TEST REPORT

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σ	Dt&C	DT&C Co., Ltd. 42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea,17042 Tel : 031-321-2664, Fax : 031-321-1664						
1. Report N	1. Report No : DRTFCC1703-0030(1)							
2. Custome	r							
• Name :	Sena Technologies, Inc							
• Addres	s : 19, Heolleung-ro 569	9-gil, Gangnam-gu, Seoul, South Korea						
3. Use of Re	eport : FCC Original Gra	ant						
4. Product N	lame / Model Name : W	/ireless Interface Module / SP40						
FCC ID :	S7A-SP40							
5. Test Meth	nod Used : KDB 558074	, ANSI C63.10-2013						
Test Spec	cification : FCC Part 15	Subpart C.247						
	RSS-247 Issu	ue 1 (2015-05), RSS-GEN Issue 4 (2014-11)						
6. Date of T	est : 2017.02.17 ~ 2017	.02.27						
7. Testing E	nvironment : See apper	nded test report.						
8. Test Resu	ult : Refer to the attache	d test result.						
Affirmation	Tested by	Technical Manager						
	Name : JungWoo Kim	(Sandrace) Name : HyunSu Son						
		est report are limited only to the sample supplied by applicant and						
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2017.03.23.								
	DT&C Co., Ltd.							

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1703-0030	Mar. 13, 2017	Initial issue
DRTFCC1703-0030(1)	Mar. 23, 2017	Seperated the report for FCC (Delete the IC)

Note: Test report DRTFCC1703-0030(1) issued on Mar. 23, 2017 supercedes previously issued test report DRTFCC1703-0030 on Mar. 13, 2017.

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1. General Information

1.1 Testing Laboratory

DT&C	Co., I	_td.				
Standa	ard	Site num	ıber	Address		
	\square	165783		42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935		
FCC		80448	8	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935		
FUU		596748		42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935		
		67874	7	683-3, Yubang-dong, Cheoin-gu, Yongin-si, Kyeonggi-do, Korea, 449-080		
10		5740A	-3	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935		
IC		5740A	-2	683-3, Yubang-dong, Cheoin-gu, Yongin-si, Kyeonggi-do, Korea, 449-080		
www.d	tnc.ne	<u>et</u>				
Teleph	one	:	+ 82-31-321-2664			
FAX		:	+ 82	2-31-321-1664		

1.2 Test Environment

Ambient Condition				
• Temperature +22 °C ~ +24 °C				
 Relative Humidity 	42 % ~ 47 %			

1.3 Measurement Uncertainty

Test items	Measurement uncertainty		
Transmitter Output Power	0.92 dB (The confidence level is about 95 %, $k = 2$)		
Conducted spurious emission	0.94 dB (The confidence level is about 95 %, $k = 2$)		
Radiated spurious emission (1 GHz Below)	5.1 dB (The confidence level is about 95 %, $k = 2$)		
Radiated spurious emission (1 GHz ~ 18 GHz)	5.4 dB (The confidence level is about 95 %, k = 2)		
Radiated spurious emission (18 GHz Above)	5.3 dB (The confidence level is about 95 %, k = 2)		



1.4 Details of Applicant

Applicant	:	Sena Technologies,Inc.
Address	:	19, Heolleung-ro 569-gil, Gangnam-gu, Seoul, South Korea
Contact person	:	Seunghyun Kim

1.5 Description of EUT

EUT	Wireless Interface Module	
Model Name	SP40	
Add Model Name	NA	
Serial Number	Identical prototype	
Hardware version	1.0	
Software version	1.0	
Power Supply	DC 12 V	
Frequency Range	2402 MHz ~ 2480 MHz	
Module Type0 / Max. RF Output Power	-4.92dBm	
Module Type1 / Max. RF Output Power	-3.36dBm	
Modulation Technique	GFSK	
Antenna Type /Antenna Gain (Module 0)	Internal Antenna / PK : 3.34 dBi	
Antenna Type /Antenna Gain (Module 1)	Internal Antenna / PK : 3.38 dBi	

1.6 Declaration by the applicant / manufacturer

N/A

1.7 Test Equipment List

Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	16/09/09	17/09/09	MY50200834
Digital Multimeter	Agilent Technologies	34401A	17/01/04	18/01/04	US36099541
DC Power Supply	SM techno	SDP30-5D	17/01/05	18/01/05	305DLJ204
Signal Generator	Rohde Schwarz	SMBV100A	17/01/04	18/01/04	255571
Signal Generator	Rohde Schwarz	SMF100A	16/06/23	17/06/23	102341
Thermohygrometer	BODYCOM	BJ5478	16/04/22	17/04/22	120612-2
Loop Antenna	Schwarzbeck	FMZB1513	16/04/22	18/04/22	1513-128
Bilog Antenna	SCHAFFNER	CBL6112B	16/05/23	18/05/23	2737
Horn Antenna	ETS-LINDGREN	3117	16/05/03	18/05/03	00140394
Horn Antenna	A.H.Systems Inc.	SAS-574	15/09/03	17/09/03	155
PreAmplifier	Agilent	8449B	17/01/11	18/01/11	3008A00370
PreAmplifier	tsj	MLA-010K01-B01- 27	16/03/10	17/03/10	1844539
EMI TEST RECEIVER	Rohde Schwarz	ESU	16/07/18	17/07/18	100469
Highpass Filter	Wainwright Instruments	WHKX12-2580- 3000-18000-80SS	16/09/09	17/09/09	3
Highpass Filter	Wainwright Instruments	WHNX6-6320- 8000-26500-40CC	16/09/13	17/09/13	1
Power Meter & Wide Bandwidth	Anritsu	ML2495A	16/05/02	17/05/02	1306007
Sensor	Annitsu	MA2490A	16/05/02	17/05/02	1249001

1.8 Summary of Test Results

FCC Part	RSS Std.	Parameter	Limit	Test Condition	Status Note 1
15.247(a)	RSS-247 [5.2]	6 dB Bandwidth	> 500 kHz		С
15.247(b)	RSS-247 [5.4]	Transmitter Output Power	< 1 Watt		С
15.247(d)	RSS-247 [5.5]	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW	Conducted	с
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8 dBm/3 kHz		с
-	RSS-Gen [6.6]	Occupied Bandwidth (99 %) RSS-Gen(6.6)		-	С
15.247(d) 15.205 15.209	RSS-247 [5.5] RSS-GEN [8.9] RSS-GEN [8.10]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209 limits	Radiated	C Note 2
15.207	RSS-Gen [8.8]	AC Line Conducted Emissions FCC 15.207 limits		AC Line Conducted	NA Note 3
15.203	15.203 RSS-Gen[8.3] Antenna Requirements FCC 15.203		-	С	
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable Note 2: This test item was performed in each axis and the worst case data was reported.					

