TEST REPORT

DT&C Co., Ltd.

500			DT&C Co., L	td.				
U	Dt&C		eon-gil, Cheoin-gu, Yongin-si, el : 031-321-2664, Fax : 031-					
1. Report	No: DRTFCC1902-004	1						
2. Custon	ıer							
• Name	e : BLUEBIRD INC.							
• Addre	ess : (Dogok-dong, SEI Tov	ver 13,14) 39, Eonj	uro30-gil, Gangnam-gu,	Seoul South Korea				
3. Use of	Report : FCC Original Gra	ant						
4. Produc	t Name / Model Name : El	nterprise Full Touc	h Handheld Computer /	/ EF501				
FCC ID): SS4EF501X							
5. Test Me	ethod Used : KDB558074	D01v05, ANSI C6	3.10-2013					
Test Sp	pecification : FCC Part 15	Subpart C.247						
6. Date of	Test : 2019.01.22 ~ 2019	0.02.01						
7. Testing	Environment : See apper	nded test report.						
8. Test Re	esult : Refer to the attache	ed test result.						
Affirmation	Tested by	651	Reviewed by	Aarat				
	Name : JaeHyeok Bang Name : Geunki Son (Signature)							
	t results presented in this test							
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	initial Table - Secondaria	ar and the second parts						

2019.02.20.

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

Test Report Version

Test Report No.	Date	Description
DRTFCC1902-0041	Feb. 20, 2019	Initial issue

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1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	Enterprise Full Touch Handheld Computer
Model Name	EF501
Add Model Name	EF501R
Hardware Version	R1.0
Software Version	R1.12
Power Supply	DC 3.8 V
Frequency Range	• 802.11b/g/n(20 MHz) : 2412 MHz ~ 2462 MHz • 802.11n(40 MHz) : 2422 MHz ~ 2452 MHz
Max. RF Output Power	2.4GHz Band • 802.11b : 19.47 dBm • 802.11g : 21.52 dBm • 802.11n (HT20) :19.57 dBm • 802.11n (HT40) :19.24 dBm
Modulation Type	• 802.11b: CCK, DSSS • 802.11g/n: OFDM
Antenna Specification	Antenna type: Internal Antenna Antenna gain: 1.11 dBi

2. INFORMATION ABOUT TESTING

2.1 Test mode

Test	Worst case data rate	г	;)	
mode		Lowest	Middle	Highest
TM 1	802.11b 1 Mbps	2412	2437	2462
TM 2	802.11g 6 Mbps	2412	2437	2462
ТМ 3	802.11n(HT20) MCS 0	2412	2437	2462
TM 4	802.11n(HT40) MCS 0	2422	2437	2452

Note 1: The worst case data rate is determined as above test mode according to the power measurements. Note 2: The power measurement results for all modes and data rate were reported.

2.2 Auxiliary equipment

Equipment	Model No. Serial No. Manufactu		Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.3 Tested environment

Temperature	: 18 ~ 23 °C
Relative humidity content	: 31 ~ 45 %
Details of power supply	: DC 3.8 V

2.4 EMI suppression Device(s) / Modifications

EMI suppression device(s) added and/or modifications made during testing \rightarrow None

2.5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Test items	Measurement uncertainty
Transmitter Output Power	0.7 dB (The confidence level is about 95 %, $k = 2$)
Conducted spurious emission	0.9 dB (The confidence level is about 95 %, $k = 2$)
AC conducted emission	2.4 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 %, $k = 2$)

3. SUMMARY OF TESTS

FCC Part Section(s)	Parameter	Limit	Test Condition	Status Note 1
15.247(a)	6 dB Bandwidth	> 500 kHz		С
15.247(b)	Transmitter Output Power	< 1 Watt	< 1 Watt	
15.247(d)	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW Conducted		С
15.247(e)	Transmitter Power Spectral Density	< 8 dBm/3 kHz		С
-	RSS-Gen [6.6]	Occupied Bandwidth (99 %)		NA
15.247(d) 15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209 limits	Radiated	C Note 3
15.207	AC Line Conducted Emissions	FCC 15.207 limits	AC Line Conducted	С
15.203 Antenna Requirements		FCC 15.203	-	С

Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable

Note 2: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS. Note 3: This test item was performed in each axis and the worst case data was reported.



4. TEST METHODOLOGY

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB558074 D01v05 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB558074 D01v05. 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.

4.1 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.

4.2 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.

4.3 General test procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB558074 D01v05.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

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 KDB558074 D01v05. 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 KDB558074 D01V05.

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. 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.

4.4 Description of test modes

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics. A test program is used to control the EUT for staying in continuous transmitting mode.



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.

6. FACILITIES AND ACCREDITATIONS

6.1 Facilities

DT&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014.

- FCC MRA Accredited Test Firm No. : KR0034

www.dtnc.net						
Telephone	:	+ 82-31-321-2664				
FAX	:	+ 82-31-321-1664				

6.2 Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, loop, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

7. ANTENNA REQUIREMENTS

7.1 According to FCC 47 CFR §15.203

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 attached on the device by means of unique coupling method (Spring Tension). Therefore this E.U.T Complies with the requirement of §15.203

8. TEST RESULT

8.1 6dB bandwidth

Test Requirements and limit, §15.247(a)

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

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration:

Refer to the APPENDIX I.

Test Procedure:

- KDB558074 D01v05 Section 8.2
- ANSI C63.10-2013 Section 11.8.2
- 1. Set resolution bandwidth (RBW) = 100 kHz.
- 2. Set the video bandwidth (VBW) \geq 3 x RBW.
- (RBW : 100 kHz / VBW : 300 kHz)
- 3. Detector = **Peak**.
- 4. Trace mode = **Max hold**.
- 5. Sweep = **Auto couple**.
- 6. Allow the trace to stabilize.
- 7. 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.

Test Results: Comply

Test Mode	Frequency	Test Results[MHz]		
	Lowest	9.07		
TM 1	Middle	9.09		
	Highest	9.07 9.09 9.06 16.38 16.40 16.37 16.43 16.43 16.38 35.24 35.25		
	Lowest	16.38		
TM 2	Middle	16.40		
	Highest	16.37		
	Lowest	16.44		
TM 3	Middle	16.43		
	Highest	16.38		
	Lowest	35.24		
TM 4	Middle	35.25		
	Highest	35.39		



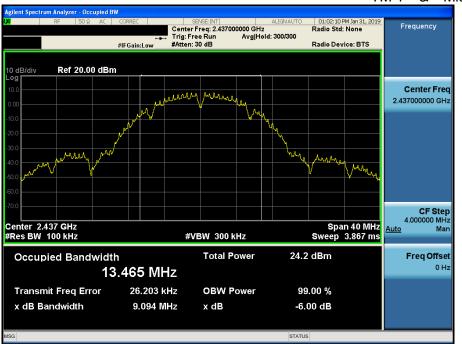
RESULT PLOTS

6 dB Bandwidth



6 dB Bandwidth

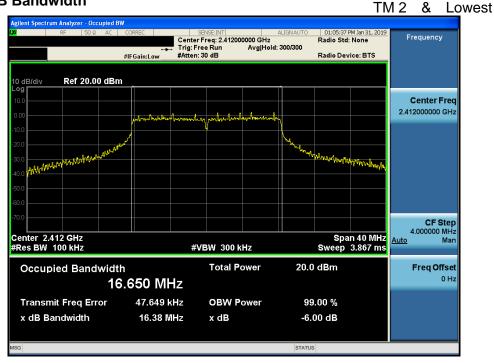
TM 1 & Middle





TDt&C

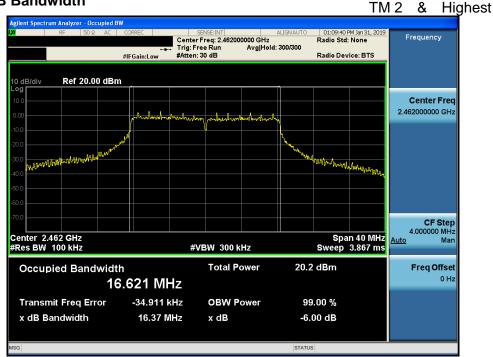
6 dB Bandwidth



6 dB Bandwidth



TM 2 & Middle





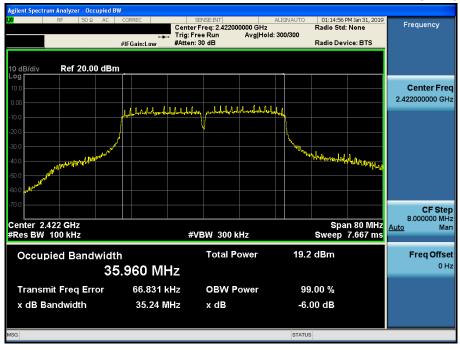
TDt&C





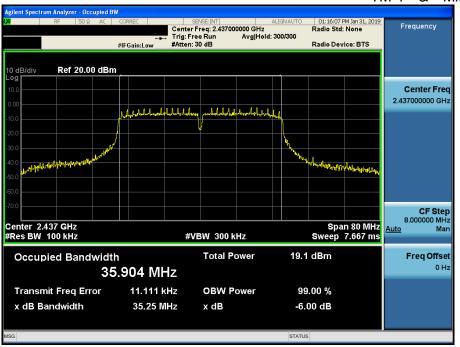


TM 4 & Lowest



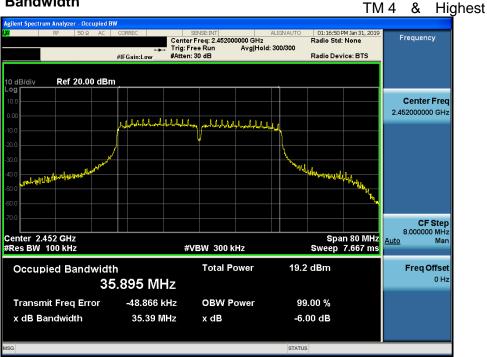
6 dB Bandwidth

TM 4 & Middle



FCC ID: SS4EF501X

Dt&C

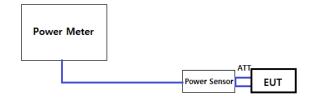


8.2 Maximum peak conducted output power

Test Requirements and limit, §15.247(b)

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

- KDB558074 D01v05 Section 8.3.1.3
- ANSI C63.10-2013 Section 11.9.1.3

PKPM1 Peak power meter method

- 1. The maximum conducted output powers were measured using a broadband peak RF power meter which has greater video bandwidth than DUT's DTS bandwidth and utilize a fast-responding diode detector.
- KDB558074 D01v05 Section 8.3.2.3
- ANSI C63.10-2013 Section 11.9.2.3.2

Method AVGPM-G

 The average conducted output powers were measured using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.



