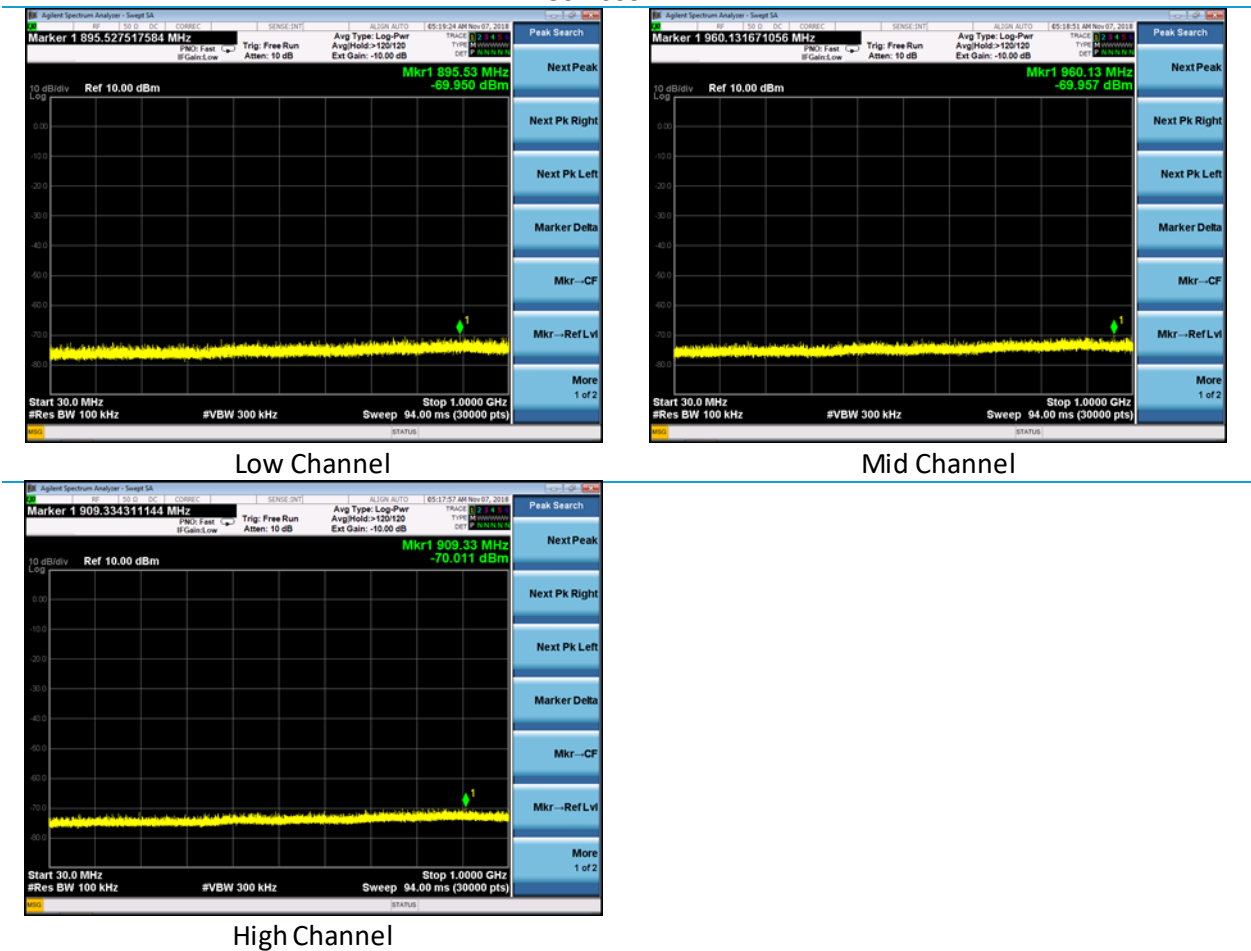
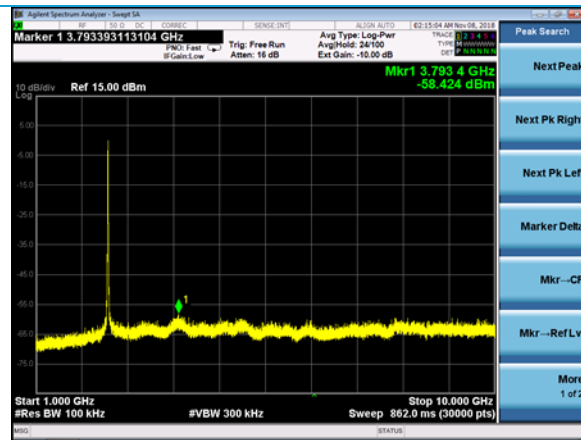


