



Spectrum Research & Testing Lab., Inc.

No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li Dist., Taoyuan City 320, Taiwan (R.O.C.)

TEST REPORT

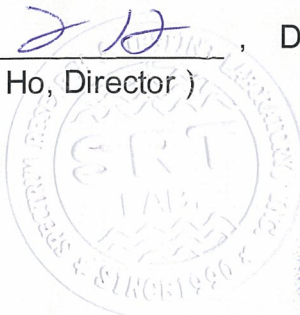
Reference No.: A16031604
Report No.: FCCA16031604
FCC ID : 2AHQ5X3ALARM
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Date: May. 10, 2016

Product Name: Alarm (TX)
Model No.: X3ALARM
Applicant: Source Global Taiwan
4F, No. 665-1, Sec. 1, Renai Road Linkou District,
New Taipei City, 24449 Taiwan
Date of Receipt: Mar. 16, 2016
Finished date of Test: Mar. 31, 2016
Applicable Standards: 47 CFR Part 15, Subpart C
47 CFR Part 15, Subpart B
ANSI C63.4: 2009

We, **Spectrum Research & Testing Laboratory Inc.**, hereby certify that one sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Tested By : Boris Lin , Date: 05 / 10 / 2016
(Boris Lin)

Approved By : JH , Date: 5/10/2016
(Johnson Ho, Director)



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Revisions History

Report No.	Issue Date	Revisions
FCCA16031604	Apr. 01, 2016	Initial issue
	May 10, 2016	FCC ID Revised



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1. DOCUMENT POLICY AND TEST STATEMENT

1.1 DOCUMENT POLICY

- The report shall not be reproduced except in full, without the written approval of SRT Lab, Inc.

1.2 TEST STATEMENT

- The test results in the report apply only to the unit tested by SRT Lab.
- There was no deviation from the requirements of test standards during the test.
- AC 120V/60Hz for PC USB port was used during the test.

1.3 EUT MODIFICATION

- No modification in SRT Lab.

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2. DESCRIPTION OF EUT AND TEST MODE**2.1 GENERAL DESCRIPTION OF EUT**

PRODUCT	Alarm (TX)
MODEL NO.	X3ALARM
POWER SUPPLY	AC power source of PC for USB port : AC 120V/60Hz
CABLE	NA
CARRIER FREQUENCY	434 MHz
NUMBER OF CHANNEL	1
RATED RF OUTPUT POWER	69.14 dBuV/m = -37.80 dBm = 0.164 μ W
MODULATION TYPE	FSK
MODE OF OPERATION	Simplex
ANTENNA TYPE	Coil Antenna
ANTENNA GAIN	1.0 dBi
OPERATING TEMPERATURE RANGE	-20 ~ 50 °C

NOTE: For more detailed information, please refer to the EUT's specification or user's manual provided by the manufacturer.

2.3 DESCRIPTION OF EUT INTERNAL DEVICE

DEVICE	BRAND / MAKER	MODEL #	FCC ID / DOC	REMARK
Lithium-Ion Battery	N/A	JP 502248	N/A	3.7 V / 500 mAh

2.4 EUT OPERATING CONDITION

1. Setup the EUT and all peripheral devices.
2. Turn on the power of all equipments and EUT.
3. Set the EUT under continuous transmission, standby and link modes.
4. The EUT was set to the highest available power level.

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2.5 DESCRIPTION OF TEST MODE

Mode			Frequency
1	Tx	Tx	434 MHz
2		Standby	NA
3	Rx	Link	NA

NOTE: The axis X,Y and Z we evaluate in chamber, the X axis is worst case.

X axis:

Y axis:

Z axis:



2.6 DESCRIPTION OF SUPPORT UNIT

The EUT was configured by the requirement of ANSI C63.4:2009. All interface ports were connected to the appropriate support units via specific cables. The support units and cables are listed below.

NO	DEVICE	BRAND	MODEL #	FCC ID/DOC	CABLE
1	PC	ASUS	CM6730	DoC	1.8m unshielded power cable
2	LCD Monitor	Dell	U2410Mb	DoC	1.8m unshielded power cable 1.5m shielded data cable
3	Keyboard	WinTEK	WM530	DoC	1.8m unshielded data cable.
4	Mouse	WinTEK	WSS30	DoC	1.5m unshielded data cable.
5	Printer	HP	C8991A	DoC	1.5m unshielded power cable 1.5m shielded data cable
6	USB 2.0 HDD	Terasys	F-12U	DoC	1.5m unshielded data cable.
7	Alarm Receiver Unit (RX)	Source Global	X3ALARM	2AHQ5X3Alarm	Rx Alarm (434 MHz)
8	Micro-USB Cable	N/A	N/A	N/A	0.5m unshielded power cable
9	Micro-USB Cable	N/A	N/A	N/A	1.0m unshielded power cable

NOTE: For the actual test configuration, please refer to the photos of testing.

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3. DESCRIPTION OF APPLIED STANDARDS

The EUT is a wireless product. According to the specifications provided by the applicant, it must comply with the requirements of the following standards:

47 CFR Part 15, Subpart C

47 CFR Part 15, Subpart B

ANSI C63.4: 2009

All tests have been performed and recorded as the above standards.

3.1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

STANDARD SECTION	TEST TYPE AND LIMIT RESULTS	RESULTS
15.207	AC Power Conducted Emission	PASS
15.231(a)	RELEASE OR OPERATING TIME Limit: max. 5 seconds	PASS
15.231(c)	20dB bandwidth Limit: $0.25\% \times \text{Center Frequency}$	PASS
15.231(b) 15.33(a) 15.209	FUNDAMENTAL & SPURIOUS RADIATED EMISSION	PASS

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4.1 CONDUCTED EMISSION TEST

4.1.1 LIMIT

Frequency (MHz)	Class A (dBμV)		Class B (dBμV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST EQUIPMENT

