



STC Test Report

Date : 2013-04-24

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No. : DM110645

Applicant (GAL002): Standard Merit Industrial Limited
2/A Harrison Court Stage 6, 10 Man Wan Road, Kowloon,
Hong Kong.

Manufacturer: Foshan Shunde Alford Electronics Co., Ltd.
Xinjiao Industrial Park, Daliang, Shunde, Foshan City,
Guangdong Province, China

Description of Sample(s): Product: Wireless Monitor (Camera unit)
Brand Name: N/A
Model Number: DXR - 8
FCC ID: 2AAAM-DXR-8BU

Date Sample(s) Received: 2013-03-22

Date Tested: 2013-03-27 to 2013-04-17

Investigation Requested: Perform ElectroMagnetic Interference measurement in
accordance with FCC 47CFR [Codes of Federal Regulations]
Part 15: 2012 and ANSI C63.4: 2009 for FCC Certification.

Conclusion(s): The submitted product COMPLIED with the requirements of
Federal Communications Commission [FCC] Rules and
Regulations Part 15. The tests were performed in accordance
with the standards described above and on Section 2.2 in this
Test Report.

Remark(s): ---

LONG Yun Jian, Along
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
STC (Dongguan) Company Limited

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



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1.0 General Details

1.1 Test Laboratory

STC (Dongguan) Company Limited
EMC Laboratory
68 Fumin Nan Road, Dalang, Dongguan, China

Telephone: (86 769) 81119888

Fax: (86 769) 81116222

1.2 Equipment Under Test [EUT]

Description of Sample(s)

Product: Wireless Monitor (Camera unit)
Manufacturer: Foshan Shunde Alford Electronics Co., Ltd.
Brand Name: N/A
Model Number: DXR - 8
Input Voltage: 5.9Vd.c. with Jack
The AC/DC adaptor was provided by the applicant with following details:
Brand name: Csec, Ktec; Model no.: CS6D059100FU, KSAS0060590100VUD;
Input: 100-120Va.c. 50/60Hz 200mA; Output: 5.9Vd.c. 1.0A.

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Standard Merit Industrial Limited, Wireless Monitor (Camera unit).
It is wireless camera, the RF signals are modulated by IC, the IC generates pseudo random frequency hopping sequence within the 2.400 – 2.4835GHz band and which supports 19 hopping channels.

1.3 Date of Order

2013-03-22

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2013-03-27 to 2013-04-17

1.6 Country of Origin

China

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2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2012 Regulations and ANSI C63.4:2009 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Output Power of Fundamental Emissions	FCC 47CFR 15.247(b)(1)	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Spurious Emissions	FCC 47CFR 15.209	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of Operating Channel	FCC 47CFR 15.247(a)(2)(b)(1)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Band-edge compliance of Conducted Emission	FCC 47CFR 15.247(c)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pseudorandom Hopping Algorithm	FCC 47CFR 15.247(a)(1)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time of Occupancy	FCC 47CFR 15.247(a)(1)(iii)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20dB Bandwidth	FCC 47CFR 15.247(a)(2)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hopping Channel Separation	FCC 47CFR 15.247(a)(1)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RF Exposure compliance	FCC 47CFR 1.1307, 2.1091, 2.1093	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A – Not Applicable



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3.0 Test Results

3.1 Emission

3.1.1 Maximum Peak Output Power

Test Requirement:	FCC 47CFR 15.247(b)(1)
Test Method:	N/A
Test Date:	2013-04-02
Mode of Operation:	Tx mode

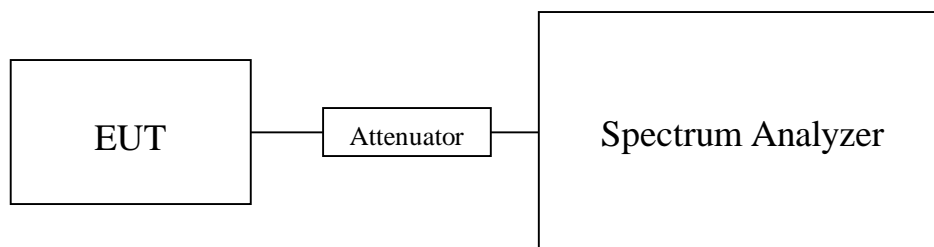
Test Method:

The RF output of the EUT was connected to the spectrum analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in dBm.

Spectrum Analyzer Setting:

RBW = 10 MHz, VBW= 30MHz, Sweep = Auto, Span = 20MHz
Detector = Peak, Trace = Max. hold

Test Setup:



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Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

The maximum peak output power shall not exceeded the following limits:
For frequency hopping systems employing at least 75 hopping channels: 1 Watt
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts
For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

Results of Tx mode (GFSK) (Fundamental Power): Pass

Maximum conducted output power

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2410.875	0.04692

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2441.250	0.04001

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2471.625	0.03385

Limit: 0.125W (125mW)

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB
1GHz to 18GHz 1.7dB

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3.1.2 Radiated Spurious Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.4:2009
Test Date:	2013-04-17
Mode of Operation:	Tx mode / Operating mode

Test Method:

The sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

*: Semi-anechoic chamber located on the STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

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EMI Receiver Setting:

9KHz – 30MHz (Pk & Av)

RBW: 10kHz
VBW: 30kHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

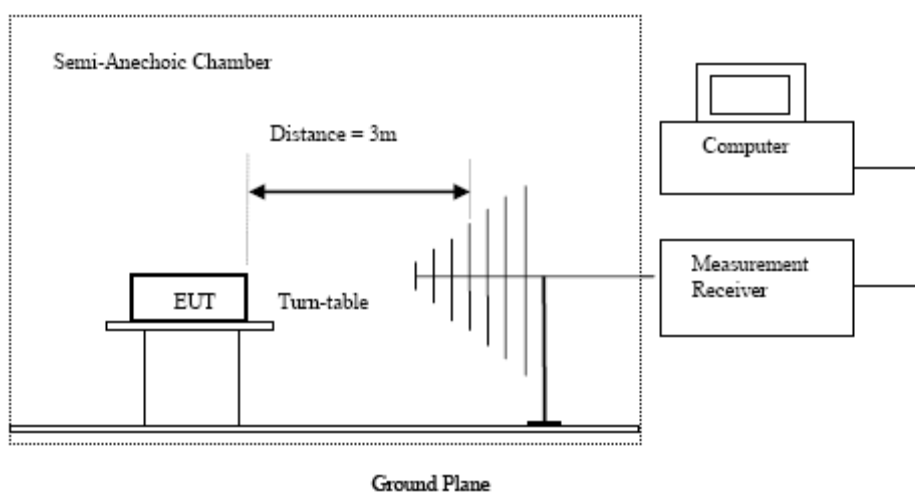
30MHz – 1GHz (QP)

RBW: 120kHz
VBW: 120kHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

Above 1GHz (Pk & Av)

RBW: 1MHz
VBW: 3MHz
Sweep: Auto
Span: Fully capture the emissions being measured
Trace: Max. hold

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Tx mode (2410.875 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level $\text{dB}\mu\text{V}$	Correction Factor dB/m	Field Strength $\text{dB}\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit $\mu\text{V/m}$	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2410.875 MHz) (GFSK mode) (30MHz – 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level $\text{dB}\mu\text{V}$	Correction Factor dB/m	Field Strength $\text{dB}\mu\text{V/m}$	Field Strength $\mu\text{V/m}$	Limit $\mu\text{V/m}$	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2410.875 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m $\text{dB}\mu\text{V}$	Correction Factor dB/m	Field Strength $\text{dB}\mu\text{V/m}$	Limit @3m $\text{dB}\mu\text{V/m}$	Margin $\text{dB}\mu\text{V/m}$	E-Field Polarity
4821.750	11.2	41.5	52.7	74.0	21.3	Vertical
7232.625	4.4	48.8	53.2	74.0	20.8	Vertical
2314.700	19.8	32.5	52.3	74.0	21.7	Vertical
2506.100	23.3	32.4	55.7	74.0	18.3	Vertical

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Result of Tx mode (2410.875 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4821.750	6.5	41.5	48.0	54.0	6.0	Vertical
7232.625	-3.7	48.8	45.1	54.0	8.9	Vertical
2314.700	12.1	32.5	44.6	54.0	9.4	Vertical
2506.100	15.5	32.4	47.9	54.0	6.1	Vertical

Result of Tx mode (2441.250 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (2441.250 MHz) (GFSK mode) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.250 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4882.500	8.7	41.4	50.1	74.0	23.9	Vertical
7323.750	0.5	48.7	49.2	74.0	24.8	Vertical
2314.800	21.1	32.5	53.6	74.0	20.4	Vertical
2508.400	23.5	32.4	55.9	74.0	18.1	Vertical

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Result of Tx mode (2441.250 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4882.500	3.2	41.4	44.6	54.0	9.4	Vertical
7323.750	-5.0	48.7	43.7	54.0	10.3	Vertical
2314.800	12.7	32.5	45.2	54.0	8.8	Vertical
2508.400	15.7	32.4	48.1	54.0	5.9	Vertical

Result of Tx mode (2471.625 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (2471.625 MHz) (GFSK mode) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

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Result of Tx mode (2471.625 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4943.250	7.1	41.4	48.5	74.0	25.5	Vertical
7414.875	5.7	48.6	54.3	74.0	19.7	Vertical
2375.600	22.8	32.5	55.3	74.0	18.7	Vertical
2566.800	21.8	32.4	54.2	74.0	19.8	Vertical

Result of Tx mode (2471.625 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
4943.250	1.8	41.4	43.2	54.0	10.8	Vertical
7414.875	-1.0	48.6	47.6	54.0	6.4	Vertical
2375.600	15.3	32.5	47.8	54.0	6.2	Vertical
2566.800	12.7	32.4	45.1	54.0	8.9	Vertical

Remarks:

* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: (30MHz - 1GHz): 4.6dB

(1GHz - 26GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

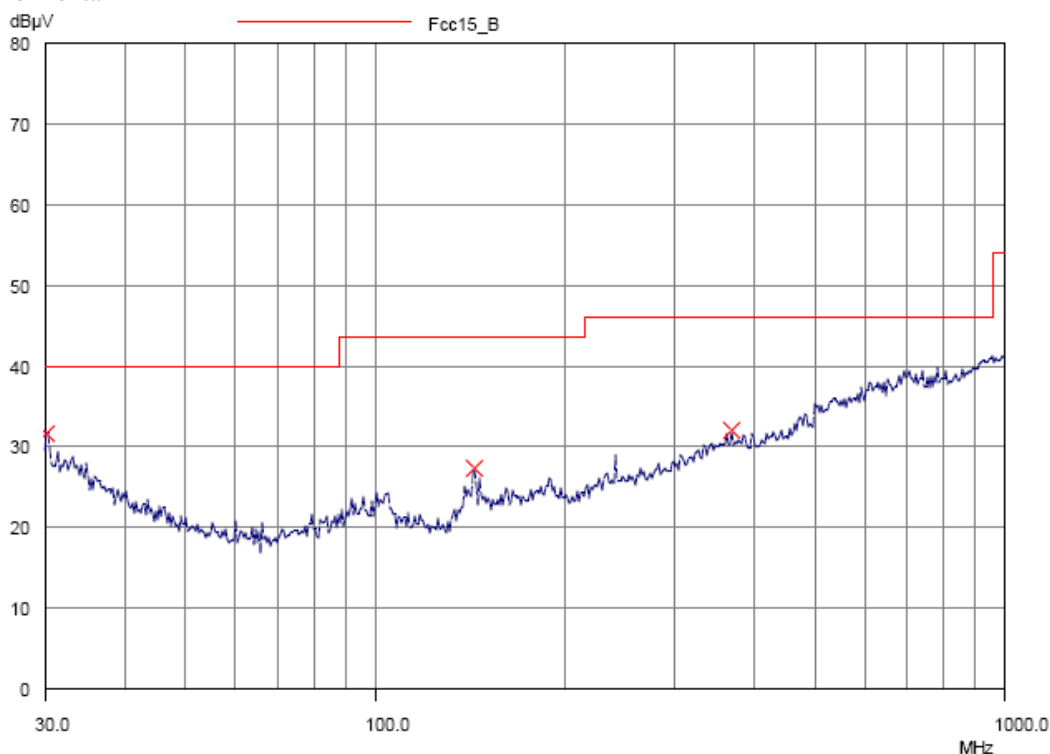
Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Operating mode (30MHz – 1GHz), (with adaptor model no. CS6D059100FU): Pass

