

RADIO TEST REPORT

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Report No.: STS2203023W01

Issued for

Shenzhen Canjing Electronics Co., Ltd.

Block 2, Zhipeng Ind. Park, Heping Village, Fuyong Town, Baoan District, Shenzhen, China.

Product Name:	Soundbar	
Brand Name:	N/A	
Model Name:	SS1022B	
Series Model:	SSXXXB	
FCC ID:	2ADGI-SS1022B	
Test Standard:	FCC Part 15.247	

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APPROVA

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TEST RESULT CERTIFICATION

Applicant's Name:	Shenzhen Canjing Electronics Co., Ltd.
Address:	Block 2, Zhipeng Ind. Park, Heping Village, Fuyong Town, Baoan District, Shenzhen, China.
Manufacturer's Name:	Shenzhen Canjing Electronics Co., Ltd.
Address	Block 2, Zhipeng Ind. Park, Heping Village, Fuyong Town, Baoan District, Shenzhen, China.
Product Description	
Product Name:	Soundbar
Brand Name:	N/A
Model Name:	SS1022B
Series Model:	SSXXXXB
Test Standards:	FCC Part15.247
Test Procedure:	

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test:Date of receipt of test item:03 Mar. 2022Date (s) of performance of tests :03 Mar. 2022 ~11 Mar. 2022Date of Issue:11 Mar. 2022Test Result:Pass

Testing Engineer (Chris Chen) **Technical Manager** (Sean she) Authorized Signatory :

(Bovey Yang)

Page 3 of 73 Report No.: STS2203023W01



Table of Contents	Page
1. SUMMARY OF TEST RESULTS	6
1.1 TEST FACTORY	7
1.2 MEASUREMENT UNCERTAINTY	7
2. GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF THE EUT	8
2.2 DESCRIPTION OF THE TEST MODES	10
2.3 FREQUENCY HOPPING SYSTEM REQUIREMENTS	10
2.4 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING	12
2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED) 12
2.6 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	13
2.7 EQUIPMENTS LIST	14
3. EMC EMISSION TEST	16
3.1 CONDUCTED EMISSION MEASUREMENT	16
3.2 RADIATED EMISSION MEASUREMENT	20
4. CONDUCTED SPURIOUS & BAND EDGE EMISSION	32
4.1 LIMIT	32
4.2 TEST PROCEDURE	32
4.3 TEST SETUP	33
4.4 EUT OPERATION CONDITIONS	33
4.5 TEST RESULTS	34
5. NUMBER OF HOPPING CHANNEL	49
5.1 LIMIT	49
5.2 TEST PROCEDURE	49
5.3 TEST SETUP	49
5.4 EUT OPERATION CONDITIONS	49
5.5 TEST RESULTS	50
6. AVERAGE TIME OF OCCUPANCY	51
6.1 LIMIT	51
6.2 TEST PROCEDURE	51
6.3 TEST SETUP	51
6.4 EUT OPERATION CONDITIONS	51
6.5 TEST RESULTS	52
7. HOPPING CHANNEL SEPARATION MEASUREMEN	56

7. HOPPING CHANNEL SEPARATION MEASUREMEN

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Page 4 of 73 Report No.: STS2203023W01



Table of Contents	Page
7.1 LIMIT	56
7.2 TEST PROCEDURE	56
7.3 TEST SETUP	56
7.4 EUT OPERATION CONDITIONS	56
7.5 TEST RESULTS	57
8. BANDWIDTH TEST	63
8.1 LIMIT	63
8.2 TEST PROCEDURE	63
8.3 TEST SETUP	63
8.4 EUT OPERATION CONDITIONS	63
8.5 TEST RESULTS	64
9. OUTPUT POWER TEST	70
9.1 LIMIT	70
9.2 TEST PROCEDURE	70
9.3 TEST SETUP	70
9.4 EUT OPERATION CONDITIONS	70
9.5 TEST RESULTS	71
10. ANTENNA REQUIREMENT	72
10.1 STANDARD REQUIREMENT	72
10.2 EUT ANTENNA	72

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Page 5 of 73 Report No.: STS2203023W01

Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	11 Mar. 2022	STS2203023W01	ALL	Initial Issue



Shenzhen STS Test Services Co., Ltd.



1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards: KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC Part 15.247,Subpart C				
Standard Section	Test Item	Judgment	Remark	
15.207	Conducted Emission	PASS		
15.247(a)(1)	Hopping Channel Separation	PASS		
15.247(a)(1)&(b)(1)	Output Power	PASS		
15.209	Radiated Spurious Emission	PASS		
15.247(d)	Conducted Spurious & Band Edge Emission	PASS		
15.247(a)(1)(iii)	Number of Hopping Frequency	PASS		
15.247(a)(1)(iii)	Dwell Time	PASS		
15.247(a)(1)	Bandwidth	PASS		
15.205	Restricted bands of operation PASS			
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS		
15.203	Antenna Requirement PASS			

NOTE:

(1) 'N/A' denotes test is not applicable in this Test Report.

(2) All tests are according to ANSI C63.10-2013.



1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China FCC test Firm Registration Number: 625569 IC test Firm Registration Number: 12108A A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	RF output power, conducted	±0.87dB
2	Unwanted Emissions, conducted	±2.895dB
3	All emissions, radiated 9K-30MHz	±3.80dB
4	All emissions, radiated 30M-1GHz	±4.09dB
5	All emissions, radiated 1G-6GHz	±4.92dB
6	All emissions, radiated>6G	±5.49dB
7	Conducted Emission (9KHz-30MHz)	±2.73dB

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Soundbar
Trade Name	N/A
Model Name	SS1022B
Series Model	SSXXXB
Model Difference	Different appearance colors, X is a number from 0 to 9
Channel List	Please refer to the Note 2.
Bluetooth	Frequency:2402 – 2480 MHz Modulation: GFSK(1Mbps), π/4-DQPSK(2Mbps), 8DPSK(3Mbps)
Bluetooth Version	5.0
Bluetooth Configuration	BR+EDR
Antenna Type	Please refer to the Note 3.
Adapter	Input: 100-240V 50/60Hz MAX 1.0A Output: 18.0V=== 2A
Hardware version number	BOEU-CJ-CS001 V1.1
Software version number	V1.1
Connecting I/O Port(s)	Please refer to the Note 1.

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.





2.

		Chanr	nel List		
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3. Table for Filed Antenna

А	nt.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
	1	N/A	SS1022B	PCB Antenna	N/A	0dBi	BT Antenna

Note: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report. Due to the incorrect antenna information, a series of problems such as the accuracy of the test results will be borne by the customer.



2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate/Modulation	
Mode 1	TX CH00	1Mbps/GFSK	
Mode 2	TX CH39	1Mbps/GFSK	
Mode 3	TX CH78	1Mbps/GFSK	
Mode 4	TX CH00	2 Mbps/π/4-DQPSK	
Mode 5	TX CH39	2 Mbps/π/4-DQPSK	
Mode 6	TX CH78	2 Mbps/π/4-DQPSK	
Mode7	TX CH00	3 Mbps/8DPSK	
Mode 8	TX CH39	3 Mbps/8DPSK	
Mode 9	TX CH78	3 Mbps/8DPSK	
Mode 10	Hopping	GFSK	
Mode 11	Hopping	π/4-DQPSK	
Mode 12	Hopping	ing 8DPSK	

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

(2) We tested for all available U.S. voltage and frequencies (For 120V, 50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/ 60Hz is shown in the report.

(3) The battery is fully-charged during the radiated and RF conducted test.

For AC Conducted Emission

	Test Case
AC Conducted Emission	Mode 13 : Keeping BT TX

2.3 FREQUENCY HOPPING SYSTEM REQUIREMENTS

(1)Standard and Limit

According to FCC Part 15.247(a)(1), The 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.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.



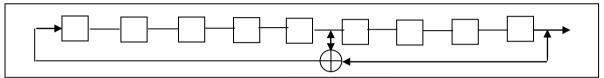
Page 11 of 73 Report No.: STS2203023W01

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.

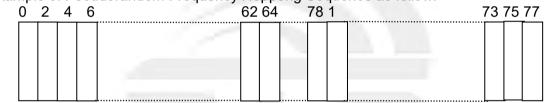
(2)The Pseudorandom sequence may be generated in a nin-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones: i.e. the shift register is initialized with nine ones.

Numver of shift register stages:9

Length of pseudo-random sequence:2⁹-1=511bits Longest sequence of zeros: 8(non-inverted signal)



Liner Feedback Shift Register for Generator of the PRBS sequence An example of Pseudorandom Frequency Hoppong Sequence as follow:



Each frequency used equally on the average by each transmitter. The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies ini synchronization with the transmitted signals.

(3)Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centred from 2402 to 2480 MHz) in the range 2,400-2,483.5MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.

This device was tested with a bluetooth system receiver to check that the device maintained hopping synchronization, and the device complied with these requirements FCC Part 15.247 rule.



Page 12 of 73 Report No.: STS2203023W01

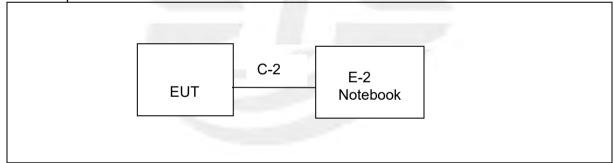
2.4 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS.

