

RADIO TEST REPORT

S T S

Report No: STS1908223W02

Issued for

PEAG, LLC dbaJLab Audio

2281 Las Palmas Drive, Suite101, Carlsbad, CA 92011

Product Name:	JLab Play Gaming Wireless Earbuds
Brand Name:	JLAB
Model Name:	JLab Play Gaming Wireless Earbuds
Series Model:	N/A
FCC ID:	2AHYV-GAMEE
Test Standard:	FCC Part 15.247

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TEST RESULT CERTIFICATION

Applicant's Name	PEAG, LLC dbaJLab Audio
Address	2281 Las Palmas Drive,Suite101 ,Carlsbad, CA 92011
Manufacture's Name	PEAG, LLC dbaJLab Audio
Address	2281 Las Palmas Drive,Suite101 ,Carlsbad, CA 92011
Product Description	
Product Name	JLab Play Gaming Wireless Earbuds
Brand Name	JLAB
Model Name	JLab Play Gaming Wireless Earbuds
Series Model	N/A
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 : 21 Aug. 2019 ~ 05 Sept. 2019

Date of Issue 09 Sept. 2019

Test Result Pass

Testing Engineer

(Chris Chen)

Technical Manager

. Ju



Authorized Signatory :

(Sunday Hu)

(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	09 Sept. 2019	STS1908223W02	ALL	Initial Issue



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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	
15.205 15.209	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	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	±0.71dB
2	Unwanted Emissions, conducted	±0.63dB
3	All emissions, radiated 30-200MHz	±3.43dB
4	All emissions, radiated 200MHz-1GHz	±3.57dB
5	All emissions, radiated>1G	±4.13dB
6	Conducted Emission (9KHz-150KHz)	±3.18dB
7	Conducted Emission (150KHz-30MHz)	±2.70dB



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	JLab Play Gaming Wireless Earbuds
Trade Name	JLAB
Model Name	JLab Play Gaming Wireless Earbuds
Series Model	N/A
Model Difference	N/A
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
Power Rating	Input: 5V/150mA
Battery	Rated Voltage: 3.7V Charge Limit: 4.2V Capacity: 150mA
Hardware version number	N/A
Software version number	N/A
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.





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	JLAB	JLab Play Gaming Wireless Earbuds	Ceramic	N/A	0.8dBi	BT Antenna



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
Mode 7	TX CH00	3 Mbps/8DPSK
Mode 8	TX CH39	3 Mbps/8DPSK
Mode 9	TX CH78	3 Mbps/8DPSK

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 Emission	Mode 10 : Keeping BT TX

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				
(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		

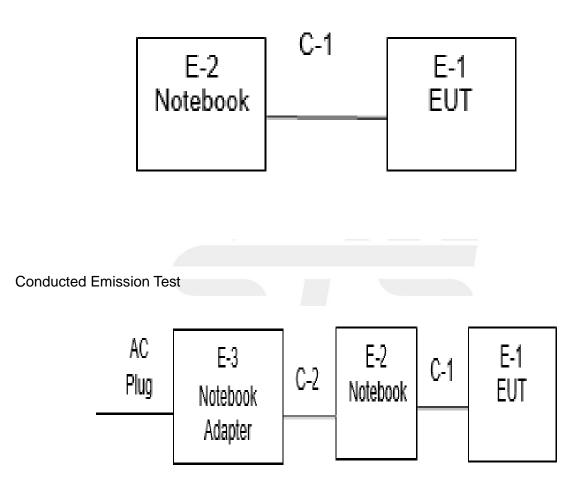


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2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

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 Emission Test



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2.5 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	Mfr/Brand Model/Type No.		Note
N/A	N/A	N/A	N/A	N/A	N/A

Necessary accessories

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Notebook	Lenovo	N/A	N/A	N/A
E-3	Notebook Adapter	Lenovo	N/A	N/A	N/A
C-1	USB Cable	N/A	100cm	N/A	N/A
C-2	DC Cable	N/A	110cm	N/A	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

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	
Test Receiver	R&S	ESCI	101427	2018.10.13	2019.10.12	
Signal Analyzer	Agilent	N9020A	MY51110105	2019.03.02	2020.03.01	
Active loop Antenna	ZHINAN	ZN30900C	16035	2018.03.11	2021.03.10	
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2020.11.1	
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2018.10.19	2021.10.18	
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2018.03.11	2021.03.10	
Pre-Amplifier(0.1M-3G Hz)	EM	EM330	060665	2018.10.13	2019.10.12	
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK201808090 1	2018.10.13	2019.10.12	
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11	2019.10.10	
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	2018.10.13	2019.10.12
LISN	R&S	ENV216	101242	2018.10.11	2019.10.10
LISN	EMCO	3810/2NM	23625	2018.10.11	2019.10.10
Temperature & Humidity	HH660	Mieo	N/A	2018.10.11	2019.10.10
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 CE)			

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	
USB RF power sensor	DARE	RPR3006W	15100041SNO03	2018.10.13	2019.10.12	
Signal Analyzer	Agilent	N9020A	MY49100060	2018.10.13	2019.10.12	
Temperature & Humidity	HH660	Mieo	Mieo N/A		2019.10.10	
Test SW	FARAD	LZ-RF /LzRf-3A3				



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.

	Conducted Emissionlimit (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.

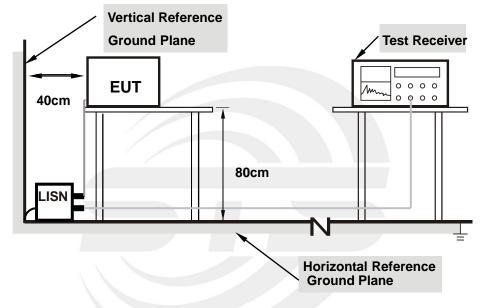
The following table is the setting of the receiver

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 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

Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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:	24.6(C)	Relative Humidity:	67%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 10		

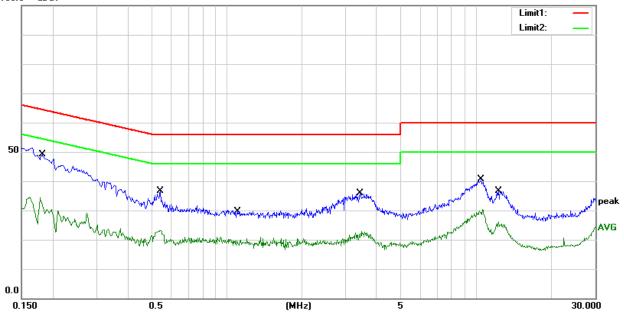
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1820	29.31	19.75	49.06	64.39	-15.33	QP
2	0.1820	14.53	19.75	34.28	54.39	-20.11	AVG
3	0.5420	16.76	19.95	36.71	56.00	-19.29	QP
4	0.5420	3.28	19.95	23.23	46.00	-22.77	AVG
5	1.1100	9.98	19.75	29.73	56.00	-26.27	QP
6	1.1100	0.43	19.75	20.18	46.00	-25.82	AVG
7	3.4260	16.21	19.76	35.97	56.00	-20.03	QP
8	3.4260	3.16	19.76	22.92	46.00	-23.08	AVG
9	10.4700	20.49	20.11	40.60	60.00	-19.40	QP
10	10.4700	10.20	20.11	30.31	50.00	-19.69	AVG
11	12.2980	16.53	20.11	36.64	60.00	-23.36	QP
12	12.2980	5.95	20.11	26.06	50.00	-23.94	AVG

Remark:

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

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







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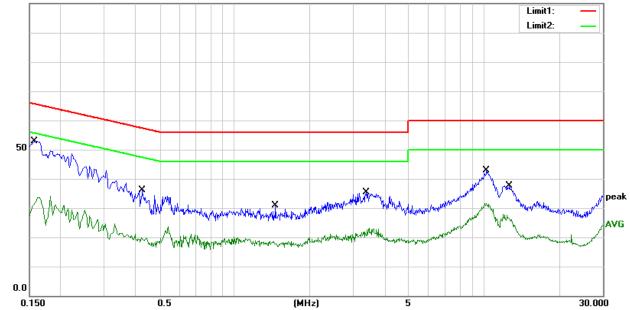
Temperature:	24.6(C)	Relative Humidity:	67%RH
Test Voltage:	AC 120V/60Hz	Phase:	Ν
Test Mode:	Mode 10		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1580	33.16	19.74	52.90	65.57	-12.67	QP
2	0.1580	13.88	19.74	33.62	55.57	-21.95	AVG
3	0.4260	16.09	20.00	36.09	57.33	-21.24	QP
4	0.4260	0.21	20.00	20.21	47.33	-27.12	AVG
5	1.4580	11.00	19.78	30.78	56.00	-25.22	QP
6	1.4580	-1.17	19.78	18.61	46.00	-27.39	AVG
7	3.3780	15.42	19.86	35.28	56.00	-20.72	QP
8	3.3780	3.34	19.86	23.20	46.00	-22.80	AVG
9	10.2460	22.94	19.84	42.78	60.00	-17.22	QP
10	10.2460	11.71	19.84	31.55	50.00	-18.45	AVG
11	12.6540	17.74	19.89	37.63	60.00	-22.37	QP
12	12.6540	7.79	19.89	27.68	50.00	-22.32	AVG

