Shenzhen Huatongwei International Inspection Co., Ltd.
1/F,Bldg 3,Hongfa Hi-tech Industrial Park,Genyu Road,Tianliao,Gongming,Shenzhen,China
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TEST REPORT

Report Reference No. ..... :	**TRE1510013001**	**R/C……..: 92424**
FCC ID ..... :	**YAMPT580HPF4**	
Applicant's name ..... :	**Hytera Communications Co.,Ltd.**	
Address.....:	HYT Tower, Hi-Tech Industrial Park North, Nanshan District, Shenzhen China	
Manufacturer.....:	**Hytera Communications Co.,Ltd.**	
Address.....:	HYT Tower, Hi-Tech Industrial Park North, Nanshan District, Shenzhen China	
Test item description ..... :	**TETRA TERMINAL**	
Trade Mark .....:	Hytera	
Model/Type reference.....:	PT580H Plus F4	
Listed Model(s) .....:	-	
Standard ..... :	**FCC Part 90/FCC Part 2/ FCC Part 15B**	
Date of receipt of test sample……..:	Oct 26, 2015	
Date of testing……:	Oct 27, 2015- Nov 10, 2015	
Date of issue……...:	Nov 10, 2015	
Result..... ……..:	**PASS**	

Compiled by (position+printed name+signature)..:	File administrators Shayne Zhu	Shayne Zhu
Supervised by (position+printed name+signature)..:	Project Engineer Cary Luo	Cary Luo
Approved by (position+printed name+signature)..:	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address.....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS AND TEST DESCRIPTION

1.1. Test Standards

The tests were performed according to following standards:
FCC Rules Part 90: 2014 Private land mobile radio services.
TIA/EIA 603 D: June 2010 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
FCC Part 15 Subpart B: 2014 Unintentional Radiators
FCC Part 2: 2014 Frequency allocations and radio treaty matters, general rules and regulations.
KDB579009 D01 v03r01: Questions and Answers on Re-farming Part 90 frequencies
KDB 579009 D02 v01r02: Transition Summary Table

1.2. Test Description

Transmitter Requirement			
Test item	Standards requirement	Result	
		Pass	N/A
Maximum Transmitter Power	FCC Part 90.205	☒	
Occupied Bandwidth	FCC Part 90.209	☒	
Emission Mask	FCC Part 90.210	☒	
Frequency Stability	FCC Part 90.213	☒	
Adjacent Channel Power Limits	FCC Part 90.221	☒	
Transmitter Radiated Spurious Emission	FCC Part 90.210	☒	
Spurious Emission On Antenna Port	FCC Part 90.210	☒	
Receiver Requirement			
Test item	Standards requirement	Result	
		Pass	N/A
Conducted Emission	FCC Part 15.207	☒	
Radiated Spurious Emission	FCC Part 15.109	☒	

2. SUMMARY

2.1. Client Information

Applicant:	Hytera Communications Co.,Ltd.
Address:	HYT Tower, Hi-Tech Industrial Park North, Nanshan District, Shenzhen China
Manufacturer:	Hytera Communications Co.,Ltd.
Address:	HYT Tower, Hi-Tech Industrial Park North, Nanshan District, Shenzhen China

2.2. Product Description

Name of EUT	TETRA TERMINAL
Trade Mark:	Hytera
Model/Type reference:	PT580H Plus F4
List Model :	-
Power supply:	DC 7.4V
Battery information:	Model:BL1806 DC7.4V,1800mAh/13.3Wh Model:BL2505 DC7.4V,2500mAh/18.5Wh
Charger information:	Model:CH10A07 Input: DC12V,1000mA Output:DC8.4V, 1000mA Model:CH10A05 Input:DC12V,2.0A Output:DC8.4V,1000mA
Adapter information:	Model:HKA01212010-3F Input:100-240Va.c.,50/60Hz,0.5A Output:12Vd.c.,1.0A
RF Specification	
Operation Frequency Range:	405MHz ~ 475MHz
Rated Output Power:	3 Watts (34.77dBm)
Modulation Type:	π/4 DQPSK
Channel Separation:	25kHz
Antenna Type	External
Maximum Transmitter Power :	2.75W for TMO 2.75W for DMO

2.3. Test frequency list

Mode	Modulation	Operation Frequency Range	Test Frequency (MHz)	
TMO	π/4 DQPSK	450MHz~470MHz	CH_L	450.025
			CH_M	460.000
			CH_H	469.975
DMO	π/4 DQPSK	450MHz~470MHz	CH_L	450.025
			CH_M	460.000
			CH_H	469.975

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above listed frequency for testing.

2.4. EUT operation mode

Test mode	Transmitting	Receiving	TMO	DMO	GPS	AC Adapter
TX1	√		√			
TX2	√			√		
RX1		√			√	√

√: is operation mode.

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	Unshielded
		Detachable :	Undetachable
○	Multimeter	Manufacturer :	/
		Model No. :	/

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China
Phone: 86-755-26748019 Fax: 86-755-26748089

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225
Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

A2LA-Lab Cert. No. 3902.01
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016.

FCC-Registration No.: 317478
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

IC-Registration No.: 5377A&5377B
The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.
Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.

ACA
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI
The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 29, 2015.
Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2013. Valid time is until Dec. 23, 2016.
Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.
Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV
Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

3.3. Environmental conditions

Normal Conditon	
Relative humidity:	20 % to 75 %.
Air Pressure:	950~1050mba
Voltage:	DC 7.4V

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.65 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)
Emission Mask	---------	(1)
Modulation Characteristic	---------	(1)
Transmitter Frequency Behavior	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.5. Equipments Used during the Test

Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2015/11/2
EMI Test Receiver	Rohde&Schwarz	ESCS 30	100038	2015/11/2
Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2015/11/2
EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2015/11/2
Artificial Mains	Rohde&Schwarz	ESH3-Z6	100210	2015/11/2
Artificial Mains	Rohde&Schwarz	ESH3-Z6	100211	2015/11/2

Adjacent Channel Power				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
TETRA Signal Analyzer	IFR	2310	231001/168	2015/11/2

Frequency Stability				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2015/11/2
Signal Generator	Rohde&Schwarz	SMT03	100059	2015/11/2
Climate Chamber	ESPEC	EL-10KA	05107008	2015/11/2

Transmitter Radiated Spurious Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
Ultra-Broadband Antenna	Rohde&Schwarz	HL562	100015	2015/11/2
EMI Test Receiver	Rohde&Schwarz	ESI 26	100009	2015/11/2
RF Test Panel	Rohde&Schwarz	TS / RSP	335015/ 0017	N/A
HORN ANTENNA	Rohde&Schwarz	HF906	100039	2015/12/2
Turntable	ETS	2088	2149	N/A
Antenna Mast	ETS	2075	2346	N/A
EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2015/11/2
Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2015/11/2
Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2015/11/2
HORN ANTENNA	ShwarzBeck	9120D	1012	2015/11/2
HORN ANTENNA	ShwarzBeck	9120D	1011	2015/11/2
TURNTABLE	MATURO	TT2.0	----	N/A
ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A

Maximum Transmitter Power & Spurious Emission On Antenna Port & Occupied Bandwidth & Emission Mask				
Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
Receiver	Rohde&Schwarz	ESI 26	100009	2015/11/2
Attenuator	R&S	ESH3-22	100449	2015/11/2
RF COMMUNICATION TEST SET	HP	8920A	3813A10206	2015/11/2
High-Pass Filter	Anritsu	MP526B	6220875256	2015/11/2
High-Pass Filter	Anritsu	MP526D	6220878392	2015/11/2
Spectrum Analzyer	Aglient	E4407B	MY44210775	2015/11/2
Spectrum Analzyer	Rohde&Schwarz	FSP40	1164.4391.40	2015/11/2
SPECTRUM ANALYZER	Agilent	E4407B	MY44210775	2015/11/2
Digital Radio Tester	IFR	3920	299001967	2015/11/2
TETRA Signal Analyzer	IFR	2310	231001/168	2015/11/2

The calibration interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. Maximum Transmitter Power

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation.

LIMIT

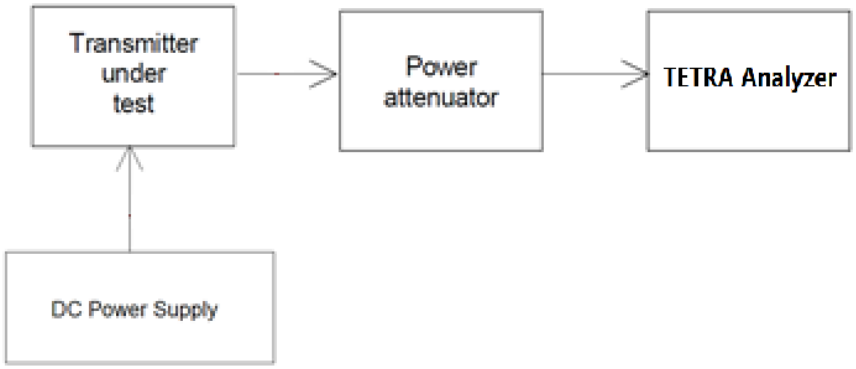
FCC Part 2.1046 and Part 90.205

Maximum ERP is dependent upon the station's antenna HAAT and required service area. The output power shall be within ±1 dB of the manufacturer's rated power listed in the equipment specifications.

TEST PROCEDURE

Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted bellow:
If the power output is adjustable, measurements shall be made for the highest and lowest power levels.
Connect the equipment as illustrated.

TEST CONFIGURATION



TEST MODE:

Please reference to the section 2.4

TEST RESULTS

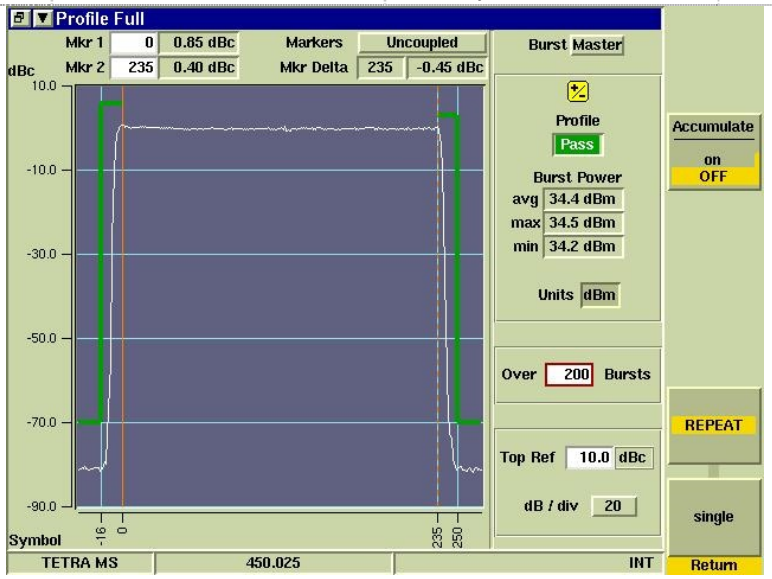
☒ **Passed** ☐ **Not Applicable**

Please refer to the below test data:

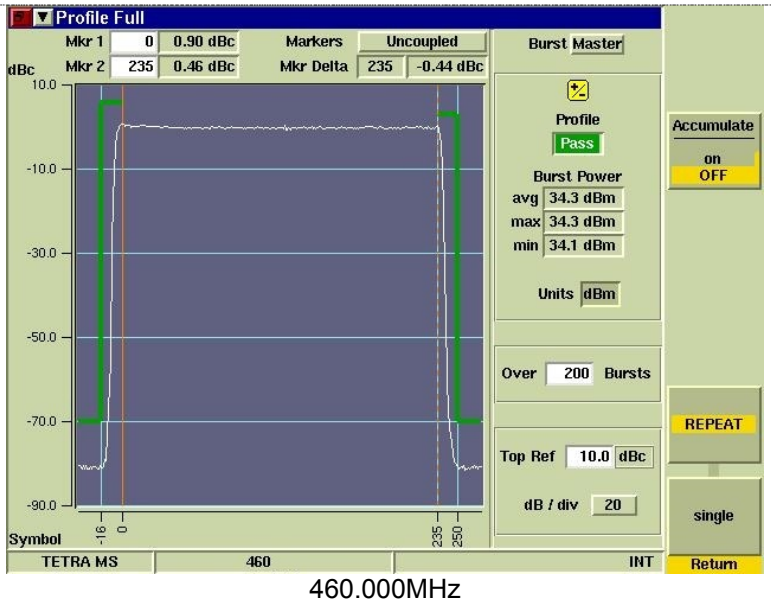
Operation Mode	Test Frequency (MHz)	Measured power (dBm)	Rated Output Power (dBm)	Difference (dB)	Limit (dB)	Result
TX1	450.025	34.40	34.77	-0.37	-1 ~ +1	Pass
	460.000	34.30	34.77	-0.47		
	469.975	34.10	34.77	-0.67		
TX2	450.025	34.40	34.77	-0.37	-1 ~ +1	Pass
	460.000	34.40	34.77	-0.37		
	469.975	34.20	34.77	-0.57		

Test plot as follows:

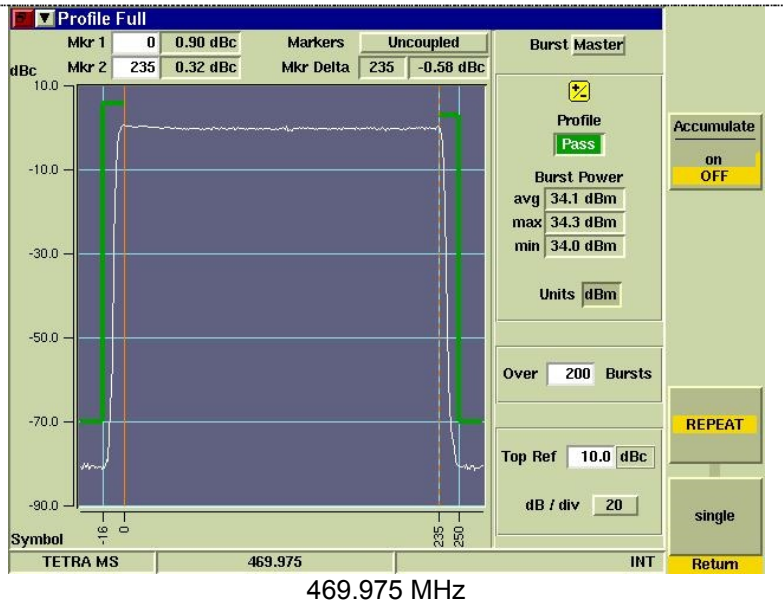
Modulation Type	π /4 DQPSK	Operation Mode	TX1



450.025 MHz

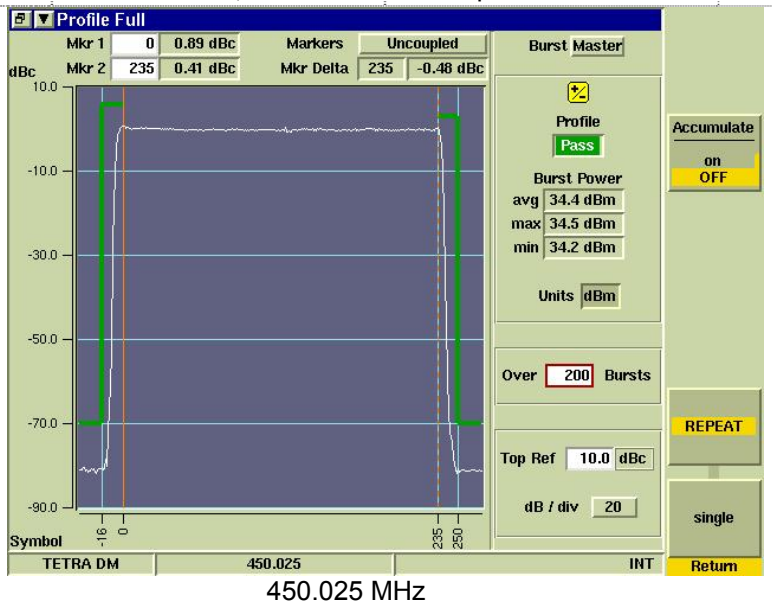


460.000MHz

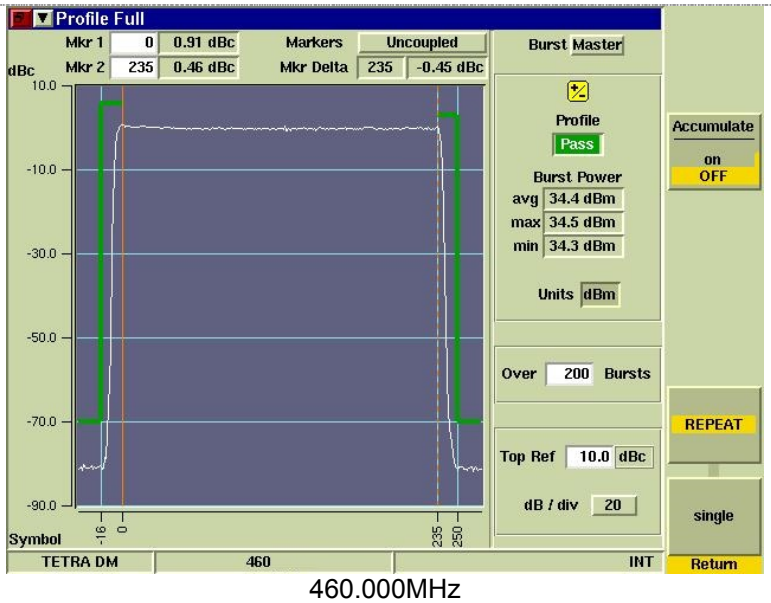


469.975 MHz

Modulation Type	π /4 DQPSK	Operation Mode	TX2



450.025 MHz



460.000MHz

469.975 MHz

4.2. Occupied Bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits.

LIMIT

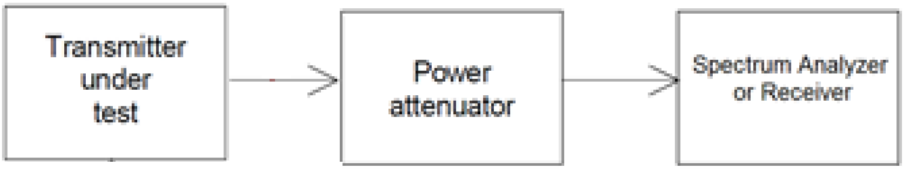
FCC part 90.209

Bandwidth limitations:

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
Below 252		
25-50	20	20
72-76	20	20
150-174	17.5	1 320/11.25/6
216-2205	6.25	20/11.25/6
220-222	5	4
406-5122	16.25	1 320/11.25/6
806-809/851-854	12.5	20
809-824/854-869	25	20
896-901/935-940	12.5	13.6
902-9284		
929-930	25	20
1427-14325	12.5	12.5
32450-2483.52		
Above 25002		

Note:
Operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the Adjacent Channel Power limits of § 90.221.

TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band ±50 kHz from the carrier frequency.

TEST MODE:

Please reference to the section 2.4

TEST RESULTS

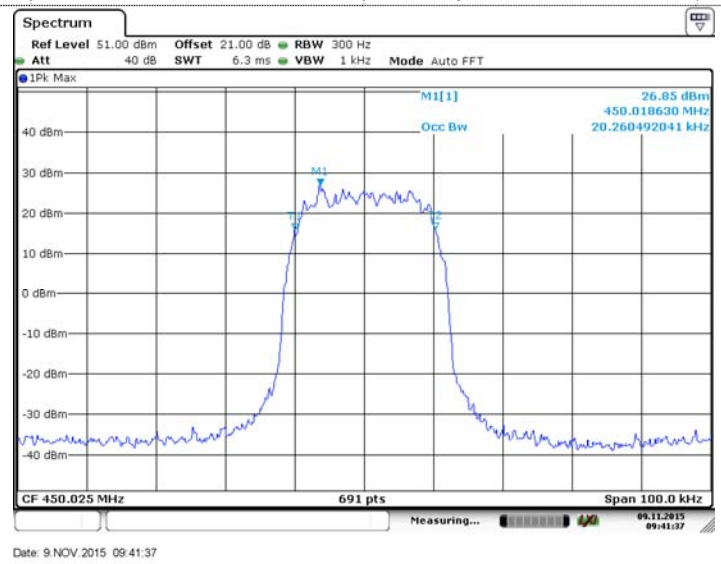
☒ **Passed** ☐ **Not Applicable**

Please refer to the below test data:

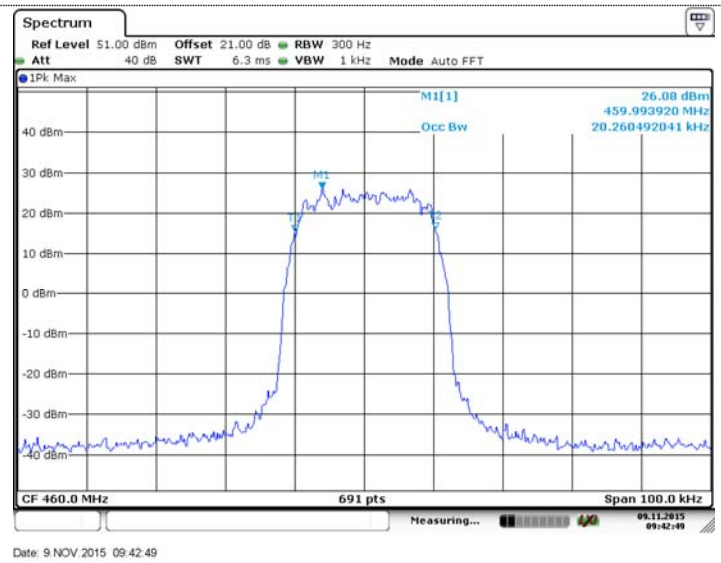
Operation Mode	Test Frequency (MHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
		99%		
TX1	450.025	20.26	≤22	Pass
	460.000	20.26		
	469.975	20.12		
TX2	450.025	20.12	≤22	Pass
	460.000	20.26		
	469.975	20.12		

Test plot as follows:

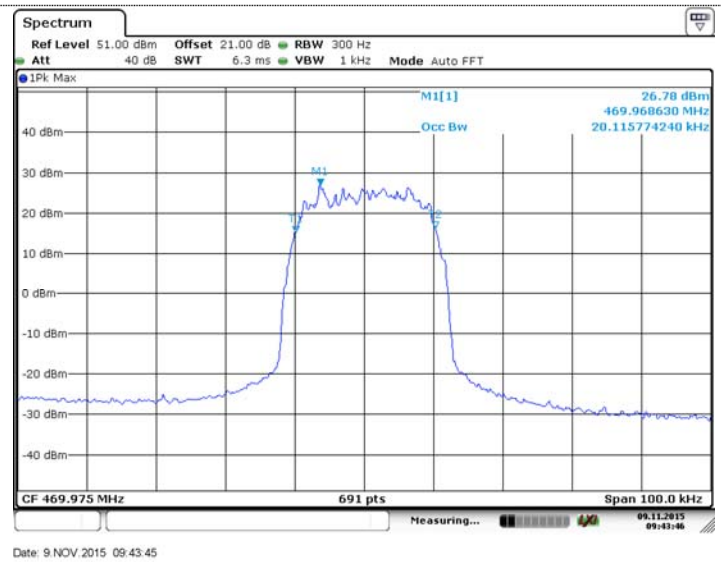
Modulation Type	π /4 DQPSK	Operation Mode	TX1



450.025 MHz

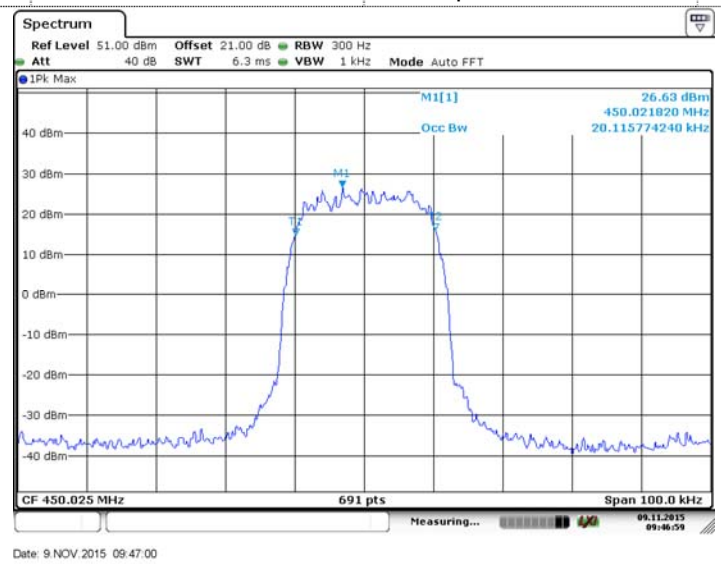


460.000MHz

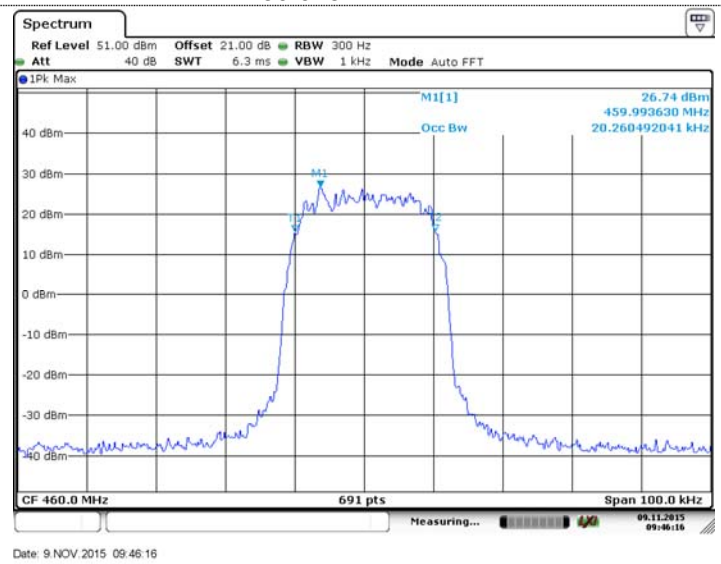


469.975 MHz

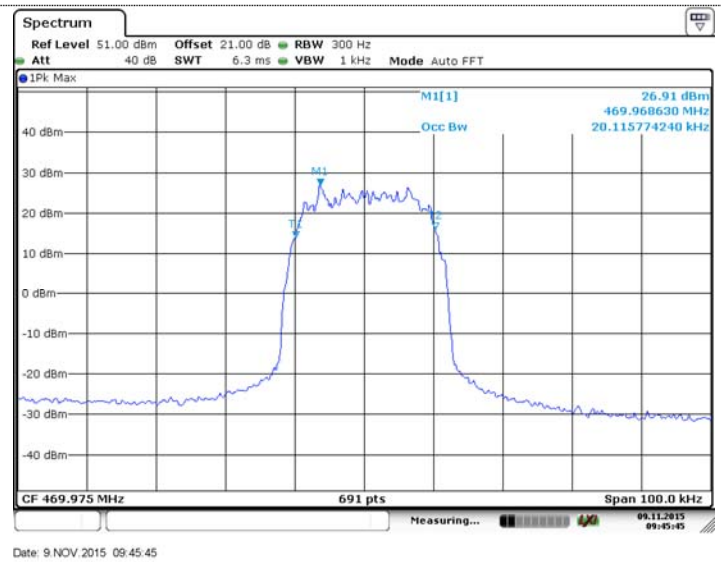
Modulation Type	π /4 DQPSK	Operation Mode	TX2



450.025 MHz



460.000MHz



469.975 MHz

4.3. Emission Mask

Transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section.

LIMIT

FCC part 90.210

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 251	A or B	A or C
25-50	B	C
72-76	B	C
150-1742	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-5122 5	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854	B	H
809-824/854-8693 5	B	G
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-59254		
All other bands	B	C

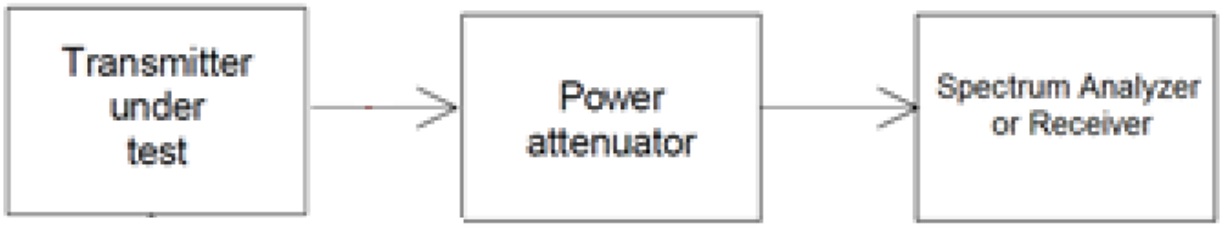
(c) Emission Mask C. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

(3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 100 Hz and the spectrum was recorded in the frequency band ±50 kHz from the carrier frequency.

TEST MODE:

Please reference to the section 2.4

TEST RESULTS

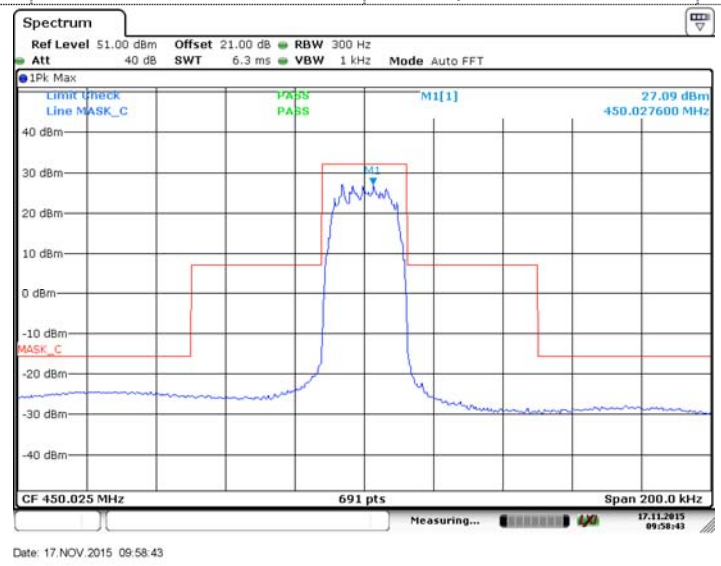
☒ **Passed** ☐ **Not Applicable**

Please refer to the below test data:

Note:
The equipment applicable to Emission Mask C.

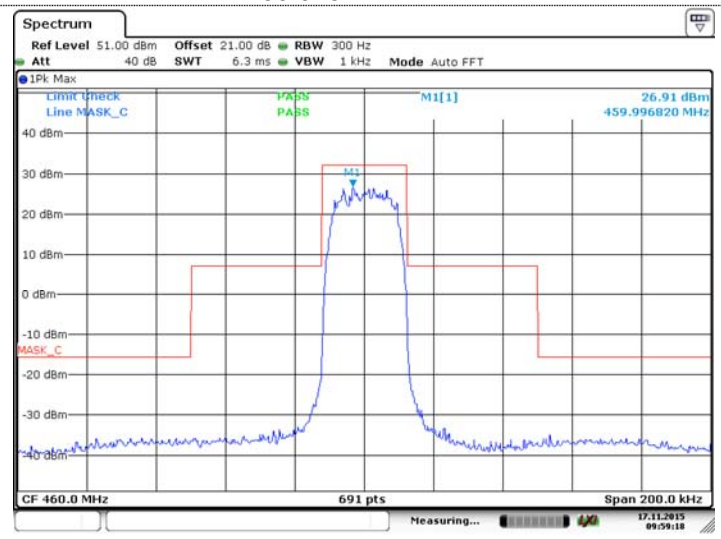
Test plot as follows:

Modulation Type	π /4 DQPSK	Operation Mode	TX1



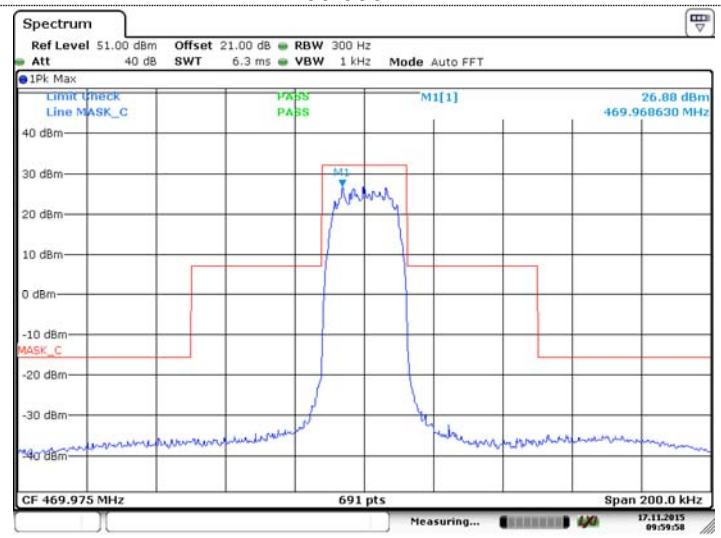
Date: 17.NOV.2015 09:58:43

450.025 MHz



Date: 17.NOV.2015 09:59:18

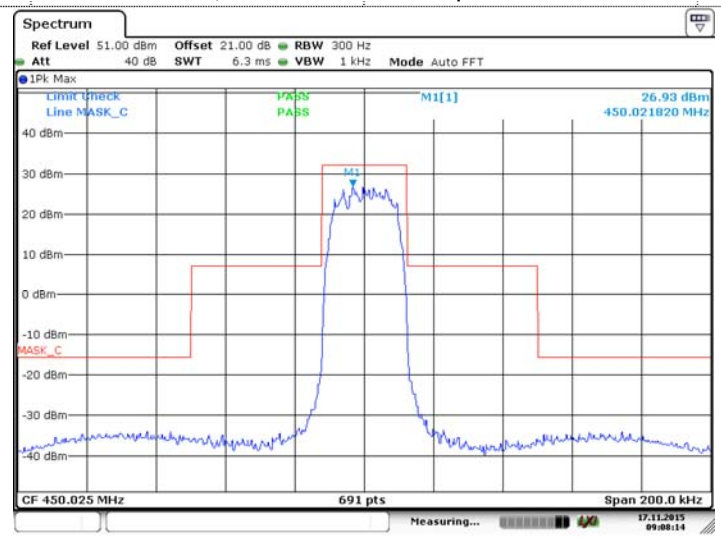
460.000MHz



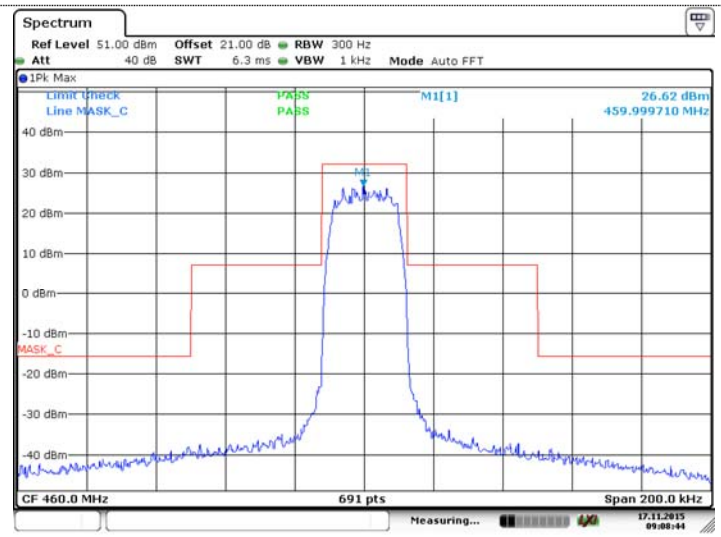
Date: 17.NOV.2015 09:59:59

469.975 MHz

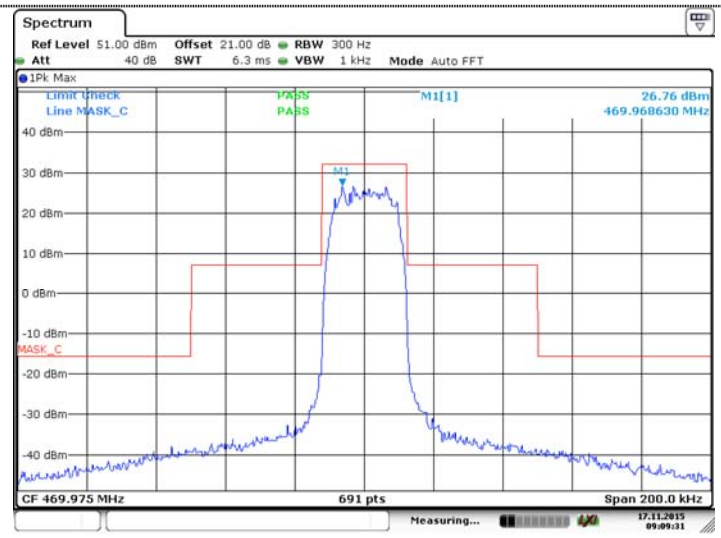
Modulation Type	π /4 DQPSK	Operation Mode	TX2



450.025 MHz



460.000MHz



469.975 MHz

4.4. Frequency Stability Test

LIMIT

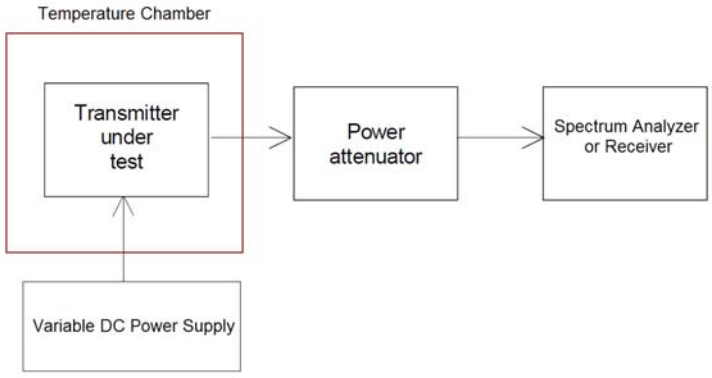
FCC part 90.213

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	1 2 3100	100	200
25-50	20	20	50
72-76	5		50
150-174	5 115	65	4 650
216-220	1.0		1.0
220-22212	0.1	1.5	1.5
421-512	7 11 142.5	85	85
806-809	141.0	1.5	1.5
809-824	141.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	140.1	1.5	1.5
902-928	2.5	2.5	2.5
902-92813	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	9300	300	300
Above 245010			

TEST PROCEDURE

1. According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +50℃ centigrade.
2. According to FCC Part 2 Section 2.1055 (d) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
3. Vary primary supply voltage from 85 to 115 percent of the nominal value.
4. The EUT was set in the climate chamber and connected to an external DC power supply. The RF output was directly connected to Spectrum Analyzer The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to a DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

TEST CONFIGURATION



TEST MODE:

Please reference to the section 2.4

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Please refer to the below test data:

TX1						
Test conditions		Frequency error (ppm)			Limit (ppm)	Result
Voltage (V)	Temp (℃)	450.025 MHz	460.000 MHz	469.975 MHz		
7.4	-30	0.13	0.14	0.19	±5	Pass
	-20	0.12	0.12	0.14		
	-10	0.09	0.09	0.08		
	0	-0.12	0.08	0.09		
	10	0.14	0.10	-0.12		
	20	0.14	0.08	0.08		
	30	0.15	0.13	0.09		
	40	0.09	0.11	0.14		
	50	0.15	0.08	0.08		
6.29 (85% Rated)	20	-0.12	0.14	-0.12		
8.51 (115% Rated)	20	0.17	0.12	0.13		

TX2						
Test conditions		Frequency error (ppm)			Limit (ppm)	Result
Voltage (V)	Temp (℃)	450.025 MHz	460.000 MHz	469.975 MHz		
7.4	-30	-0.13	0.07	0.13	±5	Pass
	-20	0.16	0.16	-0.14		
	-10	0.08	0.06	0.16		
	0	-0.14	0.12	0.10		
	10	-0.09	-0.15	0.08		
	20	0.15	0.10	0.06		
	30	0.17	0.15	0.16		
	40	0.13	0.07	0.09		
	50	0.18	-0.10	0.14		
6.29 (85% Rated)	20	0.20	0.15	0.12		
8.51 (115% Rated)	20	-0.14	0.12	-0.10		

4.5. Adjacent Channel Power Limits

LIMIT

FCC part 90.221

(a) For the frequency bands indicated in 90.209, operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the adjacent channel power (ACP) limits below. The table specifies a value for the ACP as a function of the displacement from the channel center frequency and a measurement bandwidth of 25 kHz.

(b) Maximum adjacent power levels for frequencies below 700MHz:

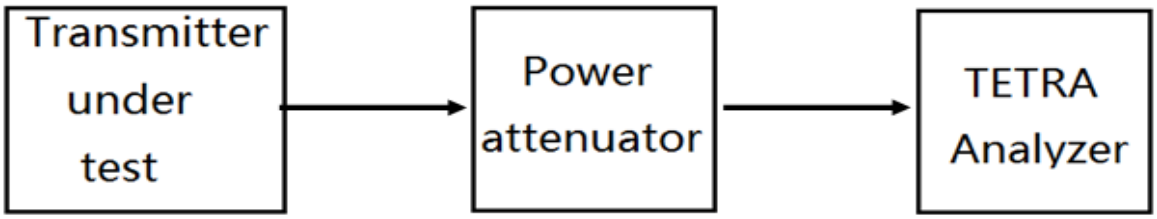
Frequency Offset	Maximum ACP (dBc) for devices 1 watt and less	Maximum ACP (dBc) for devices above 1 watt
25 kHz	-55 dBc	-60 dBc
50 kHz	-70 dBc	-70 dBc
75 kHz	-70 dBc	-70 dBc

In any case, no requirement in excess of -36 dBm shall apply.

TEST PROCEDURE

The RF output of the transmitter was connected to the input of the TETRA analyzer through sufficient attenuation.

TEST CONFIGURATION



Please reference to the section 2.4

TEST RESULTS

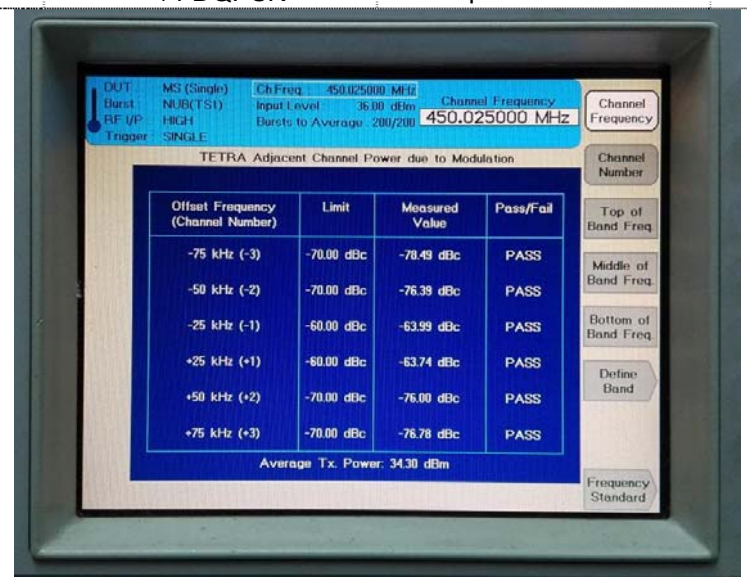
☒ **Passed** ☐ **Not Applicable**

Please refer to the below test data:

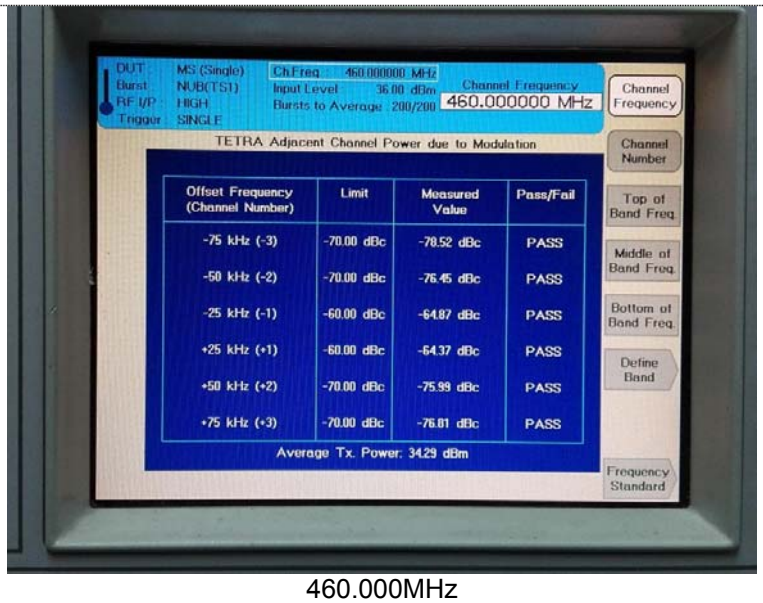
Operation Mode	Test Channel	Frequency Offset (kHz)	Measurement Power (dBc)	Limit (dB)	Result
TX1	450.025	-75	-78.49	⩽-70	
		-50	-76.39		
		-25	-63.99	⩽-60	
		25	-63.74		
		50	-76	⩽-70	
		75	-76.78		
	460.000	-75	-78.52	⩽-70	
		-50	-76.45		
		-25	-64.87	⩽-60	
		25	-64.37		
		50	-75.99	⩽-70	
		75	-76.81		
	469.975	-75	-78.52	⩽-70	
		-50	-76.4		
		-25	-64.46	⩽-60	
		25	-63.96		
		50	-75.92	⩽-70	
		75	-76.8		
TX2	450.025	-75	-78.24	⩽-70	
		-50	-75.57		
		-25	-63.72	⩽-60	
		25	-63.1		
		50	-75.21	⩽-70	
		75	-76.88		
	460.000	-75	-78.29	⩽-70	
		-50	-75.62		
		-25	-64.3	⩽-60	
		25	-63.57		
		50	-75.22	⩽-70	
		75	-76.87		
	469.975	-75	-78.36	⩽-70	
		-50	-75.59		
		-25	-64.04	⩽-60	
		25	-63.11		
		50	-75.14	⩽-70	
		75	-76.97		

