# Circle PSE Declaration of Conformity

**Applicant Name:** **Crestron Electronics Inc**
**Applicant Address:** **15 Volvo Dr Rockleigh NJ 07647-2507, USA**

**Manufacture Name:** **Crestron Electronics Inc**
**Manufacture Address:** **15 Volvo Dr Rockleigh NJ 07647-2507, USA**

*Declares that the product*
**Product Name:** **Power Amplifier(Other Audio equipment)**
**Basic Model:** **AMP-225**
**Variant Model:** **AMP-150-100, AMP-150-70**

**To which this declaration relates is in conformity with the following standard(s) or other normative document(s);**
**Applicable Regulation:** **J60065(H29)**
**J55013(H22)**
**Audio, video and similar electronic apparatus. Safety requirements**

**Also, the following device were connected for operating.**

| Type | Model | Applied Standards |
|---|---|---|
| Power Amplifier (Other Audio equipment) | AMP-225 | J60065(H29) J55013(H22) |

***I, the undersigned, hereby declare that the equipment specified above conforms to the above Standard(s) as described in the attached test report.***

**Signed for and on behalf of**
**Name :**
**Title :**
**Date :**

**Signature**

型 式 の 区 分

その他の音響機器

| 要　　素 | 区　　分 |
|---|---|
| (A)　定格電圧 | (1)　125Ｖ以下のもの |
| | (2)　125Ｖを超えるもの |
| (B)　絶縁変圧器 | (1)　あるもの |
| (C)　電源スイッチ（機器本体に取り付けられ、操作することによって機器の主機能の動作が可能となるスイッチのことをいい、自動スイッチ及び自動温度調節器を除く。） | (2)　ないもの |
| (D)　受信機構 | (2)　ないもの |
| (E)　遠隔操作機構 | (2)　ないもの |
| (F)　電源電線と器体との接続の方式 | (2)　接続器利用のもの |
| (G)　二重絶縁 | (2)　施してないもの |

備考：該当する要素記号及び区分番号に〇印を付して下さい。

JET93019-1/1-(end)

**Test Report issued under the responsibility of:**

BWS Testing Laboratory
IECEE CBTL, KOLAS

# TEST REPORT
# IEC 60065
# Audio, video and similar electronic apparatus - Safety requirements

| | |
|---|---|
| **Report Number. .....:** | BWS-17-SC-033 |
| **Date of issue .....:** | 2017-10-24 |
| **Total number of pages.....:** | 30 |
| **Name of Testing Laboratory preparing the Report.....:** | BWS TECH Inc. |
| **Applicant's name.....:** | Crestron Electronics Inc |
| **Address .....:** | 15 Volvo Dr Rockleigh NJ 07647-2507 United States |
| **Test specification:** | |
| **Standard .....:** | J60065(H29) |
| **Test procedure.....:** | N/A |
| **Non-standard test method.....:** | N/A |
| **Test Report Form No.....:** | IEC60065M |
| **Test Report Form(s) Originator.....:** | Intertek Semko AB |
| **Master TRF .....:** | Dated 2016-10 |



**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

**General disclaimer:**

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

| | |
|---|---|
| **Test item description .....:** | Power Amplifier |
| **Trade Mark .....:** | CRESTRON |
| **Manufacturer.....:** | Crestron Electronics Inc 15 Volvo Dr Rockleigh NJ 07647-2507 United States |
| **Model/Type reference .....:** | AMP-225, AMP-150-70, AMP-150-100 |
| **Ratings .....:** | 100-240 Vac, 1.0 A, 50/60 Hz |

| | | |
|---|---|---|
| **Testing procedure and testing location:** | | |
| ☒ **Testing Laboratory:** | BWS TECH Inc | |
| **Testing location/ address.....:** | 23, 480beon-gil, Gokhyeon-ro, Mohyeon-myeon, Cheoin-gu Yongin-si, Gyeonggi-do, 17031 Korea | |
| ☐ **Associated CB Laboratory:** | | |
| **Testing location/ address.....:** | N/A | |
| **Tested by (name + signature) ..... :** | Sang-Mi, Kim |  ..... |
| **Approved by (name + signature).. :** | Hyung-Jun, Choi |  ..... |
| ☐ **Testing procedure: TMP** | | |
| **Testing location/ address.....:** | N/A | |
| **Tested by (name + signature) ..... :** | N/A | ..... |
| **Approved by (name + signature).. :** | N/A | ..... |
| ☐ **Testing procedure: WMT** | | |
| **Testing location/ address.....:** | N/A | |
| **Tested by (name + signature) ..... :** | N/A | ..... |
| **Witnessed by (name + signature). :** | N/A | ..... |
| **Approved by (name + signature).. :** | N/A | ..... |
| ☐ **Testing procedure: SMT** | | |
| **Testing location/ address.....:** | N/A | |
| **Tested by (name + signature) ..... :** | N/A | ..... |
| **Approved by (name + signature).. :** | N/A | ..... |
| **Supervised by (name + signature) :** | N/A | ..... |
| ☐ **Testing procedure: RMT** | | |
| **Testing location/ address.....:** | N/A | |
| **Tested by (name + signature) ..... :** | N/A | ..... |
| **Approved by (name + signature).. :** | N/A | ..... |
| **Supervised by (name + signature) :** | N/A | ..... |

**List of Attachments (including a total number of pages in each attachment):**

1. Attachment 1: Japanese National Differences, 10 pages
2. Attachment 2: Pictures of equipment, Important Safety Instruction and Explanation of Safety – Related Symbols and Letter of Assurance, 5 pages.

| **Summary of testing:** | |
|---|---|
| **Tests performed (name of test and test clause):**<br>All clauses | **Testing location:**<br>BWS TECH Inc<br>23, 480beon-gil, Gokhyeon-ro, Mohyeon-myeon, Cheoin-gu Yongin-si, Gyeonggi-do, 17031 Korea |

**Summary of compliance with National Differences**

List of countries addressed: Japanese differences,

☒ The product fulfils the requirements of J 60065(H29)

**Test item particulars:**

| | |
|---|---|
| **Classification of installation and use ..... :** | Commercial Rack-mounted, Stationary |
| **Supply Connection ..... :** | Appliance Inlet |
| **Class of equipment ..... :** | Class I apparatus |

**Possible test case verdicts:**

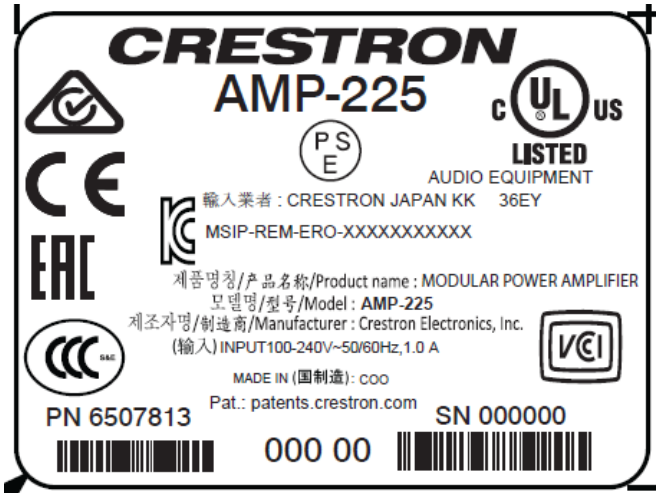
| | |
|---|---|
| **- test case does not apply to the test object ..... :** | N/A (Not Applicable) |
| **- test object does meet the requirement ..... :** | P (Pass) |
| **- test object does not meet the requirement ..... :** | F (Fail) |

**Testing:**

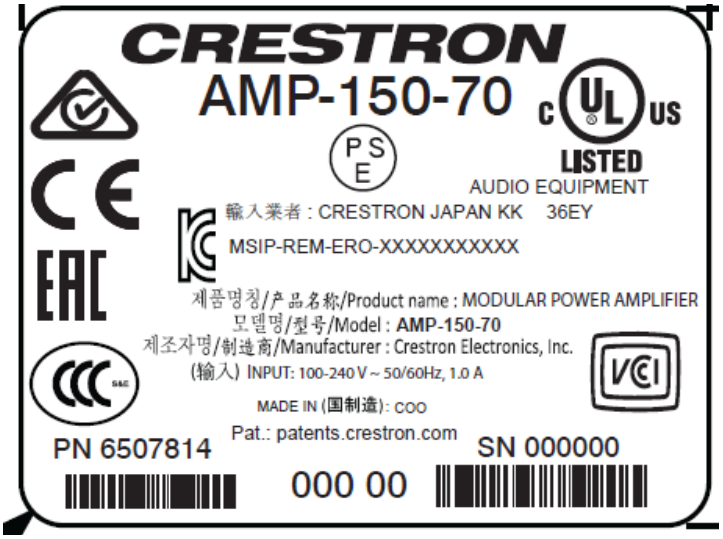
| | |
|---|---|
| **Date of receipt of test item ..... :** | 2017-10-16 |
| **Date (s) of performance of tests ..... :** | 2017-10-17-2017-10-18<br>(This report has been conversion to IEC 60065:2014 base on test report No. E302724-D94-CB) |

**Copy of marking plate**

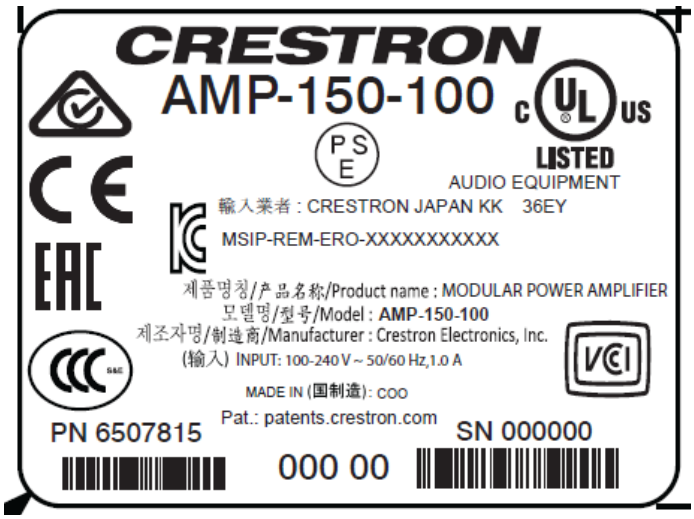
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.




**(Model, AMP-225)**




**(Model, AMP-150-70)**




**(Model, AMP-150-100)**

**General remarks:**

**The test results presented in this report relate only to the object tested.**
**This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.**
**"(see Enclosure #)" refers to additional information appended to the report.**
**"(see appended table)" refers to a table appended to the report.**

**Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**

**Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:**

| | |
|---|---|
| **The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided .....:** | ☒ **Yes**<br>☐ **Not applicable** |

**When differences exist; they shall be identified in the General product information section.**

**Name and address of factory (ies) .....:**

1.CRESTRON ELECTRONICS INC
6 VOLVO DR ROCKLEIGH NJ 07647
UNITED STATES

2. BENCHMARK ELECTRONICS DEMEXICO S DE RL DE C V

PARQUE INDUSTRIAL GUADALAJARA CIRCUITO DE LAS PRODUCTIVIDAD 132 LASPINTAS 45690 EL SALTO JAL MEXICO

3. SMTC MEX HOLDING INC

BLDG 20 WASHINGTON 3701 31200 CHIHUAHUA CHIH MEXICO JABIL CIRCUIT DE MEXICO S DE R L DE C V AVE VALDEPENAS 1993 LOMAS DE ZAPOPAN 45130 ZAPOPAN JAL MEXICO

4. M C TEST SERVICE INC, DBA MC ASSEMBLY 425 NORTH DR MELBOURNE FL 32934 UNITED STATES

5. EPI DE MEXICO S DE R L DE C V BLVD
INDEPENDENCIA 1450 ESQ PUERTO DE PALOS COL PATRIA II 32703 JUAREZ CHIH MEXICO

**General product information:**

Report Summary

All applicable tests according to the referenced standard(s) have been carried out.

**Product Description**

The products described in this report are modular power amplifiers. They are powered by a Recognized, internal power supply.

**Model Differences**

AMP-225 – Dual channel amplifier rated 25 watts per channel, 4/8Ω outputs. AMP-150-70 – Single channel amplifier rated 50 W, 70 Volt output. AMP-150-100 – Single channel amplifier rated 50 W, 100 Volt output.

**Additional Information**

N/A

**Technical Considerations**

Equipment class: Class I

| 3 | GENERAL REQUIREMENTS | | |
|---|---|---|---|
| | Safety class of the apparatus .....: | Class I | P |

| 4 | GENERAL TEST CONDITIONS | | |
|---|---|---|---|
| 4.1.4 | Ventilation instructions require the use of the test box | Yes | P |

| 5 | MARKING AND INSTRUCTIONS | | P |
|---|---|---|---|
| 5.1 | Comprehensible and easily discernible | | P |
| | Permanent durability against water and petroleum spirit | The marking withstands required tests. | P |
| 5.2 | a) Identification, maker .....: | refer to page 1 | P |
| | b) Model number or type reference.....: | Copy of marking plate | P |
| | c) Class II symbol if applicable .....: | | N/A |
| | d) Nature of supply.....: | The apparatus is marked with the symbol "~" (IEC 60417-5032). | N/A |
| | e) Rated supply voltage .....: | Please refer to ratings information at the beginning of this report | P |
| | f) Mains frequency if safety dependant .....: | Please refer to ratings information at the beginning of this report | N/A |
| | g) Rated current or power consumption for apparatus supplied by supply apparatus for general use .....: | 1.0 A | P |
| | Measured current or power consumption .....: | (see appended table) | P |
| | Deviation % (max 10%) .....: | (see appended table) | P |
| | h) Rated current or power consumption for apparat-us intended for connection to an a.c. mains supply.: | Please refer to ratings information at the beginning of this report. | P |
| | Measured current or power consumption .....: | AMP-225 – 0.285 A<br>AMP-150-70 – 0.18 A<br>AMP-150-100 – 0.18 A | P |
| | Measured current or power consumption for Television set .....: | | N/A |
| | Deviation % (max 10%) .....: | Did not exceed by more than 10% | P |
| | Symbols explained in the user manual | | P |
| 5.3 | a) Earth terminal | Protective earthing terminal is the earthing pin of the appliance inlet. | P |
| | b) Hazardous live terminals | IEC 60417-5036 (2002-10) symbol is used. | P |
| | c) Markings on supply output terminals | | N/A |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 5.4 | Caution marking | | P |
| | a) Use of triangle with exclamation mark | Described in the user's manual | P |
| | b) Marking on loudspeaker grille, IEC 60417-5036 | | N/A |
| | c) User-replaceable coin / button cell battery marking | No coin/button cell battery | N/A |
| 5.5 | Instructions | | P |
| 5.5.1 | Safety relevant information | | P |
| 5.5.2 | a) Mains powered equipment not exposed to dripping or splashing. Warning concerning objects filled with liquid, etc. | Important Safety Instructions are provided. | P |
| | b) Hazardous live terminals, instructions for wiring | | P |
| | c) Instructions for replacing lithium battery | No lithium battery. | N/A |
| | d) Class I earth connection warning | | P |
| | e) Instructions for multimedia system connection | | P |
| | f) Special stability warning for attachment of the apparatus to the floor/wall | No fixed installation. | N/A |
| | g) Warning: battery exposure to heat | No batteries. | N/A |
| | h) Warning: protective film on CRT face | No CRT. | N/A |
| | i) Warning: Non-floor standing TV >7kg | < 7 kg | N/A |
| | j) Warning: User replaceable coin / button cell battery | No coin/button cell battery | N/A |
| 5.5.3 | a-b) Disconnect device: plug/coupler or all-pole mains switch location, accessibility and markings | | P |
| | c) Instructions for permanently connected equipment | No permanently connected equipment. | N/A |
| | Marking, signal lamps or similar for completely disconnection from the mains | | N/A |

| **6** | **HAZARDOUS RADIATION** | | **N/A** |
|---|---|---|---|
| 6.1 | Ionizing radiation < 36 pA/kg (0,5 mR/h) | No ionizing radiation. | N/A |
| | Ionizing radiation under fault condition | | N/A |
| 6.2 | Laser radiation, emission limits to IEC 60825-1:2007 .....: | No laser radiation | N/A |
| | Emission limits under fault conditions .....: | | N/A |
| 6.3 | Light emitting diodes (LEDs) according to IEC 62471 | | N/A |

| **7.1** | **HEATING UNDER NORMAL OPERATING CONDITIONS** | | **P** |
|---|---|---|---|
| 7.1.1 | Temperature rises not exceeding specified values; fuse links and other protective devices defeated | (see appended table) | P |
| 7.1.2 | Temperature rise of accessible parts | (see appended table) | P |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7.1.3 | Temperature rise of parts providing electrical insulation | (see appended table) | P |
| 7.1.4 | Temperature rise of parts acting as a support or as a mechanical barrier | | N/A |
| 7.1.5 | Temperature rise of windings | (see appended table) | P |
| 7.1.6 | Parts not subject to a limit under 7.1.1 to 7.1.4 | (see appended table) | P |
| 7.2 | Softening temperature of insulating material supporting parts conductively connected to the mains carrying a current > 0,2 A at least 150 °C | | N/A |
| **8** | **CONSTRUCTIONAL REQUIREMENTS WITH REGARD TO THE PROTECTION AGAINST ELECTRIC SHOCK** | | **P** |
| 8.1 | Conductive parts covered by lacquer, paper, untreated textile oxide films and beads etc. considered to be bare | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| 8.2 | No shock hazard when changing voltage setting device, fuse-links or handling drawers etc. | No such device. | N/A |
| 8.3 | Insulation of hazardous live parts not provided by hygroscopic material | Does not contain any hygroscopic materials. | N/A |
| 8.4 | No risk of electric shock from accessible parts or from parts rendered accessible following the removal of a cover which can be removed by hand | | N/A |
| 8.5 | Class I equipment | | P |
| | Basic insulation between hazardous live parts and earthed accessible parts | | P |
| | Resistors bridging basic insulation complying with 14.2 a) | | N/A |
| | Capacitors bridging basic insulation complying with 14.3.2 a) | | N/A |
| | Protective earthing terminal | | P |
| 8.6 | Class II apparatus | | N/A |
| | a) Basic and supplementary insulation between hazardous live parts and accessible parts | | N/A |
| | b) Reinforced insulation between hazardous live parts and accessible parts | | N/A |
| 8.7 | Components bridging insulation | | N/A |
| | Basic insulation bridged by components complying with 14.4.5.3 | Evaluated as part of power supply investigation. | N/A |
| | Components bridging basic, supplementary, double or reinforced insulation complying with 14.2 a) or 14.4 | | N/A |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Basic and supplementary insulation each being bridged by a capacitor or RC-unit complying with 14.3.2 a) | | N/A |
| | Double or reinforced insulation being bridged with 2 capacitors or RC-units in series complying with 14.3.2 a) | | N/A |
| | Double or reinforced insulation being bridged with a single capacitor or RC-unit complying with 14.3.2 b) | | N/A |
| 8.8 | Insulation thickness and thin sheet materials | | N/A |
| | Basic or supplementary insulation > 0,4 mm (mm) : | Evaluated as part of Certified power supply. | N/A |
| | Reinforced insulation > 0,4 mm (mm) .....: | Evaluated as part of Certified power supply. | N/A |
| | Thin sheet material used inside the equipment | | N/A |
| | Basic or supplementary insulation, at least two layers, each meeting 10.4 | Evaluated as part of Certified power supply. | N/A |
| | Basic or supplementary insulation, three layers any two of which meet 10.4 | | N/A |
| | Reinforced insulation, two layers each of which meet 10.4 | Evaluated as part of Certified power supply. | N/A |
| | Reinforced insulation, three layers any two which meet 10.4 | | N/A |
| 8.9 | Adequate insulation between internal hazardous live conductors and accessible parts, or between internal hazardous live parts and conductors connected to accessible parts | | N/A |
| 8.10 | Double insulation between accessible parts and conductors connected to the mains | | N/A |
| | Double insulation between conductors connected to accessible parts and parts connected to the mains | | N/A |
| 8.11 | Detaching of wires | | P |
| | No undue reduction of creepages or clearance distances if wires become detached | | P |
| | Vibration test carried out .....: | Yes | P |
| 8.12 | Adequate fastening of windows, lenses, lamp covers etc. (pull test 20 N for 10 s) | | N/A |
| 8.13 | Adequate fastening of covers (push/pull test 50 N for 10 s) | | N/A |
| 8.14 | No risk of damage to the insulation of internal wiring due to hot parts or sharp edges | | P |
| 8.15 | Only special supply equipment can be used | | N/A |
| 8.16 | Insulated winding wire without additional interleaved insulation | | N/A |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 8.17 | Endurance test as required by 8.16 | | N/A |
| 8.18 | Disconnection from the mains | | P |
| | Disconnect device | Appliance Coupler | P |
| | All-pole switch or circuit breaker with >3mm contact separation | | N/A |
| | Mains switch ON indication | | N/A |
| 8.19 | Switch not fitted in the mains cord | | P |
| 8.20 | Bridging components comply with clause 14 | | N/A |
| 8.21 | Non-separable thin sheet material | No non-separable thin sheet. | N/A |
| **9** | **ELECTRIC SHOCK HAZARD UNDER NORMAL OPERATING CONDITION** | | **P** |
| 9.1 | Testing on the outside | | P |
| 9.1.1 | General | | P |
| 9.1.1.1 | Requirements | | P |
| | Accessible parts shall not be hazardous live | Complied | P |
| | Inaccessible terminals are not accessible or comply with relevant requirements | | P |
| | For voltages >1000 V ac or >1500 V dc complies with clause 13.3.1 for basic insulation.....: | | P |
| 9.1.1.2 | Determination of hazardous live parts | | P |
| | a) Open circuit voltages | | P |
| | b) Touch current measured from terminal devices using the network in annex D .....: | 1 mA max. | P |
| | c) Discharge not exceeding 45 µC | | N/A |
| | d) Energy of discharge not exceeding 350 mJ | | N/A |
| 9.1.1.3 | Test with test finger and test probe | | P |
| 9.1.2 | No hazardous live shafts of knobs, handles or levers | | N/A |
| 9.1.3 | Ventilation holes and other holes tested by means of 4 mm x 100 mm test pin | | N/A |
| 9.1.4 | Terminal devices tested with 1 mm x 20 mm test pin (10 N); test probe D of IEC 61032 | | N/A |
| | Terminal devices tested with 1 mm x 100 mm straight wire (1 N); test probe D of IEC 61032 | | N/A |
| 9.1.5 | Pre-set controls tested with 2.5 mm x 100 mm test pin (10 N); test probe C of IEC 61032 | | N/A |
| 9.1.6 | Withdrawal of the mains plug | | P |
| | No shock hazard due to stored charge after 2 s ....: | The voltage across mains plug pins 1.4 Vac. | N/A |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Bleeder resistor(s) comply with 14.2 or no shock hazard when open circuited | | N/A |
| | If C is not greater than 0,1 µF no test needed | | N/A |
| 9.1.7 | Resistance to external forces | | P |
| | a) Test probe 11 of IEC 61032 for 10 s (50 N) | | P |
| | b) Test hook of fig. 4 for 10 s (20 N) | | N/A |
| | c) 30 mm diameter test tool for 5 s (100 or 250 N) | | P |
| 9.2 | No hazard after removing a cover by hand | | N/A |
| **10** | **INSULATION REQUIREMENTS** | | **N/A** |
| 10.2 | Insulation resistance (MΩ) at least 2 MΩ min. after surge test for basic and 4 MΩ min. for reinforced insulation .....: | | N/A |
| 10.3 | Humidity treatment 48 h or 120 h .....: | Evaluated as part of Certified power supply | N/A |
| 10.4 | Insulation resistance and dielectric strength | | P |
| | Between parts of different polarity directly connected to the mains | Evaluated as part of Certified power supply | P |
| | Between parts separated by BASIC or SUPPLEMENTARY insulation | See table 10.4. Additionally evaluated as part of Certified power supply. | P |
| | Between parts separated by REINFORCED insulation | Evaluated as part of Certified power supply | P |
| **11** | **FAULT CONDITIONS** | | **P** |
| 11.1 | No shock hazard under fault condition | | P |
| 11.2 | Heating | | P |
| 11.2.1 | Requirements | | P |
| | No danger of fire to the surroundings | | P |
| | Safety not impaired by abnormal heat | | P |
| | Flames extinguish within 10 seconds | | P |
| | No hazard from softening solder | | P |
| | Soldered terminations not used as protective mechanism | | N/A |
| 11.2.2 | Measurement of temperature rises | (see appended table) | P |
| 11.2.3 | Temperature rise of accessible parts | (see appended table) | P |
| 11.2.4 | Temperature rise of parts, other than windings and printed boards, providing electrical insulation | (see appended table) | N/A |
| 11.2.5 | Temperature rise of parts acting as a support or mechanical barrier | | N/A |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 11.2.6 | Temperature rise of windings | (see appended table) | P |
| 11.2.7 | Printed boards | | P |
| | Temperature rise does not exceed the limits of table 3 or exceed the limits of table 3 by max. 100 K for max. 5 min | (see appended table) | P |
| | a) Temperature rise of V-0 or VTM-0 printed circuit boards exceeding the limits of table 3 by not more than 100 K for an area not greater than 2 $cm^2$ | | N/A |
| | b) Temperature rise of V-0 or VTM-0 printed circuit boards exceeding the limits of table 3 up to 300 K for an area not greater than 2 $cm^2$ for a maximum of 5 min | | N/A |
| | Meets all the special conditions if conductors on printed circuit boards are interrupted | | N/A |
| | Class I protective earthing maintained | | P |
| 11.2.8 | Temperature rise of parts not subject to the limits of 11.2.2 to 11.2.7 shall not exceed the limits in table 3, item e), "Fault conditions". | | N/A |

| **12** | **MECHNICAL STRENGTH** | | **P** |
|---|---|---|---|
| 12.1 | Complete apparatus | | P |
| 12.1.1 | The apparatus have adequate mechanical strength | | P |
| 12.1.2 | Bump test where mass >7 kg | Not greater than 7 kg | N/A |
| 12.1.3 | Vibration test | | P |
| 12.1.4 | Impact hammer test | No damage after 0.5 J impact hammer test. | P |
| | Steel ball test | No hazard as result from the steel ball test at 3.5 J | P |
| 12.1.4 | Drop test for portable apparatus where mass ≤ 7 kg | | N/A |
| 12.1.5 | Thermoplastic enclosures stress relief test | | N/A |
| 12.2 | Fixing of knobs, push buttons, keys and levers | | N/A |
| 12.3 | Remote controls with hazardous live parts | | N/A |
| 12.4 | Drawers (pull test 50 N, 10 s) | | N/A |
| 12.5 | Antenna coaxial sockets providing isolation | | N/A |
| 12.6 | Telescoping or rod antennas | | N/A |
| 12.6.1 | 6,0mm diameter end | | N/A |
| | Prevented from falling into the apparatus | | N/A |
| 12.6.2 | Physical securement, removal prevented | | N/A |
| 12.7 | Apparatus containing coin / button cell batteries | | N/A |
| 12.7.2 | Reduced possibility for children to remove battery | | N/A |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 12.7.3 | Tests | | N/A |
| 12.7.3.2 | Stress relief test | | N/A |
| 12.7.3.3 | Battery replacement test | | N/A |
| 12.7.3.4 | Drop test | | N/A |
| 12.7.3.5 | Impact test | | N/A |
| 12.7.4 | Battery not accessible; or not removable | | N/A |
| **13** | **CLEARANCES AND CREEPAGE DISTANCES** | | **P** |
| 13.1 | Clearances in accordance with 13.3 | | P |
| | Creepage distances in accordance with 13.4 | | P |
| 13.2 | Determination of working voltage | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| 13.3 | Clearances | | P |
| 13.3.1 | Comply with 13.3 or Annex J | | P |
| 13.3.2 | Circuits conductively connected to the mains comply with table 8 and, where applicable, table 9.....: | See appended table 13. | P |
| 13.3.3 | Circuits not conductively connected to the mains comply with table 10 | Additionally evaluated as part of Certified power supply and audio amplifier. | P |
| 13.3.4 | Measurement of transient voltages | | N/A |
| 13.4 | Creepage distances not less than appropriate table 11 minimum values | | P |
| 13.5 | Printed boards | | P |
| 13.5.1 | Clearances and creepage distances between conductors on printed circuit boards, one of which may be conductively connected to the mains, as in fig. 10 | | P |
| 13.5.2 | Type B coated printed circuit boards complying with IEC 60664-3 (basic insulation only) | | N/A |
| 13.6 | Conductive parts along uncemented joints clearances and creepage distances comply with 13.3 and 13.4 | | N/A |
| | Conductive parts along reliably cemented joints comply with 8.8 | | N/A |
| | Temperature cycle test and dielectric strength test | | N/A |
| | 500V test for transformers, magnetic coupler and similar devices, if insulation is relied upon for safety | | N/A |
| 13.7 | Enclosed, enveloped or hermetically sealed parts not conductively connected to the mains, clearances and creepage distances as in table 12 | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 13.8 | Parts filled with insulating compound, meeting the requirements of 8.8 | | N/A |

