

RADIO TEST REPORT

Product	:	Wi-Fi 6E BT M.2 Module
Model Name	:	WNFQ-268AXI(BT)
Series Model	:	WNFQ-268AX(BT)
FCC ID	:	RYK-WNFQ268AXBT
Test Regulation	:	FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date	:	2021/9/3
Test Date	:	2021/9/6 ~ 2021/11/10
Issued Date	:	2022/1/21
Applicant	:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan



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REVISION HISTORY

Original Test Report No.: 4790042400-US-R4-V0

Rev.	Test report No. 4790042400-US-R4-V0	Date	Page revised	Contents
Original	4790042400-US-R4-V0	2022/1/21	-	Initial issue
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1. Attestation of Test Results

APPLICANT:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
MANUFACTURER:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan (R.O.C.)
EUT DESCRIPTION:	Wi-Fi 6E BT M.2 Module
BRAND:	SparkLAN
MODEL:	WNFQ-268AXI(BT)
SERIES MODEL:	WNFQ-268AX(BT)
SAMPLE STAGE:	Engineering Verification Test sample
DATE of TESTED:	2021/9/6 ~ 2021/11/10
	APPLICABLE STANDARDS
	TANDARD Test Results

STANDARD

Test Results

FCC 47 CFR PART 15 Subpart C (Section 15.247)

PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Sally In

Sally Lu Project Handler

Date: 2022/1/21

Approved and Authorized By:

Waternil Guan Date : 2022/1/21 Engineer

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2. Summary of Test Results

Summary of Test Results				
FCC Clause	Result			
15.247(a)(1) (iii)	Number of Hopping Frequency Used	PASS		
15.247(a)(1) (iii)	Dwell Time on Each Channel	PASS		
15.247(a)(1)	 Hopping Channel Separation Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System 	PASS		
15.247(b)	Conducted Output Power	PASS		
15.247(d)	Antenna Port Emission	PASS		
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS		
15.207	AC Power Conducted Emission	PASS		
15.203	Antenna Requirement	PASS		



3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.		
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan		
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.		



5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	±3.1 dB
RF Conducted	9 kHz - 40GHz	±1.9 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	±1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	±5.4 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	±4.7 dB



6. Equipment under Test

6.1. Description of EUT

Product	Wi-Fi 6E BT M.2 Module	
Brand Name	SparkLAN	
Model Name	WNFQ-268AXI(BT)	
Series Model	WNFQ-268AX(BT)	
Operating Frequency	2402MHz ~ 2480MHz	
Modulation	GFSK, $\pi/4$ -DQPSK and 8DPSK	
Transfer Rate	Up to 3 Mbps	
Number of Channel	79	
Maximum Output Power	9.26 dBm	
Normal Voltage	3.3 Vdc	
S/N	21765J2100036	
Sample ID	4158081	



Note:

1. <u>The models difference table as below:</u>

Model	Difference			
WNFO-268AXI(BT)	WNFQ-268AXI(BT) Operating Temp -40~+75;			
WINFQ-208AAI(BT)	WNFQ-268AX(BT) Operating Temp -10~+65			
WNFQ-268AX(BT)	In addition, the sample has A-E key and E key versions. Only the golden			
	finger is different.			

*Except above change, there is no change to technical construction that is included circuit diagram, PCB Layout, components and component layout, all electrical construction, and mechanical construction.

2. The EUT contains following accessory devices:

Product	Brand	Model	Description	
Antenna 1	SparkLAN	AD-500AX	-	
Antenna 2	SparkLAN	AD-501AX	-	
Antenna 3	SparkLAN	AD-502AX	-	
Antenna 4	SparkLAN	AD-503AX	-	
Antenna 5	JOHANSON	2450AD18A6050	-	
Antenna 6	SparkLAN	AD-504AX	-	
Antenna 7	SparkLAN	AD-505AX	-	

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.



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6.2. Channel List

79 channels are provided for BT-EDR mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	-	-

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~26°C/ 60~65%RH	3.3Vdc	2021/09/06~ 2021/11/10	Mike Cai
Radiated Spurious Emission	966-2	23~26°C/ 60~65%RH	3.3Vdc	2021/09/06~ 2021/11/10	Mike Cai
AC power Line Conducted Emission	SR1	23~26°C/ 60~65%RH	3.3Vdc	2021/09/16~ 2021/11/10	Mike Cai

FCC Test Firm Registration Number: 498077

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6.4. Description of Available Antennas

Ant.	Transmitter	Brand	Model	Ant.	Frequency	Maximum	Remark
No.	Circuit	Name	Name	Туре	Band (MHz)	Gain (dBi)	Kemark
					2400~2483	2.65	
					5150~5250	4.35	
					5250~5350	4.35	
					5470~5725	4.35	
1	Chain (0)+(1)	SparkLAN	AD-500AX	Dipole	5725~5850	4.81	RP-SMA
					5925~6425	4.98	
					6425~6525	4.85	
					6525~6875	4.79	
					6875~7125	4.82	
					2400~2483	3.7	
2	Chain (0)+(1)	SparkLAN	AD-501AX	Dipole	5150~5850	5	RP-SMA
		_		-	5925~7125	5	
					2400~2483	3.5	
3	Chain (0)+(1)	SparkLAN	AD-502AX	PIFA	5150~5850	5	IPEX
					5925~7125	3.9	
					2400~2483	3.7	
4	Chain (0)+(1)	SparkLAN	AD-503AX	Dipole	5150~5850	5	RP-SMA
					5925~7125	5	
					2400~2483	2	
5	Chain (0)+(1)	JOHANSON	2450AD18A6050	CHIP	5150~5850	1.5	NA
					5925~7125	2.7	
					2400~2483	2.67	
					5150~5250	4.35	
					5250~5350	3.83	
					5470~5725	4.7	
6	Chain (0)+(1)	SparkLAN	AD-504AX	Dipole	5725~5850	4.87	I-PEX
		_		-	5925~6425	4.91	
					6425~6525	4.85	
					6525~6875	4.94	
					6875~7125	4.94	
					2400~2483	2.67	
					5150~5250	4.35	1
					5250~5350	3.83	
					5470~5725	4.7	
7	Chain (0)+(1)	SparkLAN	AD-505AX	Dipole	5725~5850	4.87	I-PEX
				1	5925~6425	4.91	
					6425~6525	4.85	
					6525~6875	4.94	
					6875~7125	4.94	

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.



6.5. Test Mode Applicability and Tested Channel Detail

- The fundamental of the dipole antenna was investigated in two orthogonal (lay and stand), it was determined that stand mode was worst-case. Therefore, all final radiated testing was performed with the dipole antenna in stand mode.
- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case)
- The antennas AD-501AX, AD-503AX has the highest gain, the following conducted tests are all carried out using this antenna gain.
- The antennas AD-501AX/ AD-503AX has the same type with same gain, therefore, the highest fundamental was determined antenna AD-501AX worst-case, the Antenna AD-501AX was selected for the final radiated testing.
- The fundamental of the Antenna AD-501AX, AD-502AX and 2450AD18A6050 was investigated in three orthogonal axes X-Y/Y-Z/X-Z, it was determined that Y-Z axis were worst-case. Therefore, Antenna AD-501AX(Dipole), AD-502AX(PIFA) and 2450AD18A6050(CHIP) all final radiated tests were performed with the Y-Z axis.
- The Packet Type for DH1, DH3, and DH5 have all been pre-tested, the fundamental worst case of the Packet Type was found in the DH5. Therefore, only DH5 Packet Type is recorded in the report. (Except Dwell Time).
- The modulation and bandwidth are similar for $\pi/4$ -DQPSK mode and 8DPSK mode, therefore investigated 8DPSK mode to representative mode in test report.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Since the DUT is a Bluetooth device, the AFH mode and non-AFH mode follow the Bluetooth timing protocol, and the same timing level has the same time interval, but the non-AFH mode has worse results, therefore only the test data of this type were recorded in this report.



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Test Item	Modulation Type	Available Channel	Test Channel	Packet Type
Radiated Emissions	GFSK	0 to 78	0,39,78	DH5
(Above 1GHz)	8DPSK	0 to 78	0,39,78	3DH5
Radiated Emissions (Below 1GHz)	GFSK	0 to 78	78	DH5
AC Power Line Conducted Emission	GFSK	0 to 78	78	DH5
Antenna Port Conducted	GFSK	0 to 78	0,39,78	DH1*,DH3*,DH5
Measurement	8DPSK	0 to 78	0,39,78	3DH1*,3DH3*, 3DH5
Conducted Emissions	GFSK	0 to 78	0,39,78	DH5
(Above 1GHz)	8DPSK	0 to 78	0,39,78	3DH5
Conducted Emissions (Below 1GHz)	GFSK	0 to 78	78	DH5

* Only for Dwell Time on Each Channel test

Simultaneously transmission condition:

Condition	Technology				
1	BT-GFSK WLAN (5GHz)				
2	BT-GFSK	WLAN (6GHz)			

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.



7. Test Equipment

	Test Equipment List								
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date				
	R	adiated Spurious	Emission						
Spectrum Analyzer	Keysight	N9010A	MY56070827	2020/11/11	2021/11/10				
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2020/12/11	2021/12/10				
Loop Antenna	ETS lindgren	6502	00213440	2020/12/25	2021/12/24				
Trilog- Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT- N0538	2021/1/13	2022/1/12				
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2020/12/30	2021/12/29				
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2020/12/30	2021/12/29				
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2021/6/8	2022/6/7				
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2021/2/3	2022/2/2				
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2021/5/19	2022/5/18				
Cables	Hanyitek	K1K50-UP0264- K1K50-2500	170214-4 & 170425-2	2021/1/22	2022/1/21				
Cables	Hanyitek	K1K50-UP0264- K1K50-2500	170214-1 & 170214-2	2021/1/22	2022/1/21				



Test Equipment List								
Equipment	Manufacturer	Model No.	Model No. Serial No. Cal. Date		Expired date			
	Antenna Port Conducted Measurement							
Spectrum Analyzer	Rohde & Schwarz	FSV40	101490	2021/9/7	2022/9/6			
Pulse Power Sensor	Anritsu	MA2411B	1531202	2020/12/21	2021/12/20			
Power Meter	Anritsu	ML2495A	1645002	2020/12/21	2021/12/20			
	AC po	wer Line Con	ducted Emission					
EMI Test Rohde & ESR Receiver Schwarz			101753	2020/11/17	2021/11/16			
Two-Line V- Network	Rohde & Schwarz	ENV216	102136	2021/8/30	2022/8/29			
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2021/8/26	2022/8/25			
Cables	TITAN	CFD200	T0732ACFD20 020A300-1	2021/3/2	2022/3/1			

UL Software					
Description	Name	Version			
Radiated measurement	e3	6.191211 (V6)			
Conducted measurement	RF Conducted Test Tools	ver 2.4.0.620b			
AC power Line Conducted Emission	EZ_EMC	UL-3A1.2			



8. Description of Test Setup

<u>Support Equipment</u>

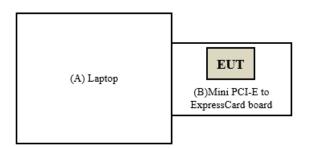
ID	Equipment	Brand Name	Model Name	S/N	Remark
А	Laptop	Lenovo	E6430	2MMN3X1	Provide by lab
В	Mini PCI-E to ExpressCard board	SparkLAN	Card-01	001	N/A

Test Setup

Controlled using a bespoke application (QRCT_Version 4.0.00185.0) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.



