TEST REPORT

	DT&C Co., Ltd.				
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1. Report No: DRTFCC2007-0221	(1)				
2. Customer					
• Name (FCC) : BLUEBIRD INC. / I	Name (IC) : BLUEBIRD INC.				
	, Gangnam-gu, Seoul, South Korea Gangnam-gu Seoul 06355 Korea (Republic Of)				
3. Use of Report : FCC & IC Original	Grant				
4. Product Name / Model Name : Ente FCC ID : SS4VF550X / IC : 22515-	erprise-Value Full Touch Handheld Computer / VF550 VF550				
5. Test Method Used : KDB558074 D Test Specification : FCC Part 15.24 RSS-247 Issue					
6. Date of Test : 2020.06.25 ~ 2020.0	7.15				
7. Location of Test : 🛛 Permanent Te	esting Lab 🔲 On Site Testing				
8. Testing Environment : See appende	ed test report.				
9. Test Result : Refer to the attached	test result.				
The results shown in this test report refer	only to the sample(s) tested unless otherwise stated.				
Affirmation Tested by	Reviewed by				
Name : JaeHyeok Bang	(Signature) Name : GeunKi Son (Signature)				
2020.07.30.					
DT&C Co., Ltd.					
- at a gran control					
Not abided by KS Q ISO / IEC 17025 and KOLAS accreditation.					
If this report is required to confirmation of authenticity, please contact to <u>report@dtnc.net</u>					

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Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2007-0221	Jul. 29, 2020	Initial issue	JaeHyeok Bang	GeunKi Son
DRTFCC2007-0221(1)	Jul. 30, 2020	Revised test site number	JaeHyeok Bang	GeunKi Son



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1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	Enterprise-Value Full Touch Handheld Computer
Model Name	VF550
Add Model Name	NA
Hardware Version	Rev0.5
Software Version	R1.01
Serial Number	Conducted : VF550A4LCNETEBA045 Radiated: VF550A4LCNETEBA018
Power Supply	DC 3.85 V
Frequency Range	▪ 802.11b/g/n(20 MHz) : 2 412 MHz ~ 2 462 MHz
Max. RF Output Power	2.4GHz Band • 802.11b : 19.15 dBm • 802.11g : 21.66 dBm • 802.11n (HT20) : 20.13 dBm
Modulation Type	• 802.11b: CCK, DSSS • 802.11g/n: OFDM
Antenna Specification	Antenna type: PIFA Antenna Antenna gain: 0.68 dBi

2. INFORMATION ABOUT TESTING

2.1 Test mode

Test	Worst case data rate	Tested Frequency(MHz)			
mode		Lowest	Middle	Highest	
TM 1	802.11b 11 Mbps	2 412	2 437	2 462	
TM 2	802.11g 54 Mbps	2 412	2 437	2 462	
ТМ 3	802.11n(HT20) MCS 7	2 412	2 437	2 462	

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.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.3 Tested environment

Temperature	:	20 °C ~ 25 °C
Relative humidity content	:	35 % ~ 45 %
Details of power supply	:	DC 3.85 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 C 63.4-2014 and ANSI C 63.10-2013. 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	0.9 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	3.6 dB (The confidence level is about 95 %, $k = 2$)
Radiated spurious emission (1 GHz Below)	4.9 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	5.1 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	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]	ransmitter Power Spectral < 8 dBm/3 kHz			С
-	RSS-Gen [6.7]	Occupied Bandwidth (99 %)	RSS-Gen(6.7)		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)		Radiated	C Note2
15.207	RSS-Gen [8.8]	AC Line Conducted Emissions FCC 15.207 limits		AC Line Conducted	С
15.203	-	Antenna Requirements	FCC 15.203	-	С

with OATS.

4. TEST METHODOLOGY

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB558074 D01v05r02 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB558074 D01v05r02. 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 D01v05r02.

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 D01v05r02. 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 C63.10-2013.

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.

Operation test setup for EUT

- Test Software Version: QRCT / 3.0.277.0
- Power setting:

Mode	Frequency [MHz]	Power Setting
	2 412	9
802.11b	2 437	9
	2 462	9
	2 412	8
802.11g	2 437	8
	2 462	8
902 11p	2 412	5
802.11n (HT20)	2 437	5
(H120)	2 462	5



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 & ISED MRA Designation No. : KR0034

- ISED#: 5740A

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 EUT 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 D01v05r02 Section 8.2
- ANSI C63.10-2013 Section 11.8.2
- 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. 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.

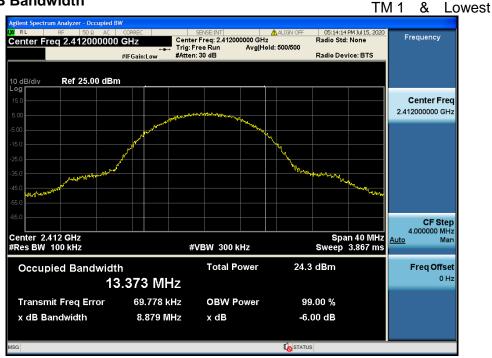
Test Results: Comply

Test Mode	Frequency	Test Results[MHz]
	Lowest	8.88
TM 1	Middle	8.90
	Highest	8.45
	Lowest	16.50
TM 2	Middle	16.50
	Highest	16.49
	Lowest	17.67
ТМ 3	Middle	17.70
	Highest	17.58



RESULT PLOTS

6 dB Bandwidth



6 dB Bandwidth

TM 1 & Middle



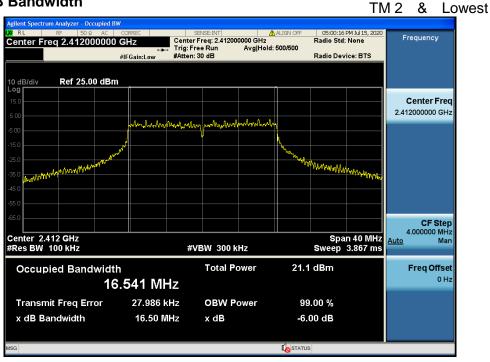
6 dB Bandwidth

🛈 Dt&C



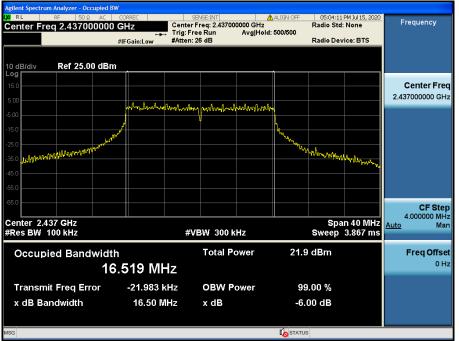
6 dB Bandwidth

TDt&C



6 dB Bandwidth





6 dB Bandwidth

🛈 Dt&C



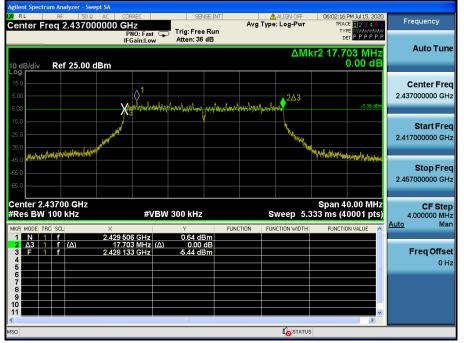
🛈 Dt&C

6 dB Bandwidth



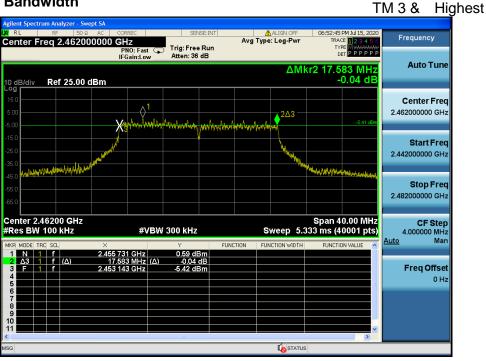
6 dB Bandwidth

TM 3 & Middle



TDt&C

6 dB Bandwidth

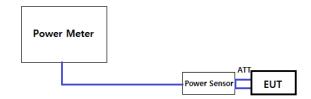


8.2 Maximum peak conducted output power

Test Requirements and limit, §15.247(b)

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

1. PKPM1 Peak power meter method of KDB558074 D01v05r02

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.

