TEST REPORT

		DT&C Co., Ltd.					
U	Dt&C	42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042 Tel : 031-321-2664, Fax : 031-321-1664					
1. Report N	No : DRTFCC2101-0003						
2. Custome	ər						
• Name	: MOTREX CO., LTD.						
Addres	ss : Seoyoung Bldg. 25, Hw	vangsaeul-ro 258beon-gil, Bundang-gu, Seongnam-si,					
	Gyeonggi-do, South Ko	irea					
3. Use of R	eport : FCC Original Grant						
4. Product	Name / Model Name : SMA	ART DISPLAY / MS310ABDmFL					
FCC ID :	BP9-MS310ABDMFL						
	gulation(s): Part 15.247						
Test Met	hod Used : KDB558074 D0	01v05r02, ANSI C63.10-2013					
6. Date of T	Fest : 2020.11.24 ~ 2020.12	2.21					
7. Location	of Test : 🛛 Permanent Te	esting Lab 🔲 On Site Testing					
8. Testing E	Environment : See appende	ed test report.					
9. Test Res	sult : Refer to the attached t	test result.					
The results sh	own in this test report refer only t	to the sample(s) tested unless otherwise stated.					
A ffirm a time	Tested by	Reviewed by					
Affirmation	Name : JungWoo Kim	Stendure) Name : JaeJin Lee (Signature)					
	15						
		2021.01.06.					
	2021.01.00.						
		DT&C Co Itd					
		DT&C Co., Ltd.					
	This test report is a genera	al report that does not use the KOLAS accreditation mark and					
is not related to 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
DRTFCC2101-0003	Jan. 06, 2021	Initial issue	JungWoo Kim	JaeJin Lee



Table of Contents

1. EUT DESCRIPTION 4
2. INFORMATION ABOUT TESTING
2.1 Test mode5
2.2 Auxiliary equipment5
2.3 Tested environment6
2.4 EMI suppression Device(s) / Modifications6
2.5 Measurement Uncertainty6
3. SUMMARY OF TESTS
4. TEST METHODOLOGY
4.1 EUT configuration8
4.2 EUT exercise
4.3 General test procedures8
4.4 Description of test modes8
5. INSTRUMENT CALIBRATION
6. FACILITIES AND ACCREDITATIONS
6.1 Facilities9
6.2 Equipment9
7. ANTENNA REQUIREMENTS9
8. TEST RESULT 10
8.1 6dB bandwidth10
8.2 Maximum peak conducted output power17
8.3 Maximum power spectral density20
8.4 Out of band emissions at the band edge / conducted spurious emissions
8.5 Radiated spurious emissions52
8.6 Power-line conducted emissions57
9. LIST OF TEST EQUIPMENT 58
APPENDIX I
APPENDIX II
APPENDIX III

1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	SMART DISPLAY
Model Name	MS310ABDmFL
Add Model Name	NA
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 : 10.05 dBm • 802.11g : 18.05 dBm • 802.11n (HT20) : 17.95 dBm • 802.11ac (VHT20) : 17.43 dBm
Modulation Type	• 802.11b: CCK, DSSS • 802.11g/n: 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		20 °C ~ 24 °C
Relative humidity content		35 % ~ 42 %
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
Antenna-port conducted emission	0.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (1 GHz Below)	4.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (1 GHz ~ 18 GHz)	5.1 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (18 GHz Above)	5.3 dB (The confidence level is about 95 %, $k = 2$)

3. SUMMARY OF TESTS

FCC Part	Parameter	Limit	Test Condition	Status Note 1
15.247(a)	6 dB Bandwidth	> 500 kHz		С
15.247(b)	Transmitter Output Power	< 1 Watt		С
15.247(d)	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW	Conducted	С
15.247(e)	Transmitter Power Spectral Density	< 8 dBm/3 kHz		С
15.247(d) 15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC Part 15.209 limits (Reference to section 8.5)	Radiated	С
15.207	AC Line Conducted Emissions	FCC Part 15.207 limits (Reference to section 8.6)	AC Line Conducted	NA Note3
15.203	Antenna Requirements	FCC Part 15.203 (Reference to section 7)	-	С
Note 1 : C = C	omply $NC = Not Comply NT = N$	lot Tested NA = Not Applical	ble	

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., 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 & IC 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. (Refer to Internal Photo file.) 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) ≥ 3 x RBW. (RBW : 100 kHz / VBW : 300 kHz)
- 3. Detector = Peak.
- 4. Trace mode = **Max hold**.
- 5. Sweep = **Auto couple**.
- 6. Allow the trace to stabilize.

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

Test Results: Comply

Test Mode	Frequency	Test Results[MHz]		
	Lowest	7.12		
TM 1	Middle	7.59		
	Highest	7.08		
	Lowest	16.34		
TM 2	Middle	16.31		
	Highest	16.07		
	Lowest	16.30		
ТМ 3	Middle	16.60		
	Highest	16.70		



RESULT PLOTS

6 dB Bandwidth

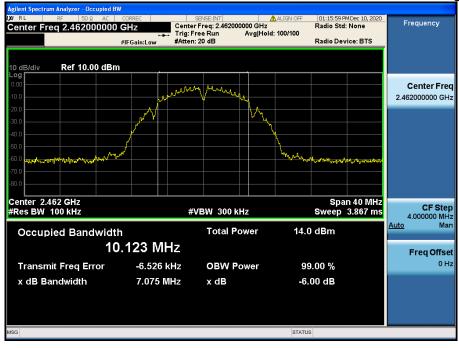


6 dB Bandwidth

TM 1 & Middle



TM 1 & Highest

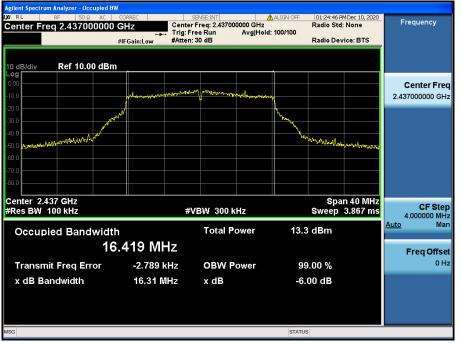


Dt&C

TM 2 & Lowest Spectrum Analyzer Occupied BV SENSE:INT ALIGN OFF Center Freq: 2.412000000 GHz Trig: Free Run Avg|Hold: 100/100 #Atten: 20 dB 01:19:45 PMDec 10, 2020 Radio Std: None Frequency Center Freq 2.412000000 GHz Radio Device: BTS #IFGain:Low Ref 10.00 dBm 0 dB/di oa **Center Freq** h. a 2.412000000 GHz Mon Mayle ฟฟมนะ Center 2.412 GHz #Res BW 100 kHz Span 40 MHz Sweep 3.867 ms CF Step 4.000000 MHz Man #VBW 300 kHz Auto 13.4 dBm Occupied Bandwidth Total Power 16.419 MHz Freq Offset -4.111 kHz **OBW Power** 99.00 % 0 Hz Transmit Freg Error x dB Bandwidth 16.34 MHz x dB -6.00 dB STATUS

6 dB Bandwidth

TM 2 & Middle



TDt&C

TM 2 & Highest

Center Freq 2.462000000 C	Center		ALIGN OFF	01:27:46 P Radio Std: Radio Dev		Frequency
10 dB/div Ref 10.00 dBm Log 0.00 -10.0	manlesonahardrow	Manuersonalinessa				Center Freq 2.462000000 GHz
-30.0 -40.0 -60.0 -60.0			- Andrew Contraction	¹⁷ hlmynluuttyfpantu	www.	
-70.0 -80.0 Center 2.462 GHz					n 40 MHz	CF Step
#Res BW 100 kHz Occupied Bandwidth 16.		/BW 300 kHz Total Power	14.:	Sweep 3 dBm	3.867 ms	4.000000 MHz <u>Auto</u> Man
Transmit Freq Error x dB Bandwidth	1.040 kHz 16.07 MHz	OBW Power x dB		9.00 % .00 dB		0 Hz
ИSG			STATU	s		





6 dB Bandwidth





🛈 Dt&C

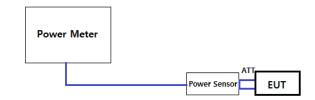


8.2 Maximum peak conducted output power

Test Requirements and limit, §15.247(b)