Test plot as follows:

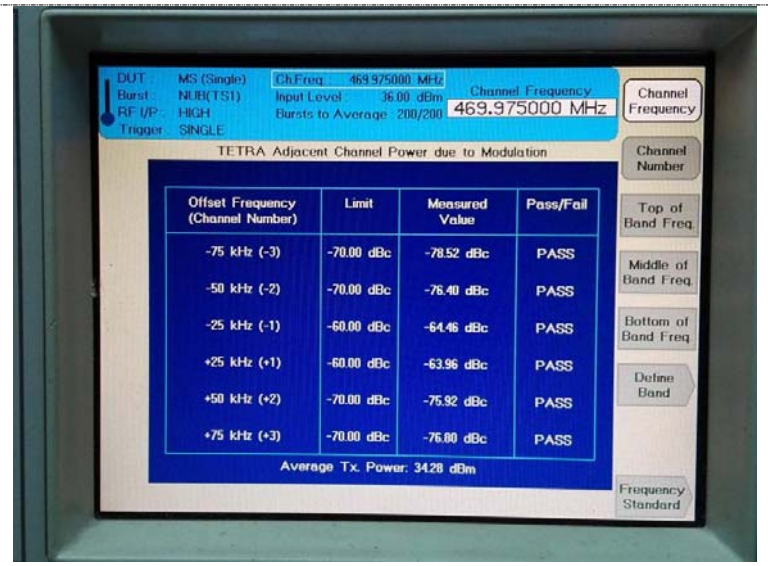
Modulation Type	π /4 DQPSK	Operation Mode	TX1



450.025 MHz

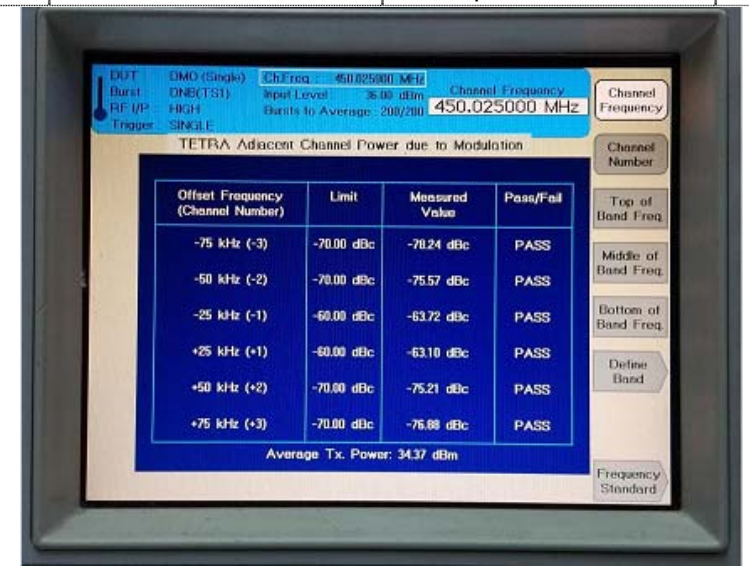


460.000MHz

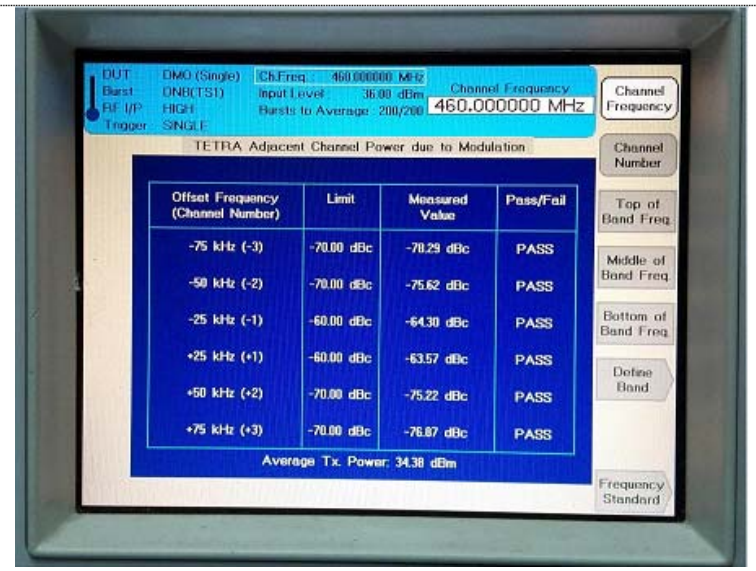


469.975 MHz

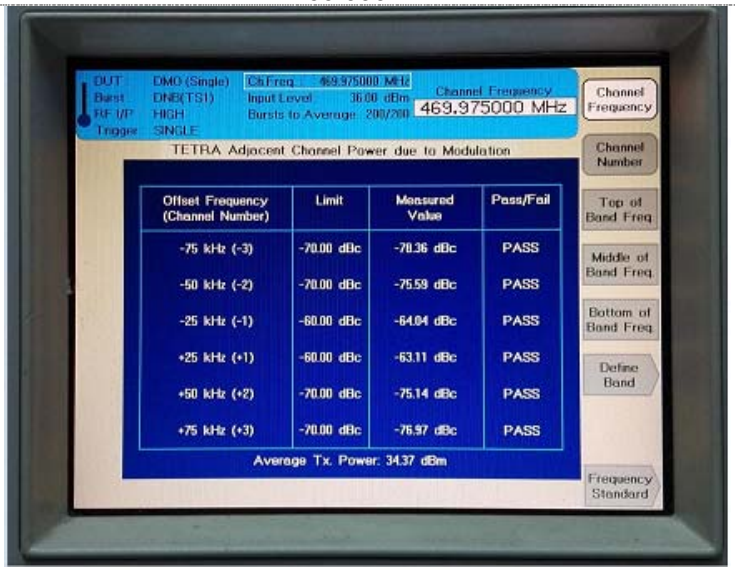
Modulation Type	π /4 DQPSK	Operation Mode	TX2



450.025 MHz



460.000MHz



469.975 MHz

4.6. Spurious Emission on Antenna Port

LIMIT

Modulation Type: π /4 DQPSK

FCC Part 22.359, 74.462, 80.211 and 90.210 (25 kHz bandwidth only):
On any frequency removed from the center of the assigned channel by more than 250 percent at least:
Low: 43 + 10 log (Pwatts) = 43 + 10log (2.57) =47.10dB
High: 43 + 10 log (Pwatts) = 43 + 10log (2.75) =47.39dB
Calculation: Limit (dBm) =EL-43-10log10 (TP)

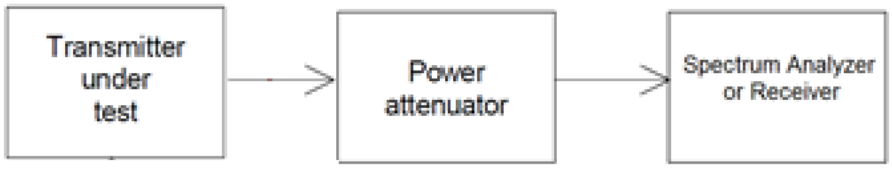
Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is 34.77dBm.

Limit (dBm) =34.77-43-10log$_{10}$ (2.75) = -13 dBm

TEST PROCEDURE

1. The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range. Set RBW 100 kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz,while set RBW=1MHz.VBW=3MHz from the 1GHz to 10th Harmonic.

TEST CONFIGURATION



TEST MODE:

Please reference to the section 2.4

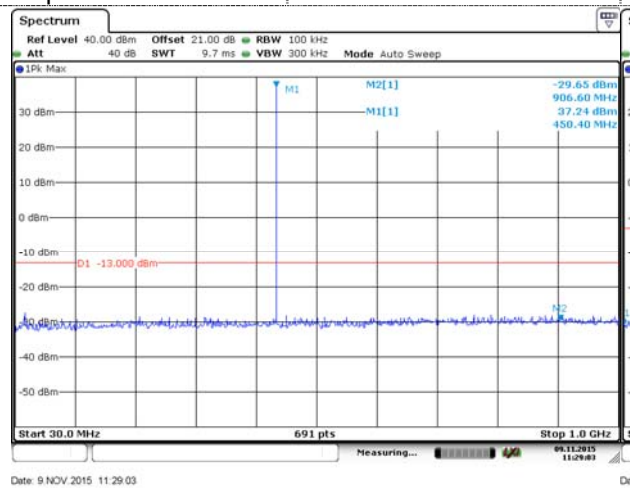
TEST RESULTS

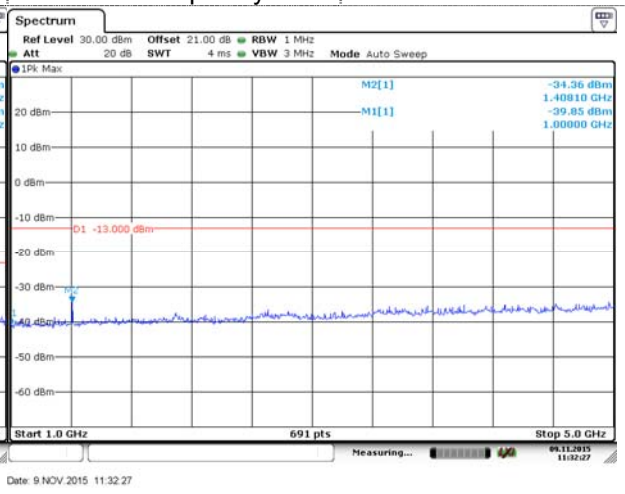
☒ **Passed** ☐ **Not Applicable**

Note:
1. In general, the worse case attenuation requirement shown above was applied.
2. The measurement frequency range from 30 MHz to 5GHz.
3. We tested Battery Model:BL1608 and BL2505,recorded the Battery Model:BL2505 at worst case.

