FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

For

Camera

MODEL NUMBER: SBDC1

FCC ID: CNFSBDC1
IC: 10193A-SBDC1

REPORT NUMBER: 4788004529.1-1

ISSUE DATE: September 29, 2017

Prepared for

GoPro, Inc.
3000 Clearview Way, San Mateo, CA 94402, USA

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	09/29/2017	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6db DTS Bandwidth And 99% Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a)	Complied
2	Peak Conducted Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (e)	Complied
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	Complied
4	Conducted Band edge And Spurious emission	FCC 15.247 (d) RSS-247 Clause 5.5	Complied
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 RSS-GEN Clause 8.10	Complied
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	GoPro, Inc.
Address:	3000 Clearview Way, San Mateo, CA 94402, USA

Manufacturer Information

Company Name:	GoPro, Inc.
Address:	3000 Clearview Way, San Mateo, CA 94402, USA

Factory Information

Company Name:	Chicony Electronics (Dongguan) Co., Ltd.
Address:	San Zhong Quan Li Qu, Qingxi, Dongguan, Guangdong, China 523651

EUT Name:	Camera
Model:	SBDC1
Sample Status:	Normal
Sample ID:	1018135
Brand:	GoPro
Sample Received:	May 25, 2017
Date of Tested:	May 26, 2017~ August 3, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 4	PASS

Tested By : 

Leo Liu
Engineer

Check By: 

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo

Laboratory Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, 558074 D01 DTS Meas Guidance v04, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

Test Location	Dongguan Dongdian Testing Service Co., Ltd
Address	No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Dongguan City, Guangdong Province, 523808, China
Accreditation Certificate	Dongguan Dongdian Testing Service Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in th eidentified field of testing. Valid time is until January 31, 2018. EMC Laboratory has been registered and fully described in a report filed wit hthe FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 270092, Renewal date March 11, 2015, valid time is until March 11, 2018. The 3m Alternate Test Site of Dongguan Dongdian Testing Service Co., Ltd. has been registered by Certification and Engineering Bureau of Industr y Canada for the performance of radiated measurements with Registration No.10288A on April 23, 2015, valid time is until April 23, 2018.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Bandwidth	1.1%
Peak Output Power(Conducted)(Spectrum analyzer)	0.86dB(10 MHz ≤ f < 3.6GHz);
	1.38dB(3.6GHz≤ f < 8GHz)
Peak Output Power(Conducted)(Power Sensor)	0.74dB
Dwell Time	0.6%
Conducted spurious emissions	0.86dB(10 MHz ≤ f < 3.6GHz);
	1.40dB(3.6GHz≤ f < 8GHz)
	1.66dB(8GHz≤ f < 22GHz)
Uncertainty for radio frequency (RBW<20KHz)	3×10-8
Temperature	0.4℃
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-25GHz)	4.10dB(1-6GHz)
	4.40dB (6GHz-25Gz)
Uncertainty for Power line conduction emission test	3.32dB (150KHz-30MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Camera		
Model Name	SBDC1		
Product Description	Operation Frequency	2402 MHz ~ 2480 MHz	
	Modulation Type		Data Rate
	GFSK		1Mbps
Battery	3.8Vdc,2620mAh,9.95Wh		
Bluetooth Version	BT 4.1+EDR		
Adapter	N/A		

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Bluetooth Mode	Frequency (MHz)	Channel Number	Max Output Power (dBm)
2400-2483.5	1	BLE	2402-2480	0-39[40]	1.87

5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	11	2424	22	2446	33	2468
1	2404	12	2426	23	2448	34	2470
2	2406	13	2428	24	2450	35	2472
3	2408	14	2430	25	2452	36	2474
4	2410	15	2432	26	2454	37	2476
5	2412	16	2434	27	2456	38	2478
6	2414	17	2436	28	2458	39	2480
7	2416	18	2438	29	2460		
8	2418	19	2440	30	2462		
9	2420	20	2442	31	2464		
10	2422	21	2444	32	2468		

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
GFSK	CH 00, CH 19, CH 39	2402MHz, 2440MHz, 2480MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band	
Test Software Version	QRCT (V3.0-00230) from QUALCOMM
Modulation Type	Setting TX Power
GFSK	MAX

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2402-2480	FPCB Antenna	2.5

Test Mode	Transmit and Receive Mode	Description
GFSK	☒1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.

5.7. WORST-CASE CONFIGURATIONS

Bluetooth Mode	Modulation Technology	Modulation Type	Data Rate (Mbps)
BLE	DTS	GFSK	1Mbit/s

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	ThinkPad	T460S	SL10K24796 JS

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB Type C	shielded	0.55	N/A

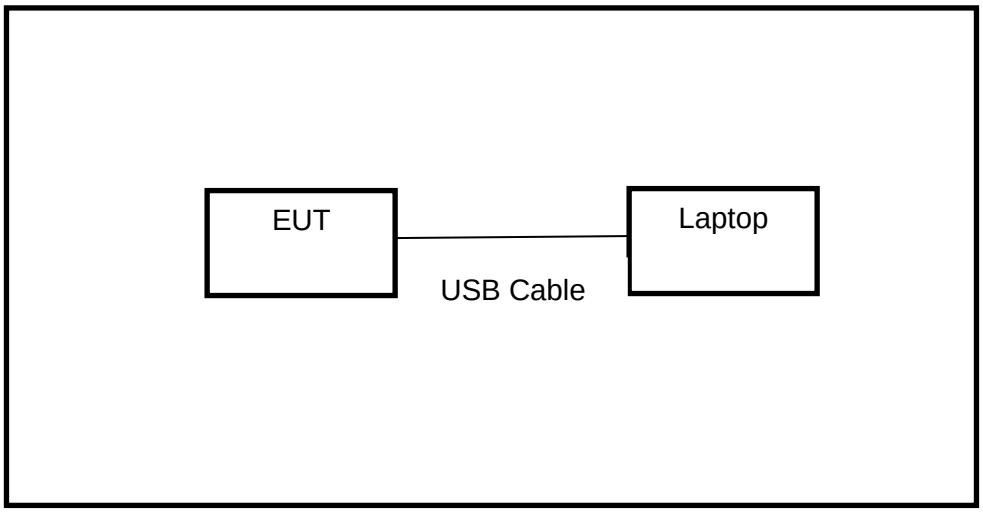
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

The EUT can work in engineering mode with firmware QRCT from QUALCOMM through a Laptop.

SETUP DIAGRAM FOR TEST



5.9. MEASURING INSTRUMENT AND SOFTWARE USED

Instrument (Conducted for RF Port)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☑	Spectrum Analyzer	Agilent	E4447A	MY50180031	Jul.06, 2016	Jul.06, 2017
☑	Spectrum analyzer	R&S	FSU26	1166.1660.26	Oct.16, 2016	Oct.16, 2017
☑	Power Sensor	Agilent	U2021XA	MY55150010	Apr.04, 2017	Apr.04, 2018
☑	Power Sensor	Agilent	U2021XA	MY55150011	Apr.18, 2017	Apr.18, 2018
☑	Attenuator	Mini-Circuits	BW-S10W2	101109	Aug.18, 2016	Aug.18, 2017
☑	RF Cable	Micable	C10-01-01-1	100309	Aug.18, 2016	Aug.18, 2017
☑	Test Software	JS Tonscend	JS1120-2	Ver.2.5	N/A	N/A
☑	USB Data acquisition	Agilent	U2531A	TW55043503	N/A	N/A
☑	Auto control Unit	JS Tonscend	JS0806-2	158060010	N/A	N/A

Instrument (Radiated Tests)						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
☑	EMI Test Receiver	R&S	ESU8	100316	Oct.16, 2016	Oct.16, 2017
☑	Spectrum analyzer	R&S	FSU26	1166.1660.26	Oct.16, 2016	Oct.16, 2017
☑	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Oct.16, 2016	Oct.16, 2017
☑	Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Oct.27, 2016	Oct.27, 2017
☑	Double Ridged Horn Antenna	R&S	HF907	100276	Oct.12, 2016	Oct.12, 2017
☑	Pre-amplifier	A.H.	PAM-0118	360	Oct.16, 2016	Oct.16, 2017
☑	RF Cable	HUBSER	CP-X2	W11.03	Oct.16, 2016	Oct.16, 2017
☑	RF Cable	HUBSER	CP-X1	W12.02	Oct.16, 2016	Oct.16, 2017
☑	MI Cable	HUBSER	C10-01-01-1M	1091629	Oct.16, 2016	Oct.16, 2017
☑	Test software	Audix	E3	V 6.11111b	N/A	N/A

Instrument (Line Conducted Emission (AC Main))						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
☑	Test Receiver	R&S	ESU8	100316	Oct.16, 2016	Oct.16, 2017
☑	LISN 1	R&S	ENV216	101109	Oct.16, 2016	Oct.16, 2017

☑	LISN 2	R&S	ESH2-Z5	100309	Oct.16, 2016	Oct.16, 2017
☑	Pulse Limiter	R&S	ESH3-Z2	101242	Oct.16, 2016	Oct.16, 2017
☑	CE Cable 1	HUBSER	ESU8/RF2	W10.01	Oct.16, 2016	Oct.16, 2017
☑	Test software	Audix	E3	V 6.11111b	N/A	N/A

6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6 dB Bandwidth/99% Bandwidth	KDB 558074 D01 DTS Meas Guidance v04	8.0
2	Peak Output Power	KDB 558074 D01 DTS Meas Guidance v04	9.1.1
3	Power Spectral Density	KDB 558074 D01 DTS Meas Guidance v04	10.2
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 DTS Meas Guidance v04	11.0
5	Out-of-band emissions in restricted bands	KDB 558074 D01 DTS Meas Guidance v04	12.1
6	Band-edge	KDB 558074 D01 DTS Meas Guidance v04	13.3.2
7	Conducted Emission Test For AC Power Port	ANSI C63.10-2013	7.3

7. ANTENNA PORT TEST RESULTS

7.1. 6 dB DTS BANDWIDTH AND 99% BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2) RSS-247 5.2 (a)	6dB Bandwidth	>= 500KHz	2400-2483.5
RSS-Gen Clause 6.6	99% Bandwidth	For reporting purposes only.	2400-2483.5

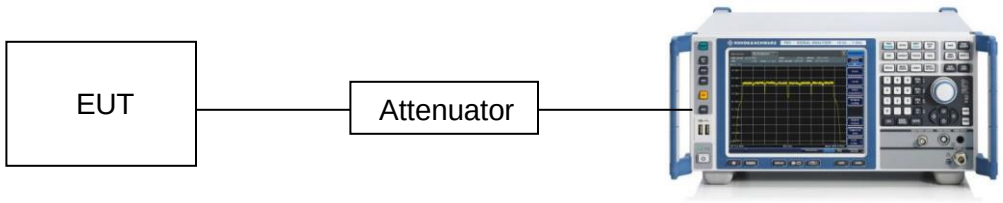
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6 dB Bandwidth :100K For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : ≥3 × RBW For 99% Bandwidth : approximately 3×RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB and 99% relative to the maximum level measured in the fundamental emission.

