FCC / IC Test Report

FOR:
Juniper Systems, Inc.

Model Name:
MS3

Product Description:
Ultra-rugged handheld computer with Windows 10, providing long battery life, 7-inch touchscreen display, programable keys, 802.11ac, Bluetooth, camera

FCC ID: VSFMS3
IC ID: 7980A-MS3

Applied Rules and Standards:
47 CFR Part 15.247 (DSS)
RSS-247 Issue 2 (FHSs) & RSS-Gen Issue 5

REPORT #: EMC_JUNIP-026-19001_15.247_BT_EXT_DSS

DATE: 2019-03-29

A2LA Accredited

IC recognized # 3462B-2

***CETECOM* Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations and the relevant ISED Canada standard RSS-247.

No deviations were ascertained.

Company	Description	Model #
Juniper Systems, Inc.	Ultra-rugged handheld computer with Windows 10, providing long battery life, 7-inch touchscreen display, programable keys, 802.11ac, Bluetooth, camera...	MS3

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2019-03-29	Compliance	Cindy Li (EMC Lab Manager)	Cindy Li Digitally signed by Cindy Li DN: cn=Cindy Li, o=Cetecom Inc., ou=EMC, email=cindy.li@cetecom.com, c=US Date: 2019.04.09 16:44:26 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
2019-03-29	Compliance	Yuchan Lu (Test Engineer)	Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2019.03.29 12:25:29 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Cindy Li
Responsible Project Leader:	Sangeetha Sivaraman

2.2 Identification of the Client

Applicant's Name:	Juniper Systems, Inc.
Street Address:	1132 W 1700 N
City/Zip Code	Logan, UT 84321
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	MS3
HW Version :	MS3_00
SW Version :	MS3_SW_00
FCC-ID:	VSFMS3
IC-ID:	7980A-MS3
PMN:	Mesa 3
Product Description:	Ultra-rugged handheld computer with Windows 10, providing long battery life, 7-inch touchscreen display, programable keys, 802.11ac, Bluetooth, camera...
Frequency Range / number of channels:	Nominal band: 2400 MHz – 2483.5 MHz Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 78), 79 Channels
Type(s) of Modulation:	Bluetooth BR/EDR: GFSK, π /4 DQPSK, 8DPSK
Modes of Operation:	Fixed Channel
Module and Antenna Information as declared:	• Module name: WT41 • Module number: WT41u-E • FCC/IC ID: QOQWT41U • PIFA, 2.1 dBi gain
Max. declared output Powers:	• Conducted Power 17.74 dBm
Power Supply/ Rated Operating Voltage Range:	Battery: Vmin: 6 VDC/ Vnom: 7.3 VDC / Vmax: 7.3 VDC Charger: Vmin: 9.9 VDC/ Vnom: 12 VDC / Vmax: 15.6 VDC
Operating Temperature Range	-20 ºC to +50 ºC
Other Radios included in the device:	❖ WiFi, Bluetooth • Module number: HS2B56 ❖ GPS • Module number: NEO-M8N ❖ WCDMA, LTE • Module number: EM7455 • FCC/IC ID: N7NEM7455 / VSF28015 / 2417C-EM7455 / 7980A-28015 ❖ RFID(Optional) • Module number: M6e-Nano & M6e-Micro • FCC/IC ID: VSF25589,7980A-25589 & VSF26593,7980A-26593

Sample Revision	☐Prototype Unit; ■Production Unit; ☐Pre-Production

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	MS3W-C06	MS3_00	MS3_SW_00	Radiated Emissions

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	AC Adapter	PSAA30R - 120	SWITCHING POWER SUPPLY	P74900952A1

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE#1	The radio of the EUT was configured to low, mid and high channel with highest possible duty cycle and maximum output power using software "BlueTest3" provided by client that is not available to the end user.

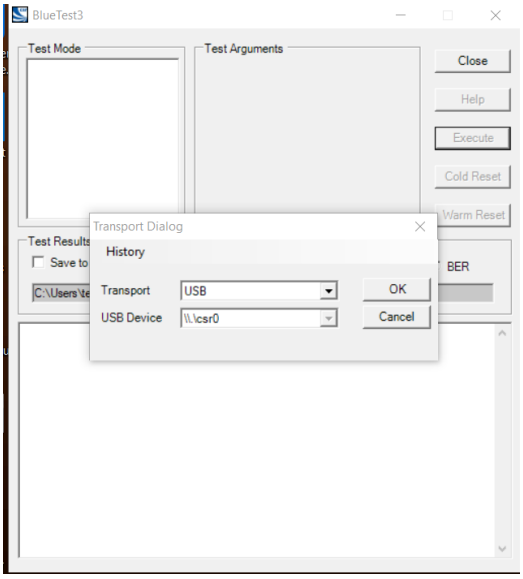
3.5 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels with the highest possible duty cycle and maximum output power.

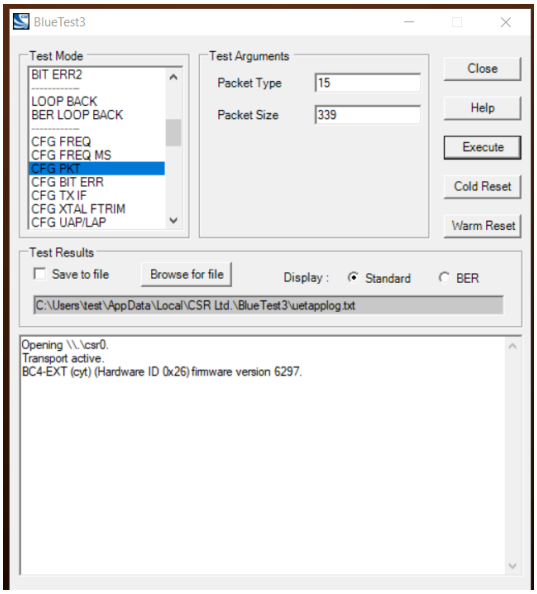
For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

The EUT were configured by "BlueTest3" provided by client (not available to the end user).

