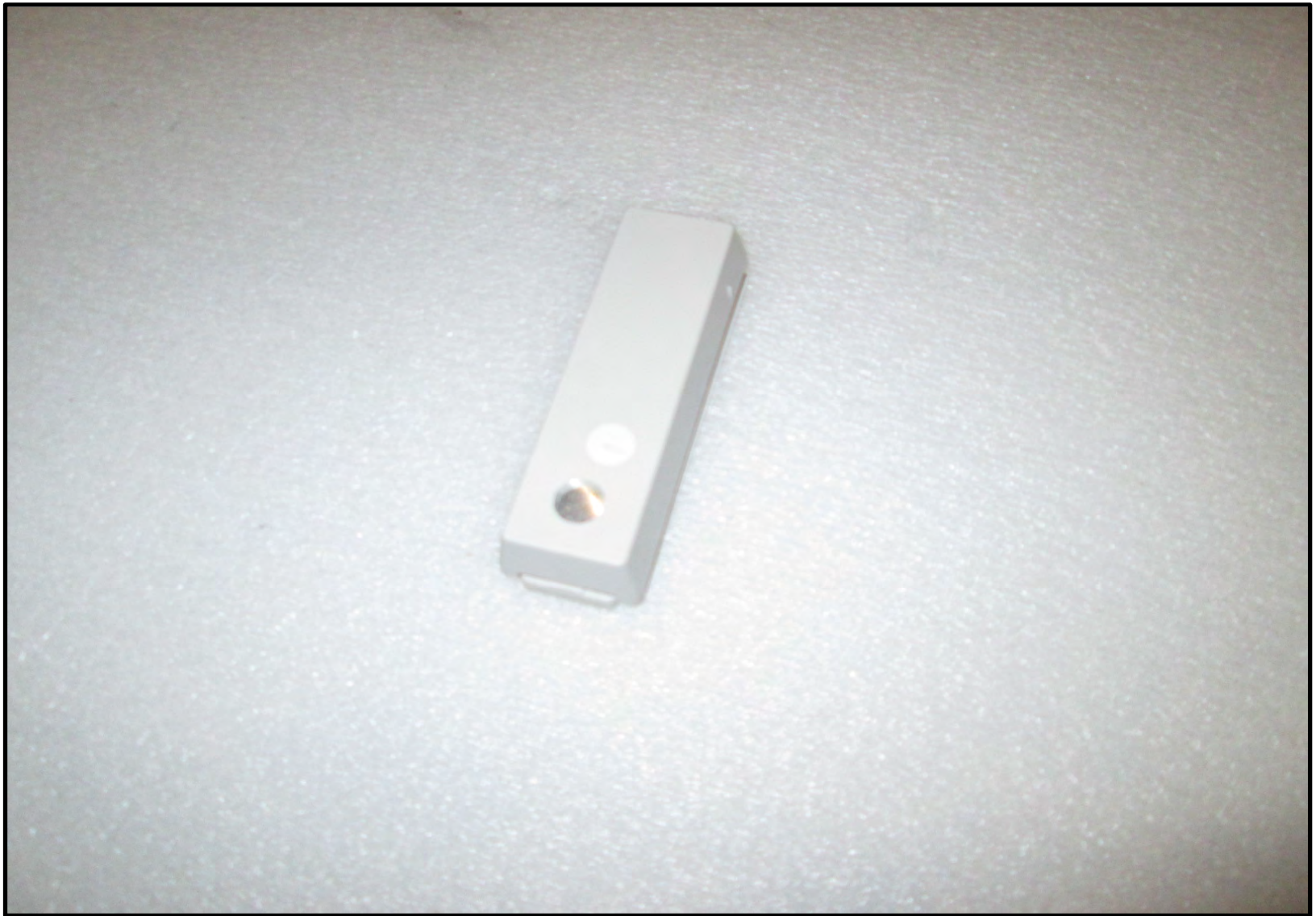
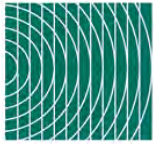