TEST SETUP

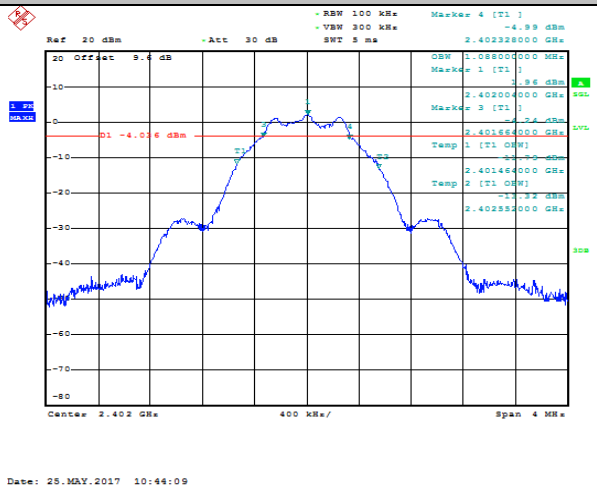
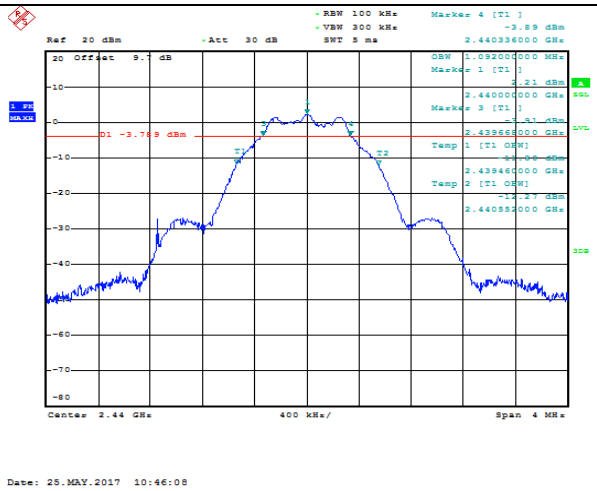


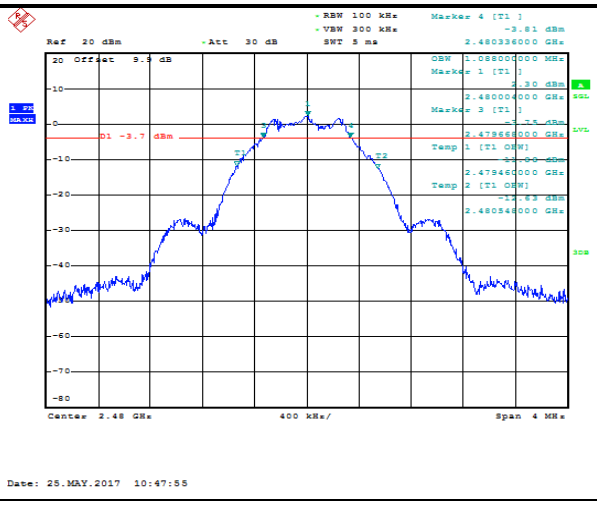
TEST CONDITIONS

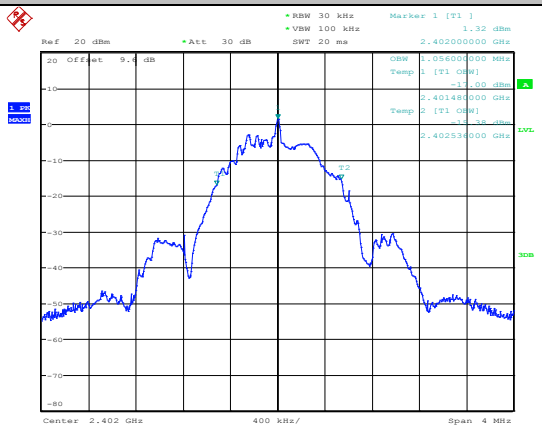
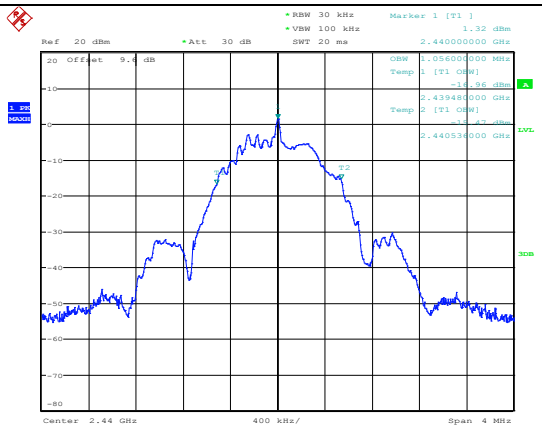
Temperature: 28°C
Relative Humidity: 60%
Test Voltage: 3.8Vdcc

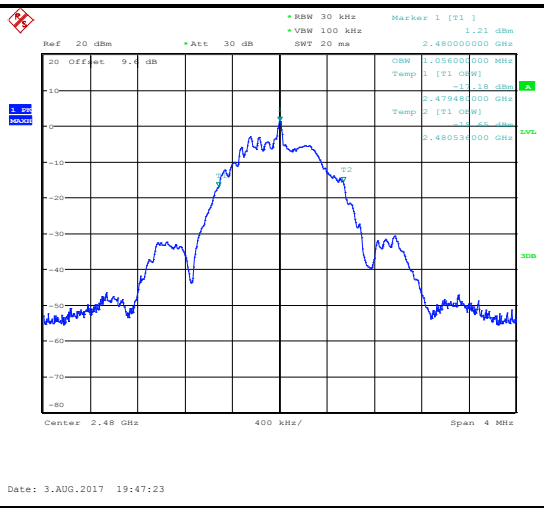
RESULTS

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	99% OBW[MHz]	Result
Low	2402	0.664	500	1.056	Pass
Middle	2440	0.668	500	1.056	Pass
High	2480	0.668	500	1.056	Pass

Graphs For 6dB Bandwidth	
LCH	
MCH	

HCH	

Graphs For 99% Bandwidth	
LCH	
MCH	

HCH	

7.2. PEAK CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3) RSS-247 5.4 (e)	Peak Output Power	1 watt or 30dBm	2400-2483.5

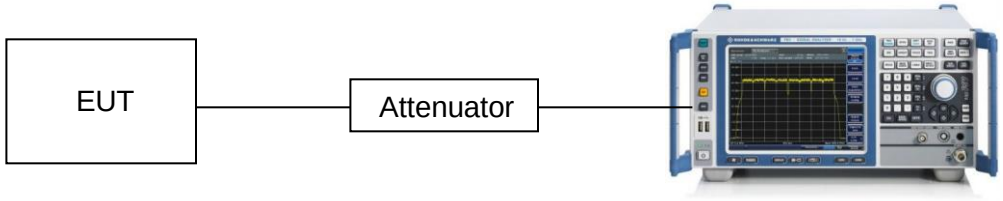
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	≥DTS bandwidth(e.g. 1 MHz for BLE)
VBW	≥3 × RBW
Span	3 x RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use peak marker function to determine the peak amplitude level.

TEST SETUP

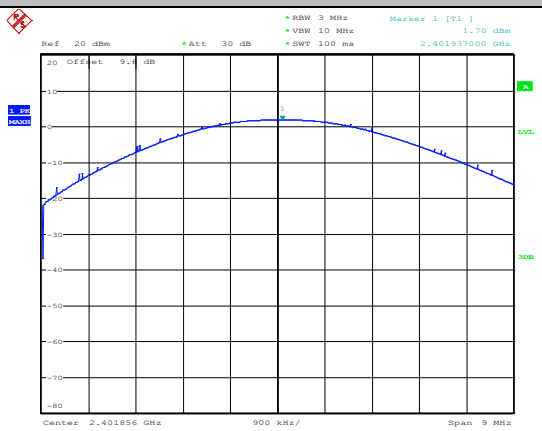
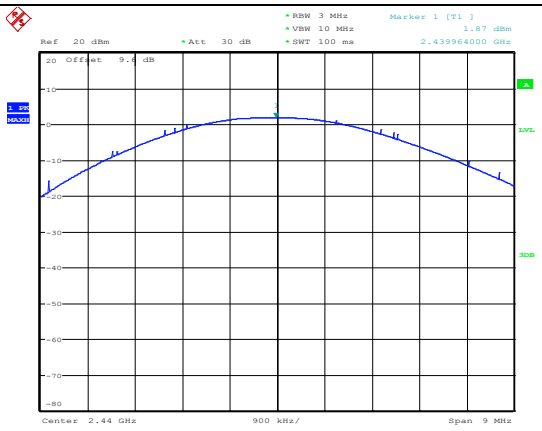


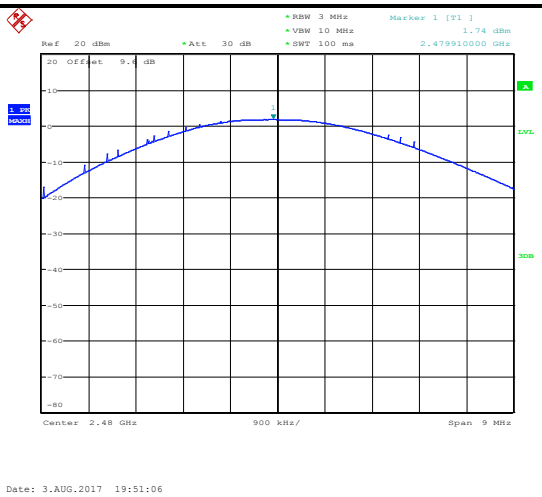
TEST CONDITIONS

Temperature: 28°C
Relative Humidity: 60%
Test Voltage: 3.8Vdc

RESULTS

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
CH00	2402	1.70	30
CH19	2440	1.87	30
CH39	2480	1.74	30

