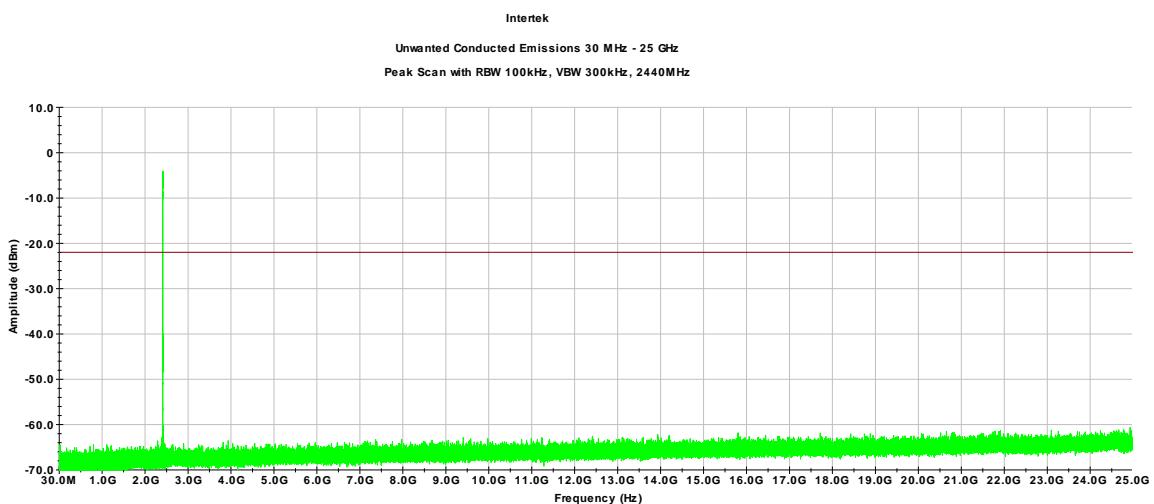
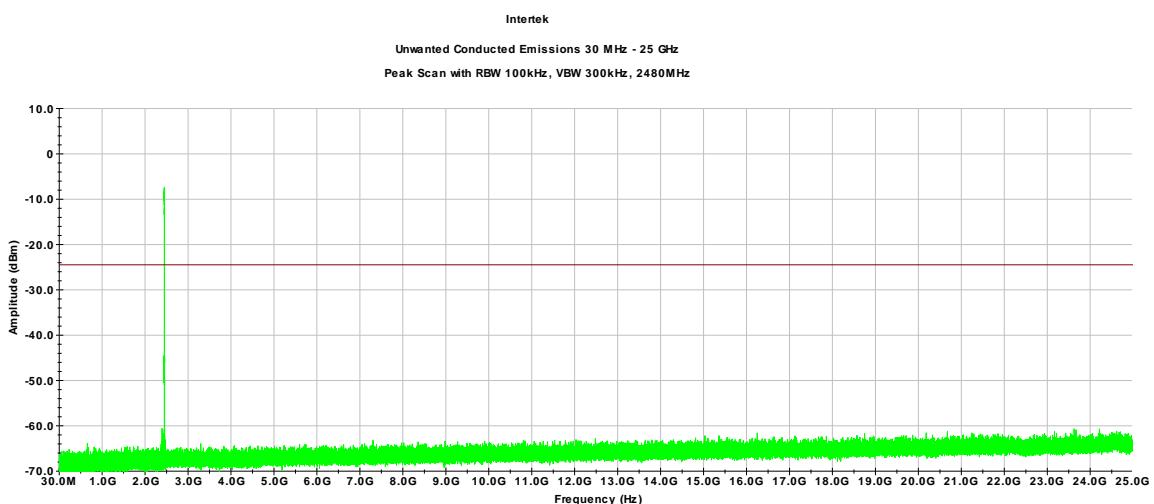


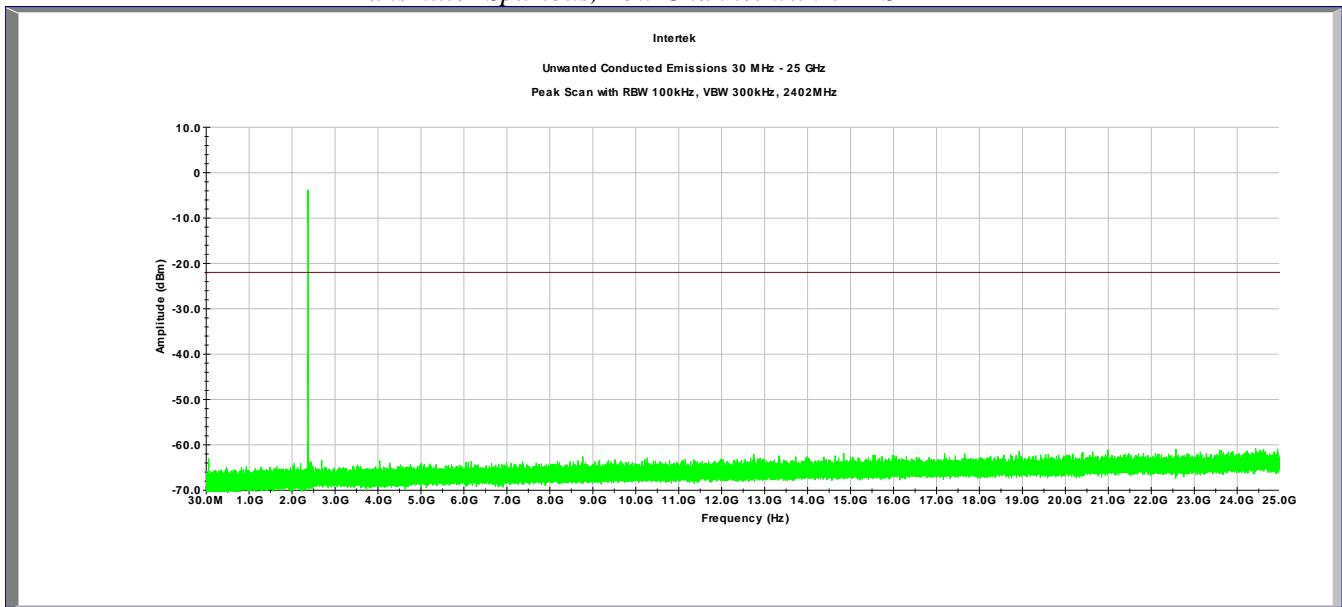
Plot 4.5
Transmitter Spurious, Mid Channel with $\pi/4$ -DQPSK



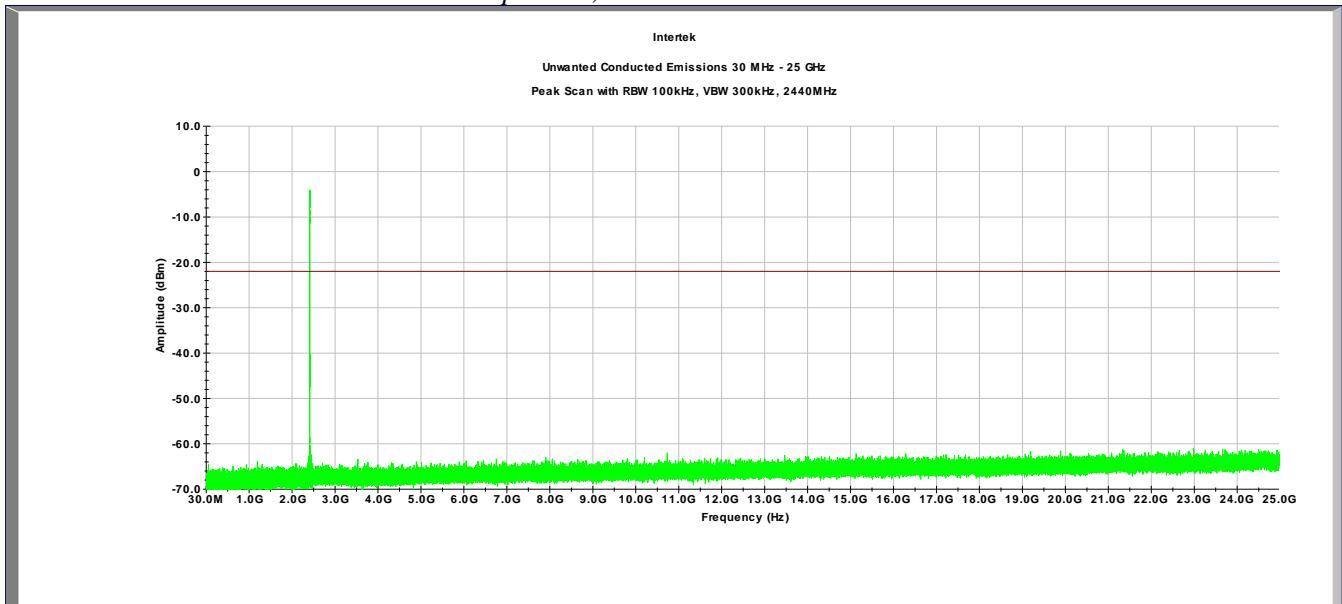
Plot 4.6
Transmitter Spurious, High Channel with $\pi/4$ -DQPSK



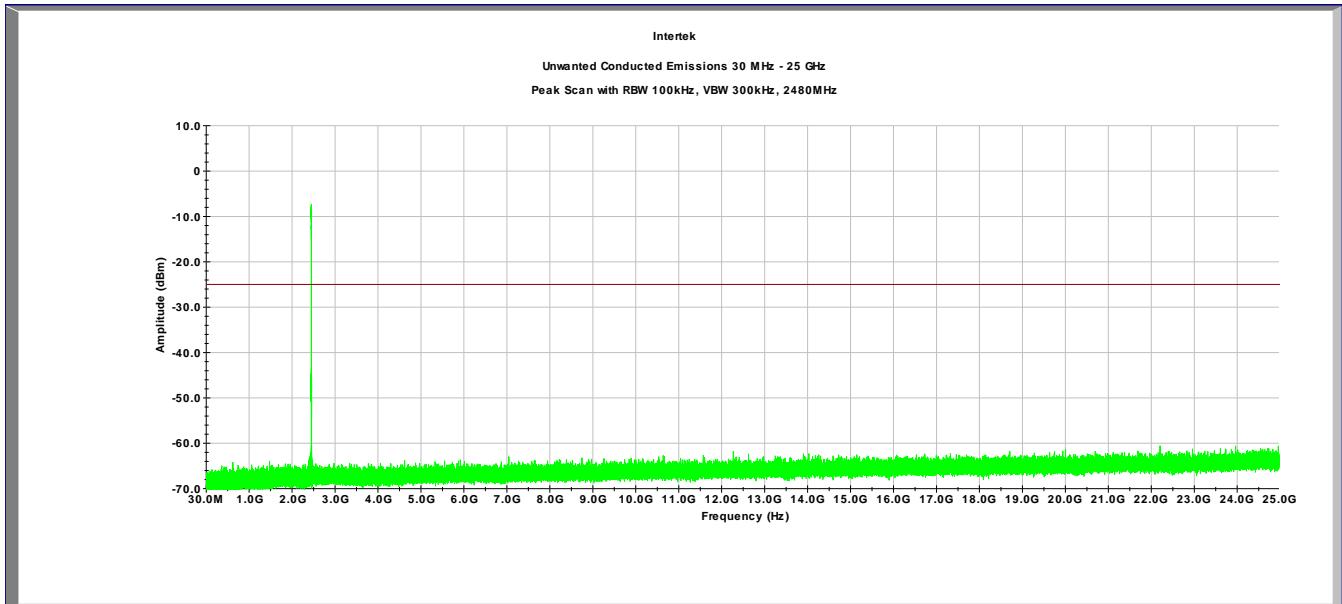
Plot 4.7
Transmitter Spurious, Low Channel with 8DPSK



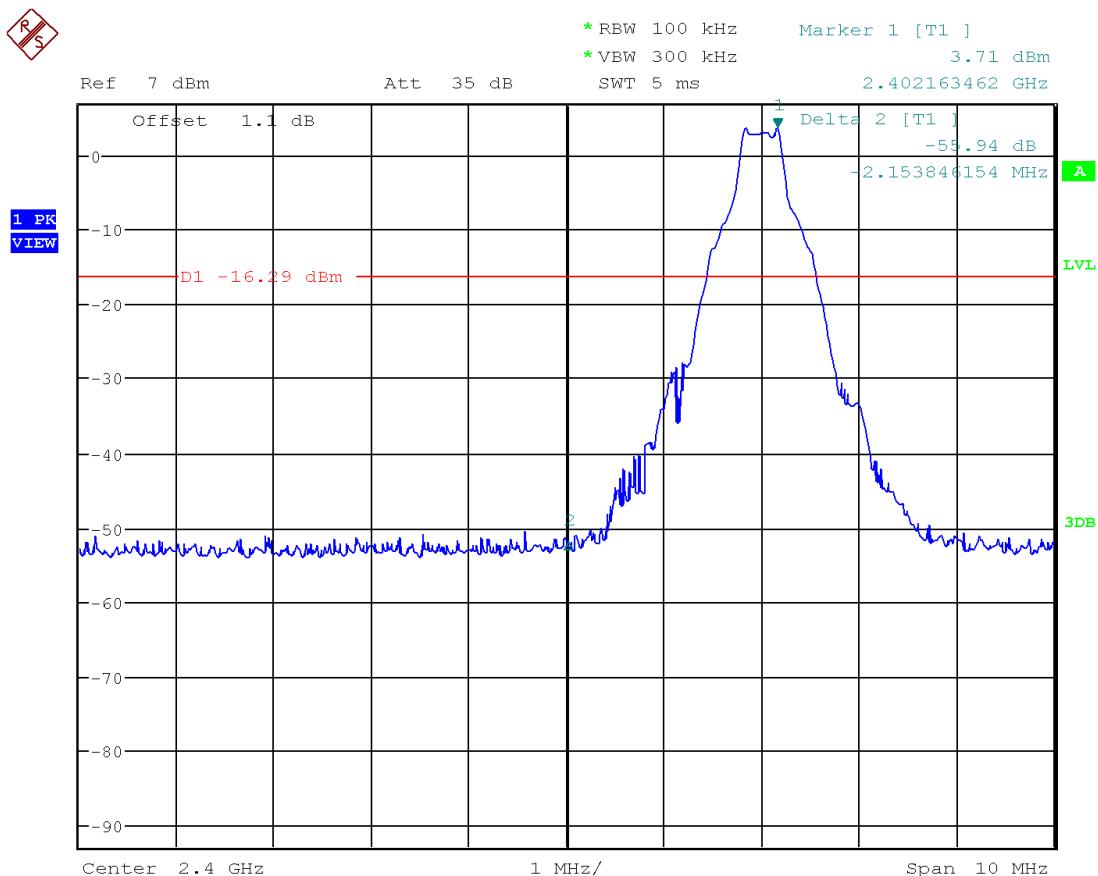
Plot 4.8
Transmitter Spurious, Mid Channel with 8DPSK



Plot 4.9
Transmitter Spurious, High Channel with 8DPSK

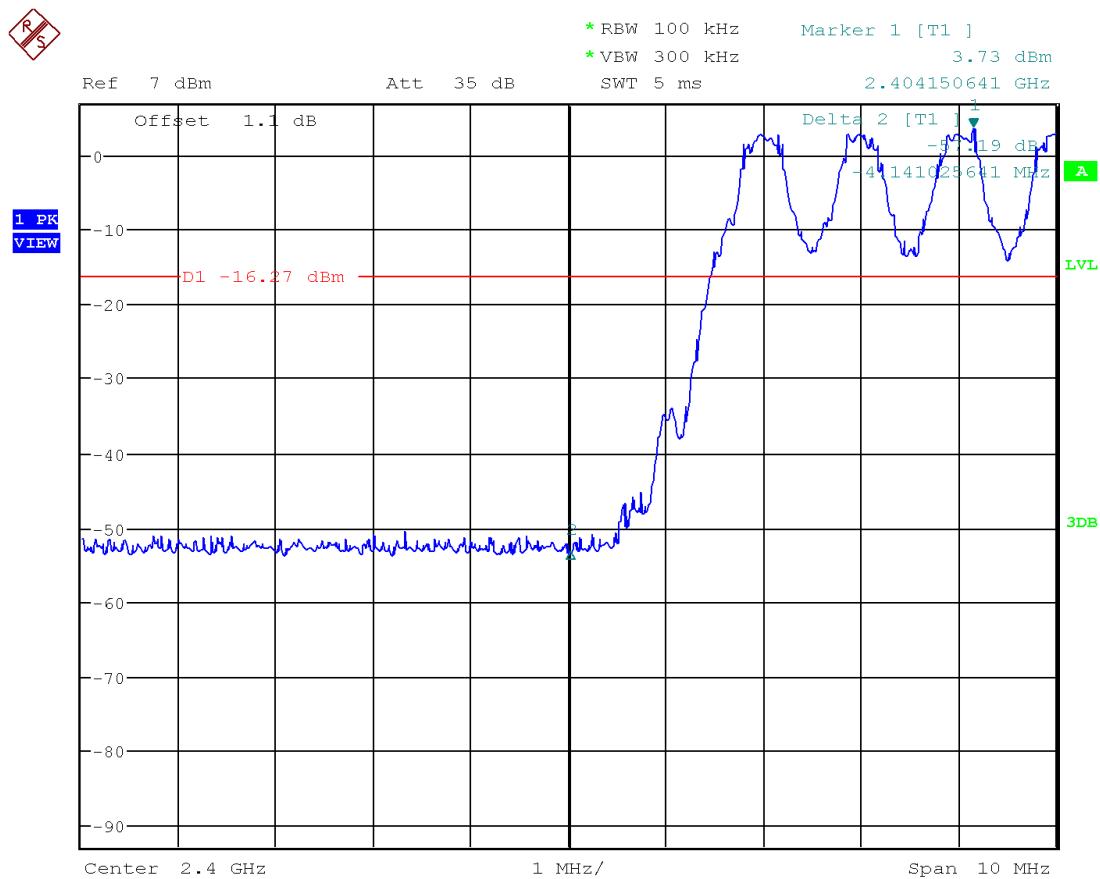


Plot 4.10
Conducted Band Edge, Low Channel with GFSK



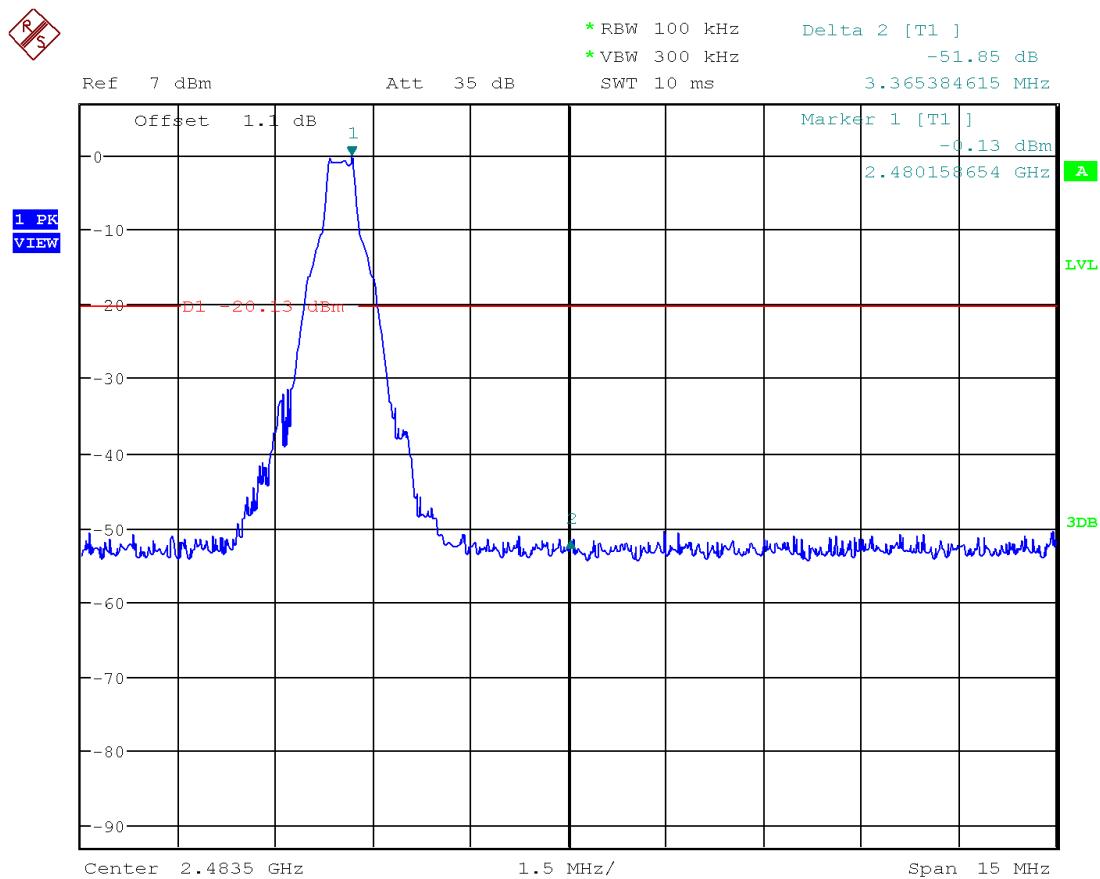
Date: 10.OCT.2018 16:55:51

Plot 4.11
Conducted Band Edge, with GFSK (Hopping)



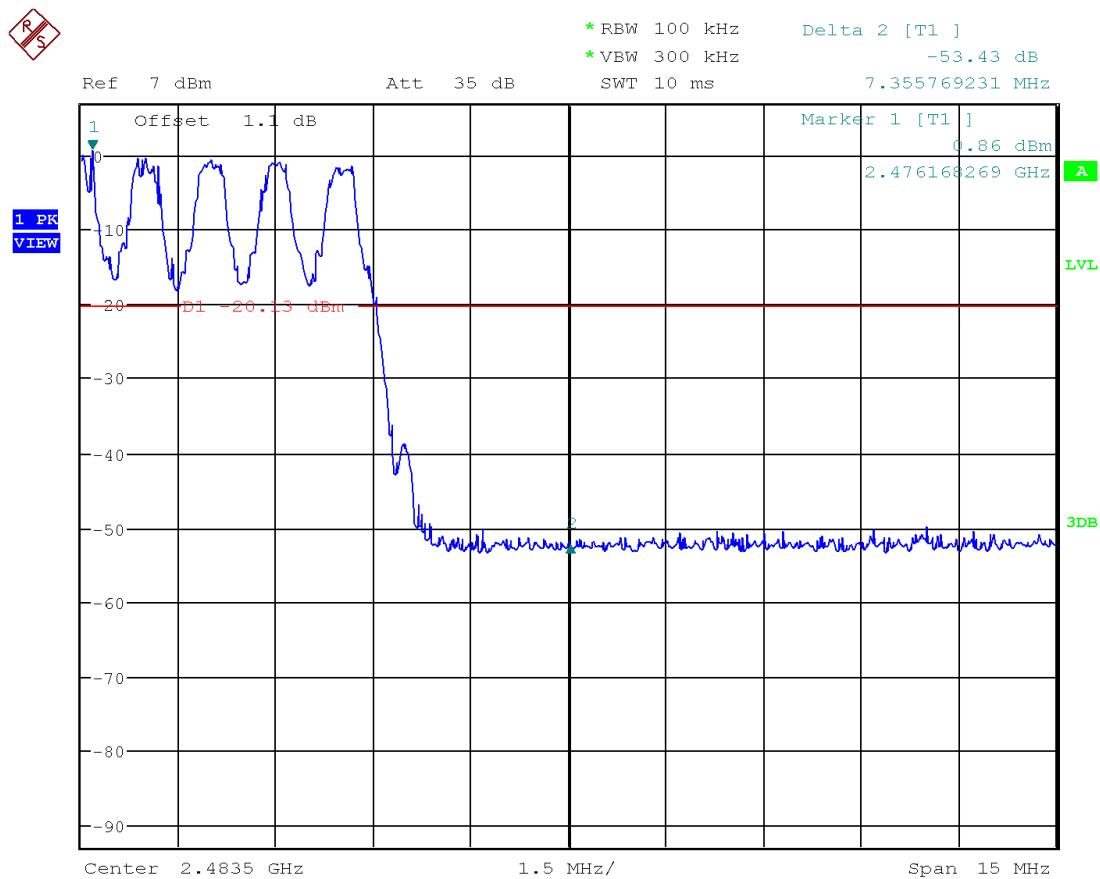
Date: 10.OCT.2018 16:58:25

Plot 4.12
Conducted Band Edge, High Channel with GFSK



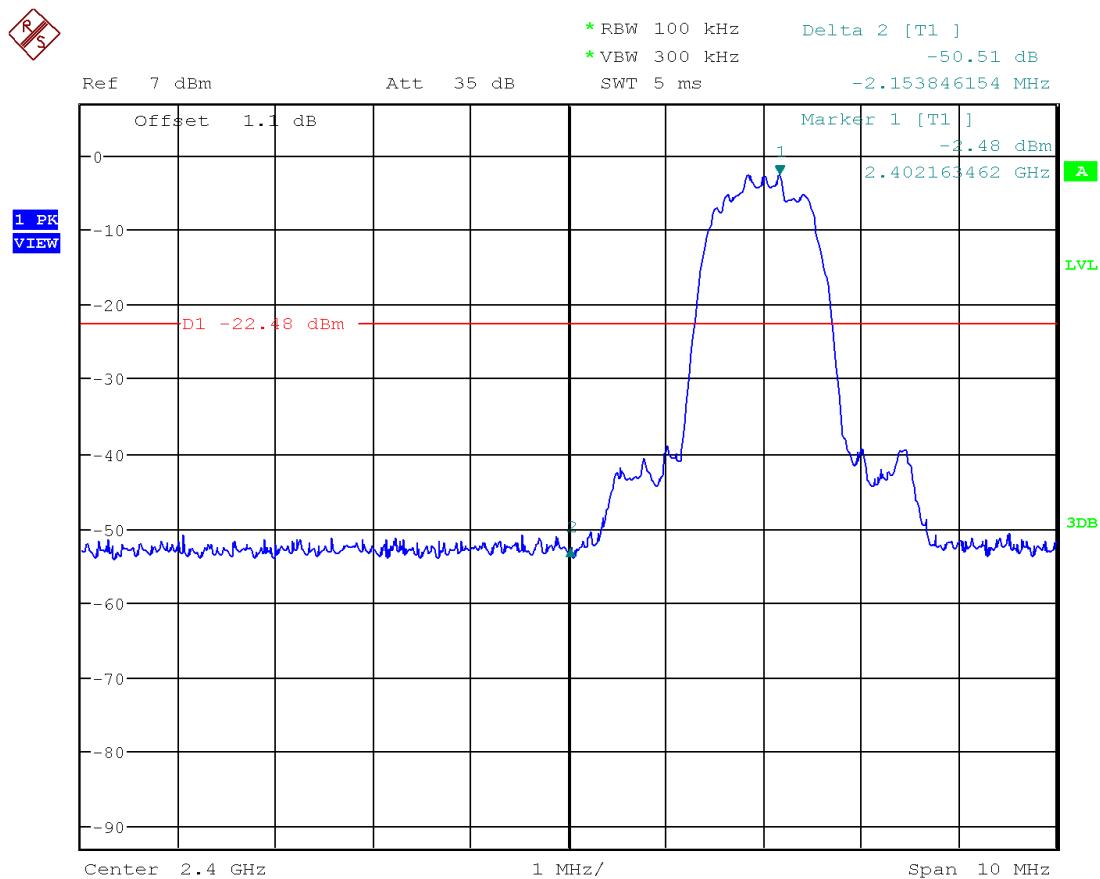
Date: 10.OCT.2018 17:10:03

Plot 4.13
Conducted Band Edge, with GFSK (Hopping)



