

RADIO TEST REPORT

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Report No:STS1806136W03

Issued for

KINGTA TECHNOLOGY CO., LTD

4F, Building 2, HaoJingDa Science Park, Shangmugu, Shenzhen, China

Product Name:	Bluetooth Speaker
Brand Name:	N/A
Model Name:	A1
Series Model:	TY-WSP100,TY-WSP101,BLG-SUBMARINE, TE1-SUB
FCC ID:	N7KA1
Test Standard:	FCC Part 15.247

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TEST RESULT CERTIFICATION

Applicant'sname	KINGTA TECHNOLOGY CO., LTD
Address	4F, Building 2, HaoJingDa Science Park,Shangmugu,Shenzhen, China
Manufacture's Name:	KINGTA TECHNOLOGY CO., LTD
Address	4F, Building 2, HaoJingDa Science Park,Shangmugu,Shenzhen, China
Product description	
Product Name:	Bluetooth Speaker
Brand Name:	N/A
Model Name:	A1
Series Model:	TY-WSP100, TY-WSP101, BLG-SUBMARINE, TE1-SUB
Test Standards	FCC Part15.247
Test procedure	: ANSI C63.10-2013

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 (s) of performance of tests .: 14 June 2018 ~21 June 2018

Date of Issue: 22 June 2018

Test Result Pass

Testing Engineer

(Chris chen)

Technical Manager

(Sean she)



Authorized Signatory :

(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	22 June 2018	STS1806136W03	ALL	Initial Issue



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards: DA 00-705

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		
15.247(d)	Radiated Spurious Emission	PASS		
15.247(d)	Conducted Spurious & Band Edge Emission	PASS		
15.247(a)(iii)	Number of Hopping Frequency	PASS		
15.247(a)(iii)	Dwell Time	PASS		
15.247(a)(1)	Bandwidth	PASS		
15.205	Restricted Band Edge Emission PA			
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

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1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd. Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China CNAS Registration No.: L7649; FCC Registration No.: 625569 IC Registration No.: 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** % °

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No.	Item	Uncertainty
1	Conducted Emission (9KHz-150KHz)	±2.88dB
2	Conducted Emission (150KHz-30MHz)	±2.67dB
3	RF power,conducted	±0.71dB
4	Spurious emissions, conducted	±0.63dB
5	All emissions,radiated (9KHz-30MHz)	±3.02dB
6	All emissions,radiated (30MHz-200MHz)	±3.80dB
7	All emissions, radiated (200MHz-1000MHz)	±3.97dB
8	All emissions,radiated(>1G)	±3.03dB

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name	Bluetooth Speaker
Trade Name	N/A
Model Name	A1
Series Model	TY-WSP100,TY-WSP101,BLG-SUBMARINE,TE1-SUB
Model Difference	Only different in model name
Channel List	Please refer to the Note 2.
Bluetooth	Frequency:2402 – 2480 MHz Modulation: GFSK(1Mbps), π/4-DQPSK(2Mbps), 8DPSK(3Mbps)
Battery	Battery(rating): Rated Voltage: 3.7V Charge Limit: 4.2V Capacity: 2000mAh
Hardware version number	A1-3254-8326C-MAIN V4
Software version number	2527
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

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

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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

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	A1	PCB Antenna	N/A	0	BT Antenna

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2.2 DESCRIPTION OF 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.

Description	Data Rate/Modulation	
TX CH00	1Mbps/GFSK	
TX CH39	1Mbps/GFSK	
TX CH78	1Mbps/GFSK	
TX CH00	2 Mbps/π/4-DQPSK	
TX CH39	2 Mbps/π/4-DQPSK	
TX CH78	2 Mbps/π/4-DQPSK	
TX CH00	3 Mbps/8DPSK	
TX CH39	3 Mbps/8DPSK	
TX CH78	3 Mbps/8DPSK	
	TX CH00 TX CH39 TX CH78 TX CH00 TX CH39 TX CH39 TX CH78 TX CH78 TX CH78 TX CH78 TX CH78 TX CH78 TX CH39 TX CH78 TX CH00 TX CH39	

Note:

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

(2) We have be tested for all avaiable 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

For AC Conducted Emission

	Test Case
AC Conducted	Mode 10 : Keeping BT TX
Emission	

2.3 TABLE OF PARAMETERS OF TEXT 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				
Frequency	2402 MHz 2441 MHz 2480 MHz				
(Power control software) Parameters(1/2/3Mbps)	Power class: 1 M rate:4:27 2 M rate:11:183 3 M rate:15:339	Power class: 1 M rate:4:27 2 M rate:11:183 3 M rate:15:339	Power class: 1 M rate:4:27 2 M rate:11:183 3 M rate:15:339		



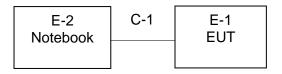
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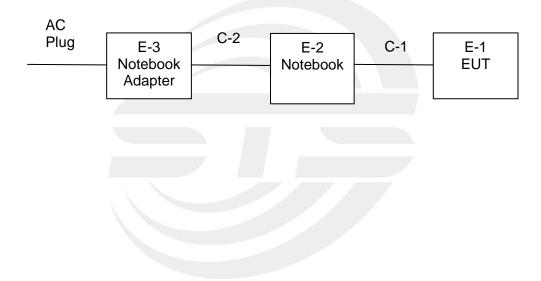
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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

Radiated Spurious EmissionTest



Conducted Emission Test



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2.5 DESCRIPTION OF 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.	Serial No.	Note
E-2	Notebook	HP	500-320cx	N/A	N/A
E-3	Notebook Adapter	HP	HSTNN-CA15	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C-1	USB Cable	NO	100cm	N/A
C-2	DC Cable	NO	90cm	N/A

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in ^r Length ^a column.
- (3) "YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until		
EMI Test Receiver	R&S	ESCI	102086	2017.10.15	2018.10.14		
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2018.11.01		
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1343	2017.10.27	2018.10.26		
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	N/A	2018.03.11	2019.03.10		
Temperature & Humitidy	HH660	Mieo	N/A	2017.10.15	2018.10.14		
Temperature & Humitidy	HH660	Mieo	N/A	2017.10.15	2018.10.14		
Pre-mplifier (0.1M-3GHz)	EM	EM330	60538	2018.03.11	2019.03.10		
PreAmplifier (1G-26.5GHz)	Agilent	8449B	60538	2017.10.15	2018.10.14		
Passive Loop (9K30MHz)	ZHNAN	ZN3090C	16035	2018.03.11	2019.03.10		
Low frequency cable	EM	R01	N/A	2018.03.11	2019.03.10		
Low frequency cable	EM	R06	N/A	2018.03.11	2019.03.10		
High frequency cable	SCHWARZBECK	R04	N/A	2018.03.11	2019.03.10		
High frequency cable	SCHWARZBECK	R02	N/A	2018.03.11	2019.03.10		
Semi-anechoic chamber	Changling	966	N/A	2017.10.15	2018.10.14		
trun table	EM	SC100_1	60531	N/A	N/A		
Antnna mast	EM	SC100	N/A	N/A	N/A		
Max-full Antenna Corp	MF	MFA-440H	N/A	N/A	N/A		

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2017.10.15	2018.10.14
LISN	R&S	ENV216	101242	2017.10.15	2018.10.14
conduction Cable	EM	C01	N/A	2018.03.11	2019.03.10
Temperature & Humitidy	Mieo	HH660	N/A	2017.10.15	2018.10.14

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RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
USB RF power sensor	DARE	RPR3006W	15100041SNO03	2017.10.15	2018.10.14
Power Meter	R&S	NRP	100510	2017.10.15	2018.10.14
Spectrum Analyzer	Agilent	N9020A	MY51110105	2018.03.08	2019.03.07
Signal Analyzer	Agilent	N9020A	MY49100060	2017.10.15	2018.10.14



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3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emissionlimit (dBuV)		
	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

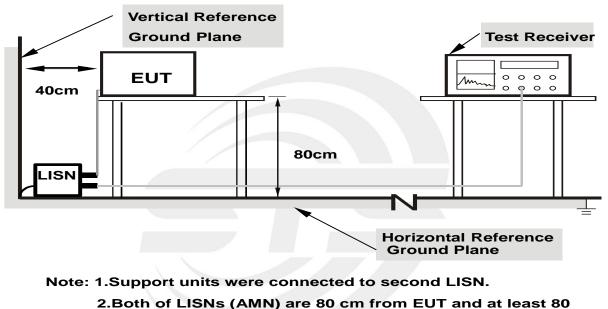
Receiver Parameters	Setting		
Attenuation	10 dB		
Start Frequency	0.15 MHz		
Stop Frequency	30 MHz		
IF Bandwidth	9 kHz		

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3.1.2 TEST PROCEDURE

- a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 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 at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item -EUT Test Photos.



