FCC TEST REPORT FOR CERTIFICATION

Report No.	:	N1901R-0757
Model and/or type referene	:	SRC10-BLE/ Bluetooth Response Device
Test item description	:	Digital Transmission System (DTS)
Trade Mark/Brand name	:	N/A
Additional model name	:	N/A
Applicant	:	SOUL2ON Inc.

Test Device Serial No.:	:	N/A
Test Standards	:	FCC 47 CFR Part 15C
Classification		Digital Transmission System (DTS)

Data of issue	:	January 25, 2019
Test result	:	Complied

Tested by (+ signature) Soo Yeon Kim / Project Engineer

Reviewed by (+ signature) Changwoo Kim / Technical Manager

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. The client should not use it to claim product endorsement by TAF or any government agencies.

The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

TABLE OF CONTENTS

1. Certificate of Information

Applicant / Manufacture

Company name	:	SOUL2ON Inc.
Address	:	712ho, 7F, 11-41, Simin-daero 327beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, Republic of Korea
Telephone /Facsimile	:	+82-70-7808-4268

Equipment Under Test (EUT)

FCC ID	:	2ASXI-SRC10-BLE
Classification of installation	:	Digital Transmission System (DTS)
Test item particulars	:	FCC 47 CFR Part 15 subpart C
Trademark	:	N/A
Model and/or type reference	:	SRC10-BLE / Bluetooth Response Device
Additional model name	:	N/A
Serial number	:	N/A
Date (s) of performance of tests:	:	January 01, 2019 to January 24, 2019
Date of receipt of test item	:	November 23, 2018
EUT condition	:	Pre-production, not damaged
Interface Ports	:	DC IN
EUT Power Source	:	Operating Voltage : 3.0 Vdc(Coin Battery) Test Voltage : 3.0 Vdc
Internal clock frequency	:	2402 MHz ~ 2480 MHz
Firmware version	:	N/A
Note	:	N/A

Model Description

- NONE

Model Specification

- NONE

Test Performed

Test started & completed	:	January 01, 2019 to January 24, 2019
Location	:	NTREE Co., Ltd.

*** To be continued next page ***

2. Summary of Test Results

Test Specification

Purpose of the test : Compliance test to the following standard
Applied standard : FCC 47 CFR Part 15C
Classification : N/A
Deviations from Standard : FCC KDB 558074 D01 DTS Meas Guidance v05
Test Method

FCC Part15(15.247), Subpart C			
Standard Section	Test Item	Verdict	Remark
15.207	Conducted Emission	N/A	1)
15.209	Radiated Emission	PASS	-
15.247(a)(2)	6dB Bandwidth	PASS	-
15.247(b)	Peak Output Power	PASS	-
15.247(c)	Radiated Spurious Emission	PASS	-
15.247(e)	Power Spectral Density	PASS	-
15.205	Band Edge Emission	PASS	-
15.203	Antenna Requirement	PASS	-

Remark

* N/A: denote test is not applicable in this test report.

* All test items were verified and recorded according to the standards and without any deviation during the test.

1) Used to only Coin battery.

3. General Information

Purpose

This document is based on the Electromagnetic Interference (EMI) tests performed on the "Bluetooth Response Device". The measurements were performed according to the measurement procedure described in ANSI C 63.4:2014. The tests were carried out in order to confirm whether the electromagnetic emissions from the EUT(Equipment Under Test), are within the class B limits defined in FCC Part 15, Subpart C- "Section 15.207- Conducted limits" and "Section 15.209-Radiated emission limits".

Test Performed

The Electromagnetic compatibility measurement facilities are located on at 30,Pajangcheon-ro 44beon-gil,Jangan-gu, Suwon-si, Gyeonggi-do Korea. Description details of test facilities were submitted to the RRA(National Radio Research Agency) according to the requirement of ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme) and FCC(Federal Communications Commission) and Vietnam MRA and TuV SUD CARAT and TuV NORD, UL WTDP.

RRA Designation No.: KR0175

KOLAS Accreditation No. : KT511

FCC(DoC) Test Firm Registration No. : KR0175

Vietnam MRA Designation No.: KR0175

(QCVN 18:2014/BTTTT, QCVN 54:2011/BTTTT,TCVN 7317:2003(CISPR 24:1997),TCVN 7189:2009(CISPR 22:2006)

TuV SUD CARAT : ROK1211C

TuV NORD : KL-3879/11

UL WTDP .: 1107-S-131

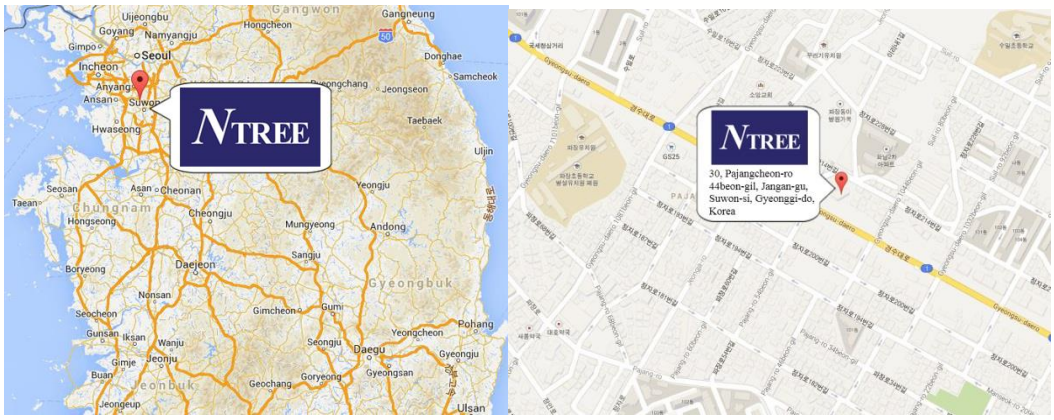
Laboratory : NTREE Co., Ltd.

Address : 30,Pajangcheon-ro 44beon-gil,Jangan-gu, Suwon-si, Gyeonggi-do Korea

Telephone : +82-31-893-1000

Facsimile : +82-31-893-0111

SITE MAP



4. Uncertainty

Measurement uncertainty

Radiated disturbance	30 MHz to 1 GHz	3.6 dB
	1 GHz to 18 GHz	7.8 dB
Conducted disturbance	0.15 MHz to 30 MHz	1.8 dB

The coverage factor k=2 yields approx. a 95% level of confidence for near-normal distribution typical of most measurement results.

5. Test Conditions and EUT Information

Operation During Test

The EUT is the transceiver which is the Bluetooth LE mode.
The Laptop was used to control the EUT to transmit the wanted TX channel by the testing program (QBlue ISP Studio) which manufacturer supported. The Laptop was removed after controlling the EUT to transmit the wanted signal. The EUT was tested at the lowest channel, middle channel and the highest channel with the maximum output power in accordance with the manufacturer's specifications. The worst data were recorded in the report.

Table of test power setting

Frequency band	Mode	Power setting Level
2402~2480 MHz	LE	Default

Table of test channels

Frequency band	Mode	Test Channel (CH)	Frequency (MHz)
2.4 GHz	LE	0	2402
		19	2440
		39	2480

Table of test modes

Test Items	Mode	Modulation	Test Channel (CH)
Radiated Emissions	LE	GFSK	0/19/39
Conducted Emissions	LE	GFSK	0/19/39
6 dB Bandwidth	LE	GFSK	0/19/39
Peak Output Power			0/19/39
Peak Power Spectral Density			0/19/39
Radiated Spurious Emission, Band edge Emission			0/19/39

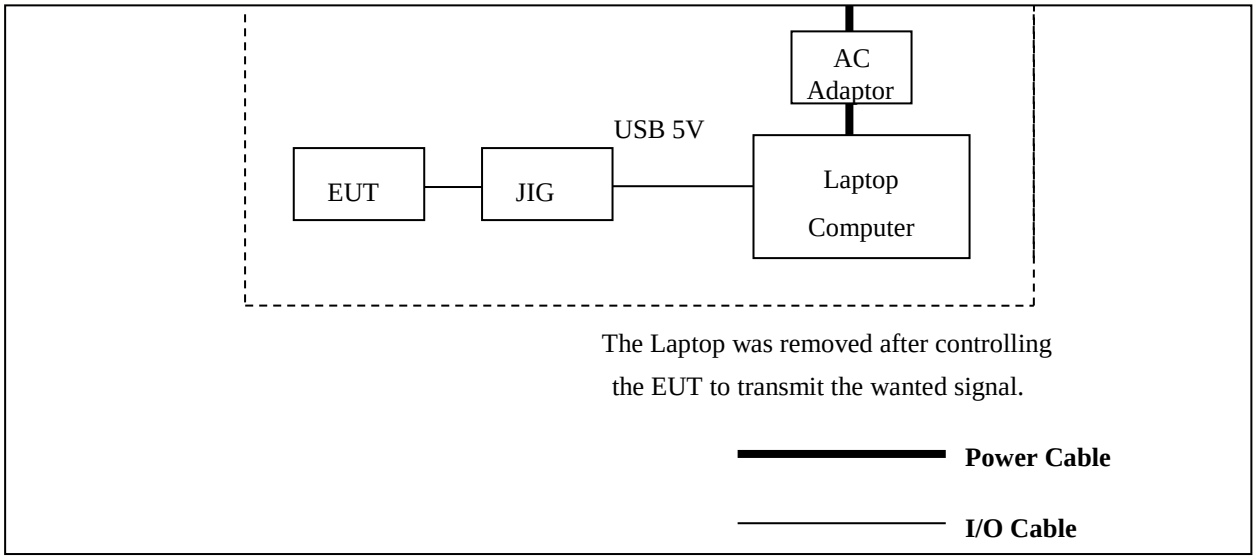
Antenna TX mode information:

Frequency band	Mode	Antenna TX mode	Support MIMO
2.4 GHz	LE	■ 1TX, □ 2TX	□ Yes, ■ No

6. Support Equipment Device

EUT	Bluetooth Response Device Model : SRC10-BLE	S/N: N/A
Laptop Computer	ASUS Model : X550Z	FCC DoC S/N : 6298
AC/DC Adapter	ASUS Model : ADP-65GD B 1.5 m unshielded power cable	FCC DoC S/N : N/A

Setup Drawing



7. EUT Information

The EUT is the **Bluetooth Response DeviceTransceiver FCC ID: 2ASXI-SRC10-BLE.**
This unit supports full qualified Bluetooth 4.0 with LE standard system.

Specifications:

Category	Bluetooth Response Device
Model Name	SRC10-BLE
Brand Name	SOUL2ON Inc.
RF Frequency	2402 MHz ~ 2480 MHz
Maximum Conducted Output Power	-22.68 dBm
Channels	40ch
Antenna Gain (peak)	-12.51 dBi
Antenna Setup	1TX / 1RX
Modulations	GFSK(BLE)
Temperature Range	-10℃ ~ 55 ℃
Voltage	3.0 Vdc (Coin Battery)
Dimensions (H x W x D)	About 58 mm x 31 mm X 10 mm
Weight	About 30 g
H/W Status	-
S/W Status	-
Remarks	-

8. Recommendation/Conclusion

The data collected shows that the **SOUL2ON Inc. Bluetooth Response Device FCC ID: 2ASXI-SRC10-BLE** is in compliance with Part 15.247 of the FCC Rule specification.

