

# SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E8257D	TGU	15-Feb-18	15-Feb-21
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

## TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to the middle channel. The EUT was transmitting at the data rate(s) and bandwidths listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

All limits were adjusted by a factor of  $[-10 \cdot \log(N)]$  dB to account for the device operation as a N port MIMO transmitter, as per FCC KDB 622911.

For Bands 12 and 14, the limit adjustment is  $-10 \cdot \log(4) = -6$  dB.

For Band 29, the limit adjustment is  $-10 \cdot \log(2) = -3$  dB.

Over the frequency range of 150kHz-20MHz, a RBW of 10 kHz was used; therefore, an additional limit adjustment factor of 10 dB was applied  $[10 \cdot \log(10/1)]$ .

The limit for the 9kHz to 150kHz frequency range was adjusted to -39dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 100kHz [i.e.:  $-39\text{dBm} = -19\text{dBm} - 10\log(100\text{kHz}/1\text{kHz})$ ]. The limit for the 150kHz to 20MHz frequency range was adjusted to -29dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 100kHz [i.e.:  $-29\text{dBm} = -19\text{dBm} - 10\log(100\text{kHz}/10\text{kHz})$ ].

Per FCC section 27.53(g), the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -19 dBm  $[-13 \text{ dBm} - 10 \log(4)]$  per FCC KDB 662911D01 v02r01 because the RRH may operate as a 4 port MIMO transmitter for Band 12. FCC 27.53(g) requires a >100 kHz measurement bandwidth for emissions 100 kHz outside of the RRH operating frequency range.

# SPURIOUS CONDUCTED EMISSIONS



XMM 2019.09.05

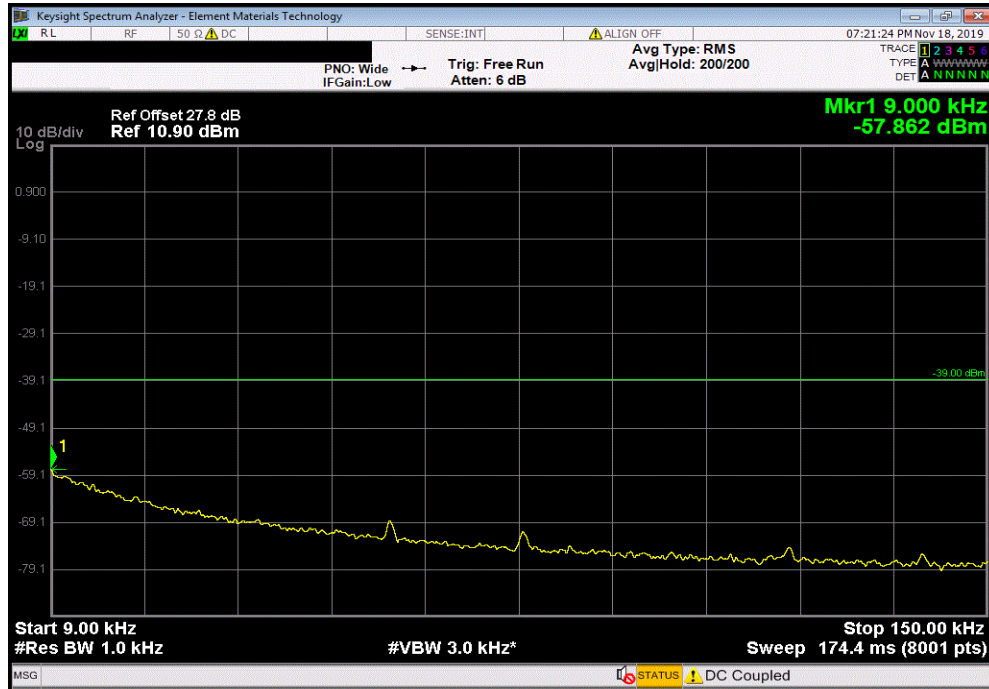
EUT: AHLBBA RRH		Work Order: NOKI0004
Serial Number: K9193514835		Date: 19-Nov-19
Customer: Nokia Solutions and Networks		Temperature: 23 °C
Attendees: John Rattanavong		Humidity: 30.7% RH
Project: None		Barometric Pres.: 1017 mbar
Tested by: Jonathan Kiefer	Power: 54VDC	Job Site: TX09
TEST SPECIFICATIONS		
FCC 27:2019		Test Method
		ANSI C63.26:2015
COMMENTS		
Band 12 conducted spurious emissions for four modulation types. Tested on highest power antenna port (Port 1). EUT is operated at 100% duty cycle.		
DEVIATIONS FROM TEST STANDARD		
None		
Configuration #	2,4,5	Signature <i>Jonathan Kiefer</i>
		Value (dBm) Limit (dBm) Result
Band 12		
QPSK Modulation		
LTE5 Bandwidth		
9kHz-150kHz	-57.862	-39 Pass
150kHz-20MHz	-55.749	-29 Pass
20MHz-600MHz	-32.238	-19 Pass
600MHz-800MHz	-35.537	-19 Pass
800MHz-1.2GHz	-33.562	-19 Pass
1.2GHz-8GHz	-33.498	-19 Pass
LTE10 Bandwidth		
9kHz-150kHz	-58.109	-39 Pass
150kHz-20MHz	-56.315	-29 Pass
20MHz-600MHz	-32.331	-19 Pass
600MHz-800MHz	-36.063	-19 Pass
800MHz-1.2GHz	-32.705	-19 Pass
1.2GHz-8GHz	-34.119	-19 Pass
16QAM Modulation		
LTE5 Bandwidth		
9kHz-150kHz	-58.302	-39 Pass
150kHz-20MHz	-55.852	-29 Pass
20MHz-600MHz	-32.536	-19 Pass
600MHz-800MHz	-36.475	-19 Pass
800MHz-1.2GHz	-33.409	-19 Pass
1.2GHz-8GHz	-34.069	-19 Pass
LTE10 Bandwidth		
9kHz-150kHz	-58.322	-39 Pass
150kHz-20MHz	-56.143	-29 Pass
20MHz-600MHz	-32.428	-19 Pass
600MHz-800MHz	-36.086	-19 Pass
800MHz-1.2GHz	-33.685	-19 Pass
1.2GHz-8GHz	-34.22	-19 Pass
64QAM Modulation		
LTE5 Bandwidth		
9kHz-150kHz	-58.303	-39 Pass
150kHz-20MHz	-55.895	-29 Pass
20MHz-600MHz	-32.719	-19 Pass
600MHz-800MHz	-35.463	-19 Pass
800MHz-1.2GHz	-33.228	-19 Pass
1.2GHz-8GHz	-34.214	-19 Pass
LTE10 Bandwidth		
9kHz-150kHz	-57.864	-39 Pass
150kHz-20MHz	-56.299	-29 Pass
20MHz-600MHz	-32.989	-19 Pass
600MHz-800MHz	-35.533	-19 Pass
800MHz-1.2GHz	-33.403	-19 Pass
1.2GHz-8GHz	-34.145	-19 Pass
256QAM Modulation		
LTE5 Bandwidth		
9kHz-150kHz	-58.25	-39 Pass
150kHz-20MHz	-56.144	-29 Pass
20MHz-600MHz	-31.973	-19 Pass
600MHz-800MHz	-36.1	-19 Pass
800MHz-1.2GHz	-32.824	-19 Pass
1.2GHz-8GHz	-34.568	-19 Pass
LTE10 Bandwidth		
9kHz-150kHz	-58.33	-39 Pass
150kHz-20MHz	-56.262	-29 Pass
20MHz-600MHz	-32.644	-19 Pass
600MHz-800MHz	-35.962	-19 Pass
800MHz-1.2GHz	-32.675	-19 Pass
1.2GHz-8GHz	-34.087	-19 Pass

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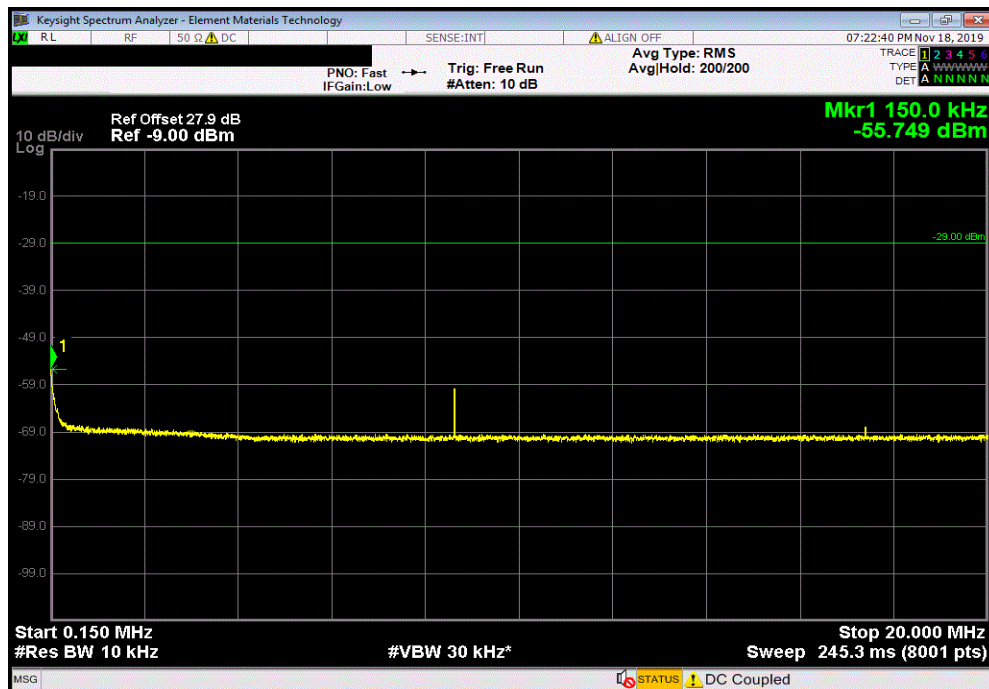


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Band 12, QPSK Modulation, LTE5 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-57.862	-39	Pass

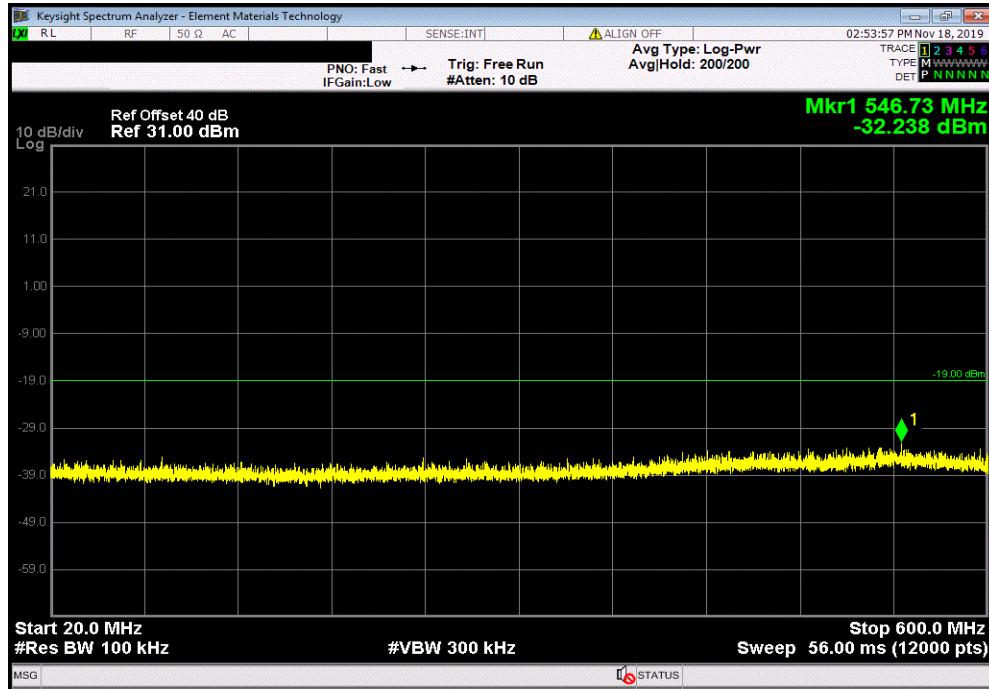


Band 12, QPSK Modulation, LTE5 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-55.749	-29	Pass

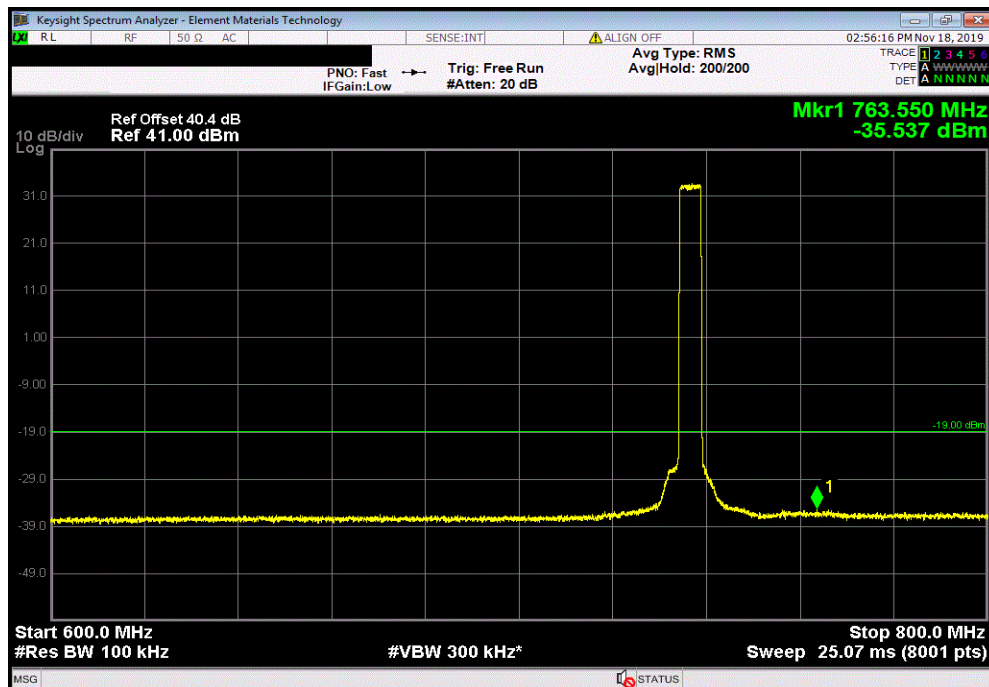


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Band 12, QPSK Modulation, LTE5 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.238	-19	Pass