Setup Diagram for Test



Under Table

Remote Site



9. Test Results

9.1. Channel Bandwidth

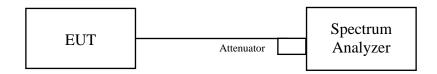
Requirements

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

Test procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



Test Data

Channel	Frequency (MHz)	20dB Bandy	vidth (MHz)
	Frequency (MIIZ)	GFSK	8DPSK
0	2402	0.93	1.29
39	2441	0.93	1.29
78	2480	0.93	1.29

	Spectrum Plot	of Worst Value				
GFSK /	CH 78		8DPSK/C	CH 78		
Spectrum Ref Level 20.00 dBm Offset 13.40 dB • RBW 30 kH Att 30 dB • SWT 63.2 µs • VBW 100 kH • IPk View • VBW 100 kH			3.40 dB e RBW 30 kHz 53.2 μs e VBW 100 kHz	Mode Auto FFT	1	-18.31 dBm
10 dBm 01 5.730 dBm 01 6.730 dBm	M3[1] 2.47953846 GHz M3[1] 5.73 dBm 2.48001800 GHz	10 dBm	M3	M3[1]		2.47935265 GHz 2.35 dBm 2.48001800 GHz
-10 dBm		-10 dBm				
-40 dBm		-40 dBm -50 dBm			h	m
-50 dBm	P2	-60 dBm			F2	
CF 2.48 GHz 1001 Marker	ts Span 3.0 MHz	CF 2.48 GHz Marker	1001 pts			Span 3.0 MHz
Type Ref Trc X-value Y-value M1 1 2.47953846 GHz -14.71 dHz D2 M1 1 2.9207 Hz 1.02 dI M3 1 2.460018 GHz 5.73 dBn	Function Function Result	Marker Ref Trc X-value M1 1 2.4799526 D2 D2 M1 1 1.288 M3 1 2.48001	7 MHz 1.12 dB	Function	Functio	n Result



9.2. Conducted Output Power

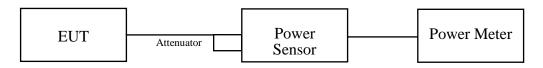
Requirements

The Maximum Output Power Measurement is 125mW.

Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Test Setup



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.



Test Data

Peak Power

BT GFSK

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	7.464	8.73	20.97	PASS
39	2441	8.414	9.25	20.97	PASS
78	2480	8.433	9.26	20.97	PASS

BT 8DPSK

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	5.408	7.33	20.97	PASS
39	2441	6.194	7.92	20.97	PASS
78	2480	5.984	7.77	20.97	PASS

Average Power (Reference Only)

BT GFSK

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	7.129	8.53
39	2441	7.998	9.03
78	2480	8.035	9.05

BT 8DPSK

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	2.825	4.51
39	2441	3.733	5.72
78	2480	3.802	5.80

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9.3. Hopping Channel Separation

Requirements

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

Test procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- c. By using the MaxHold function record the separation of two adjacent channels.
- d. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



<u>Test Data</u>

Mode	Channel	Frequency (MHz)	Adjacent Hopping Channel Separation (MHz)	Limit (MHz)	Result
	00	2402	1.00	0.621	PASS
GFSK	39	2441	1.00	0.619	PASS
	78	2480	1.00	0.621	PASS
	00	2402	1.00	0.857	PASS
8DPSK	39	2441	1.00	0.859	PASS
	78	2480	1.00	0.859	PASS

Note: Limit (MHz) = At least two/three of 20dB Bandwidth

Spectrum Plot	of Worst Value
GFSK / CH39	8DPSK / CH39
Spectrum Imp RefLevel 20.00 dBm Offset 13.40 dB @ RBW 30 kHz # Att 30 dB & SWT 63.2 µS VBW 100 kHz Mode Auto FFT ● JPK View Imp Imp Imp M111 5.72 dBm	Spectrum Imp Ref Level 20.00 dBm Offset 13.40 dB RBW 30 kHz w Att 30 dB SWT 63.2 µs PJR View Imp Imp Imp
Mi[1] 3.72 db 10 dbm .244101800 GHz 0 dbm .02 db 0 dbm .03 0.02 db -10 dbm .04 db -30 dbm	0 d8m 02[1] 0.07 d8 -20 d8m -0.010 MHz 2.22 d8m -10 d8m 02 0.010 MHz -20 d8m 0 0.010 MHz -0 d8m 0.02 MHz 0.010 MHz -0 d8m 0.02 MHz 0.010 MHz -0 d8m 0.010 MHz 0.010 MHz
-50 dBm -60 dBm -70	-50 d8m -60 d8m -70
Type Ref Trc X-volue Y-volue Function Function M1 1 2.441018 GHz 5.72 dBm 5	Type Ref Trc X-value Y-value Function Function M1 1 2.441018 GHz 2.22 dBm Function F



9.4. Number of Hopping Frequency Used

Requirements

At least 15 channels frequencies, and should be equally spaced.

Test procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

Test Setup

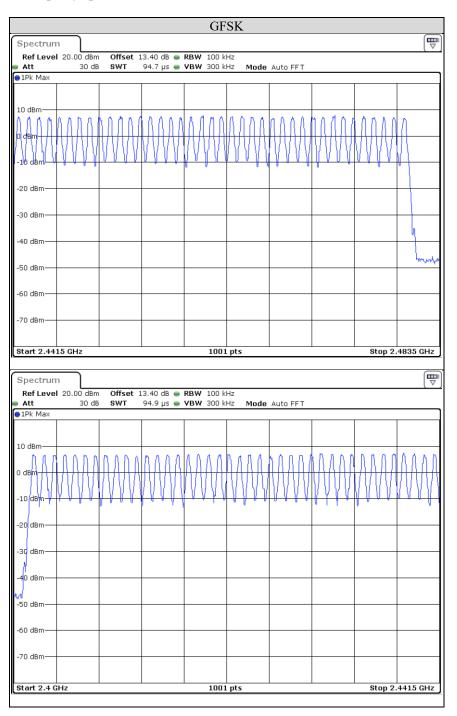


The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



Test Data

There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.



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Spectrum Participation
Att 30 dB SWT 94.7 μs VBW 300 kHz Mode Auto FFT 9 IPk Max 10 dBm 10
• 1Pk Max 10 dBm •
Arden And Ard Ard Ard Ard Ard Ard Ard Ard Ard Ar
Ageta/Apple Apple
-10 dBm -20 dBm -20 dBm -30 dBm -40 dBm -40 dBm -50 dBm -60 dBm -70
-20 dBm -30 dBm -40 dBm -50 dBm -50 dBm -60 dBm -70
-30 dBm
-40 dBm
-50 dBm
-50 dBm -60 dBm -70 dBm -70 dBm Start 2.4415 GHz 1001 pts Stop 2.4835 GHz
-70 dBm
Start 2.4415 GHz 1001 pts Stop 2.4835 GHz
Spectrum Ref Level 20.00 dBm Offset 13.40 dB • RBW 100 kHz
👄 Att 🛛 30 dB SWT 94.9 μs 👄 VBW 300 kHz Mode Auto FFT
P1Pk Max
10 dBm
10 dBm
-10 dBm
-2C dBm
-30 dBm
-40 dBm
√ -50 dBm
-60 dBm
-60 dBm
Start 2.4 GHz 1001 pts Stop 2.4415 GHz



9.5. Dwell Time on Each Channel

Requirements

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.
- f. Measure the maximum time duration of one single pulse.
- A Period Time = (channel number)*0.4
 For normal mode:
 DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)
 DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)
 DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)
 For AFH mode:
 DH1 Time Slot: Reading * (800/2)*31.6/(channel number)
 DH3 Time Slot: Reading * (800/4)*31.6/(channel number)
 DH5 Time Slot: Reading * (800/4)*31.6/(channel number)

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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Test Data

GFSK

Modulation	Channel	Frequency (MHz)	Length of transmission time (msec)	Result (msec)	Limit (msec)	Result
DH1	39	2441	0.372	119.040	400	PASS
DH3	39	2441	1.625	260.000	400	PASS
DH5	39	2441	2.880	307.210	400	PASS

8DPSK

Modulation	Channel	Frequency (MHz)	Length of transmission time (msec)	Result (msec)	Limit (msec)	Result
3DH1	39	2441	0.384	122.880	400	PASS
3DH3	39	2441	1.630	260.800	400	PASS
3DH5	39	2441	2.880	307.210	400	PASS

Note:

1. In normal mode:

DH1 hopping rate is 1600 hops/s with 2 slots in 79 hopping channels. With channel hopping rate (1600 /2/79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to (1600/2/79) x (0.4 x 79) = 320 hops.

DH3 hopping rate is 1600 hops/s with 4 slots in 79 hopping channels. With channel hopping rate (1600 /4/79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to (1600/4/79) x (0.4 x 79) = 160 hops.

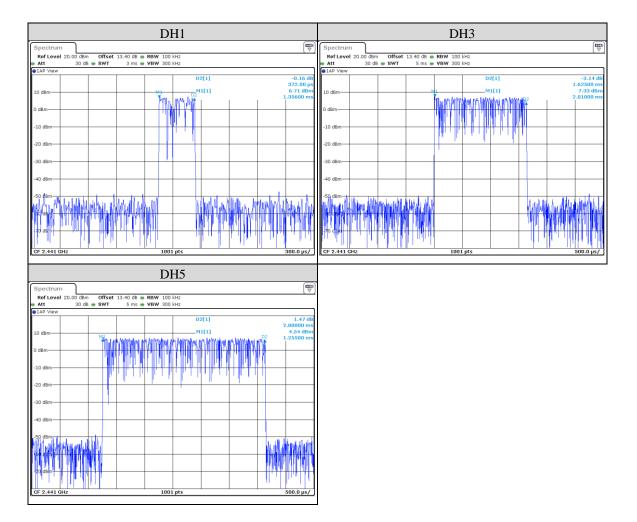
DH5 hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 /6/79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.