Note 3 : This device is installed in a motorcycle. Therefore the power source is a battery of motorcycle.

2. Test Methodology

Generally the tests were performed according to the KDB558074 D01 v03r05. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT was operated in the test mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

2.3 General Test Procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB 558074.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

Basically the radiated tests were performed with KDB 558074. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10 as stated on section 12.1 of the KDB 558074.

The EUT is placed on a non-conductive table. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axes.

2.4 Description of Test Modes

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting. The Bluetooth low energy mode with below low, middle and high channels were tested and reported.

		Frequency [MHz]			
	Test Mode	Lowest Frequency	Middle Frequency	Highest Frequency	
TM 1	BT LE	2402	2440	2480	
TM 2	-	-	-	-	
TM 3	-	-	-	-	
TM 4	-	-	-	-	

2.5 Instrument Calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.



3. Test Result

3.1 Maximum Peak Conducted Output Power

Test Requirements and limit, §15.247(b) & RSS-247 [5.4]

A transmitter antenna terminal of EUT is connected to the input of a spectrum analyzer.

Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

3.1.1 Test Setup

Refer to the APPENDIX I.

3.1.2 Test Procedures

Maximum Peak Conducted Output Power is measured using Measurement Procedure Option 1 of KDB558074

- 1. Set the RBW ≥ DTS bandwidth. Actual RBW = 2 MHz
- 2. Set VBW \ge 3 x RBW. Actual VBW = 6 MHz
- 3. Set span ≥ 3 x RBW.
- 4. Sweep time = **auto couple**
- 5. Detector = **peak**
- 6. Trace mode = **max hold**
- 7. Allow trace to fully stabilize
- 8. Use peak marker function to determine the peak amplitude level.

3.1.3 Test Results

<Module 0>

Test mode	Tested Channel	Frame Average Output Power	Peak Output Power
Test mode	Tested Gildinier	dBm	dBm
	Lowest	-10.93	-8.35
TM 1	Middle	-7.37	-4.92
	Highest	-7.65	-5.03

<Module 1>

Test mode	Tested Channel	Frame Average Output Power	Peak Output Power	
		dBm	dBm	
TM 1	Lowest	-9.56	-7.04	
	Middle	-5.78	-3.36	
	Highest	-6.02	-3.60	

Note 1 : The frame average output power was tested using an average power meter for reference only. Note 2 : See next pages for actual measured spectrum plots.

<Module 0>

Peak Output Power



Peak Output Power

Test Channel : Middle

Test Channel : Lowest





Peak Output Power

Test Channel : Highest



<Module 1>

Peak Output Power



Peak Output Power

Test Channel : Middle

Test Channel : Lowest





Peak Output Power

Test Channel : Highest





3.2 6 dB Bandwidth Measurement

Test Requirements and limit, §15.247(a) & RSS-247 [5.2]

The bandwidth at 6 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the EUT's antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6 dB bandwidth is 500 kHz.

3.2.1 Test Setup

Refer to the APPENDIX I.

3.2.2 Test Procedures

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of KDB558074

- 1. Set resolution bandwidth (RBW) = 100 kHz
- 2. Set the video bandwidth (VBW) \ge 3 x RBW.

(<u>RBW : 100 kHz / VBW : 300 kHz</u>)

- 3. Detector = **peak**.
- 4. Trace mode = **max hold**.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.

7. Option 1 - Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Option 2 - The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW \ge 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \ge 6 dB.

3.2.3 Test Results

<Module 0>

Test Mode	Tested Channel	Test Results [MHz]		
TM 1	Lowest	0.709		
	Middle	0.703		
	Highest	0.704		

<Module 1>

Test Mode	Tested Channel Test Results [MHz]		
TM 1	Lowest	0.706	
	Middle	0.703	
	Highest	0.704	



<Module 0>

6 dB Bandwidth

Test Channel : Lowest



6 dB Bandwidth

Test Channel : Middle



6 dB Bandwidth

Test Channel : Highest





<Module 1>

6 dB Bandwidth

Test Channel : Lowest



6 dB Bandwidth

Test Channel : Middle



6 dB Bandwidth

Test Channel : Highest



3.3 Maximum Power Spectral Density.

Test requirements and limit, §15.247(e) & RSS-247 [5.2]

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

3.3.1 Test Setup

Refer to the APPENDIX I.

3.3.2 Test Procedures

Method PKPSD of KDB558074 is used.

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to **1.5 times** the DTS bandwidth.
- 3. Set the RBW : $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- 4. Set the VBW \geq **3 x RBW**.
- 5. Detector = **peak.**
- 6. Sweep time = **auto couple.**
- 7. Trace mode = **max hold.**
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

3.3.3 Test Results

<Module 0>

Test Mode	Tested Channel	PKPSD [dBm]		
TM 1	Lowest	-24.83		
	Middle	-21.19		
	Highest	-21.25		

<Module 1>

Test Mode	Tested Channel	PKPSD [dBm]	
TM 1	Lowest	-22.97	
	Middle	-19.23	
	Highest	-19.50	

<Module 0>

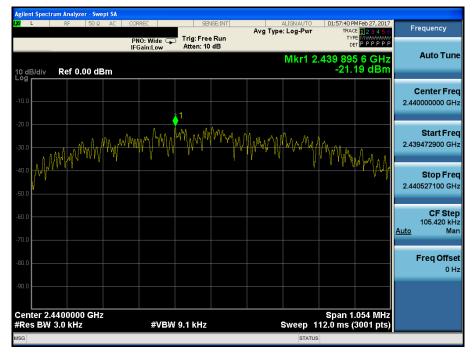
ent Spectrum Analyzer - Swept SA Feb 27, 2017 Frequency Avg Type: Log-Pwr RACE 2 3 4 5 6 TYPE MWAAAAAAA DET P P P P P P PNO: Wide 😱 IFGain:Low Trig: Free Run Atten: 10 dB Auto Tune Mkr1 2.40 2 004 3 GHz -24.83 dBm Ref 0.00 dBm 10 dB/div **Center Freq** 2.402000000 GHz Start Freq Mar Manager MWWM Anna 2.401468475 GHz MAN Stop Freq 2.402531525 GHz CF Step 106.305 kHz <u>Auto</u> Man Freq Offset 0 Hz Center 2.4020000 GHz #Res BW 3.0 kHz Span 1.063 MHz Sweep 112.8 ms (3001 pts) #VBW 9.1 kHz

