

FCC TEST REPORT

(PART 90S)

Product: Mobile Payment Terminal

Model Name: S920

FCC ID: V5PS920LTE

Applicant: PAX Technology Limited

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Report No.: RF180724W016-6

Received Date: Jul. 24, 2018

Test Date: Jul. 25, 2018 ~ Sep. 05, 2018

Issued Date: Sep. 07, 2018

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF180724W016-6	Original release	Sep. 07, 2018

1 CERTIFICATION

PRODUCT: Mobile Payment Terminal
MODEL NO.: S920
BRAND: PAX
APPLICANT: PAX Technology Limited
TESTED DATE: Jul. 25, 2018 ~ Sep. 05, 2018
TEST SAMPLE: Production Unit
STANDARDS: FCC Part 90 Subpart S
FCC Part 2

The above equipment has been tested by **BV 7Layers Communications Technology (Shenzhen) Co. Ltd** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

TESTED BY :  , DATE : Sep. 07, 2018
(Roger Li/ Engineer)

APPROVED BY :  , DATE : Sep. 07, 2018
(Sam Tung / Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
2.1046 90.635(b)	Effective Radiated Power	PASS	Meet the requirement of limit.
2.1055 90.213	Frequency Stability	N/A(see note)	Meet the requirement of limit.
2.1049 90.209	Occupied Bandwidth	N/A(see note)	Meet the requirement of limit.
2.1051 90.691	Emission Mask	N/A(see note)	Meet the requirement of limit.
2.1051 90.691	Conducted Spurious Emissions	N/A(see note)	Meet the requirement of limit.
2.1053 90.691	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -7.26dB at 510.960MHz.

Note: The product PAX S920 is fully integrated the LTE module Quectel BG96 (FCC ID: XMR201707BG96), no other modification on the LTE Module radio parameter such as power, frequency range, modulation etc., for this report only test Effective Radiated Power and Radiated Spurious Emissions, other test data are copied from the module report(report No.:RXA1706-0199RF04R1). Please refer to this report for details.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.66dB
Radiated emissions	9KHz ~ 30MHz	2.68dB
	30MHz ~ 1GMHz	3.26dB
	1GHz ~ 18GHz	4.48dB
	18GHz ~ 40GHz	4.12dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 16,18	Mar. 15,19
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Mar. 16,18	Mar. 15,19
Bilog Antenna 1	ETS-LINDGREN	3143B	00161964	Nov. 26,16	Nov. 25,18
Bilog Antenna 2	ETS-LINDGREN	3143B	00161965	Nov. 26,16	Nov. 25,18
Horn Antenna 1	ETS-LINDGREN	3117	00168728	Nov. 26,16	Nov. 25,18
Horn Antenna 2	ETS-LINDGREN	3117	00168692	Nov. 26,16	Nov. 25,18
Loop antenna	Daze	ZN30900A	0708	Nov. 20,17	Nov. 19,18
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40 -K-SG/QMS-00 361	15433	Dec. 16,16	Dec. 15,18
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Mar. 02,18	Mar. 01,19
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Jul. 09,18	Jul. 08,19
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn- CT0001143-1216	Apr. 21,18	Apr. 20,19
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	ADT	ADT_Radiated _V7.6.15.9.2	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SM A	1505	Jul. 09,18	Jul. 08,19
Power Meter	Anritsu	ML2495A	1506002	Mar. 02,18	Mar. 01,19
Power Sensor	Anritsu	MA2411B	1339352	Mar. 16,18	Mar. 15,19
Humid & Temp Programmable Tester	Juyi	ITH-120-45-CP -AR	IAA1504-001	Jul. 09,18	Jul. 08,19
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Mar. 13,18	Mar. 12,19

NOTE: 1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in 966 Chamber and RF Oven room.

3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 525120.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Mobile Payment Terminal	
MODEL NAME	S920	
POWER SUPPLY	5Vdc (adapter or host equipment) 3.6Vdc (Li-ion, battery)	
MODULATION TYPE	LTE	QPSK, 16QAM
FREQUENCY RANGE	LTE Band 26 (Channel Bandwidth: 1.4MHz)	814.7MHz ~ 823.3MHz
	LTE Band 26 (Channel Bandwidth: 3MHz)	815.5MHz ~ 822.5MHz
	LTE Band 26 (Channel Bandwidth: 5MHz)	816.5MHz ~ 821.5MHz
	LTE Band 26 (Channel Bandwidth: 10MHz)	819MHz
MAX. ERP POWER	LTE Band 26 (Channel Bandwidth: 1.4MHz)	123mW
	LTE Band 26 (Channel Bandwidth: 3MHz)	127mW
	LTE Band 26 (Channel Bandwidth: 5MHz)	125mW
	LTE Band 26 (Channel Bandwidth: 10MHz)	105mW
EMISSION DESIGNATOR	LTE Band 26 (Channel Bandwidth: 1.4MHz)	QPSK: 1M15G7D
		16QAM: 1M12W7D
	LTE Band 26 (Channel Bandwidth: 3MHz)	QPSK: 1M16G7D
		16QAM: 0M98W7D
	LTE Band 26 (Channel Bandwidth: 5MHz)	QPSK: 1M16G7D
		16QAM: 1M10W7D
	LTE Band 26 (Channel Bandwidth: 10MHz)	QPSK: 1M20G7D
		16QAM: 1M06W7D
ANTENNA TYPE	Fixed Internal antenna with 0.8dBi gain	
HW VERSION	S920-xxx-xxx-xxxx	
I/O PORTS	Refer to user's manual	
DATA CABLE	N/A	

NOTE:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. The EUT was powered by the following adapter:

ADAPTER	
BRAND:	Shenzhen Sorghum red Electronics Technology Co., Ltd
MODEL:	GLH50D1000HW
INPUT:	AC 100-240V, 400mA
OUTPUT:	DC 5V, 1000mA

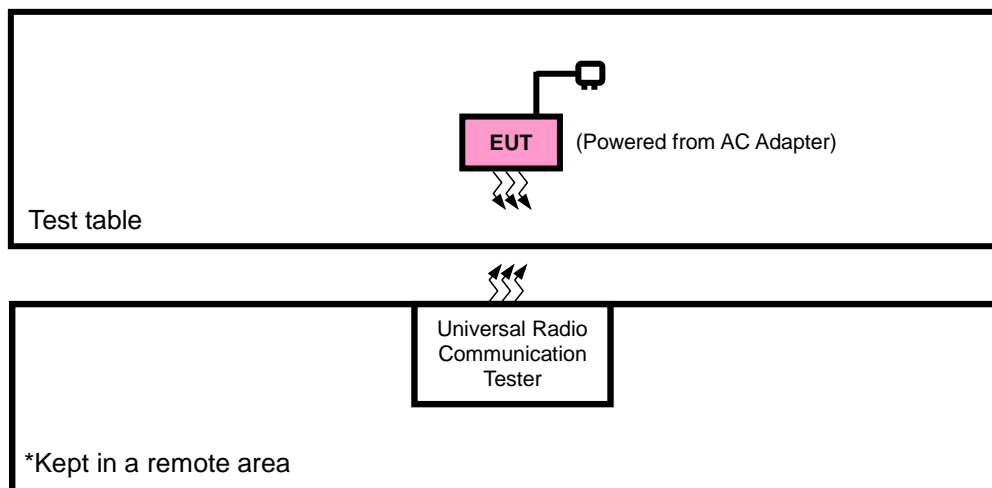
3. There were Sample A and B for this project, one carries a GPS module and the other removes it. The difference is as below, the sample A was worst and record in report

