

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name: Bluetooth V4.0 Dual-Mode Dongle

Brand Name: Targus

Model No.: ACB75A

Model Difference: N/A

FCC ID: OXM000080

Report No.: ER/2017/60149

Issue Date: Jul. 18, 2017

FCC Rule Part: §15.247, Cat: DSS

Applicant: Targus International LLC
1211 North Miller Street, Anaheim, CA
92806 USA

Prepared by: SGS Taiwan Ltd.
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Date of test: Jul. 04, 2017 ~ Jul. 06, 2017

Date of EUT Received: Jun. 29, 2017



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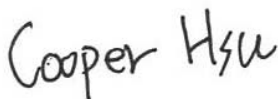
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1 REVISION HISTORY

Report Number	Revision	Description	Issue Date
ER/2017/60149	Rev.00	Initial creation of document	Jul. 18, 2017

Test By:



Date

Jul. 18, 2017

Cooper Hsu / Engineer

Prepared By:



Date

Jul. 18, 2017

Allen Tsai / Engineer

Approved By:



Date

Jul. 18, 2017

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2 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(a)(1)	20dB & 99% Bandwidth	Compliant
§15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(iii)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii)	Time of Occupancy	Compliant
§15.203 §15.247(b)	Antenna Requirement	Compliant

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4 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
20dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Frequency Separation	+/- 51.33 Hz
Number of hopping frequency	+/- 51.33 Hz
Time of Occupancy	+/- 51.33 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

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

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5 GENERAL INFORMATION

5.1 Product description

General:

Product Name:	Bluetooth V4.0 Dual-Mode Dongle
Brand Name:	Targus
Model No.:	ACB75A
Model Difference:	N/A
Power Supply:	5Vdc from USB Port

Bluetooth_BR+EDR:

Bluetooth Version:	BT4.0 dual mode
Channel number:	79 channels
Modulation type:	GFSK + $\pi/4$ DQPSK + 8DPSK
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	$\leq 0.4s$
Antenna Designation:	PCB Antenna, Peak Gain:-4.10dBi

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5.2 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

CH	FREQUENCY	CH	FREQUENCY	CH	FREQUENCY	CH	FREQUENCY
0	2402 MHz	20	2422 MHz	40	2442 MHz	70	2462 MHz
1	2403 MHz	21	2423 MHz	41	2443 MHz	71	2463 MHz
2	2404 MHz	22	2424 MHz	42	2444 MHz	72	2464 MHz
3	2405 MHz	23	2425 MHz	43	2445 MHz	73	2465 MHz
4	2406 MHz	24	2426 MHz	44	2446 MHz	74	2466 MHz
5	2407 MHz	25	2427 MHz	45	2447 MHz	75	2467 MHz
6	2408 MHz	26	2428 MHz	46	2448 MHz	76	2468 MHz
7	2409 MHz	27	2429 MHz	47	2449 MHz	77	2469 MHz
8	2410 MHz	28	2430 MHz	48	2450 MHz	78	2470 MHz
9	2411 MHz	29	2431 MHz	49	2451 MHz	79	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest Channel (CH 0)	2402 MHz
The Middle Channel (CH 39)	2441 MHz
The Highest Channel (CH 78)	2480 MHz

5.3 Test Environment

Operating Environment:	
Temperature:	25°C
Humidity:	55% RH

5.4 Description of Support Units

The EUT has been tested independently.

5.5 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)
FCC Registration Numbers are: 509634

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5.6 Deviation from standards

None

5.7 Abnormalities from Standard Conditions

None

5.8 Other Information Requested by the Customer

None

5.9 Equipment List

Conduction Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 7	100950	12/12/2016	12/11/2017
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	02/07/2016	02/06/2017
LISN	Schwarzbeck	NSLK 8127	8127-648	03/11/2016	03/10/2017
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017

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Radiated Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESC17	100760	05/11/2017	05/10/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2016	09/19/2017
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/01/2016	07/31/2017
Pre-Amplifier	Agilent	8447D	2944A07676	01/05/2017	01/04/2018
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/05/2017	01/04/2018
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018
3m Site NSA	SGS	966 chamber	N/A	07/01/2017	06/30/2018
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2016	12/11/2017
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/05/2017	01/04/2018

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6 TEST RESULT AND MEASUREMENT DATA

6.1 Antenna Requirement

Applicable Standard:	47 CFR Part 15C Section 15.203 /247(c)
15.203 requirement: 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, 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.	
15.247(b) (4) requirement: 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.	
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -4.10dBi.	

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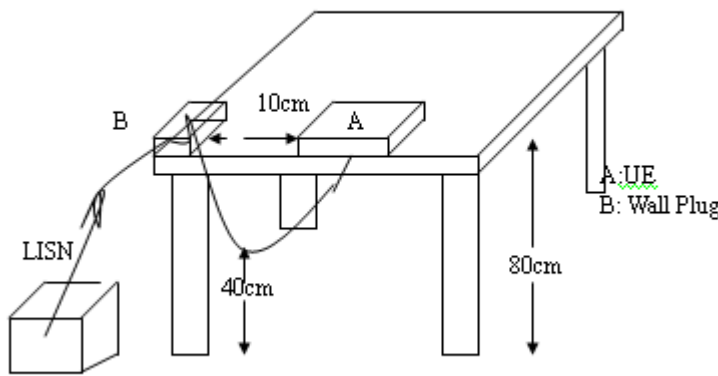
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6.2 Conducted emission test

Test Requirement:	47 CFR Part 15C Section 15.207														
Test Method	ANSI C63.10: 2013														
Test Frequency Range:	150kHz to 30MHz														
Limit	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limits dB(uV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15 to 0.50</td><td>66 to 56</td><td>56 to 46</td></tr><tr><td>0.50 to 5</td><td>56</td><td>46</td></tr><tr><td>5 to 30</td><td>60</td><td>50</td></tr></table> Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.	Frequency range (MHz)	Limits dB(uV)		Quasi-peak	Average	0.15 to 0.50	66 to 56	56 to 46	0.50 to 5	56	46	5 to 30	60	50
Frequency range (MHz)	Limits dB(uV)														
	Quasi-peak	Average													
0.15 to 0.50	66 to 56	56 to 46													
0.50 to 5	56	46													
5 to 30	60	50													
Test Procedure:	1. The EUT was placed on a table which is 0.8m above ground plan. 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance. 3. Repeat above procedures until all phases of power being supplied by given UE are completed														
Test Setup:	1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013. 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table. 3. The LISN was connected with 120Vac/60Hz power source 														
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type at the lowest, middle, high channel. Transmitting mode.														

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Final Test Mode:	Through Pre-scan, find the DH5 of data type and GFSK modulation at the Lowest channel is the worst case. Transmitting mode Only the worst case is recorded in the report.
Instrument Used:	Refer to section 5.9 for details
Test Results:	Pass

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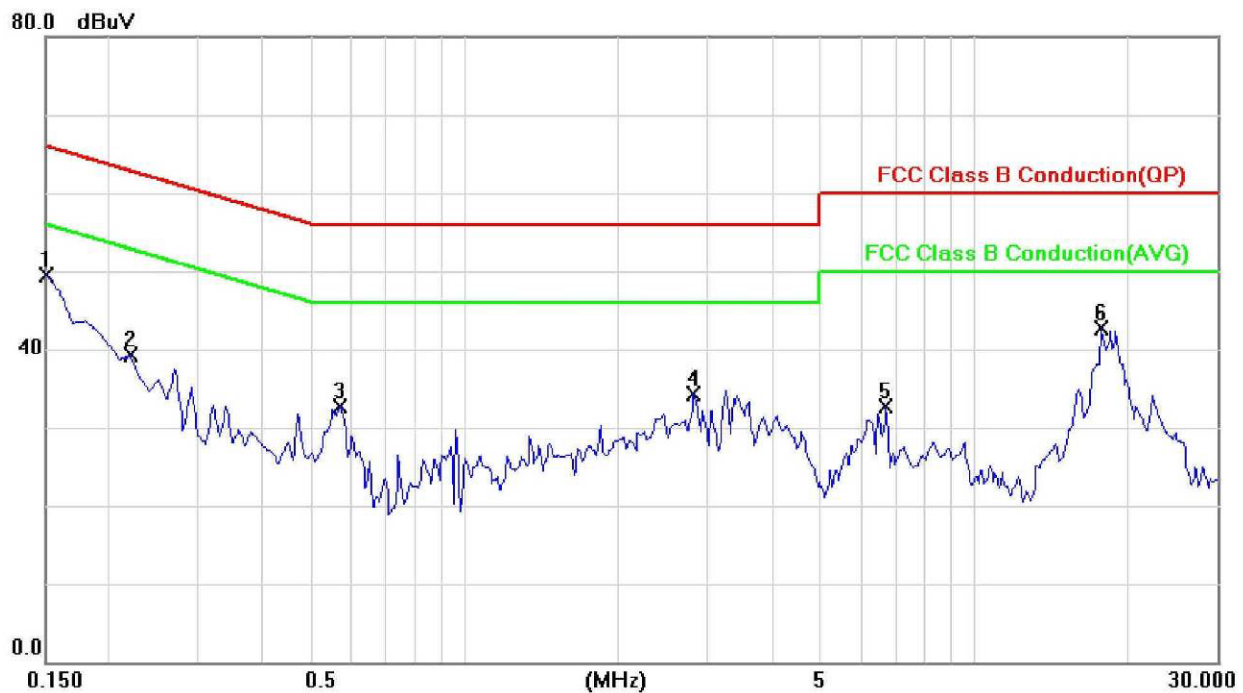
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Site: ConductionRoom
Limit: FCC Class B Conduction(QP)
Mode: Operationmode
Note:

Phase: **L1**
Power: AC 120V/60Hz

Temperature: 26 °C
Humidity: 60%

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	49.44	0.16	49.60	66.00	-16.40	peak	
2		0.2200	39.09	0.16	39.25	62.82	-23.57	peak	
3		0.5700	32.62	0.17	32.79	56.00	-23.21	peak	
4		2.8200	34.01	0.23	34.24	56.00	-21.76	peak	
5		6.7200	32.30	0.31	32.61	60.00	-27.39	peak	
6		17.6800	42.32	0.42	42.74	60.00	-17.26	peak	

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Site ConductionRoom

Limit: FCC Class B Conduction(QP)

Mode: Operationmode

Note:

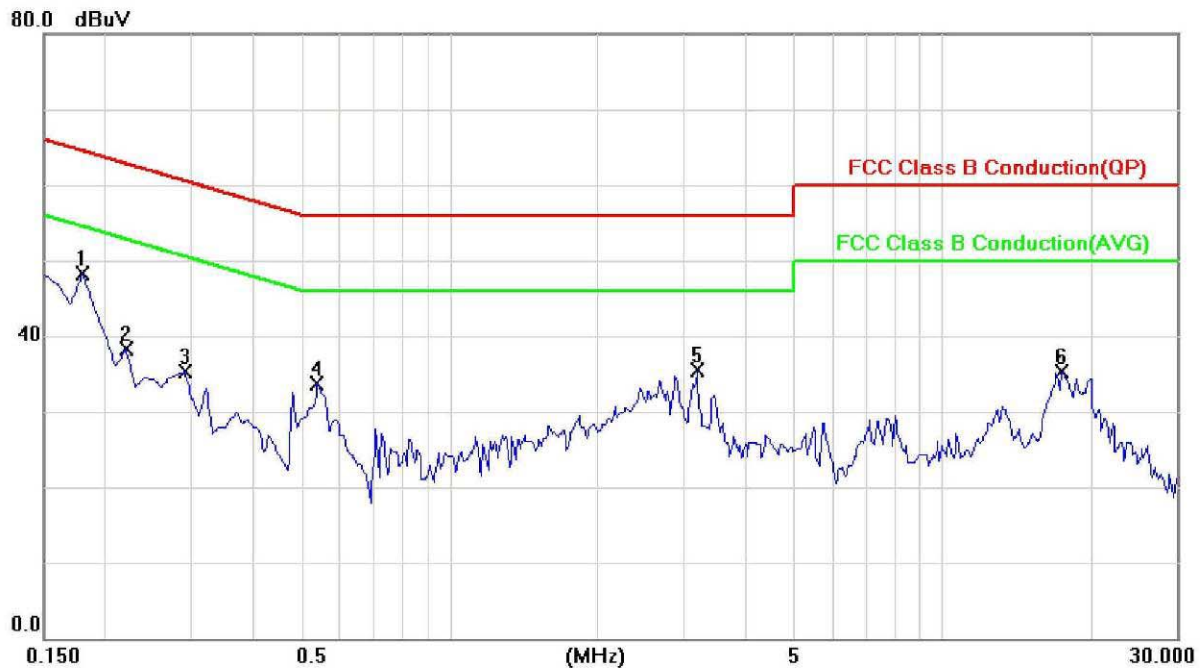
Phase: **N**

Power: AC 120V/60Hz

Temperature: 26 °C

Humidity: 60%

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1800	48.07	0.19	48.26	64.49	-16.23	peak	
2		0.2200	38.05	0.19	38.24	62.82	-24.58	peak	
3		0.2900	35.07	0.20	35.27	60.52	-25.25	peak	
4		0.5400	33.57	0.19	33.76	56.00	-22.24	peak	
5		3.1800	35.13	0.28	35.41	56.00	-20.59	peak	
6		17.5200	34.68	0.53	35.21	60.00	-24.79	peak	

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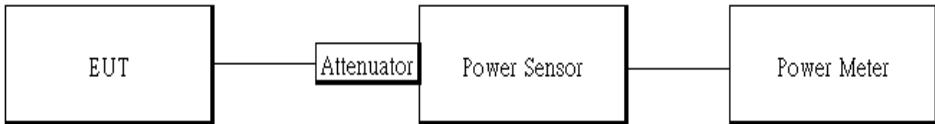
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6.3 Peak output power measurement

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method	FCC Public Notice DA 00-705 Measurement Guidelines
Test Setup:	 Remark: Offset the cable loss 0.5dB in the Power Meter.
Limit	125mW
Test Procedure:	1. Place the EUT on the table and set it in transmitting mode. 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines. 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max Hold, Detector = Peak, RBW >=20dB bandwidth) 4. Record the max. reading. 5. Repeat above procedures until all default test channel is completed.
Exploratory Test Mode:	Non-hopping transmitting with all kinds of modulation and all kinds of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$DQPSK modulation type 3-DH5 of data type is the worst case of 8DPSK modulation type
Instruments used:	Refer to section 5.9 for details
Test Results:	Pass

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Measurement Data

1M BR mode (Peak):

CH	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	6.40	4.365	125
39	2441	6.90	4.898	125
78	2480	6.49	4.457	125

1M BR mode (Average):

CH	Freq. (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	4.99	3.155	125
39	2441	5.21	3.319	125
78	2480	5.11	3.243	125

2M EDR mode (Peak):

CH	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	8.96	7.870	125
39	2441	9.22	8.356	125
78	2480	8.97	7.889	125

2M EDR mode (Average):

CH	Freq. (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	5.14	3.266	125
39	2441	5.49	3.540	125
78	2480	5.21	3.319	125

3M EDR mode (Peak):

CH	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	9.39	8.690	125
39	2441	9.61	9.141	125
78	2480	9.35	8.610	125

3M EDR mode (Average):

CH	Freq. (MHz)	Max. Avg. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	5.10	3.236	125
39	2441	5.37	3.443	125
78	2480	5.28	3.373	125

NOTE: cable loss as

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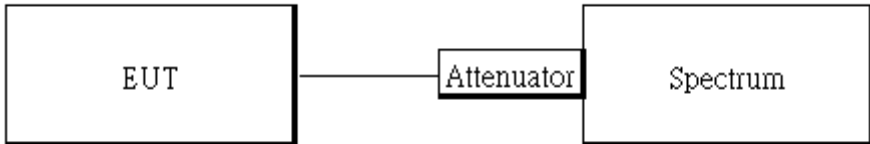
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6.4 20dB BANDWIDTH MEASUREMENT

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method	FCC Public Notice DA 00-705 Measurement Guidelines.
Test Setup:	 <pre> graph LR EUT[EUT] --- Attenuator[Attenuator] --- Spectrum[Spectrum] </pre>
Limit	N/A
Test Procedure:	1. Place the EUT on the table and set it in transmitting mode. 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines. 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. 4. Set the spectrum analyzer as RBW=10 kHz (1 % of 20 dB Bandwidth.), VBW = 30 kHz, Span= 3MHz, Sweep=auto, Detector = Peak, and Max hold for 20dB Bandwidth test. 5. Mark the peak frequency and -20dB (upper and lower) frequency 6. Repeat above procedures until all test default channel is completed.
Exploratory Test Mode:	Non-hopping transmitting with all kinds of modulation and all kinds of data type.
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case of GFSK modulation type, 2-DH5 of data type is the worst case of $\pi/4$DQPSK modulation type 3-DH5 of data type is the worst case of 8DPSK modulation type
Instruments used:	Refer to section 5.9 for details
Test Results:	Pass

Measurement data

GFSK			$\pi/4$ -DQPSK			8-DPSK		
CH	20 dB BW (MHz)	2/3 BW (MHz)	CH	20 dB BW (MHz)	2/3 BW (MHz)	CH	20 dB BW (MHz)	2/3 BW (MHz)
Low	0.9225	0.61	Low	1.318	0.88	Low	1.267	0.84
Mid	0.9224	0.61	Mid	1.318	0.88	Mid	1.268	0.85
High	0.9227	0.62	High	1.319	0.88	High	1.271	0.85

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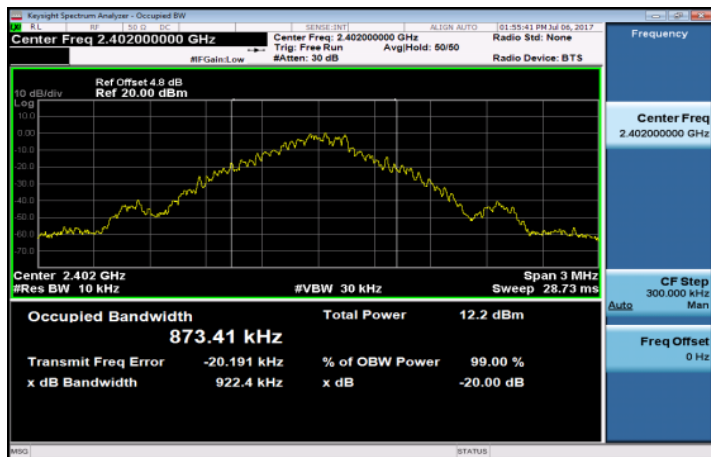
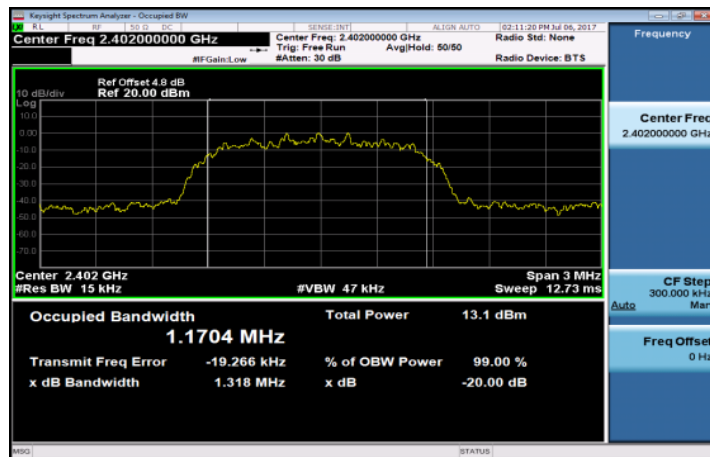
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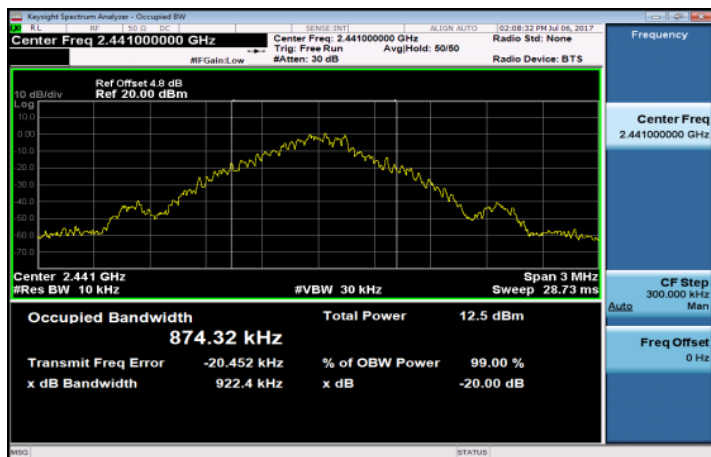
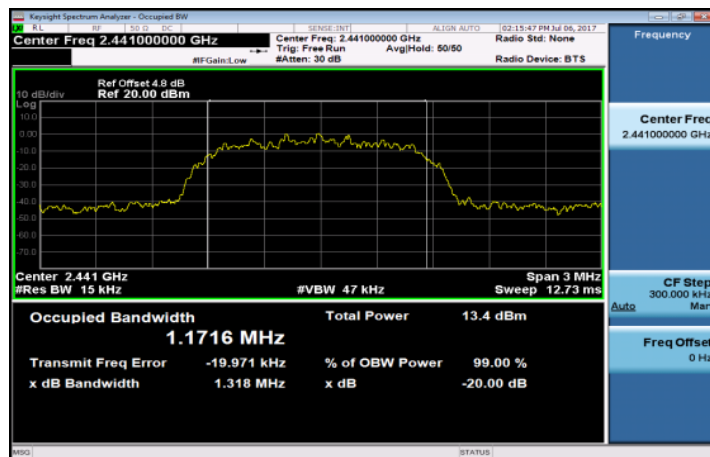
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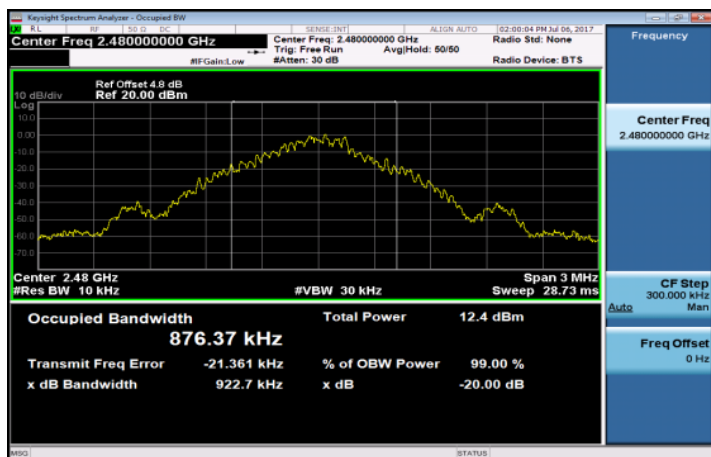
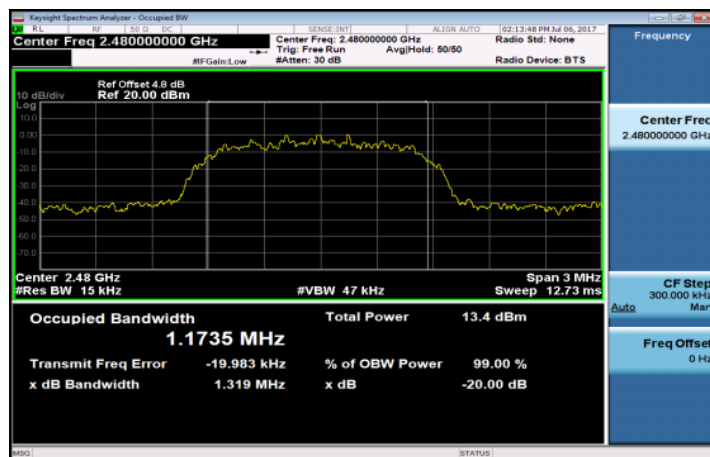
20dB Band Width Test Data CH-Low (GFSK mode)


