TEST REPORT

DT	2 &	Co.,	Ltd.

DT&C Co., Ltd.					
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 No : DRTFCC2203-005	5				
2. Customer					
• Name (FCC) : MOTREX CO., LTD.					
• Address (FCC) : Seoyoung Bldg. 25 Gyeonggi-do, Sou		8beon-gil, Bundang-gu, Seongnam-si,			
3. Use of Report : FCC Original Gr	ant				
4. Product Name / Model Name : S FCC ID : BP9-MS400ASG2	MART DISPLAY /	MS400ASG2			
5. FCC Regulation(s): Part 15.247 Test Method used: KDB558074	001v05r02, ANSI (C63.10-2013			
6. Date of Test : 2022.01.25 ~ 2022	2.02.22				
7. Location of Test : 🛛 Permanen	t Testing Lab	On Site Testing			
8. Testing Environment : See appe	nded test report.				
9. Test Result : Refer to the attache	ed test result.				
The results shown in this test report re This test report is not related to KOLAS		e(s) tested unless otherwise stated.			
Tested by		Reviewed by			
Affirmation Name : SeungMin Gil	(Signaryre)	Name : JaeJin Lee			
	2022.03.	. 04 .			
	DT&C Co	, Ltd.			

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

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2203-0055	Mar, 04. 2022	Initial issue	SeungMin Gil	JaeJin Lee

Table of Contents

1. General Information	4
1.1. Description of EUT	4
1.2. Declaration by the applicant / manufacturer	
1.3. Testing Laboratory	
1.4. Testing Environment	
1.5. Measurement Uncertainty	5
1.6. Test Equipment List	
•••	
2. Test Methodology	
2.1. EUT Configuration	
2.2. EUT Exercise	
2.3. General Test Procedures	
2.4. Instrument Calibration	
2.5. Description of Test Modes	
3. Antenna Requirements	9
4. Summary of Test Result	10
5. Test Result	
5.1. Maximum Peak Conducted Output Power	. 11
5.1.1. Test Setup	. 11
5.1.2. Test Procedures	. 11
5.1.3. Test Results	. 11
5.2. 6 dB Bandwidth	. 13
5.2.1. Test Setup	. 13
5.2.2. Test Procedures	. 13
5.2.3. Test Results	. 13
5.3. Power Spectral Density	. 20
5.3.1. Test Setup	. 20
5.3.2. Test Procedures	
5.3.3. Test Results	
5.4. Unwanted Emissions (Conducted)	
5.4.1. Test Setup	
5.4.2. Test Procedures	
5.4.3. Test Results	. 28
5.5. Unwanted Emissions (Radiated)	
5.5.1. Test Setup	
5.5.2. Test Procedures	
5.5.3. Test Results	. 54
5.6. AC Power-Line Conducted Emissions	
5.6.1. Test Setup	
5.6.2. Test Procedures	
5.6.3. Test Results	
	00

1. General Information

1.1. Description of EUT

Equipment Class	Digital Transmission System (DTS)
Product Name	SMART DISPLAY
Model Name	MS400ASG2
Add Model Name	-
Firmware Version Identification Number	Rev 0.1
EUT Serial Number	No Specified
Power Supply	DC 12 V
Modulation Technique	• 802.11b: CCK, DSSS • 802.11g/n: OFDM
Antenna Specification	Antenna Type: PCB Pattern Antenna Gain: 4.84 dBi (PK)

Band	Mode	Tx. frequency(MHz)	Max. conducted power(dBm)
	802.11b	2 412 ~ 2 462	6.96
2.4 GHz	802.11g	2 412 ~ 2 462	13.69
	802.11n (HT20)	2 412 ~ 2 462	13.16

1.2. Declaration by the applicant / manufacturer

N/A

1.3. Testing Laboratory

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 Part 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

1.4. Testing Environment

Ambient Condition	
 Temperature 	+20 °C ~ +25 °C
 Relative Humidity 	+35 % ~ +45 %

1.5. Measurement Uncertainty

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

Parameter	Measurement uncertainty
Antenna-port conducted emission	1.0 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)	4.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (18 GHz Above)	5.3 dB (The confidence level is about 95 %, $k = 2$)

1.6. Test Equipment List

Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	21/06/24	22/06/24	MY50200867
Spectrum Analyzer	Agilent Technologies	N9020A	21/12/16	22/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	21/06/24	22/06/24	US47360812
DC Power Supply	Agilent Technologies	66332A	21/06/24	22/06/24	US37474125
DC Power Supply	SM techno	SDP30-5D	21/06/24	22/06/24	305DNF079
DC Power Supply	SM techno	SDP30-5D	21/06/24	22/06/24	305DMG305
Multimeter	FLUKE	17B+	21/12/16	22/12/16	36390701WS
Signal Generator	Rohde Schwarz	SMBV100A	21/12/16	22/12/16	255571
Signal Generator	ANRITSU	MG3695C	21/12/16	22/12/16	173501
Thermohygrometer	XIAOMI	MHO-C201	21/12/16	22/12/16	00089675
Thermohygrometer	BODYCOM	BJ5478	21/12/16	22/12/16	120612-2
Thermohygrometer	BODYCOM	BJ5478	21/06/24	22/06/24	N/A
Loop Antenna	ETS-Lindgren	6502	21/01/28	23/01/28	00226186
BILOG ANTENNA	Schwarzbeck	VULB 9160	21/12/16	22/12/16	3362
Horn Antenna	ETS-Lindgren	3117	21/06/24	22/06/24	00143278
PreAmplifier	tsj	MLA-0118-B01-40	21/12/16	22/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	21/06/24	22/06/24	16966-10728
PreAmplifier	H.P	8447D	21/12/16	22/12/16	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000- 15000-40SS	21/06/24	22/06/24	8
High Pass Filter	Wainwright Instruments	WHKX10-2838- 3300-18000-60SS	21/06/24	22/06/24	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	21/06/24	22/06/24	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	21/06/24	22/06/24	16012202
Attenuator	SRTechnology	F01-B0606-01	21/06/24	22/06/24	13092403
Attenuator	Aeroflex/Weinschel	56-3	21/06/24	22/06/24	Y2370
Attenuator	SMAJK	SMAJK-2-3	21/06/24	22/06/24	2
Attenuator	Aeroflex/Weinschel	86-10-11	21/06/24	22/06/24	408
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2490A	21/12/16	22/12/16	1338004 1249303
Cable	Junkosha	MWX241	22/01/04	23/01/04	mmW-1
Cable	Junkosha	MWX241	22/01/04	23/01/04	mmW-4
Cable	HUBER+SUHNER	SUCOFLEX100	22/01/04	23/01/04	M-01
Cable	HUBER+SUHNER	SUCOFLEX100	22/01/04	23/01/04	M-02
Cable	JUNFLON	MWX241	22/01/04	23/01/04	M-03
Cable	JUNFLON	MWX221	22/01/04	23/01/04	M-04
Cable	JUNFLON	MWX221	22/01/04	23/01/04	M-05
Cable	DTNC	Cable	22/01/04	23/01/04	M-06
Cable	JUNFLON	J12J101757-00	22/01/04	23/01/04	M-07
Cable	HUBER+SUHNER	SUCOFLEX106	22/01/04	23/01/04	M-08
Cable	HUBER+SUHNER	SUCOFLEX106	22/01/04	23/01/04	M-09
Cable	DT&C	Cable	22/01/04	23/01/04	RFC-45
Test Software	tsj	Radiated Emission Measurement	NA	NA	Version 2.00.0177

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.



2. 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.

2.1. EUT Configuration

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

2.2. EUT Exercise

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

2.3. General Test Procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the 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 as stated on section 12.1 of the KDB558074 D01v05r02.

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.

2.4. 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.

2.5. Description of Test Modes

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting.

Transmitting Configuration of EUT

Mode	Data rate
802.11b	1 Mbps ~ 11 Mbps
802.11g	6 Mbps ~ 54 Mbps
802.11n(HT20)	MCS 0 ~ MCS 7

EUT Operation test setup

- Test Software: Teraterm 4.105

Test Mode

Test mode	Worst case data rate	Tested Frequency (MHz)		
TM 1	802.11b 11 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

Note1: The worst case data rate was determined according to the power measurements.

Note2: The power measurement results for all modes and data rate were reported.

3. Antenna Requirements

According to Part 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 PCB by means of unique connector. Therefore this E.U.T complies with the requirement of Part 15.203

4. Summary of Test Result

			Condition	Note 1
15.247(a)	6 dB Bandwidth	> 500 kHz		С
15.247(b)	Maximum Peak Output Power	< 1 Watt		с
15.247(d)	Unwanted Emissions(Conducted)	20 dBc in any 100 kHz BW	Conducted	с
15.247(e)	Power Spectral Density	< 8 dBm / 3 kHz		с
15.247(d) 15.205 15.209	Unwanted Emissions(Radiated)	Part 15.209 limits (Refer to section 5.5)	Radiated	с
15.207	AC Power-Line Conducted Emissions	Part 15.207 limits (Refer to section 5.6)	AC Line Conducted	NA Note 3
15.203	Antenna Requirements	Part 15.203 (Refer to section 3)	-	с

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



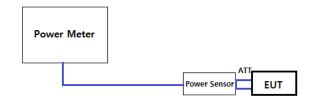
5. Test Result

5.1. Maximum Peak Conducted Output Power

Test Requirements and limit, Part 15.247(b)

The maximum permissible conducted output power is 1 Watt.

