



Test Report Serial Number:

45461627 R1.0

Test Report Date:

4 December 2020

Project Number:

1510

Appendix O - Radiated Tx Spurious Emissions Measurement Plots

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Summary of Radiated Tx Emissions (Restricted Band)

Measured Frequency Range (MHz)	Channel Frequency	Antenna Polarization	Emission Frequency	Measured Emission [E _{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L _c] (dB)	Amplifier Gain [G _A] (dB)	Corrected Emission [E _{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
9kHz - 30MHz	2442.0	Front	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	n/a
9kHz - 30MHz	2442.0	Side	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	n/a
30-1000MHz	2442.0	Horizontal	745.2MHz	37.88	0.00	0.00	0.00 (3)	37.88 (2)	46.0	8.1
30-1000MHz	2442.0	Vertical	955.9MHz	39.24	0.00	0.00	0.00 (3)	39.24 (2)	46.0	6.8
1 - 3GHz	2442.0	Horizontal	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	n/a
1 - 3GHz	2442.0	Vertical	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	n/a
3-13GHz	2442.0	Horizontal	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	n/a
3-13GHz	2442.0	Vertical	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	n/a
13-18GHz	2442.0	Horizontal	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	n/a
13-18GHz	2442.0	Vertical	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	n/a
18-26GHz	2442.0	Horizontal	ND	ND (1)	43.50	21.86	26.00	ND	54.0	n/a
18-26GHz	2442.0	Vertical	ND	ND (1)	43.50	21.86	26.00	ND	54.0	n/a
Results:									Complies	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplifier not used

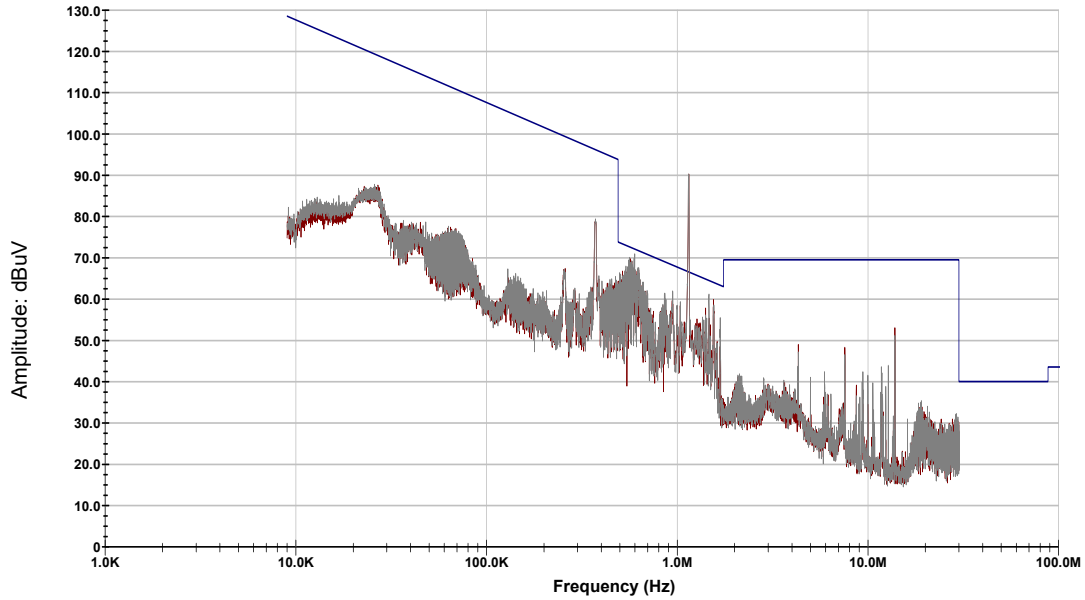
$$E_{\text{Corr}} = E_{\text{Meas}} + \text{ACF} + L_C - G_A$$

Radiated Emissions - Restricted Band

Garmin A03948 - DSS

Radiated Tx Emissions - 9kHz - 30MHz

OATS - Loop Side



03:50:37 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Trace 1 —
Trace 2 —

Frequency Range:

9kHz - 30MHz

Antenna Polarization:

Front

Emission Frequency:

ND

Channel Frequency:

2442.00 MHz

Modulation:

8-DPSK

Measured Emission:

ND dBuV

Trace 1: Ambient

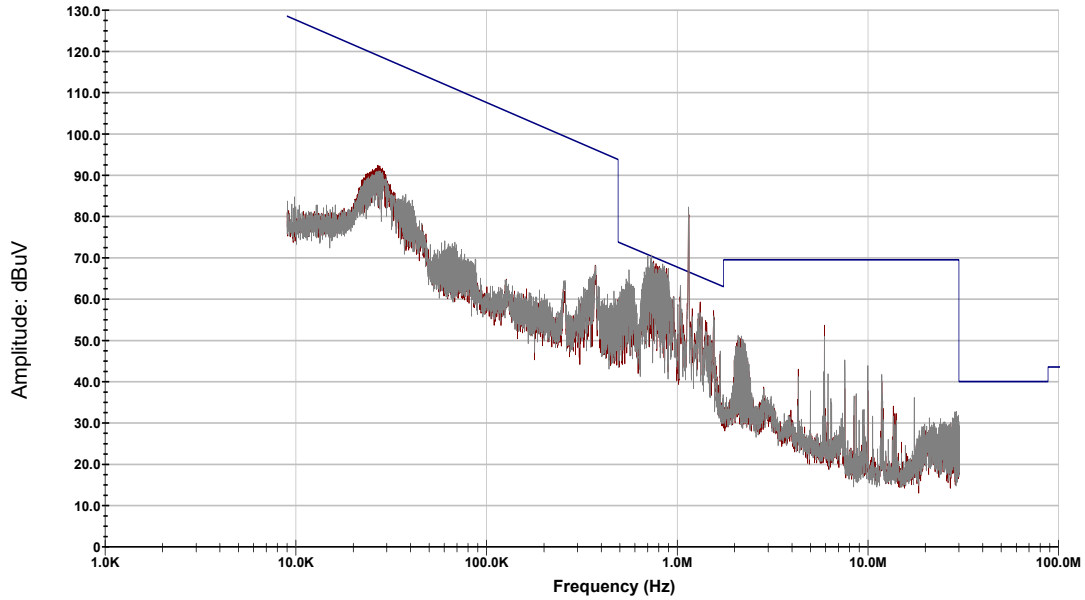
Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band

Garmin A03948 - DSS

Radiated Tx Emissions - 9kHz - 30MHz

OATS - Loop Front



03:47:31 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Trace 1 —
Trace 2 —

