TEST REPORT

Application No.:	HKEM2008000876AT
Applicant:	VTECH TELECOMMUNICATIONS LTD
Address of Applicant:	23/F.,BLOCK 1, TAI PING INDUSTRIAL CENTRE,NO. 57 TING KOK ROAD,TAI PO,N.T.,Hong Kong
Equipment Under Test (EUT):	
EUT Name:	Video Baby monitor
Model No.:	VM5254 BU, VM5254-2 BU, VM5X54-ab BU
Additional Model:	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Standard(s):	CFR 47 FCC Part 15, Subpart C, 2019 RSS-247 Issue 2: May 2017 RSS-Gen: Issue 5 Amdt 2019
FCC ID:	EW780-1920-00
IC:	1135B-80192000
HVIN:	35-201286BU
Date of Receipt:	2020-08-20
Date of Test:	2020-08-21 to 2020-08-25
Date of Issue:	2019-12-08 (for original report HKEM191100104001) 2020-08-28 (for new report HKEM200800083602)
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.

Law Man Kit
EMC Manager

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2019-12-08		Original
02		2020-08-28		C2PC Change

Authorized for issue by:				
				
		Leo Xu /Project Engineer		Date: 2020-08-27
				
		Law Man Kit /Reviewer		Date: 2020-08-28

2 Test Summary

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Disturbance at AC Power Line(150kHz-30MHz)	CFR 47 FCCPart 15, Subpart C 15.207	ANSI C63.10: 2013 Section 6.2	CFR 47 FCCPart 15, Subpart C 15.207	Pass
Conducted Peak Output Power	CFR 47 FCCPart 15, Subpart C 15.247	ANSI C63.10: 2013 Section 11.9.1.2	CFR 47 FCCPart 15, Subpart C 15.247(b)(3)	Pass
Radiated Spurious Emissions	CFR 47 FCCPart 15, Subpart C 15.247	ANSI C63.10: 2013 Section 6.10.4, Section 11.11	CFR 47 FCCPart 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	CFR 47 FCCPart 15, Subpart C 15.247 & 15.209	ANSI C63.10: 2013 Section 6.10.5	CFR 47 FCCPart 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Emissions at AC Power Line (150kHz-30MHz)	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.2	RSS-Gen Section 8.8	Pass
Conducted Peak Output Power	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.9.1	RSS-247 Section 5.4(d)	Pass
Radiated Spurious Emissions	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.11	RSS-247 Section 5.5	Pass
Radiated Emissions which fall in the restricted bands	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.4&6.5&6.6	RSS-247 Section Section 3.3 & RSS-Gen Section 8.10	Pass

Declaration of EUT Family Grouping:
Item no.:

VM5254 BU, VM5254-2 BU, VM5X54-ab BU

a=any alphanumeric character or blank is presenting number of baby unit.

b= any alphanumeric character or blank is presenting color option

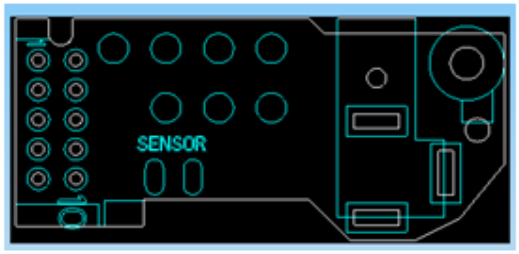
According to the confirmation from the applicant, the above models are identical in all electrical aspects in relating to the circuit design, PCB layout, electrical components used, internal wiring and functions. The differences are only the model/item No, color and decorations.
Therefore only the model VM5254 BU was tested in this report.

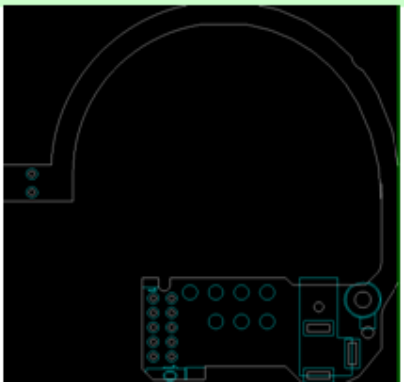
Note: According to the cover letter for C2PC (Class II permissive changes) from the applicant, the change are as bleow based on previous test reports HKEM1910000114001 issued on 2019-12-08.

1. Based on original version to change the temperature sensor from outside to inside; See below photo;

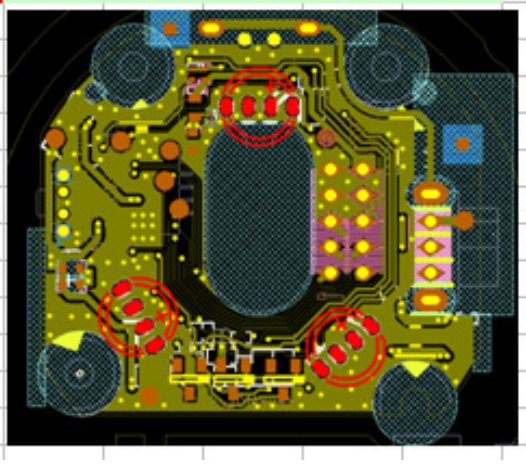
2. To change the temperature sensor from outside to inside, The PCB layout of power was updated from 35-201288-004-100 to 35-201480-X00-10B as below