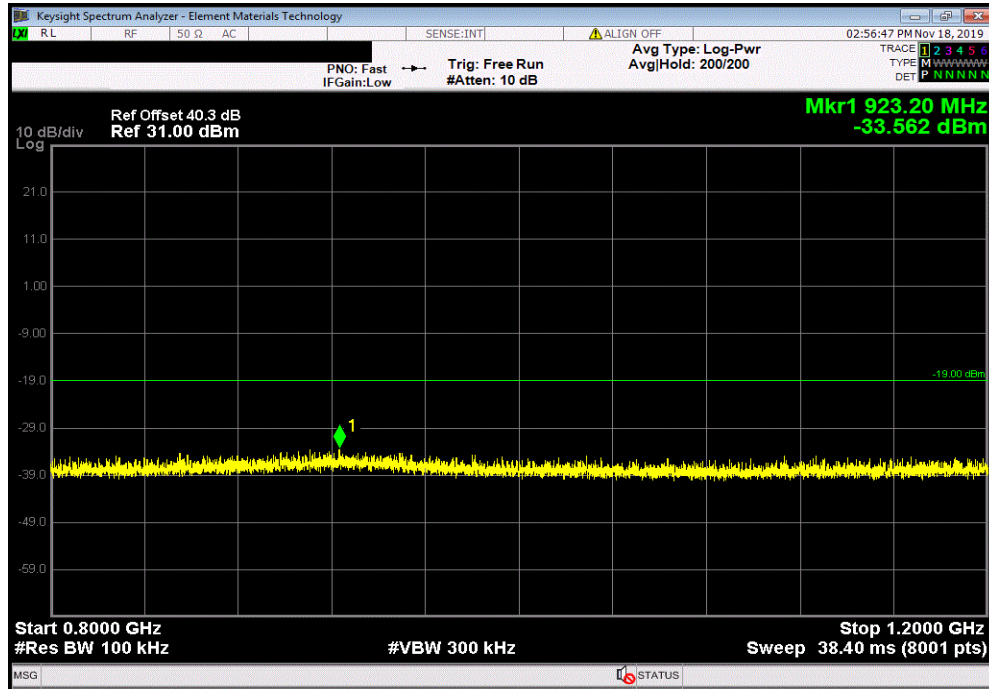


Band 12, QPSK Modulation, LTE5 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-35.537	-19	Pass

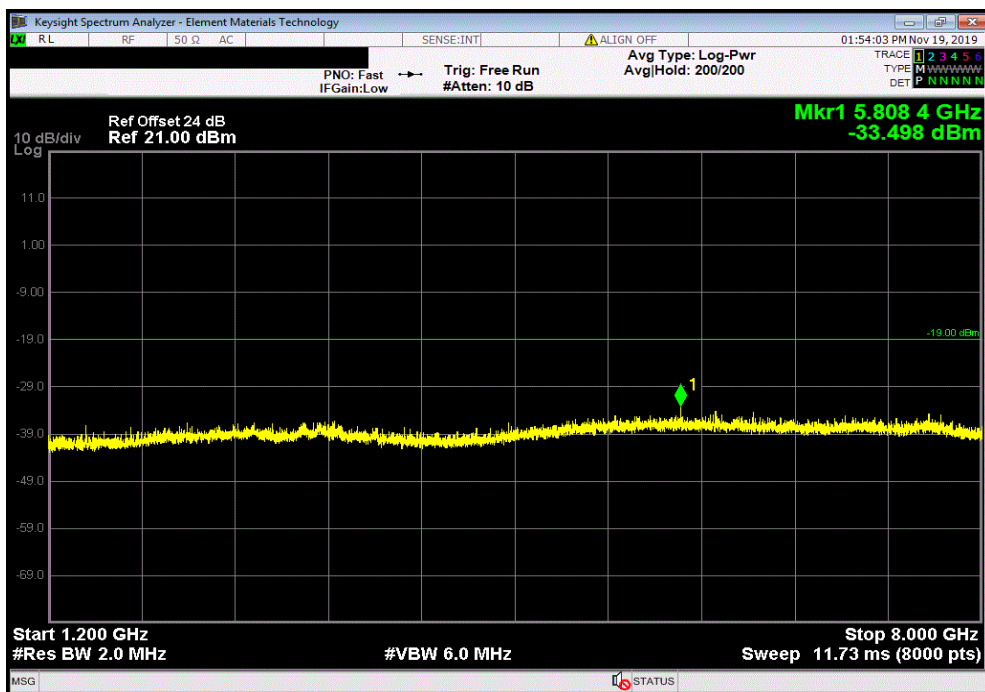


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Band 12, QPSK Modulation, LTE5 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.562	-19	Pass



Band 12, QPSK Modulation, LTE5 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.498	-19	Pass

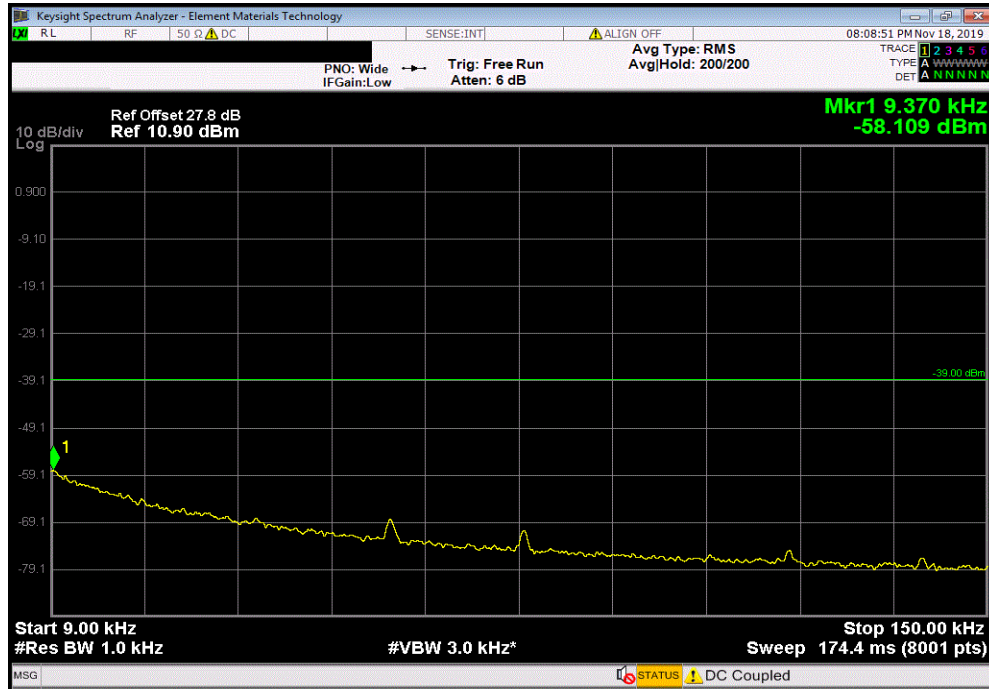


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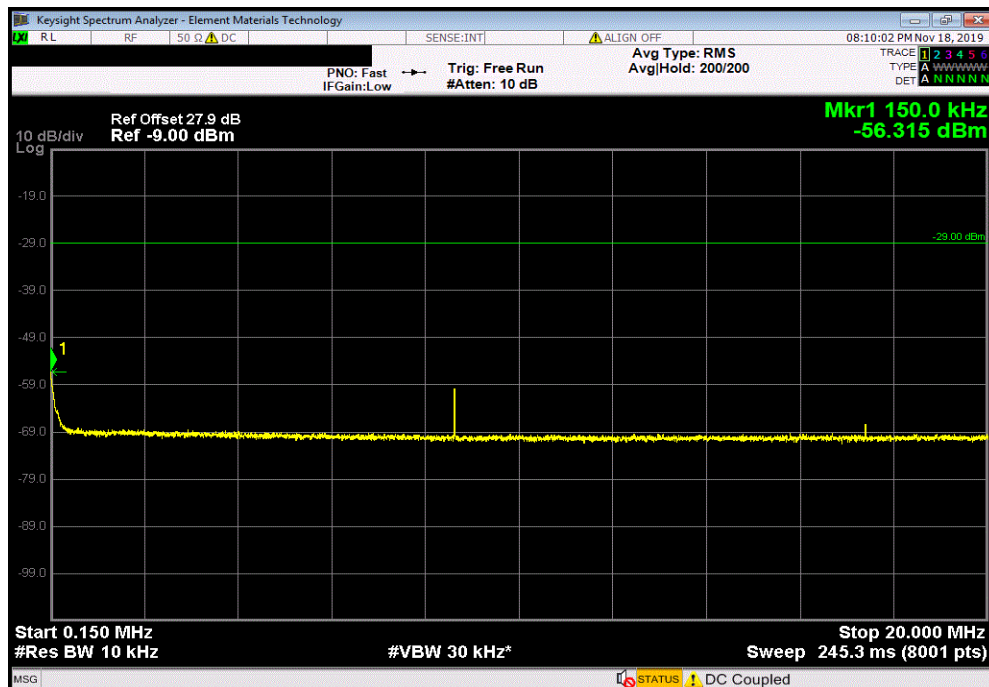


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Band 12, QPSK Modulation, LTE10 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.109	-39	Pass



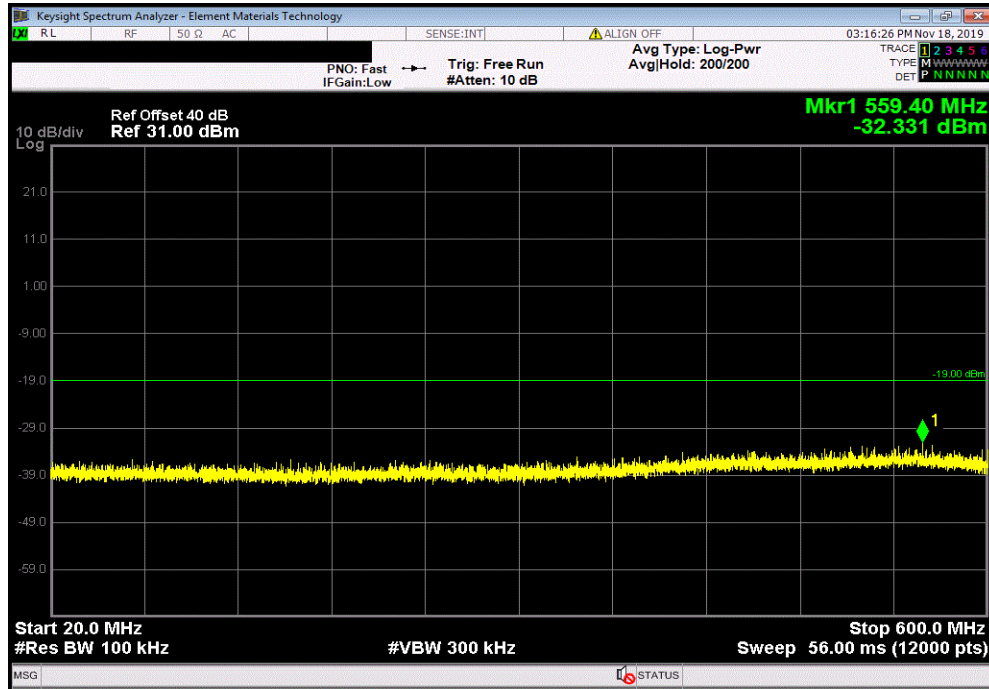
Band 12, QPSK Modulation, LTE10 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.315	-29	Pass



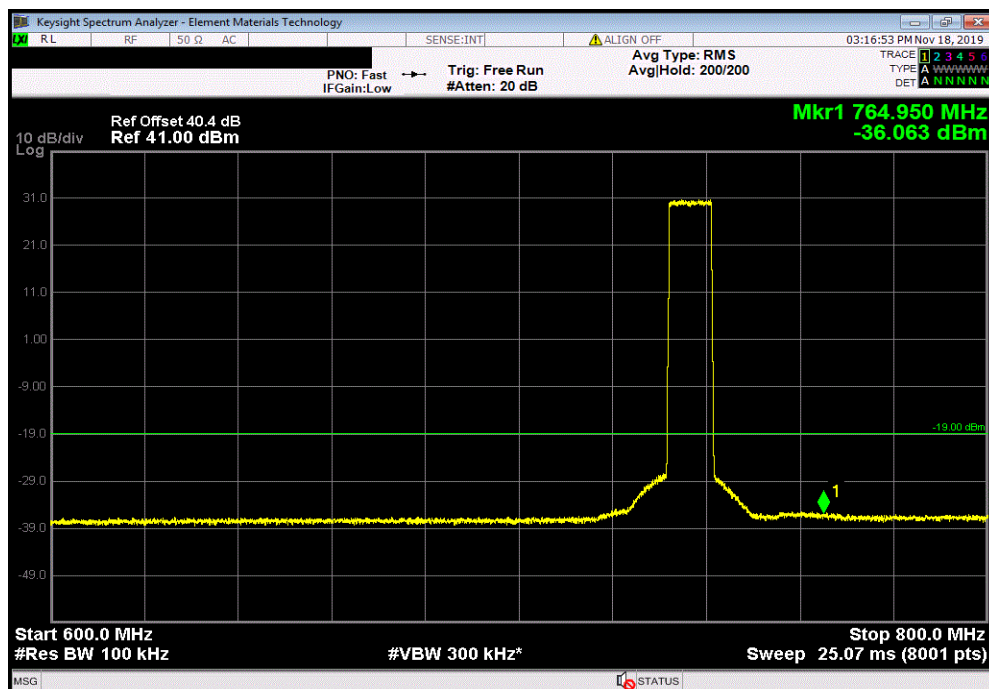


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Band 12, QPSK Modulation, LTE10 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.331	-19	Pass



Band 12, QPSK Modulation, LTE10 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-36.063	-19	Pass

