FCC PART 15.247

TEST REPORT

For

ZTE TRUNKING TECHNOLOGY CORPORATION

4/F, R&D Building 1, ZTE Industrial Park, LiuXian Road, Xili, Nanshan District, Shenzhen, P.R.China

FCC ID: 2AEKCPH7X0U1

Report Type:	Product Type:
Class II Permissive Change	DIGITAL PORTABLE RADIO

Report Number:	RSZ161008001-00BA1
Report Date:	2017-01-16
Reviewed By:	Oscar Ye Engineer
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *ZTE TRUNKING TECHNOLOGY CORPORATION*'s product, model number: PH700 U(1) *(FCC ID: 2AEKCPH7X0U1)* or the "EUT" in this report was a *DIGITAL PORTABLE RADIO,* which was measured approximately: 150 mm (L) x 60 mm (W) x 38 mm (H), rated with input voltage: DC 7.4 V rechargeable battery.

** All measurement and test data in this report was gathered from production sample serial number: 1603361. (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2016-10-08.*

Objective

This report is prepared on behalf of *ZTE TRUNKING TECHNOLOGY CORPORATION* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

This is a CIIPC application of the device, the differences between the original device and the current one are as follows:

(1) Changing the model name to "PH700 U(1)".

(2) Changing the appearance of EUT, which remove the screen and keypad from the EUT.

(3) Changing the Bluetooth antenna.

For the change made to the device, the test item "Radiated Emissions" and "Maximum Conducted Output Power" were performed.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS and Part 90 TNF submissions with FCC ID: 2AEKCPH7X0U1.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		±3.26 dB
RF conducted test with spectrum		±0.9dB
RF Output Power with Power meter		±0.5dB
Radiated emission	30MHz~1GHz	±5.91dB
	Above 1G	±4.92dB
Occupied Bandwidth		±0.5kHz
Temperature		±1.0℃
Humidity		±6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10-2013.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineer mode.

Special Accessories

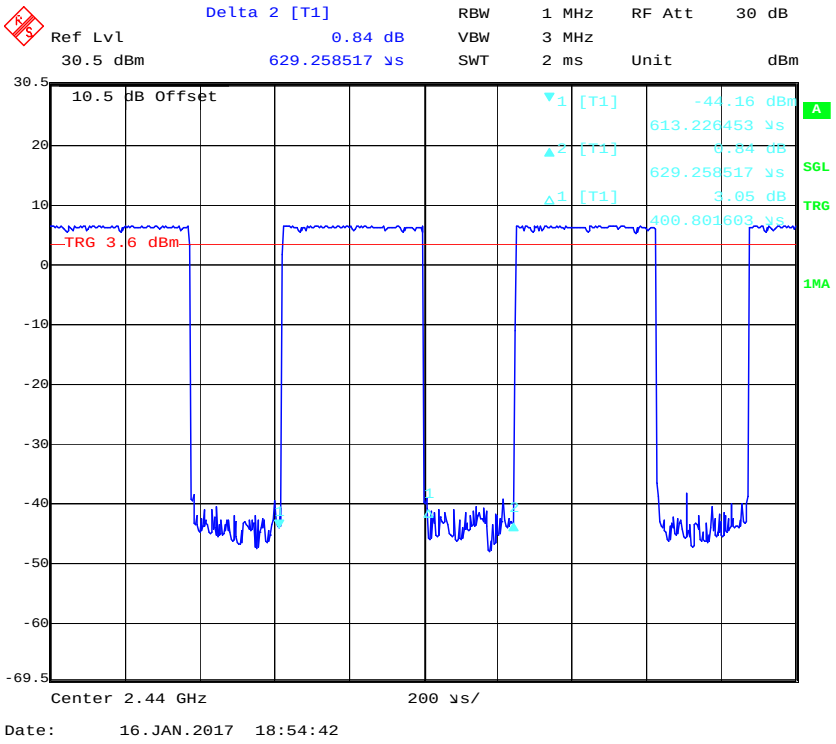
No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Duty cycle