Remark:

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

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	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)
Stop Frequency	10th carrier hamonic(Peak)
RB / VB (emission in restricted	
band)	PK=1MHz / 1MHz, AV=1 MHz /10 Hz

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Ctart/Otan Engruenau	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 / 9kHz 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

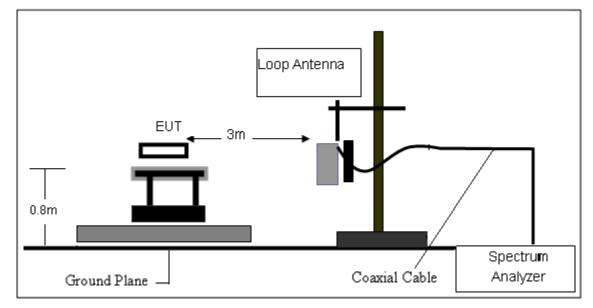
No deviation

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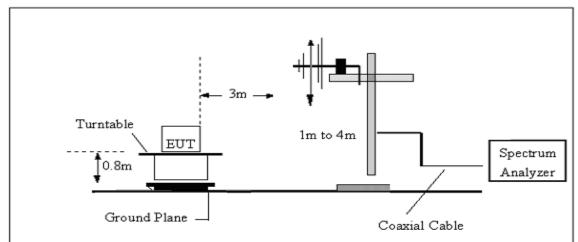


3.2.4 TESTSETUP

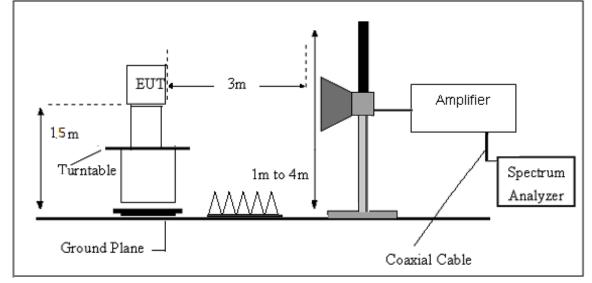
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



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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:	26.2(C)	Relative Humidity:	63%RH
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.





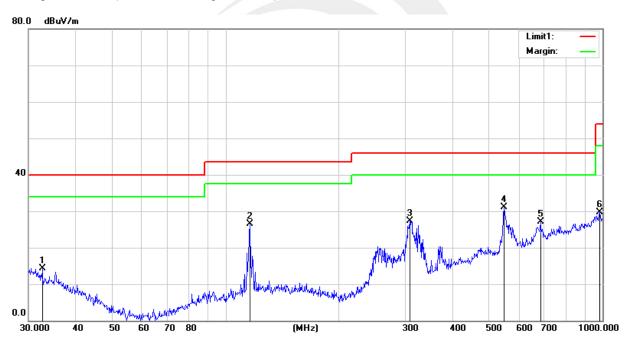
(30MHz-1000MHz)

Temperature:	26.2(C)	Relative Humidity:	63%RH	
Test Voltage:	DC 3.7V from battery	Phase:	Horizontal	
Test Mode:	Mode 1/2/3/4/5/6/7/8/9(Mode 7 worst mode)			

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	32.6340	28.41	-14.19	14.22	40.00	-25.78	QP
2	116.1320	44.96	-18.51	26.45	43.50	-17.05	QP
3	307.8312	41.80	-14.53	27.27	46.00	-18.73	QP
4	547.0977	37.25	-6.09	31.16	46.00	-14.84	QP
5	684.7454	31.33	-4.31	27.02	46.00	-18.98	QP
6	982.6200	27.29	2.51	29.80	54.00	-24.20	QP

Remark:

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



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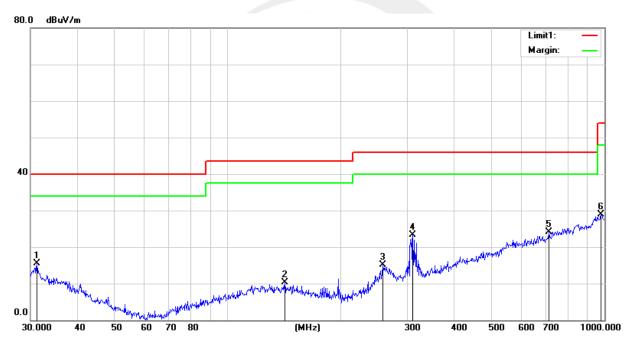


Temperature:	26.2(C)	Relative Humidity:	63%RH	
Test Voltage:	DC 3.7V from battery	Phase:	Vertical	
Test Mode:	Mode 1/2/3/4/5/6/7/8/9(Mode 7 worst mode)			

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	31.1798	28.87	-13.46	15.41	40.00	-24.59	QP
2	141.8262	28.40	-18.14	10.26	43.50	-33.24	QP
3	258.3264	29.99	-14.98	15.01	46.00	-30.99	QP
4	309.9977	37.85	-14.46	23.39	46.00	-22.61	QP
5	711.6734	27.76	-3.75	24.01	46.00	-21.99	QP
6	979.1804	26.21	2.61	28.82	54.00	-25.18	QP

Remark:

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





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

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Orrected Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	(dB)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	
				Low Ch	annel (8D/240)2 MHz)				
3264.70	61.32	44.70	6.70	28.20	-9.80	51.52	74.00	-22.48	PK	Vertical
3264.70	51.59	44.70	6.70	28.20	-9.80	41.79	54.00	-12.21	AV	Vertical
3264.68	62.05	44.70	6.70	28.20	-9.80	52.25	74.00	-21.75	PK	Horizontal
3264.68	51.11	44.70	6.70	28.20	-9.80	41.31	54.00	-12.69	AV	Horizontal
4804.31	59.10	44.20	9.04	31.60	-3.56	55.54	74.00	-18.46	PK	Vertical
4804.31	50.11	44.20	9.04	31.60	-3.56	46.55	54.00	-7.45	AV	Vertical
4804.43	59.42	44.20	9.04	31.60	-3.56	55.86	74.00	-18.14	PK	Horizontal
4804.43	49.96	44.20	9.04	31.60	-3.56	46.40	54.00	-7.60	AV	Horizontal
5359.81	48.70	44.20	9.86	32.00	-2.34	46.36	74.00	-27.64	PK	Vertical
5359.81	39.78	44.20	9.86	32.00	-2.34	37.44	54.00	-16.56	AV	Vertical
5359.73	47.73	44.20	9.86	32.00	-2.34	45.39	74.00	-28.61	PK	Horizontal
5359.73	38.41	44.20	9.86	32.00	-2.34	36.07	54.00	-17.93	AV	Horizontal
7205.82	54.21	43.50	11.40	35.50	3.40	57.61	74.00	-16.39	PK	Vertical
7205.82	44.04	43.50	11.40	35.50	3.40	47.44	54.00	-6.56	AV	Vertical
7205.86	53.74	43.50	11.40	35.50	3.40	57.14	74.00	-16.86	PK	Horizontal
7205.86	44.46	43.50	11.40	35.50	3.40	47.86	54.00	-6.14	AV	Horizontal
	1			Middle C	hannel (8D/24	441 MHz)		1	1	1
3264.62	60.84	44.70	6.70	28.20	-9.80	51.04	74.00	-22.96	PK	Vertical
3264.62	51.61	44.70	6.70	28.20	-9.80	41.81	54.00	-12.19	AV	Vertical
3264.81	61.71	44.70	6.70	28.20	-9.80	51.91	74.00	-22.09	PK	Horizontal
3264.81	50.48	44.70	6.70	28.20	-9.80	40.68	54.00	-13.32	AV	Horizontal
4882.46	58.96	44.20	9.04	31.60	-3.56	55.40	74.00	-18.60	PK	Vertical
4882.46	49.84	44.20	9.04	31.60	-3.56	46.28	54.00	-7.72	AV	Vertical
4882.38	58.18	44.20	9.04	31.60	-3.56	54.62	74.00	-19.38	PK	Horizontal
4882.38	50.06	44.20	9.04	31.60	-3.56	46.50	54.00	-7.50	AV	Horizontal
5359.74	48.99	44.20	9.86	32.00	-2.34	46.65	74.00	-27.35	PK	Vertical
5359.74	39.20	44.20	9.86	32.00	-2.34	36.86	54.00	-17.14	AV	Vertical
5359.58	47.41	44.20	9.86	32.00	-2.34	45.07	74.00	-28.93	PK	Horizontal
5359.58	38.16	44.20	9.86	32.00	-2.34	35.82	54.00	-18.18	AV	Horizontal
7323.91	53.79	43.50	11.40	35.50	3.40	57.19	74.00	-16.81	PK	Vertical
7323.91	44.70	43.50	11.40	35.50	3.40	48.10	54.00	-5.90	AV	Vertical
7323.67	54.74	43.50	11.40	35.50	3.40	58.14	74.00	-15.86	PK	Horizontal
7323.67	44.11	43.50	11.40	35.50	3.40	47.51	54.00	-6.49	AV	Horizontal