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

- KDB558074 D01v05r02 Section 8.3.1.3
- ANSI C63.10-2013 Section 11.9.1.3

PKPM1 Peak power meter method

- 1. The maximum conducted output powers were measured using a broadband peak RF power meter which has greater video bandwidth than DUT's DTS bandwidth and utilize a fast-responding diode detector.
- KDB558074 D01v05r02 Section 8.3.2.3
- ANSI C63.10-2013 Section 11.9.2.3.2

Method AVGPM-G

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



Test Results: Comply

Freq.		Maximum Peak Conducted Output Power (dBm) for 802.11b										
(MHz)	Det.	Data Rate [Mbps]										
		1	2	5.5	11	-	-	-	-			
	PK	9.82	9.46	9.44	9.53	-	-	-	-			
2 412	AV	6.77	6.45	6.52	6.49	-	-	-	-			
2 437	PK	9.84	9.49	9.51	9.43	-	-	-	-			
2 437	AV	6.80	6.51	6.46	6.69	-	-	-	-			
2 462	PK	10.05	9.87	9.82	9.79	-	-	-	-			
2 462	AV	7.03	6.89	6.88	6.94	-	-	-	-			

From		Maximum Peak Conducted Output Power (dBm) for 802.11g									
Freq. (MHz)	Det.	Data Rate [Mbps]									
		6	9	12	18	24	36	48	54		
	PK	17.09	17.02	16.21	16.14	15.95	16.19	15.17	15.15		
2 412	AV	7.26	7.24	7.06	6.94	7.03	6.95	6.97	7.00		
2 437	PK	17.21	17.16	16.35	16.22	16.11	16.19	15.19	15.22		
2 437	AV	7.35	7.22	7.29	7.16	7.17	7.15	7.22	7.28		
2 462	PK	18.05	17.97	17.24	17.28	17.04	17.22	17.24	17.20		
2 462	AV	8.02	7.92	7.86	8.01	8.04	7.98	7.95	7.79		

Freq.		Maximum Peak Conducted Output Power (dBm) for 802.11n(HT20)								
(MHz)	Det.									
		0	1	2	3	4	5	6	7	
2 412	PK	17.59	16.49	16.42	16.64	17.10	16.35	16.14	17.33	
2412	AV	7.26	7.18	7.21	6.94	7.04	7.08	7.02	7.14	
2 427	PK	17.00	16.03	16.07	16.28	16.52	16.11	16.18	16.59	
2 437	AV	7.34	7.11	7.04	7.16	7.25	7.30	7.33	7.26	
2 462	PK	17.95	16.92	16.86	16.99	17.53	17.29	17.07	17.44	
2 462	AV	7.88	7.66	7.58	7.46	7.43	7.40	7.59	7.84	



From			Maxim	num Peak Co	onducted O	utput Power	(dBm) for <u>{</u>	302.11ac(V	HT20)				
Freq. (MHz)	Det.	Data Rate [MCS]											
		0	1	2	3	4	5	6	7	8			
2 4 1 2	PK	17.43	17.07	16.36	17.25	16.63	16.32	15.85	16.22	16.29			
2 412	AV	7.21	7.02	7.01	7.07	6.98	7.11	6.93	7.16	7.11			
2 437	PK	17.07	16.04	16.11	16.15	16.34	16.29	16.28	16.70	16.66			
2 437	AV	7.23	7.11	7.04	7.09	7.15	7.20	7.22	7.28	7.25			
2 462	PK	17.16	16.17	16.03	16.21	16.30	16.28	16.38	16.69	16.57			
2 462	AV	7.83	7.64	7.60	7.83	7.80	7.67	7.71	7.56	7.55			



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 kHz** ≤ RBW ≤ **100 kHz**
- 4. Set the VBW \geq 3 x RBW
- 5. Detector = **Peak**
- 6. Sweep time = **Auto couple**
- 7. Trace mode = **Max hold.**
- 8. Allow trace to fully stabilize.

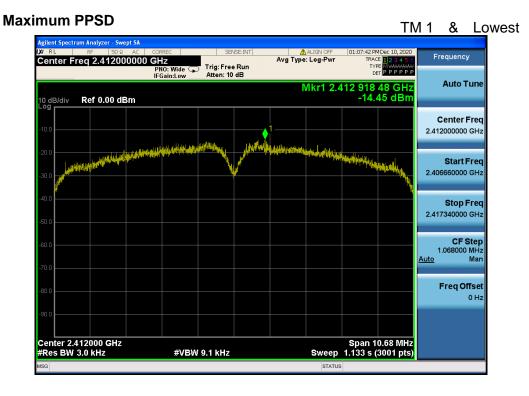
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.

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

Test Results: Comply

Test Mode	Frequency	RBW	PKPSD [dBm]
	Lowest	3 kHz	-14.45
TM 1	Middle	3 kHz	-14.60
	Highest	3 kHz	-12.76
	Lowest	3 kHz	-15.80
TM 2	Middle	3 kHz	-15.69
	Highest	3 kHz	-15.00
	Lowest	3 kHz	-16.13
ТМ 3	Middle	3 kHz	-15.16
	Highest	3 kHz	-14.27

RESULT PLOTS



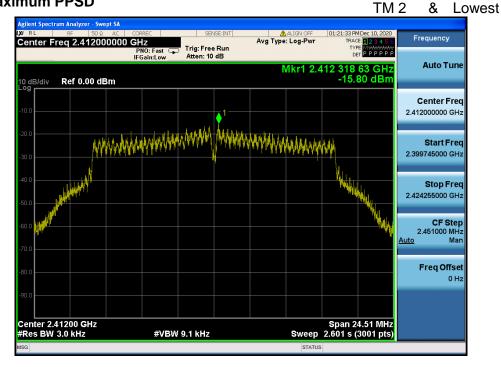


TM 1 & Middle



TM 1 & Highest gilent Spectrum Analyzer - Swept SA QU RL RF 50 Q AC CORREL Center Freq 2.462000000 GHz PNO: Wide Atten: 10 dB ALIGN OFF ec 10, 2020 Frequency 01:16 RACE 123456 TYPE MWWWWWW DET P P P P P P Mkr1 2.463 000 GHz -12.76 dBm Auto Tune B/div Ref 0.00 dBm 10 (Loc **Center Freq** 2.462000000 GHz ألليان and the second WANN. فإنبالها تقليلونا in the second Start Freq Linnith i i sa shi shi s 2.456697500 GHz **Stop Freq** 2.467302500 GHz **CF Step** 1.060500 MHz Man <u>Auto</u> Freq Offset 0 Hz Center 2.462000 GHz #Res BW 3.0 kHz Span 10.61 MHz Sweep 1.125 s (3001 pts) #VBW 9.1 kHz

🛈 Dt&C



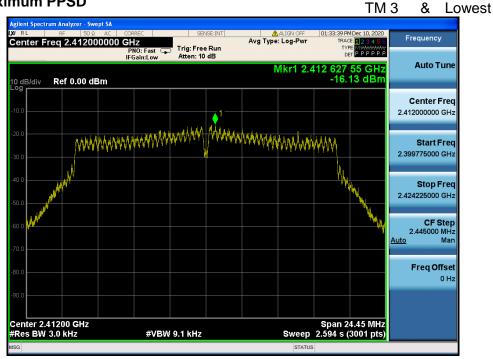
Maximum PPSD

TM 2 & Middle





🛈 Dt&C



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 : 40 001

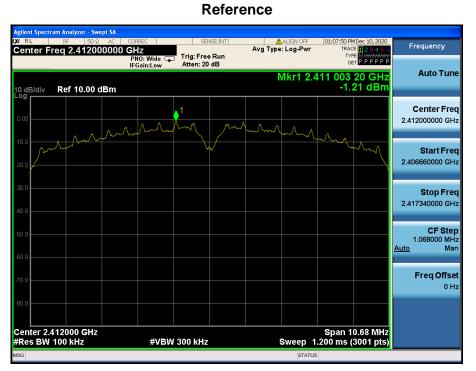
Frequency range: 30 MHz ~ 10 GHz, 10 GHz ~25 GHz RBW = 1 MHz, VBW = 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40 001

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

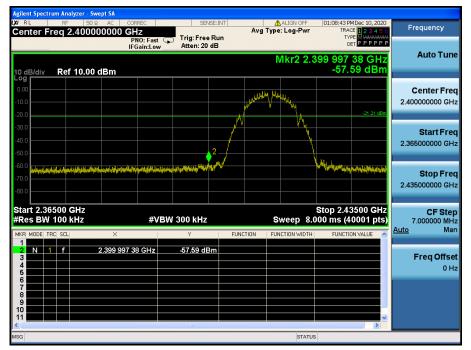
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2 001 to get accurate emission level within 100 kHz BW.