| **14** | **COMPONENTS** | | **N/A** |
|---|---|---|---|
| 14.1 | Flammability according to IEC 60695-11-10 or annex G, or 20.2.5 | | N/A |
| 14.2 | Resistors | | N/A |
| | Resistors separately approved .....: | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| | a) Resistors between hazardous live parts and accessible metal parts | | N/A |
| | b) Resistors, other than between hazardous live parts and accessible parts | | N/A |
| 14.3 | Capacitors and RC units | | N/A |
| | Capacitors separately approved : | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| 14.3.1 | Damp heat test duration 21 days | | N/A |
| 14.3.2 | Y capacitors tested to IEC 60384-14:2005 .....: | | N/A |
| 14.3.3 | X capacitors tested to IEC 60384-14:2005 .....: | | N/A |
| 14.3.4 | Capacitors operating at mains frequency but not connected to the mains: tests for X2 .....: | | N/A |
| 14.3.6 | Capacitors with volume exceeding 1750 $mm^3$, where short-circuit current exceeds 0,2 A: compliance with IEC 60384-1, 4.38 category B or better .....: | | N/A |
| | Capacitors with volume exceeding 1750 $mm^3$, mounted closer to a potential ignition source than table 13 permits: compliance with IEC 60384-1, 4.38 category B or better .....: | | N/A |
| 14.4 | Inductors and windings | | N/A |
| 14.4.1 | Comply with IEC 61558-1, IEC 61558-2 (as relevant) and clause 20.2.5 | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| | Transformers and inductors separately approved .: | | N/A |
| 14.4.2 | Transformers and inductors marked with manufacturer's name and type .....: | | N/A |
| 14.4.3 | General | | N/A |
| | Insulation material complies with clause 20.2.5 | | N/A |
| 14.4.4 | Constructional requirements | | N/A |
| 14.4.4.1 | Clearances and creepage distances comply with clause 13 | Evaluated as part of Certified power supply and audio amplifier. | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 14.4.4.2 | Transformers meet the constructional requirements | | N/A |
| 14.4.5 | Separation between windings | | N/A |
| 14.4.5.1 | Class II transformers have adequate separation between hazardous live parts and accessible parts (double or reinforced insulation).....: | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| | Coil formers and partition walls > 0,4 mm | | N/A |
| 14.4.5.2 | Class I transformers, with basic insulation and protective screening only if all 7 conditions are met | | N/A |
| 14.4.5.3 | Separating transformers with at least basic insulation | | N/A |
| 14.4.6 | Insulation between hazardous live parts and accessible parts | | N/A |
| 14.4.6.1 | Class II transformers have adequate insulation between hazardous live parts and accessible parts (double or reinforced insulation) | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| | Coil formers and partition walls > 0,4 mm | | N/A |
| 14.4.6.2 | Class I transformers have adequate insulation between hazardous live parts and accessible conductive parts or those conductive parts or protective screens connected to a protective earth terminal | | N/A |
| | Winding wires connected to protective earth have adequate current-carrying capacity | | N/A |
| 14.5 | High voltage components and assemblies (U > 4kV peak) | | N/A |
| 14.5.1 | Component meets category V-1 of IEC 60695-11-10 | | N/A |
| 14.5.2 | High voltage transformers and multipliers | | N/A |
| 14.5.3 | High voltage assemblies and other parts | | N/A |
| 14.6 | Protective devices | | N/A |
| 14.6.1 | Protective devices used within their ratings | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| | External clearances and creepage distances meet requirement of clause 13 for the voltage across the device when opened | | N/A |
| 14.6.2 | Thermal releases | | N/A |
| 14.6.2.1 | Comply with 14.6.2.2, 14.6.2.3 or 14.6.2.4 | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| 14.6.2.2 | a) Thermal cut-outs separately approved | | N/A |
| | b) Thermal cut-outs tested as part of the submission | | N/A |
| 14.6.2.3 | a) Thermal links separately approved | | N/A |
| | b) Thermal links tested as part of the submission | | N/A |
| 14.6.2.4 | Thermal devices re-settable by soldering | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 14.6.3 | Fuses and fuse holders | | N/A |
| 14.6.3.1 | Fuse-links in the mains circuit according to IEC 60127 | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| 14.6.3.2 | Correct marking of fuse-links adjacent to holder ...: | | N/A |
| 14.6.3.3 | Not possible to connect fuses in parallel | | N/A |
| 14.6.3.4 | Not possible to touch hazardous live parts when replacing fuse-links without the use of a tool .....: | | N/A |
| 14.6.4 | PTC thermistors comply with IEC 60730-1:2010 | | N/A |
| | PTC devices (>15 W) category V-1 or better | | N/A |
| 14.6.5 | Circuit protectors have adequate breaking capacity and their position is correctly marked | | N/A |
| 14.7 | Switches | | N/A |
| 14.7.1 a) | Separate testing to IEC 61058-1 including:<br>- 10 000 operations<br>- Normal pollution suitability<br>- For CRT TV's, make and break speed independent of speed of actuation<br>- V-0 or compliance with G.1.1 | | N/A |
| 14.7.1 b) | Tested in the apparatus | | N/A |
| | Switch controlling > 0.2A with open contact voltage > 35 V (peak) / 24 V dc complying with 14.6.3, 14.6.4 and V-0 or G.1.1 | | N/A |
| | Switch controlling > 0.2A with open contact voltage < 35 V (peak) / 24 V dc complying with 14.6.3 and V-0 or G.1.1 | | N/A |
| | Switch controlling ≤ 0.2A with open contact voltage > 35 V (peak)/24 V dc complying with 14.6.4 and V-0 or G.1.1 | | N/A |
| 14.7.2 | Switch tested to 14.7.1 b) checked according to IEC 61058-1 clause 13.1 and 10 000 operation test | | N/A |
| 14.7.3 | Switch tested to 14.6.1 b) compliant with IEC 61058-1 subclause 16.2.2 d) and m) not attaining excessive temperatures in use | | N/A |
| 14.7.4 | Switch tested to 14.6.1 b) has adequate dielectric strength | | N/A |
| 14.7.5 | Mains switch controlling mains socket outlets additional tests to IEC 61058-1 | | N/A |
| 14.8 | Safety interlocks according to 2.8 of IEC 60950-1 | | N/A |
| 14.9 | Voltage setting device and the like are not likely to be changed accidentally | | N/A |
| 14.10 | Motors | | N/A |
| 14.10.1 | a) Endurance test on motors | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | b) Motor start test | | N/A |
| | Dielectric strength test | | N/A |
| 14.10.2 | Not adversely affected by oil or grease etc. | | N/A |
| 14.10.3 | Protection against moving parts | | N/A |
| 14.10.4 | Motors with phase-shifting capacitors, three-phase motors and series motors meet clause. B.8, B.9 and B.10 of IEC 60950-1, Annex B | | N/A |
| 14.11 | Batteries | | N/A |
| 14.11.1 | Comply with IEC 62133 if applicable | | N/A |
| | Batteries mounted with no risk of accumulation of flammable gases | | N/A |
| 14.11.2 | No possibility of recharging user replaceable non-rechargeable batteries | | N/A |
| 14.11.3 | Recharging currents and times within manufacturers limits | | N/A |
| | Lithium batteries discharge and reverse currents within the manufacturers limits | | N/A |
| 14.11.4 | Battery mould stress relief | | N/A |
| 14.11.5 | Battery drop test | | N/A |
| 14.12 | Optocouplers | | N/A |
| | Comply with constructional requirements of clause 8 | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| | External clearances and creepage comply with 13.1 | | N/A |
| | Compound completely filling the casing or internal clearances and creepage comply with 13.1.....: | | N/A |
| | a) Complies with 13.6 (jointed insulation) and N.3.2 | | N/A |
| | b) Complies with IEC 60747-5-5:2007 | | N/A |
| | c) Complies with 13.8 | | N/A |
| 14.13 | Surge suppression varistors | | N/A |
| | Comply with IEC 61051-2 | Evaluated as part of Certified power supply and audio amplifier. | N/A |
| | Not connected between mains and accessible parts except for earthed parts of permanently connected apparatus | | N/A |
| | GDT bridging basic insulation complies with electric strength and distance requirements | | N/A |
| | Complies with the climatic, voltage, current pulse, fire hazard and thermal stress requirements of 14.13 | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **15** | **TERMINALS** | | **P** |
| 15.1 | Plugs and sockets | | P |
| 15.1.1 | Mains plug, appliance inlet, interconnection couplers and mains socket-outlet meet the appropriate standard | | P |
| | Overloading of plugs or appliance inlets prevented if the apparatus has mains socket outlets | | N/A |
| | Overloading of internal wiring prevented if the apparatus has mains socket outlets | | N/A |
| 15.1.2 | Design of connectors other than for mains power | | P |
| | Design of sockets with symbol of 5.3 b) design | No socket-outlet. | P |
| 15.1.3 | Design of terminals and connectors used in output circuits of supply apparatus | | N/A |
| 15.2 | Provision for protective earthing | | P |
| | Accessible conductive parts of Class I equipment reliably connected to earth terminal, within equipment | | P |
| | Protective earth conductors correctly fixed and coloured | | P |
| | Separate protective earth terminal near mains terminal and comply with 15.3 | | N/A |
| | Protective earth terminal resistant to corrosion | | P |
| | Earth resistance test: < 0,1 Ω at 25 A .....: | 0.0085 ohms at 40 A. | P |
| 15.3 | Terminals for external flexible cords and for permanent connection to the mains supply | | N/A |
| 15.3.1 | Adequate terminals for connection of permanent wiring | | N/A |
| 15.3.2 | Reliable connection of non-detachable cords | | N/A |
| | Not soldered to conductors of a printed circuit board | | N/A |
| | Adequate clearances and creepage distances between connections should a wire break away | | N/A |
| | Wire secured by additional means to the conductor | | N/A |
| 15.3.3 | Screws and nuts clamping conductors have adequate threads: ISO 261, ISO 262 or similar | | N/A |
| 15.3.4 | Conductors adequately fixed (two independent fixings) | | N/A |
| 15.3.5 | Terminals allow connection of conductors having appropriate cross-sectional area | | N/A |
| 15.3.6 | Terminals to 15.3.3 have sizes required by table 16 | | N/A |
| 15.3.7 | Terminals clamp conductors between metal and have adequate pressure | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Terminals designed to avoid conductor slipping out when tightened | | N/A |
| | Terminals adequately fixed when tightened or loosened (no loosening, wiring not stressed, distances not reduced) | | N/A |
| 15.3.8 | Terminals carrying a current more than 0,2 A: contact pressure not transmitted by insulating material except ceramic | | N/A |
| 15.3.9 | Termination of non-detachable cords: wires terminated near to each other | | N/A |
| | Terminals located and shielded: test with 8 mm strand | | N/A |
| 15.4 | Devices forming a part of the mains plug | | N/A |
| 15.4.1 | No undue strain on mains socket-outlets | | N/A |
| 15.4.2 | Device complies with standard for dimensions of mains plugs | | N/A |
| 15.4.3 | Device has adequate mechanical strength (tests a,b,c) | | N/A |
| **16** | **EXTERNAL FLEXIBLE CORDS** | | **P** |
| 16.1 | Mains cords sheathed type, complying with IEC 60227 for PVC or IEC 60245 for synthetic rubber cords .....: | Provided mains cords are separately certified; PVC | P |
| | Non-detachable cords for Class I have green/yellow core for protective earth | | N/A |
| 16.2 | Mains cords conductors have adequate cross-sectional area for rated current consumption of the equipment | | N/A |
| 16.3 | Flexible cords not complying with 16.1, used for interconnections between separate units of equipment used in combination and carrying hazardous live voltages comply with a) and b) | | N/A |
| 16.4 | Flexible cords used for connection between equipment have adequate cross-sectional areas to avoid temperature rise under normal and fault conditions | | N/A |
| 16.5 | Adequate strain relief on external flexible cords | | N/A |
| | Not possible to push cord back into equipment | | N/A |
| | Strain relief device unlikely to damage flexible cord | | N/A |
| | For mains cords of Class I equipment, hazardous live conductors become taut before earth conductor | | N/A |
| 16.6 | Apertures for external flexible cord: no risk of damage to the cord during assembly or movement in use | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 16.7 | Transportable apparatus have appliance inlet according to IEC 60320-1 or means of stowage to protect the cord | | N/A |
| **17** | **ELECTRICAL CONNECTIONS AND MECHANICAL FIXINGS** | | **P** |
| 17.1 | Table 20 torque test metal thread, 5 times .....: | | P |
| | Table 20 torque test non-metallic thread, 10 times ..: | | N/A |
| 17.2 | Correct introduction into female threads in non-metallic material | | N/A |
| 17.3 | Cover fixing screws captive or no hazard when replaced by a screw whose length is 10 times its diameter | | N/A |
| 17.4 | No loosening of conductive parts carrying a current > 0,2 A | | N/A |
| 17.5 | Contact pressure not transmitted through plastic other than ceramic for connections carrying a current > 0,2 A | | N/A |
| 17.6 | Stranded conductors of flexible supply cords carrying a current > 0,2 A with screw terminals not consolidated by solder | | N/A |
| 17.7 | Cover fixing devices have adequate strength and their positioning is unambiguous | | N/A |
| 17.8 | Fixing devices for detachable legs or stands provided | | N/A |
| 17.9 | Internal pluggable connections, affecting safety, unlikely to become disconnected | | P |
| **18** | **MECHANICAL STRENGTH OF PICTURE TUBES AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION** | | **N/A** |
| 18.1 | Comply with IEC 61965 or 18.2 | | N/A |
| 18.2 | Non-intrinsically protected tubes 2 | | N/A |
| **19** | **STABILITY AND MECHANICAL HAZARDS** | | **P** |
| 19.1 | Apparatus > 7kg have adequate stability or is required to be fastened in place and provided with the warning of 5.5.2 f) .....: | | N/A |
| 19.2 | Test at 10º to the horizontal | | N/A |
| 19.3 | Vertical force test 100 N applied downwards | | N/A |
| 19.4 | Horizontal force test, 100 N or 13% of weight, applied horizontally to point of least stability | | N/A |
| 19.5 | Edges or corners not hazardous | There are no hazardous edges or corners when the apparatus is operating in normal position. | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 19.6 | Mechanical strength of glass | | N/A |
| 19.6.1 | Glass surfaces (exc.laminated) with an area exceeding 0,1 m² or major dimension > 450 mm, pass the test of 12.1.4 | | N/A |
| 19.6.2 | Fragmentation test | | N/A |
| 19.7 | Wall or ceiling mounting means | | N/A |
| 19.7.1 - 19.7.3 | Not dislodged and remain mechanically intact after test according to 19.7.2 Test 1, Test 2 or Test 3 .....: | | N/A |
| **20** | **RESISTANCE TO FIRE** | | **P** |
| 20.1 | Start and spread of fire is prevented | | P |
| **20.2** | **Electrical components and mechanical parts** | | P |
| 20.2.1 | a) Exemption for components contained in an enclosure of material V-0 to IEC 60695-11-10 with openings not exceeding 1 mm in width | | N/A |
| | b) Exemption for small components | | N/A |
| 20.2.2 | Electrical components meet the requirements of Clause 14 or 20.2.5 | | N/A |
| 20.2.3 | Insulation of internal wiring working at voltages > 4 kV or leaving an internal fire enclosure, or located within the areas mentioned in Table 21, comply with G.2 | | N/A |
| 20.2.4 | Material of printed circuit boards on which the available power exceeds 15 W at a voltage between 50 V and 400 V (peak) a.c. or d.c. meets V-1 or better to IEC 60695-11-10, unless used in a fire enclosure | | N/A |
| | Material of printed circuit boards on which the available power exceeds 15 W at a voltage >400 V (peak) a.c. or d.c. meets V-0 to IEC 60695-11-10. | | N/A |
| 20.2.5 | Components and parts not covered by 20.1.1, 20.1.2 and 20.1.3 (other than fire enclosures) mounted nearer to a potential ignition source than the distances in Table 21 comply with the relevant flammability category in Table 21 | (see appended table) | P |
| | Components and parts as above but shielded from a potential ignition source, with the barrier area in accordance with Table 21 and fig. 13 | | N/A |
| | Apparatus with voltages >4kV under normal operating conditions and distances to the enclosure exceed those specified Table 21, flammability classification HB40 or better is required for the enclosure | | N/A |
| 20.3 | Fire enclosure | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 20.3.1 | Potential ignition sources with open circuit voltage > 4 kV (peak) a.c. or d.c. contained in a fire enclosure to V-1 | | N/A |
| 20.3.2 | Internal fire enclosures with openings not exceeding 1 mm in width and with openings for wires completely filled | | N/A |
| 20.3.3 | Requirements of 20.2.1 and 20.2.2 met by an internal fire enclosure | | N/A |
| **ANNEX A** | **ADDITIONAL REQUIREMENTS FOR APPARATUS WITH PROTECTION AGAINST SPLASHING WATER** | | **N/A** |
| A.5 | Marking and instructions | | N/A |
| A.5.1 | A.5.2 i) Marked with at least IPX4 (IEC 60529) 5.5.2 a) does not apply | | N/A |
| A.10 | Insulation requirements | | N/A |
| A.10.3 | Splash and humidity treatment | | N/A |
| A.10.3.1 | The enclosure provide adequate protection against splashing water | | N/A |
| A.10.3.2 | Complies with 10.3,duration of the test is 168h | | N/A |
| **ANNEX B** | **APPARATUS TO BE CONNECTED TO TELECOMUNICATION THE TELECOMMUNICATION NETWORKS** | | **N/A** |
| | Complies with IEC 62151 clause 1 | No TNV circuits. | N/A |
| | Complies with IEC 62151 clause 2 | | N/A |
| | Complies with IEC 62151 clause 3 modified | | N/A |
| | Complies with IEC 62151 clause 4 modified | | N/A |
| | Complies with IEC 62151 cause 5 modified | | N/A |
| | Complies with IEC 62151 clause 6 | | N/A |
| | Complies with IEC 62151 clause 7 | | N/A |
| | Complies with IEC 62151 annex A, B and C | | N/A |
| **ANNEX L** | **ADDITIONAL REQUIREMENTS FOR ELECTRONIC FLASH APPARATUS FOR PHOTOGRAPHIC PURPOSES** | | **N/A** |
| L. 5 | Marking and instructions | | N/A |
| L.5.5.1 | Instructions for battery chargers and Supply apparatus indicating type or model number of flash apparatus with which it is to be used | | N/A |
| | Instructions for flash apparatus indicating type or model number of battery chargers or Supply apparatus with which it is to be used | | N/A |
| L. 7 | Heating under normal operating conditions | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| L.7.1.6 | Lithium batteries meet permissible temp rise in Table 3 | | N/A |
| L.9 | Electric shock hazard under normal operating conditions | | N/A |
| L. 9.1.1.1 | Terminals for connection to synchroniser not hazardous live | | N/A |
| L.14 | Components | | N/A |
| L.14.6.7 | Mains switch characteristics appropriate to its function under normal conditions | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | |
|---|---|---|---|
| **7.1** | **TABLE: temperature rise measurements:** | | **P** |
| | **Ambient (°C) .....:** | 22.7 | — |
| | **Loudspeaker impedance (Ω).....:** | 4Ω | |

| Cond. | $U_n$ (V) | Hz | $I_n$ (A) | $P_n$ (W) | $U_{out}$ (V) | $P_{out}$ (W) | Operating Condition / Status |
|---|---|---|---|---|---|---|---|
| a | 90 | 60 | 0.315A | 26.2 W | 5.05 V | 6.4 W | Audio input supplied with a 1 kHz signal, speaker output loaded 4 ohms, operating at 1/8 max undistorted power. |
| b | 264 | 60 | 0.193A | 28.0 W | 5.0 V | 6.3 W | Audio input supplied with a 1 kHz signal, speaker output loaded 4 ohms, operating at 1/8 max undistorted power. |

| | | | |
|---|---|---|---|
| | Loudspeaker impedance (Ω) .....: | | — |
| | Several loudspeaker systems .....: | | N/A |
| | Marking of loudspeaker terminals .....: | | N/A |

| **Temperature Rise dT of Part** | **No. a** | **No. b** | **No. c** | Limit max dT (K) |
|---|---|---|---|---|
| Test Condition No. | | | | |
| Enclosure Hot Spot | 16.5 | 16.4 | - | 40 |
| Inlet Filter Body | 18.6 | 18.3 | - | 85 |
| Power Supply Board | - | - | - | - |
| C521 Body | 40.6 | 41.1 | - | 75 |
| C526 Body | 37.6 | 35.0 | - | 65 |
| T500 Winding | 49.3 | 51.0 | - | 85 |
| T500 Core | 43.5 | 45.1 | - | 85 |
| T505 by PWB | 50.5 | 63.2 | - | 85 |
| CON702 Body | 35.9 | 35.6 | - | 55 |
| 07574 Board | - | - | - | - |
| C96 Body | 33.0 | 33.1 | - | - |
| Ambient | 22.7 | 22.7 | - | - |

| **Winding temperature rise measurements** | | | | | |
|---|---|---|---|---|---|
| Ambient temperature t1 (°C) ..... : | | | | | — |
| Ambient temperature t2 (°C) ..... : | | | | | — |

| Temperature rise dT of winding: $dT = \frac{(R_2 - R_1)}{R_1} \times (234.5 + t1) - (t2 - t1)$ | $R_1$ (Ω) | $R_2$ (Ω) | dT (K) | Limit max (K) | Insulation class |
|---|---|---|---|---|---|
| | | | | | |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 7.2 | TABLE: softening temperature of thermoplastics | N/A |
|---|---|---|

| Temperature T of part | T - normal conditions (ºC) | T - fault conditions (ºC) | Min T softening (ºC) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

| 10.3 | TABLE: insulation resistance measurements | N/A |
|---|---|---|

| Insulation resistance R between: | R (MΩ) | Required R (MΩ) |
|---|---|---|
| | | |
| | | |

| 10.3 | TABLE: electric strength measurements | P |
|---|---|---|

| Test voltage applied between: | Test voltage (V) | Breakdown |
|---|---|---|
| Between mains poles (primary fuse disconnected) | | |
| Between parts separated by basic or supplementary insulation | 1500 Vdc | No |
| Between parts separated by double or reinforced insulation | 4242 Vdc | No |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 11 | TABLE: Fault Conditions | | P |
|---|---|---|---|
| | Voltage (V) 0,9 or 1,1 times rated voltage .....: | 264 | — |
| | Frequency (Hz) .....: | 60 | — |
| | Ambient temperature (°C) .....: | Refer below. | — |

| No. | Component | Fault | dT (K) / Component | Test conditions, test duration, test result |
|---|---|---|---|---|
| | Enclosure Hot Spot | Blocked Vents | 16.4 | 5.5 Hrs., No Hazards |
| | Inlet Filter Body | Blocked Vents | 18.2 | 5.5 Hrs., No Hazards |
| | Power Supply Board | - | - | 5.5 Hrs., No Hazards |
| | C521 Body | Blocked Vents | 40.9 | 5.5 Hrs., No Hazards |
| | C526 Body | Blocked Vents | 37.1 | 5.5 Hrs., No Hazards |
| | T500 Winding | Blocked Vents | 49.4 | 5.5 Hrs., No Hazards |
| | T500 Core | Blocked Vents | 43.4 | 5.5 Hrs., No Hazards |
| | T505 by PWB | Blocked Vents | 52.4 | 5.5 Hrs., No Hazards |
| | CON702 Body | Blocked Vents | 35.5 | 5.5 Hrs., No Hazards |
| - | 07574 Board | - | - | 5.5 Hrs., No Hazards |
| | C96 Body | Blocked Vents | 32.8 | 5.5 Hrs., No Hazards |
| Supplementary information: | | | | |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | | |
|---|---|---|---|---|---|---|
| **13** | **TABLES: clearances and creepage distances** | | | | | **P** |
| Rated supply voltage: | 264 | Pollution degree.. : | 2 | Material Group.... : | IIb | |
| 2 N force on internal parts applied: | | | Yes | | | |
| 30 N force on outside of conductive enclosure applied: | | | Yes | | | |

| Location | Working Voltage | | Clearance (mm) | | Creepage (mm) | |
|---|---|---|---|---|---|---|
| | V rms | V peak | Min | Actual | Min | Actual |
| Power Supply – Primary to Chassis | 264 | 373 | 2 | 6.1 | 3.8 | 6.1 |
| Notes: | | | | | | |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| 14 | TABLE: list of critical components and materials | P |
|---|---|---|

| Object / part No. | Manufacturer/ trademark | Type / model | Technical data | Standard | Mark(s) of conformity[1)] |
|---|---|---|---|---|---|
| Enclosure | Interchangeable | Interchangeable | Metal. Min. 1.05 mm thickness | IEC 60065 | Tested in equipment |
| Appliance Inlet Filter | Schaffner EMV AG | FN9244S-3-06 | 250 Vac, 3 A. Green / Yellow ground wire from inlet runs directly to ring terminal and attached to chassis stud by nut and lock washer. | IEC / EN 60320-1, IEC 60939, UL 498, UL 1283 | UR, ENEC (Intertek Semko Cert. SE-54869A2) |
| Wiring, internal primary | Interchangeable | Interchangeable | Marked VW-1; Min. 300 V, 80 °C, 18 AWG, 0.82 $mm^2$. | UL 758 | UL |
| Insulating Tubing/Sleeving | Interchangeable | Interchangeable | FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1; 80 °C, 300 V | UL 224 | UL |
| Insulating Tubing/ Sleeving | Interchangeable | Interchangeable | FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1; 80 °C, 300 V | UL 224 | UL |
| Power supply / Amplifier | Pascal A/S | U-PRO2SD | Input 100-240 Vac, 50-60 Hz, 75 W; Output 70 W | IEC 60065:2001 + Am. 1 + Am. 2. Additionally evaluated to 8 th Ed. as part of this investigation | UL Demko (Cert. CB-DK-58534-UL) |
| Insulation Sheet | Formex | GK-17BK | Rated Min. V-2, 80 °C. 0.4 mm thick. | UL 94 | UL |
| Connectors (primary) | Interchangeable | Interchangeable | Rated Min. 250 V | UL 1977 | UL |
| Connectors (secondary) | Interchangeable | Interchangeable | - | UL 1977 | UL |
| Connectors ( secondary) | Interchangeable | Interchangeable | Copper alloy pins housed in bodies of Min. V-2 material. | UL 94 | UL |

| IEC 60065 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | | | | |
|---|---|---|---|---|---|
| Printed Wiring Boards | Interchangeable | Interchangeable | Min. V-1, 105 °C, rated for direct support of live parts | UL 796 | UL |

**Supplementary information:**

**[1)] Provided evidence ensures the agreed level of compliance. See OD-CB2039.**

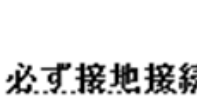
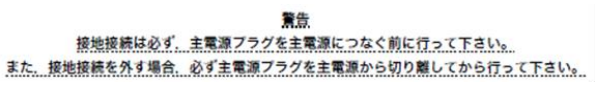
Remarks

Cord set (optional): According to the manufacturer's declaration, the unit can be supplied with a power attachment cord and plug which meet the national requirements which have been approved to relevant national and international standards.

