Company: Tarana Wireless

Test of: AA2-CN65AFP
To: FCC CFR 47 Part 15 Subpart E 15.407

Report No.: TARA25-U3_Radiated Rev A

RADIATED TEST REPORT

Issue Date: 15th December 2016

Master Document Number	Addendum Reports
TARA25-U3_Master	TARA25-U3_Conducted
	TARA25-U3_Radiated

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1. TEST SUMMARY

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2. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy to read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Data'.

Test and report automation was performed by MiTest. MiTest is an automated test system developed by MiCOM Labs. MiTest is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing.

3. TEST RESULTS

3.1. Radiated

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious and Band-Edge Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (b), 15.205, 15.209	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions
Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.
Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Test configuration and setup for Undesirable Measurement were per the Radiated Test Set-up specified in this document.

15.407 (b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Limits for Restricted Bands (15.205, 15.209)
Peak emission: 74 dBuV/m
Average emission: 54 dBuV/m

Field Strength Calculation
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where:
FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss

Example:
The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBµV/m);

$$E = \frac{1000000 \times \sqrt{30P}}{3}$$ µV/m

where P is the EIRP in Watts

Therefore: -27 dBm/MHz equates to 68.23 dBuV/m

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:
Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m
48 dBmV/m = 250 mV/m

Restricted Bands of Operation (15.205)
(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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

12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to §15.213.

(4) Any equipment operated under the provisions of §15.253, 15.255, and 15.256 in the frequency band 75-85 GHz, or §15.257 of this part.

(5) Biomedical telemetry devices operating under the provisions of §15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

(6) Transmitters operating under the provisions of subparts D or F of this part.

(7) Devices operated pursuant to §15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.

(8) Devices operated in the 24.075-24.175 GHz band under §15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in §15.245(b).

(9) Devices operated in the 24.0-24.25 GHz band under §15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in §15.249(a).

(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of §15.245 shall not exceed the limits specified in §15.245(b).

3.1.1. TX Spurious & Restricted Band Emissions

3.1.1.1. Tarana AA2-CN65AFP

Spurious emissions were performed in the 20MHz bandwidth channel configuration which represents the worst case producing the highest emissions.

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	Tarana Integral	**Variant:**	20 Low Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5170.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5171.22	58.95	3.71	-11.53	51.13	Fundamental	Vertical	101	242	--	--	
#2	15644.05	46.83	6.00	0.04	52.87	Peak (Scan)	Vertical	101	242	74.0	-21.1	Pass
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%) and it was found that there were no failing emissions present.

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	Tarana Integral	**Variant:**	20 Low Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5200.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5201.52	54.02	3.66	-11.46	46.22	Fundamental	Vertical	101	0	--	--	
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%) and it was found that there were no failing emissions present.

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	Tarana Integral	**Variant:**	20 Low Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5240.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5242.09	56.89	3.63	-11.36	49.16	Fundamental	Vertical	101	0	--	--	
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%) and it was found that there were no failing emissions present.

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	Tarana Integral	**Variant:**	20 High Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5735.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB

Test Measurement Results
Click here to view measurement data...
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%) and it was found that there were no failing emissions present.

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	Tarana Integral	**Variant:**	20 High Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5785.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5786.44	58.24	3.79	-10.44	51.59	Fundamental	Vertical	146	264	--	--	
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%) and it was found that there were no failing emissions present.

Equipment Configuration for TX Spurious & Restricted Band Emissions			
Antenna:	Tarana Integral	**Variant:**	20 High Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5835.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB

Test Measurement Results

1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5836.12	54.86	3.85	-10.21	48.50	Fundamental	Vertical	115	249	--	--	
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%) and it was found that there were no failing emissions present.

3.1.2. Restricted Edge & Band-Edge Emissions

3.1.2.2. Tarana Integral

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

5150 - 5250 MHz

Tarana Integral		Band-Edge Freq	Limit 74.0dBµV/m	Limit 54.0dBµV/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
20 Low Band	5170.00	5150.00	55.99	41.87	14
40 Low Band	5180.00	5150.00	56.16	41.87	14

5725 MHz Radiated Lower Band-Edge Emissions

Tarana Integral		Band-Edge Freq		Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	
20 High Band	5725.00	5725.00	43.31	5
40 High Band	5725.00	5725.00	43.31	8.5

5850 MHz Radiated Higher Band-Edge Emissions

Tarana Integral		Band-Edge Freq		Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	
20 High Band	5850.00	5850.00	44.35	5
40 High Band	5850.00	5850.00	44.37	8

Click on the links to view the data.

Equipment Configuration for Restricted Lower Band-Edge Emissions			
Antenna:	Tarana Integral	**Variant:**	20 Low Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5170.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	14	**Tested By:**	SB

Test Measurement Results

4475.00 - 5175.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5150.00	4.09	3.67	34.11	41.87	Max Avg	Vertical	175	273	54.0	-12.1	Pass
#2	5150.00	18.21	3.67	34.11	55.99	Max Peak	Vertical	175	273	74.0	-18.0	Pass
#3	5150.00	--	--	--	--	Restriced-Band	--	--	--	--	--	--
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%)

4475.00 - 5175.00 MHz								
Num	**Frequency MHz**	**Level dBµV/m @ 3m**	**Level uW ****	**Measurement Type**	**Limit dBµV/m @ 3m**	**Limit uW**	**Margin uW**	**Pass /Fail**
#1	5150.00	41.87	0.0736	Max Avg	54.0	0.0753	-0.0017	Pass
#2	5150.00	55.99	1.9056	Max Peak	74.0	7.5356	-5.63	Pass
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01								

*****(Emission Level (uW) × # of Transmitter Chains) + Duty Cycle = Emission Level (uW)***

Equipment Configuration for Restricted Lower Band-Edge Emissions			
Antenna:	Tarana Integral	**Variant:**	40 Low Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5180.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	14	**Tested By:**	SB

Test Measurement Results

4475.00 - 5175.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5047.60	18.32	3.64	34.20	56.16	Max Peak	Vertical	175	273	74.0	-17.8	Pass
#2	5150.00	4.09	3.67	34.11	41.87	Max Avg	Vertical	175	273	54.0	-12.1	Pass
#3	5150.00	--	--	--	--	Restriced-Band	--	--	--	--	--	--
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%)

4475.00 - 5175.00 MHz								
Num	**Frequency MHz**	**Level dBµV/m @ 3m**	**Level uW ****	**Measurement Type**	**Limit dBµV/m @ 3m**	**Limit uW**	**Margin uW**	**Pass /Fail**
#1	5150.00	41.87	0.0736	Max Avg	54.0	0.0753	-0.0017	Pass
#2	5047.60	56.16	1.9824	Max Peak	74.0	7.5356	-5.5532	Pass
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01								

****(Emission Level (uW) × # of Transmitter Chains) + Duty Cycle = Emission Level (uW)***

Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions			
Antenna:	Tarana Integral	**Variant:**	20 High Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5735.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB

Test Measurement Results

5550.00 - 5755.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5651.05	5.37	3.76	34.18	43.31	Max Avg	Vertical	175	273	68.9	-25.6	Pass
#2	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%)

4475.00 - 5175.00 MHz								
Num	**Frequency MHz**	**Level dBµV/m @ 3m**	**Level uW ****	**Measurement Type**	**Limit dBµV/m @ 3m**	**Limit uW**	**Margin uW**	**Pass /Fail**
#1	5651.05	43.31	0.1024	Max Avg	68.9	1.9958	-1.8934	Pass
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01								