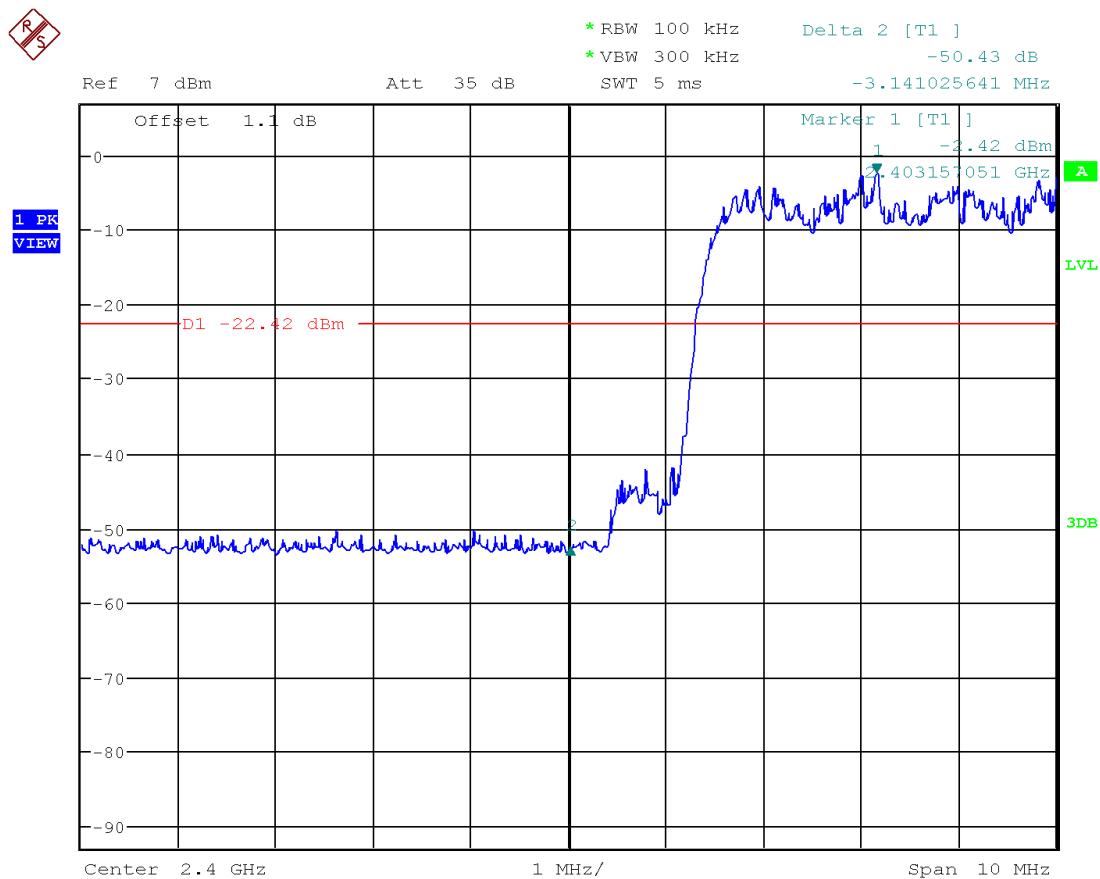
Date: 10.OCT.2018 17:26:39

Plot 4.14
Conducted Band Edge, Low Channel with $\pi/4$ -DQPSK



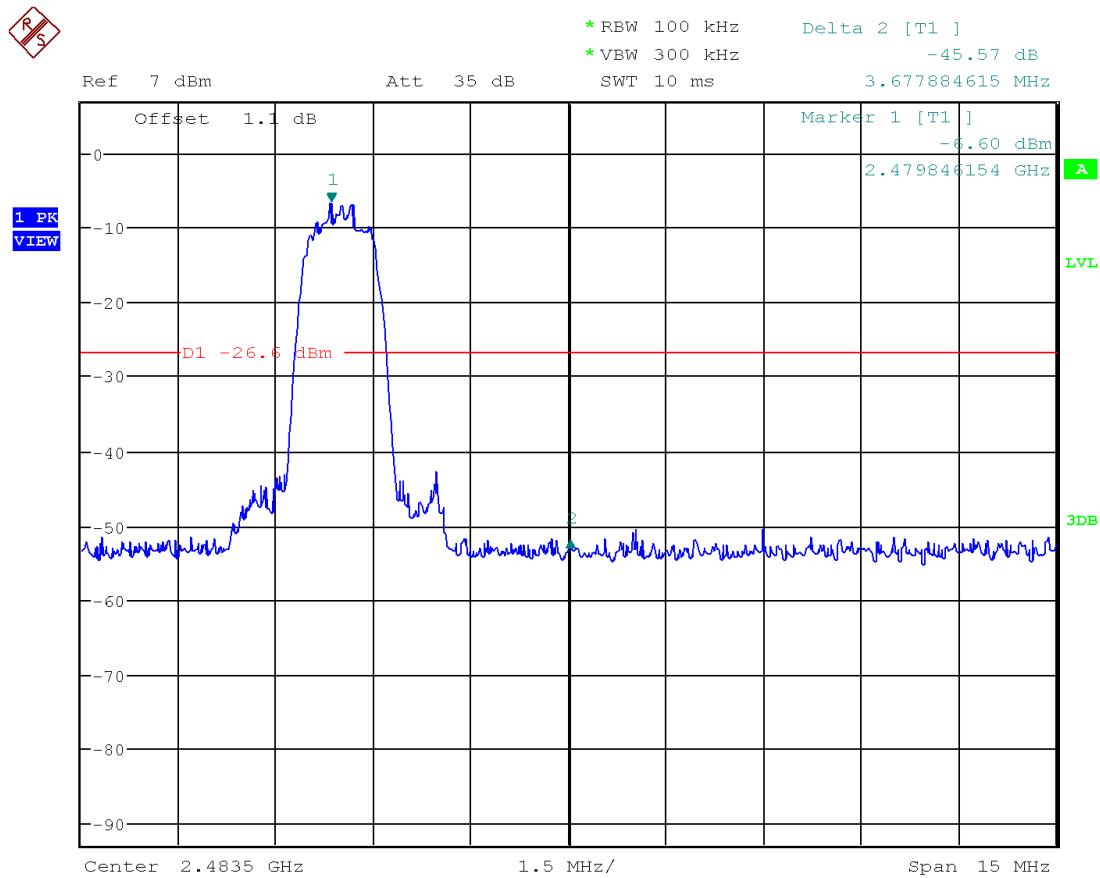
Date: 10.OCT.2018 17:00:37

Plot 4.15
Conducted Band Edge, with $\pi/4$ -DQPSK (Hopping)



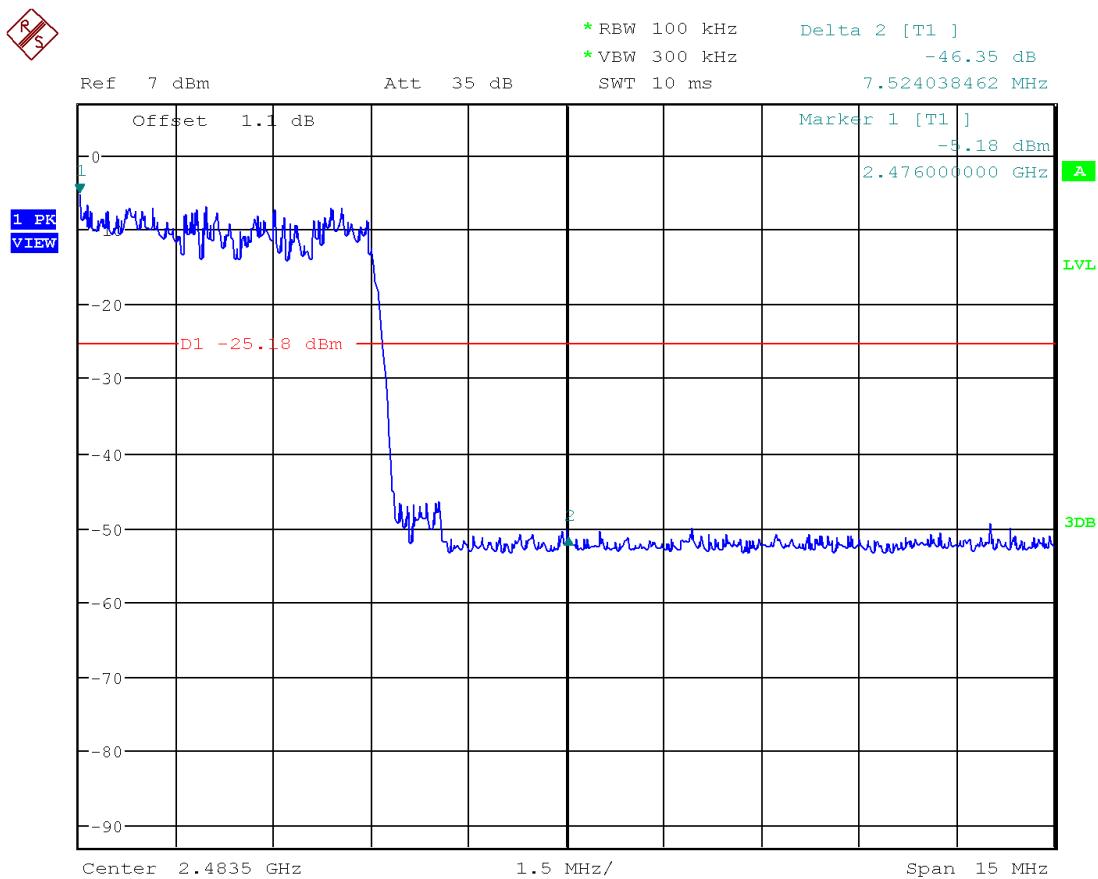
Date: 10.OCT.2018 17:03:13

Plot 4.16
Conducted Band Edge, High Channel with $\pi/4$ -DQPSK



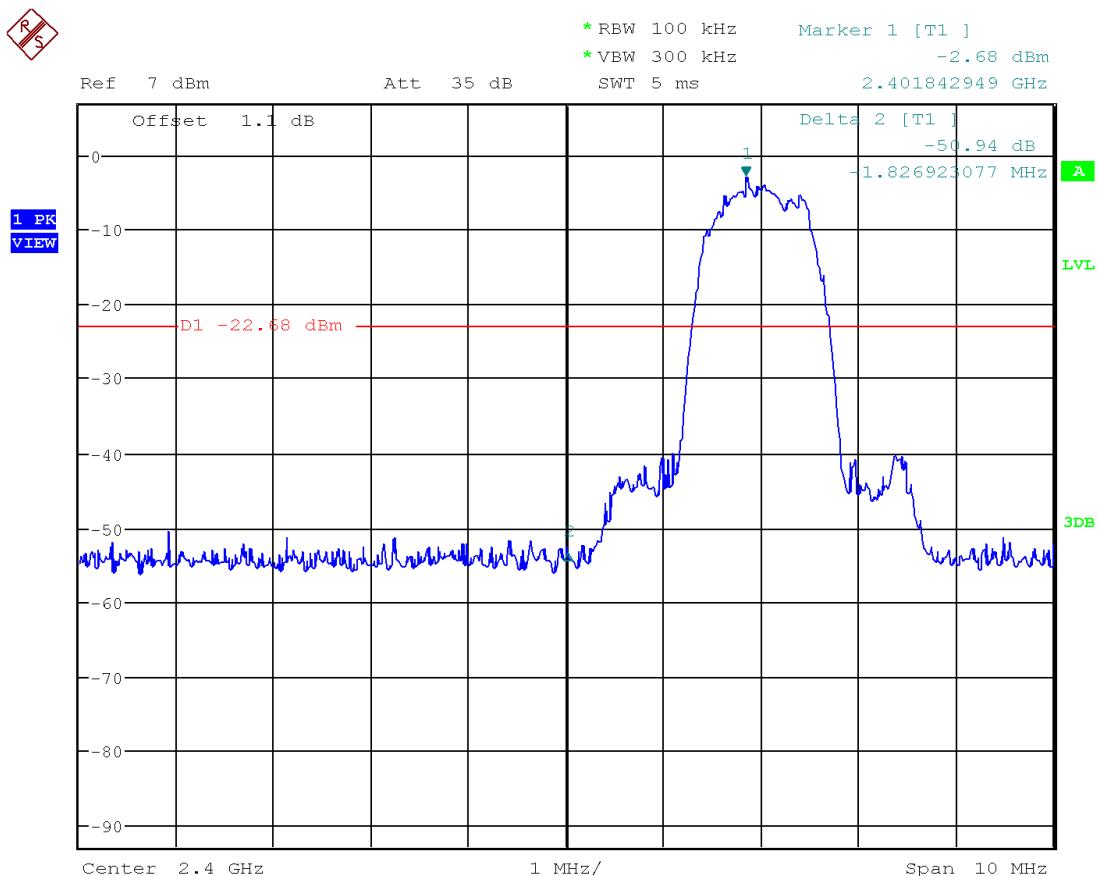
Date: 10.OCT.2018 17:28:18

Plot 4.17
Conducted Band Edge, with $\pi/4$ -DQPSK (Hopping)



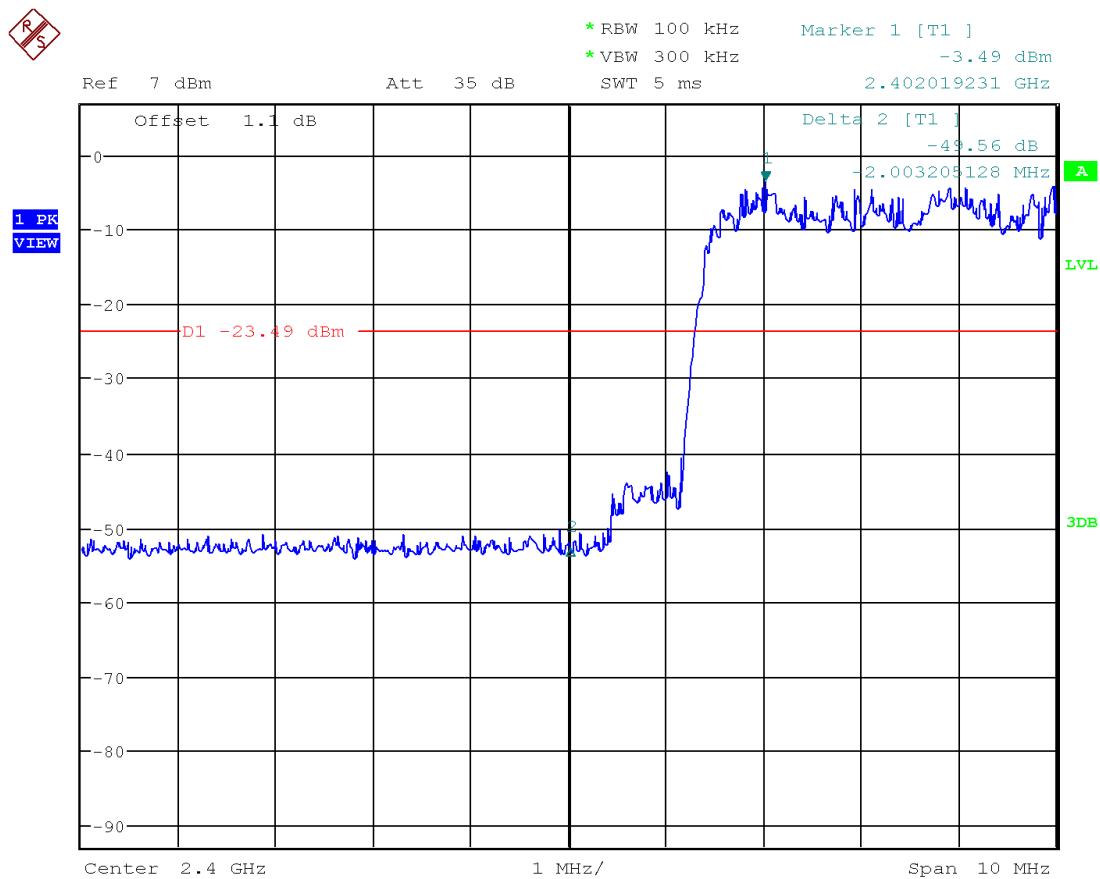
Date: 10.OCT.2018 17:29:51

Plot 4.18
Conducted Band Edge, Low Channel with 8DPSK



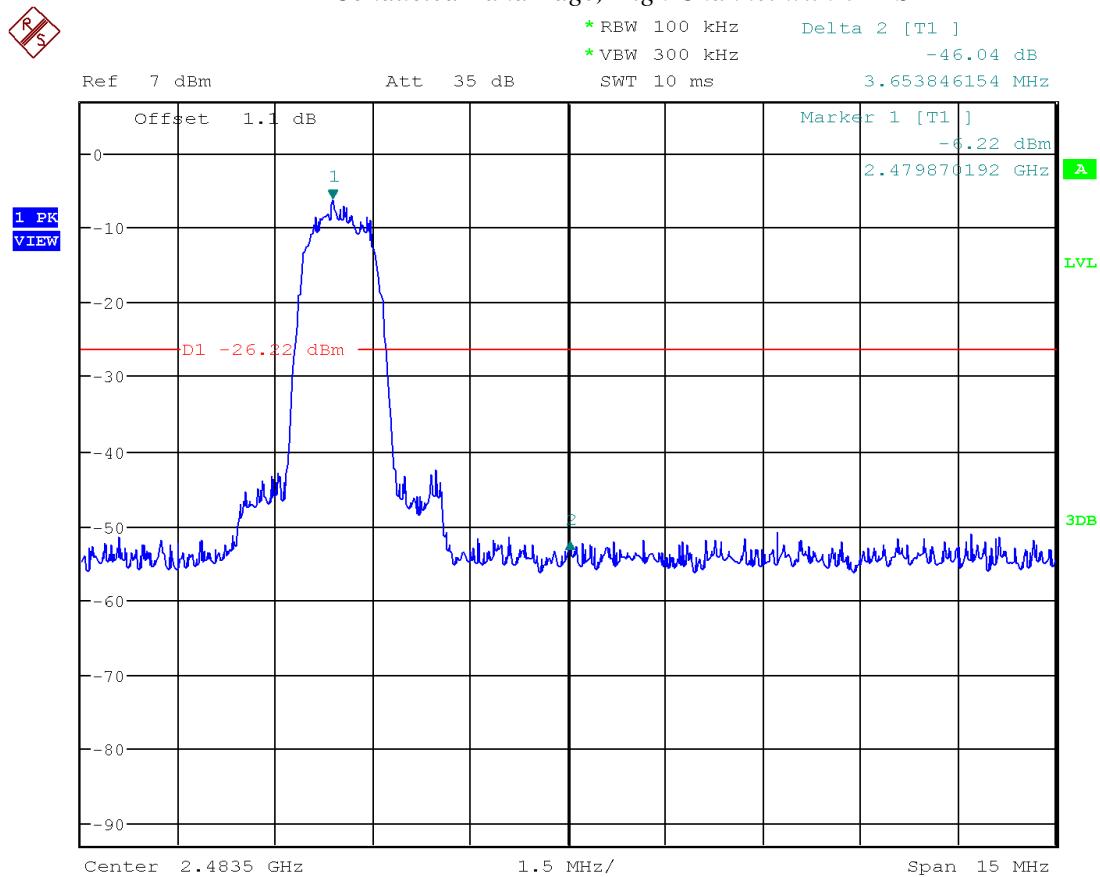
Date: 10.OCT.2018 17:08:14

Plot 4.19
Conducted Band Edge, with 8DPSK (Hopping)



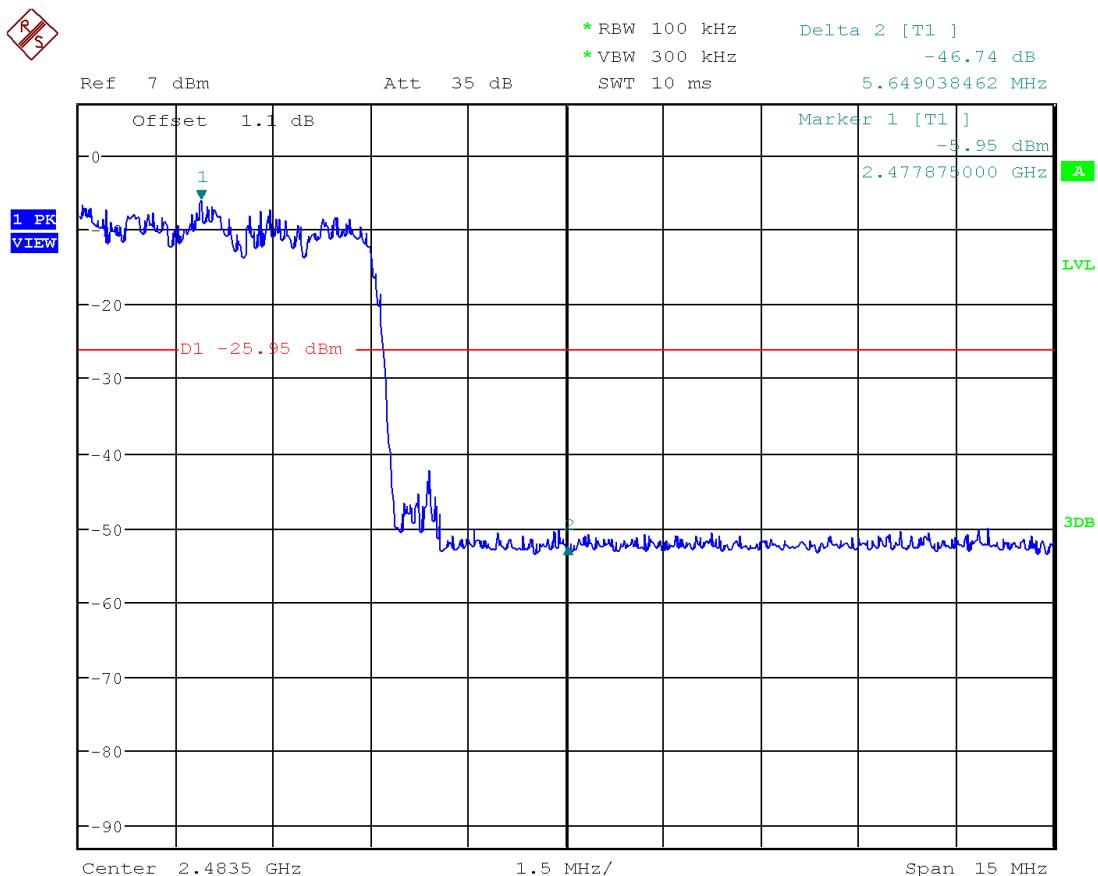
Date: 10.OCT.2018 17:06:07

Plot 4.20
Conducted Band Edge, High Channel with 8DPSK



Date: 10.OCT.2018 17:32:06

Plot 4.21
Conducted Band Edge, with 8DPSK (Hopping)



Date: 10.OCT.2018 17:34:49

4.7 Transmitter Radiated Emissions FCC Rule 15.247(d), 15.209, 15.205

4.7.1 Requirement

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

For out of band radiated emissions (except for frequencies in restricted bands), in any 100 kHz bandwidths outside the EUT pass-band, the RF power shall be at least 20dB (peak) or 30 dB (average) below that of the maximum in-band 100 kHz emissions.

4.7.2 Procedure

Radiated emission measurements were performed from 30 MHz to 26,000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz for frequencies above 1000 MHz.

The EUT is placed on a plastic turntable that is 80 cm in height for below 1000MHz and 1.5m in height for above 1GHz. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at 3 meters for frequencies above 1 GHz and at 10 meters for frequencies below 1 GHz.

Radiated Band Edge measurements made were made from 2300- 2406 MHz for the low channel and 2470 – 2500 MHz for the high channel.

Measurements made from 1 GHz to 18GHz had a 2.4-2.5GHz notch filter in place. A preamp was used from 30MHz to 26GHz.

All measurements were made with a Peak Detector and compared to QP limits for 30MHz – 1GHz and Average limits for 1GHz – 26GHz where applicable.

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels).

EUT was tested with Internal Antenna.

4.7.3 Field Strength Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB(μ V); CF = Correction Factor in dB (CF = Antenna Factor in dB(1/m) (AF) + Cable Attenuation Factor in dB (CL) - Amplifier Gain in dB (AG)).

Assume a receiver reading of 52.0 dB(μ V) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μ V/m). This value in dB(μ V/m) was converted to its corresponding level in μ V/m.

RA = 52.0 dB(μ V)

AF = 7.4 dB(1/m)

CL = 1.6 dB

AG = 29.0 dB

FS = 52.0+(7.4+1.6-29.0) = 32 dB(μ V/m).

Level in μ V/m = Common Antilogarithm [(32 dB μ V/m)/20] = 39.8 μ V/m.