3.1.3 TEST SETUP

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.

from other units and other metal planes

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3.1.5 TEST RESULT

Temperature:	25.5℃	Relative Humidity:	63%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 10		

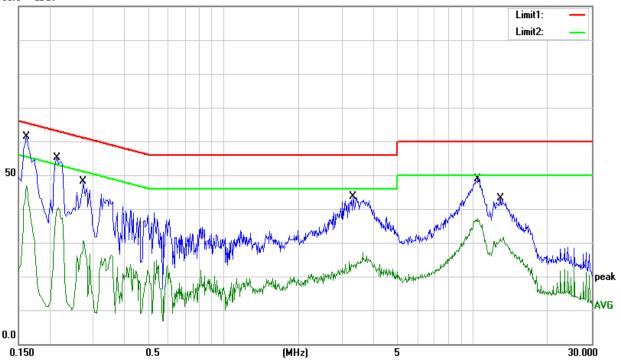
Frequency	Reading	Correct	Result	Limit	Margin	Demeril
(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	Remark
0.1620	51.47	9.79	61.26	65.36	-4.10	QP
0.1620	37.02	9.79	46.81	55.36	-8.55	AVG
0.2140	45.25	9.84	55.09	63.05	-7.96	QP
0.2140	30.57	9.84	40.41	53.05	-12.64	AVG
0.2740	37.98	10.11	48.09	61.00	-12.91	QP
0.2740	20.48	10.11	30.59	51.00	-20.41	AVG
3.2980	33.83	9.82	43.65	56.00	-12.35	QP
3.2980	13.40	9.82	23.22	46.00	-22.78	AVG
10.4940	38.64	10.21	48.85	60.00	-11.15	QP
10.4940	26.07	10.21	36.28	50.00	-13.72	AVG
12.9020	32.85	10.22	43.07	60.00	-16.93	QP
12.9020	20.08	10.22	30.30	50.00	-19.70	AVG

Remark:

1. All readings are Quasi-Peak and Average values.

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

100.0 dBu¥



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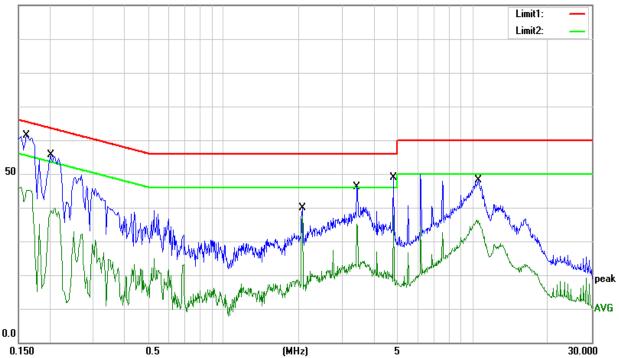
Temperature:	23.5 ℃	Relative Humidity:	63%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 10		

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	Remark
0.1620	51.52	9.79	61.31	65.36	-4.05	QP
0.1620	35.24	9.79	45.03	55.36	-10.33	AVG
0.2020	45.93	9.79	55.72	63.53	-7.81	QP
0.2020	29.20	9.79	38.99	53.53	-14.54	AVG
2.0660	30.14	9.79	39.93	56.00	-16.07	QP
2.0660	27.85	9.79	37.64	46.00	-8.36	AVG
3.4300	36.23	9.82	46.05	56.00	-9.95	QP
3.4300	25.38	9.82	35.20	46.00	-10.80	AVG
4.8060	39.06	9.85	48.91	56.00	-7.09	QP
4.8060	27.86	9.85	37.71	46.00	-8.29	AVG
10.5460	37.89	10.21	48.10	60.00	-11.90	QP
10.5460	24.98	10.21	35.19	50.00	-14.81	AVG

Remark:

All readings are Quasi-Peak and Average values.
 Margin = Result (Result = Reading + Factor)–Limit

100.0 dBuV



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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	Field Strength	Measurement Distance
(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)

FREQUENCY (MHz)	(dBuV/m) (at 3M)		
	PEAK	AVERAGE	
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).

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted	
band)	PK=1MHz / 1MHz, AV=1 MHz /10 Hz

For Band edge

Spectrum Parameter	Setting	
Detector	Peak	
	Lower Band Edge: 2300 to 2403 MHz	
Start/Stop Frequency	Upper Band Edge: 2479 to 2500 MHz	
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz / 10 Hz	

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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 of 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 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees 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 polarizations 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 then QuasiPeak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement 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

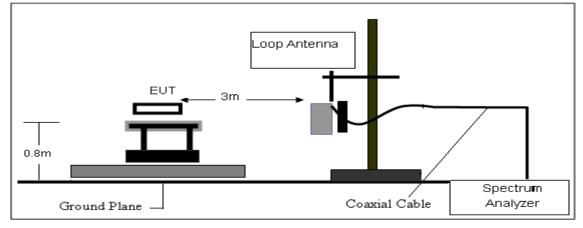
No deviation



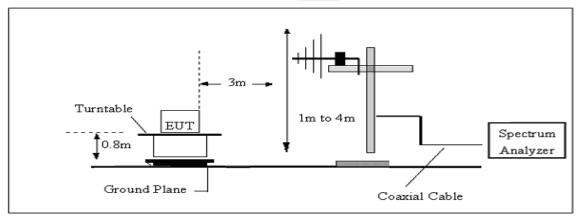


3.2.4 TESTSETUP

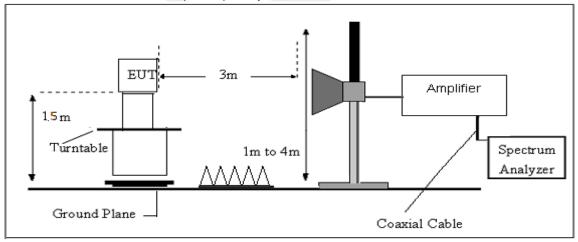
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

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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



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3.2.7 TEST RESULTS

(9KHz-30MHz)

Temperature:	25.5 ℃	Relative Humidity:	63%
Test Voltage:	DC 3.7V from battery	Test Mode:	TX Mode

Freq.	Reading	Limit	Margin	State	Toot Docult
(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.





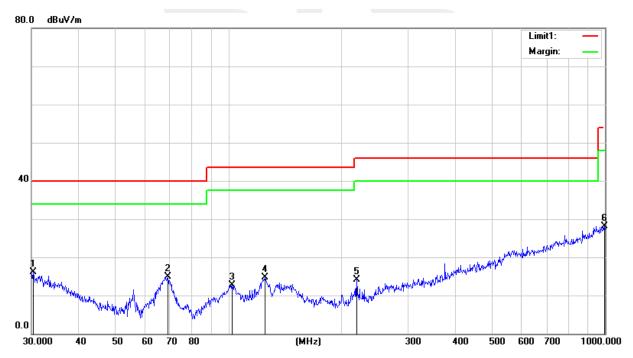
(30MHz-1000MHz)

Temperature:	25.5 ℃	Relative Humidity:	62%	
Test Voltage:	DC 3.7V from battery	Phase:	Horizontal	
Test Mode:	Mode 1/2/3/4/5/6/7/8/9(Mode 1-1M worst mode)			

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
30.3173	27.43	-11.35	16.08	40.00	-23.92	QP
69.1141	39.00	-24.12	14.88	40.00	-25.12	QP
102.3597	31.71	-18.99	12.72	43.50	-30.78	QP
125.0066	32.26	-17.61	14.65	43.50	-28.85	QP
219.0753	33.28	-19.18	14.10	46.00	-31.90	QP
996.4996	28.22	-0.09	28.13	54.00	-25.87	QP

Remark:

1. Margin = Result (Result = Reading + Factor)–Limit





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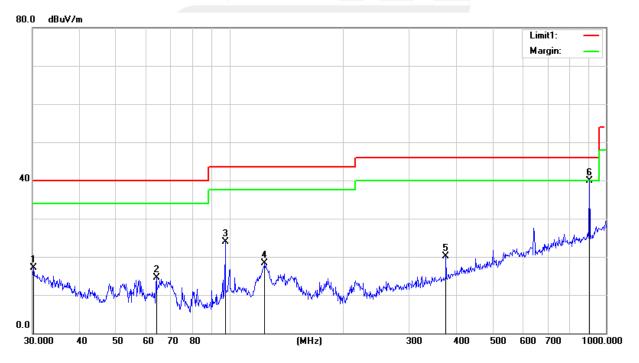
Report No.: STS1806136W03

Temperature:	25.5 ℃	Relative Humidity:	62%
Test Voltage:	DC 3.7V from battery	Phase:	Vertical
Test Mode:	Mode 1/2/3/4/5/6/7/8/9(Mode	1-1M worst mode)	

Frequency	Reading	Correct	Result	Limit	Margin	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
30.2111	28.31	-11.30	17.01	40.00	-22.99	QP
63.9828	38.70	-24.25	14.45	40.00	-25.55	QP
97.4560	43.32	-19.44	23.88	43.50	-19.62	QP
124.1330	35.95	-17.64	18.31	43.50	-25.19	QP
375.9385	32.88	-12.73	20.15	46.00	-25.85	QP
903.3094	42.03	-2.14	39.89	46.00	-6.11	QP

Remark:

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





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(1GHz~25GHz) Restricted band and Spurious emission Requirements

GFSK Low Channel

				Antenna	Corrected	Emission				
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
				Low	Channel (2402 I	MHz)				
3264.84	49.12	44.70	6.70	28.20	-9.80	39.32	74.00	-34.68	PK	Vertical
3264.84	38.53	44.70	6.70	28.20	-9.80	28.73	54.00	-25.27	AV	Vertical
3264.84	48.09	44.70	6.70	28.20	-9.80	38.29	74.00	-35.71	PK	Horizontal
3264.84	38.14	44.70	6.70	28.20	-9.80	28.34	54.00	-25.66	AV	Horizontal
4804.44	58.25	44.20	9.04	31.60	-3.56	54.69	74.00	-19.31	PK	Vertical
4804.44	38.36	44.20	9.04	31.60	-3.56	34.80	54.00	-19.20	AV	Vertical
4804.38	59.51	44.20	9.04	31.60	-3.56	55.95	74.00	-18.05	PK	Horizontal
4804.38	38.91	44.20	9.04	31.60	-3.56	35.35	54.00	-18.65	AV	Horizontal
5359.64	45.19	44.20	9.86	32.00	-2.34	42.85	74.00	-31.15	PK	Vertical
5359.64	37.90	44.20	9.86	32.00	-2.34	35.56	54.00	-18.44	AV	Vertical
5359.57	46.25	44.20	9.86	32.00	-2.34	43.91	74.00	-30.09	PK	Horizontal
5359.57	37.27	44.20	9.86	32.00	-2.34	34.93	54.00	-19.07	AV	Horizontal
7205.86	50.60	43.50	11.40	35.50	3.40	54.00	74.00	-20.00	PK	Vertical
7205.86	33.97	43.50	11.40	35.50	3.40	37.37	54.00	-16.63	AV	Vertical
7205.75	50.93	43.50	11.40	35.50	3.40	54.33	74.00	-19.67	PK	Horizontal
7205.75	33.59	43.50	11.40	35.50	3.40	36.99	54.00	-17.01	AV	Horizontal