****(Emission Level (uW) × # of Transmitter Chains) + Duty Cycle = Emission Level (uW)***

Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions			
Antenna:	Tarana Integral	**Variant:**	40 High Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5745.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	8.5	**Tested By:**	SB

Test Measurement Results

5550.00 - 5755.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#1	5649.41	5.38	3.75	34.18	43.31	Max Avg	Vertical	175	273	68.2	-24.9	Pass
#2	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%)

4475.00 - 5175.00 MHz								
Num	**Frequency MHz**	**Level dBµV/m @ 3m**	**Level uW ****	**Measurement Type**	**Limit dBµV/m @ 3m**	**Limit uW**	**Margin uW**	**Pass /Fail**
#1	5649.41	43.31	0.1024	Max Avg	68.9	1.9958	-1.8934	Pass
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01								

****(Emission Level (uW) × # of Transmitter Chains) + Duty Cycle = Emission Level (uW)***

Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions			
Antenna:	Tarana Integral	**Variant:**	20 High Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5835.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB

Test Measurement Results

5800.00 - 6000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#2	5930.96	5.67	3.84	34.84	44.35	Max Avg	Vertical	175	273	68.2	-23.9	Pass
#1	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%)

4475.00 - 5175.00 MHz								
Num	**Frequency MHz**	**Level dBµV/m @ 3m**	**Level uW ****	**Measurement Type**	**Limit dBµV/m @ 3m**	**Limit uW**	**Margin uW**	**Pass /Fail**
#2	5930.96	44.35	0.1296	Max Avg	68.9	1.9958	-1.8662	Pass
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01								

****(Emission Level (uW) × # of Transmitter Chains) + Duty Cycle = Emission Level (uW)***

Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions			
Antenna:	Tarana Integral	**Variant:**	40 High Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5825.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	8	**Tested By:**	SB

Test Measurement Results

5800.00 - 6000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
#2	5942.18	5.64	3.87	34.86	44.37	Max Avg	Vertical	175	273	68.2	-23.9	Pass
#1	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01												

In Reference to KDB 759532 spurious emission values were corrected for additional Transmitter Chains (8) and Duty Cycle Correction (50%)

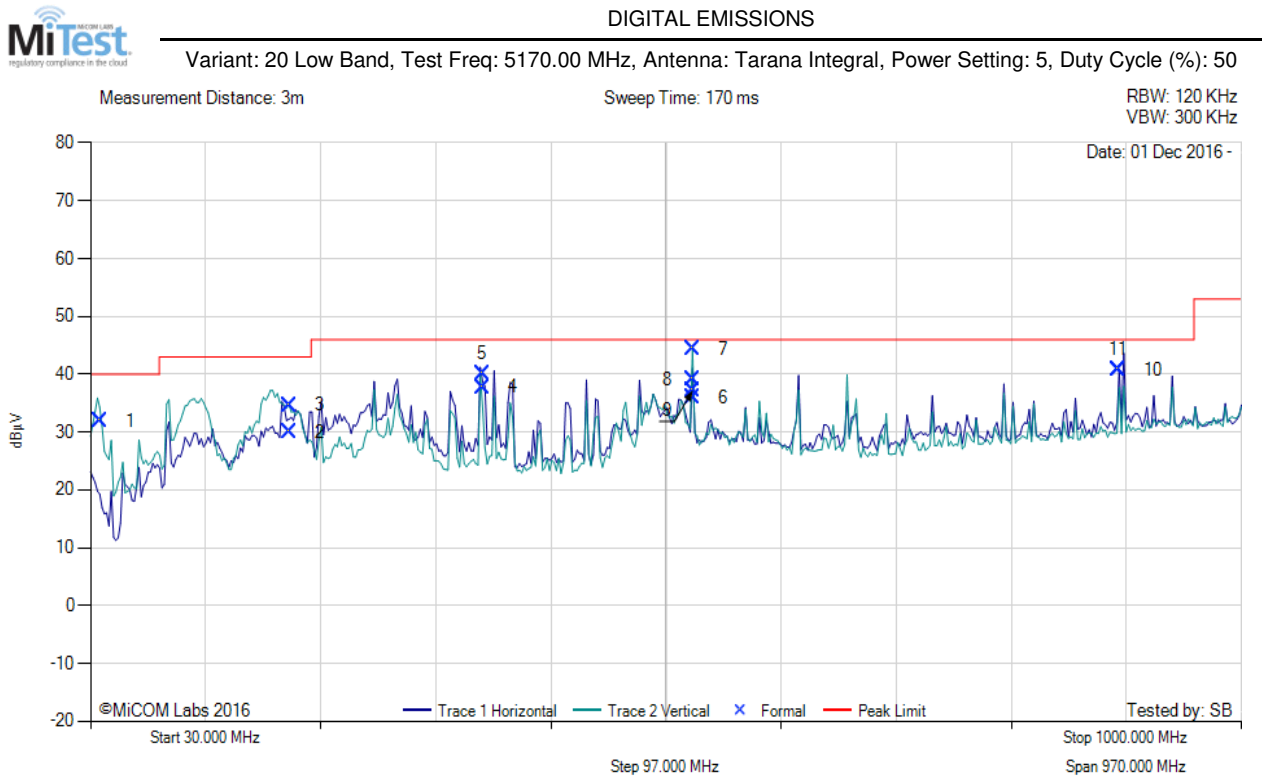
4475.00 - 5175.00 MHz								
Num	**Frequency MHz**	**Level dBµV/m @ 3m**	**Level uW ****	**Measurement Type**	**Limit dBµV/m @ 3m**	**Limit uW**	**Margin uW**	**Pass /Fail**
#2	5942.18	44.37	0.1312	Max Avg	68.9	1.9958	-1.8646	Pass
Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01								

*****(Emission Level (uW) × # of Transmitter Chains) + Duty Cycle = Emission Level (uW)***

3.1.3. Digital Emissions

Equipment Configuration for Digital Emissions			
Antenna:	Tarana Integral	**Variant:**	20 Low Band
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5170.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB
Test Notes:	AC/DC Adapter: MEAN WELL HLG-150H-54		

