



FCC RADIO TEST REPORT

Applicant : Latchable, Inc.
Address : 508 West 26th Street, Suite 6G, New York,
NY 10001
Equipment : Water Leak Sensor
Model No. : WTR1LW1
Trade Name : Latchable, Inc.
FCC ID : 2AK5B-WTR1

I HEREBY CERTIFY THAT :

The sample was received on Aug. 17, 2020 and the testing was completed on Aug. 31, 2020 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 / Supervisor

Laboratory Accreditation:

CerpPASS Technology Corporation Test Laboratory





Contents

1. Summary of Test Procedure and Test Results.....	5
1.1 Applicable Standards	5
2. Test Configuration of Equipment under Test.....	6
2.1 Feature of Equipment under Test.....	6
2.2 Carrier Frequency of Channels.....	6
2.3 Test Mode and Test Software.....	7
2.4 Description of Test System.....	7
2.5 General Information of Test.....	8
2.6 Measurement Uncertainty	8
3. Test Equipment and Ancillaries Used for Tests	9
4. Antenna Requirements.....	10
4.1 Standard Applicable	10
4.2 Antenna Construction and Directional Gain.....	10
5. Test of AC Power Line Conducted Emission	11
5.1 Test Limit	11
5.2 Test Procedures	11
5.3 Typical Test Setup	12
5.4 Test Result and Data.....	13
6. Test of Spurious Emission (Radiated)	14
6.1 Test Limit	14
6.2 Test Procedures	14
6.3 Typical Test Setup	15
6.4 Test Result and Data (9kHz ~ 30MHz).....	16
6.5 Test Result and Data (30MHz ~ 1GHz).....	16
6.6 Test Result and Data (1GHz ~ 25GHz).....	18
6.7 Restricted Bands of Operation	24
6.8 Test Photographs (30MHz ~ 1GHz)	25
6.9 Test Photographs (1GHz ~ 25GHz)	26
7. Test of Spurious Emission (Conducted).....	28
7.1 Test Limit	28
7.2 Test Procedure	28
7.3 Test Setup Layout	28
7.4 Test Result and Data.....	28
8. On Time, Duty Cycle and Measurement methods	31
8.1 Test Limit	31
8.2 Test Procedure	31
8.3 Test Setup Layout	31
8.4 Test Result and Data.....	31
9. 6dB Bandwidth Measurement Data	33
9.1 Test Limit	33
9.2 Test Procedures	33



9.3	Test Setup Layout	33
9.4	Test Result and Data	33
10.	Maximum Peak and Average Output Power	35
10.1	Test Limit	35
10.2	Test Procedures	35
10.3	Test Setup Layout	35
10.4	Test Result and Data	35
11.	Power Spectral Density	36
11.1	Test Limit	36
11.2	Test Procedures	36
11.3	Test Setup Layout	36
11.4	Test Result and Data	36
12.	Radio Frequency Exposure	38
12.1	Applicable Standards	38
12.2	EUT Specification	38
12.3	Test Results	39
12.4	Calculation	39
12.5	Maximum Permissible Exposure	40



History of this test report

Report No.	Issue Date	Description
TEFA2008111	Sep. 04, 2020	Original



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.10:2013

FCC Rules and Regulations Part 15 Subpart C §15.247

FCC Rule	Description of Test	Result
15.203	Antenna Requirement	PASS
15.207	AC Power Line Conducted Emission	Not required
15.209 15.205	Radiated Spurious Emission	PASS
15.247(d)	Conducted Spurious Emission	PASS
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)	Maximum Peak Output Power	PASS
15.247(e)	Power Spectral Density	PASS

*The lab has reduced the uncertainty risk factor from test equipment, environment and staff technicians which according to the standard on contract. Therefore, the test result will only be determined by standard requirement.

*This EUT has been also tested and compiled with the requirement of FCC Part 15, Subpart B, recorded in a separate test report(TEFD2008111).



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Frequency Range	2405MHz~2480MHz
Modulation Type	O-QPSK
Modulation Technology	DTS
Data Rate	O-QPSK: 250kbps
Antenna Type	PCB Antenna
Antenna Gain	0.63dBi
Firmware Number	Node Test Application v1.0
Serial Number	1703CFM000057
Water Cable	Brand: Ricolink Model: 26A1800065

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

2.2 Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
*11	2405	17	2435	23	2465
12	2410	18	2440	24	2470
13	2415	*19	2445	25	2475
14	2420	20	2450	*26	2480
15	2425	21	2455	--	--
16	2430	22	2460	--	--

Note: Channels remarked * are selected to perform test.



2.3 Test Mode and Test Software

- a. During testing, the interface cables and equipment positions were varied according to ANSI C63.10.
- b. The complete test system included Notebook and EUT for RF test.
- c. An executive "command" under Windows OS system was executed to transmit and receive data via Zigbee.
- d. The following test modes were performed for the test:

Test Mode	Operating Description
1	O-QPSK(250kbps)

2.4 Description of Test System

N/A



2.5 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	
	FCC	TW1439, TW1079
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication test C-4663 for Conducted emission test R-4218 for Radiated emission test G-10812, G-10813 for radiated disturbance above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 25,000MHz	
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.	