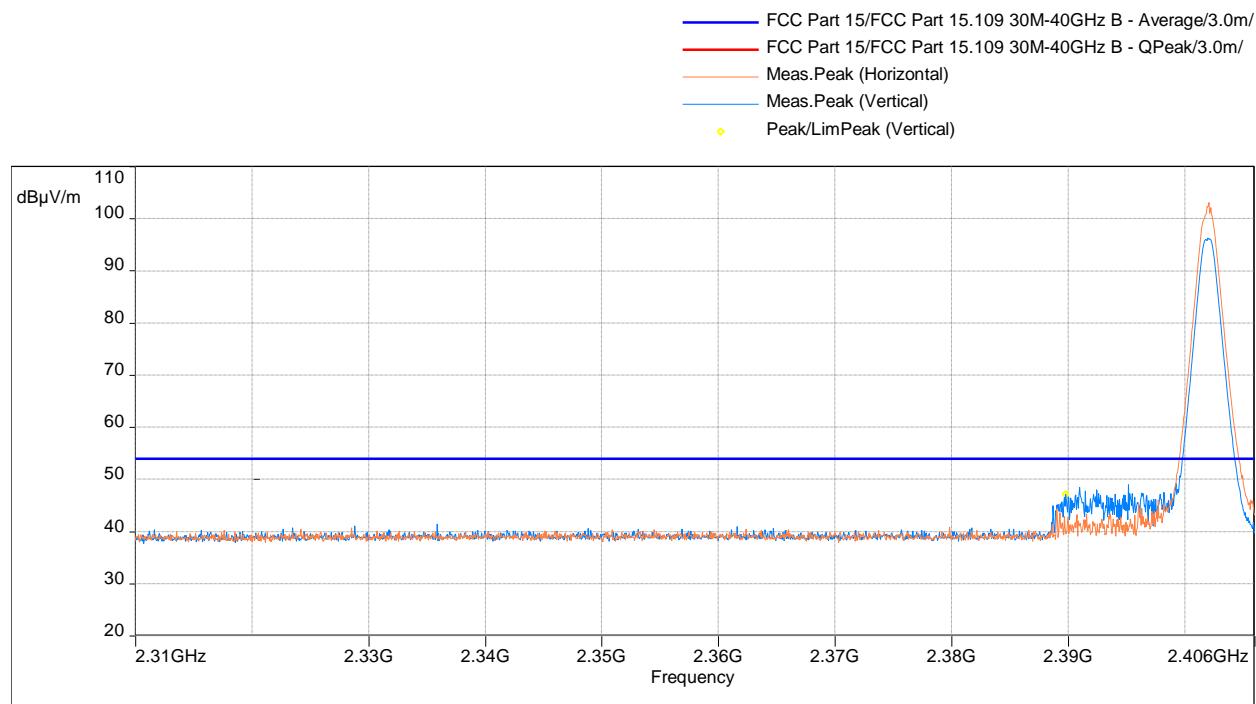
4.7.4 Test Results

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Tested By:	Minh Ly
Test Date:	September 26 to October 01, 2018

4.7.4 Test Results: 15.209/15.205 Restricted Band Emissions with Internal Antenna

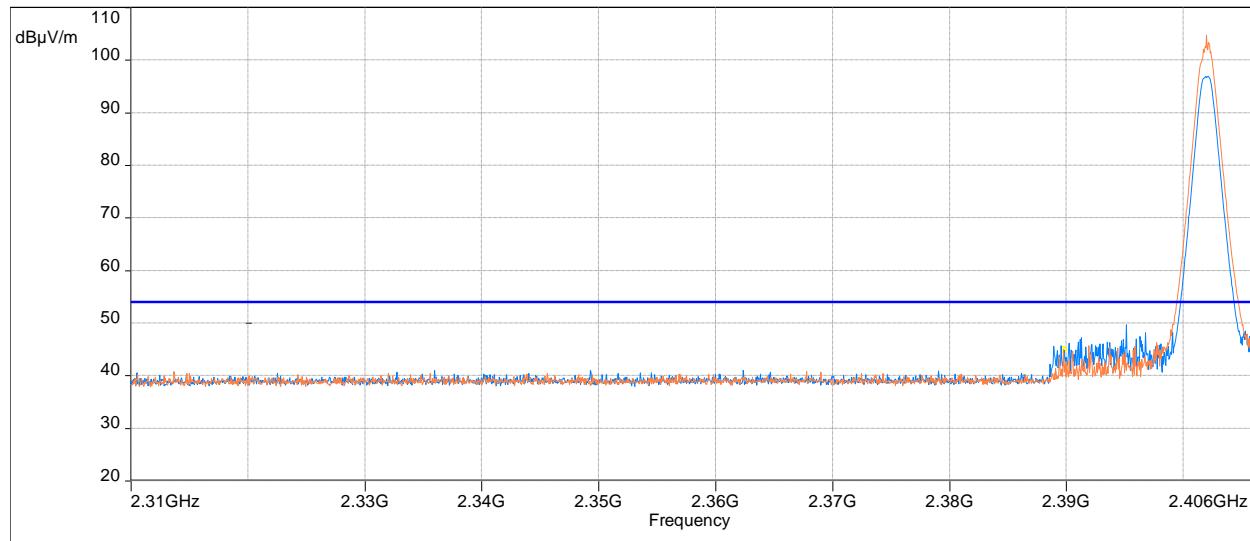
**Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2310–2390 MHz, Peak Scan with Average Limit
GFSK, Charging Mode**



Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
2389.786	47.1	54.0	-6.9	165.5	1.5	Vertical	61.5	-14.4

Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2310–2390 MHz, Peak Scan with Average Limit
GFSK, Normal Mode

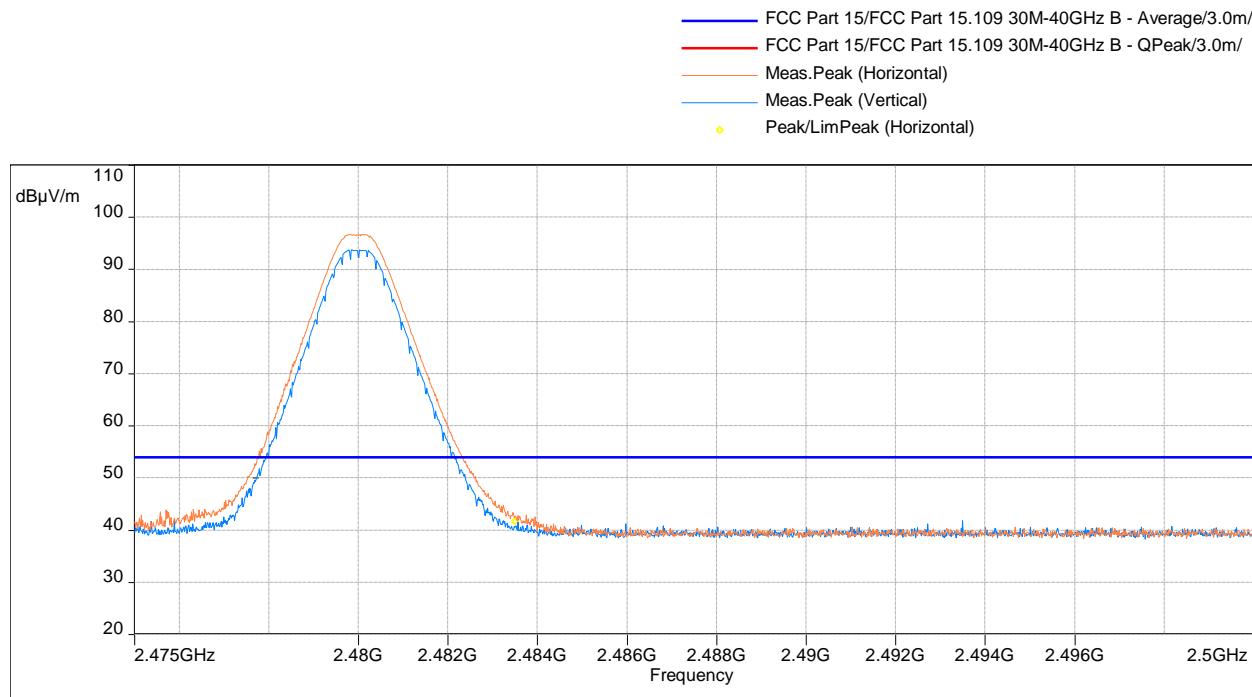
— FCC Part 15/FCC Part 15.109 30M-40GHz B - Average/3.0m/
— FCC Part 15/FCC Part 15.109 30M-40GHz B - QPeak/3.0m/
— Meas.Peak (Horizontal)
— Meas.Peak (Vertical)
○ Peak/LimPeak (Horizontal)



Model: ; Client: ; Comments: ; Test Date: 09/26/2018 18:21

Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2389.757	45.0	54.0	-9.0	166.0	1.5	Horizontal	59.4	-14.4

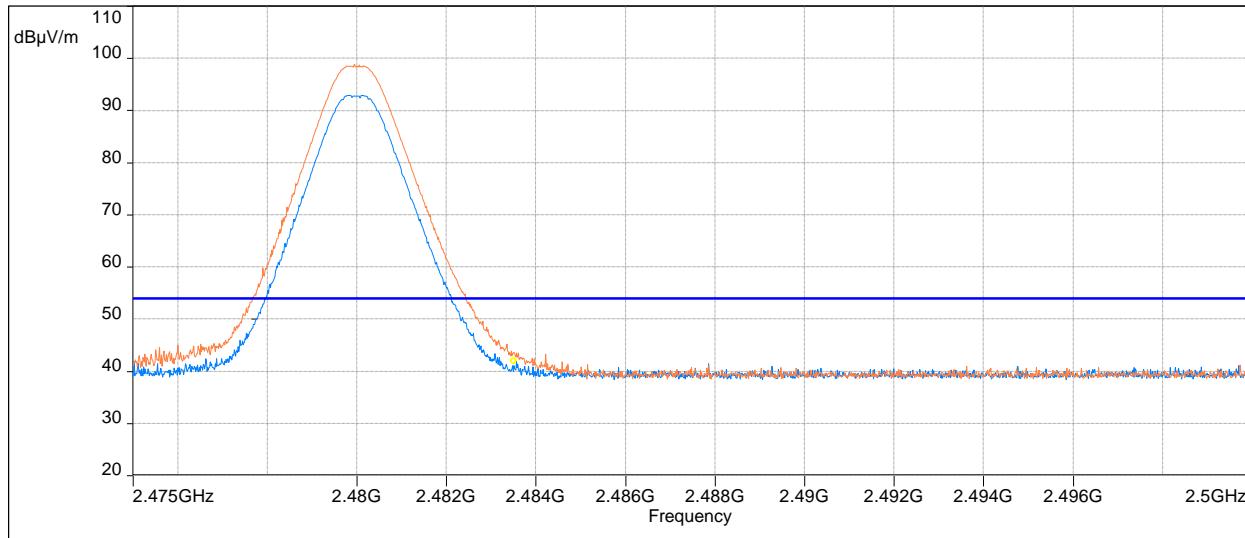
Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Average Limit
GFSK, Charging Mode



Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2483.500	41.6	54.0	-12.4	12.0	1.5	Horizontal	55.7	-14.1

**Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Average Limit
GFSK, Normal Mode**

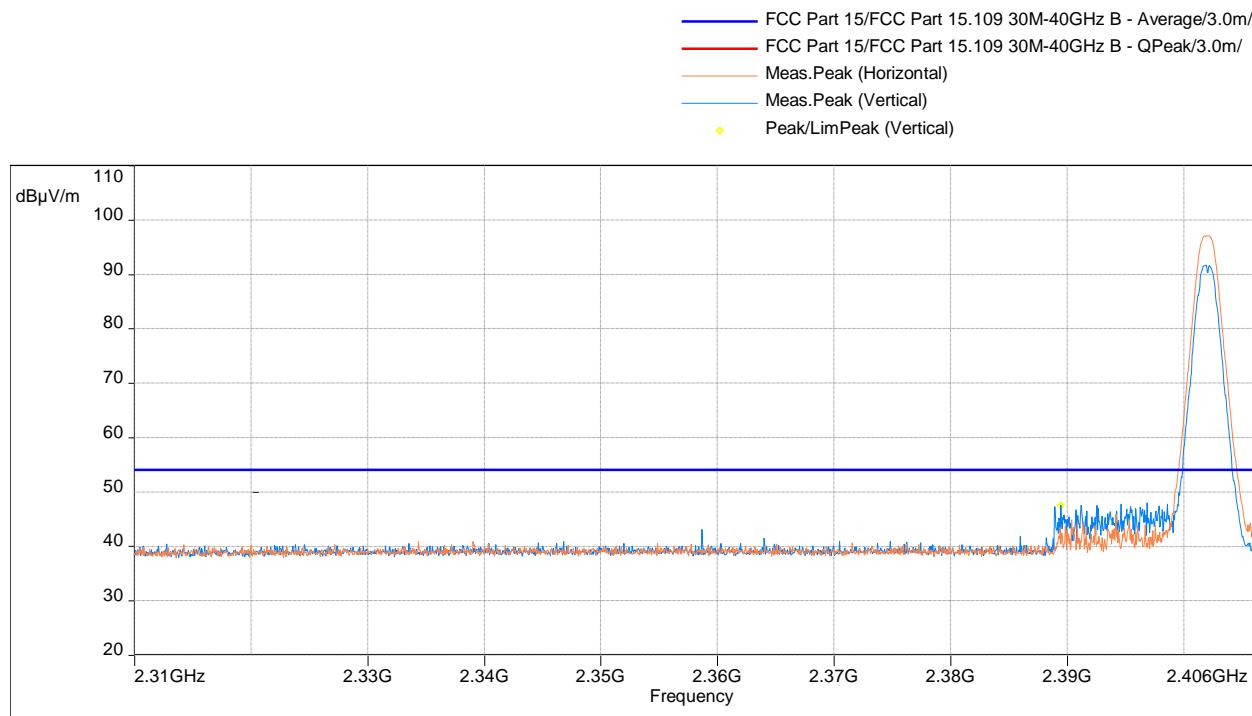
FCC Part 15/FCC Part 15.109 30M-40GHz B - Average/3.0m/
 FCC Part 15/FCC Part 15.109 30M-40GHz B - QPeak/3.0m/
 Meas. Peak (Horizontal)
 Meas. Peak (Vertical)
 Peak/LimPeak (Horizontal)



Model: ; Client: ; Comments: ; Test Date: 09/26/2018 18:45

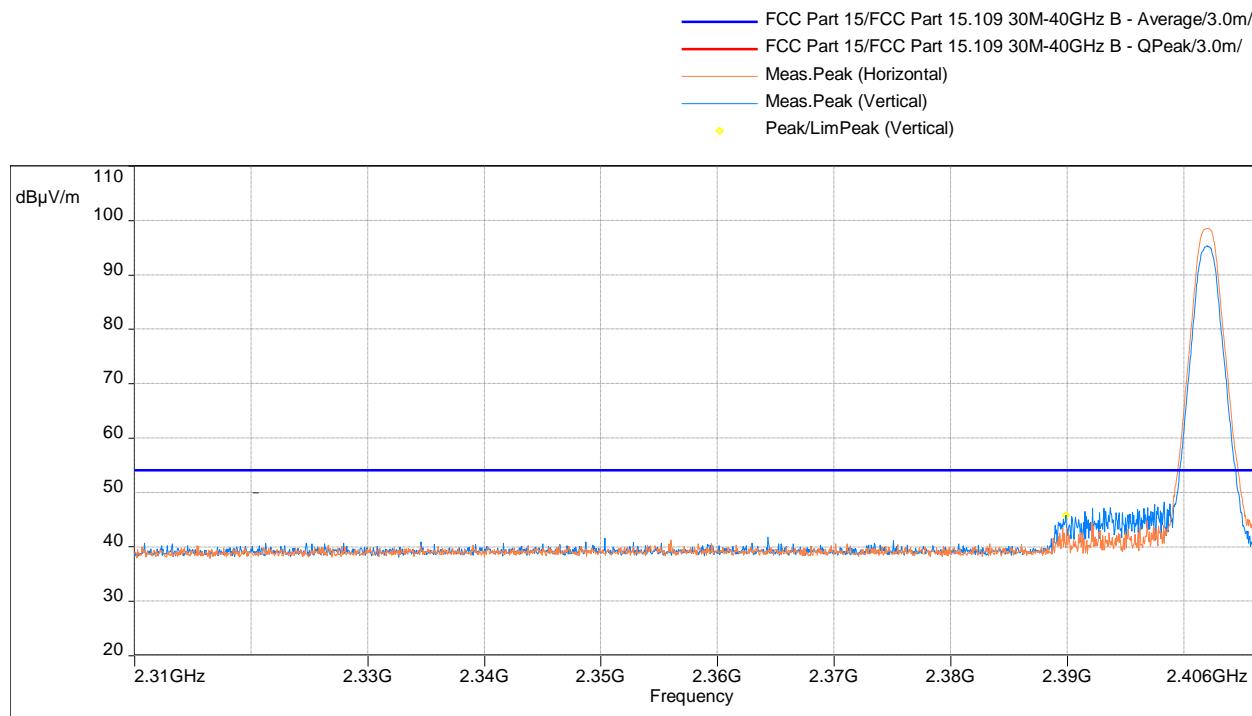
Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2483.500	42.1	54.0	-12.0	158.5	1.5	Horizontal	56.2	-14.1

Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2310–2390 MHz, Peak Scan with Average Limit
 $\pi/4$ -DQPSK, Charging Mode



Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2389.488	47.5	54.0	-6.5	160.0	2.5	Vertical	61.9	-14.4

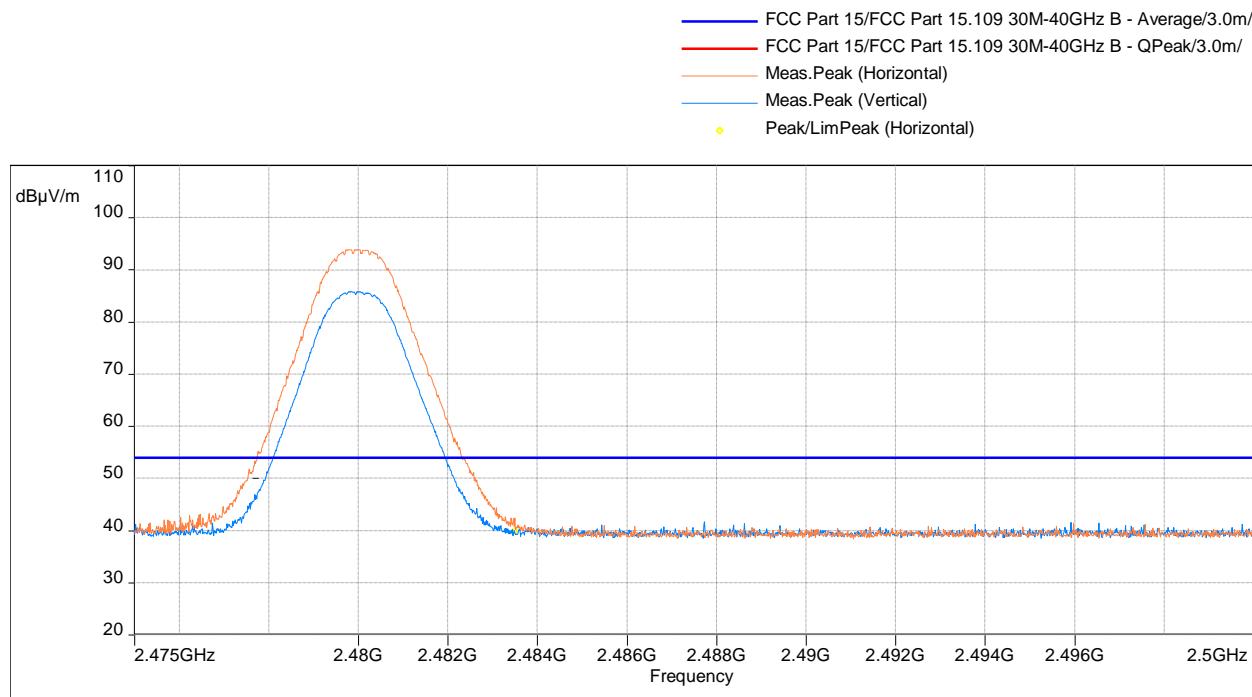
Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2310–2390 MHz, Peak Scan with Average Limit
 $\pi/4$ -DQPSK, Normal Mode



Model: ; Client: ; Comments: ; Test Date: 09/26/2018 18:03

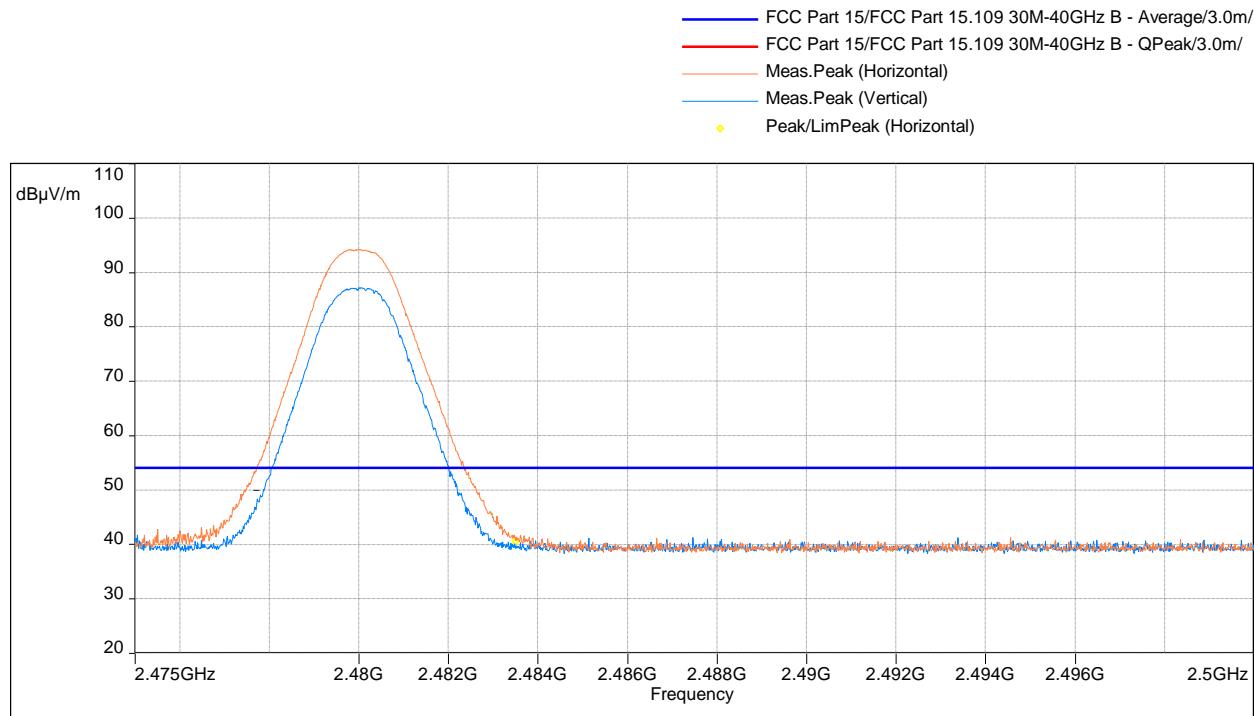
Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2389.910	45.8	54.0	-8.2	33.3	2.5	Vertical	60.2	-14.4

Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Average Limit
 $\pi/4$ -DQPSK, Charging Mode



Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2483.500	40.0	54.0	-14.0	357.3	1.5	Horizontal	54.1	-14.1

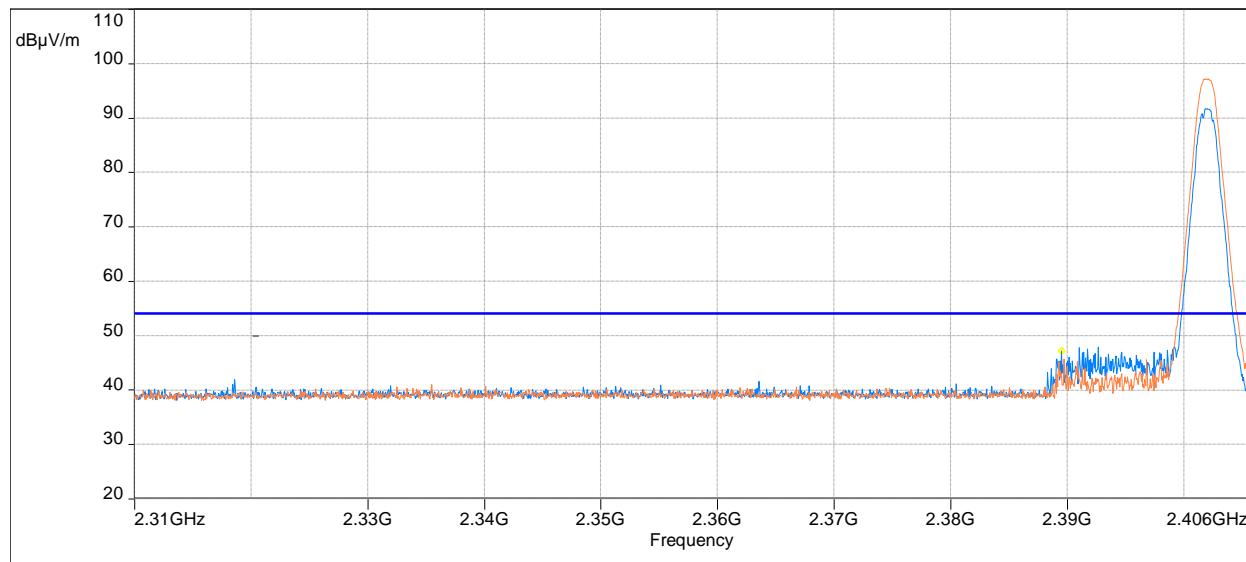
Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Average Limit
 $\pi/4$ -DQPSK, Normal Mode



Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2483.500	40.5	54.0	-13.5	153.8	1.5	Horizontal	54.7	-14.1

Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2310–2390 MHz, Peak Scan with Average Limit
8DPSK, Charging Mode