9. Antenna Requirements

§15.203 of the FCC Rules part 15 Subpart C
: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna of the **SOUL2ON Inc. Bluetooth Response Device FCC ID: 2ASXI-SRC10-BLE** is **permanently attached** and there are no provisions for connection to an internal antenna. It complies with the requirement of §15.203.

10. Description of Test

10.1 Conducted Emissions

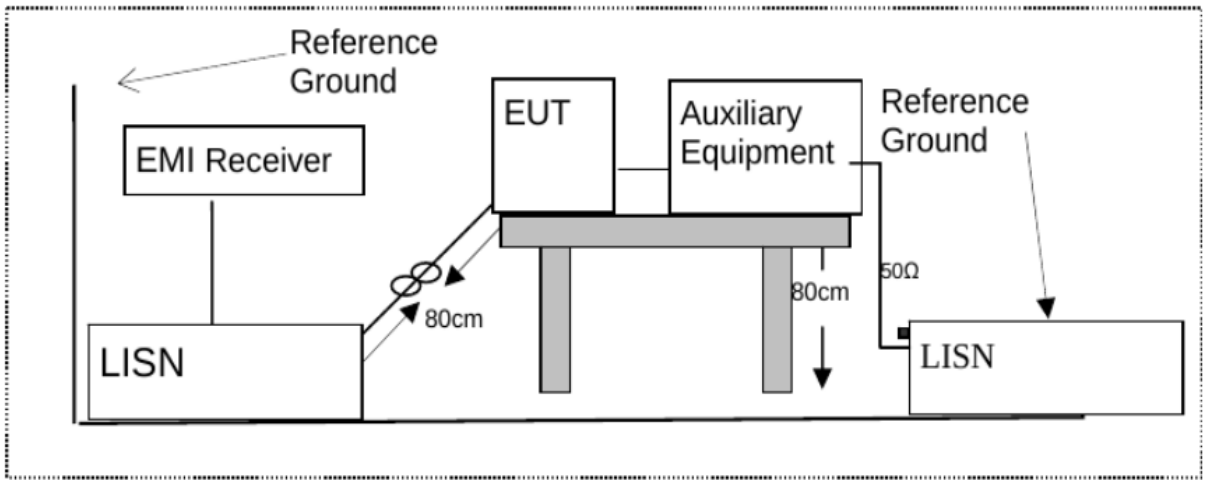
The Line conducted emission test facility is located inside a 8.0 x 5.0 x 3.0 meter shielded enclosure.

It is manufactured by DAMS Tec's. The shielding effectiveness of the shielded room is in accordance with IEEE 299, MIL-STD-285 or NSA CISPR 16-1-4 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 1.5 m away from the side of wall of the shielded room Rohde & Schwarz (ENV216) and (ENV216) of the 50 ohm/50 µH Line Impedance Stabilization Network (LISN) are bonded to the shielded room. The EUT is powered from the Rohde & Schwarz LISN (ENV216) and the support equipment is powered from the Rohde & Schwarz LISN (ENV216). Power to the LISNs are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1 / 2 ".

If DC power device, power will be derived from the source power supply it normally will be powered

from and this supply lines will be connected to the LISNs, All interconnecting cables more than 1 meter were shortened by non inductive bundling (serpentinefashion) to a 1 meter length.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.



The spectrum was scanned from 150 kHz to 30 MHz with 200 msec sweep time.

The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESR3 and ESR7). The detector functions were set to CISPR quasi-peak

mode & average mode. The bandwidth of receiver was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.

Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; whichever determined the worst case emission.

Each EME reported was calibrated using the R&S signal generator.

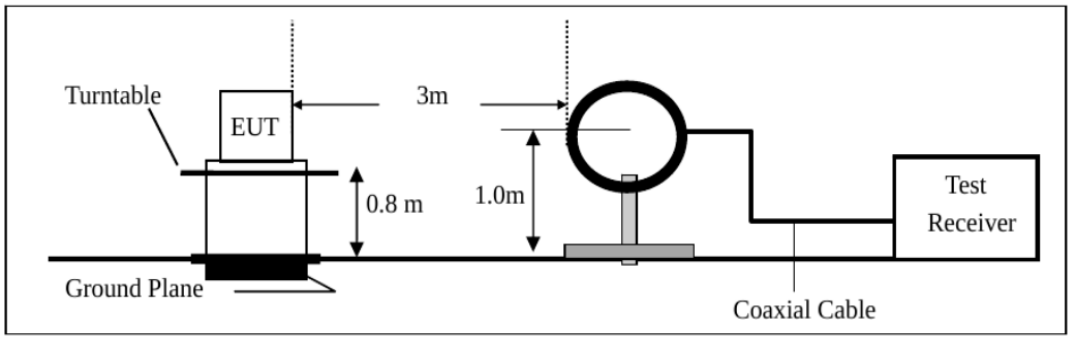
10.2 Radiated Emissions

The measurement was performed at the test site that is specified in accordance with ANSI C63.10-2013.

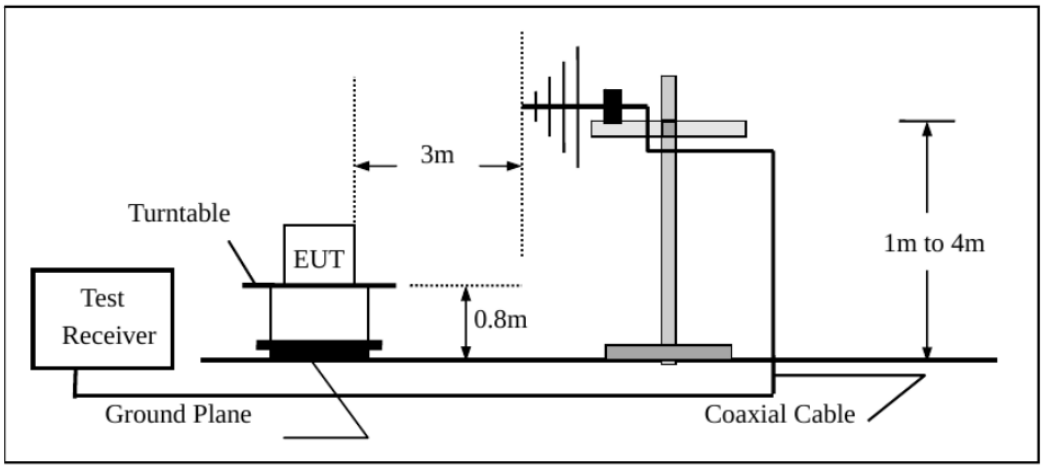
The spurious emission was scanned from 9 kHz to 30 MHz using Loop Antenna(Schwarzbeck, FMZB1519) and 30 to 1000 MHz using Trilog broadband test antenna(Schwarzbeck, VULB 9168). Above 1 GHz, Horn antenna (Schwarzbeck BBHA 9120D: up to 18 GHz, Schwarzbeck BBHA9170 : 18 to 40 GHz) was used.

For emissions testing at below 1GHz, The test equipment was placed on turntable with 0.8 m above ground. For emission measurements above 1 GHz, The test equipment was placed on turntable with 1.5 m above ground. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The EUT, cable, wire arrangement and mode of operation that has the highest amplitude relative to the limit was selected. Then, the turn table was rotated from 0˚ to 360˚ and an antenna mast was moved from 1 m to 4 m height to maximize the suspected highest amplitude signal. The final maximized level was recorded.

(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



At frequencies below 1000 MHz, measurements performed using the CISPR quasi-peak detection. At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in KDB “558074 D01 15.247 Meas Guidance v05”

in section 12.2.4 and 12.2.5.3. Peak emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Trace mode = max hold. Average emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 3kHz, Detector = Peak, Trace mode = max hold. Allow max hold to run for at least 50 times (1/duty cycle) traces.

According to FCC Part 15.247(d): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

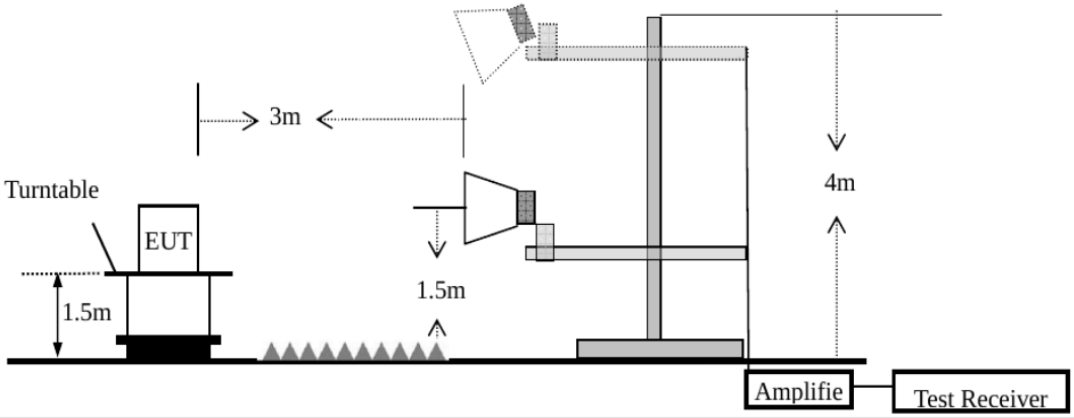
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100	3
88–216	150	3
216–960	200	3
Above 960	500	3

Radiated Emissions Limits per 47 CFR 15.209(a)

Limits of Radiated Emission Measurement(Above 1000MHz)

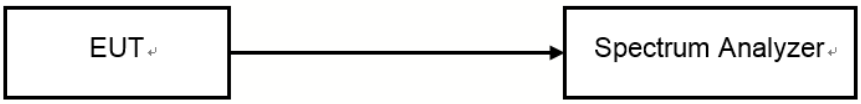
Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

(c) For radiated emissions above 1000MHz



11. 6 dB Bandwidth

Test Setup



Test Procedure

EUTs 6 dB bandwidth is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

The spectrum analyzer setting is as follows.

RBW = 100 kHz

VBW ≥ 3 x RBW

Detector = Peak

Trace mode = max hold

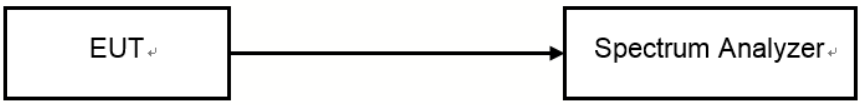
Sweep = auto couple

Allow the trace to stabilize.

The bandwidth measurement function on the spectrum analyzer is used to measure the 6 dB bandwidth.

12. Peak Output Power and E.I.R.P

Test Setup



Test Procedure

EUTs Maximum Peak Conducted Output Power is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

The spectrum analyzer setting is as follows.

RBW = 1 MHz

VBW = 3 MHz

Span = fully encompass the DTS bandwidth

Detector = peak

Sweep time = auto couple

Trace mode = max hold

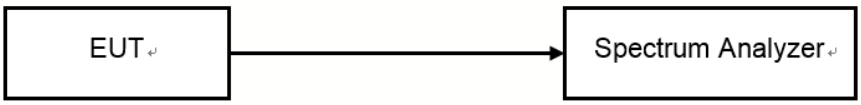
Allow the trace to stabilize.

Use peak marker function to determine the peak amplitude level.

E.I.R.P is calculated according to KDB412172 D01 Determining ERP and EIRP v01

13. Peak Power Spectral Density

Test Setup



Test Procedure

EUTs Peak Power Spectral Density is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

The spectrum analyzer setting is as follows.

