



CERTIFICATION TEST REPORT

Report Number. : 12071505-E1V3

Applicant : SEMICONDUCTOR COMPONENTS INDUSTRIES LLC
5005 E McDowell Rd.
Phoenix, AZ 85008 UNITED STATES

Model : SPSDEVR1-8

FCC ID : 2AQ8Q-SPSDEVR1-8

EUT Description : UHF RFID Reader

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
October 05, 2018

Prepared by:
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NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	9/21/2018	Initial Issue	--
V2	10/05/2018	Updated antenna gain in section 5.3 Updated results in section 8.5 Updated results in section 9.1	Huda Mustapha

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SEMICONDUCTOR COMPONENTS INDUSTRIES LLC
5005 E MCDOWELL RD
PHOENIX, AZ 85008 USA

EUT DESCRIPTION: UHF RFID Reader

MODEL: SPSDEV1-8

SERIAL NUMBER: Q41

DATE TESTED: AUGUST 30 - OCTOBER 4, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

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 the U.S. government.

Approved & Released For
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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 and ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, 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	47658 Kato Rd.
☒ Chamber A (IC:2324B-1)	☐ Chamber D (IC:22541-1)	☐ Chamber I (IC: 2324A-5)
☐ Chamber B (IC:2324B-2)	☐ Chamber E (IC:22541-2)	☐ Chamber J (IC: 2324A-6)
☐ Chamber C (IC:2324B-3)	☐ Chamber F (IC:22541-3)	☐ Chamber K (IC: 2324A-1)
	☐ Chamber G (IC:22541-4)	☐ Chamber L (IC: 2324A-3)
	☐ Chamber H (IC:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

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

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a control node transmitter module that operates in the 902-928 MHz band. Device uses hopping technology and is categorized as a Frequency Hopping System(FHS).

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)
902-928	Normal	28.10	645.51

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dipole antenna, with a maximum gain of 1.8 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 0x280818.

Software installed during test was as follows:

RestApi Version: restAPI ver2.6
ReaderApi Version: readerAPI ver2.6
GuiApp Version: guiAPP ver2.3

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 30MHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emissions from 30MHz to 1GHz were performed with the EUT set to transmit at low middle and high channels.

Band edge and radiated emissions between 30MHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The EUT can only be setup in desktop orientation, therefor all radiated testing was performed with the EUT in desktop orientation.

Preliminary testing (power measurement and radiated spurious and harmonics) was performed on the 8 antenna ports and port 4 was found to be worst case. Therefore, all testing was done using port 4.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	TYPE 4243-5UU	R9-PKF4Z	-
Laptop Adapter	Lenovo	42T4438	36200150	-
4-Port Broadband Router	TRENDnet	TW100-S4W1CA/A	RA1737S401032	-
Switching Adapter	DVE	DSA-6PFG-05	-	-

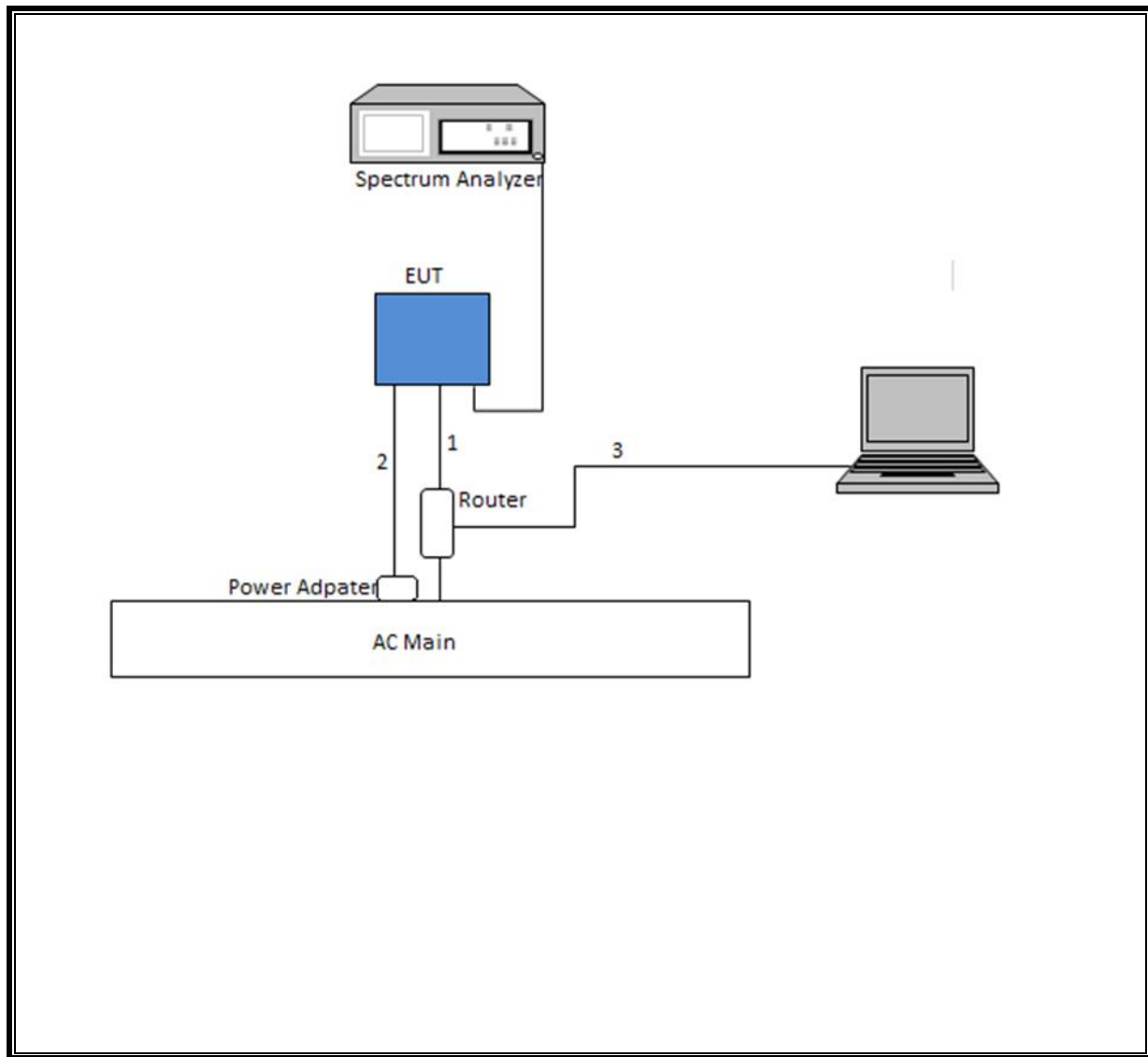
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Ethernet	1	Ethernet	Unshielded	>3	
2	DC	1	DC	Shielded	1	
3	Ethernet	1	Ethernet	Shielded	1	

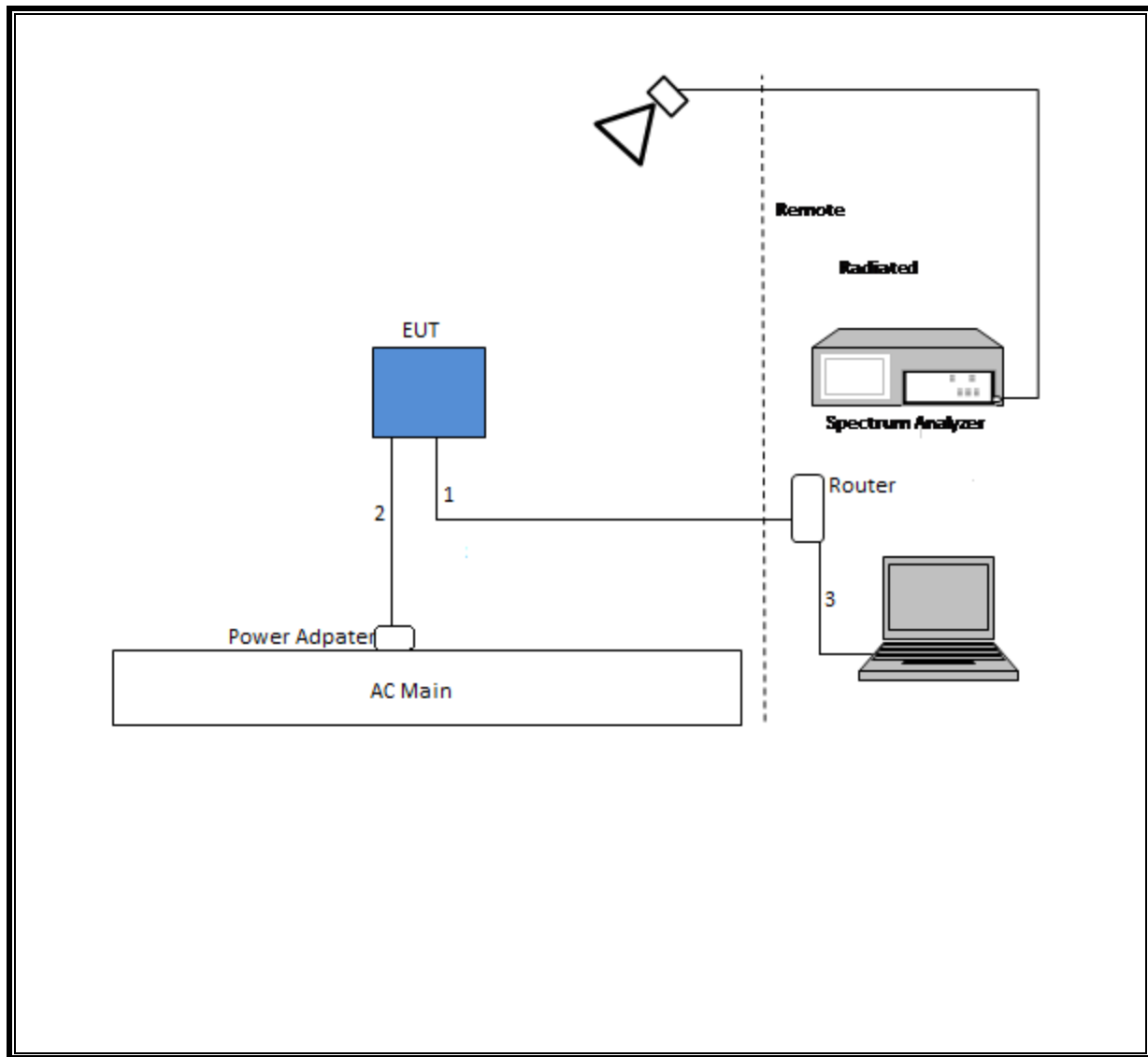
TEST SETUP

The EUT is connected to a 4-port broadband router during the tests. The customer provided test software to exercise the EUT during test.

SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



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	ID Num	Cal Due	Last Cal
EMI Test Receiver	Rohde&Schwarz	ESR	1436	02/23/2019	02/23/2018
Transient Limiter	COM-POWER	LIT-930	1457	03/01/2019	03/01/2018
L.I.S.N	FCC INC.	FCC LISN 50/250	24	03/06/2019	03/06/2018
EMI Test Receiver	Rohde&Schwarz	ESR	1436	02/23/2019	02/23/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T130	10/14/2018	10/14/2017
Amplifier, 9KHz to 1GHz, 32dB	Agilent (keysight) Technologies	8447D	T15	08/15/2019	08/15/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/16/2019	04/16/2018
Antenna Horn 1-18GHz	ETS-Lindgren	3117	T862	05/24/2019	05/24/2018
RF Amplifier, 1-18GHz	MITEQ	AFS42-00101800-25-S-42	T1165	6/12/2019	6/12/2018
Filter, HPF 3.0GHz	MICRO-TRONICS	HPM17543	T486	6/12/2019	6/12/2018
Filter, BRF 902 to 928MHz	MICRO-TRONICS	BRC50722	T1847	8/16/2019	8/16/2018
Filter, Highpass 1.2GHz	MICRO-TRONICS	HPM50108	T1737	4/17/2019	4/17/2018
Antenna, Active Loop 9KHz to 30MHz	MICRO-TRONICS	AL-130R	PRE0165308	12/13/2018	12/13/2019

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, December 1, 2016
Antenna Port Software	UL	UL RF	Ver 9.1, January 25, 2018

7. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

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

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

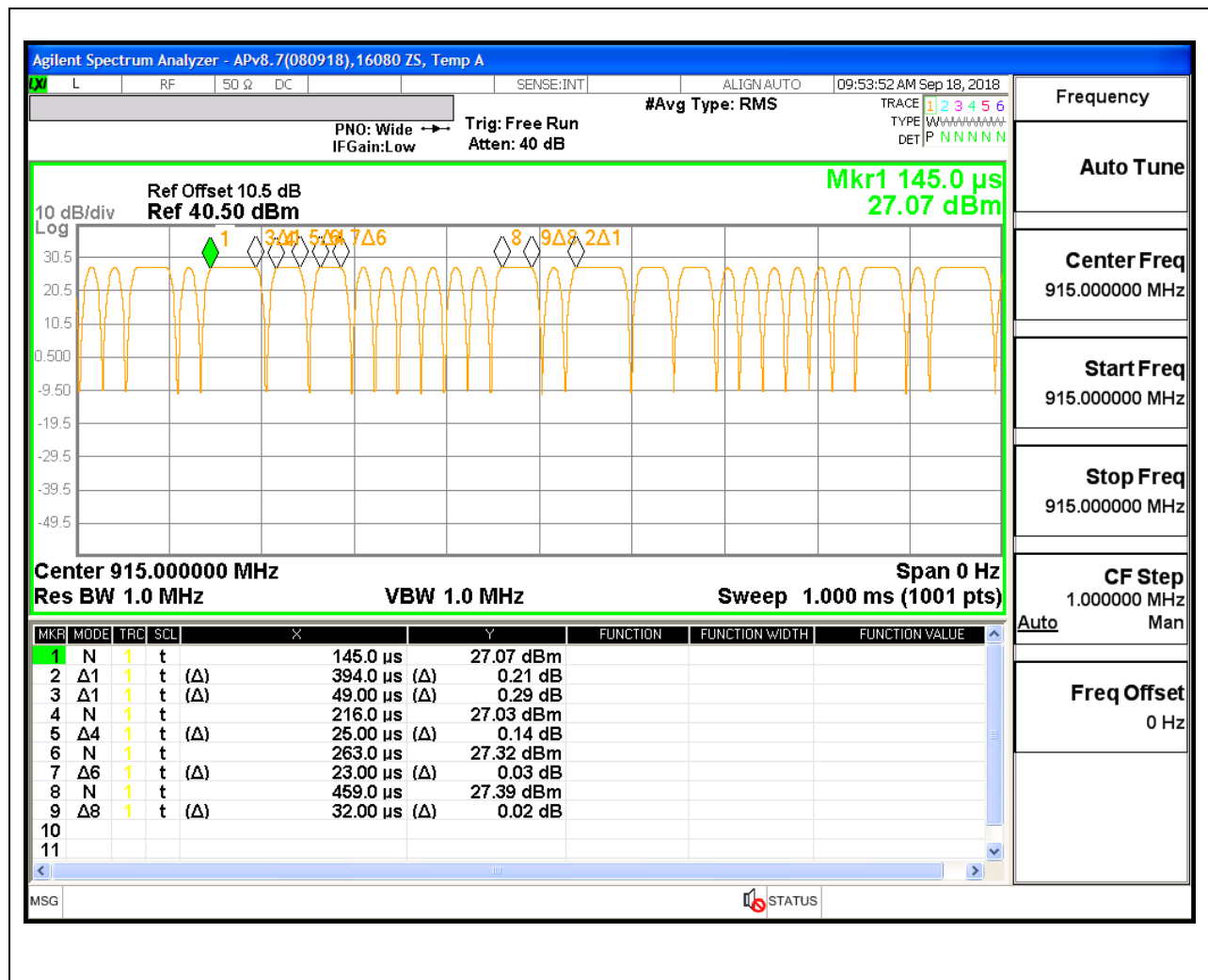
LIMITS

None; for reporting purposes only.

ON TIME AND DUTY CYCLE RESULTS

one Period (ms)	On Time 1 (ms)	On Time 2 (ms)	On Time 3 (ms)	On Time 4 (ms)	Duty Cycle (%)	20*Log Duty Cycle (dB)	Duty Cycle Correction Factor(dB)
0.394	0.049	0.025	0.023	0.032	32.741	30.302	4.85

DUTY CYCLE PLOTS



8.2. 20 dB AND 99% BANDWIDTH

LIMITS

FCC §15.247 (a) (1)(i)

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth Limit (kHz)
Low	902.75	107.30	115.8	500
Mid	915.25	106.86	115.3	500
High	927.25	107.54	116.4	500



8.3. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

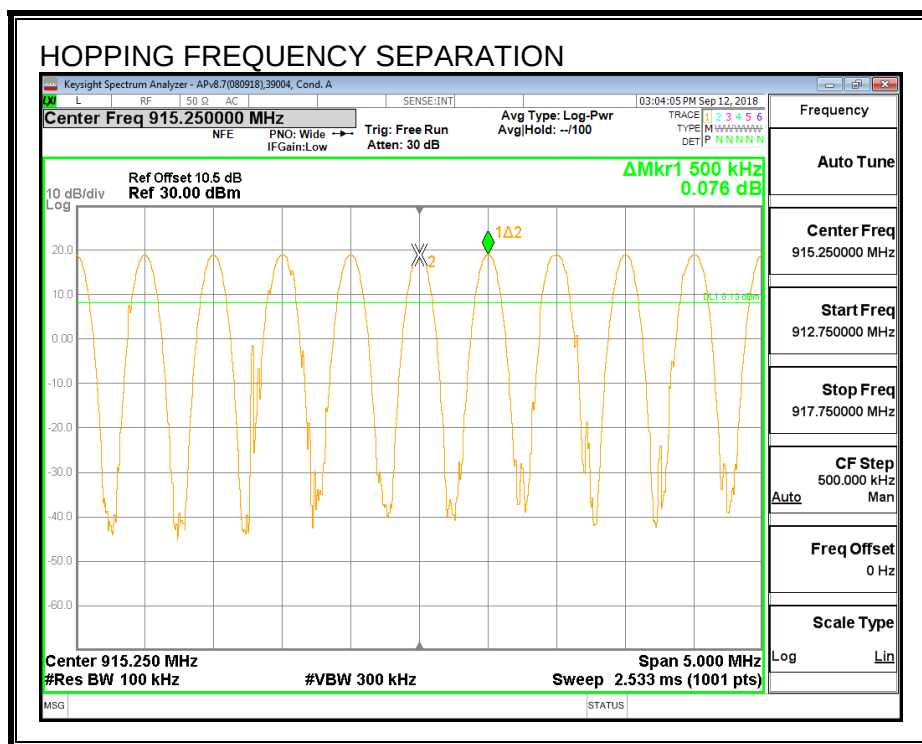
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



8.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (i)

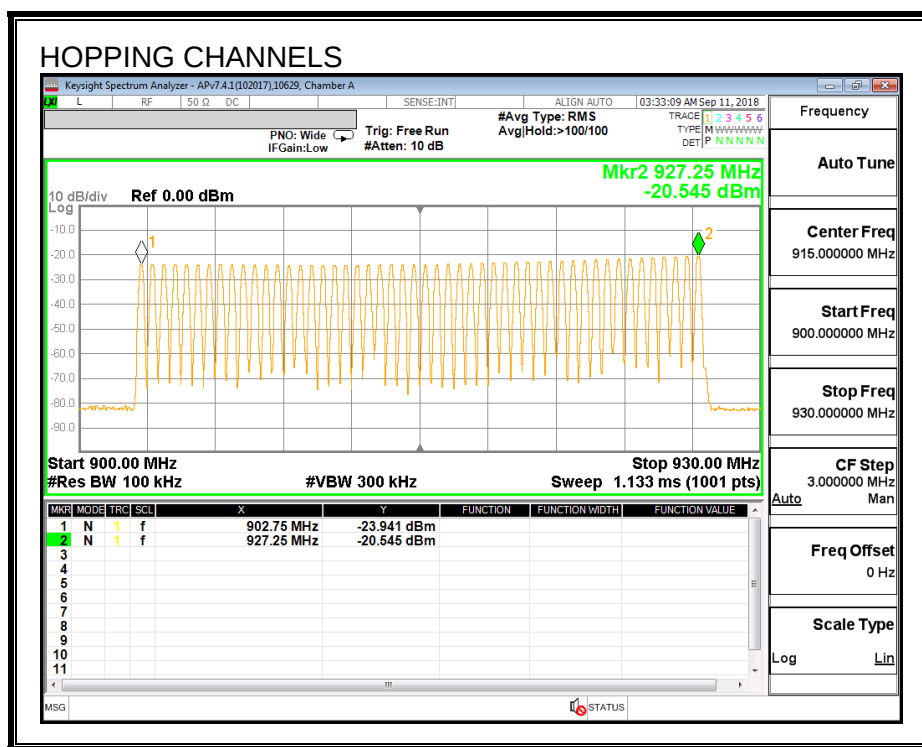
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 50 Channels observed.



8.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (i)

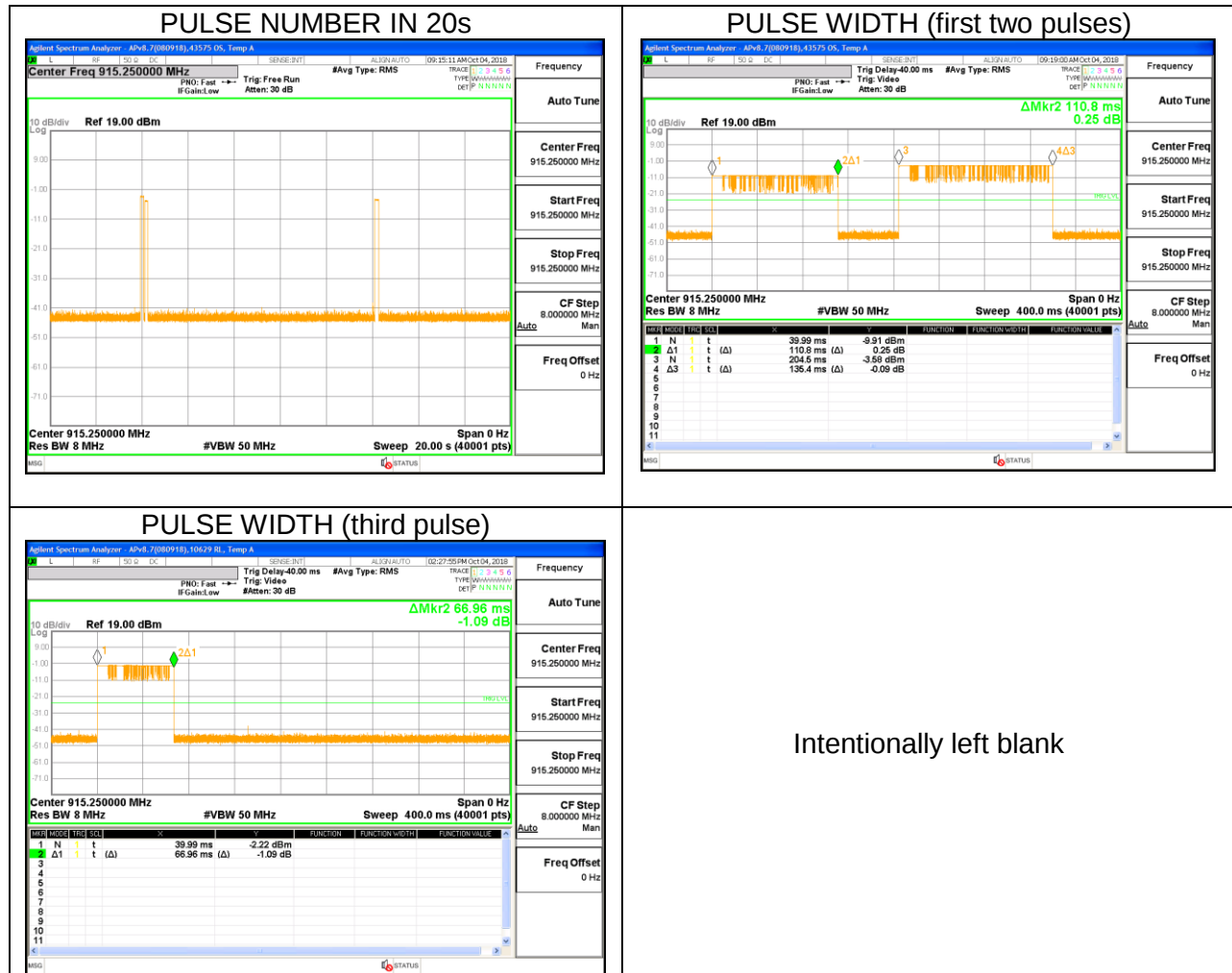
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 20 second scan, to enable resolution of each occurrence.

RESULTS

DH Packet	Pulse 1 Width (msec)	Pulse 2 Width (msec)	Pulse 3 Width (msec)	Number of Pulses in 20 seconds	Average Time of Occupancy in 20 seconds (sec)
Normal	110.8	135.4	66.96	3	0.3132



8.6. OUTPUT POWER

LIMITS

§15.247 (b) (2)

(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels as permitted under paragraph (a)(1)(i) of this section.