35-201288-004-100	to	35-201480-X00-10B

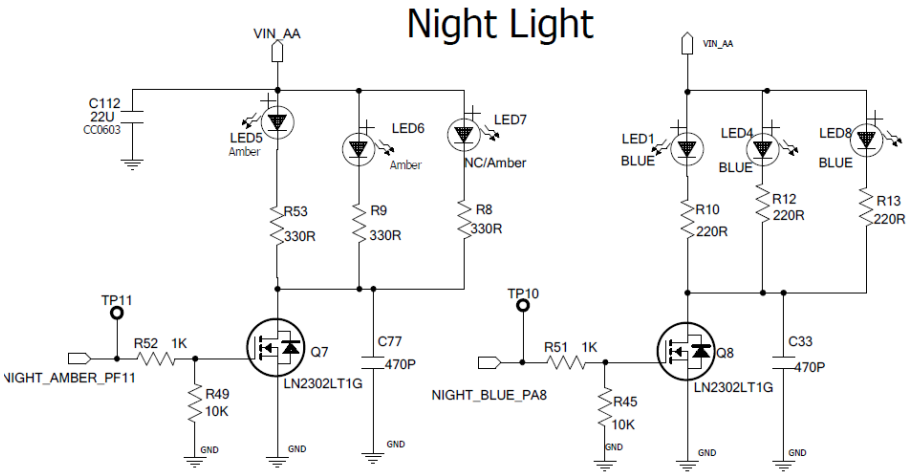




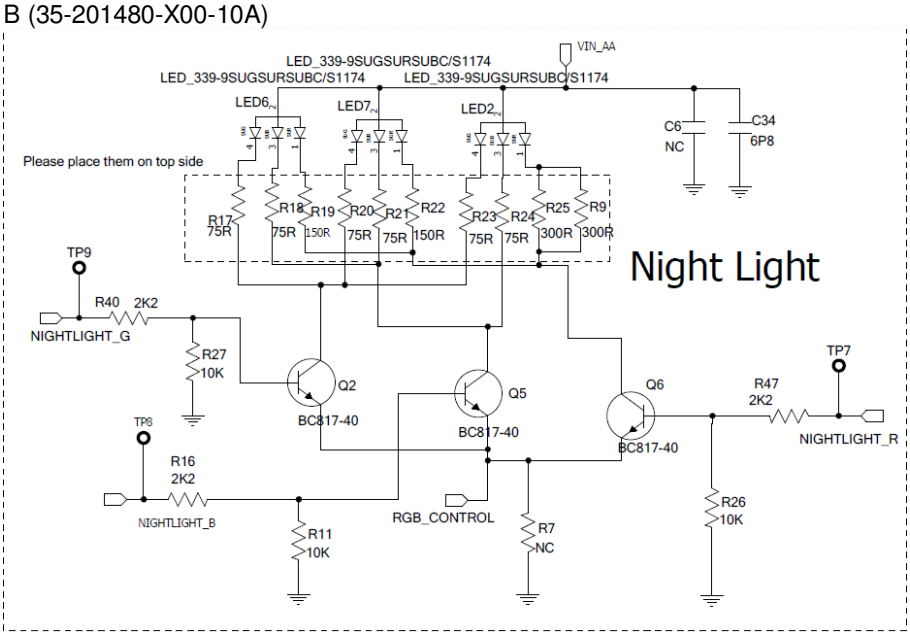
3.The PCB layout of Night Light was changed from surface Mounted technology component to through hole technology component, And the circuit was changed as from A (35-201287-X04-10A to B (35-201480-X00-10A). And the LED component from “19-217/S2C-AM2N2VY/3T(V) _LED5,LED6,LED7 ” and 19-217/G7C-AP1Q2B/3T_LED1,LED4,LED8” to “YL5ARGB9UCK22/P17-H,_LED2,LED6,LED7”.

图 A(35-201287-X04-10A)	to	图 B(35-201480-X00-10A)
		

A (35-201287-X04-10A)

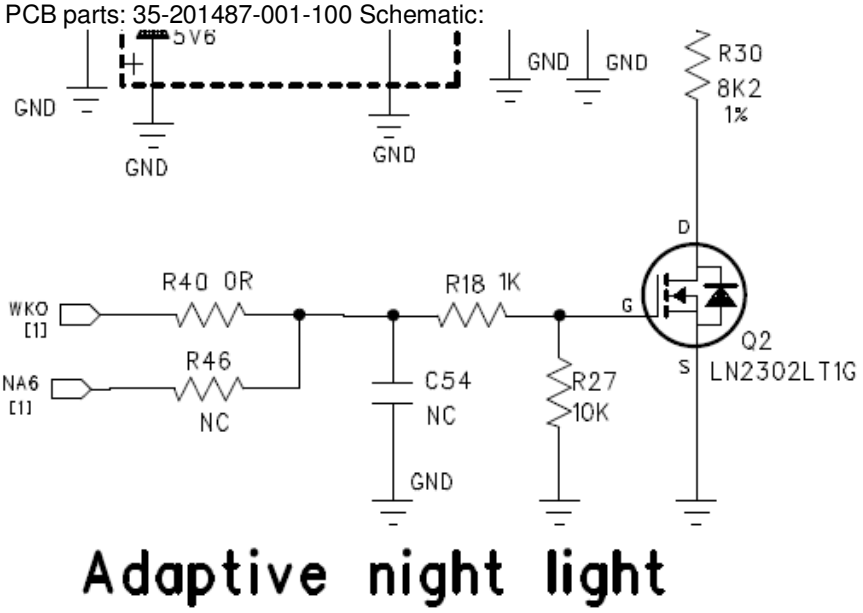


B (35-201480-X00-10A)

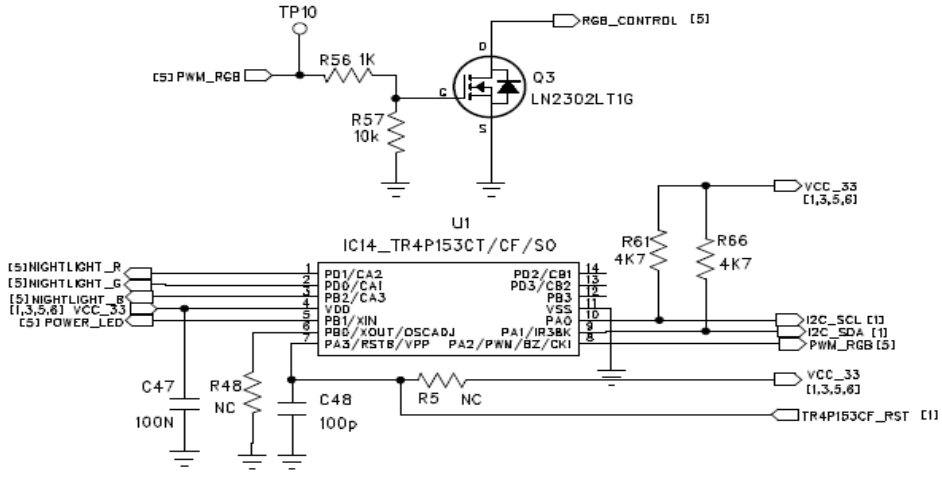


4. To control the Night sensor and Night light LED, the main PCB layout and circuit were updated and newly added parts as below in SCH&PCB (35-201487-001-100):