Center frequency = DTS channel center frequency

Span = 1.5 times the DTS channel bandwidth

RBW ≥ 3 kHz

VBW ≥ 3 x RBW

Detector = peak

Sweep time = auto couple

Trace mode = max hold

Allow the trace to stabilize.

The peak search function on the spectrum analyzer is used to determine the maximum amplitude level within the RBW.

14. Test Results

14.1 Conducted Emission(Line)

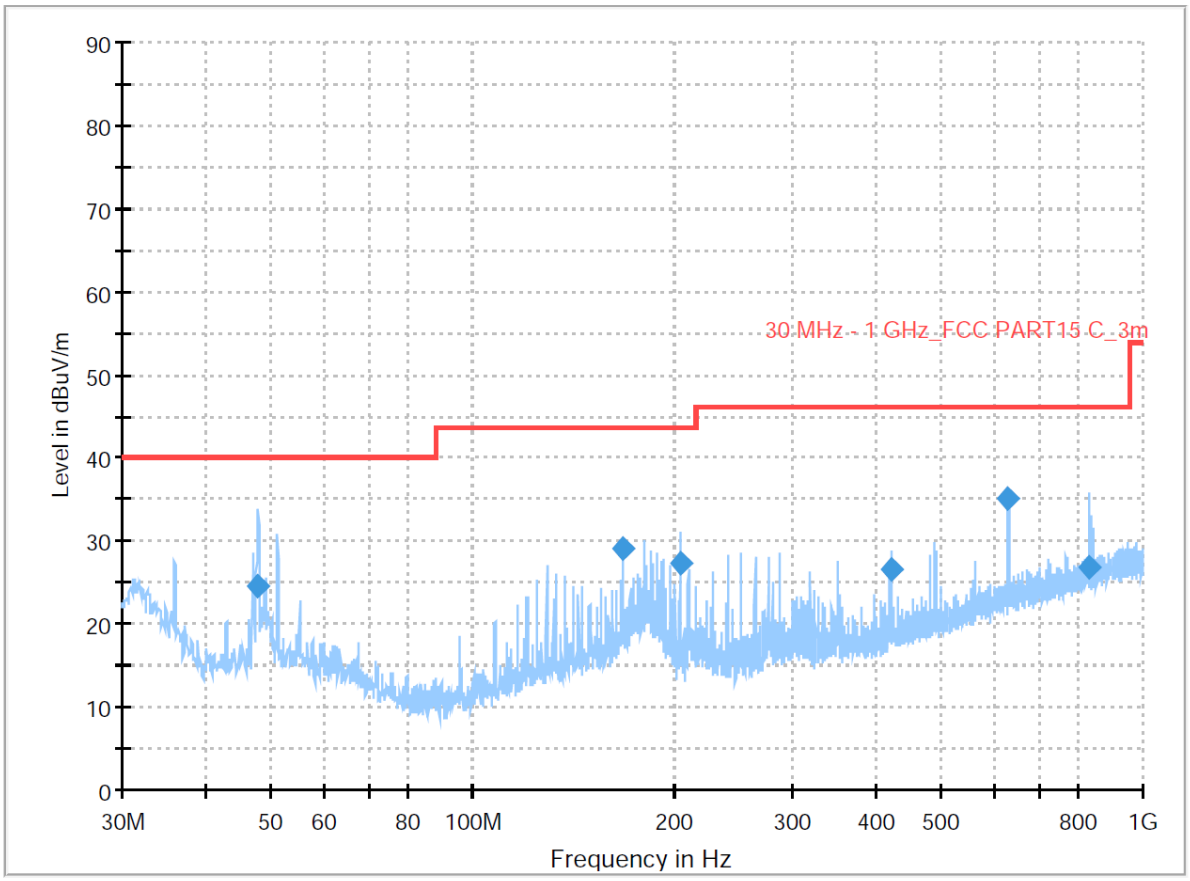
14.2 Conducted Emission(Neutral)

14.3 Radiated Emissions

Test Report

Common Information

Test Description:	SRC10-BLE
Test Mode:	2 402 MHz
Test Standard:	FCC PART 15 C
Environment Conditions:	DC 3 V / Temp 22 Humi 51
Operator Name:	KIM SOOYEON
Comment:	TX



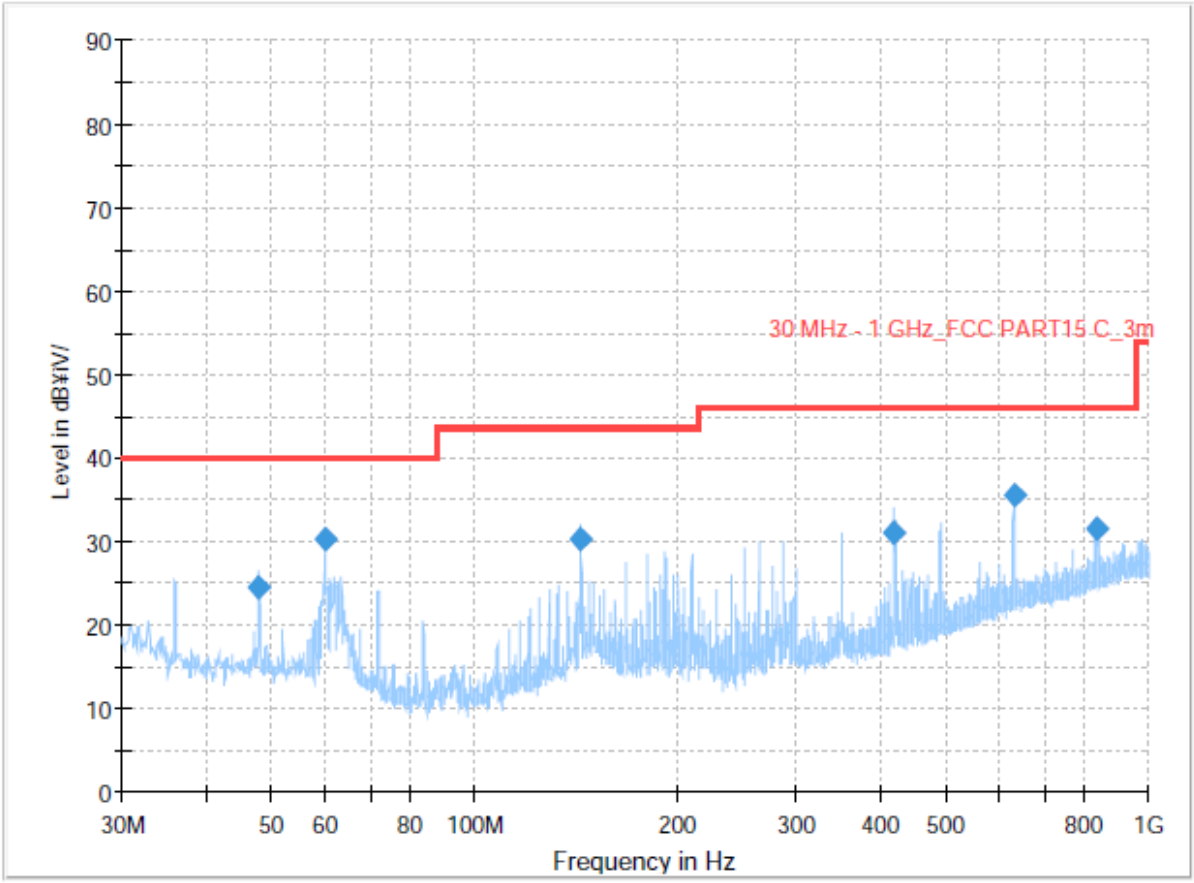
Final_Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.751000	24.60	40.00	15.40	2000.0	120.000	100.0	V	117.0	-27.9
167.934000	29.17	43.52	14.35	2000.0	120.000	300.0	H	136.0	-27.1
203.921000	27.24	43.52	16.28	2000.0	120.000	100.0	H	0.0	-29.2
420.231000	26.48	46.02	19.54	2000.0	120.000	200.0	H	300.0	-21.8
629.848000	35.06	46.02	10.96	2000.0	120.000	100.0	H	20.0	-16.6
832.675000	26.92	46.02	19.10	2000.0	120.000	100.0	V	50.0	-12.4

Test Report

Common Information

Test Description:	SRC10-BLE
Test Mode:	2 440 MHz
Test Standard:	FCC PART 15 C
Environment Conditions:	DC 3 V / Temp 22 Humi 51
Operator Name:	KIM SOOYEON
Comment:	TX



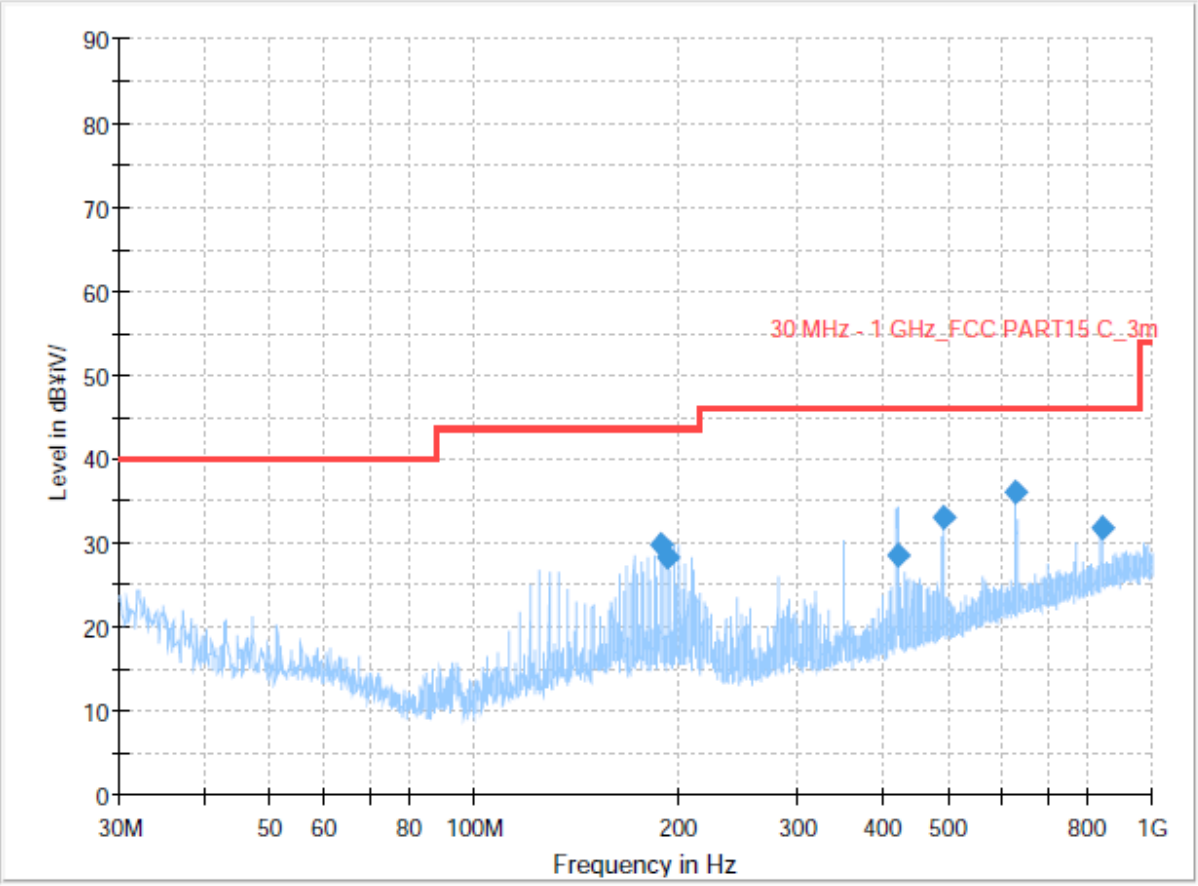
Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.848000	24.59	40.00	15.41	2000.0	120.000	100.0	V	0.0	-27.9
59.973000	30.41	40.00	9.59	2000.0	120.000	100.0	V	274.0	-28.4
143.587000	30.29	43.52	13.23	2000.0	120.000	200.0	H	355.0	-27.1
419.843000	31.18	46.02	14.84	2000.0	120.000	200.0	H	339.0	-21.8
632.467000	35.60	46.02	10.43	2000.0	120.000	100.0	H	10.0	-16.6
839.853000	31.69	46.02	14.33	2000.0	120.000	100.0	H	330.0	-12.2