TEST PROCEDURE

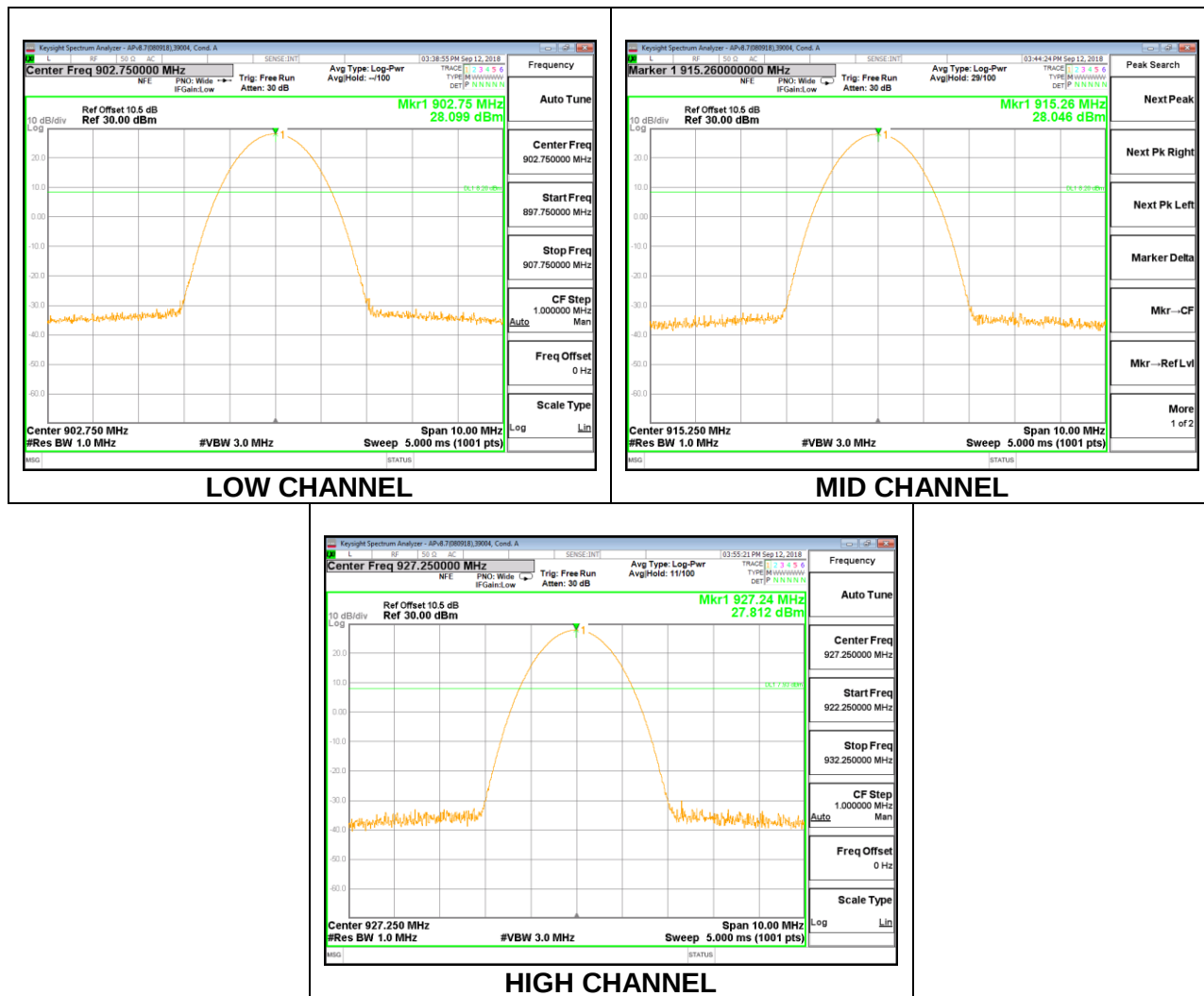
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1 MHz, and the VBW is set to 3 MHz. The detector is peak and max hold.

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 spectrum analyzer to allow for a peak reading of power.

RESULTS

Tested By:	39004
Date:	9/12/2018

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	902.72	28.099	30	-1.901
Middle	912.72	28.046	30	-1.954
High	927.20	27.812	30	-2.188



8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

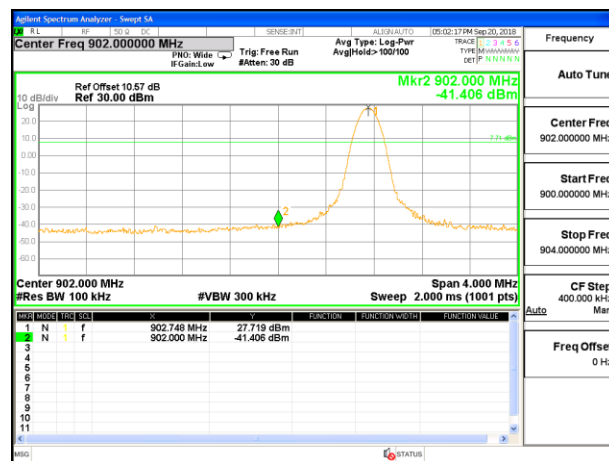
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

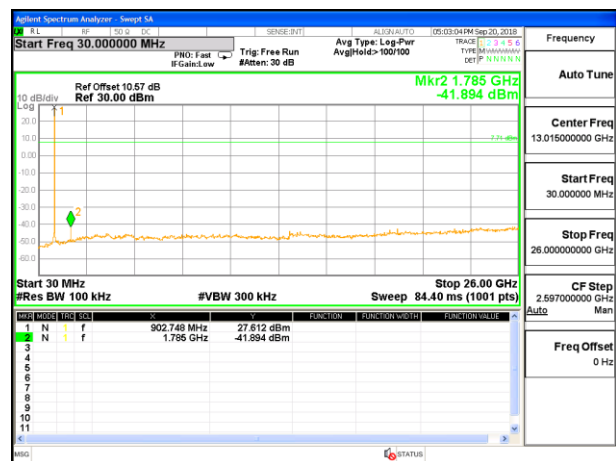
The bandedges at 902MHz and 928MHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

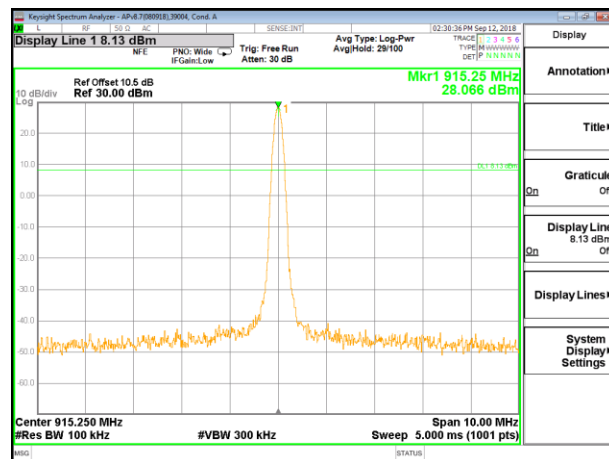
SPURIOUS EMISSIONS, NON-HOPPING



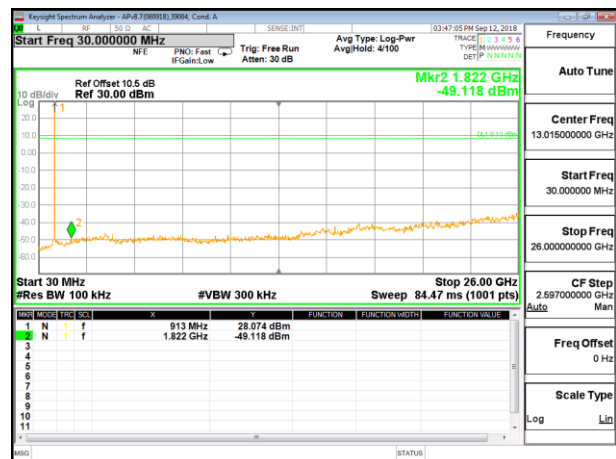
LOW CHANNEL BANDEDGE



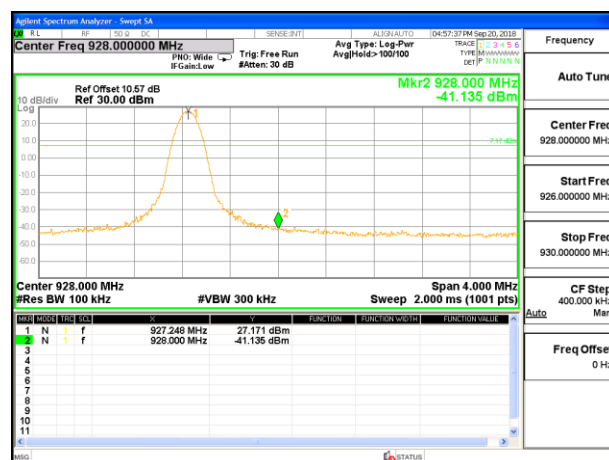
LOW CHANNEL SPURIOUS



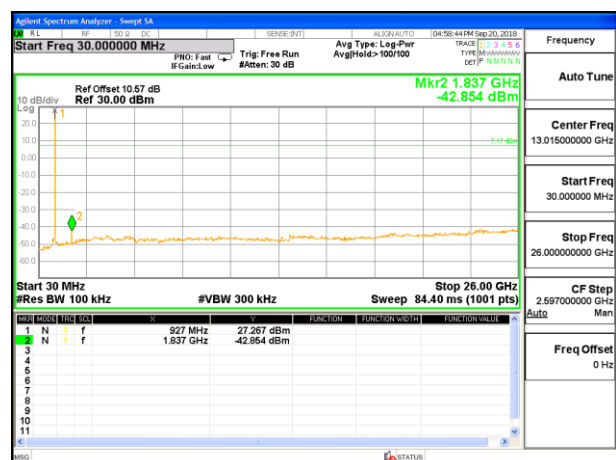
IN-BAND REFERENCE LEVEL



MID CHANNEL SPURIOUS

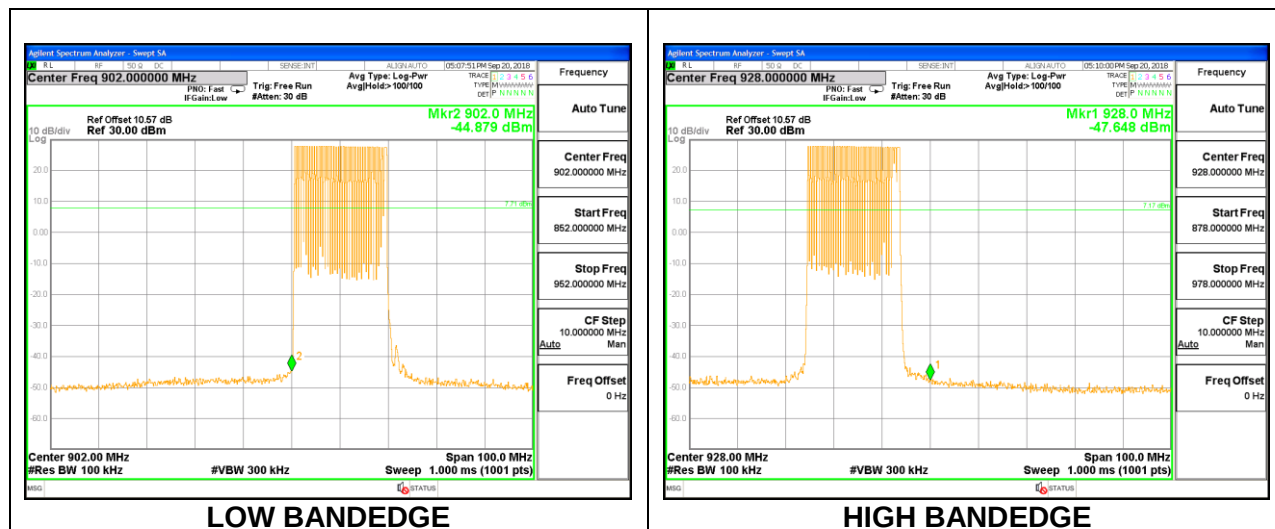


HIGH CHANNEL BANDEDGE



HIGH CHANNEL SPURIOUS

SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



9. RADIATED TEST RESULTS

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 measurement below 1GHz; 1.5 m above the ground plane for measurement 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 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. 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 and as applicable for average measurements.

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 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.