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				High Ch	annel (8D/24	180 MHz)				
3264.74	61.07	44.70	6.70	28.20	-9.80	51.27	74.00	-22.73	PK	Vertical
3264.74	51.51	44.70	6.70	28.20	-9.80	41.71	54.00	-12.29	AV	Vertical
3264.78	61.07	44.70	6.70	28.20	-9.80	51.27	74.00	-22.73	PK	Horizontal
3264.78	51.22	44.70	6.70	28.20	-9.80	41.42	54.00	-12.58	AV	Horizontal
4960.30	58.39	44.20	9.04	31.60	-3.56	54.83	74.00	-19.17	PK	Vertical
4960.30	49.20	44.20	9.04	31.60	-3.56	45.64	54.00	-8.36	AV	Vertical
4960.60	59.37	44.20	9.04	31.60	-3.56	55.81	74.00	-18.19	PK	Horizontal
4960.60	49.54	44.20	9.04	31.60	-3.56	45.98	54.00	-8.02	AV	Horizontal
5359.62	48.36	44.20	9.86	32.00	-2.34	46.02	74.00	-27.98	PK	Vertical
5359.62	40.37	44.20	9.86	32.00	-2.34	38.03	54.00	-15.97	AV	Vertical
5359.74	48.40	44.20	9.86	32.00	-2.34	46.06	74.00	-27.94	PK	Horizontal
5359.74	38.74	44.20	9.86	32.00	-2.34	36.40	54.00	-17.60	AV	Horizontal
7439.78	54.80	43.50	11.40	35.50	3.40	58.20	74.00	-15.80	PK	Vertical
7439.78	43.54	43.50	11.40	35.50	3.40	46.94	54.00	-7.06	AV	Vertical
7439.96	54.12	43.50	11.40	35.50	3.40	57.52	74.00	-16.48	PK	Horizontal
7439.96	43.61	43.50	11.40	35.50	3.40	47.01	54.00	-6.99	AV	Horizontal

Note:

1) Scan with GFSK, π /4-DQPSK,8DPSK,the worst case is 8DPSK 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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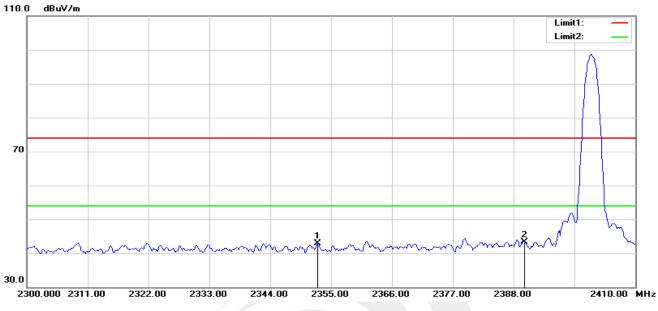
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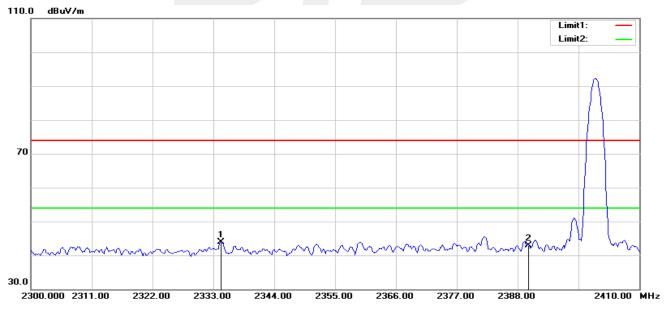
Restricted band Requirements

GFSK-Low Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	SRemark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2352.580	39.06	3.78	42.84	74.00	-31.16	peak
2	2390.000	39.04	4.34	43.38	74.00	-30.62	peak

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2334.430	40.26	3.66	43.92	74.00	-30.08	peak
2	2390.000	38.53	4.34	42.87	74.00	-31.13	peak

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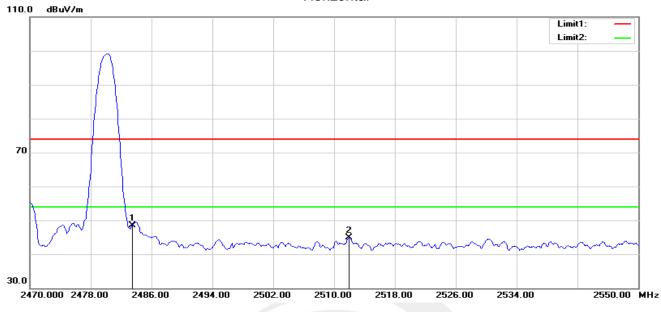
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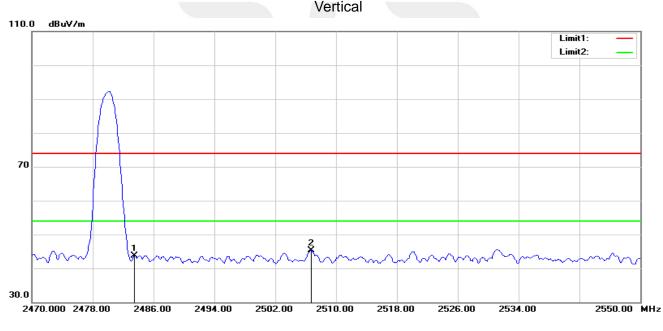
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GFSK-High Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	43.83	4.60	48.43	74.00	-25.57	peak
2	2512.000	40.20	4.72	44.92	74.00	-29.08	peak



No.	Frequency	Reading	Correct	Result	Limit	Margin	WRemark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	39.15	4.60	43.75	74.00	-30.25	peak
2	2506.720	40.57	4.70	45.27	74.00	-28.73	peak

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 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

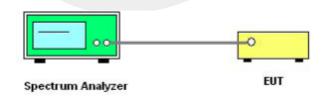
Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Stort/Stop Eroguopou	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



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. 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 from battery

00 CH

		RF		AC		SENSE:INT	A	LIGNAUTO		05:18	3:59 PM Sep 05, 21
enter	r Fre	eq 12.	51500		PNO: Fast 🕞 Gain:Low	Trig: Free #Atten: 30	Run dB	Avg Type:	Log-Pwr		TRACE 1 2 3 4 TYPE M WANNA DET P P P P
			set 0.5 d								402 2 GH).022 dB
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R MOD	E TRC 1 1	00 kH: SCL f f		× 2.402 2 GHz 3.602 6 GHz 9.608 5 GHz	0.022 -40.910 -51.577	dBm dBm dBm dBm		TION WIDTH		eep 2.39 :	s (40001 p
RMODI N 2 N 3 N ↓ N	e TRC 1 1	00 kH: f		3.602 6 GHz	v 0.022 -40.910	dBm dBm dBm dBm		TION WIDTH			s (40001 p
R MOD N 2 N 3 N 4 N 5	E TRC 1 1	00 kH: SCL f f		3.602 6 GHz 9.608 5 GHz	0.022 -40.910 -51.577	dBm dBm dBm dBm		TION WIDTH			s (40001 p
R M000 N 2 N 3 N 4 N 5 5 7 3	E TRC 1 1	00 kH: SCL f f		3.602 6 GHz 9.608 5 GHz	0.022 -40.910 -51.577	dBm dBm dBm dBm		TION WIDTH			s (40001 p
G MODI 1 N 2 N 3 N 4 N 5 5 7 3 9 0	E TRC 1 1	00 kH: SCL f f		3.602 6 GHz 9.608 5 GHz	0.022 -40.910 -51.577	dBm dBm dBm dBm		TION WIDTH			s (40001 p
R MODI 1 N 2 N 3 N 4 N 5 5 7 3 9	E TRC 1 1	00 kH: SCL f f		3.602 6 GHz 9.608 5 GHz	0.022 -40.910 -51.577	dBm dBm dBm dBm		TION WIDTH			s (40001 p

