

Measurement Distance

EUT antenna of far field distance		
Measureent Frequency range	Far Field calculation distance	Measurement Distance (Far field)
Below 18GHz	0.4135m	3m
18GHz to 40GHz	0.9189m 2m	2m
40GHz to 50GHz	0.9189m to 1.1486m	2m
50GHz to 100GHz	1.1486m to 2.2971m	3m
Note: EUT Antenna Dimension 42mm length, 41mm thick.		
Measurement antenna of far field distance		
Measureent Frequency range	Far Field calculation distance	Measurement Distance (Far field)
18GHz-40GHz	0.65m to 1.445	2m
40GHz-50GHz	0.240m to 0.3m	2m
50GHz-75GHz	0.208m to 0.313m	3m
75GHz-110GHz	0.162m to 0.238m	3m
18GHz-40GHz: Antenna Dimension 59mm length, 44mm thick.		
40GHz-50GHz: Antenna diameter 30mm length.		
50GHz-75GHz: Antenna diameter 25mm length.		
75GHz-100GHz: Antenna diameter 18mm length.		

NOTE:

Test Instruments for above 18 GHz emission test

1. 18 GHz - 40 GHz: HORN Antenna (SAS-574) + Pre-Ammlifier (RAMP00M50GA)
2. 40 GHz - 50 GHz: HORN Antenna (QWH-UCRR00) + Ammlifier (RAMP00M50GA)
3. 50 GHz - 75 GHz: HORN Antenna (WR15CH-Conical) + VDI Standard Downconverter
4. 75 GHz - 100 GHz: HORN Antenna (WR10CH-Conical) + VDI Standard Downconverter

The emission test results as above listed are performed by different frequency bands respectively because the test instruments, that will make the emission trace non-continuously for these bands.

4.5.5 Deviation from Test Standard

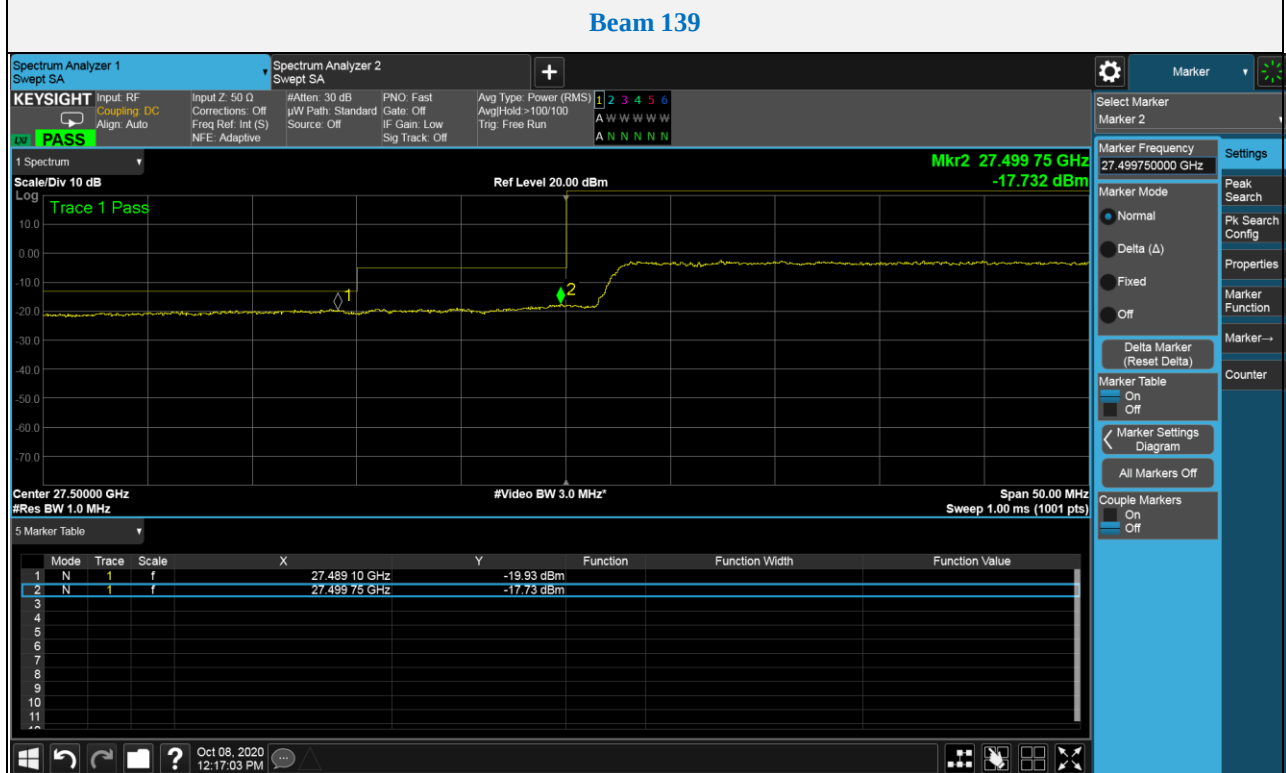
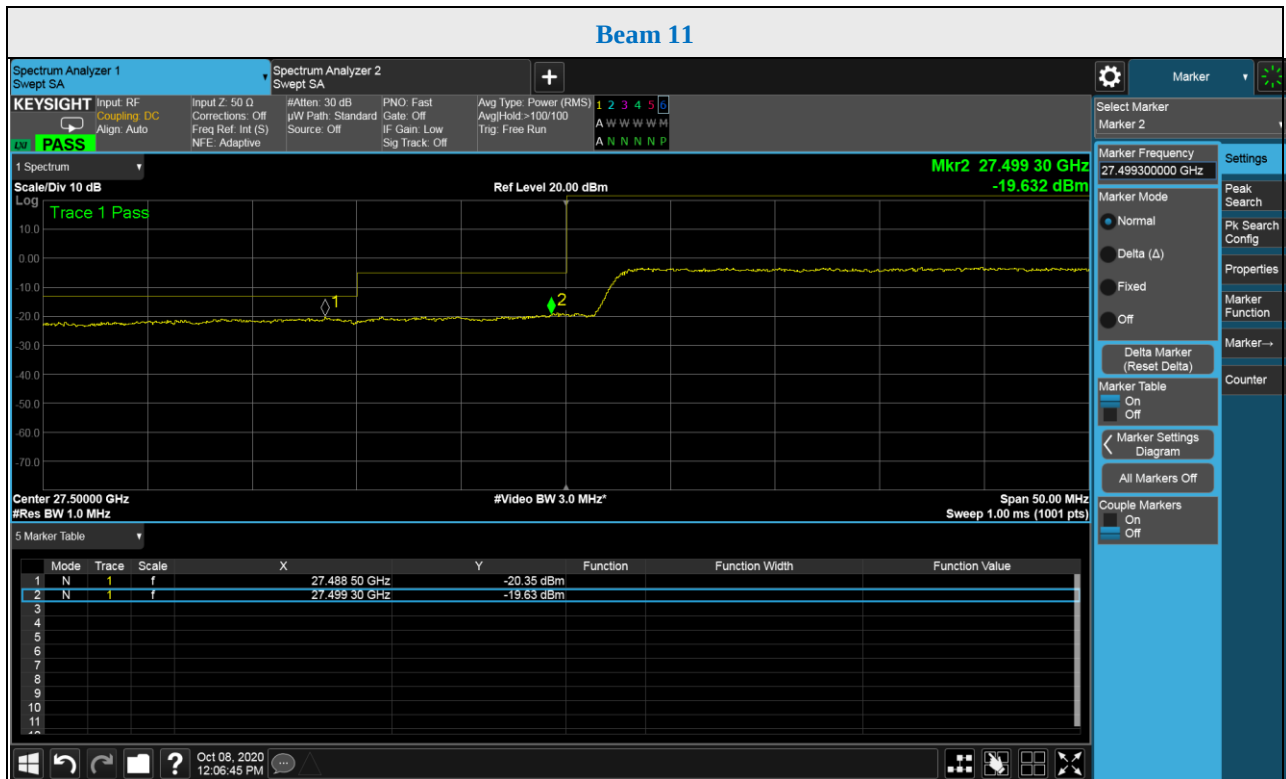
No deviation.

