TEST REPORT

FCC PART 15 SUBPART C 15.247
RSS-247 ISSUE 2

Test report
On Behalf of
Poly-Control ApS
For
Electronic door lock V3

Model No.: V3-BTZBE

FCC ID: 2ADSH-V3BTZBE

IC ID: 12588A-V3BTZBE

Prepared for : **Poly-Control ApS**
Gammel Stillingvej 427C, DK-8462 Harlev J, Denmark

Prepared By : **Shenzhen HUAK Testing Technology Co., Ltd.**
1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

Date of Test: **Jan. 22, 2019 ~ Jan. 28, 2019**
Date of Report: **Jan. 28, 2019**
Report Number: **HK1811301755E**

TEST RESULT CERTIFICATION

Applicant's name	Poly-Control ApS
Address	Gammel Stillingvej 427C, DK-8462 Harlev J, Denmark
Manufacture's Name	Poly-Control ApS
Address	Gammel Stillingvej 427C, DK-8462 Harlev J, Denmark
Factory	Xiamen CMM CO. , LTD.
Address	NO. 136 Xin Guang Road, Haicang District | Xiamen city, Fujian Province, P.R. China
Product description	
Trade Mark:	danalock
Product name	Electronic door lock V3
Model and/or type reference ...	V3-BTZBE
Standards	**47 CFR FCC Part 15 Subpart C 15.247** **RSS-247 issue 2**

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Date of Test ..... :	
Date (s) of performance of tests ..... :	Jan. 22, 2019 ~ Jan. 28, 2019
Date of Issue..... :	Jan. 28, 2019
Test Result..... :	**Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

TABLE OF CONTENTS

1.SUMMARY 4

1.1 TEST STANDARDS 4
1.2 TEST DESCRIPTION 4
1.3 TEST FACILITY 5
1.4 STATEMENT OF THE MEASUREMENT UNCERTAINTY 5

2.GENERAL INFORMATION 6

2.1 ENVIRONMENTAL CONDITIONS 6
2.2 GENERAL DESCRIPTION OF EUT 6
2.3 DESCRIPTION OF TEST MODES AND TEST FREQUENCY 6
2.4 DESCRIPTION OF TEST SETUP 7
2.5 RELATED SUBMITTAL(S) / GRANT (S) 7
2.6 MODIFICATIONS 7
2.7 EQUIPMENT USED 8

3. PEAK OUTPUT POWER 9

3.1. MEASUREMENT PROCEDURE 9
3.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 9
3.3. LIMITS AND MEASUREMENT RESULT 10

4. 6 DB BANDWIDTH 14

4.1. MEASUREMENT PROCEDURE 14
4.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 14
4.3. LIMITS AND MEASUREMENT RESULTS 15

5. CONDUCTED SPURIOUS EMISSION 19

5.1. MEASUREMENT PROCEDURE 19
5.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 19
5.3. MEASUREMENT EQUIPMENT USED 19
5.4. LIMITS AND MEASUREMENT RESULT 19

6. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY 26

6.1 MEASUREMENT PROCEDURE 26
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 26
6.3 MEASUREMENT EQUIPMENT USED 26
6.4 LIMITS AND MEASUREMENT RESULT 27

7. RADIATED EMISSION 31

7.1. MEASUREMENT PROCEDURE 31
7.2. TEST SETUP 32
7.3. LIMITS AND MEASUREMENT RESULT 33
7.4. TEST RESULT 33

APPENDIX A: PHOTOGRAPHS OF TEST SETUP 45

APPENDIX B: PHOTOGRAPHS OF EUT 46

1.SUMMARY

1.1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

RSS-247-Issue 2: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

RSS-Gen Issue 5: General Requirements for Compliance of Radio Apparatus

ANSI C63.10:2013 : American National Standard for Testing Unlicensed Wireless Devices

1.2 TEST DESCRIPTION

	DESCRIPTION OF TEST	RESULT
FCC PART 15.247 & RSS 247	Peak Output Power	Compliant
	6 dB Bandwidth	Compliant
	Conducted Spurious Emission and Band Edges	Compliant
	Maximum Conducted Output Power Density	Compliant
	Radiated Emission	Compliant
	Line Conduction Emission	NA

1.3 TEST FACILITY

1.3.1 ADDRESS OF THE TEST LABORATORY
Shenzhen HUAK Testing Technology Co., Ltd.
Add.:1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park,Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.
1.3.2 LABORATORY ACCREDITATION
The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 21210

The 3m alternate test site of Shenzhen HUAK Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 21210 on May 24, 2016.

FCC Registration No.: CN1229
Test Firm Registration Number : 616276

1.4 STATEMENT OF THE MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen HUAK Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for HUAK laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.GENERAL INFORMATION

2.1 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2 GENERAL DESCRIPTION OF EUT

Product Name:	Electronic door lock V3
Model/Type reference:	V3-BTZBE
Power supply:	DC 12V by Battery
Modulation:	OQPSK
Operation frequency:	2405MHz~2480MHz
Channel number:	16
Channel separation:	5MHz
Antenna type:	Chip Antenna
Antenna gain:	-3.44dBi
Hardware Version:	101-025_D1+101-029-E1
Software Version:	0x10020000

Note: For more details, refer to the user's manual of the EUT.

2.3 DESCRIPTION OF TEST MODES AND TEST FREQUENCY

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	11	2405MHZ
	12	2410MHZ
	:	:
	25	2475MHZ
	26	2480MHZ

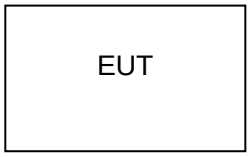
NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX 2475MHz
4	High channel TX 2480MHz

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

2.4 DESCRIPTION OF TEST SETUP

Configure :



Item	Equipment	Model No.	ID or Specification	Remark
1	Electronic door lock V3	V3-BTZBE	FCC ID: 2ADSH-V3BTZBE IC ID: 12588A-V3BTZBE	EUT

2.5 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and RSS-247.

2.6 MODIFICATIONS

No modifications were implemented to meet testing criteria.

2.7 EQUIPMENT USED

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 27, 2018	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 27, 2018	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 27, 2018	1 Year
4.	Horn Antenna	Schewarzbeck	BBHA 9170	HKE-090	Dec. 27, 2018	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 27, 2018	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 27, 2018	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 27, 2018	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 27, 2018	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 27, 2018	1 Year
11.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 27, 2018	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 27, 2018	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 27, 2018	N/A
14.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 27, 2018	3 Year

The calibration interval was one year

3. PEAK OUTPUT POWER

3.1. MEASUREMENT PROCEDURE

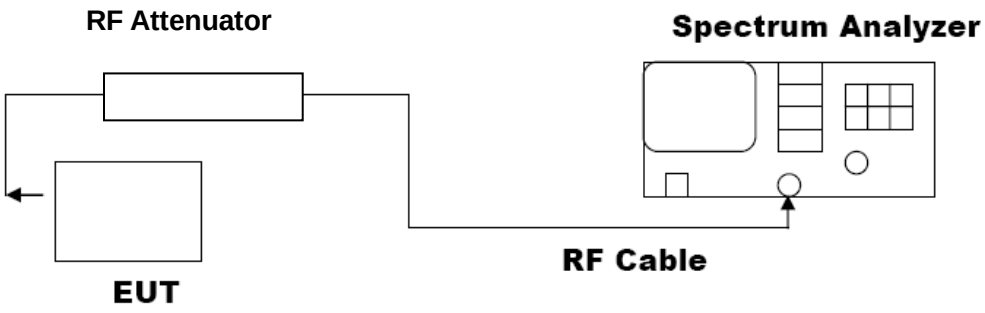
For peak power test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. RBW⩾DTS bandwidth
3. VBW⩾3*RBW.
4. SPAN⩾VBW.
5. Sweep: Auto.
6. Detector function: Peak.
7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

3.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

PEAK POWER TEST SETUP

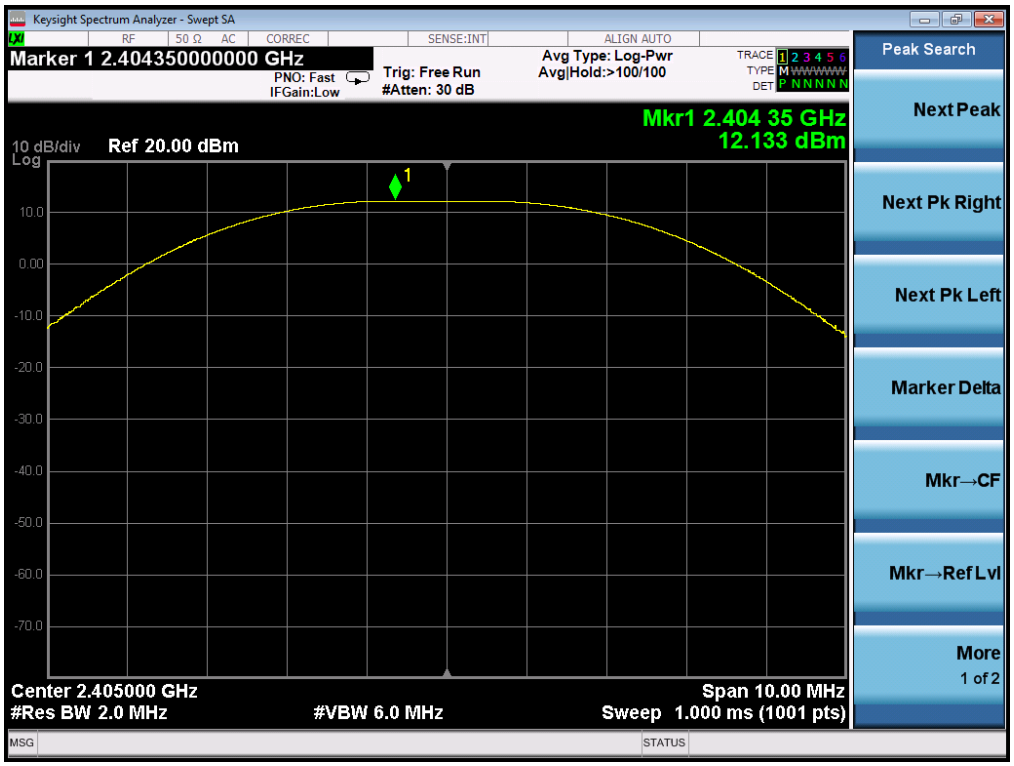


3.3. LIMITS AND MEASUREMENT RESULT

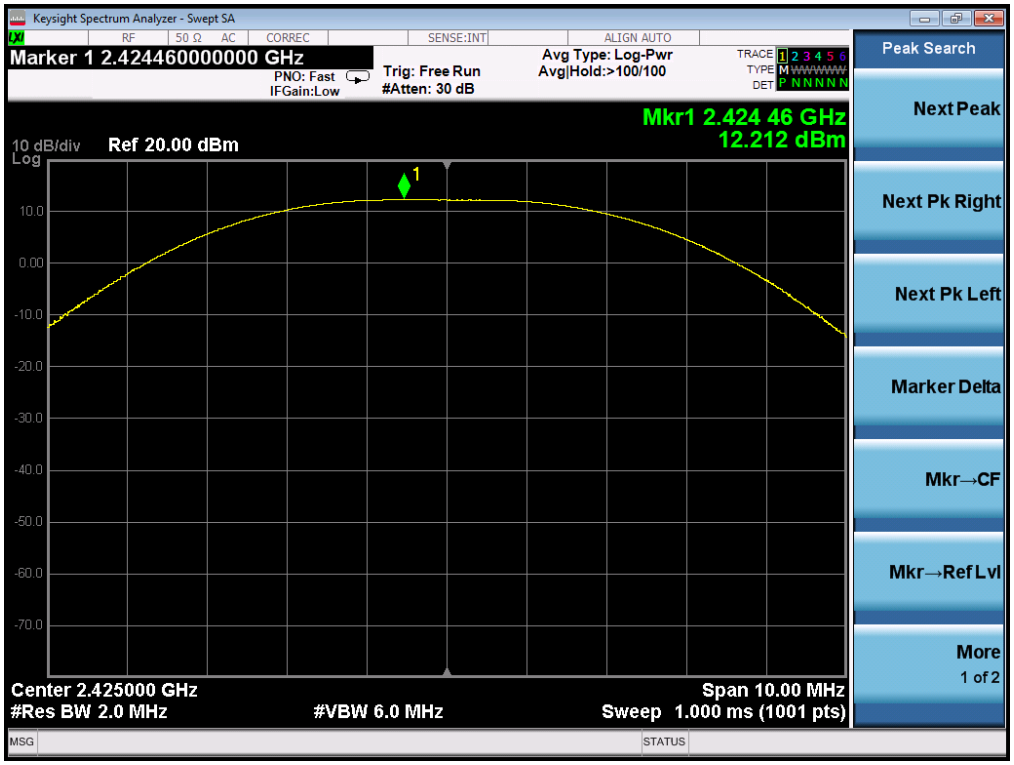
PEAK OUTPUT POWER MEASUREMENT RESULT FOR OQPSK MOUDULATION			
Frequency (GHz)	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.405(CH11)	12.133	30	Pass
2.425(CH15)	12.212	30	Pass
2.440(CH18)	12.265	30	Pass
2.445(CH19)	12.274	30	Pass
2.450(CH20)	12.288	30	Pass
2.475(CH25)	12.192	30	Pass
2.480(CH26)	7.960	30	Pass

Note: The CH15, 19, 20 and 25 had been tested which is required by US customer.

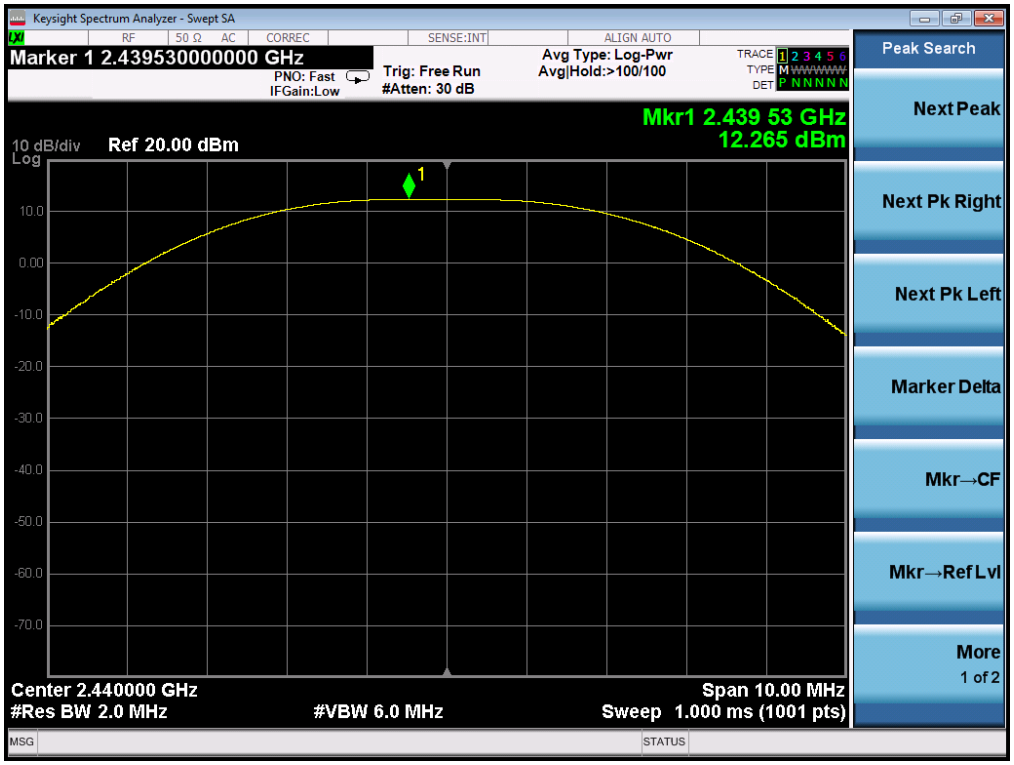
CH11



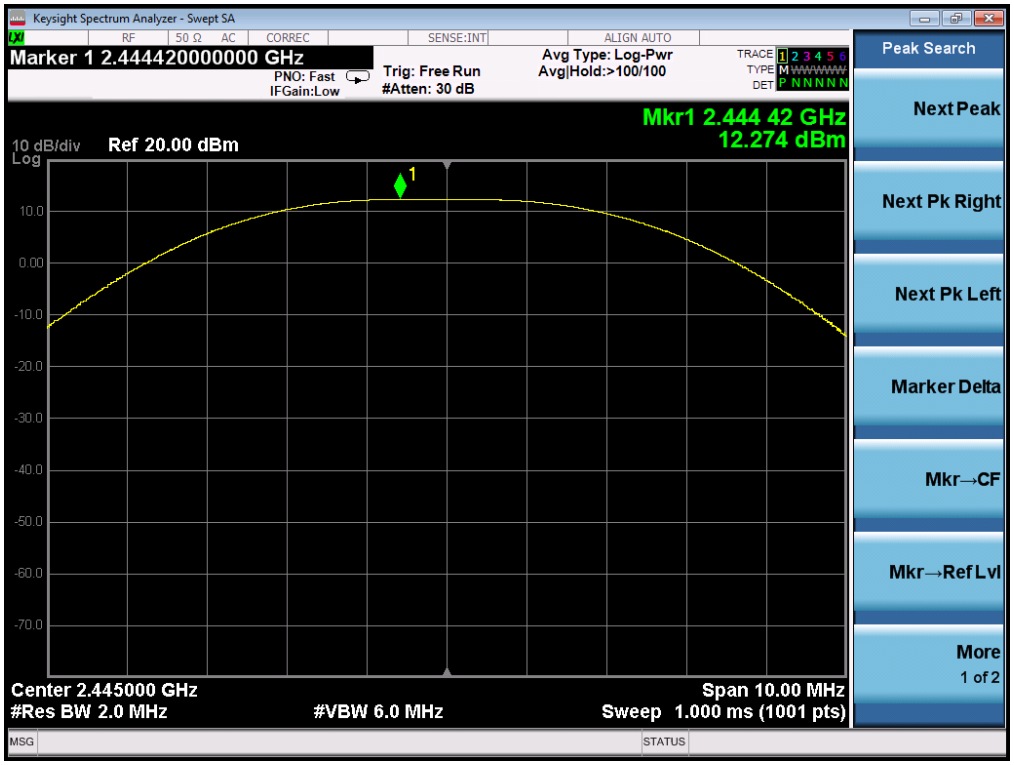
CH15


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.424460000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.424 46 GHz
12.212 dBm
10 dB/div
Ref 20.00 dBm
Center 2.425000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

