8 Frequency stability measurements

8.1 *Test Result*

Test Description		Test Result
Frequency stability measurements	935210 D05 Indus Booster Basic Meas v01r02	Pass

8.2 *Test Method*

Testing was performed according to KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.8

8.3 *Test Equipment*

Test End Date:03/13/2018 Tester: SKM

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ENVIRONMENTAL TEST CHAMBER	T2RC	TENNEY ENVIRONMENTAL	B094877	CNR
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	25-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079659	25-Jul-2018
SIGNAL GENERATOR	SMBV100A	ROHDE & SCHWARZ	15002	2-Oct-2018
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17016	25-Jul-2018

8.4 *Test Data*

Voltage %	Voltage V	Temp °C	Frequency MHz	Freq Dev Hz	Freq Dev max Hz	Freq Dev ppm
100%	120.00	+20 (Ref)	160.0000000	+0	+0	+0.00
100%	120.00	-30	160.0000000	+0	+0	+0.00
100%	120.00	-20	160.0000000	+0	+0	+0.00
100%	120.00	-10	160.0000000	+0	+0	+0.00
100%	120.00	0	160.0000000	+0	+0	+0.00
100%	120.00	+10	160.0000000	+0	+0	+0.00
100%	120.00	+20	160.0000000	+0	+0	+0.00
100%	120.00	+30	160.0000000	+0	+0	+0.00
100%	120.00	+40	160.0000000	+0	+0	+0.00
100%	120.00	+50	160.0000000	+0	+0	+0.00
115%	138.00	+20	160.0000000	+0	+0	+0.00
85%	102.00	+20	160.0000000	+0	+0	+0.00
100%	120.00	+20 (Ref)	469.0000000	+0	+0	+0.00
100%	120.00	-30	469.0000000	+0	+0	+0.00
100%	120.00	-20	469.0000000	+0	+0	+0.00
100%	120.00	-10	469.0000000	+0	+0	+0.00
100%	120.00	0	469.0000000	+0	+0	+0.00
100%	120.00	+10	469.0000000	+0	+0	+0.00
100%	120.00	+20	469.0000000	+0	+0	+0.00
100%	120.00	+30	469.0000000	+0	+0	+0.00
100%	120.00	+40	469.0000000	+0	+0	+0.00
100%	120.00	+50	469.0000000	+0	+0	+0.00
115%	138.00	+20	469.0000000	+0	+0	+0.00
85%	102.00	+20	469.0000000	+0	+0	+0.00
100%	120.00	+20 (Ref)	769.0000000	+0	+0	+0.00
100%	120.00	-30	769.0000000	+0	+0	+0.00
100%	120.00	-20	769.0000000	+0	+0	+0.00
100%	120.00	-10	769.0000000	+0	+0	+0.00
100%	120.00	0	769.0000000	+0	+0	+0.00
100%	120.00	+10	769.0000000	+0	+0	+0.00
100%	120.00	+20	769.0000000	+0	+0	+0.00
100%	120.00	+30	769.0000000	+0	+0	+0.00
100%	120.00	+40	769.0000000	+0	+0	+0.00
100%	120.00	+50	769.0000000	+0	+0	+0.00
115%	138.00	+20	769.0000000	+0	+0	+0.00
85%	102.00	+20	769.0000000	+0	+0	+0.00
100%	120.00	+20 (Ref)	852.5000000	+0	+0	+0.00
100%	120.00	-30	852.5000000	+0	+0	+0.00
100%	120.00	-20	852.5000000	+0	+0	+0.00
100%	120.00	-10	852.5000000	+0	+0	+0.00
100%	120.00	0	852.5000000	+0	+0	+0.00
100%	120.00	+10	852.5000000	+0	+0	+0.00
100%	120.00	+20	852.5000000	+0	+0	+0.00
100%	120.00	+30	852.5000000	+0	+0	+0.00
100%	120.00	+40	852.5000000	+0	+0	+0.00
100%	120.00	+50	852.5000000	+0	+0	+0.00
115%	138.00	+20	852.5000000	+0	+0	+0.00
85%	102.00	+20	852.5000000	+0	+0	+0.00

9 Spurious emissions radiated measurements

9.1 *Test Result*

Test Description		Test Result
Spurious emissions radiated measurements	935210 D05 Indus Booster Basic Meas v01r02	Pass

9.2 *Test Method*

Testing was performed according to KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.9

Limit
-13 dBm = 82.2 dBuV/m at 3 m

9.3 *Test Site*

3 m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA (above 1 GHz)
10 m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA (below 1 GHz)

Environmental Conditions
Temperature: 23.1 °C
Relative Humidity: 50.1 %

9.4 *Test Equipment*

Test End Date: 1-May-2018 Tester: ASF

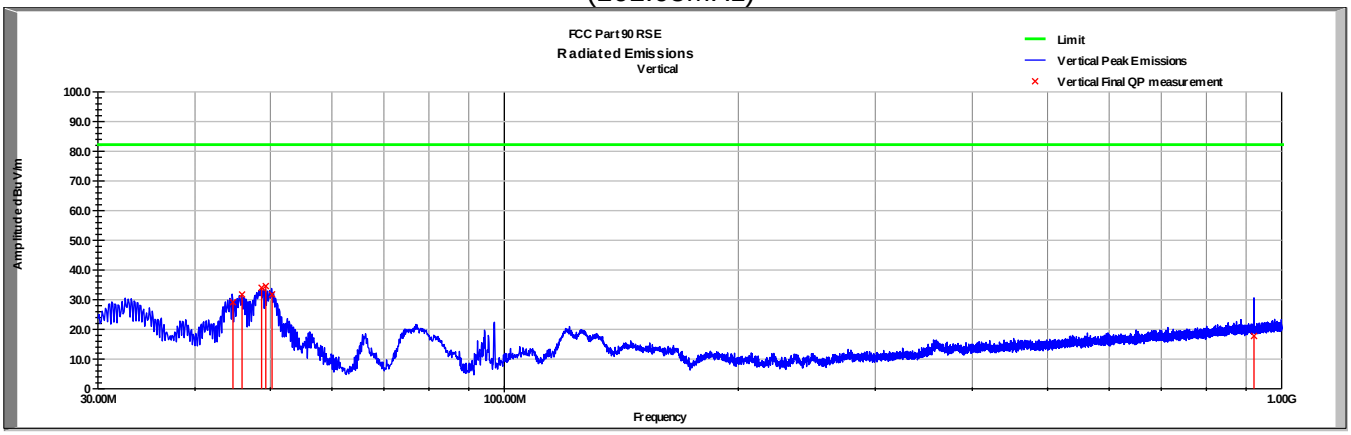
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-May-2018
ANTENNA, BILOG	JB6	SUNOL	B079690	29-Nov-2018
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079716	24-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079661	25-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079713	24-Jul-2018
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17017	25-Jul-2018
RF CABLE	104PE	HUBER & SUHNER	B079793	24-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	28-Jul-2018
SIGNAL GENERATOR, 40 GHZ	HMC-T2240	HITTITE	16005	CNR
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17016	25-Jul-2018
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	24-Jul-2018

Note: The calibration period equipment is 1 year.