5.1.1. Test Setup



5.1.2. Test Procedures

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

RBW ≥ DTSPKPM1 Peak-reading power meter method

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

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.

5.1.3. Test Results

- Refer to the next page



	_		Maximum Peak Conducted Output Power (dBm)									
Mode	Freq. (MHz)	Det.				Data Rat	te (Mbps)					
	(, 	1	2	5.5	11	-	-	-	-		
	2 412	PK	6.52	6.53	6.23	6.59	-	-	-	-		
	2412	AV	3.38	3.41	3.51	3.48	-	-	-	-		
802.11b	2 437	PK	6.94	6.92	6.69	6.96	-	-	-	-		
002.110	2 437	AV	3.86	3.84	3.95	3.94	-	-	-	-		
	2.462	PK	5.95	5.91	5.68	5.98	-	-	-	-		
	2 462	AV	2.85	2.84	2.97	2.94	-	-	-	-		

	_	_	Maximum Peak Conducted Output Power (dBm)									
Mode	Freq. (MHz)	Det.		Data Rate (Mbps)								
	(11112)	12)	6	9	12	18	24	36	48	54		
	2 412	PK	13.69	13.57	12.80	11.28	11.73	12.03	11.51	11.24		
	2412	AV	3.46	3.40	3.38	2.98	2.93	2.99	3.14	3.16		
902 11a	2 437	PK	13.16	13.08	12.89	12.68	12.32	11.98	11.65	10.94		
802.11g	2 431	AV	3.09	3.06	2.98	2.86	2.87	2.84	2.90	2.79		
	2 462	PK	13.13	12.98	12.78	12.54	12.45	11.98	11.76	11.51		
	2 402	AV	2.91	3.13	3.28	3.42	3.08	3.21	3.35	3.32		

	_			Maximum Peak Conducted Output Power (dBm)									
Mode	Freq. (MHz)	Det.		Data Rate (MCS)									
	(0	1	2	3	4	5	6	7			
	2 412	PK	13.16	12.84	12.82	12.78	12.56	12.43	12.23	11.85			
	2412	AV	3.59	3.40	3.55	3.26	3.36	3.41	3.38	3.24			
802.11n	2 437	PK	12.97	12.84	12.72	12.68	12.46	12.32	12.08	11.86			
(HT20)	2 437	AV	3.27	3.21	3.18	3.16	3.19	3.16	3.15	3.13			
	2 462	PK	12.83	12.76	12.71	12.68	12.56	12.48	12.37	12.21			
	2 402	AV	3.08	3.06	3.12	3.23	3.11	3.08	3.42	3.56			

5.2.6 dB Bandwidth

Test Requirements and limit, Part 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 EUT's antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6 dB bandwidth is 500 kHz.

5.2.1. Test Setup

Refer to the APPENDIX I.

5.2.2. Test Procedures

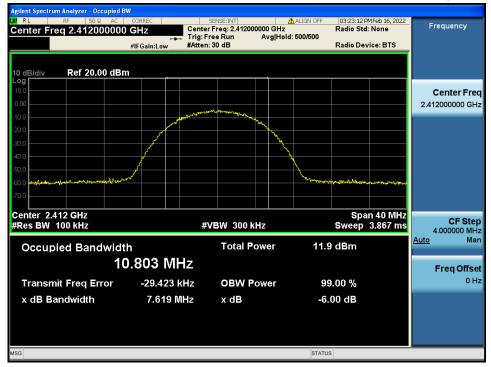
- KDB558074 D01v05r02 Section 8.2
- ANSI C63.10-2013 Section 11.8.2
- 1. Set resolution bandwidth (RBW) = 100 kHz
- 2. Set the video bandwidth (VBW) \ge 3 x RBW.
- 3. Detector = **Peak**.
- 4. Trace mode = **max hold**.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.
- 7. Option 1 Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

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

5.2.3. Test Results

Test Mode	Frequency	Test Results (MHz)
	2 412	7.62
TM 1	2 437	7.75
	2 462	7.29
	2 412	16.34
TM 2	2 437	16.35
	2 462	16.35
	2 412	17.56
TM 3	2 437	17.58
	2 462	16.94

TM 1 & 2412

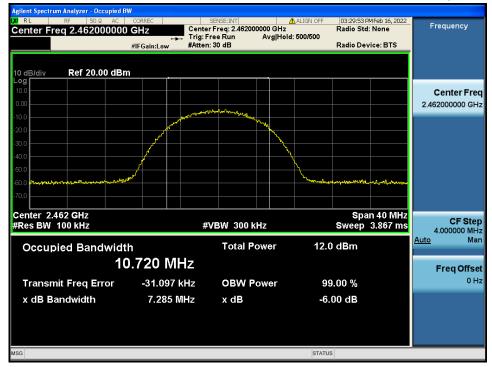


6 dB Bandwidth

TM 1 & 2437



TM 1 & 2462





6 dB Bandwidth

TM 2 & 2 437



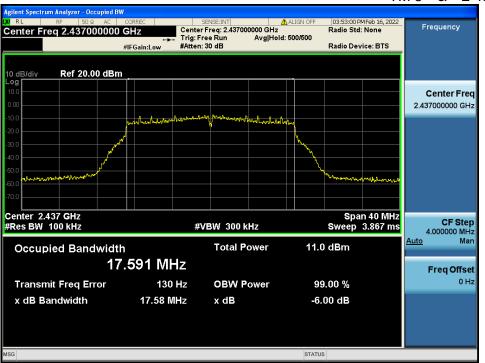


Dt&C



6 dB Bandwidth

TM 3 & 2 437





Test requirements and limit, Part 15.247(e)

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

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.

5.3.1. Test Setup

Refer to the APPENDIX I.

5.3.2. Test Procedures

- KDB558074 D01v05r02 Section 8.4
- ANSI C63.10-2013 Section 11.10.2

Method PKPSD (peak PSD)

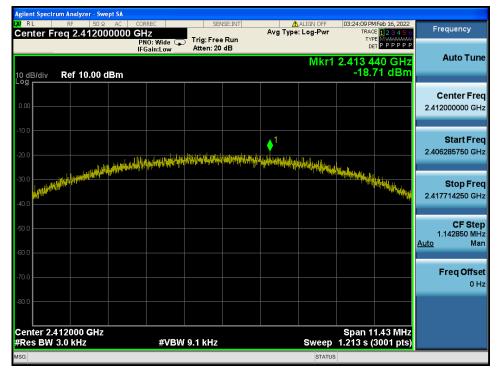
- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to **1.5 times** the DTS bandwidth.
- 3. Set the RBW : 3 kHz \leq RBW \leq 100 kHz.
- 4. Set the VBW \geq 3 x RBW.
- 5. Detector = **peak.**
- 6. Sweep time = **auto couple.**
- 7. Trace mode = max hold.
- 8. Allow 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.

5.3.3. Test Results

Test Mode	Test Mode Frequency		PKPSD (dBm)	Limit (dBm / 3 kHz)	
	2 412	3 kHz	-18.71	8.00	
TM 1	2 437	3 kHz	-17.23	8.00	
	2 462	3 kHz	-18.71	8.00	
	2 412	3 kHz	-19.11	8.00	
TM 2	2 437	3 kHz	-19.32	8.00	
	2 462	3 kHz	-18.59	8.00	
	2 412	3 kHz	-19.44	8.00	
TM 3	2 437	3 kHz	-19.31	8.00	
	2 462	3 kHz	-18.41	8.00	