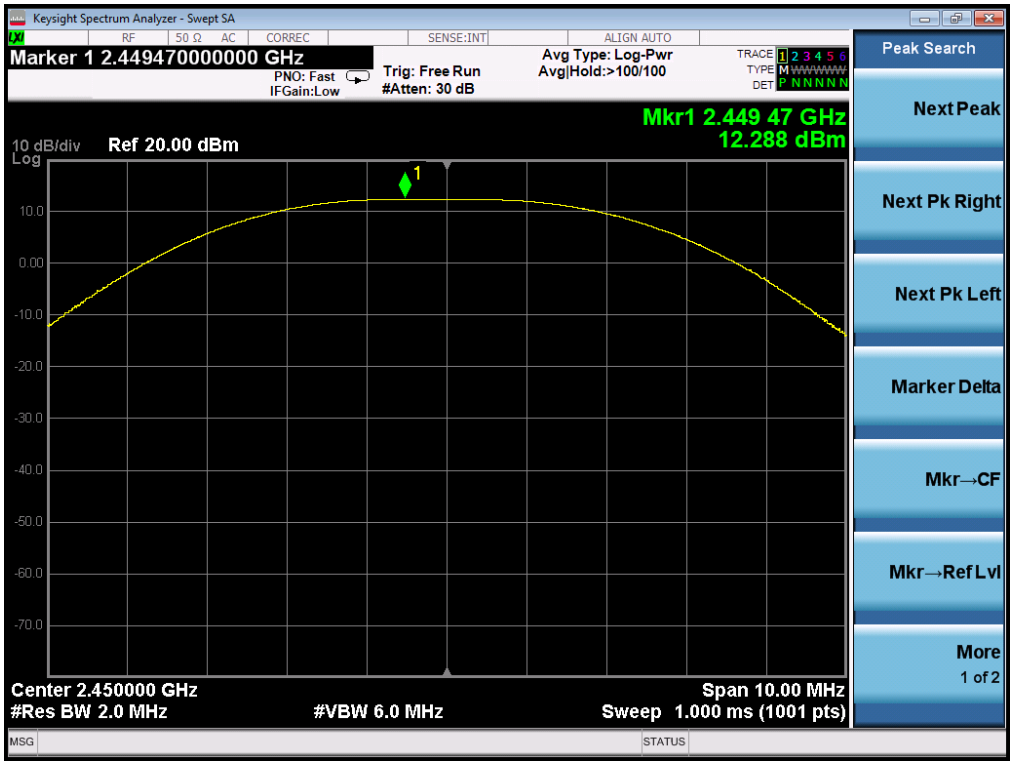
CH18


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.439530000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.439 53 GHz
12.265 dBm
10 dB/div
Ref 20.00 dBm
Center 2.440000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

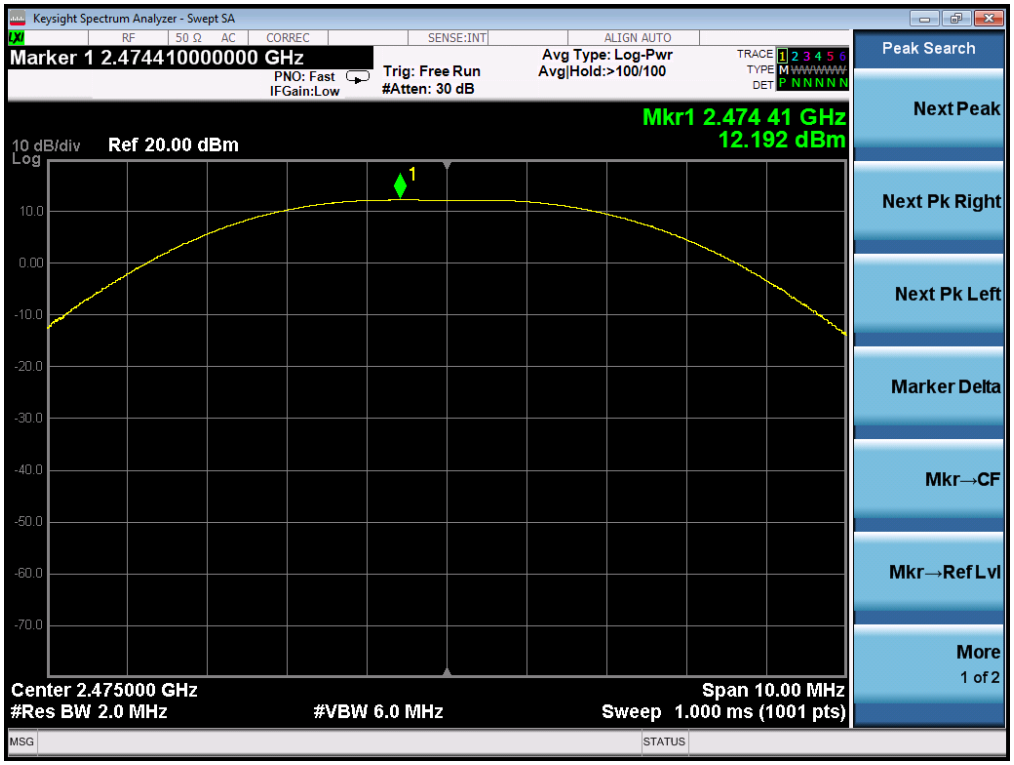
CH19


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.444420000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.444 42 GHz
12.274 dBm
10 dB/div Ref 20.00 dBm
Log
Center 2.445000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

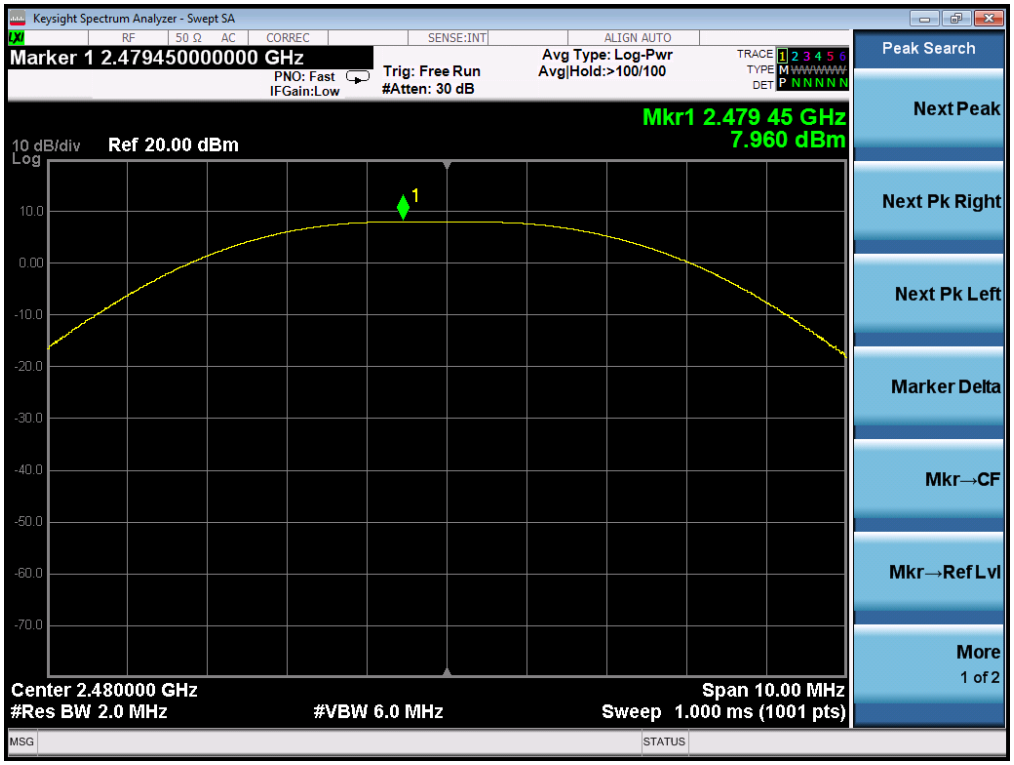
CH20


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.449470000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.449 47 GHz
12.288 dBm
10 dB/div Ref 20.00 dBm
Log
Center 2.450000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH25


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.474410000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.474 41 GHz
12.192 dBm
10 dB/div Ref 20.00 dBm
Log
Center 2.475000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH26


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.479450000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.479 45 GHz
7.960 dBm
10 dB/div Ref 20.00 dBm
Log
Center 2.480000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

4. 6 DB BANDWIDTH

4.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW⩾3×RBW.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

4.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

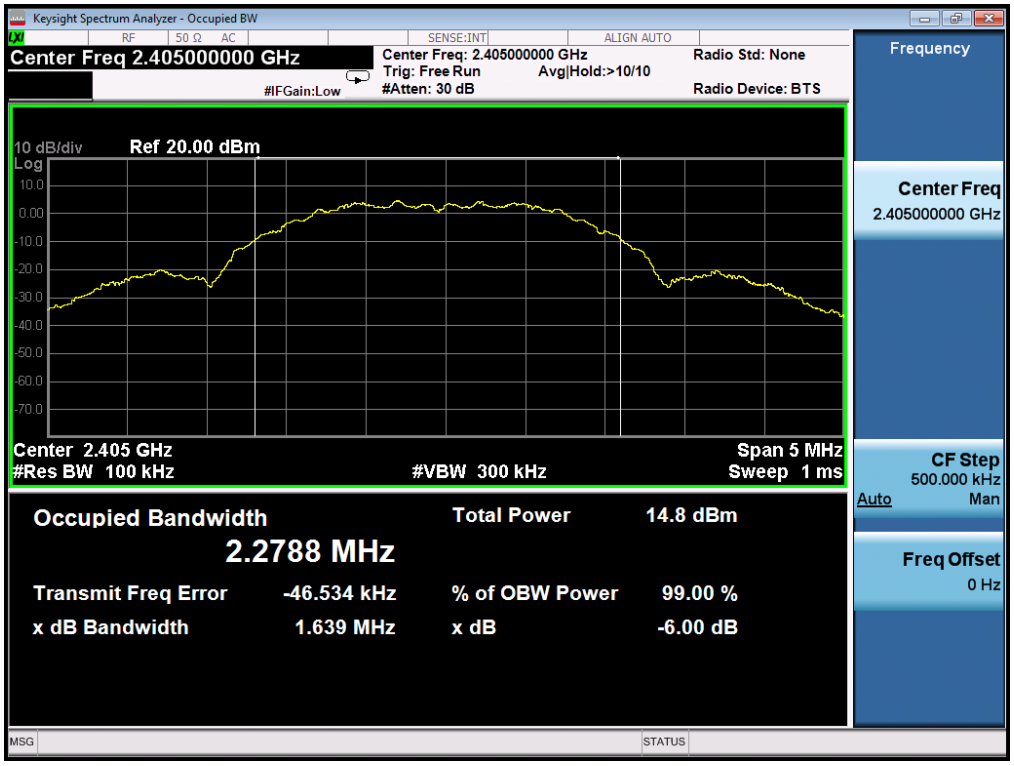
The same as described in section 7.2.

4.3. LIMITS AND MEASUREMENT RESULTS

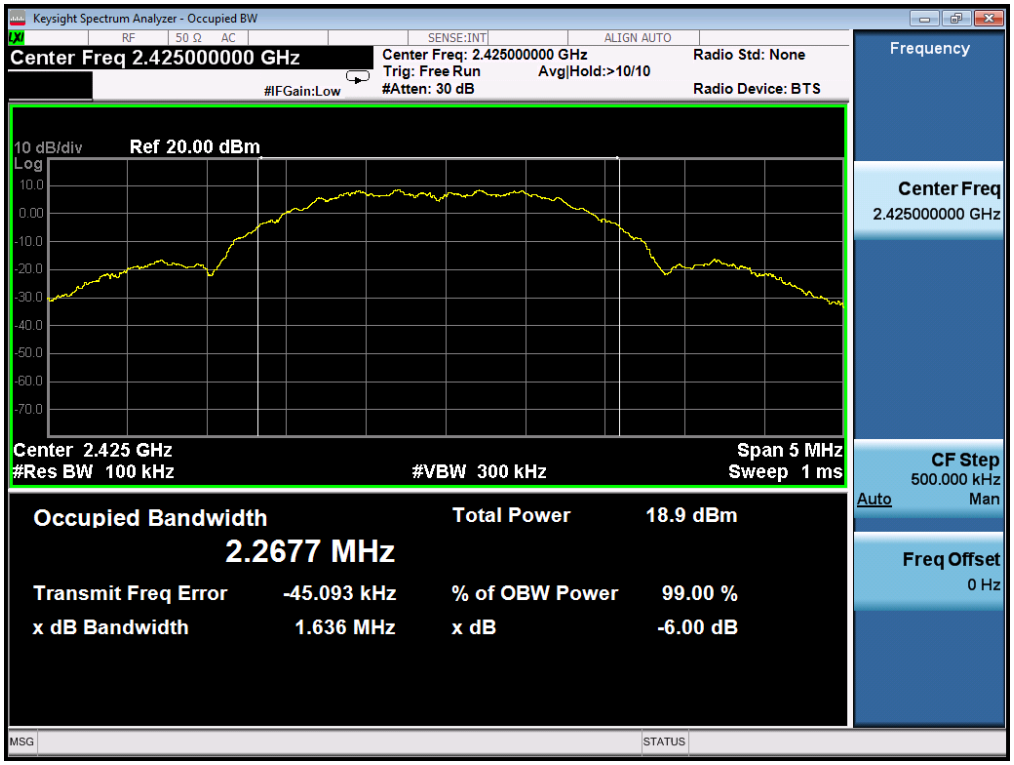
LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Applicable Limits		
	Frequency (GHz)	Test Data (MHz)	Criteria
>500KHZ	2.405(CH11)	1.639	PASS
	2.425(CH15)	1.636	PASS
	2.440(CH18)	1.642	PASS
	2.445(CH19)	1.628	PASS
	2.450(CH20)	1.638	PASS
	2.475(CH25)	1.636	PASS
	2.480(CH26)	1.638	PASS

Note: The CH15, 19, 20 and 25 had been tested which is required by US customer.

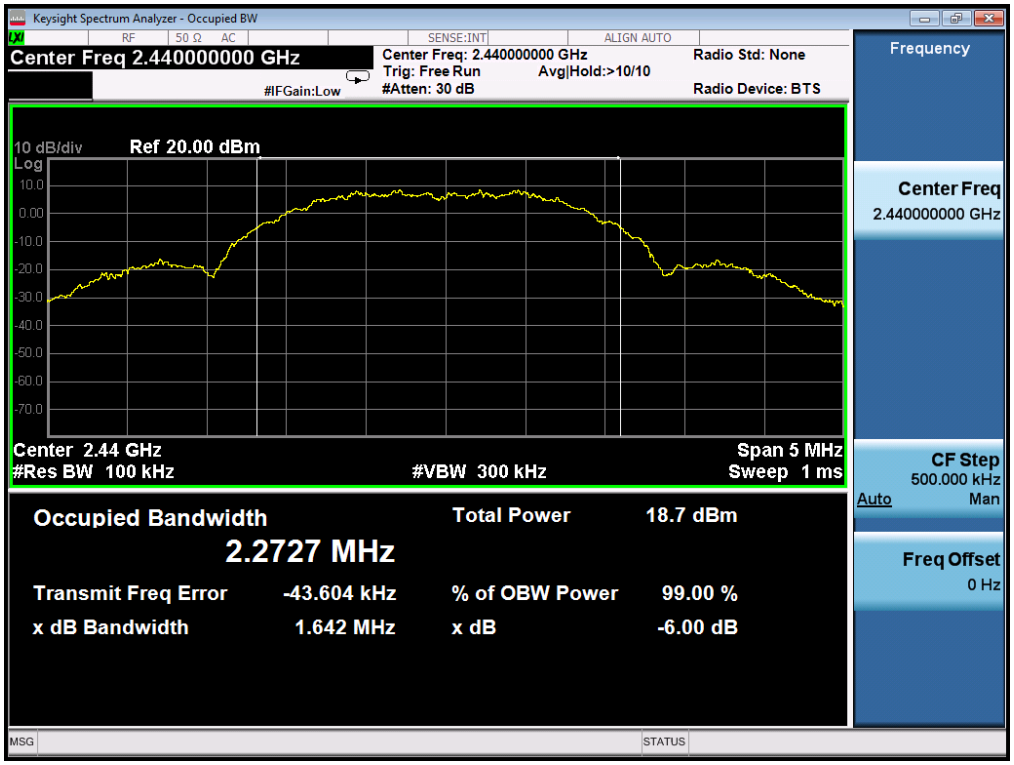
CH11



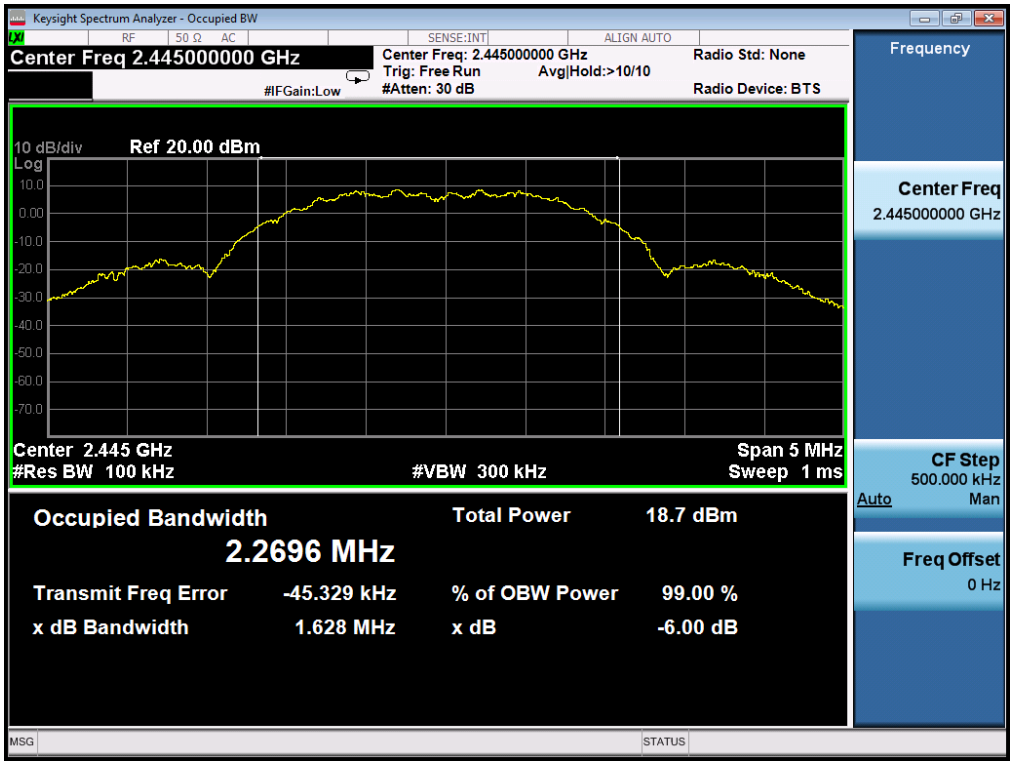
CH15


Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.425000000 GHz
Center Freq: 2.425000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
10 dB/div
Ref 20.00 dBm
Center 2.425 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5 MHz
Sweep 1 ms
Occupied Bandwidth
2.2677 MHz
Total Power 18.9 dBm
Transmit Freq Error -45.093 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.636 MHz
x dB -6.00 dB
Frequency
Center Freq
2.425000000 GHz
CF Step
500.000 kHz
Auto Man
Freq Offset
0 Hz