4.5.6 EUT Operating Condition

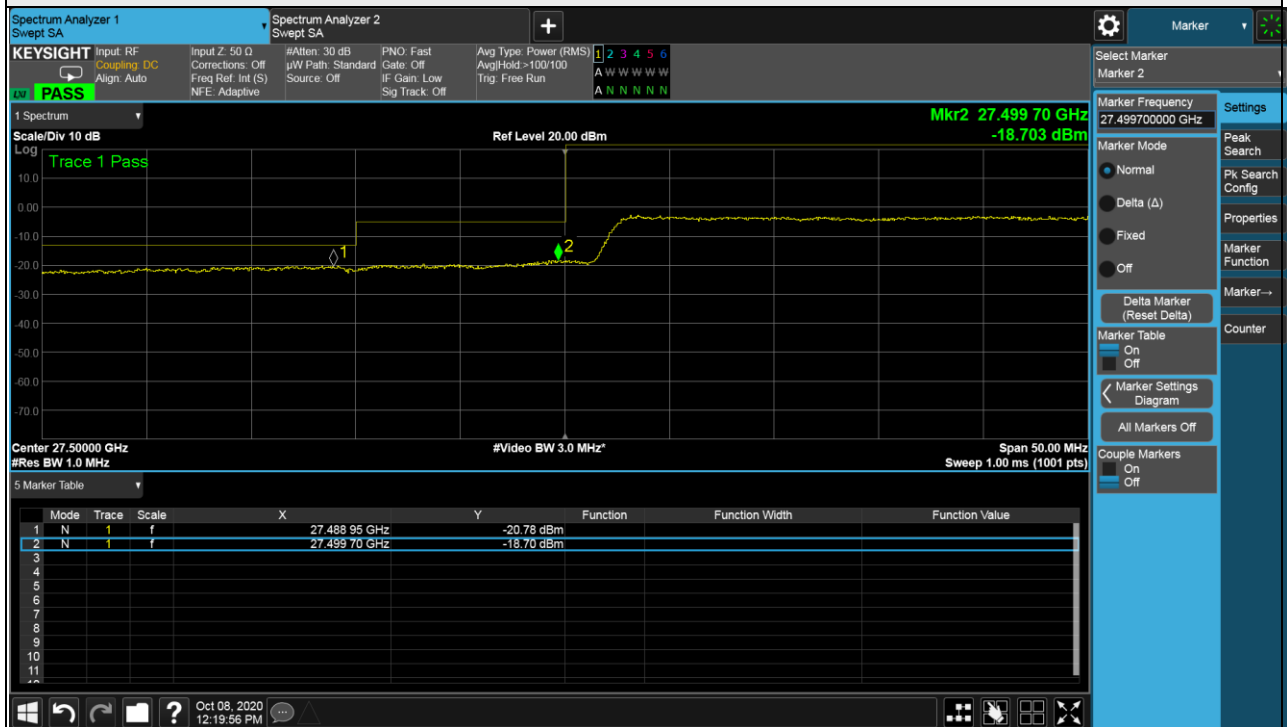
Refer to section 4.2.7 to get information of EUT operating conditions.

4.5.7 Test Results

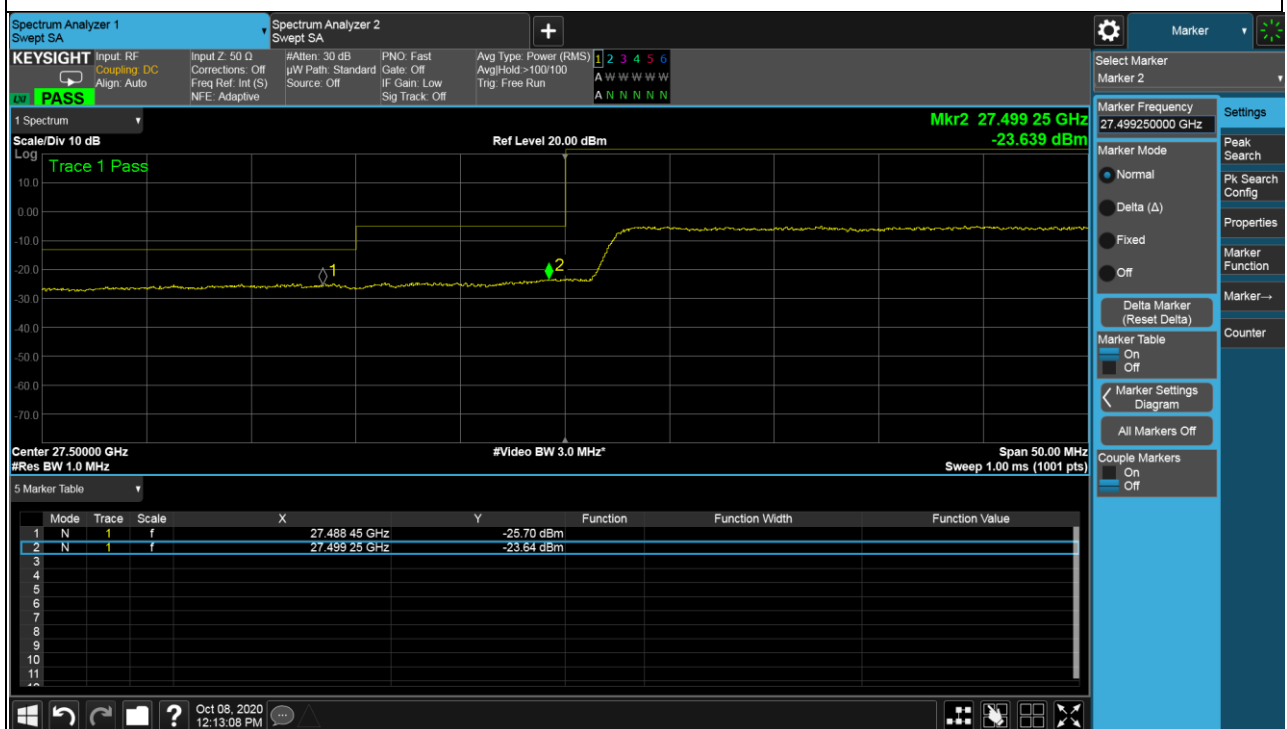
QPSK-1CC Low Channel:



Beam 11 + 139



Beam 11 + 139



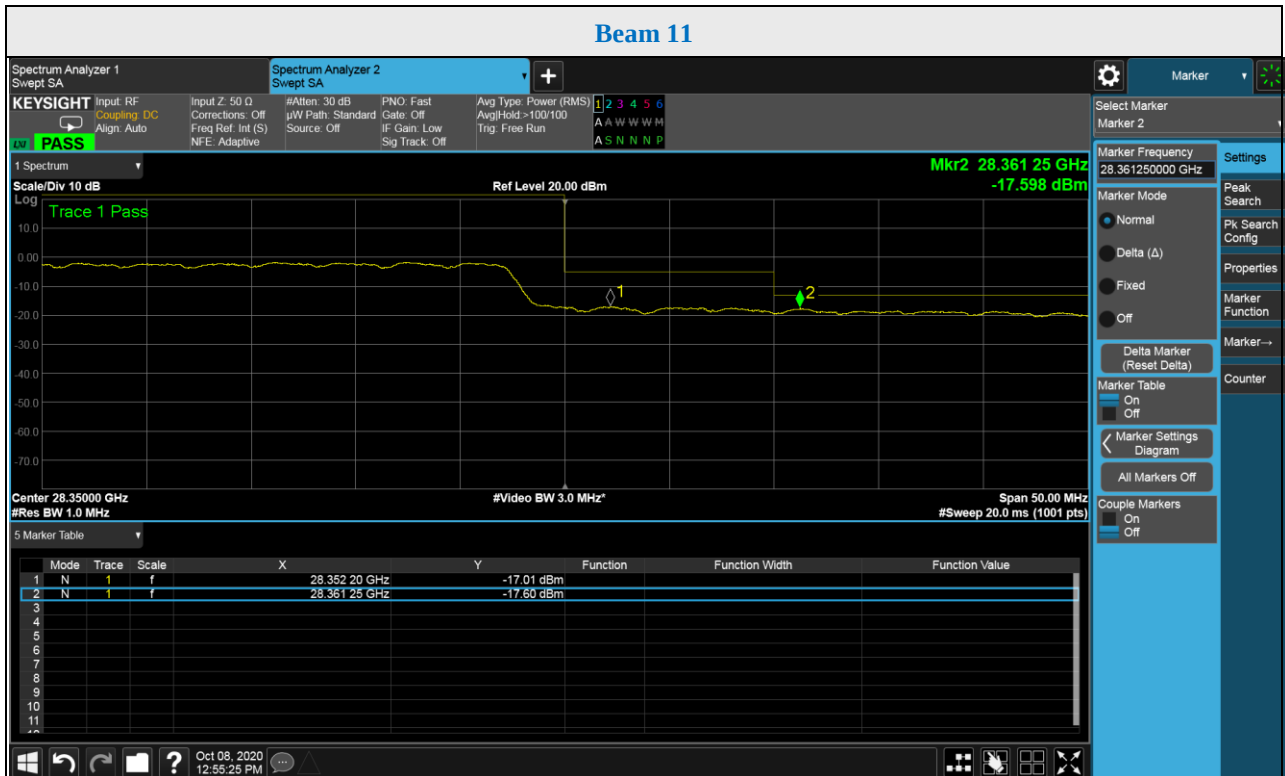
Summary of MIMO Beam Out-of Band Emission:

