



TEST REPORT

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APPLICANT	:	Shenzhen Chainway Information Technology Co., Ltd.
PRODUCT NAME	:	Mobile Data Terminal
MODEL NAME	:	C66
BRAND NAME	:	CHAINWAY
FCC ID	:	2AC6AC66P
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2021-04-13
TEST DATE	:	2021-05-02 to 2021-06-03
ISSUE DATE	:	2021-10-14

Edited by:

Yong Mi

Peng Mi (Rapporteur)

Approved by:

Shen Junsheng (Supervisor)

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Change History				
Version Date Reason for change				
1.0	2021-10-14	First edition		





1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Shenzhen Chainway Information Technology Co., Ltd.	
	9F Building 2, Daqian Industrial Park, District 67, XingDong	
Applicant Address:	Community, Xin'an Street, Bao'an District, Shenzhen,	
	Guangdong, China	
Manufacturer:	Shenzhen Chainway Information Technology Co., Ltd.	
	9F Building 2, Daqian Industrial Park, District 67, XingDong	
Manufacturer Address:	Community, Xin'an Street, Bao'an District, Shenzhen,	
	Guangdong, China	

1.2. Equipment Under Test (EUT) Description

Product Name:	Mobile Data Term	Mobile Data Terminal			
Sample No.:	4#	4#			
Hardware Version:	QDC505-GL_V1.	2			
Software Version:	C66_Common_V	(1.00			
Equipment Type:	Bluetooth classic				
Bluetooth Version:	5.1				
Modulation Type:	FHSS (GFSK(1Mbps), π/4-DQPSK(EDR 2Mbps), 3-DPSK(EDR 3Mbps))				
Operating Frequency Range:	2402MHz-2480N	ЛНz			
Antenna Type:	PIFA Antenna				
Antenna Gain:	1.3dBi				
	Battery				
	Brand Name:	CHAINWAY			
	Model No.:	J295			
Accessory Information	Serial No.:	N/A			
Accessory Information:	Capacity:	4300mAh			
	Rated Voltage:	3.8V			
	Charge Limit:	4.35V			
	Manufacturer:	Hixon(Shenzhen) Technology Limited			



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	AC Adapter		
	Brand Name:	FULLPOWER	
	Model No.:	DBS15Q	
	Serial No.:	N/A	
	Rated Output:	5V=3A, 9V=2A, 12V=1.5A	
Accessory Information:	Rated Input:	100-240V~50/60Hz, 0.5A	
	Manufacturer:	SHENZHEN SHI YING YUAN	
		ELECTRONICS CO LTD	
	USB Cable		
	Model No.:	1.8.17.067	
	Manufacturer:	SHENZHEN HUANJIAN ELECTRONIC	
		CO., LTD.	

Note 1: The EUT only use 9V=2A rated output.

Note 2: We use the dedicated software to control the EUT continuous transmission.

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.





1.3. The Channel Number and Frequency

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		

Note 1: The black bold channels were selected for test.





1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No.	Identity	Document Title			
1	47 CFR Part 15	Radio Frequency Devices			
Test	Test detailed items/section required by FCC rules and results are as below:				

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	15.247(a) 15.247(h)	Hopping Mechanism	N/A	N/A	PASS	No deviation
3	15.247(a)	Number of Hopping Frequency	May 04, 2021	Meng Shurui	PASS	No deviation
4	ANSI C63.10	Duty Cycle	May 04, 2021	Meng Shurui	PASS	No deviation
5	15.247(b)	Maximum Peak Conducted Output Power	May 04, 2021	Meng Shurui	PASS	No deviation
6	15.247(b)	Maximum Average Conducted Output Power	May 04, 2021	Meng Shurui	PASS	No deviation
7	15.247(a)	20dB Bandwidth	May 04, 2021	Meng Shurui	PASS	No deviation
8	15.247(a)	Carrier Frequency Separation	May 04, 2021	Meng Shurui	PASS	No deviation
9	15.247(a)	Time of Occupancy (Dwell time)	May 04, 2021	Meng Shurui	PASS	No deviation
10	15.247(d)	Conducted Spurious Emission	May 04, 2021	Meng Shurui	PASS	No deviation
11	15.207	Conducted Emission	May 02, 2021	Wu Runfeng	PASS	No deviation
12	15.247(d)	Restricted Frequency Bands	Jun 03, 2021	Gao Jianrou	PASS	No deviation
13	15.209, 15.247(d)	Radiated Emission	May 30, 2021	Gao Jianrou	PASS	No deviation



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Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013, KDB558074 D01 v05r02 and DA 00-075.

Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The Ref offset 1.5dB means the cable loss is 1.5dB.

Note 3: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 4: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106





2.47 CFR Part 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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.

2.1.2. Test Result: Compliant

Inside of the EUT has a PIFA antenna coupled with the metal shrapnel. Please refer to the EUT internal photos.

2.2. Hopping Mechanism

2.2.1. Requirement

According to FCC §15.247(a)(1), a frequency hopping spread spectrum system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

According to FCC §15.247(h), the incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

2.2.2. Result: Compliant

The hopping mechanism of the EUT is in compliance with the document "*Bluetooth core specification v5.1*".





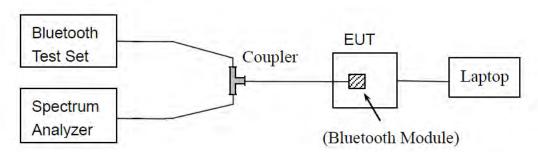
2.3. Number of Hopping Frequency

2.3.1. Requirement

According to FCC §15.247(a)(1)(iii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

2.3.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

2.3.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = the frequency band of operation

RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

VBW ≥ RBW

Sweep = auto Detector function = peak Trace = max hold

Allow the trace to stabilize





2.3.4. Test Result

A. Test Verdict:

Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	PASS
π/4-DQPSK	2400 - 2483.5	79	15	PASS
8-DPSK	2400 - 2483.5	79	15	PASS

B. Test Plot:



(GFSK)



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arker 1 Δ 79.074500000	PNO: Fast IFGain:Low Atten: 30 dB	Avg Type: Log-Pwr Avg Hold>100/100	05:02:31 PM May 04, 2021 TRACE 2 2 4 TYPE MUMANANAN DET P N REN (LN	Peak Search
Ref Offset 1.5 dB dB/div Ref 20.00 dBm		ΔMkr	1 79.074 5 MHz -0.707 dB	Next Peak
	wwwwwwwwww	www.www.www	~~~~~ ¹ ^2	Next Pk Right
0.0				Next Pk Lef
0.0				Marker Delta
00				Mkr→CF
un				MkrRefLv
tart 2.40000 GHz Res BW 300 kHz	#VBW 300 kHz	Swoon	Stop 2.48350 GHz .133 ms (1001 pts)	More 1 of 2

(m/4-DQPSK)









2.4. Duty Cycle of Test Signal

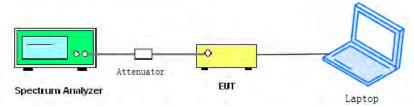
2.4.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be nonconstant.

2.4.2. Test Description

Test Setup:



ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.

2.4.3. Test Result

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*lg[1/D])
GFSK	76.80	1.15
π/4-DQPSK	77.33	1.12
8-DPSK	77.33	1.12



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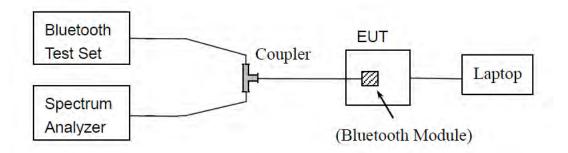
2.5. Maximum Peak Conducted Output Power

2.5.1. Requirement

According to FCC §15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.5.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.





2.5.3. Test Result

GFSK Mode

A. Test Verdict:

Channel	Frequency	Measured Output Peak Power		Lin	nit	Vardiat
Channel	(MHz)	dBm	W	dBm	W	Verdict
0	2402	10.96	0.012			PASS
39	2441	10.61	0.012	20.96	0.125	PASS
78	2480	10.90	0.012			PASS

B. Test Plot:



(Channel 0, GFSK)



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(Channel 39, GFSK)



(Channel 78, GFSK)

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π/4-DQPSK Mode

A. Test Verdict:

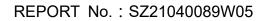
Channel	Frequency	Measured Output Peak Power L		Lin	nit	Vardiat
Channel	(MHz)	dBm	W	dBm	W	Verdict
0	2402	10.45	0.011			PASS
39	2441	9.87	0.010	20.96	0.125	PASS
78	2480	10.33	0.011	-		PASS

B. Test Plot:

	: Fast C Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr	05:07:54 PM May 04, 2021 TRACE 2 4 TYPE MULLING DET P. N.N.N.N.N	Frequency
Ref Offset 1.5 dB B/div Ref 20.00 dBm		Mkr1	2.402 100 GHz 10.454 dBm	Auto Tune
	¢1			Center Freq 2.402000000 GHz
				Start Free 2.399500000 GHz
				Stop Fred 2.404500000 GH
				CF Step 500.000 kH Auto Mar
				Freq Offse 0 Ha
ter 2.402000 GHz s BW 1.5 MHz	#VBW 5.0 MHz		Span 5.000 MHz .000 ms (1001 pts)	