Test Item	Test Site	Finish Date	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2020/08/31	27°C / 42%	Nick Guan
Radiated Emissions	3M02-NK	2020/08/28	25°C / 42%	Leon Huang

2.6 Measurement Uncertainty

Measurement Item	Uncertainty
AC Power Line Conduction(150K~30MHz)	±1.60dB
Radiated Spurious Emission(9KHz~30MHz)	±3.404dB
Radiated Spurious Emission(30MHz~1GHz)	±5.686dB
Radiated Spurious Emission(1GHz~25GHz)	±6.597dB
Conducted Spurious Emission	±2.022dB
6dB Bandwidth	±4.482%
20dB Bandwidth	±4.40%
Occupied Bandwidth	±4.40%
Peak Output Power(Conducted Power Meter)	±1.02dB
Dwell Time	±3.49%
Power Spectral Density	±1.963dB
Duty Cycle	±3.47%



3. Test Equipment and Ancillaries Used for Tests

Test Item	Radiated Emissions				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	275	2019/09/24	2020/09/23
Active Loop Antenna	EMCO	6507	40855	2020/05/21	2021/05/20
Horn Antenna	EMCO	3115	31589	2020/03/26	2021/03/25
Horn Antenna	EMCO	3116	31974	2019/09/17	2020/09/16
EMI Receiver	ROHDE & SCHWARZ	ESCI	100821	2019/09/16	2020/09/15
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	102151	2020/08/03	2021/08/02
Preamplifier	EM Electronics corp.	EM330	60660	2020/03/16	2021/03/15
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2019/09/20	2020/09/19
Preamplifier	Agilent	8449B	3008A01954	2020/03/16	2021/03/15
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2019/11/07	2020/11/06
Bluetooth Tester	ROHDE & SCHWARZ	CBT	101133	2020/04/07	2021/04/06
Cable-3in1(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1316	2019/09/20	2020/09/19
Cable-0.5m(1G-18G)	HUBER SUHNER	SUCOFLEX 100	805443/4	2020/05/27	2021/05/26
Cable-3m(1G-18G)	HUBER SUHNER	SUCOFLEX 100	805796/4	2020/05/27	2021/05/26
Cable-8m(1G-18G)	HUBER SUHNER	SUCOFLEX 100	805795/4	2020/05/27	2021/05/26
Cable-0.5m(30M-40G)	HUBER SUHNER	SUCOFLEX 102	28420/2	2020/04/01	2021/03/31
Cable-3m(30M-40G)	HUBER SUHNER	SUCOFLEX 102	MY2608/2	2020/04/01	2021/03/31
Cable-0.5m(1G-40G)	Rapidtek	40GHZ 50CM	38MS-38MS 50314	2020/04/09	2021/04/08
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA

Test Item	RF Conducted				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	101329	2020/07/07	2021/07/06
Bluetooth Tester	ROHDE & SCHWARZ	CBT	101133	2020/04/07	2021/04/06
CAX Signal Analyzer	KEYSIGHT	N9000B	MY57100339	2019/11/25	2020/11/24
Attenuator	KEYSIGHT	8491B	MY39250703	2020/04/17	2021/04/16
TEMP & HUMI CHAMBER	T-MACHINE	TMJ-9712	T-12-040111	2020/08/25	2021/08/24
Power Meter	Anritsu	ML2495A	1224005	2020/04/17	2021/04/16
Power Sensor	Anritsu	MA2411B	1207295	2020/04/17	2021/04/16



4. Antenna Requirements

4.1 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.

4.2 Antenna Construction and Directional Gain

Antenna Type	PCB Antenna
Antenna Gain	0.63 dBi



5. Test of AC Power Line Conducted Emission

The power supply is DC source, so this item doesn't require testing.

5.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz, according to the methods defined in ANSI C63.4-2014. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. 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

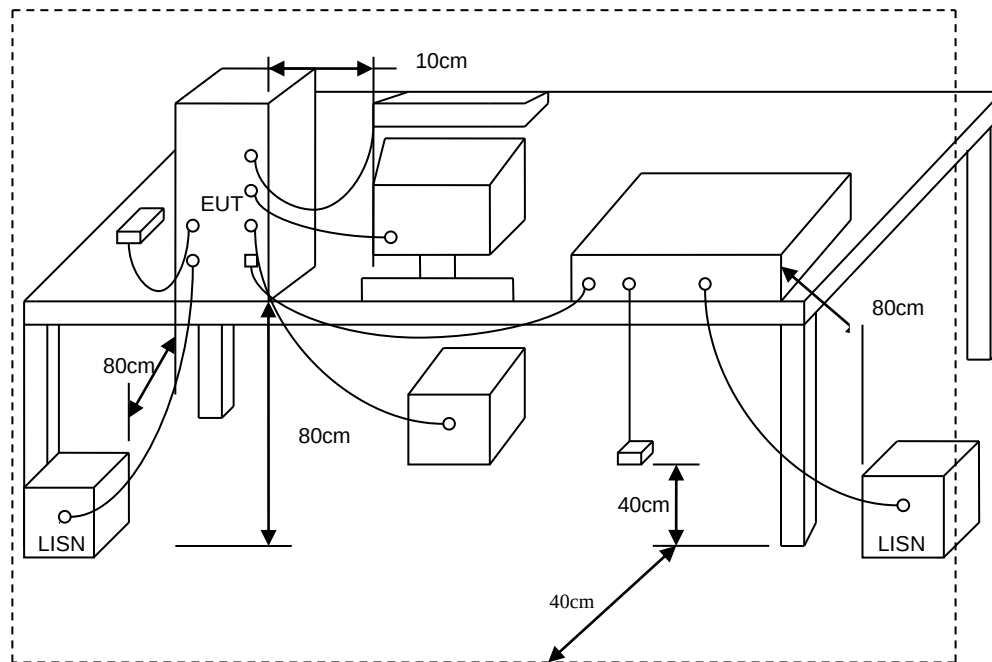
*Decreases with the logarithm of the frequency.

5.2 Test Procedures

- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.



5.3 Typical Test Setup





5.4 Test Result and Data

The power supply is DC source, so this item doesn't require testing.