To address compliance of MIMO Out-of Band emission per KDB 662911 D01, the MIMO Out-of Band emission EIRP is calculated by summing the worst-case H Beam EIRP and V Beam EIRP in linear powers units then converted back to dBm.

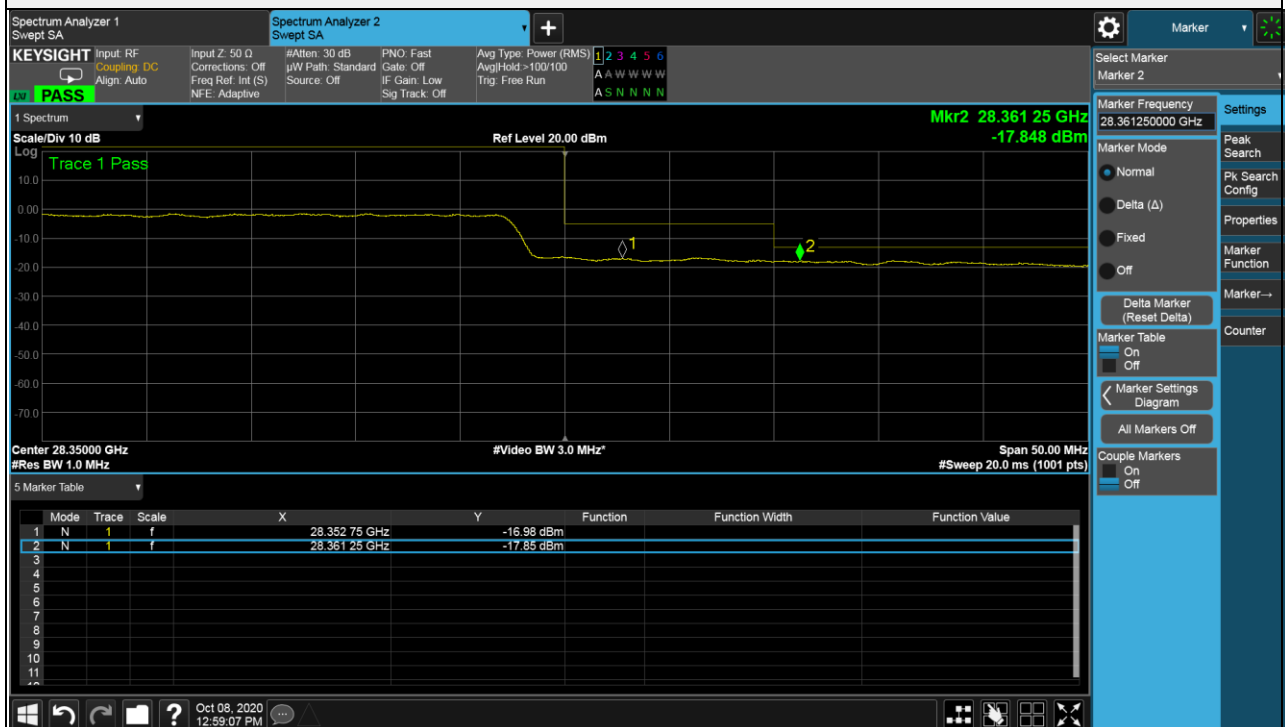
Beam ID	EIRP for V Beam (dBm)	EIRP for H Beam (dBm)	EIRP for V+H Beam (dBm)	Limit(dBm)	Margin(dB)	Result
11 + 139	-20.78	-25.7	-19.57	-5	-14.57	Pass
	-18.70	-23.64	-17.49	-13	-4.49	Pass

QPSK-1CC High Channel:

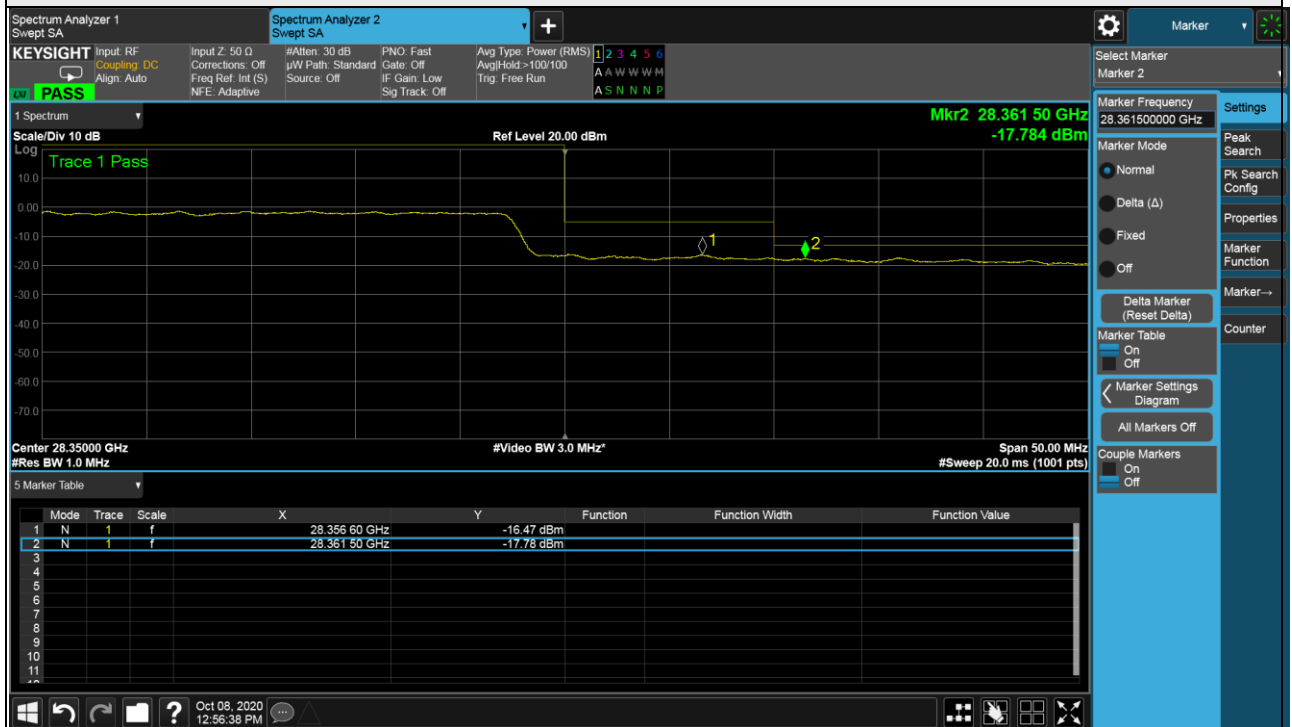
Beam 11



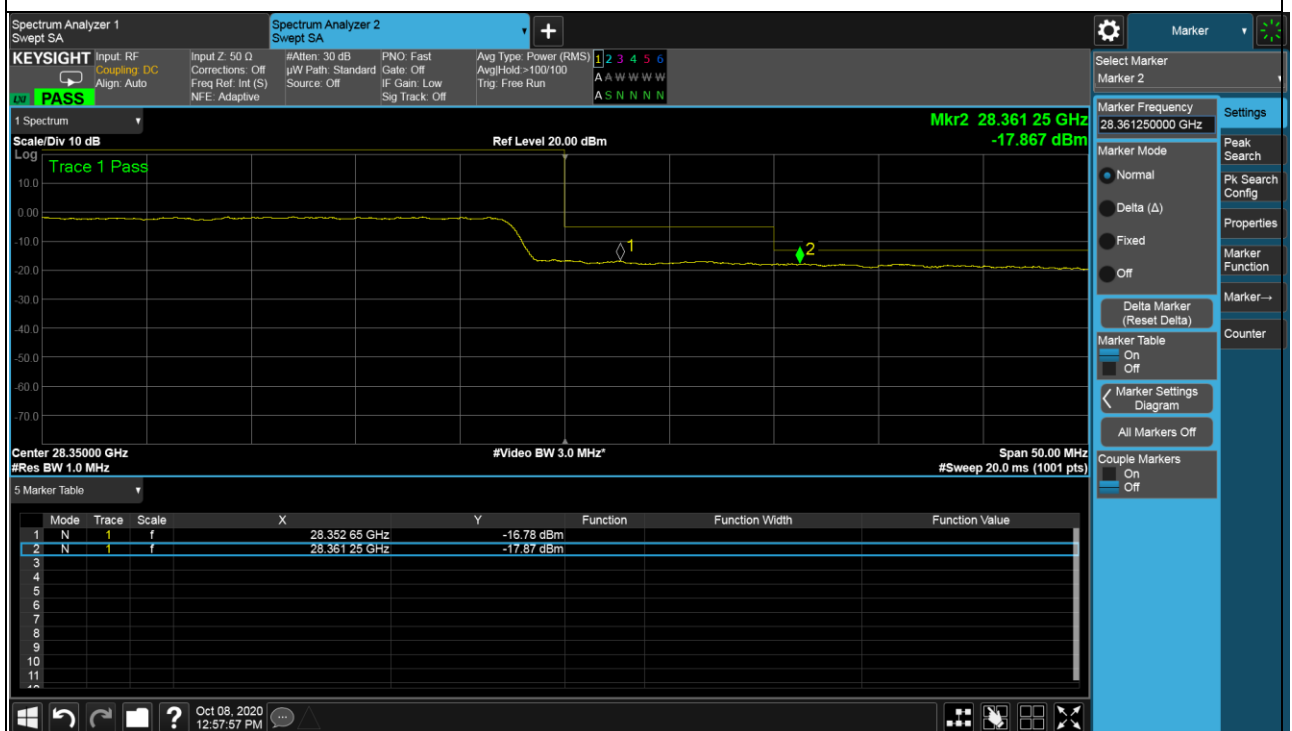
Beam 139



Beam 11 + 139



Beam 11 + 139

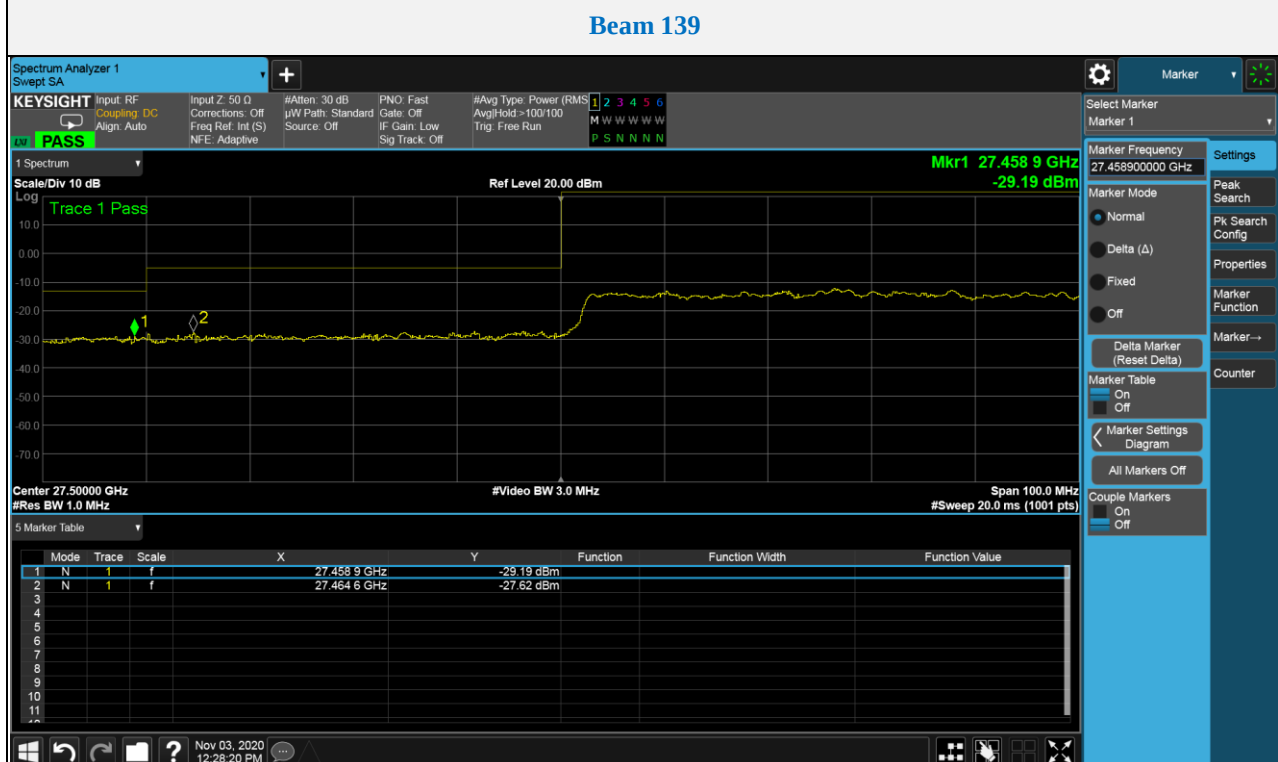
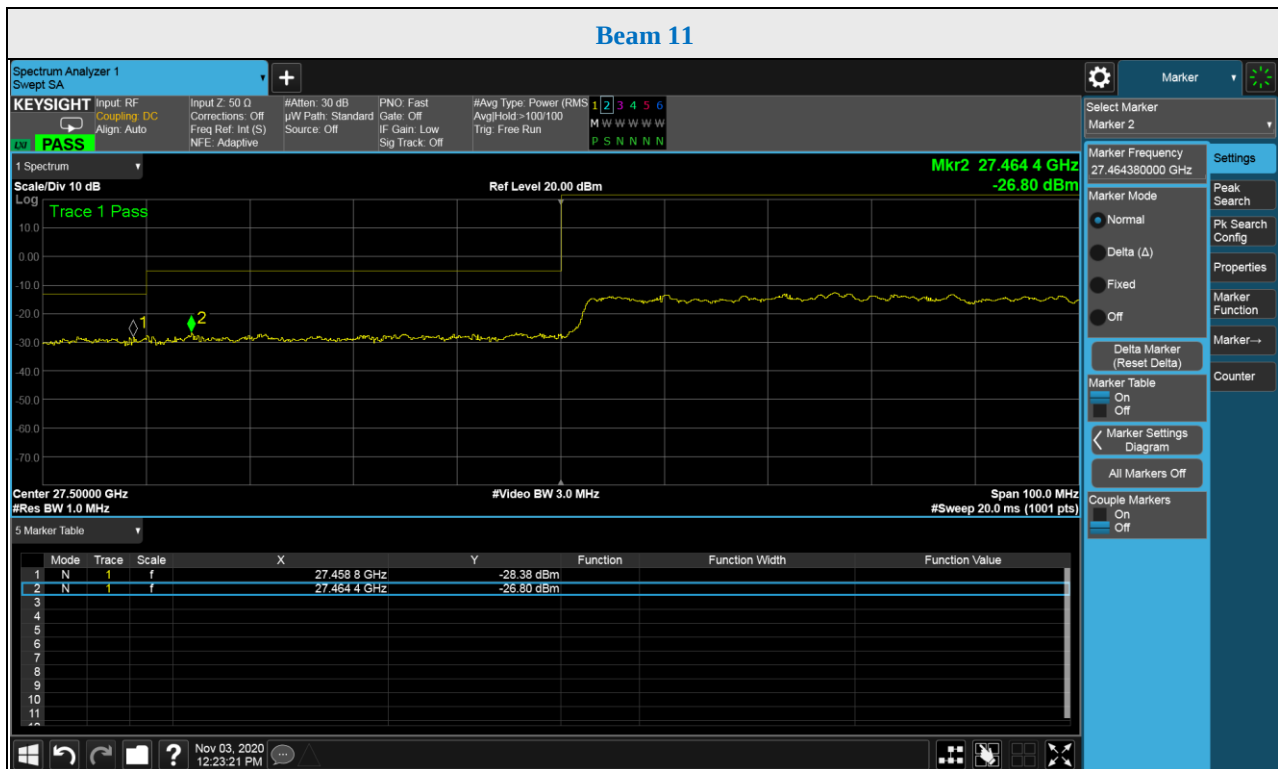