BlueTest3 Tool:

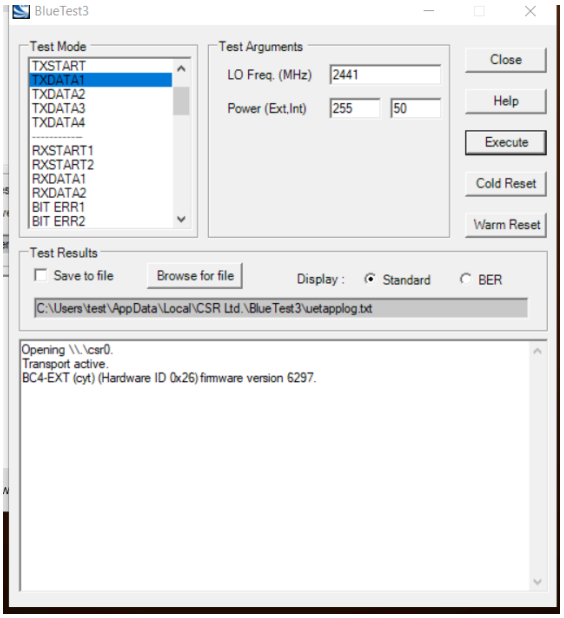


Choose USB->CSR1 or CSR0



Click "Warm Reset", In Test Mode -> Choose "RXStart1"->Click "Execute" -> Choose "CFG PKT"->Configure to the desired Packet Type and Packet Size ->Click "Execute"

Mode	Packet	Packet Type	Packet Size
GFSK	DH1	4	27
	DH3	11	183
	DH5	15	339
π/4-DQPSK	2-DH1	20	54
	2-DH3	26	367
	2-DH5	30	679
8-DPSK	3-DH1	24	83
	3-DH3	27	552
	3-DH5	31	1021



Enter the desired frequency in the “LO Freq. (MHz)” field. The low, middle and high channels are specified as 2402, 2441 and 2480 respectively.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and Radio Standard Specification RSS-247 Issue1 of ISED Canada.

Testing procedures are based on ANSI C63.10:2013 including section 7.8 for FHSS systems.

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA[1]	NP[1]	Result
§15.247(b)(1) RSS-247 5.4(2)	Maximum Peak Conducted Output Power	Nominal	N/A[1]	☐	☐	■	Note 2
§15.247(d) RSS-247 5.5 RSS-Gen 8.10	Band Edge Compliance	Nominal	N/A[1]	☐	☐	■	Note 2
§15.247(a)(1) RSS-247 5.1(1)	Spectrum Bandwidth	Nominal	N/A[1]	☐	☐	■	Note 2
§15.247(a)(1) RSS-247 5.1(1)	Carrier Frequency Separation	Nominal	N/A[1]	☐	☐	■	Note 2
§15.247(a)(1) RSS-247 5.1(4)	Number of Hopping Channels	Nominal	N/A[1]	☐	☐	■	Note 2
§15.247(a)(1)(iii) RSS-247 5.1(4)	Time of occupancy	Nominal	N/A[1]	☐	☐	■	Note 2
§15.247(d) §15.209 (a) RSS-Gen 6.13	TX Spurious emissions-Radiated	Nominal	GFSK DH5	■	☐	☐	Complies
§15.207(a) RSS-Gen 8.8	AC Conducted Emissions	Nominal	GFSK DH5	■	☐	☐	Complies

Note1: NA= Not Applicable; NP= Not Performed.
Note2: Leveraged from module certification FCC ID: QOQWT41U