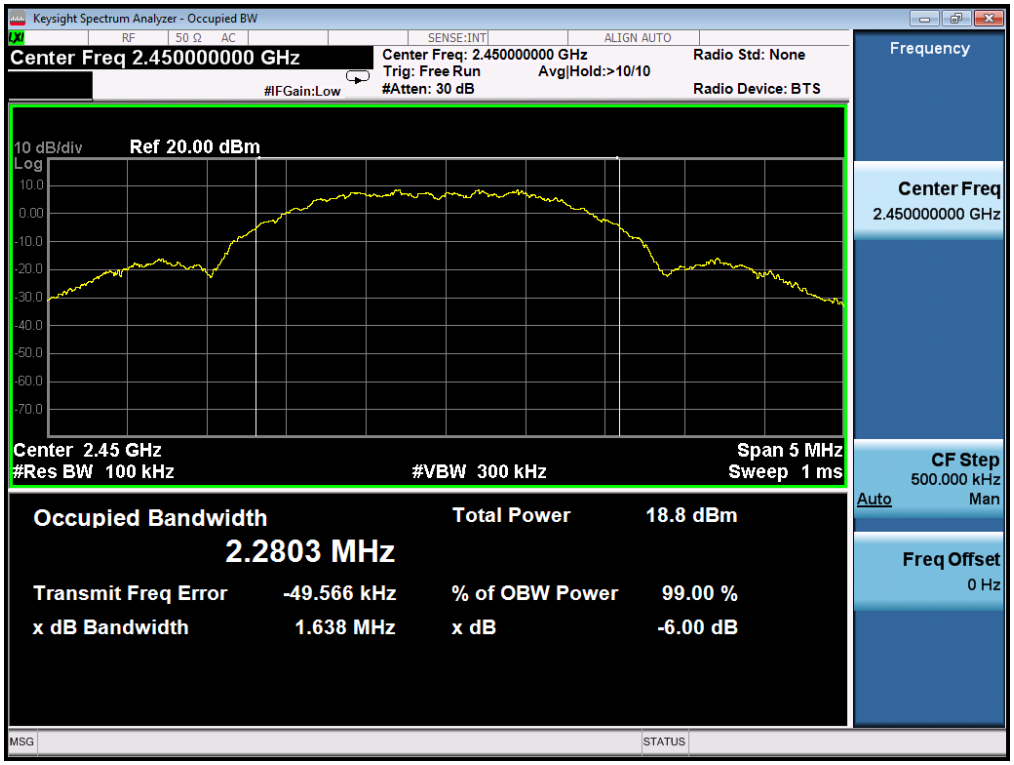
CH18


Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.440000000 GHz
Center Freq: 2.440000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
10 dB/div
Ref 20.00 dBm
Center 2.44 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5 MHz
Sweep 1 ms
Occupied Bandwidth
2.2727 MHz
Total Power 18.7 dBm
Transmit Freq Error -43.604 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.642 MHz
x dB -6.00 dB
Frequency
Center Freq
2.440000000 GHz
CF Step
500.000 kHz
Auto Man
Freq Offset
0 Hz

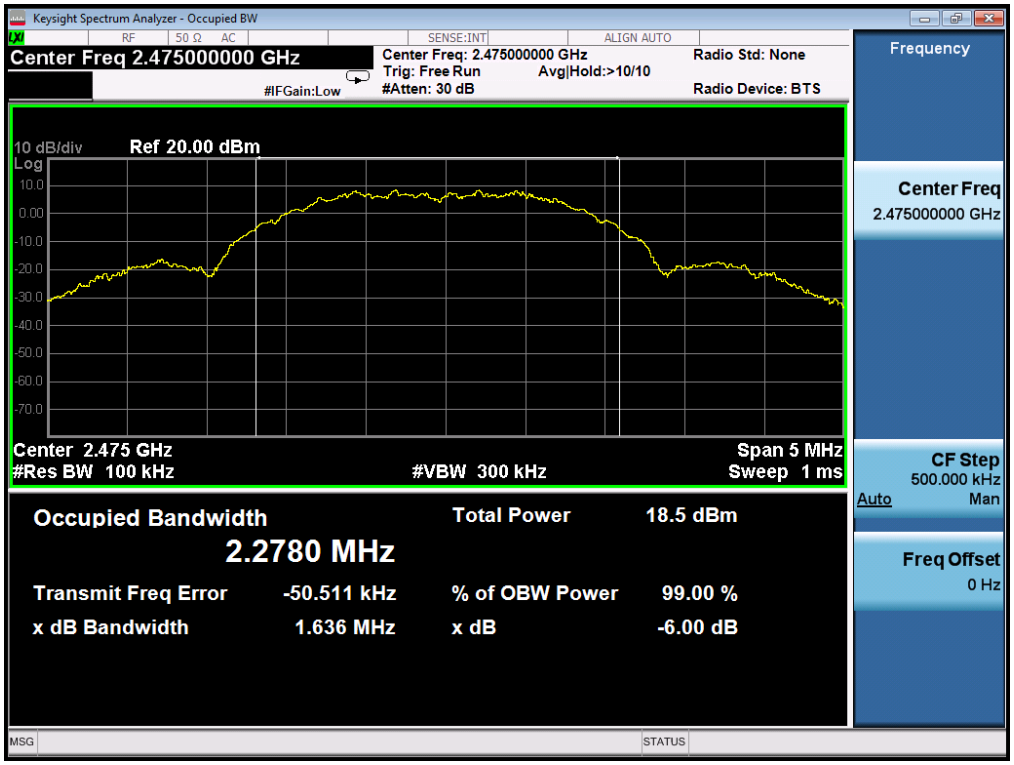
CH19


Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.445000000 GHz
Center Freq: 2.445000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
10 dB/div
Ref 20.00 dBm
Center 2.445 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5 MHz
Sweep 1 ms
Occupied Bandwidth
2.2696 MHz
Total Power 18.7 dBm
Transmit Freq Error -45.329 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.628 MHz
x dB -6.00 dB
Frequency
Center Freq
2.445000000 GHz
CF Step
500.000 kHz
Auto Man
Freq Offset
0 Hz

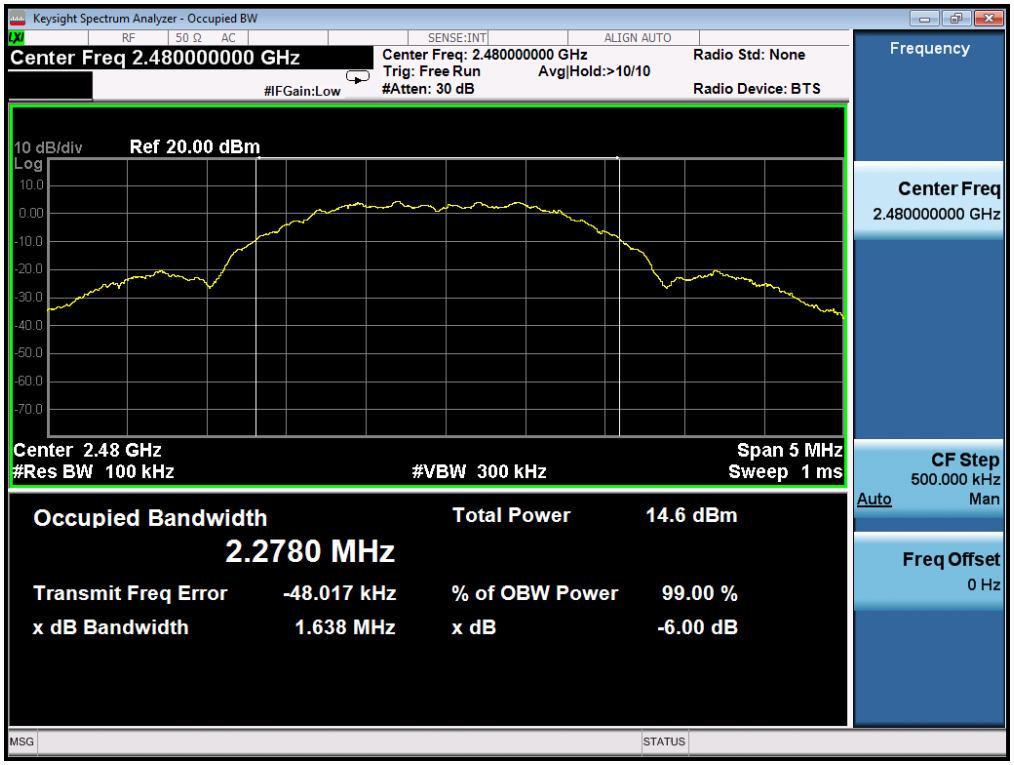
CH20


Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.450000000 GHz
Center Freq: 2.450000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
10 dB/div
Ref 20.00 dBm
Center 2.45 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5 MHz
Sweep 1 ms
Occupied Bandwidth
2.2803 MHz
Total Power 18.8 dBm
Transmit Freq Error -49.566 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.638 MHz
x dB -6.00 dB
Frequency
Center Freq
2.450000000 GHz
CF Step
500.000 kHz
Auto Man
Freq Offset
0 Hz

CH25


Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.475000000 GHz
Center Freq: 2.475000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
10 dB/div
Ref 20.00 dBm
Center 2.475 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5 MHz
Sweep 1 ms
Occupied Bandwidth
2.2780 MHz
Total Power 18.5 dBm
Transmit Freq Error -50.511 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.636 MHz
x dB -6.00 dB
Frequency
Center Freq
2.475000000 GHz
CF Step
500.000 kHz
Auto Man
Freq Offset
0 Hz

CH26


Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
10 dB/div
Ref 20.00 dBm
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5 MHz
Sweep 1 ms
Occupied Bandwidth
2.2780 MHz
Total Power 14.6 dBm
Transmit Freq Error -48.017 kHz
% of OBW Power 99.00 %
x dB Bandwidth 1.638 MHz
x dB -6.00 dB
Frequency
Center Freq
2.480000000 GHz
CF Step
500.000 kHz
Auto Man
Freq Offset
0 Hz

5. CONDUCTED SPURIOUS EMISSION

5.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

5.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

5.3. MEASUREMENT EQUIPMENT USED

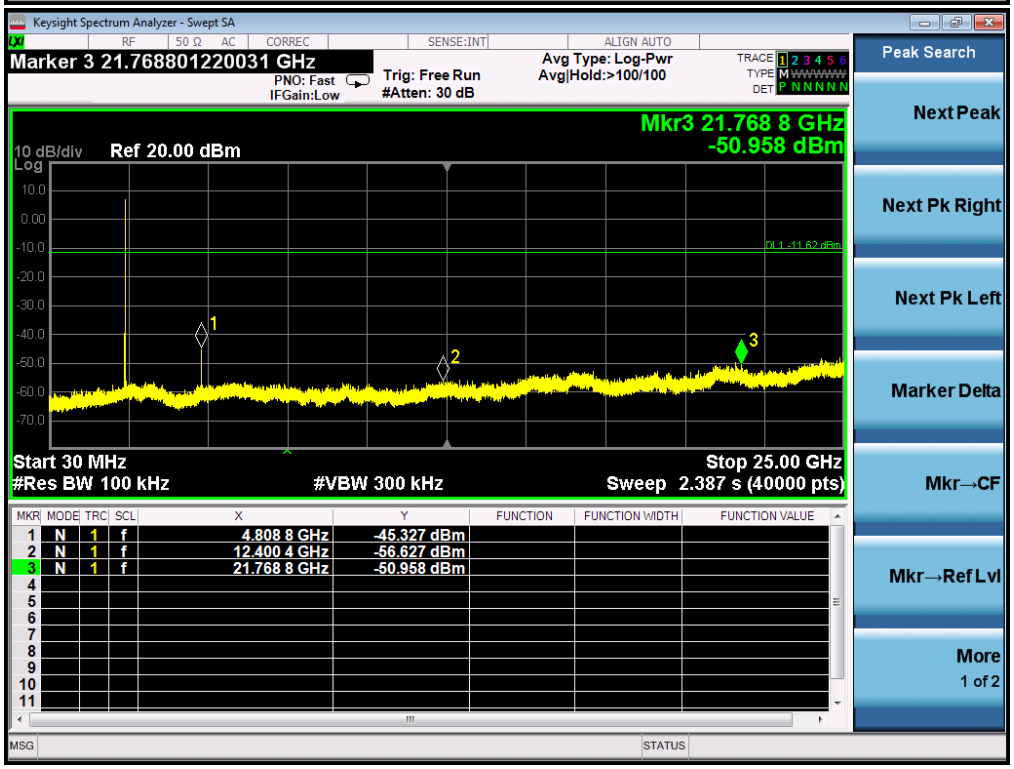
The same as described in section 6.

5.4. LIMITS AND MEASUREMENT RESULT

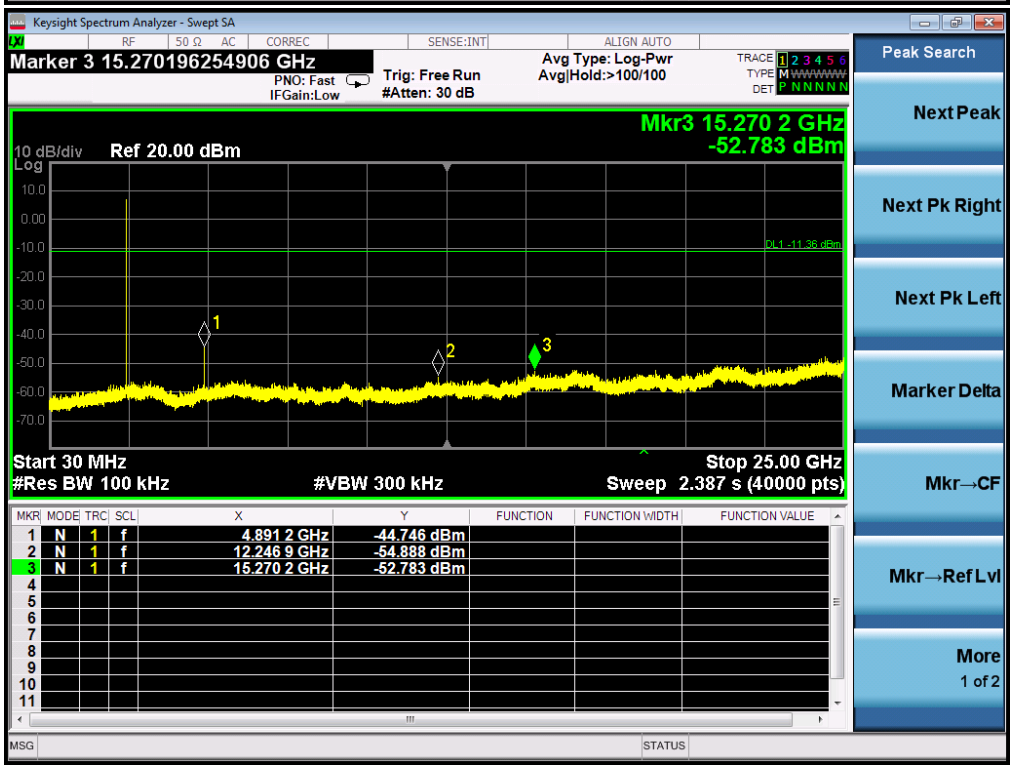
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Criteria**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS PASS