(Channel 0, π/4-DQPSK)

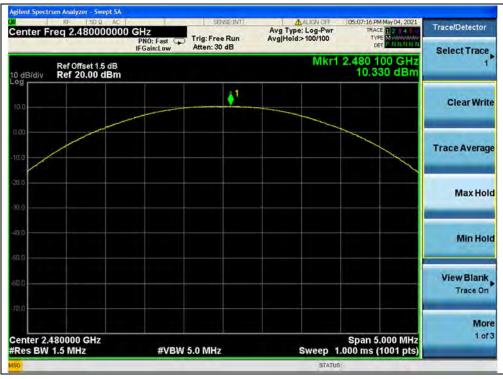








(Channel 39, π/4-DQPSK)



(Channel 78, π/4-DQPSK)

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8-DPSK Mode

A. Test Verdict:

Channel	Frequency	Measured Output Peak Power Limit		Verdict		
Channel	(MHz)	dBm	W	dBm	W	verdict
0	2402	10.62	0.012			PASS
39	2441	10.20	0.010	20.96	0.125	PASS
78	2480	10.53	0.011			PASS

B. Test Plot:

nter Freq 2.402000000 GI	SENSE UNT PNO: Fast Gain:Low Atten: 30 dB	Avg Type: Log-Pwr Avg Hold>100/100	05:08:12 PM May 04, 2021 TRACE 2 4 TYPE TYPE MAAAAAAAA DET E NALINALIN	Trace/Detector
B/div Ref 20.00 dBm		Mkr1	2.402 015 GHz 10.622 dBm	1
	¥1			Clear Wri
				Trace Avera
				Max Ho
				Min Ho
1 1				View Blani Trace Or
nter 2.402000 GHz es BW 1.5 MHz	#VBW 5.0 MHz	Swaar 1	Span 5.000 MHz .000 ms (1001 pts)	Mo 1 a

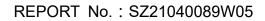
(Channel 0, 8-DPSK)



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(Channel 39, 8-DPSK)



(Channel 78, 8-DPSK)

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2.6. Maximum Average Conducted Output Power

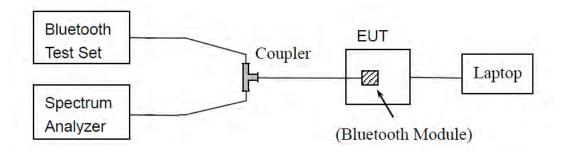
2.6.1. Requirement

According to FCC §15.247(b), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum average output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.6.2. Test Description

The measured output power was calculated by the reading of the USB Wideband Power Sensor and calibration.

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.





2.6.3. Test Result

GFSK Mode

	Fraguanay	Moogurad		Average Pov	wer	1.5	mit	
Channel	Frequency (MHz)	Measured	Duty	Duty Factor	r Calculated		Limit	
	(IVITZ)	dBm	Factor	dBm	W	dBm	W	
0	2402	9.64		10.79	0.012			PASS
39	2441	9.16	1.15	10.31	0.011	20.96	0.125	PASS
78	2480	9.57		10.72	0.012			PASS

π/4-DQPSK Mode

	Frequency	Measured		Average Pov	wer	Lie	mit	
Channel	Frequency (MHz)	Measureu	Duty	Duty Factor	r Calculated	Limit		Verdict
	(IVITZ)	dBm	Factor	dBm	W	dBm	W	
0	2402	6.87		7.99	0.006			PASS
39	2441	5.95	1.12	7.07	0.005	20.96	0.125	PASS
78	2480	6.69		7.81	0.006			PASS

8-DPSK Mode

	Fraguanay	Measured		Average Pov	wer	1.1	mit	
Channel	Frequency (MHz)	Measureu	Duty	Duty Factor	^r Calculated	Limit		Verdict
	(10172)	dBm	Factor	dBm	W	dBm	W	
0	2402	6.81		7.93	0.006			PASS
39	2441	5.91	1.12	7.03	0.005	20.96	0.125	PASS
78	2480	6.66		7.78	0.006			PASS



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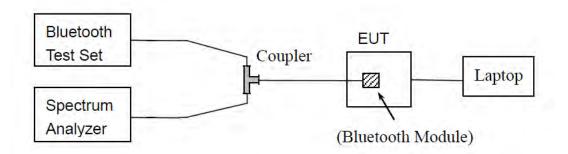
2.7. 20 dB Bandwidth

2.7.1. Definition

According to FCC 15.247(a)(1), the 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth ($10*\log 1\% = 20$ dB) taking the total RF output power.

2.7.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

2.7.3. Test Procedure

Use the following spectrum analyzer settings: Span = between 2 to 5 times the OBW, centered on the test channel RBW= 1% to 5% of the OBW $VBW \ge 3 \times RBW$ Sweep = auto Detector function = peak Trace = max hold





2.7.4. Test Result

GFSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Result
0	2402	0.931	PASS
39	2441	0.931	PASS
78	2480	0.933	PASS

B. Test Plot:



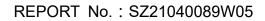
(Channel 0, GFSK)



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(Channel 78, GFSK)



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π/4-DQPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	1.310	PASS
39	2441	1.275	PASS
78	2480	1.276	PASS

B. Test Plot:

RF 50.0 AC Center Freq 2.402000000	GHz Cente	SENSE:INT r Freq: 2.402000000 GHz free Run Avg Hol h: 20 dB	d:>10/10	02:35:04 PM May 04, 2021 Ladio Std: None Ladio Device: BTS	Frequency
0 dB/div Ref 20.00 dBm					
00		Mann			Center Free 2.402000000 GH:
80 80	1				
00 mmmm			~~~	m	
80 80					
enter 2.402 GHz Res BW 30 kHz	#	VBW 100 kHz		Span 3 MHz weep 4.133 ms	CF Step
Occupied Bandwidt		Total Power	15.2 c		300.000 kH Auto Mar Freg Offse
Transmit Freq Error x dB Bandwidth	-317 Hz 1.310 MHz	OBW Power x dB	99.0 -20.00		OH

(Channel 0, π/4-DQPSK)



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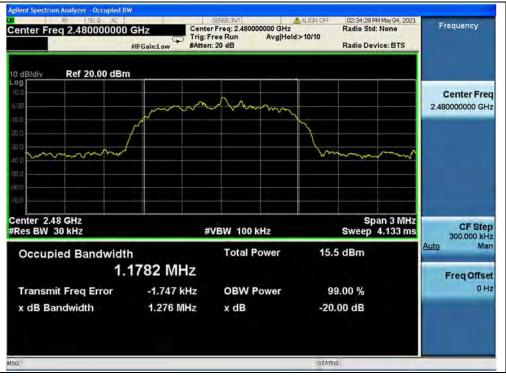
Fax: 86-755-36698525







(Channel 39, π/4-DQPSK)



(Channel 78, π/4-DQPSK)



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8-DPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
0	2402	1.291	PASS
39	2441	1.283	PASS
78	2480	1.289	PASS

B. Test Plot:

enter Freq 2.402000000	Trig: f	SENSE:INT rr Freq: 2.402000000 GHz Free Run Avg Hold h: 20 dB	Radio Ste	1: None	e/Detector
0 dB/div Ref 20.00 dBm 0 g 0 0		manny			Clear Write
			hum	~~~~	Average
00 00 00					Max Hol
enter 2.402 GHz Res BW 30 kHz	#	VBW 100 kHz	Sp Sweep	oan 3 MHz 4.133 ms	Min Hol
Occupied Bandwidth	1852 MHz	Total Power	15.7 dBm		Detecto
Transmit Freq Error x dB Bandwidth	707 Hz 1.291 MHz	OBW Power x dB	99.00 % -20.00 dB	Auto	Average Ma
G			STATUS		

(Channel 0, 8-DPSK)



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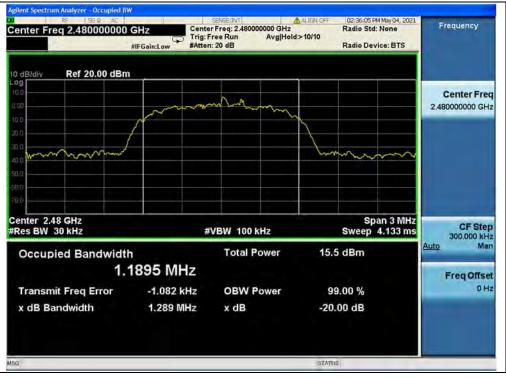
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(Channel 39, 8-DPSK)



(Channel 78, 8-DPSK)



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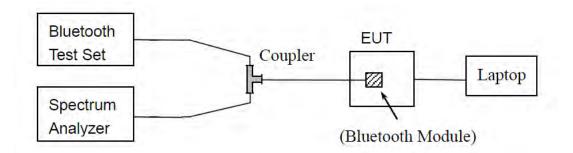
2.8. Carried Frequency Separation

2.8.1. Definition

According to FCC §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

2.8.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

2.8.3. Test Procedure

The EUT must have its hopping function enabled. According to DA 00-705, use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span

Video (or Average) Bandwidth (VBW) ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.