6 Measurements

6.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

Conducted measurement

150 kHz to 30 MHz	±0.7 dB (LISN)
RF conducted measurement	±0.5 dB

6.2 Environmental Conditions During Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

6.3 Dates of Testing:

03/18/2019

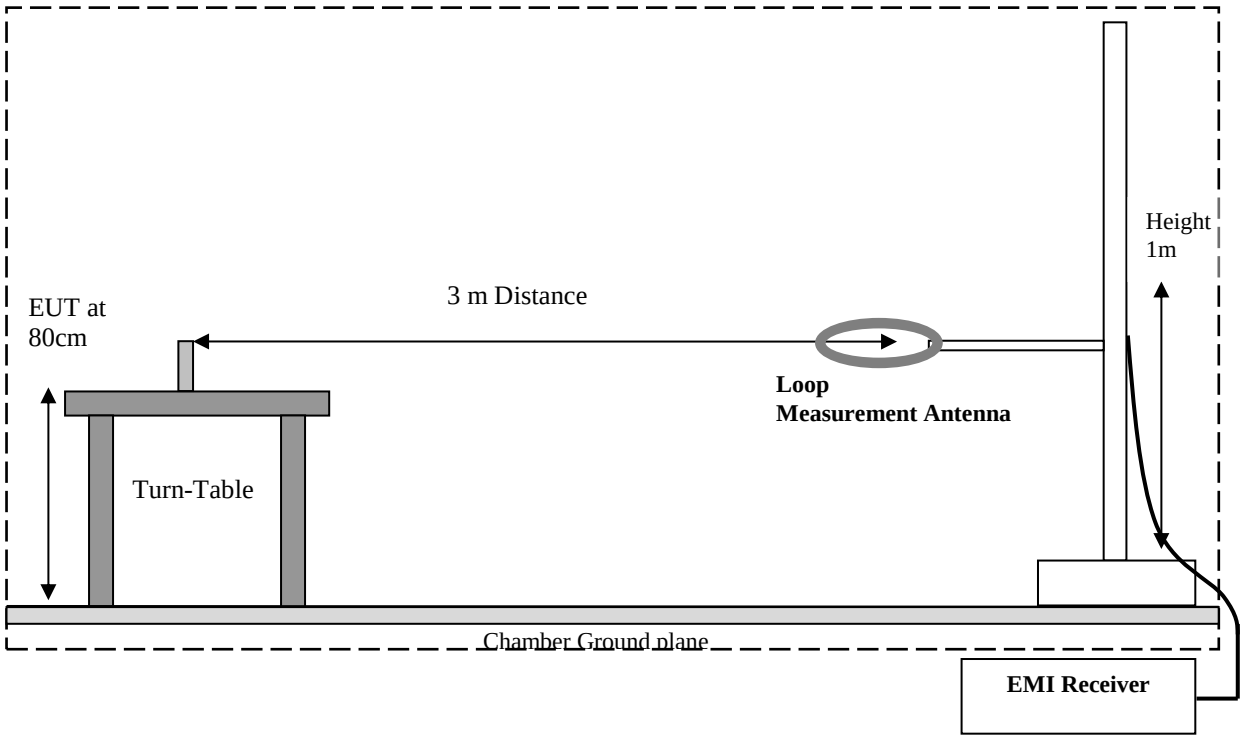
7 Measurement Procedures

7.1 Radiated Measurement

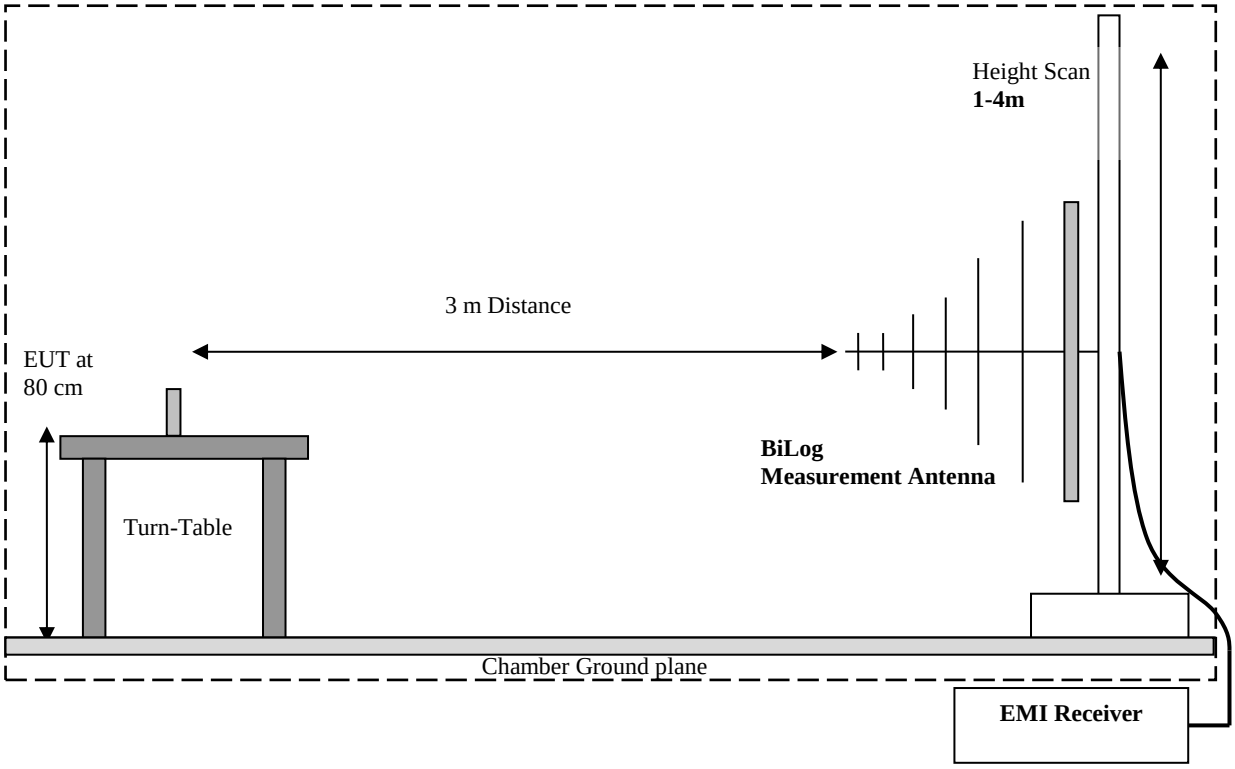
The radiated measurement is performed according to: ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

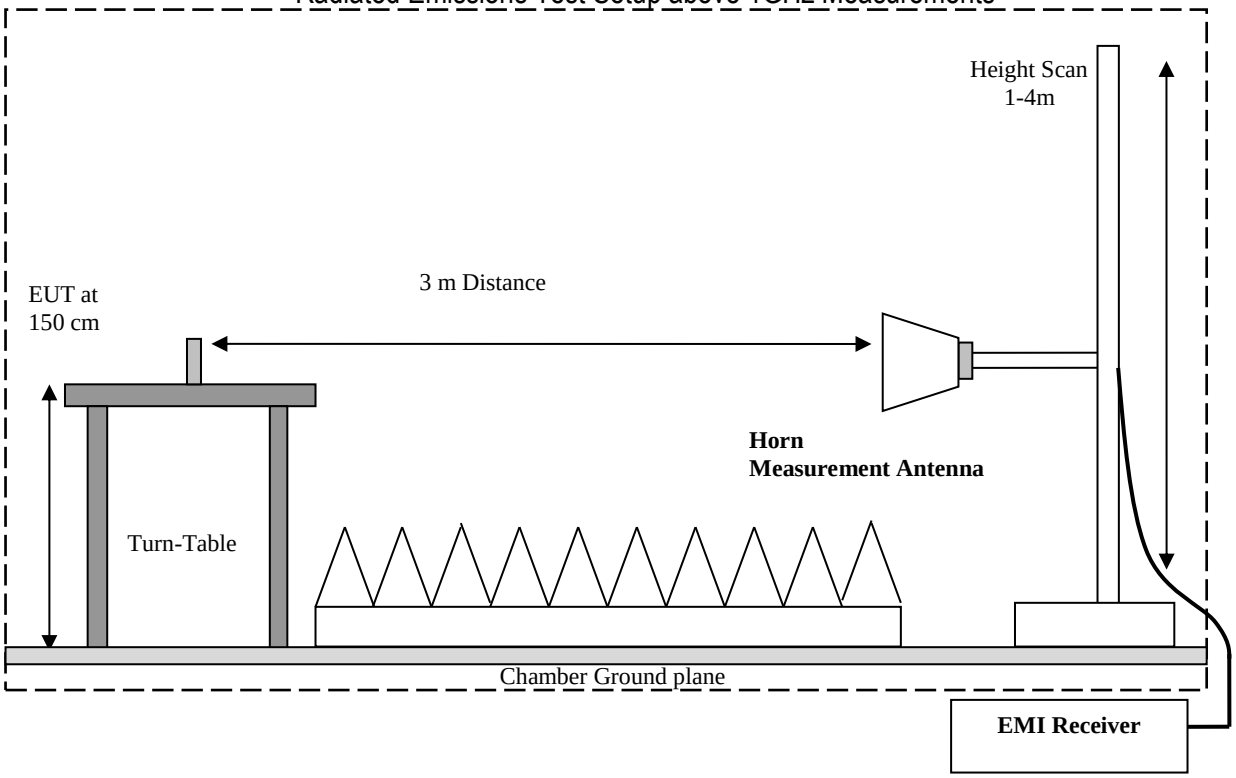
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBµV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV)- Cable Loss (dB)+ Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

8 Test Result Data

8.1 Transmitter Spurious Emissions and Restricted Bands

8.1.1 Measurement according to ANSI C63.10

Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector = Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW = 120 KHz (<1 GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1MHz

Plots reported here represent the worst case emissions for horizontal and vertical antenna polarizations and for three orientations of the EUT. Unless mentioned otherwise, the emissions outside the limit lines in the plots are from the transmit signal.

8.1.2 Limits: FCC 15.247(d)/15.209(a)

- Except as shown in CFR 47 Part 15.205 paragraph (d), only spurious emissions are permitted in any of the frequency bands listed below

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
- PEAK LIMIT= 74dBµV/m
- AVG. LIMIT= 54dBµV/m

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements described in 5.4.
The highest (or worst-case) data rate shall be recorded for each measurement.