6. Test of Spurious Emission (Radiated)

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

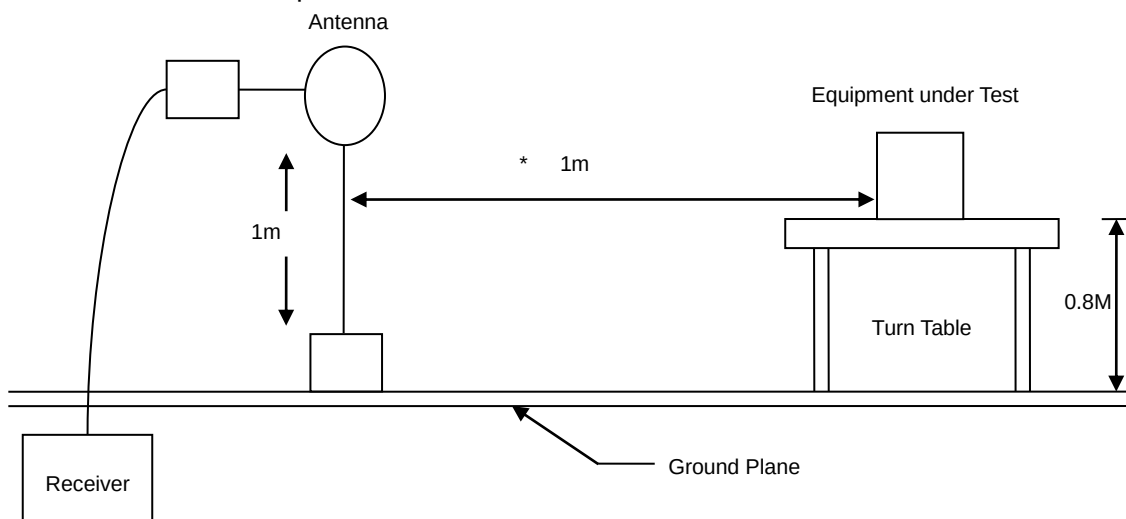
6.2 Test Procedures

- 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.

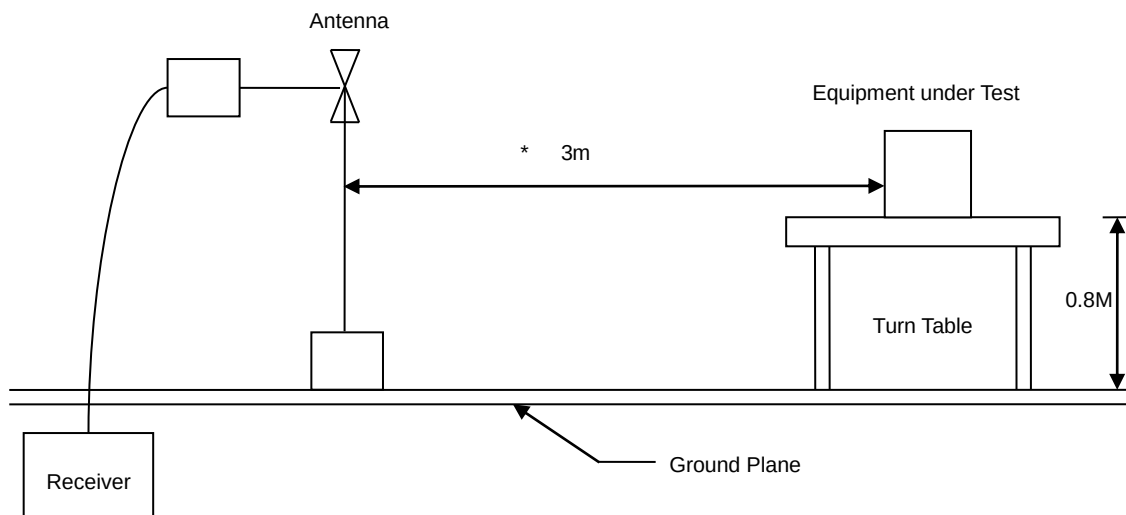


6.3 Typical Test Setup

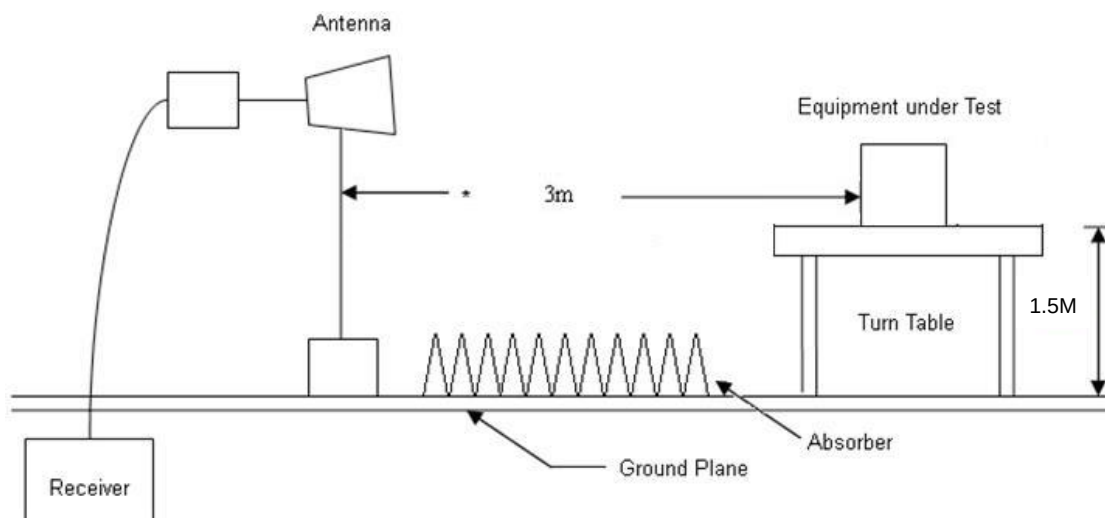
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup



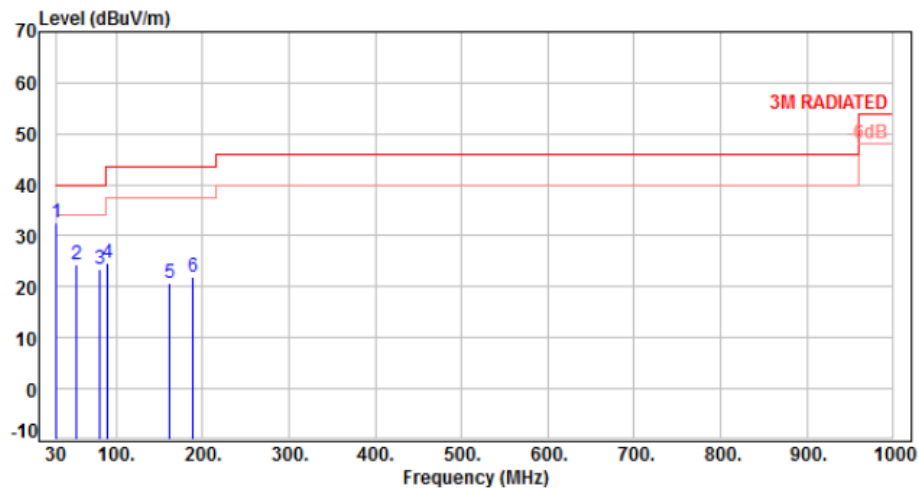


6.4 Test Result and Data (9kHz ~ 30MHz)

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

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

Power	:	DC 3V from Battery	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBUV)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	30.00	-10.42	43.04	32.62	40.00	-7.38	Peak	400	0	P
2	53.28	-9.49	33.80	24.31	40.00	-15.69	Peak	400	0	P
3	81.41	-14.53	37.85	23.32	40.00	-16.68	Peak	400	0	P
4	90.14	-15.58	40.12	24.54	43.50	-18.96	Peak	400	0	P
5	161.92	-9.50	30.21	20.71	43.50	-22.79	Peak	400	0	P
6	189.08	-11.66	33.59	21.93	43.50	-21.57	Peak	400	0	P

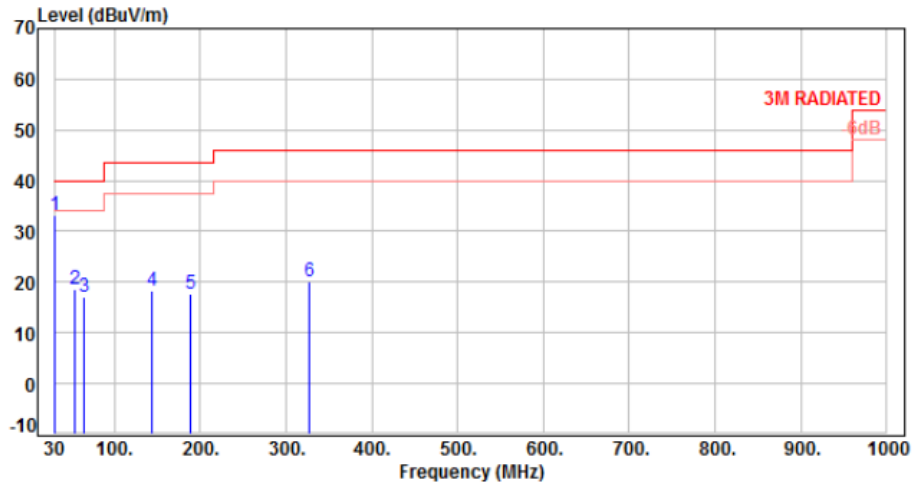
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3V from Battery	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	30.00	-10.42	43.62	33.20	40.00	-6.80	Peak	100	0	P
2	53.28	-9.49	28.11	18.62	40.00	-21.38	Peak	100	0	P
3	64.92	-10.84	27.96	17.12	40.00	-22.88	Peak	100	0	P
4	143.49	-9.49	27.92	18.43	43.50	-25.07	Peak	100	0	P
5	189.08	-11.66	29.47	17.81	43.50	-25.69	Peak	100	0	P
6	327.79	-7.67	27.79	20.12	46.00	-25.88	Peak	100	0	P

Note: Level=Reading+Factor

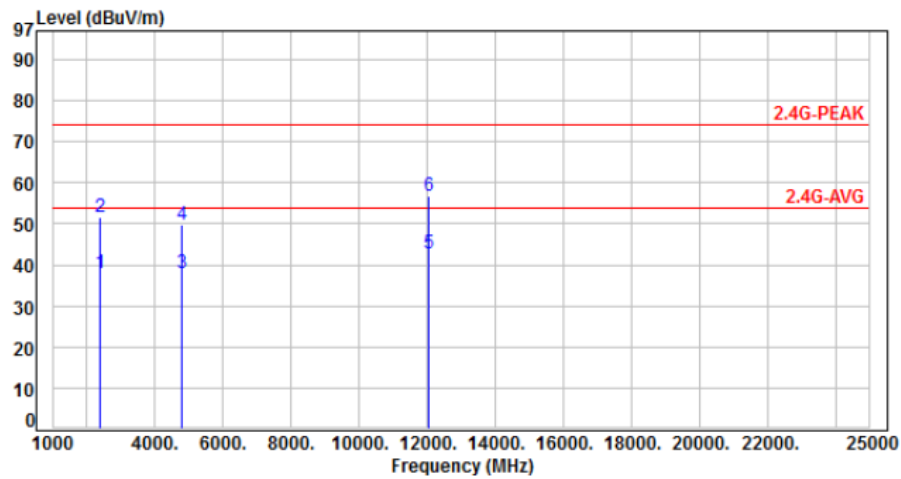
Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