2. Method AVGPM-G (Measurement using a gated RF average power meter) of KDB558074 D01v05r02

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

From			Maxim	(dBm) for <u>8</u>	02.11b							
Freq. (MHz)	Det.	Data Rate [Mbps]										
		1	2	5.5	11	-	-	-	-			
2 412	PK	17.87	17.91	18.02	18.11	-	-	-	-			
2412	AV	15.60	15.63	15.67	15.71	-	-	-	-			
2 437	PK	19.00	19.06	19.13	19.15	-	-	-	-			
2 437	AV	16.59	16.65	16.78	16.80	-	-	-	-			
2 462	PK	18.22	18.29	18.33	18.37	-	-	-	-			
2 462	AV	15.64	15.66	15.69	15.73	-	-	-	-			

Frog		Maximum Peak Conducted Output Power (dBm) for 802.11g									
Freq. (MHz)	Det.	Data Rate [Mbps]									
		6	9	12	18	24	36	48	54		
2 4 1 2	PK	20.70	20.75	20.81	20.66	20.69	20.77	20.79	20.84		
2 412	AV	13.47	13.42	13.44	13.51	13.52	13.55	13.55	13.59		
2 437	PK	21.47	21.51	21.58	21.42	21.64	21.52	21.55	21.66		
2 437	AV	14.25	14.23	14.23	14.32	14.30	14.37	14.33	14.38		
2 462	PK	21.24	21.29	21.22	21.35	21.36	21.44	21.35	21.49		
2 402	AV	13.33	13.35	13.29	13.39	13.38	13.32	13.40	13.42		

Frog		Maximum Peak Conducted Output Power (dBm) for <u>802.11n(HT20)</u>										
Freq. (MHz)	Det.	Data Rate [MCS]										
		0	1	2	3	4	5	6	7			
2 412	PK	19.05	19.11	19.27	19.22	19.42	19.49	19.59	19.75			
2412	AV	10.86	10.89	10.91	10.81	10.85	10.92	11.02	11.12			
2 437	PK	19.77	19.49	19.56	19.63	19.56	19.58	19.63	20.13			
2 437	AV	11.32	11.36	11.39	11.41	11.50	11.54	11.57	11.62			
2 462	PK	18.95	18.99	19.24	19.11	19.38	19.51	19.55	19.68			
2 462	AV	10.26	10.33	10.41	10.35	10.52	10.58	10.55	10.62			



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 D01v05r02 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 : $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- 4. Set the VBW ≥ **3 x RBW**
- 5. Detector = Peak
- 6. Sweep time = **Auto couple**
- 7. Trace mode = **Max hold.**
- 8. Allow trace to fully stabilize.

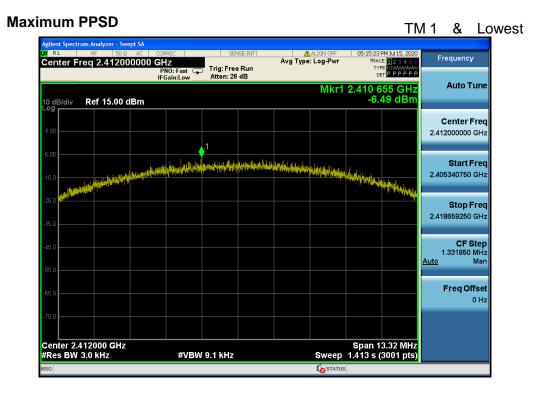
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.

10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Results: Comply

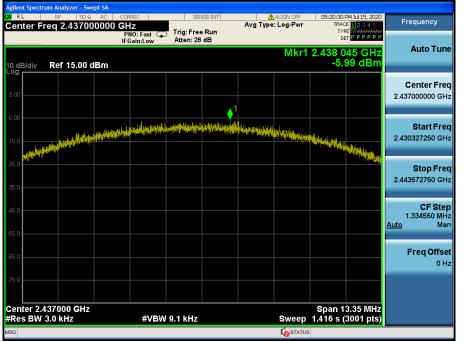
Test Mode	Frequency	RBW	PKPSD [dBm]
	Lowest	3 kHz	-6.49
TM 1	Middle	3 kHz	-5.99
	Highest	3 kHz	-6.53
	Lowest	3 kHz	-12.27
TM 2	Middle	3 kHz	-11.44
	Highest	3 kHz	-11.31
	Lowest	3 kHz	-14.33
ТМ 3	Middle	3 kHz	-13.90
	Highest	3 kHz	-14.36

RESULT PLOTS



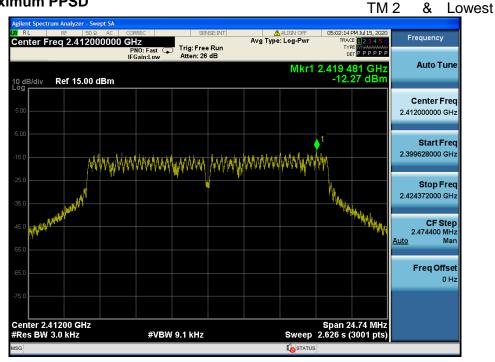
Maximum PPSD

TM 1 & Middle





🛈 Dt&C

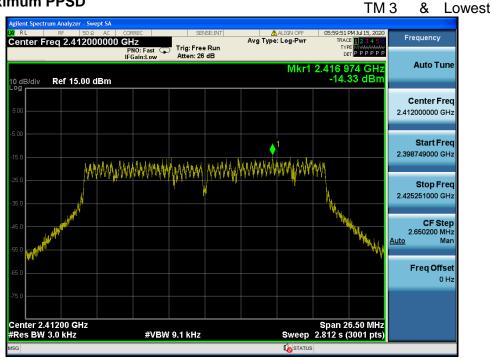


Maximum PPSD

TM2 & Middle







Maximum PPSD

TM 3 & 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 D01v05r02 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 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.

- 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 ≥ 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

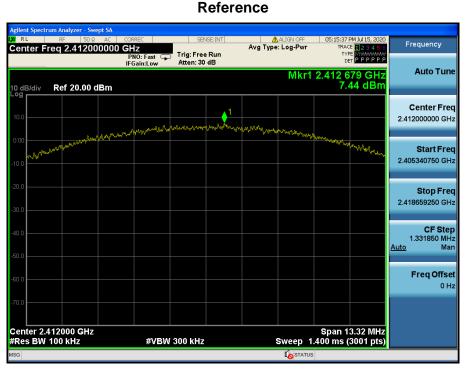
Frequency range: 30 MHz ~ 10 GHz, 10 GHz ~25 GHz RBW = 1 MHz, VBW = 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

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

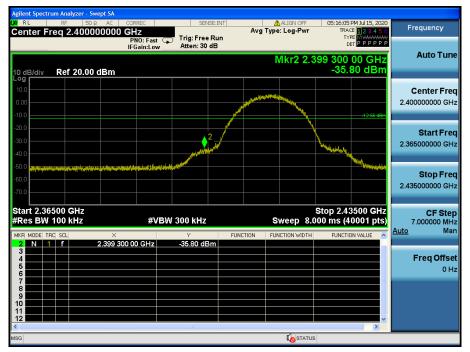
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

RESULT PLOTS

TM 1 & Lowest

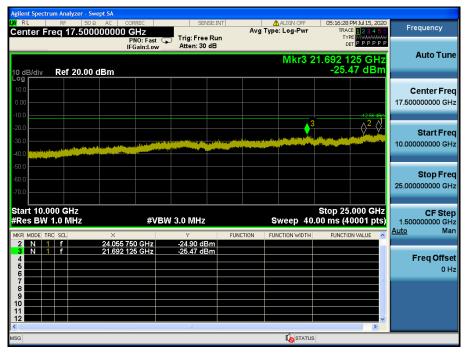


Low Band-edge



Agilent Spectrum Analyzer - Swept SA					
	CORREC	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	05:16:12 PM Jul 15, 2020 TRACE 1 2 3 4 5 6	Frequency
Center Freq 15.004500 M	PNO: Fast	Trig: Free Run	Avg Type. Log-t wi	TYPE M MAAAAAAAAA	
	IFGain:Low	Atten: 30 dB		DETPPPPP	
				Mkr1 281.9 kHz	Auto Tune
10 dB/div Ref 20.00 dBm				-47.18 dBm	
Log					
10.0					Center Freq
0.00					15.004500 MHz
-10.0				-12.56 dBm	
-20.0					
					Start Freq
-30.0					9.000 kHz
-40.0 1					
-50.0					
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					30.000000 MHz
-70.0					
Start 9 kHz				Stop 30.00 MHz	
#Res BW 100 kHz	#VBW 3	200 642	Sween 5	333 ms (40001 pts)	CF Step 2.999100 MHz
	#*D**				Auto Man
MKR MODE TRC SCL X		Y FU	TO FUNCTION WIDTH	FUNCTION VALUE	<u>rato</u> man
2					
4					Freq Offset
5					0 Hz
7				=	
8					
9					
11					
12				×	
			De erere		
MSG				s <u>1</u> DC Coupled	