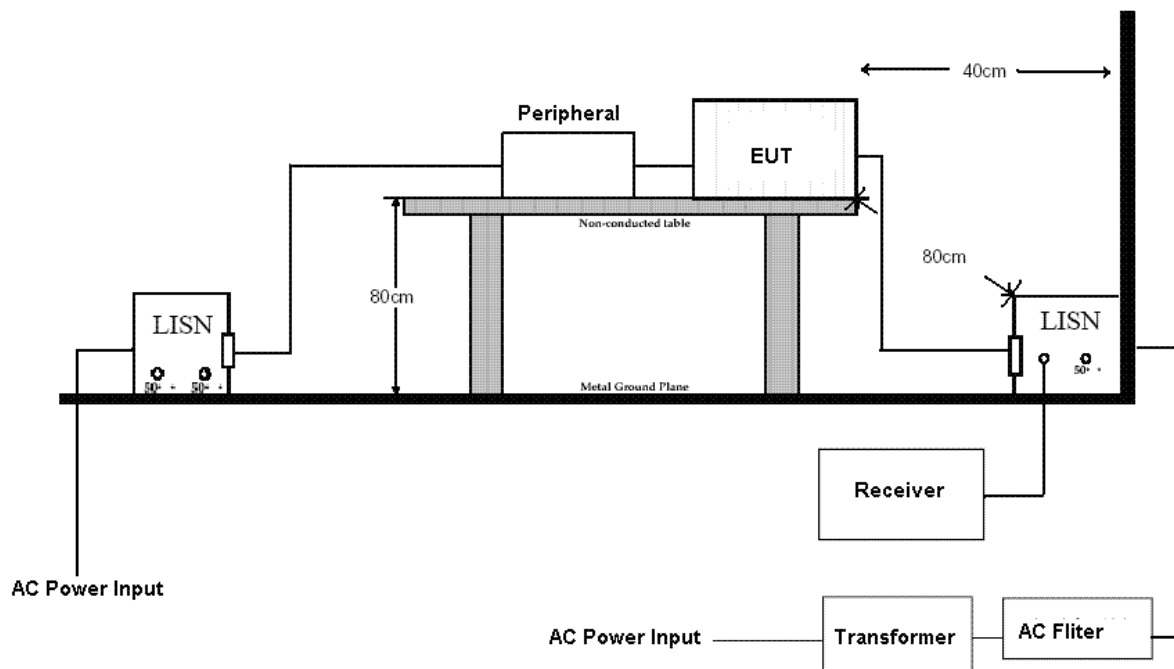
The following test equipment was used for the test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	CAIBRATION DATE
EMI TEST RECEIVER	9 kHz ~ 2.75 GHz	ROHDE & SCHWARZ	ESCS30 / 100376	DEC. 16, 2015 ETC
EMI TEST RECEIVER	9 kHz ~ 30 MHz	ROHDE & SCHWARZ	ESHS30 / 826003/008	JAN. 22, 2016 ETC
LISN	50 μH, 50 ohm	FCC	FCC-LISN-50-25-2 / 01017	JUN. 21, 2015 ETC
LISN	50 μH, 50 ohm	SOLAR	9252-50-R-24-BNC/ 951315	OCT. 21, 2015 ETC
LISN	50 μH, 50 ohm	EMCO	3825/2/ 9204-1952	JUN. 06, 2015 ETC
50Ω BNC TYPE TERMINATOR	50 ohm	N/A	B00-CD-204/ L1TEQU008	JUN. 24, 2015 ETC
50Ω BNC TYPE TERMINATOR	50 ohm	N/A	B00-CD-357/ L1TEQU009	JUN. 24, 2015 ETC
COAXIAL CABLE	5 m	HUBER+SUHNER	RG214/U / #5M(L1TCAB013)	MAY. 21, 2015 ETC
FILTER	2 LINE, 30 A	FIL.COIL	FC-943 / 771	NCR
GROUND PLANE	2 m (H) x 3 m (W)	SRT	N/A	NCR
GROUND PLANE	2.5 m (H) x 3 m (W)	SRT	N/A	NCR
PULSE LIMITER	9 kHz ~ 30 MHz	ROHDE & SCHWARZ	ESH3Z2/ L1TTES010	JAN. 07, 2016 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.



4.1.3 TEST SETUP



NOTE :

1. The EUT was put on a wooden table with 0.8m heights above ground plane, and 0.4m away from reference ground plane (> 2mx2m).
2. For the actual test configuration, please refer to the photos of testing.

4.1.4 TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4:2009 and CISPR22:2011. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm/50μH as specified. All readings were quasi-peak and average values with 10 kHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. Both lines of the power mains of EUT were measured and the cables connected to EUT and support units were moved to find the maximum emission levels for each frequency. First, find the margin or higher points at least 6 points by software, then use manual to find the maximum data. The procedure is referred on the test procedure of SRT LAB.

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4.1.5 TEST RESULT

Temperature:	22 °C	Humidity:	69% RH
Tested By:	Boris Lin	Tested Mode:	Tx
Receiver Detector:	Q.P. and AV.	Modulation Type:	FSK
Frequency Range:	0.15 – 30 MHz	Tested Date:	Mar. 31, 2016

Power Line Measured : Line

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBmV)		Emission Level (dBmV)		Limit (dBmV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.300	0.00	36.24	32.26	36.24	32.26	60.25	50.25	-24.01	-17.99
0.303	0.00	35.22	31.89	35.22	31.89	60.16	50.16	-24.94	-18.27
4.012	0.01	30.52	26.13	30.53	26.14	56.00	46.00	-25.47	-19.86
4.507	0.02	35.30	33.54	35.32	33.56	56.00	46.00	-20.68	-12.44
14.602	0.19	29.88	20.23	30.07	20.42	60.00	50.00	-29.93	-29.58
19.684	0.28	35.44	27.40	35.72	27.68	60.00	50.00	-24.28	-22.32

Power Line Measured : Neutral

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBmV)		Emission Level (dBmV)		Limit (dBmV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.903	0.04	28.52	25.73	28.56	25.77	56.00	46.00	-27.44	-20.23
4.457	0.12	37.86	36.74	37.98	36.86	56.00	46.00	-18.02	-9.14
4.764	0.13	37.90	35.24	38.03	35.37	56.00	46.00	-17.97	-10.63
5.061	0.14	36.72	35.41	36.86	35.55	60.00	50.00	-23.14	-14.45
5.365	0.14	35.18	34.14	35.32	34.28	60.00	50.00	-24.68	-15.72
19.684	0.49	35.82	27.19	36.31	27.68	60.00	50.00	-23.69	-22.32

NOTE :

1. Measurement uncertainty is ± 2.91 dB
2. Emission level = Reading value + Correction factor
3. Correction Factor = Cable loss + Insertion loss of LISN
4. Margin value = Emission level - Limit
5. The emission of other frequencies was very low against the limit.
6. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

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Temperature:	22 °C	Humidity:	69% RH
Tested By:	Boris Lin	Tested Mode:	Standby
Receiver Detector:	Q.P. and AV.	Modulation Type:	FSK
Frequency Range:	0.15 – 30 MHz	Tested Date:	Mar. 31, 2016

Power Line Measured : Line

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBmV)		Emission Level (dBmV)		Limit (dBmV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.300	0.00	37.54	33.53	37.54	33.53	60.25	50.25	-22.71	-16.72
0.303	0.00	36.14	32.68	36.14	32.68	60.16	50.16	-24.02	-17.48
4.081	0.01	33.46	30.03	33.47	30.04	56.00	46.00	-22.53	-15.96
4.734	0.02	32.60	29.07	32.62	29.09	56.00	46.00	-23.38	-16.91
14.805	0.20	31.42	22.29	31.62	22.49	60.00	50.00	-28.38	-27.51
17.983	0.25	38.54	26.27	38.79	26.52	60.00	50.00	-21.21	-23.48

Power Line Measured : Neutral

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBmV)		Emission Level (dBmV)		Limit (dBmV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.300	0.04	35.28	31.42	35.32	31.46	60.25	50.25	-24.93	-18.79
4.229	0.12	37.60	36.76	37.72	36.88	56.00	46.00	-18.28	-9.12
4.457	0.12	38.62	37.20	38.74	37.32	56.00	46.00	-17.26	-8.68
5.061	0.14	37.34	36.30	37.48	36.44	60.00	50.00	-22.52	-13.56
5.365	0.14	34.24	32.48	34.38	32.62	60.00	50.00	-25.62	-17.38
17.983	0.45	38.34	25.49	38.79	25.94	60.00	50.00	-21.21	-24.06

NOTE :

1. Measurement uncertainty is ± 2.91 dB
2. Emission level = Reading value + Correction factor
3. Correction Factor = Cable loss + Insertion loss of LISN
4. Margin value = Emission level - Limit
5. The emission of other frequencies was very low against the limit.
6. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

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Temperature:	22 °C	Humidity:	69% RH
Tested By:	Boris Lin	Tested Mode:	Link
Receiver Detector:	Q.P. and AV.	Modulation Type:	FSK
Frequency Range:	0.15 – 30 MHz	Tested Date:	Mar. 31, 2016

Power Line Measured : Line

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBmV)		Emission Level (dBmV)		Limit (dBmV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.300	0.00	36.00	32.24	36.00	32.24	60.25	50.25	-24.25	-18.01
0.303	0.00	34.82	31.70	34.82	31.70	60.16	50.16	-25.34	-18.46
3.705	0.01	30.22	27.15	30.23	27.16	56.00	46.00	-25.77	-18.84
4.507	0.02	34.92	33.03	34.94	33.05	56.00	46.00	-21.06	-12.95
14.805	0.20	31.28	22.43	31.48	22.63	60.00	50.00	-28.52	-27.37
23.118	0.33	39.62	23.07	39.95	23.40	60.00	50.00	-20.05	-26.60