# Attachment 1 – Japanese National Differences

| Japan- Differences - IEC 6065:2014<br>J60065(H29) | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 1.1.3 | **Addition:**<br>Add the following as after the first sentence.<br>In Japan, the requirements for regions with moderate climate apply. | | P |
| 2.1 | **Addition:**<br>Add the CLASS 0I in definitions. | | N/A |
| 2.6.2A | Addition:<br>Add this sub-clause.<br>CLASS 0I: design of apparatus which has, as for protection against electric shock,<br>-at least using BASIC INSULATION, and<br>-providing a means of connecting to the protective earthing conductor in the building wiring those conductive parts that are otherwise capable of assuming HAZARDOUS VOLTAGES if the BASIC INSULATION fails, which means apparatus provided with a cord set having a two-pin type plug with a lead wire for earthing.<br>Having three pin - two pin adaptor is also regarded as CLASS 0I.<br>NOTE CLASS 0I apparatus may have a part constructed with Double Insulation or Reinforced Insulation.' | | N/A |
| 3.2 | **Addition:**<br>Add the "or CLASS 0I apparatus" in addition to the CLASS I or CLASS II apparatus. | | N/A |
| 3.2 | **Addition:**<br>Add the following after the first sentence of this sub-clause.<br>NOTE 1 Apparatus that are frequently moved should not be CLASS I or CLASS 0I apparatus.<br>NOTE 2 Except for apparatus intended to be installed by service person, CLASS I and CLASS 0I construction should be avoided in designing an apparatus that will likely be installed where the earthing connection is impractical with the power distribution infrastructure in Japan taken into account. | | N/A |
| 4.3.14 | **Replacement:**<br>Replace "250 V a.c." by "the maximum of the variable range". | | P |
| 5.5.3 | **Addition:**<br>NOTE The installation rules include ministerial ordinance that sets technical standards relating to electrical equipment (March 27, 1997 Ordinance of Ministry of International Trade and Industry No. 52). | | N/A |
| 5.5.3A | **Addition:** | | N/A |

# Attachment 1 – Japanese National Differences

| Japan- Differences - IEC 6065:2014<br>J60065(H29) | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | For CLASS 0I apparatus, the following instruction shall be indicated where readily visible on the mains plug or the product:<br>“WARNING: Provide an earthing connection”<br>Example in Japanese:<br>  <br><br>Moreover, for CLASS 0I apparatus, the following instruction shall be indicated where readily visible on the product or written in the operating instructions:<br>“WARNING: Provide an earthing connection before the mains plug is connected to the mains. And, when disconnecting the earthing connection, be sure to disconnect after pulling out the mains plug from the mains.”<br>Example in Japanese:<br>  <br> | | |
| 6.2.0B | **Addition:**<br>It is possible to alternate method for use clause 4.4 of JIS C6802:2014 for laser products, except for toys, which are designed to function as conventional lamps.<br>NOTE Such product is for example front projection type projector using laser as light source. | | N/A |
| 7.1.2 | **Addition:**<br>Add the following as example after last dash of Condition “b “in Table 3.<br>“Do not touch the area around this symbol since it is hot”<br>Example in Japanese:<br>  <br> | | N/A |
| 7.1.3 | **Addition**:<br>Add the following NOTE to Condition “d “in Table 3.<br>NOTE For materials not listed in Table 3, it is considered acceptable to apply the requirements from item 3 of detailed regulations, 1.1.2.3, Appendix 4 in the Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance and Material.<br>Add the following to Condition b) after the above NOTE.<br>Permissible temperature rise of “Supply cords and wiring insulation” is applicable only to the materials used in supply cords complying with JIS C 3662 (corresponding to IEC 60227) or JIS C 3663 (corresponding to IEC 60245). Materials used in | | P |

## Attachment 1 – Japanese National Differences

<table>
<tr><th colspan="4">Japan- Differences - IEC 6065:2014<br>J60065(H29)</th></tr>
<tr><td>Clause</td><td>Requirement + Test</td><td>Result - Remark</td><td>Verdict</td></tr>
<tr><td></td><td>other wiring shall .comply with item 3 of detailed regulations, 1.1.2.3, Appendix 4 in the Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance and Material, and also it shall not exceed 100K under fault conditions.</td><td></td><td></td></tr>
<tr><td>8.5</td><td>Addition:<br>In the first paragraph, add “and CLASS 0I apparatus” after the words, CLASS I apparatus.</td><td></td><td>N/A</td></tr>
<tr><td>8.5</td><td>Addition:<br>In the six paragraph (before NOTE 2), add the following to the end of the first sentence.<br>CLASS 0I apparatus shall be provided with a PROTECTIVE EARTHING TERMINAL or contact to which ACCESSIBLE conductive parts shall be reliably connected.</td><td></td><td>N/A</td></tr>
<tr><td>9.1.1.2</td><td>Addition:<br>In the last paragraph of b), add the following sentence after the first sentence.<br>For CLASS 0I apparatus, the r.m.s. TOUCH-CURRENT to earth shall not be more than 1.0 mA.</td><td></td><td>N/A</td></tr>
<tr><td>10.2</td><td>Addition:<br>Add “CLASS 0I apparatus and” to the head of the first paragraph.</td><td></td><td>N/A</td></tr>
<tr><td>10.4.2</td><td>Addition:<br>In Table 5, add the following values to the sub-table of NOTE.
<table>
<tr><td rowspan="2">Operating Voltage U (peak)</td><td colspan="2">Test Voltage (peak)</td></tr>
<tr><td>Curve A</td><td>Curve B</td></tr>
<tr><td>142 V</td><td>1414 V</td><td>2828 V</td></tr>
</table></td><td></td><td>P</td></tr>
<tr><td>11.2.2</td><td>Replacement:<br>Replace the first dashed paragraph with the following:<br>- a fuse complying with the JIS C 6575 series or those having equivalent characteristics shall open within 1 s; or<br><br>Addition:<br>Add the following after the first dash.<br>NOTE 1 A fuse is considered to have equivalent characteristics to those complying with JIS C 6575 series if it complies with appendix 3 of the Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance and Material.<br><br>Add the following requirement after NOTE 2 in c) of the third dash.</td><td></td><td>N/A</td></tr>
</table>

## Attachment 1 – Japanese National Differences

| Japan- Differences - IEC 6065:2014<br>J60065(H29) | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | In case of Class A fuse of JIS C 6575, replace “2.1 times” by “1.35 times” and in case of Class B fuse of JIS C6575, replace “2.1 times” by “1.6 times”. A fuse not complying with the JIS C 6575 series shall be tested with the breaking capacity taken into account.<br>Add the following NOTE 3 in c) of the third dash<br>NOTE 3 In case of fuses complying with Appendix 3 of the Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance and Material used, replace “2.1 times” by “1.35 times” for Class A fuses, and replace“2.1 times” by “1.6 times” for Class B fuses. | | |
| 11.2.7 | **Addition:**<br>Add “and CLASS 0I” after the words, CLASS I in last sentence. | | N/A |
| 14.3.1 | **Replacement:**<br>Replace Table 9 of IEC 60384-14:2005 by Table 3 of JIC C 5101-14. | | N/A |
| 14.6.2.3 | **Replacement:**<br>In the third sentence of item a), replace “10.3” by “10.4” for the dielectric strength of the THERMAL LINK and replace “10.4 of IEC 60691:2002” by “10.3 of JIS C6691 | | N/A |
| 14.6.2.3 | **Replacement:**<br>In the third sentence of item a), replace “10.3” by “10.4” for the dielectric strength of the THERMAL LINK and replace “10.4 of IEC 60691:2002” by “10.3 of JIS C6691”. | | N/A |
| 14.6.2.3 | **Replacement:**<br>In the compliance statement of item a), replace “IEC 60691” by “IEC 60691:2002 or JIS C 6691”**.** | | N/A |
| 14.6.3.1 | **Replacement:**<br>Replace the first and second sentences by the following:<br>Fuses directly connected to the mains, used in order to prevent the apparatus from becoming unsafe within the sense of this standard shall comply with the relevant part of JIS C 6575(corresponding to IEC60127) or shall have equivalent characteristics.<br>NOTE Fuses complying with appendix 3 of Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance and Material are considered having equivalent characteristics to the fuses complying with JIS C 6575. | | N/A |
| 14.6.3.2 | **Addition:**<br>Add the symbols “A” and “B” for Class A and Class B respectively in the first dash. | | N/A |

## Attachment 1 – Japanese National Differences

| Japan- Differences - IEC 6065:2014<br>J60065(H29) | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Add the following sentence before last paragraph:<br>For fuses complying with or equivalent to Appendix 3 of the Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance and Material have current rating in Class A or Class B time/current characteristics, A or B shall be marked as applicable.<br>NOTE Fuses complying with appendix 3 of Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance and Material are considered having equivalent characteristics to the fuses complying with JIS C 6575. | | |
| 14.12 | **Replacement:**<br>Replace the second sentence “Clause 13.1” by “Clause 13”.<br>Replace the second dash of a) “Annex N.3.2” by “Annex JA” for ROUTINE TESTS. | | N/A |
| 14.13 | **Replacement:**<br>Replace “connected” by “directly connected” in the second sentence.<br><br>**Addition:**<br>Add the following NOTE after the second sentence.<br>NOTE: The example of “not directly connected to the MAINS” is:<br>- A combination of a varistor in series with a gas discharge tube (GDT) complying with appropriate value of the external CLEARANCE and CREEPAGE DISTANCES. | | N/A |
| 15.1.1 | **Replacement:**<br>Replace the first and second paragraph by the following**.**<br>Plugs and appliance couplers for the connection of the apparatus to the MAINS and socket-outlets and interconnection couplers for providing MAINS power to other apparatus shall comply with below.<br>a) Plugs and socket-outlets:<br>These components complied with relevant JIS standards or equivalent requirement.<br>b) Appliance coupler and interconnection coupler:<br>These components complied with relevant JIS standards.<br>These components complied with following criteria and relevant standards are considered to be acceptable.<br>- Plugs and socket-outlets: JIS C 8282 series<br>- Connectors: JIS C 8283-1 or JIS C 8283-2-3<br>**- Appliance couplers: JIS 8283-1 or 8283-2-3**<br>- Socket-outlets for interconnection coupler: JIS C | | P |

## Attachment 1 – Japanese National Differences

| Japan- Differences - IEC 6065:2014<br>J60065(H29) | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 8283-2-2<br>- Plug connectors for interconnection coupler: JIS C 8283-2-2<br>- Cord set for power supply and Cord set for interconnection: JIS C 8286<br>Where the product provided with connectors (except for appliance couplers rated 20A, 125V as specified in JIS C8283-1) or interconnection couplers with rated current exceeding 16 A, these components shall be in compliance with JIS C 8285 or equivalent requirement. In that case, it shall not be able to mate with any connectors specified in the standard sheet other than JIC C 8285.<br>In case of apparatus rated 125 V or less, appliance inlets according to standard sheet C14 and C18 of JIS C 8283-1 are permitted to be used up to 15 A in the normal operating condition as specified in 4.2. | | |
| 15.1.1 | **Addition:**<br>NOTE 3 Mains plug and socket-outlets complied with Appendix 4 of the Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance are considered equivalent to those complying with JIS C 8285. | | N/A |
| 15.1.1 | **Addition:**<br>CLASS 0I apparatus shall not be provided with either socket-outlets or interconnection couplers. | | N/A |
| 15.1.2 | **Replacement:**<br>Replace of statement “An example of a connector not meeting the requirements of this sub clause is the so-called "banana" plug.” by “Use of “banana” plug is considered to be acceptable. “ | See manufacturer’s letter of Assurance. | P |
| 15.1.3 | **Replacement:**<br>Replace the references, “standard nominal MAINS voltage according to IEC 60038:2009, Table I” by “standard nominal MAINS voltage”, and replace “IEC 60083, IEC 60320, IEC 60884, IEC 60906” by “JIS 8282 series , JIS C 8283 series, JIS C 8303,<br>IEC 60906.” | | P |
| 15.2 | **Addition:**<br>Add “and CLASS 0I apparatus” after the words, “CLASS I apparatus” | | N/A |
| 15.2 | **Addition:**<br>Add the following paragraphs after the third paragraph.<br>The external earth wire of plug with an external earth wire shall not be earthed by a clip.<br>Rated voltage of plug with an external earth wire shall be less than 150 Vac. | | N/A |
| 15.3.5 | **Replacement:**<br>Replace Table 15 with the following. | | N/A |

## Attachment 1 – Japanese National Differences

**Japan- Differences - IEC 6065:2014**

J60065(H29)

| Clause | Requirement + Test | Result - Remark | Verdict |
|---|---|---|---|
| | RATED CURRENT CONSUMPTION of the apparatus [a] A / Nominal cross-sectional area mm$^2$: Up to and including 6 — 0.75 to 1; Over 6 up to and including 10 — 1 to 1.5; Over 10 up to and including 16 — 1.5 to 2.5<br>[a] The RATED CURRENT CONSUMPTION includes currents which can be drawn from socket-outlets providing MAINS power for other apparatus. | | |
| 15.4.3 | **Addition:**<br>Add the following NOTE to Table 17.<br>NOTE If mains plug is parallel blade, a pull force as given in "Over 10 A up to and including 16 A, 130/250 V" of Table 17 is applied. | | N/A |
| 16.1 | **Addition:**<br>Add the third dash following the second dash.<br>- Comply with Appendix 1 of the Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance.. | | P |
| 16.1 | **Addition:**<br>Add the following paragraph after the fourth paragraph.<br>An external earth wire of plug of CLASS 0I apparatus shall be green/yellow, and the length equal or more than 10 cm from the plug. | | P |
| 16.2 | **Replacement:**<br>Replace the first paragraph with the following:<br>The conductor of the power supply cord shall have a nominal cross sectional area that is not smaller than the value specified in Table 18 when conforming to the requirements specified in JIS C 3662 series or JIS C 3663 series. In the case of a power supply cord meeting other criteria, the conductor shall conform to the relevant wiring specification. | | P |
| 16.2 | **Addition:**<br>NOTE Mains cords of sheathed type complying with Appendix 1 of the Ministerial Ordinance on stipulating technical requirements for the Electrical Appliance are considered to comply with this requirement if they are also in compliance with 1.3.1.3 in Appendix 4. | | P |
| 16.2 | **Replacement:**<br>Replace Table 18 with the following. | | P |

## Attachment 1 – Japanese National Differences

**Japan- Differences - IEC 6065:2014**

J60065(H29)

| Clause | Requirement + Test | Result - Remark | Verdict |
|---|---|---|---|
| | RATED CURRENT CONSUMPTION of the apparatus [a] A / Nominal cross-sectional area mm$^2$<br>Up to and including 6 / 0.75<br>Over 6 up to and including 10 / 1<br>Over 10 up to and including 16 / 1.5<br>[a] The RATED CURRENT CONSUMPTION includes currents which can be drawn from socket-outlets providing MAINS power for other apparatus. | | |
| 16.5 | **Addition:**<br>Add “or CLASS 0I apparatus” after the words, CLASS I apparatus. | | P |
| 17.9A | **Addition:**<br>Apparatus shall be so constructed that mechanical force is not transmitted to soldering section of appliance coupler when connector is inserted in or pulled out. This requirement is not applied to apparatus which appliance coupler is securely fixed, and installation of appliance coupler is not relied solely on soldering. | | N/A |
| Annex B | **Addition:**<br>NOTE 1 Delete original NOTE 1 and replace with the following.<br>NOTE 1 To reduce the possibility of overvoltage exceeding the 1.5 kV peak on the apparatus, it is assumed that appropriate measures are taken under ITU-T Recommendation K. 11. In an installation environment where an overvoltage exceeding 1.5 kV (peak) is applied to the apparatus, it may be necessary to take additional measures such as surge suppression. For appropriate measures and additional measures, see Annex JB. | | N/A |
| Annex J.3 | **Addition:**<br>The mains transient voltage for Japan’s nominal 100V system is selected from the 150V line in table J.1. | | N/A |
| Annex J.4 | **Addition:**<br>Refer to Annex B NOTE 1 for overvoltage over 1.5 kV. | | N/A |
| Annex N.2.3 | **Addition:**<br>Add “and CLASS 0I apparatus” after the words, “CLASS I apparatus”<br>Add third dash as follows: | | N/A |

## Attachment 1 – Japanese National Differences

<table>
<tr><th colspan="4">Japan- Differences - IEC 6065:2014<br>J60065(H29)</th></tr>
<tr><td>Clause</td><td>Requirement + Test</td><td>Result - Remark</td><td>Verdict</td></tr>
<tr><td></td><td>-earth wire of plug with an external earth wire or protective earthing contact of appliance inlet for CLASS 0I apparatus.</td><td></td><td></td></tr>
<tr><td>Annex N.3.2</td><td>Deletion:<br>Dielectric strength test moved to Annex JA.</td><td></td><td>N/A</td></tr>
<tr><td>Annex N 3.3</td><td>Addition:<br>Add the following before the first dashed paragraph<br>For CLASS 0I apparatus, it should verify the continuity of protective earthing connection between the earth wire of the plug with an external earth wire or protective earthing conductor in appliance inlet and the following parts:</td><td></td><td>N/A</td></tr>
<tr><td>Annex JA</td><td>Addition:<br>Routine tests for dielectric strength shall be carried out during or after manufacturing of all apparatus.<br>The insulation of the apparatus shall be checked by the following test.<br>An a.c. test voltage of substantially sine-wave form, having mains frequency, or a d.c. test voltage or a combination of both with a peak value as specified in Table JA.1 is applied between the supply terminals connected in parallel and<br>- terminals (refer to 8.4) regarded as accessible, and<br>- accessible conductive parts respectively,<br>that may become hazardous live in the event of an insulation fault as a result of incorrect assembly.<br>TERMINALS regarded as ACCESSIBLE and ACCESSIBLE conductive parts may be connected together during the electric strength test.<br>Table JA.1 – Test Voltage
<table>
<tr><td rowspan="2">Application of test voltage</td><td colspan="2">Test Voltage V (peak) a.c or d.c.Application of test voltage</td></tr>
<tr><td>Rated mains voltage ≤ 150</td><td>Rated mains voltage > 150</td></tr>
<tr><td>Basic insulation</td><td>1 130 (800 r.m.s.)</td><td>2 120 (1 500 r.m.s.)</td></tr>
<tr><td>Double insulation or Reinforced insulation</td><td>2 120 (1 500 r.m.s.)</td><td>3 540 (2 500 r.m.s.)</td></tr>
</table>
Before the test voltage is applied, intimate contact shall be made between the apparatus and the connection devices.<br>Initially it is allowed to apply not more than half of the prescribed test voltage, then it is raised with a steepness not exceeding 1 560 V/ms to the full value which is held for 1 s to 4 s.<br>NOTE A steepness of 1 560 V/ms corresponds to the steepness of a sine-wave with a MAINS frequency of 60 Hz.<br>During the test, MAINS switches and functional</td><td></td><td>P</td></tr>
</table>

## Attachment 1 – Japanese National Differences

| Japan- Differences - IEC 6065:2014<br>J60065(H29) | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | switches CONDUCTIVELY CONNECTED TO THE MAINS, if any, shall be in the on-position and it shall be ensured by suitable means that the test voltage is effectively connected to the apparatus.<br>No flash-over or breakdown shall occur during the test. The test voltage source shall be provided with a current sensing (over-current) device which, when activated, gives an indication "unacceptable". When loaded up to and including the tripping current, the voltage source shall still deliver the prescribed voltage. | | |

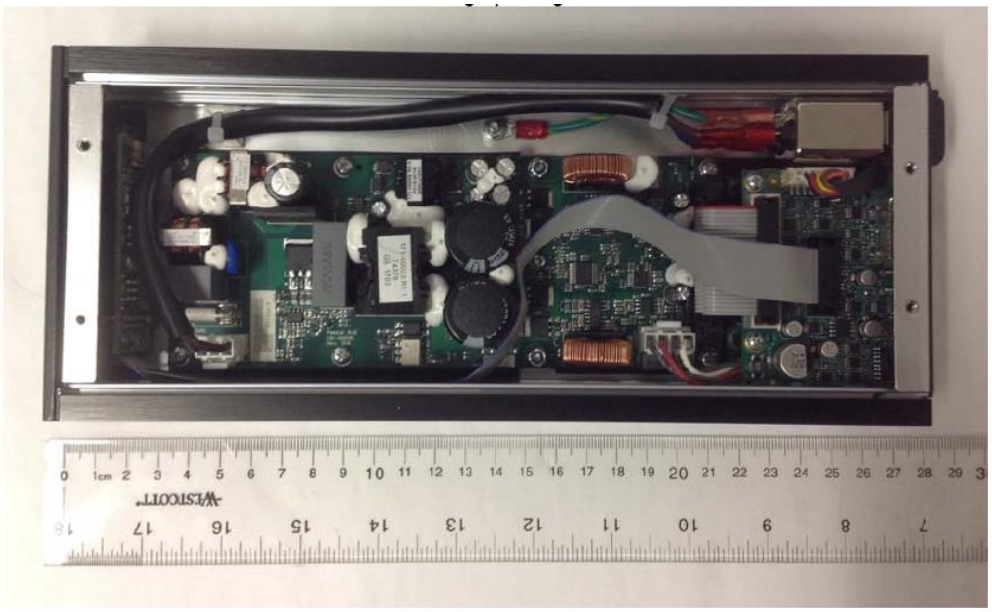
**Attachment 2 – Pictures of equipment, Important Safety Instruction and Explanation of Safety-Related Symbols and Letter of Assurance**

**Front View**


**< Front side view for model, AMP-225>**

**< Rear side view for model, AMP-225>**

**Attachment 2 – Pictures of equipment, Important Safety Instruction and Explanation of Safety-Related Symbols and Letter of Assurance**



**< Inside view for model,AMP-225 >**

**Attachment 2 – Pictures of equipment, Important Safety Instruction and Explanation of Safety-Related Symbols and Letter of Assurance**


**< Front side view for model, AMP-150-70>**


**< Front side view for model, AMP-150-100>**

**Attachment 2 – Pictures of equipment, Important Safety Instruction and Explanation of Safety-Related Symbols and Letter of Assurance**

Crestron

# English

## Important Safety Instructions

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the equipment. When a cart is used, use caution when moving the cart/equipment combination to avoid injury from tipping over.

- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- Disconnect power prior to connecting or disconnecting equipment.
- Do not install in direct sunlight.
- The apparatus must be installed in a way that the power cord can be removed either from the wall outlet or from the device itself in order to disconnect the mains power.
- Prevent foreign objects from entering the device.

**WARNING:**

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE. THE APPARATUS SHALL NOT BE EXPOSED TO DRIPPING OR SPLASHING. OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, SHOULD NOT BE PLACED ON THE APPARATUS.

**WARNING:**

TO PREVENT ELECTRIC SHOCK, DO NOT REMOVE COVER. THERE ARE NO USER SERVICEABLE PARTS INSIDE. ONLY QUALIFIED SERVICE PERSONNEL SHOULD PERFORM SERVICE.


AVIS: RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance

**WARNING:**

THIS IS AN APPARATUS WITH CLASS I CONSTRUCTION. IT SHALL BE CONNECTED TO AN ELECTRICAL OUTLET WITH AN EARTHING GROUND TERMINAL.

**IMPORTANT:**

This device can be used with Class 2 output wiring.

**< Important Safety Instruction and Explanation of safety-Related Symbols>**

**Attachment 2 – Pictures of equipment, Important Safety Instruction and Explanation of Safety-Related Symbols and Letter of Assurance**

Miscellaneous III-2

CRESTRON

## *LETTER OF ASSURANCE*

8/3/16

UL LLC
12 Laboratory Drive
Research Triangle Park, NC 27709
To: Jeff Smith
Subject: National Differences
Dear: Jeff Smith

This document confirms that Crestron Electronics Inc. will provide the following items needed to the accepting NCB along with the IT/CB test report.

Markings and Safety Instructions – All required safety instructions and markings in the language suitable for countries listed in the attached report will be provided at the time the IT/CB test report is submitted to the accepting NCB.

EMC Test Report – Where detailed in the National Differences, an EMC Test report or Declaration of Conformity (documentation determined by accepting NCB) will accompany this product when sent to countries that require EMC test results as part of their certification process.

Multiple Factories – This confirms that samples submitted for certification are representative of the products from each factory. The factories are noted in this CB test Report.

ROHS Directive – We have been advised that we will need to provide evidence of compliance with ROHS directive 2002/95/EC. The NCB may obtain this information from that Crestron electronics Inc. upon request.

Power Supply Cords and Plugs - All power cords and plug assemblies provided with the unit will be certified and suitable for use in the countries listed in the attached CB test report.

Production Line Tests – Production line electric strength and polarity verification testing will be carried out on 100 percent of units in accordance Annex N.

LEDs – All LEDs operate in the 400-710nm, visible spectrum, and are used as indicators only.

Chirag Patel
Compliance Engineer

Crestron Electronics, Inc.
15 Volvo Drive
Rockleigh, NJ 07647
Tel: 800.237.2041/ 201.767.3400

NEW YORK LOS ANGELES ATLANTA DALLAS CHICAGO ORLANDO
TORONTO MEXICO CITY SAO PAULO BRUSSELS MUNICH MILAN

**< Letter of Assurance>**

# TEST REPORT

**KCTL Inc.**
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr



**1. Client**

- Name : Crestron Electronics Inc.
- Address : 15 Volvo Drive, Rockleigh, NJ 07647, United States
- Date of Receipt : 2017-09-28

**2. Use of Report** : -

**3. Name of Product and Model** : Single-Channel Modular Power Amplifiers, 50W, 70V or 100V / AMP-225

**4. Manufacturer and Country of Origin** : Crestron Electronics Inc. / USA

**5. Date of Test** : 2017-10-13

**6. Test method used** : J55013(H22)

**7. Test Results** : Refer to the test result in the test report

| | | |
|---|---|---|
| Affirmation | Tested by<br>Name : Donghyun Kim (Signature) | Technical Manager<br>Name : Gunsu Park (Signature) |

2017-10-19

## KCTL Inc.

## REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2017-10-19 | Originally issued | - |
| | | |
| | | |
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| | | |

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# 1. Applicant information

| | |
|---|---|
| **Applicant:** | Crestron Electronics Inc. |
| **Address:** | 15 Volvo Drive, Rockleigh, NJ 07647, United States |
| **Telephone:** | +01-800-237-2041 |
| **E-mail:** | cpatel@crestron.com |
| **Contact name:** | Chirag Patel |

| | |
|---|---|
| **Manufacturer:** | Crestron Electronics Inc. |
| **Address:** | 15 Volvo Drive, Rockleigh, NJ 07647, United States |
| **Telephone:** | +01-800-237-2041 |
| **E-mail:** | cpatel@crestron.com |
| **Contact name:** | Chirag Patel |

# 2. Laboratory information

**Address**

**KCTL Inc. (Suwon Lab.)**

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

Telephone Number: 82 31 285 0894

Facsimile Number: 82 505 299 8311

FCC Site Designation No: KR0040, FCC Site Registration No: 687132

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP

# 3. Test system configuration

## 3.1 Operation environment

| | Temperature | Humidity | Pressure |
|---|---|---|---|
| Chamber 10 m(RE) | 21.6 °C | 49.3 % R.H. | - |
| Shielded room(CE) | 24.3 °C | 52.7 % R.H. | - |

Test site

These testing items were performed following locations;

| Test item | Test site |
|---|---|
| Disturbance voltage at the mains terminals | Shielded Room |
| Disturbance voltage at the antenna terminals | Shielded Room |
| Wanted signal and disturbance voltage at RF output terminals of equipment with RF video modulator | Shielded Room |
| Disturbance power | 10 m Chamber |
| Radiated disturbances | 10 m Chamber |

## 3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

| Conducted Emission measurement (Confidence level about 95 %, *k* = 2) | | |
|---|---|---|
| Shielded Room (CE#1) | 9 kHz ~ 150 kHz: 3.66 dB | |
| | 150 kHz ~ 30 MHz: 3.26 dB | |
| Shielded Room (CE#2) | 9 kHz ~ 150 kHz: 3.48 dB | |
| | 150 kHz ~ 30 MHz: 3.06 dB | |
| Radiated Emission measurement (Confidence level about 95 %, *k* = 2) | | |
| 10 m Chamber (4F) | 30 MHz ~ 300 MHz | 3 m: 5.42 dB |
| | | 10 m: 5.40 dB |
| | 300 MHz ~ 1 000 MHz | 3 m: 5.56 dB |
| | | 10 m: 5.44 dB |
| | 1 GHz ~ 6 GHz | 3 m: 6.28 dB |
| 10 m Chamber (2F) | 30 MHz ~ 300 MHz | 3 m: 5.06 dB |
| | | 10 m: 5.04 dB |
| | 300 MHz ~ 1 000 MHz | 3 m: 5.18 dB |
| | | 10 m: 5.06 dB |
| | 1 GHz ~ 6 GHz | 3 m: 6.36 dB |
| Radio Frequency Electromagnetic Fields (Confidence level about 95 %, *k* = 2) | | |
| 0.86 dB | | |
| Disturbance Power Electromagnetic Fields (Confidence level about 95 %, *k* = 2) | | |
| 2.82 dB | | |

## 3.3 Measurement Program

These test items were performed by software programs;

| Test item | Measurement Program | | Used |
|---|---|---|---|
| Conducted Emission | EP5CE_V 5.4.0(TOYO) | | ☒ |
| Radiated Emission | 2F | EP5RE_V 4.6.0(TOYO) | ☒ |
| | 4F | EP5RE_V 5.11.10(TOYO) | |
| Disturbance power | EMC32_V 9.01.0<br>(ROHDE & SCHWARZ) | | ☒ |

# 4. Description of EUT

## 4.1 General information

### Audio

**Input Signal Types:** Balanced or unbalanced analog line-level
**Output Power:** 25 Watts per channel @ 4-8 Ohms
**Frequency Response:** 20 Hz to 20 kHz ±0.5 dB
**THD+N:** <0.1% at full rated output power
**S/N Ratio:** >100 dBA, 20 Hz to 20 kHz, balanced
**Crosstalk:** -75 dB at 1 kHz
**Input Sensitivity:** 1.23 Vrms, +4 dBu balanced;
0.316 Vrms, -10 dBV unbalanced;
For full rated output power
**Go To Sleep Time:** 25 minutes with no signal present
**Wake Time:** 0.5 second typical
**Wake Threshold:** 5 to 20 mV typical
**Protection:** Clip limiter, over current, under voltage, over temperature, DC offset, extreme high frequency