20dB Band Width Test Data CH-Low ($\pi/4$ -DQPSK mode)


20dB Band Width Test Data CH-Mid (GFSK mode)


20dB Band Width Test Data CH-Mid ($\pi/4$ -DQPSK mode)


20dB Band Width Test Data CH-High (GFSK mode)


20dB Band Width Test Data CH-High ($\pi/4$ -DQPSK mode)


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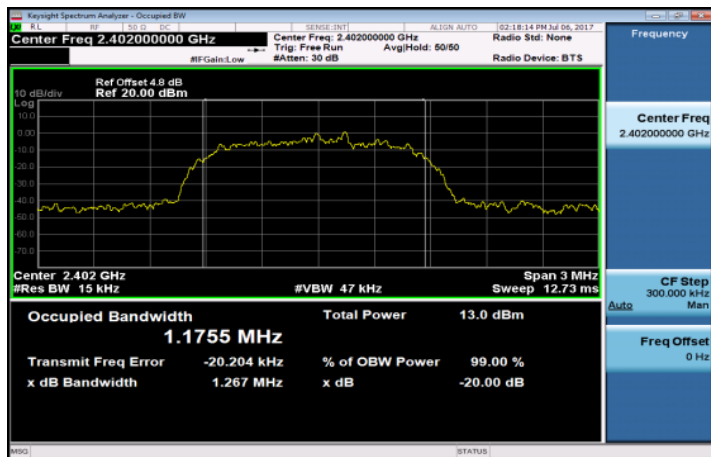
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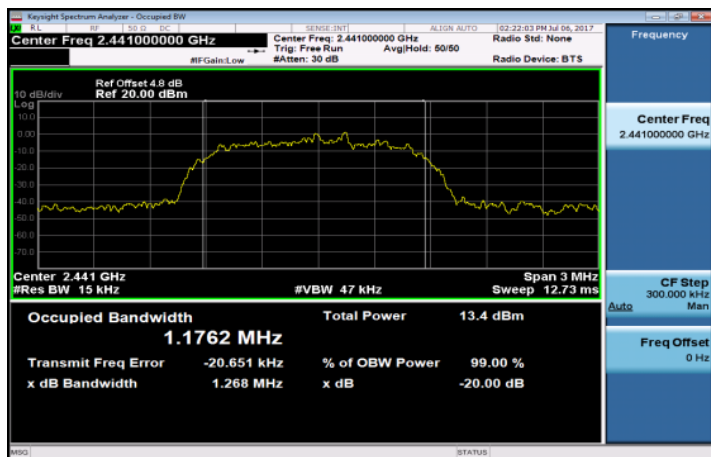
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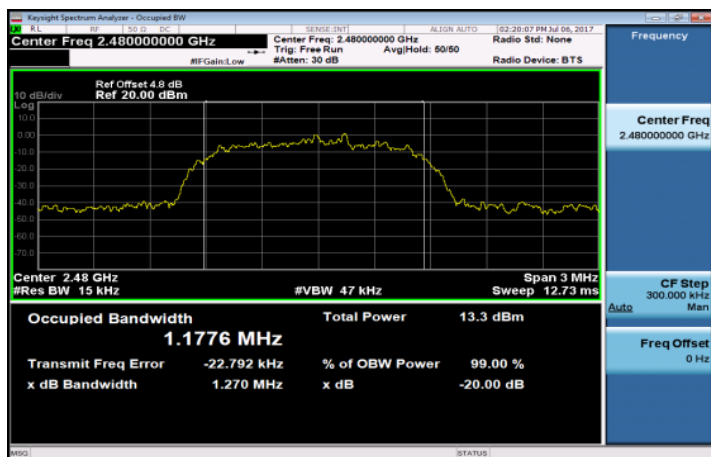
20dB Band Width Test Data CH-Low (8-DPSK mode)



20dB Band Width Test Data CH-Mid (8-DPSK mode)



20dB Width Test Data CH-High (8-DPSK mode)

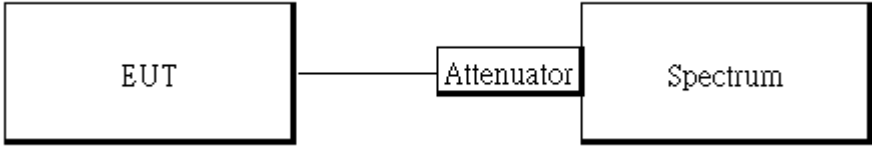


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6.5 FREQUENCY SEPARATION

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 Section 7.8.2 The testing follows FCC Public Notice DA 00-705 Measurement
Test Setup:	
Test Procedure:	1. Place the EUT on the table and set it in transmitting mode. 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines. 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. 4. Set center frequency of spectrum analyzer = middle of hopping channel. 5. Set the spectrum analyzer as RBW, VBW=100 kHz, Adjust Span to 5MHz, Sweep = auto. 6. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.
Limit:	2/3 of the 20dB bandwidth
	Remark: the transmission power is less than 0.125W.
Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type.
Final Test Mode:	Through Pre-scan, find the DH5 GFSK of data type is the worst case.
Instruments Used:	Refer to section 5.9 for details.
Test Results:	Pass

Measurement data

Channel separation (MHz)	Limit	Result
1	≥ 25 kHz or 2/3 times 20dB bandwidth	PASS

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Frequency Separation Test Data



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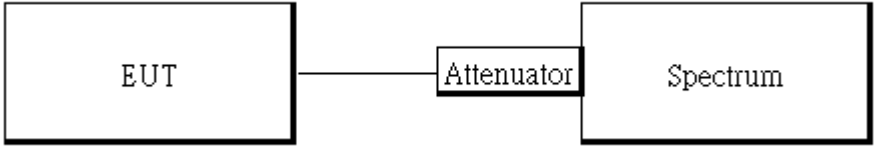
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6.6 NUMBER OF HOPPING FREQUENCY

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 Section 7.8.3 FCC Public Notice DA 00-705 Measurement Guidelines
Test Setup:	
Test Procedure:	1. Place the EUT on the table and set it in transmitting mode. 2. The testing follows. 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. 4. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto. 5. Set the spectrum analyzer as RBW=430 kHz, VBW=1.5MHz., Detector = Peak 6. Max hold, view and count how many channel in the band.
Limit:	At least 15 channels
Test Mode:	Hopping transmitting with DH5 GFSK of modulation
Instruments Used:	Refer to section 5.9 for details.
Test Results:	Pass

Measurement Data

Tabular Data of Total Channel Number

	<i>Channel Number</i>	Limit
2.4 GHz – 2.441GHz	40	>15
2.441 GHz – 2.4835GHz	39	
2.4GHz ~2.4835GHz	(40+39) = 79	

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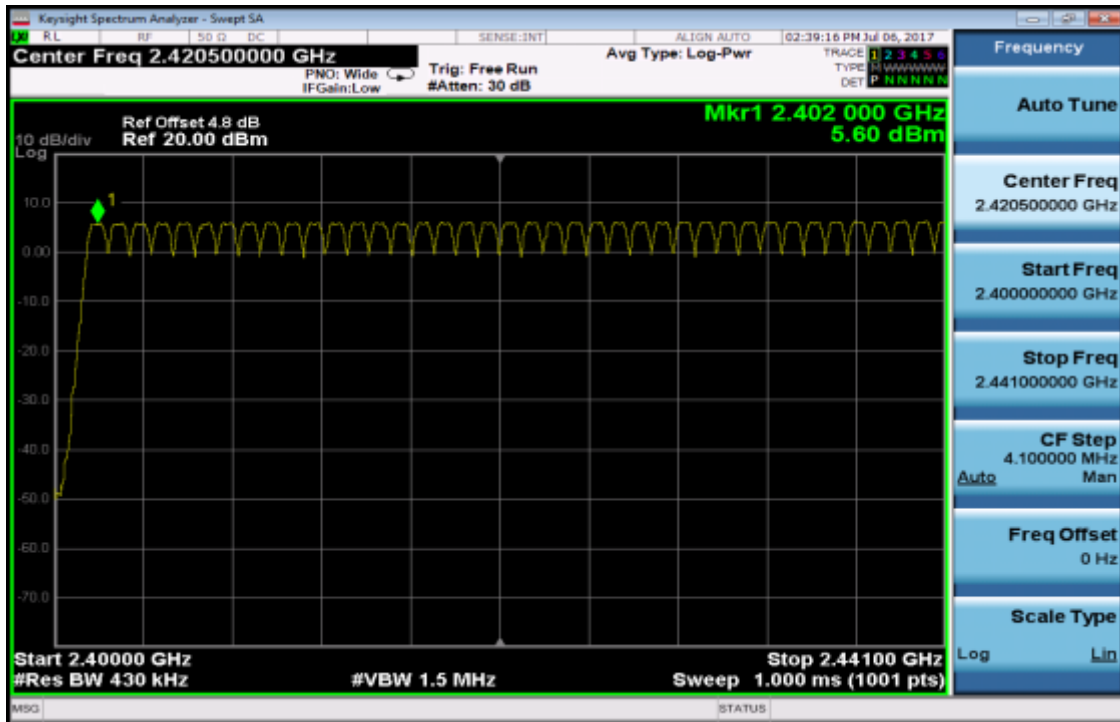
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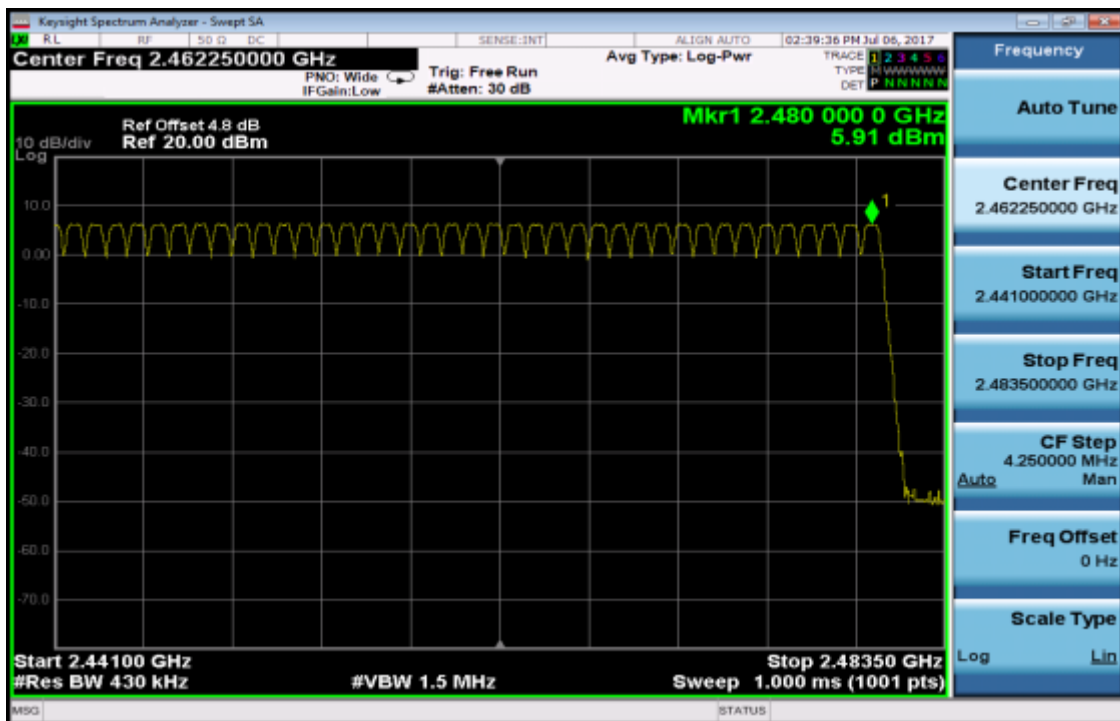
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Channel Number

1.4GHz – 2.441GHz



2.441 GHz – 2.4835GHz



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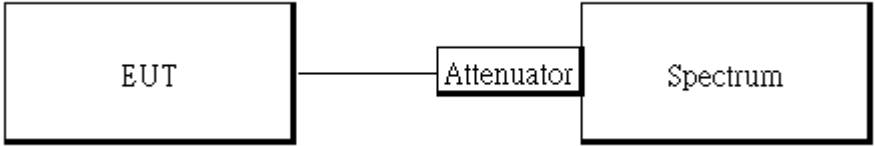
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6.7 TIME OF OCCUPANCY (DWELL TIME)

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 Section 7.8.4 FCC Public Notice DA 00-705 Measurement Guidelines
Test Setup:	
Test Procedure:	1. Place the EUT on the table and set it in transmitting mode. 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. 3. Set center frequency of spectrum analyzer = operating frequency. 4. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz , Detector = Peak, 5. Adjust Sweep = 2~8ms. 6. Repeat above procedures until all frequency of the interest measured were complete. 7. Formula Deduced: time occupancy of one time slot X Hopping rate / total slot in one channel / total channel that hops X period of working channels. 8. Where, standard hopping rate is 1600 hops/s, slot in one channel for DH1, DH3, and DH5 is 2, 4, and 6, respectively.
Limit:	0.4 Second
Test Mode:	Hopping transmitting with DH5 GFSK of modulation
Instruments Used:	Refer to section 5.9 for details.
Test Results:	Pass

Formula Deduced: time occupancy of one time slot X Hopping rate / total slot in one channel / total channel that hops X period of working channels.

Where, standard hopping rate is 1600 hops/s, slot in one channel for DH1, DH3, and DH5 is 2, 4, and 6, respectively.

DH1 consists of single time slot of the uplink, and one slot of the downlink Total Slot: 2

DH3 consists of three time slot of the uplink, and one slot of the downlink. Total Slot: 4

DH5 consists of five time slot of the uplink, and one slot of the downlink. Total Slot: 6

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In AFH mode, hopping rate is 800 hop/s with 6 slots in 20 hopping channels with channel hopping rate $(800 / 6 / 20)$ in Occupancy Time Limit $(0.4 * 20)$ (S), Hop Over Occupancy Time comes to $(800 / 6 / 20) * (0.4 * 20) = 53.33$

Note: the result of the complete test default channel at 1Mbps is recorded on the test report, 2Mbps, and 3Mbps only records the measurement result at middle channel that reveals no much deviation.

Measurement data

GFSK (1Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
0	DH1	118.40	400ms
	DH3	256.32	400ms
	DH5	302.61	400ms
39	DH1	116.80	400ms
	DH3	256.32	400ms
	DH5	302.72	400ms
78	DH1	116.80	400ms
	DH3	256.32	400ms
	DH5	302.61	400ms

$\pi/4$ DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
39	DH1	118.40	400ms
	DH3	257.60	400ms
	DH5	302.61	400ms

8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
39	DH1	118.40	400ms
	DH3	257.60	400ms
	DH5	302.61	400ms

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A period time = 0.4 (s) * 79 = 31.6 (s)

GFSK (1Mbps):

CH Low	DH1 time slot =	0.370	*	(1600/2/79)	*	31.6	=	118.40	(ms)
	DH3 time slot =	1.602	*	(1600/4/79)	*	31.6	=	256.32	(ms)
	DH5 time slot =	2.837	*	(1600/6/79)	*	31.6	=	302.61	(ms)

CH Mid	DH1 time slot =	0.365	*	(1600/2/79)	*	31.6	=	116.80	(ms)
	DH3 time slot =	1.602	*	(1600/4/79)	*	31.6	=	256.32	(ms)
	DH5 time slot =	2.838	*	(1600/6/79)	*	31.6	=	302.72	(ms)

CH High	DH1 time slot =	0.365	*	(1600/2/79)	*	31.6	=	116.80	(ms)
	DH3 time slot =	1.602	*	(1600/4/79)	*	31.6	=	256.32	(ms)
	DH5 time slot =	2.837	*	(1600/6/79)	*	31.6	=	302.61	(ms)

$\pi/4$ -DQPSK (2Mbps):

CH Mid	2DH1 time slot =	0.370	*	(1600/2/79)	*	31.6	=	118.40	(ms)
	2DH3 time slot =	1.610	*	(1600/4/79)	*	31.6	=	257.60	(ms)
	2DH5 time slot =	2.837	*	(1600/6/79)	*	31.6	=	302.61	(ms)

8-DPSK (3Mbps):

CH Mid	3DH1 time slot =	0.370	*	(1600/2/79)	*	31.6	=	118.40	(ms)
	3DH3 time slot =	1.610	*	(1600/4/79)	*	31.6	=	257.60	(ms)
	3DH5 time slot =	2.837	*	(1600/6/79)	*	31.6	=	302.61	(ms)

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GFSK (1Mbps) for AFH Mode			
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)
20	DH5	151.31	400ms
$\pi/4$ DQPSK (2Mbps) for Mode			
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)
20	DH5	151.31	400ms
8-DPSK (3Mbps) for AFH Mode			
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)
20	DH5	151.31	400ms

GFSK (1Mbps):

DH5 time sl = $2.837 \text{ (ms)} * (800/6/20)^8 = 151.31 \text{ (ms)}$

$\pi/4$ -DQPSK (2Mbps)

2DH5 time := $2.837 \text{ (ms)} * (800/6/20)^8 = 151.31 \text{ (ms)}$

8-DPSK (3Mbps):

3DH5 time := $2.837 \text{ (ms)} * (800/6/20)^8 = 151.31 \text{ (ms)}$

6.8 Measurement Result

Note: Refer to next page for plots.