Power Line Measured : Neutral

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBmV)		Emission Level (dBmV)		Limit (dBmV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.903	0.04	28.92	26.17	28.96	26.21	56.00	46.00	-27.04	-19.79
4.229	0.12	37.60	36.67	37.72	36.79	56.00	46.00	-18.28	-9.21
4.457	0.12	38.14	37.36	38.26	37.48	56.00	46.00	-17.74	-8.52
5.061	0.14	37.18	36.43	37.32	36.57	60.00	50.00	-22.68	-13.43
8.309	0.22	34.44	31.91	34.66	32.13	60.00	50.00	-25.34	-17.87
23.118	0.57	39.22	23.60	39.79	24.17	60.00	50.00	-20.21	-25.83

NOTE :

1. Measurement uncertainty is ± 2.91 dB
2. Emission level = Reading value + Correction factor
3. Correction Factor = Cable loss + Insertion loss of LISN
4. Margin value = Emission level - Limit
5. The emission of other frequencies was very low against the limit.
6. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

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4.2 20dB Bandwidth

4.2.1 LIMIT

FREQUENCY (MHz)	BANDWIDTH LIMIT(kHz)
Above 70-900	$0.25\% \times \text{Center Frequency(MHz)}$
Above 900	$0.5\% \times \text{Center Frequency(MHz)}$

NOTE: Bandwidth is determined at the points 20dB down from the modulated carrier.

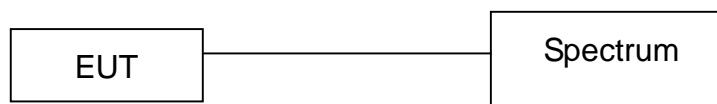
4.2.2 TEST EQUIPMENT

The following test equipment was used during the test :

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER (INCLUDE SPECTRUM ANALYZER)	9 KHz ~ 6 GHz	ROHDE & SCHWARZ	ESL /100176	MAR. 28, 2016 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

4.2.4 TEST PROCEDURE

Please refer to FCC Part15C 15.231.

4.2.5 EUT OPERATING CONDITION

The EUT was operated in continually transmitting mode.

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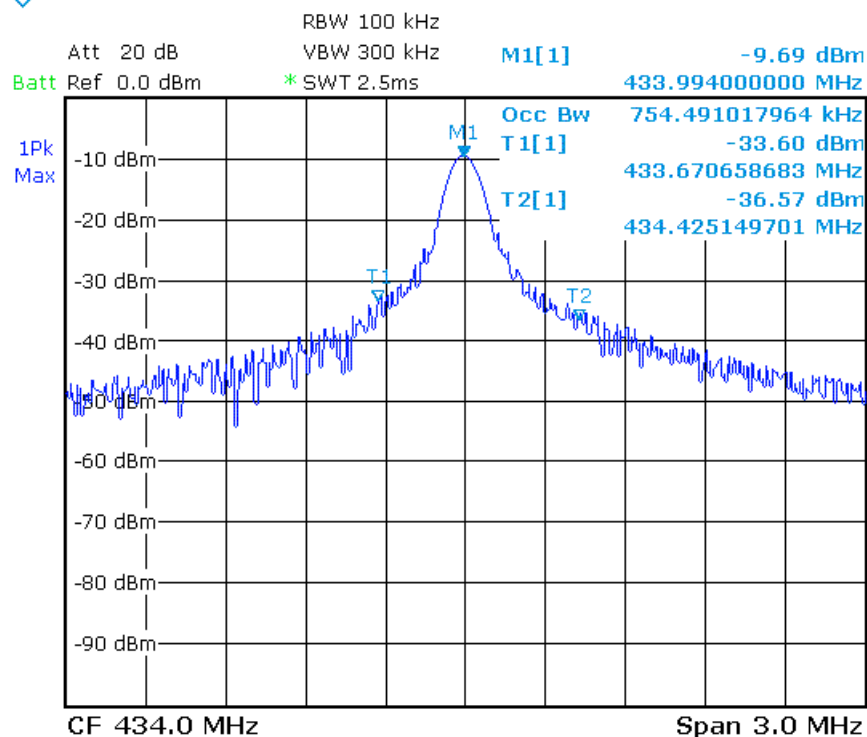
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4.2.6 TEST RESULT

Temperature:	22 °C	Humidity:	69% RH
Spectrum Detector:	PK	Tested by:	Boris Lin
Test Result:	PASS	Tested Date:	Mar. 31, 2016

Channel Number	Channel Frequency (MHz)	20dB Down Bandwidth (kHz)	Maximum Limit (kHz)	Pass/Fail
1	434	754.5	1085	Pass





4.3 RELEASE OR OPERATING TIME

4.3.1 LIMIT

1. A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
2. A transmitter activated automatically shall cease transmission within 5 seconds after activation.
- 3). Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.
4. Intentional radiators, which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pungency of the alarm condition.

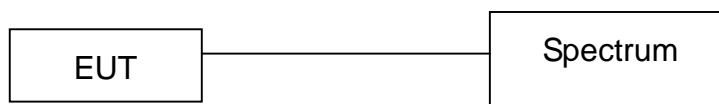
4.3.2 TEST EQUIPMENT

The following test equipment was used during the test :

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER (INCLUDE SPECTRUM ANALYZER)	9 KHz ~ 6 GHz	ROHDE & SCHWARZ	ESL /100176	MAR. 28, 2016 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

**Spectrum Research & Testing Lab., Inc.**

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4.3.4 EUT OPERATING CONDITION

The EUT was operated in Normal Link mode.

Activation EUT's release time and measurement.

4.3.5 TEST RESULT

Temperature: 22 °C

Humidity: 69% RH

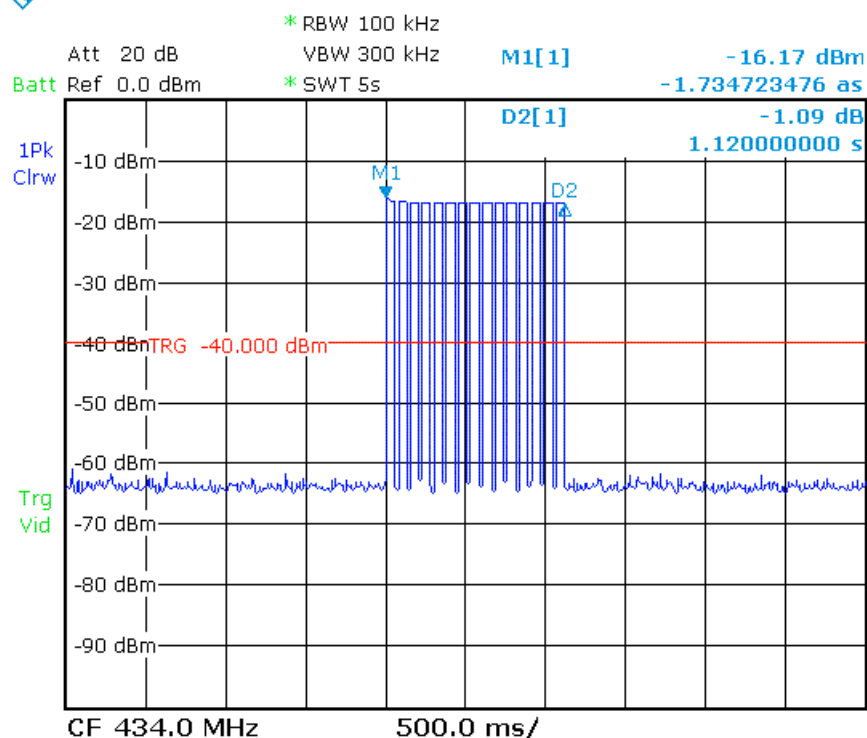
Spectrum Detector: PK

Tested by: Boris Lin

Test Result: PASS

Tested Date: Mar. 31, 2016

Total release time(s)	Limit of release time<(s)	Pass/Fail
1.12	5	Pass



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4.4 FUNDAMENTAL & SPURIOUS RADIATED EMISSION TEST**4.4.1 LIMIT**

FCC Part15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000MHz. The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

FREQUENCY (MHz)	DISTANCE (m)	FIELD STRENGTH (dBmV/m)
0.009 - 0.490	300	2400/F(KHz)
0.490 - 1.705	30	24000/F(KHz)
1.705 - 30	30	30
30 - 88	3	40.0
88 - 216	3	43.5
216 - 960	3	46.0
Above 960	3	54.0

NOTE:

- 30 dBuV (in 30m) = 70 dBuV (in 3m).
- Transmitters that require Crystal Controlled Oscillators with values below 30 MHz requires the Test Report to show "Spurious Radiated Emissions" results below 30 MHz per FCC Part 15.33(a).