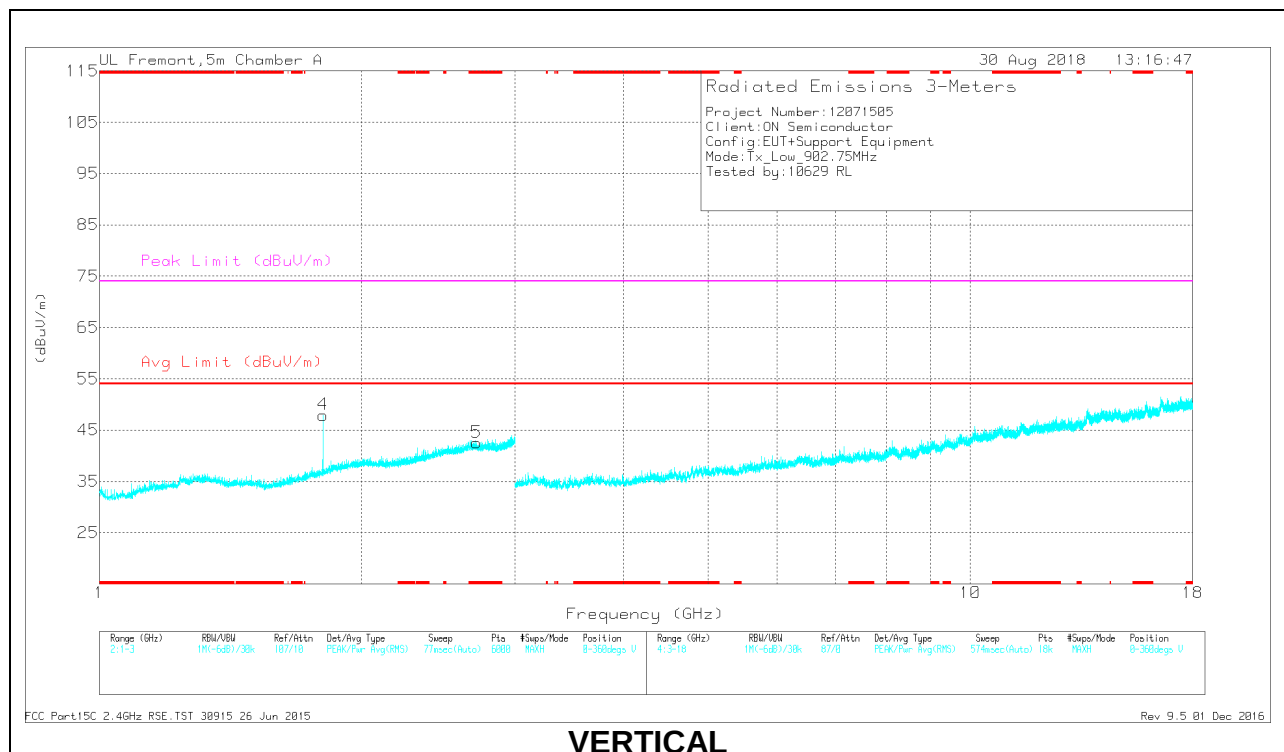
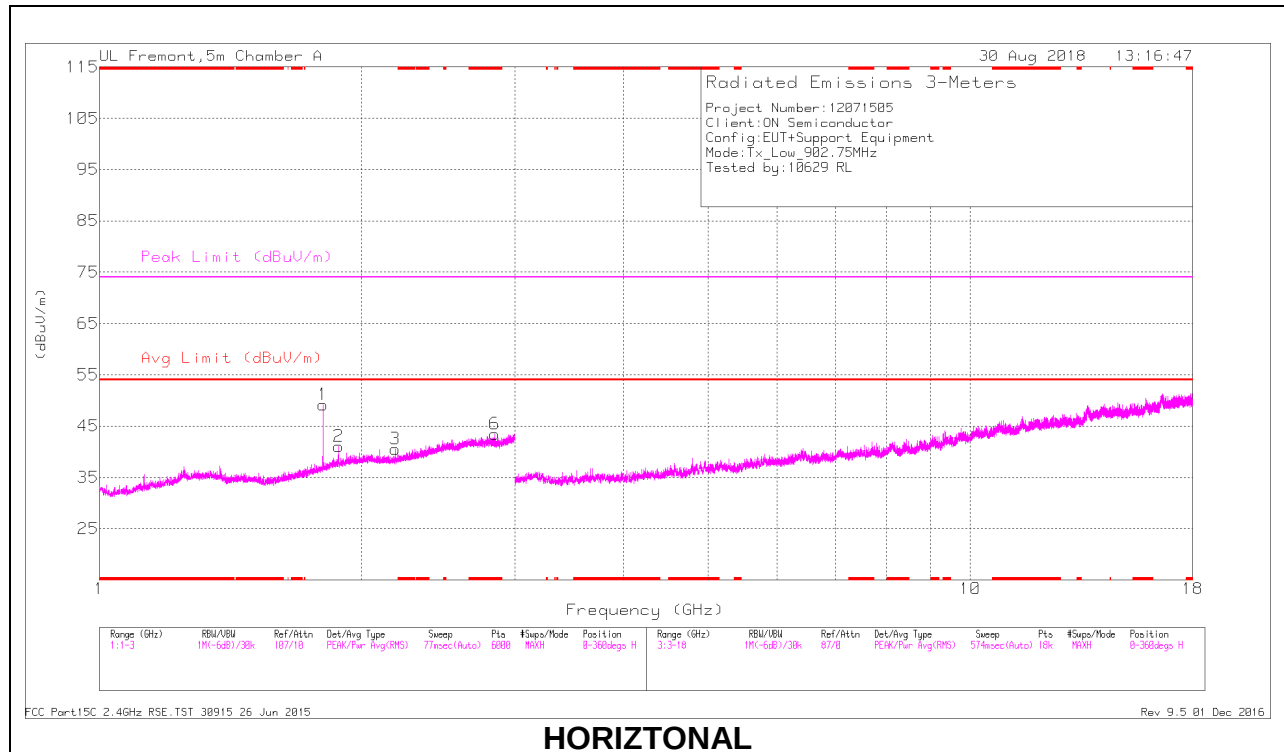
KDB 414788 OATS and Chamber Correlation Justification

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.

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

9.1. TRANSMITTER ABOVE 1 GHz

HARMONICS AND SPURIOUS EMISSIONS LOW CHANNEL RESULTS



RADIATED EMISSIONS

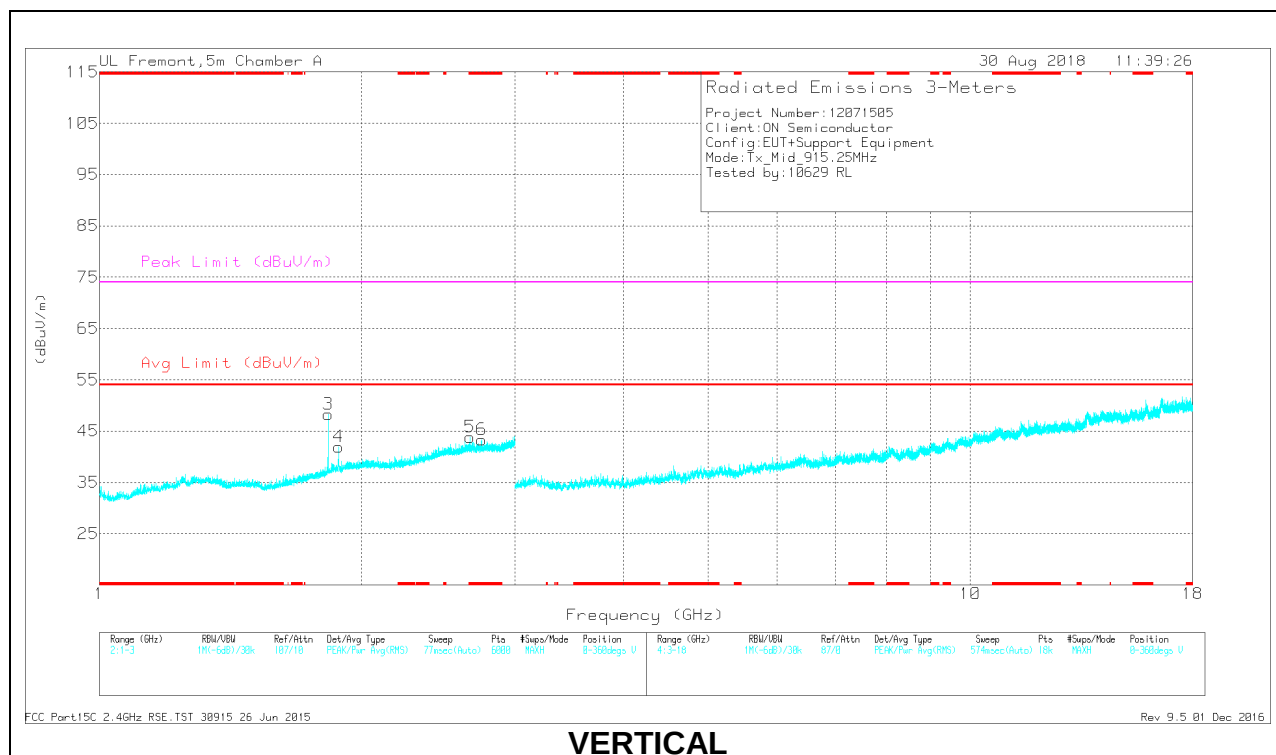
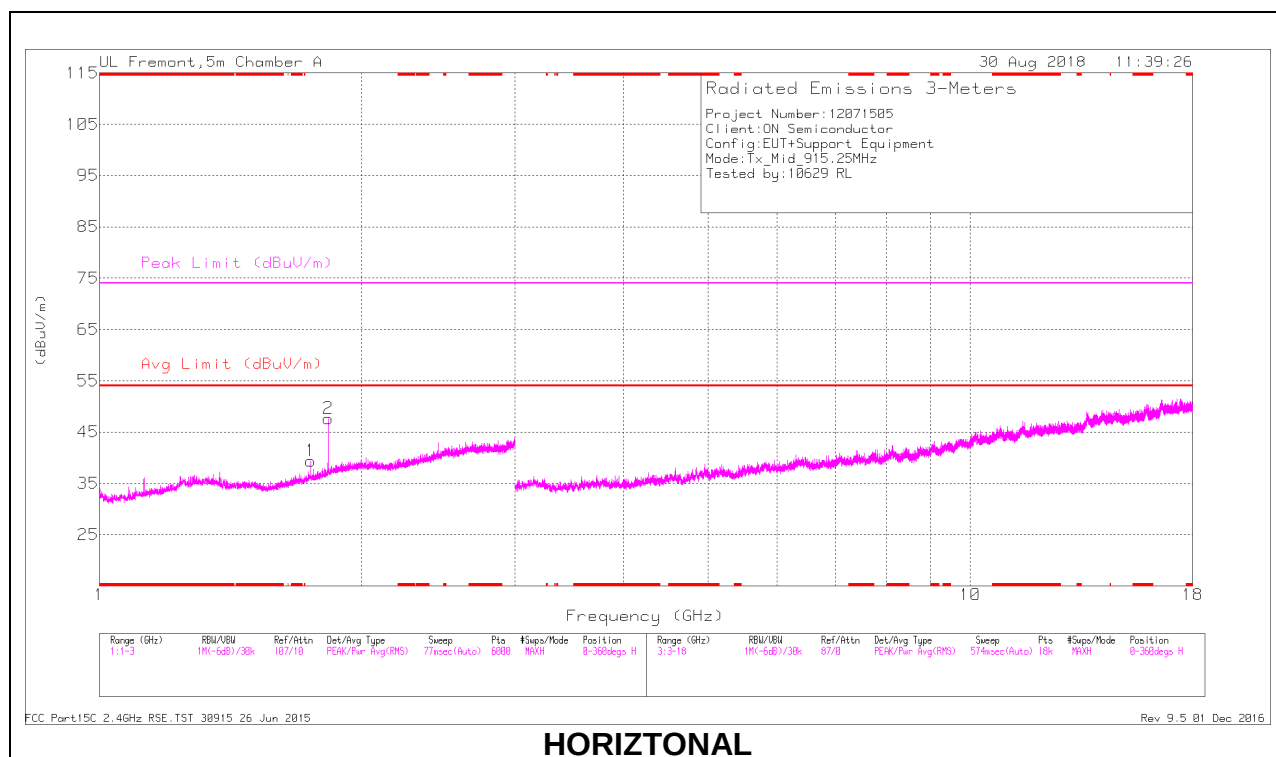
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 2.847	37.15	Pk	32.1	-20.6	-	48.65	54	-5.35	74	-25.35	333	245	H
5	* 2.708	38.22	Pk	32.5	-21.3	-	49.42	54	-4.58	74	-24.58	206	103	V
1	1.805	41.81	Pk	30.3	-22	-	50.11	-	-	-	-	0-360	102	H
4	1.805	40.65	Pk	30.3	-22	-	48.95	-	-	-	-	0-360	101	V
2	1.882	32.96	Pk	31	-21.9	-	42.06	-	-	-	-	0-360	102	H
3	2.186	32.67	Pk	31.1	-22.2	-	41.57	-	-	-	-	0-360	102	H

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

Pk - Peak detector

Peak measurements meet the average limit. Therefore, average readings were not necessary to measure.