Summary of MIMO Beam Out-of Band Emission:

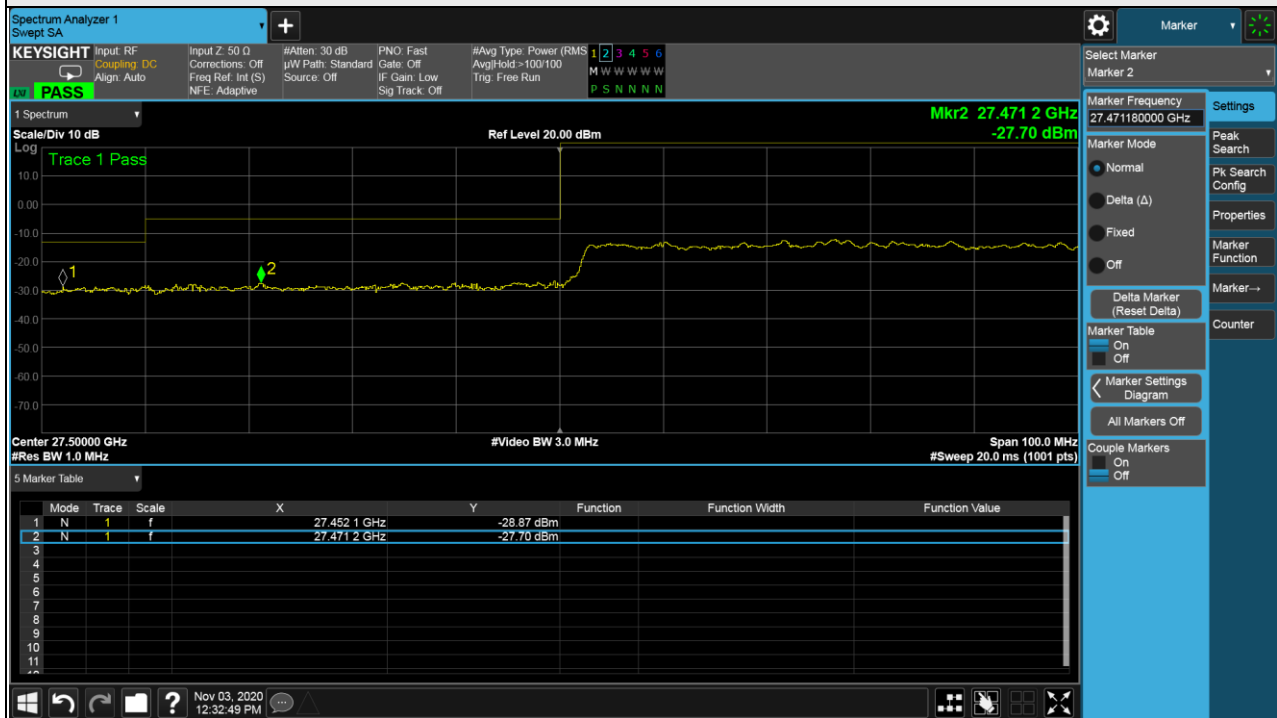
To address compliance of MIMO Out-of Band emission per KDB 662911 D01, the MIMO Out-of Band emission EIRP is calculated by summing the worst-case H Beam EIRP and V Beam EIRP in linear powers units then converted back to dBm.

Beam ID	EIRP for V Beam (dBm)	EIRP for H Beam (dBm)	EIRP for V+H Beam (dBm)	Limit(dBm)	Margin(dB)	Result
11 + 139	-16.47	-16.78	-13.61	-5	-8.61	Pass
	-17.78	-17.87	-14.81	-13	-1.81	Pass

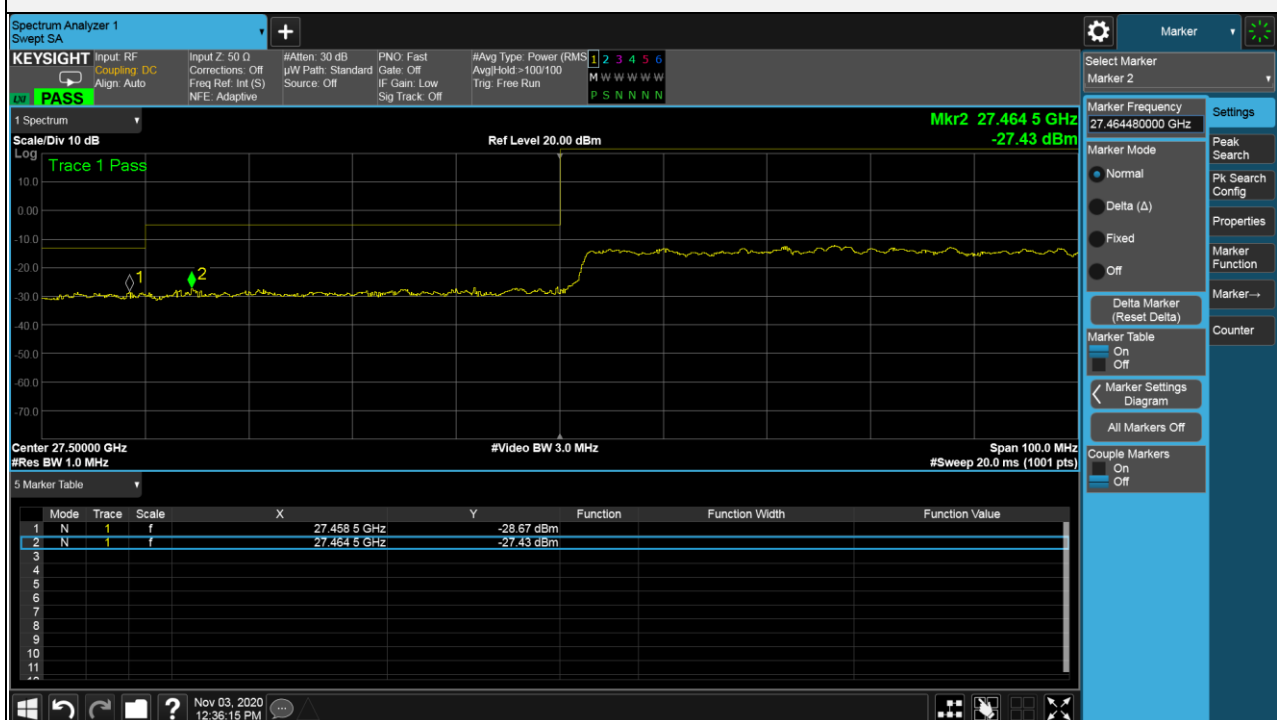
QPSK-4CC Low Channel:



Beam 11 + 139



Beam 11 + 139

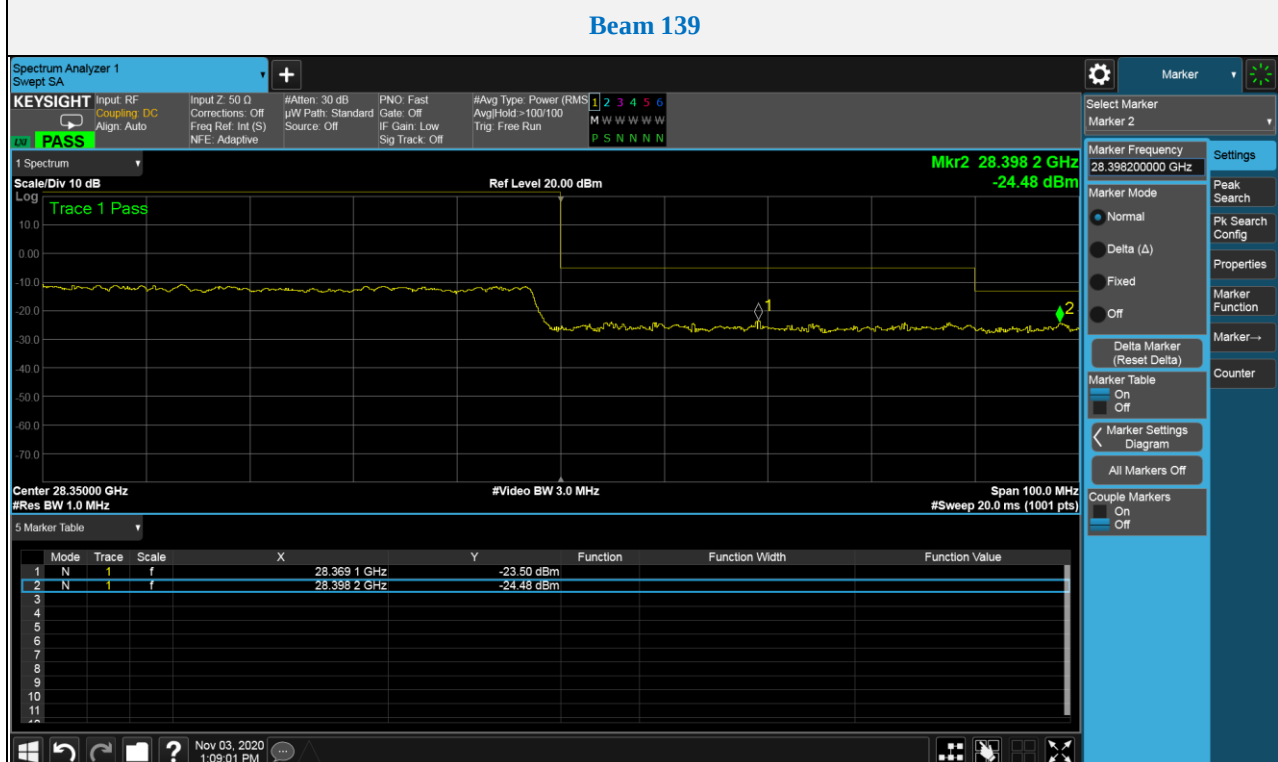
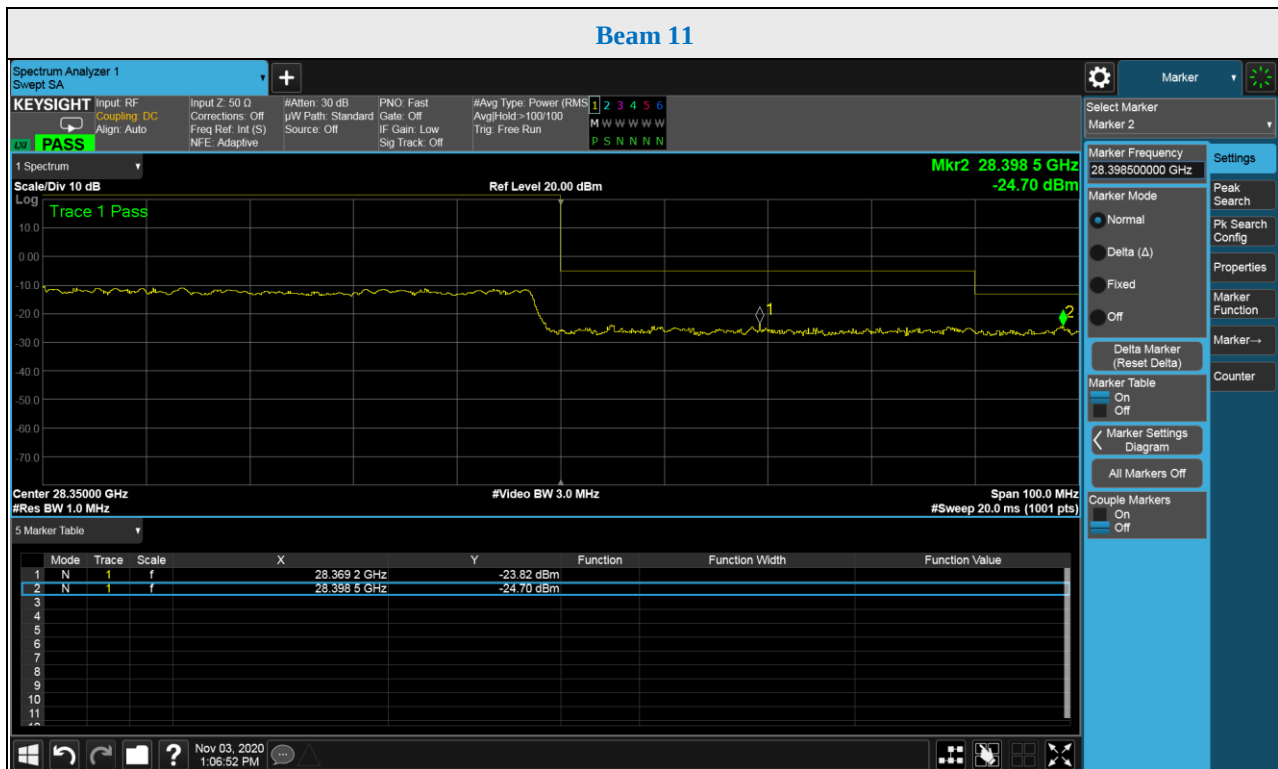


Summary of MIMO Beam Out-of Band Emission:

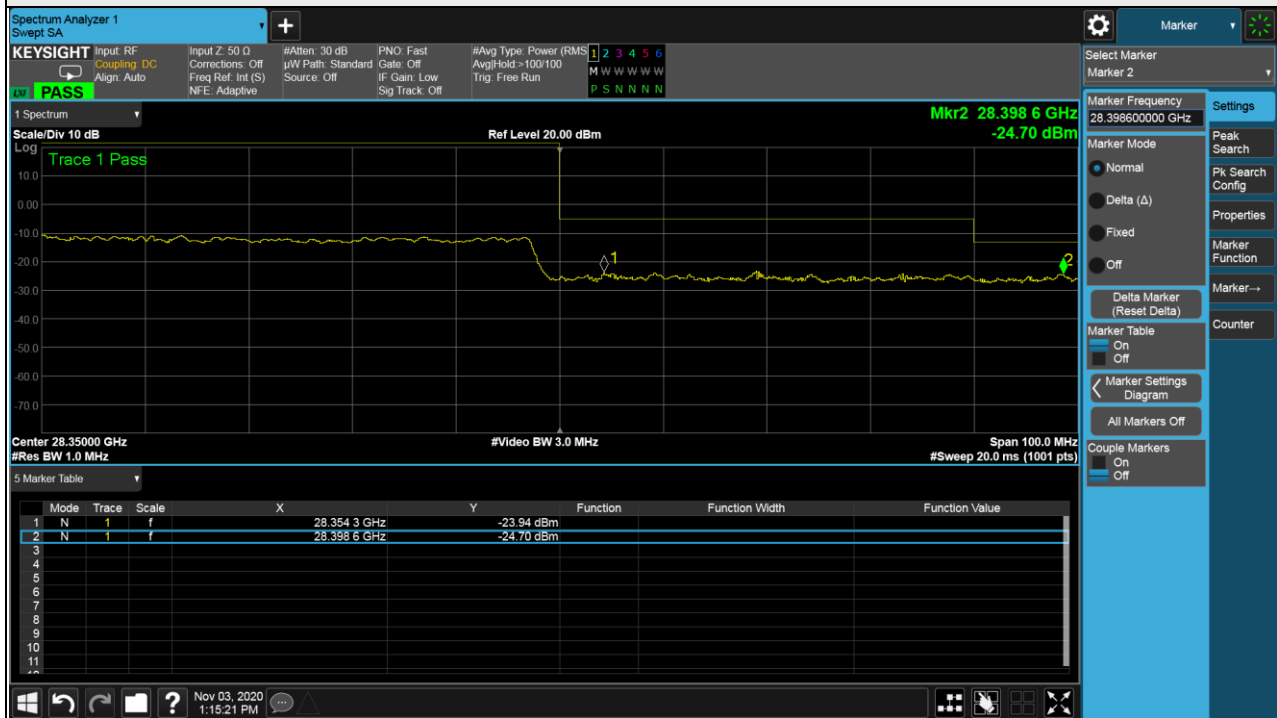
To address compliance of MIMO Out-of Band emission per KDB 662911 D01, the MIMO Out-of Band emission EIRP is calculated by summing the worst-case H Beam EIRP and V Beam EIRP in linear powers units then converted back to dBm.