2. Dwell time (ms) = Hops Over Occupancy Time (hops) x Length of transmission time (ms).



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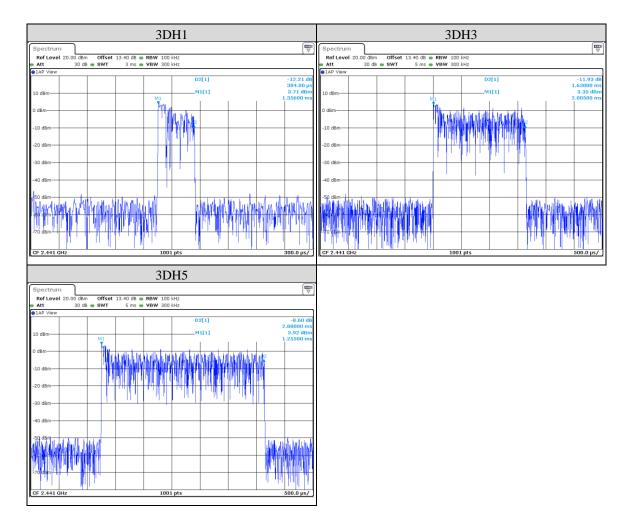
GFSK





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9.6. Conducted Out of Band Emission

Requirements

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 this section, 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.

Test procedure

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

Test Setup



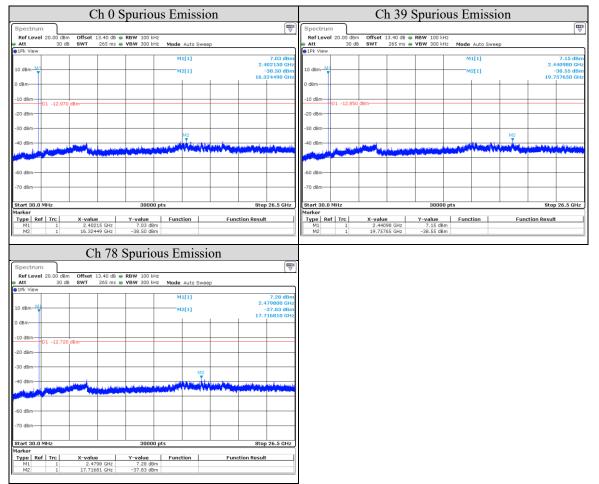
The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



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Ch 0 Band Edge	Ch 78 Band Edge							
Spectrum								
Ref Level 20.00 dBm Offset 13.40 dB . RBW 100 kHz	Ref Level 20.00 dBm Offset 13.40 dB . RBW 100 kHz							
Att 30 dB SWT 436.1 µs • VBW 300 kHz Mode Auto FFT • 1Pk View	● Att 30 dB SWT 436.1 µs ● VBW 300 kHz Mode Auto FFT ● 1Pk View							
10 dBm 2.363700 GHz 10 dBm M1[1] 7.04 dBm	10 dBm M1[1] 7.79 dBm							
2.401960 GHz	2.480160 GHz							
-10 dBm 01 -12.960 dBm	-10 dBm 01 -12.210 dBm							
-20 dBm	-20 dBm							
-30 dBm-	-30 dBm							
-40 dBm M2	-40 dBm							
ng grant Hausen har grant har and h	ngu dhantan tan tan tan tan tan tan tan tan ta							
-60 dBm-	-60 dBm							
-70 dBm	-70 dBm							
CF 2.405 GHz 1001 pts Span 190.0 MHz	CF 2.405 GHz 1001 pts Span 190.0 MHz							
Marker	Marker							
Type Ref Trc X-value Y-value Function Function Result M1 1 2.40196 GHz 7.04 dBm Function Function Function	Type Ref Trc X-value Y-value Function Function Result M1 1 2.48016 GHz 7.79 dBm							
M2 1 2.4 GHz -48.34 dBm								
	M2 1 2.4835 GHz -48.77 dBm M3 1 2.49858 GHz -45.75 dBm							
M3 1 2.3637 GHz -45.16 dBm	mc 1 2.49358 GHz -45.75 dBm M3 1 2.49858 GHz -45.75 dBm							
M3 1 2.3637 GHz -45.16 dBm	M3 1 2.49858 GHz -45.75 dBm							
M3 1 2.3637 GHz -45.16 dBm Hopping Band Edge	M3 1 2.49658 GHz -45.75 dBm Hopping Spurious Emission							
M3 1 2.3637 GHz ~45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB @ RBW 100 HHz	M3 1 2.49858 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 kHz							
M3 1 2.3637 GHz -45.16 dBm Hopping Band Edge Spectrum	M3 1 2.49658 GHz -45.75 dBm Hopping Spurious Emission							
M3 1 2:8637 GHz -45:16 dBm Hopping Band Edge Spectrum Ref Level 20:00 dBm Offset 13:40 dB RBW 100 kHz att 30 dB SWT 24:0.5 µS VBW 300 kHz M1[1] 7.72 dBm	M3 1 2.49858 GHz -45,75 dBm Hopping Spurious Emission Ref Level 20.00 dBm Offset 13.40 dB @ RBW 100 kHz Ref Level 20.00 dBm Offset 13.40 dB @ RBW 100 kHz Att 30 dB @ WT Mode Auto Sweep M2[1] -39.06 dBm							
M3 1 2:887 GH2 -45:16 dBm Hopping Band Edge Spectrum Ref Level 20:00 dBm Offset 13:40 dB RBW 100 kH2 Att 30 dB SWT 240.5 µS VBW 300 kH2 MI[1] 2.72 dBm MI[1] 2.72 dBm MI[1] 2.72 dBm MI[1] 2.72 dBm MI[1] 2.458020 GH2	M3 1 2.49858 GHz -45,75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dbm Offset 13.40 db @ RBW 100 HHz Att 30 db @ WT 265 ms WSW 300 HHz M2[1] -39.06 dbm							
M3 1 2:8837 GHz -45:16 dBm Hopping Band Edge Spectrum Ref Level 20:00 dBm Offset 13:40 dB RBW 100 KHz Will Att 30 dB SWT 24:55 µs VBW 300 KHz Mode Auto FFT 0 JPk View M1[1] 2:455020 dHz -47:02 dHz 10 dBm Util (11114/14) H11111/14) H11111111111111111111111111111111111	M3 1 2.49858 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 HHz Att 30 dB SWW 205 ms VBW 300 HHz Mode Auto Sweep #IP View M2[1] 17.747100 GHz 10 dBm M1[1] 7.40 dBm							
M3 1 2:8837 GHz -45:16 dBm Hopping Band Edge Spectrum Ref Level 20:00 dBm Offset 13:40 dB RBW 100 HHz Mode Auto FFT Att 30 dB SWT 240.5 µs VBW 300 HHz Mode Auto FFT 0 JPk View M1(1) 7.72 dBm 2.455020 dHz 10 dBm H14111011111111111111111111111111111111	M3 1 2.49858 GHz -45,75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dbm Offset 13.40 db @ RBW 100 HHz Att 30 db @ WT 265 ms WSW 300 HHz M2[1] -39.06 dbm							
M3 1 2:8837 GHz -45:16 dBm Hopping Band Edge Spectrum Ref Level 20:00 dBm Offset 13:40 dB RBW 100 KHz Will Att 30 dB SWT 24:55 µs VBW 300 KHz Mode Auto FFT 0 JPk View M1[1] 2:455020 dHz -47:02 dHz 10 dBm Util (11114/14) H11111/14) H11111111111111111111111111111111111	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dbm Offset 13.40 dB RBW 100 kHz Att 30 dB 8WT 265 ms VBW 300 kHz Mode Auto Sweep #IP K view M2[1] 1.7.747100 GHz 7.90.66 dbm 17.747100 GHz 10 dbm M1[1] 2.409310 GHz M1[1] 2.409310 GHz							
M3 1 2:3637 GHz ~45:16 dBm Hopping Band Edge Colspan="2">Colspan="2"Colsp	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref tevel 20.00 dBm Offset 13.40 d8 = RBW 100 HE Att 30 d8 SWT 265 ms VBW 100 HE Att 30 d8 SWT 265 ms VBW 100 HE 0 dBm M2[1] 7.09 dBm 10 dBm M1[1] 7.09 dBm 10 dBm M1[1] 7.09 dBm 10 dBm 10 dBm							
M3 1 2.3637 GH2 ~45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 KH2 Att 30 dB SYMT 246.5 µs VBW 300 KH2 MI(1) 7.72 dBm 10 dBm M1(1) 7.72 dBm 2.455020 dH2 -47.02 dBm M1(1) 7.72 dBm 2.455020 dH2 -47.02 dBm M1(1) 7.72 dBm 2.450020 GH2 0 dBm M1(1) 7.72 dBm 2.450020 GH2 -400000 GH2 M1(1) 7.72 dBm 2.450020 GH2	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref Lavel 20.00 dBm Offset 13.40 dB @ RBW 100 kHz Att 30 dB @ WT Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Att 30 dB MIZ[1]							
M3 1 2.3637 GHz ~45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 KHz COL Att 30 dB SWT 240.5 µs VBW 300 KHz -47.22 dBm 10 dBm 1 1 7.72 dBm 2.455020 GHz -47.02 dBm 10 dBm 1 1 1 2.455020 GHz -47.02 dBm 20 dBm 1 1 1 1 1 -10 dBm 1 1 1 1 1 -20 dBm 1 1 1 1 1 -30 dB 1 1 1 1 1	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 kHz Att 30 dB Spectrum 0 dBm 265 ms VBW 300 kHz Mode Auto Sweep -39.06 dBm 0 dBm 0 dBm M1[1] 2.39.30 dbm 2.400310 GHz -10 dBm 01 -12.970 dBm 0 0 0 0							
M3 1 2:837 GHz -45:16 dBm Hopping Band Edge Spectrum Ref Level 20:00 dBm Offset 13:40 dB RBW 100 HHz Mode Auto FFT Att 30 dB SWT 240.5 µs VBW 300 HHz Mode Auto FFT 0 dBm 0 dBm M1[1] 2.453020 dHz -47.02 dBm 0 dBm 01 +12.280 dBm 01 +12.280 dBm 01 +12.280 dBm 01 +12.280 dBm -20 dBm 01 +12.280 dBm 01 +12.280 dBm 01 +12.280 dBm 01 +12.280 dBm	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dbm Offset 13.40 dB RBW 100 kHz Att 30 dB SWW 300 kHz Mode Auto Sweep M2[1] -79.06 dbm 10 dbm M1[1] 7.49.06 dbm 2.460310 GHz -10 dbm -01 -12.970 dBm -01 -01							
M3 1 2.8877 GHz ~45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 kHz CC Att 30 dB SWT 240.5 µs VBW 300 kHz Made Auto FFT 0 FP View 0 dB WT 90 kHz Made Auto FFT -7.72 dBm 10 dBm 0 dBm 01 + 12.200 dBm 01 + 12.200 dBm 01 + 12.200 dBm 01 + 12.200 dBm -30 dBm 01 + 12.200 dBm 01 + 12.200 dBm 01 + 12.200 dBm 01 + 12.200 dBm	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Image: Colspan="2">Image: Colspan="2" Image: Colspa="2" Image: Colspan="2" Image: Colspa="2" Image: Colspa="2" Image:							
M3 1 2.8877 GHz -45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 kHz Wade Auto FFT 0 HP 0 dB WM 240.5 µs VBW 300 kHz Made Auto FFT 0 HP 0 dB WM 240.5 µs VBW 20000 GHz 0 dBm 01 12.280 dBm 01 12.280 dBm 0 -30 dBm 01 12.280 dBm 0 0 0 -30 dBm 0 0 0 0 0 0 -30 dBm 0 0 0 0 0 0 0 -30 dBm 0 0 0 0 0 0 0 -30 dBm 0 0 0 0 0 0 0 0 0 -30 dBm 0 0 0 0 0 0 0 0 0 0 0 0 0	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref level 20.00 dBm Offset 13.40 dB # RBW 100 Hd; Att 30 dB \$WT 265 ms VBW 300 Hd; Mode Auto Sweep Other Mark M2[1] -39.06 dBm 0 dBm M1[1] -2.400310 dHz M1[1] -2.400310 dHz M2[1] -2.400310 dHz M1[1] -2.400310 dHz 0 dBm M2[1] -2.400310 dHz -0.0 dBm -0.0 dBm -0.0 dBm							
M3 1 2.8877 GHz -45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 kHz Att 30 dB SWT 240.5 µz VBW 300 kHz Made Auto FFT 50.72 dBm -47.02 dBm -47.0	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dbm Offset 13.40 dB RBW 100 kHz Att 30 db SPE Vaw 10 dBm M2[1] -7.9.06 dbm 0 dBm M1[1] 2.40310 GHz -10 dBm M1[1] 2.40310 GHz -20 dBm M1 M2 -40 dBm M2 M42							
M3 1 2.8877 GHz -45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 kHz Wade Auto FFT 0 HP 0 dB WM 240.5 µs VBW 300 kHz Made Auto FFT 0 HP 0 dB WM 240.5 µs VBW 20000 GHz 0 dBm 01 12.280 dBm 01 12.280 dBm 0 -30 dBm 01 12.280 dBm 0 0 0 -30 dBm 0 0 0 0 0 0 -30 dBm 0 0 0 0 0 0 0 -30 dBm 0 0 0 0 0 0 0 -30 dBm 0 0 0 0 0 0 0 0 0 -30 dBm 0 0 0 0 0 0 0 0 0 0 0 0 0	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref level 20.00 dbm Offset 13.40 db RBW 100 HHz Att 30 db SWT 265 ms VBW 300 HHz Mode Auto Sweep 10 dbm 41 30 db SWT 265 ms VBW 300 HHz Mode Auto Sweep 10 dbm 41 2.466910 GHz M1[1] 2.00 dbm 10 dbm 41 2.466910 GHz 2.466910 GHz 10 dbm 41 2.466910 GHz 2.466910 GHz 10 dbm 41 10.466910 GHz 2.466910 GHz 20 dbm 40 dbm 41.2970 dbm 41.46910 GHz 41.46910 GHz -20 dbm - - - - - -30 dbm - - - - - - -20 dbm - - - - - - - -10 dbm - - - - - - - </td							
M3 1 2,857 GHz -45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 HHz Mode Auto FFT 30 dB BWT 246.5 µ3 VBW 200 HHz Mode Auto FFT 10 dBm 0 M1[1] 2.455020 GHz 2.455020 GHz -10 dBm 0 1.12.260 dBm 1.12.260 dBm 1.12.260 dBm 1.12.260 dBm -20 dBm 0 1.12.260 dBm	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref level 20.00 dbm Offset 13.40 db RBW 100 Hd; Att 30 db MBW 100 Hd; Att 30 db M2[1] -39.06 dbm 10 dbm 0 M1[1] -2.460310 GHz 10 dbm 01 -12.970 dBm -20 dbm							
M3 1 2.8877 GHz -45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB @ RBW 100 HHz 0 dB Spectrum TO dBm Offset 13.40 dB @ RBW 100 HHz 0 dBm YBW 20.5 Jule YBW 10 dBm 10 dBm 7.72 dBm 2.405000 GHz -20 dBm 10 dBm 10 dBm 2.405000 GHz -30 dBm 1.12 480 dBm 1.10 HIT 1.10 HIT 1.10 HIT -0 dBm 1.12 480 dBm 1.10 HT 1.12 480 dBm 1.10 HZ 1.12 480 dBm 1.10 HZ 1.10 HZ 1.10 HZ 1.12 480 dBm 1.10 HZ	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Refueel 20.00 dBm Offset 13.40 dB @ RBW 100 Hz; Att 30 dB @WT 205 ms @ VBW 200 Hz; Made Auto Sweep I data and a gwar and a gwa							
M3 1 2,837 GHz -45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 H/z Made Auto FF T 0 HX 30 dB SWT 240.5 µs VBW 300 H/z Made Auto FF T 0 HX 0 dB MI[1] 7.72 dBm -77.00 dBm 0 dBm 01-12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm -20 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm -30 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm -20 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm -20 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm -20 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm -20 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm 01.12.200 dBm -20 dBm 01.12.200 dBm	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 Hz Att 30 dB RBW 1265 ms VBW 300 Hz Mode Auto Sweep 0 dBm M2[1] -39.06 dBm -39.06 dBm 0 dBm M1[1] 2.400310 GHz -39.06 dBm -10 dBm M1[1] 2.400310 GHz -39.06 dBm -20 dBm M1[1] 2.400310 GHz -39.06 dBm -30 dBm M1[1] 2.400310 GHz -40 dBm -40 dBm M2 -40 dBm -40 dBm -30 dBm M2 -40 dBm -40 dBm <td< td=""></td<>							
Mil 1 2.3637 GHz -45.16 dBm Hopping Band Edge Spectrum Ref Level 20.00 dBm Offset 13.40 dB RBW 100 KHz Made Auto FF T 0 FP. View VIEW VIEW 300 dB SWT 246.5 µs VIEW Made Auto FF T 0 FP. View VIEW VIEW MILIJ 7.72 dBm 0 dBm 0 dBm 10.12 280 dB	M3 1 2.49958 GHz -45.75 dBm Hopping Spurious Emission Spectrum Refueel 20.00 dBm Offset 13.40 dB @ RBW 100 Hz; Att 30 dB @WT 205 ms @ VBW 200 Hz; Made Auto Sweep I data and a gwar and a gwa							