RESULT PLOTS

TM 1 & Lowest



Low Band-edge



Agilent Spectrum Analyzer - Swept					
🕅 RL RF 50 Ω 🧥 Center Freg 15.00450		SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	01:08:51 PMDec 10, 2020 TRACE 2 3 4 5 6	Frequency
Center Freq 15.00450	PNO: Fast G IFGain:Low	Trig: Free Run Atten: 20 dB		TRACE 123456 TYPE MWWWWW DET PPPPP	
10 dB/div Ref 10.00 dE	3m			Vlkr1 296.2 kHz -45.13 dBm	Auto Tune
-10.0				-21.21.dBm	Center Freq 15.004500 MHz
-30.0 -40.0 -50.0					Start Freq 9.000 kHz
-60.0	ninadalariasi)(menghilisingnasi	utacallaniqaanantiissantiintartiika	elenin fydfanol nif fiedol ffi fold yn ardinei	sind M. Perlanan Said Bash cabal capacities	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 100 kHz	#VBW	300 kHz	Sweep 5.3	Stop 30.00 MHz 33 ms (40001 pts)	CF Step 2.999100 MHz <u>Auto</u> Man
N 1 F 2 - - 3 - - 4 - - 5 - -	296.2 kHz	-45.13 dBm			Freq Offset 0 Hz
6 7 8 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10				· · · · · · · · · · · · · · · · · · ·	
<		ш		>	
MSG			STATUS	L Coupled	

Agilent Spectrum								
Center Fre	RF 50 Ω		SENSE:II		ALIGN OFF Type: Log-Pwr	01:09:01 PMDec 10, 2020 TRACE 1 2 3 4 5 6		
Center Fre	q 5.015000	PNO: Fa:			Type: Log-t wi			
		IFGain:Lo	Atten: 20 dB					
					Mkr	5 8.878 13 GHz	Auto Tune	
10 dB/div	Ref 10.00 dl					-46.12 dBm		
Log 0.00		Q1					Comton Error	
							Center Freq	
-10.0							5.015000000 GHz	
-20.0						-21.21 dBm		
-30.0							Start Freq	
-40.0						⁴ ⊖ ⁴ 5	30.000000 MHz	
-50.0	NAME OF TAXABLE PARTY OF	and the second states of th	The paper property with the state	here an history a	and the second second second second	And the supervision of the super		
	New A DESCRIPTION OF THE OWNER OF	and a state of the second s	Contraction of the second s	and the second				
-70.0							Stop Freq	
							10.000000000 GHz	
-80.0								
Start 30 MH	lz			I		Stop 10.000 GHz	CF Step	
#Res BW 1.		#	VBW 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	
1 N 1	f	2.411 09 GHz						
2 N 1 3 N 1	f	7.826 54 GHz 7.790 90 GHz	-45.43 dBm -45.93 dBm				Freq Offset	
4 N 1	f	8.076 04 GHz	-45.98 dBm				0 Hz	
5 N 1	<u>†</u>	8.878 13 GHz	-46.12 dBm					
7								
8								
10								
11			10			~		
MSG					STATUS			
	анно							

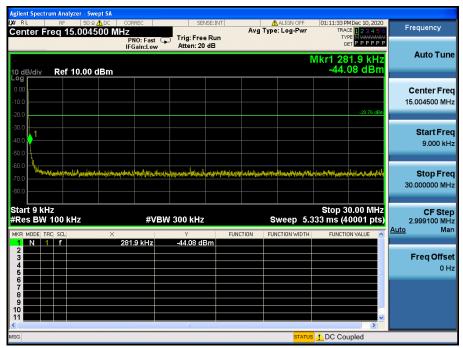




TM 1 & Middle

Reference





XI RL RF	alyzer - Swept S			10000 00 000					
Center Freq			SE	ISE:INT		ALIGN OFF	TRAC	Dec 10, 2020	Frequency
oontor rrog	0.0100000	PNO: Fa IFGain:Lo	st 🕞 Trig: Free ow Atten: 20		•	-	TYP	PPPPP PPPPP	
10 dB/div Re	f 10.00 dBr	n				Mkr	5 7.854 : -45.5	21 GHz 55 dBm	Auto Tune
0.00 -10.0 -20.0		Q1 ↓						-20.76 dBm	Center Freq 5.015000000 GHz
-30.0	alle an i forte a transfer to a transfer			a degus di katamat nya di ana de					Start Freq 30.000000 MHz
-60.0			an finantia an filmatia						Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0	MHz	#	VBW 3.0 MHz		s	weep 18		000 GHz 0001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL		Х	Y	FUNC	TION FUI	ICTION WIDTH	FUNCTIO	N VALUE	<u>Auto</u> Man
1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f		2.436 01 GHz 7.491 55 GHz 7.754 01 GHz 7.312 09 GHz 7.854 21 GHz	2 -45.28 df 2 -45.33 df 2 -45.54 df	3m 3m 3m				=	Freq Offset 0 Hz
6 7 8 9 10									
11								×	
MSG						STATUS			

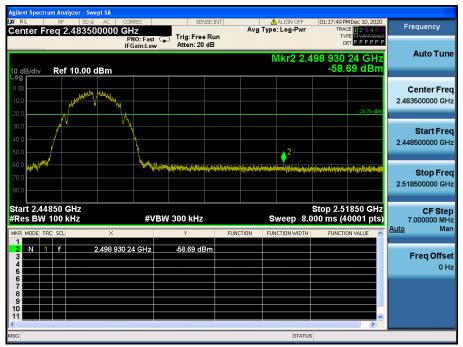
Agilent Spectrum Analyzer - Swept SA				
🗶/RL RF 50Ω AC		SE:INT ALIGN OF		Frequency
Center Freq 17.50000000	OGHZ PNO: Fast C Trig: Free	Avg Type: Log-Pv Run	TYPE M WANAAAAA	Frequency
	IFGain:Low Atten: 20		DETPPPPP	
		Mkr	3 24.093 625 GHz	Auto Tune
10 dB/div Ref 10.00 dBm			-35.31 dBm	
0.00				Center Freq
-10.0				17.50000000 GHz
			-20.76 dBm	17.50000000 GH2
-20.0			A13 A2	
-30.0				Start Freq
-40.0				10.00000000 GHz
-50.0 detailed with a standard a standard		and the second		
-60.0				
-70.0				Stop Freq
-80.0				25.00000000 GHz
Start 10.000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep	Stop 25.000 GHz 40.00 ms (40001 pts)	CF Step 1.50000000 GHz
MKR MODE TRC SCL X	Y	FUNCTION FUNCTION WID	TH FUNCTION VALUE	<u>Auto</u> Man
	875 GHz -34.65 dB 500 GHz -35.24 dB	m		
3 N 1 f 24.093	625 GHz -35.31 dB			Freq Offset
4			-	0 Hz
6				
7 8				
9				
10			~	
<	III.		<u> </u>	
MSG		ST/	TUS	

TM 1 & Highest

Reference



High Band-edge



Agilent Spectrum Analyzer - Sw					
Center Freq 15.004		SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	01:17:56 PMDec 10, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast IFGain:Low	Trig: Free Run Atten: 20 dB		TRACE 123456 TYPE M WWWWW DET PPPPP	
10 dB/div Ref 10.00				Mkr1 281.9 kHz -45.62 dBm	Auto Tune
-10.0				-20.76 dBm	Center Freq 15.004500 MHz
-30.0					Start Freq 9.000 kHz
-60.0 -70.0 -80.0	hendinen annen (sondhailteitigehielet)	giazete,tjonioinenenenetenesistophiesistophie	ation generation is blocked and the generation at a such	analyshingin antipostan iya karayara	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 100 kHz		300 kHz		Stop 30.00 MHz 333 ms (40001 pts)	CF Step 2.999100 MH Auto Mar
MKR MODE TRC SCL 1 N 1 f 2 - - - 3 - - - 4 - - - 5 - - -	× 281.9 kHz	45.62 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offset
6 7 8 9 10					
11		III		×	
MSG			STATUS	DC Coupled	

