TEST REPORT

	DT&C Co., Ltd.					
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1. Report No: DRTFCC2008-0238						
2. Customer						
• Name : MOTREX CO., LTD.						
• Address : Seoyoung Bldg. 25, Hwa Gyeonggi-do, South Kor	angsaeul-ro 258beon-gil, Bundang-gu, Seongnam-si, rea					
3. Use of Report : FCC Original Grant						
4. Product Name / Model Name : SMA FCC ID : BP9-MS310AKA4	RT DISPLAY / MS310AKA4					
5. Test Method Used : KDB558074 D0 Test Specification : FCC Part 15.247						
6. Date of Test : 2020.06.03 ~ 2020.06	5.15					
7 Location of Test : 🛛 Permanent Tes	ting Lab On Site Testing					
8. Testing Environment : See appende	d test report.					
9. Test Result : Refer to the attached te	est result.					
The results shown in this test report refer o	only to the sample(s) tested unless otherwise stated.					
Affirmation Tested by	Reviewed by					
Name : InHee Bae	(Signature) Name : JaeJin Lee (Signature)					
2020. 08. 07.						
	DT&C Co., Ltd.					
Not abided by k	KS Q ISO / IEC 17025 and KOLAS accreditation.					

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



Test Report Version

Test Report No.	Date	Description	Revised By	Reviewed by
DRTFCC2008-0238	Aug. 07, 2020	Initial issue	InHee Bae	JaeJin Lee



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1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	SMART DISPLAY
Model Name	MS310AKA4
Add Model Name	NA
Hardware Version	2
Software Version	KA4.GEN.0000.002.P25H.200610
Power Supply	DC 12 V
Frequency Range	■ 802.11b/g/n/ac(20 MHz) : 2 412 MHz ~ 2 462 MHz
Max. RF Output Power	2.4GHz Band • 802.11b : 9.92 dBm • 802.11g : 17.22 dBm • 802.11n (HT20) : 17.21 dBm • 802.11ac (VHT20) : 17.19 dBm
Modulation Type	• 802.11b: CCK, DSSS • 802.11g/n/ac: OFDM
Antenna Specification	Antenna type: PCB Pattern Antenna Antenna gain: 3.23 dBi

2. INFORMATION ABOUT TESTING

2.1 Test mode

Test mode	Worst case data rate	Tested Frequency(MHz)				
		Lowest	Middle	Highest		
TM 1	802.11b 1 Mbps	2 412	2 437	2 462		
TM 2	802.11g 6 Mbps	2 412	2 437	2 462		
ТМ 3	802.11n(HT20) MCS 0	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	:	23 °C ~ 26 °C
Relative humidity content	:	39 % ~ 44 %
Details of power supply	:	DC 12 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	0.7 dB (The confidence level is about 95 %, k = 2)
Conducted spurious emission	1.0 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]	Transmitter Power Spectral < 8 dBm/3 kHz			С
-	RSS-Gen [6.7]	Occupied Bandwidth (99 %)	RSS-Gen(6.7)		NA
15.247(d) 15.205 15.209	RSS-247 [5.5] RSS-GEN [8.9] RSS-GEN [8.10]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209 limits	Radiated	С
15.207	RSS-Gen [8.8]	AC Line Conducted Emissions	FCC 15.207 limits	AC Line Conducted	NA Note3
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 device is installed in a car. Therefore the power source is a battery of car.



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.

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., Lt	td.	
The 3 m test si	te and o	conducted measurement facility used to collect the radiated data are located at the
42, Yurim-ro, 1	54beon	-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.
The test site co	mplies	with the requirements of § 2.948 according to ANSI C63.4-2014.
- FCC MRA	Desigr	nation 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 employs a unique antenna connector. 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 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.

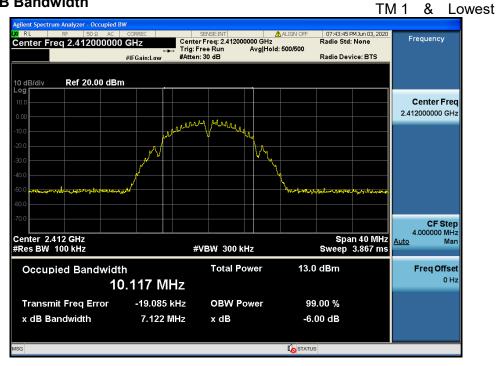
Test Results: Comply

Test Mode	Frequency	Test Results[MHz]	
	Lowest	7.12	
TM 1	Middle	7.11	
	Highest	7.09	
	Lowest	16.33	
TM 2	Middle	15.85	
	Highest	16.08	
	Lowest	16.97	
ТМ 3	Middle	17.29	
	Highest	17.28	