Software:
“RE 30-1000MHz ” TILE! profile dated 12 2015
“RE 1-18GHz ” TILE! profile dated 12 2015

9.5 *Test Data*

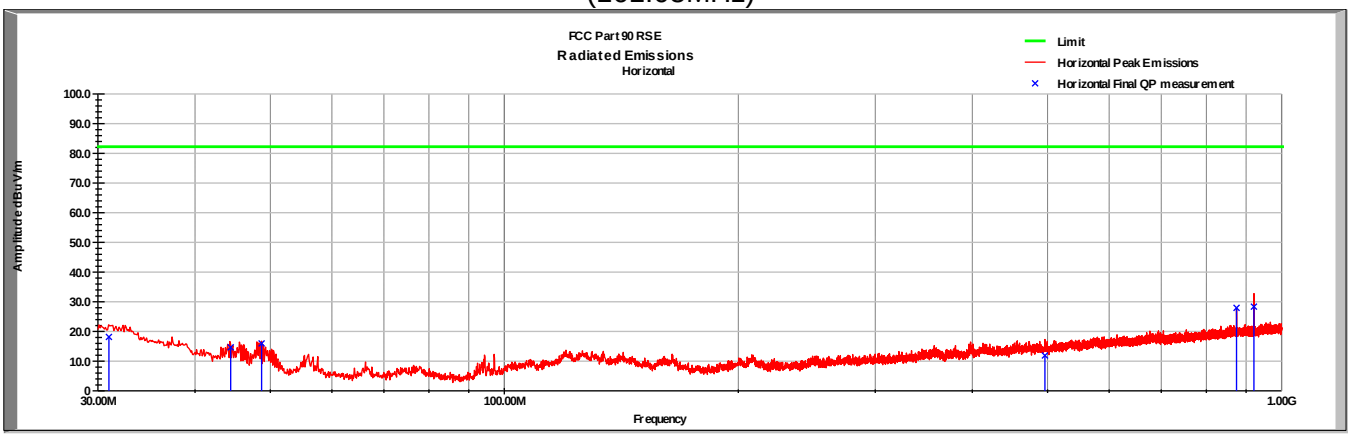
Vertical Radiated Spurious Emissions Plot
(161.05MHz)



Vertical Radiated Spurious Emissions Data
(161.05MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
44.77	49.4	V	355.0	111.0	11.4	0.6	32.2	29.2	82.2	-53.0
45.99	52.8	V	180.0	100.0	10.6	0.6	32.3	31.7	82.2	-50.5
48.72	56.6	V	198.0	100.0	9.3	0.6	32.5	34.0	82.2	-48.2
49.33	57.4	V	88.0	100.0	9.1	0.6	32.6	34.6	82.2	-47.6
50.26	55.1	V	151.0	100.0	8.7	0.6	32.6	31.8	82.2	-50.4
921.55	25.3	V	40.0	315.0	23.1	2.8	33.5	17.8	82.2	-64.4
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

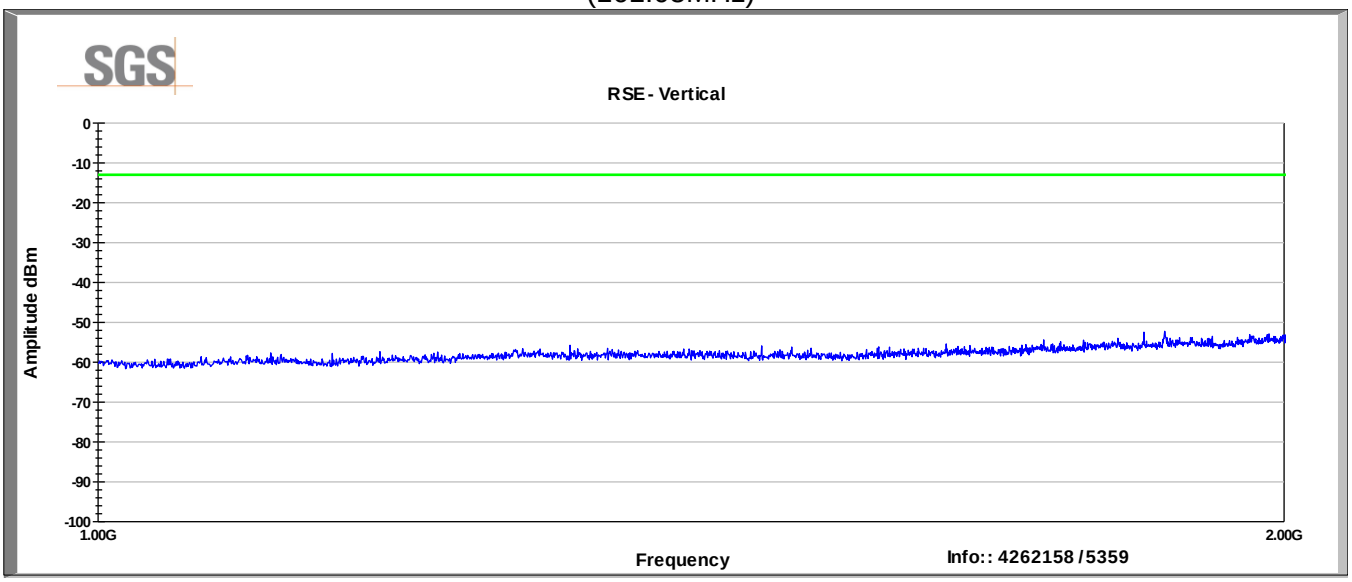
Horizontal Radiated Spurious Emissions Plot (161.05MHz)



