

FCC ID TEST REPORT

for

Swing Gate Operator

Model: SL600

FCC ID: HBW600

Prepared for: Chamberlain Group Inc, The
845 N Larch Ave, Elmhurst, IL 60126

Prepared by: Shenzhen TCT Testing Technology Co., Ltd
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Report Number: TCT141209E004

Date of Test: Dec. 09-Dec. 20, 2014

Date of Report: Dec. 25, 2014

The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from TCT Testing Technology.

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1.0 General Details

1.1 Test Lab Details

Name :	Shenzhen Tongce Testing Lab
Address:	1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China
Telephone:	13410377511
Fax:	--

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

FCC Registration Number: 572331

Shenzhen TCT Testing Technology Co., Ltd., Shenzhen EMC Laboratory: Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

Registration Number: 572331

Industry Canada (IC)

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

Registration Number IC: 10668A-1

1.2 Applicant Details

Applicant:	Chamberlain Group Inc, The
Address:	845 N Larch Ave, Elmhurst, IL 60126
Telephone:	630-516-6613
Fax:	630-516-6813

Manufacturer:	FoShan ShunDe RongGui FORESEE Garage Doors Co., Ltd.
Address:	33rd, Changbao West Road, Rongli, Ronggui, Shunde District, Foshan City, Guangdong Province, P.R.C.
Telephone:	+86 13549882099
Fax:	--

1.3 Description of EUT

Product:	Swing Gate Operator
Model No.:	SL600
Additional Model No.:	N.A.
Brand Name	Liftmaster
Rating:	AC 120V/60Hz
Modulation Type:	GFSK
Transfer Data Rate	96kbps
Channel number:	50
Channel spacing:	500KHz
Operation Frequency:	902.25~926.75MHz
Antenna Designation:	A wire antenna, and the maximum antenna gain is -5dBi.

1.4 Statement

N.A.

1.5 Test Engineer

The sample tested by



Printed name: SKY

2.0 Test equipments and Associated Equipment used during the test.

2.1 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 2, 2014	July 1, 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 2, 2014	July 1, 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSU3	1166.1660.03	July 7, 2014	July 6, 2015
Pre-amplifier	Teseq	LNA6900	--	July 2, 2014	July 1, 2015
Pre-amplifier	Agilent	8447D	83153007374	July 2, 2014	July 1, 2015
Pre-amplifier	Agilent	8449B	3008A01738	July 2, 2014	July 1, 2015
Loop antenna	A.R.A.	PLA-1030/B	1029	July 2, 2014	July 1, 2015
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 2, 2014	July 1, 2015
Horn Antenna	ETS LINDGREN	3117	--	July 2, 2014	July 1, 2015
Horn Antenna	ETS LINDGREN	3160	--	July 2, 2014	July 1, 2015
EMI Test Receiver	R&S	ESCS30	100139	July 2, 2014	July 1, 2015
LISN	AFJ	LS16C	16010222119	July 2, 2014	July 1, 2015

2.2 AE used during the test

Equipment type	Manufacturer	Model
N/A		
N/A		
N/A		
N/A		

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications

Requirement	CFR 47 Section	Result
Power Line Conducted Emission Test	15.207(a)	PASS
20dB Channel Bandwidth	15.247 (a)(i), 15.215(c)	PASS
Maximum Peak Output Power	15.247(b)(2)	PASS
Carrier Frequency Separation	15.247 (a)(1)	PASS
Number of Hopping Channels	15.247(a)(1)(i)	PASS
Time of Occupancy (Dwell Time)	15.247(a)(1)(i)	PASS
Band edge Measurement, Spurious Emission Test	15.247 (d), 15.205 (a), 15.209 (a)	PASS
Antenna Requirement	15.203	PASS

3.2 Test Standards

FCC Part 15:2013 Subpart C, Paragraph 15.247

FCC Public Notice DA 00-705-Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

4.0 EUT Modification

No modification by Shenzhen TCT Testing Technology Co., Ltd

5.0 Measurement Uncertainty (95% confidence levels, k=2)

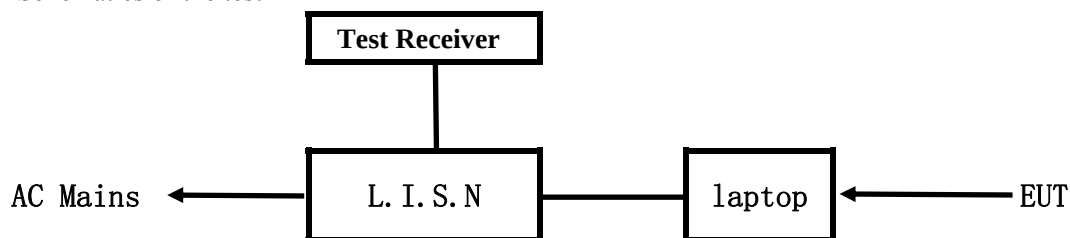
No.	Item	MU
1.	Radio Frequency	$\pm 1 \times 10^{-9}$
2.	Temperature	$\pm 0.1^{\circ}\text{C}$
3.	Humidity	$\pm 1.0\%$
4.	RF power, conducted	$\pm 0.34\text{dB}$
5.	RF power density, conducted	$\pm 1.45\text{dB}$
6.	Spurious emissions, conducted	$\pm 3.70\text{dB}$
7.	All emissions, radiated	$\pm 4.50\text{dB}$

Note: 1) Low channel: 902.25MHz, Middle channel: 914.75MHz, High channel: 926.75MHz

2) The EUT is a portable device, and measurements were conducted in all three axis (X, Y, Z), and the worst case (X axis) was submitted only.