Test Measurement Results



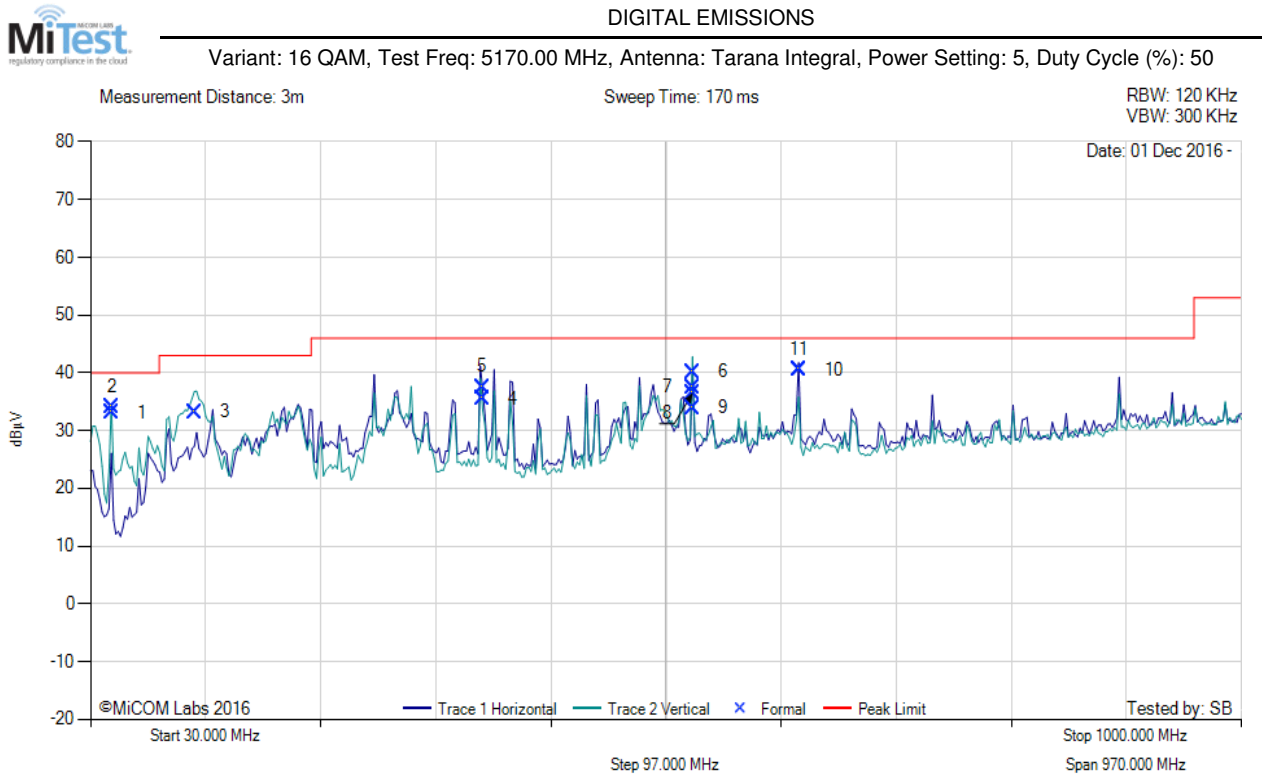
30.00 - 1000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	37.83	44.46	3.48	-16.06	31.88	MaxQP	Vertical	100	193	40.0	-8.1	Pass
2	197.41	44.31	4.33	-18.66	29.98	MaxQP	Vertical	100	346	43.0	-13.0	Pass
3	197.41	49.02	4.33	-18.66	34.69	Peak (NRB)	Vertical	100	1	--	--	Pass
4	360.08	48.27	4.90	-15.38	37.79	MaxQP	Horizontal	100	3	46.0	-8.2	Pass

5	360.08	50.48	4.90	-15.38	40.00	Peak (NRB)	Horizontal	100	1	--	--	Pass
6	537.59	42.66	5.42	-12.14	35.94	Peak (NRB)	Vertical	100	1	--	--	Pass
7	537.59	51.09	5.42	-12.14	44.37	MaxQP	Vertical	113	64	46.0	-1.6	Pass
8	537.63	45.78	5.42	-12.14	39.06	MaxQP	Horizontal	100	222	46.0	-6.9	Pass
9	537.63	43.96	5.42	-12.14	37.24	Peak (NRB)	Horizontal	100	1	--	--	Pass
10	895.99	42.43	6.32	-8.04	40.71	MaxQP	Horizontal	103	66	46.0	-5.3	Pass
11	895.99	42.45	6.32	-8.04	40.73	Peak (NRB)	Horizontal	100	1	--	--	Pass
Test Notes: AC/DC Adapter with laptop on the table (lid is closed support equipment)												

Equipment Configuration for Digital Emissions

Antenna:	Tarana Integral	**Variant:**	16 QAM
Antenna Gain (dBi):	14.00	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50
Channel Frequency (MHz):	5170.00	**Data Rate:**	16 QAM-2/4 55 MBit/s
Power Setting:	5	**Tested By:**	SB
Test Notes:	Tarana outdoor POE Injector		

Test Measurement Results



30.00 - 1000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	48.09	51.91	3.56	-22.34	33.13	MaxQP	Vertical	100	257	40.0	-6.9	Pass
2	48.09	52.91	3.56	-22.34	34.13	Peak (NRB)	Vertical	100	1	--	--	Pass
3	118.22	46.99	3.97	-17.70	33.26	MaxQP	Vertical	100	228	43.0	-9.7	Pass
4	360.24	46.03	4.90	-15.38	35.55	MaxQP	Horizontal	100	0	46.0	-10.5	Pass
5	360.24	48.01	4.90	-15.38	37.53	Peak (NRB)	Horizontal	100	1	--	--	Pass
6	537.63	46.89	5.42	-12.14	40.17	MaxQP	Vertical	105	59	46.0	-5.8	Pass

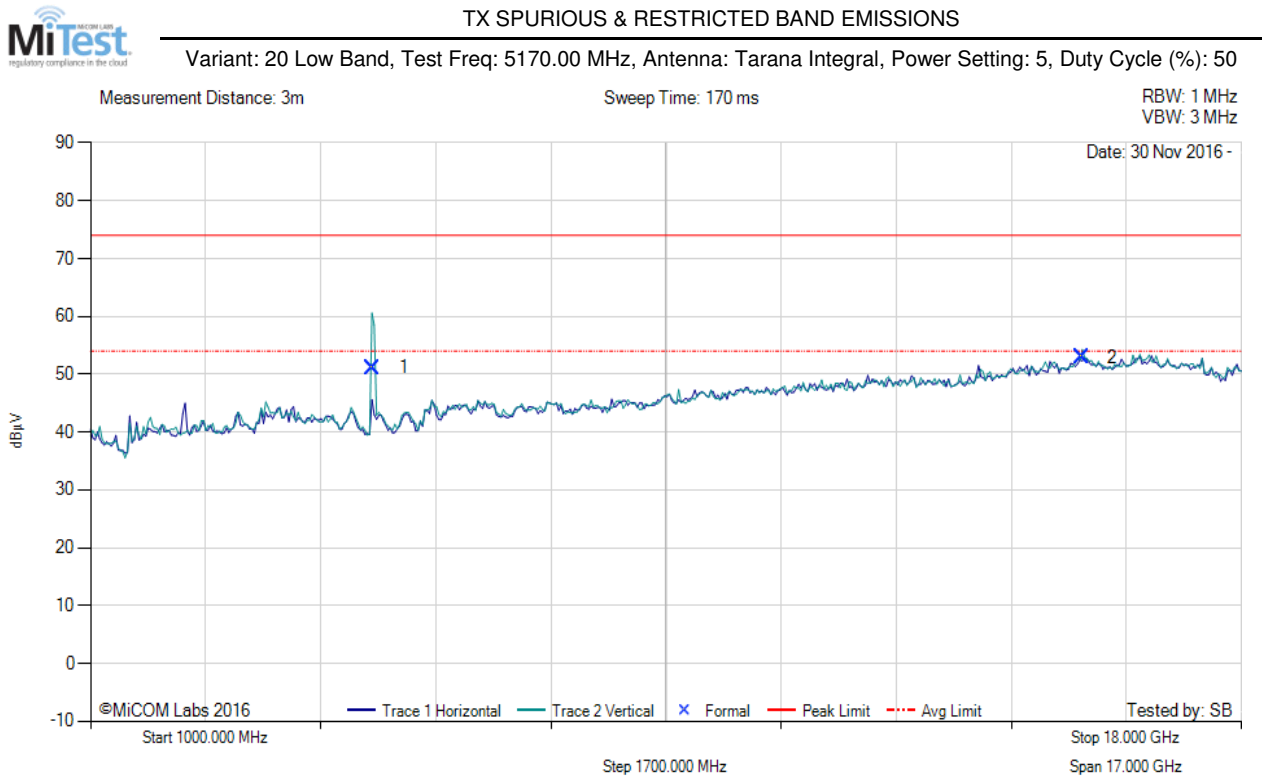
7	537.63	44.29	5.42	-12.14	37.57	MaxQP	Horizontal	271	213	46.0	-8.4	Pass
8	537.63	43.32	5.42	-12.14	36.60	Peak (NRB)	Vertical	100	1	--	--	Pass
9	537.63	40.67	5.42	-12.14	33.95	Peak (NRB)	Horizontal	100	1	--	--	Pass
10	627.21	45.83	5.68	-10.95	40.56	MaxQP	Horizontal	100	191	46.0	-5.4	Pass
11	627.21	45.78	5.68	-10.95	40.51	Peak (NRB)	Horizontal	100	1	--	--	Pass
Test Notes: AC/DC Adapter with POE and laptop on the table (lid is closed support equipment)												