For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation as follow:

Conversion factor (CF) = 40 log (D/d) = 40 log (300 m / 3 m) = 80 dB

8.1.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	1DH5 fixed channel	110 VAC

8.1.4 Measurement result:

Plot #	Channel #	Scan Frequency	Limit	Result
1-3	Low	30 MHz – 18 GHz	See section 8.8.2	Pass
4-8	Mid	9 kHz – 26 GHz	See section 8.8.2	Pass
9-12	High	30 MHz – 18 GHz	See section 8.8.2	Pass

8.1.5 Measurement Plots:

Plot # 1 Radiated Emissions: 30MHz -1GHz

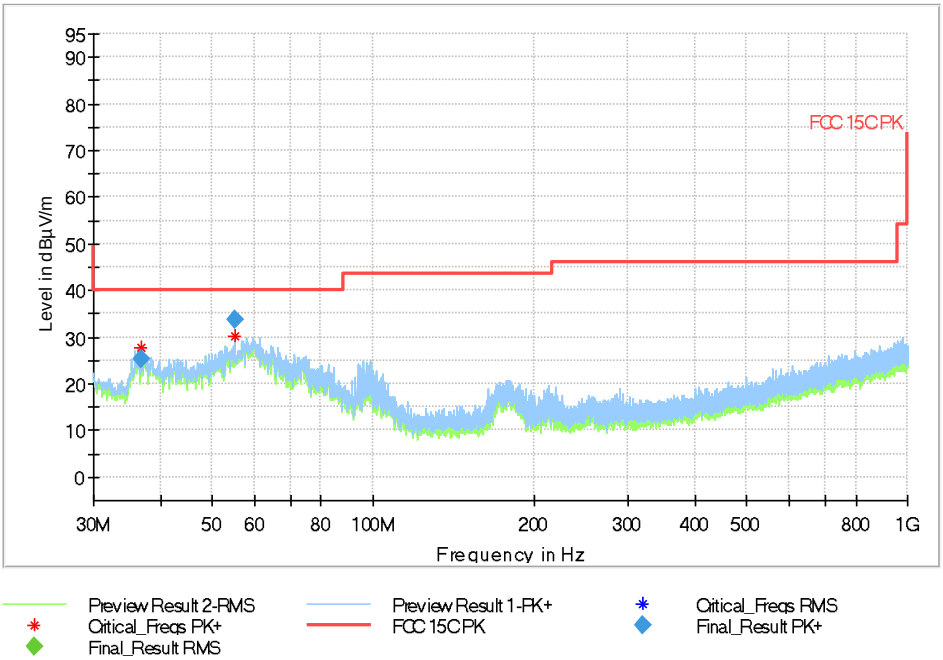
Modulation: GFSK | **Channel: Low**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
36.753	25.43	---	40.00	14.57	100.0	100.0	158.0	V
55.292	33.83	---	40.00	6.17	100.0	100.0	100.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
36.753	315.0	-13	3:03:46 PM - 3/18/2019
55.292	217.0	-21	3:06:28 PM - 3/18/2019



Plot # 2 Radiated Emissions: 1-3 GHz

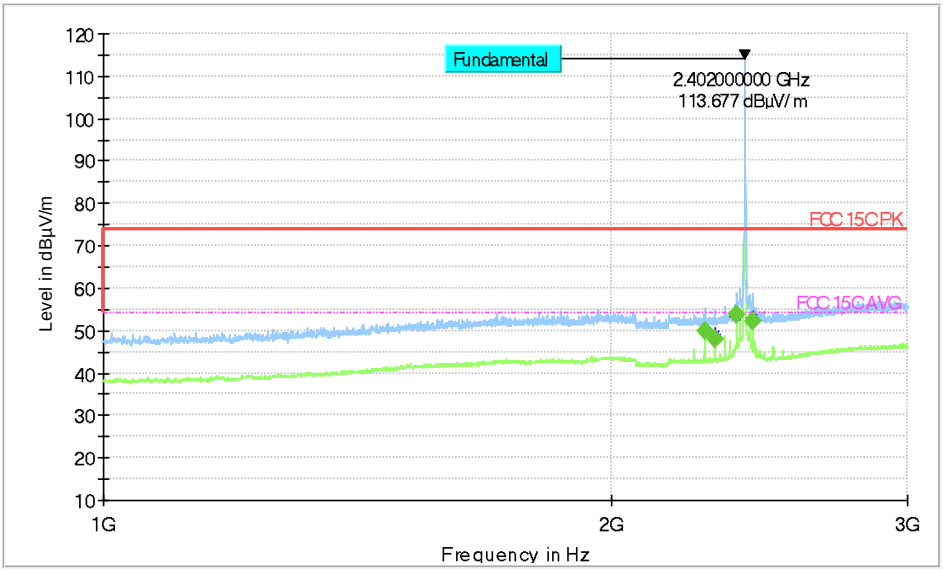
Modulation: GFSK | **Channel: Low**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
2274.055	---	50.01	53.98	3.97	300.0	1000.0	107.0	V
2306.000	---	48.05	53.98	5.93	300.0	1000.0	145.0	H
2375.970	---	53.87	53.98	0.11	300.0	1000.0	107.0	V
2428.065	---	52.37	53.98	1.61	300.0	1000.0	135.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
2274.055	205.0	8	-22	0	30	42	6:11:59 PM - 3/18/2019
2306.000	314.0	8	-22	0	30	40	6:18:23 PM - 3/18/2019
2375.970	202.0	8	-21	0	30	45	6:15:13 PM - 3/18/2019
2428.065	200.0	8	-21	0	30	44	6:09:05 PM - 3/18/2019