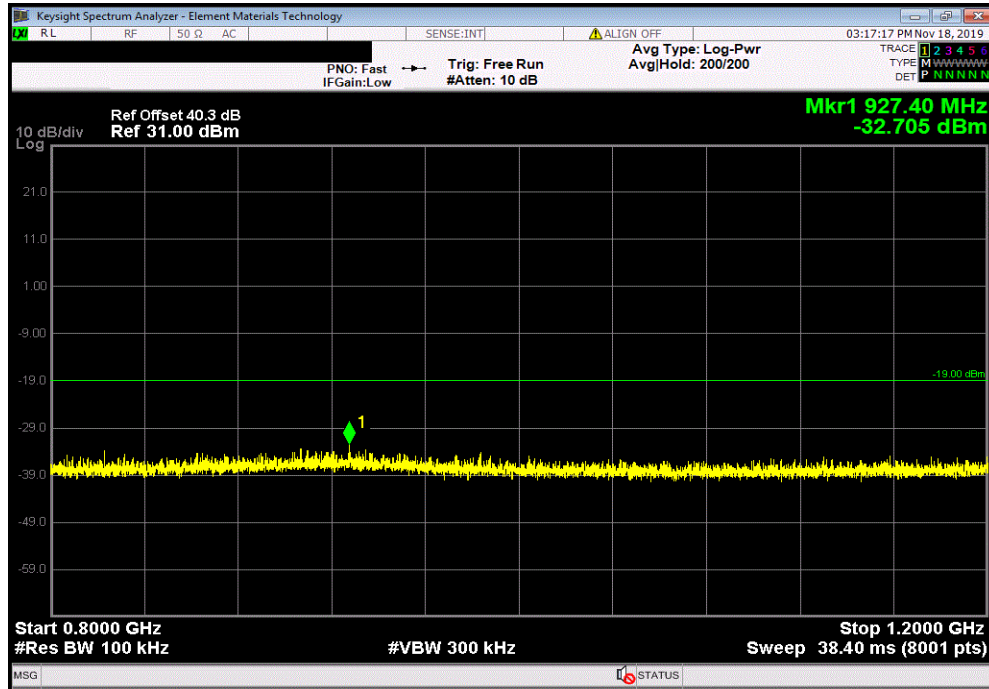


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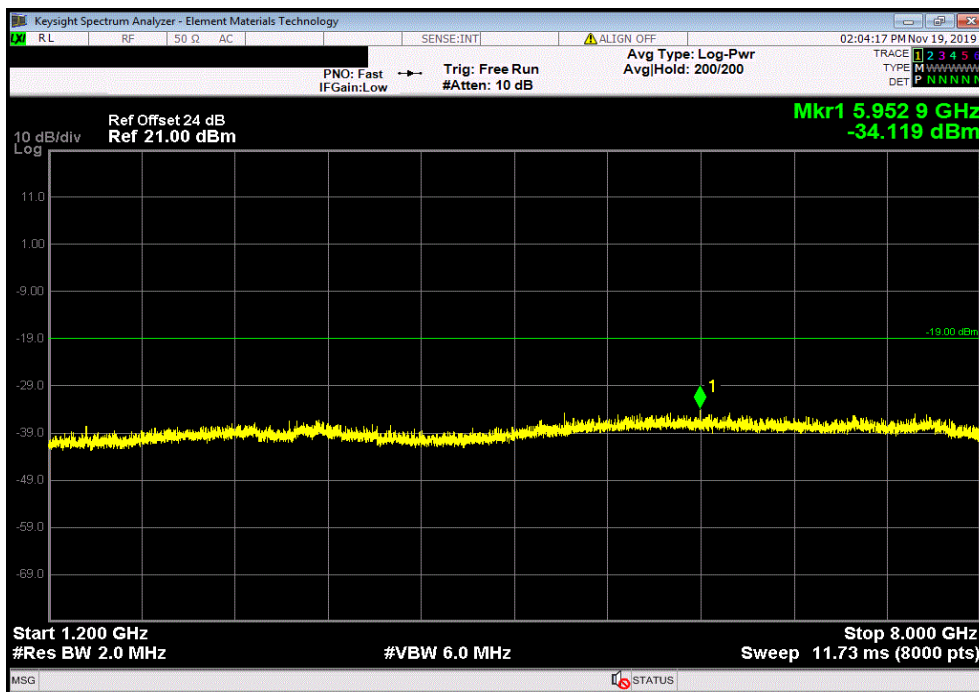


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Band 12, QPSK Modulation, LTE10 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-32.705	-19	Pass



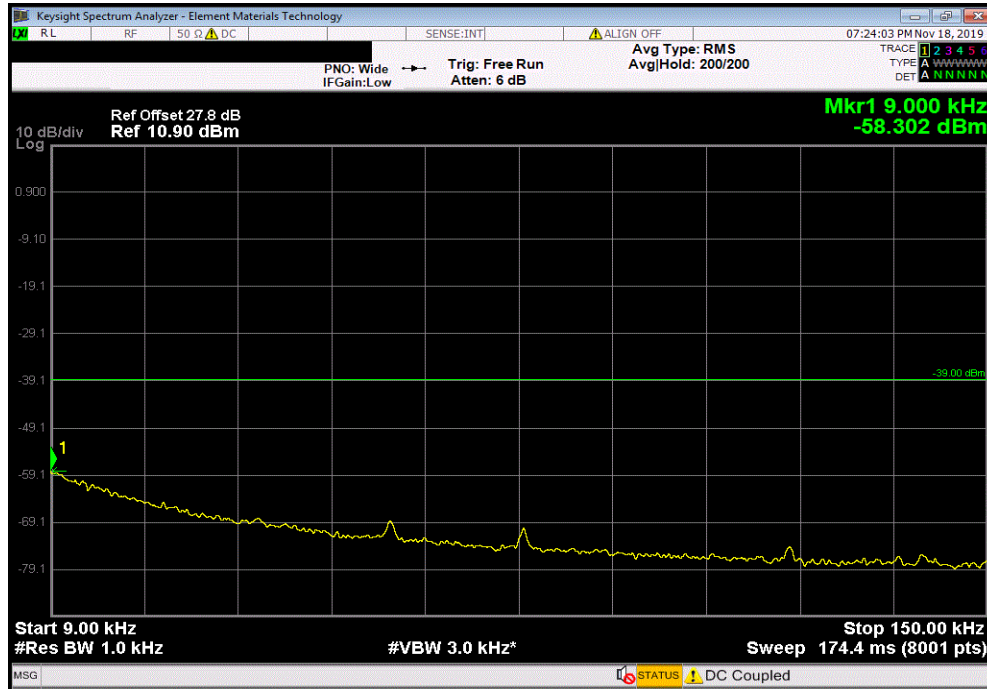
Band 12, QPSK Modulation, LTE10 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.119	-19	Pass



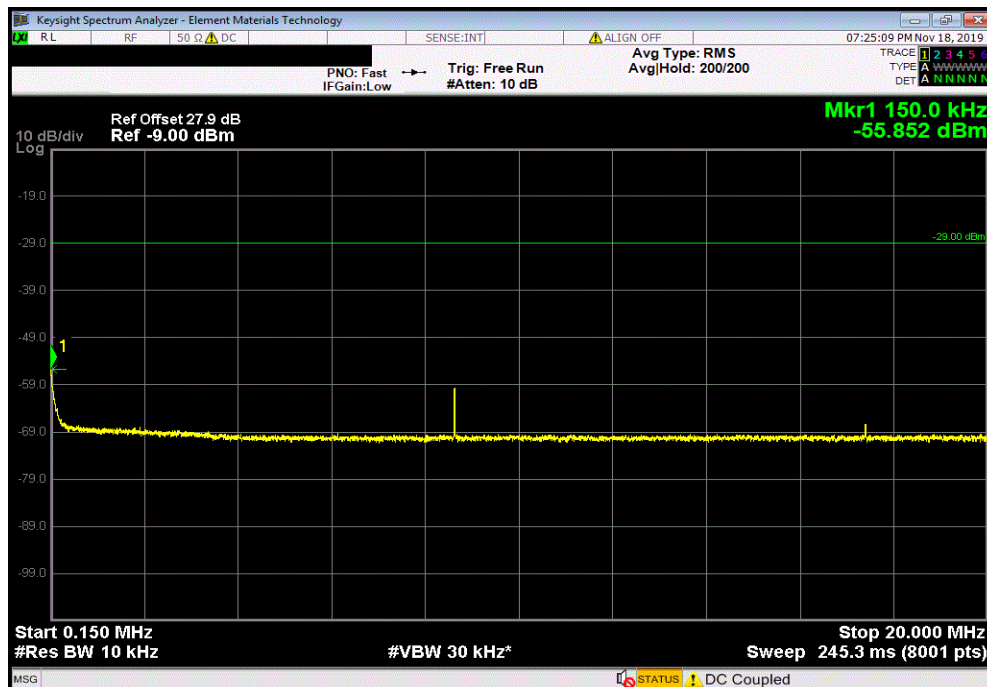


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Band 12, 16QAM Modulation, LTE5 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.302	-39	Pass



Band 12, 16QAM Modulation, LTE5 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-55.852	-29	Pass

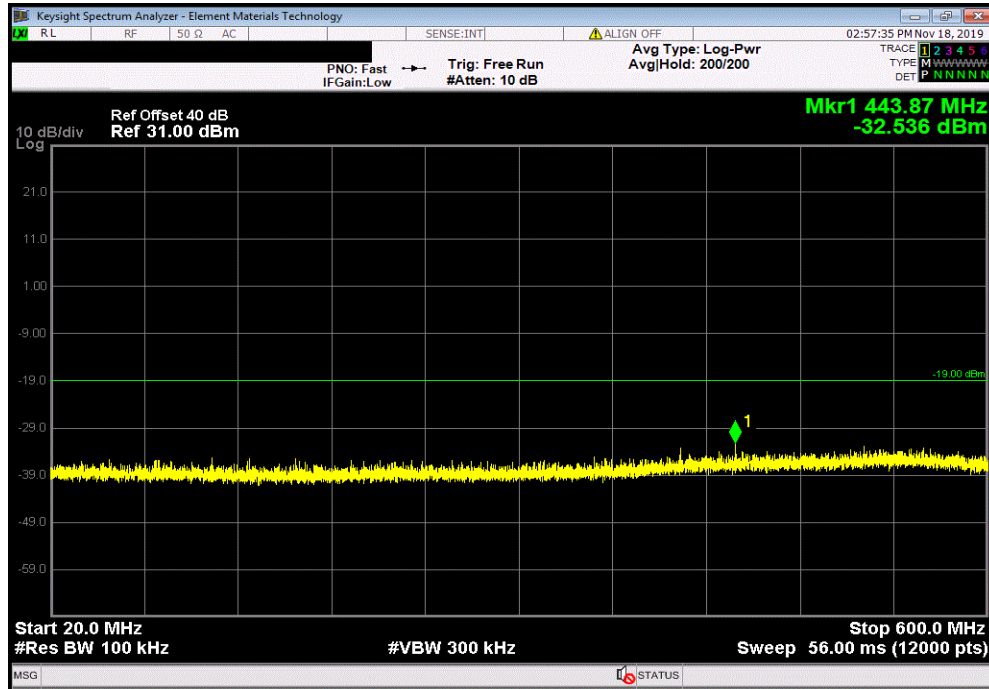


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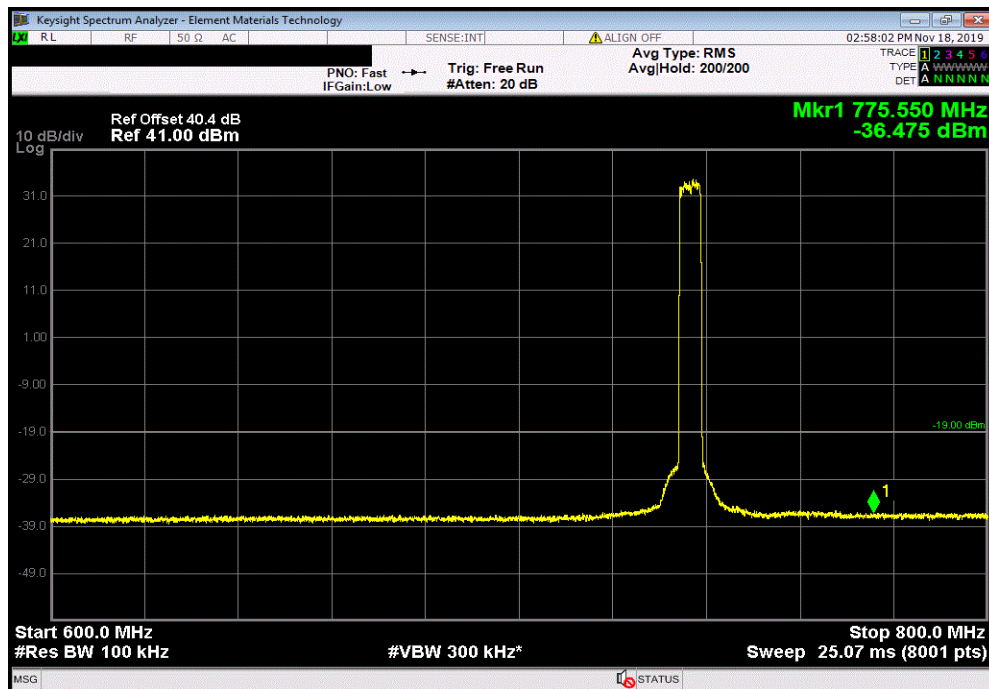


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Band 12, 16QAM Modulation, LTE5 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.536	-19	Pass



Band 12, 16QAM Modulation, LTE5 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-36.475	-19	Pass