Agilent Spectrum Analyzer - Swept S						
RL RF 50 Ω AC Center Freq 5.0150000		SENSE:INT		ALIGN OFF	05:16:20 PM Jul 15, 2020 TRACE 123456	Frequency
Center Freq 5.0150000	PNO: Fast	Trig: Free Run		,,		
	IFGain:Low	Atten: 30 dB				Auto Tune
				Mkr	5 5.640 62 GHz	Auto Tune
10 dB/div Ref 20.00 dBn					-35.07 dBm	
10.0	Q1					Center Freq
0.00						5.015000000 GHz
						3.013000000 GHz
-10.0					-12.56 dBm	
-20.0	A3 A2		▲5			Start Freq
-30.0			- \`			30.000000 MHz
-40.0		in the second	a district providenting.	and the product of the Property of the Propert	PERseptement and a comparison of the second s	
-50.0						
-60.0						Stop Freq
-70.0						10.00000000 GHz
-70.0						
Start 30 MHz					Stop 10.000 GHz	CF Step
#Res BW 1.0 MHz	#VE	3W 3.0 MHz		Sweep 18.	67 ms (40001 pts)	997.000000 MHz
MKR MODE TRC SCL	×	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f	3.282 46 GHz	-34.01 dBm				
3 N 1 f	2.595 53 GHz 3.111 48 GHz	-34.39 dBm -34.84 dBm				Freq Offset
5 N 1 f	5.640 62 GHz	-35.07 dBm				0 Hz
6						0112
8						
9						
11						
12					×	
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1100				No STATUS		

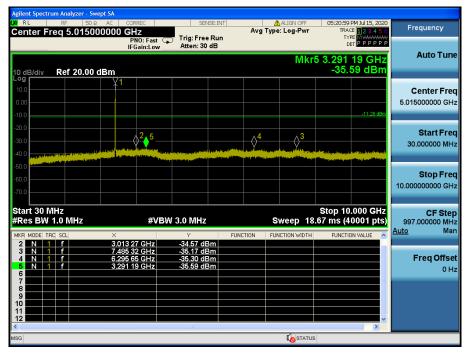


TM 1 & Middle

Reference



Agilent Spectrum	n Analyzer - Swe RF 50 Ω			CEN	ISE:INT		ALIGN OFF	05,00,51	PM Jul 15, 2020	
Center Fre		00 MHz				Avg	Type: Log-Pwr	TRAC	E 1 2 3 4 5 6	Frequency
			0: Fast 🖵 ain:Low	Atten: 30					Е М илилии ТРРРРР	Auto Tune
10 dB/div Log	Ref 20.00 d	IBm						Mkr1 30 -47.	5.2 kHz 74 dBm	Auto Tune
10.0										Center Freq
0.00									-11.28 dBm	15.004500 MHz
-10.0									-11.20 dom	
-30.0										Start Freq 9.000 kHz
-40.0										
-50.0	tyskillen and the second states of the second state		ومؤبوطيراوم نينتمين	walmonyone	Lingtonský levisterské podlejské	maniphoniqu	the states and the second states	hadden and the	Nevhathing the start	Stop Freq
-70.0										30.000000 MHz
Start 9 kHz								Stop 3	0.00 MHz	CF Step
#Res BW 1			#VBW	300 kHz			Sweep 5.3			2.999100 MHz Auto Man
MKR MODE TRC	SCL	×		Y	FUN	CTION	FUNCTION WIDTH	FUNCTIO	IN VALUE	Auto Mari
3										Freq Offset
5 6 7										0 Hz
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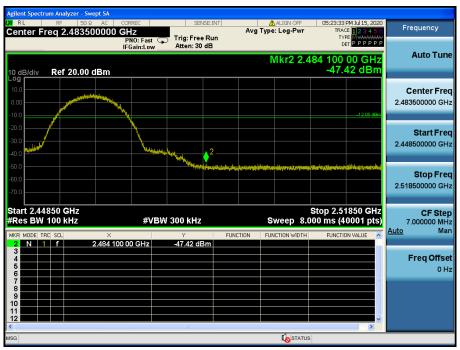
Agilent Spectrum Analyzer - Swept SA				
RL RF 50 Ω AC CORR Conter Freq 17.500000000 GH	7	Avg Type: Log-Pwr	05:21:07 PM Jul 15, 2020 TRACE 2 3 4 5 6	Frequency
PN	D: Fast Trig: Free Ru ain:Low Atten: 30 dB		DET P P P P P	
		Mkr3	24.560 125 GHz	Auto Tune
10 dB/div Ref 20.00 dBm			-24.94 dBm	
Log 10.0				Center Freq
0.00				17.50000000 GHz
-10.0			-11.28 dBm	
-20.0				Otart From
-30.0	And the second	the party of the second later of the second s		Start Freq 10.00000000 GHz
-40.0	In the local data in the local	And a second		10.00000000000000
-50.0				
-60.0				Stop Freq 25.00000000 GHz
-70.0				25.00000000 GHz
Start 10.000 GHz			Stop 25.000 GHz	05.04.0
#Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 4	0.00 ms (40001 pts)	CF Step 1.50000000 GHz
MKR MODE TRC SCL X	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 24.157 000 3 N 1 f 24.560 125				
4				Freq Offset
6				0 Hz
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MSG		to statu	IS	

TM 1 & Highest

Reference

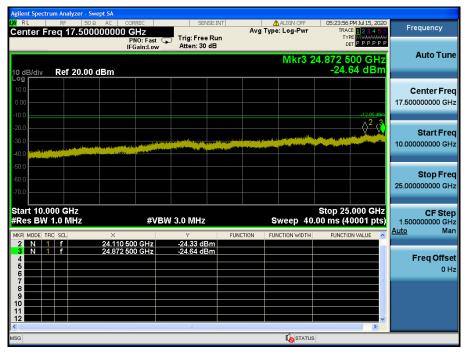


High Band-edge



	um Analyzer - !										
Center Fr			CORREC	SEI	NSE:INT		ALIGN OFF		M Jul 15, 2020	Frequency	
Center Fr	eq 15.00	4300 Min	PNO: Fast G	Trig: Free		1113 134		TYP	E MWWWWWW T P P P P P P		_
			IFGain:Low	Atten: 30	dB			DE		Auto Tu	
								Mkr1 28		Auto Tu	me
10 dB/div	Ref 20.0	0 dBm						-48.4	l3 dBm		
Log											
10.0										Center Fr	req
0.00										15.004500 M	1Hz
-10.0									-12.05 dBm		
-20.0											
										Start Fr	
-30.0										9.000 k	κΗz
-40.0 1											
-50.0			and the line with	former a list of a state	be as to face of				a kalk a state		
-60.0	And an Antonia line	Allen Biller Biller Biller	hand a second	a an air sha waa a ta a a a a a a a a a a a a a a a	A genetic of the solution of the	and the state of the	tervieweekonerveeko	en finske staar staar de skaar de skaa Neer skaar de		Stop Fr	
-70.0										30.000000 M	iHz
-70.0											
Start 9 kH	z							Stop 30	0.00 MHz	CF St	en
#Res BW	100 kHz		#VBV	/ 300 kHz		s	weep 5.	333 ms (4)		2.999100 M	
MKR MODE TH		×		Y	CLIN	CTION FU	NCTION WIDTH	FUNCTIO			/lan
2		0		1	TON		ACTION WIDTH	TONCHO	N VALUE		
3										FO #_	
4 5										Freq Offs	
6										0	Hz
7									Ξ		
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11									~		
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MSG								DC Cou	pled		
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Agilent Spectrum Analyzer -					
Center Freq 5.015		SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	05:23:48 PM Jul 15, 2020 TRACE 123456	Frequency
	PNO: Fast G IFGain:Low	Trig: Free Run Atten: 30 dB		DET P P P P P	
			Mkr	5 3.038 20 GHz	Auto Tune
10 dB/div Ref 20.00				-35.23 dBm	
10.0	V1				Center Freq
0.00					5.015000000 GHz
-10.0				-12.05 dBm	
-20.0					Start Freq
-30.0	<mark>53 ∂²</mark>		∕⁴		30.000000 MHz
-40.0	asheer the second s			effed we water bage of a title with the balle	
-50.0		التكفي التتقيم			
-60.0					Stop Freq 10.00000000 GHz
-70.0					10.00000000 GHZ
Start 30 MHz				Stop 10.000 GHz	
#Res BW 1.0 MHz	#VB\	№ 3.0 MHz	Sweep 18	.67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	X	Y FU	NCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 3 N 1 f	3.594 03 GHz 3.192 23 GHz	-33.90 dBm -35.13 dBm			
4 N 1 f	5.846 00 GHz	-35.13 dBm			Freq Offset
5 N 1 f	3.038 20 GHz	-35.23 dBm			0 Hz
8				=	
9					
11					
12				<u> </u>	
MSG					