Plot # 3 Radiated Emissions: 3-18 GHz

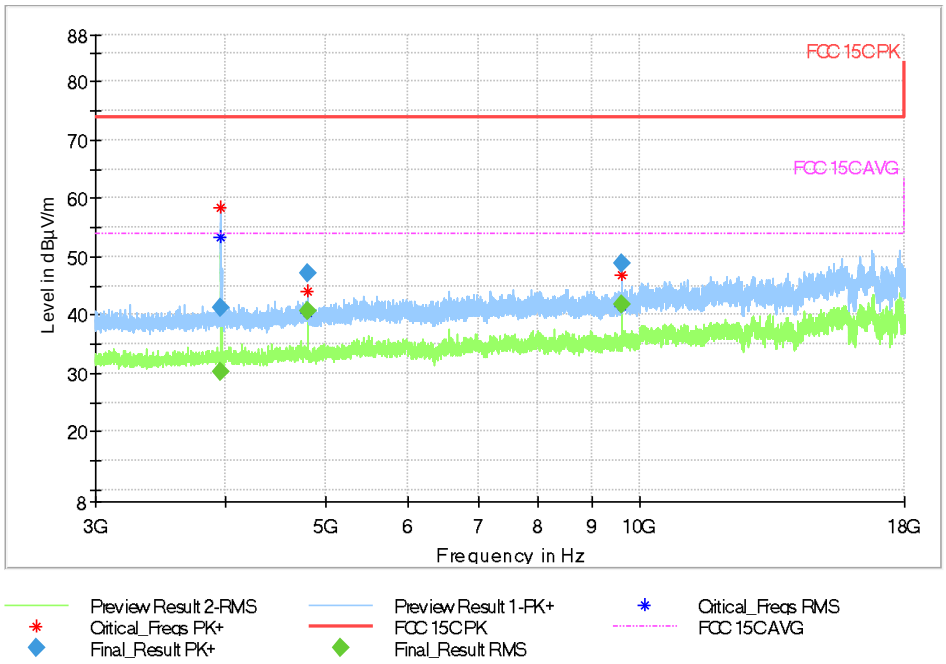
Modulation: GFSK | **Channel: Low**

Final_Result

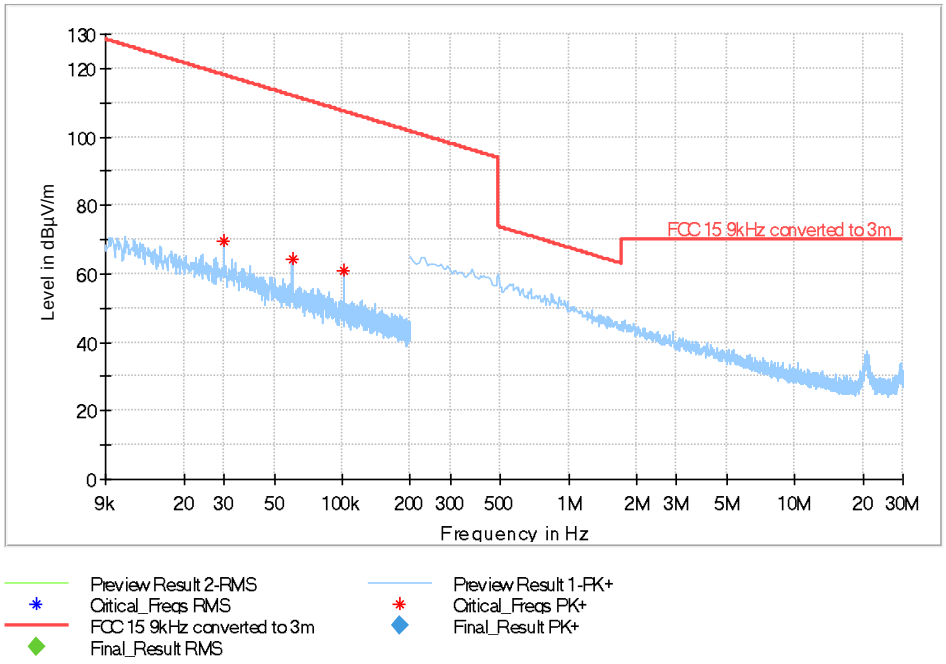
Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
3957.144	41.17	---	73.99	32.82	200.0	1000.0	294.0	H
3957.397	---	30.35	53.98	23.63	200.0	1000.0	314.0	H
4803.662	47.11	---	73.99	26.88	200.0	1000.0	148.0	V
4803.731	---	40.75	53.98	13.23	200.0	1000.0	194.0	V
9608.071	---	41.82	53.98	12.16	200.0	1000.0	121.0	V
9608.575	48.76	---	73.98	25.22	200.0	1000.0	147.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
3957.144	219.0	-34	7:01:03 PM - 3/18/2019
3957.397	350.0	-34	7:10:49 PM - 3/18/2019
4803.662	147.0	-33	7:07:49 PM - 3/18/2019
4803.731	145.0	-33	7:17:45 PM - 3/18/2019
9608.071	91.0	-25	7:14:34 PM - 3/18/2019
9608.575	92.0	-25	7:04:38 PM - 3/18/2019



Plot # 4 Radiated Emissions: 9 KHz - 30 MHz	
Modulation: GFSK	**Channel: Mid**



Plot #5 Radiated Emissions: 30 MHz – 1GHz

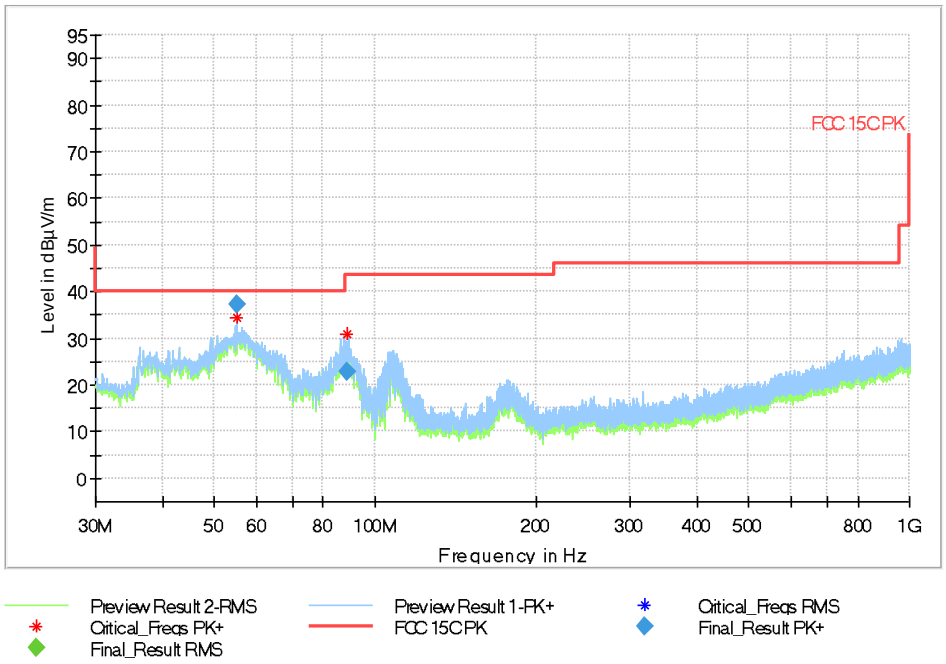
Modulation: GFSK | **Channel: Mid**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
55.298	37.09	---	40.00	2.91	100.0	100.0	100.0	V
88.599	22.97	---	43.50	20.53	100.0	100.0	129.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
55.298	-15.0	-21	2:49:31 PM - 3/18/2019
88.599	3.0	-22	2:52:38 PM - 3/18/2019



