



FCC RADIO TEST REPORT

Applicant	: Guangzhou Shirui Electronics Co., Ltd
Address	: No.192, KeZhu Road, Science Park, Economic -Technological Development Area, Guangzhou,Guangdong,China
Equipment	: WIFI and Bluetooth module
Model No.	: WIFI-2-R821USA1A
Trademark	: N/A
FCC ID	: 2AFG6-R821USA1A

I HEREBY CERTIFY THAT :

The sample was received on Jul. 17, 2017 and the testing was carried out on Aug. 11, 2017 at CerpPASS Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of CerpPASS Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Mark Liao

Assistant Manager

Laboratory Accreditation:



CerpPASS Technology Corporation Test Laboratory

TAF LAB Code:

1439



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History of this test report

■ ORIGINAL

☐ Additional attachment as following record:

Attachment No.	Issue Date	Description



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

FCC Rule	Description of Test	Result
FCC CFR Title 47 Part 15 Subpart C: Section 15.203/15.247 (b)	. Antenna Requirement	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.207	. AC Power Line Conducted Emission	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.205/15.209; Part2 section 2.1051, 2.1053, 2.1057	. Spurious Emission(Radiated)	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.247(d); Part2 section 2.1051 and 2.1057	. Spurious Emission(Conducted)	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.247(a)(2); Part2 section 2.1049	. 6dB Bandwidth	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.247(b); Part2 section 2.1046	. Maximum Peak Output Power	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.247(e)	. Power Spectral Density	Pass



2. Test Configuration of Equipment under Test

2.2 Feature of Equipment under Test

Product	WIFI and Bluetooth module
Test Model	WIFI-2-R821USA1A
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V from host equipment
Frequency Range	2.4 GHz ISM radio band / 5 GHz Unlicensed National Information Infrastructure (U-NII) band
Number of Channels	2.4G: 802.11b, 802.11g, 802.11n(HT20):11 802.11n(HT40):7 Bluetooth:78 Bluetooth Low Energy:39 5G: 802.11a, 802.11n(HT20), 802.11ac(VHT20):19 802.11n(HT40), 802.11ac(VHT40):9 802.11ac (VHT80):4
Modulation	DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM and 256-QAM for WLAN GFSK (1Mbps), $\pi/4$ DQPSK (2Mbps) and 8DPSK (3Mbps) for Bluetooth GFSK (Bluetooth low energy)
Data Rates	802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b: 1, 2, 5.5, 11Mbps 802.11n: MCS0~MCS7 802.11ac: MCS0NSS1~ MCS8NSS1 Bluetooth: 1, 2, 3Mbps Bluetooth Low Energy: 1Mbps

Note: for more details, please refer to the User's manual of the EUT.

Antenna List

Antenna	Manufacturer	Peak Gain
FPCB Antenna	South Star	Chain 1: 3.21dBi for 2400~2500MHz band, 3.41dBi for 5150~5850MHz band. Chain 2: 2.52dBi for 2400~2500MHz band, 3.28dBi for 5150~5850MHz band.

Note: Bluetooth is only applicable to Chain 1



2.3 Test Mode & Test Software

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
*00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	*19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	*39	2480
12	2426	26	2454	--	--
13	2428	27	2456	--	--

Note: Channels remarked * are selected to perform test.

2.4 Test Manner

Test Manner	
a	During testing, the interface cables and equipment positions were varied according to 47 CFR, Part 2, Part 15
b	Adjust the EUT at the test mode and the test channel. Then test. Test Mode: Mode 1: GFSK(1Mbps)

2.5 Description of Test System

No	Device	Manufacturer	Model No.	Description
1	Notebook	SONY	PCG-71811P	R33021
2	USB Mouse	DELL	OXN967	R41108

Cable:

No.	Cable	Quantity	Description
A	USB Cable	1	0.8m Shielding
B	USB Mouse Cable	1	1.8m Non Shielding
C	DC Cable	1	1.7m Non Shielding



2.6 General Information of Test

☒	Test Site	Cerpass Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881 Address: No.68-1, Shihbachongsi, Shihding Township, New Taipei City 223, Taiwan, R.O.C. Tel: +886-2-2663-8582
	FCC	TW1079, TW1061, 390316, 228391, 641184
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-3428, R-4218 for Radiated emission test G-812, G-813 for radiated disturbance above 1GHz
Frequency Range Investigated:		Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 25000MHz
Test Distance:		The test distance of radiated emission from antenna to EUT is 3 M.



