



CERTIFICATION TEST REPORT

Report Number. : R12886350-E1

Applicant : Resideo
2 Corporate Center Drive
Melville, NY, 11747
United States

Model : SiXMINICTA / SiXMINICT

FCC ID : CFS-8DL6MCTAR1

IC : 573F-6MCTAR1

EUT Description : Remote Control

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5

Date Of Issue:
2019-06-11

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
--	--	Initial Issue	--
V2	2019-06-11	Updated support equipment and I/O section	Niklas Haydon

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Resideo
2 Corporate Center Drive
Melville, NY, 11749-3265
United States

EUT DESCRIPTION: Remote Control

MODEL: SiXMINICTA / SiXMINICT

SERIAL NUMBER: Radiated Samples: MEL693
Conducted Samples: MEL-689

DATE TESTED: 2019-06-03 to 2019-06-06

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

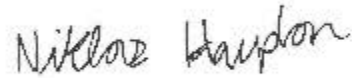
This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

Approved & Released For
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Prepared By:



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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, North Carolina, USA and 2800 Suite Perimeter Park Dr., Morrisville, North Carolina, USA. 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.

12 Laboratory Dr.	2800 Perimeter Park Dr., Suite B
ISED Site Code: 2180C	
☐ Chamber A RTP	☐ North Chamber
☐ Chamber C RTP	☒ South Chamber

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0

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. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	2.00%
RF output power, conducted	1.3 dB (PK), 0.45 dB (AV)
RF output power, radiated (SAC)	4.52 dB
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	2.00 dB
All emissions, radiated	4.88 dB
Temperature	2.26°C
Humidity	6.79%
DC Supply voltages	1.70%
Time	3.39%

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The SIXMINICT is a battery powered portable transceiver and functions as a wireless door / window contact in an alarm system. It is used in conjunction with an access point transceiver to allow remote control of an RF6-based alarm system. It is possible to "arm", "disarm", or raise a panic alarm in the system using the SIXMINICT.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2405 - 2475	802.15.4	9.66	9.25

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an single dipole antenna, with a maximum gain of 2.4 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Version 2.3.7.

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT only transmits while battery powered therefore powerline conducted emissions were not performed.

Radiated emissions below 1GHz and above 18GHz were performed with the EUT set to transmit at the channel with highest output power and PSD as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle, and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	FCC ID
DC Power Supply	CircuitSpecialists	CS13005X5	N/A

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	N/A	N/A	N/A	DC	1	The EUT is battery powered and operates at a low duty cycle. To facilitate testing using a continuous transmit mode the battery was replaced with an external DC power supply that was connected to the battery terminals.

SETUP DIAGRAMS

Please refer to 12886350-EP1 for setup diagrams

6. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10 Section 11.6

6 dB BW: ANSI C63.10 Subclause 11.8.1

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Subclause 11.9.1.3 (PKPM1)

PSD: ANSI C63.10 Subclause 11.10.2 (Peak PSD)

Out-of-band emissions in non-restricted bands: ANSI C63.10-2013 Section 11.11 & 6.10.4

Out-of-band emissions in restricted bands: ANSI C63.10-2013 Section 11.12.1, 6.10.5 and KDB 558074 D01 15.247 Section 11. FAQ 3c

General Radiated Emissions: ANSI C63.10:2013 Sections 6.3 – 6.6

7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	(Loop Ant.)			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2019-01-24	2020-01-31
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2018-07-24	2019-07-24
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2019-04-22	2020-04-22
	18-40 GHz				
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2018-11-08	2019-11-08
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2019-05-02	2020-05-02
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2019-05-02	2020-05-02
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2019-03-13	2020-03-13
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2018-09-30	2019-09-30
	Receiver & Software				
SA0025	Spectrum Analyzer	Agilent	N9030A	2019-02-28	2020-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	N/A	N/A

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 1				
T177 (PRE0079253)	Spectrum Analyzer	Agilent Technologies	E4446A	2019-04-22	2020-04-22
PWM003 (PRE0137345)	RF Power Meter	Keysight Technologies	N1911A	2018-07-30	2019-07-30
PWS001 (PRE0137348)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2019-05-06	2020-05-06
SN 181474341	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27
76021	DC Regulated Power Supply	CircuitSpecialists .Com	CSI3005X5	N/A	N/A

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

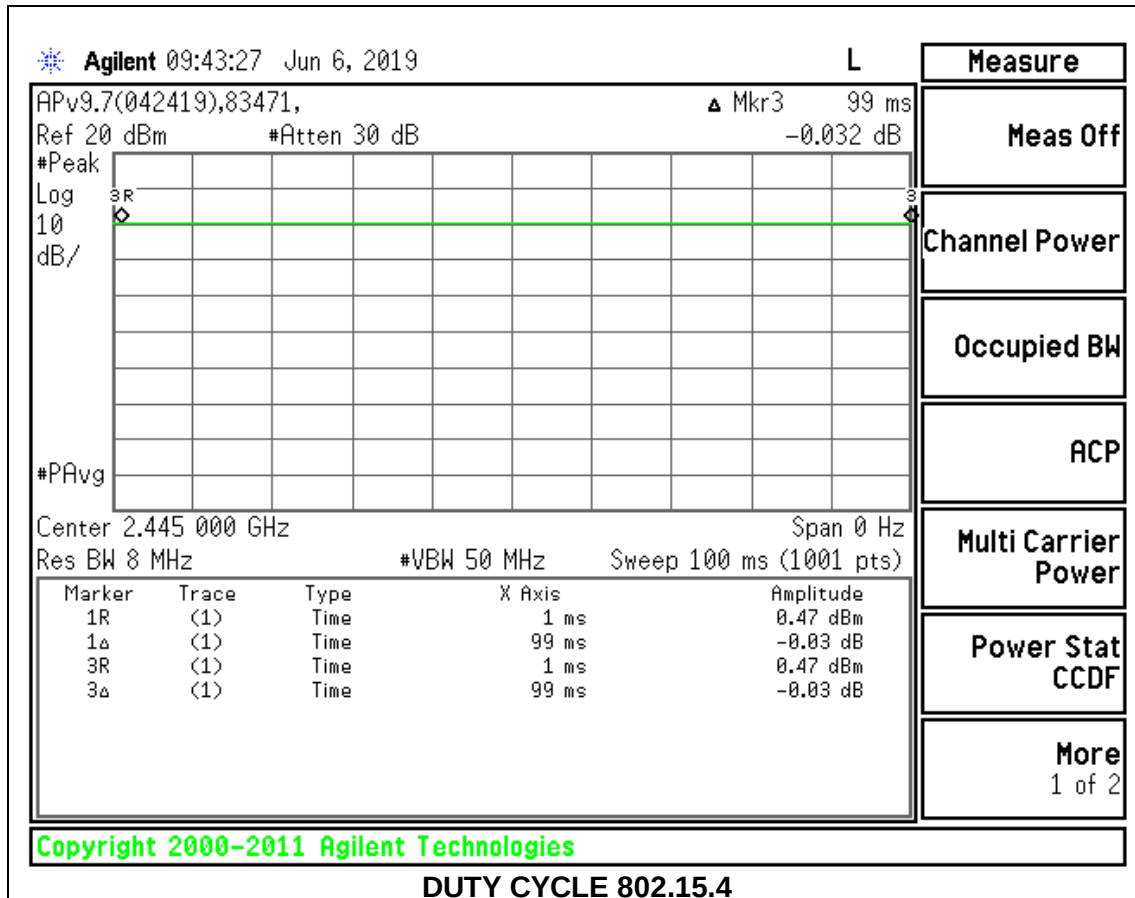
KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Note: Duty cycle below shows how sample operated during testing. Real life worst-case duty cycle is protocol limited to 6.976%.

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
802.15.4	99.000	99.000	1.000	100.00%	0.00	0.010

DUTY CYCLE PLOTS



8.2. 99% BANDWIDTH

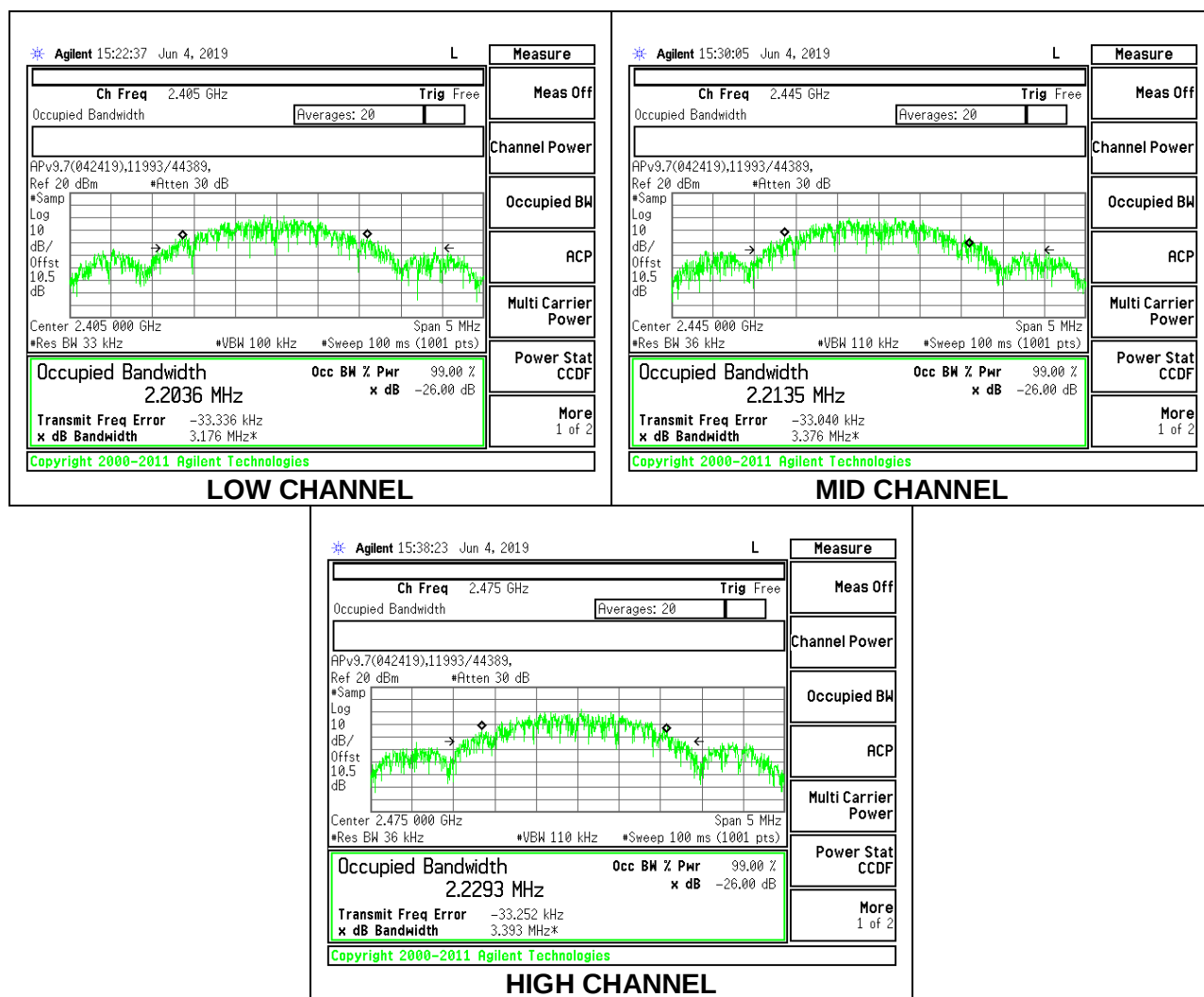
LIMITS

None; for reporting purposes only.

