SPURIOUS CONDUCTED EMISSIONS

XMit 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*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*log(4) = -6 dB.
For Band 29, the limit adjustment is -10*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*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.: -39dBm = -19dBm -10log(100kHz/1kHz)]. 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.: -29dBm = -19dBm -10log(100kHz/10kHz)].

Per section 90.543(e)(3), the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -19 dBm [-13 dBm -10 log (4)] per FCC KDB 662911D01 v02r01 because the RRH may operate as a 4 port MIMO transmitter for Band 14. FCC 90.543(e)(5) requires a >100 kHz measurement bandwidth for emissions 100 kHz outside of the RRH operating frequency range.

Per section 90.543(f), for the frequency range 1559-1610 MHz the EIRP limit is -70dBW/MHz for wideband signals and -80dBW for discrete emissions of bandwidths less than 700Hz. This equates to an EIRP of -40dBm/MHz for wideband emissions and -50dBm/MHz for discrete emissions. The limit is adjusted to -46 dBm [-40 dBm -10 log (4)] for wideband signals and -56dBm [-50 dBm -10 log (4)] for discrete emissions per FCC KDB 662911D01 v02r01 because the RRH may operate as a 4 port MIMO transmitter.

SPURIOUS CONDUCTED EMISSIONS

element

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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:**	**30.8% RH**
Project:	**None**			**Barometric Pres.:**	**1017 mbar**
Tested by:	**Jonathan Kiefer**	**Power:**	**54VDC**	**Job Site:**	**TX09**

TEST SPECIFICATIONS	**Test Method**
FCC 27:2019	ANSI C63.26:2015

COMMENTS

Band 14 conducted spurious emissions for four modulation types. Tested on highest power antenna port (Port 2). EUT is operated at 100% duty cycle.

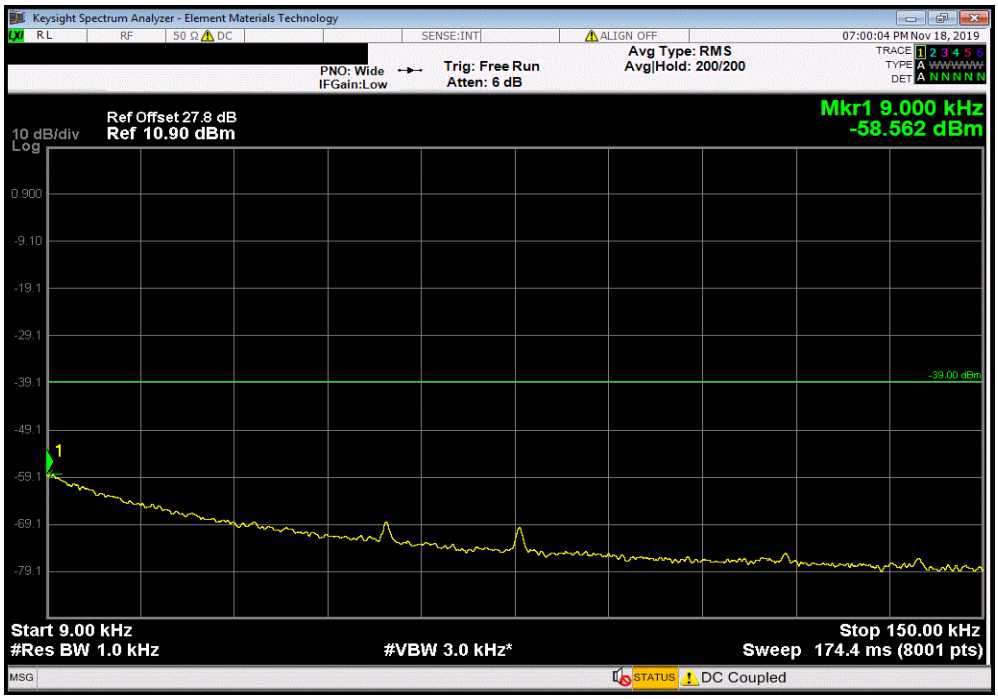
DEVIATIONS FROM TEST STANDARD

None

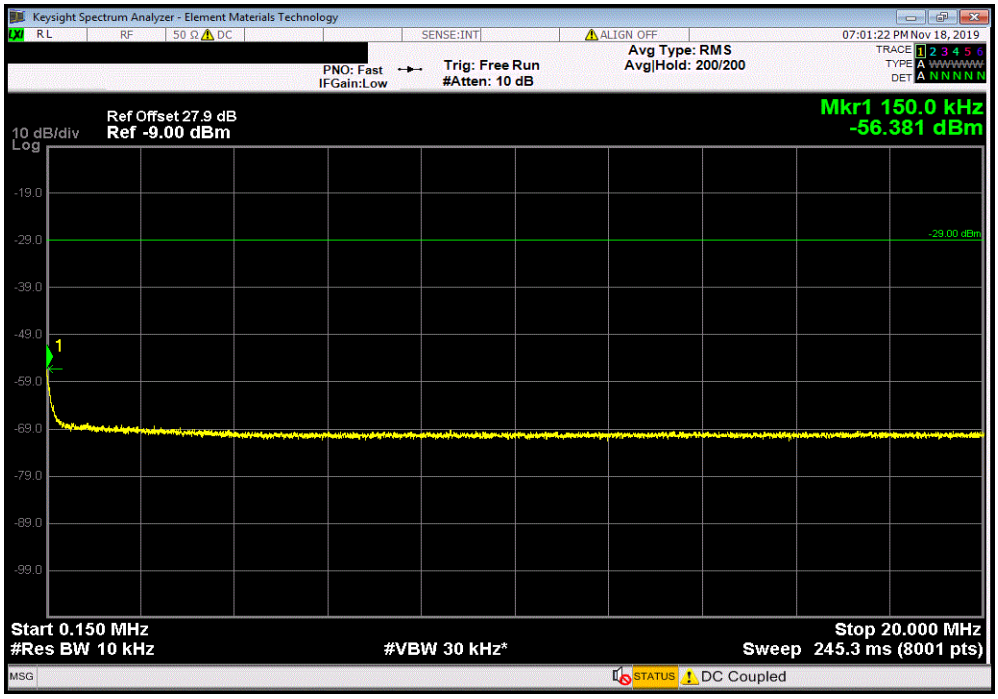
Configuration #	**2,4,5**	*Signature* Jonathan Kiefer

		Value (dBm)	**Limit (dBm)**	**Result**
Band 14				
QPSK Modulation				
LTE5 Bandwidth				
	9kHz-150kHz	-58.562	-39	Pass
	150kHz-20MHz	-56.381	-29	Pass
	20MHz-600MHz	-32.698	-19	Pass
	600MHz-800MHz	-35.15	-19	Pass
	800MHz-1.2GHz	-32.62	-19	Pass
	1.2GHz-8GHz	-34.554	-19	Pass
	1559MHz-1610MHz	-58.934	-46	Pass
LTE10 Bandwidth				
	9kHz-150kHz	-58.767	-39	Pass
	150kHz-20MHz	-56.309	-29	Pass
	20MHz-600MHz	-32.978	-19	Pass
	600MHz-800MHz	-35.292	-19	Pass
	800MHz-1.2GHz	-33.084	-19	Pass
	1.2GHz-8GHz	-34.512	-19	Pass
	1559MHz-1610MHz	-58.991	-46	Pass
16QAM Modulation				
LTE5 Bandwidth				
	9kHz-150kHz	-58.204	-39	Pass
	150kHz-20MHz	-56.25	-29	Pass
	20MHz-600MHz	-33.044	-19	Pass
	600MHz-800MHz	-35.764	-19	Pass
	800MHz-1.2GHz	-33.74	-19	Pass
	1.2GHz-8GHz	-34.281	-19	Pass
	1559MHz-1610MHz	-59.138	-46	Pass
LTE10 Bandwidth				
	9kHz-150kHz	-58.319	-39	Pass
	150kHz-20MHz	-56.492	-29	Pass
	20MHz-600MHz	-32.791	-19	Pass
	600MHz-800MHz	-35.186	-19	Pass
	800MHz-1.2GHz	-32.939	-19	Pass
	1.2GHz-8GHz	-33.29	-19	Pass
	1559MHz-1610MHz	-59.087	-46	Pass
64QAM Modulation				
LTE5 Bandwidth				
	9kHz-150kHz	-58.037	-39	Pass
	150kHz-20MHz	-56.445	-29	Pass
	20MHz-600MHz	-32.396	-19	Pass
	600MHz-800MHz	-35.358	-19	Pass
	800MHz-1.2GHz	-33.062	-19	Pass
	1.2GHz-8GHz	-33.818	-19	Pass
	1559MHz-1610MHz	-58.848	-46	Pass
LTE10 Bandwidth				
	9kHz-150kHz	-58.06	-39	Pass
	150kHz-20MHz	-56.183	-29	Pass
	20MHz-600MHz	-32.205	-19	Pass
	600MHz-800MHz	-35.676	-19	Pass
	800MHz-1.2GHz	-33.692	-19	Pass
	1.2GHz-8GHz	-33.942	-19	Pass
	1559MHz-1610MHz	-59.137	-46	Pass
256QAM Modulation				
LTE5 Bandwidth				
	9kHz-150kHz	-58.187	-39	Pass
	150kHz-20MHz	-55.901	-29	Pass
	20MHz-600MHz	-32.777	-19	Pass
	600MHz-800MHz	-35.87	-19	Pass
	800MHz-1.2GHz	-33.167	-19	Pass
	1.2GHz-8GHz	-34.817	-19	Pass
	1559MHz-1610MHz	-59.098	-46	Pass
LTE10 Bandwidth				
	9kHz-150kHz	-58.185	-39	Pass
	150kHz-20MHz	-56.374	-29	Pass
	20MHz-600MHz	-32.432	-19	Pass
	600MHz-800MHz	-35.652	-19	Pass
	800MHz-1.2GHz	-33.839	-19	Pass
	1.2GHz-8GHz	-34.404	-19	Pass
	1559MHz-1610MHz	-59.05	-46	Pass

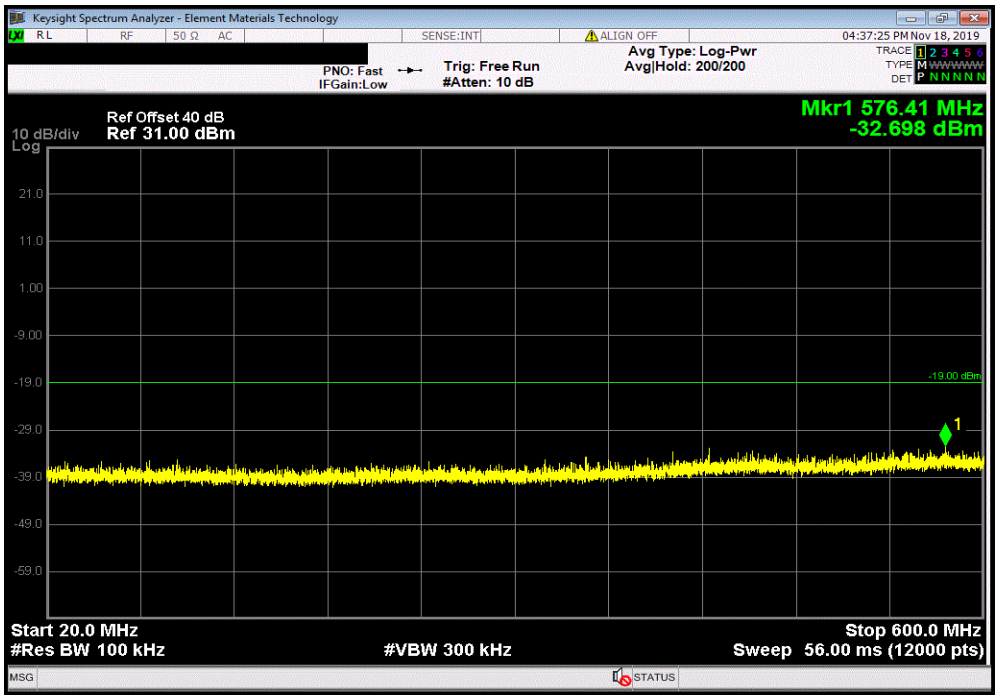
Band 14, QPSK Modulation, LTE5 Bandwidth, 9kHz-150kHz							
					Value (dBm)	Limit (dBm)	Result
					-58.562	-39	Pass



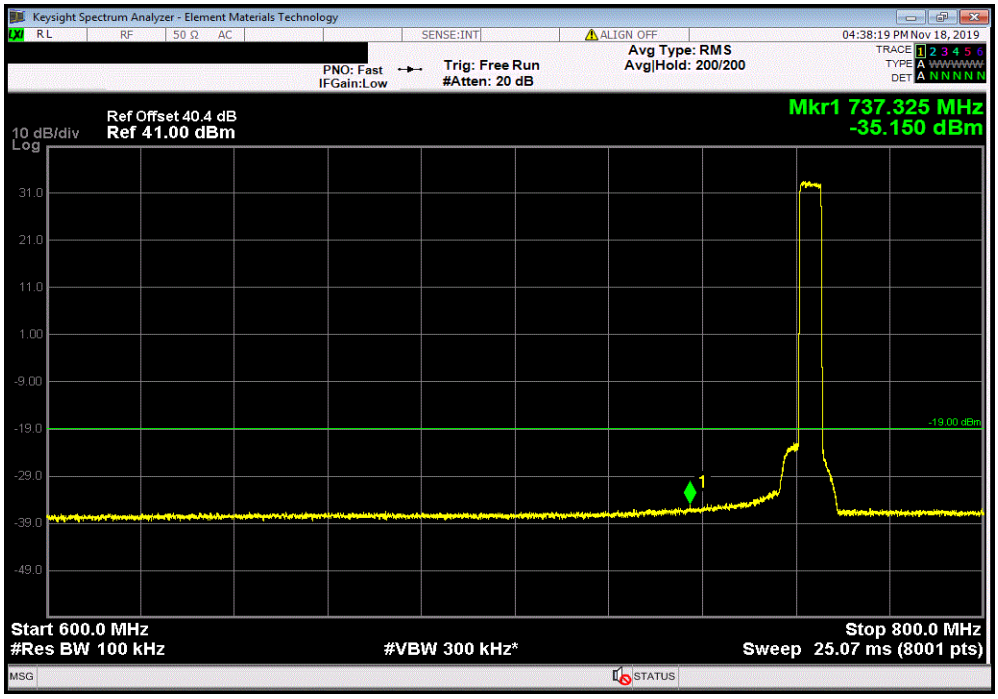
Band 14, QPSK Modulation, LTE5 Bandwidth, 150kHz-20MHz							
					Value (dBm)	Limit (dBm)	Result
					-56.381	-29	Pass



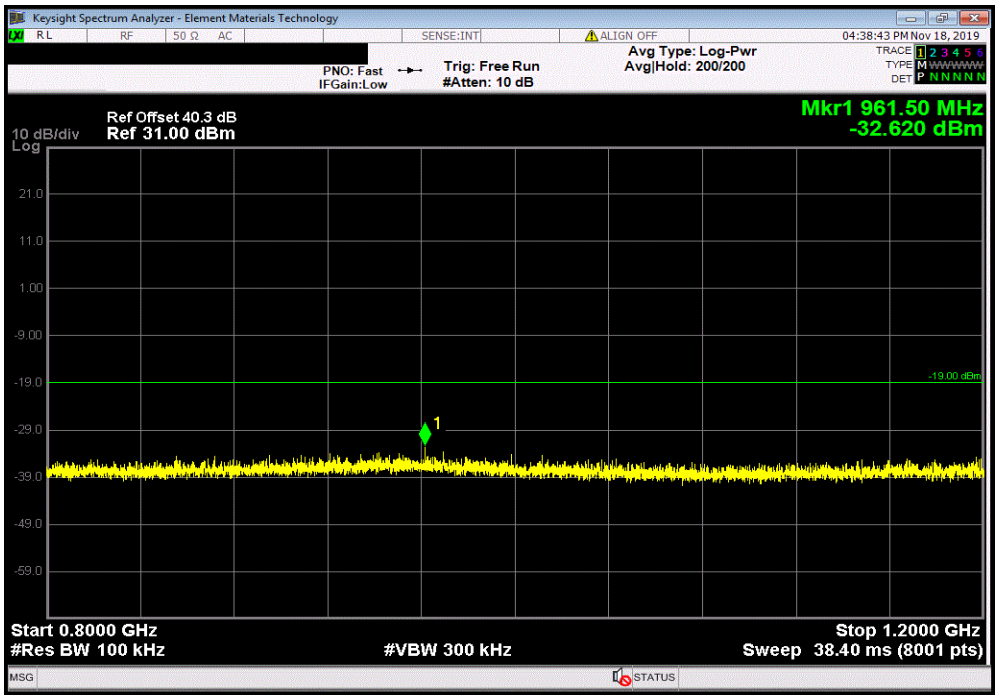
Band 14, QPSK Modulation, LTE5 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.698	-19	Pass