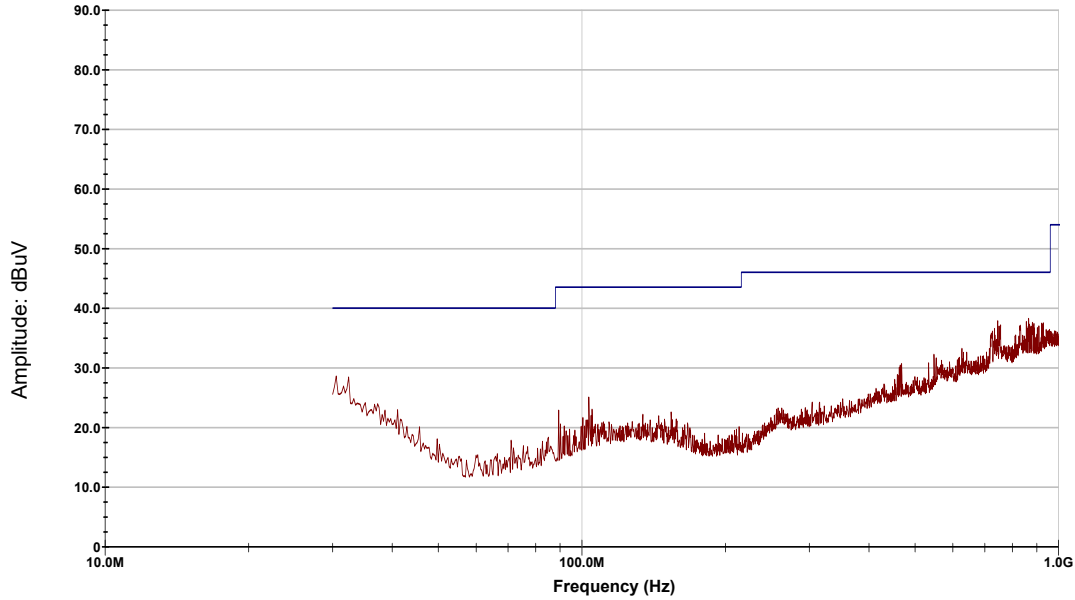
Frequency Range: 9kHz - 30MHz	Antenna Polarization: Side	Emission Frequency: ND
Channel Frequency: 2442.00 MHz	Modulation: 8-DPSK	Measured Emission: ND dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band

Garmin A03948 - DSS
Radiated Tx Emissions - 30MHz-1GHz
OATS Horizontal



03:41:46 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Frequency Range:

30-1000MHz

Antenna Polarization:

Horizontal

Emission Frequency:

745.2MHz

Channel Frequency:

2442.00 MHz

Modulation:

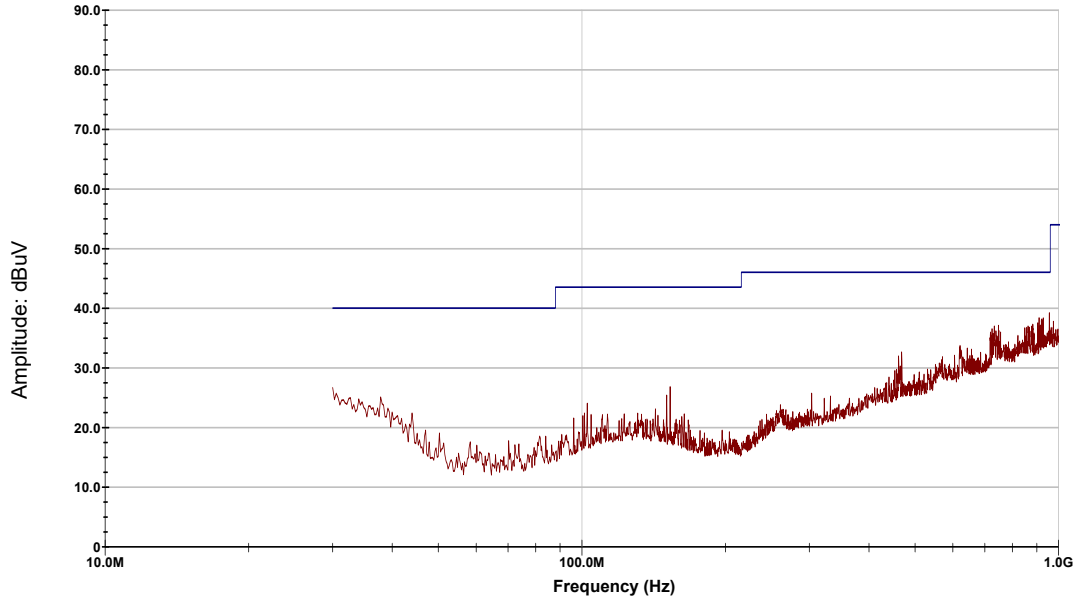
8-DPSK

Measured Emission:

37.88 dBuV

Radiated Emissions - Restricted Band

Garmin A03948 - DSS
Radiated Tx Emissions 30 MHz - 1 GHz
OATS Vertical



03:41:46 PM, Thursday, December 10, 2020

Profile Build: 2020.10.19

Frequency Range:

30-1000MHz

Antenna Polarization:

Vertical

Emission Frequency:

955.9MHz

Channel Frequency:

2442.00 MHz

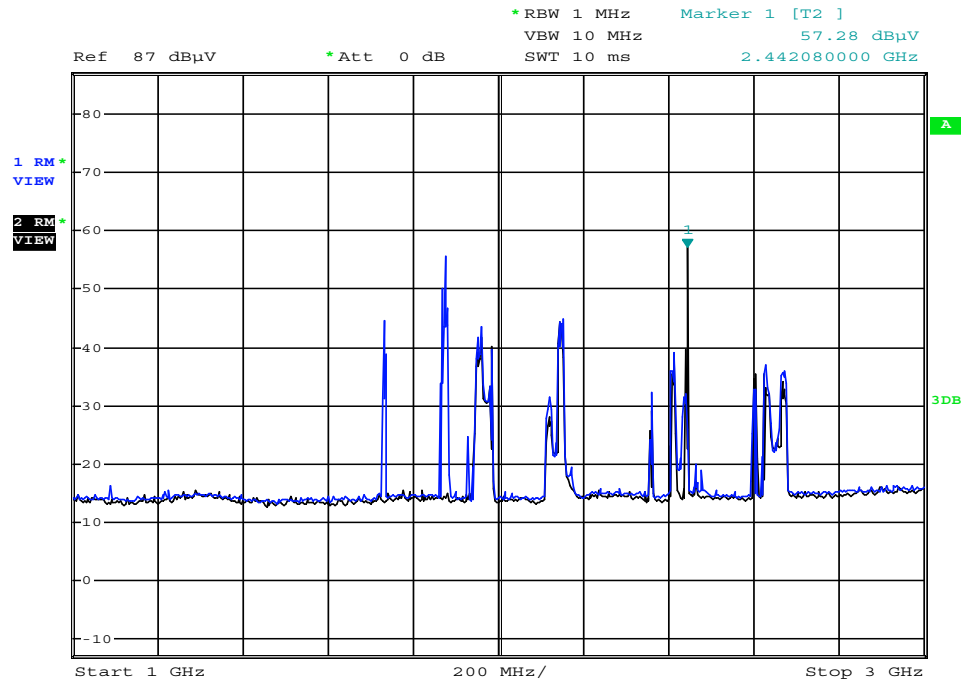
Modulation:

8-DPSK

Measured Emission:

39.24 dBuV

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:30:00

Frequency Range:

1 - 3GHz

Antenna Polarization:

Horizontal

Emission Frequency:

ND

Channel Frequency:

2442.00 MHz

Modulation:

8-DPSK

Measured Emission:

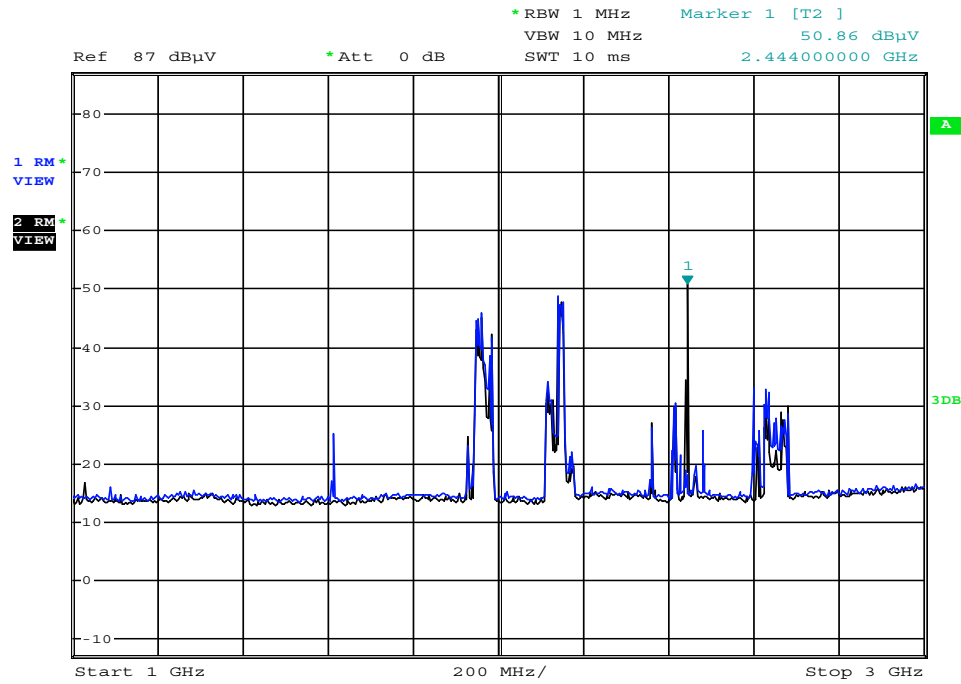
ND dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Marker 1: Fundamental

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:36:48

Frequency Range:

1 - 3GHz

Antenna Polarization:

Vertical

Emission Frequency:

ND

Channel Frequency:

2442.00 MHz

Modulation:

8-DPSK

Measured Emission:

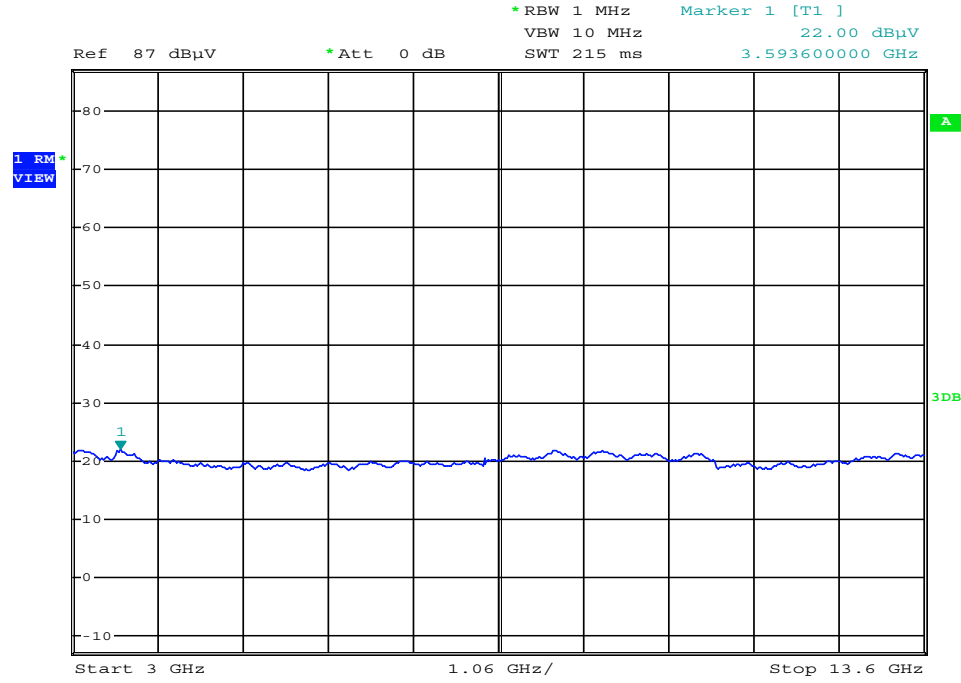
ND dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Marker 1: Fundamental