TM 2 & Lowest

Reference

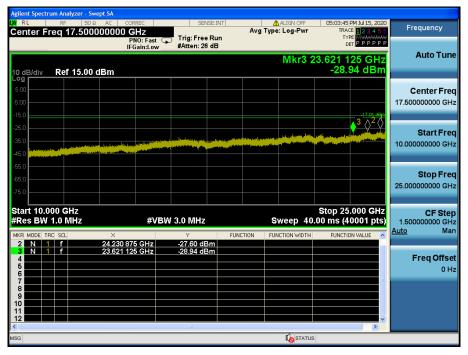


Low Band-edge



Agilent Spectrum Analyzer -	Swept SA		ISE:INT	ALIGN OFF	05:03:03 PM Jul 15, 2020	
Center Freq 15.00	4500 MHz		Avg	Type: Log-Pwr	TRACE 1 2 3 4 5 6	Frequency
	PNO: I IFGain				TYPE MWWWWW DET P P P P P P	A
10 dB/div Ref 15.0	0 dBm				Vlkr1 281.9 kHz -52.73 dBm	Auto Tune
5.00						Center Freq
-5.00						15.004500 MHz
-15.0						
-25.0						Start Freq
-35.0						9.000 kHz
-65.0	gðiskrækkeynskungræðisenn felskenning	http://www.arenticogeneral	nynysia frankski far hallag	with a history many states that the	himiter for a first a second shall a soli	Stop Freq
-75.0						30.000000 MHz
Start 9 kHz #Res BW 100 kHz		#VBW 300 kHz		Sweep 5.3	Stop 30.00 MHz 333 ms (40001 pts)	CF Step 2.999100 MHz
MKR MODE TRC SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
3						Freq Offset
5						0 Hz
7					=	
9						
11						
12 <		110			>	
MSG					L DC Coupled	

Agilent Spectrum Analyzer - Swept S					
RL RF 50 Ω AC Center Freq 5.0150000	00 GHz	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	05:03:13 PM Jul 15, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast 🔾 IFGain:Low	Trig: Free Run Atten: 26 dB		TYPE MWWWWWW DET PPPPP	
10 dB/div Ref 15.00 dBr			Mkr	5 3.496 82 GHz -39.28 dBm	Auto Tune
5.00 -5.00 -15.0	Υ 1			-17.01.dBm,	Center Freq 5.015000000 GHz
-25.0			ala bi sa ang mang kisi ng kinang kinang Manang pang manana kinang k	and the foregoing and a second second second generation of the	Start Freq 30.000000 MHz
-55.0 -65.0 -75.0					Stop Freq 10.00000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBV	/ 3.0 MHz	Sweep 18	Stop 10.000 GHz 67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	× 2.390 65 GHz	ү ғ -31.43 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
3 N 1 F 4 N 1 F 5 N 1 F 6 4 4 4 5	3.507 54 GHz 3.161 33 GHz 3.496 82 GHz	-38.91 dBm -38.92 dBm -39.28 dBm			Freq Offset 0 Hz
7 8 9 10 11					
12		100		×	
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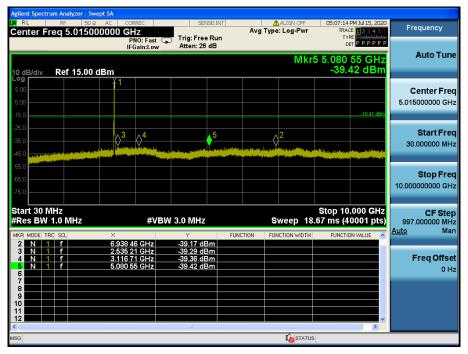


TM 2 & Middle

Reference



Agilent Spectrun										
Center Fre			ORREC		NSE:INT	Avg	ALIGN OFF Type: Log-Pwr	TRACE	M Jul 15, 2020	Frequency
			PNO: Fast FGain:Low					TYPE DE1	PPPPP	Auto Tomo
10 dB/div	Ref 15.00	dBm						4 vikr1 287 52.3-	7.9 kHz 3 dBm	Auto Tune
5.00 -5.00 -15.0									-16.41 dBm	Center Freq 15.004500 MHz
-25.0 -35.0 -45.0										Start Freq 9.000 kHz
-55.0 -65.0 -75.0 -75.0	tion <mark>tha</mark> listonors ^{thei} le	A leiten siste für stander der	*******	יייזאנעריייאינגייטיןלאעלעערייי איזעראיןאערייאין	Nerthald, Marine		Nerode Selection and Andrews	nderse intersections in the	mannenhainn	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 1	00 kHz		#V	BW 300 kHz			Sweep 5.3	133 ms (40		CF Step 2.999100 MHz Auto Man
MKR MODE TRC	SCL	×		Y	FU	NCTION	FUNCTION WIDTH	FUNCTION	N VALUE	
3 4 5 6 7										Freq Offset 0 Hz
8 9 10 11										
12									×	
MSG								L DC Cou	pled	



Agilent Spectrum Analyzer - Swept SA				
	CORREC SENSE:		05:07:22 PM Jul 15, 2020	Frequency
Center Freq 17.500000000		Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE M WWWWWW	rioquonoy
	PNO: Fast Trig: Free Ru IFGain:Low Atten: 26 dB		DETPPPPP	
		Mkr2 (4.250 750 GHz	Auto Tune
		IVINI 3 2	-27.66 dBm	
10 dB/div Ref 15.00 dBm			-27.00 0.511	
5.00				Center Freq
				17.500000000 GHz
-5.00				17.50000000 GHZ
-15.0			-16.41 /IBm	
-25.0			? `♀	Start Freq
-35.0	A DESCRIPTION OF A DESC	and the second	Lines Aldered Street Street Street Street	
-35.0		States and its in the state of		10.00000000 GHz
and a state of the				
-55.0				04
-65.0				Stop Freq
-75.0				25.00000000 GHz
10.0				
Start 10.000 GHz			Stop 25.000 GHz	CF Step
#Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 40	.00 ms (40001 pts)	1.500000000 GHz
MKB MODE TRC SCL X	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
	-27.50 dBm		FUNCTION VALUE	
	750 GHz -27.66 dBm			
4				Freq Offset
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TM 2 & Highest

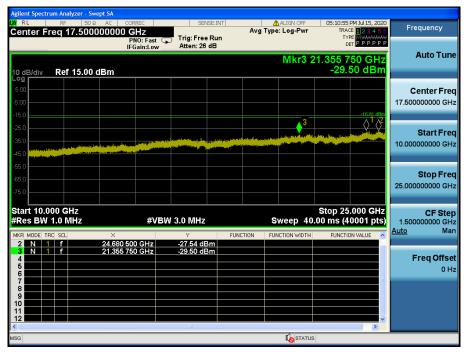


High Band-edge



Agilent Spectrum Analyzer - Swept SA					
ເ <mark>X/</mark> RL RF 50Ω <u>A</u> DC Center Freq 15.004500 M		SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	05:10:39 PM Jul 15, 2020 TRACE 123456	Frequency
Contor Freq Forestere	PNO: Fast 🖵	Trig: Free Run Atten: 26 dB		TYPE MWWWWW DET PPPPP	
	IFGain:Low	Atten: 20 dB		MI-4 200 0 111-	Auto Tune
				Mkr1 302.2 kHz -53.01 dBm	
10 dB/div Ref 15.00 dBm				-33.01 0.511	
5.00					Center Free
-5.00					15.004500 MH
-15.0				-16.81 dBm	
-25.0					Start Free
-35.0					9.000 kH
-45.0 1					
-55.0	hans harmittik sont alt att addite	1	and the second diversion of the second	والمتركبة والمتحدة والمتحالية والمتحد والمحالية والمتحال	
-65.0			a na ana ang ang ang ang ang ang ang ang		Stop Free
-75.0					30.000000 MH
Start 9 kHz				Stop 30.00 MHz	CF Step
#Res BW 100 kHz	#VBW	300 kHz	Sweep 5	.333 ms (40001 pts)	2.999100 MH
MKR MODE TRC SCL X		Y FL	INCTION FUNCTION WIDTI	H FUNCTION VALUE	<u>Auto</u> Mai
2 3					
4					Freq Offse
5					он
7				=	
8					
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<		illi illi		>	
MSG				us 1 DC Coupled	

Center Freq 5.015000000		SENSE	INT					
					ALIGN OFF	TRACE	M Jul 15, 2020	Frequency
	PNO: Fast 🖵 IFGain:Low	Trig: Free R Atten: 26 dB				DE	MWWWWWW PPPPP	
10 dB/div Ref 15.00 dBm					Mkr(5 2.581 (-39.6	32 GHz 9 dBm	Auto Tune
5.00 -5.00 -15.0	1						-16.81.dBm	Center Freq 5.015000000 GHz
-25.0 -35.0 -45.0	5? 3	ي ما الارتيانية من الماريني مراجع من المارينية من المارينية المراجع		a la faria aya aya tu	l de georgieg benike de segrige oak De georgieg benike de segrige oak	latan kan kan da sa sa ka		Start Freq 30.000000 MHz
-55.0								Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW	3.0 MHz		S	weep 18.	Stop 10. 67 ms (40		CF Step 997.000000 MHz Auto Man
MKR MODE TRC SCL X	83 27 GHz	-39.23 dBm	FUNCI	'ION FUN	ICTION WIDTH	FUNCTIO	N VALUE	Auto Mari
3 N 1 f 3.2 4 N 1 f 5.7	83 27 GHZ 99 66 GHz 67 24 GHz 81 32 GHz	-39.41 dBm -39.44 dBm -39.69 dBm	1					Freq Offset 0 Hz
7 8 9 9 10 11								
12							~	
MSG					I STATUS			