39 CH

	trum Ana RF	lyzer - Swept 50 Ω									
			0000 GHz P	NO: Fast 🕞 Gain:Low	SENSE:INT) Trig: Fre- #Atten: 3	∍Run 0dB	ALIO	Avg Type	: Log-Pwr		RS2 PM Sep 05, 2 TRACE 1 2 3 4 TYPE M WAAAA DET P P P P
) dB/div		Offset 0.5 d 9.61 dBn									440 9 GH).386 dB
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2 N 3 N 4 N	1 f 1 f 1 f		2.440 9 GH2 3.661 9 GHz 4.881 7 GHz 24.424 4 GHz	-0.386 -39.321 -27.410 -47.648	dBm dBm						
5 5 7 8											
2 2											



78 CH

L R	. <mark>nalyzer - Swept</mark> ! RF 50 Ω / A	AC	9	ENSE:INT	AL	IGN AUTO			41 PM Sep 06, 3
nter Freq	12.515000	F	'NO: Fast 😱 Gain:Low	Trig: Free #Atten: 30		Avg Type:	Log-Pwr		TYPE MWWW DET P P P F
dB/div Re	ef Offset 0.5 di ef 9.36 dBm							Mkr1 2.4 -0	80 2 G .639 dE
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nter 12.52 es BW 100			#VBI	N 300 kHz			Sw	Spar eep 2.39 s	1 24.97 G (40001 p
R MODE TRC SO	il I	Х	Ŷ		CTION FUNCT	ION WIDTH		FUNCTION VALUE	
N 1 f		2.480 2 GHz 3.720 6 GHz	-0.639 (-39.748 (dBm					
N 1 f		4.960 3 GHz 24.780 9 GHz	-31.740 (-47.582 (



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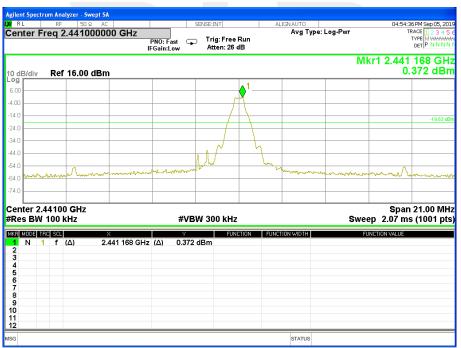


For Band edge

00 CH

ilent Spectrum Analyze	r - Swept SA 50 Ω AC		SENSE:INT		IGNAUTO		05:15:0	0 PM Sep 05, 2
	51500000 GHz	PNO: Fast IFGain:Low	Tain Face De	n	Avg Type: I	Log-Pwr	TI	RACE 1 2 3 4 TYPE M WWW DET P P P P
dB/div Ref 11	set 0.5 dB .07 dBm					М	kr1 2.401 1.	867 GI 067 dB
g 17								
3								-18.95
.9								-10.95
.9								
.9							<u>2</u>	
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.9								
art 2.30000 GH: es BW 100 kHz		#VB	W 300 kHz			Swe	stop 2. ep 9.87 ms	40300 G ; (1001 p
R MODE TRC SCL	× 2.401 867 GHz	z 1.067	FUNCTION	IN FUNCT	ION WIDTH	ł	UNCTION VALUE	
N 1 f	2.390 022 GHz 2.399 704 GHz	z -59.535	dBm					

39 CH





78 CH

	RF 5	50 Ω AC	SENSE:INT	ALIC	NAUTO	07:3	7:09 PM Sep 06, 20
nter F	req 2.489		NO: Fast 😱 Trig: Fre Gain:Low #Atten: 3		Avg Type: Log-	Pwr	TRACE 1 2 3 4 5 TYPE M WWWW DET P P P P
dB/div	Ref Offse Ref 11.0					Mkr1 2.48	30 029 GH 1.032 dB
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0	wy.	munimum	manadam	~~~~~	and a constrained and	and the second	
urt 2.47	7900 GHz		/// (This is a set of			Stop	2.50000 GI
es BW	100 kHz	×	#VBW 300 kH		N WIDTH	Sweep 2.07	
al Model Tr			1.032 dBm				
NODE THE	l f l f	2.480 029 GHz 2.483 914 GHz 2.488 030 GHz	-55.686 dBm -53.758 dBm				
N 1 N 1	l f l f	2.483 914 GHz	-55.686 dBm				
N 1 N 1	l f l f	2.483 914 GHz	-55.686 dBm				
N 1 N 1 N 1	l f l f	2.483 914 GHz	-55.686 dBm				



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
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 Http://www.stsapp.com
 E-mail: sts@stsapp.com



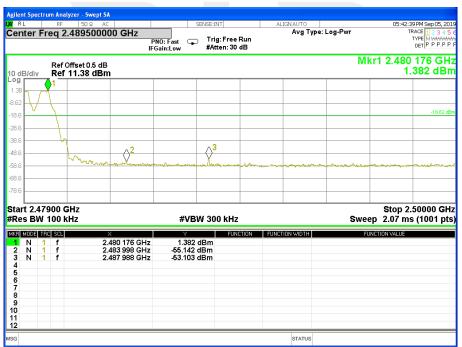


For Hopping Band edge

00 CH

	rum Analyzer - 9 RF 50							
enter F				rig: Free Run Atten: 30 dB	ALIGNAUTO Avg Type:	Log-Pwr	TYP	4 Sep 05, 20 E <u>1 2 3 4 !</u> E M WAAWA T P P P P I
dB/div	Ref Offset Ref 10.69					Mkr	1 2.402 0 0.76	73 GH 56 dB
90								
31								-19.46 (
3								
3								
.3					and the barrier		$\langle \rangle^2$	
.3								
.3								
	0000 GHz 100 kHz		#VBW 3	00 kHz		Sweep	Stop 2.40 9.87 ms (*	
R MODE T		X	0.766 dBr	FUNCTION	FUNCTION WIDTH	FUNCI	ION VALUE	
2 N 1	1 f 1 f 1 f	2.402 073 GHz 2.390 022 GHz 2.398 983 GHz	-58.866 dBr -54.545 dBr	n				
6					STATUS			

78 CH





Page 36 of 72 Report No.: STS1908223W02

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

L RF 50 enter Freq 12.51	5000000 GHz		Free Run	ALIGN AUTO Avg Type:	Log-Pwr	TI	3 AM Sep 06, 2 RACE 1 2 3 4 TYPE MWWW DET P P P P
Ref Offset 0).5 dB	ain:Low #Att	en: 30 dB			Mkr1 2.4 1.	
91							-18.60 (
3.9	$\langle \rangle^3$						-10.00
.9	2						
9	and the stand of the stand of the	والمعادية والمحالي والمحالي	Constant of the			and the strength of the streng	
.9							
.9							
enter 12.52 GHz tes BW 100 kHz		#VBW 300	kHz		Swe	Span ep 2.39 s	24.97 G (40001 p
R MODE TRC SCL N 1 f	× 2.402 2 GHz	Y 1.088 dBm	FUNCTION	FUNCTION WIDTH	FL	UNCTION VALUE	
	3.603 2 GHz 4.803 6 GHz	-43.095 dBm -31.145 dBm					
N 1 f N 1 f N 1 f	24.612 3 GHz	-47.324 dBm					
			_	STATUS			
		30	O CH				

00 CH

39	CH
00	0

L	RF 50 Ω	AC	SENSE:IN	л	ALIGN AUTO		08:31:	39 AM Sep 06, 21
	eq 12.51500	00000 GHz	O: Fast Trig	g: Free Run ten: 30 dB		e: Log-Pwr		TRACE 1 2 3 4 TYPE MWWW DET P P P P
	Ref Offset 0.5 (Ref 7.26 dB)						Mkr1 2.4	140 9 GH .312 dB
.74	1							
2.7								-19.60
2.7		-0 ³						-10.00
.7	2							
2.7								
.7 .7	and the ball		All and the second second					
.7								
2.7								
enter 12.	52 OU-							n 24.97 G
Res BW 1			#VBW 30	0 kHz		Sv	veep 2.39 s	
R MODE TRC		×	Y	FUNCTION	FUNCTION WIDTH		FUNCTION VALUE	
N 1 2 N 1 3 N 1	f f f	2.440 9 GHz 3.661 9 GHz 4.882 3 GHz 24.631 7 GHz	-1.312 dBm -44.807 dBm -28.787 dBm -51.037 dBm					
IN 1								
4 N 1 5 7								

П

Shenzhen STS Test Services Co., Ltd.