Test Results: Comply

Free			Maxim	um Peak Co	eak Conducted Output Power (dBm) for <u>802.11b</u>					
Freq. (MHz)	Det. Data Rate [Mbps]									
		1	2	5.5	11	-	-	-	-	
0440	PK	19.12	19.08	19.02	19.01	-	-	-	-	
2412	AV	16.96	16.94	16.91	16.89	-	-	-	-	
2427	PK	19.27	19.23	19.18	19.15	-	-	-	-	
2437	AV	16.79	16.77	16.74	16.72	-	-	-	-	
2462	PK	19.47	19.43	19.37	19.32	-	-	-	-	
	AV	16.97	16.96	16.93	16.90	-	-	-	-	

Freq.			Maxim	um Peak Co	onducted Ou	Itput Power	(dBm) for <u><i>8(</i></u>	02.11g			
(MHz)	Det.	Data Rate [Mbps]									
		6	9	12	18	24	36	48	54		
2412	PK	20.57	20.54	20.47	20.40	20.38	20.35	20.34	20.32		
2412	AV	13.70	13.67	13.66	13.64	13.62	13.58	13.57	13.54		
2437	PK	21.21	21.06	21.16	21.10	21.16	21.11	21.15	21.10		
2437	AV	13.70	13.55	13.59	13.55	13.60	13.64	13.63	13.57		
2462	PK	21.52	21.41	21.43	21.46	21.44	21.39	21.45	21.41		
2402	AV	13.90	13.85	13.78	13.81	13.79	13.79	13.85	13.75		

F		Maximum Peak Conducted Output Power (dBm) for <u>802.11n(HT20)</u>									
Freq. (MHz)	Det.				Data Ra	te [MCS]					
		0	1	2	3	4	5	6	7		
2412	PK	19.26	19.02	18.90	18.88	18.94	19.05	18.77	18.52		
2412	AV	11.97	11.93	11.91	11.90	11.88	11.87	11.88	11.86		
2437	PK	19.42	19.30	19.32	19.30	19.30	19.27	19.34	19.32		
2437	AV	11.91	11.76	11.80	11.83	11.83	11.80	11.81	11.80		
2462	PK	19.57	19.52	19.49	19.48	19.47	19.43	19.47	19.47		
2462	AV	11.94	11.88	11.79	11.85	11.80	11.85	11.83	11.85		

Freq. (MHz)		Maximum Peak Conducted Output Power (dBm) for <u>802.11n(HT40)</u>										
	Det.	Data Rate [MCS]										
		0	1	2	3	4	5	6	7			
2422	PK	19.24	18.85	18.99	18.56	18.90	18.42	18.37	18.26			
2422	AV	11.97	11.95	11.93	11.91	11.88	11.85	11.82	11.75			
2437	PK	18.88	18.79	18.79	18.78	18.82	18.80	18.83	18.75			
2437	AV	11.76	11.71	11.62	11.71	11.67	11.61	11.69	11.64			
0450	PK	19.08	19.03	18.96	18.96	18.93	18.97	18.94	18.99			
2452	AV	11.91	11.80	11.85	11.81	11.76	11.80	11.83	11.77			

8.3 Maximum power spectral density

Test requirements and limit, §15.247(e)

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.

Test Configuration:

Refer to the APPENDIX I.

Test Procedure

- KDB558074 D01v05 Section 8.4
- ANSI C63.10-2013 Section 11.10.2

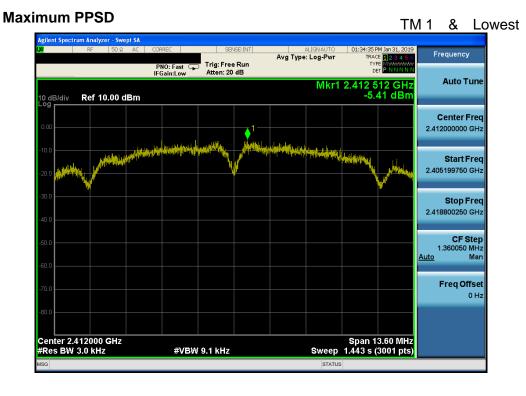
Method PKPSD (peak PSD)

- 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 to : **3 kHz** ≤ 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 amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Results: Comply

Test Mode	Frequency	RBW	PKPSD [dBm]		
	Lowest	3 kHz	-5.41		
TM 1	Middle	3 kHz	-4.38		
	Highest	3 kHz	-6.00		
	Lowest	3 kHz	-11.07		
TM 2	Middle	3 kHz	-11.46		
	Highest	3 kHz	-11.05		
	Lowest	3 kHz	-13.13		
TM 3	Middle	3 kHz	-13.53		
	Highest	3 kHz	-12.87		
	Lowest	3 kHz	-15.73		
TM 4	Middle	3 kHz	-16.63		
	Highest	3 kHz	-15.96		

RESULT PLOTS

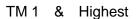








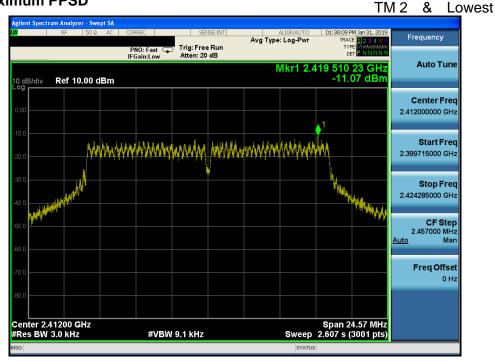
Dt&C



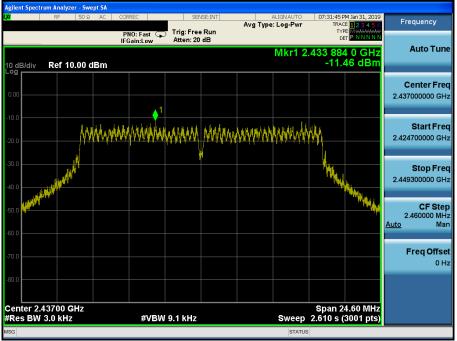


TDt&C

Maximum PPSD

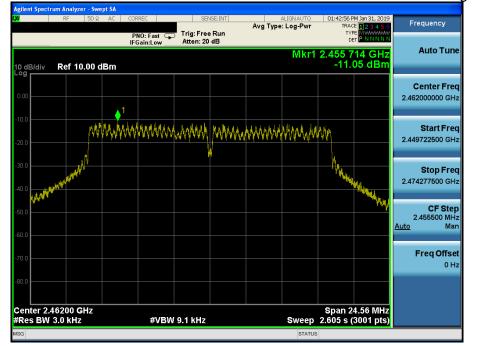






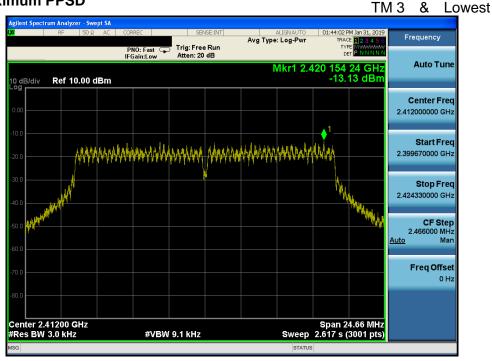
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Maximum PPSD

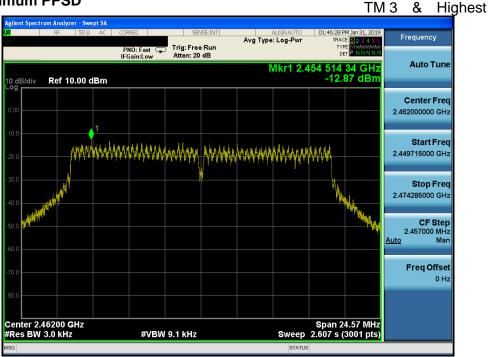


Maximum PPSD

TM 3 & Middle

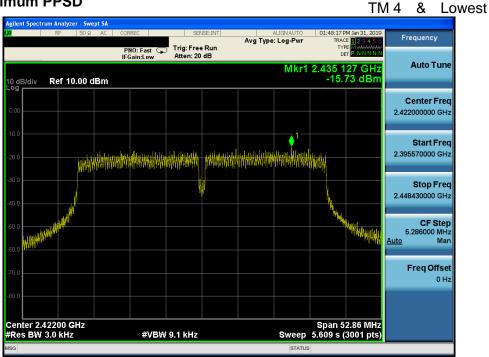


TDt&C



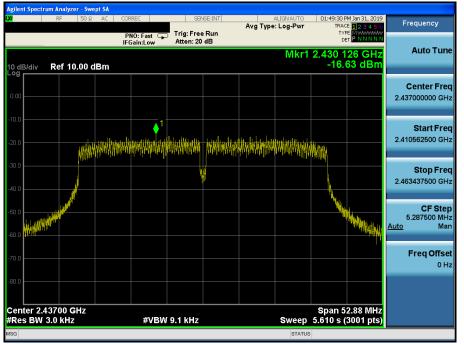
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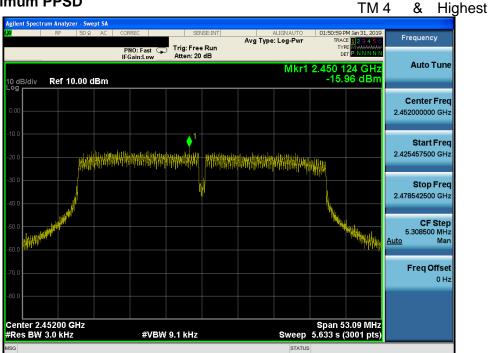
Maximum PPSD



Maximum PPSD

TM4 & Middle







8.4 Out of band emissions at the band edge / conducted spurious emissions

Test requirements and limit, §15.247(d)

§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 in band average PSD level. In either case, attenuation to levels below the general emission limits specified in §15.209(a) is not required.

Test Configuration:

Refer to the APPENDIX I.

Test Procedure

- KDB558074 D01v05 Section 8.5
- ANSI C63.10-2013 Section 11.11

- Reference level measurement

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 $\overrightarrow{RBW} = 100 \text{ kHz}$.
- 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 PSD level.

- Emission level measurement

- 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 \ge 3 x RBW. (Actual 3 MHz, See below note)
- 4. Detector = **Peak**.
- 5. Ensure that the number of measurement points \geq 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: 9 kHz ~ 30 MHz RBW = 100 kHz, VBW = 300 kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

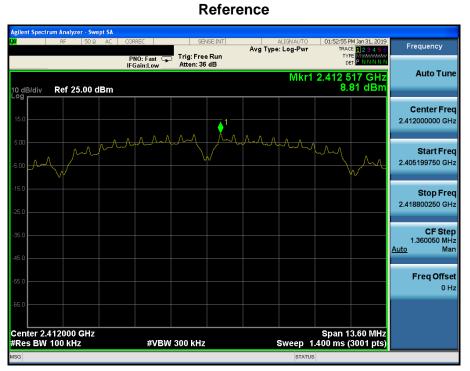
Frequency range: 30 MHz ~ 10 GHz, 10 GHz ~26.5 GHz RBW = 1 MHz, VBW = 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)

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.