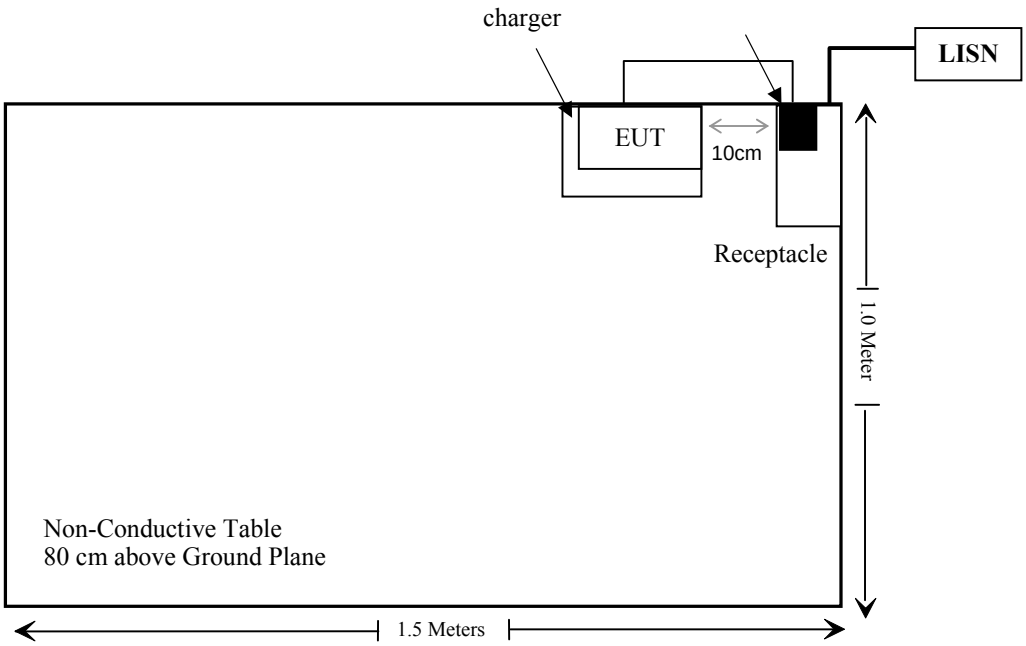
BLE Mode



Band	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting	10log(1/x)
BLE	63.7	400.8	2.50	3kHz	1.96

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1)& §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance*
§15.247(b)(3)	Maximum Conducted Output Power	Compliance*
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance*
§15.247(e)	Power Spectral Density	Compliance*

Compliance*: Please referred to original report with FCC ID: 2AEKCPH7X0U1 granted on 2016-09-19, which was tested by Bay Area Compliance Laboratories Corp. (Shenzhen).

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	834115/007	2016-11-25	2017-11-25
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-10
Rohde & Schwarz	Pulse limiter	ESH3-Z2	879940/0058	2016-06-18	2017-06-17
MICRO-COAX	Coaxial line	UFB-293B-1-0480-50X50	97F0173	2016-09-08	2017-09-08
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	NCR	NCR
Radiation test					
Sonoma Instrunent	Amplifier	330	171377	2016-09-16	2017-09-16
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-07	2016-11-06
Mini	Pre-amplifier	ZVA-183-S+	857001418	2016-09-16	2017-09-15
DUCOMMUN	Pre-amplifier	ALN-22093530-01	990147	2016-09-16	2017-09-15
EMCO	Horn Antenna	3116	9510-2384	2015-11-07	2016-11-06
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
ETS	Horn Antenna	3115	6229	2015-11-07	2016-11-06
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-06-16	2016-12-15
BACL	RF cable	KS-LAB-010	KS-LAB-010	2015-12-16	2016-12-15

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.247 (i), §1.1307 (b) (1) & §2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Measurement Result

For worst case:

Mode	Frequency (MHz)	Max Tune-up Conducted Power (dBm)	Max Tune-up Conducted Power (mW)	Calculated Distance (mm)	Calculated value	Threshold (1-g SAR)	SAR Test Exclusion
BLE	2480	6.5	4.47	5	1.4	3.0	Yes

Result: No SAR test is required

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the 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 6 dBi.

Antenna Connector Construction

The EUT has one internal antenna arrangement, which was permanently attached and the antenna gain is -2 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

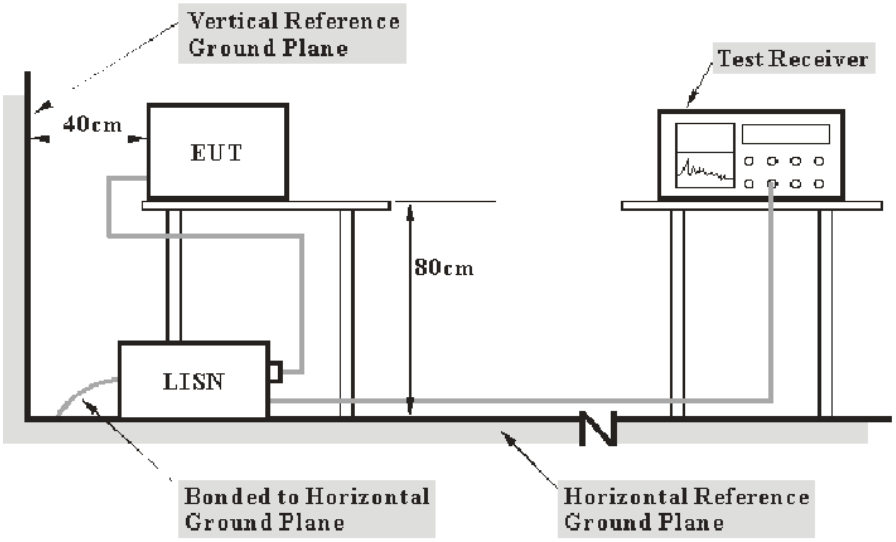
Result: Compliance.