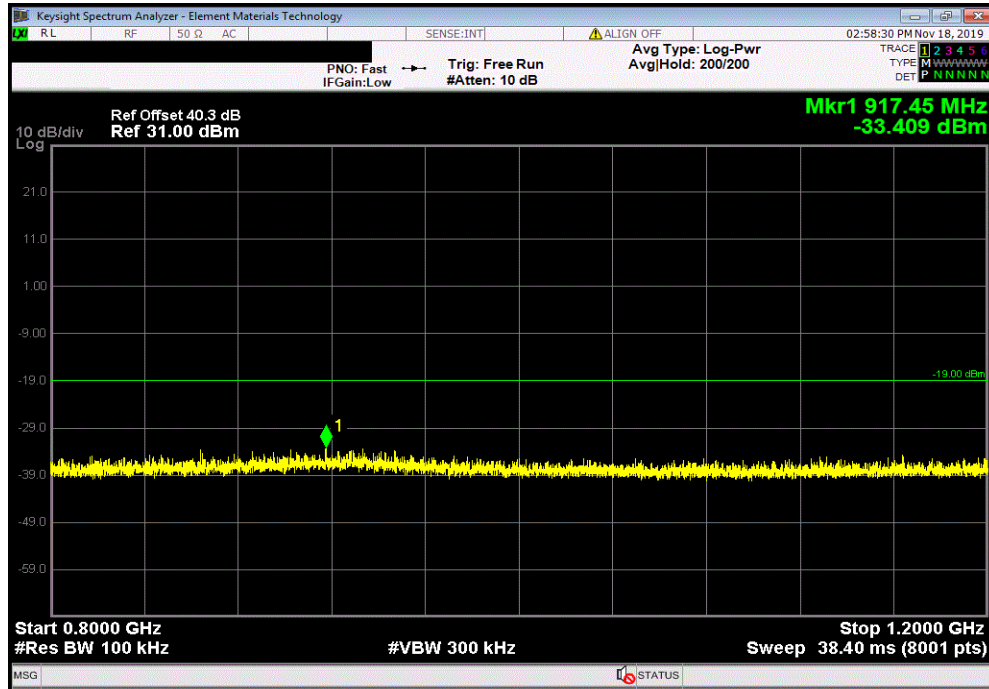


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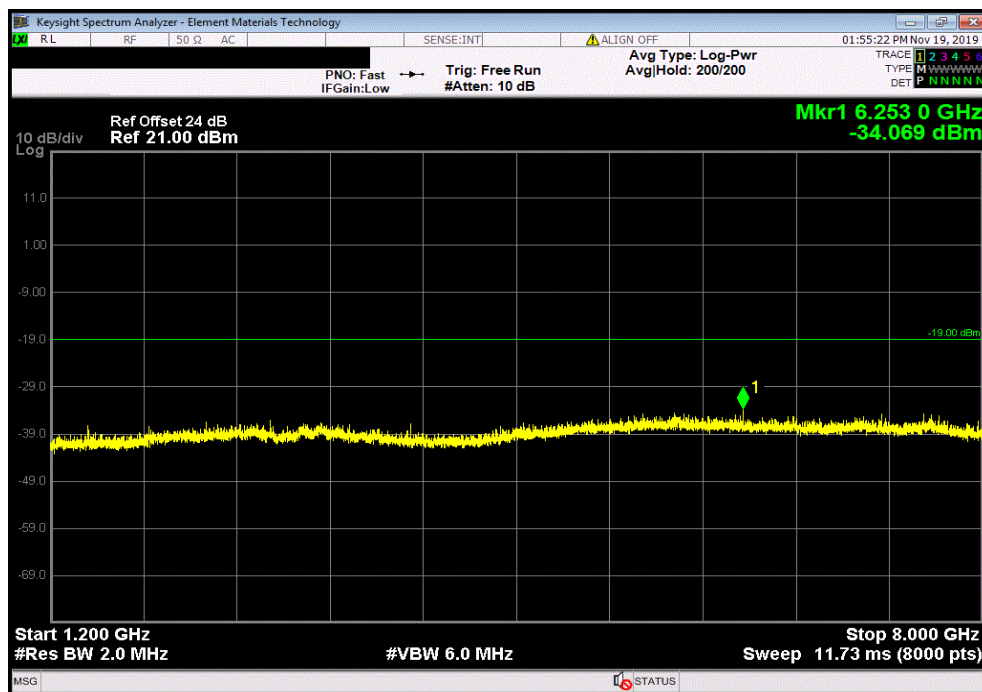


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Band 12, 16QAM Modulation, LTE5 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.409	-19	Pass



Band 12, 16QAM Modulation, LTE5 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.069	-19	Pass

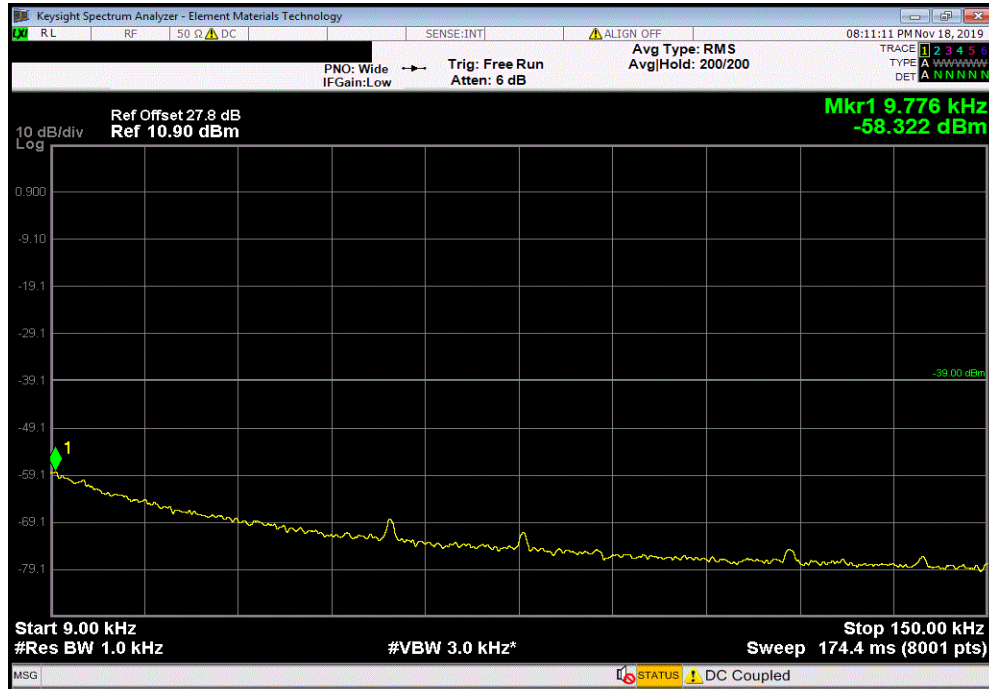


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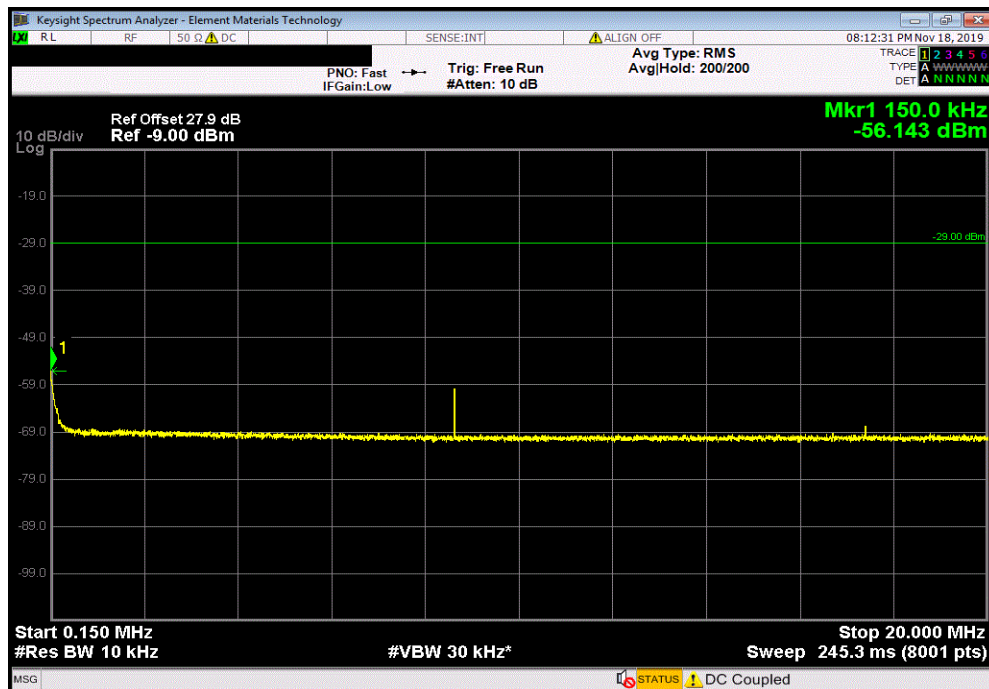


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Band 12, 16QAM Modulation, LTE10 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.322	-39	Pass



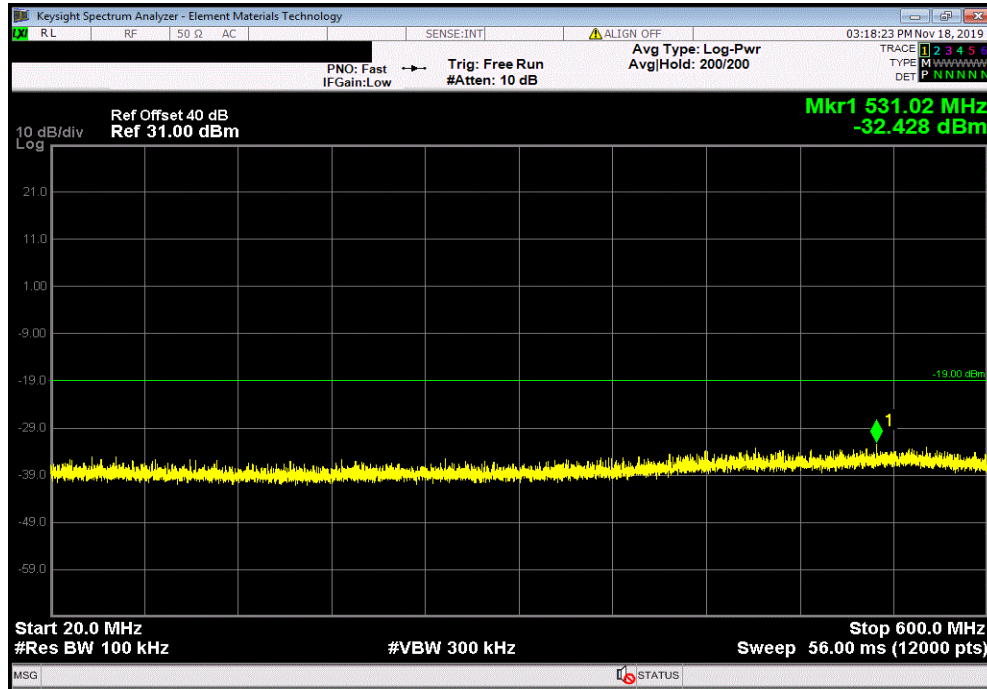
Band 12, 16QAM Modulation, LTE10 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.143	-29	Pass



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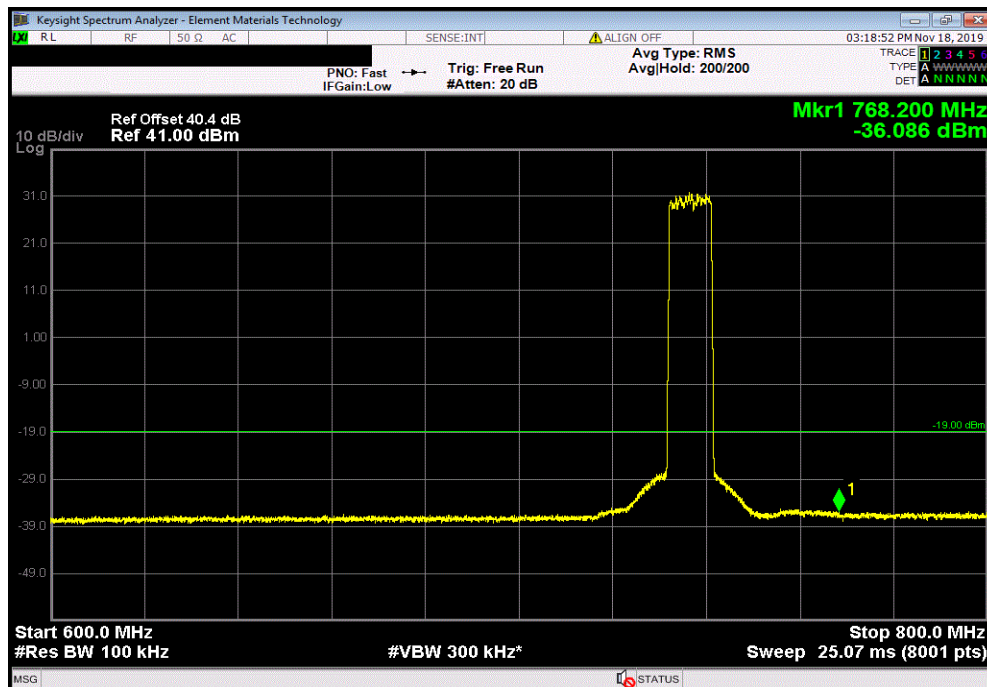
Band 12, 16QAM Modulation, LTE10 Bandwidth, 20MHz-600MHz