6 MBPS

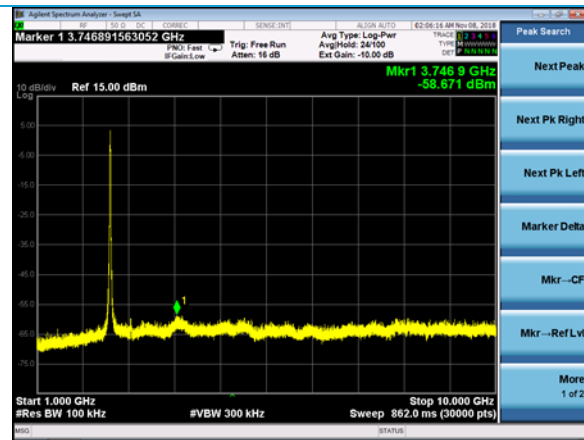
30-1000 MHz



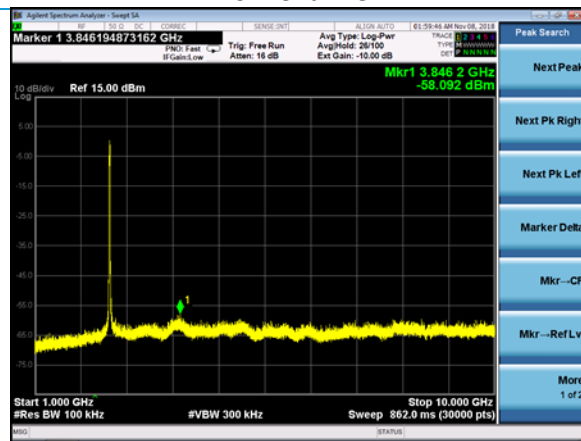
1000-10000 MHz



Low Channel



Mid Channel

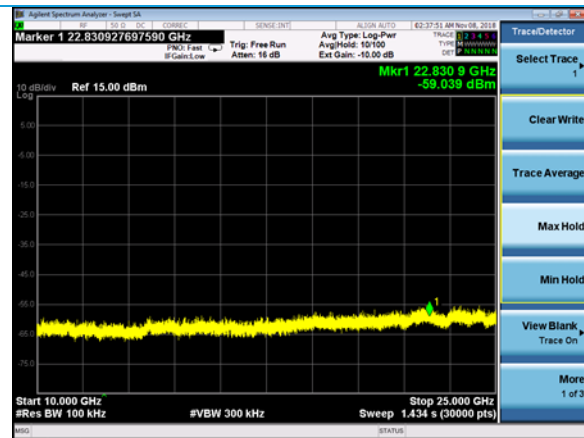


High Channel

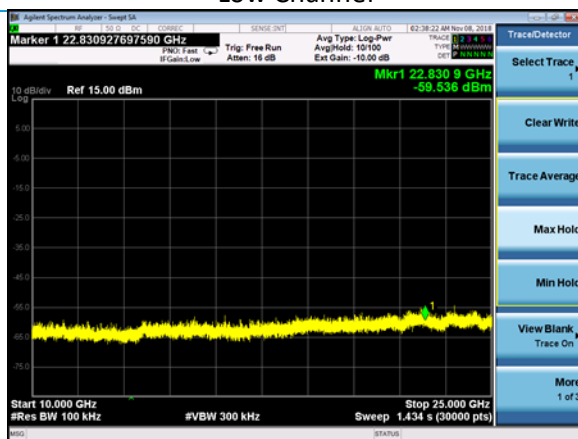
10000-25000 MHz



Low Channel

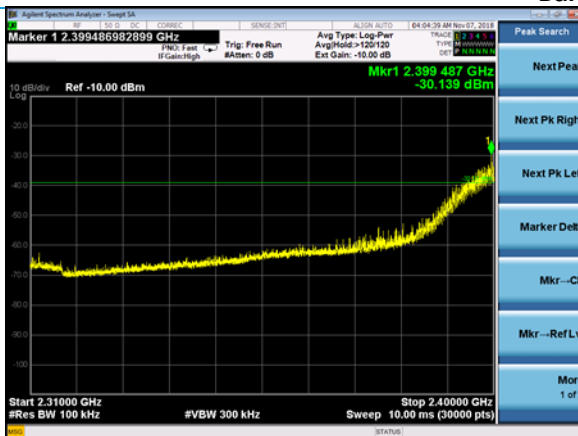


Mid Channel

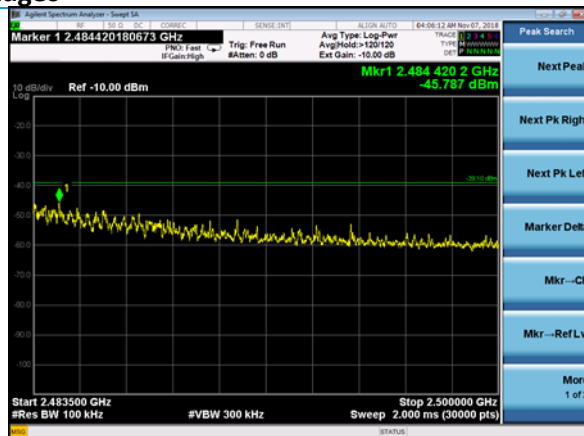


High Channel

Band Edges



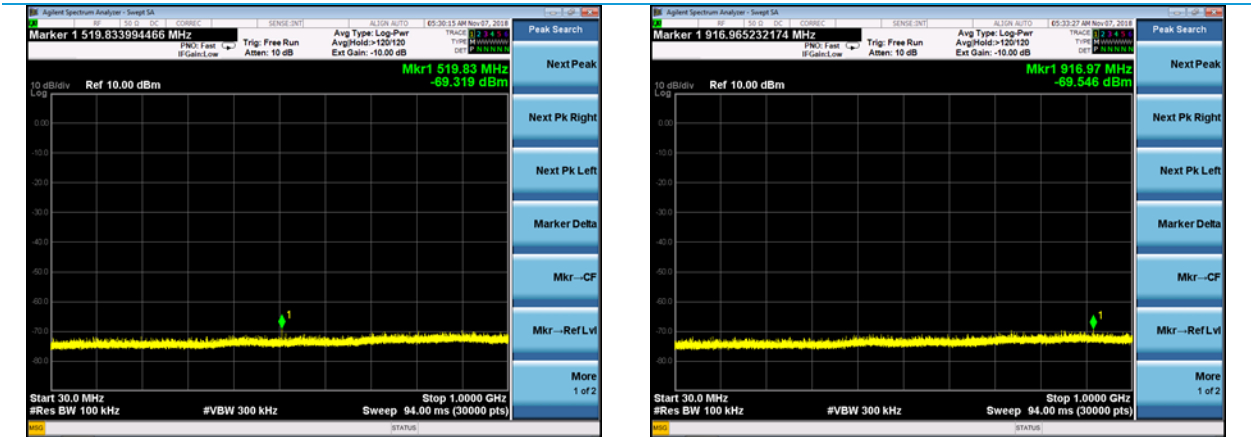
Low Channel



High Channel

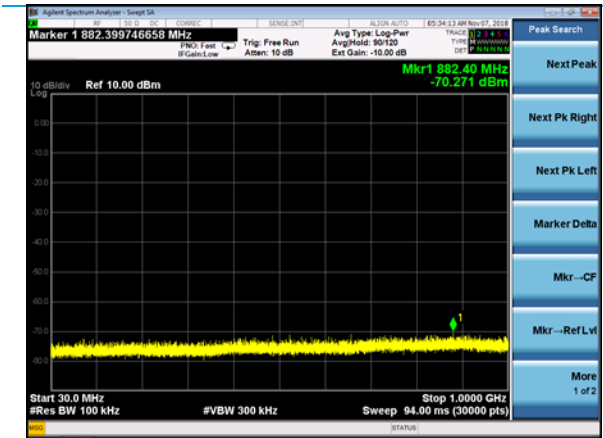
MCS7

30-1000 MHz



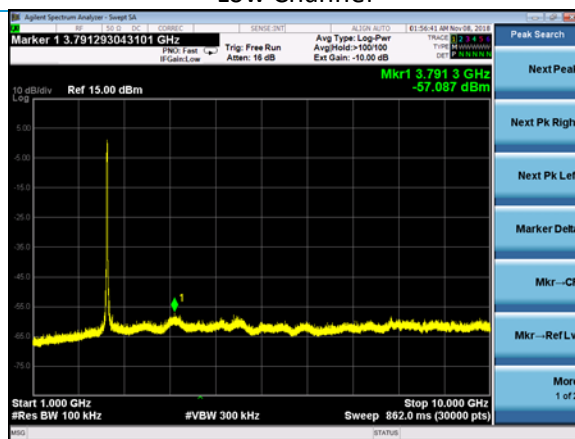
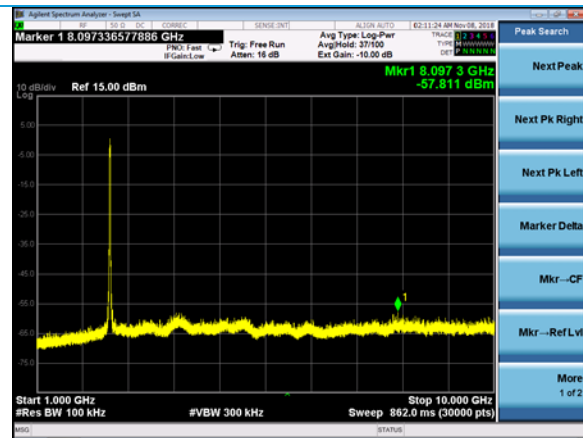
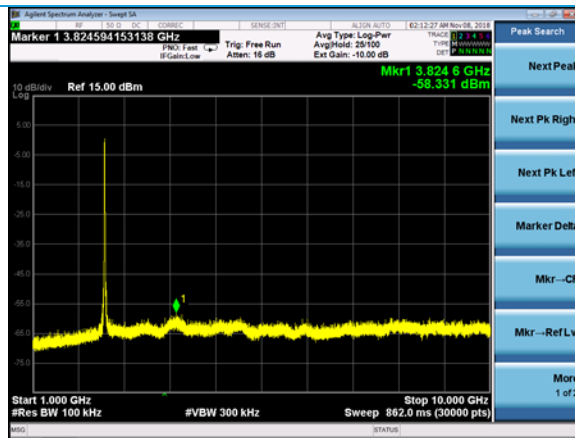
Low Channel