TM 3 & Lowest



Low Band-edge



W RL RF 50.2.ALDC CORREC SE Center Freq 15.004500 MHZ PN0: Fast IFGain:Low FGain:Low	Avg Typ e Run	ALIGN OFF 06 e: Log-Pwr	:00:41 PM Jul 15, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
PNO: Fast 😱 Trig: Fre	e Run		TYPE M MAAAAAAAA	
IFGain:Low Atten: 2) dB			
				Auto Tune
			281.9 kHz	Auto Tune
10 dB/div Ref 10.00 dBm		-	-57.84 dBm	
				Center Freq
-10.0			-19.55 dBm	15.004500 MHz
-20.0			-19.55 (194)	
-30.0				Start Freq
-40.0				9.000 kHz
-50.0 \ 1				9.000 KH2
-60.0				
Wincons all in the transmission of	متعادة أفسا ويعادون الطلطان سبب فأذا ابذق خالابيه وا	annalusian maingana fian	And we have a surfly a surply	Stop Freq
10.0				30.000000 MHz
-80.0				
Start 9 kHz		St	op 30.00 MHz	05.04.0
#Res BW 100 kHz #VBW 300 kHz	, ,	Sweep 5.333 n		CF Step 2.999100 MHz
				Auto Man
MKR MODE TRC SCL X Y		INCTION WIDTH F	UNCTION VALUE	
2				
				Freq Offset
5			=	0 Hz
6				
8				
9	_			
			~	
×				
MSG		🚺 STATUS 🚹 DO	C Coupled	

Agilent Spectrum Analyzer - Sw					
Center Freq 5.01500	AC CORREC 00000 GHz PN0: Fast	SENSE: INT	ALIGN OFF	06:00:50 PM Jul 15, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P P	Frequency
10 dB/div Ref 10.00 (IFGain:Low	Atten: 20 dB	Mkr	5 2.614 47 GHz -45.12 dBm	Auto Tune
-10.0	↑1 ↓ 2 ↓			-19.55 dBm	Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0			Hend, interpreter to the company of the design of the first state of the company of the design of th	n an	Start Freq 30.000000 MHz
-60.0					Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VB\	V 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	× 2.419 31 GHz 2.399 37 GHz	Y FU 7.37 dBm -23.03 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
3 N 1 F 4 N 1 f 5 N 1 F 6 7	2.392 89 GHz 3.142 38 GHz 2.614 47 GHz	-34.52 dBm -44.85 dBm -45.12 dBm			Freq Offset 0 Hz
8 9 10 11				×	
MSG					

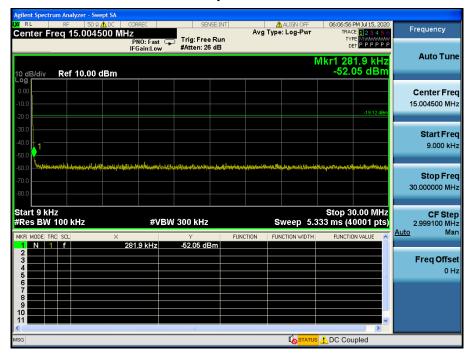


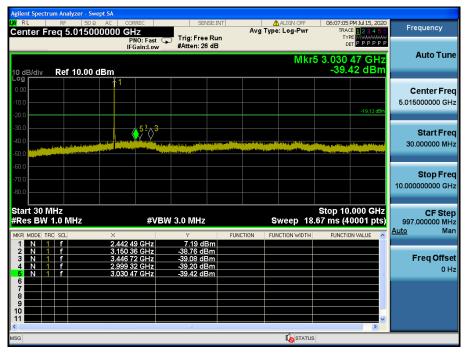
TM 3 & Middle

Reference m Analyzer - Sw ept S Agriculture Jose V RL RF 50.9 AC COnnex Center Freq 2.437000000 GHz PN0: Fast IFGain:Low #Atten: 26 dB 06:06:49 PM Jul 15, 20 TRACE 1 2 3 4 4 ALIGN OFF Frequency TYPE MWWWWWW DET P P P P P Auto Tune Mkr1 2.430 742 GHz 0.88 dBm Ref 10.00 dBm 10 dB/div **Center Freq ♦**¹ 2.437000000 GHz when prophysically benerical way and the second and the Start Freq 2.423722750 GHz Stop Freq 2.450277250 GHz CF Step 2.655450 MHz Man Auto Freq Offset 0 Hz Center 2.43700 GHz #Res BW 100 kHz Span 26.55 MHz Sweep 2.600 ms (3001 pts) #VBW 300 kHz

Conducted Spurious Emissions

I STAT





Agilent Spectrum Analyzer - Swept SA				
Center Freq 17.500000000 GHz	SENSE:INT	ALIGN OFF	06:07:13 PM Jul 15, 2020 TRACE 123456	Frequency
PNO: Fast 😱 IEGain:Low	Trig: Free Run #Atten: 26 dB		DET P P P P P	
		Mkr3.2	4.269 875 GHz	Auto Tune
10 dB/div Ref 10.00 dBm		MIRIO 2	-27.15 dBm	
				Center Freq
-10.0				17.50000000 GHz
-20.0				
-30.0				Otent From
-40.0	م المحمول ومعلم ويري والله وما المحمل المربول والمحمل المربول ومع المحمول ومع المحمول والمحمل والمحمل والمحمل و مستقد من المحمول ومعالم المحمول والمحمل والمحمل المحمول ومعالم المحمول ومعالم المحمول والمحمل والمحمل والمحمول و	An address of the second s	and a strength of the state of	Start Freq 10.00000000 GHz
-50.0				10.00000000000000
-60.0				
-70.0				Stop Freq
-80.0				25.00000000 GHz
Start 10.000 GHz			Stop 25.000 GHz	
	3.0 MHz	Sweep 40.	00 ms (40001 pts)	CF Step 1.50000000 GHz
MKR MODE TRC SCL X	Y FUN	CTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 24.086 125 GHz 2 N 1 f 24.112 000 GHz	-26.45 dBm -27.09 dBm			
3 N 1 f 24.269 875 GHz	-27.15 dBm			Freq Offset
				0 Hz
8				
10				
<			×	
MSG		I o status		

TM 3 & Highest

Reference



High Band-edge



Agilent Spectru										
Center Fr			REC		SE:INT		ALIGN OFF	TRAC	PM Jul 15, 2020 E 1 2 3 4 5 6	Frequency
		Р	NO: Fast 🔾 Gain:Low	Trig: Free Atten: 20				TYI Di	E MWWWWWW PPPPPP	
			Jam.cow					Mkr1 28	5 7 kHz	Auto Tune
10 dB/div	Ref 10.00	dBm							95 dBm	
Log 0.00										O and an Emer
-10.0										Center Freq 15.004500 MHz
-10.0									-19.35 dBm	15.004500 MHz
-30.0										Start Freq
-40.0										9.000 kHz
-50.0										
-60.0	eners for any sources	graterouse with terms	and general when the	والمناورين وإوجده	whiteware white		our market and the		where the states of the	Stop Freq
-70.0										30.000000 MHz
-80.0										
Start 9 kH									0.00 MHz	CF Step
#Res BW 1	100 kHz		#VBV	/ 300 kHz		s	weep 5.3	333 ms (4	0001 pts)	2.999100 MHz
MKR MODE TRI		×		Y		CTION FUN	NCTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Man
1 N 1 2	f	285	.7 kHz	-57.95 dB	m					
3										Freq Offset
5									=	0 Hz
6										
8										
10										
11									>	
MSG								DC Cou	upled	

	n Analyzer - Swept SA								
Center Fre	RF 50Ω AC eq 5.01500000		SENSE:IN		Avg Type	ALIGN OFF : Log-Pwr	TRACI	M Jul 15, 2020	Frequency
		PNO: Fast G	Trig: Free Run Atten: 20 dB				DE	PPPPP	
10 dB/div	Ref 10.00 dBm	,				Mkr	5 2.581 -45.2	57 GHz 27 dBm	Auto Tune
0.00		1							Center Freq 5.01500000 GHz
-20.0								-19.35 dBm	5.01500000 GHz
-30.0		2 ▲5 ∧3		4					Start Freq
50.0									30.000000 MHz
-60.0									Stop Freq
-80.0									10.000000000 GHz
Start 30 MH #Res BW 1		#VBV	V 3.0 MHz		Si	weep 18.	Stop 10. 67 ms (40	000 GHz 0001 pts)	CF Step 997.000000 MHz
MKR MODE TRC		456 20 GHz	۲ 7.39 dBm	FUNCTI	ON FUN	CTION WIDTH	FUNCTIO	N VALUE	<u>Auto</u> Man
2 N 1 3 N 1	f 2 f 2	484 61 GHz 920 05 GHz	-36.87 dBm -44.82 dBm						Freq Offset
4 N 1 5 N 1 6	f 5 f 2	682 49 GHz 581 57 GHz	-45.23 dBm -45.27 dBm					=	0 Hz
7 8									
9 10 11									
< MSG						STATUS			
mod						No 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) 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 emission	ons are permitted in any of th	he 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

Refer to the APPENDIX I.