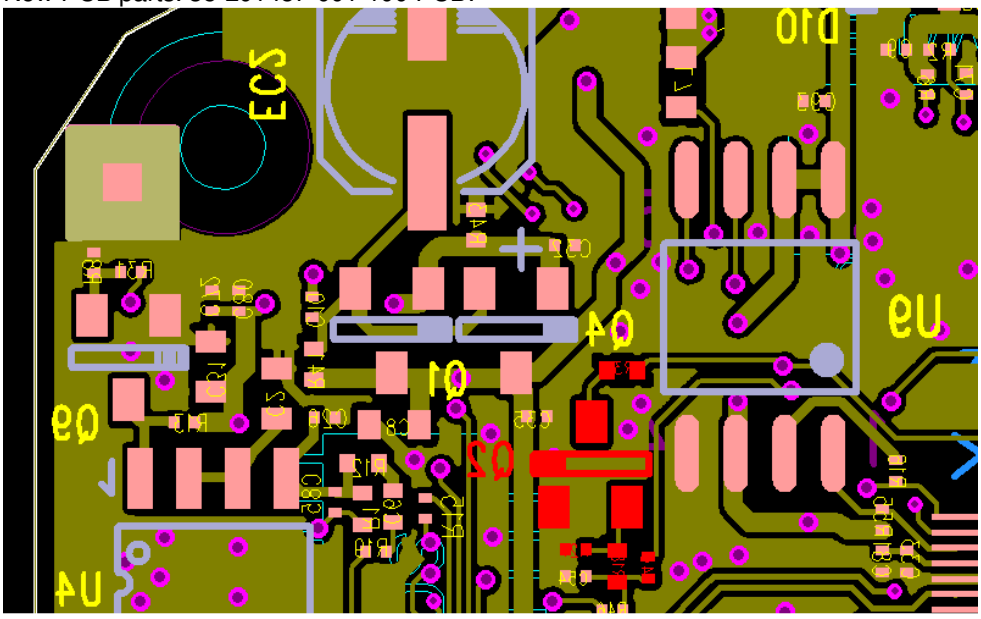
New PCB parts: 35-201487-001-100 Schematic:

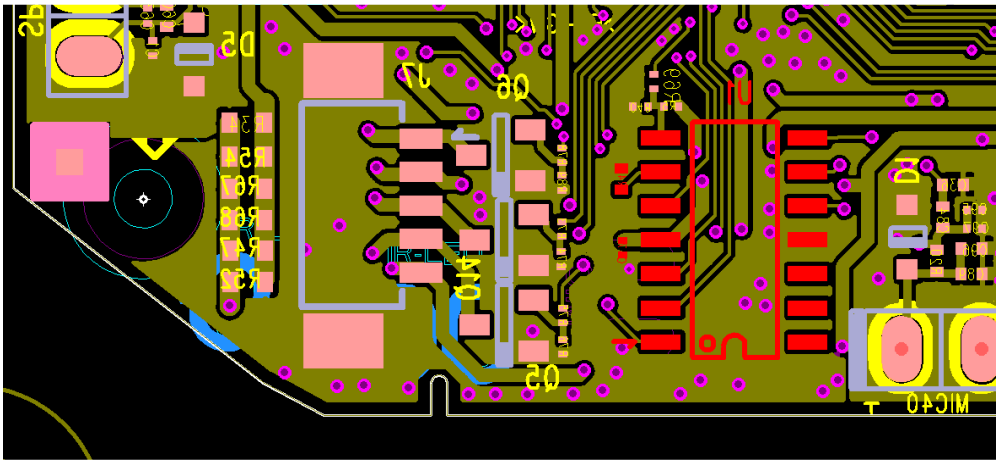


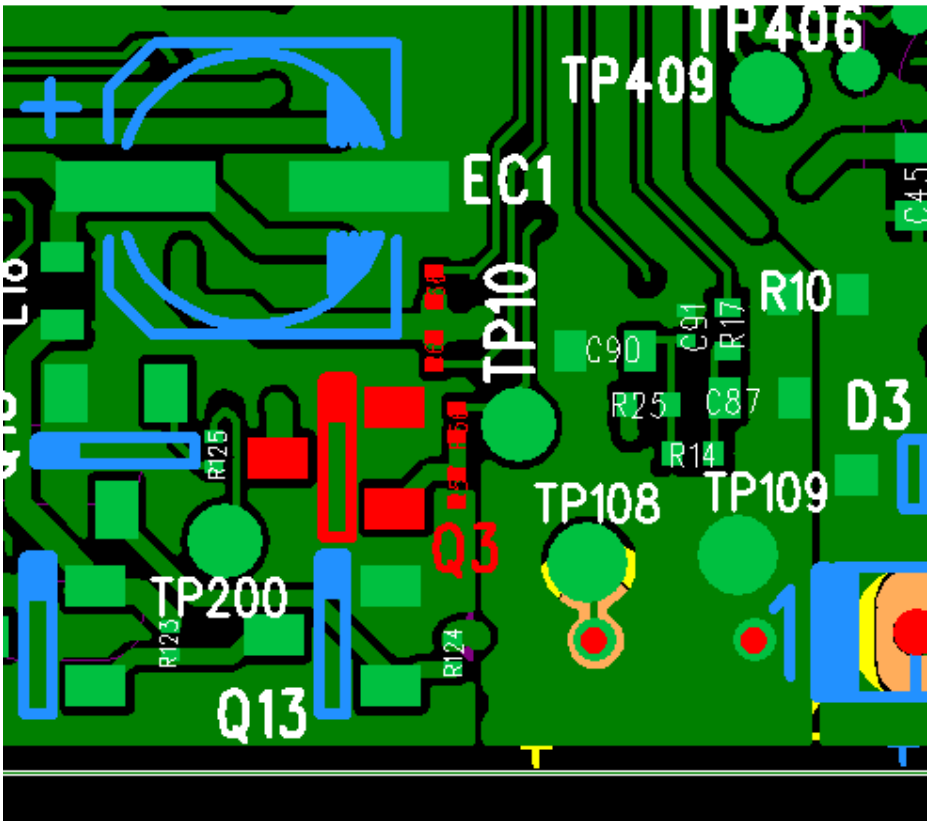
Adaptive night light



New PCB parts: 35-201487-001-100 PCB:







According to the changes above, no impact on RF circuit and design. Hence, Conducted Disturbance at AC Power Line; Conducted Peak Output Power and Radiated Emission were re-tested in this report, all other test result were referred to previos report HKEM1910000114001 issued on 2019-12-08.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	AC 120 V, 60 Hz
Adapter	Adaptor 1: AC 100-240V ~ 50/60Hz 150mA to DC 5.0V 600 mA Model no: S003GU0500060 Adaptor 2: AC 100-240V ~ 50/60Hz 150mA to DC 5.0V 600 mA Model no: VT05EUS05060
Cable	Power Cable: 205cm unshielded 2-wire AC cable
Funtion	Monitoring Device
Test Voltage	AC120 V 60 Hz
Operation Frequency:	2405-2475MHz
Channel Numbers:	16
Channel Separation:	≥ 2MHz
Type of Modulation:	Frequency Hopping Spread Spectrum (FHSS)
Sample Type:	Indoor
Antenna Type:	Dipole
Declared Antenna Gain:	0 dBi
Series Number:	A1
Hardware Version:	V001
Software Version:	V0101

Frequency List

Channel Number	TX Freq (MHz)	Channel Number	TX Freq (MHz)	Channel Number	TX Freq (MHz)
1	**2405**	12	2428	23	2454
2	2407	13	2430	24	2456
3	2409	14	2433	25	2458.5
4	2411	15	2435	26	2460.5
5	2413	16	2437	27	2462.5
6	2415	**17**	**2439**	28	2467
7	2418	18	2441	29	2469
8	2420	19	2444	30	2471
9	2422	20	2446	31	2473
10	2424	21	2450	**32**	**2475**
11	2426	22	2452		

Remark: 1. Operation channel is only 16.

2. Testing Channels are highlighted in **bold**.

4.2 Description of Support Units

The EUT has been tested with corresponding accessories as below:

Supplied by client

Description	Manufacturer	Model No.	SN/Certificate NO
UART Test board	N/A	MX3232	N/A
Test Software	MicroRidge System	Version 3.0.0.108	N/A

Supplied by SGS:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook (EMC2)	Dell	P75F	N/A

4.3 Measurement Uncertainty(95% confidence level, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	± 7.25 x 10^{-8}
2	Duty cycle	± 0.37%
3	Occupied Bandwidth	± 3%
4	Conduction emission	± 3.0dB (150kHz to 30MHz)
5	RF conducted power	± 0.75dB
6	RF power density	± 2.84dB
7	Conducted Spurious emissions	± 0.75dB
8	RF Radiated power	± 4.5dB (Below 1GHz)
		± 4.8dB (Above 1GHz)
9	Radiated Spurious emission test	± 4.5dB (Below 1GHz)
		± 4.8dB (Above 1GHz)
10	Temperature test	± 1℃
11	Humidity test	± 3%
12	Supply voltages	± 1.5%
13	Time	± 3%

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

According to decision rule based on Clause 4.2 of CISPR 16-4-2, the EUT complied with the standards specified above.

4.4 Test Location

All tests were performed at:

SGS Hong Kong Limited

Unit 2 and 3, G/F, Block A, Po Lung Centre,

11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **HOKLAS (Lab Code: 009)**

SGS HONG KONGLimited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2017 an it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **IAS Accreditation (Lab Code: TL-187)**

SGS HONG KONGLimited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 514599)**

SGS HONG KONG Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0015, Test Firm Registration Number: 514599.

- **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS HONG KONG Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0015, Site Registration Number: 26103.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	E231	2019/9/2	2020/9/1
Signal Generator	Rohde & Schwarz	SMT03	E177	2020/5/11	2021/5/10
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127312	TE10	2020/5/11	2021/5/10
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 357881052	TE36	2020/5/11	2021/5/10
EMC32 Test Software	R&S	Version 10	N/A	--	--

Radiated Spurious Emissions (30MHz-1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2020/8/9	2021/8/8
Coaxial Cable	SGS	N/A	E167	2020/7/20	2021/7/19
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESR7 / 102298	E314	2020/5/18	2021/5/17
TRILOG Super Broadb. Test Antenna, (25) 30-1000MHz	Schwarzbeck	VULB 9168	E264	2018/10/20	2020/10/19
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	--	--
Turntable with Controller	ChamPro	EM1000	E238	--	--
EMC32 Test Software	R&S	Version 10	N/A	--	--

Radiated Spurious Emissions (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ChamPro	N/A	E229	2020/8/9	2021/8/8
Coaxial Cable	SGS	N/A	E167	2020/7/20	2021/7/19

EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESR7 / 102298	E314	2020/5/18	2021/5/17
Signal and Spectrum Analyzer 2Hz - 26.5GHz	Rohde & Schwarz	FSW26	E296	2019/10/29	2020/10/28
Spectrum Analyzer 9kHz - 30GHz	Rohde & Schwarz	FSP30	E204	2020/5/11	2021/5/10
Horn Antenna 1 - 18GHz	Schwarzbeck	BBHA9120D	E211	2020/1/29	2022/1/29
Horn Antenna 15 - 40GHz	Schwarzbeck	BBHA9170	E212	2020/01/29	2022/01/28
Preamplifier 33dB, 1 - 18GHz	Schwarzbeck	BBV9718	E214	2020/4/14	2021/4/12
Preamplifier 33dB, 18 - 26.5GHz	Schwarzbeck	BBV9719	E215	2019/4/24	2021/4/23
Broadband Coaxial Preamplifier typ. 30 dB, 18-40GHz	Schwarzbeck	BBV 9721	E266	2019/8/22	2021/8/21
Highpass Filter 3.5-26.5GHz	Wainwright	WHNX3.5/26.5 G-6SS	E205	2019/4/24	2021/4/23
Band Reject Filter 2.4-2.5GHz	Wainwright	WRCJV 2400/2500-2100	E206	2019/4/24	2021/4/23
RF cable SMA to SMA 10000mm	HUBER+SUHNER	SF104-26.5/2*11SMA 45	E207-1	2019/9/26	2020/9/25
Boresight Mast Controller	ChamPro	AM-BS-4500-E	E237	--	--
Turntable with Controller	ChamPro	EM1000	E238	--	--
EMC32 Test Software	R&S	Version 10	N/A	--	--

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Digital temperature & humidity data logger	SATO	SK-L200TH II	E232	2019/10/28	2020/10/27

Electronic Digital Thermometer with Hygrometer	nil	2074/2075	E159	2019/10/28	2020/10/27
Barometer with digital thermometer	SATO	7612-00	E218	2020/04/23	2021/04/22
Conditional Chamber	Zhong Zhi Testing Instruments	CZ-E-608D	E216	2020/08/21	2021/08/20

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

FCC Part 15 Subpart C Section 15.247 & 15.203

RSS-Gen Section 8.3

6.1.2 Conclusion

Standard Requirement:

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.