8DPSK

Ch 0 Spurious Emission	Ch 39 Spurious Emission							
Spectrum		Spectrum						
Ref Level 20.00 dBm Offset 13.40 dB RBW 100 kHz Att 30 dB SWT 265 ms VBW 300 kHz Mode Auto Sweep		Att 30 dB SW	set 13.40 dB 👄 RBW 100 kHz T 265 ms 👄 VBW 300 kHz Mo	de Auto Sweep				
1Pk View M1[1]	2.06 dBm	• 1Pk View		M1[1]	2.59 dBm			
10 dBm	2.402150 GHz -38.97 dBm	10 dBm		-M2[1]	2.440980 GHz -37.72 dBm			
0 dBm	17.700050 GHz	0 dBm			17.733580 GHz			
-10 dBm		-10 dBm						
01 17 040 40		01 -17 410 dBm						
-20 dBm 01 -17.940 dBm		-20 dBm						
-30 dBm		-30 dBm		M2				
-40 dBm	IM M2				and Hills in and strends it.			
	A trapport of a part of the			and the search had seen from an				
-60 dBm		-60 dBm						
-70 dBm		-70 dBm						
Start 30.0 MHz 30000 pts	Stop 26.5 GHz	Start 30.0 MHz	30000 pts		Stop 26.5 GHz			
Marker Type Ref Trc X-value Y-value Function	Function Result	Marker _Type Ref Trc X-	value Y-value Fu	inction Fun	ction Result			
M1 1 2.40215 GHz 2.06 dBm M2 1 17.70005 GHz -38.97 dBm		M1 1 2	2.44098 GHz 2.59 dBm 7.73358 GHz -37.72 dBm					
					<u>)</u>			
Ch 78 Spurious Emission	L							
Spectrum								
RefLevel 20.00 dBm Offset 13.40 dB RBW 100 kHz Att 30 dB SWT 265 ms VBW 300 kHz Mode Auto Sweep								
1Pk View [1]	2.94 dBm							
10 dBm M2[1]	2.479800 GHz -38.83 dBm							
D dBm	17.719460 GHz							
-10 dBm								
-20 dBm								
-30 dBm								
-40 dBm								
	Manager and the second second							
-60 dBm								
-70 dBm								
	01-01-01-01-01-01-01-01-01-01-01-01-01-0							
Start 30.0 MHz 30000 pts Marker	Stop 26.5 GHz							
Type Ref Trc X-value Y-value Function M1 1 2.4798 GHz 2.94 dBm	Function Result							
M2 1 17.71946 GHz -38.83 dBm								