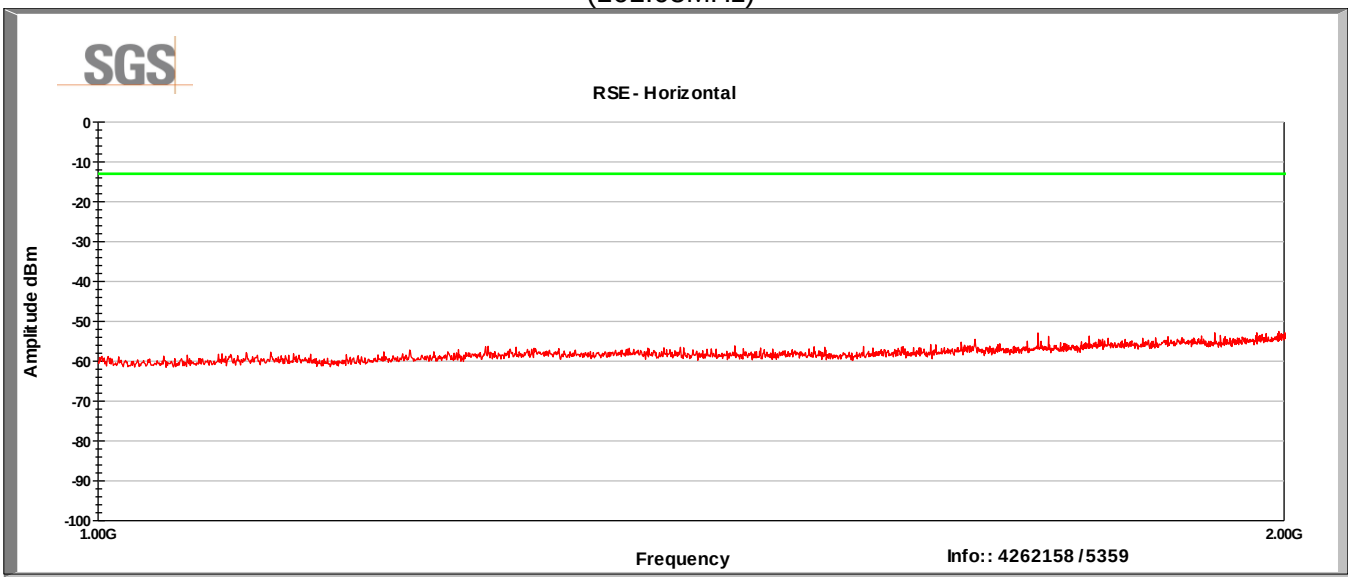
Horizontal Radiated Spurious Emissions Data (161.05MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
31.00	27.3	H	56.0	286.0	21.5	0.5	31.1	18.2	82.2	-64.0
44.46	34.7	H	225.0	204.0	11.6	0.6	32.2	14.6	82.2	-67.6
48.72	38.6	H	231.0	121.0	9.3	0.6	32.5	16.0	82.2	-66.2
496.02	25.2	H	181.0	250.0	18.1	2.0	33.4	11.9	82.2	-70.3
875.09	35.9	H	144.0	276.0	22.8	2.7	33.5	27.9	82.2	-54.3
921.34	35.9	H	40.0	307.0	23.1	2.8	33.5	28.4	82.2	-53.8
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

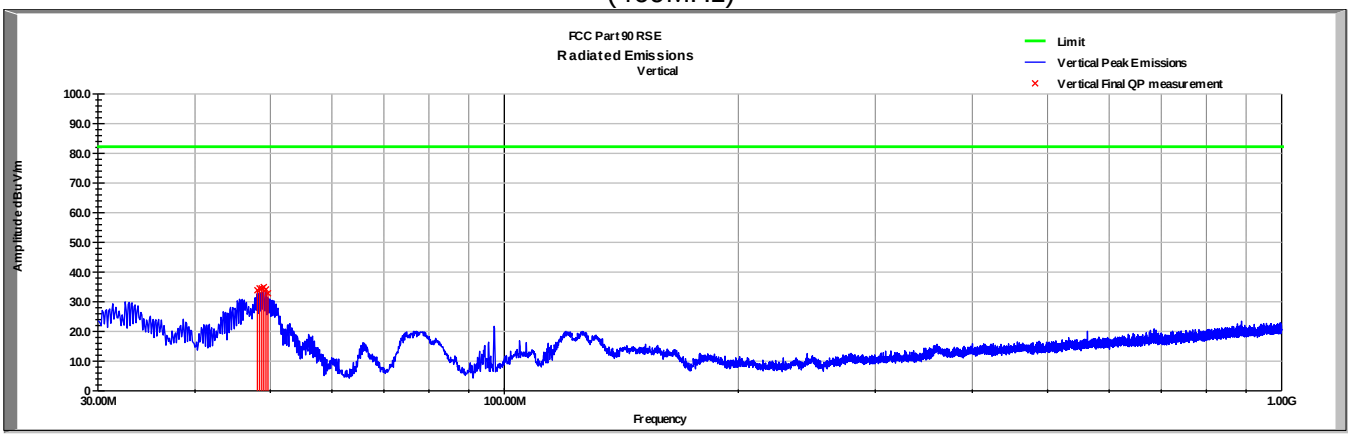
Vertical Radiated Spurious Emissions Plot
(161.05MHz)



Horizontal Radiated Spurious Emissions Plot
(161.05MHz)