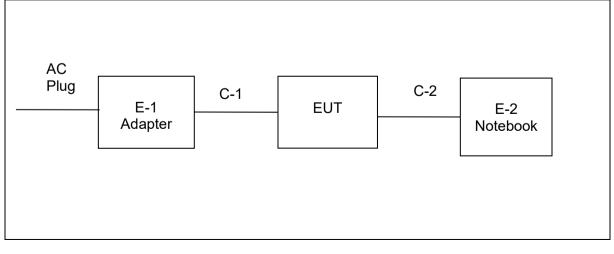
Test software Version	Test program: Bluetooth				
(Power control software) Parameters(1/2/3Mbps)	Power class: DH1 rate:4:27 2DH1 rate:20:54 3DH1 rate:24:83	Power class: DH3 rate:11:183 2DH3 rate:26:367 3DH3 rate:27:552	Power class: DH5 rate:15:339 2DH5 rate:30:679 3DH5 rate:31:1021		

RF Function	Туре	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
		GFSK	0	6	
ВТ	BR+EDR	π/4-DQPSK	0	6	FrequencyTool_v0.3.2
		8DPSK	0	6	

2.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED Radiated Spurious Emission Test



Conducted Emission Test



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2.6 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E-1	Adapter	N/A	THX-120200KD	N/A	N/A
C-1	DC Cable	N/A	N/A	145cm	NO

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E-2	Notebook	LENOVO	Think Pad E470	N/A	N/A
C-2	USB Cable	N/A	N/A	150cm	NO
		1			

Note:

- (1) For detachable type I/O cable should be specified the length in cm in ^CLength₂ column.
- (2) "YES" is means "with core"; "NO" is means "without core".



2.7 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	
Test Receiver	R&S	ESCI	101427	2021.09.30	2022.09.29	
Signal Analyzer	R&S	FSV 40-N	101823	2021.09.30	2022.09.29	
Active loop Antenna	ZHINAN	ZN30900C	16035	2021.04.11	2023.04.10	
Bilog Antenna	TESEQ	CBL6111D	34678	2020.10.12	2022.10.11	
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2021.10.11	2023.10.10	
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2020.10.12	2022.10.11	
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2021.10.08	2022.10.07	
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2021.09.30	2022.09.29	
Pre-Amplifier (18G-40GHz)	SKET	LNPA-1840-50	SK2018101801	2021.09.28	2022.09.27	
Temperature & Humidity	HH660	Mieo	N/A	2021.10.09	2022.10.08	
Turn table	EM	SC100_1	60531	N/A	N/A	
Antenna mast	EM	SC100	N/A	N/A	N/A	
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)				

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	
Test Receiver	R&S	ESCI	101427	2021.09.30	2022.09.29	
LISN	R&S	ENV216	101242	2021.09.30	2022.09.29	
LISN	EMCO	3810/2NM	23625	2021.09.30	2022.09.29	
Temperature & Humidity	HH660	Mieo N/A 2021.10.09 2022.10.08				
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)				



Page 15 of 73 Report No.: STS2203023W01

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
			MY55520005	2021.09.30	2022.09.29
	ower Sensor Keysight U20		MY55520006	2021.09.30	2022.09.29
Power Sensor		U2021XA	MY56120038	2021.09.30	2022.09.29
			MY56280002	2021.09.30	2022.09.29
Signal Analyzer	Agilent	N9020A	MY51110105	2022.03.01	2023.02.28
Temperature & Humidity	HH660	Mieo	N/A	2021.10.09	2022.10.08
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)			



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3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

	Conducted Emiss	sionlimit (dBuV)
FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz



3.1.2 TEST PROCEDURE

- a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN is at least 80 cm from the nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item -EUT Test Photos.
 - Vertical Reference Ground Plane EUT 40cm EUT 80cm N Horizontal Reference Ground Plane

3.1.3 TEST SETUP

Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

3.1.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



3.1.5 TEST RESULT

Temperature:	24.1(C)	Relative Humidity:	44%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 13		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.2060	37.03	20.34	57.37	63.37	-6.00	QP
2	0.2060	7.87	20.34	28.21	53.37	-25.16	AVG
3	0.3580	30.19	20.63	50.82	58.77	-7.95	QP
4	0.3580	5.05	20.63	25.68	48.77	-23.09	AVG
5	0.7180	24.13	20.35	44.48	56.00	-11.52	QP
6	0.7180	-2.71	20.35	17.64	46.00	-28.36	AVG
7	1.3700	19.56	20.30	39.86	56.00	-16.14	QP
8	1.3700	1.82	20.30	22.12	46.00	-23.88	AVG
9	2.7620	13.44	20.34	33.78	56.00	-22.22	QP
10	2.7620	-1.87	20.34	18.47	46.00	-27.53	AVG
11	15.1460	11.36	21.77	33.13	60.00	-26.87	QP
12	15.1460	-0.54	21.77	21.23	50.00	-28.77	AVG

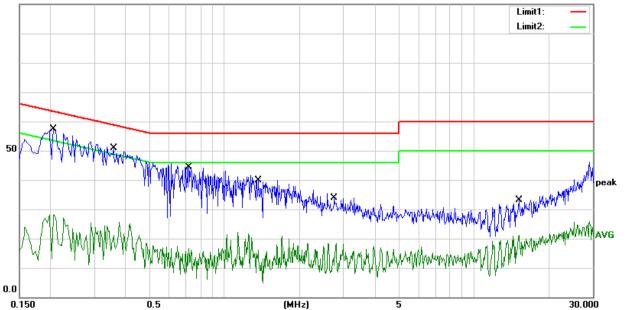
Remark:

1. All readings are Quasi-Peak and Average values

2. Margin = Result (Result = Reading + Factor)-Limit

3. Factor=LISN factor+Cable loss+Limiter (10dB)

100.0 dBuV



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Page 19 of 73 Report No.: STS2203023W01

Temperature:	24.1(C)	Relative Humidity:	44%RH
Test Voltage:	AC 120V/60Hz	Phase:	Ν
Test Mode:	Mode 13		

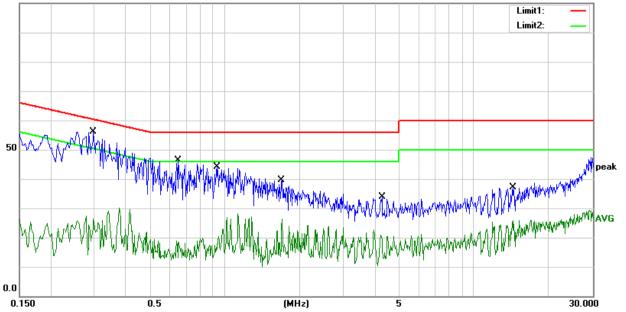
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.2980	35.36	20.74	56.10	60.30	-4.20	QP
2	0.2980	9.37	20.74	30.11	50.30	-20.19	AVG
3	0.6540	26.07	20.39	46.46	56.00	-9.54	QP
4	0.6540	1.55	20.39	21.94	46.00	-24.06	AVG
5	0.9300	23.84	20.31	44.15	56.00	-11.85	QP
6	0.9300	6.46	20.31	26.77	46.00	-19.23	AVG
7	1.7020	19.31	20.30	39.61	56.00	-16.39	QP
8	1.7020	6.19	20.30	26.49	46.00	-19.51	AVG
9	4.2700	13.46	20.41	33.87	56.00	-22.13	QP
10	4.2700	2.09	20.41	22.50	46.00	-23.50	AVG
11	14.3220	15.57	21.66	37.23	60.00	-22.77	QP
12	14.3220	4.33	21.66	25.99	50.00	-24.01	AVG

Remark:

1. All readings are Quasi-Peak and Average values

3. Factor=LISN factor+Cable loss+Limiter (10dB)

100.0 dBuV



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^{2.} Margin = Result (Result = Reading + Factor)-Limit



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies	Frequencies Field Strength	
(MHz)	(micorvolts/meter)	(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

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

PEAK AVERAGE		(dBuV/m) (at 3M)		
	FREQUENCY (MHz)	PEAK	AVERAGE	
Above 1000 74 54	Above 1000	74	54	

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

		-	
FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

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Page 21 of 73 Report No.: STS2203023W01

For Radiated Emission

Spectrum Parameter	Setting		
Attenuation	Auto		
Detector	Peak/QP/AV		
Start Frequency	9 KHz/150KHz(Peak/QP/AV)		
Stop Frequency	150KHz/30MHz(Peak/QP/AV)		
	200Hz (From 9kHz to 0.15MHz)/		
RB / VB (emission in restricted	9KHz (From 0.15MHz to 30MHz);		
band)	200Hz (From 9kHz to 0.15MHz)/		
	9KHz (From 0.15MHz to 30MHz)		

Spectrum Parameter	Setting	
Attenuation	Auto	
Detector	Peak/QP	
Start Frequency	30 MHz(Peak/QP)	
Stop Frequency	1000 MHz (Peak/QP)	
RB / VB (emission in restricted		
band)	120 KHz / 300 KHz	

Spectrum Parameter	Setting	
Attenuation	Auto	
Detector	Peak/AV	
Start Frequency	1000 MHz(Peak/AV)	
Stop Frequency	10th carrier hamonic(Peak/AV)	
RB / VB (emission in restricted	1 MHz / 3 MHz(Peak)	
band)	1 MHz/1/T MHz(AVG)	

For Restricted band

Spectrum Parameter	Setting		
Detector	Peak/AV		
Start/Stop Frequency	Lower Band Edge: 2310 to 2410 MHz		
	Upper Band Edge: 2476 to 2500 MHz		
RB / VB	1 MHz / 3 MHz(Peak)		
	1 MHz/1/T MHz(AVG)		

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Page 22 of 73 Report No.: STS2203023W01

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

- a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
- c. The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
- d. 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 QuasiPeak detector mode will be re-measured.
- e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos. Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

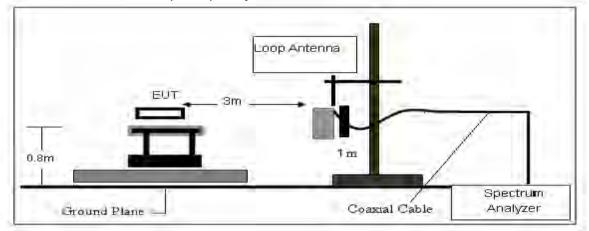
3.2.3 DEVIATION FROM TEST STANDARD

No deviation.