TEST RESULT FOR ENTIRE FREQUENCY RANGE

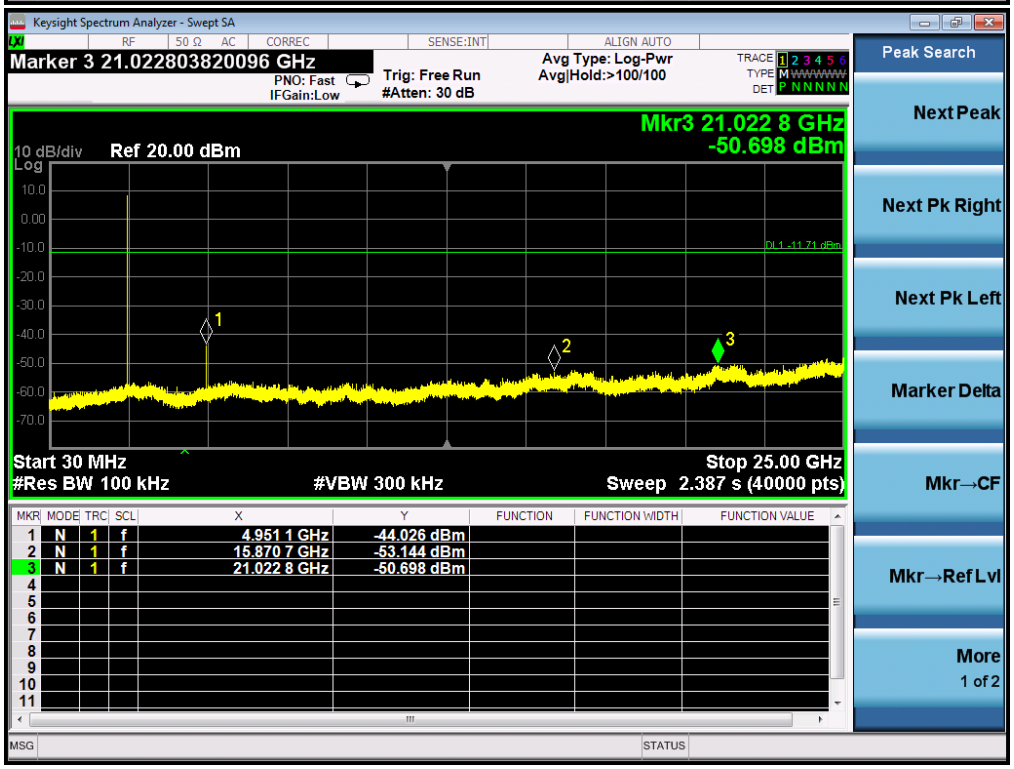
OQPSK MODULATION IN LOW CHANNEL



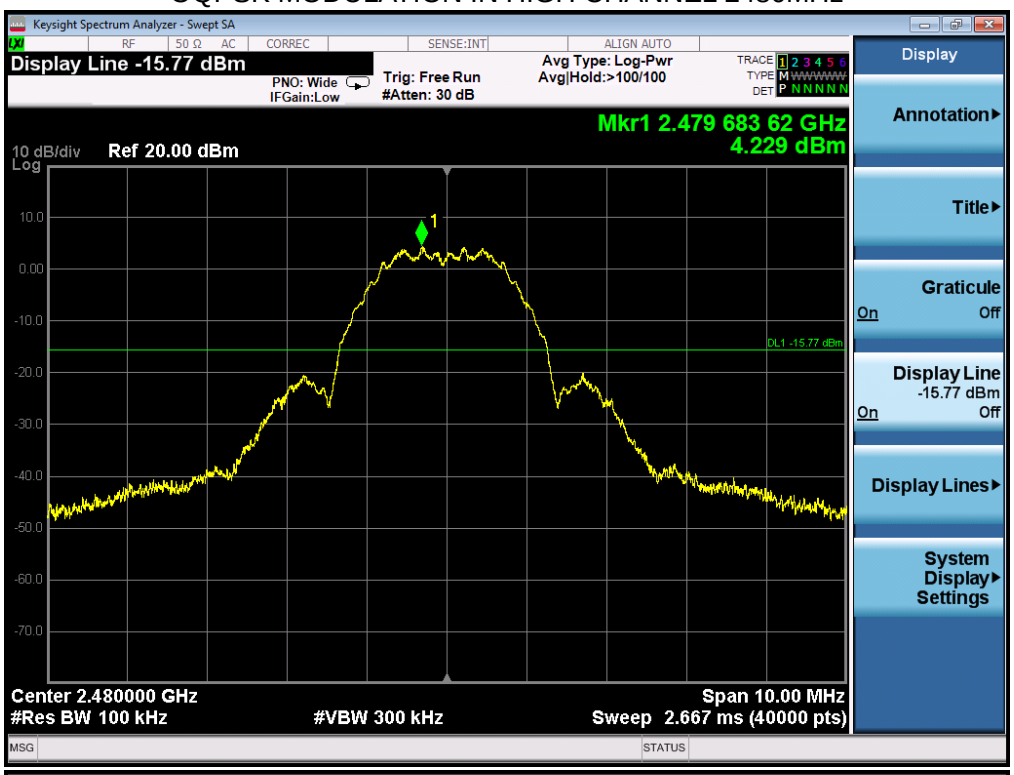
OQPSK MODULATION IN MIDDLE CHANNEL

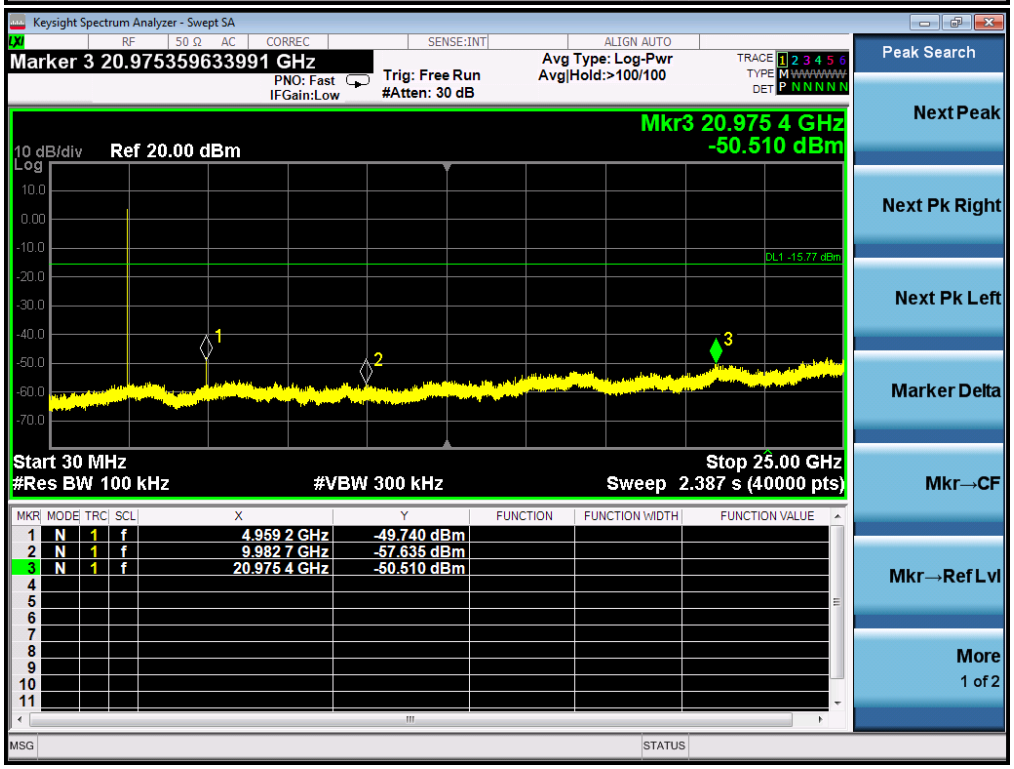


OQPSK MODULATION IN HIGH CHANNEL 2475MHz



OQPSK MODULATION IN HIGH CHANNEL 2480MHz

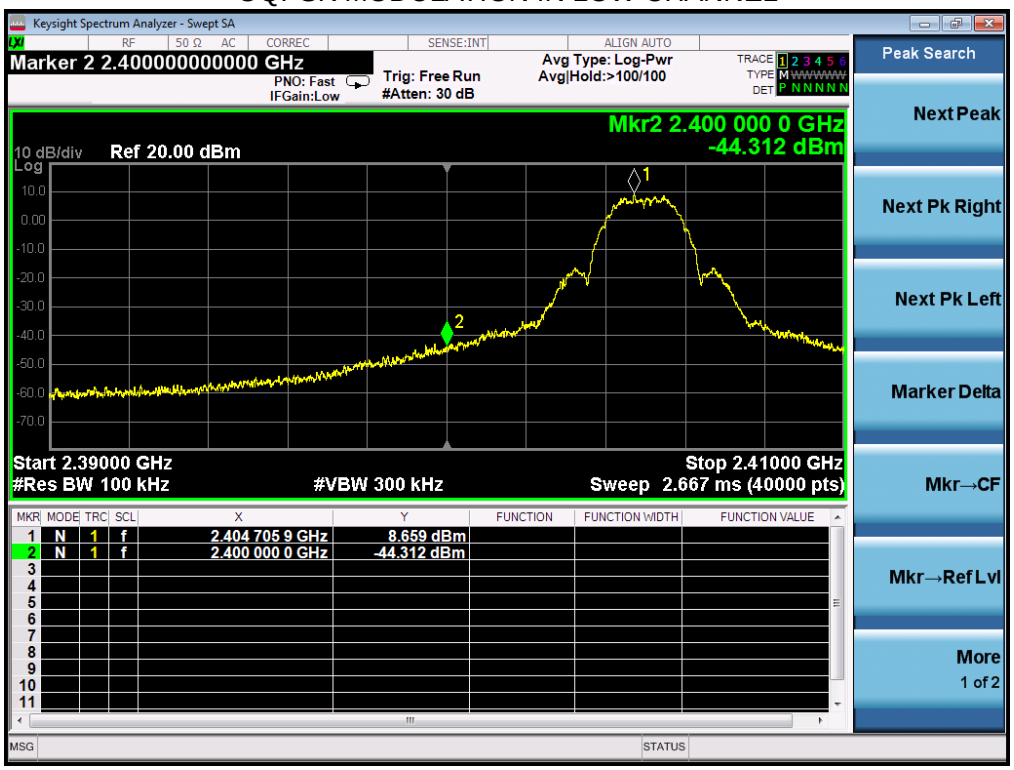




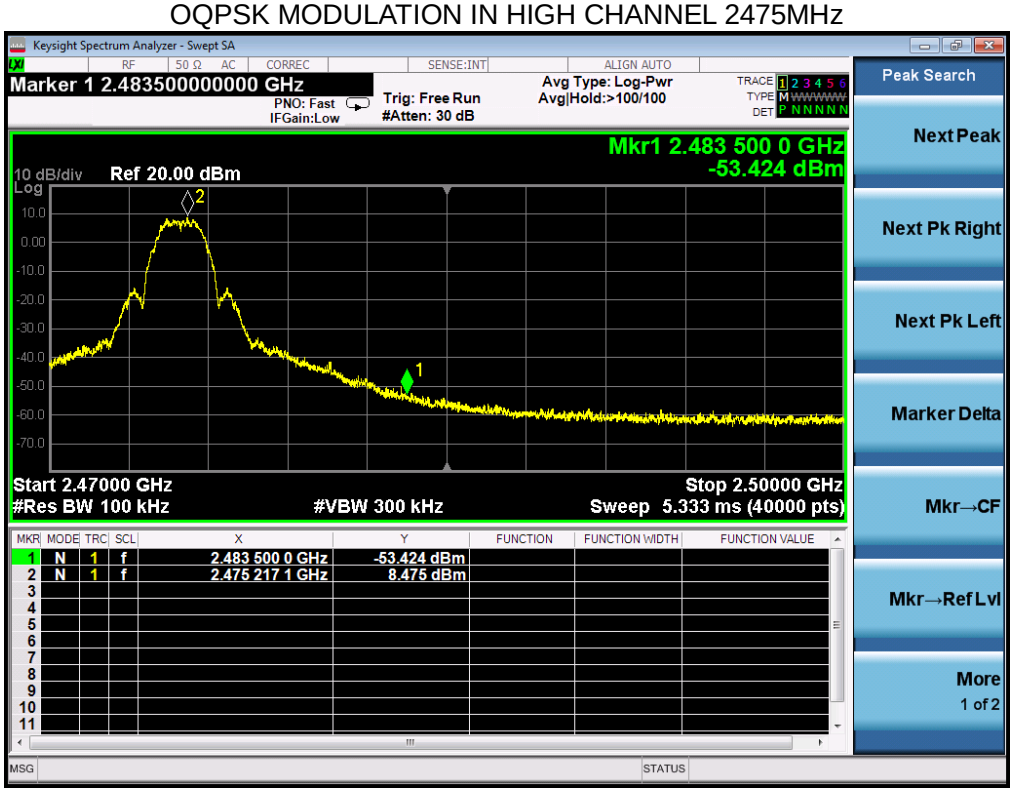
Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.

TEST RESULT FOR BAND EDGE

OQPSK MODULATION IN LOW CHANNEL



OQPSK MODULATION IN HIGH CHANNEL 2475MHz



OQPSK MODULATION IN HIGH CHANNEL 2480MHz

6. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

6.1 MEASUREMENT PROCEDURE

(1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator

(2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.

(3). Set SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 10.2 was used in this testing.

6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 7.2.

6.3 MEASUREMENT EQUIPMENT USED

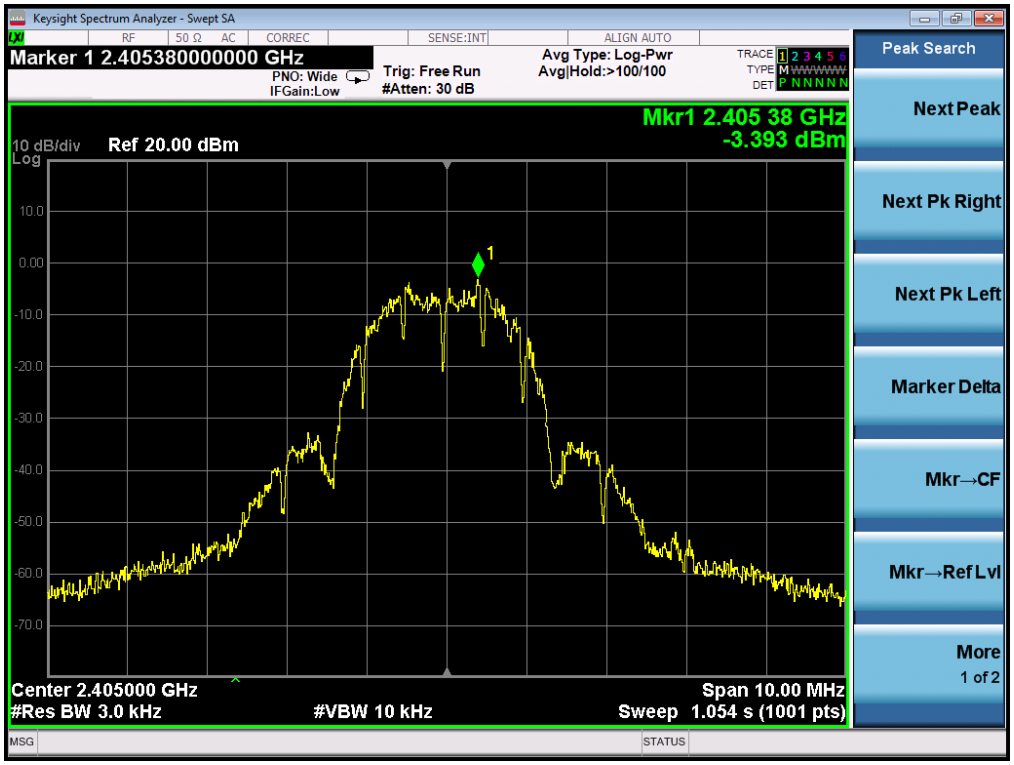
Refer To Section 6.

6.4 LIMITS AND MEASUREMENT RESULT

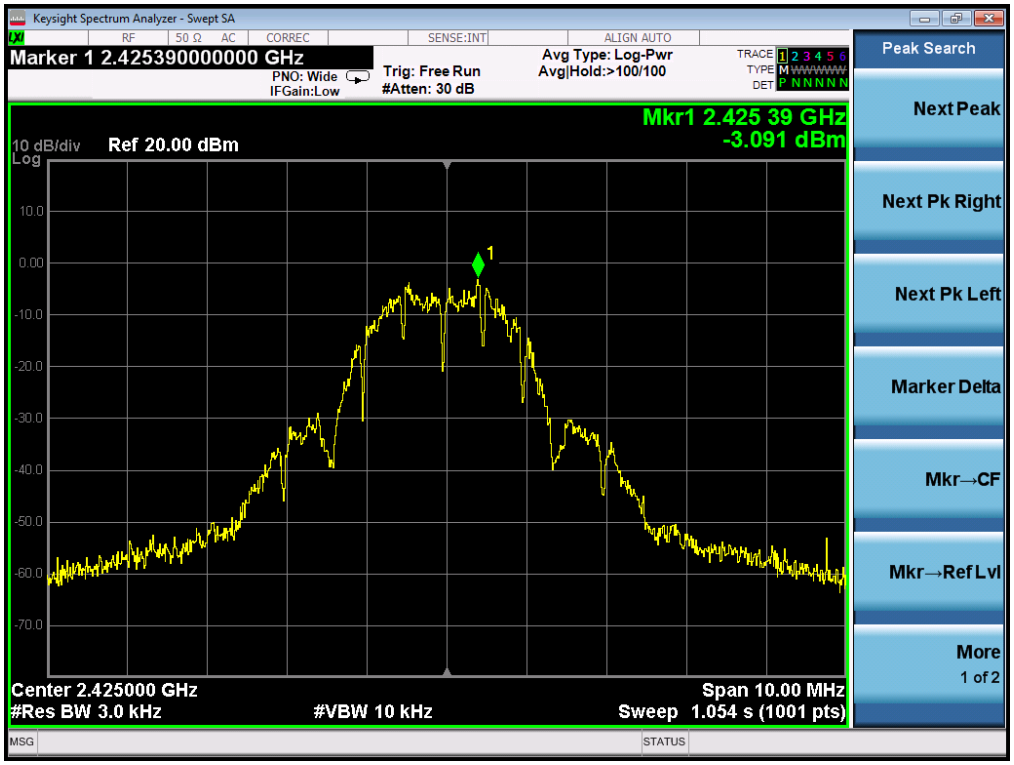
Frequency (GHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2.405(CH11)	-3.393	8	Pass
2.425(CH15)	-3.091	8	Pass
2.440(CH18)	-2.709	8	Pass
2.445(CH19)	-4.147	8	Pass
2.450(CH20)	-2.795	8	Pass
2.475(CH25)	-2.849	8	Pass
2.480(CH26)	-7.724	8	Pass

Note: The CH15, 19, 20 and 25 had been tested which is required by US customer.