				Value (dBm)	Limit (dBm)	Result
				-32.428	-19	Pass



Band 12, 16QAM Modulation, LTE10 Bandwidth, 600MHz-800MHz

				Value (dBm)	Limit (dBm)	Result
				-36.086	-19	Pass



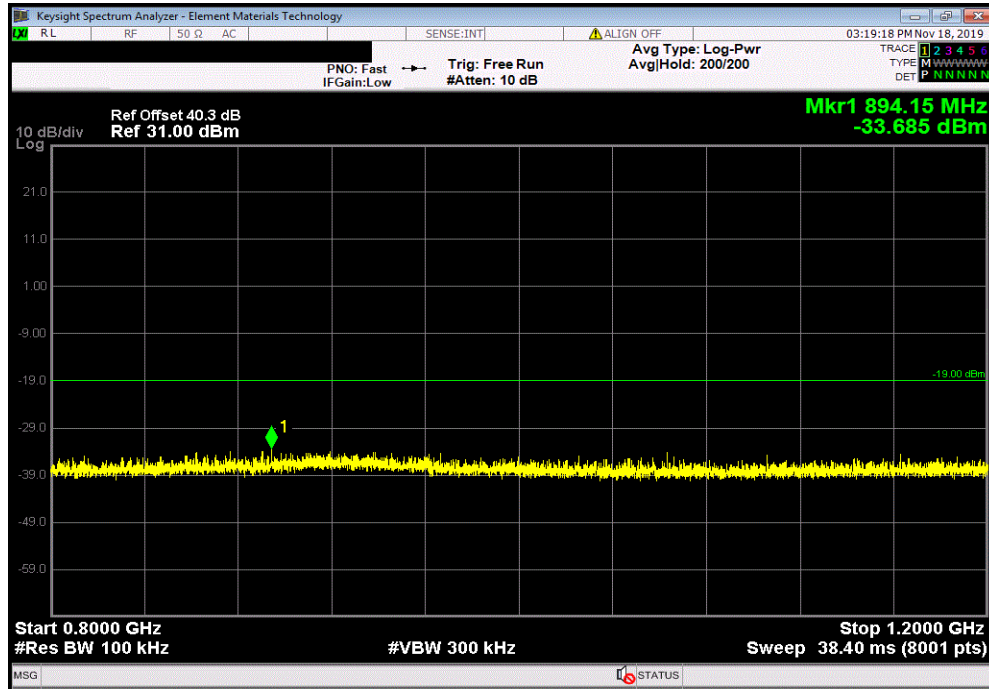


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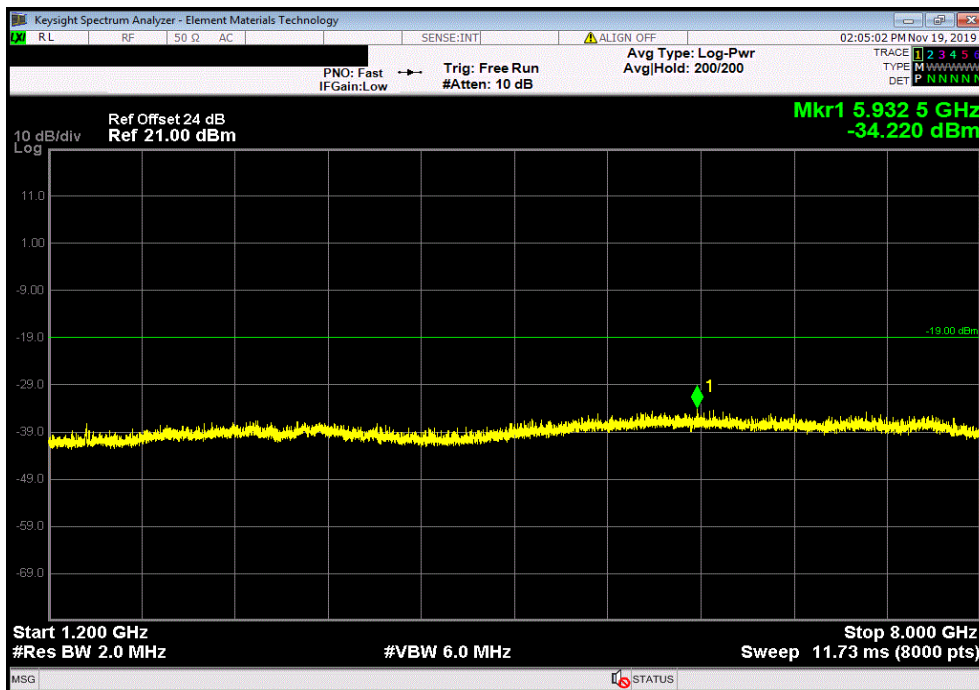


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Band 12, 16QAM Modulation, LTE10 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.685	-19	Pass



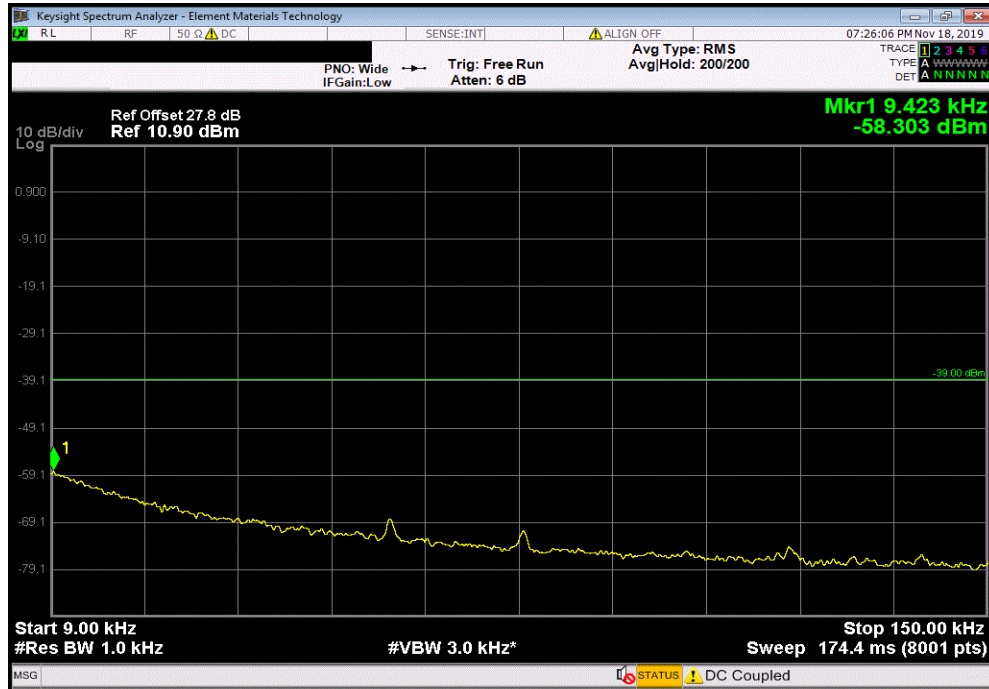
Band 12, 16QAM Modulation, LTE10 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.22	-19	Pass



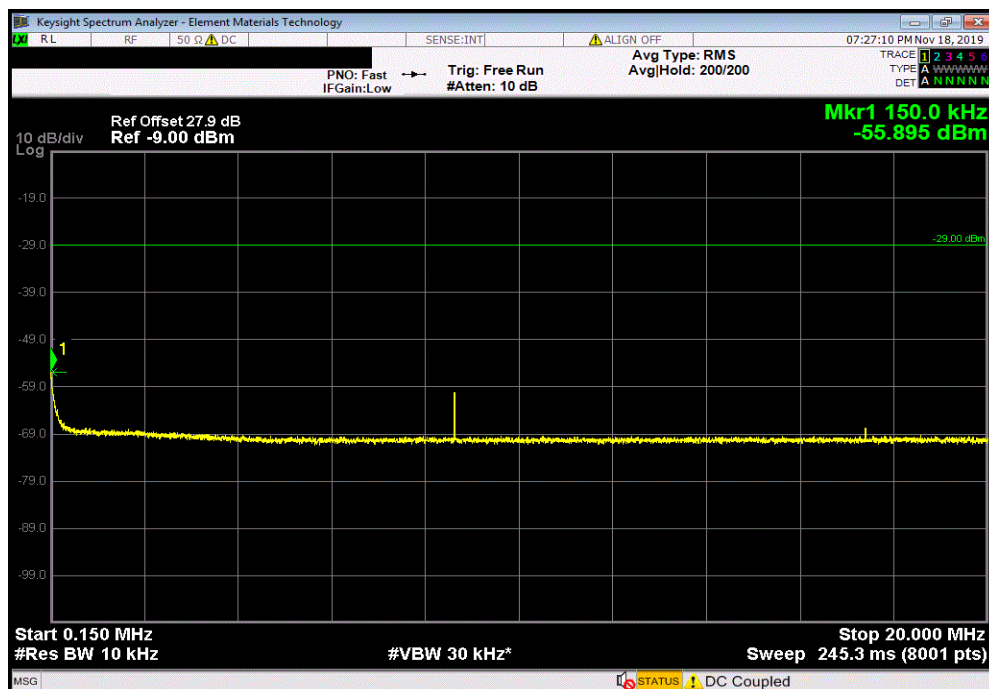


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Band 12, 64QAM Modulation, LTE5 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.303	-39	Pass

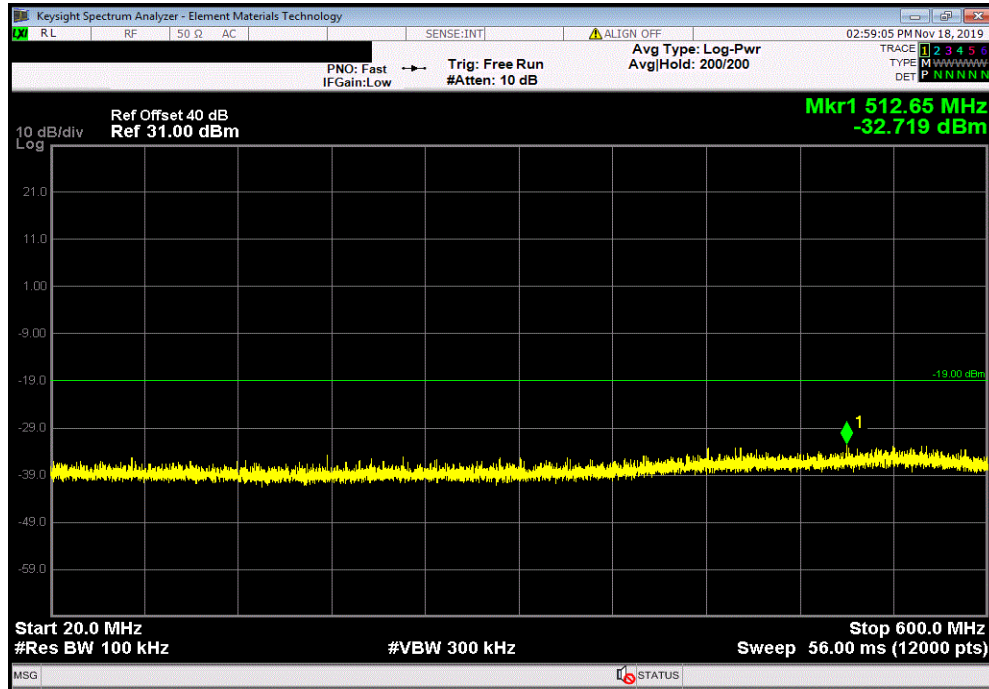


Band 12, 64QAM Modulation, LTE5 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-55.895	-29	Pass

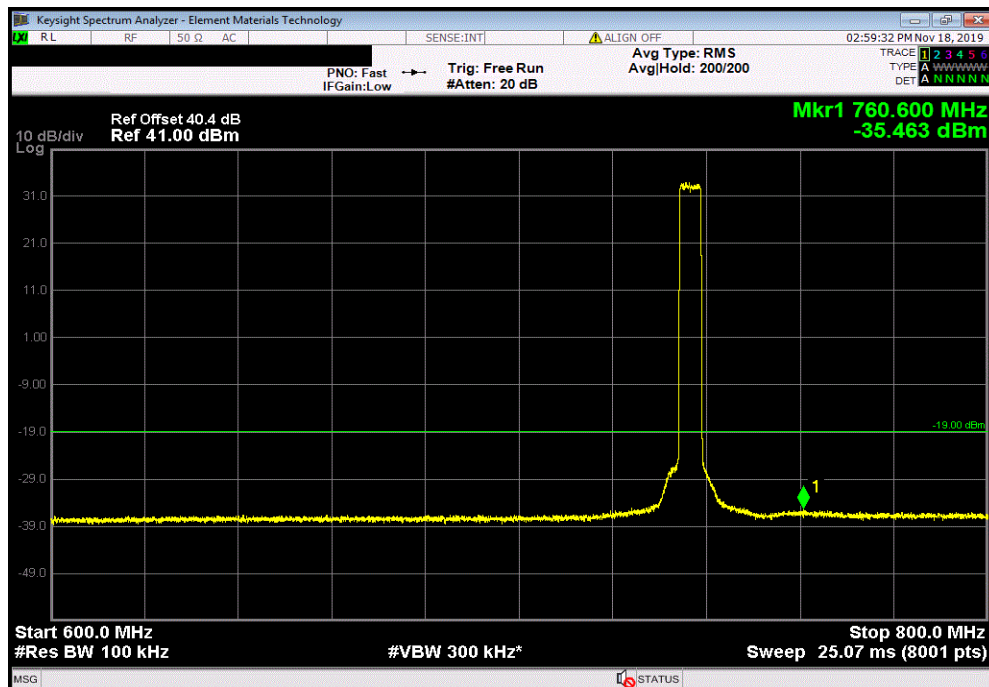


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Band 12, 64QAM Modulation, LTE5 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.719	-19	Pass



Band 12, 64QAM Modulation, LTE5 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-35.463	-19	Pass

