



Test Report

Date : 2018-03-15
No. : HM18010034

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Applicant: Gatekeeper Systems (HK) Ltd.
36/F, Tower 2, Times Square, 1 Matheson Street, Causeway Bay,
Hong Kong

Manufacturer: Gatekeeper Systems (HK) Ltd.
36/F, Tower 2, Times Square, 1 Matheson Street, Causeway Bay,
Hong Kong

Description of Sample(s): Product: Module
Brand Name: Gatekeeper Systems
Model Number: N-9390
FCC ID: W3Z-N9390

Date Sample(s) Received: 2018-01-18

Date Tested: 2018-02-28 to 2018-03-05

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2016 and ANSI C63.10:2013 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): ---


CHEUNG Chi, Kenneth
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.





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1.0 General Details

1.1 Equipment Under Test [EUT] Description of Sample(s)

Product:	Module
Manufacturer:	Gatekeeper Systems (HK) Ltd. 36/F, Tower 2, Times Square, 1 Matheson Street, Causeway Bay, Hong Kong
Brand Name:	Gatekeeper Systems
Model Number:	N-9390
Rating:	CR123A x 2=3.0Vd.c (CR123A x2 are parallel connected)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a "module" mounted on shopping cart handle to communicate with remote controlled (lock function) wheels of Gatekeeper Systems (HK) Ltd., which is 2.4GHz transceiver.

The N-9390 Operational mode transmissions are modulated at FSK (Frequency Shift Keying), with a deviation of 19 kHz (Carson's rule bandwidth about 80 kHz) and MSK (Minimum Shift Keying).

The EUT was tested under test mode which was set in maximum output power (RF output Power = 0.0 dBm) and transmit continuously.

1.3 Date of Order

2018-01-18

1.4 Submitted Sample(s):

2 Samples

1.5 Test Duration

2018-02-28 to 2018-03-05

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: 2017 Regulations and ANSI C63.10:2013 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
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	ANSI C63.10:2013	N/A	☒	☐
AC power-line conducted emissions	FCC 47CFR 15.207	ANSI C63.10:2013	N/A	N/A	
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	☒	☐

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Field Strength of Fundamental & Harmonics Emissions

Test Requirement:	FCC 47CFR 15.249
Test Method:	ANSI C63.10:2013
Test Date:	2018-02-28
Mode of Operation:	1. Tx Mode (FSK) 2. Tx Mode (MSK)

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m 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, rotated about all 3 axis (X, Y & Z) and 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. In the frequency range of 9kHz to 30MHz, The center of the loop antenna shall be 1 meter above the ground and rotated loop axis for maximum reading. The emissions worst-case are shown in Test Results of the following pages.

Remark: 3 orthogonal axis apply to hand-held device only.

*: Semi-anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd.
FCC Test Firm Registration Number 723883
Designation Number HK0001

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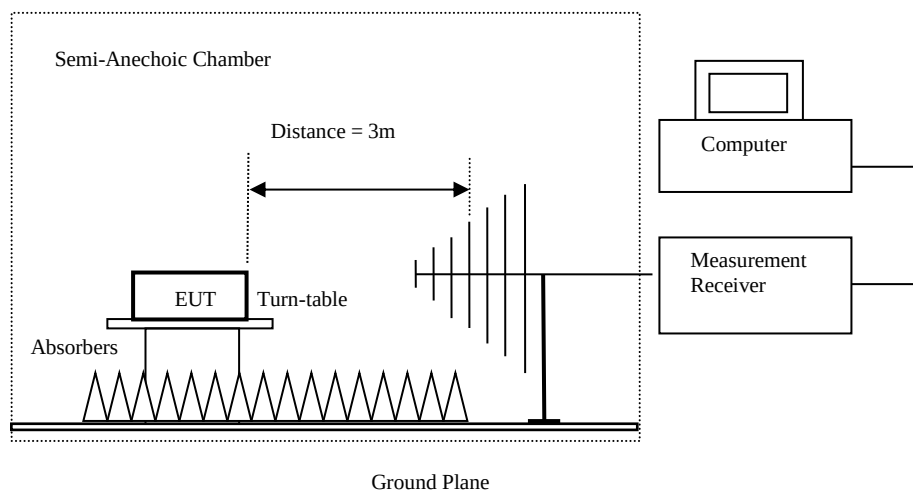
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Spectrum Analyzer Setting:

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:	3MHz
	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.

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Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:

Fundamental frequency [MHz]	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

Result of TX mode (FSK) (Lowest Channel), (Above 1GHz): Pass



Att 0 dB

INPUT 1

Det

MA/CA Trd

HORN

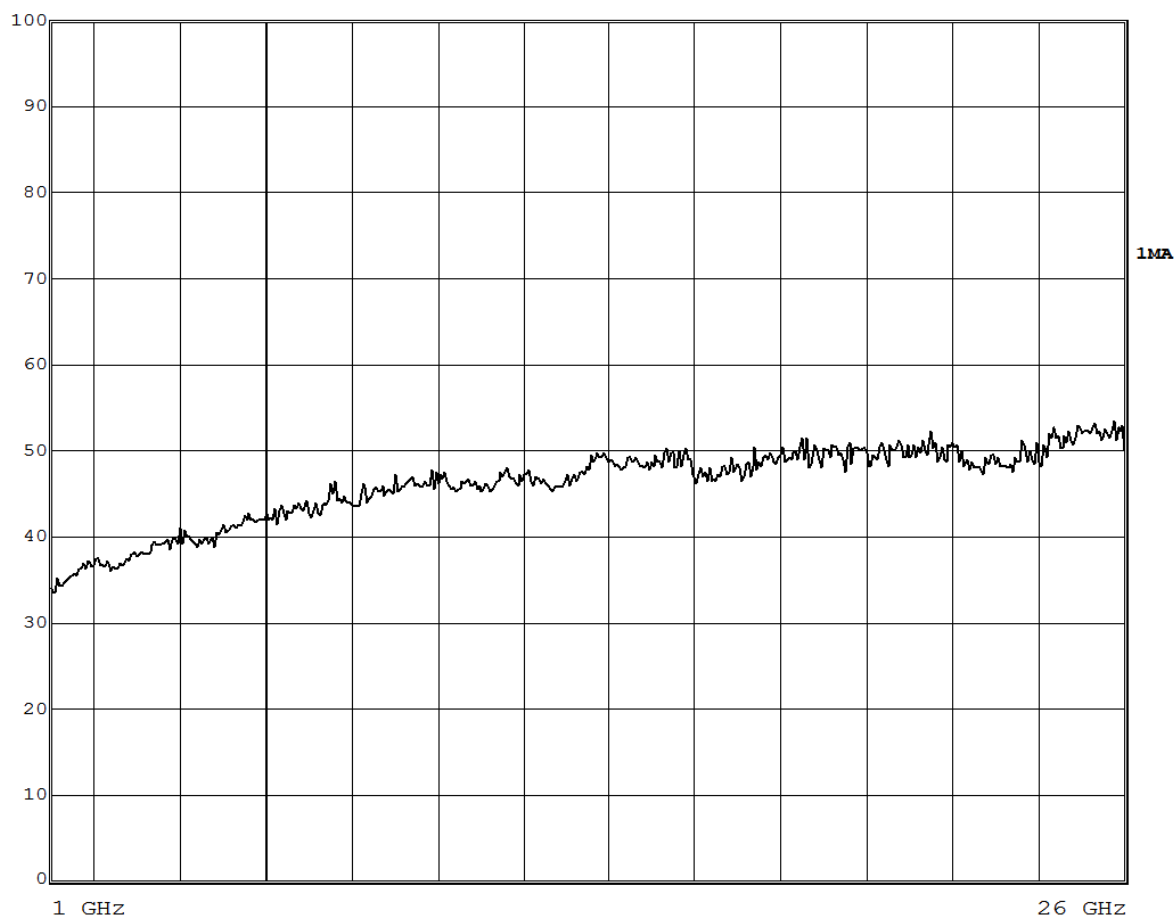
ResBW

1 MHz

Meas T

100 ms Unit

dBV/m



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Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2402.0	58.1	27.9	86.0	19,952.6	500,000	Vertical
* 4804.0	12.1	32.1	44.2	162.2	5,000	Vertical
7206.0	3.1	38.6	41.7	121.6	5,000	Vertical
9608.0	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12010.0					5,000	Vertical
14412.0					5,000	Vertical
16814.0					5,000	Vertical
* 19216.0					5,000	Vertical
21618.0					5,000	Vertical
24020.0					5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2402.0	46.9	27.9	74.8	5,495.4	50,000	Vertical
* 4804.0	2.3	32.1	34.4	52.5	500	Vertical
7206.0	-1.2	38.6	37.4	74.1	500	Vertical
9608.0	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 12010.0					500	Vertical
14412.0					500	Vertical
16814.0					500	Vertical
* 19216.0					500	Vertical
21618.0					500	Vertical
24020.0					500	Vertical

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Result of TX mode (FSK) (Middle Channel), (Above 1GHz): Pass