RESULTS

8.2.1. 802.15.4 (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	2.2036
Middle	2445	2.2135
High	2475	2.2293



8.3. 6 dB BANDWIDTH

LIMITS

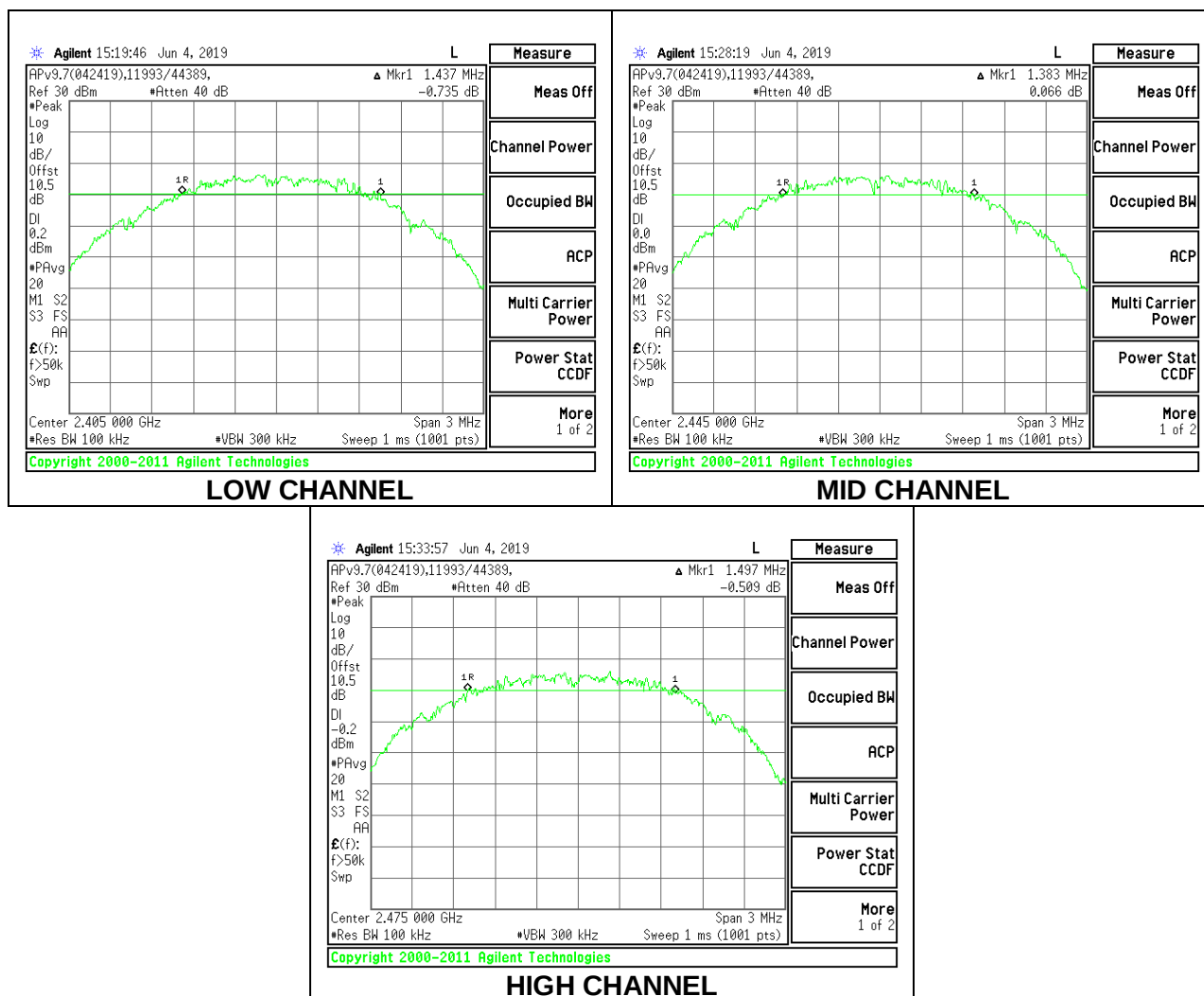
FCC §15.247 (a) (2)
RSS-247 5.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

8.3.1. 802.15.4 (1Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2405	1.437	0.5
Middle	2445	1.383	0.5
High	2475	1.497	0.5



8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

RESULTS

8.4.1. 802.15.4 (1Mbps)

Tested By:	11993/44389
Date:	2019-06-04

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2405	9.66	30	-20.340
Middle	2445	9.44	30	-20.560
High	2475	9.31	30	-20.690

8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

8.5.1. 802.15.4 (1Mbps)

Tested By:	11993/44389
Date:	2019-06-04

Channel	Frequency (MHz)	AV power (dBm)
Low	2405	9.61
Middle	2445	9.39
High	2475	9.25

8.6. POWER SPECTRAL DENSITY

LIMITS

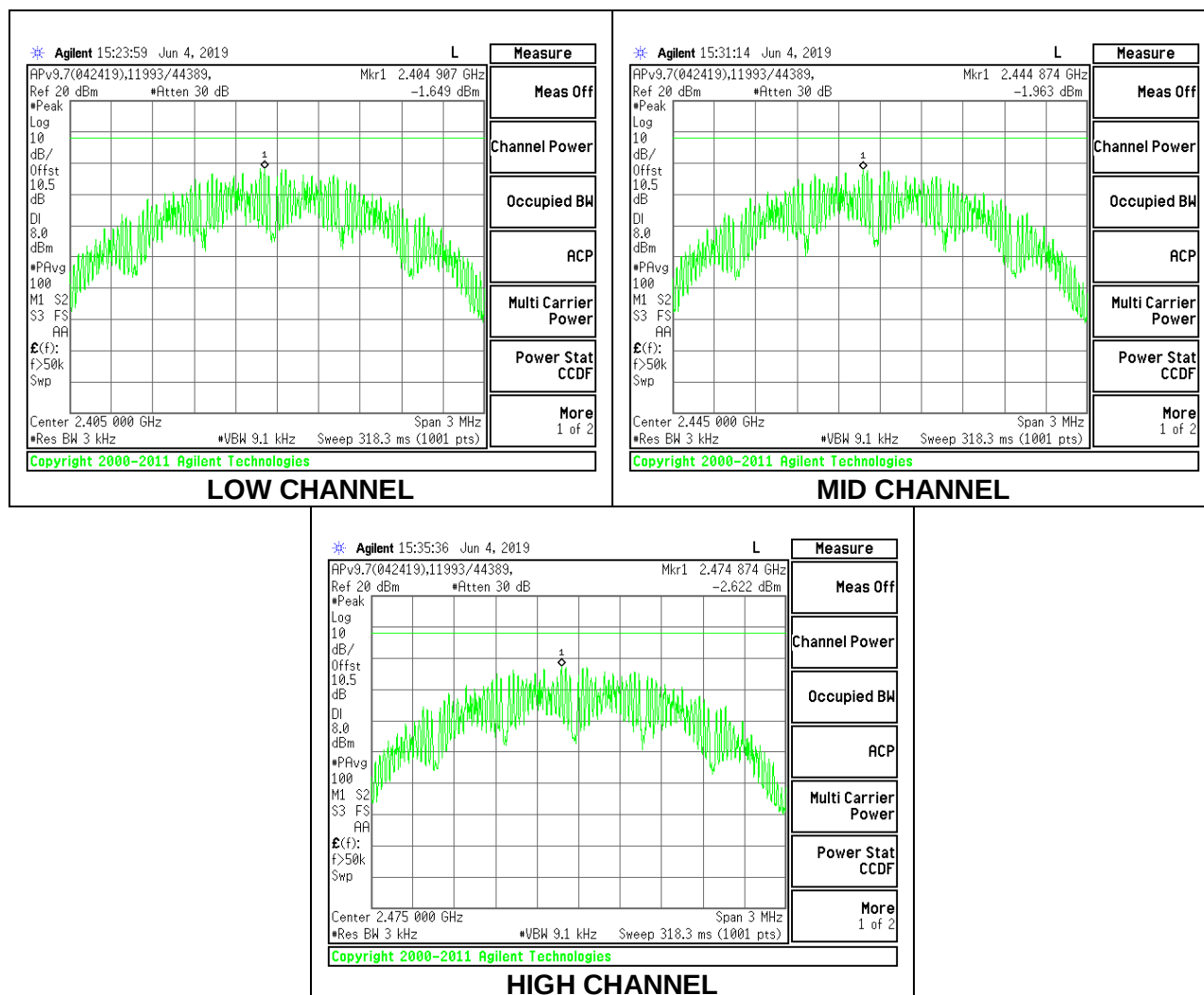
FCC §15.247 (e)
RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

8.6.1. 802.15.4 (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2405	-1.649	8	-9.65
Middle	2445	-1.963	8	-9.96
High	2475	-2.622	8	-10.62