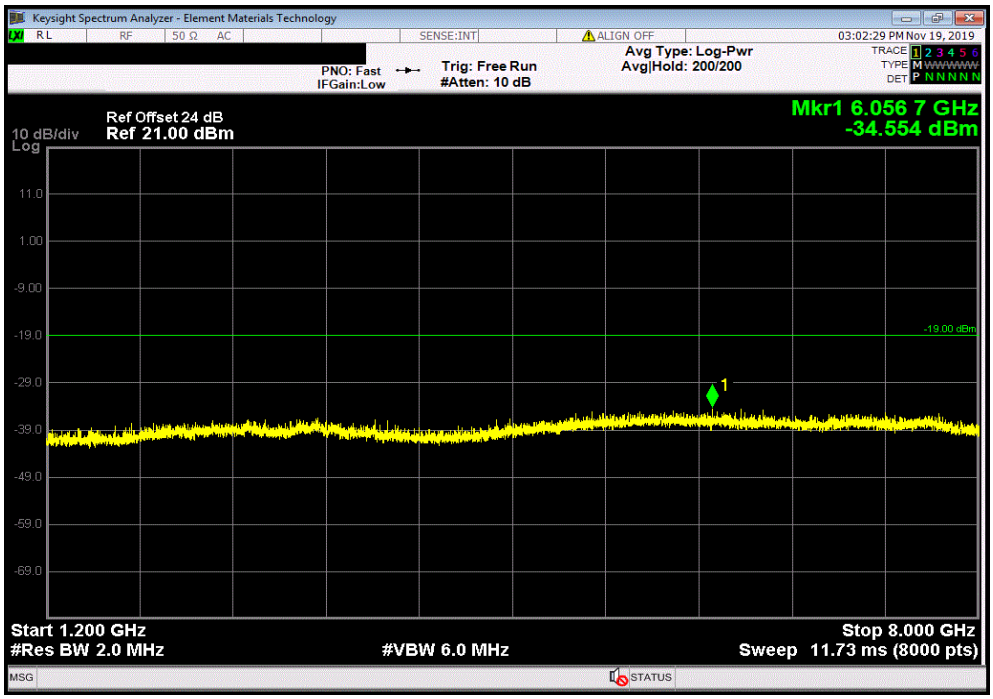
Band 14, QPSK Modulation, LTE5 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-35.15	-19	Pass



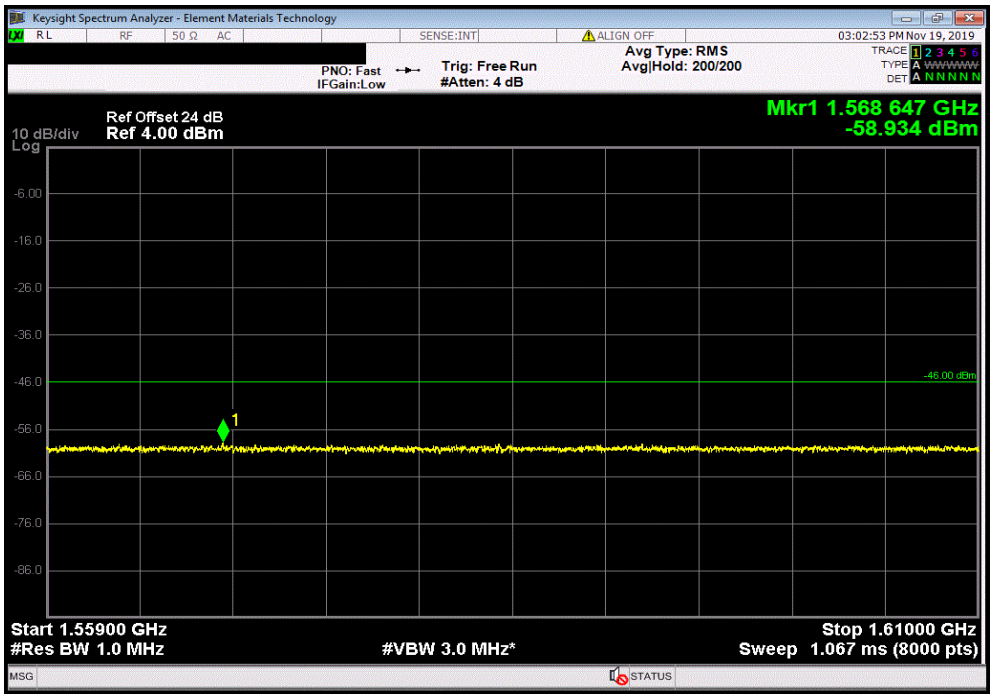
Band 14, QPSK Modulation, LTE5 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-32.62	-19	Pass



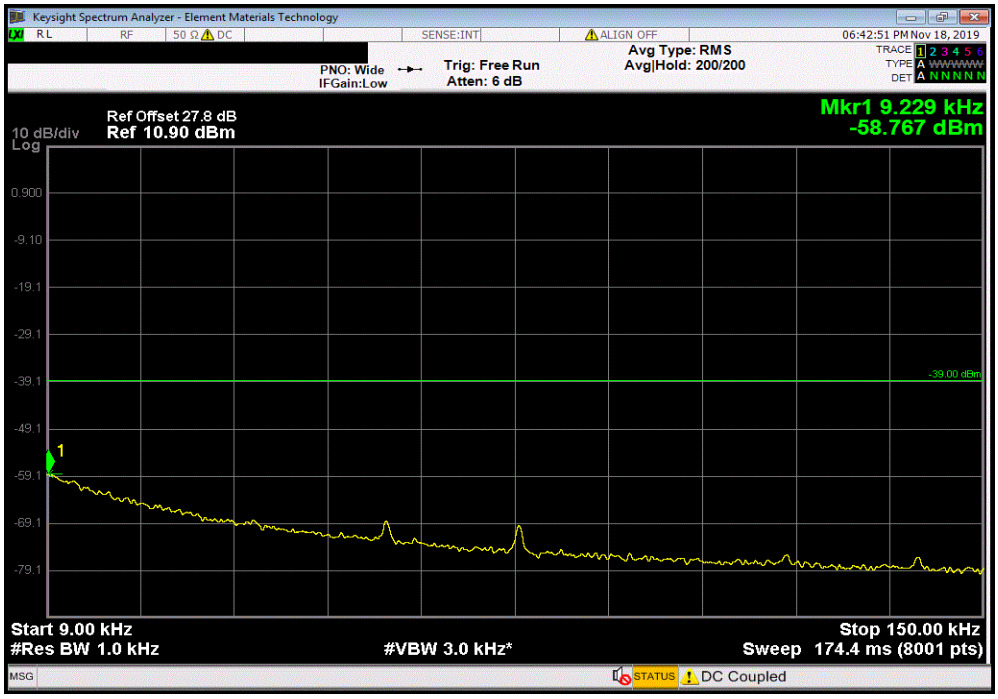
Band 14, QPSK Modulation, LTE5 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.554	-19	Pass



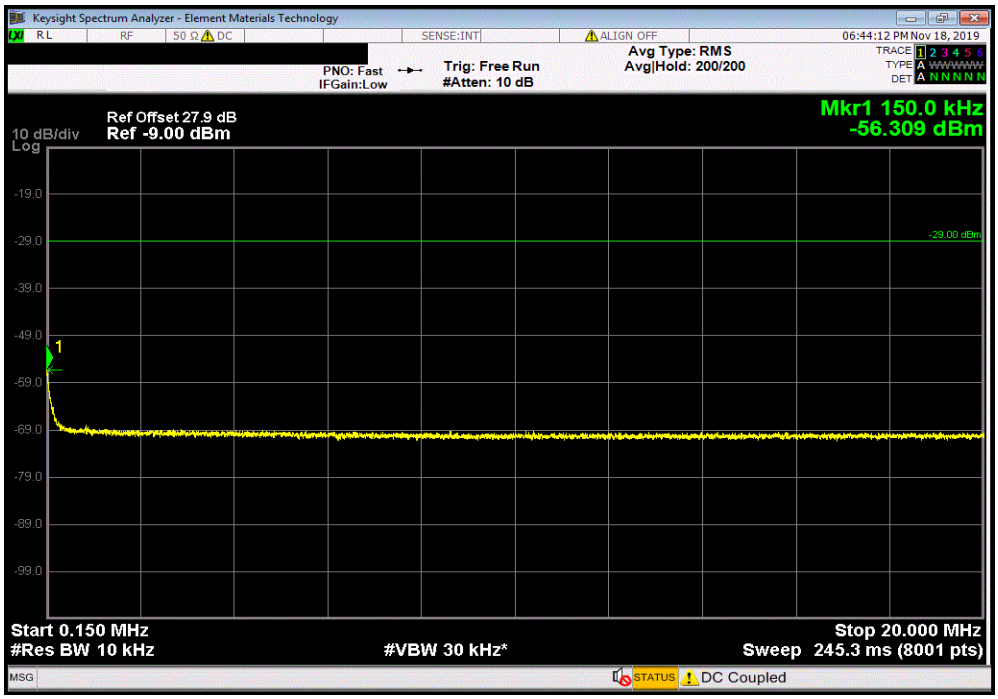
Band 14, QPSK Modulation, LTE5 Bandwidth, 1559MHz-1610MHz						
				Value (dBm)	Limit (dBm)	Result
				-58.934	-46	Pass



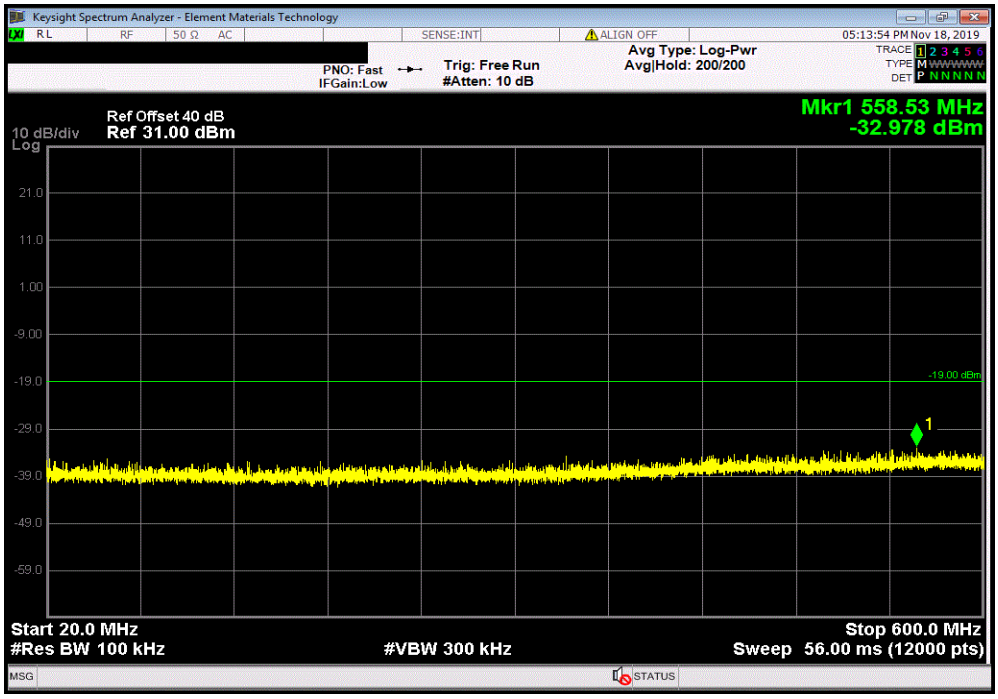
Band 14, QPSK Modulation, LTE10 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.767	-39	Pass



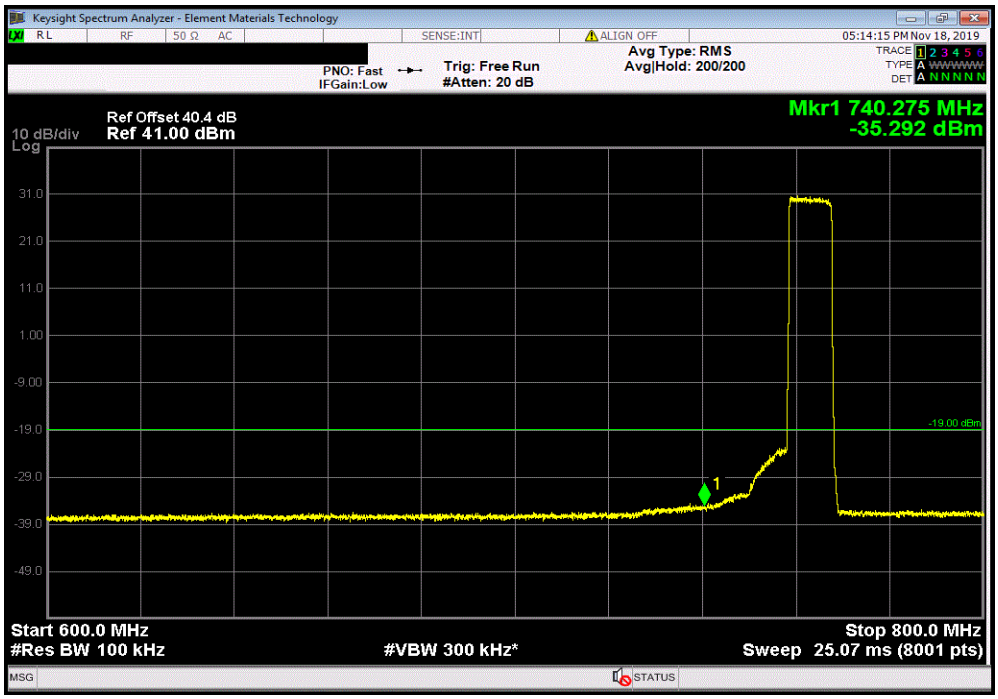
Band 14, QPSK Modulation, LTE10 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.309	-29	Pass



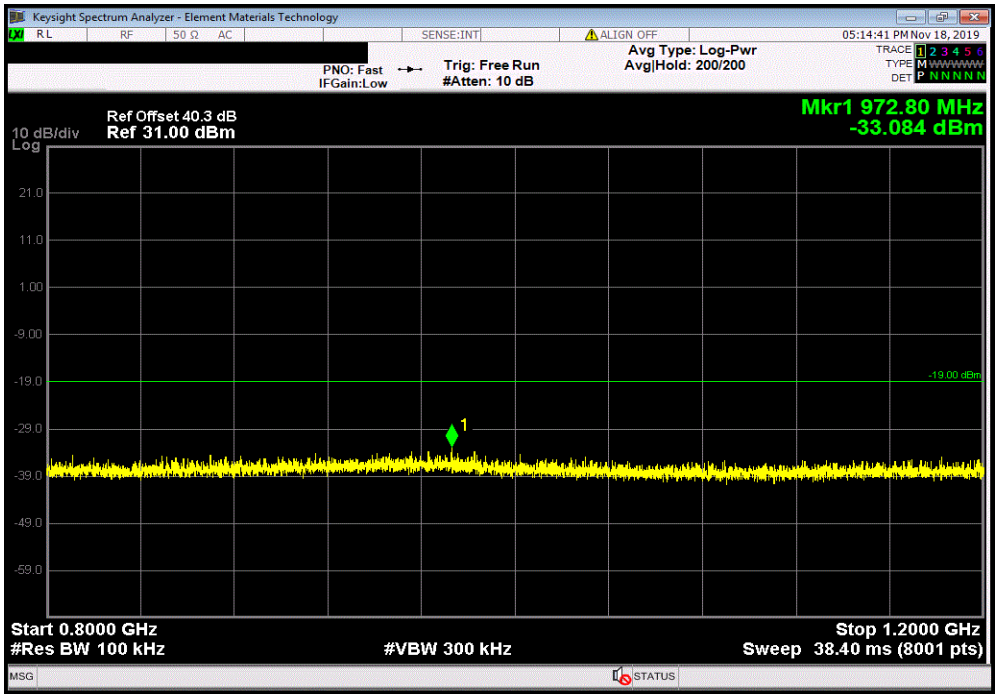
Band 14, QPSK Modulation, LTE10 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.978	-19	Pass