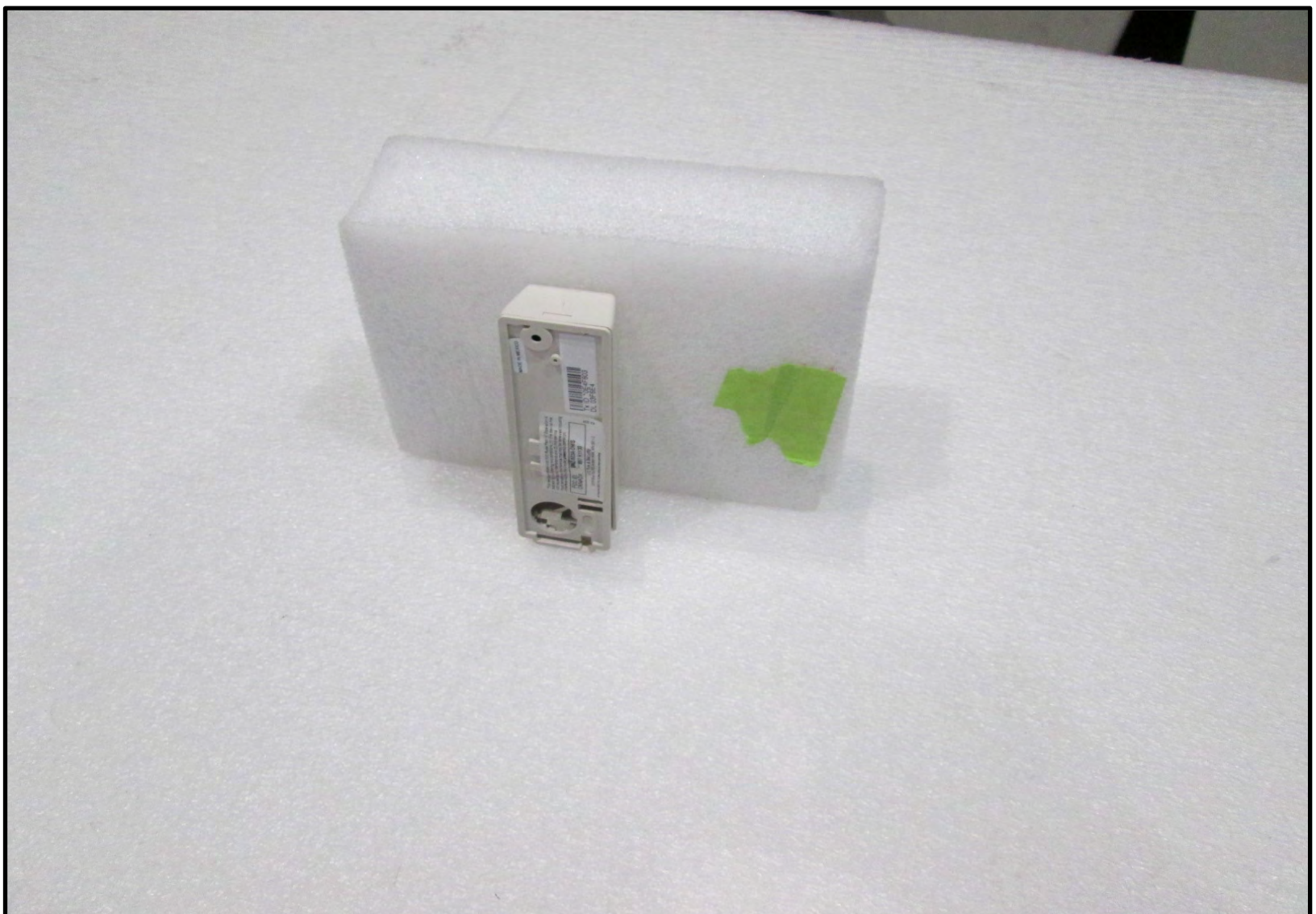