6.0 Power Line Conducted Emission Test

6.1 Schematics of the test



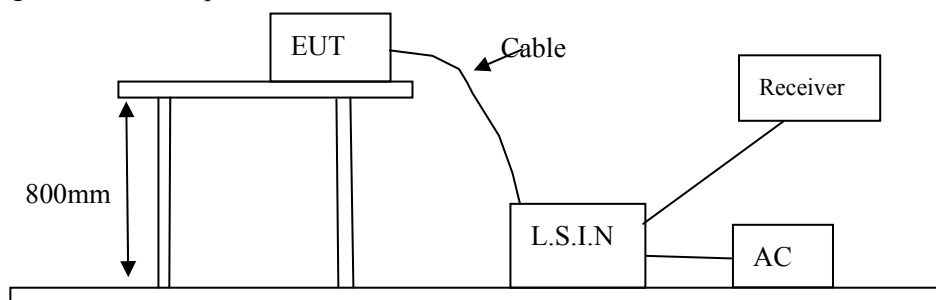
EUT: Equipment Under Test

6.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2009 and ANSI C63.4-2003. The Frequency spectrum from 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



6.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009 and ANSI C63.4-2003

- 1) Setup the EUT and simulators as shown on the following
- 2) Enable AF signal and confirm EUT active to normal condition

6.4 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
EMI Test Receiver	R&S	ESCS30	100139	July 2, 2014	July 1, 2015
LISN	AFJ	LS16C	16010222119	July 2, 2014	July 1, 2015

6.5 Conducted Emission Limit

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

Notes: 1) *Decreasing linearly with logarithm of frequency.
2) The tighter limit shall apply at the transition frequencies

6.6 Photo documentation of the test set-up

Please refer to the Document Setup photo

6.7 Test specification:

Environmental conditions: Temperature: 22° C Humidity: 52% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

The test was carried out in the following operation mode(s):

- Tx mode

6.8 Test result

Min. limit margin >10 dB from 0.15MHz to 30MHz

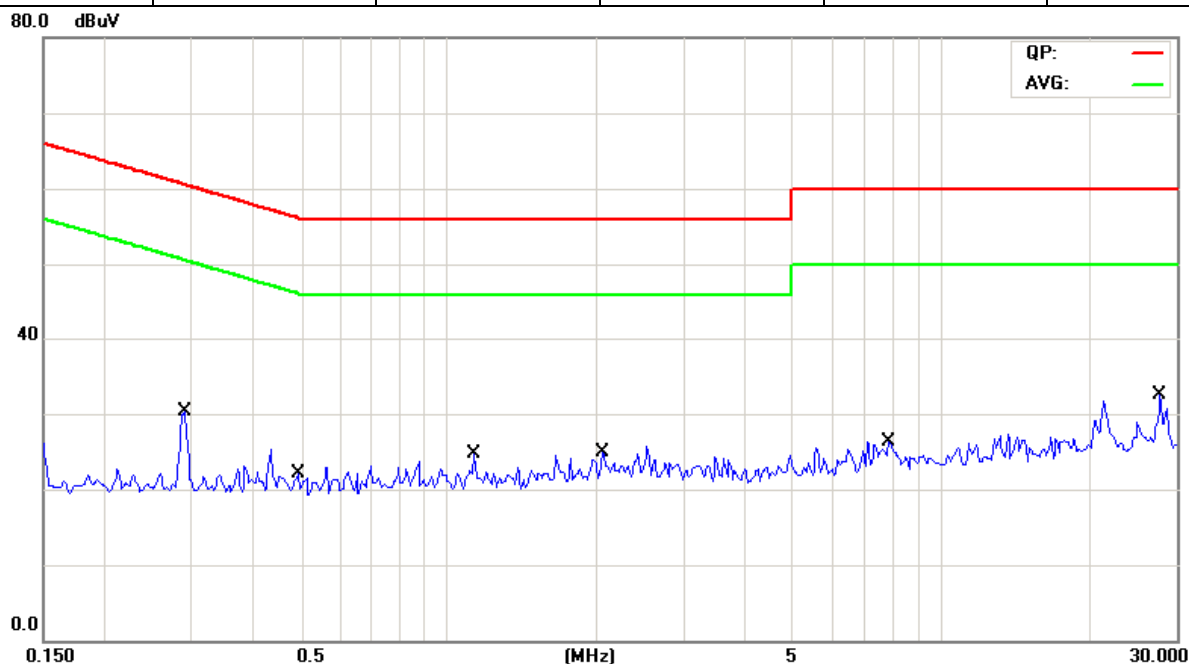
The requirements are FULFILLED

Remarks:

A Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)

EUT Description:	Swing Gate Operator
Operation Mode:	Tx mode
Tested By:	SKY
Test date:	Dec. 18, 2014