8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

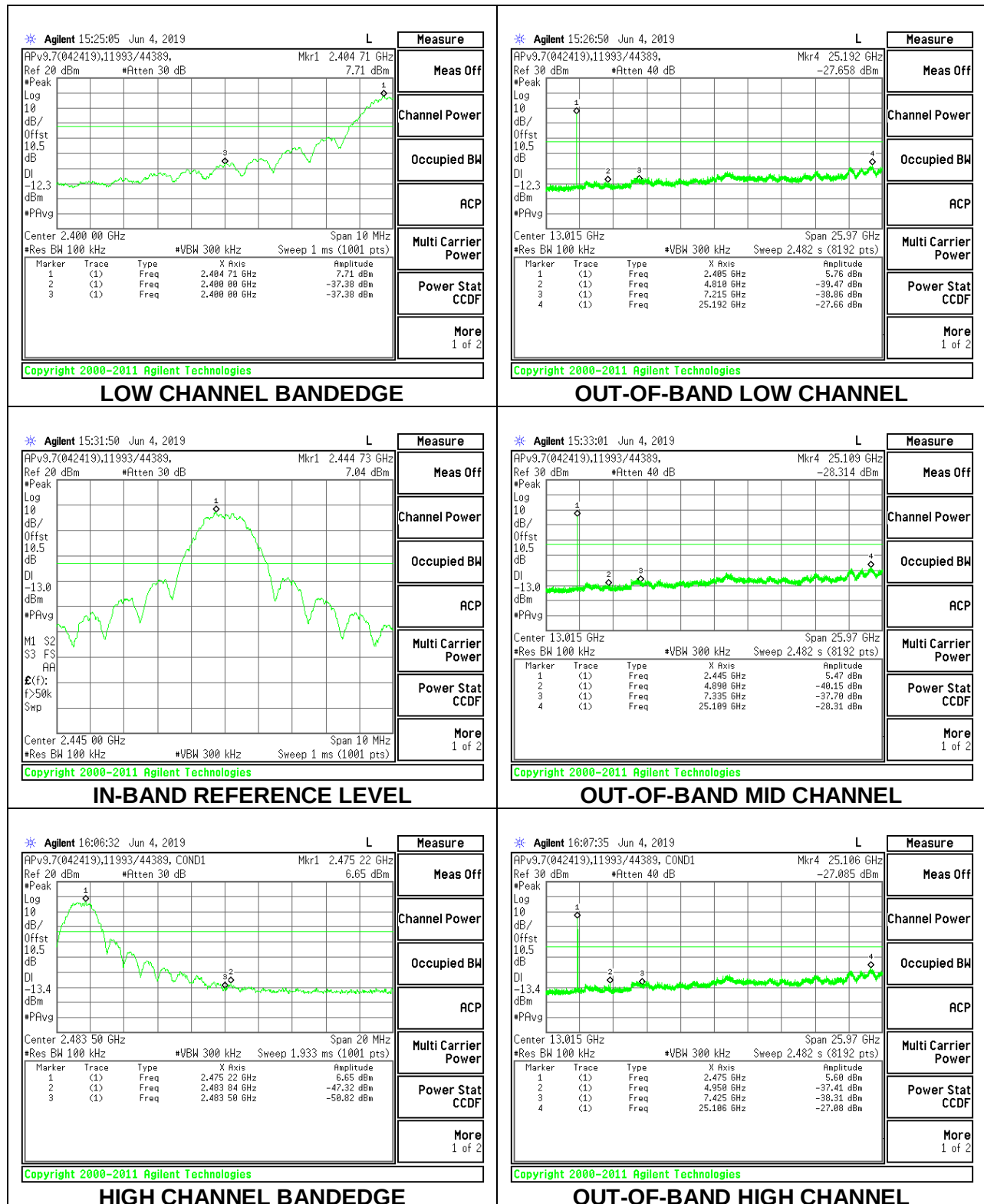
FCC §15.247 (d)

RSS-247 5.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

8.7.1. 802.15.4 (1Mbps)



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209
RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurements below 1GHz; 1.5 m above the ground plane for measurements above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak and/or quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. The particular averaging method used for this test program was voltage and duty cycle correction per KDB 558074 D01 15.247 V05r02, FAQ Answer 3c).

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power and PSD was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

KDB 558074 D01 15.247 Meas Guidance V05r02

11. Frequently Asked Questions; Answer 3: c)

A voltage averaging measurement was taken in accordance to ANSI C63.10. The average measurement was corrected down based on the protocol-limited worst-case duty cycle of 6.976% provided by the manufacturer. The calculation of $20 \cdot \log(1/0.06976)$ leads to a 23.1 dB correction factor that is subtracted from the average measurement.

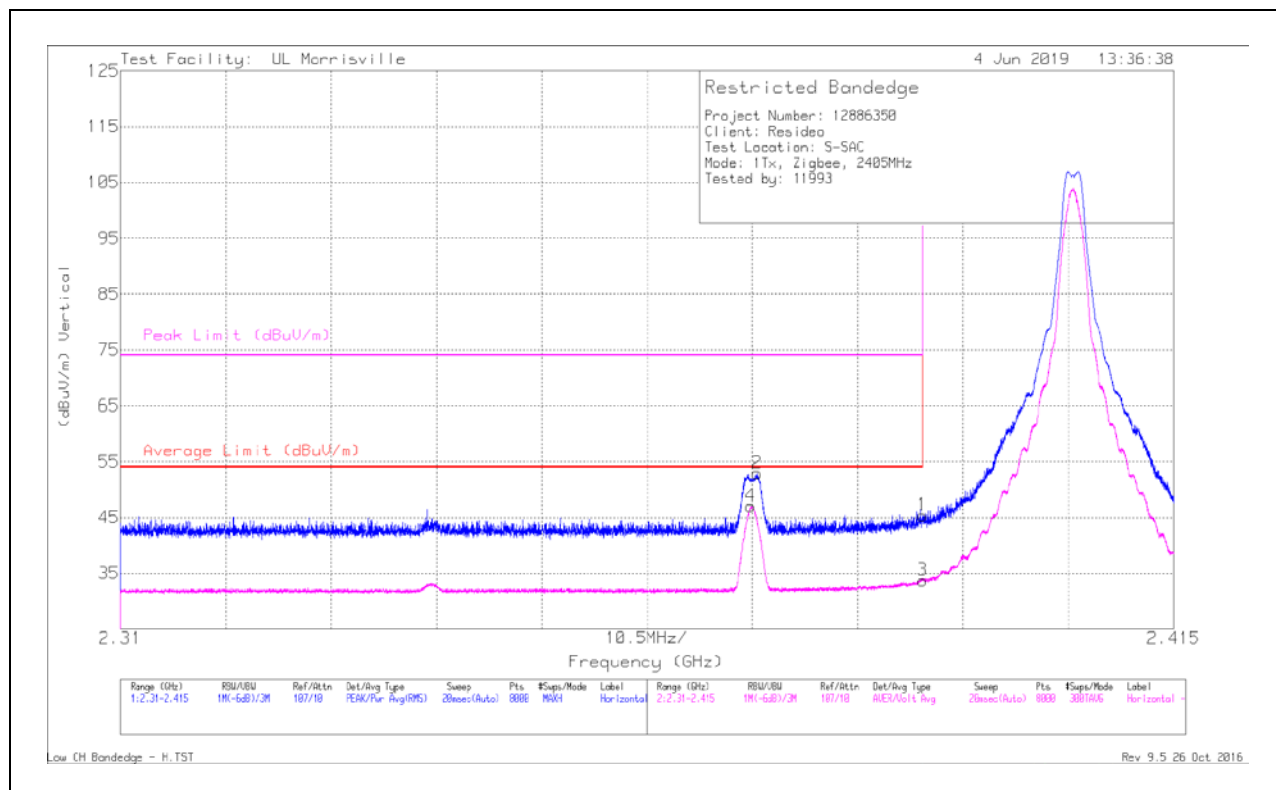
9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. 802.15.4 (1Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	*** 2.373	45.06	Pk	31.8	-24	0	52.86	-	-	74	-21.14	55	123	H
4	*** 2.373	39.21	Av	31.8	-24	-23.1	23.91	54	-30.09	-	-	55	123	H
1	* ** 2.39	37.46	Pk	31.9	-24	0	45.36	-	-	74	-28.64	55	123	H
3	* ** 2.39	25.8	Av	31.9	-24	-23.1	10.6	54	-43.4	-	-	55	123	H

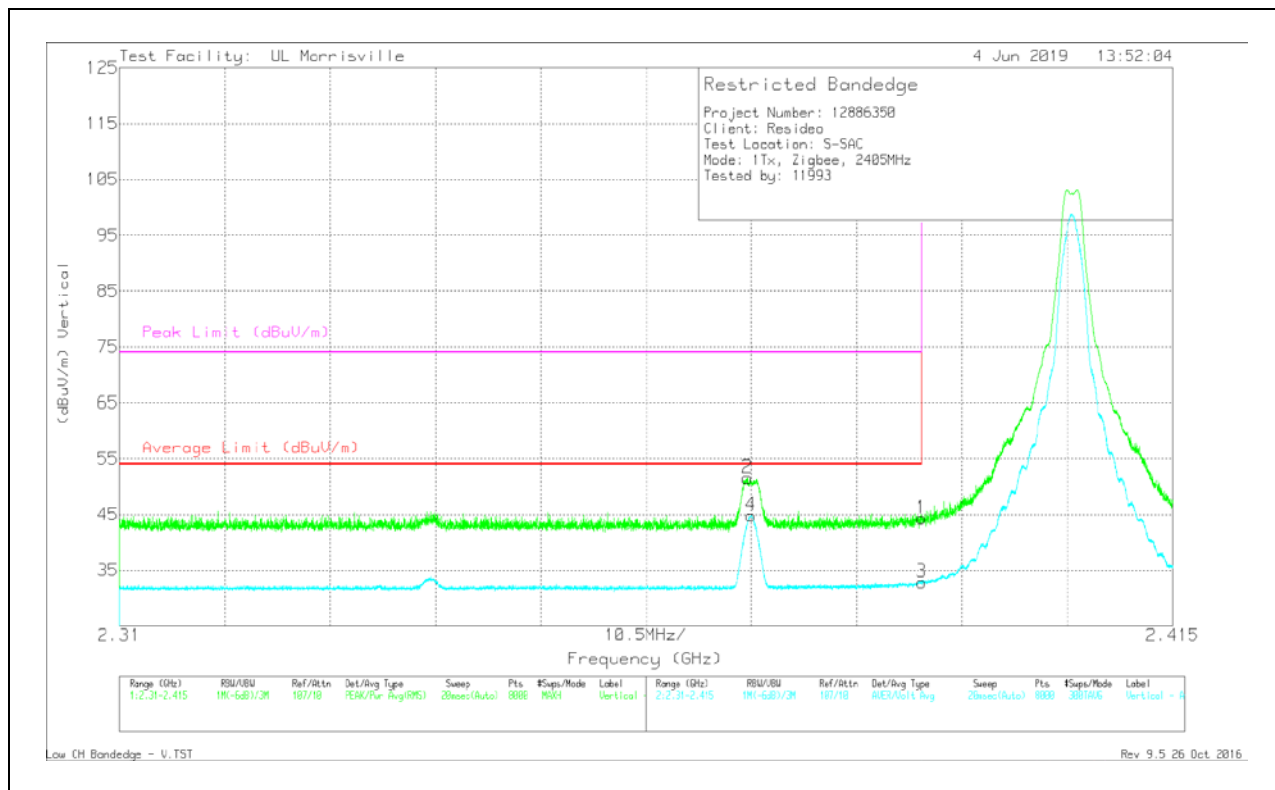
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