Agilent Spectrum Analyzer - Swept SA				
Center Freg 5.01500000		ALIGN OFF 01	18:06 PMDec 10, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast Trig: Free Run IFGain:Low Atten: 20 dB		TYPE MWWWWWW DET P P P P P	
10 dB/div Ref 10.00 dBm		Mkr5 7.	.823 55 GHz -46.23 dBm	Auto Tune
-10.0	V1		-20.76 dBm	Center Freq 5.015000000 GHz
-30.0				Start Freq 30.000000 MHz
-60.0				Stop Freq 0.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW 3.0 MHz	Steep 18.67		CF Step 997.000000 MHz
MKR MODE TRC SCL ×	2.461 18 GHz 2.60 dBm	FUNCTION FUNCTION WIDTH		<u>uto</u> Man
2 N 1 f 33 3 N 1 f 77 4 N 1 f 77	151 61 GHz 46.04 dBm 7.390 85 GHz 46.14 dBm 7.647 58 GHz 46.21 dBm 7.823 55 GHz 46.23 dBm		=	Freq Offset 0 Hz
7 8 8 9 9 10 11				
MSG	m	STATUS	>	



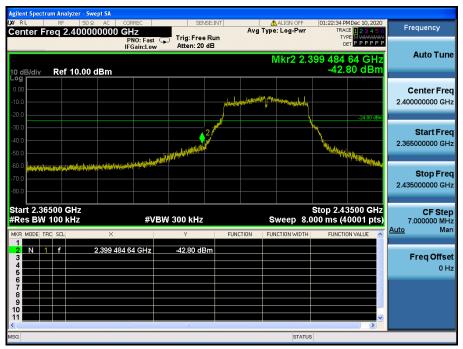


TM 2 & Lowest

Reference



Low Band-edge



Agilent Spectrum Analyzer					
Center Freq 15.0	50 Ω ▲ DC CORREC 04500 MHz PNO: Fast	SENSE:INT	ALIGN OFF	01:22:42 PM Dec 10, 2020 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P P P P P	Frequency
10 dB/div Ref 10.	IFGain:Low			Mkr1 287.2 kHz -43.25 dBm	Auto Tune
0.00 -10.0					Center Free 15.004500 MH
-30.0				-24,80 dBm	Start Free 9.000 kH:
-60.0	adination (side a company) which is a company of the side of the	ngthalananlinniannal ^{ta} lanntuitlandu	เสราะที่รู้ที่กำระบบรูกของมีเอาร์อูกุรระไฟไมต์อิตุโนทัศม	handhanaa isoo taadhaa fifaanaa	Stop Free 30.000000 MH
Start 9 kHz #Res BW 100 kHz	#V	BW 300 kHz	Sweep 5.	Stop 30.00 MHz 333 ms (40001 pts)	CF Ste 2.999100 MH <u>Auto</u> Ma
1 N 1 f 2 3 4 5	287.2 kHz	-43.25 dBm	Tokenow Pokenow with		Freq Offse 0 H
6 7 8 9 10					
<		III.		>	
ISG			STATU	DC Coupled	

Agilent Spectrum Analyzer - Swept SA					
Center Freq 5.015000000	CORREC	SENSE:INT	ALIGN OFF	01:22:52 PMDec 10, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: East	rig: Free Run Atten: 20 dB	• •	TYPE NIMANANANA DET PPPPP	
	IFGain:Low	aten. 20 ab	Milen		Auto Tune
10 dB/div Ref 10.00 dBm			IVIKIS	5 7.803 11 GHz -46.44 dBm	
Log	1				
-10.0					Center Freq 5.015000000 GHz
-20.0					5.015000000 GHZ
-30.0				-24.80 dBm	
-40.0	<mark>43</mark>		▲ 5	_∧2	Start Freq
-50.0		ومعاقد والدريب والمراجع			30.000000 MHz
-50.0	States of the second	an an ine anala in	and the track of the state of t	and the second state of th	
-70.0					Stop Freq
-80.0					10.00000000 GHz
-00.0					
Start 30 MHz				Stop 10.000 GHz	CF Step
#Res BW 1.0 MHz	#VBW 3.	0 MHz	Sweep 18.	67 ms (40001 pts)	997.000000 MHz Auto Man
MKR MODE TRC SCL X	11 09 GHz	Y FUNC 4.06 dBm	TION FUNCTION WIDTH	FUNCTION VALUE	Auto
2 N 1 f 9.4	.76 58 GHz →	16.03 dBm			
3 N 1 f 3.1 4 N 1 f 3.0	158 09 GHz -4 085 31 GHz -4	46.24 dBm 46.31 dBm			Freq Offset 0 Hz
		16.44 dBm		=	0 H2
7					
8					
10				×	
<		111		>	
MSG			STATUS		

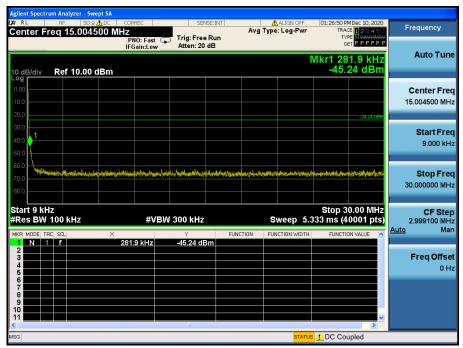


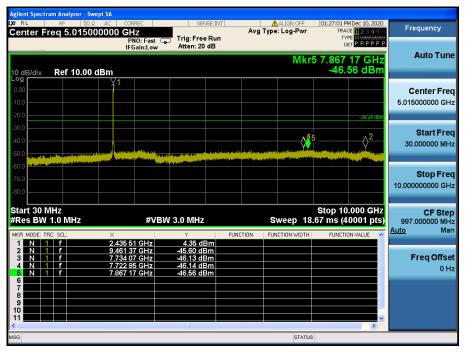


TM 2 & Middle

Reference







Agilent Spectrum Analyzer - Swept SA					
μχ/ RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN OFF	01:27:09 PMDec 10, 2020 TRACE 1 2 3 4 5 6	Frequency
Center Freq 17.5000000	PNO: East	ig: Free Run	Avg Type. Log-Fwi		
	IFGain:Low A	tten: 20 dB			Auto Tune
			Mkr3 2	4.556 750 GHz	Auto Tune
10 dB/div Ref 10.00 dBm				-35.77 dBm	
Log					0
					Center Freq
-10.0					17.50000000 GHz
-20.0				-24.24 dHm	
-30.0					Start Freq
-40.0		والمتحديد والمتحدين والمتحدي	a la secolar de la secolar	And the second	10.000000000 GHz
-50.0 Minutedation and an alter designed		and the second s		Charles and the second s	10.00000000000000
-70.0					Stop Freq
					25.00000000 GHz
-80.0					
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
MKRI MODEL TRCI SCLI X		Y FUNCT	TION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 23.84	4 625 GHz -3	4.86 dBm		TONORION MEDE	
2 N 1 f 23.86 3 N 1 f 24.55	4 500 GHz -3 6 750 GHz -3	5.10 dBm 5.77 dBm			Freq Offset
4 24.35					0 Hz
5				Ξ.	0 H2
6					
8					
9					
11				~	
		10		>	
MSG			STATUS		