Maximum PKPSD

Maximum PKPSD

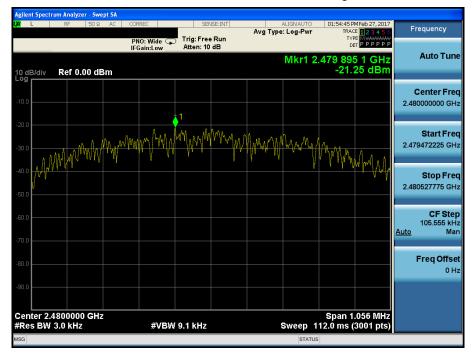
Test Channel : Middle

Test Channel : Lowest



Maximum PKPSD

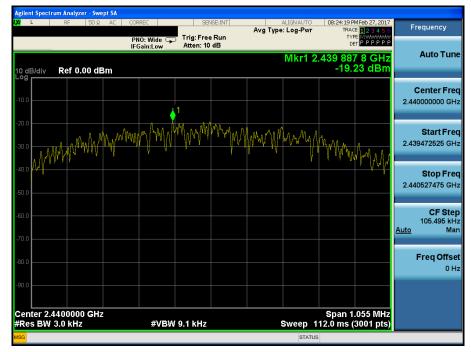
Test Channel : Highest



<Module 1>

Maximum PKPSD Test Channel : Lowest nt Spectrum Analyzer - Swept SA 08:21:46 PMFeb 27, 2017 Frequency Avg Type: Log-Pwr RACE 2 3 4 5 6 TYPE MWAAAAAAA DET P P P P P P PNO: Wide Trig: Free Run Mkr1 2.401 996 5 GHz -22.97 dBm Auto Tune Ref 0.00 dBm 3/div **Center Freq** 2.402000000 GHz Munnhummh Juny Start Freq MMMM MANAMAA 2.401470275 GHz the work with AMM Stop Freq 2.402529725 GHz CF Step 105.945 kHz <u>Auto</u> Man Freq Offset 0 Hz Center 2.4020000 GHz #Res BW 3.0 kHz Span 1.059 MHz Sweep 112.6 ms (3001 pts) #VBW 9.1 kHz Test Channel : Middle

Maximum PKPSD



Maximum PKPSD

Test Channel : Highest



3.4 Unwanted Emissions (Conducted)

Test requirements and limit, §15.247(d) & RSS-247 [5.5]

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions :

If **the peak output power procedure** is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20 dB** relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured inband average PSD level. In either case, attenuation to levels below the general emission limits specified in **§15.209(a)** is not required.

3.4.1 Test Setup

Refer to the APPENDIX I including path loss

3.4.2 Test Procedures

The transmitter output is connected to a spectrum analyzer.

- Measurement Procedure 1 Reference Level
- 1. Set instrument center frequency to DTS channel center frequency.
- 2. Set the span to \geq 1.5 times the DTS bandwidth.
- 3. Set the RBW = 100 kHz.
- 4. Set the VBW \geq 3 x RBW.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum PSD level LIMIT LINE = 20 dB below of the reference level.

- Measurement Procedure 2 - Unwanted Emissions

- 1. Set the center frequency and span to encompass frequency range to be measured.
- 2. Set the RBW = 100 kHz.(Actual 1 MHz , See below note)
- 3. Set the VBW ≥ 3 x RBW.(Actual 3 MHz, See below note)
- 4. Detector = **peak**.
- 5. Ensure that the number of measurement points ≥ span / RBW
- 6. Sweep time = auto couple.
- 7. Trace mode = **max hold.**
- 8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
- 9. Use the peak marker function to determine the maximum amplitude level.

Note : The conducted spurious emission was tested with below settings.

Frequency range	RBW	VBW	Detector	Trace	Sweep Point
9 kHz ~ 30 MHz	100 kHz	300 kHz			
30 MHz ~ 10 GHz	1 MHz	3 MHz	Peak	Max Hold	40001
10 GHz ~ 25 GHz	1 MHz	3 MHz			

If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

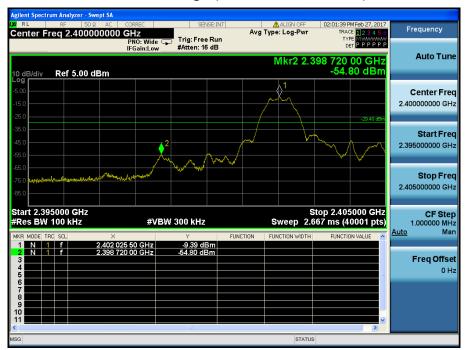
3.4.3 Test Results

<Module 0>



Reference (Test Channel : Lowest)

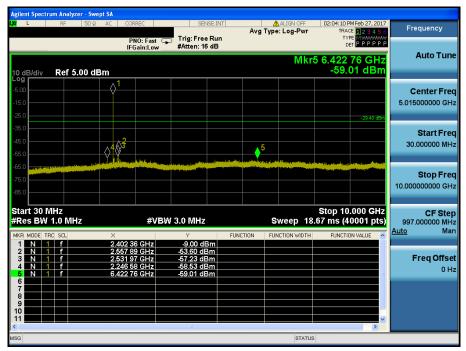
Low Band-edge (Test Channel : Lowest)



ALIGN OFF Frequency Center Freq 15.004500 MHz PNO: Fast Trig: Free Run IFGain:Low #Atten: 16 dB TYPE MWWWWWW DET P P P P P Auto Tune Mkr2 297.7 kHz -68.54 dBm Ref 5.00 dBm 10 dB/div **Center Freq** 15.004500 MHz Start Freq 9.000 kHz Stop Freq 30.000000 MHz **CF Step** 2.999100 MHz Man Start 9 kHz #Res BW 100 kHz Stop 30.00 MHz Sweep 5.333 ms (40001 pts) #VBW 300 kHz Auto -68.54 dBm -68.54 dBm N 1 f N 1 f 297.7 kHz 297.7 kHz Freq Offset 0 Hz DC Coupled

Conducted Spurious Emissions 1 (Test Channel : Lowest)

Conducted Spurious Emissions 2 (Test Channel : Lowest)