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.

- KDB558074 D01v05r02 - Section 8.6

- ANSI C63.10-2013 – Section 11.12

Peak Measurement

RBW = As specified in below table, VBW \ge 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 \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/D), 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/D), 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.

Duty Cycle Correction factor

Test Mode	st Mode Date rate		T _{on+off} (ms)	D = Ton / (Ton+off)	DCCF = 10 log(1/D) (dB)
TM 1	11 Mbps	0.923	1.120	0.823 7	0.84
TM 2	54 Mbps	0.172	0.370	0.465 8	3.32
TM 3	MCS 7	0.160	0.358	0.447 5	3.49

Note1: Where, T= Transmission duration / D= Duty cycle

Note2: Please refer to the appendix I for duty cycle plots.

Test Results: Comply

Test Notes.

- 1. The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found below 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, measurements may be performed at a distance closer than that specified in the regulations. In this case, the distance factor is applied to the result.

- Calculation of distance factor

At frequencies below 30 MHz = 40 log(tested distance / specified distance)

At frequencies at or above 30 MHz = 20 log(tested distance / specified distance)

When distance factor is "N/A", the measurements were performed at the specified distance and distance factor is not applied.

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)
	2 387.82	V	Z	PK	52.00	4.79	N/A	N/A	56.79	74.00	17.21
Lowoot	2 388.05	V	Z	AV	40.90	4.79	0.84	N/A	46.53	54.00	7.47
Lowest	4 824.23	Н	Х	PK	53.36	0.93	N/A	N/A	54.29	74.00	19.71
	4 824.08	Н	Х	AV	43.59	0.93	0.84	N/A	45.36	54.00	8.64
Middle	4 873.89	Н	Х	PK	51.97	1.17	N/A	N/A	53.14	74.00	20.86
wildule	4 873.98	Н	Х	AV	42.34	1.17	0.84	N/A	44.35	54.00	9.65
	2 484.37	V	Z	PK	51.47	5.26	N/A	N/A	56.73	74.00	17.27
Lighoot	2 484.30	V	Z	AV	41.22	5.26	0.84	N/A	47.32	54.00	6.68
Highest	4 924.00	Н	Х	PK	51.33	1.45	N/A	N/A	52.78	74.00	21.22
	4 923.97	Н	Х	AV	41.89	1.45	0.84	N/A	44.18	54.00	9.82

Radiated Spurious Emissions data(1 GHz ~ 25 GHz) : TM 1



4 924.00

Н

	opunous		5510113 (112 ~ 25	0112) - 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)	Limit (dBuV/m)	Margin (dB)
	2 389.77	V	Z	PK	55.14	4.80	N/A	N/A	59.94	74.00	14.06
Lowoot	2 389.85	V	Z	AV	42.64	4.80	3.32	N/A	50.76	54.00	3.24
Lowest	4 824.17	Н	Х	PK	48.85	0.93	N/A	N/A	49.78	74.00	24.22
	4 824.20	Н	Х	AV	38.65	0.93	3.32	N/A	42.90	54.00	11.10
Middle	4 873.88	Н	Х	PK	49.72	1.17	N/A	N/A	50.89	74.00	23.11
wilddie	4 873.57	Н	Х	AV	38.88	1.17	3.32	N/A	43.37	54.00	10.63
:	2 483.83	V	Z	PK	55.63	5.26	N/A	N/A	60.89	74.00	13.11
Highoot	2 483.78	V	Z	AV	41.97	5.26	3.32	N/A	50.55	54.00	3.45
Highest	4 924.10	Н	Х	PK	50.25	1.45	N/A	N/A	51.70	74.00	22.30

1.45

3.32

N/A

43.92

54.00

10.08

Radiated Spurious Emissions data(1 GHz ~ 25 GHz) : <u>TM 2</u>

Radiated Spurious Emissions data(1 GHz ~ 25 GHz) : TM 3

Х

 AV

39.15

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)
	2 389.83	V	Z	PK	53.25	4.80	N/A	N/A	58.05	74.00	15.95
Lowest	2 389.80	V	Z	AV	41.10	4.80	3.49	N/A	49.39	54.00	4.61
Lowest	4 823.67	Н	Х	PK	49.87	0.93	N/A	N/A	50.80	74.00	23.20
	4 823.85	Н	Х	AV	38.62	0.93	3.49	N/A	43.04	54.00	10.96
Middle	4 874.00	Н	Х	PK	49.45	1.17	N/A	N/A	50.62	74.00	23.38
Midule	4 874.07	Н	Х	AV	39.03	1.18	3.49	N/A	43.70	54.00	10.30
	2 483.98	V	Z	PK	53.63	5.26	N/A	N/A	58.89	74.00	15.11
Highoot	2 483.85	V	Z	AV	41.26	5.26	3.49	N/A	50.01	54.00	3.99
Highest	4 924.11	Н	Х	PK	49.75	1.45	N/A	N/A	51.20	74.00	22.80
	4 924.18	Н	Х	AV	38.94	1.45	3.49	N/A	43.88	54.00	10.12

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 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.)

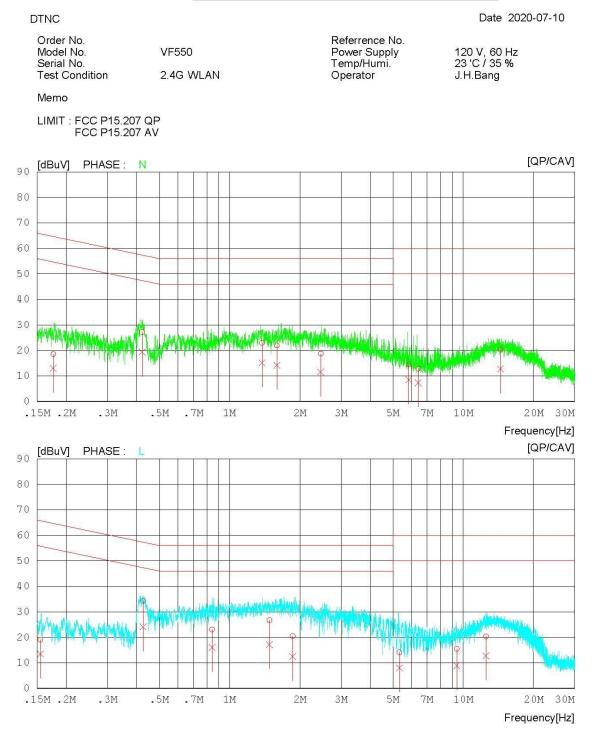
The worst data was reported

RESULT PLOTS



Test Mode: TM 2 & 2 437 MHz

Results of Conducted Emission



Date 2020-07-10

AC Line Conducted Emissions (List)

Test Mode: TM 2 & 2 437 MHz

Results of Conducted Emission

DTNC

Order No. Model No. Serial No.	VF550	Referrence No. Power Supply Temp/Humi.	120 V, 60 Hz 23 'C / 35 %
Test Condition	2.4G WLAN	Operator	J.H.Bang

Memo

LIMIT : FCC P15.207 QP FCC P15.207 AV

NO FREQ READING C.FACTOR RESULT LIMIT MARGIN PH QP CAV QP CAV QP CAV QP CAV	IASE
[MHz] [dBuV][dBuV] [dB] [dBuV][dBuV][dBuV][dBuV] [dBuV][dBuV]	
1 0.17596 8.60 3.07 9.96 18.5613.03 64.67 54.67 46.1141.64 N	
2 0.42209 17.17 9.39 9.97 27.14 19.36 57.41 47.41 30.27 28.05 N	
3 1.37615 13.01 5.11 9.99 23.0015.10 56.00 46.00 33.0030.90 N	
4 1.59237 11.87 4.15 10.01 21.88 14.16 56.00 46.00 34.12 31.84 N	
5 2.45430 8.70 1.48 10.06 18.7611.54 56.00 46.00 37.2434.46 N	
6 5.84291 4.39-1.71 10.18 14.57 8.47 60.00 50.00 45.4341.53 N	
7 6.41739 2.68-2.91 10.20 12.88 7.29 60.00 50.00 47.1242.71 N	
8 14.44218 9.96 2.31 10.44 20.4012.75 60.00 50.00 39.6037.25 N	
9 0.15502 9.12 3.44 9.96 19.0813.40 65.73 55.73 46.6542.34 L	
10 0.42615 24.28 14.15 9.95 34.23 24.10 57.33 47.33 23.10 23.23 L	
11 0.84306 13.00 6.07 9.98 22.9816.05 56.00 46.00 33.0229.95 L	
12 1.48076 16.63 7.14 10.00 26.63 17.14 56.00 46.00 29.37 28.86 L	
13 1.86124 10.32 2.46 10.04 20.3612.50 56.00 46.00 35.64 33.50 L	
14 5.33662 3.92-2.22 10.17 14.09 7.95 60.00 50.00 45.9142.05 L	
15 9.38151 5.15-1.46 10.30 15.45 8.84 60.00 50.00 44.5541.16 L	
16 12.51032 9.86 2.36 10.39 20.2512.75 60.00 50.00 39.7537.25 L	

Test Requirements, RSS-Gen [6.7]

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.