Please refer to the following table for result details

Horizontal



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Result of Operating mode (30MHz – 1GHz), (with adaptor model no. CS6D059100FU): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @3m μ V/m
30.1	Horizontal	31.8	40.0	38.9	100
144.0	Horizontal	27.3	43.5	23.2	150
368.4	Horizontal	32.1	46.0	40.3	200

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

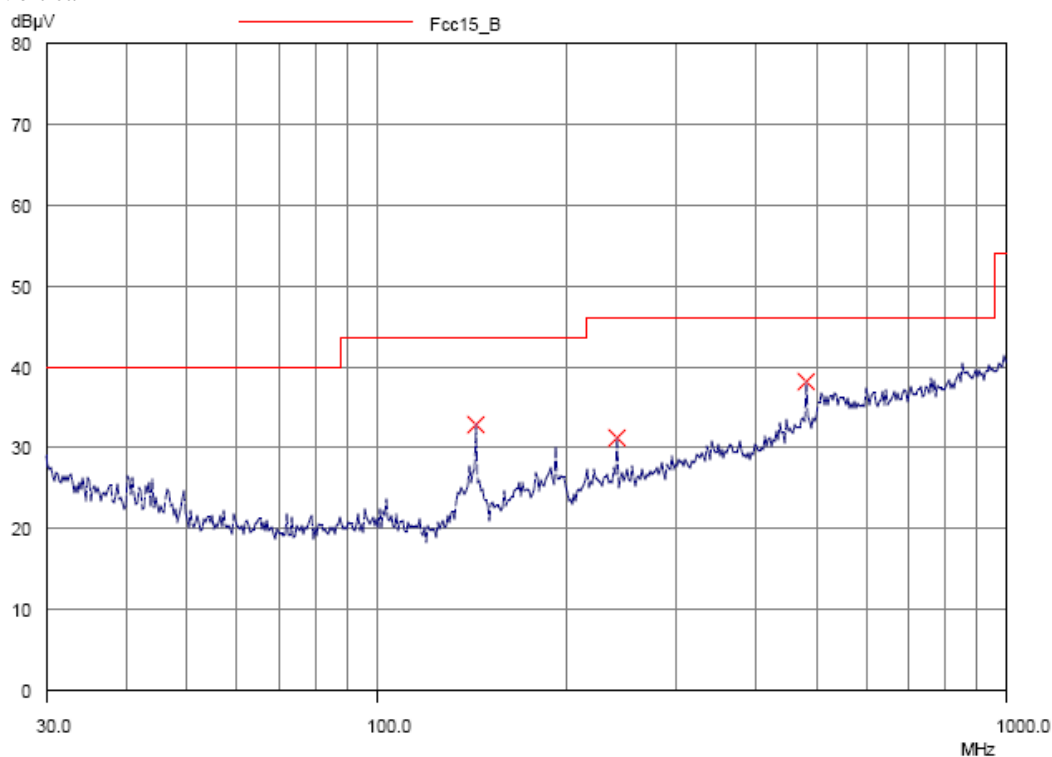
Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Operating mode (30MHz – 1GHz), (with adaptor model no. CS6D059100FU): Pass

Please refer to the following table for result details

Vertical



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Result of Operating mode (30MHz – 1GHz), (with adaptor model no. CS6D059100FU): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @3m μ V/m
144.0	Vertical	33.0	43.5	44.7	150
240.0	Vertical	31.4	46.0	37.2	200
480.0	Vertical	38.2	46.0	81.3	200

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

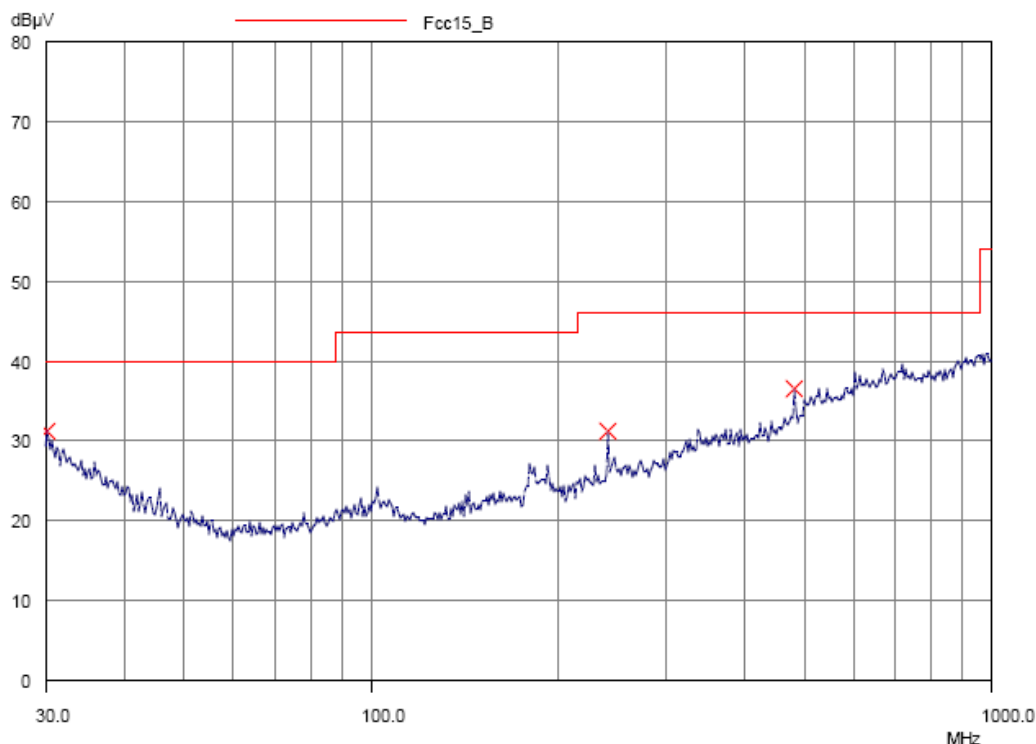
Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Operating mode (30MHz – 1GHz), (with adaptor model no. KSAS0060590100VUD): Pass

Please refer to the following table for result details

Horizontal



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Result of Operating mode (30MHz – 1GHz), (with adaptor model no. KSAS0060590100VUD): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @3m μ V/m
30.1	Horizontal	31.4	40.0	37.2	100
240.0	Horizontal	31.3	46.0	36.7	200
480.0	Horizontal	36.7	46.0	68.4	200

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

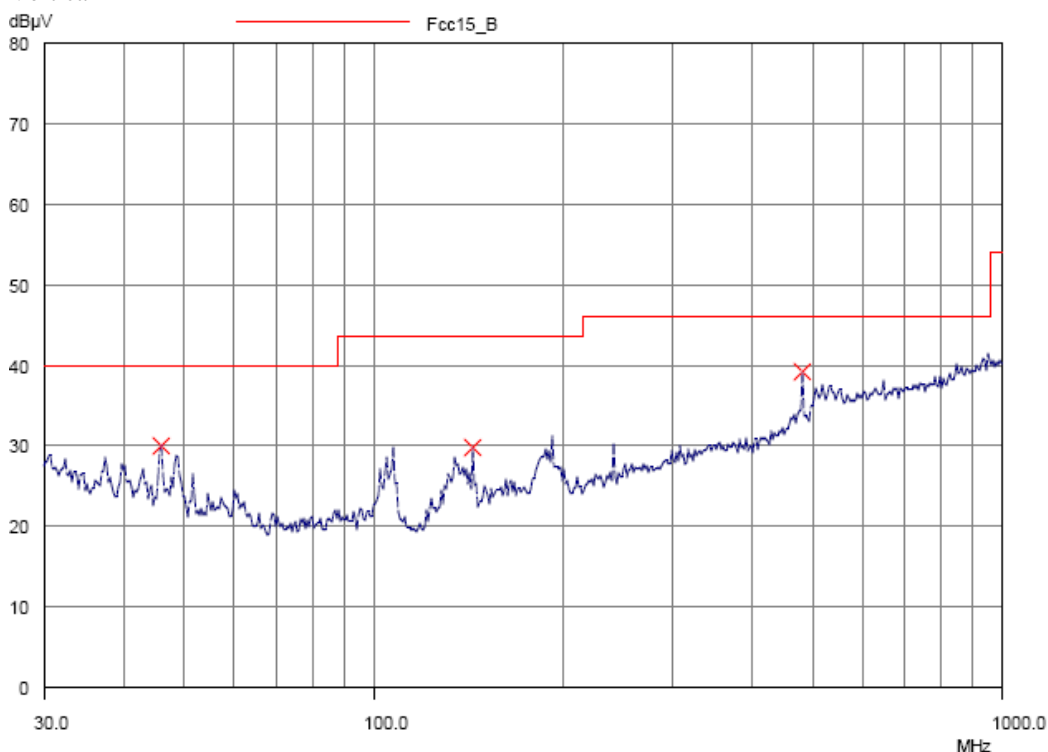
Frequency Range [MHz]	Quasi-Peak Limits [$\mu\text{V/m}$]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Operating mode (30MHz – 1GHz), (with adaptor model no. KSAS0060590100VUD): Pass

Please refer to the following table for result details

Vertical



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Result of Operating mode (30MHz – 1GHz), (with adaptor model no. KSAS0060590100VUD): Pass

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @3m μ V/m
46.0	Vertical	30.1	40.0	32.0	100
144.0	Vertical	29.9	43.5	31.3	150
480.0	Vertical	39.2	46.0	91.2	200

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty (30MHz – 1GHz): 4.6dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report

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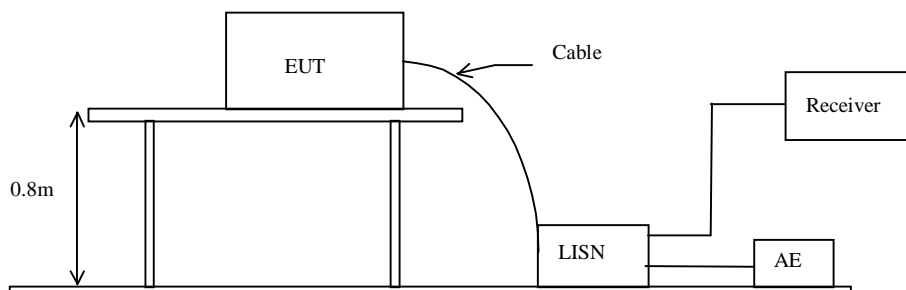
3.1.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.4:2009
Test Date:	2013-03-26
Mode of Operation:	Operating + Charging mode
Test Voltage:	117V a.c., 60Hz

Test Method:

The test was performed in accordance with ANSI C63.4: 2009, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:





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Limit for Conducted Emissions (FCC 47 CFR 15.207):