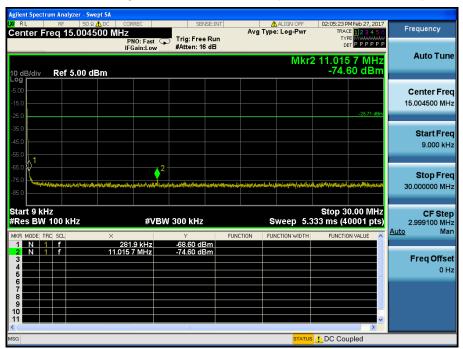
Conducted Spurious Emissions 3 (Test Channel : Lowest)

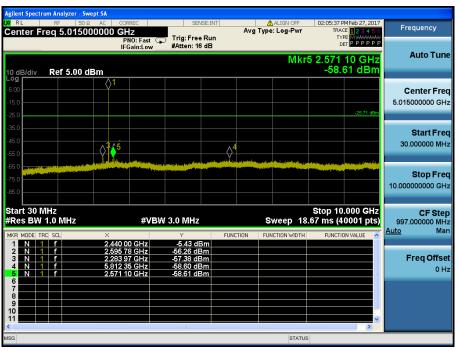




Reference (Test Channel : Middle)

Conducted Spurious Emissions 1 (Test Channel : Middle)





Conducted Spurious Emissions 2 (Test Channel : Middle)

Conducted Spurious Emissions 3 (Test Channel : Middle)







Reference (Test Channel : Highest)

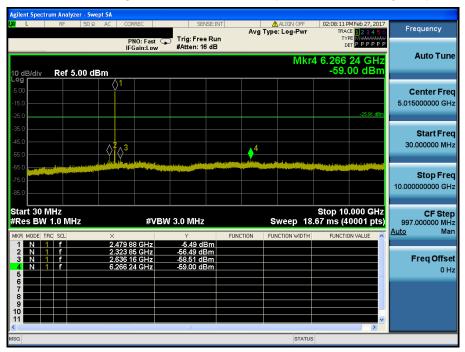
High Band-edge (Test Channel : Highest)



Frequency ALIGN OFF Avg Type: Log-Pwr Center Freq 15.004500 MHz PNO: Fast Trig: Free Run IFGain:Low #Atten: 16 dB TYPE MWWWWWW DET P P P P P Auto Tune Mkr2 19.859 3 MHz -74.88 dBm Ref 5.00 dBm 10 dB/div Log **Center Freq** 15.004500 MHz Start Freq 9.000 kHz 2 Stop Freq 30.000000 MHz **CF Step** 2.999100 MHz Man Start 9 kHz #Res BW 100 kHz Stop 30.00 MHz Sweep 5.333 ms (40001 pts) #VBW 300 kHz Auto -68.57 dBm -74.88 dBm N 1 f N 1 f 287.9 kHz 19.859 3 MHz Freq Offset 0 Hz DC Coupled

Conducted Spurious Emissions 1 (Test Channel : Highest)

Conducted Spurious Emissions 2 (Test Channel : Highest)





Conducted Spurious Emissions 3 (Test Channel : Highest)





<Module 1>

Dt&C

:40 PMFe TRACE ALIGN OFF Frequency Auto Tune Mkr1 2.402 018 GHz -7.58 dBm Ref 5.00 dBm 10 dB/div **Center Freq** 2.402000000 GHz Start Freq 2.400500000 GHz Stop Freq 2.403500000 GHz **CF Step** 300.000 kHz Man <u>Auto</u> Freq Offset 0 Hz Center 2.402000 GHz #Res BW 100 kHz Span 3.000 MHz Sweep 1.000 ms (3001 pts) #VBW 300 kHz

Reference (Test Channel : Lowest)

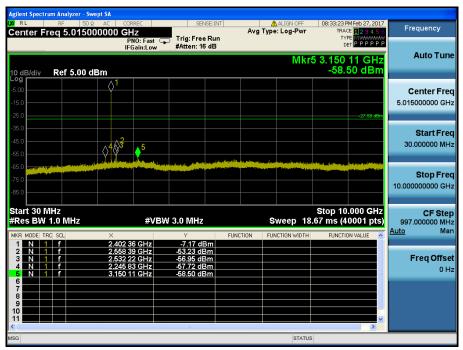
Low Band-edge (Test Channel : Lowest)



Frequency Center Freq 15.004500 MHz Avg Type: Log-Pwr TRACE PNO: Fast Trig: Free Run IFGain:Low #Atten: 16 dB DET P P P P P P Auto Tune Mkr2 281.9 kHz -69.04 dBm Ref 5.00 dBm 10 dB/div **Center Freq** 15.004500 MHz Start Freq 9.000 kHz Stop Freq 30.000000 MHz **CF Step** 2.999100 MHz Man Start 9 kHz #Res BW 100 kHz Stop 30.00 MHz Sweep 5.333 ms (40001 pts) #VBW 300 kHz Auto -69.04 dBm -69.04 dBm N 1 f N 1 f 281.9 kHz 281.9 kHz Freq Offset 0 Hz DC Coupled

Conducted Spurious Emissions 1 (Test Channel : Lowest)

Conducted Spurious Emissions 2 (Test Channel : Lowest)





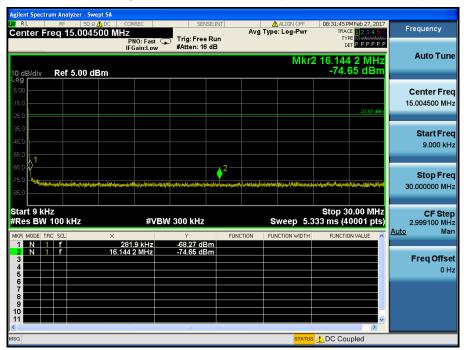
Conducted Spurious Emissions 3 (Test Channel : Lowest)

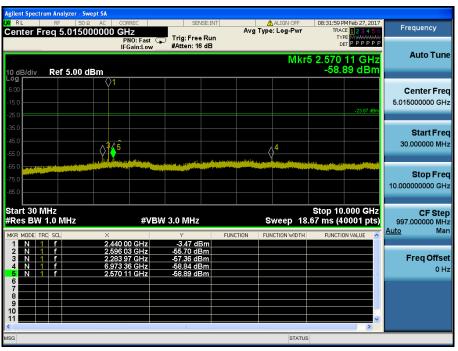




Reference (Test Channel : Middle)

Conducted Spurious Emissions 1 (Test Channel : Middle)





Conducted Spurious Emissions 2 (Test Channel : Middle)

Conducted Spurious Emissions 3 (Test Channel : Middle)





Reference (Test Channel : Highest)