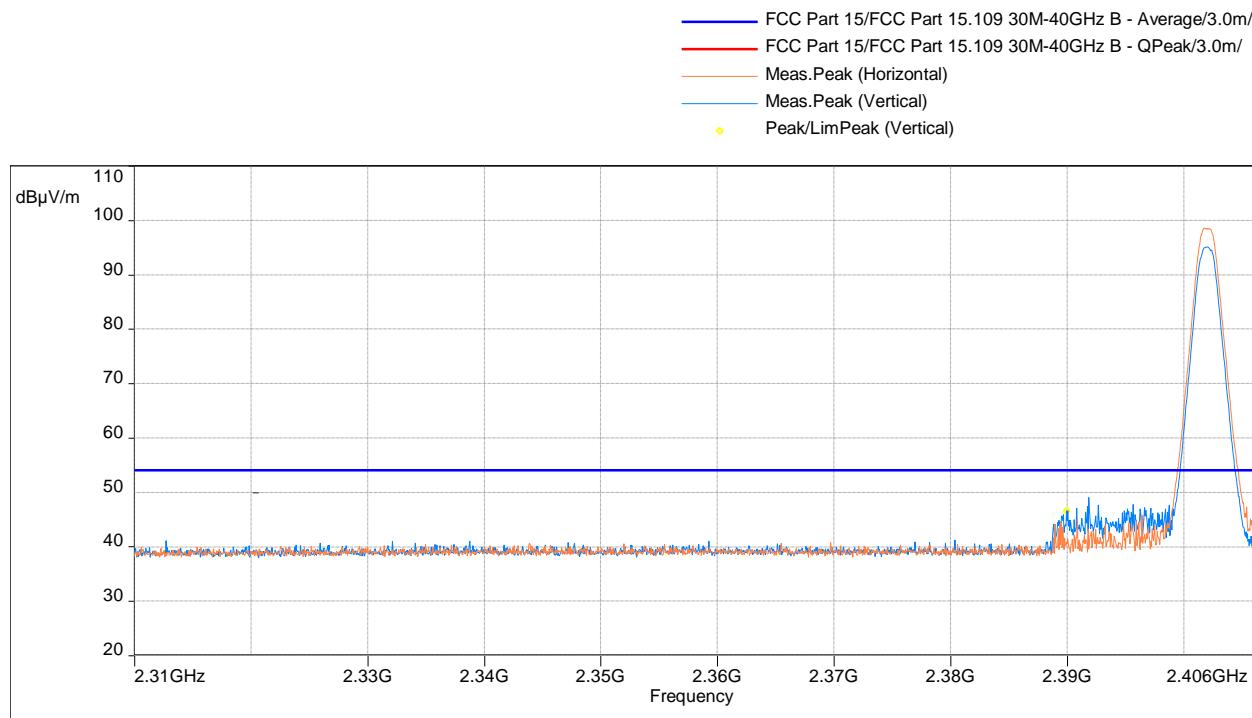
— FCC Part 15/FCC Part 15.109 30M-40GHz B - Average/3.0m/
 — FCC Part 15/FCC Part 15.109 30M-40GHz B - QPeak/3.0m/
 — Meas.Peak (Horizontal)
 — Meas.Peak (Vertical)
 ● Peak/LimPeak (Vertical)



Model: ; Client: ; Comments: ; Test Date: 09/26/2018 17:48

Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
2389.498	47.1	54.0	-6.9	155.8	2.5	Vertical	61.5	-14.4

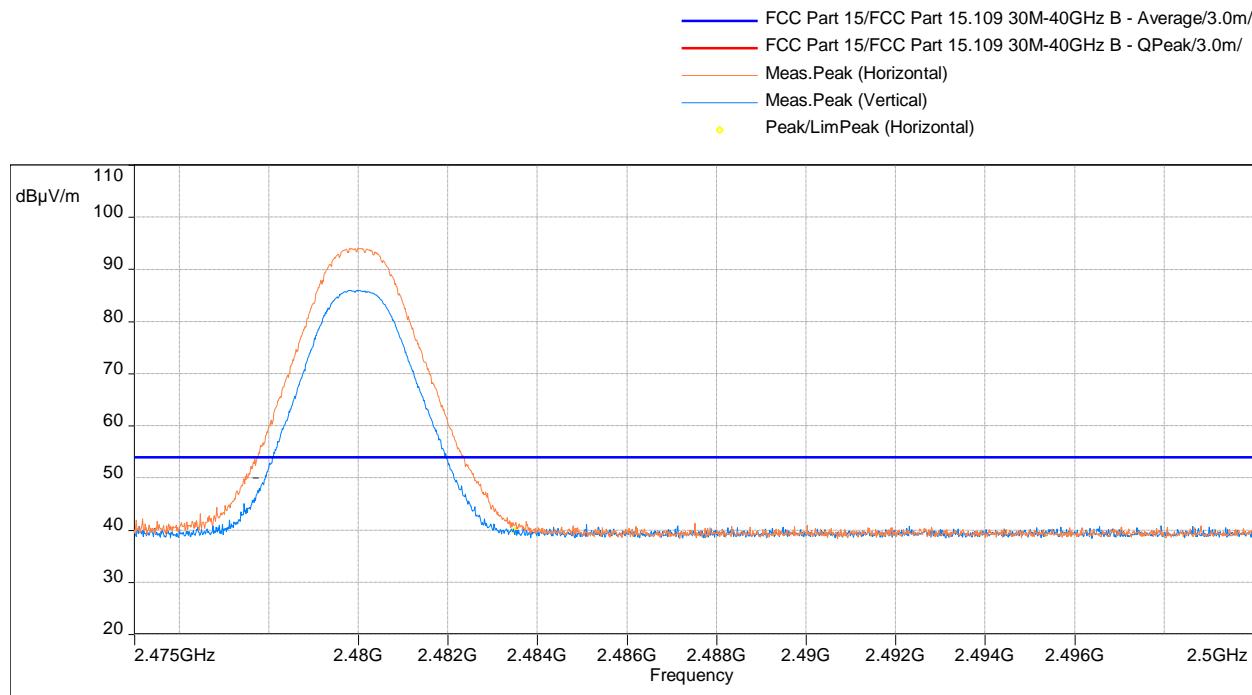
Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2310–2390 MHz, Peak Scan with Average Limit
8DPSK, Normal Mode



Model: ; Client: ; Comments: ; Test Date: 09/26/2018 17:53

Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2389.949	46.5	54.0	-7.5	149.8	2.5	Vertical	60.9	-14.4

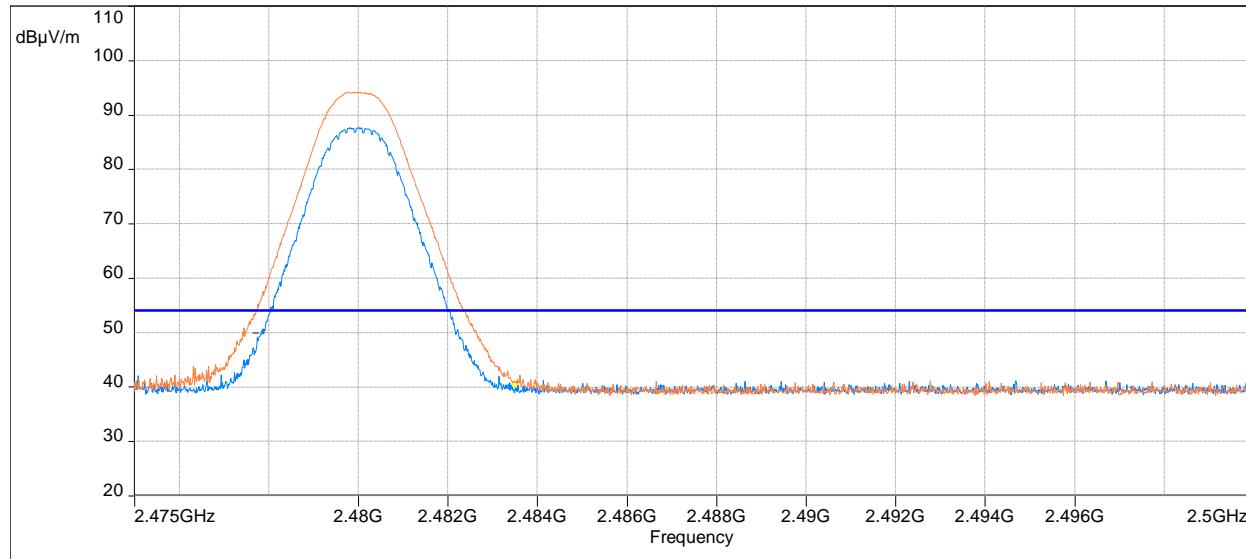
**Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Average Limit
8DPSK, Charging Mode**



Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2483.500	39.8	54.0	-14.2	0.0	1.5	Horizontal	53.9	-14.1

**Out-of-Band Radiated spurious emissions at the Band-edge @3m distance
2483.5–2500 MHz, Peak Scan with Average Limit
8DPSK, Normal Mode**

FCC Part 15/FCC Part 15.109 30M-40GHz B - Average/3.0m/
 FCC Part 15/FCC Part 15.109 30M-40GHz B - QPeak/3.0m/
 Meas.Peak (Horizontal)
 Meas.Peak (Vertical)
 Peak/LimPeak (Horizontal)

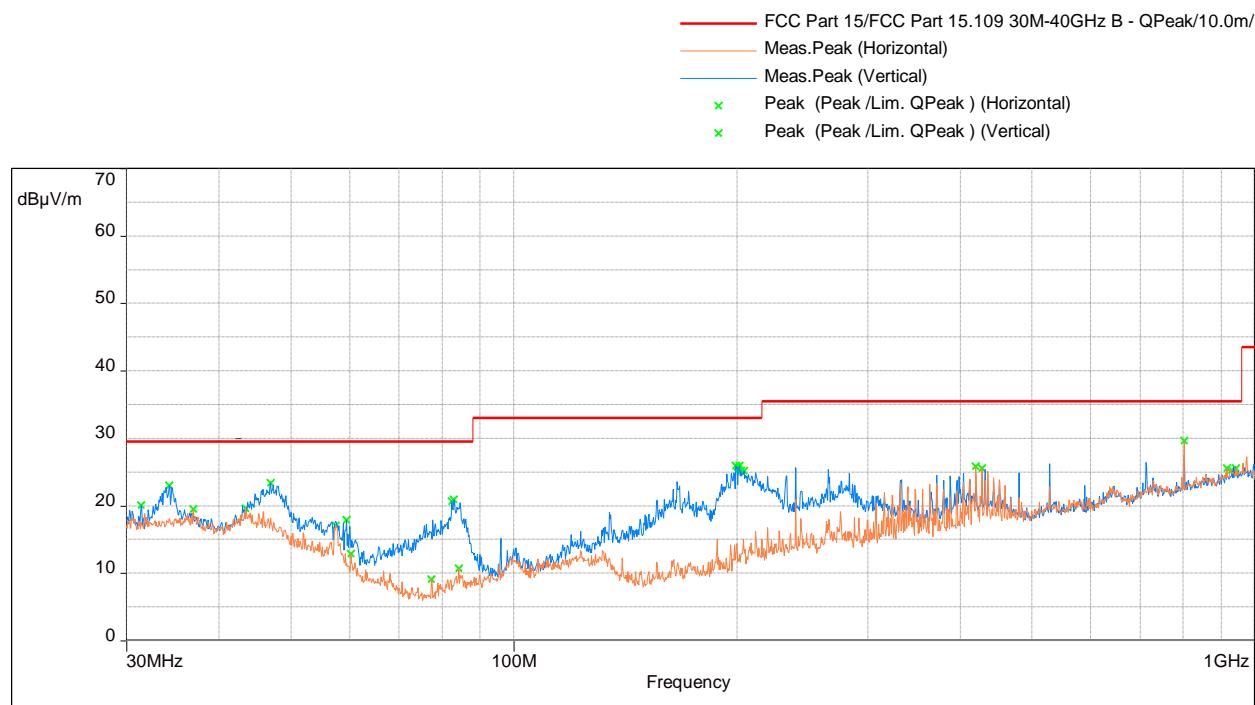


Model: ; Client: ; Comments: ; Test Date: 09/26/2018 19:20

Frequency (MHz)	Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
2483.500	40.4	54.0	-13.6	159.3	1.5	Horizontal	54.5	-14.1

Test Results: 15.209 Out-of-Band Radiated Spurious Emissions, GFSK, 2402MHz, Charging Mode

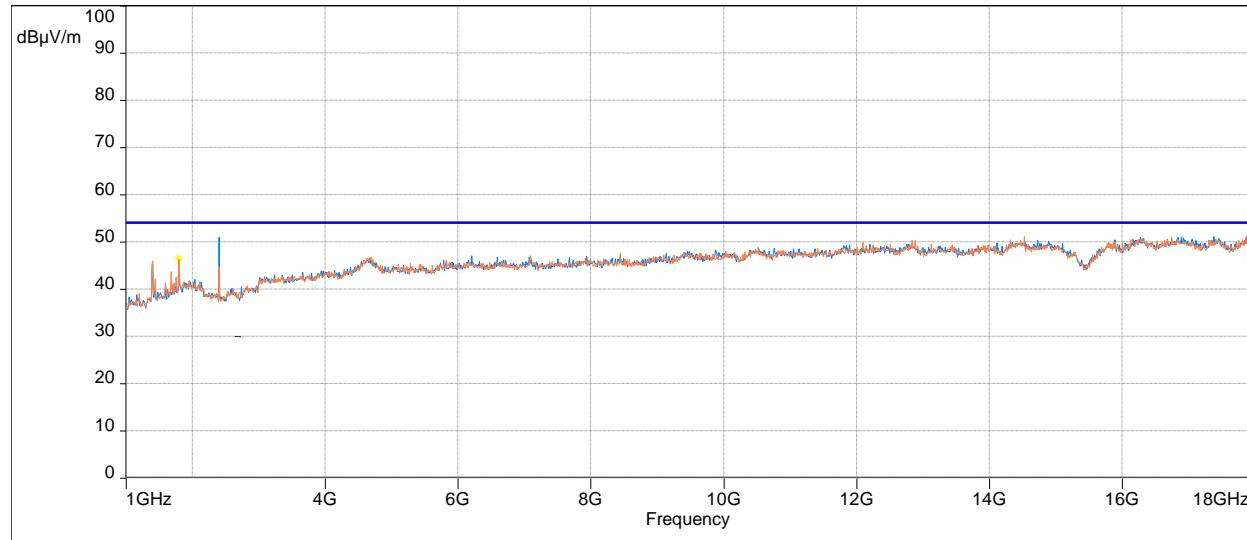
Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
801.829	29.6	35.5	-5.9	51.3	1.0	Horizontal	33.1	-3.5

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, GFSK, 2402MHz, Charging Mode

FCC Part 15/FCC Part 15.109 30M-40GHz B - Average/3.0m/
 FCC Part 15/FCC Part 15.109 30M-40GHz B - QPeak/3.0m/
 Meas. Peak (Horizontal)
 Meas. Peak (Vertical)
 Peak (Peak/LimPeak) (Horizontal)



Model: ; Client: ; Comments: ; Test Date: 09/28/2018 13:46

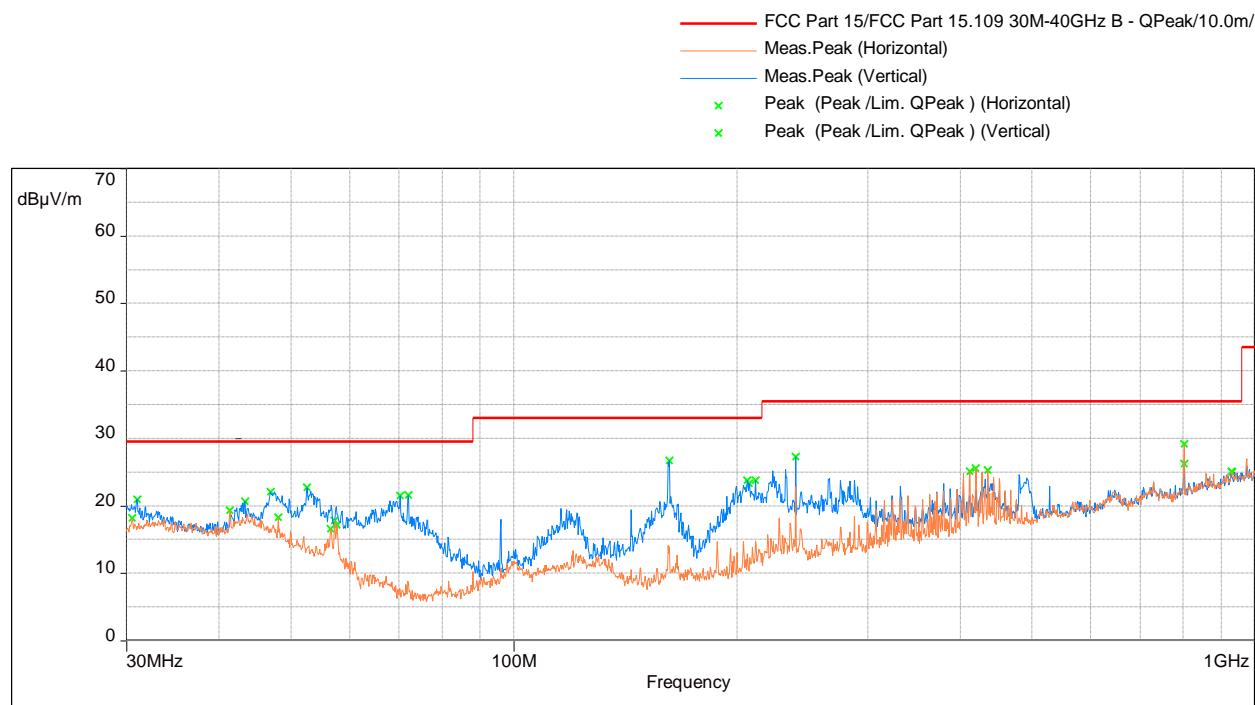
Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
1799.000	46.4	54.0	-7.6	85.8	2.5	Horizontal	60.2	-13.8

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

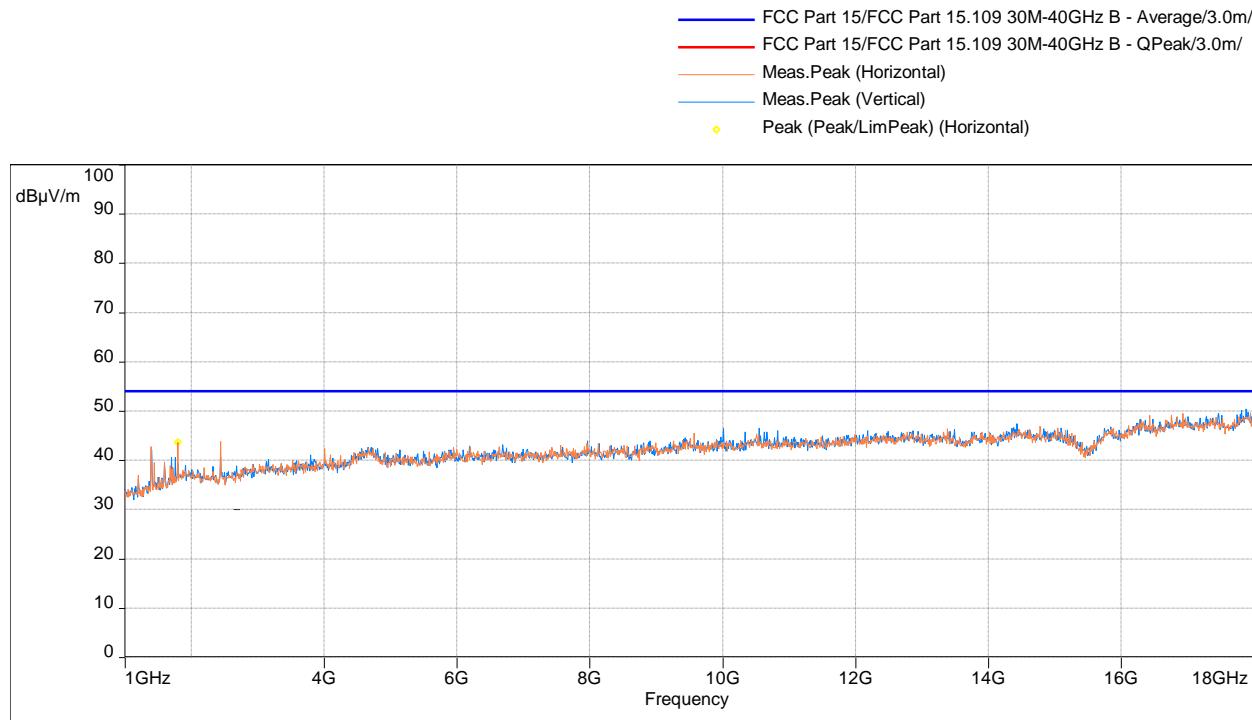
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Test Results: 15.209 Out-of-Band Radiated Spurious Emissions, GFSK, 2441MHz, Charging Mode

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
161.985	26.7	33.0	-6.3	352.0	2.0	Vertical	44.8	-18.1

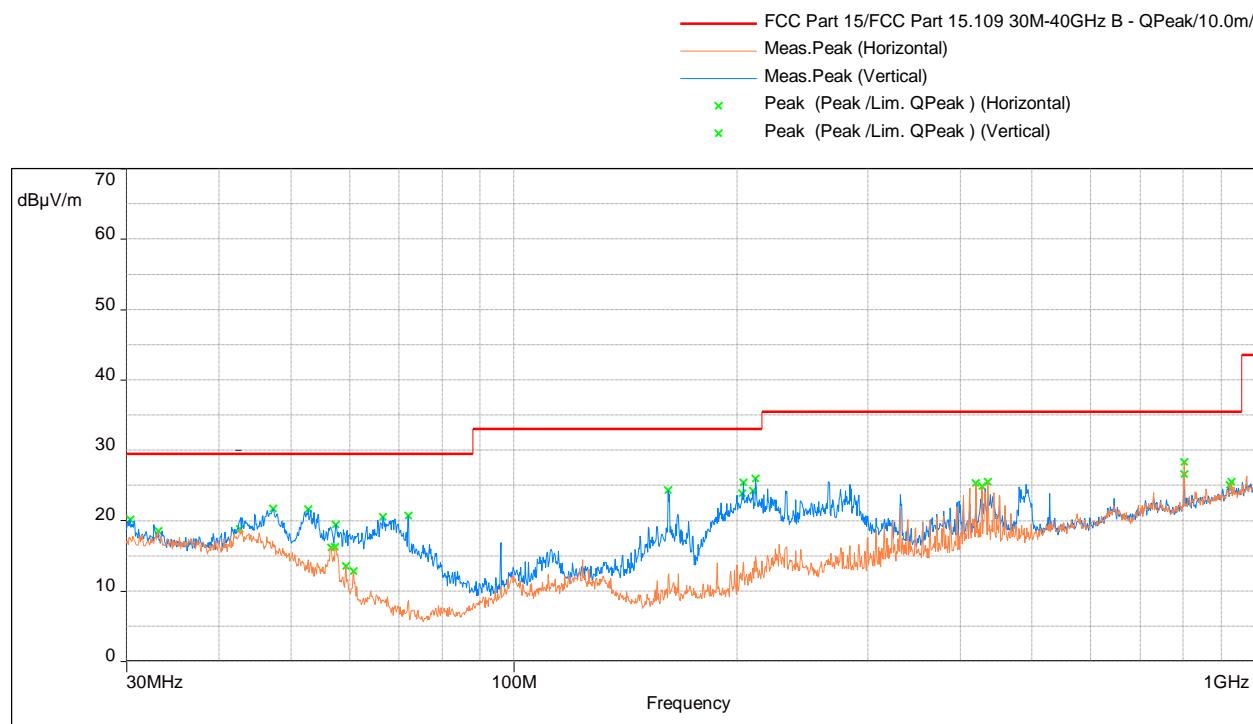
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, GFSK, 2441MHz, Charging Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1797.867	43.7	54.0	-10.3	153.5	1.5	Horizontal	59.2	-15.6

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

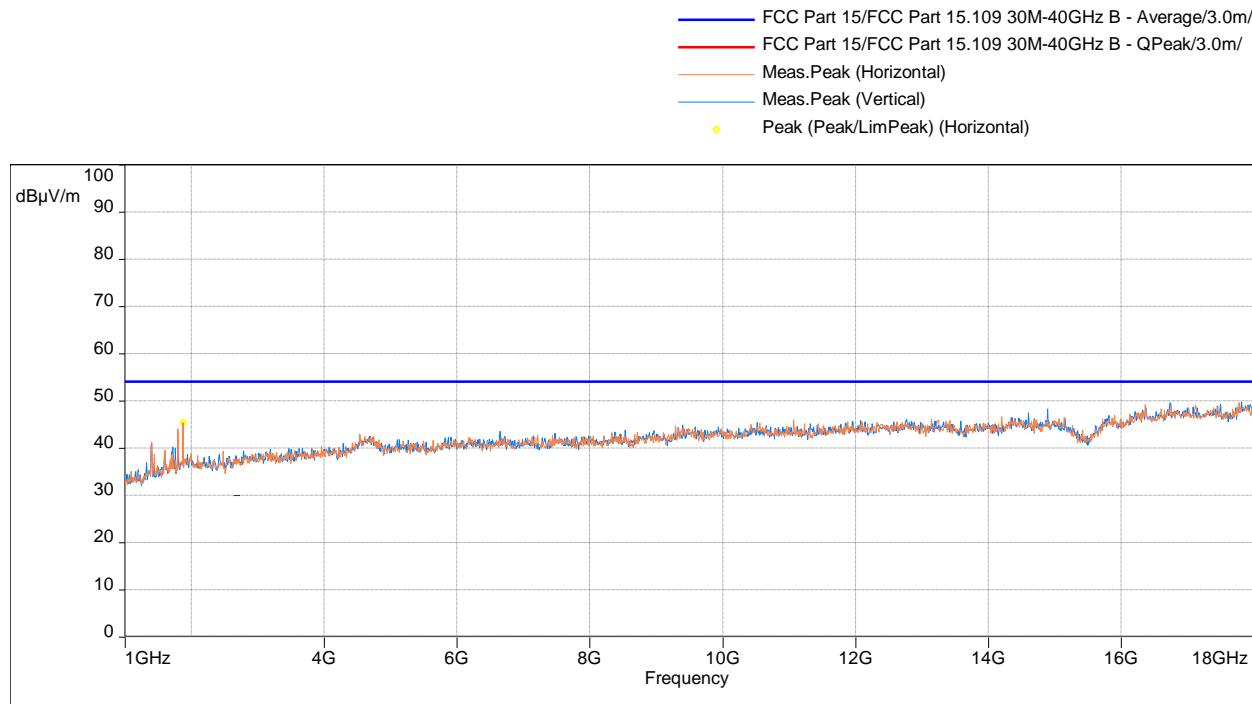
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 09/28/2018 19:11

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
204.050	25.4	33.0	-7.6	211.0	1.0	Vertical	41.6	-16.2