FCC §15.207 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.207

EUT Setup



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

The measurement procedure of EUT setup is according with per ANSI C63.4-2014. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL., $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

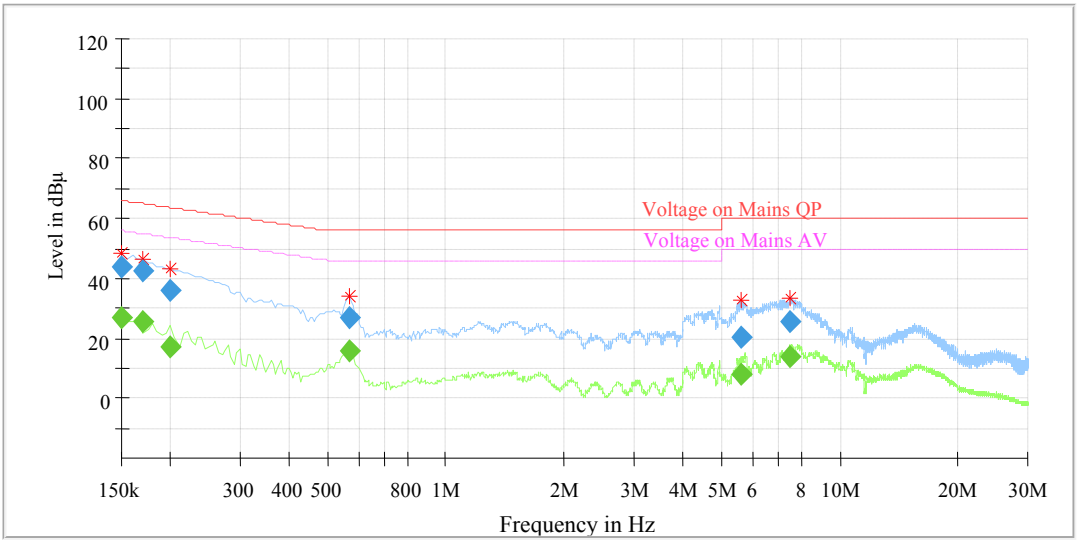
Environmental Conditions

Temperature:	23.5 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2017-01-16.