Graphs	
LCH	
MCH	

HCH	

7.3. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e) RSS-247 5.2 (b)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

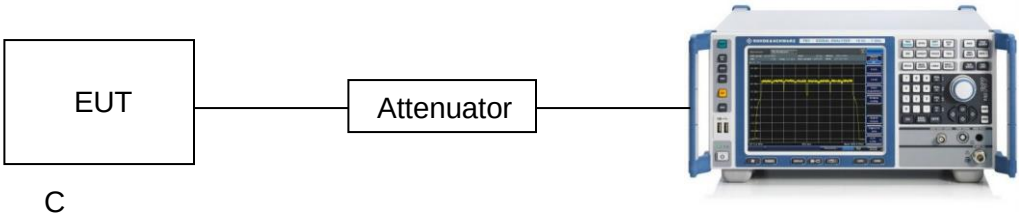
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW 100 ≤ kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP



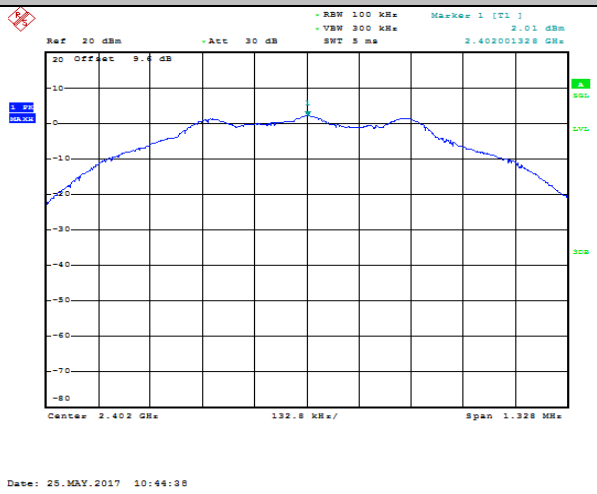
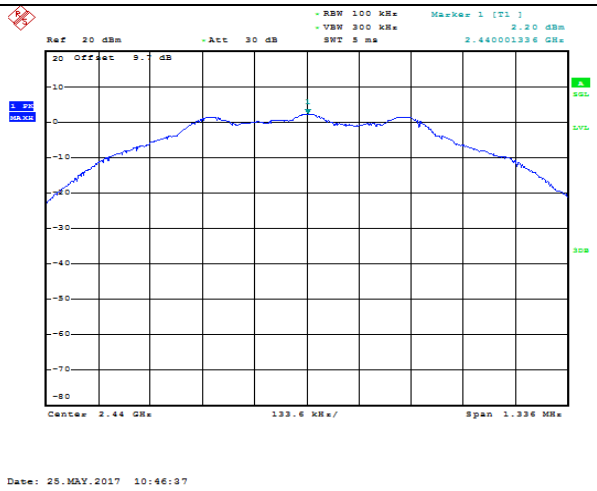
C

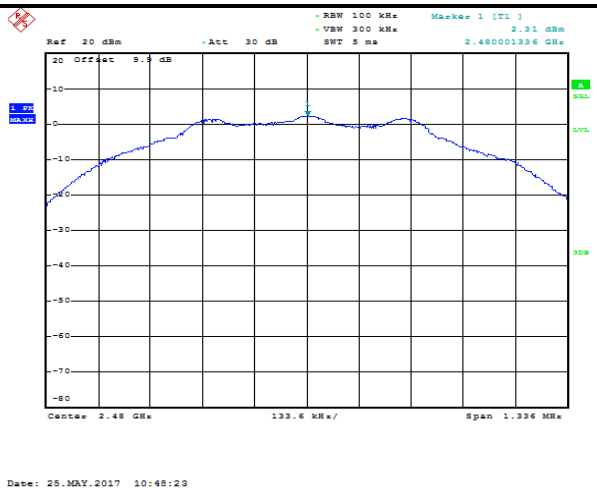
TEST CONDITIONS

Temperature: 28°C
Relative Humidity: 60%
Test Voltage: 3.8Vdc

RESULTS

Frequency	Power Spectral Density (dBm/100kHz)	Limit (dBm/100K)	Result
2402 MHz	2.010	8	PASS
2440 MHz	2.200	8	PASS
2480 MHz	2.310	8	PASS

Graphs	
LCH	
MCH	

HCH	

7.4. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2		
Section	Test Item	Limit
FCC §15.247 (d) RSS-247 5.5	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

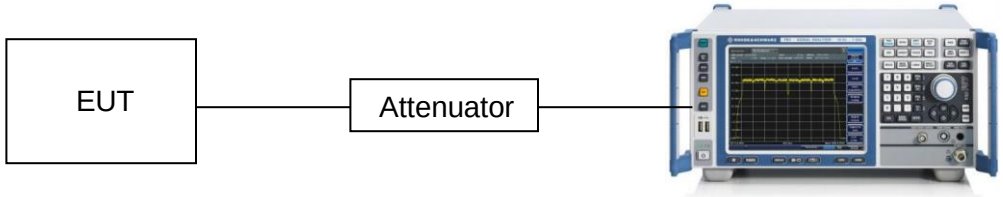
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level**.**

TEST SETUP



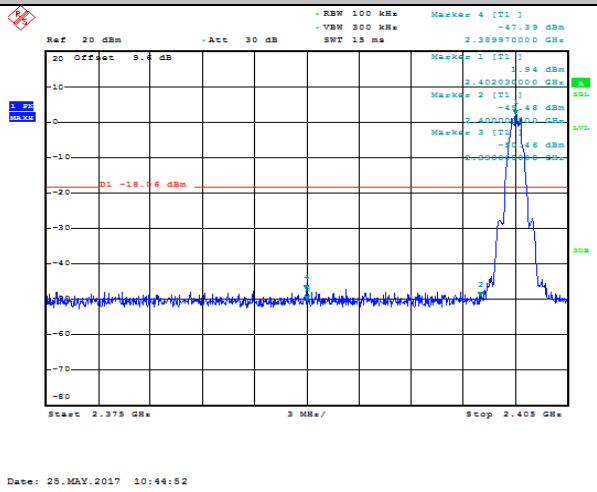
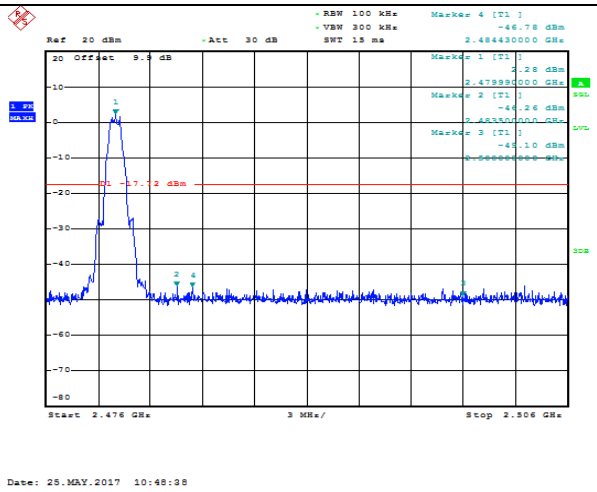
TEST CONDITIONS

Temperature: 28°C
Relative Humidity: 60%
Test Voltage: 3.8Vdc

RESULTS

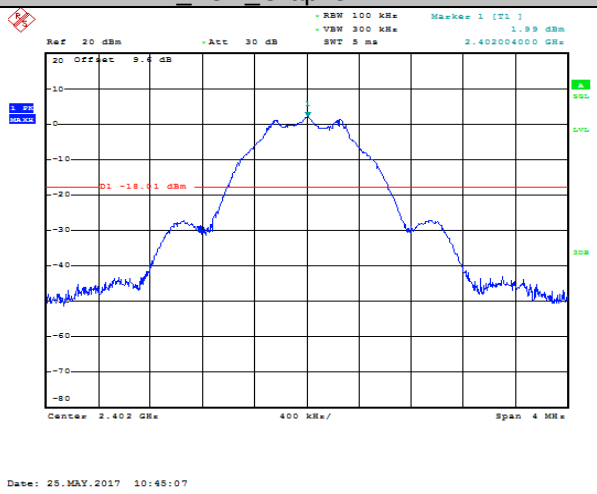
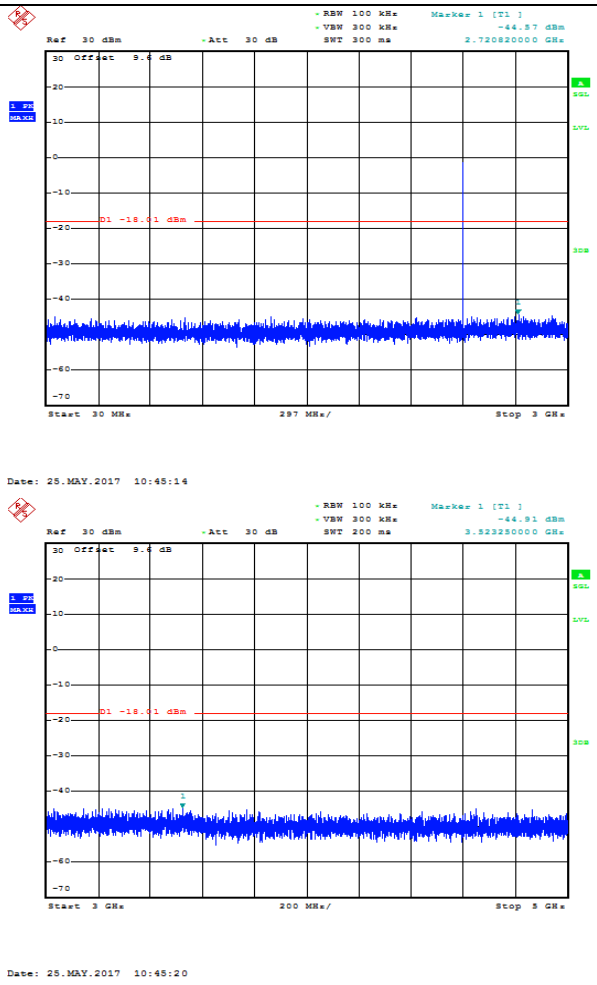
RF Conducted Bandedge

