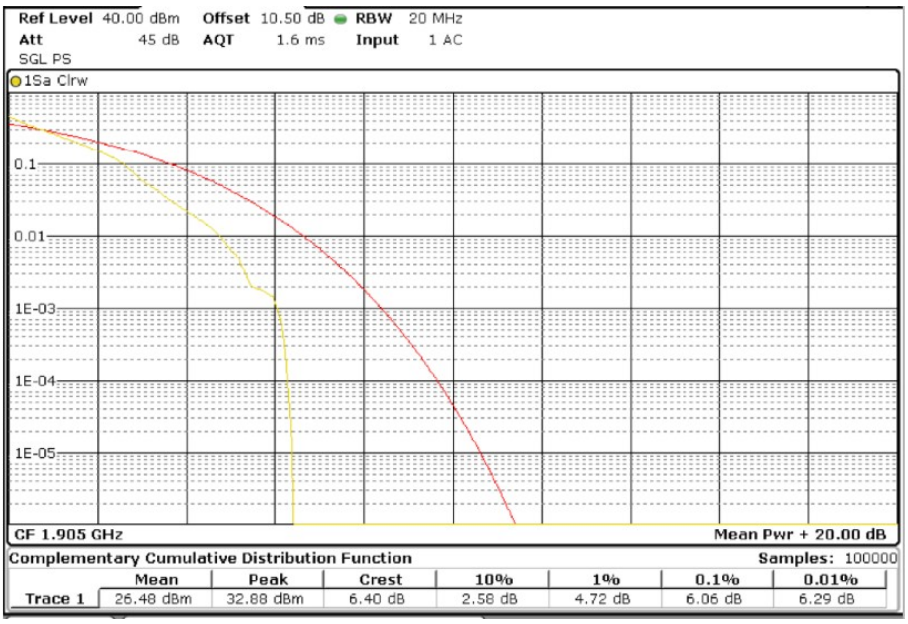
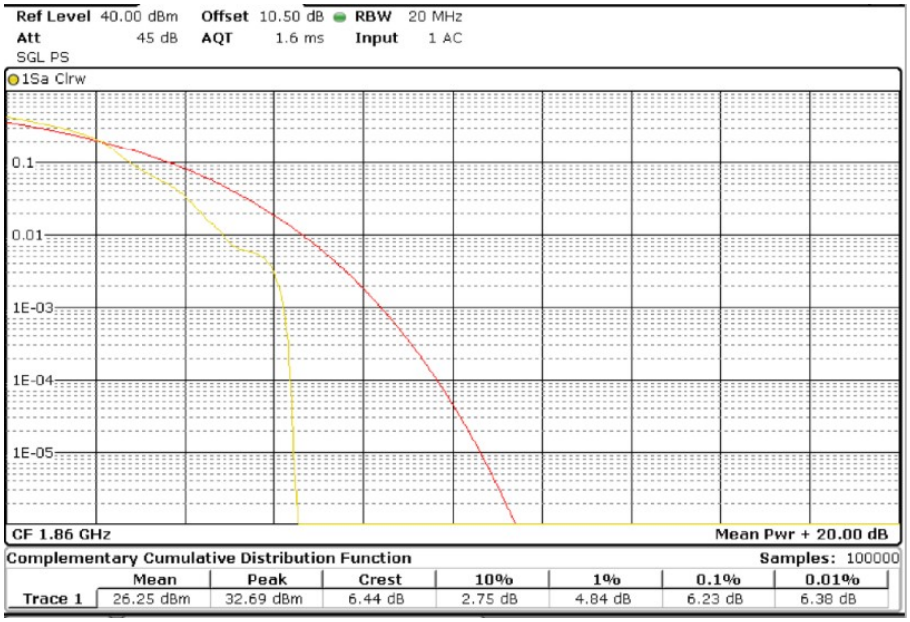
TEST RESULTS (Cont):	

Highest channel

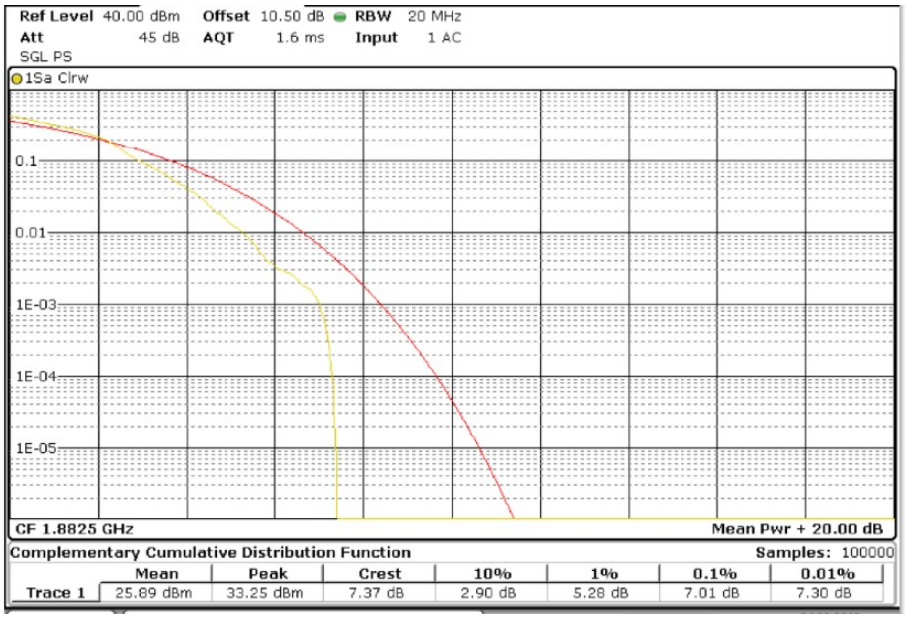


Bandwidth = 20 MHz. Modulation 16QAM. RB Size: 1. RB Offset: 0.
Lowest channel



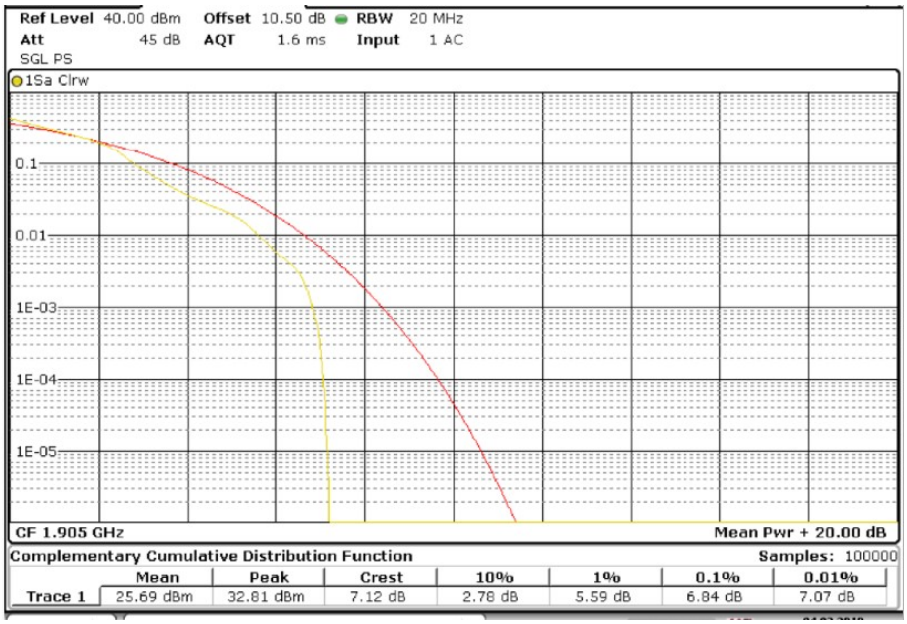
TEST RESULTS (Cont):	

Middle channel



	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	25.89 dBm	33.25 dBm	7.37 dB	2.90 dB	5.28 dB	7.01 dB	7.30 dB

Highest channel



	Mean	Peak	Crest	10%	1%	0.1%	0.01%
Trace 1	25.69 dBm	32.81 dBm	7.12 dB	2.78 dB	5.59 dB	6.84 dB	7.07 dB

TEST A.2: MODULATION CHARACTERISTICS

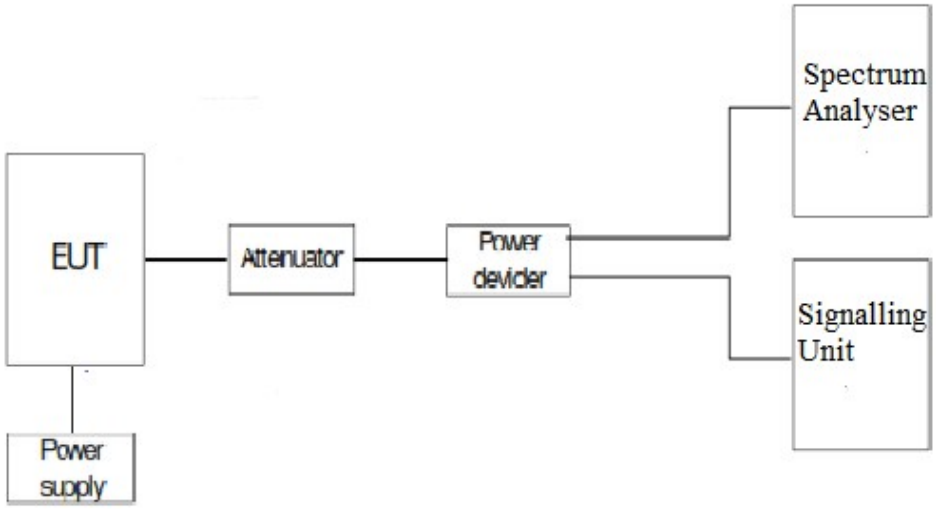
LIMITS:	Product standard:	FCC Part 24 / IC RSS-133
	Test standard:	FCC §2.1047 and §24.236. RSS-133 Clause 6.3

LIMITS

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

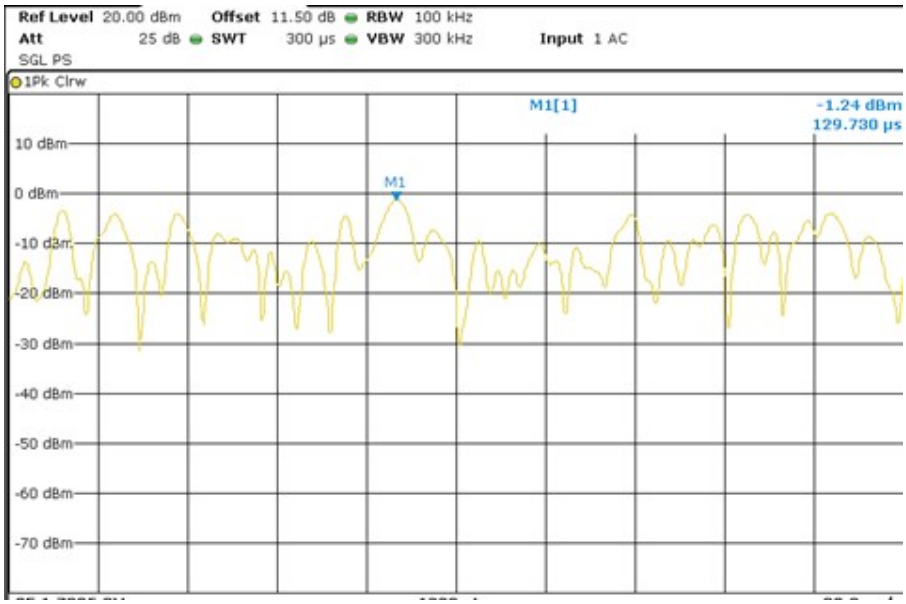
TEST SETUP

For LTE the EUT operates with QPSK and 16QAM modulation modes in which the information is digitized and coded into a bit stream. The RF transmission is multiplexed using Orthogonal Frequency Division Multiplexing (OFDM) using different possible arrangement of subcarriers (Resource Blocks RB).

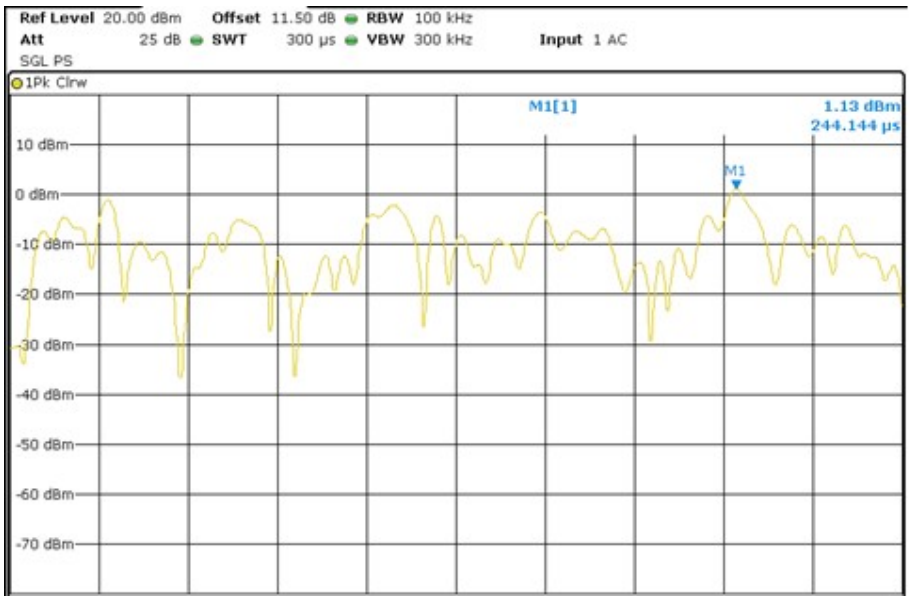


TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

QPSK Modulation



16QAM Modulation



TEST A.3: FREQUENCY STABILITY

LIMITS:	Product standard:	FCC Part 24 / IC RSS-133
	Test standard:	FCC §2.1055 and § 24.235/ RSS-133 Clause 6.5

LIMITS

The frequency stability shall be enough to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST SETUP	

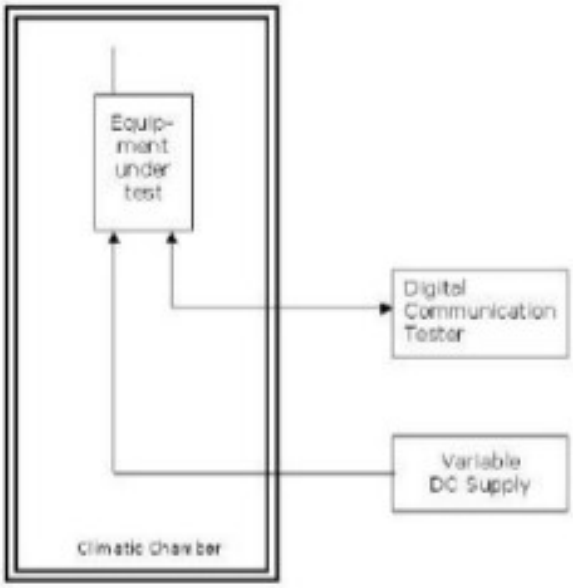
The frequency tolerance measurements over temperature variations were made over the temperature range of

–30ºC to +50ºC. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10ºC steps from –30ºC up to +50ºC.