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

Power	:	DC 3V from Battery	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH11		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	40.72	37.83	54.00	-16.17	Average	100	15	P
2	2390.00	-2.89	54.40	51.51	74.00	-22.49	Peak	100	15	P
3	4810.00	4.81	33.35	38.16	54.00	-15.84	Average	100	45	P
4	4810.00	4.81	45.00	49.81	74.00	-24.19	Peak	100	45	P
5	12025.00	14.83	27.92	42.75	54.00	-11.25	Average	100	15	P
6	12025.00	14.83	42.14	56.97	74.00	-17.03	Peak	100	15	P

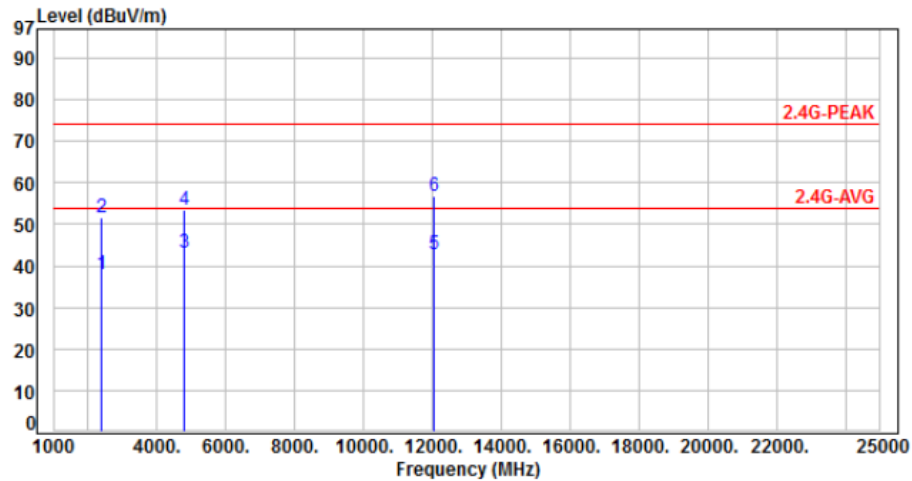
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3V from Battery	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH11		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	41.01	38.12	54.00	-15.88	Average	100	210	P
2	2390.00	-2.89	54.66	51.77	74.00	-22.23	Peak	100	210	P
3	4810.00	4.81	38.23	43.04	54.00	-10.96	Average	120	250	P
4	4810.00	4.81	48.55	53.36	74.00	-20.64	Peak	120	250	P
5	12025.00	14.83	27.93	42.76	54.00	-11.24	Average	100	33	P
6	12025.00	14.83	42.08	56.91	74.00	-17.09	Peak	100	33	P

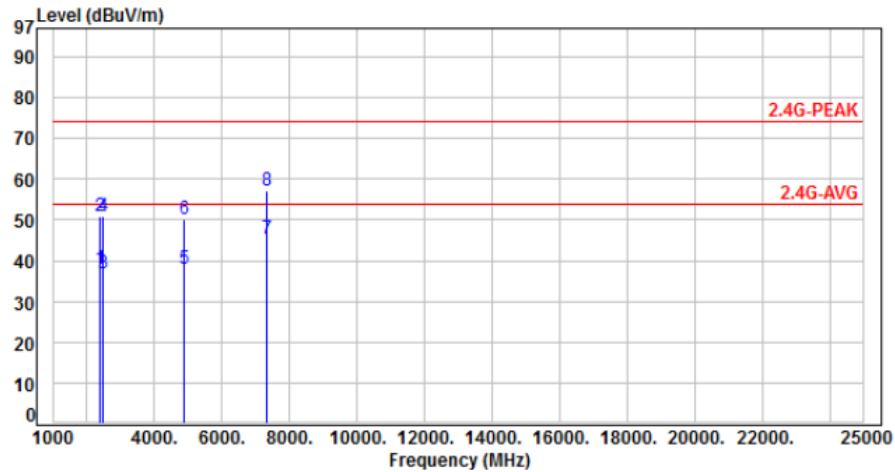
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3V from Battery	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH19		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	41.02	38.13	54.00	-15.87	Average	100	78	P
2	2390.00	-2.89	53.81	50.92	74.00	-23.08	Peak	100	78	P
3	2483.50	-2.69	39.62	36.93	54.00	-17.07	Average	100	78	P
4	2483.50	-2.69	53.69	51.00	74.00	-23.00	Peak	100	78	P
5	4890.00	5.13	32.90	38.03	54.00	-15.97	Average	110	325	P
6	4890.00	5.13	45.00	50.13	74.00	-23.87	Peak	110	325	P
7	7335.00	10.08	35.18	45.26	54.00	-8.74	Average	100	350	P
8	7335.00	10.08	47.17	57.25	74.00	-16.75	Peak	100	350	P