Mid Channel

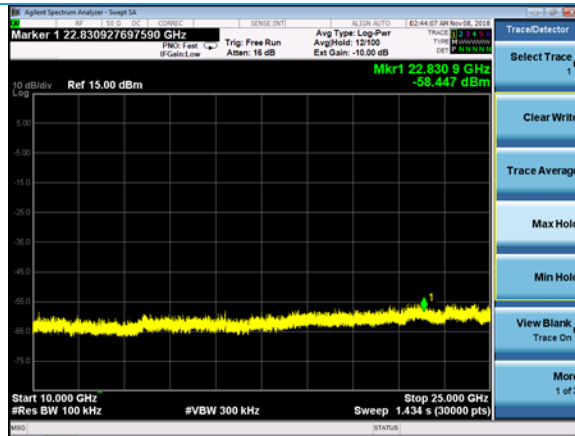


High Channel

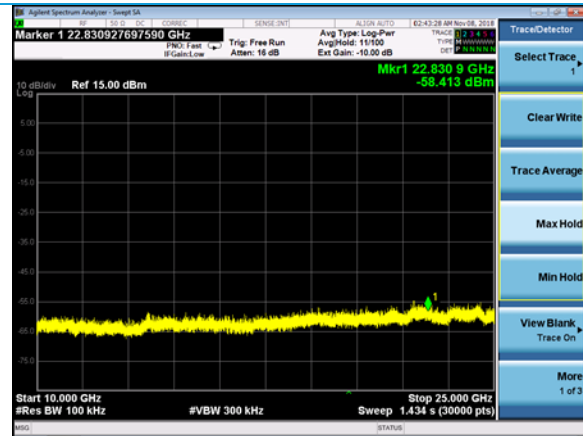
1000-10000 MHz



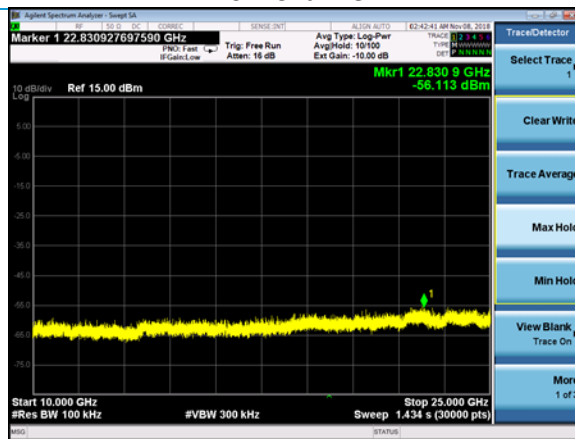
10000-25000 MHz



Low Channel

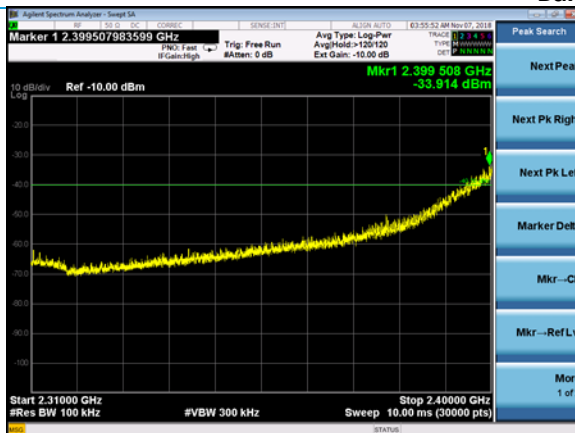


Mid Channel

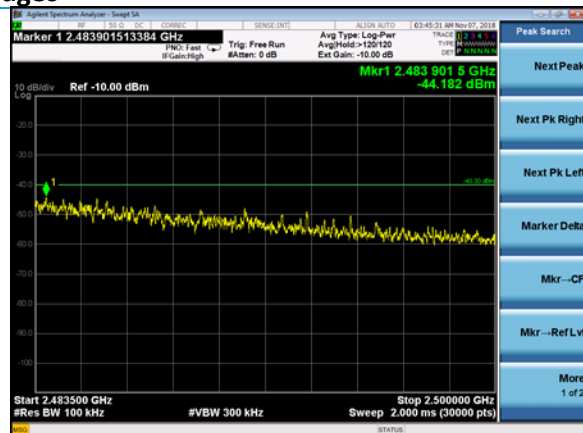


High Channel

Band Edges



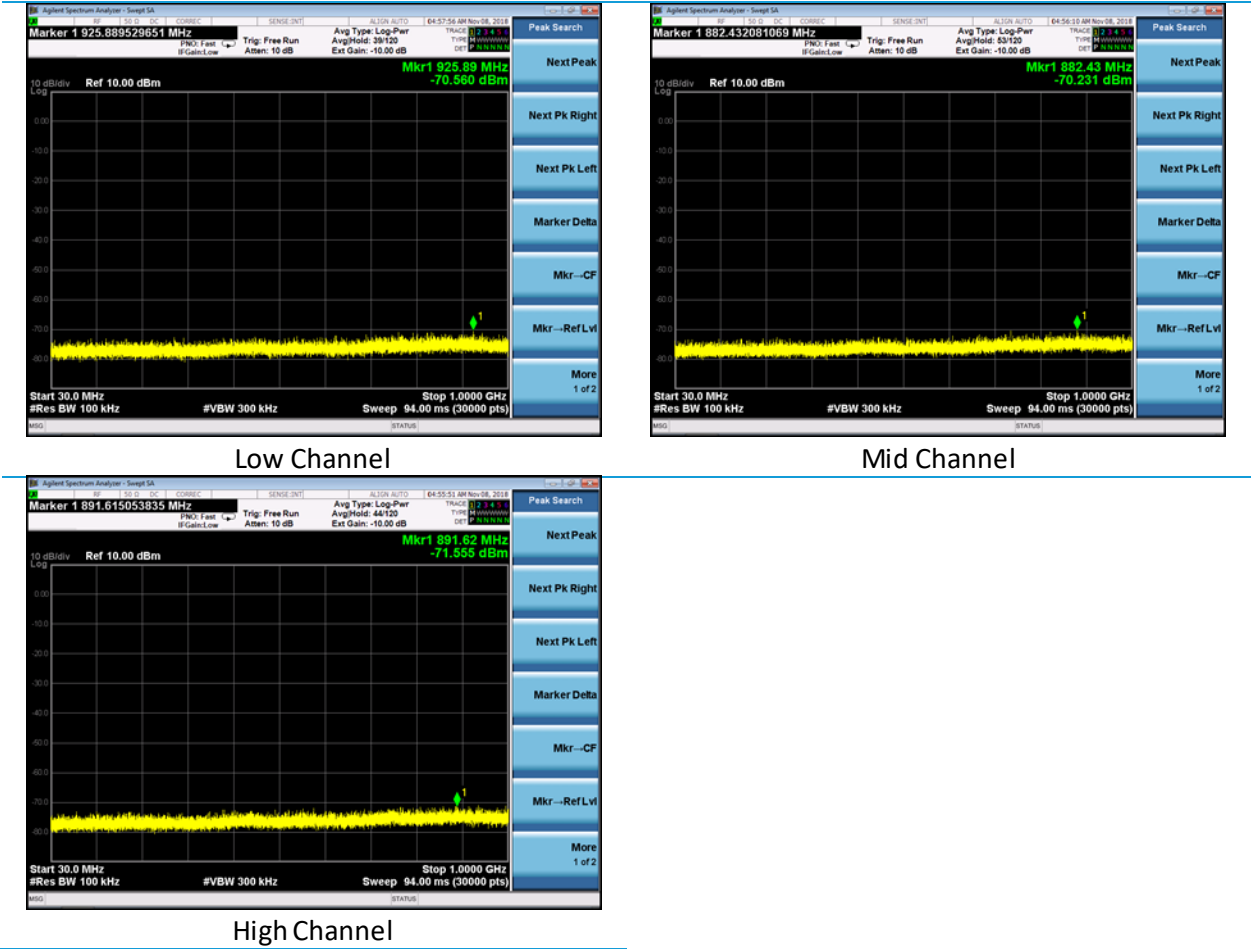
Low Channel



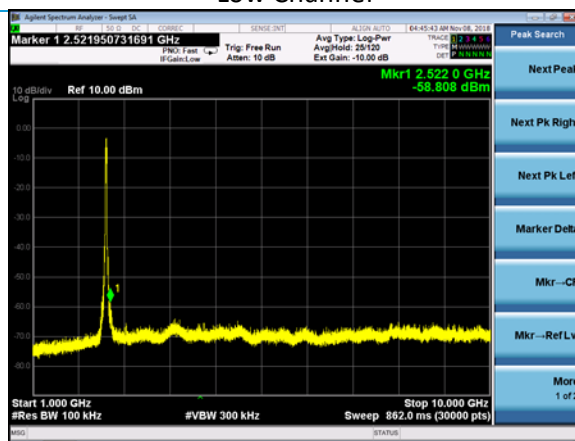
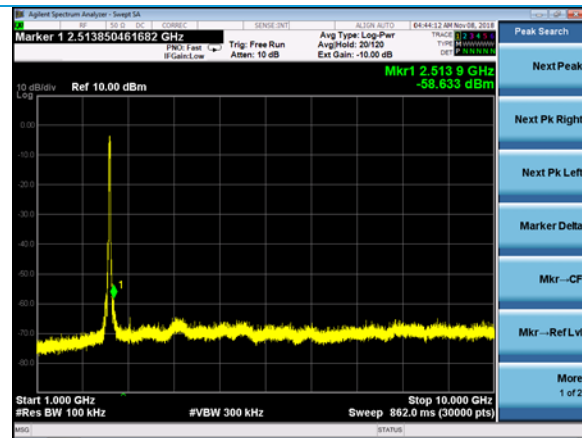
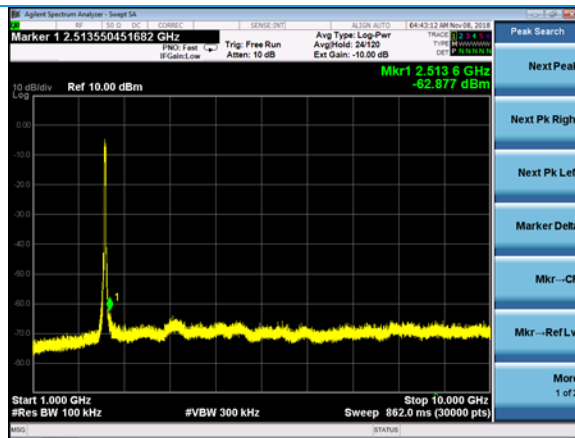
High Channel