Photo of antenna refer to Appendix – Internal photo.

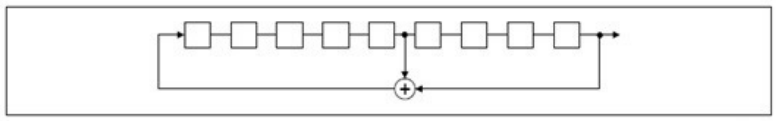
6.2 Pseudorandom Frequency Hopping Sequence

6.2.1 Test Requirement:

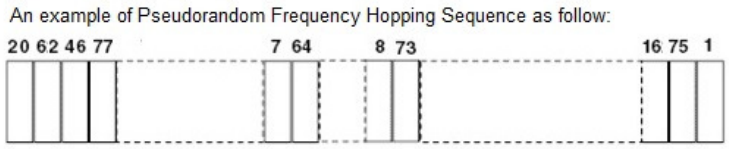
FCC Part 15 Subpart C Section 15.247(a)(1)

RSS-247 Section 5.1(a)

6.2.2 Test Setup Diagram



Linear Feedback Shift Register for Generation of the PRBS sequence



6.2.3 Conclusion

Standard Requirement:

The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 29 -1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207, RSS-Gen Section 8.8

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

7.1.1 E.U.T. Operation

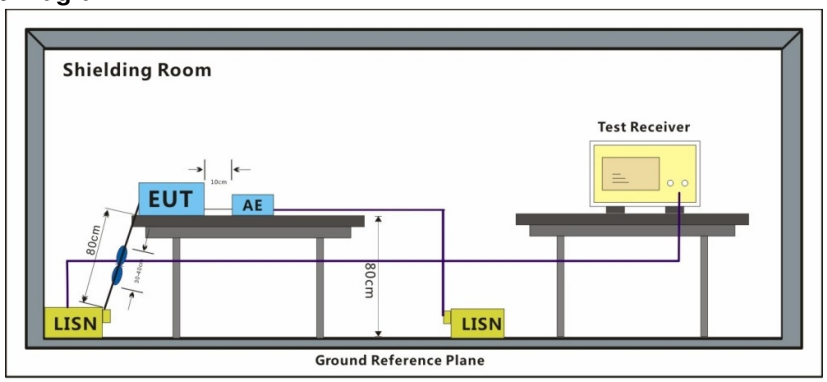
Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a:TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

Pretest on Adaptor 1 and Adaptor 2, and only show worse result on Adaptor 2 in report.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

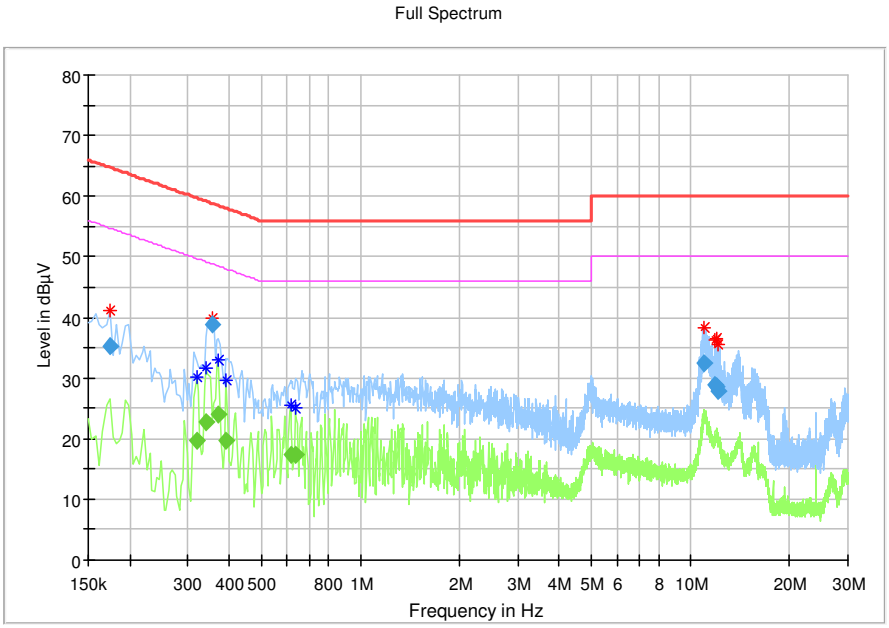
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

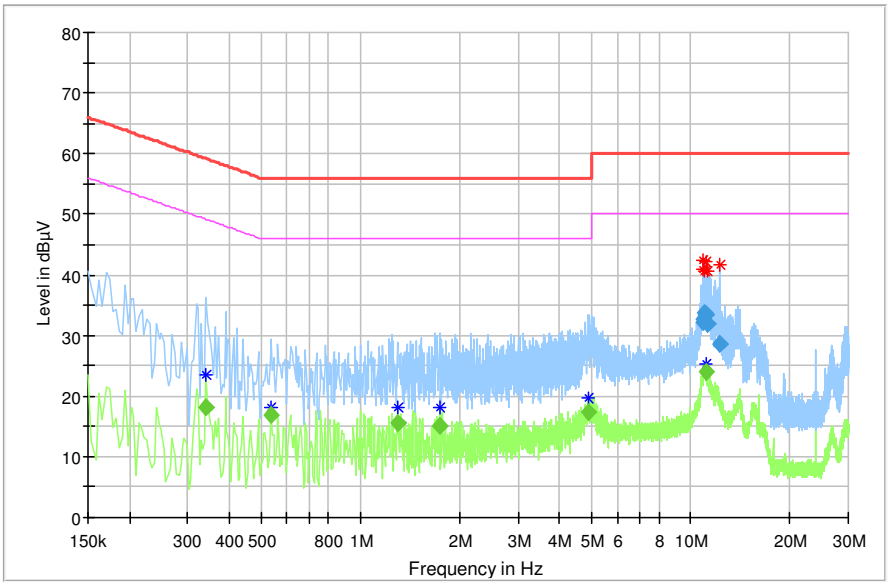
Mode:a; Line:Live Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.174000	35.31	---	64.77	29.45	10.1	Pass
0.318000	---	19.57	49.76	30.19	10.1	Pass
0.342000	---	22.65	49.16	26.50	10.1	Pass
0.354000	38.81	---	58.87	20.06	10.1	Pass
0.370000	---	23.97	48.50	24.53	10.1	Pass
0.390000	---	19.66	48.06	28.40	10.1	Pass
0.614000	---	17.38	46.00	28.62	10.1	Pass
0.634000	---	17.28	46.00	28.72	10.1	Pass
10.978000	32.41	---	60.00	27.59	10.7	Pass
11.922000	28.85	---	60.00	31.15	10.8	Pass
12.022000	28.55	---	60.00	31.45	10.8	Pass
12.146000	27.92	---	60.00	32.08	10.8	Pass