2.8.4. Test Result

A. Test Verdict:

	Measured	Carried Frequency	20 dB		
Test Mode	Channel	Separation	Bandwidth	Min. Limit	Verdict
	Numbers	(MHz)	(MHz)		
GFSK	39 and 40	1.005	0.933	two-thirds of the - 20dBbandwidth -	PASS
π/4-DQPSK	39 and 40	1.194	1.310		PASS
8-DPSK	39 and 40	0.993	1.291		PASS

B. Test Plot:



(GFSK)



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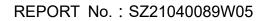


(π/4-DQPSK)





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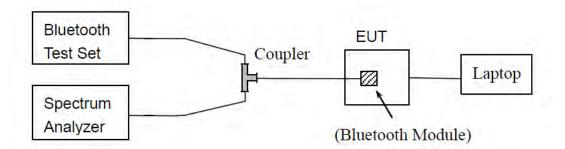
2.9. Time of Occupancy (Dwell time)

2.9.1. Requirement

According to FCC §15.247(a) (1) (iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

2.9.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

2.9.3. Test Procedure

Normal Mode:

DH1: Dwell time equal to Pulse time (ms) *(1600 / 2 /79)*31.6 Millisecond DH3: Dwell time equal to Pulse time (ms) * (1600 /4 /79) *31.6 Millisecond DH5: Dwell time equal to Pulse Time (ms)* (1600 / 6 /79) *31.6 Millisecond

AFH Mode:

DH1: Dwell time equal to Pulse time (ms) (800 / 2 / 20)(0.4 + 20) Millisecond DH3: Dwell time equal to Pulse time (ms) (800 / 4 / 20)(0.4 + 20) Millisecond DH5: Dwell time equal to Pulse Time (ms) (800 / 6 / 20)(0.4 + 20) Millisecond.





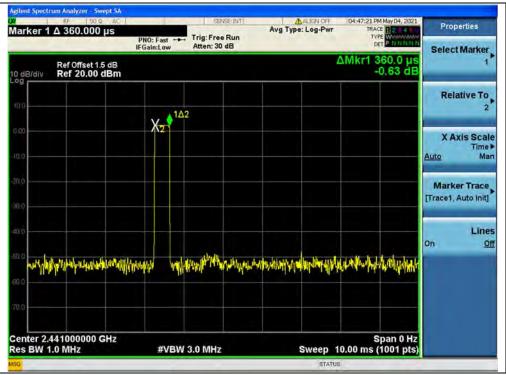
2.9.4. Test Result

GFSK Mode

A. Test Verdict:

DH Pulse Width		Dwell T	Dwell Time (ms)		Verdict
Packet	(ms)	Normal Mode	AFH Mode	Limit (sec)	Voraiot
DH1	0.36	115.20	57.60		PASS
DH3	1.60	256.00	128.00	0.4	PASS
DH5	2.88	307.20	153.60]	PASS

B. Test Plot:



(DH1, GFSK)

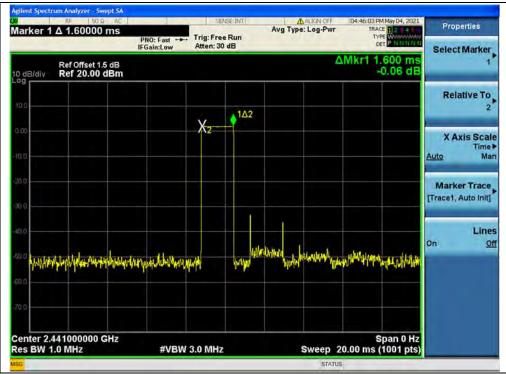


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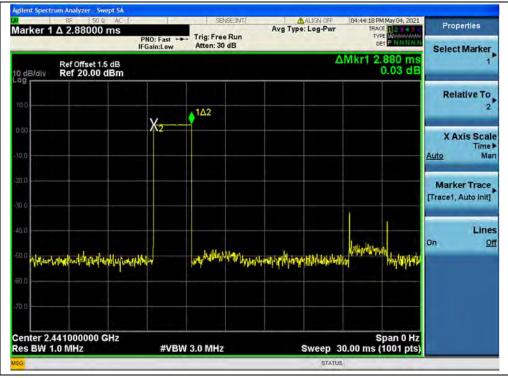
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(DH3, GFSK)







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Dama 24 of

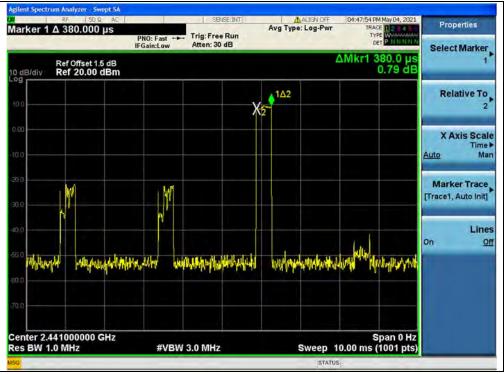


π/4-DQPSK Mode

A. Test Verdict:

DH Pul	Pulse Width	Ise Width Dwell Time (ms)		– Limit (sec)	Verdict
Packet	(ms)	Normal Mode	AFH Mode	Linit (Sec)	Verdici
DH1	0.38	121.60	60.80		PASS
DH3	1.62	259.20	129.60	0.4	PASS
DH5	2.73	291.20	145.60		PASS

B. Test Plot:



(DH1, π/4-DQPSK)

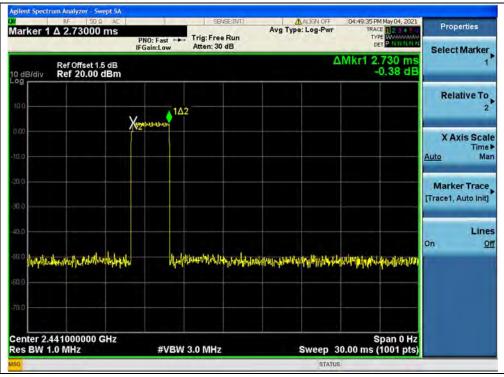


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(DH3, π/4-DQPSK)



(DH5, π/4-DQPSK)



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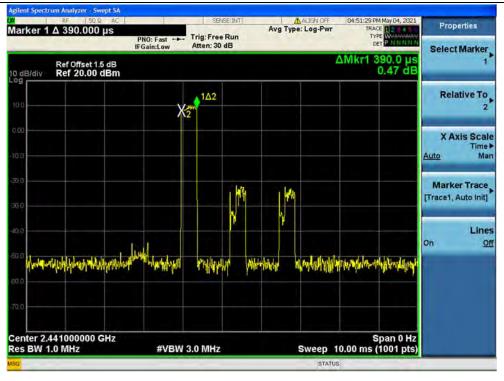


8-DPSK mode

A. Test Verdict:

DH	Pulse Width	Pulse Width Dwell Time (ms)			
Packet	(ms)	Normal Mode	AFH Mode	Limit (sec)	Verdict
DH1	0.39	124.80	62.40		PASS
DH3	1.64	262.40	131.20	0.4	PASS
DH5	2.73	291.20	145.60		PASS

B. Test Plot:



(DH1, 8-DPSK)

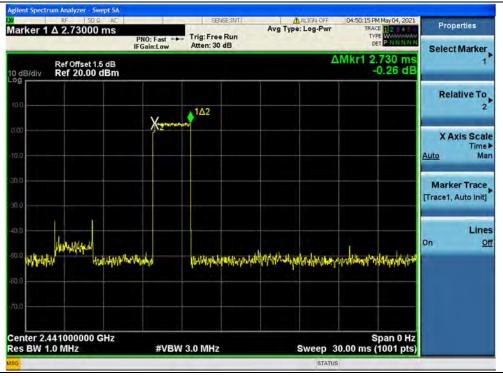


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larker 1	RF 50Ω AC 1 1 Δ 1.64000 ms	PNO: Fast				ALIGN OFF		Nay 04, 2021	Properties
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 0.0									X Axis Scal Time <u>Auto</u> Ma
0,0 0,0 0,0								riiu(lawiin	Marker Trace [Trace1, Auto Init]
0.0 0.0									Líne On <u>G</u>
u û	Aparticipation of the state of	opinulisel pluchectro	/	iyyy qilamu	www.Winder	telenertier	al-aventra.		
enter 2	441000000 GHz						Sn	an 0 Hz	
	1.0 MHz	#VBW	3.0 MHz			Sweep 2	0.00 ms (10		

(DH3, 8-DPSK)

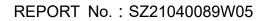


(DH5, 8-DPSK)



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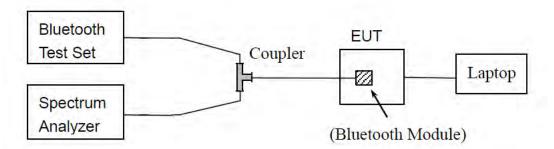
2.10. Conducted Spurious Emissions

2.10.1. Requirement

According to FCC §15.247(d), in any 100kHz 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 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.10.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

2.10.3. Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz VBW \geq RBW Sweep = auto Detector function = peak Trace = max hold Allow the trace to stabilize.