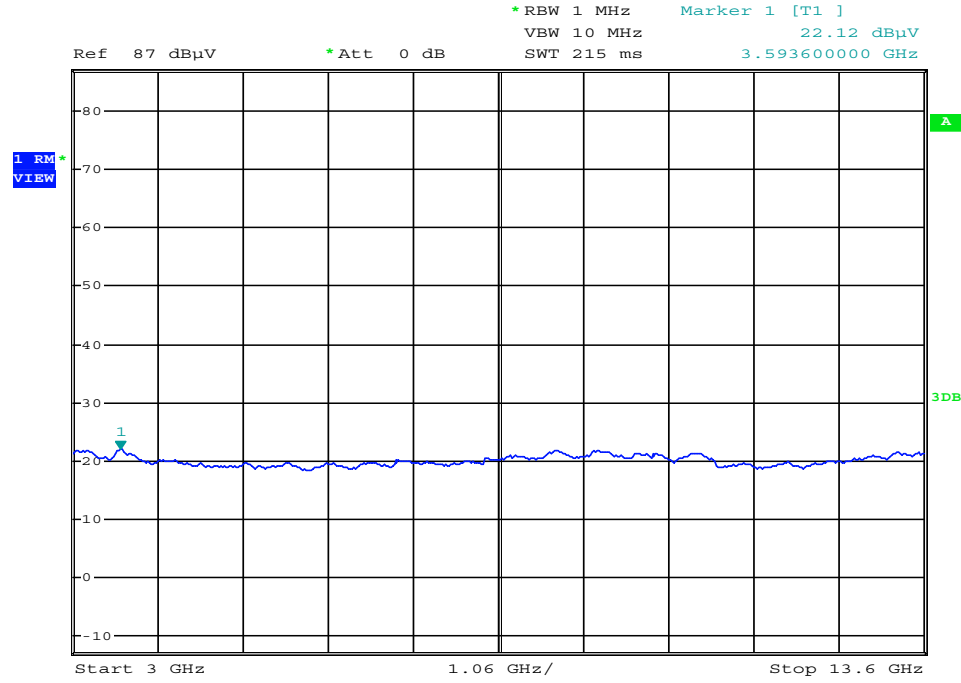
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:31:16

Frequency Range: 3-13GHz	Antenna Polarization: Horizontal	Emission Frequency: ND
Channel Frequency: 2442.00 MHz	Modulation: 8-DPSK	Measured Emission: ND dBuV

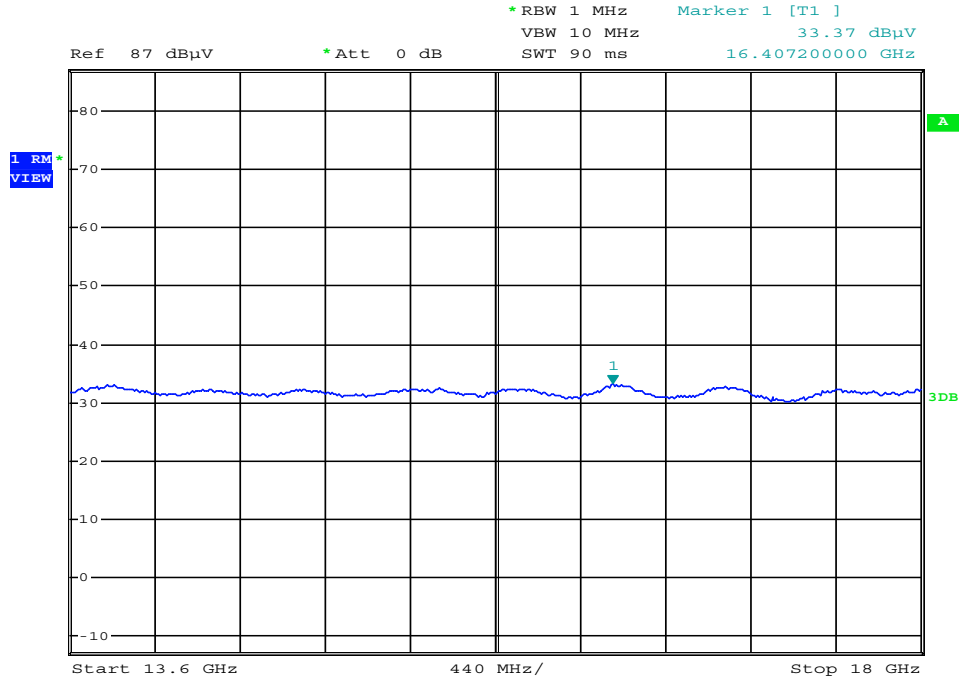
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:33:31

Frequency Range: 3-13GHz	Antenna Polarization: Vertical	Emission Frequency: ND
Channel Frequency: 2442.00 MHz	Modulation: 8-DPSK	Measured Emission: ND dBuV

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:31:39

Frequency Range:

13-18GHz

Antenna Polarization:

Horizontal

Emission Frequency:

ND

Channel Frequency:

2442.00 MHz

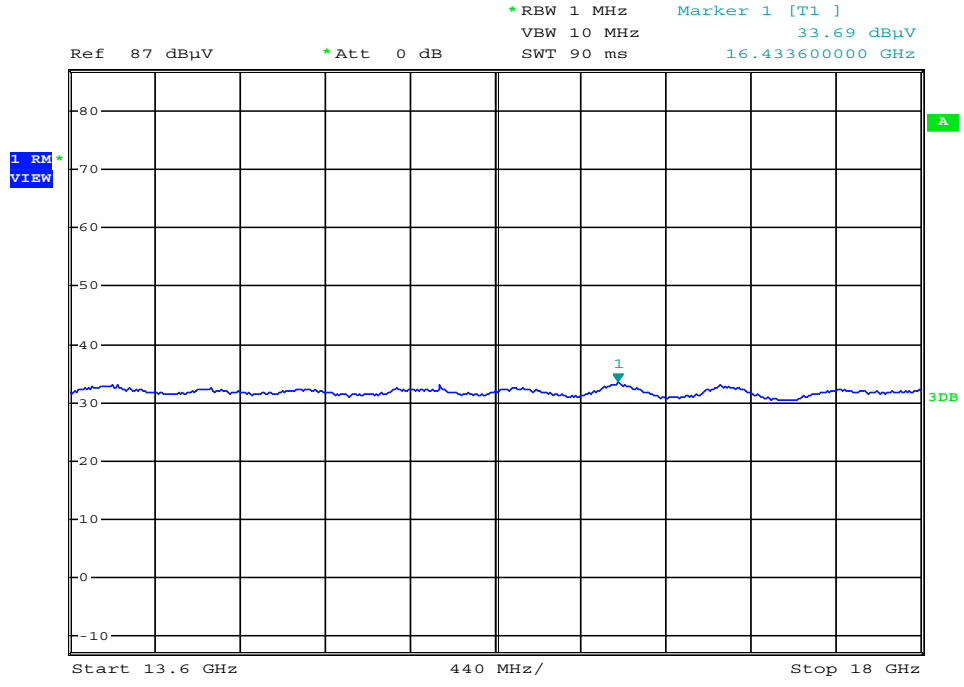
Modulation:

8-DPSK

Measured Emission:

ND dBuV

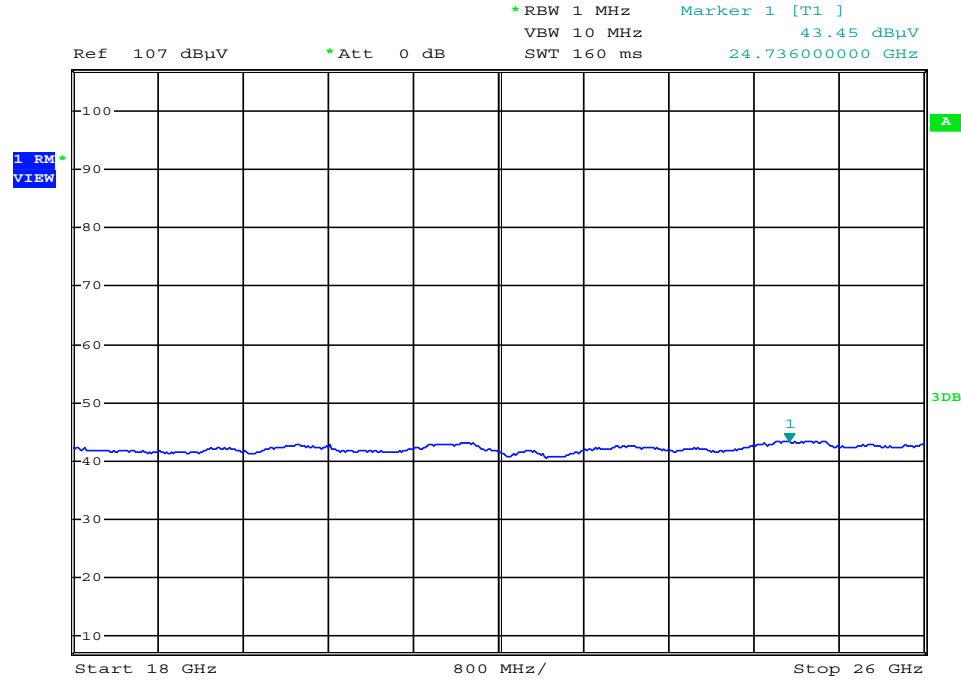
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 16:32:58

Frequency Range: 13-18GHz	Antenna Polarization: Vertical	Emission Frequency: ND
Channel Frequency: 2442.00 MHz	Modulation: 8-DPSK	Measured Emission: ND dBuV

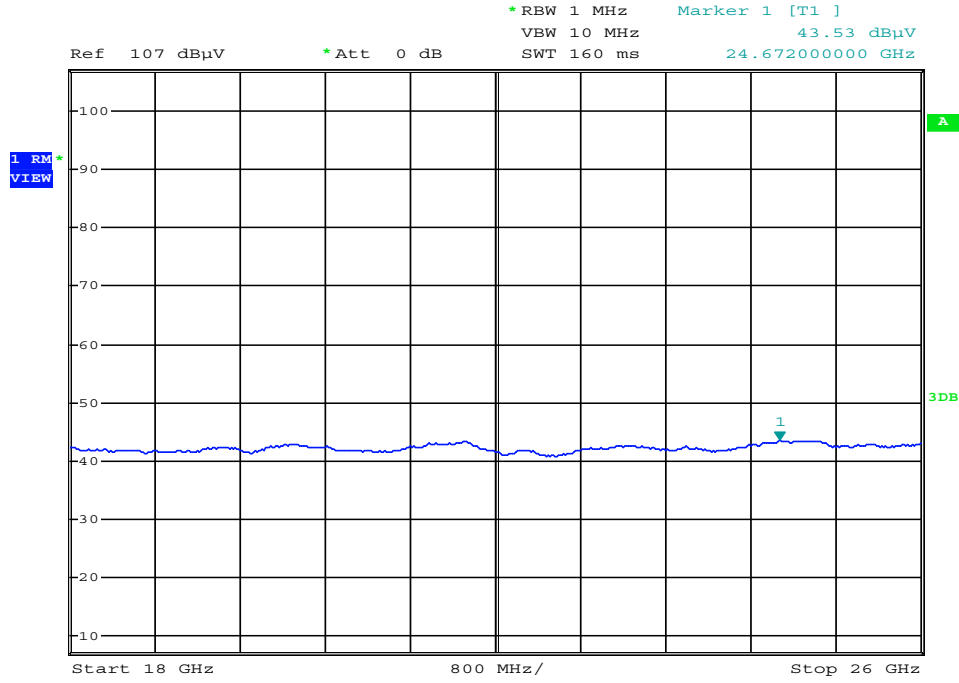
Radiated Emissions - Restricted Band



Date: 26.NOV.2020 14:44:03

Frequency Range: 18-26GHz	Antenna Polarization: Horizontal	Emission Frequency: ND
Channel Frequency: 2442.00 MHz	Modulation: 8-DPSK	Measured Emission: ND dBuV

Radiated Emissions - Restricted Band



Date: 26.NOV.2020 14:59:07

Frequency Range:

18-26GHz

Antenna Polarization:

Vertical

Emission Frequency:

ND

Channel Frequency:

2442.00 MHz

Modulation:

8-DPSK

Measured Emission:

ND dBuV

Summary of Conducted Tx Emissions (Restricted Band)

Measured Frequency Range (MHz)	Channel Frequency	Emission Frequency	Antenna Gain [G _T]	Measured Emission [P _T] (dBm)	e.r.p. or e.i.r.p. (dB)	Ground Reflection [L _R] (dB)	Conversion dBm to dBuV/m [CF _R] (dB)	Distance Correction [L _D]	Corrected Emission [E _{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
9kHz - 30MHz	13.56	13.56* MHz	-0.15 dBd	-70.57	-70.72	6.0	107.0	9.54	32.7	69.5	36.8
		487.8 MHz		-73.16	-73.31	4.7	107.0		28.9	46.0	17.2
		515.0 MHz		-74.91	-75.06	4.7	107.0		27.1	46.0	18.9
		610.1 MHz		-76.80	-76.95	4.7	107.0		25.2	46.0	20.8
Results:										Complies	

Ground Reflection Factor [CF_R] = 6dB for f < 30MHz, 4.7dB for 30MHz < f < 1000MHz, 0dB for f > 1000MHz

e.r.p. = P_T + G_T - L_C, where P_T = measured emission (dBm), G_T = DUT antenna gain (dBd), L_C = loss between the DUT transmitter and DUT antenna (dB) = 0

e.i.r.p. = P_T + G_T - L_C, where P_T = measured emission (dBm), G_T = DUT antenna gain (dB), L_C = loss between the DUT transmitter and DUT antenna (dB) = 0

G_T(dBd) = G_T(dBi) - 2.15, e.r.p. = e.i.r.p - 2.15

G_T minimum = 2dBi, -0.15dBd

Distance Correction [L_D] = 20Log(D), where D would have been the measurement distance = 3m