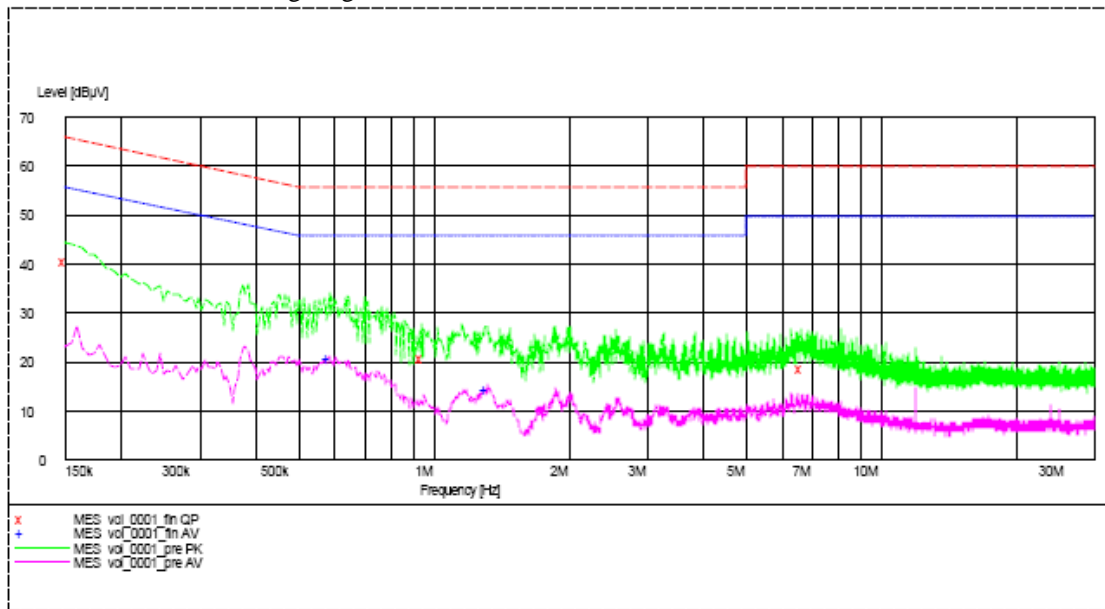
Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of Operating + Charging mode (with adaptor model no. CS6D059100FU) (L): PASS

Please refer to the following diagram for individual results.



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Results of Operating + Charging mode (with adaptor model no. CS6D059100FU) (L): PASS

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Live	0.150	40.7	66.0	-*-	-*-
Live	0.945	20.7	56.0	-*-	-*-
Live	6.660	18.7	60.0	-*-	-*-
Live	0.585	-*-	-*-	20.8	46.0
Live	1.315	-*-	-*-	14.4	46.0

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Limit for Conducted Emissions (FCC 47 CFR 15.207):

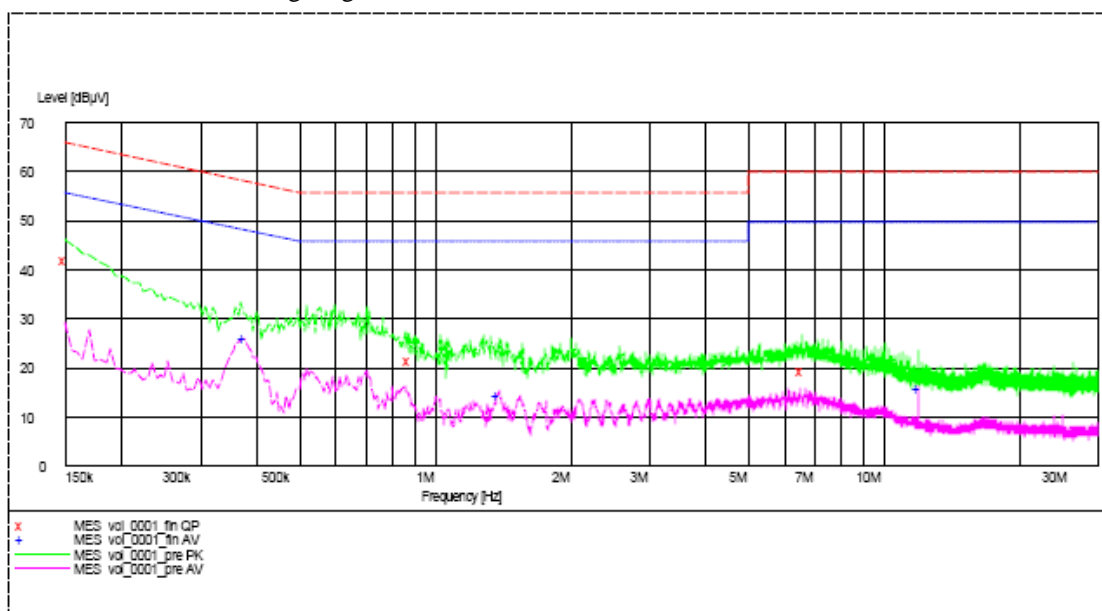
Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of Operating + Charging mode (with adaptor model no. CS6D059100FU) (N): PASS

Please refer to the following diagram for individual results.



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Results of Operating + Charging mode (with adaptor model no. CS6D059100FU) (N): PASS

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Neutral	0.150	42.0	66.0	-*-	-*-
Neutral	0.880	21.6	56.0	-*-	-*-
Neutral	6.560	19.6	60.0	-*-	-*-
Neutral	0.375	-*-	-*-	26.3	48.0
Neutral	1.390	-*-	-*-	14.4	46.0
Neutral	12.000	-*-	-*-	16.0	50.0

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Limit for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

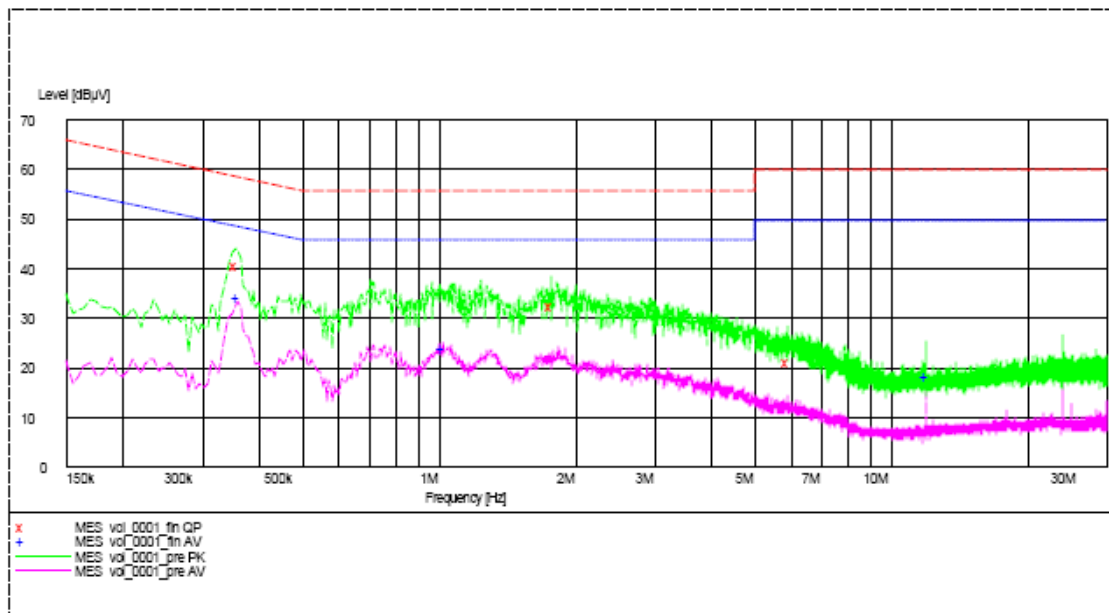
* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of Operating + Charging mode (with adaptor model no. KSAS0060590100VUD)

(L): PASS

Please refer to the following diagram for individual results.



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Results of Operating + Charging mode (with adaptor model no. KSAS0060590100VUD) (L): PASS

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Live	0.355	40.8	59.0	-*-	-*-
Live	1.775	32.4	56.0	-*-	-*-
Live	5.925	21.2	60.0	-*-	-*-
Live	0.360	-*-	-*-	34.1	49.0
Live	1.025	-*-	-*-	24.0	46.0

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Limit for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

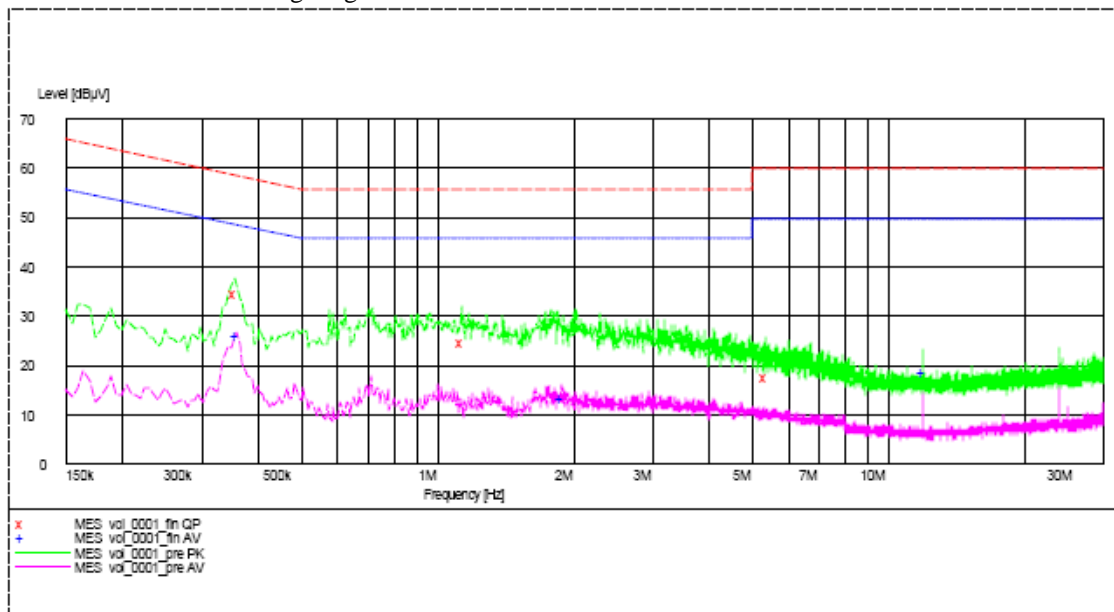
* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of Operating + Charging mode (with adaptor model no. KSAS0060590100VUD)

(N): PASS

Please refer to the following diagram for individual results.



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Results of Operating + Charging mode (with adaptor model no. KSAS0060590100VUD) (N): PASS

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Neutral	0.355	34.6	59.0	-*-	-*-
Neutral	1.135	24.6	56.0	-*-	-*-
Neutral	5.365	17.8	60.0	-*-	-*-
Neutral	0.360	-*-	-*-	26.3	49.0
Neutral	1.885	-*-	-*-	13.6	46.0
Neutral	12.000	-*-	-*-	18.8	50.0

Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.2dB

-*- Emission(s) that is far below the corresponding limit line.

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3.1.4 20dB Bandwidth Measurement

Test Requirement:	FCC 47CFR 15.247(a)(1)
Test Method:	ANSI C63.4:2009
Test Date:	2013-03-28
Mode of Operation:	Communication mode

Remark:

The result has been done on all the possible configurations for searching the worst cases.

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.