Test Report

Common Information

Test Description:	SRC10-BLE
Test Mode:	2 480 MHz
Test Standard:	FCC PART 15 C
Environment Conditions:	DC 3 V / Temp 22 Humi 51
Operator Name:	KIM SOOYEON
Comment:	TX



Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
188.401000	29.73	43.52	13.79	2000.0	120.000	100.0	H	38.0	-28.6
192.475000	28.21	43.52	15.32	2000.0	120.000	100.0	H	3.0	-28.9
420.231000	28.65	46.02	17.37	2000.0	120.000	200.0	H	11.0	-21.8
491.914000	33.21	46.02	12.81	2000.0	120.000	200.0	H	279.0	-20.0
629.848000	36.21	46.02	9.81	2000.0	120.000	100.0	H	340.0	-16.6
843.248000	31.79	46.02	14.23	2000.0	120.000	200.0	H	40.0	-12.1

Notes:

1. All modes were measured and the worst-case emission was reported.

2. Pol. H = Horizontal, V = Vertical

3. Corr. = Antenna Factor + Cable Loss + Amplifier.

4. Measurements using CISPR quasi-peak mode below 1 GHz.

5. The radiated emissions testing were made by rotating the receive antenna with horizontal, Vertical polarization.

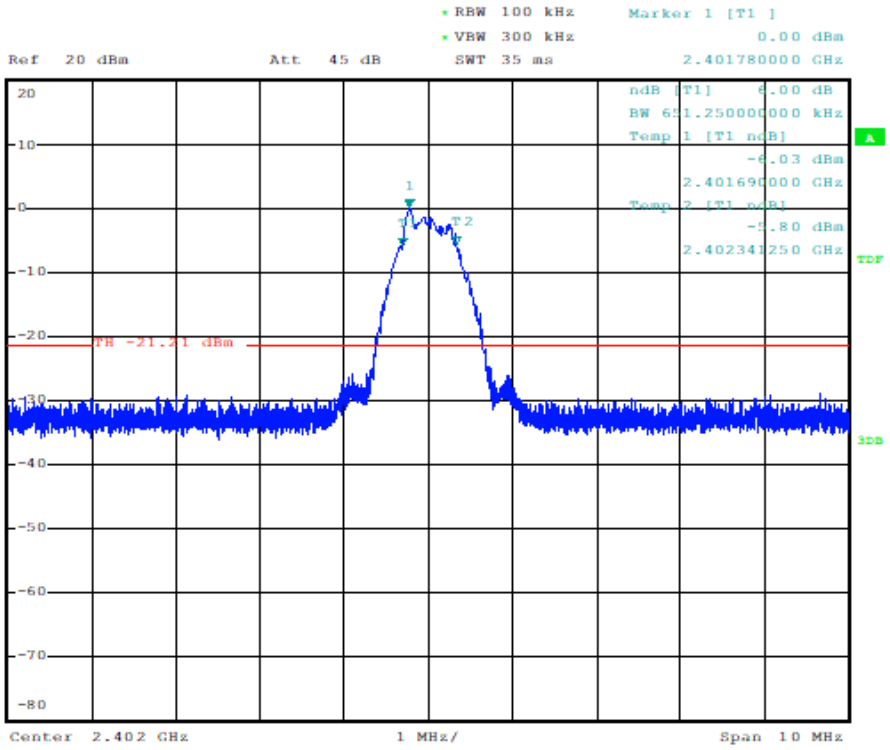
6. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

7. The limit is on the FCC §15.209

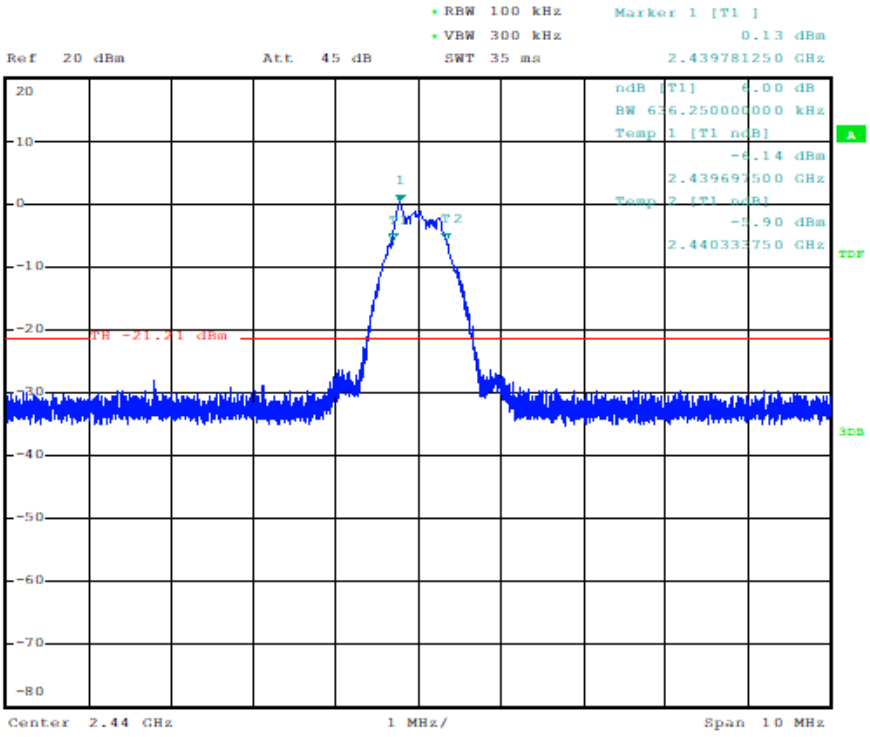
14.4 6 dB Modulated Bandwidth

Channel	Frequency (MHz)	6 dB modulated bandwidth (MHz)	Limit (MHz)	Result
Lowest	2402	0.651	0.500	Pass
Middle	2440	0.636	0.500	Pass
Highest	2480	0.644	0.500	Pass

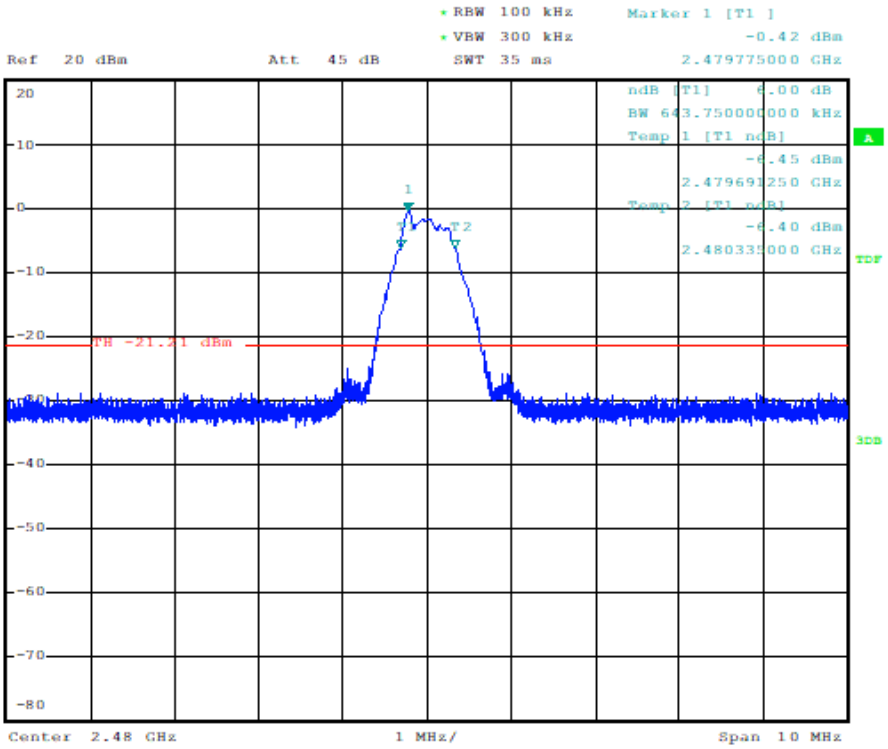
6 dB Bandwidth, Lowest Channel (2402 MHz)



6 dB Bandwidth, Middle Channel (2440 MHz)



6 dB Bandwidth, Highest Channel (2480 MHz)



14.5 Peak Output Power and E.I.R.P

Frequency (MHz)	Peak Power (dBm)	Limit (MHz)	E.I.R.P* (dBm)	Result
2402	0.64	30.00	-11.87	Pass
2440	0.44	30.00	-12.07	Pass
2480	0.06	30.00	-12.45	Pass

Note:

The following formular was used for spectrum offset:

Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

***)** *E.I.R.P was calculated by following equation according to KDB412172 D01 Determining ERP and EIRP v01*

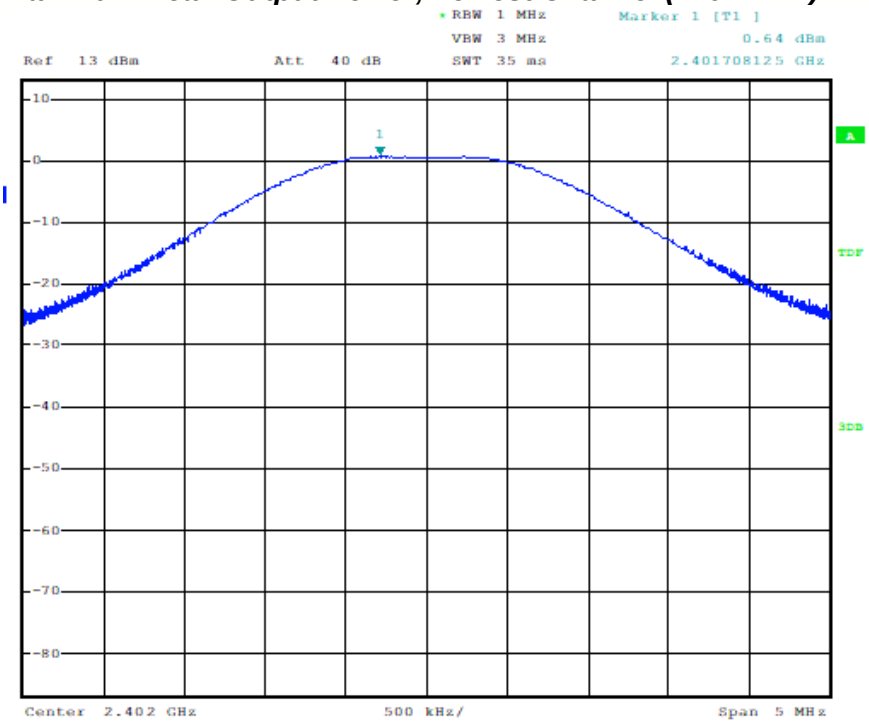
$E.I.R.P = P_T + G_T - Lc$

P_T = *Peak outputpower (dBm)*

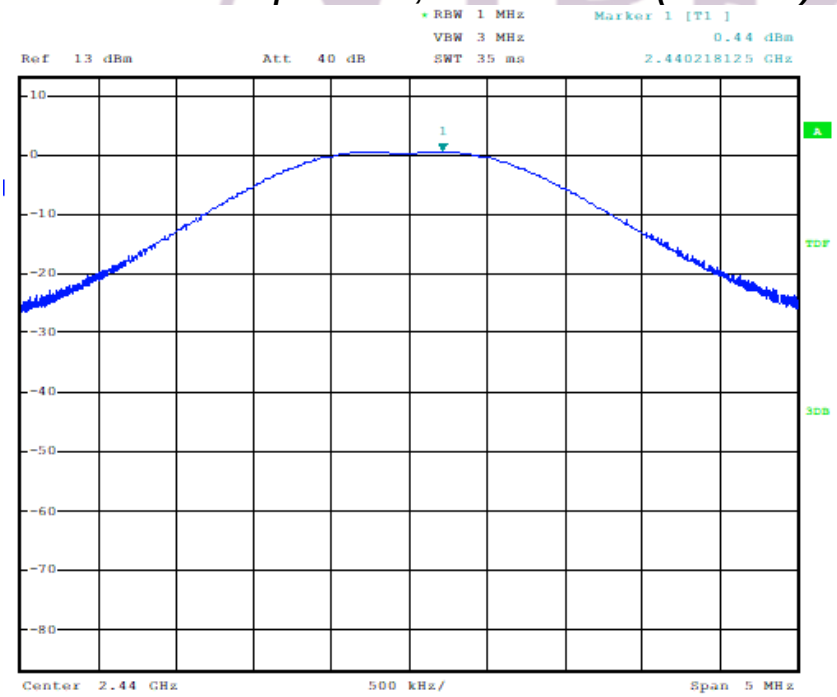
G_T = *Gain of the transmitting antenna in dBi, Peak antenna gain is -12.51 dBi.*

L_C = *Signal attenuation in the connecting cable between the transmitter and antenna in dB. This factor of an integral antenna is negligible.*

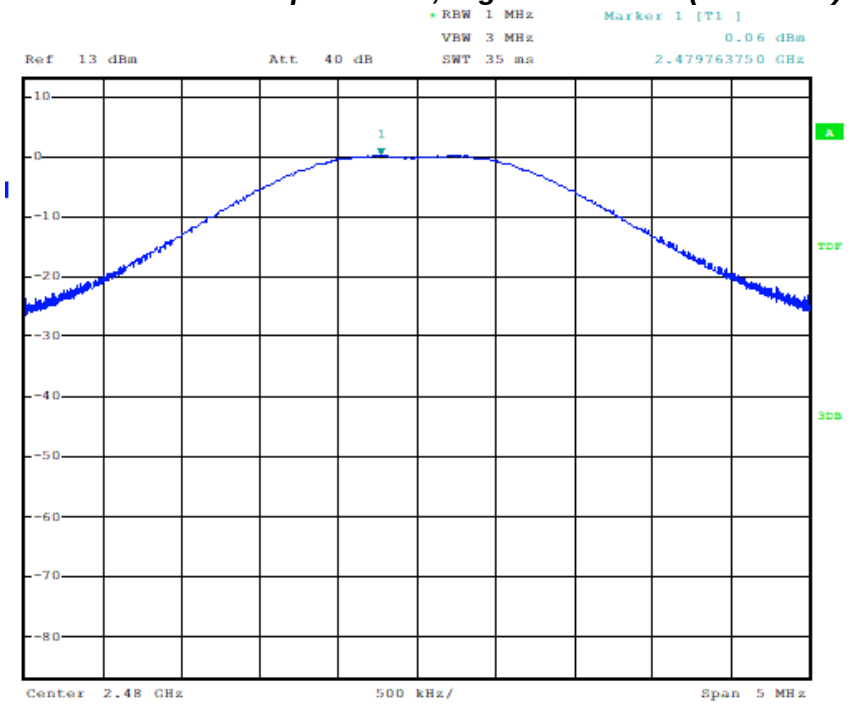
Maximum Peak Output Power, Lowest Channel (2402 MHz)



Maximum Peak Output Power, Middle Channel (2442 MHz)



Maximum Peak Output Power, Highest Channel (2480 MHz)



14.6 Peak power Spectral Density

Channel	Frequency (MHz)	Reading (dBm)	Ant. Gain (dB)	Result (dBm)	Limit (dBm)	Verdict
Lowest	2402	-10.17	-12.51	-22.68	8.00	Pass
Middle	2440	-10.24	-12.51	-22.75	8.00	Pass
Highest	2480	-10.89	-12.51	-23.04	8.00	Pass

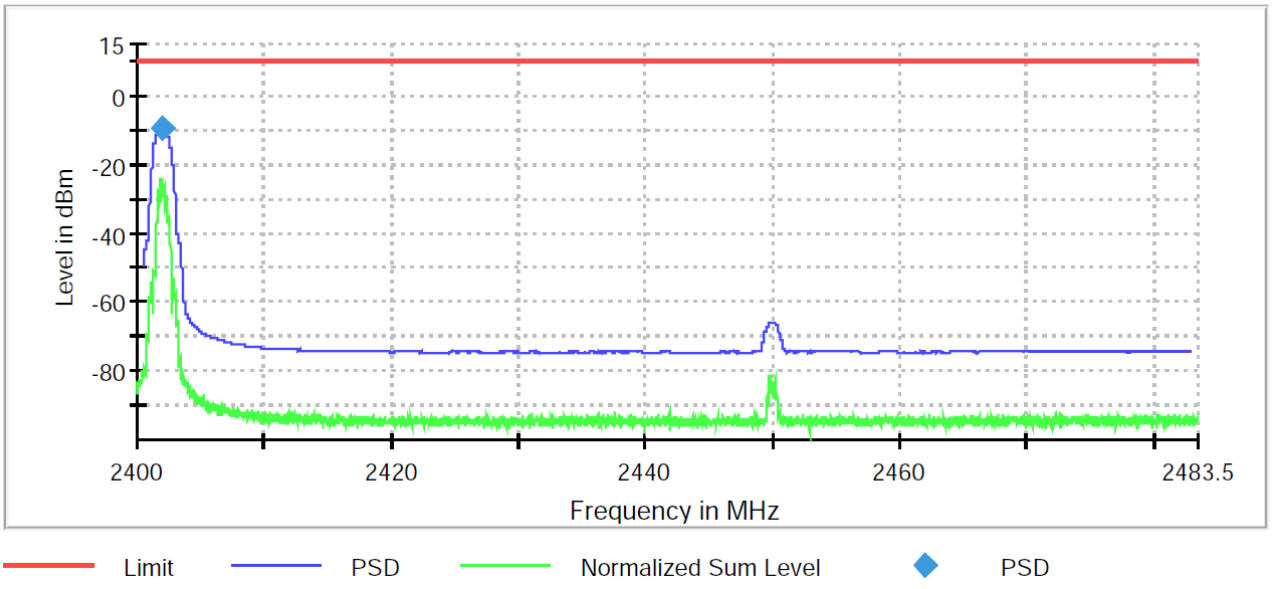
Note:

The following equation was used for spectrum offset:

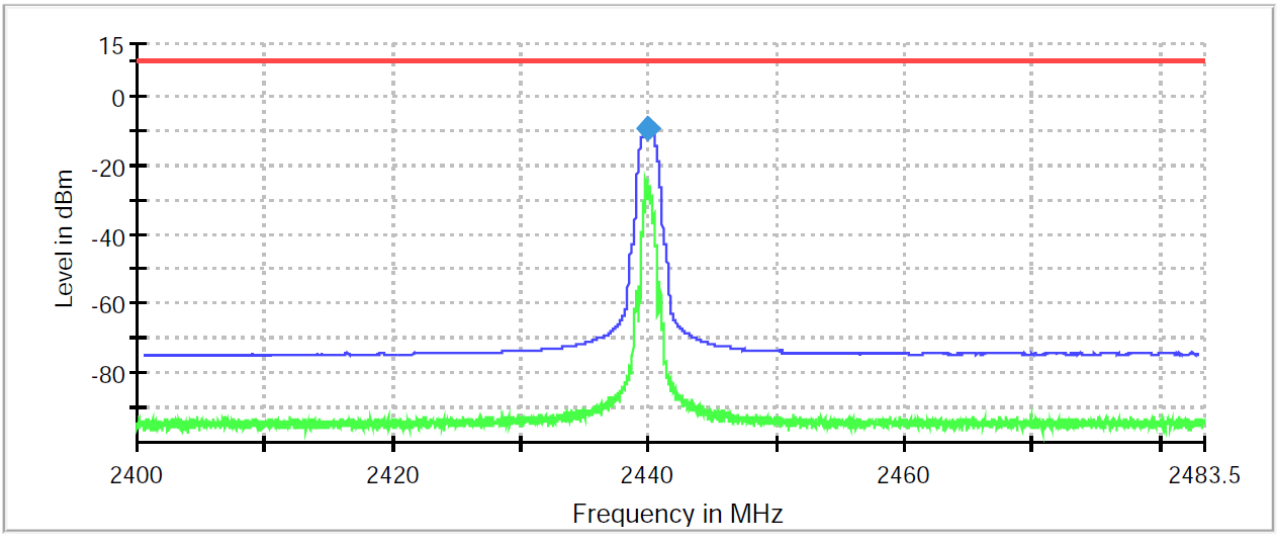
Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

Result(dBm) = Reading + Ant. Gain

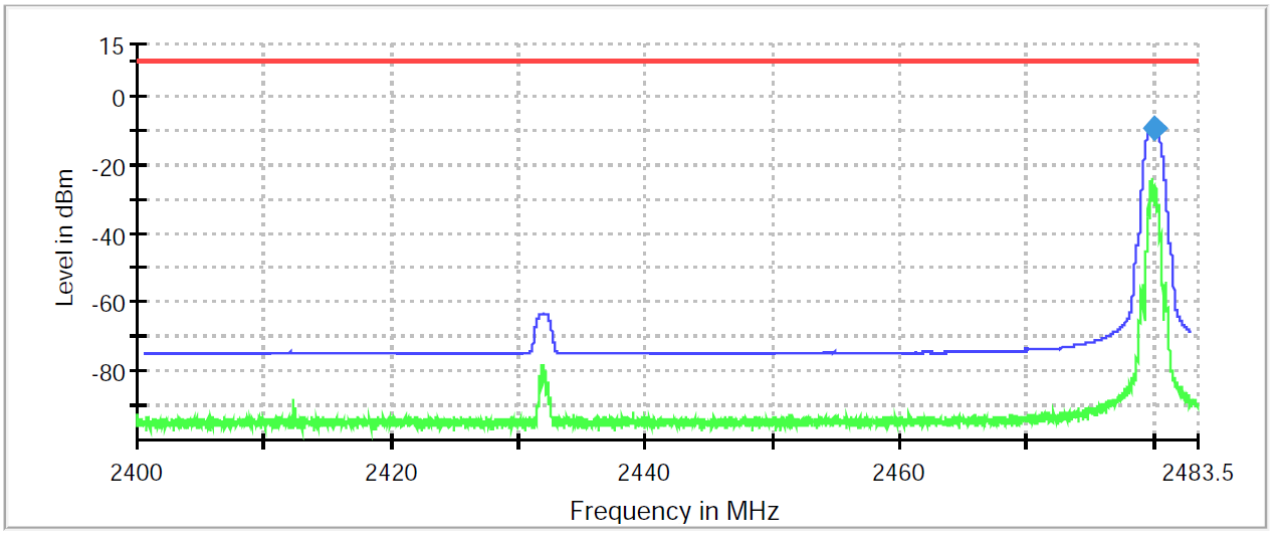
Peak Power Spectral Density, Lowest Channel (2402 MHz)