MID CHANNEL RESULTS



RADIATED EMISSIONS

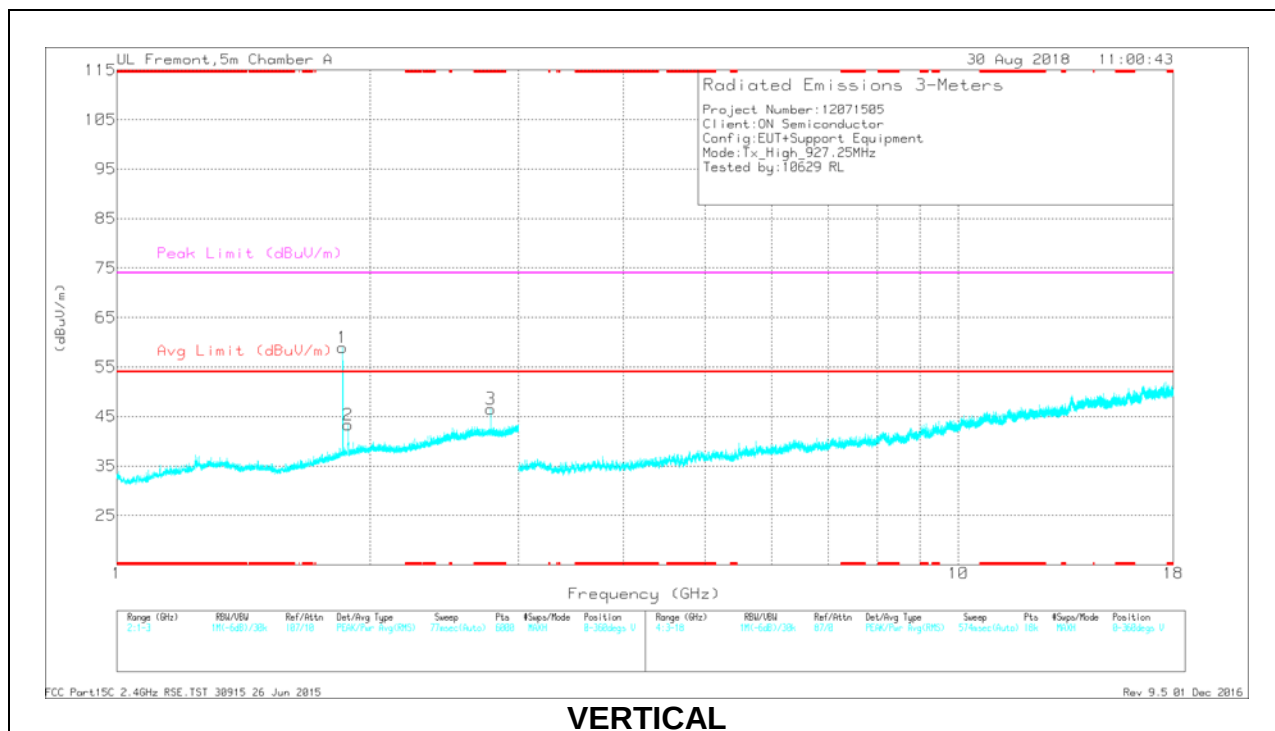
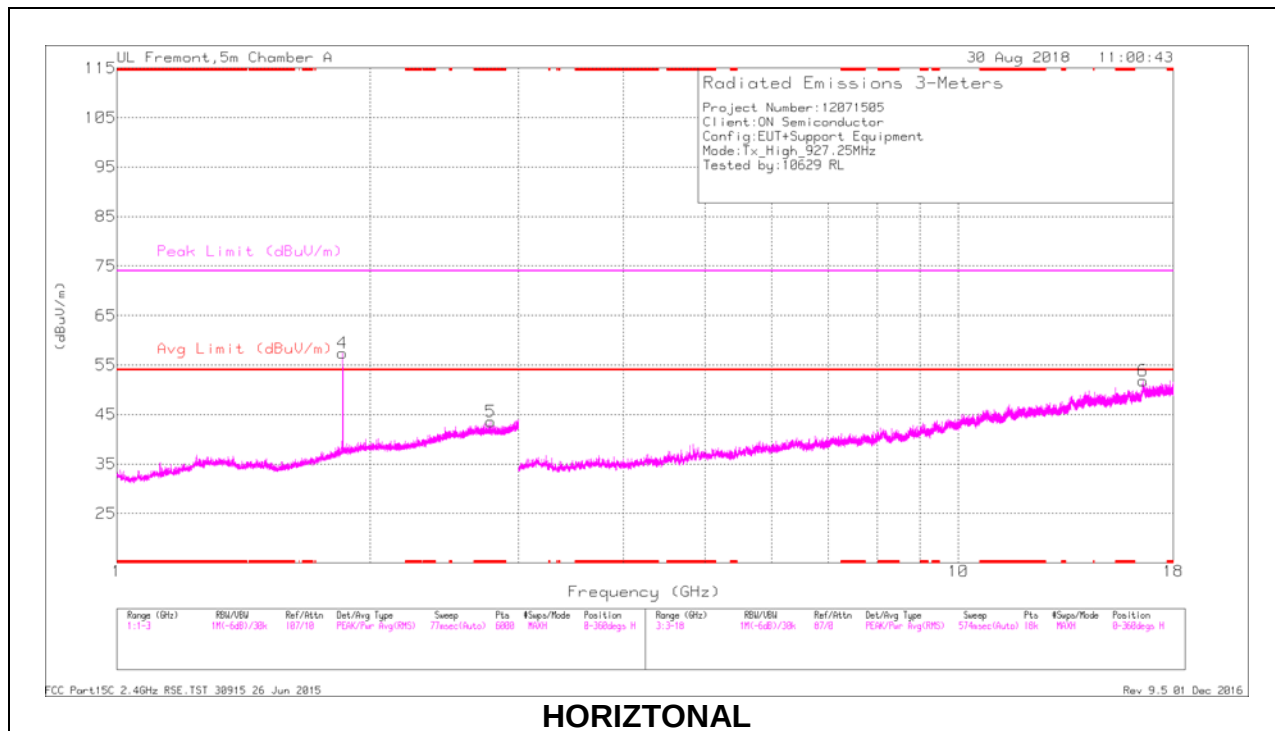
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 2.661	38.01	Pk	32.5	-21.4	-	49.11	54	-4.89	74	-24.89	248	263	V
5	* 2.746	39.46	Pk	32.3	-21.1	-	50.66	54	-3.34	74	-23.34	210	104	V
1	1.748	32.66	Pk	29.7	-22	-	40.36	-	-	-	-	0-360	101	H
2	1.83	40.05	Pk	30.6	-22	-	48.65	-	-	-	-	0-360	199	H
3	1.83	40.65	Pk	30.6	-22	-	49.25	-	-	-	-	0-360	200	V
4	1.882	33.85	Pk	31	-21.9	-	42.95	-	-	-	-	0-360	101	V

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

Pk - Peak detector

Peak measurements meet the average limit. Therefore, average readings were not necessary to measure.

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fitr/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
5	* 2.782	39.49	Pk	32.3	-20.9	-	50.89	54	-3.11	74	-23.11	275	168	H
3	* 2.782	41.13	Pk	32.3	-20.9	-	52.53	54	-1.47	74	-21.47	209	117	V
4	1.854	49.4	Pk	30.9	-21.9	-	58.4	-	-	-	-	0-360	199	H
1	1.854	50.93	Pk	30.9	-21.9	-	59.93	-	-	-	-	0-360	101	V
2	1.882	35.22	Pk	31	-21.9	-	44.32	-	-	-	-	0-360	200	V
6	16.577	26.33	Pk	41.4	-14.9	-	52.83	-	-	-	-	0-360	199	H

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

Pk - Peak detector

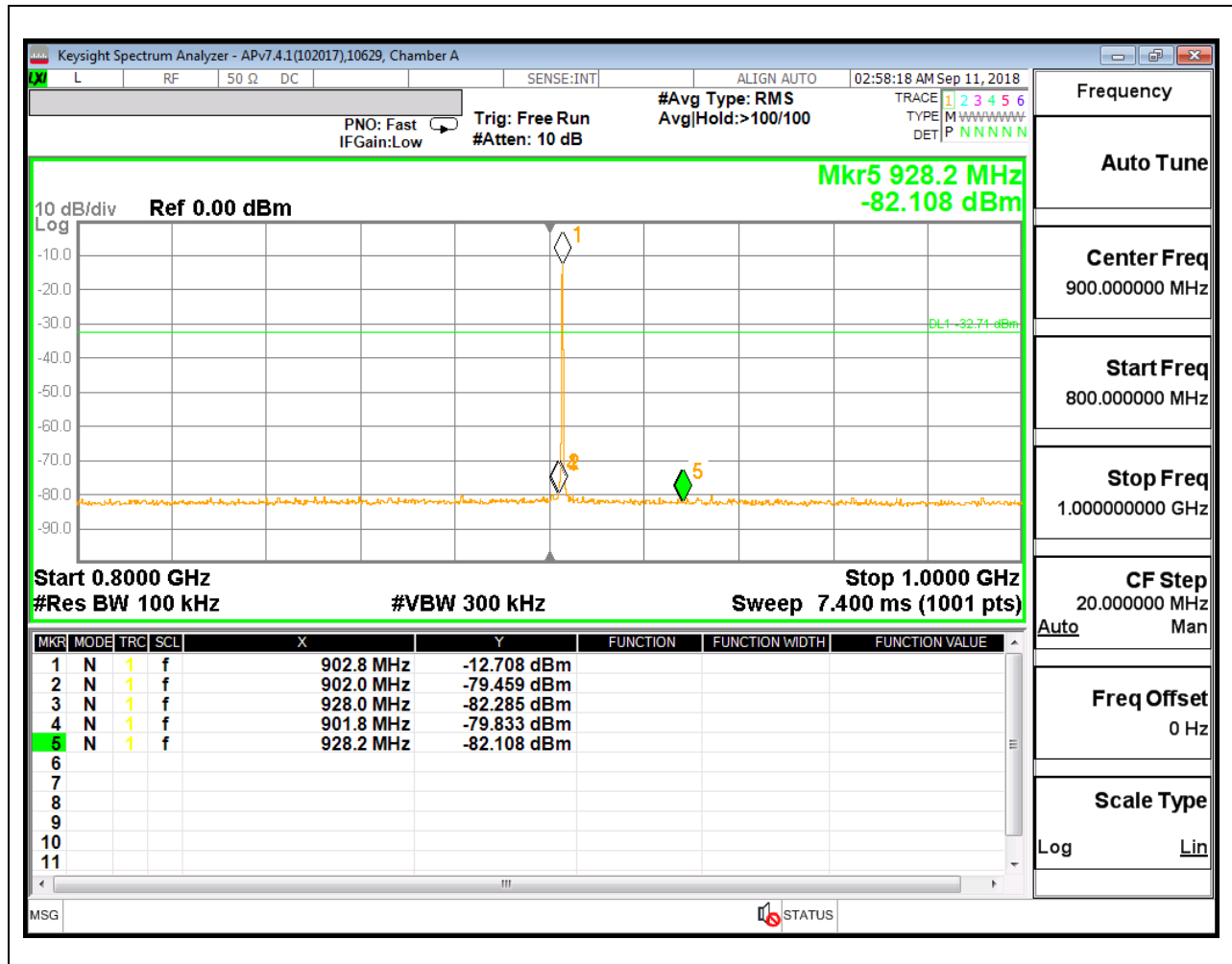
Peak measurements meet the average limit. Therefore, average readings were not necessary to measure.

9.2. TRANSMITTER BELOW 1 GHz

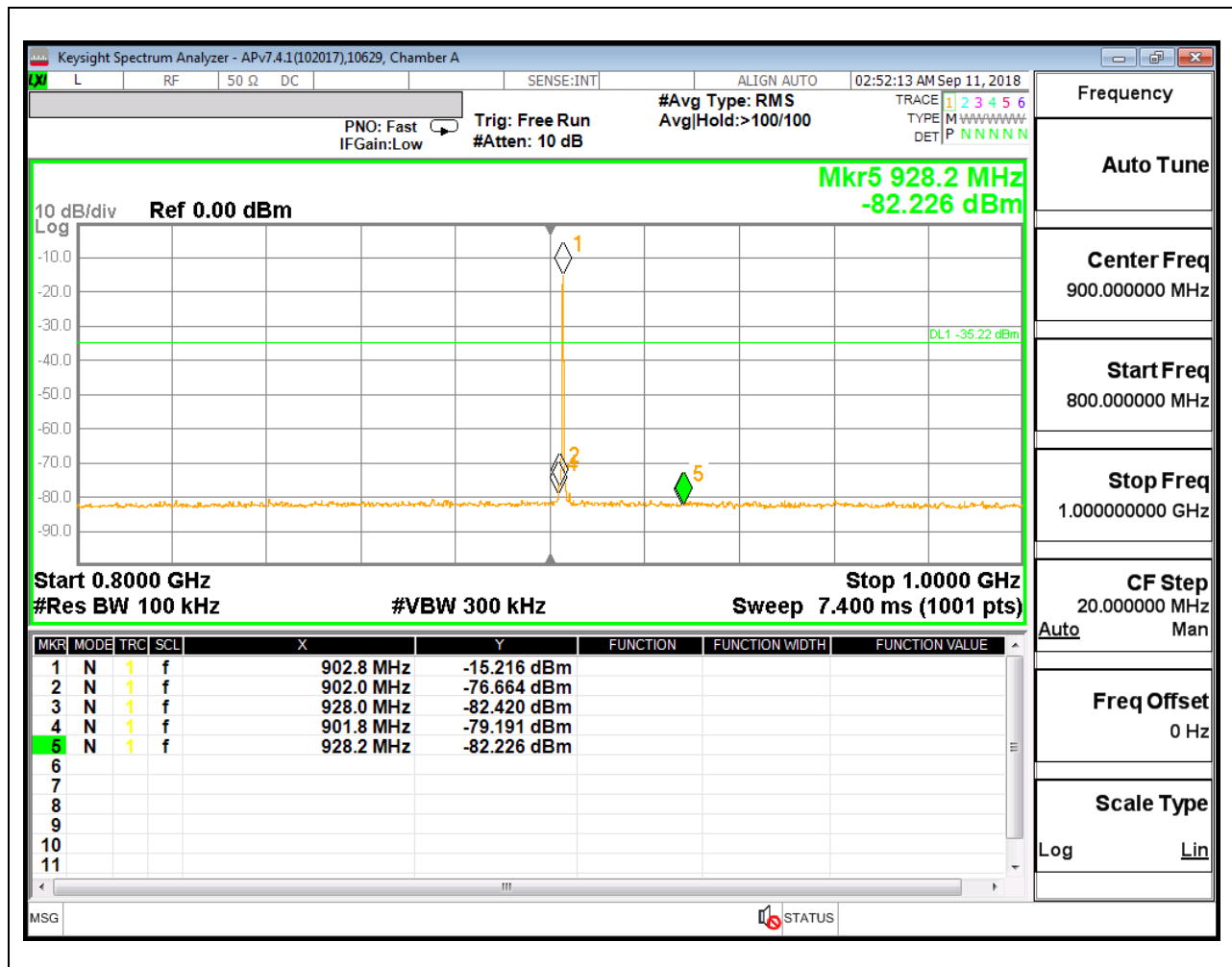
9.2.1. -20 dBc BANDEDGE WITHOUT NOTCH FILTER AND PRE-AMPLIFIER