TM 2 & Highest

Reference



High Band-edge



	Analyzer - Swept SA RF 50 Ω A DC		SENSE:I	NT	ALIGN OFF	01:30:41 PM Dec 10, 2020	
	q 15.004500		Trig: Free Ru	Avg	Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE M WWWWWW DET P P P P P	Frequency
		IFGain:Low	Atten: 20 dB			Vkr1 289.4 kHz -43.55 dBm	Auto Tune
10 dB/div F 0.00	Ref 10.00 dBm					-23.54 dBm	Center Fre 15.004500 MH
-30.0 -40.0 -50.0							Start Fred 9.000 kH
60.0 70.0 80.0	n Hertmantin karts utteran	fing & Reyland fin slavna fiftures	anajnesinya na kata na kata ana kata a	ahinin tukin alan kati	orienterrendeterrenteretende	jaranipalan Kilika nayaasi wayaa bu	Stop Fre 30.000000 MH
Start 9 kHz Res BW 10			W 300 kHz	FUNCTION	Sweep 5.3	Stop 30.00 MHz 333 ms (40001 pts)	CF Ste 2.999100 MH Auto Ma
1 N 1 2 3 4 5		289.4 kHz	-43.55 dBm	FUNCTION	FUNCTION WIDTH		Freq Offso 0 ⊦
6							
11			III			~	
G						DC Coupled	

	um Analyzer - S								
Center F		Ω AC CORREC			Avg Type	ALIGN OFF : Log-Pwr	TRAC	MDec 10, 2020 E 1 2 3 4 5 6	Frequency
		PNO: IFGain	Fast 🖵 Trig: Fre Low Atten: 20				TYI DI		
	_					Mkr		96 GHz 71 dBm	Auto Tune
10 dB/div Log	Ref 10.00	dBm 1					-40.	/ T UBIII	
0.00									Center Freq
-10.0									5.015000000 GHz
-20.0								-23.84 dBm	
-30.0						۸4 ۸	о <u>г</u>		Start Freq
-40.0						$-\diamond^{-}\diamond$	3 5		30.000000 MHz
and and a second se	nangen pppersonspiller Andres samtifier		And the second s	a maalaan yaalaa ya boo				And the second	
00.0									Stop Freq
-70.0									10.00000000 GHz
-80.0									
Start 30 N					_		Stop 10	.000 GHz	CF Step
#Res BW	1.0 MHz		#VBW 3.0 MHz		S	weep 18	.67 ms (4	0001 pts)	997.000000 MHz Auto Man
MKR MODE TH		× 2.460 44 G	۲ Hz 5.65 d	FUNCTIO	ON FUN	CTION WIDTH	FUNCTIO	IN VALUE	Auto Mari
2 N 1	f	8.331 77 G	Hz -45.95 d	Bm					Eron Offect
3 N 1 4 N 1	f	7.913 28 G 7.362 44 G	Hz -46.58 d	Bm					Freq Offset 0 Hz
5 N 1	f	8.269 96 G	Hz -46.71 d	Bm				Ξ	0112
7 8									
9									
10								~	
<			III			0745-15			
MSG						STATUS			



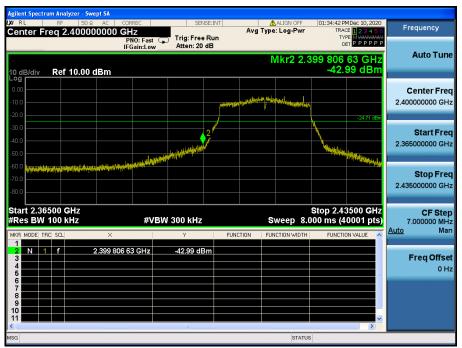


TM 3 & Lowest

Reference



Low Band-edge



	ept SA	OFNOT J			01-01-10 PMP 10, 000	
X/RL RF 50 ຊ. Center Freq 15.0045		SENSE:I	Avg	ALIGN OFF	01:34:49 PM Dec 10, 202 TRACE 1 2 3 4 5 TYPE MWWWW	6 Frequency
	IFGain:Low	Atten: 20 dB			^{DET} PPPPP Mkr1 281.9 kH -46.00 dBn	Auto Tune
10 dB/div Ref 10.00 c					-24.71 dB	Center Freq 15.004500 MHz
-30.0					24;/1 08	Start Freq 9.000 kHz
-60.0	and the second	a a la set la set a constante a	and that do not do not			
-70.0	land an growth of the day of holds and a			y land an linder a land an linder an lind	hija da se	
-80 0 Start 9 kHz #Res BW 100 kHz	#VE	300 kHz		Sweep 5.	Stop 30.00 MH 333 ms (40001 pts	30.000000 MH2 CF Step 2.999100 MH2
-80.0			FUNCTION		Stop 30.00 MH 333 ms (40001 pts	30.000000 MHz CF Step 2.999100 MHz Auto Man
Start 9 kHz #Res BW 100 kHz MKR MODE TRC SCL 1 N 2 3 4 5 6 7	#VE	BW 300 kHz		Sweep 5.	Stop 30.00 MH 333 ms (40001 pts	2.999100 MHz
Start 9 kHz #Res BW 100 kHz MRR MODE TRO SCL 1 N 2 3 4 5	#VE	BW 300 kHz		Sweep 5.	Stop 30.00 MH 333 ms (40001 pts FUNCTION VALUE	30.00000 MHz CF Step 2.999100 MHz Auto Man

Agilent Spectrum Analyzer - Swept SA					
	CORREC	SENSE:INT	ALIGN OFF	01:34:58 PMDec 10, 2020 TRACE 1 2 3 4 5 6	Frequency
Center Freq 5.015000000	PNO: Fast 😱	Trig: Free Run			
	IFGain:Low	Atten: 20 dB			Auto Tune
			Mkr	5 7.244 79 GHz -46.38 dBm	nato rano
10 dB/div Ref 10.00 dBm				-40.36 UBIII	
0.00					Center Freq
-10.0					5.015000000 GHz
-20.0					
-30.0				-24.71 dBm	
-40.0			▲ 5 ∧⁄ ¾	4	Start Freq
-50.0	new address of	the standard		litie liles in a statement of a tilter	30.000000 MHz
A Designed with the second	The second s		white and the second state of the second state	And a state of the	
-80.0					Stop Freq
-70.0					10.00000000 GHz
-80.0					
Start 30 MHz	I	I		Stop 10.000 GHz	CF Step
#Res BW 1.0 MHz	#VBW :	3.0 MHz	Sweep 18	.67 ms (40001 pts)	997.000000 MHz
MKR MODE TRC SCL X		Y F	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
	13 58 GHz	4.26 dBm			
2 N 1 F 7.1 3 N 1 F 7.8	09 89 GHz 30 78 GHz	-45.67 dBm -45.84 dBm			Freq Offset
	93 09 GHz 44 79 GHz	-46.15 dBm -46.38 dBm			0 Hz
6	44 79 612	40.06 UBIII			
7 8					
9					
10				~	
<		ш		>	
MSG			STATUS		

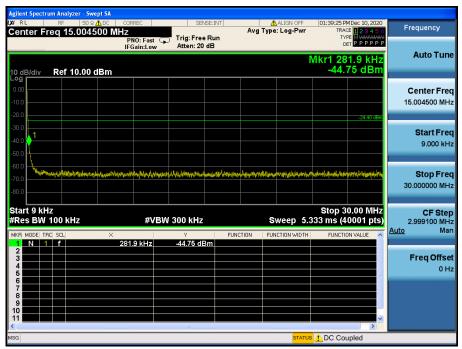




TM 3 & Middle

Reference







Agilent Spectrum Analyzer - Swept SA				
LX/ RL RF 50Ω AC CORREC Center Freq 17.500000000 GHz	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	01:39:44 PM Dec 10, 2020 TRACE 1 2 3 4 5 6	Frequency
PNO: Fast IFGain:Low	Trig: Free Run Atten: 20 dB	• •	TYPE MINAMANAN DET PPPPP	
IFGaintEow	Atten: 20 dB	ML-2 /		Auto Tune
10 dB/div Ref 10.00 dBm		IVIKIS 2	23.728 750 GHz -36.21 dBm	
0.00				Center Freq
-10.0				17.50000000 GHz
-20.0			-24,40 dBm	
-30.0				Start Freq
-40.0	and a standard in the state	and the second se		10.000000000 GHz
		and the constant of the second s		
-60.0				
-70.0				Stop Freq
-80.0				25.00000000 GHz
Start 10.000 GHz #Res BW 1.0 MHz #V	BW 3.0 MHz	Susan 40	Stop 25.000 GHz .00 ms (40001 pts)	CF Step
				1.500000000 GHz Auto Man
MKR MODE TRC SCL X 1 N 1 f 24.029 875 GHz	-34.30 dBm	NCTION FUNCTION WIDTH	FUNCTION VALUE	
2 N 1 f 24.556 375 GHz	-35.50 dBm			Ener Offerst
3 N 1 f 23.728 750 GHz	-36.21 dBm			Freq Offset 0 Hz
5			=	0 H2
7				
8				
10				
11	Ш		×	
MSG		STATUS	3	