The supply voltage was varied between 85% and 115% of nominal voltage.

The EUT was set in “call mode” in the middle channel using the Universal Radio Communication tester R&S CMW500 and the maximum frequency error was measured using the built-in calibrated frequency meter.

For LTE mode the QPSK modulation was used for the test as it is the worst case for conducted power.



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

LTE QPSK MODULATION. BW = 5 MHz

Frequency stability over temperature variations

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
50	1.96	0.0010	0.00000010
40	2.66	0.0014	0.00000014
30	4.13	0.0022	0.00000022
20	2.8	0.0015	0.00000015
10	4.62	0.0025	0.00000025
0	2.25	0.0012	0.00000012
-10	6.35	0.0034	0.00000034
-20	2.02	0.0011	0.00000011
-30	-2.7	-0.0014	-0.00000014

Frequency stability over voltage variations

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.4	6.55	0.0035	0.00000035
Vmin	3.3	-0.26	-0.0001	-0.00000001

TEST A.4: OCCUPIED BANDWIDTH

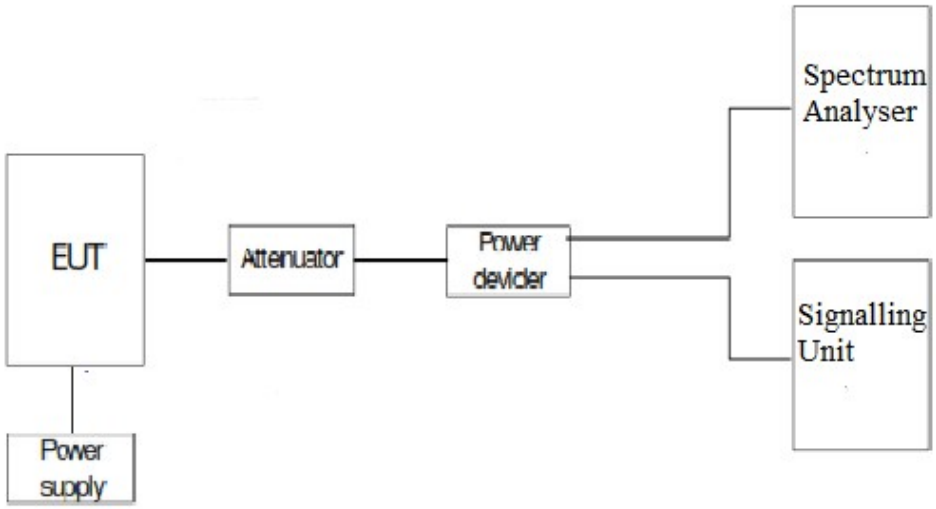
LIMITS:	Product standard:	FCC Part 24 / IC RSS-133
	Test standard:	FCC § 2.1049/ RSS-133 Clause 2.3

LIMITS

Reference only.

TEST SETUP

The occupied bandwidth measurement was performed at the output terminals of the EUT using an attenuator, power splitter and spectrum analyzer. The EUT was controlled via the Universal Radio Communication Tester R&S CMW500 selecting maximum transmission power of the EUT and different modes of modulation. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyzer.



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01
TEST RESULTS:	PASS

LTE QPSK MODULATION. BW = 1.4 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	1.13	1.14	1.13
-26 dBc bandwidth (MHz)	1.42	1.41	1.43

LTE 16QAM MODULATION. BW = 1.4 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	1.13	1.13	1.13
-26 dBc bandwidth (MHz)	1.43	1.42	1.44

LTE QPSK MODULATION. BW = 3 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	2.74	2.74	2.74
-26 dBc bandwidth (MHz)	3.19	3.21	3.16

LTE 16QAM MODULATION. BW = 3 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	2.74	2.75	2.72
-26 dBc bandwidth (MHz)	3.18	3.21	3.16

LTE QPSK MODULATION. BW = 5 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	4.73	4.79	4.76
-26 dBc bandwidth (MHz)	6.27	6.25	6.27

LTE 16QAM MODULATION. BW = 5 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	4.72	4.75	4.55
-26 dBc bandwidth (MHz)	6.23	6.19	6.17

TEST RESULTS (Cont):	

LTE QPSK MODULATION. BW = 10 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	9.04	9.06	9.08
-26 dBc bandwidth (MHz)	11.60	11.58	11.58

LTE 16QAM MODULATION. BW = 10 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	5.46	5.36	5.28
-26 dBc bandwidth (MHz)	9.14	9.23	9.09

LTE QPSK MODULATION. BW = 15 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	13.50	13.50	13.47
-26 dBc bandwidth (MHz)	16.06	16.15	16.06

LTE 16QAM MODULATION. BW = 15 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	5.49	5.52	5.49
-26 dBc bandwidth (MHz)	9.07	9.38	9.47

LTE QPSK MODULATION. BW = 20 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	17.96	17.88	18.12
-26 dBc bandwidth (MHz)	20.43	21.09	20.07

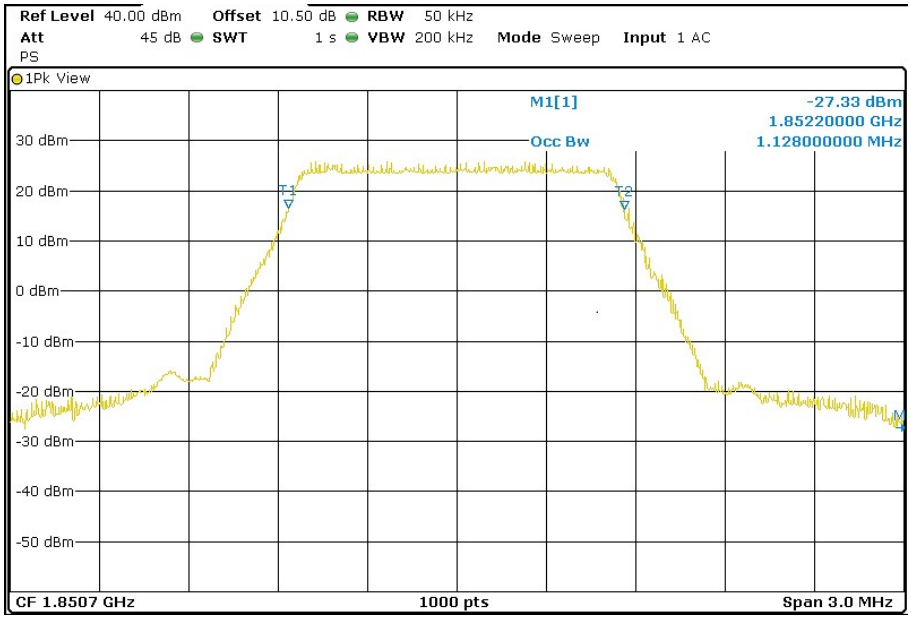
LTE 16QAM MODULATION. BW = 20 MHz

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (MHz)	7.36	7.68	7.48
-26 dBc bandwidth (MHz)	10.82	12.85	11.17

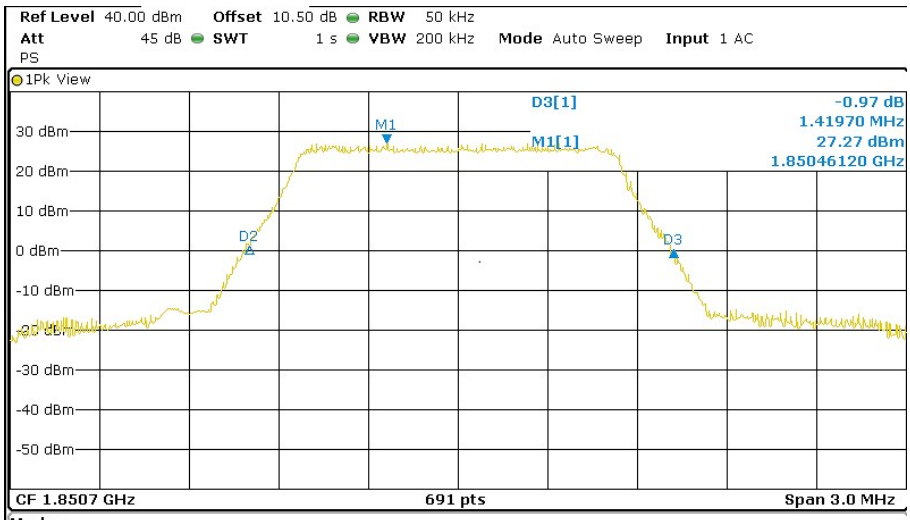
TEST RESULTS (Cont):	

LTE QPSK MODULATION. BW = 1.4 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

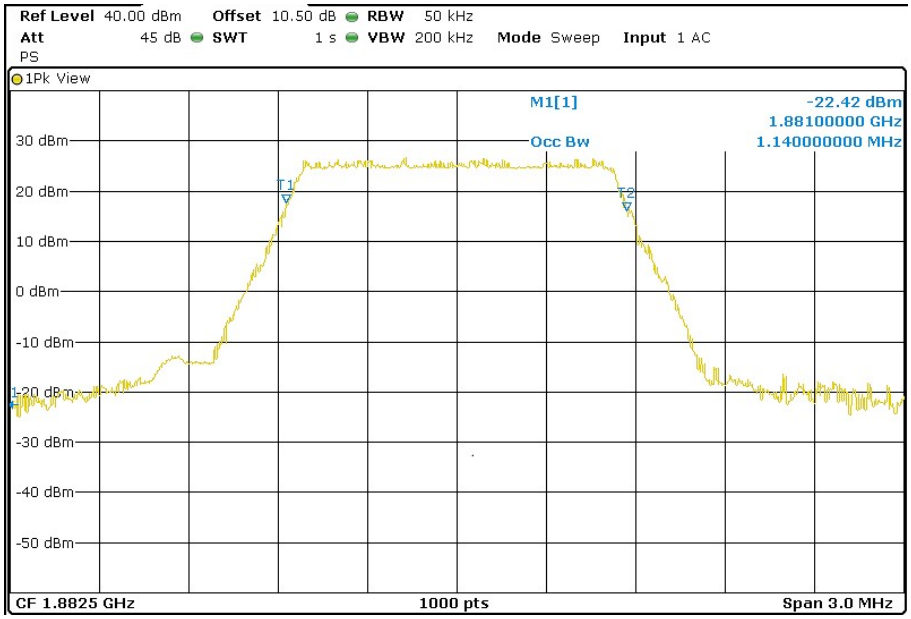


Marker

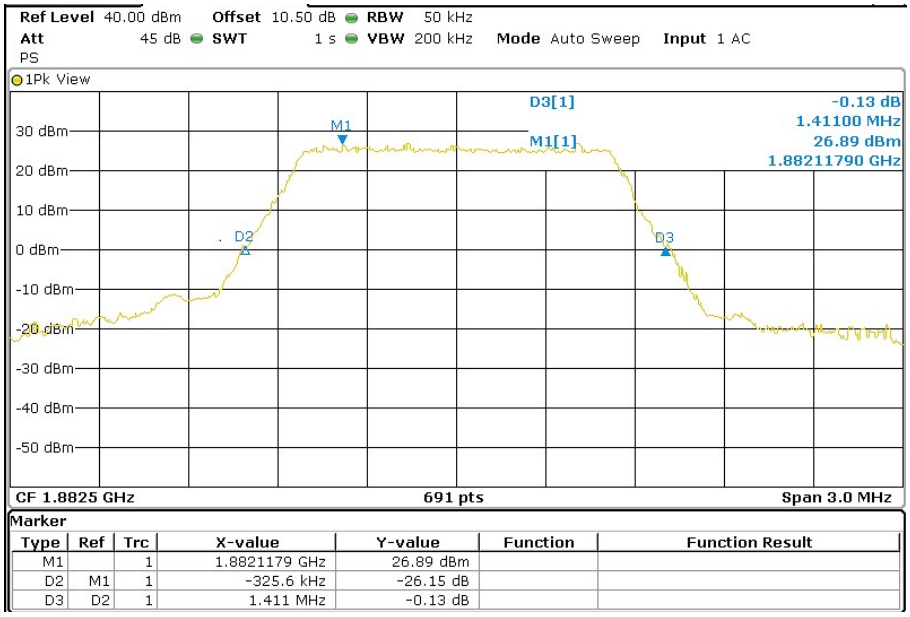
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8504612 GHz	27.27 dBm		
D2	M1	1	-460.2 kHz	-26.06 dB		
D3	D2	1	1.4197 MHz	-0.97 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz

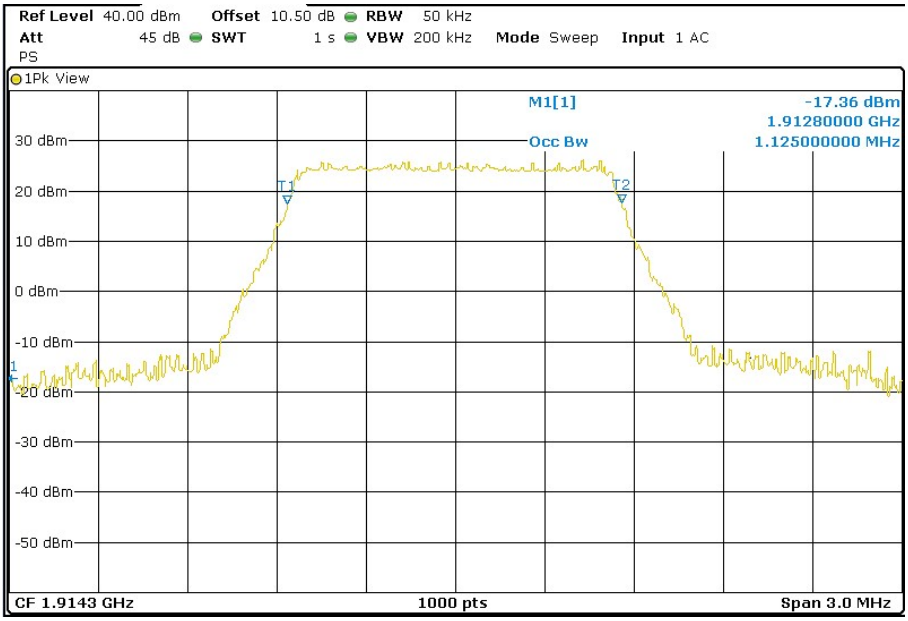


Marker

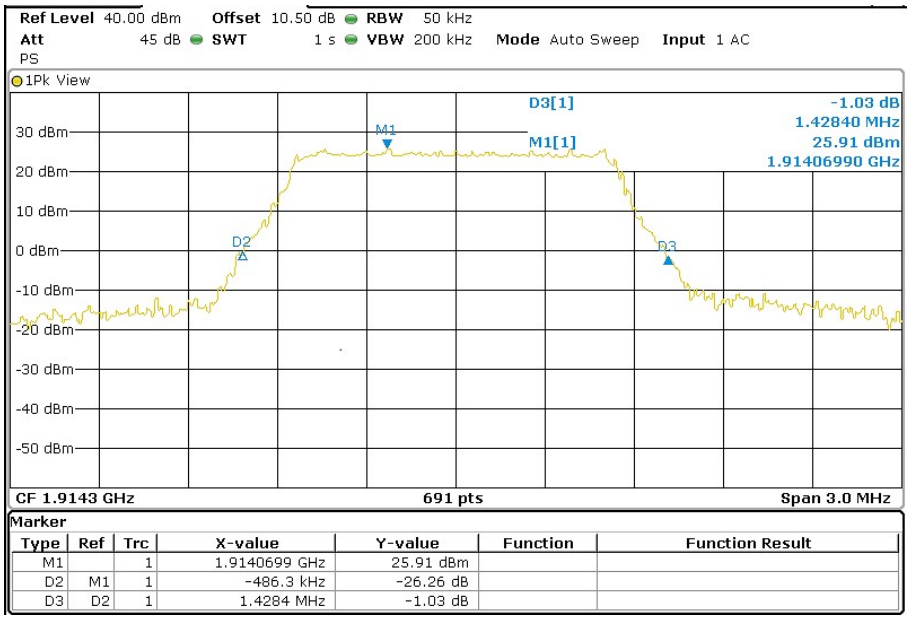
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8821179 GHz	26.89 dBm		
D2	M1	1	-325.6 kHz	-26.15 dB		
D3	D2	1	1.411 MHz	-0.13 dB		

TEST RESULTS (Cont):	

Highest Channel 99% Occupied Bandwidth



Highest Channel -26dBc Bandwidth kHz



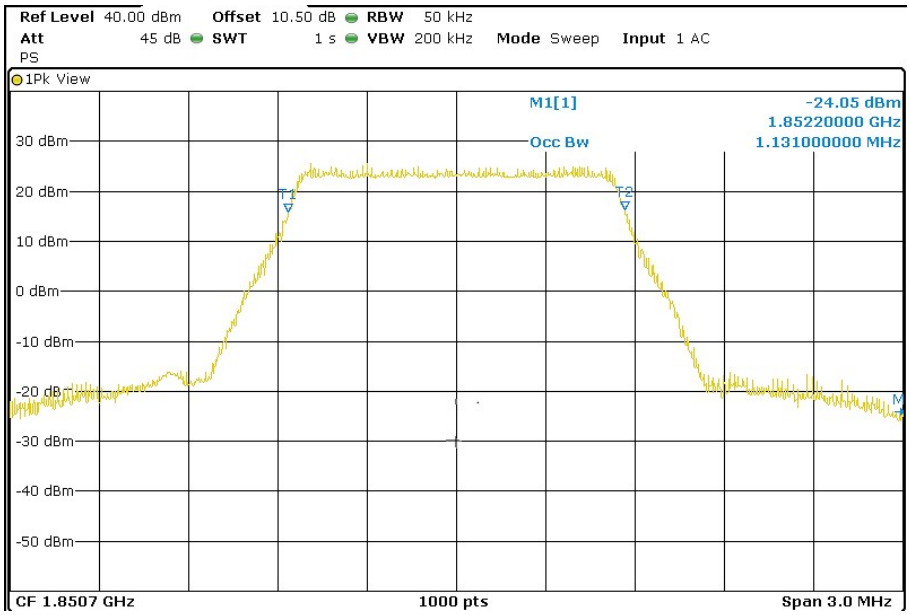
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.9140699 GHz	25.91 dBm		
D2	M1	1	-486.3 kHz	-26.26 dB		
D3	D2	1	1.4284 MHz	-1.03 dB		

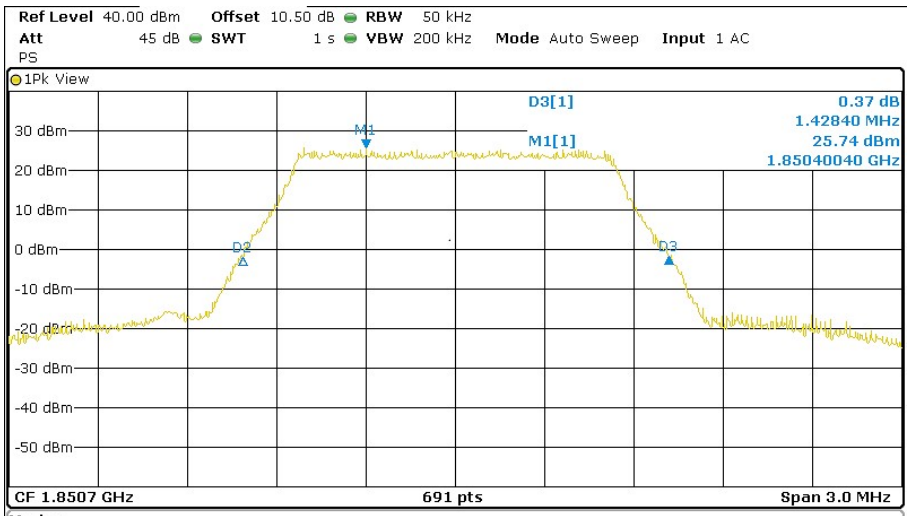
TEST RESULTS (Cont):	

LTE 16QAM MODULATION. BW = 1.4 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

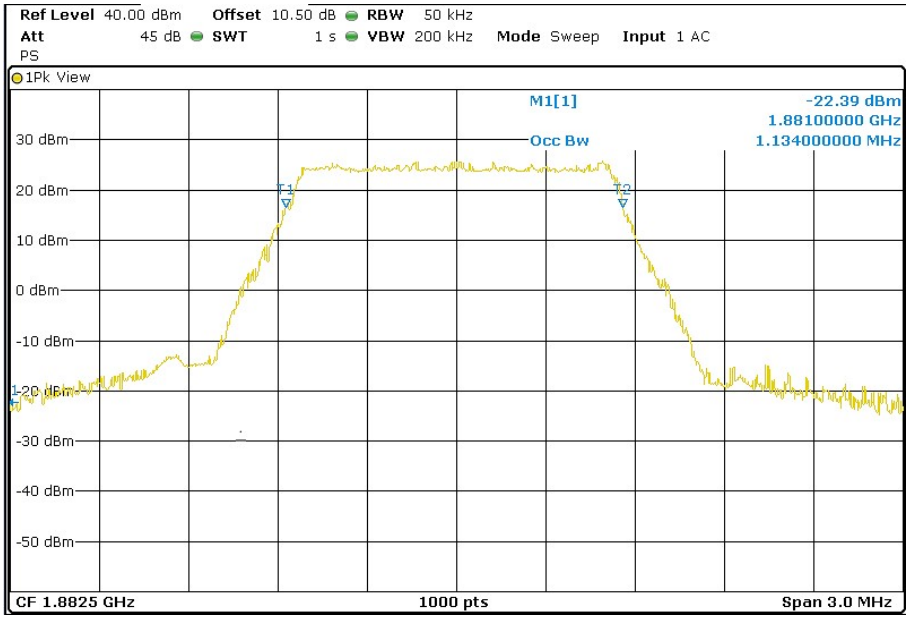


Marker

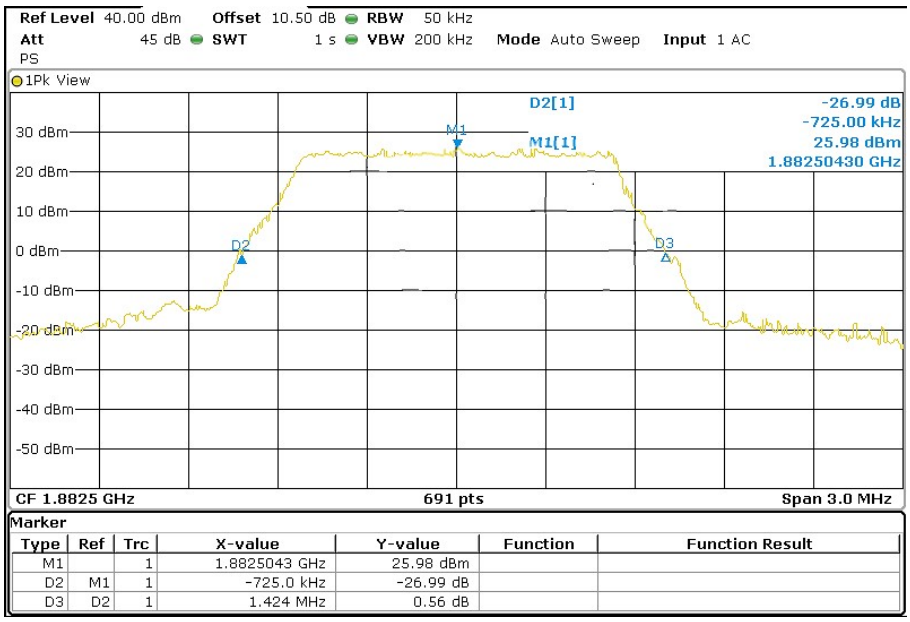
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8504004 GHz	25.74 dBm		
D2	M1	1	-412.4 kHz	-27.70 dB		
D3	D2	1	1.4284 MHz	0.37 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz

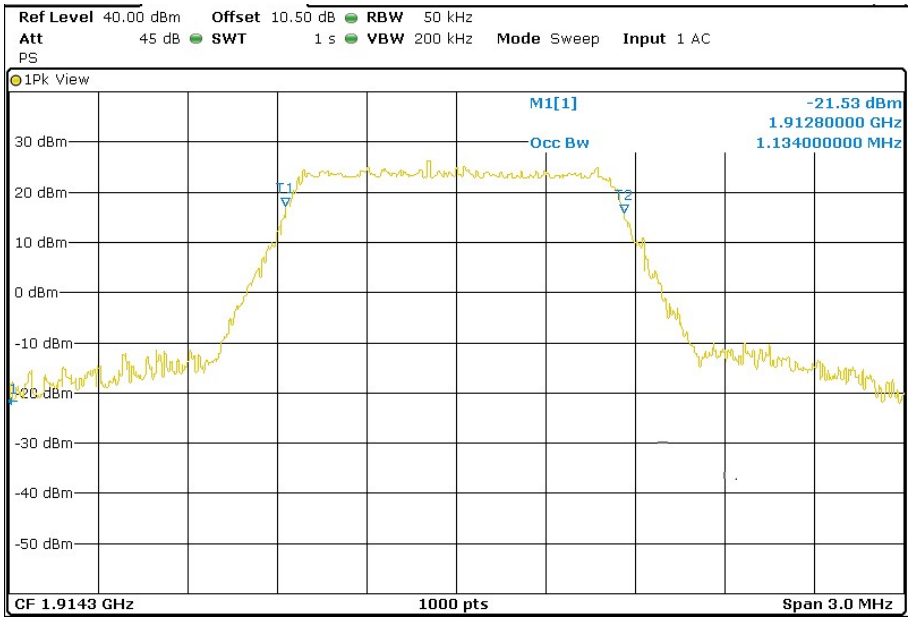


Marker

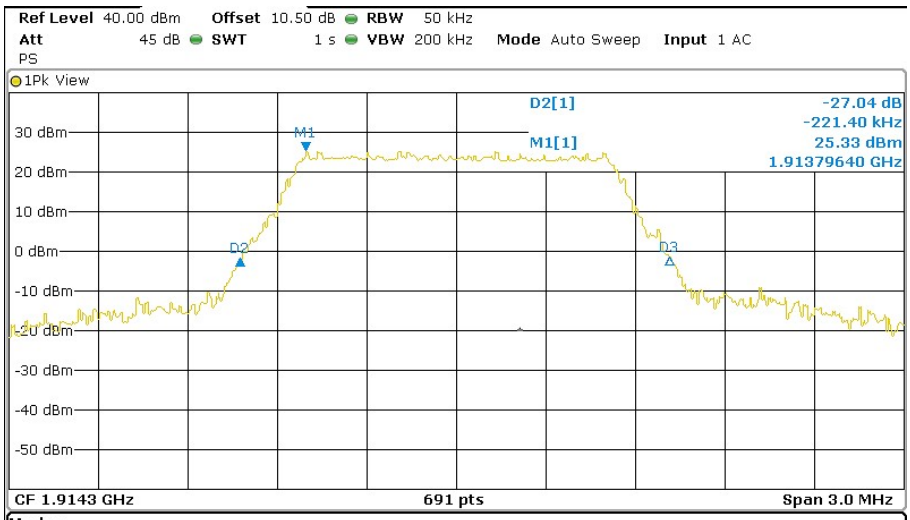
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.8825043 GHz	25.98 dBm		
D2	M1	1	-725.0 kHz	-26.99 dB		
D3	D2	1	1.424 MHz	0.56 dB		

TEST RESULTS (Cont):	