RESULT PLOTS

TM 1 & Lowest



Low Band-edge

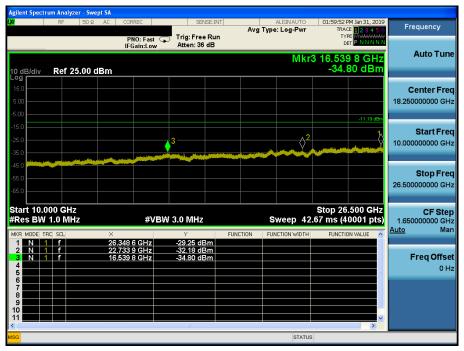


Conducted Spurious Emissions

Agilent Spectrum Analyzer						04-55-00-51	11	
, K F 1	50 Ω 🧥 DC 📔 COR		SENSE:INT		ALIGNAUTO e: Log-Pwr	TRACE	1 Jan 31, 2019	Frequency
	IFG		en: 36 dB			DE	PNNNNN	
10 dB/div Ref 25.0	00 dBm				Ν	/kr1 292 -48.1	2.4 kHz 2 dBm	Auto Tune
15.0								Center Fred
5.00								15.004500 MH
-5.00							-11.19 dBm	
-15.0								Start Fred
-25.0								9.000 kHz
-45.0								
	hill for the standard of the state of the st	nianaaliyoo,jiiqdaalaay,diigaa	utminten en estatution	And we down the stand of the stand of the	anthrough an Augment	ung the failed of the second	ing the second state	Stop Free 30.000000 MH;
-65.0								
Start 9 kHz #Res BW 100 kHz		#VBW 300	kHz	s	weep 5.3	Stop 30 33 ms (40	.00 MHz 001 pts)	CF Step 2.999100 MH
MKR MODE TRC SCL	×	Y		NCTION FUN	NCTION WIDTH	FUNCTION	VALUE	<u>Auto</u> Mar
1 N 1 f	292.	4 kHz -48	12 dBm					Freq Offse
3								0 Hi
6								
8								
10							~	
<			Ш					
SG					STATUS	L DC Cou	oled	

Agilent Spectrum Analyzer - Swept SA	
Image: Walk RF 50 Ω AC CORREC SENSE:INT ALIGN AUTO 01:57:49 PM Jan 31, 2019 Avg Type: Log-Pwr TRACE 12 3 4 5 6	Frequency
PN0: Fast 🕞 Trig: Free Run TYPE MAAAAAAA	
	Auto Tune
Mkr3 5.354 48 GHz 40 dB/div Ref 25.00 dBm -39.86 dBm	
10 dB/div Ref 25.00 dBm39.86 dBm	
15.0	Center Freq
5.00 5.0	.015000000 GHz
-5.00	
-15.0	Start Freq
-25.0	30.000000 MHz
2^2	00.000000 11112
-55.0	Stop Freq
-65.0	.000000000 GHz
Start 30 MHz Stop 10.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 18.67 ms (40001 pts)	CF Step
Auto	997.000000 MHz o Man
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE Automatical control of the second contrel control of the second control of the second control	<u> </u>
2 N 1 f 3.162 57 GHz -38.69 dBm	E
3 N 1 f 5.354 48 GHz -39.86 dBm	Freq Offset 0 Hz
	0 H2
10	
NSG STATUS	

Conducted Spurious Emissions

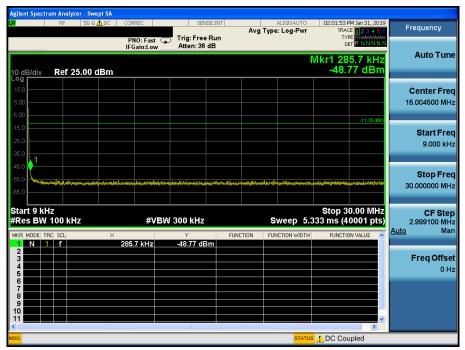


TM 1 & Middle

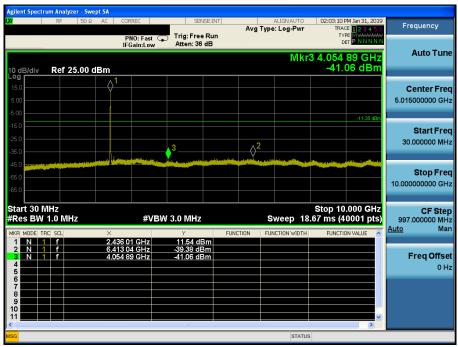
Reference



Conducted Spurious Emissions







Mikrs 16,922.2 CHz 10 dB/div Ref 25.00 dBm -34.92 dBm 150 -34.92 dBm 150 -1135 dB 160 -1135 dB 160 -1135 dB 160 -1135 dB 160 -1135 dB 150 -1150 dB 1650 -1150 dB	Agilent Spectr	um Ana	lyzer - Sw	ept SA									
PN0: Fast Trig: Free Run Atten: 36 dB Nutra 16, 922 2 GHz -34.92 dBm Auto Tune 10 dB/div Ref 25.00 dBm -34.92 dBm -34.92 dBm -34.92 dBm 150 -34.92 dBm -34.92 dBm -34.92 dBm -34.92 dBm -34.92 dBm 150 -30 -45.0 -4	L <mark>XI</mark>	RF	50 Ω	AC	CORREC		SEN	SE:INT	0				Frequency
Mkr3 16.922 2 GHz Auto Tune 10 dB/div Ref 25.00 dBm -34.92 dBm Center Freq 15 0 -34.92 dBm -34.92 dBm Center Freq 15 0 -41.95 dm -41.95 dm Center Freq 25 0 -41.95 dm -41.95 dm -41.95 dm 25 0 -45.0 -41.95 dm -41.95 dm 25 0 -45.0 -41.95 dm -41.95 dm 26 0 -41.95 dm -41.95 dm -41.95 dm 36 0 -41.95 dm -41.95 dm -41.95 dm 37 0 -41.95 dm -41.95 dm -41.95 dm 38 0 -41.95 dm -41.95 dm -41.95 dm					PNO: F	ast 🖵			Avg	iype: Log-Pwr	TY	PE M WANNANA	
10 dB/div Ref 25.00 dBm 34.92 dBm 150					IFGain:	LOW	Atten: 50		_	Mler	2 4 6 9 2	2.2.04	Auto Tune
150 Center Freq 500	10 dB/div	Ref	25.00	dBm						IVIKI			
5.00													Center Fred
15.0	5.00												18.250000000 GHz
150 20 21 0 0 <td>-5.00</td> <td></td> <td>-11 35 dBm</td> <td></td>	-5.00											-11 35 dBm	
25.0 3 4 4 4 10.00000000 GHz 55.0 55.	-15.0			-								. 1	Start Freq
45.0 Stop Freq 26.50000000 GHz Start 10.000 GHz Stop 26.500 GHz WRes BW 1.0 MHz Stop 26.500 GHz WBW 3.0 MHz Stop 26.500 GHz Sweep 42.67 ms (40001 pts) MRR MODE TRC SCL X Y FUNCTION FUNCTION VIDTH FUNCTION VIDTH 1 N 1 f 22.186 2 GHz -29.70 dBm FUNCTION FUNCTION VIDTH FUNCTION VIDTH 3 N 1 f 22.186 2 GHz -30.54 dBm F F 20.00000 GHz 4 - <td>-25.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3</td> <td></td> <td></td> <td>__∕∠</td> <td></td> <td></td> <td>10.00000000 GHz</td>	-25.0						3			_ _∕ ∠			10.00000000 GHz
Stop Stop Stop Stop Stop Stop Stop Stop Stop General Stop Stop General Stop General Stop General Stop General Stop General Genera			and the second second							and the second			
MKR MODE TRC Start 26.50000000 GHz CF Step 26.50000000 GHz CF Step 26.50000000 GHz CF Step 26.50000000 GHz CF Step 1.65000000 GHz CF Step 1.65000000 GHz CF Step 1.65000000 GHz Auto Man Man Auto Man Auto Man Function width													Stop Freq
Start 10.000 GHz #VBW 3.0 MHz Stop 26.500 GHz CF Step 16.500000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 42.67 ms (40001 pts) 1.65000000 GHz 1 N 1 f 25.186 2 GHz -29.70 dBm Function violth													26.50000000 GHz
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 42.67 ms (40001 pts) 1.65000000 GHz MKR_MODE X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE Auto Man 1 N 1 f 25.186 2 GHz -29.70 dBm FUNCTION FUNCTION VIDTH FUNCTION VALUE Auto Man 2 N 1 f 16.922 2 GHz -30.54 dBm For equation of the second of the se													
MRR MODE TPC Stcl X Y FUNCTION FUNCTION<						#VBW	3.0 MHz			Sweep 42	Stop 26 67 ms (4	.500 GHz 0001 pts)	CF Step 1.65000000 GHz
2 N 1 f 22.238 1 GHz -30.54 dBm 3 N 1 f 16.922 2 GHz -34.92 dBm Freq Offset 4									CTION	FUNCTION WIDTH	FUNCTIO	ON VALUE	Auto Man
4 0 0 Hz	2 N 1	f		22	238 1 GF	١z	-30.54 dB	m					
		f		16	.922 2 Gł	-Iz	-34.92 dB	m					•
												=	0 112
	7												
MSG STATUS	MSG									STATUS	3	>	

TM 1 & Highest

Reference



High Band-edge



Agilent Spectrum Analyz								
LXI RF	50 Ω <u>Λ</u> DC	CORREC	SENSE:		ALIGNAUTO	TRAC	M Jan 31, 2019 E <mark>1 2 3 4 5 6</mark>	Frequency
		PNO: Fast G	Trig: Free Ru Atten: 36 dB			TYP DE	E MWWWWWW T P N N N N N	
		IFGain:Low	Atten: 00 ub			Vikr1 28		Auto Tune
10 dB/div Ref 2	5.00 dBm					-48.8	34 dBm	
Log 15.0								Center Freq
5.00								15.004500 MHz
-5.00								10.004000 Mil 12
-15.0							-11.36 dBm	
-25.0								Start Freq
-35.0								9.000 kHz
-45.0								
57 0 V								Stop Freq
-65.0	water and the set of the set of the set	en public poster in stander.	u ferrefet for some of some of the	analis, sin catter by bally i	iputan dipirkusptantek	وبالبر الاربطالية الإخرا	eringele von til finisty	30.000000 MHz
-03.0								
Start 9 kHz						Stop 30	0.00 MHz	CF Step
#Res BW 100 kF		#VBV	V 300 kHz		Sweep 5.3			2.999100 MHz Auto Man
MKR MODE TRC SCL	×	281.9 kHz	۲ -48.84 dBm	FUNCTION	FUNCTION WIDTH	FUNCTIO	N VALUE	<u>/(ato</u>
2			40.04 0.011					Freq Offset
3								0 Hz
5							=	0112
7								
9								
10							~	
<			ill.				>	
MSG					STATUS	DC Cou	pled	