Line: Neutral Line

Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Corr. (dB)	Result
0.342000	---	18.13	49.16	31.02	10.0	Pass
0.538000	---	16.83	46.00	29.17	10.1	Pass
1.294000	---	15.71	46.00	30.29	10.3	Pass
1.734000	---	15.03	46.00	30.97	10.4	Pass
4.894000	---	17.35	46.00	28.65	10.6	Pass
10.890000	32.23	---	60.00	27.77	11.0	Pass
10.926000	32.81	---	60.00	27.19	11.0	Pass
11.002000	33.80	---	60.00	26.20	11.0	Pass
11.110000	33.38	---	60.00	26.62	11.0	Pass
11.146000	---	24.10	50.00	25.90	11.0	Pass
11.258000	31.86	---	60.00	28.14	11.0	Pass
12.230000	28.67	---	60.00	31.33	11.2	Pass

7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247:2019(b)(1) & 15.247(b)(3), RSS-247 Section 5.4(b)

Test Method: ANSI C63.10 (2013) Section 7.8.5

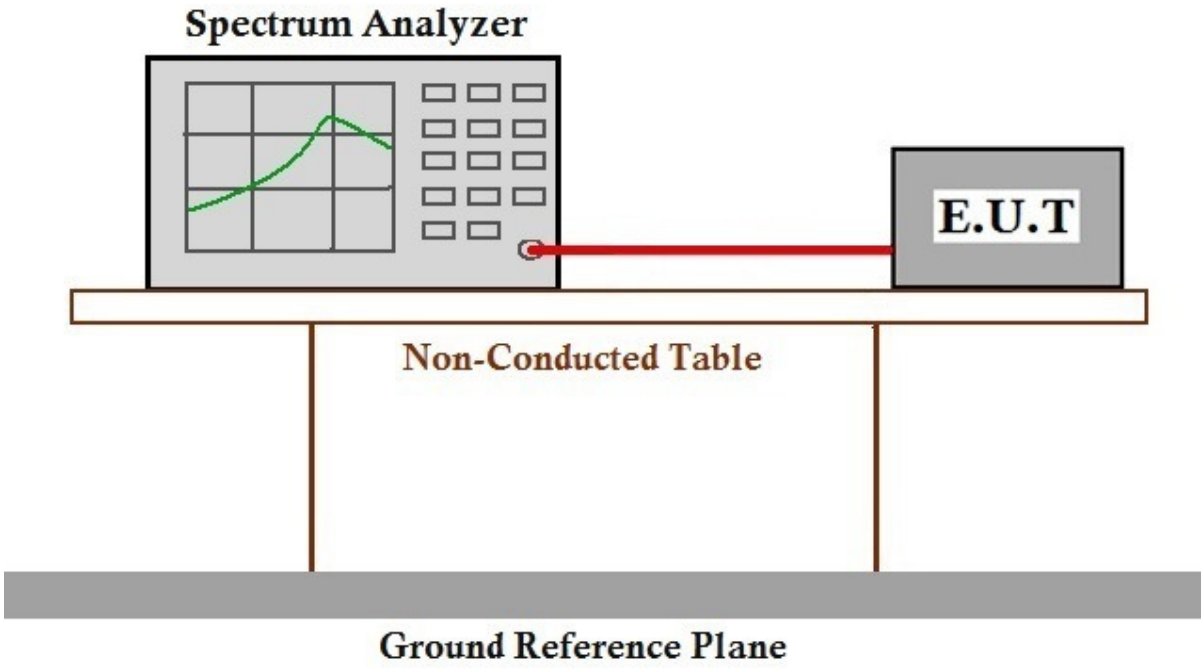
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a:TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see section 9: Appendix

7.3 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d), Section 3.3 & RSS-Gen Section 8.10

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μ V/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μ A/m)	Measurement distance (m)
9 - 490 kHz 1	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

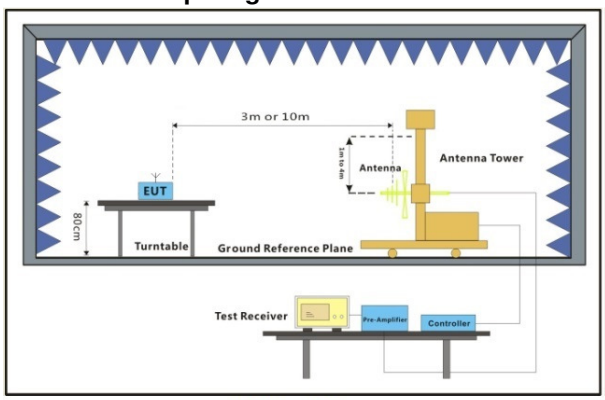
7.3.1 E.U.T. Operation

Operating Environment:

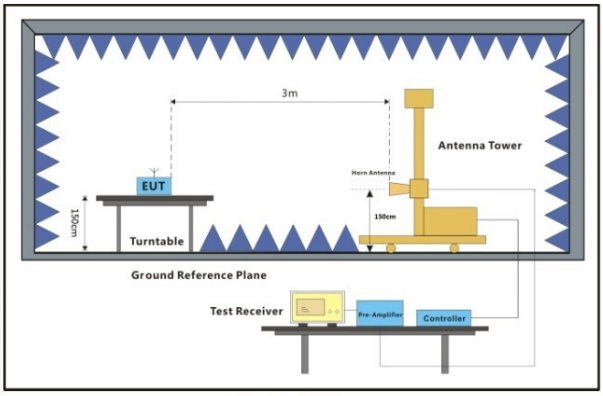
Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a:TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

7.3.2 Test Setup Diagram



30MHz-1GHz



Above 1GHz

7.3.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

7.3.4 Measurement Procedure and data

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
2390.000	H	50.1	/	74.0	54.0	Pass
2483.500	H	49.2	/	74.0	54.0	Pass
2390.000	V	52.1	/	74.0	54.0	Pass
2483.500	V	50.3	/	74.0	54.0	Pass