OCCUPIED BANDWIDTH







SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 319.5 MHz, CW

POWER SETTINGS INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

UTCf0013 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 4 GHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	3/14/2014	12 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	3/14/2014	12 mo
Antenna, Horn (DRG)	ETS Lindgren	3115	AIP	6/29/2011	36 mo
Attenuator, 10db, 'SMA'	S.M. Electronics	SA18H-10	REN	5/20/2013	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAD	3/14/2014	12 mo
Antenna, Bilog	Teseq	CBL 6141B	AYD	12/17/2013	12 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/14/2014	12 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2013	24 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The single, integral antenna to be used with the EUT was tested. The EUT was configured for un-modulated, CW operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2009).

A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = N1L1 +N2L2 +....

Where N1 is the number of type 1 pulses, L1 is length of type 1 pulses, N2 is the number of type 2 pulses, L2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = (N1L1 +N2L2 +...)/100mS or T, whichever is less. Where T is the period of the pulse train.

The measured values for the EUT's pulse train are as follows:

Period = 100 mSec
Pulsewidth of Type 1 Pulse = 0.9889 mSec
Pulsewidth of Type 2 Pulse = 0.1274 mSec
Pulsewidth of Type 3 Pulse = 0.4975 mSec
Number of Type 1 Pulses = 1
Number of Type 2 Pulses = 58
Number of Type 3 Pulses = 1

Duty Cycle = 20 log [(1)(0.9889) + (58)(0.1274) + (1)(0.4975))/100] = -21.0 dB

The duty cycle correction factor of -21.0 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz for measurements at or below 1GHz. Above 1GHz, a resolution bandwidth of 1MHz and a video bandwidth of 3MHz was used.

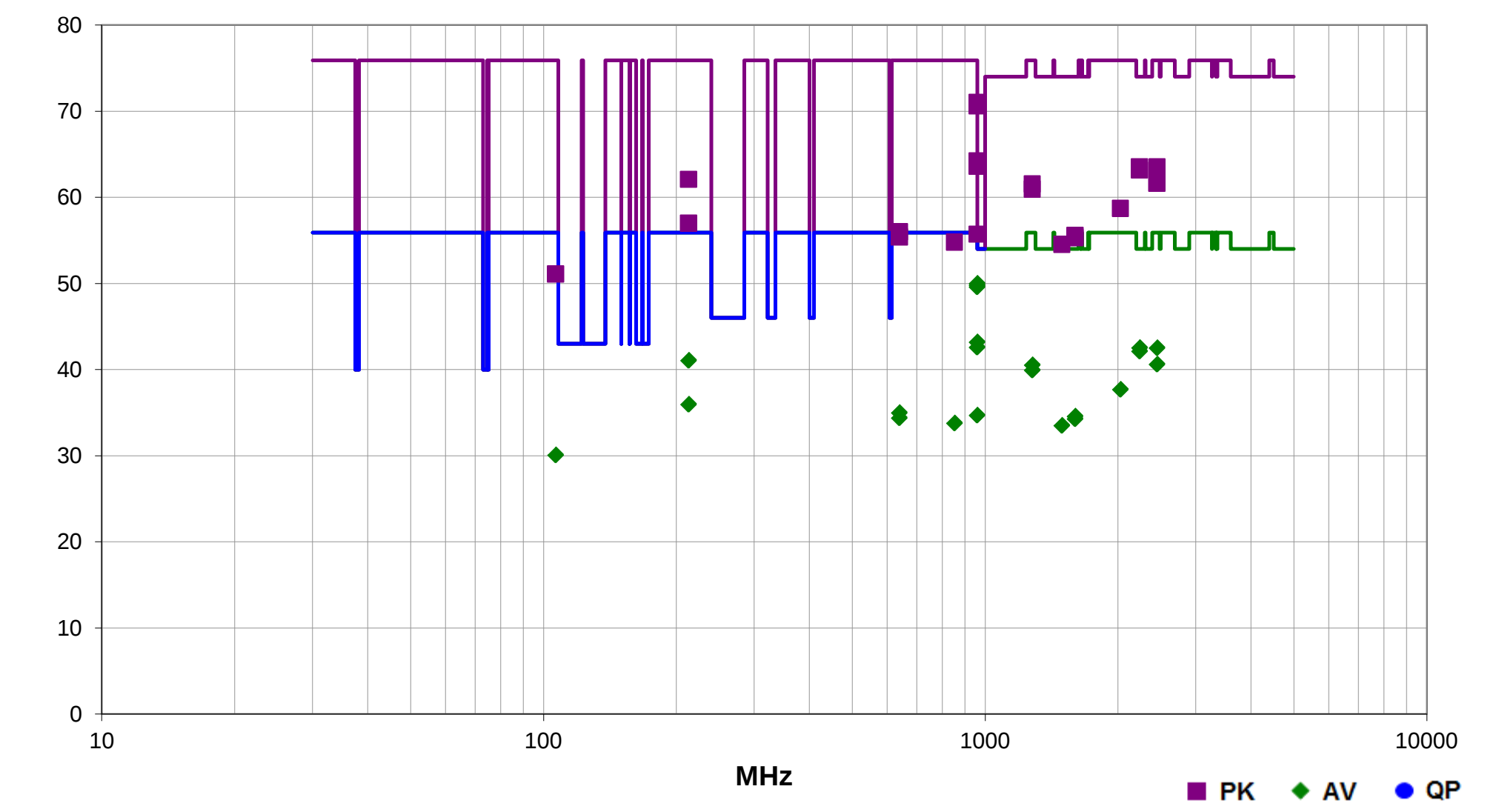
The field strength of the spurious emissions meet the limits as defined in 47 CFR 15.231(b). The spurious emissions also meet the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions. Further, spurious emissions meet the provisions of 15.205 using the measurement instrumentation specified in that section.



