FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

60 GHz MODULE SET FOR GIGABIT-CLASS WIRELESS INFRASTRUCTURE APPLICATIONS

MODEL NUMBER: GigaRay MOD65412

FCC ID: UK2-MOD65412

REPORT NUMBER: 11882066-E1V3

ISSUE DATE: FEBRUARY 28, 2018

Prepared for
LATTICE SEMICONDUCTOR CORPORATION
2115 O'NEL DRIVE,
SAN JOSE, CA 95131, U.S.A.

Prepared by
UL VERIFICATION SERVICES INC
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2/20/2018	Initial Issue	Michael Heckrotte
V2	2/27/2018	Revised section 5.6 for clarification, Revised § 15.255 citations.	Michael Heckrotte
V3	2/28/2018	Revised section 7.4 for the test results to “Pass” in “Pass or Fail” column.	Michael Heckrotte

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 5

2. TEST METHODOLOGY 6

3. FACILITIES AND ACCREDITATION 6

4. CALIBRATION AND UNCERTAINTY 7

4.1. MEASURING INSTRUMENT CALIBRATION 7

4.2. MEASUREMENT UNCERTAINTY 7

5. EQUIPMENT UNDER TEST 8

5.1. MANUFACTURER'S DESCRIPTION OF EUT 8

5.2. OUTPUT POWER 8

5.3. DESCRIPTION OF AVAILABLE ANTENNAS 8

5.4. SOFTWARE AND FIRMWARE 8

5.5. DESCRIPTION OF TEST SETUP 9

5.6. TEST PROTOCOL AND WORST-CASE CONFIGURATION 11

6. TEST AND MEASUREMENT EQUIPMENT 12

7. APPLICABLE LIMITS AND TEST RESULTS 13

7.1. DUTY CYCLE 13

7.2. 6 dB BANDWIDTH 15

7.3. 99% and 26 dB BANDWIDTH 22

7.4. AVERAGE AND PEAK RADIATED POWER 29

7.5. PEAK CONDUCTED OUTPUT POWER 32

7.6. FREQUENCY STABILITY 33

7.7. TX SPURIOUS EMISSIONS 34

7.7.1. SPURIOUS EMISSION 30 TO 1000 MHz 35
7.7.2. SPURIOUS EMISSION 1 TO 18 GHz 38
7.7.3. SPURIOUS EMISSION 18 TO 26 GHz 41
7.7.4. SPURIOUS EMISSION 26 TO 40 GHz 43
7.7.5. SPURIOUS EMISSION 40 TO 200 GHz 45

7.8. AC POWER LINE CONDUCTED EMISSIONS 46

8. GROUP INSTALLATION 51

9. RF EXPOSURE 52

9.1. LIMIT 52

9.2. EQUATIONS 53

9.3. UPPER BOUND POWER DENSITY OF UNWANTED EMISSIONS 54

9.4. RESULTS FOR FUNDAMENTAL PLUS UNWANTED EMISSIONS 55

10. SETUP PHOTOS 56

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LATTICE SEMICONDUCTOR CORPORATION
2115 O'NEL DRIVE,
SAN JOSE, CA 95131, U.S.A.

EUT DESCRIPTION: 60 GHz MODULE SET FOR GIGABIT-CLASS WIRELESS INFRASTRUCTURE APPLICATION

MODEL: GigaRay MOD65412

SERIAL NUMBER: 00:d0:bd:a9:0c:33

DATE TESTED: DECEMBER 18-20TH, 2017
JANUARY 10, 17, 22 and 31st, 2018
FEBRUARY 1st -2ND 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

MICHAEL HECKROTTE
PRINCIPAL ENGINEER
UL Verification Services Inc.

Tested By:

GIA-PIAO CHIN
TEST ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 15 Subpart C and FCC Bulletin OET 65.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F
	☐ Chamber G
	☐ Chamber H

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	±3.52 dB
Radiated Disturbance, 30 to 1000 MHz	±4.94 dB
Radiated Disturbance, 1 to 6 GHz	±3.86 dB
Radiated Disturbance, 6 to 18 GHz	±4.23 dB
Radiated Disturbance, 18 to 26 GHz	±5.30 dB
Radiated Disturbance, 26 to 40 GHz	±3.23 dB
Radiated Disturbance, 40 GHz above	±3.50dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. MANUFACTURER'S DESCRIPTION OF EUT

The Lattice SiBeam GigaRay MOD65412 is a 60 GHz module set that includes a baseband PCB with a Half-Mini PCI Express (PCI-e) Card interface and an RF PCB (MOD63422) that includes two integral printed circuit board antennas (one for Tx, one for Rx). The baseband board operates with UDP protocol. The RF board and baseband board are interconnected with a Flexible Printed Circuit (FPC) cable with options of 75, 150 or 250 mm length, and 2 or 3 layers.

The GigaRay MOD65412 module operates on industry-standard Channel 2 (60.48 GHz) and Channel 3 (62.64 GHz).

Cable Option	Cable Length (mm)	No. of Layers
1	75	2
2	75	3
3	150	2
4	150	3
5	250	2
6	250	3

5.2. OUTPUT POWER

The highest peak conducted output power is 19.21 dBm (83.41 mW).

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antennas, one Tx and one Rx, are integral phased-array antennas, each with 22.7 dBi gain.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was FW Rev1 SVN59642.

The test utility software used during testing was:

1. EMI_STA_TX_MCS1_Ch2_Test (Shell script to configure EUT as STA Transmitter running MCS1 @ Ch2)
2. EMI_STA_TX_MCS1_Ch3_Test (Shell script to configure EUT as STA Transmitter running MCS1 @ Ch3)
3. configBRP (Shell script to enable/disable beam refinement search)

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number
Laptop	Lenovo	T420	S4476
Laptop Power Supply	Lenovo	92P1105	11S92P1105Z1ZBW979N1WA
Switch/Router	Netgear	FS105	1D52163P04569
Switch/Router Power Supply	Netgear	FA-0751000SUA	4F111814G1015403C8
Mini-PC w/Half Mini PCI-e interface card, for EUT	Zotac	ZBOX-CI520NANO	250-FB213-T02ZT G144800007395
Mini-PC Power Supply	Delta Electronics Inc	ADP-40KD BB	39MW47E0B52
Companion Device (Rx), JAX RF Board	Lattice/SiBeam	6340 (Engr only)	P/N: SiI-GE-1341, rev X02
Mini-PC for Companion Device	Zotac	ZBOX-CI520NANO	250-FB213-T02ZT G145000004409
Mini-PC Power Supply	Delta Electronics Inc	ADP-40KD BB	39MW47E080U

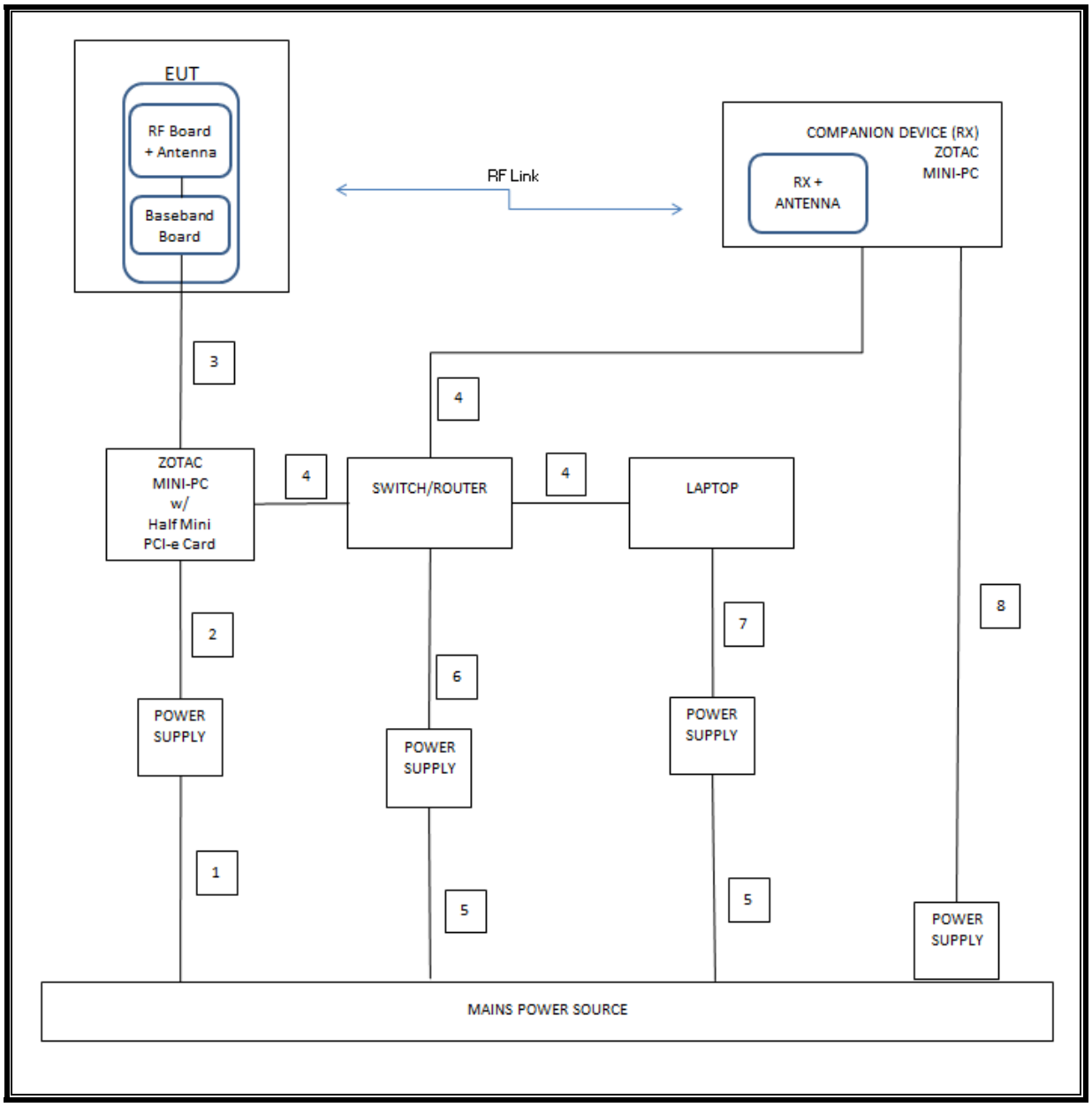
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	3-Prong	Unshielded	1.2	AC Main
2	DC	1	DC Barrel	Unshielded	1.7	Zotac DC Input
3	Data	1	Ribbon	Shielded	0.7	--
4	Ethernet	3	RJ45	Unshielded	3.0	--
5	AC	2	2-Prong	Unshielded	1.0	AC Main
6	DC	1	DC Barrel	Unshielded	1.5	Switch/Router DC Input
7	DC	1	DC Barrel	Unshielded	1.8	Power to Laptop
8	DC	1	DC Barrel	Shielded	1.8	Zotac DC Input

TEST SETUP

Support computers were connected to the EUT and companion device individually to program the test mode and establish a communication link. The mini-PC for the EUT was placed in a small shielded box during radiated emissions tests. The rest of the support equipment was placed in a large shielded tent during radiated emissions tests. The antenna of the companion device was positioned behind a window in the shielded tent during radiated emissions tests. The support equipment computers were connected to the charger during testing.