7.4 Radiated Spurious Emissions

Test Requirement Section 3.3 & RSS-Gen Section 8.9
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Limit:

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength (μ V/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (μ A/m)	Measurement distance (m)
9 - 490 kHz 1	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

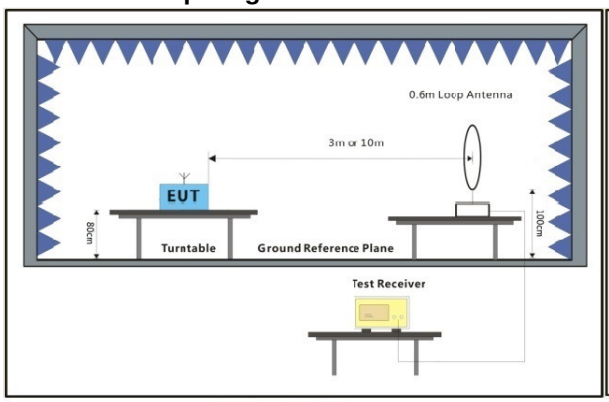
7.4.1 E.U.T. Operation

Operating Environment:

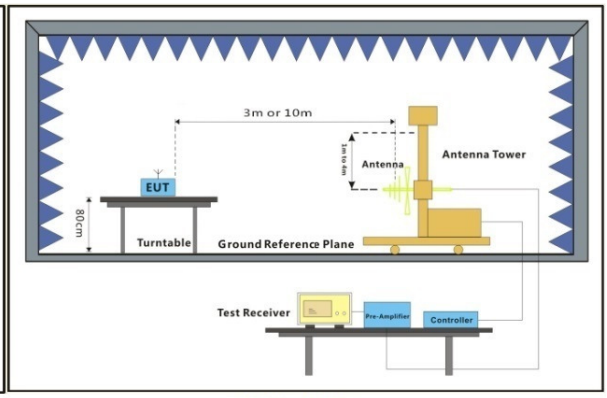
Temperature: 22.5 °C Humidity: 51.2 % RH :

Test mode a:TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

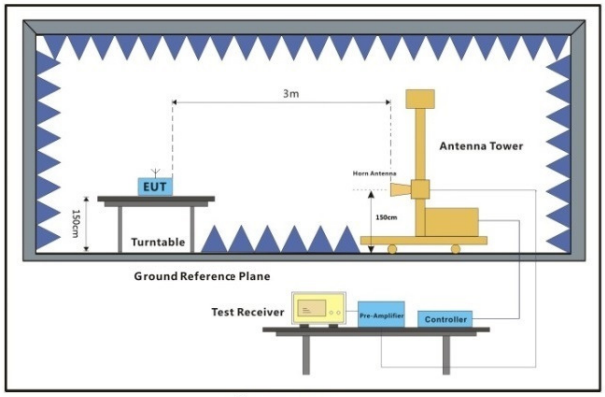
7.4.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

7.4.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

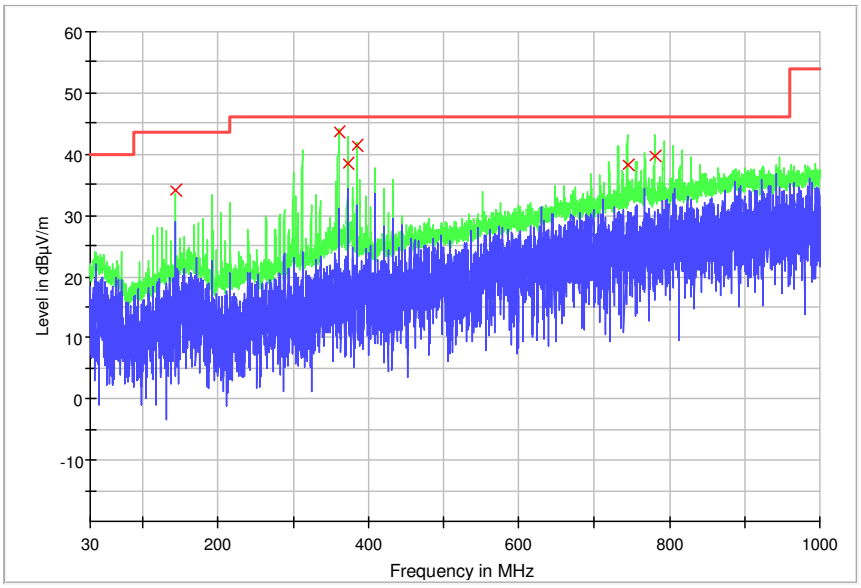
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Radiated emission below 1GHz

Horizontal (worse plots was shown as below)

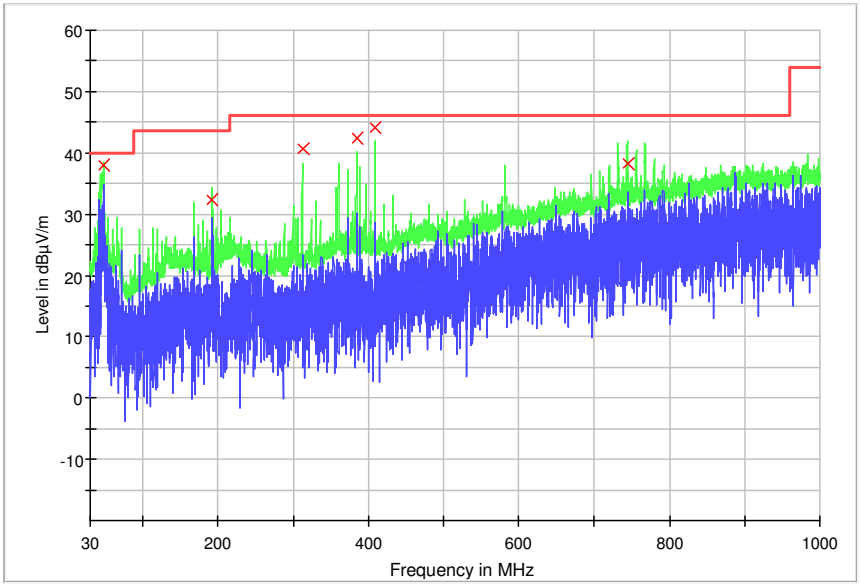


Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
143.950000	34.1	H	13.6	9.4	43.5	Pass
360.010000	43.5	H	15.8	2.5	46.0	Pass
371.905000	38.5	H	16.2	7.5	46.0	Pass
383.995000	41.5	H	16.3	4.5	46.0	Pass
744.062500	38.1	H	24.2	7.9	46.0	Pass
780.040000	39.7	H	24.4	6.3	46.0	Pass