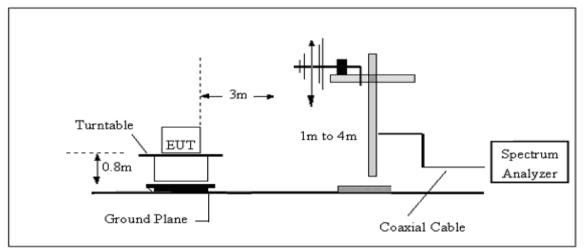


3.2.4 TESTSETUP

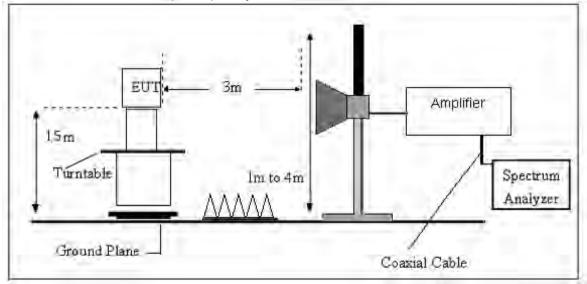
(A) Radiated Emission Test-Up Frequency Below 30MHz

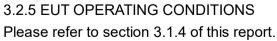


(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz







3.2.6 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AGWhere FS = Field Strength CL = Cable Attenuation Factor (Cable Loss) RA = Reading Amplitude AG = Amplifier Gain AF = Antenna Factor

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

Factor=AF+CL-AG





3.2.7 TEST RESULTS

(9KHz-30MHz)

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	AC 120V/60Hz	Test Mode:	TX Mode

Freq.	Reading	Limit	Margin	State	
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F	Test Result
					PASS
					PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB); Limit line = specific limits (dBuv) + distance extrapolation factor.





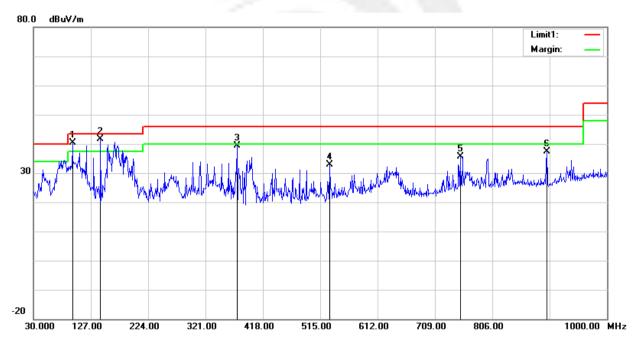
(30MHz-1000MHz)

Temperature:	23.1(C)	Relative Humidity:	60%RH		
Test Voltage:	AC 120V/60Hz	Phase:	Horizontal		
Test Mode:	Mode 1/2/3/4/5/6/7/8/9(Mode 1 worst mode)				

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	95.9600	61.01	-20.67	40.34	43.50	-3.16	peak
2	143.4900	59.80	-18.23	41.57	43.50	-1.93	peak
3	374.3500	51.89	-12.39	39.50	46.00	-6.50	peak
4	530.5200	40.34	-7.43	32.91	46.00	-13.09	peak
5	751.6800	37.92	-2.17	35.75	46.00	-10.25	peak
6	898.1500	37.78	-0.49	37.29	46.00	-8.71	peak

Remark:

- 1. Margin = Result (Result = Reading + Factor)-Limit
- 2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain





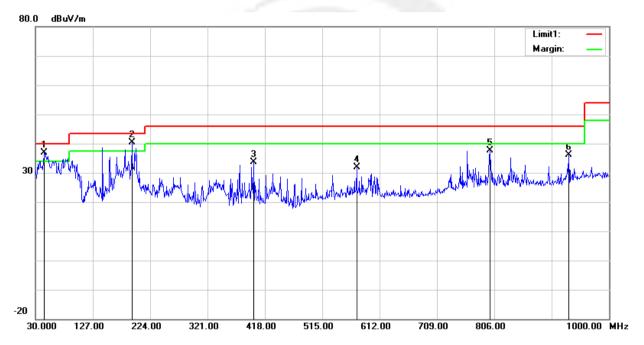
Page 27 of 73 Report No.: STS2203023W01

Temperature:	23.1(C)	Relative Humidity:	60%RH	
Test Voltage:	AC 120V/60Hz	Phase:	Vertical	
Test Mode:	Mode 1/2/3/4/5/6/7/8/9(Mode 1 worst mode)			

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	44.5500	57.39	-20.43	36.96	40.00	-3.04	peak
2	192.9600	61.49	-21.08	40.41	43.50	-3.09	peak
3	399.5700	44.85	-11.16	33.69	46.00	-12.31	peak
4	573.2000	37.46	-5.65	31.81	46.00	-14.19	peak
5	798.2400	39.67	-2.03	37.64	46.00	-8.36	peak
6	932.1000	35.40	0.72	36.12	46.00	-9.88	peak

Remark:

- 1. Margin = Result (Result = Reading + Factor)-Limit
- 2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



Page 28 of 73 Report No.: STS2203023W01



(1GHz~25GHz) Spurious emission Requirements

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
				Low Cl	nannel (GFSK/2	2402 MHz)				
3264.64	61.78	44.70	6.70	28.20	-9.80	51.98	74.00	-22.02	PK	Vertical
3264.64	51.43	44.70	6.70	28.20	-9.80	41.63	54.00	-12.37	AV	Vertical
3264.66	61.58	44.70	6.70	28.20	-9.80	51.78	74.00	-22.22	PK	Horizontal
3264.66	50.59	44.70	6.70	28.20	-9.80	40.79	54.00	-13.21	AV	Horizontal
4804.53	59.52	44.20	9.04	31.60	-3.56	55.96	74.00	-18.04	PK	Vertical
4804.53	50.01	44.20	9.04	31.60	-3.56	46.45	54.00	-7.55	AV	Vertical
4804.48	58.56	44.20	9.04	31.60	-3.56	55.00	74.00	-19.00	PK	Horizontal
4804.48	50.45	44.20	9.04	31.60	-3.56	46.89	54.00	-7.11	AV	Horizontal
5359.73	48.65	44.20	9.86	32.00	-2.34	46.31	74.00	-27.69	PK	Vertical
5359.73	39.47	44.20	9.86	32.00	-2.34	37.13	54.00	-16.87	AV	Vertical
5359.83	47.64	44.20	9.86	32.00	-2.34	45.30	74.00	-28.70	PK	Horizontal
5359.83	38.96	44.20	9.86	32.00	-2.34	36.62	54.00	-17.38	AV	Horizontal
7205.69	54.88	43.50	11.40	35.50	3.40	58.28	74.00	-15.72	PK	Vertical
7205.69	43.62	43.50	11.40	35.50	3.40	47.02	54.00	-6.98	AV	Vertical
7205.69	53.81	43.50	11.40	35.50	3.40	57.21	74.00	-16.79	PK	Horizontal
7205.69	44.72	43.50	11.40	35.50	3.40	48.12	54.00	-5.88	AV	Horizontal
	•			Middle C	Channel (GFSK	(/2441 MHz)		•	•	
3264.82	60.84	44.70	6.70	28.20	-9.80	51.04	74.00	-22.96	PK	Vertical
3264.82	50.67	44.70	6.70	28.20	-9.80	40.87	54.00	-13.13	AV	Vertical
3264.56	61.29	44.70	6.70	28.20	-9.80	51.49	74.00	-22.51	PK	Horizontal
3264.56	50.49	44.70	6.70	28.20	-9.80	40.69	54.00	-13.31	AV	Horizontal
4882.52	59.11	44.20	9.04	31.60	-3.56	55.55	74.00	-18.45	PK	Vertical
4882.52	49.23	44.20	9.04	31.60	-3.56	45.67	54.00	-8.33	AV	Vertical
4882.54	59.59	44.20	9.04	31.60	-3.56	56.03	74.00	-17.97	PK	Horizontal
4882.54	49.85	44.20	9.04	31.60	-3.56	46.29	54.00	-7.71	AV	Horizontal
5359.77	49.23	44.20	9.86	32.00	-2.34	46.89	74.00	-27.11	PK	Vertical
5359.77	39.46	44.20	9.86	32.00	-2.34	37.12	54.00	-16.88	AV	Vertical
5359.80	47.23	44.20	9.86	32.00	-2.34	44.89	74.00	-29.11	PK	Horizontal
5359.80	39.49	44.20	9.86	32.00	-2.34	37.15	54.00	-16.85	AV	Horizontal
7323.74	54.93	43.50	11.40	35.50	3.40	58.33	74.00	-15.67	PK	Vertical
7323.74	43.54	43.50	11.40	35.50	3.40	46.94	54.00	-7.06	AV	Vertical
7323.92	53.61	43.50	11.40	35.50	3.40	57.01	74.00	-16.99	PK	Horizontal
7323.92	43.82	43.50	11.40	35.50	3.40	47.22	54.00	-6.78	AV	Horizontal



Page 29 of 73 Report No.: STS2203023W01

				High Char	nnel (GFSK/	2480 MHz)				
3264.84	61.93	44.70	6.70	28.20	-9.80	52.13	74.00	-21.87	PK	Vertical
3264.84	50.93	44.70	6.70	28.20	-9.80	41.13	54.00	-12.87	AV	Vertical
3264.67	62.07	44.70	6.70	28.20	-9.80	52.27	74.00	-21.73	PK	Horizontal
3264.67	51.15	44.70	6.70	28.20	-9.80	41.35	54.00	-12.65	AV	Horizontal
4960.48	59.11	44.20	9.04	31.60	-3.56	55.55	74.00	-18.45	PK	Vertical
4960.48	49.55	44.20	9.04	31.60	-3.56	45.99	54.00	-8.01	AV	Vertical
4960.57	59.01	44.20	9.04	31.60	-3.56	55.45	74.00	-18.55	PK	Horizontal
4960.57	49.44	44.20	9.04	31.60	-3.56	45.88	54.00	-8.12	AV	Horizontal
5359.86	48.21	44.20	9.86	32.00	-2.34	45.87	74.00	-28.13	PK	Vertical
5359.86	39.46	44.20	9.86	32.00	-2.34	37.12	54.00	-16.88	AV	Vertical
5359.84	47.15	44.20	9.86	32.00	-2.34	44.81	74.00	-29.19	PK	Horizontal
5359.84	39.33	44.20	9.86	32.00	-2.34	36.99	54.00	-17.01	AV	Horizontal
7439.74	54.66	43.50	11.40	35.50	3.40	58.06	74.00	-15.94	PK	Vertical
7439.74	44.37	43.50	11.40	35.50	3.40	47.77	54.00	-6.23	AV	Vertical
7439.76	53.58	43.50	11.40	35.50	3.40	56.98	74.00	-17.02	PK	Horizontal
7439.76	44.14	43.50	11.40	35.50	3.40	47.54	54.00	-6.46	AV	Horizontal

Note:

- 1) Scan with GFSK, π /4-DQPSK, 8DPSK, the worst case is GFSK Mode.
- 2) Factor = Antenna Factor + Cable Loss Pre-amplifier.