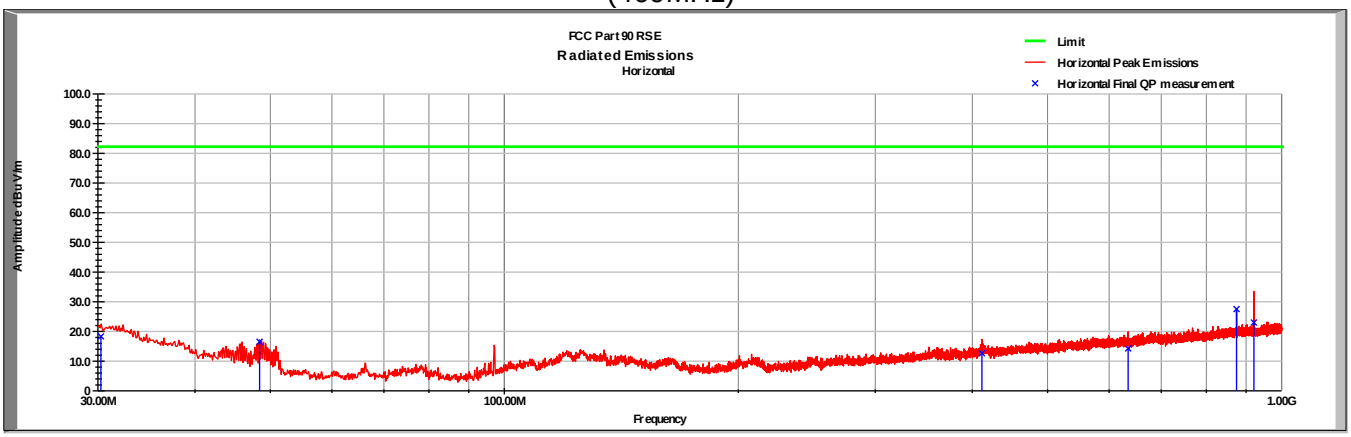
Vertical Radiated Spurious Emissions Plot (469MHz)



Vertical Radiated Spurious Emissions Data (469MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
48.12	56.2	V	112.0	100.0	9.6	0.6	32.5	33.9	82.2	-48.3
48.43	56.9	V	45.0	100.0	9.4	0.6	32.5	34.5	82.2	-47.7
48.74	57.1	V	180.0	100.0	9.3	0.6	32.5	34.5	82.2	-47.7
49.04	57.7	V	90.0	100.0	9.2	0.6	32.5	34.9	82.2	-47.3
49.35	57.0	V	202.0	100.0	9.1	0.6	32.6	34.2	82.2	-48.0
49.65	55.8	V	188.0	110.0	8.9	0.6	32.6	32.8	82.2	-49.4
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

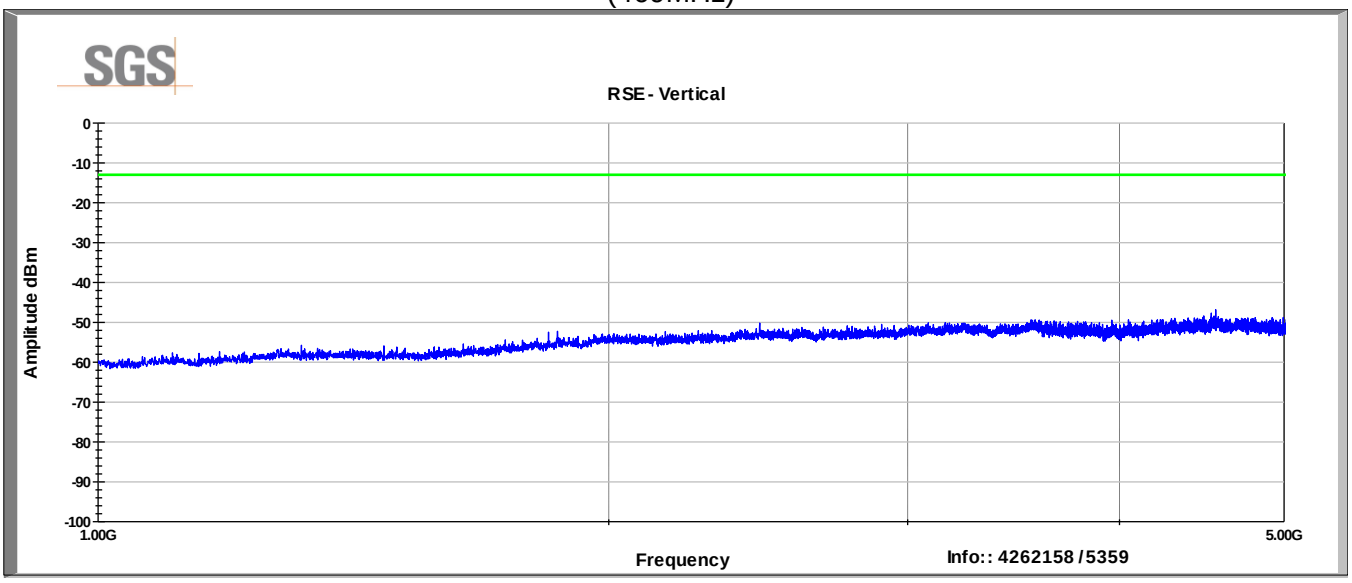
Horizontal Radiated Spurious Emissions Plot (469MHz)



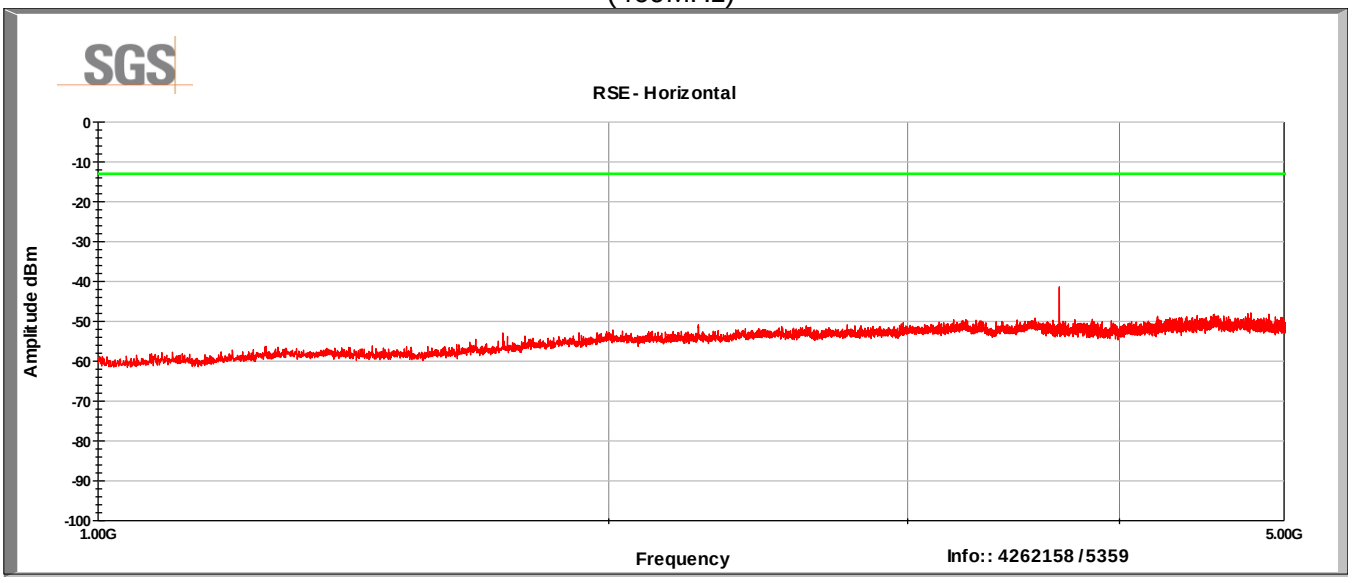
Horizontal Radiated Spurious Emissions Data (469MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.27	26.9	H	135.0	100.0	22.1	0.5	31.1	18.3	82.2	-63.9
48.43	38.9	H	241.0	249.0	9.4	0.6	32.5	16.5	82.2	-65.7
411.54	27.8	H	19.0	298.0	16.6	1.8	33.5	12.7	82.2	-69.5
634.62	25.2	H	18.0	110.0	20.2	2.3	33.4	14.3	82.2	-67.9
875.09	35.4	H	159.0	278.0	22.8	2.7	33.5	27.5	82.2	-54.7
921.39	30.6	H	44.0	270.0	23.1	2.8	33.5	23.0	82.2	-59.2
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