Test plot as follows:

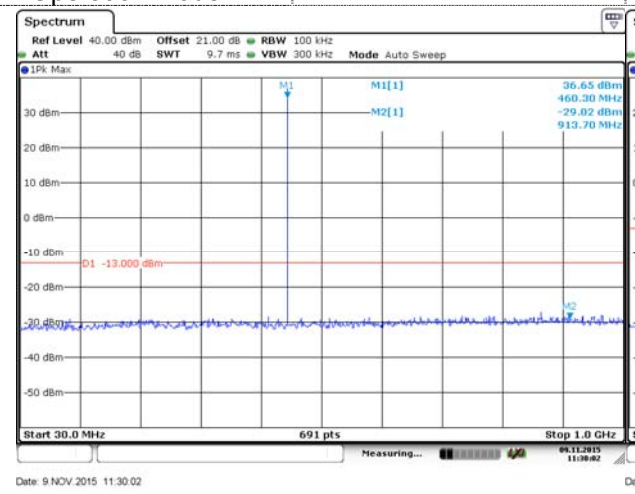
Operation Mode	TX1	Test Frequency	450.025 MHz

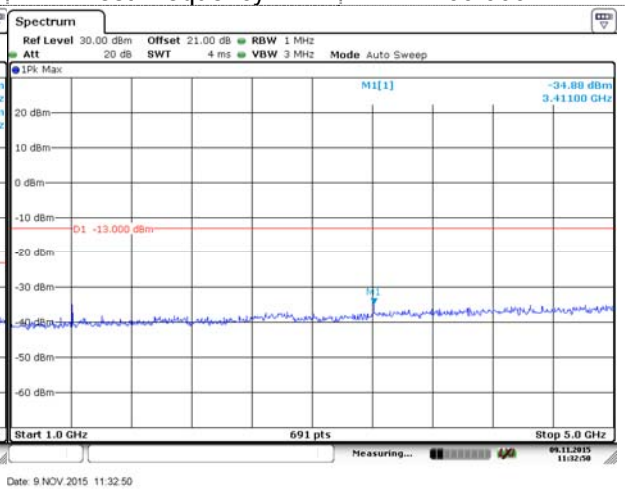




30MHz-1GHz 1GHz-5GHz

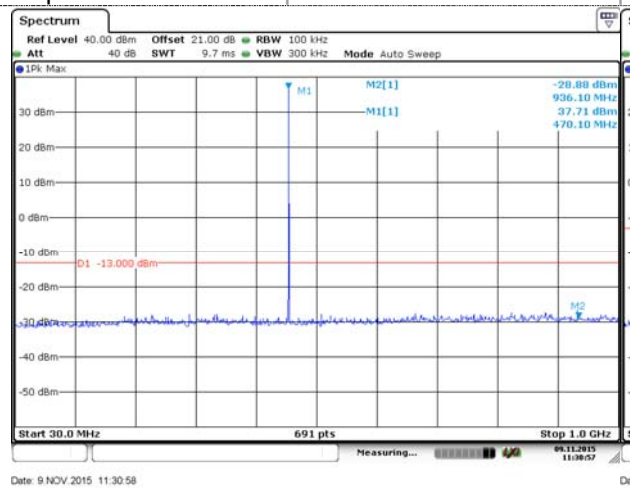
Operation Mode	TX1	Test Frequency	460.000MHz

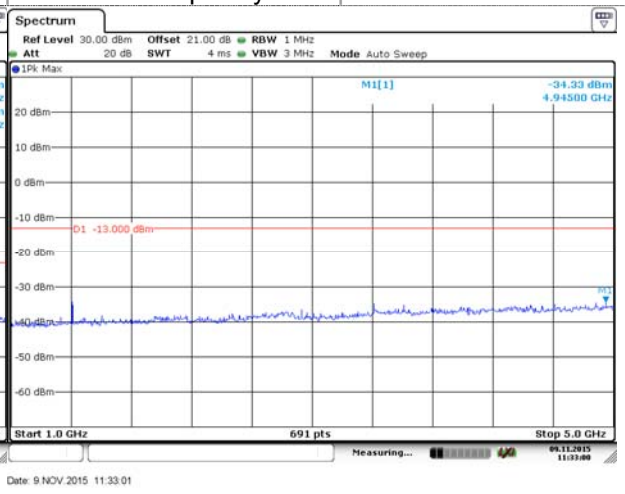




30MHz-1GHz 1GHz-5GHz

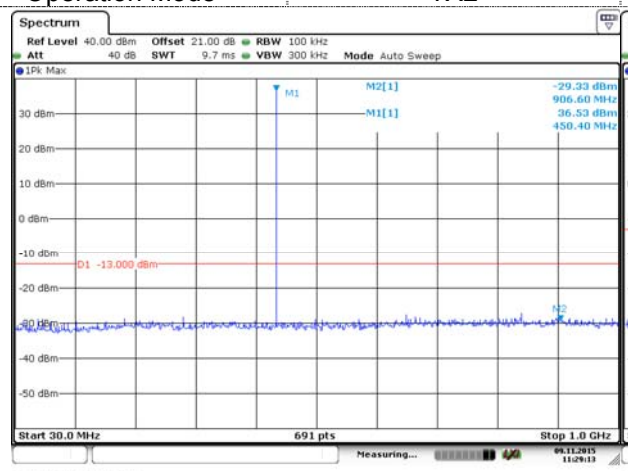
Operation Mode	TX1	Test Frequency	469.975MHz

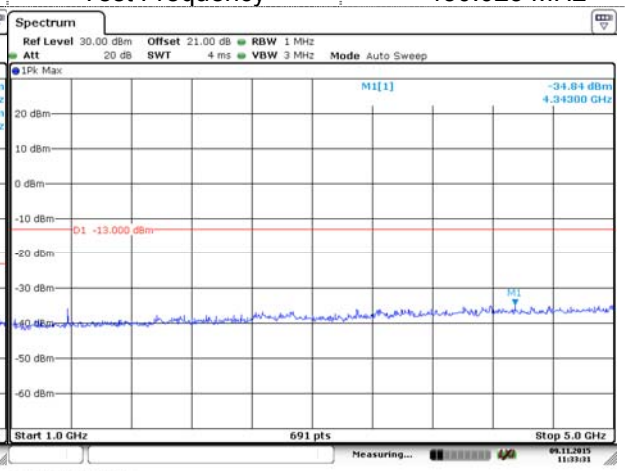




30MHz-1GHz 1GHz-5GHz

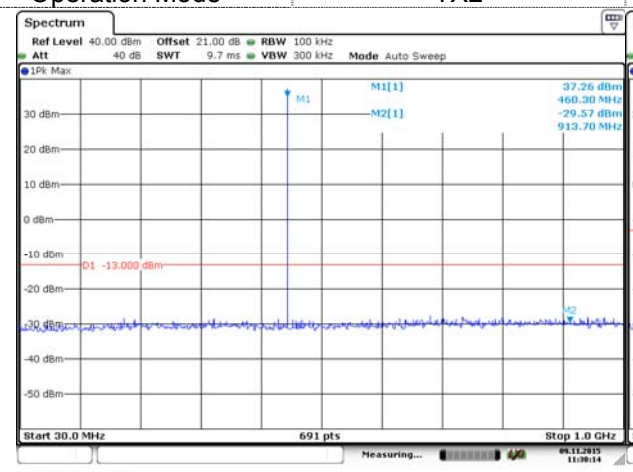
Operation Mode	TX2	Test Frequency	450.025 MHz

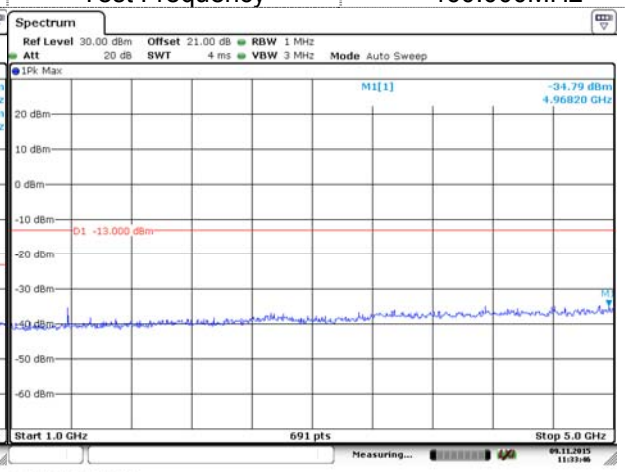




30MHz-1GHz	1GHz-5GHz

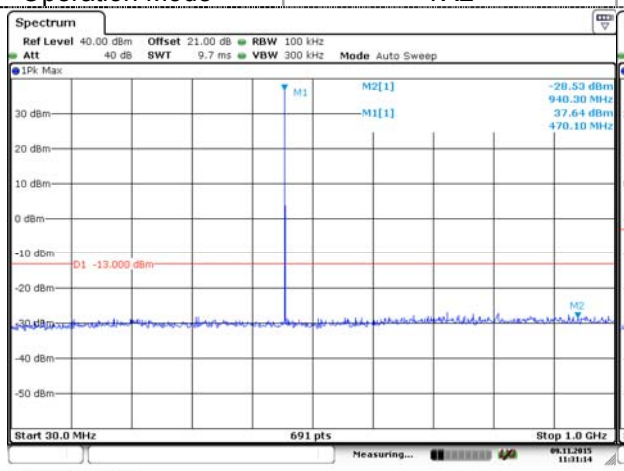
Operation Mode	TX2	Test Frequency	460.000MHz

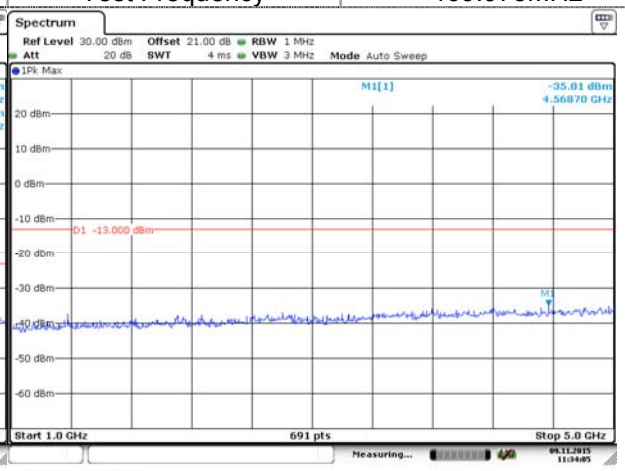




30MHz-1GHz	1GHz-5GHz

Operation Mode	TX2	Test Frequency	469.975MHz





30MHz-1GHz	1GHz-5GHz

4.7. Transmitter Radiated Spurious Emission

LIMIT

Modulation Type: π /4 DQPSK

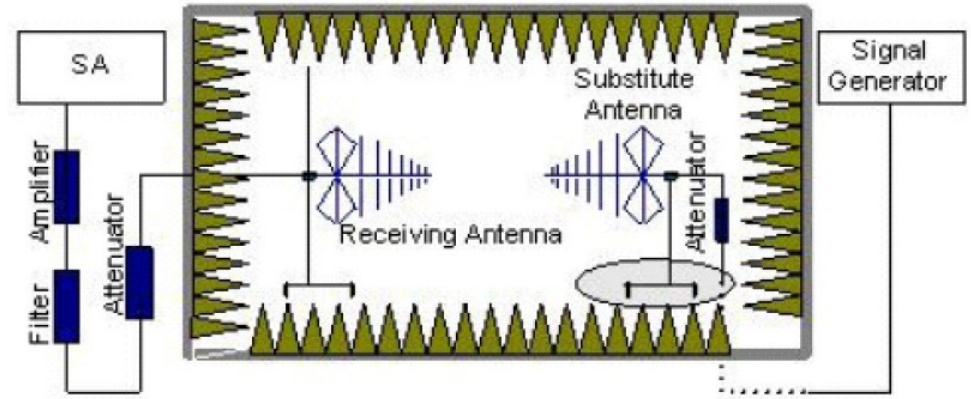
FCC Part 22.359, 74.462, 80.211 and 90.210 (25 kHz bandwidth only):
On any frequency removed from the center of the assigned channel by more than 250 percent at least:
Low: 43 + 10 log (Pwatts) = 43 + 10log (2.57) =47.10dB
High: 43 + 10 log (Pwatts) = 43 + 10log (2.75) =47.39dB
Calculation: Limit (dBm) =EL-43-10log10 (TP)