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

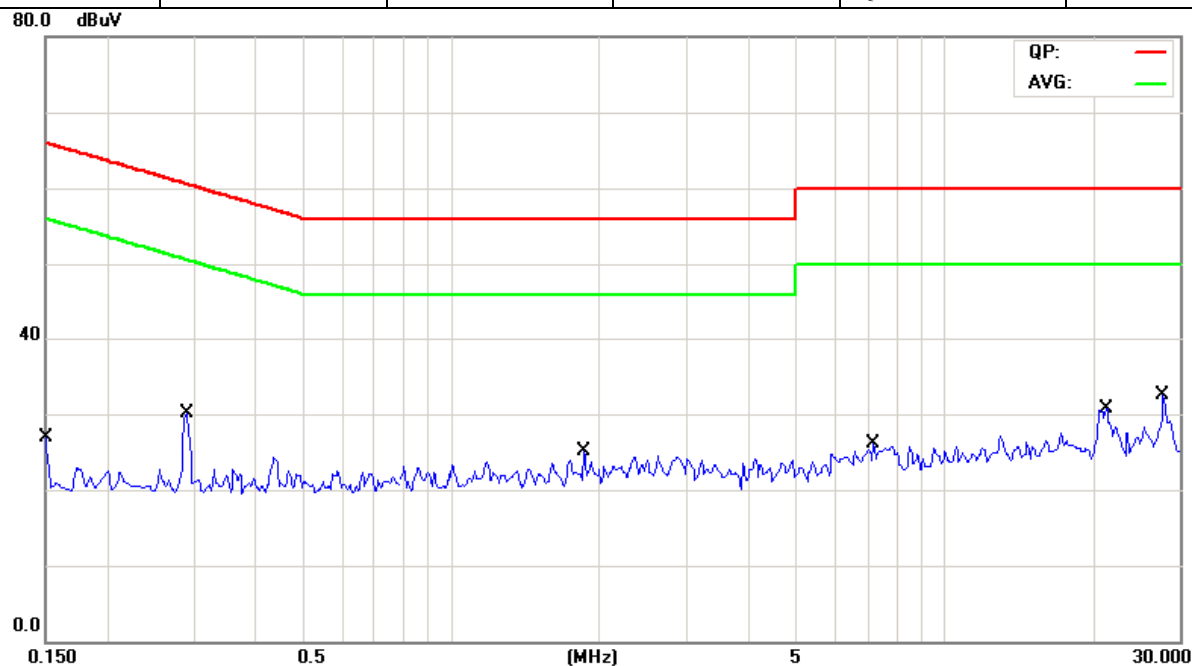


Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral		Quasi-peak	
	Quasi-peak	Average	Quasi-peak	Average		
0.2906	28.22	24.84	--	--	60.50	50.50
0.4938	10.06	8.88	--	--	56.10	46.10
1.1266	9.86	8.89	--	--	56.00	46.00
2.0641	13.88	11.12	--	--	56.00	46.00
7.8242	12.09	9.55	--	--	60.00	50.00
27.7656	30.49	27.08	--	--	60.00	50.00

B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

EUT Description:	Swing Gate Operator
Operation Mode:	Tx mode
Tested By:	SKY
Test Data:	Dec. 18, 2014

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral		Quasi-peak	
	Quasi-peak	Average	Quasi-peak	Average		
0.1500	--	--	22.70	19.98	65.99	55.99
0.2906	--	--	27.98	24.55	60.50	50.50
1.6773	--	--	11.10	9.49	56.00	46.00
3.1991	--	--	11.64	9.28	60.00	50.00
10.7227	--	--	28.50	25.48	60.00	50.00
27.7617	--	--	30.15	26.40	60.00	50.00

7.0 20dB Bandwidth Measurement

7.1 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSU3	1166.1660.03	July 7, 2014	July 6, 2015

7.2 Test Specification:

Environmental conditions: Temperature 23° C Humidity: 51% Atmospheric pressure: 103kPa

7.3 Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

7.4 Test status:

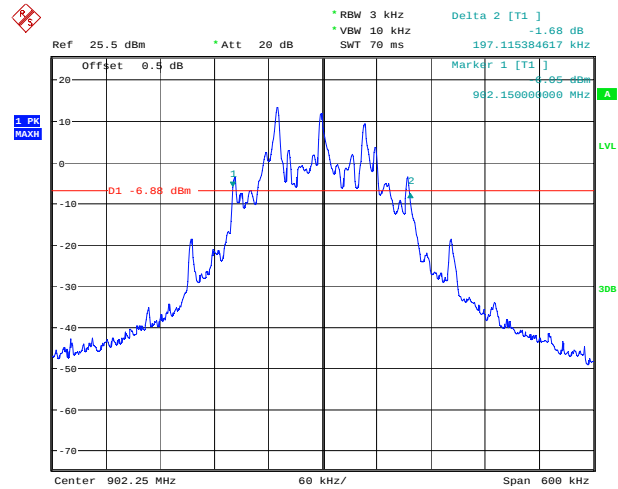
N.A.

7.5 Test Result:

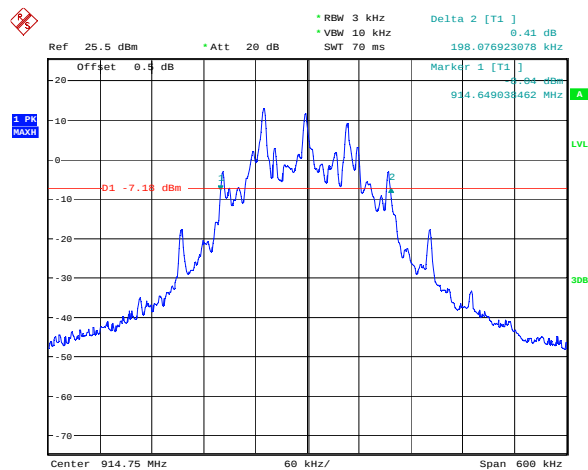
Modulation Type	Channel number	20dB Bandwidth (kHz)	Limit (kHz)	Conclusion
GFSK	Low	197.12	---	PASS
	Middle	198.08	---	PASS
	High	197.12	---	PASS

Modulation: GFSK

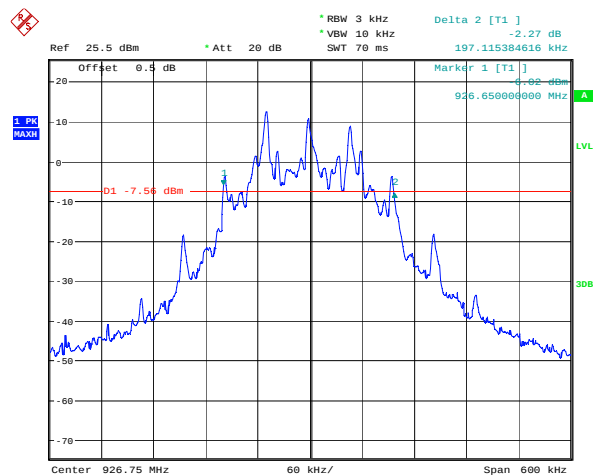
Low channel



Middle channel



High channel



8.0 Maximum Peak Output Power

8.1 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSU3	1166.1660.03	July 7, 2014	July 6, 2015

8.2 Test specification:

Environmental conditions: Temperature 23° C Humidity: 51% Atmospheric pressure: 103kPa

8.3 Test Procedure

- 1) Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2) Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centred on a hopping channel; RBW > the 20 dB bandwidth of the emission being measured; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold
- 3) Measure the highest amplitude appearing on spectral display and record the level to calculate results.
- 4) Repeat above procedures until all frequencies measured were complete.