78 CH

L		OΩ AC			SENSE:INT	Al	IGNAUTO Avg Type:	Lon Dum		DAM Sep 06, RACE 1 2 3
nter Fr	eq 12.51	5000000	F	PNO: Fast Gain:Low	Trig: Free #Atten: 30		Avg Type:	Log-Pwr		TYPE MWW DET P P P
dB/div	Ref Offset Ref_7.78								Mkr1 2.4 -2.	80 2 G 216 di
2	1									
.2										-18.36
2		A2		2						
2		\diamond		>						
2		4			والمراجع ومعارضها والمراجع	a la china china como su				
.2										
.2										
2										
	.52 GHz 100 kHz			#VB	W 300 kH:	Z		Swe	Span ep 2.39 s	24.97 G (40001 ا
NODE TR		×		Y		ICTION FUNC	TION WIDTH	F	JNCTION VALUE	
N 1 N 1	f f	3.7	80 2 GHz 19 9 GHz	-2.216 -39.514	dBm					
N 1			40 5 GHz 73 4 GHz	-40.552						
							STATUS			



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Shenzhen STS Test Services Co., Ltd.

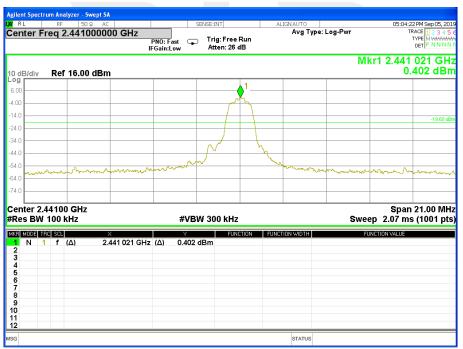


For Band edge

00 CH

gilent Spectrum Analyzer - S							
enter Freq 2.3515	500000 GHz		≕int rig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type	-	TH	AM Sep 06, 20 ACE 1 2 3 4 5 IYPE M WWWW DET P P P P
Ref Offset 0 dB/div Ref 11.40					MI	kr1 2.401 1.1	970 GH 397 dBi
og 1.40							
.60							-18.60 d
8.6							
B.6							
						$\langle \rangle^2$	ment
3.6	ann shanair darara	all aloud a hard a faith	Berlauge-Alfreige-Alfrei	๛(๛๛ฺ฿๎๚ฺ฿๛ฺ ^ๅ ๛๛ ¹ ๛ฐ๛ไปงระหารักระการณ์ได้พิ	A Cally May and Maryon	10 Production de la constitue d	
8.6							
art 2.30000 GHz Res BW 100 kHz		#VBW 3	00 kHz		Swee	Stop 2.4 ep 9.87 ms	40300 GI (1001 pi
R MODE TRC SCL	×	Y		FUNCTION WIDTH	FU	INCTION VALUE	
N 1 f 2 N 1 f 3 N 1 f 4 5 5 5 7	2.401 970 GHz 2.390 022 GHz 2.399 601 GHz	1.397 dBn -57.647 dBn -48.752 dBn	1				
5 7 3 9							
2							
3				STATUS			

39 CH





78 CH

	RF	lyzer - Swept Si 50 Ω AC		SENS	EINT	ALIGN AUTO		08:42	:08 AM Sep 06, 20
nter F	req 2	.4895000	00 GHz	NO: East	Trig: Free Run Atten: 30 dB		e: Log-Pwr		TRACE 1 2 3 4 5 TYPE MWWW DET P P P P F
dB/div		Offset 0.5 dB 11.64 dBn					N	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 029 GH .642 dBi
64	2 1								
36									-18.36 0
.4									
.4		monto	λ^2	()3					
.4			howan	montand	monor	and marked and the second s	⁰ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		mar marcale Long
.4									
art 2.4 es BW				#VBW 3	300 kHz		Swe	Stop 2 eep 2.07 m	2.50000 G ns (1001 p
R MODE T	ric scl 1 f		× .480 029 GHz	ĭ 1.642 dBr	FUNCTION	FUNCTION WIDTH		FUNCTION VALUE	
2 N	1 f 1 f	2	.483 515 GHz .486 959 GHz	-46.658 dBr -53.070 dBr	n				
5 7 3									
1 • •									



Shenzhen STS Test Services Co., Ltd.





For Hopping Band edge

00 CH

	rum Analyzer - S								
enter F		D Q AC 500000 GHz	PNO: Fast FGain:Low	NSE:INT Trig: Free Run #Atten: 30 dB	ALIGN AL	vg Type: Log-I	Pwr	TR4	PM Sep 05, 20 VCE 1 2 3 4 5 /PE M WWWWW DET P P P P P
0 dB/div	Ref Offset Ref 10.24						Mkr1		000 GH 41 dBr
og 240									
9.76									
9.8									-19.76 d
9.8									n le
								2	
.8		and a state of the second s	الي هذا ٦ حد الإفسانيون بينا			and her and have	and the second	molene	www.dave
9.8									
0.8									
	0000 GHz 100 kHz		#VBW	300 kHz			Sweep	Stop 2.4 9.87 ms	
	RC SCL	×	Y	FUNCTION	FUNCTION W	IDTH	FUNCTI	ON VALUE	
N 1 2 N 1 3 N 1 4 5 7		2.403 000 GHz 2.390 022 GHz 2.399 498 GHz	-59.014 dE	3m					
1									
) 1 2									

78 CH



Shenzhen STS Test Services Co., Ltd.



Page 41 of 72 Report No.: STS1908223W02

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

00 CH

	RF 50 Ω AC		CE	NSE:INT	AL	IGN AUTO		09:50:0	2 AM Sep 06, 2
isplay Line	e -18.83 dBm	n PN	0: Fast 🖵	Trig: Free Ru #Atten: 30 dB	ın	Avg Type:	Log-Pwr	TI	RACE 1 2 3 4 TYPE MWWW DET P P P P
dB/div R	ef Offset 0.5 dB ef 6.79 dBm							Mkr1 2.4 -1.	02 2 GI 082 dB
21	Q 1								
3.2									-18.83
3.2		3							
3.2									
8.2 Name and S			New Joseffinite						
3.2									
3.2									
art 30 MHz Res BW 10			#VBW	/ 300 kHz			Sw	Stop eep 2.39 s	25.00 G (40001 p
CO PAR 10									
(R MODE TRC S			Y	FUNCTIO	ON FUNCT	ION WIDTH	F	UNCTION VALUE	
R MODE TRC S N 1 1 2 N 1 1 3 N 1 1 4 N 1 1	f f f	2.402 2 GHz 3.603 2 GHz 4.804 3 GHz 24.651 0 GHz	-1.082 d -40.019 d -29.660 d -48.352 d	Bm Bm Bm	DN FUNCT	ION WIDTH	F	UNCTION VALUE	
MODE TRC S N 1 1 2 N 1 1 3 N 1 1 4 N 1 1 5 7 - - 3 N 1 1	f f f	2.402 2 GHz 3.603 2 GHz 4.804 3 GHz	-1.082 d -40.019 d -29.660 d	Bm Bm Bm	DN FUNCT	ION WIDTH	F	UNCTION VALUE	
R MODE TRC S N 1 1 2 N 1 1 3 N 1 1	f f f	2.402 2 GHz 3.603 2 GHz 4.804 3 GHz	-1.082 d -40.019 d -29.660 d	Bm Bm Bm		ION WIDTH	F	UNCTION VALUE	