### Connectors

**SPEAKER OUT 1 – 2:** (2) 2-pin 7.62 mm reversed gender 20A detachable terminal blocks; Power amplifier outputs;
Wire Size: Terminals accept up to 12 AWG (3.31 $mm^2$)

**AUDIO IN 1 – 2 (unbalanced):** (2) RCA connectors, female;
Unbalanced line-level audio inputs;
Maximum Input Level: 2.24 Vrms, +7 dBV (+9.2 dBu)

**AUDIO IN 1 – 2 (balanced):** (1) 5-pin 3.5 mm detachable terminal block;
Balanced line-level audio inputs;
Maximum Input Level: 7.75 Vrms, +20 dBu;
Input Impedance: 20k Ohms

**G:** (1) 6-32 screw;
Chassis ground lug

**100-240V~1A 50/60 Hz:** (1) IEC 60320 C14 main power inlet;
Mates with removable power cord, included

### Controls & Indicators

**PWR:** (1) Bi-color green/amber LED, indicates operating power supplied from AC line power, turns green while operating and amber when in standby

### Power

**Main Power:** 1 Amp @ 100-240 Volts AC, 50/60 Hz
**Power Consumption:** 17 Watts, all channels driven at 1/8th output power;
8 Watts, idle;
<0.5 Watt, standby (sleep)

### Environmental

**Temperature:** 41° to 104° F (5° to 40° C)
**Humidity:** 10% to 90% RH (non-condensing)

### Construction

**Chassis:** Metal, convection-cooled (fanless), vented front and rear
**Front Panel:** Metal, black finish with polycarbonate label overlay
**Mounting:** Freestanding, surface-mount, or 1/4-width 1 RU 19-inch rack-mountable; gangable with other Crestron modular AMP series products (adhesive feet, surface mounting kit, ganging kit, and rack mounting kit included)

### Dimensions

**Height:** 1.74 in (45 cm) without feet;
1.82 in (47 mm) with surface kit
**Width:** 4.33 in (110 mm);
5.43 in (138 mm) with surface kit;
19.00 in (483 mm) with rack kit
**Depth:** 10.46 in (266 mm)

### Weight

1.9 lb (0.9 kg) without mounting kits
2.2 lb (1.0 kg) maximum with surface or rack kit

### Compliance

ENERGY STAR, ErP (1275/2008/EC), UL 60065, FCC Class A commercial use

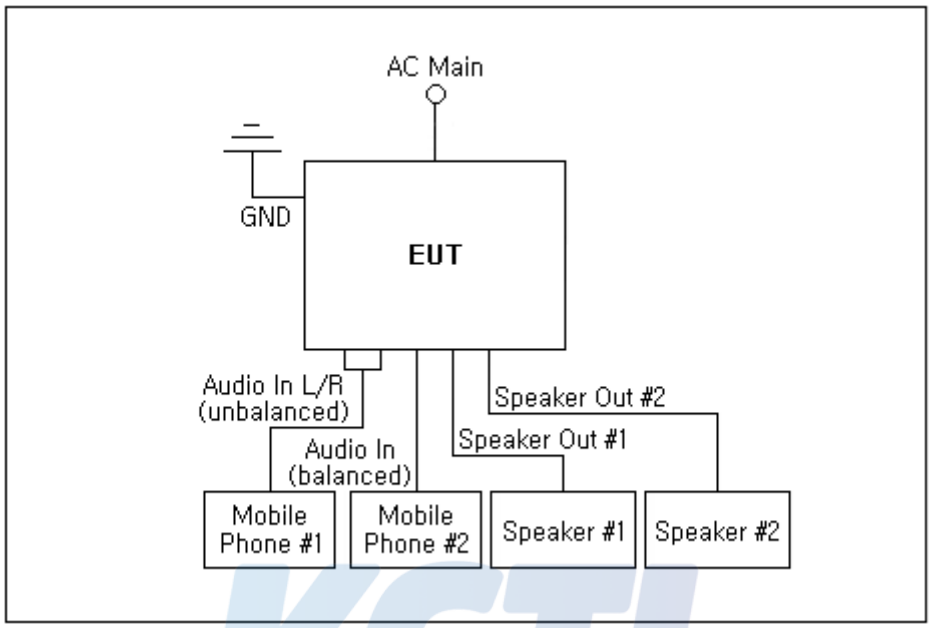
## 4.2 Product description

| | |
|---|---|
| Type of product | Single-Channel Modular Power Amplifiers, 50W, 70V or 100V |
| Model name (Basic) | AMP-225 |
| Model name (Variant) | - |
| Difference | - |
| Serial no | - |
| Testing voltage | 100 V, 50 Hz |
| Input rating | 100 V - 240 V, 50/60 Hz |
| Internal clock frequency | 500 MHz |
| Note | - |

## 4.3 Auxiliary equipments

| Type | Model / Part # | S/N | Manufacturer |
|---|---|---|---|
| Mobile Phone #1 | GT-N7105 | - | SAMSUNG |
| Mobile Phone #2 | LG-F200L | - | LG |
| Speaker #1 | - | - | Crestron Electronics Inc. |
| Speaker #2 | - | - | Crestron Electronics Inc. |

## 4.4 Test configuration




| | Start | | End | | Cable | |
|---|---|---|---|---|---|---|
| | Name | I/O port | Name | I/O port | Length (m) | Spec. |
| 1 | **EUT** | Power | AC Main | - | 2.0 | Unshield |
| 2 | | Audio In L/R (unbalanced) | Mobile Phone #1 | AUX | 3.0 | Unshield |
| 3 | | Audio In (balanced) | Mobile Phone #2 | AUX | 3.0 | Unshield |
| 4 | | Speaker Out #1 | Speaker #1 | Speaker In | 3.0 | Unshield |
| 5 | | Speaker Out #2 | Speaker #2 | Speaker In | 3.0 | Unshield |
| 6 | | GND | GND | - | 2.0 | - |

## 4.5 Operating conditions

The EUT was configured as normal intended use.

| Test mode | Normal operating |
|---|---|
| Test #1 | After arranging as above, mobile phones #1 and #2 are used to check the output state of the speaker after 1 kHz music playback and test. |

# 5. Summary of test results

## 5.1 Summary of EMI emission test results

| Applied | Test items | Test method | Result |
|---|---|---|---|
| ☒ | Disturbance voltage at the mains terminals | J55013(H22) | Pass |
| ☒ | Disturbance power | J55013(H22) | Pass |
| ☒ | Radiated disturbances | J55013(H22) | Pass |

# 6. Test results

## 6.1 Disturbance voltage at the mains terminals

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | Shielded room (CE#2) | | |
| Date | 2017-10-13 | | |
| Temperature (°C) | 24.3 °C | Humidity (% R.H.) | 52.7 % R.H. |
| Remarks | Pass | | |

### 6.1.1 Limits of disturbance voltage at the mains terminals

| Equipment Type | Frequency range [MHz] | Limit values dB($\mu$V) | |
|---|---|---|---|
| | | Quasi-peak | Average |
| Television and sound receivers and associated equipment | 0.15 ~ 0.5 | 66 ~ 56 [1)] | 56 ~ 46 [1)] |
| | 0.5 ~ 5 | 56 | 46 |
| | 5 ~ 30 | 60 | 50 |
| [1)] Decreasing linealy with the longarithm of the frequncy. | | | |

### 6.1.2 Measurement procedure

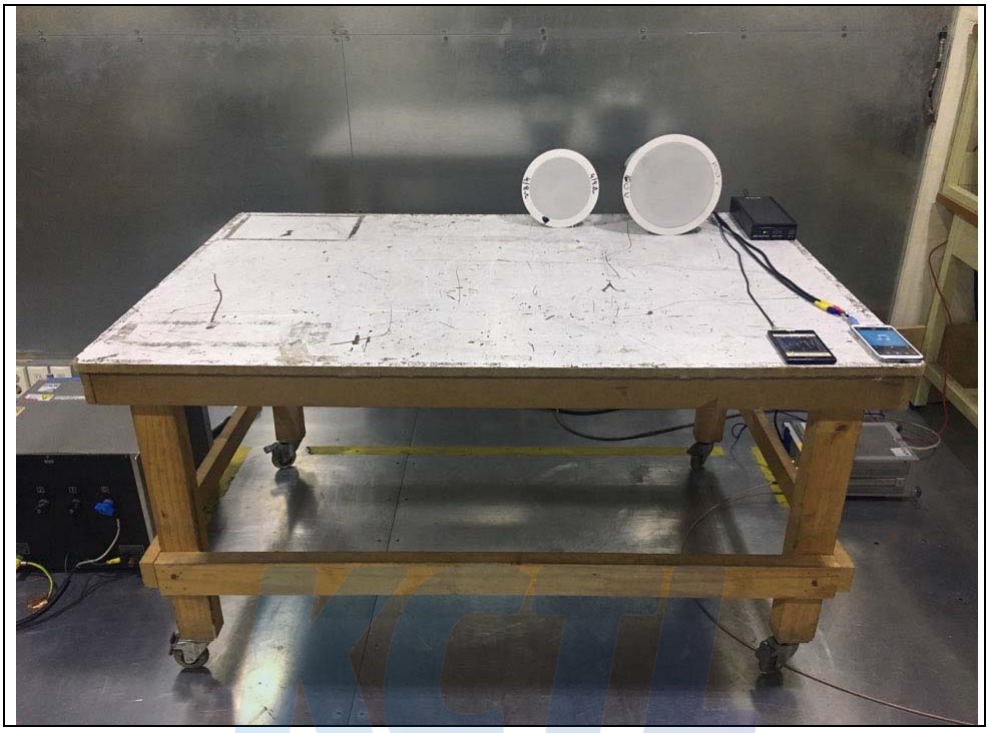
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 ㎜ above the reference ground plane. The rear of table was located 0.4 ㎜ to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 40 ㎝ to the Horizontal metal ground 30 ~ 40 ㎝ long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 80 ㎝ from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement. Both lines of power cord, hot and neutral, were measured.

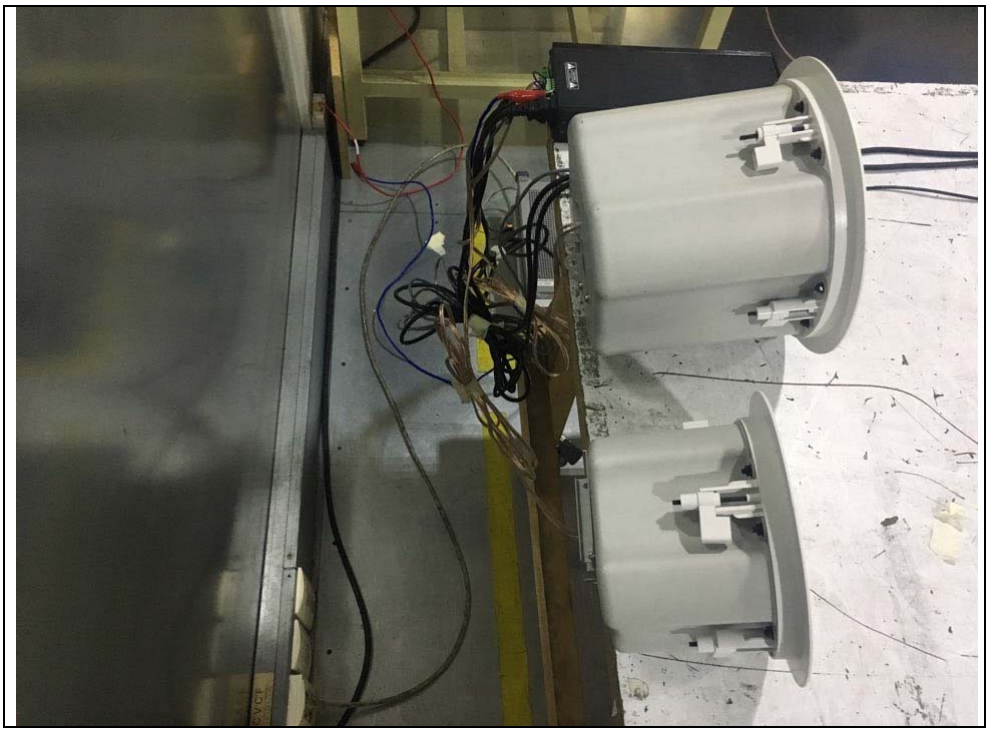
### 6.1.3 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESCI | 100710 | R&S | 2018.08.24 | ☒ |
| TWO-LINE V-NETWORK | ENV216 | 101352 | R&S | 2018.08.25 | ☒ |
| TWO-LINE V-NETWORK | NNLK8121 | 8121-472 | SCHWARZBECK | 2018.08.25 | ☐ |

6.1.4 Photographs of test setup

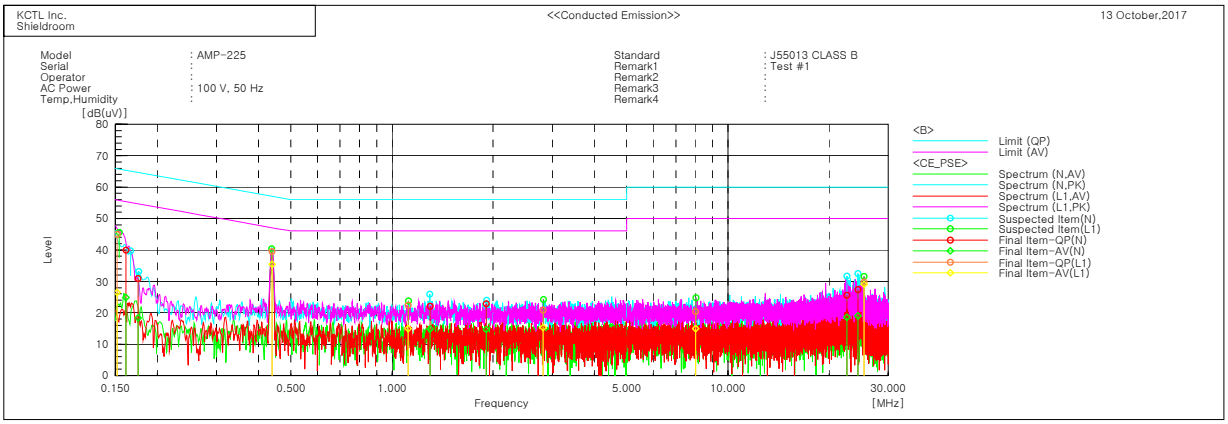
AC Main





## 6.1.5 Measurement result

AC Main




Final Result

--- N Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.16156 | 29.6 | 14.6 | 10.3 | 39.9 | 24.9 | 65.4 | 55.4 | 25.5 | 30.5 |
| 2 | 0.17526 | 20.5 | 8.0 | 10.4 | 30.9 | 18.4 | 64.7 | 54.7 | 33.8 | 36.3 |
| 3 | 1.30001 | 12.0 | 4.7 | 10.1 | 22.1 | 14.8 | 56.0 | 46.0 | 33.9 | 31.2 |
| 4 | 1.91029 | 12.8 | 4.6 | 10.1 | 22.9 | 14.7 | 56.0 | 46.0 | 33.1 | 31.3 |
| 5 | 22.62029 | 15.2 | 8.3 | 10.3 | 25.5 | 18.6 | 60.0 | 50.0 | 34.5 | 31.4 |
| 6 | 24.37797 | 17.0 | 8.6 | 10.4 | 27.4 | 19.0 | 60.0 | 50.0 | 32.6 | 31.0 |

--- L1 Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1517 | 34.8 | 16.3 | 10.1 | 44.9 | 26.4 | 65.9 | 55.9 | 21.0 | 29.5 |
| 2 | 0.43926 | 29.4 | 25.3 | 10.1 | 39.5 | 35.4 | 57.1 | 47.1 | 17.6 | 11.7 |
| 3 | 1.11547 | 12.3 | 4.8 | 10.1 | 22.4 | 14.9 | 56.0 | 46.0 | 33.6 | 31.1 |
| 4 | 2.82022 | 10.8 | 5.3 | 10.0 | 20.8 | 15.3 | 56.0 | 46.0 | 35.2 | 30.7 |
| 5 | 8.01691 | 10.3 | 4.8 | 10.1 | 20.4 | 14.9 | 60.0 | 50.0 | 39.6 | 35.1 |
| 6 | 25.42503 | 19.4 | 18.8 | 10.3 | 29.7 | 29.1 | 60.0 | 50.0 | 30.3 | 20.9 |

## 6.2 Disturbance power

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | 10 m Chamber (4F) | | |
| Date | 2017-10-13 | | |
| Temperature (°C) | 21.8 °C | Humidity (% R.H.) | 50.2 % R.H. |
| Remarks | Pass (#1- Power, #2- Audio In L/R, #3- Audio In, #4- Speaker Out) | | |

### 6.2.1 Measurement procedure

The appliance to be tested is placed on a non-metallic table at least 0.8 m from other metallic objects and the lead to be measured on is stretched in a straight line for a distance sufficient to accommodate the absorbing clamp, and to permit the necessary measuring adjustment of position for tuning. The clamp is placed around the lead so as to measure a quantity proportional to the disturbance power on the lead. The absorbing clamp is positioned for maximum indication at each test frequency; the clamp shall be moved along the lead until the maximum value is found between a position adjacent to the appliance and a distance of about a half-wavelength from it. EUT during the test are noted in the following test records.

### 6.2.2 Limits of disturbance power

| Equipment Type | Frequency range [MHz] | Limit values dB(pW) | |
|---|---|---|---|
| | | Quasi-peak | Average |
| Associated equipment (video recorders excluded) | 30 to 300 | 45 ~ 55 [a] | 35 ~ 45 [a] |
| [a] Increasing linearly with the frequency. | | | |

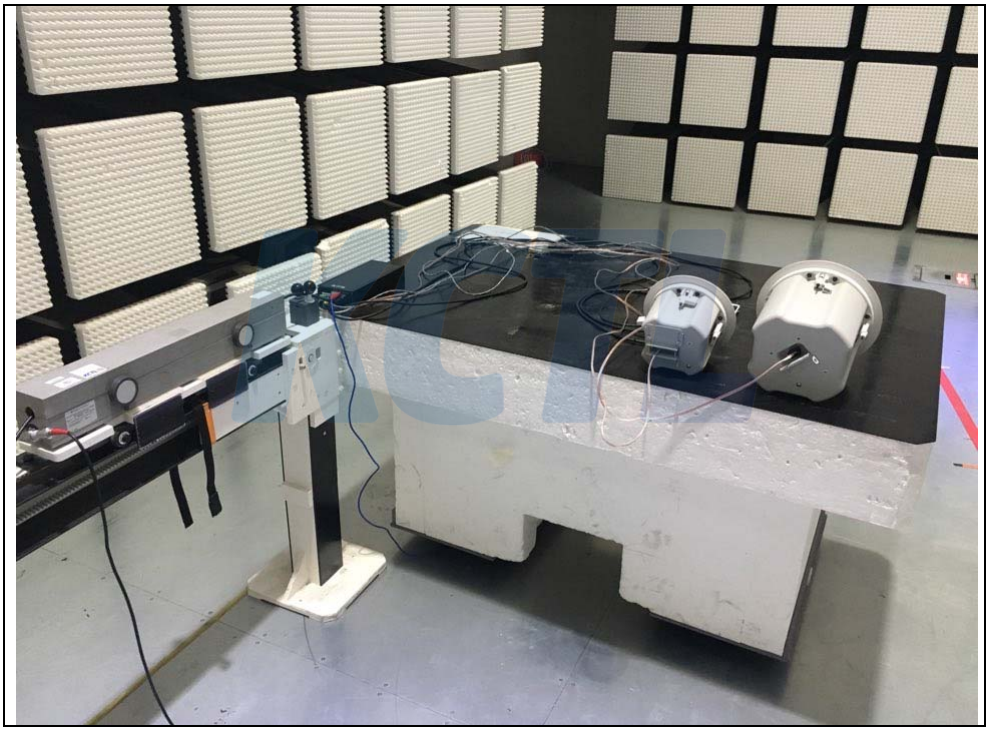
Margin(dB) = Limit(dB(pW)) - QuasiPeak(dB(pW))

Margin(dB) = Limit(dB(pW)) - C-Average(dB(pW))

### 6.2.3 Used equipments

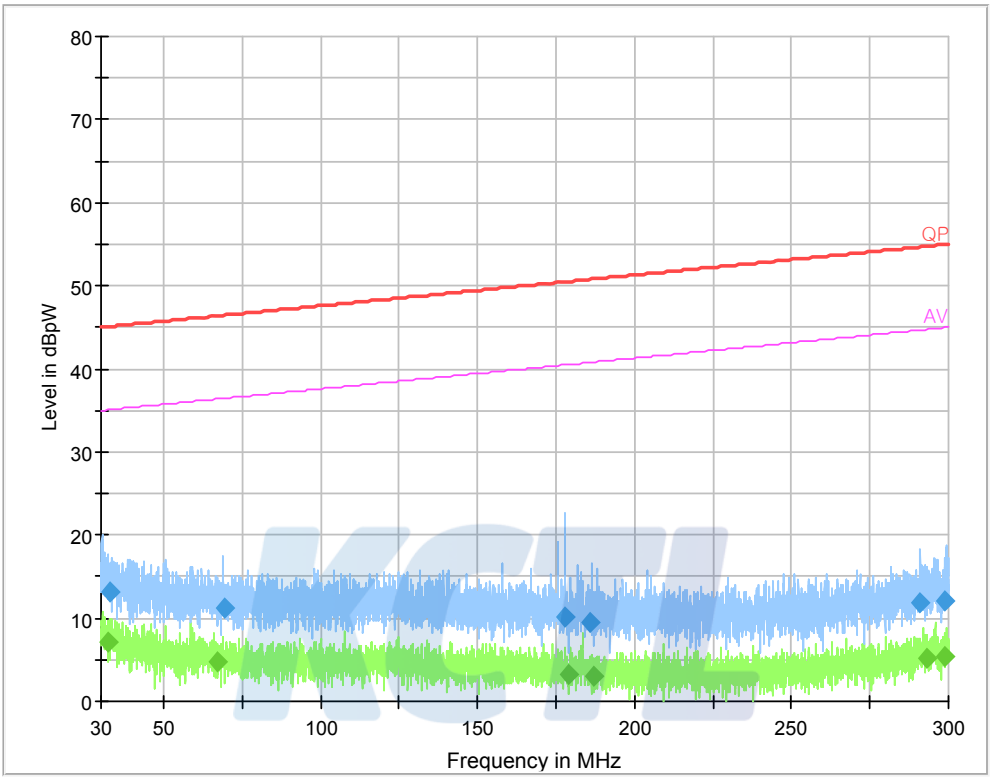
| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESCI | 101408 | R&S | 2018.08.24 | ☒ |
| ABSORBING CLAMP | MDS-21 | 100537 | R&S | 2018.08.28 | ☒ |
| Slide Bar | - | - | SIWON | - | ☒ |

### 6.2.4 Photographs of test setup



6.2.5 Disturbance power measurement result

#1- Power



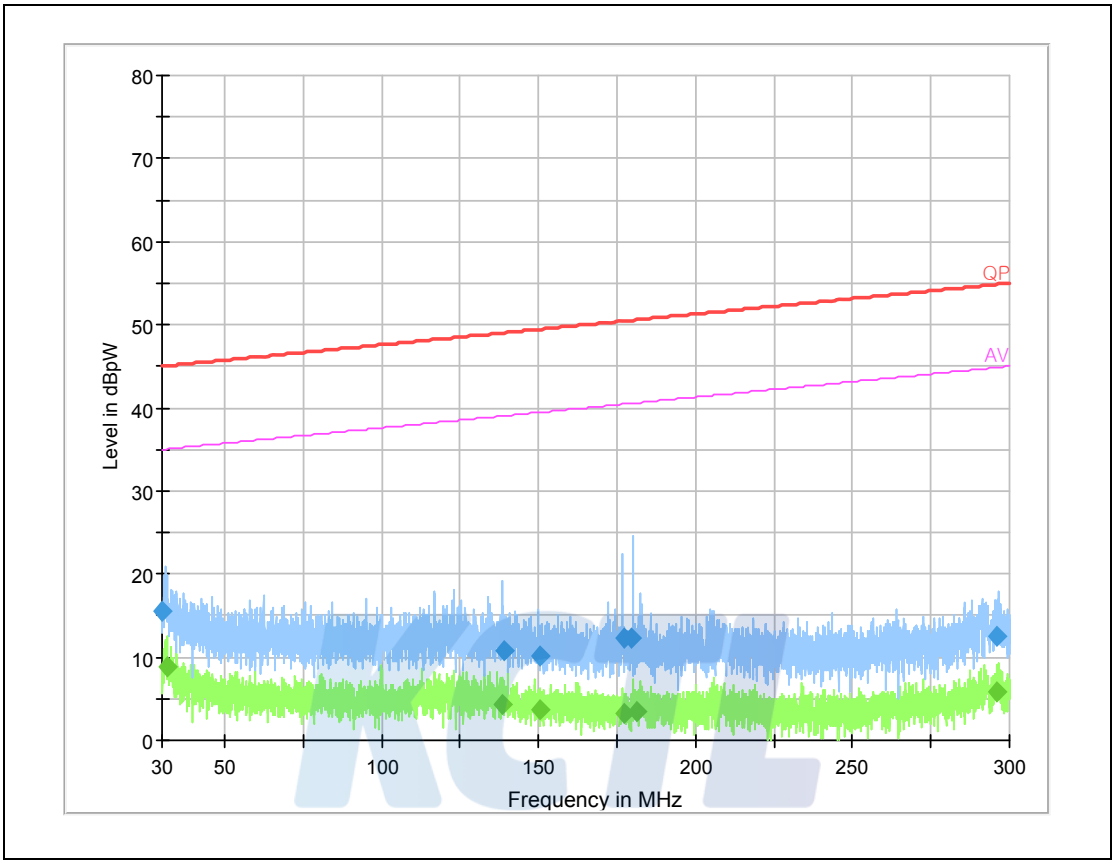

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 33.08 | 9.8 | 13.26 | 45.11 | 31.85 |
| 69.49 | 7.6 | 11.21 | 46.46 | 35.25 |
| 178.00 | 5.7 | 10.23 | 50.48 | 40.25 |
| 185.76 | 5.6 | 9.41 | 50.77 | 41.36 |
| 291.05 | 6.9 | 11.76 | 54.67 | 42.91 |
| 299.05 | 7.0 | 12.13 | 54.96 | 42.83 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 32.30 | 9.9 | 7.09 | 35.09 | 28.00 |
| 66.92 | 7.6 | 4.80 | 36.37 | 31.57 |
| 178.83 | 5.7 | 3.20 | 40.51 | 37.31 |
| 186.75 | 5.6 | 2.97 | 40.81 | 37.84 |
| 292.91 | 7.0 | 5.23 | 44.74 | 39.51 |
| 299.14 | 7.0 | 5.35 | 44.97 | 39.62 |

#2- Audio In L/R



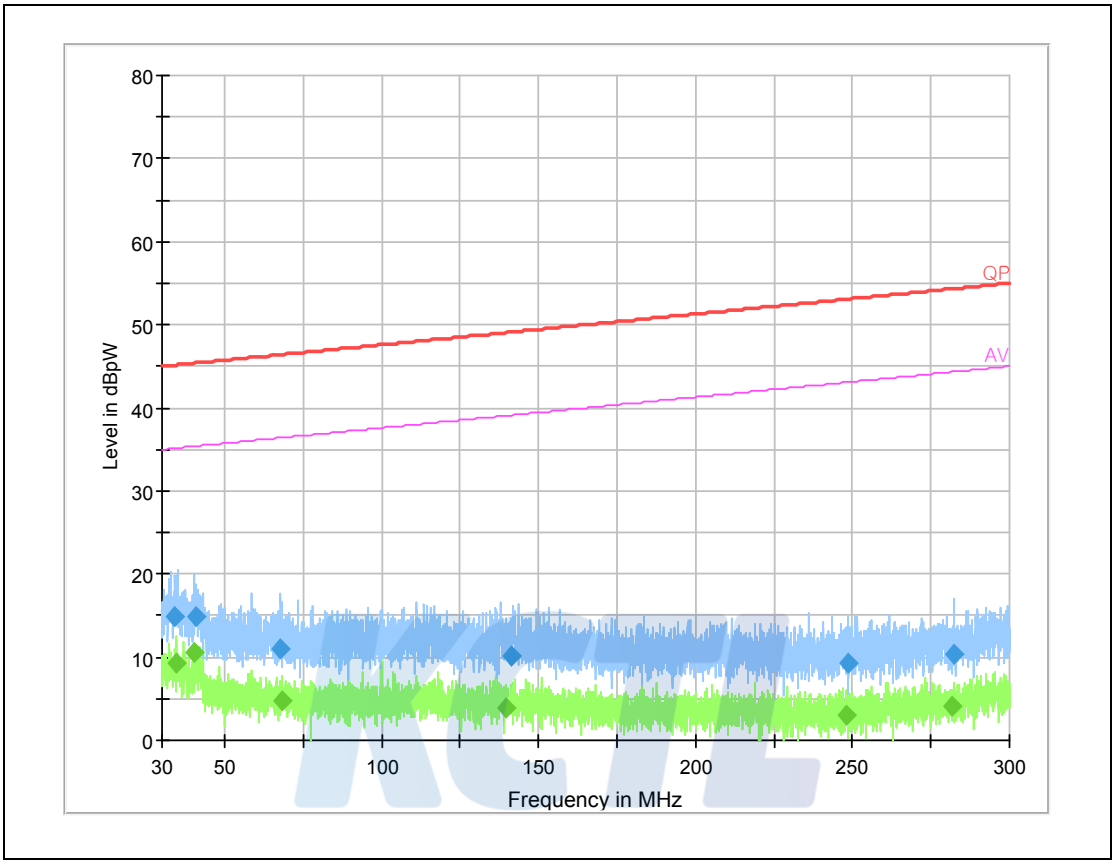

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.26 | 10.2 | 15.63 | 45.01 | 29.38 |
| 138.91 | 6.8 | 10.76 | 49.03 | 38.27 |
| 150.61 | 6.5 | 10.06 | 49.47 | 39.41 |
| 177.19 | 5.7 | 12.34 | 50.45 | 38.11 |
| 179.72 | 5.6 | 12.39 | 50.55 | 38.16 |
| 295.91 | 7.0 | 12.49 | 54.85 | 42.36 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 31.50 | 10.0 | 8.74 | 35.06 | 26.32 |
| 138.23 | 6.8 | 4.29 | 39.01 | 34.72 |
| 150.51 | 6.5 | 3.73 | 39.46 | 35.73 |
| 177.05 | 5.7 | 3.20 | 40.45 | 37.25 |
| 180.99 | 5.6 | 3.41 | 40.59 | 37.18 |
| 295.90 | 7.0 | 5.81 | 44.85 | 39.04 |