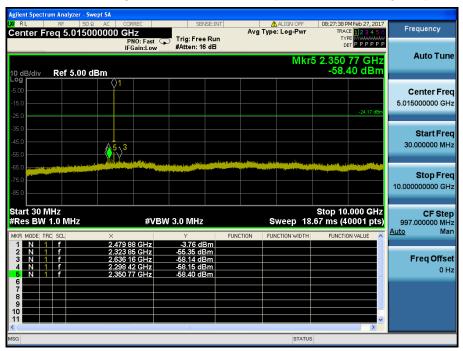
High Band-edge (Test Channel : Highest)



Frequency ALIGN OFF Center Freq 15.004500 MHz TRACE PNO: Fast Trig: Free Run IFGain:Low #Atten: 16 dB TYPE MWWWWWW DET P P P P P P Auto Tune Mkr2 291.7 kHz -68.33 dBm Ref 5.00 dBm 10 dB/div **Center Freq** 15.004500 MHz Start Freq 9.000 kHz Stop Freq 30.000000 MHz **CF Step** 2.999100 MHz Man Start 9 kHz #Res BW 100 kHz Stop 30.00 MHz Sweep 5.333 ms (40001 pts) #VBW 300 kHz Auto -68.33 dBm -68.33 dBm N 1 f N 1 f 291.7 kHz 291.7 kHz Freq Offset 0 Hz DC Coupled

Conducted Spurious Emissions 1 (Test Channel : Highest)

Conducted Spurious Emissions 2 (Test Channel : Highest)





Conducted Spurious Emissions 3 (Test Channel : Highest)



3.5 Unwanted Emissions (Radiated)

Test Requirements and limit,

§15.247(d), §15.205, §15.209 & RSS-247 [5.5], RSS-Gen [8.9], RSS-Gen [8.10]

In any 100 kHz bandwidth outside the operating frequency band. In case the emission

fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed

- FCC Part 15.209(a) and (b)

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 MHz, 76 ~ 88 MHz, 174 ~ 216 MHz or 470 ~ 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

• FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240	3600 ~ 4400		
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

• FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.



3.5.1 Test Setup

Refer to the APPENDIX I.

3.5.2 Test Procedures

- 1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Repeat above procedures until the measurements for all frequencies are complete.

Note: Measurement Instrument Setting for Radiated Emission Measurements.

1. Frequency Range Below 1 GHz

RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak

2. Frequency Range > 1 GHz

Peak Measurement > 1 GHz

RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Sweep time = Auto, Trace mode = Max Hold until the trace stabilizes **Average** Measurement> **1GHz**

- 1. RBW = 1 MHz (unless otherwise specified).
- 2. VBW \geq 3 x RBW.
- 3. Detector = RMS (Number of points ≥ 2 x Span / RBW)
- 4. Averaging type = power (i.e., RMS).
- 5. Sweep time = auto.
- 6. Perform a trace average of at least 100 traces.
- 7. A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
- 1) If power averaging (RMS) mode was used in step 4, then the applicable correction factor is 10 log(1/x), where x is the duty cycle.
- 2) If linear voltage averaging mode was used in step 4, then the applicable correction factor is 20 log(1/x), where x is the duty cycle.
- If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

<Module 0>

Test Mode	Duty Cycle (%)	T _{on} (ms)	T _{on} + T _{off} (ms)	DCF = 10 log(1/Duty) (dB)
TM 1	60.62	0.394	0.650	2.17

<Module 1>

Test Mode	Duty Cycle (%)	T _{on} (ms)	T _{on} + T _{off} (ms)	DCF = 10 log(1/Duty) (dB)	
TM 1	60.62	0.394	0.650	2.17	

Note : Refer to appendix II for duty cycle measurement procedure and plots



3.5.3 Test Results

<Module 0>

Frequency Range : 9 kHz ~ 25 GHz

Lowest Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2376.66	Н	Х	PK	46.77	0.78	N/A	N/A	47.55	74.00	26.45
2375.90	Н	Х	AV	35.91	0.78	2.17	N/A	38.86	54.00	15.14
4802.71	Н	Х	PK	44.87	7.63	N/A	N/A	52.50	74.00	21.50
4802.15	Н	Х	AV	33.98	7.63	2.17	N/A	43.78	54.00	10.22

Middle Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4880.31	Н	Х	PK	44.64	7.36	N/A	N/A	52.00	74.00	22.00
4880.02	Н	Х	AV	34.03	7.36	2.17	N/A	43.56	54.00	10.44

Highest Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.54	Н	Х	PK	55.19	1.16	N/A	N/A	56.35	74.00	17.65
2483.51	Н	Х	AV	45.87	1.16	2.17	N/A	49.20	54.00	4.80
4960.58	Н	Х	PK	44.89	7.48	N/A	N/A	52.37	74.00	21.63
4960.90	Н	Х	AV	34.49	7.48	2.17	N/A	44.14	54.00	9.86

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3 m to 1 m. In this case, the distance factor(-9.54 dB) is applied to the result. - Calculation of distance factor = 20 log(applied distance / required distance) = $20 \log(1 \text{ m} / 3 \text{ m}) = -9.54 \text{ dB}$

When distance factor is "N/A", the distance is 3 m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit - Result / Result = Reading + T.F + D.C.F / T.F = AF + CL - AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.



<Module 1>

Frequency Range : 9 kHz ~ 25 GHz

Lowest Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2376.22	Н	Х	PK	47.10	0.78	N/A	N/A	47.88	74.00	26.12
2376.22	Н	Х	AV	36.51	0.78	2.17	N/A	39.46	54.00	14.54
4802.37	Н	Х	PK	44.50	7.63	N/A	N/A	52.13	74.00	21.87
4802.93	Н	Х	AV	34.21	7.63	2.17	N/A	44.01	54.00	9.99

Middle Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4879.65	Н	Х	PK	45.94	7.36	N/A	N/A	53.30	74.00	20.70
4879.07	Н	Х	AV	34.00	7.36	2.17	N/A	43.53	54.00	10.47

Highest Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.59	Н	Х	PK	55.74	1.16	N/A	N/A	56.90	74.00	17.10
2483.53	Н	Х	AV	44.92	1.16	2.17	N/A	48.25	54.00	5.75
4961.25	Н	Х	PK	45.23	7.48	N/A	N/A	52.71	74.00	21.29
4961.63	Н	Х	AV	34.23	7.48	2.17	N/A	43.88	54.00	10.12

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3 m to 1 m. In this case, the distance factor(-9.54 dB) is applied to the result.