8.4 Limits

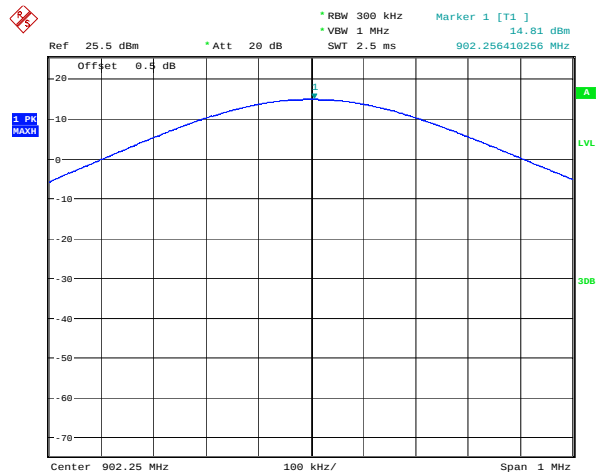
According to §15.247(b)(2), For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.5 Test Result

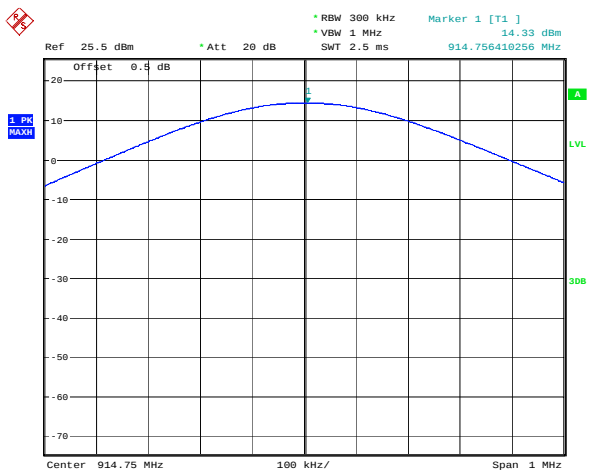
Modulation Type	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (mW)	Peak Power Limit (dBm)	Pass/ Fail
GFSK	902.25	14.81	1000	30	Pass
	914.75	14.33	1000	30	Pass
	926.75	13.99	1000	30	Pass

Modulation: GFSK

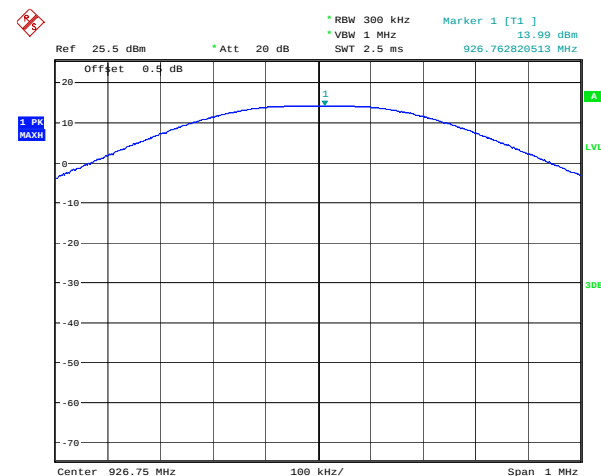
Lowest channel



Middle channel



Highest channel



9.0 Carrier Frequency Separation

9.1 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSU3	1166.1660.03	July 7, 2014	July 6, 2015

9.2 Test specification:

Environmental conditions: Temperature 23° C Humidity: 51% Atmospheric pressure: 103kPa

9.3 Test Procedure

1. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW) $\geq$ 1% of the span; Video (or Average) Bandwidth (VBW) $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold
2. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
3. Repeat above procedures until all frequencies measured were complete.

9.4 Limits

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

9.5 Test status:

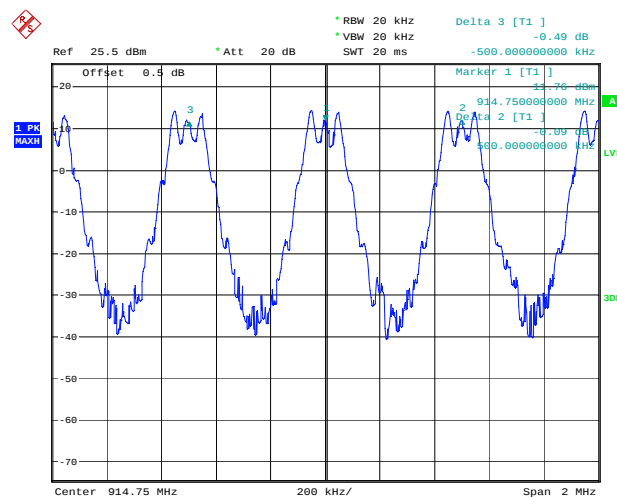
N.A.

9.6 Test Result

Mode	Channel	Carrier Frequency Separation	Limit	Pass/ Fail
Tx Hopping	Low	500KHz	$\geq$ 25 kHz or two-thirds 20 dB bandwidth	Pass

Note: Two-thirds 20 dB bandwidth: GFSK: 132.05 kHz;

Low channel



10.0 Number of Hopping Channels

10.1 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSU3	1166.1660.03	July 7, 2014	July 6, 2015

10.2 Test specification:

Environmental conditions: Temperature 22° C Humidity: 51% Atmospheric pressure: 103kPa

10.3 Test Procedure

Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW $\geq$ 1% of the span; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold

10.4 Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies, if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

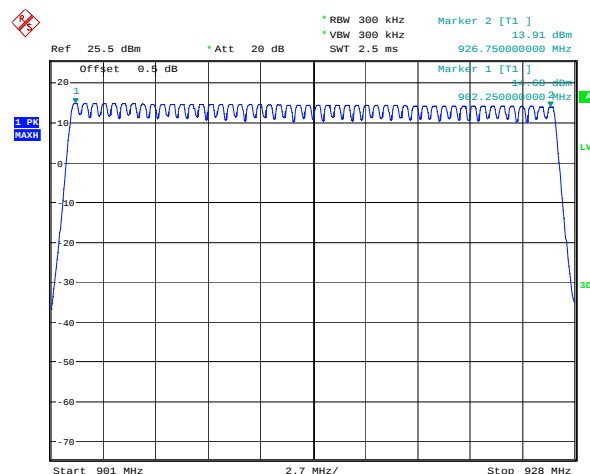
10.5 Test status:

N.A.