Agilent Spect	rum An	alyzer - Sw	vept SA											
LXI	RF	50 \$	2 AC	CORRE	c	SEN	SE:INT	A		LIGNAUTO		PM Jan 31, 2019		Frequency
				DNO	:Fast 🗔	Trig: Free	Run	Avg	Type:	Log-Pwr	TY	CE 1 2 3 4 5 (PE M WWWWW		
				IFGai	n:Low	Atten: 36	dB				D	et <mark>P N N N N</mark>		
										Mkr	2 6.202	68 GHz		Auto Tune
10 dB/div	Ref	25.00	dBm								-39.	87 dBm		
Log				1										
15.0			Ý	/										Center Freq
5.00														5.015000000 GHz
-5.00												-11.36 dBm		
-15.0														Start Freq
-25.0														30.000000 MHz
-35.0								<mark>_</mark> _2						30.000000 1411 12
-45.0			a sure	and the second		and south and south		any produced to	and party		and the second second second	and a second second second		
-55.0		and the second									The second second			Stop Freq
													1	0.000000000 GHz
-65.0														
Start 30 I	MHz										Stop 10	.000 GHz		CF Step
#Res BW		٧Hz			#VBW	/ 3.0 MHz			Sv	veep 18	.67 ms (4	0001 pts)		997.000000 MHz
MKR MODE T	RC SCL		×			Y	FU	NCTION	FUNC	TION WIDTH	FUNCTI	ON VALUE 🛛 🔼	A	<u>uto</u> Man
1 N ′			2.	460 94 (GHz	11.77 dE	3m							
2 N /	1 1		6.	202 68 (SHZ	-39.87 dE	sm							Freq Offset
4														0 Hz
5														
7														
8														
10													1	
11												~		
MSG	_				_			_		STATUS			_	
	_								_					



TM 2 & Lowest

Reference

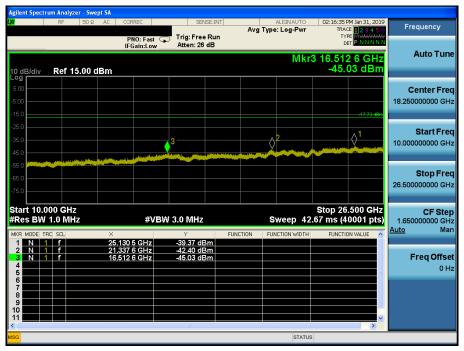


Low Band-edge



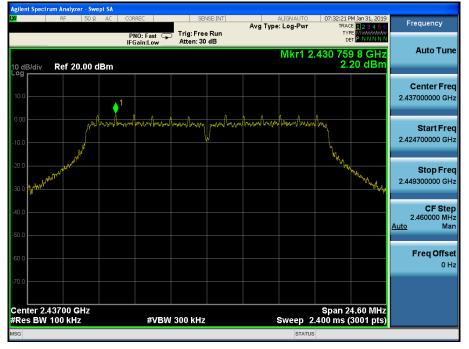
	t Spectr		alyzer - S												1
L <mark>XI</mark>		RF	50	Ω 🧘 D	c coi	RREC	SE	NSE:INT	Avg		ALIGNAUTO	TRAC	M Jan 31, 2019	Frequency	/
						NO: Fast Gain:Low	Trig: Fre		-		-		PE MWWWWWW T P N N N N N		
	_				IF	Gain:Low	Aden. 2			_		ML-1 00	1.9 kHz	Auto T	une
10 dE	7/41	Do	15.00		~							-58.4	48 dBm		
Log	57019	Ke	15.00												
5.00														Center F	⁼req
-5.00														15.004500	MHz
-15.0													-17.73 dBm		
-25.0														Start F	rea
-35.0														9.000	
-45.0	1														
-55.0	♦'														
-65.0	-	Annuality	10		found and little	a for a fail to see a se	alar data ana	and the standard of the star				data hanta kanada	and the star and stores	Stop F	
-75.0														30.000000	MHZ
	t9k⊦ sBW		kH7			#VB	W 300 kHz	,		S	ween 53	Stop 3 333 ms (4	0.00 MHz 0001 pts)	CF S 2.999100	
	HODE TI				X	# 3 E	Y		UNCTION		ICTION WIDTH		IN VALUE		Man
	N 1	_				.9 kHz	-58.48 d		UNCTION	FUN	CTION WIDTH	FUNCTIO	JN VALUE		
2														Freq Of	fset
4															0 Hz
5													==		
7															
9															
10													~		
<							Ш						>		
MSG											STATUS	L DC Cou	upled		

Agilent Spectrum Analyzer - Sw	rept SA				
<mark>(X)</mark> RF 50 Ω	AC CORREC	SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	02:15:24 PM Jan 31, 2019 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast		ing type. Log i m	TYPE MWWWWW	
	IFGain:Low	Atten: 26 dB			Auto Tune
			Mkr	3 9.669 00 GHz	Auto Tunc
10 dB/div Ref 15.00	dBm			-50.60 dBm	
5.00	<u> </u>				Center Freq
-5.00					5.015000000 GHz
-15.0				-17.73 dBm	
-25.0					
-35.0					Start Freq
-35.0				▲ 3	30.000000 MHz
	وسويد فاستعمد وسايينا المستريان		and the state of the second		
-55.0 contract of the contribution					Stop Freq
-65.0					10.00000000 GHz
-75.0					
Start 30 MHz				Stop 10.000 GHz	CF Step
#Res BW 1.0 MHz	#V	BW 3.0 MHz	Sweep 18	.67 ms (40001 pts)	997.000000 MHz
MKR MODE TRC SCL	X	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f	2.407 35 GHz	9.80 dBm			
2 N 1 f 3 N 1 f	5.333 54 GHz 9.669 00 GHz	-49.93 dBm -50.60 dBm			Freq Offset
4					0 Hz
6					
8					
9					
10				~	
<		m		>	
MSG			STATU	3	

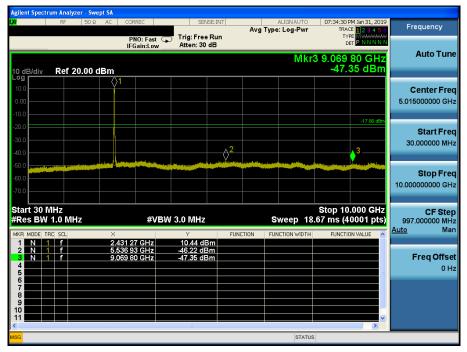


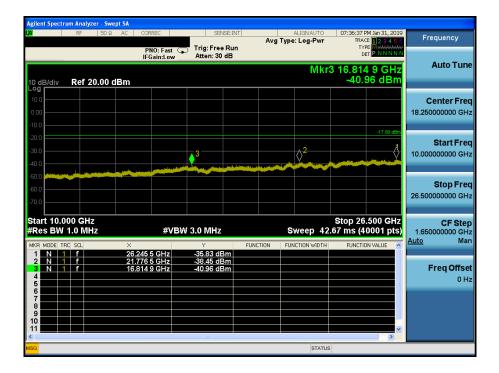
TM 2 & Middle

Reference



Agilent Spectrum Analyzer	- Swept SΛ 50 Ω 🛕 DC CORREC	SENSE:IN	IT	ALIGNAUTO	07:33:17 PM Jan 31, 2019	
	PNO: Fa	st 😱 Trig: Free Rui	Avg Typ	e: Log-Pwr	TRACE 123456 TYPE MWWWWW DET P N N N N N	Frequency
10 dB/div Ref 20.	.00 dBm	uw Auen. oo ub		N	/kr1 285.7 kHz -53.97 dBm	Auto Tune
10.0 0.00 -10.0						Center Freq 15.004500 MHz
-20.0					-17.80 dBm	Start Freq 9.000 kHz
-50.0	มทั _{้งไป} กันส์ (ปีมีประกรณ์กรุณภาพมาส์กระจำกัน ภาพม	the counter for the state of the	shaqatarhartharthathann Attan	ingtofic from the former of the second	eepinenerisely/karthlichas/kateerate	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 100 kHz	×	VBW 300 kHz		Sweep 5.3	Stop 30.00 MHz 33 ms (40001 pts) FUNCTION VALUE	CF Step 2.999100 MHz <u>Auto</u> Mar
1 N 1 f 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	285.7 kH	z -53.97 dBm				Freq Offset 0 Hz
7 8 9 10 11					~	
MSG				STATUS	LDC Coupled	





TM 2 & Highest

Reference



High Band-edge



Agilent Spectrum Analyzer - Swe	pt SA				
<mark>ιXI</mark> RF 50 Ω,	🚹 DC 🔋 CORREC	SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	02:24:21 PM Jan 31, 2019 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast IFGain:Low	Trig: Free Run Atten: 26 dB	Avg Type: Log-Pwr	TYPE MWWWWW DET P N N N N N	
10 dB/div Ref 15.00 d	lBm		1	//kr1 281.9 kHz -58.23 dBm	Auto Tune
5.00 -5.00 -15.0					Center Freq 15.004500 MHz
-25.0 -35.0 -45.0					Start Freq 9.000 kHz
-55.0 -65.0 -75.0	เป็นที่สามาร์กรุงหนึ่งหมิดเมือง จาก เมษารัสสมุทรีจะได้ไ	Alt fry Sarhalf in Sansas for Lage of a high of y Although the			Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 100 kHz	#VE	W 300 kHz	Sweep 5.3	Stop 30.00 MHz 33 ms (40001 pts)	CF Step 2.999100 MHz
MKR MODE TRC SCL	× 281.9 kHz	Y FU -58.23 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 3 4 5					Freq Offset 0 Hz
6 7 8 9					
10 11 11 11 11 11 11 11 11 11 11 11 11 1		ill		~	
MSG			STATUS	DC Coupled	