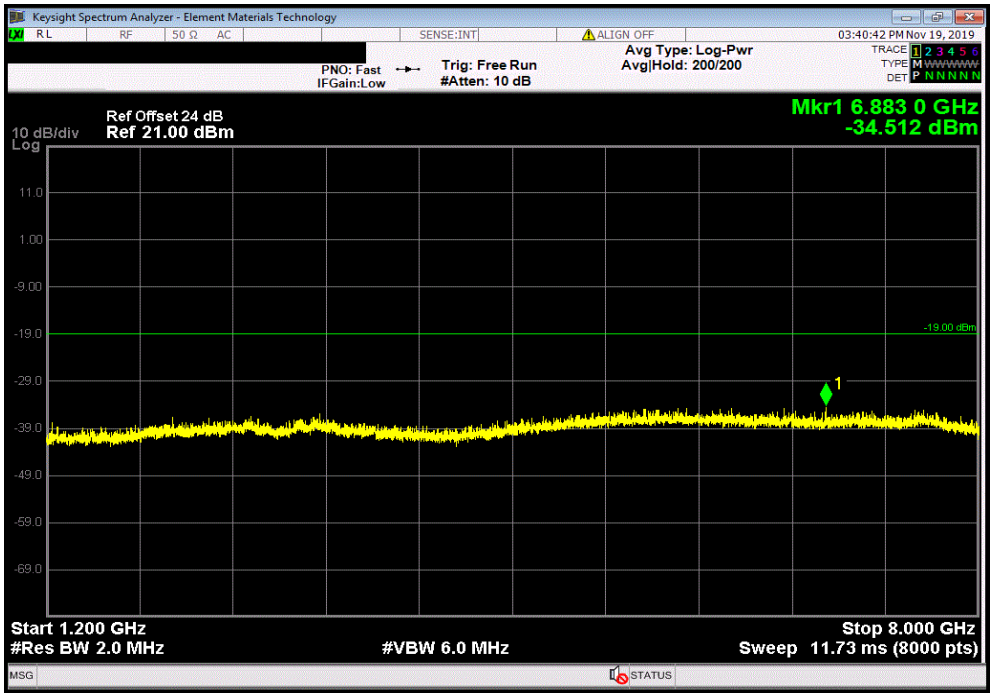
Band 14, QPSK Modulation, LTE10 Bandwidth, 600MHz-800MHz							
					Value (dBm)	Limit (dBm)	Result
					-35.292	-19	Pass



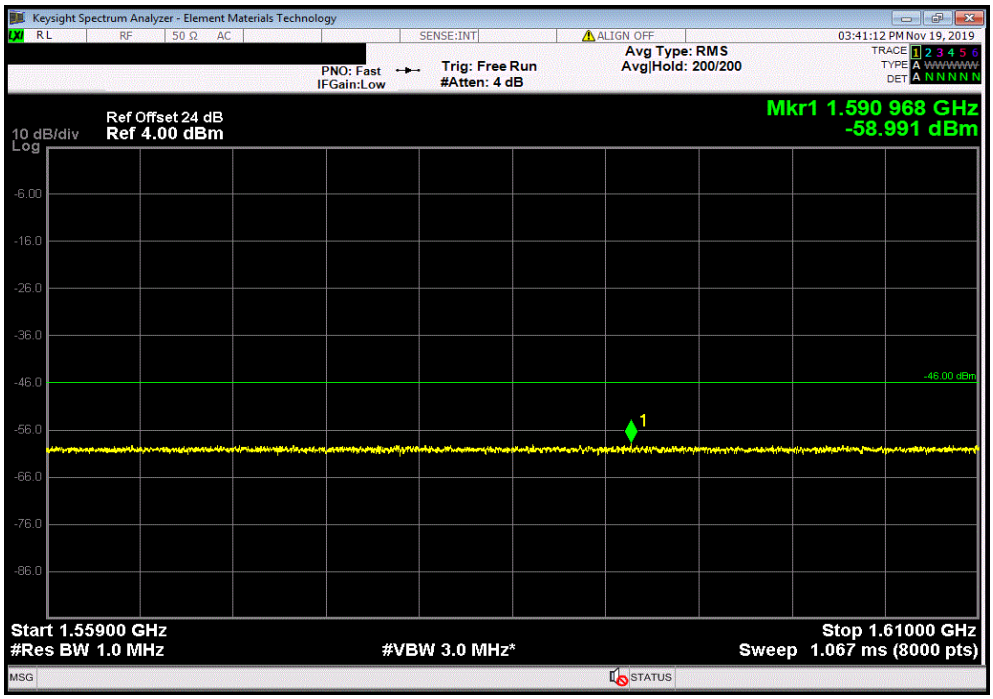
Band 14, QPSK Modulation, LTE10 Bandwidth, 800MHz-1.2GHz							
					Value (dBm)	Limit (dBm)	Result
					-33.084	-19	Pass



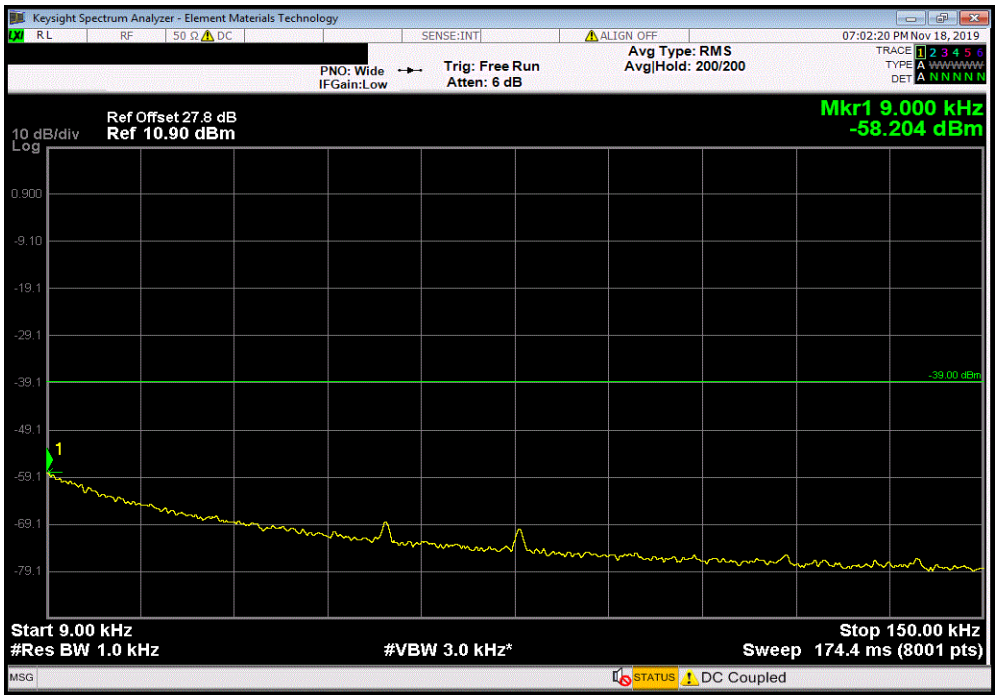
Band 14, QPSK Modulation, LTE10 Bandwidth, 1.2GHz-8GHz							
					Value (dBm)	Limit (dBm)	Result
					-34.512	-19	Pass



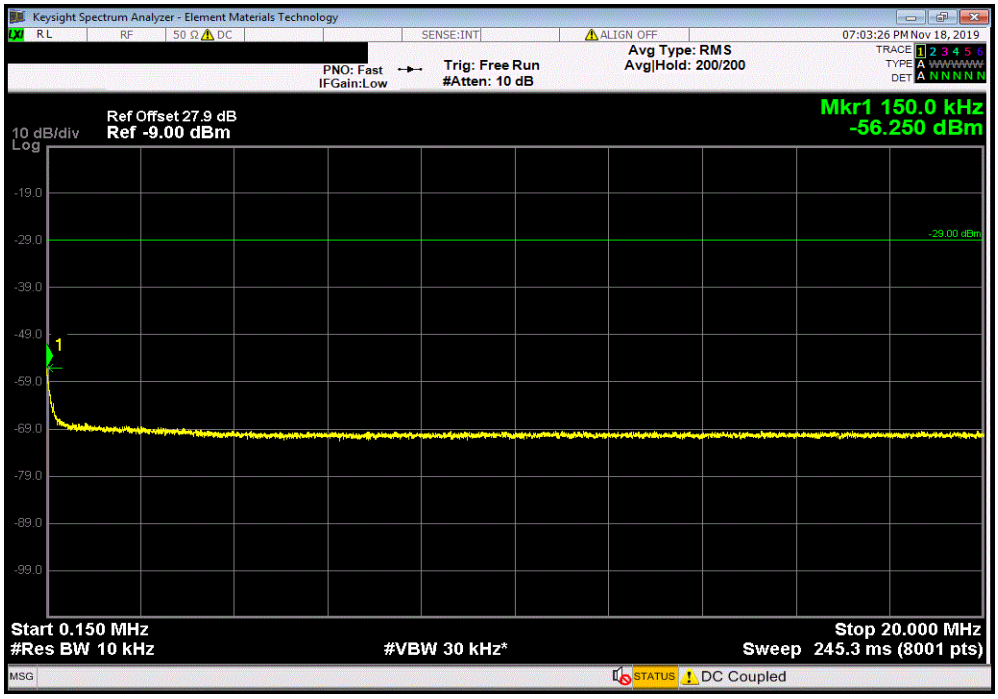
Band 14, QPSK Modulation, LTE10 Bandwidth, 1559MHz-1610MHz							
					Value (dBm)	Limit (dBm)	Result
					-58.991	-46	Pass



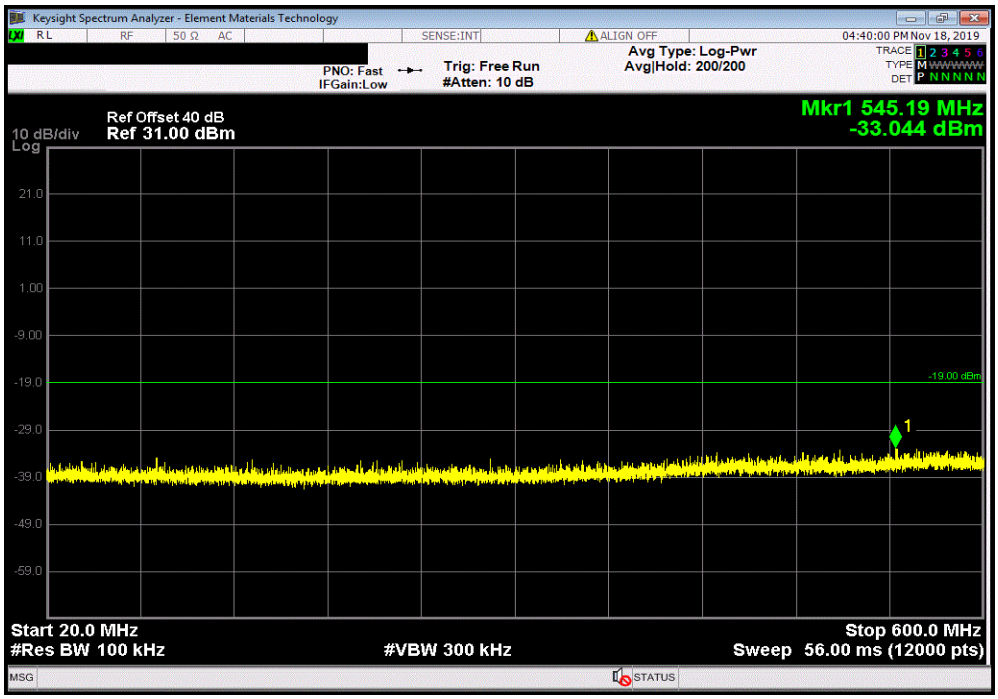
Band 14, 16QAM Modulation, LTE5 Bandwidth, 9kHz-150kHz							
					Value (dBm)	Limit (dBm)	Result
					-58.204	-39	Pass



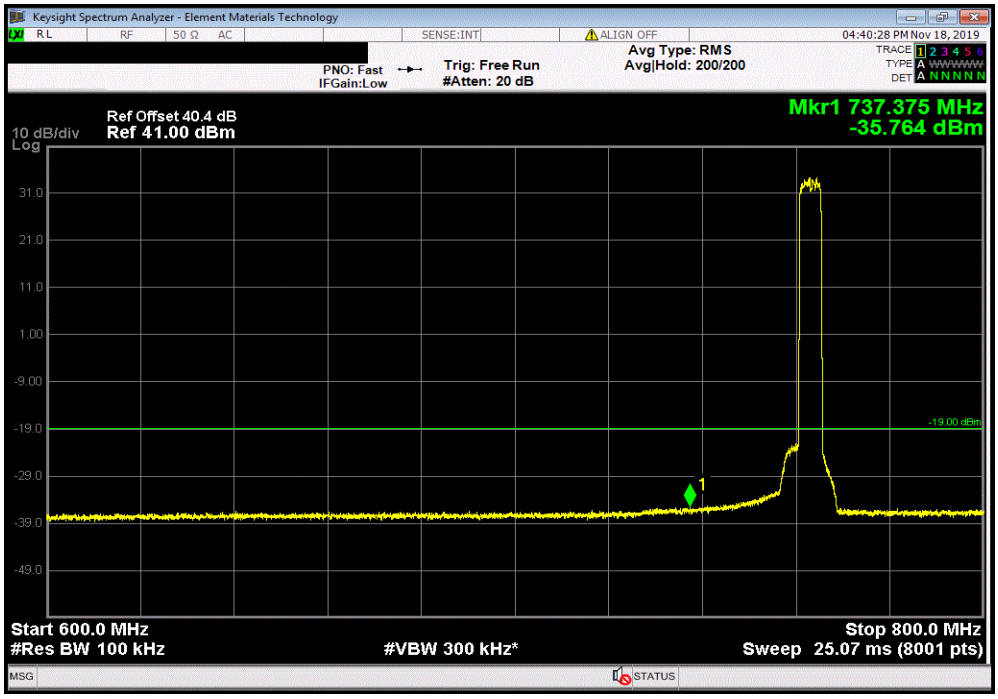
Band 14, 16QAM Modulation, LTE5 Bandwidth, 150kHz-20MHz							
					Value (dBm)	Limit (dBm)	Result
					-56.25	-29	Pass



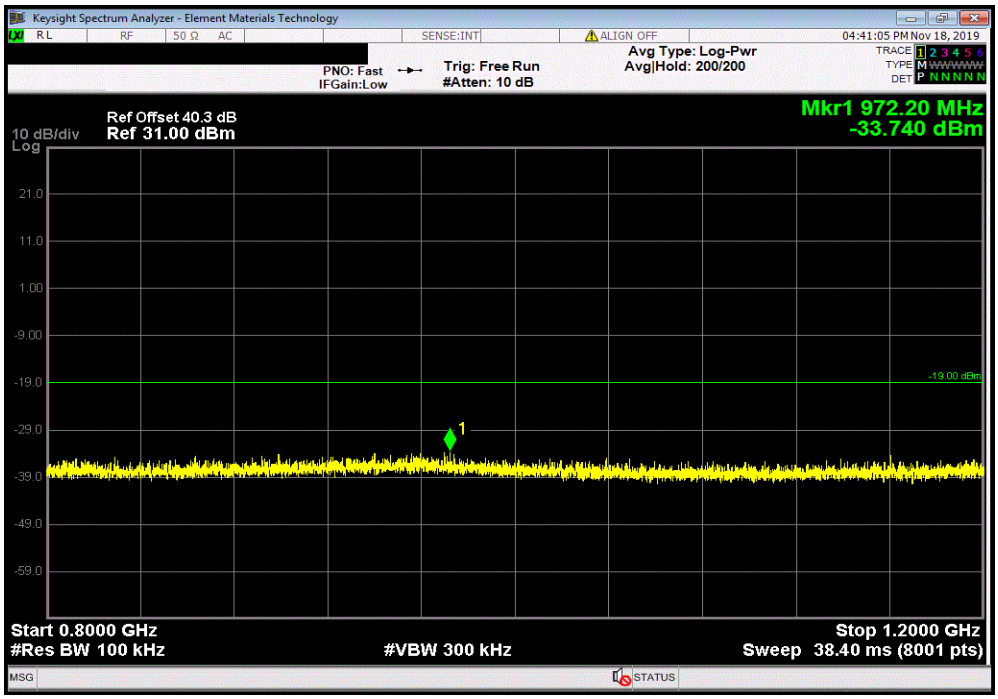
Band 14, 16QAM Modulation, LTE5 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-33.044	-19	Pass