TM 3 & Highest

Reference

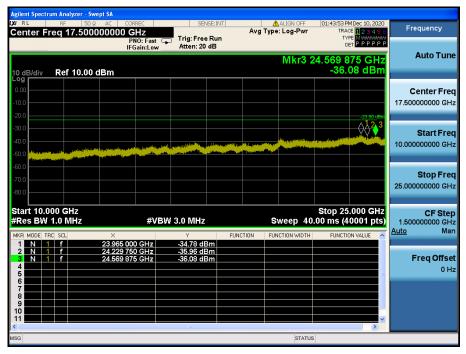


High Band-edge



	Analyzer - Swe		REC	SEN	BE:INT		ALIGN OFF	01:43:34 P	MDec 10, 2020	
Center Free		00 MHz	IO: Fast G		Run		e: Log-Pwr	TRAC	^{2E} 123456 РЕМ ИНИИНИИ ЕТРРРРР	Frequency
10 dB/div	Ref 10.00 c								4.7 kHz 16 dBm	Auto Tune
-10.0									-23:50 dBm	Center Fred 15.004500 MH;
-30.0										Start Free 9.000 kH;
-60.0 -70.0 -80.0	M.V.M.M.	rallesis provinsies	nderfordersjeders	Angele, et de la fage en fl	(troppedia)(bogite	نەردىرمەيدۇرىي بىرىرىرمەيدۇرىر	Apaphonnalainto	hantoristeinede.	n-angesernanskille	Stop Free 30.000000 MH:
Start 9 kHz #Res BW 10	00 kHz		#VB۱	№ 300 kHz		s	weep 5.3	Stop 3 33 ms (4	0.00 MHz 0001 pts)	CF Step 2.999100 MH Auto Mar
MKR MODE TRC		× 294.	7 kHz	ץ -45.16 dB		CTION FU	NCTION WIDTH	FUNCTIO	ON VALUE	<u>Auto</u> Ma
2 3 4 5										Freq Offse 0 H
6 7 8 9										
10 11				Ш					~	
ISG							STATUS	DC Cou	upled	

Agilent Spectrum Analyze					
Center Freq 5.0 ⁴	50 Ω AC CORREC	SENSE:INT	ALIGN OFF	01:43:45 PMDec 10, 2020 TRACE 1 2 3 4 5 6	Frequency
Center Freq 5.0	PNO: Fast IFGain:Low	Trig: Free Run Atten: 20 dB	ing type. Log i ki	TYPE MINIMUM	
10 dB/div Ref 10	0.00 dBm		Mkr	5 7.891 10 GHz -46.48 dBm	Auto Tune
-10.0 -20.0	¥1			-23.50 uBm	Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0					Start Freq 30.000000 MHz
-60.0 -70.0 -80.0					Stop Freq 10.00000000 GHz
Start 30 MHz #Res BW 1.0 MHz	z #VE	SW 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	× 2.463 43 GHz	Y FU 5.41 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	6.840 76 GHz 9.474 58 GHz 7.524 95 GHz 7.891 10 GHz	-46.06 dBm -46.30 dBm -46.43 dBm -46.43 dBm			Freq Offset 0 Hz
7 8 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10					
11 <		111		>	
MSG			STATUS		





8.5 Radiated spurious emissions

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

In any 100 kHz bandwidth outside the operating frequency band, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed.

• FCC Part 15.209(a) and (b)

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 - 0.490	2 400 / F (kHz)	300
0.490 – 1.705	24 000 / F (kHz)	30
1.705 – 30.000	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 MHz - 72 MHz, 76 MHz - 88 MHz, 174 MHz - 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 	ns are permitted in any of the frequency bands listed below:
---	--

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.414 25 ~ 8.414 75	108.00 ~ 121.94	1 300 ~ 1 427	4.50 ~ 5.15	14.47 ~ 14.50
0.495 ~ 0.505	12.290 ~ 12.293	123 ~ 138	1 435.0 ~ 1 626.5	5.35 ~ 5.46	15.35 ~ 16.20
2.173 5 ~ 2.190 5	12.519 75 ~ 12.520 25	149.9 ~ 150.05	1 645.5 ~ 1 646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.576 75 ~ 12.577 25	156.524 75 ~ 156.525 25	1 660 ~ 1 710	8.025 ~	22.01 ~ 23.12
4.177 25 ~ 4.177 75	13.36 ~ 13.41	156.7 ~ 156.9	1 718.8 ~ 1 722.2	8.500	23.6 ~ 24.0
4.207 25 ~ 4.207 75	16.420 ~ 16.423	162.012 5 ~ 167.170 0	2 200 ~ 2 300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	16.694 75 ~ 16.695 25	167.72 ~ 173.20	2 310 ~ 2 390	9.3 ~ 9.5	36.43 ~ 36.50
6.267 75 ~ 6.268 25	16.804 25 ~ 16.804 75	240 ~ 285	2 483.5 ~ 2 500.0	10.6 ~ 12.7	Above 38.6
6.311 75 ~ 6.312 25	25.50 ~ 25.67	322.0 ~ 335.4	2 655 ~ 2 900	13.25 ~ 13.4	
8.291 ~ 8.294	37.50 ~ 38.25	399.90 ~ 410.00	3 260 ~ 3 267		
8.362 ~ 8.366	73.0 ~ 74.6	608 ~ 614	3 332 ~ 3 339		
8.376 25 ~ 8.386 75	74.8 ~ 75.2	960 ~ 1 240	3 345.8 ~ 3 358.0		
			3 600 ~ 4 400		

• 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 1 000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 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 kHz – 150 kHz	200 Hz – 300 Hz
0.15 MHz – 30.00 MHz	9 kHz – 10 kHz
30 MHz – 1 000 MHz	100 kHz – 120 kHz
> 1 000 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.

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	1 Mbps	8.611	8.703	0.989 4	NA	
TM 2	6 Mbps	1.428	1.530	0.933 3	0.30	
TM 3	MCS 0	1.336	1.438	0.929 1	0.32	

Duty Cycle Correction factor

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

Note2: Please refer to the appendix II 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 + HL + AL – AG Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, HL = High pass filter Loss, AL = Attenuator Loss, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

- Information of Distance Correction 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)

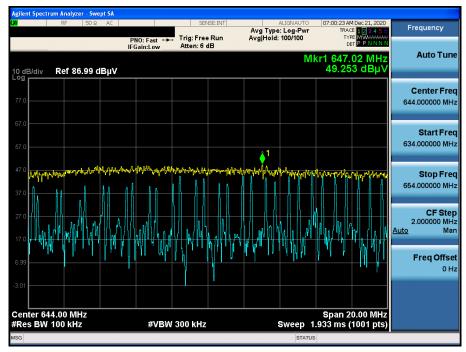
When distance factor is "N/A", the measurements were performed at the specified distance and distance factor is not applied.

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)
	58.13	V	Х	PK	42.60	-13.50	N/A	N/A	29.10	40.00	10.90
	207.51	Н	Х	PK	51.60	-14.50	N/A	N/A	37.10	43.50	6.40
Lowest	399.57	Н	Х	PK	47.00	-9.30	N/A	N/A	37.70	46.00	8.30
(Worst case)	647.02	V	Х	PK	49.25	-5.40	N/A	N/A	43.85	46.00	2.15
	680.87	V	Х	PK	46.40	-4.90	N/A	N/A	41.50	46.00	4.50
	826.36	Н	Х	PK	43.90	-1.90	N/A	N/A	42.00	46.00	4.00

Radiated Spurious Emissions data(9 kHz ~ 1 GHz) : TM 1

802.11b & 2 412 MHz & X axis & Ver

Detector Mode : PK





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)
	2 383.11	V	Х	PK	51.28	8.41	N/A	N/A	59.69	74.00	14.31
Lowoot	2 384.61	V	Х	AV	39.24	8.42	N/A	N/A	47.66	54.00	6.34
Lowest	4 824.36	V	Х	PK	49.19	1.78	N/A	N/A	50.97	74.00	23.03
	4 824.02	V	Х	AV	38.55	1.78	N/A	N/A	40.33	54.00	13.67
Middle	4 873.64	V	Х	PK	49.36	2.12	N/A	N/A	51.48	74.00	22.52
Midule	4 873.77	V	Х	AV	39.07	2.12	N/A	N/A	41.19	54.00	12.81
	2 497.47	V	Х	PK	50.03	9.26	N/A	N/A	59.29	74.00	14.71
Llighoot	2 496.56	V	Х	AV	39.21	9.25	N/A	N/A	48.46	54.00	5.54
Highest	4 923.64	V	Х	PK	48.97	2.44	N/A	N/A	51.41	74.00	22.59
	4 923.90	V	Х	AV	38.86	2.45	N/A	N/A	41.31	54.00	12.69