Emission Level = Reading + Factor

3) The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

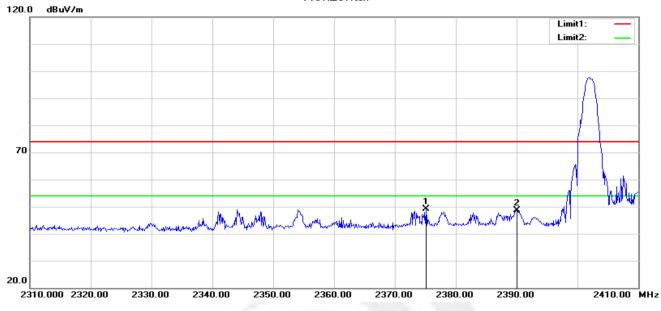


Page 30 of 73 Report No.: STS2203023W01

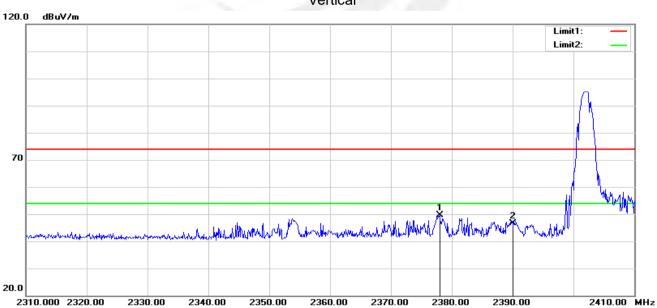


Restricted band Requirements

GFSK-Low Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2375.100	45.01	4.12	49.13	74.00	-24.87	peak
2	2390.000	44.21	4.34	48.55	74.00	-25.45	peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2378.000	45.39	4.16	49.55	74.00	-24.45	peak
2	2390.000	42.28	4.34	46.62	74.00	-27.38	peak

Vertical

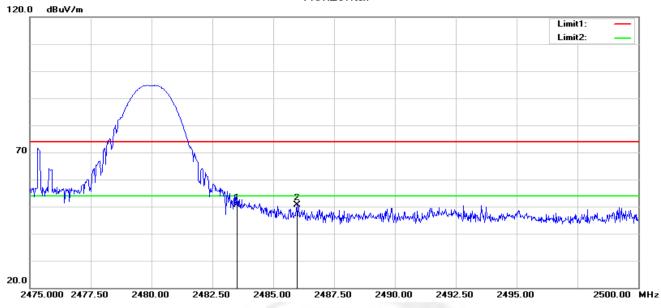
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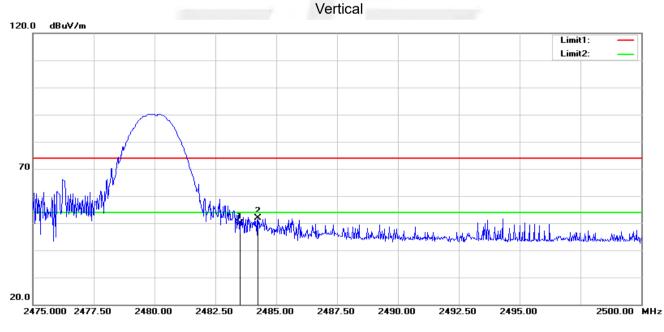
Page 31 of 73

Report No.: STS2203023W01

GFSK-High Horizontal



No.	Frequency	Reading	Correct	Result Limit		Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	45.97	4.60	50.57	74.00	-23.43	peak
2	2485.975	46.10	4.61	50.71	74.00	-23.29	peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	45.23	4.60	49.83	74.00	-24.17	peak
2	2484.250	47.16	4.61	51.77	74.00	-22.23	peak

Note: GFSK, $\pi/4$ -DQPSK, 8DPSK of the nohopping and hopping mode all have been test, the worst case is GFSK of the nohopping mode, this report only show the worst case.

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4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 LIMIT

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, based on either an RF conducted or a radiated measurement.

4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting		
Detector	Peak		
Start/Stop Eraguapay	Lower Band Edge: 2300 – 2407 MHz		
Start/Stop Frequency	Upper Band Edge: 2475 – 2500 MHz		
RB / VB (emission in restricted band)	100 KHz/300 KHz		
Trace-Mode:	Max hold		

For Hopping Band edge

Spectrum Parameter	Setting					
Detector	Peak					
Start/Stan Fraguanay	Lower Band Edge: 2300– 2403 MHz					
Start/Stop Frequency	Upper Band Edge: 2479 – 2500 MHz					
RB / VB (emission in restricted band)	100 KHz/300 KHz					
Trace-Mode:	Max hold					



4.3 TEST SETUP



The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. Tune the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, the span is set to be greater than RBW.

4.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.



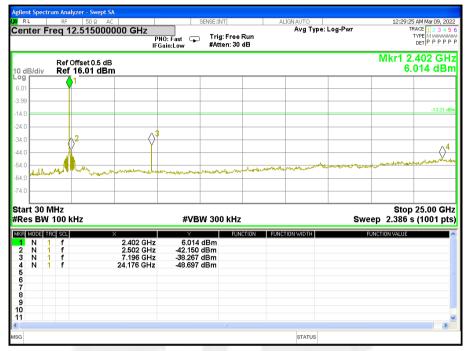
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4.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
Test Mode:	GFSK(1Mbps)-00/39/78 CH	Test Voltage:	AC 120V/60Hz

00 CH



39 CH

		ilyzer - Swept SA							
RL	RF	50 Ω AC		SENSE:	INT	ALIGNAUTO			LAM Mar 09, 20
enter F	-req 1	2.51500000	PNC		ig: Free Run tten: 30 dB	Avg Type	: Log-Pwr		RACE 1 2 3 4 TYPE MWAAAAA DET P P P P
) dB/div		Offset 0.5 dB 16.38 dBm						Mkr1 2. 6.	.452 GH 375 dB
^g	(1							
38									
62									-13.04
1.6									10.04
1.6									
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art 30 les BM		kHz		#VBW 30	10 kHz		Swe	Stop ep 2.386 s	25.00 G (1001 p
R MODE		X		Ŷ	FUNCTION	FUNCTION WIDTH	FL	JNCTION VALUE	
N 2 N	1 f 1 f		2.452 GHz 2.527 GHz	6.375 dBm -45.011 dBm					
3N	1 f		7.321 GHz	-40.381 dBm					
	1 f	2	4.401 GHz	-48.623 dBm					
; ,									
3									
)									
						STATUS			



78 CH

nt Spectrum Analyze						10-00-00-0	M M 00
	50 Ω AC 515000000 GHz		SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Typ	e: Log-Pwr	TY	M Mar U9, DE <u>1 2 3</u> PE M VAN ET P P P
	et 0.5 dB .13 dBm					Mkr1 2.4 5.1	.77 G 33 dl
							-14.3
2		<u>3</u>					
		Y			Manual Langer aller	and a manufacture and a second	ment
manupation	Muser eleventer have	oo hala aa	when any approximately	and man and a second			
rt 30 MHz s BW 100 kHz		#VB	W 300 kHz	,	Sw	Stop 2 veep 2.386 s (
MODE TRC SCL N 1 f N 1 f N 1 f N 1 f	× 2.477 G 2.577 G 7.446 G 23.976 G	Hz -45.375 Hz -47.403	dBm dBm	FUNCTION WIDTH		FUNCTION VALUE	



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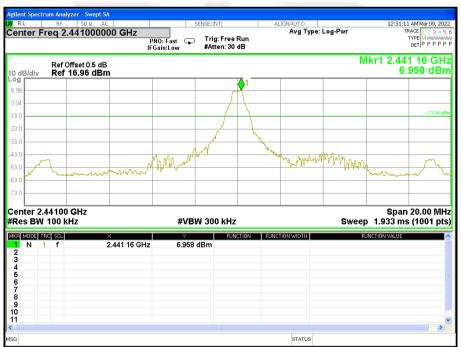


For Band edge(it's also the reference level for conducted spurious emission)

		lyzer - Swept SA											
CIRL	RF	50 Ω AC			SENSE	INT		AL:	IGN AUTO		1	2:28:55 AM Ma	
Center F	req 2	.35350000		PNO: Fast FGain:Low	₽ Tr #A	ig: Free F tten: 30 d	lun IB		Avg Typ	oe: Log-Pwr		TRACE 1 TYPE M DET P	2345 WWWW PPPP
0 dB/div		Dffset 0.5 dB 16.69 dBm	1								Mkr1 2	2.402 19 6.691	
- og 6.69													\ 1
3.31													ß
13.3													-13 31 di
23.3													Ц
33.3													4
13.3	() ²											Ý	
3.3	Ĭ				۸.		lm	,			11	A /	۱. L
3.3 ~///~~	Marm	malanna	www.lodella	mound	IL. Mrs	And had	W line	har	mand	14 June 1474	why way	of human	
73.3													
tart 2.30 Res BW				#\	/BW 30)0 kHz				Sw	Sto reep 10.2	op 2.4070 7 ms (10	
IKR MODE T	_	>		Y		FUNC	TION	FUNCT	ION WIDTH		FUNCTION V.	ALUE	
1 N 2 N	1 f 1 f		.402 19 GHz .305 78 GHz		91 dBm 27 dBm								
	1 f 1 f		.378 11 GHz .400 05 GHz		24 dBm 01 dBm								
5		2	.400 00 012	-09.0	or ubiii								
6 7													
8 9													
10													
1													>

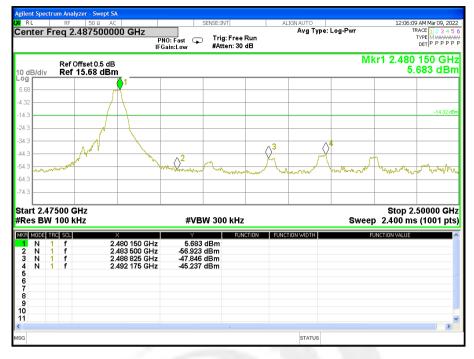
00 CH

39 CH





78 CH





Shenzhen STS Test Services Co., Ltd.