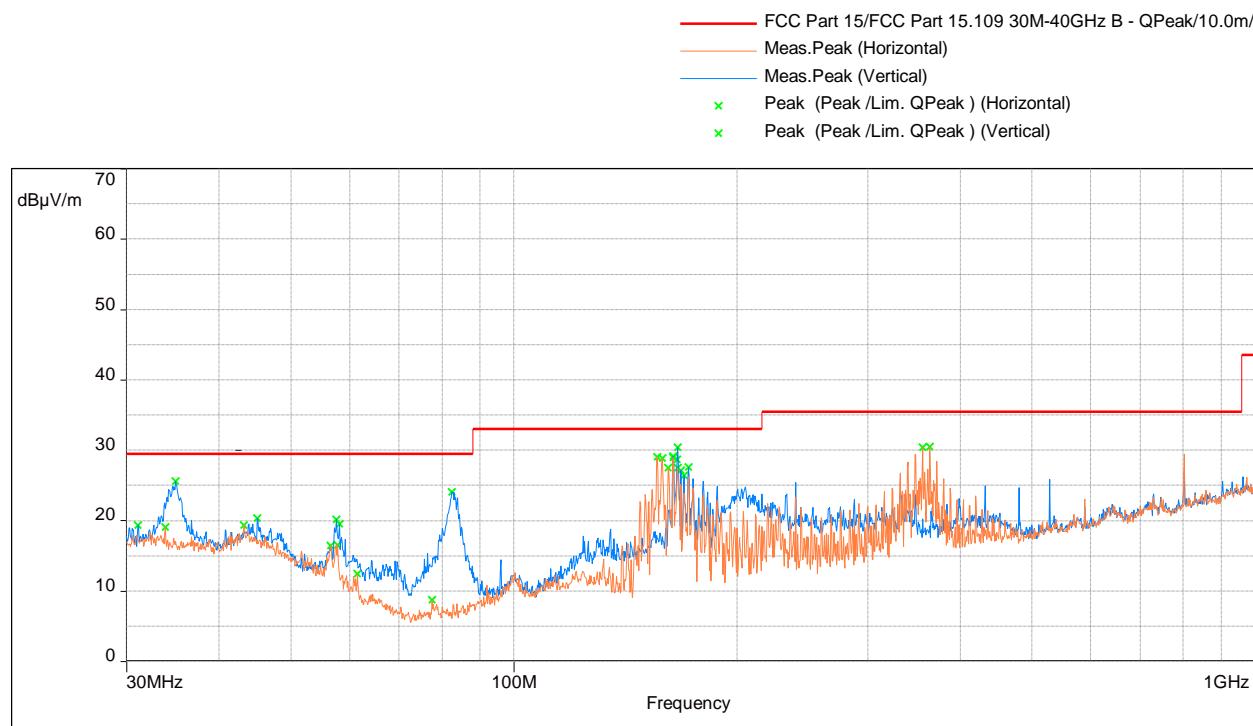
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, GFSK, 2480MHz, Charging Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1875.500	45.4	54.0	-8.6	95.8	1.5	Horizontal	60.3	-15.0

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

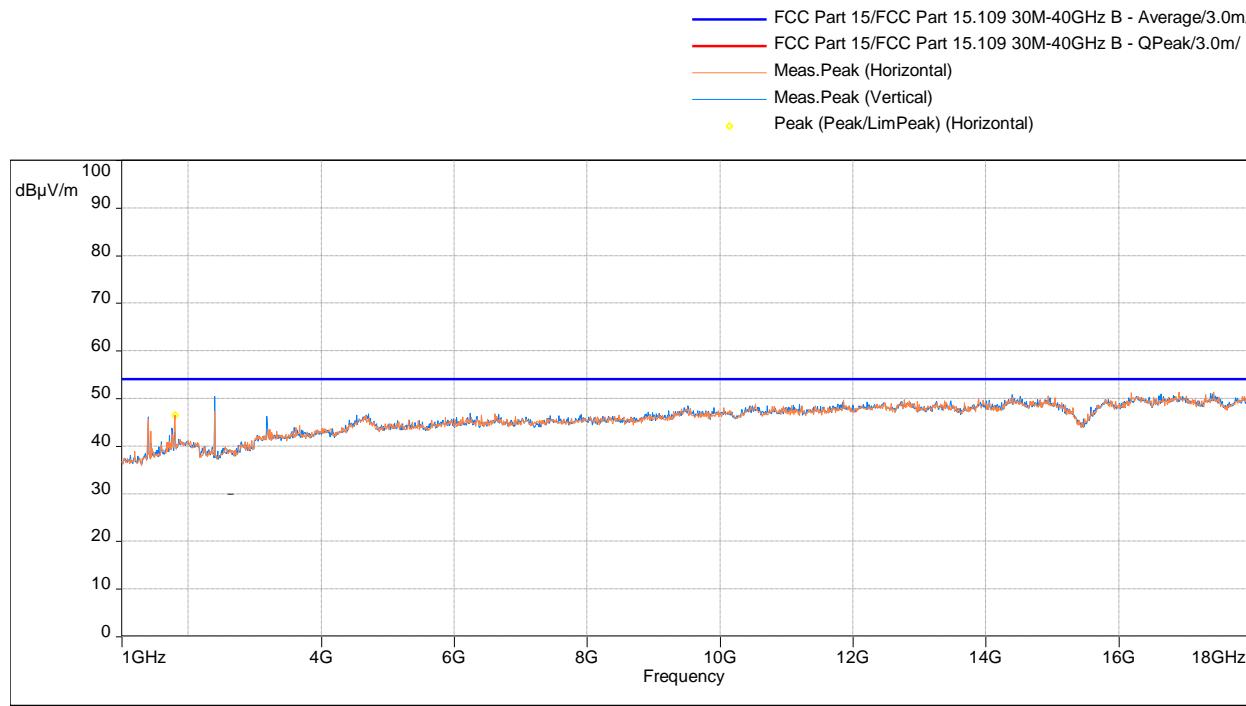
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 09/28/2018 18:17

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
204.050	25.4	33.0	-7.6	211.0	1.0	Vertical	41.6	-16.2
204.050	25.4	33.0	-7.6	211.0	1.0	Vertical	41.6	-16.2

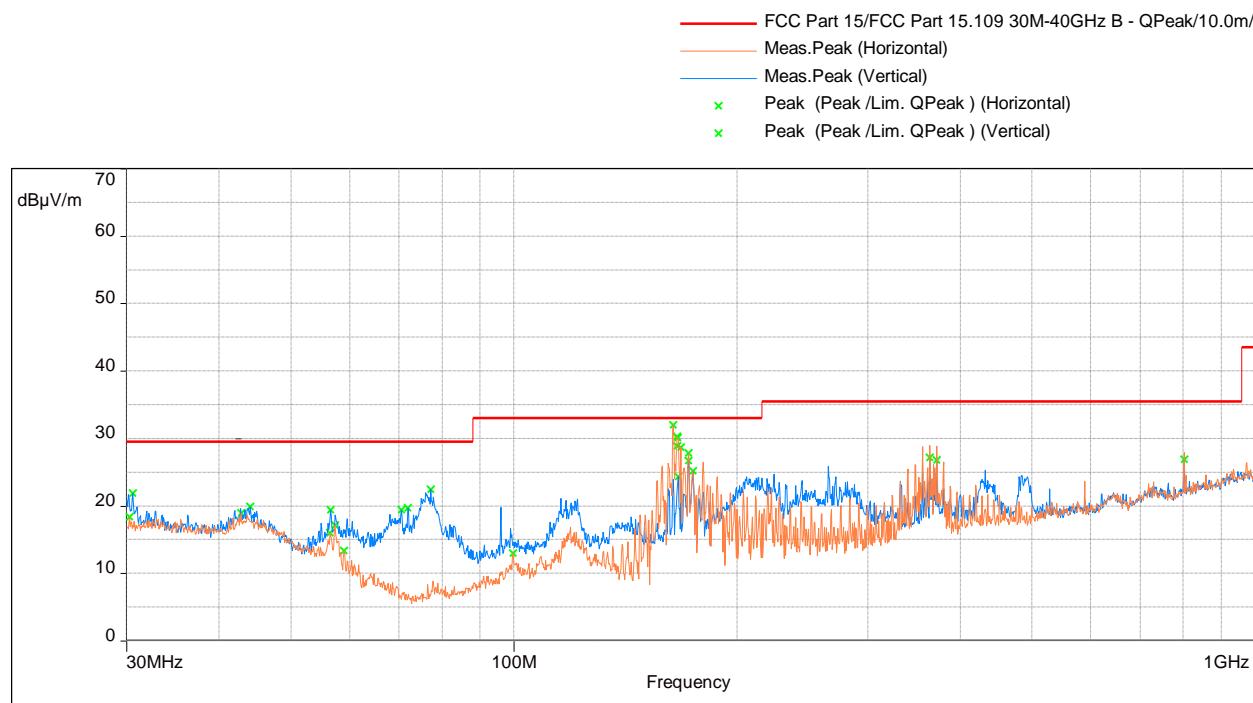
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, GFSK, 2402MHz, Normal Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
1800.700	46.5	54.0	-7.5	220.5	2.5	Horizontal	60.3	-13.8

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

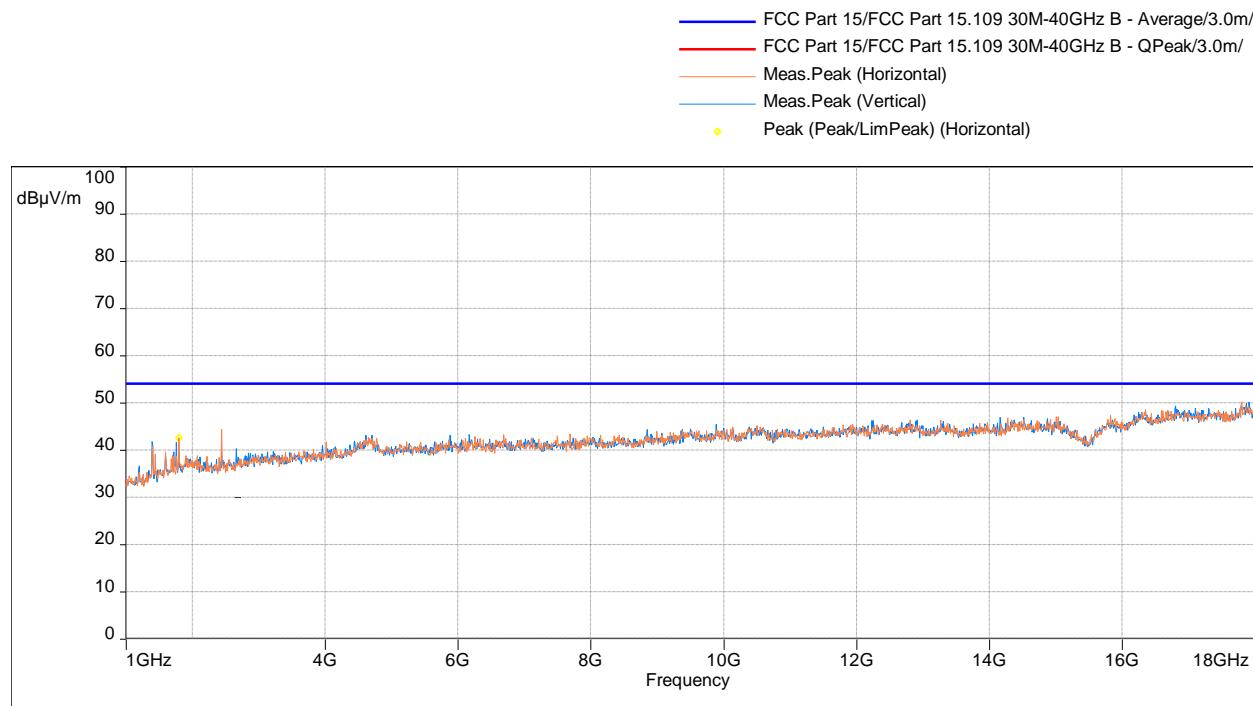
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 09/28/2018 19:01

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
164.054	30.8	33.0	-2.2	17.3	3.0	Horizontal	48.5	-17.7

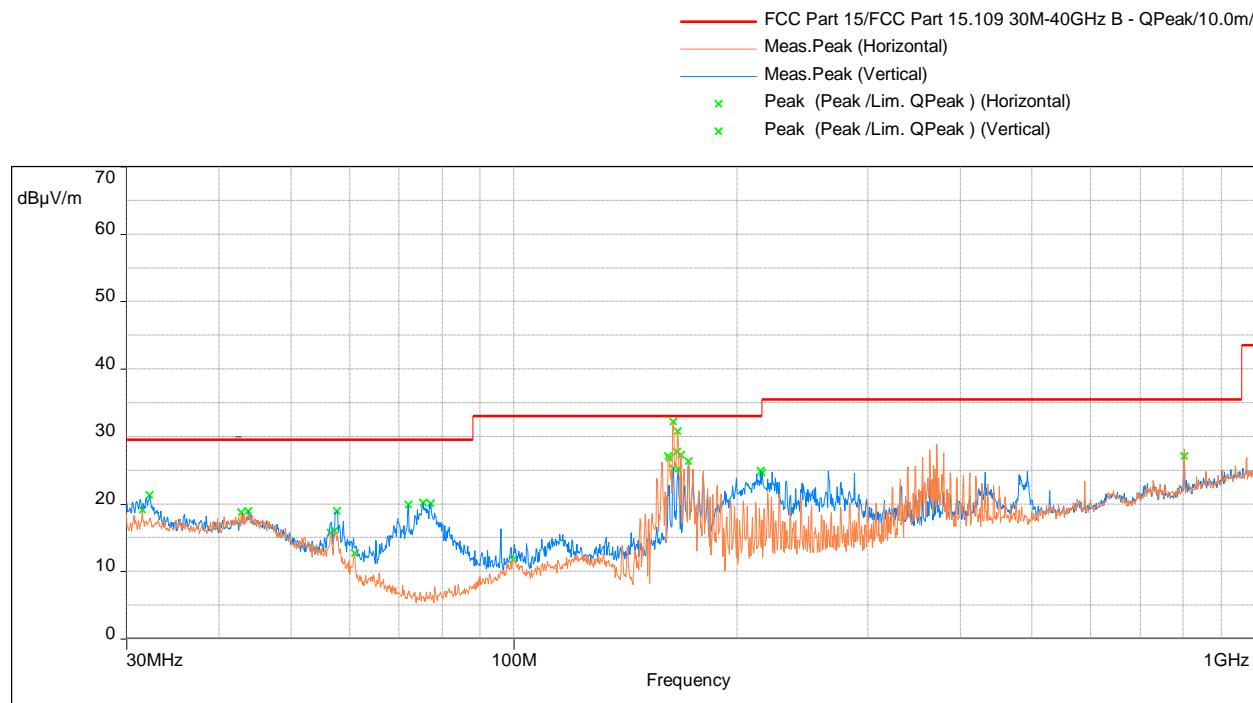
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, GFSK, 2441MHz, Normal Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1801.267	42.6	54.0	-11.4	95.0	1.5	Horizontal	58.1	-15.5

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

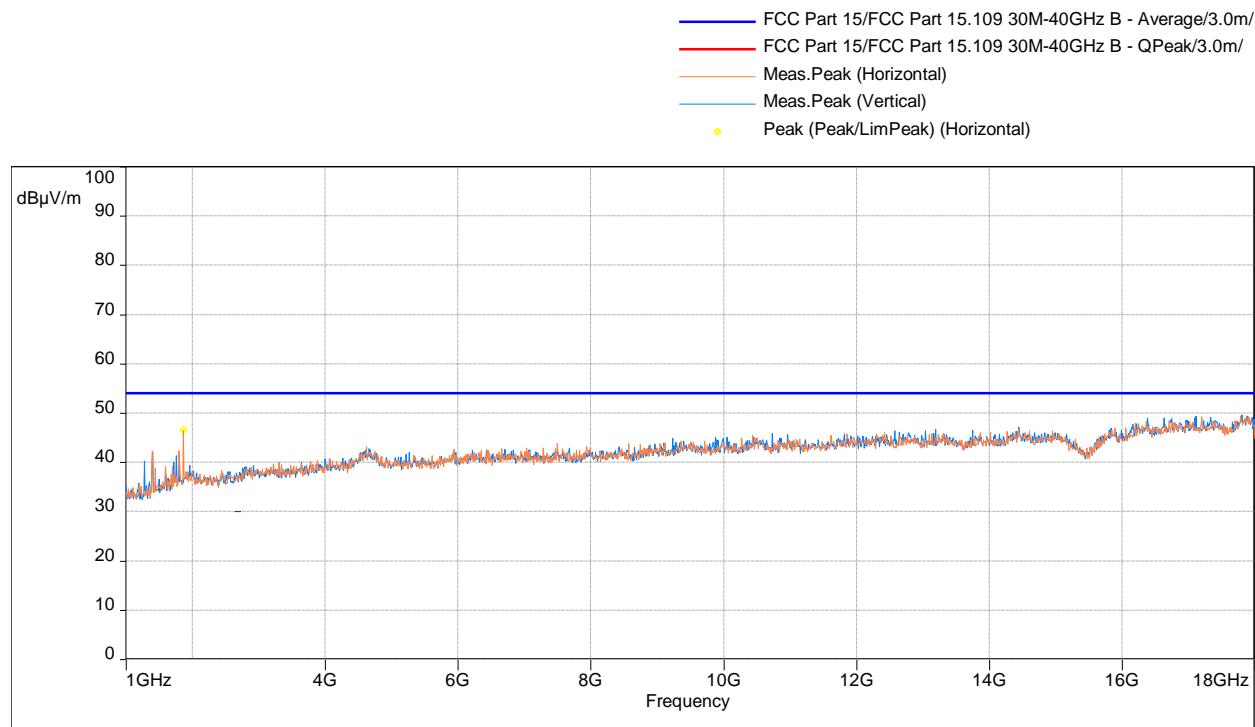
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 09/28/2018 19:23

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
164.022	31.8	33.0	-1.2	23.8	3.0	Horizontal	49.5	-17.7
166.000	30.8	33.0	-2.2	199.0	3.0	Horizontal	48.2	-17.4

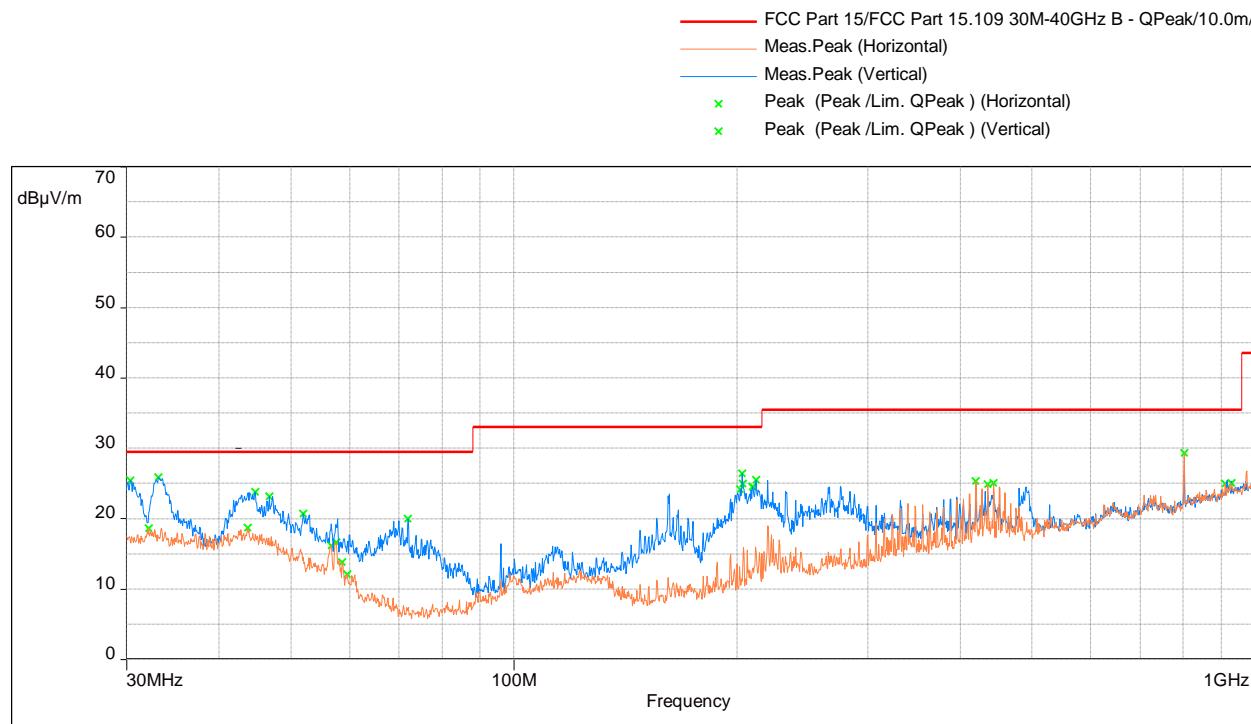
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, GFSK, 2480MHz, Normal Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1861.900	46.5	54.0	-7.5	59.8	2.5	Horizontal	61.7	-15.1

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

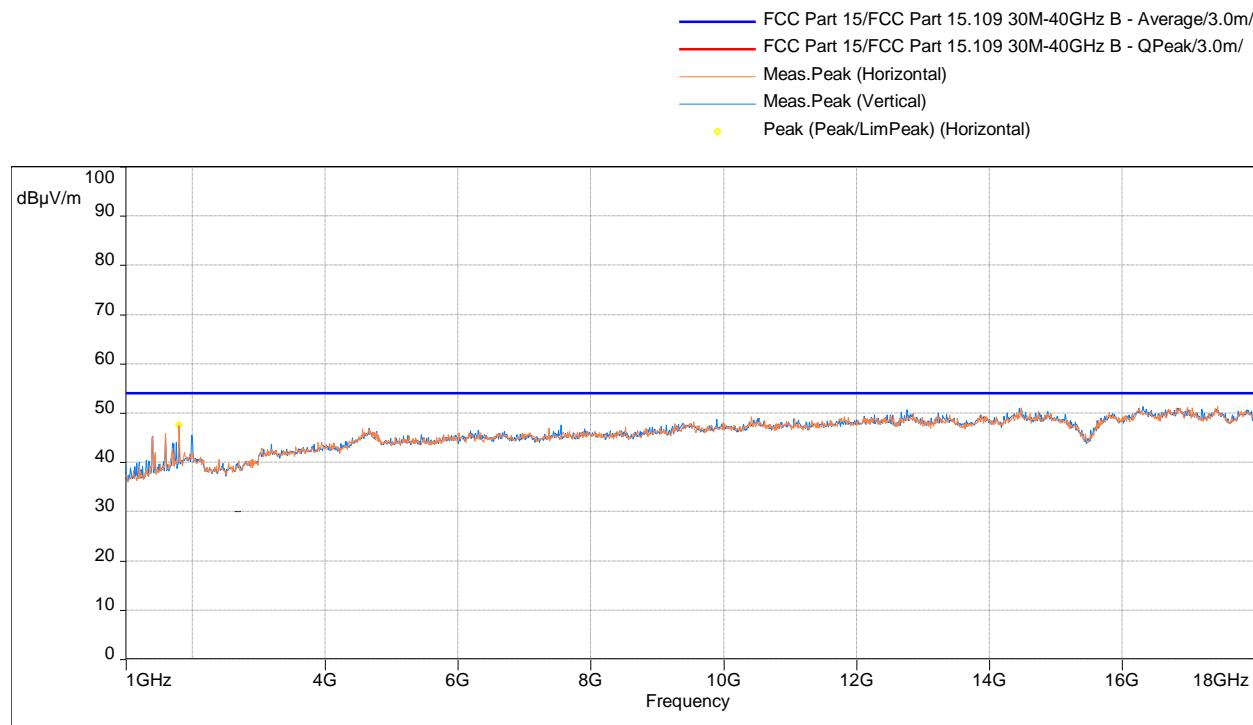
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 09/28/2018 19:33

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
30.388	25.4	29.5	-4.1	202.3	3.0	Vertical	35.0	-9.5
33.136	25.8	29.5	-3.7	155.8	1.0	Vertical	35.5	-9.7
44.744	23.8	29.5	-5.7	342.0	1.0	Vertical	33.6	-9.8

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, $\pi/4$ -DQPSK, 2402MHz, Charging Mode


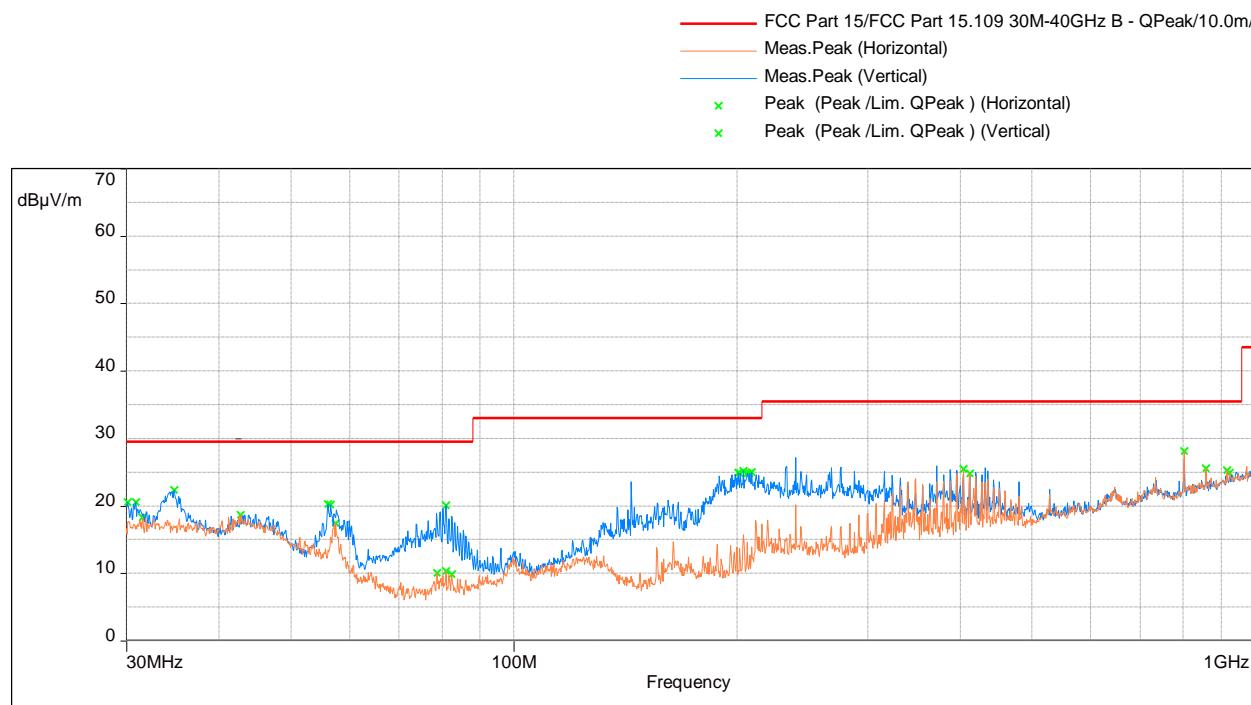
Model: ; Client: ; Comments: ; Test Date: 09/28/2018 15:45