HT40 MCS7

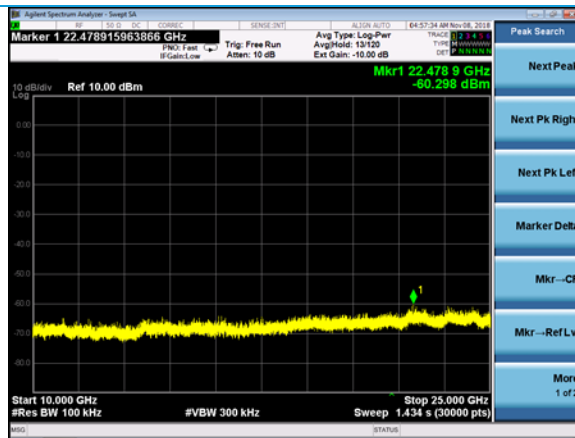
30-1000 MHz



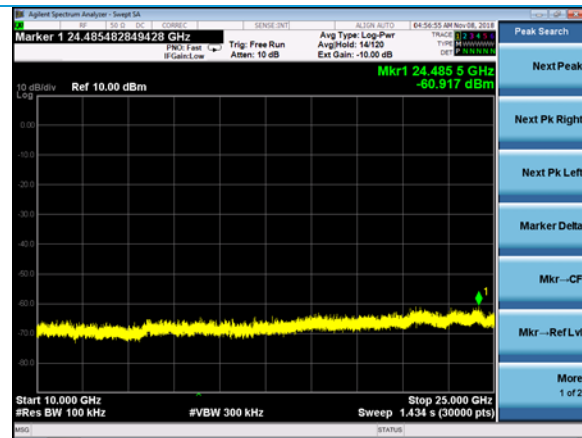
1000-10000 MHz



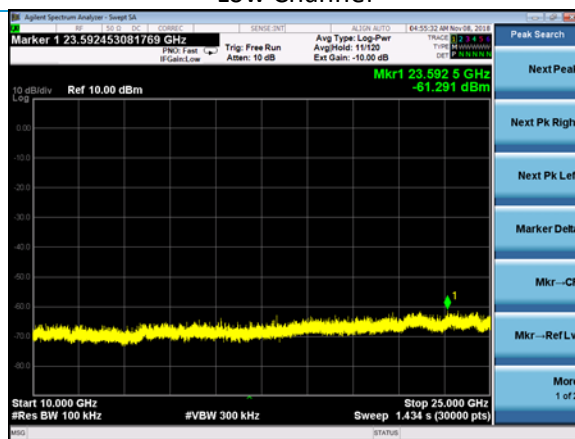
10000-25000 MHz



Low Channel

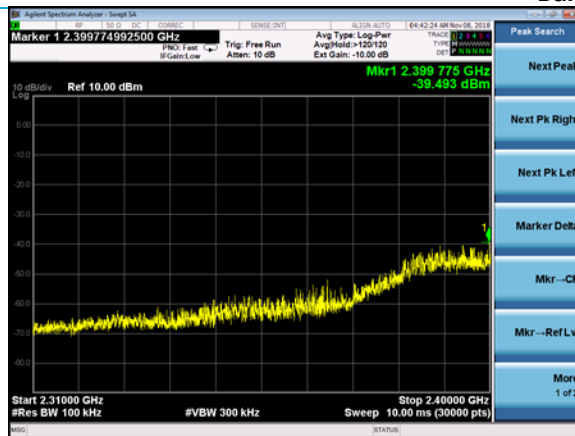


Mid Channel

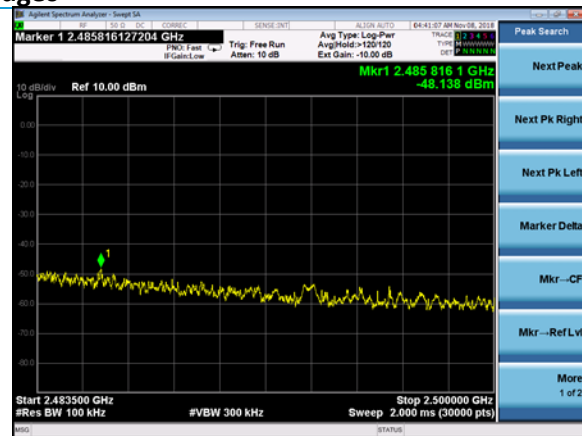


High Channel

Band Edges



Low Channel



High Channel

5.1.5 Antenna Port Conducted Emissions – Frequency Stability

Operator	Shane Dock
Test Date	11/8/18
Location	Conducted RF Area
Temp. / R.H.	70 degrees F/ 23% RH
Requirement	FCC: 2.1055 (d) IC: RSS-GEN 6.11
Method	ANSI C63.10 Section 6.8

Test Parameters

Frequency	2412-2462 MHz
Settings	Voltage range of 10.2-13.8 VDC. EUT in CW mode.

Table

Channel	10.2 VDC Frequency (Hz)	12.0 VDC Frequency (Hz)	13.8 VDC Frequency (Hz)	Deviation (Hz)
Low	2411992391	2411981624	2411982991	10767
Mid	2436989925	2436989481	2436989075	850
High	2461992141	2461979641	2461982024	12500

5.2 Radiated Emissions

Description of Measurement	The frequency spectrum is investigated for intentional and /or unintentional signals emanating from the EUT by use of a standardized test site and measurement antenna. The antenna, cable, pre-amp, and other necessary measurement system correction factors are loaded onto the EMI receiver / spectrum analyzer when the measurements are performed allowing the data to be gathered and reported as corrected values. The maximum emissions from the EUT are determined by turn-table azimuth rotation (360°) and scanning of the measurement antenna. Maximized levels are noted at degree values of azimuth, measurement antenna height, and measurement antenna polarity.
Example Calculations	Measurement (dBμV) + Cable factor (dB) + Other (dB) + Antenna Factor (dB/m) = Corrected Reading (dBμV/m) Margin (dB) = Limit (dBμV/m) - Corrected Reading (dBμV/m) Example at 4000 MHz: Reading = 40 dBμV + 3.4 dB + 0.9 dB + 6.5 dB/m = 50.8 dBμV/m Average Limit = 20 log (500) = 54 dBμV/m Margin = 54 dBμV/m - 50.8 dBμV/m = 3.2 dB

Block Diagram



5.2.1 Radiated Emissions

Operator	Jon Dilley
QA	Shane Dock
Test Date	10/30/18 – 11/29/18
Location	Chamber 3, Chamber 5
Temp. / R.H.	22.5 degrees C/ 42% RH
Requirement	FCC: 15.247 (d) IC: RSS-GEN 8.10
Method	ANSI C63.10 Sections 6.3, 6.5, 6.6

Limits:

	30-88 MHz	88-216 MHz	216 – 960 MHz	960+ MHz
Field Strength ($\mu\text{V}/\text{m}$)	100	150	200	500
Field Strength ($\text{dB}\mu\text{V}/\text{m}$)	40.0	43.5	46.0	54.0

Test Parameters

Frequency	30-25000 MHz
Distance	3 meters
Settings	Unit tested at low, mid, and high channels.
Settings	RBW = 120kHz, VBW = 1.2 MHz (<1 GHz) RBW = 1 MHz, VBW = 3 MHz (>1 GHz) . Average measurements taken with a VBW greater than 1/on time (s) of the transmission (calculated for each data rate.
EUT	Unit tested and measured in three orientations.
Notes	Measurements taken in restricted bands. For measurements above 1 GHz, antenna used with a tilt gear to keep EUT within the cone of radiation. Absorbers were also added to the floor of the chamber while measuring emissions above 1 GHz. Emissions below 1 GHz are not a function of the transmitter.
Example Calculation	Limit ($\text{dB}\mu\text{V}$) = $20 * \log[\text{Limit}(\mu\text{V})]$ $40 = 20 * \log(100)$ Raw Data + Antenna Factor + Cable Factor = Reported Data $19.77 \text{ dB}\mu\text{V} + 12.50 \text{ dB/m} + 0.93 \text{ dB} = 33.20 \text{ dB}\mu\text{V/m}$

Instrumentation



Date : 8-Aug-2018

Test : Tx Spurious Emissions

Job : C-3047

PE : Shane Dock

Customer : Kohler

Quote : 318219

No.	Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due Date	Equipment Status
1	EE 960085	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/24/2018	4/24/2019	Active Calibration
2	AA 960081	Antenna - Double Ridge Horn	EMCO	3115	6907	4/16/2018	4/16/2019	Active Calibration
3	AA 960154	Filter - High Pass 2.4 GHz	KWM	HPF-L-14186	7272-02	4/25/2018	4/25/2019	Active Calibration
4	AA 960176	Cable	A.H. Systems, Inc	SAC-26G-6	395	6/4/2018	6/4/2019	Active Verification
5	AA 960174	Antenna - Small Horn	ETS Lindgren	3116C-PA	00206880	5/15/2018	5/15/2019	Active Calibration
6	EE 960085	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/24/2018	4/24/2019	Active Calibration
7	AA 960195	Antenna - Log Periodic	A.H. Systems, Inc	SAS-512-2	557	1/30/2018	1/30/2019	Active Calibration
8	AA 960150	Antenna - Biconical	ETS Lindgren	3110B	0003-3346	4/20/2018	4/20/2019	Active Calibration
9	AA 960007	Antenna - Double Ridge Horn	EMCO	3115	9311-4138	9/12/2018	9/12/2019	Active Calibration
10	EE 960160	Antenna - Low Noise Amplifier	Mini-Circuits	ZVA-213X-S+	977711030	9/12/2018	9/12/2019	Active Calibration
11	EE 960088	Analyzer - EMI Receiver	Agilent	N9038A	MY51210138	4/24/2018	4/24/2019	Active Calibration

Table (4-25 GHz)

Frequency (MHz)	Height (cm)	Azimuth (degree)	Peak Reading (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Average Reading (dBμV/m)	Average Limit (dBμV/m)	Average Margin (dB)	Antenna Polarity	EUT Orientation	Channel
4924.0	100.0	60.0	47.3	74.0	26.7	41.5	54.0	12.5	Horizontal	Side	11
4924.0	150.0	176.5	47.1	74.0	26.9	40.8	54.0	13.3	Vertical	Side	11
4874.0	110.0	60.0	48.9	74.0	25.1	43.2	54.0	10.8	Horizontal	Side	6
4874.0	190.0	187.0	47.7	74.0	26.3	41.9	54.0	12.1	Vertical	Side	6
4874.0	137.9	183.3	47.8	74.0	26.2	41.7	54.0	12.3	Vertical	Vertical	6
4874.0	223.4	171.5	48.5	74.0	25.5	42.9	54.0	11.1	Horizontal	Vertical	6
4874.0	235.5	150.8	48.9	74.0	25.1	43.5	54.0	10.5	Horizontal	Flat	6
4874.0	118.9	308.3	48.0	74.0	26.0	42.2	54.0	11.8	Vertical	Flat	6
4824.0	100.0	155.5	46.9	74.0	27.1	40.4	54.0	13.6	Horizontal	Flat	1
4924.0	315.0	148.3	47.9	74.0	26.1	42.1	54.0	11.9	Horizontal	Flat	11

Table (Band Edges)

Lower Band Edge (2310 - 2390 MHz)