Av - Voltage average detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 2.39	36.44	Pk	31.9	-24	0	44.34	-	-	74	-29.66	79	150	V
2	* ** 2.373	43.78	Pk	31.8	-24	0	51.58	-	-	74	-22.42	79	150	V
3	* ** 2.39	24.99	Av	31.9	-24	-23.1	9.79	54	-44.21	-	-	79	150	V
4	* ** 2.373	37.06	Av	31.8	-24	-23.1	21.76	54	-32.24	-	-	79	150	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

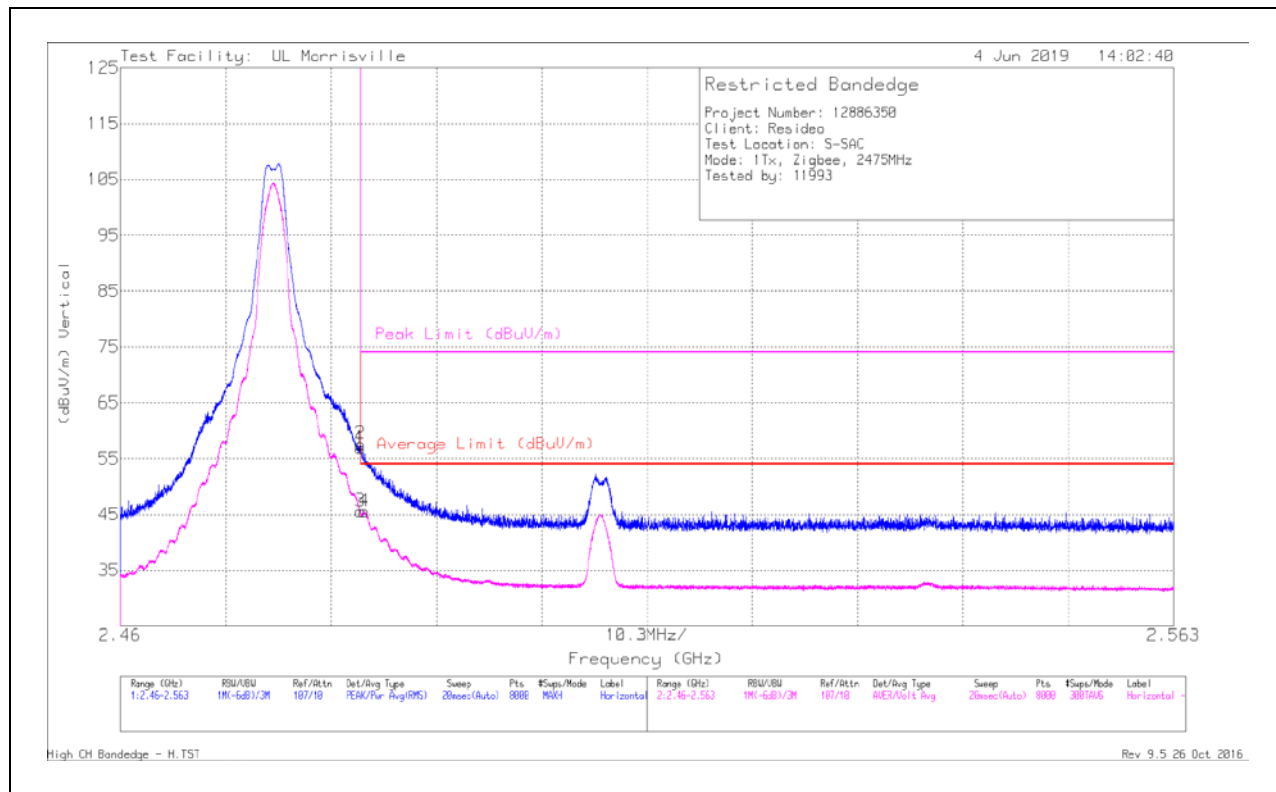
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

Av - Voltage average detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.484	49.09	Pk	32.3	-24.5	0	56.89	-	-	74	-17.11	53	207	H
2	*** 2.484	49.8	Pk	32.3	-24.5	0	57.6	-	-	74	-16.4	53	207	H
3	*** 2.484	37.8	Av	32.3	-24.5	-23.1	22.5	54	-31.5	-	-	53	207	H
4	*** 2.484	37.73	Av	32.3	-24.5	-23.1	22.43	54	-31.57	-	-	53	207	H

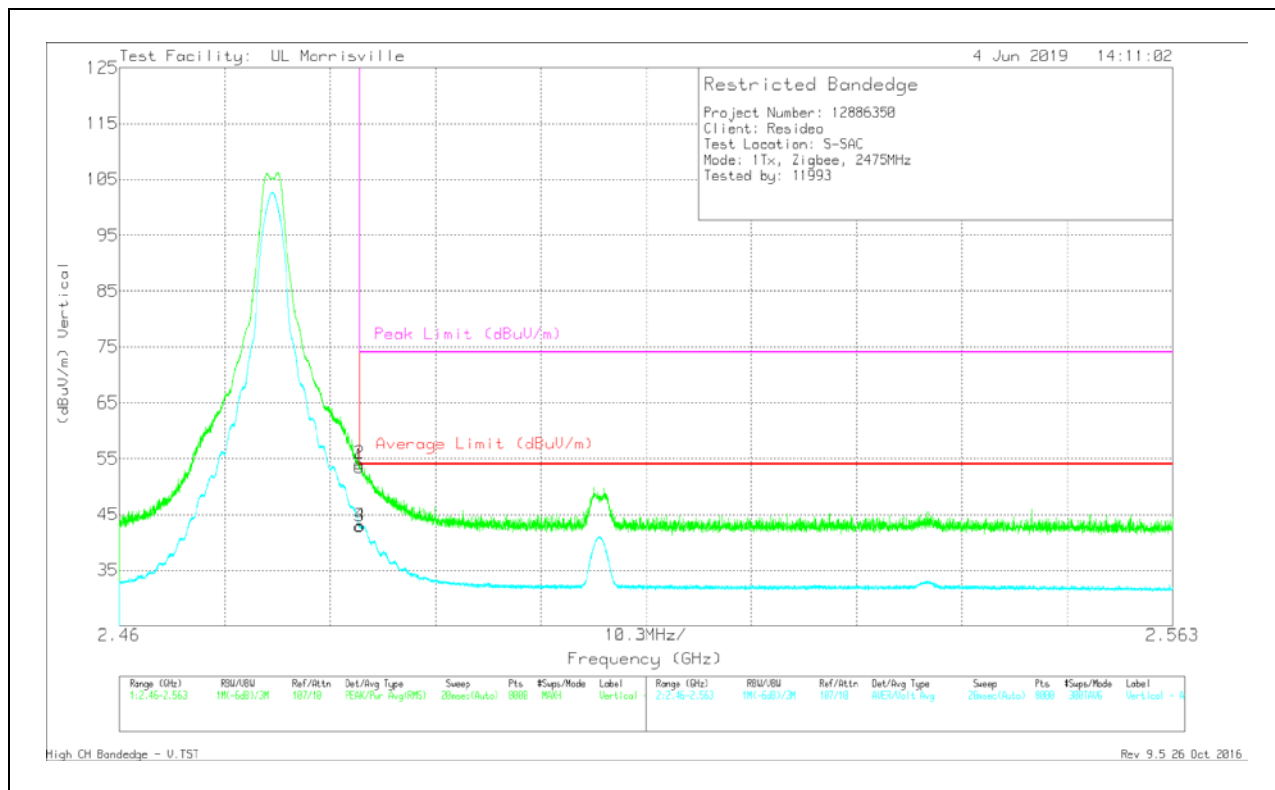
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

Av - Voltage average detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 2.484	45.78	Pk	32.3	-24.5	0	53.58	-	-	74	-20.42	315	182	V
2	*** 2.484	46.29	Pk	32.3	-24.5	0	54.09	-	-	74	-19.91	315	182	V
3	*** 2.484	35.05	Av	32.3	-24.5	-23.1	19.75	54	-34.25	-	-	315	182	V
4	*** 2.484	35.19	Av	32.3	-24.5	-23.1	19.89	54	-34.11	-	-	315	182	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