A. APPENDIX - GRAPHICAL IMAGES

A.1. Radiated

A.1.1. TX Spurious & Restricted Band Emissions

A.1.1.1. Tarana Integral



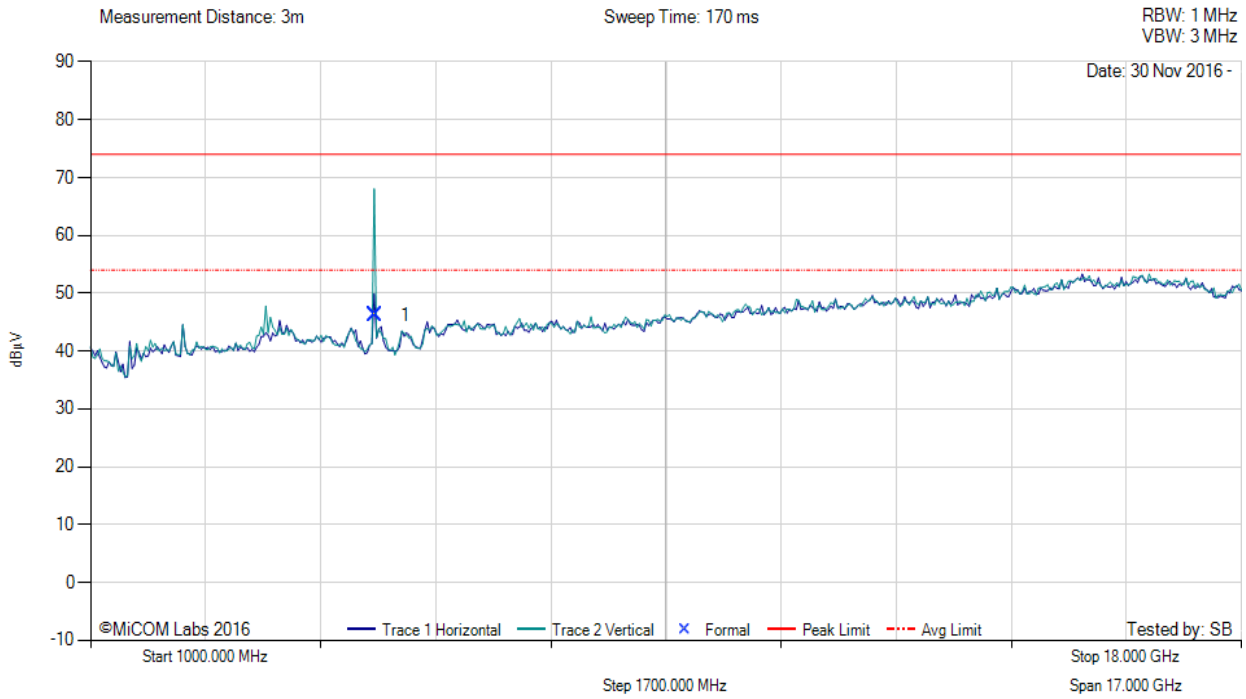
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5171.22	58.95	3.71	-11.53	51.13	Fundamental	Vertical	101	242	--	--	
2	15644.05	46.83	6.00	0.04	52.87	Peak (Scan)	Vertical	101	242	74.0	-21.1	Pass

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 20 Low Band, Test Freq: 5200.00 MHz, Antenna: Tarana Integral, Power Setting: 5, Duty Cycle (%): 50



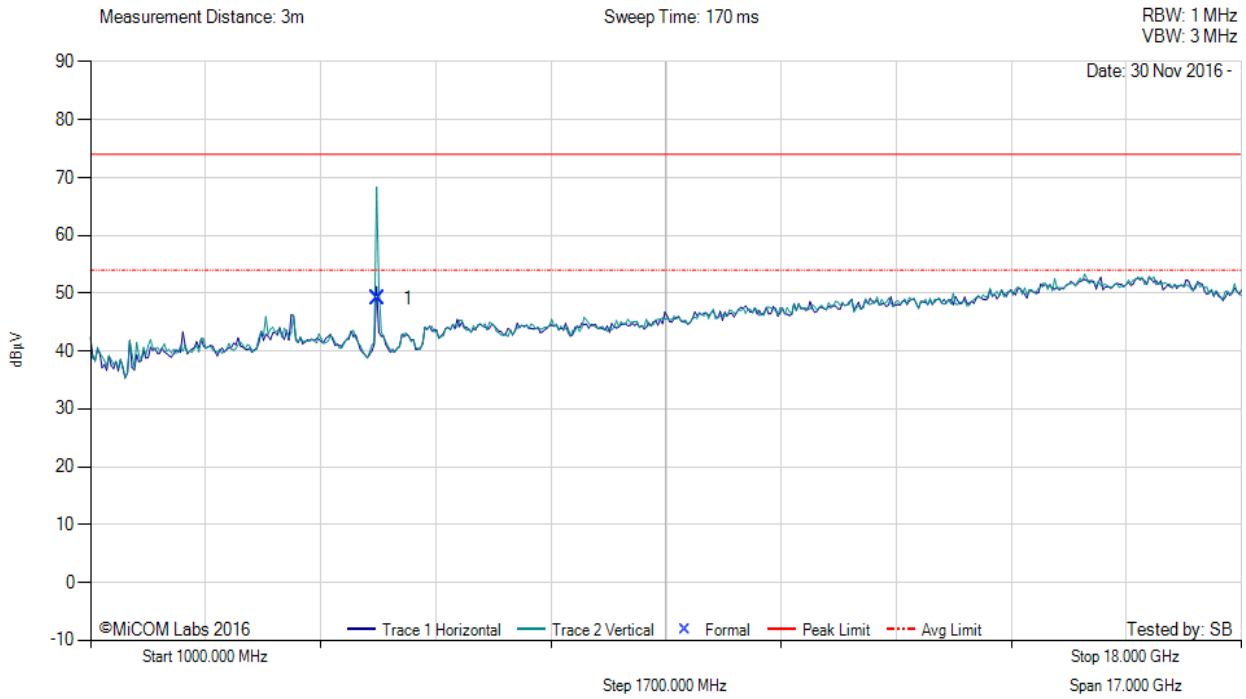
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5201.52	54.02	3.66	-11.46	46.22	Fundamental	Vertical	101	0	--	--	