LOW CHANNEL

HORIZONTAL RESULT



VERTICAL RESULT



Keysight Spectrum Analyzer - APv7.4.1(102017),10629, Chamber A

RL RF 50 Ω DC SENSE:INT ALIGN AUTO 02:38:55 AM Sep 11, 2018

PNO: Fast IFGain:Low Trig: Free Run #Atten: 10 dB #Avg Type: RMS Avg|Hold:>100/100

TRACE 1 2 3 4 5 6 TYPE M W W W W W W W DET P N N N N N N

10 dB/div Ref 0.00 dBm

Log

Mkr5 928.2 MHz -77.928 dBm

DL1 -31.06 dBm

Start 0.8000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 1.0000 GHz Sweep 7.400 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	927.2 MHz	-11.062 dBm			
2	N	1	f	902.0 MHz	-82.277 dBm			
3	N	1	f	928.0 MHz	-76.334 dBm			
4	N	1	f	901.8 MHz	-81.963 dBm			
5	N	1	f	928.2 MHz	-77.928 dBm			
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency

Auto Tune

Center Freq 900.000000 MHz

Start Freq 800.000000 MHz

Stop Freq 1.000000000 GHz

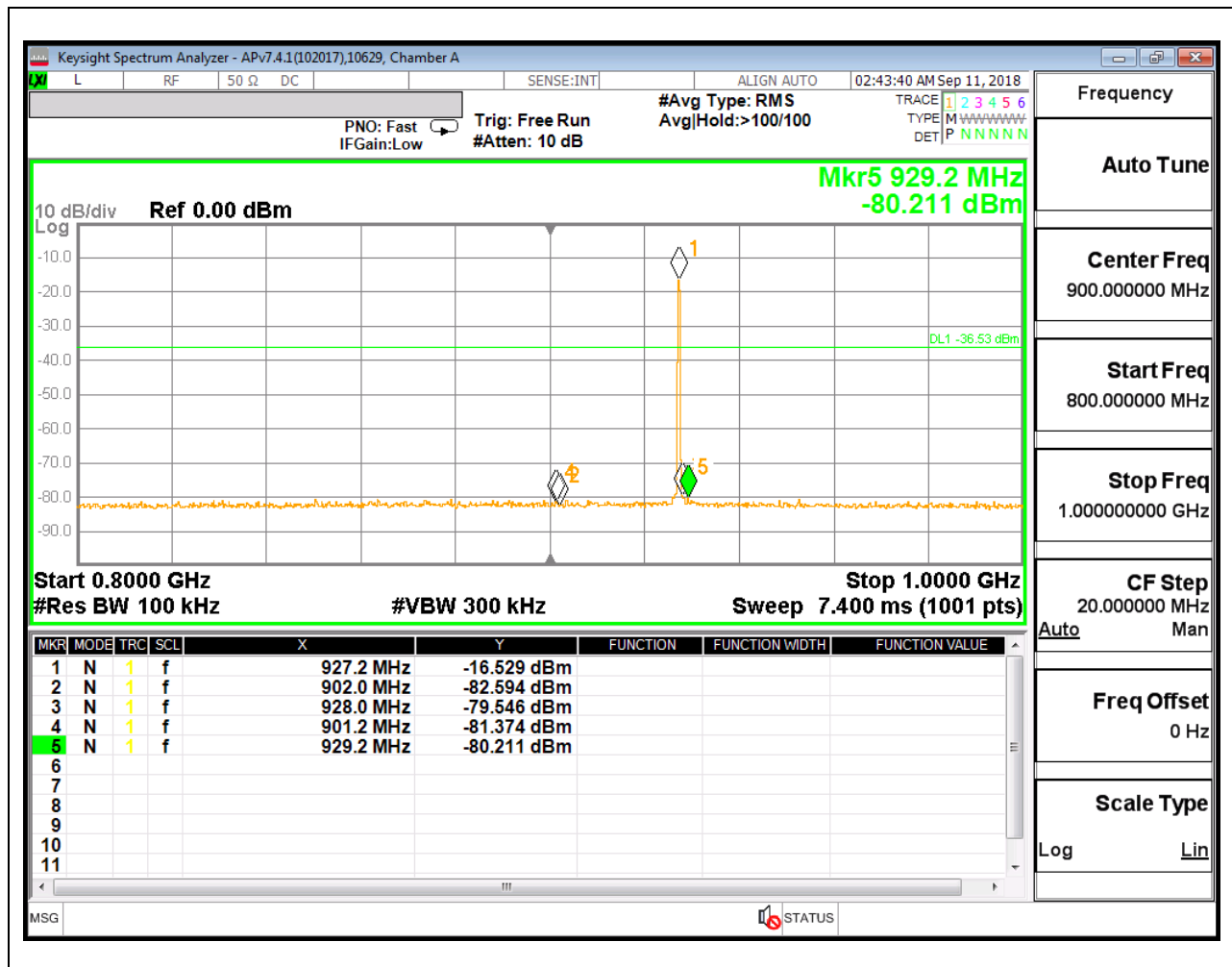
CF Step 20.000000 MHz

Auto Man

Freq Offset 0 Hz

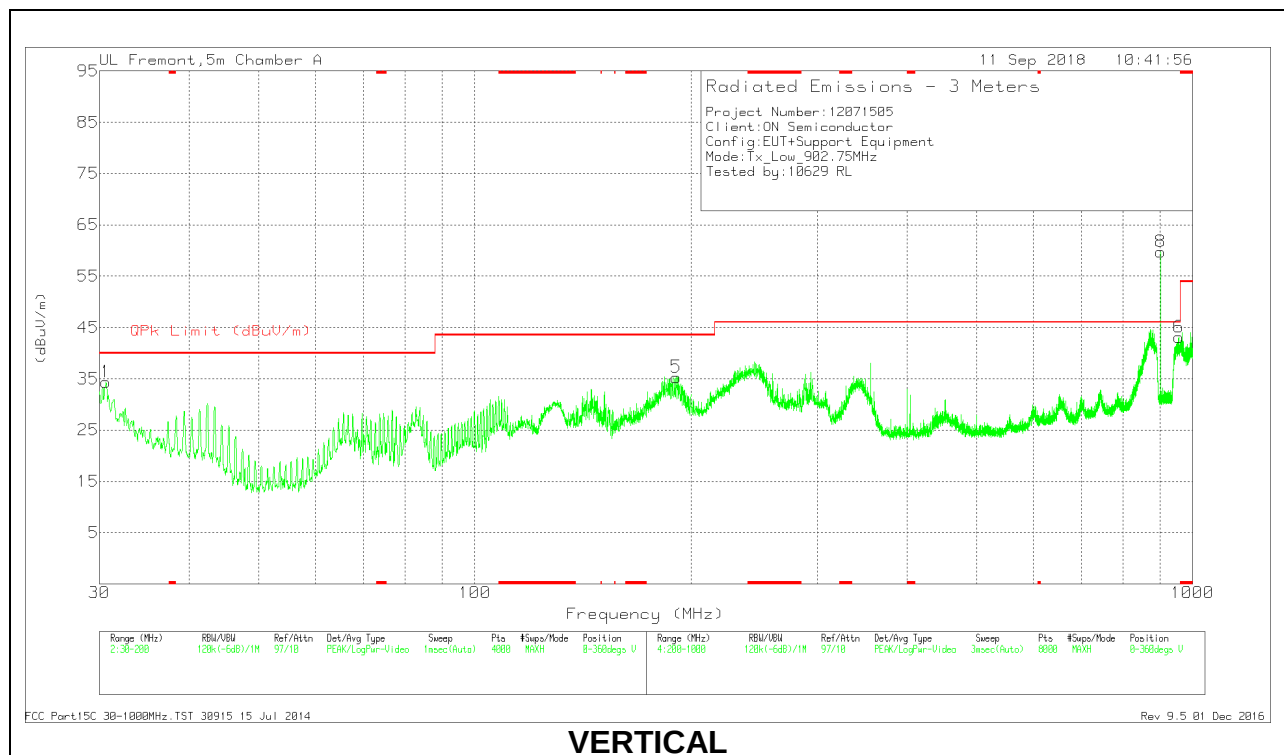
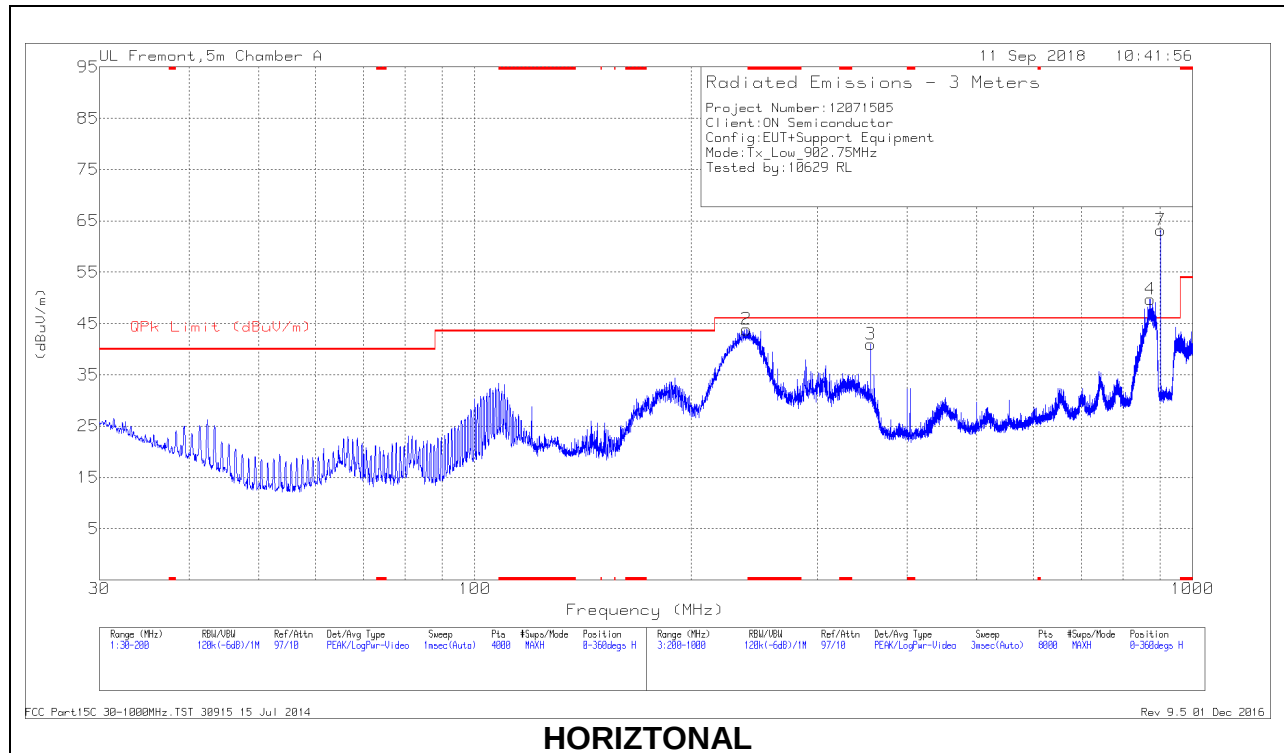
Scale Type Log Lin