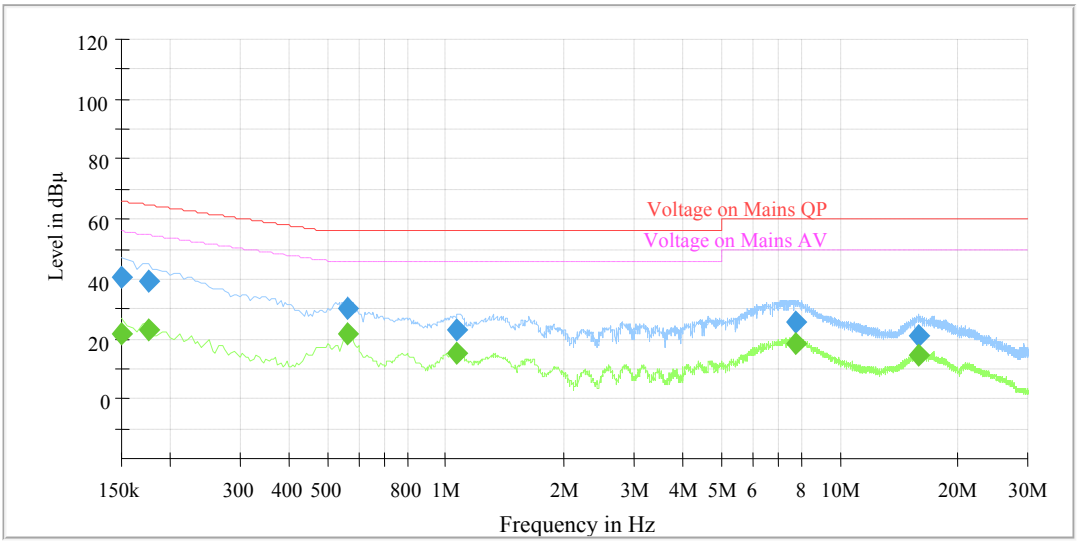
EUT Operation Mode: charging & transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	---	27.04	9.000	L1	10.3	28.96	56.00	Compliance
0.150000	43.92	---	9.000	L1	10.3	22.08	66.00	Compliance
0.170000	---	25.57	9.000	L1	10.3	29.39	54.96	Compliance
0.170000	42.28	---	9.000	L1	10.3	22.68	64.96	Compliance
0.200000	---	17.01	9.000	L1	10.3	36.60	53.61	Compliance
0.200000	35.87	---	9.000	L1	10.3	27.74	63.61	Compliance
0.570000	---	15.58	9.000	L1	10.3	30.42	46.00	Compliance
0.570000	27.19	---	9.000	L1	10.3	28.81	56.00	Compliance
5.635000	---	7.83	9.000	L1	10.5	42.17	50.00	Compliance
5.635000	20.39	---	9.000	L1	10.5	39.61	60.00	Compliance
7.510000	---	13.75	9.000	L1	10.5	36.25	50.00	Compliance
7.510000	25.34	---	9.000	L1	10.5	34.66	60.00	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	---	21.96	9.000	N	10.3	34.04	56.00	Compliance
0.150000	40.47	---	9.000	N	10.3	25.53	66.00	Compliance
0.175000	---	23.03	9.000	N	10.3	31.69	54.72	Compliance
0.175000	39.20	---	9.000	N	10.3	25.52	64.72	Compliance
0.565000	---	21.36	9.000	N	10.3	24.64	46.00	Compliance
0.565000	30.03	---	9.000	N	10.3	25.97	56.00	Compliance
1.070000	---	15.18	9.000	N	10.3	30.82	46.00	Compliance
1.070000	22.74	---	9.000	N	10.3	33.26	56.00	Compliance
7.755000	---	18.43	9.000	N	10.6	31.57	50.00	Compliance
7.755000	25.61	---	9.000	N	10.6	34.39	60.00	Compliance
15.935000	---	14.49	9.000	N	10.5	35.51	50.00	Compliance
15.935000	21.30	---	9.000	N	10.5	38.70	60.00	Compliance

Note:

1) Corrected Amplitude = Reading + Correction Factor
2) Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation
3) Margin = Limit – Corrected Amplitude

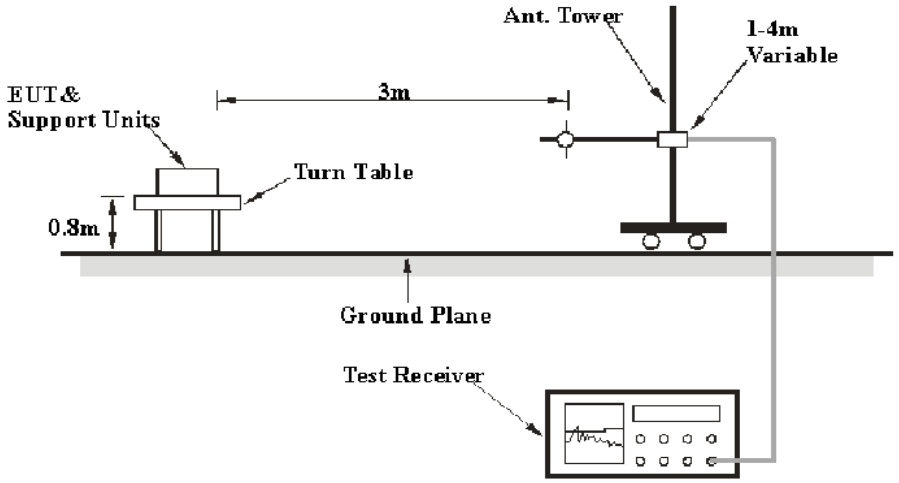
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