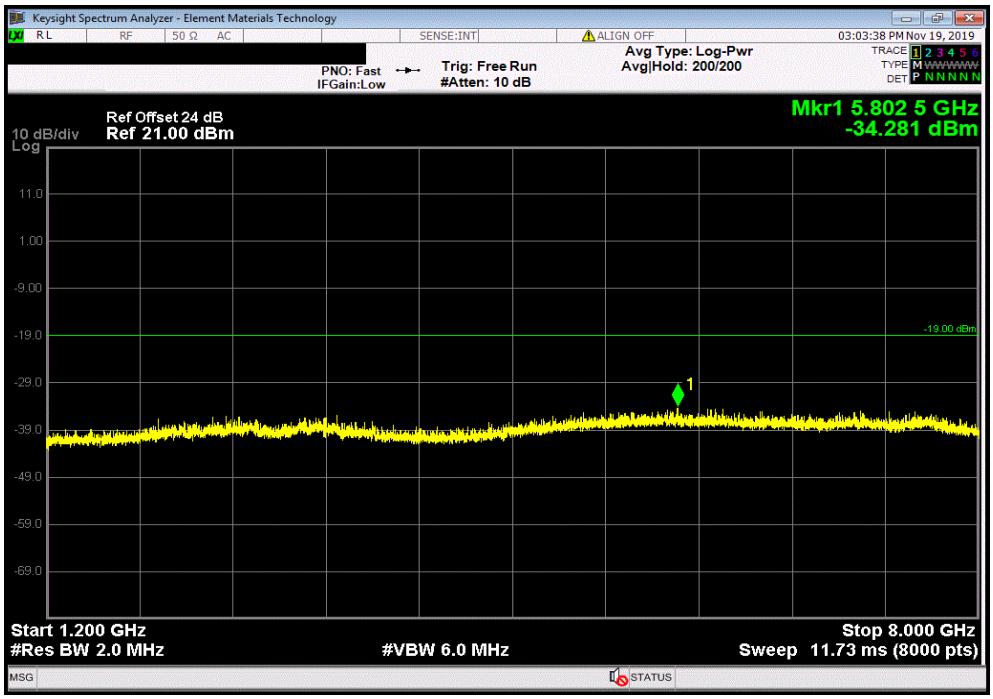
Band 14, 16QAM Modulation, LTE5 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-35.764	-19	Pass



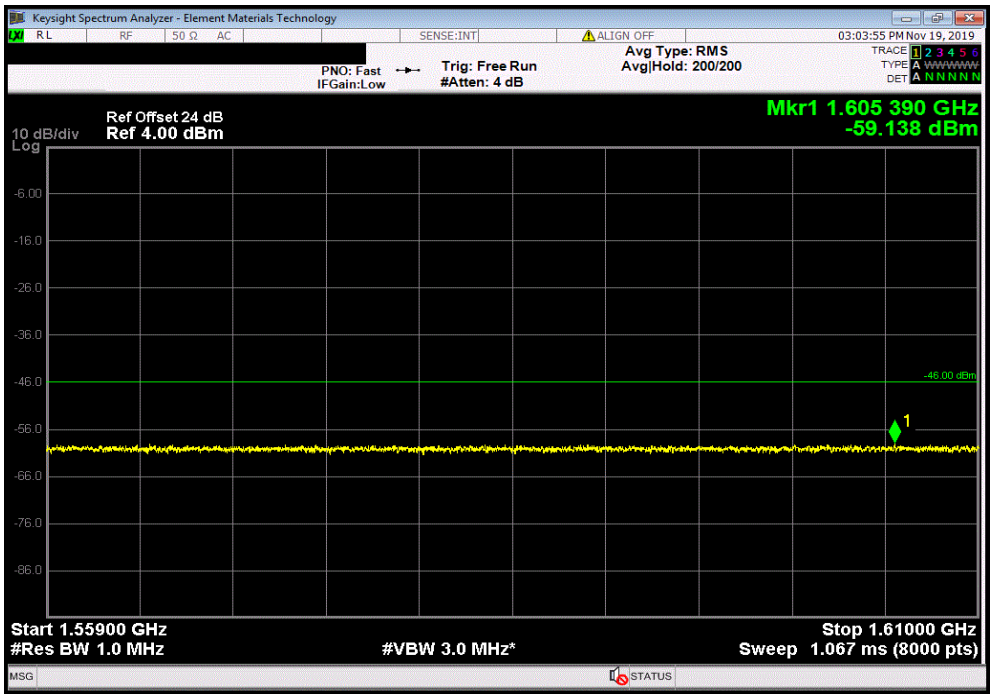
Band 14, 16QAM Modulation, LTE5 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.74	-19	Pass



Band 14, 16QAM Modulation, LTE5 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.281	-19	Pass

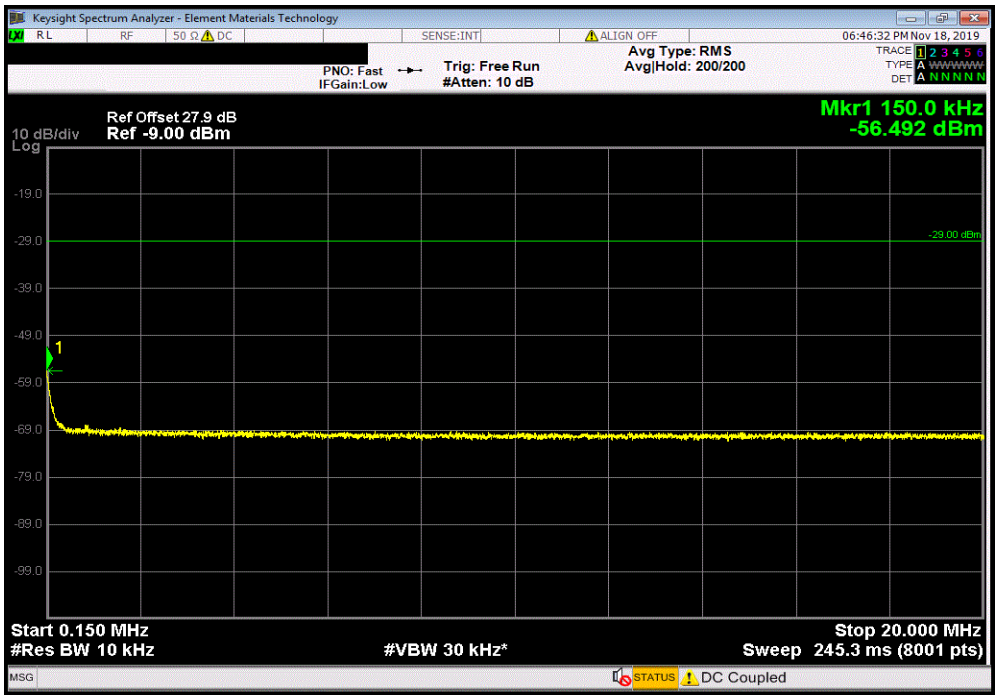


Band 14, 16QAM Modulation, LTE5 Bandwidth, 1559MHz-1610MHz							
					Value (dBm)	Limit (dBm)	Result
					-59.138	-46	Pass

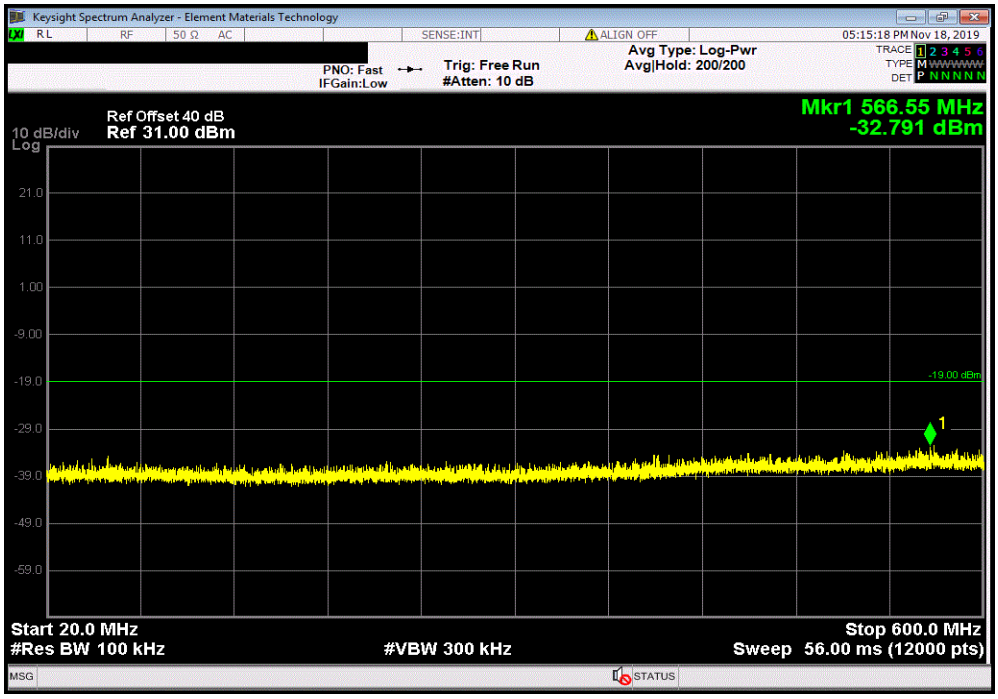


Band 14, 16QAM Modulation, LTE10 Bandwidth, 9kHz-150kHz							
					Value (dBm)	Limit (dBm)	Result
					-58.319	-39	Pass

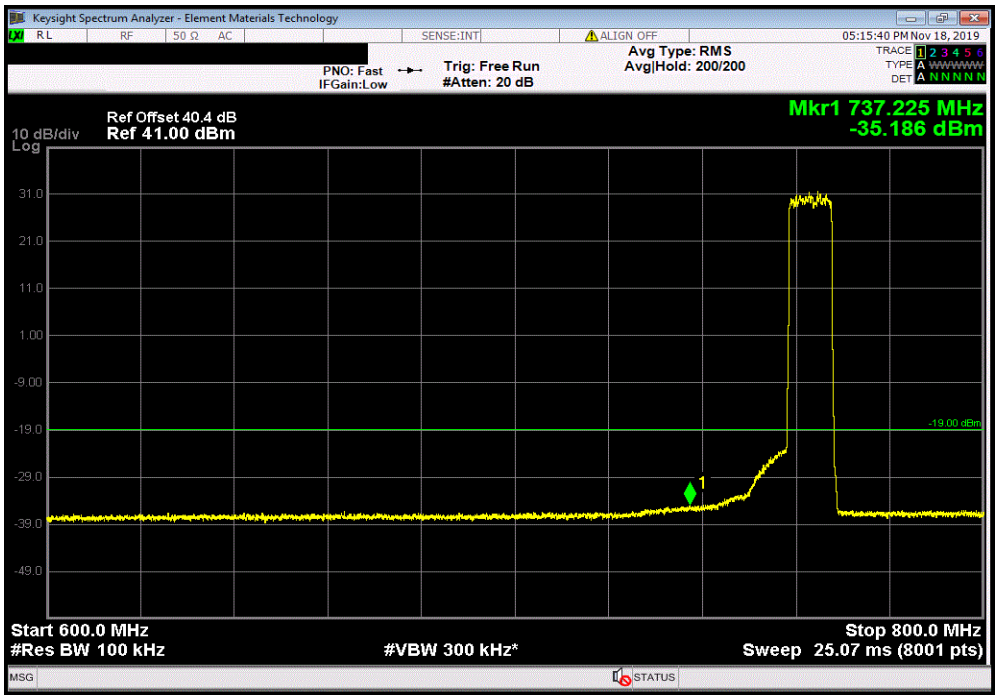
Band 14, 16QAM Modulation, LTE10 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.492	-29	Pass



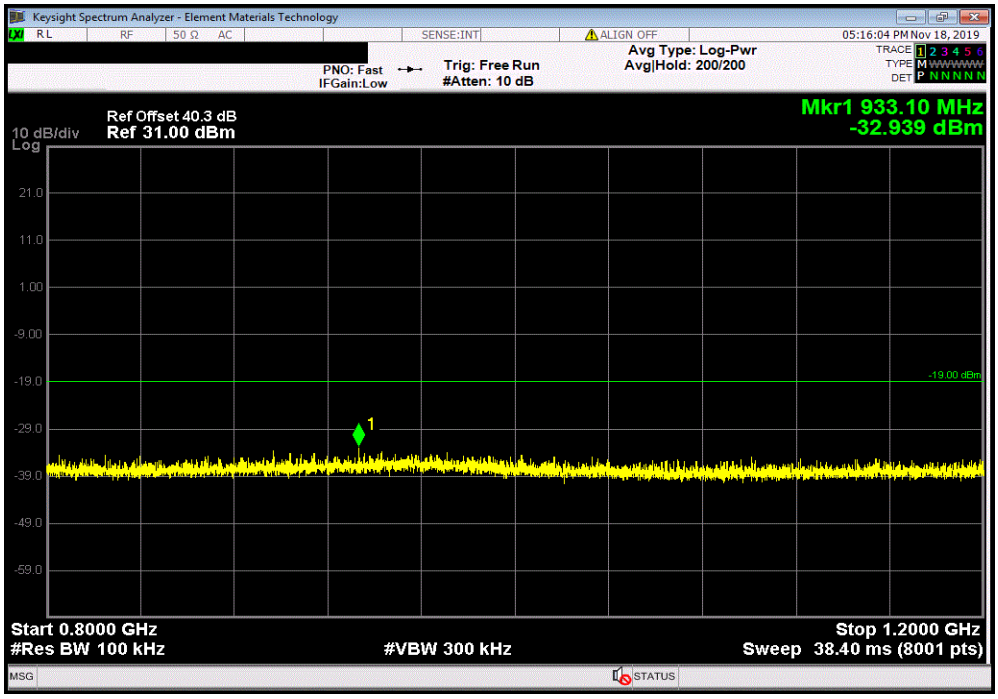
Band 14, 16QAM Modulation, LTE10 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.791	-19	Pass



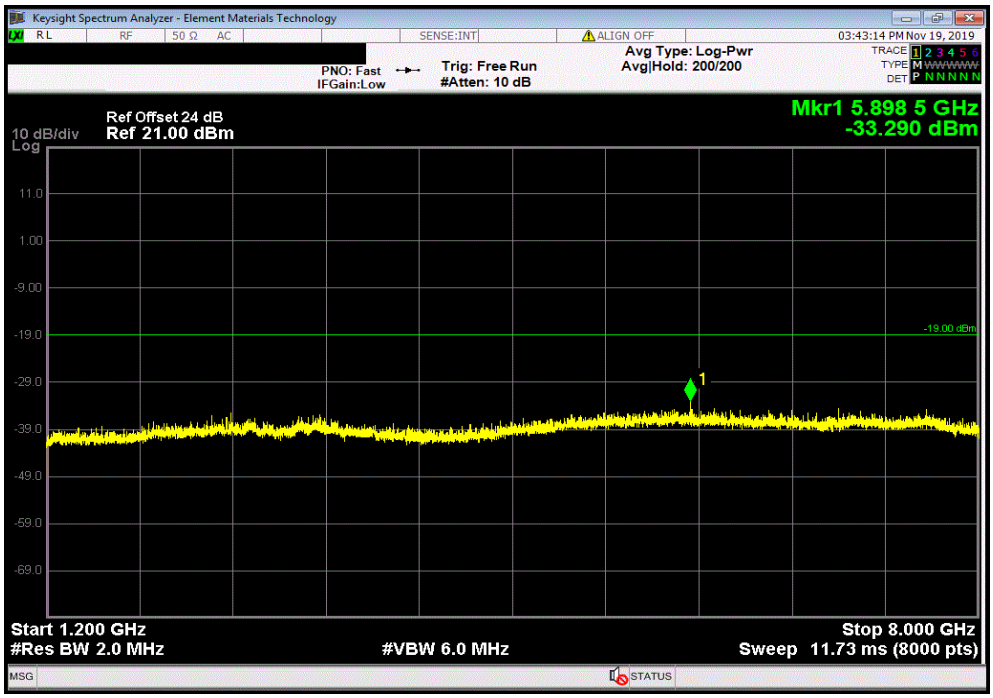
Band 14, 16QAM Modulation, LTE10 Bandwidth, 600MHz-800MHz							
					Value (dBm)	Limit (dBm)	Result
					-35.186	-19	Pass