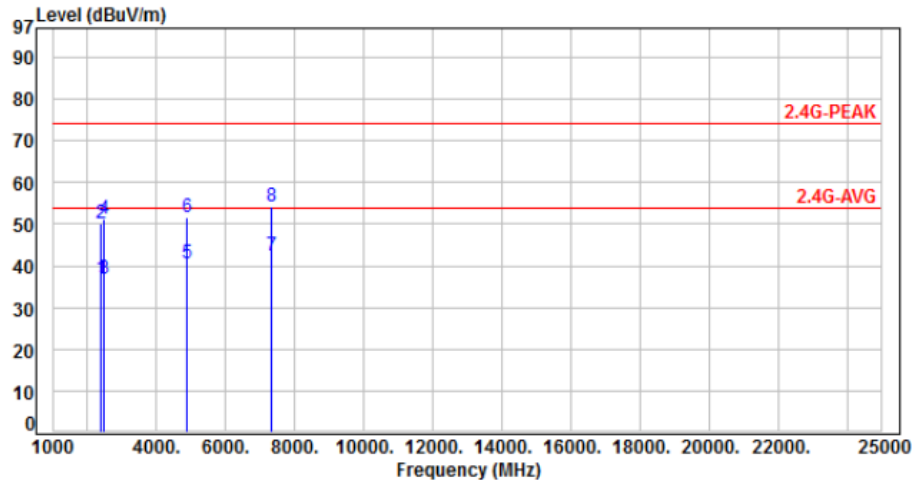
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3V from Battery	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH19		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	39.73	36.84	54.00	-17.16	Average	100	115	P
2	2390.00	-2.89	53.16	50.27	74.00	-23.73	Peak	100	115	P
3	2483.50	-2.69	39.68	36.99	54.00	-17.01	Average	100	115	P
4	2483.50	-2.69	54.07	51.38	74.00	-22.62	Peak	100	115	P
5	4890.00	5.13	35.31	40.44	54.00	-13.56	Average	130	245	P
6	4890.00	5.13	46.61	51.74	74.00	-22.26	Peak	130	245	P
7	7335.00	10.08	32.27	42.35	54.00	-11.65	Average	100	30	P
8	7335.00	10.08	44.13	54.21	74.00	-19.79	Peak	100	30	P

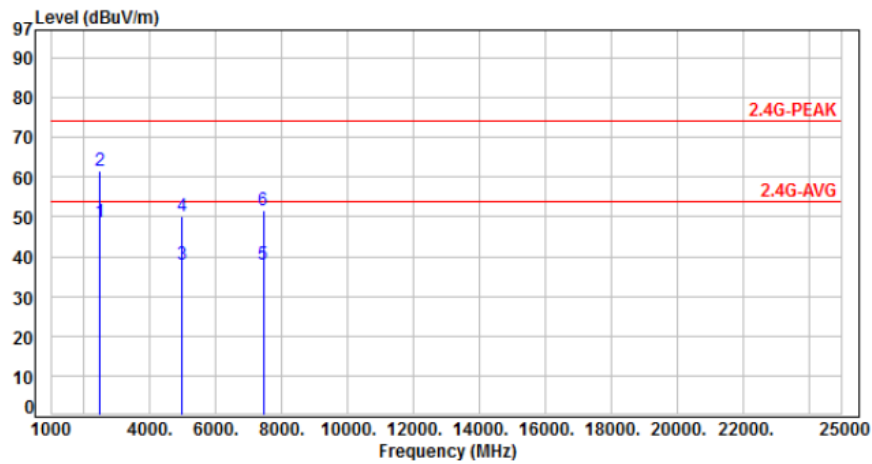
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	:	DC 3V from Battery	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH26		:	

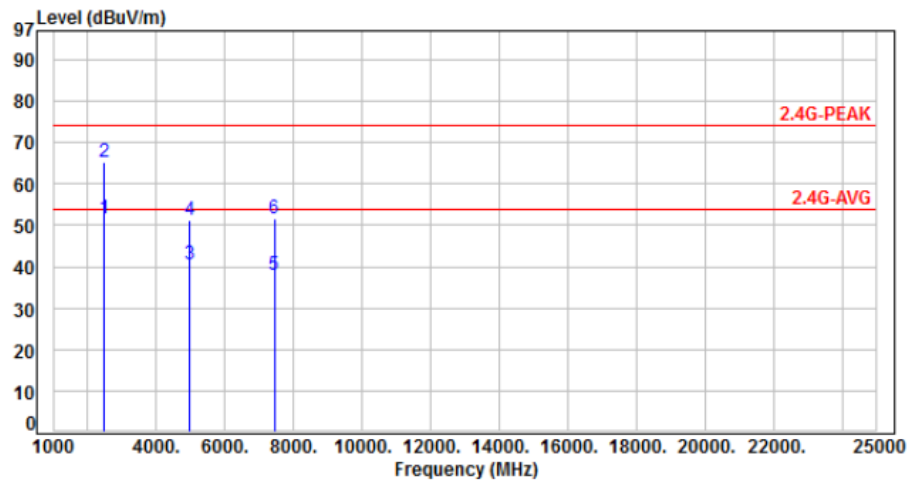


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-2.69	51.36	48.67	54.00	-5.33	Average	135	180	P
2	2483.50	-2.69	64.43	61.74	74.00	-12.26	Peak	135	180	P
3	4960.00	5.46	32.68	38.14	54.00	-15.86	Average	305	165	P
4	4960.00	5.46	44.54	50.00	74.00	-24.00	Peak	305	165	P
5	7440.00	10.16	27.95	38.11	54.00	-15.89	Average	100	49	P
6	7440.00	10.16	41.51	51.67	74.00	-22.33	Peak	100	49	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor



Power	:	DC 3V from Battery	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1, CH26		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-2.69	54.24	51.55	54.00	-2.45	Average	125	200	P
2	2483.50	-2.69	67.89	65.20	74.00	-8.80	Peak	125	200	P
3	4960.00	5.46	35.12	40.58	54.00	-13.42	Average	120	250	P
4	4960.00	5.46	45.90	51.36	74.00	-22.64	Peak	120	250	P
5	7440.00	10.16	27.72	37.88	54.00	-16.12	Average	100	218	P
6	7440.00	10.16	41.65	51.81	74.00	-22.19	Peak	100	218	P