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 20 Low Band, Test Freq: 5240.00 MHz, Antenna: Tarana Integral, Power Setting: 5, Duty Cycle (%): 50



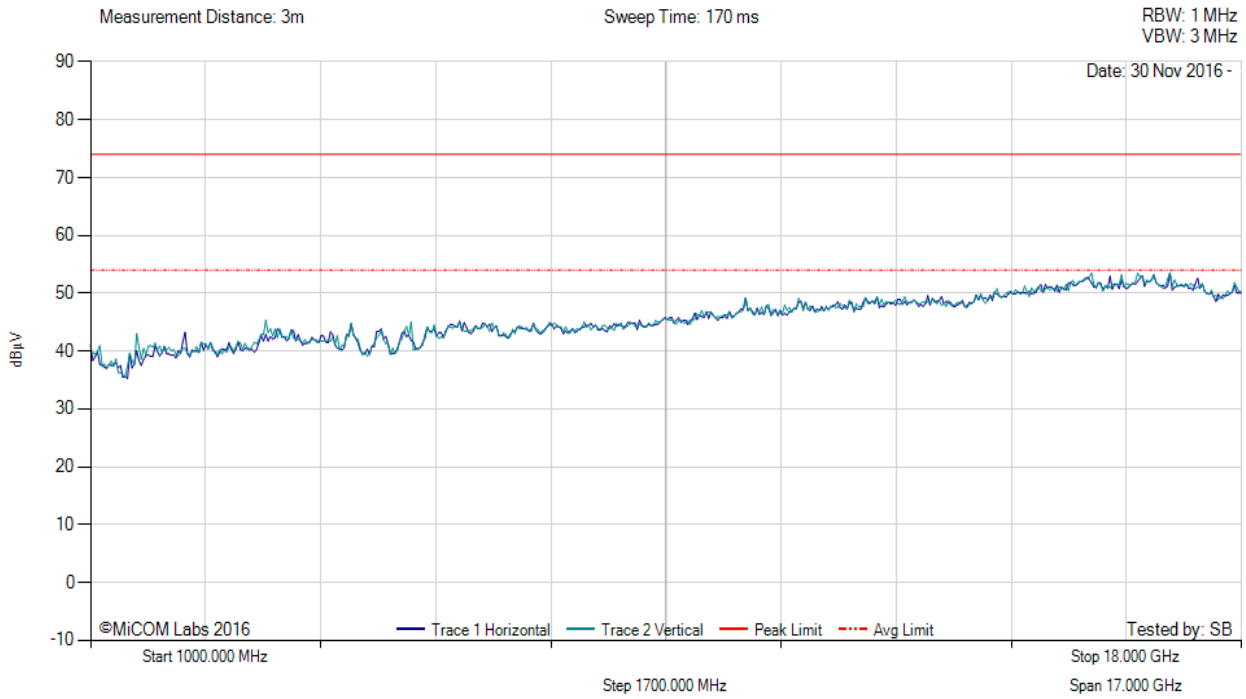
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5242.09	56.89	3.63	-11.36	49.16	Fundamental	Vertical	101	0	--	--	

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 20 High Band, Test Freq: 5735.00 MHz, Antenna: Tarana Integral, Power Setting: 5, Duty Cycle (%): 50



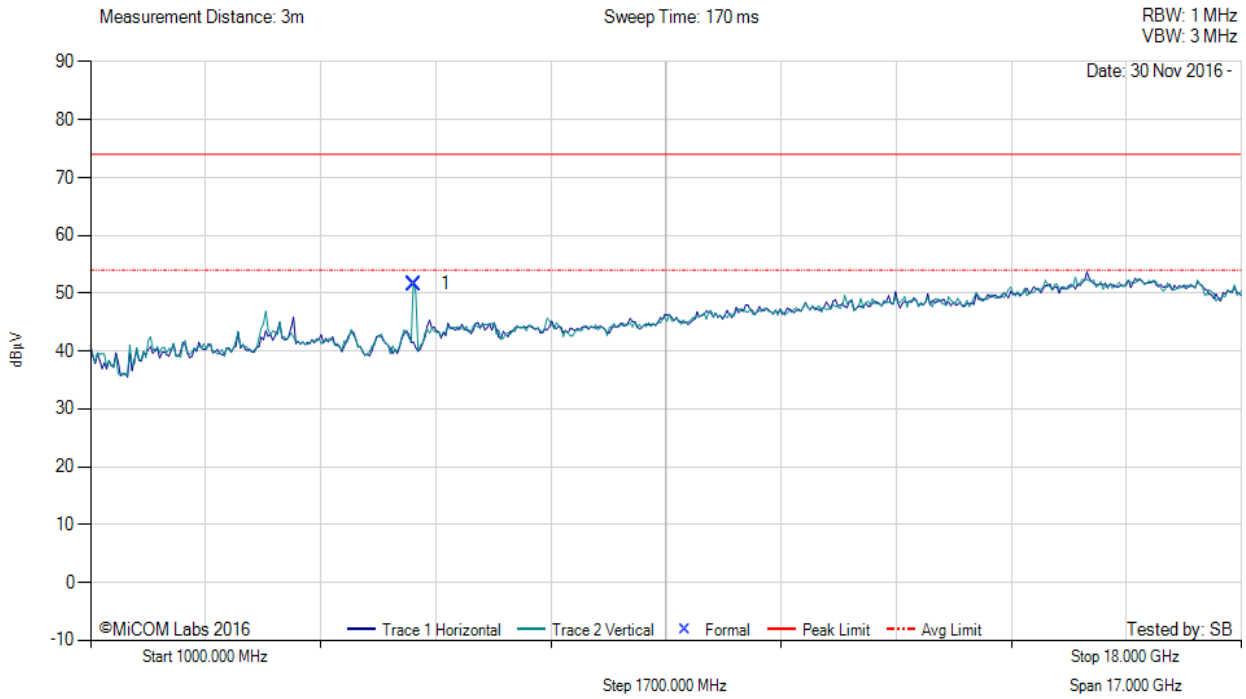
There are no emissions found within 6dB of the limit line.