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GFSK Mid Channel

				Antenna	Corrected	Emission				
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	Comment
				Mid	Channel (2441 M	//Hz)				
3264.84	48.42	44.70	6.70	28.20	-9.80	38.62	74.00	-35.38	PK	Vertical
3264.84	39.76	44.70	6.70	28.20	-9.80	29.96	54.00	-24.04	AV	Vertical
3264.84	48.38	44.70	6.70	28.20	-9.80	38.58	74.00	-35.42	PK	Horizontal
3264.84	38.16	44.70	6.70	28.20	-9.80	28.36	54.00	-25.64	AV	Horizontal
4882.54	58.40	44.20	9.04	31.60	-3.56	54.84	74.00	-19.16	PK	Vertical
4882.54	38.29	44.20	9.04	31.60	-3.56	34.73	54.00	-19.27	AV	Vertical
4882.45	58.72	44.20	9.04	31.60	-3.56	55.16	74.00	-18.84	PK	Horizontal
4882.45	38.12	44.20	9.04	31.60	-3.56	34.56	54.00	-19.44	AV	Horizontal
5359.64	46.34	44.20	9.86	32.00	-2.34	44.00	74.00	-30.00	PK	Vertical
5359.64	38.21	44.20	9.86	32.00	-2.34	35.87	54.00	-18.13	AV	Vertical
5359.81	45.34	44.20	9.86	32.00	-2.34	43.00	74.00	-31.00	PK	Horizontal
5359.81	38.09	44.20	9.86	32.00	-2.34	35.75	54.00	-18.25	AV	Horizontal
7313.94	51.85	43.50	11.40	35.50	3.40	55.25	74.00	-18.75	PK	Vertical
7313.94	33.56	43.50	11.40	35.50	3.40	36.96	54.00	-17.04	AV	Vertical
7313.83	51.42	43.50	11.40	35.50	3.40	54.82	74.00	-19.18	PK	Horizontal
7313.83	33.61	43.50	11.40	35.50	3.40	37.01	54.00	-16.99	AV	Horizontal

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GFSK High Channel

				Antenna	Corrected	Emission				
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	Comment
				High	Channel (2480	MHz)				
3264.67	48.68	44.70	6.70	28.20	-9.80	38.88	74.00	-35.12	PK	Vertical
3264.67	39.27	44.70	6.70	28.20	-9.80	29.47	54.00	-24.53	AV	Vertical
3264.57	47.78	44.70	6.70	28.20	-9.80	37.98	74.00	-36.02	PK	Horizontal
3264.57	39.26	44.70	6.70	28.20	-9.80	29.46	54.00	-24.54	AV	Horizontal
4960.36	58.45	44.20	9.04	31.60	-3.56	54.89	74.00	-19.11	PK	Vertical
4960.36	38.60	44.20	9.04	31.60	-3.56	35.04	54.00	-18.96	AV	Vertical
4960.42	59.26	44.20	9.04	31.60	-3.56	55.70	74.00	-18.30	PK	Horizontal
4960.42	38.81	44.20	9.04	31.60	-3.56	35.25	54.00	-18.75	AV	Horizontal
5359.70	45.33	44.20	9.86	32.00	-2.34	42.99	74.00	-31.01	PK	Vertical
5359.70	38.39	44.20	9.86	32.00	-2.34	36.05	54.00	-17.95	AV	Vertical
5359.58	45.73	44.20	9.86	32.00	-2.34	43.39	74.00	-30.61	PK	Horizontal
5359.58	38.11	44.20	9.86	32.00	-2.34	35.77	54.00	-18.23	AV	Horizontal
7439.78	51.55	43.50	11.40	35.50	3.40	54.95	74.00	-19.05	PK	Vertical
7439.78	32.69	43.50	11.40	35.50	3.40	36.09	54.00	-17.91	AV	Vertical
7439.74	51.08	43.50	11.40	35.50	3.40	54.48	74.00	-19.52	PK	Horizontal
7439.74	32.69	43.50	11.40	35.50	3.40	36.09	54.00	-17.91	AV	Horizontal

Note:

3)

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

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.

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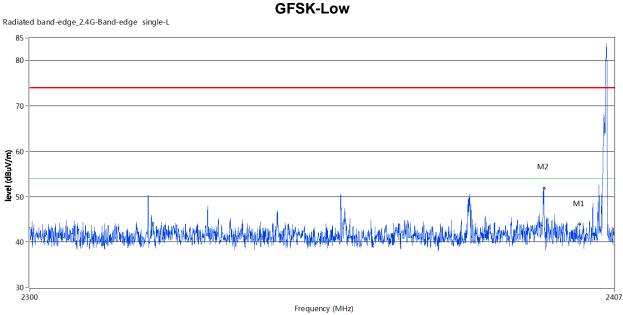
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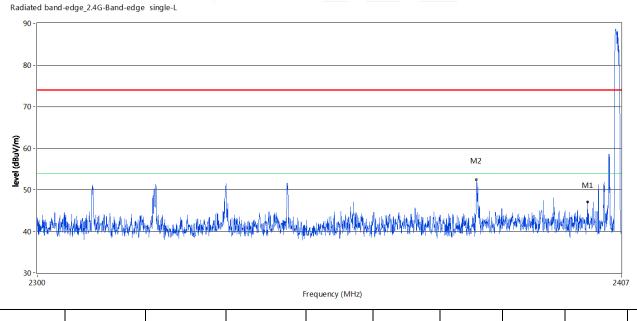
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Band edge Requirements



Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detecto r	Table (o)	Height (cm)	ANT	Verdict
2400.048	44.04	13.25	74.0	29.96	Peak	6.00	100	Horizontal	Pass
2393.846	51.55	13.50	74.0	22.45	Peak	5.00	100	Horizontal	Pass



Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2400.690	46.70	13.20	74.0	27.30	Peak	6.00	100	Vertical	Pass
2380.049	51.98	13.28	74.0	22.02	Peak	14.00	100	Vertical	Pass

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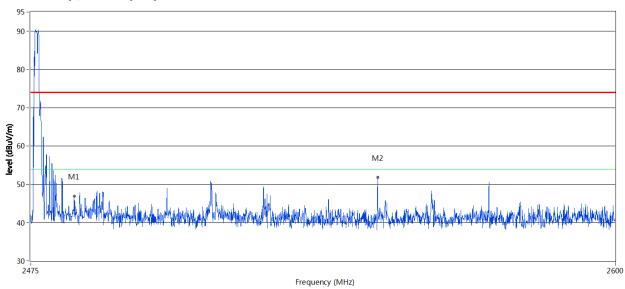


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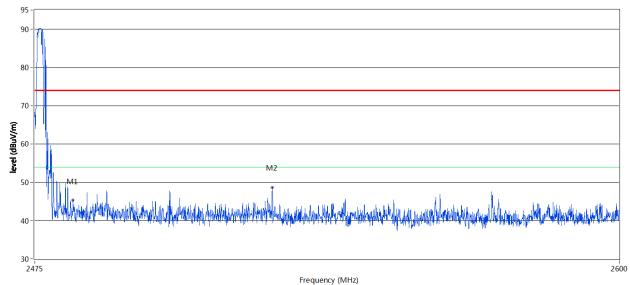
GFSK-High

Radiated band-edge_2.4G-Band-edge single-H



Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdi ct
2483.458	46.85	14.28	74.0	27.15	Peak	9.00	100	Horizontal	Pass
2548.463	51.83	13.40	74.0	22.17	Peak	12.00	100	Horizontal	Pass

Radiated band-edge_2.4G-Band-edge single-H



Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2482.996	45.35	14.31	74.0	28.65	Peak	6.00	100	Vertical	Pass
2525.037	48.69	13.20	74.0	25.31	Peak	7.00	100	Vertical	Pass

Note: GFSK, π /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 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, based on either an RF conducted or a radiated measurement.

4.2 TEST PROCEDURE

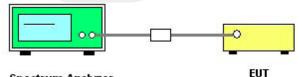
Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Eroguanau	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

Remark : Hopping on and Hopping off mode all have been tested, only worst case hopping off is reported.