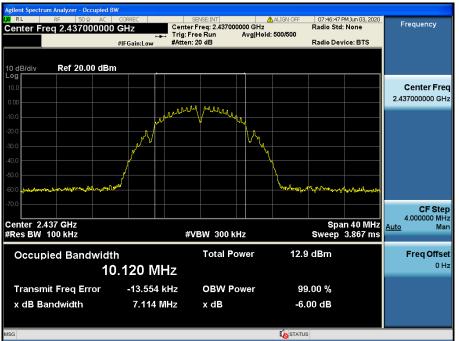
RESULT PLOTS

6 dB Bandwidth



6 dB Bandwidth

TM 1 & Middle

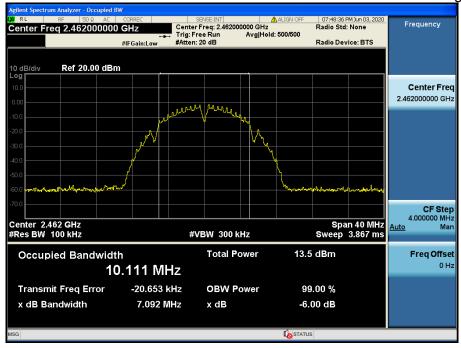


FCC ID: BP9-MS310AKA4

6 dB Bandwidth

🛈 Dt&C

TM 1 & Highest

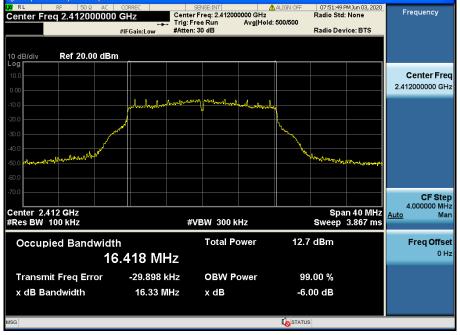


FCC ID: BP9-MS310AKA4

6 dB Bandwidth

Dt&C

ALIGN OFF 07:51:49 PM Jun 03,2020 Radio Std: None Frequency



6 dB Bandwidth

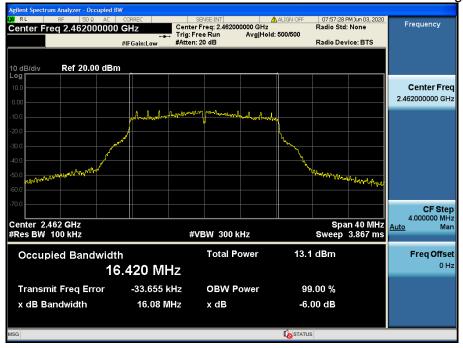
TM 2 & Middle



6 dB Bandwidth

🛈 Dt&C

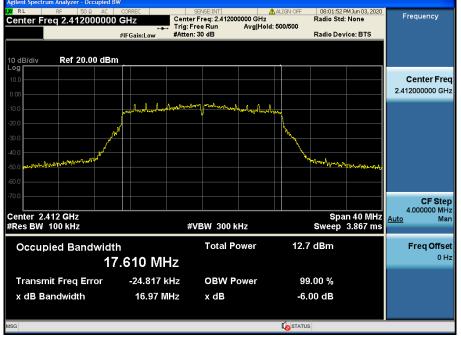
TM 2 & Highest



6 dB Bandwidth

Dt&C

TM 3 & Lowest



6 dB Bandwidth

TM 3 & Middle

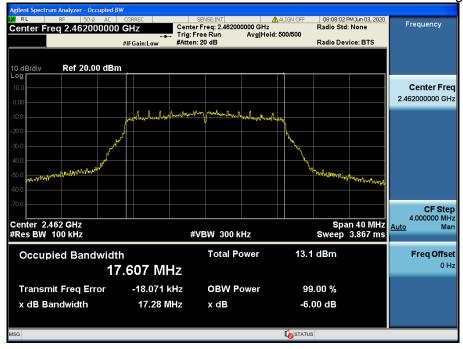


FCC ID: BP9-MS310AKA4

6 dB Bandwidth

🛈 Dt&C

TM 3 & Highest

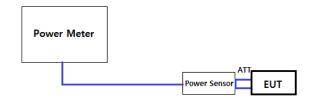


8.2 Maximum peak conducted output power

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		Maximum Peak Conducted Output Power (dBm) for <u>802.11b</u>							
Freq. (MHz)	Det.				Data Rat	e [Mbps]			
		1	2	5.5	11	-	-	-	-
2412	PK	9.53	9.48	9.52	9.51	-	-	-	-
2412	AV	6.45	6.40	6.42	6.38	-	-	-	-
2437	PK	9.50	9.43	9.47	9.41	-	-	-	-
2437	AV	6.41	6.32	6.36	6.28	-	-	-	-
2462	PK	9.92	9.83	9.79	9.85	-	-	-	-
2402	AV	6.85	6.77	6.70	6.81	-	-	-	-

Free			Maximum Peak Conducted Output Power (dBm) for 802.11g								
Freq. (MHz)	Det.	Det. Data Rate [Mbps]									
		6	9	12	18	24	36	48	54		
0440	PK	16.43	16.19	16.31	16.37	16.29	16.32	16.22	16.19		
2412	AV	6.49	6.33	6.35	6.34	6.37	6.37	6.31	6.43		
2437	PK	16.54	16.41	16.37	16.43	16.42	16.52	16.30	16.34		
2437	AV	6.48	6.30	6.47	6.29	6.44	6.28	6.29	6.42		
2462	PK	17.22	17.19	17.00	17.12	16.98	16.98	17.19	17.18		
2462	AV	7.08	6.95	6.87	6.90	6.97	6.90	7.02	6.85		

F			Maximum	Peak Condu	icted Outpu	t Power (dB	m) for <u>802.</u>	11n(HT20)	
Freq. (MHz)	Det.				Data Ra	te [MCS]			
		0	1	2	3	4	5	6	7
0.1.1.0	PK	15.39	15.37	16.34	16.40	16.29	16.39	16.31	16.34
2412	AV	6.31	6.13	6.28	6.27	6.34	6.36	6.40	6.48
2437	PK	15.60	15.44	16.33	16.36	16.32	16.44	16.34	16.53
2437	AV	6.27	6.24	6.25	6.42	6.34	6.31	6.44	6.37
2462	PK	17.21	16.66	17.14	17.13	17.11	17.07	17.17	16.77
2462	AV	6.95	6.89	6.93	6.91	6.92	6.89	6.88	6.84

Dt&C

-			Maxim	num Peak Co	onducted O	utput Power	r (dBm) for <u>a</u>	302.11ac(V	HT20)	
Freq. (MHz)	Det.									
		0	1	2	3	4	5	6	7	8
0.140	PK	15.39	15.36	16.21	16.42	16.22	16.22	16.19	16.31	15.16
2412	AV	6.35	6.24	6.26	6.39	6.33	6.25	6.48	6.25	6.21
2437	PK	15.88	15.74	16.42	16.52	16.41	16.31	16.48	16.50	15.78
2437	AV	6.30	6.24	6.36	6.47	6.39	6.40	6.36	6.40	6.25
2462	PK	17.19	16.42	16.56	17.09	17.03	17.08	17.09	17.00	16.44
2462	AV	6.94	6.80	6.90	6.86	6.83	6.91	6.88	6.89	6.92



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 \geq 3 x RBW
- 5. Detector = **Peak**
- 6. Sweep time = **Auto couple**
- 7. Trace mode = **Max hold.**
- 8. Allow trace to fully stabilize.

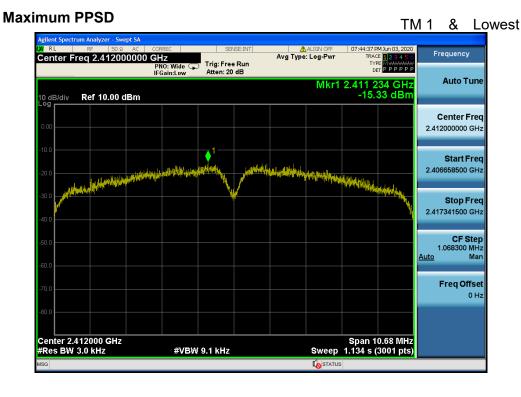
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.

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	-15.33
TM 1	Middle	3 kHz	-16.22
	Highest	3 kHz	-13.62
	Lowest	3 kHz	-17.10
TM 2	Middle	3 kHz	-17.21
	Highest	3 kHz	-16.75
	Lowest	3 kHz	-16.92
ТМ 3	Middle	3 kHz	-16.34
	Highest	3 kHz	-17.05

RESULT PLOTS

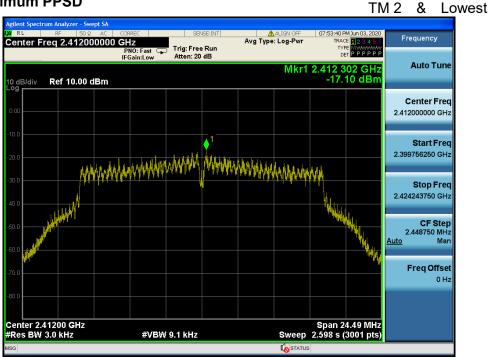


Maximum PPSD

TM 1 & Middle



TM 1 & Highest nt Spectrum Analyzer -Swept S/ V RL RF 50 Q AC CORREL Center Freq 2.462000000 GHz PNO: Wide Trig: Free Run IFGain:Low Atten: 20 dB ALIGN OFF lun 03, 2021 Frequency RACE 123456 TYPE MWWWWWW DET P P P P P Mkr1 2.462 762 GHz -13.62 dBm Auto Tune B/div Ref 10.00 dBm 10 c Center Freq 2.462000000 GHz • Start Freq la kan dadh s 2.456681000 GHz in the second and an a start of the start of **Stop Freq** 2.467319000 GHz **CF Step** 1.063800 MHz Man <u>Auto</u> Freq Offset 0 Hz Center 2.462000 GHz #Res BW 3.0 kHz Span 10.64 MHz Sweep 1.129 s (3001 pts) #VBW 9.1 kHz **I**sta



Maximum PPSD

TM 2 & Middle







Maximum PPSD









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

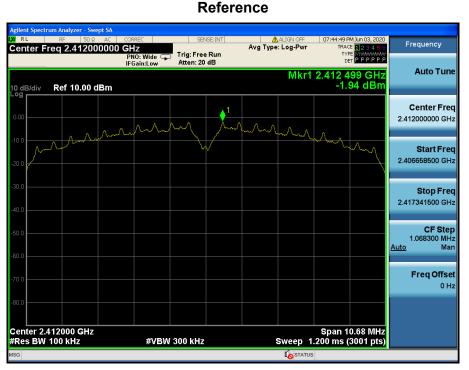
Frequency range: 30 MHz ~ 10 GHz, 10 GHz ~25 GHz RBW = 1 MHz, VBW = 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