10.6 Test Result

Mode	Operating Frequency	Number of hopping channels	Limit	Pass/ Fail
Tx Hopping	902.25-926.75MHz	50	≥ 50	Pass

Modulation Type: GFSK



11.0 Time of Occupancy (Dwell Time)

11.1 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 2, 2014	July 1, 2015

11.2 Test specification:

Environmental conditions: Temperature 22° C Humidity: 52% Atmospheric pressure: 103kPa

11.3 Test Procedure

Span = zero span, centred on a hopping channel; RBW = 1 MHz; VBW $\geq$ RBW; Detector function = peak;

Sweep = as necessary to capture the entire dwell time per hopping channel; Trace = max hold

Measure the dwell time using the marker-delta function.

Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

11.4 Limits

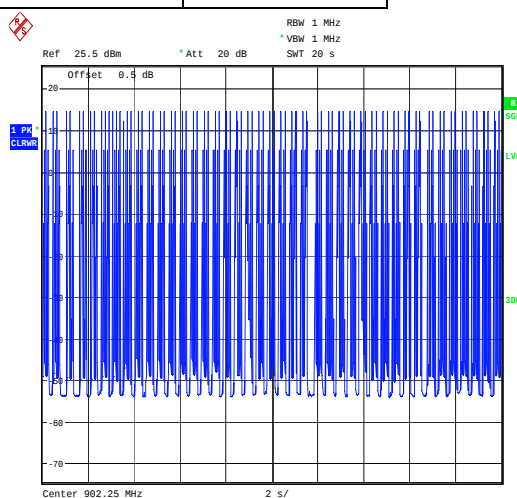
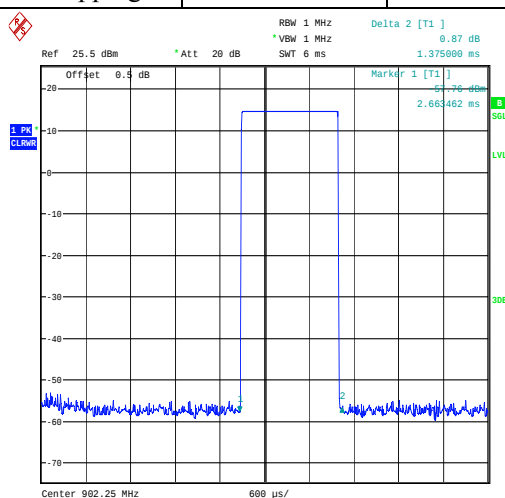
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

11.5 Test status:

N.A.

11.6 Test Result

Mode	Reading (ms)	Number of channels	Maximum Time Allowed in 20s	Measured Dwell Time in 20s
Tx Hopping	1.375	50	0.4	112.9



Note: 1) The number of transitions plots show only the single channel. It was checked that the number of transitions was the same on other channels do to equal channel use. The total number of transitions counted in 20s is: 81. Total maximum transmit time: 111.4ms within 20s.

12.0 Band edge Measurement

12.1 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSU3	1166.1660.03	July 7, 2014	July 6, 2015

12.2 Test specification:

Environmental conditions: Temperature 22° C Humidity: 52% Atmospheric pressure: 103kPa

12.3 Test Procedure

For band edge test, the spectrum set as follows: Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation

RBW $\geq$ 1% of the span

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

12.4 Limit

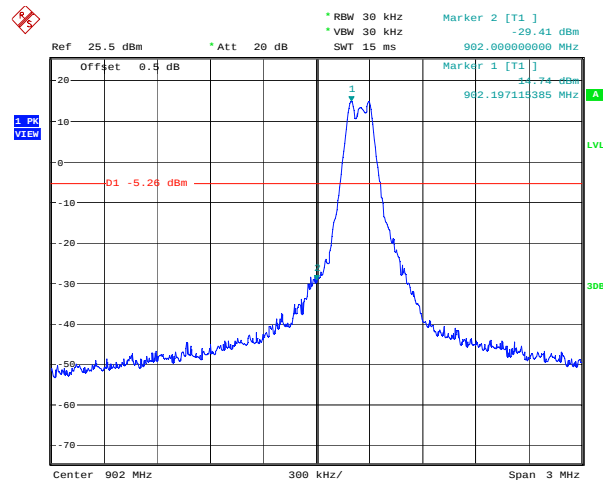
Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

12.5 Test status:

N.A.

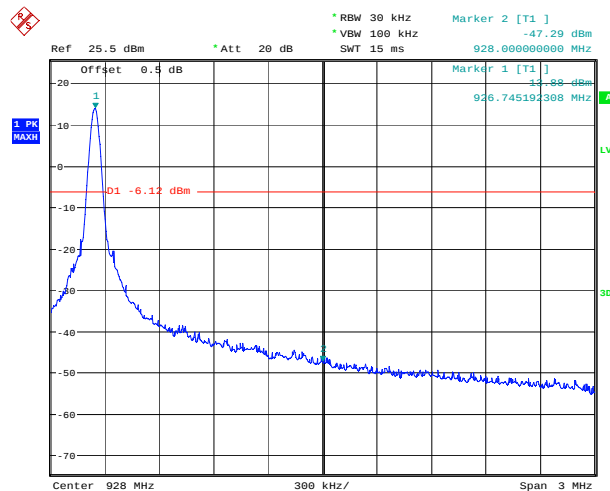
EUT operation mode: Keep transmitting in low channel



Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission was 46.18dBuV/m@3m at 902MHz, which is less than the Average limit.

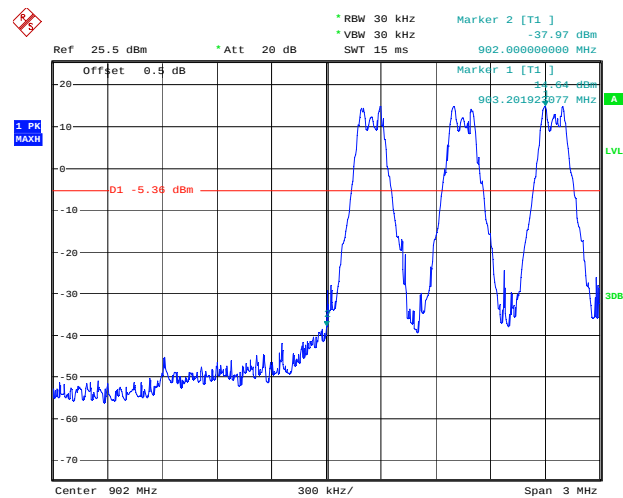
EUT operation mode: Keep transmitting in high channel



Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission was [45.32dBuV/m@3m](#) at 902MHz, which is less than the Average limit.