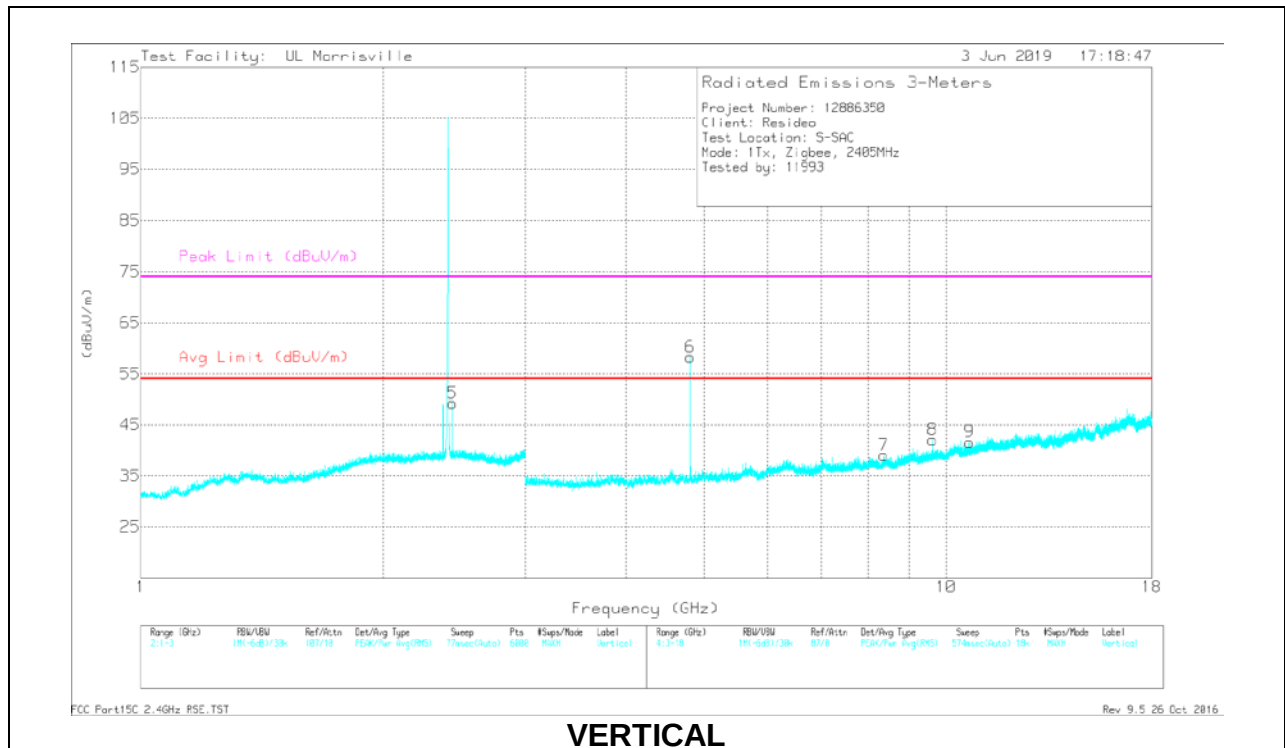
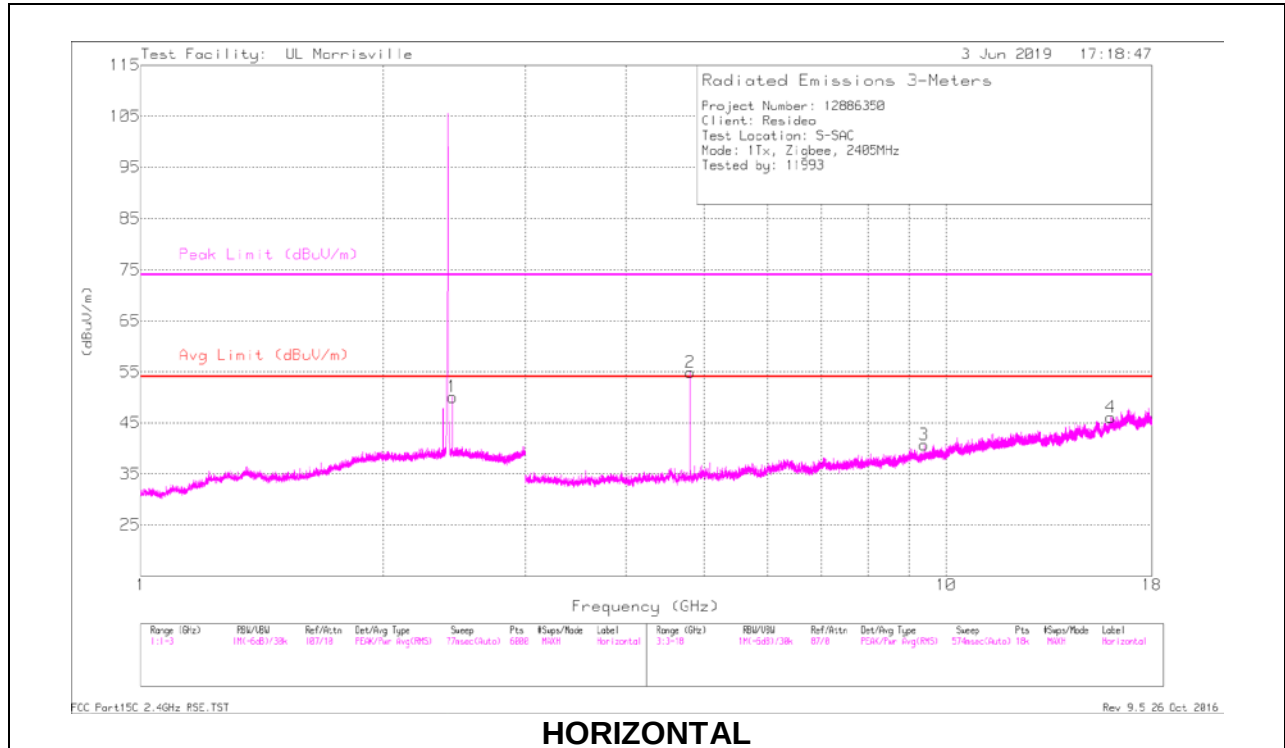
** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

Av - Voltage average detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	*** 4.809	54.41	PK-U	34.2	-31	0	57.61	-	-	74	-16.39	66	104	H
	*** 4.809	47.3	ADV	34.2	-31	-23.1	27.4	54	-26.6	-	-	66	104	H
3	*** 9.388	35.26	PK-U	36.9	-26.2	0	45.96	-	-	74	-28.04	98	105	H
	*** 9.388	22.39	ADV	36.9	-26.2	-23.1	9.99	54	-44.01	-	-	98	105	H
4	*** 16.018	35.21	PK-U	40.7	-23.5	0	52.41	-	-	74	-21.59	77	309	H
	*** 16.018	22.26	ADV	40.7	-23.5	-23.1	16.36	54	-37.64	-	-	77	309	H
6	*** 4.809	56.64	PK-U	34.2	-31	0	59.84	-	-	74	-14.16	0	115	V
	*** 4.809	49.81	ADV	34.2	-31	-23.1	29.91	54	-24.09	-	-	0	115	V
7	*** 8.364	36.25	PK-U	36	-26.9	0	45.35	-	-	74	-28.65	132	332	V
	*** 8.364	22.9	ADV	36	-26.9	-23.1	8.9	54	-45.01	-	-	132	332	V
9	*** 10.683	34.41	PK-U	37.7	-24.4	0	47.71	-	-	74	-26.29	145	162	V
	*** 10.683	21.13	ADV	37.7	-24.4	-23.1	11.33	54	-42.67	-	-	145	162	V
1	2.437	42.16	Pk	32.1	-24.2	0	50.06	-	-	-	-	0-360	199	H
5	2.438	41.31	Pk	32.1	-24.2	0	49.21	-	-	-	-	0-360	200	V
8	9.618	30.96	Pk	37.1	-26	0	42.06	-	-	-	-	0-360	101	V

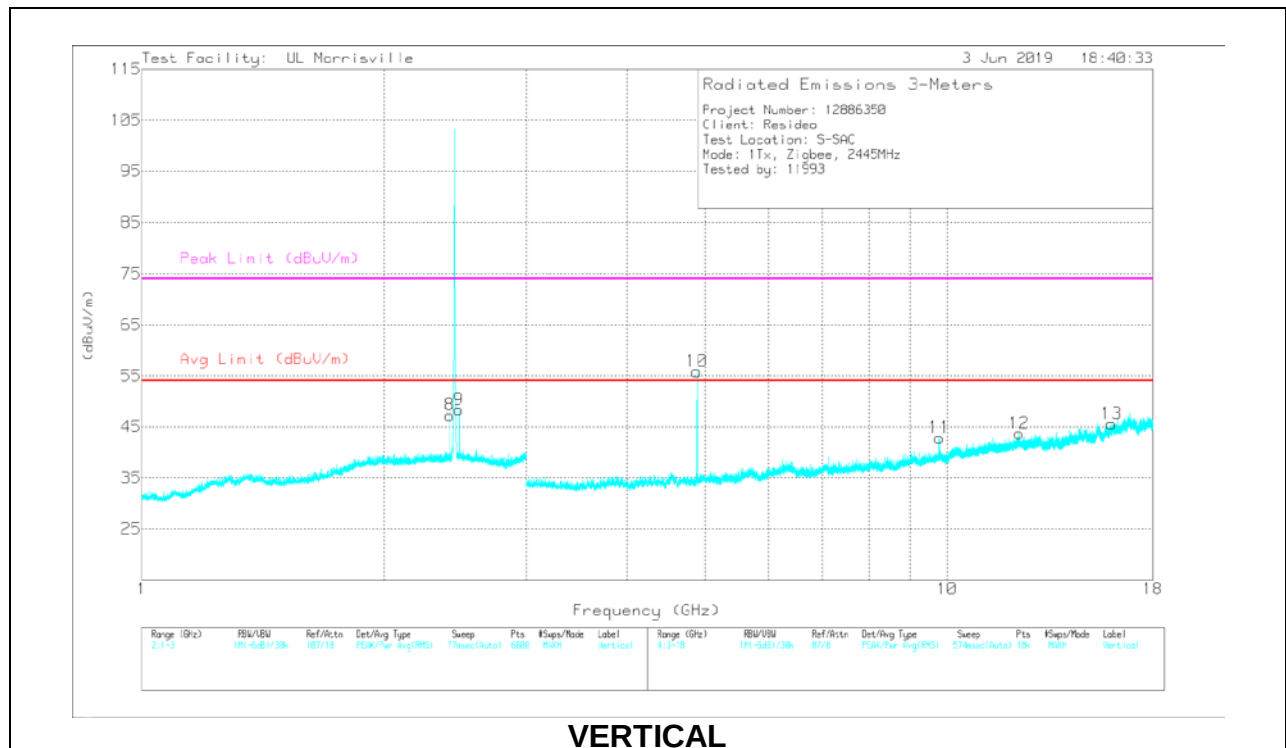
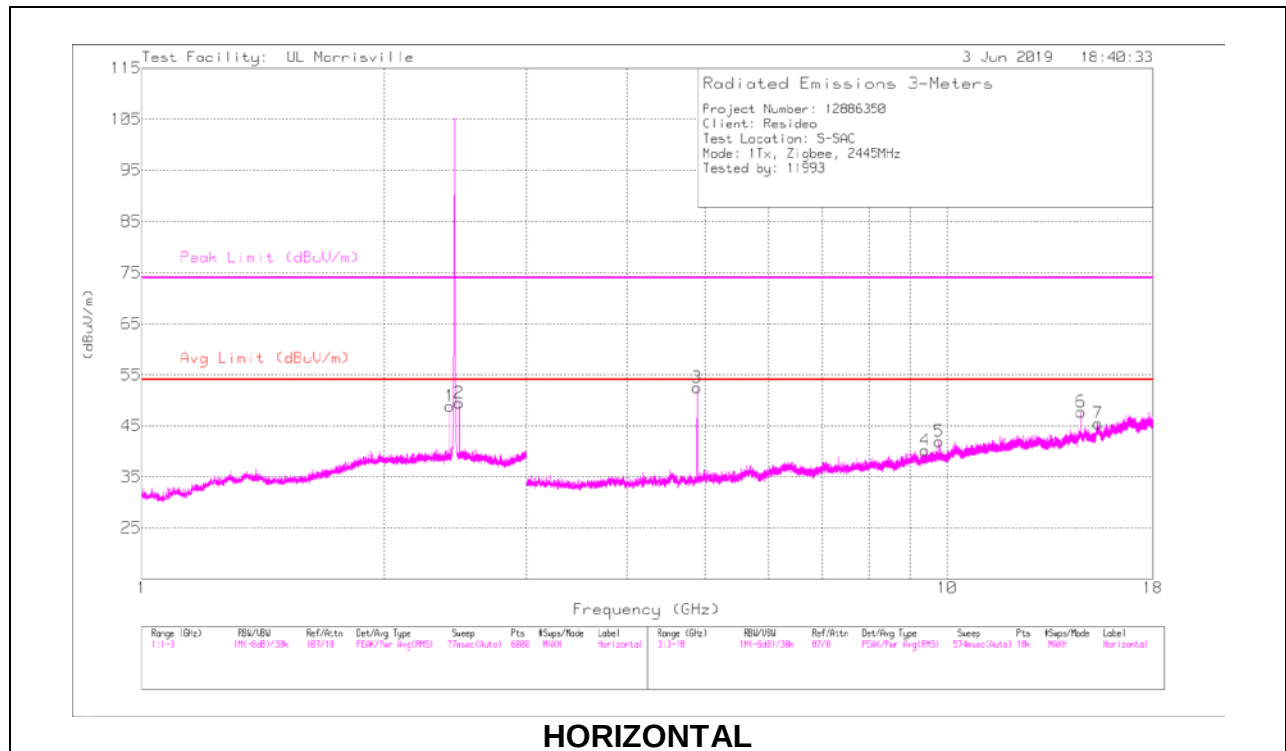
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV – Voltage average detection