4.3 TEST SETUP



Spectrum Analyzer

The EUT is coupled 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. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

4.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



4.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
Test Mode:	GFSK(1Mbps)-00/39/78 CH	Test Voltage:	DC 3.7V

00 CH

Re 0 dB/div Re 0 g 0.8 0.8 0.8 0.9 0.8 <th>12.51500000</th> <th></th> <th>C: Fast</th> <th>Trig: Free R #Atten: 30 d</th> <th></th> <th>Avg Type:</th> <th>Log-Pwr</th> <th></th> <th>TRACE 12 3 4 4 TYPE IM WWW DET P P P P P 0.795 dB</th>	12.51500000		C: Fast	Trig: Free R #Atten: 30 d		Avg Type:	Log-Pwr		TRACE 12 3 4 4 TYPE IM WWW DET P P P P P 0.795 dB
0 dB/div Re 99 08 08 08 08 08 08 08 08 08 08 08 08 08	f -0.80 dBm	3							0.795 dBi
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0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8		3			N COMPANY I NO TRANSPORT				-30.80 d
0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8		3							-30.80 c
0.8 0.8 0.8 0.8 0.8 0.8 0.8 tart 30 MHz Res BW 100									
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Res BW 100									
	kHz		#VBW	300 kHz			Sw		op 25.00 GI s (40001 p
XE MODE TRC SC 1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5	2. 3. 5.	402 2 GHz 327 9 GHz 170 1 GHz 647 9 GHz	-10.795 dE -51.696 dE -56.257 dE -48.305 dE	m	TION FUNC	TION WIDTH	F	FUNCTION VALUE	E
6 7 8 9 0 1 2									

39 CH

		lyzer - Swept Si									
enter F	RF req 1	50 Ω AC 2.515000	000 GHz	NO: Fast 🕞 Gain:Low	SENSE:INT Trig: Fre #Atten: 3		ALIG	NAUTO Avg Typ	e: Log-Pwr	11:	38:40 AM Jun 20, : TRACE 1 2 3 4 TYPE MWWW DET P P P F
dB/div		Offset 0.5 dB 4.52 dBm									.440 9 G -5.477 dE
48		1									
5.5											
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R MODE T			× 2.440 9 GHz	ү -5,477		INCTION	FUNCTIO	N WIDTH		FUNCTION VALU	IE
2 N .	1 f 1 f		3.327 9 GHz	-50.644	dBm						
N 1	1 f 1 f		4.881 7 GHz 24.759 0 GHz	-53.006 -47.438							
i											
1											
1											
2											
6								STATUS			



78 CH

ilent Spect RL	rum Ana RF	l <mark>yzer - Swep</mark> 50 Ω	AC		SENSE:INT		AL II	GNAUTO		09/53/0	14 AM Jun 21, 2
			00000 GHz	PNO: Fast Gain:Low	T		ALI	Avg Type:	Log-Pwr	TI	RACE 1 2 3 4 TYPE M WWW DET P P P P
dB/div		Offset 0.5 5.55 dB								Mkr1 2.4 -4.	80 2 GI 446 dB
45)1									
4.5											-24.45
1.5											-24.45
4.5		2									
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(r Mode 1			х	Ŷ		NCTION	FUNCTI	ON WIDTH	FL	INCTION VALUE	
	1 f 1 f		2.480 2 GHz 2.507 0 GHz	-4.446 -48.472							
3 N	1 f		6.014 1 GHz	-55.717	dBm						
5	1 f		24.764 7 GHz	-48.421	dBm						
5											
3											
9											
1											
2											
2								STATUS			



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Shenzhen STS Test Services Co., Ltd.

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



For Band edge

00 CH

		yzer - Swept SA							
RL	RF	50 Ω AC	-	SENSE:INT		ALIGNAUTO Avg Type:	Lon Dum		0 AM Jun 20, 21 RACE 1 2 3 4
enter F	req 2	.351500000 GH	IZ PNO: Fast IFGain:Low		e Run 0 dB	Avg Type:	Log-Pwr	1	TYPE MWWW DET P P P P
dB/div		Dffset 0.5 dB 6.66 dBm					М	kr1 2.401 -3.	970 GH 340 dB
9 34									
.3									
.3									-23.3
.3								2	
.3							Uhunharrigha	and the work	whereared
.3	مراجعهارم	moutenter	manymouth	ungent man and the	mound	Ballonfolistingstration			
.3									
.3									
art 2.30 les BW			:	#VBW 300 kH	z		Swe	Stop 2. ep 9.87 ms	40300 G s (1001 p
R MODE TI	RC SCL	×			INCTION	FUNCTION WIDTH	F	UNCTION VALUE	
N 1 N 1	f	2.401 97 2.390 02 2.398 67	2 GHz -46	1.340 dBm 1.905 dBm 1.434 dBm					
)									
2									
			1			STATUS			

78 CH

RF	50Ω AC	SENSE:I	NT	ALIGN AUTO			49 AM Jun 21
er Freq 2			g: Free Run tten: 30 dB	Avg Type:	Log-Pwr	1	TYPE MWA DET P P P
	Offset 0.5 dB 6.53 dBm				М	kr1 2.479 -3	840 C .469 d
/	~ 2						-23
\sim \downarrow	monday water water	3					
		untrecommentation		when the work we	woon	han	mon
t 2.47900 G s BW 100 k		#VBW 30	0 kHz		Swe	Stop 2 ep 2.07 m	.50000 (s (1001
	× 2.479 840 GHz		FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE	
N 1 f	2.483 746 GHz						
N 1 f	2.483 746 GHz 2.485 657 GHz						
N 1 f N 1 f							
N 1 f							
N 1 f N 1 f							



For Hopping Band edge

00 CH

ent Spectrum Analyz R L RF	er - Swept SA 50 Ω AC		SENSE:INT	A	IGN AUTO		09:55:1	5 AM Jun 21, :
	51500000 GHz	PNO: Fast G	Tuin Fue	Run	Avg Type:	Log-Pwr	TF	TYPE M WWW DET P P P F
dB/div Ref 6.	fset 0.5 dB . 38 dBm					M	lkr1 2.403 -3.	000 G 622 dE
2								
6								
6								-23.62
								MM
5 0.00000000000000000000000000000000000	wwwwwwww	ALAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	analdadanad	0.000.000.000	mushnerker	water work and	www.	number
² NANAANIANAAN	RAARARAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	AAAAAAAAAAA	λάθληληληλη	CODMONN				
5 								
6								
art 2.30000 GH es BW 100 kH		#VE	3W 300 kHz			Swe	Stop 2. eep 9.87 ms	40300 G ; (1001 p
Mode TRG SCL N 1 f N 1 f N 1 f	× 2.403 000 GH 2.390 022 GH 2.399 292 GH	z -46.41	2 dBm IdBm	CTION FUNC	TION WIDTH		FUNCTION VALUE	

78 CH

	RF	50 Ω AC		SE	INSE:INT		ALIGNAUTO			31 AM Jun 21,
ter F	req 2.4	89500000	PN	0: Fast 😱 ain:Low	Trig: Free R #Atten: 30 d		Avg Type	: Log-Pwr		RACE 1 2 3 TYPE MWW DET P P P
B/div		set 0.5 dB 65 dBm						M	lkr1 2.479 -3.	000 G 355 d
$\int \mathcal{L}$	h									
V										-23.3
<u> </u>	hand	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2 3 Marina							
			- wayne -	سميصلين	al all comments	- Wyman	when the second	man	multipling	wald war
<u> </u>										
	7900 GH 100 kH			#VBV	/ 300 kHz			Swe	Stop 2. eep 2.07 m	.50000 (s (1001
Mode T	RC SCL	× 2.479	000 GHz	-3.355 d	FUNCT	ION FUN	NCTION WIDTH	F	FUNCTION VALUE	
N 1 N 1	f f		809 GHz 027 GHz	-34.622 d -40.181 d						



Page 36 of 71

Report No.: STS1806136W03

Temperature:	25 ℃	Relative Humidity:	50%
Test Mode:	π/4-DQPSK(2Mbps)– 00/39/78 CH	Test Voltage:	DC 3.7V

	RF	50 Ω AC			SENSE:INT		ALIC	GNAUTO		08:57:5	58 AM Jun 21,
er F	req 12.5	150000	1	PNO: Fast G Gain:Low	Trig: Fre #Atten: 3			Avg Type:	Log-Pwr		RACE 1 2 3 4 TYPE MWAA DET P P P F
3/div	Ref Offse Ref_3.3									Mkr1 2.4 -6.	02 2 G 700 dE
	1										
											-26.7
		\ <u>2</u>									
		<u>}</u>						and some state in the second			
المعربين	deside and the			State of the local division of the local div		and state of the					
t 30 s BW	MHz 100 kHz			#VI	3W 300 kH	z			Swe	Stop ep 2.39 s	25.00 G (40001
	RC SCL	×		Y		INCTION	FUNCTIO	ON WIDTH	FL	JNCTION VALUE	
	1 f 1 f 1 f 1 f		2.402 2 GHz 3.327 9 GHz 6.039 7 GHz 4.701 6 GHz	-50.962 -55.070 -47.892	6 dBm						
N	1 T										
N	і т —										
N											
N											
N											

00 CH

39 CH

	RF 50 Ω	AC	SENSE:INT	A	LIGNAUTO		09:01:29 AM Jun 2
iter Frec	12.51500		D: Fast Trig: Free in:Low #Atten: 30		Avg Type: Lo	g-Pwr	TRACE 12 TYPE MW DET P P
	ef Offset 0.5 d ef_5.15 dBi					М	kr1 2.440 9 (-4.849 c
	\ 1						
							-24
		3					
	Y	Y				and the second	and the state
lung berdinste				and the second second			
rt 30 MHz es BW 10			#VBW 300 kH:	z		Sweep	Stop 25.00 2.39 s (40001
MODE TRC S		×		NCTION FUNC	TION WIDTH	FUNC	TION VALUE
	f f f	2.440 9 GHz 3.327 9 GHz 4.882 3 GHz	-4.849 dBm -50.659 dBm -51.785 dBm				
N 1		01770000	-48.188 dBm				
		24.770 3 GHz					
N 1		24.770 3 GHZ					
N 1		24.770 3 GHZ					
N 1		24.770 3 GHZ					
N 1		24.770 3 GHZ					

Shenzhen STS Test Services Co., Ltd.