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 20 High Band, Test Freq: 5785.00 MHz, Antenna: Tarana Integral, Power Setting: 5, Duty Cycle (%): 50



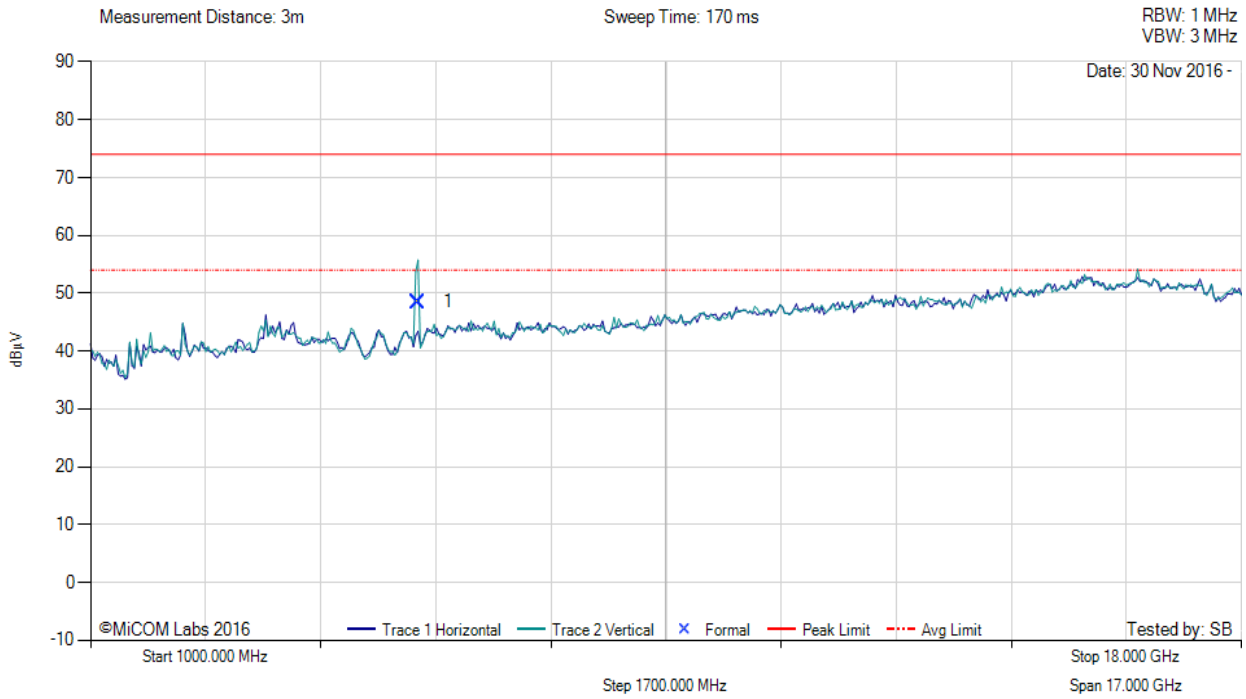
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5786.44	58.24	3.79	-10.44	51.59	Fundamental	Vertical	146	264	--	--	

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 20 High Band, Test Freq: 5835.00 MHz, Antenna: Tarana Integral, Power Setting: 5, Duty Cycle (%): 50



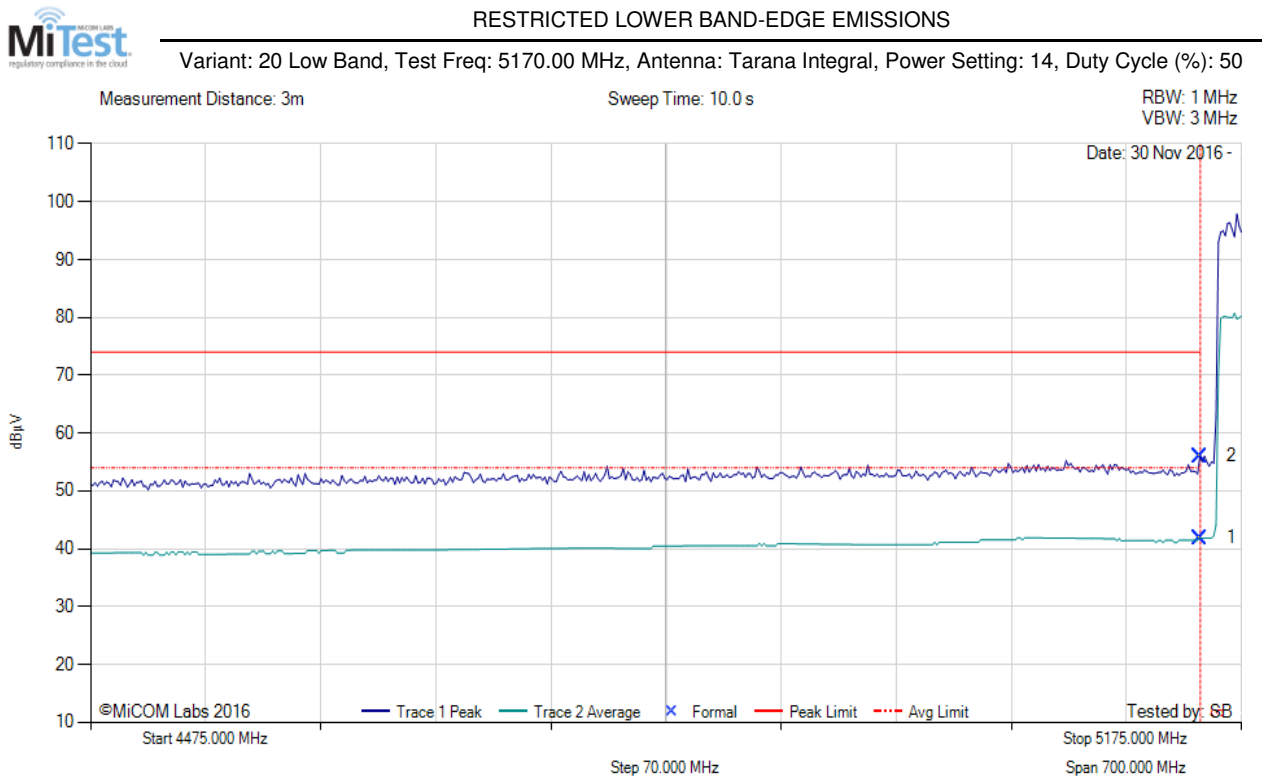
1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5836.12	54.86	3.85	-10.21	48.50	Fundamental	Vertical	115	249	--	--	

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

A.1.2. Restricted Edge & Band-Edge Emissions

A.1.2.2. Tarana Integral



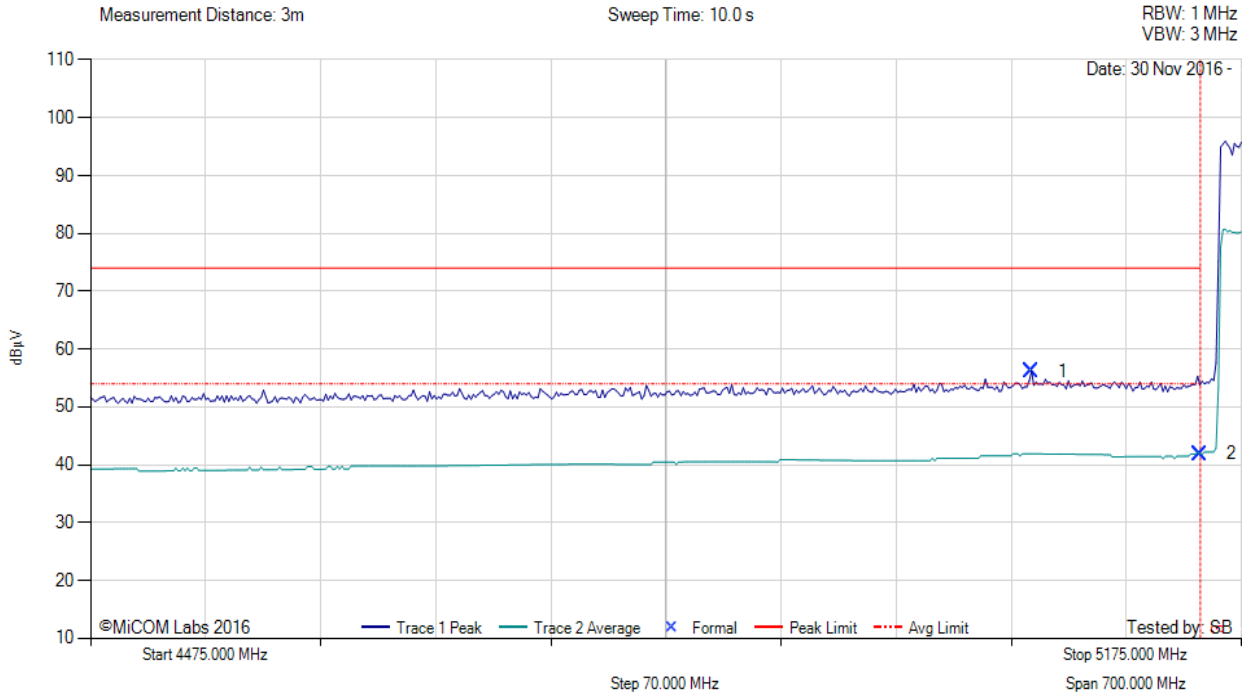
4475.00 - 5175.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5150.00	4.09	3.67	34.11	41.87	Max Avg	Vertical	175	273	54.0	-12.1	Pass
2	5150.00	18.21	3.67	34.11	55.99	Max Peak	Vertical	175	273	74.0	-18.0	Pass
3	5150.00	--	--	--	--	Restriced-Band	--	--	--	--	--	--