3. Test Equipment and Ancillaries Used for Tests

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Test Receiver	R&S	ESCI	100564	2017.02.14	2018.02.13
LISN	SCHWARZBEC K	NSLK 8127	8127748	2017.02.14	2018.02.13
LISN	SCHWARZBEC K	NSLK 8127	8127749	2017.02.14	2018.02.13
Pulse Limiter with 10dB Attenuation	SCHWARZBEC K	VTSD 9561-F	9561-F106	2017.02.14	2018.02.13
Temperature/ Humidity Meter	mingle	ETH529	N/A	2017.02.14	2018.02.13
AMPLIFIER	HP	8447F	3113A0591 5	2017.02.14	2018.02.13
Loop Antenna	R&S	HFH2-Z2	100150	2016.10.24	2017.10.23
BILOG Antenna	SCHAFFNER	CBL6112D	22241	2017.02.14	2018.02.13
Horn Antenna	Sunol	DRH-118	A072913	2016.10.12	2017.10.11
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-347	2017.05.26	2018.05.25
Preamplifier	COM-POWER	PA-840	711885	2017.02.14	2018.02.13
Temp&Humidity& barometer	mingle	ETH529	N/A	2017.02.14	2018.02.13
Preamplifier	Feld	AFS44-00101 800-25- 10P-44	1579008	2016.09.30	2017.09.29
ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY450925 82	2017.05.26	2018.05.25
MXG VECTOR SIGNAL GENERATOR	Agilent	N5182B	MY530501 27	2017.05.26	2018.05.25
EXA Signal Analyzer	Agilent	N9020A	US462202 90	2017.05.26	2018.05.25
Power sensor	e-channel	ERS-180T-24	TW545102 6	2017.05.26	2018.05.25
Series Power Meter	ANRITSU	ML24958A	1224005	2017.02.14	2018.02.13



4. Antenna Requirements

4.7 Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.8 Antenna Construction and Directional Gain

Antenna	Manufacturer	Peak Gain
FPCB Antenna	South Star	Chain 1: 3.21dBi for 2400~2500MHz band, 3.41dBi for 5150~5850MHz band. Chain 2: 2.52dBi for 2400~2500MHz band, 3.28dBi for 5150~5850MHz band.



5. Test of Conducted Emission

5.9 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHZ on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.10-2013. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 6.2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

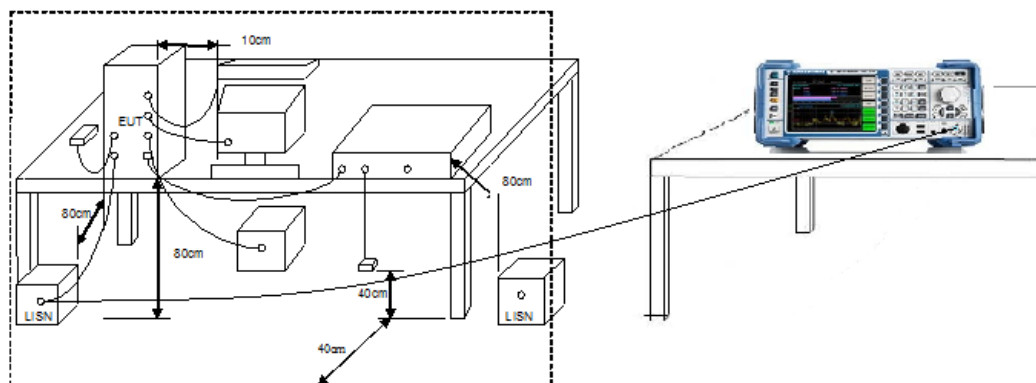
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

5.10 Test Procedures

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of Oct 2014 KDB558074 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

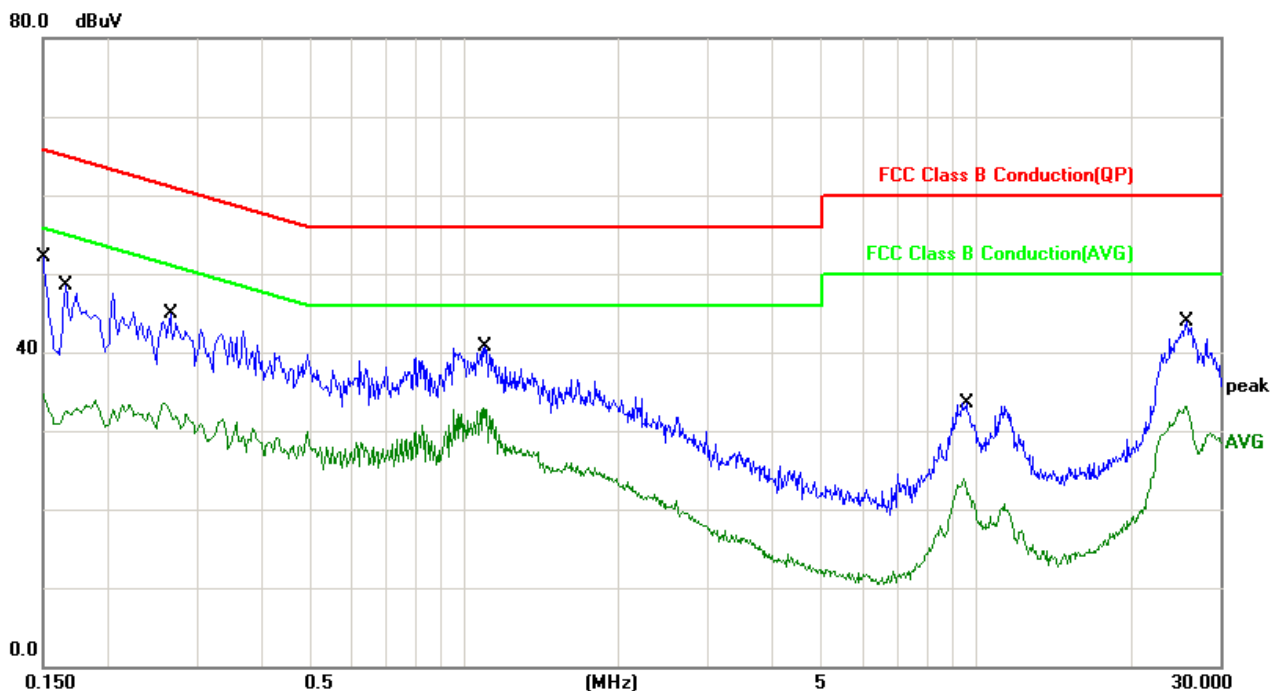
5.11 Typical Test Setup





5.12 Test Result and Data

Test Mode :	Normal Link	Phase :	Line
Temperature :	20°C	Humidity:	51%
Pressur(mbar) :	1002	Date:	Aug. 10, 2017