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	Cl	n 0 Band	l Edge						Ch 7	'8 Ba	nd E	dge			
Spectrum					Spectru	Ch 78 Band Edge									
RefLevel 20.00 dBm Offset 13.40 dB . RBW 100 kHz						al 20.00 dBm		40 dB 🖷 RE							
Att 30 1Pk View	dB SWT 436.1 µs 🖷	VBW 300 KHZ	Mode Auto FFT			Att IPk View	30 dB	SWT 43	6.1 µs 🖷 Vi	SW 300 KH	IZ Mode	Auto FFT			
			M3[1]		-45.88 dB 2.386000 G						M	13[1]			-45.87 dBm 490870 GHz
10 dBm		M1	M1[1]		3.46 dB	10 dBm					M	1[1]		M	11 4.05 dBm
0 dBm		Ţ			2.401770 G	0 dBm						-	-	2.	80160 GHz
-10 dBm01 -16.54	10 dBm					-10 dBm-	-D1 -15.950	dBm							
-20 dBm	+0 UBIII					-20 dBm-	01 -10,000								
-30 dBm						-30 dBm-									
-40 dBm						-40 dBm-									
	manthe seed to see the set	M [®] M [®]	a for a start for a second the second	mound	provindencientesadanosas		A consider	want	Hardenergelige				and por law	la sede a	M3 Recently
-50 dBm	a ning the manufactor of the second	Additionant conta	And and broad and	and so dread	a an Weberlaw Later and	-50 dBm-	water	wroneynna r	the stand and the	a see of the	and the other othe	Summer.	foundate condes	Splantific	an and and
-60 dBm		+ + + -				-60 dBm-									
-70 dBm						-70 dBm-									
-/o ubiii		F1				-70 0011									F1
CF 2.405 GHz		1001 pts			Span 190.0 MH		GHz			1001	pts		-	Span	190.0 MHz
Marker Type Ref Trc	X-value	Y-value	Function	Functio	n Result	Marker Type R	ef Trc	X-value	1.5	'-value	Fund	tion	Func	tion Result	
	2.40177 GHz	3.46 dBm	ranotion	T difecto	ii ito suit		1	2.48016		4.05 dBr				Allon Ho Sui	
M1 1						M1		0 1000	(011a)						
M1 1 M2 1 M3 1	2.4 GHz 2.386 GHz	-47.44 dBm -45.88 dBm	nd Edge			M1 M2 M3	1	2.4835 2.49087	GHz GHz	-49.13 dBr -45.87 dBr	n	Emis	sion		
M2 1 M3 1 Spectrum Ref Level 20.00 df	2.4 GHz 2.386 GHz Hop	-47.44 dBm -45.88 dBm	nd Edge		(E	M2 M3 Spectrum Ref Leve	1 1 1 20.00 dBm	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious i				
M2 1 M3 1 Spectrum Ref Level 20.00 dt Att 30	2.4 GHz 2.386 GHz Hop	-47.44 dBm -45.88 dBm	nd Edge			M2 M3 Spectrum Ref Leve	1 1 1	2.4835 2.49087 Hop	GHZ GHZ	-49.13 dBr -45.87 dBr Spur	ious i				(III)
M2 1 M3 1 Spectrum Ref Level 20.00 df	2.4 GHz 2.386 GHz Hop	-47.44 dBm -45.88 dBm			4.39 dB	M2 M3 Spectrum Ref Leve Att e1Pk View	1 1 1 20.00 dBm	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious				-39.49 dBm
M2 1 M3 1 Spectrum Ref Level 20.00 dt Att 30	2.4 GHz 2.386 GHz Hop	-47.44 dBm -45.88 dBm	Mode Auto FFT		4.39 dB 2.464010 G -47.27 dB	M2 M3 Spectrum Ref Leve Att 10 dBm	1 1 1 20.00 dBm	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee		15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum Image: Construct on the second se	2.4 GHz 2.386 GHz Hop	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G	M2 M3 Spectrum Ref Leve Att 10 dBm M	1 1 1 20.00 dBm	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee		15.9	-39.49 dBm 985140 GHz
M2 1 M3 1 Spectrum Ref Level 20.00 dl Ref Level 20.00 dl 30 Att 30 PIPk View 10 dBm 0 dBm William br	2.4 GHz 2.386 GHz Hop	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB	M2 M3 Spectrum Ref Leve • Att • IPk View 10 dBm M 0 dBm	1 1 1 20.00 dBm	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee		15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum Ref Level 20.00 df extra 30 1 91Pk View 0 0 dBm MML pr -10 dBm 01 - 15.6	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB	M2 M3 Spectrum Ref Leve Att 10 dBm M	1 1 1 20.00 dBm 30 dB	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee		15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum Ref Level 20.00 dl Ref Level 20.00 dl 30 Att 30 PIPk View 10 dBm 0 dBm William br	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB	M2 M3 Spectrum Ref Leve • Att • IPk View 10 dBm M 0 dBm	1 1 1 20.00 dBm	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee		15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum Ref Level 20.00 df e1Pk View 30 e1Pk View 0 0 dBm MMultiple -10 dBm 01 - 15.6	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB	M2 M3 Spectrum Ref Levi • 11 View 10 dBm -10 dBm -20 dBm	1 1 1 20.00 dBm 30 dB	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee		15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum Ref Level 20.00 df All 2000 0000 All 30 0 MB 10 0 dBm Multiply -10 dBm 01 -15.67 -30 dBm 01 -15.67	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB 2.400000 G	M2 M3 M2 M3 M2 M3 M2 M2 M2 M2 M2 M2 M2 M2 M2 M2	1 1 1 20.00 dBm 30 dB	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee		15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum 1 Ref Level 20.00 df 30 Att 30 D fPr View 10 0 dBm 1-15.6 -20 dBm 01 -15.6 -30 dBm 40 dBm	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB 2.400000 G	M2 M3 M2 M3 M2 M3 M2 M2 M2 M2 M2 M2 M2 M2 M2 M2	1 1 1 20.00 dBm 30 dB	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee	*p	15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB	M2 M3 M2 M3 M2 M3 M2 M2 M2 M2 M2 M2 M2 M2 M2 M2	1 1 1 20.00 dBm 30 dB	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee	*p	15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum Image: Comparison of the system o	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB 2.400000 G	M2 M3 Spectrum Ref Leve Att 0 5Pk View 10 dBm -10 dBm -20 dBm -30 dBm -40 dBm- -40 dBm	1 1 1 20.00 dBm 30 dB	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee	*p	15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum 1 Ref Level 20.00 di 20.00 di Att 30 9 PF View 10 dBm 10 dBm 01 -15.61 -20 dBm 01 -15.61 -30 dBm -40 dBm -50 dBm -50 dBm	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB 2.400000 G	M2 M3 M2 M3 M2 M3 M2 M2 M2 M2 M2 M2 M2 M2 M2 M2	1 1 1 20.00 dBm 30 dB	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee	*p	15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum 1 Ref Level 20.00 di 20.00 di Att 30 1 9 IPk View 10 dBm 10 dBm 01 -15.61 -20 dBm -1.15.61 -30 dBm -40 dBm -50 dBm -50 dBm	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1		4.39 dB 2.464010 G -47.27 dB 2.400000 G	M2 M3 Spectrum Ref Leve Att 0 5Pk View 10 dBm -10 dBm -20 dBm -30 dBm -40 dBm- -40 dBm	1 1 1 20.00 dBm 30 dB	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	ious	Auto Swee	*p	15.9	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum Image: Comparison of the system o	2.4 GHz 2.386 GHz HOp ds Offset 13.40 db s wr 246.5 µs =	-47.44 dBm -45.88 dBm	Mode Auto FFT M1[1] M2[1] M1 M2[1] M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M		4.39 dB 2.464010 G -47.27 dB 2.400000 G	M2 M3 For Leve For Leve </td <td>1 1 1 1 1 1 1 1 1 1 1 1 1 1</td> <td>2.4835 2.49087 Hop</td> <td>GHZ GHZ ping</td> <td>-49.13 dBr -45.87 dBr Spuri</td> <td>n IOUS Iz Mode M</td> <td>Auto Swee</td> <td>*p</td> <td>15.5</td> <td></td>	1 1 1 1 1 1 1 1 1 1 1 1 1 1	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spuri	n IOUS Iz Mode M	Auto Swee	*p	15.5	
M2 1 M3 1 Spectrum Ref Level 20.00 di att 30 PFk View 30 10 dbm 01 -10 dbm 01 -20 dbm -1 -30 dbm	2.4 GHz 2.386 GHz HOp as Offset 13.40 dB b SWT 246.5 µs a b SWT 246.5 µs b C C C C C C C C C C C C C C C C C C C	-47.44 dbm -45.89 dbm ping Ba RBW 100 kHz VBW 300 kHz VBW 300 kHz	Mode Auto FFT MI[1] M2[1] M1 M2[1] M1 M1 M1 M1 M1 M1 M1 M1 M1 M1		4.39 dB 2.464010 G -47.27 dB 2.400000 G 2.400000 G	M2 M3 Spectrum Ref Leve Att D EP. View 10 dBm -10 dBm -20 dBm -40 dBm -60 dBm -70 dBm CF 13.265	1 1 1 1 1 1 1 1 1 1 1 1 1 1	2.4835 2.49087 Hop	GHZ GHZ ping	-49.13 dBr -45.87 dBr Spur	n IOUS Iz Mode M	Auto Swee	*p	15.5	-39.49 dBm 985140 GHz 2.99 dBm
M2 1 M3 1 Spectrum Ref Level 2:0:00 df Att 30 PFk View 0 0 dBm 01 -15.6: -10 dBm 01 -15.6: -30 dBm	2.4 GHz 2.386 GHz HOp am Offset 13.40 dB ab SWT 246.5 µs b SWT 246.5 µs ab SWT 246.5 µs b C SWT	-47,44 dbm -45,89 dbm ping Ba RBW 100 kHz VVBW 300 kHz VV	Mode Auto FFT M1[1] M2[1] M1 M2[1] M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M1 M		4.39 dB 2.464010 G -47.27 dB 2.400000 G 2.400000 G	M2 M3 Spectrum Ref Leve Att D EP. View Att D 0 Bm -10 dBm -20 dBm -30 dBm -40 dBm -60 dBm -70 dBm -60 dBm -70 dBm -70 dBm -70 dBm	1 1 1 1 20.00 dBm 30 dB 	2.4905 2.49087 Hop	GHZ GHZ 40 dB = RE 65 ms = VI		n n n n curve n dz Mode M n n n n n n n	Auto Sweet		15.5	
M2 1 M3 1 Spectrum 1 Ref Level 20.00 df appl: View 10 10 dbm 10 0 dbm 1/Multiply -10 dbm 01 -20 dbm 01 -30 dbm -15.61 -50 dbm -70 dbm -70 dbm -70 dbm Start 2.39 GHz 47xe Type Ref I Trc [2.4 GHz 2.386 GHz HOpp	-47,44 (8m) -45,89 (8m) ping Ba 900 kHz 900 kH	Mode Auto FFT MI[1] M2[1] M1 M2[1] M1 M1 M1 M1 M1 M1 M1 M1 M1 M1		4.39 dB 2.464010 G -47.27 dB 2.400000 G 2.400000 G	M2 M2 M2 Spectrum For Love Att Im	1 1 1 1 20.00 dBm 30 dB 	2.4835 2.49087 Hop	GHZ		Image: marked bit is a state of the state of th	Auto Sweet		15.5	



9.7. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level $(dBuV/m) = 20 \log Emission level (uV/m)$.
- 3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



Test Procedures

[For 9 kHz ~ 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.