Att 0 dB

INPUT 1

Det

MA/CA Trd

HORN

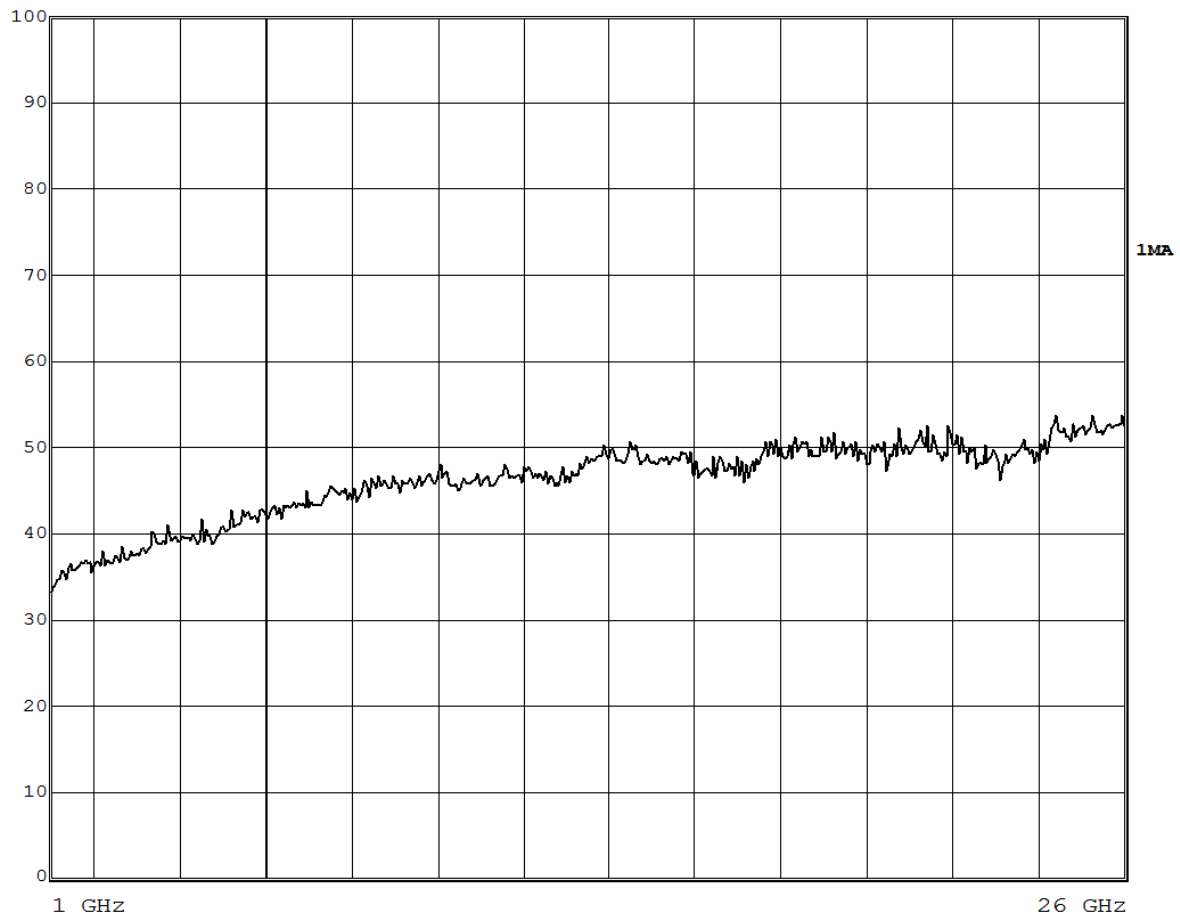
ResBW

1 MHz

Meas T

100 ms Unit

dB μ V/m



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Result of TX mode (FSK) (Middle Channel), (Above 1GHz): Pass

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2440.0	57.4	27.9	85.3	18,407.7	500,000	Vertical
* 4880.0	9.9	32.1	42.0	125.9	5,000	Vertical
* 7320.0	2.8	38.6	41.4	117.5	5,000	Vertical
9760.0	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12200.0					5,000	Vertical
14640.0					5,000	Vertical
17080.0					5,000	Vertical
* 19520.0					5,000	Vertical
21960.0					5,000	Vertical
24400.0					5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2440.0	45.1	27.9	73.0	4,466.8	50,000	Vertical
* 4880.0	2.4	32.1	34.5	53.1	500	Vertical
* 7320.0	-1.4	38.6	37.2	72.4	500	Vertical
9760.0	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 12200.0					500	Vertical
14640.0					500	Vertical
17080.0					500	Vertical
* 19520.0					500	Vertical
21960.0					500	Vertical
24400.0					500	Vertical

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Result of TX mode (FSK) (Highest Channel), (Above 1GHz): Pass



Att 0 dB

INPUT 1

Det

MA/CA Trd

HORN

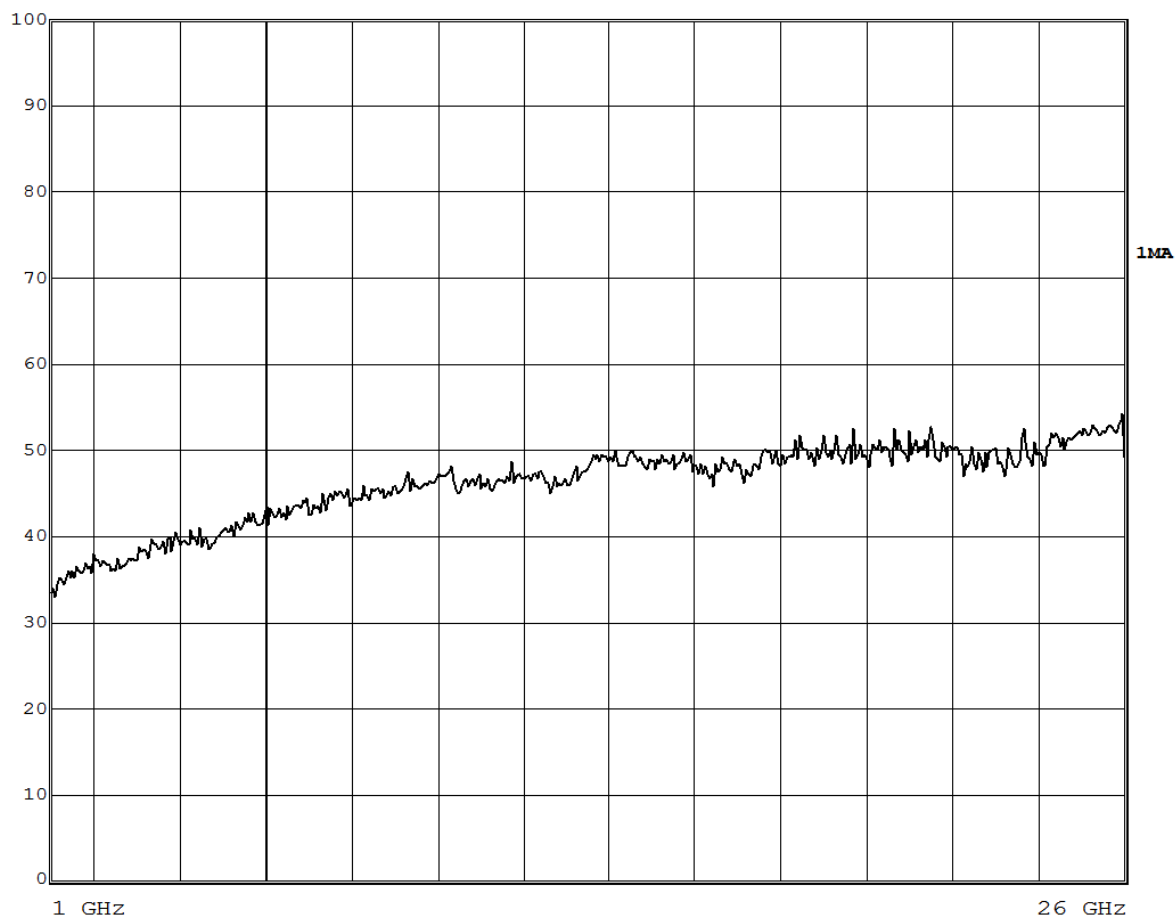
ResBW

1 MHz

Meas T

100 ms Unit

dB μ V/m



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Result of TX mode (FSK) (Highest Channel), (Above 1GHz): Pass

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2480.0	57.9	27.9	85.8	19,498.4	500,000	Vertical
* 4960.0	11.1	32.1	43.2	144.5	5,000	Vertical
* 7440.0	2.1	38.6	40.7	108.4	5,000	Vertical
9920.0	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12400.0					5,000	Vertical
14880.0					5,000	Vertical
17360.0					5,000	Vertical
* 19840.0					5,000	Vertical
22320.0					5,000	Vertical
24800.0					5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2480.0	45.7	27.9	73.6	4,786.3	50,000	Vertical
* 4960.0	3.2	32.1	35.3	58.2	500	Vertical
* 7440.0	-0.8	38.6	37.8	77.6	500	Vertical
9920.0	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 12400.0					500	Vertical
14880.0					500	Vertical
17360.0					500	Vertical
* 19840.0					500	Vertical
22320.0					500	Vertical
24800.0					500	Vertical

Remarks: The fundamental frequency was not included in the pre-scan plot, a 2.4G notch filter was added prior to the Receiver, please refer the band-edge plot for the level of fundamental frequency.