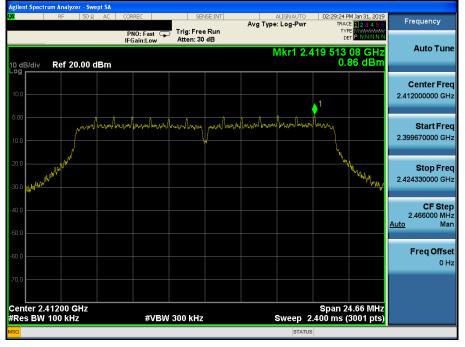
Agilent Spectrum Analyzer - Swept	SA				
LXI RF 50Ω Å	AC CORREC	SENSE:INT	ALIGNAUTO	02:25:52 PM Jan 31, 2019	Frequency
	PNO: Fast 🖵 IFGain:Low	Trig: Free Run Atten: 26 dB	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW DET P NNNNN	
10 dB/div Ref 15.00 dB	m		Mkr	3 8.067 32 GHz -50.57 dBm	Auto Tune
5.00 -5.00 -15.0	X1			47.30 dBm	Center Freq 5.015000000 GHz
-25.0			Juliensen mit aktor miteriel i	3	Start Freq 30.000000 MHz
-55.0 -65.0 -75.0					Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	× 2.455 45 GHz	10.14 dBm	TION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 3 N 1 f 4 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	5.641 61 GHz 8.067 32 GHz	-49.79 dBm -50.57 dBm			Freq Offset 0 Hz
				×	
MSG			STATUS		



Dt&C

TM 3 & Lowest

Reference

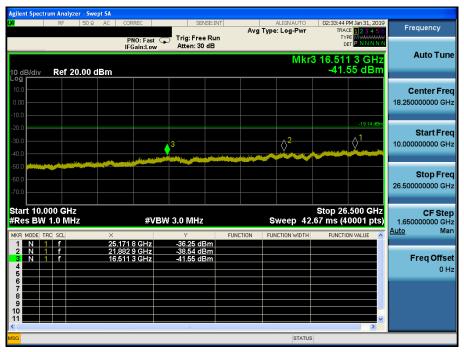


Low Band-edge



gilent Spectrum Analyzer - Swa RF 50 Ω	ept SA ▲ DC CORREC	SENSE: INT	ALIGNAUTO	02:30:57 PM Jan 31, 2019	
10 004	PNO: Fast IFGain:Low		Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW DET P N N N N N	Frequency
0 dB/div Ref 20.00 d		Auen. oo vu		Vkr1 281.9 kHz -54.34 dBm	Auto Tune
.og 10.0 0.00 10.0					Center Free 15.004500 MH
20.0 30.0 40.0				-19.14 dBm	Start Free 9.000 kH
50.0	ารรับในกระบบเลยาเสรารับไป <mark>เสียงแล้งเป็นหมายใน</mark>	in fragming that fan had trinden trader	langhaarrakarinkata ya ng Projensinakata m	لىلەر يەر ئەرەت بىلەر يەر يەر يەر يەر يەر يەر يەر يەر يەر ي	Stop Free 30.000000 MH
Start 9 kHz Res BW 100 kHz		300 kHz		Stop 30.00 MHz 333 ms (40001 pts)	CF Ste 2.999100 M⊢ Auto Ma
MKR MODE TRC SCL 1 N 1 f 2 3 3 4 4 5	× 281.9 kHz	-54.34 dBm	JNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse 0 H
6 7 8 9 10 11					
				>	

Agilent Spectrum Analyzer - Swept S	SA				
LXU RF 50Ω A	AC CORREC	SENSE:INT	ALIGNAUTO	02:32:21 PM Jan 31, 2019	Frequency
	PNO: Fast 😱	Trig: Free Run	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE M 44444444	riequeney
	IFGain:Low	Atten: 30 dB		DET PNNNN	
			Mkr	2 5.827 80 GHz	Auto Tune
10 dB/div Ref 20.00 dB	m			-46.00 dBm	
10.0	∆ ¹				0
					Center Freq
0.00					5.015000000 GHz
-10.0					
-20.0				-19.14 dBm	Start Freq
-30.0					30.000000 MHz
-40.0			2		30.000000 WHZ
	and the state of the	and the second			
-50.0					Stop Freq
-60.0					10.000000000 GHz
-70.0					10.0000000000000
Start 30 MHz #Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	X	Y FUN	CTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f	2.412 33 GHz	7.98 dBm			
2 N 1 f	5.827 80 GHz	-46.00 dBm			Freq Offset
4					0 Hz
5				=	0112
6					
8					
9					
11				✓	
<					
MSG			STATUS		

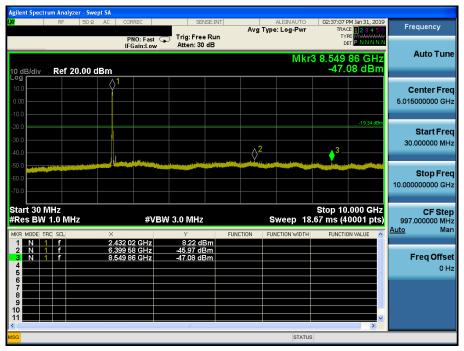


TM 3 & Middle

Reference



Agilent Spectrum Analyze					
XU RF		Fast	Avg Type: Log-P		Frequency
10 dB/div Ref 20	IFGain	Low Atten: 30 dB		Mkr1 293.2 kHz -54.57 dBm	Auto Tune
10.0 0.00					Center Freq 15.004500 MHz
-20.0				-19.34 dBm	Start Freq 9.000 kHz
-50.0	is-art-Notice-ming-of-sent-and-withster	Maassan add May Intel a Maharing an air an ar	มี _{ปรุญ} รณี _ต ุปาญการปลายปลุกครับจากป _ล ะสุดเรงจาก	n. Maynell hays Myhadish of Sain an Indianathan an Andréa	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 100 kHz MKR MODE TRC SCL	×	#VBW 300 kHz	Sweep	Stop 30.00 MHz 5.333 ms (40001 pts) TH FUNCTION VALUE	CF Step 2.999100 MHz <u>Auto</u> Mar
1 N 1 f 2 3 4 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	293.2 k	Hz 54.57 dBm			Freq Offset 0 Hz
SG			ST	TUS DC Coupled	



Agilent Spectrum Analyzer - Swept SA				
LXI RF 50Ω AC	CORREC SENSE:IN	Avg Type: Log-Pwr	02:38:17 PM Jan 31, 2019 TRACE 1 2 3 4 5 6 TYPE MVWWWW	Frequency
	PNO: Fast 😱 Trig: Free Rur IFGain:Low Atten: 30 dB			
10 dB/div Ref 20.00 dBm		Mkr	3 16.780 3 GHz -41.33 dBm	Auto Tune
10.0 0.00 -10.0				Center Freq 18.250000000 GHz
-20.0	3	¢²	-19.34 dBm	Start Freq 10.000000000 GHz
-50.0 -60.0 -70.0				Stop Freq 26.50000000 GHz
Start 10.000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	-	Stop 26.500 GHz .67 ms (40001 pts)	CF Step 1.65000000 GHz Auto Man
MKR MODE TRC SCL X	161 4 GHz -36.29 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	
3 N 1 f 16.7 4 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	910 1 GHz -38.41 dBm 780 3 GHz -41.33 dBm			Freq Offset 0 Hz
6 7 8 9				
10			~	
MSG		STATUS		

Dt&C

TM 3 & Highest

Reference

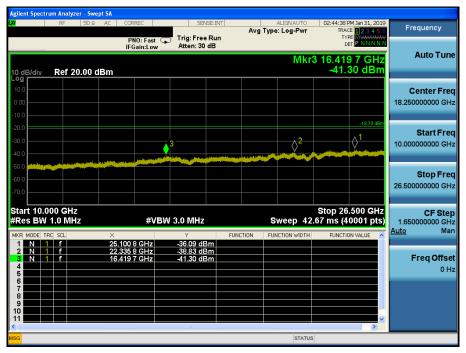


High Band-edge



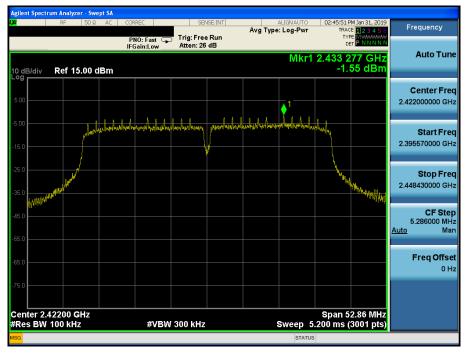
Agilent Spectrum Analy									
LXI RF	50 Ω 🦺 DC	CORREC	SENSE			LIGNAUTO		M Jan 31, 2019	Frequency
		PNO: Fast G	Trig: Free R	un	ing type	Logini	TYI Di		
		IFGain:Low	Atten: oo u	,			// ///////////////////////////////////		Auto Tune
10 dB/div Ref 2	20.00 dBm							59 dBm	
Log 10.0									Center Freq
0.00									15.004500 MHz
-10.0									
-20.0								-18.78 dBm	Start Freq
-30.0									9.000 kHz
-40.0									5.000 KH2
-50.0 🔶 🖢 🛶									
-60.0	ومنتحدة والمراجع ومعرو	ale state and ale of the second	a hi an data da da ma	and the second second second	Leathernaut of the	ورائدها المراجعة والمتعاد	المعادلة الشادية	ليار ويتطلع يعط وي	Stop Freq 30.000000 MHz
-70.0									30.000000 MHz
Start 9 kHz							Stop 3	0.00 MHz	CF Step
#Res BW 100 k	Hz	#VBV	V 300 kHz		SI	weep 5.3	33 ms (4	0001 pts)	2.999100 MHz
MKR MODE TRC SCL	×		Y	FUNCTION	N FUN	CTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Man
1 N 1 f	2	281.9 kHz	-53.59 dBm						
3									Freq Offset
5								=	0 Hz
6 7									
8									
10									
<								>	
MSG						STATUS	L DC Cou	upled	

Agilent Spectr	rum An	alyzer - Sw	/ept SA											
L <mark>XI</mark>	RF	50 S	2 AC	CORRE	ic	SEN	ISE:INT			LIGNAUTO		PM Jan 31, 2019		Frequency
				DNO	:Fast G	Trig: Free	Run	Avg	iype:	Log-Pwr	TY	CE 1 2 3 4 5 (PE M WWWWW		,
				IFGai	in:Low	Atten: 30	dB				D	et <mark>P N N N N</mark>		
										Mkr	2 7.594	49 GHz	Í	Auto Tune
10 dB/div	Re	f 20.00	dBm									43 dBm		
Log 10.0				,1										
														Center Freq
0.00														5.015000000 GHz
-10.0												10.70.10.		
-20.0												-18.78 dBm		Start Freq
-30.0														30.000000 MHz
-40.0										2_				00.000000 11112
-50.0				and a spectrum			100			Mary and the second	alle and	A Construction of the second sec		
-60.0		and the second												Stop Freq
													1	0.000000000 GHz
-70.0														
Start 30 P	VIHZ								i		Stop 10	.000 GHz		CF Step
#Res BW		₩Hz			#VB\	V 3.0 MHz			Sv	veep 18	.67 ms (4	0001 pts)		997.000000 MHz
MKR MODE T	RC SCL		X			Y	FUN	ICTION	FUNC	TION WIDTH	FUNCTI	DN VALUE	<u>Αι</u>	<u>ito</u> Man
1 N 1			2.	456 95 (GHz	8.38 dE								
2 N 1 3			- 13	594 49 (JHZ	-46.43 dE	sm							Freq Offset
4														0 Hz
6												=====		
7														
8														
10														
11												>		
MSG										STATUS			_	
	_	_	_	_	_			_						