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	*** 4.889	53.35	PK-U	34	-30.6	0	56.75	-	-	74	-17.25	215	108	H
	*** 4.889	46.4	ADV	34	-30.6	-23.1	26.7	54	-27.3	-	-	215	108	H
4	*** 9.396	35.41	PK-U	36.9	-26.2	0	46.11	-	-	74	-27.89	111	121	H
	*** 9.396	22.26	ADV	36.9	-26.2	-23.1	9.86	54	-44.14	-	-	111	121	H
7	*** 15.392	33.33	PK-U	39.9	-21.4	0	51.83	-	-	74	-22.17	58	232	H
	*** 15.392	20.51	ADV	39.9	-21.4	-23.1	15.91	54	-38.09	-	-	58	232	H
10	*** 4.889	56.05	PK-U	34	-30.6	0	59.45	-	-	74	-14.55	337	111	V
	*** 4.889	49.25	ADV	34	-30.6	-23.1	29.55	54	-24.45	-	-	337	111	V
12	*** 12.278	33.95	PK-U	38.9	-23.7	0	49.15	-	-	74	-24.85	95	190	V
	*** 12.278	21.18	ADV	38.9	-23.7	-23.1	13.28	54	-40.72	-	-	95	190	V
13	*** 15.997	35.04	PK-U	40.7	-23.5	0	52.24	-	-	74	-21.76	221	247	V
	*** 15.997	21.94	ADV	40.7	-23.5	-23.1	16.04	54	-37.96	-	-	221	247	V
1	2.413	40.92	Pk	32	-24.1	0	48.82	-	-	-	-	0-360	102	H
8	2.413	39.38	Pk	32	-24.1	0	47.28	-	-	-	-	0-360	101	V
2	2.477	41.64	Pk	32.3	-24.5	0	49.44	-	-	-	-	0-360	199	H
9	2.477	40.53	Pk	32.3	-24.5	0	48.33	-	-	-	-	0-360	101	V
5	9.777	30.46	Pk	37.1	-25.6	0	41.96	-	-	-	-	0-360	101	H
11	9.778	31.36	Pk	37.1	-25.6	0	42.86	-	-	-	-	0-360	101	V
6	14.666	30.7	Pk	39.4	-22.4	0	47.7	-	-	-	-	0-360	101	H

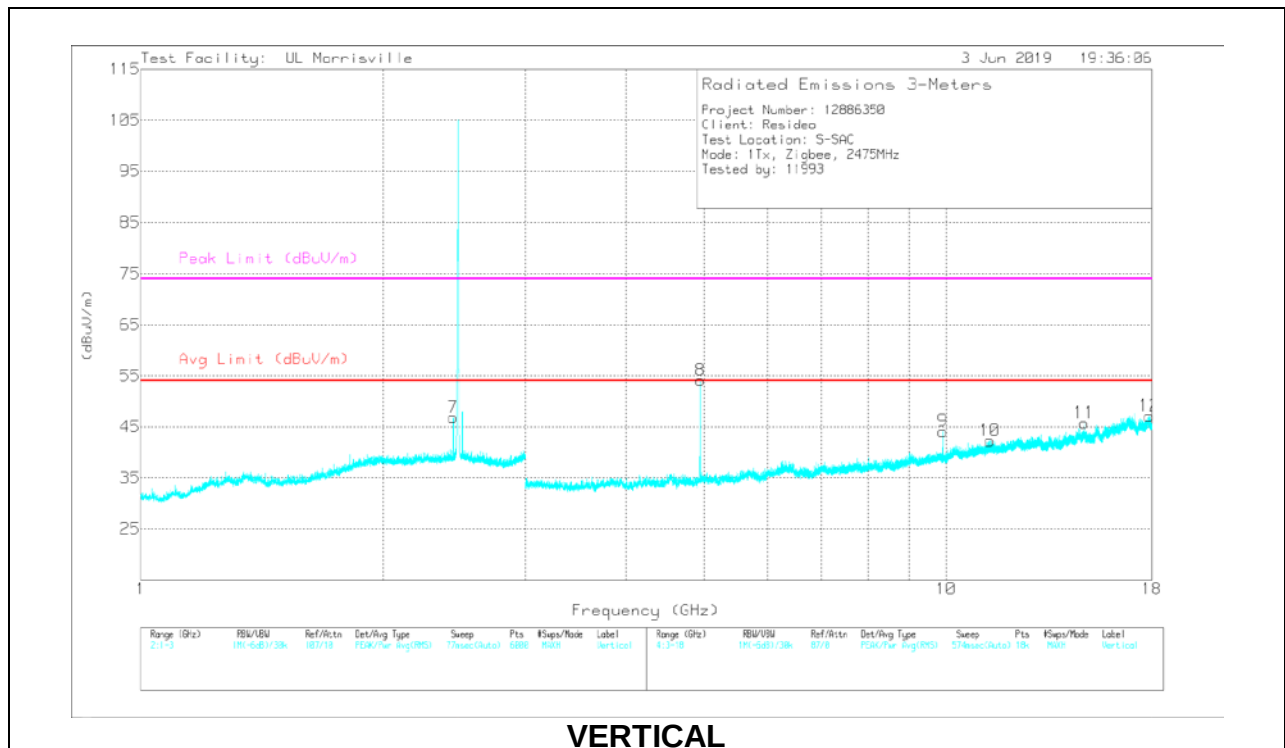
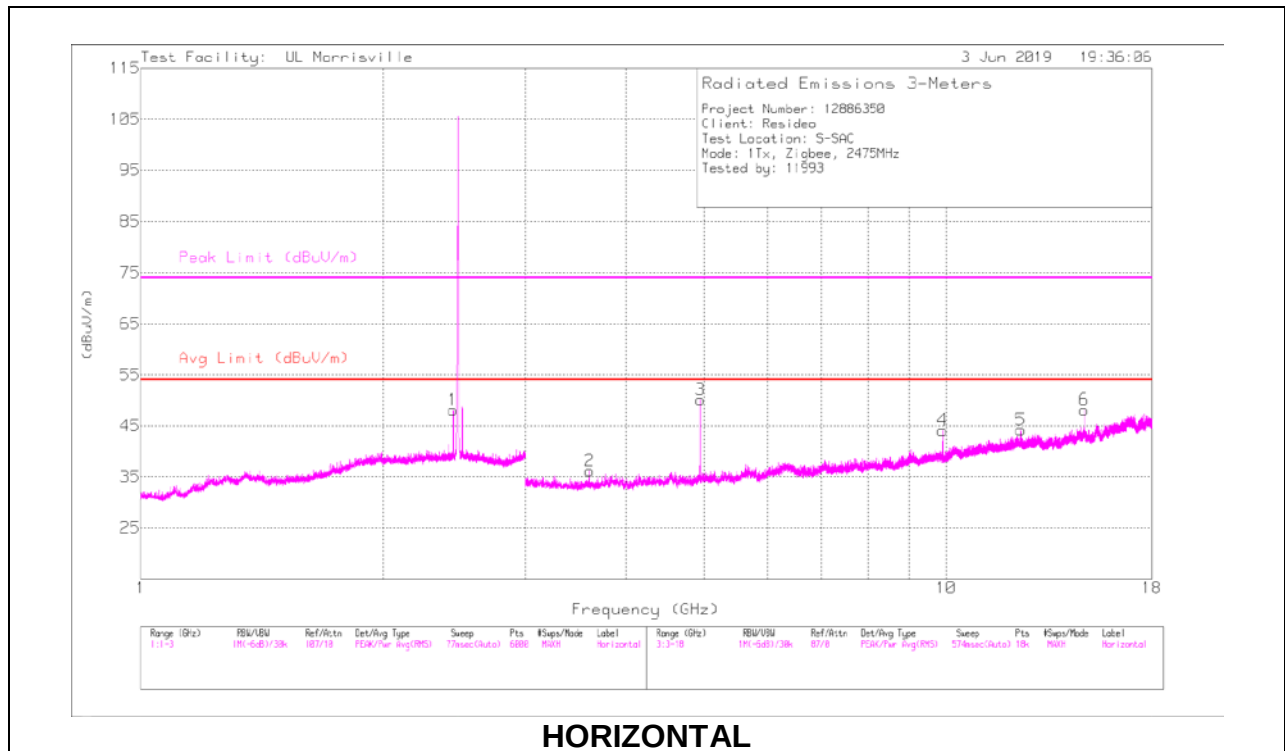
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