39 CH

L		RF	50 Ω	AC		SENSE:INT		ALIGN	IAUTO		08	:52:49 AM Sep 06, 2
enter	Fre	eq 1	2.51500		PNO: Fast G FGain:Low	Trig: Fr #Atten:			Avg Type:	Log-Pwr		TRACE 1 2 3 4 TYPE M WAAAA DET P P P P
0 dB/di			Offset 0.5 10.85 dl								Mkr1 2	2.441 5 GI 0.988 dB
.og	v		10.00 u	Dill								
.850			(·									
.15												
9.2				3							_	-19.56
9.2												
9.2				_								
9.2			<mark>ر2</mark>						the statistics of the	ور المراجع ا		The second second second
9.2			V. Hinding	and a suspect for the second	and the second s	and the second	ويتأكر أنهيه	Sector Sector	No. of Concession, Name			-
9.2			territe pe									
· · · ·												
32												
3.2												
enter Res B					#VE	300 k	Hz			Sv	Si veep 2.3	pan 24.97 G 9 s (40001 p
enter Res B	W 1	00 k		×	Y		Hz	FUNCTION	NWIDTH		Sp veep 2.39	9 s (40001 p
enter tes B	W 1	00 k 500		2.441 5 GHz	Y 0.98	B dBm		FUNCTION	N WIDTH		veep 2.3	9 s (40001 p
enter tes B R MOOD N N N N N	W 1	00 k f f		2.441 5 GHz 2.649 4 GHz 4.882 3 GHz	0.98 -55.656 -27.80	3 dBm 5 dBm 7 dBm		FUNCTION	1 WIDTH		veep 2.3	9 s (40001 j
enter Res B N N N N N N N	W 1	00 k 501 f		2.441 5 GHz 2.649 4 GHz	0.98 -55.656 -27.80	3 dBm 5 dBm 7 dBm		FUNCTION	I WIDTH		veep 2.3	9 s (40001 p
enter Res B I N 2 N 3 N 4 N	W 1	00 k f f		2.441 5 GHz 2.649 4 GHz 4.882 3 GHz	0.98 -55.656 -27.80	3 dBm 5 dBm 7 dBm		Function	N WIDTH		veep 2.3	9 s (40001 p
enter Res B 1 N 2 N 3 N 4 N 5 7	W 1	00 k f f		2.441 5 GHz 2.649 4 GHz 4.882 3 GHz	0.98 -55.656 -27.80	3 dBm 5 dBm 7 dBm		FUNCTION	NWIDTH		veep 2.3	9 s (40001 p
enter Res B R 1000 1 N 2 N 3 N 4 N 5 5 7 8	W 1	00 k f f		2.441 5 GHz 2.649 4 GHz 4.882 3 GHz	0.98 -55.656 -27.80	3 dBm 5 dBm 7 dBm		FUNCTION	NWIDTH		veep 2.3	9 s (40001 p
enter Res B N N N N N N N N N N N N N N N N N N N	W 1	00 k f f		2.441 5 GHz 2.649 4 GHz 4.882 3 GHz	0.98 -55.656 -27.80	3 dBm 5 dBm 7 dBm		FUNCTION	I WIDTH		veep 2.3	9 s (40001 p
enter Res B I N 2 N 3 N 4 N	W 1	00 k f f		2.441 5 GHz 2.649 4 GHz 4.882 3 GHz	0.98 -55.656 -27.80	3 dBm 5 dBm 7 dBm			I WIDTH		veep 2.3	9 s (40001 p



78 CH

nter Fi	^{RF} req 12.	50Ω A 515000	000 GHz		ENSE:INT		IGNAUTO Avg Type:	Log-Pwr		SAM Sep 06 RACE 1 2 3
			F	NO: Fast 🖵 Gain:Low	#Atten: 30					DET P P P
B/div		set0.5 dB 71 dBm							Mkr1 2.4	80 2 C
	0 1									
ŝ										
										-18.6
		2		_						
		<u> </u>	$\langle \rangle$	3						
			ľ				WINTER AND INCOME.	a contraction of		
3		Pilling and and				-				
	.52 GH	_							0	04.07.4
	100 kH			#VB	N 300 kHz			Sw	eep 2.39 s	1 24.97 ((40001
MODE TF			X	Y		CTION FUNCT	ION WIDTH		FUNCTION VALUE	
N 1 N 1			2.480 2 GHz 3.719 9 GHz	-1.169 -39.870						
N 1	f		7.439 2 GHz	-44.077	dBm					
_N 1	т		24.613 6 GHz	-47.110	вш					



Shenzhen STS Test Services Co., Ltd.

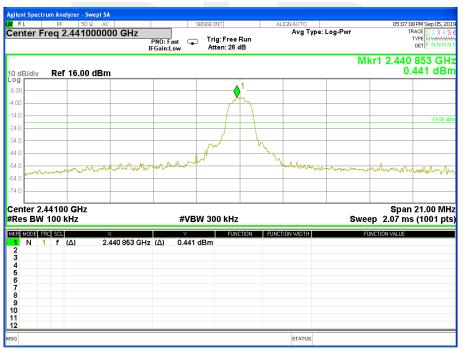


For Band edge

00 CH

ilent Spectrum Analyzer RL RF	- Swept SA 50 Ω AC	SENSE:IN	T	ALIGNAUTO		08:56:29 AM Sep 06, 2
enter Freq 2.35	1500000 GHz	NO: East Trig	: Free Run en: 30 dB	ALIGNAUTU Avg Type: Lu	-	TRACE 1 2 3 4 TYPE M WANN DET P P P P
Ref Offse dB/div Ref 11.	et 0.5 dB 17 dBm				Mki	1 2.401 867 GI 1.168 dB
17						
83						
.8						-18.83
.8						
.8						2
8 where merile way war	allerter to the text of the second	www.whereastronet.	and a superior	manna	man and a second	- man have been the
.8						
art 2.30000 GHz tes BW 100 kHz		#VBW 300	kHz		Sweep	Stop 2.40300 G 9.87 ms (1001 p
R MODE TRC SCL	×	Y	FUNCTION	FUNCTION WIDTH	FUN	CTION VALUE
N 1 f N 1 f N 1 f S N 1 f	2.401 867 GHz 2.390 022 GHz 2.399 807 GHz	1.168 dBm -57.819 dBm -45.103 dBm				
à				STATUS		

39 CH





78 CH

		yzer - Swept SA						
RL enter F	RF rea 2.	50 Ω AC 489500000 GHz		EINT	ALIGNAUTO Avg Type:	Log-Pwr	TI	9 AM Sep 06, 20 RACE 1 2 3 4 5
				Trig: Free Run #Atten: 30 dB				
) dB/div		offset 0.5 dB 11.35 dBm				Mk	r1 2.479 1.	861 GH 351 dBi
⁹ 35	1							
.65	m l							
8.7								-18.69 0
3.7	-							
3.7	- 4		∧ <u>3</u>					
3.7		munition	2	John with and a	1 mar mar mar and			
8.7						and the second	northolds and	undownafterior
B.7								
art 2.47	2000 C	H7					Stop 2	50000 GI
Res BW			#VBW 3	300 kHz		Swee	p 2.07 ms	; (1001 p
R MODE TI		× 2.479 861 GHz	r 1.351 dBi	FUNCTION	FUNCTION WIDTH	FUN	ICTION VALUE	
2 N 1	f	2.483 515 GHz 2.485 216 GHz	-53.085 dBr	n				
4		2.465 216 612	-54.571 081					
5 7								
3								
9 D 1								
2								



Shenzhen STS Test Services Co., Ltd.



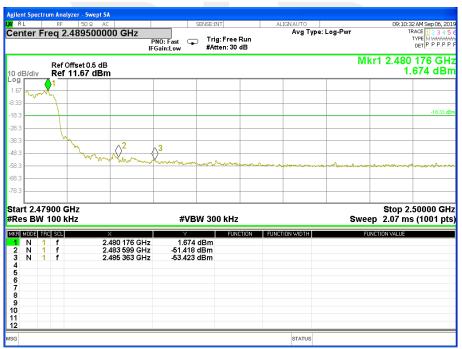


For Hopping Band edge

00 CH

ilent Spectr R L	um Analyzer - S RF 50	wept SA Ω AC	000	e-mart 1	ALIGN AUTO		00-00-10	M Car 96, 22
		500000 GHz	PNO: East	≊:INT Trig: Free Run #Atten: 30 dB	ALIGNAUTU Avg Type	: Log-Pwr	TRA T`	AM Sep 06, 20 ACE 1 2 3 4 5 YPE M WWWW DET P P P P F
) dB/div	Ref Offset 0 Ref 11.00					Mk	r1 2.401 9 1.0	970 GH)04 dBr
.00								
00								-19.00 d
9.0								-13.00 0
.0								N
.0							<mark>2</mark>	and the second
0	freezenses for some men and some	u hayb maaaadoo madagalaa maghifu ahada gaagif iyo g	and the second	an a	****		mar have been and and and and and and and and and an	Nan
.0								
	000 GHz 100 kHz		#VBW	300 kHz		Swee	Stop 2.4 p 9.87 ms	
R MODE TR N 1 2 N 1 3 N 1 4 5 5	f	× 2.401 970 GHz 2.390 022 GHz 2.399 704 GHz	1.004 dB -58.206 dB -50.034 dB	n	FUNCTION WIDTH	FUI	ICTION VALUE	
à					STATUS			