[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.



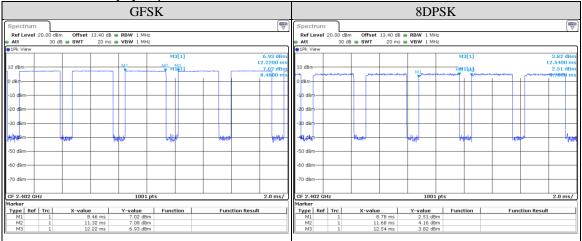
Note:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

Configuration	Average				
Configuration	RBW	VBW			
Bluetooth	1MHz	510 Hz			

Note:

- The BT-GFSK Duty cycle = (2.86/3.76)*100% = 76.064 < 98%, so video bandwidth is 1/2.86 = 0.35 kHz. Therefore VBW configuration is 510Hz for testing.
- The BT-8DPSK Duty cycle = (2.9/3.76)*100% = 77.128 < 98%, so video bandwidth is 1/2.9 = 0.345 kHz. Therefore VBW configuration is 510Hz for testing.
- Refer to duty cycle plots as below:



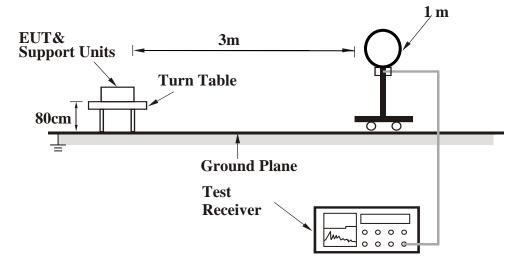
- 4. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
- 5. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- 6. Test data of Margin(dB) = Result value (dBuV/m) Limit value (dBuV/m).
- 7. Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) Preamp Factor (dB).
- 8. Test data of Notation "@" = Fundamental Frequency
- 9. Test data of Notation " * " = The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.



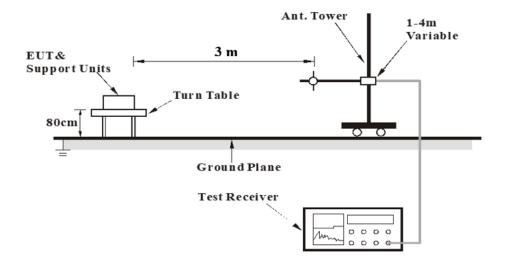
Test Setup

For Radiated Test Method:

<Frequency Range 9 kHz ~ 30 MHz>

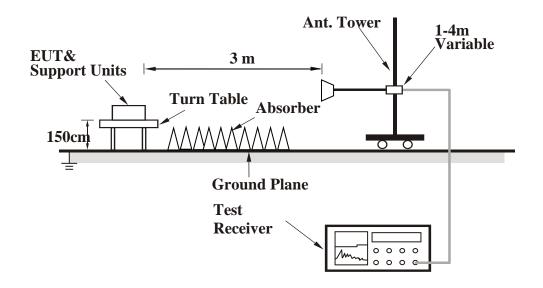


<Frequency Range 30 MHz ~ 1 GHz >





<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.



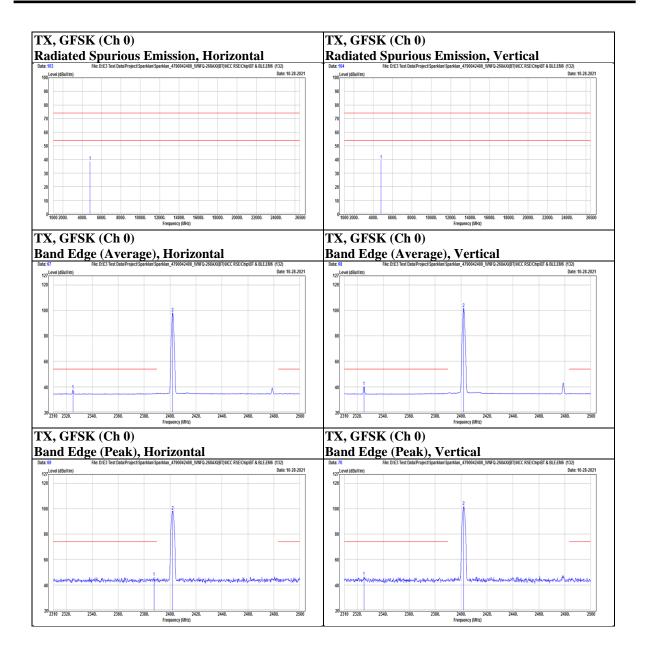
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Test Data

Chip (Model: 2450AD18A6050)

Above 1 GHz								
Mode O	GFSK			Channel	l 0			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kelliark
		2325.2	31.35	6.13	37.48	54	-16.52	AVG
		2387.71	40.11	6.1	46.21	74	-27.79	PK
Horizontal	@	2402	92.08	6.13	98.21	N/A	N/A	PK
	@	2402	91.81	6.13	97.94	N/A	N/A	AVG
	*	4804	36.2	2.46	38.66	74	-35.34	PK
		2325.2	40.41	6.13	46.54	74	-27.46	PK
Vertical		2325.2	34.01	6.13	40.14	54	-13.86	AVG
	@	2402	95.55	6.13	101.68	N/A	N/A	PK
	@	2402	95.31	6.13	101.44	N/A	N/A	AVG
	*	4804	37.14	2.46	39.6	74	-34.4	РК



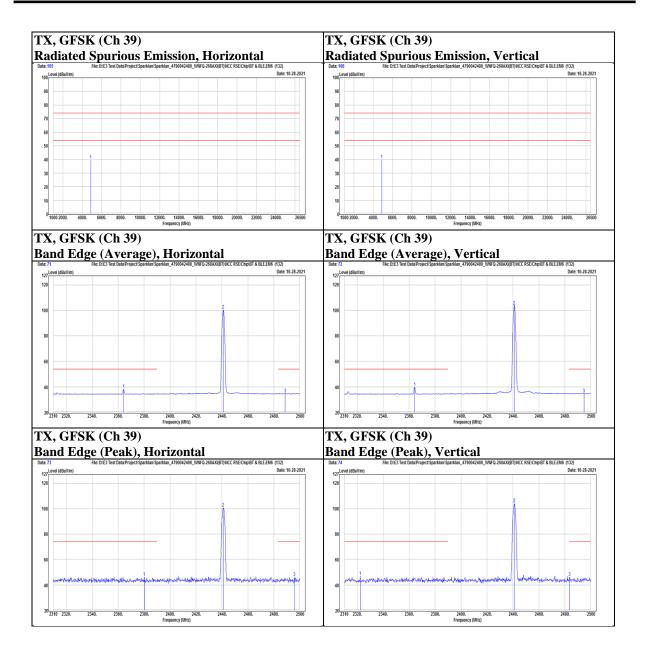




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Mode C	GFSK			Channel	1 39			
					-			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
FOIAITZAUOII	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark
		2364.15	31.85	6.06	37.91	54	-16.09	AVG
		2380.11	40.03	6.08	46.11	74	-27.89	PK
	@	2441	94.42	6.11	100.53	N/A	N/A	PK
Horizontal	@	2441	94.1	6.11	100.21	N/A	N/A	AVG
		2488.79	28.66	6.1	34.76	54	-19.24	AVG
		2496.01	40.07	6.1	46.17	74	-27.83	PK
	*	4882	36.78	2.66	39.44	74	-34.56	PK
		2322.35	40.51	6.15	46.66	74	-27.34	PK
		2364.15	33.56	6.06	39.62	54	-14.38	AVG
-	@	2441	97.8	6.11	103.91	N/A	N/A	PK
Vertical	@	2441	97.4	6.11	103.51	N/A	N/A	AVG
		2483.66	40.04	6.1	46.14	74	-27.86	PK
		2494.87	28.67	6.1	34.77	54	-19.23	AVG
	*	4882	37.15	2.66	39.81	74	-34.19	РК



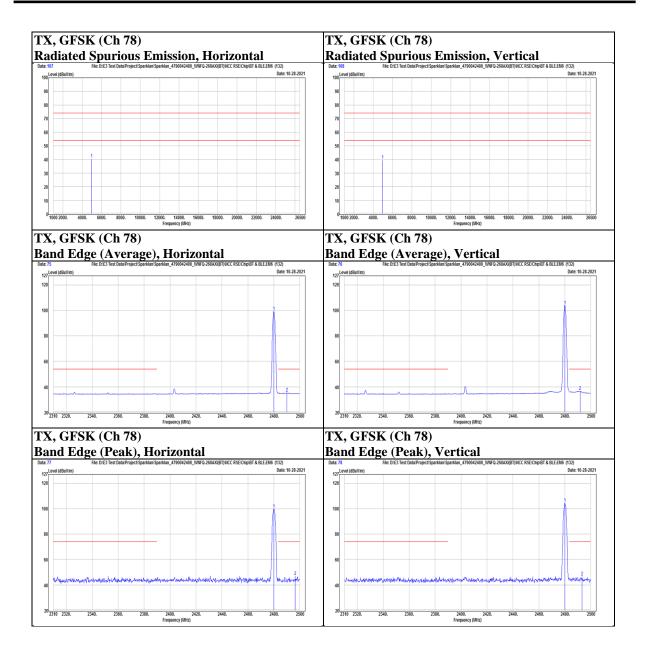




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Mode	GFSK			Channel	l 78			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalizatioli	Inotation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kelliark
	@	2480	93.57	6.1	99.67	N/A	N/A	PK
	@	2480	93.05	6.1	99.15	N/A	N/A	AVG
Horizontal		2490.12	29.16	6.1	35.26	54	-18.74	AVG
		2496.58	40.71	6.1	46.81	74	-27.19	PK
	*	4960	37.86	2.62	40.48	74	-33.52	PK
	@	2480	98.05	6.1	104.15	N/A	N/A	PK
	@	2480	97.5	6.1	103.6	N/A	N/A	AVG
Vertical		2491.83	30.37	6.1	36.47	54	-17.53	AVG
		2493.35	40.3	6.1	46.4	74	-27.6	PK
	*	4960	36.94	2.62	39.56	74	-34.44	PK