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 40 Low Band, Test Freq: 5180.00 MHz, Antenna: Tarana Integral, Power Setting: 14, Duty Cycle (%): 50



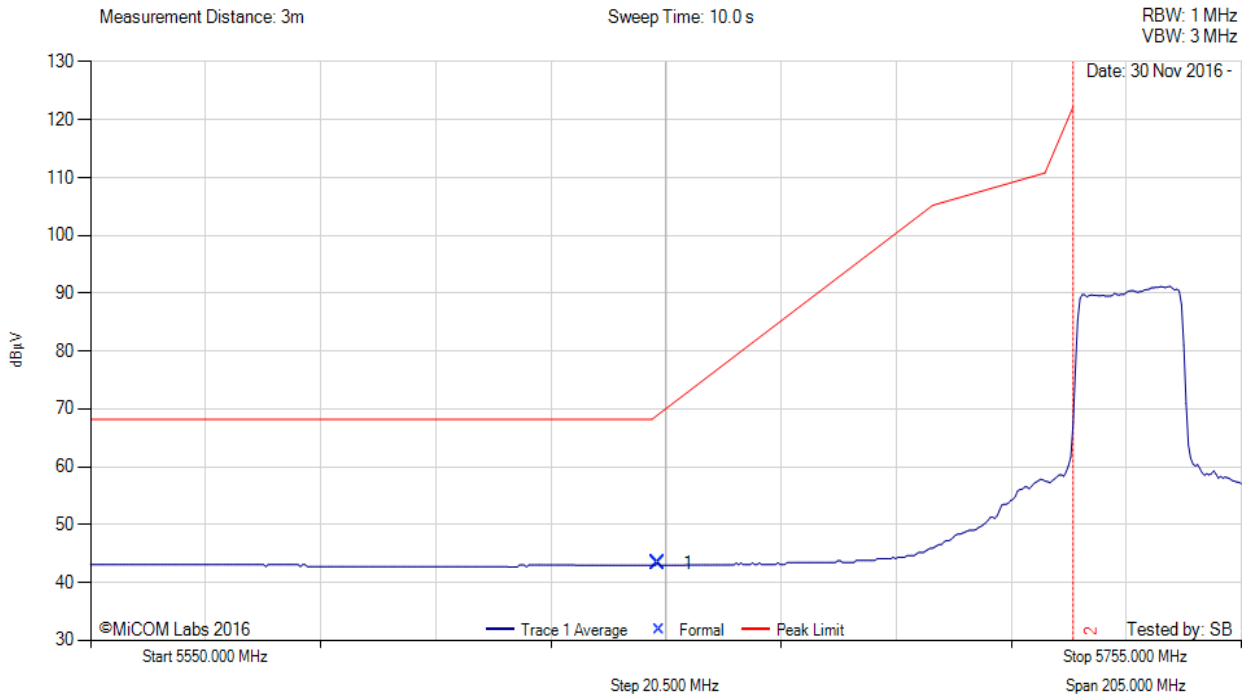
4475.00 - 5175.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5047.60	18.32	3.64	34.20	56.16	Max Peak	Vertical	175	273	74.0	-17.8	Pass
2	5150.00	4.09	3.67	34.11	41.87	Max Avg	Vertical	175	273	54.0	-12.1	Pass
3	5150.00	--	--	--	--	Restriced-Band	--	--	--	--	--	--

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

5725 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 20 High Band, Test Freq: 5735.00 MHz, Antenna: Tarana Integral, Power Setting: 5, Duty Cycle (%): 50



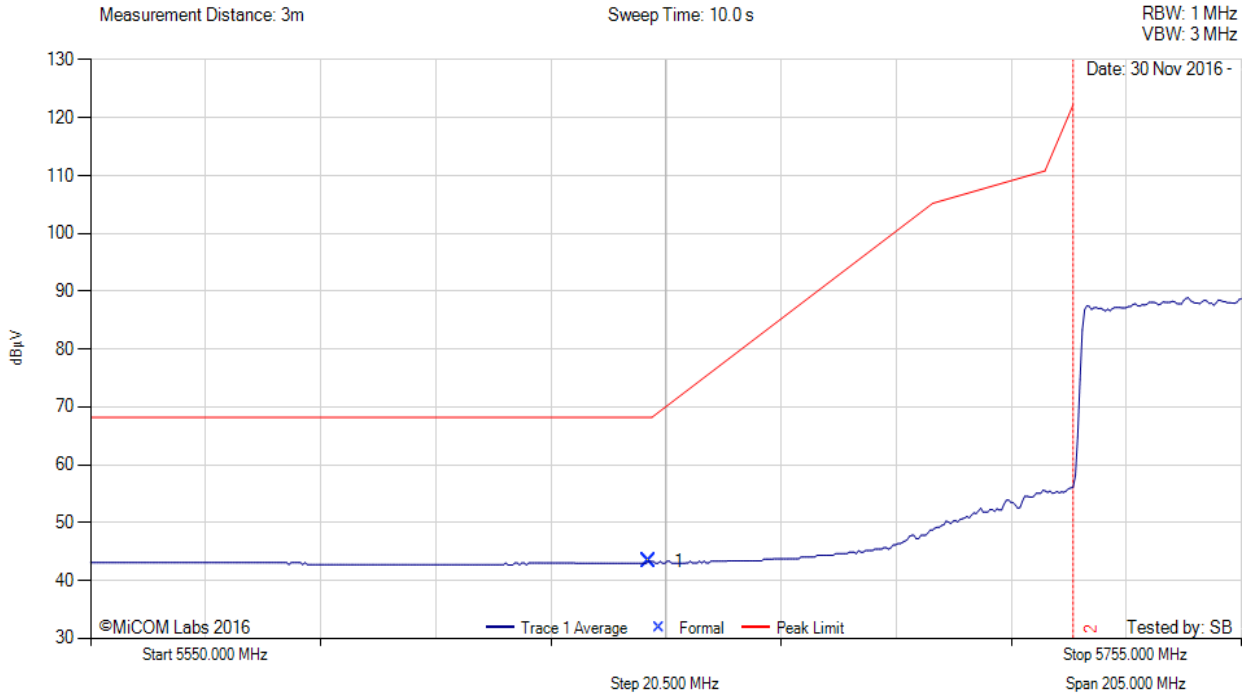
5550.00 - 5755.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5651.05	5.37	3.76	34.18	43.31	Max Avg	Vertical	175	273	68.9	-25.6	Pass
2	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