Conversion dBm to dBuV/m [CF] = 107 for e.r.p. and G_T expressed as dBd, 104.85 for e.i.r.p. and G_T expressed as dBi

E_{Corr} = e.r.p - [L_D] + [CF] + [CF_R]

E_{Corr} = e.i.r.p - [L_D] + [CF] + [CF_R]

Margin = Limit - E_{Corr}

* Fundamental

Summary of Radiated Tx Emissions (Restricted Band)

Measured Frequency Range (MHz)	Channel Frequency	Antenna Polarization	Emission Frequency	Measured Emission [E _{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L _c] (dB)	Amplifier Gain [G _A] (dB)	Corrected Emission [E _{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
1 - 3GHz	13.56MHz	Horizontal	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	n/a
1 - 3GHz		Vertical	ND	ND (1)	27.40	4.58	0.00 (3)	ND	54.0	n/a
3-13GHz		Horizontal	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	n/a
3-13GHz		Vertical	ND	ND (1)	36.76	9.86	0.00 (3)	ND	54.0	n/a
13-18GHz		Horizontal	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	n/a
13-18GHz		Vertical	ND	ND (1)	38.75	16.54	0.00 (3)	ND	54.0	n/a
18-26GHz		Horizontal	ND	ND (1)	43.50	21.86	26.00	ND	54.0	n/a
18-26GHz		Vertical	ND	ND (1)	43.50	21.86	26.00	ND	54.0	n/a
Results:									Complies	

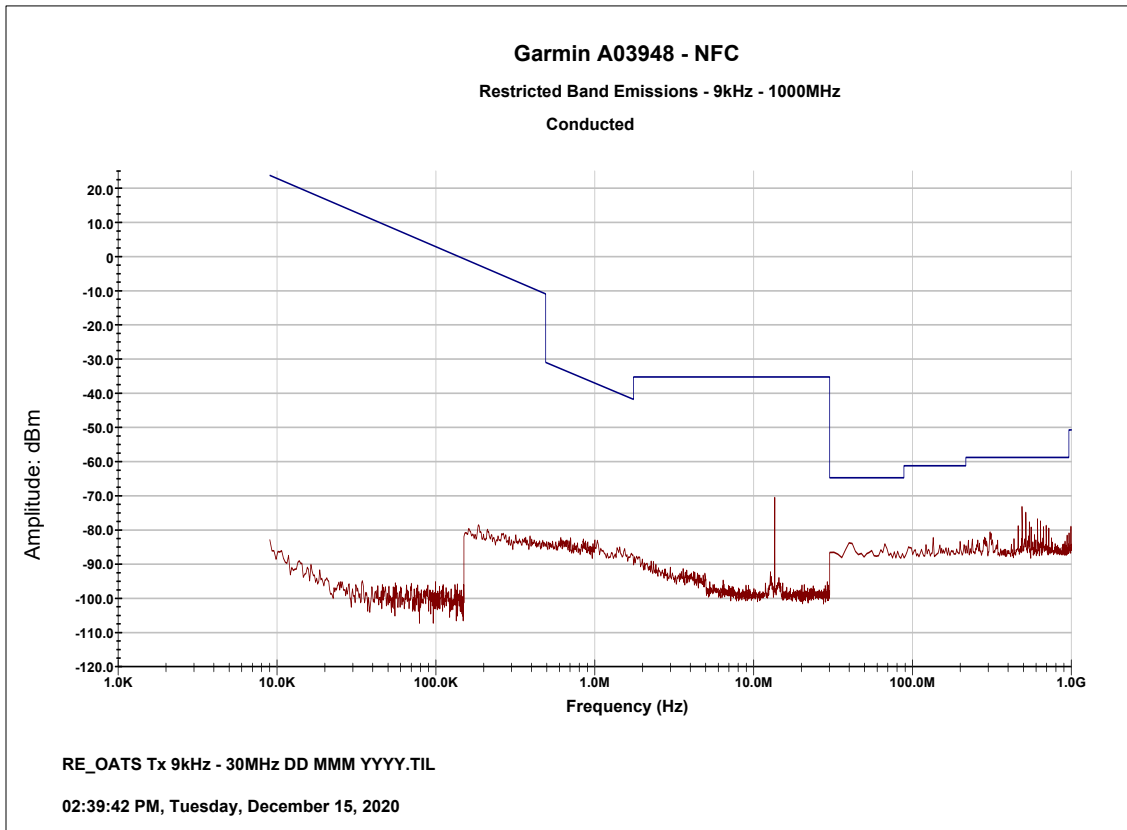
(1) No Emissions Detected (ND) above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplifier not used

$$E_{\text{Corr}} = E_{\text{Meas}} + \text{ACF} + L_{\text{C}} - G_{\text{A}}$$

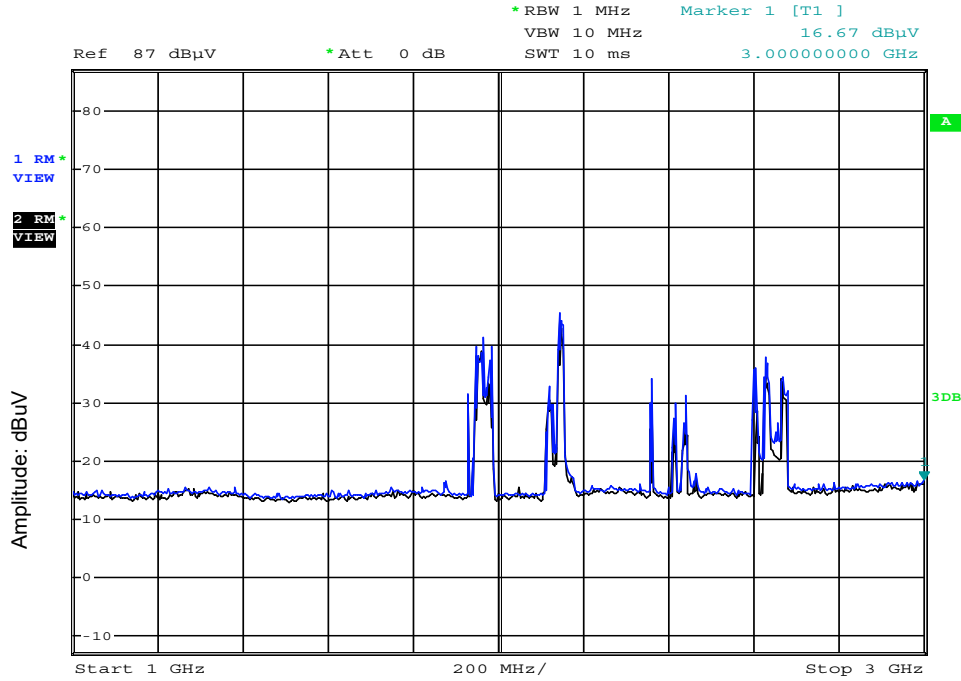
Conducted Emissions - Restricted Band



Frequency Range: 9kHz - 30MHz	Antenna Polarization: Conducted	Emission Frequency: -
Channel Frequency: 13.56 MHz	Modulation: ASK	Measured Emission: - dBuV