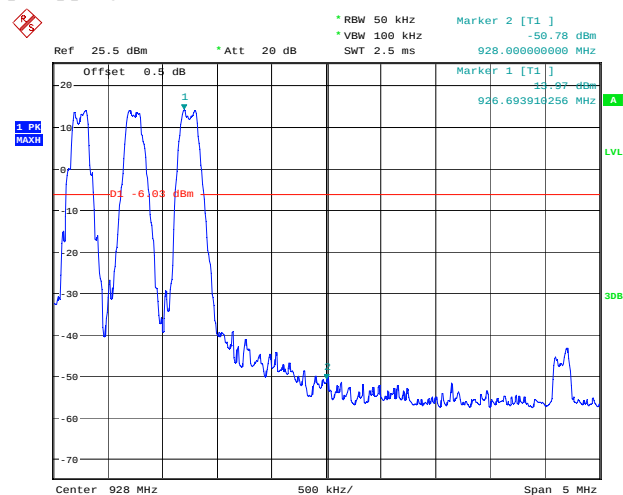
EUT operation mode: Keep hopping



Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission was 45.73dBuV/m@3m at 902MHz which is less than the Average limit.

EUT operation mode: Keep hopping



Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum PK emission was 45.64dBuV/m@3m at 928MHz which is less than the Average limit.

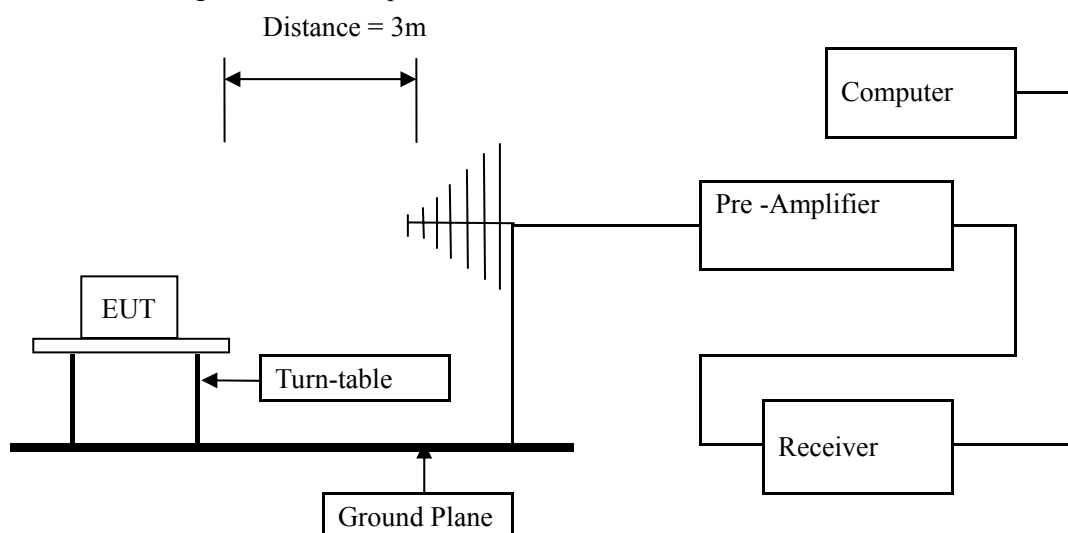
13.0 Spurious Emission Test

13.1 Radiated emissions

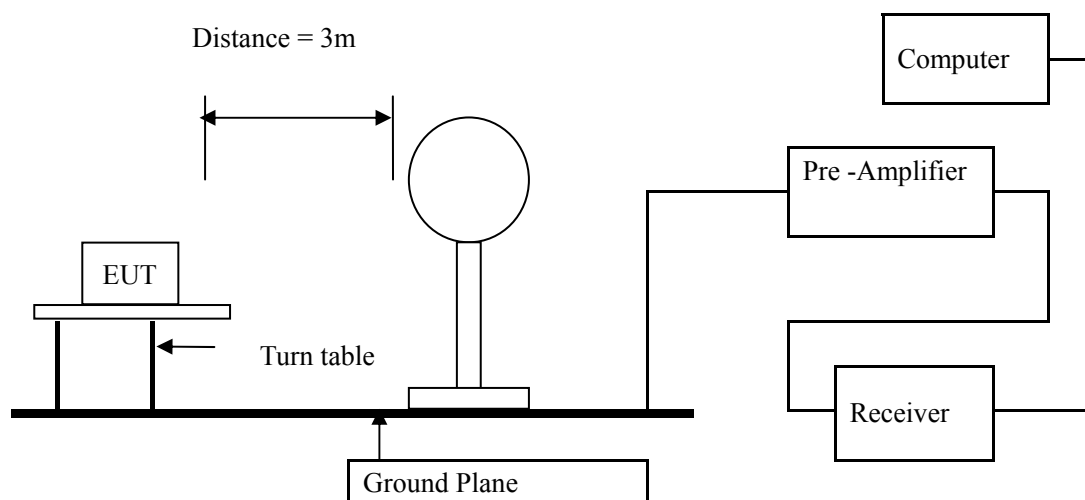
13.1.1 Test Method and test Procedure:

- 1) The EUT was tested according to ANSI C63.10 –2009 and ANSI C63.4-2003.
- 2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2009 and ANSI C63.4-2003.
- 3) The frequency spectrum from 9 kHz to 25 GHz was investigated. All readings from 9 kHz to 30 MHz are quasi-peak values with a resolution bandwidth of 9 kHz. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.
- 4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- 5) The antenna polarization: Vertical polarization and Horizontal polarization.