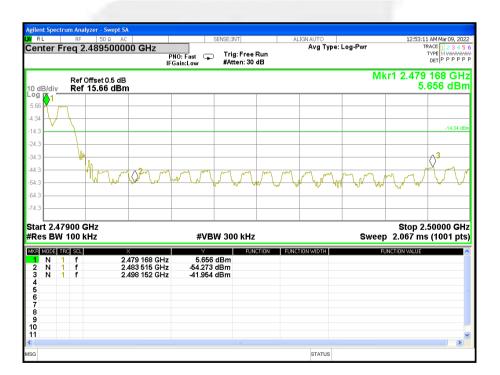




For Hopping Band edge

GFSK

RL		RF	alyzer - Swept S 50 Ω A 2.3515000	C		SENSE:INT		LIGNAUTO Avg Type:	Log-Pwr	TI	LAM Mar 09, 20 RACE 1 2 3 4 5
					PNO: Fast 🖵 Gain:Low	Trig: Free #Atten: 30					DET P P P I
dB/o	div		Offset 0.5 dB 16.65 dB							kr1 2.402 6.	650 dBi
65 -											
35											-13.35 d
.4 -											
4											
.4 A	₩	MA	YANNAMA	AMAMAA	WWWWWW		MMMMM	MMMMM	17074WIYYYY	MAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	AAAAAAA .
1.4 —											
 art∶	2.30	000	GHz							Stop 2.	40300 GH
		100			#VB	W 300 kHz				p 9.867 ms	
	1 1 1 1		2	× 2.402 176 GHz 2.390 022 GHz 2.400 013 GHz	6.650 -42.595 -41.072	dBm dBm	ICTION FUNC	TION WIDTH	F	UNCTION VALUE	
3											
)) 											
						iii					>
								STATUS			





Page 39 of 73 Report No.: STS2203023W01

Temperature:	25 ℃	Relative Humidity:	50%
	π/4-DQPSK(2Mbps)– 00/39/78 CH	Test Voltage:	AC 120V/60Hz

RL	RF	50 Ω A	c	SE	ENSE:INT	ALIGN			01:09:0	8 AM Mar 09, 20
enter F	req 1	12.515000	PN	0: Fast 😱 ain:Low	Trig: Free Run #Atten: 30 dB		Avg Type: Lo	og-Pwr	-	TYPE MWWWW DET P P P P
dB/div		Offset 0.5 dE f 9.84 dBm								.402 GH .157 dBi
g	- (1								
6										
2										-13.39 c
2										
2		<u> </u>								
2		2								~~~
2		<u> </u>								∇
2	- deal	- Andrew Andrew	mounter	Put-ush-ush-	and the manufacture	working	al mar allowed and a	in and the sease	Mulanduna	
		Contraction of the second seco								
.2										
.2										
art 30 les BW		kHz		#VBV	/ 300 kHz	I	I	Swe	Stop ep 2.386	o 25.00 GH s (1001 pt
R MODE 1	TRC SCL		×	Y	FUNCTION	FUNCTION	WIDTH	FI	UNCTION VALUE	
N N	1 f 1 f 1 f 1 f		2.402 GHz 2.502 GHz 7.196 GHz 24.176 GHz	-0.157 d -43.487 d -51.346 d -49.206 d	IBm IBm					
										>

00 CH

39 CH	39	CH
-------	----	----

		alyzer - Swept SA								
nter F	req '	50 Ω AC 12.5150000	PN	IO: Fast 😱 ain:Low	NSE:INT Trig: Free Ru #Atten: 30 dB		GNAUTO Avg Type:	Log-Pwr		TYPE NWMAR 09, 2 TYPE NWMMA DET P P P P
dB/div		Offset 0.5 dB [10.99 dBm	I							.452 GI .987 dB
9	(1								
1										
										-13.56
		. 2	3							
			Y							
		ul				-	and a start and a start and a start a s	monor	and some man	how what
Wente	and the second second		and and a second se	and the second s	and a star a					
art 30 I es BW		kHz		#VBW	/ 300 kHz			Swe	Stop eep 2.386	o 25.00 G s (1001 p
MODE T	RC SCL 1 f	×	2.452 GHz	Y 0.987 d	FUNCTIO	IN FUNCTI	ON WIDTH		FUNCTION VALUE	
N ·	1 f		2.627 GHz	-46.951 d	Bm					
	1 f 1 f		7.321 GHz 24.376 GHz	-42.735 d -49.263 d						



78 CH

RL	rum Ana RF	alyzer - Swept S 50 Ω A			SENSE:INT		ALIGNAUTO		01:18:3	5 AM Mar 09, 202
enter F	req 1	12.515000	Р	NO: Fast Gain:Low			Avg Type:	Log-Pwr		RACE 1 2 3 4 5 TYPE MWAAAAA DET P P P P P
dB/div		Offset 0.5 dE 12.23 dBr								.477 GH 229 dBr
.23	(1								
77										-14.41 df
7.8										
		2		•						4
.8	. (3			and the sharefully	-	mark of the for the state of th	harmonter
7.8 m. 1 .8	and so the	- and and and and	And and the work of the	and when the	whether and work	Chinada Carlo varian				
7.8										
art 30 I Res BW		kHz		#VB	W 300 kHz	 		Swe	Stop eep 2.386 s	25.00 GH
art 30 I Res BW	/ 100 RC 501		×	Y	FUN	-	NCTION WIDTH		Stop eep 2.386 s) 25.00 GF s (1001 pt
art 30 Res BW E MODE 1 N 2 N 3 N 4 N	100		× 2.477 GHz 2.577 GHz 7.446 GHz 23.976 GHz	#VB 2.229 47.826 -53.380 -48.643	dBm dBm dBm dBm	-	NCTION WIDTH		eep 2.386	25.00 GH s (1001 pt
art 30 Res BW R MODE N N 2 N 3 N	100 1 f 1 f 1 f 1 f		2.477 GHz 2.577 GHz 7.446 GHz	2.229 -47.826 -53.380	dBm dBm dBm dBm	-	NCTION WIDTH		eep 2.386	25.00 GH 5 (1001 pt
art 30 I Res BW F M009 I N 2 N 3 N 4 N 5 5 7 7 8	100 1 f 1 f 1 f 1 f		2.477 GHz 2.577 GHz 7.446 GHz	2.229 -47.826 -53.380	dBm dBm dBm dBm	-	NCTION WIDTH		eep 2.386	9 25.00 GH s (1001 pt



Shenzhen STS Test Services Co., Ltd.



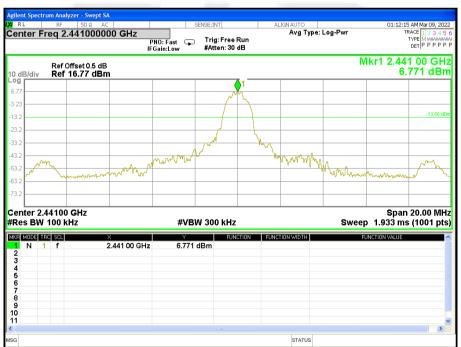


For Band edge(it's also the reference level for conducted spurious emission)

RE SO 2 Center Freq 2.353500 Ref Offset 0.5 c 10 dB/div Ref 16.61 dB -3.39	000 GHz Pi IFC	NO: Fast Gain:Low	Trig: Free #Atten: 30	Run			™. ™ Ikr1 2.402	AMMar09, 202 ACE 12 3 4 5 VPE MWWW DET P P P P P 2 19 GH 510 dBr 1
Ref Offset 0.5 c Ref 16.61 dE	Pi IFG	NO: Fast G			Avg Type:		Ikr1 2.402	2 19 GH 310 dBr
10 dB/div Ref 16.61 dE						N		610 dBr
6.61 .3.39 .13.4 .23.4 								-1339 dE
13.4 23.4 33.4								-1339 dE
23.4 33.4						3		-13,99 dE
33.4						<u>3</u>		04
				Ь		⊢X	лЛа	\rightarrow
3.4	سام معاملهم معاملهم ما		MAA	ULAA	Margar Mr.	Mum	WWw	
3.4								
3.4								
tart 2.30000 GHz Res BW 100 kHz		#VBI	N 300 kHz		^	Sweep	Stop 2.4 0 10.27 ms	10700 GH (1001 pt
KR MODE TRC SCL 1 N 1 f	× 2.402 19 GHz	Y 6.610	dBm	CTION FUNCT	TION WIDTH	FL	JNCTION VALUE	
2 N 1 f 3 N 1 f	2.306 21 GHz 2.377 79 GHz	-46.686 -42.448	dBm					
4 N 1 f	2.400 05 GHz	-39.277	dBm					
3								
8 9 0								
1								
3					STATUS			>

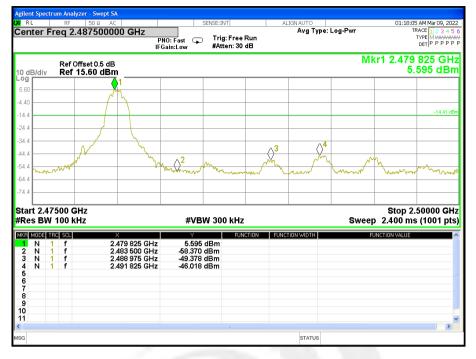
00 CH

39 CH





78 CH





Shenzhen STS Test Services Co., Ltd.