2.10.4. Test Result

GFSK Mode

A. Test Verdict:

	Frequency	Measured Max. Out of Band	Limit ((dBm)	
Channel			Carrier Level	Calculated	Verdict
	(10172)			-20dBc Limit	
0	2402	-43.43	10.49	-9.51	PASS
39	2441	-45.51	10.19	-9.81	PASS
78	2480	-42.64	10.08	-9.92	PASS

B. Test Plot:



(30MHz to 25GHz, Channel 0, GFSK)



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(Band edge, Channel 0, GFSK)

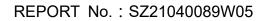


(Band edge with hopping on, Channel 0, GFSK)

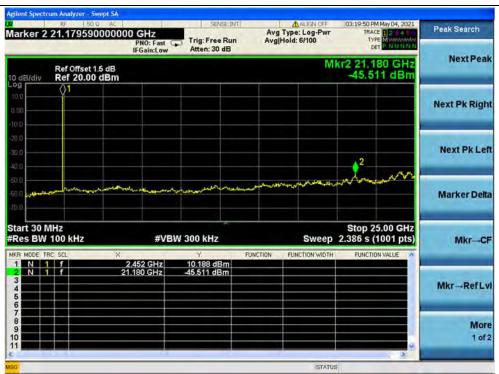


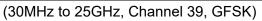
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Fax: 86-755-36698525 E-mail: service@morlab.cn







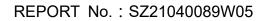




(30MHz to 25GHz, Channel 78, GFSK)



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(Band edge, Channel 78, GFSK)



(Band edge with hopping on, Channel 78, GFSK)





π/4-DQPSK Mode

A. Test Verdict:

	Fraguanay	requency Measured Max. Out of Band		Limit (dBm)			
Channel	Frequency	-	Carrier	Calculated	Verdict		
	(MHz) Emission (dBm)		Level	-20dBc Limit			
0	2402	-42.43	6.66	-13.34	PASS		
39	2441	-42.48	5.47	-14.53	PASS		
78	2480	-43.42	5.82	-14.18	PASS		

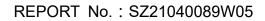
B. Test Plot:



(30MHz to 25GHz, Channel 0, π/4-DQPSK)



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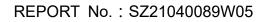
(Band edge, Channel 0, π/4-DQPSK)



(Band edge with hopping on, Channel 0, $\pi/4$ -DQPSK)

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And Annual Contract	04:34:00 PM May 04, 2021	ALIGN OFF	IT.	SENSE; D		AC	RF 50 0	-
Peak Search	TRACE 2 2 3 4 8 TYPE MUMANANANA DET 8 N.N.N.N.N.N	Type: Log-Pwr Iold: 9/100		Trig: Free Ru Atten: 30 dB	NO: Fast 😱 Sain:Low	P	4.026170	er 2
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Next Pk Righ							¢ ¹	
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Mkr→C	Stop 25.00 GHz 2.386 s (1001 pts)	Sweep	FUNCTION	300 kHz	#VBW :		00 kHz	30 M
Mkr→RefL	PORCHOWARDE	POINCHOIN WIDTH	PONCTION	5.469 dBm 42.478 dBm	2 GHz 6 GHz -	2.45		N 1
Mor 1 of								

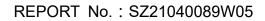
(30MHz to 25GHz, Channel 39, π/4-DQPSK)



(30MHz to 25GHz, Channel 78, π /4-DQPSK)



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	04:35:13 PM May 04, 2021	ALIGN OFF		SENSE:INT			Q AC	F 50	1
Marker	TRACE	Type: Log-Pwr Hold>100/100		ig: Free Run ten: 30 dB		PNO: Wide	000000	83500	2 2.4
Select Marker	2 2.483 50 GHz -56.745 dBm	Mkr		ten: 30 dB	v	IFGain:Low		f Offset 1 f 20.00	
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Mo 1 of									

(Band edge, Channel 78, π/4-DQPSK)



(Band edge with hopping on, Channel 78, $\pi/4$ -DQPSK)



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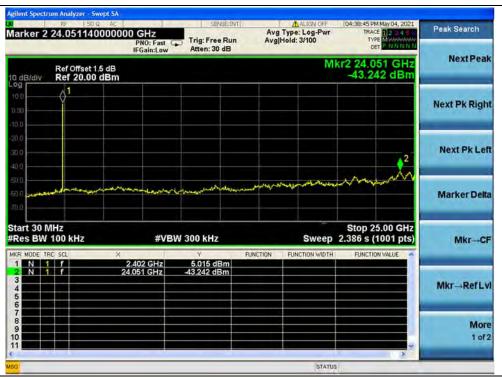


8-DPSK Mode

A. Test Verdict:

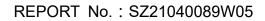
	Fraguanay	Measured Max. Out of Band	Limi	t (dBm)	
Channel	Frequency	1 7		Calculated	Verdict
	(MHz)	Emission (dBm)	Level	-20dBc Limit	
0	2402	-43.24	5.02	-14.98	PASS
39	2441	-46.01	4.66	-15.34	PASS
78	2480	-45.04	6.01	-13.99	PASS

B. Test Plot:



(30MHz to 25GHz, Channel 0, 8-DPSK)









(Band edge, Channel 0, 8-DPSK)

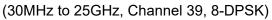


(Band edge with hopping on, Channel 0, 8-DPSK)





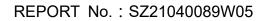
Peak Search	May 04, 2021 E 1 2 3 4 0 E MUMANIN T P NN NN N	TRACI TVP	ALIGN OFF Type: Log-Pwr Hold: 5/100	A	SENSE IN Trig: Free Run Atten: 30 dB	GHZ NO: Fast 😱 Gain:Low	AC 0000000 (P IF		er 2 2	
NextPea	55 GHz I0 dBm	(r2 21.1) -46.01	M			Ref Offset 1.5 dB Bidiv Ref 20.00 dBm				
Next Pk Righ								∆ 1		
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Mkr→C		Stop 25 2.386 s (1 FUNCTIO	Sweep	FUNCTION	300 kHz	#VBW	X	0 kHz	30 M BW 1	
Mkr→RefL					4.661 dBm 46.010 dBm	52 GHz 55 GHz		f	N 1 N 1	
Mor 1 of										
-	2	1	STATUS							





(30MHz to 25GHz, Channel 78, 8-DPSK)







AC SENSE UNT ALIGN OFF 04:40:16 PM May 04, 2021	Marker
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IB Mkr2 2.483 57 GHz	Select Marker
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	-
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man 22	
	Fixed
Span 10.00 MHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)	Off
X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE	
2,480 16 GHz 8,893 dBm 2,483 57 GHz -54,329 dBm	-
	Properties>
	More 1 of 2
	1012

(Band edge, Channel 78, 8-DPSK)



(Band edge with hopping on, Channel 78, 8-DPSK)

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2.11. Conducted Emission

2.11.1. Requirement

According to FCC section 15.207, for 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μ H/50 Ω line impedance stabilization network (LISN).

Frequency Penge (MHz)	Conducted	Limit (dBµV)
Frequency Range (MHz)	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5- 30	60	50

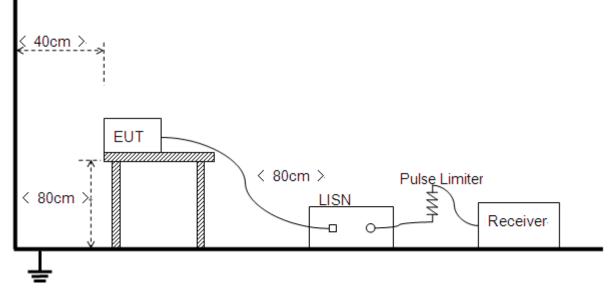
Note:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.11.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

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2.11.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

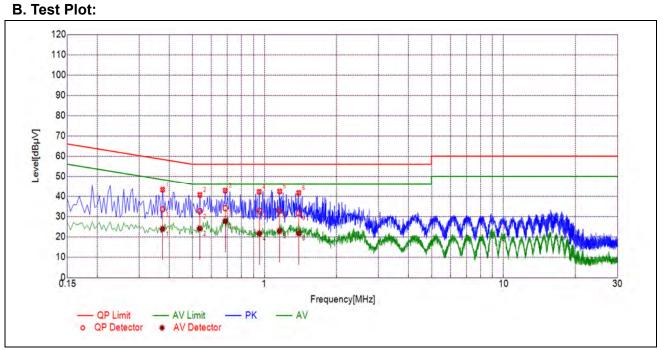
Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hzwere considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT+ Adapter +BT TX Test Voltage: AC 120V/60Hz The measurement results are obtained as below: E [dB μ V] =U_R + L_{Cable loss} [dB] + A_{Factor} U_R: Receiver Reading AFactor: Voltage division factor of LISN



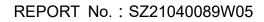




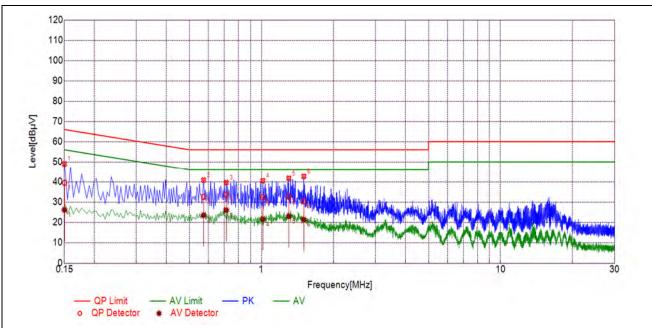
(L Phase)