Data Rate	Peak Measurement Frequency (MHz)	Peak Measurement (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Average Measurement Frequency (MHz)	Average Measurement (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
1 MBPS	2386.5	51.8	74.0	13.2	2386.8	44.6	54.0	9.4
11 MBPS	2387.3	51.9	74.0	13.1	2386.8	44.6	54.0	9.4
6 MBPS	2388.9	63.9	74.0	10.1	2390.0	43.7	54.0	10.3
54 MBPS	2389.9	63.9	74.0	10.1	2389.5	48.5	54.0	5.5
MCS0	2389.1	64.8	74.0	9.2	2389.7	44.9	54.0	9.1
MCS7	2389.1	65.5	74.0	8.5	2389.8	49.5	54.0	4.5
HT40 MCS0	2387.9	63.8	74.0	10.2	2389.2	48.4	54.0	5.6
HT40 MCS7	2386.5	67.5	74.0	6.5	2389.4	53.1	54.0	0.9

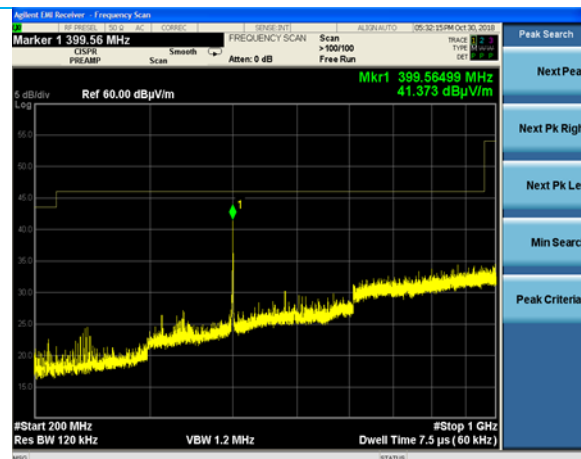
Upper Band Edge (2483.5 – 2500 MHz)

Data Rate	Peak Measurement Frequency (MHz)	Peak Measurement (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Average Measurement Frequency (MHz)	Average Measurement (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
1 MBPS	2485.3	52.0	74.0	22.0	2487.5	43.8	54.0	10.2
11 MBPS	2488.8	52.6	74.0	21.4	2487.2	44.7	54.0	9.3
6 MBPS	2483.8	65.1	74.0	8.9	2483.7	43.2	54.0	10.8
54 MBPS	2483.8	65.7	74.0	8.3	2483.5	49.4	54.0	4.6
MCS0	2483.6	66.6	74.0	7.4	2483.5	45.0	54.0	9.0
MCS7	2484.0	65.1	74.0	8.9	2483.7	49.9	54.0	4.1
HT40 MCS0 (2437 MHz)	2483.8	68.2	74.0	5.8	2483.6	50.9	54.0	3.1
HT40 MCS0 (2442 MHz)	2483.9	64.9	74.0	9.1	2483.7	45.5	54.0	8.5
HT40 MCS7	2483.7	58.7	74.0	15.3	2484.5	47.3	54.0	6.7

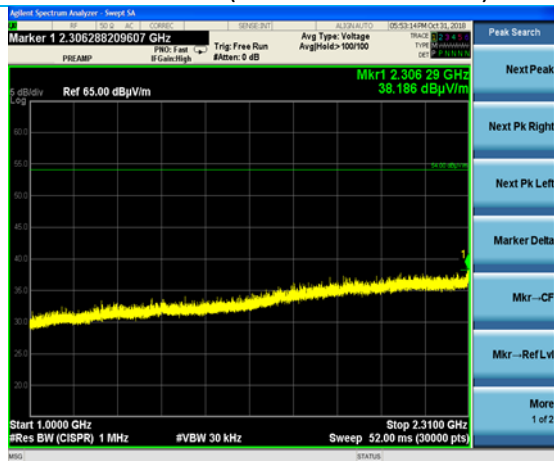
Plots (Worst-Case Shown)



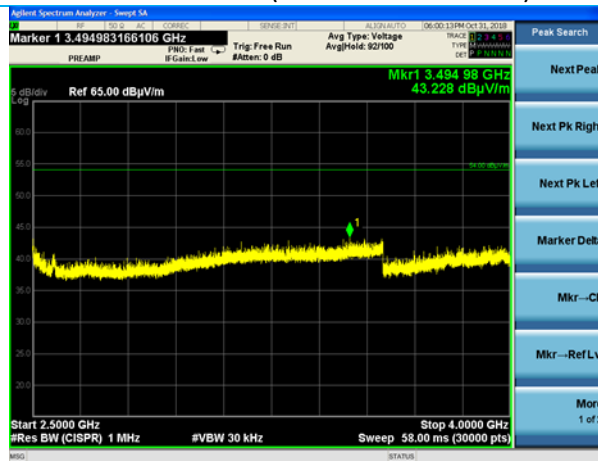
30-200 MHz (Vertical Polarization)



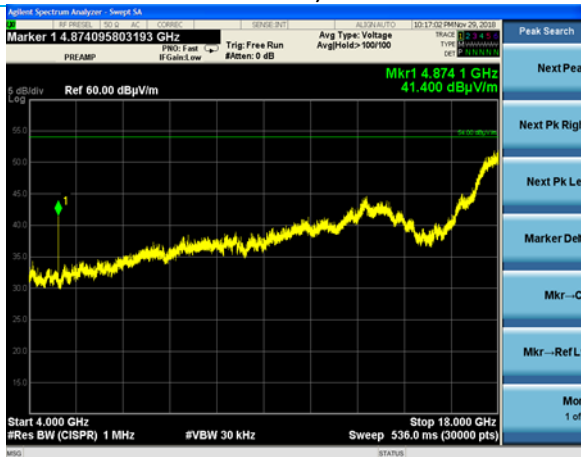
200-1000 MHz (Vertical Polarization)



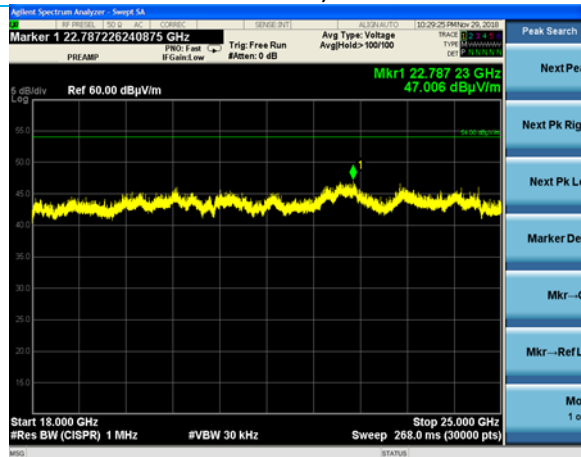
1000-2310 MHz (Vertical Polarization, Reduced BW)



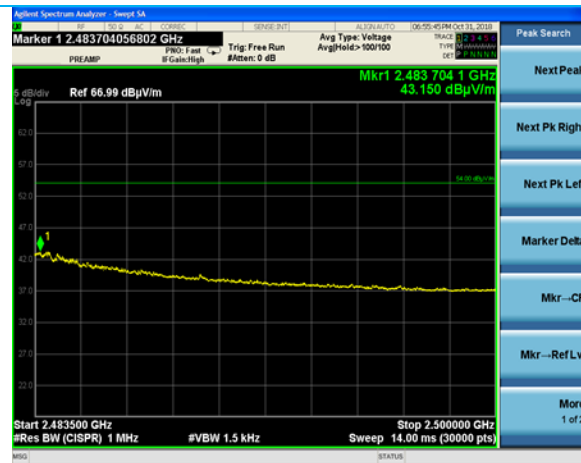
2500 – 4000 MHz (Vertical Polarization, Reduced BW)



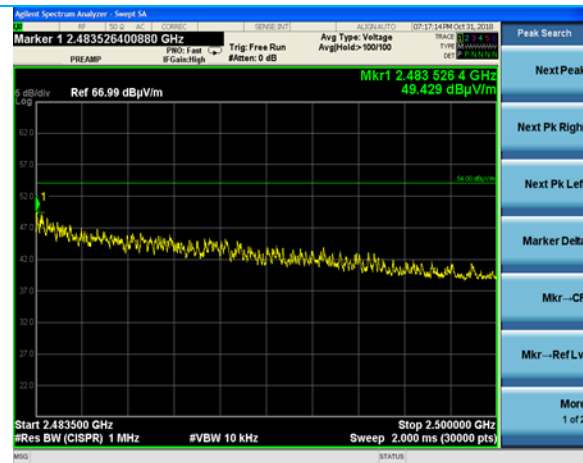
4-18 GHz (Vertical Polarization, Reduced BW)



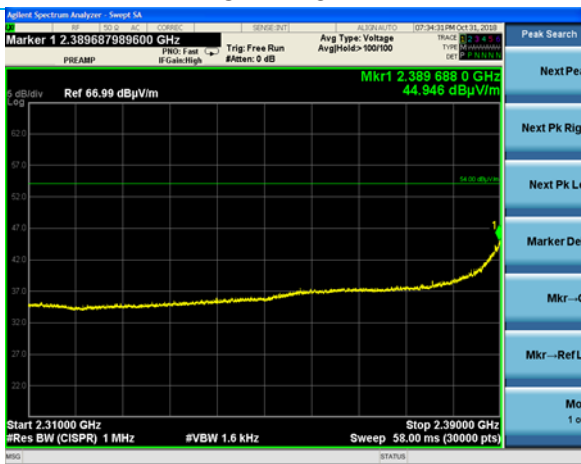
18-25 GHz (Vertical Polarization, Reduced BW)