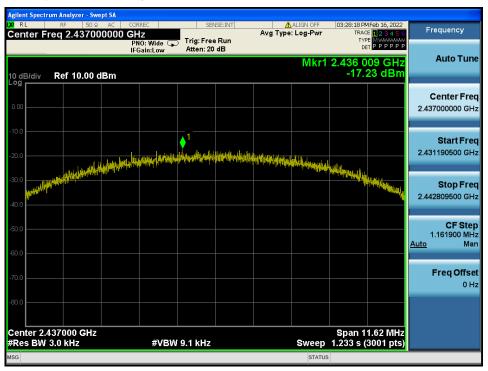


TM 1 & 2412

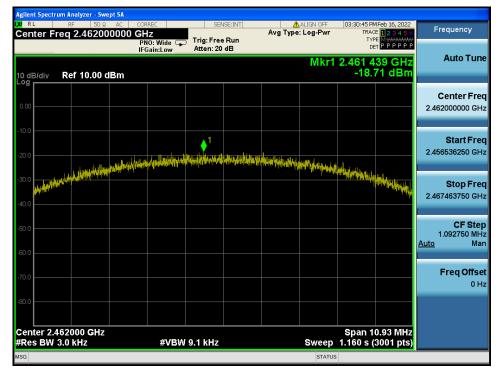


Power Spectral Density

TM 1 & 2437

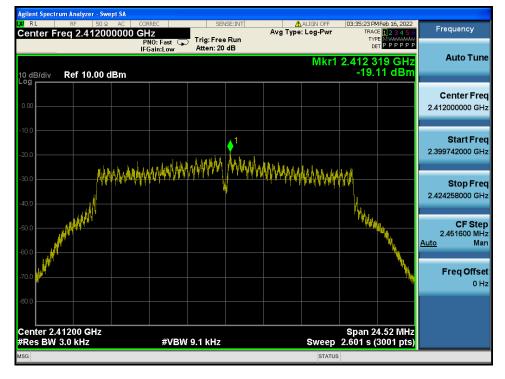


TM 1 & 2462



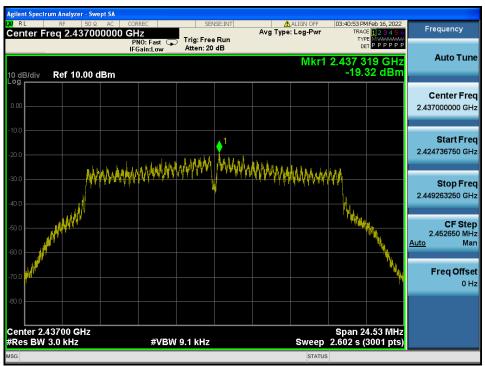


TM 2 & 2412



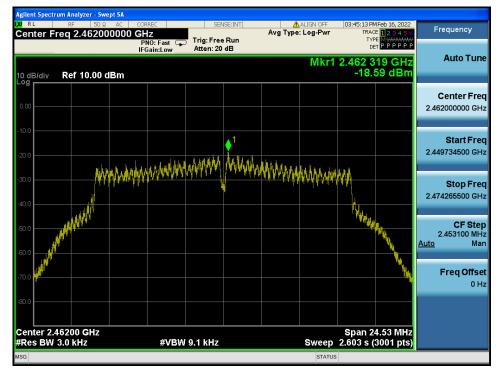
Power Spectral Density

TM 2 & 2437





TM 2 & 2462





TM 3 & 2412



Power Spectral Density

TM 3 & 2437

ON RL RF 50.2 AC CHART Center Freq 2.437000000 GHz PN0: Fast C IFGain:Low Feb 16, 2022 SENSE:INT ALIGN OFF Avg Type: Log-Pwr 03:56 Frequency Trig: Free Run Atten: 20 dB TYPE DET PPPPPF Auto Tune Mkr1 2.437 659 GHz -19.31 dBm 10 dB/div Ref 10.00 dBm Center Freq 2.437000000 GHz hannannin white have a start white the start w Start Freq 2.423813500 GHz Stop Freq 2.450186500 GHz <u>,</u>₩ W, CF Step 2.637300 MHz Man Auto Freq Offset 0 Hz Center 2.43700 GHz #Res BW 3.0 kHz Span 26.37 MHz Sweep 2.798 s (3001 pts) #VBW 9.1 kHz



TM 3 & 2462





5.4. Unwanted Emissions (Conducted)

Test requirements and limit, Part 15.247(d)

In any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions :

If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level. If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured inband average PSD level. In either case, attenuation to levels below the general emission limits specified in §15.209(a) is not required.

5.4.1. Test Setup

Refer to the APPENDIX I including path loss

5.4.2. Test Procedures

- 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

LIMIT LINE = 20 dB below of the reference 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 \geq 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 unwanted emission(conducted) was tested with below settings.

Frequency range	RBW	VBW	Detector	Trace	Sweep Point
9 kHz ~ 30 MHz	100 kHz	300 kHz			
30 MHz ~ 10 GHz	1 MHz	3 MHz	Peak	Max Hold	40 001
10 GHz ~ 25 GHz	1 MHz	3 MHz			

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

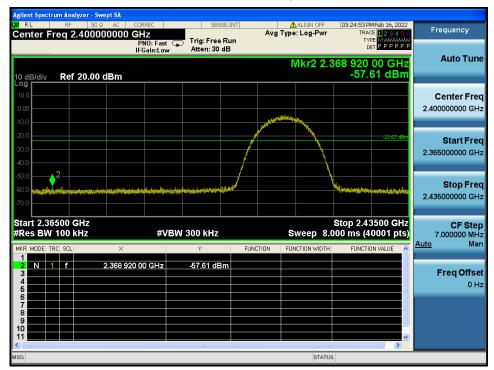
5.4.3. Test Results

TM 1 & 2412

nt Spectrum Analyzer - Swept SA ALIGN OFF 03:24 Frequency Center Freg 2.412000000 GHz Trig: Free Run Atten: 30 dB PNO: Wide 🖵 IFGain:Low Auto Tune Mkr1 2.412 522 GHz -3.67 dBm Ref 20.00 dBm 10 dB/div **Center Freq** 2.412000000 GHz **?** Start Freq 2.406285750 GHz N MAN Stop Freq 2.417714250 GHz **CF Step** 1.142850 MHz Man <u>Auto</u> Freq Offset 0 Hz Center 2.412000 GHz #Res BW 100 kHz Span 11.43 MHz Sweep 1.200 ms (3001 pts) #VBW 300 kHz STATUS

Reference

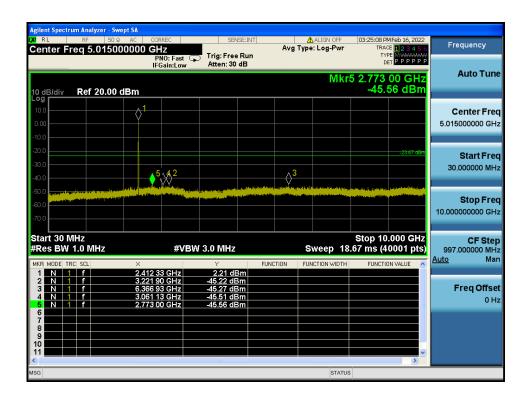
Low Band-edge





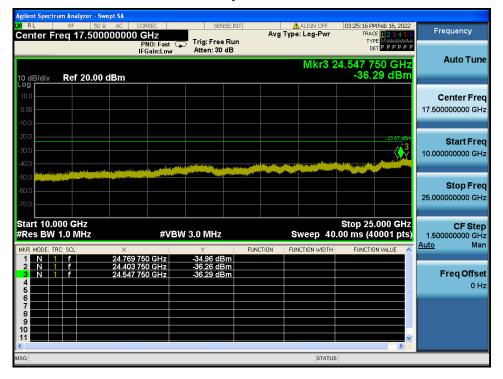
Conducted Spurious Emissions

LXI RL	n Analyzer - Swep RF 50 Ω <u>A</u> ⊋q 15.00450	DC CORREC	SENSE	Av	▲ ALIGN OFF g Type: Log-Pwr	03:25:00 PMFeb 16, 2022 TRACE 1 2 3 4 5 (TYPE MWWWWW	Frequency
10 dB/div	Ref 20.00 dl	PNO: Fast IFGain:Low 3m				Mkr1 302.2 kHz -54.53 dBm	Auto Tune
10.0 0.00							Center Free 15.004500 MH
-20.0						-23:87 dBm	Start Free 9.000 kH
-50.0 -50.0	udien franziska station	alijstaa daa mada sere ti seli sedan aa da sa da s	ingtothe Attack in the original sector	uter differentering de aniel ter	Stabilium Pressent in themary	a performa de la desta de la competitiona de la competitiona de la competitiona de la competitiona de la compet	Stop Fre 30.000000 MH
Start 9 kHz #Res BW 1	00 KHZ	X	BW 300 kHz	FUNCTION	Sweep 5.	Stop 30.00 MHz 333 ms (40001 pts) FUNCTION VALUE	2.999100 MH Auto Ma
1 N 1 2 3 4 5 6		302.2 kHz	-54.53 dBn				Freq Offse 0 H
7 8 9 9 9 10 11 11 1 1 1 1 1 1 1 1 1 1 1 1						~	
ISG					STATUS	DC Coupled	