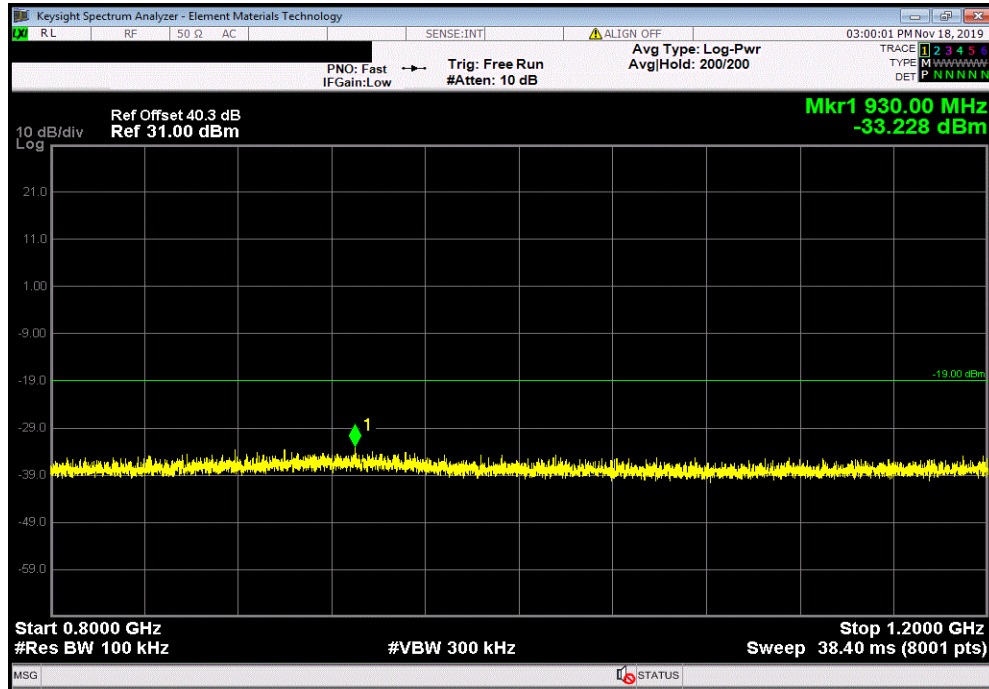


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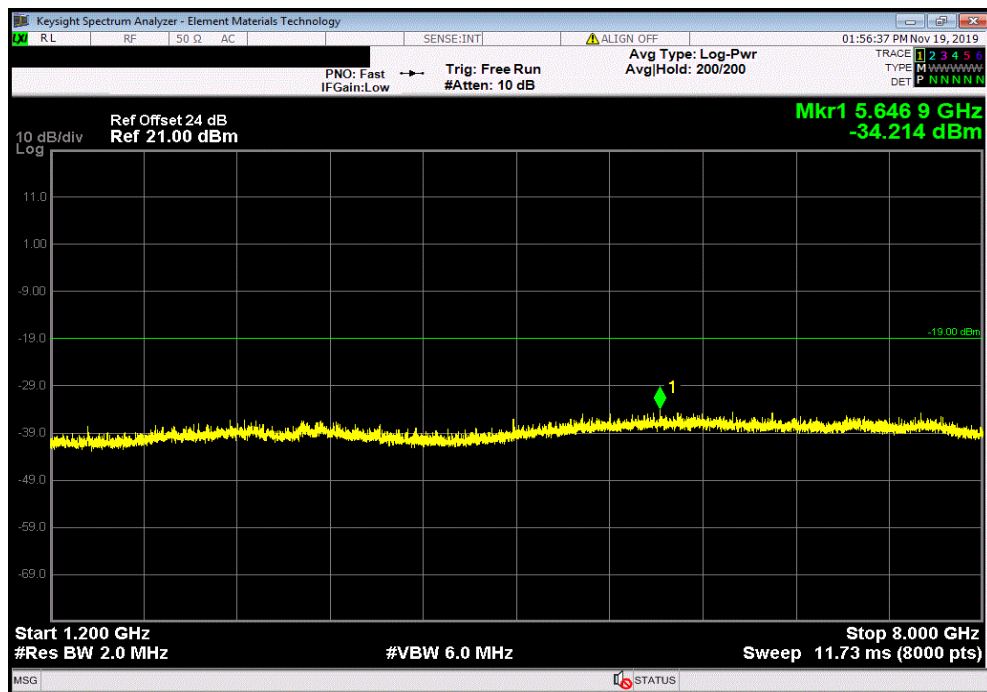


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Band 12, 64QAM Modulation, LTE5 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.228	-19	Pass



Band 12, 64QAM Modulation, LTE5 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.214	-19	Pass



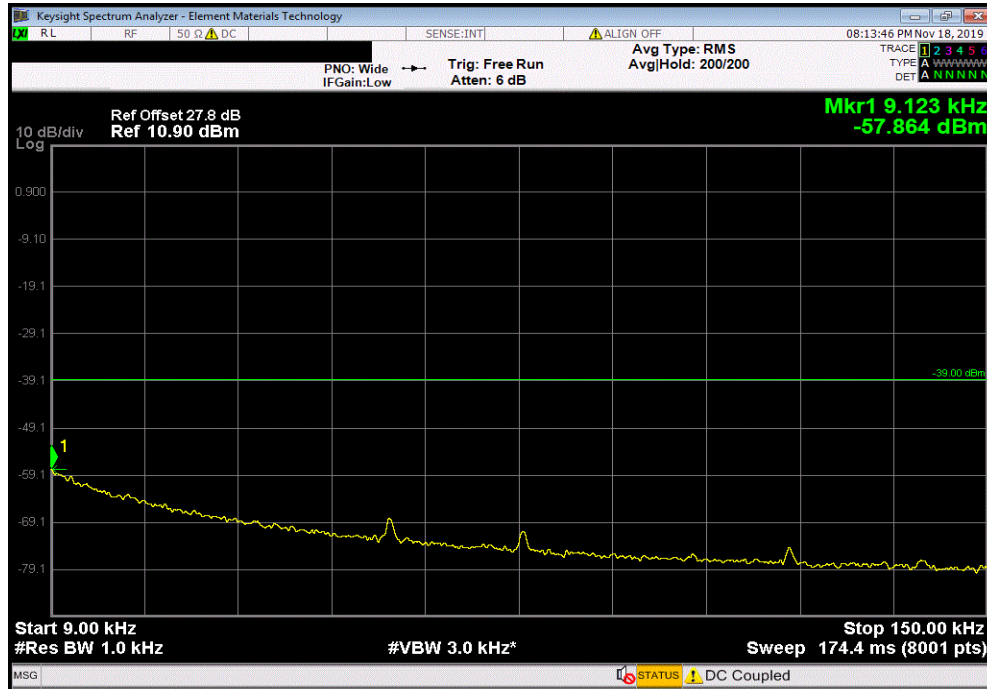
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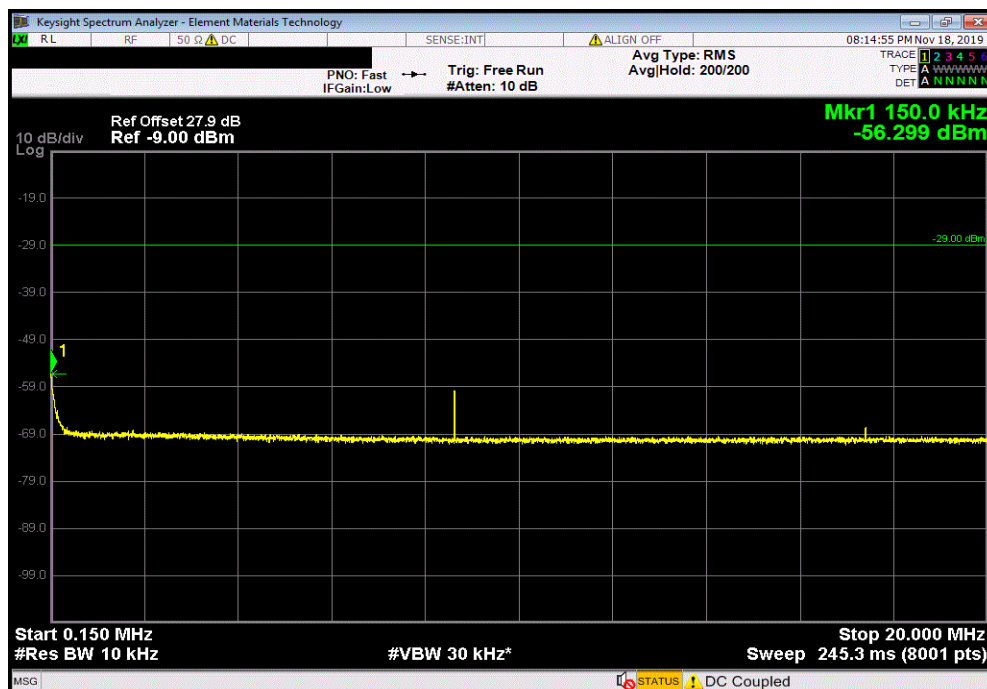
Band 12, 64QAM Modulation, LTE10 Bandwidth, 9kHz-150kHz

				Value (dBm)	Limit (dBm)	Result
				-57.864	-39	Pass



Band 12, 64QAM Modulation, LTE10 Bandwidth, 150kHz-20MHz

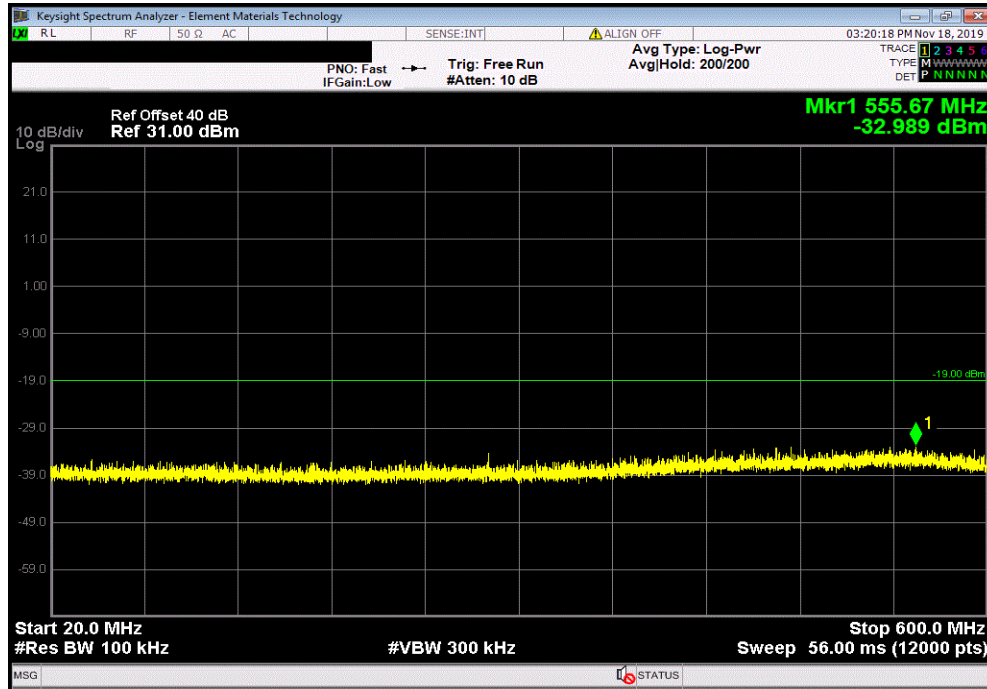
				Value (dBm)	Limit (dBm)	Result
				-56.299	-29	Pass



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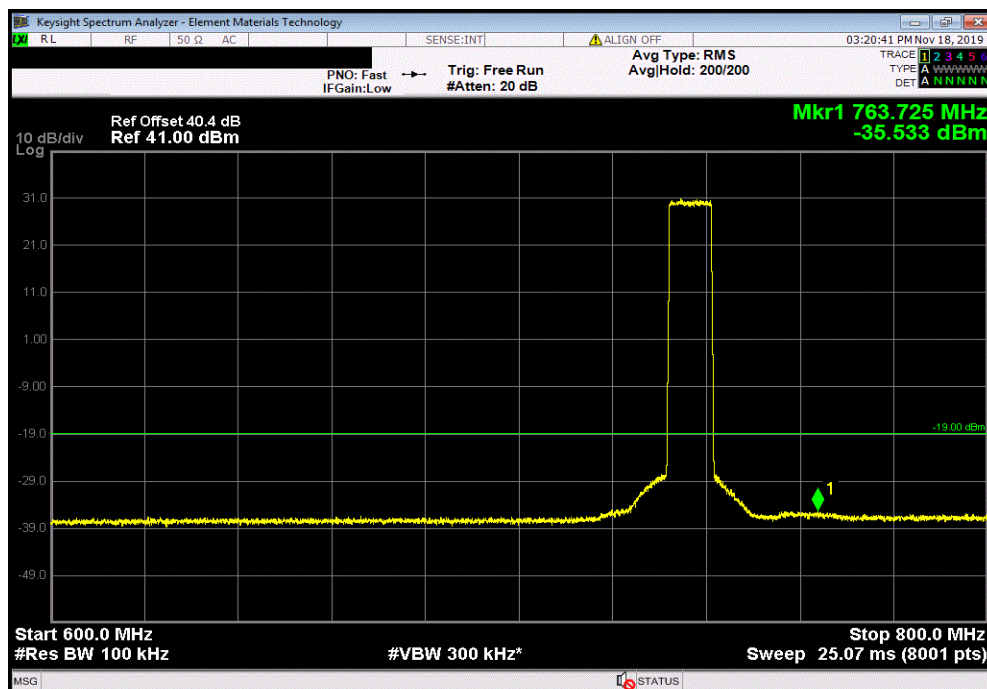
Band 12, 64QAM Modulation, LTE10 Bandwidth, 20MHz-600MHz