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

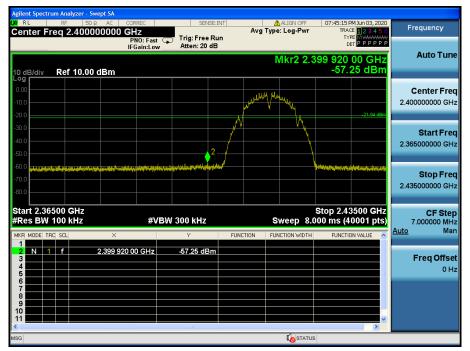
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

RESULT PLOTS

TM 1 & Lowest



Low Band-edge



Agilent Spectrum An							
Center Fred	50 Ω <u>A</u> DC 15.004500 MH	CORREC 7	SENSE	Av	ALIGN OFF	07:45:23 PM Jun 03, 2020 TRACE 123456	Frequency
		PNO: Fast G	Trig: Free R Atten: 20 dB			DET P P P P F	
		IFGall.LOW	1100111 20 41			Mkr1 281.9 kHz	Auto Tune
10 dB/div Re	f 10.00 dBm					-58.12 dBm	
	r to.oo abiii						
0.00							Center Freq
-10.0							15.004500 MHz
-20.0						-21.94 dBm	
-30.0							Otort Eror
-40.0							Start Freq
-50.0 1							9.000 kHz
-60.0							
Antester to the	history.adjustice-granted dailier	hennisterhendligende		and the second second	والمتوجار ومتواحيه والإلار الرامياوه	enerselette de de seisen de se	Stop Freq
-70.0							30.000000 MHz
-80.0							
Start 9 kHz						Stop 30.00 MHz	CF Step
#Res BW 100	kHz	#VBV	V 300 kHz		Sweep 5.3	333 ms (40001 pts)	
MKR MODE TRC SCL	. ×		Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f		81.9 kHz	-58.12 dBm				
2							Freq Offset
4							0 Hz
5						=	
7							
8							
10							
<			Ш			×	
MSG						DC Coupled	

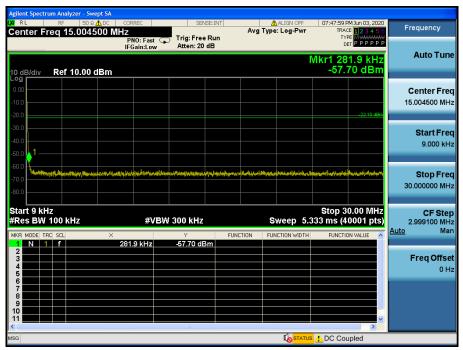
Agilent Spectrum Anal					
Center Freq 5	50 Ω AC CORREC .015000000 GHz	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	07:45:31 PM Jun 03, 2020 TRACE 12 3 4 5 6	Frequency
	PNO: Fast IFGain:Low	Trig: Free Run Atten: 20 dB		DET P P P P P	
10 dB/div Ref	10.00 dBm		Mkr	5 2.975 14 GHz -46.49 dBm	Auto Tune
Log				40.40 0.00	
0.00					Center Freq
-10.0					5.015000000 GHz
-20.0				-21.94.dBm	
-30.0	∧2 ,5 ,4				Start Freq
-50.0	I STATE LAND AND AND AND AND AND AND AND AND AND			والمستعانية الشريقية أورج ورجور والمتأتين	30.000000 MHz
-60.0	the second second second second second second second second		ومرويتك أفأفاك ماريا وأرأ فأشروه بامرا بدأنا بالخصروار محاديتك	Children and States and Annual States and Annual States	
-70.0					Stop Freq
-80.0					10.00000000 GHz
Start 30 MHz #Res BW 1.0 M	IHz #VB	W 3.0 MHz	Sweep 18	Stop 10.000 GHz 67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	×	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 2 N 1 f	2.411 09 GHz 2.559 64 GHz	1.33 dBm -45.92 dBm			
3 N 1 f	3.003 30 GHz 3.308 63 GHz	-46.27 dBm -46.28 dBm			Freq Offset
5 N 1 f	2.975 14 GHz	-46.49 dBm		=	0 Hz
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TM 1 & Middle

Reference



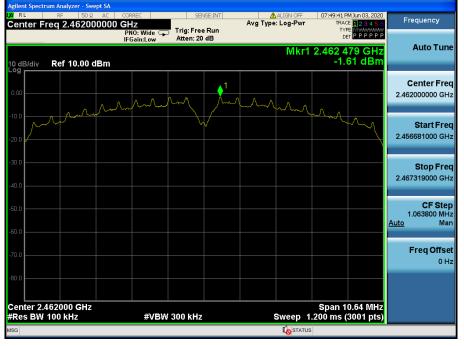




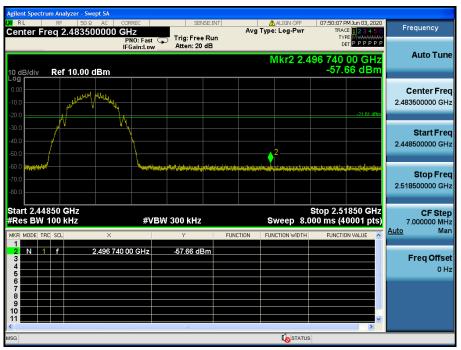
	ım Analyzer - S									
Center Fr		Ω AC CORREC 00000000000000000000000000000000000	SENSE:	Avg	ALIGN OFF	07:48:15 PM Jun 03, 2020 TRACE 1 2 3 4 5 (Frequency			
		PNO: Fast IFGain:Lov		In		TYPE MWWWWW DET PPPPP				
10 dB/div	Ref 10.00) dBm			Mkr3 2	3.778 625 GHz -37.92 dBm	Auto Tune			
0.00 -10.0 -20.0						-22.10 xtBm	Center Freq 17.500000000 GHz			
-30.0 -40.0 -50.0						<u>3</u> ,2∆	Start Freq 10.000000000 GHz			
-60.0 -70.0 -80.0							Stop Freq 25.00000000 GHz			
Start 10.00 #Res BW		#\	'BW 3.0 MHz		Sweep 40	Stop 25.000 GHz .00 ms (40001 pts)	CF Step 1.50000000 GHz Auto Man			
MKR MODE TR	C SCL	× 24.727 375 GHz	۲ -36.23 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto			
2 N 1 3 N 1 4 5	f f	24.245 125 GHz 23.778 625 GHz	-36.99 dBm -37.92 dBm				Freq Offset 0 Hz			
7 8 9 10										
11			m			×				
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TM 1 & Highest