Frequency (MHz)	Peak (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1800.700	47.6	54.0	-6.5	299.5	1.5	Horizontal	61.4	-13.8

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

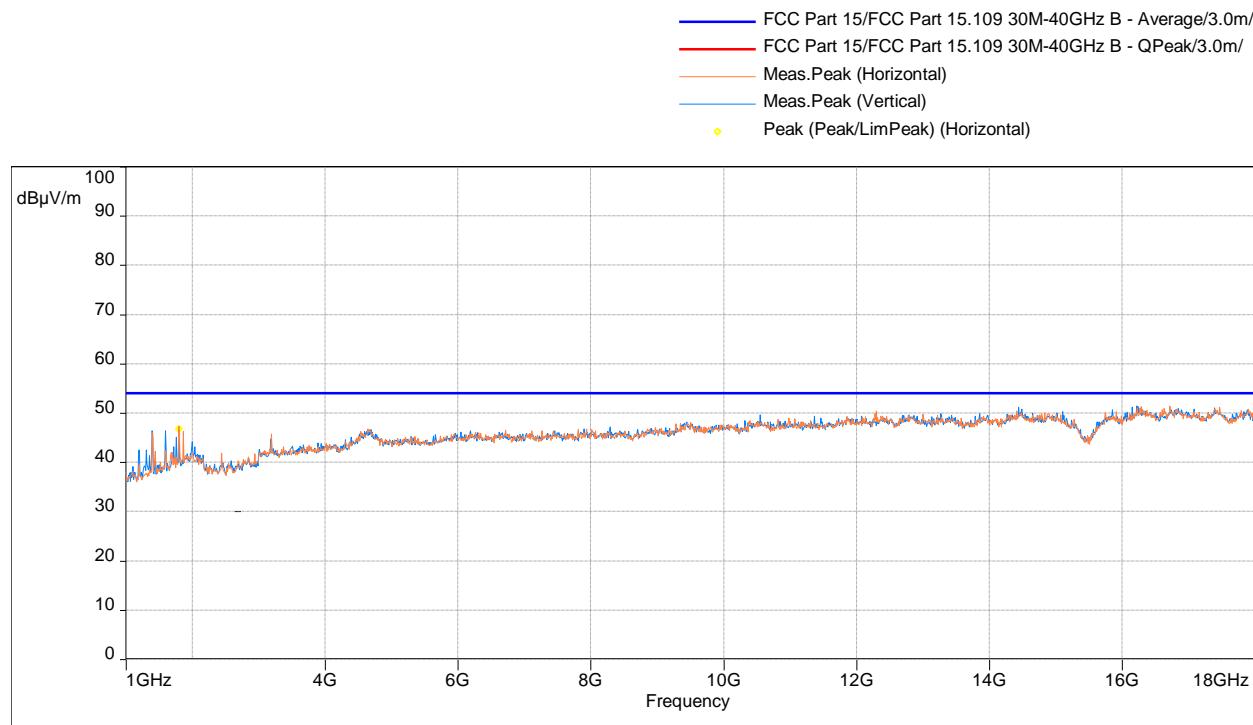
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 14:45

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
34.785	22.3	29.5	-7.2	359.8	1.0	Vertical	32.4	-10.1
203.986	25.2	33.0	-7.8	154.0	1.0	Vertical	41.4	-16.2

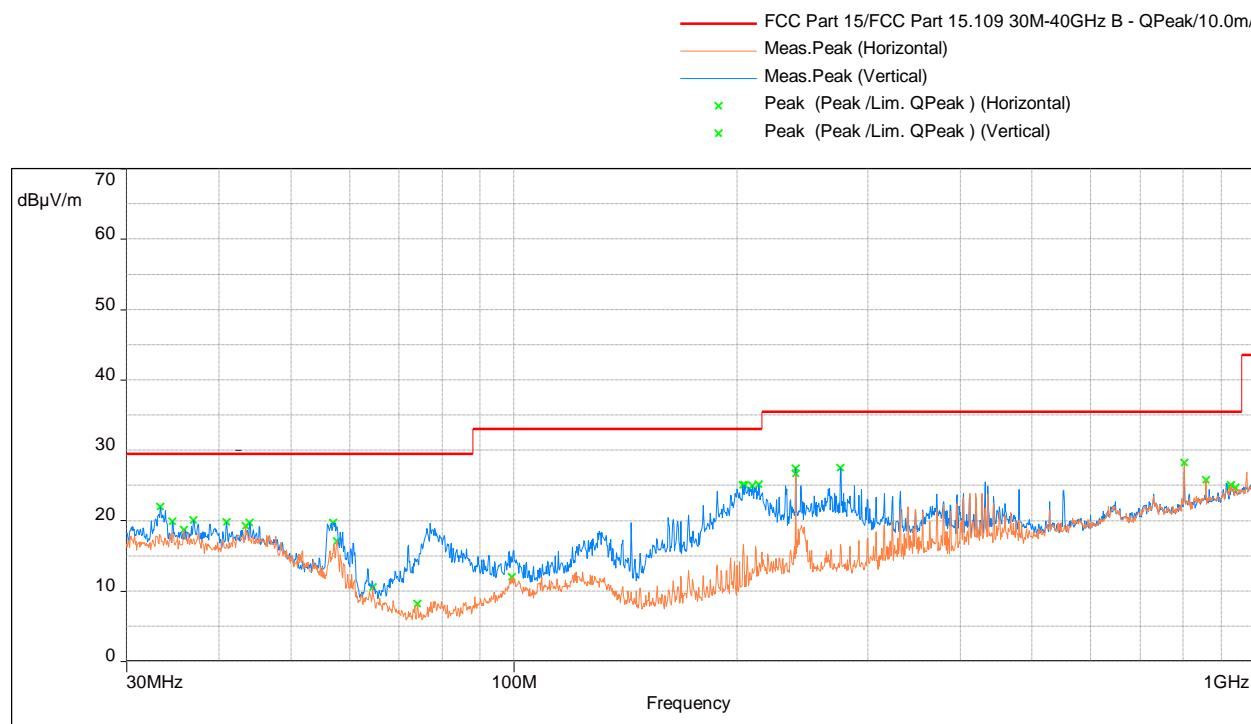
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, $\pi/4$ -DQPSK, 2441MHz, Charging Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1797.300	46.8	54.0	-7.3	359.8	1.5	Horizontal	60.6	-13.9

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

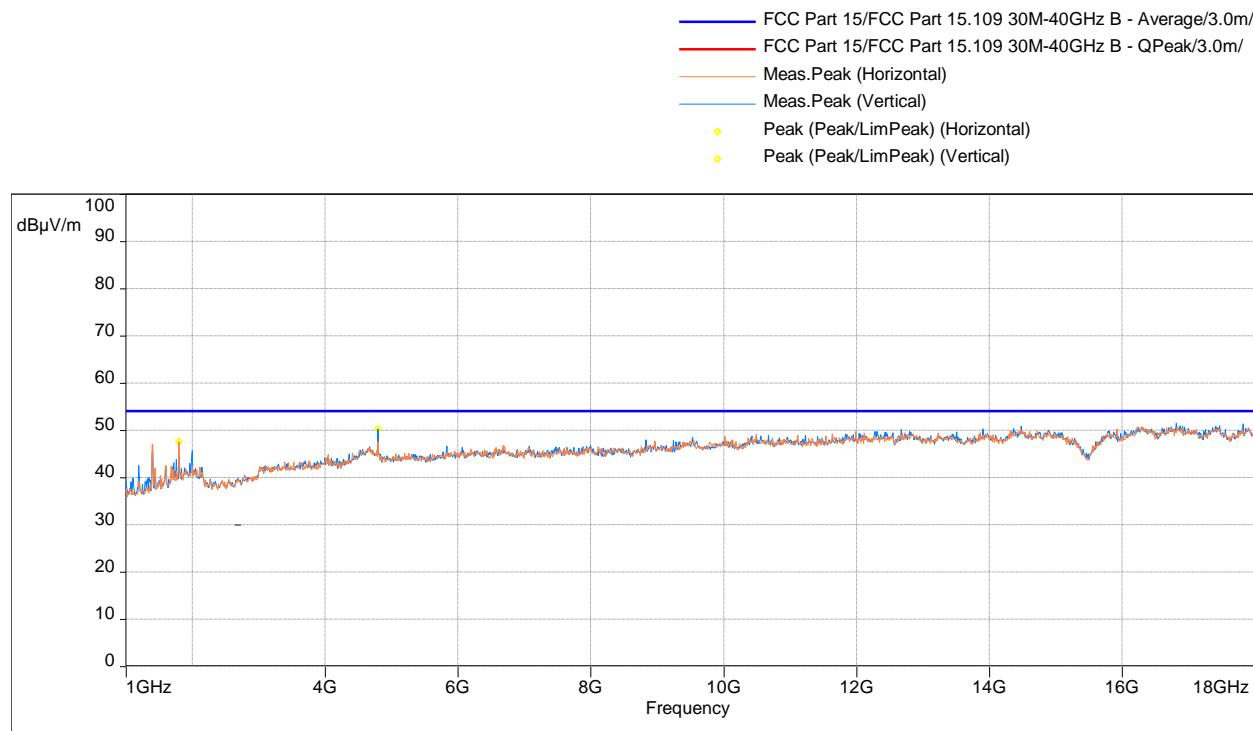
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 16:37

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
33.330	22.0	29.5	-7.6	300.3	1.0	Vertical	31.7	-9.8
203.727	25.1	33.0	-8.0	74.3	1.0	Vertical	41.3	-16.2

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, $\pi/4$ -DQPSK, 2480MHz, Charging Mode


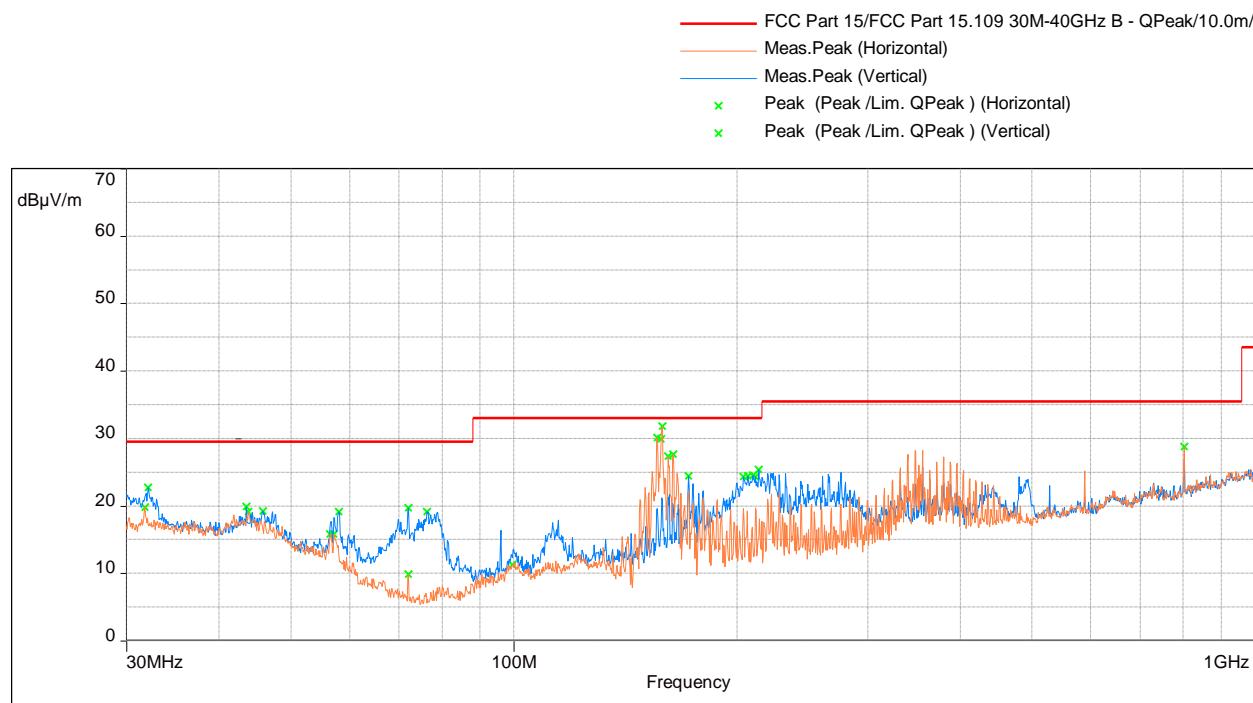
Model: ; Client: ; Comments: ; Test Date: 09/28/2018 16:57

Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1797.300	47.6	54.0	-6.4	223.8	1.5	Horizontal	61.5	-13.9
4796.100	50.3	54.0	-3.7	171.0	1.5	Vertical	55.6	-5.3

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

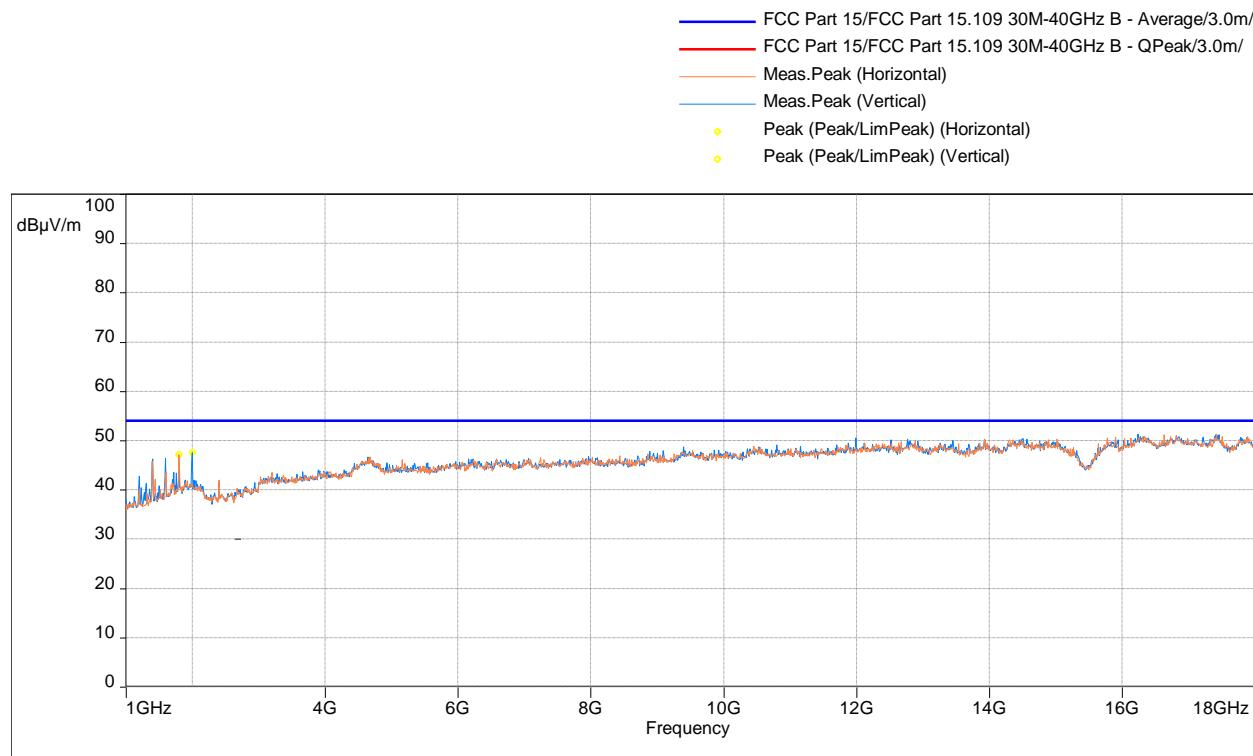
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 09/28/2018 19:44

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
156.035	30.1	33.0	-2.9	50.3	3.0	Horizontal	48.4	-18.3
158.072	29.9	33.0	-3.1	218.3	3.0	Horizontal	47.9	-18.1
158.428	31.8	33.0	-1.2	31.3	3.0	Horizontal	49.8	-18.0

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, $\pi/4$ -DQPSK, 2402MHz, Normal Mode


Model: ; Client: ; Comments: ; Test Date: 09/28/2018 15:53

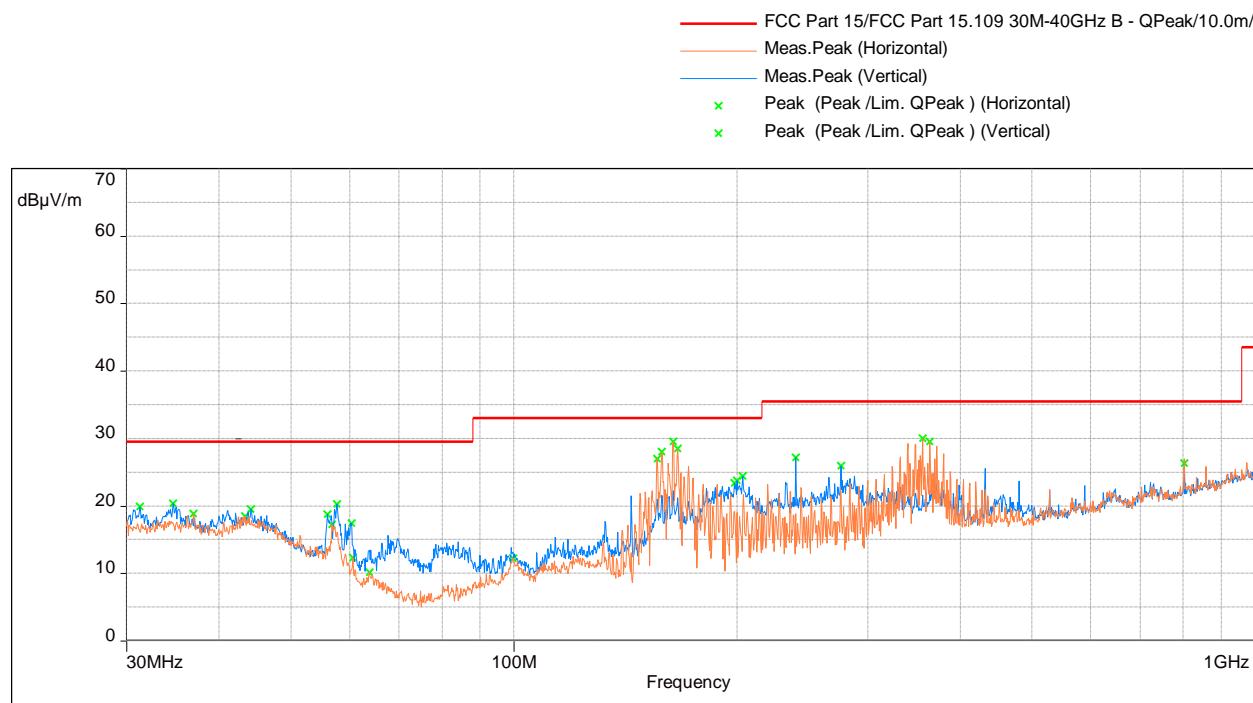
Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1799.000	47.2	54.0	-6.8	214.8	1.5	Horizontal	61.0	-13.8
1996.200	47.6	54.0	-6.5	155.0	1.5	Vertical	60.5	-12.9

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Note: FS@3m = RA + Correction

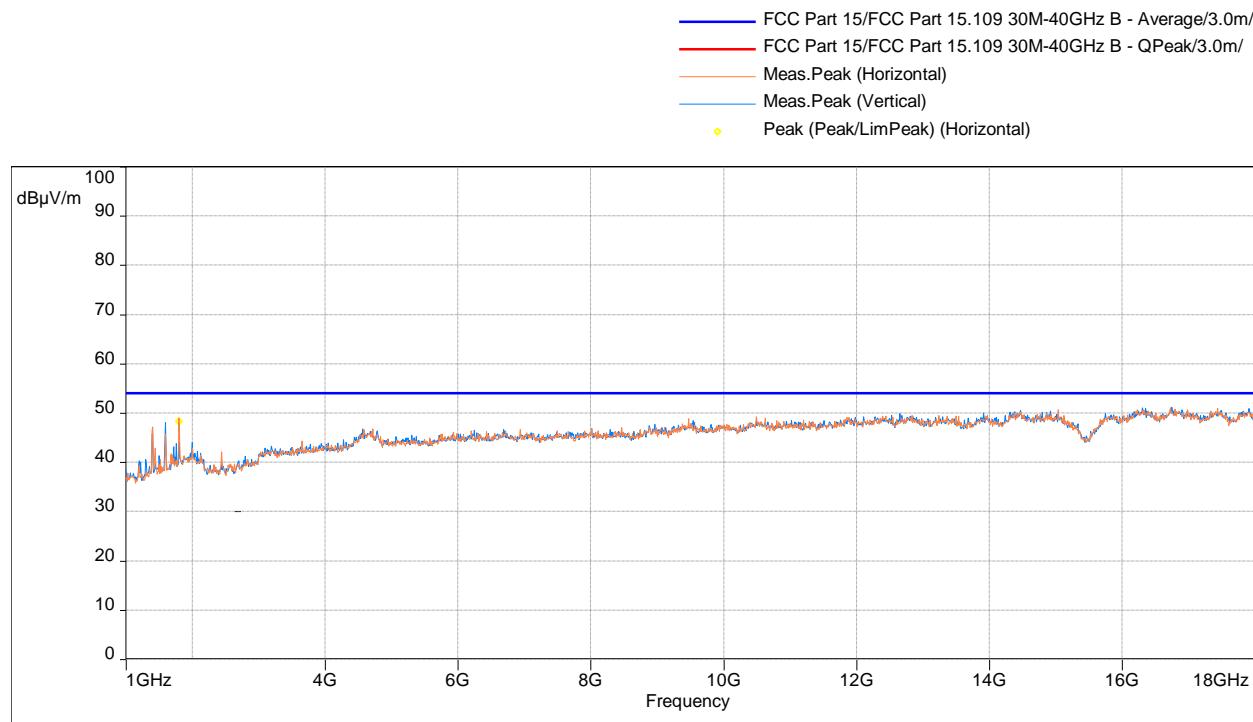
Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 15:32

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
158.396	28.0	33.0	-5.0	198.5	3.0	Horizontal	46.1	-18.0
164.022	29.6	33.0	-3.4	29.0	3.0	Horizontal	47.3	-17.7
166.414	28.5	33.0	-4.5	202.8	3.0	Horizontal	46.0	-17.4

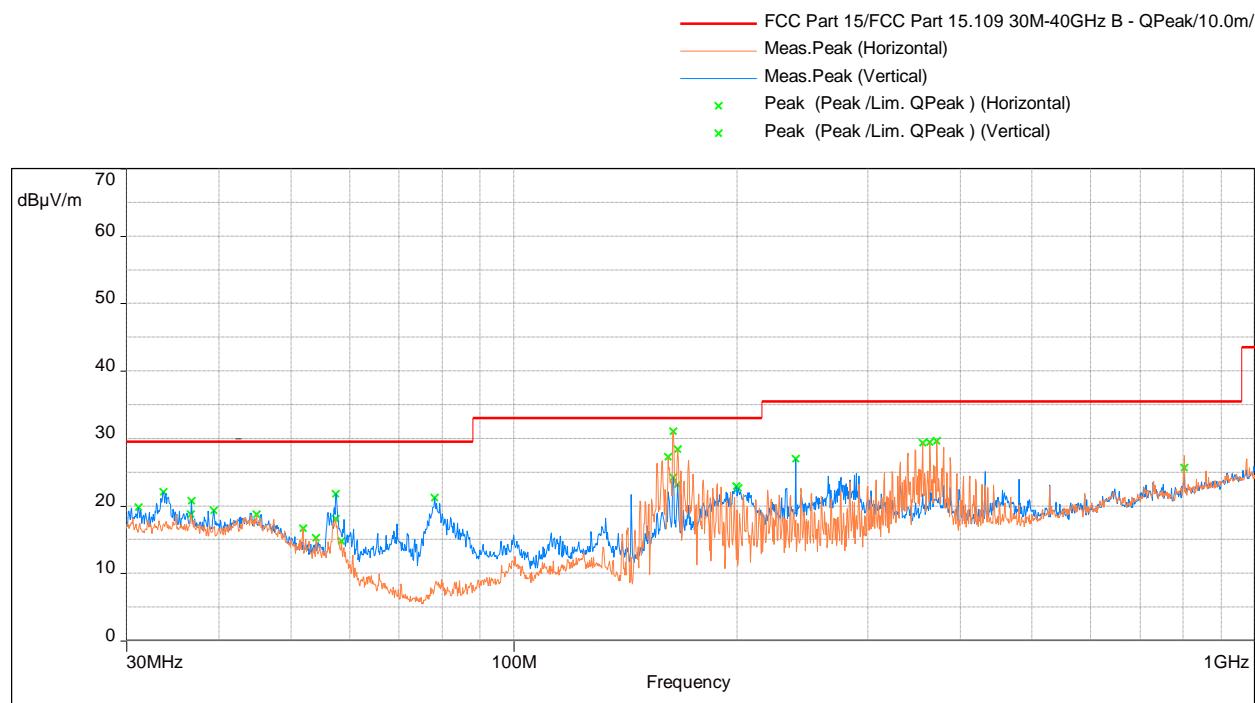
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, $\pi/4$ -DQPSK, 2441MHz, Normal Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1798.433	48.4	54.0	-5.6	98.5	1.5	Horizontal	62.2	-13.8