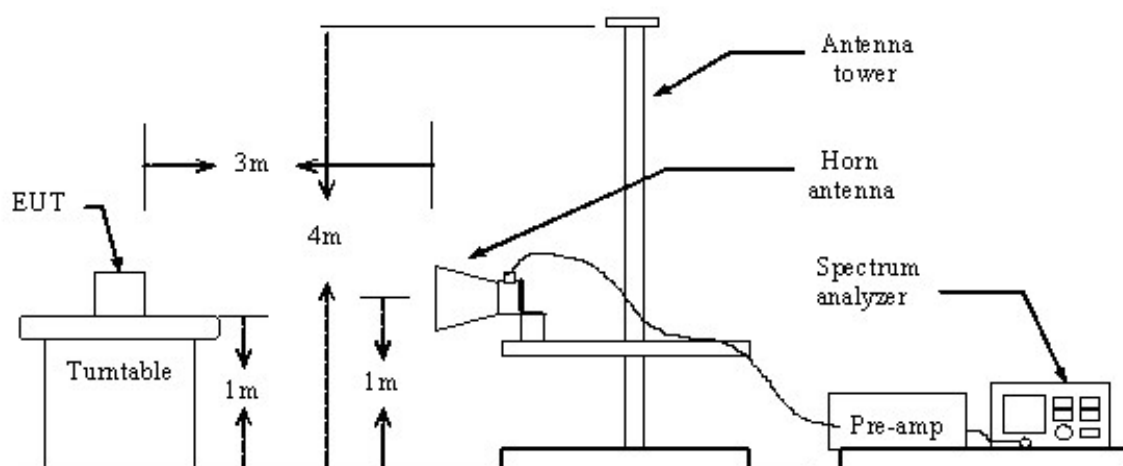
13.1.2 Block diagram of Test setup



Block diagram of Test setup for frequency below 30MHz



Block diagram of Test setup for frequency above 1GHz



13.1.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009 and ANSI C63.4-2003.

13.1.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	$20\log 2400/F$ (kHz) + 80
0.490-1.705	3	$20\log 24000/F$ (kHz) + 40
1.705-30	3	$20\log 30$ + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
- 1) RF Voltage (dBuV) = 20 log RF Voltage (uV)
 - 2) In the Above Table, the tighter limit applies at the band edges.
 - 3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT
 - 4) This is a handheld device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
 - 5) All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz. As to 1G-25G, the final emission level got using PK and AV detector.
 - 6) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula $Ld1 = Ld2 * (d2/d1)$

13.1.5 Photo documentation of the test set-up

Please refer to the Document Setup photo

13.1.6 Test Equipment:

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 2, 2014	July 1, 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 2, 2014	July 1, 2015
Pre-amplifier	Teseq	LNA6900	--	July 2, 2014	July 1, 2015
Pre-amplifier	Agilent	8447D	8315300737 4	July 2, 2014	July 1, 2015
Pre-amplifier	Agilent	8449B	3008A01738	July 2, 2014	July 1, 2015
Loop antenna	A.R.A.	PLA-1030/B	1029	July 2, 2014	July 1, 2015
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 2, 2014	July 1, 2015
Horn Antenna	ETS LINDGREN	3117	--	July 2, 2014	July 1, 2015
Horn Antenna	ETS LINDGREN	3160	--	July 2, 2014	July 1, 2015

13.1.7 Test specification:

Environmental conditions: Temperature 23° C Humidity: 50% Atmospheric pressure: 103kPa

13.1.8 Test result

Pass

A Radiated Emission (9 kHz---30 MHz)

Note: 1) Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor

2) The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

Result: Pass

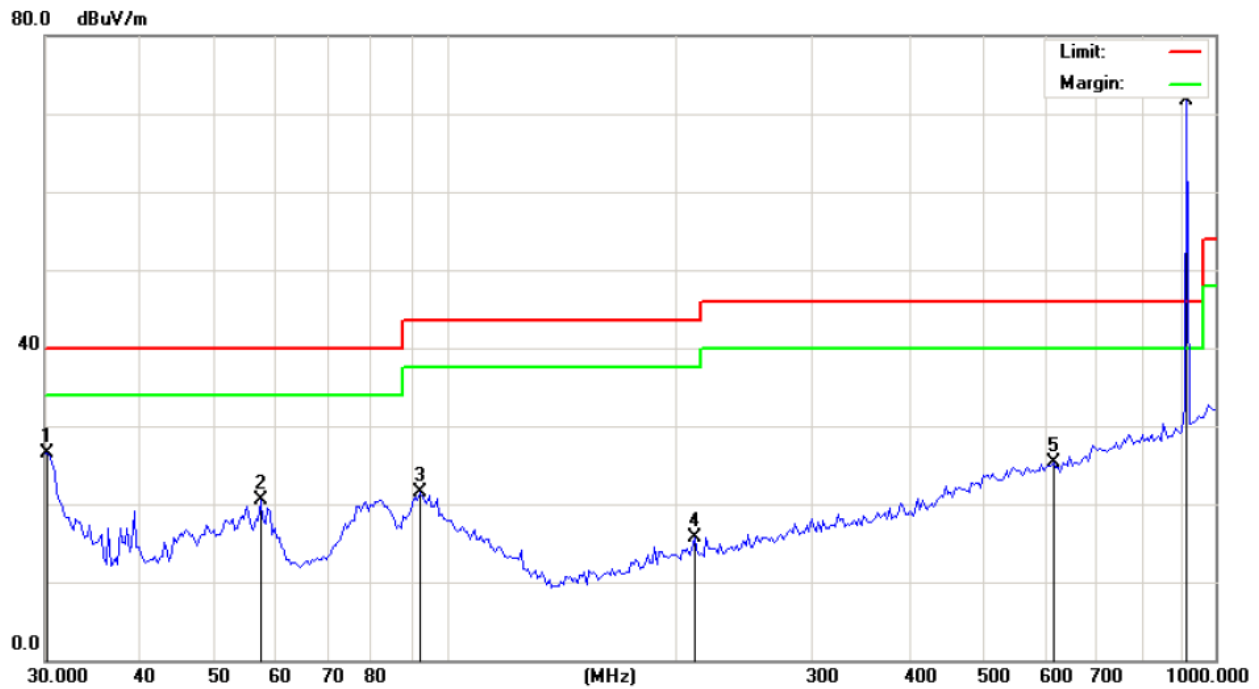
Frequency (MHz)	Level@3m (dB μ V/m)	Limit@3m (dB μ V/m)
--	--	--
--	--	--
--	--	--
--	--	--

B General Radiated Emissions Data

Radiated Emission In Horizontal (30MHz----1000MHz)