FCC part15C 15.231(b) limit of fundamental and spurious emissions measurement.

FREQUENCY (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750 (NOTE 5)	125 to 375 (NOTE 7)
174-260	3750	375 (NOTE 7)
260-470	3750 to 12500 (NOTE 6)	375 to 1250
Above 470	12500	1250

NOTE:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBμV/m) = 20 log Emission level (μV/m).
- In the emission tables above, the tighter limit applies at the band edges.
- Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.
- Limit = 20 log(56.81818 x F - 6136.3636) ; F : Fundamental Frequency (MHz)
- Limit = 20 log(41.667 x F - 7083.3333) ; F : Fundamental Frequency (MHz)
- Limit = The Limit of Fundamental Frequency – 20dB
- The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

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FCC Part 15, Section 15.35(b) limit of radiated emission for frequency above 1000 MHz

FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

4.4.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	CALIBRATION DATE
EMI TEST RECEIVER	9 kHz ~ 2.75 GHz	ROHDE & SCHWARZ	ESCS30 / 100376	DEC. 16, 2015 ETC
EMI TEST RECEIVER	20 MHz ~ 1000 MHz	ROHDE & SCHWARZ	ESVS30 / 841977/003	DEC. 02, 2015 ETC
SPECTRUM ANALYZER	9 kHz ~ 7GHz	ROHDE & SCHWARZ	FSP7 / 100289	APR. 12, 2015 ETC
LOOP ANTENNA	9 kHz ~ 30 MHz	ETS.LINDGREN	HFH2-Z3 /860 605/002(1162 1/2)	MAR. 06, 2016 ETC
BI-LOG ANTENNA	30 MHz ~ 2 GHz	SCHAFFNER	CBL6141A / 4181	JUN. 25, 2015 ETC
HORN ANTENNA	1 GHz ~ 18 GHz	EMCO	3115/ 9602-4681	DEC. 21, 2015 ETC
OPEN AREA TEST SITE	3 – 10 M MEASUREMENT	SRT	A02 / SRT002	MAR. 09, 2016 SRT
PRE-AMPLIFIER	1 GHz ~ 26.5 GHz	AGILENT	8449B/ 3008A01995	DEC. 18, 2015 ETC
ANECHOIC CHAMBER	3 M MEASUREMENT	SRT	A01 / SRT001	MAY. 13, 2015 SRT
COAXIAL CABLE	30 M	TIMES	LMR-400 / #30M (L1TCAB014)	MAY. 30, 2015 ETC
RF CABLE	UP TO 18 GHz 1.5 m	JYEBAO	A30A30-L 142 / EQF-0035(001)	DEC. 19, 2015 ETC
RF CABLE	UP TO 18 GHz 3.5 m	JYEBAO	A30A30-L 142 / EQF-0036(002)	DEC. 19, 2015 ETC
K-TYPE CABLE	UP TO 40 GHz 3 m	HUBER+SUHNER	SF102-46/2*11SK 252 /MY2611/2	MAR. 07, 2016 ETC
K-TYPE CABLE	UP TO 40 GHz, 1 m	HUBER+SUHNER	SF 102-40/2*11 /23934/2	OCT. 24, 2015 ETC
FILTER	2 LINE, 30 A	FIL.COIL	FC-943 / 869	NCR

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.



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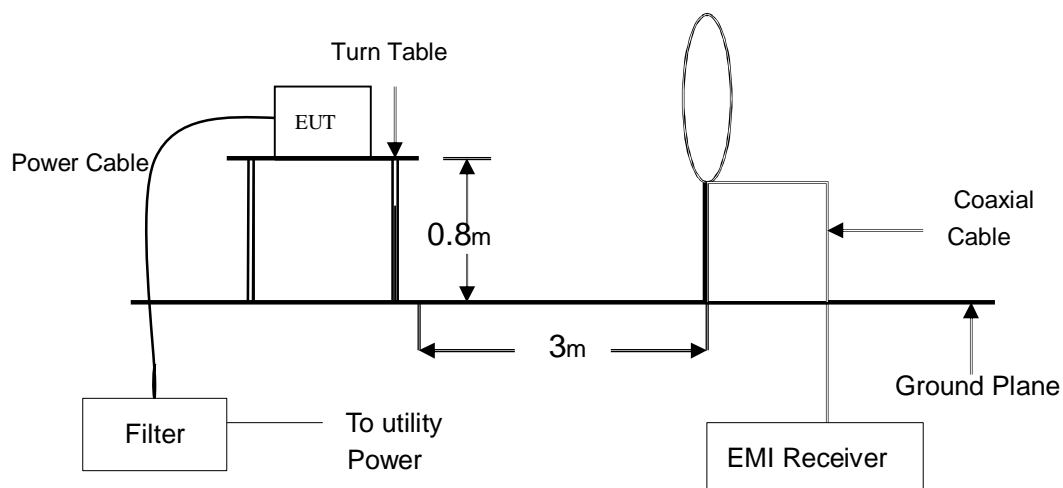
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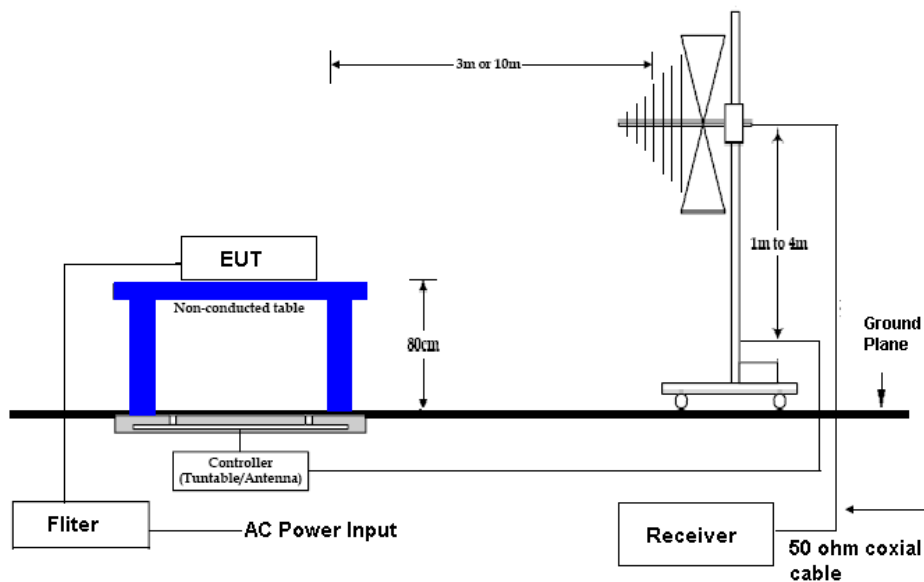
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4.4.3 TEST SET-UP