TEST CONFIGURATION

Refer to the APPENDIX I.

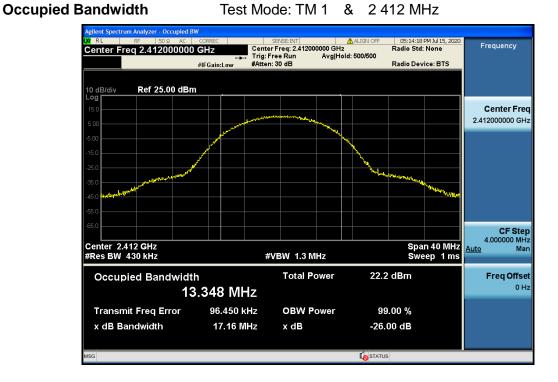
TEST PROCEDURE

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- 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 3x RBW.

TEST RESULTS: Comply

Test Mode	Frequency	Test Results[MHz]	
	Lowest	13.35	
TM 1	Middle	13.22	
	Highest	13.16	
	Lowest	17.30	
TM 2	Middle	17.21	
	Highest	17.19	
	Lowest	18.16	
ТМ 3	Middle	18.14	
	Highest	18.22	

RESULT PLOTS



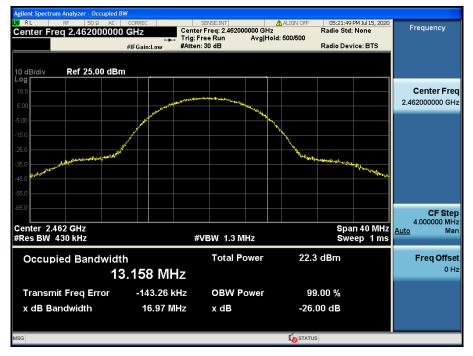
Occupied Bandwidth

Test Mode: TM 1 & 2 437 MHz

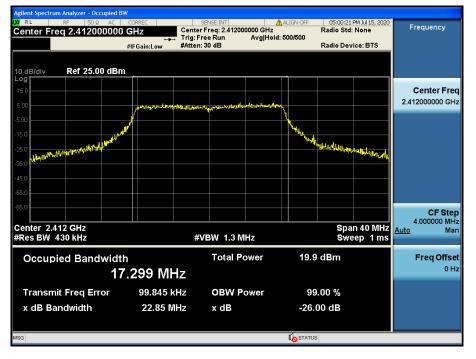




Test Mode: TM 1 & 2 462 MHz

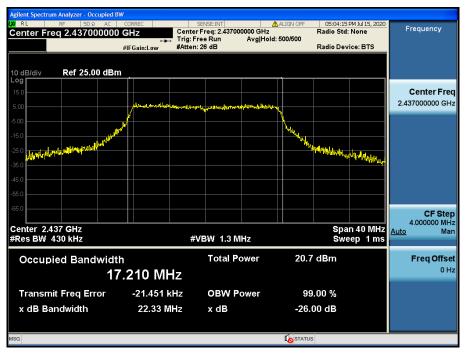


Test Mode: TM 2 & 2 412 MHz



Occupied Bandwidth

Test Mode: TM 2 & 2 437 MHz



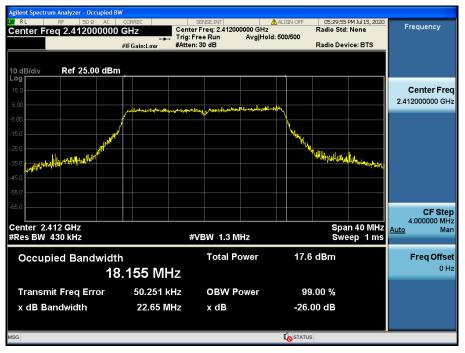


Test Mode: TM 2 & & 2 462 MHz



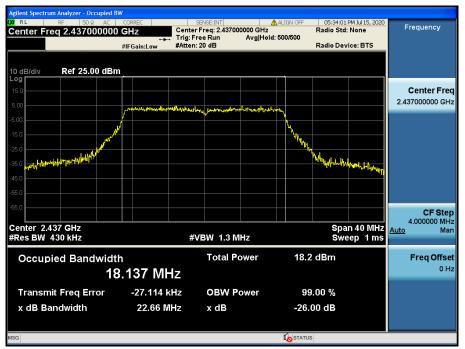


Test Mode: TM 3 & 2 412 MHz

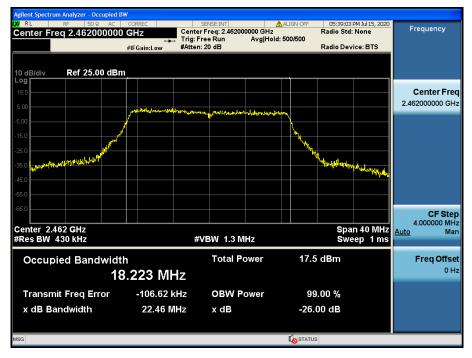


Occupied Bandwidth

Test Mode: TM 3 & 2 437 MHz



Test Mode: TM 3 & 2 462 MHz



9. LIST OF TEST EQUIPMENT

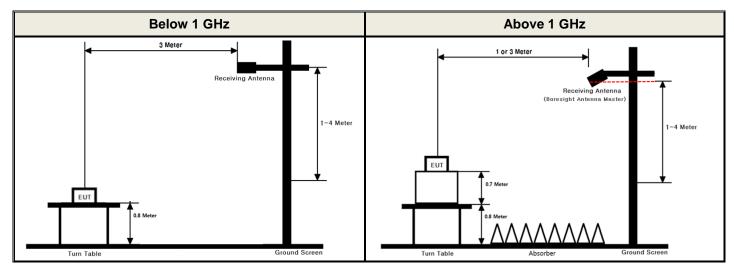
Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY50410357
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48010133
DC Power Supply	Agilent Technologies	66332A	19/06/25 20/06/24	20/06/25 21/06/24	MY43000211
Multimeter	FLUKE	17B	19/12/16	20/12/16	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-1
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-2
Thermohygrometer	BODYCOM	BJ5478	19/07/03 20/07/01	20/07/03 21/07/01	N/A
HYGROMETER	TESTO	608-H1	20/01/21	21/01/21	34862883
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
BILOG ANTENNA	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
Horn Antenna	ETS-Lindgren	3115	20/01/30	22/01/30	6419
Horn Antenna	Schwarzbeck	BBHA 9120C	19/12/04	21/12/04	9120C-561
PreAmplifier	tsj	MLA-0118-B01-40	19/12/16	20/12/16	1852267
PreAmplifier		MLA-1840-J02-45	19/06/27	20/06/27	16966-10728
· .	tsj		20/06/24	21/06/24	
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000- 15000-40SS	19/06/26	20/06/26	8
			20/06/24	21/06/24	
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300- 18000-60SS	19/06/26	20/06/26 21/06/24	- 1
			19/06/27	20/06/27	
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	20/06/24	21/06/24	3
			19/06/27	20/06/27	
Attenuator	Hefei Shunze	SS5T2.92-10-40	20/06/24	21/06/24	16012202
Attenuator	SRTechnology	F01-B0606-01	19/06/27	20/06/27	13092403
Allendaloi	Sitteenhology	101-0000-01	20/06/24	21/06/24	13032403
Attenuator	Aeroflex/Weinschel	56-3	19/06/27	20/06/27	Y2370
			20/06/24	21/06/24 20/06/27	
Attenuator	SMAJK	SMAJK-2-3	20/06/24	21/06/24	2
Attenuator	SMAJK	SMAJK-50-10	19/06/25	20/06/25	15081901
Power Meter & Wide		ML2488B	20/06/24	21/06/24	0910025
Bandwidth Sensor	Anritsu	MA2491A	20/01/02	21/01/02	0845333
EMI Test Receiver	ROHDE&SCHWARZ	ESR	19/12/17	20/12/17	101767
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	19/09/17	20/09/17	101333
LISN	SCHWARZBECK	NSLK 8128 RC	19/11/04	20/11/04	8128 RC-387
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-04
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-07
Cable	DT&C	Cable	20/01/13	21/01/13	G-13
Cable	DT&C	Cable	20/01/13	21/01/13	G-14
Cable	HUBER+SUHNER	SUCOFLEX 104	20/01/13	21/01/13	G-15
Cable	Radiall	TESTPRO3	20/01/16	21/01/16	M-01
Cable	Junkosha	MWX315	20/01/16	21/01/16	M-05
Cable	Junkosha	MWX221	20/01/16	21/01/16	M-06
Cable	Radiall	TESTPRO3	20/01/16	21/01/16	RF-82
Test Software	tsj	Raidated Emission Measurement	NA	NA	Version 2.00.0177
Test Software	tsj	Noise Terminal	NA	NA	Version

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.