Reference



High Band-edge



Agilent Spectrur WRL Center Fre	RF 50 Ω	🛕 DC 🔋 CORREC 📗	SENSE		ALIGN OFF	07:50:14 PM Jun 03, 2020 TRACE 1 2 3 4 5 6	
		PNO: Fast IFGain:Lov		Run		TYPE MUMAN DET P P P P P P Mkr1 323.2 kHz -58.35 dBm	Auto Tune
10 dB/div 0.00	Ref 10.00 (1Bm				-36.33 UBIII	Center Freq 15.004500 MHz
-30.0 -40.0 -50.0							Start Freq 9.000 kHz
-60.0 -70.0 -80.0	nije politika do politika d	hft-degelstrongtagtionstationstationstation	rdavneyddarfydylyfreyddwrai yn	ويتبيغا المومونين وموري والمير	harrailan harrailan din din din din din din din din din di	yel Alapitan ing an analalan pada	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 1	SCL	#V × 323.2 kHz	/BW 300 kHz -58,35 dBn	FUNCTION	Sweep 5.3	Stop 30.00 MHz 333 ms (40001 pts) FUNCTION VALUE	CF Step 2.999100 MHz Auto Man
2 3 4 5 6		525.2 KHZ	-96.99 461				Freq Offset 0 Hz
7 8 9 10 11						~	
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LXI RL		AC CORREC	SENSE:INT	ALIGN OFF	07:50:23 PM Jun 03, 2020	Frequency
Center F	req 5.015000	DUUU GHZ PNO: Fast IFGain:Low	Trig: Free Run Atten: 20 dB	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWWW DET P P P P P P	
10 dB/div	Ref 10.00 di			Mkr	5 3.013 02 GHz -46.50 dBm	Auto Tune
-10.0		○ 1			-21.61.dBm	Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0				Hansan yan 1994 yang sana sana sana sana sana sana sana s	n john na gran ya kang ng kang Ng kang ng kang	Start Freq 30.000000 MHz
-60.0						Stop Freq 10.000000000 GHz
Start 30 N #Res BW	1.0 MHz		V 3.0 MHz	· · · · ·	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TF 1 N 1 2 N 1 3 N 1 4 N 1 5 N 1 6	IC SCL f f f f f f	× 2.460 94 GHz 3.156 84 GHz 2.706 45 GHz 3.097 02 GHz 3.013 02 GHz	45.91 dBm -45.98 dBm -45.98 dBm -46.30 dBm -46.50 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz
7 8 9 10 11					~	
MSG				to status		

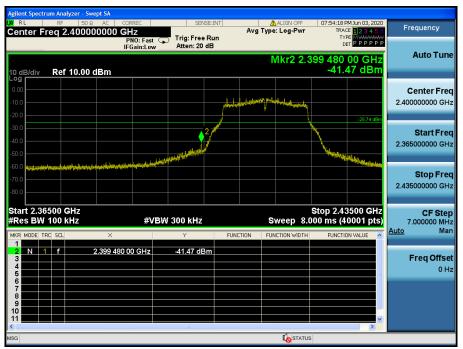


TM 2 & Lowest

Reference



Low Band-edge



LXI RL		🛕 DC 📔 CORI	REC	SENS	E:INT		ALIGN OFF		M Jun 03, 2020 2 1 2 3 4 5 6	Frequency
Center Fr	eq 15.004	PN	l0: Fast G ain:Low	Trig: Free Atten: 20 o	Run 18	Avg Typ		TYI Di	5.9 kHz	Auto Tune
10 dB/div Log	Ref 10.00	dBm							19 dBm	
0.00 -10.0										Center Freq 15.004500 MHz
-20.0									-25.74 dBm	
-40.0										Start Freq 9.000 kHz
-60.0 -70.0 -80.0	itelistikelesioonaanaatiini	the and the second second second	episyhadelamisty	hinasioninininini	dan basiyada is	i,thagi,gadiyetaank	Waterback Automotion	gan freit fich i de gatage	aybardada ahiyana	Stop Freq 30.000000 MHz
Start 9 kH: #Res BW 1	100 kHz		#VB\	₩ 300 kHz		s	weep 5.	Stop 3 333 ms (4	0.00 MHz 0001 pts)	CF Step 2.999100 MHz Auto Man
MKR MODE TRO		× 305.	9 kHz	∀ -58.19 dB	FUNC	TION FU	NCTION WIDTH	FUNCTIO	IN VALUE	Auto Mari
2 3 4 5										Freq Offset 0 Hz
6 7 8 9										
10 11									<u>~</u>	
MSG								DC Cou	upled	

Agilent Spectrum Analyzer - Sw					
KI RF 50 Ω Center Freq 5.01500	AC CORREC	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	07:54:33 PM Jun 03, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ⊂ IFGain:Low	Trig: Free Run Atten: 20 dB		TYPE MWWWWWW DET P P P P P P	
	in outlineow _		Mkr	5 3.227 38 GHz	Auto Tune
10 dB/div Ref 10.00				-46.39 dBm	
	Y1				Center Freq
-10.0					5.015000000 GHz
-20.0					0.010000000 0112
-30.0				-25.74 dBm	
-40.0	5				Start Freq 30.000000 MHz
-50.0		A second second second second	and a state of the second state	ألحاء وفاقط وأسيرها المالي ورواحه ومحيوره الأكاف	30.000000 MHZ
-60.0		an electric con anticipation of an international state	for a second distance on the Distance of the last of t		
-70.0					Stop Freq
-80.0					10.00000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBI	A/ 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	×	Y FUI	CTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 2 N 1 f	2.413 33 GHz 2.538 95 GHz	3.55 dBm -46.28 dBm			
3 N 1 f	3.186 00 GHz	-46.32 dBm			Freq Offset
4 N 1 f 5 N 1 f	5.517 74 GHz 3.227 38 GHz	-46.33 dBm -46.39 dBm			0 Hz
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TM 2 & Middle

Reference



Agilent Spectrum Analyzer - Swep (X) RL RF 50 ହ 🚹	DC CORREC	SENSE:INT		ALIGN OFF	07:57:00 PM Jun 03, 202 TRACE 12345	
Center Freq 15.00450	PNO: Fast C IFGain:Low	Trig: Free Run Atten: 20 dB	Avgity	_	/kr1 286.4 kHz -58.35 dBm	Auto Tune
10 dB/div Ref 10.00 dl Log 0.00 -10.0	5m					Center Freq 15.004500 MHz
-30.0 -40.0 -50.0 <mark>- 1</mark>					-25.77 dBn	Start Freq 9.000 kHz
-60.0 -70.0 -80.0	Abarby der Bittangt son Better In Sistemation of Se	ระสุดรูปกรร เกตรีสรรณ เช่นสรรณ ได้เสรรณ ได้เสรรณ	ar-aribiterilarisfilaantispelikyy	an alainnatan yaalila	ng brechen ng aligne di pen per basan si pe	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 100 kHz MKR MODE TRC SCL	X	W 300 kHz		Sweep 5.3	Stop 30.00 MHz 33 ms (40001 pts FUNCTION VALUE	2.999100 MHz Auto Man
1 N 1 f 2 - - - 3 - - - 4 - - - 5 - - - 6 - - - 7 - - - 8 - - - 9 - - -	286.4 kHz	-58.35 dBm				Freq Offset 0 Hz
10 11 * MSG					↓ DC Coupled	

Agilent Spectrum An.	alyzer - Swept SA 50 Ω AC CORREC 5.015000000 GHz PNO: Fas IEGain: Ire		ALIGN OFF	07:57:09 PM Jun 03, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P	Frequency
10 dB/div Re	f 10.00 dBm	Atten: 20 dB	Mkr	5 2.696 48 GHz -46.07 dBm	Auto Tune
Log				-25.77 dBm	Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0					Start Fred 30.000000 MHz
-60.0 -70.0 -80.0					Stop Fred 10.000000000 GH
Start 30 MHz #Res BW 1.0 I		/BW 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MH <u>Auto</u> Mar
1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	2.436 26 GHz 6.895 59 GHz 3.056 39 GHz 2.643 39 GHz 2.696 48 GHz	-45.22 dBm -45.55 dBm			Freq Offse 0 H:
7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9				~	
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Agilent Spectr	um Analyzer -	Swept SA						
LXI RL		id Ω AC CORF		SENSE:		ALIGN OFF	07:57:17 PM Jun 03, 203 TRACE 1 2 3 4 5	
Center F	req 17.50		0:Fast 🗔	Trig: Free Ru		Type: Log-Pwr	TYPE MWWWAAA DET P P P P P	At .
		IFG	ain:Low	Atten: 20 dB				
						Mkr3 2	4.444 625 GH	
10 dB/div Log	Ref 10.0	0 dBm					-36.96 dBn	
0.00								Center Freq
-10.0								17.50000000 GHz
								17.50000000 GH2
-20.0							-25.77 dB	
-30.0								Start Freq
-40.0			Label Annual (all summer and states of the second	Property and the second second	Support in the second state of the second stat		10.00000000 GHz
-50.0		internet internet internet.	and the second se		محافظ التناقي وحت	and the second second		
-60.0								
-70.0								Stop Freq
-80.0								25.00000000 GHz
Start 10.0							Stop 25.000 GH	CF Step
#Res BW	1.0 MHz		#VBW	/ 3.0 MHz		Sweep 40	.00 ms (40001 pts	
MKR MODE TH		×		Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Man
1 N 1 2 N 1		24.681 625 24.804 250		-35.31 dBm -36.32 dBm				
3 N 1		24.444 625		-36.96 dBm				Freq Offset
4								0 Hz
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TM 2 & Highest