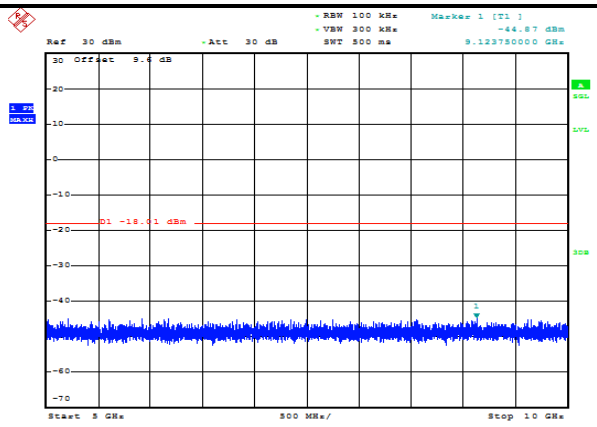
Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	1.940	-47.386	-18.06	PASS
BLE	HCH	2.280	-46.781	-17.72	PASS

Graphs	
LCH	
HCH	

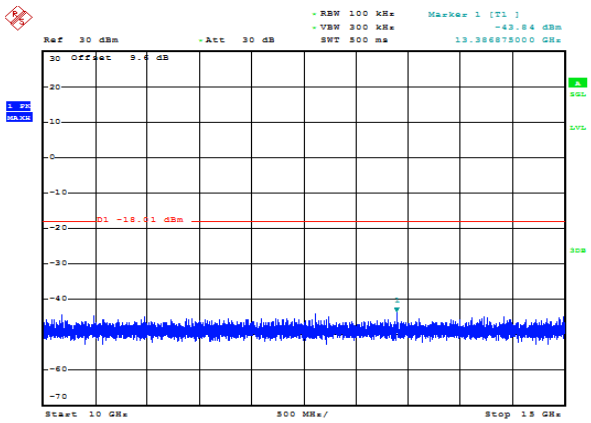
RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	1.99	<Limit	PASS
BLE	MCH	2.19	<Limit	PASS
BLE	HCH	2.3	<Limit	PASS

BLE_LCH_Graphs	
Pref/BLE/LCH	
Puw/BLE/LCH	



Date: 25.MAY.2017 10:45:28



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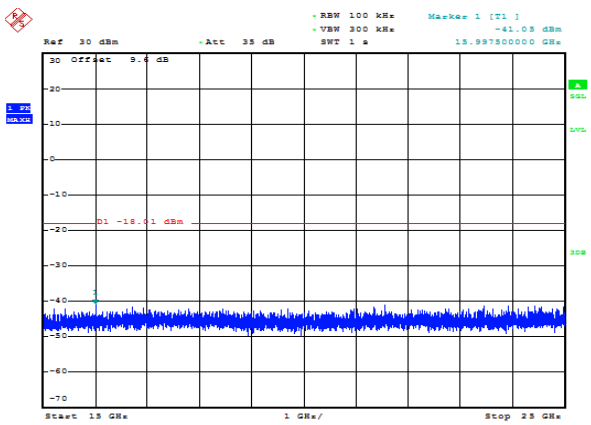
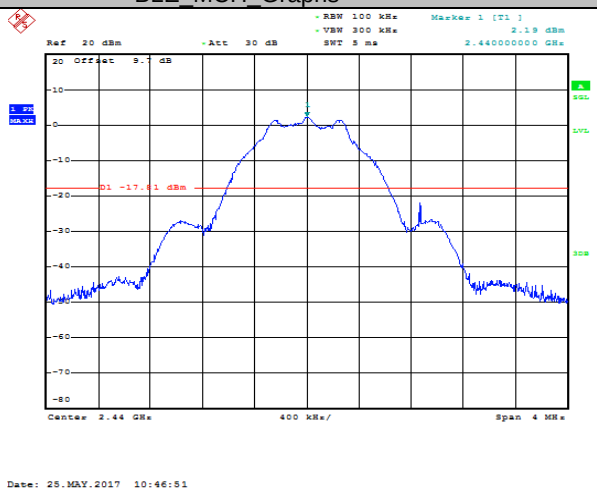
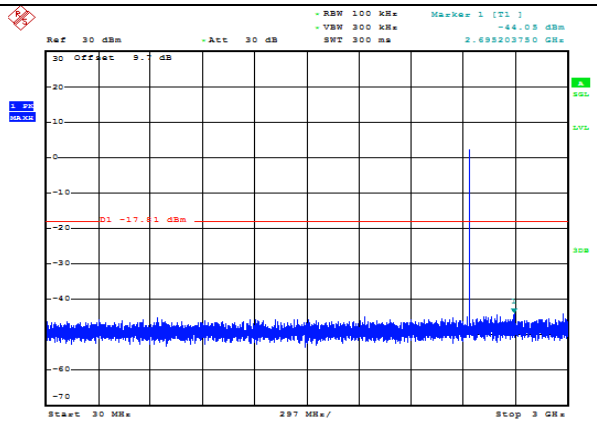
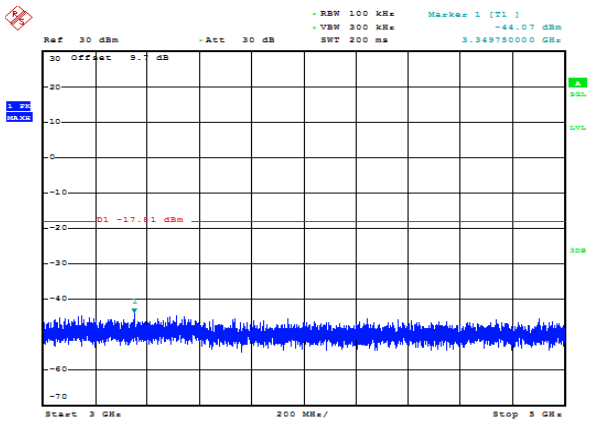
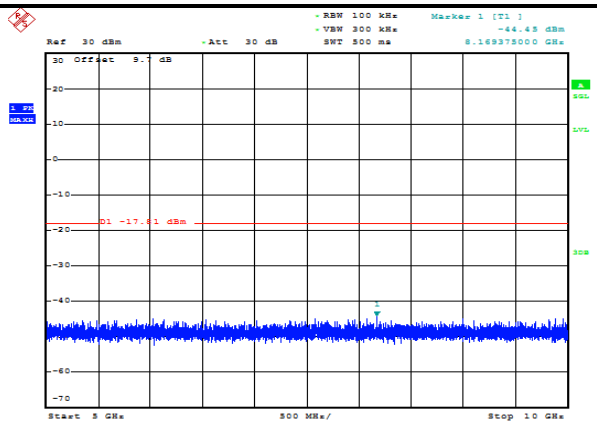
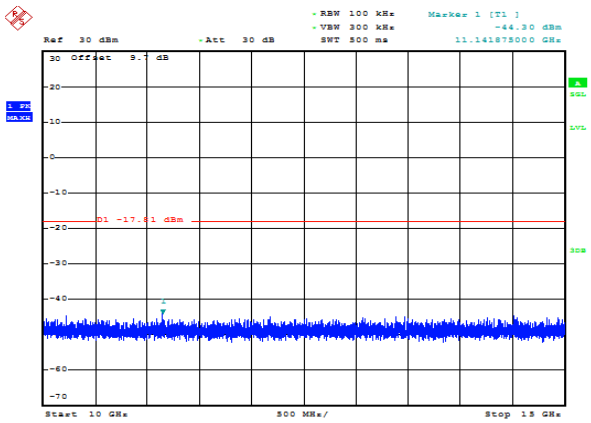


Date: 25.MAY.2017 10:45:45

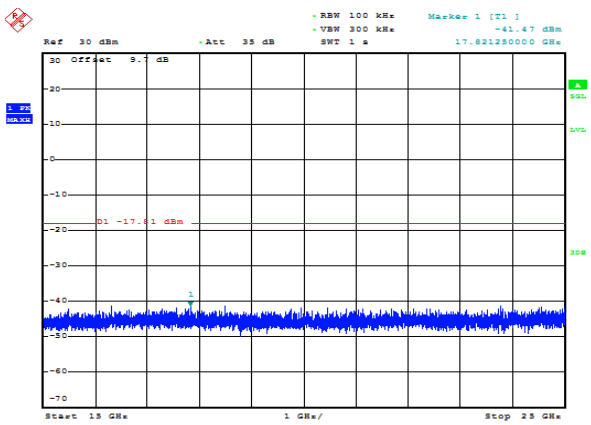
BLE_MCH_Graphs	
Pref/BLE/MCH	
Puw/BLE/MCH	 



Date: 25.MAY.2017 10:47:13

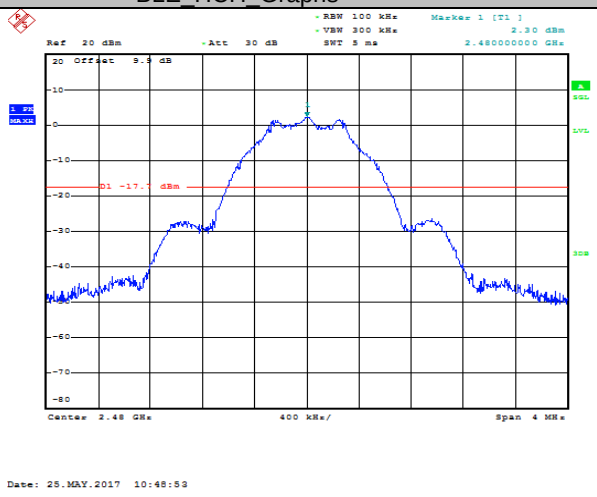
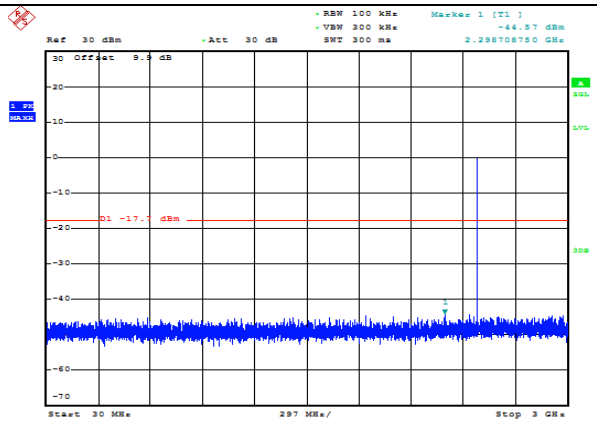
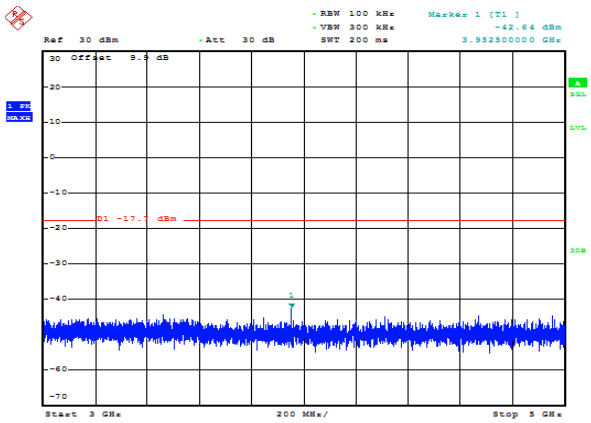