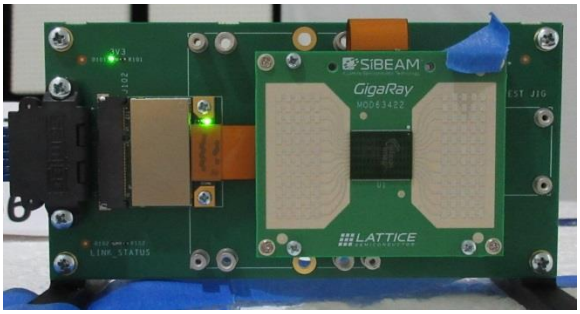
SETUP DIAGRAM FOR TESTS



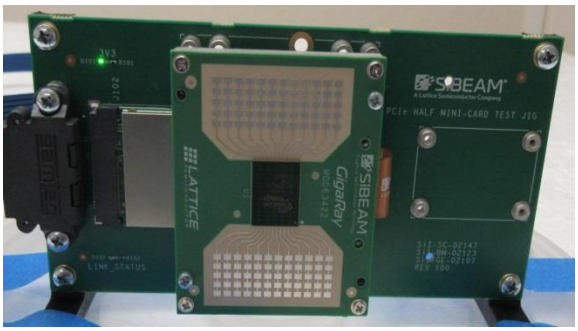
5.6. TEST PROTOCOL AND WORST-CASE CONFIGURATION

The phased-array antennas are integral, thus radiated measurements are performed.

Horizontal Antenna Board Orientation



Vertical Antenna Board Orientation



The baseband board is mounted on the half mini PCIe interface card. The antenna array board is mounted in one of two orientations relative to the baseband board (and interface card), as constrained by the length of the interface cable between the baseband and antenna array boards. The measurement antenna is rotated as needed to maximize emissions by aligning with the polarization of the RF energy from the EUT.

MCS1 data rate is the highest power, thus is worst-case.

Fundamental emissions are measured with all possible interconnect cable configurations on both operating channels. The 150 mm, 3-layer cable and antennas oriented vertically on the interface card yields the highest fundamental EIRP. Emissions from 40-57 and 71-200 GHz are measured with the EUT operating on Channels 2 and 3 with MCS1, 150mm, 3-layer FPC cable.

Initial scans of spurious emissions are performed with configurations that included the three lengths of interconnect cables, the 2-layer and 3-layer interconnect cables, and operating channels 2 and 3. The worst-case is with Channel 3, 150mm, 2-layer FPC cable and antennas oriented horizontally on the interface card. Emissions from 30 MHz to 40 GHz are measured with the EUT operating on the worst-case configuration of MCS1, Channel 3, 150mm, 2-layer FPC cable.

6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List					
Description	**Manufacturer**	**Model**	**S/N**	**Local ID (T No.)**	**Cal Due**
PXA Signal Analyzer	Agilent	N9030A	MY52350427	313	8/7/2018
Horn antenna, 33-50 GHz	CMI	HO22R	--	--	CNR
LNA, 40-50 GHz	Spacek Labs	SL4510-33-4W	14J05	1099	8/14/2018
Horn Antenna, 50-75 GHz	CMI	HO15R	--	--	CNR
LNA, 50-75 GHz	Vivatech	VTLNA-15-6018-FB	2013051	--	8/29/2018
Harmonic Mixer, 50-80 GHz	Keysight	M1970V	MY51390830	994	8/16/2018
Horn Antenna, 75-110 GHz	CMI	HO10R	--	--	CNR
LNA, 75-110 GHz	Spacek	SLW-22-5	15J04	1600079	8/30/2018
Harmonic Mixer, 75-110 GHz	Keysight	M1970W	MY51430784	993	8/16/2018
Horn Antenna, 110-170 GHz	CMI	HO6R	--	--	CNR
LNA, 110-170 GHz	Vivatech	VTLNA-06S01	2015085	--	8/31/2018
Harmonic Mixer, 110-170 GHz	OML	M06HWDXA	F90519-2	150918-1	8/14/2018
Horn Antenna, 170-260 GHz	CMI	HO4R	--	--	CNR
Harmonic Mixer, 170-260 GHz	OML	M04HWDXA	150918-1	--	8/14/2018
Digital Signal Analyzer, 8 GHz	Agilent	DSA90804A	MY51420139	215	9/18/2018
Low Pass Filter, 10 MHz	Solar Electric Co.	6623-10	136101	417	7/30/2018
P-Series Power Meter	Keysight	N1913A	MY53100006	412	3/1/2018
Power Sensor, 50-75 GHz	Agilent	V8486-CFG002-H01	MY44420424	234	8/24/2018
RF Detector, 50-75 GHz	Spacek Labs	DV-2P	17A27	--	CNR
Analog Signal Generator, 50 GHz	Agilent	E8257D	MY52350427	1839	6/28/2018
Spectrum Analyzer, 44GHz	Keysight	8564E	MY55410147	1454-PRE0126763	1/15/2018 *
Preamplifier, 1-26.5GHz	Agilent	8449B	3008A04710	404-PRE0077930	7/23/2018
Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2093387	449	6/12/2018
Horn Antenna, 26-40 GHz	ARA	MWH-2640/B	209340	446	6/12/2018
Preamplifier, 26-40 GHz	Miteq	11A2640-35-HG	--	1864-PRE0163190	9/21/2018
PXA Signal Analyzer	Agilent	N9030A	MY54410193	1466-PRE0126762	4/11/2018
Hybrid Antenna, 30-1000 MHz	Sunol Sciences	JB3	A051314-2	130	10/16/2018
Preamp, 0.1-1300 MHz	HP	8447D	--	15-PRE0079216	8/14/2018
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	--	862-PRE0078250	6/9/2018
Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	--	1165	6/24/2018
EMI Test Receiver	Rohde & Schwarz	ESR	101559	1436	1/6/2018 *
9KHz-30MHz LISN	FCC	50/250-25-2-01-CISPR16	161124	1310	6/15/2018
9KHz-30MHz LISN	FCC	50/250-25-2	114	24	3/1/2018
Environmental Chamber	Cincinnati SubZero	ZPHS-8-3.5-SCT/WC	ZP1313613	754	3/8/2018
True RMS Multimeter	Fluke	77IV	30860448	1747	4/15/2018
Power Supply, AC	Elgar-Ametek	CW2501M	1307A03505	350	CNR
Conducted Software	UL	UL EMC	Ver 9.5, July 22, 2014		
Radiated Software	UL	UL EMC	Ver 9.5, April 26, 2016		

* Tested before due date

All horn antennas at and above the 33-50 GHz band are standard gain horns. In accordance with C63.10 clause 4.4.3 (a) these antennas do not need to be calibrated. UL measures the critical dimensions on an annual basis and checks for damage and deterioration before each test.

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. DUTY CYCLE

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

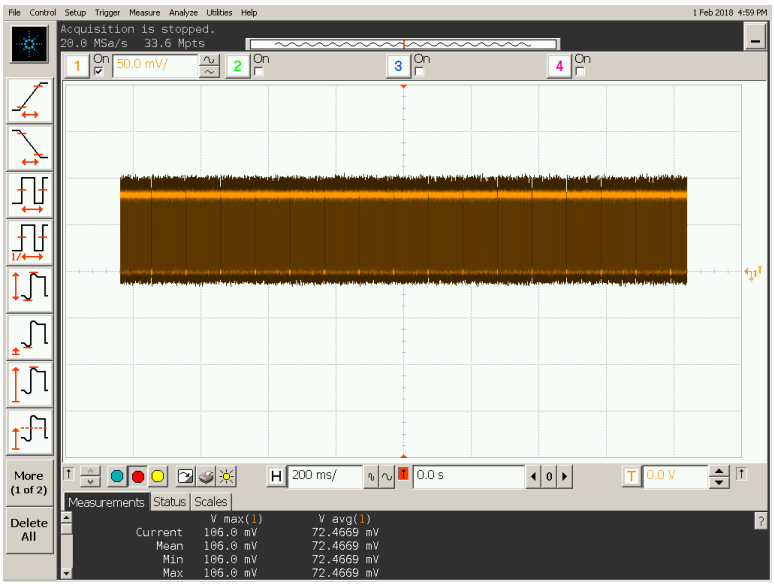
A 50-75 GHz millimeter-wave detector was connected to an antenna via an LNA. The output of the detector was connected to an oscilloscope.

The overall duty cycle is the composite of three separate duty cycles; a 100mS super-frame, a TXOP (Transmission Opportunity) duty cycle, and a duty cycle within the TXOP. A CSV file collecting 16 super-frames from the oscilloscope was utilized to calculate the final duty cycle.

RESULTS

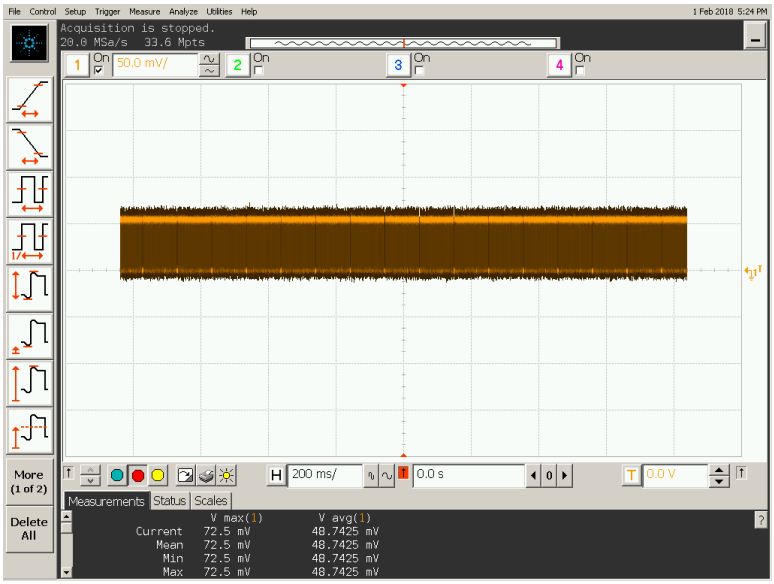
Channel	FPC Cable	Duty Cycle (linear)	Duty Cycle Correction Factor (dB)
2	75mm 2 layer	0.888	0.52
2	75mm 3 layer	0.888	0.52
3	75mm 2 layer	0.889	0.51
3	75mm 3 layer	0.889	0.51
2	150mm 2 layer	0.888	0.52
2	150mm 3 layer	0.887	0.52
3	150mm 2 layer	0.889	0.51
3	150mm 3 layer	0.889	0.51
2	250mm 2 layer	0.889	0.51
2	250mm 3 layer	0.888	0.52
3	250mm 2 layer	0.890	0.51
3	250mm 3 layer	0.890	0.51

Channel 2 Oscilloscope plot. Representative of all FPC cables.



250mm 3 layer FPC cable

Channel 3 Oscilloscope plot. Representative of all FPC cables.



250mm 3 layer FPC cable

7.2. 6 dB BANDWIDTH

APPLICABLE RULE

§15.255 (e) (1) For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g. for frequency hopping devices).

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The spectrum analyzer and external mixer are set up to measure the radiated output of the transmitter.