9KHz ~ 30MHz

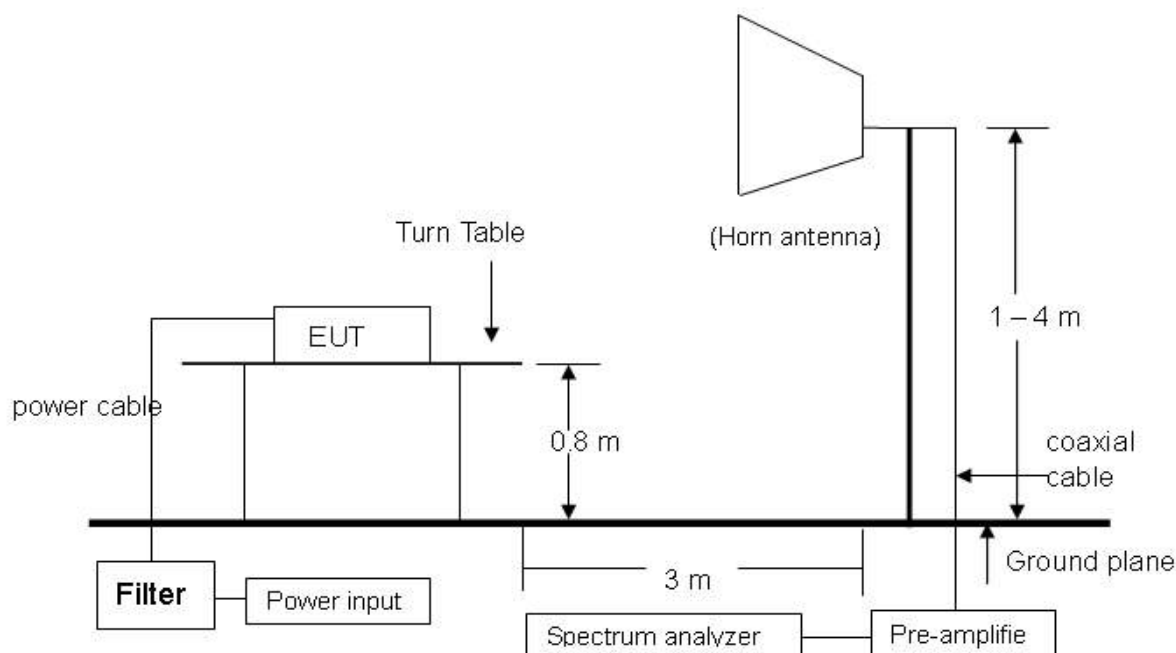


30 MHz ~ 1 GHz





Above 1 GHz



NOTE: The EUT system was put on a wooden table with 0.8m heights above a ground plane. For the actual test configuration, please refer to the photos of testing.

4.4.4 TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4:2009 and CISPR 22:2011.

The measurements were made at an open area test site with 3 meter measurement distance under 1 GHz and with 3m distance above 1GHz.

The frequency spectrum measured started from 9kHz to 30MHz and 30 MHz to 1 GHz, all readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver.

Above 1 GHz, the measurements were made at an open area test site with 3 meter measurement distance and all readings were peak or average values with 1 MHz resolution bandwidth of the test receiver.

The EUT system was operated in all typical methods by users.

The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency.

First, find the margin or higher points at least 6 points by software, then use manual to find the maximum data.

The procedure is referred on the test procedure of SRT LAB.

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4.4.5 TEST RESULT

Temperature:	22 °C	Humidity:	69% RH
Frequency Range:	9 KHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	AV.	Tested Mode:	Tx
Tested By:	Boris Lin	Tested Date:	Mar. 31, 2016

Frequency (KHz)	Cable Loss (dB)	Ant. Fac. (dB)	Reading (dBμV)	Emission (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)
6.79	0.46	20.37	6.83	27.66	70.00	-42.34
11.35	0.59	20.57	6.58	27.74	70.00	-42.26
14.46	0.66	20.72	6.24	27.62	70.00	-42.38
20.13	0.76	21.01	5.87	27.64	70.00	-42.36
24.33	0.83	21.22	5.63	27.68	70.00	-42.32
28.65	0.89	21.43	5.39	27.71	70.00	-42.29

Temperature:	22 °C	Humidity:	69% RH
Frequency Range:	9 KHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	AV.	Tested Mode:	Standby
Tested By:	Boris Lin	Tested Date:	Mar. 31, 2016

Frequency (KHz)	Cable Loss (dB)	Ant. Fac. (dB)	Reading (dBμV)	Emission (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)
5.50	0.42	20.32	7.81	28.55	70.00	-41.45
9.55	0.55	20.48	7.49	28.52	70.00	-41.48
16.26	0.69	20.81	6.53	28.03	70.00	-41.97
22.71	0.80	21.14	6.07	28.01	70.00	-41.99
26.94	0.87	21.35	6.58	28.79	70.00	-41.21
28.68	0.89	21.43	5.85	28.18	70.00	-41.82

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Temperature:	22 °C	Humidity:	69% RH
Frequency Range:	9 KHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	AV.	Tested Mode:	Link
Tested By:	Boris Lin	Tested Date:	Mar. 31, 2016

Frequency (KHz)	Cable Loss (dB)	Ant. Fac. (dB)	Reading (dBμV)	Emission (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)
7.66	0.49	20.41	6.58	27.48	70.00	-42.52
10.96	0.58	20.55	6.42	27.55	70.00	-42.45
13.21	0.63	20.66	5.96	27.25	70.00	-42.75
16.65	0.70	20.83	6.13	27.66	70.00	-42.34
19.41	0.75	20.97	5.58	27.30	70.00	-42.70
28.65	0.89	21.43	5.72	28.04	70.00	-41.96

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Temperature:	22 °C	Humidity:	69% RH
Tested By:	Boris Lin	Tested Mode:	Tx
Receiver Detector:	Q.P. or AV.	Modulation Type:	FSK
Frequency Range:	30 M – 1 GHz	Tested Date:	Mar. 31, 2016

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
143.03	1.80	12.84	12.52	27.16	43.5	-16.34	125	3.55
215.47	2.22	12.65	5.77	20.64	43.5	-22.86	277	3.41
600.85	4.13	19.80	6.63	30.56	46.0	-15.44	107	2.29
647.40	4.35	20.36	7.38	32.09	46.0	-13.91	69	2.07
754.13	4.80	21.93	3.79	30.52	46.0	-15.48	48	1.75
788.82	4.94	22.20	6.33	33.47	46.0	-12.53	136	1.61

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
56.45	1.18	11.70	6.37	19.25	40.0	-20.75	91	1.09
143.30	1.80	12.84	9.08	23.72	43.5	-19.78	173	1.34
491.35	3.67	18.04	5.61	27.31	46.0	-18.69	38	2.44
600.82	4.13	19.80	3.91	27.84	46.0	-18.16	251	2.78
647.36	4.35	20.36	3.35	28.06	46.0	-17.94	312	2.95
935.71	5.47	24.07	3.58	33.12	46.0	-12.88	229	3.48

NOTE :

1. Measurement uncertainty is +/- 4.20dB.
2. "**": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

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Temperature:	22 °C	Humidity:	69% RH
Tested By:	Boris Lin	Tested Mode:	Standby
Receiver Detector:	Q.P. or AV.	Modulation Type:	FSK
Frequency Range:	30 M – 1 GHz	Tested Date:	Mar. 31, 2016

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
166.40	1.94	11.60	5.16	18.70	43.5	-24.80	223	3.47
600.83	4.13	19.80	7.58	31.51	46.0	-14.49	169	2.22
647.13	4.35	20.36	7.93	32.64	46.0	-13.36	108	2.07
750.49	4.78	21.90	3.55	30.23	46.0	-15.77	284	1.75
839.55	5.14	23.00	3.38	31.52	46.0	-14.48	96	1.53
935.21	5.47	24.07	3.52	33.06	46.0	-12.94	134	1.24