Beam ID	EIRP for V Beam (dBm)	EIRP for H Beam (dBm)	EIRP for V+H Beam (dBm)	Limit(dBm)	Margin(dB)	Result
11 + 139	-27.70	-27.43	-24.55	-5	-19.55	Pass
	-28.87	-28.68	-25.76	-13	-12.76	Pass

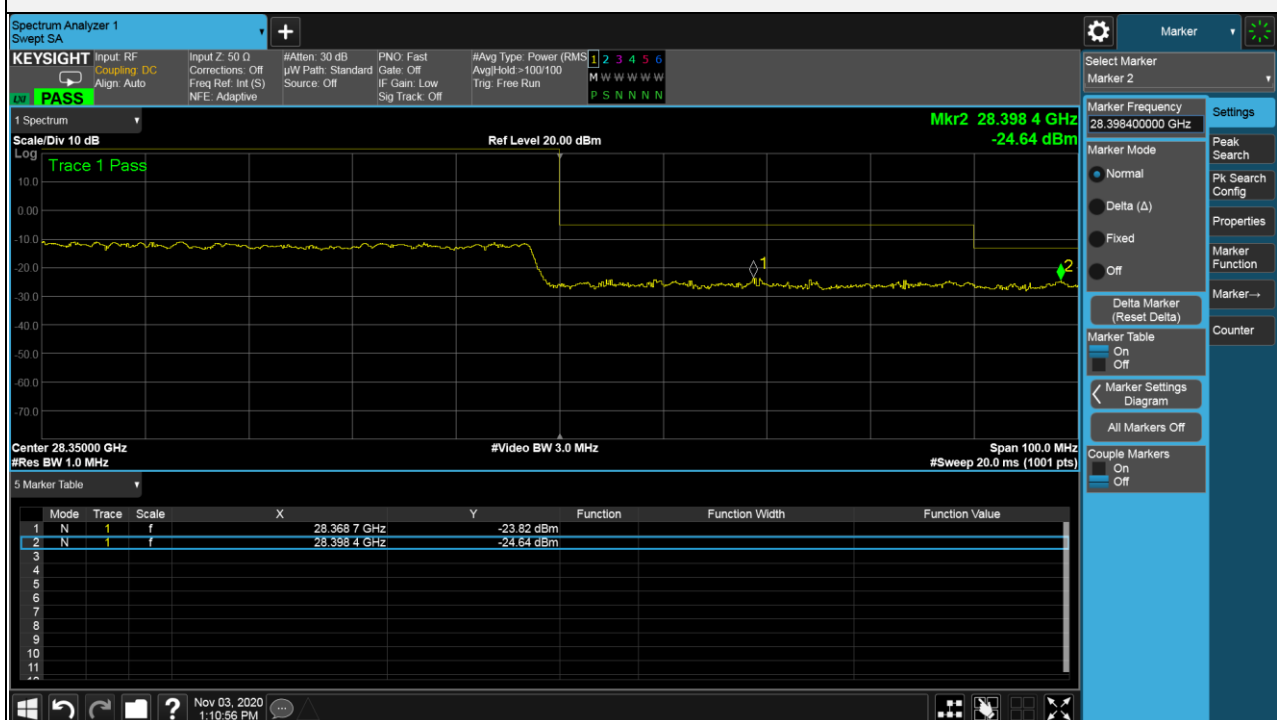
QPSK-4CC High Channel:



Beam 11 + 139



Beam 11 + 139



Summary of MIMO Beam Out-of Band Emission:

To address compliance of MIMO Out-of Band emission per KDB 662911 D01, the MIMO Out-of Band emission EIRP is calculated by summing the worst-case H Beam EIRP and V Beam EIRP in linear powers units then converted back to dBm.

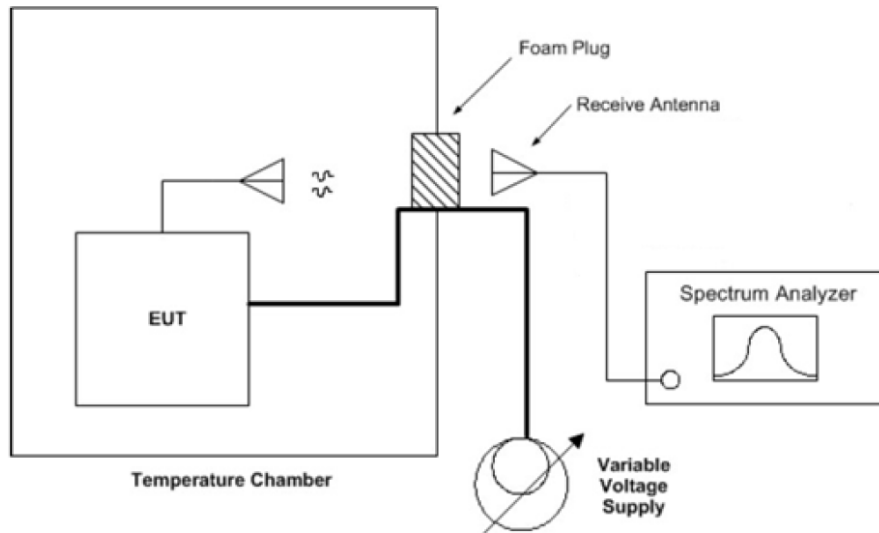
Beam ID	EIRP for V Beam (dBm)	EIRP for H Beam (dBm)	EIRP for V+H Beam (dBm)	Limit(dBm)	Margin(dB)	Result
11 + 139	-23.94	-23.82	-20.87	-5	-15.87	Pass
	-24.70	-24.64	-21.66	-13	-8.66	Pass

4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency band.

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.2.3 to get information of above instrument.