Radiated Spurious Emissions data(1 GHz ~ 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)
	2 388.87	V	Х	PK	50.42	8.45	N/A	N/A	58.87	74.00	15.13
Lowoot	2 389.41	V	Х	AV	39.42	8.46	0.30	N/A	48.18	54.00	5.82
Lowest	4 823.76	V	Х	PK	49.32	1.78	N/A	N/A	51.10	74.00	22.90
	4 824.27	V	Х	AV	38.57	1.78	0.30	N/A	40.65	54.00	13.35
Middle	4 874.18	V	Х	PK	49.49	2.13	N/A	N/A	51.62	74.00	22.38
wildule	4 874.05	V	Х	AV	38.89	2.12	0.30	N/A	41.31	54.00	12.69
	2 484.56	V	Х	PK	50.96	9.10	N/A	N/A	60.06	74.00	13.94
Llighoot	2 483.85	V	Х	AV	39.18	9.09	0.30	N/A	48.57	54.00	5.43
Highest	4 924.34	V	Х	PK	49.66	2.45	N/A	N/A	52.11	74.00	21.89
	4 923.53	V	Х	AV	38.78	2.44	0.30	N/A	41.52	54.00	12.48

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

Radiated Spurious Emissions data(1 GHz ~ 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)
	2 389.59	V	Х	PK	51.10	8.46	N/A	N/A	59.56	74.00	14.44
Lowoot	2 389.78	V	Х	AV	40.34	8.46	0.32	N/A	49.12	54.00	4.88
Lowest	4 824.18	V	Х	PK	49.28	1.78	N/A	N/A	51.06	74.00	22.94
	4 824.39	V	Х	AV	38.55	1.78	0.32	N/A	40.65	54.00	13.35
Middle	4 873.87	V	Х	PK	49.20	2.12	N/A	N/A	51.32	74.00	22.68
wildule	4 873.63	V	Х	AV	38.80	2.12	0.32	N/A	41.24	54.00	12.76
	2 483.79	V	Х	PK	48.85	9.09	N/A	N/A	57.94	74.00	16.06
Llighoot	2 483.81	V	Х	AV	39.50	9.09	0.32	N/A	48.91	54.00	5.09
Highest	4 924.44	V	Х	PK	48.75	2.45	N/A	N/A	51.20	74.00	22.80
	4 924.31	V	Х	AV	38.64	2.45	0.32	N/A	41.41	54.00	12.59

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 I	_imit (dBuV)
(MHz)	Quasi-Peak	Average
0.15 ~ 0.50	66 to 56 *	56 to 46 *
0.5 ~ 5.0	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

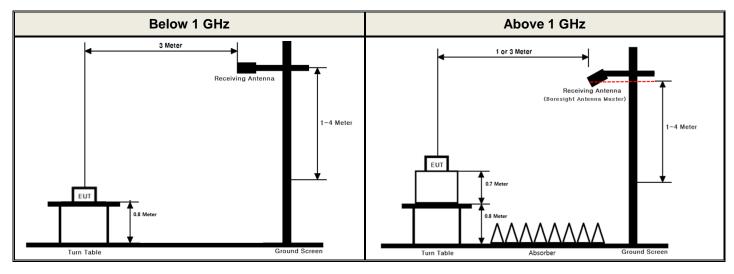
Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	20/06/24	21/06/24	US47360812
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48011700
Spectrum Analyzer	Aglient rechnologies	N9020A	20/12/16	21/12/16	WIT46011700
Spectrum Applyzer	Agilant Technologian	N9020A	19/12/16	20/12/16	MY50410357
Spectrum Analyzer	Agilent Technologies	N9020A	20/12/16	21/12/16	MT 504 10557
DC Power Supply	Agilent Technologies	66332A	20/06/24	21/06/24	US37473422
DC Power Supply	SM techno	SDP30-5D	20/06/24	21/06/24	305DMG305
Multimeter	FLUKE	17B	19/12/16	20/12/16	26030065WS
Multimeter	LOKE	170	20/12/16	21/12/16	20030003W3
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	Runue Schwarz	SIVIDV TOUR	20/12/16	21/12/16	200071
Signal Concretor	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Signal Generator	ANKIISU	WG3095C	20/12/16	21/12/16	175501
Thermehygrometer	PODYCOM	D 15470	19/12/18	20/12/18	100610.1
Thermohygrometer	BODYCOM	BJ5478	20/12/16	21/12/16	120612-1
The sum of summers of a s	DODVCOM	D IC 470	19/12/18	20/12/18	400040.0
Thermohygrometer	BODYCOM	BJ5478	20/12/16	21/12/16	120612-2
Thermohygrometer	BODYCOM	BJ5478	20/07/01	21/07/01	N/A
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
Hybrid Antenna	Schwarzbeck	VULB9163	19/08/05	21/08/05	9163-572
Horn Antenna	ETS-Lindgren	3117	20/10/23	21/10/23	00143278
Horn Antenna	A.H.Systems Inc.	SAS-574	20/06/24	21/06/24	155
			19/12/16	20/12/16	4050007
PreAmplifier	tsj	MLA-0118-B01-40	20/12/16	21/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	20/06/24	21/06/24	16966-10728
			19/12/16	20/12/16	
PreAmplifier	H.P	8447D	20/12/16	21/12/16	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000- 15000-40SS	20/06/24	21/06/24	8
High Pass Filter	Wainwright Instruments	WHKX10-2838- 3300-18000-60SS	20/06/24	21/06/24	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	20/06/24	21/06/24	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	20/06/24	21/06/24	16012202
Attenuator	SRTechnology	F01-B0606-01	20/06/24	21/06/24	13092403
Attenuator	Aeroflex/Weinschel	56-3	20/06/24	21/06/24	Y2370
Attenuator	SMAJK	SMAJK-2-3	20/06/24	21/06/24	2
Attenuator	SMAJK	SMAJK-50-10	20/06/24	21/06/24	15081903
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A MA2490A	20/06/24	21/06/24	1306007 1249001
EMI Test Receiver	ROHDE&SCHWARZ	ESR7	20/01/29	21/01/29	101061
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	DT&C	Cable	20/01/16	21/01/16	RF-82
Test Software	tsj	Radiated Emission Measurement	N/A	N/A	Version 2.00.0177

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.

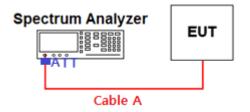
APPENDIX I

Test set up diagrams

Radiated Measurement



Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	9.44	15	10.42
1	9.49	20	10.78
2.412 & 2.437 & 2.462	9.69	25	11.05
5	9.80	-	-
10	9.97	-	-

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

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.)

Duty Cycle

Frequency Avg Type: Log-Pwr Center Freq 2.437000000 GHz Trig: Free Ru Atten: 30 dB ast 🖵 Nmmm Auto Tune ∆Mkr3 8.703 m 0.41 dl Ref 20.00 dBm X Center Fred 2 437000000 GHz Start Freq 2.437000000 GHz Stop Freq 2.437000000 GHz Center 2.437000000 GHz Res BW 8 MHz Span 0 Hz Sweep 44.00 ms (10001 pts) CF Step 8.000000 MHz #VBW 8.0 MHz Mar Auto 10.2 0.41 dB 10.26 dP Freq Offset (Δ) (Δ) 0 Hz STATUS