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Result of TX mode (MSK) (Lowest Channel), (Above 1GHz): Pass



Att 0 dB

INPUT 1

Det

MA/CA Trd

HORN

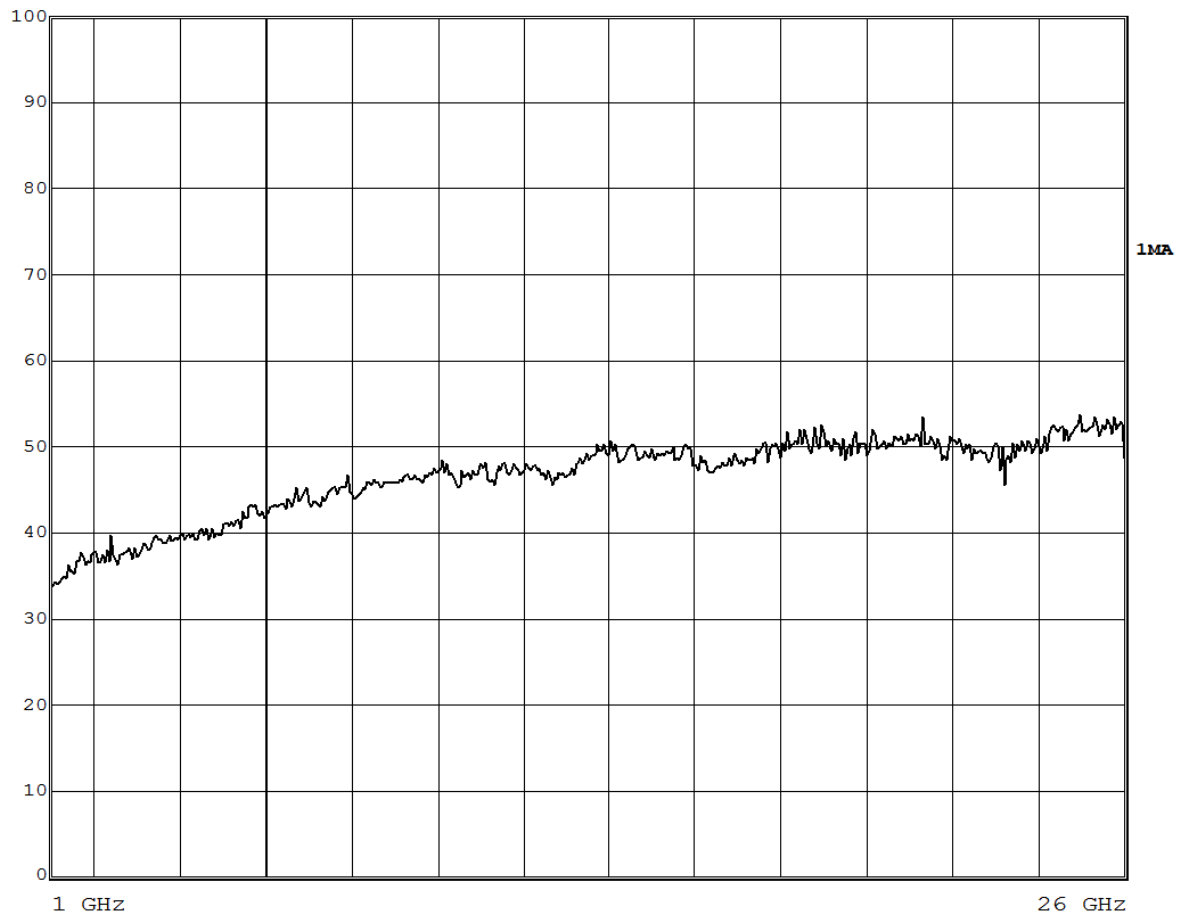
ResBW

1 MHz

Meas T

100 ms Unit

dB μ V/m



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Result of TX mode (MSK) (Lowest Channel), (Above 1GHz): Pass

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2401.0	58.4	27.9	86.3	20,653.8	500,000	Vertical
* 4802.0	11.6	32.1	43.7	153.1	5,000	Vertical
7203.0	2.4	38.6	41.0	112.2	5,000	Vertical
9604.0	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12005.0					5,000	Vertical
14406.0					5,000	Vertical
16807.0					5,000	Vertical
* 19208.0					5,000	Vertical
21609.0					5,000	Vertical
24010.0					5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2401.0	47.3	27.9	75.2	5,754.4	50,000	Vertical
* 4802.0	2.1	32.1	34.2	51.3	500	Vertical
7203.0	-0.8	38.6	37.8	77.6	500	Vertical
9604.0	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 12005.0					500	Vertical
14406.0					500	Vertical
16807.0					500	Vertical
* 19208.0					500	Vertical
21609.0					500	Vertical
24010.0					500	Vertical

Remarks: The fundamental frequency was not included in the pre-scan plot, a 2.4G notch filter was added prior to the Receiver, please refer the band-edge plot for the level of fundamental frequency.

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Result of TX mode (MSK) (Middle Channel), (Above 1GHz): Pass



Att 0 dB

INPUT 1

Det

MA/CA Trd

HORN

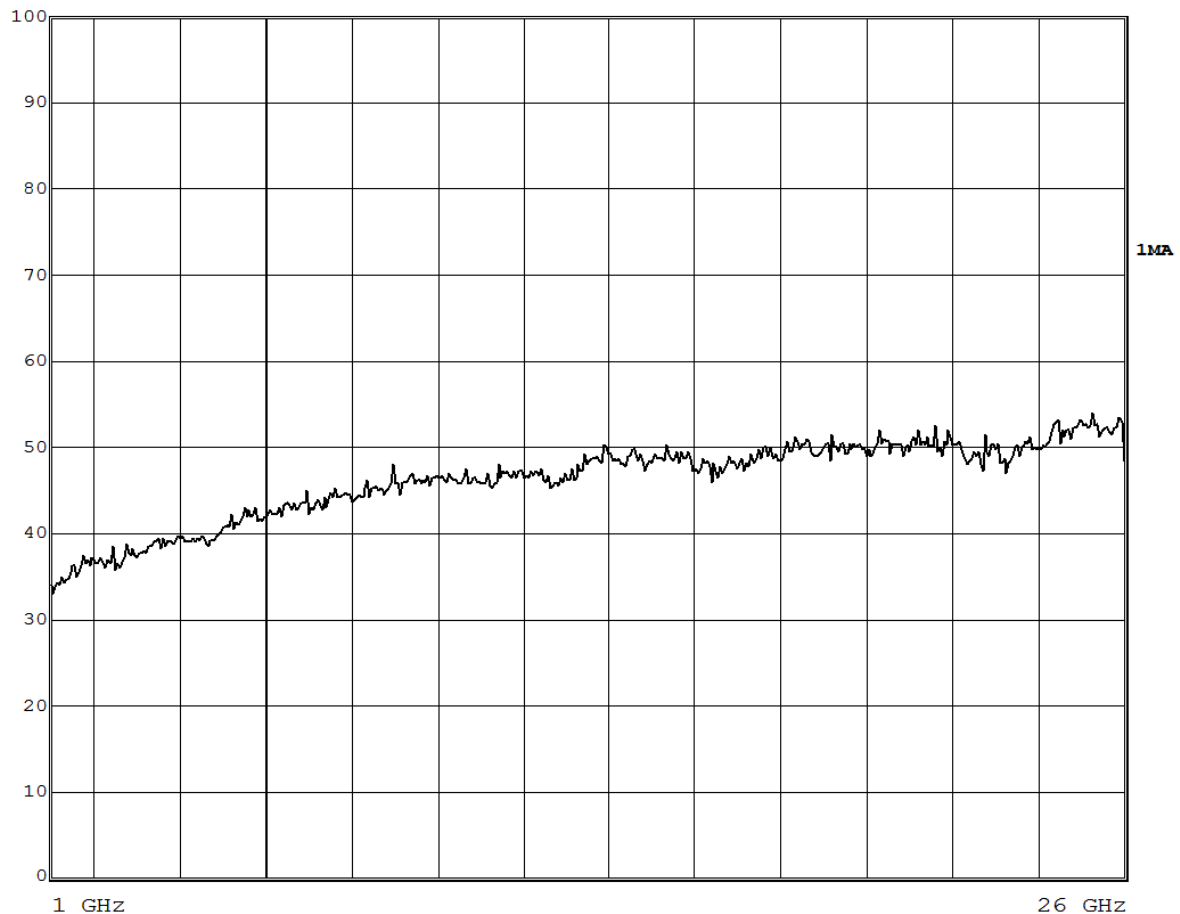
ResBW

1 MHz

Meas T

100 ms Unit

dB μ V/m



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Result of TX mode (MSK) (Middle Channel), (Above 1GHz): Pass

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2442.0	58.3	27.9	86.2	20,417.4	500,000	Vertical
* 4884.0	11.6	32.1	43.7	153.1	5,000	Vertical
* 7326.0	3.4	38.6	42.0	125.9	5,000	Vertical
9768.0	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12210.0					5,000	Vertical
14652.0					5,000	Vertical
17094.0					5,000	Vertical
* 19536.0					5,000	Vertical
21978.0					5,000	Vertical
24420.0					5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2442.0	46.2	27.9	74.1	5,069.9	50,000	Vertical
* 4884.0	1.8	32.1	33.9	49.5	500	Vertical
* 7326.0	-0.6	38.6	38.0	79.4	500	Vertical
9768.0	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 12210.0					500	Vertical
14652.0					500	Vertical
17094.0					500	Vertical
* 19536.0					500	Vertical
21978.0					500	Vertical
24420.0					500	Vertical

Remarks: The fundamental frequency was not included in the pre-scan plot, a 2.4G notch filter was added prior to the Receiver, please refer the band-edge plot for the level of fundamental frequency.