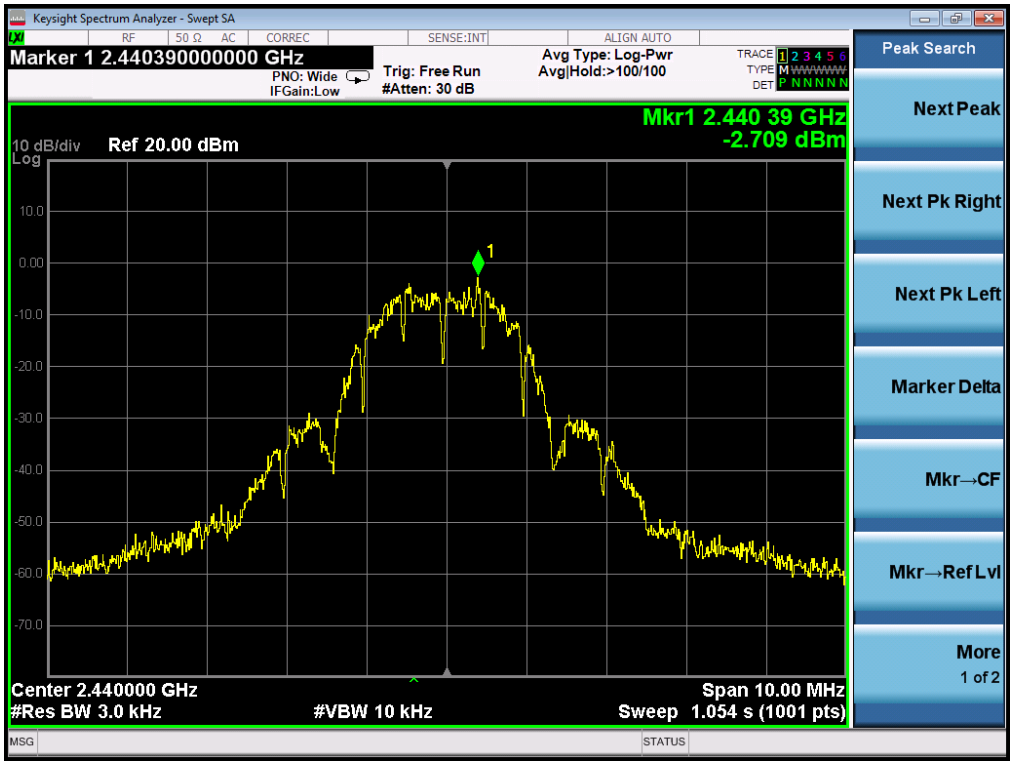
CH11



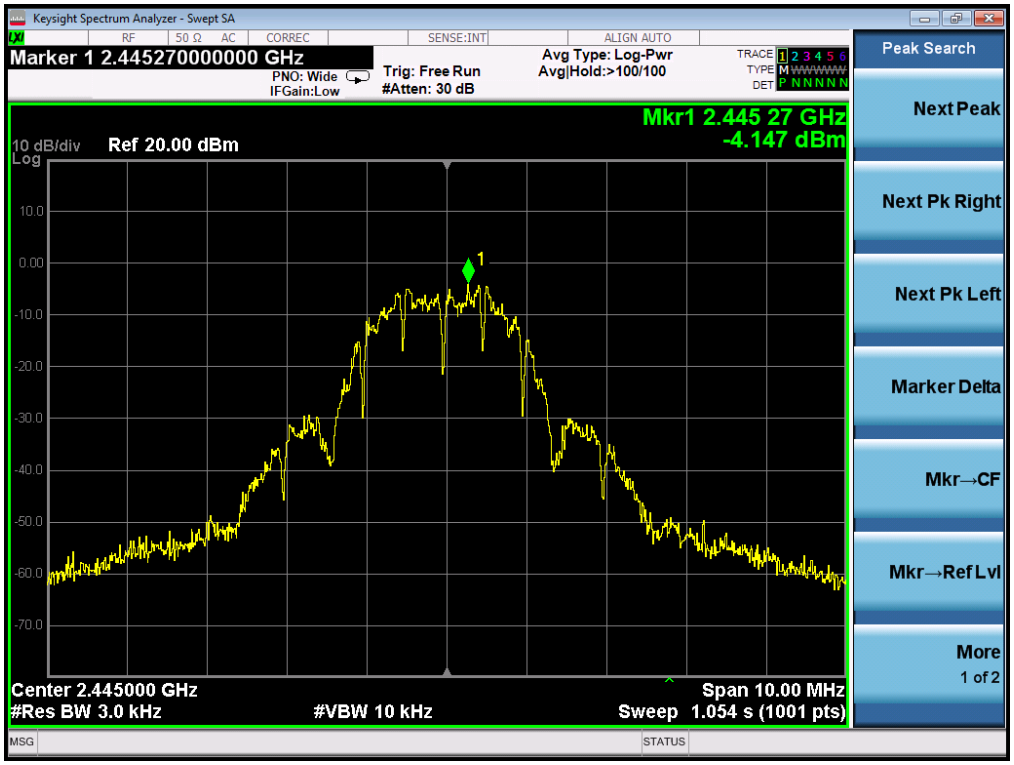
CH15


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.425390000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.425 39 GHz
-3.091 dBm
10 dB/div
Ref 20.00 dBm
Center 2.425000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 10.00 MHz
Sweep 1.054 s (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

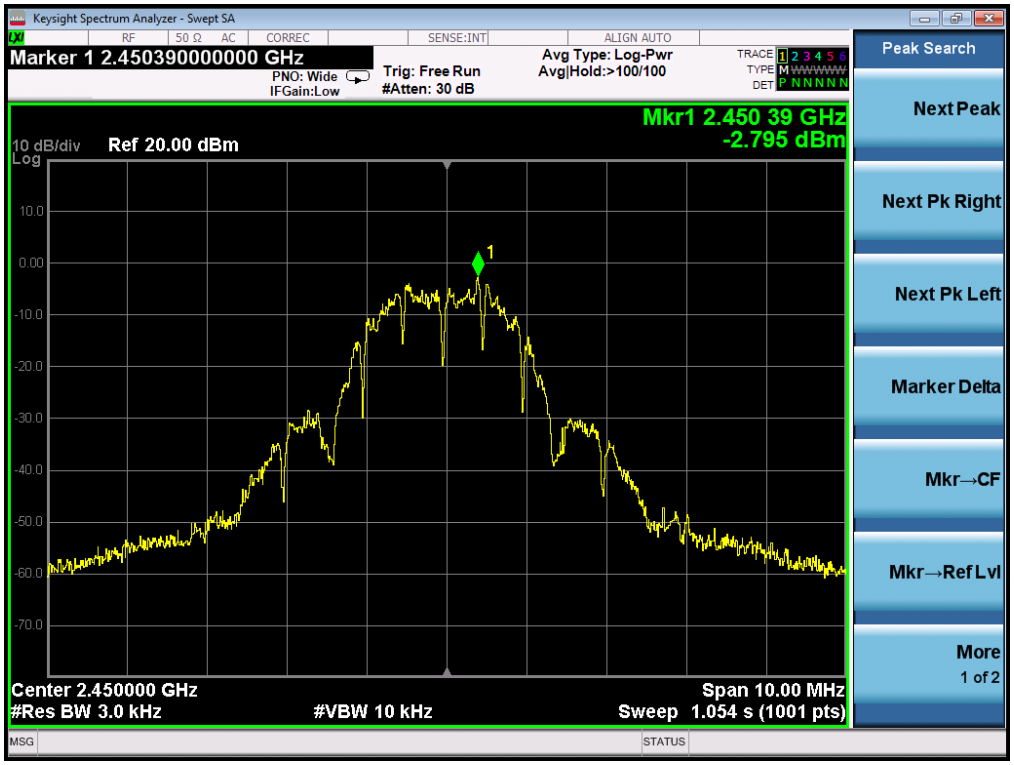
CH18


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.440390000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.440 39 GHz
-2.709 dBm
10 dB/div
Ref 20.00 dBm
Center 2.440000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 10.00 MHz
Sweep 1.054 s (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

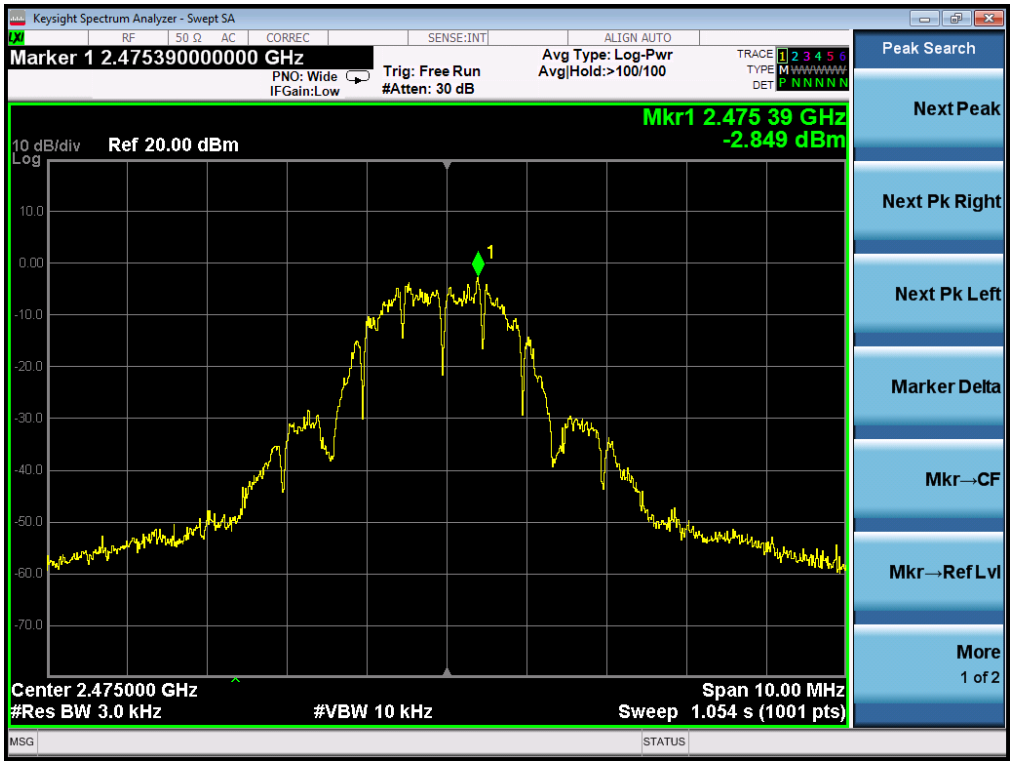
CH19


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.445270000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.445 27 GHz
-4.147 dBm
10 dB/div
Ref 20.00 dBm
Center 2.445000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 10.00 MHz
Sweep 1.054 s (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

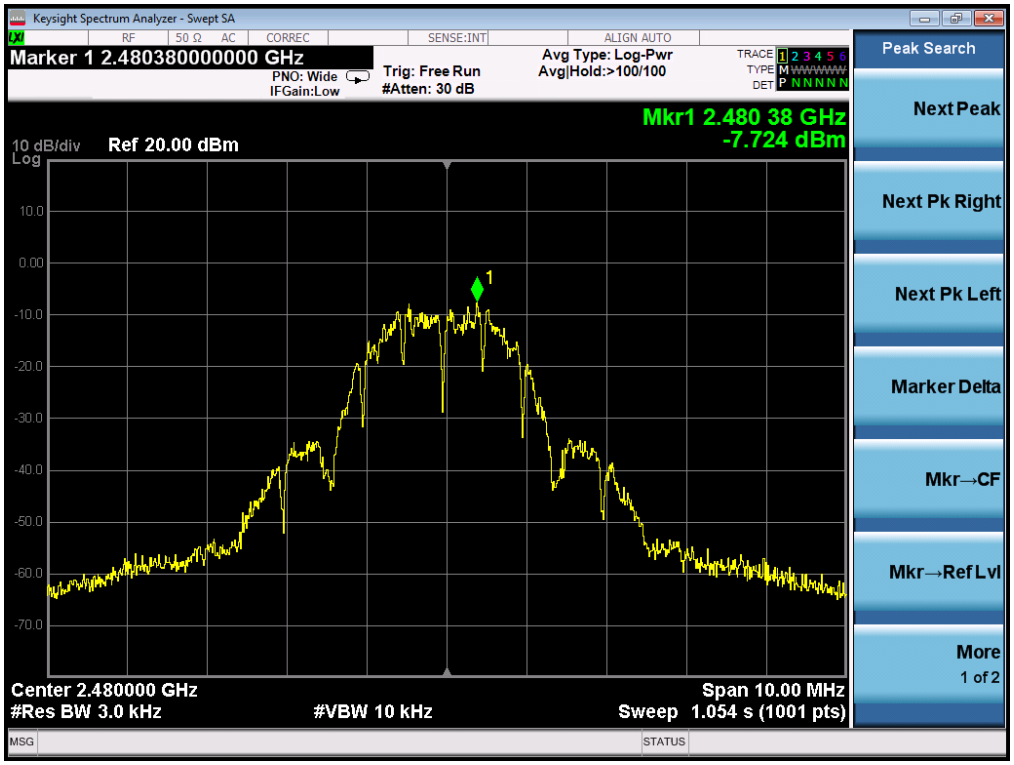
CH20


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.450390000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.450 39 GHz
-2.795 dBm
10 dB/div
Ref 20.00 dBm
Center 2.450000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 10.00 MHz
Sweep 1.054 s (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH25


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.475390000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.475 39 GHz
-2.849 dBm
10 dB/div
Ref 20.00 dBm
Center 2.475000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 10.00 MHz
Sweep 1.054 s (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH26


Keysight Spectrum Analyzer - Swept SA
Marker 1 2.480380000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Mkr1 2.480 38 GHz
-7.724 dBm
10 dB/div
Ref 20.00 dBm
Center 2.480000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 10.00 MHz
Sweep 1.054 s (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

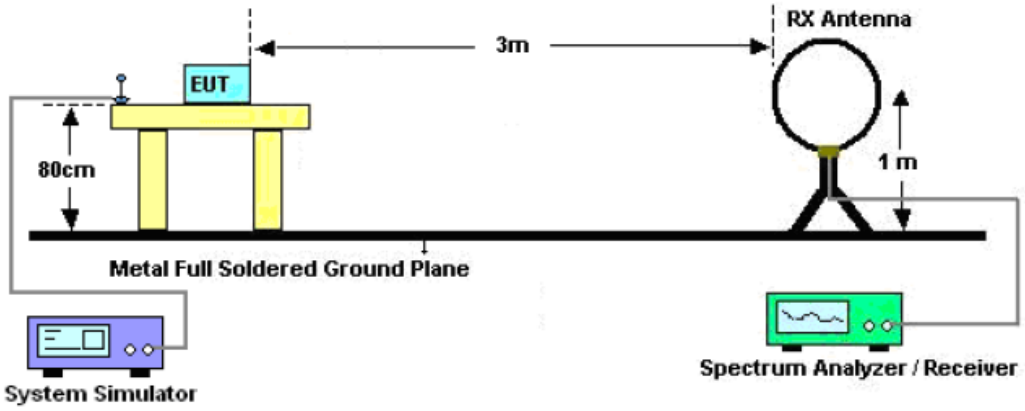
7. RADIATED EMISSION

7.1. MEASUREMENT PROCEDURE

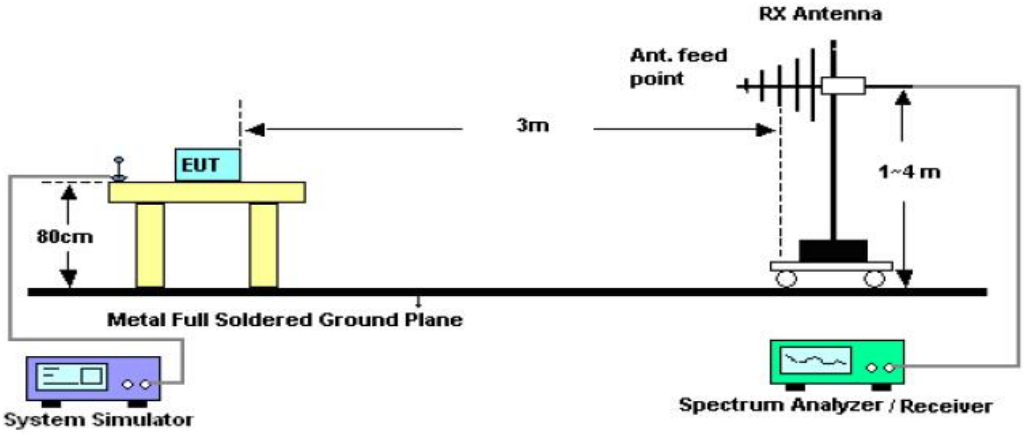
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

7.2. TEST SETUP

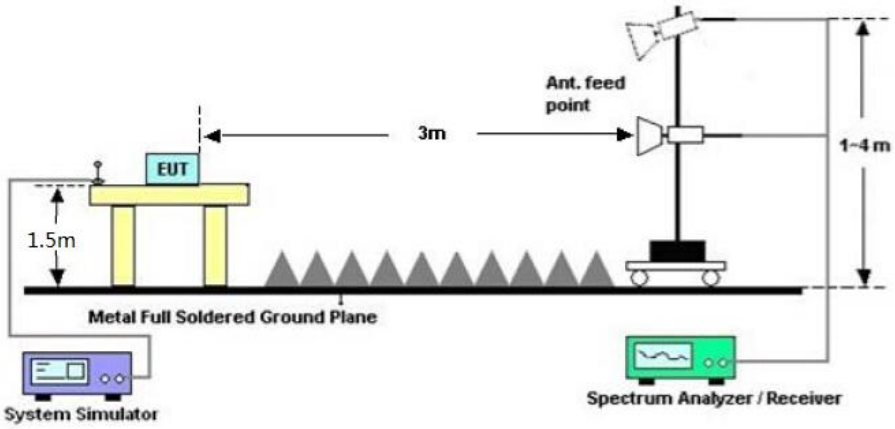
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