No.	Fre.	Emission L	.evel (dBµV)	Limit (dBµV)	Power-line	Verdict
	(MHz)	Quai-peak	Average	Quai-peak	Average		
1	0.3751	33.57	23.90	58.39	48.39		PASS
2	0.5365	32.64	24.12	56.00	46.00		PASS
3	0.6855	34.08	27.73	56.00	46.00	Line	PASS
4	0.9520	32.79	21.62	56.00	46.00	Line	PASS
5	1.1571	32.67	22.87	56.00	46.00		PASS
6	1.3907	31.64	21.71	56.00	46.00		PASS



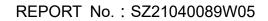






No.	Fre.			Limit (dBµV)	Power-line	Verdict
	(MHz)	Quai-peak	Average	Quai-peak	Average		
1	0.1501	39.49	26.15	65.99	55.99		PASS
2	0.5730	32.57	23.52	56.00	46.00		PASS
3	0.7127	33.70	25.99	56.00	46.00	Noutral	PASS
4	1.0135	32.39	21.55	56.00	46.00	Neutral	PASS
5	1.3010	32.59	22.99	56.00	46.00		PASS
6	1.5033	30.42	21.38	56.00	46.00		PASS







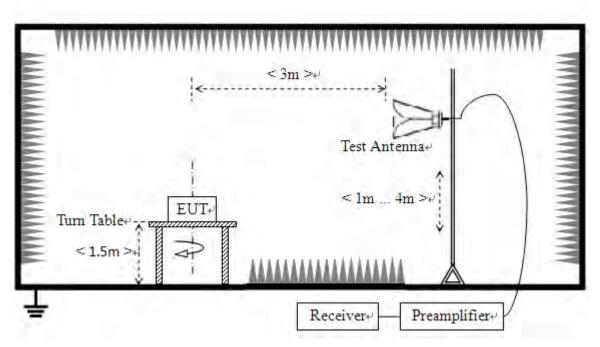
2.12. Restricted Frequency Bands

2.12.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

2.12.2. Test Description

Test Setup:



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Horn Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.





2.12.3. Test Procedure

Span = wide enough to fully capture the emission being measured RBW = 1 MHz for $f \ge 1$ GHz, 100 kHz for f < 1GHz VBW = 3 MHz Sweep = auto Detector function = peak/average Trace = max hold Allow the trace to stabilize

2.12.4. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

 $E [dB\mu V/m] = U_R + A_T + A_{Factor} [dB]; AT = L_{Cable loss} [dB] - G_{preamp} [dB]$

AT: Total correction Factor except Antenna

UR: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

GFSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U _R	A⊤ (dB)	A _{Factor} (dB@3m)	Max. Emission E	Limit (dBµV/m)	Verdict
		PK/ AV	(dBµV)			(dBµV/m)		
0	2363.34	PK	26.69	6.74	27.20	60.63	74	PASS
0	2390.00	AV	14.87	6.74	27.20	48.81	54	PASS
78	2484.09	PK	26.60	6.74	27.20	60.54	74	PASS
78	2497.14	AV	14.64	6.74	27.20	48.58	54	PASS

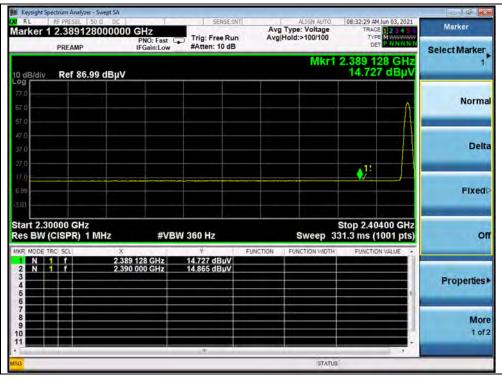




B. Test Plot:

L REPRESEL 50 9 DC		SENSE:INT		ALIGN AUTO	08:29:57 AM Jun 03, 2021	100000
ker 1 2.36333600000	PNO: Fast	Trig: Free Run		Type: Voltage Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE MWARMAN DET P NNNNN	Marker
PREAMP B/div Ref 86.99 dBµV	IFGain:Low	#Atten: 10 dB		Mkr1	2.363 336 GHz 26.689 dBµV	Select Marker
					Λ	Norma
			1-		\diamond^2	Delt
	n - n na seasona ann an stri	4-1	waantalameero		h-gangate, jina, phata ang 1	Fixed
rt 2.30000 GHz BW (CISPR) 1 MHz	#VBW	3.0 MHz		Sweep 1.	Stop 2.40400 GHz 000 ms (1001 pts)	o
BW (CISPR) 1 MHz MODE TRC SCL X N 1 f 2.36	53 336 GHz	3.0 MHz 26.689 dBµV 24.927 dBµV	FUNCTION	Sweep 1.	Stop 2.40400 GHz 000 ms (1001 pts) FUNCTION VALUE	O
BW (CISPR) 1 MHz MODE TRC SCL X N 1 f 2.36	53 336 GHz	ې 26.689 dByV	FUNCTION	Sweep 1.	000 ms (1001 pts)	

(PEAK, Channel 0, GFSK)



(AVERAGE, Channel 0, GFSK)

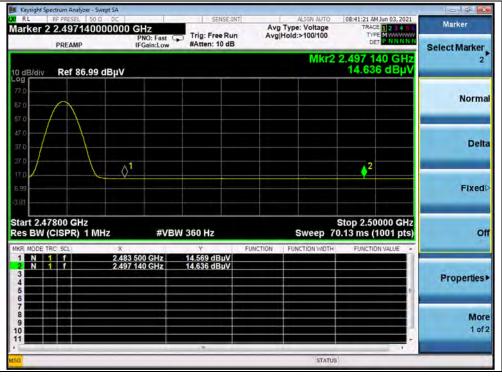


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	DC	SENSE: INT		ALIGN AUTO	08:37:56 AM Jun 03, 2021	Marker
rker 2 2.4840940 PREAMP	00000 GHz PNO: Fast IFGain:Low	Trig: Free Run #Atten: 10 dB		Type: Voltage Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE M MANNAN DET P N N N N N	Select Marker
Bidiv Ref 86.99	dBµV			Mkr2	2.484 094 GHz 26.600 dBµV	2
						Norma
	1 ²		يتعريك ومرجوع	and the second second		Delt
0 9 1						Fixed
nt 2.47800 GHz s BW (CISPR) 1 Mi		W 3.0 MHz	FUNCTION	Sweep 1.	Stop 2.50000 GHz 000 ms (1001 pts)	o
MODE TRC SCL N 1 f N 1 f	X 2.483 500 GHz 2.484 094 GHz	25.662 dBµV 26.600 dBµV				Properties
MODE TRC SCL	2.483 500 GHz					Properties Mon 1 of

(PEAK, Channel 78, GFSK)



(AVERAGE, Channel 78, GFSK)



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π/4-DQPSK Mode

A. Test Verdict:

Channel	Frequency	Detector	Receiver Reading	A _T	A _{Factor}	Max. Emission	Limit	Verdict
	(MHz)	PK/ AV	U _R (dBµV)	(dB)	(dB@3m)	E (dBµV/m)	(dBµV/m)	, er aret
0	2378.52	PK	25.95	6.74	27.20	59.89	74	PASS
0	2390.00	AV	14.66	6.74	27.20	48.60	54	PASS
78	2483.81	PK	26.96	6.74	27.20	60.90	74	PASS
78	2484.80	AV	14.55	6.74	27.20	48.49	54	PASS

B. Test Plot:

RL	RF PRESEL 50 2.378520 PREAMP		t G Trig: Free Run #Atten: 10 dB	ALIGN AUTO Avg Type: Voltage Avg Hold:>100/100	08:30:12 AM Jun 03, 2021 TRACE 2 3 4 5 (TYPE M NNNN DET P NNNNN	Marker Select Marker
0 dB/div	Ref 86.99) dBµV		Mkr1	2.378 520 GHz 25.949 dBµV	1
7 D					Λ	Norm
7 0 7 0 7 0 7 0				1-	\$ ²	Del
17.0 1.99 1.01						Fixed
es BW (0000 GHz CISPR) 1 N		/BW 3.0 MHz	Sweep 1	Stop 2.40400 GHz .000 ms (1001 pts)	c
KR MODE TO 1 N 1 2 N 1 3 4 5 5		X 2.378 520 GHz 2.390 000 GHz	25.949 dBuV	UNCTION FUNCTION (ADTH	FUNCTION VALUE	Properties
6 7 8 9 0						Mo 1 o
3	1		m	STATU		

(PEAK, Channel 0,π/4-DQPSK)

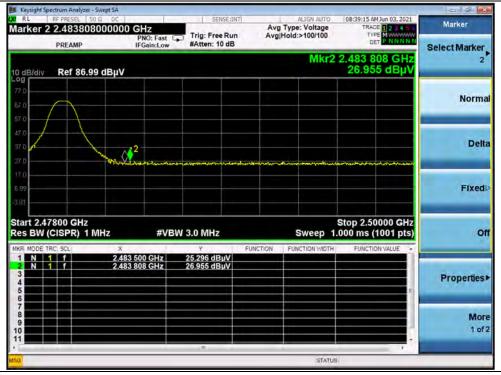


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Marker Select Marke	08:32:40 AMJun 03, 2021 TRACE 2 2 4 5 0 TYPE MWWWWW DET PNNNNN	ALIGN AUTO Type: Voltage Hold:>100/100		SENSE:IN Trig: Free Run #Atten: 10 dB	GHz PNO: Fast IFGain:Low	L 50 9 DC	RL RF PRESEL arker 1 2.3843
	2.384 344 GHz 14.655 dBµV	Mkr1				86.99 dBµV	dB/div Ref 8
Norm	Λ						7.0
Del							0 0 0 0
Fixed	• ¹ ◊ ²						99
c	Stop 2.40400 GHz 31.3 ms (1001 pts)		FUNCTIO	360 Hz	#VBV		art 2.30000 GH es BW (CISPR)
Properties				14.655 dBµV 14.655 dBµV	4 344 GHz 0 000 GHz	2.384	N 1 f
Mo 1 o							
	104	STATUS		in .			