				Value (dBm)	Limit (dBm)	Result
				-32.989	-19	Pass



Band 12, 64QAM Modulation, LTE10 Bandwidth, 600MHz-800MHz

				Value (dBm)	Limit (dBm)	Result
				-35.533	-19	Pass

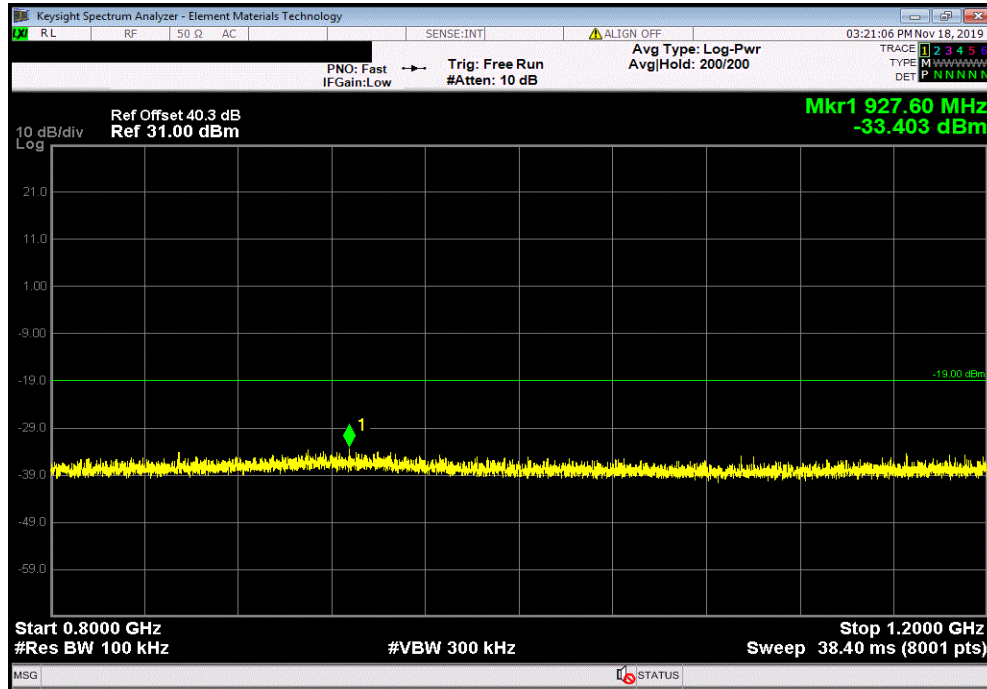




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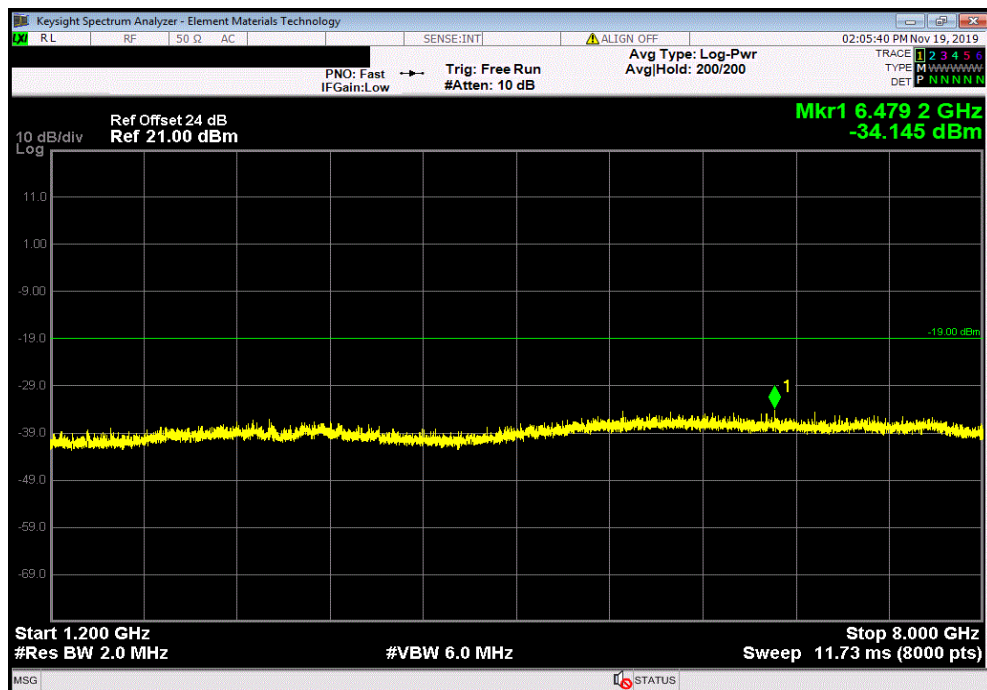
Band 12, 64QAM Modulation, LTE10 Bandwidth, 800MHz-1.2GHz

				Value (dBm)	Limit (dBm)	Result
				-33.403	-19	Pass



Band 12, 64QAM Modulation, LTE10 Bandwidth, 1.2GHz-8GHz

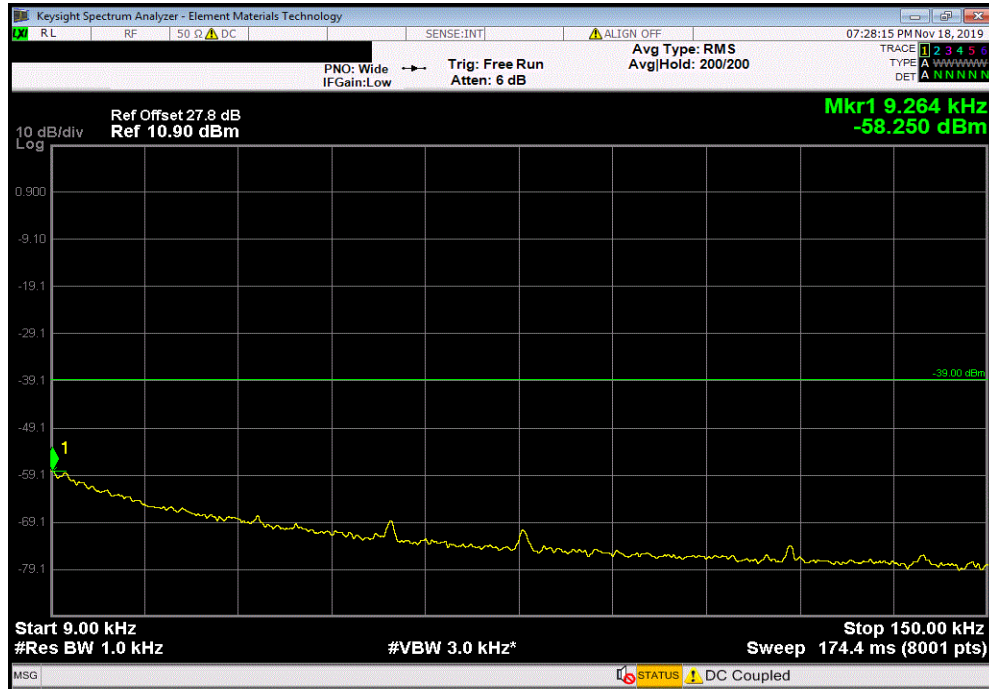
				Value (dBm)	Limit (dBm)	Result
				-34.145	-19	Pass



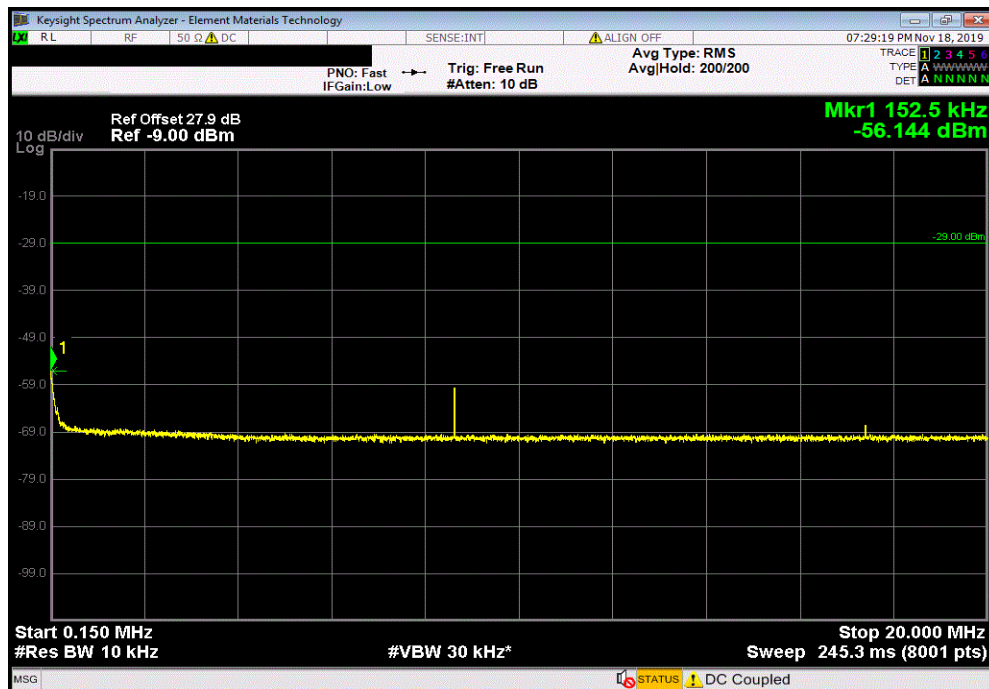


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Band 12, 256QAM Modulation, LTE5 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.25	-39	Pass



Band 12, 256QAM Modulation, LTE5 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.144	-29	Pass



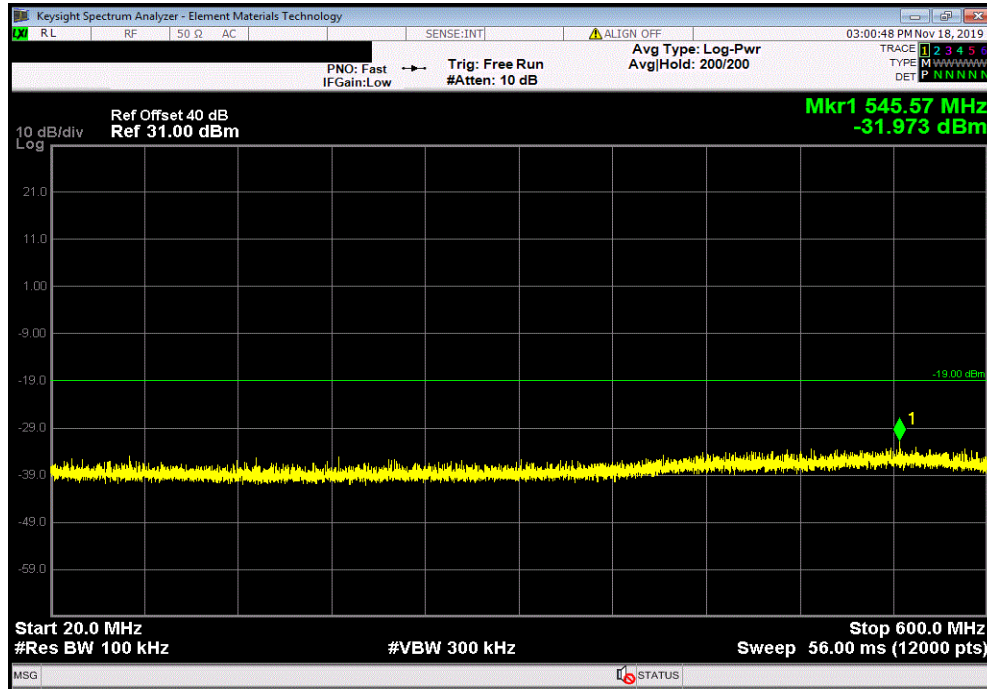
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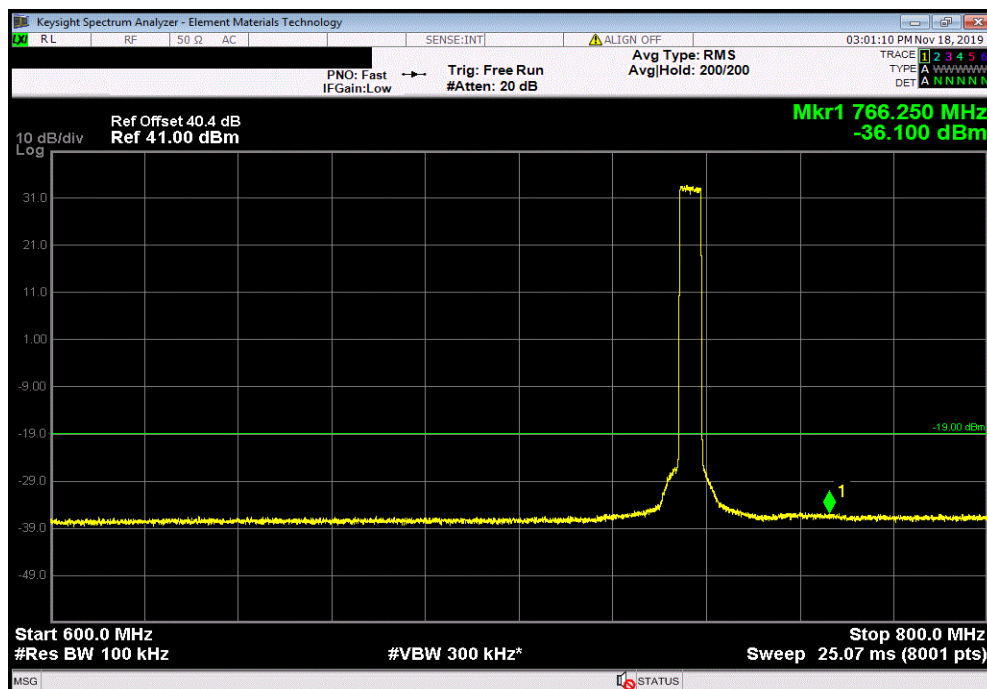
Band 12, 256QAM Modulation, LTE5 Bandwidth, 20MHz-600MHz