78 CH

	_	RF	50 Ω A			SENSE:INT		ALIGNAUTO			10 AM Jun 21, 2
nter	r Fre	∋q 12.	515000		PNO: Fast Gain:Low	Trig: Free #Atten: 3		Avg Type:	Log-Pwr		RACE 1 2 3 4 TYPE MWAAA DET P P P P
dB/di			set 0.5 dB 02 dBm							Mkr1 2.4 -3.	80 2 GI 979 dB
		1									
.0											-23.98
			2	,	3						
.0	ي وي	وروا مروان	Y		2 The block of the second second	a final a spille of the state		and the second second		and the second	
.0				an particul de la caracteria de la caracter	hand the state of						
.0											
art 3		HZ 00 kH	7		#VB	W 300 KH	z		Swe	Stop ep 2.39 s	25.00 G (40001 p
	JV4 1	00 MII	2								
R MOD	e trc	SCL	_	×	Y		NCTION FUN	ICTION WIDTH	FL	JNCTION VALUE	
R MOD		SCL f	_	2.480 2 GHz	-3.979	dBm	INCTION FUN	CTION WIDTH	FL	JNCTION VALUE	
R MOD N 2 N 3 N	e tro 1	SCL f f		2.480 2 GHz 3.327 9 GHz 7.524 7 GHz	-3.979 -51.667 -54.865	dBm dBm dBm	INCTION FUN	ICTION WIDTH	FL	JNCTION VALUE	
R MOD N 2 N 3 N 4 N	E TRC 1 1	SCL f f		2.480 2 GHz 3.327 9 GHz	-3.979 -51.667	dBm dBm dBm	NCTION FUN	ICTION WIDTH	FL	UNCTION VALUE	
R MOD N 2 N 3 N 4 N	E TEC 1 1	SCL f f		2.480 2 GHz 3.327 9 GHz 7.524 7 GHz	-3.979 -51.667 -54.865	dBm dBm dBm	INCTION FUN	ICTION WIDTH	FL	UNCTION VALUE	
R MOD N N N N N	E TEC 1 1	SCL f f		2.480 2 GHz 3.327 9 GHz 7.524 7 GHz	-3.979 -51.667 -54.865	dBm dBm dBm	NCTION FUN	ICTION WIDTH	FL	UNCTION VALUE	
R MOD N 2 N 3 N 4 N 5 5	E TEC 1 1	SCL f f		2.480 2 GHz 3.327 9 GHz 7.524 7 GHz	-3.979 -51.667 -54.865	dBm dBm dBm	NCTION FUN	ICTION WIDTH	F1	INCTION VALUE	
R MOD N 2 N 3 N 4 N 5 5 7 8	E TEC 1 1	SCL f f		2.480 2 GHz 3.327 9 GHz 7.524 7 GHz	-3.979 -51.667 -54.865	dBm dBm dBm	NCTION FUN	ICTION WIDTH	R1	INCTION VALUE	
R MOD N 2 N 3 N 4 N 5 5 7 7 8	E TEC 1 1	SCL f f		2.480 2 GHz 3.327 9 GHz 7.524 7 GHz	-3.979 -51.667 -54.865	dBm dBm dBm	NCTION FUN	ICTION WIDTH	F1	INCTION VALUE	
R MOD N 2 N 3 N 4 N 5 5 7 8	E TEC 1 1	SCL f f		2.480 2 GHz 3.327 9 GHz 7.524 7 GHz	-3.979 -51.667 -54.865	dBm dBm dBm	NCTION FUN	STATUS	FL	INCTION VALUE	



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Shenzhen STS Test Services Co., Ltd.



For Band edge

00 CH

		lyzer - Swept SA						
RL	RF	50 Ω AC		SENSE:INT	ALIGN AUTO	e: Log-Pwr	08:58:32 AM Ju TRACE 1	
enter F	req z		PNO: Fast G IFGain:Low	Trig: Free Run #Atten: 30 dB		e. Logi ni	TYPE	PPP
dB/div		Offset 0.5 dB 6.25 dBm				М	kr1 2.401 970 -3.747	
75								
								-23.75
								$\langle \rangle$
							\wedge^2	۳۹
					and an the monte working	mound		
1.8 Minterne	phanpatoph	harmon cale how man	and an and an and an and an	annow Month	And a contraction of the contrac			
· ·								
3.8								
3.8								
art 2.30						_	Stop 2.4030	
tes BW		(Hz	#VI	3W 300 kHz		Swe	ep 9.87 ms (10	01 p
R MODE T		× 2.401 970	CU- 274	FUNCTIO 7 dBm	FUNCTION WIDTH	FI	JNCTION VALUE	
2 N 1	1 f	2.390 022	GHz -47.49	5 dBm				
3 N 1	1 f	2.398 571	GHz -33.19	7 dBm				
5								
5 7								
3								
0								
1								
3					STATUS			

78 CH

-	nalyzer - Swept SA F 50 Ω AC		SENSE	INT	ALIGNAUTO			:34 AM Jun 2
ter Freq	2.489500000	PNO		rig: Free Run Atten: 30 dB	Avg Typ	e: Log-Pwr		TRACE 1 2 TYPE MW DET P P
	of Offset 0.5 dB					M	lkr1 2.48 -3	0 008 (3.359 c
1								
\rightarrow								
-		x2						-23
/ \	www.	$\sum_{m=1}^{3}$						
	- www.www	- Morrison Marrie	mahrmannon	Marrie Marrie	Mumun	mallen and an	000mm 0 000 000	
t 2.47900								2.50000
5 BW 100) kHz		#VBW 3	00 kHz		Swe	eep 2.07 m	ns (1001
IODE TRC SO			Y	FUNCTION	FUNCTION WIDTH	1	FUNCTION VALUE	
N 1 f N 1 f		0 008 GHz 3 578 GHz	-3.359 dBn -33.751 dBn					
N 1 f	2.48	5 426 GHz	-38.959 dBn	ı				





For Hopping Band edge

00 CH

RL	RF	<mark>rzer - Swept SA</mark> 50 Ω AC			SENSE:INT	AL	IGNAUTO) AM Jun 21, 2
art Fre	eq 2.30	0000000		PNO: Fast 🕞 FGain:Low	⊃ Trig: Free #Atten: 30		Avg Type:	-	1	ACE 1 2 3 4 TYPE M WAAA DET P P P P
dB/div		ffset 0.5 dB 1.58 dBm						M	kr1 2.401 -5.4	867 GI 418 dB
42										
5.4										
.4										-25.42
i.4										()°
.4									2 104	when the
.4 /114/1	howith	www.huna	a why any any	Mantagent	with and marking	anahanhang	mangham	millenality	when the share	of all i
.4										
.4										
5.4										
	0000 G 1 100 ki		1	#VB	W 300 kHz	1	1	Swe	Stop 2.4 ep 9.87 ms	40300 G (1001 p
R MODE T	RC SCL		401 867 GHz	-5,418		CTION FUNC	ION WIDTH	FI	JNCTION VALUE	
	1 f 1 f	2.3	390 022 GHz 398 777 GHz	-49.300 -38.305	dBm					
3 N		2.		00.000	ub.m					
8 N 4 5 7 8		Ζ.								
8 N -		2.								

78 CH

		Ω AC	SENSE:I	NT	ALIGNAUTO Avg Type:	Lan Dum		4 AM Jun 21, 2 ACE 1 2 3 4
irt Fre	q 2.47900			g: Free Run tten: 30 dB	Avg Type:	Log-Pwr	1	YPE MWAWA
dB/div	Ref Offset Ref 2.82					Mł	(r1 2.479 -7.	882 G 181 dE
3 June	1 Mm							
2			√3					-27.18
2	hornal	Murantimeda	Mr. washer Martin			0		
2			I T T T MARKET IN THE	*** *******	Margantensturio	and many affred the	dunnun	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
2								
2								
	7900 GHz 100 kHz		#VBW 30	10 kHz		Swee	Stop 2.3 ep 2.07 ms	50000 G (1001 p
	RCİ SCLİ	× 2.479 882 GHz	-7.181 dBm	FUNCTION	FUNCTION WIDTH	FU	INCTION VALUE	
N 1	f		05.040 JD					
	f f	2.483 704 GHz 2.485 426 GHz						
N 1 N 1	f f	2.483 704 GHz						
N 1 N 1	f f	2.483 704 GHz						
N 1	f f	2.483 704 GHz						



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Report No.: STS1806136W03

Temperature:	25 ℃	Relative Humidity:	50%
Test Mode:	8DPSK(3Mbps) -00/39/78 CH	Test Voltage:	DC 3.7V

00 CH

	RF 50	IQ AC	S	ENSE:INT	AL	IGN AUTO		09:09:4	3 AM Jun 21, 20
arker 1	2.402150		PNO: Fast 🖵 -Gain:Low	Trig: Free #Atten: 30		Avg Type:	-		ACE 1 2 3 4 1 TYPE MWAAAA DET P P P P I
dB/div	Ref Offset (Ref 4.06							Mkr1 2.4 -5.	02 2 GH 941 dB
94									
5.9									-25.94 (
i.9									
.9	$- \downarrow 0^2$	2	3					Marcal Andrews	
.9 Islama									
.9									
.9									
	VIHz 100 kHz		#VB\	№ 300 kHz			Swe	Stop eep 2.39 s	
R MODE TR N 1 2 N 1 3 N 1 4 N 1	100 kHz FC SCL f f	× 2.402 2 GHz 3.327 9 GHz 7.936 8 GHz 24.990 0 GHz	#VB\ -5.941 (-50.723 (-56.098 (-48.254 (dBm dBm dBm dBm	CTION FUNCT	ION WIDTH			
R MODE 11 N 1 N 1 N 1 N 1	100 kHz FC SCL f f	2.402 2 GHz 3.327 9 GHz 7.936 8 GHz	-5.941 c -50.723 c -56.098 c	dBm dBm dBm dBm	FUNCT	ION WIDTH		eep 2.39 s	
Res BW R MODE H N 1 2 N 1 3 N 1	100 kHz FC SCL f f	2.402 2 GHz 3.327 9 GHz 7.936 8 GHz	-5.941 c -50.723 c -56.098 c	dBm dBm dBm dBm	FUNCT	ION WIDTH		eep 2.39 s	25.00 Gł (40001 p

39 CH

L	RF	yzer - Swep 50 Ω	AC		SENSE:INT		ALT	GNAUTO		09:12	:48 AM Jun 21
			00000 GHz	PNO: Fast -Gain:Low	Trig: Fr #Atten:	ee Run 30 dB	1164	Avg Type:	Log-Pwr		TRACE 1 2 3 TYPE MWM DET P P P
IB/div		offset 0.5 5.35 dB								Mkr1 2.4	440 9 C I.646 d
,)									
											-24.6
		{\} ²	(3							
rt 30 P es BW		Hz		#	VBW 300 k	Hz			Sw	Sto eep 2.39	p 25.00 (s (40001
MODE T N ⁽ N ⁽ N ⁽	f f f		× 2.440 9 GHz 3.327 9 GHz 7.409 9 GHz 24.679 8 GHz	-50.0 -55.7	46 dBm 41 dBm 73 dBm 17 dBm	UNCTION	FUNCTI	ON WIDTH		FUNCTION VALUE	

Shenzhen STS Test Services Co., Ltd.