Conducted Spurious Emissions

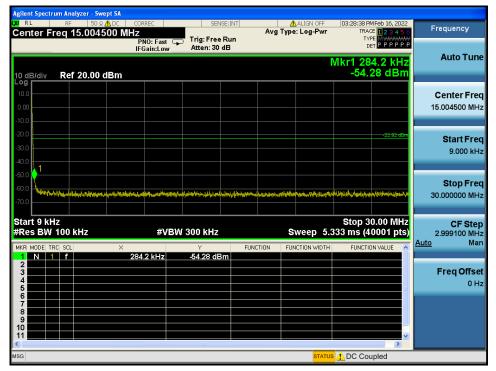


TM 1 & 2437

Reference



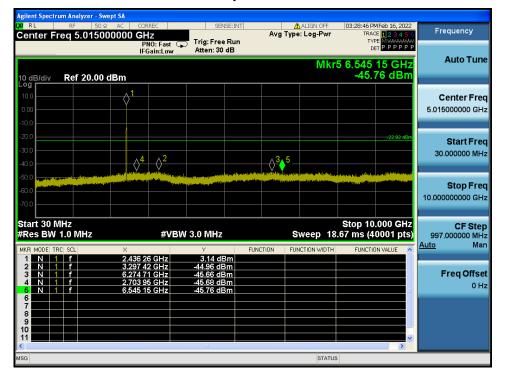
Conducted Spurious Emissions

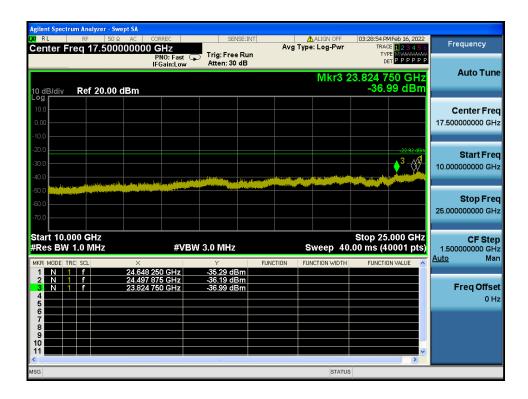


Pages: 31 / 67



Conducted Spurious Emissions



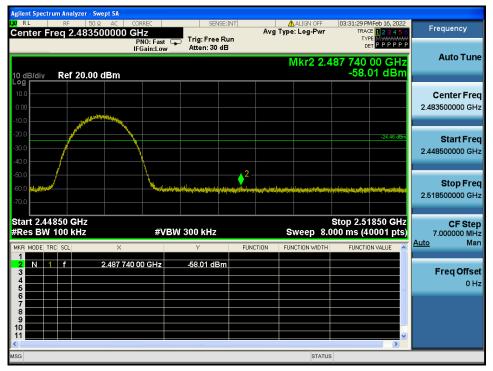


TM 1 & 2462

Reference



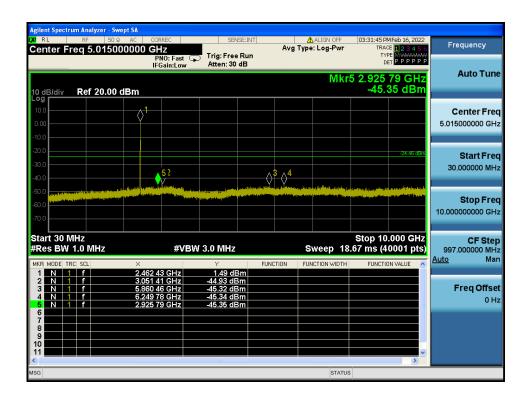
High Band-edge





Conducted Spurious Emissions

Ngilent Spectrum Analyzer - Sw X/ RL RF 50 ຊ	ept SA	SENSE:INT	ALIGN	N OFF 03:31:37 PM Feb 16, 2022	
Center Freq 15.004		Trig: Free Run	Avg Type: Log	-Pwr TRACE 12345 TYPE MWAAAAAA	Frequency
10 dB/div Ref 20.00	IFGain:Low	Atten: 30 dB		Mkr1 281.9 kHz -52.39 dBm	Auto Tune
Log 10.0 0.00 -10.0					Center Fre 15.004500 MH
-20.0				-24.45 dBr	Start Fred 9.000 kH
-50.0	of in the second se	ىر مەرىپەر بەر بەر بەر بەر بەر بەر بەر بەر بەر ب	anthy the independent of the second of the	Delayahlar Andripastal Alman New Joy (1915 and 1916 and	Stop Fre 30.000000 MH
Start 9 kHz FRes BW 100 kHz	#VE	300 kHz	Swee	Stop 30.00 MHz p 5.333 ms (40001 pts	2.999100 MH
1 N 1 f 2 1 1 3 3 3 3 3 4 5 5 6 6 7 9 9	281.9 kHz	-52.39 dBm			Freq Offse
8 9 10					



Agilent Spectrum An							
X/ RL RF	50 Q AC		SENSE:IN	Avg	ALIGN OFF Type: Log-Pwr	03:31:53 PMFeb 16, 2022 TRACE 123456	Frequency
		PNO: Fast G IFGain:Low	Trig: Free Run Atten: 30 dB	-		TYPE MWWWWW DET PPPPP	
10 dB/div Re	f 20.00 dBm				Mkr3 2	4.041 125 GHz -37.00 dBm	Auto Tune
10.0 0.00 -10.0							Center Fred 17.500000000 GHz
-20.0 -30.0 -40.0			a forestears i forest to a start of the			-24.45 dBm	Start Fred 10.000000000 GH;
50.0 14 14 14 14 14 14 14 14 14 14 14 14 14 1		نىڭلىك <u>ئەلماتە مەرىپى ، مەرمى</u>					Stop Fred 25.000000000 GH
Start 10.000 0 #Res BW 1.0		#VBV	V 3.0 MHz		Sweep 40	Stop 25.000 GHz .00 ms (40001 pts)	CF Step 1.500000000 GH: Auto Mar
MKR MODE TRC SCL 1 N 1 f 2 N 1 f	24.60 23.87	7 375 GHz 7 250 GHz	Y -35.95 dBm -36.28 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
3 N 1 f 4 5	24.04	125 GHz	-37.00 dBm			=	Freq Offse 0 Ha
6 7 8 9 10							
11			ш			>	
ISG					STATUS		

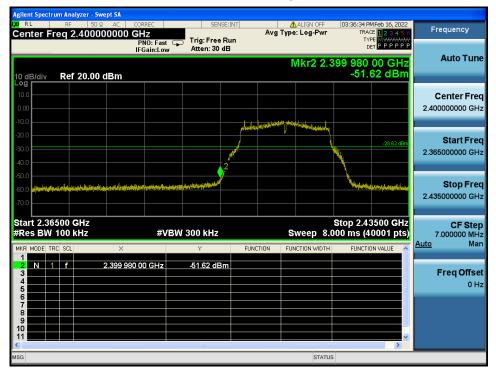
Conducted Spurious Emissions

TM 2 & 2412

Reference

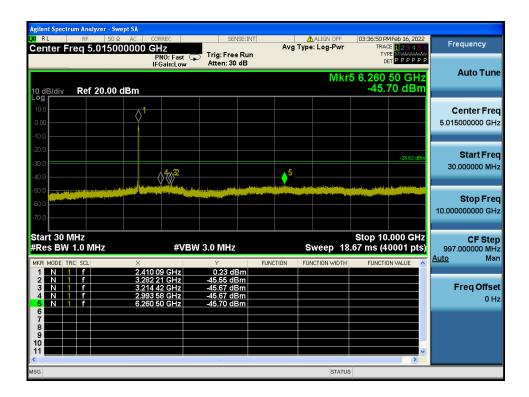


Low Band-edge

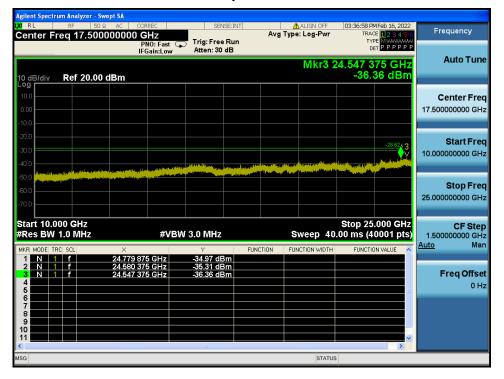




Agilent Spectrum Analy	zer - Swept SA 50 Ω ⚠ DC CORR		E:INT	ALIGN OFF	03:36:41 PMFeb 16, 2	022
Center Freq 15	.004500 MHz	D: Fast 🕞 Trig: Free I	Avg Typ	e: Log-Pwr	TRACE 1234 TYPE MWWW	56 Frequency
10 dB/div Ref 2		Atten: 30 c		ſ	Det P P P F Vikr1 313.4 ki -54.54 dE	Auto Tune
10.0						Center Fred 15.004500 MH
-20.0					-28.62	GBm Start Free 9.000 kH:
-50.0	nellarsisticta daga segun trijinin befor tir elje	a fa da sa ang sa an	ะาทศิปปัตรรณะ _{เคร} าร์เป็นสีรถุมรู้หรือเป็นที่ได้เป	Leterleystell-sectors	ndatus shidu shiribi yaqoog dalarayingi	Stop Free 30.000000 MH
Start 9 kHz #Res BW 100 kl MKR MODE TRC SCL	Hz	#VBW 300 kHz		Sweep 5.3	Stop 30.00 M 333 ms (40001 p FUNCTION VALUE	HZ ts) Auto Ma
1 N 1 f 2 3 4 5 6 9	313.4	i kHz -54.54 dBi				Freq Offse
7 8 9 10 11						×