TM 4 & Lowest

Reference

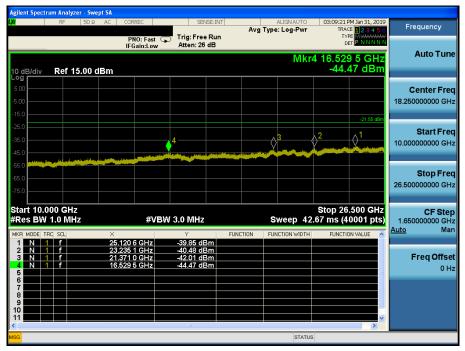


Low Band-edge



RF	r - Swept SA 50 Ω / DC	CORREC	SEN	SE:INT		ALIGNAUTO	03/06/19 0	M Jan 31, 2019	
Tu	30 % <u>A</u> DC	PNO: Fast		Run		: Log-Pwr	TRAC	E 123456 E MWWWWWW T P N N N N N	Frequency
0 dB/div Ref 15	.00 dBm	II Galil.cow				N		6.9 kHz 63 dBm	Auto Tun
5.00 5.00 15.0									Center Fre 15.004500 MH
25.0 35.0 45.0 1								-21.55 dBm	Start Fre 9.000 kH
55.0 - 55.0	anthing an	that dig a second the hypothesis	at picture de la constante de la	na da ante da tra	anta de la construcción de la const	ainootukileeriyaad	dat aya sakar saya saya	ter part que en la com	Stop Fre 30.000000 M⊦
tart 9 kHz Res BW 100 kHz	-	#VE	3W 300 kHz		S	weep 5.3	Stop 3 33 ms (4	0.00 MHz 0001 pts)	CF Ste 2.999100 MI
IKR MODE TRC SCL	×	296.9 kHz	∀ -56.63 dB	FUNC	TION FUN	ICTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Ma
2 3 4 5									Freq Offs 0 F
6 7 8 9									
								~	
G						STATUS	LDC Cou	ipled	

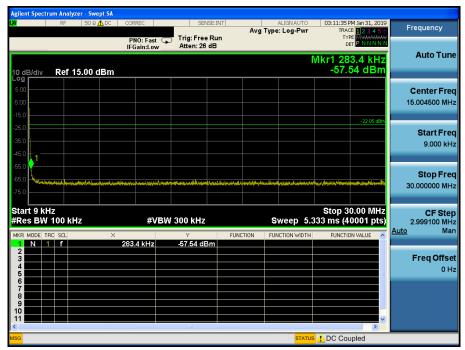
Agilent Spectrum Analyzer - Swept SA								
LXI RF 50 Ω AC CORRE	C SENSE:	INT A Avg Type:		PM Jan 31, 2019 CE 1 2 3 4 5 6	Frequency			
PNO	: Fast 😱 Trig: Free Ri n:Low Atten: 26 dE	un	TY					
IFGai	n:Low Atten: 20 de	J	Mbs2 0 424	20.0115	Auto Tune			
10 dB/div Ref 15.00 dBm	IB/div Ref 15.00 dBm -50.61 dBm							
5.00					Center Freq			
-5.00					5.015000000 GHz			
-15.0				-21.55 dBm				
-25.0					Start Freq			
-35.0					30.000000 MHz			
-45.0		- ⊘ ²	<mark>\$</mark> 3					
-55.0								
-65.0					Stop Freq			
-75.0					10.00000000 GHz			
Start 30 MHz #Res BW 1.0 MHz	#VBW 3.0 MHz	S14	10 Stop 4/eep 18.67 ms	.000 GHz	CF Step 997.000000 MHz			
	#VDVV 5.0 10112		· ·		Auto Man			
MKR MODE TRC SCL X 1 N 1 f 2.431 03 0	GHz 5.78 dBm		TION WIDTH FUNCTI	DN VALUE				
2 N 1 f 5.397 85 0 3 N 1 f 8.134 36 0	GHz -49.61 dBm				Freq Offset			
4	5HZ -50.61 dBm				0 Hz			
5				=				
7								
9								
<								
MSG			STATUS					

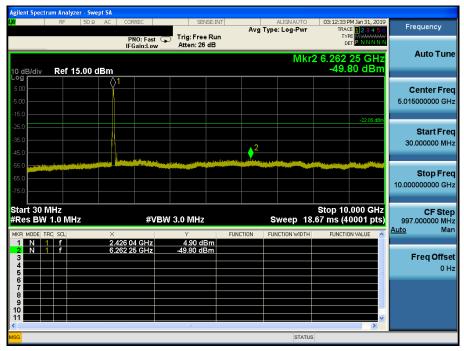


TM 4 & Middle

Reference







Agilent Spectrum Analyzer - Sw						
ιχι RF 50 Ω	AC CORREC	SENSE:INT		ALIGNAUTO	03:13:38 PM Jan 31, 2019 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast (IFGain:Low	Trig: Free Run Atten: 26 dB			TYPE MWWWWWW DET P N N N N N	
				Mkr	4 13.889 5 GHz	Auto Tune
10 dB/div Ref 15.00	dBm				-48.54 dBm	
5.00						Center Freq
-5.00						18.25000000 GHz
-15.0					22.05.40-	
-25.0					-22.05 dBm	Start Freq
-35.0	<u>.</u> 4	∧\$		<mark>2</mark>		10.000000000 GHz
-45.0				the second second		
-55.0						Stop Freq
-65.0						26.50000000 GHz
Start 10.000 GHz #Res BW 1.0 MHz	#\/B	W 3.0 MHz	0	ween 12	Stop 26.500 GHz .67 ms (40001 pts)	CF Step 1.65000000 GHz
MKR MODE TRC SCL	×	Y 3.0 WI12			FUNCTION VALUE	Auto Man
1 N 1 f	25.146 2 GHz	-39.55 dBm		CHON WIDTH	TONCHON VALUE	
2 N 1 f 3 N 1 f	22.215 8 GHz 16.335 6 GHz	-42.01 dBm -45.49 dBm				Freq Offset
4 N 1 f	13.889 5 GHz	-48.54 dBm			=	0 Hz
6 7						
8						
10					~	
<		ш			>	
<mark>MSG</mark>				STATUS		

Dt&C

TM 4 & Highest

Reference nt Sr ctrum Analyz Sw rept S*I* 03:14:39 PM Jan 31, 201 TRACE 1 2 3 4 5 TYPE MMMMM DET P N N N N SENSE:INT Frequency Avg Type: Log-Pwr PNO: Fast Free Run IFGain:Low Atten: 26 dB Auto Tune Mkr1 2.443 276 GHz -1.40 dBm 10 dB/div Ref 15.00 dBm **Center Freq** 2.452000000 GHz 111 d at la L.I. I I Start Freq 2.425457500 GHz Stop Freq 2.478542500 GHz Winder CF Step 5.308500 MHz Man Auto Freq Offset 0 Hz Center 2.45200 GHz #Res BW 100 kHz Span 53.09 MHz Sweep 5.200 ms (3001 pts) #VBW 300 kHz

High Band-edge



Agilent Spectrum Analyzer - S	wept SA				
LXI RF 50	Ω 🧥 DC 🔋 CORREC 📔	SENSE:INT	ALIGNAUTO	03:16:10 PM Jan 31, 2019	Frequency
	PNO: Fast IFGain:Low	Trig: Free Run Atten: 26 dB	Avg Type: Log-Pwr	TRACE 23456 TYPE MWWWW DET PNNNNN	
10 dB/div Ref 15.00	dBm		١	//kr1 281.9 kHz -57.57 dBm	Auto Tune
-5.00					Center Freq 15.004500 MHz
-25.0 -35.0 -45.0				-21,40 dBm	Start Freq 9.000 kHz
-75.0	Arsonina d Americka an Antonia a Angalysina a Songalysina a Songalysina a Songalysina a Songalysina a Songalysina	artindanaki ili narahini artiri dia mempupati	สมรูรของวิธีที่ระที่ประโยร์ แล้งได้สุดการของชีวิตที่ ที่ได้เรียงเปลี่ยง		Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 100 kHz	#VE	3W 300 kHz	Sweep 5.3	Stop 30.00 MHz 33 ms (40001 pts)	CF Step 2.999100 MHz
MKR MODE TRC SCL	× 281.9 kHz	Y FL -57.57 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 3 4 5					Freq Offset 0 Hz
6 7 8 9					
10 11				×	
MSG			STATUS	L DC Coupled	

Agilent Spectrum Analyzer - Swep	ot SA							
ιχί RF 50 Ω	AC CORREC	SENSE:INT	ALIGNAUTO Ava Type: Loa-Pwr	03:17:17 PM Jan 31, 2019 TRACE 1 2 3 4 5 6	Frequency			
	PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 26 dB		TYPE MWWWWWWW DET P N N N N N				
	IFGain:Low	Atten: 20 dB	Miles		Auto Tune			
	dB/div Ref 15.00 dBm -50.95 dBm							
10 dB/div Ref 15.00 d				00.00 abiii				
5.00					Center Freq			
-5.00					5.015000000 GHz			
-15.0				-21.40 dBm				
-25.0				-21 40 dBh	Start Freq			
-35.0					30.000000 MHz			
-45.0			<mark>2</mark>	<mark>▲</mark> 3	00.000000 11112			
-55.0		a la ser en la construction de la service	and the state of the	and the state of t				
-65.0					Stop Freq			
-75.0					10.00000000 GHz			
Start 30 MHz	-42 (5)144	0.0 841-	9 40	Stop 10.000 GHz	CF Step			
#Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 18	.67 ms (40001 pts)	997.000000 MHz <u>Auto</u> Man			
MKR MODE TRC SCL	× 2.440 00 GHz	Y FUN 5.57 dBm	CTION FUNCTION WIDTH	FUNCTION VALUE	Auto			
2 N 1 F	6.303 37 GHz	-50.10 dBm						
3 N 1 f	8.088 75 GHz	-50.95 dBm			Freq Offset 0 Hz			
5					0 Hz			
7								
8								
10								
11 <		THE SECOND		×				
MSG			STATUS					



8.5 Radiated spurious emissions

Test Requirements and limit, §15.247(d), §15.205, §15.209

In any 100 kHz bandwidth outside the operating frequency band, 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. 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) a	nd ((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

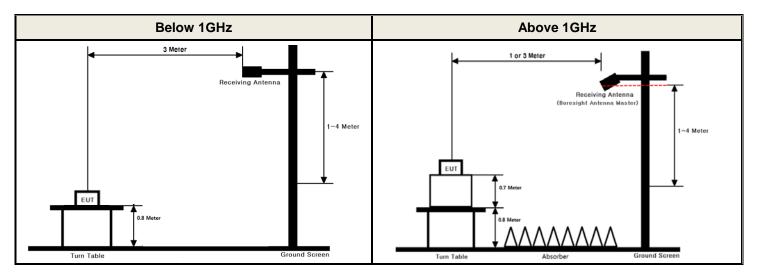
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, 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 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	608 ~ 614	3345.8 ~ 3358		
		960 ~ 1240	3600 ~ 4400		

• 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.