For Hopping Band edge

$\pi/4$ -DQPSK

nt Spect	rum An RE	alyzer - Sw 50 Ω				SENSE:IN	τl		LIGNAUTO			01:54	:22 AM Mar 09, 2
			00000 G	Р	NO: Fast Gain:Low	Trig	: Free Ru en: 30 dE	n		ype: Log-F	^o wr	01:54	TRACE 1 2 3 4 TYPE MWWW DET P P P
B/div		Offset 0. f 16.92									М		2 794 G 6.922 dE
2													
						_							
-													-13.08
												\bigcirc	2
1	MW	MMM	mount	WWWW	WWW	winnin	n/wahel	nopm	Wrwh	www.	approved	mmm	างใจงาวกุจไป
1													
						_							
urt 2.30 es BW					#	/BW 300	kHz				Swee		2.40300 G ns (1001 p
MODE T			X				FUNCTI	IN FUN	CTION WIDTH		ŀ	UNCTION VALUE	
N ⁴	1 f 1 f 1 f		2.390 0	794 GHz 022 GHz 013 GHz	-43.6	022 dBm 06 dBm 03 dBm							
							Ш						
									STATU	s			

	RF	50 Ω AC		SENSE:IN	Л	ALIGN AU			1:56:33 AM Mar 09, 2
nter F	req 2.48	9500000 GI	Hz PNO: Fas IFGain:Lo		: Free Run en: 30 dB	Av	g Type: Log-P∖	wr	TRACE 1 2 3 4 TYPE MWAAA DET P P P F
B/div	Ref Offs Ref 14.	et 0.5 dB 82 dBm						Mkr1 2.4	479 924 G 4.824 dE
2	1								
	m -								
·									-15.18
<u> </u>	- h.								3
<u> </u>	-	m m an	NM m	Mr m	~M. ~M	mm	man		Awan
<u> </u>		HV . MV	Mr. Mart	~ " vu ^{re} vi		an Mar M	www.w	mon	V ·
<u> </u>									
rt 2.47	'900 GHz							Sto	op 2.50000 G
es BW	100 kHz			#VBW 300) kHz			Sweep 2.06	
MODE T		×		Y	FUNCTION	FUNCTION WI	DTH	FUNCTION V	ALUE
N 1 N 1	f	2.479 92 2.483 51	5 GHz -	4.824 dBm 51.348 dBm					
N 1	f	2.497 81	6 GHz -∠	2.355 dBm					

Shenzhen STS Test Services Co., Ltd.



Page 44 of 73 Report No.: STS2203023W01

Temperature:	25 ℃	Relative Humidity:	50%
Test Mode:	8DPSK(3Mbps) -00/39/78 CH	Test Voltage:	AC 120V/60Hz

27 AM Mar 09, 2022 TRACE 1 2 3 4 5 TYPE MWWWWW DET P P P P I Center Freq 12.515000000 GHz Avg Type: Log-Pwr PNO: Fast 😱 IFGain:Low Trig: Free Run #Atten: 30 dB Mkr1 2.402 GHz 2.697 dBm Ref Offset 0.5 dB Ref 12.70 dBm 10 dB/div -12.79 d 37. \Diamond^4 47 : Stop 25.00 GHz Sweep 2.386 s (1001 pts) Start 30 MHz #Res BW 100 kHz #VBW 300 kHz MKR MODE TRC SCL NCTION VALUE FUNCTION FUNCTION WIDTH 2.697 dBm -45.184 dBm -48.492 dBm -48.938 dBm 2.402 GHz 2.502 GHz 7.196 GHz 24.151 GHz N N N 1 2 3 4 5 6 7 8 9 10 11 f f STATUS

00 CH

39	СН

			ilyzer - Swept SA							
XIRL		RF	50 Ω AC		SENSE:INT	A	LIGNAUTO			AM Mar 09, 2022
Cente	er Fre	eq 1	2.515000000 G	Hz PNO: Fast IFGain:Low	Trig: Free #Atten: 30		Avg Type: L	og-Pwr		ACE 1 2 3 4 5 TYPE MWWWWWW DET P P P P P
10 dB/c	div		Offset 0.5 dB 13.35 dBm							452 GH: 352 dBn
	411	(1							
3.35										
6.65										-12.51 dB
16.7										
-26.7										
36.7			x2							
-46.7			V	3						
-56.7		_		Henry human when her		and the second second	- commanutero	monor	وعارياسي معمد المرمن	and the state of t
-66.7	المالية بطاكرته	hart	- Swatwall	and the second states of the s						
-76.7										
Ľ										
Start 3 Res I			kHz	#	VBW 300 kH:	z		Swee	Stop 2.386 s	25.00 GH (1001 pts
IKR MOD		SCL	×			NCTION FUNC	CTION WIDTH	FU	NCTION VALUE	
1 N		f			352 dBm 559 dBm					
2 N										
2 N 3 N	1	f	7.321		136 dBm					
	1		7.321 24.625		917 dBm					
3 N 4 N 5 6	1	f								
3 N 4 N 5 6 7 8	1	f								
3 N 4 N 5 6 7	1	f								
3 N 4 N 5 6 7 8 9	1	f								



78 CH

		alyzer - Swept S								
RL enter F	RF req 1	50 Ω A	0000 GHz	NO: Fast	SENSE:INT		IGN AUTO Avg Type:	Log-Pwr		5 AM Mar 09, 202 RACE 1 2 3 4 5 TYPE M MAAAAA
				Gain:Low	#Atten: 30 d					DETPPPP
) dB/div		Offset 0.5 dE f 11.90 dBr								.477 GH 904 dBr
.90		1								
10										-14.01 df
3.1										
3.1										
3.1 3.1		2 ²		3						\Diamond^4
	and been	and the second	mannesser	-	And the second second	and the second second	ahomed market	mangha	whetherestow	and water
3.1										
3.1										
art 30 Res BM				#\/B	W 300 kHz				Stop eep 2.386 s	25.00 GH
R MODE			×	#VD			TION WIDTH		UNCTION VALUE	s (1001 pt
1 N 2 N 3 N	1 f 1 f 1 f 1 f		2.477 GHz 2.577 GHz 7.446 GHz 24.101 GHz	1.904 -48.382 -56.253 -49.384	dBm dBm dBm					
5										
5 5 7 3 9										
5 5 7 8										



Shenzhen STS Test Services Co., Ltd.



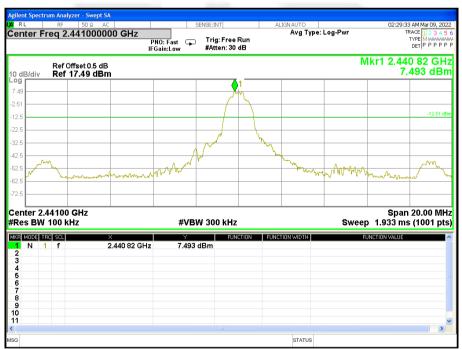


For Band edge(it's also the reference level for conducted spurious emission)

		ctrur		lyzer - S																	
RL		_	RF	50					_	9	SENSE:IN	Т		A	IGN AUT		Log-Pw		02:		AM Mar 09, 20
Jen	ter	Fre	eq 2	2.3535	5000	100 G		PNO: IFGair	Fast n:Low	Ģ		: Free en: 30			Avg	Type:	Log-Pw	r		Т	ACE 1 2 3 4 5 YPE MWWWW DET P P P P
	B/div			Offset (17.21														N	1kr1 2.		219 GH 210 dBi
- og 7.21 -2.79																					
12.8 22.8 32.8																	0.3				-12/79 dl
42.8 52.8 62.8	mu	Â	,2 	angunanik	www.				مروري	M	M	. Au	1,1	a Ann	War	w./u/W		ħωſγ	AN	1	
62.8 72.8																					
	t 2.: s Bl								#	٧B١	W 300) kHz					s	weep	Stoj p 10.27	p 2.4 ms	0700 GH (1001 pt
1 2 3 4	N N N N N	1 1 1 1	f f f f			2.306 2.377	19 GH; 21 GH; 79 GH; 05 GH;	z z	-46.	021 390	dBm dBm dBm dBm	FUN	CTION	FUNC	TION WID	TH		Į.	UNCTION VAL	UE	
5 6 7 8 9 0																					
G															STA	TUS					

00 CH

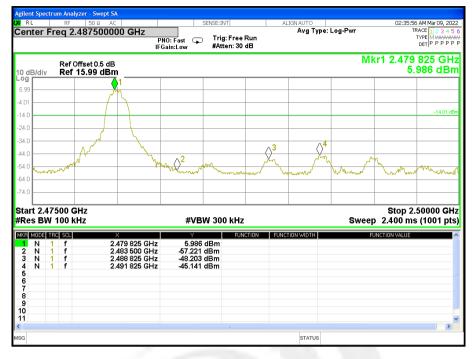
39 CH





Page 47 of 73

78 CH





Shenzhen STS Test Services Co., Ltd.