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

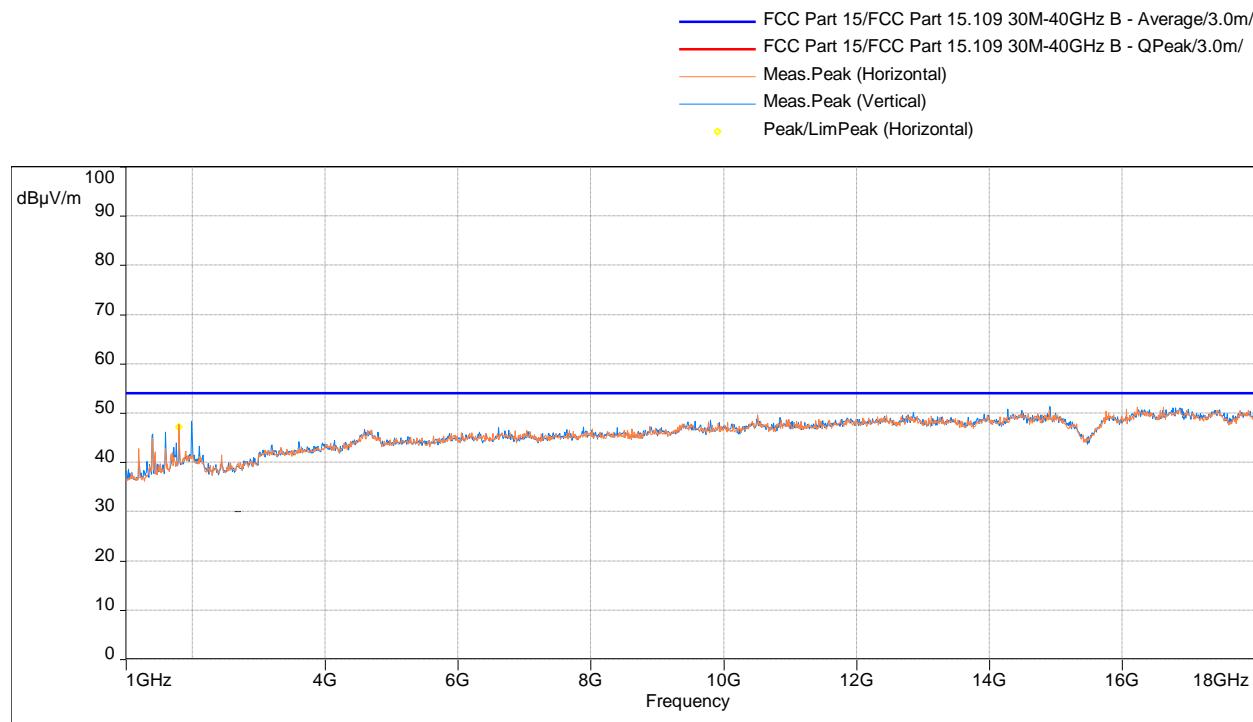
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 16:22

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
163.989	31.0	33.0	-2.0	23.5	3.0	Horizontal	48.7	-17.7
166.414	28.4	33.0	-4.6	355.0	3.0	Horizontal	45.8	-17.4

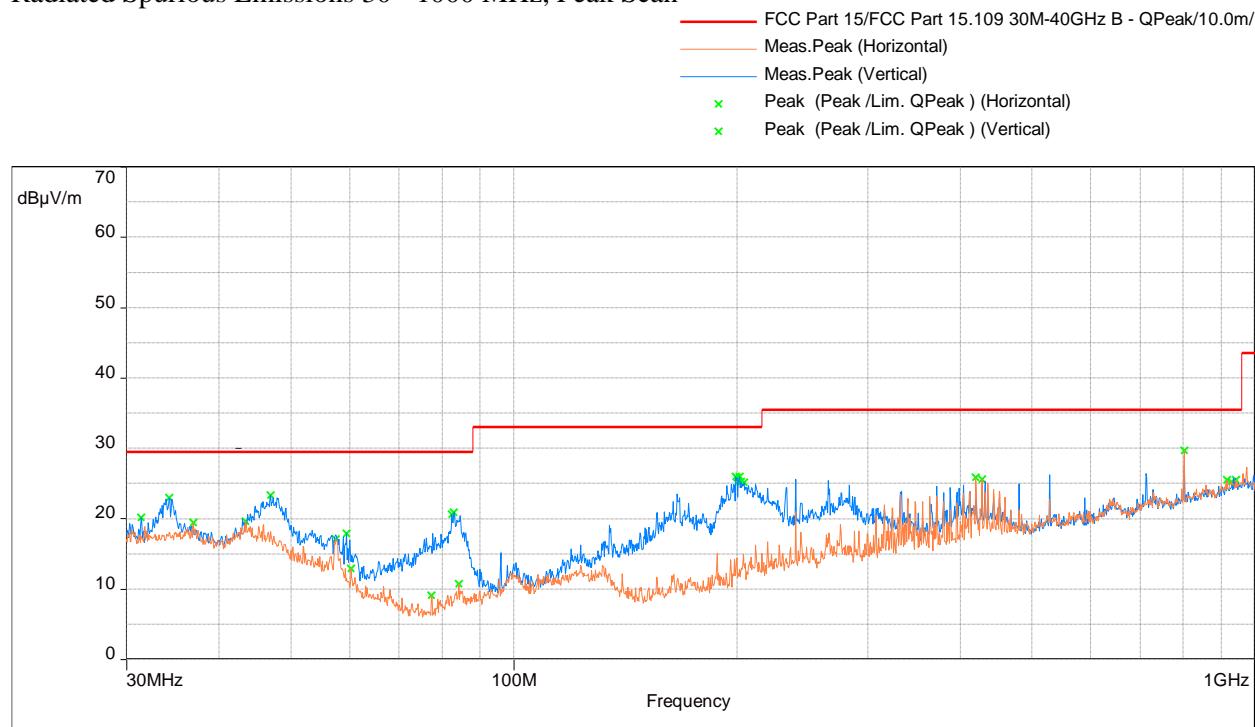
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, $\pi/4$ -DQPSK, 2480MHz, Normal Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1799.567	47.1	54.0	-6.9	271.5	1.5	Horizontal	61.0	-13.8

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

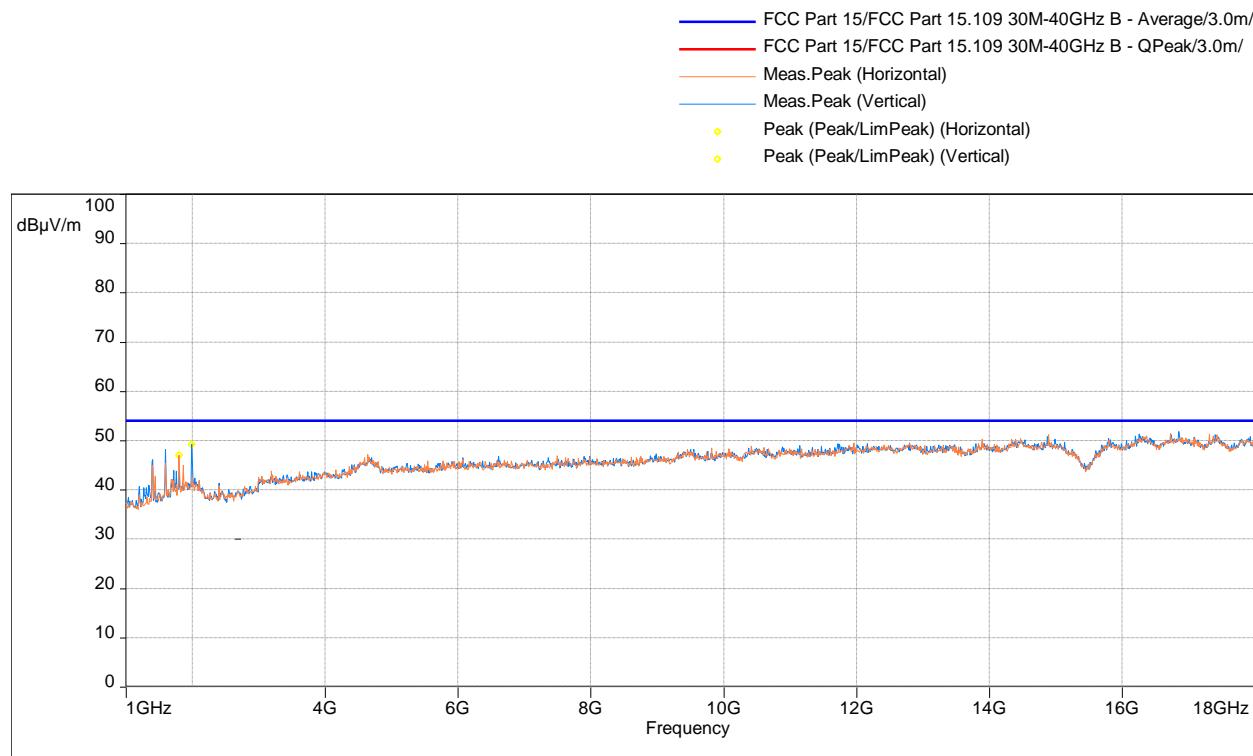
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 09/28/2018 18:07

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
201.399	25.9	33.0	-7.1	36.3	1.0	Vertical	42.3	-16.4

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, 8DPSK, 2402MHz, Charging Mode


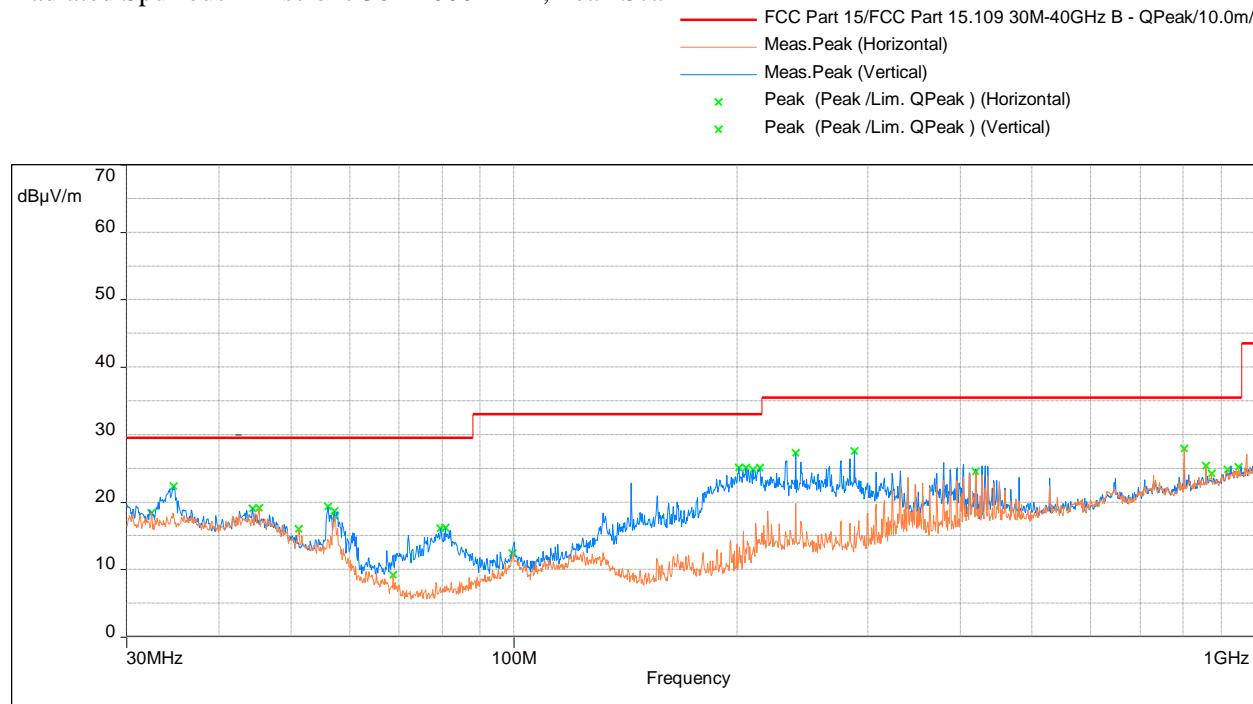
Model: ; Client: ; Comments: ; Test Date: 09/28/2018 17:20

Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1799.000	47.1	54.0	-6.9	188.3	1.5	Horizontal	60.9	-13.8
1992.800	49.2	54.0	-4.8	162.3	1.5	Vertical	62.2	-13.0

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

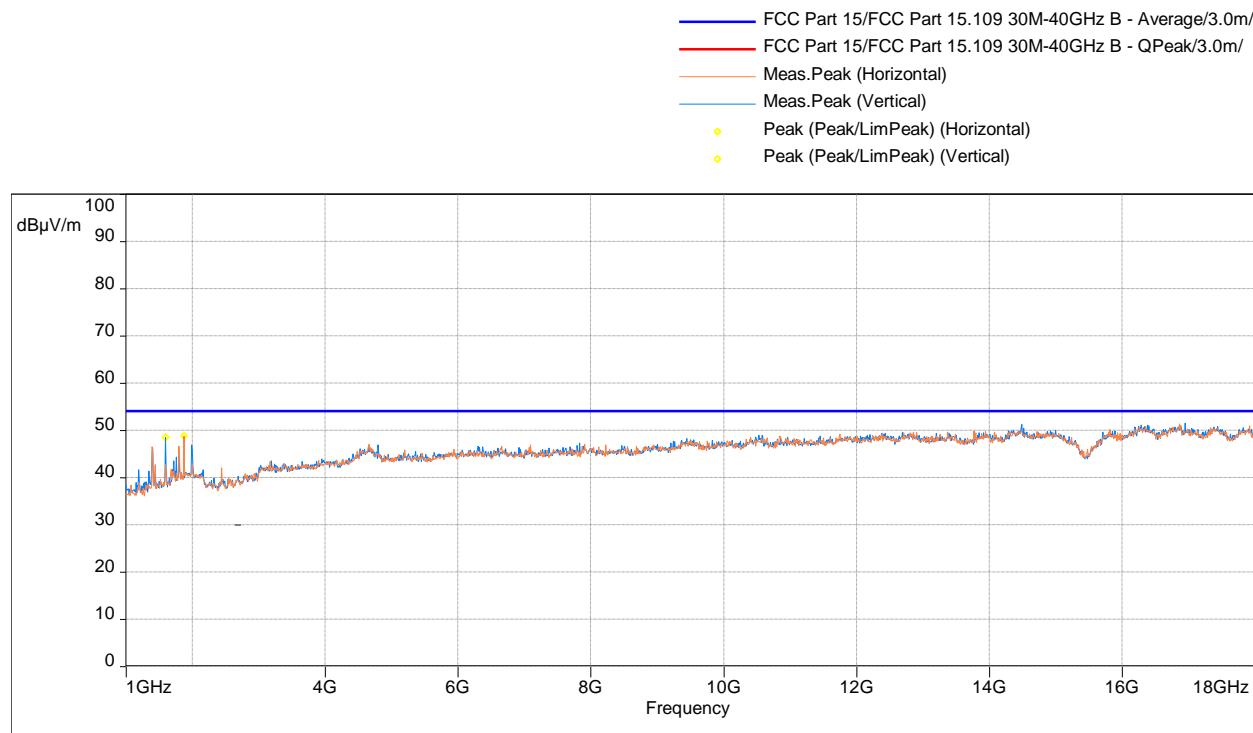
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 15:23

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
34.721	22.3	29.5	-7.2	289.8	1.0	Vertical	32.4	-10.1
201.237	25.1	33.0	-8.0	70.5	1.0	Vertical	41.5	-16.4
205.699	25.1	33.0	-7.9	78.5	1.0	Vertical	41.2	-16.1

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, 8DPSK, 2441MHz, Charging Mode


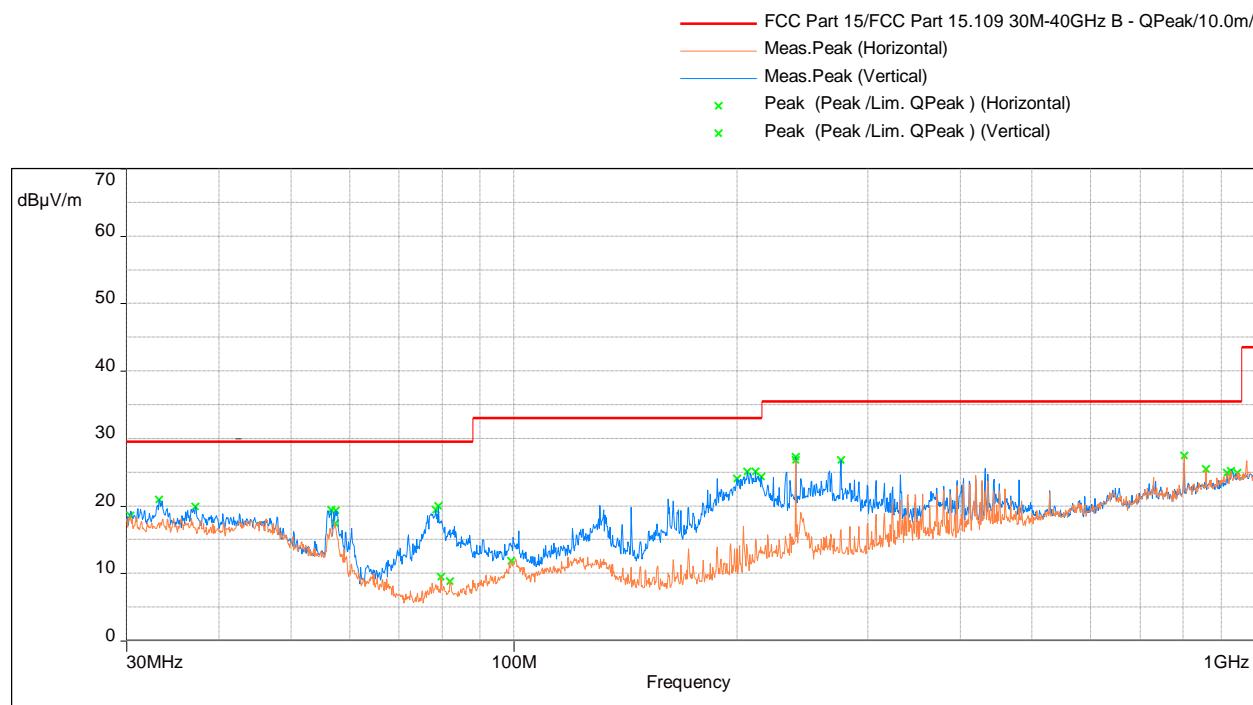
Model: ; Client: ; Comments: ; Test Date: 09/28/2018 17:36

Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1873.800	48.8	54.0	-5.2	22.3	1.5	Horizontal	62.0	-13.3
1598.400	48.5	54.0	-5.5	142.8	2.5	Vertical	63.7	-15.2

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

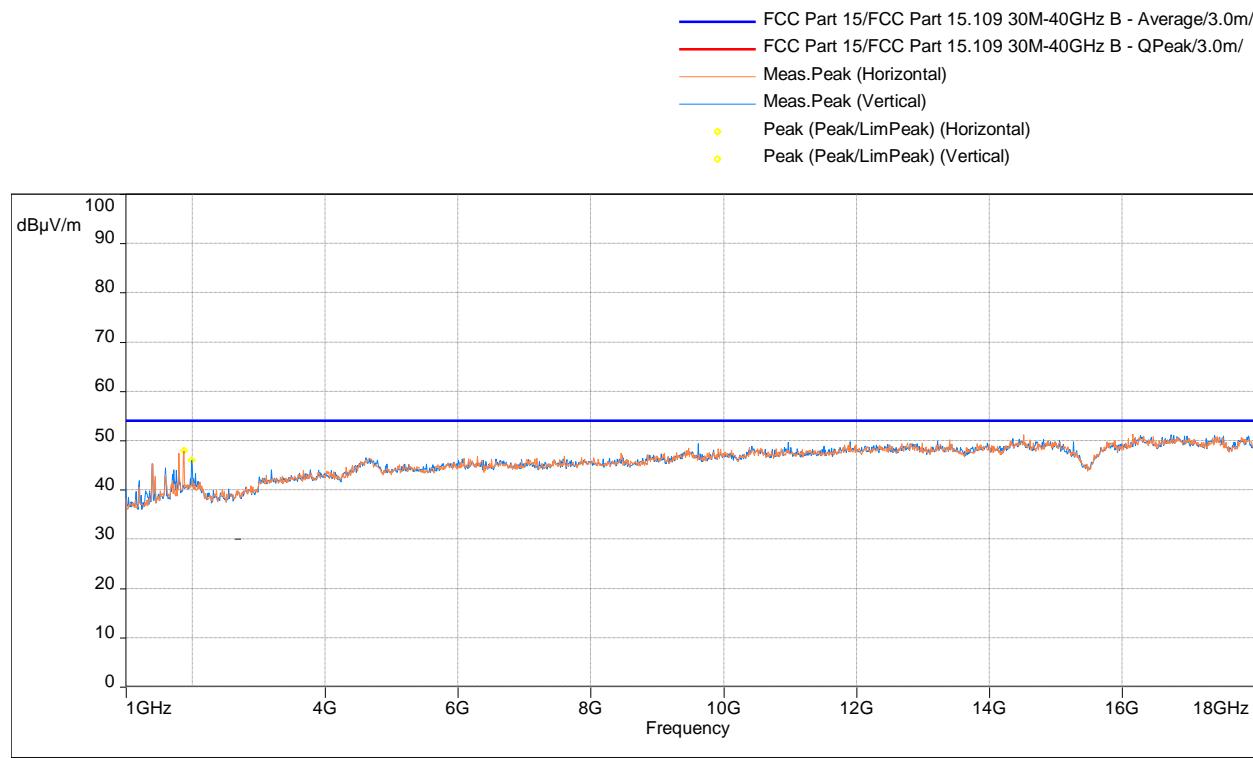
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 16:38

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
33.201	21.0	29.5	-8.6	292.0	2.0	Vertical	30.6	-9.7
206.314	25.1	33.0	-7.9	66.3	1.0	Vertical	41.1	-16.1
212.004	25.1	33.0	-7.9	90.3	1.0	Vertical	40.5	-15.4

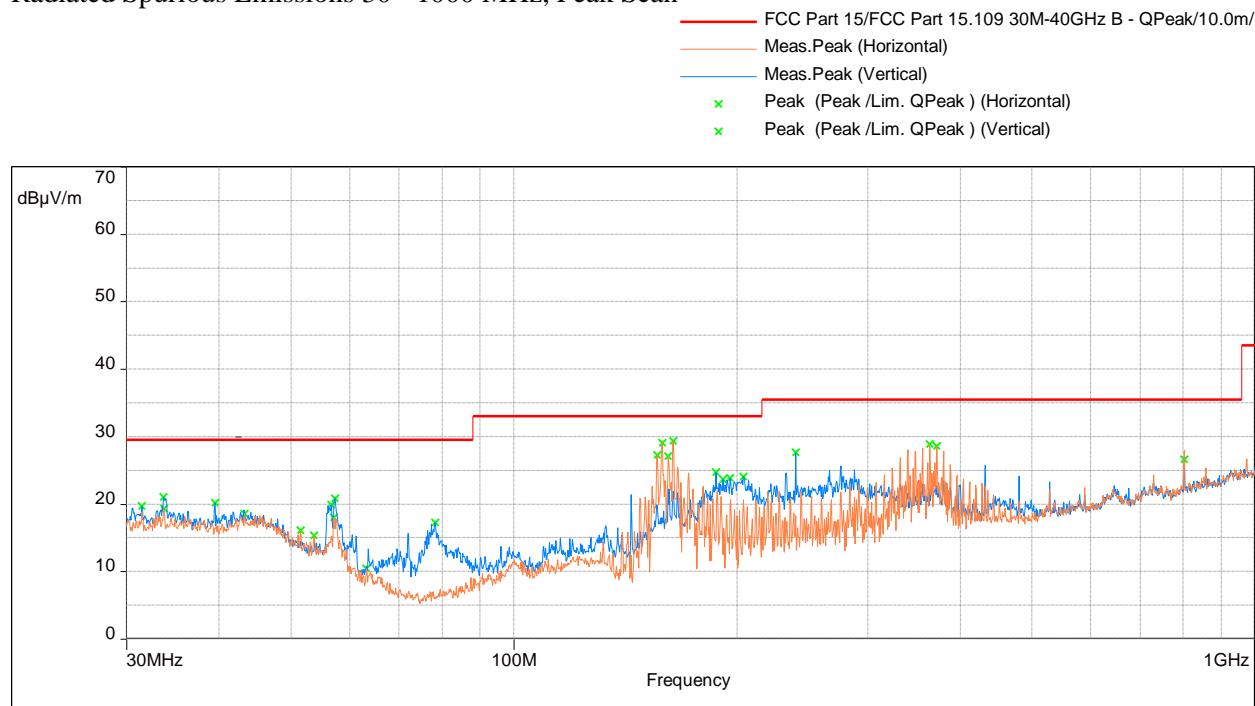
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, 8DPSK, 2480MHz, Charging Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1877.200	47.9	54.0	-6.1	245.5	2.5	Horizontal	61.1	-13.2
1991.100	45.9	54.0	-8.1	156.5	1.5	Vertical	58.9	-13.0

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

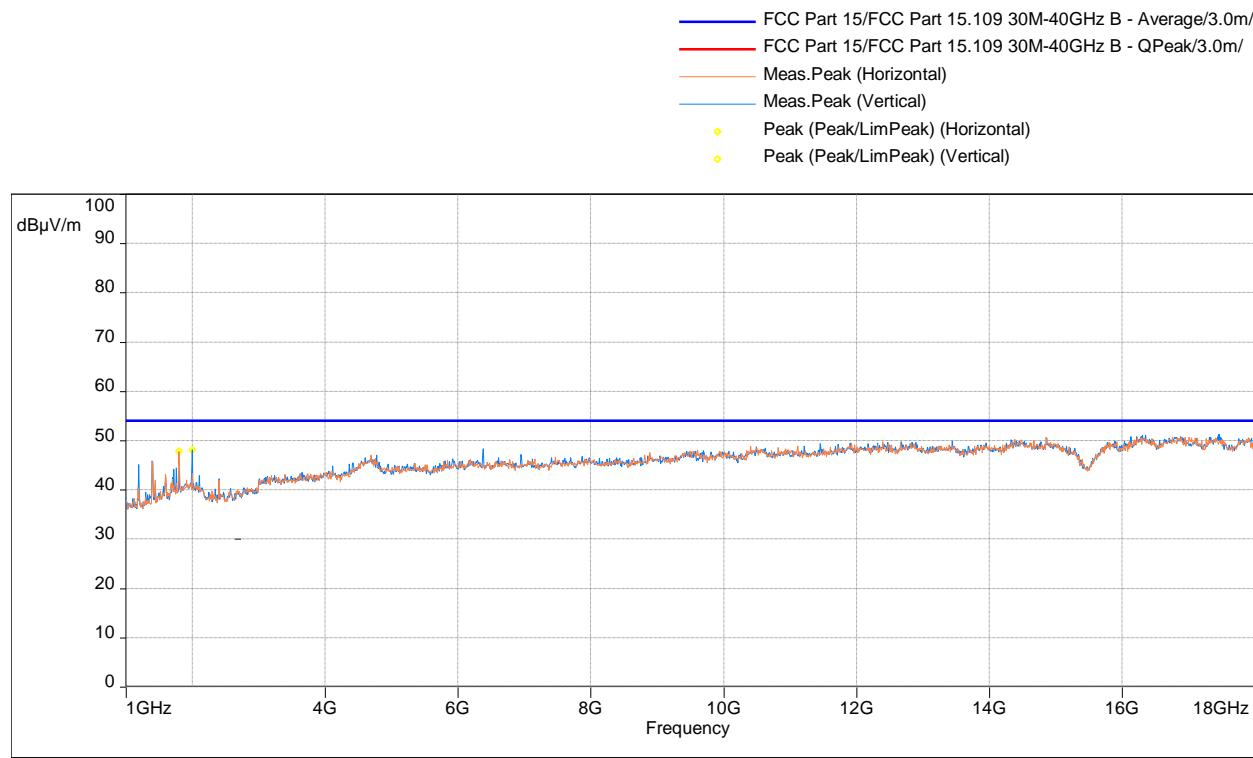
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 16:47