Test Configuration



Test Procedure

- 1. The EUT is placed on a non-conductive table, emission measurements at below 1 GHz, the table height is 80 cm and 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 1 or 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.



Measurement Instrument Setting for Radiated Emission Measurements.

The radiated emission was tested according to the section 6.3, 6.4, 6.5 and 6.6 of the ANSI C63.10-2013 with following settings.

Peak Measurement

RBW = As specified in below table, VBW \geq 3 x RBW, Sweep = Auto, Detector = Peak, Trace mode = Max Hold until the trace stabilizes.

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
>1000 MHz	1 MHz

Average Measurement:

- 1. RBW = 1 MHz (unless otherwise specified).
- 2. VBW ≥ 3 x RBW.
- 3. Detector = RMS (Number of points $\ge 2 \times \text{Span} / \text{RBW}$)
- 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.
- 3) 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.

Test Mode	Date rate	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
TM 1	1 Mbps	97.63	0.11
TM 2	6 Mbps	87.32	0.59
ТМ 3	MCS 0	86.57	0.63
TM 4	MCS0	76.04	1.19

Duty Cycle Correction factor

Test Results: Comply

Please refer to next page for data table and the appendix I for worst data plots.

Margin

(dB)

21.50

10.37

21.17

8.72

21.86

11.33

21.06

9.96

21.99

11.36

Limit

(dBuV/m)

74.00

54.00

74.00

54.00

74.00

54.00

74.00

54.00

74.00

54.00



Radiated	Spurious	Emis	sions d	lata(9 kł	Hz ~ 25 G	GHz) : <u>Te</u>	st Mode	1(TM 1)	
Tested Frequency	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)
	2387.97	Н	Z	PK	50.80	1.70	N/A	N/A	52.50
Lowoot	2387.85	Н	Z	AV	41.82	1.70	0.11	N/A	43.63
Lowest	4823.73	V	Z	PK	47.33	5.50	N/A	N/A	52.83

AV

ΡK

AV

ΡK

AV

ΡK

AV

Note.

Middle

Highest

1. The radiated emissions were investigated 9kHz to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.

5.50

5.63

5.63

1.81

1.82

5.70

5.70

0.11

N/A

0.11

N/A

0.11

N/A

0.11

N/A

N/A

N/A

N/A

N/A

N/A

N/A

45.28

52.14

42.67

52.94

44.04

52.01

42.64

2. Sample Calculation.

4824.10

4874.23

4874.19

2486.42

2487.05

4923.70

4924.00

V

V

V

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Н

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V

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Ζ

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Ζ

Ζ

Ζ

Margin = Limit – Result / Result = Reading + T.F + DCCF + DCF / T.F = AF + CL – AG Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

39.67

46.51

36.93

51.13

42.11

46.31

36.83

3. Information of Distance Factor.

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



Radiated Spurious Emissions	data(9 kHz ~ 25	GHz) : <u>Test Mode 2</u>	(TM 2)

Tested Frequency	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	2389.86	Н	Z	PK	66.16	1.71	N/A	N/A	67.87	74.00	6.13
Lowest	2389.98	Н	Z	AV	48.91	1.71	0.59	N/A	51.21	54.00	2.79
Lowest	4823.72	V	Z	PK	45.49	5.50	N/A	N/A	50.99	74.00	23.01
	4823.16	V	Z	AV	34.30	5.50	0.59	N/A	40.39	54.00	13.61
Middle	4874.44	V	Z	PK	45.04	5.63	N/A	N/A	50.67	74.00	23.33
Middle	4873.97	V	Z	AV	34.30	5.63	0.59	N/A	40.52	54.00	13.48
	2483.92	Н	Z	PK	63.54	1.80	N/A	N/A	65.34	74.00	8.66
Highest	2483.52	Н	Z	AV	48.08	1.79	0.59	N/A	50.46	54.00	3.54
	4924.75	V	Z	PK	45.14	5.70	N/A	N/A	50.84	74.00	23.16
	4924.44	V	Z	AV	34.18	5.70	0.59	N/A	40.47	54.00	13.53

Note.

1. The radiated emissions were investigated 9kHz to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.

2. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F + DCCF + DCF / T.F = AF + CL – AG Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

3. Information of Distance Factor.

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

'TM 3)



Radiated	Spurious	Emis	sions d	ata(9 kH	Hz ∼ 25 G	GHz) : <u>Te</u>	st Mode	3(
Tested Frequency	Frequency (MHz)	ANT Pol	EUT Position	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	

Tested Frequency	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	2389.79	Н	Z	PK	64.44	1.71	N/A	N/A	66.15	74.00	7.85
Lowest	2389.95	Н	Z	AV	44.82	1.71	0.63	N/A	47.16	54.00	6.84
Lowest	4823.57	V	Z	PK	45.17	5.50	N/A	N/A	50.67	74.00	23.33
	4823.85	V	Z	AV	34.38	5.50	0.63	N/A	40.51	54.00	13.49
Middle	4874.39	V	Z	PK	45.02	5.63	N/A	N/A	50.65	74.00	23.35
Midule	4873.87	V	Z	AV	34.21	5.63	0.63	N/A	40.47	54.00	13.53
	2484.39	Н	Z	PK	61.27	1.80	N/A	N/A	63.07	74.00	10.93
Highest	2483.62	Н	Z	AV	46.29	1.79	0.63	N/A	48.71	54.00	5.29
	4924.20	V	Z	PK	45.21	5.70	N/A	N/A	50.91	74.00	23.09
	4924.27	V	Z	AV	34.18	5.70	0.63	N/A	40.51	54.00	13.49

Note.

1. The radiated emissions were investigated 9kHz to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.

2. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F + DCCF + DCF / T.F = AF + CL – AG Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

3. Information of Distance Factor.

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

Radiated Spurious	s Emissions data(9 kHz ~	~ 25 GHz) : <u>Test Mode 4(TM 4)</u>
--------------------------	--------------------------	--------------------------------------

Tested Frequency	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	2389.38	Н	Z	PK	61.76	1.71	N/A	N/A	63.47	74.00	10.53
Lowest	2389.93	Н	Z	AV	47.66	1.71	1.19	N/A	50.56	54.00	3.44
Lowest	4843.53	V	Z	PK	45.19	5.55	N/A	N/A	50.74	74.00	23.26
	4843.37	V	Z	AV	34.67	5.55	1.19	N/A	41.41	54.00	12.59
Middle	4874.47	V	Z	PK	45.24	5.63	N/A	N/A	50.87	74.00	23.13
widdle	4873.50	V	Z	AV	34.44	5.63	1.19	N/A	41.26	54.00	12.74
	2483.63	Н	Z	PK	61.42	1.79	N/A	N/A	63.21	74.00	10.79
Highest	2483.70	Н	Z	AV	47.91	1.79	1.19	N/A	50.89	54.00	3.11
	4904.41	V	Z	PK	45.64	5.67	N/A	N/A	51.31	74.00	22.69
	4903.40	V	Z	AV	34.56	5.67	1.19	N/A	41.42	54.00	12.58

Note.

1. The radiated emissions were investigated 9kHz to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.

2. Sample Calculation.

Margin = Limit – Result / Result = Reading + T.F + DCCF + DCF / T.F = AF + CL – AG Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

3. Information of Distance Factor.

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

8.6 Power-line conducted emissions

Test Requirements and limit, §15.207

For an intentional radiator which 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 uH/50 ohm line impedance stabilization network(LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency Range	Conducted Limit (dBuV)				
(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.

Test Configuration

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

Test Procedure

- 1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
- 2. The EUT is connected via LISN to the test power supply.
- 3. The measurement results are obtained as described below:
- 4. Detectors Quasi Peak and Average Detector.

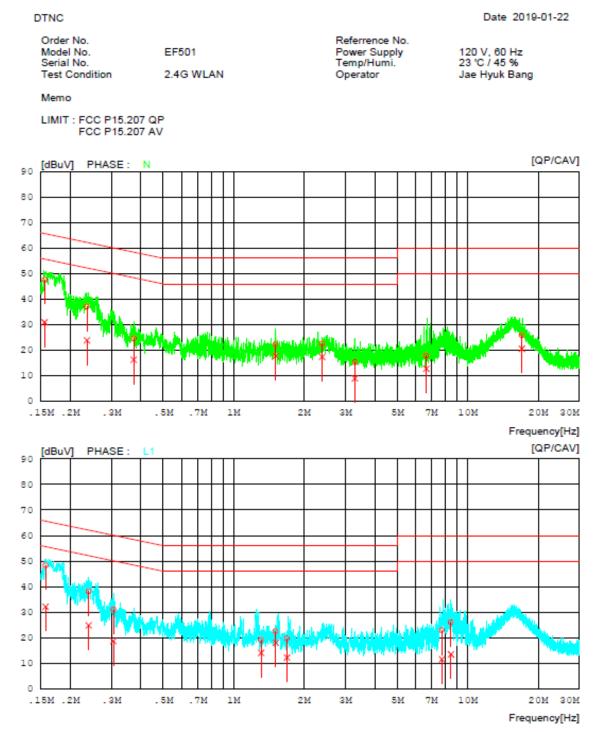
Test Results: Comply(Refer to next page.)

The worst data was reported.