RESULTS

FPC Cable	Channel	Frequency (GHz)	6 dB Bandwidth (GHz)
75mm 2 layer	2	60.48	1.155
75mm 3 layer	2	60.48	1.165
150mm 2 layer	2	60.48	1.210
150mm 3 layer	**2**	**60.48**	**1.315**
250mm 2 layer	2	60.48	1.085
250mm 3 layer	2	60.48	1.165
75mm 2 layer	3	62.64	1.440
75mm 3 layer	**3**	**62.64**	**1.455**
150mm 2 layer	3	62.64	1.385
150mm 3 layer	3	62.64	1.445
250mm 2 layer	3	62.64	1.360
250mm 3 layer	3	62.64	1.290

Bold = Worst case of each channel

6 dB BANDWIDTH

CHANNEL 2 – 75 mm 2 layers

CHANNEL 2 – 75 mm 3 layers

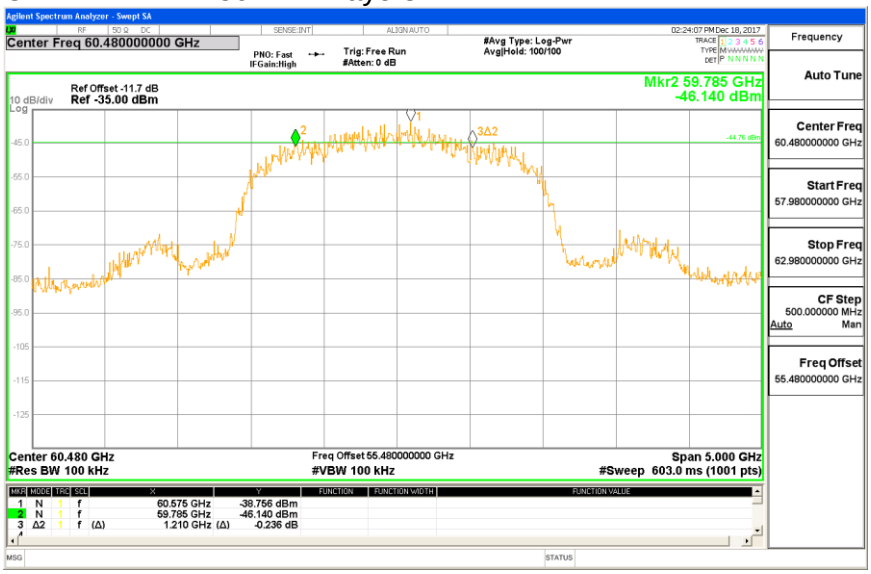
6 dB BANDWIDTH

CHANNEL 3 – 75 mm 2 layers

CHANNEL 3 – 75 mm 3 layers

6 dB BANDWIDTH

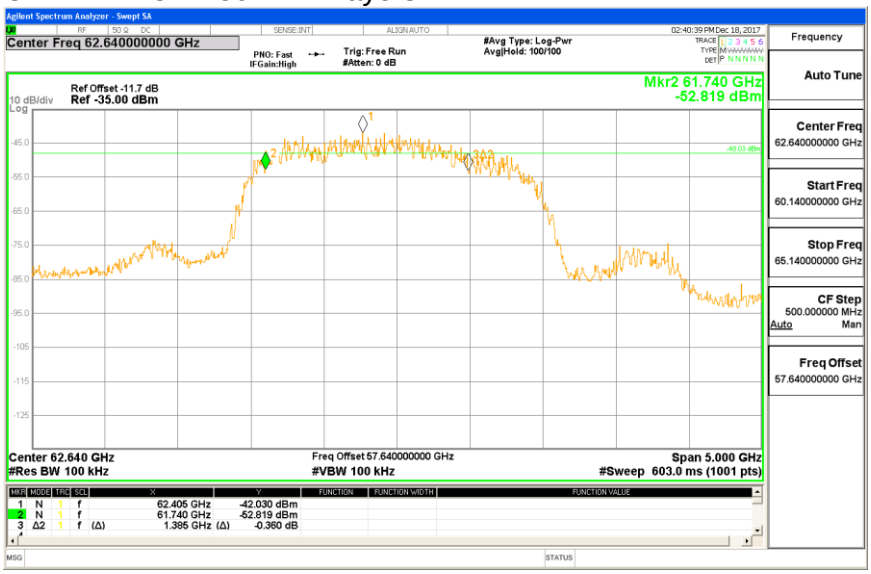
CHANNEL 2 – 150 mm 2 layers



CHANNEL 2 – 150 mm 3 layers

6 dB BANDWIDTH

CHANNEL 3 – 150 mm 2 layers



CHANNEL 3 – 150 mm 3 layers

6 dB BANDWIDTH

CHANNEL 2 – 250 mm 2 layers

CHANNEL 2 – 250 mm 3 layers

6 dB BANDWIDTH

CHANNEL 3 – 250 mm 2 layers

CHANNEL 3 – 250 mm 3 layers

7.3. 99% and 26 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The spectrum analyzer and external mixer are set up to measure the radiated output of the transmitter.

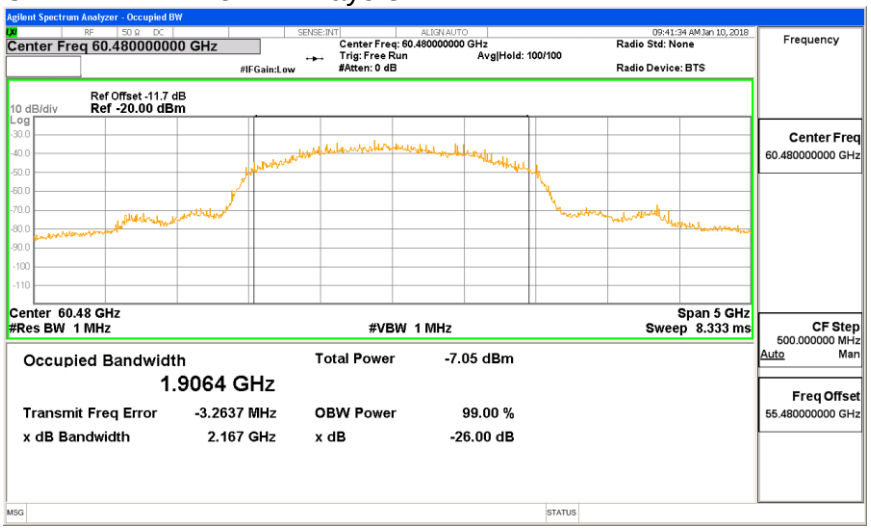
RESULTS

FPC Cable	Channel	Frequency (GHz)	99% Bandwidth (GHz)	26 dB Bandwidth (GHz)
75mm 2 layer	2	60.48	1.9064	2.167
75mm 3 layer	**2**	**60.48**	**1.9272**	**2.203**
150mm 2 layer	2	60.48	1.9061	2.147
150mm 3 layer	2	60.48	1.8851	2.134
250mm 2 layer	2	60.48	1.8758	2.134
250mm 3 layer	2	60.48	1.9091	2.116
75mm 2 layer	3	62.64	1.9453	2.193
75mm 3 layer	**3**	**62.64**	**1.9571**	**2.193**
150mm 2 layer	3	62.64	1.8990	2.165
150mm 3 layer	3	62.64	1.9121	2.156
250mm 2 layer	3	62.64	1.9083	2.137
250mm 3 layer	3	62.64	1.9252	2.128

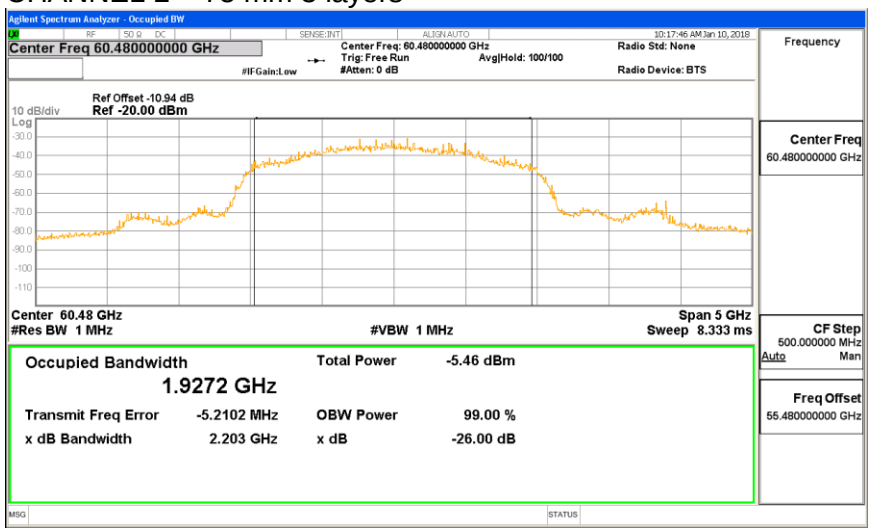
Bold = Worst case 99% BW of each channel