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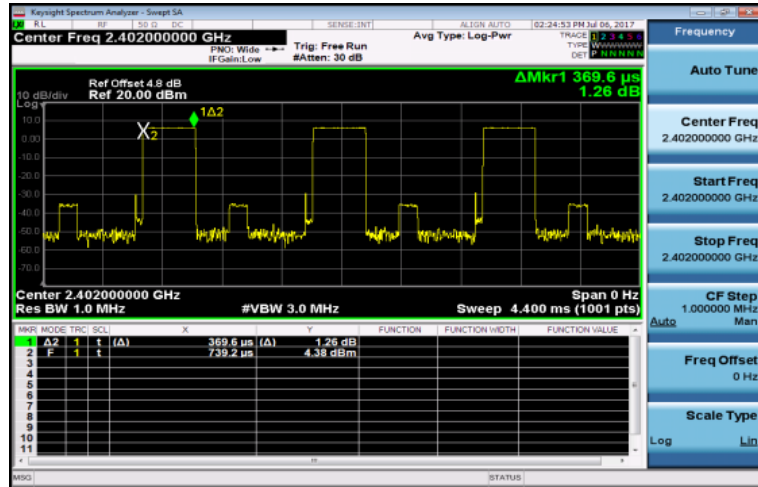
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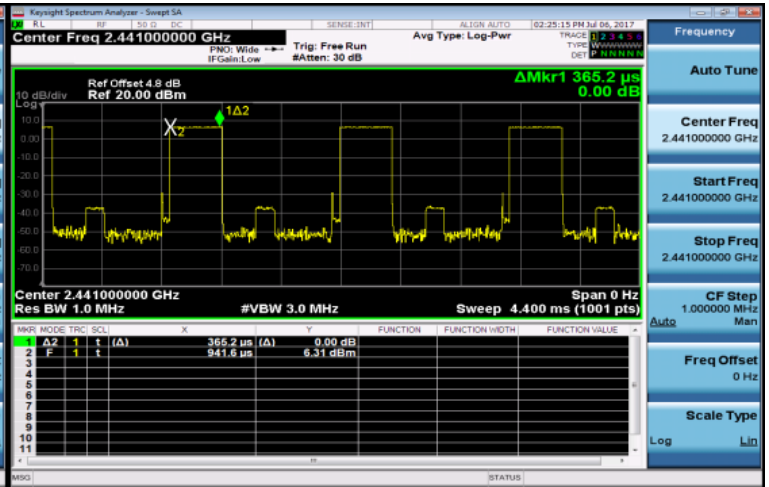
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CH-Low DH1



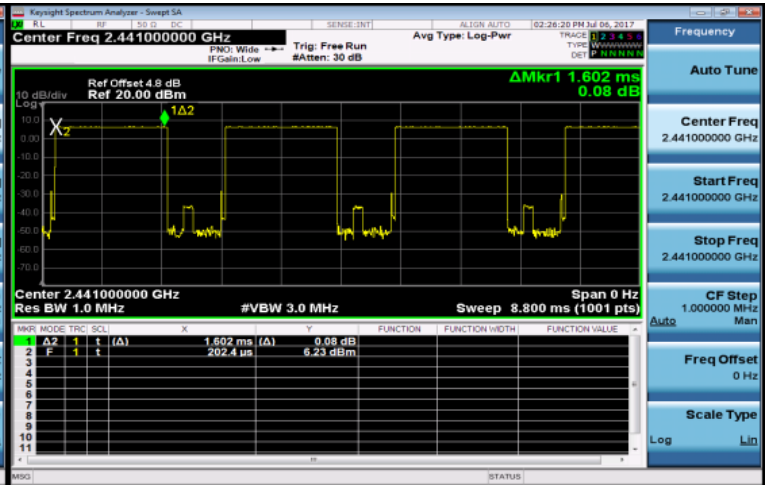
CH-Mid DH1



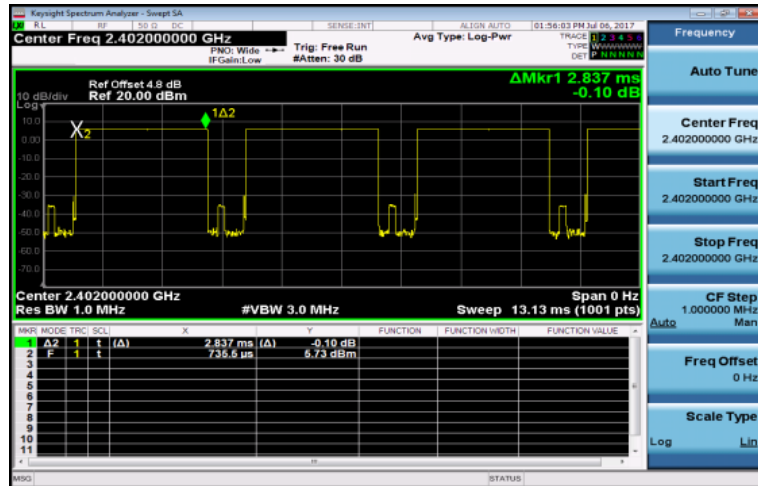
CH-Low DH3



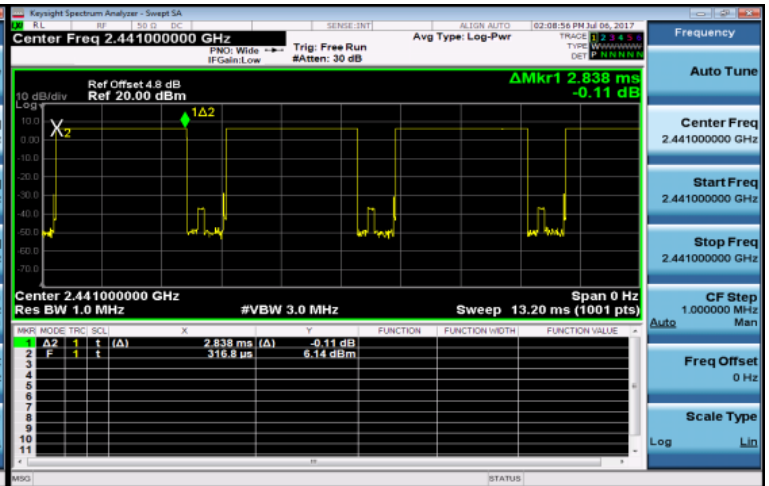
CH-Mid DH3



CH-Low DH5



CH-Mid DH5

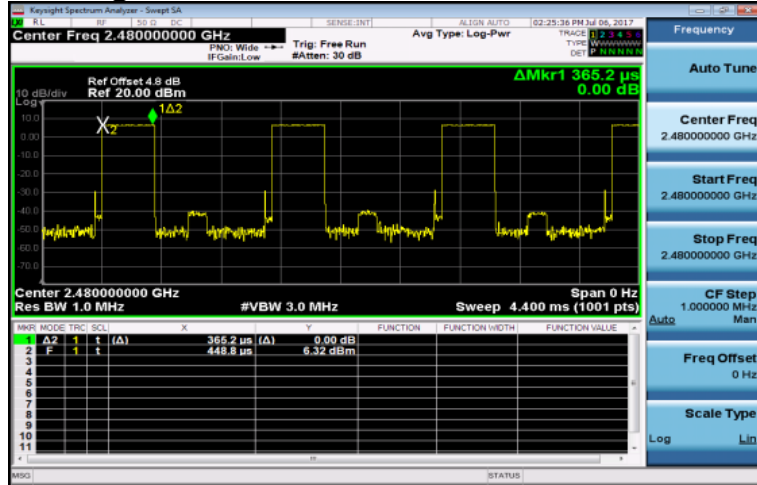


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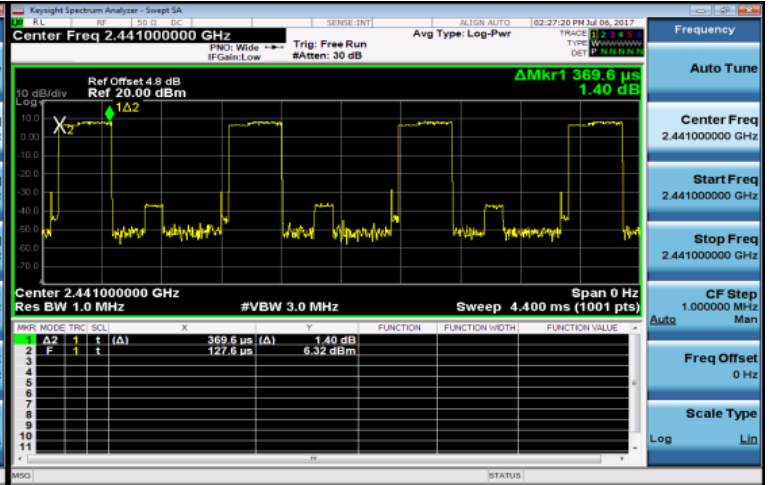
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CH-High DH1



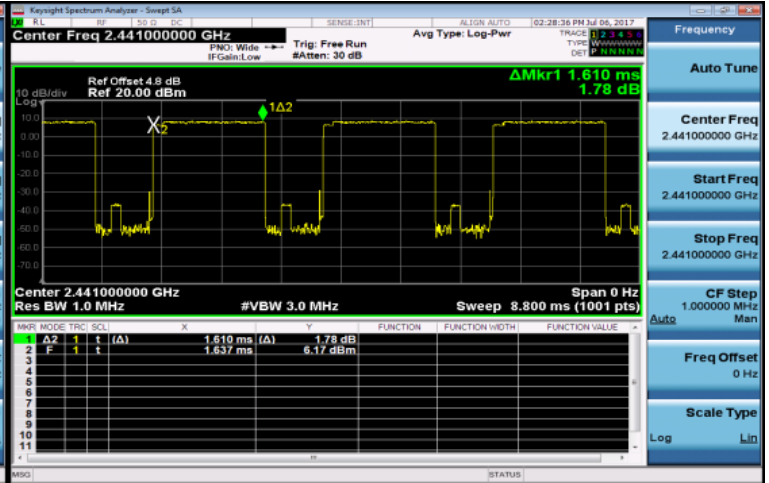
CH-Mid 2DH1



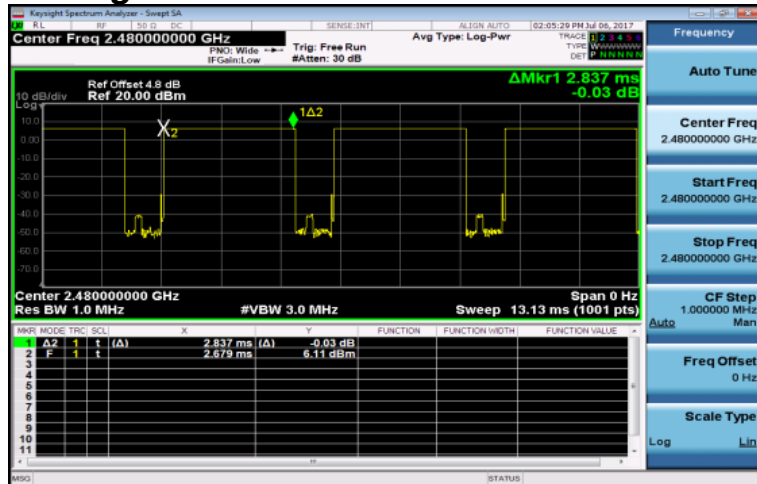
CH-High DH3



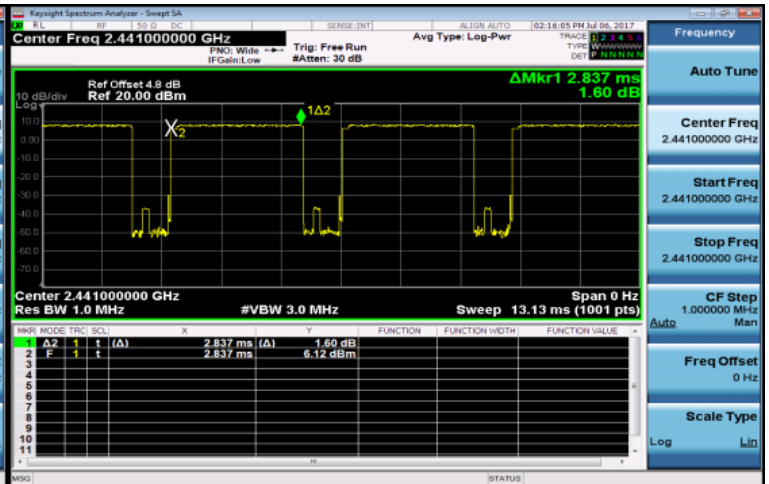
CH-Mid 2DH3



CH-High DH5



CH-Mid 2DH5



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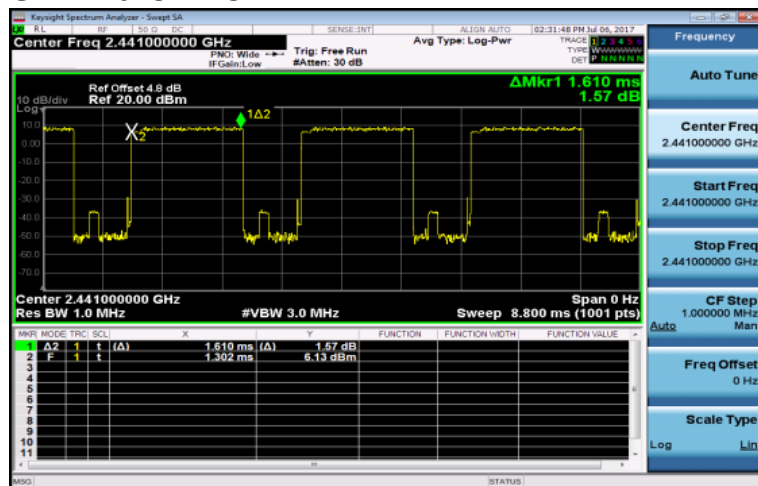
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CH-Mid 3DH1



CH-Mid 3DH3



CH-Mid 3DH5

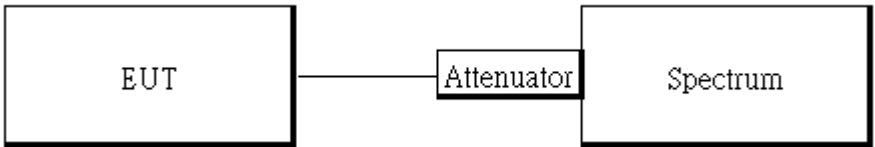


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6.9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 Section 7.8.6 & 7.8.8 FCC Public Notice DA 00-705 Measurement Guidelines
Test Setup:	 Cable loss as 4.8dB that offsets in the spectrum
Conducted Band Edge test Procedure:	1. Place the EUT on the table and set it in transmitting mode. 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. 3. Set center frequency of spectrum analyzer = operating frequency. 4. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Sweep = auto 5. Mark Peak, 2.3999GHz and 2.4836GHz and record the max. level. 6. Repeat above procedures until all frequency measured were complete.
Conducted Spurious Emission test Procedure:	1. To connect Antenna Port of EUT to Spectrum. 2. Set RBW = 100 kHz & VBW = 300 kHz, Detector =Peak, Sweep = Auto 3. Allow trace to fully stabilize. 4. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW. 5. Repeat above procedures until all default test channel measured were complete.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Mode:	Hopping and Non-hopping transmitting with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worst case.
Instruments Used:	Refer to section 5.9 for details.
Test Results:	Pass

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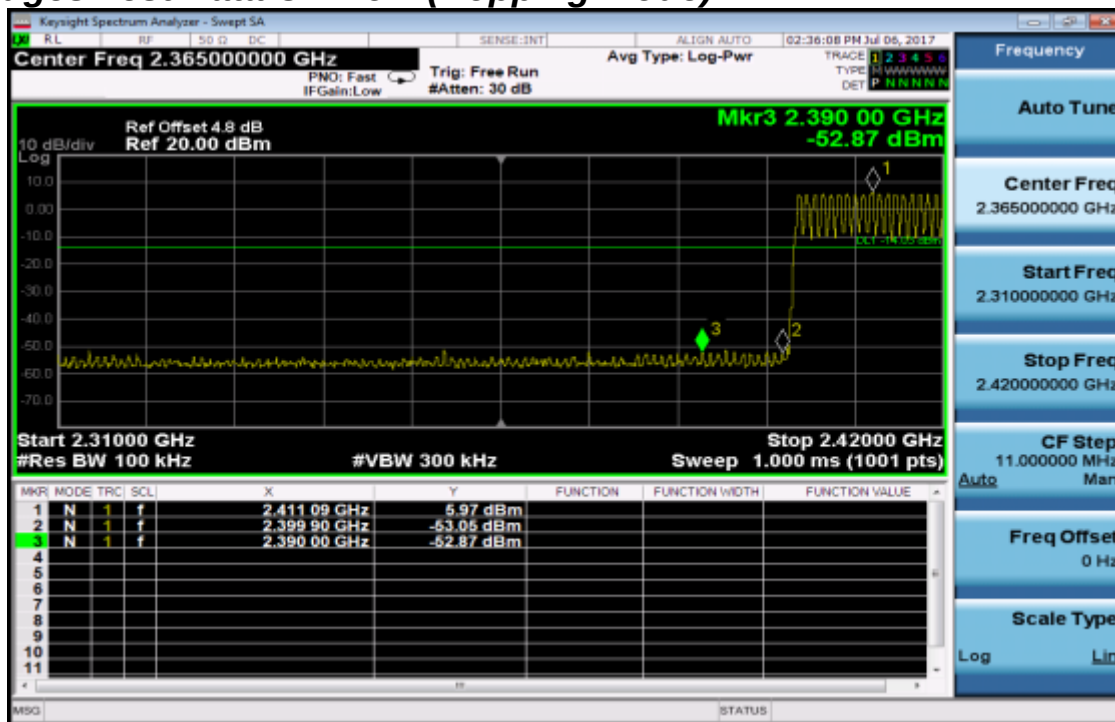
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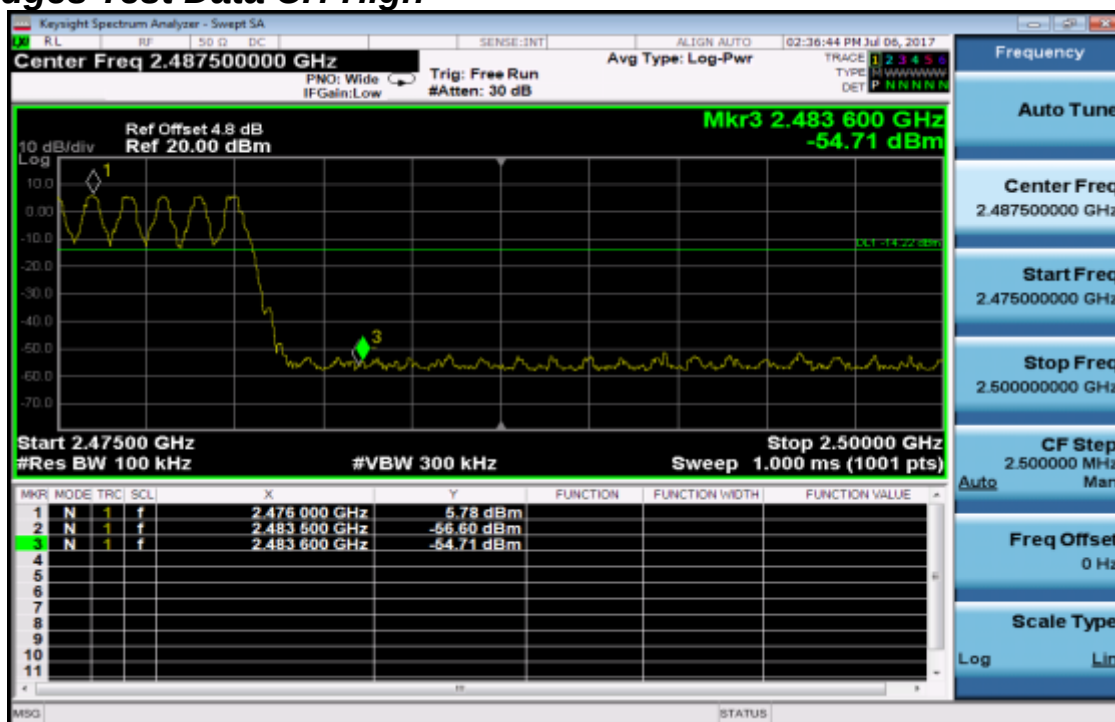
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Measurement data

Band Edges Test Data CH-Low (Hopping mode)