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Result of TX mode (MSK) (Highest Channel), (Above 1GHz): Pass



Att 0 dB

INPUT 1

Det

MA/CA Trd

HORN

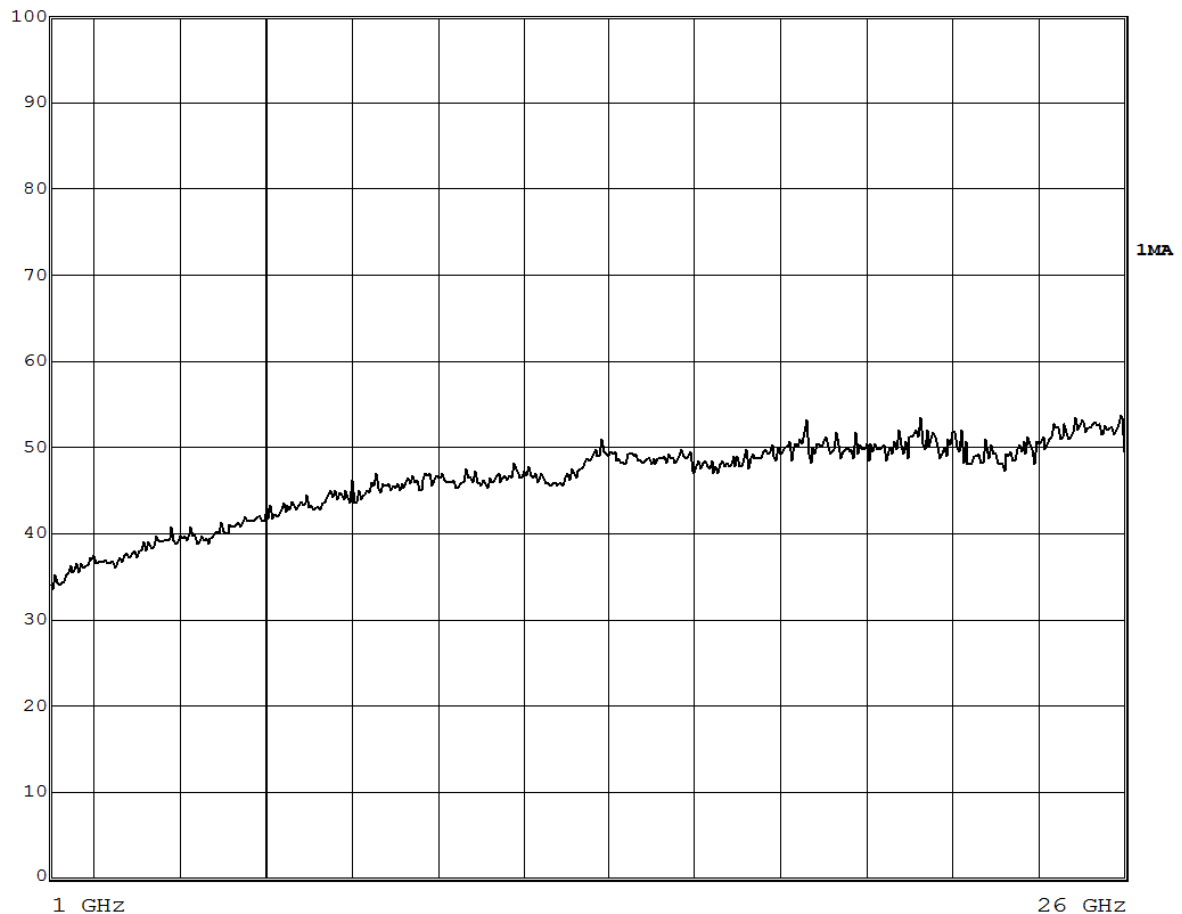
ResBW

1 MHz

Meas T

100 ms Unit

dB μ V/m



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Result of TX mode (MSK) (Highest Channel), (Above 1GHz): Pass

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2481.1	57.9	27.9	85.8	19,498.4	500,000	Vertical
* 4962.2	11.2	32.1	43.3	146.2	5,000	Vertical
* 7443.3	2.1	38.6	40.7	108.4	5,000	Vertical
9924.4	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12405.5					5,000	Vertical
14886.6					5,000	Vertical
17367.7					5,000	Vertical
* 19848.8					5,000	Vertical
22329.9					5,000	Vertical
24811.0					5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2481.1	45.8	27.9	73.7	4,841.7	50,000	Vertical
* 4962.2	1.9	32.1	34.0	50.1	500	Vertical
* 7443.3	-1.1	38.6	37.5	75.0	500	Vertical
9924.4	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 12405.5					500	Vertical
14886.6					500	Vertical
17367.7					500	Vertical
* 19848.8					500	Vertical
22329.9					500	Vertical
24811.0					500	Vertical

Remarks: The fundamental frequency was not included in the pre-scan plot, a 2.4G notch filter was added prior to the Receiver, please refer the band-edge plot for the level of fundamental frequency.

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

*: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz 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.

Calculated measurement uncertainty : 9kHz to 30MHz 2.4dB
 30MHz to 18GHz 5.0dB
 18GHz – 26.5Hz: 5.24dB

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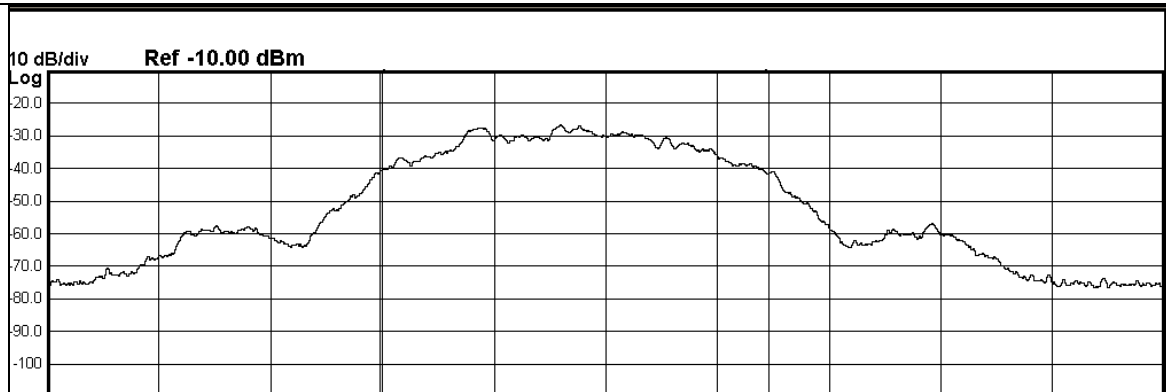
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Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2402.0	1.13

TX mode FSK Lowest Channel

20dB Bandwidth of Fundamental Emission



Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 4.133 ms

Occupied Bandwidth		Total Power	-16.2 dBm
1.0406 MHz			
Transmit Freq Error	-82.896 kHz	OBW Power	99.00 %
x dB Bandwidth	1.128 MHz	x dB	-20.00 dB

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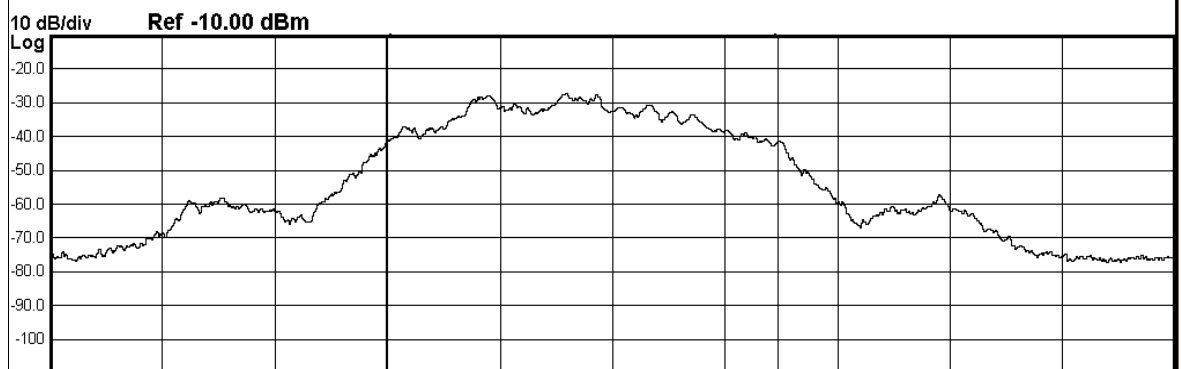
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Frequency Range [MHz]	20dB Bandwidth [MHz]
2440.0	1.14