Peak Power Spectral Density, Middle Channel (2440 MHz)



Peak Power Spectral Density, Highest Channel (2480 MHz)



14.7 Radiated Spurious Emissions (above 1 ㎓ to 25 ㎓)

2402 ㎒ Channel

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Result (dBuV/m)	Margin (dB)	Meas.Time (ms)	Bandwidth (kHz)	Height (cm)	Pol (H/V)	Azimuth (deg)	Corr. (dB)
1260.1	36.53	-	74.00	44.74	29.26	1000	1000	150	V	0	8.21
1260.1	-	22.90	54.00	31.11	22.89	1000	1000	150	V	0	8.21
7077.5	44.82	-	74.00	65.02	8.98	1000	1000	150	V	0	20.20
7077.5	-	31.94	54.00	52.14	1.86	1000	1000	150	V	0	20.20
19924.0	26.80	0.00	74.00	62.03	11.97	1000	1000	150	V	135	35.23
21830.4	27.17	0.00	74.00	63.45	10.55	1000	1000	150	V	151	36.28

2440 ㎒ Channel

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Result (dBuV/m)	Margin (dB)	Meas.Time (ms)	Bandwidth (kHz)	Height (cm)	Pol (H/V)	Azimuth (deg)	Corr. (dB)
1504.9	35.45	-	74.00	44.45	29.55	1000	1000	150	V	0	9.00
1504.9	-	22.11	54.00	31.11	22.89	1000	1000	150	V	0	9.00
7035.0	44.81	-	74.00	64.91	9.09	1000	1000	150	V	0	20.10
7035.0	-	32.26	54.00	52.36	1.64	1000	1000	150	V	0	20.10
19830.4	27.39	0.00	74.00	62.49	11.51	1000	1000	150	V	239	35.10
21497.6	27.11	0.00	74.00	63.26	10.74	1000	1000	150	V	268	36.15

2480 ㎒ Channel

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Result (dBuV/m)	Margin (dB)	Meas.Time (ms)	Bandwidth (kHz)	Height (cm)	Pol (H/V)	Azimuth (deg)	Corr. (dB)
1258.4	34.84	-	74.00	43.05	30.95	1000	1000	150	V	0	8.21
1258.4	-	22.15	54.00	30.36	23.64	1000	1000	150	V	0	8.21
7031.6	45.24	-	74.00	65.34	8.66	1000	1000	150	V	0	20.10
7031.6	-	32.31	54.00	52.41	1.59	1000	1000	150	V	0	20.10
19378.4	27.91	0.00	74.00	62.91	11.09	1000	1000	150	V	252	35.00
21420.0	26.80	0.00	74.00	62.95	11.05	1000	1000	150	V	357	36.15

Note:

*1. *Pol. H = Horizontal V = Vertical*

*2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.*

3. Other spurious was under 20 dB below Fundamental.

4. GFSK modulation on the highest channel (2402MHz) was the worst condition.

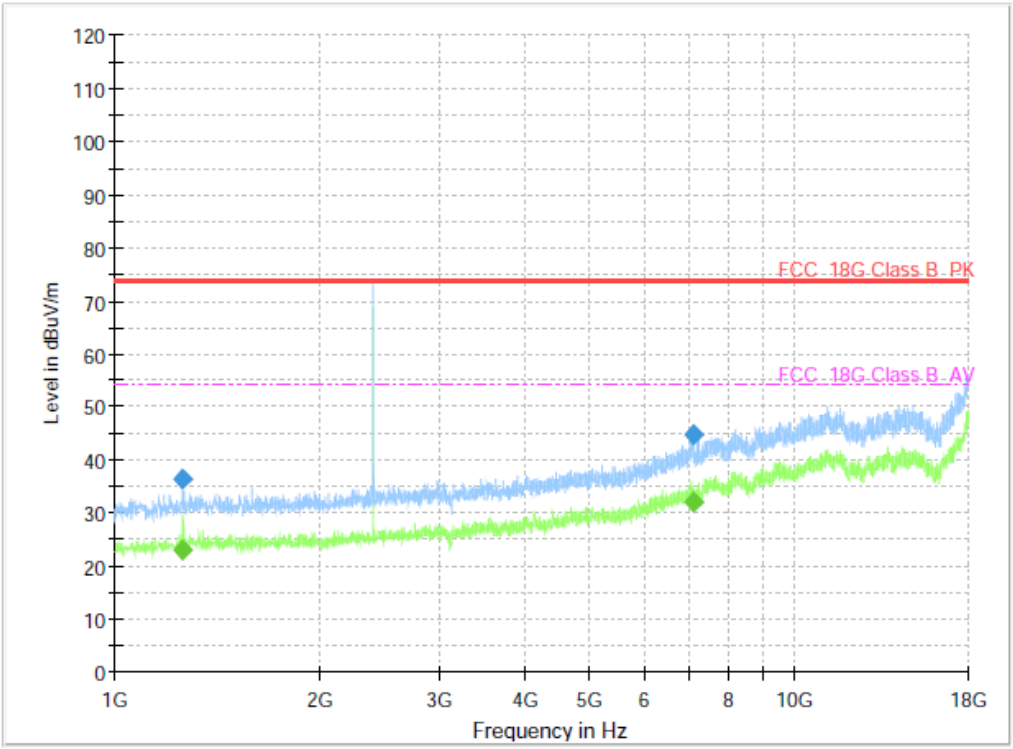
5. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.

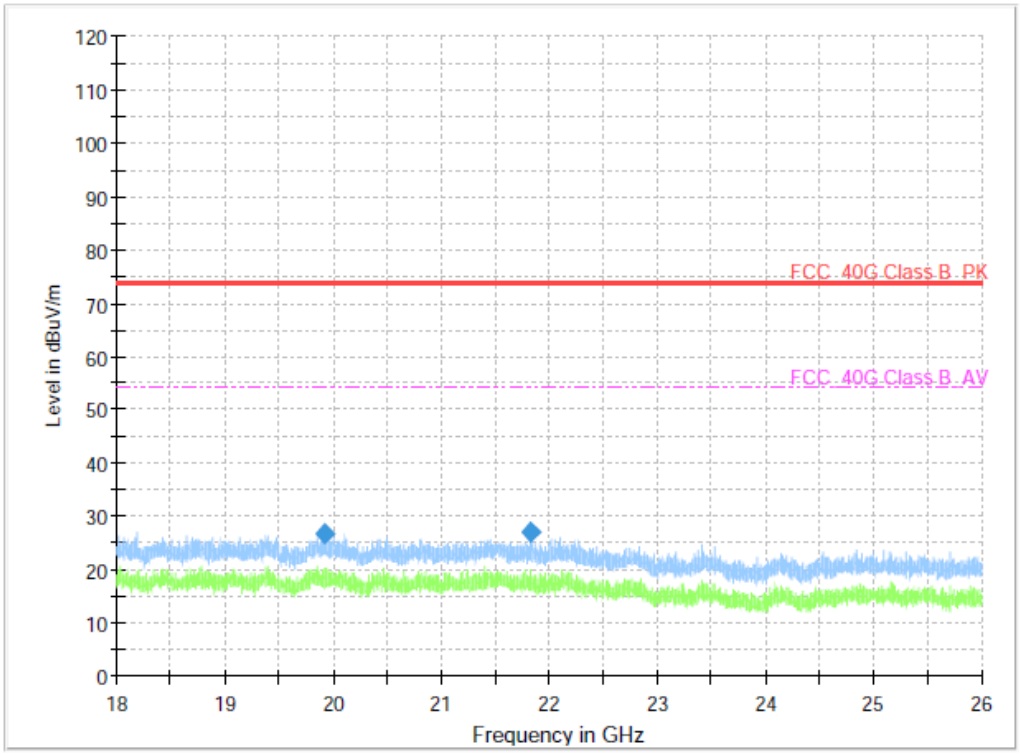
6. Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.

7. Average emissions were measured using RBW = 1 MHz, VBW = 3kHz, Detector = Peak

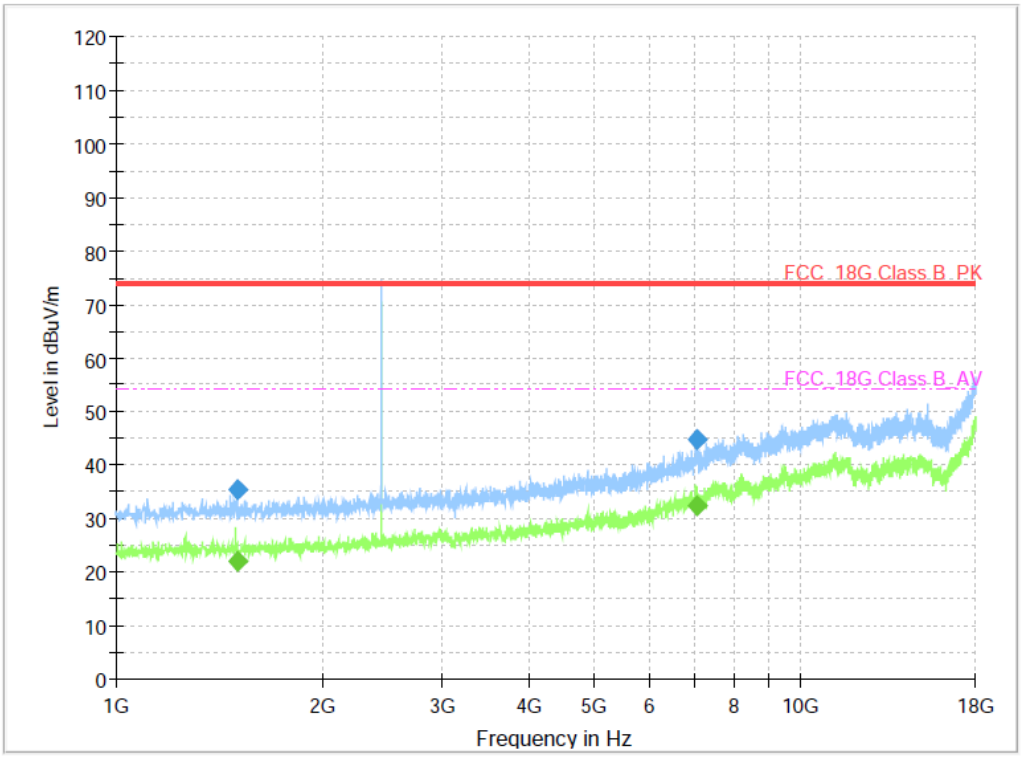
8. The spectrum was measured from 9 kHz to 10th harmonic and the worst-case emissions were reported. No significant emissions were found beyond the 5nd harmonic for this device.