7.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/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

Note: All modes were tested For restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

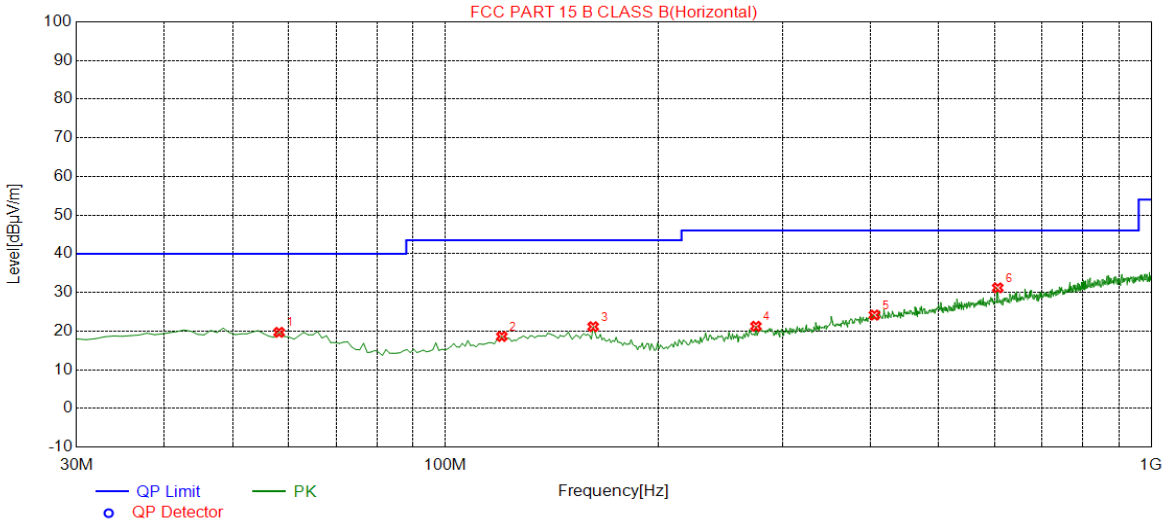
7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

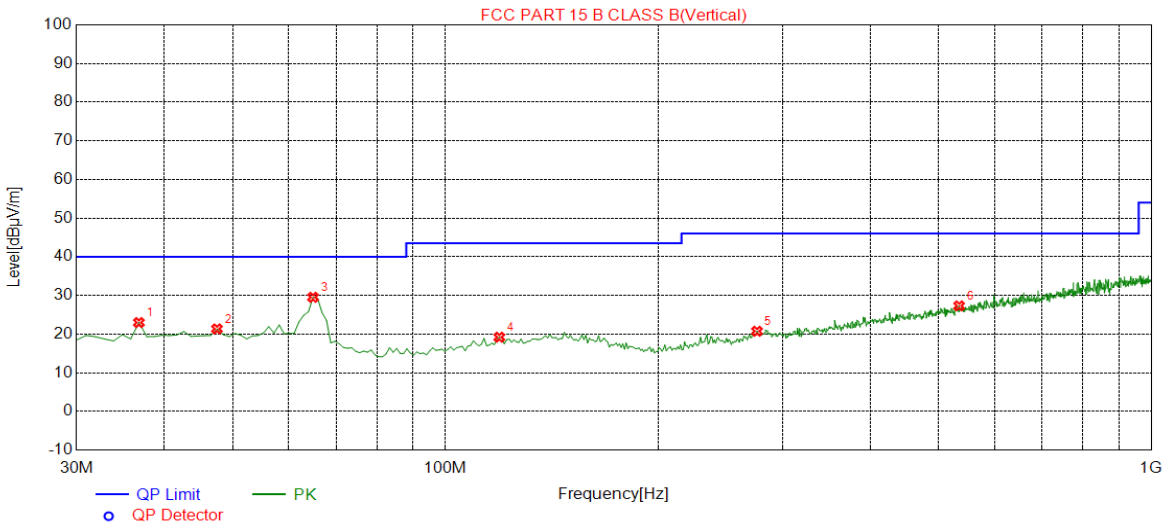
EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 1	**Antenna**	Horizontal



Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	58.1300	19.67	13.69	40.00	20.33	100	70	Horizontal
2	120.2100	18.60	12.91	43.50	24.90	100	10	Horizontal
3	161.9200	21.13	14.07	43.50	22.37	150	230	Horizontal
4	275.4100	21.24	14.98	46.00	24.76	150	10	Horizontal
5	405.3900	24.15	18.79	46.00	21.85	100	250	Horizontal
6	606.1800	31.18	23.02	46.00	14.82	100	360	Horizontal

RESULT: PASS

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 1	**Antenna**	Vertical



Suspected Data List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7900	22.98	13.89	40.00	17.02	150	130	Vertical
2	47.4600	21.34	14.42	40.00	18.66	200	150	Vertical
3	64.9200	29.52	12.70	40.00	10.48	200	10	Vertical
4	119.2400	19.19	12.82	43.50	24.31	200	120	Vertical
5	276.3800	20.73	15.06	46.00	25.27	100	50	Vertical
6	534.4000	27.30	21.61	46.00	18.70	100	80	Vertical

RESULT: PASS

Note:

1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
2. All test modes had been tested. The mode 1 is the worst case and recorded in the report.

RADIATED EMISSION ABOVE 1GHZ

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 1	**Antenna**	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4810.011	46.74	7.12	53.86	74	-20.14	peak
4810.011	40.52	7.12	47.64	54	-6.36	AVG
7215.022	42.12	9.84	51.96	74	-22.04	peak
7215.022	37.75	9.84	47.59	54	-6.41	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 1	**Antenna**	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4810.011	45.48	7.12	52.6	74	-21.4	peak
4810.011	41.17	7.12	48.29	54	-5.71	AVG
7215.022	43.25	9.84	53.09	74	-20.91	peak
7215.022	37.63	9.84	47.47	54	-6.53	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 2	**Antenna**	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4880.005	45.87	7.12	52.99	74	-21.01	peak
4880.005	42.34	7.12	49.46	54	-4.54	AVG
7320.140	43.46	9.84	53.3	74	-20.7	peak
7320.140	37.39	9.84	47.23	54	-6.77	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 2	**Antenna**	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4880.050	45.11	7.12	52.23	74	-21.77	peak
4880.050	39.74	7.12	46.86	54	-7.14	AVG
7320.080	44.03	9.84	53.87	74	-20.13	peak
7320.080	36.82	9.84	46.66	54	-7.34	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 3	**Antenna**	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.012	46.68	7.12	53.8	74	-20.2	peak
4960.012	41.71	7.12	48.83	54	-5.17	AVG
7440.027	43.65	9.84	53.49	74	-20.51	peak
7440.027	37.58	9.84	47.42	54	-6.58	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 3	**Antenna**	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.013	44.35	7.12	51.47	74	-22.53	peak
4960.013	41.08	7.12	48.2	54	-5.8	AVG
7440.027	42.31	9.84	52.15	74	-21.85	peak
7440.027	38.62	9.84	48.46	54	-5.54	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

Note:

Other emissions from 1G to 25 GHz are considered as ambient noise. No recording in the test report.

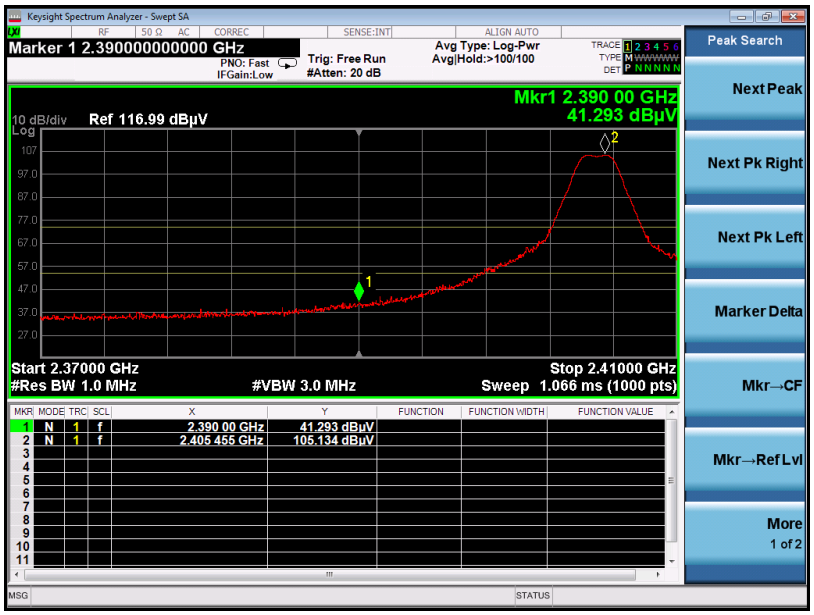
Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 1	**Antenna**	Horizontal

PK

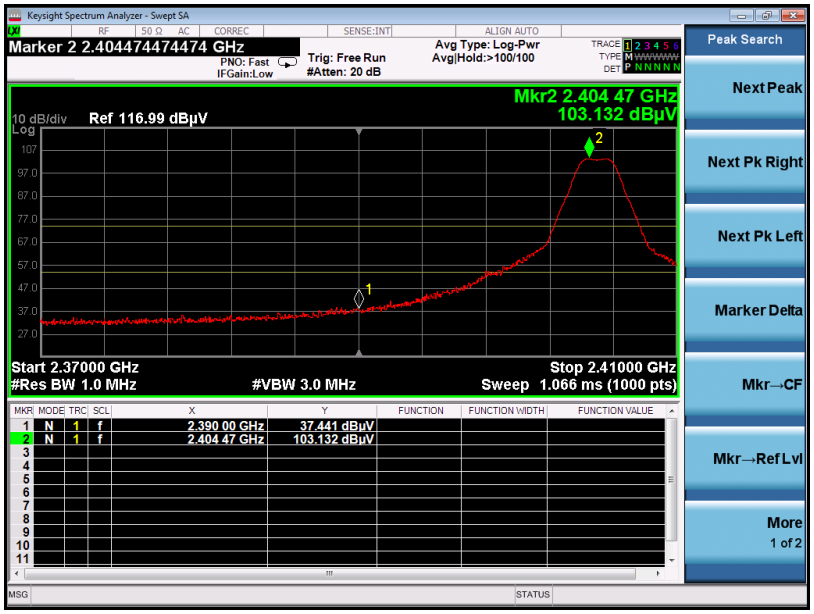


AV

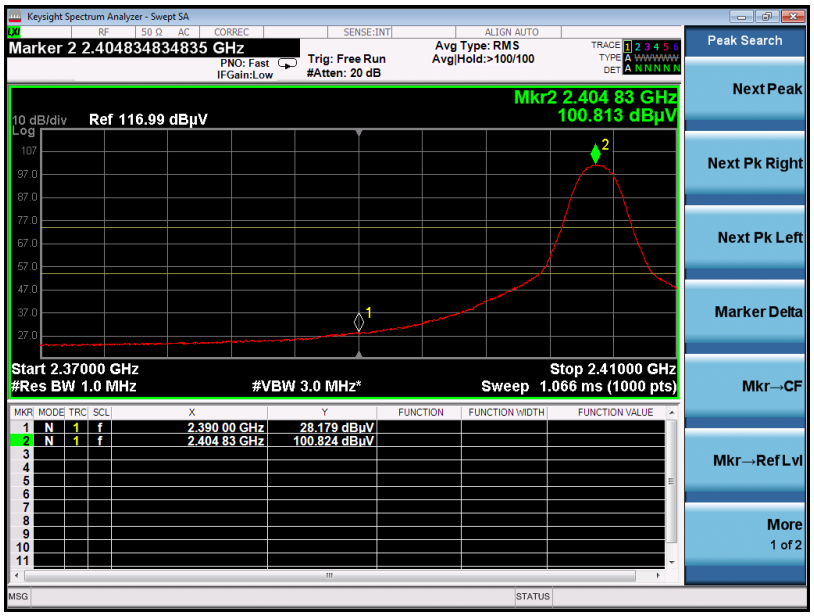
RESULT: PASS

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 1	**Antenna**	Vertical

PK



AV



RESULT: PASS

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 4	**Antenna**	Horizontal

PK

AV

RESULT: PASS

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 4	**Antenna**	Vertical

PK

AV

RESULT: PASS

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 3	**Antenna**	Horizontal

PK

AV

RESULT: PASS

EUT	Electronic door lock V3	**Model Name**	V3-BTZBE
Temperature	25° C	**Relative Humidity**	55.4%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	Mode 3	**Antenna**	Vertical

PK

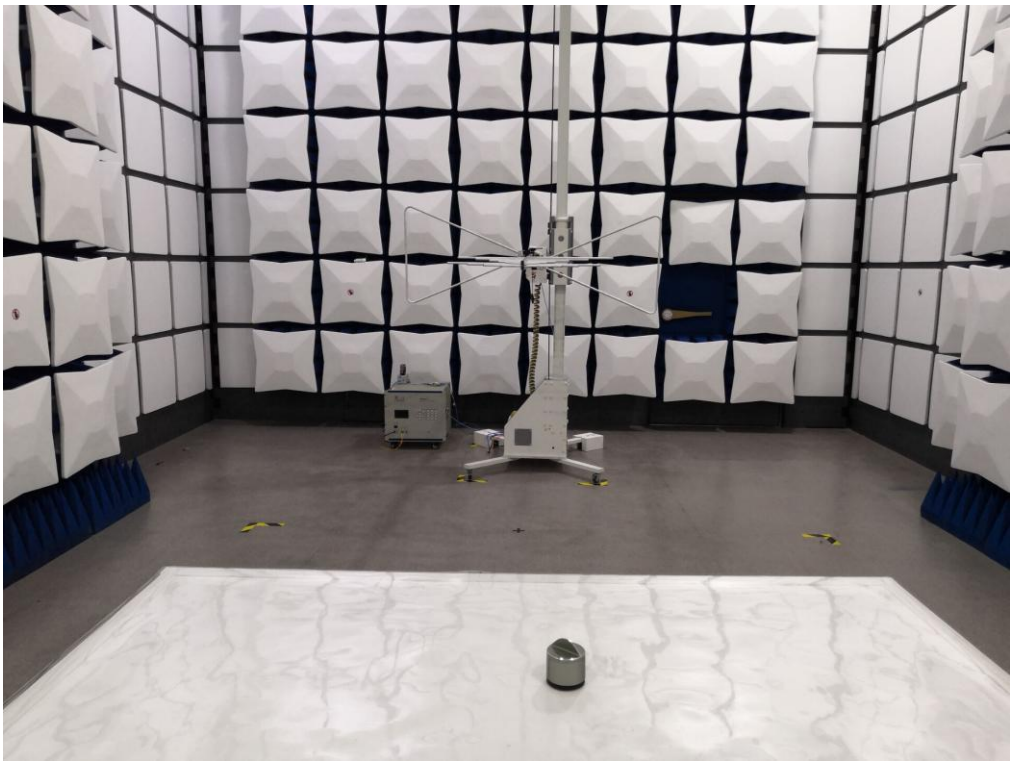
AV

RESULT: PASS

Note: The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(µV) to represent the Amplitude. Use the F dB(µV/m) to represent the Field Strength. So A=F.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