78 CH



П



5. NUMBER OF HOPPING CHANNEL

5.1 LIMIT

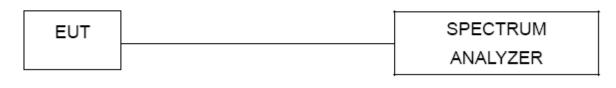
	FCC Part 15.247,Subpart C									
Section	Test Item	Limit	FrequencyRange (MHz)	Result						
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS						

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

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 -GFSK Mode	Test Voltage:	DC 3.7V from battery

Number of Hopping Channel

79

Hopping channel

RL	spect	rum And RF	alyzer - Swept SA 50 Ω AC			SENSE:INT		AI	.IGN AUTO		05:27	:58 PM Sep 05, 3
	er F		2.44175000	F	PNO: Fast Gain:Low	Tuine Fu		1	Avg Type:	Log-Pwr		TRACE 1 2 3 4 TYPE MWWW DET P P P F
dB/	div		Offset 0.5 dB 11.53 dBm							Mki	r2 2.480	160 0 G 1.59 dE
.53 .47		WW		YMMMY		mm	ww	m	mmm	mm	WWWW	WYYWY
9.5 -												
15												
8.5												
3.5 -	2 41	0000	CU-7								Ston	2.48350 G
		300			#VB	W 300 kl	łz			Swe	ep 1.13 m	is (1001 p
1 N 2 N 3 4 5 5	1	RC SCL 1 f 1 f	2.40	2 171 0 GHz 0 160 0 GHz		dBm dBm	UNCTION	FUNC	TION WIDTH	F	FUNCTION VALUE	
7 B 9												

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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.
- \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 x 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.



6.5 TEST RESULTS

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

Data Packet	Channel	pulse time(ms)	Dwell Time(s)	Limits(s)
DH1	middle	0.387	0.124	0.4
DH3	middle	1.647	0.264	0.4
DH5	middle	2.893	0.309	0.4



Shenzhen STS Test Services Co., Ltd.



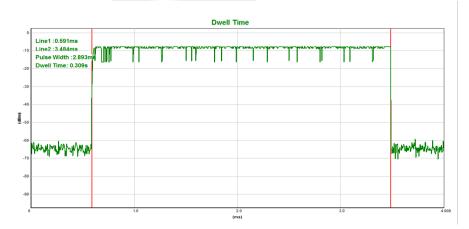
CH39-DH1

	Dwell Time	
Line1 :0.424ms Line2 :0.811ms Pulse Width :0.387ms Dwell Time: 0.124s	אריאוירוייוע אייזאריירי אריירעריך ער יואלואירי ⁻ ר	
Parper San Martin San Carlan San San San San San San San San San S		w. writen payor wyburd
	Line2:0.811ms Pulse Width :0.387ms Dwell Time: 0.124s	Line1:0.424ms Line2:0.811ms Pulse Width :0.387ms

CH39-DH3



CH39-DH5



Shenzhen STS Test Services Co., Ltd.



Page 51 of 72 Report No.: STS1908223W02

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

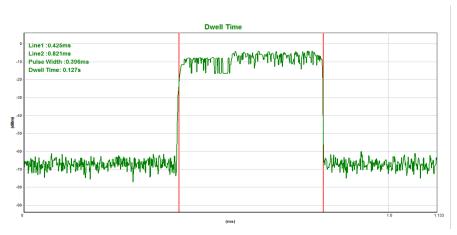
Data Packet	Channel	pulse time(ms)	Dwell Time(s)	Limits(s)
2DH1	middle	0.396	0.127	0.4
2DH3	middle	1.653	0.264	0.4
2DH5	middle	2.904	0.310	0.4



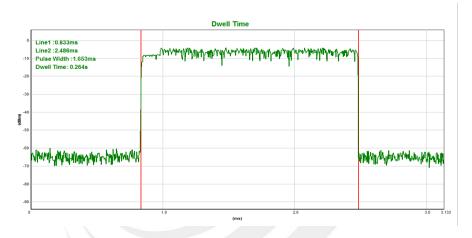
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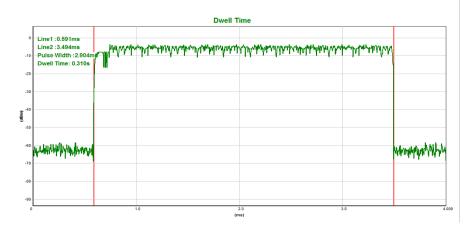
CH39-2DH1



CH39-2DH3



CH39-2DH5





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

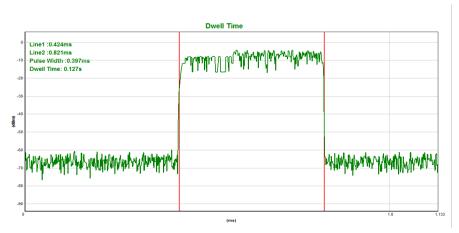
Data Packet	Channel	pulse time(ms)	Dwell Time(s)	Limits(s)
3DH1	middle	0.397	0.127	0.4
3DH3	middle	1.648	0.264	0.4
3DH5	middle	2.901	0.309	0.4



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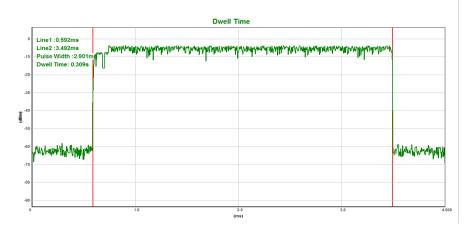
CH39-3DH1



CH39-3DH3



CH39-3DH5



7. HOPPING CHANNEL SEPARATION MEASUREMEN

7.1 LIMIT

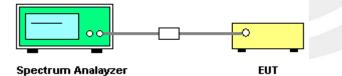
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that 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		
RB30 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 ℃	Relative Humidity:	50%
	CH00 / CH39 / CH78 (GFSK(1Mbps) Mode)	Test Voltage:	DC 3.7V from battery

Frequency	Mark1 Frequency (MHz)	Mark2 Frequency (MHz)	Ch. Separation (MHz)	Limit (MHz)	Result
2402 MHz	2401.843	2402.845	1.002	0.921	Complies
2441 MHz	2440.846	2441.842	0.996	0.921	Complies
2480 MHz	2478.846	2479.845	0.999	0.886	Complies

For GFSK: Ch. Separation Limits: > 20dB bandwidth

CH00 -1Mbps



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CH39 -1Mbps



CH78 -1Mbps





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

Frequency	Mark1 Frequency (MHz)	Mark2 Frequency (MHz)	Ch. Separation (MHz)	Limit (MHz)	Result
2402 MHz	2402.020	2403.010	0.990	0.879	Complies
2441 MHz	2441.020	2442.010	0.990	0.888	Complies
2480 MHz	2479.020	2480.010	0.990	0.890	Complies

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

RL	RF 50 Ω	AC	SENSE:I	NT	ALIGN AUTO		08:39:14 AM Sep 06
enter F	req 2.402500	PNO		g: Free Run ten: 30 dB	Аvg Туре	: Log-Pwr	TRACE 1 2 3 TYPE M WW DET P P P
) dB/div	Ref Offset 0.5 c Ref 8.93 dBr					Mk	r2 2.403 010 G 0.749 dl
07			<u>2</u>			2	
.1		m		\sim	$\sim \sim$	m	~~~
.1							
.1	~~						\longrightarrow
.1							
.1							
.1							
	402500 GHz 30 kHz		#VBW 10	0 kHz		Swee	Span 3.000 M p 3.20 ms (1001
r Mode t N 1		× 2.402 020 GHz	ĭ -1.04 dBm	FUNCTION	FUNCTION WIDTH	FUI	NCTION VALUE
2 N 1 3	f	2.403 010 GHz	0.75 dBm				
1 5 5							
)							
7 3 9							