4.6.4 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the AC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be recording the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be holding the $\pm 0.5^\circ\text{C}$ during the measurement testing. Each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded from the communication simulator.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Same as Item 4.3.6

4.6.7 Test Results

Frequency Error vs. Voltage

Voltage (Vac)	Bnad: n261		
	Modulation: QPSK-1CC / Frequency: 27925MHz		
	Frequency (MHz)	Frequency Error (ppm)	PASS/FAIL
132	27925.01	0.358	PASS
120	27925.00	0.000	PASS
108	27925.02	0.716	PASS

Frequency Error vs. Temperature

Temp. (°C)	Bnad: n261		
	Modulation: QPSK-1CC / Frequency: 27925MHz		
	Frequency (MHz)	Frequency Error (ppm)	PASS/FAIL
0	27925.09	3.22	PASS
10	27925.04	1.43	PASS
20	27925.02	0.72	PASS
30	27924.97	-1.07	PASS
40	27924.96	-1.43	PASS

Frequency Error vs. Voltage

Voltage (Vac)	Bnad: n261		
	Modulation: 64QAM-1CC / Frequency: 27925MHz		
	Frequency (MHz)	Frequency Error (ppm)	PASS/FAIL
132	27925.03	1.07	PASS
120	27925.00	0	PASS
108	27925.04	1.43	PASS

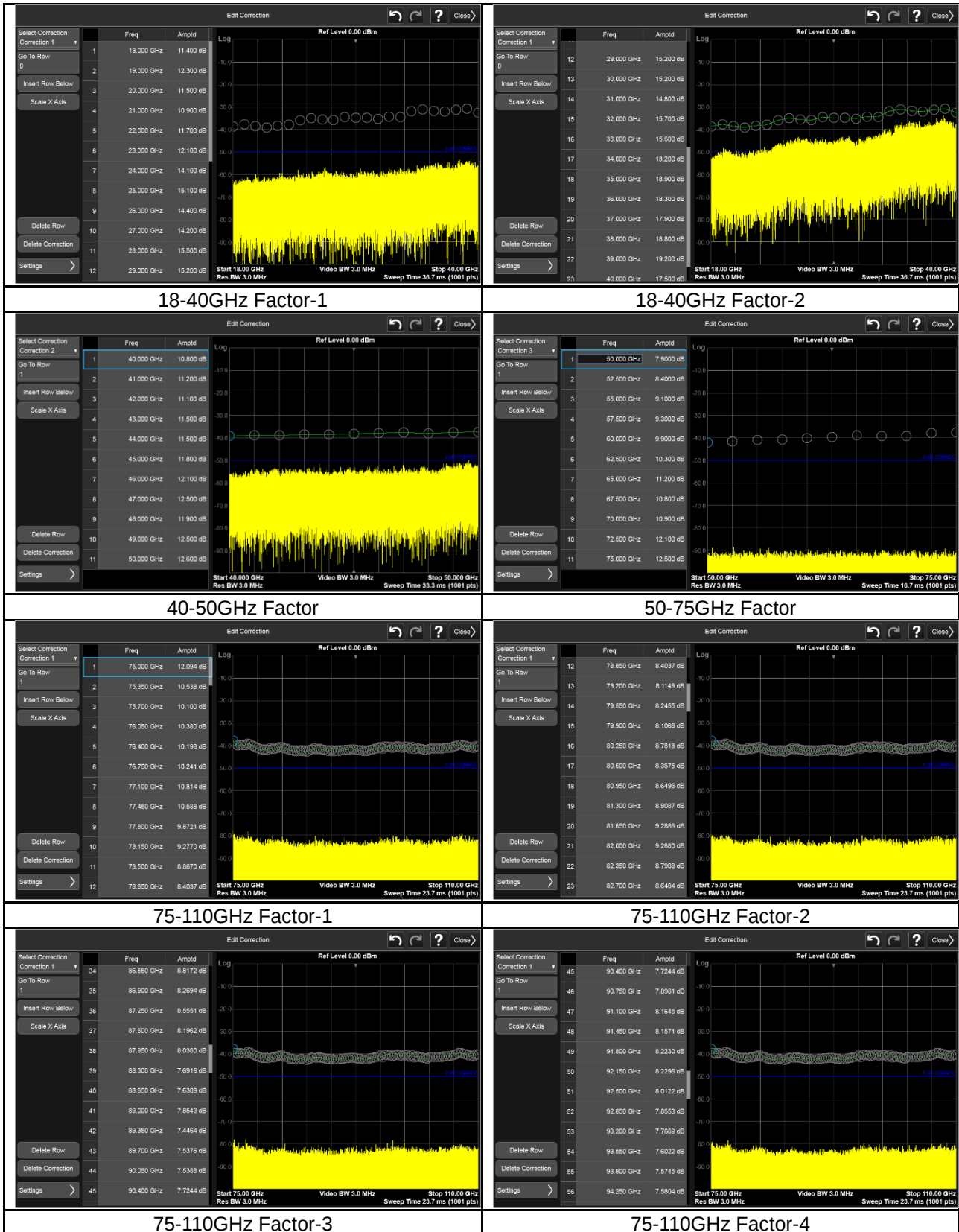
Frequency Error vs. Temperature

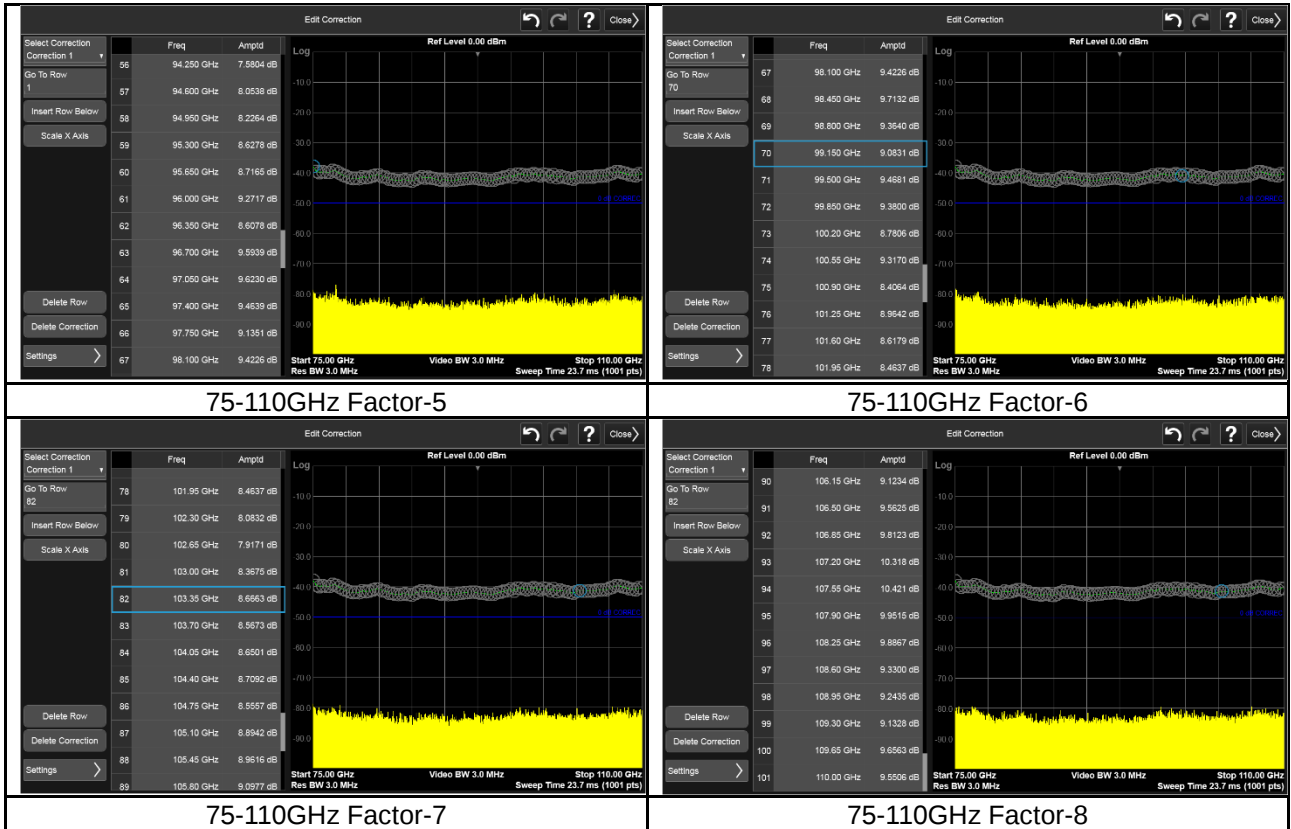
Temp. (°C)	Bnad: n261		
	Modulation: 64QAM-1CC / Frequency: 27925MHz		
	Frequency (MHz)	Frequency Error (ppm)	PASS/FAIL
0	27925.05	1.79	PASS
10	27925.02	0.71	PASS
20	27925.01	0.35	PASS
30	27924.99	-0.35	PASS
40	27924.98	-0.72	PASS

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

6 Appendix A. Factor to 110GHz





Appendix – Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.cpsusa-bureauveritas.com

The address and road map of all our labs can be found in our web site also.

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