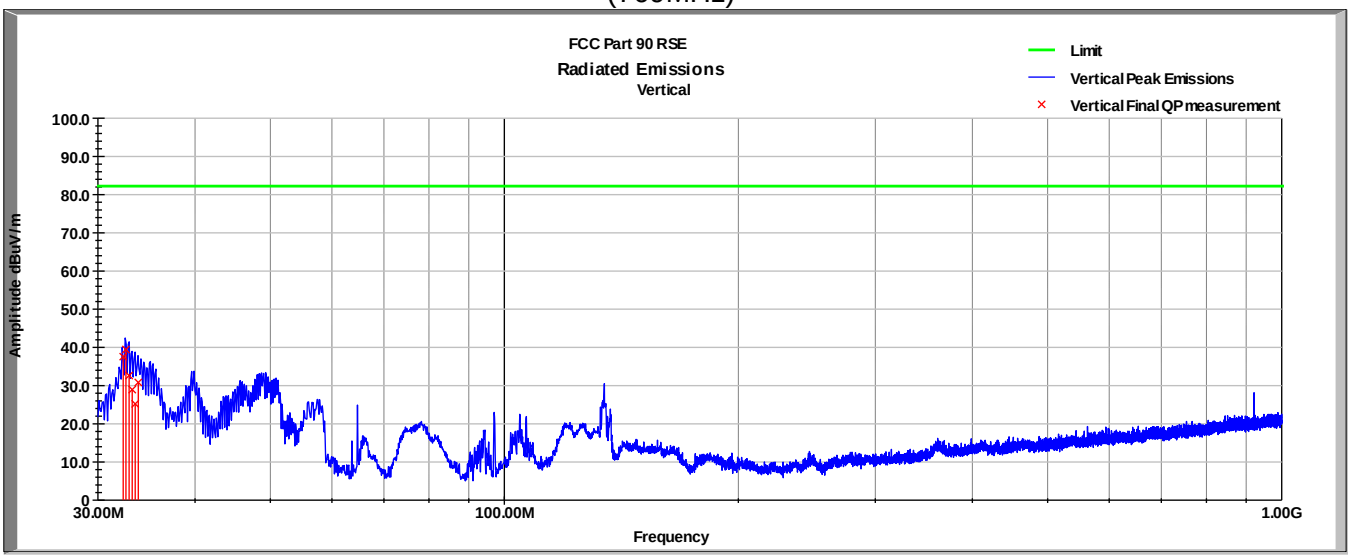
Vertical Radiated Spurious Emissions Plot
(469MHz)



Horizontal Radiated Spurious Emissions Plot
(469MHz)



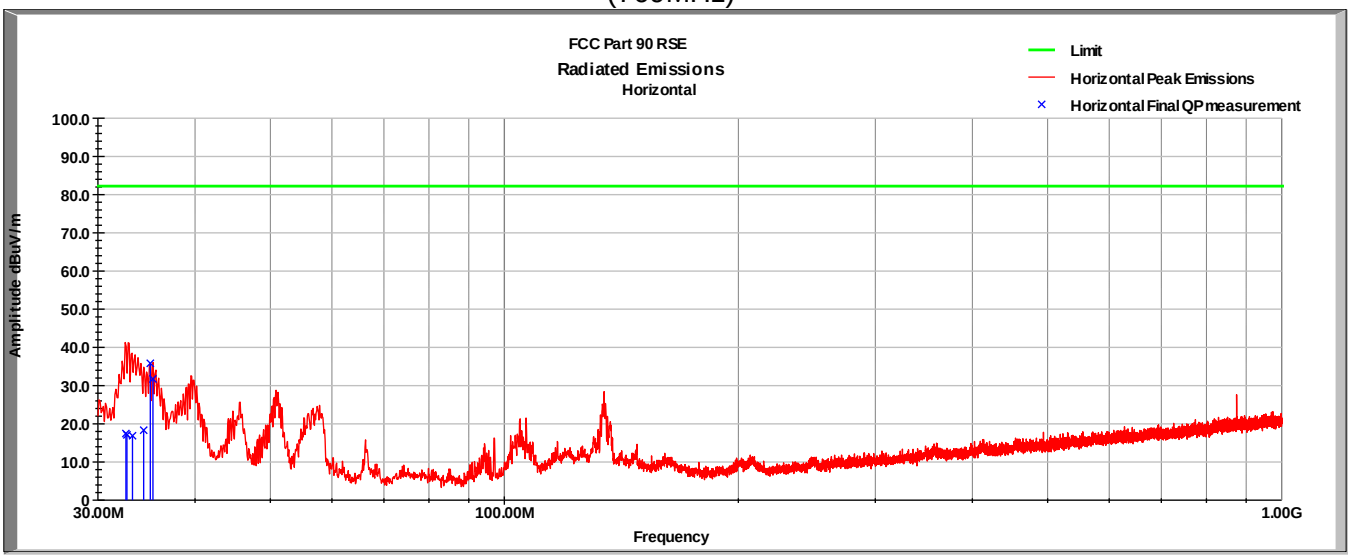
Vertical Radiated Spurious Emissions Plot (769MHz)