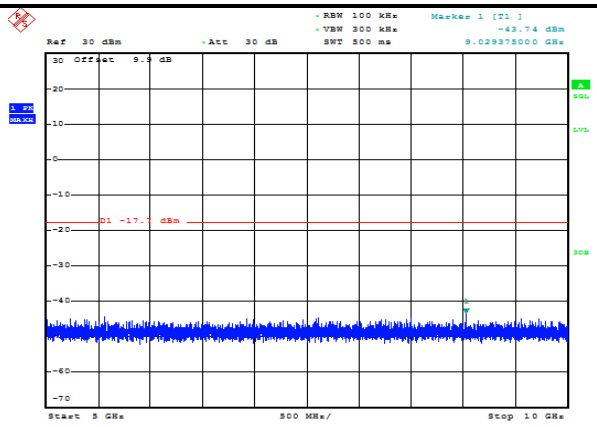
Date: 25.MAY.2017 10:47:21



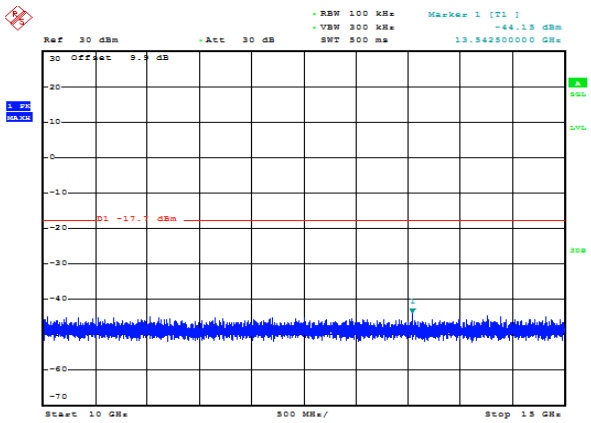
Date: 25.MAY.2017 10:47:29

#imgtxble1mchnnpuw6

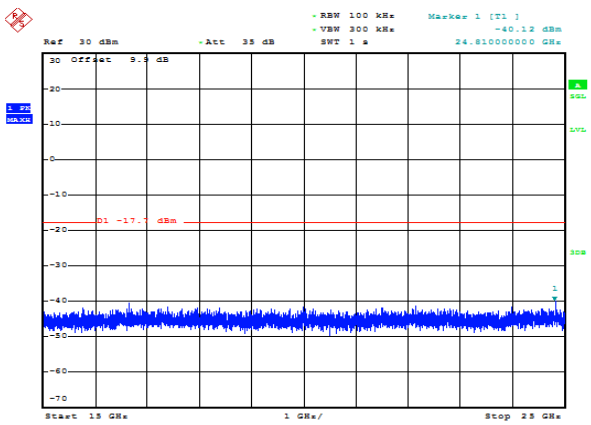
BLE_HCH_Graphs	
Pref/BLE/HCH	
Puw/BLE/HCH	 



Date: 25.MAY.2017 10:49:14



Date: 25.MAY.2017 10:49:23



Date: 25.MAY.2017 10:49:31

7.5. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to RSS-GEN Clause 8.9 and Clause 8.10

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

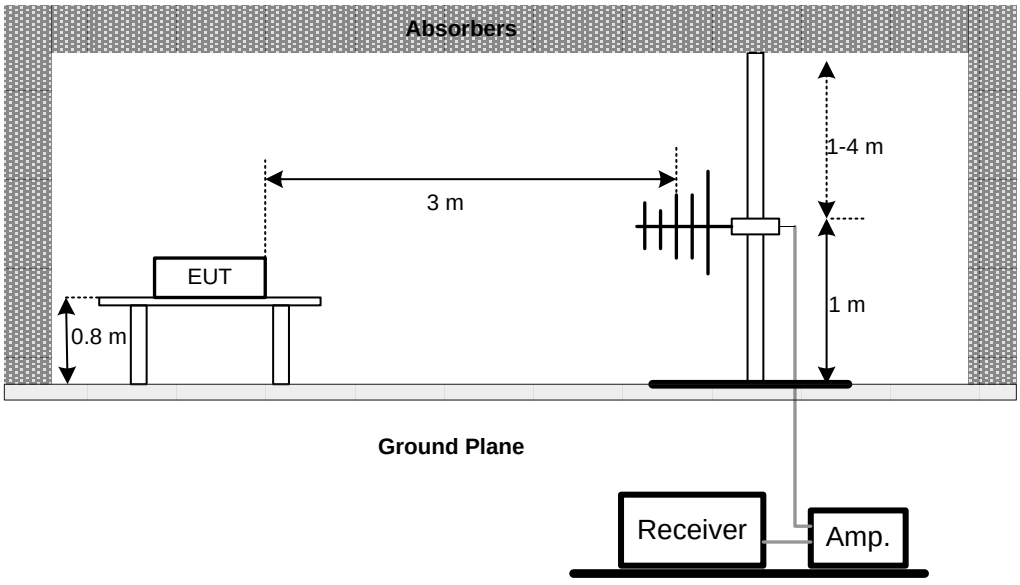
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

TEST SETUP AND PROCEDURE

Below 1G



The setting of the spectrum analyser

RBW	120KHz
VBW	300KHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 0.8 meter above ground.

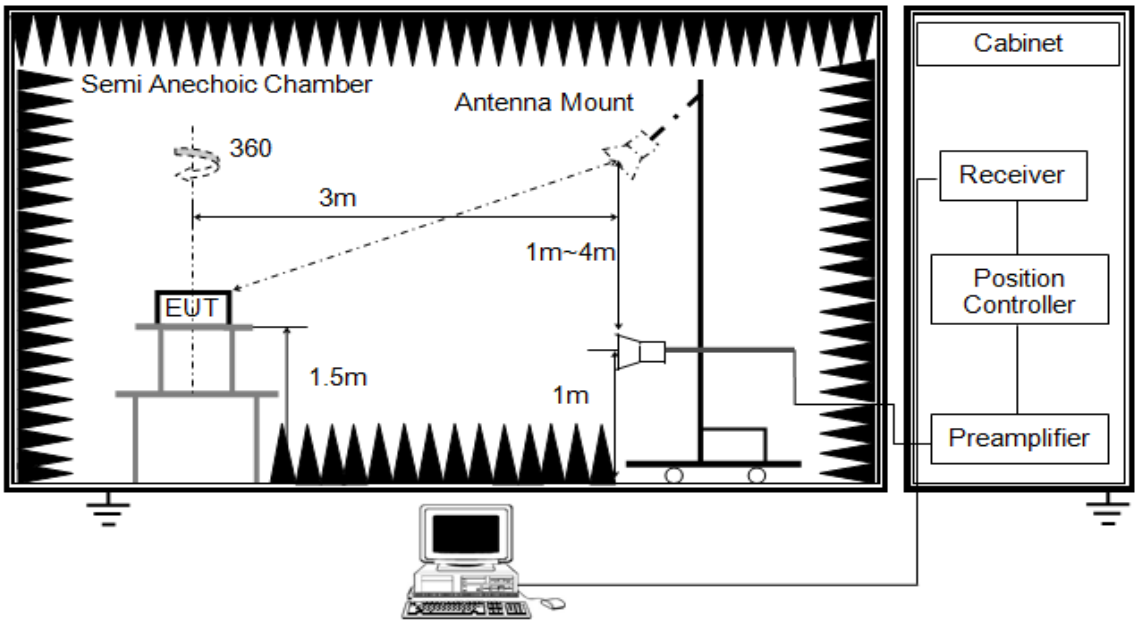
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

7. For the actual test configuration, please refer to the related ltem in this test report (Photographs of the Test Configuration)

ABOVE 1G



The setting of the spectrum analyser

RBW	1M MHz
VBW	3MHz
Sweep	Auto
Detector	Peak and CISPR Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

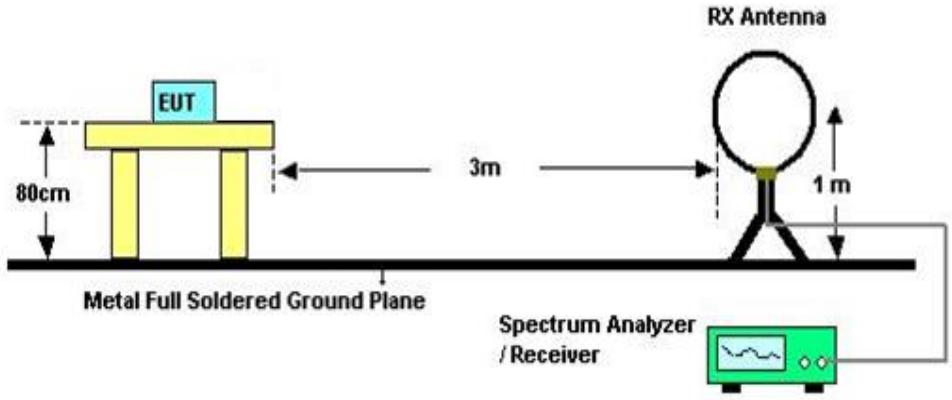
3. The EUT was placed on a turntable with 1.5 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