5725 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 40 High Band, Test Freq: 5745.00 MHz, Antenna: Tarana Integral, Power Setting: 8.5, Duty Cycle (%): 50



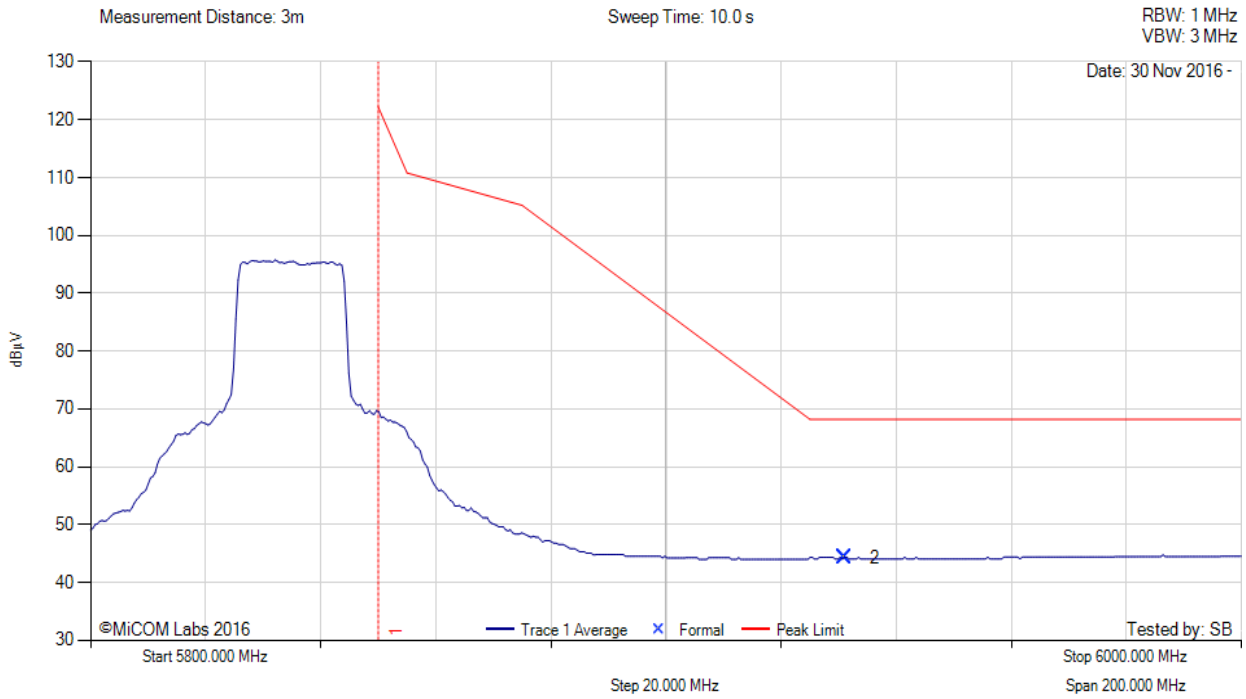
5550.00 - 5755.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	5649.41	5.38	3.75	34.18	43.31	Max Avg	Vertical	175	273	68.2	-24.9	Pass
2	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

5850 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 20 High Band, Test Freq: 5835.00 MHz, Antenna: Tarana Integral, Power Setting: 5, Duty Cycle (%): 50



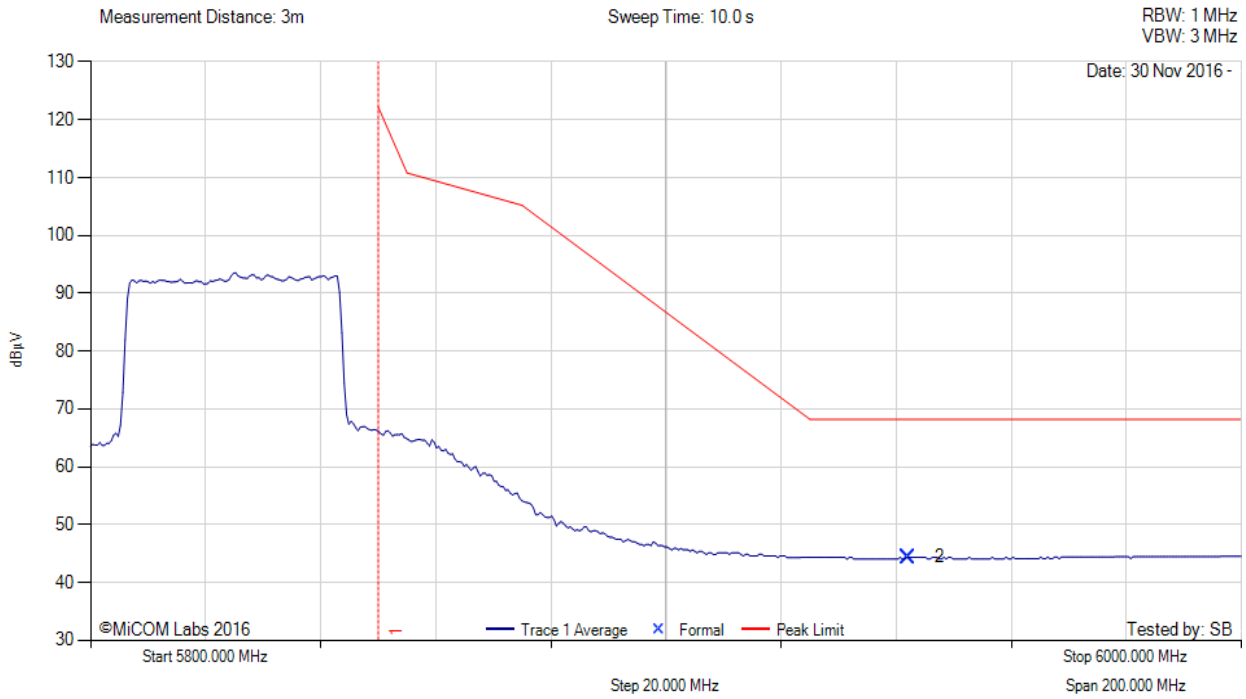
5800.00 - 6000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
2	5930.96	5.67	3.84	34.84	44.35	Max Avg	Vertical	175	273	68.2	-23.9	Pass
1	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

back to matrix

5850 MHz RADIATED BAND-EDGE EMISSIONS

Variant: 40 High Band, Test Freq: 5825.00 MHz, Antenna: Tarana Integral, Power Setting: 8, Duty Cycle (%): 50



5800.00 - 6000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
2	5942.18	5.64	3.87	34.86	44.37	Max Avg	Vertical	175	273	68.2	-23.9	Pass
1	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Test Notes: SW Version-FCR.A2.XXX.AXX.4.000.002.01

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