99% and 26 dB BANDWIDTH

CHANNEL 2 – 75 mm 2 layers

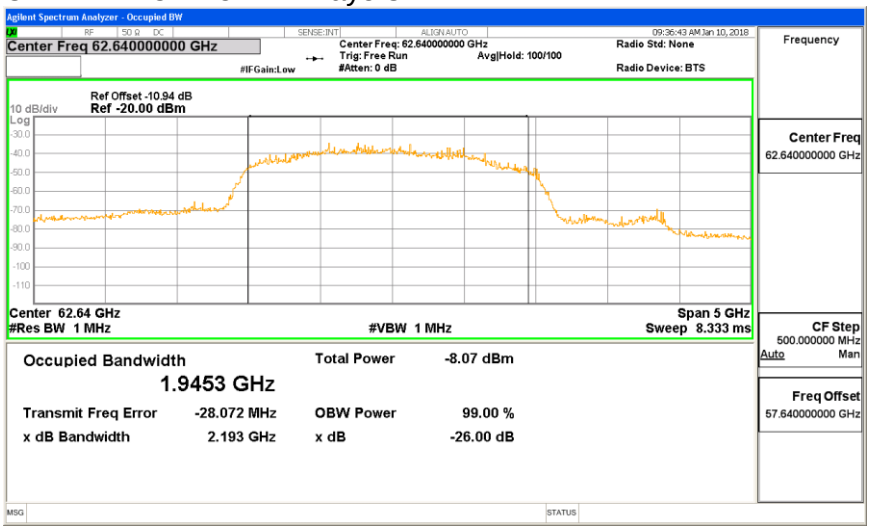


CHANNEL 2 – 75 mm 3 layers

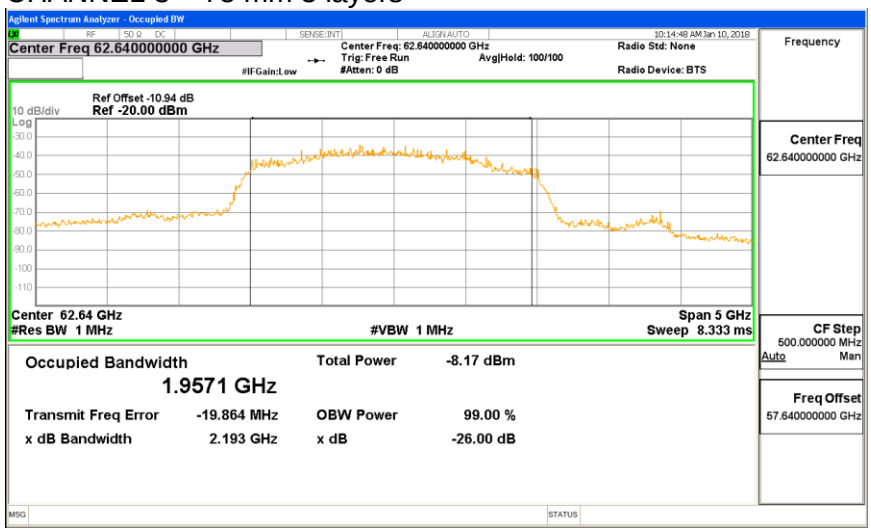


99% and 26 dB BANDWIDTH

CHANNEL 3 – 75 mm 2 layers

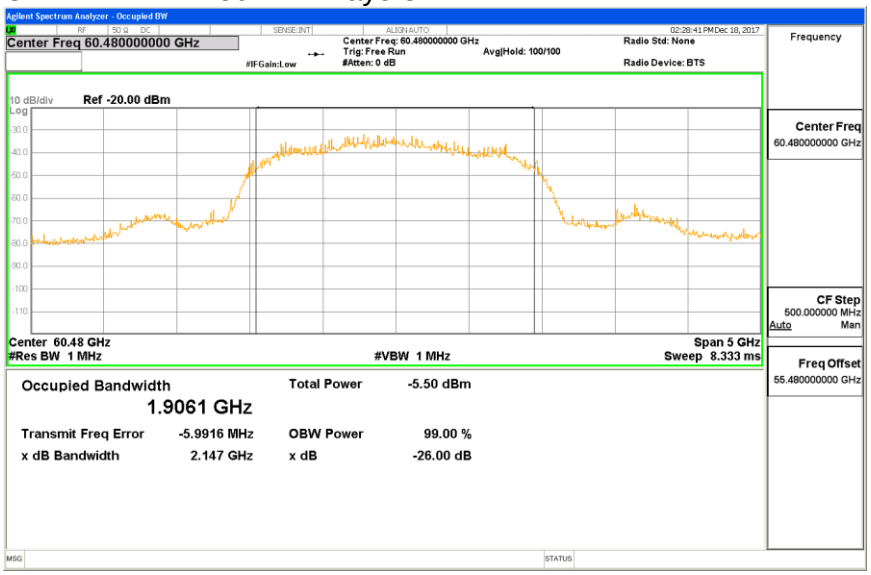


CHANNEL 3 – 75 mm 3 layers

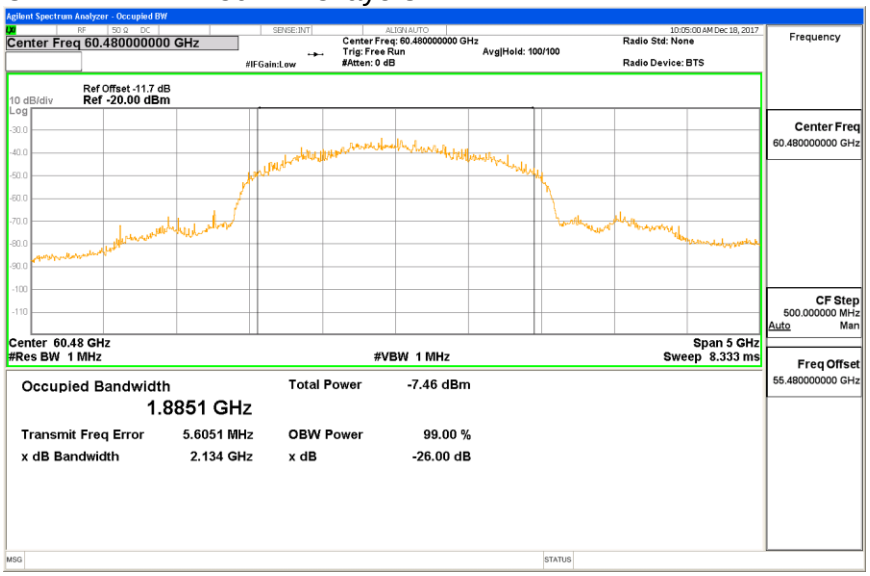


99% and 26 dB BANDWIDTH

CHANNEL 2 – 150 mm 2 layers

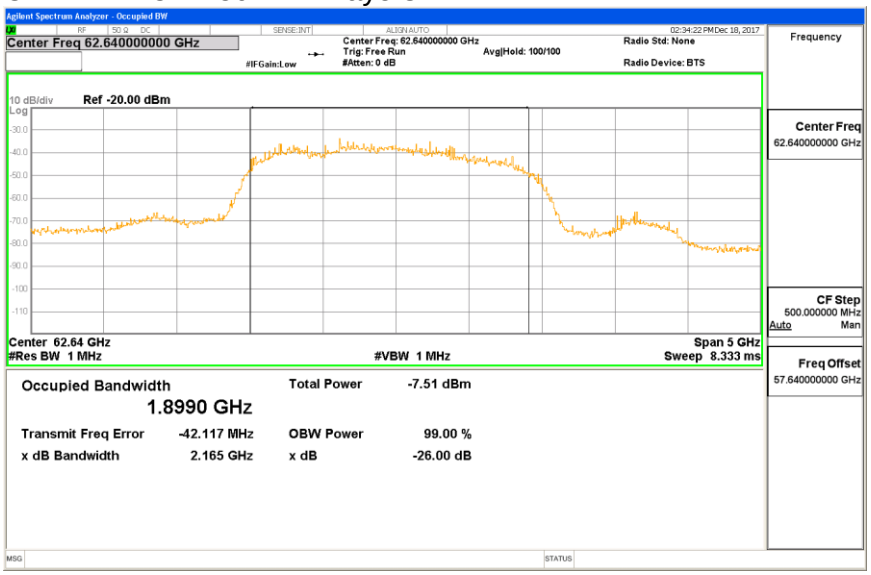


CHANNEL 2 – 150 mm 3 layers

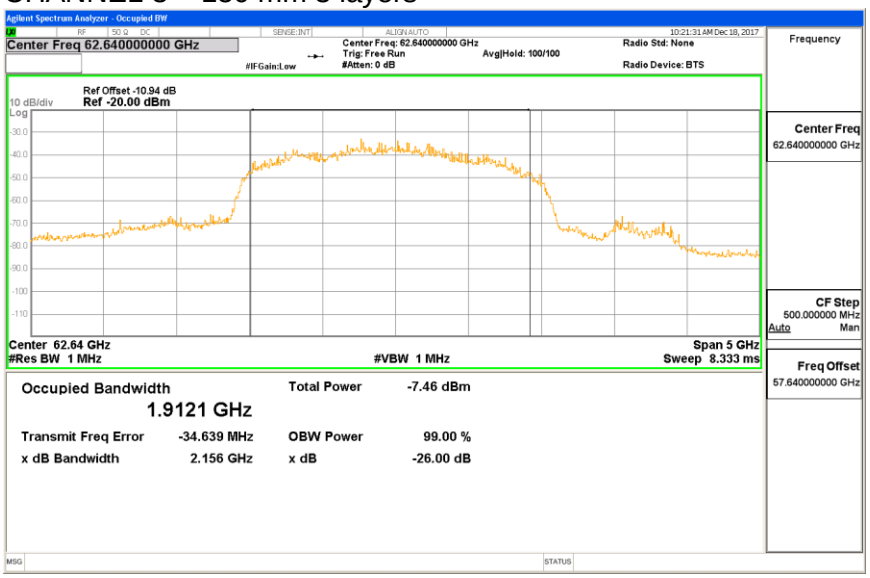


99% and 26 dB BANDWIDTH

CHANNEL 3 – 150 mm 2 layers

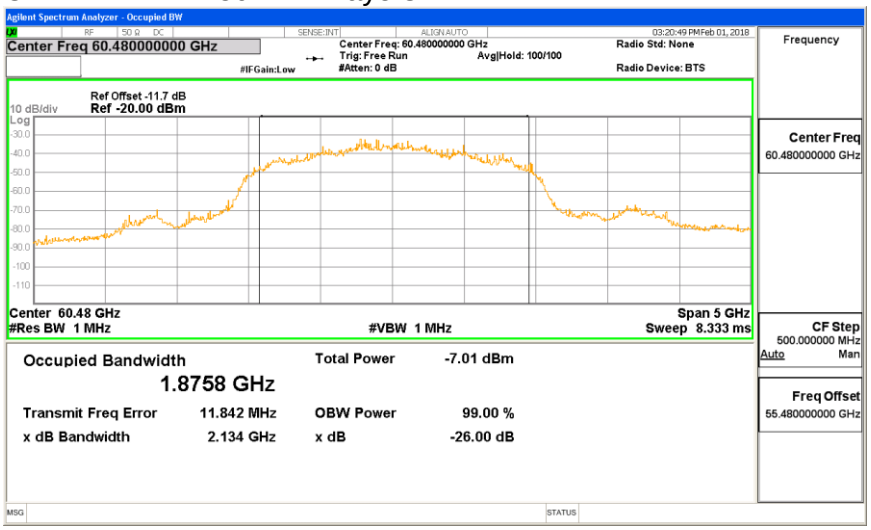


CHANNEL 3 – 150 mm 3 layers

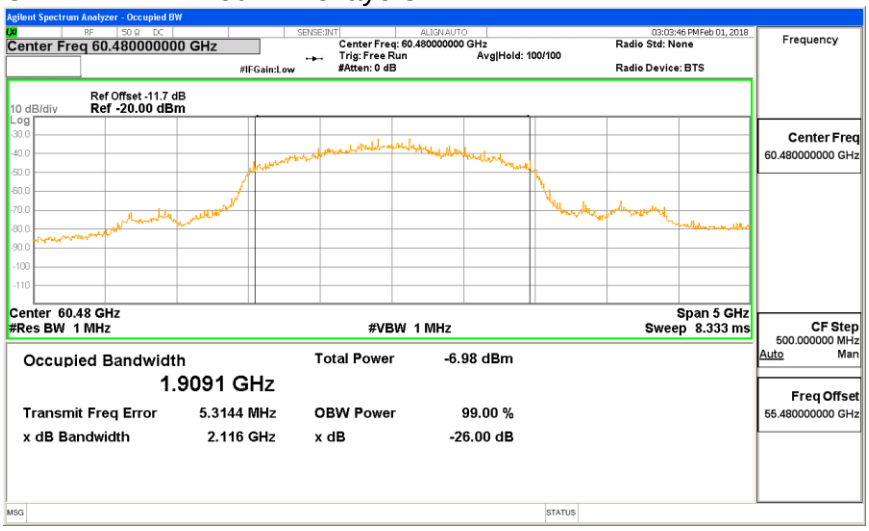


99% and 26 dB BANDWIDTH

CHANNEL 2 – 250 mm 2 layers

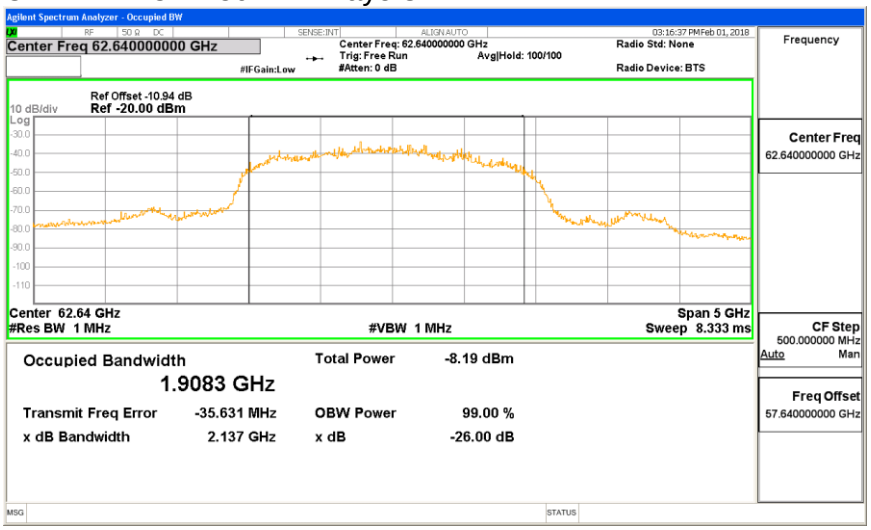


CHANNEL 2 – 250 mm 3 layers

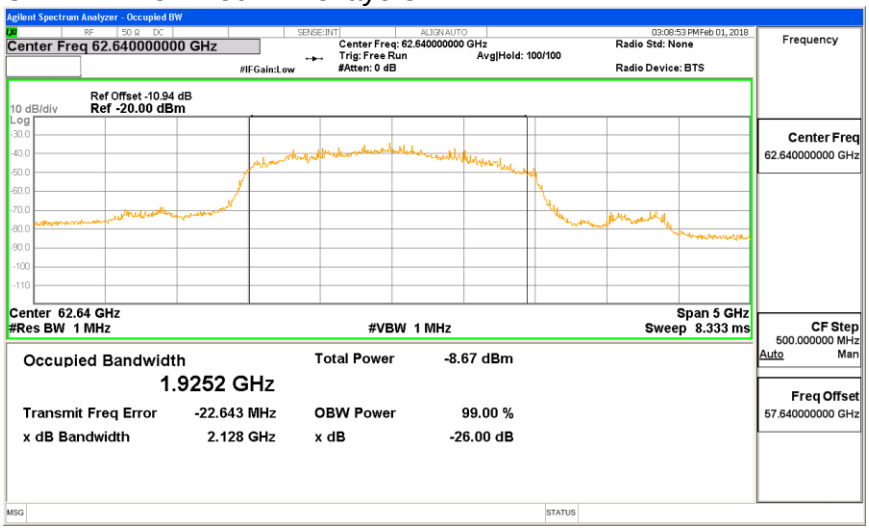


99% and 26 dB BANDWIDTH

CHANNEL 3 – 250 mm 2 layers



CHANNEL 3 – 250 mm 3 layers



7.4. AVERAGE AND PEAK RADIATED POWER

LIMIT

§ 15.255 (c) Within the 57-71 GHz band, emission levels shall not exceed the following equivalent isotropically radiated power (EIRP):

§ 15.255 (c) (1) (ii) For fixed point-to-point transmitters located outdoors, the average power of any emission shall not exceed 82 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi. The peak power of any emission shall not exceed 85 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi.