#3- Audio In



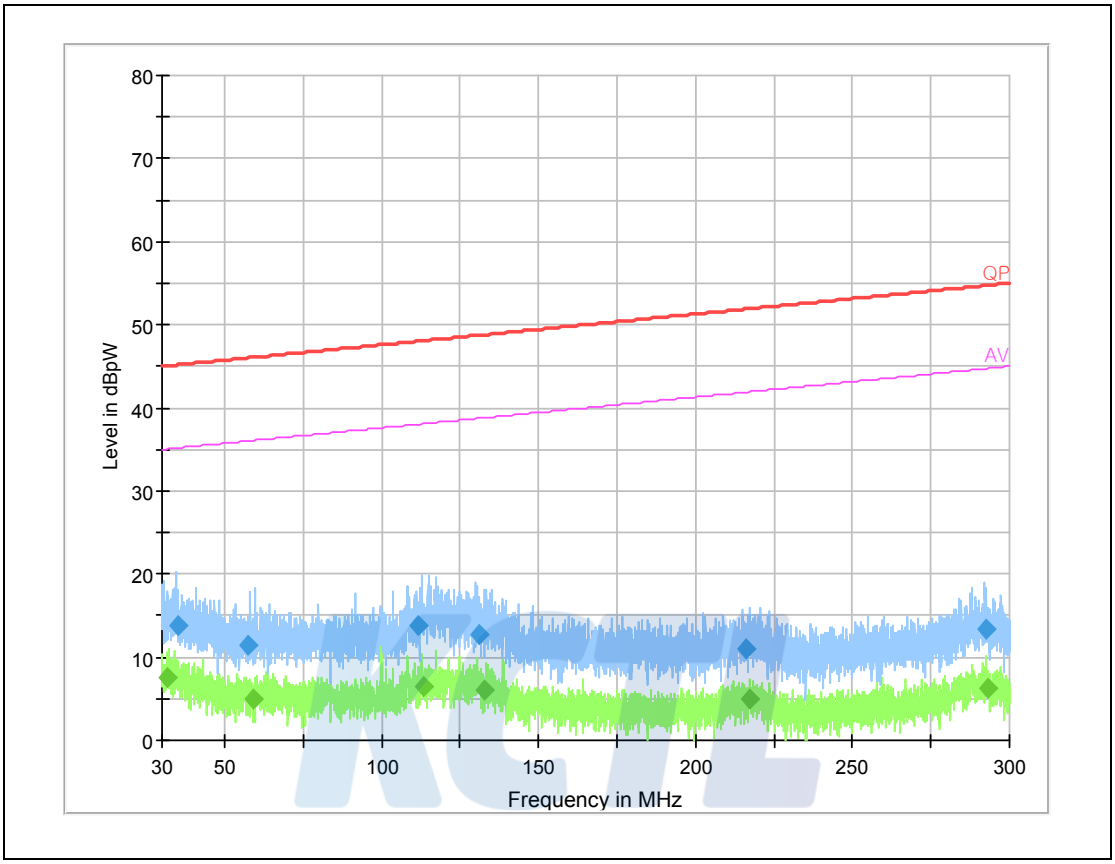

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 34.27 | 9.6 | 14.86 | 45.16 | 30.30 |
| 40.64 | 8.8 | 14.86 | 45.39 | 30.53 |
| 67.57 | 7.6 | 11.08 | 46.39 | 35.31 |
| 141.35 | 6.8 | 10.15 | 49.12 | 38.97 |
| 248.68 | 6.0 | 9.34 | 53.10 | 43.76 |
| 282.45 | 6.8 | 10.36 | 54.35 | 43.99 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 34.64 | 9.6 | 9.34 | 35.17 | 25.83 |
| 40.37 | 8.8 | 10.62 | 35.38 | 24.76 |
| 68.52 | 7.6 | 4.81 | 36.43 | 31.62 |
| 139.41 | 6.8 | 3.79 | 39.05 | 35.26 |
| 248.14 | 6.0 | 3.05 | 43.08 | 40.03 |
| 281.56 | 6.8 | 4.01 | 44.32 | 40.31 |

#4- Speaker Out




## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 34.94 | 9.5 | 13.90 | 45.18 | 31.28 |
| 57.50 | 7.5 | 11.36 | 46.02 | 34.66 |
| 111.67 | 7.4 | 13.76 | 48.02 | 34.26 |
| 131.01 | 7.1 | 12.77 | 48.74 | 35.97 |
| 216.34 | 5.5 | 11.07 | 51.90 | 40.83 |
| 292.70 | 7.0 | 13.35 | 54.73 | 41.38 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 31.79 | 10.0 | 7.60 | 35.07 | 27.47 |
| 58.86 | 7.5 | 4.98 | 36.07 | 31.09 |
| 113.06 | 7.4 | 6.56 | 38.08 | 31.52 |
| 132.51 | 7.0 | 6.14 | 38.80 | 32.66 |
| 217.38 | 5.5 | 4.96 | 41.94 | 36.98 |
| 292.94 | 7.0 | 6.18 | 44.74 | 38.56 |

## 6.3 Radiated disturbances

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | 10 m Chamber (4F) | | |
| Test distance | 3 m | | |
| Date | 2017-10-13 | | |
| Temperature (°C) | 21.6 °C | Humidity (% R.H.) | 49.3 % R.H. |
| Remarks | Pass | | |

### 6.3.1 Limits of radiated disturbances at 3 m distance

| Equipment type | Source | Frequency [㎒] | Limit dB(㎶/m) Quasi-peak [a] | Limit dB(㎶/m) RMS-average [a, b] |
|---|---|---|---|---|
| Television receivers, Video recorders and PC tuner cards | Local oscillator | ≤ 1 000 | Fundamental 57 [a] | Fundamental 57 [a] |
| | | 30 to 300 | Harmonics 52 | Harmonics 52 |
| | | 300 to 1 000 | Harmonics 56 | Harmonics 56 |
| | Other | 30 to 230 | 40 | 34/40 [c] |
| | | 230 to 1 000 | 47 | 47 |
| Television and sound receivers for broadcast satellite transmissions (Except outdoor units), Infrared remote control Units and Infrared headphone systems | Other | 30 to 230 | 40 | 34/40 [c] |
| | | 230 to 1 000 | 47 | 47 |
| Frequency modulation Sound receivers and PC Tuner cards | Local oscillator | ≤ 1 000 | Fundamental 60 | Fundamental 60 |
| | | 30 to 300 | Harmonics 52 | Harmonics 52 |
| | | 300 to 1 000 | Harmonics 56 | Harmonics 56 |
| | Other | 30 to 230 | 40 | 34/40 [c] |
| | | 230 to 1 000 | 47 | 47 |

[a] In Japan: 57 dB(㎶/m) is relaxed to 66 dB(㎶/ m) for operating channels <300 ㎒ and to 70 dB(㎶/m) for operating channels>300 ㎒.

[b] The RMS-average limits can be applied as an alternative to quasi-peak limits.

[c] For narrowband disturbances 40 dB(μV/m) applies. For this application a narrowband disturbance is identified if the difference between Peak and RMS-average value is ≤ 3 dB. All other signals are considered as broadband disturbances.
For these signals a Peak limit of 54 dB(μV/m) applies in addition to the RMS-average limit of 34 dB(μV/m).

### 6.3.2 Measurement procedure

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

### 6.3.3 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESR7 | 101078 | R&S | 2018.08.24 | ☒ |
| Bilog Antenna | VULB9168 | 583 | SCHWARZBECK | 2018.06.10 | ☒ |
| AMPLIFIER | 310N | 293004 | SONOMA | 2018.08.24 | ☒ |
| COAXIAL FIXED ATTENUATOR | 8491B-003 | 2708A18758 | AGILENT | - | ☒ |
| Antenna Mast | MA4640-XP-ET | - | Innco Systems | - | ☒ |
| Turn Table | TT 3.0-3t | - | MATURO | - | ☒ |

### 6.3.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L + 6 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

A.G = Amplifier Gain

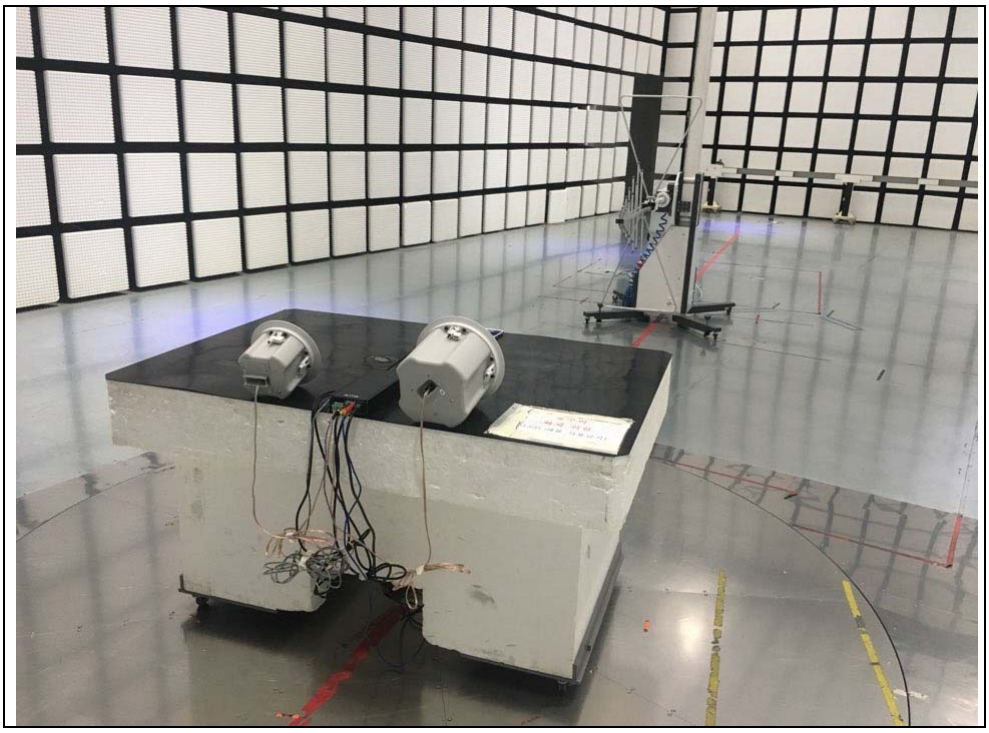
6 dB Att = 6 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

The result is

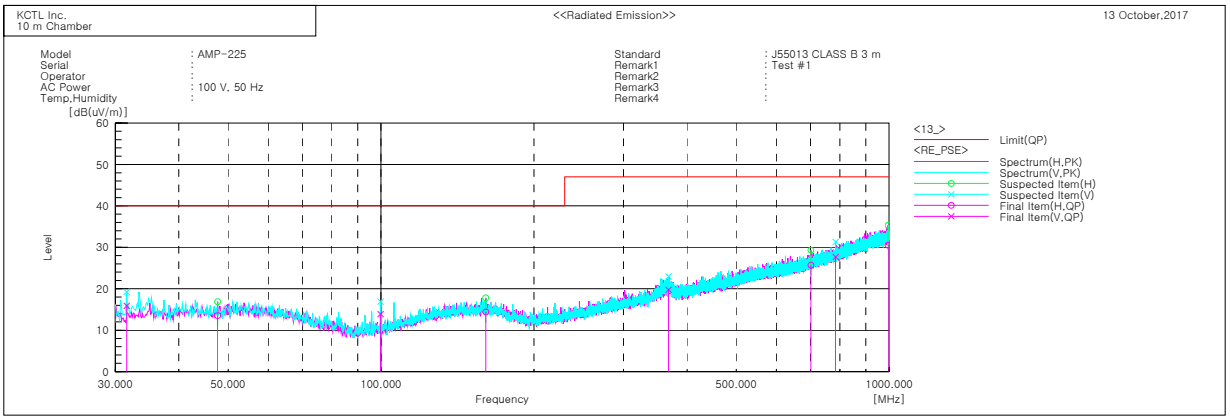
30 + 12 + 5 + 6 – 35 = 18 dB($\mu$N/m)

6.3.5 Photographs of test setup



## 6.3.6 Radiated disturbances measurement result

**Graph and Data**




Final Result

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 31.576 | V | 28.4 | -12.5 | 15.9 | 40.0 | 24.1 | 116.0 | 102.1 |
| 2 | 47.703 | H | 24.6 | -11.1 | 13.5 | 40.0 | 26.5 | 288.0 | 234.1 |
| 3 | 99.840 | V | 29.0 | -15.1 | 13.9 | 40.0 | 26.1 | 164.0 | 78.8 |
| 4 | 160.708 | H | 24.3 | -9.9 | 14.4 | 40.0 | 25.6 | 235.0 | 30.4 |
| 5 | 368.045 | V | 26.0 | -6.2 | 19.8 | 47.0 | 27.2 | 319.0 | 48.4 |
| 6 | 702.089 | H | 23.8 | 1.9 | 25.7 | 47.0 | 21.3 | 376.0 | 186.2 |
| 7 | 785.266 | V | 23.6 | 4.1 | 27.7 | 47.0 | 19.3 | 189.0 | 257.8 |
| 8 | 995.878 | H | 21.8 | 8.7 | 30.5 | 47.0 | 16.5 | 251.0 | 172.0 |

# 7. EUT photographs

Front View


Rear View

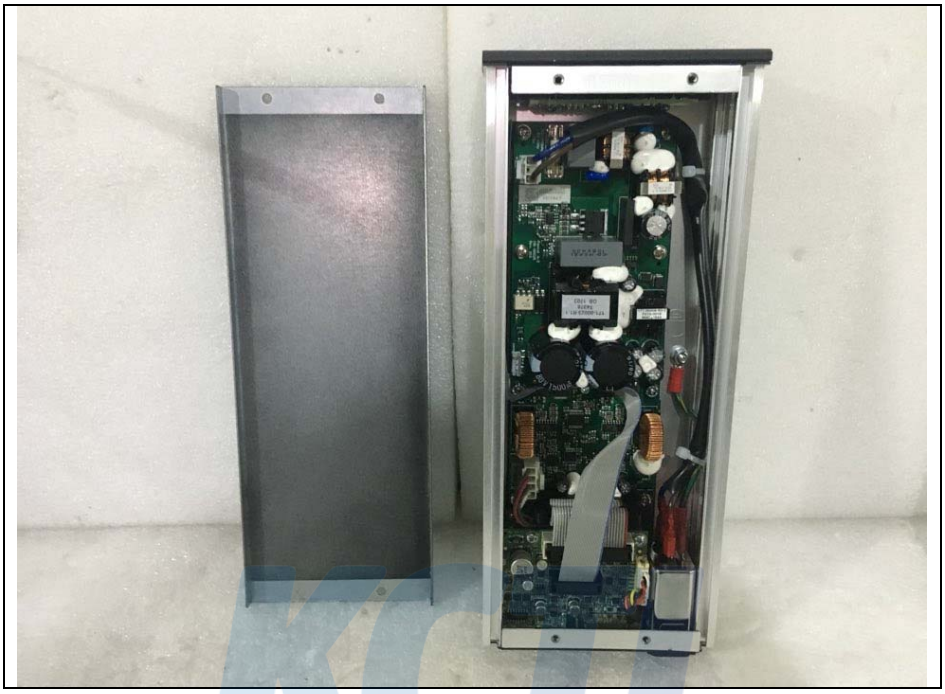
Left View

Right View

Top View

Bottom View

Inside



# TEST REPORT

**KCTL Inc.**
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr



**1. Client**

- Name : Crestron Electronics Inc.
- Address : 15 Volvo Drive, Rockleigh, NJ 07647, United States
- Date of Receipt : 2017-10-11

**2. Use of Report** : -

**3. Name of Product and Model** : Single-Channel Modular Power Amplifiers, 50W, 70V or 100V / AMP-150-70

**4. Manufacturer and Country of Origin** : Crestron Electronics Inc. / USA

**5. Date of Test** : 2017-10-13

**6. Test method used** : J55013(H22)

**7. Test Results** Refer to the test result in the test report

| | | |
|---|---|---|
| Affirmation | Tested by<br>Name : Donghyun Kim (Signature) | Technical Manager<br>Name : Gunsu Park (Signature) |

2017-10-19

## KCTL Inc.

REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2017-10-19 | Originally issued | - |
| | | |
| | | |
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| | | |

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# 1. Applicant information

| | |
|---|---|
| **Applicant:** | Crestron Electronics Inc. |
| **Address:** | 15 Volvo Drive, Rockleigh, NJ 07647, United States |
| **Telephone:** | +01-800-237-2041 |
| **E-mail:** | cpatel@crestron.com |
| **Contact name:** | Chirag Patel |

| | |
|---|---|
| **Manufacturer:** | Crestron Electronics Inc. |
| **Address:** | 15 Volvo Drive, Rockleigh, NJ 07647, United States |
| **Telephone:** | +01-800-237-2041 |
| **E-mail:** | cpatel@crestron.com |
| **Contact name:** | Chirag Patel |

# 2. Laboratory information

**Address**

**KCTL Inc. (Suwon Lab.)**

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

Telephone Number: 82 31 285 0894

Facsimile Number: 82 505 299 8311

FCC Site Designation No: KR0040, FCC Site Registration No: 687132

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP

# 3. Test system configuration

## 3.1 Operation environment

| | Temperature | Humidity | Pressure |
|---|---|---|---|
| Chamber 10 m(RE) | 21.8 °C | 50.4 % R.H. | - |
| Shielded room(CE) | 23.4 °C | 51.2 % R.H. | - |

Test site

These testing items were performed following locations;

| Test item | Test site |
|---|---|
| Disturbance voltage at the mains terminals | Shielded Room |
| Disturbance voltage at the antenna terminals | Shielded Room |
| Wanted signal and disturbance voltage at RF output terminals of equipment with RF video modulator | Shielded Room |
| Disturbance power | 10 m Chamber |
| Radiated disturbances | 10 m Chamber |

## 3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

| Conducted Emission measurement (Confidence level about 95 %, $k$ = 2) | | |
|---|---|---|
| Shielded Room (CE#1) | 9 kHz ~ 150 kHz: 3.66 dB | |
| | 150 kHz ~ 30 MHz: 3.26 dB | |
| Shielded Room (CE#2) | 9 kHz ~ 150 kHz: 3.48 dB | |
| | 150 kHz ~ 30 MHz: 3.06 dB | |
| Radiated Emission measurement (Confidence level about 95 %, $k$ = 2) | | |
| 10 m Chamber (4F) | 30 MHz ~ 300 MHz | 3 m: 5.42 dB |
| | | 10 m: 5.40 dB |
| | 300 MHz ~ 1 000 MHz | 3 m: 5.56 dB |
| | | 10 m: 5.44 dB |
| | 1 GHz ~ 6 GHz | 3 m: 6.28 dB |
| 10 m Chamber (2F) | 30 MHz ~ 300 MHz | 3 m: 5.06 dB |
| | | 10 m: 5.04 dB |
| | 300 MHz ~ 1 000 MHz | 3 m: 5.18 dB |
| | | 10 m: 5.06 dB |
| | 1 GHz ~ 6 GHz | 3 m: 6.36 dB |
| Radio Frequency Electromagnetic Fields (Confidence level about 95 %, $k$ = 2) | | |
| 0.86 dB | | |
| Disturbance Power Electromagnetic Fields (Confidence level about 95 %, $k$ = 2) | | |
| 2.82 dB | | |

## 3.3 Measurement Program

These test items were performed by software programs;

| Test item | Measurement Program | | Used |
|---|---|---|---|
| Conducted Emission | EP5CE_V 5.4.0(TOYO) | | ☒ |
| Radiated Emission | 2F | EP5RE_V 4.6.0(TOYO) | ☒ |
| | 4F | EP5RE_V 5.11.10(TOYO) | |
| Disturbance power | EMC32_V 9.01.0<br>(ROHDE & SCHWARZ) | | ☒ |

# 4. Description of EUT

## 4.1 General information

### Audio

**Input Signal Types:** Balanced or unbalanced analog line-level
**Output Power, AMP-150-70:** 50 Watts @ 70 Volts nominal
**Output Power, AMP-150-100:** 50 Watts @ 100 Volts nominal
**Frequency Response:** 200 Hz to 20 kHz ±0.5 dB
**High-Pass Filter:** -3 dB @ 80 Hz, 12 dB per octave
**THD+N:** <0.1% [1]
**S/N Ratio:** >100 dBA, 20 Hz to 20 kHz, balanced
**Input Sensitivity:** 1.23 Vrms, +4 dBu balanced;
0.316 Vrms, -10 dBV unbalanced;
For full rated output power
**Go To Sleep Time:** 25 minutes with no signal present
**Wake Time:** 0.5 second typical
**Wake Threshold:** 5 to 20 mV typical
**Protection:** Clip limiter, over current, under voltage, over temperature, DC offset, extreme high frequency

### Connectors

**SPEAKER OUT:** (1) 2-pin 7.62 mm reversed gender 20A detachable terminal block; Power amplifier output;
Wire Size: Terminals accept up to 12 AWG (3.31 $mm^2$);
*Note: Output is direct-coupled, not transformer isolated*

**AUDIO IN L/R (unbalanced):** (2) RCA connectors, female;
Unbalanced line-level audio inputs (summed);
Maximum Input Level: 2.24 Vrms, +7 dBV (+9.2 dBu)

**AUDIO IN L/R (balanced):** (1) 5-pin 3.5 mm detachable terminal block;
Balanced line-level audio inputs (summed);
Maximum Input Level: 7.75 Vrms, +20 dBu;
Input Impedance: 20k Ohms

**G:** (1) 6-32 screw;
Chassis ground lug

**100-240V~1A 50/60 Hz:** (1) IEC 60320 C14 main power inlet;
Mates with removable power cord, included

### Controls & Indicators

**PWR:** (1) Bi-color green/amber LED, indicates operating power supplied from AC line power, turns green while operating and amber when in standby
**FAULT:** (1) Red LED; indicates an over-temperature or over-current fault
**SIGNAL:** (1) Bi-color green/red LED, green indicates input signal presence and red indicates input signal clipping
**Input Level:** (1) Screwdriver-adjustable rotary control, adjusts the input attenuation level, tamper-preventive magnetic cover included

### Power

**Main Power:** 1 Amp @ 100-240 Volts AC, 50/60 Hz
**Power Consumption:** 17 Watts, all channels driven at 1/8th output power;
8 Watts, idle;
<0.5 Watt, standby (sleep)

### Environmental

**Temperature:** 41° to 104° F (5° to 40° C)
**Humidity:** 10% to 90% RH (non-condensing)

### Construction

**Chassis:** Metal, convection-cooled (fanless), vented front and rear
**Front Panel:** Metal, black finish with polycarbonate label overlay
**Mounting:** Freestanding, surface-mount, or 1/4-width 1 RU 19-inch rack-mountable; gangable with other Crestron modular AMP series products (adhesive feet, surface mounting kit, ganging kit, and rack mounting kit included)

### Dimensions

**Height:** 1.74 in (45 cm) without feet;
1.82 in (47 mm) with surface kit
**Width:** 4.33 in (110 mm);
5.43 in (138 mm) with surface kit;
19.00 in (483 mm) with rack kit
**Depth:** 10.46 in (266 mm)

### Weight

1.9 lb (0.9 kg) without mounting kits
2.2 lb (1.0 kg) maximum with surface or rack kit

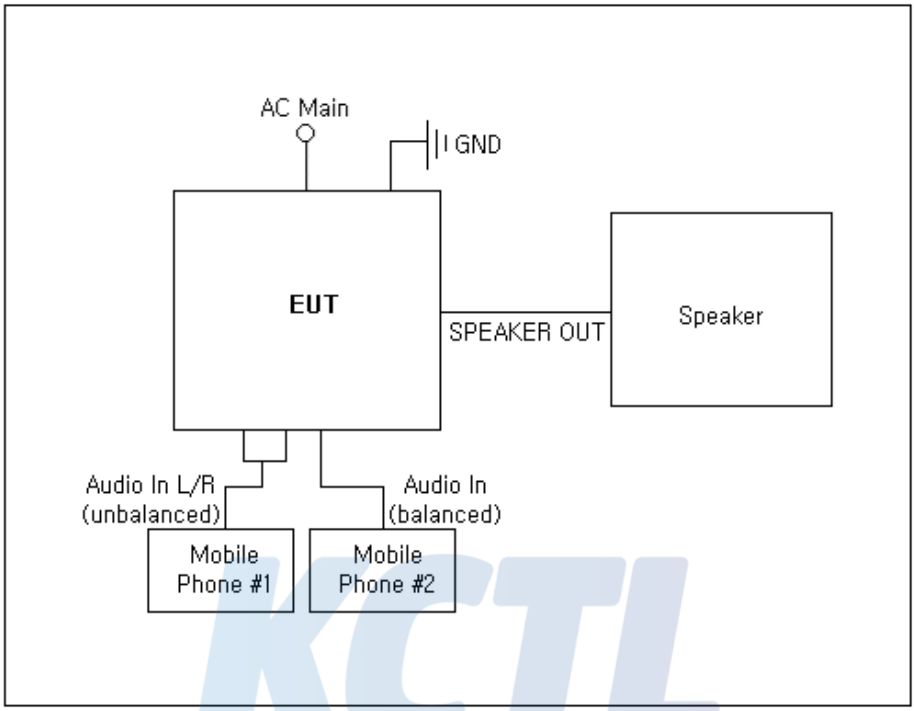
## 4.2 Product description

| | |
|---|---|
| Type of product | Single-Channel Modular Power Amplifiers, 50W, 70V or 100V |
| Model name (Basic) | AMP-150-70 |
| Model name (Variant) | - |
| Difference | - |
| Serial no | - |
| Testing voltage | 100 V, 50 Hz |
| Input rating | 100 V - 240 V, 50/60 Hz |
| Internal clock frequency | 500 MHz |
| Note | - |

## 4.3 Auxiliary equipments

| Type | Model / Part # | S/N | Manufacturer |
|---|---|---|---|
| Mobile Phone #1 | GT-N7105 | - | SAMSUNG |
| Mobile Phone #2 | LG-F200L | - | LG |
| Speaker | - | - | Crestron Electronics Inc. |

## 4.4 Test configuration




| | Start | | End | | Cable | |
|---|---|---|---|---|---|---|
| | Name | I/O port | Name | I/O port | Length (m) | Spec. |
| 1 | **EUT** | Power | AC Main | - | 2.0 | Unshield |
| 2 | | Audio In L/R (unbalanced) | Mobile Phone #1 | AUX | 3.0 | Unshield |
| 3 | | Audio In (balanced) | Mobile Phone #2 | AUX | 3.0 | Unshield |
| 4 | | SPEAKER OUT | Speaker | SPEAKER IN | 3.0 | Unshield |
| 5 | | GND | GND | - | 2.0 | - |

## 4.5 Operating conditions

The EUT was configured as normal intended use.

| Test mode | Normal operating |
|---|---|
| Test #1 | After arranging as above, mobile phones #1 and #2 are used to check the output state of the speaker after 1 kHz music playback and test. |

# 5. Summary of test results

## 5.1 Summary of EMI emission test results

| Applied | Test items | Test method | Result |
|---|---|---|---|
| ☒ | Disturbance voltage at the mains terminals | J55013(H22) | Pass |
| ☒ | Disturbance power | J55013(H22) | Pass |
| ☒ | Radiated disturbances | J55013(H22) | Pass |

# 6. Test results

## 6.1 Disturbance voltage at the mains terminals

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | Shielded room (CE#2) | | |
| Date | 2017-10-13 | | |
| Temperature(°C) | 23.4 °C | Humidity (% R.H.) | 51.2 % R.H. |
| Remarks | Pass | | |

### 6.1.1 Limits of disturbance voltage at the mains terminals

| Equipment Type | Frequency range [㎒] | Limit values (㏈(㎶)) | |
|---|---|---|---|
| | | Quasi-peak | Average |
| Television and sound receivers and associated equipment | 0.15 ~ 0.5 | 66 ~ 56 | 56 ~ 46 |
| | 0.5 ~ 5 | 56 | 46 |
| | 5 ~ 30 | 60 | 50 |
| *Decreasing linealy with the longarithm of the frequncy. | | | |

### 6.1.2 Measurement procedure

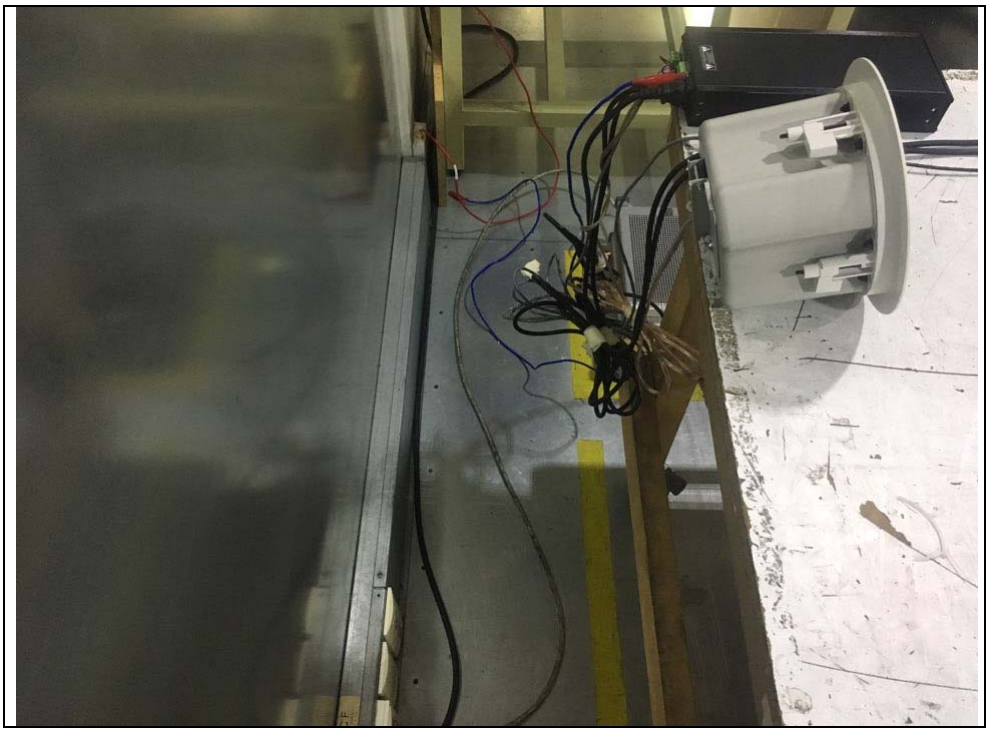
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 ㎜ above the reference ground plane. The rear of table was located 0.4 ㎜ to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 40 ㎝ to the Horizontal metal ground 30 ~ 40 ㎝ long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 80 ㎝ from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement. Both lines of power cord, hot and neutral, were measured.