CH00 -2Mbps



CH39 -2Mbps

۱۱		RF	50 Ω A	AC		SEF	VSE:INT		ALIGNAUTO			38 AM Sep 06, 21
nter	Fre	eq 2	.4415000	000 GHz	PNO: Wid IFGain:Lo		Trig: Free #Atten: 30	Run dB	Avg Type:	Log-Pwr		TYPE M WAAWA DET P P P P
			Offset 0.5 dB							М	kr2 2.44	
dB/di	V	Ref	8.73 dBm	1					2			.061 dB
-												
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim$	$\sim$	$\sim \sim$	-m	$\sim\sim$	$\sim$	$\sim$	$\sim$	
			~~~~								► ~	
			/									\
	~	\sim										\square
1												
			0 GHz					1				n 3.000 M
		10 kH	IZ			#VBW	100 kHz				ep 3.20 m	is (1001 p
MODE N	TRC	f		× 2.441 020 G		-1.25 di		CTION FUN	ICTION WIDTH	F	JNCTION VALUE	
N	1	f		2.442 010 G		1.06 di						

CH78 -2Mbps





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

Frequency	Mark1 Frequency (MHz)	Mark2 Frequency (MHz)	Ch. Separation (MHz)	Limit (MHz)	Result
2402 MHz	2402.020	2403.010	0.990	0.846	Complies
2441 MHz	2441.020	2442.010	0.990	0.859	Complies
2480 MHz	2479.023	2480.010	0.987	0.859	Complies

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

CH00 -3Mbps

RL	RF 50	Swept SA	SENSE:INT		ALIGNAUTO	03:52:15 PM Sep 06, 2
enter		500000 GHz	NO: Mide Trig:	Free Run n: 30 dB	Avg Type: Log	
0 dB/div	Ref Offset Ref 8.62					Mkr2 2.403 010 GF 0.876 dB
.38			<u></u>		2	
1.4				\sim		~~~
1.4		,				
1.4	m					
1.4						
1.4						
1.4						
1.4						
	2.402500 GH N 30 kHz	lz	#VBW 100	kH7		Span 3.000 M Sweep 3.20 ms (1001 p
	TRC SCL	×	× BM 100		CTION WIDTH	EUNCTION VALUE
1 N 2 N 3	1 f 1 f	2.402 020 GHz 2.403 010 GHz	-1.38 dBm 0.88 dBm			
5						
4 5 6 7						
5 6 7 8 9						
5 6						

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CH39 -3Mbps

- RF 50 Ω AC	SENSE:INT	ALIGN AUTO	08:54:32 AM Sep 06, 2
ter Freq 2.441500000 GHz	PNO: Wide Trig: Free IFGain:Low #Atten: 30	Avg Type: Log-Pwr Run dB	TRACE 1 2 3 4 TYPE M WAAA DET P P P P
Ref Offset 0.5 dB B/div Ref 8.67 dBm			Mkr2 2.442 010 GI 1.051 dE
		2	
		m m	m
ter 2.441500 GHz			Span 3.000 M
s BW 30 kHz	#VBW 100 kHz	S	weep 3.20 ms (1001 p
MODE TRC SCL X N 1 f 2.441 020 G		CTION FUNCTION WIDTH	FUNCTION VALUE
N 1 f 2.442 010 G			

CH78 -3Mbps



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8. BANDWIDTH TEST

8.1 LIMIT

	FCC Part15 15.247,Subpart C							
Ī	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.



8.5 TEST RESULTS

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

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	0.921	PASS
2441 MHz	0.921	PASS
2480 MHz	0.886	PASS

CH00 -1Mbps

gilent Spectrum Analyzer - Occupied BW RL RF 50 Q AC		SENSE:INT	ALIGN AUTO	05:20:07 PM Sep 05, 20
enter Freg 2.402000000	GHz	Center Freq: 2.402000		Radio Std: None
·	#IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
Ref Offset 0.5 dB 0 dB/div Ref 20.00 dBm	_			
9 g				
00				
		\sim		
	~~~	~	$\sim$	
0	~~~~~			~
0				
.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
0				
0				
enter 2.402 GHz				Span 2 M
les BW 30 kHz		#VBW 100 k	Hz	Sweep 2.733
Occupied Bandwidth	1	Total Power	7.24 dBm	
84	15.57 kHz			
Transmit Freq Error	6.678 kHz	OBW Power	99.00 %	
x dB Bandwidth	920.9 kHz	x dB	-20.00 dB	
			STATUS	

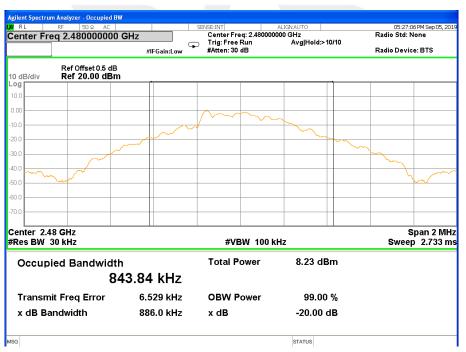
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### CH39 -1Mbps



#### CH78 -1Mbps





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

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.318	PASS
2441 MHz	1.332	PASS
2480 MHz	1.335	PASS

#### CH00 -2Mbps



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#### CH39 -2Mbps



#### CH78 -2Mbps





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

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.269	PASS
2441 MHz	1.289	PASS
2480 MHz	1.289	PASS

# CH00 -3Mbps

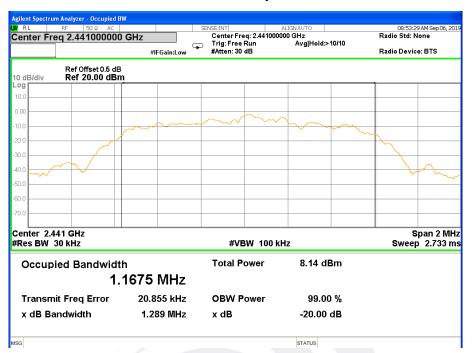
ent Spectrum Analyzer - Occupied RL RF 50 Ω AC	517	SENSE:INT	ALIGNAUTO	08:55:52 AM Sep 06, 2
nter Freg 2.4020000	0 GHz	Center Freq: 2.402000	000 GHz	Radio Std: None
		Trig: Free Run #Atten: 30 dB	Avg Hold:>10/10	Radio Device: BTS
Ref Offset 0.5 dl dB/div Ref 20.00 dB				
g				
0				
0				
			hom	
				~
D				
0				
0				
nter 2.402 GHz es BW 30 kHz		#VBW 100 k	Hz	Span 2 M Sweep 2.733
Occupied Bandwid	<b>th</b>	Total Power	8.20 dBm	
		Total Tower	0.20 0011	
1	.1673 MHz			
Transmit Freq Error	18.850 kHz	OBW Power	99.00 %	
k dB Bandwidth	1.269 MHz	x dB	-20.00 dB	
CUD Danuwiath	1.209 WHZ	x ub	-20.00 dB	
			STATUS	

Π

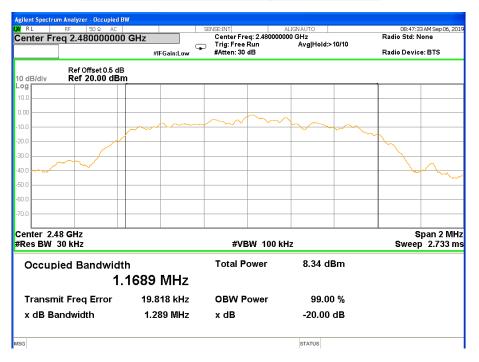
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### CH39 -3Mbps



#### CH78 -3Mbps



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# 9. OUTPUT POWER TEST

# 9.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247	Output	1 W or 0.125W	2400 2482 5	DASS
(a)(1)&(b)(1)	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 Sensor&PC

#### 9.3 TEST SETUP

EUT Power sensor	PC
------------------	----

### 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:	<b>25</b> ℃	Relative Humidity:	60%
Test Voltage:	DC 3.7V from battery		

Mode	Channel Number	Frequency (MHz)	Peak Power	Average Power	Limit
			(dBm)	(dBm)	(dBm)
GFSK(1M)	0	2402	1.69	0.32	30.00
	39	2441	1.67	0.38	30.00
	78	2480	1.41	0.12	30.00

#### Note: the channel separation >20dB bandwidth

Mode	Channel Number	Frequency (MHz)	Peak Power	Average Power	Limit
			(dBm)	(dBm)	(dBm)
π/4-DQPSK( 2M)	0	2402	4.07	0.09	20.97
	39	2441	4.17	0.39	20.97
	78	2480	4.29	0.57	20.97

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

Mode	Channel Number	Frequency (MHz)	Peak Power	Average Power	Limit
			(dBm)	(dBm)	(dBm)
8-DPSK(3M)	0	2402	4.96	0.57	20.97
	39	2441	4.71	0.33	20.97
	78	2480	4.84	0.67	20.97

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



# **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 Ceramic 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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