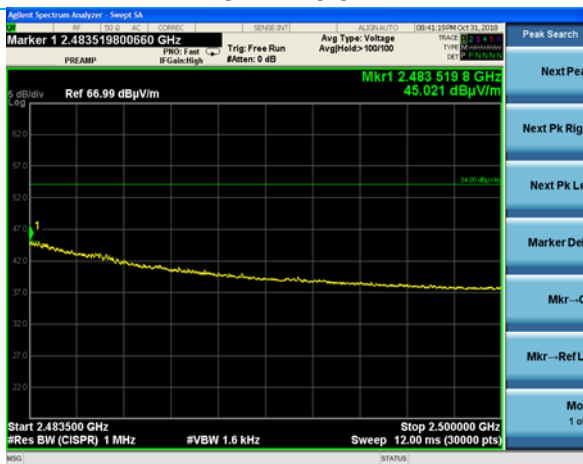
54 MBPS LBE



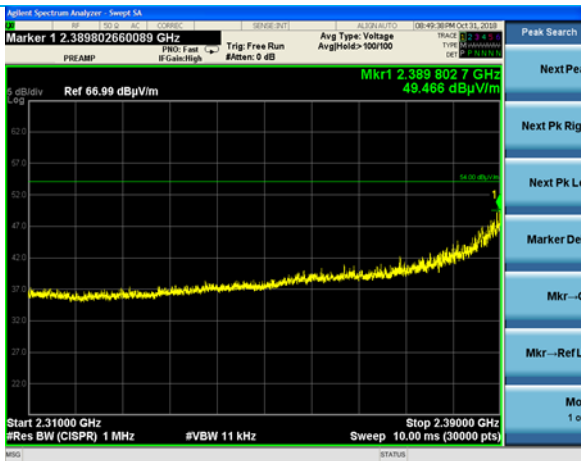
54 MBPS UBE



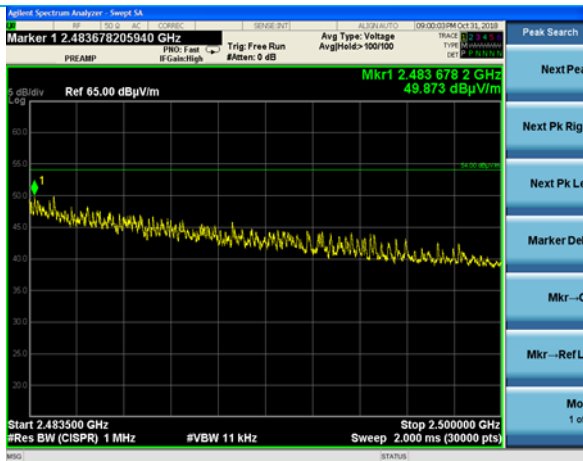
MCS0 LBE



MCS0 UBE



MCS7 LBE



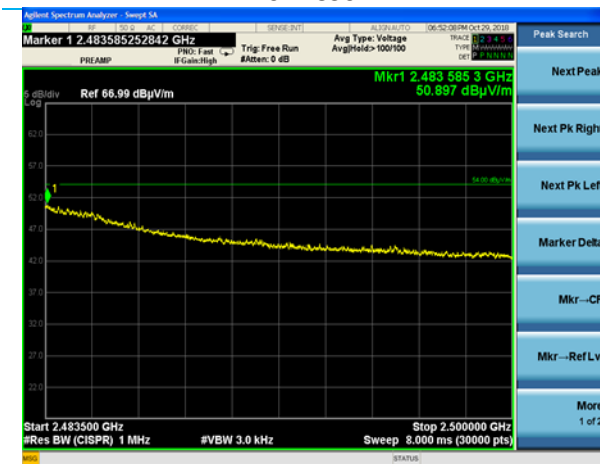
MCS7 UBE



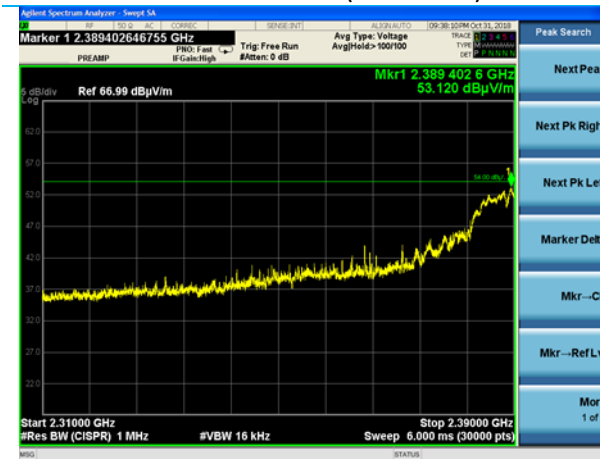
HT40 MCS0 LBE



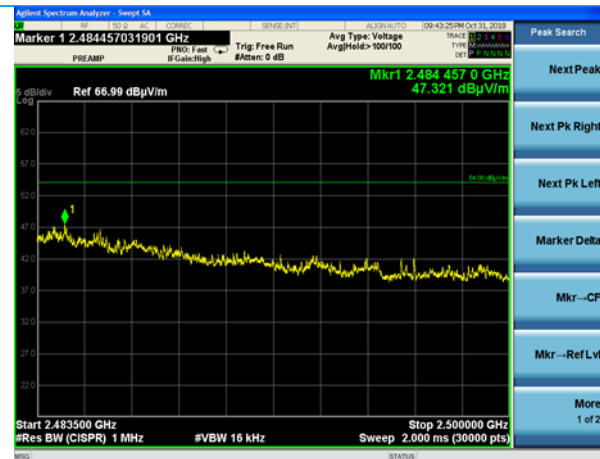
HT40 MCS0 UBE (2442 MHz)



HT40 MCS0 UBE (2437 MHz)

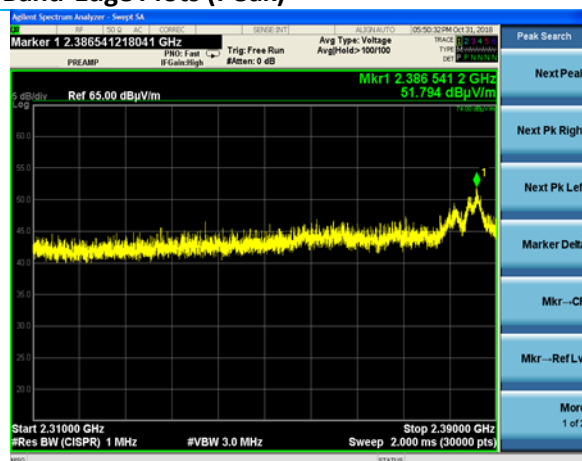


HT40 MCS7 LBE

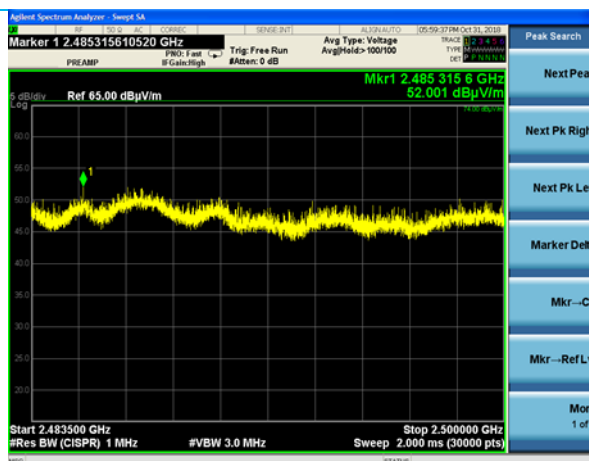


HT40 MCS7 UBE

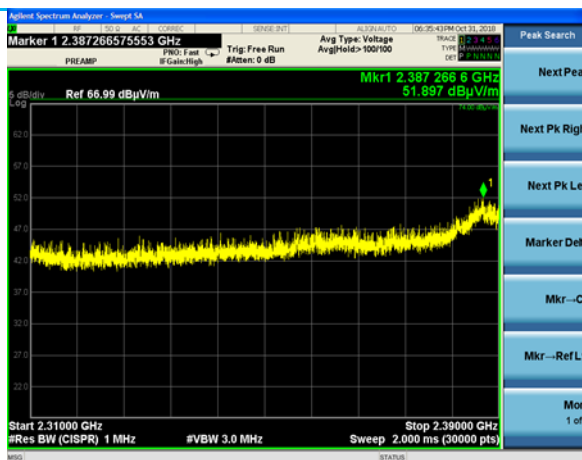
Band-Edge Plots (Peak)