Vertical Radiated Spurious Emissions Data (769MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.33	47.8	V	180.0	261.0	20.5	0.5	31.2	37.6	82.2	-44.6
32.59	49.9	V	206.0	259.0	20.3	0.5	31.3	39.4	82.2	-42.8
32.90	43.3	V	225.0	268.0	20.1	0.5	31.3	32.6	82.2	-49.6
33.21	39.9	V	180.0	250.0	19.8	0.5	31.3	28.9	82.2	-53.3
33.50	36.4	V	201.0	316.0	19.6	0.5	31.3	25.2	82.2	-57.0
33.81	42.3	V	167.0	269.0	19.3	0.5	31.4	30.8	82.2	-51.4
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

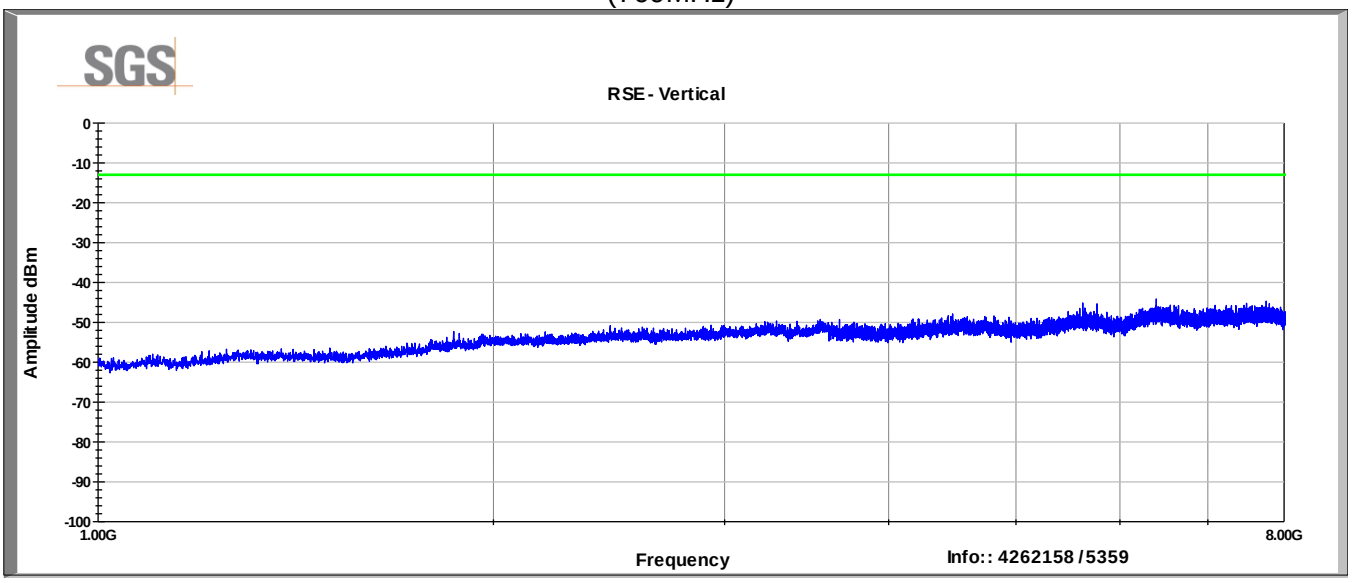
Horizontal Radiated Spurious Emissions Plot (769MHz)



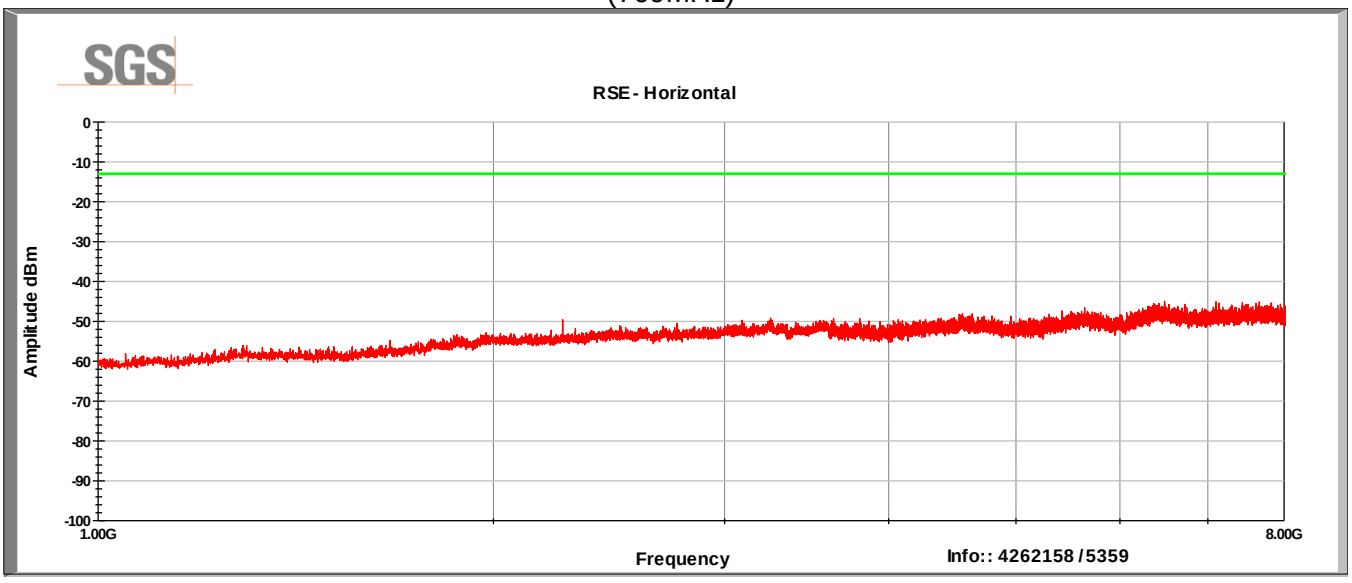
Horizontal Radiated Spurious Emissions Data (769MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.59	27.9	H	139.0	278.0	20.3	0.5	31.3	17.4	82.2	-64.8
32.69	27.6	H	135.0	278.0	20.2	0.5	31.3	17.1	82.2	-65.1
33.24	27.9	H	90.0	279.0	19.8	0.5	31.3	16.8	82.2	-65.4
34.36	30.3	H	217.0	270.0	19.0	0.5	31.4	18.3	82.2	-63.9
35.03	48.3	H	94.0	270.0	18.5	0.5	31.5	35.8	82.2	-46.4
35.31	44.5	H	101.0	271.0	18.2	0.5	31.5	31.7	82.2	-50.5
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