Remark:

1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Vertical (worse plots was shown as below)



Frequency (MHz)	QuasiPeak (dBµV/m)	Pol.	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)	Result
48.010000	38.0	V	14.2	2.0	40.0	Pass
191.920000	32.4	V	11	11.2	43.5	Pass
312.040000	40.6	V	14.8	5.4	46.0	Pass
383.995000	42.3	V	16.3	3.7	46.0	Pass
407.980000	44.0	V	16.4	2.0	46.0	Pass
744.062500	38.3	V	24.2	7.7	46.0	Pass

Remark:

1. All readings are Quasi-Peak values.
2. Correction Factor = Antenna Factor + Cable Loss.
3. Pol. = antenna polarization

Above 1GHz

Channel:Low

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1158.003	H	37.6	/	74.0	54.0	Pass
2281.462	V	43.7	/	74.0	54.0	Pass
3493.007	H	44.1	/	74.0	54.0	Pass
4602.555	H	47.8	/	74.0	54.0	Pass
6628.362	V	52.9	/	74.0	54.0	Pass
8760.027	H	54.3	43.5	74.0	54.0	Pass

Channel:Middle

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1841.253	H	35.2	/	74.0	54.0	Pass
2970.240	V	43.5	/	74.0	54.0	Pass
3236.013	V	46.7	/	74.0	54.0	Pass
4497.006	V	48.7	/	74.0	54.0	Pass
6560.026	V	53.7	/	74.0	54.0	Pass
8607.149	V	57.4	47.5	74.0	54.0	Pass

Channel: High

Frequency (MHz)	Antenna Polarization	Emission Level (dBµV/m)		Limit (dBµV/m)		Remark
		Peak	Average	Peak	Average	
1236.281	H	38.2	/	74.0	54.0	Pass
3498.570	V	45.3	/	74.0	54.0	Pass
4514.093	H	43.7	/	74.0	54.0	Pass
5607.486	H	47.5	/	74.0	54.0	Pass
7706.259	H	49.2	/	74.0	54.0	Pass
9834.021	V	56.2	47.2	74.0	54.0	Pass

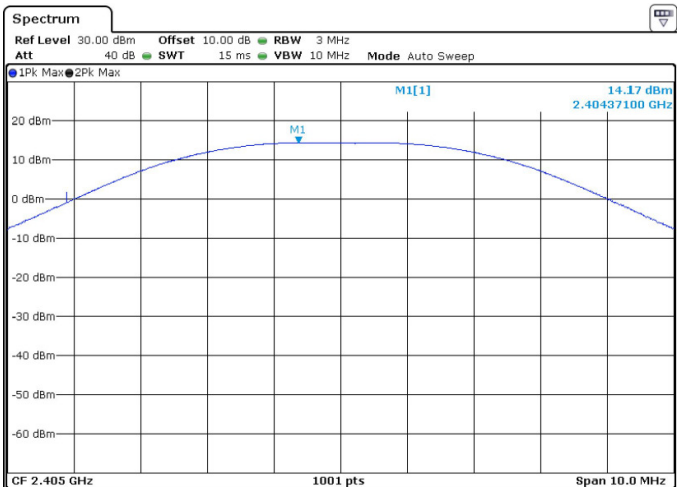
8 Photographs

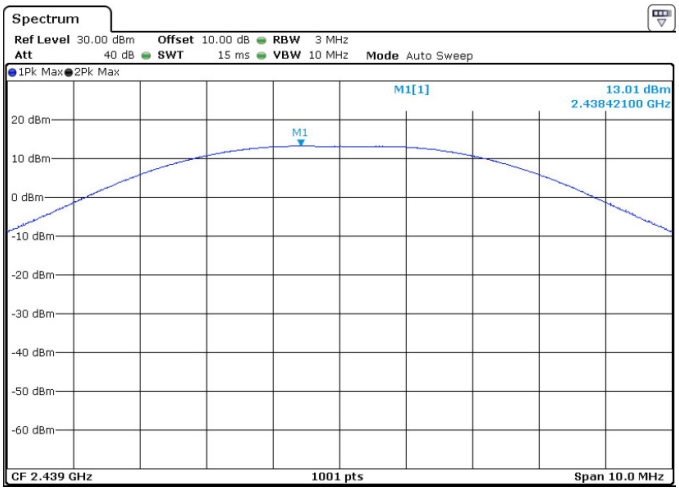
Remark: Photos refer to Appendix: External Photo, Internal Photo, Setup Photo of HKEM2008000876AT

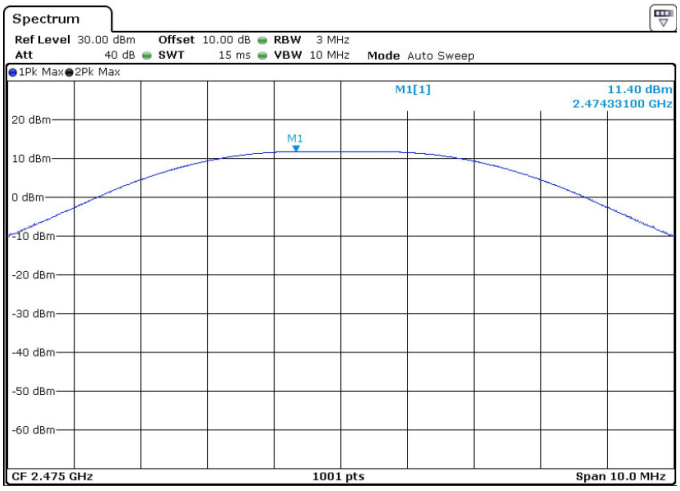
9 Appendix

9.1 Peak output power (Sweep)

DUT Frequency (MHz)	Measured Conducted Power (dBm)	Cable Loss (dB)	Final Result (dBm)	Limit Max (dBm)	Result
2405.000000	14.2	0.2	14.4	21.0	PASS
2439.000000	13.0	0.2	13.2	21.0	PASS
2475.000000	11.4	0.2	11.6	21.0	PASS







- End of Report -