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



7. Test of Spurious Emission (Conducted)

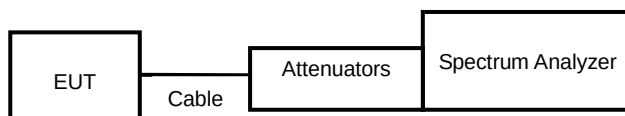
7.1 Test Limit

Below -20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

7.2 Test Procedure

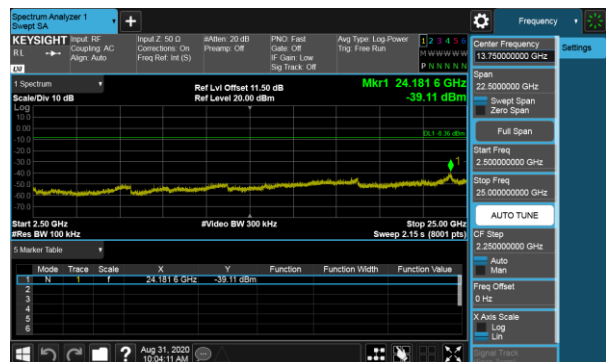
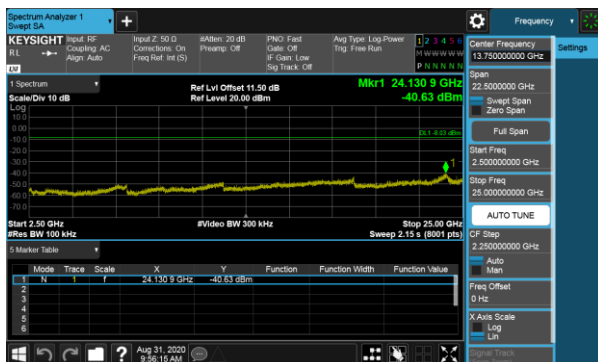
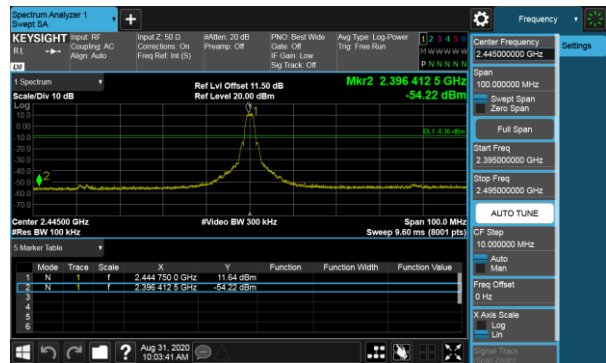
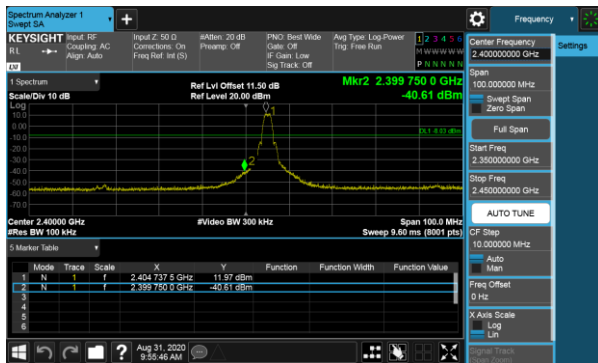
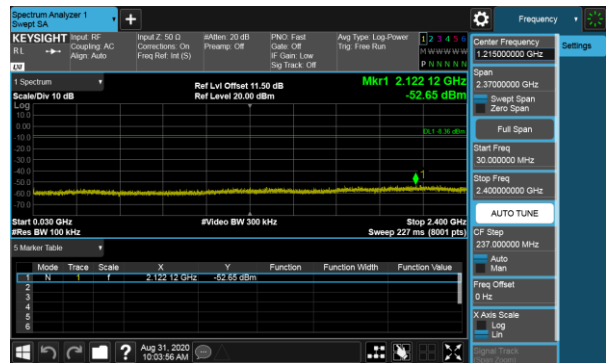
- The transmitter output was connected to the spectrum analyzer via a low loss cable.
- Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
- Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
- The band edges was measured and recorded.

7.3 Test Setup Layout



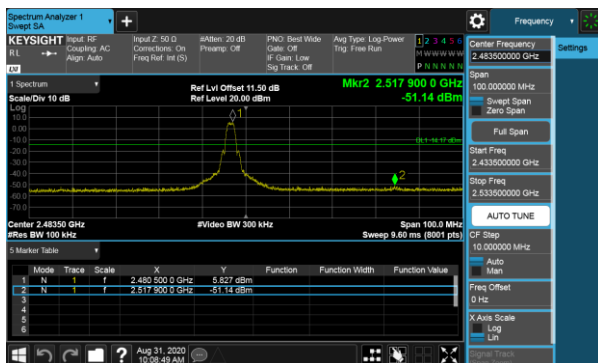
7.4 Test Result and Data

Note: Test plots refer to the following pages.

Modulation Type: O-QPSK
CH11Modulation Type: O-QPSK
CH19



Modulation Type: O-QPSK
CH26





8. On Time, Duty Cycle and Measurement methods

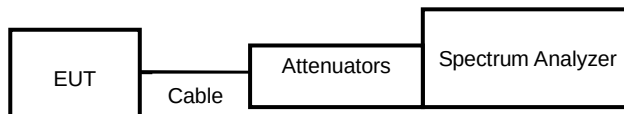
8.1 Test Limit

None; for reporting purposes only.

8.2 Test Procedure

Zero-Span Spectrum Analyzer Method.