### 6.1.3 Used equipments

| Equipment | Model | Serial No. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESCI | 100710 | R&S | 2018.08.24 | ☒ |
| TWO-LINE V-NETWORK | ENV216 | 101352 | R&S | 2018.08.25 | ☒ |
| TWO-LINE V-NETWORK | NNLK8121 | 8121-472 | SCHWARZBECK | 2018.08.25 | ☐ |

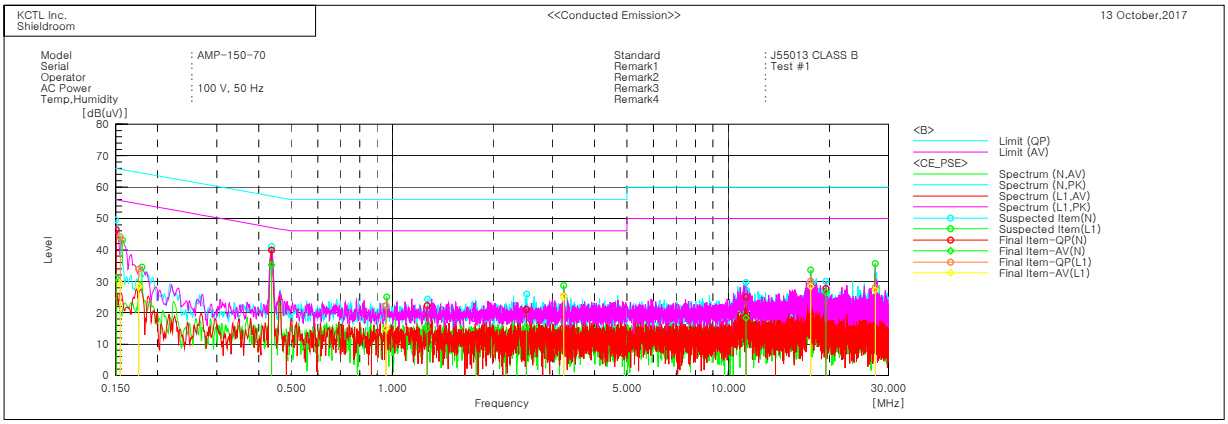
### 6.1.4 Photographs of test setup

AC Main



## 6.1.5 Measurement result

### AC Main




Final Result

--- N Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15083 | 36.3 | 21.0 | 10.1 | 46.4 | 31.1 | 66.0 | 56.0 | 19.6 | 24.9 |
| 2 | 0.43699 | 29.8 | 25.1 | 10.1 | 39.9 | 35.2 | 57.1 | 47.1 | 17.2 | 11.9 |
| 3 | 1.27004 | 12.2 | 4.7 | 10.1 | 22.3 | 14.8 | 56.0 | 46.0 | 33.7 | 31.2 |
| 4 | 2.5086 | 10.9 | 5.4 | 10.1 | 21.0 | 15.5 | 56.0 | 46.0 | 35.0 | 30.5 |
| 5 | 11.28522 | 14.8 | 8.2 | 10.2 | 25.0 | 18.4 | 60.0 | 50.0 | 35.0 | 31.6 |
| 6 | 19.56009 | 17.5 | 16.2 | 10.3 | 27.8 | 26.5 | 60.0 | 50.0 | 32.2 | 23.5 |

--- L1 Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15496 | 33.9 | 19.0 | 10.2 | 44.1 | 29.2 | 65.7 | 55.7 | 21.6 | 26.5 |
| 2 | 0.17593 | 23.5 | 17.9 | 10.3 | 33.8 | 28.2 | 64.7 | 54.7 | 30.9 | 26.5 |
| 3 | 0.95839 | 12.1 | 4.8 | 10.1 | 22.2 | 14.9 | 56.0 | 46.0 | 33.8 | 31.1 |
| 4 | 3.23667 | 15.3 | 15.1 | 10.0 | 25.3 | 25.1 | 56.0 | 46.0 | 30.7 | 20.9 |
| 5 | 17.60189 | 19.8 | 18.1 | 10.3 | 30.1 | 28.4 | 60.0 | 50.0 | 29.9 | 21.6 |
| 6 | 27.38395 | 17.8 | 16.8 | 10.3 | 28.1 | 27.1 | 60.0 | 50.0 | 31.9 | 22.9 |

## 6.2 Disturbance power

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | 10 m Chamber (4F) | | |
| Date | 2017-10-13 | | |
| Temperature (°C) | 21.5 °C | Humidity (% R.H.) | 50.3 % R.H. |
| Remarks | Pass (#1- Power, #2- Audio In L/R(unbalanced),<br>#3-Audio In(balanced), #4- SPEAKER OUT) | | |

### 6.2.1 Measurement procedure

The appliance to be tested is placed on a non-metallic table at least 0.8 m from other metallic objects and the lead to be measured on is stretched in a straight line for a distance sufficient to accommodate the absorbing clamp, and to permit the necessary measuring adjustment of position for tuning. The clamp is placed around the lead so as to measure a quantity proportional to the disturbance power on the lead. The absorbing clamp is positioned for maximum indication at each test frequency; the clamp shall be moved along the lead until the maximum value is found between a position adjacent to the appliance and a distance of about a half-wavelength from it. EUT during the test are noted in the following test records.

### 6.2.2 Limits of disturbance power

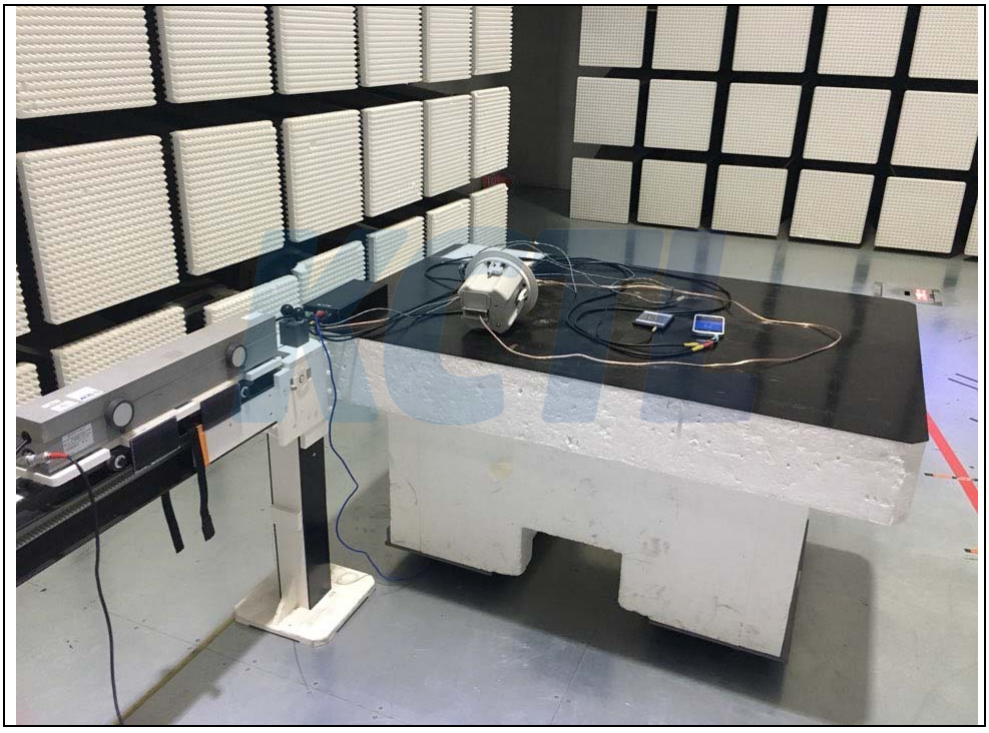
| Equipment Type | Frequency range [MHz] | Limit values dB(pW) | |
|---|---|---|---|
| | | Quasi-peak | Average |
| Associated equipment (video recorders excluded) | 30 to 300 | 45 ~ 55 [a] | 35 ~ 45 [a] |
| [a] Increasing linearly with the frequency. | | | |

Margin(dB) = Limit(dB(pW)) - QuasiPeak(dB(pW))
Margin(dB) = Limit(dB(pW)) - C-Average(dB(pW))

### 6.2.3 Used equipments

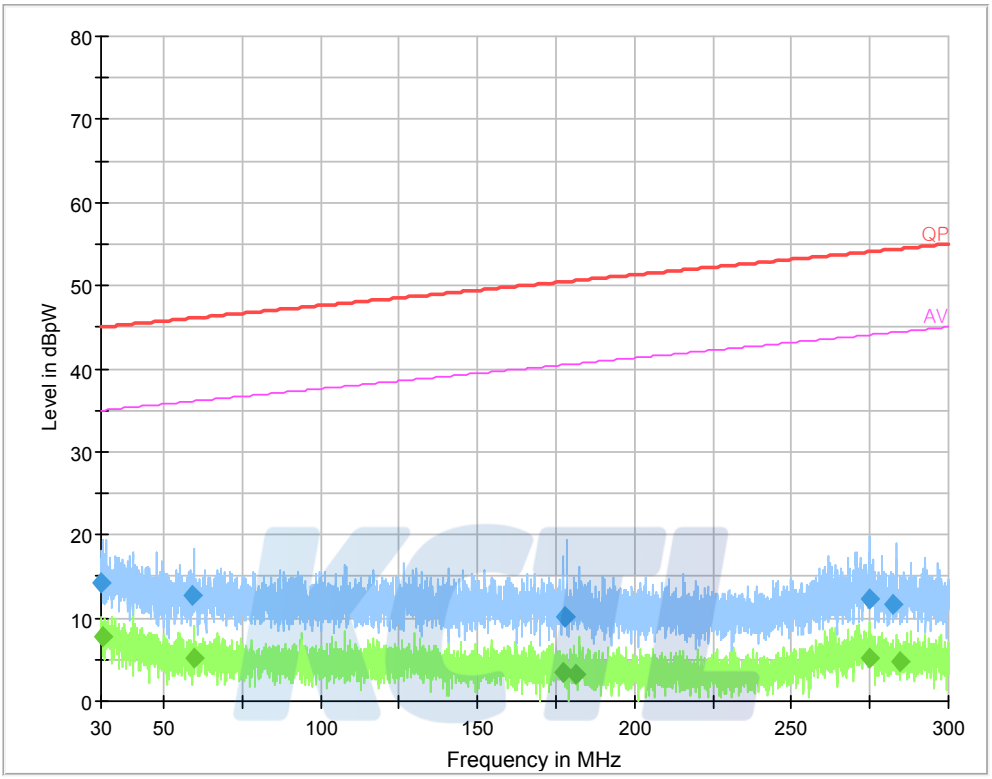
| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESCI | 101408 | R&S | 2018.08.24 | ☒ |
| ABSORBING CLAMP | MDS-21 | 100537 | R&S | 2018.08.28 | ☒ |
| Slide Bar | - | - | SIWON | - | ☒ |

### 6.2.4 Photographs of test setup



6.2.5 Disturbance power measurement result

#1- Power



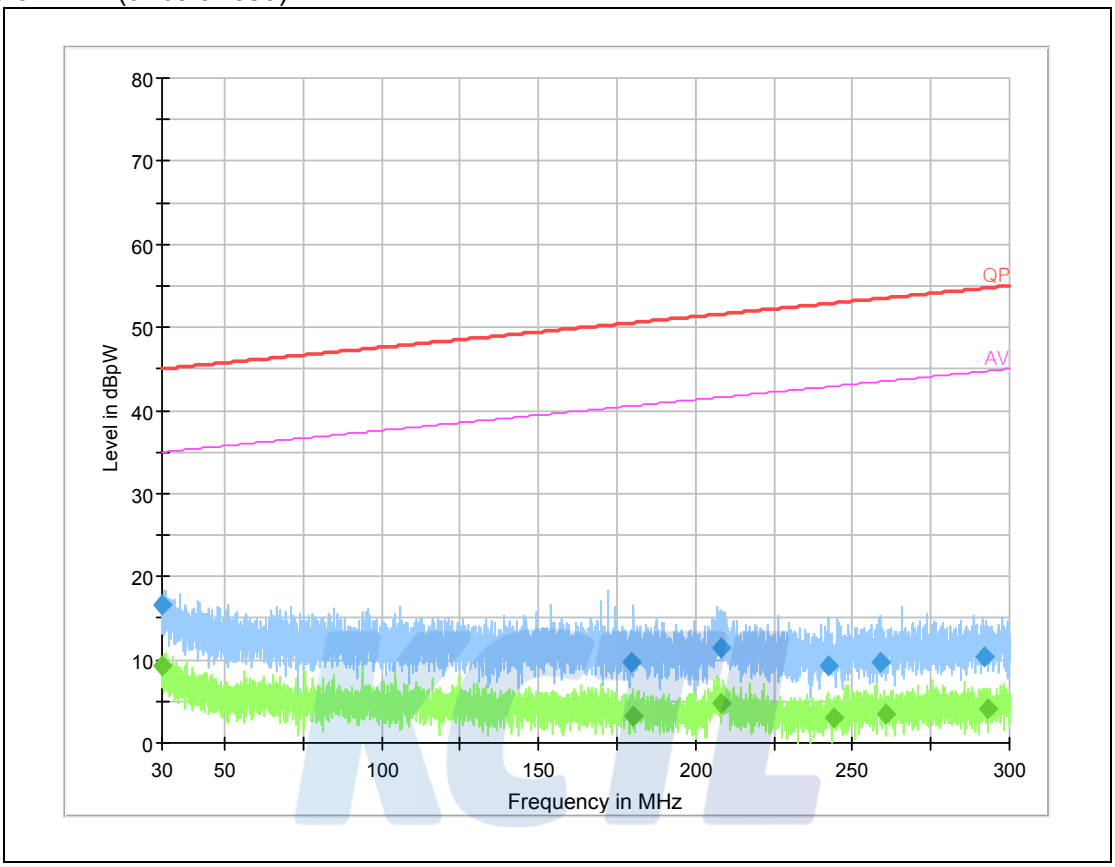

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.28 | 10.2 | 14.22 | 45.01 | 30.79 |
| 59.05 | 7.5 | 12.62 | 46.08 | 33.46 |
| 177.86 | 5.7 | 10.18 | 50.48 | 40.30 |
| 177.93 | 5.7 | 10.19 | 50.48 | 40.29 |
| 274.82 | 6.7 | 12.23 | 54.07 | 41.84 |
| 282.46 | 6.8 | 11.64 | 54.35 | 42.71 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.55 | 10.1 | 7.82 | 35.02 | 27.20 |
| 59.87 | 7.5 | 5.26 | 36.11 | 30.85 |
| 177.42 | 5.7 | 3.52 | 40.46 | 36.94 |
| 181.36 | 5.6 | 3.34 | 40.61 | 37.27 |
| 274.75 | 6.7 | 5.23 | 44.06 | 38.83 |
| 284.70 | 6.8 | 4.71 | 44.43 | 39.72 |

#2- Audio In L/R(unbalanced)



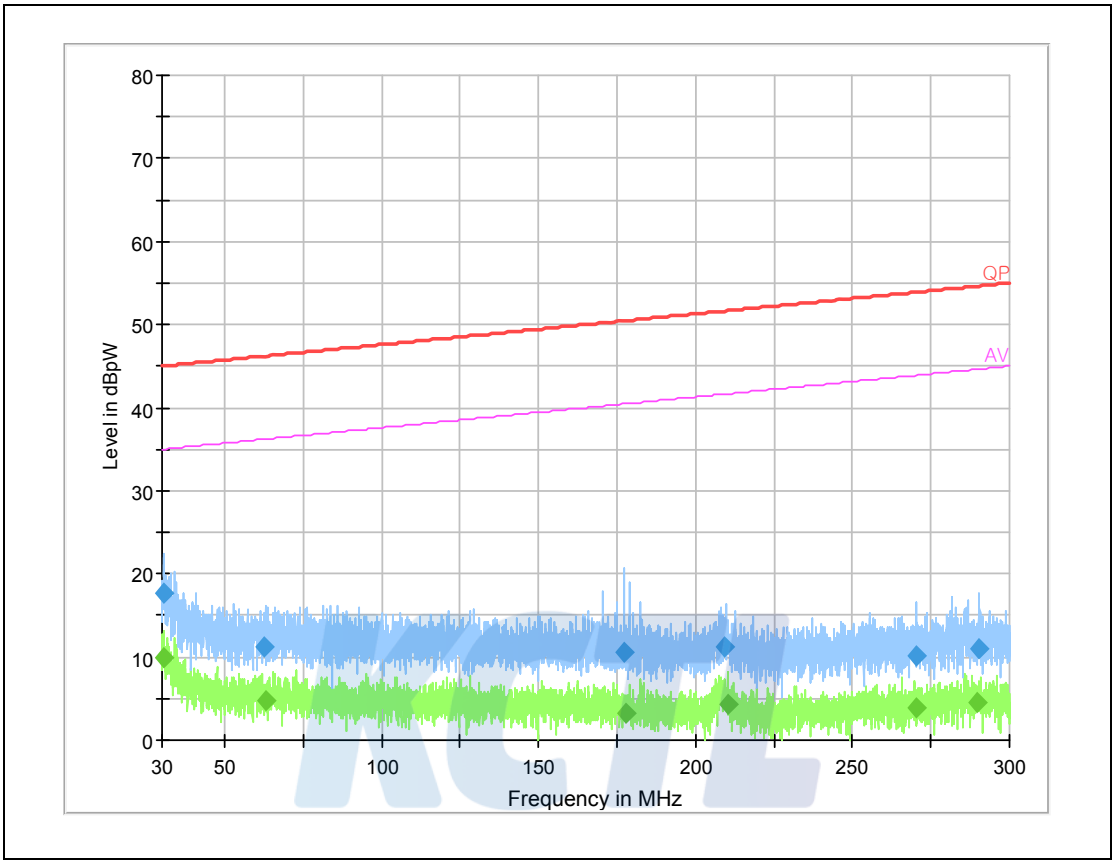

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.01 | 10.2 | 16.53 | 45.00 | 28.47 |
| 179.74 | 5.6 | 9.68 | 50.55 | 40.87 |
| 207.93 | 5.4 | 11.47 | 51.59 | 40.12 |
| 242.50 | 5.9 | 9.22 | 52.87 | 43.65 |
| 258.77 | 6.3 | 9.74 | 53.47 | 43.73 |
| 292.23 | 6.9 | 10.41 | 54.71 | 44.30 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.09 | 10.2 | 9.33 | 35.00 | 25.67 |
| 179.99 | 5.6 | 3.26 | 40.56 | 37.30 |
| 207.89 | 5.4 | 4.82 | 41.59 | 36.77 |
| 244.34 | 5.9 | 3.08 | 42.94 | 39.86 |
| 260.45 | 6.4 | 3.40 | 43.54 | 40.14 |
| 293.16 | 7.0 | 4.02 | 44.75 | 40.73 |

#3-Audio In(balanced)



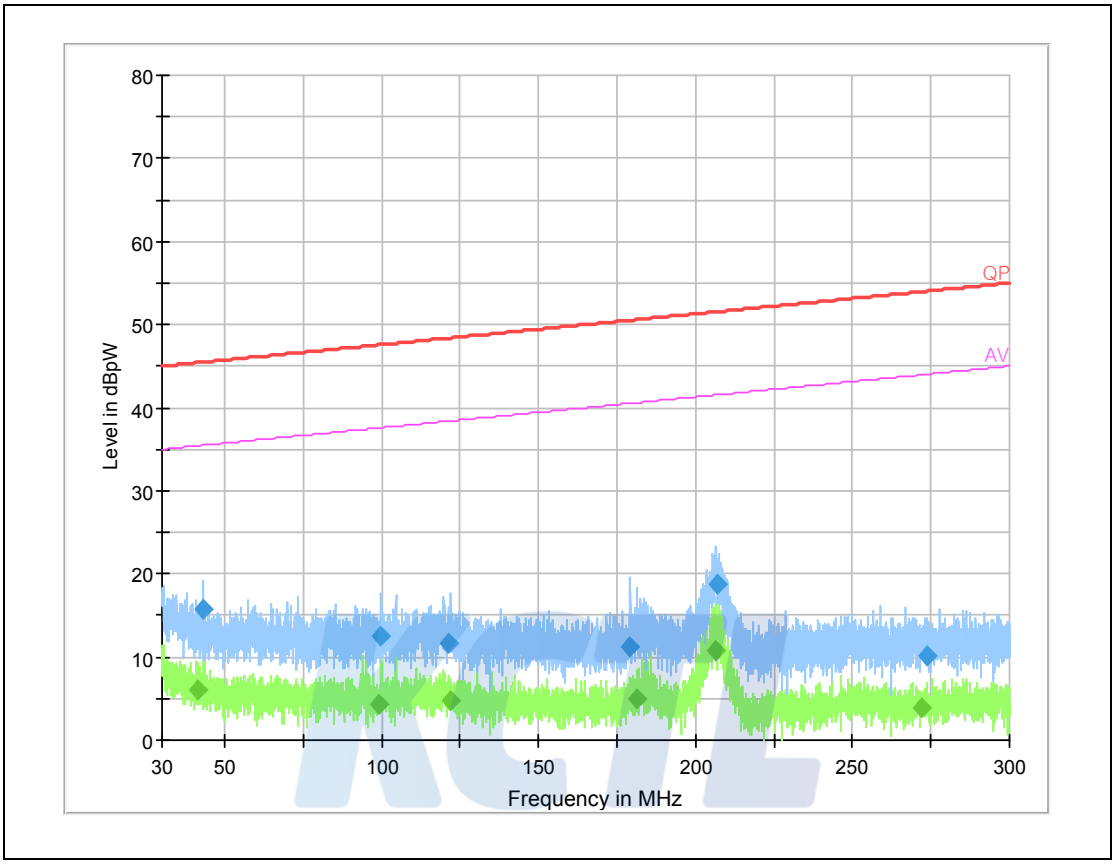

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.63 | 10.1 | 17.68 | 45.02 | 27.34 |
| 62.67 | 7.6 | 11.14 | 46.21 | 35.07 |
| 177.39 | 5.7 | 10.48 | 50.46 | 39.98 |
| 209.07 | 5.4 | 11.18 | 51.63 | 40.45 |
| 270.35 | 6.7 | 10.07 | 53.90 | 43.83 |
| 290.21 | 6.9 | 11.06 | 54.64 | 43.58 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.84 | 10.1 | 9.83 | 35.03 | 25.20 |
| 63.30 | 7.6 | 4.83 | 36.23 | 31.40 |
| 178.02 | 5.7 | 3.32 | 40.48 | 37.16 |
| 210.37 | 5.4 | 4.36 | 41.68 | 37.32 |
| 270.13 | 6.7 | 3.83 | 43.89 | 40.06 |
| 289.63 | 6.9 | 4.44 | 44.62 | 40.18 |

#4- SPEAKER OUT




## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 43.15 | 8.4 | 15.81 | 45.49 | 29.68 |
| 99.84 | 7.4 | 12.58 | 47.59 | 35.01 |
| 121.16 | 7.3 | 11.65 | 48.38 | 36.73 |
| 179.19 | 5.7 | 11.27 | 50.53 | 39.26 |
| 207.04 | 5.4 | 18.84 | 51.56 | 32.72 |
| 273.87 | 6.7 | 10.14 | 54.03 | 43.89 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 41.29 | 8.7 | 6.13 | 35.42 | 29.29 |
| 99.20 | 7.4 | 4.32 | 37.56 | 33.24 |
| 121.83 | 7.3 | 4.80 | 38.40 | 33.60 |
| 181.35 | 5.6 | 4.88 | 40.61 | 35.73 |
| 206.51 | 5.5 | 10.84 | 41.54 | 30.70 |
| 272.17 | 6.7 | 3.86 | 43.97 | 40.11 |

## 6.3 Radiated disturbances

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | 10 m Chamber (4F) | | |
| Test distance | 3 m | | |
| Date | 2017-10-13 | | |
| Temperature (°C) | 21.8 °C | Humidity (% R.H.) | 50.4 % R.H. |
| Remarks | Pass | | |

### 6.3.1 Limits of radiated disturbances at 3 m distance

| Equipment type | Source | Frequency [㎒] | Limit dB(㎶/m) Quasi-peak [a] | Limit dB(㎶/m) RMS-average [a, b] |
|---|---|---|---|---|
| Television receivers, Video recorders and PC tuner cards | Local oscillator | ≤ 1 000 | Fundamental 57 [a] | Fundamental 57 [a] |
| | | 30 to 300 | Harmonics 52 | Harmonics 52 |
| | | 300 to 1 000 | Harmonics 56 | Harmonics 56 |
| | Other | 30 to 230 | 40 | 34/40 [c] |
| | | 230 to 1 000 | 47 | 47 |
| Television and sound receivers for broadcast satellite transmissions (Except outdoor units), Infrared remote control Units and Infrared headphone systems | Other | 30 to 230 | 40 | 34/40 [c] |
| | | 230 to 1 000 | 47 | 47 |
| Frequency modulation Sound receivers and PC Tuner cards | Local oscillator | ≤ 1 000 | Fundamental 60 | Fundamental 60 |
| | | 30 to 300 | Harmonics 52 | Harmonics 52 |
| | | 300 to 1 000 | Harmonics 56 | Harmonics 56 |
| | Other | 30 to 230 | 40 | 34/40 [c] |
| | | 230 to 1 000 | 47 | 47 |

[a] In Japan: 57 dB(㎶/m) is relaxed to 66 dB(㎶/ m) for operating channels <300 ㎒ and to 70 dB(㎶/m) for operating channels>300 ㎒.