Plot #6 Radiated Emissions: 1-3 GHz

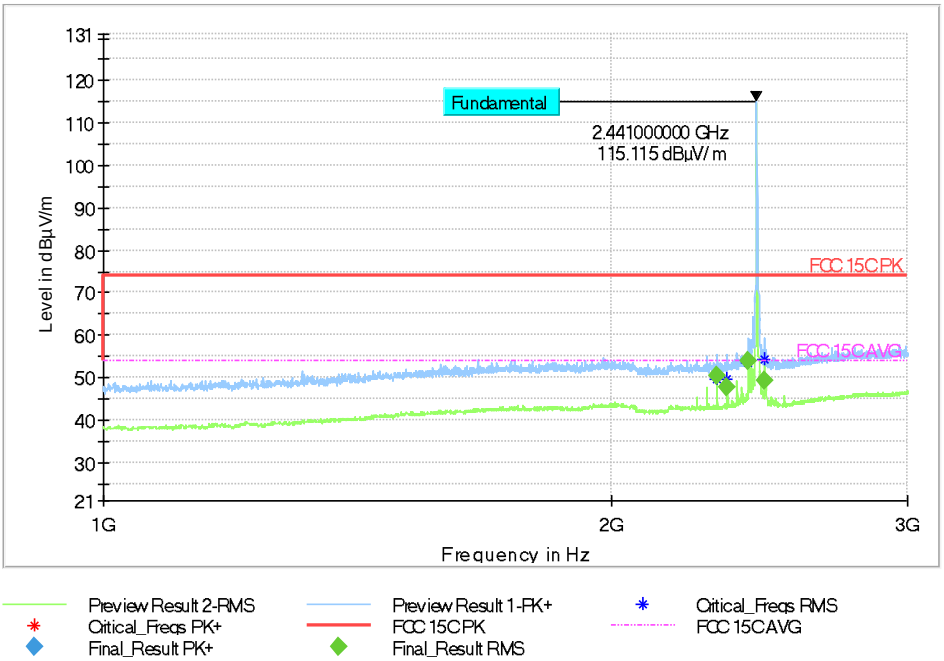
Modulation: GFSK | **Channel: Mid**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
2312.975	---	50.29	53.98	3.69	300.0	1000.0	115.0	V
2345.165	---	47.73	53.98	6.25	300.0	1000.0	141.0	H
2415.035	---	53.83	53.98	0.15	300.0	1000.0	115.0	V
2466.825	---	49.12	53.98	4.86	300.0	1000.0	142.0	H

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
2312.975	295.0	8	-22	0	30	42	5:53:01 PM - 3/18/2019
2345.165	315.0	8	-21	0	30	39	5:56:05 PM - 3/18/2019
2415.035	195.0	8	-21	0	30	45	5:49:54 PM - 3/18/2019
2466.825	-23.0	8	-22	0	30	41	5:46:35 PM - 3/18/2019



Plot #7 Radiated Emissions: 3-18 GHz

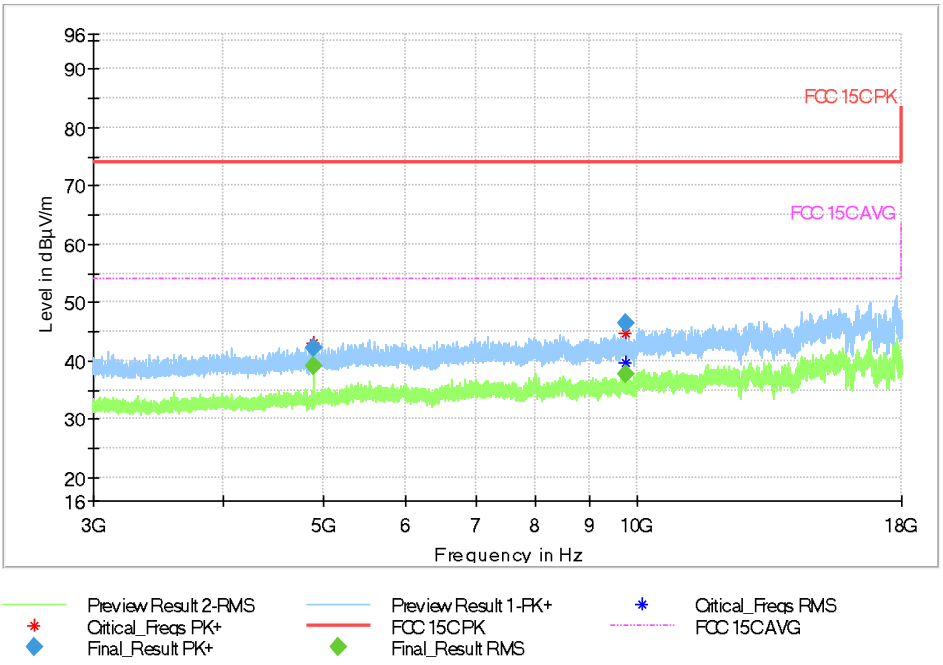
Modulation: GFSK | **Channel: Mid**

Final_Result

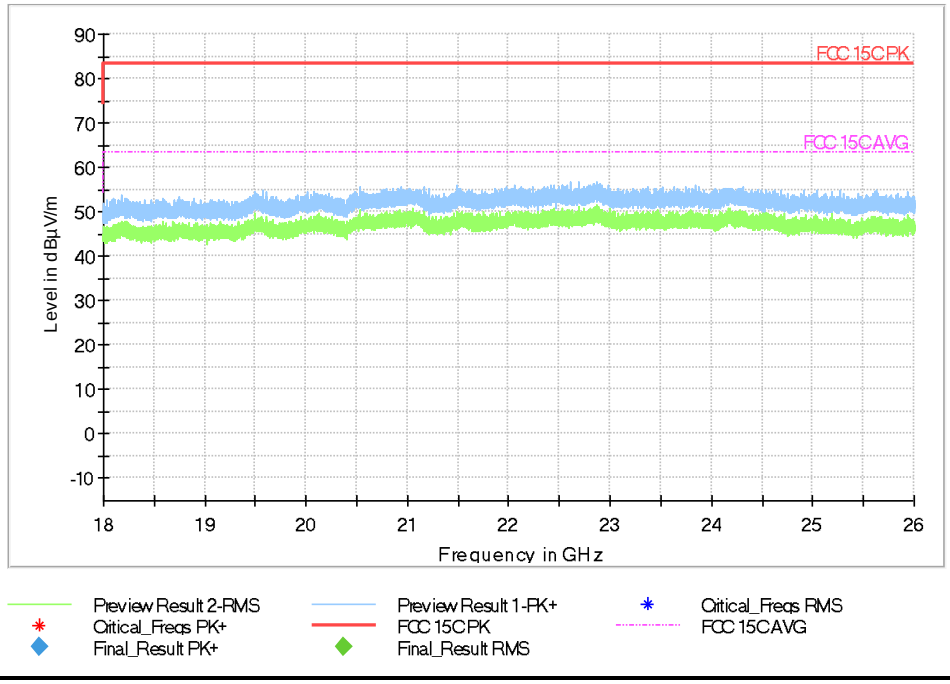
Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
4881.557	42.18	---	73.99	31.81	200.0	1000.0	145.0	V
4881.758	---	39.03	53.98	14.95	200.0	1000.0	100.0	V
9763.234	46.38	---	73.98	27.60	200.0	1000.0	107.0	V
9763.906	---	37.56	53.98	16.42	200.0	1000.0	127.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
4881.557	113.0	-33	7:59:24 PM - 3/18/2019
4881.758	76.0	-33	8:08:59 PM - 3/18/2019
9763.234	77.0	-25	8:02:35 PM - 3/18/2019
9763.906	79.0	-25	8:05:38 PM - 3/18/2019