8.3 Test Setup Layout

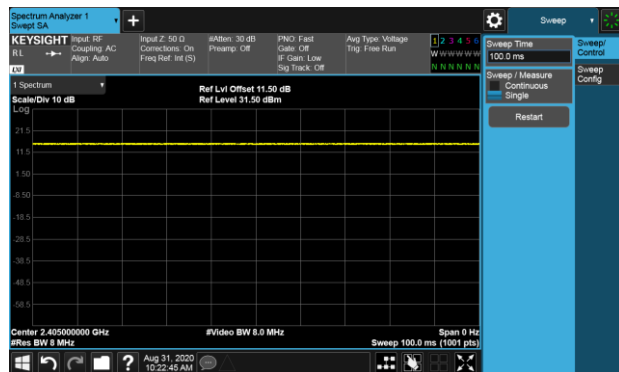


8.4 Test Result and Data

Modulation Type	On Time (ms)	Period Time (ms)	Duty Cycle (%)
O-QPSK	100.00	100.00	100.00%



Modulation Type: O-QPSK





9. 6dB Bandwidth Measurement Data

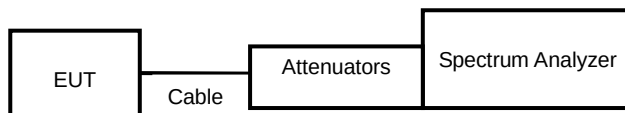
9.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

9.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 100 KHz and VBW to 300 KHz.
- The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.
- The 6dB Bandwidth was measured and recorded.

9.3 Test Setup Layout

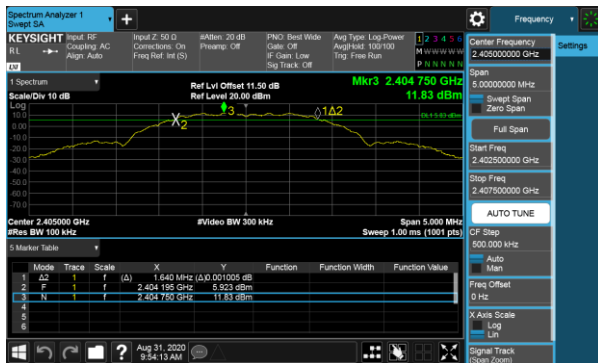


9.4 Test Result and Data

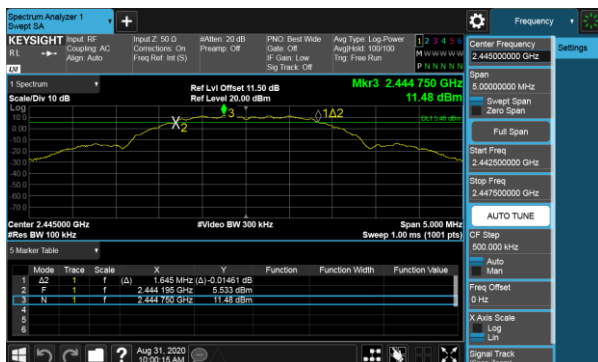
Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	Limit KHz)
O-QPSK	11	2405	1640.00	500
	19	2445	1645.00	500
	26	2480	1640.00	500



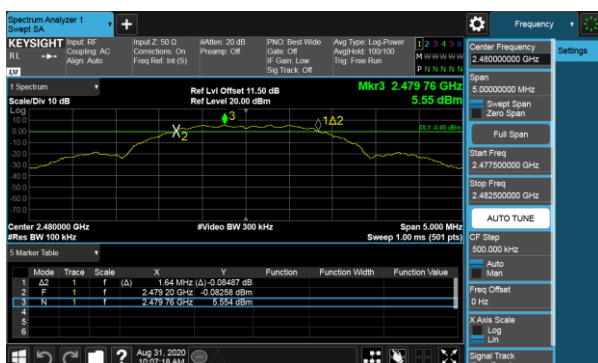
Modulation Type: O-QPSK
CH11



Modulation Type: O-QPSK
CH19



Modulation Type: O-QPSK
CH26





10. Maximum Peak and Average Output Power

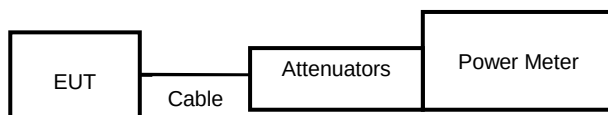
10.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

10.2 Test Procedures

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 worse case test result.

10.3 Test Setup Layout



10.4 Test Result and Data

Power Set	Modulation Type	Channel	Frequency (MHz)	Power Output (dBm)		Power Output (mW)	
				Peak	Average	Peak	Average
e	O-QPSK	11	2405	15.30	15.27	33.884	33.651
e		19	2445	14.87	14.84	30.690	30.479
9		26	2480	9.24	9.31	8.395	8.531

*Average Power is for reference only



11. Power Spectral Density

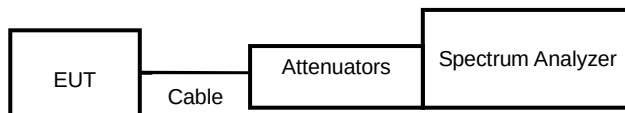
11.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm.

11.2 Test Procedures

- The transmitter output was connected to spectrum analyzer.
- The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 10KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
- The power spectral density was measured and recorded.

11.3 Test Setup Layout



11.4 Test Result and Data

Modulation Type	Channel	Frequency (MHz)	Maximum Power Density of 3KHz Bandwidth(dBm)	Limit
O-QPSK(250kbps)	11	2405	0.28	8.00
	19	2445	-0.72	8.00
	26	2480	-5.91	8.00



Modulation Type: O-QPSK
CH11



Modulation Type: O-QPSK
CH19



Modulation Type: O-QPSK
CH26