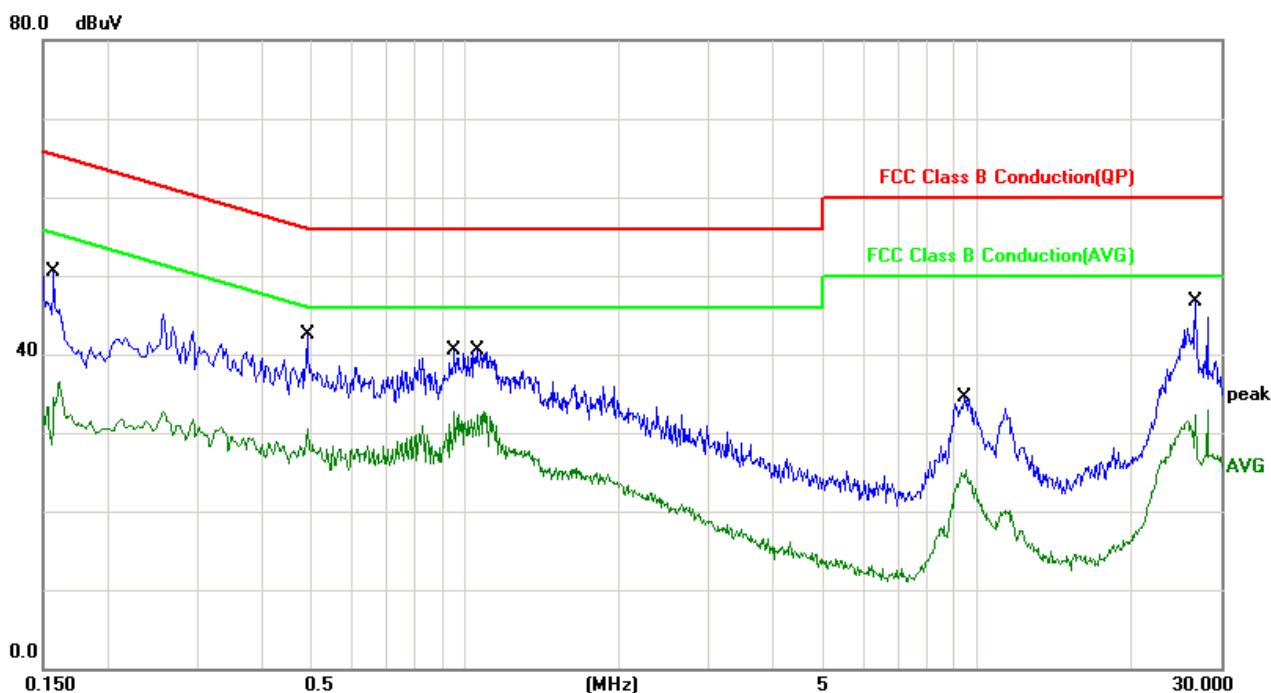


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	10.06	42.83	52.89	65.99	-13.10	QP
2	0.1500	10.06	26.58	36.64	55.99	-19.35	AVG
3	0.1660	10.06	33.40	43.46	65.15	-21.69	QP
4	0.1660	10.06	22.06	32.12	55.15	-23.03	AVG
5	0.2660	10.02	29.70	39.72	61.24	-21.52	QP
6	0.2660	10.02	21.35	31.37	51.24	-19.87	AVG
7	1.0940	10.21	26.29	36.50	56.00	-19.50	QP
8	1.0940	10.21	22.44	32.65	46.00	-13.35	AVG
9	9.5940	10.27	16.90	27.17	60.00	-32.83	QP
10	9.5940	10.27	9.88	20.15	50.00	-29.85	AVG
11	25.8620	10.61	26.94	37.55	60.00	-22.45	QP
12	25.8620	10.61	20.12	30.73	50.00	-19.27	AVG

Note: Measurement Level = Reading Level + Correct Factor+ Attenuator



Test Mode :	Normal Link	Phase :	Neutral
Temperature :	20°C	Humidity:	51%
Pressur(mbar) :	1002	Date:	Aug. 10, 2017



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1580	10.06	38.72	48.78	65.56	-16.78	QP
2	0.1580	10.06	21.93	31.99	55.56	-23.57	AVG
3	0.4940	9.89	29.94	39.83	56.10	-16.27	QP
4	0.4940	9.89	24.60	34.49	46.10	-11.61	AVG
5	0.9540	10.12	26.68	36.80	56.00	-19.20	QP
6	0.9540	10.12	21.87	31.99	46.00	-14.01	AVG
7	1.0580	10.13	26.03	36.16	56.00	-19.84	QP
8	1.0580	10.13	21.24	31.37	46.00	-14.63	AVG
9	9.4740	10.26	18.88	29.14	60.00	-30.86	QP
10	9.4740	10.26	11.81	22.07	50.00	-27.93	AVG
11	26.8260	10.61	23.07	33.68	60.00	-26.32	QP
12	26.8260	10.61	15.38	25.99	50.00	-24.01	AVG