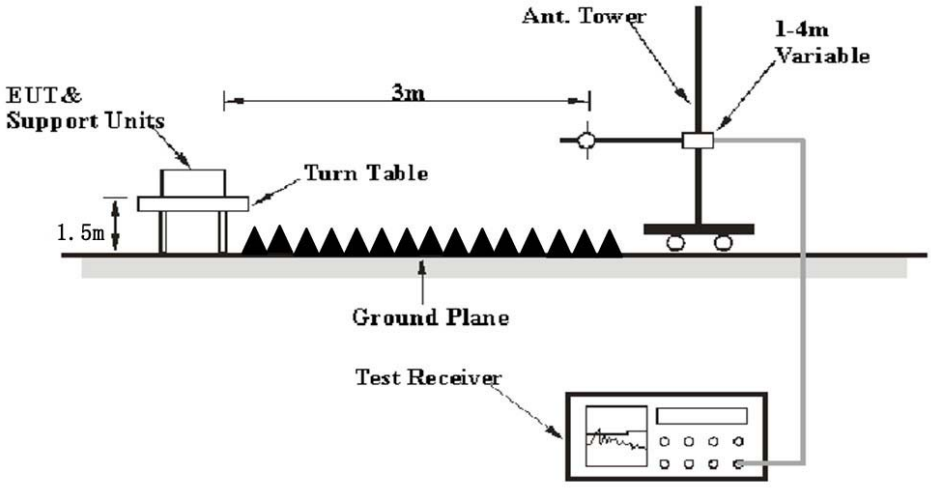
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Ave.
	1MHz	＞1/T Note 2	/	Ave.

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2016-10-13.

EUT operation mode: Transmitting

30 MHz-25 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2402 MHz)									
932.51	36.32	QP	57	1.2	H	-4.07	32.25	46	13.75
2402.00	89.22	PK	142	1.3	H	-3.04	86.18	/	/
2402.00	83.24	Ave.	142	1.3	H	-3.04	80.20	/	/
2402.00	88.57	PK	223	1.7	V	-3.04	85.53	/	/
2402.00	82.70	Ave.	223	1.7	V	-3.04	79.66	/	/
2381.63	41.26	PK	352	2.3	H	-3.06	38.20	74	35.80
2381.63	27.54	Ave.	352	2.3	H	-3.06	24.48	54	29.52
2389.91	41.88	PK	85	1.5	H	-3.05	38.83	74	35.17
2389.91	27.53	Ave.	85	1.5	H	-3.05	24.48	54	29.52
2483.87	41.14	PK	75	2.2	H	-2.99	38.15	74	35.85
2483.87	27.62	Ave.	75	2.2	H	-2.99	24.63	54	29.37
4804.00	43.78	PK	151	2.1	V	7.16	50.94	74	23.06
4804.00	34.86	Ave.	151	2.1	V	7.16	42.02	54	11.98

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2440 MHz)									
932.51	36.01	QP	27	1.6	H	-4.07	31.94	46	14.06
2440.00	92.30	PK	294	2.1	H	-3.02	89.28	/	/
2440.00	87.34	Ave.	294	2.1	H	-3.02	84.32	/	/
2440.00	90.22	PK	193	2.2	V	-3.02	87.20	/	/
2440.00	83.34	Ave.	193	2.2	V	-3.02	80.32	/	/
2383.56	40.80	PK	14	2.1	H	-3.05	37.75	74	36.25
2383.56	27.53	Ave.	14	2.1	H	-3.05	24.48	54	29.52
2388.78	41.36	PK	83	1.2	H	-3.05	38.31	74	35.69
2388.78	27.53	Ave.	83	1.2	H	-3.05	24.48	54	29.52
2485.31	41.29	PK	181	1.7	H	-2.99	38.30	74	35.70
2485.31	27.62	Ave.	181	1.7	H	-2.99	24.63	54	29.37
4880.00	44.10	PK	314	1.5	V	7.28	51.38	74	22.62
4880.00	34.14	Ave.	314	1.5	V	7.28	41.42	54	12.58
High Channel (2480 MHz)									
932.51	36.23	QP	128	2.3	H	-4.07	32.16	46	13.84
2480.00	97.30	PK	292	1.4	H	-2.99	94.31	/	/
2480.00	92.15	Ave.	292	1.4	H	-2.99	89.16	/	/
2480.00	93.61	PK	330	2.2	V	-2.99	90.62	/	/
2480.00	87.30	Ave.	330	2.2	V	-2.99	84.31	/	/
2387.35	41.53	PK	106	1.3	H	-3.05	38.48	74	35.52
2387.35	27.53	Ave.	106	1.3	H	-3.05	24.48	54	29.52
2483.51	58.79	PK	274	1.3	H	-2.99	55.80	74	18.20
2483.51	48.21	Ave.	274	1.3	H	-2.99	45.22	54	**8.78**
2484.23	57.15	PK	176	2.4	H	-2.99	54.16	74	19.84
2484.23	47.09	Ave.	176	2.4	H	-2.99	44.10	54	9.90
4960.00	41.20	PK	179	1.9	V	7.40	48.60	74	25.40
4960.00	29.10	Ave.	179	1.9	V	7.40	36.50	54	17.50

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude
The other spurious emission which is 20dB to the limit was not recorded.

******* END OF REPORT *******