				Value (dBm)	Limit (dBm)	Result
				-31.973	-19	Pass



Band 12, 256QAM Modulation, LTE5 Bandwidth, 600MHz-800MHz

				Value (dBm)	Limit (dBm)	Result
				-36.1	-19	Pass

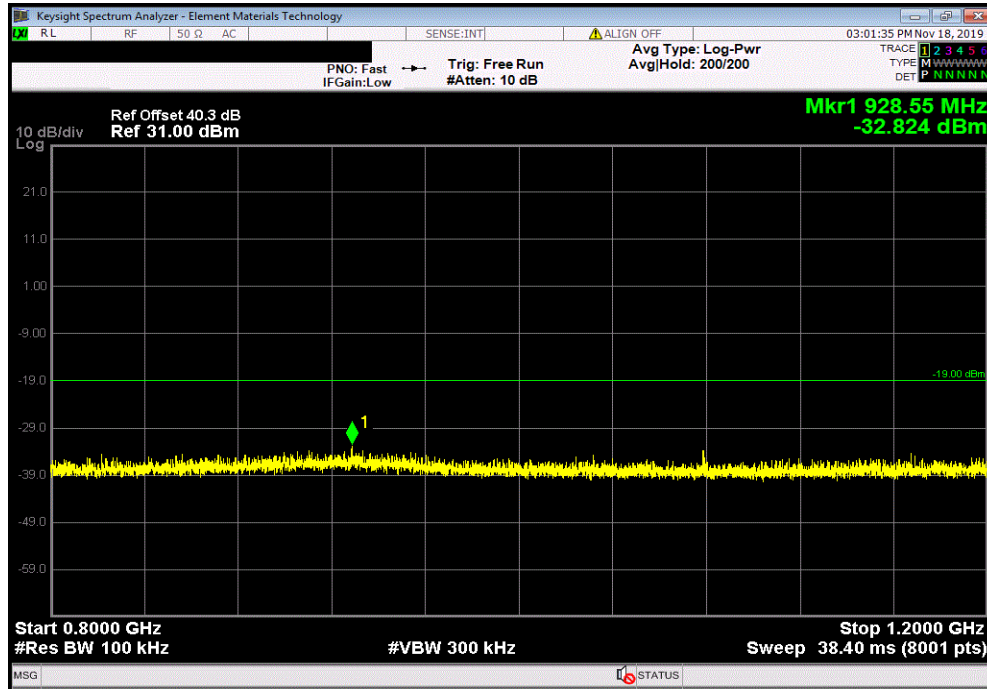


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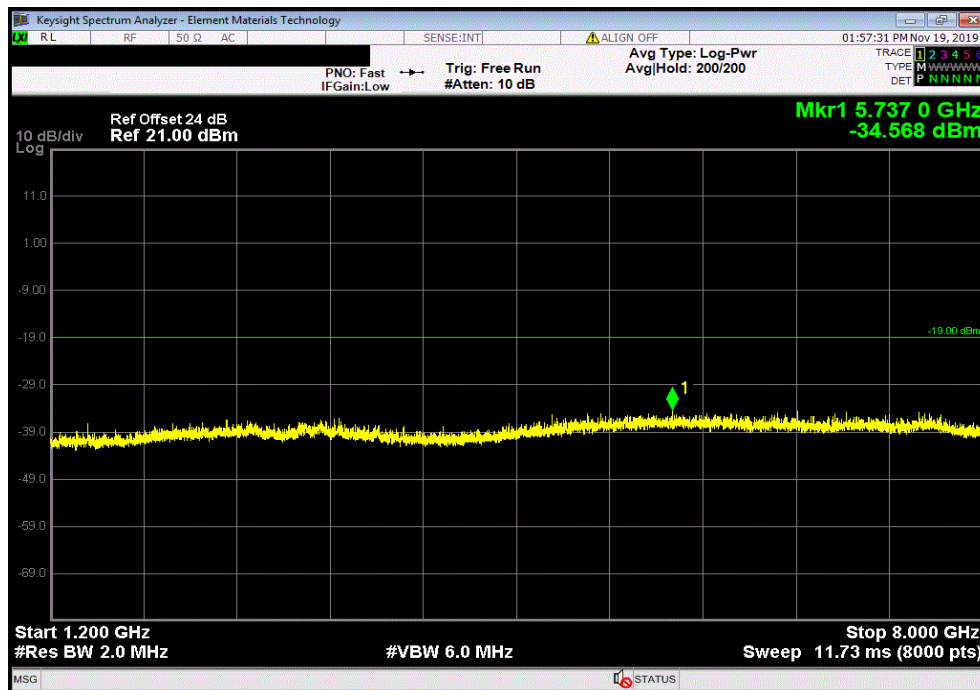


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Band 12, 256QAM Modulation, LTE5 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-32.824	-19	Pass

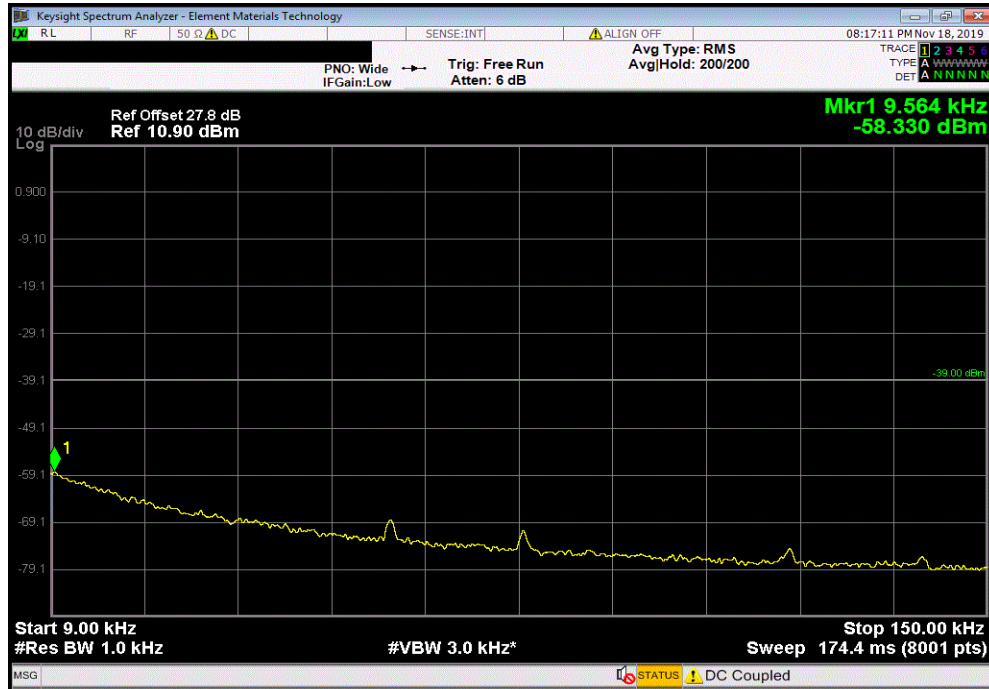


Band 12, 256QAM Modulation, LTE5 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.568	-19	Pass

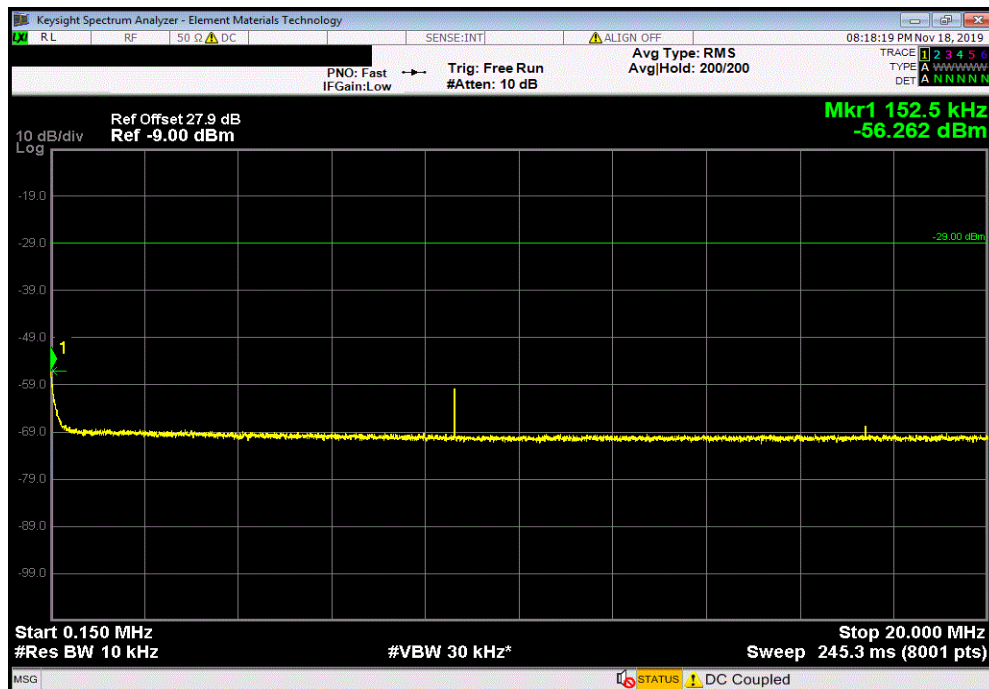


# SPURIOUS CONDUCTED EMISSIONS

Band 12, 256QAM Modulation, LTE10 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.33	-39	Pass



Band 12, 256QAM Modulation, LTE10 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.262	-29	Pass

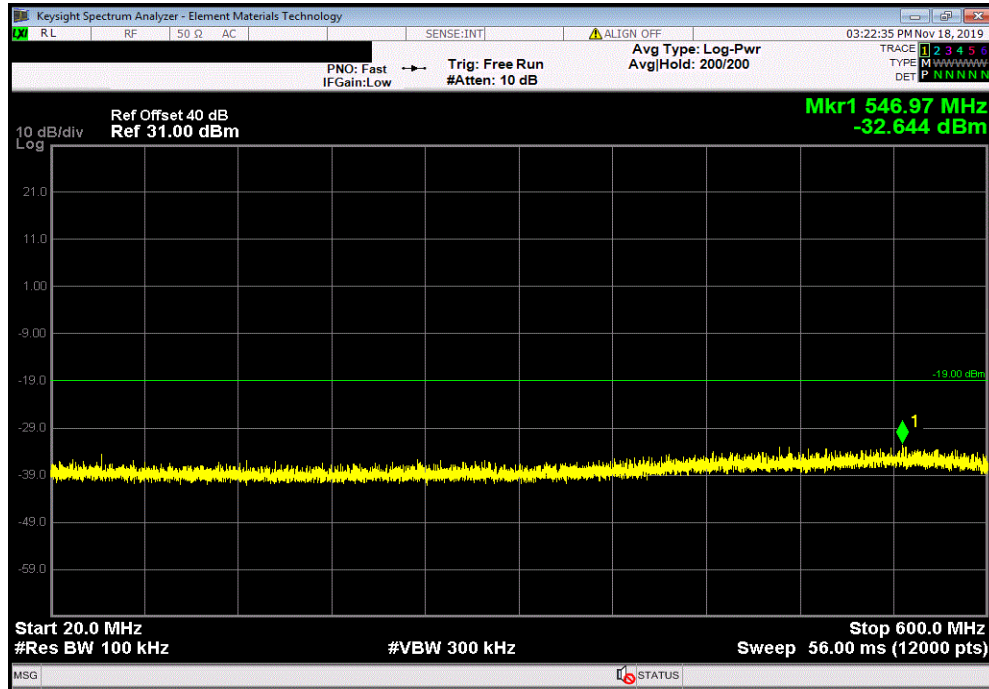


# SPURIOUS CONDUCTED EMISSIONS

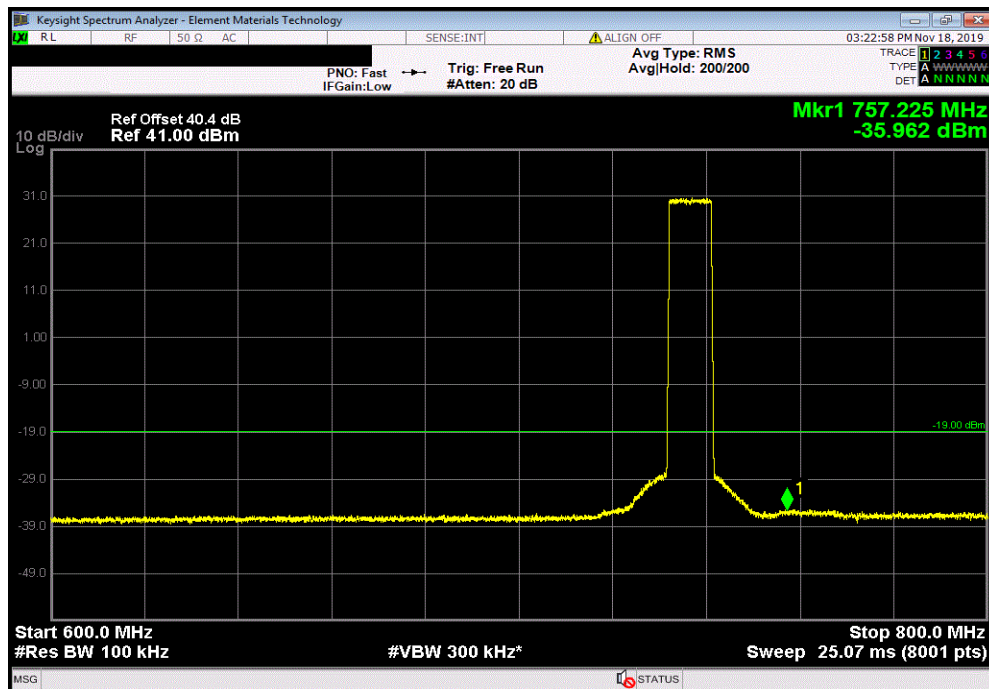


XMI 2019.09.05

Band 12, 256QAM Modulation, LTE10 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.644	-19	Pass



Band 12, 256QAM Modulation, LTE10 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-35.962	-19	Pass



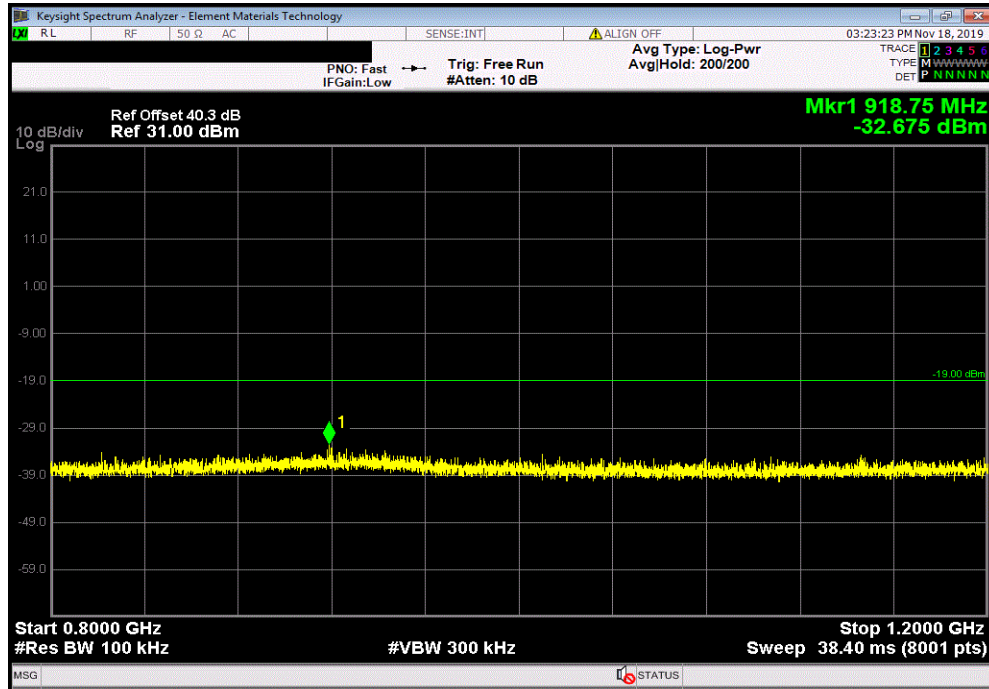


# SPURIOUS CONDUCTED EMISSIONS



XMI 2019.09.05

Band 12, 256QAM Modulation, LTE10 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-32.675	-19	Pass



Band 12, 256QAM Modulation, LTE10 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.087	-19	Pass