SAMPLE	SW VERSION	GPS
A	V0.0.0.1	With GPS
B	V0.0.0.2	Without GPS

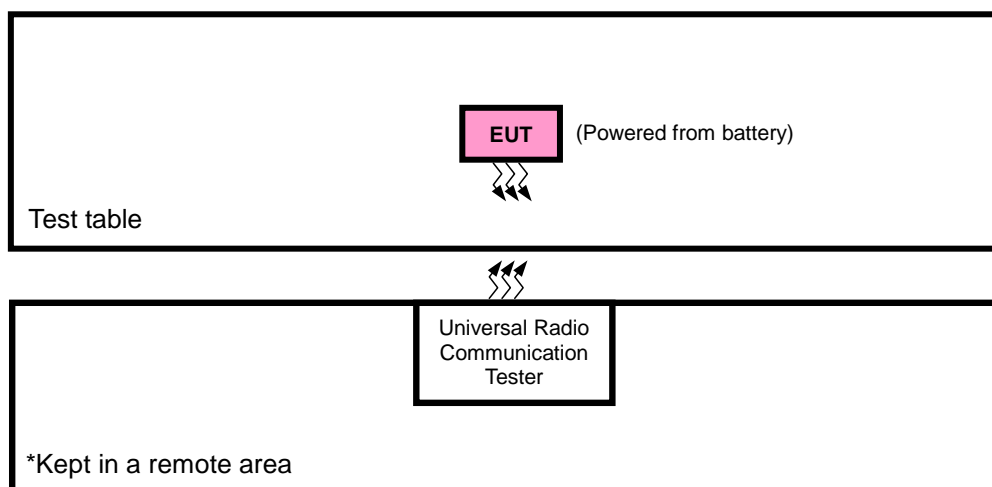
4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION



FOR CONDUCTED & E.R.P. TEST



3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
-	-	-	-	-	-

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
-	-

NOTE: All power cords of the above support units are non shielded (1.8m).

3.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Y-plane for EIRP and X-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	EUT + Adapter with LTE link
B	EUT + Battery with LTE link

Note: A is worst mode

LTE BAND 26 MODE

EUT CONFIGURE MODE	TEST ITEM	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
-	OUTPUT POWER	26697, 26740, 26783	1.4 MHz	QPSK, 16QAM	1RB /50%/100%RB
		26705, 26740, 26775	3 MHz	QPSK, 16QAM	1RB /50%/100%RB
		26715, 26740, 26765	5 MHz	QPSK, 16QAM	1RB /50%/100%RB
		26740	10 MHz	QPSK, 16QAM	1RB /50%/100%RB
	E.R.P.	26697, 26740, 26783	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		26705, 26740, 26775	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		26715, 26740, 26765	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		26740	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	FREQUENCY STABILITY	26740	1.4 MHz	QPSK, 16QAM	100%RB
		26740	3 MHz	QPSK, 16QAM	100%RB
		26740	5 MHz	QPSK, 16QAM	100%RB
		26740	10 MHz	QPSK, 16QAM	100%RB
-	OCCUPIED BANDWIDTH	26697, 26740, 26783	1.4 MHz	QPSK, 16QAM	100%RB
		26705, 26740, 26775	3 MHz	QPSK, 16QAM	100%RB
		26715, 26740, 26765	5 MHz	QPSK, 16QAM	100%RB
		26740	10 MHz	QPSK, 16QAM	100%RB
-	MASK	26697, 26740, 26783	1.4 MHz	QPSK, 16QAM	1RB /100%RB
		26705, 26740, 26775	3 MHz	QPSK, 16QAM	1RB /100%RB
		26715, 26740, 26765	5 MHz	QPSK, 16QAM	1RB /100%RB
		26740	10 MHz	QPSK, 16QAM	1RB /100%RB
-	CONDCUDED EMISSION	26697, 26740, 26783	1.4 MHz	QPSK	1 RB / 0 RB Offset
		26705, 26740, 26775	3 MHz	QPSK	1 RB / 0 RB Offset
		26715, 26740, 26765	5 MHz	QPSK	1 RB / 0 RB Offset
		26740	10 MHz	QPSK	1 RB / 0 RB Offset
-	RADIATED EMISSION	26740	1.4 MHz	QPSK	1 RB / 0 RB Offset
		26740	3 MHz	QPSK	1 RB / 0 RB Offset
		26715, 26740, 26765	5 MHz	QPSK	1 RB / 0 RB Offset
		26740	10 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
EIRP	24deg. C, 60%RH	3.6Vdc from Battery	Vincent Chen
FREQUENCY STABILITY	24deg. C, 61%RH	DC 4.75V/5V/5.25V	Bert Ma
OCCUPIED BANDWIDTH	24deg. C, 61%RH	3.6Vdc from Battery	Bert Ma
PEAK TO AVERAGE RATIO	24deg. C, 61%RH	3.6Vdc from Battery	Bert Ma
BAND EDGE	24deg. C, 61%RH	3.6Vdc from Battery	Bert Ma
CONDUCTED EMISSION	24deg. C, 61%RH	3.6Vdc from Battery	Vincent Chen
RADIATED EMISSION	24deg. C, 60%RH	DC 5V from adaptor	Vincent Chen

3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 90

ANSI/TIA-603-C-2004

NOTE: All test items have been performed and recorded as per the above standards.

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Per FCC Part 90.635(a)(b)

The maximum output power of the transmitter for mobile stations is 100 watts

4.1.2 TEST PROCEDURES

ERP MEASUREMENT:

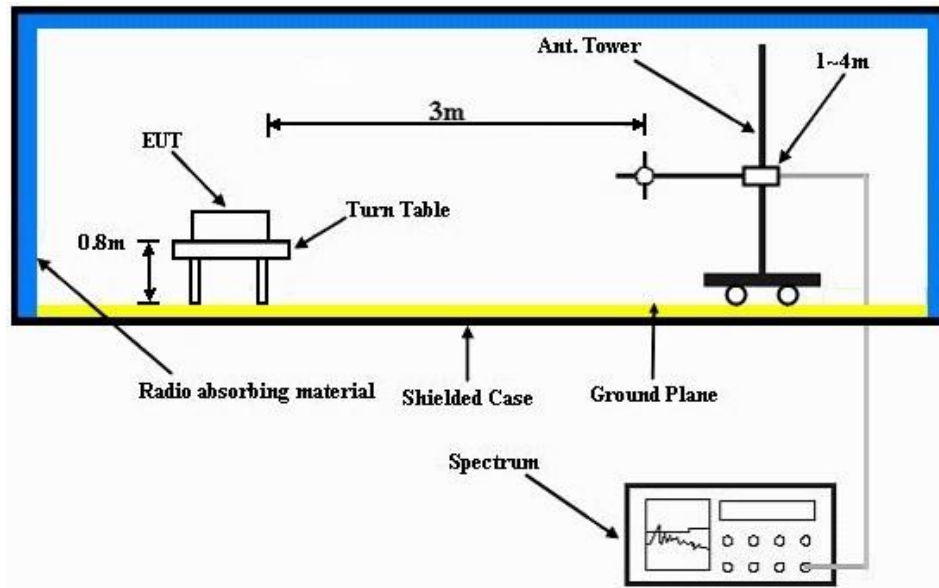
- a. The EUT was set up for the maximum power with LTE link data modulation. The power was measured with Agilent Spectrum Analyzer. All measurements were done at low, middle and high. RWB and VBW is 5MHz for LTE
- b. E.I.R.P power measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$
- e. $E.R.P = E.I.R.P - 2.15 \text{ dB}$

CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

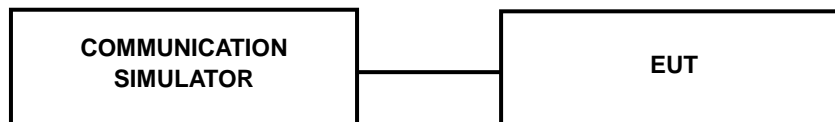
4.1.3 TEST SETUP

ERP MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

CONDUCTED POWER MEASUREMENT:



4.1.4 EUT OPERATING CONDITIONS

- 1) Upload test waveform to signal generator and produce test signal to link up with EUT.
- 2) Execute test tool to control EUT transmit at specific modulation, RB size, frequency and output power level continuously.