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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2410.875	3.64	Within 2400-2483.5

(Lowest Operating Frequency) - (GFSK)

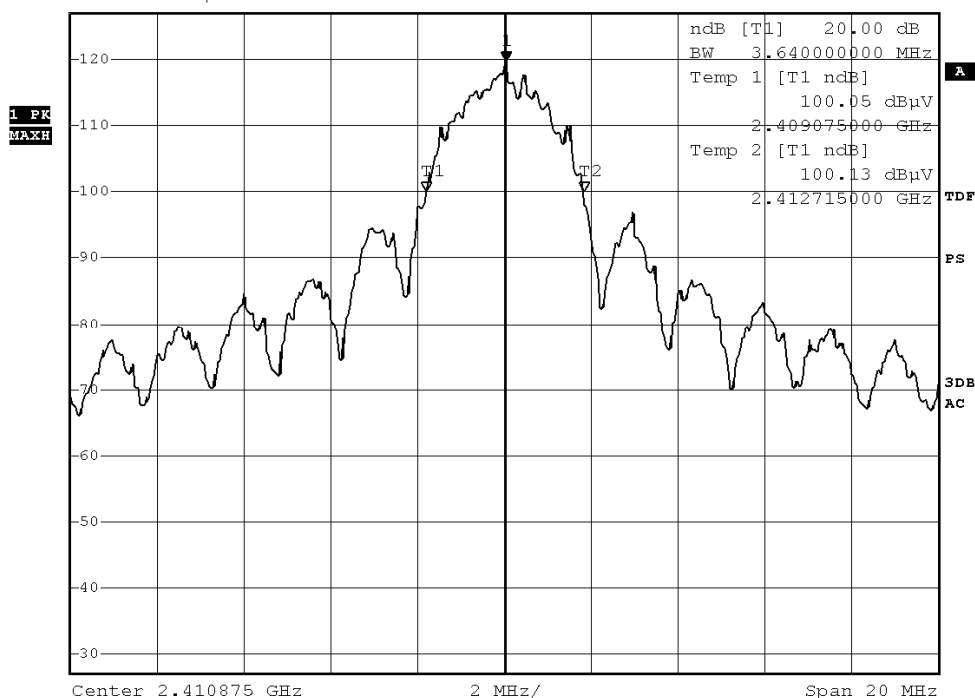


*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz 119.87 dBμV
 SWT 2.5 ms 2.410915000 GHz

Ref 127 dBμV

*Att 40 dB

2.410915000 GHz



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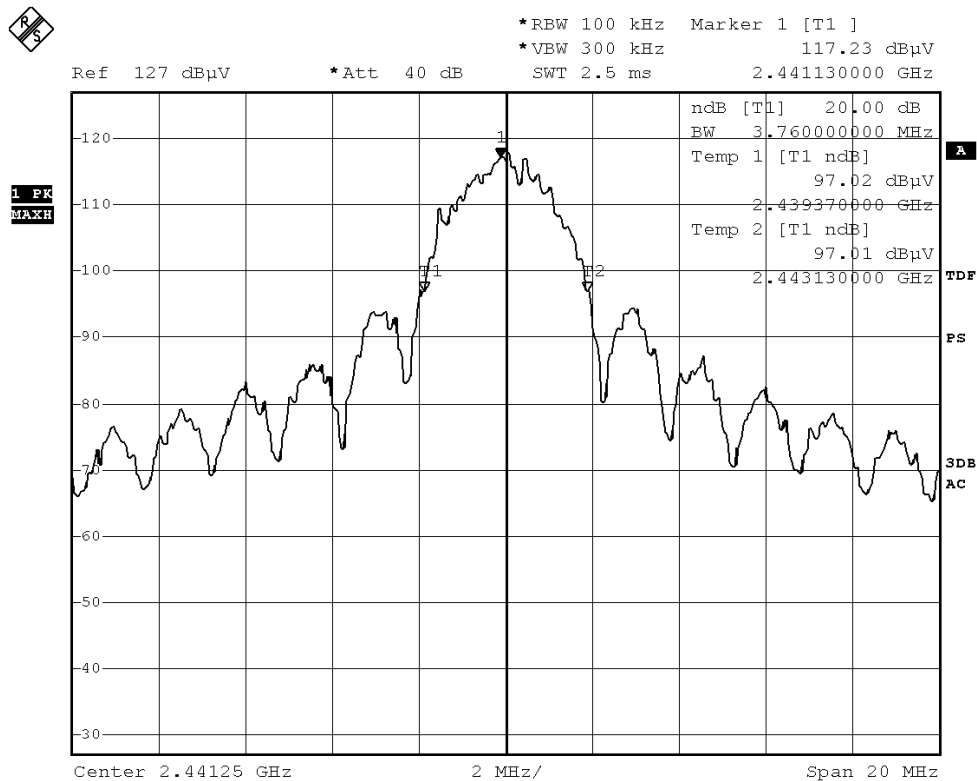
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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2441.25	3.76	Within 2400-2483.5

(Middle Operating Frequency) - (GFSK)





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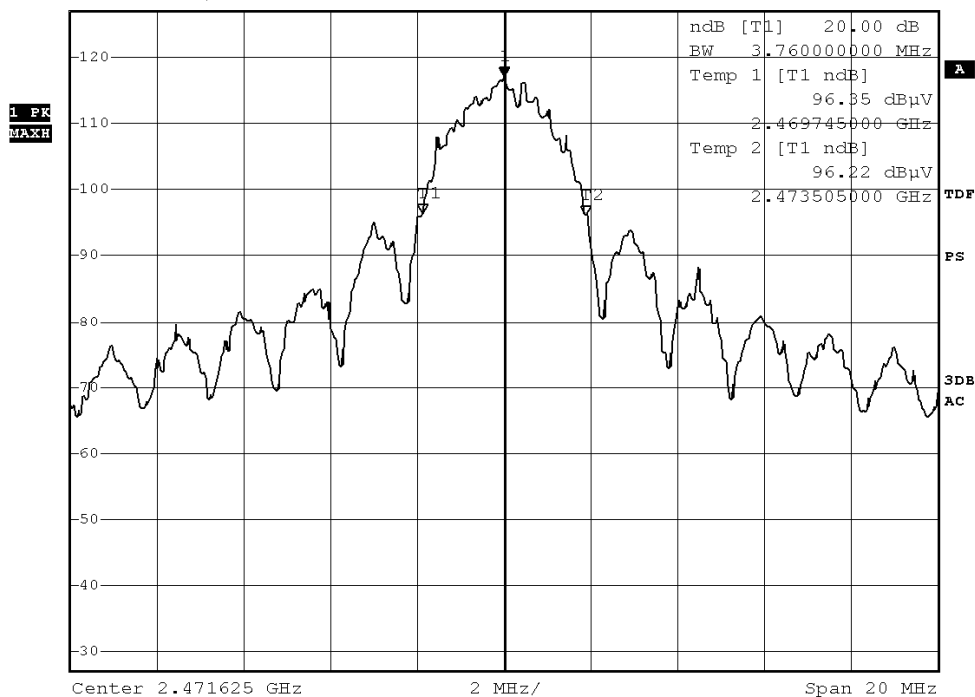
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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2471.625	3.76	Within 2400-2483.5

(Highest Operating Frequency) - (GFSK)



*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz 117.26 dBµV
 Ref 127 dBµV *Att 40 dB SWT 2.5 ms 2.471625000 GHz



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Channel Centre Frequency

Requirements:

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

Frequency (MHz)
2410.875
2414.250
2417.625
2421.000
2424.375
2427.750
2431.125
2434.500
2437.875
2441.250
2444.625
2448.000
2451.375
2454.750
2458.125
2461.500
2464.875
2468.250
2471.625

Hopping Channel Separation

Requirements:

Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Limit:

The measured minimum bandwidth * 2/3 = 3.76MHz * 2/3 = 2506.67kHz

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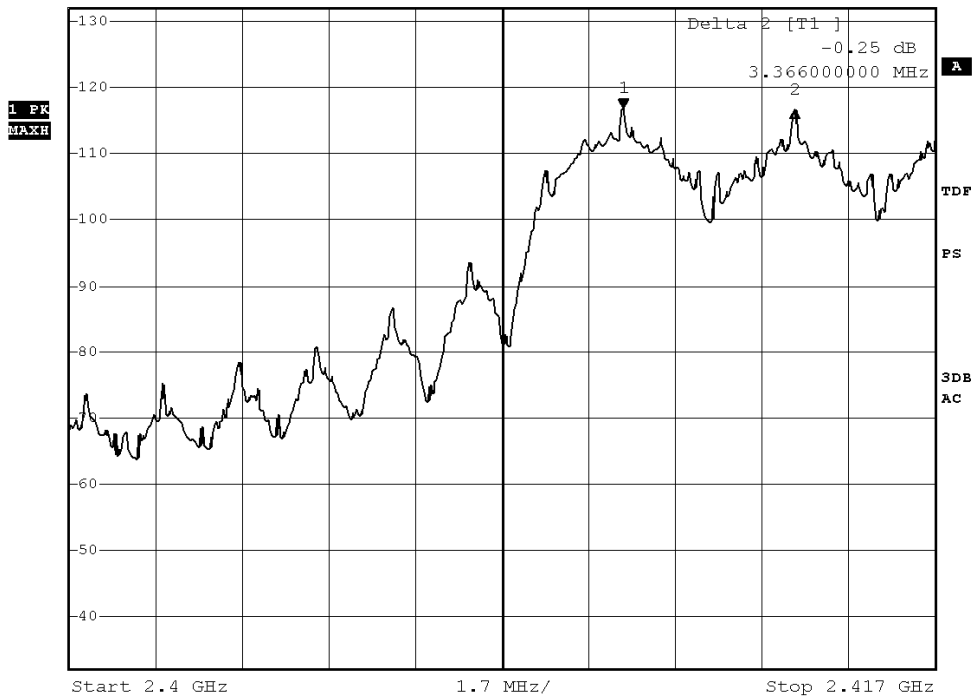
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Channel separation (GFSK)

Channel 0 – Channel 1, Pass



*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz 116.93 dBµV
 Ref 132 dBµV *Att 40 dB SWT 2.5 ms 2.410880000 GHz





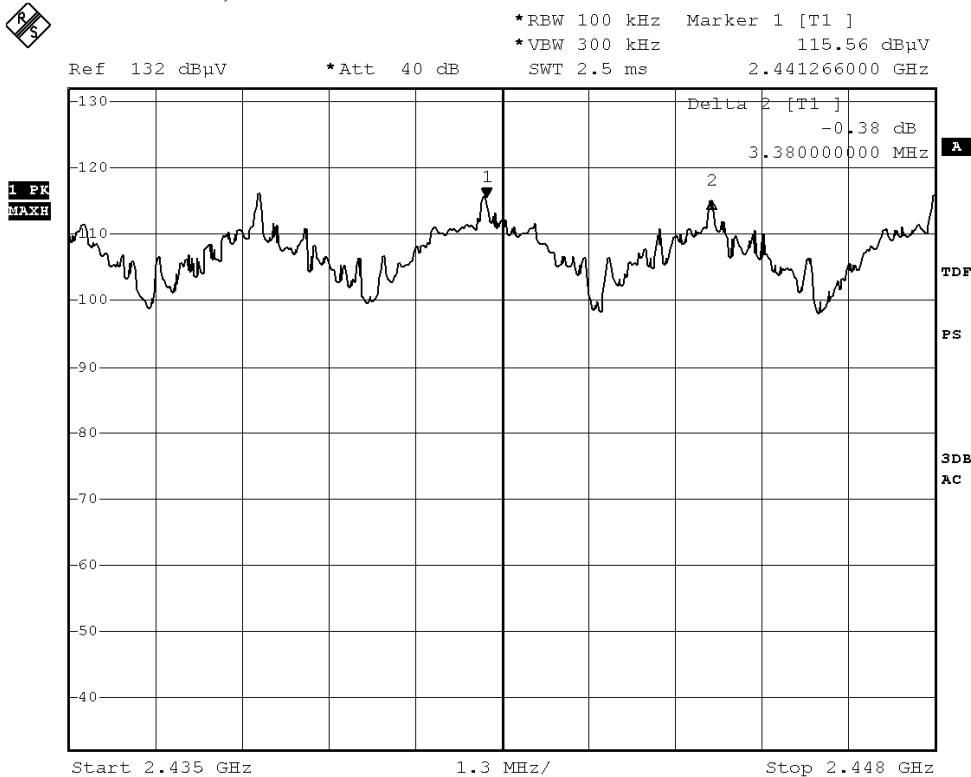
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Channel 9 – Channel 10, Pass