- Calculation of distance factor = 20 log(applied distance / required distance) = 20 log(1 m / 3 m) = -9.54 dB

When distance factor is "N/A", the distance is 3 m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit - Result / Result = Reading + T.F + D.C.F / T.F = AF + CL - AG

 $\label{eq:Where, T.F = Total Factor, \quad AF = Antenna \ Factor, \quad CL = Cable \ Loss, \quad AG = Amplifier \ Gain,$

DCF = Duty Cycle Correction Factor.



3.6 Power line Conducted Emissions

Test Requirements and limit, §15.207 & RSS-Gen [8.8]

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies,

within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

	Conducted Limit (dBuV)					
Frequency Range (MHz)	Quasi-Peak	Average				
0.15 ~ 0.5	66 to 56 *	56 to 46 *				
0.5 ~ 5	56	46				
5 ~ 30	60	50				

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

3.6.1 Test Setup

See test photographs for the actual connections between EUT and support equipment.

3.6.2 Test Procedures

Conducted emissions from the EUT were measured according to the ANSI C63.10.

- The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
- 2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
- 3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
- 4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

3.6.3 Test Results

NA

3.7 Occupied Bandwidth

Test Requirements, RSS-Gen [6.6]

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 % emission bandwidth, as calculated or measured.

3.7.1 Test Setup

3.7.2 Test Procedures

The 99 % power bandwidth was measured with a calibrated spectrum analyzer.

The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately $3 \times RBW$.

Spectrum analyzer plots are included on the following pages.

3.7.3 Test Results

<Module 0>

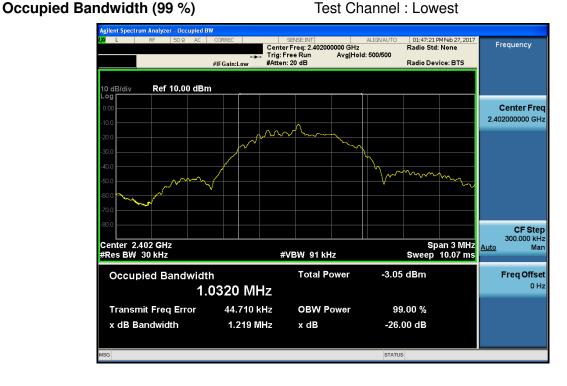
Test Mode	Tested Channel	Test Results (MHz)		
	Lowest	1.032		
TM 1	Middle	1.023		
	Highest	1.023		

<Module 1>

Test Mode	Tested Channel	Test Results (MHz)
	Lowest	1.028
TM 1	Middle	1.023
	Highest	1.024



<Module 0>

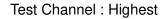


Occupied Bandwidth (99 %)

Test Channel : Middle



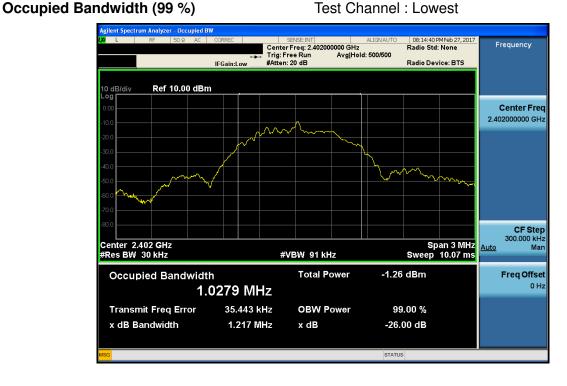
Occupied Bandwidth (99 %)







<Module 1>

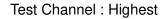


Occupied Bandwidth (99 %)

Test Channel : Middle



Occupied Bandwidth (99 %)





4. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203 & RSS-Gen [8.3]

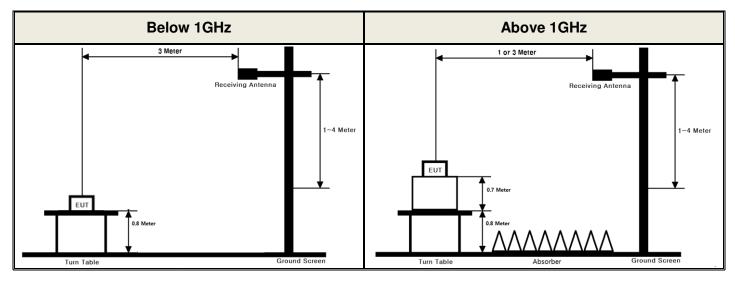
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

The antenna is printed to the internal PCB (Refer to Internal Photo file.) Therefore this E.U.T Complies with the requirement of §15.203.

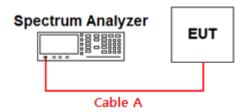
APPENDIX I

Test set up diagrams

Radiated Measurement



Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	0.18	15	3.50
1	0.80	20	4.86
2.402 & 2.440 & 2.480	1.30	25	5.35
5	1.82	ŀ	-
10	2.70	-	-

Note 1: The path loss from EUT to Spectrum analyzer was measured and used for test. Path loss (S/A's correction factor) = Cable A (Attenuator, Applied only when it was used externally)

FCC ID: S7A-SP40

APPENDIX II

Duty cycle plots

Test Procedure

Duty Cycle was measured using section 6.0 b) of KDB558074 :

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW \geq OBW if possible; otherwise, set RBW to the largest available value. Set VBW \geq RBW. Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T \leq 16.7 microseconds.)

<Module 0>

Duty Cycle

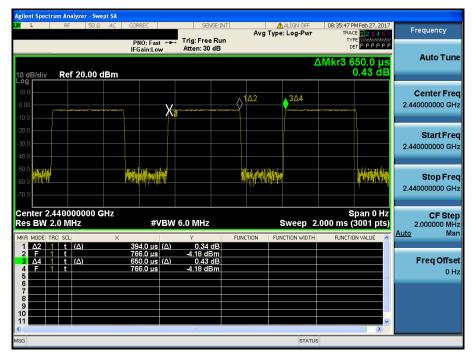
Swept SA Frequency Avg Type: Log-Pwr Trig: Free Run Atten: 30 dB PNO: Fast IFGain:Lov Auto Tune ∆Mkr3 0.10 di Ref 20.00 dBm **Center Freq** 2.44000000 GH; X. Start Freq 2.440000000 GHz Stop Freq 2.44000000 GHz Span 0 Hz Sweep 2.000 ms (3001 pts) Center 2.440000000 GHz Res BW 2.0 MHz CF Step 2.000000 MHz Man #VBW 6.0 MHz Auto 51 Freq Offset 0.10 -5.82 c 0 Hz