Plot #8 Radiated Emissions: 18-26 GHz	
Modulation: GFSK	**Channel: Mid**



Plot #9 Radiated Emissions: 30 MHz – 1GHz

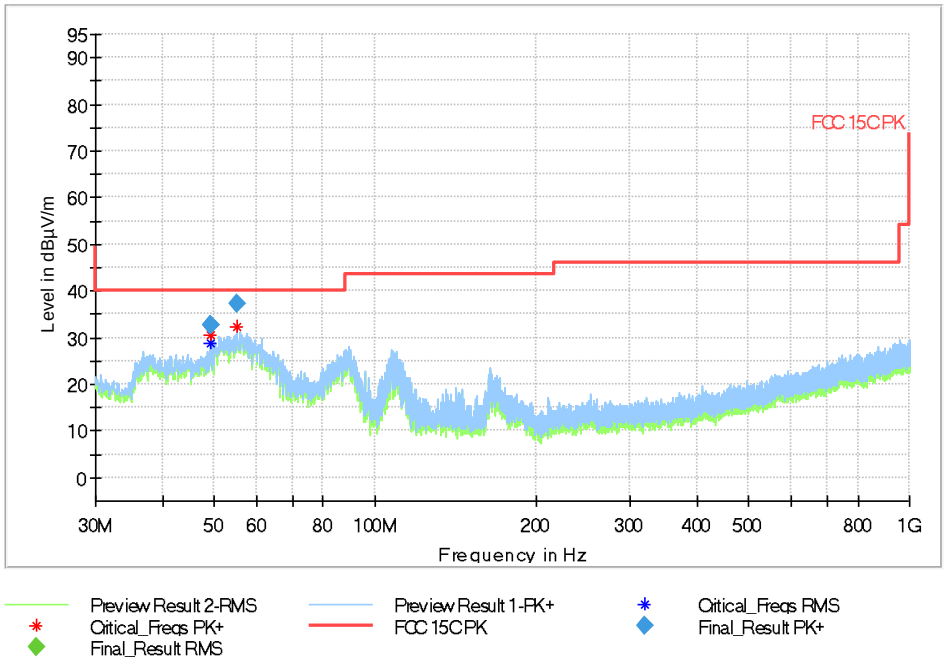
Modulation: GFSK | **Channel: High**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
49.165	32.51	---	40.00	7.49	100.0	100.0	100.0	V
49.173	32.54	---	40.00	7.46	100.0	100.0	100.0	V
55.283	37.39	---	40.00	2.61	100.0	100.0	100.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
49.165	253.0	-19	2:32:23 PM - 3/18/2019
49.173	358.0	-19	2:34:50 PM - 3/18/2019
55.283	-20.0	-21	2:37:46 PM - 3/18/2019



Plot # 10 Radiated Emissions: 1-3 GHz

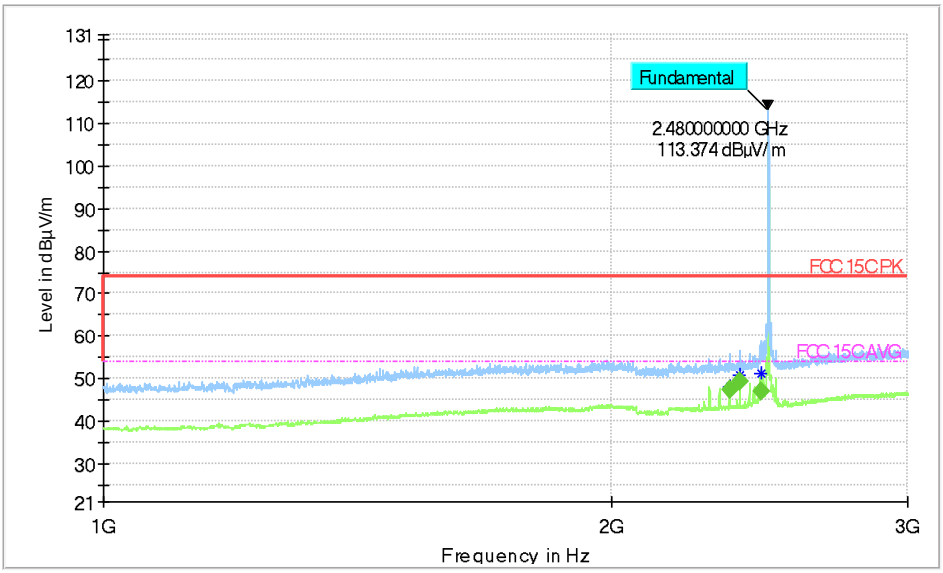
Modulation: GFSK | **Channel: High**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
2352.080	---	47.26	53.98	6.72	300.0	1000.0	139.0	H
2384.025	---	49.09	53.98	4.89	300.0	1000.0	100.0	V
2454.170	---	47.14	53.98	6.84	300.0	1000.0	135.0	H

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
2352.080	313.0	8	-21	0	30	39	5:24:42 PM - 3/18/2019
2384.025	176.0	8	-21	0	30	41	5:27:57 PM - 3/18/2019
2454.170	300.0	8	-22	0	30	39	5:21:49 PM - 3/18/2019



Plot #11 Radiated Emissions: 3-18 GHz

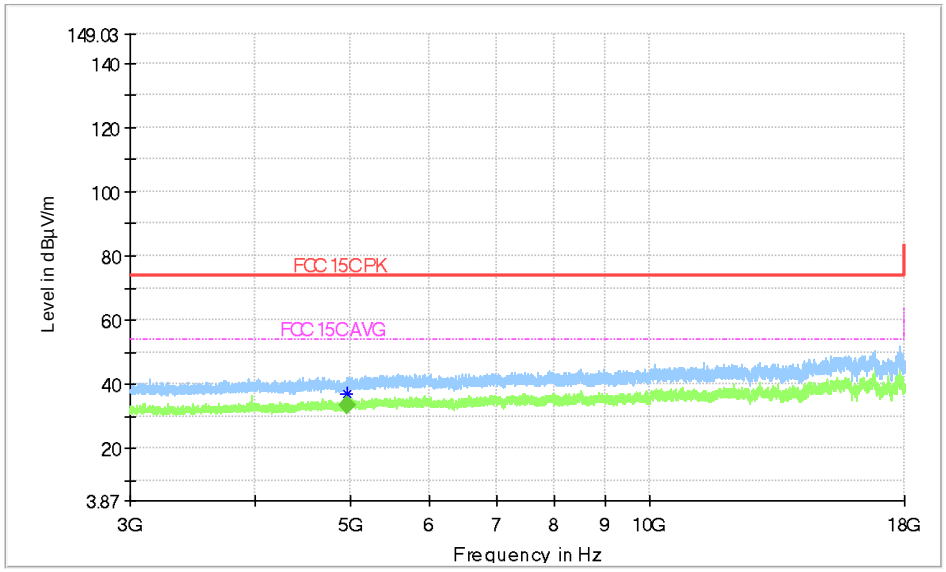
Modulation: GFSK | **Channel: High**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
4959.989	---	33.52	53.98	20.46	200.0	1000.0	214.0	V

(continuation of the "Final_Result" table from column 14 ...)