[b] The RMS-average limits can be applied as an alternative to quasi-peak limits.

[c] For narrowband disturbances 40 dB(μV/m) applies. For this application a narrowband disturbance is identified if the difference between Peak and RMS-average value is ≤ 3 dB. All other signals are considered as broadband disturbances.
For these signals a Peak limit of 54 dB(μV/m) applies in addition to the RMS-average limit of 34 dB(μV/m).

### 6.3.2 Measurement procedure.

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

### 6.3.3 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESR7 | 101078 | R&S | 2018.08.24 | ☒ |
| Bilog Antenna | VULB9168 | 583 | SCHWARZBECK | 2018.06.10 | ☒ |
| AMPLIFIER | 310N | 293004 | SONOMA | 2018.08.24 | ☒ |
| COAXIAL FIXED ATTENUATOR | 8491B-003 | 2708A18758 | AGILENT | - | ☒ |
| Antenna Mast | MA4640-XP-ET | - | Innco Systems | - | ☒ |
| Turn Table | TT 3.0-3t | - | MATURO | - | ☒ |

### 6.3.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L + 6 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

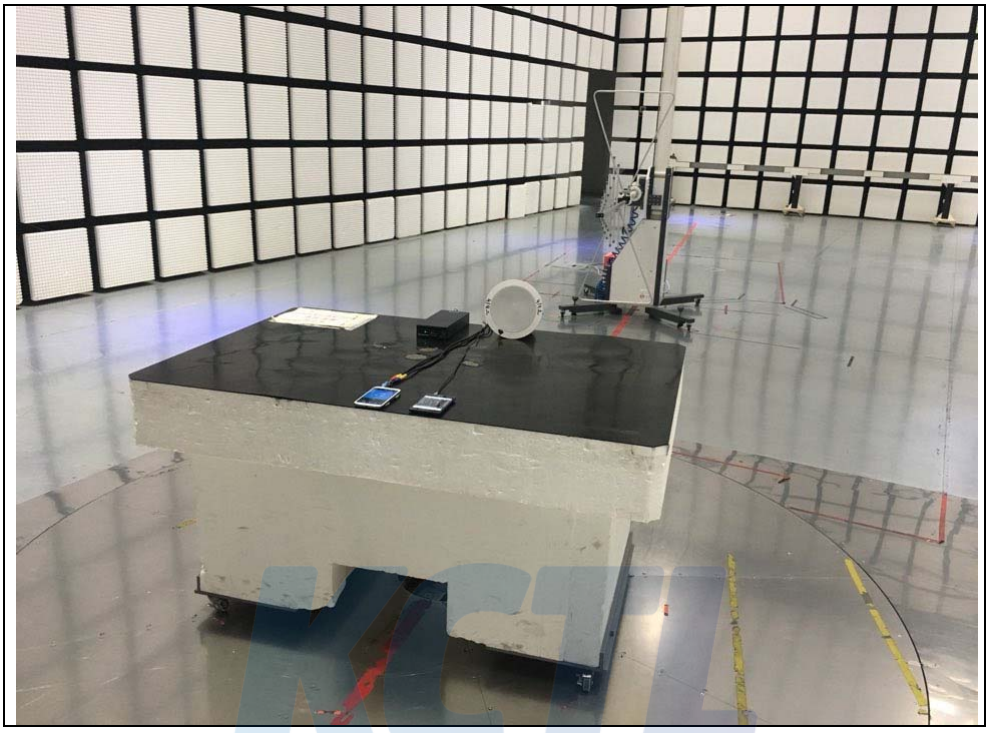
A.G = Amplifier Gain

6 dB Att = 6 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

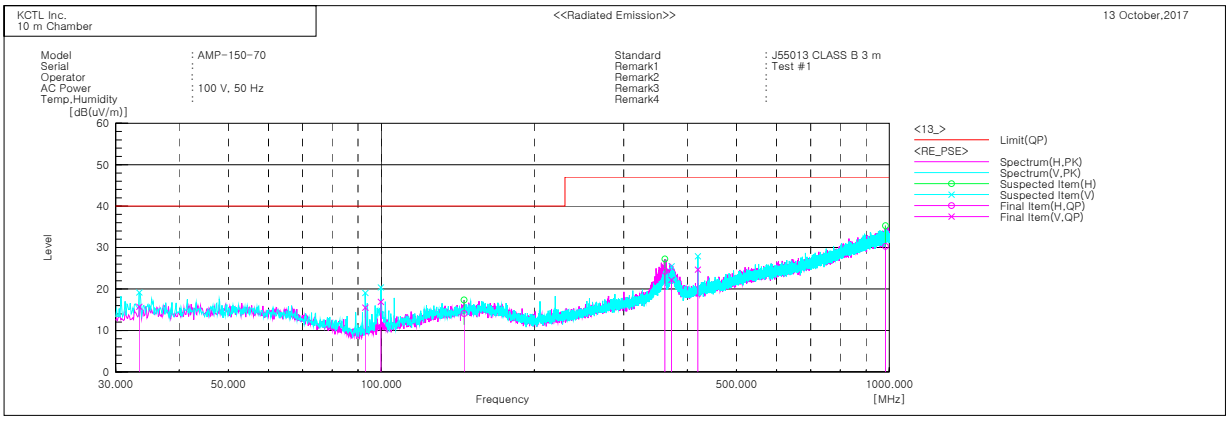
The result is 30 + 12 + 5 + 6 – 35 = 18 dB($\mu$N/m)

6.3.5 Photographs of test setup



## 6.3.6 Radiated disturbances measurement result

### Graph and Data




Final Result

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 33.395 | V | 28.1 | -12.4 | 15.7 | 40.0 | 24.3 | 397.0 | 277.7 |
| 2 | 93.050 | V | 31.4 | -15.9 | 15.5 | 40.0 | 24.5 | 256.0 | 44.1 |
| 3 | 99.840 | V | 32.0 | -15.1 | 16.9 | 40.0 | 23.1 | 399.0 | 348.0 |
| 4 | 145.551 | H | 24.4 | -10.3 | 14.1 | 40.0 | 25.9 | 114.0 | 43.7 |
| 5 | 361.498 | H | 30.6 | -6.3 | 24.3 | 47.0 | 22.7 | 377.0 | 240.7 |
| 6 | 372.653 | V | 28.3 | -6.1 | 22.2 | 47.0 | 24.8 | 122.0 | 169.8 |
| 7 | 419.940 | V | 29.5 | -4.8 | 24.7 | 47.0 | 22.3 | 209.0 | 189.2 |
| 8 | 982.661 | H | 21.9 | 8.4 | 30.3 | 47.0 | 16.7 | 101.0 | 9.5 |

# 7. EUT photographs

Front View


Rear View

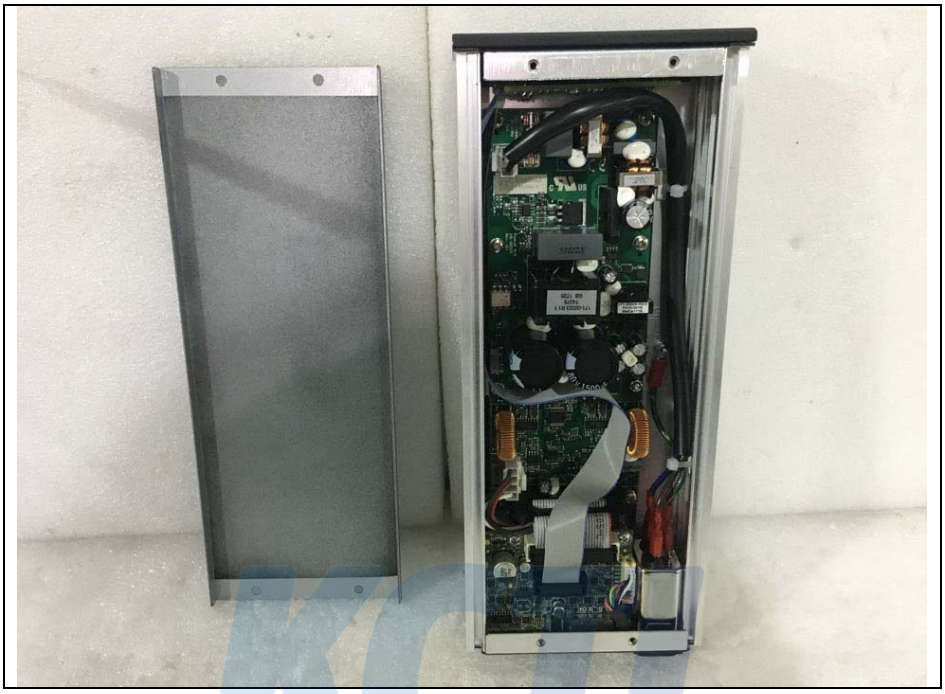
Left View

Right View

Top View

Bottom View

Inside



# TEST REPORT

**KCTL Inc.**
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr



**1. Client**

- Name : Crestron Electronics Inc.
- Address : 15 Volvo Drive, Rockleigh, NJ 07647, United States
- Date of Receipt : 2017-09-28

**2. Use of Report** : -

**3. Name of Product and Model** : Single-Channel Modular Power Amplifiers, 50W, 70V or 100V / AMP-150-100

**4. Manufacturer and Country of Origin** : Crestron Electronics Inc. / USA

**5. Date of Test** : 2017-10-13

**6. Test method used** : J55013(H22)

**7. Test Results** Refer to the test result in the test report

| | | |
|---|---|---|
| Affirmation | Tested by<br>Name : Donghyun Kim (Signature) | Technical Manager<br>Name : Gunsu Park (Signature) |

2017-10-19

## KCTL Inc.

## REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2017-10-19 | Originally issued | - |
| | | |
| | | |
| | | |
| | | |
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| | | |
| | | |
| | | |

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# 1. Applicant information

| | |
|---|---|
| **Applicant:** | Crestron Electronics Inc. |
| **Address:** | 15 Volvo Drive, Rockleigh, NJ 07647, United States |
| **Telephone:** | +01-800-237-2041 |
| **E-mail:** | cpatel@crestron.com |
| **Contact name:** | Chirag Patel |

| | |
|---|---|
| **Manufacturer:** | Crestron Electronics Inc. |
| **Address:** | 15 Volvo Drive, Rockleigh, NJ 07647, United States |
| **Telephone:** | +01-800-237-2041 |
| **E-mail:** | cpatel@crestron.com |
| **Contact name:** | Chirag Patel |

# 2. Laboratory information

**Address**

**KCTL Inc. (Suwon Lab.)**

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

Telephone Number: 82 31 285 0894

Facsimile Number: 82 505 299 8311

FCC Site Designation No: KR0040, FCC Site Registration No: 687132

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP

# 3. Test system configuration

## 3.1 Operation environment

| | Temperature | Humidity | Pressure |
|---|---|---|---|
| Chamber 10 ㎡(RE) | 21.5 °C | 48.5 % R.H. | - |
| Shielded room(CE) | 24.6 °C | 50.2 % R.H. | - |

Test site

These testing items were performed following locations;

| Test item | Test site |
|---|---|
| Disturbance voltage at the mains terminals | Shielded Room |
| Disturbance voltage at the antenna terminals | Shielded Room |
| Wanted signal and disturbance voltage at RF output terminals of equipment with RF video modulator | Shielded Room |
| Disturbance power | 10 ㎡ Chamber |
| Radiated disturbances | 10 ㎡ Chamber |

## 3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

| Conducted Emission measurement (Confidence level about 95 %, *k* = 2) | | |
|---|---|---|
| Shielded Room (CE#1) | 9 kHz ~ 150 kHz: 3.66 dB | |
| | 150 kHz ~ 30 MHz: 3.26 dB | |
| Shielded Room (CE#2) | 9 kHz ~ 150 kHz: 3.48 dB | |
| | 150 kHz ~ 30 MHz: 3.06 dB | |
| Radiated Emission measurement (Confidence level about 95 %, *k* = 2) | | |
| 10 m Chamber (4F) | 30 MHz ~ 300 MHz | 3 m: 5.42 dB |
| | | 10 m: 5.40 dB |
| | 300 MHz ~ 1 000 MHz | 3 m: 5.56 dB |
| | | 10 m: 5.44 dB |
| | 1 GHz ~ 6 GHz | 3 m: 6.28 dB |
| 10 m Chamber (2F) | 30 MHz ~ 300 MHz | 3 m: 5.06 dB |
| | | 10 m: 5.04 dB |
| | 300 MHz ~ 1 000 MHz | 3 m: 5.18 dB |
| | | 10 m: 5.06 dB |
| | 1 GHz ~ 6 GHz | 3 m: 6.36 dB |
| Radio Frequency Electromagnetic Fields (Confidence level about 95 %, *k* = 2) | | |
| 0.86 dB | | |
| Disturbance Power Electromagnetic Fields (Confidence level about 95 %, *k* = 2) | | |
| 2.82 dB | | |

## 3.3 Measurement Program

These test items were performed by software programs;

| Test item | Measurement Program | | Used |
|---|---|---|---|
| Conducted Emission | EP5CE_V 5.4.0(TOYO) | | ☒ |
| Radiated Emission | 2F | EP5RE_V 4.6.0(TOYO) | ☒ |
| | 4F | EP5RE_V 5.11.10(TOYO) | |
| Disturbance power | EMC32_V 9.01.0<br>(ROHDE & SCHWARZ) | | ☒ |

# 4. Description of EUT

## 4.1 General information

### Audio

**Input Signal Types:** Balanced or unbalanced analog line-level
**Output Power, AMP-150-70:** 50 Watts @ 70 Volts nominal
**Output Power, AMP-150-100:** 50 Watts @ 100 Volts nominal
**Frequency Response:** 200 Hz to 20 kHz ±0.5 dB
**High-Pass Filter:** -3 dB @ 80 Hz, 12 dB per octave
**THD+N:** <0.1% [1]
**S/N Ratio:** >100 dBA, 20 Hz to 20 kHz, balanced
**Input Sensitivity:** 1.23 Vrms, +4 dBu balanced;
0.316 Vrms, -10 dBV unbalanced;
For full rated output power
**Go To Sleep Time:** 25 minutes with no signal present
**Wake Time:** 0.5 second typical
**Wake Threshold:** 5 to 20 mV typical
**Protection:** Clip limiter, over current, under voltage, over temperature, DC offset, extreme high frequency

### Connectors

**SPEAKER OUT:** (1) 2-pin 7.62 mm reversed gender 20A detachable terminal block; Power amplifier output;
Wire Size: Terminals accept up to 12 AWG (3.31 $mm^2$);
*Note: Output is direct-coupled, not transformer isolated*

**AUDIO IN L/R (unbalanced):** (2) RCA connectors, female;
Unbalanced line-level audio inputs (summed);
Maximum Input Level: 2.24 Vrms, +7 dBV (+9.2 dBu)

**AUDIO IN L/R (balanced):** (1) 5-pin 3.5 mm detachable terminal block;
Balanced line-level audio inputs (summed);
Maximum Input Level: 7.75 Vrms, +20 dBu;
Input Impedance: 20k Ohms

**G:** (1) 6-32 screw;
Chassis ground lug

**100-240V~1A 50/60 Hz:** (1) IEC 60320 C14 main power inlet;
Mates with removable power cord, included

### Controls & Indicators

**PWR:** (1) Bi-color green/amber LED, indicates operating power supplied from AC line power, turns green while operating and amber when in standby
**FAULT:** (1) Red LED; indicates an over-temperature or over-current fault
**SIGNAL:** (1) Bi-color green/red LED, green indicates input signal presence and red indicates input signal clipping
**Input Level:** (1) Screwdriver-adjustable rotary control, adjusts the input attenuation level, tamper-preventive magnetic cover included

### Power

**Main Power:** 1 Amp @ 100-240 Volts AC, 50/60 Hz
**Power Consumption:** 17 Watts, all channels driven at 1/8th output power;
8 Watts, idle;
<0.5 Watt, standby (sleep)

### Environmental

**Temperature:** 41° to 104° F (5° to 40° C)
**Humidity:** 10% to 90% RH (non-condensing)

### Construction

**Chassis:** Metal, convection-cooled (fanless), vented front and rear
**Front Panel:** Metal, black finish with polycarbonate label overlay
**Mounting:** Freestanding, surface-mount, or 1/4-width 1 RU 19-inch rack-mountable; gangable with other Crestron modular AMP series products (adhesive feet, surface mounting kit, ganging kit, and rack mounting kit included)

### Dimensions

**Height:** 1.74 in (45 cm) without feet;
1.82 in (47 mm) with surface kit
**Width:** 4.33 in (110 mm);
5.43 in (138 mm) with surface kit;
19.00 in (483 mm) with rack kit
**Depth:** 10.46 in (266 mm)

### Weight

1.9 lb (0.9 kg) without mounting kits
2.2 lb (1.0 kg) maximum with surface or rack kit

### Compliance

ENERGY STAR, ErP (1275/2008/EC), UL 60065, FCC Class A commercial use

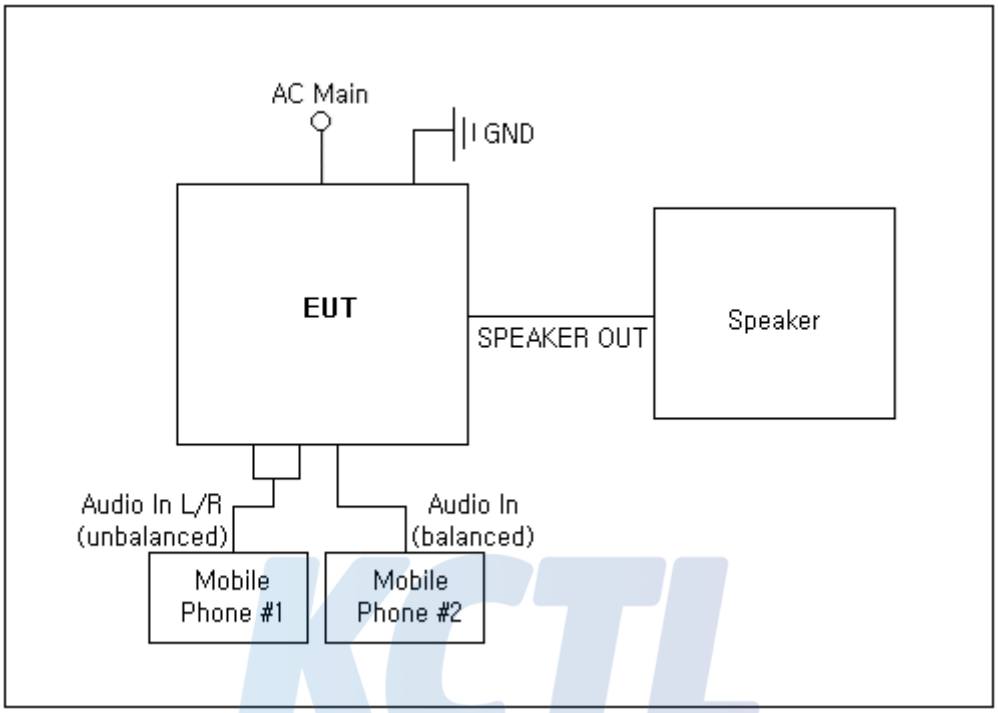
## 4.2 Product description

| | |
|---|---|
| Type of product | Single-Channel Modular Power Amplifiers, 50W, 70V or 100V |
| Model name (Basic) | AMP-150-100 |
| Model name (Variant) | - |
| Difference | - |
| Serial no | - |
| Testing voltage | 100 V, 50 Hz |
| Input rating | 100 V - 240 V, 50/60 Hz |
| Internal clock frequency | 500 MHz |
| Note | - |

## 4.3 Auxiliary equipments

| Type | Model / Part # | S/N | Manufacturer |
|---|---|---|---|
| Mobile Phone #1 | GT-N7105 | - | SAMSUNG |
| Mobile Phone #2 | LG-F200L | - | LG |
| Speaker | - | - | Crestron Electronics Inc. |

## 4.4 Test configuration




| | Start | | End | | Cable | |
|---|---|---|---|---|---|---|
| | Name | I/O port | Name | I/O port | Length (m) | Spec. |
| 1 | **EUT** | Power | AC Main | - | 2.0 | Unshield |
| 2 | | Audio In L/R (unbalanced) | Mobile Phone #1 | AUX | 3.0 | Unshield |
| 3 | | Audio In (balanced) | Mobile Phone #2 | AUX | 3.0 | Unshield |
| 4 | | SPEAKER OUT | Speaker | SPEAKER IN | 3.0 | Unshield |
| 5 | | GND | GND | - | 2.0 | - |

## 4.5 Operating conditions

The EUT was configured as normal intended use.

| Test mode | Normal operating |
|---|---|
| Test #1 | After arranging as above, mobile phones #1 and #2 are used to check the output state of the speaker after 1 kHz music playback and test. |

# 5. Summary of test results

## 5.1 Summary of EMI emission test results

| Applied | Test items | Test method | Result |
|---|---|---|---|
| ☒ | Disturbance voltage at the mains terminals | J55013(H22) | Pass |
| ☒ | Disturbance power | J55013(H22) | Pass |
| ☒ | Radiated disturbances | J55013(H22) | Pass |

# 6. Test results

## 6.1 Disturbance voltage at the mains terminals

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | Shielded room (CE#2) | | |
| Date | 2017-10-13 | | |
| Temperature(°C) | 24.6 °C | Humidity (% R.H.) | 50.2 % R.H. |
| Remarks | Pass | | |

### 6.1.1 Limits of disturbance voltage at the mains terminals

| Equipment Type | Frequency range [㎒] | Limit values (㏈(㎶)) | |
|---|---|---|---|
| | | Quasi-peak | Average |
| Television and sound receivers and associated equipment | 0.15 ~ 0.5 | 66 ~ 56 | 56 ~ 46 |
| | 0.5 ~ 5 | 56 | 46 |
| | 5 ~ 30 | 60 | 50 |
| *Decreasing linealy with the longarithm of the frequncy. | | | |

### 6.1.2 Measurement procedure

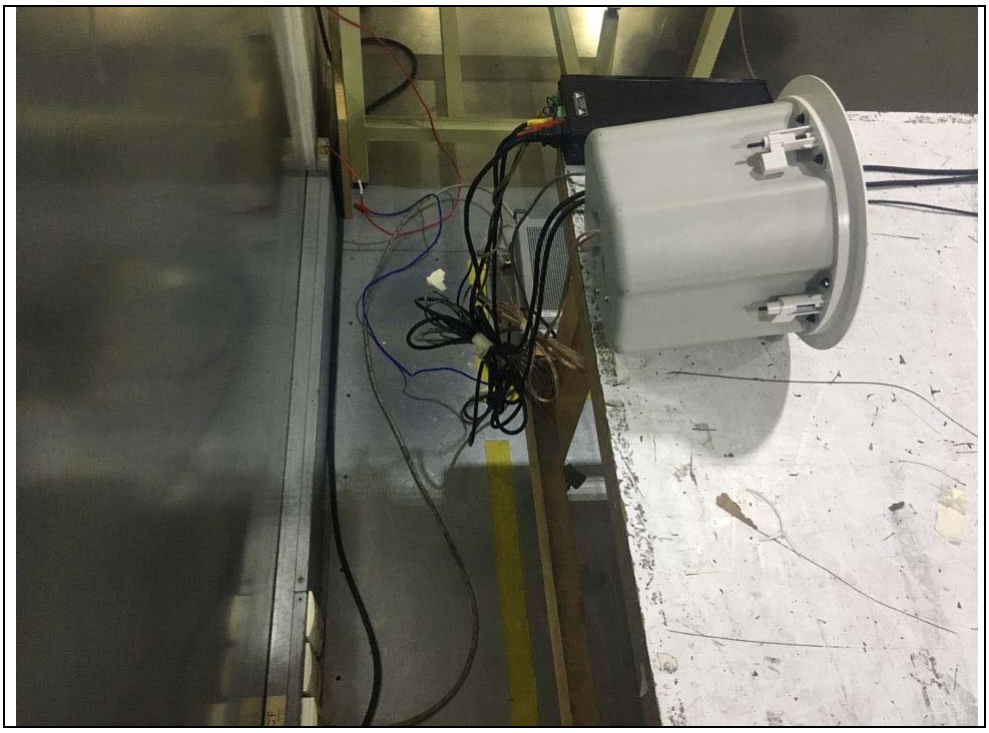
The measurements were performed in a shielded room. EUT was setup as shown in photograph and placed on a non-metallic table height of 0.8 ㎜ above the reference ground plane. The rear of table was located 0.4 ㎜ to the vertical conducted plane. EUT was power through the LISN, which was bonded to the ground plane. The LISN power was filtered. Each EUT power lead, except ground (safety) lead was individually connected through a LISN to input power source. EUT signal cables that hung closer than 40 ㎝ to the Horizontal metal ground 30 ~ 40 ㎝ long. The power cord was bundles in the center. All peripheral equipment was powered from a sub LISN. The LISN and ISN were positioned 80 ㎝ from the EUT. Peak and Average detection were used in preliminary testing and Quasi-peak and Average detections were used at final measurement. Both lines of power cord, hot and neutral, were measured.

### 6.1.3 Used equipments

| Equipment | Model | Serial No. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESCI | 100710 | R&S | 2018.08.24 | ☒ |
| TWO-LINE V-NETWORK | ENV216 | 101352 | R&S | 2018.08.25 | ☒ |
| TWO-LINE V-NETWORK | NNLK8121 | 8121-472 | SCHWARZBECK | 2018.08.25 | ☐ |

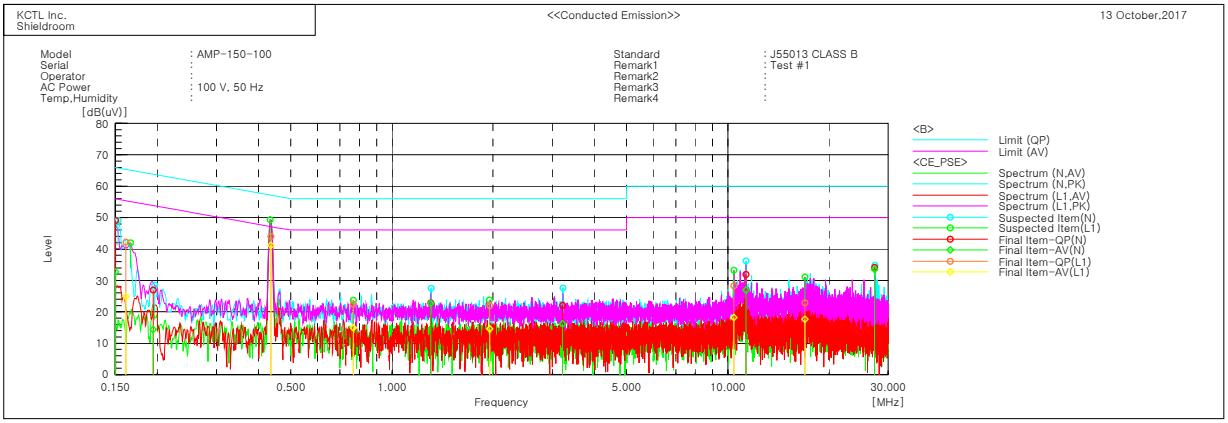
### 6.1.4 Photographs of test setup

AC Main



## 6.1.5 Measurement result

AC Main




Final Result

--- N Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15038 | 39.1 | 22.6 | 10.1 | 49.2 | 32.7 | 66.0 | 56.0 | 16.8 | 23.3 |
| 2 | 0.19463 | 16.7 | 4.0 | 10.3 | 27.0 | 14.3 | 63.8 | 53.8 | 36.8 | 39.5 |
| 3 | 1.30595 | 12.8 | 12.6 | 10.1 | 22.9 | 22.7 | 56.0 | 46.0 | 33.1 | 23.3 |
| 4 | 3.22105 | 11.9 | 6.1 | 10.1 | 22.0 | 16.2 | 56.0 | 46.0 | 34.0 | 29.8 |
| 5 | 11.31375 | 21.8 | 16.7 | 10.2 | 32.0 | 26.9 | 60.0 | 50.0 | 28.0 | 23.1 |
| 6 | 27.38056 | 23.8 | 23.1 | 10.4 | 34.2 | 33.5 | 60.0 | 50.0 | 25.8 | 16.5 |

--- L1 Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.16138 | 31.9 | 14.6 | 10.3 | 42.2 | 24.9 | 65.4 | 55.4 | 23.2 | 30.5 |
| 2 | 0.43603 | 33.9 | 31.1 | 10.1 | 44.0 | 41.2 | 57.1 | 47.1 | 13.1 | 5.9 |
| 3 | 0.76757 | 12.3 | 4.8 | 10.1 | 22.4 | 14.9 | 56.0 | 46.0 | 33.6 | 31.1 |
| 4 | 1.95373 | 12.0 | 4.6 | 10.0 | 22.0 | 14.6 | 56.0 | 46.0 | 34.0 | 31.4 |
| 5 | 10.42769 | 18.0 | 8.1 | 10.2 | 28.2 | 18.3 | 60.0 | 50.0 | 31.8 | 31.7 |
| 6 | 16.96862 | 12.6 | 7.4 | 10.3 | 22.9 | 17.7 | 60.0 | 50.0 | 37.1 | 32.3 |

## 6.2 Disturbance power

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | 10 m Chamber (4F) | | |
| Date | 2017-10-13 | | |
| Temperature (°C) | 21.7 °C | Humidity (% R.H.) | 50.4 % R.H. |
| Remarks | Pass (#1- Power, #2- Audio In L/R(unbalanced),<br>#3- Audio In(balanced), #4- SPEAKER OUT) | | |

### 6.2.1 Measurement procedure

The appliance to be tested is placed on a non-metallic table at least 0.8 m from other metallic objects and the lead to be measured on is stretched in a straight line for a distance sufficient to accommodate the absorbing clamp, and to permit the necessary measuring adjustment of position for tuning. The clamp is placed around the lead so as to measure a quantity proportional to the disturbance power on the lead. The absorbing clamp is positioned for maximum indication at each test frequency; the clamp shall be moved along the lead until the maximum value is found between a position adjacent to the appliance and a distance of about a half-wavelength from it. EUT during the test are noted in the following test records.