78 CH

R L	rum Anal RE	yzer - Swept 50 Ω	AC		SENSE:INT		ALIGNAUTO		09:14:4	3 AM Jun 21, 2
enter F	req 1		00000 GHz	NO: Fast Gain:Low		Run	Avg Type:	Log-Pwr	TF	ACE 1 2 3 4 TYPE M WAAWA DET P P P P
dB/div		offset 0.5 c 5.81 dBr							Mkr1 2.4 -4.	80 2 GH 191 dB
19)1								
1.2										-24.19
1.2										
		2	^3							
1.2				and the same the state of the same			A STREET, STRE	-		
1.2							•••			
4.2										
art 30 Res BW		·U		#\/P	W 300 kH;	_			Stop ep 2.39 s	25.00 G
R MODE 1		.пz	X	#VD		-	CTION WIDTH		votion value	(40001 p
1 N 2 N	1 f 1 f 1 f		2.480 2 GHz 2.509 5 GHz 5.977 9 GHz	-4.191 -50.406 -55.489	dBm dBm				SNCTION VALUE	
4 N	1 f		24.697 2 GHz	-48.444						
5 7 3										
))										
1										
1 2 3							STATUS			



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Shenzhen STS Test Services Co., Ltd.



For Band edge

00 CH

		er - Swept SA							
RL	RF	50Ω AC		SE	NSE:INT	ALIGNAUTO	pe:Log-Pwr		21 AM Jun 21, 20 RACE 1 2 3 4
arker 1	2.4019	97000000	P	NO: Fast 😱 Gain:Low	Trig: Free Run #Atten: 30 dB	Avgiy	pe: Log-Pwr		TYPE MWWW DET P P P P
) dB/div		set 0.5 dB 57 dBm					N	1kr1 2.401 -3.	970 GH 430 dB
43									
3.4									
3.4									-23.47
3.4									1
.4						in alanharmon	whenter	wowner	a state of the sta
A norm	Manne	man	all have maked	a and the second second	wys wallow when the walk	or a star har a share was her			
.4									
3.4									
art 2.30 Res BW				#VBW	/ 300 kHz		Sw	Stop 2. eep 9.87 ms	40300 GI s (1001 pt
R MODE TR		Х		Y	FUNCTION	FUNCTION WIDTH		FUNCTION VALUE	
N 1 2 N 1 3 N 1	f f	2.39	01 970 GHz 90 022 GHz	-3.430 d -45.819 d					
	f	2.39	98 880 GHz	-34.014 d	Bm				
1 5 5									
7 3									
3									
1									
					1	STATUS			

78 CH

RL RF 50 Ω AC	SENSE:INT	ALIGNAUTO	09:15:16 AM Jun 21, 2
enter Freq 2.489500000 GHz	PNO: Fast Trig: Free R IFGain:Low #Atten: 30 d		TRACE 1234 TYPE M WWW DET P P P
Ref Offset 0.5 dB dB/div Ref 6.63 dBm			Mkr1 2.480 008 GF -3.368 dB
37			-23.37
4	3	alregramment annound for the solves	
4		an sende water and a server for a for the server for the	ann all was not all a second
4			
art 2.47900 GHz es BW 100 kHz	#VBW 300 kHz		Stop 2.50000 G Sweep 2.07 ms (1001 p
MODE TRC SCL × N 1 f 2.480 008 GI N 1 f 2.483 599 GI N 1 f 2.485 006 GI	Iz -33.433 dBm	TION FUNCTION WIDTH	FUNCTION VALUE





For Hopping Band edge

00 CH

		wept SA					
rt Fre	RF 50 9 q 2.300000	Ω AC 0000 GHz	PNO: Fast G	SENSE:INT Trig: Free Rui #Atten: 30 dB		e: Log-Pwr	10:40:04 AM Jun 21 TRACE 1 2 3 TYPE M WW DET P P P
B/div	Ref Offset 0 Ref -0.85					Mł	r1 2.403 000 G -10.846 dl
							-716
							^2 whether 1
miles	mar alman Montan	manunaphymitalite	dimportant	down when the	when any analyse and the	a for the second and	athefun and the start of the start
L	0000 GHz			300 kHz		Swee	Stop 2.40300 G p 9.87 ms (1001 j
	100 kHz		# ¥ L				
s BW	RC SCL	×	Y	FUNCTIO	N FUNCTION WIDTH	FU	NCTION VALUE
	FC SCL	× 2.403 000 G 2.390 022 G 2.398 159 G	Hz -10.846 Hz -52.259	6 dBm ∂ dBm	N FUNCTION WIDTH	FU	NCTION VALUE
SBW NODE TO N 1 N 1	FC SCL	2.403 000 G 2.390 022 G	Hz -10.846 Hz -52.259	6 dBm ∂ dBm	N FUNCTION WIDTH	FU	NCTION VALUE

78 CH



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5. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES / LIMIT

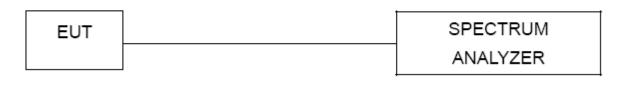
FCC Part 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RB	100KHz
VB	100KHz
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= 100KHz, VBW=100KHz, Sweep time = Auto.

5.3 TEST SETUP



5.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



5.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	60%
Test Mode:	Hopping Mode	Test Voltage:	DC 3.7V

Number of Hopping Channel

79

Hopping channel

-	RF	50 Ω AC	SENSE:	INT	ALIGNAUTO		09:53:00 AM	
enter	Freq 2.4	441750000 GHz PI IFC	NO: Fast 😱 Tr Gain:Low #A	ig: Free Run tten: 30 dB	Avg Type: I	-	TYPE DET	1234 MWWW AAAA
0 dB/di		ffset 0.5 dB 5.93 dBm				Mkr2	2.480 243 -3.0	5 G⊦ 4 dB
^{og} 3.07)1							2
13.1								··· \
23.1								
B.1								
I3.1								
i3.1								
3.1								
3.1								
33.1								
							Stop 2.483	350 CI
tart 2	40000 G	Hz						
	.40000 G W 1.0 M		#VBW 1.	0 MHz		Swee	p 1.00 ms (1	
Res B	W 1.0 MI	iz ×	Y	FUNCTION	FUNCTION WIDTH			
Res B REMODE 1 N 2 N	W 1.0 M	lz		FUNCTION	FUNCTION WIDTH		p 1.00 ms (1	
Res B 1 N 2 N 3 4	W 1.0 MI	1z × 2.401 920 5 GHz	Y -3.09 dBm	FUNCTION	FUNCTION WIDTH		p 1.00 ms (1	
Res B 1 N 2 N 3 4	W 1.0 MI	1z × 2.401 920 5 GHz	Y -3.09 dBm	FUNCTION	FUNCTION WIDTH		p 1.00 ms (1	
Res B 1 N 2 N 3 4 5 6 7	W 1.0 MI	1z × 2.401 920 5 GHz	Y -3.09 dBm	FUNCTION	FUNCTION WIDTH		p 1.00 ms (1	
Res B 1 N 2 N 3 4 5 6 7 8 9	W 1.0 MI	1z × 2.401 920 5 GHz	Y -3.09 dBm	FUNCTION	FUNCTION WIDTH		p 1.00 ms (1	
Res B 1 N 2 N 3 4 5 6	W 1.0 MI	1z × 2.401 920 5 GHz	Y -3.09 dBm	FUNCTION	FUNCTION WIDTH		p 1.00 ms (1	

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6. AVERAGE TIME OF OCCUPANCY

6.1 APPLIED PROCEDURES / 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.
- \tilde{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). Sothe dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds.
- 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 he dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds.
- 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 dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds.

6.3 TEST SETUP



6.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



Report No.: STS1806136W03

6.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
Test Mode:	GFSK(1Mbps)-DH1/DH3/DH5	Test Voltage:	DC 3.7V

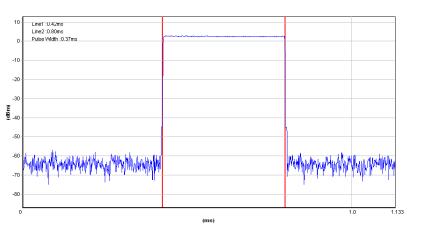
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)
DH1	2441 MHz	0.370	0.118	0.4
DH3	2441 MHz	1.630	0.261	0.4
DH5	2441 MHz	2.880	0.307	0.4



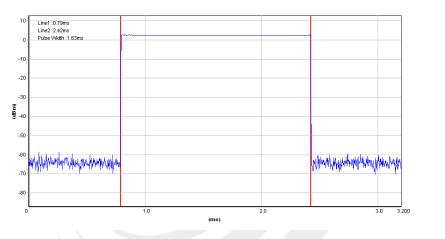
Shenzhen STS Test Services Co., Ltd.