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
4959.989	202.0	-33	9:07:50 PM - 3/18/2019



8.2 AC Power Line Conducted Emissions

8.2.1 Measurement according to ANSI C63.4

Analyzer Settings:

- RBW = 9 KHz (CISPR Bandwidth)
- Pre-scan Detector = Peak / Average for
- Final Measurements Detector = Quasi-Peak / Average

8.2.2 Limits: FCC 15.207 & RSS-Gen 8.8

(a) Except as shown in paragraphs (b) and (c) of this section of the CFR, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table (1), as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

8.2.3 Test conditions and setup:

Ambient Temperature (C)	EUT Set-Up #	EUT operating mode	Power line (L1, L2, L3, N)	Power Input
22	1	GFSK continuous fixed channel	Line & Neutral	110 V / 60 Hz

8.2.4 Measurement Result:

Plot #	Port	EUT Set-Up #	EUT operating mode	Scan Frequency	Limit	Result
1	AC Mains	1	GFSK continuous fixed channel	150 kHz – 30 MHz	See section 8.8.2	Pass

8.2.5 Measurement Plots:

Plot # 1

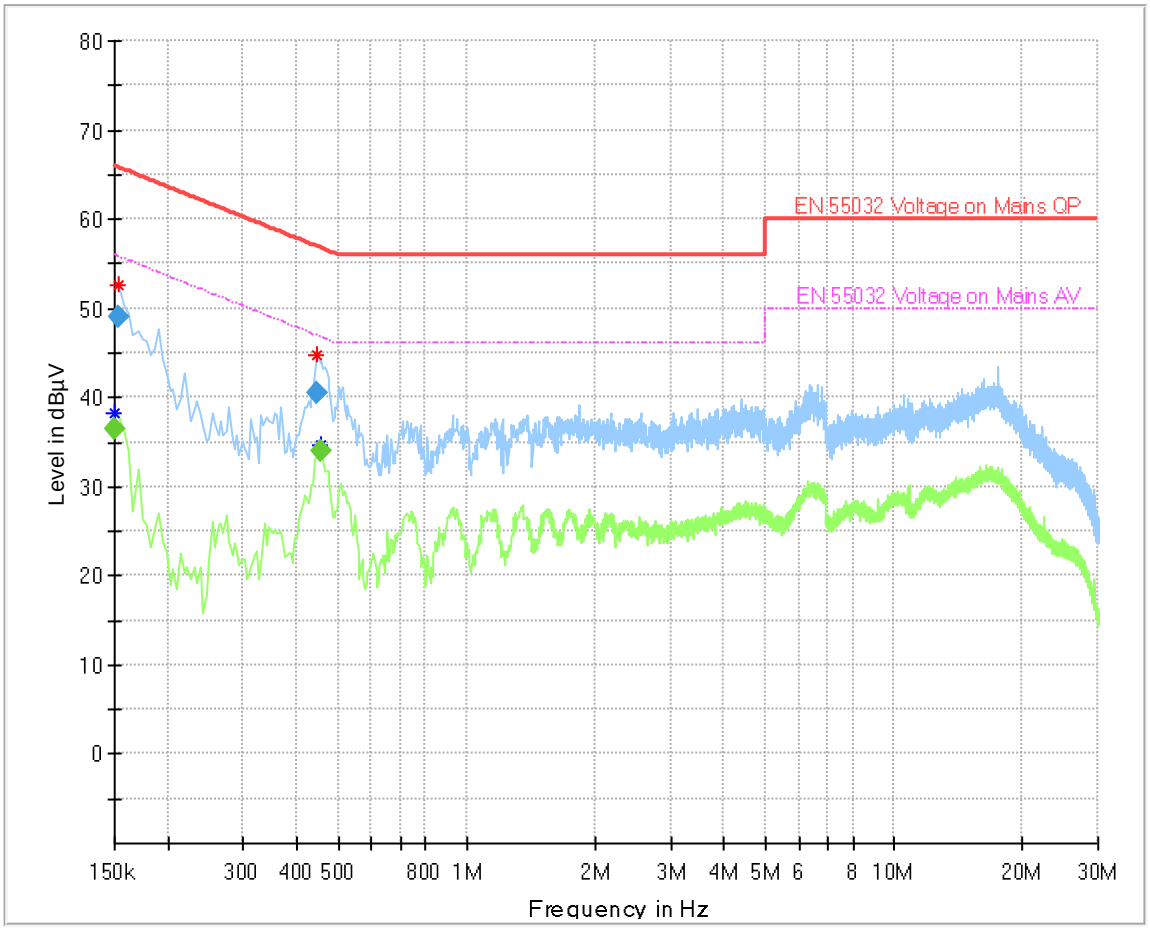
Disclaimer: Any measurement data within 2dB from the limit line is conditional PASS/FAIL due to measurement uncertainty considerations.

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.150000	---	36.36	56.00	19.64	500.0	9.000	L1	GND	10.5
0.154000	49.00	---	65.78	16.78	500.0	9.000	L1	GND	10.7
0.446000	40.50	---	56.95	16.45	500.0	9.000	L1	GND	10.3
0.458000	---	34.07	46.73	12.66	500.0	9.000	L1	GND	10.2

(continuation of the "Final_Result" table from column 15 ...)

Frequency (MHz)	Comment
0.150000	10:48:55 AM - 3/19/2019
0.154000	10:48:47 AM - 3/19/2019
0.446000	10:48:51 AM - 3/19/2019
0.458000	10:48:59 AM - 3/19/2019



9 Test setup photos

Setup photos are included in supporting file name: "EMC_JUNIP-026-19001_BT_EXT_Setup_Photos.pdf"

10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
PASSIVE LOOP	ETS.LINDGREN	6512	00164698	3 YEARS	08/08/2017
BILOG ANTENNA	TESEO	CBL 6141B	41106	3 YEARS	11/01/2017
HORN ANTENNA	ETS.LINDGREN	3115	00035114	3 YEARS	07/31/2017
HORN ANTENNA	ETS.LINDGREN	3117	0167061	3 YEARS	08/08/2017
HORN ANTENNA	ETS.LINDGREN	3116C	00166821	3 YEARS	09/24/2017
SIGNAL ANALYZER	R&S	FSU26	200065	2 YEARS	07/03/2017
SIGNAL ANALAYZER	R&S	FSV 40	101022	3 YEARS	07/05/2017
TEST RECEIVER	R&S	ESU.EMI	100256	3 YEARS	01/31/2018
COMPACT DIGITAL BAROMETER	CONTROL COMPANY	35519-055	91119547	2 YEARS	06/20/2017
THRMOMETER HUMIDIY	DICKSON	TM320	16253639	3 YEARS	11/02/2017
LINE IMPEDANCE STABILIZATION NETWORK	FCC	FCC-LISN-50-25-2-08	08014	3 YEARS	11/10/2016

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

11 Revision History

Date	Report Name	Changes to report	Report prepared by
2019-03-29	EMC_JUNIP-026-19001_15.247_BT_EXT_DSS	Initial Version	Yuchan Lu