VERTICAL RESULT



9.2.2. HARMONICS AND SPURIOUS EMISSIONS WITH A NOTCH FILTER

LOW CHANNEL RESULTS



Trace Markers

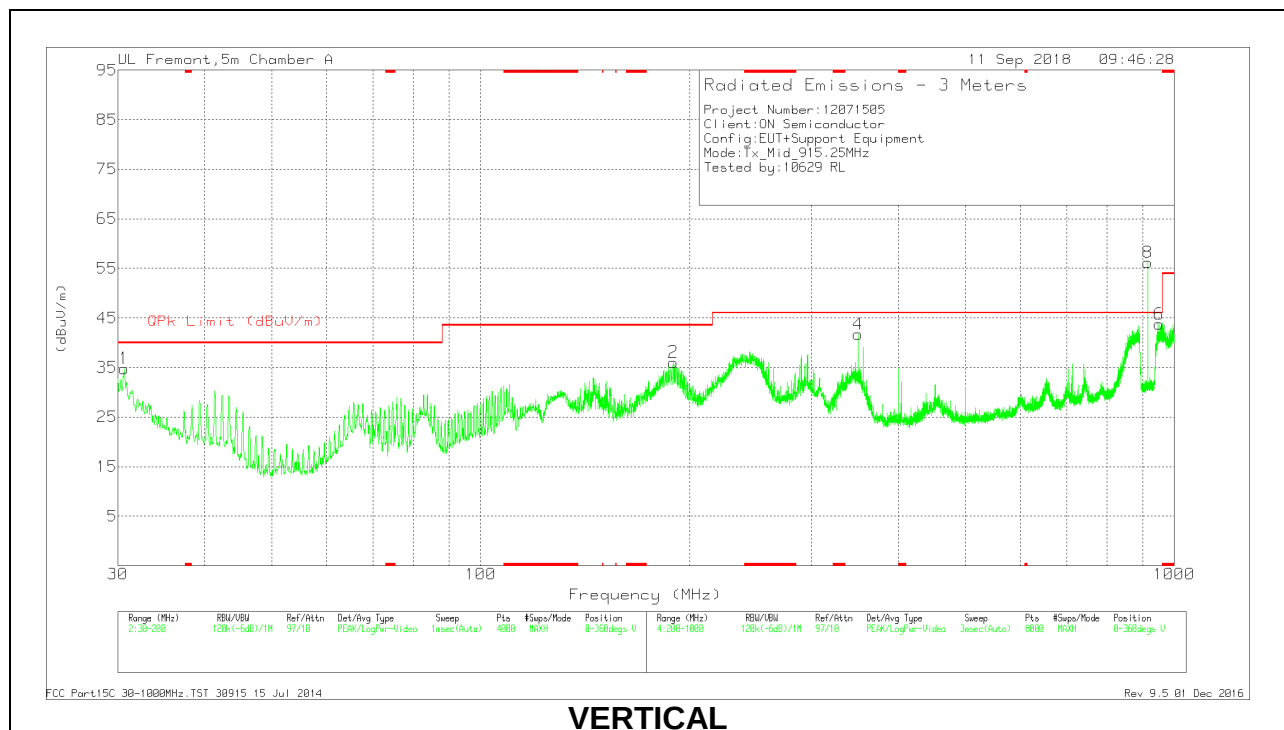
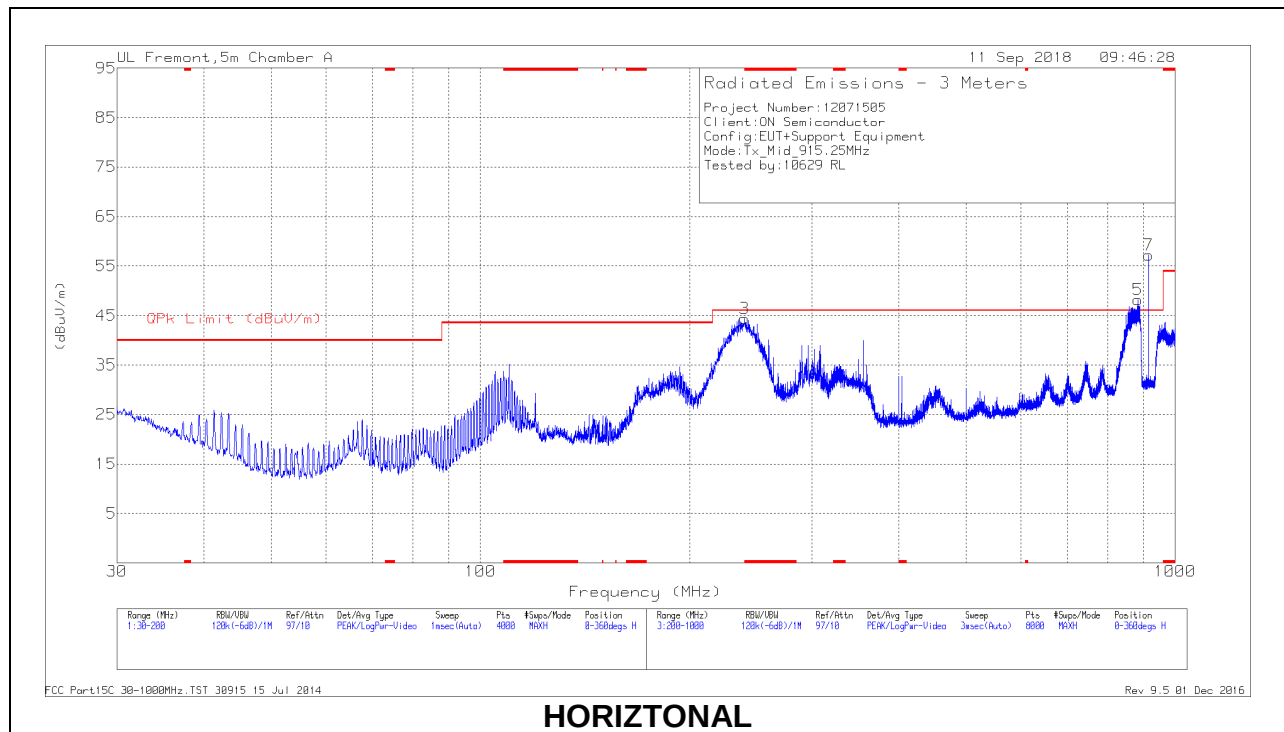
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.6147	34.87	Qp	24.8	-26.7	32.97	40	-7.03	65	104	V
5	190.6491	45.31	Pk	15.4	-24.8	35.91	43.52	-7.61	0-360	100	V
2	239.9957	51.12	Qp	15.5	-24.3	42.32	46.02	-3.7	242	107	H
3	356.0037	45.95	Qp	18.5	-24.2	40.25	46.02	-5.77	128	110	H
4	874.0317	39.31	Qp	25.9	-22.6	42.61	46.02	-3.41	208	110	H
6	952.2627	34.28	Qp	26.7	-22.1	38.88	46.02	-7.14	293	101	V
**7	902.7914	59.59	Pk	26.6	-22.4	63.79	-	-	0-360	100	H
**8	902.7914	56.2	Pk	26.6	-22.4	60.4	-	-	0-360	100	V

** - Fundamental Frequencies

Pk - Peak detector

Qp - Quasi-Peak detector

MID CHANNEL RESULTS



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	*240.0001	51.39	Qp	15.5	-24.3	42.59	46.02	-3.43	235	125	H
1	30.5997	34.3	Qp	24.8	-26.7	32.4	40	-7.6	211	106	V
2	189.7563	46.17	Pk	15.3	-24.8	36.67	43.52	-6.85	0-360	100	V
4	356.0051	44	Qp	18.5	-24.2	38.3	46.02	-7.72	315	107	V
5	883.9574	40.46	Qp	26.1	-22.6	43.96	46.02	-2.06	211	101	H
6	957.837	36.66	Qp	26.8	-22.1	41.36	46.02	-4.66	295	115	V
**8	915.243	52.61	Pk	26.5	-22.3	56.81	-	-	0-360	200	V
**7	915.293	53.56	Pk	26.5	-22.3	57.76	-	-	0-360	300	H

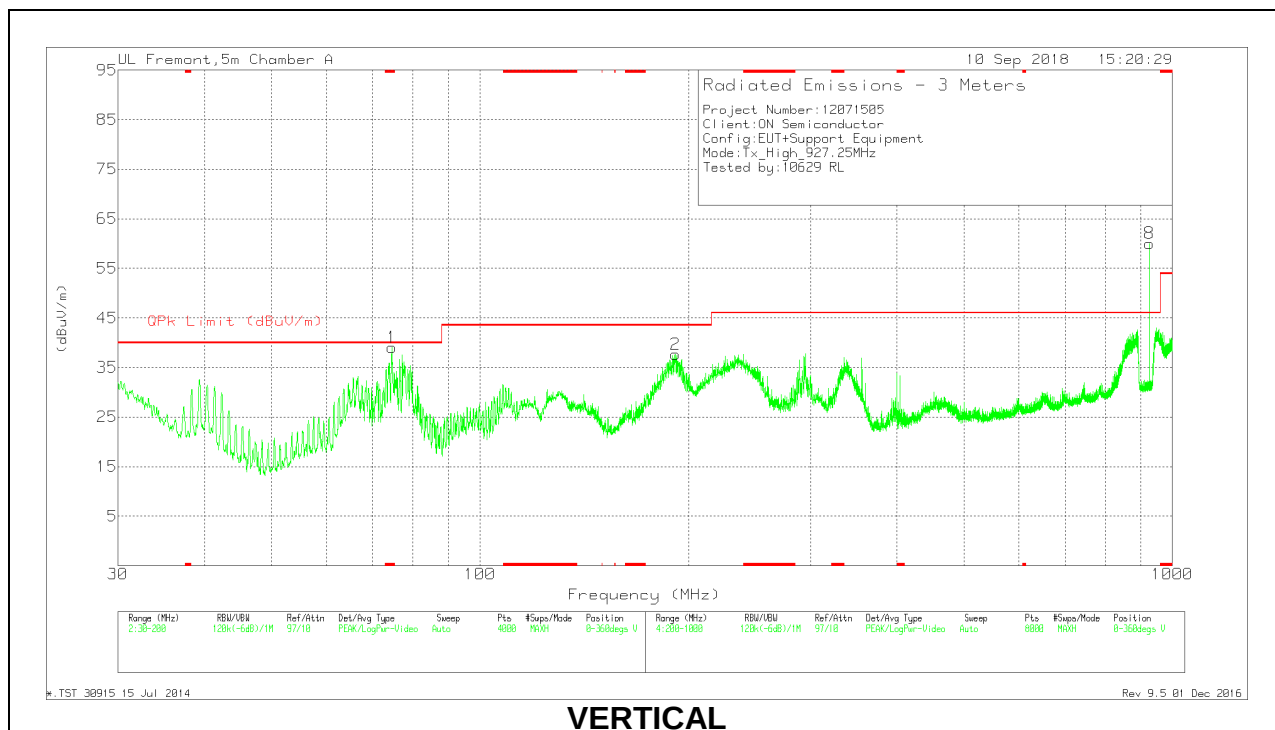
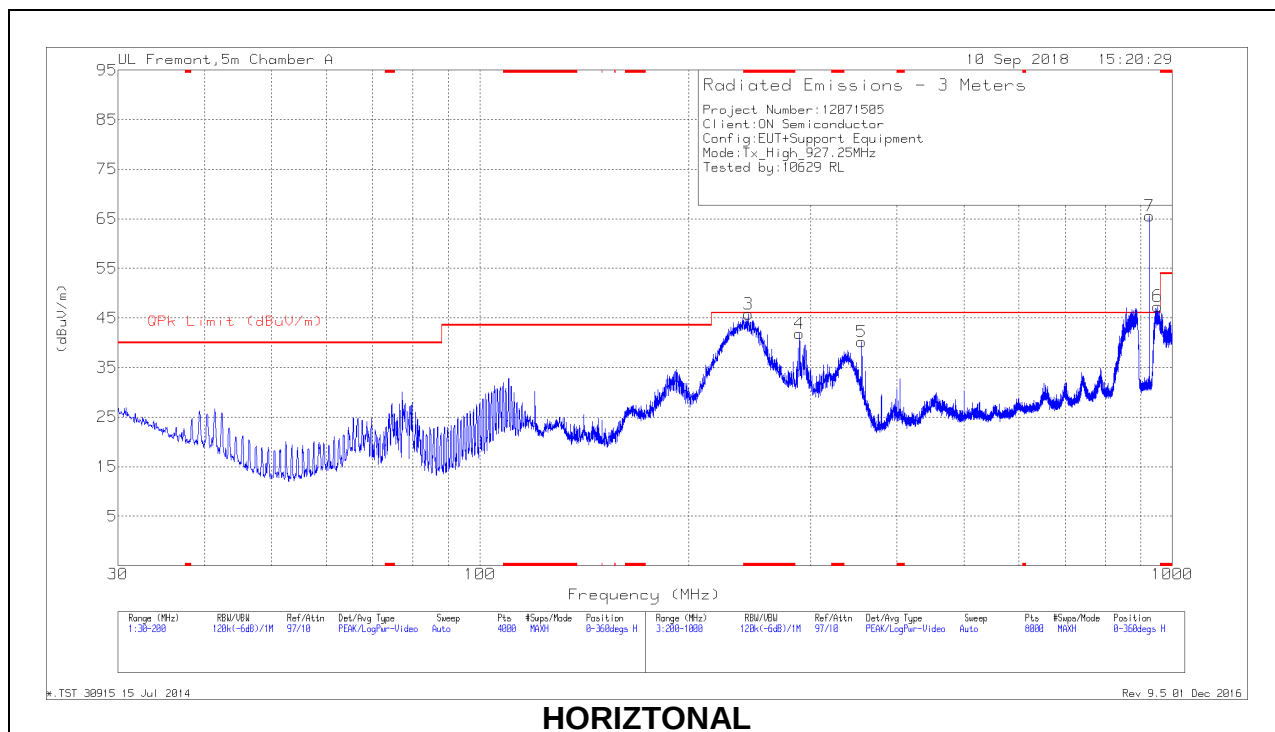
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

** - Fundamental Frequencies

Pk - Peak detector

Qp - Quasi-Peak detector

HIGH CHANNEL RESULTS



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	77.2123	50.96	Qp	11.8	-26.1	36.66	40	-3.34	339	127	V
3	* 249.99	53.28	Qp	15.5	-24.2	44.58	46.02	-1.44	223	140	H
2	190.4822	44.06	Qp	15.3	-24.8	34.56	43.52	-8.96	105	108	V
4	293.5402	45.28	Qp	17.2	-24	38.48	46.02	-7.54	108	143	H
5	356.0033	44.72	Qp	18.5	-24.2	39.02	46.02	-7	90	116	H
6	951.1422	38.7	Qp	26.7	-22.1	43.3	46.02	-2.72	153	168	H
**7	927.2945	61.93	Pk	26.5	-22.2	66.23	-	-	0-360	101	H
**8	927.2945	56.36	Pk	26.5	-22.2	60.66	-	-	0-360	101	V