For Hopping Band edge

8DPSK

ilent Spectrur R L	n Analyzer - S RF 50			SENSE:INT		JGN AUTO		00/05/15	AM Mar 09, 20
		000000 GHz	PNO: Fast IFGain:Low	Teles Free B	un	Avg Type:	Log-Pwr	TF	AMIMARU9, 20 ACE 1 2 3 4 1 IVPE MWWWW DET P P P P
dB/div	Ref Offset (Ref 17.05						М	kr1 2.401 7.	970 GH 051 dB
05									
95									-12.95 d
1.0 1.0									12.55 0
								^2	
0.0 10.0 Million	AMAAAA MA	ይታራስበኩሌታቶስዲሁ	WWWWWWW	hAntinada Jiha.	MonMart	annaaan	manawa	wwwww	www
	** * * * * * * * * * * * * * *		<u> </u>	<u>የተቀቀም የቀቀም የ</u>	VIGGGGGGGG				
3.0									
art 2.300 tes BW 1			#VE	SW 300 kHz			Swee	Stop 2.4 p 9.867 ms	40300 GH (1001 pt
r mode trc		×	Ŷ	FUNC	TION FUNC	TION WIDTH		UNCTION VALUE	
N 1 2 N 1 3 N 1 4	f f f	2.401 970 G 2.390 022 G 2.400 013 G	Hz -43.688						
7 3 9 0									
									>
1						STATUS			