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
56.62	1.18	11.70	6.76	19.64	40.0	-20.36	292	1.09
216.49	2.23	12.74	9.48	24.45	46.0	-21.55	140	1.56
603.75	4.14	19.84	3.64	27.62	46.0	-18.38	88	2.73
647.17	4.35	20.36	3.52	28.23	46.0	-17.77	76	2.91
749.91	4.78	21.88	3.39	30.04	46.0	-15.96	271	3.22
935.24	5.47	24.07	3.75	33.29	46.0	-12.71	38	3.54

NOTE :

1. Measurement uncertainty is +/- 4.20dB.
2. "**": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

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Temperature:	22 °C	Humidity:	69% RH
Tested By:	Boris Lin	Tested Mode:	Link
Receiver Detector:	Q.P. or AV.	Modulation Type:	FSK
Frequency Range:	30 M – 1 GHz	Tested Date:	Mar. 31, 2016

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
223.82	2.27	13.01	8.91	24.19	46.0	-21.81	221	3.41
603.14	4.14	19.84	7.28	31.26	46.0	-14.74	308	2.25
647.58	4.35	20.36	7.34	32.05	46.0	-13.95	152	2.07
824.06	5.08	22.73	7.52	35.33	46.0	-10.67	40	1.53
893.74	5.31	23.29	3.45	32.05	46.0	-13.96	179	1.36
962.96	5.57	24.50	3.87	33.94	54.0	-20.06	62	1.12

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
70.30	1.30	8.10	12.72	22.12	40.0	-17.88	199	1.14
342.80	2.95	14.99	12.63	30.57	46.0	-15.43	243	1.98
370.13	3.08	15.72	9.48	28.28	46.0	-17.72	78	2.03
647.51	4.35	20.36	3.49	28.20	46.0	-17.80	124	2.90
824.03	5.08	22.73	3.58	31.39	46.0	-14.61	312	3.35
962.91	5.57	24.50	3.66	33.73	54.0	-20.27	267	3.56

NOTE :

1. Measurement uncertainty is +/- 4.20dB.
2. "**": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

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Temperature:	22 °C	Humidity:	69% RH
Receiver Detector:	PK. or AV.	Tested Mode:	Tx
Frequency Range:	1 GHz – 25 GHz	Modulation Type:	FSK
Tested By:	Boris Lin	Tested Date:	Mar. 31, 2016

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2431.68	-31.11	28.41	54.46	43.92	51.75	41.21	74.00	54.00	-22.25	-12.79	128	2.08
3448.40	-29.86	31.50	47.91	37.36	49.55	39.00	74.00	54.00	-24.45	-15.00	251	1.76
4144.04	-29.13	32.80	46.24	35.71	49.91	39.38	74.00	54.00	-24.09	-14.62	109	1.55
4712.91	-28.55	33.31	46.43	35.84	51.19	40.60	74.00	54.00	-22.81	-13.40	89	1.38
5203.81	-27.71	34.28	46.38	35.78	52.96	42.36	74.00	54.00	-21.04	-11.64	224	1.25
5391.77	-27.14	34.55	46.47	35.98	53.88	43.39	74.00	54.00	-20.12	-10.61	312	1.19

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2431.64	-31.11	28.41	54.69	44.23	51.98	41.52	74.00	54.00	-22.02	-12.48	130	1.42
3038.75	-30.62	30.68	46.58	36.05	46.64	36.11	74.00	54.00	-27.36	-17.89	216	1.63
3762.15	-29.52	32.23	45.83	35.26	48.54	37.97	74.00	54.00	-25.46	-16.03	157	1.87
4633.10	-28.61	33.12	47.16	36.64	51.67	41.15	74.00	54.00	-22.33	-12.85	264	2.08
5334.27	-27.31	34.47	45.97	35.48	53.13	42.64	74.00	54.00	-20.87	-11.36	305	2.31
5795.01	-27.45	34.64	46.73	36.33	53.92	43.52	74.00	54.00	-20.08	-10.48	289	2.44

NOTE :

1. Measurement uncertainty is +/- 3.83dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.

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Temperature:	22 °C	Humidity:	69% RH
Receiver Detector:	PK. or AV.	Tested Mode:	Standby
Frequency Range:	1 GHz – 25 GHz	Modulation Type:	FSK
Tested By:	Boris Lin	Tested Date:	Mar. 31, 2016

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1921.45	-31.75	26.92	57.84	47.34	53.01	42.51	74.00	54.00	-20.99	-11.49	239	2.23
3649.57	-29.62	31.96	46.52	35.98	48.85	38.31	74.00	54.00	-25.15	-15.69	210	2.70
4013.07	-29.28	32.80	46.03	35.52	49.55	39.04	74.00	54.00	-24.45	-14.96	306	1.65
4442.83	-28.79	32.80	46.54	35.96	50.55	39.97	74.00	54.00	-23.45	-14.03	105	1.43
5334.26	-27.31	34.47	46.39	35.86	53.55	43.02	74.00	54.00	-20.45	-10.98	73	1.22
5749.19	-27.35	34.65	46.11	35.67	53.41	42.97	74.00	54.00	-20.59	-11.03	91	1.09

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1921.49	-31.75	26.92	59.13	48.55	54.30	43.72	74.00	54.00	-19.70	-10.28	250	1.27
2433.68	-31.11	28.41	53.01	42.56	50.31	39.86	74.00	54.00	-23.69	-14.14	271	1.45
3728.16	-29.55	32.15	46.55	36.03	49.15	38.63	74.00	54.00	-24.85	-15.37	298	1.83
4052.38	-29.24	32.80	46.62	36.19	50.18	39.75	74.00	54.00	-23.82	-14.25	334	1.96
4623.86	-28.62	33.10	46.27	35.78	50.74	40.25	74.00	54.00	-23.26	-13.75	96	2.07
5319.23	-27.36	34.45	46.49	35.96	53.58	43.05	74.00	54.00	-20.42	-10.95	192	2.34

NOTE :

1. Measurement uncertainty is +/- 3.83dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.

**Spectrum Research & Testing Lab., Inc.**

No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li Dist., Taoyuan City 320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A16031604
Report No.: FCCA16031604
FCC ID : 2AHQ5X3ALARM
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Date: May. 10, 2016

Temperature:	22 °C	Humidity:	69% RH
Receiver Detector:	PK. or AV.	Tested Mode:	Link
Frequency Range:	1 GHz – 25 GHz	Modulation Type:	FSK
Tested By:	Boris Lin	Tested Date:	Mar. 31, 2016

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1233.21	-33.34	24.97	52.82	40.36	44.45	31.99	74.00	54.00	-29.55	-22.01	140	2.44
1917.84	-31.76	26.90	58.72	46.28	53.87	41.43	74.00	54.00	-20.13	-12.57	239	2.21
2894.04	-30.76	30.18	46.58	35.97	45.99	35.38	74.00	54.00	-28.01	-18.62	268	1.95
3573.15	-29.69	31.78	46.54	35.92	48.62	38.00	74.00	54.00	-25.38	-16.00	115	1.70
4197.72	-29.07	32.80	46.17	35.64	49.90	39.37	74.00	54.00	-24.10	-14.63	309	1.53
5329.13	-27.33	34.46	46.11	35.56	53.24	42.69	74.00	54.00	-20.76	-11.31	43	1.21

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1924.03	-31.75	26.93	54.97	42.78	50.15	37.96	74.00	54.00	-23.85	-16.04	95	1.29
2435.90	-31.11	28.42	54.33	42.13	51.64	39.44	74.00	54.00	-22.36	-14.56	108	1.46
3573.52	-29.69	31.78	46.18	35.67	48.26	37.75	74.00	54.00	-25.74	-16.25	41	1.78
3951.63	-29.35	32.68	45.76	35.23	49.10	38.57	74.00	54.00	-24.90	-15.43	207	1.86
4778.16	-28.50	33.47	45.86	35.46	50.83	40.43	74.00	54.00	-23.17	-13.57	193	2.12
5612.32	-27.05	34.68	45.68	35.19	53.30	42.81	74.00	54.00	-20.70	-11.19	252	2.39