TX mode FSK Middle Channel

20dB Bandwidth of Fundamental Emission



Center 2.44 GHz
#Res BW 30 kHz

#VBW 100 kHz

Span 3 MHz
Sweep 4.133 ms

Occupied Bandwidth

1.0429 MHz

Total Power

-17.5 dBm

Transmit Freq Error -79.749 kHz

OBW Power

99.00 %

x dB Bandwidth 1.136 MHz

x dB

-20.00 dB

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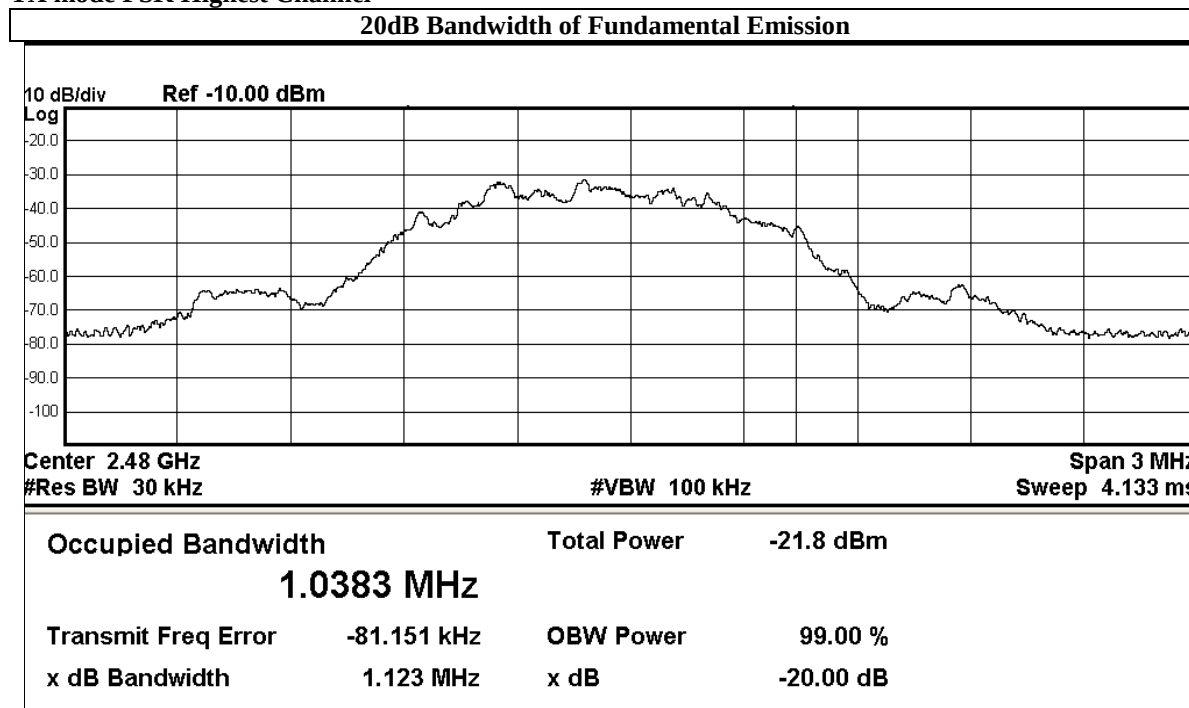
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Frequency Range [MHz]	20dB Bandwidth [MHz]
2480.0	1.12

TX mode FSK Highest Channel



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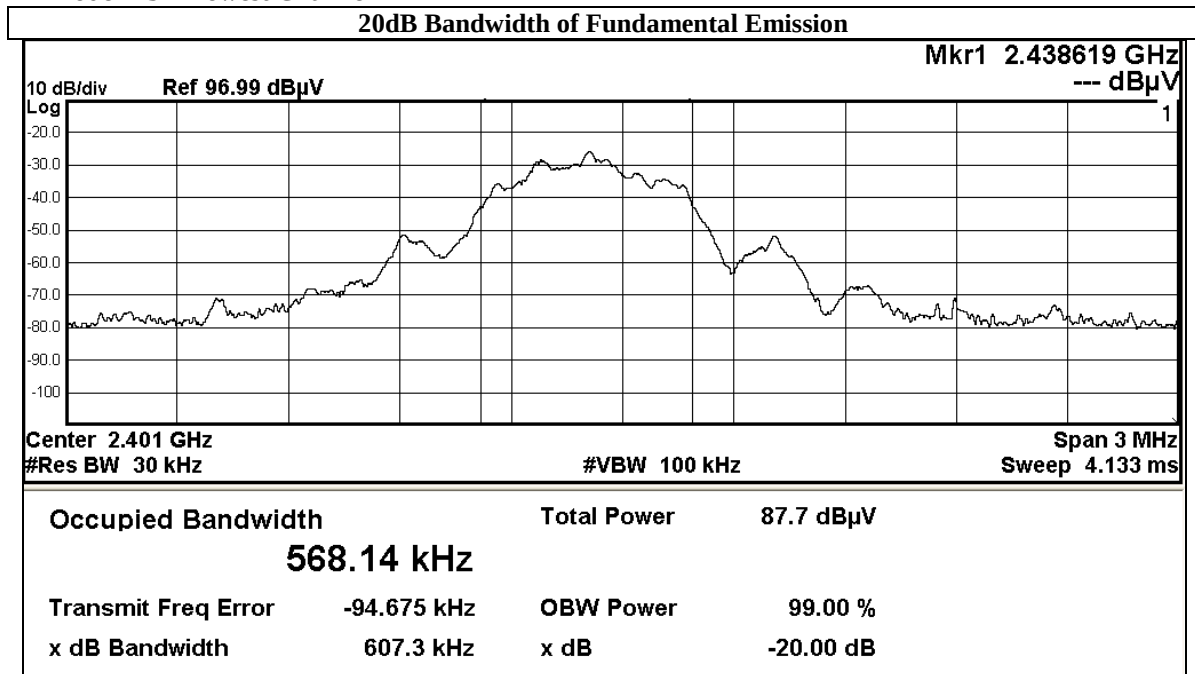
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Frequency Range [MHz]	20dB Bandwidth [MHz]
2401.0	0.607

TX mode MSK Lowest Channel



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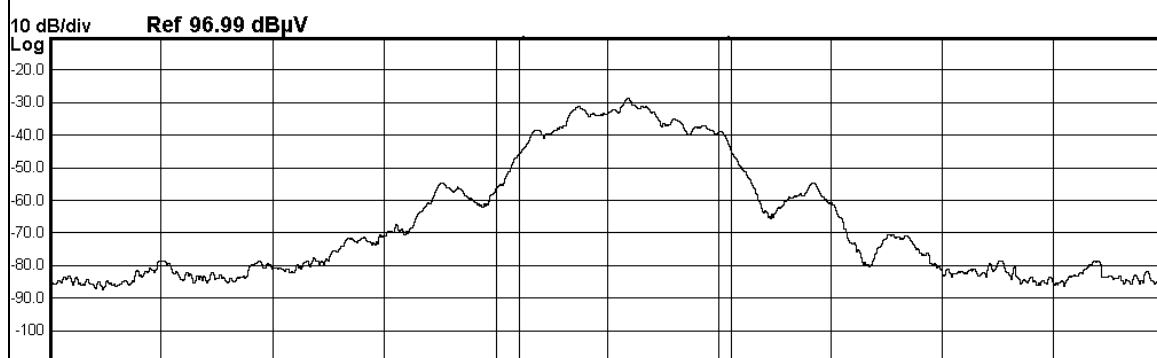
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Frequency Range [MHz]	20dB Bandwidth [MHz]
2442.0	0.607

TX mode MSK Middle Channel

20dB Bandwidth of Fundamental Emission



Center 2.442 GHz Span 3 MHz
#Res BW 30 kHz #VBW 100 kHz Sweep 4.133 ms

Occupied Bandwidth	Total Power	85.1 dBμV
565.79 kHz		
Transmit Freq Error	50.163 kHz	OBW Power
x dB Bandwidth	606.5 kHz	99.00 %
	x dB	-20.00 dB

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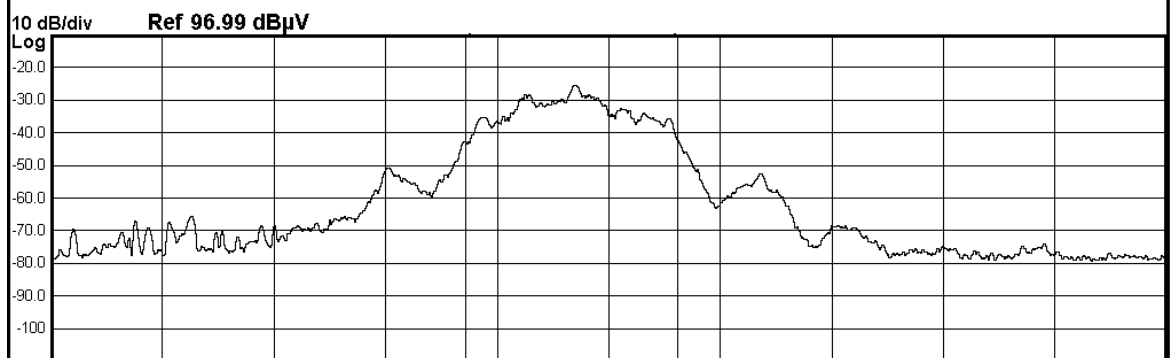
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Frequency Range [MHz]	20dB Bandwidth [MHz]
2481.1	0.597