Note: Test waveform and tool are provided by client.

4.1.5 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Band / BW	Modulation	RB Size	RB Offset	Low CHG 26697	Mid CH 26740	High CH 26783
				Frequency 814.7 MHz	Frequency 819 MHz	Frequency 823.3 MHz
26/1.4	QPSK	1	0	22.53	22.93	21.91
		1	2	22.53	22.91	23.03
		1	5	22.47	22.86	22.80
		3	0	22.16	22.39	22.37
		3	1	22.20	22.51	22.36
		3	3	22.23	22.49	22.30
		6	0	22.33	22.40	22.28
	16QAM	1	0	23.19	23.15	22.55
		1	2	23.20	23.57	22.57
		1	5	23.59	23.29	22.29
		3	0	22.58	22.62	21.71
		3	1	22.57	22.56	21.85
		3	3	22.61	22.74	21.83
		6	0	21.68	21.41	21.29

Band / BW	Modulation	RB Size	RB Offset	Low CHG 26705	Mid CH 26740	High CH 26775
				Frequency 815.5 MHz	Frequency 819 MHz	Frequency 822.5 MHz
26/3	QPSK	1	0	22.52	22.89	21.89
		1	7	22.51	22.90	23.00
		1	14	22.44	22.81	22.76
		8	0	22.14	22.35	22.34
		8	3	22.17	22.46	22.32
		8	7	22.20	22.46	22.26
		15	0	22.31	22.36	22.23
	16QAM	1	0	23.14	23.13	22.53
		1	7	23.18	23.51	22.55
		1	14	23.56	23.25	22.26
		8	0	22.55	22.61	21.67
		8	3	22.54	22.51	21.81
		8	7	22.59	22.70	21.80
		15	0	21.65	21.36	21.25

Band / BW	Modulation	RB Size	RB Offset	Low CHG 26715	Mid CH 26740	High CH 26765
				Frequency 816.5 MHz	Frequency 819 MHz	Frequency 821.5 MHz
26/5	QPSK	1	0	22.49	22.85	21.86
		1	12	22.50	22.86	22.98
		1	24	22.42	22.80	22.73
		12	0	22.11	22.30	22.30
		12	6	22.15	22.42	22.29
		12	13	22.17	22.41	22.22
		25	0	22.28	22.31	22.19
	16QAM	1	0	23.12	23.09	22.48
		1	12	23.14	23.52	22.51
		1	24	23.54	23.22	22.24
		12	0	22.52	22.56	21.65
		12	6	22.51	22.49	21.78
		12	13	22.56	22.65	21.76
		25	0	21.63	21.32	21.22

Band / BW	Modulation	RB Size	RB Offset	Low CHG	Mid CH 26740	High CH
				Frequency	Frequency 819 MHz	Frequency
26/10	QPSK	1	0		22.53	
		1	24		22.57	
		1	49		22.52	
		25	0		22.72	
		25	12		22.79	
		25	25		22.87	
		50	0		22.27	
	16QAM	1	0		22.89	
		1	24		22.85	
		1	49		23.05	
		25	0		23.10	
		25	12		23.04	
		25	25		22.56	
		50	0		22.89	

ERP POWER (dBm)

LTE Band 26							
Channel Bandwidth: 1.4MHz / QPSK							
Plane	Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Z	26697	814.7	-10.85	33.67	20.67	116.76	H
	26740	819.0	-10.81	33.62	20.66	116.52	H
	26783	823.3	-10.59	33.65	20.91	123.17	H
	26697	814.7	-17.06	34.25	15.04	31.90	V
	26740	819.0	-17.12	34.60	15.33	34.10	V
	26783	823.3	-17.14	34.63	15.34	34.20	V

LTE Band 26							
Channel Bandwidth: 1.4MHz / 16QAM							
Plane	Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Z	26697	814.7	-11.68	33.67	19.84	96.45	H
	26740	819.0	-11.83	33.62	19.64	92.13	H
	26783	823.3	-11.69	33.65	19.81	95.61	H
	26697	814.7	-17.89	34.25	14.21	26.35	V
	26740	819.0	-18.14	34.60	14.31	26.96	V
	26783	823.3	-18.24	34.63	14.24	26.55	V

LTE Band 26							
Channel Bandwidth: 3MHz / QPSK							
Plane	Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Z	26705	815.5	-10.66	33.72	20.91	123.34	H
	26740	819.0	-10.75	33.62	20.72	118.14	H
	26775	822.5	-10.46	33.65	21.04	127.03	H
	26705	815.5	-16.87	34.30	15.28	33.74	V
	26740	819.0	-17.06	34.60	15.39	34.58	V
	26775	822.5	-17.01	34.57	15.41	34.76	V

LTE Band 26							
Channel Bandwidth: 3MHz / 16QAM							
Plane	Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Z	26705	815.5	-11.81	33.72	19.76	94.65	H
	26740	819.0	-11.85	33.62	19.62	91.71	H
	26775	822.5	-11.62	33.65	19.88	97.25	H
	26705	815.5	-18.02	34.30	14.13	25.89	V
	26740	819.0	-18.16	34.60	14.29	26.84	V
	26775	822.5	-18.17	34.57	14.25	26.61	V

LTE Band 26							
Channel Bandwidth: 5MHz / QPSK							
Plane	Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Z	26715	816.5	-10.67	33.69	20.87	122.29	H
	26740	819.0	-10.82	33.62	20.65	116.25	H
	26765	821.5	-10.53	33.66	20.98	125.34	H
	26715	816.5	-16.88	34.85	15.82	38.19	V
	26740	819.0	-17.13	34.60	15.32	34.03	V
	26765	821.5	-17.08	34.59	15.36	34.39	V

LTE Band 26							
Channel Bandwidth: 5MHz / 16QAM							
Plane	Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Z	26715	816.5	-11.53	33.69	20.01	100.32	H
	26740	819.0	-11.69	33.62	19.78	95.15	H
	26765	821.5	-11.38	33.66	20.13	103.06	H
	26715	816.5	-17.74	34.85	14.96	31.33	V
	26740	819.0	-18.00	34.60	14.45	27.85	V
	26765	821.5	-17.93	34.59	14.51	28.27	V

LTE Band 26							
Channel Bandwidth: 10MHz / QPSK							
Plane	Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Z	26740	819.0	-11.27	33.62	20.20	104.81	H
	26740	819.0	-17.58	34.60	14.87	30.68	V

LTE Band 26							
Channel Bandwidth: 10MHz / 16QAM							
Plane	Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Z	26740	819.0	-12.34	33.62	19.13	81.92	H
	26740	819.0	-18.65	34.60	13.80	23.98	V