Highest Channel 99% Occupied Bandwidth



Highest Channel -26dBc Bandwidth kHz



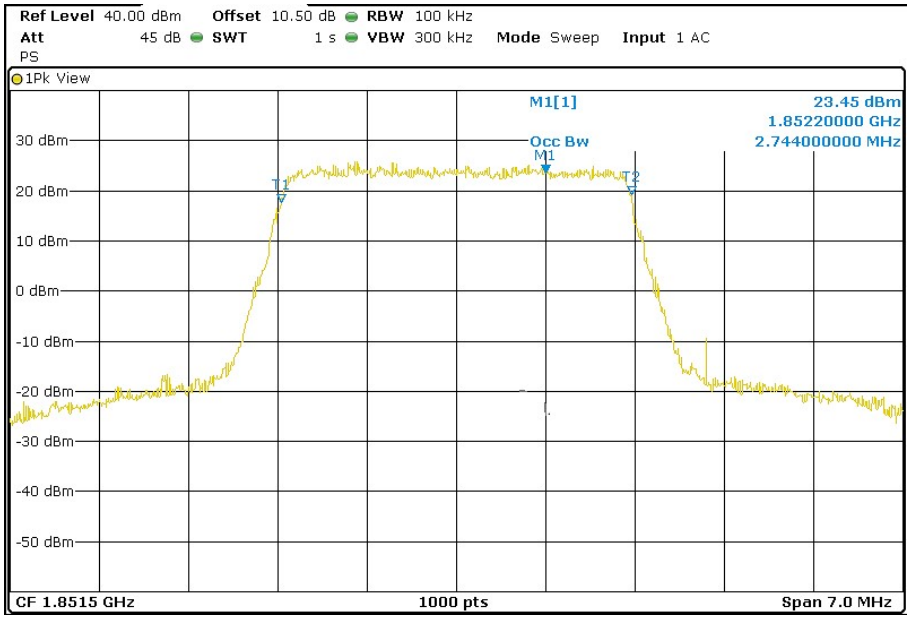
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.9137964 GHz	25.33 dBm		
D2	M1	1	-221.4 kHz	-27.04 dB		
D3	D2	1	1.437 MHz	0.42 dB		

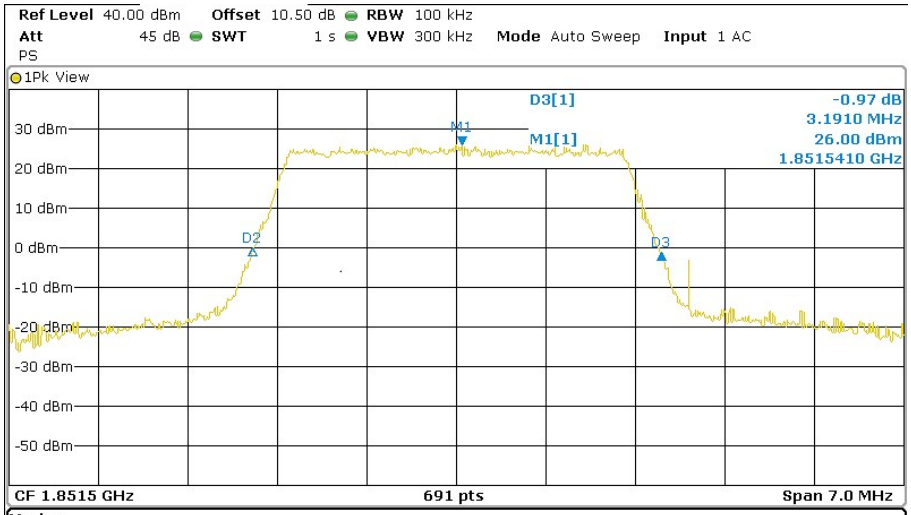
TEST RESULTS (Cont):	

LTE QPSK MODULATION. BW = 3 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

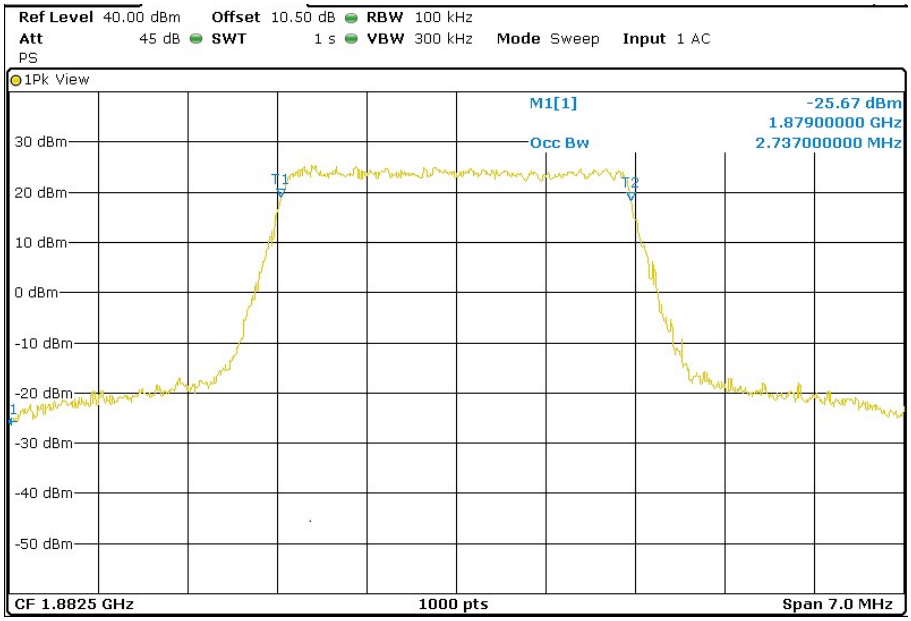


Marker

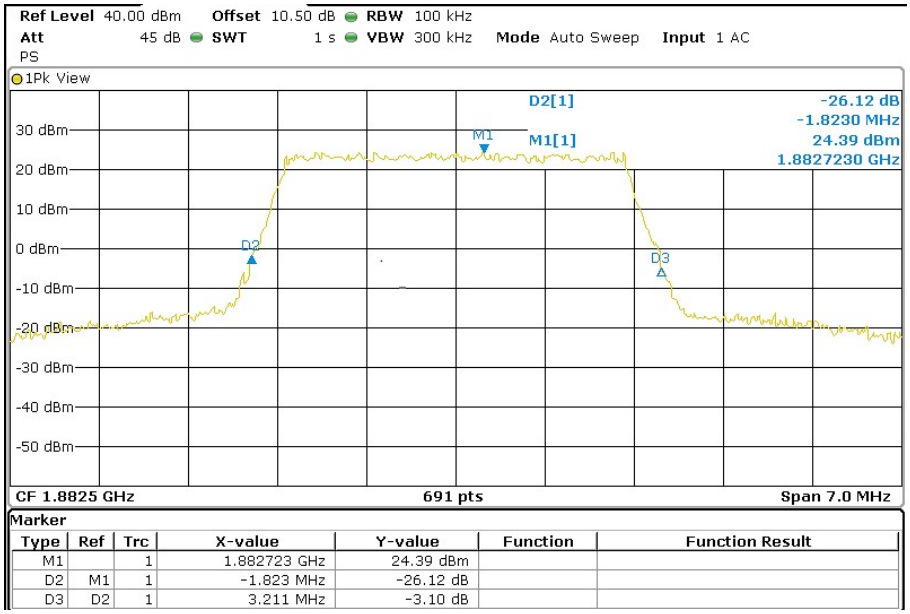
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.851541 GHz	26.00 dBm		
D2	M1	1	-1.63 MHz	-26.07 dB		
D3	D2	1	3.191 MHz	-0.97 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz

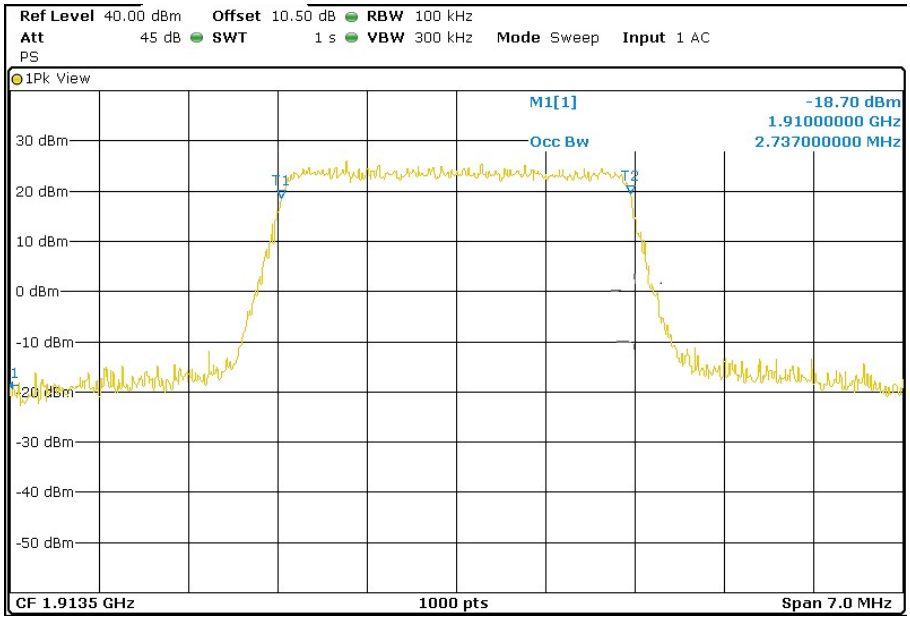


Marker

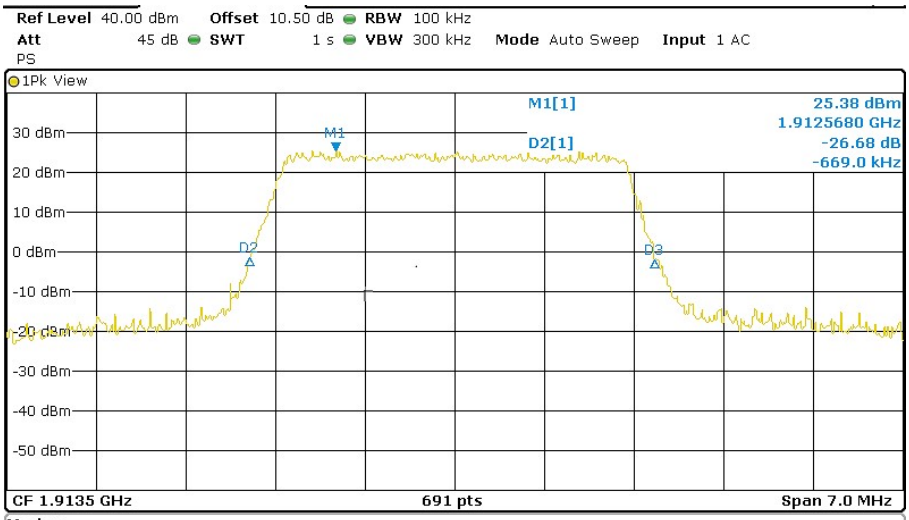
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.882723 GHz	24.39 dBm		
D2	M1	1	-1.823 MHz	-26.12 dB		
D3	D2	1	3.211 MHz	-3.10 dB		

TEST RESULTS (Cont):	

Highest Channel 99% Occupied Bandwidth



Highest Channel -26dBc Bandwidth kHz



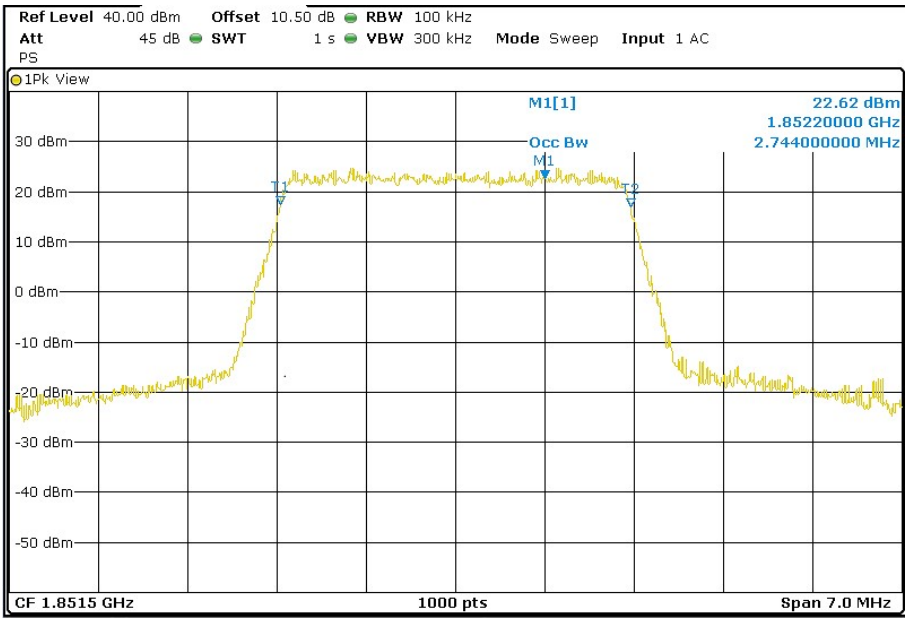
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.912568 GHz	25.38 dBm		
D2	M1	1	-669.0 kHz	-26.68 dB		
D3	D2	1	3.161 MHz	-0.70 dB		

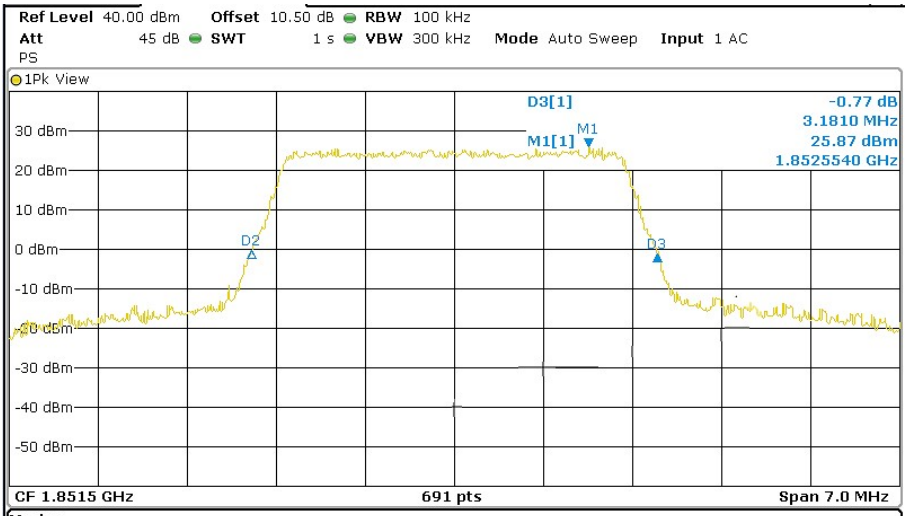
TEST RESULTS (Cont):	

LTE 16QAM MODULATION. BW = 3 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