6. For measurement above 1GHz, the emission measurement will be measured by the peak detector and the AV detector.

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

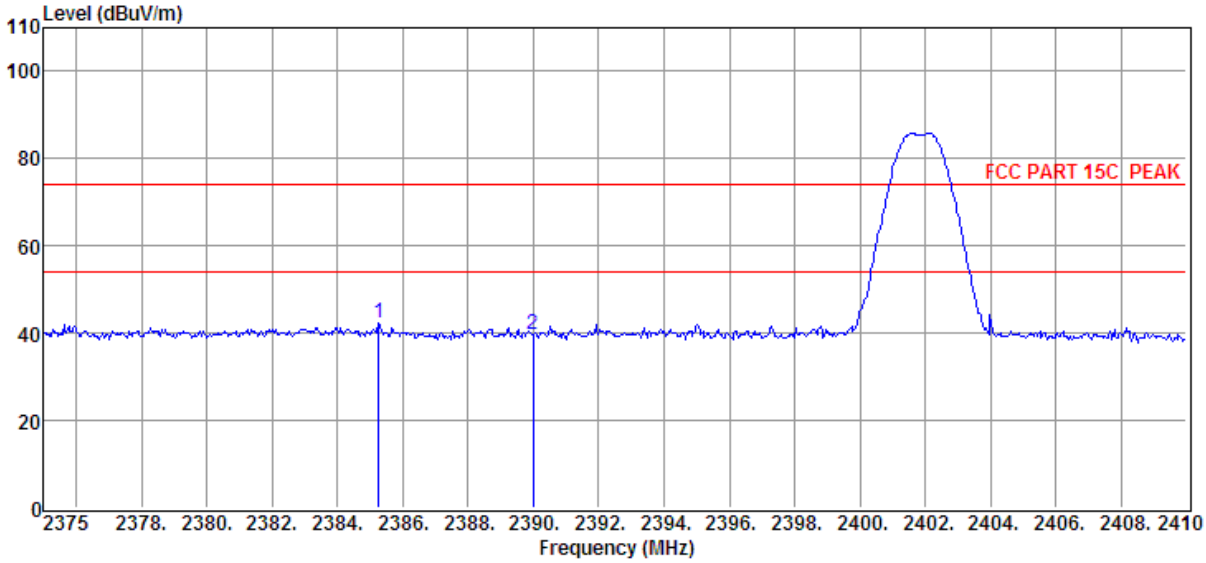
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

TEST CONDITIONS

Temperature: 22.2°C
Relative Humidity: 61%
Test Voltage: 3.8Vdc

7.6. RESTRICTED BANDEDGE

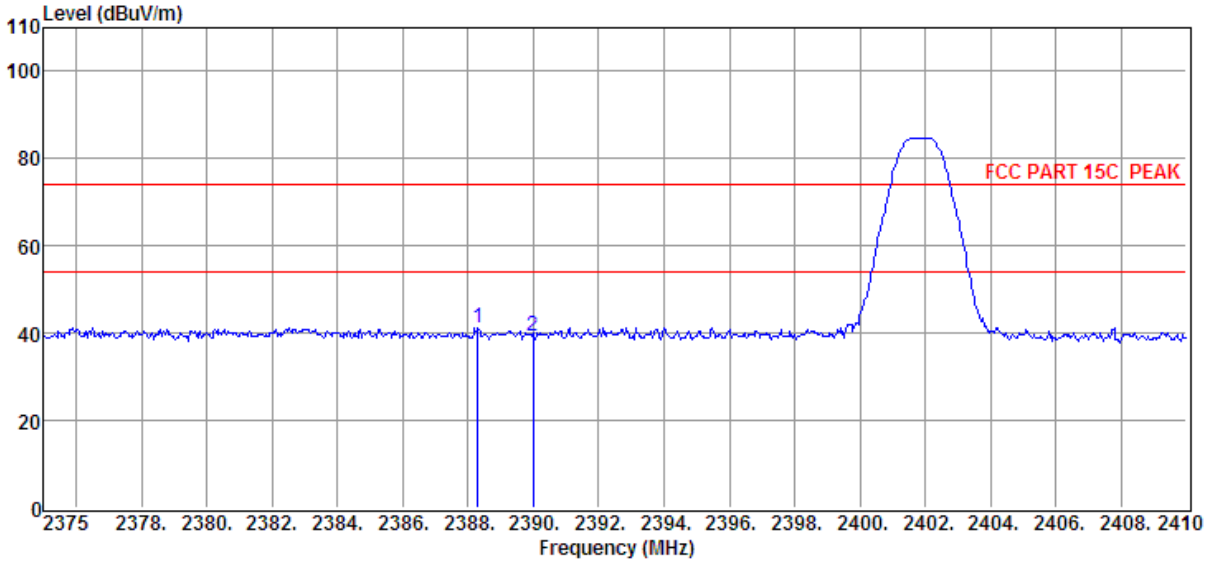
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	2385.26	36.06	29.76	29.41	6.01	42.42	74.00	-31.58	Peak	HORIZONTAL
2	2390.00	33.48	29.78	29.42	6.03	39.87	74.00	-34.13	Peak	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

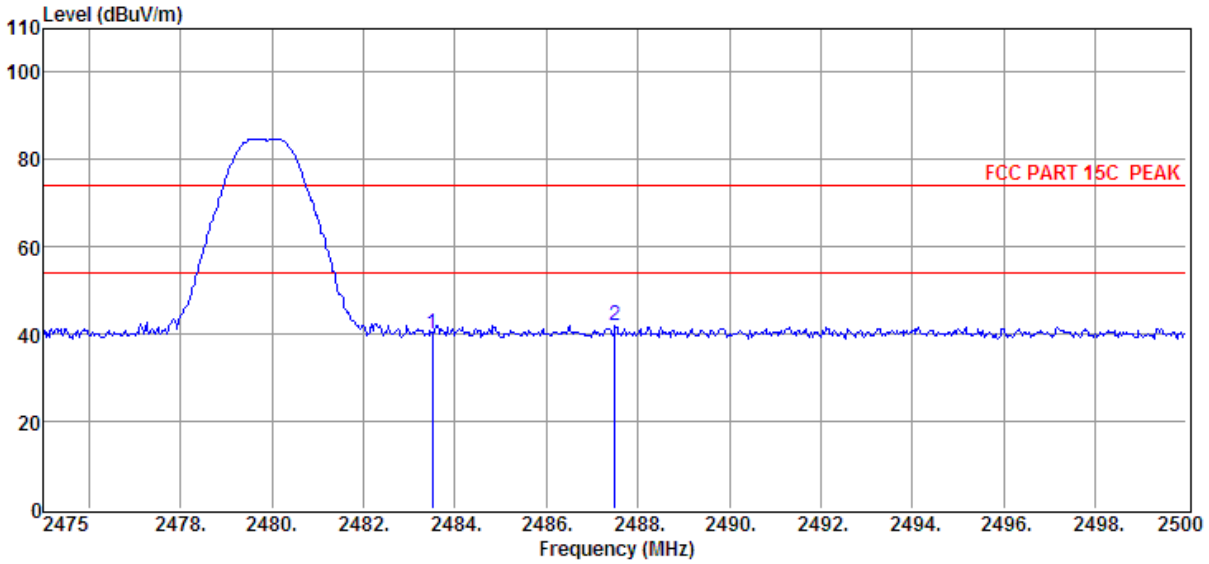
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	2388.30	34.86	29.77	29.41	6.01	41.23	74.00	-32.77	Peak	VERTICAL
2	2390.00	32.84	29.78	29.42	6.03	39.23	74.00	-34.77	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

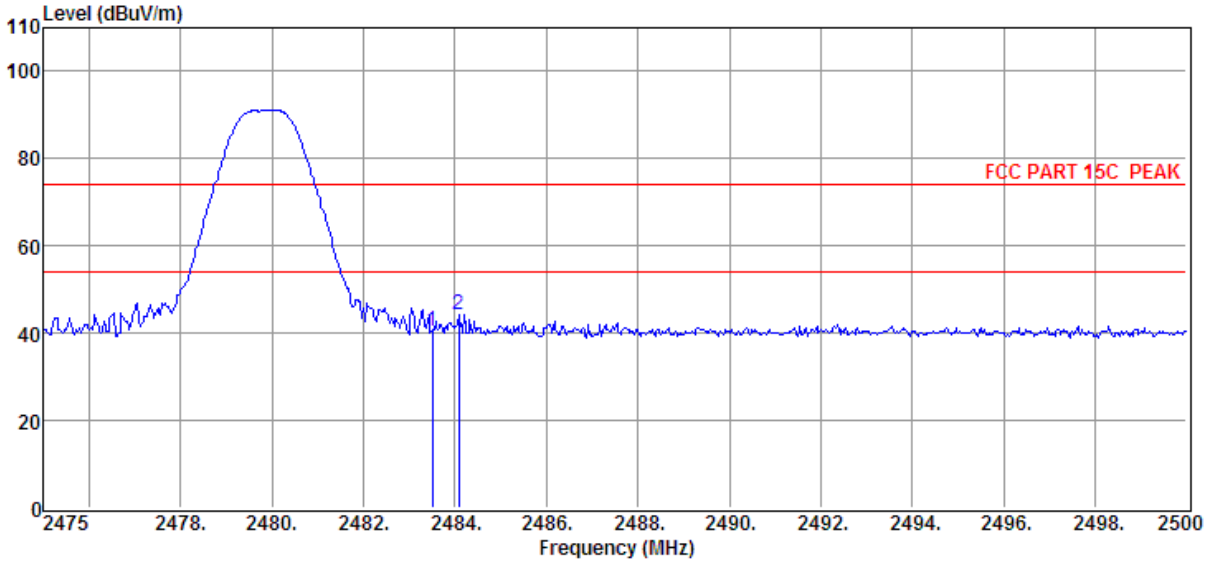
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	33.58	30.14	29.71	6.13	40.14	74.00	-33.86	Peak	HORIZONTAL
2	2487.50	35.49	30.15	29.71	6.13	42.06	74.00	-31.94	Peak	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	33.96	30.14	29.71	6.13	40.52	74.00	-33.48	Peak	VERTICAL
2	2484.08	37.80	30.14	29.71	6.13	44.36	74.00	-29.64	Peak	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