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

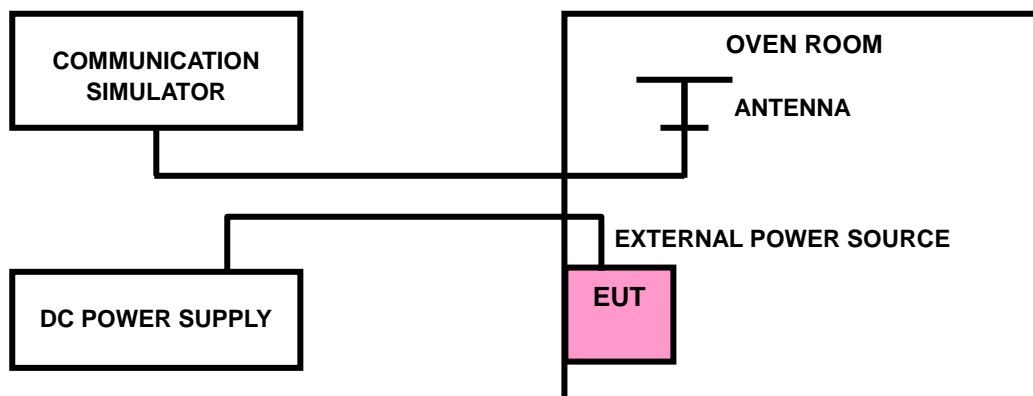
The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

4.2.2 TEST PROCEDURE

- a. The oven room could control the temperatures and humidity.
- b. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- c. Laptop pc is connected the external power supply to control the DC input power. The various Volts from the minimum to maximum working voltage. Each step shall be record the frequency error rate.
- d. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing.
- e. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 TEST SETUP



EUT OPERATING CONDITIONS

Same as 4.1.4.

4.2.5 TEST RESULTS

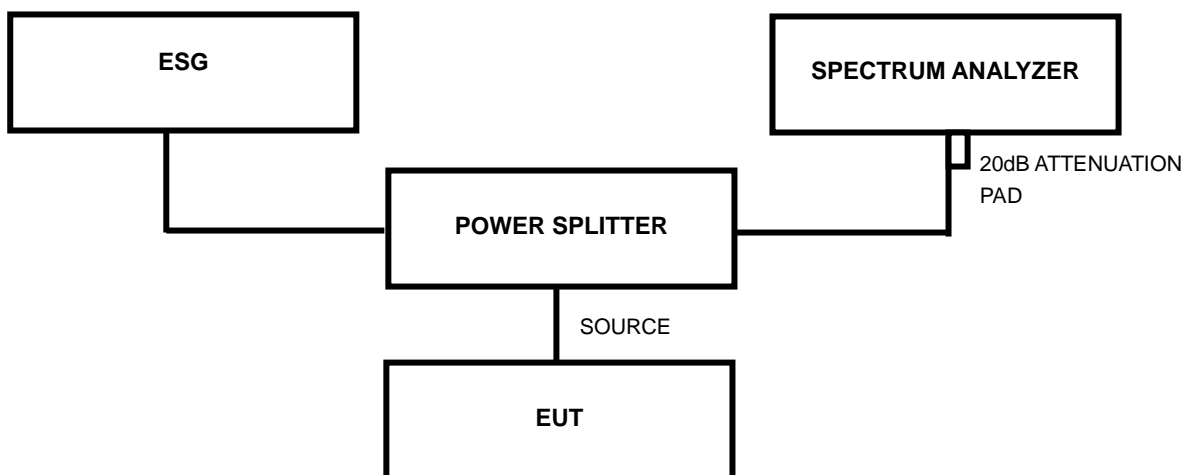
The test results was recorded in Report No.:RXA1706-0199RF04R1

4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.3.2 TEST SETUP



4.3.3 TEST PROCEDURES

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.4 EUT OPERATING CONDITIONS

Same as 4.1.4.



Test Report No.: RF180724W016-6

4.3.5 TEST RESULTS

The test results was recorded in Report No.:RXA1706-0199RF04R1

4.4 EMISSION MASK MEASUREMENT

4.4.1 LIMITS OF EMISSION MASK MEASUREMENT

Emission mask shall comply with 90.210(a)

For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

4.4.2 TEST PROCEDURES

1. The power was measured with Agilent Spectrum Analyzer. All measurements were done at 1 channel.
2. The measurement used the power splitter via EUT RF power connector between signal generator and spectrum analyzer.
3. Record the test plot.

4.4.3 TEST SETUP

Same as Item 4.3.3

4.4.4 EUT OPERATING CONDITIONS

Same as 4.1.4.

4.4.5 TEST RESULTS

The test results was recorded in Report No.:RXA1706-0199RF04R1

4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB

4.5.2 TEST PROCEDURE

- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 9 kHz to 9GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

4.5.3 TEST SETUP

Same as 4.3.3

4.5.4 EUT OPERATING CONDITIONS

Same as 4.1.4.

4.5.5 TEST RESULTS

The test results was recorded in Report No.:RXA1706-0199RF04R1

4.6 RADIATED EMISSION MEASUREMENT

4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

(1) The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

(2) For operations in the 763–775 MHz and 793–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

4.6.2 TEST INSTRUMENTS

Same as 4.1.2.

4.6.3 TEST PROCEDURES

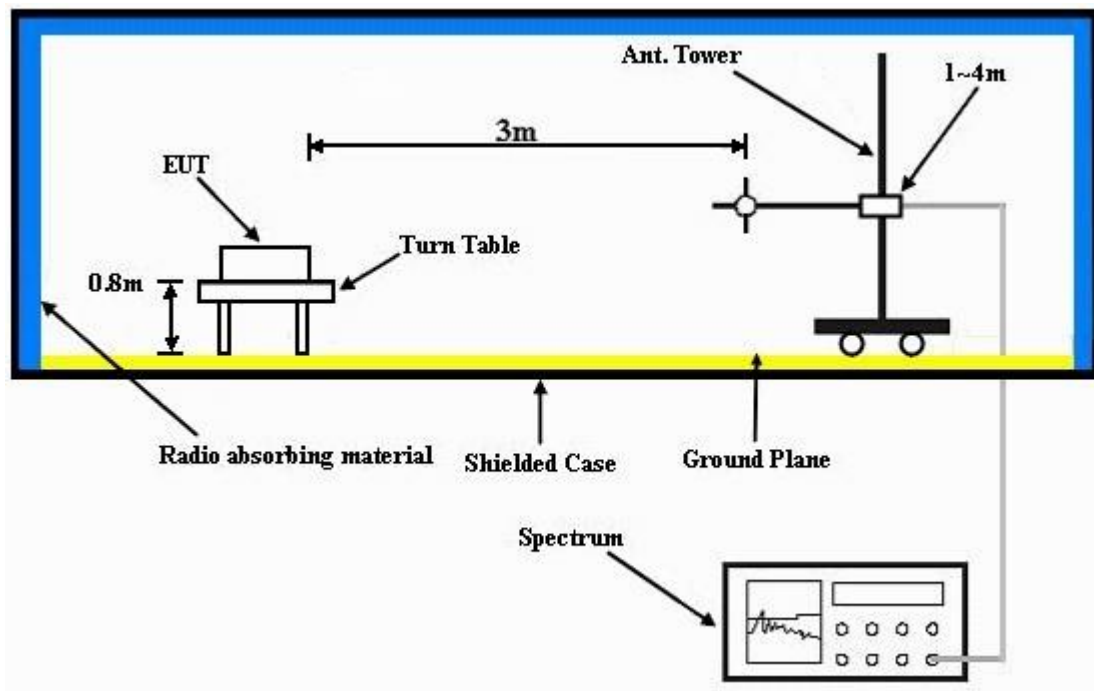
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.
- c. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading and recorded the value.
- d. Repeat step a ~ c for horizontal polarization.

NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.6.6 EUT OPERATING CONDITIONS

Same as 4.1.4.