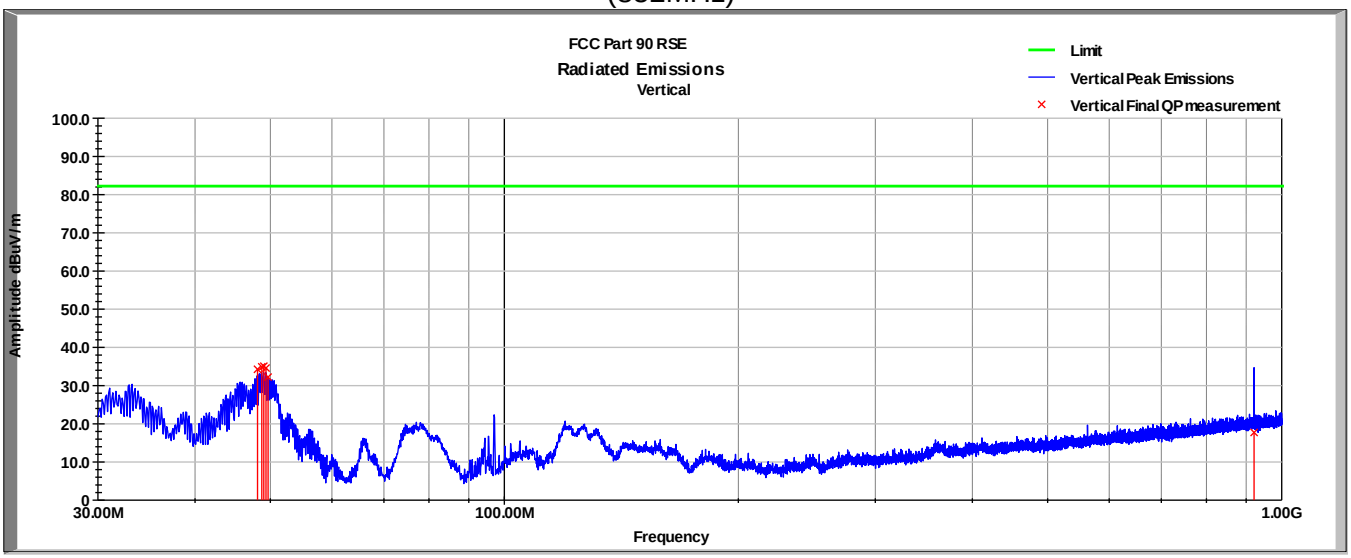
Vertical Radiated Spurious Emissions Plot
(769MHz)



Horizontal Radiated Spurious Emissions Plot
(769MHz)



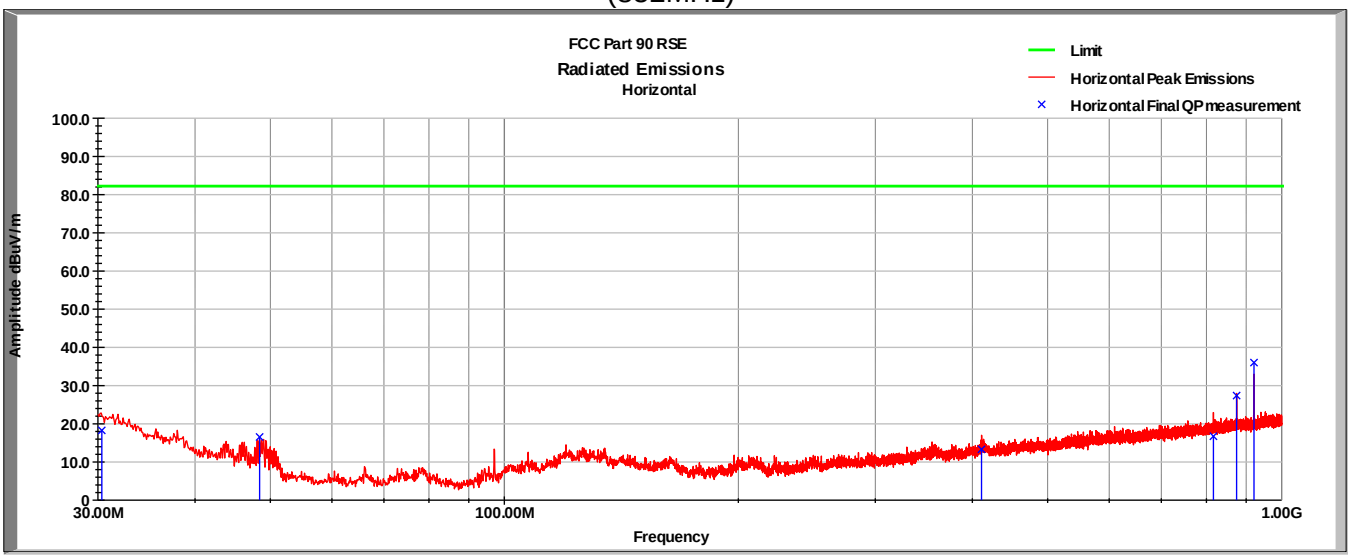
Vertical Radiated Spurious Emissions Plot (852MHz)



Vertical Radiated Spurious Emissions Data (852MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
48.13	56.6	V	264.0	100.0	9.5	0.6	32.5	34.3	82.2	-47.9
48.74	57.5	V	69.0	100.0	9.3	0.6	32.5	34.9	82.2	-47.3
49.04	57.8	V	46.0	100.0	9.2	0.6	32.5	35.1	82.2	-47.1
49.36	57.5	V	41.0	100.0	9.1	0.6	32.6	34.6	82.2	-47.6
49.66	55.2	V	359.0	130.0	8.9	0.6	32.6	32.2	82.2	-50.0
921.51	25.3	V	127.0	233.0	23.1	2.8	33.5	17.7	82.2	-64.5
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