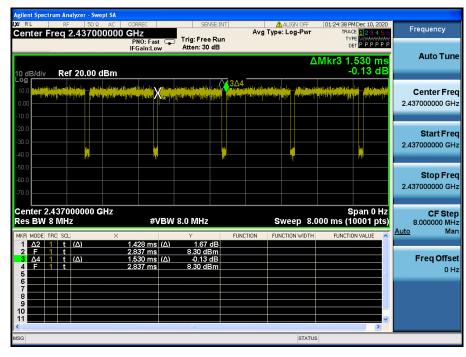
TM 1 & Middle

TDt&C

TM 2

& Middle

Duty Cycle



& Middle

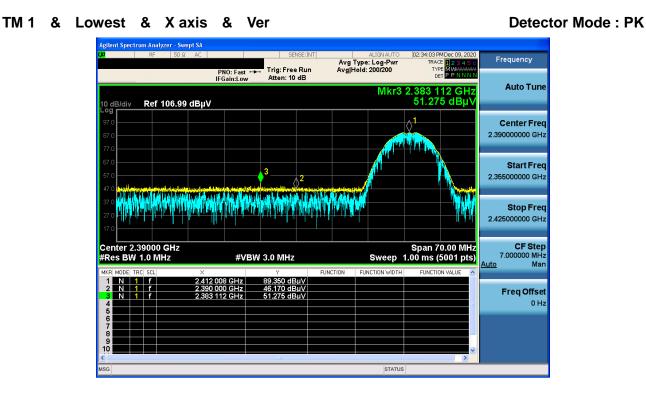
TM 3

n Analyzer ent SA 01:37:11 PM Dec 10, 202 TRACE 12 3 4 5 ZORL RF SUM ACCOUNT OF THE RUN Center Freq 2.437000000 GHz PN0: Fast C Trig: Free Run IFGain:Low Atten: 30 dB SENSE:INT ALIGN OFF Frequency TYPE WWWWWWW Auto Tune 1.438 ms -0.50 dB ∆Mkr3 Ref 20.00 dBm /div **Center Freq** 2.437000000 GHz Xa Start Freq 2.437000000 GHz Stop Freq 2.437000000 GHz Center 2.437000000 GHz Res BW 8 MHz Span 0 Hz Sweep 8.000 ms (10001 pts) CF Step 8.000000 MHz Man #VBW 8.0 MHz Auto FUNCTION 1 t (Δ) 1 t (Δ) 1 t (Δ) 1 t s (A) 10.53 dB Δ2 -1.5 **Freq Offset** (Δ) -0.50 dE -1.54 dBm 0 Hz STATUS

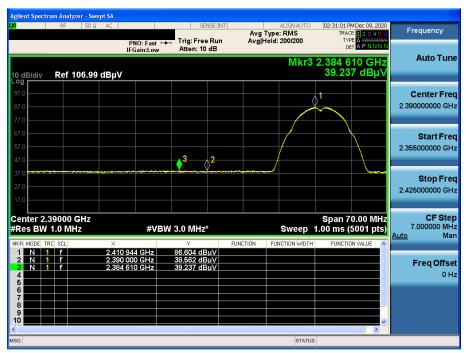
Duty Cycle

APPENDIX III

Unwanted Emissions (Radiated) Test Plot



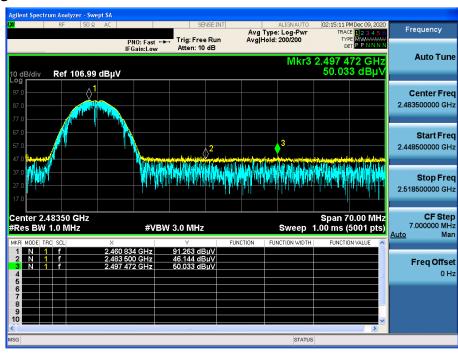
TM 1 & Lowest & X axis & Ver





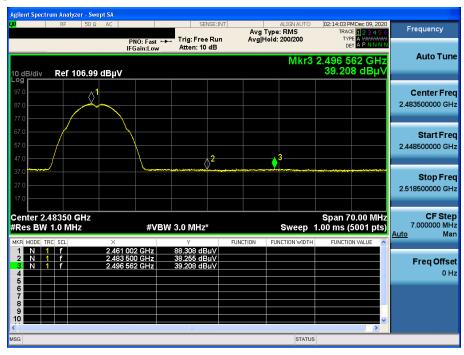
TM 1 & Highest & X axis & Ver





TM 1 & Highest & X axis & Ver

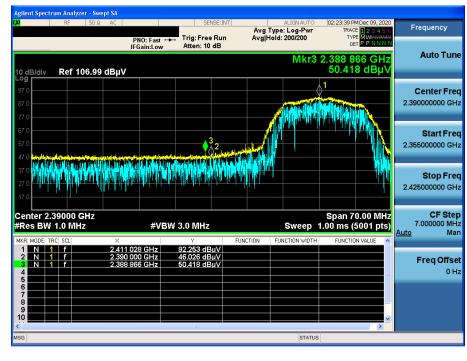
Detector Mode : AV





TM 2 & Lowest & X axis & Ver





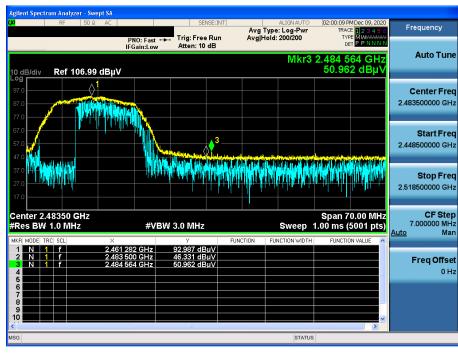
TM 2 & Lowest & X axis & Ver

m Analyzer - Swept S Frequency Avg Type: RMS Avg|Hold: 200/200 Trig: Free Run Atten: 10 dB TYPE DE1 PNO: Fast IFGain:Low A P N Auto Tune Mkr3 2.389 412 GH 39.420 dBµ Ref 106.99 dBµV **Center Freq** \Diamond^1 2.39000000 GHz Start Freq 2.355000000 GHz Stop Freq 2.425000000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 70.00 MHz 1.00 ms (5001 pts) CF Step 7.000000 MHz Man #Res #VBW 3.0 MHz* Sweep Auto FUNCTION FUNCTION 84.266 dBµ∖ 39.477 dBµ∖ 39.420 dBµ∖ Freq Offset 0 Hz STATUS



TM 2 & Highest & X axis & Ver





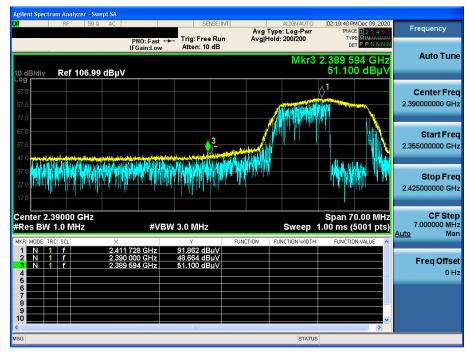
TM 2 & Highest & X axis & Ver





TM 3 & Lowest & X axis & Ver





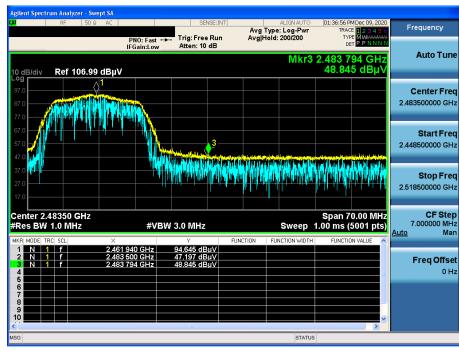
TM 3 & Lowest & X axis & Ver

n Analyzer -Swept S Frequency Avg Type: RMS Avg|Hold: 200/200 Trig: Free Run Atten: 10 dB TYPE DE1 PNO: Fast IFGain:Low A P N Auto Tune Mkr3 2.389 776 GH 40.339 dBµ Ref 106.99 dBµV **Center Freq** \Diamond^1 2.39000000 GHz Start Freq 2.355000000 GHz Stop Freq 2.425000000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 70.00 MHz 1.00 ms (5001 pts) CF Step 7.000000 MHz Man #VBW 3.0 MHz* Sweep Auto FUNCTION FUNCTION 84.355 dBµ∖ 39.309 dBµ∖ 40.339 dBµ∖ Freq Offset 0 Hz STATUS

Dt&C

TM 3 & Highest & X axis & Ver





TM 3 & Highest & X axis & Ver



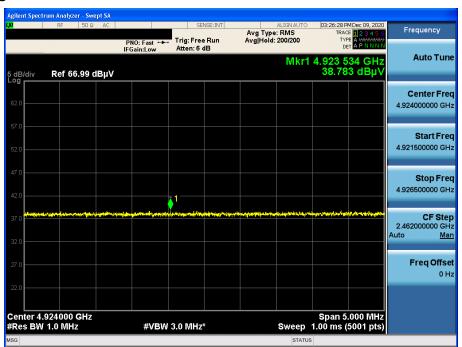


TM 1 & Highest & X axis & Ver





TM 2 & Highest & X axis & Ver





TM 3 & Highest & X axis & Ver