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dBuV)	Correction (dB)
158.428	29.1	33.0	-3.9	212.0	3.0	Horizontal	47.1	-18.0
161.564	27.1	33.0	-5.9	224.3	3.0	Horizontal	45.2	-18.1
163.957	29.3	33.0	-3.7	18.0	3.0	Horizontal	47.0	-17.7
364.003	28.9	35.5	-6.6	44.0	2.0	Horizontal	39.7	-10.8

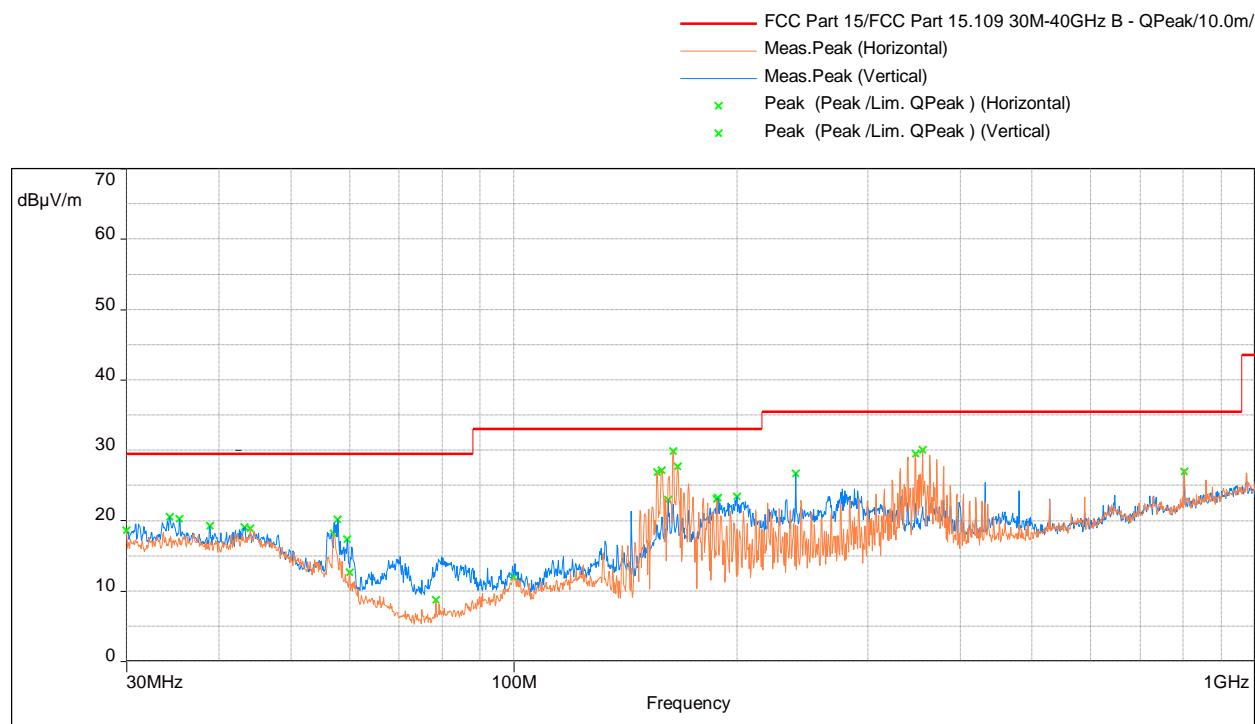
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, 8DPSK, 2402MHz, Normal Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1797.300	47.8	54.0	-6.2	106.8	1.5	Horizontal	61.7	-13.9
1996.200	48.1	54.0	-5.9	258.0	1.5	Vertical	61.1	-12.9

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

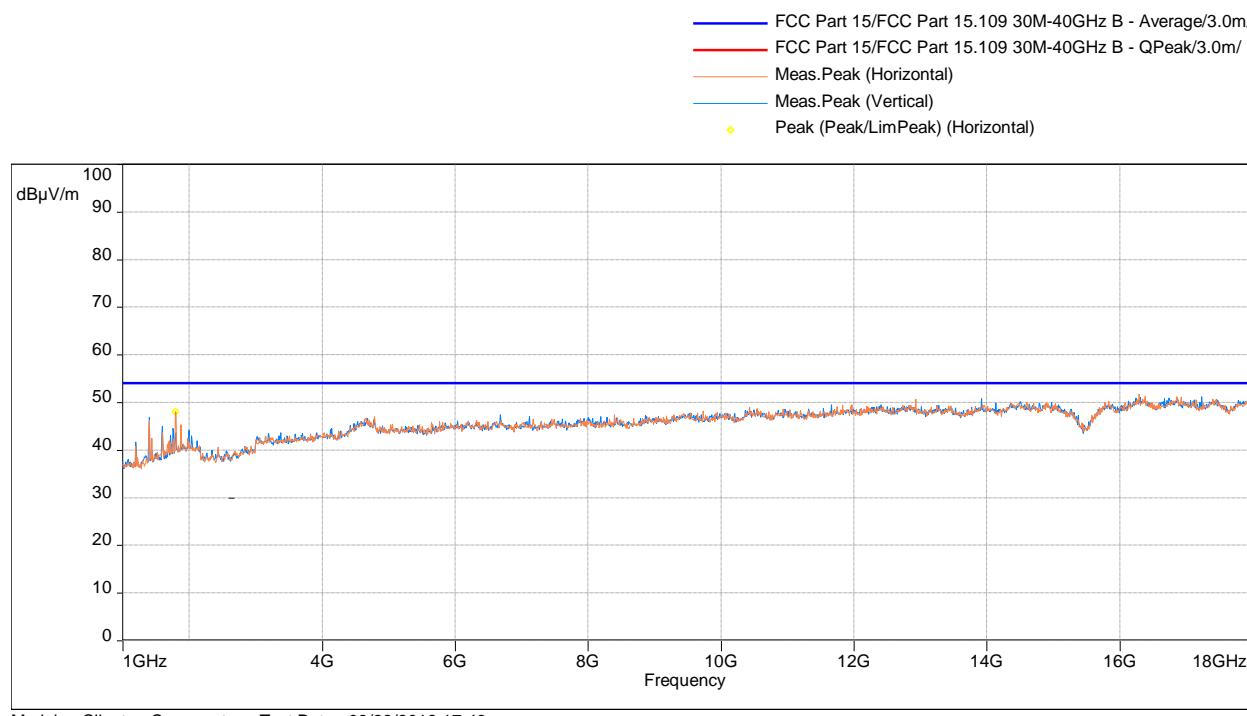
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 16:01

Frequency (MHz)	Q-Peak (dB _u V/m)	Limit@10m (dB _u V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB _u V)	Correction (dB)
158.396	27.2	33.0	-5.9	40.3	2.0	Horizontal	45.2	-18.0
164.022	29.8	33.0	-3.2	30.3	3.0	Horizontal	47.5	-17.7
166.414	27.7	33.0	-5.3	46.8	3.0	Horizontal	45.1	-17.4
348.063	29.5	35.5	-6.0	5.8	3.0	Horizontal	40.7	-11.3
356.049	30.0	35.5	-5.5	0.3	2.0	Horizontal	41.2	-11.2

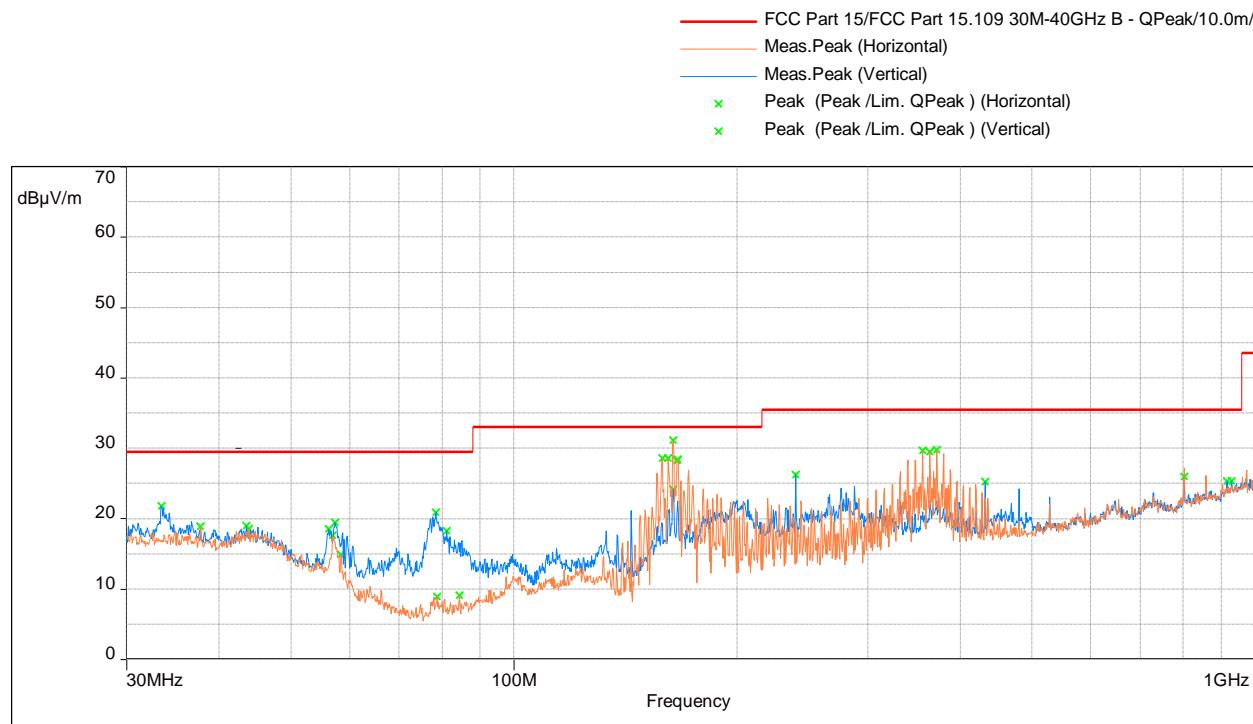
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, 8DPSK, 2441MHz, Normal Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1797.300	48.1	54.0	-5.9	260.5	1.5	Horizontal	61.9	-13.9

Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

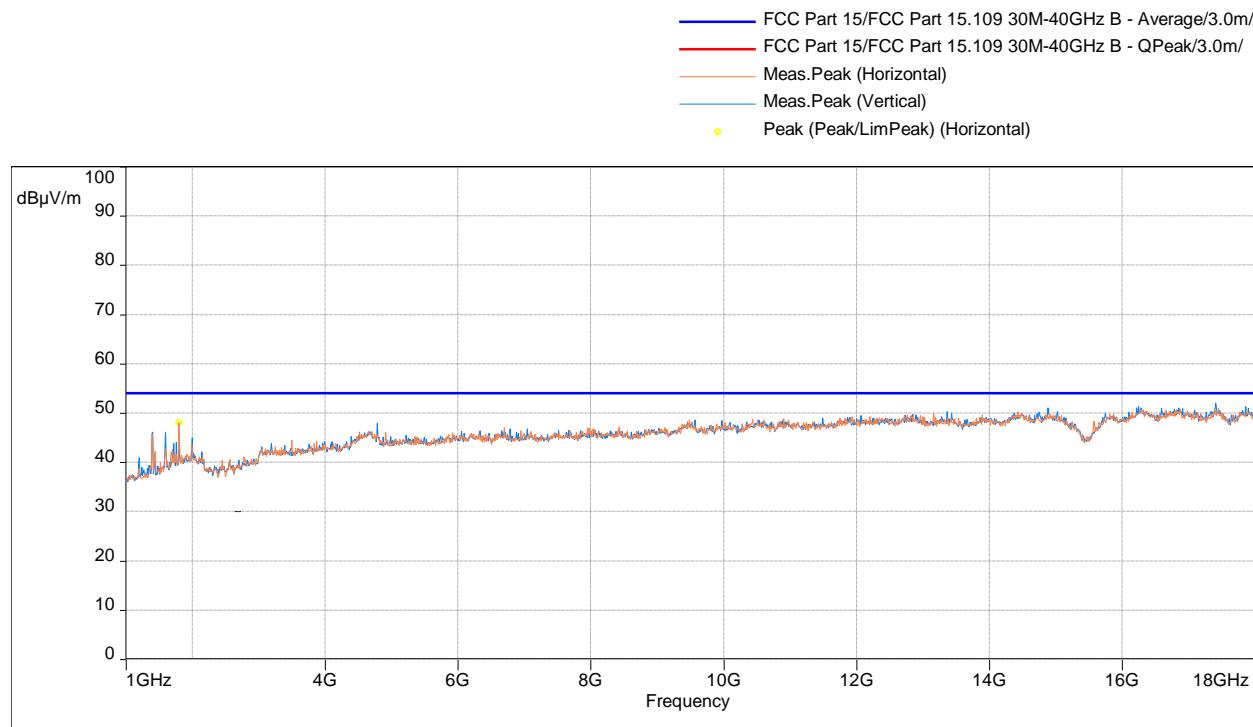
Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Radiated Spurious Emissions 30 - 1000 MHz, Peak Scan



Model: ; Client: ; Comments: ; Test Date: 10/01/2018 16:14

Frequency (MHz)	Q-Peak (dB μ V/m)	Limit@10m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
158.428	28.6	33.0	-4.4	224.8	3.0	Horizontal	46.6	-18.0
161.564	28.6	33.0	-4.4	224.8	3.0	Horizontal	46.7	-18.1
163.989	31.1	33.0	-1.9	32.3	3.0	Horizontal	48.8	-17.7
166.091	28.2	33.0	-4.8	36.5	3.0	Horizontal	45.6	-17.4
166.479	28.4	33.0	-4.6	36.5	3.0	Horizontal	45.8	-17.4
355.985	29.7	35.5	-5.9	24.3	3.0	Horizontal	40.8	-11.2

Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan vs Average Limit, 8DPSK, 2480MHz, Normal Mode


Frequency (MHz)	FS@3m (dB μ V/m)	Av Limit@3m (dB μ V/m)	Margin (dB)	Angle (°)	Height (m)	Polarity	Raw (dB μ V)	Correction (dB)
1797.300	48.1	54.0	-5.9	245.8	1.5	Horizontal	62.0	-13.9

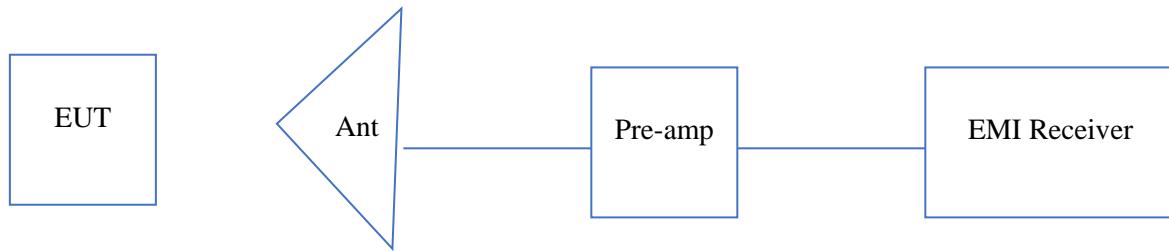
Note: Radiated emission measurements were performed up to 25GHz. No Emissions were identified when scanned from 18-25 GHz

Note: FS@3m = RA + Correction
 Correction = AF + CF - Preamp

Results	Complies
----------------	-----------------

4.7.5 Test Setup Photographs

The following photographs show the testing configurations used.



4.8 AC Line Conducted Emission
15.207

4.8.1 Requirement

Frequency Band MHz	Class B Limit dB(µV)		Class A Limit dB(µV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.50	66 to 56 *	56 to 46 *	79	66
0.50-5.00	56	46	73	60
5.00-30.00	60	50	73	60

*Note: *Decreases linearly with the logarithm of the frequency. At the transition frequency the lower limit applies.*

4.8.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

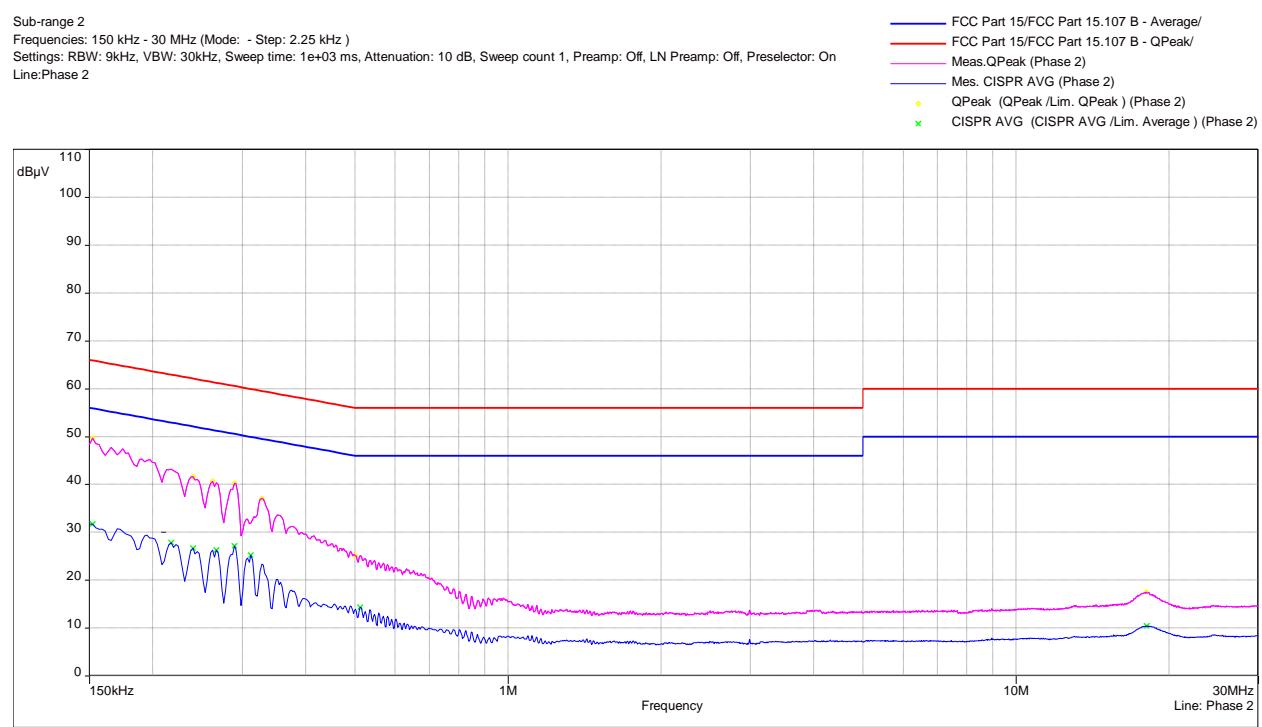
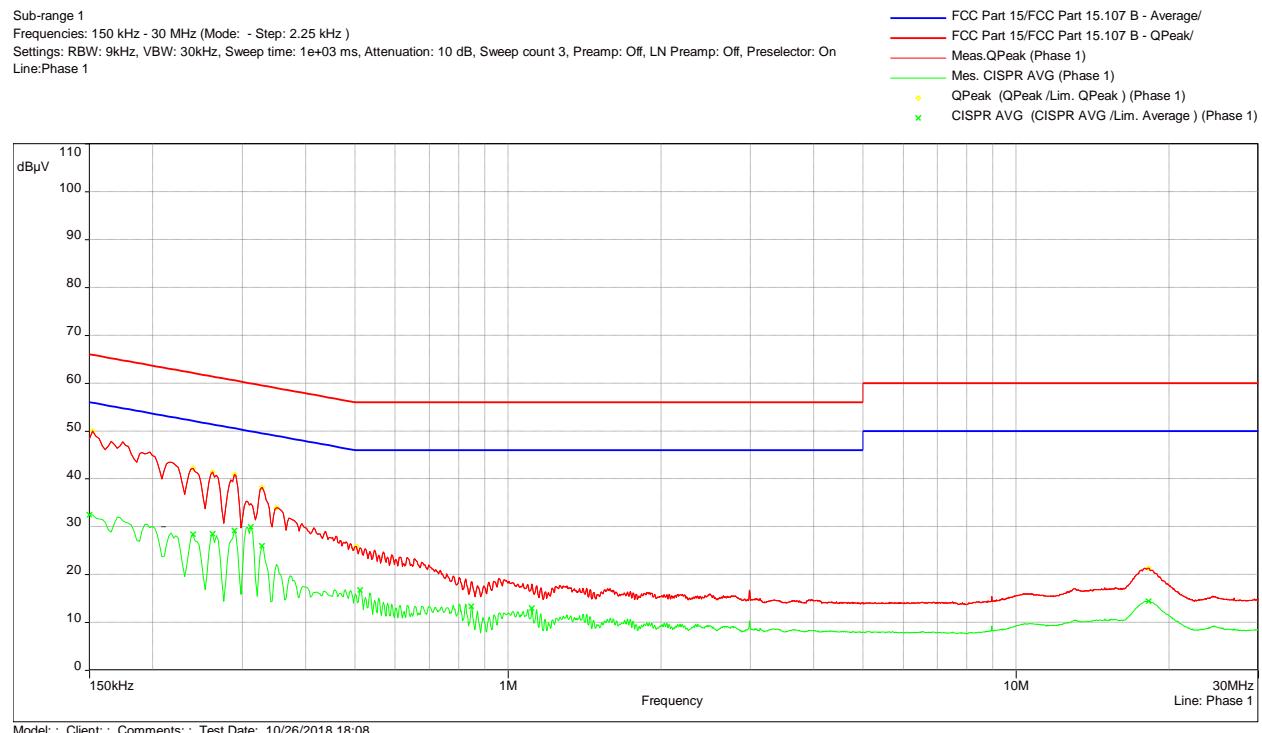
Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.10-2013

Tested By:	Minh Ly
Test Date:	October 26, 2018

4.8.3 Test Results

FCC Part 15.207 Conducted Disturbances, 120V 60Hz



Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	Margin (dB)	Line	Correction (dB)
0.152250	50.0	65.9	-15.9	Phase 1	11.6
0.240000	42.1	62.1	-20.0	Phase 1	11.6
0.262500	41.4	61.4	-20.0	Phase 1	11.6
0.289500	40.9	60.5	-19.7	Phase 1	11.6
0.327750	38.2	59.5	-21.3	Phase 1	11.6
0.350250	33.9	59.0	-25.0	Phase 1	11.6
0.152250	49.7	65.9	-16.2	Phase 2	11.6
0.240000	41.6	62.1	-20.5	Phase 2	11.6
0.262500	40.6	61.4	-20.8	Phase 2	11.6
0.289500	40.2	60.5	-20.3	Phase 2	11.6
0.327750	37.1	59.5	-22.5	Phase 2	11.6
18.044250	17.5	60.0	-42.5	Phase 2	12.1

Frequency (MHz)	Ave Level (dBuV)	Ave Limit (dBuV)	Margin (dB)	Line	Correction (dB)
0.150000	32.5	56.0	-23.5	Phase 1	11.6
0.240000	28.4	52.1	-23.7	Phase 1	11.6
0.262500	28.5	51.4	-22.9	Phase 1	11.6
0.289500	29.2	50.5	-21.4	Phase 1	11.6
0.312000	29.9	49.9	-20.0	Phase 1	11.6
0.327750	25.9	49.5	-23.6	Phase 1	11.6
0.152250	31.7	55.9	-24.2	Phase 2	11.6
0.217500	27.8	52.9	-25.1	Phase 2	11.6
0.240000	26.6	52.1	-25.5	Phase 2	11.6
0.267000	26.3	51.2	-24.9	Phase 2	11.6
0.289500	27.2	50.5	-23.4	Phase 2	11.6
0.312000	25.1	49.9	-24.8	Phase 2	11.6

Results:	Complies by 15.9 dB at 120V 60Hz
-----------------	---

5.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
Spectrum Analyzer	Rohde and Schwarz	FSU	ITS 00913	12	01/24/19
Pyramidal Horn Antenna	EMCO	3160-09	ITS 00571	#	#
Pre-Amplifier (18-40GHz)	Miteq	TTA1840-35-S-M	ITS 01393	12	01/19/19
Active Horn Antenna	ETS-Lindgren	3117-PA	ITS 01325	12	01/25/19
EMI Receiver	Rohde and Schwarz	ESR7	ITS 01607	12	10/09/18
BI-Log Antenna	Antenna Research	LPB-2513	ITS 00355	12	02/21/19
Pre-Amplifier	Sonoma Instrument	310N	ITS 01493	12	10/20/18
Notch Filter	Micro-Tronics	BRM50702	ITS 01166	12	03/10/19
Notch Filter	MICRO-TRONICS	BRM50702	ITS 01166	12	12/08/18
RF Cable	Megaphase	EMC1-K1K1-236	ITS 01538	12	06/25/19
RF Cable	Megaphase	TM40-K1K1-59	ITS 01657	12	06/26/19
RF Cable	TRU Corporation	TRU CORE 300	ITS 01330	12	11/29/18
RF Cable	TRU Corporation	TRU CORE 300	ITS 01465	12	08/16/19
RF Cable	TRU Corporation	TRU CORE 300	ITS 01470	12	08/16/19
LISN	COM-POWER	LIN-115A	ITS 01285	12	06/21/19

No Calibration required

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
Tile	Quantum Change	3.4.K.22	Conducted Spurious_30M-25GHz
BAT-EMC	Nexio	3.16.0.64	Vocera, Bluetooth.bpp
RS Commander	Rohde Schwarz	1.6.4	Not Applicable (Screen grabber)

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0 / G103615308	ML	KV	October 29, 2018	Original document