Band Edges Test Data CH-High



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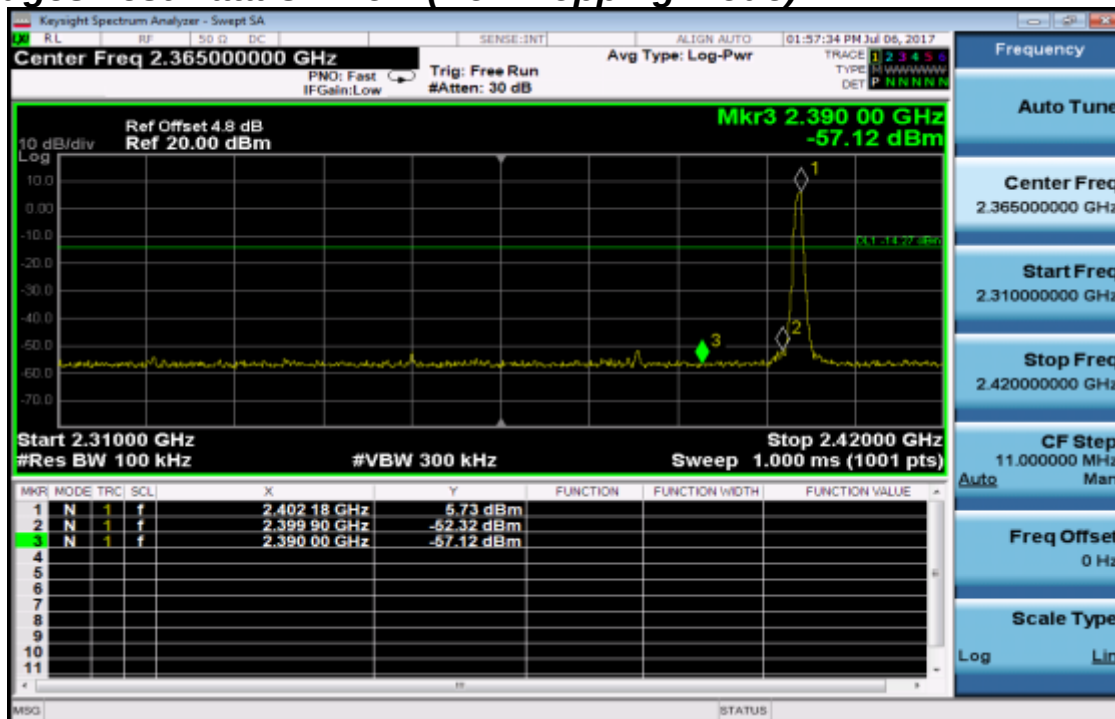
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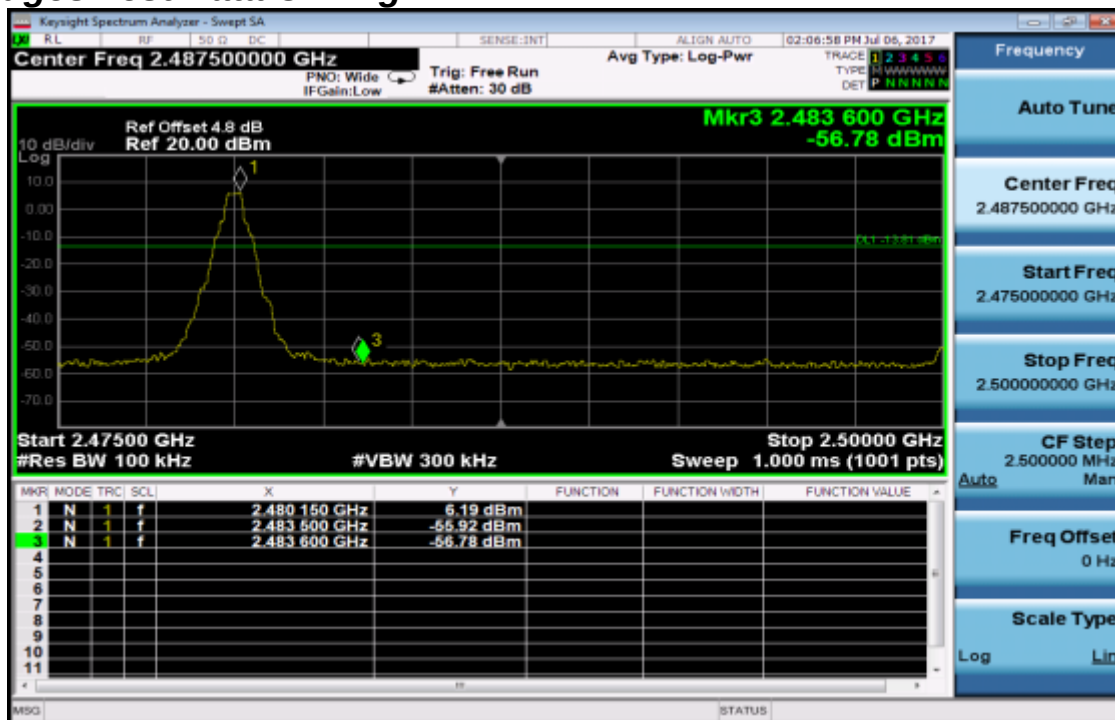
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Band Edges Test Data CH-Low (Non-Hopping mode)



Band Edges Test Data CH-High



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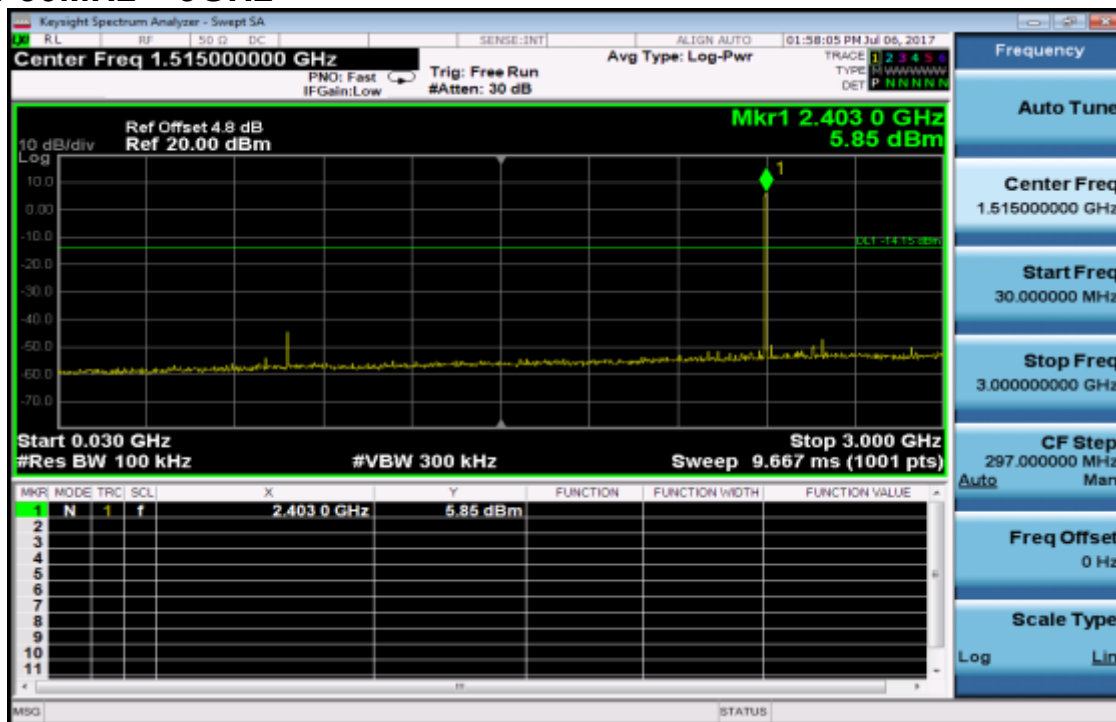
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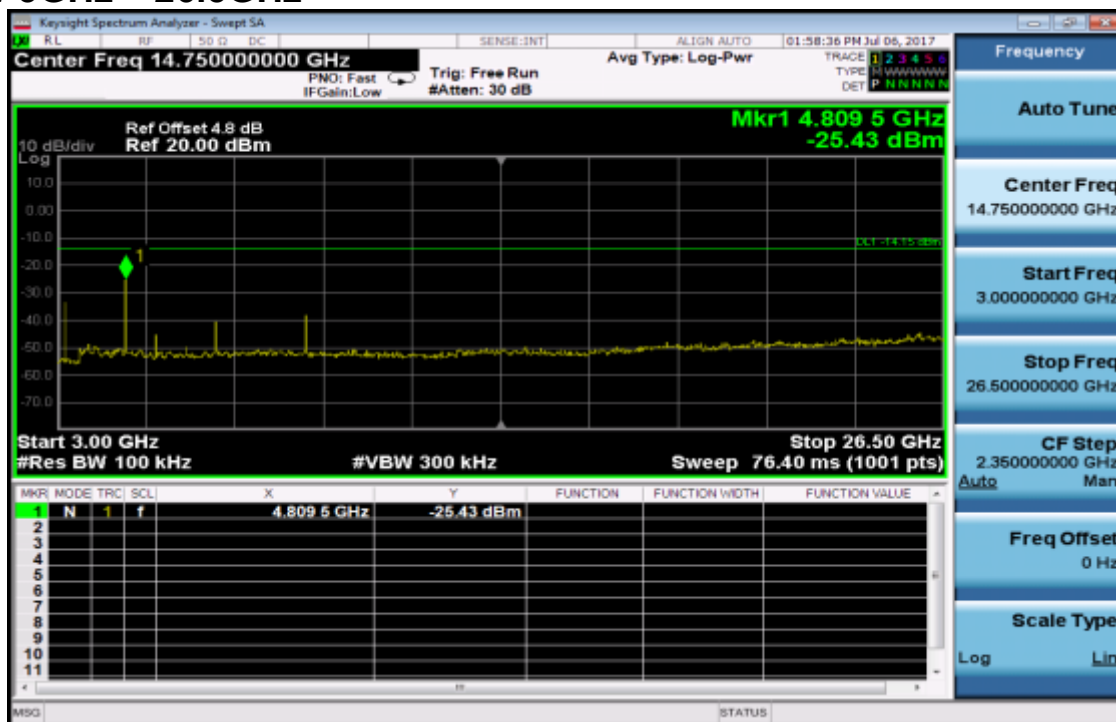
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Conducted Spurious Emission Measurement Result Ch Low 30MHz – 3GHz



Ch Low 3GHz – 26.5GHz



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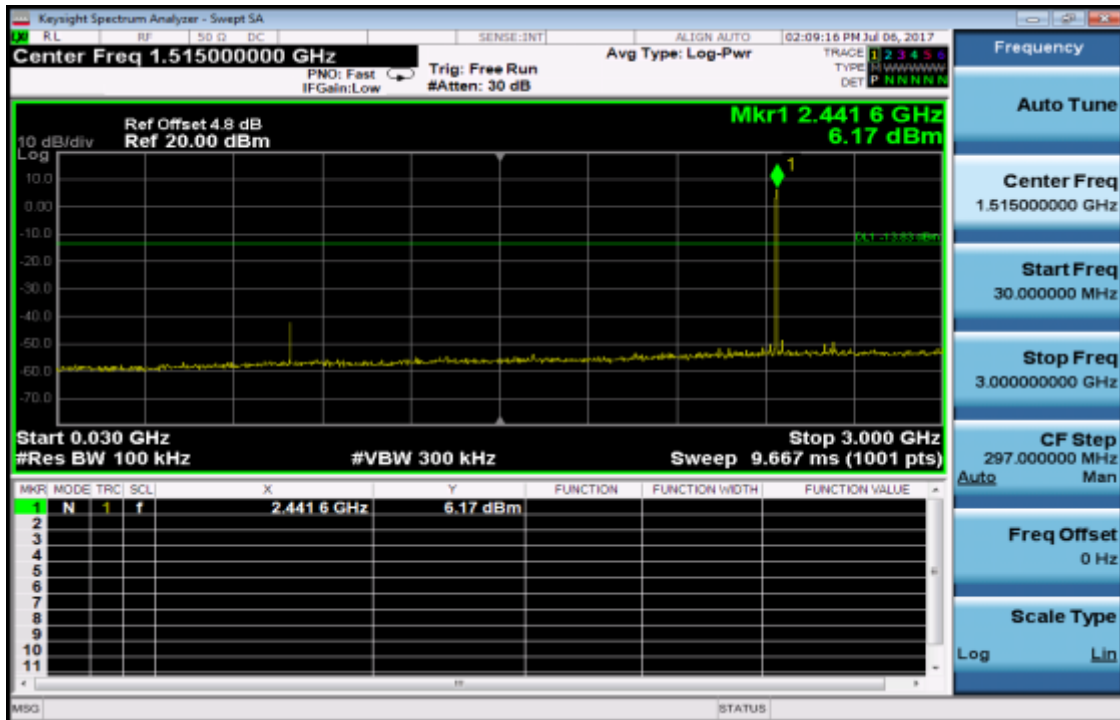
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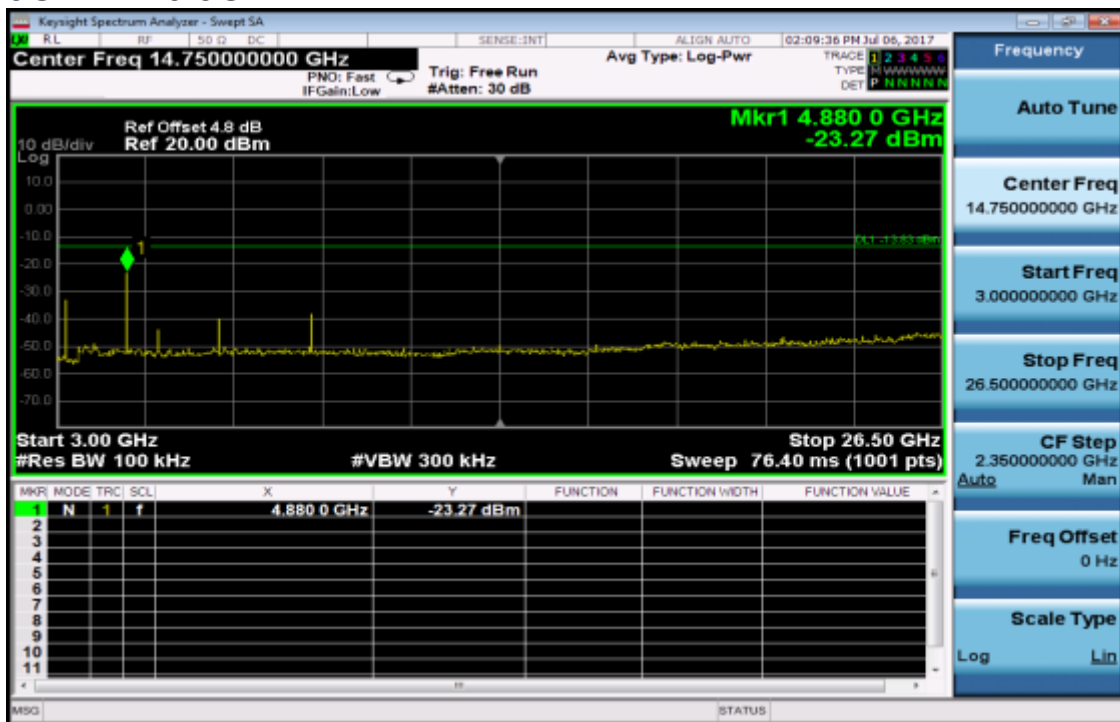
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Ch Mid 30MHz – 3GHz



Ch Mid 3GHz – 26.5GHz



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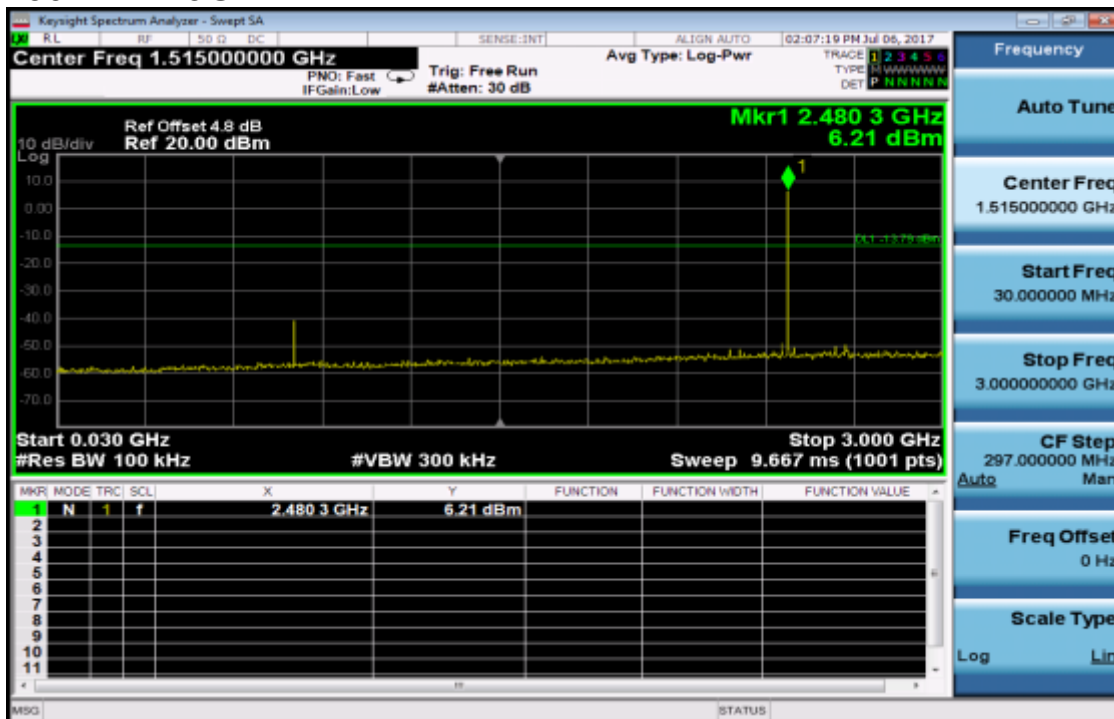
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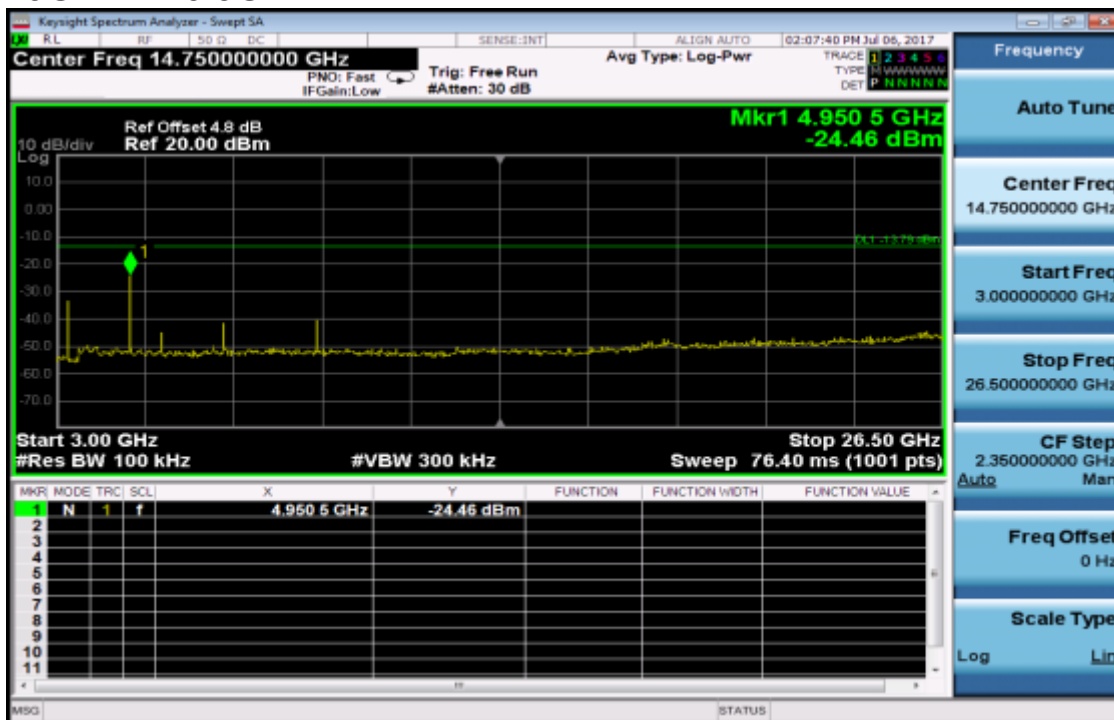
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Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



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6.10 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205																										
Test Method:	ANSI C63.10: 2013 FCC Public Notice DA 00-705 Measurement Guidelines																										
Limit:	<table><tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Distance (meters)</th></tr><tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr><tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr><tr><td>1.705-30</td><td>30</td><td>30</td></tr><tr><td>30-88</td><td>100</td><td>3</td></tr><tr><td>88-216</td><td>150</td><td>3</td></tr><tr><td>216-960</td><td>200</td><td>3</td></tr><tr><td>Above 960</td><td>500</td><td>3</td></tr></table> The lower limit shall apply at the transition frequencies. Emission level (dBµV/m) = 20 log Emission level (dBµV/m) Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.			Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)	0.009-0.490	2400/F(kHz)	300	0.490-1.705	24000/F(kHz)	30	1.705-30	30	30	30-88	100	3	88-216	150	3	216-960	200	3	Above 960	500	3
Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)																									
0.009-0.490	2400/F(kHz)	300																									
0.490-1.705	24000/F(kHz)	30																									
1.705-30	30	30																									
30-88	100	3																									
88-216	150	3																									
216-960	200	3																									
Above 960	500	3																									
Test Procedure:	1. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 0.8m for frequency> 1GHz above ground plan. 2. The turn table shall rotate 360 degrees to determine the position of maximum emission level. 3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions. 4. Use the follow spectrum analyzer setting: (1) Span = wide enough to fully capture the emission being measured (2) RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto,Detector function = peak, Trace = max hold (3) For average measurement: use duty cycle correction factor method per 15.35(c) (4) Duty Cycle = On time/100 milliseconds On time = N1*L1=N2*L2+...+N(n-1)*LN(n-1)+N(n)*L(n)																										

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	Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20*log (duty Cycle) 5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna. 6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance. 7. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. 8. Repeat above procedures until all frequency of the interest measured were complete.
Test Mode:	The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth LE Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

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Test Site Factor:	Field Strength Calculation The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows: $FS = RA + AF + CL - AG$	
	Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	
Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB) Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB) Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency. “E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.		
Instruments Used:	Refer to section 5.9 for details.	
Test Results:	Pass	