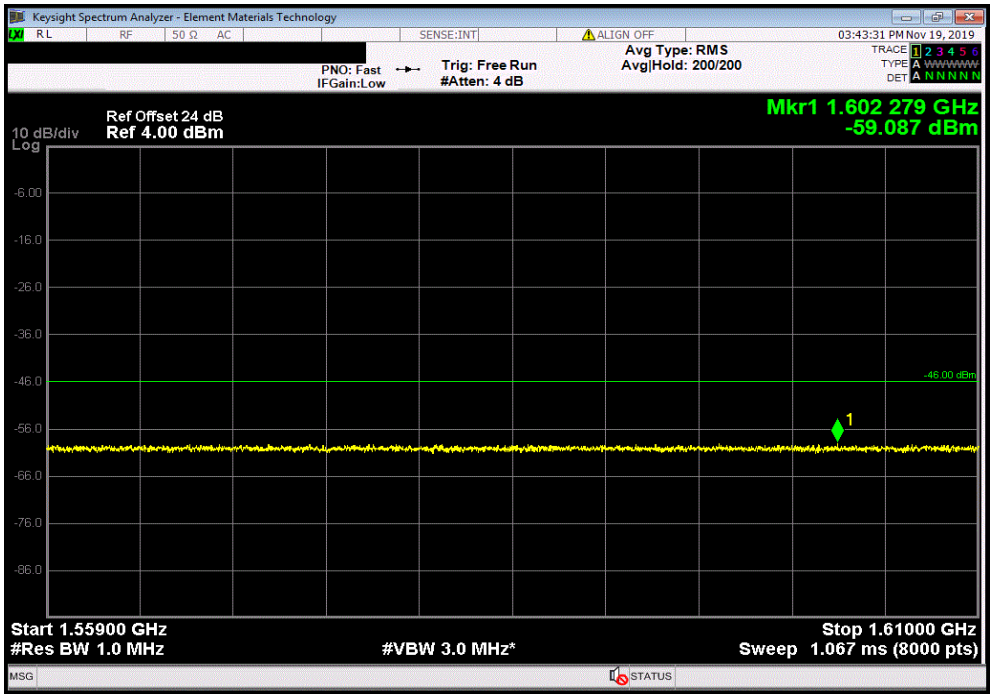
Band 14, 16QAM Modulation, LTE10 Bandwidth, 800MHz-1.2GHz							
					Value (dBm)	Limit (dBm)	Result
					-32.939	-19	Pass



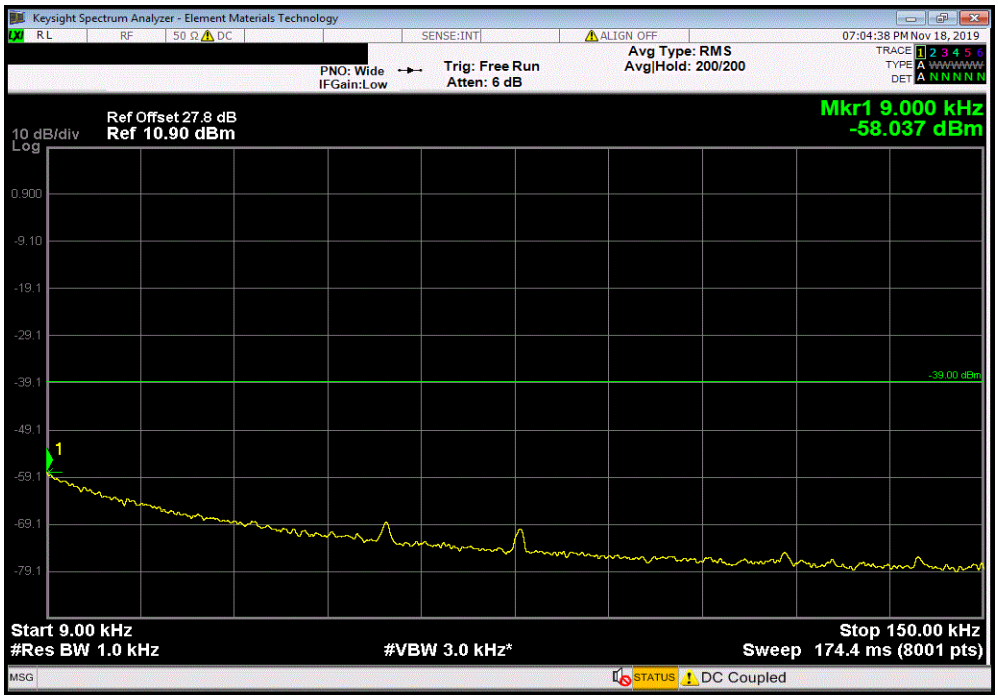
Band 14, 16QAM Modulation, LTE10 Bandwidth, 1.2GHz-8GHz							
					Value (dBm)	Limit (dBm)	Result
					-33.29	-19	Pass



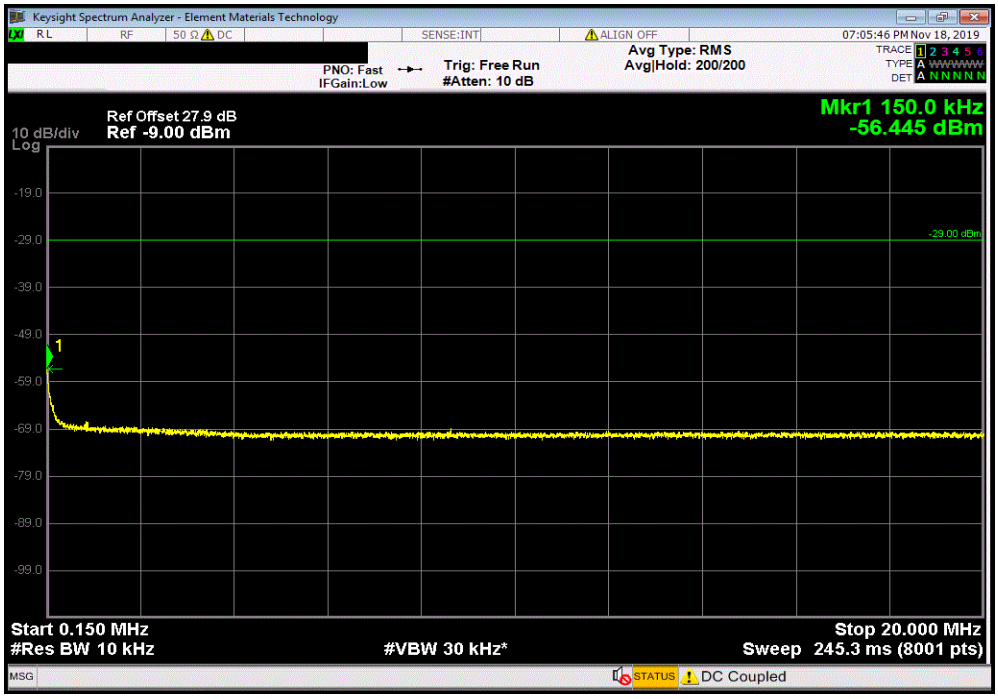
Band 14, 16QAM Modulation, LTE10 Bandwidth, 1559MHz-1610MHz							
					Value (dBm)	Limit (dBm)	Result
					-59.087	-46	Pass



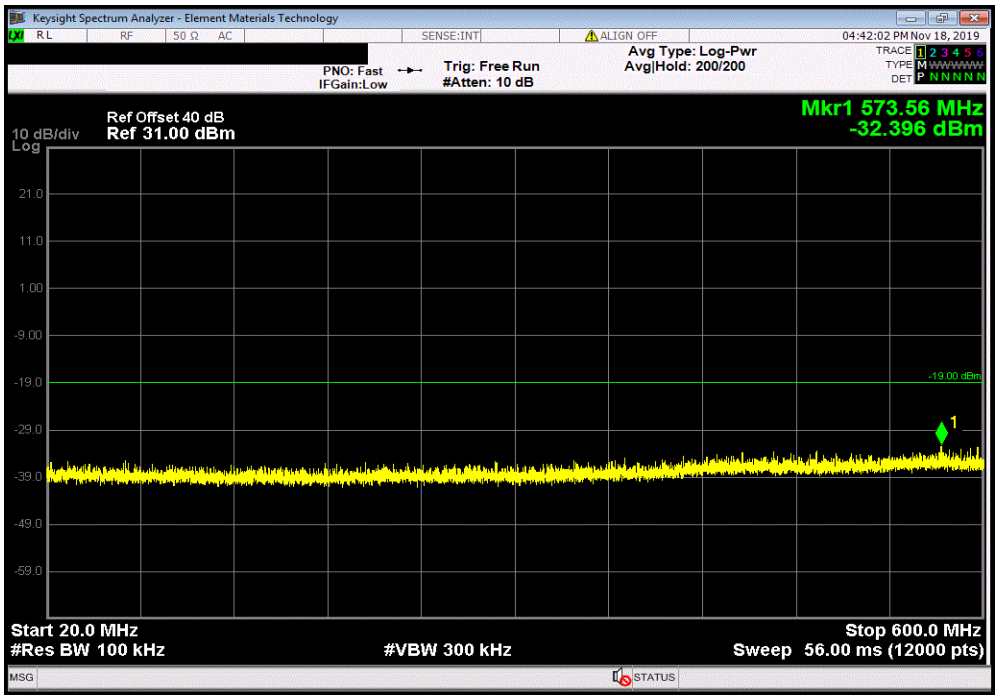
Band 14, 64QAM Modulation, LTE5 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.037	-39	Pass



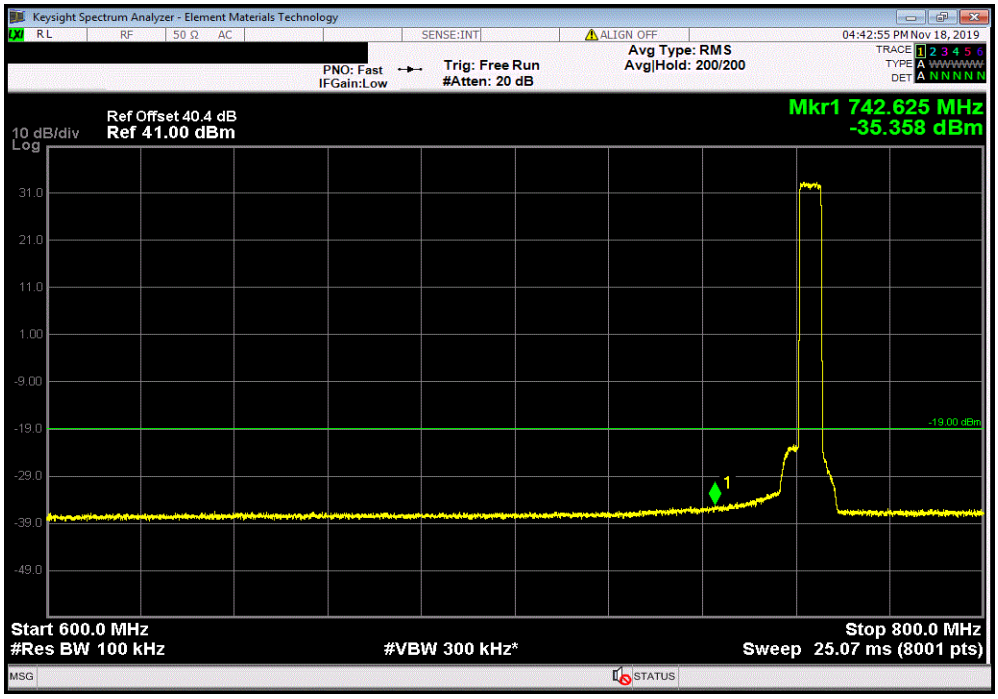
Band 14, 64QAM Modulation, LTE5 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.445	-29	Pass



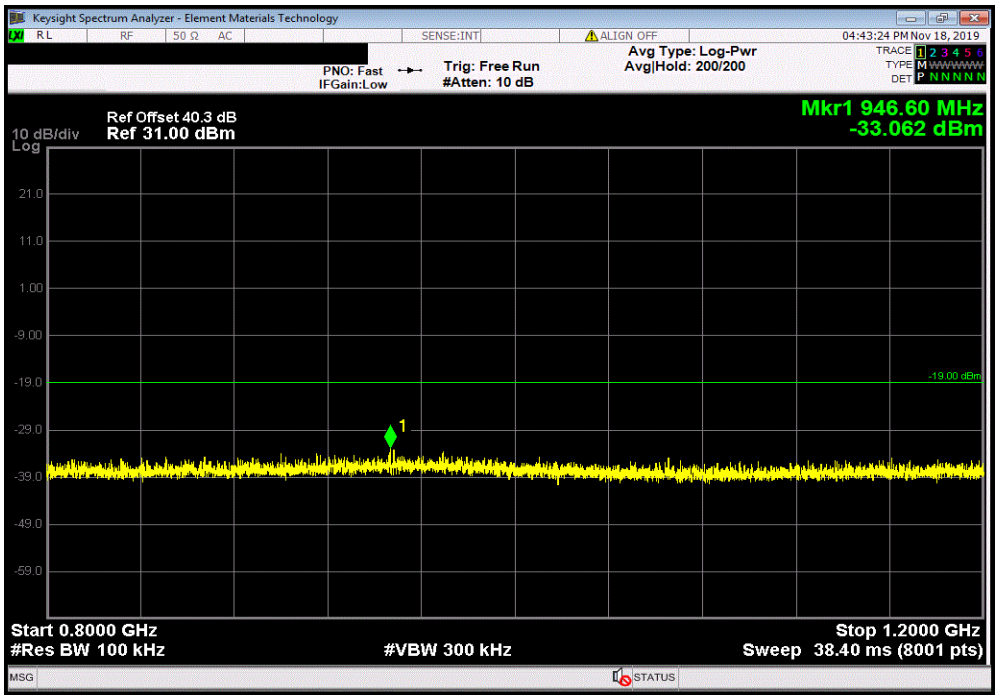
Band 14, 64QAM Modulation, LTE5 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.396	-19	Pass



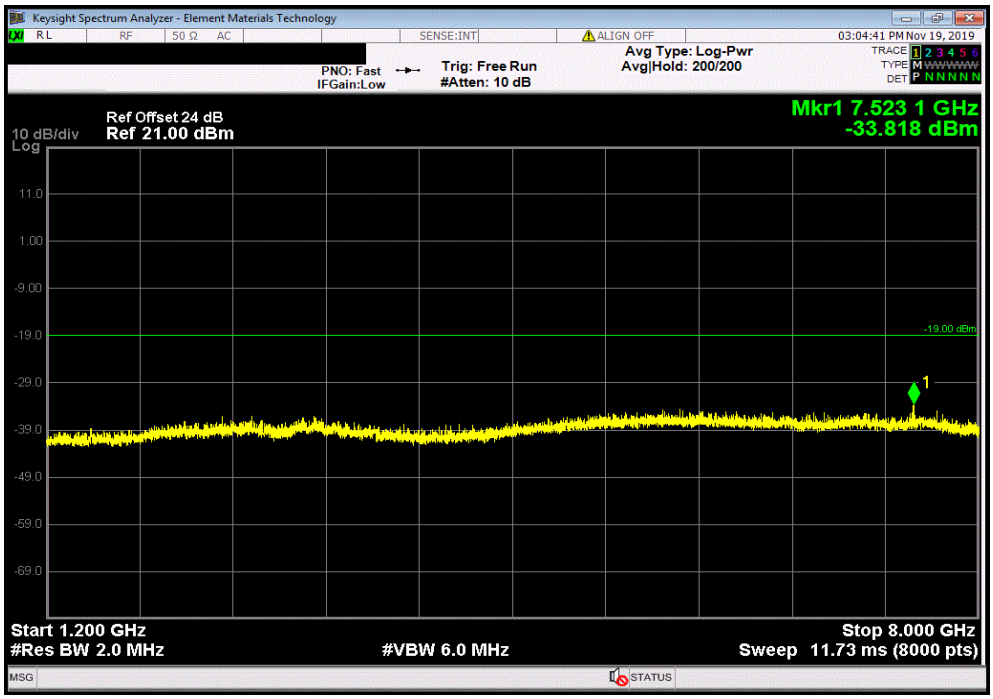
Band 14, 64QAM Modulation, LTE5 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-35.358	-19	Pass