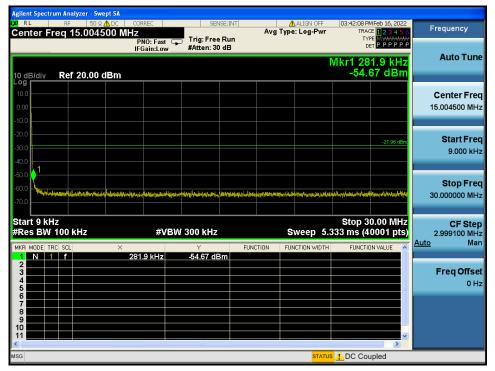




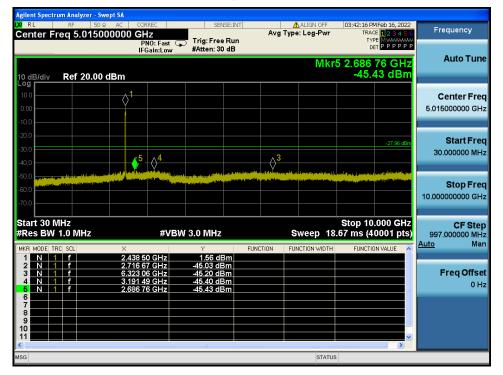
TM 2 & 2437

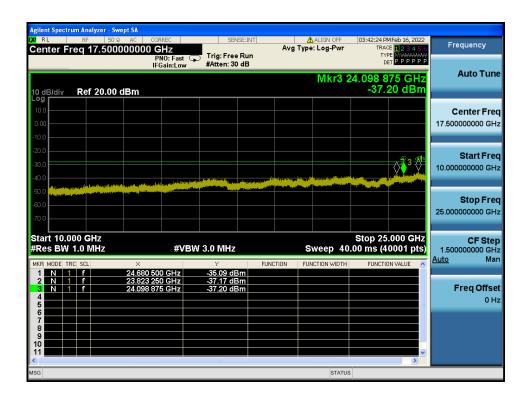
Reference











TM 2 & 2462

Reference

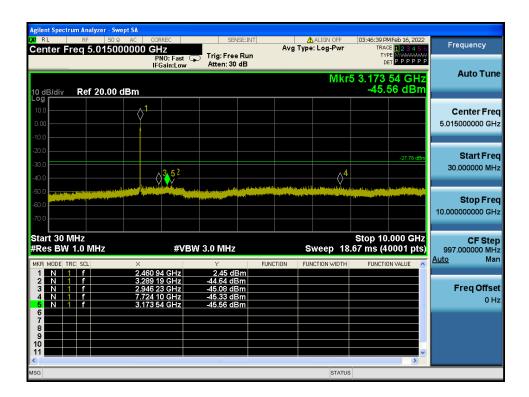


High Band-edge

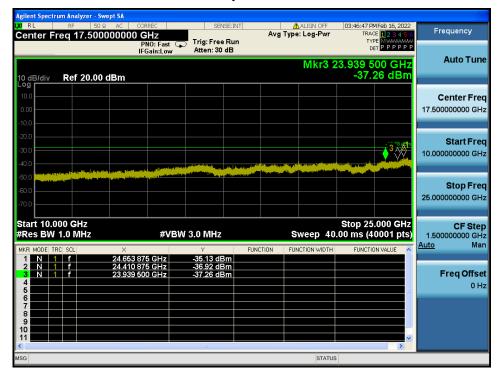




Agilent Spectrum Analyzer - Swe W RL RF 50 Ω2 Center Freq 15.0045	dc correc	SENSE:IN	Avg Ty	ALIGN OFF	03:46:31 PM Feb 16, 2022 TRACE 1 2 3 4 5 6 TYPE MV444444	Frequency
10 dB/div Ref 20.00 c	PNO: Fast C IFGain:Low	➡ Trig: Free Run Atten: 30 dB			Mkr1 308.9 kHz -54.70 dBm	Auto Tune
10.0 0.00 -10.0						Center Freq 15.004500 MHz
-20.0					-27.78 dBm	Start Freq 9.000 kHz
-50.0	ng by the film of the second	45.4° - 18° - 18° - 14°	a figt angen an an an an the second	\$ \$	sentellutsaapellessperietsaattadpusse	Stop Free 30.000000 MHz
Start 9 kHz #Res BW 100 kHz	#VB	W 300 kHz -54.70 dBm		Sweep 5.3	Stop 30.00 MHz 333 ms (40001 pts) FUNCTION VALUE	CF Step 2.999100 MH; Auto Mar
	308.9 KHZ	-54.70 dBm				Freq Offset 0 Hz
7 8 9 10 11 11					~	
ISG				STATUS	DC Coupled	

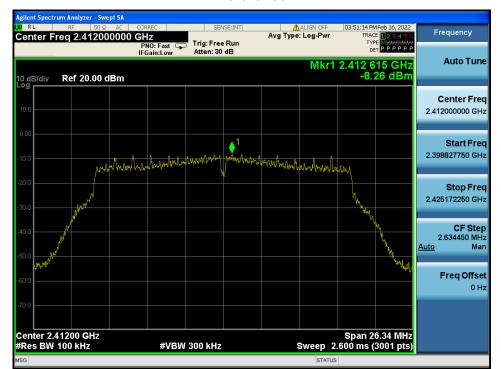






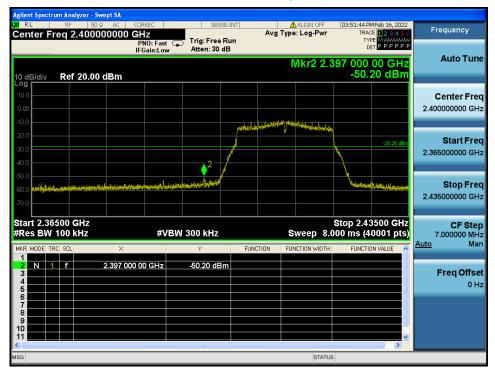
Dt&C

TM 3 & 2412



Reference

Low Band-edge





LXI RL	n Analyzer - Swe RF 50 Q 2 29 15.0045	DC CORREC	SENSE	Avg	ALIGN OFF	03:51:51 PMFeb 16, 20 TRACE 1 2 3 4 5 TYPE MMMMM	Frequency
10 dB/div	Ref 20.00 d	PNO: Fast IFGain:Low				^{рет} РРРР Mkr1 287.9 kH -54.74 dBr	Auto Tune
10.0 0.00							Center Fred 15.004500 MHz
-20.0						-28.26 dl	Start Free 9.000 kH:
-50.0 1 -60.0 -70.0	enellin ann an dahar	alers/Mailufiefighterrefit/thighterref	a state the state and a state of the state	any particular and a second	deligene congré de la Politique de Las Au	เขาใสสารระจะโอรูลาสุโฟฟอร์ ซูโอรูลส์ฟรากูลส์จะไป	Stop Free 30.000000 MH
Start 9 kHz #Res BW 1	00 kHz	X	BW 300 kHz Y	FUNCTION	Sweep 5.3	Stop 30.00 MH 333 ms (40001 pt FUNCTION VALUE	IZ CF Stej S) 2.999100 MH
1 N 1 2 3 4 5 6 9		287.9 kHz	-54.74 dBn				Freq Offse 0 H
7 8 9 10 11 <			Ш			>	<u>×</u>
ISG					STATUS	DC Coupled	

RL RF 50		SENSE:INT	\Lambda ALIGN OFF	03:52:00 PM Feb 16, 2022	Frequency
enter Freq 5.0150	1000000 GHz PNO: Fast C IEGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW DET PPPPP	Frequency
0 dB/div Ref 20.00		Hateli ov ub	Mkr	5 6.774 46 GHz -45.67 dBm	Auto Tun
	↓ ↓ ↓				Center Fre 5.015000000 GH
20.0				-28.26 dBm	Start Fre 30.000000 MH
50.0 Transform Top To Plant Top Top Top Top Top Top Top Top Top Top					Stop Fre 10.000000000 G⊦
tart 30 MHz Res BW 1.0 MHz	#VB	W 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Ste 997.000000 MH
IKR MODE TRC SCL	× 2.412 08 GHz	Y FL 1.35 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	6.375 66 GHz 5.503 53 GHz 3.182 51 GHz 6.774 46 GHz	-45.38 dBm -45.44 dBm -45.45 dBm -45.67 dBm			Freq Offse 0 H
6 6 7 8					
				v	