§ 15.255 (c) (1) (ii) (A) The provisions in this paragraph (c) for reducing transmit power based on antenna gain shall not require that the power levels be reduced below the limits specified in paragraph (c) (1) (i) of this section.

§ 15.255 (c) (1) (i) The average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm;

TEST PROCEDURE

ANSI C63.10 Clause 9.11

Measurements are made at a distance greater than or equal to the far field boundary distance. The measured power level is converted to EIRP using the Friis equation:

$EIRP = P_T * G_T = (P_R / G_R) * (4 * Pi * D / \lambda)^2$

where,

P_R is the received power
G_R is the gain of the receive measurement antenna
D is the measurement distance
λ is the wavelength

Notes: For average power measurements, P_R is corrected for duty cycle.
Calculations are made in the log form equivalent to the linear form listed above.

FAR FIELD BOUNDARY CALCULATIONS

The far-field boundary is given as:

$R_{far\ field} = (2 * L^2) / \lambda$

where,

L = Largest Antenna Dimension, including the reflector, in meters
λ = wavelength in meters

The dimension of integral patch-array antenna is 34mm x 16mm.

Channel	Frequency (GHz)	L (m)	Lambda (m)	R (Far Field) (m)
2	60.48	0.0376	0.0050	0.57
3	62.64	0.0376	0.0048	0.59

Radiated power measurements are performed at a 3 meter test distance.

RESULTS

PEAK EIRP

Center Frequency (GHz)	CH	MCS	Meas. Dist. (m)	Measured Peak Voltage (mV)	Measured Power (dBm)	Waveguide Loss (dB)	Received Power (dBm)	Rx Ant. Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Pass Or Fail	Cable Configuration
60.48	2	1	3	117.5	-13.35	0.6	-12.75	23	41.86224	43	-1.1	Pass	75mm, 2-layer ribbon
62.64	3	1	3	84.4	-15.9	0.6	-15.3	23	39.61703	43	-3.4	Pass	75mm, 2-layer ribbon
60.48	2	1	3	116.1	-13.56	0.6	-12.96	23	41.65224	43	-1.3	Pass	75mm, 3-layer ribbon
62.64	3	1	3	77.7	-16.41	0.6	-15.81	23	39.10703	43	-3.9	Pass	75mm, 3-layer ribbon
60.48	2	1	3	116.9	-13.5	0.6	-12.9	23	41.71224	43	-1.3	Pass	150mm, 2-layer ribbon
62.64	3	1	3	74.3	-16.71	0.6	-16.11	23	38.80703	43	-4.2	Pass	150mm, 2-layer ribbon
60.48	**2**	**1**	**3**	**119.5**	**-13.3**	**0.6**	**-12.7**	**23**	**41.91224**	**43**	**-1.1**	**Pass**	**150mm, 3-layer ribbon**
62.64	3	1	3	82.2	-16.05	0.6	-15.45	23	39.46703	43	-3.5	Pass	150mm, 3-layer ribbon
60.48	2	1	3	103.2	-14.26	0.6	-13.66	23	40.95224	43	-2.0	Pass	250mm, 2-layer ribbon
62.64	3	1	3	75.5	-16.52	0.6	-15.92	23	38.99703	43	-4.0	Pass	250mm, 2-layer ribbon
60.48	2	1	3	103.1	-14.27	0.6	-13.67	23	40.94224	43	-2.1	Pass	250mm, 3-layer ribbon
62.64	3	1	3	72.5	-17.07	0.6	-16.47	23	38.44703	43	-4.6	Pass	250mm, 3-layer ribbon

AVERAGE EIRP

Center Frequency (GHz)	CH	MCS	Meas. Distance (m)	Duty Cycle %	Measured Peak Voltage (mV)	Measured Power (dBm)	Waveguide Loss (dB)	Received Power (dBm)	Rx Antenna Gain (dBi)	Duty Cycle Corr Fac (dB)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Pass Or Fail	Cable Configuration
60.48	2	1	3.0	0.888	83.66	-16.01	0.60	-15.41	23.00	0.52	39.7	40.0	-0.3	Pass	75mm, 2-layer ribbon
62.64	3	1	3.0	0.889	59.11	-18.18	0.60	-17.58	23.00	0.51	37.8	40.0	-2.2	Pass	75mm, 2-layer ribbon
60.48	2	1	3.0	0.888	82.27	-16.17	0.60	-15.57	23.00	0.52	39.6	40.0	-0.4	Pass	75mm, 3-layer ribbon
62.64	3	1	3.0	0.889	54.32	-18.85	0.60	-18.25	23.00	0.51	37.2	40.0	-2.8	Pass	75mm, 3-layer ribbon
60.48	2	1	3.0	0.888	82.67	-16.21	0.60	-15.61	23.00	0.52	39.5	40.0	-0.5	Pass	150mm, 2-layer ribbon
62.64	3	1	3.0	0.889	50.45	-19.35	0.60	-18.75	23.00	0.51	36.7	40.0	-3.3	Pass	150mm, 2-layer ribbon
60.48	**2**	**1**	**3.0**	**0.887**	**84.06**	**-15.95**	**0.60**	**-15.35**	**23.00**	**0.52**	**39.8**	**40.0**	**-0.2**	**Pass**	**150mm, 3-layer ribbon**
62.64	3	1	3.0	0.889	56.94	-18.83	0.60	-18.23	23.00	0.51	37.2	40.0	-2.8	Pass	150mm, 3-layer ribbon
60.48	2	1	3.0	0.888	75.12	-16.70	0.60	-16.10	23.00	0.52	39.0	40.0	-1.0	Pass	250mm, 2-layer ribbon
62.64	3	1	3.0	0.889	55.61	-18.70	0.60	-18.10	23.00	0.51	37.3	40.0	-2.7	Pass	250mm, 2-layer ribbon
60.48	2	1	3.0	0.888	76.87	-16.44	0.60	-15.84	23.00	0.52	39.3	40.0	-0.7	Pass	250mm, 3-layer ribbon
62.64	3	1	3.0	0.890	53.45	-18.76	0.60	-18.16	23.00	0.51	37.3	40.0	-2.7	Pass	250mm,3-layer ribbon

Bold = Worst case of EIRP powers

7.5. PEAK CONDUCTED OUTPUT POWER

LIMIT

§15.255 (e) Except as specified paragraph (e) (1) of this section, the peak transmitter conducted output power shall not exceed 500 mW. Depending on the gain of the antenna, it may be necessary to operate the intentional radiator using a lower peak transmitter output power in order to comply with the EIRP limits specified in paragraph (b) of this section.

§15.255 (e) (1) Transmitters with an emission bandwidth of less than 100 MHz must limit their peak transmitter conducted output power to the product of 500 mW times their emission bandwidth divided by 100 MHz. For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g., for frequency hopping devices).

PROCEDURE

The maximum EUT antenna gain is subtracted from the Peak EIRP.

RESULTS

PEAK OUTPUT POWER

Frequency (GHz)	CH	MCS	EIRP (dBm)	EUT Antenna Gain (dBi)	Output Power (dBm)	Output Power (mW)	Output Power Limit (mW)	Margin (mW)	Pass Or Fail	Cable Configuration
60.48	2	1	41.9	22.70	19.16	82.46	500	-418	Pass	75mm, 2-layer ribbon
62.64	3	1	39.6	22.70	16.92	49.17	500	-451	Pass	75mm, 2-layer ribbon
60.48	2	1	41.7	22.70	18.95	78.56	500	-421	Pass	75mm, 3-layer ribbon
62.64	3	1	39.1	22.70	16.41	43.72	500	-456	Pass	75mm, 3-layer ribbon
60.48	2	1	41.7	22.70	19.01	79.66	500	-420	Pass	150mm, 2-layer ribbon
62.64	3	1	38.8	22.70	16.11	40.80	500	-459	Pass	150mm, 2-layer ribbon
60.48	**2**	**1**	**41.9**	**22.70**	**19.21**	**83.41**	**500**	**-417**	**Pass**	**150mm, 3-layer ribbon**
62.64	3	1	39.5	22.70	16.77	47.50	500	-452	Pass	150mm, 3-layer ribbon
60.48	2	1	41.0	22.70	18.25	66.87	500	-433	Pass	250mm, 2-layer ribbon
62.64	3	1	39.0	22.70	16.30	42.63	500	-457	Pass	250mm, 2-layer ribbon
60.48	2	1	40.9	22.70	18.24	66.72	500	-433	Pass	250mm, 3-layer ribbon
62.64	3	1	38.4	22.70	15.75	37.56	500	-462	Pass	250mm, 3-layer ribbon

Bold = Highest Peak Output Power

7.6. FREQUENCY STABILITY

LIMIT

§15.255 (f) Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

TEST PROCEDURE

The radio module is placed in an environmental chamber, with power furnished by an adjustable source. The carrier frequency is counted at each condition and compared with the reference condition.

RESULTS

Reference Conditions: 120VAC @ 20ºC		CHANNEL 2	
Power Supply (VDC/VAC)	**Environment Temperature (ºC)**	**Frequency (MHz)**	**Delta (kHz)**
120.00	50	60520.9109000	-277.500
120.00	40	60521.0611000	-127.300
120.00	30	60521.2499000	61.500
120.00	***20***	***60521.1884000***	***Reference***
120.00	10	60520.9596000	-228.800
120.00	0	60520.8844000	-304.000
120.00	-10	60520.8952000	-293.200
120.00	-20	60520.9612000	-227.200
102.00	20	60521.1908000	2.400
138	20	60521.1898000	1.400

The Channel 2 center frequency of 60.48 GHz is offset by a 41.1884 MHz CW baseband signal, yielding a CW output at a nominal frequency of 60521.1884 MHz.

Worst case delta = +61.5 / -304 kHz.

7.7. TX SPURIOUS EMISSIONS

LIMITS

§15.255 (d) (1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.

§15.255 (d) (2) Radiated emissions below 40 GHz shall not exceed the general limits in §15.209.

§15.255 (d) (3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 meters.