07:59:30 PM Jun 03, 20 TRACE 1 2 3 4 DR RL RF | 50.9. AL | WARNES Center Freq 2.462000000 GHz PN0: Fast IFGain:Low Atten: 20 dB ALIGN OFF Frequency DET P P P P P Auto Tune Mkr1 2.463 246 GHz -5.43 dBm Ref 10.00 dBm 10 dB/div **Center Freq** 2.462000000 GHz R Start Freq 2.449941500 GHz Stop Freq 2.474058500 GHz CF Step 2.411700 MHz Man Auto Freq Offset 0 Hz Center 2.46200 GHz #Res BW 100 kHz Span 24.12 MHz Sweep 2.400 ms (3001 pts) #VBW 300 kHz **I** STAT

High Band-edge



Reference

Agilent Spectrum	RF 50 Ω 🧥 🛙	C CORREC	SENSE:		ALIGN OFF	08:00:04 PM Jun 03, 2020 TRACE 1 2 3 4 5 6	Frequency
		PNO: Fast IFGain:Low	Trig: Free Ro Atten: 20 dE	un		TYPE DET P P P P P P DET P P P P P P Vkr1 282.7 kHz -57.99 dBm	Auto Tune
10 dB/div R 0.00 -10.0	lef 10.00 dB	m					Center Freq 15.004500 MHz
-30.0 -40.0 -50.0 1						-25.43 dBm	Start Freq 9.000 kHz
-60.0 -70.0 -80.0	htereta standina y posset dina	s.Alveneteletynneteletynnetelety	ain in the second s	tonda on an dataine	nykthalekai)ysynakoostienses	anathilasafanna annsa faraisistan a an sid	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 10	ICL	X	W 300 kHz	FUNCTION	Sweep 5.3	Stop 30.00 MHz 333 ms (40001 pts) FUNCTION VALUE	CF Step 2.999100 MHz Auto Man
1 N 1 2 3 3 4 5 5 6		282.7 kHz	-57.99 dBm				Freq Offset 0 Hz
7 8 9 10 11							
MSG						DC Coupled	

	Analyzer - Swept SA						
	RF 50Ω AC		SENSE:INT	Avg Ty	ALIGN OFF	08:00:12 PM Jun 03, 2020 TRACE 1 2 3 4 5 6	Frequency
Contor mo		PNO: Fast G	Trig: Free Run Atten: 20 dB				
		IFGalli.Low	The contract of the		Mke	5 6.914 04 GHz	Auto Tune
	Ref 10.00 dBm				IVIN I	-46.74 dBm	
Log 0.00		⁷ 1					Center Freq
-10.0							5.015000000 GHz
-20.0							
-30.0						-25.43 dBm	
-40.0		24			5}		Start Freq 30.000000 MHz
-50.0		Y.Y.	In contrast page of the state of the state of the	here the second and better	and the second state of th	Charles to a support of the Hot Area and	30.000000 WH2
-60.0		Contraction of the Contraction of the Local Distance of the Local	A DESCRIPTION OF THE OWNER OF THE	and the second			
-70.0							Stop Freq
-80.0							10.00000000 GHz
						04 40.000 OU	
Start 30 MH #Res BW 1.0		#VB\	V 3.0 MHz		Sweep 18.	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC :			Y	FUNCTION	UNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
		460 94 GHz 716 92 GHz	3.93 dBm -46.30 dBm				
3 N 1	f 7.	001 27 GHz 027 48 GHz	-46.51 dBm -46.60 dBm				Freq Offset
5 N 1		914 04 GHz	-46.74 dBm				0 Hz
6 7							
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MSG					I ostatus		



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TM 3 & Lowest

Reference



Low Band-edge



Agilent Spectrum Analyzer - Swept SA						
RL RF 50 Ω ▲ DC Center Freq 15.004500 N		SENSE:INT		ALIGN OFF Type: Log-Pwr	08:04:32 PM Jun 03, 2020 TRACE 123456	Frequency
	PNO: Fast 🖵 IFGain:Low	Trig: Free Run Atten: 20 dB			TYPE MWWWWWW DET P P P P P	
	II Gam.Eow				Vkr1 281.9 kHz	Auto Tune
10 dB/div Ref 10.00 dBm					-56.98 dBm	
						O antan Enan
-10.0						Center Freq 15.004500 MHz
-20.0						13.004300 Mi112
-30.0					-26.09 dBm	
-40.0						Start Freq
-50.0 1						9.000 kHz
-60.0						
-70.0 Marianal mating in familian any mating in the	untrastant destability of the second	an an in the second and the second	and work of the	iteren and a state to the state of the state	ومعهديا فأعرب سيهم ورفيهم والألم الماتية	Stop Freq
-80.0						30.000000 MHz
Start 9 kHz					Stop 30.00 MHz	CF Step
#Res BW 100 kHz	#VBW	300 kHz		Sweep 5.3	133 ms (40001 pts)	2.999100 MHz Auto Man
MKR MODE TRC SCL X	281.9 kHz	∀ -56.98 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Mari
2	201.9 KHZ	-56.98 GBIII				Ency Offered
3 4						Freq Offset 0 Hz
5					=	0 H2
7						
8 9 9						
10					~	
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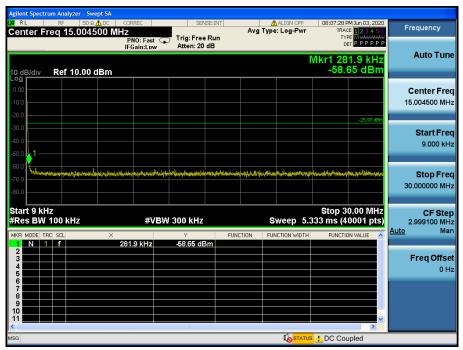
Agilent Spectrum Analyzer - Swept SA						
RL RF 50 Ω AC Center Freq 5.015000000	CORREC	SENSE:INT	Avg	ALIGN OFF Type: Log-Pwr	08:04:41 PM Jun 03, 2020 TRACE 123456	Frequency
	PNO: Fast 🖵 IFGain:Low	Trig: Free Run Atten: 20 dB			TYPE MWWWWW DET P P P P P P	
10 dB/div Ref 10.00 dBm				Mkr	5 3.044 93 GHz -46.54 dBm	Auto Tune
-10.0	1				-26.09 dBm	Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0				en en talen for en dag vers dat Miller en truege (s) en en talen for en dag vers dat Miller en truege (s)		Start Freq 30.000000 MHz
-60.0						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 X	412 83 GHz	Y 2.87 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 2. 3 N 1 f 9. 4 N 1 f 5.	412 85 GHZ 389 65 GHz 719 59 GHz 752 53 GHz 044 93 GHz	-42.64 dBm -45.94 dBm -46.30 dBm -46.54 dBm				Freq Offset 0 Hz
					~	
MSG						