Test Channel : Middle

<Module 1>

Duty Cycle

Test Channel : Middle



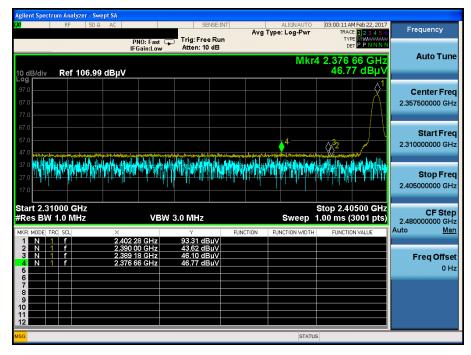


APPENDIX III

Unwanted Emissions (Radiated) Test Plot

<Module 0>

TM1 & Lowest & X & Hor



TM1 & Lowest & X & Hor

Detector Mode : AV

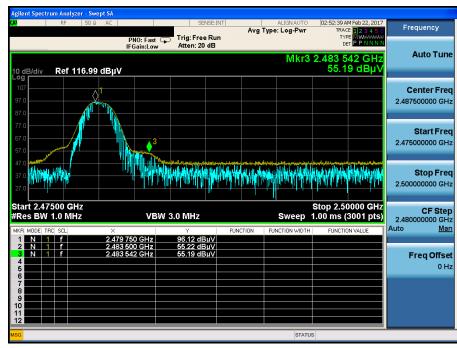
Detector Mode : PK

	RF	50 Q	AC		SEN	ISE:INT		ALIGNAUTO Pwr(RMS)	TRAC	M Feb 22, 2017	Frequency
				NO: Fast + Gain:Low	Trig: Free Atten: 10		Avg Hold	200/200	TYP	E A WWWWW T A P N N N N	
								Mkr4	1 2.375		Auto Tu
l0 dB/div _og r	Ref '	106.99	dBµV	1					35.90	9 dBµV	
97.0											Center Fr
87.0										- Å	2.357500000 G
77.0											
67.0											Start Fr
57.0										- N	2.310000000 G
47.0								4		- difference	
		to shall		the state of the late	e lleneration d	At the state of the	the set of the set	be set the street of the	743		
			HAR HAR	and the build	n de statistic de New Hereiter	in the		A NUMBER OF STREET			Stop Fr
27.0			Million Andrea	n hinn h			a the state of the				Stop Fr 2.405000000 G
			n an			***					
27.0 17.0 Start 2.3	31000 G	Hz	n de la compañía					to Klaith.U	Stop 2.40	0500 GHz	2.405000000 G
27.0 17.0 Start 2.3 #Res BV	31000 G N 1.0 MI	Hz			V 3.0 MHz*	, dist, d or d		Sweep	Stop 2.40	3001 pts)	2.405000000 G CF St 2.480000000 G
27.0 17.0 Start 2.3 Res BV	31000 G N 1.0 MI	Hz	×	VBV	V 3.0 MHz*	FUN		to Klaith.U	Stop 2.40		2.405000000 G CF St 2.480000000 G
27.0 17.0 Start 2.3 #Res BV MKR MODE 1 N 2 N	31000 G N 1.0 MI	Hz	× 2.402 0 2.390 0	VBV 6 GHz 0 GHz	V 3.0 MHz* V 3.0 MHz* 90.414 dB/ 35.248 dB/	FUN PV		Sweep	Stop 2.40	3001 pts)	2.405000000 G CF St 2.480000000 G Auto <u>M</u>
27.0 17.0 Start 2.3 #Res BW MKR MODE 1 N 2 N 3 N 4 N	31000 G N 1.0 MI	Hz	× 2.402 C	VBV 6 GHz 0 GHz 7 GHz	V 3.0 MHz*	FUN HV		Sweep	Stop 2.40	3001 pts)	2.40500000 G CF St 2.48000000 G Auto <u>M</u> Freq Offe
27.0 17.0 Start 2.3 #Res BW MKR MODE 1 N 2 N 3 N	31000 G N 1.0 MI	Hz	× 2.402 0 2.390 0 2.389 2	VBV 6 GHz 0 GHz 7 GHz	V 3.0 MHz* V 3.0 MHz* <u> 90.414 dB</u> 35.248 dB 35.424 dB	FUN HV		Sweep	Stop 2.40	3001 pts)	2.405000000 G CF St 2.480000000 G Auto <u>M</u>
27.0 17.0 Start 2.3 #Res BV MKR MODE 1 1 2 N 3 N 4 N 5 6 7	31000 G N 1.0 MI	Hz	× 2.402 0 2.390 0 2.389 2	VBV 6 GHz 0 GHz 7 GHz	V 3.0 MHz* V 3.0 MHz* <u> 90.414 dB</u> 35.248 dB 35.424 dB	FUN HV		Sweep	Stop 2.40	3001 pts)	2.40500000 G CF St 2.48000000 G Auto <u>M</u> Freq Offe
27.0 17.0 Start 2.3 #Res BU #KR MODE 1 N 2 N 3 N 4 N 5 6 6 7 8 9	31000 G N 1.0 MI	Hz	× 2.402 0 2.390 0 2.389 2	VBV 6 GHz 0 GHz 7 GHz	V 3.0 MHz* V 3.0 MHz* <u> 90.414 dB</u> 35.248 dB 35.424 dB	FUN HV		Sweep	Stop 2.40	3001 pts)	2.40500000 G CF St 2.48000000 G Auto <u>M</u> Freq Offe
27.0 17.0 Start 2.3 ¢Res BV MKR MODE 1 N 2 N 3 N 5 6 6 7 8	31000 G N 1.0 MI	Hz	× 2.402 0 2.390 0 2.389 2	VBV 6 GHz 0 GHz 7 GHz	V 3.0 MHz* V 3.0 MHz* <u> 90.414 dB</u> 35.248 dB 35.424 dB	FUN HV		Sweep	Stop 2.40	3001 pts)	2.40500000 G CF St 2.48000000 G Auto <u>M</u> Freq Offe