NOTE :

1. Measurement uncertainty is +/- 3.83dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.

**Spectrum Research & Testing Lab., Inc.**

No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li Dist., Taoyuan City 320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A16031604
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Temperature:	22 °C	Humidity:	69% RH
Tested By:	Boris Lin	Tested Mode:	Tx (Fundamental)
Receiver Detector:	Q.P. or AV.	Modulation Type:	FSK
Frequency Range:	30 M – 1 GHz	Tested Date:	Mar. 31, 2016

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
434	3.39	17.03	42.17	69.14	80.83	-18.25	173	3.02
867.84	5.23	23.23	4.65	33.12	46.00	-12.89	138	1.68

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
434	3.39	17.03	41.25	67.08	80.83	-19.17	89	2.41
867.84	5.23	23.23	3.48	31.95	46.00	-14.06	251	2.83

NOTE :

1. Measurement uncertainty is +/- 4.20dB.
2. "": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

**Spectrum Research & Testing Lab., Inc.**

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Chung-Li Dist., Taoyuan City
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TEST REPORT

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Date: May. 10, 2016

Temperature:	22 °C	Humidity:	69% RH
Receiver Detector:	PK. or AV.	Tested Mode:	Tx (Fundamental)
Frequency Range:	1 GHz – 25 GHz	Modulation Type:	FSK
Tested By:	Boris Lin	Tested Date:	Mar. 31, 2016

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1301.76	-33.10	25.08	45.78	35.21	37.76	27.19	74.00	54.00	-36.24	-26.81	142	2.41
1735.68	-32.03	26.25	45.13	34.62	39.34	28.83	74.00	54.00	-34.66	-25.17	315	2.27
2169.60	-31.43	27.67	45.37	34.76	41.62	31.01	74.00	54.00	-32.38	-22.99	227	2.19
2603.52	-30.96	29.01	45.76	35.28	43.81	33.33	74.00	54.00	-30.19	-20.67	108	2.02

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1301.76	-33.10	25.08	45.09	34.57	37.07	26.55	74.00	54.00	-36.93	-27.45	179	1.16
1735.68	-32.03	26.25	44.91	34.36	39.12	28.57	74.00	54.00	-34.88	-25.43	201	1.29
2169.60	-31.43	27.67	45.75	35.19	42.00	31.44	74.00	54.00	-32.00	-22.56	97	1.37
2603.52	-30.96	29.01	45.15	34.66	43.20	32.71	74.00	54.00	-30.80	-21.29	154	1.51

NOTE:

1. Measurement uncertainty is +/- 3.83dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.:Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F):The field strength of fundamental frequency.



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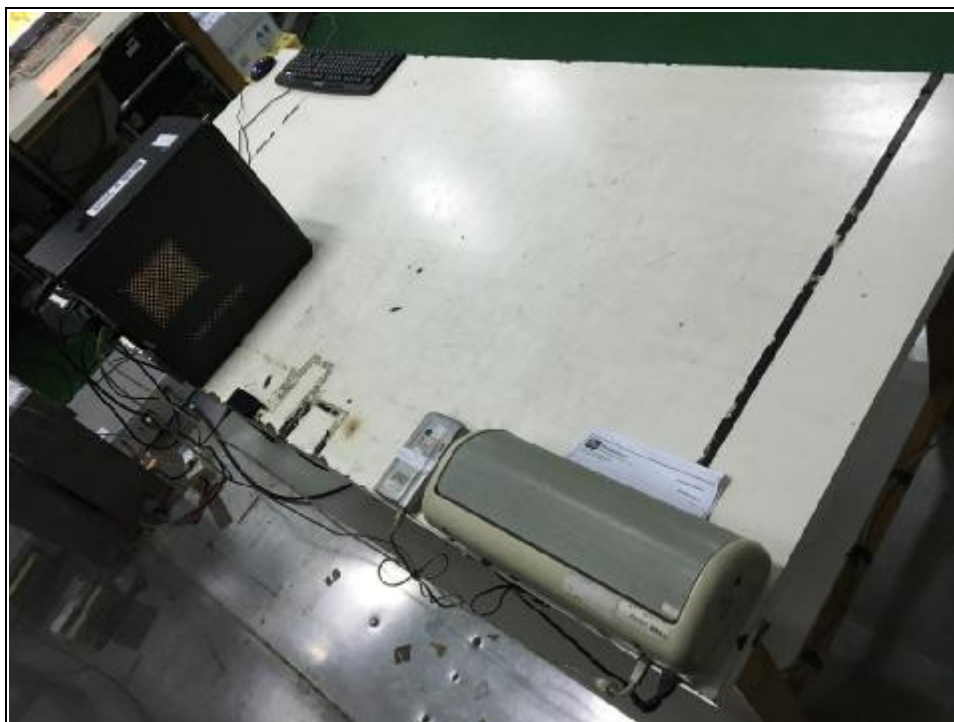
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5. PHOTOS OF TESTING

- Conducted Emission Test (TX & Standby)





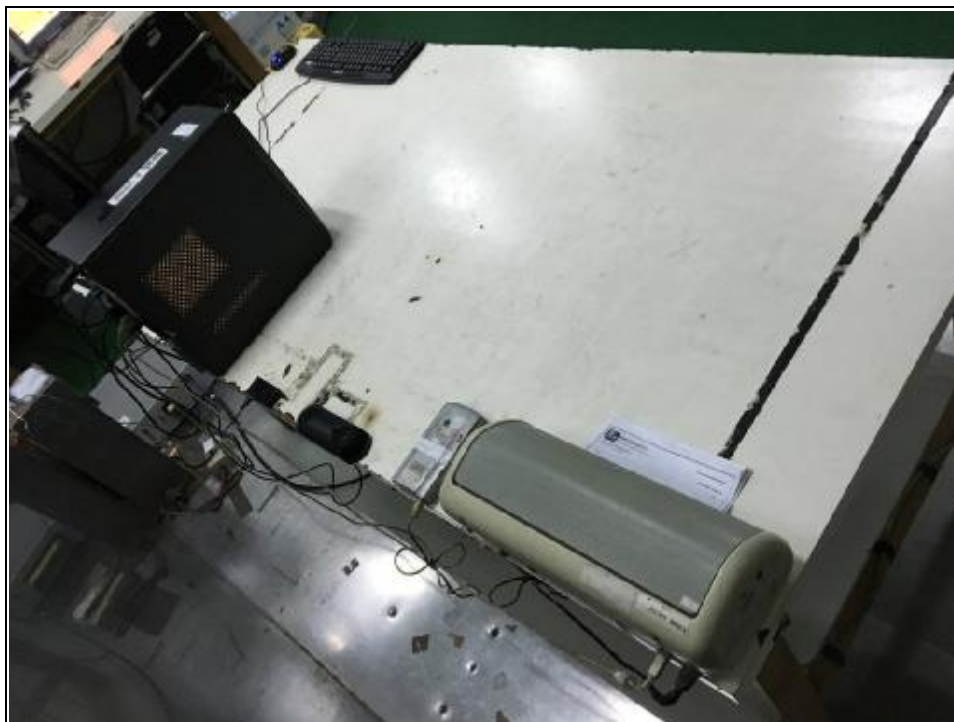
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- Conducted Emission Test (Link)





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- Radiated test (below 30M , TX & Standby)





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- Radiated test (below 30M , Link)





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- Radiated test (below 1G , TX & Standby)





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- Radiated test (below 1G , Link)