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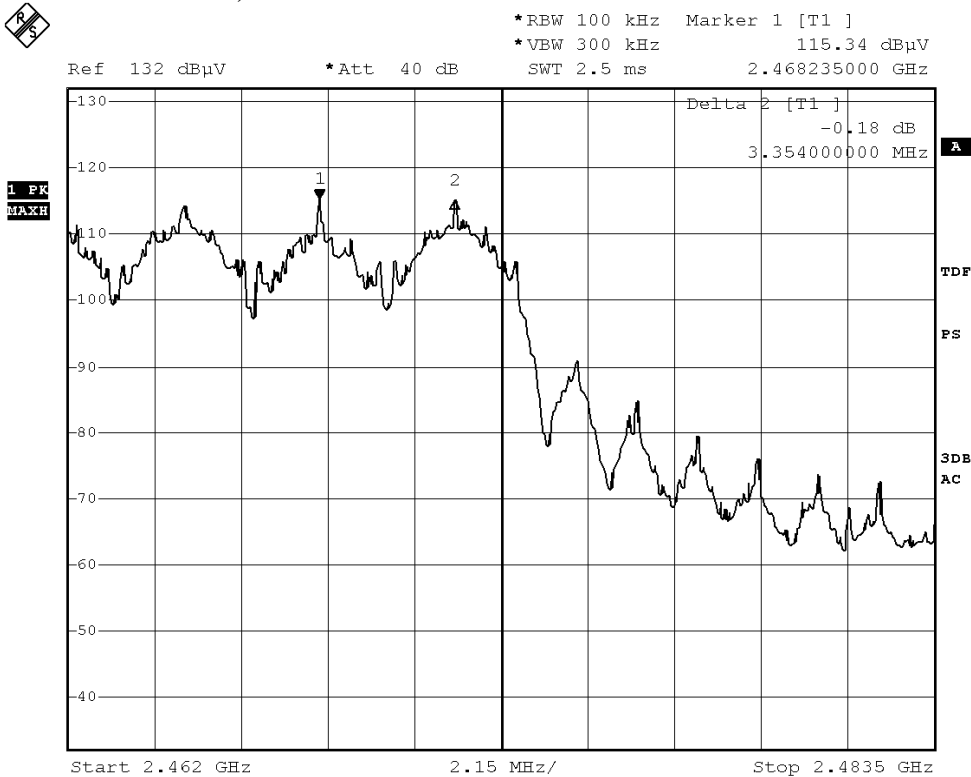
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Channel 18 – Channel 19, Pass



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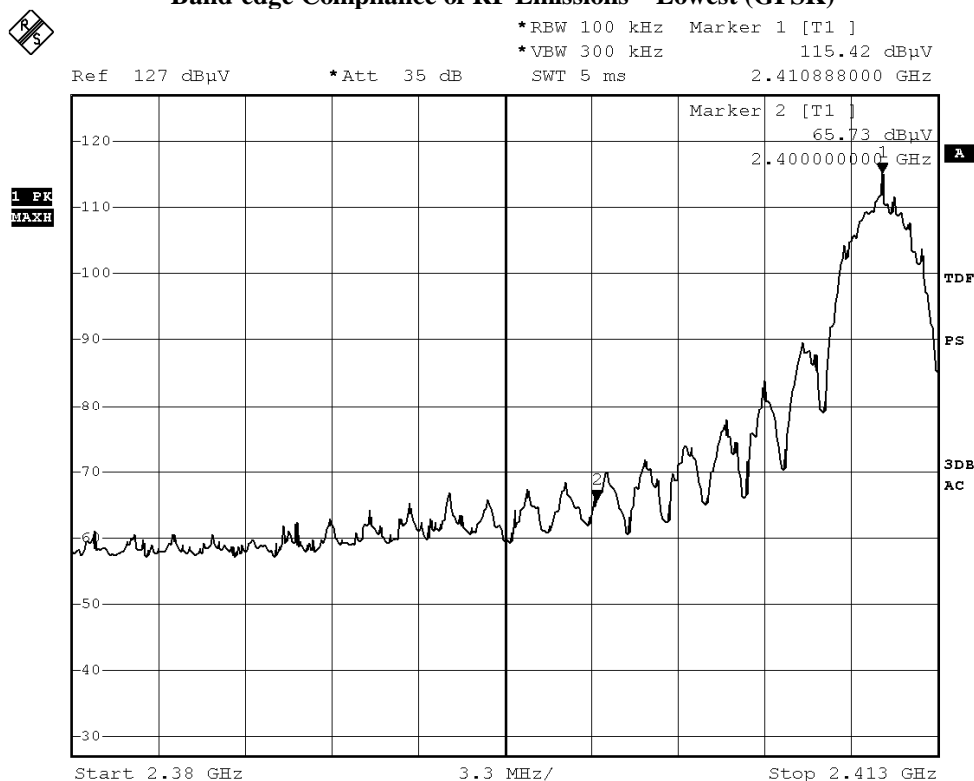
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Band-edge Compliance of RF Emissions – Lowest (GFSK)



Band-edge Compliance of RF Emissions						
Peak Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m	
2400.0	32.8	35.4	68.2	74.0	5.8	Vertical

Band-edge Compliance of RF Emissions						
Average Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m	
2400.0	14.7	35.4	50.1	54.0	3.9	Vertical

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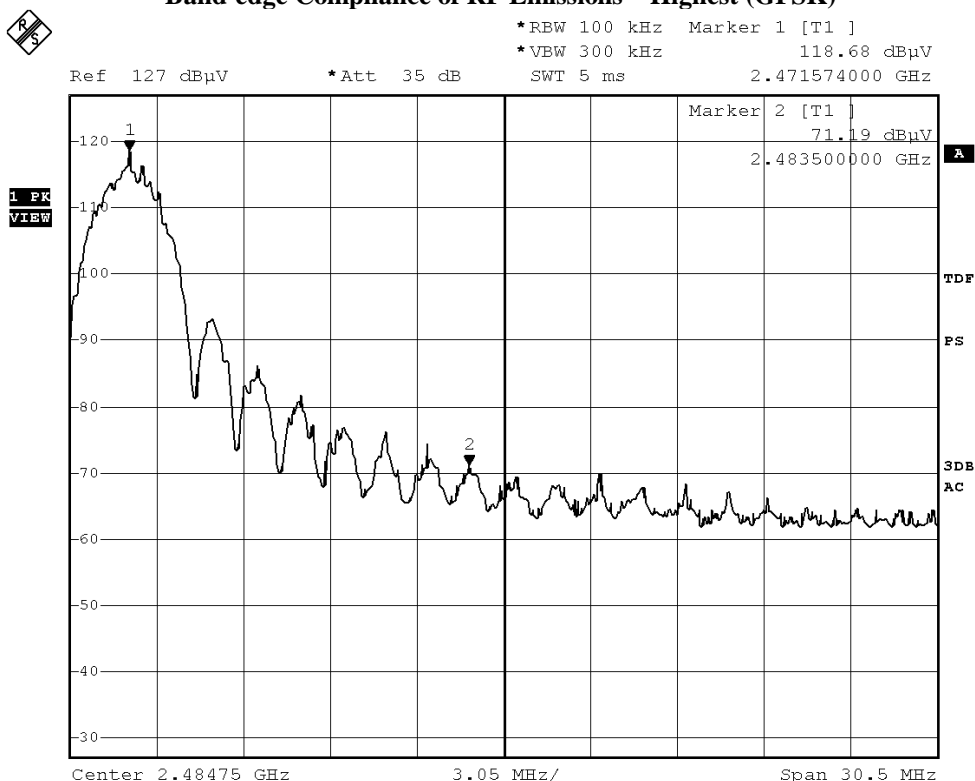
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Band-edge Compliance of RF Emissions – Highest (GFSK)



Band-edge Compliance of RF Emissions						
Peak Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m	
2483.5	31.9	35.4	67.3	74.0	6.7	Vertical

Band-edge Compliance of RF Emissions						
Average Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m	
2483.5	16.6	35.4	52.0	54.0	2.0	Vertical

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Antenna Requirement

Test Requirements: § 15.203

Test Specification:

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 use of a standard antenna jack or electrical connector is prohibited.

Test Results:

The EUT has 1 [Integral Antenna] which is permanently attached to the main unit and attached on PCB board, the antenna gain = 0dBi. All component install on inside of EUT. User unable to remove or changed the Antenna.

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Pseudorandom Hopping Algorithm

Requirements:

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

EUT Pseudorandom Hopping Algorithm

The embedded FHSS engine uses 19 hopping frequencies. Each channel frequency is selected from a pseudorandom ordered list of hopping frequencies, from 2402.0MHz to 2480.0MHz with separating in 3.375 MHz apart from each of the channels. A single data frame is transmitted on each frequency location before skipping to the next hopping frequency in the list. Each channel is occupied 8 milliseconds.

Typically, the initiation of an FHSS communication is as follows

1. The initiating party sends a request via a predefined frequency or control channel.
2. The receiving party sends a number, known as a seed back to the initiating party.
3. The initiating party sends a synchronization signal acknowledging to the receiving party as it has successfully established a transmission link.
4. The communication begins, and both the receiving and the sending party change their frequencies along an unpredictable hopping sequence with pseudorandom properties.

System Receiver Input Bandwidth

The receiver bandwidth is equal to the receiver bandwidth in the 19 hopping channel mode. The receiver bandwidth was verified during RF hopping to the relative channel.

Receiver Hopping Capability

The associated receiver has the ability to shift frequencies in synchronization with the transmitted signals, with they start connect with a same channel and then hop to next channel with a same formula among each other.

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Occupancy Time (2410.875MHz)

Requirements:

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channel employed.
No requirements for Digital Transmission System.

Measurement Data: Number of RF channel: 19
Observed duration of occupancy: $0.4 \times 19 = 7.6\text{s}$
Period observed: 1s
Duration of short burst: 0.00252s

Time of occupancy: $(20 \times 0.00252) / 1 \times 7.6 = 0.38304\text{s}$
See fig. A and B.

Remark: The Occupancy Time of the Lowest, Middle and Highest operating frequency has been examined and the worst case test result is recorded in this test report.