Pk - Peak detector

ADV – Voltage average detection

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* ** 3.607	40.1	PK-U	32.9	-31.7	0	41.3	-	-	74	-32.7	340	357	H
	* ** 3.607	26.87	ADV	32.9	-31.7	-23.1	4.97	54	-49.03	-	-	340	357	H
3	* ** 4.949	51.55	PK-U	34.1	-30.8	0	54.85	-	-	74	-19.15	202	118	H
	* ** 4.949	44.12	ADV	34.1	-30.8	-23.1	24.32	54	-29.68	-	-	202	118	H
5	* ** 12.377	36.75	PK-U	38.8	-23.7	0	51.85	-	-	74	-22.15	122	120	H
	* ** 12.377	25.47	ADV	38.8	-23.7	-23.1	17.47	54	-36.53	-	-	122	120	H
8	* ** 4.949	54.79	PK-U	34.1	-30.8	0	58.09	-	-	74	-15.91	341	104	V
	* ** 4.949	47.85	ADV	34.1	-30.8	-23.1	28.05	54	-25.95	-	-	341	104	V
10	* ** 11.324	33.2	PK-U	38	-22.8	0	48.4	-	-	74	-25.6	145	127	V
	* ** 11.323	20.41	ADV	38	-22.8	-23.1	12.51	54	-41.49	-	-	145	127	V
12	* ** 17.871	33.65	PK-U	41.2	-20.6	0	54.25	-	-	74	-19.75	9	177	V
	* ** 17.87	20.19	ADV	41.2	-20.6	-23.1	17.69	54	-36.31	-	-	9	177	V
1	2.443	40.18	Pk	32.1	-24.2	0	48.08	-	-	-	-	0-360	199	H
7	2.443	38.92	Pk	32.1	-24.2	0	46.82	-	-	-	-	0-360	101	V
4	9.898	32.32	Pk	37.2	-25.4	0	44.12	-	-	-	-	0-360	102	H
9	9.901	32.34	Pk	37.2	-25.4	0	44.14	-	-	-	-	0-360	101	V
6	14.846	31.53	Pk	39.5	-22.9	0	48.13	-	-	-	-	0-360	102	H
11	14.846	29.15	Pk	39.5	-22.9	0	45.75	-	-	-	-	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - indicates frequency in Taiwan NCC LP0002 Restricted Band

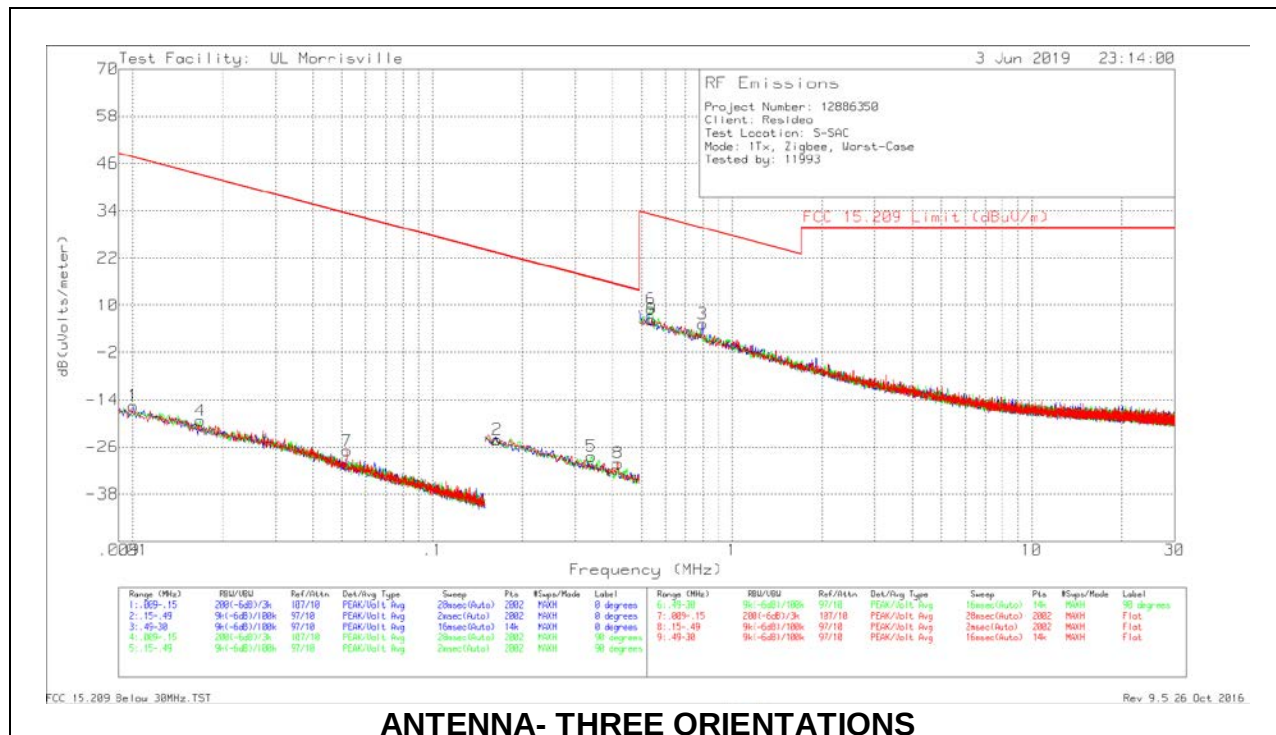
Pk - Peak detector

ADV – Voltage average detection

9.3. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9 - 490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were $40 \cdot \log(\text{test distance} / \text{specification distance})$.



ANTENNA- THREE ORIENTATIONS

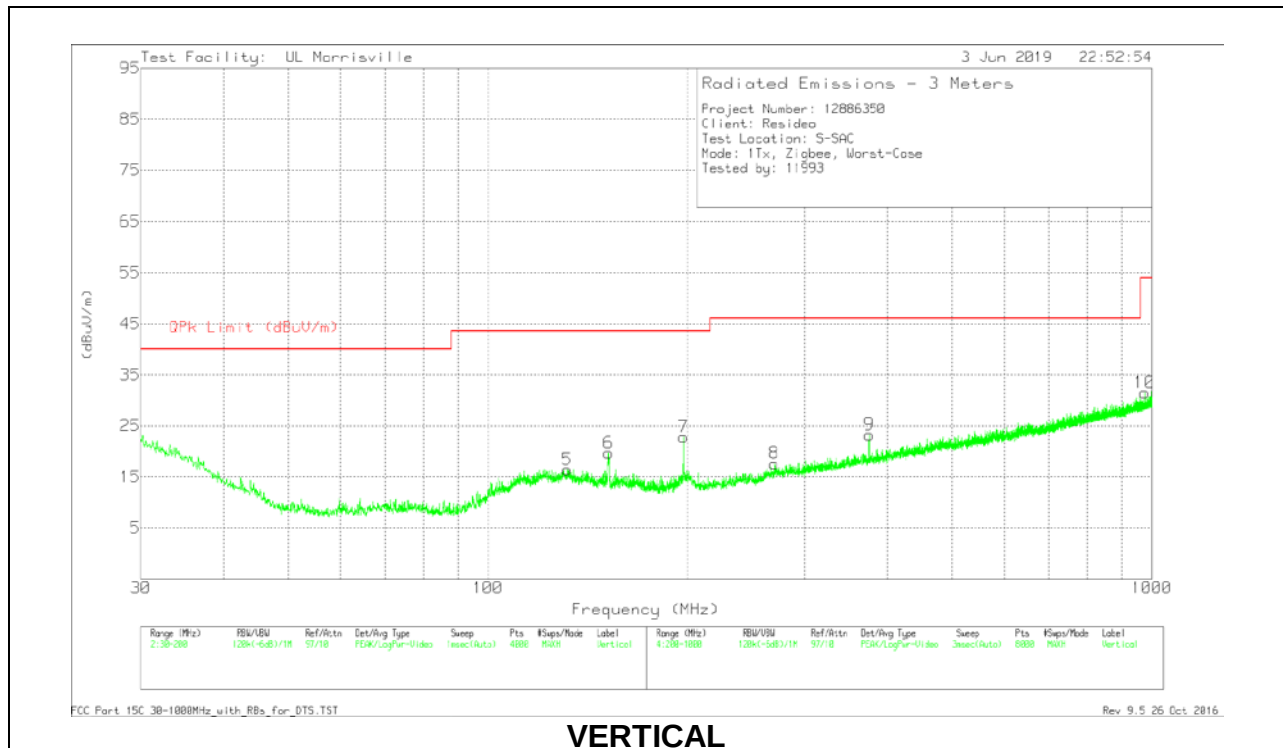
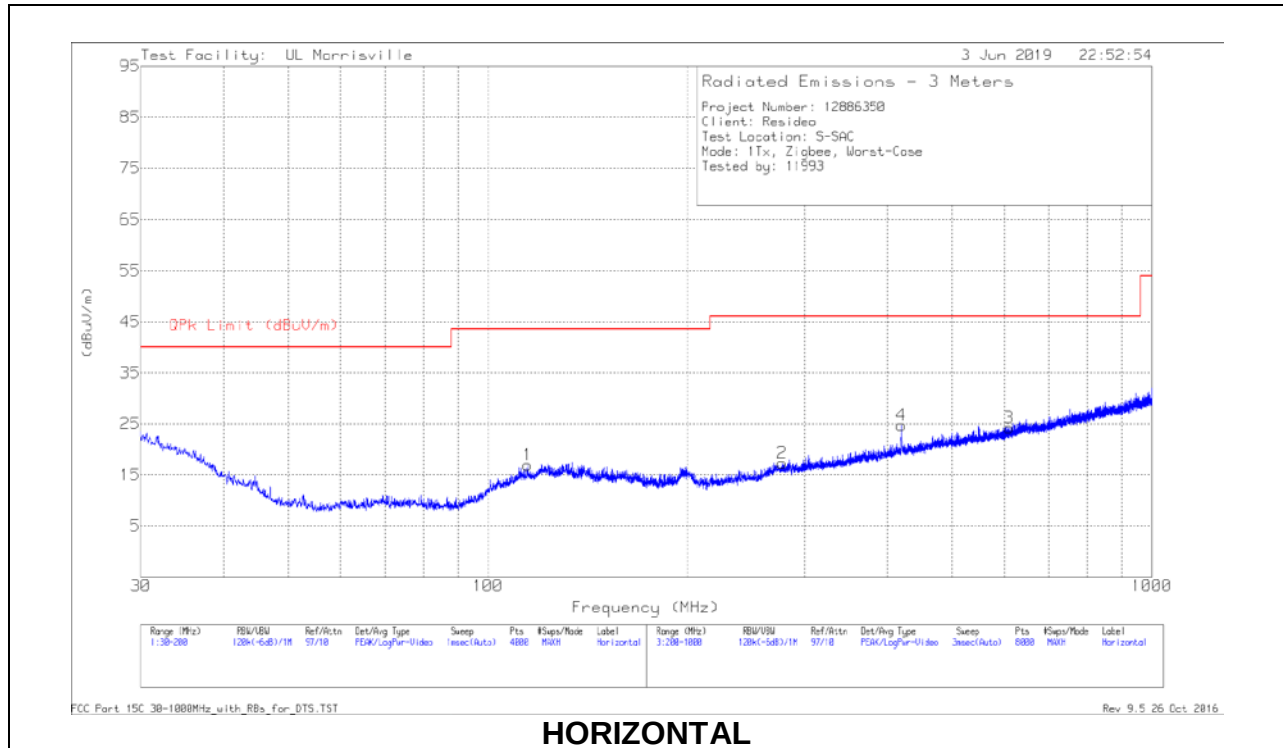
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Avg/Qp FCC 15.209 Limit (dBuV/m)	Pk FCC 15.209 Limit (dBuV/m)	Worst-Case Margin (dB)	Azimuth (Degs)	Antenna Face
1	.01005	46.01	Pk	18.3	.1	-80	-15.59	47.56	-	-63.15	0-360	On
4	.01684	45.14	Pk	15.4	.1	-80	-19.36	43.08	63.08	-62.44	0-360	Off
7	.05191	41.36	Pk	11.5	.1	-80	-27.04	33.3	53.3	-60.34	0-360	Flat
2	.16445	45.03	Pk	10.7	.1	-80	-24.17	23.28	43.28	-47.45	0-360	On
5	.34015	40.92	Pk	10.6	.1	-80	-28.38	16.97	36.97	-45.35	0-360	Off
8	.4169	39.17	Pk	10.6	.1	-80	-30.13	15.2	35.2	-45.33	0-360	Flat
6	.53743	38.18	Pk	10.8	.1	-40	9.08	33	-	-23.92	0-360	Off
9	.54059	35.46	Pk	10.8	.1	-40	6.36	32.95	-	-26.59	0-360	Flat
3	.79777	34.3	Pk	10.8	.1	-40	5.2	29.57	-	-24.37	0-360	On