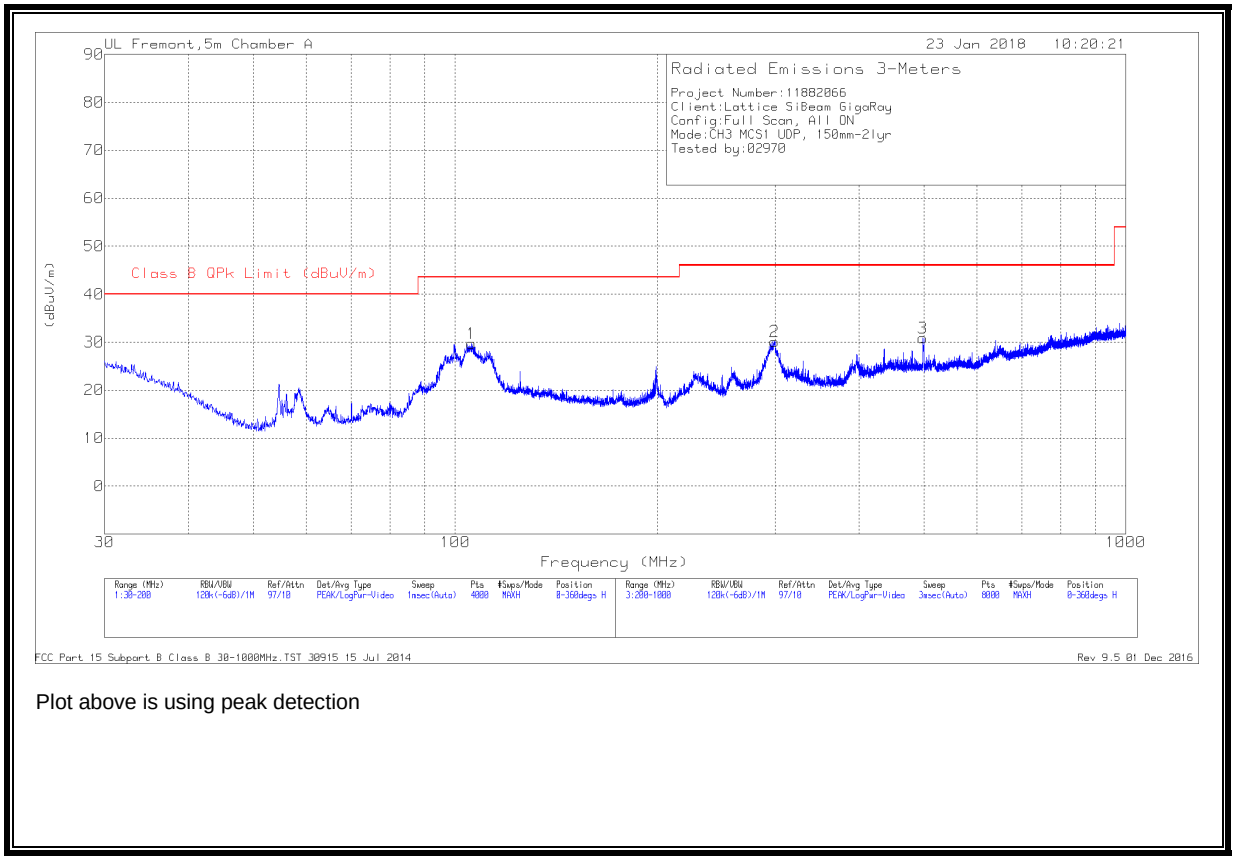
§15.255 (d) (4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

TEST PROCEDURE

ANSI C63.10

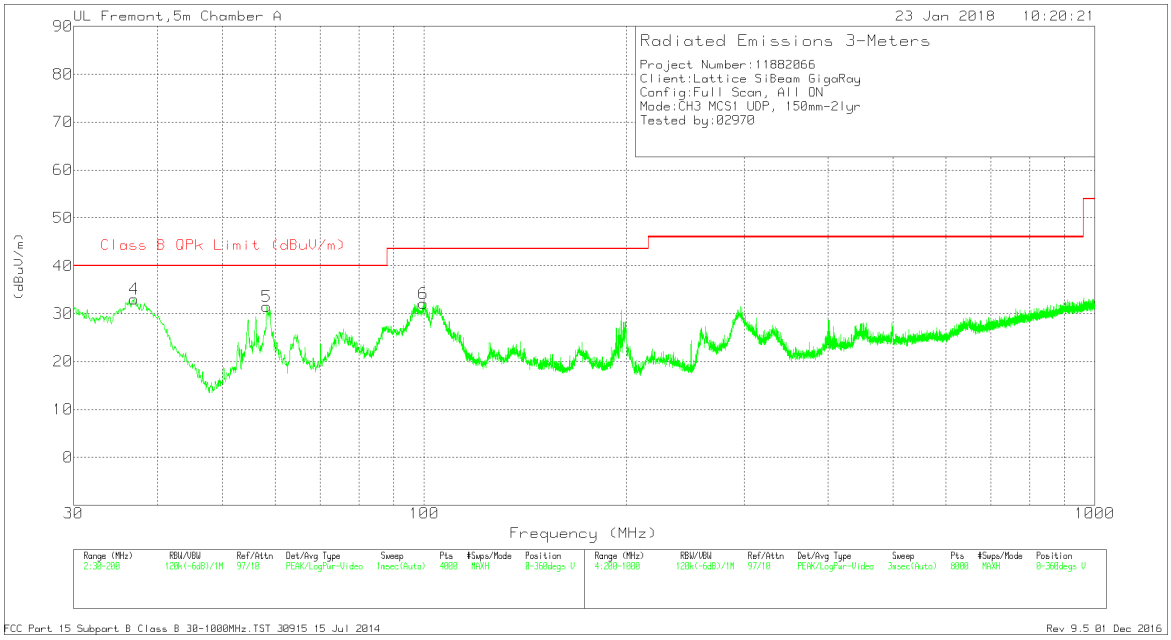
7.7.1. SPURIOUS EMISSION 30 TO 1000 MHz

TX SPURIOUS EMISSION 30 TO 1000 MHz (HORIZONTAL PLOT)



Plot above is using peak detection

TX SPURIOUS EMISSION 30 TO 1000 MHz (VERTICAL PLOT)



Plot above is using peak detection

TX SPURIOUS EMISSION 30 TO 1000 MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	36.971	40.2	Pk	20.1	-27.2	33.1	40	-6.9	0-360	100	V
5	58.269	47.03	Pk	11.4	-26.9	31.53	40	-8.47	0-360	100	V
6	99.718	44.47	Pk	14.1	-26.4	32.17	43.52	-11.35	0-360	100	V
1	105.797	40.24	Pk	15.8	-26.3	29.74	43.52	-13.78	0-360	300	H
2	299.612	37.48	Pk	17.3	-24.6	30.18	46.02	-15.84	0-360	101	H
3	497.938	34.43	Pk	21.7	-25.2	30.93	46.02	-15.09	0-360	101	H

Pk - Peak detector – Pre-scan

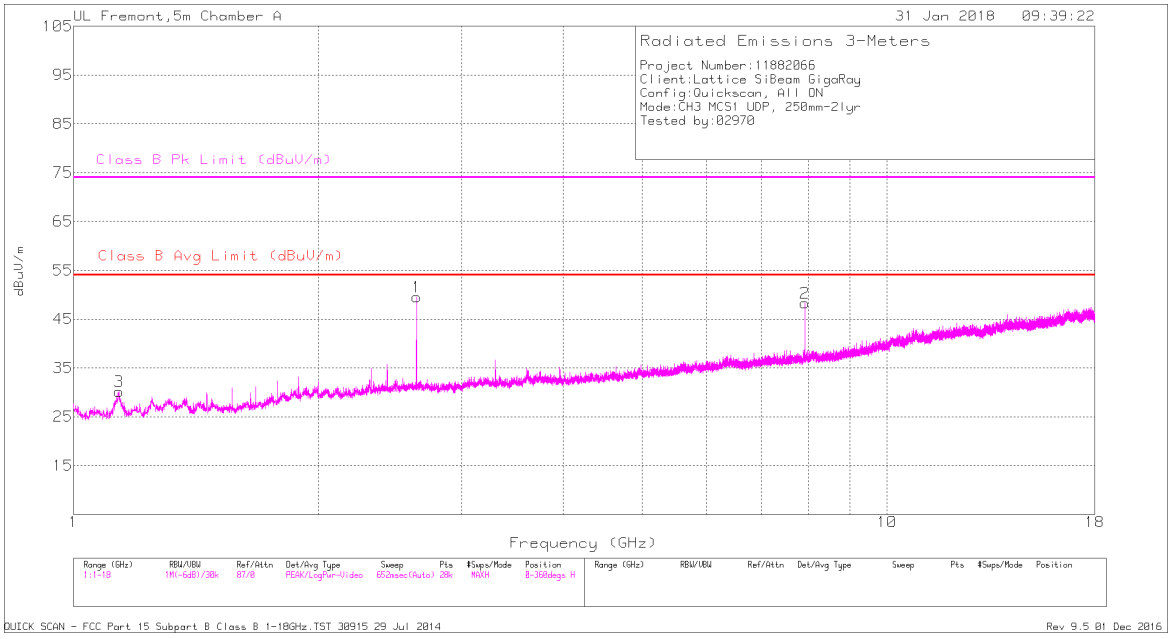
Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	Class B QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	36.7016	35.15	Qp	20.3	-27.2	28.25	40	-11.75	238	119	V
5	58.9315	41.39	Qp	11.5	-26.9	25.99	40	-14.01	7	116	V
6	97.4	41.23	Qp	13.5	-26.4	28.33	43.52	-15.19	14	140	V
1	105.2	36.34	Qp	15.6	-26.3	25.64	43.52	-17.88	123	269	H

Pk - Peak detector
Qp - Quasi-Peak detector

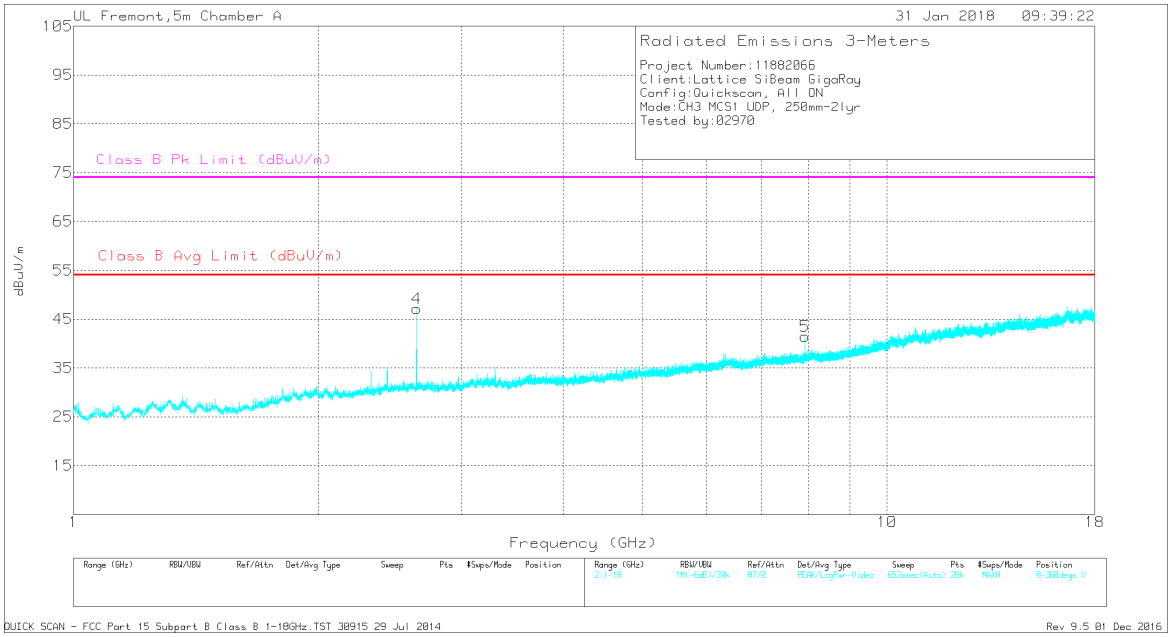
7.7.2. SPURIOUS EMISSION 1 TO 18 GHz

CHANNEL 3 - TX SPURIOUS EMISSION 1 - 18 GHz (HORIZONTAL PLOT)



Plot above is using peak detection

CHANNEL 3 – TX SPURIOUS EMISSION 1-18 GHz (VERTICAL PLOT)