Note: Measurement Level = Reading Level + Correct Factor+ Attenuator



6. Test of Radiated Emission

6.1 Test Limit

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. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

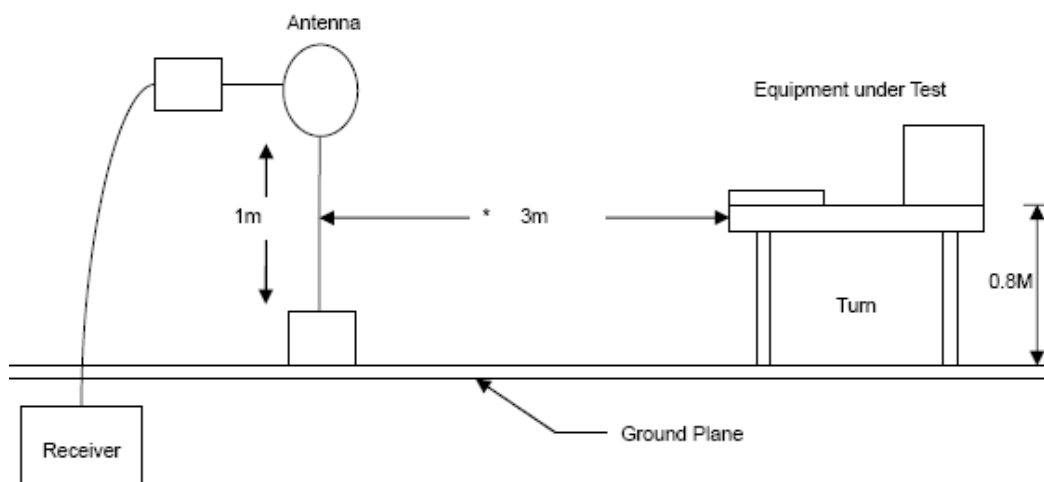
6.2 Test Procedures

- The EUT was placed on a rotatable table top 0.8 meter above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- "Cone of radiation" has been considered to be 3dB bandwidth of the measurement antenna.