SPURIOUS RADIATED EMISSIONS

Work Order:	UTCF0013	Date:	04/30/14	<i>Trevor Buls</i>
Project:	None	Temperature:	23.4 °C	
Job Site:	MN05	Humidity:	27.4% RH	
Serial Number:	1	Barometric Pres.:	1009.7 mbar	Tested by: Trevor Buls
EUT:	Learn Mode Freeze Sensor			
Configuration:	2			
Customer:	UTC Fire and Security			
Attendees:	None			
EUT Power:	Battery			
Operating Mode:	Transmitting at 319.5 MHz, CW			
Deviations:	None			
Comments:	None			

Test Specifications					Test Method		
FCC 15.231:2014					ANSI C63.10:2009		
Run #	2	Test Distance (m)	3	Antenna Height(s)	1-4m	Results	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
958.524	50.2	10.8	1.0	71.0		10.0	Horz	PK	0.0	71.0	75.9	-4.9	EUT on Side
958.522	50.0	10.8	1.0	78.0		10.0	Horz	PK	0.0	70.8	75.9	-5.1	EUT Horizontal
958.526	49.8	10.8	1.1	214.0		10.0	Vert	PK	0.0	70.6	75.9	-5.3	EUT Vertical
958.524	50.2	10.8	1.0	71.0	-21.0	10.0	Horz	AV	0.0	50.0	55.9	-5.9	EUT on Side
958.522	50.0	10.8	1.0	78.0	-21.0	10.0	Horz	AV	0.0	49.8	55.9	-6.1	EUT Horizontal
958.526	49.8	10.8	1.1	214.0	-21.0	10.0	Vert	AV	0.0	49.6	55.9	-6.3	EUT Vertical
2236.575	65.6	-2.0	1.2	25.0		0.0	Vert	PK	0.0	63.6	74.0	-10.4	EUT on Side
2236.535	65.2	-2.0	1.0	276.0		0.0	Horz	PK	0.0	63.2	74.0	-10.8	EUT on Side
2236.575	65.6	-2.0	1.2	25.0	-21.0	0.0	Vert	AV	0.0	42.6	54.0	-11.4	EUT on Side
958.521	43.4	10.8	1.5	345.0		10.0	Vert	PK	0.0	64.2	75.9	-11.7	EUT on Side
2236.535	65.2	-2.0	1.0	276.0	-21.0	0.0	Horz	AV	0.0	42.2	54.0	-11.8	EUT on Side
958.529	42.8	10.8	1.6	159.0		10.0	Vert	PK	0.0	63.6	75.9	-12.3	EUT Horizontal
2449.535	66.7	-3.2	1.2	189.0		0.0	Horz	PK	0.0	63.5	75.9	-12.4	EUT Vertical
958.521	43.4	10.8	1.5	345.0	-21.0	10.0	Vert	AV	0.0	43.2	55.9	-12.7	EUT on Side
958.529	42.8	10.8	1.6	159.0	-21.0	10.0	Vert	AV	0.0	42.6	55.9	-13.3	EUT Horizontal