4.6.7 TEST RESULTS

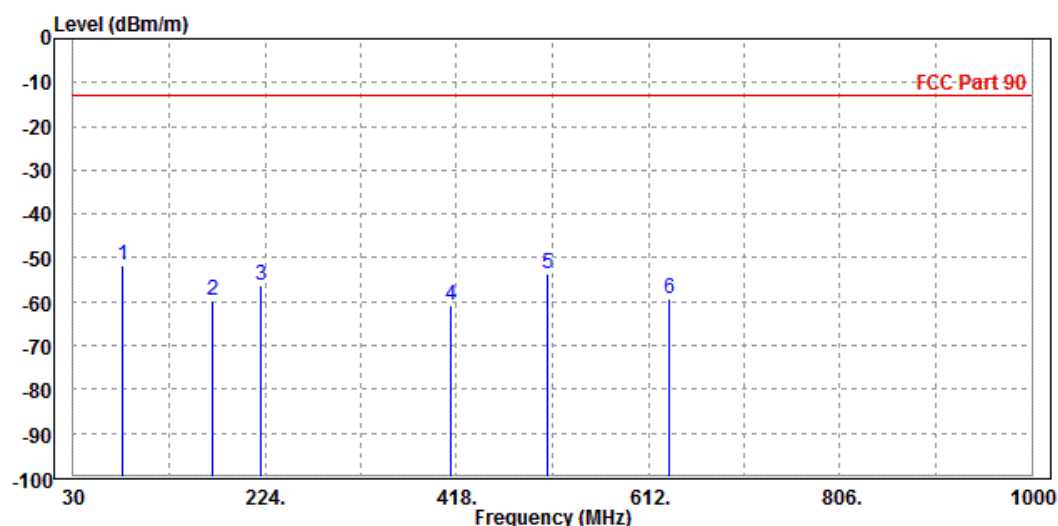
BELOW 1GHz WORST-CASE DATA

30 MHz – 1GHz data:

LTE Band 26:

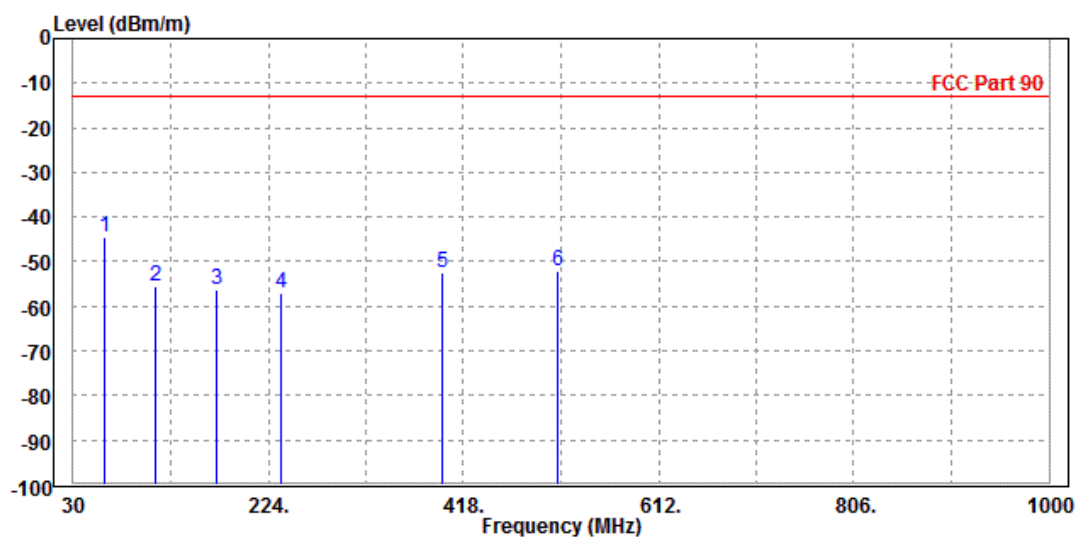
MODE	TX channel 26740	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	80.510	-51.56	-43.85	-13.00	-38.56	-7.71	Peak	Horizontal
2	171.420	-59.73	-41.66	-13.00	-46.73	-18.07	Peak	Horizontal
3	220.310	-56.45	-39.60	-13.00	-43.45	-16.85	Peak	Horizontal
4	412.580	-60.81	-50.36	-13.00	-47.81	-10.45	Peak	Horizontal
5	510.520	-53.68	-43.48	-13.00	-40.68	-10.20	Peak	Horizontal
6	632.470	-59.40	-51.79	-13.00	-46.40	-7.61	Peak	Horizontal



MODE	TX channel 26740	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	61.230	-44.30	-31.53	-13.00	-31.30	-12.77	Peak	Vertical
2	112.540	-55.34	-43.01	-13.00	-42.34	-12.33	Peak	Vertical
3	173.260	-56.38	-42.50	-13.00	-43.38	-13.88	Peak	Vertical
4	236.570	-57.22	-45.94	-13.00	-44.22	-11.28	Peak	Vertical
5	396.230	-52.60	-41.65	-13.00	-39.60	-10.95	Peak	Vertical
6	510.960	-52.02	-44.76	-13.00	-39.02	-7.26	Peak	Vertical