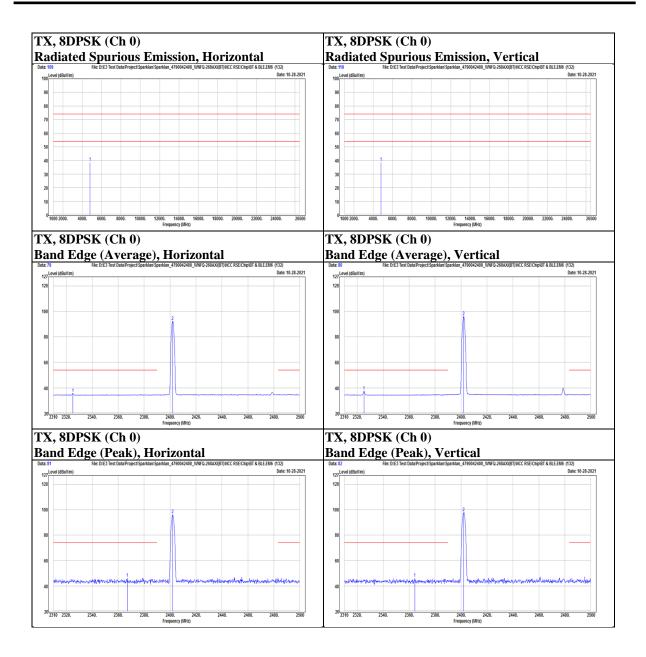




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Mode 8	8DPSK			Channel	l 0			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalization	INOLALIOII	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark
		2325.01	29.54	6.13	35.67	54	-18.33	AVG
		2367	40.17	6.07	46.24	74	-27.76	PK
Horizontal	@	2402	89.95	6.13	96.08	N/A	N/A	PK
	@	2402	86.07	6.13	92.2	N/A	N/A	AVG
	*	4804	36.18	2.46	38.64	74	-35.36	PK
		2325.2	31.24	6.13	37.37	54	-16.63	AVG
		2364.34	40.01	6.06	46.07	74	-27.93	PK
Vertical	@	2402	91.57	6.13	97.7	N/A	N/A	PK
	@	2402	89.87	6.13	96	N/A	N/A	AVG
	*	4804	36.14	2.46	38.6	74	-35.4	PK



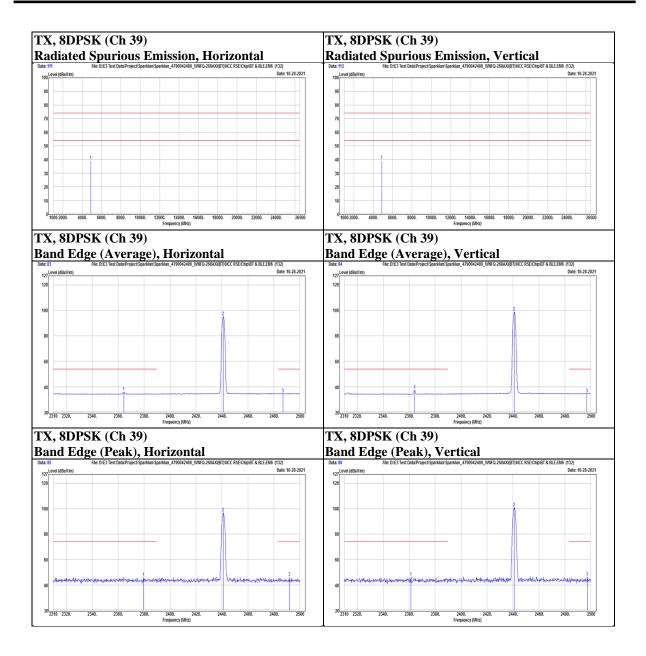




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Mode 8	BDPSK			Channel	1 39			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
rolalization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kelliark
		2364.34	29.95	6.06	36.01	54	-17.99	AVG
		2379.54	39.78	6.08	45.86	74	-28.14	PK
	@	2441	90.57	6.11	96.68	N/A	N/A	PK
Horizontal	@	2441	88.92	6.11	95.03	N/A	N/A	AVG
		2487.08	28.56	6.1	34.66	54	-19.34	AVG
		2492.02	40.01	6.1	46.11	74	-27.89	PK
	*	4882	36.33	2.66	38.99	74	-35.01	PK
		2361.3	40.19	6.05	46.24	74	-27.76	PK
		2364.15	31.25	6.06	37.31	54	-16.69	AVG
	@	2441	94.62	6.11	100.73	N/A	N/A	PK
Vertical	@	2441	92.51	6.11	98.62	N/A	N/A	AVG
-		2496.96	28.66	6.1	34.76	54	-19.24	AVG
		2497.34	40.35	6.1	46.45	74	-27.55	PK
	*	4882	36.55	2.66	39.21	74	-34.79	РК



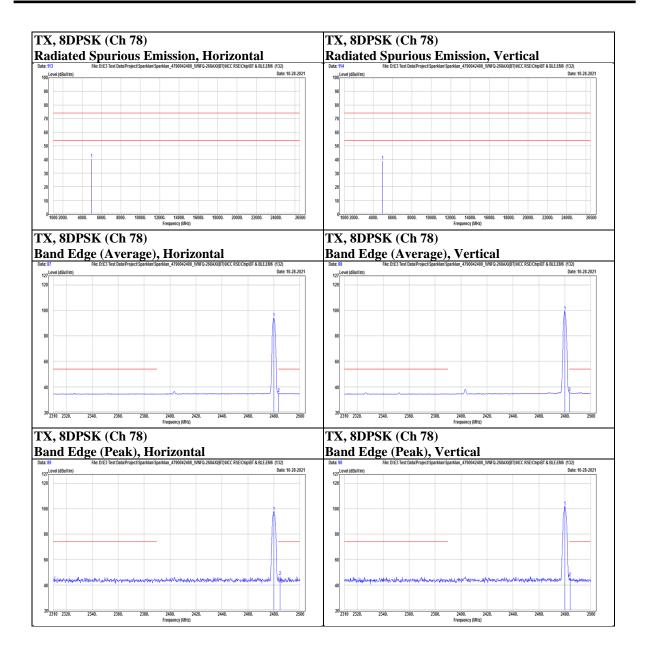




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Mode 8	8DPSK			Channel	l 78			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalization	INOLALIOIT	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark
	@	2480	91.62	6.1	97.72	N/A	N/A	РК
	@	2480	87.81	6.1	93.91	N/A	N/A	AVG
Horizontal		2483.66	28.71	6.1	34.81	54	-19.19	AVG
		2484.8	40.6	6.1	46.7	74	-27.3	PK
	*	4960	37.8	2.62	40.42	74	-33.58	PK
	@	2480	95.8	6.1	101.9	N/A	N/A	PK
	@	2480	93.1	6.1	99.2	N/A	N/A	AVG
Vertical		2483.66	29.53	6.1	35.63	54	-18.37	AVG
		2484.04	39.73	6.1	45.83	74	-28.17	PK
	*	4960	36.38	2.62	39	74	-35	РК







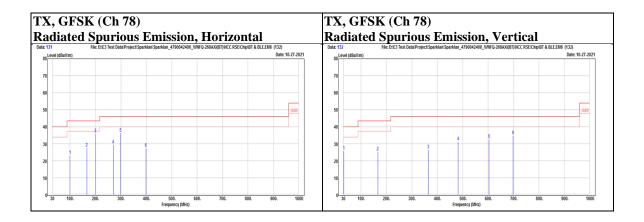
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Below 1 GHz

Mode C	GFSK			Channel	l 78			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalizatioli	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kelliark
		99.84	39.73	-16.45	23.28	43.5	-20.22	PK
		165.8	38.72	-11.13	27.59	43.5	-15.91	PK
Horizontal		199.75	49.84	-13.91	35.93	43.5	-7.57	PK
Horizontai		269.59	40.62	-11.02	29.6	46	-16.4	PK
		298.69	46.37	-9.99	36.38	46	-9.62	PK
		398.6	34.54	-7.06	27.48	46	-18.52	PK
		31.94	38.19	-12.47	25.72	40	-14.28	PK
		165.8	36.53	-11.13	25.4	43.5	-18.1	PK
Mantinal.		364.65	34.45	-8.01	26.44	46	-19.56	PK
Vertical		482.02	36.55	-5.1	31.45	46	-14.55	PK
		603.27	34.55	-1.89	32.66	46	-13.34	PK
		698.33	35.29	-0.45	34.84	46	-11.16	PK



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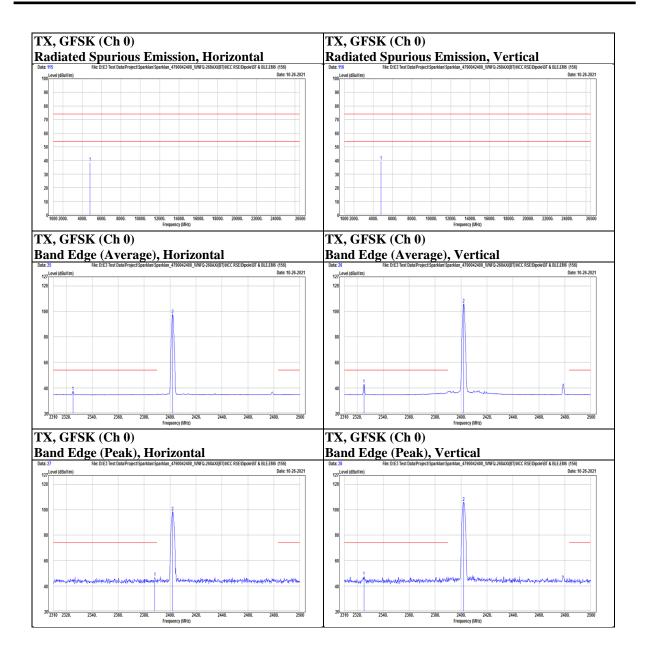
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Dipole (Model: AD-501AX)

Above 1 GHz

Mode	GFSK				Channel 0					
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark		
Folarization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark		
		2325.2	30.96	6.13	37.09	54	-16.91	AVG		
		2388.28	40.59	6.1	46.69	74	-27.31	PK		
Horizontal	@	2402	92.16	6.13	98.29	N/A	N/A	PK		
	@	2402	91.42	6.13	97.55	N/A	N/A	AVG		
	*	4804	36.09	2.46	38.55	74	-35.45	PK		
		2325.2	41.23	6.13	47.36	74	-26.64	PK		
		2325.2	36.48	6.13	42.61	54	-11.39	AVG		
Vertical	@	2402	99.85	6.13	105.98	N/A	N/A	PK		
	@	2402	99.68	6.13	105.81	N/A	N/A	AVG		
	*	4804	37.01	2.46	39.47	74	-34.53	PK		