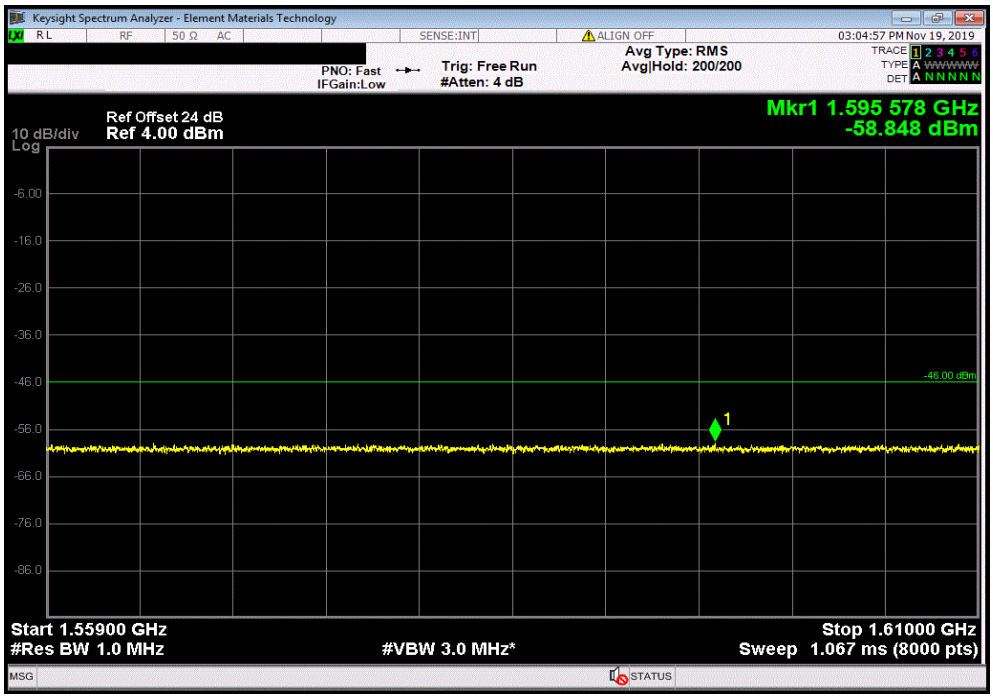
Band 14, 64QAM Modulation, LTE5 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.062	-19	Pass



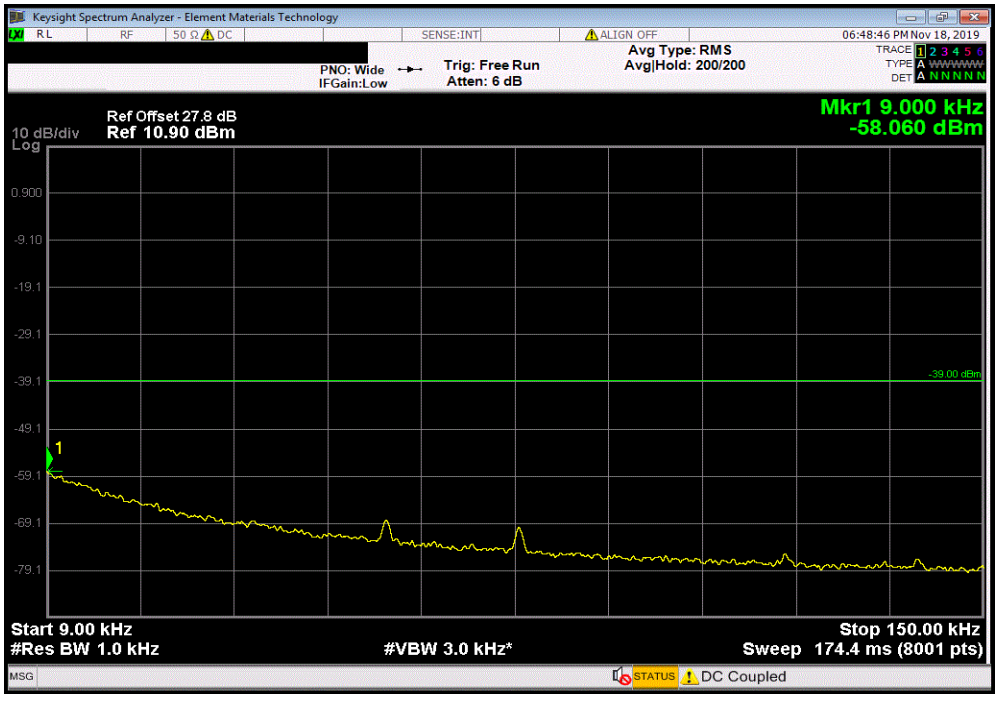
Band 14, 64QAM Modulation, LTE5 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.818	-19	Pass



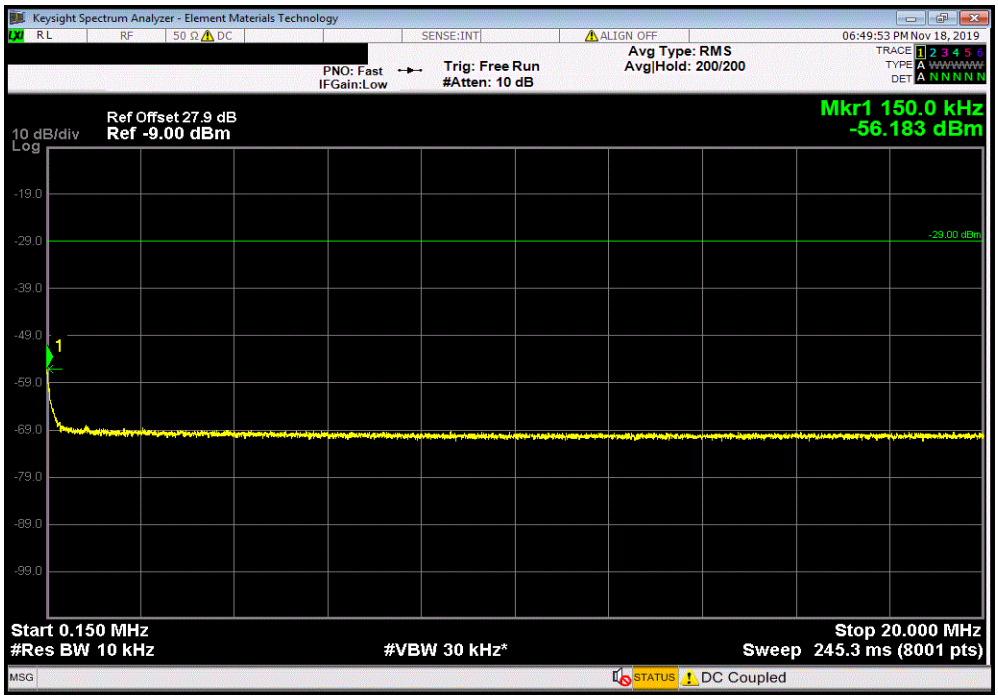
Band 14, 64QAM Modulation, LTE5 Bandwidth, 1559MHz-1610MHz						
				Value (dBm)	Limit (dBm)	Result
				-58.848	-46	Pass



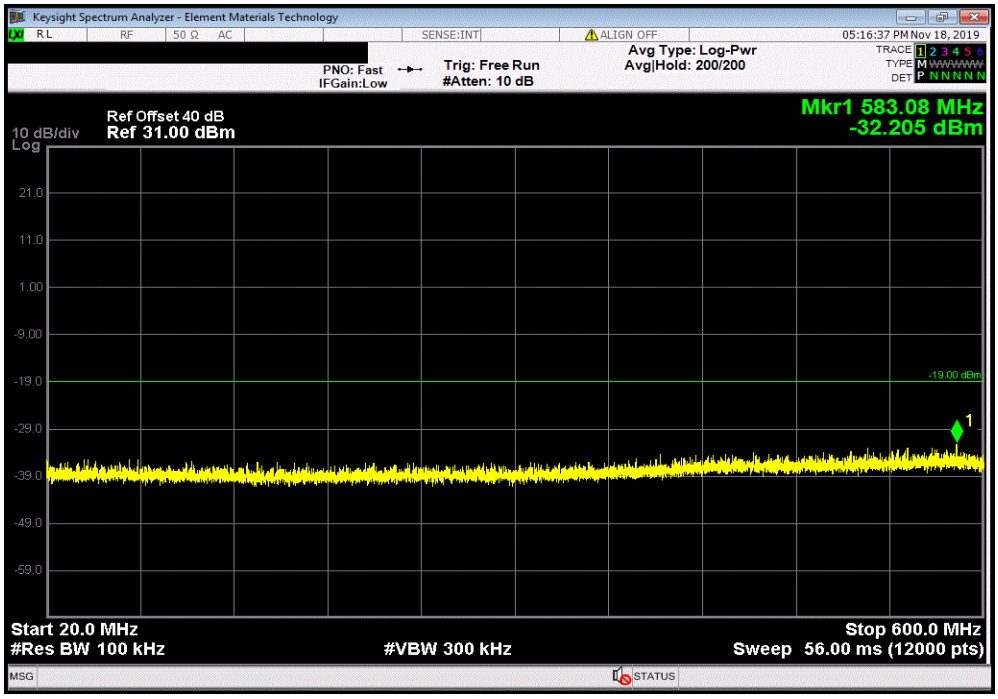
Band 14, 64QAM Modulation, LTE10 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.06	-39	Pass



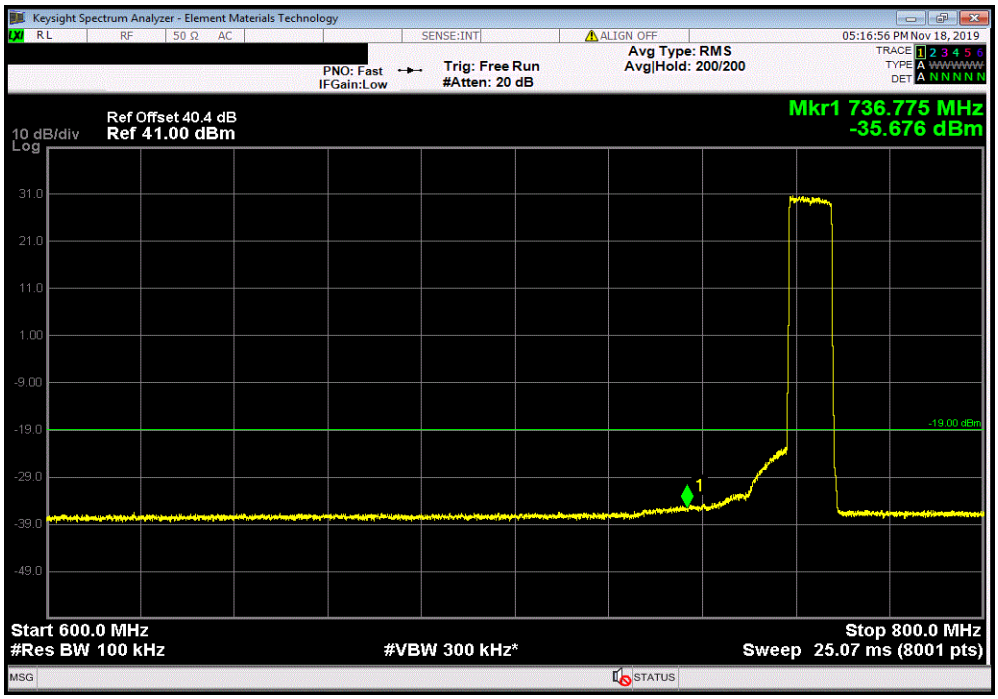
Band 14, 64QAM Modulation, LTE10 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.183	-29	Pass



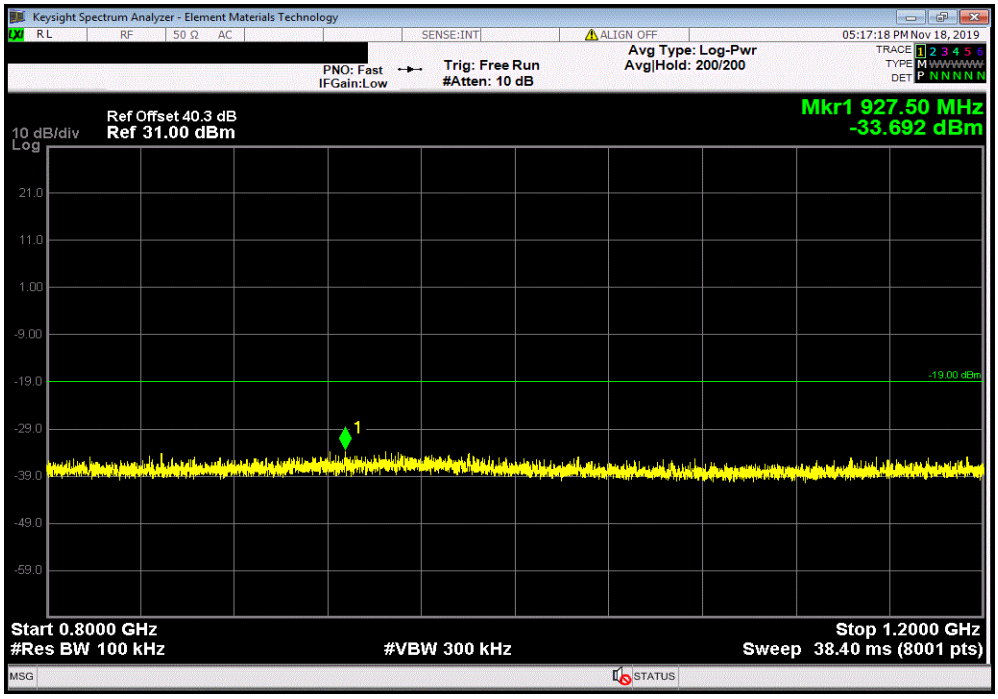
Band 14, 64QAM Modulation, LTE10 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.205	-19	Pass



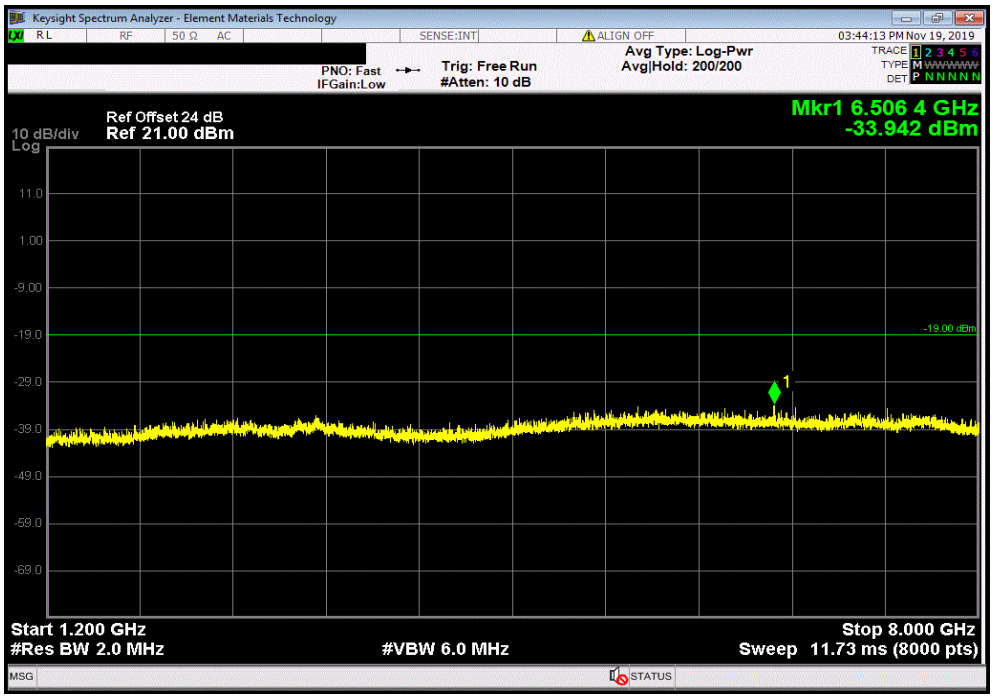
Band 14, 64QAM Modulation, LTE10 Bandwidth, 600MHz-800MHz							
					Value (dBm)	Limit (dBm)	Result
					-35.676	-19	Pass