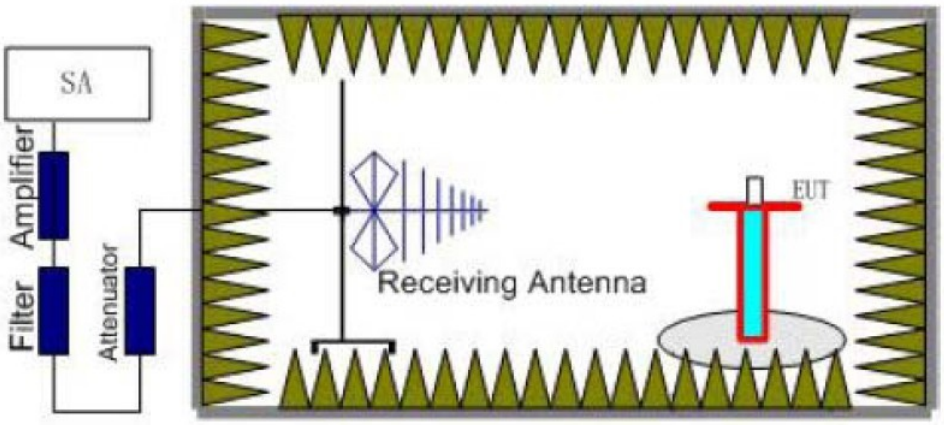
Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is 34.77dBm.

Limit (dBm) =34.77-43-10log$_{10}$ (2.75) = -13 dBm

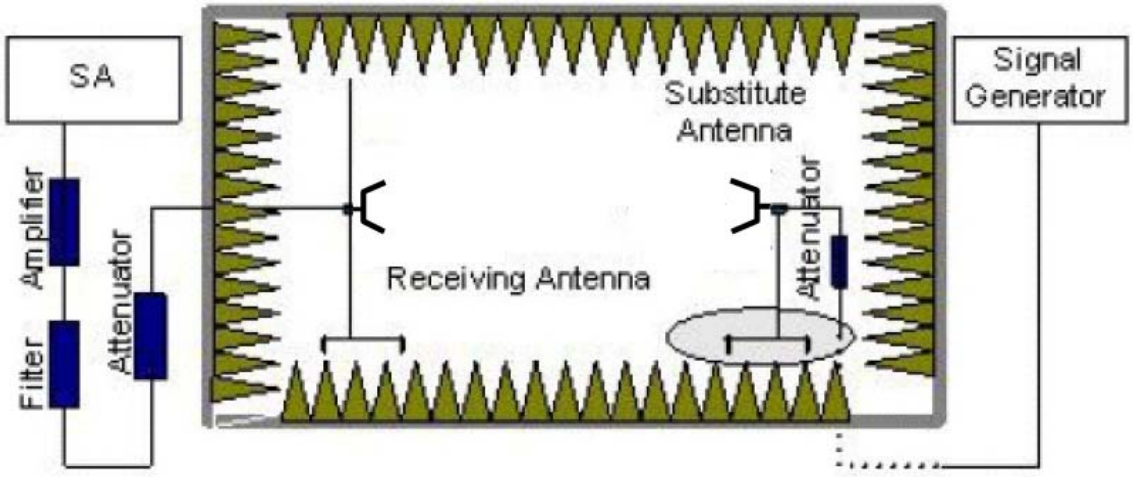
TEST CONFIGURATION

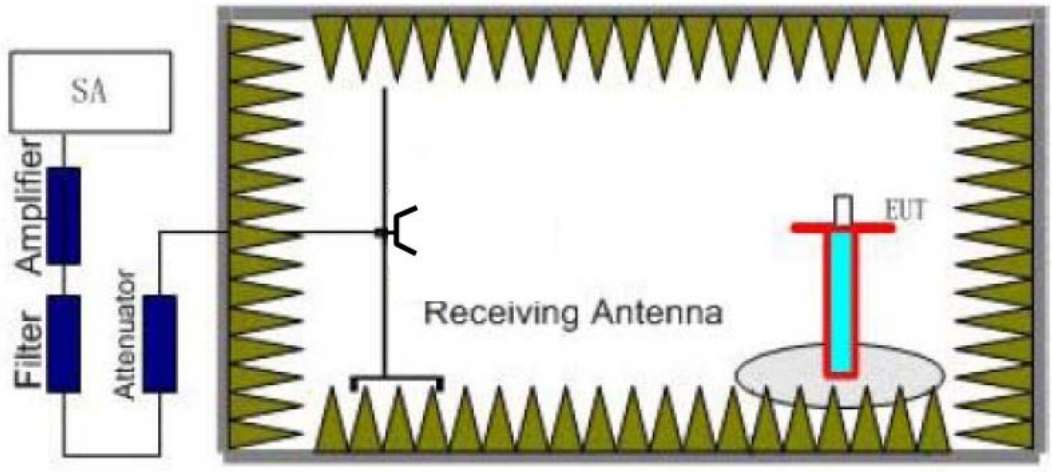
Below 1GHz:





Above 1GHz:





TEST PROCEDURE

1. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1. 0 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in six channels were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100kHz,VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power(EIRP)=P_{Mea}- P_{Ag} - P_{cl} - G_a
   We used SMF100A micowave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substituation test; The measurement results are amend as described below:
   Power(EIRP)=P_{Mea}- P_{cl} - G_a
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST MODE:

Please reference to the section 2.4

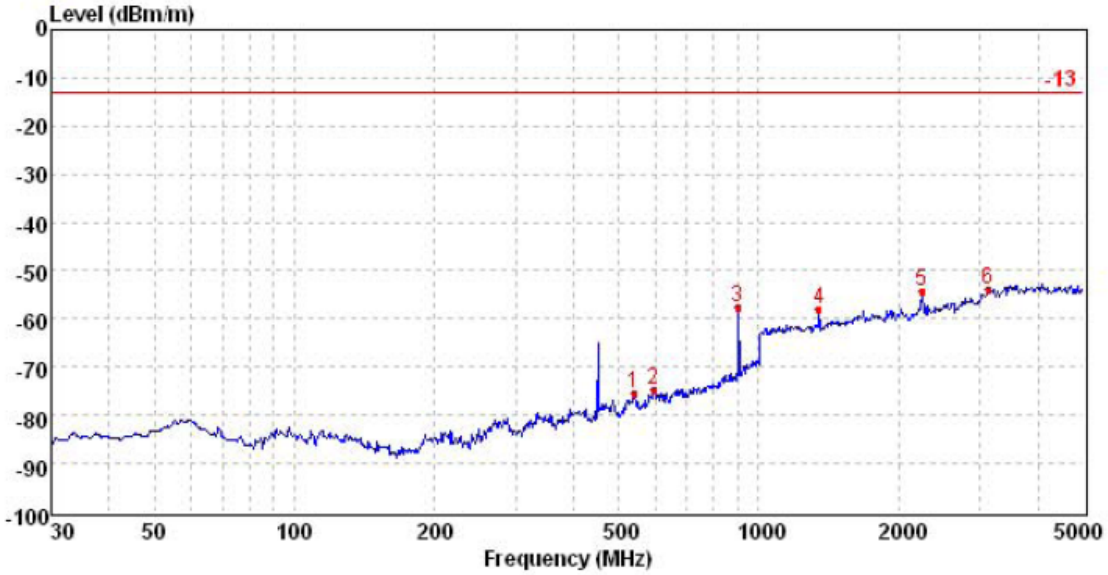
TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Note:
1. In general, the worse case attenuation requirement shown above was applied.
2. The measurement frequency range from 30 MHz to 5 GHz.
3. We tested Battery Model:BL1608 and BL2505,recorded the Battery Model:BL2505 at worst case.

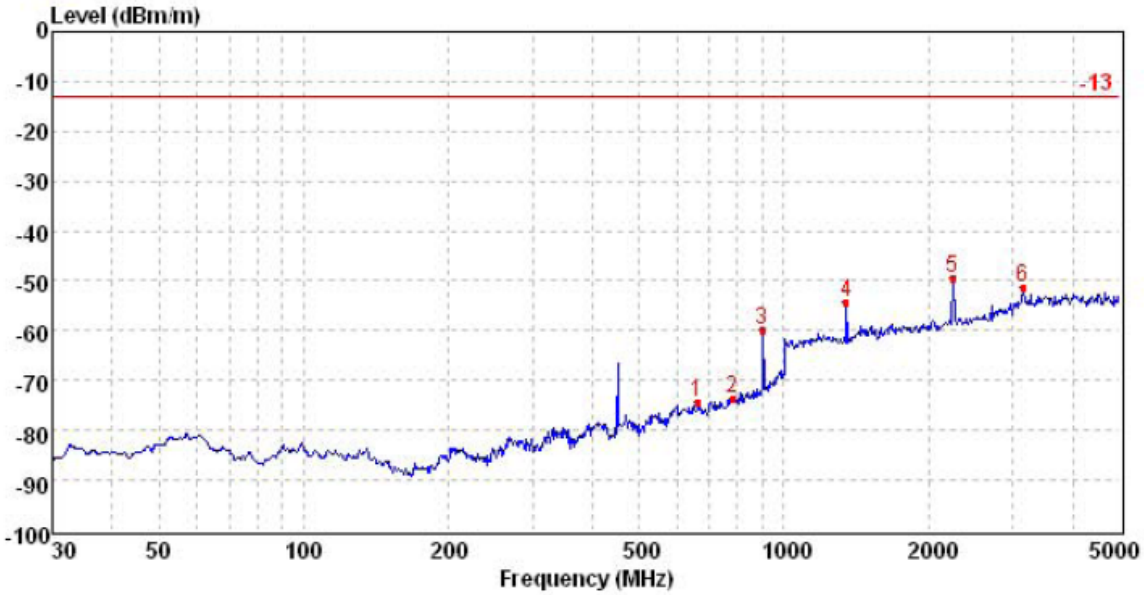
Test plot as follows:

TX1			
Test Frequency:	450.025MHz	Polarity:	*Horizontal*



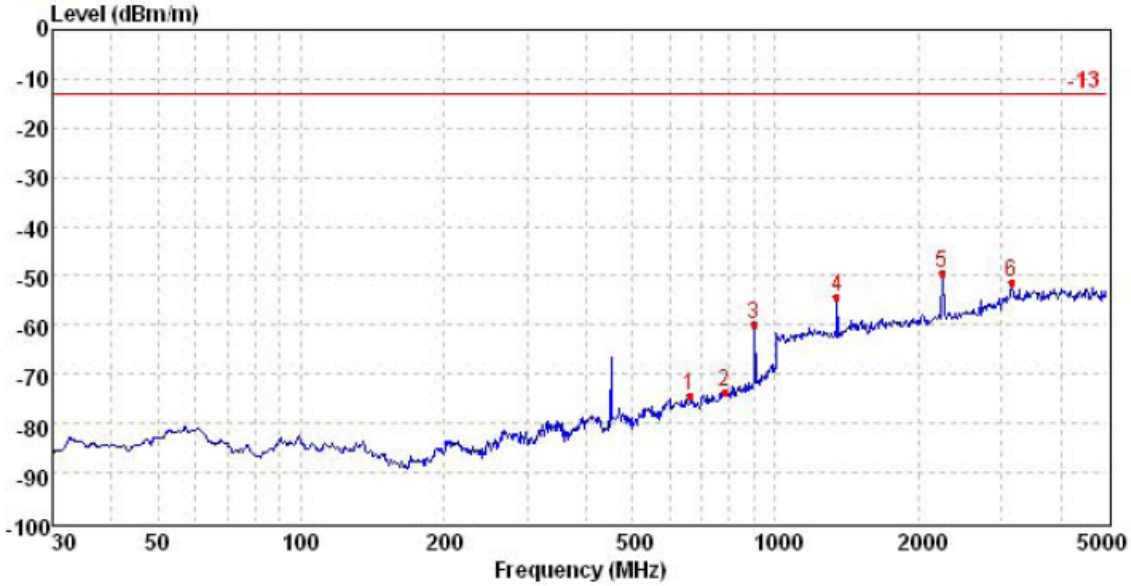
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	539.60	-79.76	30.56	2.64	28.85	-75.41	-13.00	-62.41	Peak
2	593.50	-80.35	31.51	2.86	28.77	-74.75	-13.00	-61.75	Peak
3	900.24	-68.12	35.32	3.62	28.41	-57.59	-13.00	-44.59	Peak
4	1348.00	-65.84	39.59	4.87	36.68	-58.06	-13.00	-45.06	Peak
5	2248.00	-65.08	41.75	6.59	37.46	-54.20	-13.00	-41.20	Peak
6	3116.00	-67.68	43.39	8.33	37.99	-53.95	-13.00	-40.95	Peak

Test Frequency:	450.025MHz	Polarity:	Vertical



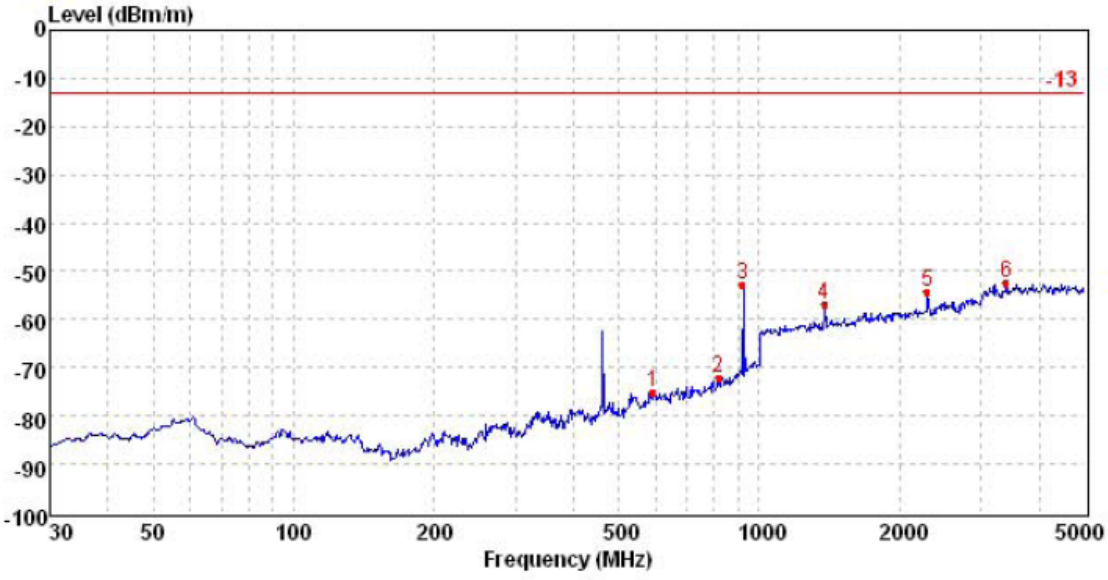
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	661.12	-80.52	31.89	3.04	28.68	-74.27	-13.00	-61.27	Peak
2	782.64	-81.52	33.03	3.27	28.53	-73.75	-13.00	-60.75	Peak
3	900.24	-70.39	35.32	3.62	28.41	-59.86	-13.00	-46.86	Peak
4	1348.00	-62.05	39.59	4.87	36.68	-54.27	-13.00	-41.27	Peak
5	2248.00	-60.41	41.75	6.59	37.46	-49.53	-13.00	-36.53	Peak
6	3152.00	-65.11	43.44	8.38	37.99	-51.28	-13.00	-38.28	Peak

TX1			
Test Frequency:	460.000MHz	Polarity:	*Horizontal*



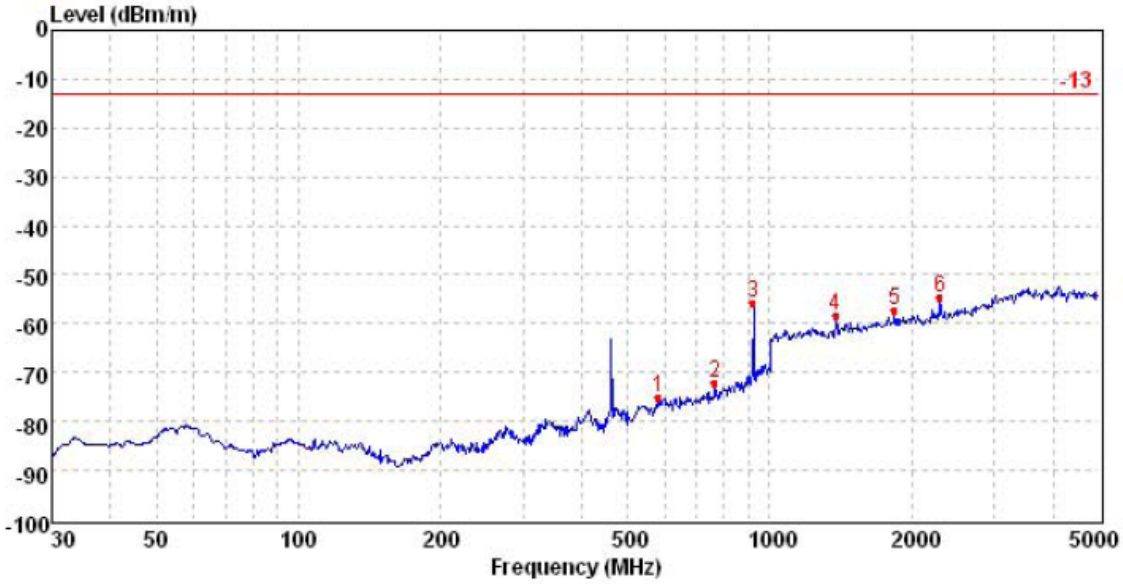
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	661.12	-80.52	31.89	3.04	28.68	-74.27	-13.00	-61.27	Peak
2	782.64	-81.52	33.03	3.27	28.53	-73.75	-13.00	-60.75	Peak
3	900.24	-70.39	35.32	3.62	28.41	-59.86	-13.00	-46.86	Peak
4	1348.00	-62.05	39.59	4.87	36.68	-54.27	-13.00	-41.27	Peak
5	2248.00	-60.41	41.75	6.59	37.46	-49.53	-13.00	-36.53	Peak
6	3152.00	-65.11	43.44	8.38	37.99	-51.28	-13.00	-38.28	Peak

Test Frequency:	460.000MHz	Polarity:	Vertical



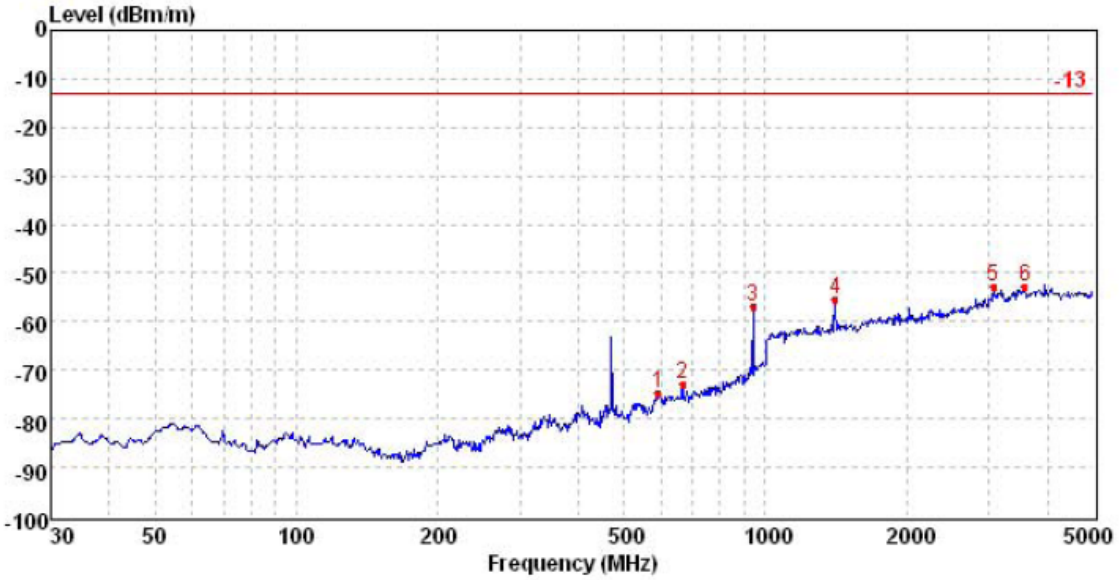
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	591.54	-80.61	31.51	2.83	28.78	-75.05	-13.00	-62.05	Peak
2	816.94	-80.66	33.61	3.37	28.50	-72.18	-13.00	-59.18	Peak
3	920.82	-63.92	35.89	3.63	28.39	-52.79	-13.00	-39.79	Peak
4	1380.00	-64.76	39.71	4.94	36.71	-56.82	-13.00	-43.82	Peak
5	2300.00	-65.34	41.87	6.67	37.50	-54.30	-13.00	-41.30	Peak
6	3388.00	-66.89	43.67	8.67	37.99	-52.54	-13.00	-39.54	Peak

TX1			
Test Frequency:	469.975 MHz	Polarity:	*Horizontal*



Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	581.74	-80.32	31.31	2.81	28.79	-74.99	-13.00	-61.99	Peak
2	764.02	-79.72	32.85	3.24	28.55	-72.18	-13.00	-59.18	Peak
3	920.82	-66.90	35.89	3.63	28.39	-55.77	-13.00	-42.77	Peak
4	1380.00	-66.44	39.71	4.94	36.71	-58.50	-13.00	-45.50	Peak
5	1840.00	-66.89	40.75	5.87	37.13	-57.40	-13.00	-44.40	Peak
6	2300.00	-65.70	41.87	6.67	37.50	-54.66	-13.00	-41.66	Peak

Test Frequency:	469.975 MHz	Polarity:	Vertical



Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	592.52	-80.15	31.51	2.83	28.78	-74.59	-13.00	-61.59	Peak
2	666.02	-79.27	31.91	3.06	28.67	-72.97	-13.00	-59.97	Peak
3	940.42	-68.53	36.45	3.64	28.38	-56.82	-13.00	-43.82	Peak
4	1408.00	-63.35	39.79	4.99	36.74	-55.31	-13.00	-42.31	Peak
5	3060.00	-66.34	43.35	8.25	37.99	-52.73	-13.00	-39.73	Peak
6	3572.00	-67.30	43.91	8.77	37.99	-52.61	-13.00	-39.61	Peak