(AVERAGE, Channel 0, π/4-DQPSK)



(PEAK, Channel 78, π/4-DQPSK)



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6	AM Jun 03, 2021	08:41:	ALIGN AUTO	ri f	SENSE:IN	1		Analyzer - Swe		
Marker	ACE 1 2 3 4 5 6 VPE MWWWWWW DET P NNNNN		Type: Voltage fold:>100/100	Avg	Trig: Free Run #Atten: 10 dB	NO: Fast	0000 G	8479800 AMP	2 2.4	ker
Select Marker 2	798 GHz 47 dBµV		Mkr2			Guineon		ef 86.99 d		3/di
Norm									1	
Dell									/	
Fixed						¢ ²	1			/
o	50000 GHz (1001 pts)	0.13 m		FUNCTION	360 Hz	#VBW	z	PR) 1 MH	47800 (CIS	BV
Properties	E			- Chic Hold	14.433 dBµV 14.547 dBµV	00 GHz 98 GHz	2,483 50 2,484 79		1	N
Mor 1 of										

(AVERAGE, Channel 78, π/4-DQPSK)





8-DPSK Mode

A. Test Verdict:

Channel	Frequency	Detector	Receiver Reading	A _T	A _{Factor}	Max. Emission	Limit	Verdict
	(MHz)	PK/ AV	U _R (dBµV)	(dB)	(dB@3m)	E (dBµV/m)	(dBµV/m)	, or anot
0	2366.04	PK	26.24	6.74	27.20	60.18	74	PASS
0	2390.00	AV	14.68	6.74	27.20	48.62	54	PASS
78	2489.44	PK	27.11	6.74	27.20	61.05	74	PASS
78	2483.50	AV	14.51	6.74	27.20	48.45	54	PASS

B. Test Plot:

RL	RF PRESEL 50		SENSE:INT	ALIGN AUTO	08:30:26 AM Jun 03, 2021	Trace/Detector
arker 1	2.366040	DOODOO GHZ PNO: Fast	Trig: Free Run	Avg Type: Voltage Avg Hold:>100/100	TRACE 1 2 3 4 5 6	TraceiDetector
_	PREAMP	PNO: Fast IFGain:Low	#Atten: 10 dB	Arginold. Provide	DET PNNNN	Select Trace
				Mkr1	2.366 040 GHz	1
dB/div	Ref 86.99	dBuV			26.235 dBµV	
^{pg}						
7.D						Clear Writ
7,0,					A I	
7.D						-
t p			-			
0						Trace Averag
ro				•	\Diamond^2	and the second
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99						Max Ho
ot						Maxino
						20
art 2.30	0000 GHz				Stop 2.40400 GHz	
es BW (CISPR) 1 N	IHZ #VE	3W 3.0 MHz	Sweep 1	.000 ms (1001 pts)	Min Ho
R MODE T	RC SCL	x	Y F	UNCTION FUNCTION WIDTH	FUNCTION VALUE .	
	1 f 1 f	2.366 040 GHz 2.390 000 GHz	26.235 dBµV 24.403 dBµV			
		2,350 000 6H2	24.405 0504			View Blank
						Trace On
4 5 6 7 7 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	11 020 COM 12 000 12 000 10 000 1000 10 000 10 000 10 000 10000 1000 1000000			and the second se	Concession of the local division of the loca	Mo
6 1 1 7 1 1 8 1 1 9 1 1						
						Moi 1 of
			m			

(PEAK, Channel 0, 8-DPSK)

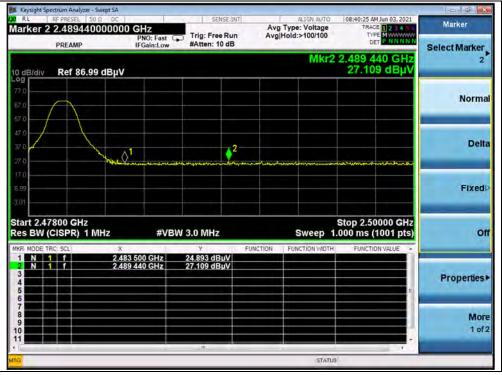


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	ESEL 50 Q D		SENSE:IM		ALIGN AUTO	08:32:49 AM Jun (Marker
	774800000 AMP	PNO: Fast IFGain:Low	Trig: Free Run #Atten: 10 dB		Type: Voltage Hold:>100/100	TRACE 1 2 TYPE MU DET P	145 INNNN	Select Marker
3/div Re	ef 86.99 dBj	٧u			Mkr1	2.377 480 14.607 d		1
							A	Norma
								Dell
					∮ ¹	\$ ²		Fixed
t 2.30000 BW (CISF	PR) 1 MHz		W 360 Hz	FUNCTION	Sweep 3	Stop 2.40400 31.3 ms (100	1 pts)	C
N 1 f	2	X 2.377 480 GHz 2.390 000 GHz	14.607 dBµV 14.683 dBµV	FONCTION	FUNCTION WIDTH	FUNCTION VAL		Properties
ی کر ک ا کر ک ا کر ک ا کر ک								
					STATUS			Properties) More 1 of 2

(AVERAGE, Channel 0, 8-DPSK)



(PEAK, Channel 78, 8-DPSK)



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	RF PRESEL 50 Q 0		SENSE:II		ALIGN AUTO	08:40:43 AM Jun 03, 2021	Marker
	2.484160000	000 GHz PNO: Fast IFGain:Low	Trig: Free Run #Atten: 10 dB		Type: Voltage Hold:>100/100	TRACE 23456 TYPE MWWWWW DET P NNNN	
dB/div	Ref 86.99 dB		#Atten: 10 db		Mkr2	2.484 160 GHz 14.444 dBµV	Select Marker 2
							Norm
							Deli
40 99 71							Fixed
s BW (C	800 GHz SISPR) 1 MHz		BW 360 Hz		Sweep 7	Stop 2.50000 GHz 0.13 ms (1001 pts)	o
	f	× 2.483 500 GHz 2.484 160 GHz	14.510 dBµV 14.444 dBµV	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Properties
							Mo 1 of

(AVERAGE, Channel 78, 8-DPSK)





2.13. Radiated Emission

2.13.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
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

Note1: For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit. **Note2:**For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

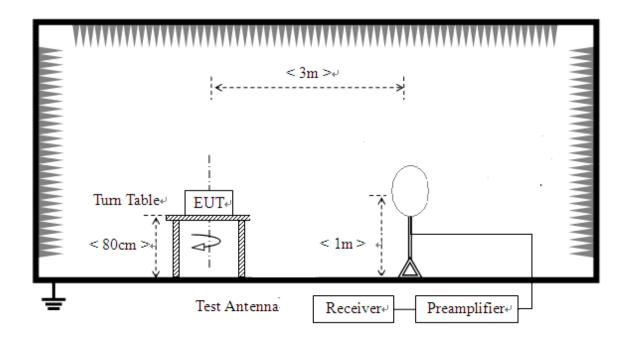




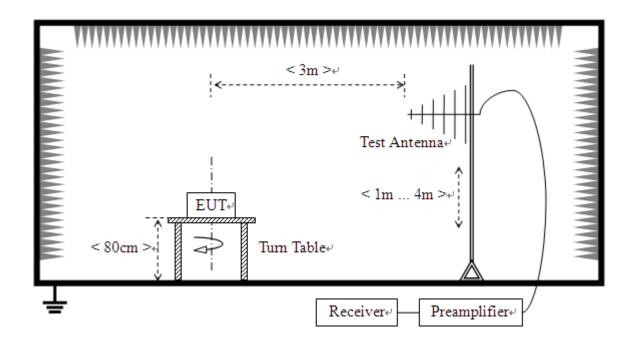
2.13.2. Test Description

Test Setup:

1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



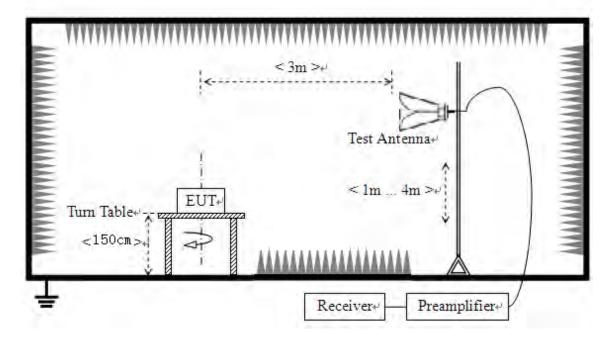


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3) For radiated emissions above 1GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.