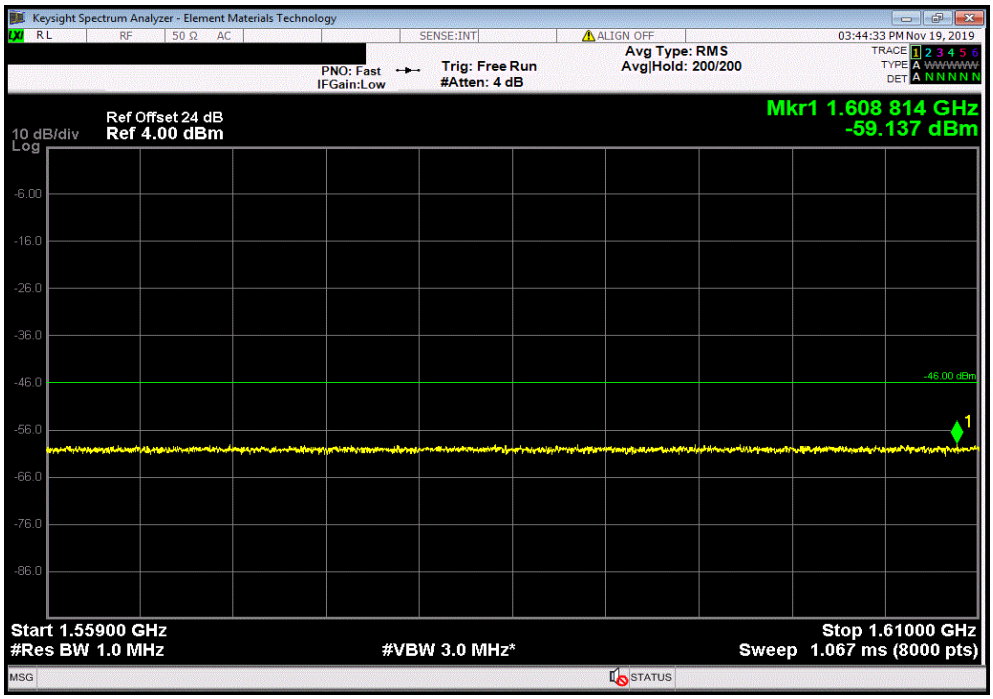
Band 14, 64QAM Modulation, LTE10 Bandwidth, 800MHz-1.2GHz							
					Value (dBm)	Limit (dBm)	Result
					-33.692	-19	Pass



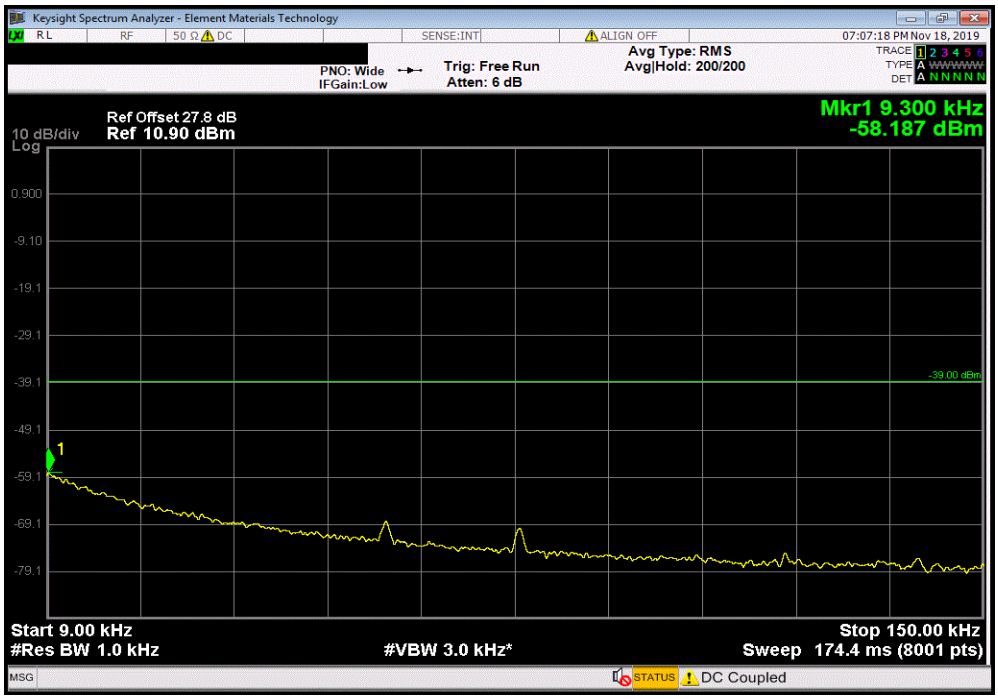
Band 14, 64QAM Modulation, LTE10 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.942	-19	Pass



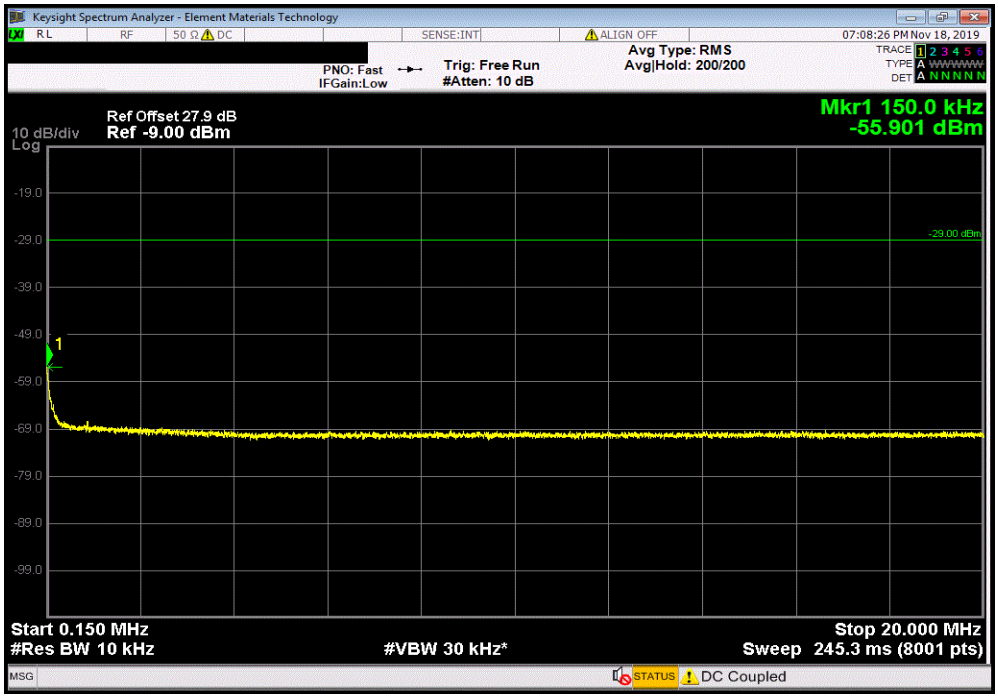
Band 14, 64QAM Modulation, LTE10 Bandwidth, 1559MHz-1610MHz						
				Value (dBm)	Limit (dBm)	Result
				-59.137	-46	Pass



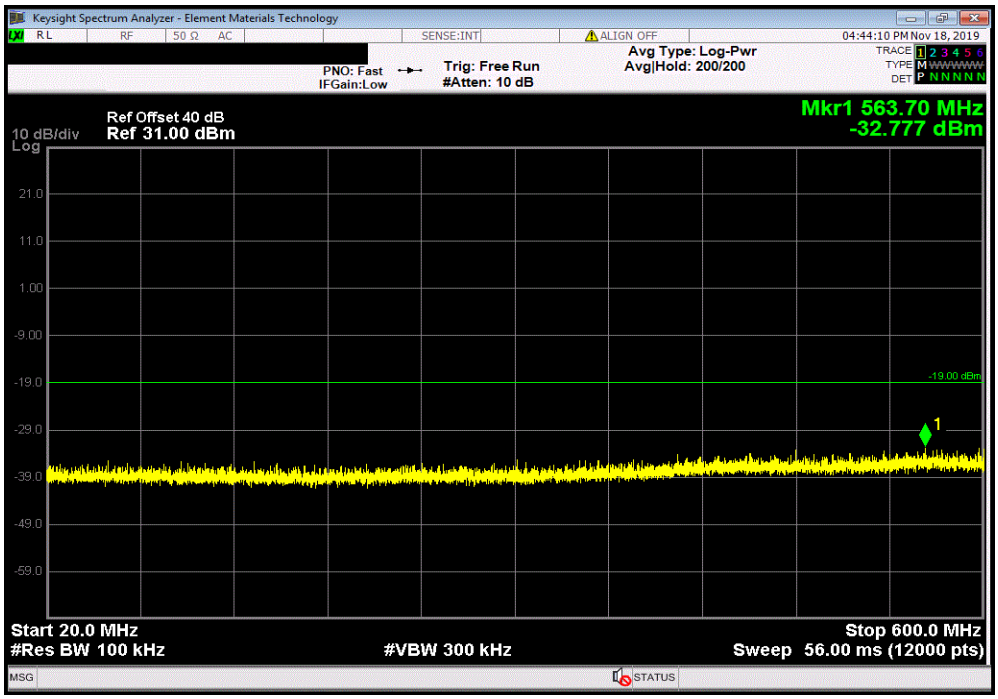
Band 14, 256QAM Modulation, LTE5 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.187	-39	Pass



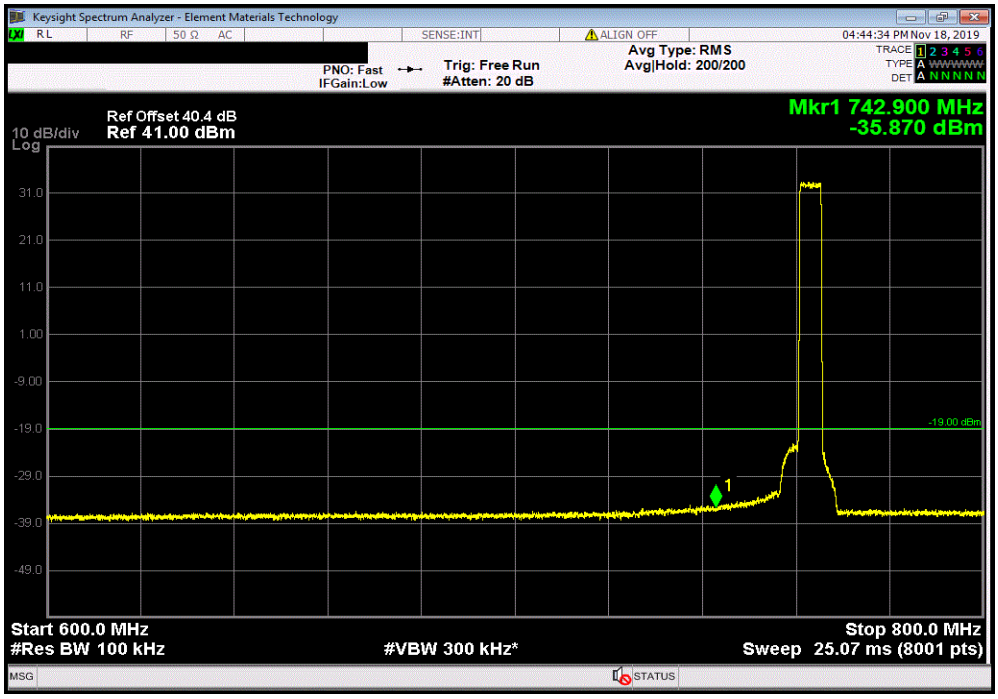
Band 14, 256QAM Modulation, LTE5 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-55.901	-29	Pass



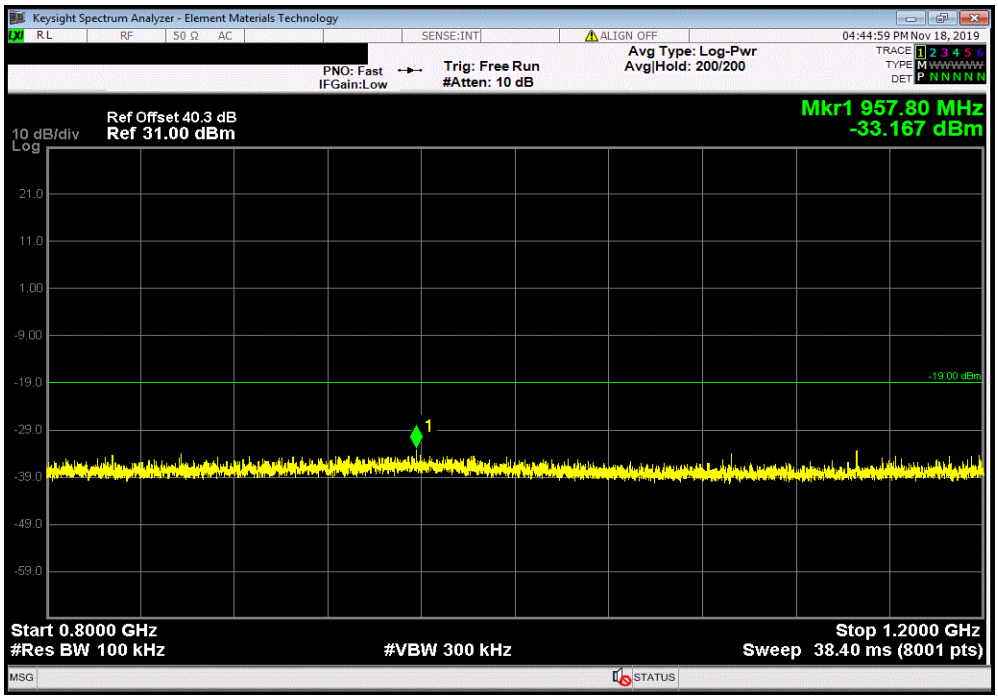
Band 14, 256QAM Modulation, LTE5 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.777	-19	Pass



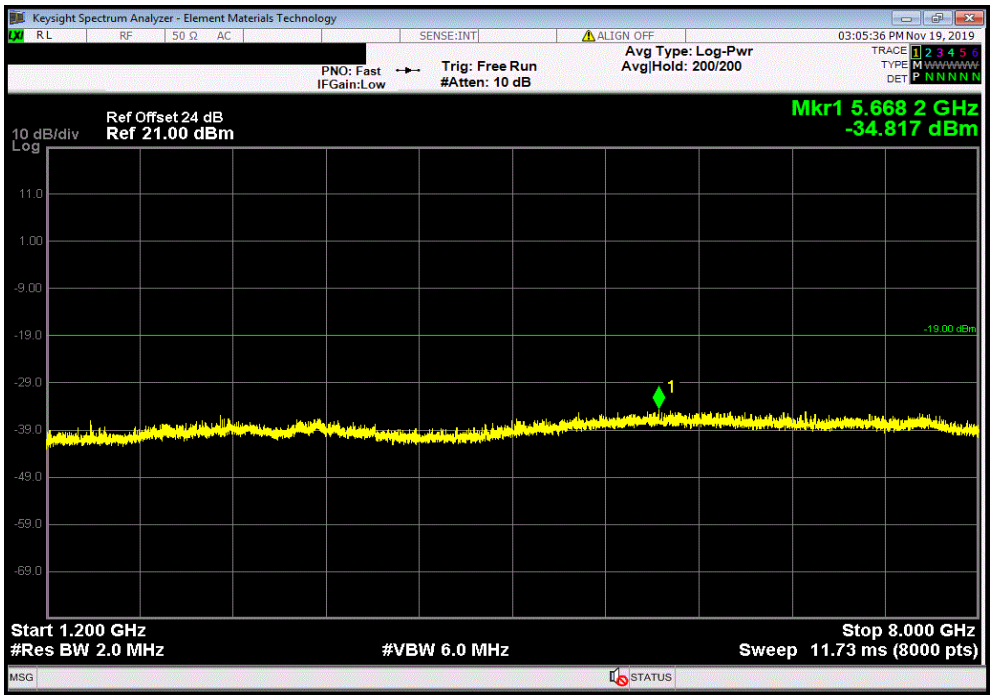
Band 14, 256QAM Modulation, LTE5 Bandwidth, 600MHz-800MHz						
				Value (dBm)	Limit (dBm)	Result
				-35.87	-19	Pass