TM 3 & Middle

Reference





Agilent Spectrum Ar		ec i sen	ISE:INT	ALIGN OFF	08:07:37 PMJun 03, 2020	
	5.015000000 GHz		Avg Ty Run	/pe: Log-Pwr	TRACE 123456 TYPE MWWWWW DET PPPPP	Frequency
10 dB/div Re	f 10.00 dBm	In:Low Atten: 20		Mkr	5 2.494 83 GHz -46.30 dBm	Auto Tune
Log 0.00 -10.0 -20.0					-25 97 dBm	Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0	5,92		4			Start Freq 30.000000 MHz
-60.0 -70.0 -80.0						Stop Freq 10.00000000 GHz
Start 30 MHz #Res BW 1.0		#VBW 3.0 MHz		-	Stop 10.000 GHz 67 ms (40001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TRC SC 1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f 6	× 2.436 26 2.794 93 2.696 73 6.279 69 2.494 83	GHz -44.74 dE GHz -45.47 dE GHz -46.25 dE	3m 3m 3m 3m	FUNCTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz
7 8 9 10 11					~	
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Agilent Spectrum Analyzer - Swept SA	
Image: Structure Structure Structure Autor of F 08:07:44 PM Jun 03 Center Freq 17.500000000 GHz Avg Type: Log-Pwr TRACE 12 12 </td <td>Frequency</td>	Frequency
PNO: Fast Trig: Free Run TYPE	www.
Mkr3 24.035 125 0	Auto Tune
10 dB/div Ref 10.00 dBm -37.56 d	
Log	
0.00	Center Freq
-10.0	17.500000000 GHz
-20.0	97 dBm
-30.0	Start Freq
	10.00000000 GHz
-60.0	
-70.0	Stop Freq
-80.0	25.00000000 GHz
Start 10.000 GHz Stop 25.000 #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 40.00 ms (40001	GHZ CF Step pts) 1.500000000 GHz
MKRI MODEL TRCI SCL X Y FUNCTION VIDTH FUNCTION VALUE	Auto Man
1 N 1 f 24.797 875 GHz 36.80 dBm	
2 N 1 f 24.202 000 GHz 37.01 dBm 3 N 1 f 24.035 125 GHz 37.56 dBm	Freq Offset
	0 Hz
9 10	
MSG Los STATUS	

TM 3 & Highest

Reference



High Band-edge



Center Freq 13.004300 MHZ PNO: Fast IFGain:Low Trig: Free Run Atten: 20 dB Mkr1 281.9 kHz -57.32 dBm Auto Tu 10 dB/div Ref 10.00 dBm -57.32 dBm Center Fr 15.004500 M Center Fr 15.004500 M 200	nt Spectrum Analyzer - Swe RL RF 50 ຊ.	ALIGN OFF 08:10:45 PM Jun 03, 2020 Deal of Part Trace Trace Prequency
Mkr1 281.9 kHz Auto Tu 10 dB/div Ref 10.00 dBm -57.32 dBm Center Fr 100 200 2544.00 2544.00 Start Fr 400 1 0 0 0 0 0 0	nter Freq 15.0045	
000 <td>IB/div Ref 10.00 d</td> <td>Mkr1 281.9 kHz Auto Tune</td>	IB/div Ref 10.00 d	Mkr1 281.9 kHz Auto Tune
-30.0) 	Center Freq 15.004500 MHz
		3.25 44 60° Start Freq 9.000 kHz
	Walaheshinghicherhilter	na annunaktiva taqlar (dayah) nana) lana 30.000000 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 5.333 ms (40001 pts)	es BW 100 kHz	Sweep 5.333 ms (40001 pts) 2.999100 MHz
MRR MODE THE SCL X Y FUNCTION FUNCTION VIDTH FUNCTION VALUE F 1 N 1 f 281.9 kHz -57.32 dBm 2 Freq Offs		UNCTION WIDTH FUNCTION VALUE Freq Offset
MSG Local DC Coupled		

Agilent Spectrum Analyzer - Swe					
ເ₩ RL RF 50Ω Center Freq 5.01500	PNO: Fast 🔾	SENSE:INT	Avg Type: Log-Pwr	08:10:53 PMJun 03, 2020 TRACE 1 2 3 4 5 6 TYPE M WWWWWW DET P P P P P P	Frequency
10 dB/div Ref 10.00 d	IFGain:Low	Atten: 20 dB	Mkr	5 2.991 59 GHz -46.42 dBm	Auto Tune
-10.0				-25.44 dBm	Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0	<u>3</u> 2,5_				Start Freq 30.000000 MHz
-60.0					Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBV	V 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	× 2.460 44 GHz	Y FU 3.31 dBm	NCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	2.680 28 GHz 2.494 33 GHz 2.923 04 GHz 2.991 59 GHz	-44.90 dBm -45.27 dBm -45.31 dBm -46.42 dBm		=	Freq Offset 0 Hz
6 7 8 9 10					
11				>	
MSG			Ko 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 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

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 D 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 D 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	Date rate	T _{on} (ms)	T _{on+off} (ms)	D = T _{on} / (T _{on+off})	DCCF = 10 log(1/D) (dB)
TM 1	1Mbps	8.605	8.700	0.989 1	NA
TM 2	6Mbps	1.427	1.530	0.932 7	0.30
TM 3	MCS 0	1.336	1.439	0.928 4	0.32

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

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

Test Results: Comply

Note.

- 1. The radiated emissions were investigated 9 kHz to 25 GHz. 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, 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)
	2 389.32	V	Х	PK	49.49	4.80	N/A	N/A	54.29	74.00	19.71
Lowest	2 389.59	V	Х	AV	38.75	4.80	N/A	N/A	43.55	54.00	10.45
Lowesi	4 824.82	V	Х	PK	49.07	0.94	N/A	N/A	50.01	74.00	23.99
	4 823.93	V	Х	AV	38.96	0.93	N/A	N/A	39.89	54.00	14.11
Middle	4 875.28	V	Х	PK	49.23	1.20	N/A	N/A	50.43	74.00	23.57
wildule	4 873.40	V	Х	AV	39.13	1.17	N/A	N/A	40.30	54.00	13.70
	2 484.21	V	Х	PK	49.00	5.26	N/A	N/A	54.26	74.00	19.74
Highoot	2 483.69	V	Х	AV	38.75	5.25	N/A	N/A	44.00	54.00	10.00
Highest	4 922.87	V	Х	PK	49.31	1.44	N/A	N/A	50.75	74.00	23.25
	4 922.95	V	Х	AV	39.40	1.44	N/A	N/A	40.84	54.00	13.16

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : 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)	Limit (dBuV/m)	Margin (dB)
	2 389.38	V	Х	PK	49.25	4.80	N/A	N/A	54.05	74.00	19.95
Lowest	2 389.63	V	Х	AV	38.87	4.80	0.30	N/A	43.97	54.00	10.03
Lowest	4 823.35	V	Х	PK	49.69	0.93	N/A	N/A	50.62	74.00	23.38
	4 825.32	V	Х	AV	38.95	0.94	0.30	N/A	40.19	54.00	13.81
Middle	4 872.91	V	Х	PK	49.75	1.17	N/A	N/A	50.92	74.00	23.08
wildule	4 872.58	V	Х	AV	39.22	1.17	0.30	N/A	40.69	54.00	13.31
	2 484.02	V	Х	PK	48.79	5.26	N/A	N/A	54.05	74.00	19.95
Llighteet	2 483.88	V	Х	AV	39.64	5.26	0.30	N/A	45.20	54.00	8.80
Highest	4 924.57	V	Х	PK	49.40	1.45	N/A	N/A	50.85	74.00	23.15
	4 923.39	V	Х	AV	39.16	1.44	0.30	N/A	40.90	54.00	13.10