2.13.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

 $E [dB\mu V/m] = U_R + A_T + A_{Factor} [dB]; A_T = L_{Cable loss} [dB] - G_{preamp} [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor AT and A_{Factor} were built in test software.

Note 1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note 2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

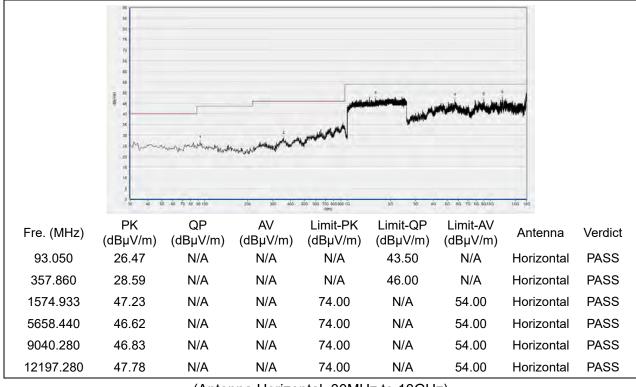
Note 3: For the frequency, which started from 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.



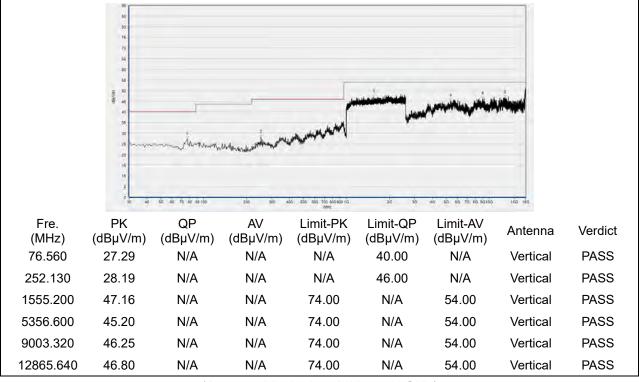


GFSK Mode

Plots for Channel 0



(Antenna Horizontal, 30MHz to 18GHz)



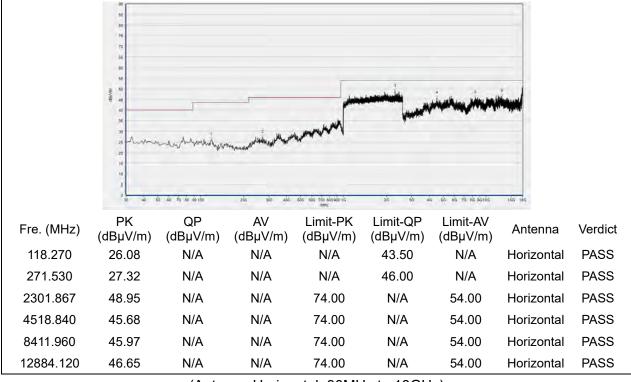
(Antenna Vertical, 30MHz to 18GHz)



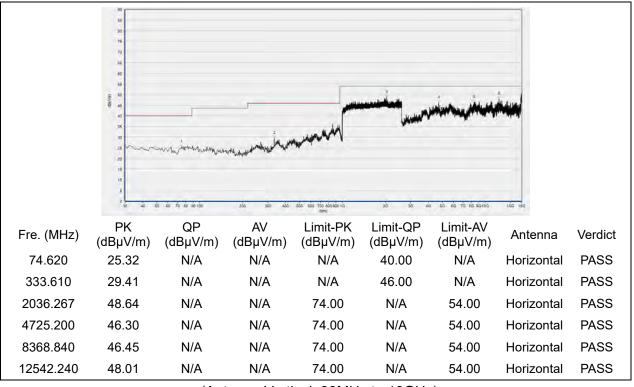
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Plot for Channel 39



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



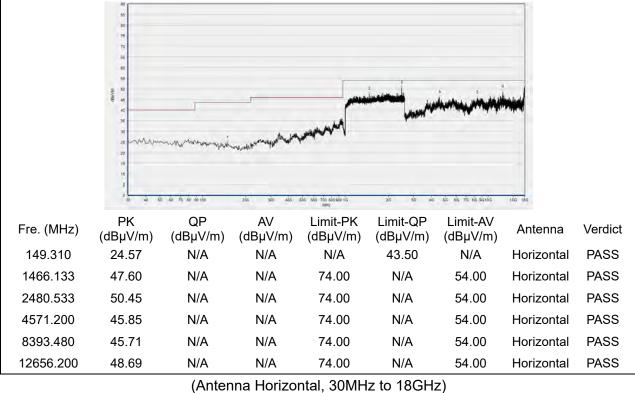
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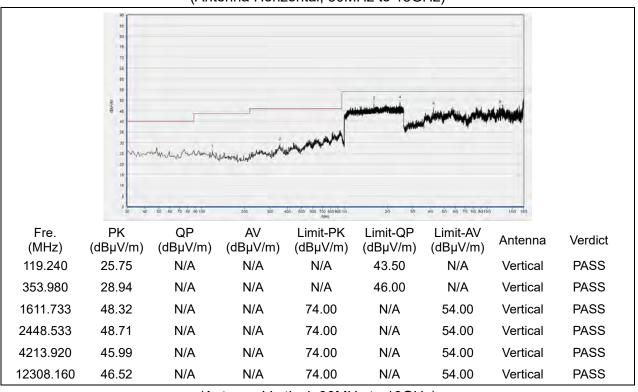
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Plot for Channel 78





(Antenna Vertical, 30MHz to 18GHz)

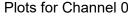


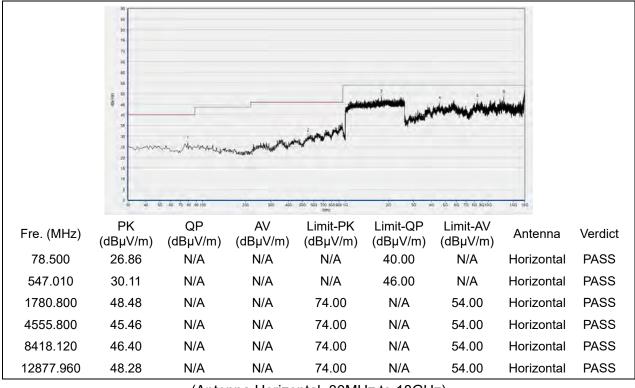
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Fax: 86-755-36698525

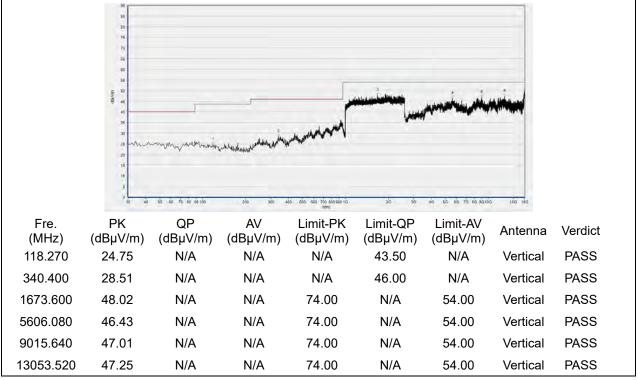
Http://www.morlab.cn

π/4-DQPSK Mode





(Antenna Horizontal, 30MHz to 18GHz)



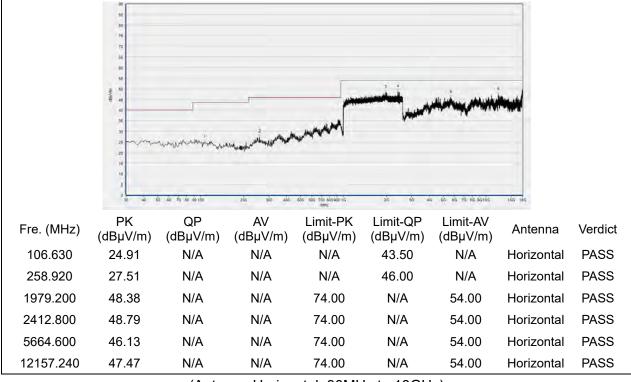
(Antenna Vertical, 30MHz to 18GHz)



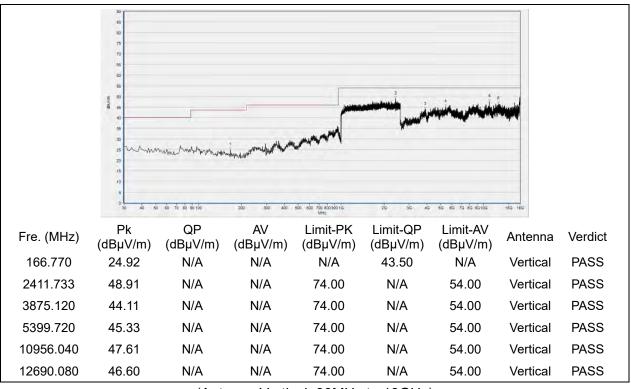
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Plot for Channel 39



(Antenna Horizontal, 30MHz to 18GHz)