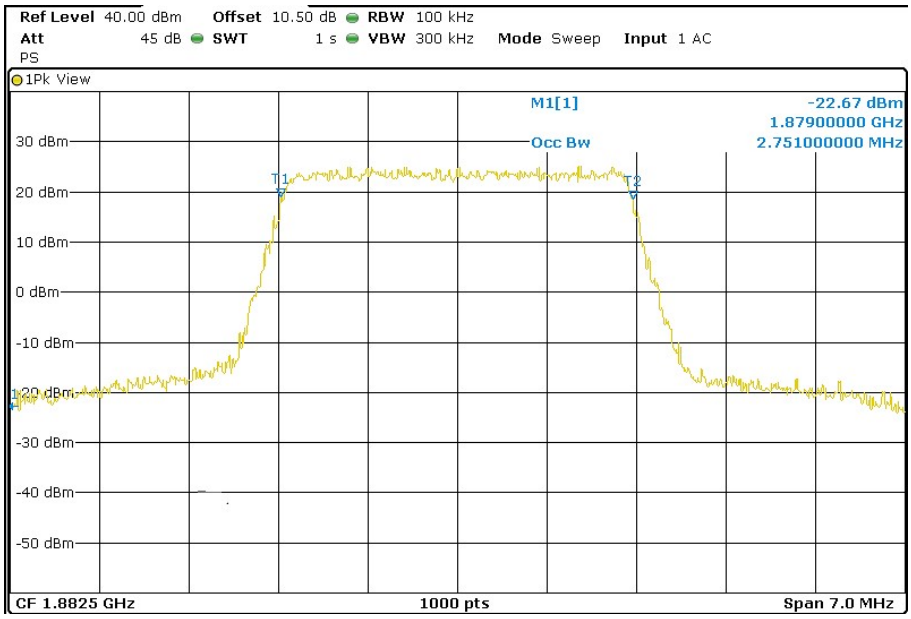


Marker

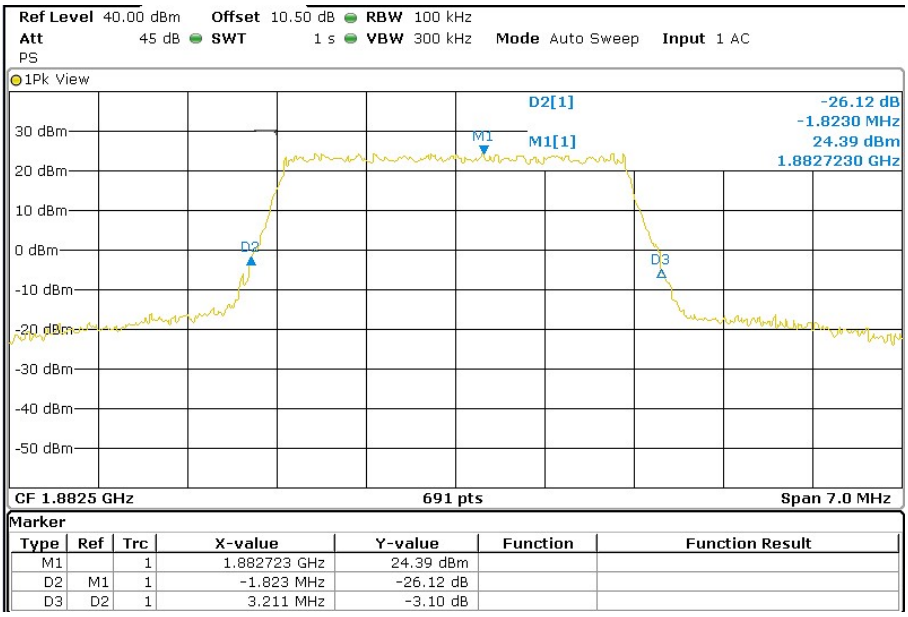
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.852554 GHz	25.87 dBm		
D2	M1	1	-2.643 MHz	-26.19 dB		
D3	D2	1	3.181 MHz	-0.77 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz

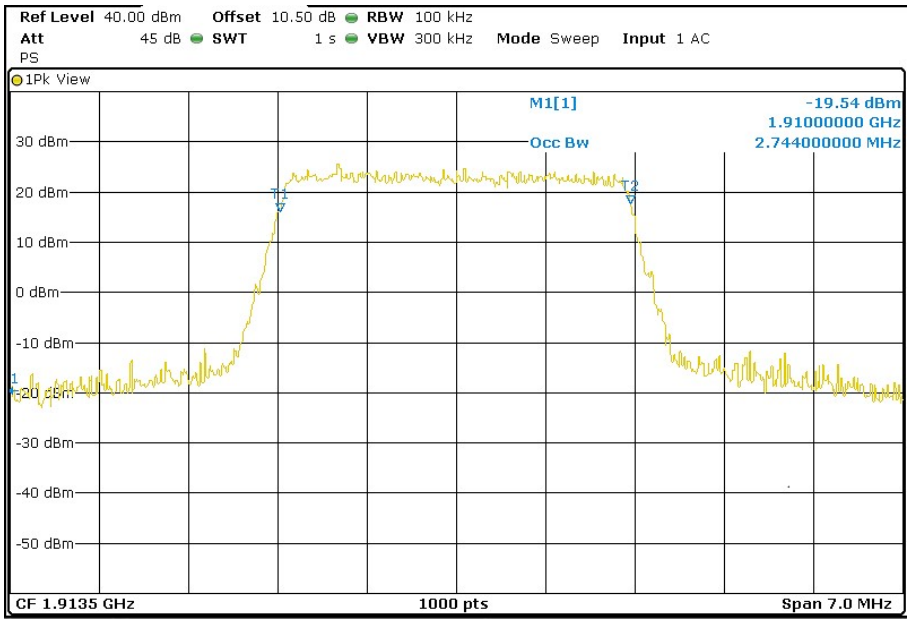


Marker

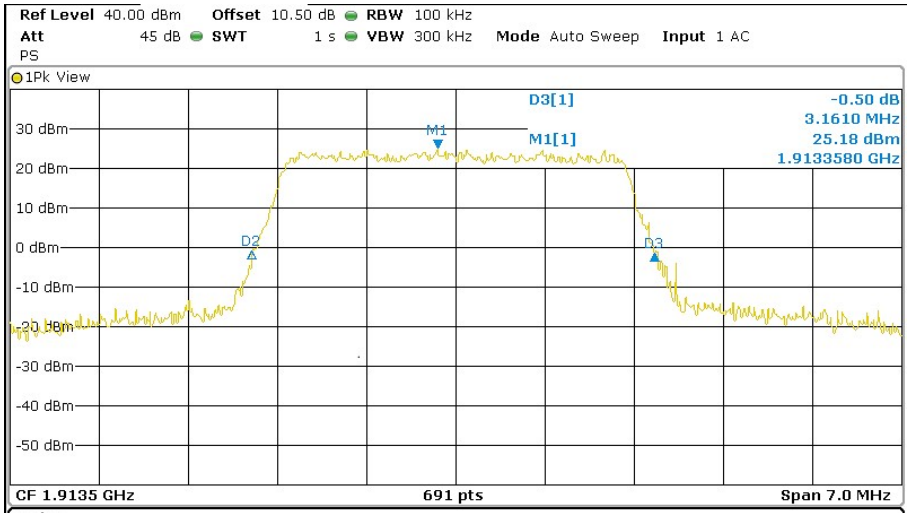
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.882723 GHz	24.39 dBm		
D2	M1	1	-1.823 MHz	-26.12 dB		
D3	D2	1	3.211 MHz	-3.10 dB		

TEST RESULTS (Cont):	

Highest Channel 99% Occupied Bandwidth



Highest Channel -26dBc Bandwidth kHz



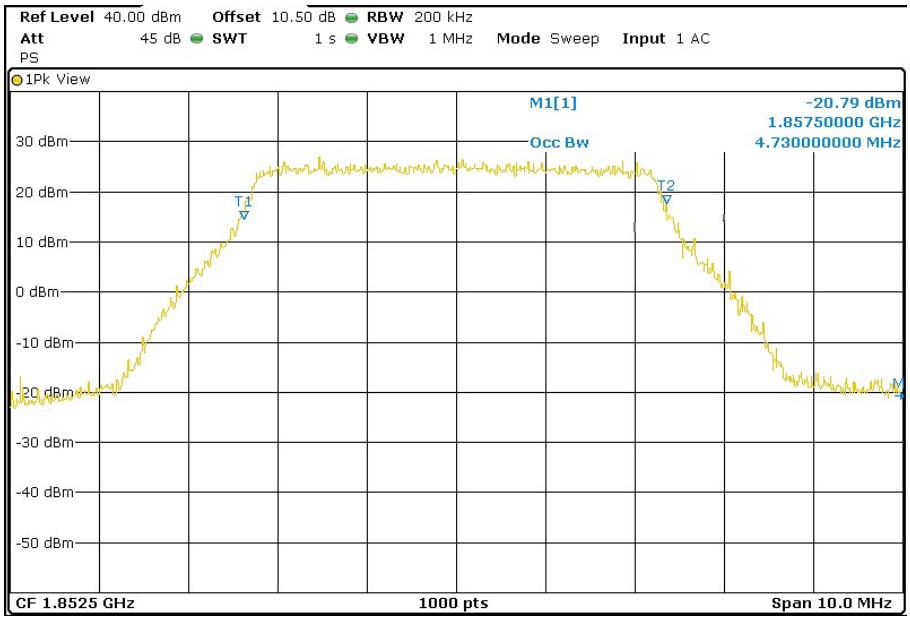
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.913358 GHz	25.18 dBm		
D2	M1	1	-1.459 MHz	-26.15 dB		
D3	D2	1	3.161 MHz	-0.50 dB		

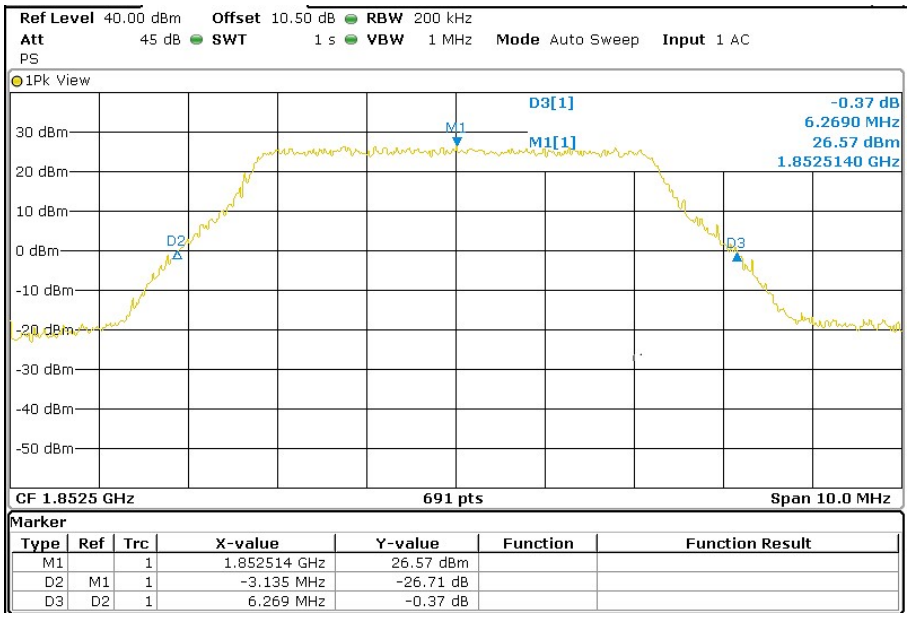
TEST RESULTS (Cont):	

LTE QPSK MODULATION. BW = 5 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

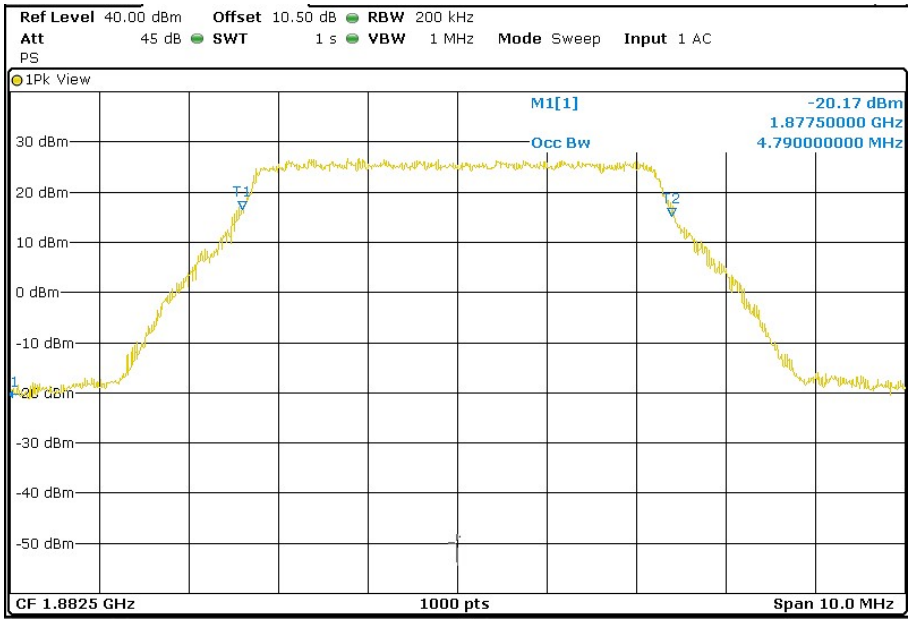


Marker

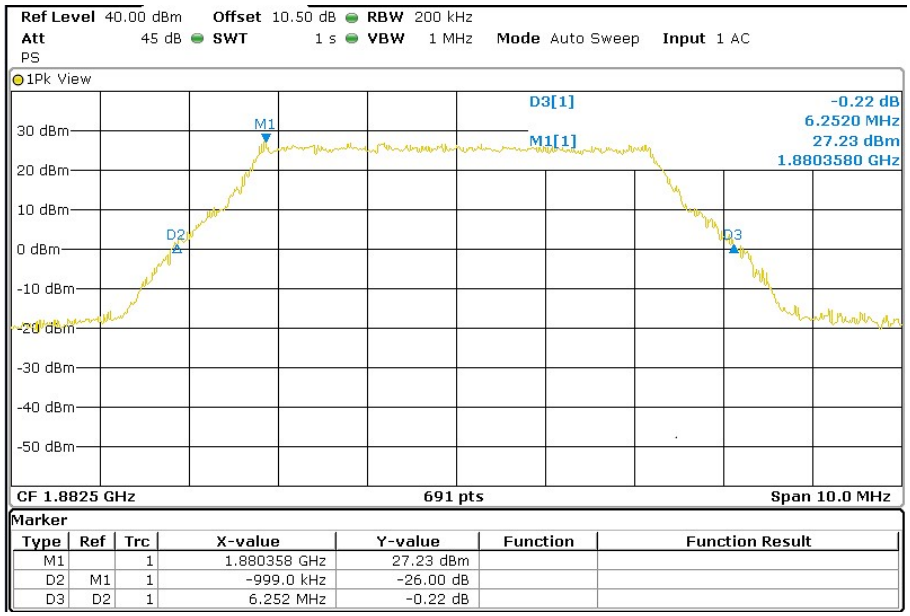
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.852514 GHz	26.57 dBm		
D2	M1	1	-3.135 MHz	-26.71 dB		
D3	D2	1	6.269 MHz	-0.37 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz

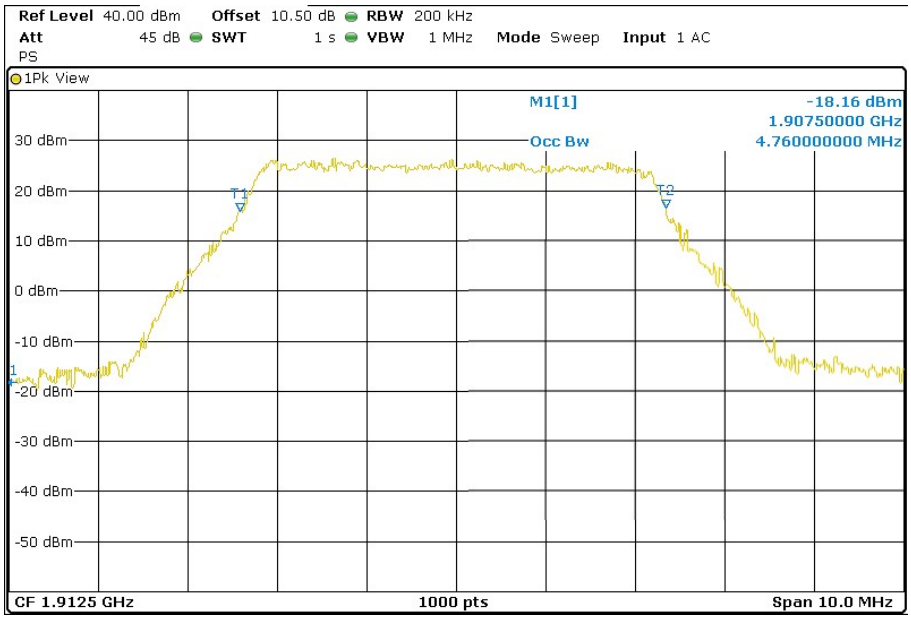


Marker

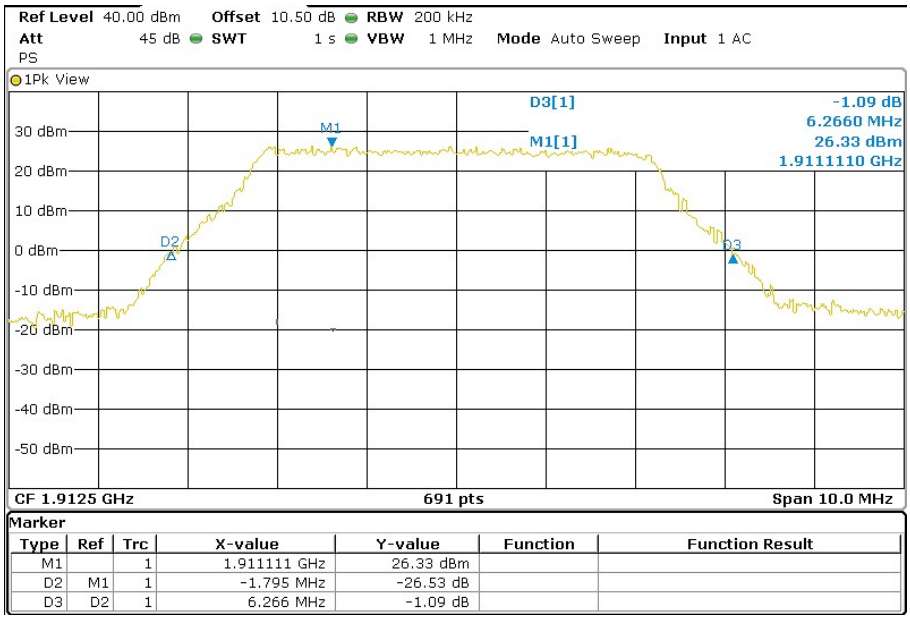
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.880358 GHz	27.23 dBm		
D2	M1	1	-999.0 kHz	-26.00 dB		
D3	D2	1	6.252 MHz	-0.22 dB		

TEST RESULTS (Cont):	

Highest Channel 99% Occupied Bandwidth



Highest Channel -26dBc Bandwidth kHz



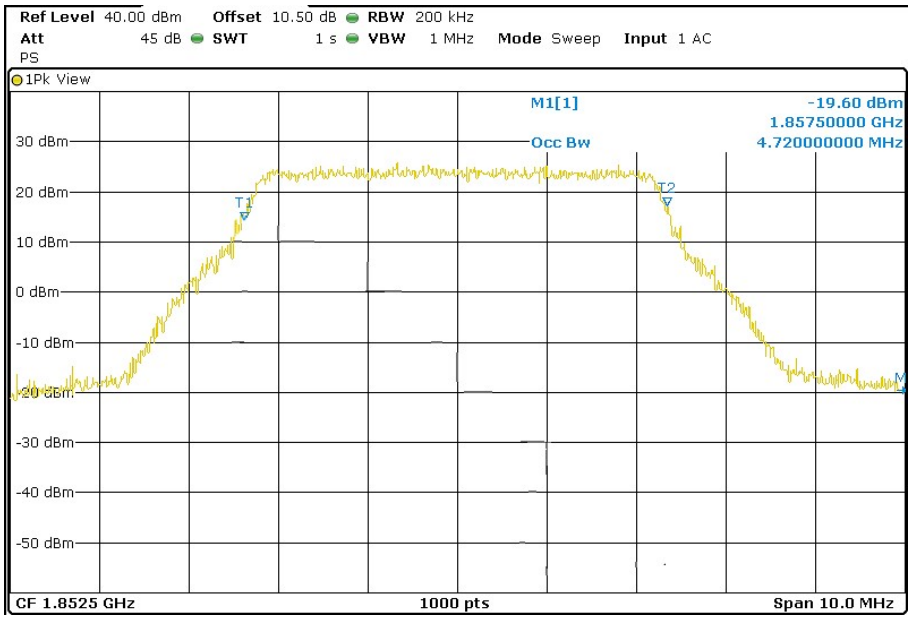
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.911111 GHz	26.33 dBm		
D2	M1	1	-1.795 MHz	-26.53 dB		
D3	D2	1	6.266 MHz	-1.09 dB		

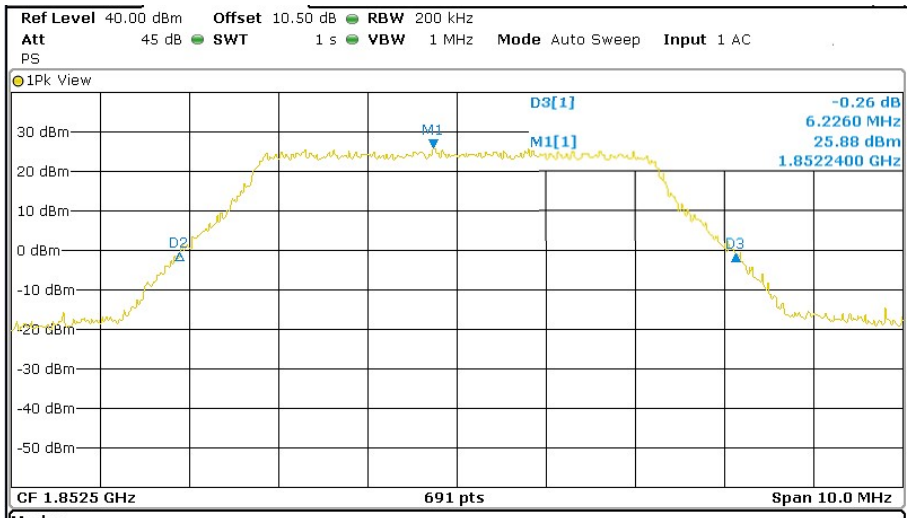
TEST RESULTS (Cont):	

LTE 16QAM MODULATION. BW = 5 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

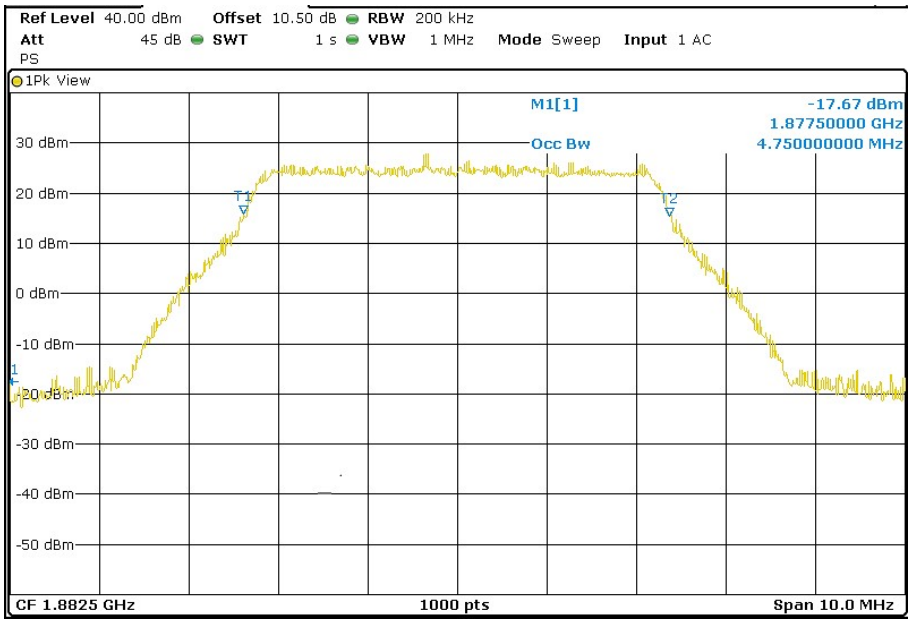


Marker

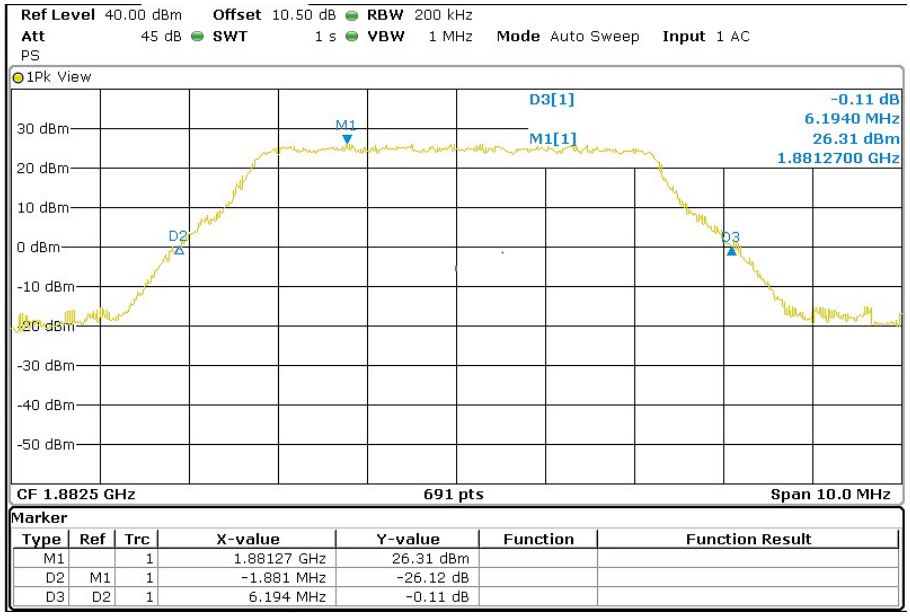
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.85224 GHz	25.88 dBm		
D2	M1	1	-2.846 MHz	-26.34 dB		
D3	D2	1	6.226 MHz	-0.26 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz

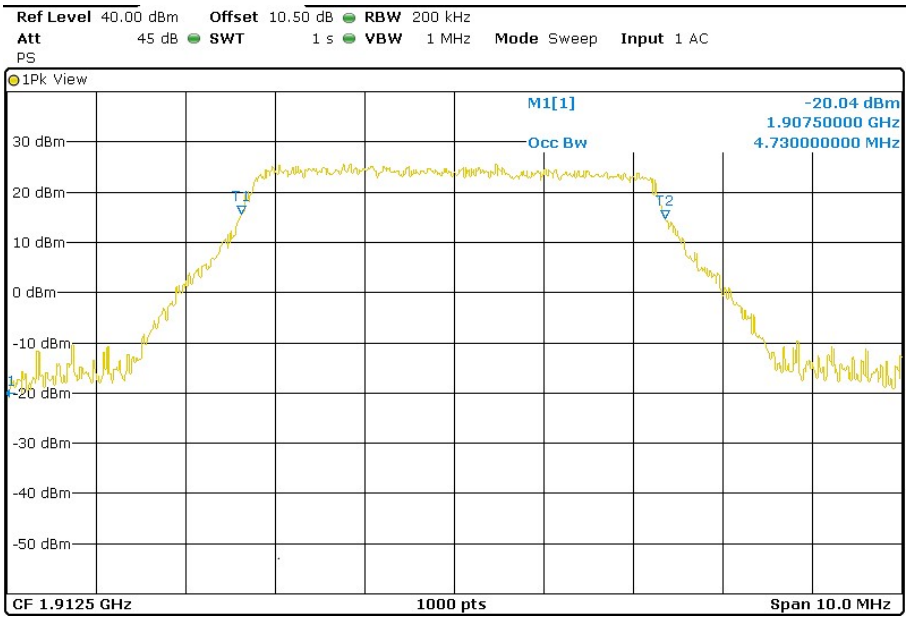


Marker

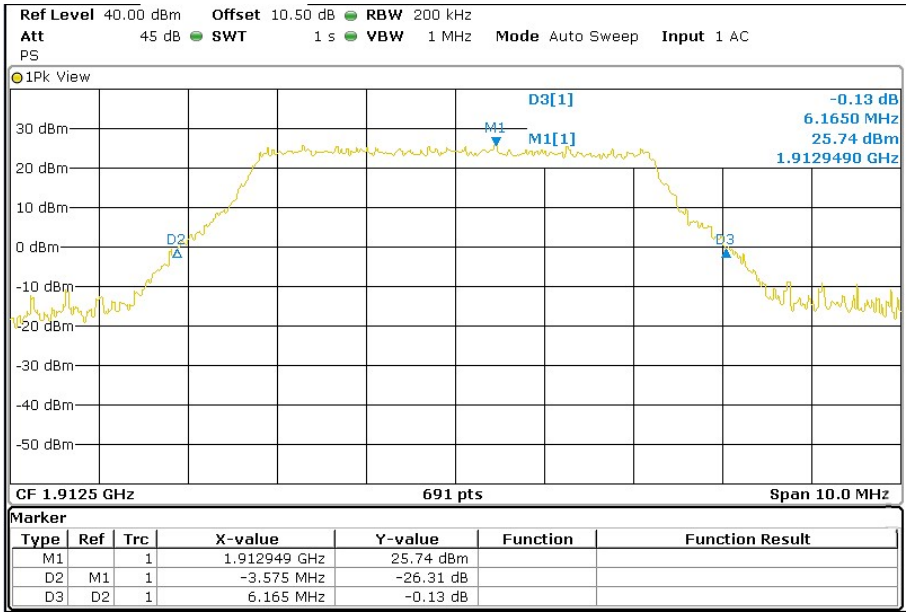
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.88127 GHz	26.31 dBm		
D2	M1	1	-1.881 MHz	-26.12 dB		
D3	D2	1	6.194 MHz	-0.11 dB		