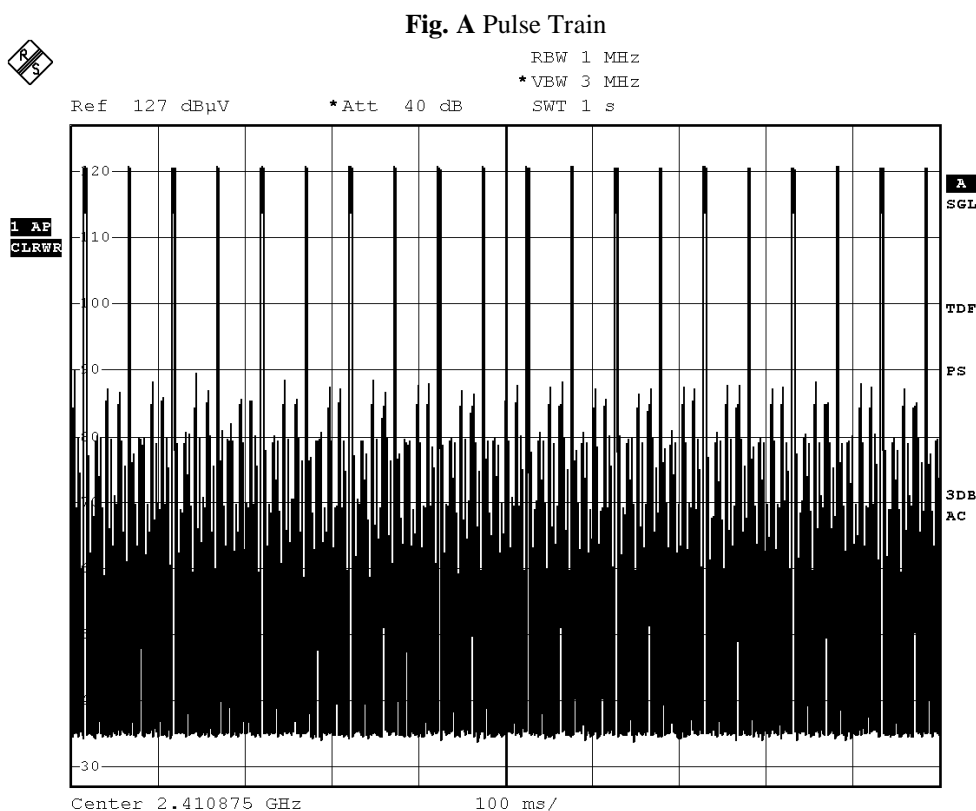


Fig B . Single Pulse

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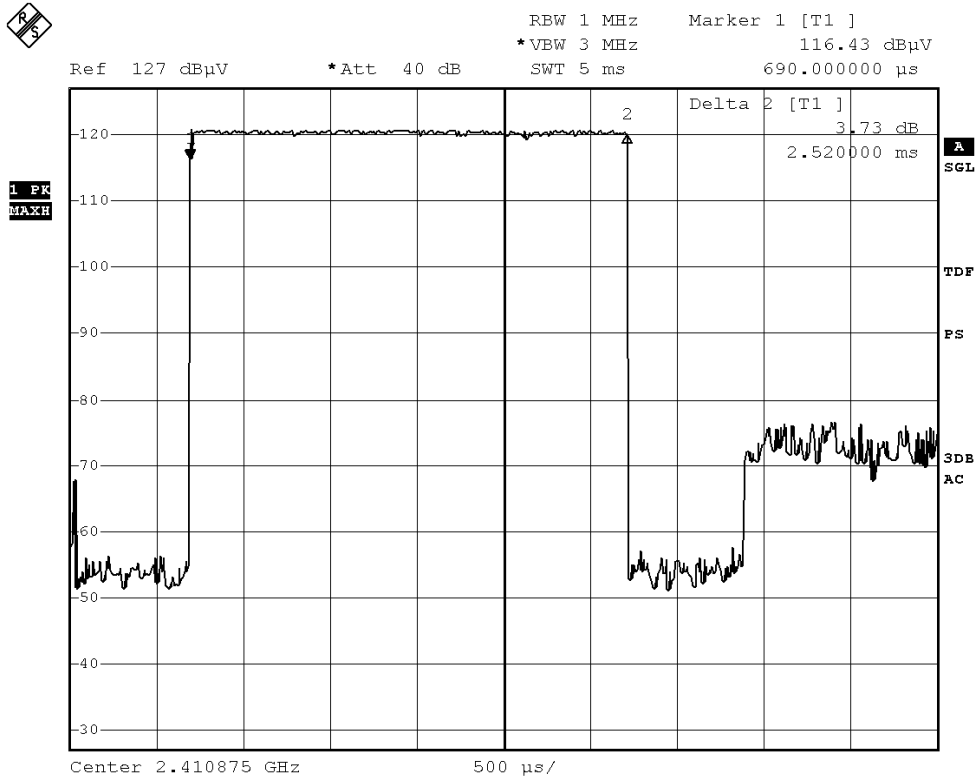


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Occupancy Time (2441.25MHz)

Requirements:

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channel employed.
No requirements for Digital Transmission System.

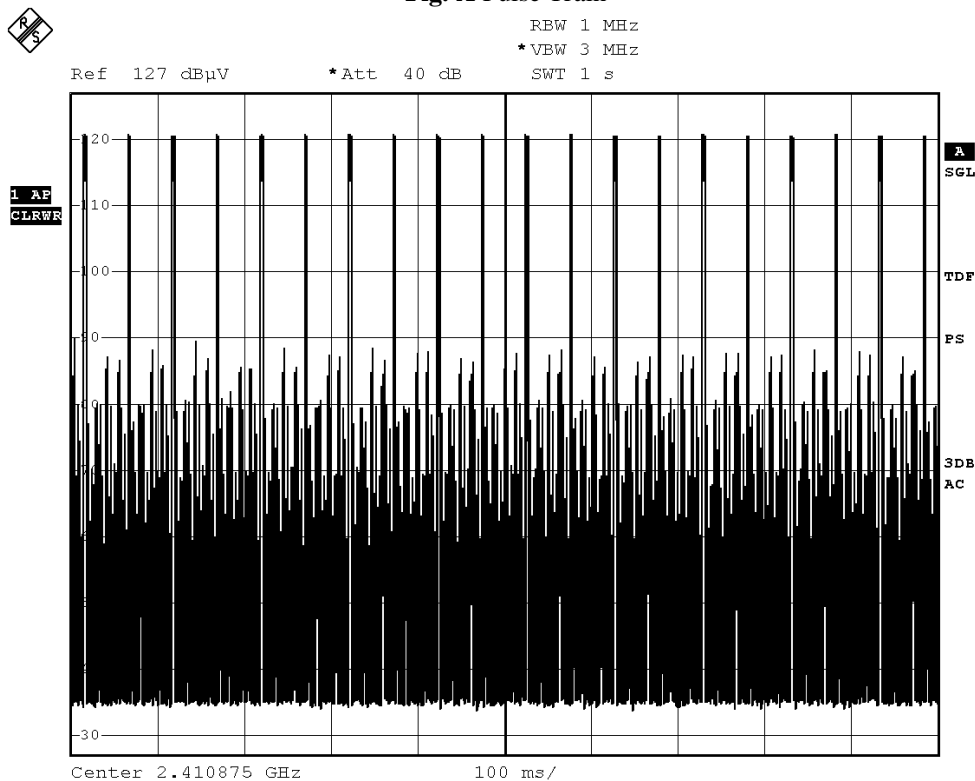
Measurement Data: Number of RF channel: 19
Observed duration of occupancy: $0.4 \times 19 = 7.6$ s
Period observed: 1s
Duration of short burst: 0.00252s

Time of occupancy: $(20 \times 0.00252) / 1 \times 7.6 = 0.38304$ s

See fig. A and B.

Remark: The Occupancy Time of the Lowest, Middle and Highest operating frequency has been examined and the worst case test result is recorded in this test report.

Fig. A Pulse Train



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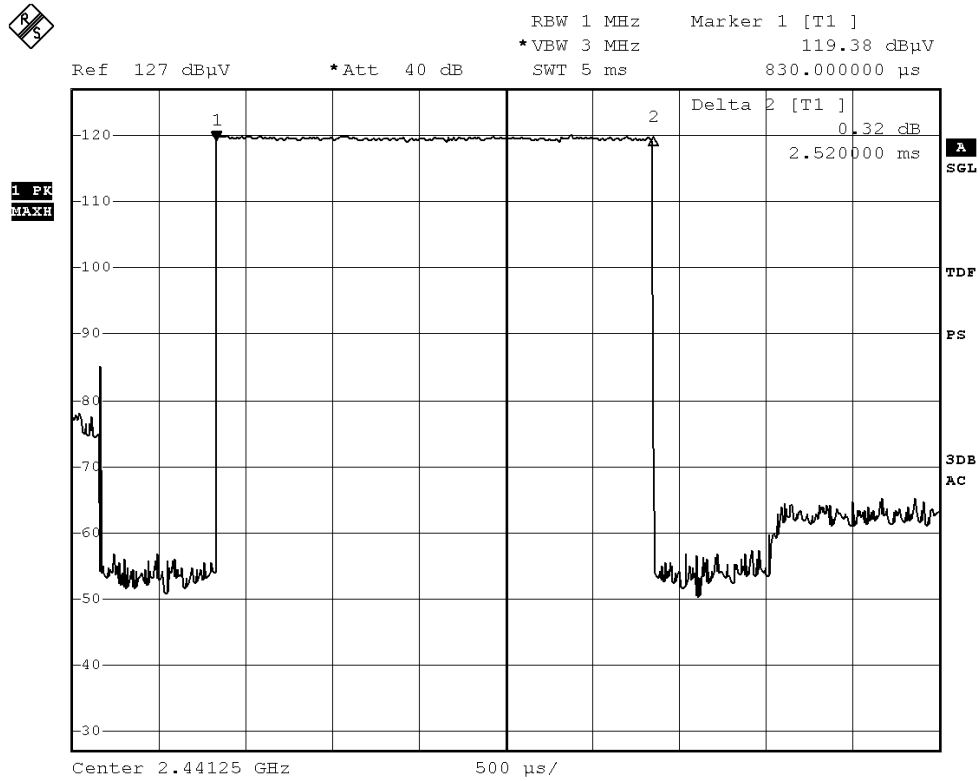
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Fig B . Single Pulse



1 PK
MAXH

A
SGL

TDF

FS

3DB
AC

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Occupancy Time (2471.625MHz)

Requirements:

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channel employed.
No requirements for Digital Transmission System.

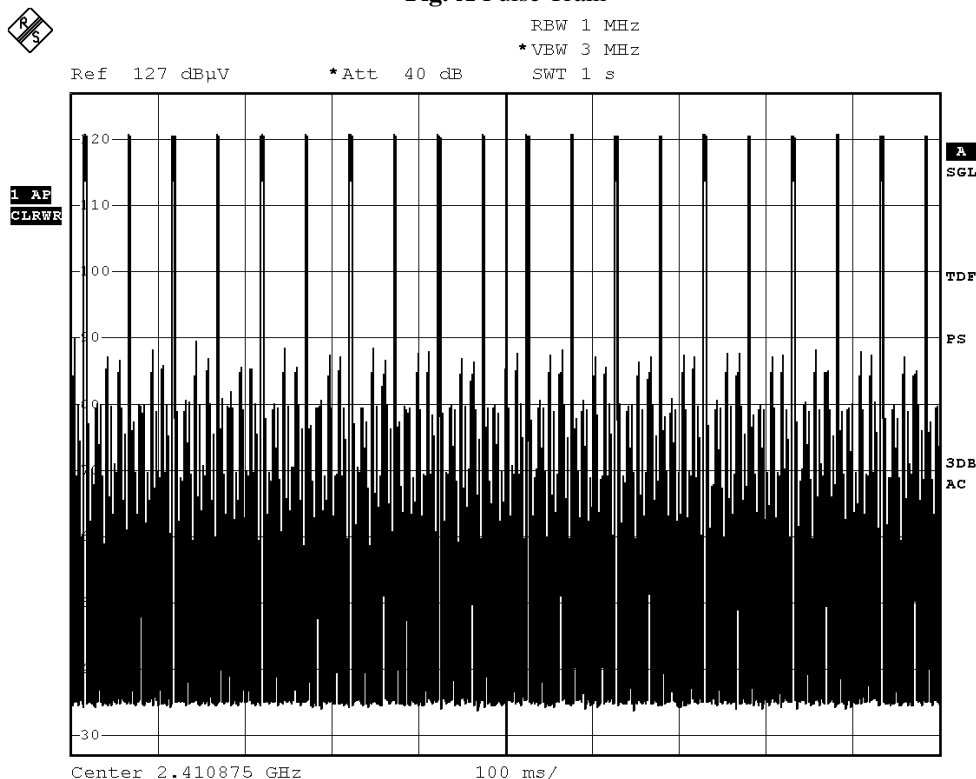
Measurement Data: Number of RF channel: 19
Observed duration of occupancy: $0.4 \times 19 = 31.6\text{s}$
Period observed: 1s
Duration of short burst: 0.00252s

Time of occupancy: $(20 \times 0.00252) / 1 \times 7.6 = 0.38304\text{s}$

See fig. A and B.