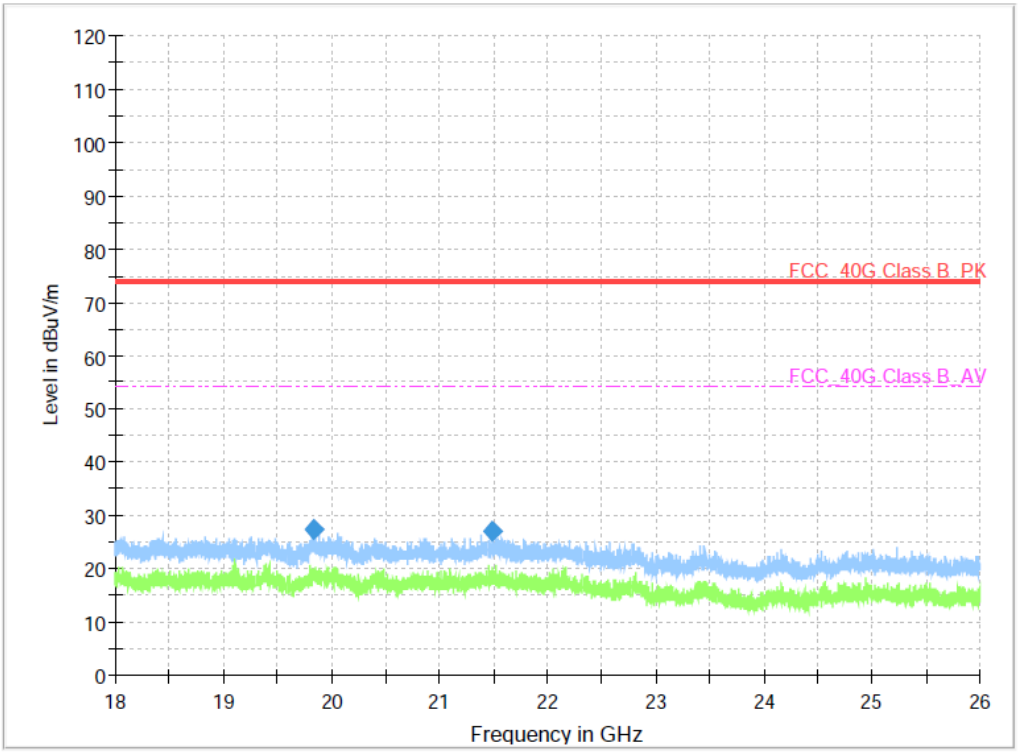
2402 ㎒ GFSK modulation : Above 1 ㎓



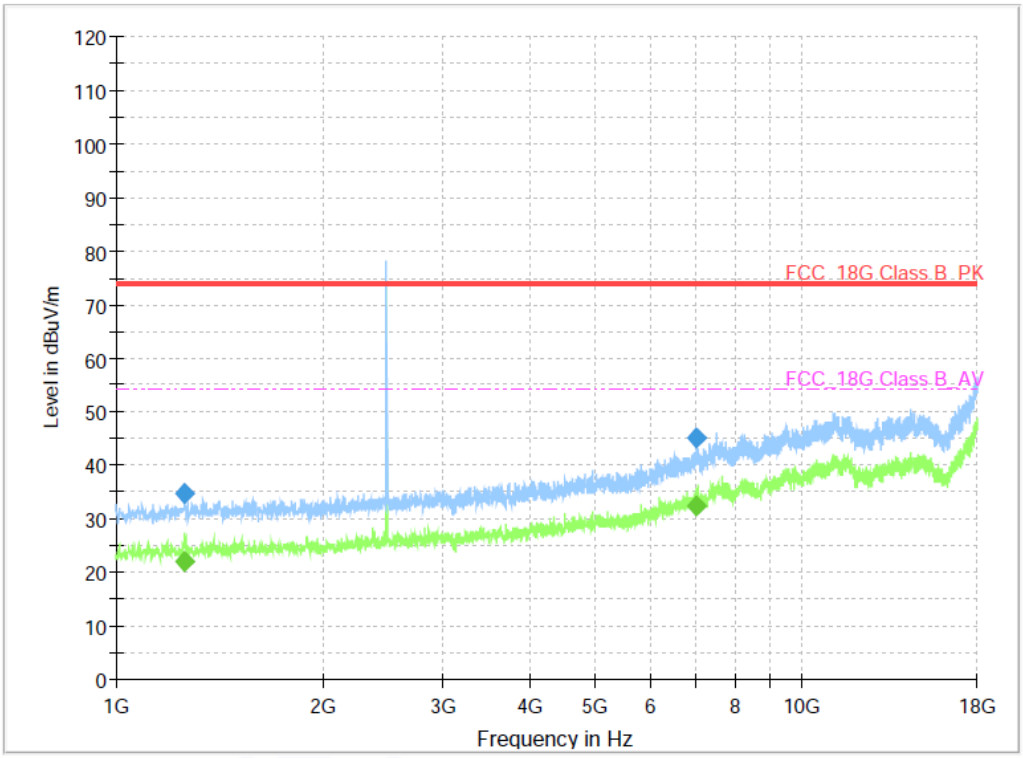


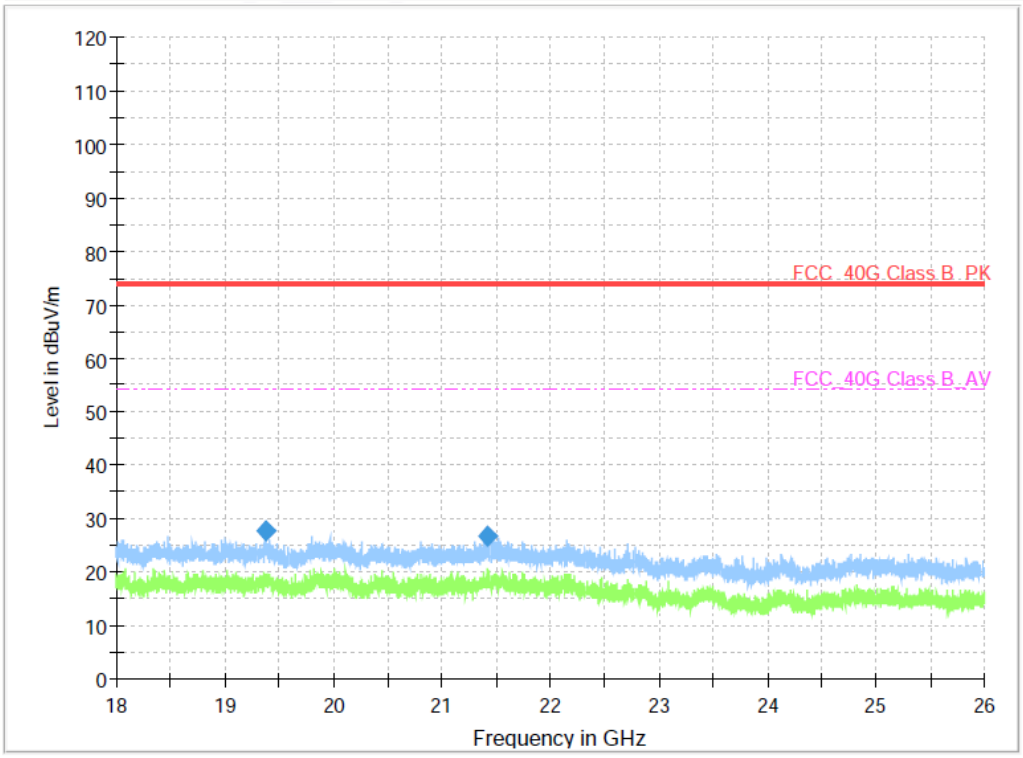
2440 ㎒ GFSK modulation : Above 1 ㎓





2480 ㎒ GFSK modulation : Above 1 ㎓



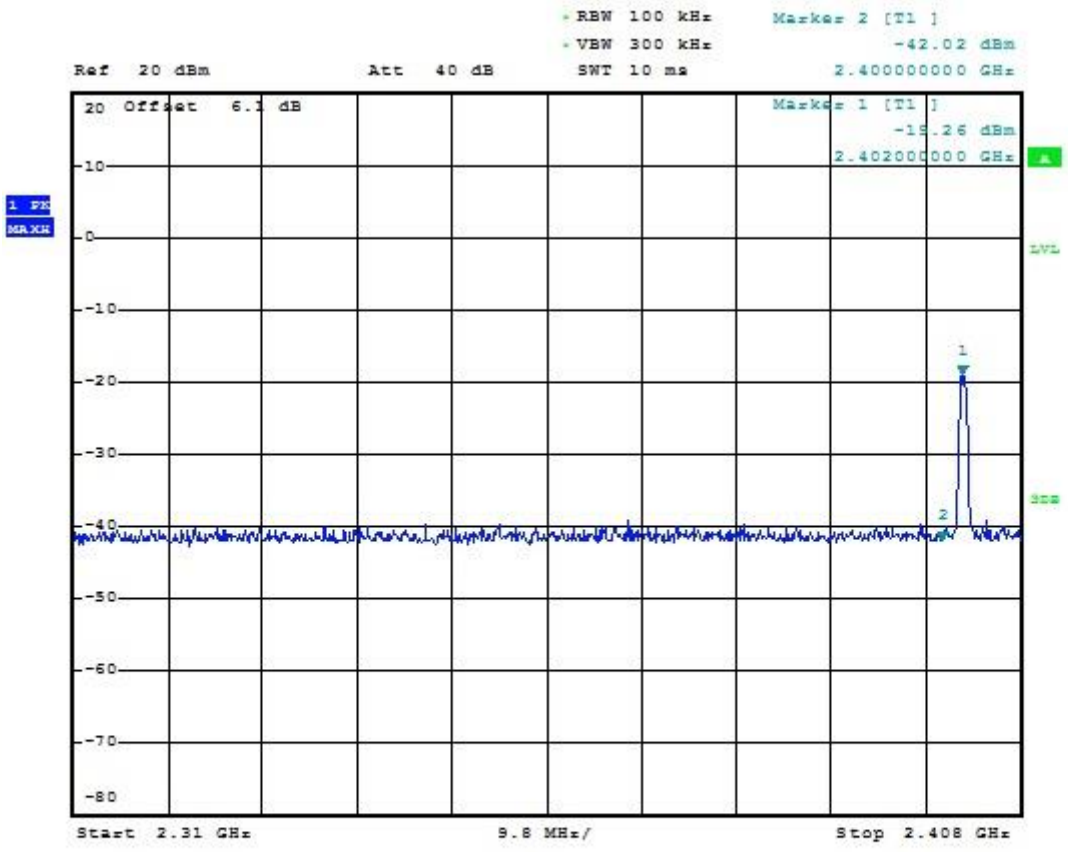


14.8 Conducted Band Edge Emission

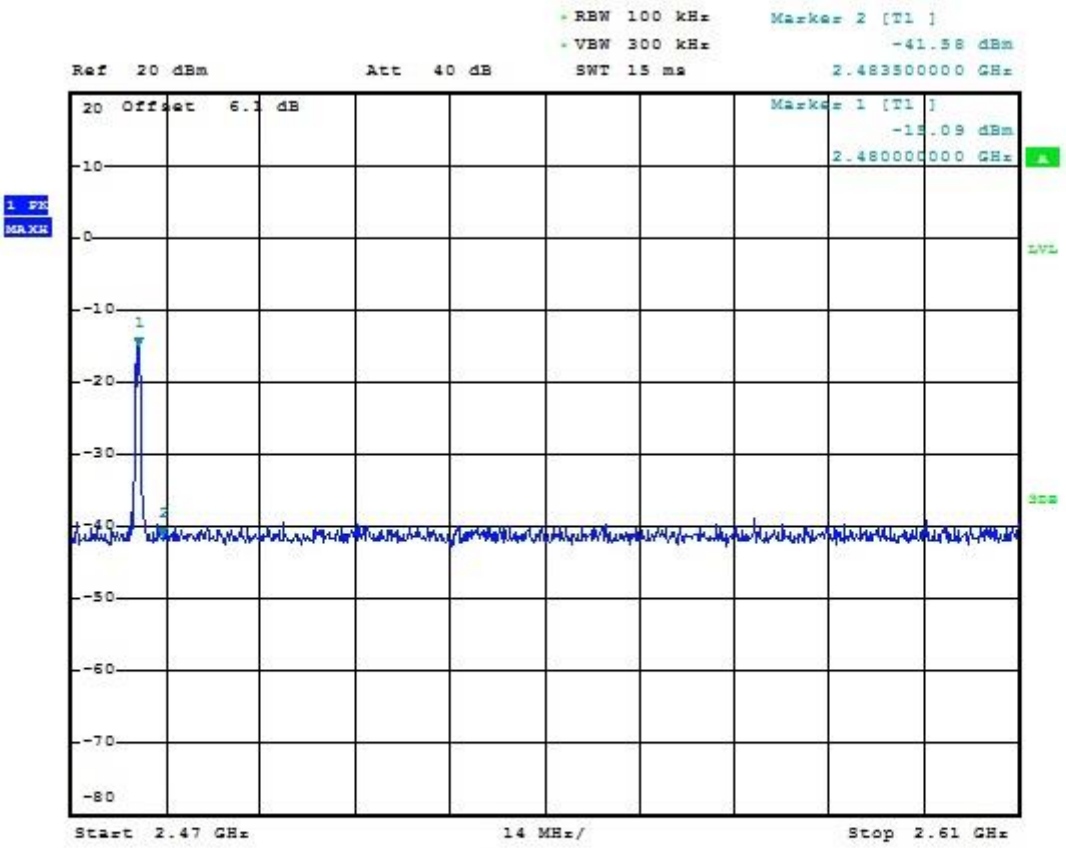
According to FCC Part 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05 Section 8.7.
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated
intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall
be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the
desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB..

The testing follows FCC KDB 558074 D01 15.247 Meas Guidance v05 Section 8.7.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously.
The EUT was operating in controlled its channel.
Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including
100 kHz bandwidth from band edge.
Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph
with marking the highest point and edge frequency. Repeat above procedures until all measured frequencies were complete.

2 402 ㎒


RBW 100 kHz
VBW 300 kHz
Ref 20 dBm
Att 40 dB
SWT 10 ms
Marker 2 [T1]
-42.02 dBm
2.400000000 GHz
Marker 1 [T1]
-15.26 dBm
2.402000000 GHz
20 Offset 6.1 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 2.31 GHz
9.8 MHz/
Stop 2.408 GHz

2 480 ㎒


RBW 100 kHz
VBW 300 kHz
SWT 15 ms
Marker 2 [T1]
-41.58 dBm
2.483500000 GHz
Ref 20 dBm
Att 40 dB
Offset 6.1 dB
Marker 1 [T1]
-15.09 dBm
2.480000000 GHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Start 2.47 GHz
14 MHz/
Stop 2.61 GHz

15. Test Equipment

No	Type of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal.Interval
1	EMI Test Receiver	ROHDE & SCHWARZ	ESR7	101542	2020.03.14	1 Year
2	Tri-Log Antenna	Schwarzbeck	VULB9168	9168-721	2020.04.03	2 Year
3	Amplifier	TESTEK	TK-PA6S	120018	2020.03.14	1 Year
4	Attenuator	SRTechnology Corporate	N-ATTEN	101785#2	2020.03.14	1 Year
5	EMI Test Receiver	ROHDE & SCHWARZ	FSV40	100994	2020.03.14	1 Year
6	EMI Test Receiver	ROHDE & SCHWARZ	ESR7	101302	2020.03.14	1 Year
7	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1245	2020.04.02	2 Year
8	BROADBAND HORN ANTENNA	Schwarzbeck	BBHA9170	BBHA9170 573	2020.04.20	2 Year
9	Amplifier	TESTEK	TK-PA1840H	140003	2019.03.15	1 Year
10	Amplifier	TESTEK	TK-PA1840H	140002	2019.03.14	1 Year
11	ATTENUATOR	AEROFLEX	40AH2W-3	226942	2019-03-14	1 Year
12	ATTENUATOR	AEROFLEX	40AH2W-3	228735	2019-03-14	1 Year
13	ATTENUATOR	AEROFLEX	40AH2W-6	201378	2019-03-15	1 Year
14	ATTENUATOR	AEROFLEX	40AH2W-6	201379	2019-03-14	1 Year
15	ATTENUATOR	AEROFLEX	40AH2W-10	203129	2019-03-15	1 Year
16	ATTENUATOR	AEROFLEX	40AH2W-10	203130	2019-03-15	1 Year
17	ATTENUATOR	AEROFLEX	40AH2W-20	851572	2019-03-14	1 Year
18	ATTENUATOR	AEROFLEX	40AH2W-20	851573	2019-03-14	1 Year
19	ATTENUATOR	WEINSCHEL	89-30-12	715	2019-03-15	1 Year
20	ATTENUATOR	WEINSCHEL	67-30-33	CH0132	2018-03-14	1 Year
21	ATTENUATOR	Hewlett-Packard	8493C	05572	2019-03-15	1 Year
22	ATTENUATOR	Hewlett-Packard	8496B	3308A19907	2019-03-15	1 Year
23	RF FILTER	CHENGDU MICROWAVE	WT-A1205-R12	WT160105001	2019-03-15	1 Year