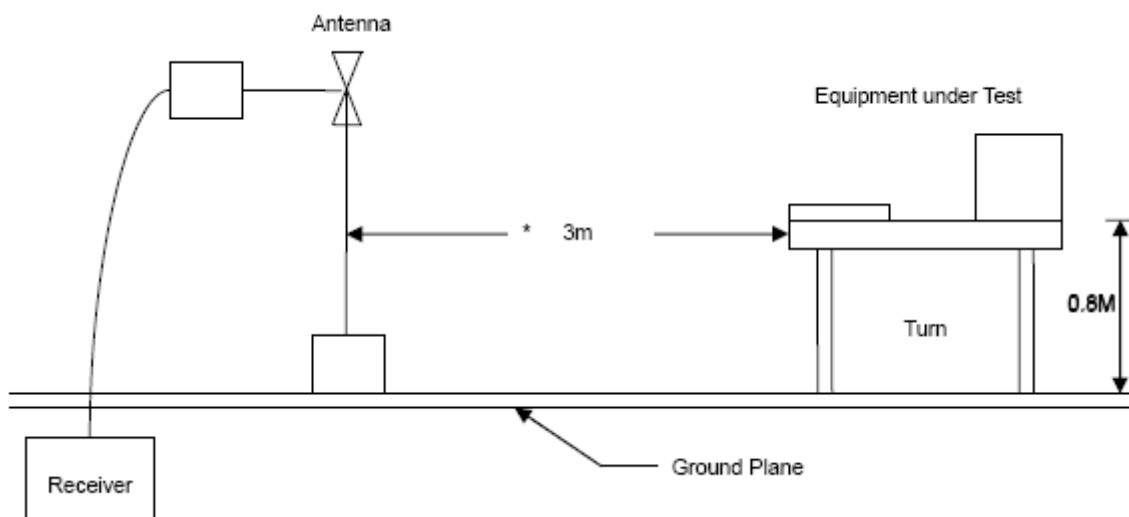


6.3 Typical Test Setup

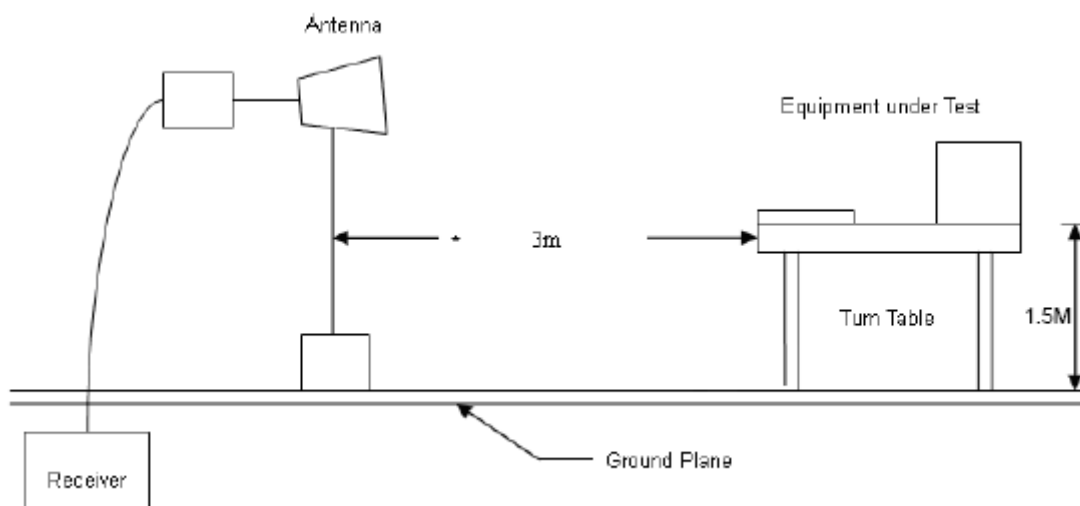
Below 30MHz Test Setup



30M - 1GHz Test Setup



Above 1GHz Test Setup





6.4 Test Result and Data (9KHz ~ 30MHz)

The 9kHz-30MHz spurious emission is under limit 20dB more.

6.5 Test Result and Data (30MHz ~ 1GHz)

Power	:	DC3.3V	Temperature	:	24 °C
Test Mode	:	Normal Link	Humidity	:	54 %
Test date	:	Aug. 10, 2017	Atmospheric Pressure	:	1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)	Detector mode (PK/QP)
58.1300	H	-15.58	42.92	27.34	40.00	-12.66	QP
144.4600	H	-10.87	43.57	32.70	43.50	-10.80	QP
236.6100	H	-9.23	44.71	35.48	46.00	-10.52	QP
330.6999	H	-4.08	41.51	37.43	46.00	-8.57	QP
481.0500	H	-1.15	36.47	35.32	46.00	-10.68	QP
960.2300	H	3.17	28.77	31.94	54.00	-22.06	QP
43.5800	V	-11.77	44.62	32.85	40.00	-7.15	QP
100.8100	V	-9.54	43.54	34.00	43.50	-9.50	QP
188.1100	V	-10.49	44.35	33.86	43.50	-9.64	QP
276.3800	V	-8.82	40.69	31.87	46.00	-14.13	QP
692.5100	V	-1.21	35.71	34.50	46.00	-11.50	QP
759.4400	V	1.78	27.74	29.52	46.00	-16.48	QP

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor

**6.6 Test Result and Data (1GHz ~ 25GHz)**

Power	: DC3.3V	Temperature	: 24 °C
Test Mode1	2402MHz	Humidity	: 54 %
Test date	: Aug. 10, 2017	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)	Detector mode (PK/AV)
2445.000	H	-2.82	49.42	46.60	74.00	-27.40	peak
4187.500	H	6.07	37.14	43.21	74.00	-30.79	peak
5420.000	H	8.95	36.75	45.70	74.00	-28.30	peak
5887.500	H	9.98	35.82	45.80	74.00	-28.20	peak
6397.500	H	10.42	36.83	47.25	74.00	-26.75	peak
6950.000	H	11.92	37.55	49.47	74.00	-24.53	peak
2615.000	V	-1.81	45.03	43.22	74.00	-30.78	peak
3847.500	V	4.59	37.40	41.99	74.00	-32.01	peak
5037.500	V	8.63	36.51	45.14	74.00	-28.86	peak
5632.500	V	9.35	36.45	45.80	74.00	-28.20	peak
6270.000	V	10.37	36.87	47.24	74.00	-26.76	peak
7247.500	V	13.05	34.86	47.91	74.00	-26.09	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC3.3V	Temperature	: 24 °C
Test Mode1	2441MHz	Humidity	: 54 %
Test date	: Aug. 10, 2017	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)	Detector mode (PK/AV)
2487.500	H	-2.63	53.58	50.95	74.00	-23.05	peak
3677.500	H	4.01	37.17	41.18	74.00	-32.82	peak
4357.500	H	6.93	36.42	43.35	74.00	-30.65	peak
5037.500	H	8.63	36.75	45.38	74.00	-28.62	peak
6312.500	H	10.38	36.95	47.33	74.00	-26.67	peak
7247.500	H	13.05	37.98	51.03	74.00	-22.97	peak
2445.000	V	-2.82	53.01	50.19	74.00	-23.81	peak
4272.500	V	6.50	37.16	43.66	74.00	-30.34	peak
4655.000	V	7.95	37.41	45.36	74.00	-28.64	peak
5335.000	V	8.88	36.66	45.54	74.00	-28.46	peak
6270.000	V	10.37	37.10	47.47	74.00	-26.53	peak
6907.500	V	11.78	35.91	47.69	74.00	-26.31	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



Power	: DC3.3V	Temperature	: 24 °C
Test Mode1	2480MHz	Humidity	: 54 %
Test date	: Aug. 10, 2017	Atmospheric Pressure	: 1010 hpa

Frequency (MHz)	AntPol. H/V	Correct Factor (dB)	Reading level (dBuV)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)	Detector mode (PK/AV)
2445.000	H	-2.82	47.56	44.74	74.00	-29.26	peak
4102.500	H	5.63	37.72	43.35	74.00	-30.65	peak
4655.000	H	7.95	36.04	43.99	74.00	-30.01	peak
5037.500	H	8.63	36.55	45.18	74.00	-28.82	peak
6227.500	H	10.35	36.95	47.30	74.00	-26.70	peak
7162.500	H	12.71	38.10	50.81	74.00	-23.19	peak
2445.000	V	-2.82	52.39	49.57	74.00	-24.43	peak
3677.500	V	4.01	38.19	42.20	74.00	-31.80	peak
4230.000	V	6.28	36.79	43.07	74.00	-30.93	peak
4825.000	V	8.27	36.13	44.40	74.00	-29.60	peak
5590.000	V	9.24	37.00	46.24	74.00	-27.76	peak
7162.500	V	12.71	34.94	47.65	74.00	-26.35	peak