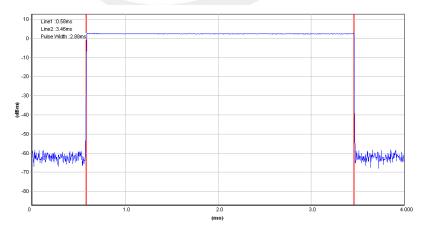
CH39-DH1







CH39-DH5



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Temperature:	25 ℃	Relative Humidity:	50%
Test Mode:	π/4-DQPSK(2Mbps)– 2DH1/2DH3/2DH5	Test Voltage:	DC 3.7V

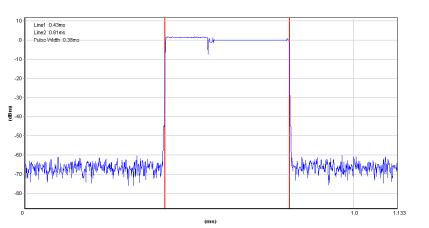
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)
2DH1	2441 MHz	0.380	0.122	0.4
2DH3	2441 MHz	1.640	0.262	0.4
2DH5	2441 MHz	2.880	0.307	0.4



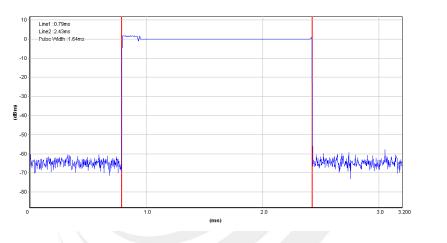
Shenzhen STS Test Services Co., Ltd.



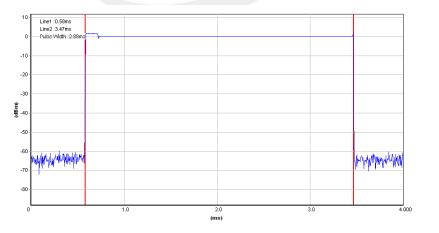
CH39-2DH1











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Temperature:	25 ℃	Relative Humidity:	50%
Test Mode:	8DPSK(3Mbps)– 3DH1/3DH3/3DH5	Test Voltage:	DC 3.7V

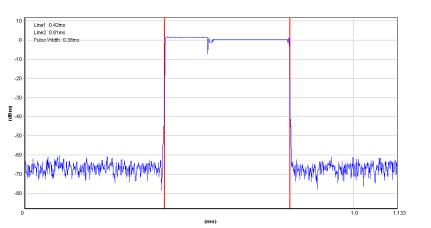
Data Packet	Frequency	Pulse Duration(ms)	Dwell Time(s)	Limits(s)
3DH1	2441 MHz	0.380	0.122	0.4
3DH3	2441 MHz	1.640	0.262	0.4
3DH5	2441 MHz	2.890	0.308	0.4



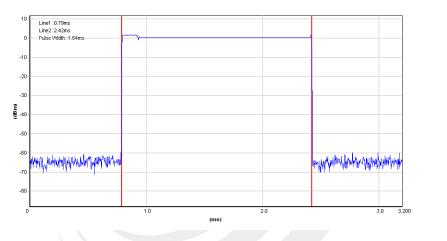
Shenzhen STS Test Services Co., Ltd.



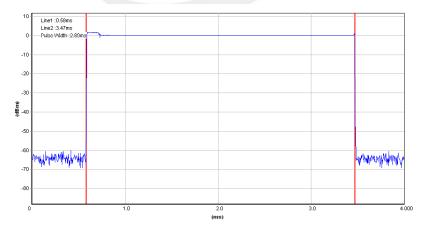
CH39-3DH1











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7. HOPPING CHANNEL SEPARATION MEASUREMEN

7.1 APPLIED PROCEDURES / LIMIT

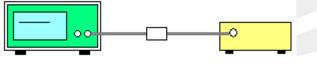
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that 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



Spectrum Analayzer

EUT

7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.



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7.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
	CH00 / CH39 / CH78 (GFSK(1Mbps) Mode)	Test Voltage:	DC 3.7V

Frequency	Ch. Separation (MHz)	Limit	Result
2402 MHz	0.999	0.737	Complies
2441 MHz	1.005	0.736	Complies
2480 MHz	0.999	0.731	Complies

For GFSK: Ch. Separation Limits: > two-thirds 20dB bandwidth

RL RF	rzer - Swept SA 50 Ω AC	SENSE:I	NT	ALIGN AUTO		:27:08 PM Jun 21,
nter Freq 2.	402500000 GHz		g: Free Run tten: 30 dB	Avg Type: Lo	g-Pwr	TRACE 1 2 3 TYPE MWW DET P P P
B/div Ref 4	ffset 0.5 dB 1.42 dBm				Mkr2 2.4	03 064 G -5.578 d
		()1		2		
	\sim	have		1 million	~~~~	
5	m		mar and a start of the start of		M	
	5-0-				~	2
man of						har
; 						
; 						
5 						
6						
nter 2.40250 es BW 30 kH		#VBW 10	0 kHz		Sp Sweep 3.20	an 3.000 M ms (1001
NODE TRC SCL	× 2.402 065 GH	z -5.57 dBm	FUNCTION FL	NCTION WIDTH	FUNCTION VALU	JE
N 1 f	2.403 064 GH	z -5.58 dBm				

CH00 -1Mbps



CH39 -1Mbps



CH78 -1Mbps



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Report No.: STS1806136W03

Temperature:	25 ℃	Relative Humidity:	50%
LOCT IVIODO.	CH00 / CH39 / CH78 (π/4-DQPSK(2Mbps) Mode)	Test Voltage:	DC 3.7V

Frequency	Ch. Separation (MHz)	Limit	Result
2402 MHz	1.002	0.915	Complies
2441 MHz	0.999	0.915	Complies
2480 MHz	0.996	0.915	Complies

For π /4-DQPSK(2Mbps): Ch. Separation Limits: > two-thirds 20dB bandwidth

ter Fi	RF	72er - Swept S. 50 Ω AC 4025000	00 GHz		E:INT	ALIGNAUTO Avg Type:	: Log-Pwr		56 PM Jun 2 IRACE 1 2 TYPE MW
3/div		ffset 0.5 dB -3.23 dBm	IF	Gain:Low 1	¥Atten: 30 dB		N	lkr2 2.403 -13	0ET P P
	Itel	0.20 0.81		()1			2		
			\sim		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	\sim	m	
		<i>م</i> م						~	\
~~~	m								hora
<u> </u>									
	10250 30 kH			#VBW	100 kHz		Sw	Spar eep 3.20 m	1 3.000 s (100 ⁷
MODE TH	IC SCL		×	Y	FUNCTION	FUNCTION WIDTH		FUNCTION VALUE	
N 1 N 1	f		.402 143 GHz .403 145 GHz	-13.22 dBi -13.23 dBi					
		-	.400 140 0112	10.20 42.					

### CH00 -2Mbps

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## CH39 -2Mbps

Erec 2 444600000 CU	SENSE:I		AUTO Avg Type: Log-Pwr	02:25:25 PM J TRACE
Freq 2.441500000 GH	PNO: Wide Tri	g: Free Run ten: 30 dB	Avg Type. Log-r wi	TYPE DET F
Ref Offset 0.5 dB			Mł	r2 2.442 14: -14.058
	()1		2	
~~~	$\sim$	mm	m	$\sim$
				- h
www				
2.441500 GHz W 30 kHz	#VBW 10	0 kHz	Swee	Span 3.0 p 3.20 ms (10
TRC SCL X	Y	FUNCTION FUNCTION		NCTION VALUE
1 f 2.441 143 1 f 2.442 142				
1 1 2.442 142	0112 -14.00 dBill			

CH78 -2Mbps

RF 50 Ω AC	SENSE:INT	ALIGN AUTO	02:25:56 PM Jun
r Freq 2.479500000 GHz	PNO: Wide Trig: Fr IFGain:Low #Atten:		
Ref Offset 0.5 dB div Ref -3.91 dBm			Mkr2 2.480 145 -13.913
	{1		2
	\sim	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m
			~
			1.00
er 2.479500 GHz			Span 3.000
BW 30 kHz	#VBW 100 ki	lz	Sweep 3.20 ms (100
DE TRC SCL X		UNCTION FUNCTION WIDTH	FUNCTION VALUE
I 1 f 2.479 149 GH			
2.400 140 011	10.01 4011		

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Report No.: STS1806136W03

Temperature:	25 ℃	Relative Humidity:	50%
	CH00 / CH39 / CH78 (8DPSK(3Mbps)Mode)	Test Voltage:	DC 3.7V

Frequency	Ch. Separation (MHz)	Limit	Result
2402 MHz	0.999	0.905	Complies
2441 MHz	0.999	0.905	Complies
2480 MHz	0.981	0.905	Complies

For 8DPSK(3Mbps):Ch. Separation Limits: > two-thirds 20dB bandwidth

	trum Analyzer - Sv							
(RL)	RF 50 G		SENSE:INT		ALIGN AUTO Avg Type: I	og-Pwr		3 PM Jun 21, 20
enter F	-req 2.4025	Р		Free Run n:30 dB	Ang Type.	Logi wi	1	
0 dB/div	Ref Offset 0 Ref -2.71					Mk	r2 2.402 -12.8	914 GH 304 dB
og 12.7		4	∕ ∑ 1		2			
2.7		\sim		m			\sim	
12.7	5						~	
	0.0						X	\
2.7								mon
2.7								
2.7								
2.7								
12.7								
2.7								
	.402500 GHz / 30 kHz	<u>.</u>	#VBW 100	kHz		Swee	Span p 3.20 ms	3.000 M (1001 p
KR MODE T		×	Y	FUNCTION	FUNCTION WIDTH	FUN	ICTION VALUE	
2 N	1 f 1 f	2.401 915 GHz 2.402 914 GHz	-12.71 dBm -12.80 dBm					
4								
4								
4 5 6 7								
3 4 5 6 7 8 9								
4 5 6 7 8 9								
4 5 6								