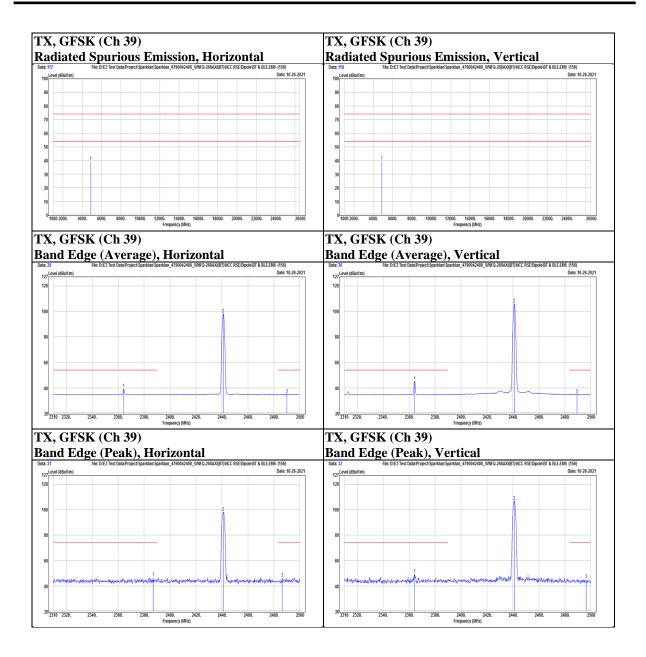




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Mode GFSK				Channel 39					
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark	
1 Olarization	Notation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kemark	
		2364.15	33.12	6.06	39.18	54	-14.82	AVG	
		2387.14	40.53	6.1	46.63	74	-27.37	PK	
	@	2441	92.07	6.11	98.18	N/A	N/A	PK	
Horizontal	@	2441	91.85	6.11	97.96	N/A	N/A	AVG	
		2486.51	40.11	6.1	46.21	74	-27.79	PK	
		2490.12	28.82	6.1	34.92	54	-19.08	AVG	
-	*	4882	36.64	2.66	39.3	74	-34.7	PK	
		2364.15	43.55	6.06	49.61	74	-24.39	PK	
-		2364.15	39.1	6.06	45.16	54	-8.84	AVG	
-	@	2441	100.71	6.11	106.82	N/A	N/A	PK	
Vertical	@	2441	99.61	6.11	105.72	N/A	N/A	AVG	
		2489.36	28.87	6.1	34.97	54	-19.03	AVG	
		2496.58	39.24	6.1	45.34	74	-28.66	PK	
	*	4882	36.99	2.66	39.65	74	-34.35	PK	



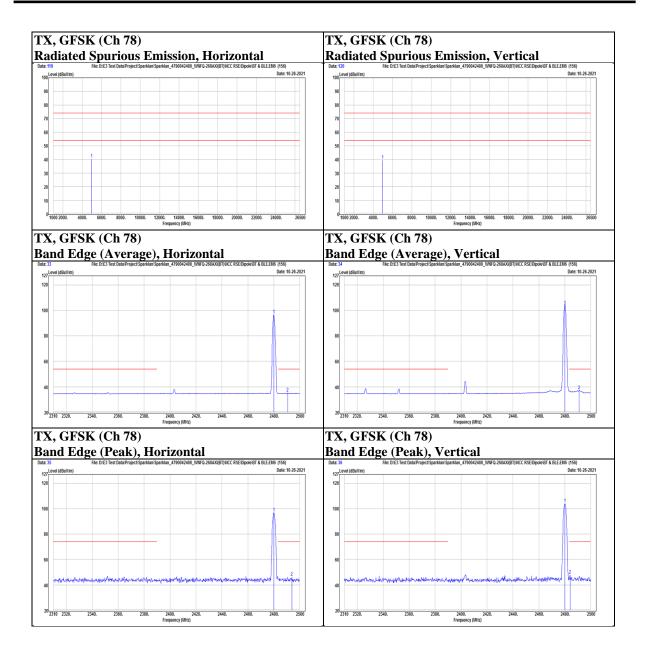




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Mode	GFSK			Channel	l 78			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalization	Inotation	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark
	@	2480	90.58	6.1	96.68	N/A	N/A	PK
	@	2480	90.38	6.1	96.48	N/A	N/A	AVG
Horizontal		2490.69	29.19	6.1	35.29	54	-18.71	AVG
		2493.92	39.96	6.1	46.06	74	-27.94	PK
	*	4960	37.68	2.62	40.3	74	-33.7	PK
	@	2480	97.9	6.1	104	N/A	N/A	PK
	@	2480	97.61	6.1	103.71	N/A	N/A	AVG
Vertical		2484.04	41.52	6.1	47.62	74	-26.38	PK
		2491.07	31.07	6.1	37.17	54	-16.83	AVG
	*	4960	36.83	2.62	39.45	74	-34.55	PK



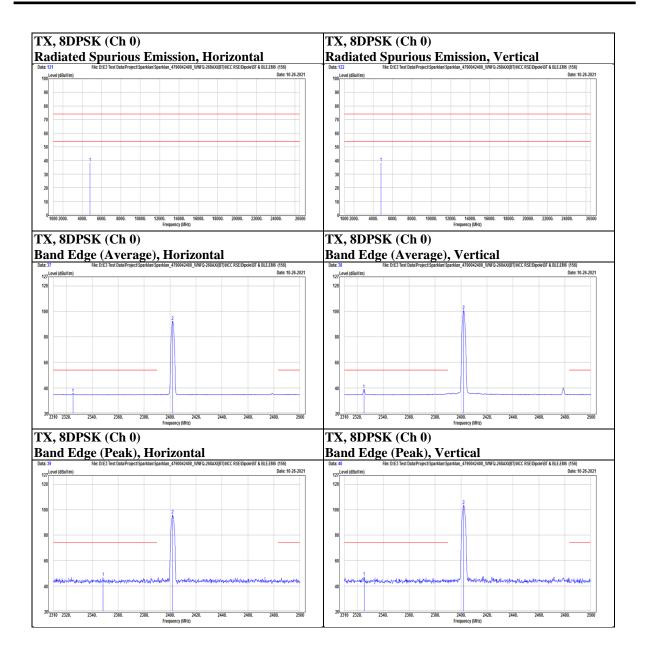




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Mode 8	8DPSK			Channel	l 0			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
Folalization	INOLALIOII	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Kennark
		2325.2	29.48	6.13	35.61	54	-18.39	AVG
		2348.38	40.72	6.04	46.76	74	-27.24	PK
Horizontal	@	2402	89.73	6.13	95.86	N/A	N/A	PK
	@	2402	86.05	6.13	92.18	N/A	N/A	AVG
	*	4804	36.02	2.46	38.48	74	-35.52	PK
		2325.2	32.67	6.13	38.8	54	-15.2	AVG
		2325.39	40.95	6.13	47.08	74	-26.92	PK
Vertical	@	2402	97.28	6.13	103.41	N/A	N/A	PK
	@	2402	94.46	6.13	100.59	N/A	N/A	AVG
	*	4804	35.95	2.46	38.41	74	-35.59	PK



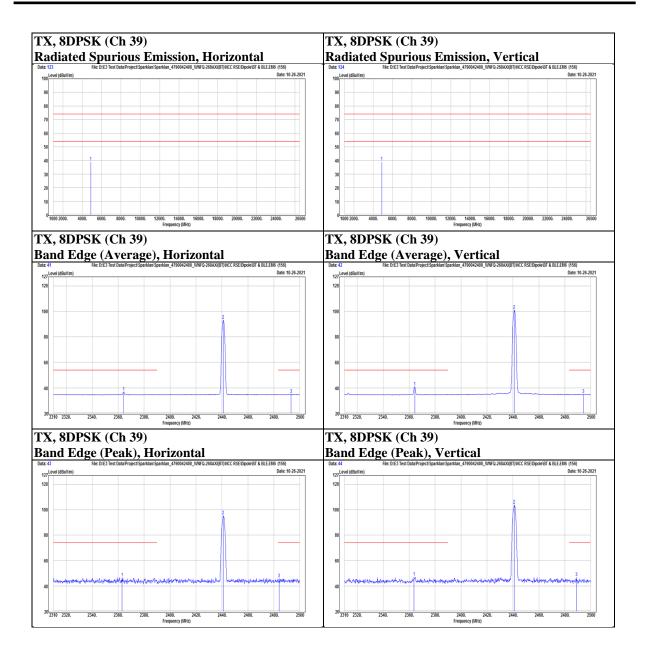




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Mode 8	BDPSK			Channel	1 39				
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark	
		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		
		2363.01	40.46	6.06	46.52	74	-27.48	PK	
		2364.15	30.89	6.06	36.95	54	-17.05	AVG	
	@	2441	89.22	6.11	95.33	N/A	N/A	PK	
Horizontal	@	2441	86.89	6.11	93	N/A	N/A	AVG	
		2484.04	39.72	6.1	45.82	74	-28.18	PK	
		2493.35	28.8	6.1	34.9	54	-19.1	AVG	
	*	4882	36.21	2.66	38.87	74	-35.13	PK	
Vertical		2363.77	40.99	6.06	47.05	74	-26.95	PK	
		2364.34	34.77	6.06	40.83	54	-13.17	AVG	
	@	2441	97.55	6.11	103.66	N/A	N/A	PK	
	@	2441	94.64	6.11	100.75	N/A	N/A	AVG	
		2488.98	40.7	6.1	46.8	74	-27.2	PK	
		2494.3	28.89	6.1	34.99	54	-19.01	AVG	
	*	4882	36.42	2.66	39.08	74	-34.92	РК	







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Mode 8	8DPSK			Channel	l 78			
Polarization	Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
	@	2480	88.54	6.1	94.64	N/A	N/A	PK
	@	2480	84.83	6.1	90.93	N/A	N/A	AVG
Horizontal		2484.42	39.8	6.1	45.9	74	-28.1	РК
		2490.31	28.86	6.1	34.96	54	-19.04	AVG
	*	4960	37.65	2.62	40.27	74	-33.73	PK
	@	2480	96.45	6.1	102.55	N/A	N/A	PK
Vertical	@	2480	94.15	6.1	100.25	N/A	N/A	AVG
		2483.66	29.94	6.1	36.04	54	-17.96	AVG
		2487.46	39.93	6.11	46.04	74	-27.96	PK
	*	4960	36.25	2.62	38.87	74	-35.13	РК