Note: Level = Reading + Factor

Margin = Level – Limit

Factor= Antenna Factor + Cable Loss - Amplifier Factor



6.7 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz



6.8 Restrict Band Emission Measurement Data

Test Date : Aug. 10, 2017
Temperature : 24 °C
Humidity : 52 %
Atmospheric Pressure : 1023 hPa

Modulation Standard:GFSK

Channel 00				Fundamental Frequency: 2402 MHz			
Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Ant-Pol H/V
2390.000	-3.05	47.78	44.73	74.00	-29.27	peak	H
2390.000	-3.05	32.51	29.46	54.00	-24.54	AVG	H
2390.000	-3.05	47.03	43.98	74.00	-30.02	peak	V
2390.000	-3.05	32.15	29.10	54.00	-24.90	AVG	V
Channel 39				Fundamental Frequency: 2480 MHz			
2483.500	-2.65	55.82	53.17	74.00	-20.83	peak	H
2483.500	-2.65	38.31	35.66	54.00	-18.34	AVG	H
2483.500	-2.65	59.05	56.40	74.00	-17.60	peak	V
2483.500	-2.65	43.21	40.56	54.00	-13.44	AVG	V

Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector peak mode) for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector sample mode) for Average detection at frequency above 1GHz



7. Test of Spurious Emission (Conducted)

7.9 Test Limit

Below 30dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

7.10 Test Procedure

KDB 558074 D01v03r02 - Section 11.2 & Section 11.3

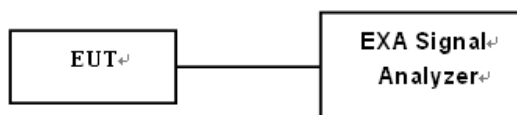
1. Reference level measurement

- (a) Set instrument center frequency to DTS channel center frequency
- (b) Set the span to ≥ 1.5 times the DTS bandwidth
- (c) Set the RBW = 100 kHz
- (d) Set the VBW $\geq 3 \times$ RBW
- (e) Detector = peak
- (f) Sweep time = auto couple
- (g) Trace mode = max hold
- (h) Allow trace to fully stabilize

2. Emission level measurement

- (a) Set the center frequency and span to encompass frequency range to be measured
- (b) RBW = 100kHz
- (c) VBW = 300kHz
- (d) Detector = Peak
- (e) Trace mode = max hold
- (f) Sweep time = auto couple
- (g) The trace was allowed to stabilize

7.11 Test Setup Layout

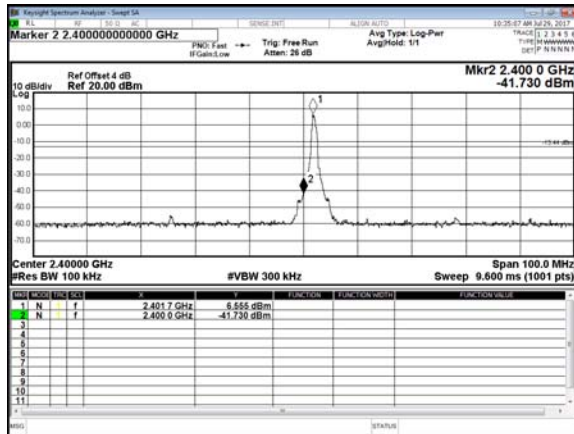


7.12 Test Result and Data

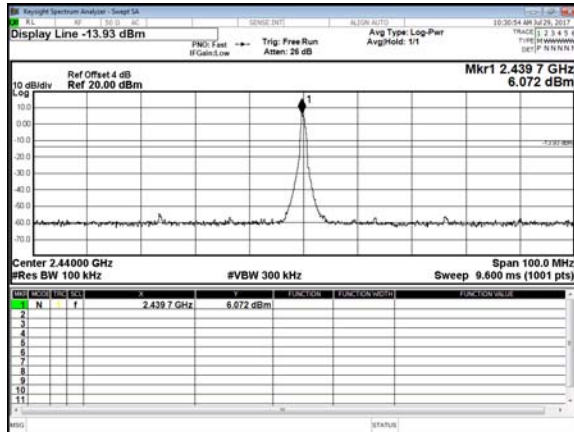
Modulation Standard	Channel	Frequency (MHz)	Test Result
GFSK	01	2402	PASS
	40	2480	PASS