Dt&C

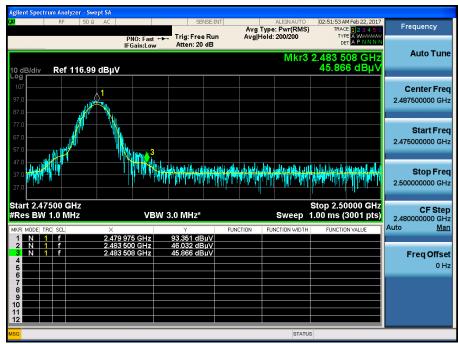
TM1 & Highest & X & Hor





Detector Mode : AV

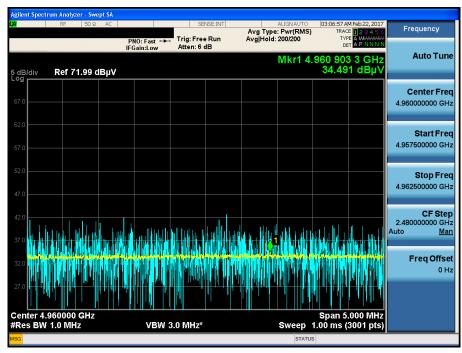
TM1 & Highest & X & Hor





TM1 & Highest & X & Hor

Detector Mode : AV





<Module 1>

TM1 & Lowest & X & Hor

Detector Mode : PK

RF	50 Ω AC		SENSE:I	T	ALIGN AUTO	03:31:02 AM	Feb 22, 2017	-
		PNO: Fast 🔾	Trig: Free Rui Atten: 10 dB		pe: Log-Pwr	TYPE	123456 MWATAAAAA PPNNNN	Frequency
) dB/div Ref 1	06.99 dBµV	IFGain:Low	Atten: 10 dB		Mkr	4 2.376 2		Auto Tur
17.0	оо.99 авµv							Center Fre 2.357500000 Gi
57.0 57.0	Norw period and the drive of the option of	alaurahan Martin at Martingan		n valar mar mar	4	2		Start Fre 2.310000000 GF
87.0 4444444444444444 27.0	*****		YHHN ATHY YH		r wydyniad y	y photo fin		Stop Fr 2.405000000 G
tart 2.31000 GH Res BW 1.0 MH		VBW	3.0 MHz		Sweep	Stop 2.40 1.00 ms (3		CF St 2.480000000 G
KR MODE TRC SCL	× 2.40	02 34 GHz	Y 92.21 dBµV	FUNCTION	FUNCTION WIDTH	FUNCTION	VALUE	Auto <u>M</u>
2 N 1 f 3 N 1 f 4 N 1 f	2.3	90 00 GHz 89 94 GHz 76 22 GHz	44.71 dBμV 45.63 dBμV 47.10 dBμV					Freq Offs 0
5								
5 6 7 8 9								

Detector Mode : AV

TM1 & Lowest & X & Hor

Agilent Spectrum Analyzer - Swept SA					
LXI RF 50Ω AC	PNO: Fast ↔→	SENSE:INT	ALIGNAUTO Avg Type: Pwr(RMS) Avg Hold: 200/200	TYPE A WARAAAAA	Frequency
10 dB/div Ref 106.99 dBµ	IFGain:Low	Atten: 10 dB	Mkr	4 2.376 22 GHz 36.510 dBμV	Auto Tune
97.0 87.0 77.0				Å	Center Freq 2.357500000 GHz
67.0 57.0 47.0			4		Start Freq 2.310000000 GHz
37.0 11.1 11.1 11.1 11.1 11.1 11.1 11.1 1			a fan de fan Einer fan de f		Stop Fred 2.405000000 GH;
Start 2.31000 GHz #Res BW 1.0 MHz	VBW 3	.0 MHz*		Stop 2.40500 GHz 1.00 ms (3001 pts)	CF Step 2.48000000 GH
MKR MODE TRC SCL X		Y FUN B8.892 dBuV	CTION FUNCTION WIDTH	FUNCTION VALUE	Auto <u>Mar</u>
2 N 1 f 2 3 N 1 f 2 4 N 1 f 2 5	.390 00 GHz .389 91 GHz	34.948 dBμV 35.611 dBμV 36.510 dBμV			Freq Offset 0 Hz
6 7 8 9 10					
11 12 MSG			STATU		

Dt&C

TM1 & Highest & X & Hor

Detector Mode : PK

RF 50 S	Ω AC	SENSE:INT	ALIGNAUTO	03:26:52 AM Feb 22, 2017	Frequency
	PNO: Fast	Trig: Free Run Atten: 20 dB	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P N N N N	- requeries
dB/div Ref 116.9	IFGain:Low	Atten: 20 dB	Mkr3	2.483 592 GHz 55.74 dBµV	Auto Tune
					Center Freq 2.487500000 GHz
					Start Freq 2.475000000 GHz
	MARINA TIMUN M	han	materia de la companya de la company	n an the product of the last	Stop Freq 2.500000000 GHz
art 2.47500 GHz es BW 1.0 MHz	× ×	W 3.0 MHz	Sweep	Stop 2.50000 GHz 1.00 ms (3001 pts)	CF Step 2.480000000 GHz Auto Man
N 1 f N 1 f N 1 f	2.479 750 GHz 2.483 500 GHz 2.483 592 GHz	97.77 dBµV 55.45 dBµV 55.74 dBµV			Freq Offset 0 Hz

Detector Mode : AV

TM1 & Highest & X & Hor

Agilent Spectrum Analyzer - Swept SA							
LXI RF 50Ω AC		SENSE:I	Avg T	ALIGNAUTO ype: Pwr(RMS)	TRAC	M Feb 22, 2017 E 123456	Frequency
10 dB/div Ref 116.99 dBµV	PNO: Fast ↔ IFGain:Low	- Trig: Free Ru Atten: 20 dB	n AvgjH	old: 200/200 Mkr3	DE 2.483 5	25 GHz 5 dBµV	Auto Tune
107 97.0 87.0							Center Freq 2.487500000 GHz
77.0 67.0 57.0	3						Start Freq 2.475000000 GHz
47.0 37.0 11.1 27.0			n han te the second		de la constante		Stop Freq 2.500000000 GHz
Start 2.47500 GHz #Res BW 1.0 MHz	VBW	3.0 MHz*		Sweep ′	1.00 ms (0000 GHz 3001 pts)	CF Step 2.480000000 GHz Auto Man
MKR MODE TRC SCL X	008 GHz	⊻ 94,790 dBuV	FUNCTION	FUNCTION WIDTH	FUNCTIO	IN VALUE	Auto <u>Man</u>
3 N 1 f 2.483 4 5 6 6	3 500 GHz 3 525 GHz	44.342 dBµV 44.915 dBµV					Freq Offset 0 Hz
7 8 9 10							
11 12							
MSG				STATUS	6		



TM1 & Lowest & X & Hor

Detector Mode : AV