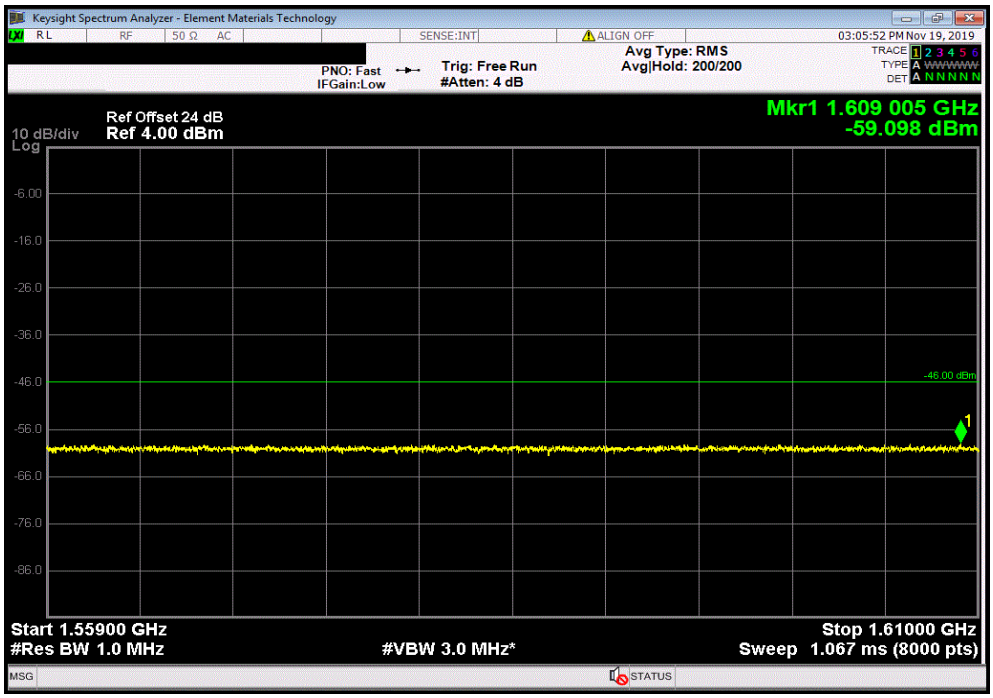
Band 14, 256QAM Modulation, LTE5 Bandwidth, 800MHz-1.2GHz						
				Value (dBm)	Limit (dBm)	Result
				-33.167	-19	Pass



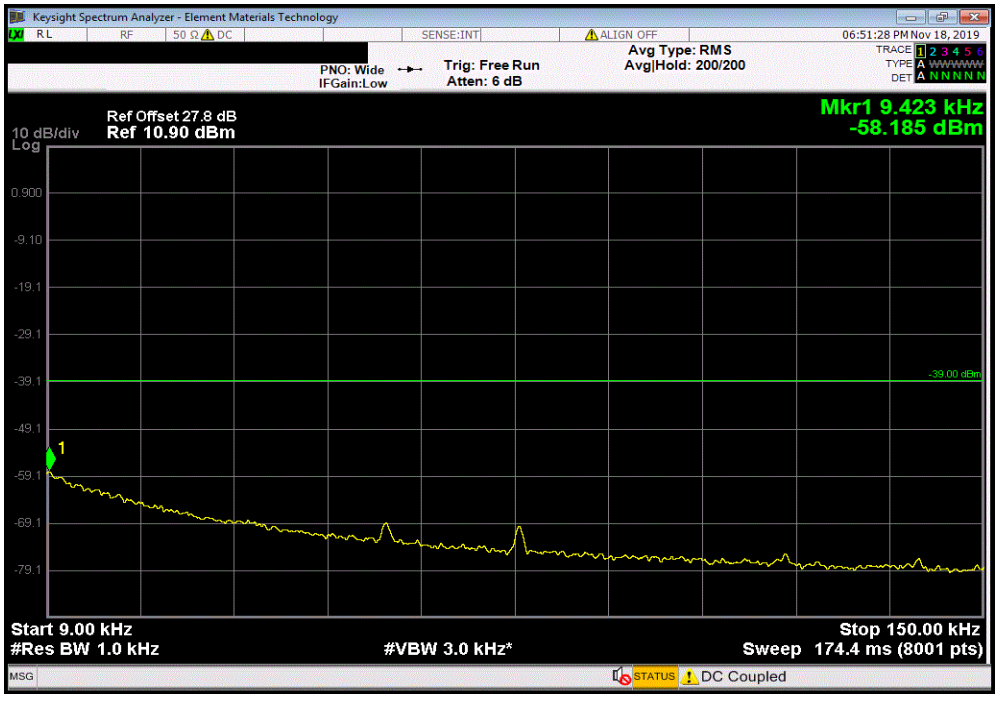
Band 14, 256QAM Modulation, LTE5 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.817	-19	Pass



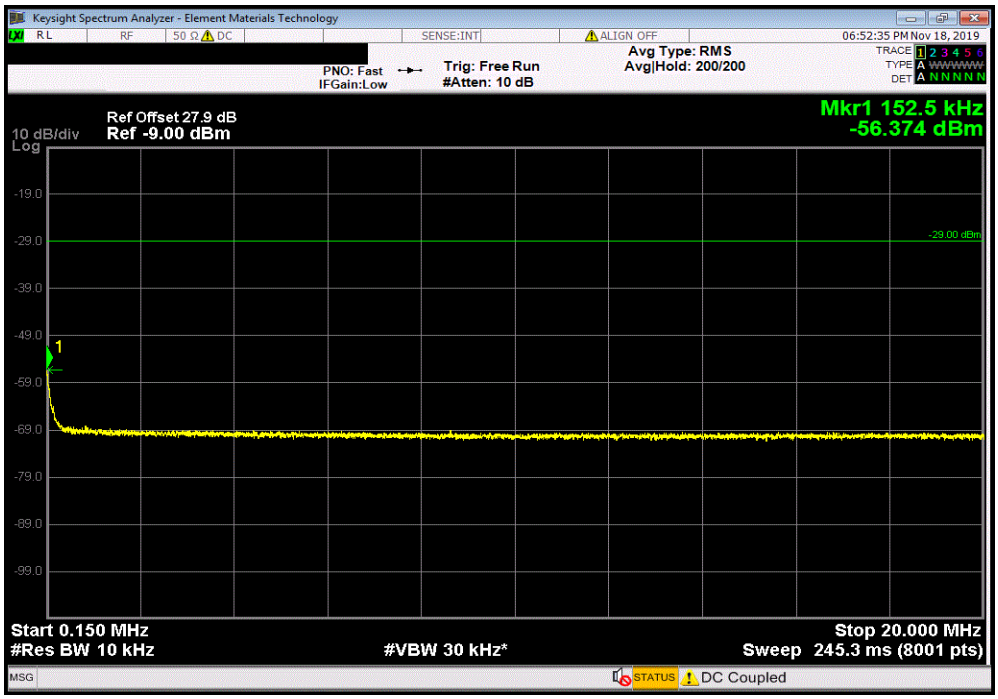
Band 14, 256QAM Modulation, LTE5 Bandwidth, 1559MHz-1610MHz						
				Value (dBm)	Limit (dBm)	Result
				-59.098	-46	Pass



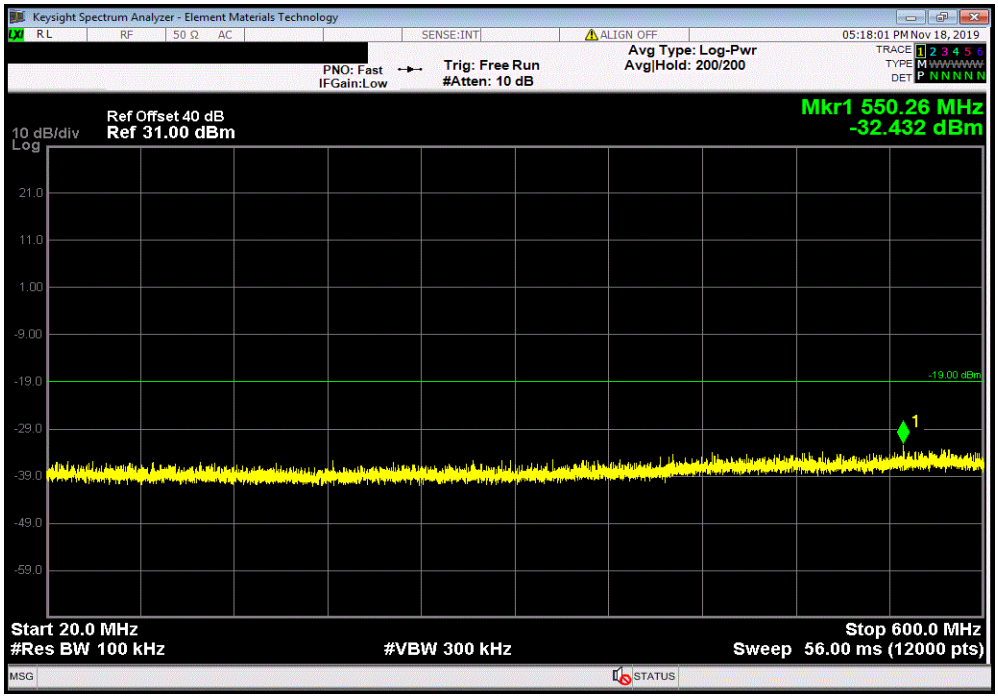
Band 14, 256QAM Modulation, LTE10 Bandwidth, 9kHz-150kHz						
				Value (dBm)	Limit (dBm)	Result
				-58.185	-39	Pass



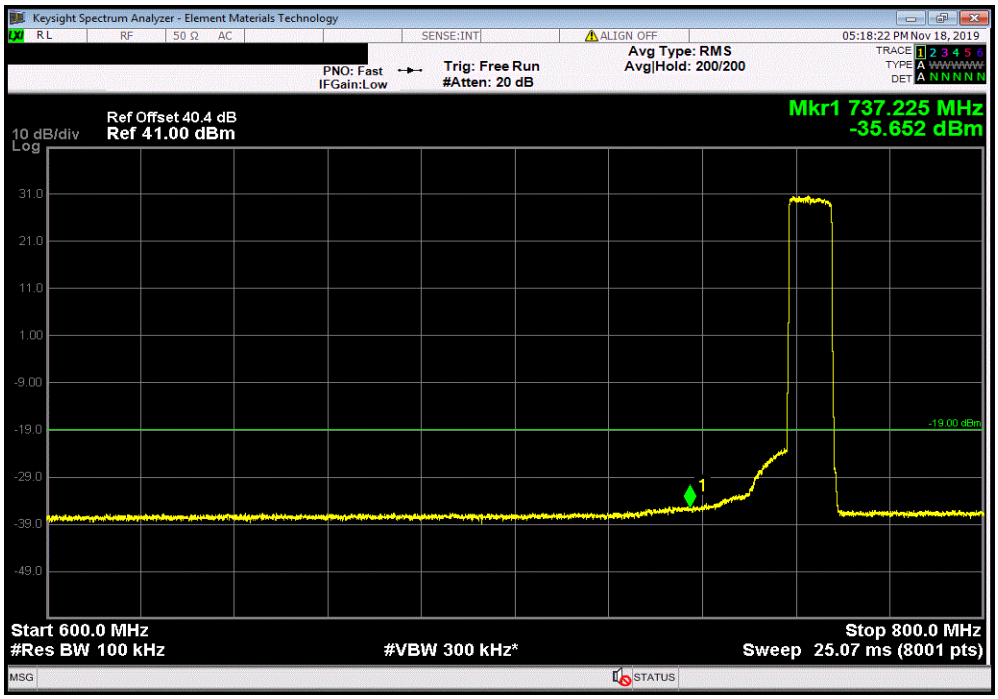
Band 14, 256QAM Modulation, LTE10 Bandwidth, 150kHz-20MHz						
				Value (dBm)	Limit (dBm)	Result
				-56.374	-29	Pass



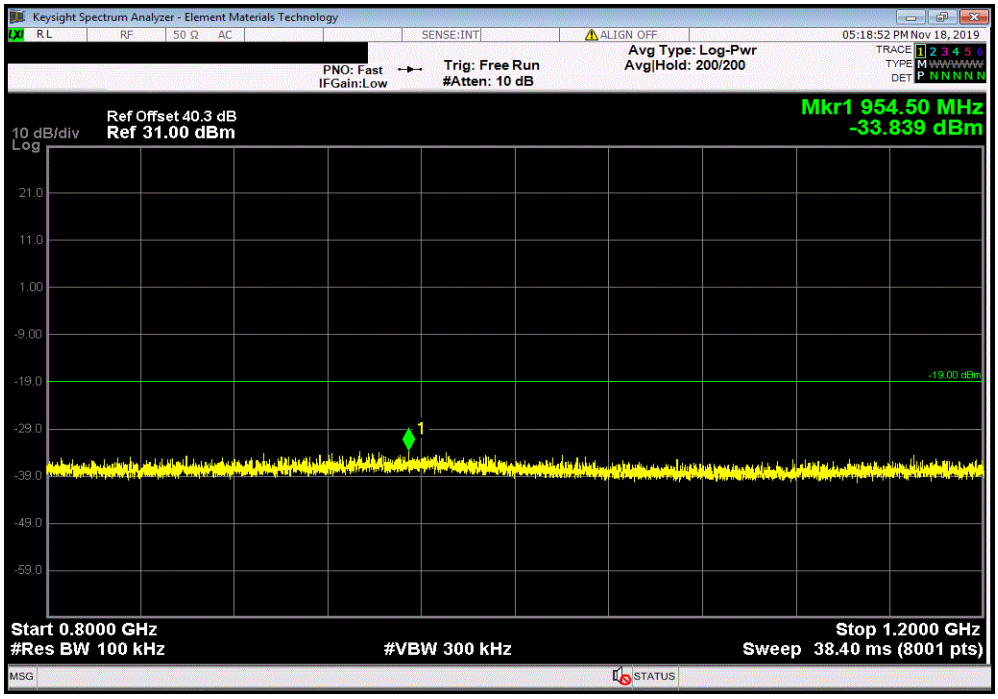
Band 14, 256QAM Modulation, LTE10 Bandwidth, 20MHz-600MHz						
				Value (dBm)	Limit (dBm)	Result
				-32.432	-19	Pass



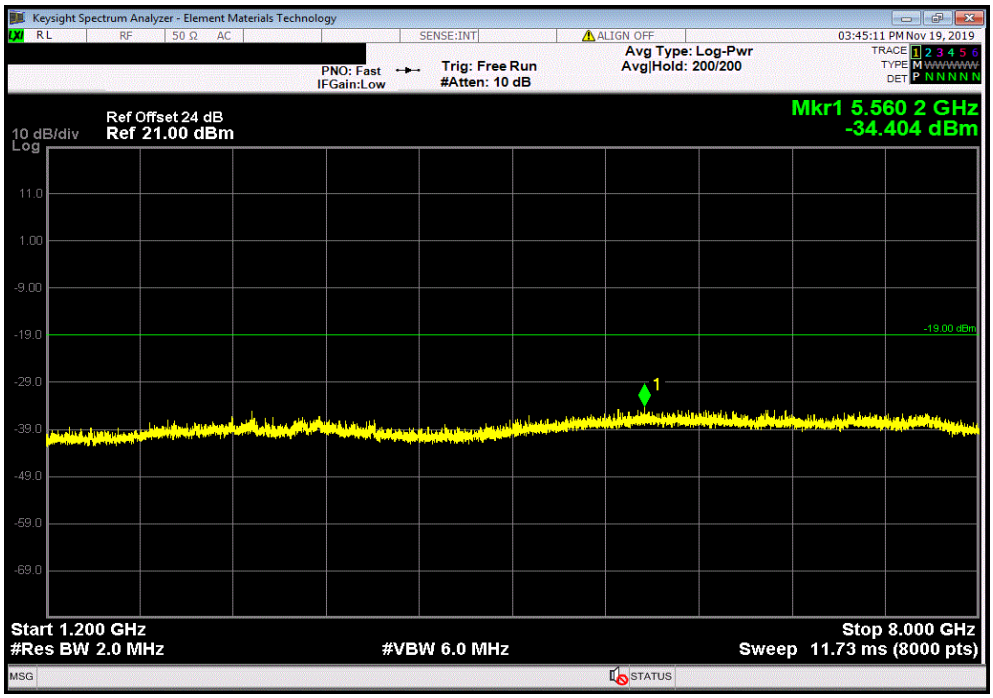
Band 14, 256QAM Modulation, LTE10 Bandwidth, 600MHz-800MHz							
					Value (dBm)	Limit (dBm)	Result
					-35.652	-19	Pass



Band 14, 256QAM Modulation, LTE10 Bandwidth, 800MHz-1.2GHz							
					Value (dBm)	Limit (dBm)	Result
					-33.839	-19	Pass



Band 14, 256QAM Modulation, LTE10 Bandwidth, 1.2GHz-8GHz						
				Value (dBm)	Limit (dBm)	Result
				-34.404	-19	Pass



Band 14, 256QAM Modulation, LTE10 Bandwidth, 1559MHz-1610MHz						
				Value (dBm)	Limit (dBm)	Result
				-59.05	-46	Pass