TEST RESULTS (Cont):	

Highest Channel 99% Occupied Bandwidth



Highest Channel -26dBc Bandwidth kHz



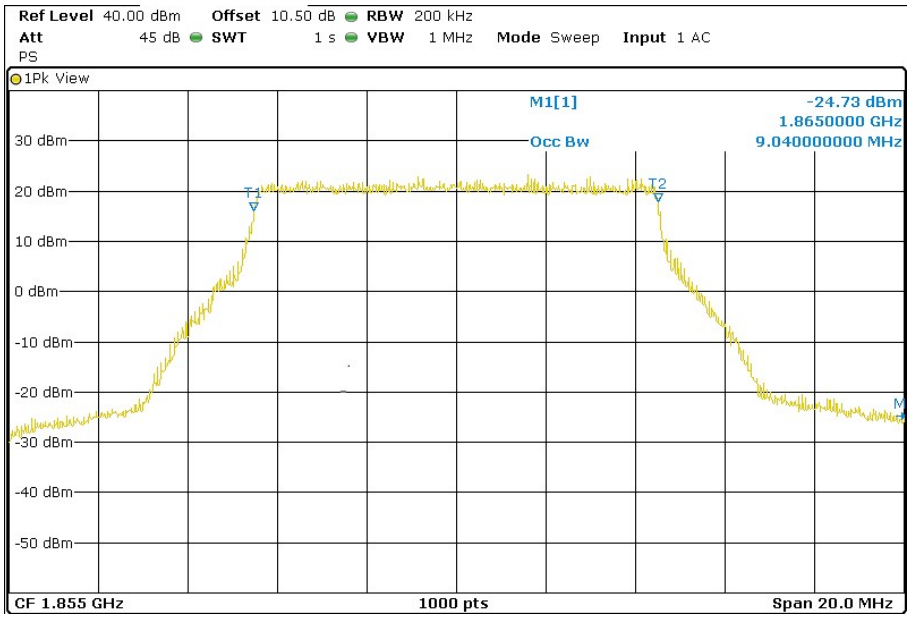
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.912949 GHz	25.74 dBm		
D2	M1	1	-3.575 MHz	-26.31 dB		
D3	D2	1	6.165 MHz	-0.13 dB		

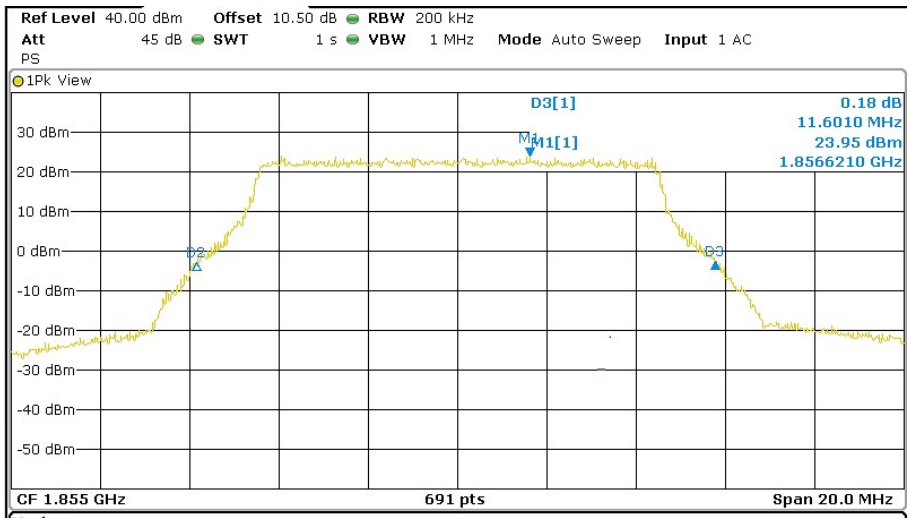
TEST RESULTS (Cont):	

LTE QPSK MODULATION. BW = 10 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

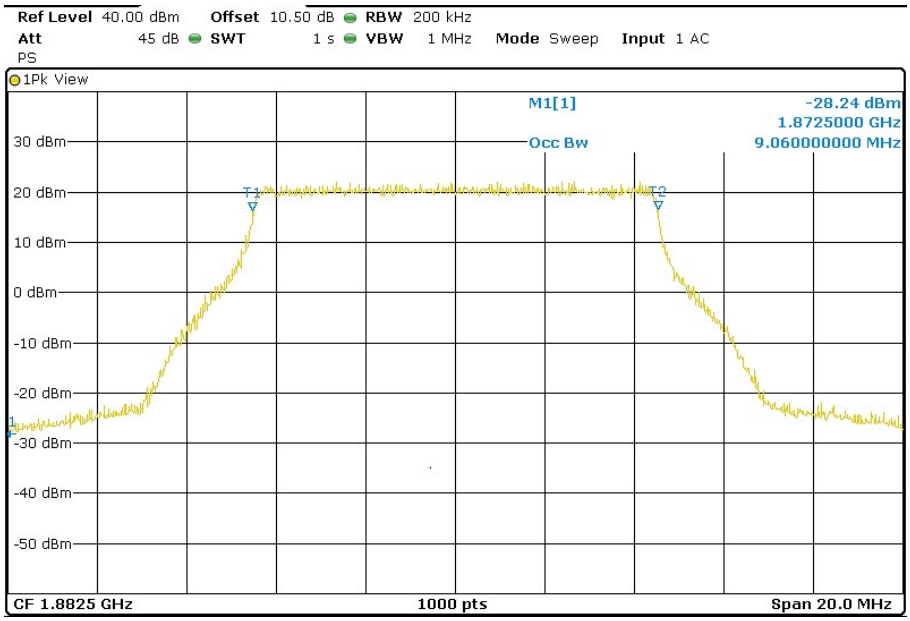


Marker

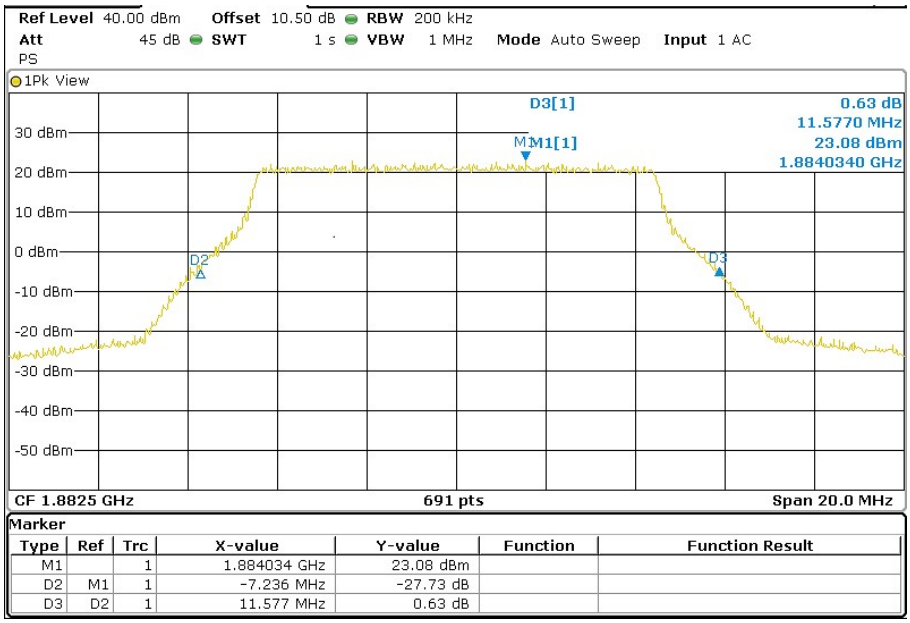
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.856621 GHz	23.95 dBm		
D2	M1	1	-7.465 MHz	-26.82 dB		
D3	D2	1	11.601 MHz	0.18 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz

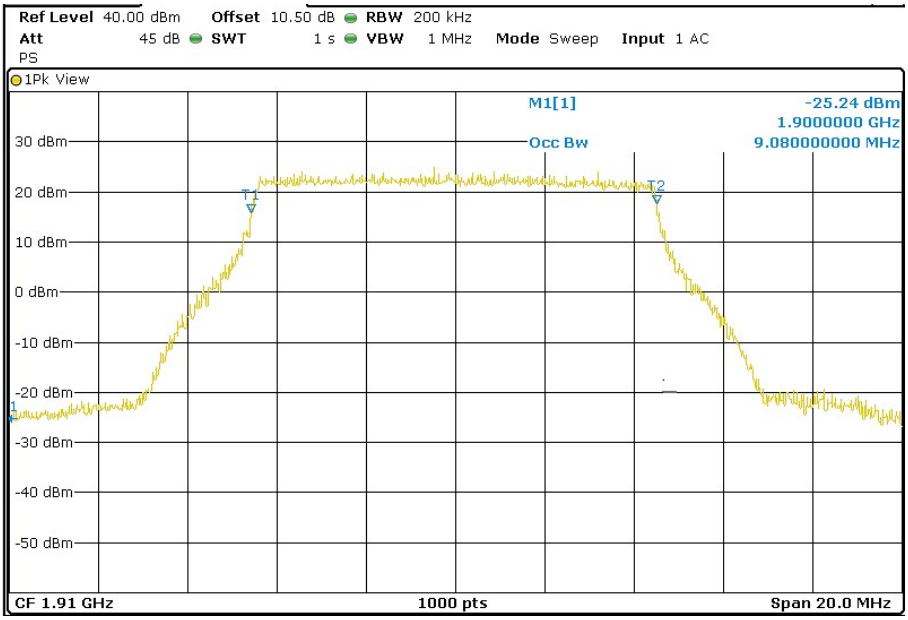


Marker

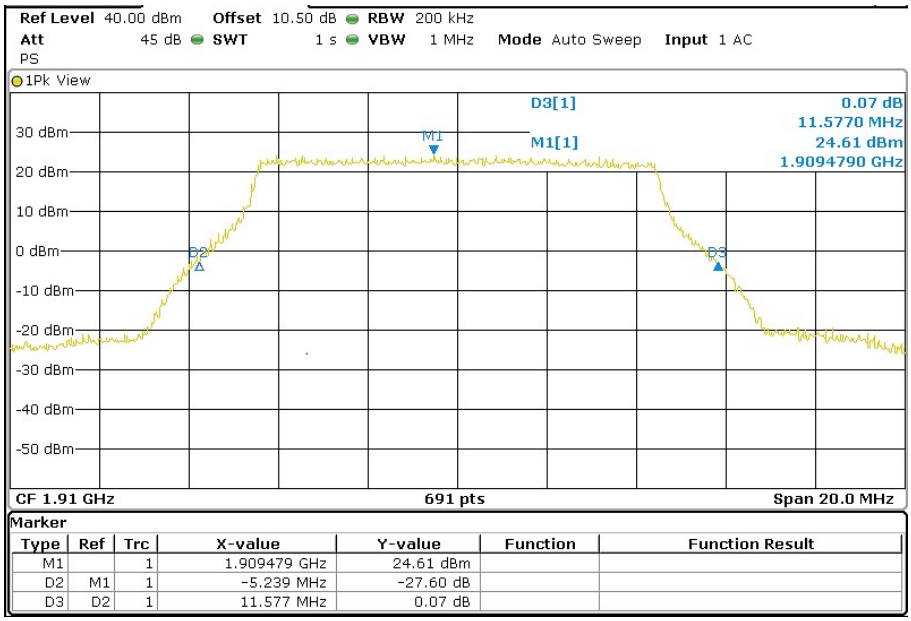
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.884034 GHz	23.08 dBm		
D2	M1	1	-7.236 MHz	-27.73 dB		
D3	D2	1	11.577 MHz	0.63 dB		

TEST RESULTS (Cont):	