24	RF FILTER	CHENGDU MICROWAVE	WT-A1696-HS	WT160105002	2019-03-15	1 Year
25	RF FILTER	CHENGDU MICROWAVE	WT-A1706-HS	WT160105003	2019-03-15	1 Year
26	RF FILTER	CHENGDU MICROWAVE	WT-A1698-HS	WT160105004	2019-03-15	1 Year
27	RF FILTER	CHENGDU MICROWAVE	WT-A1699-HS	WT160105005	2019-03-15	1 Year
28	RF FILTER	CHENGDU MICROWAVE	WT-A1700-LS	WT160105006	2019-03-15	1 Year
29	RF FILTER	Telestek	800 Hz BPF	160222FLT-002	2019-03-14	1 Year
30	RF FILTER	WT-MICROWAVE	WT-A4930-Q06	WT181107-X1-1	2018-12-01	1 Year
31	BAND REJECT FILTER(150W)	HBT	BAND7	20190103-05	2019-01-07	1 Year
32	BAND REJECT FILTER(150W)	HBT	BAND8	20190103-04	2019-01-07	1 Year
33	BAND REJECT FILTER(150W)	HBT	BAND26	20190103-03	2019-01-07	1 Year
34	BAND REJECT FILTER(150W)	HBT	BAND28(A)	20190103-02	2019-01-07	1 Year
35	BAND REJECT FILTER(150W)	HBT	BAND28	20190103-01	2019-01-07	1 Year
36	TERMINATION	WEINSCHEL	M1465	68599	2019-03-15	1 Year
37	TERMINATION	WEINSCHEL	M1465	68600	2019-03-15	1 Year

No	Type of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal.Interval
38	Amplifier	MITEQ	TTA2650-HG	1989447	2019-01-07	1 Year
39	TEMP&HUMIDITY CHAMBER	JFM ENGINEERING	JFMD-001	20160119-1	2019-07-19	1 Year
40	TEMP&HUMIDITY CHAMBER	JFM ENGINEERING	JFMA-001	16112901	2019-07-19	1 Year
41	TEMP&HUMIDITY CHAMBER	Daeyang ETS	TH-408GL	DY3114C01	2019-12-26	1 Year
42	VECTOR SIGNAL GENERATOR	ROHDE & SCHWARZ	SMBV100A	260354	2019-03-14	1 Year
43	SIGNAL GENERATOR	ROHDE & SCHWARZ	SMB100A	177568	2019-03-14	1 Year
44	SIGNAL ANALYZER	ROHDE & SCHWARZ	FSV40	100994	2019-03-14	1 Year
45	SIGNAL ANALYZER	ROHDE & SCHWARZ	FSQ26	200939	2018-11-06	1 Year
46	SIGNAL ANALYZER	ROHDE & SCHWARZ	FSVA40	101501	2018-12-03	1 Year
47	POWER MODULE	ROHDE & SCHWARZ	OSP120	101213	2018-03-15	1 Year
48	POWER SENSOR	ROHDE & SCHWARZ	NRP-Z85	101554	2019-01-09	1 Year
49	POWER SENSOR	ROHDE & SCHWARZ	NRP-Z91	103336	2019-01-09	1 Year
50	POWER SENSOR	Agilent technologies	8481A	3318A98910	2019-03-14	1 Year
51	POWER SENSOR HUB	ROHDE & SCHWARZ	NRP-Z5	1146.7740.02	-	1 Year
52	EPM POWER METER	Agilent technologies	E4416A	GB41291281	2019-03-14	1 Year
53	MODULRATION ANALYZER	Hewlett-Packard	8901B	2914A02004	2019-03-14	1 Year
54	AUDIO ANALYZER	ROHDE & SCHWARZ	UPL	100249	2019-03-14	1 Year
55	FREQUENCY COUNTER	Agilent technologies	53181A	KR91200591	2019-03-14	1 Year
56	DIGITAL MULTI METER	Hewlett-Packard	34401A	US36017450	2019-03-14	1 Year
57	TRUE RMS MULTIMETER	FLUKE	179	12220398	2018-11-06	1 Year
58	SYSTEM DC POWER SUPPLY	Hewlett-Packard	6622A	3307A02512	2019-03-14	1 Year
59	SYSTEM DC POWER SUPPLY	Hewlett-Packard	6674A	3501A00827	2018-11-06	1 Year
60	SLIDAC	DaeKaung S.L.I	DS-5023	N/A	-	1 Year
61	HUMIDITY.TEMP.BARO DATA RECORDER	LUTRON	MHB-382SD	AI.50545	2019-01-14 2019-01-16	1 Year
62	BLUETOOTH TESTER	TESCOM	TC-3000B	3000B000265	2019-01-09	1 Year
63	DROP TESTER	Kim' Tec Co., Ltd.	SMB013	20160127-1	-	1 Year
64	WIDEBAND RADIO COMMUNICATION TESTER	ROHDE & SCHWARZ	CMW500	116163	2019-01-09	1 Year
65	BROADBAND HORN ANTENNA	Schwarzbeck	BBHA 9170	BBHA9170 573	2019.03.21	1 Year
66	BROADBAND HORN ANTENNA	Schwarzbeck	BBHA 9170	BBHA9170 574	2019.03.21	1 Year
67	LOOP ANTENNA	Schwarzbeck	FMZB1519	1519-046	2018.04.16	1 Year
68	LOOP ANTENNA	Schwarzbeck	FMZB1519	1519-051	2018.03.29	1 Year