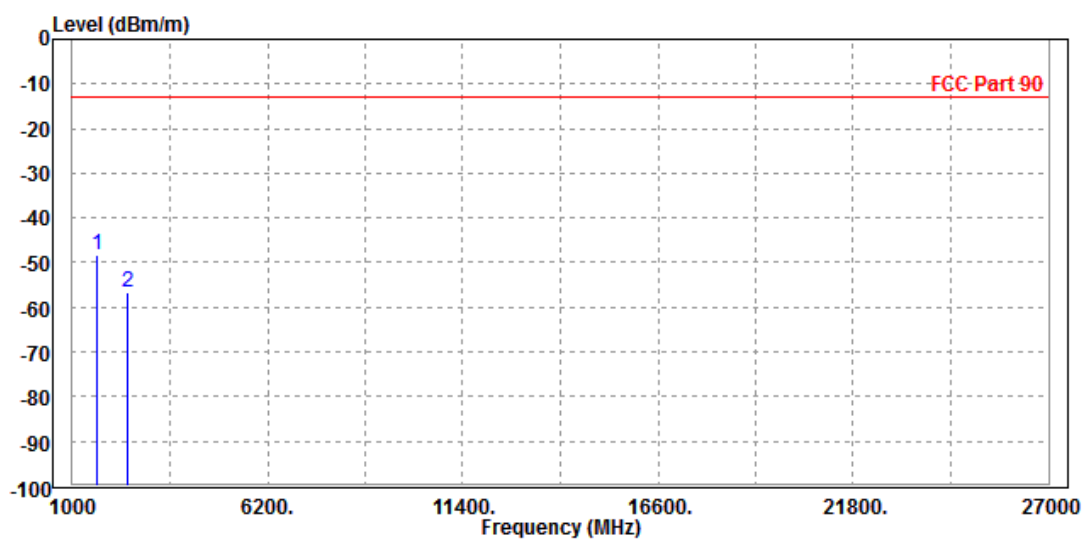
ABOVE 1GHz

LTE Band 26

CHANNEL BANDWIDTH: 1.4MHz / QPSK

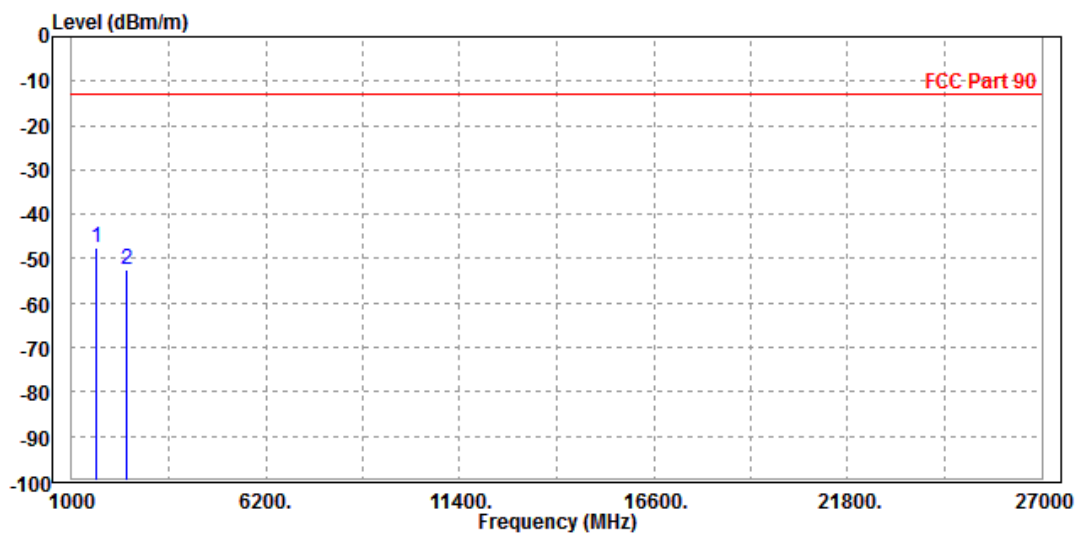
MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1638.000	-48.38	-43.33	-13.00	-35.38	-5.05	Peak	Horizontal
2	2457.000	-56.70	-55.03	-13.00	-43.70	-1.67	Peak	Horizontal



MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

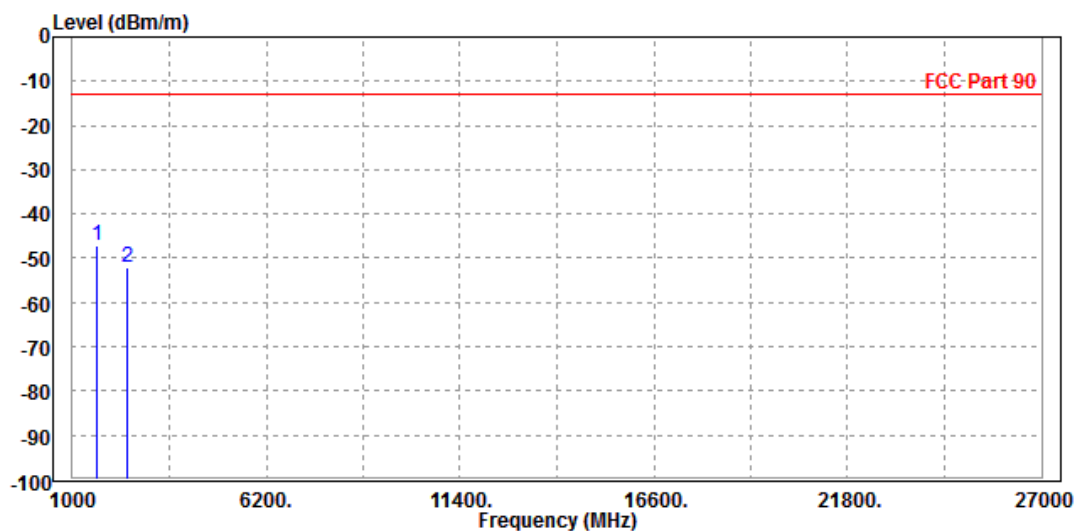
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1638.000	-47.53	-43.89	-13.00	-34.53	-3.64	Peak	Vertical
2	2457.000	-52.47	-52.29	-13.00	-39.47	-0.18	Peak	Vertical



CHANNEL BANDWIDTH: 3MHz / QPSK

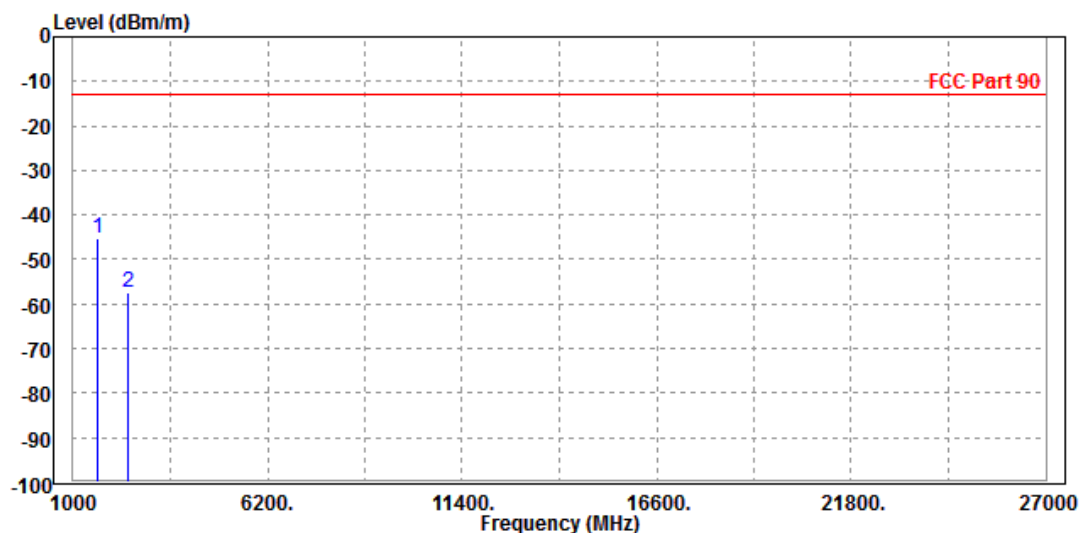
MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

			Read	Limit	Over			
	Freq	Level	Level	Line	Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1638.000	-47.26	-42.21	-13.00	-34.26	-5.05	Peak	Horizontal
2	2457.000	-51.95	-50.28	-13.00	-38.95	-1.67	Peak	Horizontal



MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1638.000	-45.15	-41.51	-13.00	-32.15	-3.64	Peak	Vertical
2	2457.000	-57.30	-57.12	-13.00	-44.30	-0.18	Peak	Vertical