Pk - Peak detector

9.4. WORST CASE BELOW 1 GHZ

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



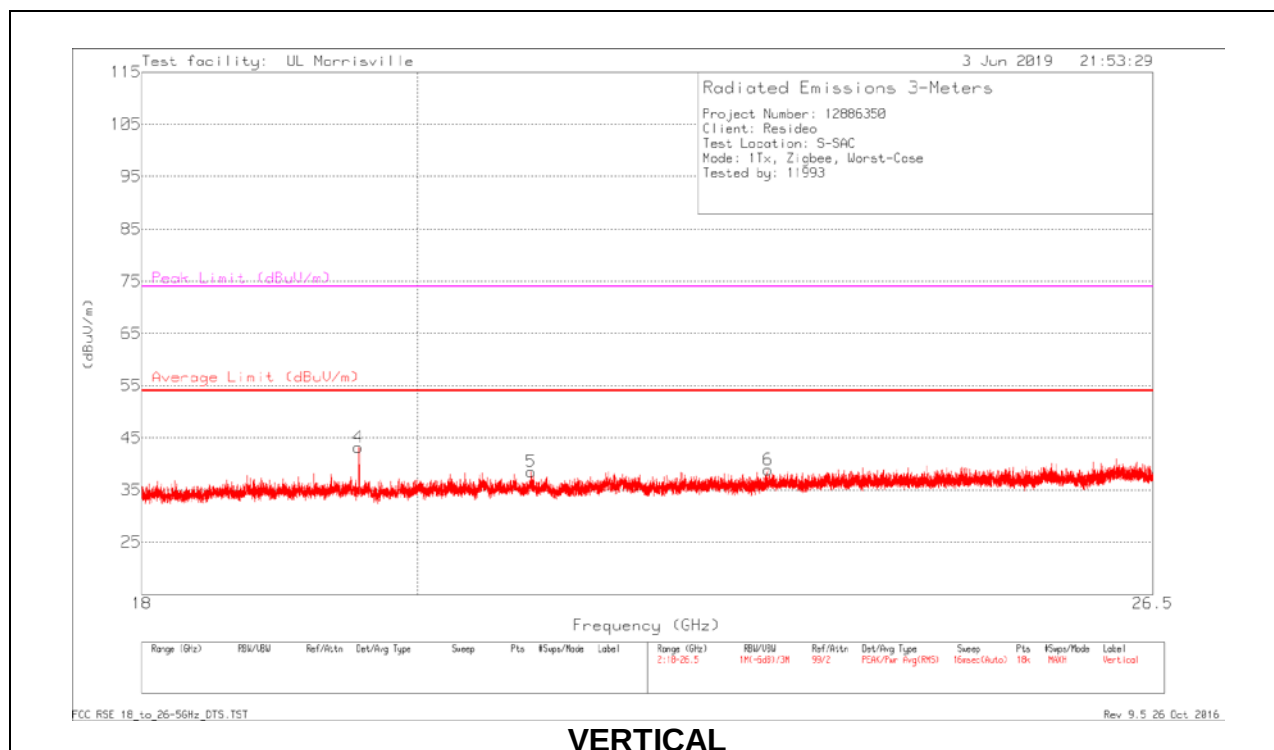
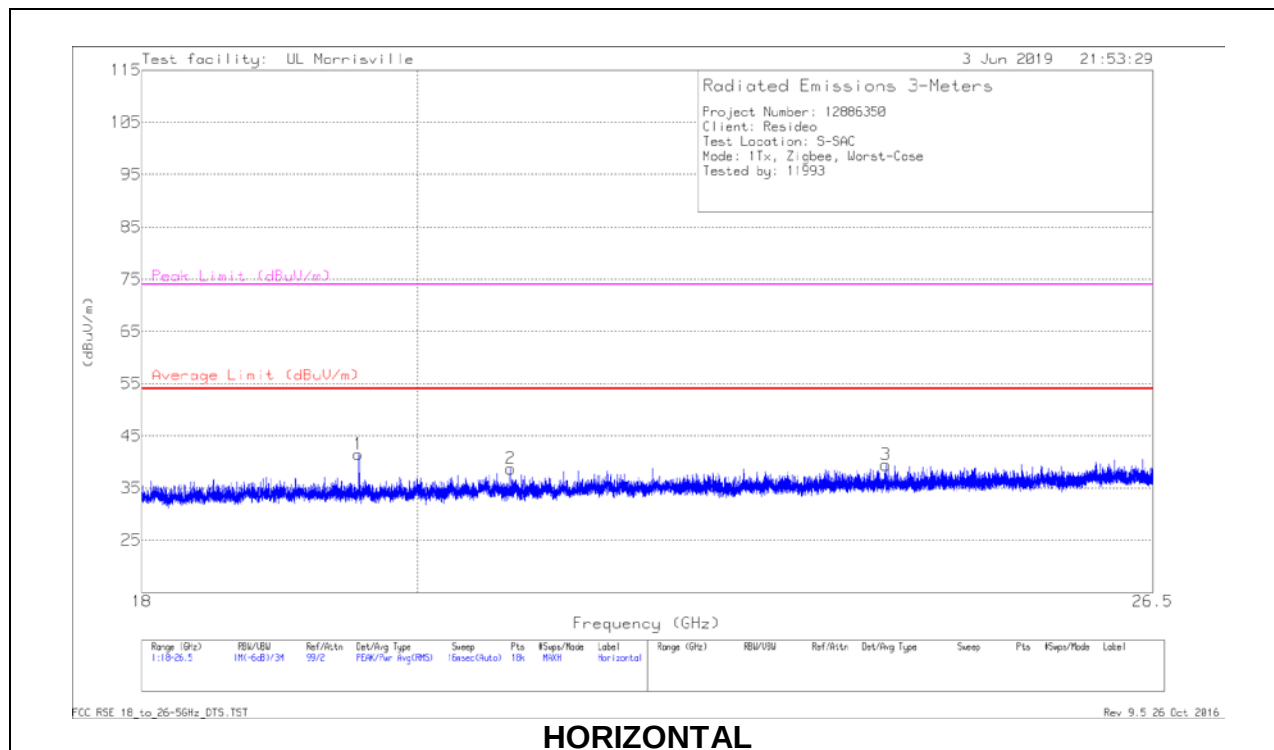
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*** 114.7244	30.08	Pk	17.6	-30.8	16.88	43.52	-26.64	0-360	298	H
5	*** 131.7288	29.12	Pk	18.1	-30.8	16.42	43.52	-27.1	0-360	101	V
2	*** 277.5101	29.17	Pk	17.9	-29.8	17.27	46.02	-28.75	0-360	298	H
3	*** 609.8533	29.29	Pk	23.6	-28.7	24.19	46.02	-21.83	0-360	298	H
8	*** 269.9091	29.51	Pk	17.8	-29.7	17.61	46.02	-28.41	0-360	298	V
10	*** 976.1009	29.82	Pk	27.8	-26.1	31.52	53.97	-22.45	0-360	102	V
6	151.9641	33.28	Pk	16.9	-30.5	19.68	43.52	-23.84	0-360	101	V
7	197.1107	35.73	Pk	17.4	-30.3	22.83	43.52	-20.69	0-360	101	V
9	375.2228	32.55	Pk	19.9	-29.2	23.25	46.02	-22.77	0-360	298	V
4	419.3285	32.91	Pk	20.9	-29.1	24.71	46.02	-21.31	0-360	298	H

Pk - Peak detector

9.5. WORST CASE 18-26 GHZ

SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0076 AF (dB/m)	Cbl/Amp (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 19.556	47.58	Pk	32.7	-38.8	41.48	54	-12.52	74	-32.52	0-360	299	H
2	* ** 20.726	44	Pk	33	-38.3	38.7	54	-15.3	74	-35.3	0-360	299	H
3	* ** 23.927	42.73	Pk	34	-37.3	39.43	54	-14.57	74	-34.57	0-360	299	H
4	* ** 19.556	49.26	Pk	32.7	-38.8	43.16	54	-10.84	74	-30.84	0-360	201	V
5	* ** 20.89	43.49	Pk	33.1	-38.1	38.49	54	-15.51	74	-35.51	0-360	251	V
6	* ** 22.873	43.03	Pk	33.6	-37.8	38.83	54	-15.17	74	-35.17	0-360	201	V

Pk - Peak detector

10. SETUP PHOTOS

Please refer to R12886350-EP1 for setup photos

END OF TEST REPORT