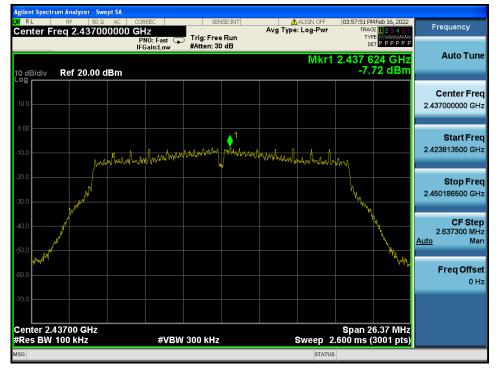


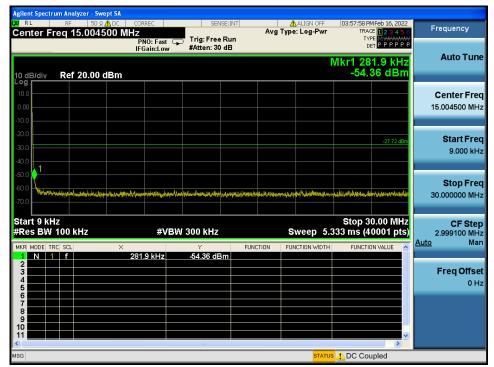




TM 3 & 2437

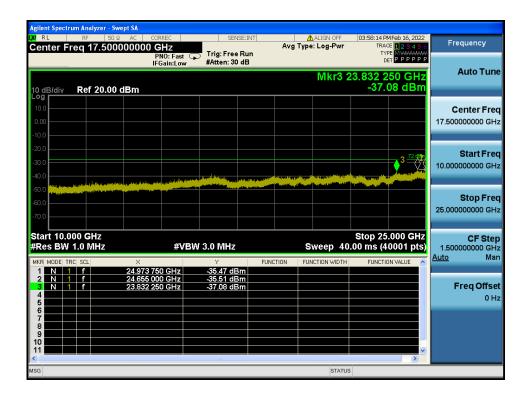
Reference







Agilent Spectrum Analyzer - Swept SA							
Center Freq 5.015000000	GHZ	SENSE:IN		ALIGN OFF	03:58:06 PMFe TRACE	123456	Frequency
	PNO: Fast IFGain:Low	Trig: Free Run #Atten: 30 dB			TYPE	MWWWWW PPPPPP	Auto Tune
10 dB/div Ref 20.00 dBm						dBm	
10.0							Center Freq 5.015000000 GHz
-20.0	3		\ ⁴	∮ 5		-27.72 dBm	Start Freq 30.000000 MHz
-50.0 -70.0		n an an Anna an Anna an Anna Anna Anna	And an Amerika Constant of State of Sta			n (a shi na shi ka shi na s	Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW	3.0 MHz			Stop 10.0 .67 ms (400	001 pts)	CF Step 997.000000 MHz Auto Man
2 N 1 f 2.33 3 N 1 f 3.04 4 N 1 f 6.7	34 76 GHz 96 88 GHz 51 66 GHz 48 78 GHz 45 54 GHz	1.03 dBm -44.75 dBm -44.93 dBm -45.28 dBm -45.58 dBm	FUNCTION FUN		FUNCTION		Freq Offset 0 Hz
MSG				STATUS		>	



🛈 Dt&C

TM 3 & 2462

Reference



High Band-edge

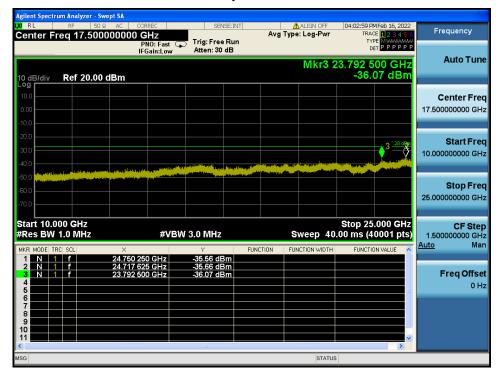




LXI RL		DC CORREC	SENSE:II		ALIGN OFF		1Feb 16, 2022	Frequency
Center F	req 15.004	500 MHZ PNO: Fast IFGain:Low	Trig: Free Ru Atten: 30 dB		ype: Log-Pwr	TYP	E 1 2 3 4 5 6 E M WWWWW T P P P P P P	
10 dB/div	Ref 20.00					//////// 53.4	2.7 kHz 17 dBm	Auto Tune
Log 10.0								Center Freq 15.004500 MHz
-20.0 -30.0 -40.0							-27.28 dBm	Start Freq 9.000 kHz
-50.0 -60.0 -70.0	a hering di Marina di	eyek láng fill fan der dir lei fan din gener dir be	sent for Adaptin Maril Marine States	hiye organize da fan hywing die	ร่ะเอาระเจาะรูประกะกระบระ	literes bitter a fratter by a	opentitionperiodicity	Stop Freq 30.000000 MHz
Start 9 kl #Res BW	100 kHz	#VE	8W 300 kHz	FUNCTION	Sweep 5.3	Stop 30 333 ms (4) FUNCTIO		CF Step 2.999100 MHz <u>Auto</u> Man
1 N 2 3 3 4 5 5	1 f	282.7 kHz	-53.47 dBm					Freq Offset 0 Hz
6 7 8 9 10 11								
MSG					STATUS	L DC Cou	pled	

Agilent Spectrum Analyzer - Sv (X) RL RF 50 S	vept SA 2 AC CORREC	SENSE:INT		ALIGN OFF	04:02:51 PM Feb 16, 2022	-
Center Freq 5.0150	00000 GHz PNO: Fast	Trig: Free Run		Type: Log-Pwr	TRACE 123456 TYPE MWAMAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	Frequency
10 dB/div Ref 20.00	IFGain:Low	Atten: 30 dB		Mkr	5 2.731 37 GHz -45.51 dBm	Auto Tune
10.0 0.00 -10.0						Center Fred 5.015000000 GHz
-20.0	5			4	-27.28 dBm	Start Free 30.000000 MH;
-50.0 -70.0						Stop Free 10.000000000 GH:
Start 30 MHz #Res BW 1.0 MHz	#VB	W 3.0 MHz		Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MH;
MKR MODE TRC SCL	× 2.463 43 GHz	ү 1.49 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mar
2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	2.798 67 GHz 9.711 87 GHz 7.242 30 GHz 2.731 37 GHz	-44.76 dBm -44.85 dBm -45.33 dBm -45.51 dBm				Freq Offset 0 Hz
6 7 8 9						
10		ш			×	
MSG				STATUS		







5.5. Unwanted Emissions (Radiated)

Test Requirements and limit,

Part 15.247(d), Part 15.205, Part 15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, 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 that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of Part 15.247 the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

- Part 15.209: General requirement

Frequency (MHz)	FCC Limit (uV/m)	Measurement Distance (m)
0.009 - 0.490	2 400 / F (kHz)	300
0.490 - 1.705	2 4000 / F (kHz)	30
1.705 – 30.0	30	30

Frequency (MHz)	FCC Limit (uV/m)	Measurement Distance (m)
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

**Except as provided in paragraph (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.

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.414 25 ~ 8.414 75	108 ~ 121.94	1 300 ~ 1 427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1 435 ~ 1 626.5	5.35 ~ 5.46	15.35 ~ 16.2
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 ~ 8.5	22.01 ~ 23.12
4.177 25 ~ 4.177 75	13.36 ~ 13.41	156.7 ~ 156.9	1 718.8 ~ 1 722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.207 25 ~ 4.207 75	16.42 ~ 16.423	162.012 5 ~ 167.17	2 200 ~ 2 300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.694 75 ~ 16.695 25	167.72 ~ 173.2	2 310 ~ 2 390	10.6 ~ 12.7	36.43 ~ 36.5
6.267 75 ~ 6.268 25	16.804 25 ~ 16.804 75	240 ~ 285	2 483.5 ~ 2 500	13.25 ~ 13.4	Above 38.6
6.311 75 ~ 6.312 25	25.5 ~ 25.67	322 ~ 335.4	2 655 ~ 2 900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3 260 ~ 3 267		
8.362 ~ 8.366	73 ~ 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		
			3 600 ~ 4 400		

- Part 15.205(a): Restricted band of operation

5.5.1. Test Setup

Refer to the APPENDIX I.

5.5.2. Test Procedures

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

Note: Measurement Instrument Setting for Radiated Emission Measurements.

- KDB558074 D01v05r02 Section 8.6
- ANSI C63.10-2013 Section 11.12

1. Frequency Range Below 1 GHz

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

2. Frequency Range > 1 GHz

Peak Measurement > 1 GHz

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

- 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.

20.19 09010 0											
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	11 Mbps	1.208	1.303	0.927 1	0.33						
TM 2	6 Mbps	2.064	2.166	0.952 9	0.21						
TM 3	MCS 0	1.920	2.023	0.949 1	0.23						

Duty Cycle Correction factor

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

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

5.5.3. Test Results

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. 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 correction 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.