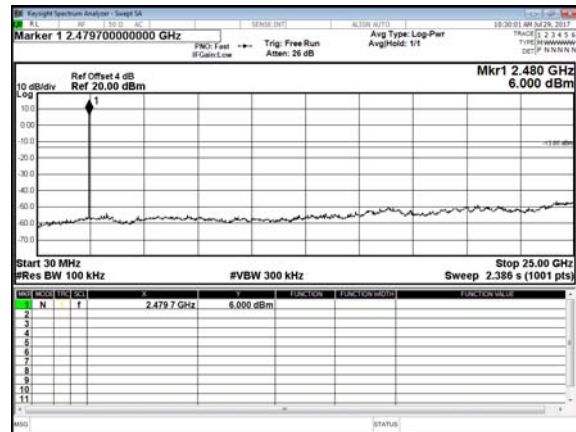
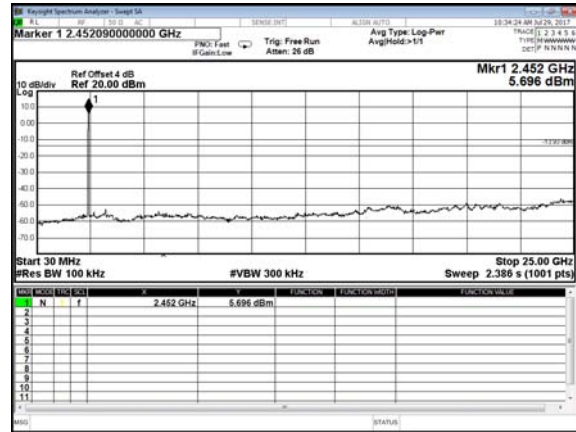
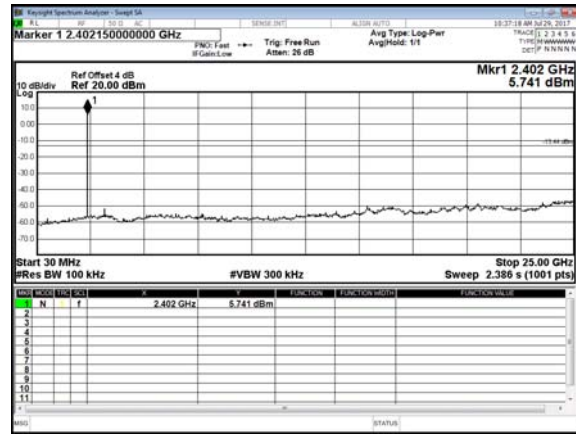
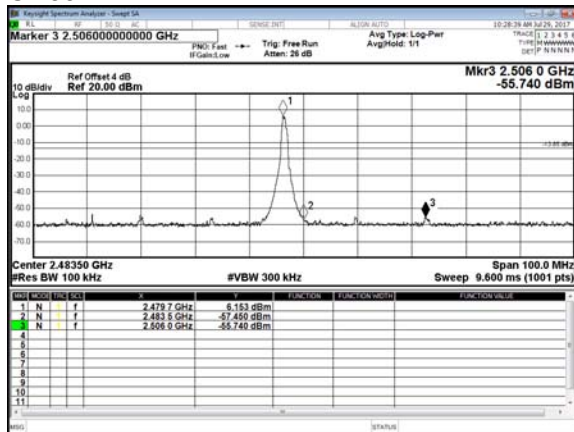
Modulation Type: GFSK
Channel 00



CH19



CH39





8. 6dB Bandwidth Measurement Data

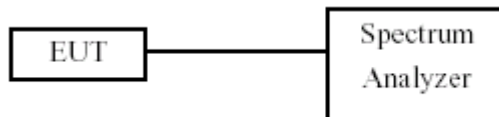
8.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

8.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 100 KHz and VBW to 300 KHz.
- Set spectrum analyzer X dB to 6 dB.
- Set spectrum analyzer peak detector with maximum hold.

8.3 Test Setup Layout





8.4 Test Result and Data

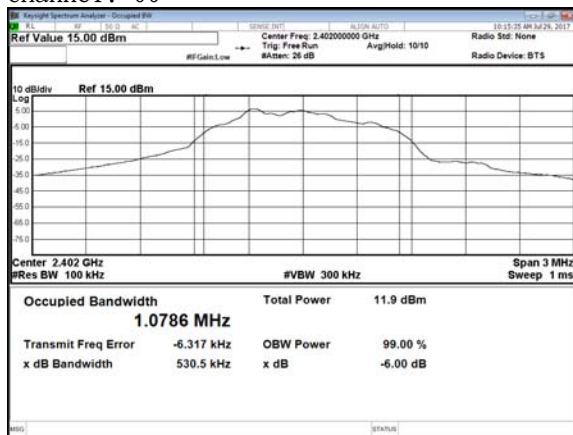
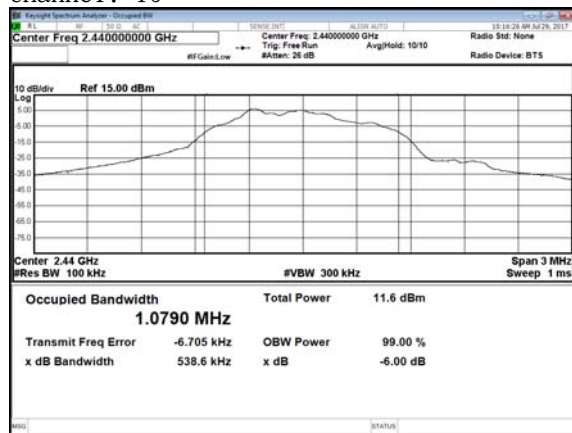
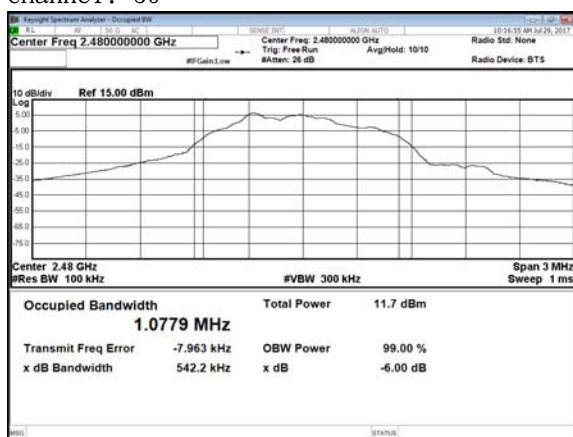
Test Date: Jul. 29, 2017