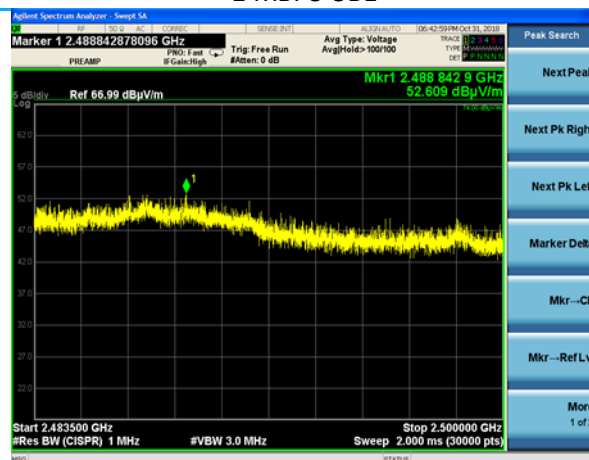
1 MBPS LBE



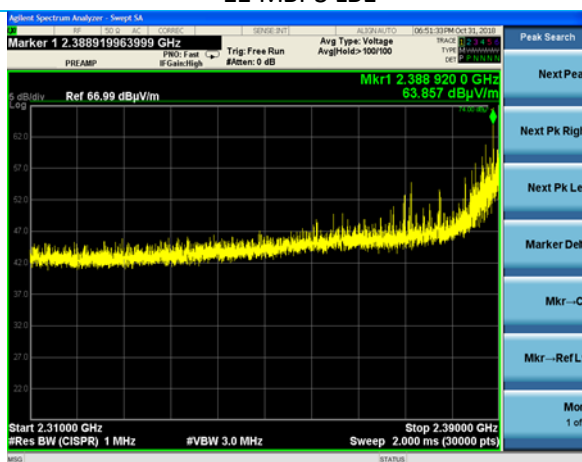
1 MBPS UBE



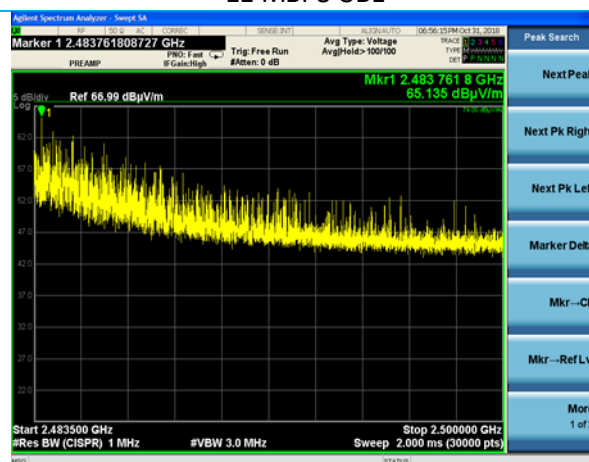
11 MBPS LBE



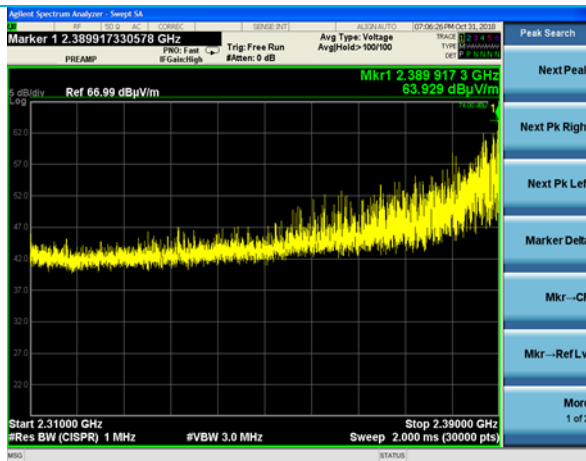
11 MBPS UBE



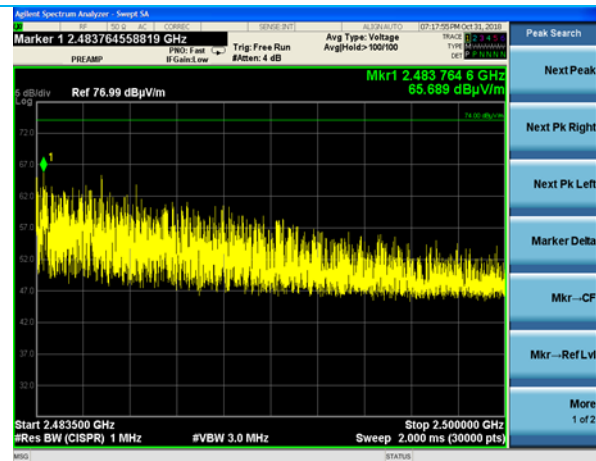
6 MBPS LBE



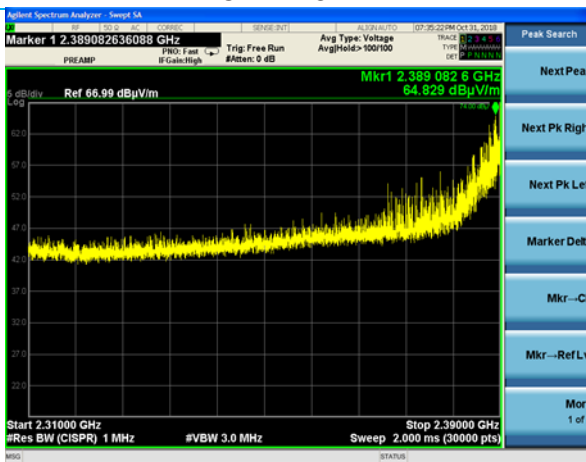
6 MBPS UBE



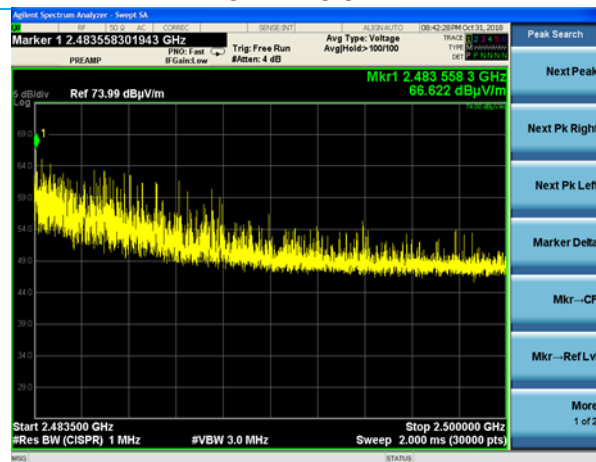
54 MBPS LBE



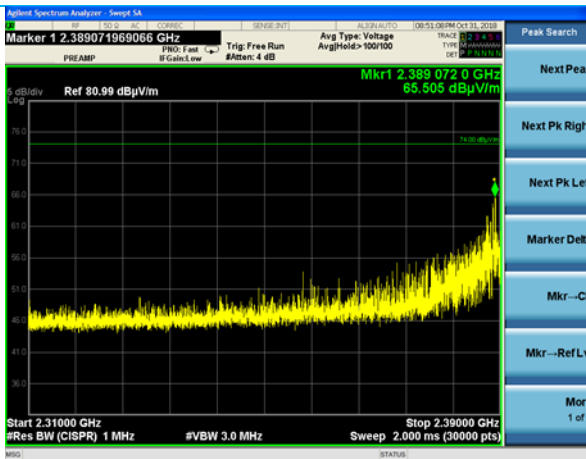
54 MBPS UBE



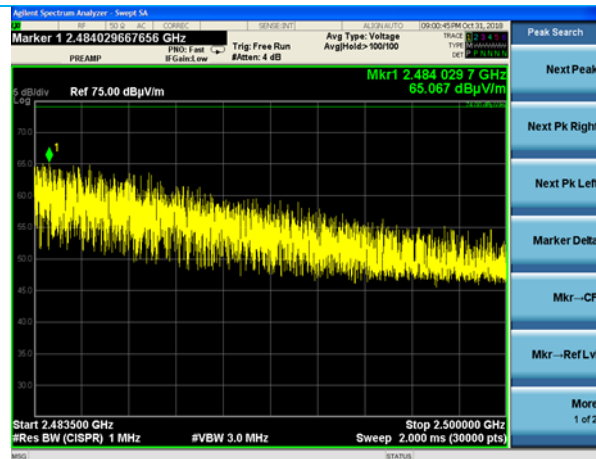
MCS0 LBE



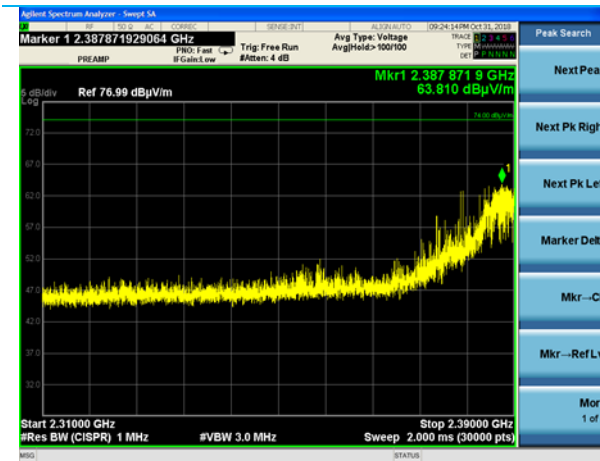
MCS0 UBE



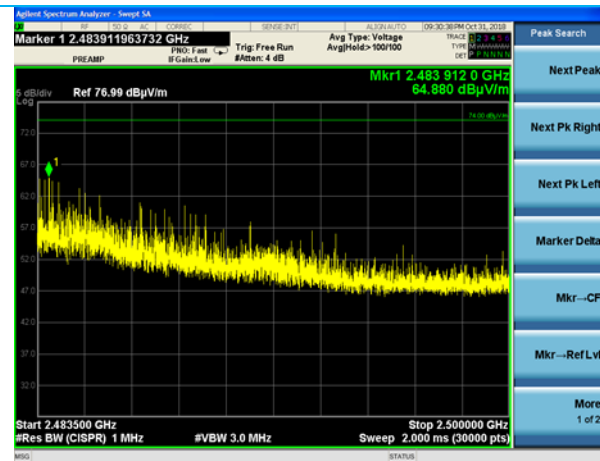
MCS7 LBE



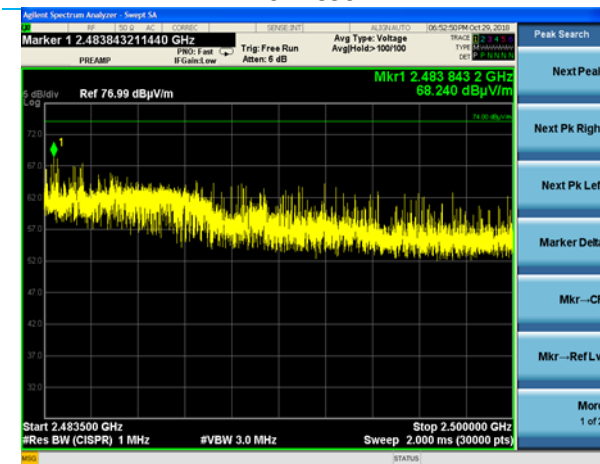
MCS7 UBE



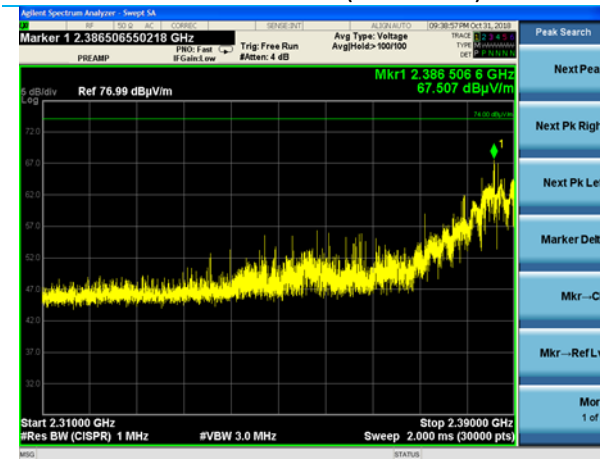
HT40 MCS0 LBE



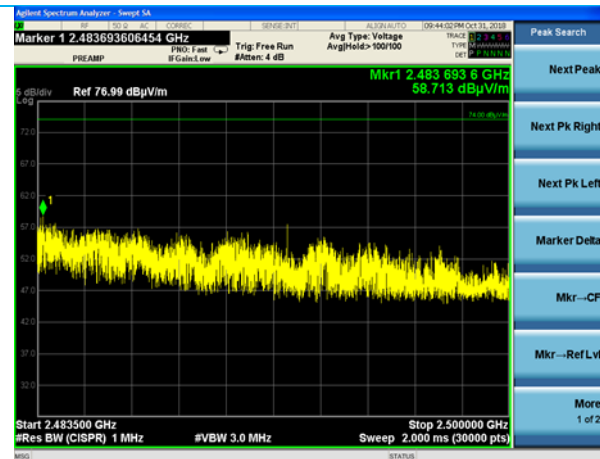
HT40 MCS0 UBE (2442 MHz)



HT40 MCS0 UBE (2437 MHz)



HT40 MCS7 LBE



HT40 MCS7 UBE

5.3 AC Mains Conducted Emissions

A line impedance stabilization network (LISN) or artificial mains network (AMN) allows the emissions of the power supply conductors to be measured while isolating the EUT from the supply mains.

Description of Measurement

The AMN, cable, and other necessary measurement system correction factors are loaded onto the EMI receiver when the measurements are performed. The data is gathered and reported as the corrected values.

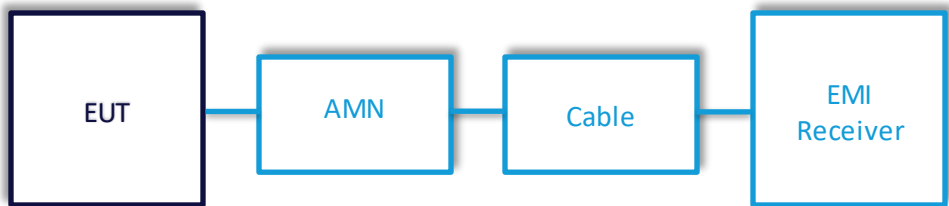
Maximum emissions are determined with a peak max hold trace then measurements at a selection of the highest points are made with quasi-peak and average detectors. Results are recorded and compared to limit for each line. (e.g. line and neutral)

Example Calculations

Measurement (dBµV) + Cable factor (dB) + Other (dB) = Corrected Reading (dBµV)

Margin (dB) = Limit (dBµV) - Corrected Reading (dBµV)

Block Diagram



5.3.1 AC Mains Conducted Emissions

Operator	Jon Dille	QA	Shane Dock