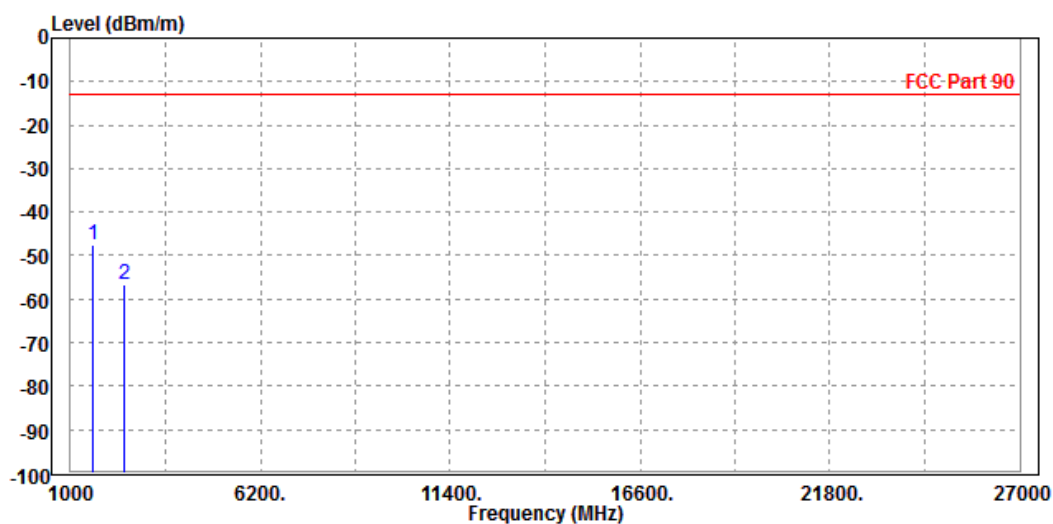


CHANNEL BANDWIDTH: 5MHz / QPSK

CH26715

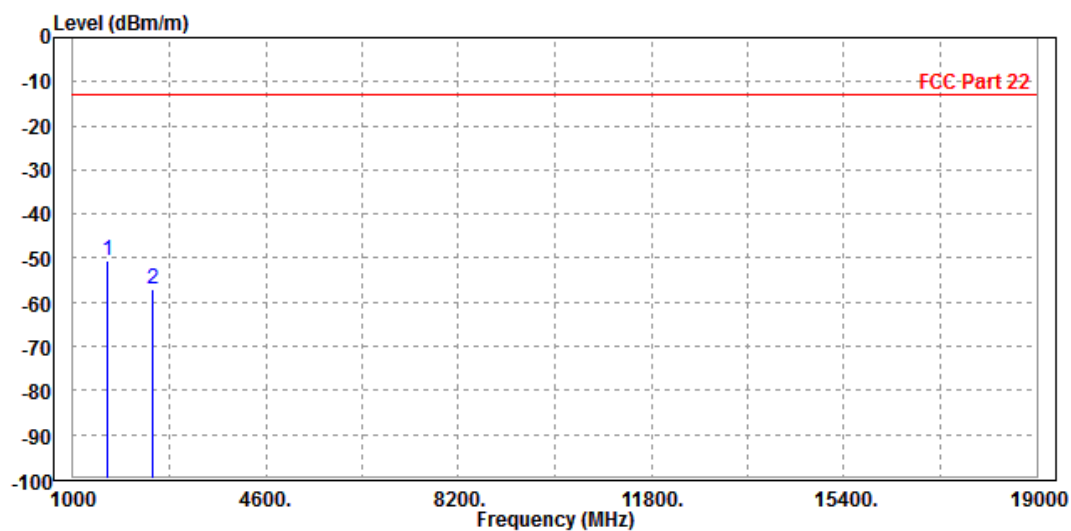
MODE	TX channel 26715	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1633.000	-47.60	-42.51	-13.00	-34.60	-5.09	Peak	Horizontal
2	2449.000	-56.77	-55.09	-13.00	-43.77	-1.68	Peak	Horizontal



MODE	TX channel 26715	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

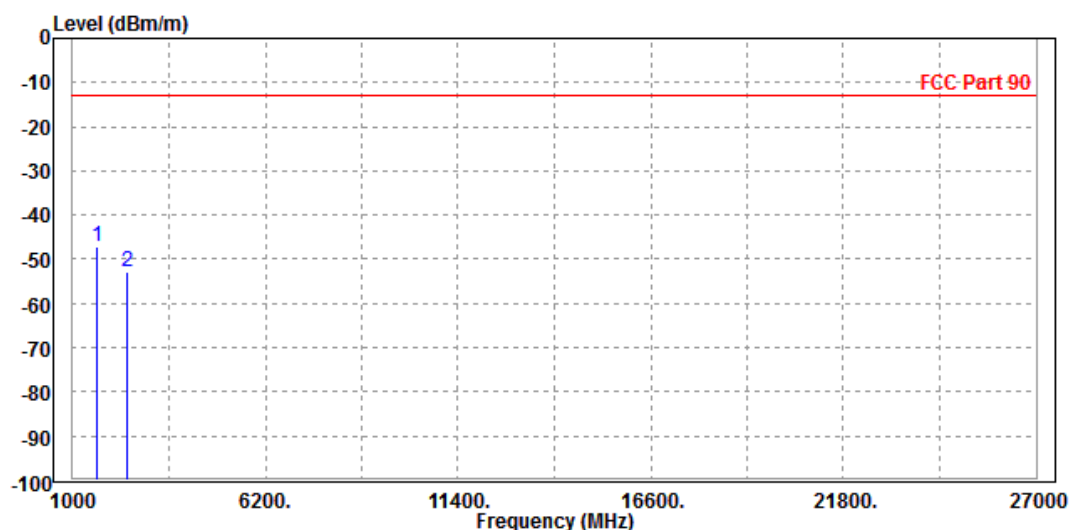
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1650.000	-50.63	-47.10	-13.00	-37.63	-3.53	Peak	Vertical
2	2493.000	-56.86	-56.69	-13.00	-43.86	-0.17	Peak	Vertical



CH26740

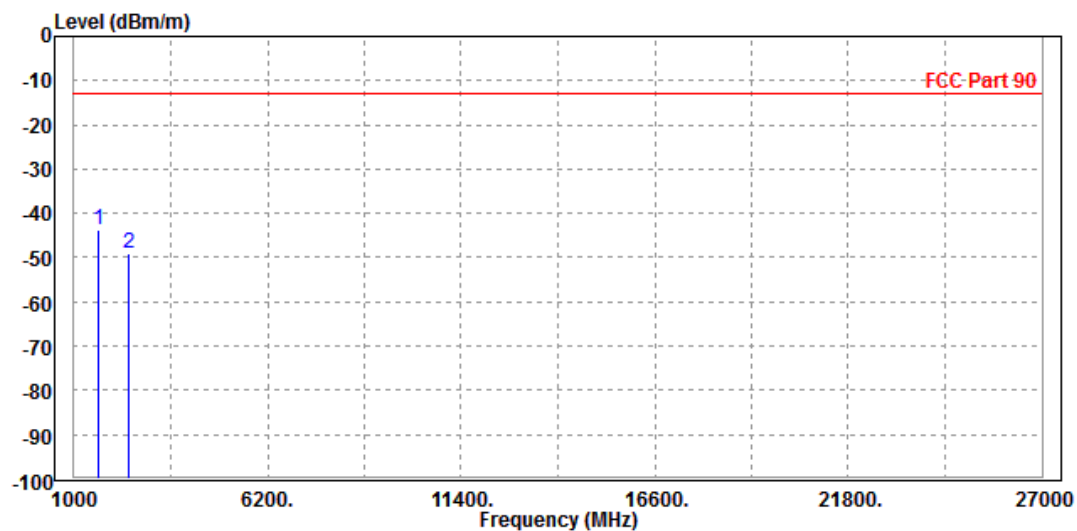
MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1638.000	-47.18	-42.13	-13.00	-34.18	-5.05	Peak	Horizontal
2	2457.000	-52.70	-51.03	-13.00	-39.70	-1.67	Peak	Horizontal



MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

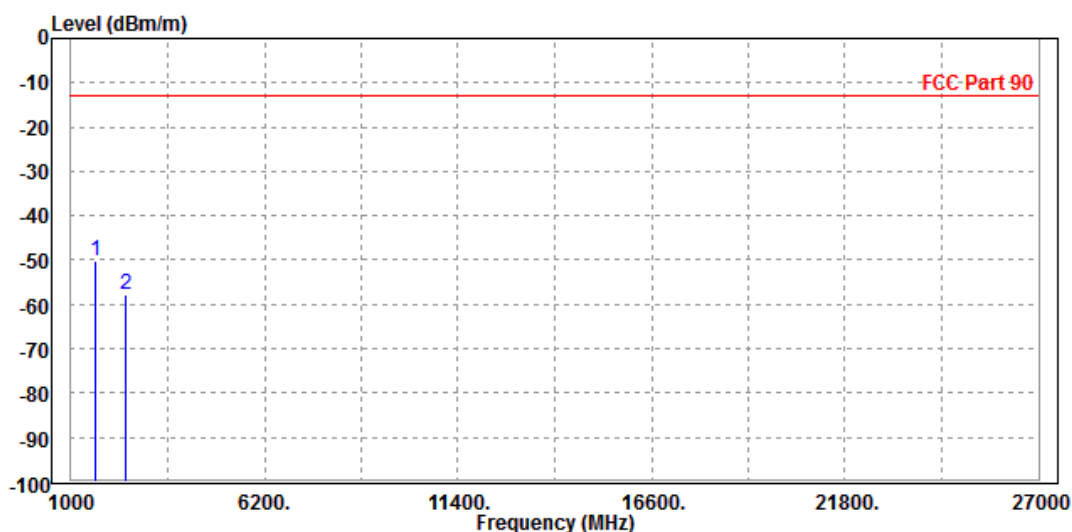
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1638.000	-43.82	-40.18	-13.00	-30.82	-3.64	Peak	Vertical
2	2457.000	-49.20	-49.02	-13.00	-36.20	-0.18	Peak	Vertical