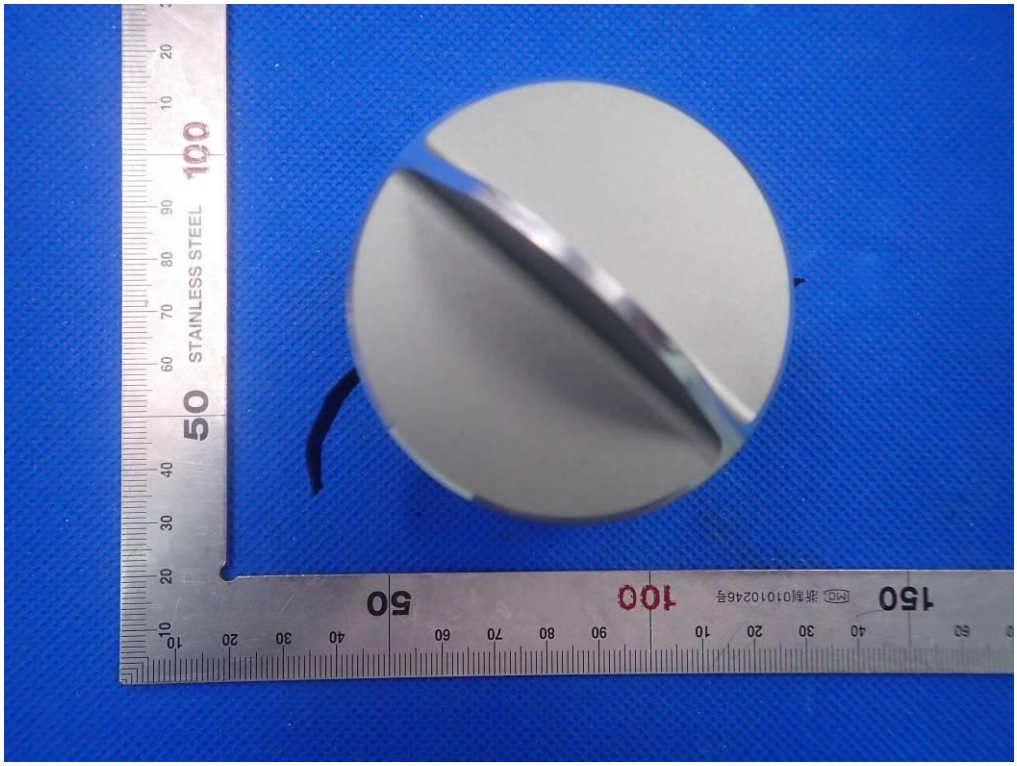
RADIATED EMISSION TEST SETUP BELOW 1GHZ



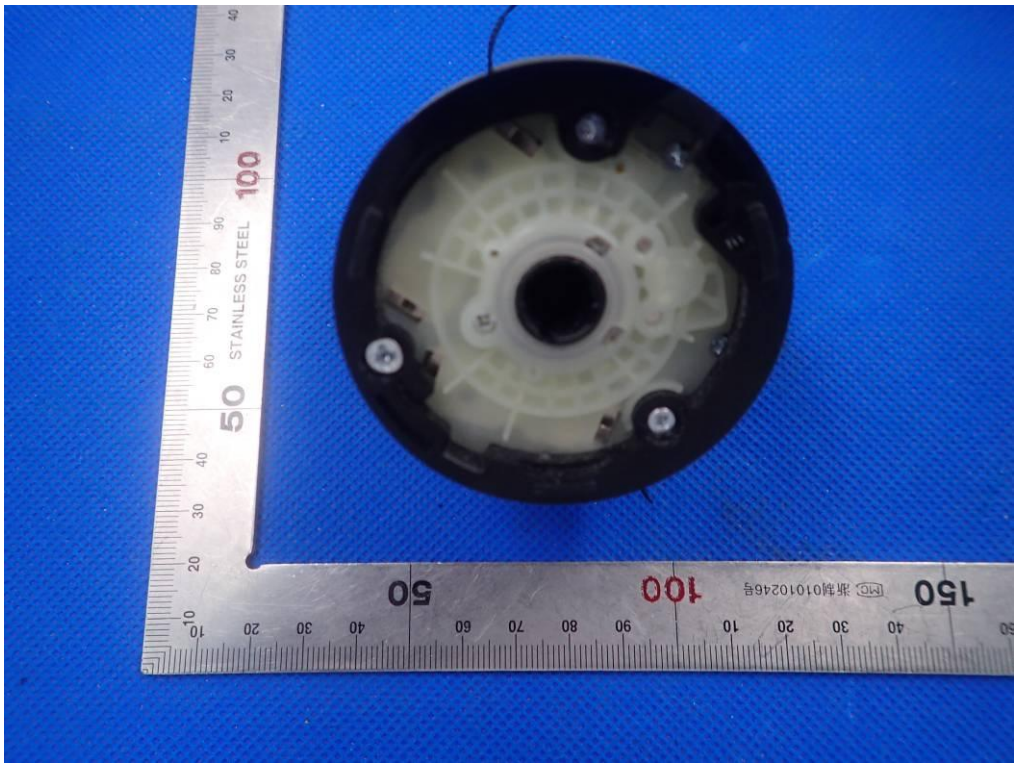
RADIATED EMISSION TEST SETUP ABOVE 1GHZ

APPENDIX B: PHOTOGRAPHS OF EUT

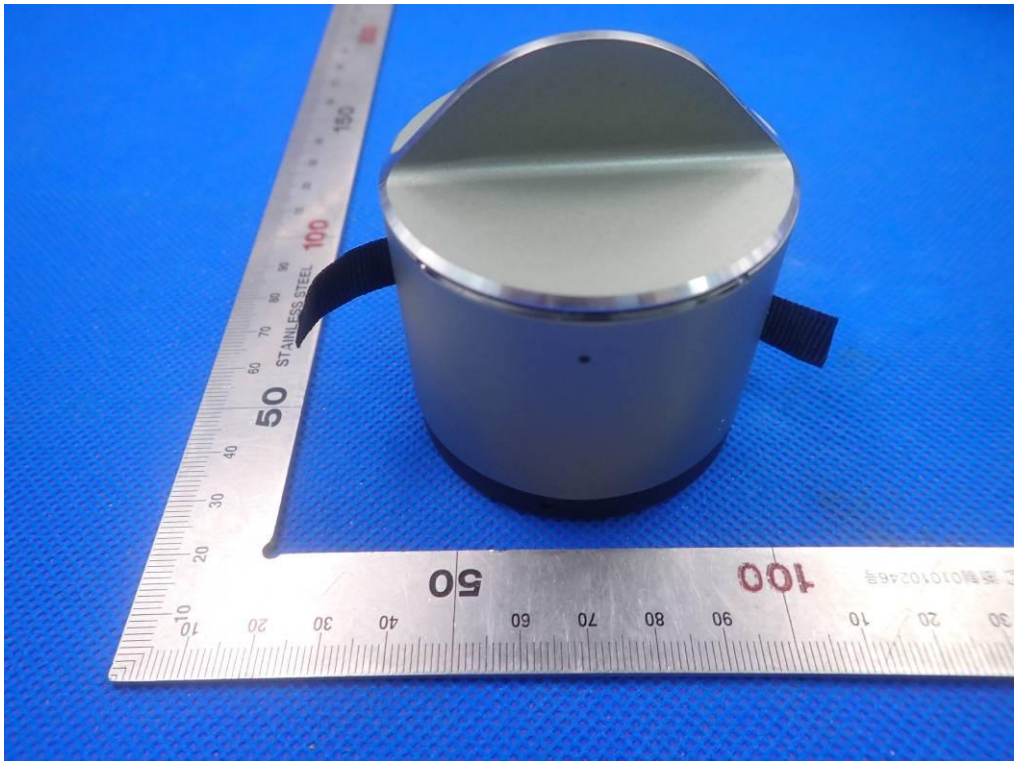
TOP VIEW OF EUT



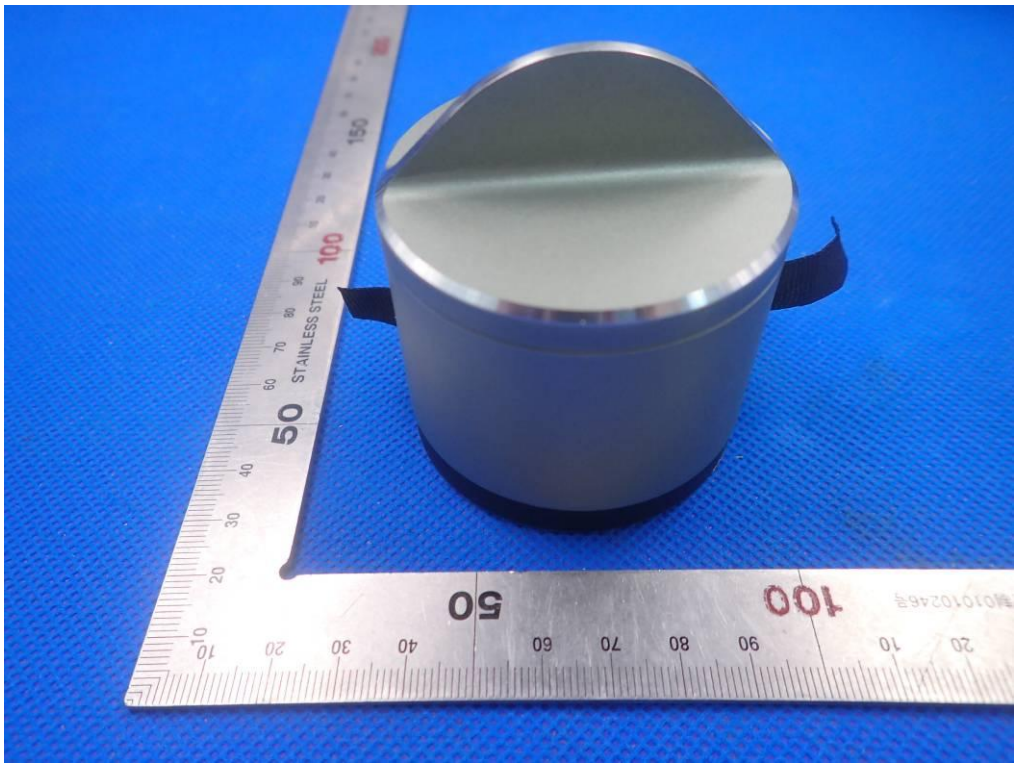
BOTTOM VIEW OF EUT



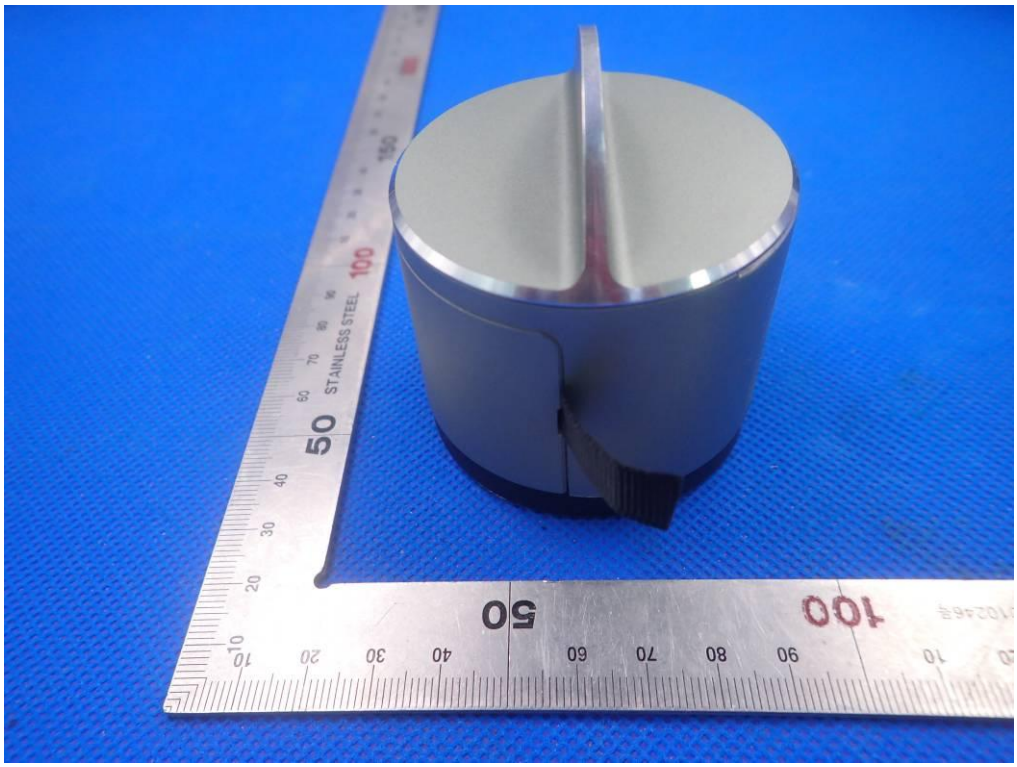
FRONT VIEW OF EUT



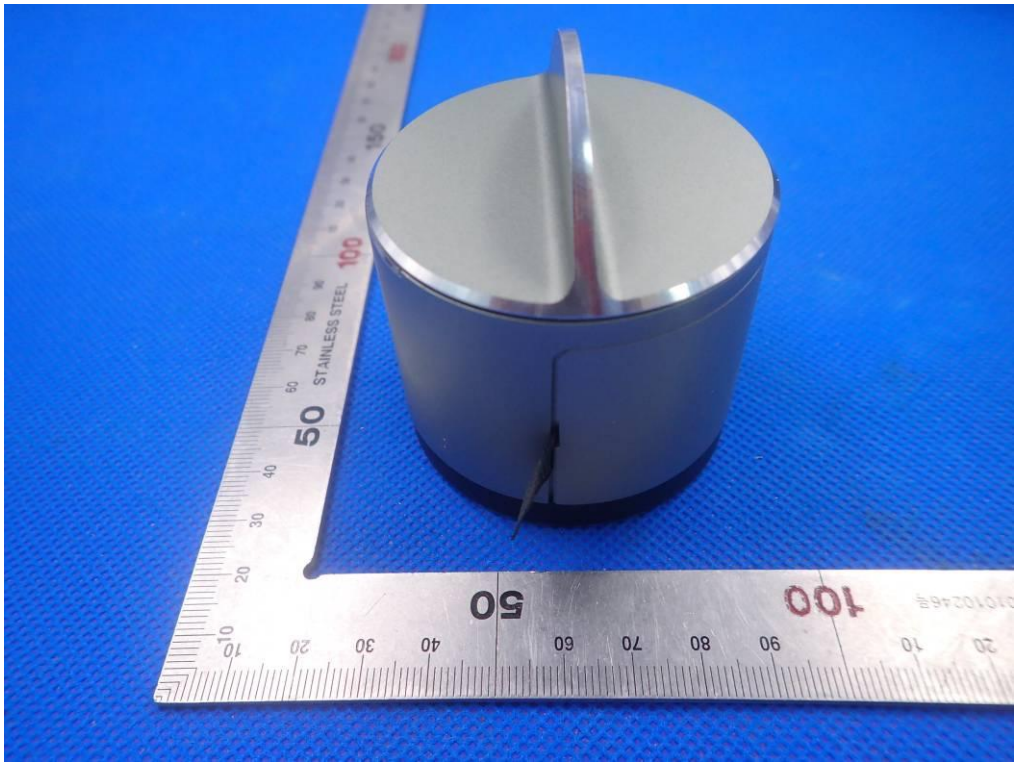
BACK VIEW OF EUT



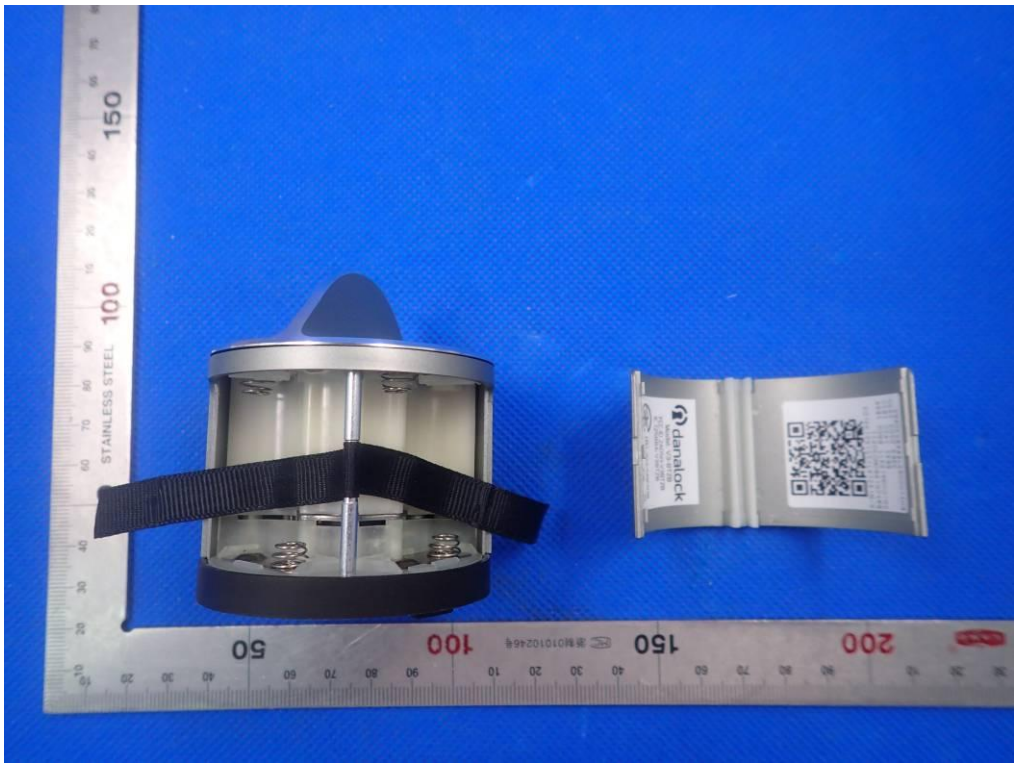
LEFT VIEW OF EUT



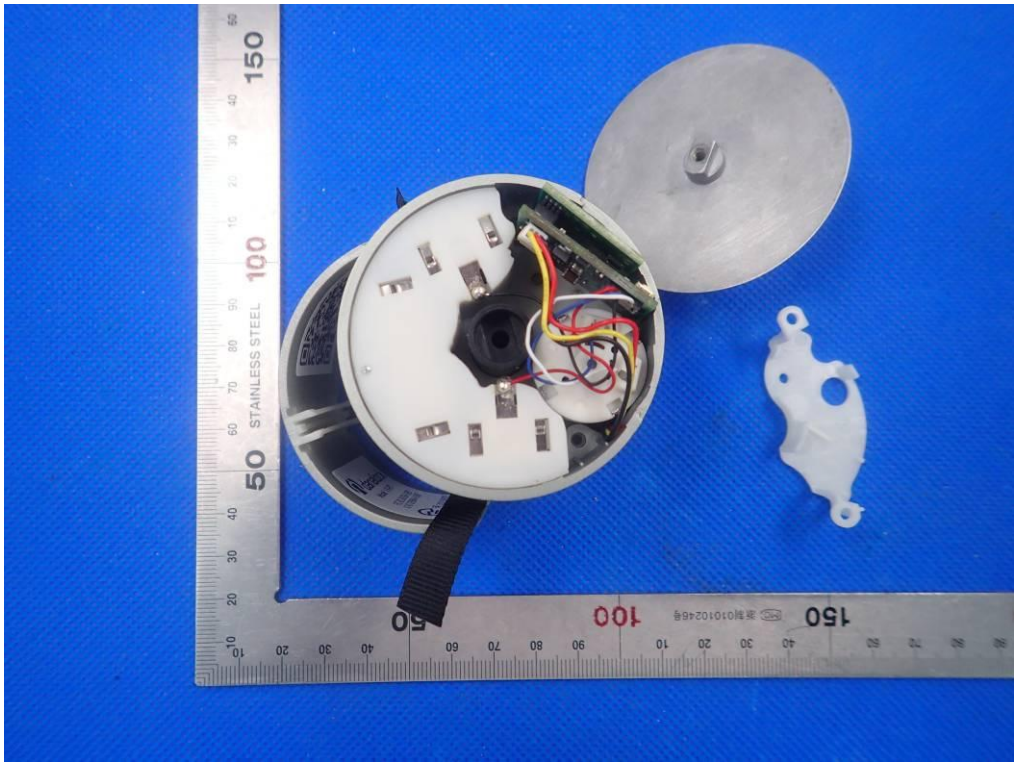