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

Radiated Spurious Emissions data(9 kHz ~ 25 GHz) : TM 3

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)
	2 387.54	V	Х	PK	49.77	4.79	N/A	N/A	54.56	74.00	19.44
Lowest	2 389.82	V	Х	AV	38.93	4.80	0.32	N/A	44.05	54.00	9.95
Lowest	4 823.06	V	Х	PK	48.90	0.93	N/A	N/A	49.83	74.00	24.17
	4 823.38	V	Х	AV	38.76	0.93	0.32	N/A	40.01	54.00	13.99
Middle	4 874.97	V	Х	PK	49.43	1.20	N/A	N/A	50.63	74.00	23.37
wildule	4 873.69	V	Х	AV	39.19	1.17	0.32	N/A	40.68	54.00	13.32
	2 483.76	V	Х	PK	49.68	5.25	N/A	N/A	54.93	74.00	19.07
Highoot	2 483.90	V	Х	AV	39.59	5.26	0.32	N/A	45.17	54.00	8.83
Highest	4 925.05	V	Х	PK	50.01	1.45	N/A	N/A	51.46	74.00	22.54
	4 923.88	V	Х	AV	39.19	1.45	0.32	N/A	40.96	54.00	13.04

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: NA

9. LIST OF TEST EQUIPMENT

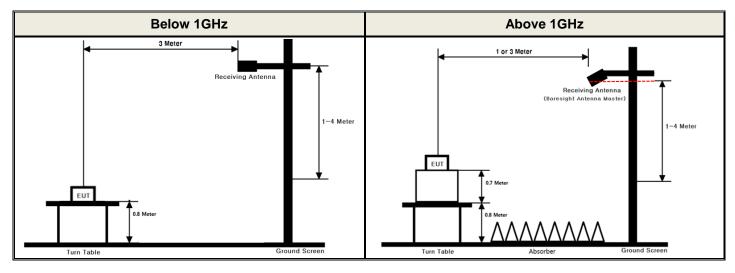
Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY49060056
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48010133
DC Power Supply	Agilent Technologies	66332A	19/06/25	20/06/25	MY43001173
DC Power Supply	SM techno	SDP30-5D	19/06/24	20/06/24	305DMG305
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	19/06/25	20/06/25	N/A
Loop Antenna	ETS-Lindgren	6502	19/12/18	21/12/18	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	A.H.Systems Inc.	SAS-574	19/07/03	21/07/03	155
PreAmplifier	tsj	MLA-0118-B01-40	19/12/16	20/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	19/06/27	20/06/27	16966-10728
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
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300- 18000-60SS	19/06/26	20/06/26	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	19/06/27	20/06/27	3
Attenuator	SMAJK	SMAJK-50-10	19/06/26	20/06/26	3-50-10
Attenuator	Hefei Shunze	SS5T2.92-10-40	19/06/27	20/06/27	16012202
Attenuator	SRTechnology	F01-B0606-01	19/06/27	20/06/27	13092403
Attenuator	Aeroflex/Weinschel	20515	19/06/27	20/06/27	Y2370
Attenuator	SMAJK	SMAJK-2-3	19/06/27	20/06/27	2
Attenuator	Aeroflex/Weinschel	56-3	19/06/25	20/06/25	Y2342
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A MA2490A	19/06/24	20/06/24	1306007 1249001
EMI Receiver	ROHDE&SCHWARZ	ESW44	19/07/30	20/07/30	101645
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	20/01/15	21/01/15	RF-64

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.

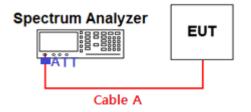
APPENDIX I

Test set up diagrams

Radiated Measurement



Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	9.37	15	13.39
1	9.88	20	13.62
2.412 & 2.437 & 2.462	10.19	25	13.90
5	10.36	-	-
10	13.30	-	-

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

Middle

&

APPENDIX II

Duty cycle plots

Test Procedure

Duty Cycle

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.)

TM 1 AVg Type: Log-Pwr Sweep/Control weep Time 50.00 ms PNO: Fast IFGain:Low Trig: Free Run Atten: 30 dB Sweep Time 50.00 ms AMkr3.8 -2.17 Ref 20.00 dBm X Span 0 Hz Sweep 50.00 ms (10001 pts Center 2.437000000 GHz Res BW 8 MHz #VBW 50 MHz (Δ) 94 Gate (Δ) íΔì -2.17 dE 9.41 dBm [Off.LO] Points 10001 **I**STATUS

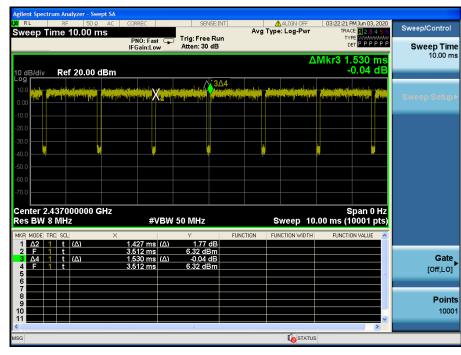
TRF-RF-236(04)171516

Dt&C

TM 2

& Middle

Duty Cycle



Duty Cycle

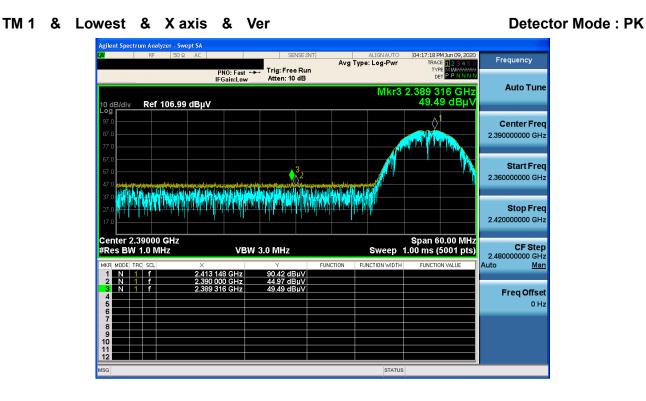
ALIGN OFF Avg Type: Log-Pwr 03:38:59 PN Jun 03, 20 Sweep/Control weep Time 10.00 ms Trig: Free Run Atten: 30 dB DET PPPP PNO: Fast 😱 IFGain:Low Sweep Time 10.00 ms 1.439 ms -0.24 dB ∆Mkr3 Ref 20.00 dBm idis 1 Center 2.437000000 GHz Res BW 8 MHz Span 0 Hz Sweep 10.00 ms (10001 pts) #VBW 50 MHz FUNCTION 3.33 dB 6.73 dBm (Δ) (Δ) Gate [Off,LO] 1 t (Δ) 1 t ms (Δ) -0.24 dB 6.73 dBm 1.439 4.679 Points 10001