7.7. SPURIOUS EMISSIONS (1~25GHz)

HARMONICS AND SPURIOUS EMISSIONS

Freq (MHz)	Read level (dBµV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector type	Polarization
GFSK Tx mode 2402MHz									
4026.00	33.92	33.42	29.04	7.63	45.93	74.00	-28.07	Peak	VERTICAL
6304.00	32.53	35.49	29.49	9.84	48.37	74.00	-25.63	Peak	VERTICAL
7171.00	34.94	36.34	30.48	10.57	51.37	74.00	-22.63	Peak	VERTICAL
7970.00	34.61	36.69	31.12	11.12	51.30	74.00	-22.70	Peak	VERTICAL
9075.00	33.59	37.33	32.35	11.89	50.46	74.00	-23.54	Peak	VERTICAL
13410.00	34.19	39.21	35.38	14.78	52.80	74.00	-21.20	Peak	VERTICAL
3541.00	35.96	32.03	29.45	7.32	45.86	74.00	-28.14	Peak	HORIZONTAL
3940.00	34.64	33.23	29.07	7.58	46.38	74.00	-27.62	Peak	HORIZONTAL
4654.00	33.64	33.77	29.28	8.31	46.44	74.00	-27.56	Peak	HORIZONTAL
5788.00	32.75	34.88	29.21	9.47	47.89	74.00	-26.11	Peak	HORIZONTAL
6824.00	32.95	36.06	30.25	10.26	49.02	74.00	-24.98	Peak	HORIZONTAL
7706.00	33.35	36.64	30.97	10.97	49.99	74.00	-24.01	Peak	HORIZONTAL
GFSK Tx mode 2441MHz									
7035.00	34.89	36.23	30.40	10.47	51.19	74.00	-22.81	Peak	VERTICAL
7341.00	34.31	36.48	30.59	10.72	50.92	74.00	-23.08	Peak	VERTICAL
7919.00	34.14	36.68	31.10	11.09	50.81	74.00	-23.19	Peak	VERTICAL
9109.00	34.11	37.26	32.36	11.95	50.96	74.00	-23.04	Peak	VERTICAL
12339.00	33.49	38.08	35.08	14.51	51.00	74.00	-23.00	Peak	VERTICAL
13274.00	35.04	39.08	35.50	14.74	53.36	74.00	-20.64	Peak	VERTICAL
4026.00	33.68	33.42	29.04	7.63	45.69	74.00	-28.31	Peak	HORIZONTAL
6015.00	33.36	35.02	29.19	9.69	48.88	74.00	-25.12	Peak	HORIZONTAL
7154.00	34.39	36.33	30.45	10.56	50.83	74.00	-23.17	Peak	HORIZONTAL
8021.00	35.09	36.64	31.17	11.16	51.72	74.00	-22.28	Peak	HORIZONTAL
9211.00	34.68	37.03	32.42	12.05	51.34	74.00	-22.66	Peak	HORIZONTAL
13410.00	34.60	39.21	35.38	14.78	53.21	74.00	-20.79	Peak	HORIZONTAL
GFSK Tx mode 2480MHz									
3924.00	34.61	33.18	29.08	7.57	46.28	74.00	-27.72	Peak	VERTICAL
6100.00	32.36	35.17	29.27	9.74	48.00	74.00	-26.00	Peak	VERTICAL
7936.00	34.96	36.69	31.11	11.10	51.64	74.00	-22.36	Peak	VERTICAL
9024.00	34.27	37.45	32.33	11.83	51.22	74.00	-22.78	Peak	VERTICAL
12084.00	33.24	37.72	34.85	14.30	50.41	74.00	-23.59	Peak	VERTICAL
13325.00	34.47	39.13	35.42	14.75	52.93	74.00	-21.07	Peak	VERTICAL
4026.00	34.32	33.42	29.04	7.63	46.33	74.00	-27.67	Peak	HORIZONTAL
5981.00	33.52	34.99	29.19	9.66	48.98	74.00	-25.02	Peak	HORIZONTAL
7936.00	34.15	36.69	31.11	11.10	50.83	74.00	-23.17	Peak	HORIZONTAL
9041.00	34.66	37.41	32.34	11.87	51.60	74.00	-22.40	Peak	HORIZONTAL
10469.00	34.63	36.43	33.25	12.69	50.50	74.00	-23.50	Peak	HORIZONTAL
12050.00	33.45	37.67	34.82	14.26	50.56	74.00	-23.44	Peak	HORIZONTAL

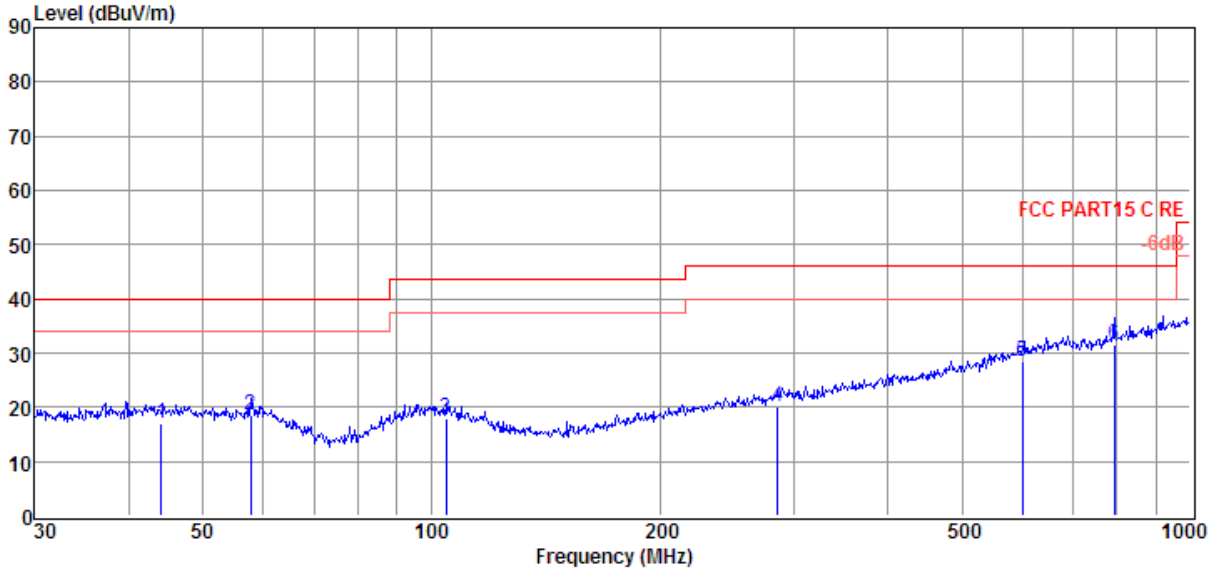
Result: Pass

Note:
1. 30MHz~25GHz: Only show the worst cast data in this report.
2. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
3. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.
4. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

7.8. SPURIOUS EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

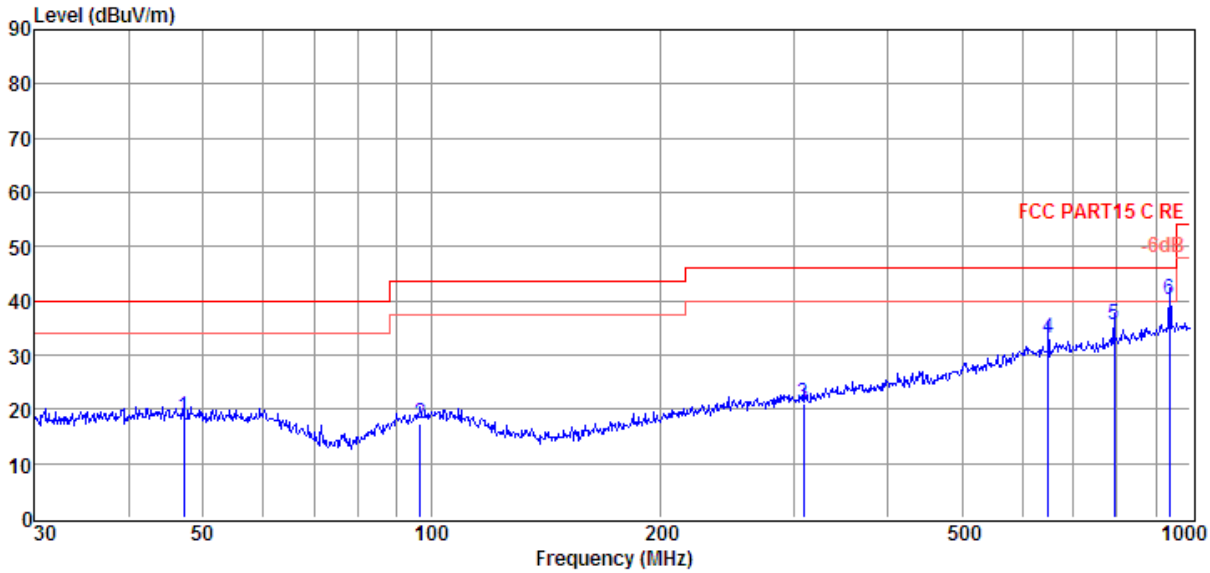
Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	3.8Vdc
Test Mode:	Tx Mode	Polarization:	HORIZONTAL



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	44.12	0.65	12.39	3.83	16.87	40.00	-23.13	QP	HORIZONTAL
2	57.80	2.90	11.69	3.96	18.55	40.00	-21.45	QP	HORIZONTAL
3	104.54	1.85	11.64	4.33	17.82	43.50	-25.68	QP	HORIZONTAL
4	285.98	1.78	13.02	5.31	20.11	46.00	-25.89	QP	HORIZONTAL
5	601.43	2.61	19.27	6.51	28.39	46.00	-17.61	QP	HORIZONTAL
6	793.40	3.42	21.00	7.10	31.52	46.00	-14.48	QP	HORIZONTAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	3.8Vdc
Test Mode:	Tx Mode	Polarization:	VERTICAL



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	47.16	2.51	12.26	3.86	18.63	40.00	-21.37	QP	VERTICAL
2	96.78	1.41	11.74	4.28	17.43	43.50	-26.07	QP	VERTICAL
3	308.91	1.94	13.58	5.42	20.94	46.00	-25.06	QP	VERTICAL
4	649.66	7.08	19.49	6.67	33.24	46.00	-12.76	QP	VERTICAL
5	793.40	7.62	21.00	7.10	35.72	46.00	-10.28	QP	VERTICAL
6	938.83	9.83	22.97	7.52	40.32	46.00	-5.68	QP	VERTICAL