Plot above is using peak detection

CHANNEL 3 - TX SPURIOUS EMISSION 1 - 18 GHz

Trace Markers

Radiated Emissions

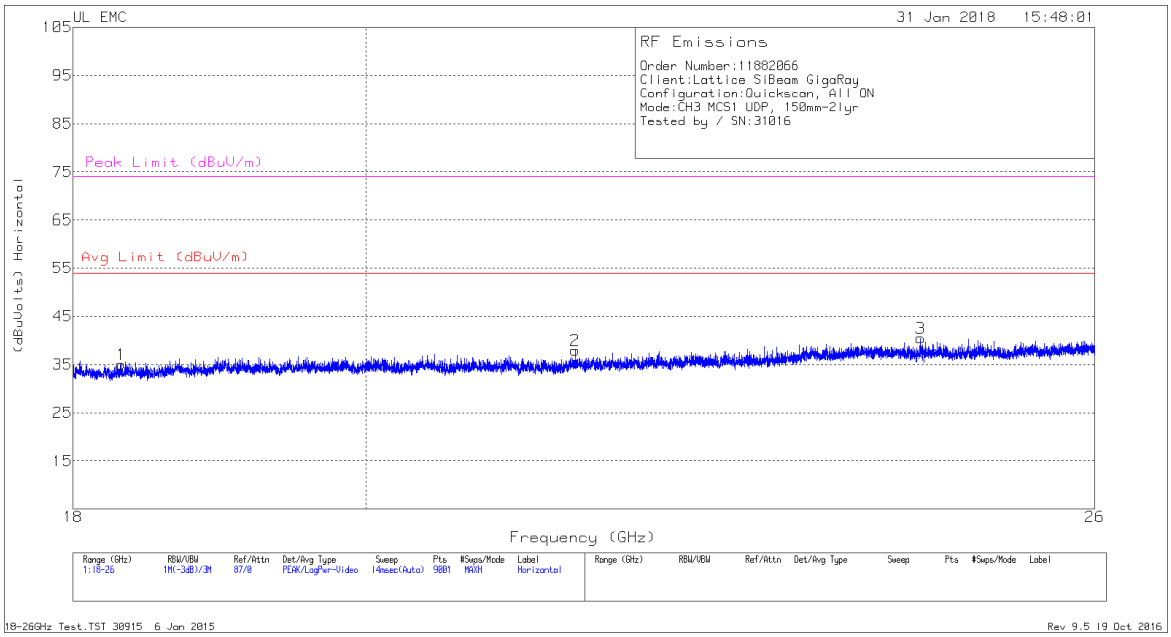
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Class B Avg Limit (dBuV/m)	Av(CISPR) Margin (dB)	Class B Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	1.134	46.01	Pk	27.7	-31.9	41.81	-	-	74	-32.19	147	103	H
3	1.134	30.29	Av	27.7	-31.9	26.09	54	-27.91	-	-	147	103	H
1	7.92	39.23	Pk	35.8	-22.9	52.13	-	-	74	-21.87	345	189	H
1	7.92	34.08	Av	35.8	-22.9	46.98	54	-7.11	-	-	345	189	H
4	7.92	37.25	Pk	35.8	-22.9	50.15	-	-	74	-23.85	338	102	V
4	7.92	27.02	Av	35.8	-22.9	39.92	54	-14.08	-	-	338	102	V
2	10.56	34.21	Pk	37.7	-20.2	51.71	-	-	74	-22.29	359	261	H
2	10.56	23.23	Av	37.7	-20.2	40.73	54	-13.27	-	-	359	261	H

Pk - Peak detector
Av - Average detection

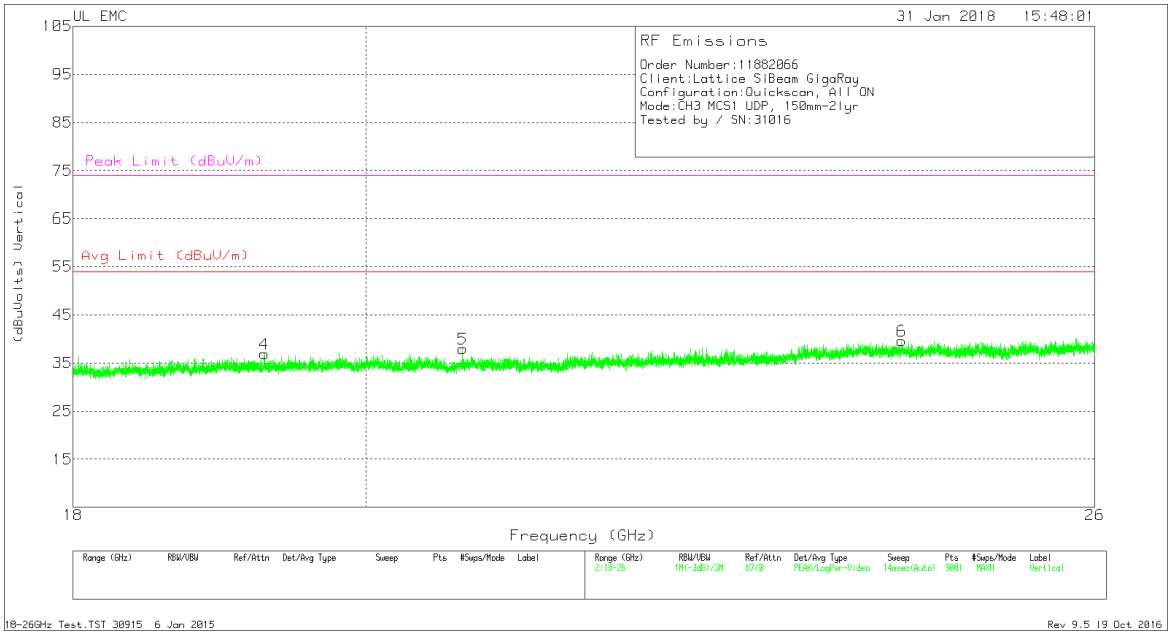
7.7.3. SPURIOUS EMISSION 18 TO 26 GHz

CHANNEL 3 - TX SPURIOUS EMISSION 18 TO 26 GHz (HORIZONTAL AND VERTICAL PLOTS)

Horizontal



Vertical



CHANNEL 3 - TX SPURIOUS EMISSION 18 TO 26 GHz

Trace Markers

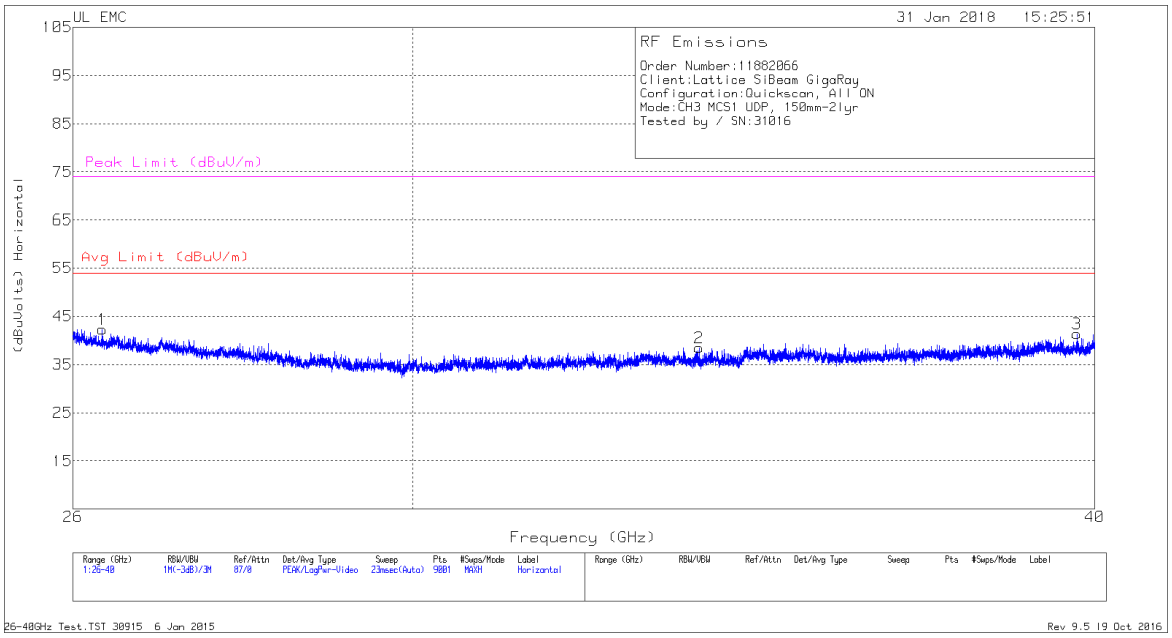
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Polarity
1	18.314	37.65	Pk	32.2	-25.3	-9.5	35.05	54	-18.95	74	-38.95	H
2	21.564	39.57	Pk	33.2	-25.3	-9.5	37.97	54	-16.03	74	-36.03	H
3	24.42	40.08	Pk	34	-24.1	-9.5	40.48	54	-13.52	74	-33.52	H
4	19.283	38.48	Pk	32.6	-24.7	-9.5	36.88	54	-17.12	74	-37.12	V
5	20.708	39.56	Pk	33	-25.1	-9.5	37.96	54	-16.04	74	-36.04	V
6	24.252	39.49	Pk	33.8	-24.2	-9.5	39.59	54	-14.41	74	-34.41	V

Pk - Peak detector

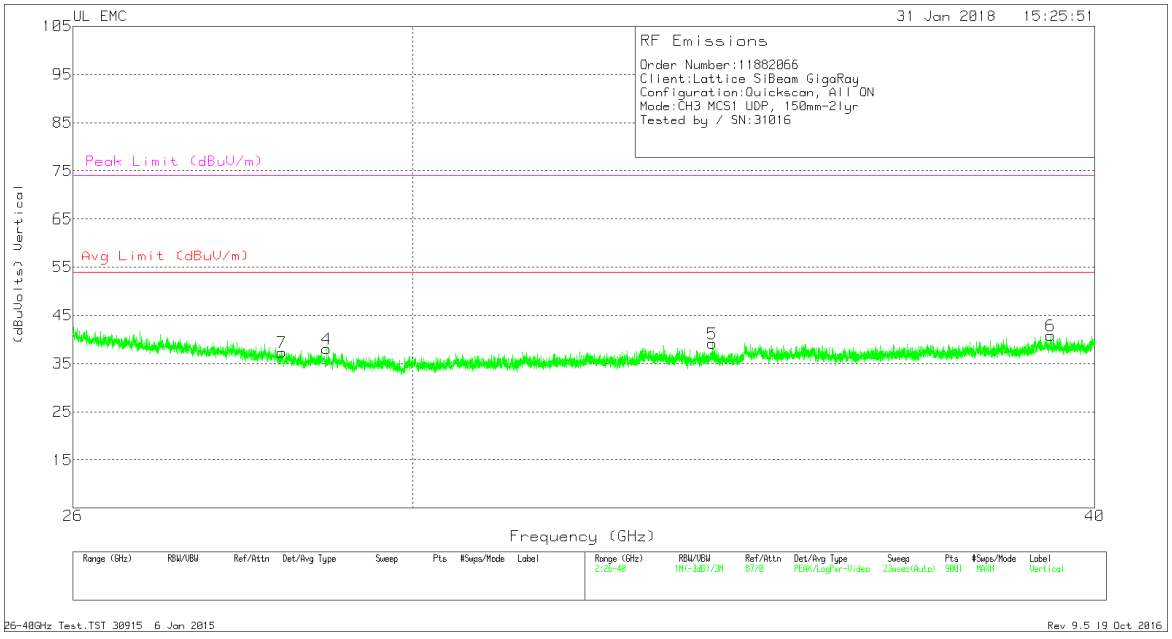
7.7.4. SPURIOUS EMISSION 26 TO 40 GHz

CHANNEL 3 - TX SPURIOUS EMISSION 26 TO 40 GHz (HORIZONTAL AND VERTICAL PLOTS)