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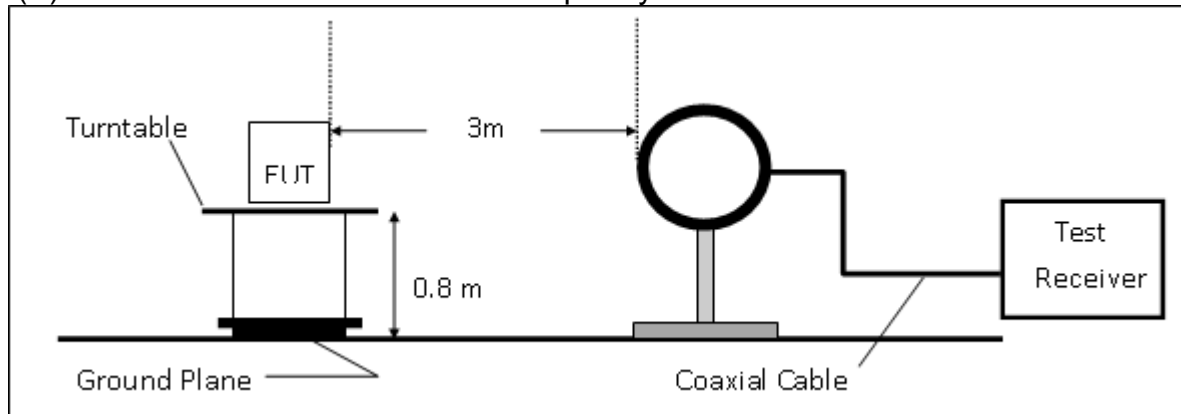
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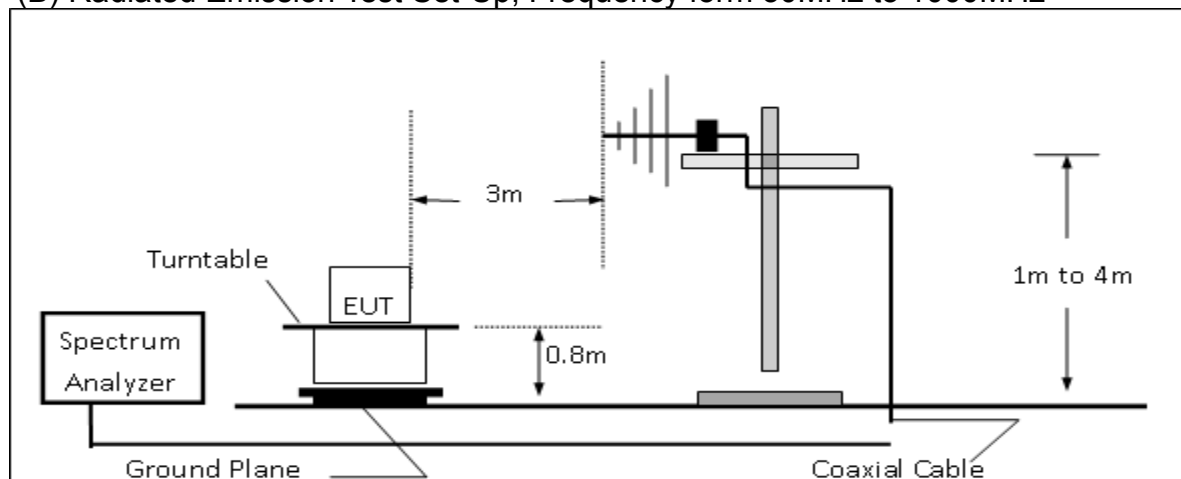
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Test Set-up:

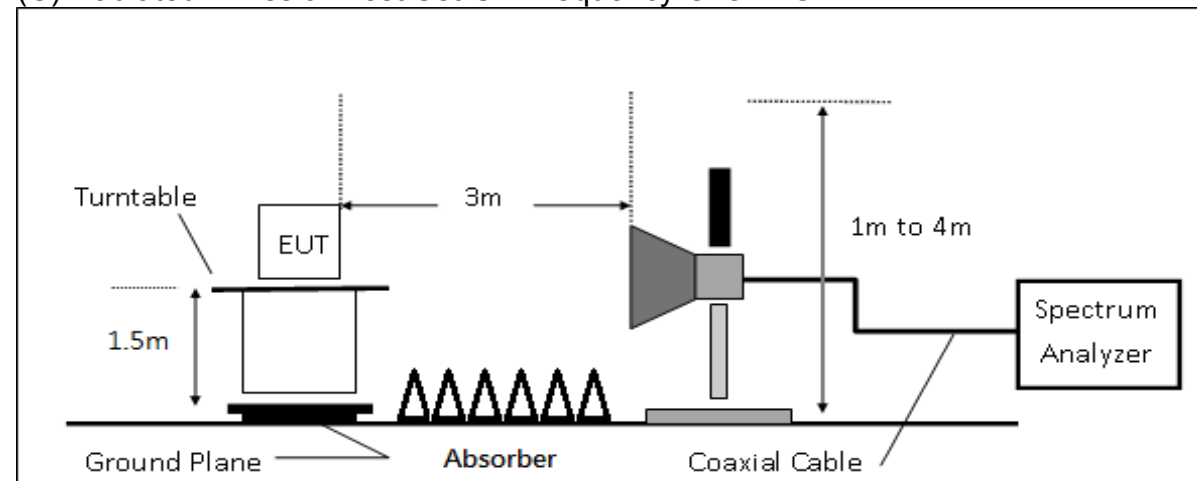
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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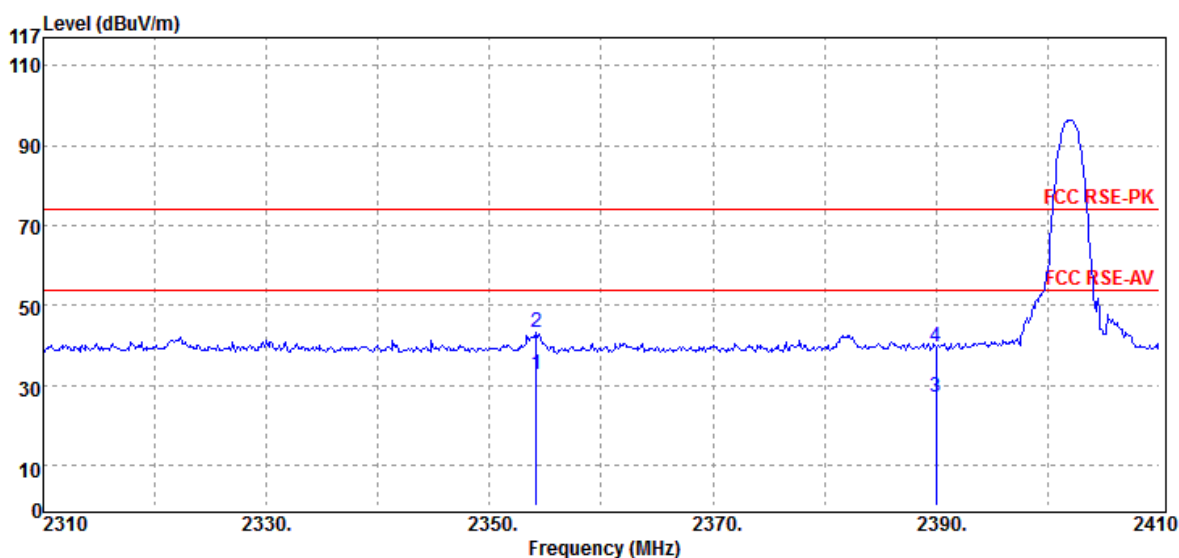
6.10.1 Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

6.10.2 Measurement Result

Operation Band :BR(1M)
Fundamental Frequency :2402 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Margin dB
2354.20	S	Average	34.42	-1.57	32.85	54.00	-21.15
2354.20	S	Peak	44.87	-1.57	43.30	74.00	-30.70
2390.00	E	Average	28.78	-1.74	27.04	54.00	-26.96
2390.00	E	Peak	41.42	-1.74	39.68	74.00	-34.32

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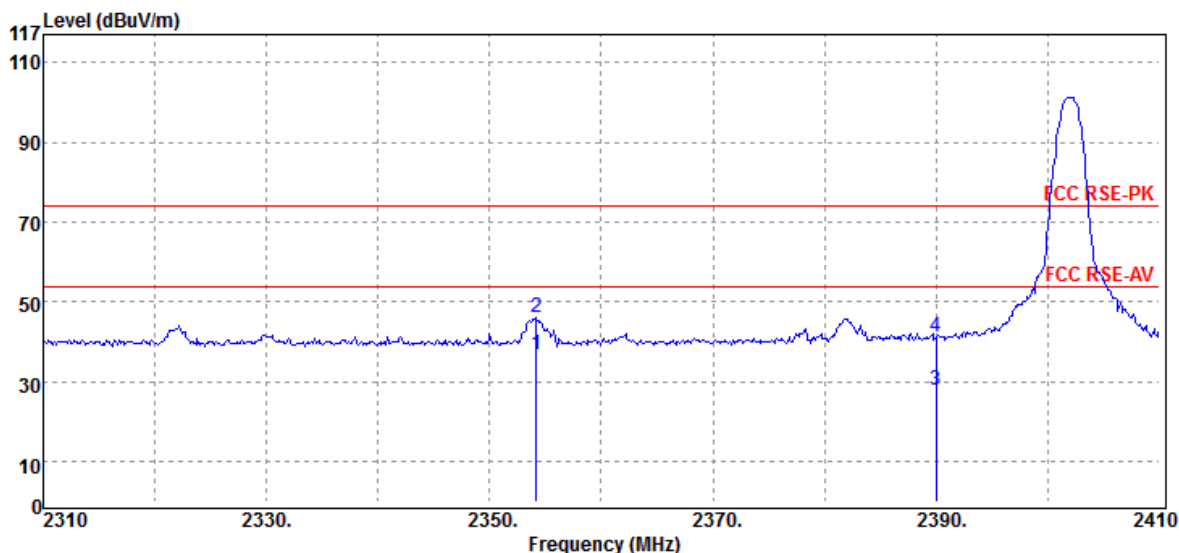
f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

Operation Band :BR(1M)
 Fundamental Frequency :2402 MHz
 Operation Mode :Bandedge CH LOW
 EUT Pol. :E2 Plane

Test Date :2017-07-05
 Temp./Humi. :22 deg_C / 61 RH
 Engineer :Tin
 Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2354.20	S	Average	38.40	-1.57	36.83	54.00	-17.17
2354.20	S	Peak	47.55	-1.57	45.98	74.00	-28.02
2390.00	E	Average	29.68	-1.74	27.94	54.00	-26.06
2390.00	E	Peak	42.87	-1.74	41.13	74.00	-32.87

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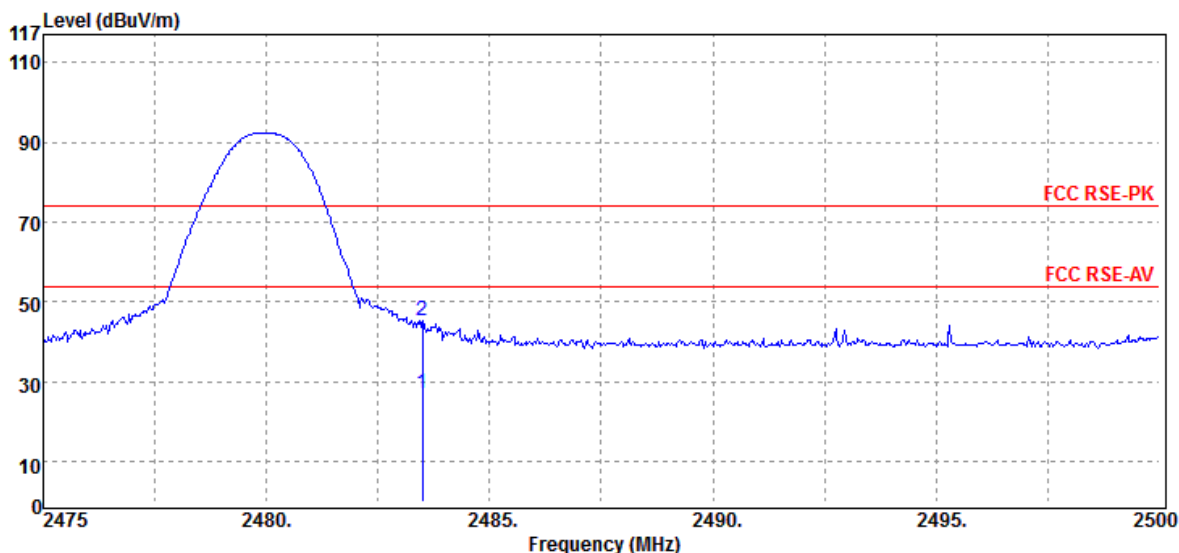
f (886-2) 2298-0488

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Member of SGS Group

Operation Band :BR(1M)
Fundamental Frequency :2480 MHz
Operation Mode :Bandedge CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	E	Average	28.88	-1.62	27.26	54.00	-26.74
2483.50	E	Peak	46.99	-1.62	45.37	74.00	-28.63

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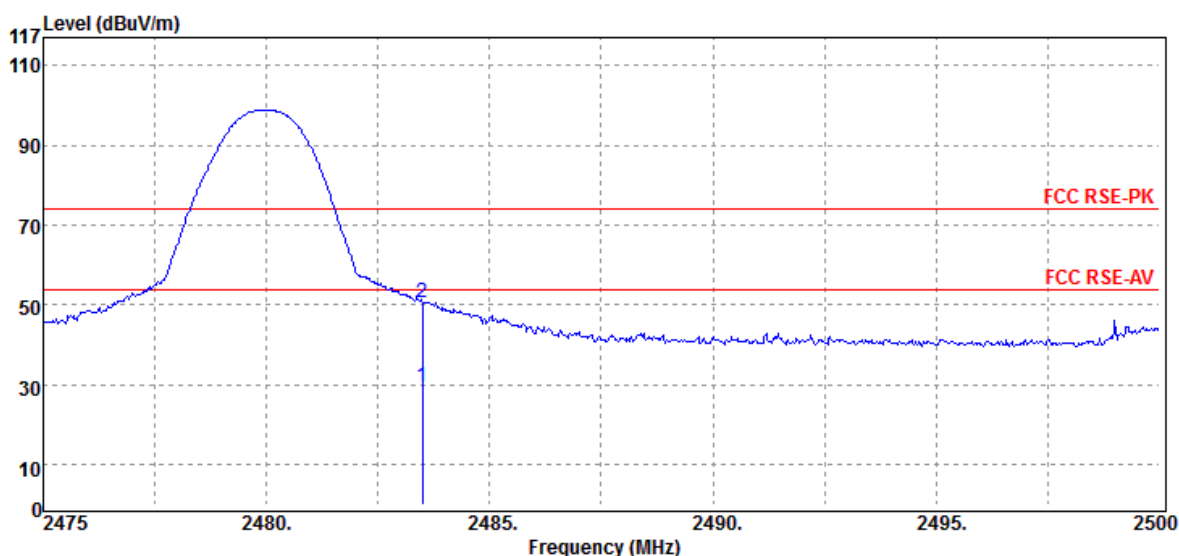
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Member of SGS Group

Operation Band :BR(1M)
Fundamental Frequency :2480 MHz
Operation Mode :Bandedge CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V / m	dB μ V / m	dB
2483.50	E	Average	31.31	-1.62	29.69	54.00	-24.31
2483.50	E	Peak	52.23	-1.62	50.61	74.00	-23.39

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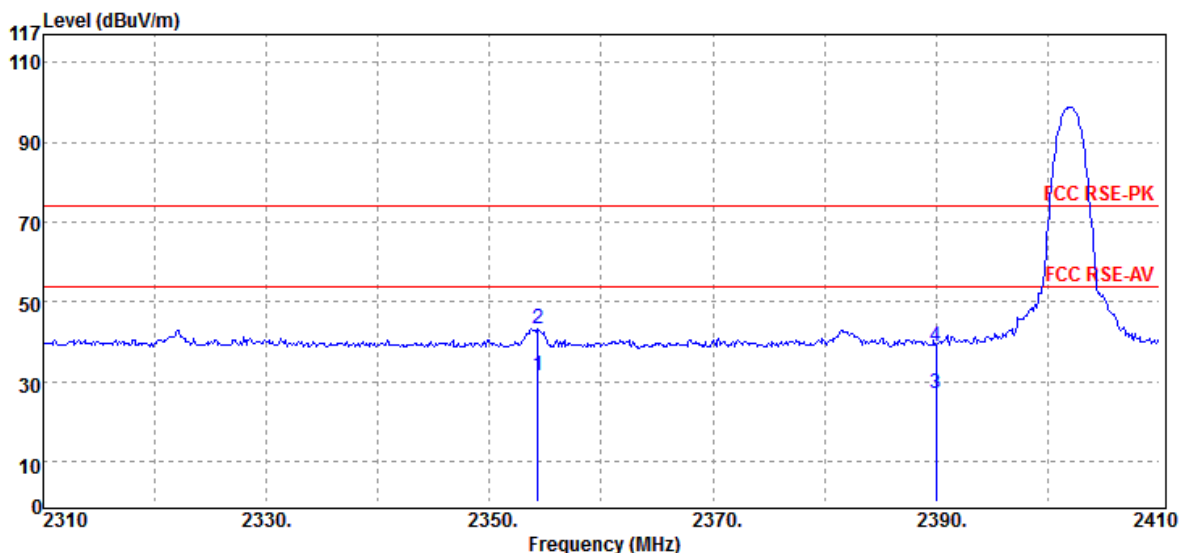
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Operation Band :EDR(3M)
Fundamental Frequency :2402 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2354.30	S	Average	33.28	-1.57	31.71	54.00	-22.29
2354.30	S	Peak	44.81	-1.57	43.24	74.00	-30.76
2390.00	E	Average	28.73	-1.74	26.99	54.00	-27.01
2390.00	E	Peak	40.74	-1.74	39.00	74.00	-35.00

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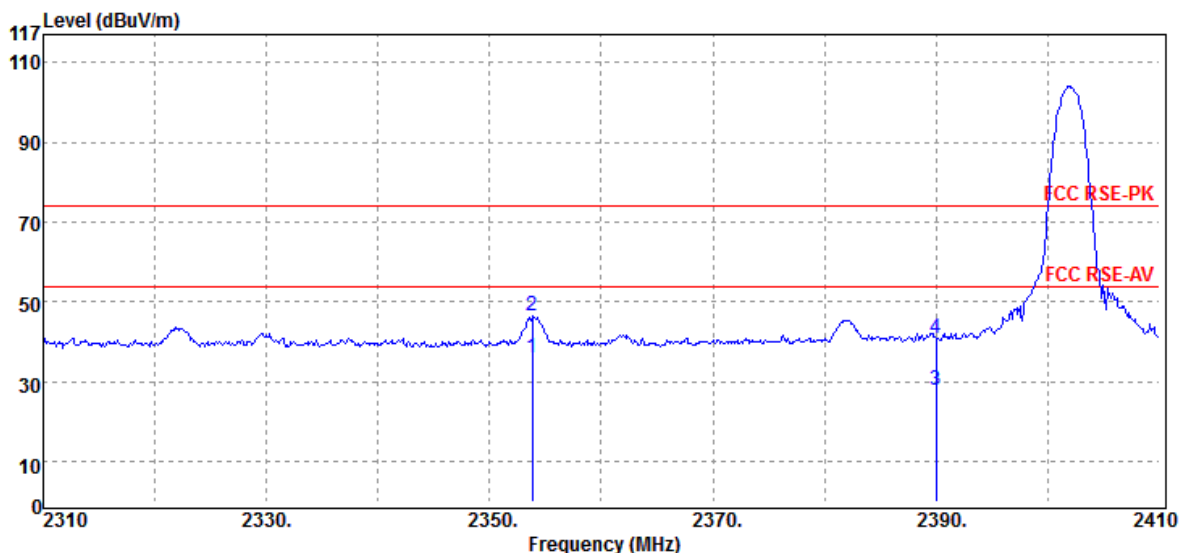
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Member of SGS Group

Operation Band :EDR(3M)
Fundamental Frequency :2402 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2353.80	S	Average	37.64	-1.57	36.07	54.00	-17.93
2353.80	S	Peak	47.95	-1.57	46.38	74.00	-27.62
2390.00	E	Average	29.72	-1.74	27.98	54.00	-26.02
2390.00	E	Peak	42.54	-1.74	40.80	74.00	-33.20