Note:
1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.
4. EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

7.9. SPURIOUS EMISSIONS BELOW 30M

The emissions don't show in following result tables are more than 20dB below the limits. The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

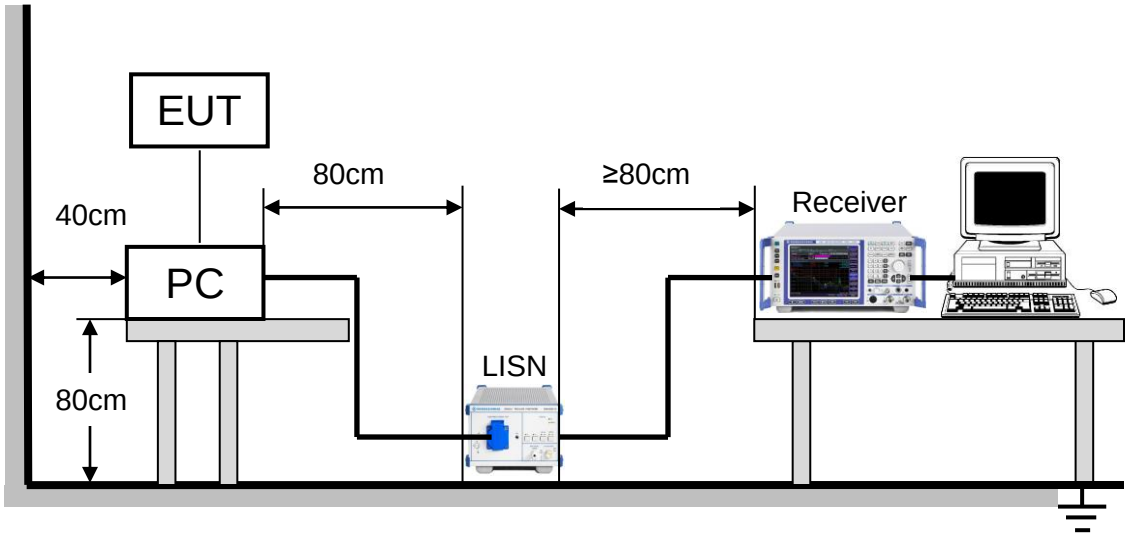
8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

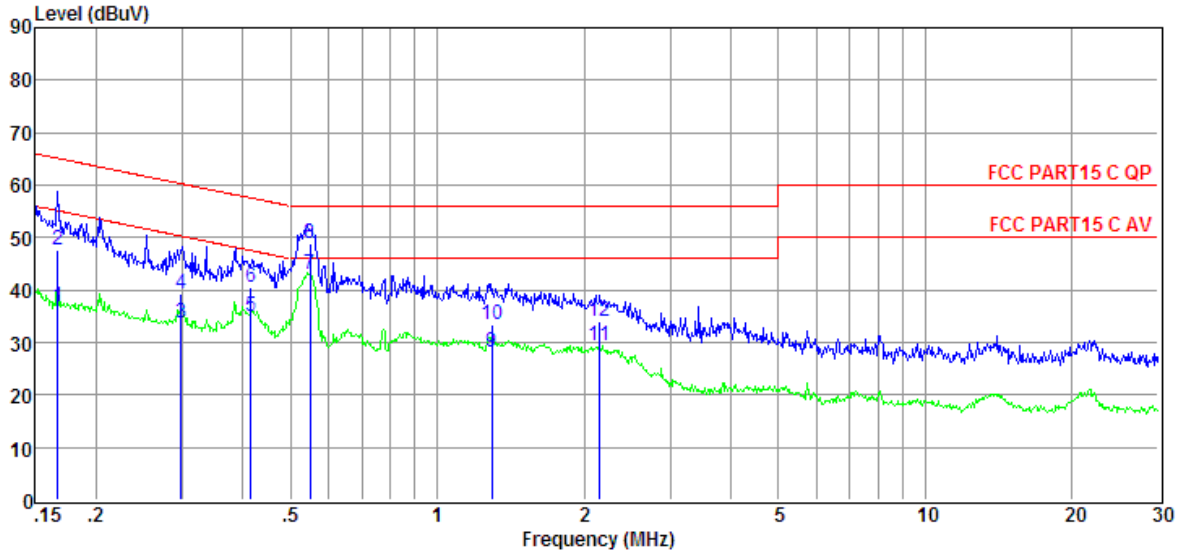
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST CONDITIONS

Temperature: 23.8°C
Relative Humidity: 58%
Test Voltage: 3.8Vdc

TEST RESULTS

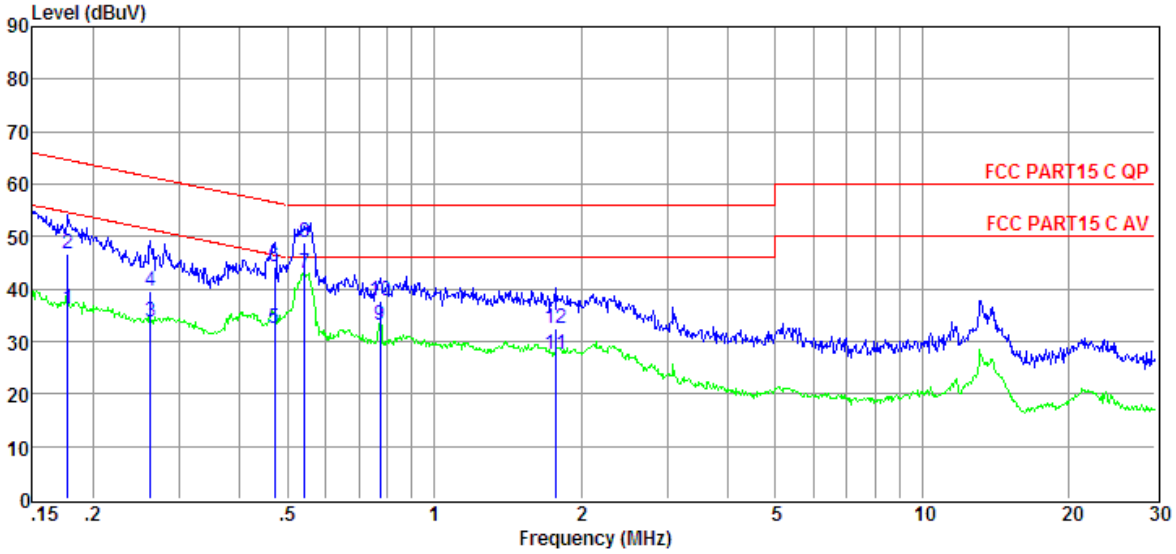
Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	AC120V,60Hz
Test Mode:	Tx Mode	Phase :	L
Remark:	N/A		



Item	Freq.	Read Level	LISN Factor	Cable Loss	Pulse Limiter Factor	Result Level	Limit Line	Over Limit	Detector	Phase
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)		
1	0.17	17.35	9.61	0.02	9.86	36.84	55.12	-18.28	Average	LINE
2	0.17	28.23	9.61	0.02	9.86	47.72	65.12	-17.40	QP	LINE
3	0.30	14.29	9.61	0.02	9.86	33.78	50.28	-16.50	Average	LINE
4	0.30	19.68	9.61	0.02	9.86	39.17	60.28	-21.11	QP	LINE
5	0.41	15.51	9.61	0.02	9.86	35.00	47.55	-12.55	Average	LINE
6	0.41	21.14	9.61	0.02	9.86	40.63	57.55	-16.92	QP	LINE
7	0.55	23.50	9.61	0.03	9.86	43.00	46.00	-3.00	Average	LINE
8	0.55	29.37	9.61	0.03	9.86	48.87	56.00	-7.13	QP	LINE
9	1.30	8.68	9.62	0.03	9.86	28.19	46.00	-17.81	Average	LINE
10	1.30	13.99	9.62	0.03	9.86	33.50	56.00	-22.50	QP	LINE
11	2.16	9.94	9.63	0.04	9.87	29.48	46.00	-16.52	Average	LINE
12	2.16	14.43	9.63	0.04	9.87	33.97	56.00	-22.03	QP	LINE

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

Temperature:	24.5°C	Relative Humidity:	55%
Pressure:	1012 hPa	Test Voltage:	AC120V,60Hz
Test Mode:	Tx Mode	Phase :	N
Remark:	N/A		



Item	Freq.	Read Level	LISN Factor	Cable Loss	Pulse Limiter Factor	Result Level	Limit Line	Over Limit	Detector	Phase
(Mark)	(MHz)	(dBµV)	(dB)	(dB)	(dB)	(dBµV)	(dBµV)	(dB)		
1	0.18	16.76	9.61	0.02	9.86	36.25	54.59	-18.34	Average	NEUTRAL
2	0.18	27.23	9.61	0.02	9.86	46.72	64.59	-17.87	QP	NEUTRAL
3	0.26	14.11	9.61	0.02	9.86	33.60	51.38	-17.78	Average	NEUTRAL
4	0.26	20.13	9.61	0.02	9.86	39.62	61.38	-21.76	QP	NEUTRAL
5	0.47	13.09	9.61	0.02	9.86	32.58	46.49	-13.91	Average	NEUTRAL
6	0.47	24.82	9.61	0.02	9.86	44.31	56.49	-12.18	QP	NEUTRAL
7	0.54	23.41	9.61	0.03	9.86	42.91	46.00	-3.09	Average	NEUTRAL
8	0.54	29.36	9.61	0.03	9.86	48.86	56.00	-7.14	QP	NEUTRAL
9	0.78	13.72	9.61	0.03	9.86	33.22	46.00	-12.78	Average	NEUTRAL
10	0.78	18.10	9.61	0.03	9.86	37.60	56.00	-18.40	QP	NEUTRAL
11	1.77	8.01	9.62	0.04	9.87	27.54	46.00	-18.46	Average	NEUTRAL
12	1.77	12.92	9.62	0.04	9.87	32.45	56.00	-23.55	QP	NEUTRAL

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

9. ANTENNA REQUIREMENTS

Applicable requirements

Please refer to FCC §15.203
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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector

Antenna Connector is on the PCB within enclosure and not accessible to user.

Antenna Gain

The antenna gain of EUT is less than 6 dBi.

END OF REPORT