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2449.535	66.7	-3.2	1.2	189.0	-21.0	0.0	Horz	AV	0.0	42.5	55.9	-13.4	EUT Vertical
213.004	57.0	-4.9	1.3	79.0		10.0	Horz	PK	0.0	62.1	75.9	-13.8	EUT on Side
2449.510	64.8	-3.2	1.2	57.0		0.0	Vert	PK	0.0	61.6	75.9	-14.3	EUT on Side
1278.030	67.4	-5.8	1.0	291.0	-21.0	0.0	Horz	PK	0.0	61.6	75.9	-14.3	EUT on Side
213.004	57.0	-4.9	1.3	79.0		10.0	Horz	AV	0.0	41.1	55.9	-14.8	EUT on Side
1277.960	66.8	-5.8	1.1	92.0		0.0	Vert	PK	0.0	61.0	75.9	-14.9	EUT Vertical
2449.510	64.8	-3.2	1.2	57.0	-21.0	0.0	Vert	AV	0.0	40.6	55.9	-15.3	EUT on Side
1278.030	67.4	-5.8	1.0	291.0	-21.0	0.0	Horz	AV	0.0	40.6	55.9	-15.3	EUT on Side
1277.960	66.8	-5.8	1.1	92.0	-21.0	0.0	Vert	AV	0.0	40.0	55.9	-15.9	EUT Vertical
2023.595	60.8	-2.1	1.2	223.0	-21.0	0.0	Horz	PK	0.0	58.7	75.9	-17.2	EUT on Side
2023.595	60.8	-2.1	1.2	223.0		0.0	Horz	AV	0.0	37.7	55.9	-18.2	EUT on Side
1597.535	60.9	-5.3	1.2	179.0		0.0	Vert	PK	0.0	55.6	74.0	-18.4	EUT on Side
1597.515	60.6	-5.3	1.2	194.0	-21.0	0.0	Horz	PK	0.0	55.3	74.0	-18.7	EUT Vertical
213.003	51.9	-4.9	2.5	4.0		10.0	Vert	PK	0.0	57.0	75.9	-18.9	EUT Vertical
1597.535	60.9	-5.3	1.2	179.0		0.0	Vert	AV	0.0	34.6	54.0	-19.4	EUT on Side
1491.175	59.6	-5.1	1.0	20.0	-21.0	0.0	Vert	PK	0.0	54.5	74.0	-19.5	EUT Vertical
1597.515	60.6	-5.3	1.2	194.0		0.0	Horz	AV	0.0	34.3	54.0	-19.7	EUT Vertical
639.018	40.6	5.4	1.3	242.0		10.0	Horz	PK	0.0	56.0	75.9	-19.9	EUT on Side
213.003	51.9	-4.9	2.5	4.0	-21.0	10.0	Vert	AV	0.0	36.0	55.9	-19.9	EUT Vertical
958.521	34.9	10.8	1.0	297.0	-21.0	10.0	Horz	PK	0.0	55.7	75.9	-20.2	EUT Vertical
1491.175	59.6	-5.1	1.0	20.0		0.0	Vert	AV	0.0	33.5	54.0	-20.5	EUT Vertical
639.015	40.0	5.4	1.0	207.0		10.0	Vert	PK	0.0	55.4	75.9	-20.5	EUT Vertical
639.018	40.6	5.4	1.3	242.0	-21.0	10.0	Horz	AV	0.0	35.0	55.9	-20.9	EUT on Side
852.020	35.9	8.9	1.0	255.0	-21.0	10.0	Horz	PK	0.0	54.8	75.9	-21.1	EUT on Side
958.521	34.9	10.8	1.0	297.0		10.0	Horz	AV	0.0	34.7	55.9	-21.2	EUT Vertical
639.015	40.0	5.4	1.0	207.0		10.0	Vert	AV	0.0	34.4	55.9	-21.5	EUT Vertical
852.020	35.9	8.9	1.0	255.0	-21.0	10.0	Horz	AV	0.0	33.8	55.9	-22.1	EUT on Side
106.502	47.6	-6.5	2.5	218.0	-21.0	10.0	Horz	PK	0.0	51.1	75.9	-24.8	EUT on Side
106.502	47.6	-6.5	2.5	218.0		10.0	Horz	AV	0.0	30.1	55.9	-25.8	EUT on Side