Horizontal



Vertical



CHANNEL 3 - TX SPURIOUS EMISSION 26 TO 40 GHz

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Avg Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Polarity
1	26.322	47.21	Pk	35.6	-31	-9.5	42.31	54	-11.69	74	-31.69	H
2	33.852	44.12	Pk	36.9	-33	-9.5	38.52	54	-15.48	74	-35.48	H
3	39.697	45.18	Pk	37.2	-31.5	-9.5	41.38	54	-12.62	74	-32.62	H
4	28.932	43.63	Pk	35.9	-32	-9.5	38.03	54	-15.97	74	-35.97	V
5	34.039	44.54	Pk	36.9	-32.8	-9.5	39.14	54	-14.86	74	-34.86	V
6	39.26	43.84	Pk	38.6	-32.1	-9.5	40.84	54	-13.16	74	-33.16	V
7	28.391	42.64	Pk	35.8	-31.6	-9.5	37.34	54	-16.66	74	-36.66	V

Pk - Peak detector

7.7.5. SPURIOUS EMISSION 40 TO 200 GHz

Channel 2

No emissions detected in the following bands:
40-57 GHz
71-200 GHz

Channel 3

Peak			
Frequency (GHz)	**Measurement Distance (m)**	**Peak Power (dBm)**	**Total Receiving Gain (dBi)**
50.112	3.000	-65.30	34.10
	EIRP (dBm)	**EIRP (W)**	**Specification Distance (m)**
	-23.43	0.00000454	3.0
Power Density (W/m^2)	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Margin (pW/cm&^2)**
0.0000000402	4.02	90.00	**-85.98**

Average			
Frequency (GHz)	**Measurement Distance (m)**	**Average Power (dBm)**	**Total Receiving Gain (dBi)**
50.112	3.000	-69.06	34.10
Duty Cycle Factor (dB)	**EIRP (dBm)**	**EIRP (W)**	**Specification Distance (m)**
0.52	-26.66	0.00000216	3.0
Power Density (W/m^2)	**Power Density (pW/cm^2)**	**Limit (pW/cm^2)**	**Margin (pW/cm&^2)**
0.0000000191	1.91	90.00	**-88.09**

Note: 50.112 is fourth harmonic of LO

No other emissions detected in the following bands:
40-57 GHz

No emissions detected in the following bands:
71-200 GHz

7.8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

§15.207

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.

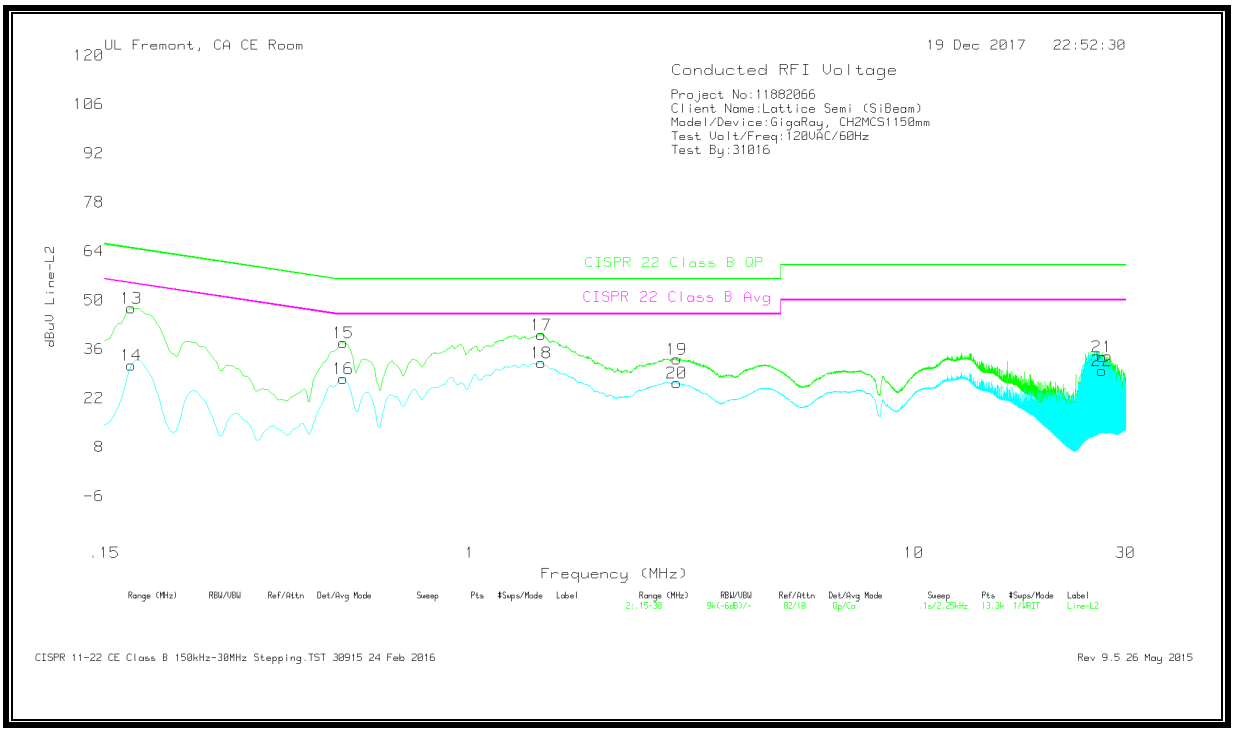
TEST PROCEDURE

ANSI C63.10

Channels 2 with MCS1, 150mm, 3-layer FPC cable configuration was used for these tests.

LINE 1 RESULTS

LINE 2 RESULTS



WORST EMISSIONS

Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.177	35.99	Qp	0	0	10.1	46.09	64.63	-18.54	-	-
2	.177	21.04	Ca	0	0	10.1	31.14	-	-	54.63	-23.49
3	.51	28.28	Qp	0	0	10.1	38.38	56	-17.62	-	-
4	.51	17.75	Ca	0	0	10.1	27.85	-	-	46	-18.15
5	1.4415	29.68	Qp	0	.1	10.1	39.88	56	-16.12	-	-
6	1.4415	21.54	Ca	0	.1	10.1	31.74	-	-	46	-14.26
7	2.985	20.05	Qp	0	.1	10.1	30.25	56	-25.75	-	-
8	2.985	12.7	Ca	0	.1	10.1	22.9	-	-	46	-23.1
9	12.6825	22.39	Qp	.1	.2	10.2	32.89	60	-27.11	-	-
10	12.6825	16.98	Ca	.1	.2	10.2	27.48	-	-	50	-22.52
11	26.18475	15.86	Qp	.1	.3	10.5	26.76	60	-33.24	-	-
12	26.18475	12.28	Ca	.1	.3	10.5	23.18	-	-	50	-26.82

Qp - Quasi-Peak detector
Ca - CISPR average detection

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
13	.1725	37.64	Qp	0	0	10.1	47.74	64.84	-17.1	-	-
14	.1725	21.27	Ca	0	0	10.1	31.37	-	-	54.84	-23.47
15	.51675	27.71	Qp	0	0	10.1	37.81	56	-18.19	-	-
16	.51675	17.45	Ca	0	0	10.1	27.55	-	-	46	-18.45
17	1.446	29.91	Qp	0	.1	10.1	40.11	56	-15.89	-	-
18	1.446	21.89	Ca	0	.1	10.1	32.09	-	-	46	-13.91
19	2.91975	22.87	Qp	0	.1	10.1	33.07	56	-22.93	-	-
20	2.91975	16.2	Ca	0	.1	10.1	26.4	-	-	46	-19.6
21	26.4885	22.9	Qp	.1	.3	10.5	33.8	60	-26.2	-	-
22	26.4885	18.96	Ca	.1	.3	10.5	29.86	-	-	50	-20.14

Qp - Quasi-Peak detector
Ca - CISPR average detection
CISPR 11-22 CE Class B 150kHz-30MHz Stepping.TST 30915 24 Feb 2016
Rev 9.5 26 May 2015

8. GROUP INSTALLATION

LIMIT

§15.255 (h) Any transmitter that has received the necessary FCC equipment authorization under the rules of this chapter may be mounted in a group installation for simultaneous operation with one or more other transmitter(s) that have received the necessary FCC equipment authorization, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

RESULTS

The frequency amplitude and phase of the transmit signal are set within the EUT. There are no external phase-locking inputs or any other means of combining two or more units together to realize a beam-forming array.

9. RF EXPOSURE

9.1. LIMIT

§15.255 (g) Regardless of the power density levels permitted under this section, devices operating under the provisions of this section are subject to the radiofrequency radiation exposure requirements specified in §§1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

§1.1310(e) The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

9.2. EQUATIONS

POWER DENSITY

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where,

S = Power density in mW/cm^2
EIRP = Equivalent Isotropic Radiated Power in mW
D = Separation distance in cm

DISTANCE

Distance is given by:

D_{cm} = SQRT (EIRP / (4 * Pi * S))

where,

D_{cm} = Separation distance in cm
EIRP = Equivalent Isotropic Radiated Power in mW
S = Power density in mW/cm^2

and,

$D_m = D_{cm} / 100$

where,

D_m = Separation distance in m
D_{cm} = Separation distance in cm

9.3. UPPER BOUND POWER DENSITY OF UNWANTED EMISSIONS

TECHNICAL INFORMATION IN ACCORDANCE WITH 15.255 (g) SHOWING BASIS OF UPPER BOUND RESULTS FOR UNWANTED EMISSIONS

Worst-case possible Integrated Band Power, assuming unwanted emissions encompass the entire band and the power density at every frequency is equal to the spurious emissions average limit								
Band	Start (MHz)	Stop (MHz)	Limit (dBuV/m at 3m)	Limit (dBm EIRP)	Limit (mW EIRP)	RBW (MHz)	Num Intervals (stop-start)/(RBW)	Integrated Band Power (mW EIRP)
30 to 88 MHz	30	88	40	-55.2	3.01995E-06	0.1	580	0.002
88 to 216 MHz	88	216	43.5	-51.7	6.76083E-06	0.1	1280	0.009
216 to 960 MHz	216	960	46	-49.2	1.20226E-05	0.1	7440	0.089
960 to 1000 MHz	960	1000	54	-41.2	7.58578E-05	0.1	400	0.030
1 to 40 GHz	1000	40000	54	-41.2	7.58578E-05	1	39000	2.958
30 MHz to 40 GHz								3.089

Integrated Band Power, equal to the sum of the power of all measured unwanted emissions within the band.								
Freq or Band (GHz)	EUT Channel			Actual Emissions (dBm EIRP)	Actual Power (mW EIRP)			Integrated Band Power (mW EIRP)
	2							
40-57, 71-200 GHz	2							0.000
	3			-26.66	0.002			
40-57, 71-200 GHz	3							0.002

Total unwanted Power, equal to the worst-case possible 30 MHz to 40 GHz band power plus the measured 40 to 200 GHz band power								
Band	EUT Channel							Integrated Band Power (mW EIRP)
30 MHz to 200 GHz	2							3.089
30 MHz to 200 GHz	3							3.091

9.4. RESULTS FOR FUNDAMENTAL PLUS UNWANTED EMISSIONS

The manufacturer's declared minimum separation distance is 30 cm.

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

Freq (GHz)	Fundamental EIRP (dBm)	Fundamental EIRP (mW)	Unwanted EIRP (mW)	Total EIRP (mW)	Separation Distance (cm)	Power Density (mW/cm^2)	FCC Limit (mW/cm^2)
60.480	39.80	9549.926	3.089	9553.0	30.0	0.8451	1.0
62.640	37.80	6025.596	3.091	6028.7	30.0	0.5333	1.0