Remark: The Occupancy Time of the Lowest, Middle and Highest operating frequency has been examined and the worst case test result is recorded in this test report.

Fig. A Pulse Train



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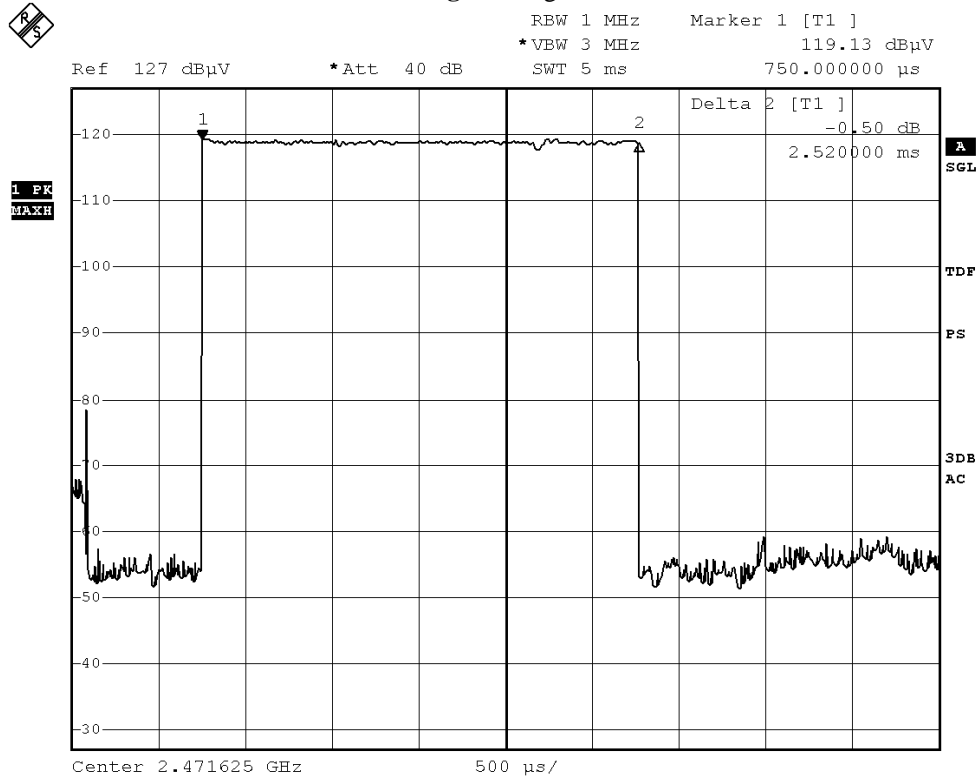
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Fig B . Single Pulse



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RF Exposure

Test Requirement: FCC 47CFR 15.247(i)
Test Date: 2013-04-17
Mode of Operation: Tx mode

Test Method:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Test Results:

The EUT complied with the requirement(s) of this section.
EUT meets the requirements of these sections as proven through MPE calculation
The MPE calculation for EUT @ 20cm
Based on the highest P = 46.92 mW

$$\begin{aligned} P_d &= PG / 4\pi R^2 = (46.92 \times 1.0) / 12.566 \times (20)^2 \\ &= (46.92) / 12.566 \times 400 = 46.92 / 5026.4 \\ &= 0.0093 \text{ mW/cm}^2 \end{aligned}$$

where:

- *Pd = power density in mW/cm²
- * G = Antenna numeric gain (1.0); Log G = g/10 (g = 0 dBi).
- * P = Conducted RF power to antenna (46.92 mW).
- * R = Minimum allowable distance.(20 cm)

- *The power density Pd = 0.0093 mW/cm² is less than 1 mW/cm² (listed MPE limit)
- *The SAR evaluation is not needed (this is a desk top device, R> 20 cm)
- * The EUT(antenna) must be 0.2 meters away from the General Population.



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Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD015	Signal Generator	MARCONI INSTRUMENTS	2030	112191/012	2013.03.15	2014.03.15
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	100388	2012.07.06	2013.07.06
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2012.11.03	2014.11.03
EMD062	Double-Ridged Waveguide (1GHz – 18GHz)	ETS.LINDGREN	3117	00075933	2012.11.28	2014.11.28
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	Video Contol Unit	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	Monitor	ViewSonic	VA9036	Q8X064201876	N/A	N/A
EMD102	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD105	FACT-3 EMC Chamber	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2012.03.26	2014.03.26
EMD131	Standard Gain Horn Antenna (18GHZ-26.5GHZ)	Chengdu AINFO Inc.	JTXLKB-42-15-C-KF	J2021100721001	2013.01.25	2015.01.25

Conducted Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD003	IMPULSEGRENZER PULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	100071	2013.03.15	2014.03.15
EMD004	ZWEILEITER-V-NETZNACHBILDUNG TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ESH3-Z5	100102	2013.03.15	2014.03.15
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS 30	100314	2013.03.15	2014.03.15
EMD103	Intelligent Frequency	Ainuo Instrument Co., Ltd	AN97005SS	79707455	N/A	N/A
EMD106	Shielding Room #1	ETS.LINDGREN	RFD-100	3802	N/A	N/A

Remarks:-

CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

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Appendix B

Photographs of EUT

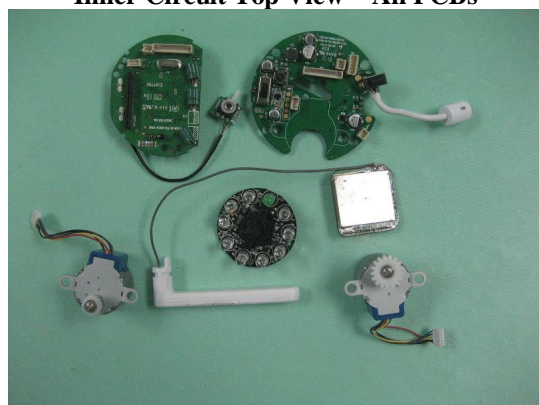
Front View of the product



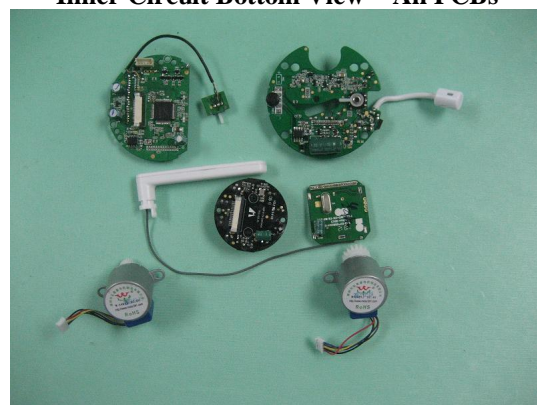
Rear View of the product



Inner Circuit Top View – All PCBs



Inner Circuit Bottom View – All PCBs





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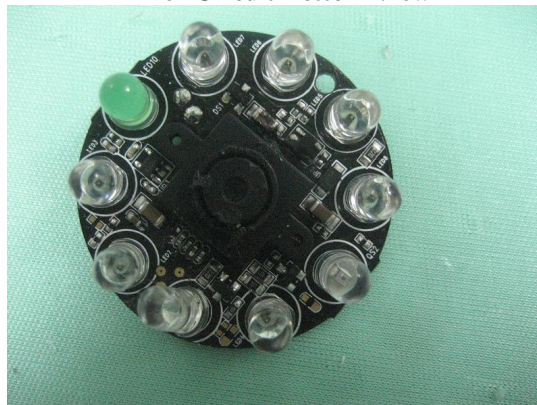
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Photographs of EUT

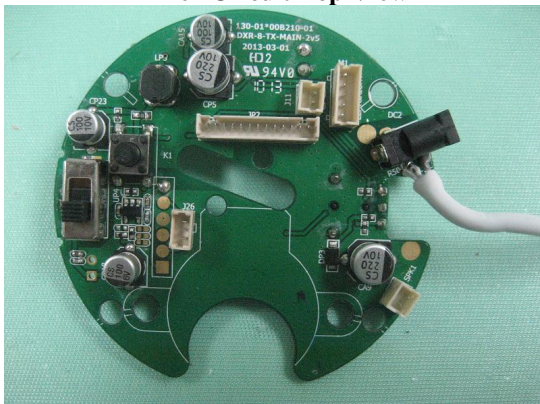
Inner Circuit Top View



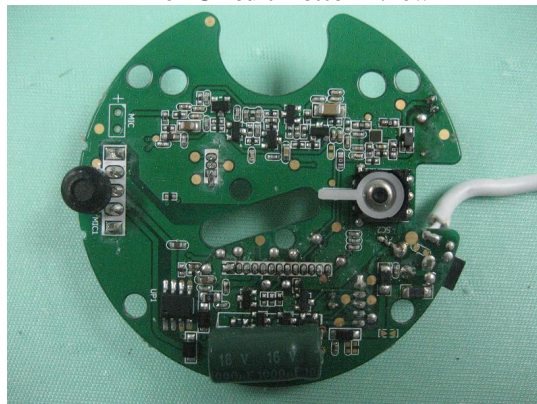
Inner Circuit Bottom View



Inner Circuit Top View



Inner Circuit Bottom View



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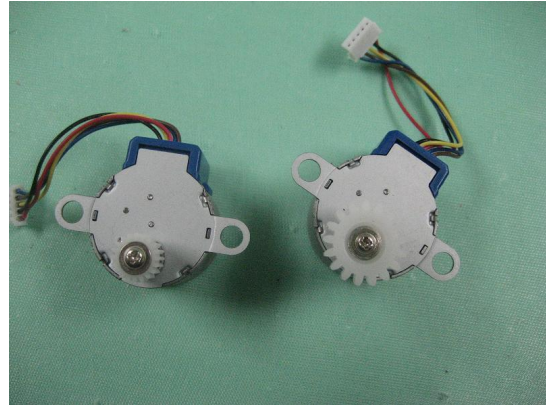
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Photographs of EUT