Limit Line Converted to dBm

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 13:21:44

Frequency Range:

1 - 3GHz

Antenna Polarization:

Horizontal

Emission Frequency:

ND

Channel Frequency:

13.56 MHz

Modulation:

ASK

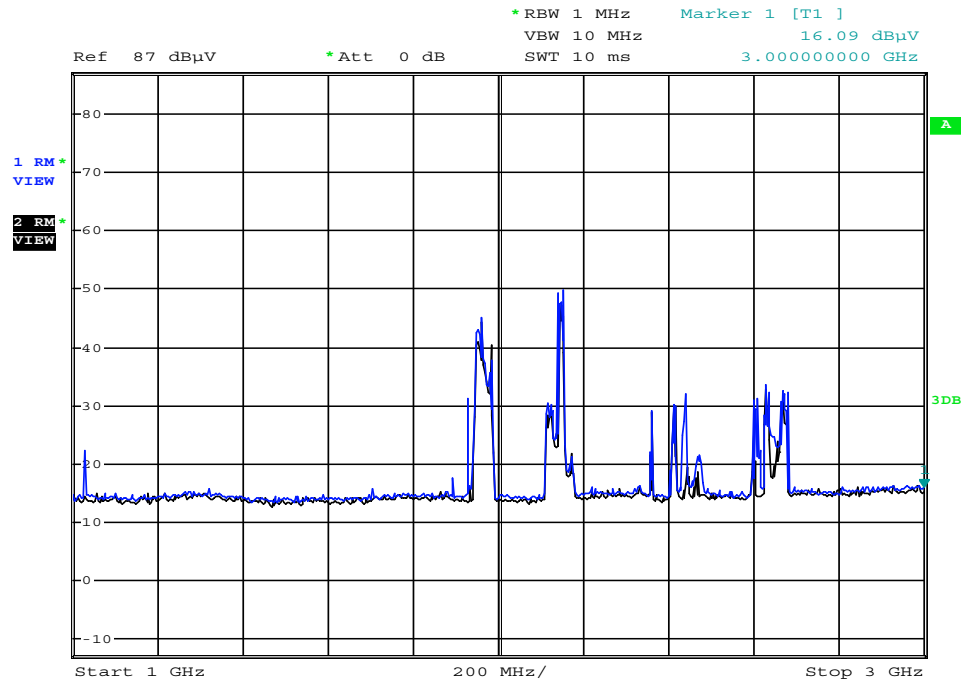
Measured Emission:

ND dBuV

Trace 1: Ambient

Trace 2: Ambient + DUT

Radiated Emissions - Restricted Band

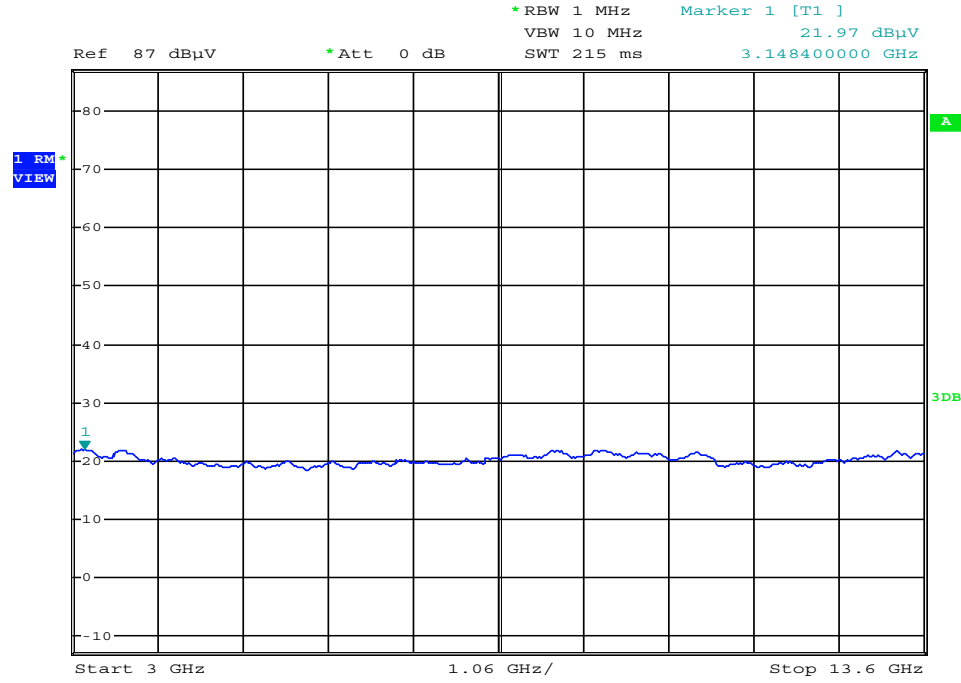


Date: 23.NOV.2020 13:17:27

Frequency Range: 1 - 3GHz	Antenna Polarization: Vertical	Emission Frequency: ND
Channel Frequency: 13.56 MHz	Modulation: ASK	Measured Emission: ND dBuV