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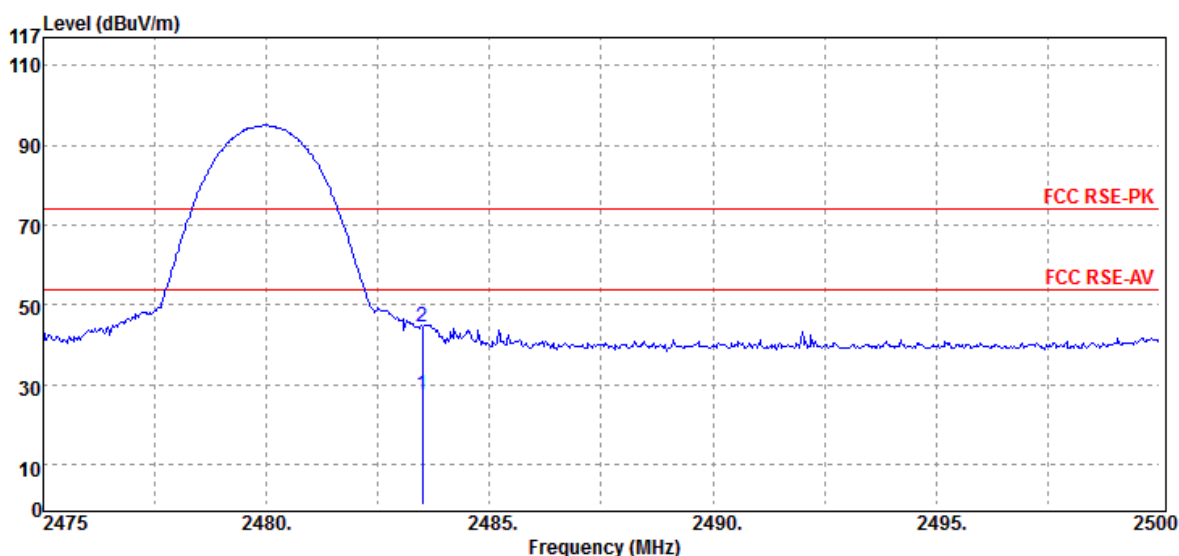
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Operation Band :EDR(3M)
Fundamental Frequency :2480 MHz
Operation Mode :Bandedge CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	E	Average	29.12	-1.62	27.50	54.00	-26.50
2483.50	E	Peak	46.34	-1.62	44.72	74.00	-29.28

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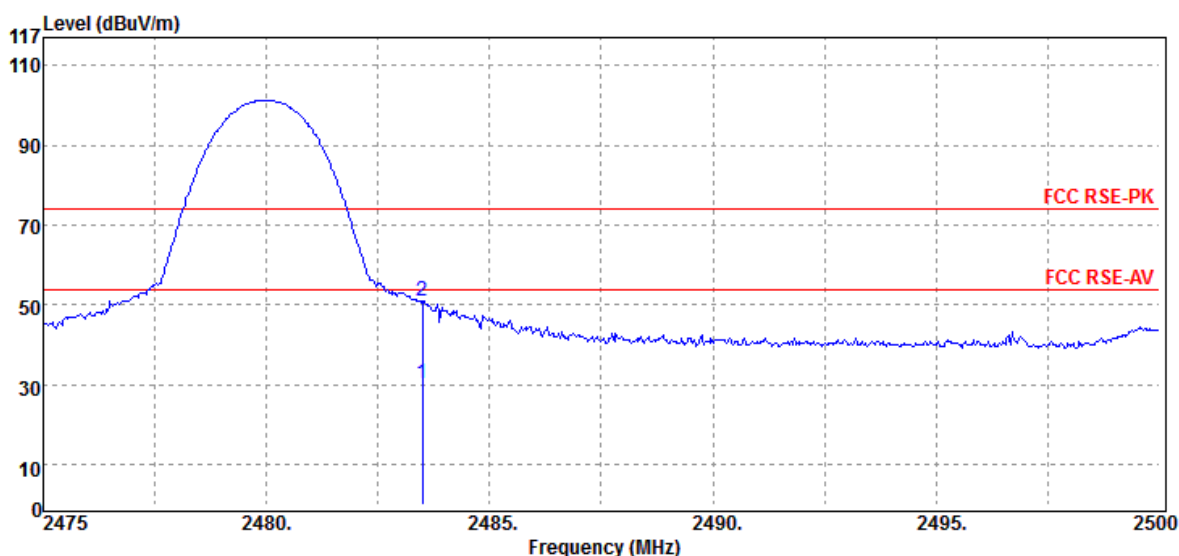
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Operation Band :EDR(3M)
 Fundamental Frequency :2480 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2017-07-05
 Temp./Humi. :22 deg_C / 61 RH
 Engineer :Tin
 Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	E	Average	31.90	-1.62	30.28	54.00	-23.72
2483.50	E	Peak	52.68	-1.62	51.06	74.00	-22.94

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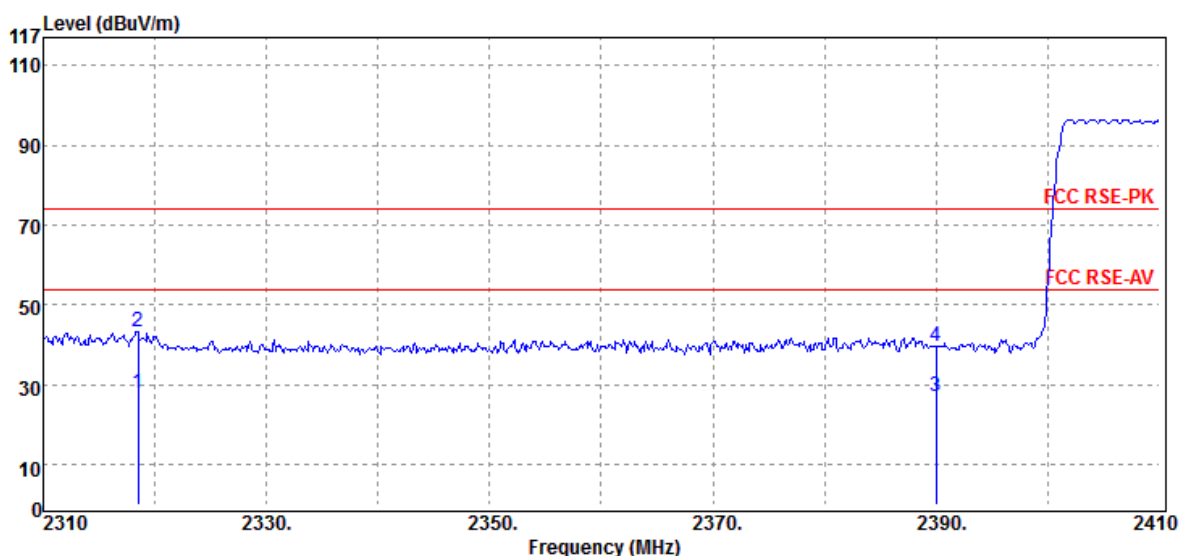
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Operation Band :BR Hopping
Fundamental Frequency :2402 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2318.50	S	Average	29.21	-1.40	27.81	54.00	-26.19
2318.50	S	Peak	44.64	-1.40	43.24	74.00	-30.76
2390.00	E	Average	28.70	-1.74	26.96	54.00	-27.04
2390.00	E	Peak	41.57	-1.74	39.83	74.00	-34.17

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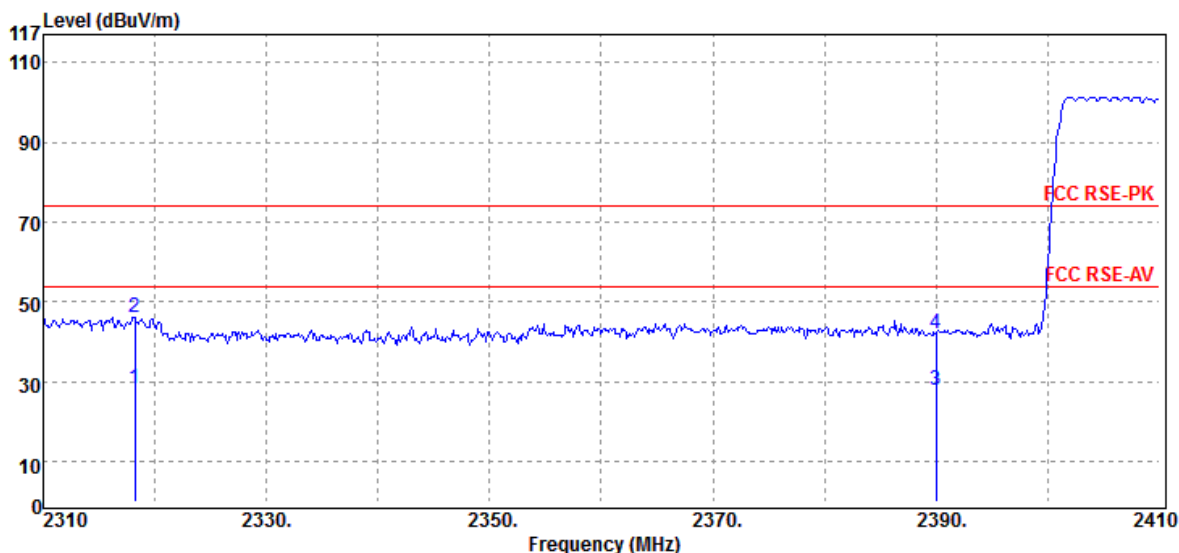
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Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2318.20	S	Average	29.88	-1.39	28.49	54.00	-25.51
2318.20	S	Peak	47.72	-1.39	46.33	74.00	-27.67
2390.00	E	Average	29.83	-1.74	28.09	54.00	-25.91
2390.00	E	Peak	43.69	-1.74	41.95	74.00	-32.05

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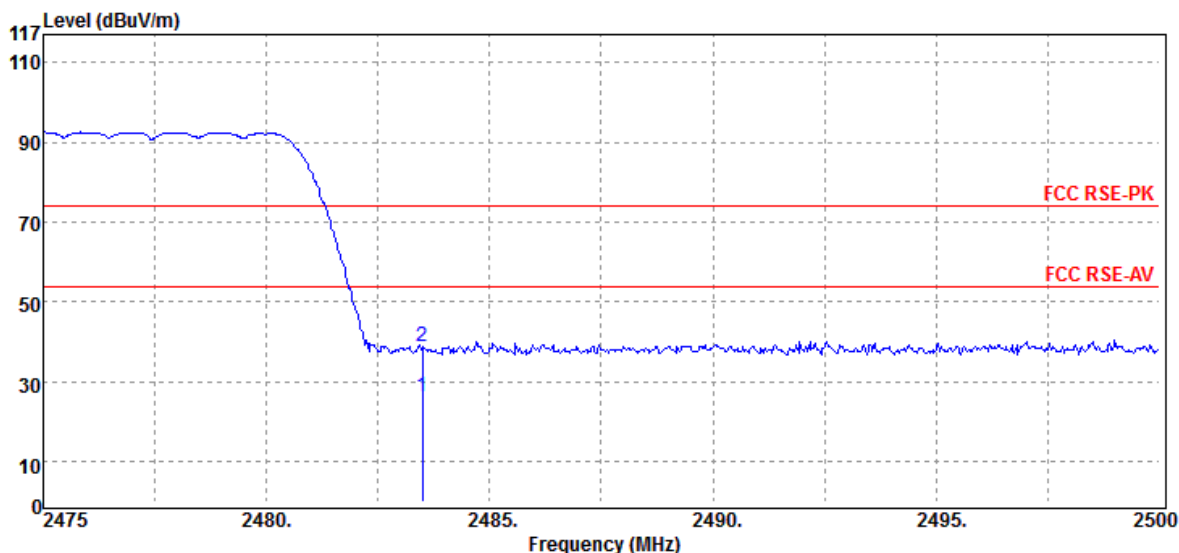
f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

Operation Band :BR Hopping
Fundamental Frequency :2480 MHz
Operation Mode :Bandedge CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	E	Average	28.10	-1.62	26.48	54.00	-27.52
2483.50	E	Peak	40.37	-1.62	38.75	74.00	-35.25

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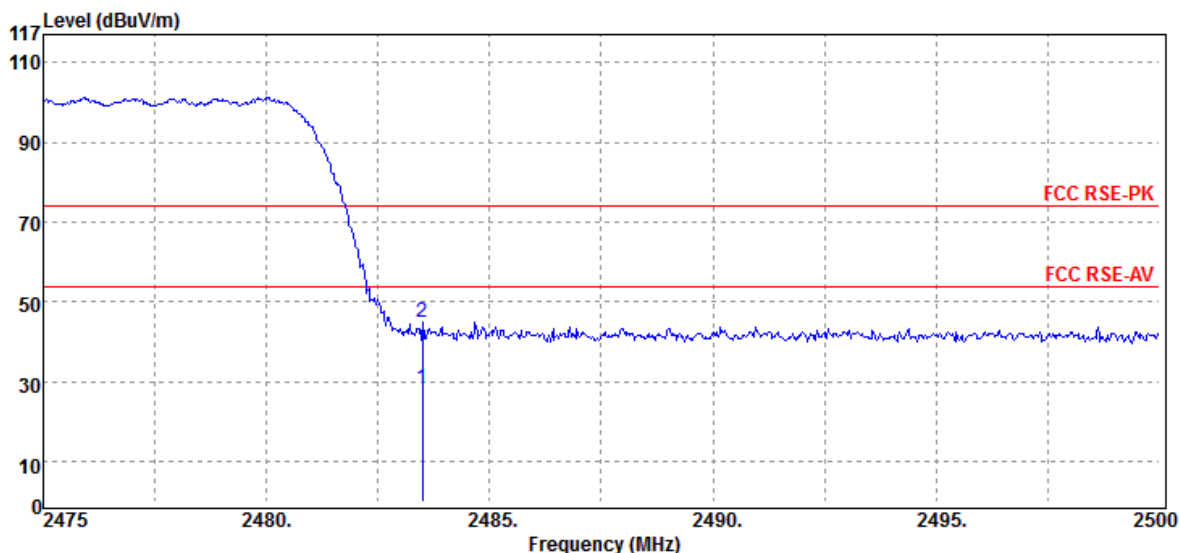
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Member of SGS Group

Operation Band :BR Hopping
Fundamental Frequency :2480 MHz
Operation Mode :Bandedge CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	E	Average	29.76	-1.62	28.14	54.00	-25.86
2483.50	E	Peak	46.36	-1.62	44.74	74.00	-29.26

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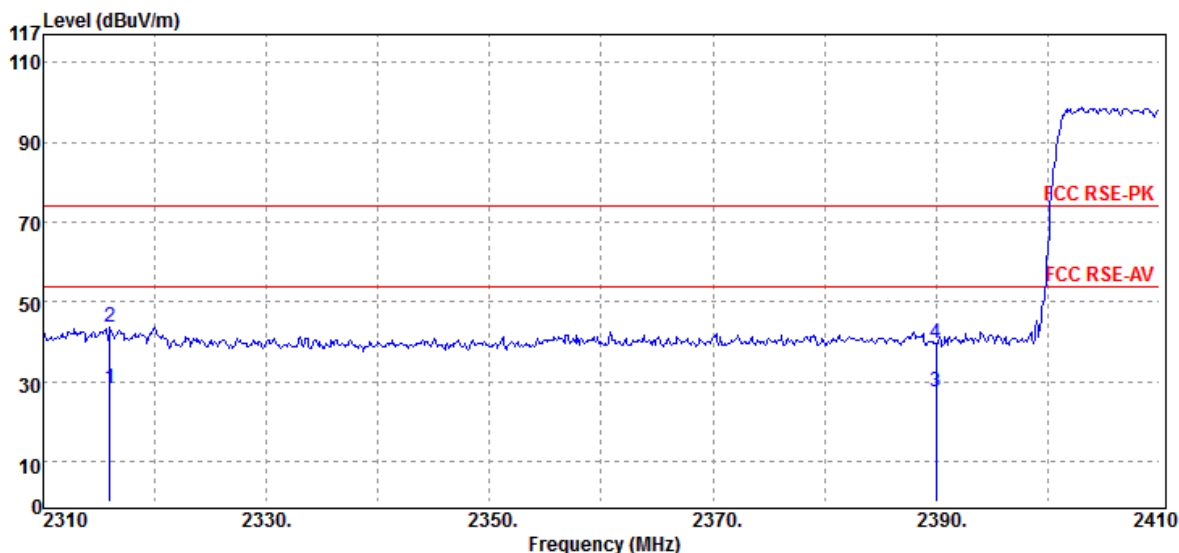
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Operation Band :EDR Hopping
Fundamental Frequency :2402 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2316.00	S	Average	29.71	-1.41	28.30	54.00	-25.70
2316.00	S	Peak	45.02	-1.41	43.61	74.00	-30.39
2390.00	E	Average	29.43	-1.74	27.69	54.00	-26.31
2390.00	E	Peak	41.37	-1.74	39.63	74.00	-34.37

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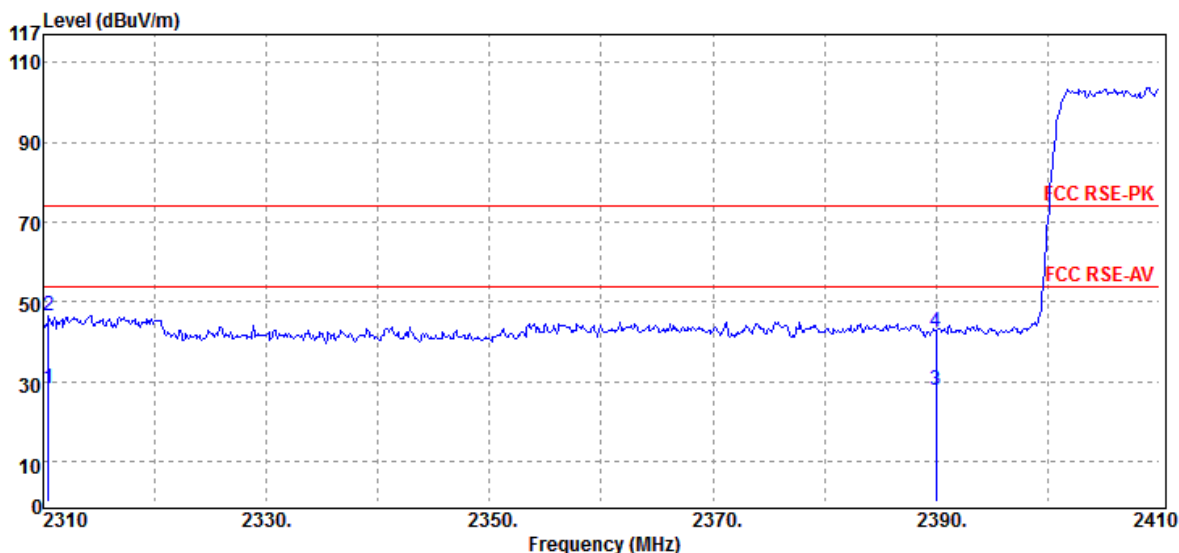
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Member of SGS Group

Operation Band :EDR Hopping
Fundamental Frequency :2402 MHz
Operation Mode :Bandedge CH LOW
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2310.50	S	Average	29.81	-1.40	28.41	54.00	-25.59
2310.50	S	Peak	47.95	-1.40	46.55	74.00	-27.45
2390.00	E	Average	29.80	-1.74	28.06	54.00	-25.94
2390.00	E	Peak	44.40	-1.74	42.66	74.00	-31.34

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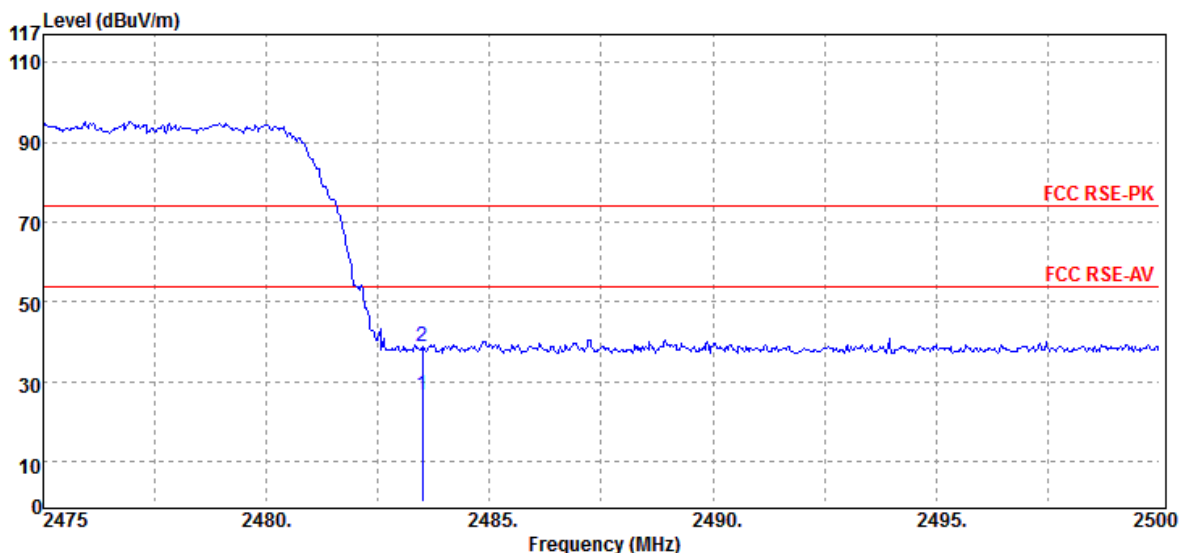
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www.tw.sgs.com

Member of SGS Group

Operation Band :EDR Hopping
 Fundamental Frequency :2480 MHz
 Operation Mode :Bandedge CH HIGH
 EUT Pol. :E2 Plane

Test Date :2017-07-05
 Temp./Humi. :22 deg_C / 61 RH
 Engineer :Tin
 Measurement Antenna Pol. :VERTICAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV / m	dBμV / m	dB
2483.50	E	Average	28.41	-1.62	26.79	54.00	-27.21
2483.50	E	Peak	40.31	-1.62	38.69	74.00	-35.31