Temperature	22.2 degrees C	R.H. %	30.9%
Test Date	4/10/2019	Location	Conducted Emissions Bench
Requirement	FCC 15.207 RSS-GEN	Method	ANSI C63.10

Limits:

Frequency Range (MHz)	Quasi-Peak (dBμV)	Average (dBμV)
0.15 -0.50	79.0	66.0
0.50 – 30.0	73.0	60.0

Test Parameters

Frequency	150 kHz – 30 MHz	Distance	40 cm from VCP
Detector(s)	Quasi-Peak, Average	Table height	80 cm
RBW	9 kHz	VBW	90 kHz
Example Calculations	Raw Data + Cable Factor = Reported Data 19.77 dBμV + 0.93 dB = 38.80 dBμV		

Instrumentation



Date : 8-Aug-2018

Test : Conducted AC Mains

Job : C-3047

PE : Shane Dock

Customer : Kohler

Quote : 318219

No.	Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due Date	Equipment Status
1	EE 960162	LISN	COM-POWER	LI-215A	191969	4/23/2018	4/23/2019	Active Calibration
2	EE 960085	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/24/2018	4/24/2019	Active Calibration

Company: Kohler Co.	Page 61 of 64	Name: DTV Konnect Module
Report: 318219 A		Model: K-97999-NA
Job: C-3047		Serial: 02

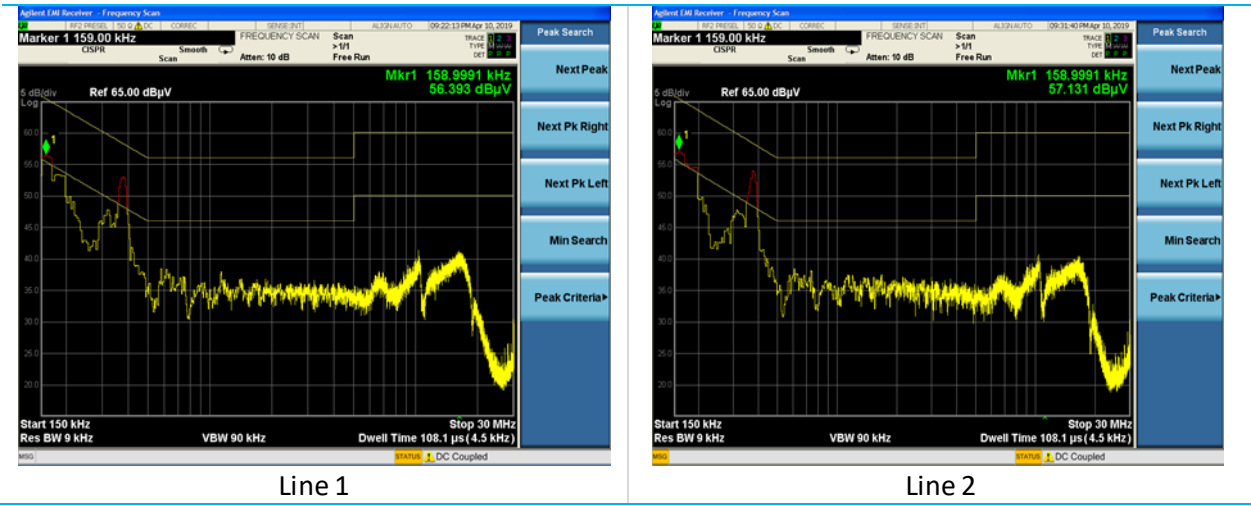
EUT Parameters

Input Power	120 VAC, 60 Hz	Mode	Tx Mode (Low Channel is worst-case)
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Table

Line	Frequency (MHz)	Q-Peak Reading (dBμV)	Q-Peak Limit (dBμV)	Quasi-Peak Margin (dB)	Average Reading (dBμV)	Average Limit (dBμV)	Average Margin (dB)
1	0.154	53.6	65.8	12.2	41.0	55.8	14.8
1	0.379	51.0	58.3	7.3	42.0	48.3	6.3
1	15.957	38.3	60.0	21.7	31.2	50.0	18.8
2	0.159	54.3	65.5	11.2	41.2	55.5	14.3
2	0.374	52.2	58.4	6.2	43.3	48.4	5.1
2	10.343	37.3	60.0	22.7	29.0	50.0	21.0

Plots



6 REVISION HISTORY

Version	Date	Notes	Person
V0	12/10/18	Rough Draft	Shane Dock
V1	12/11/18	Updated Draft	Shane Dock
V2	12/12/18	Final Draft	Shane Dock
V3	5/1/19	Further Revisions	Shane Dock
V4	5/2/19	TCB comments addressed	Shane Dock
V5	5/3/19	Third Review	Shane Dock

END OF REPORT