### 6.2.2 Limits of disturbance power

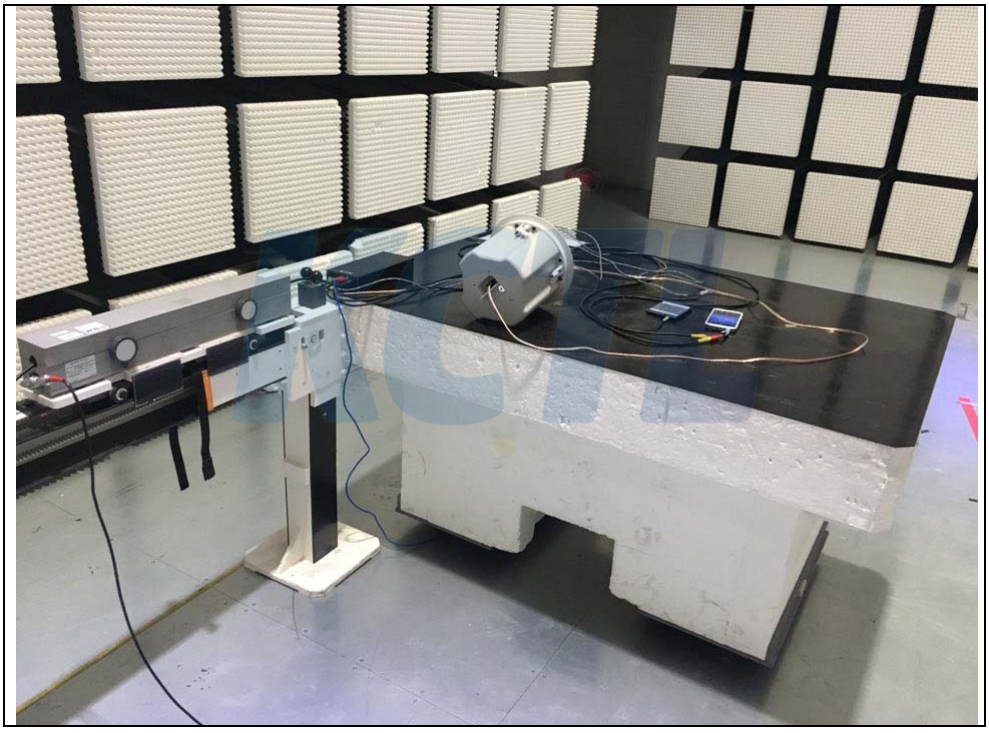
| Equipment Type | Frequency range [MHz] | Limit values dB(pW) | |
|---|---|---|---|
| | | Quasi-peak | Average |
| Associated equipment (video recorders excluded) | 30 to 300 | 45 ~ 55 [a] | 35 ~ 45 [a] |
| [a] Increasing linearly with the frequency. | | | |

Margin(dB) = Limit(dB(pW)) - QuasiPeak(dB(pW))
Margin(dB) = Limit(dB(pW)) - C-Average(dB(pW))

### 6.2.3 Used equipments

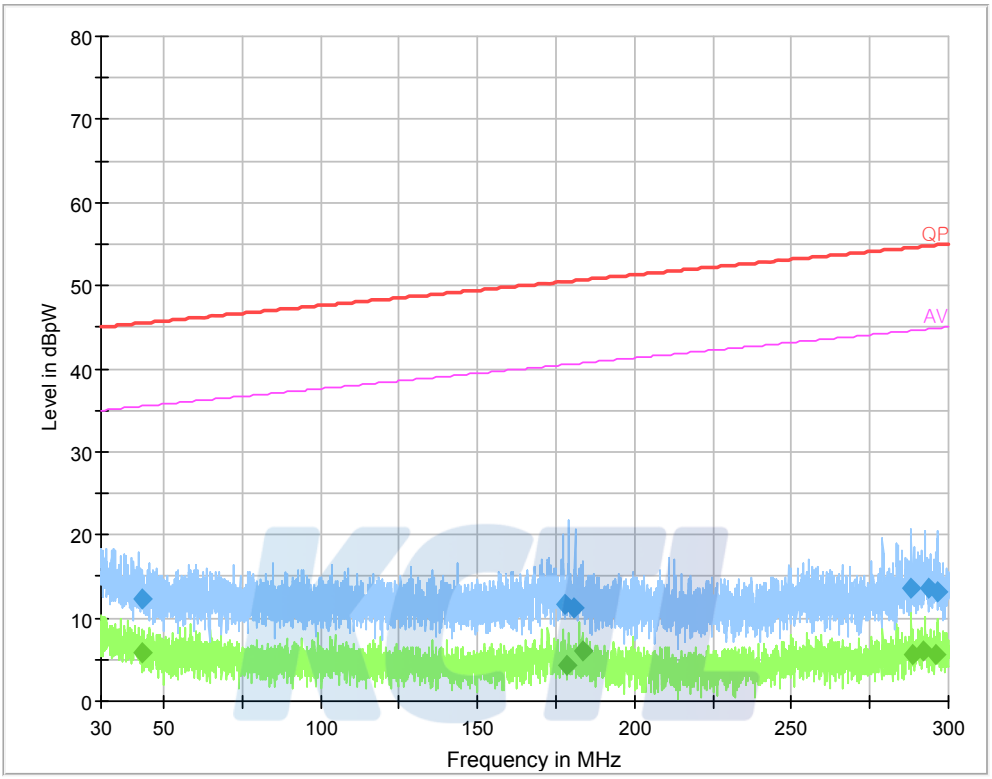
| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESCI | 101408 | R&S | 2018.08.24 | ☒ |
| ABSORBING CLAMP | MDS-21 | 100537 | R&S | 2018.08.28 | ☒ |
| Slide Bar | - | - | SIWON | - | ☒ |

### 6.2.4 Photographs of test setup



6.2.5 Disturbance power measurement result

#1- Power



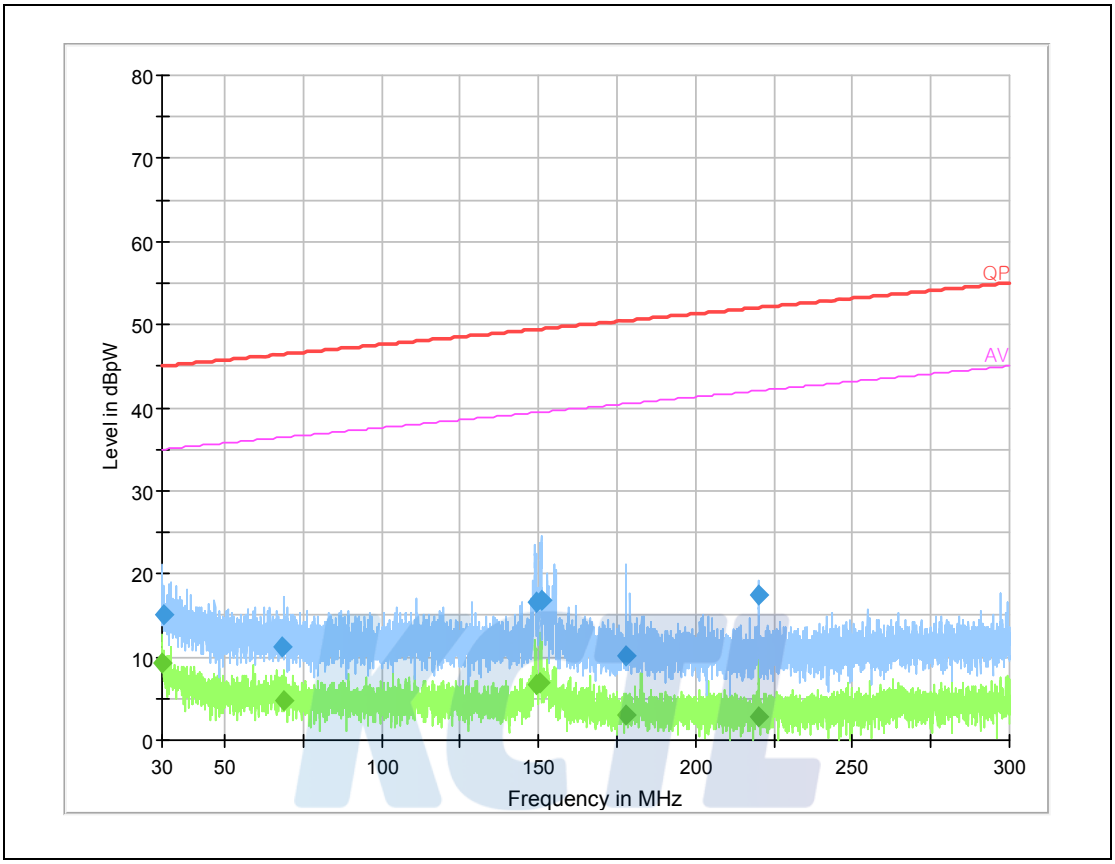

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 43.09 | 8.4 | 12.28 | 45.48 | 33.20 |
| 178.09 | 5.7 | 11.72 | 50.48 | 38.76 |
| 180.77 | 5.6 | 11.18 | 50.58 | 39.40 |
| 287.86 | 6.9 | 13.65 | 54.55 | 40.90 |
| 293.53 | 7.0 | 13.66 | 54.76 | 41.10 |
| 296.55 | 7.0 | 13.11 | 54.87 | 41.76 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 43.08 | 8.4 | 5.88 | 35.48 | 29.60 |
| 178.23 | 5.7 | 4.42 | 40.49 | 36.07 |
| 183.37 | 5.6 | 6.03 | 40.68 | 34.65 |
| 288.49 | 6.9 | 5.65 | 44.57 | 38.92 |
| 291.95 | 6.9 | 5.93 | 44.70 | 38.77 |
| 296.06 | 7.0 | 5.69 | 44.85 | 39.16 |

#2- Audio In L/R(unbalanced)



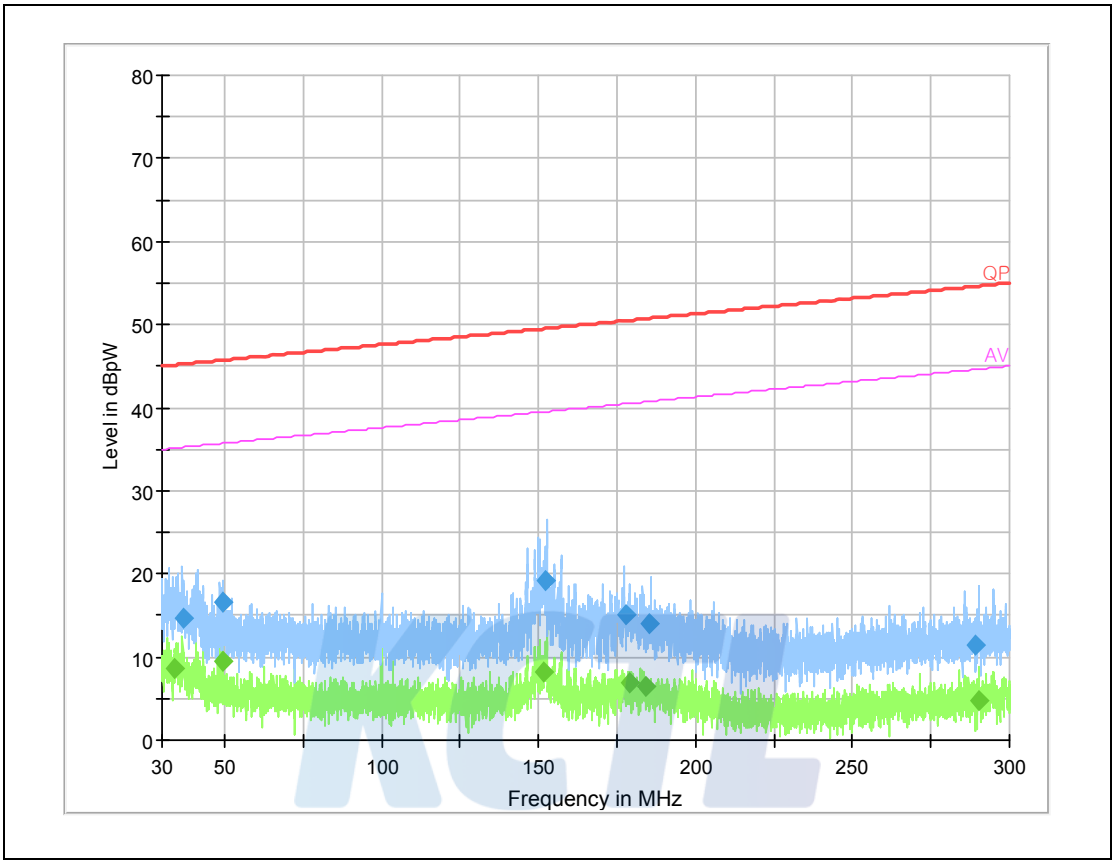

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.47 | 10.1 | 15.10 | 45.02 | 29.92 |
| 68.34 | 7.6 | 11.13 | 46.42 | 35.29 |
| 149.05 | 6.5 | 16.52 | 49.41 | 32.89 |
| 151.25 | 6.5 | 16.86 | 49.49 | 32.63 |
| 177.86 | 5.7 | 10.22 | 50.48 | 40.26 |
| 220.02 | 5.5 | 17.41 | 52.04 | 34.63 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 30.02 | 10.2 | 9.22 | 35.00 | 25.78 |
| 69.06 | 7.6 | 4.79 | 36.45 | 31.66 |
| 149.19 | 6.5 | 6.74 | 39.41 | 32.67 |
| 150.61 | 6.5 | 6.97 | 39.47 | 32.50 |
| 177.81 | 5.7 | 3.04 | 40.47 | 37.43 |
| 220.01 | 5.5 | 2.82 | 42.04 | 39.22 |

#3- Audio In(balanced)



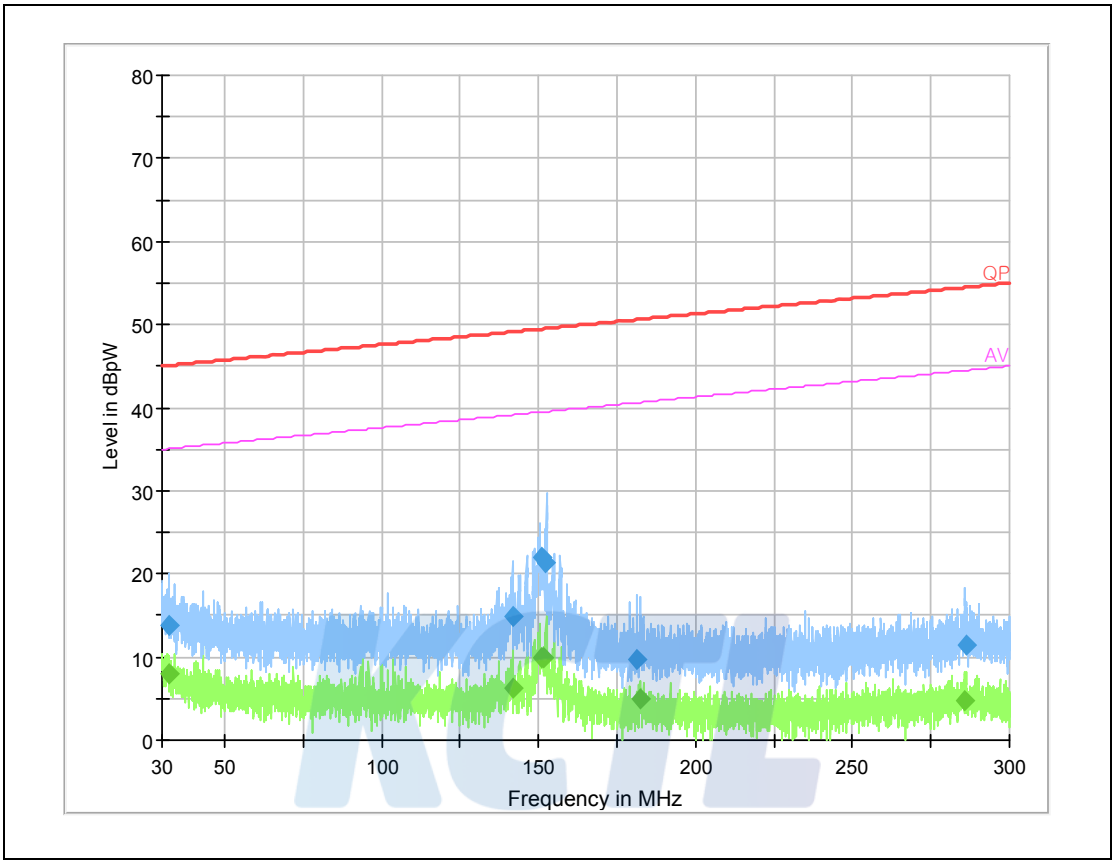

## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 36.85 | 9.3 | 14.66 | 45.25 | 30.59 |
| 49.16 | 7.6 | 16.69 | 45.71 | 29.02 |
| 151.98 | 6.4 | 19.19 | 49.52 | 30.33 |
| 177.60 | 5.7 | 15.18 | 50.47 | 35.29 |
| 185.43 | 5.6 | 14.05 | 50.76 | 36.71 |
| 289.28 | 6.9 | 11.43 | 54.60 | 43.17 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 34.12 | 9.6 | 8.56 | 35.15 | 26.59 |
| 49.14 | 7.6 | 9.41 | 35.71 | 26.30 |
| 151.44 | 6.5 | 8.19 | 39.50 | 31.31 |
| 179.18 | 5.7 | 6.97 | 40.53 | 33.56 |
| 184.36 | 5.6 | 6.44 | 40.72 | 34.28 |
| 290.45 | 6.9 | 4.78 | 44.65 | 39.87 |

#4- SPEAKER OUT




## Quasi-peak

| Frequency (MHz) | Corr. (dB) | QuasiPeak (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 32.52 | 9.9 | 13.88 | 45.09 | 31.21 |
| 141.65 | 6.7 | 14.93 | 49.14 | 34.21 |
| 150.80 | 6.5 | 21.93 | 49.47 | 27.54 |
| 152.16 | 6.4 | 21.32 | 49.52 | 28.20 |
| 181.35 | 5.6 | 9.66 | 50.61 | 40.95 |
| 286.41 | 6.9 | 11.53 | 54.50 | 42.97 |

## C-Average

| Frequency (MHz) | Corr. (dB) | CAverage (dB(pW)) | Limit (dB(pW)) | Margin (dB) |
|---|---|---|---|---|
| 32.04 | 9.9 | 7.94 | 35.08 | 27.14 |
| 141.93 | 6.7 | 6.17 | 39.15 | 32.98 |
| 151.29 | 6.5 | 10.01 | 39.49 | 29.48 |
| 151.43 | 6.5 | 9.98 | 39.50 | 29.52 |
| 182.59 | 5.6 | 5.01 | 40.65 | 35.64 |
| 285.72 | 6.9 | 4.75 | 44.47 | 39.72 |

## 6.3 Radiated disturbances

| Test specification | J55013(H22) | | |
|---|---|---|---|
| Testing voltage | 100 V, 50 Hz | | |
| Test facility | 10 m Chamber (4F) | | |
| Test distance | 3 m | | |
| Date | 2017-10-13 | | |
| Temperature (°C) | 21.5 °C | Humidity (% R.H.) | 48.5 % R.H. |
| Remarks | Pass | | |

### 6.3.1 Limits of radiated disturbances at 3 m distance

| Equipment type | Source | Frequency [㎒] | Limit dB(㎶/m) Quasi-peak [a] | | Limit dB(㎶/m) RMS-average [a, b] | |
|---|---|---|---|---|---|---|
| Television receivers, Video recorders and PC tuner cards | Local oscillator | ≤ 1 000 | Fundamental | 57 [a] | Fundamental | 57 [a] |
| | | 30 to 300 | Harmonics | 52 | Harmonics | 52 |
| | | 300 to 1 000 | Harmonics | 56 | Harmonics | 56 |
| | Other | 30 to 230 | | 40 | | 34/40 [c] |
| | | 230 to 1 000 | | 47 | | 47 |
| Television and sound receivers for broadcast satellite transmissions (Except outdoor units), Infrared remote control Units and Infrared headphone systems | Other | 30 to 230 | | 40 | | 34/40 [c] |
| | | 230 to 1 000 | | 47 | | 47 |
| Frequency modulation Sound receivers and PC Tuner cards | Local oscillator | ≤ 1 000 | Fundamental | 60 | Fundamental | 60 |
| | | 30 to 300 | Harmonics | 52 | Harmonics | 52 |
| | | 300 to 1 000 | Harmonics | 56 | Harmonics | 56 |
| | Other | 30 to 230 | | 40 | | 34/40 [c] |
| | | 230 to 1 000 | | 47 | | 47 |

[a] In Japan: 57 dB(㎶/m) is relaxed to 66 dB(㎶/ m) for operating channels <300 ㎒ and to 70 dB(㎶/m) for operating channels>300 ㎒.

[b] The RMS-average limits can be applied as an alternative to quasi-peak limits.

[c] For narrowband disturbances 40 dB(μV/m) applies. For this application a narrowband disturbance is identified if the difference between Peak and RMS-average value is ≤ 3 dB. All other signals are considered as broadband disturbances.
For these signals a Peak limit of 54 dB(μV/m) applies in addition to the RMS-average limit of 34 dB(μV/m).

### 6.3.2 Measurement procedure.

The test was done at a 10 m chamber with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

### 6.3.3 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| EMI TEST RECEIVER | ESR7 | 101078 | R&S | 2018.08.24 | ☒ |
| Bilog Antenna | VULB9168 | 583 | SCHWARZBECK | 2018.06.10 | ☒ |
| AMPLIFIER | 310N | 293004 | SONOMA | 2018.08.24 | ☒ |
| COAXIAL FIXED ATTENUATOR | 8491B-003 | 2708A18758 | AGILENT | - | ☒ |
| Antenna Mast | MA4640-XP-ET | - | Innco Systems | - | ☒ |
| Turn Table | TT 3.0-3t | - | MATURO | - | ☒ |

### 6.3.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L + 6 dB Att – A.G)

M.R = Meter Reading

C.F = Correction Factor

A.F = Antenna Factor

C.L = Cable Loss

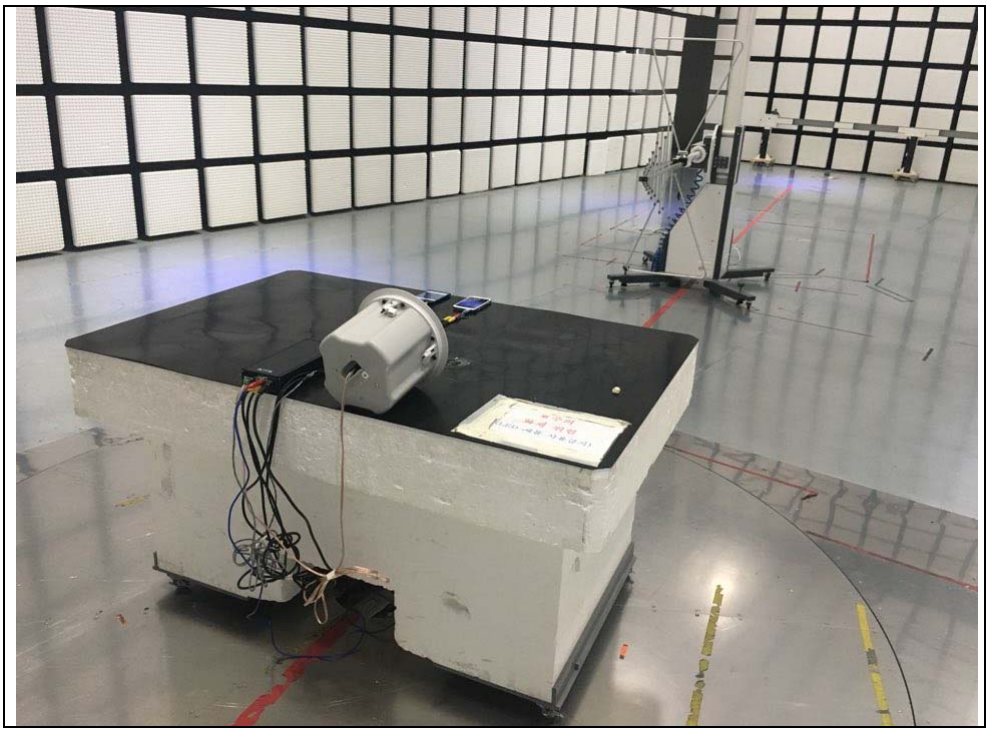
A.G = Amplifier Gain

6 dB Att = 6 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 6 dB, A.G 35 dB

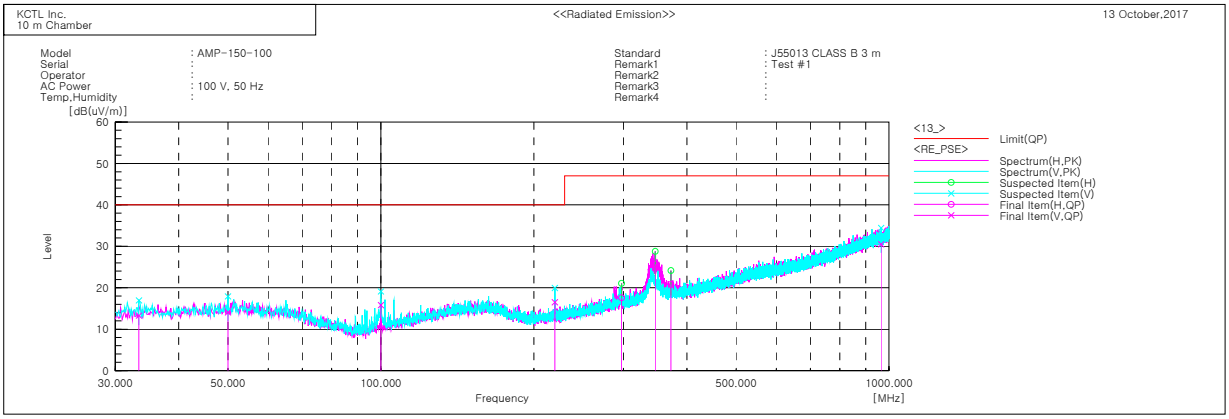
The result is 30 + 12 + 5 + 6 – 35 = 18 dB($\mu$N/m)

6.3.5 Photographs of test setup



## 6.3.6 Radiated disturbances measurement result

**Graph and Data**




Final Result

| No. | Frequency [MHz] | (P) | Reading QP [dB(uV)] | c.f [dB(1/m)] | Result QP [dB(uV/m)] | Limit QP [dB(uV/m)] | Margin QP [dB] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 33.395 | V | 25.7 | -12.4 | 13.3 | 40.0 | 26.7 | 138.0 | 166.3 |
| 2 | 50.006 | V | 25.1 | -11.0 | 14.1 | 40.0 | 25.9 | 217.0 | 180.5 |
| 3 | 99.961 | V | 30.9 | -15.1 | 15.8 | 40.0 | 24.2 | 186.0 | 163.9 |
| 4 | 219.999 | V | 28.4 | -11.9 | 16.5 | 40.0 | 23.5 | 349.0 | 354.7 |
| 5 | 297.720 | H | 25.8 | -8.2 | 17.6 | 47.0 | 29.4 | 215.0 | 80.9 |
| 6 | 346.584 | H | 32.4 | -6.7 | 25.7 | 47.0 | 21.3 | 317.0 | 265.0 |
| 7 | 372.410 | H | 26.9 | -6.1 | 20.8 | 47.0 | 26.2 | 168.0 | 274.0 |
| 8 | 965.323 | V | 22.4 | 8.1 | 30.5 | 47.0 | 16.5 | 289.0 | 175.3 |

# 7. EUT photographs

Front View


Rear View

Left View

Right View

Top View

Bottom View

Inside