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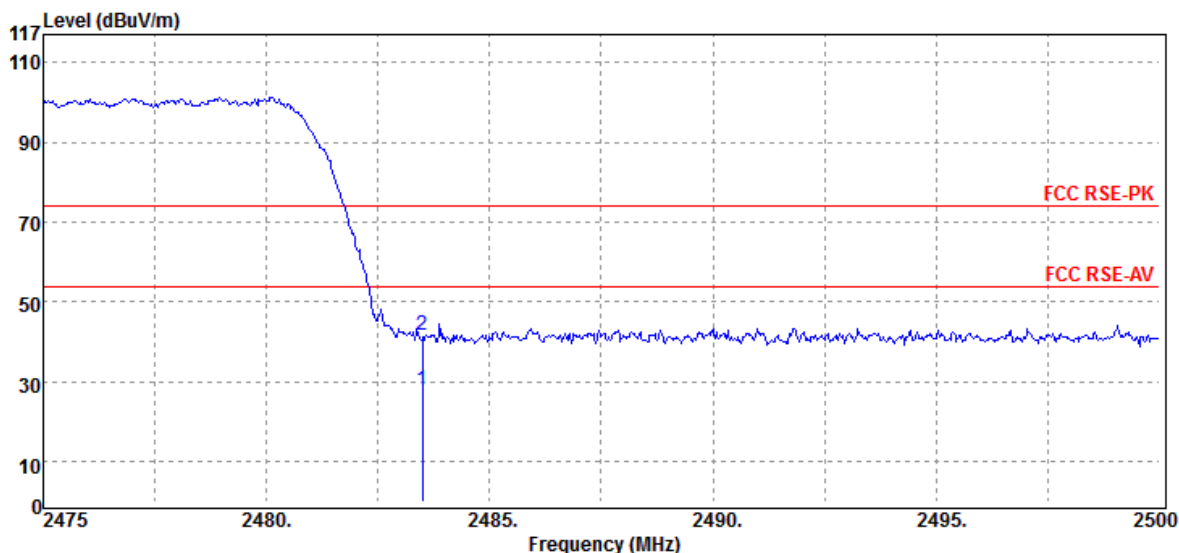
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Member of SGS Group

Operation Band :EDR Hopping
Fundamental Frequency :2480 MHz
Operation Mode :Bandedge CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB μ V	dB	dB μ V / m	dB μ V / m	dB
2483.50	E	Average	29.73	-1.62	28.11	54.00	-25.89
2483.50	E	Peak	43.17	-1.62	41.55	74.00	-32.45

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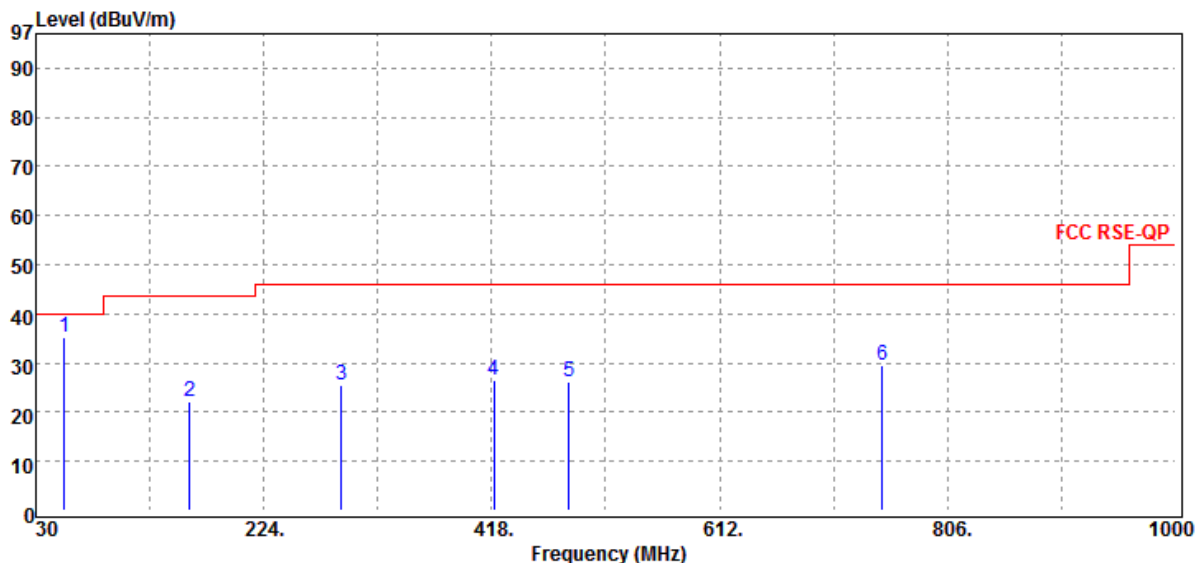
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Radiated Spurious Emission Measurement Result:

For Frequency form 30MHz to 1000MHz

Operation Band	:EDR(3M)	Test Date	:2017-07-05
Fundamental Frequency	:2402 MHz	Temp./Humi.	:22 deg_C / 61 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Margin dB
54.25	S	Peak	42.99	-7.82	35.17	40.00	-4.83
160.95	S	Peak	29.52	-7.43	22.09	43.50	-21.41
289.96	S	Peak	31.61	-6.07	25.54	46.00	-20.46
419.94	S	Peak	29.80	-3.39	26.41	46.00	-19.59
483.96	S	Peak	28.65	-2.47	26.18	46.00	-19.82
750.71	S	Peak	26.91	2.76	29.67	46.00	-16.33

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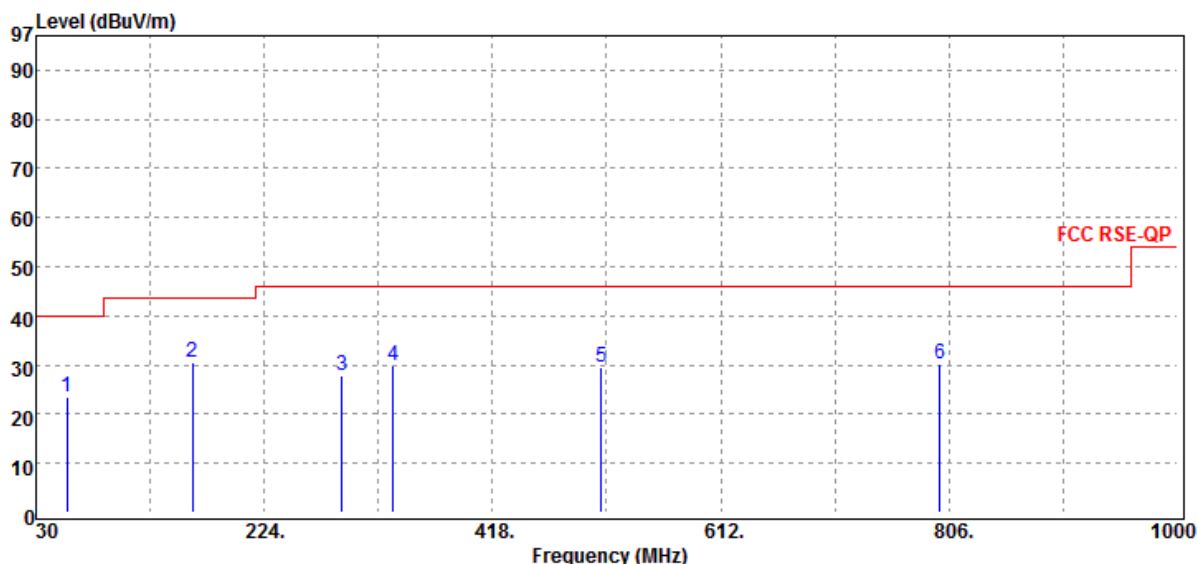
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Operation Band :EDR(3M)
Fundamental Frequency :2402 MHz
Operation Mode :Tx CH LOW
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Margin dB
56.19	S	Peak	31.32	-7.91	23.41	40.00	-16.59
162.89	S	Peak	38.15	-7.48	30.67	43.50	-12.83
289.96	S	Peak	33.94	-6.07	27.87	46.00	-18.13
333.61	S	Peak	35.21	-5.29	29.92	46.00	-16.08
510.15	S	Peak	31.77	-2.19	29.58	46.00	-16.42
798.24	S	Peak	27.08	3.11	30.19	46.00	-15.81

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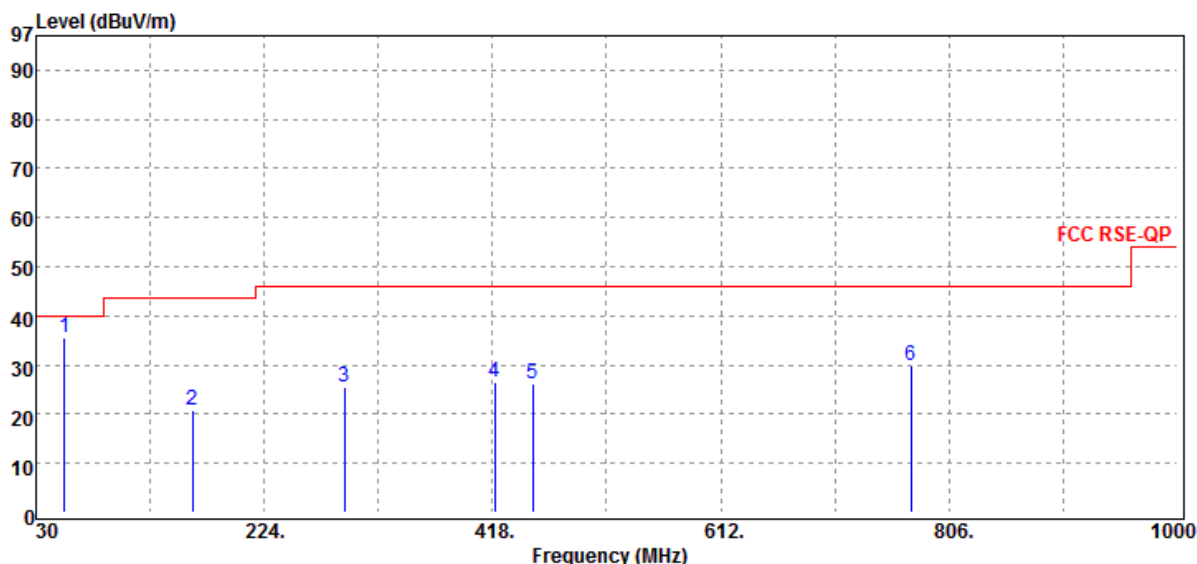
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Operation Band :EDR(3M)
Fundamental Frequency :2441 MHz
Operation Mode :Tx CH MID
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Margin dB
54.25	S	Peak	43.54	-7.82	35.72	40.00	-4.28
162.89	S	Peak	28.28	-7.48	20.80	43.50	-22.70
291.90	S	Peak	31.73	-6.08	25.65	46.00	-20.35
419.94	S	Peak	29.83	-3.39	26.44	46.00	-19.56
451.95	S	Peak	29.13	-2.84	26.29	46.00	-19.71
773.99	S	Peak	27.03	2.78	29.81	46.00	-16.19

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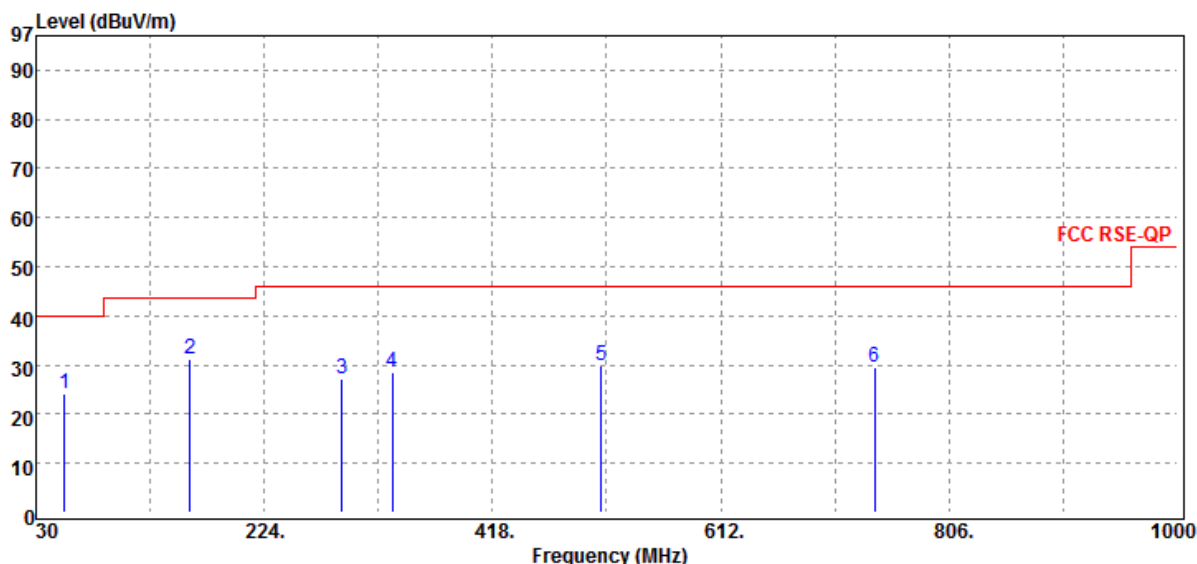
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Member of SGS Group

Operation Band :EDR(3M)
Fundamental Frequency :2441 MHz
Operation Mode :Tx CH MID
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Margin dB
54.25	S	Peak	31.84	-7.82	24.02	40.00	-15.98
160.95	S	Peak	38.68	-7.43	31.25	43.50	-12.25
289.96	S	Peak	33.27	-6.07	27.20	46.00	-18.80
332.64	S	Peak	33.76	-5.30	28.46	46.00	-17.54
510.15	S	Peak	32.16	-2.19	29.97	46.00	-16.03
742.95	S	Peak	27.43	2.27	29.70	46.00	-16.30

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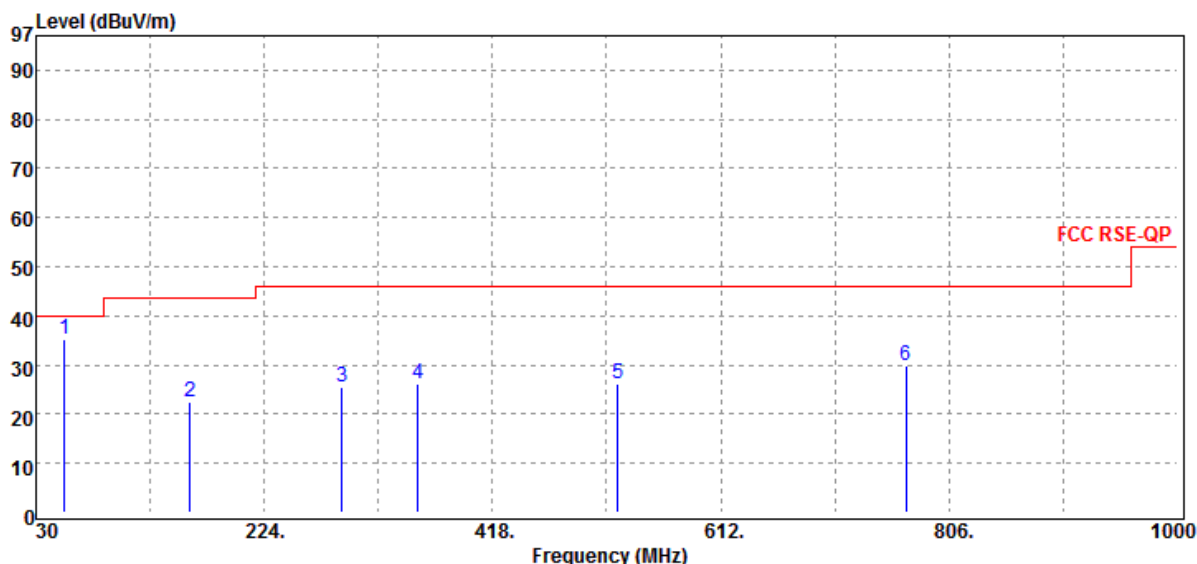
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Operation Band :EDR(3M)
Fundamental Frequency :2480 MHz
Operation Mode :Tx CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :22 deg_C / 61 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Margin dB
54.25	S	Peak	43.08	-7.82	35.26	40.00	-4.74
160.95	S	Peak	29.85	-7.43	22.42	43.50	-21.08
289.96	S	Peak	31.42	-6.07	25.35	46.00	-20.65
354.95	S	Peak	31.01	-4.75	26.26	46.00	-19.74
524.70	S	Peak	27.73	-1.68	26.05	46.00	-19.95
769.14	S	Peak	27.06	2.77	29.83	46.00	-16.17

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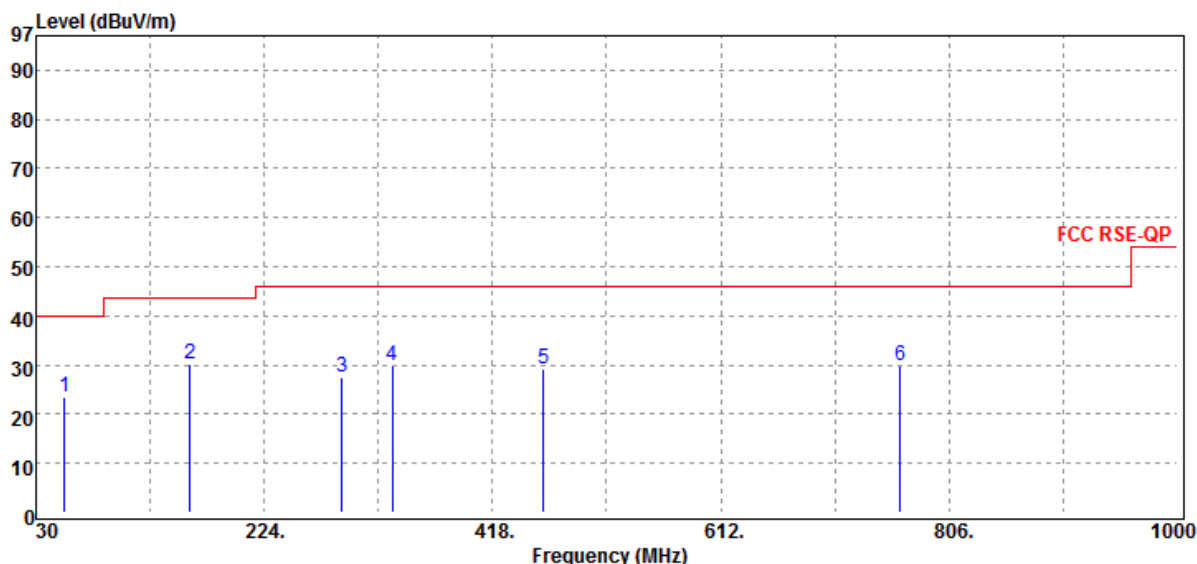
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Operation Band	:EDR(3M)	Test Date	:2017-07-05
Fundamental Frequency	:2480 MHz	Temp./Humi.	:22 deg_C / 61 RH
Operation Mode	:Tx CH HIGH	Engineer	:Tin
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Margin dB
54.25	S	Peak	31.46	-7.82	23.64	40.00	-16.36
160.95	S	Peak	37.66	-7.43	30.23	43.50	-13.27
289.96	S	Peak	33.63	-6.07	27.56	46.00	-18.44
332.64	S	Peak	35.03	-5.30	29.73	46.00	-16.27
461.65	S	Peak	31.87	-2.60	29.27	46.00	-16.73
764.29	S	Peak	27.04	2.97	30.01	46.00	-15.99

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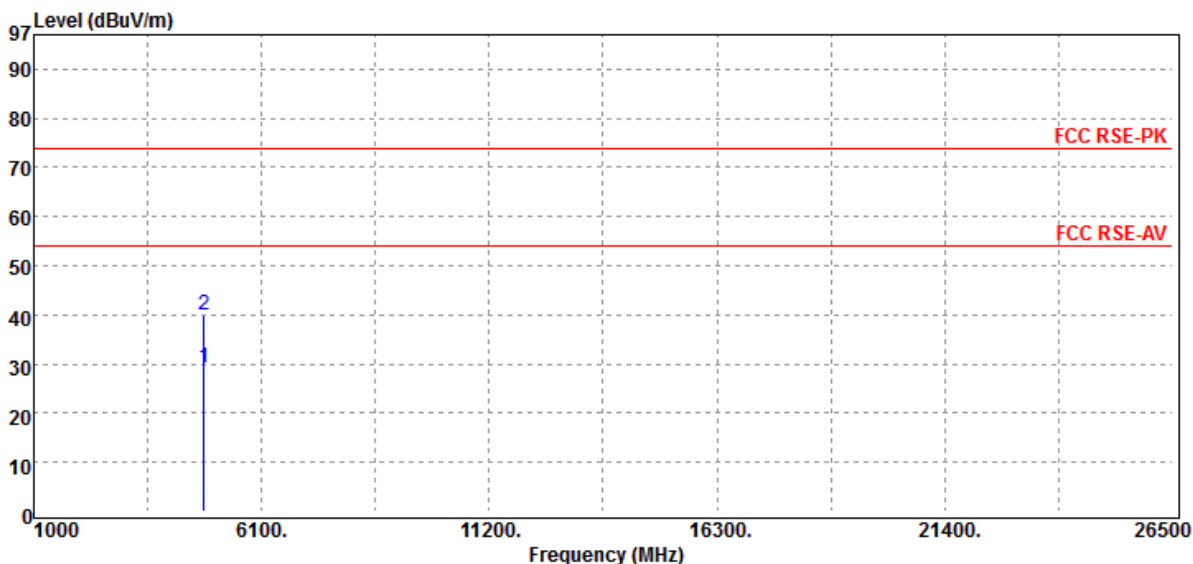
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Radiated Spurious Emission Measurement Result:

For Frequency above 1 GHz

Operation Band	:EDR(3M)	Test Date	:2017-07-05
Fundamental Frequency	:2402 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Safe Margin dB
4804.00	H	Average	24.20	4.92	29.12	54.00	-24.88
4804.00	H	Peak	34.85	4.92	39.77	74.00	-34.23

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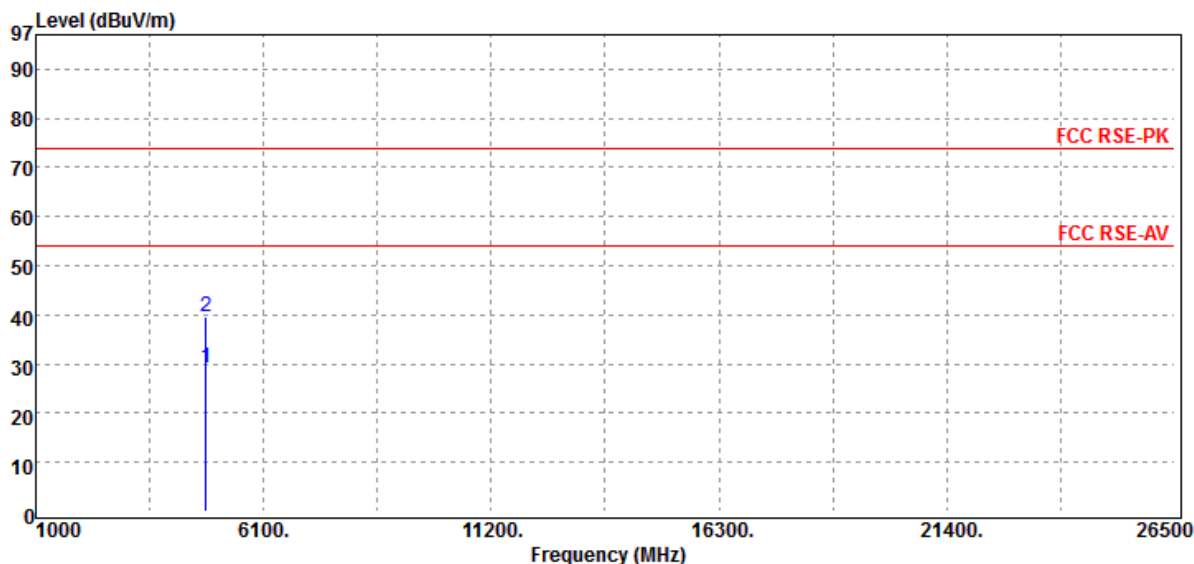
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Operation Band :EDR(3M)
Fundamental Frequency :2402 MHz
Operation Mode :Tx CH LOW
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :23 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Safe Margin dB
4804.00	H	Average	24.27	4.92	29.19	54.00	-24.81
4804.00	H	Peak	34.79	4.92	39.71	74.00	-34.29

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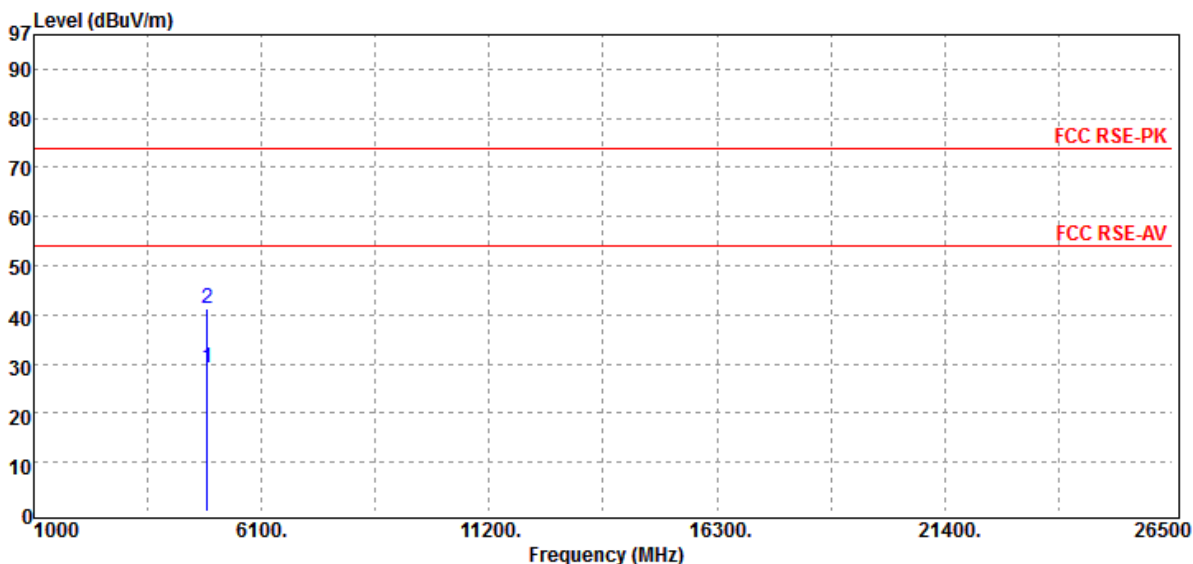
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Operation Band	:EDR(3M)	Test Date	:2017-07-05
Fundamental Frequency	:2441 MHz	Temp./Humi.	:23 deg_C / 62 RH
Operation Mode	:Tx CH MID	Engineer	:Tin
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Safe Margin dB
4882.00	H	Average	24.09	5.18	29.27	54.00	-24.73
4882.00	H	Peak	36.24	5.18	41.42	74.00	-32.58

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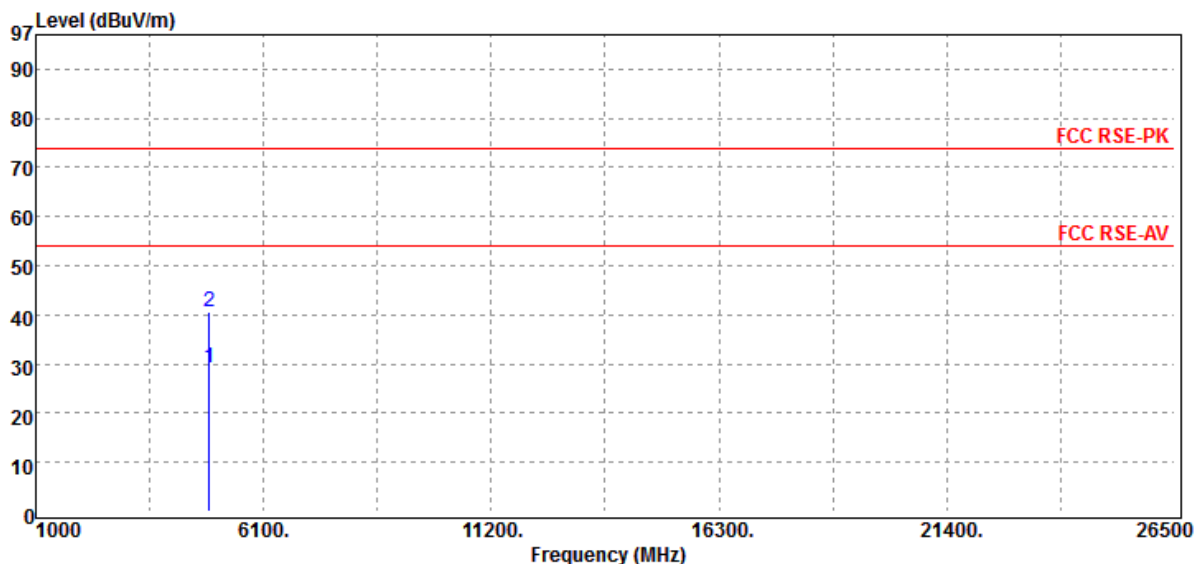
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Operation Band :EDR(3M)
Fundamental Frequency :2441 MHz
Operation Mode :Tx CH MID
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :23 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dB μ V	Factor dB	Actual FS dB μ V / m	Limit @3m dB μ V / m	Safe Margin dB
4882.00	H	Average	24.18	5.18	29.36	54.00	-24.64
4882.00	H	Peak	35.36	5.18	40.54	74.00	-33.46

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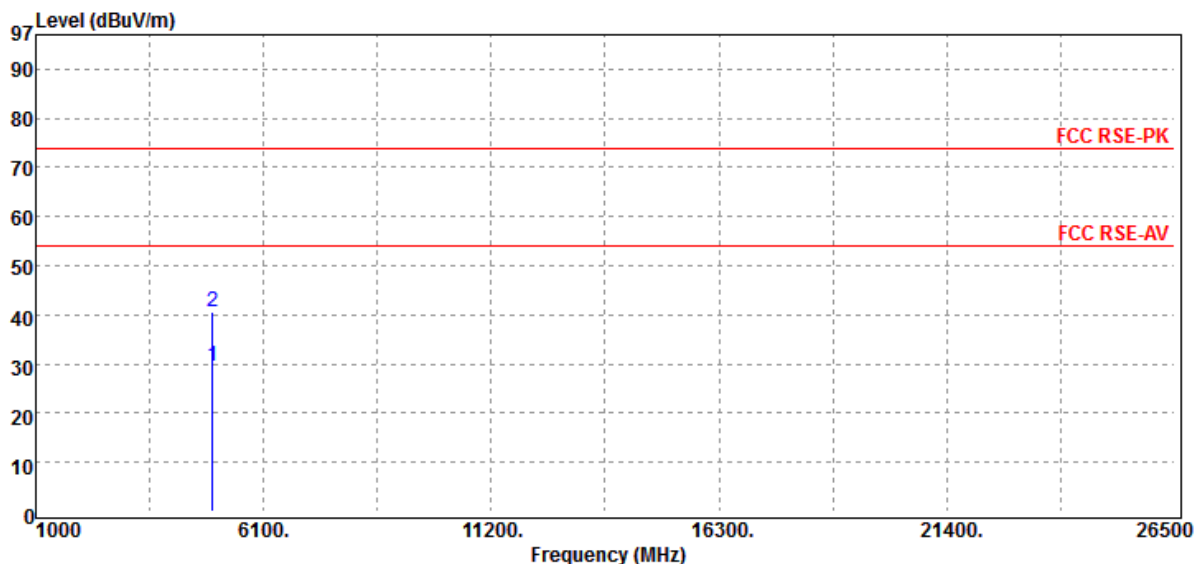
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Operation Band :EDR(3M)
Fundamental Frequency :2480 MHz
Operation Mode :Tx CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :23 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Safe Margin dB
4960.00	H	Average	24.11	5.29	29.40	54.00	-24.60
4960.00	H	Peak	35.47	5.29	40.76	74.00	-33.24

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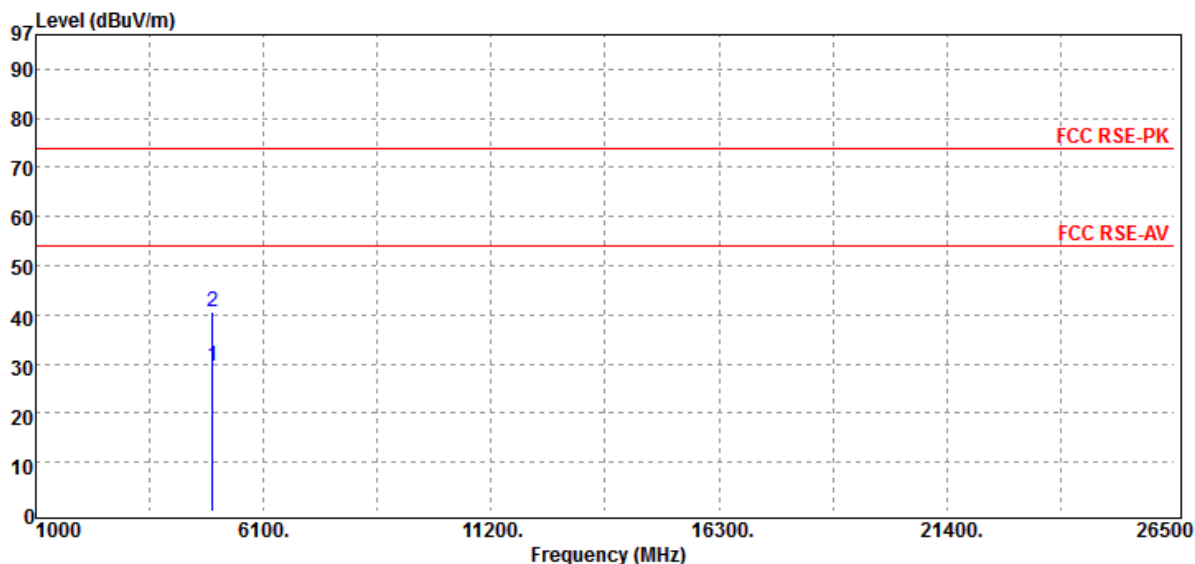
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Operation Band :EDR(3M)
Fundamental Frequency :2480 MHz
Operation Mode :Tx CH HIGH
EUT Pol. :E2 Plane

Test Date :2017-07-05
Temp./Humi. :23 deg_C / 62 RH
Engineer :Tin
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectrum Reading Level dBμV	Factor dB	Actual FS dBμV / m	Limit @3m dBμV / m	Safe Margin dB
4960.00	H	Average	24.14	5.29	29.43	54.00	-24.57
4960.00	H	Peak	35.49	5.29	40.78	74.00	-33.22

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7 RF EXPOSURE

7.1 Standard Applicable:

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Portable device with its physical nature to be used nearby, the distance between radiating structure and human is less than 20cm.

As per KDB 447498 D01 4.3.1, The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g Head & Body SAR and ≤ 7.5 for 10-g extremity Hand SAR, where

*f (GHz) is the RF channel transmit frequency in GHz
Power and distance are rounded to the nearest mW and mm before calculation*

7.2 Measurement Result:

This is a portable device and the max. output power including tune-up tolerance is 3.54 (mW), lower than the threshold given and derived as formula given above, where

$$=3.54(\text{mW})/5(\text{mm}) \cdot \sqrt{2.462 \text{ (GHz)}} = 1.111 < 3.0$$

Frequency (MHz)	Max. output power including tune-up tolerance(dBm)	Max. output power including tune-up tolerance(mW)	Distance (mm)	Result
2462	5.49	3.540	5	1.111

As the result of calculation result indicates, the RF exposure generating from given transmitter (transmitter employed digital modulation) can be excluded from SAR measurement, and is deemed compliant with RF exposure as per FCC.

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The table of quick reference in terms of power threshold

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

Note that the table present above is the table of quick reference, indexing the level of power threshold with respect to the corresponding frequency. The value of the index may be deviated, and therefore, the derivation of exemption based on KDB447498 D01 is used in this test report, relevantly.

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PHOTOGRAPHS OF SET UP

Radiated Emission Set up Photos (Below 1GHz)



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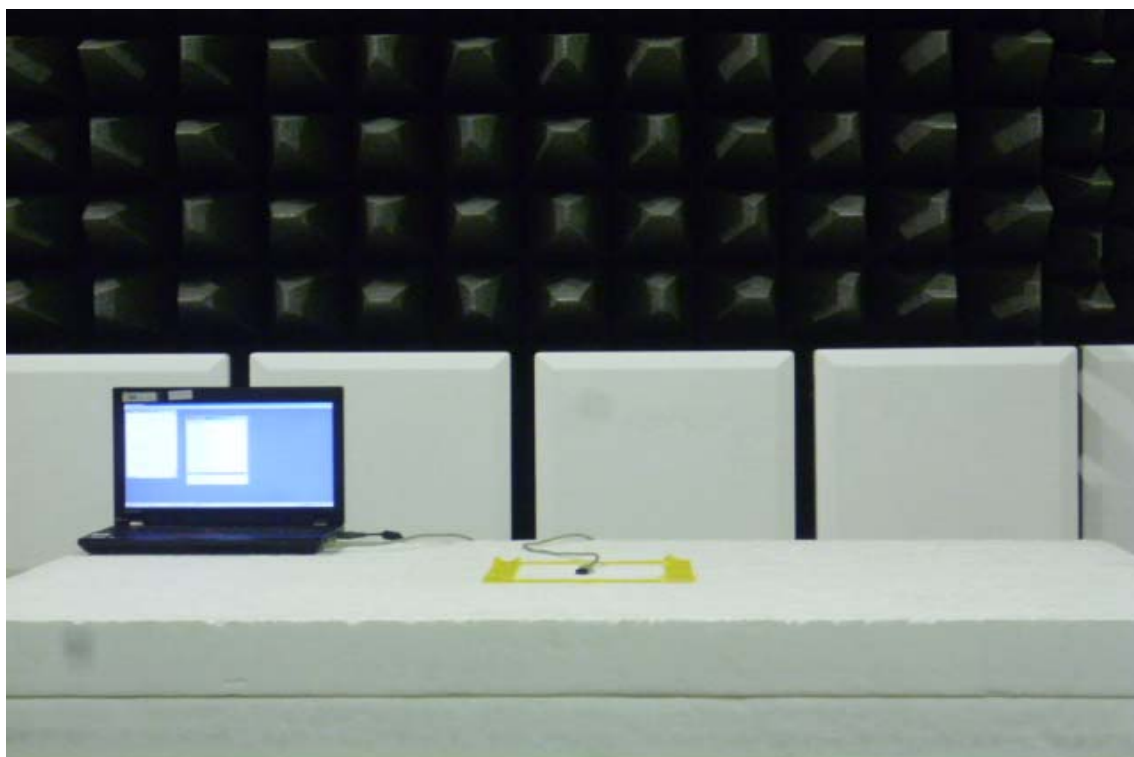
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Radiated Emission Set up Photos (Above 1GHz)



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Conducted Setup Photo (Measurement at Antenna Port)



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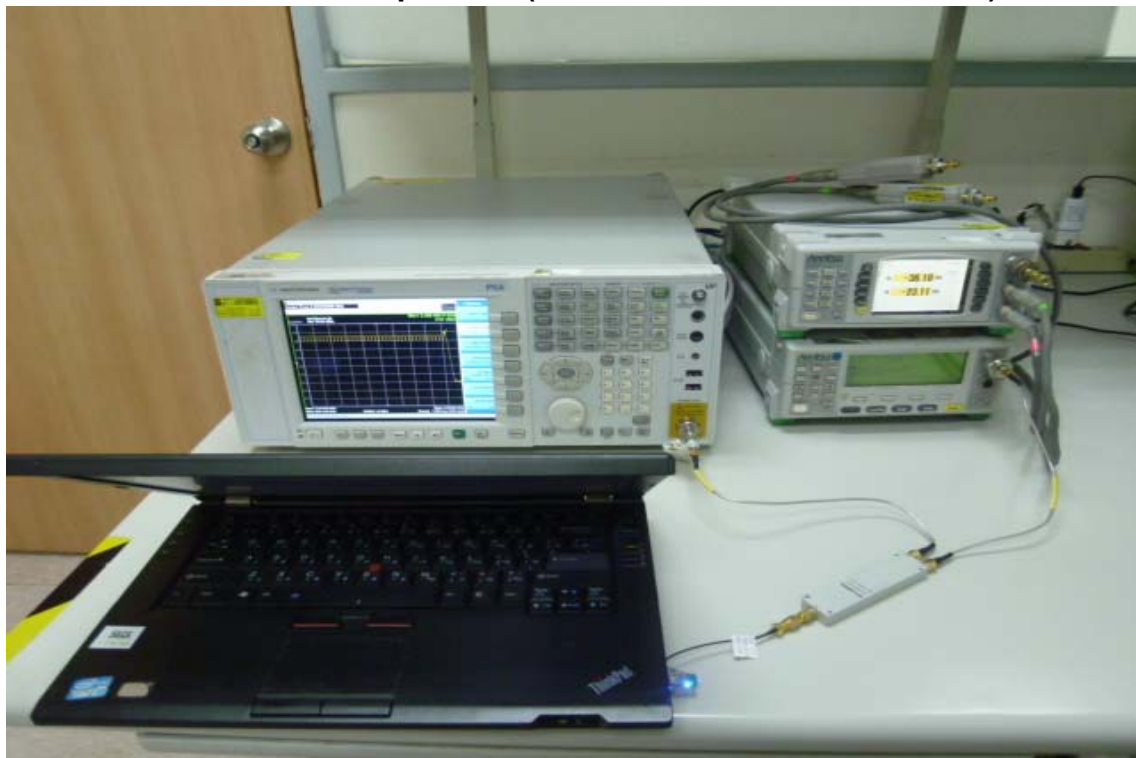
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Conducted Setup Photo (Measurement at Antenna Port)**PHOTOGRAPHS OF EUT**

Please refer to the attached file(EUT Photo)

~ End of Report ~

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