TX mode MSK Highest Channel

20dB Bandwidth of Fundamental Emission



Center 2.481 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 4.133 ms

Occupied Bandwidth	Total Power	87.7 dBμV
567.78 kHz		
Transmit Freq Error	-98.356 kHz	OBW Power 99.00 %
x dB Bandwidth	596.8 kHz	x dB -20.00 dB

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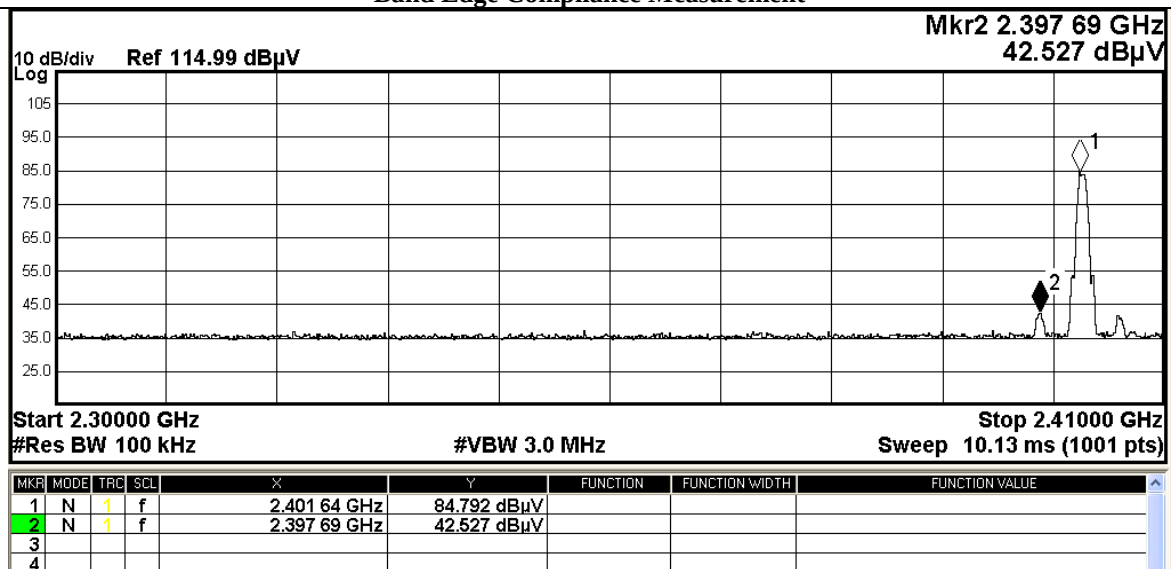
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Band Edge Measurement:

TX mode FSK

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400MHz – Lowest Fundamental	42.3

Band Edge Compliance Measurement



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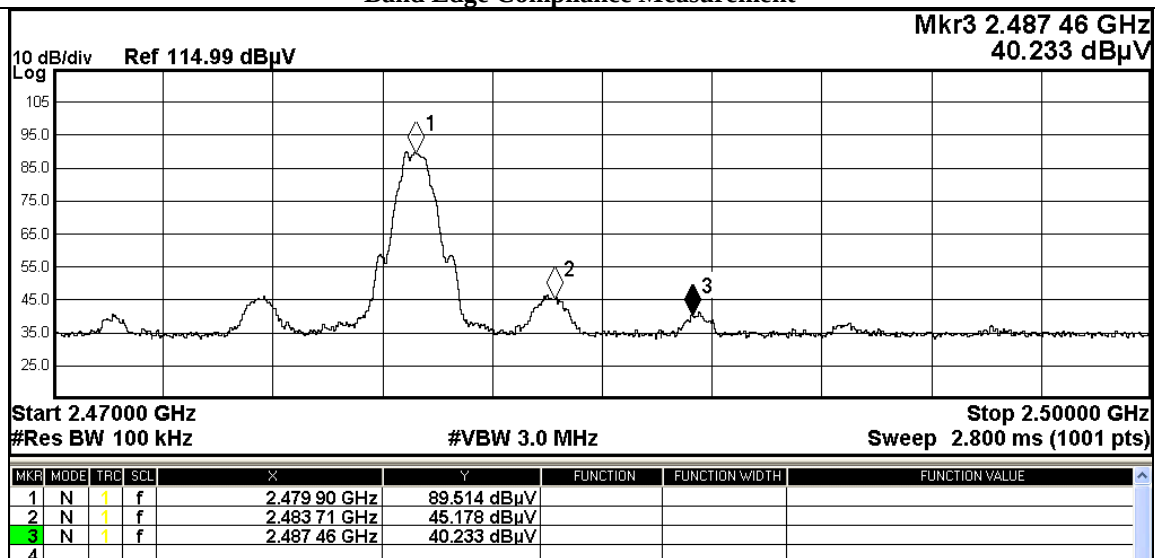
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Band Edge Measurement:

TX mode FSK

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental – 2483.5MHz	44.3

Band Edge Compliance Measurement



Result of TX mode FSK, Band-edge measurement: PASS

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2397.6	15.4	27.6	43.0	141.3	5,000	Vertical
2487.5	13.5	28.0	41.5	118.9	5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2397.6	4.3	27.6	31.9	39.4	500	Vertical
2487.5	3.8	28.0	31.8	38.9	500	Vertical

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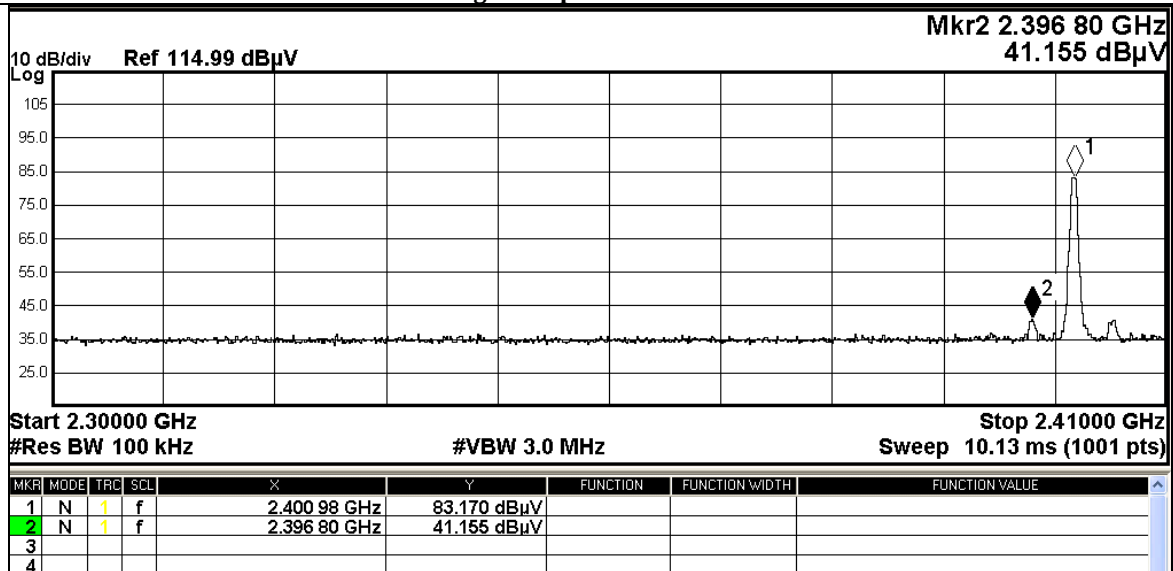
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Band Edge Measurement:

TX mode MSK

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400MHz – Lowest Fundamental	42.0

Band Edge Compliance Measurement



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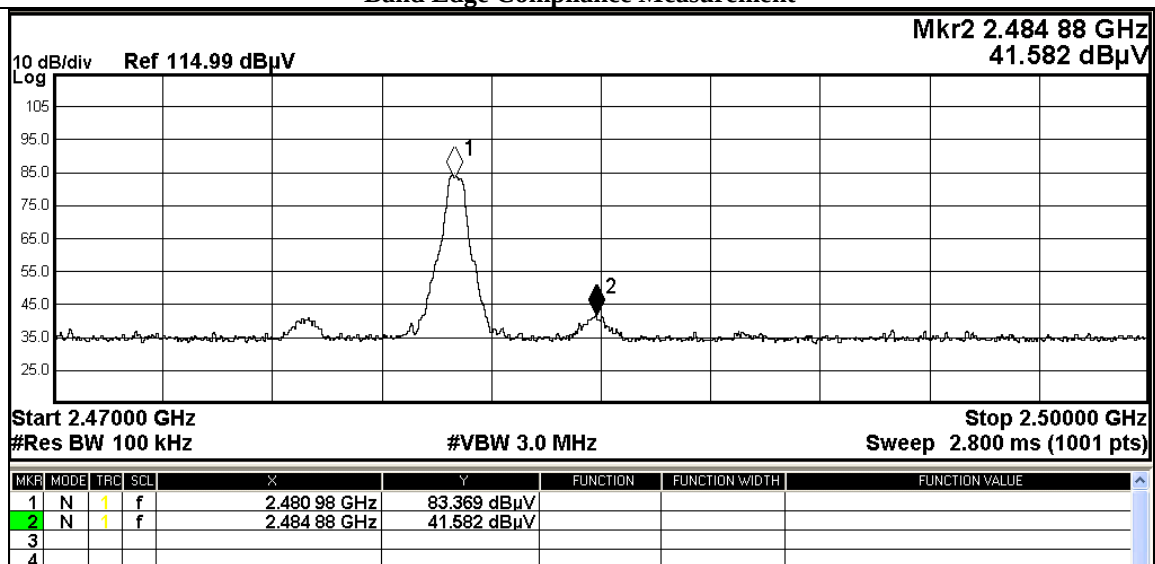
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Band Edge Measurement:

TX mode MSK

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental – 2483.5MHz	41.8

Band Edge Compliance Measurement



Result of TX mode MSK, Band-edge measurement: PASS

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2396.8	16.4	27.9	44.3	164.1	5,000	Vertical
2484.9	14.8	28.0	42.8	138.0	5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
2396.8	3.1	27.9	31.0	35.5	500	Vertical
2484.9	3.4	28.0	31.4	37.2	500	Vertical

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Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/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 (MSK), (9kHz – 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

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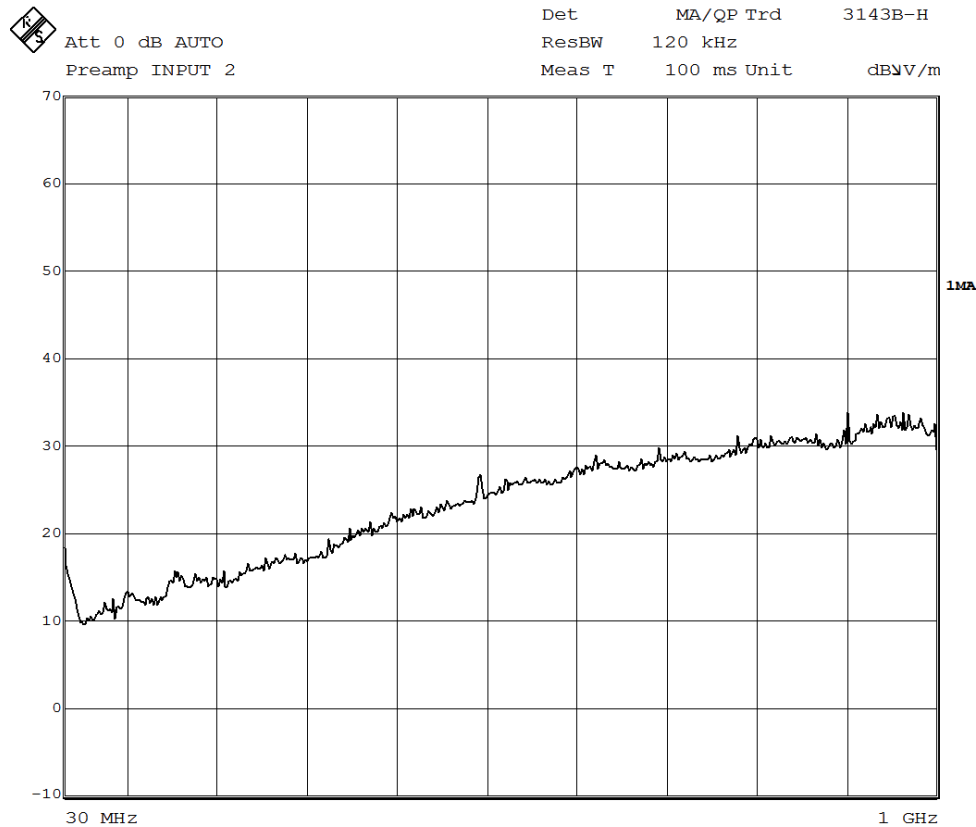


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Result of TX mode (MSK), (30MHz – 1GHz): PASS



Field Strength of Fundamental and Harmonics Emissions						
Quasi-Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
89.2	2.0	7.1	9.1	2.9	100	Vertical
132.7	3.6	7.7	11.3	3.7	150	Horizontal
224.8	2.4	11.8	14.2	5.1	150	Horizontal
293.4	0.2	13.0	13.2	4.6	200	Horizontal
374.9	6.1	16.3	22.4	13.2	200	Horizontal
464.7	4.9	18.2	23.1	14.3	200	Horizontal

Remarks: Tx mode was tested in both FSK and MSK modulation, MSK modulation was the worst case found in Tx mode.



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Result of Receiver mode, (9kHz – 30MHz): PASS

Emissions detected are more than 20 dB below the Limits

Result of Receiver mode, (30MHz – 1GHz): PASS

Emissions detected are more than 20 dB below the Limits

Result of Receiver mode, (1GHz – 18GHz): PASS

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2442.0	2.8	27.9	30.7	34.3	5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	E-Field Polarity
2442.0	-0.1	27.9	27.8	24.5	500	Vertical

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz
Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : (9kHz – 30MHz): 2.4dB
(30MHz – 18GHz): 5.0dB
(18GHz - 26GHz): 5.24dB

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Appendix A

LIST OF MEASUREMENT EQUIPMENT

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM217	ELECTRIC POWERED TURNABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2017/04/24	2018/04/24
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A
EM355	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00201783	2017/03/15	2019/03/15
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2017/06/01	2018/06/01
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2016/04/27	2018/04/27
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2016/05/13	2018/05/13
EM302	PRECISION OMNIDIRECTIONAL DIPOLE (1 – 6GHZ)	SEIBERSDORF LABORATORIES	POD 16	161806/L	2016/05/11	2018/05/11
EM303	PRECISION OMNIDIRECTIONAL DIPOLE (6 – 18GHZ)	SEIBERSDORF LABORATORIES	POD 618	6181908/L	2016/05/11	2018/05/11
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2016/03/16	2018/03/16

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



Rear View of the product



Rear View of the product



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Photographs of EUT

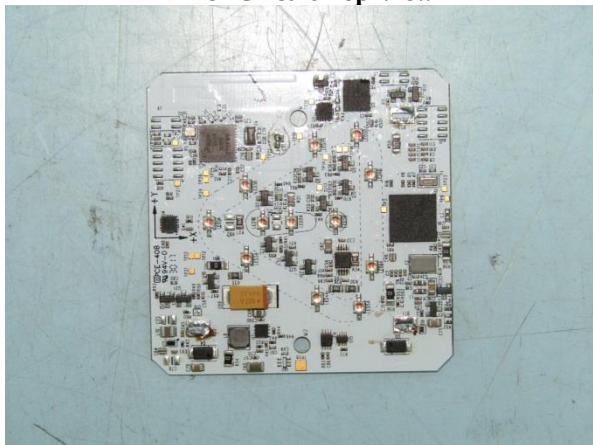
Inner View of the Product



Inner View of the Product



Inner Circuit Top View



Inner Circuit Bottom View



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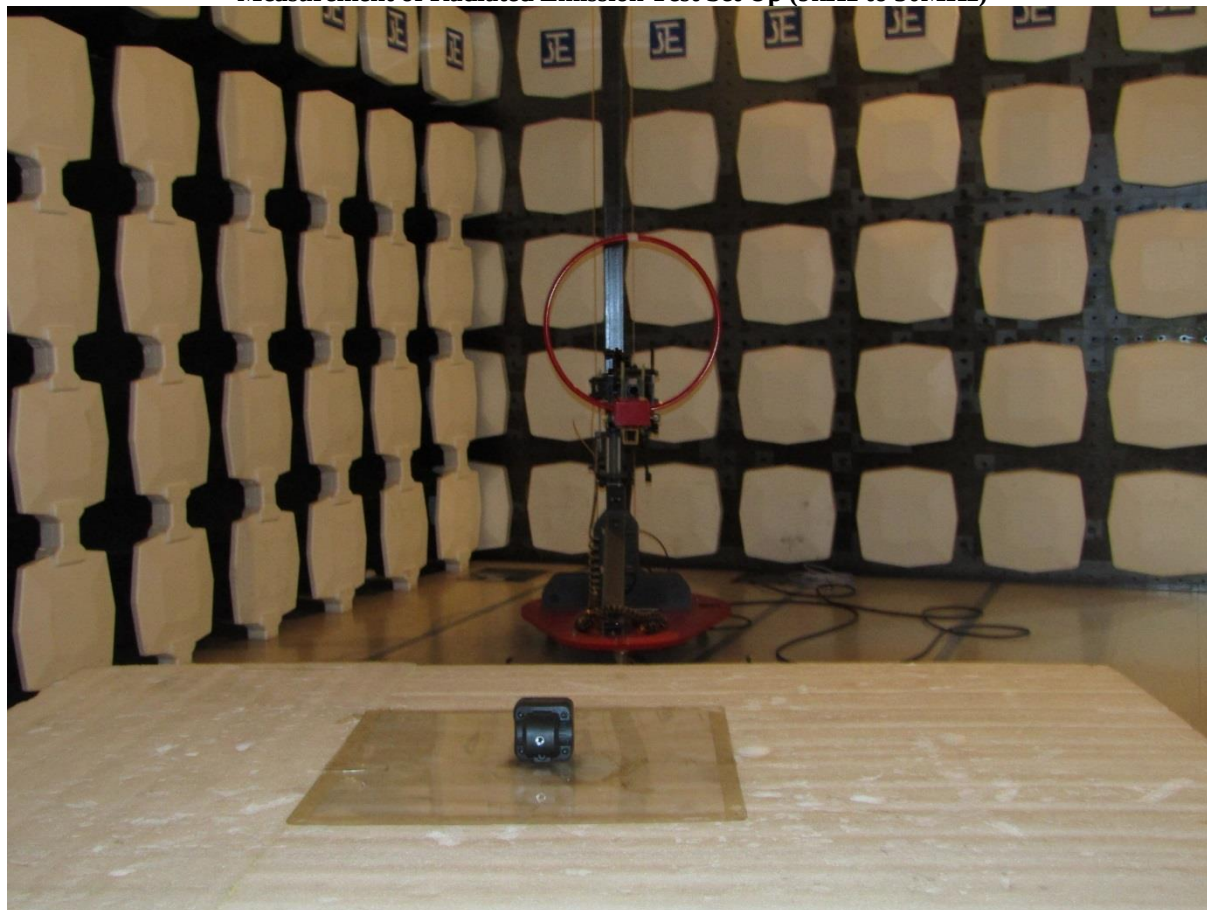
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Photographs of EUT