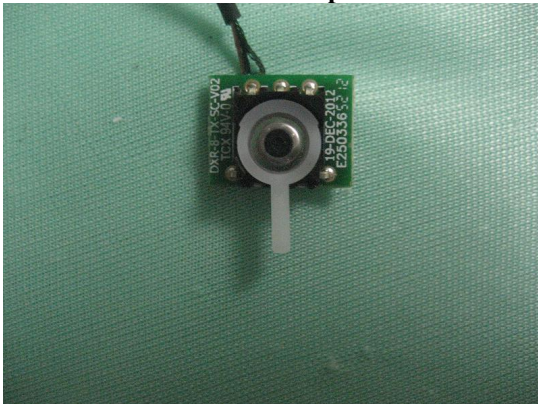
Inner Circuit Top View



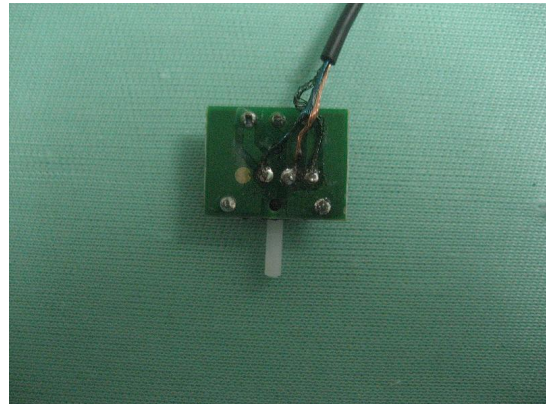
Inner Circuit Bottom View



Inner Circuit Top View



Inner Circuit Bottom View





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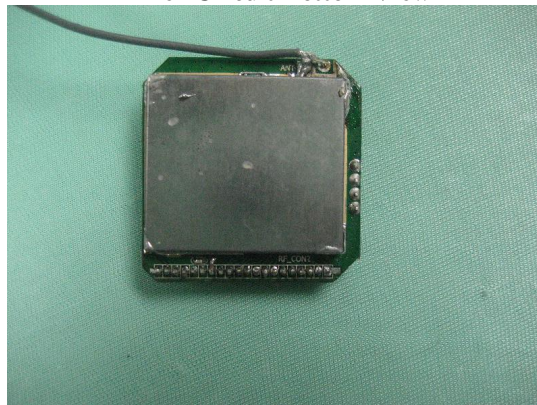
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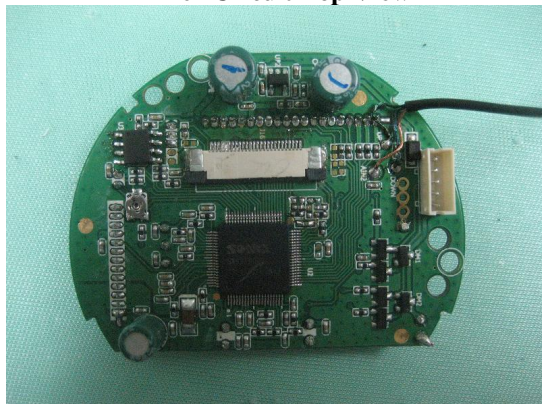
Inner Circuit Top View



Inner Circuit Bottom View



Inner Circuit Top View



Inner Circuit Bottom View



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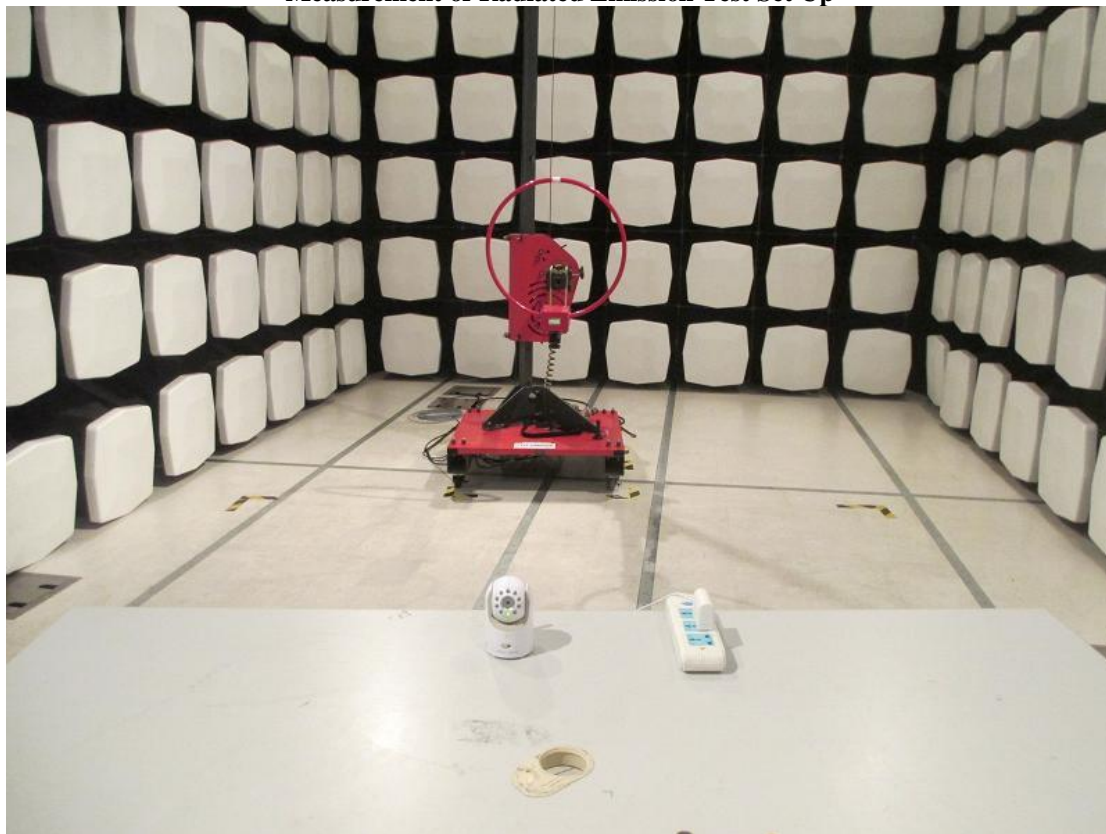
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Photographs of EUT

Measurement of Radiated Emission Test Set Up



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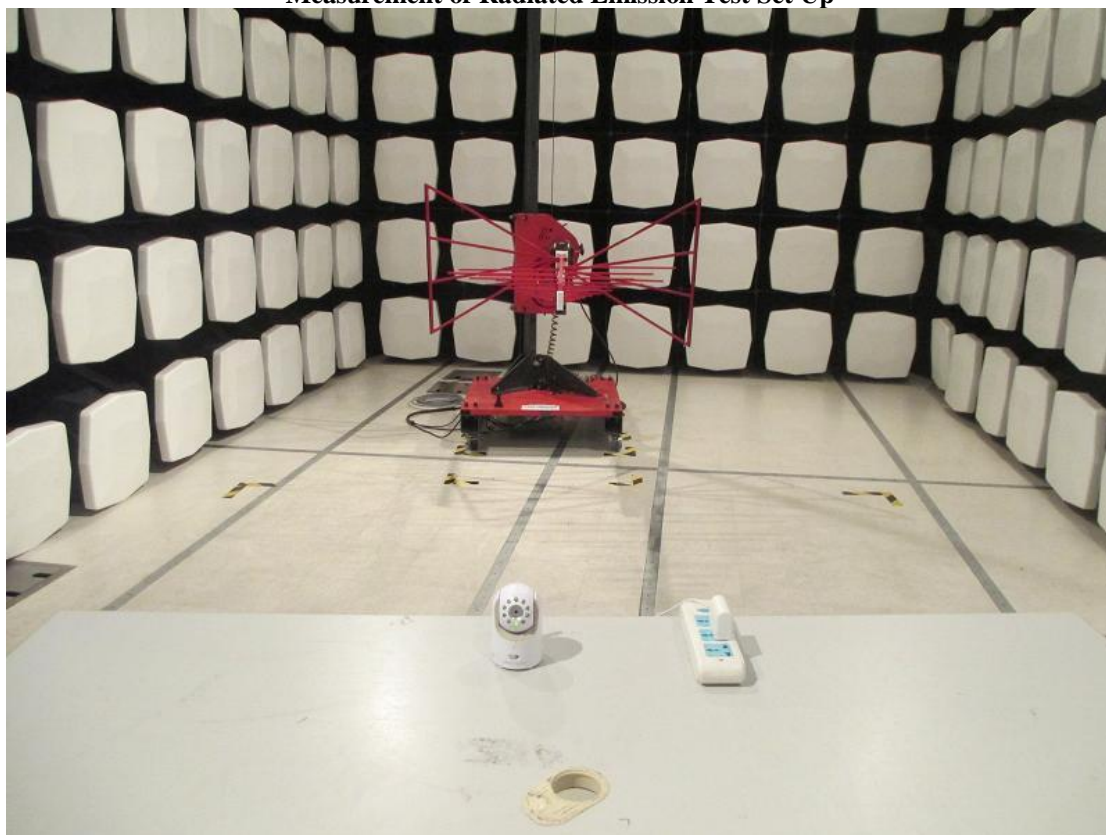
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Photographs of EUT

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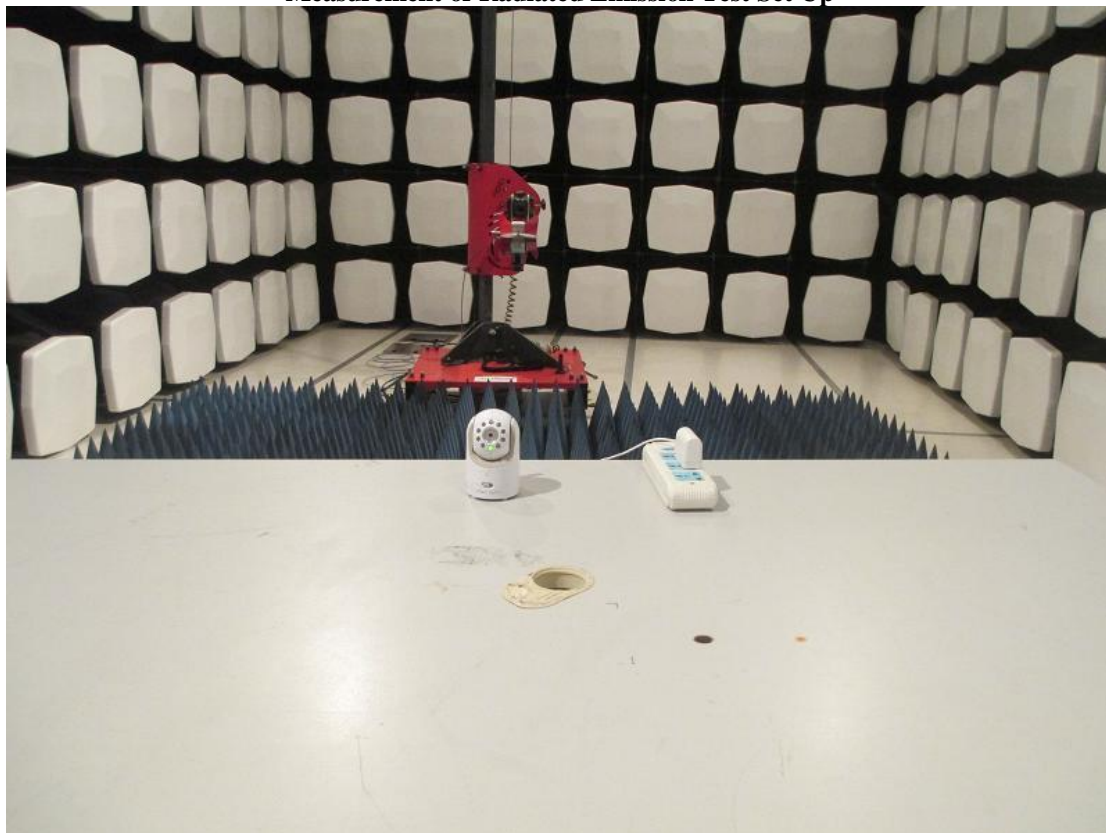
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Photographs of EUT

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Photographs of EUT

Measurement of Conducted Emission Test Set Up



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