RIGHT VIEW OF EUT



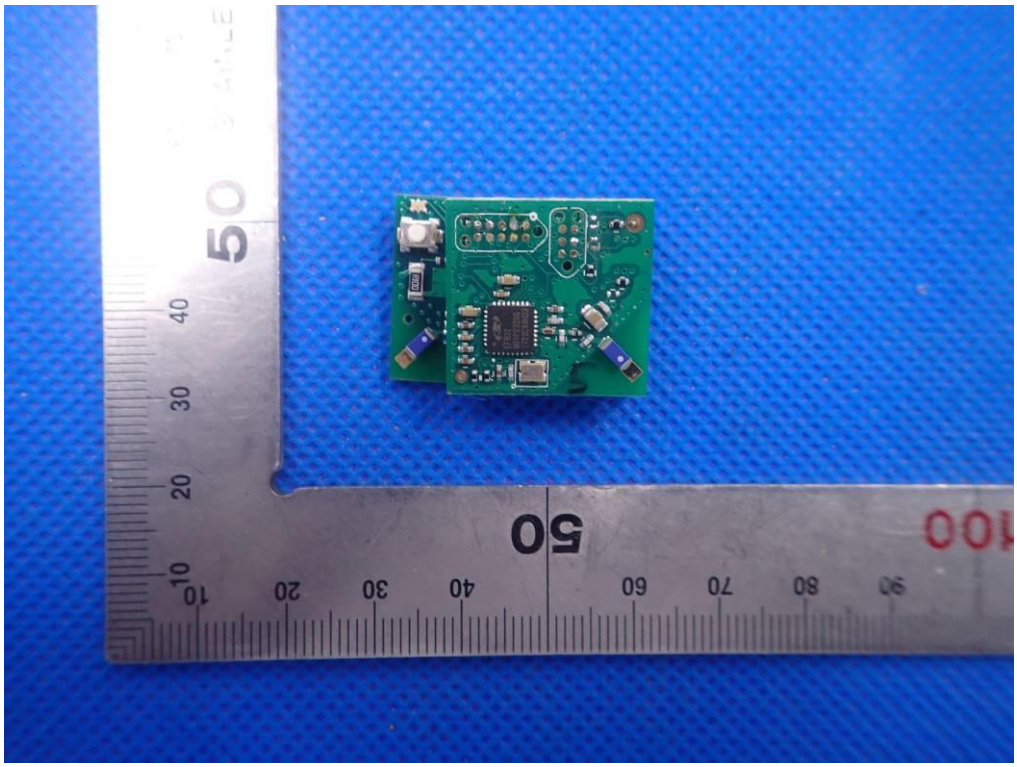
OPEN VIEW OF EUT



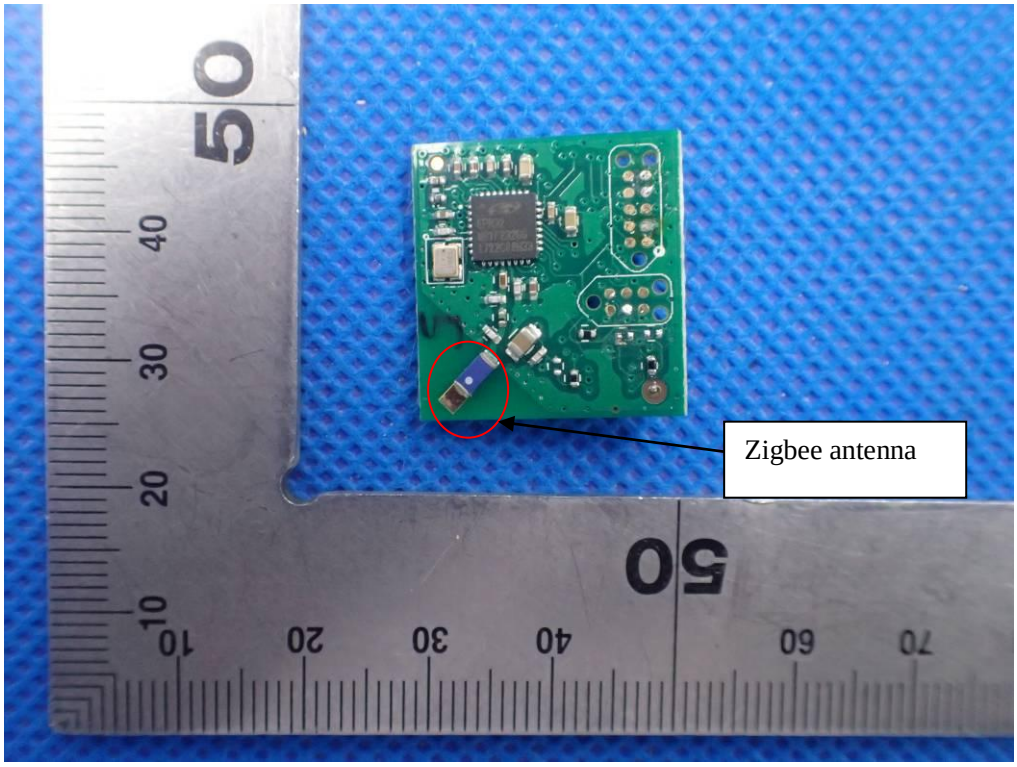
OPEN VIEW OF EUT-2



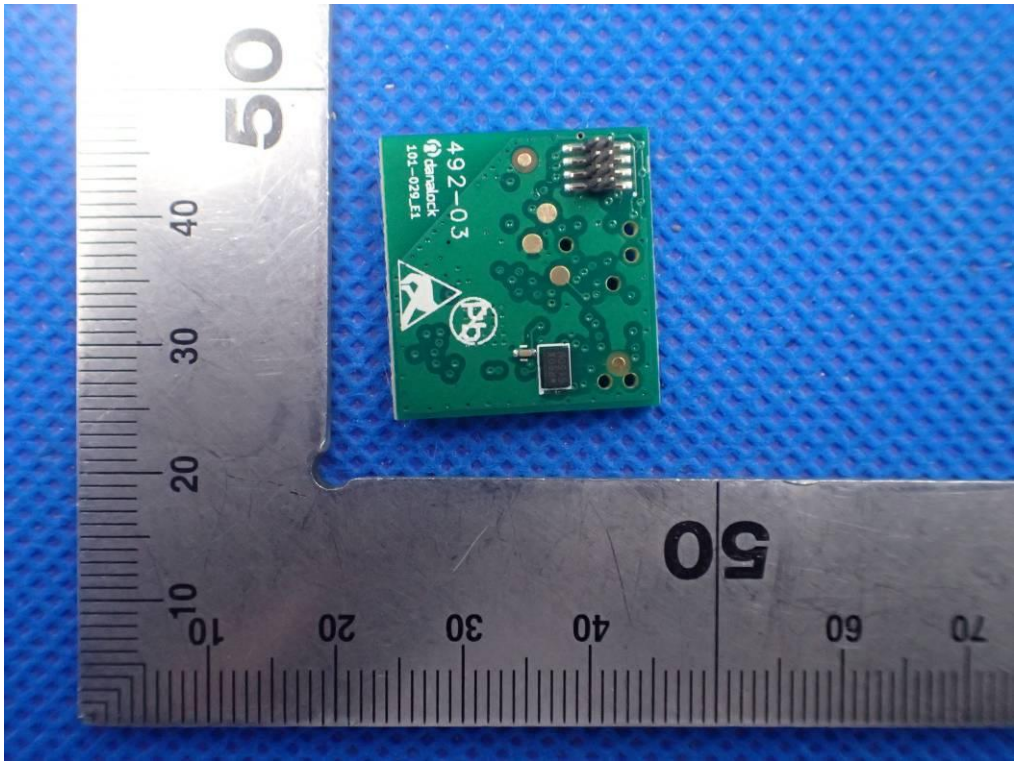
INTERNAL VIEW OF EUT-1



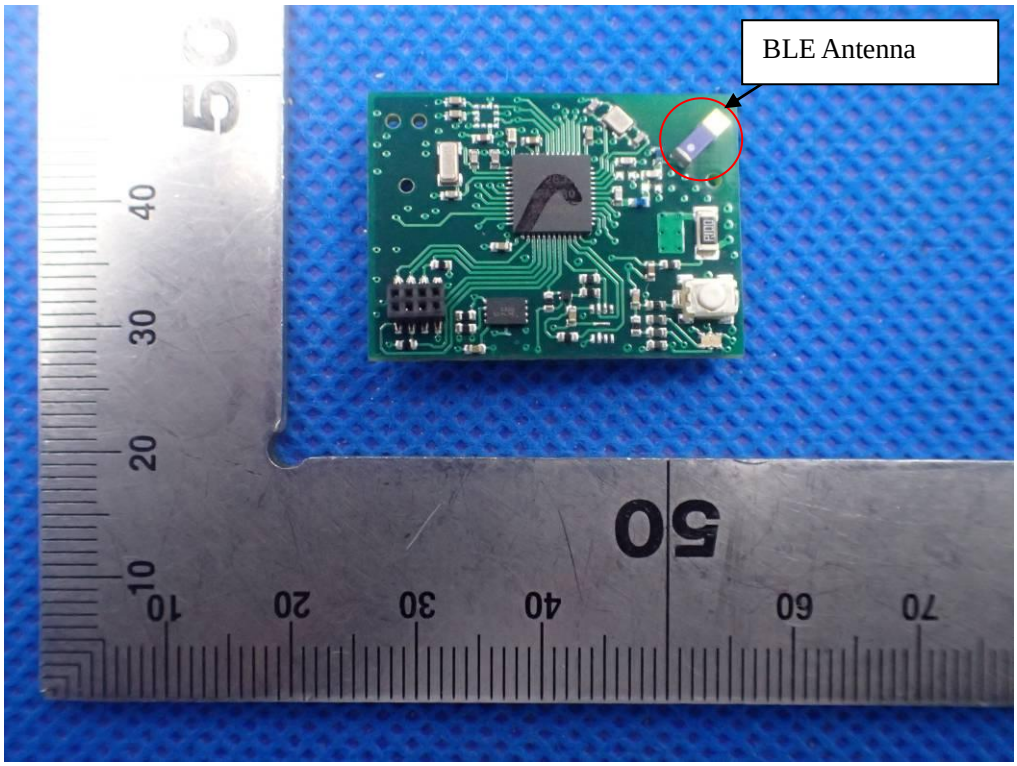
INTERNAL VIEW OF EUT-2



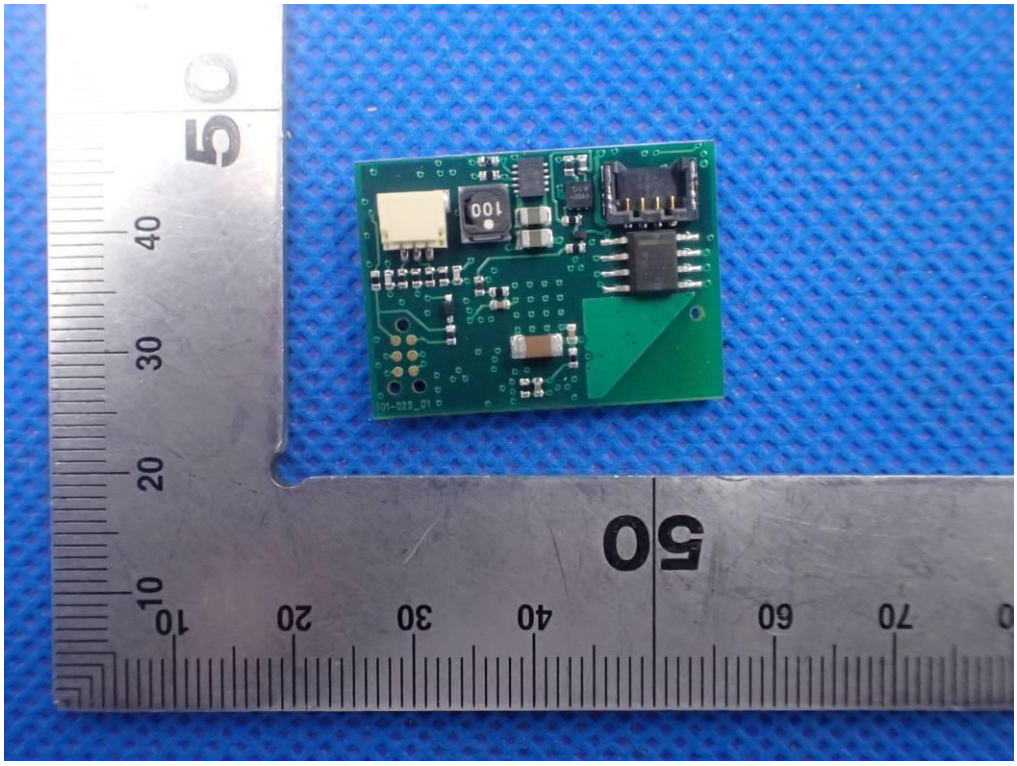
INTERNAL VIEW OF EUT-3



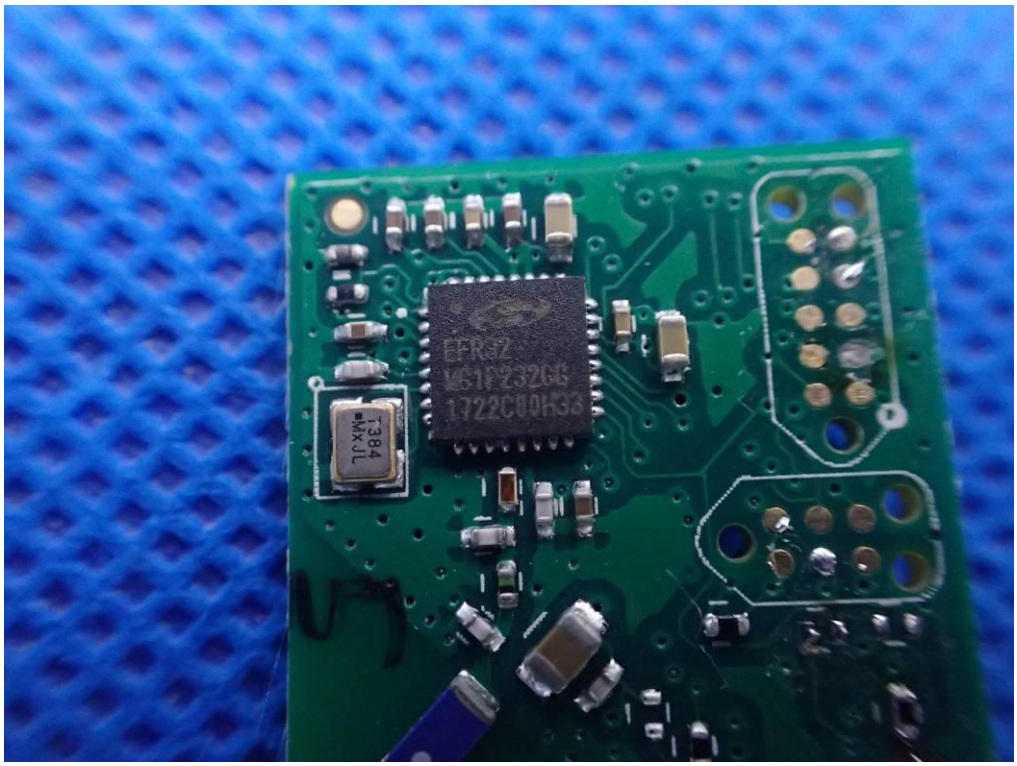
INTERNAL VIEW OF EUT-4



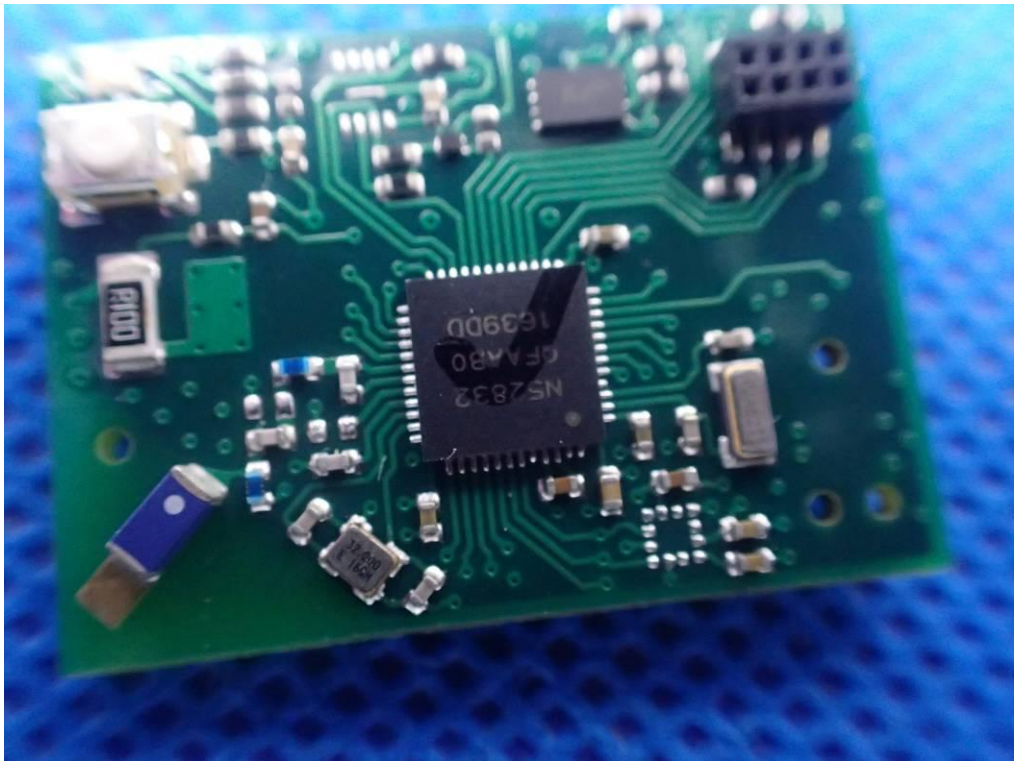
INTERNAL VIEW OF EUT-5



INTERNAL VIEW OF EUT-6



INTERNAL VIEW OF EUT-7



----END OF REPORT----