tor	RF	50 Ω	AC 0000 GHz		SENSE:INT		ALIG	AVg Type:	Log-Pwa		26 AM Mar 09, 20 TRACE 1 2 3 4
ileri	rieq 2	.409500		PNO: Fast 😱	Trig: Fro #Atten: 3			ing type.			DET P P P
B/div		Offset 0.5 d							N	1kr1 2.480 5) 176 GH .889 dB
	1										
w	Not the										
											-14.11 c
<u> </u>											
\vdash	- 4	J.									3
		Vm.	mar 2m. v	mmm	and a mark	1 ~m	mm	Mr. Mr.	martin	an and	Muran
		~~~				~~~~~		~~~~	WILLT' ht	C C C C C C C C C C C C C C C C C C C	
	7900 V 100			#VE	SW 300 kł	Iz			Swe	2 Stop 2.067 m	.50000 Gl s (1001 pi
	TRC SCL		X	Y		UNCTION	FUNCTIO	N WIDTH		FUNCTION VALUE	
N N	1 f 1 f		2.480 176 GH 2.483 515 GH		)dBm )dBm						
Ν	1 f		2.497 816 GH	lz -42.114	dBm						
											>

A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China Tel: +86-755 3688 6288 Fax:+86-755 3688 6277 Http://www.stsapp.com E-mail: sts@stsapp.com

Shenzhen STS Test Services Co., Ltd.



## 5. NUMBER OF HOPPING CHANNEL

5.1 LIMIT

FCC Part 15.247,Subpart C								
Section	Test Item	Limit	FrequencyRange (MHz)	Result				
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS				

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RB	300KHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 300KHz, VBW=300KHz, Sweep time = Auto.

### 5.3 TEST SETUP



5.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.



### 5.5 TEST RESULTS

Temperature:	<b>25</b> ℃	Relative Humidity:	60%
Test Mode:	Hopping Mode -GFSK Mode	Test Voltage:	AC 120V/60Hz

### Number of Hopping Channel

79

## Avg Type: Log-Pwr ter Freq 2.441750000 GHz PNO: Fast Trig: Free Run FGain:Low #Atten: 30 dB OCT PPPP Mkr2 2.479 993 0 GH: 5.76 dBm Ref Offset 0.5 dB Ref 17.21 dBm 6 TITLE Start 2.40000 GHz #Res BW 300 kHz Stop 2.48350 GHz Sweep 1.133 ms (1001 pts) #VBW 300 kHz Image: Logical state Image: Lo 2.402 004 0 GHz 2.479 993 0 GHz 6.84 dBm 5.76 dBm stAtus

### **Hopping channel**

Shenzhen STS Test Services Co., Ltd.



## 6. AVERAGE TIME OF OCCUPANCY

### 6.1 LIMIT

FCC Part 15.247,Subpart C								
Section	Test Item	Limit	FrequencyRange (MHz)	Result				
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS				

### 6.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer.
- b. Set RBW =1MHz/VBW =3MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to e. zero span.
- f. Measure the maximum time duration of one single pulse.
- g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
- h. Measure the maximum time duration of one single pulse.
- i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 3.37 x 31.6 = 106.6.
- j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 5.06 x 31.6 = 160.
- k. DH1 Packet permit maximum 1600 / 79 / 2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 10.12 x 31.6 = 320.

6.3 TEST SETUP



### 6.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.



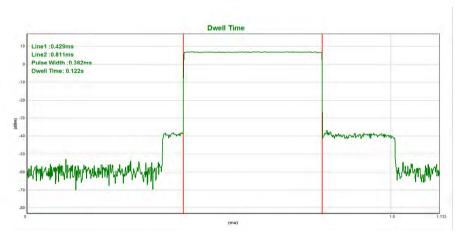
## 6.5 TEST RESULTS

Temperature:	<b>25℃</b>	Relative Humidity:	50%
Test Mode:	GFSK/ π/4-DQPSK/ 8DPSK	Test Voltage:	AC 120V/60Hz

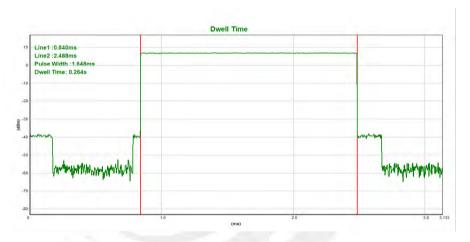
Modulation	Pocket Type	Frequency (MHz)	Single Pulse Time (ms)	Dwell Time (s)	Limit (s)	Result
	DH1	2441	0.382	0.122	0.4	Pass
GFSK	DH3	2441	1.648	0.264	0.4	Pass
	DH5	2441	2.876	0.307	0.4	Pass
	2DH1	2441	0.390	0.125	0.4	Pass
π/4DQPSK	2DH3	2441	1.642	0.263	0.4	Pass
	2DH5	2441	2.888	0.308	0.4	Pass
	3DH1	2441	0.389	0.124	0.4	Pass
8DPSK	3DH3	2441	1.639	0.262	0.4	Pass
	3DH5	2441	2.884	0.308	0.4	Pass



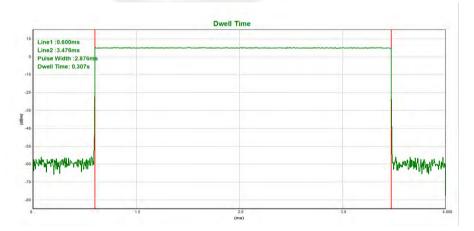
## CH39-DH1



### CH39-DH3



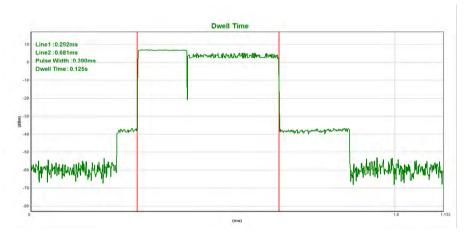
### CH39-DH5



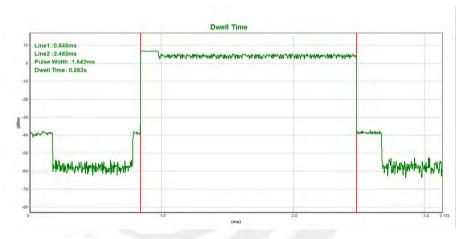
Shenzhen STS Test Services Co., Ltd.



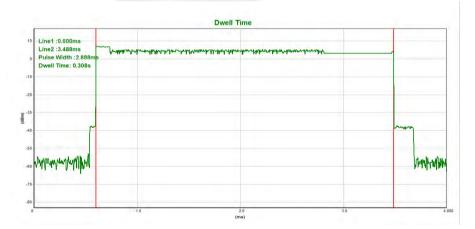
### CH39-2DH1







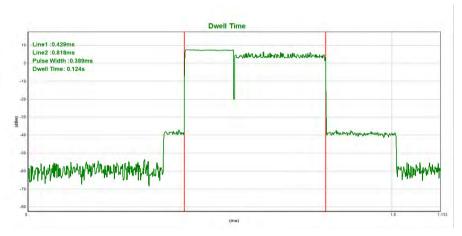




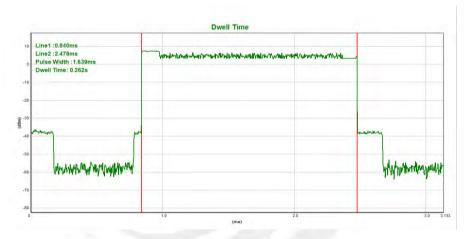
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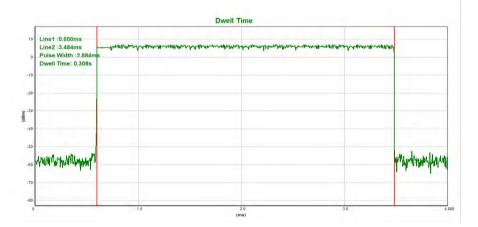
### CH39-3DH1



#### CH39-3DH3



#### CH39-3DH5



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## 7. HOPPING CHANNEL SEPARATION MEASUREMEN

7.1 LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting					
Attenuation	Auto					
Span Frequency	> 20 dB Bandwidth or Channel Separation					
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)					
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)					
Detector	Peak					
Trace	Max Hold					
Sweep Time	Auto					

#### 7.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

7.3 TEST SETUP



### 7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.



## 7.5 TEST RESULTS

Temperature:	25°C		Relative Hu	midity:	50%			
Test Mode:	GFSK/π/4-D	GFSK/π/4-DQPSK/8DPSK			AC 120V/60Hz			
	·							
Modulation	Frequency (MHz)	Mark1 Frequency (MHz)	Mark2 Frequency (MHz)	Channel Separation (MHz)		Limit (MHz)	Result	
	2402	2402.158	2403.163	163 1.00		0.972	Pass	
GFSK	2441	2441.161	2442.154	0.9	93	0.979	Pass	
	2480	2479.155	2480.151	0.9	96	0.967	Pass	
	2402	2401.990	2402.995	1.005		0.864	Pass	
π/4DQPSK	2441	2440.993	2441.989	0.996		0.867	Pass	
	2480	2478.984	2479.983	0.9	99	0.869	Pass	
	2402	2401.990	2403.004	1.014		0.862	Pass	
8DPSK	2441	2440.987	2441.989	1.002		0.863	Pass	
	2480	2478.993	2479.980	0.987		0.863	Pass	

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### CH00 -1 Mbps



#### CH39 -1Mbps





#### CH78 -1Mbps



#### CH00 -2Mbps



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#### CH39 -2Mbps

L RF	50 Ω AC		SENSE:INT	ALIGN AUTO		01:45:17 AM Mar 09, 20
iter Freq 2.4	41500000 GHz	PNO: Wide 🕞 IFGain:Low	Trig: Free Ru #Atten: 30 dB		Log-Pwr	TRACE 1 2 3 4 5 TYPE M WWWW DET P P P P
B/div Ref 1	fset 0.5 dB 3.58 dBm				Mki	2 2.441 989 GH 4.433 dBi
		{1		2		
m		mmm		monton	M _	man
- have	man mar		and have		warn	~~~~ (
nter 2.441500 es BW 30 kHz		#VB	W 100 kHz		Sweep	Span 3.000 MH 3.200 ms (1001 pt
MODE TRC SCL N 1 f	× 2.440 993 (	Y	dBm	ON FUNCTION WIDTH	FUN	ICTION VALUE
N 1 f	2.440 995 (		dBm			
						>

#### CH78 -2Mbps



Shenzhen STS Test Services Co., Ltd.



#### CH00 -3Mbps

Agilent Spectrum Analyzer - Swept SA			
222 RL RF 50 Ω AC Center Freq 2.402500000 GHz PN IFC	O: Wide Trig: Free R Gain:Low #Atten: 30 d	ALIGNAUTO Avg Type: Log-Pw un B	02:11:05 AM Mar 09, 2022 <b>r</b> TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P P P P
Ref Offset 0.5 dB 10 dB/div Ref 12.60 dBm			Mkr2 2.403 004 GHz 3.546 dBm
2.60 -7.40	Vin	man WV har	man har
-17.4 -27.4 -37.4			
-47.4 -57.4 -67.4			
-77.4 Center 2.402500 GHz #Res BW 30 kHz	#VBW 100 kHz	s	Span 3.000 MHz sweep 3.200 ms (1001 pts)
MXS  MXODE  IFG  SCL  X    1  N  1  f  2.401 990 GHz    2  N  1  f  2.403 004 GHz    3  4  4  4	Y FUNCT 4.376 dBm 3.546 dBm	TON FUNCTION WIDTH	FUNCTION VALUE
5 6 7 8 9 10			
10 11 ≪ MSG	iu.	STATUS	×

## CH39 -3Mbps



A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China Tel: +86-755 3688 6288 Fax:+86-755 3688 6277 Http://www.stsapp.com E-mail: sts@stsapp.com



## CH78 -3Mbps

	fset 0.5 dB 1.81 dBm				Mki	r2 2.479 980 G 1.881 d
where here		harry	man	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Man	~
						Mr.
						1 Arm
						Jam
	GHz	#\/P\	V 100 kHz		-	Span 3.000 I 3.200 ms (1001
ter 2.479500 s BW 30 kHz		#VDI				ICTION VALUE
		У GHz 3.11		FUNCTION WIDTH	FUN	
s BW 30 kHz Mode TRC SCL	× 2.478 993 (	У GHz 3.11	dBm	FUNCTION WIDTH	FUN	
s BW 30 kHz Mode TRC SCL	× 2.478 993 (	У GHz 3.11	dBm	FUNCTION WIDTH	FUN	



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## 8. BANDWIDTH TEST

## 8.1 LIMIT

FCC Part15 15.247,Subpart C					
Section  Test Item  Limit  FrequencyRange (MHz)  Result					
15.247 (a)(1)	Bandwidth	N/A	2400-2483.5	PASS	

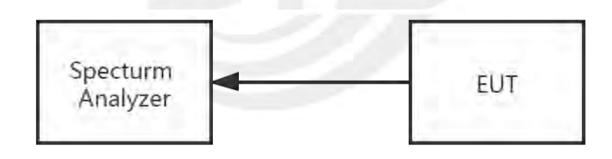
Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency > Measurement Bandwidth or Channel Separation	
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### **8.2 TEST PROCEDURE**

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

8.3 TEST SETUP



### 8.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.



## 8.5 TEST RESULTS

Temperature:	25℃	Relative Humidity:	50%
Test Mode:	GFSK/π/4-DQPSK/8DPSK	Test Voltage:	AC 120V/60Hz

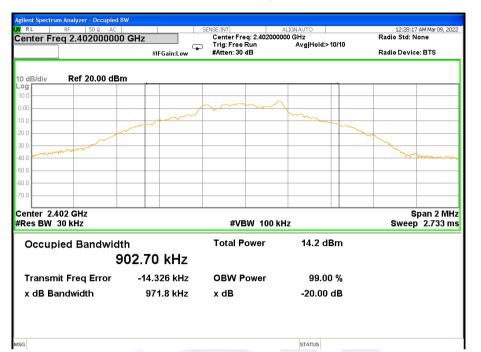
Modulation	Frequency (MHz)	-20 dB Bandwidth (MHz)	Result
	2402	0.9718	Pass
GFSK	2441	0.9791	Pass
	2480	0.9670	Pass
	2402	1.296	Pass
π/4DQPSK	2441	1.300	Pass
	2480	1.304	Pass
	2402	1.293	Pass
8DPSK	2441	1.294	Pass
	2480	1.294	Pass



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#### CH00 -1Mbps



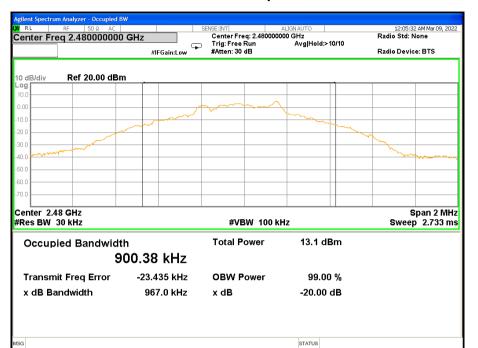
CH39 -1Mbps



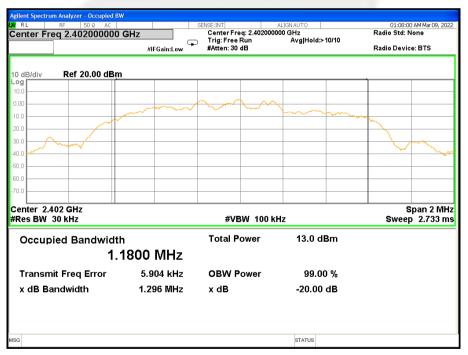
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### CH78 -1Mbps



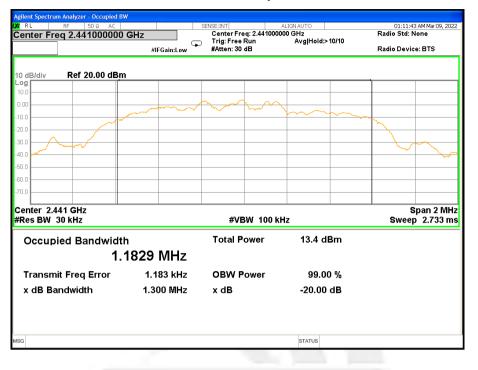
#### CH00 -2Mbps



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#### CH39 -2Mbps



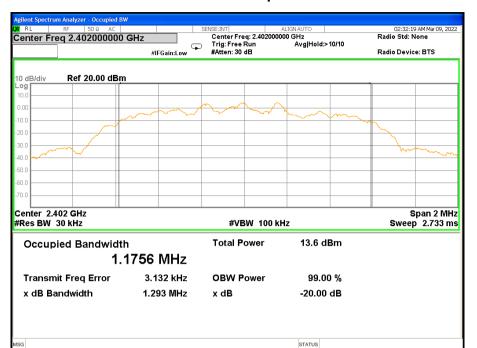
## CH78 -2Mbps



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#### CH00 -3Mbps



CH39 -3Mbps



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## CH78 -3Mbps



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Page 70 of 73 Report No.: STS2203023W01

# 9. OUTPUT POWER TEST

### 9.1 LIMIT

FCC Part 15.247,Subpart C					
Section	Test Item	Limit	Frequency Range (MHz)	Result	
		1 W or 0.125W			
15.247 (a)(1)&(b)(1)	Output Power	if channel separation > 2/3 bandwidthprovided thesystems operatewith an output power no greater than125 mW(20.97dBm)	2400-2483.5	PASS	

### 9.2 TEST PROCEDURE

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:

1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.

2) RBW > 20 dB bandwidth of the emission being measured.

3) VBW  $\geq$  RBW.

4) Sweep: Auto.

5) Detector function: Peak.

6) Trace: Max hold.

b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

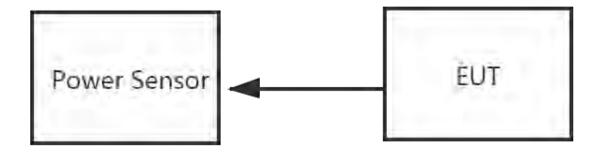
e) A plot of the test results and setup description shall be included in the test report.

NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

PKPM1 Peak power meter method:

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DSS bandwidth and shall use a fast-responding diode detector.

9.3 TEST SETUP



### 9.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

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## 9.5 TEST RESULTS

Temperature:	25°C	Relative Humidity:	60%
Test Voltage:	AC 120V/60Hz		

Modulation	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	Limit (dBm)
	2402	7.82	6.42	20.97
GFSK (1M)	2441	7.61	6.29	20.97
	2480	5.81	4.50	20.97
	2402	7.79	2.87	20.97
π/4-DQPSK (2M)	2441	7.59	2.94	20.97
	2480	5.80	1.29	20.97
	2402	7.74	2.58	20.97
8-DPSK (3M)	2441	7.55	2.75	20.97
	2480	5.79	1.11	20.97



## 10. ANTENNA REQUIREMENT

### 10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

### 10.2 EUT ANTENNA

The EUT antenna is PCB Antenna. It comply with the standard requirement.



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## **APPENDIX-PHOTOS OF TEST SETUP**

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

* * * * * END OF THE REPORT * * * * *



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