& Middle

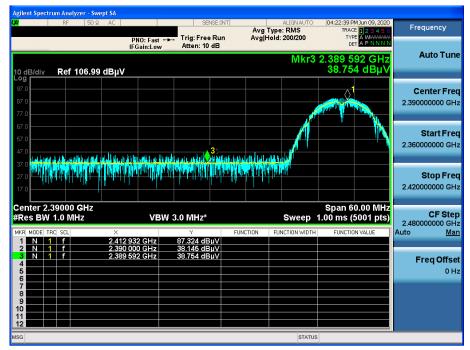
TM 3

APPENDIX III

Unwanted Emissions (Radiated) Test Plot



TM 1 & Lowest & X axis & Ver

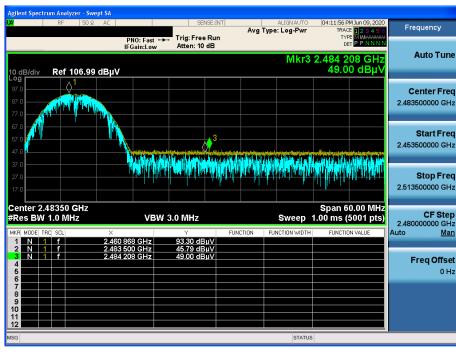


Detector Mode : AV



TM 1 & Highest & X axis & Ver

Detector Mode : PK



TM 1 & Highest & X axis & Ver

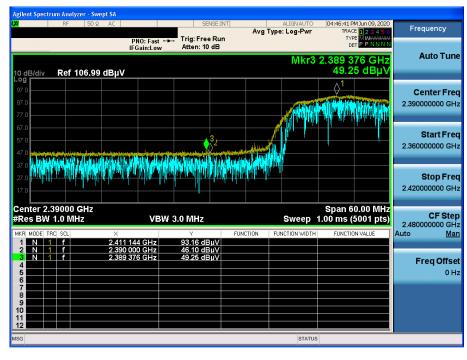
Avg Type: RMS Avg|Hold: 200/200 Frequency Trig: Free Run Atten: 10 dB A WATA TYPE DE1 PNO: Fast IFGain:Low Auto Tune Mkr3 2.483 692 GH 38.747 dBµ Ref 106.99 dBµV **Center Freq** 2.483500000 GHz Start Freq 2.453500000 GHz un lin ab ille ille da i and and the trick ball and death de they. Brish di M Stop Freq 2.513500000 GHz Center 2.48350 GHz #Res BW 1.0 MHz Span 60.00 MHz 1.00 ms (5001 pts) CF Step 2.48000000 GHz VBW 3.0 MHz* Sweep Auto Man 38.347 dBµ\ 38.747 dBµ\ 2.483 500 GHz 2.483 692 GHz Freq Offset 0 Hz 11 12 STATUS

су



TM 2 & Lowest & X axis & Ver

Detector Mode : PK



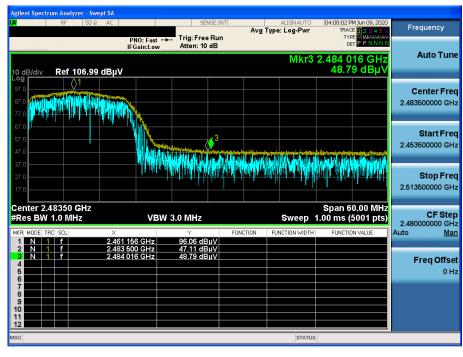
TM 2 & Lowest & X axis & Ver

Avg Type: RMS Avg|Hold: 200/200 Frequency Trig: Free Run Atten: 10 dB A WARA PNO: Fast IFGain:Low Auto Tune Mkr3 2.389 628 GH 38.869 dBµ' Ref 106.99 dBµV **Center Freq** 2.39000000 GHz **M** Start Freq 2.36000000 GHz y de la menoral dan formi de la fanti provident angeligen angeligen angeligen angeligen angeligen angeligen an Stop Freq 2.420000000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 60.00 MHz 1.00 ms (5001 pts) CF Step 2.48000000 GHz VBW 3.0 MHz* Sweep FUNCTION FUNCTION Auto Man 85.016 dBµ\ 37.777 dBµ\ Freq Offset 0 Hz STATUS

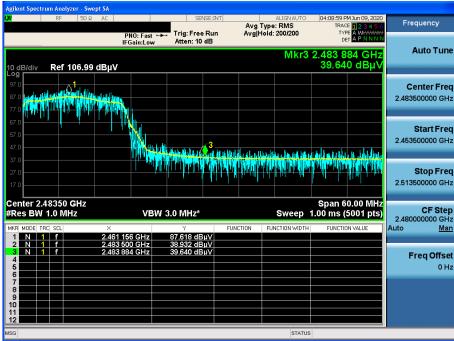


TM 2 & Highest & X axis & Ver

Detector Mode : PK



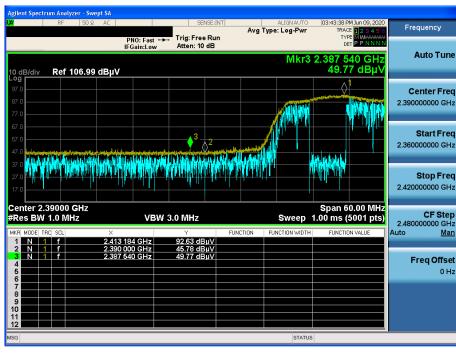
TM 2 & Highest & X axis & Ver





TM 3 & Lowest & X axis & Ver





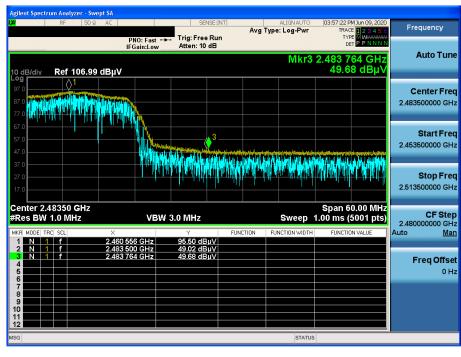
TM 3 & Lowest & X axis & Ver

Avg Type: RMS Avg|Hold: 200/200 Frequency Trig: Free Run Atten: 10 dB A WARA TYPE DE1 PNO: Fast IFGain:Low Auto Tune Mkr3 2.389 820 GH 38.932 dBµ' Ref 106.99 dBµV **Center Freq** \Diamond 2.39000000 GHz PHAN) Start Freq 2.36000000 GHz a histolia bil aldadada Line Marshallin dad a da da da da da na andra ann tha a Michillian Ann Ala an an air a th Stop Freq 2.420000000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 60.00 MHz 1.00 ms (5001 pts) CF Step 2.48000000 GHz VBW 3.0 MHz* Sweep FUNCTION FUNCTION WIT Auto Man 38.026 dBµ\ 38.932 dBµ\ Freq Offset 0 Hz STATUS

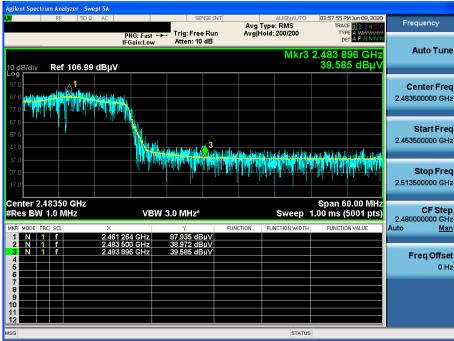


TM 3 & Highest & X axis & Ver

Detector Mode : PK



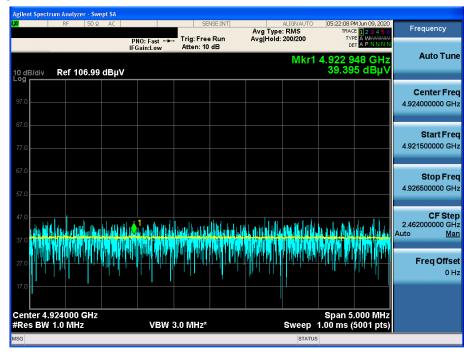
TM 3 & Highest & X axis & Ver





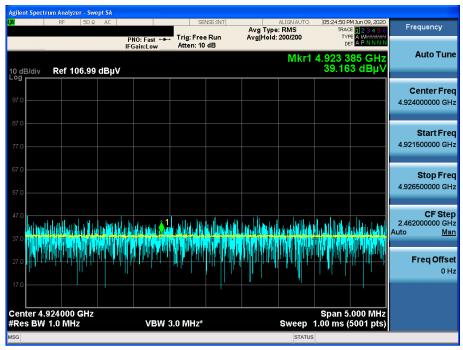
TM 1 & Highest & X axis & Ver

Detector Mode : AV



TM 2 & Highest & X axis & Ver







TM 3 & Highest & X axis & Ver