RESULT PLOTS

AC Line Conducted Emissions (Graph)

Results of Conducted Emission



AC Line Conducted Emissions (List)

Results of Conducted Emission

DTNC			Date	2019-01-22
Order No. Model No. Serial No. Test Condition Memo	EF501 2.4G WLAN	Referrenc Power Su Temp/Hur Operator	pply 120 V, 60	%
LIMIT : FCC P15.207 (FCC P15.207 /				
QE		QP CAV QP	MIT MARGIN CAV QP CAV /][dBuV][dBuV][dBu	
2 0.23561 27.1 3 0.37379 14.6 4 1.50960 12.1 5 2.38600 12.5 6 3.29720 5.2 7 6.64220 7.6 8 17.02120 15.3	16 13.91 10.00 3 67 6.29 10.03 2 19 7.73 10.09 2 52 7.27 10.13 2 23 -1.11 10.15 1 65 2.49 10.27 1 39 10.04 10.55 2 08 21.84 10.22 4 20 14.81 9.97 3 99 8.65 9.98 3 00 3.96 10.04 1 42 7.93 10.06 2 55 2.11 10.06 1 62 1.16 10.27 2	$\begin{array}{llllllllllllllllllllllllllllllllllll$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	N N N N N N L L L L L L L L L L L L L L

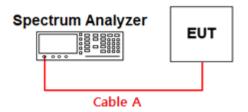
9. LIST OF TEST EQUIPMENT

Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	18/07/09	19/07/09	MY50200834
Spectrum Analyzer	Agilent Technologies	N9020A	18/07/09	19/07/09	MY46471251
DC Power Supply	Agilent Technologies	66332A	18/07/02	19/07/02	US37473422
Multimeter	FLUKE	17B	18/12/18	19/12/18	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	18/12/19	19/12/19	255571
Signal Generator	ANRITSU	MG3695C	18/12/10	19/12/10	173501
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-1
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-2
HYGROMETER	TESTO	608-H1	18/02/10	19/02/10	34862883
Loop Antenna	Schwarzbeck	FMZB1513	18/01/30	20/01/30	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	18/07/13	20/07/13	3359
Horn Antenna	ETS-Lindgren	3117	18/05/10	20/05/10	00140394
Horn Antenna	A.H.Systems Inc.	SAS-574	17/07/31	19/07/31	155
PreAmplifier	Agilent Technologies	8449B	18/07/05	19/07/05	3008A02108
PreAmplifier	H.P	8447D	18/12/18	19/12/18	2944A07774
Attenuator	SMAJK	SMAJK-50-10	18/07/04	19/07/04	15081903
High Pass Filter	Wainwright Instruments	WHKX12-2580- 3000-18000-80SS	18/07/05	19/07/05	3
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2411B	18/12/19	19/12/19	1338004 1306053
EMI Test Receiver	Rohde Schwarz	ESR7	18/02/13	19/02/13	101061
EMI Test Receiver	Rohde Schwarz	ESCI7	18/02/12	19/02/12	100910
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	18/09/27	19/09/27	101333
LISN	SCHWARZBECK	NNLK 8121	18/03/20	19/03/20	06183
Cable	Radiall	TESTPRO3	18/07/06	19/07/06	M-01
Cable	Junkosha	MWX315	18/11/19	19/11/19	M-05
Cable	Junkosha	MWX221	18/11/19	19/11/19	M-06
Cable	HUBER+SUHNER	SUCOFLEX103	18/07/06	19/07/06	M-03
Cable	DT&C	Cable	18/07/05	19/07/05	RF-82
Cable	DT&C	Cable	18/06/25	19/06/25	RF-07

Note 1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017 Note 2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

APPENDIX I

Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	0.04	15	1.09
1	0.24	20	1.87
2.402 & 2.440 & 2.480	0.38	25	2.72
5	0.50	-	-
10	0.90	-	-

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: SS4EF501X

APPENDIX II

Duty cycle plots

Test Procedure

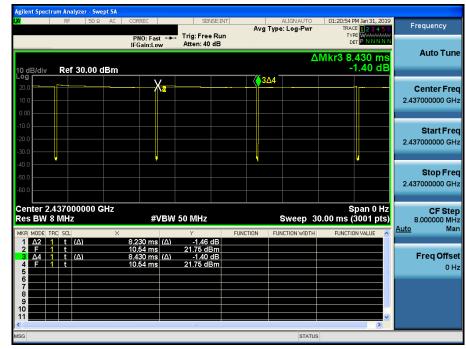
Duty Cycle was measured using section 6.0 b) of KDB558074 D01V05 :

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.)

Duty Cycle

TM 1 & Middle

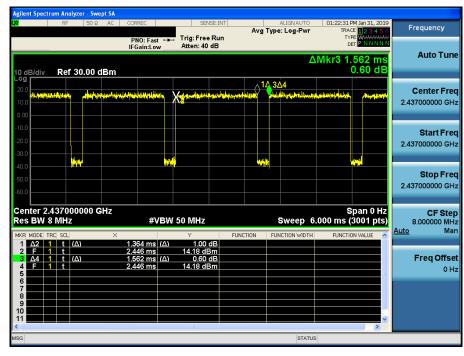


Dt&C

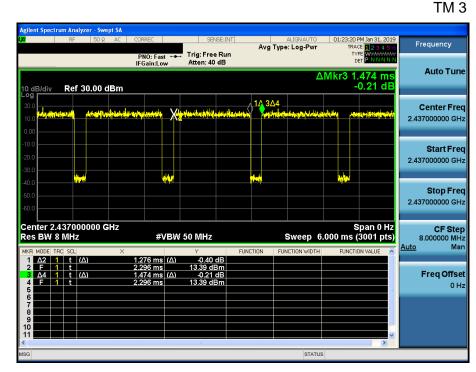
TM 2 8

& Middle

Duty Cycle



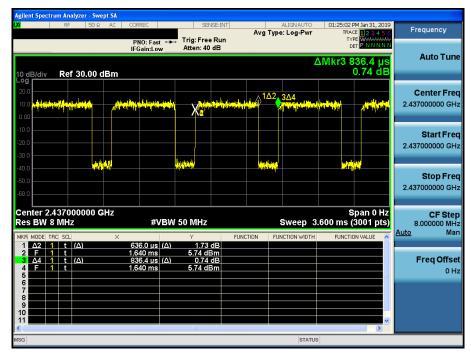
& Middle



Duty Cycle

Duty Cycle

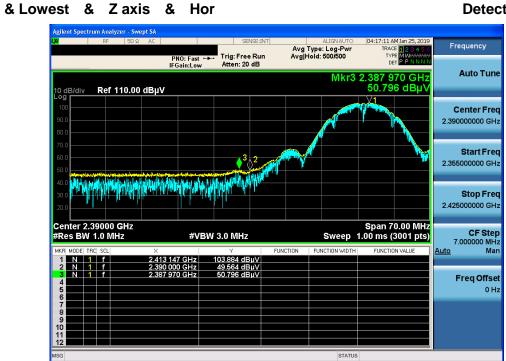
TM 4 & Middle



APPENDIX III

TM 1

Unwanted Emissions (Radiated) Test Plot



Detector Mode : PK

🛈 Dt&C

Detector Mode : AV

TM 1 & Lowest & Zaxis & Hor



TM 1 & Highest & Zaxis & Hor





TM 1 & Highest & Zaxis & Hor



Detector Mode : PK



TM 2 & Lowest & Zaxis & Hor



TM 2 & Lowest & Zaxis & Hor



TM 2 & Highest & Zaxis & Hor





TM 2 & Highest & Zaxis & Hor



Detector Mode : PK



TM 3 & Lowest & Zaxis & Hor

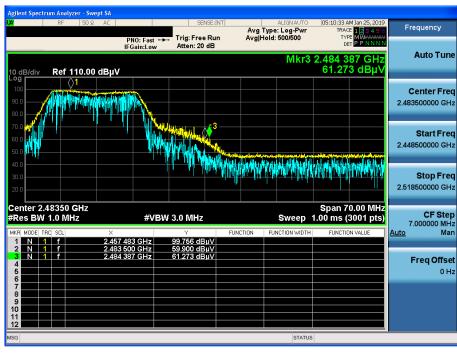


TM 3 & Lowest & Zaxis & Hor

Avg Type: Pwr(RMS) Avg|Hold: 500/500 Frequency Trig: Free Run Atten: 20 dB TYPE DET PNO: Fast IFGain:Low A P N N Auto Tune Mkr3 2.389 953 GH: 44.821 dBµ Ref 110.00 dBµV ∇^1 **Center Freq** 2.39000000 GHz Start Freq 2.355000000 GHz 3 Stop Freq 2.425000000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 70.00 MHz 1.00 ms (3001 pts) CF Step 7.000000 MHz Man #VBW 3.0 MHz* Sweep Auto FUNCTION 91.890 dBµv 44.776 dBµv 44.821 dBµv 2.390 000 GHz Freq Offset 0 Hz 11 12 STATUS

TM 3 & Highest & Zaxis & Hor





TM 3 & Highest & Zaxis & Hor





TM 4 & Lowest & Zaxis & Hor



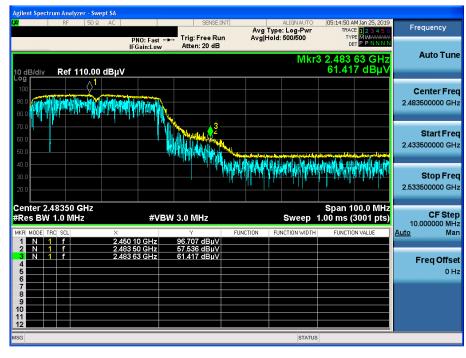


TM 4 & Lowest & Zaxis & Hor

Avg Type: Pwr(RMS) Avg|Hold: 500/500 Frequency Trig: Free Run Atten: 20 dB TYPE DE1 PNO: Fast IFGain:Low A UMARA A P N N Auto Tune Mkr3 2.389 93 GH: 47.657 dBµ\ Ref 110.00 dBµV **Center Freq** 2.39000000 GHz Start Freq 3 2.335000000 GHz Stop Freq 2.445000000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 110.0 MHz 1.00 ms (3001 pts) **CF Step** 11.000000 MHz <u>o</u> Man #VBW 3.0 MHz* Sweep Auto FUNCTION 87.794 dBµV 46.996 dBµV 47.657 dBµV Freq Offset 0 Hz 11 12 STATUS

TM 4 & Highest & Zaxis & Hor

Detector Mode : PK



TM 4 & Highest & Zaxis & Hor



Detector Mode : AV

TM 1 & Lowest & Zaxis & Ver



TM 2 & Middle & Zaxis & Ver

zer - Swept SA Frequency Avg Type: Pwr(RMS) Avg|Hold: 300/300 TYPE A WANN PNO: Fast +++ Trig: Free Run IFGain:High #Atten: 0 dB Auto Tune Mkr1 4.873 965 0 GHz 34.304 dBµV Ref 66.99 dBµV 5 dB/div Log **Center Freq** 4.874000000 GHz Start Freq 4.871500000 GHz Stop Freq 4.876500000 GHz **CF Step** 2.437000000 GHz Auto <u>Man</u> Freq Offset 0 Hz Center 4.874000 GHz #Res BW 1.0 MHz Span 5.000 MHz Sweep 1.00 ms (3001 pts) #VBW 3.0 MHz*

Dt&C

TM 3 & Highest & Zaxis & Ver





TM 4 & Highest & Zaxis & Ver