3. Sample Calculation.

Margin = Limit – Result / Result = Reading + TF+ DCCF + DCF / TF = AF + CL + HL + AL – AG Where, TF = 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

Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin(dB)
	2 389.40	Н	Х	PK	51.06	4.46	N/A	N/A	55.52	74.00	18.48
	2 389.22	Н	Х	AV	39.53	4.46	0.33	N/A	44.32	54.00	9.68
2,412	4 824.85	Н	Х	PK	49.76	2.33	N/A	N/A	52.09	74.00	21.91
2 412	4 824.90	Н	Х	AV	39.56	2.33	0.33	N/A	42.22	54.00	11.78
	5 000.20	V	Х	PK	51.83	2.26	N/A	N/A	54.09	74.00	19.91
	5 000.11	V	Х	AV	43.36	2.26	N/A	N/A	45.62	54.00	8.38
	4 874.56	Н	Х	PK	50.07	2.18	N/A	N/A	52.25	74.00	21.75
2 437	4 874.01	Н	Х	AV	39.36	2.16	0.33	N/A	41.85	54.00	12.15
2 437	5 000.63	V	Х	PK	51.26	2.26	N/A	N/A	53.52	74.00	20.48
	5 000.06	V	Х	AV	41.78	2.26	N/A	N/A	44.04	54.00	9.96
	2 485.71	Н	Х	PK	50.31	5.43	N/A	N/A	55.74	74.00	18.26
	2 485.74	Н	Х	AV	39.28	5.43	0.33	N/A	45.04	54.00	8.96
2.462	4 924.32	Н	Х	PK	49.58	2.45	N/A	N/A	52.03	74.00	21.97
2 462	4 924.64	Н	Х	AV	39.33	2.45	0.33	N/A	42.11	54.00	11.89
	5 000.38	V	Х	PK	51.47	2.26	N/A	N/A	53.73	74.00	20.27
	5 000.04	V	Х	AV	41.83	2.26	N/A	N/A	44.09	54.00	9.91

Radiated Emissions data(9 kHz ~ 25 GHz) : TM 1



Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin(dB)
	2 389.57	V	Х	PK	50.43	4.46	N/A	N/A	54.89	74.00	19.11
	2 389.75	V	Х	AV	39.39	4.46	0.21	N/A	44.06	54.00	9.94
2.440	4 824.56	V	Х	PK	51.29	2.33	N/A	N/A	53.62	74.00	20.38
2 412	4 824.76	V	Х	AV	39.91	2.33	0.21	N/A	42.45	54.00	11.55
	5 000.08	V	Х	PK	51.18	2.26	N/A	N/A	53.44	74.00	20.56
	5 000.00	V	Х	AV	43.38	2.26	N/A	N/A	45.64	54.00	8.36
	4 874.03	V	Х	PK	50.06	2.16	N/A	N/A	52.22	74.00	21.78
0.407	4 873.71	V	Х	AV	39.60	2.16	0.21	N/A	41.97	54.00	12.03
2 437	5 000.54	V	Х	PK	51.99	2.26	N/A	N/A	54.25	74.00	19.75
	5 000.03	V	Х	AV	41.70	2.26	N/A	N/A	43.96	54.00	10.04
	2 485.19	V	Х	PK	50.44	5.42	N/A	N/A	55.86	74.00	18.14
	2 485.02	V	Х	AV	40.12	5.42	0.21	N/A	45.75	54.00	8.25
0.400	4 924.05	V	Х	PK	49.18	2.45	N/A	N/A	51.63	74.00	22.37
2 462	4 924.74	V	Х	AV	39.35	2.45	0.21	N/A	42.01	54.00	11.99
	5 000.24	V	Х	PK	51.80	2.26	N/A	N/A	54.06	74.00	19.94
	5 000.11	V	Х	AV	41.75	2.26	N/A	N/A	44.01	54.00	9.99

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

Tested Frequency (MHz)	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin(dB)
	2 389.70	V	Х	PK	50.69	4.46	N/A	N/A	55.15	74.00	18.85
	2 389.62	V	Х	AV	39.85	4.46	0.23	N/A	44.54	54.00	9.46
2 412	4 824.41	V	Х	PK	50.75	2.33	N/A	N/A	53.08	74.00	20.92
2412	4 824.84	V	Х	AV	39.66	2.33	0.23	N/A	42.22	54.00	11.78
	5 000.11	V	Х	PK	51.58	2.26	N/A	N/A	53.84	74.00	20.16
	5 000.04	V	Х	AV	43.44	2.26	N/A	N/A	45.70	54.00	8.30
0.407	4 873.77	V	Х	PK	50.98	2.16	N/A	N/A	53.14	74.00	20.86
	4 873.35	V	Х	AV	39.31	2.16	0.23	N/A	41.70	54.00	12.30
2 437	5 000.38	V	Х	PK	50.85	2.26	N/A	N/A	53.11	74.00	20.89
	5 000.08	V	Х	AV	41.81	2.26	N/A	N/A	44.07	54.00	9.93
	2 484.99	V	Х	PK	50.08	5.42	N/A	N/A	55.50	74.00	18.50
	2 484.55	V	Х	AV	39.59	5.41	0.23	N/A	45.23	54.00	8.77
2.462	4 923.96	V	Х	PK	49.61	2.45	N/A	N/A	52.06	74.00	21.94
2 462	4 924.18	V	Х	AV	39.16	2.45	0.23	N/A	41.84	54.00	12.16
	5 000.62	V	Х	PK	51.83	2.26	N/A	N/A	54.09	74.00	19.91
	5 000.22	V	Х	AV	41.72	2.26	N/A	N/A	43.98	54.00	10.02

5.6. AC Power-Line Conducted Emissions

Test Requirements and limit, Part 15.207

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 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.

	Conducted Limit (dBuV)				
Frequency Range (MHz)	Quasi-Peak	Average			
0.15 ~ 0.5	66 to 56 *	56 to 46 *			
0.5 ~ 5.0	56	46			
5 ~ 30	60	50			

* Decreases with the logarithm of the frequency

5.6.1. Test Setup

NA

5.6.2. Test Procedures

Conducted emissions from the EUT were measured according to the ANSI C63.10-2013.

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

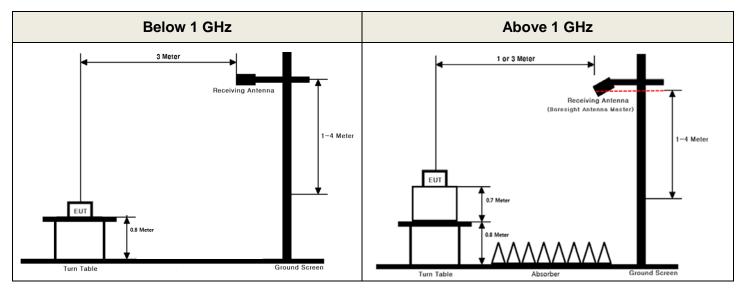
5.6.3. Test Results

NA

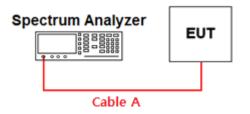
APPENDIX I

Test set up diagrams

Radiated Measurement



Conducted Measurement





APPENDIX II

Duty cycle plots

Test Procedures

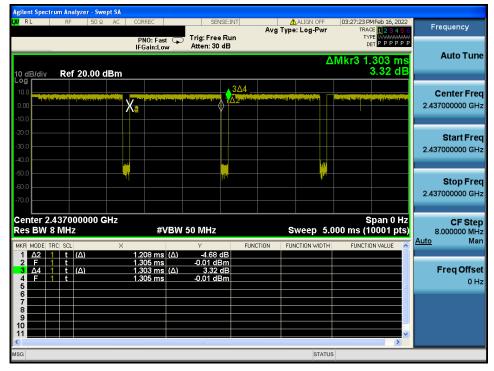
- KDB558074 D01v05r02 - Section 6

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 ≥ 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 zerospan method of measuring duty cycle shall not be used if $T \le 16.7$ microseconds.)