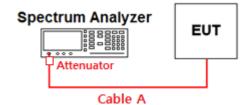
APPENDIX I

Test set up diagrams

Radiated Measurement



Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	9.45	15	11.11
1	9.75	20	11.45
2.412 & 2.437 & 2.462	10.27	25	11.56
5	10.37	-	-
10	10.49	-	-

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

APPENDIX II

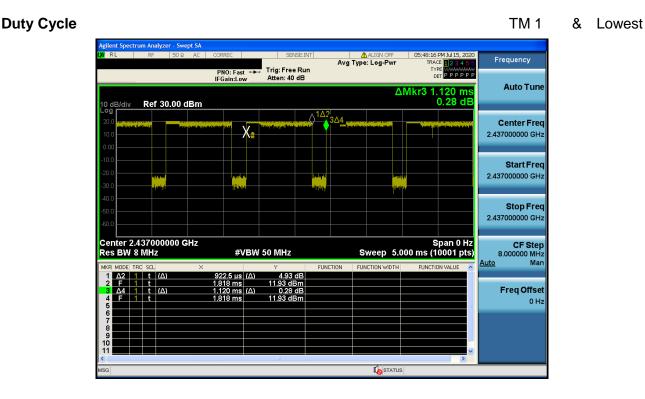
Duty cycle plots

Test Procedure

Duty Cycle was measured using section 6.0 b) of KDB558074 D01V05R02 :

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.)



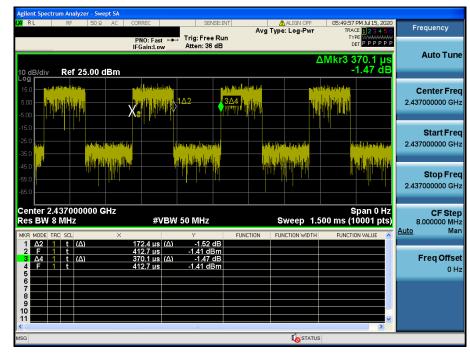
TRF-RF-236(04)171516

🛈 Dt&C

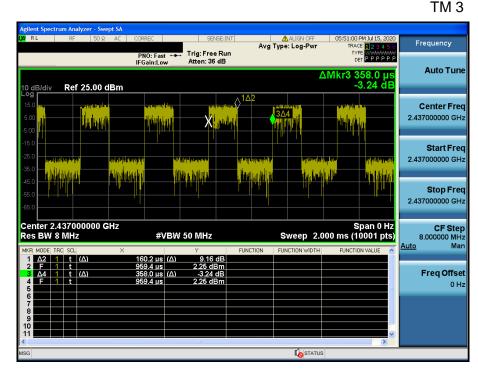
TM 2 &

Lowest

Duty Cycle



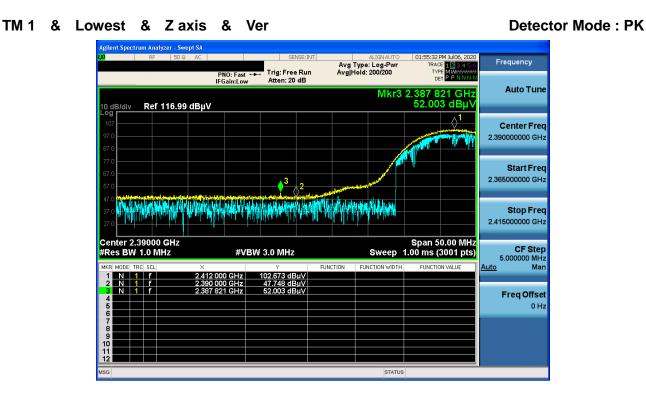
& Lowest



Duty Cycle

APPENDIX III

Unwanted Emissions (Radiated) Test Plot



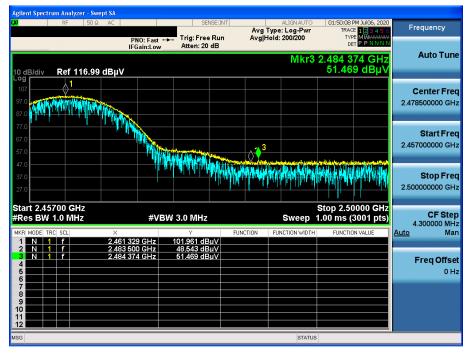
TM 1 & Lowest & Zaxis & Ver



Detector Mode : PK



TM 1 & Highest & Zaxis & Ver



TM 1 & Highest & Zaxis & Ver

n Analyzer - Swept S Frequency Avg Type: RMS Avg|Hold: 200/200 Trig: Free Run Atten: 20 dB PNO: Fast IFGain:Low A P N Auto Tune Mkr3 2.484 303 GH 41.221 dBµ Ref 116.99 dBµV **Center Freq** 11 2.478500000 GHz Start Freq 2.457000000 GHz ∂<mark>∂</mark>3 Stop Freq 2.500000000 GHz Start 2.45700 GHz #Res BW 1.0 MHz Stop 2.50000 GHz 1.00 ms (3001 pts) CF Step 4.300000 MHz Man #VBW 3.0 MHz* Sweep FUNCTION FUNCTION Auto 94.093 dBµV 40.180 dBµV 41.221 dBµV Freq Offset 0 Hz STATUS

Detector Mode : PK

TM 2 & Lowest & Zaxis & Ver



TM 2 & Lowest & Zaxis & Ver



IC : 22515-VF550

Detector Mode : PK

Highest & Zaxis & Ver TM 2 &

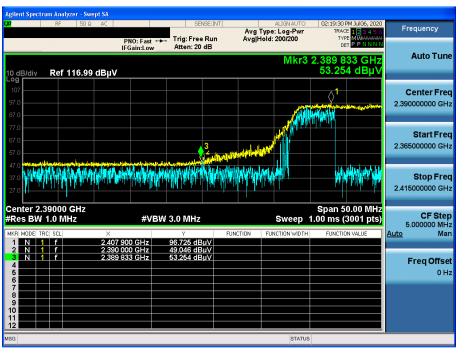


TM 2 & Highest & Zaxis & Ver



Detector Mode : PK

TM 3 & Lowest & Zaxis & Ver



TM 3 & Lowest & Zaxis & Ver

n Analyzer -Avg Type: RMS Avg|Hold: 200/200 Frequency Trig: Free Run Atten: 20 dB TYPE DE1 PNO: Fast IFGain:Low A P N Auto Tune Mkr3 2.389 800 GH: 41.095 dBµ Ref 116.99 dBµV **Center Freq** 2.39000000 GHz \Diamond^1 Start Freq 2.365000000 GHz 3 Stop Freq 2.415000000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 50.00 MHz 1.00 ms (3001 pts) CF Step 5.000000 MHz Man #VBW 3.0 MHz* Sweep FUNCTION FUNCTION WIDT Auto 84.726 dBμV 40.274 dBμV 41.095 dBμV Freq Offset 0 Hz STATUS

TM 3 & Highest & Zaxis & Ver



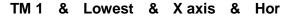


TM 3 & Highest & Zaxis & Ver





Detector Mode : AV





TM 2 & Highest & X axis & Hor

m Analyzer - Swept SA Avg Type: RMS Avg|Hold: 200/200 Frequency PNO: Fast ---- Trig: Free Run IFGain:Low Atten: 6 dB DET A P N N N Auto Tune Mkr1 4.923 996 7 GHz 39.149 dBµV Ref 66.99 dBµV 5 dB/div Center Freq 4.924000000 GHz Start Freq 4.921500000 GHz Stop Freq 4.926500000 GHz CF Step 2.462000000 GHz uto <u>Man</u> Auto Freq Offset 0 Hz Center 4.924000 GHz #Res BW 1.0 MHz Span 5.000 MHz Sweep 1.00 ms (3001 pts) #VBW 3.0 MHz*

TM 3 & Highest & X axis & Hor