CH26765

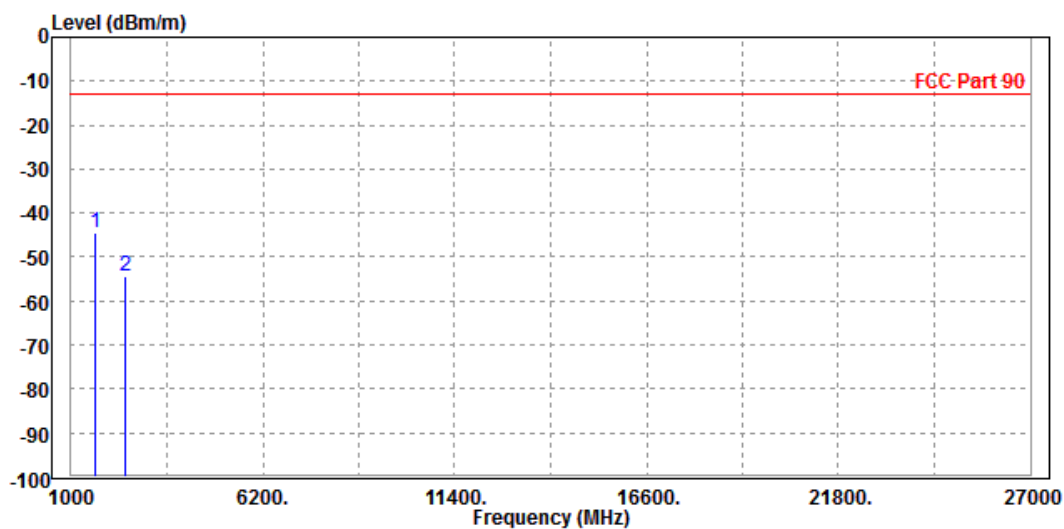
MODE	TX channel 26765	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1643.000	-50.09	-45.08	-13.00	-37.09	-5.01	Peak	Horizontal
2		2464.000	-57.67	-56.01	-13.00	-44.67	-1.66	Peak	Horizontal



MODE	TX channel 26765	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

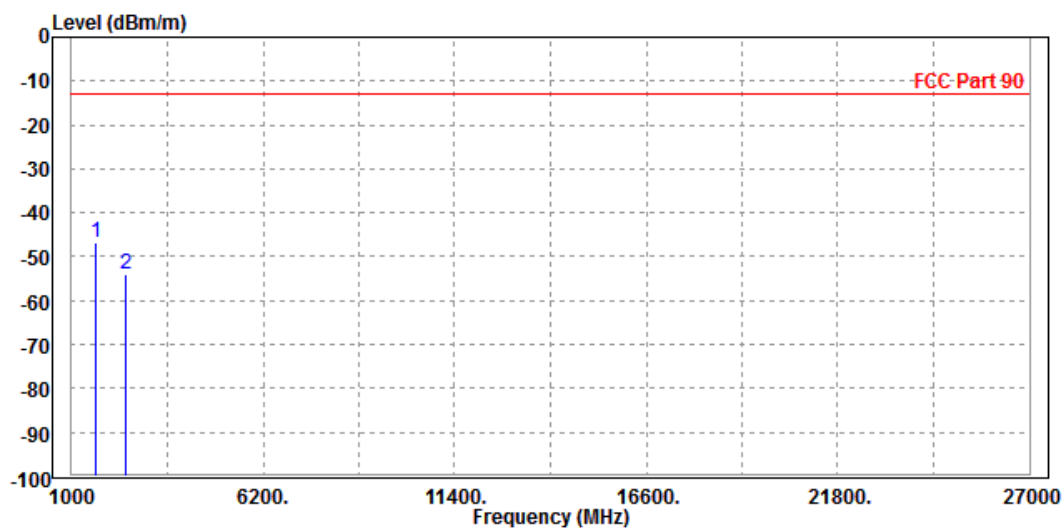
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1643.000	-44.67	-41.07	-13.00	-31.67	-3.60	Peak	Vertical
2	2464.000	-54.25	-54.08	-13.00	-41.25	-0.17	Peak	Vertical



CHANNEL BANDWIDTH: 10MHz / QPSK

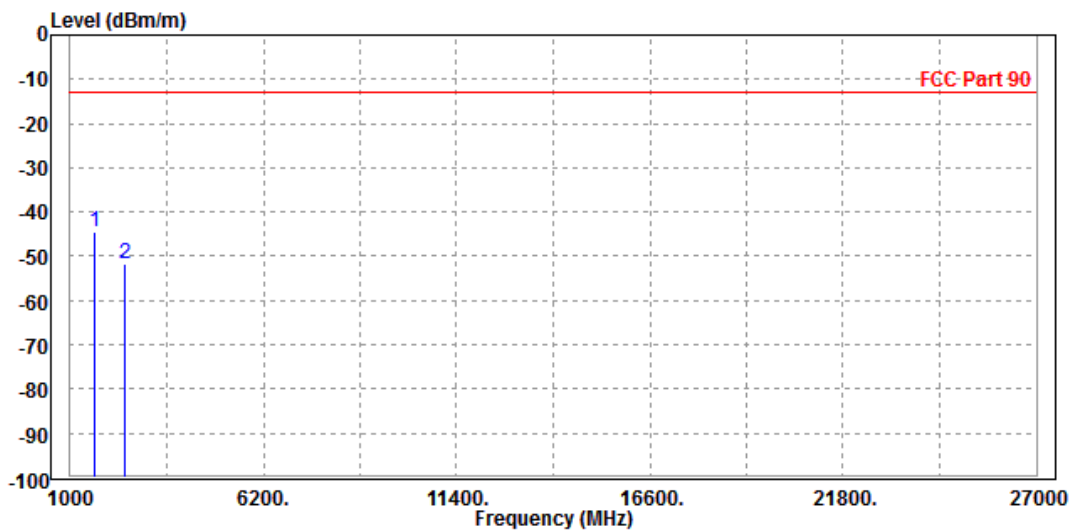
MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1638.000	-46.61	-41.56	-13.00	-33.61	-5.05	Peak	Horizontal
2	2457.000	-54.05	-52.38	-13.00	-41.05	-1.67	Peak	Horizontal



MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Vincent Chen		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1638.000	-44.33	-40.69	-13.00	-31.33	-3.64	Peak	Vertical
2	2457.000	-51.65	-51.47	-13.00	-38.65	-0.18	Peak	Vertical





Test Report No.: RF180724W016-6

5 INFORMATION ON THE TESTING LABORATORIES

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Shenzhen EMC/RF Lab:

Tel: +86 755 8869 6566

Fax: +86 755 8869 6577

Email: customerservice.dg@cn.bureauveritas.com

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---