CH00 -3Mbps



CH39 -3Mbps

		SENSE:INT	ALIC	Avg Type: Log	02:2	23:40 PM Jur TRACE
r Freq 2.4415000	PNO:	Wide 🥁 Trig: Fre n:Low #Atten: 3				DET P
Ref Offset 0.5 di					Mkr2 2.44 -1	11 914 3.622
	()1			2		
~	m	m		-		
~~~			-		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
						$\lambda$
~~~						h
2.441500 GHz					Sp	an 3.00
BW 30 kHz		#VBW 100 kH			Sweep 3.20	
E TRC SCL	X		JNCTION FUNCTION	DN WIDTH	FUNCTION VALUE	E .
	2.440 915 GHz 2.441 914 GHz	-13.58 dBm -13.62 dBm				
1 f 1 f						
1 f 1 f						

CH78 -3Mbps

L RF	50 Ω AC	SENSE:I	NT	ALIGN AUTO		02:23:11 PM Jun 2
ter Freq 2.4	79500000 GHz P IF	NO: Wide 🕞 Tri	g: Free Run ten: 30 dB	Avg Type:	Log-Pwr	TRACE 1 2 TYPE MW DET P P
	set 0.5 dB .36 dBm				Mk	r2 2.480 112 (-13.316 d
		\sum^{1}			2	
			- marine			~~~
m						- m
ter 2.479500	CH7					Span 3.000
s BW 30 kHz	0112	#VBW 10	0 kHz		Swee	p 3.20 ms (1001
MODE TRC SCL	×	Y	FUNCTION	FUNCTION WIDTH	FUN	ICTION VALUE
N 1 f	2.479 131 GHz 2.480 112 GHz	-13.30 dBm -13.32 dBm				

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8. BANDWIDTH TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	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

EUT	SPECTRUM
	ANALYZER

8.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



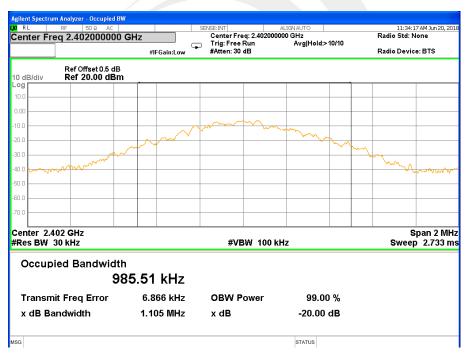
Report No.: STS1806136W03

8.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
	GFSK(1Mbps) CH00 / CH39 / C78	Test Voltage:	DC 3.7V

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.105	PASS
2441 MHz	1.104	PASS
2480 MHz	1.097	PASS

CH00 -1Mbps



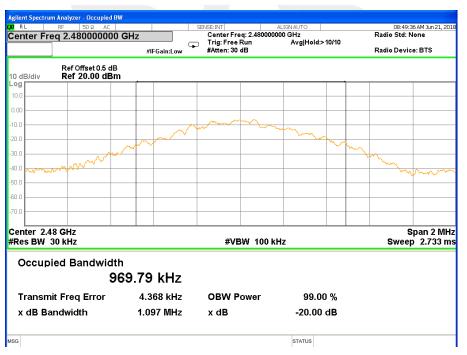
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CH39 -1Mbps



CH78 -1Mbps



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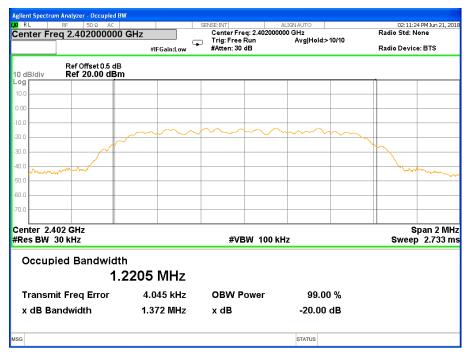
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Temperature:	25 ℃	Relative Humidity:	50%
	π/4-DQPSK(2Mbps) CH00 / CH39 / C78	Test Voltage:	DC 3.7V

Frequency	20dB Bandwidth(MHz)	Result
2402 MHz	1.372	PASS
2441 MHz	1.372	PASS
2480 MHz	1.373	PASS

CH00 -2Mbps

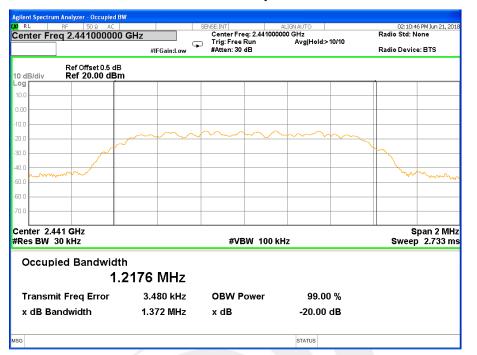


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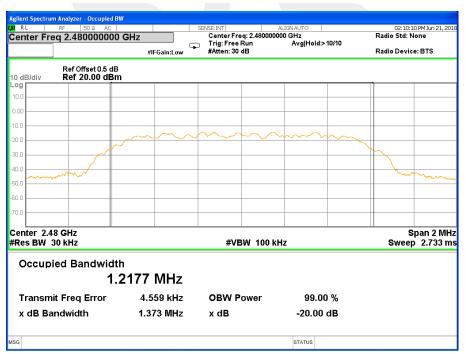
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CH39 -2Mbps



CH78 -2Mbps



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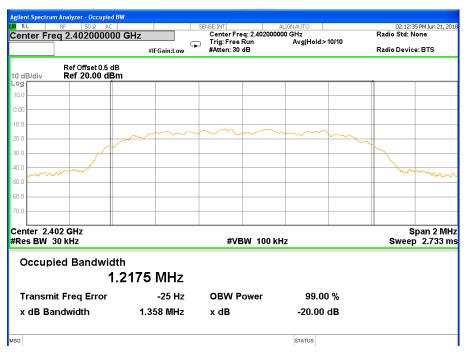
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Report No.: STS1806136W03

Temperature:	25 ℃	Relative Humidity:	50%
	8DPSK(3Mbps) CH00 / CH39 / CH78	Test Voltage:	DC 3.7V

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.358	PASS
2441 MHz	1.357	PASS
2480 MHz	1.358	PASS

CH00 -3Mbps

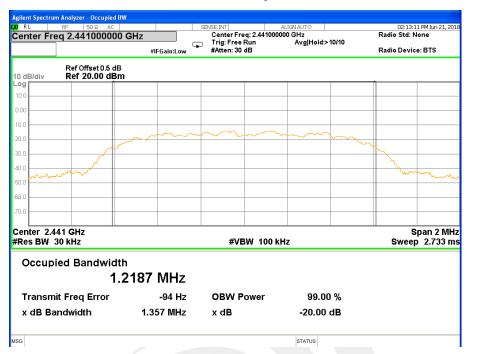


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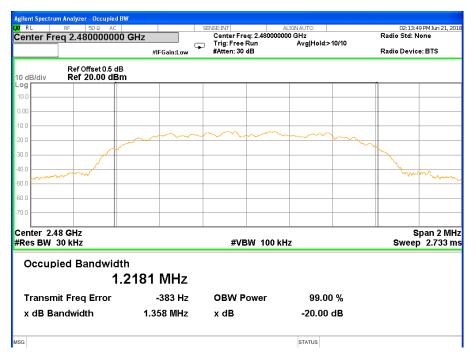
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CH39 -3Mbps



CH78 -3Mbps



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9. OUTPUT POWER TEST

9.1 APPLIED PROCEDURES / LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
	Outout	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

a. The EUT was directly connected to the Power Meter

9.3 TEST SETUP

EUT	Power meter	

9.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



9.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	60%
Test Voltage:	DC 3.7V		

GFSK(1Mbps)					
Test Channel	Frequency	Conducted Output Power		LIMIT	
	(MHz)	Peak (dBm)	AVG (dBm)	dBm	
CH00	2402	-1.66	-5.83	20.97	
CH39	2441	-2.14	-6.34	20.97	
CH78	2480	-2.51	-6.68	20.97	

Note: the channel separation >2/3 20dB bandwidth

π/4QPSK(2Mbps)					
Test Channel	Frequency	Conducted Output Power		LIMIT	
	(MHz)	Peak (dBm)	AVG (dBm)	dBm	
CH00	2402	-1.89	-6.01	20.97	
CH39	2441	-2.28	-6.43	20.97	
CH78	2480	-2.76	-6.79	20.97	

Note: the channel separation >2/3 20dB bandwidth

8DPSK(3Mbps)					
Test Channel	Frequency	Conducted Output Power		LIMIT	
	(MHz)	Peak (dBm)	AVG (dBm)	dBm	
CH00	2402	-2.16	-6.28	20.97	
CH39	2441	-2.52	-6.65	20.97	
CH78	2480	-2.91	-6.87	20.97	

Note: the channel separation >2/3 20dB bandwidth

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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.

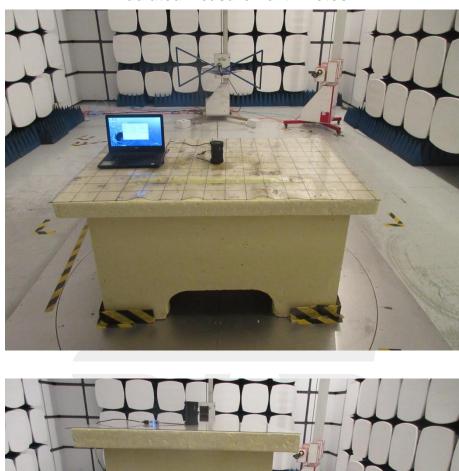


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APPENDIX-PHOTOS OF TEST SETUP



Radiated Measurement Photos



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Conducted Measurement Photos



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

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