Duty Cycle

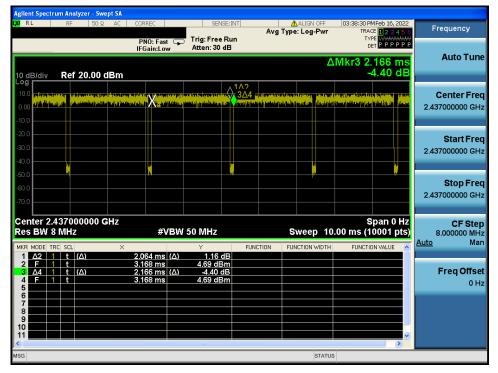
TM 1 2 437 MHz &





Duty Cycle

TM 2 & 2 437 MHz



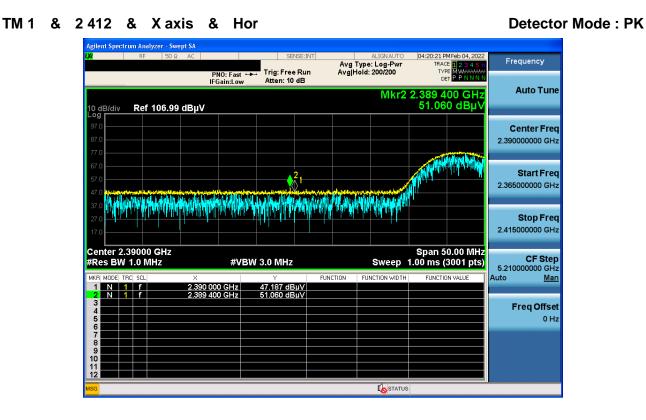
TM 3 & 2 437 MHz

Duty Cycle

	F 50Ω AC	CORREC	SENSE:INT	🛕 ALIGN OFF	03:54:08 PMFeb 16, 2022	
		PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr	TRACE 12345 TYPE WWWWWW DET PPPPP	+
0 dB/div Re	ef 20.00 dBm			Δ	Mkr3 2.023 ms 3.59 dB	
0 10.0 0.00 10.0	al val i se conservation especial de la conservation de la conservation de la conservation de la conservation d In 1911 : la conservation de la cons In 1911 : la conservation de la cons	linda operation og de her podana a Regio di altra segi for de la factoria				Center Fr 2.437000000 G
20.0						Start Fr 2.437000000 G
50.0 50.0 70.0				<mark>/</mark>	• •	Stop Fr 2.437000000 G
	000000 GHz	#VBW	50 MHz	Sweep 10	Span 0 Hz .00 ms (10001 pts	CF St 8.000000 M
tes BW 8 M⊦						Auto N
Res BW 8 MF MKR MODE TRC SC 1 Δ2 1 t 2 F 1 t	ι × (Δ)	1.920 ms (Δ) 4.842 ms 2.023 ms (Δ)	-1.06 dB 0.91 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> M
Les BW 8 MF MKR MODE TRC SC 1 Δ2 1 t 2 F 1 t	ι × (Δ)		-1.06 dB	JNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto N
Res BW 8 MH KR MODE TRC SC 1 Δ2 1 t 2 F 1 t 3 Δ4 1 t 4 F 1 t 5	ι × (Δ)	4.842 ms 2.023 ms (Δ)	-1.06 dB 0.91 dBm 3.59 dB	JNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto M Freq Offs

APPENDIX III

Unwanted Emissions (Radiated) Test Plot



TM 1 & 2412 & Xaxis & Hor





TM 1 & 2 462 & X axis & Hor

Detector Mode : PK

Frequency

Auto Tune

Center Freq 2.478500000 GHz

Aglent Spectrum Analyzer - Swept SA Od RF SO Q AC SENSE:INT ALIGNAUTO IO4:53:35 PMFeb 04, 202 PN0: Fast — Trig: Free Run Atten: 10 dB Avg Type: Log-Pvr Avg|Hold: 200/200 TrACE P00: Fast 0 dB/div Ref 106.99 dBµV Mkr2 2.485 707 GH: 50.311 dBµV 97.0 — — — — — — — — — — — — — — — …



ISTATUS

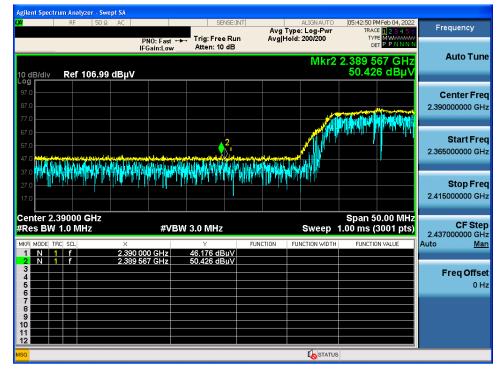
TM 1 & 2462 & Xaxis & Hor

Avg Type: RMS Avg|Hold: 200/200 Frequency Trig: Free Run Atten: 10 dB DET A P N PNO: Fast + IFGain:Low Auto Tune Mkr2 2.485 736 GHz 39.276 dBµV Ref 106.99 dBµV 10 dB/div Center Freq 2.478500000 GHz Start Freq 2.457000000 GHz ⊘¹ ♦² Stop Freq 2.50000000 GHz Stop 2.50000 GHz 1.00 ms (3001 pts) Start 2.45700 GHz #Res BW 1.0 MHz CF Step 5.21000000 GHz #VBW 3.0 MHz* Sweep FUNCTION FUNCTION Auto Man 2.483 500 GHz 2.485 736 GHz 38.823 dBµV 39.276 dBµV Ň **Freq Offset** 0 Hz



TM 2 & 2412 & X axis & Ver

Detector Mode : PK



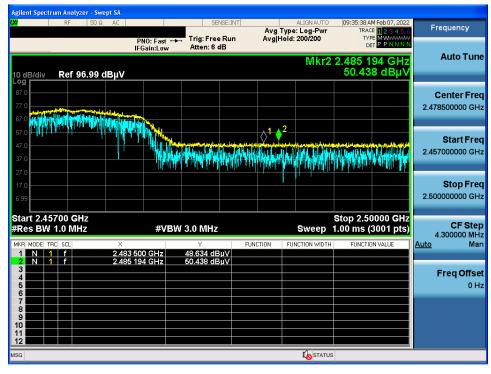
TM 2 & 2412 & Xaxis & Ver

Avg Type: RMS Avg|Hold: 200/200 Frequency Trig: Free Run Atten: 10 dB PNO: Fast + IFGain:Low A WW A P N DET Auto Tune Mkr2 2.389 750 GHz 39.386 dBµ∨ Ref 106.99 dBµV 10 dB/div Log Center Freq 2.390000000 GHz Start Freq 2.365000000 GHz Stop Freq 2.415000000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 50.00 MHz CF Step 2.437000000 GHz #VBW 3.0 MHz* Sweep 1.00 ms (3001 pts) FUNCTION WIDT FUNCTION Auto Man FUNCTION 2.390 000 GHz 2.389 750 GHz 39.249 dBµV 39.386 dBµV N **Freq Offset** 0 Hz

D

Detector Mode : PK

TM 2 & 2462 & X axis & Ver

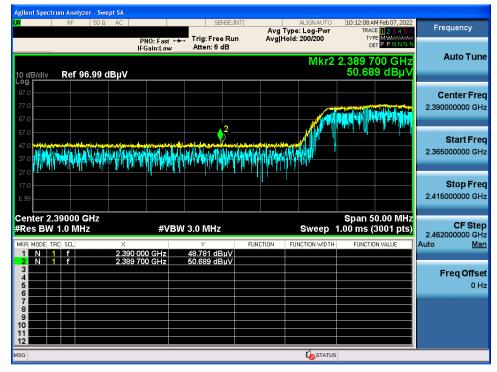


TM 2 & 2462 & X axis & Ver

vzer - Swent SA SENSE:INT UTO 09:37:17 AM Feb 07, Frequency Avg Type: RMS Avg|Hold: 200/200 TRACE 1 2 3 TYPE A WW DET A P N PNO: Fast +++ Trig: Free Run IFGain:Low Atten: 6 dB Auto Tune Mkr2 2.485 019 GHz 40.124 dBu 10 09 Ref 96.99 dBµV B/div **Center Freq** 2.478500000 GHz Start Freq ∂¹ ♦² 2.457000000 GHz Stop Freq 2.50000000 GHz Start 2.45700 GHz #Res BW 1.0 MHz Stop 2.50000 GHz 1.00 ms (3001 pts) CF Step 4.300000 MHz Man #VBW 3.0 MHz* Sweep FUNCTION Auto 2.483 500 GHz 2.485 019 GHz 39.251 dBµV 40.124 dBµV Freq Offset 0 Hz 11 12 **I**STATUS

Detector Mode : PK

TM 3 & 2 412 & X axis & Ver



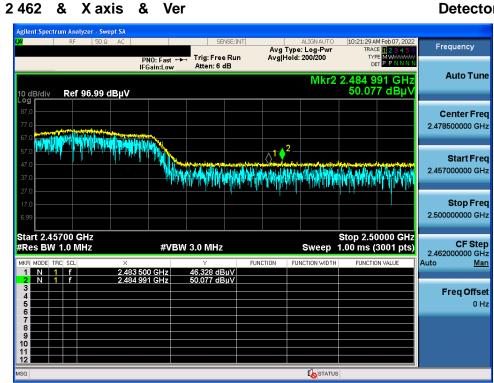
TM 3 & 2412 & Xaxis & Ver





TM 3 & 2462 & Xaxis

Detector Mode : PK



TM 3 & 2462 & Xaxis & Ver

Avg Type: RMS Avg|Hold: 200/200 Frequency Trig: Free Run Atten: 6 dB PNO: Fast ↔ IFGain:Low Auto Tune Mkr2 2.484 546 GHz 39.592 dBµ∨ Ref 96.99 dBµV 10 dB/div Log Center Freq 2.478500000 GHz Start Freq ¹² 2.457000000 GHz Stop Freq 2.50000000 GHz Stop 2.50000 GHz 1.00 ms (3001 pts) Start 2.45700 GHz #Res BW 1.0 MHz CF Step 2.46200000 GHz #VBW 3.0 MHz* Sweep FUNCTION FUNCTION Auto Man 2.483 500 GHz 2.484 546 GHz 39.183 dBµV 39.592 dBµV Ň **Freq Offset** 0 Hz

Detector Mode : AV

TM 1 & 2412 & Xaxis & Ver



TM 2 & 2412 & X axis & Ver



TM 3 & 2 412 & X axis & Ver