Please refer to following diagram for individual

Low channel: 926.75MHz

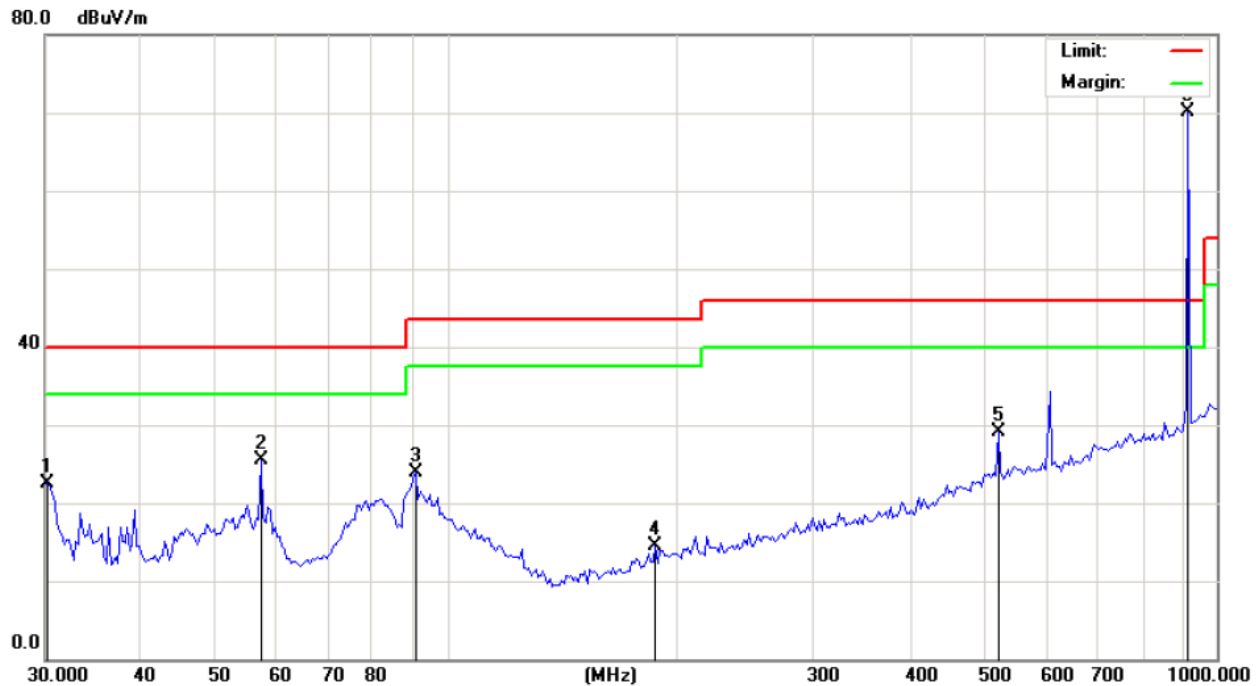


Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
30.2116	26.46	H	40.00
57.2653	20.41	H	40.00
92.3461	21.56	H	40.00
210.1294	15.67	H	43.50
615.7743	25.23	H	46.00
919.1313	71.63	H	--

Radiated Emission In Vertical (30MHz----1000MHz)

Please refer to following diagram for individual

High channel: 926.75 MHz



Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
30.2116	22.46	V	40.00
57.2653	25.41	V	40.00
91.0574	23.85	V	43.50
186.4686	14.49	V	43.50
520.2078	29.16	V	46.00
919.1313	70.13	V	46.00

Note: 1. Measurements were conducted in all three channels (high, middle, low), and the worst case (High channel) was submitted only.

2. The highlight frequency was fundamental wave.

C Fundamental & Harmonics Radiated Emission Data (1000MHz-10000MHz)

Low channel: 906.25 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1257.25	H	52.71	---	-4.20	48.51	---	74	54	-5.49
1804.50	H	50.35	---	-3.94	46.41	---	74	54	-7.59
2706.75	H	44.92	---	0.52	45.44	---	74	54	-8.56
---	H	---	---	---	---	---	---	---	---
---	H	---	---	---	---	---	---	---	---
1257.25	V	51.43	---	-4.25	47.18	---	74	54	-6.82
1804.50	V	49.82	---	-3.94	45.88	---	74	54	-8.12
2706.75	V	44.82	---	0.59	45.41	---	74	54	-8.59
---	V	---	---	---	---	---	---	---	---
---	V	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector).

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

Middle channel: 914.75 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1257.25	H	48.69	---	-4.20	44.49	---	74	54	-9.51
1829.50	H	49.32	---	-3.98	45.34	---	74	54	-8.66
2744.25	H	46.10	---	0.56	46.66	---	74	54	-7.34
---	H	---	---	---	---	---	---	---	---
---	H	---	---	---	---	---	---	---	---
1257.25	V	48.74	---	-4.25	44.49	---	74	54	-9.51
1829.50	V	50.02	---	-3.98	46.04	---	74	54	-7.96
2744.25	V	46.35	---	0.57	46.92	---	74	54	-7.08
---	V	---	---	---	---	---	---	---	---
---	V	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector).

3) Average test would be performed if the peak result were greater than the average limit.

4) Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

High channel: 926.75 MHz

Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1257.25	H	49.89	---	-4.20	45.69	---	74	54	-8.31
1853.50	H	48.78	---	-3.98	44.8	---	74	54	-9.2
2780.25	H	47.68	---	0.52	48.2	---	74	54	-5.8
---	H	---	---	---	---	---	---	---	---
---	H	---	---	---	---	---	---	---	---
1257.25	V	49.37	---	-4.25	45.12	---	74	54	-8.88
1853.50	V	48.25	---	-3.98	44.27	---	74	54	-9.73
2780.25	V	44.18	---	0.57	44.75	---	74	54	-9.25
---	V	---	---	---	---	---	---	---	---
---	V	---	---	---	---	---	---	---	---

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector).

3) Average test would be performed if the peak result were greater than the average limit.

4) Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

14.0 Antenna Requirement

14.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

14.2 Antenna Specification

According to the manufacturer declared, the EUT has a wire antenna; the directional gain of antenna is -5 dBi, and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.



ANTENNA

****END OF REPORT****