Trace 1: Ambient
 Trace 2: Ambient + DUT
 Marker 1: Fundamental

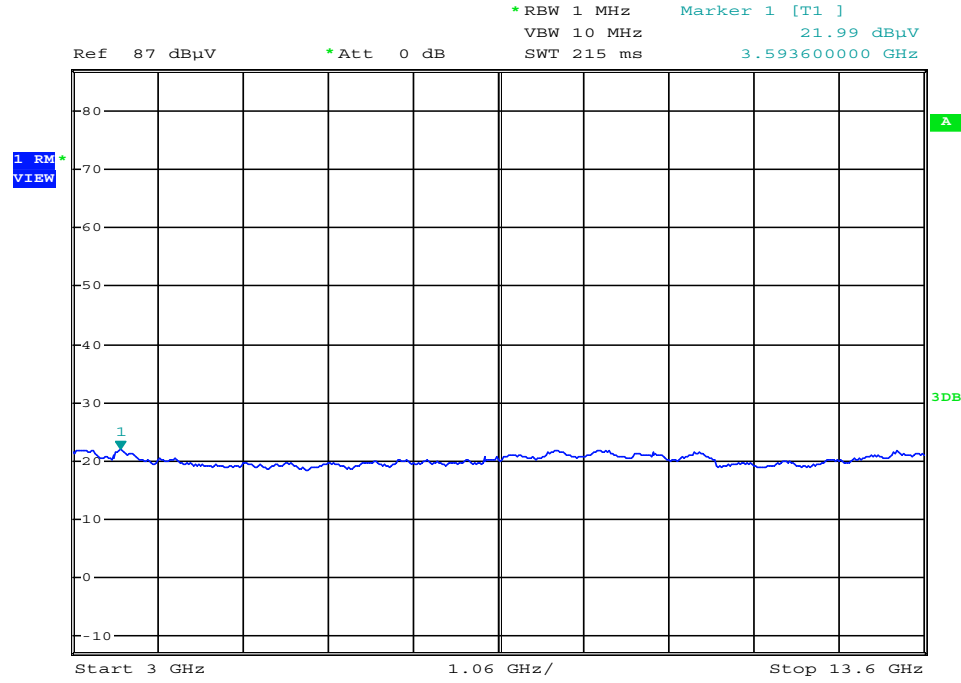
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 13:20:40

Frequency Range: 3-13GHz	Antenna Polarization: Horizontal	Emission Frequency: ND
Channel Frequency: 13.56 MHz	Modulation: ASK	Measured Emission: ND dBuV

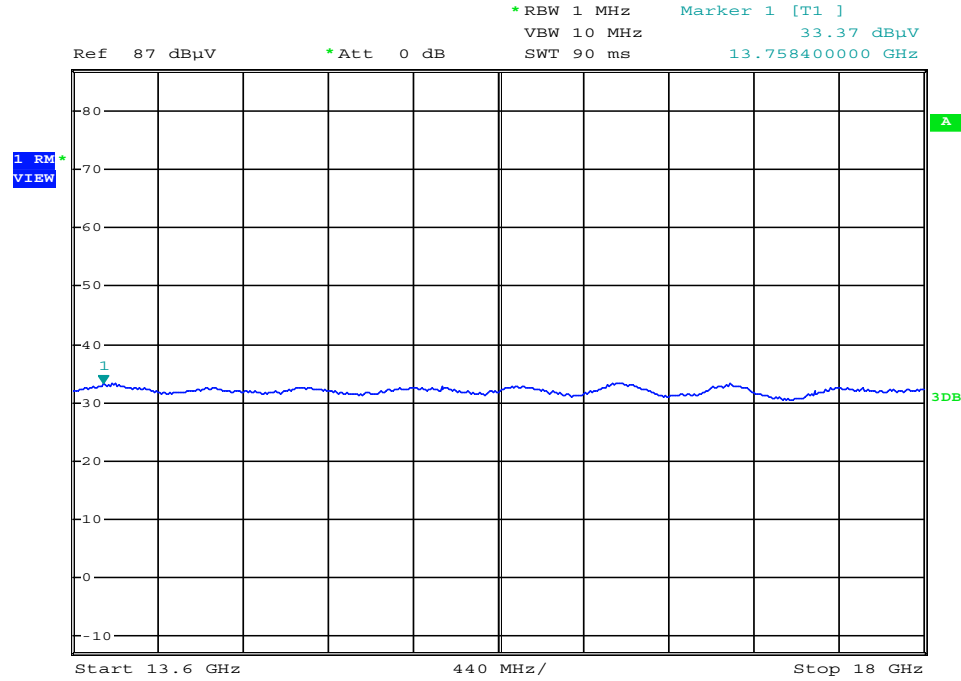
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 13:18:11

Frequency Range: 3-13GHz	Antenna Polarization: Vertical	Emission Frequency: ND
Channel Frequency: 13.56 MHz	Modulation: ASK	Measured Emission: ND dBuV

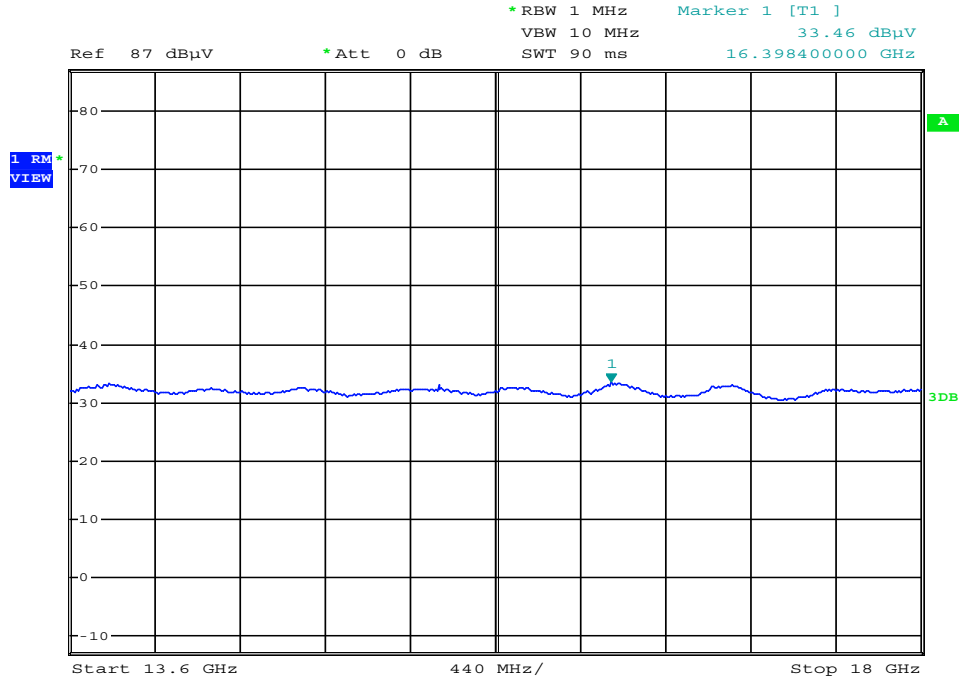
Radiated Emissions - Restricted Band



Date: 23.NOV.2020 13:20:05

Frequency Range: 13-18GHz	Antenna Polarization: Horizontal	Emission Frequency: ND
Channel Frequency: 13.56 MHz	Modulation: ASK	Measured Emission: ND dBuV

Radiated Emissions - Restricted Band



Date: 23.NOV.2020 13:18:38

Frequency Range:

13-18GHz

Antenna Polarization:

Vertical

Emission Frequency:

ND

Channel Frequency:

2442.00 MHz

Modulation:

8-DPSK

Measured Emission:

ND dBuV