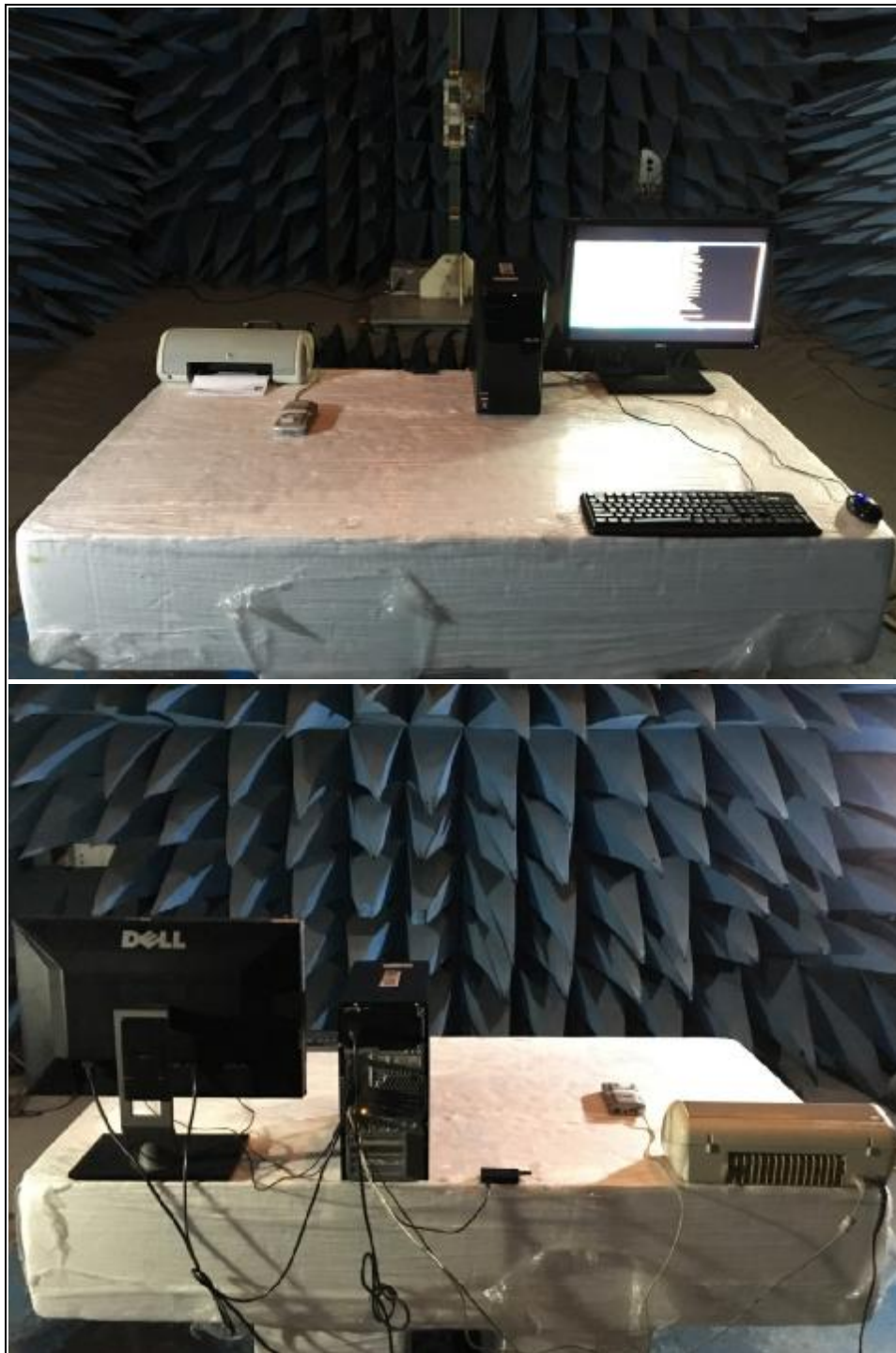
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- Radiated test (above 1G , TX & Standby)





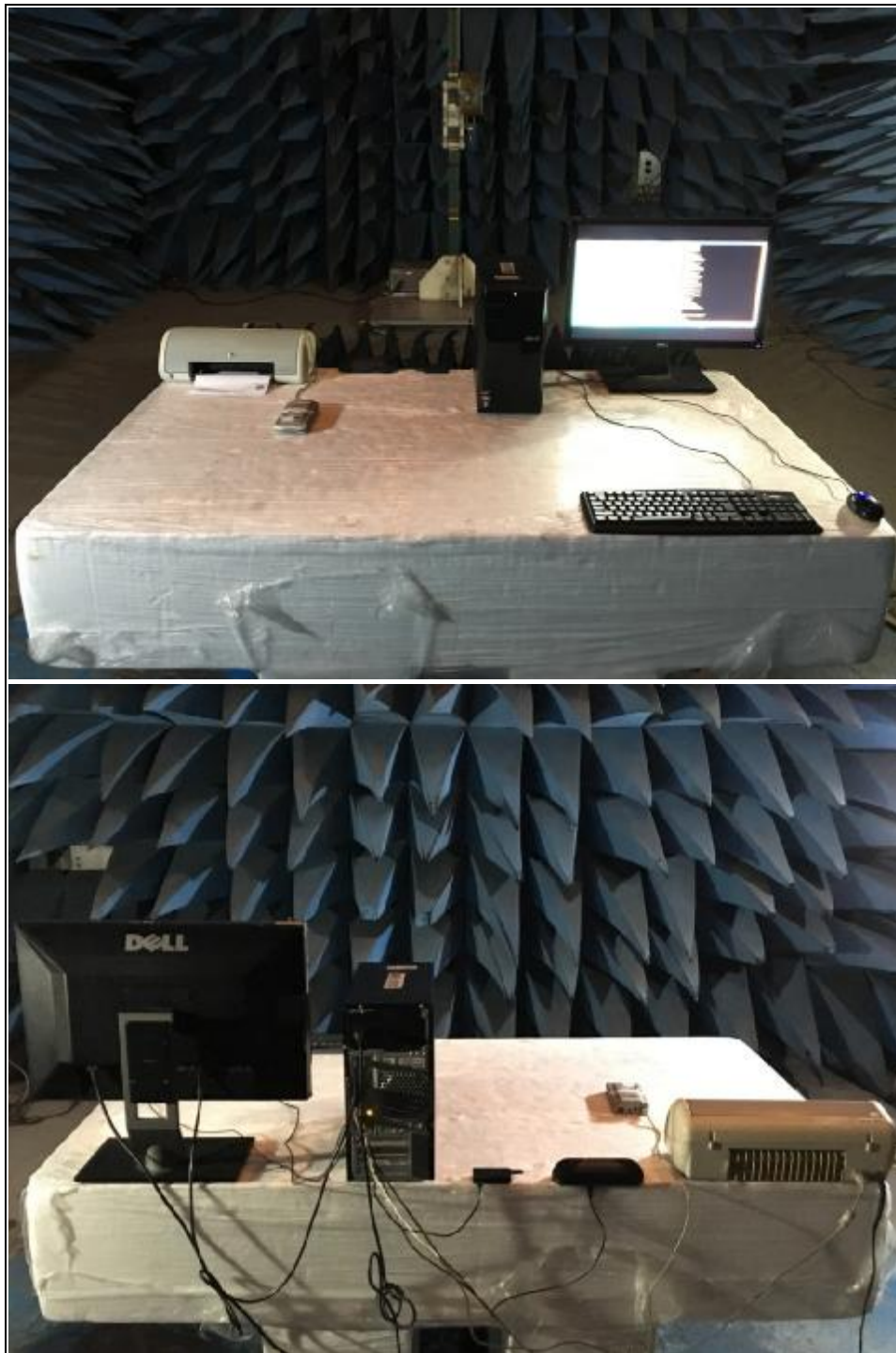
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6. TERMS OF ABBREVIATION

AV.	Average detection
AZ(°)	Turn table azimuth
Correct.	Correction
EL(m)	Antenna height (meter)
EUT	Equipment Under Test
Horiz.	Horizontal direction
LISN	Line Impedance Stabilization Network
NSA	Normalized Site Attenuation
Q.P.	Quasi-peak detection
SRT Lab	Spectrum Research & Testing Laboratory, Inc.
Vert.	Vertical direction