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

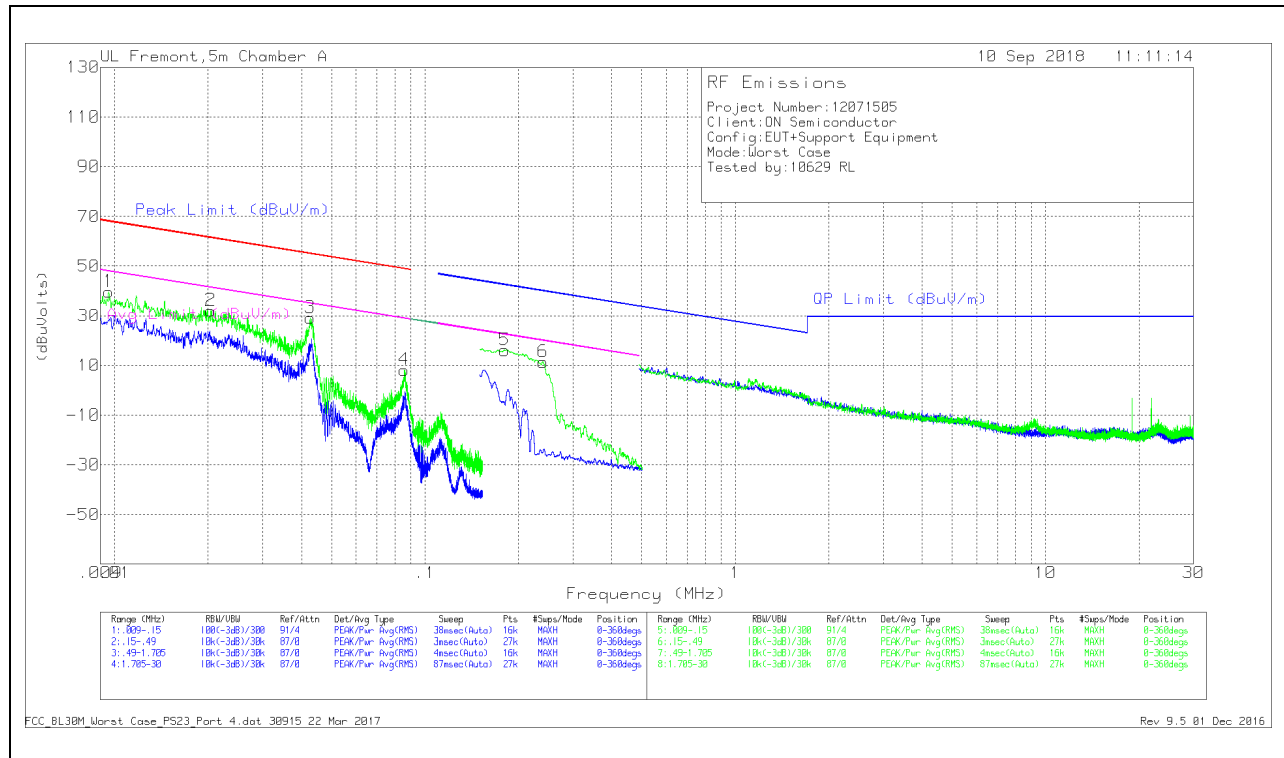
** - Fundamental Frequencies

Pk - Peak detector

Qp - Quasi-Peak detector

9.3. WORST CASE BELOW 30 MHz

9.3.1. SPURIOUS EMISSIONS 9 kHz TO 30 MHz (WORST-CASE CONFIGURATION)



Below 30MHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBUV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBUV/m)	Peak Limit (dBUV/m)	Margin (dB)	Avg Limit (dBUV/m)	Margin (dB)	QP Limit (dBUV/m)	Margin (dB)	Azimuth (Degs)
1	.00957	100.4	Pk	19.2	.1	-80	39.7	67.97	-28.27	47.97	-8.27	-	-	0-360
2	.02039	97.79	Pk	14.2	.1	-80	32.09	61.39	-29.3	41.39	-9.3	-	-	0-360
3	.04268	96.6	Pk	12.5	.1	-80	29.2	54.98	-25.78	34.98	-5.78	-	-	0-360
	.04231	95.37	Av	12.5	.1	-80	27.97	-	-	35.06	-7.09	-	-	159
4	.08552	76.61	Pk	11.5	.1	-80	8.21	48.94	-40.73	28.94	-20.73	-	-	0-360
5	.18023	85.01	Pk	11	.1	-80	16.11	42.5	-26.39	22.5	-6.39	-	-	0-360
6	.2399	80.28	Pk	11	.1	-80	11.38	40.01	-28.63	20.01	-8.63	-	-	0-360

Pk - Peak detector

Av - Average detection

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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

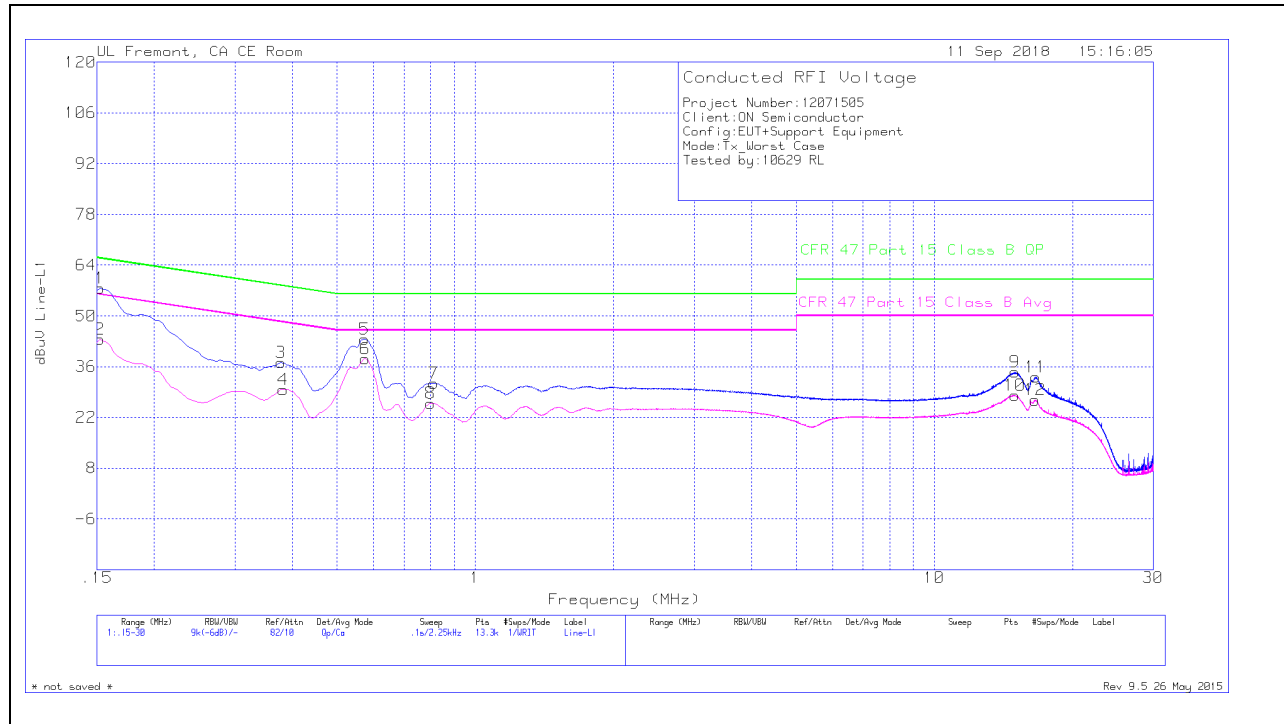
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

LINE 1 RESULTS



Trace Markers

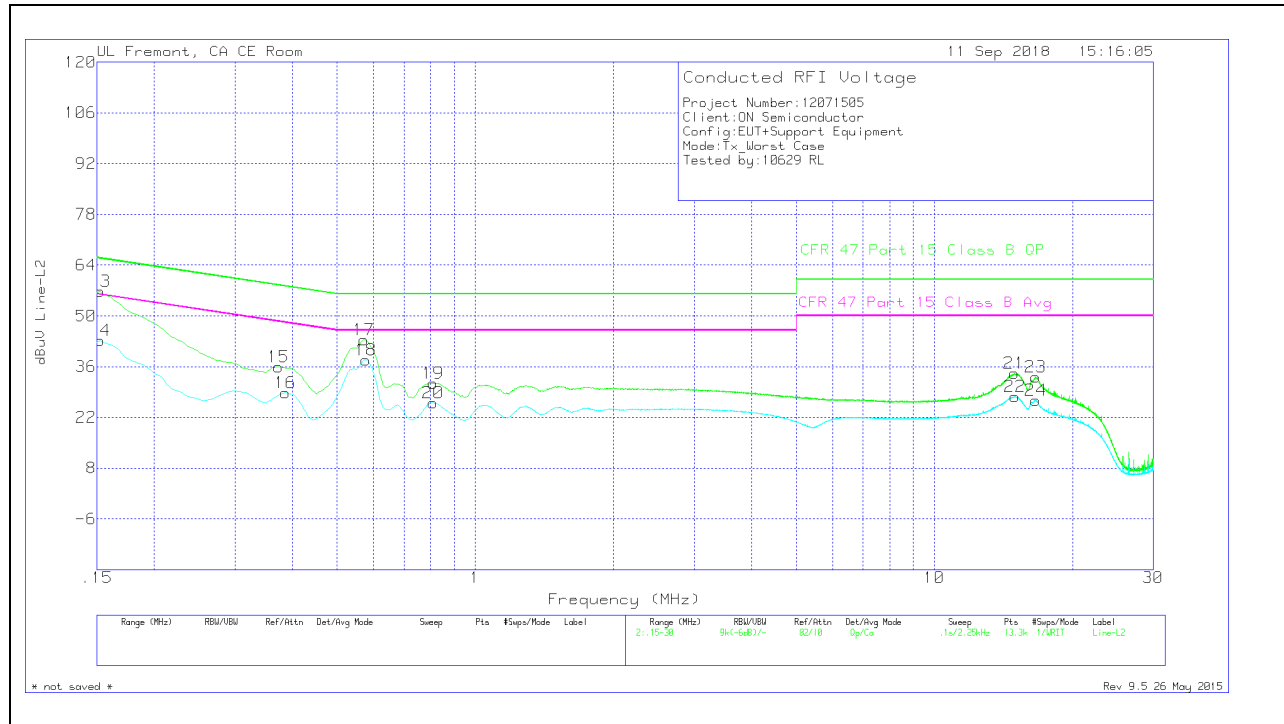
Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
1	.15225	47.49	Qp	.1	0	10.1	57.69	65.88	-8.19	-	-
2	.15225	33.36	Ca	.1	0	10.1	43.56	-	-	55.88	-12.32
3	.37725	26.97	Qp	0	0	10.1	37.07	58.34	-21.27	-	-
4	.38175	19.63	Ca	0	0	10.1	29.73	-	-	48.24	-18.51
5	.57412	33.52	Qp	0	0	10.1	43.62	56	-12.38	-	-
6	.57525	28.09	Ca	0	0	10.1	38.19	-	-	46	-7.81
7	.8115	21.35	Qp	0	0	10.1	31.45	56	-24.55	-	-
8	.80025	15.82	Ca	0	0	10.1	25.92	-	-	46	-20.08
9	15.00675	23.88	Qp	.1	.3	10.2	34.48	60	-25.52	-	-
10	15.00675	17.49	Ca	.1	.3	10.2	28.09	-	-	50	-21.91
11	16.64025	22.44	Qp	.1	.3	10.3	33.14	60	-26.86	-	-
12	16.602	16.1	Ca	.1	.3	10.3	26.8	-	-	50	-23.2

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



Trace Markers

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
13	.15225	46.61	Qp	.1	0	10.1	56.81	65.88	-9.07	-	-
14	.15225	33.07	Ca	.1	0	10.1	43.27	-	-	55.88	-12.61
15	.37275	25.86	Qp	0	0	10.1	35.96	58.44	-22.48	-	-
16	.38625	18.68	Ca	0	0	10.1	28.78	-	-	48.14	-19.36
17	.573	33.25	Qp	0	0	10.1	43.35	56	-12.65	-	-
18	.5775	27.8	Ca	0	0	10.1	37.9	-	-	46	-8.1
19	.80925	21.37	Qp	0	0	10.1	31.47	56	-24.53	-	-
20	.80925	15.91	Ca	0	0	10.1	26.01	-	-	46	-19.99
21	14.955	23.58	Qp	.1	.3	10.2	34.18	60	-25.82	-	-
22	15.009	17.16	Ca	.1	.3	10.2	27.76	-	-	50	-22.24
23	16.65375	22.46	Qp	.1	.3	10.3	33.16	60	-26.84	-	-
24	16.656	16.05	Ca	.1	.3	10.3	26.75	-	-	50	-23.25

Qp - Quasi-Peak detector

Ca - CISPR average detection