Temperature: 23 °C

Atmospheric pressure: 1087 hPa

Humidity: 54 %

Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (KHz)
GFSK	00	2402	531
	19	2441	539
	39	2480	542

Modulation Standard: GFSK (1Mbps)
Channel: 00Modulation Standard: GFSK (1Mbps)
Channel: 19Modulation Standard: GFSK (1Mbps)
Channel: 39



9. Maximum Peak and Average Output Power

9.1 Test Limit

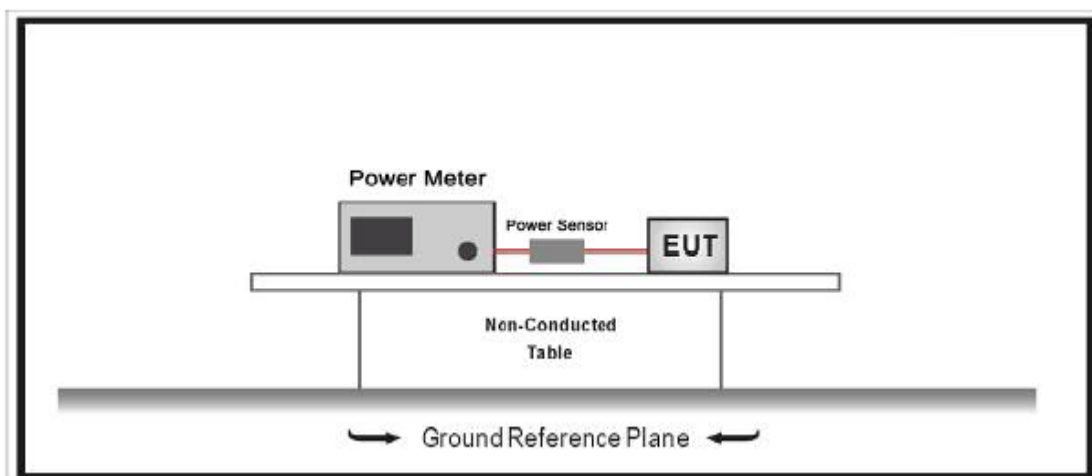
The Maximum Peak Output Power Measurement is 30dBm.

9.2 Test Procedure

Test procedure refers to KDB558074 D01v03r05, section 9.1.2 PKPM1 Peak power meter method.

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worst case test result.

9.3 Test Setup Layout



**9.4 Test Result and Data**

Test Date: Jul. 29, 2017

Temperature: 23°C

Atmospheric pressure: 1087 hPa

Humidity: 54%

Modulation Standard	Channel	Frequency (MHz)	Power Output (dBm)	Peak Power Output (mW)
GFSK	00	2402	7.84	6.081
	19	2440	7.41	5.508
	39	2480	7.59	5.741



10. Power Spectral Density

10.1 Test Limit

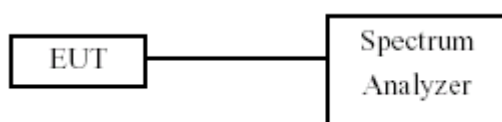
The Maximum of Power Spectral Density Measurement is 8dBm.

10.2 Test Procedure

Test procedure refers to section 10.3 Method AVGPSD-1.

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set VBW $\geq 3 \times \text{RBW}$.
- e) Detector = power averaging (RMS) or sample detector (when RMS not available).
- f) Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- g) Sweep time = auto couple.
- h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

10.3 Test Setup Layout





10.4 Test Result and Data

Test Date: Jul. 29, 2017

Temperature: 23°C

Atmospheric pressure: 1087 hPa

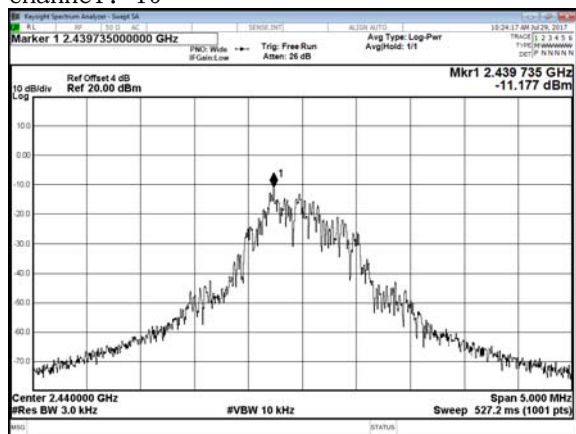
Humidity: 54%

Modulation Standard	Channel	Frequency (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)
GFSK	00	2402	-10.756
	19	2440	-11.177
	39	2480	-10.947

Modulation Standard: GFSK (1Mbps)
Channel: 00



Modulation Standard: GFSK (1Mbps)
Channel: 19



Modulation Standard: GFSK (1Mbps)
Channel: 39