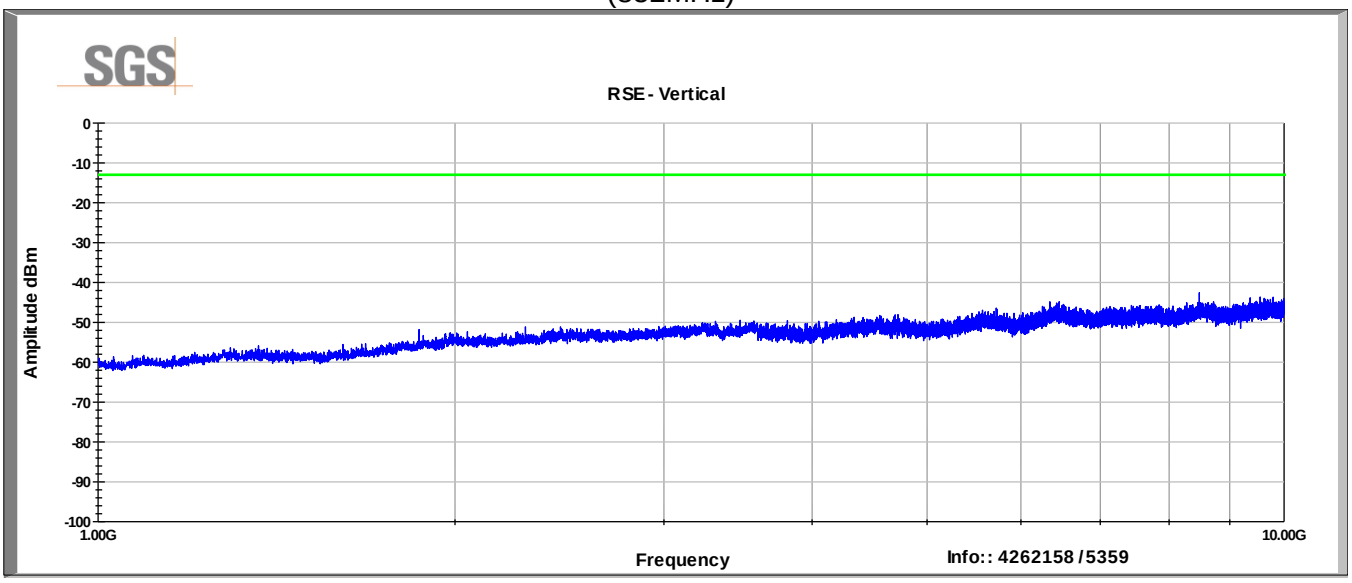
Horizontal Radiated Spurious Emissions Plot (852MHz)



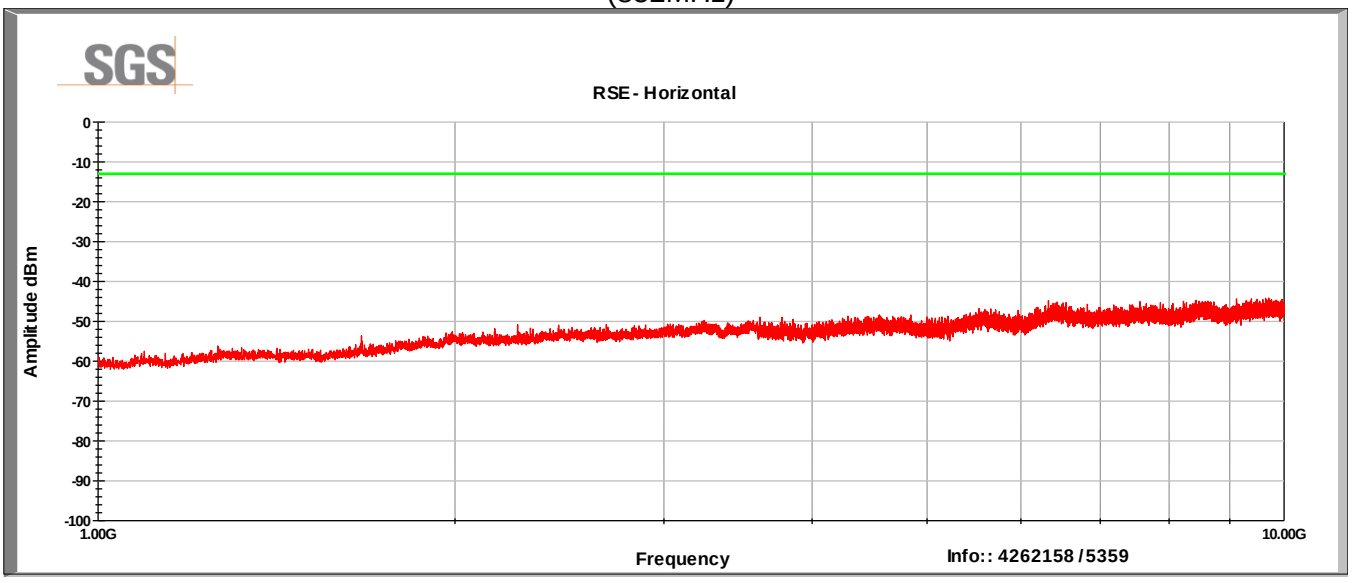
Horizontal Radiated Spurious Emissions Data (852MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.35	26.9	H	139.0	176.0	22.0	0.5	31.1	18.2	82.2	-64.0
48.43	39.0	H	257.0	119.0	9.4	0.6	32.5	16.5	82.2	-65.7
411.10	28.5	H	45.0	297.0	16.5	1.8	33.5	13.3	82.2	-68.9
816.93	25.2	H	191.0	346.0	22.3	2.6	33.4	16.7	82.2	-65.5
875.09	35.3	H	82.0	250.0	22.8	2.7	33.5	27.4	82.2	-54.8
921.39	43.6	H	158.0	120.0	23.1	2.8	33.5	36.0	82.2	-46.2
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

Vertical Radiated Spurious Emissions Plot
(852MHz)



Horizontal Radiated Spurious Emissions Plot
(852MHz)



10 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	31 May 2018
1	1) Section 1.3: Added operating frequency ranges 2) Section 1.7: Added signal generator information	18 July 2018