Measurement of Radiated Emission Test Set Up (9kHz to 30MHz)



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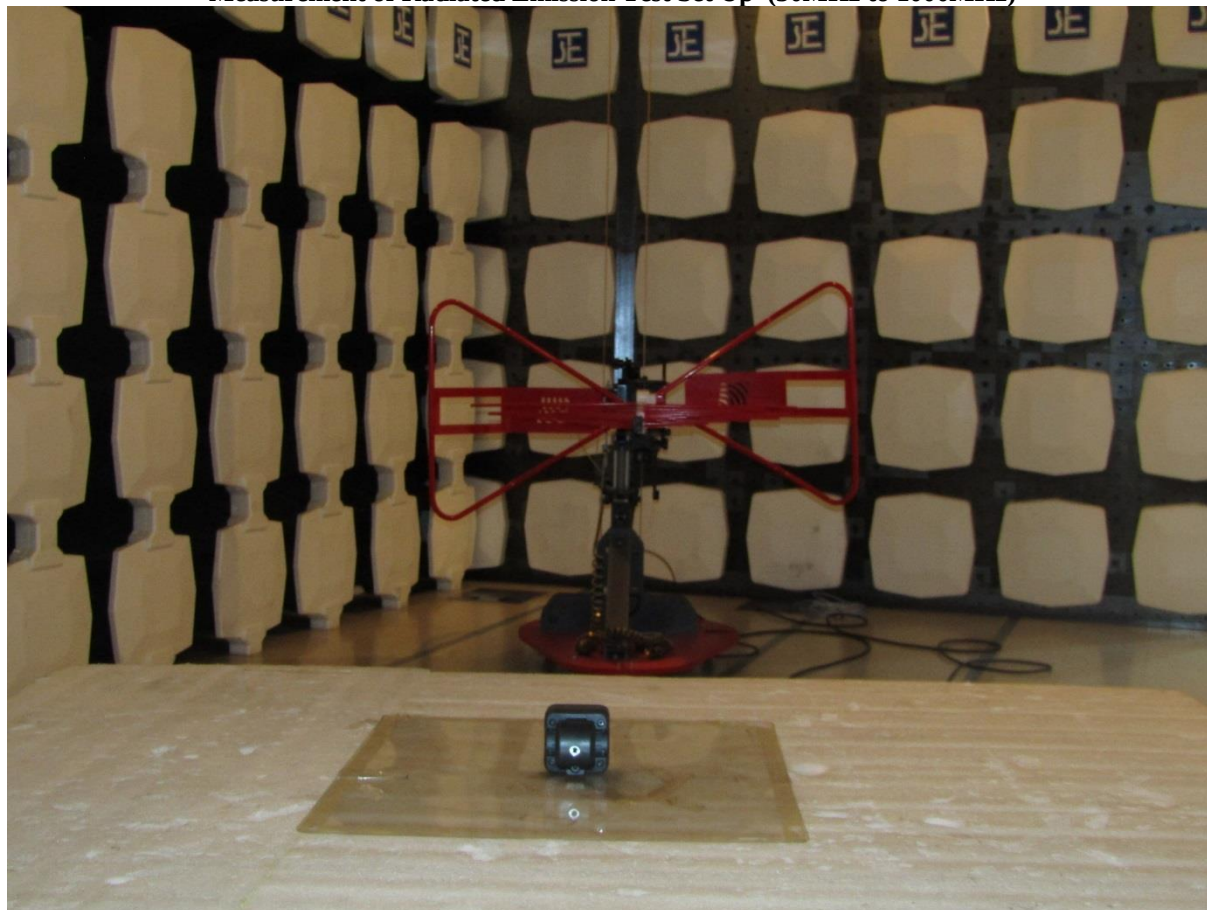
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Photographs of EUT

Measurement of Radiated Emission Test Set Up (30MHz to 1000MHz)



The Hong Kong Standards and Testing Centre Limited

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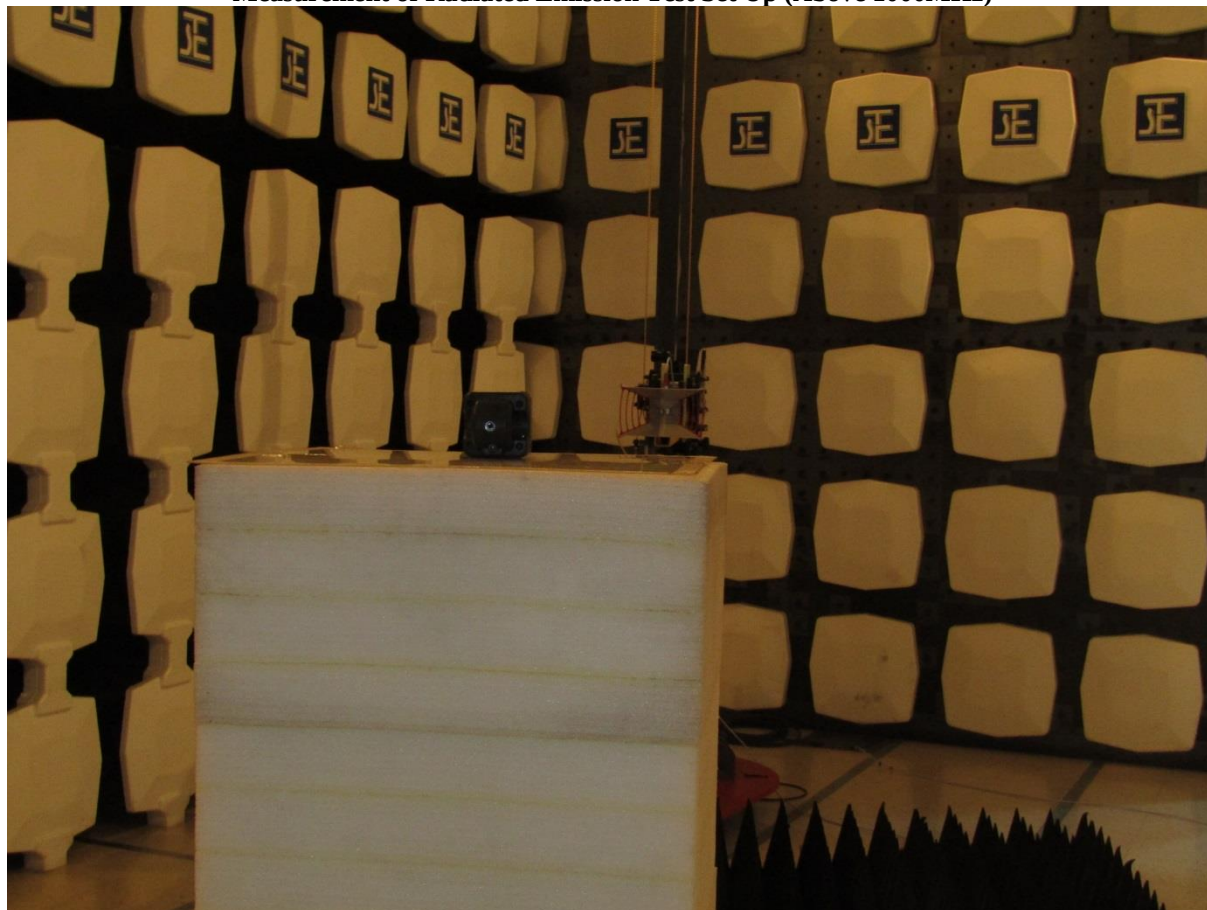
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Photographs of EUT

Measurement of Radiated Emission Test Set Up (Above 1000MHz)



***** End of Test Report *****

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