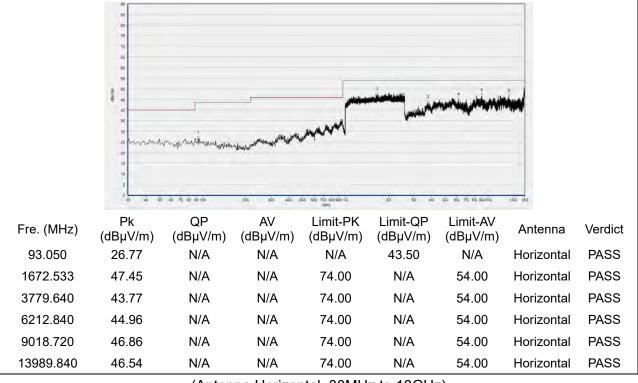
(Antenna Vertical, 30MHz to 18GHz)



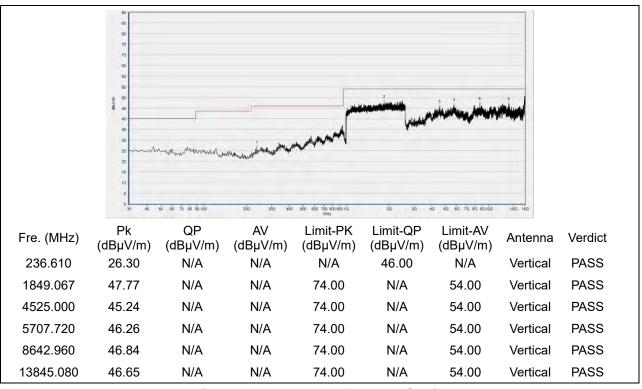
Shenzhen Morlab Communications Technology Co., Ltd. FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.cn Fax: 86-755-36698525



Plot for Channel 78



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)

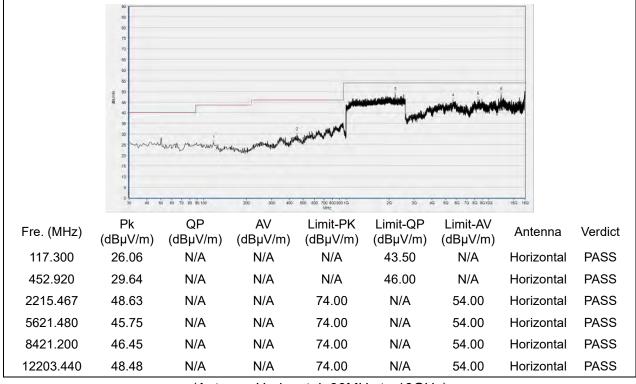


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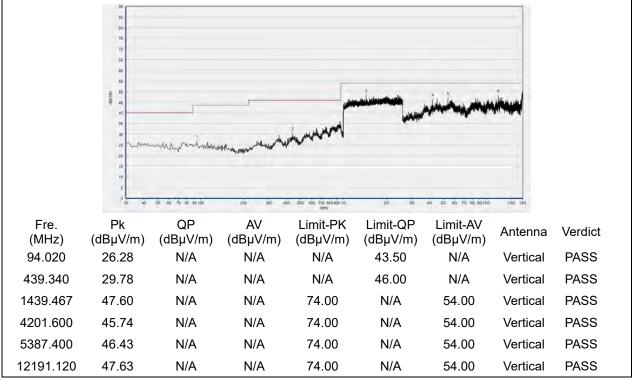


8-DPSK Mode

Plots for Channel 0



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)

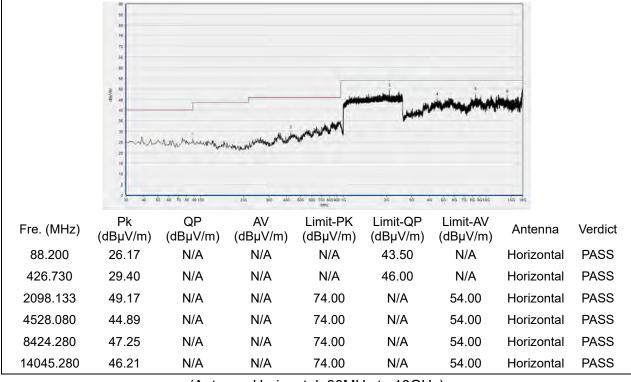


Shenzhen Morlab Communications Technology Co., Ltd. FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.cn Fax: 86-755-36698525 E-mail: service@morlab.cn

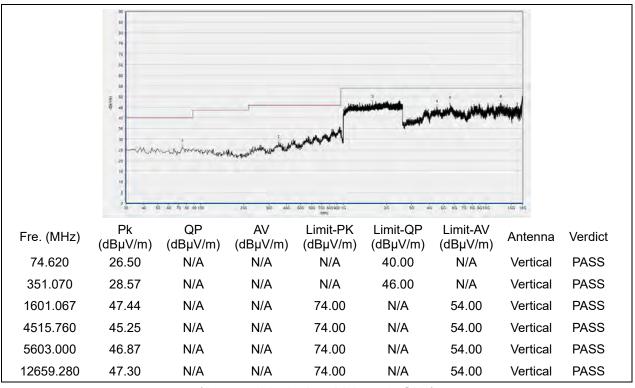
-



Plot for Channel 39



(Antenna Horizontal, 30MHz to 18GHz)



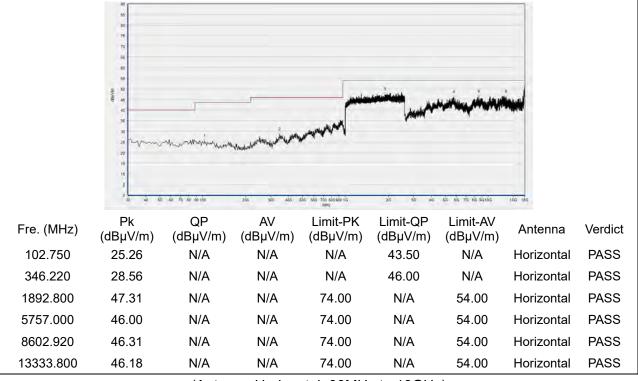
(Antenna Vertical, 30MHz to 18GHz)



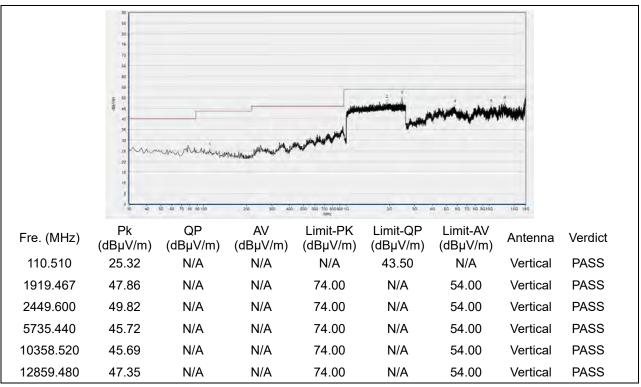
Shenzhen Morlab Communications Technology Co., Ltd. FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.cn Fax: 86-755-36698525



Plot for Channel 78



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



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Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Uncertainty
±5%
±2.22dB
±5%
±5%
±5%
±2.77dB
±5%
±2.95dB
±2.44dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.





Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.		
	FL.3, Building A, FeiYang Science Park, No.8 LongChang		
Laboratory Address:	Road, Block 67, BaoAn District, ShenZhen, GuangDong		
	Province, P. R. China		
Telephone:	+86 755 36698555		
Facsimile:	+86 755 36698525		

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.				
	FL.3, Building A, FeiYang Science Park, No.8 LongChang				
Address:	Road, Block 67, BaoAn District, ShenZhen, GuangDong				
	Province, P. R. China				

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.





4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
Bluetooth Base Station	6K00006210	MT8852B	Anritsu	2021.03.25	2022.03.24
Directional Coupler	17041703	DTO-5-30	ShangHaiHuaxiang	N/A	N/A
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2021.03.25	2022.03.24
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial Cable	CB02	RF02	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2021.03.09	2022.03.08
	040744	NSLK	Schwarzbeck	2021.03.09	2022.03.08
LISN	812744	8127			
Pulse Limiter	VTSD 9561	VTSD	Coburer=book	2020.07.24	2021.07.23
(10dB)	F-B #206	9561-F	Schwarzbeck	2020.07.24	2021.07.23
Coaxial					
Cable(BNC)	CB01	EMC01	Morlab	N/A	N/A
(30MHz-26GHz)					

4.3 List of Software Used

Description	Manufacturer	Software Version
Test System	Tonscend	V2.5.77.0418
Morlab EMCR V1.2	Morlab	V1.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0





4.4 Radiated Test Equipments

Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2020.07.21	2021.07.20
Test Antenna -	1011 34 1300 10	N9030A	Aglient	2020.07.21	2021.07.20
Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2019.02.14	2022.02.13
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2019.07.26	2022.07.25
Coaxial Cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-40GHz)	CB05	EMC05	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L32 03	Tonscend	2020.07.21	2021.07.20
18-26.5GHz pre-Amplifier	46732	S10M100L38 02	Tonscend	2020.07.21	2021.07.20
26-40GHz pre-Amplifier	56774	S40M400L40 02	Tonscend	2020.07.21	2021.07.20
Notch Filter	N/A	WRCG-2400- 2483.5-60SS	Wainwright	2020.07.21	2021.07.20
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

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