Highest Channel 99% Occupied Bandwidth



Highest Channel -26dBc Bandwidth kHz



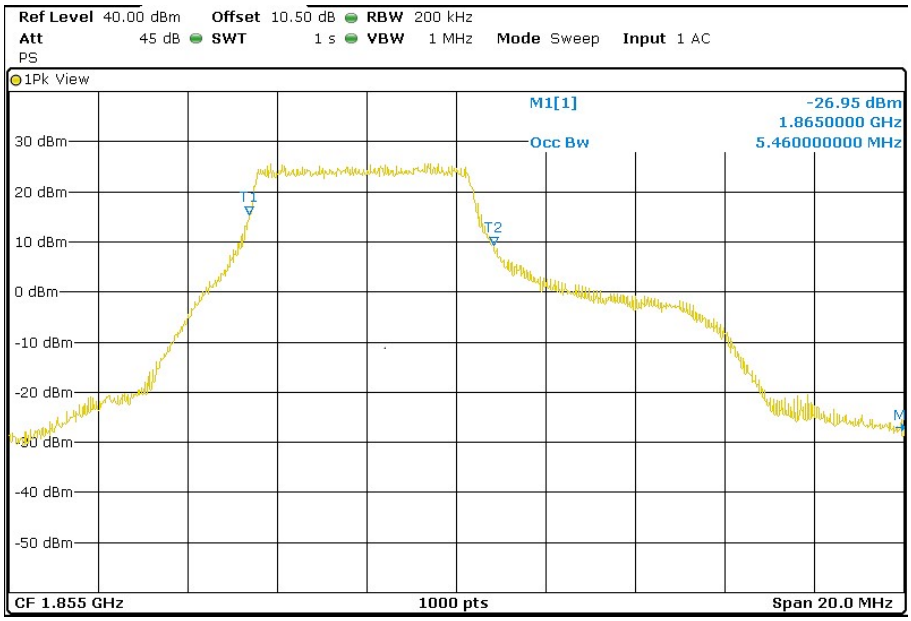
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.909479 GHz	24.61 dBm		
D2	M1	1	-5.239 MHz	-27.60 dB		
D3	D2	1	11.577 MHz	0.07 dB		

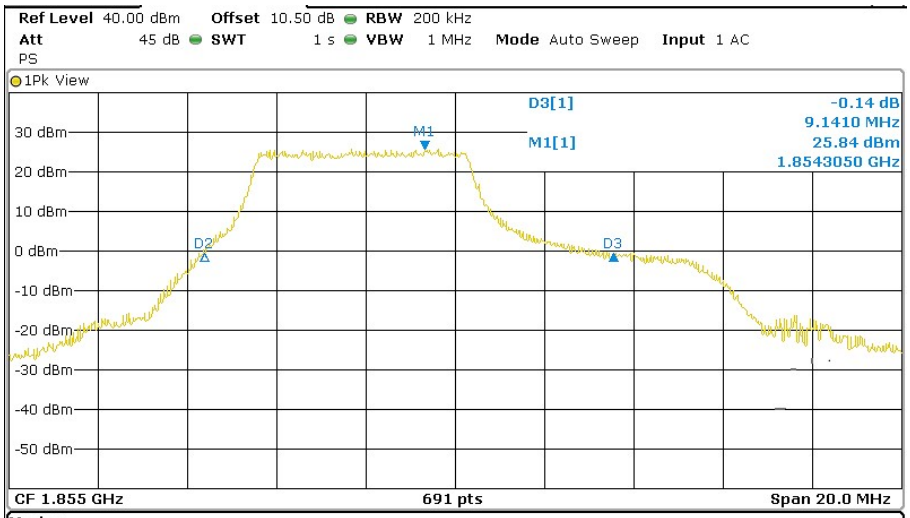
TEST RESULTS (Cont):	

LTE 16QAM MODULATION. BW = 10 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

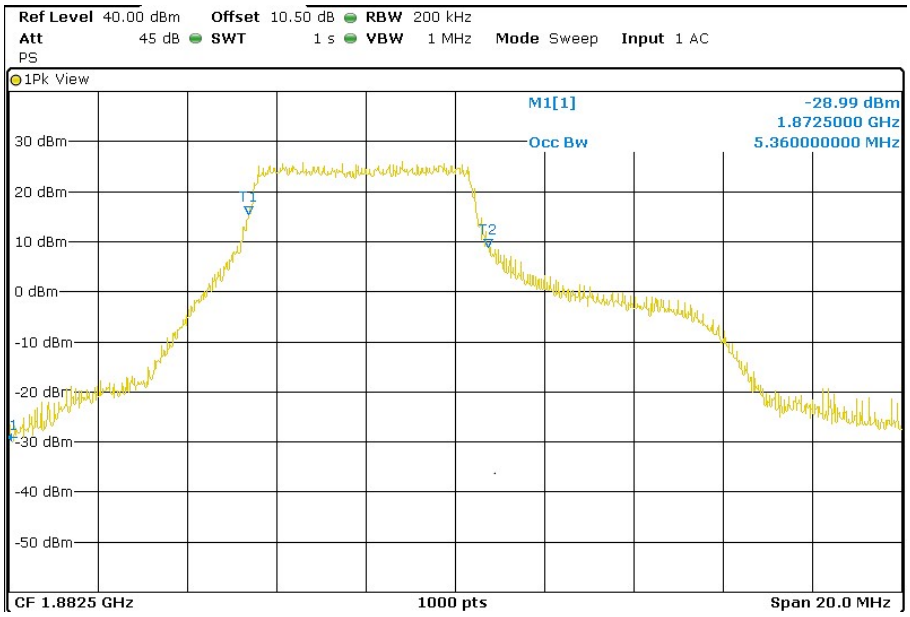


Marker

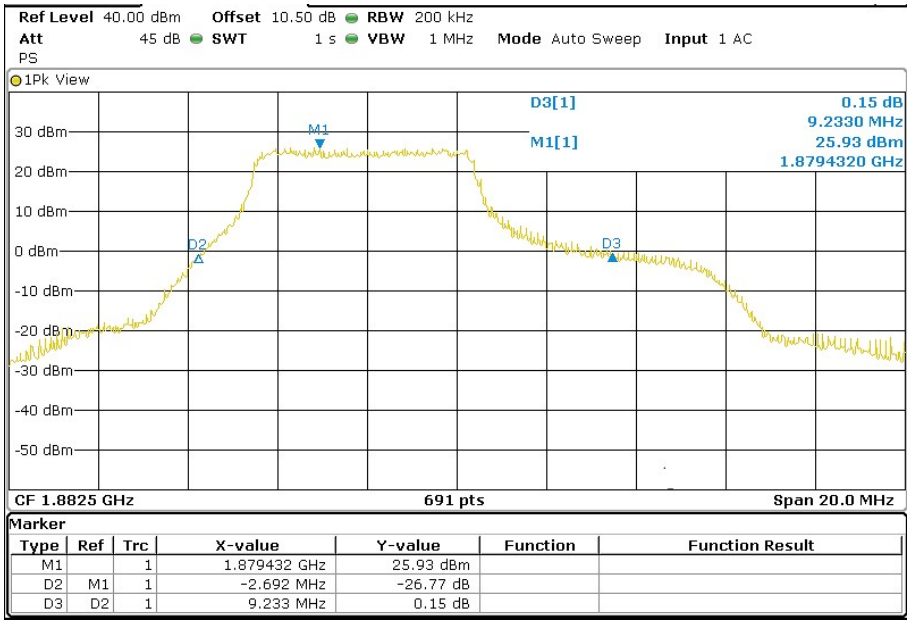
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.854305 GHz	25.84 dBm		
D2	M1	1	-4.918 MHz	-26.27 dB		
D3	D2	1	9.141 MHz	-0.14 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz

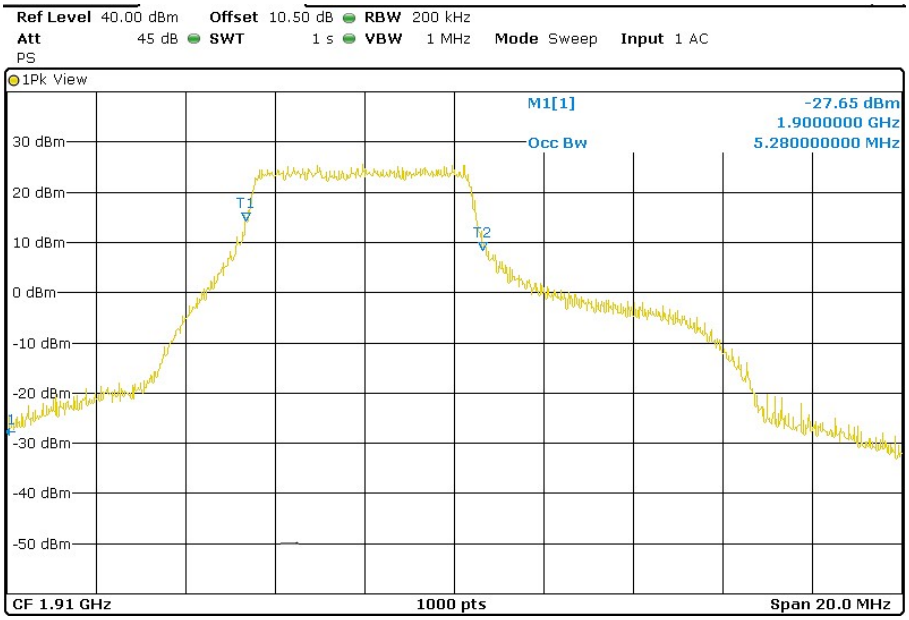


Marker

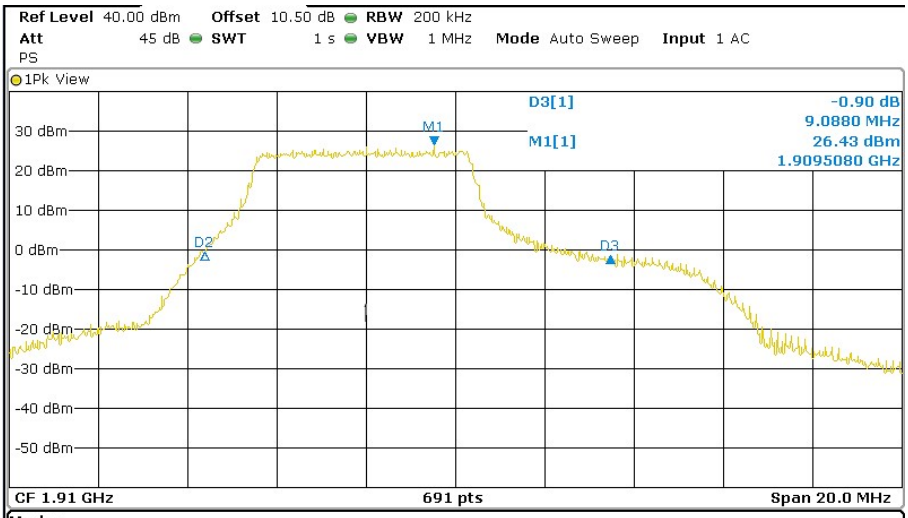
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.879432 GHz	25.93 dBm		
D2	M1	1	-2.692 MHz	-26.77 dB		
D3	D2	1	9.233 MHz	0.15 dB		

TEST RESULTS (Cont):	

Highest Channel 99% Occupied Bandwidth



Highest Channel -26dBc Bandwidth kHz



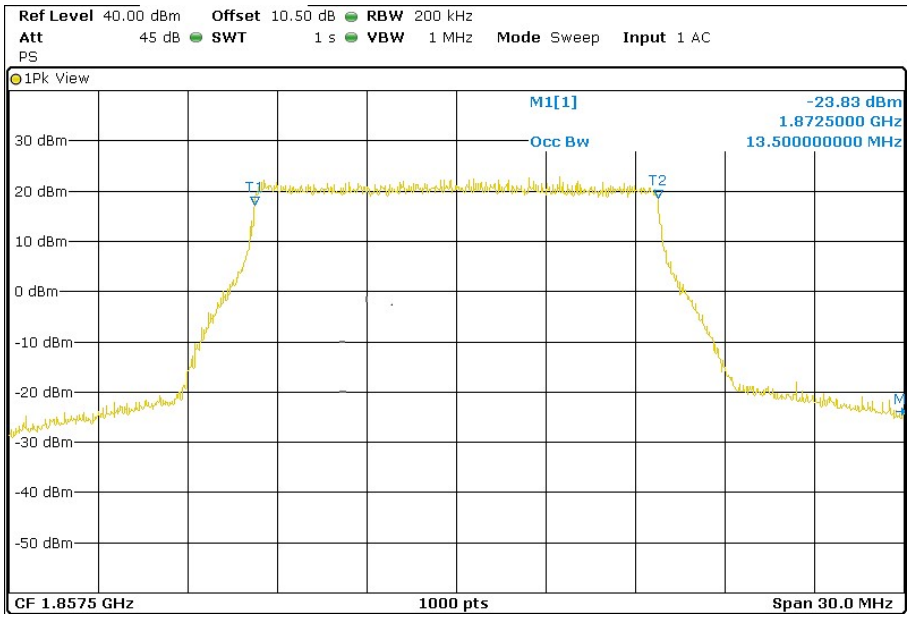
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.909508 GHz	26.43 dBm		
D2	M1	1	-5.123 MHz	-26.92 dB		
D3	D2	1	9.088 MHz	-0.90 dB		

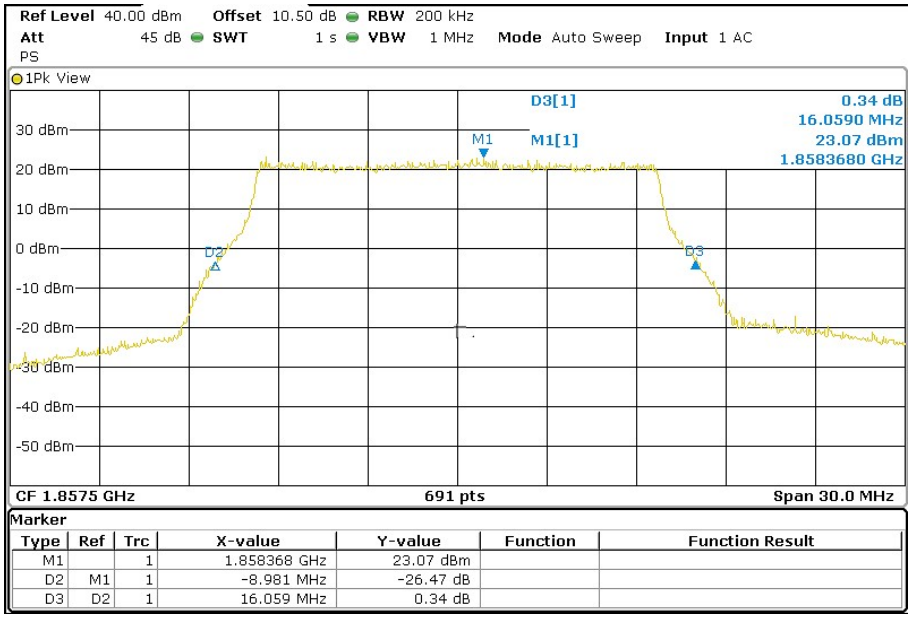
TEST RESULTS (Cont):	

LTE QPSK MODULATION. BW = 15 MHz

Lowest Channel 99% Occupied Bandwidth



Lowest Channel -26dBc Bandwidth kHz

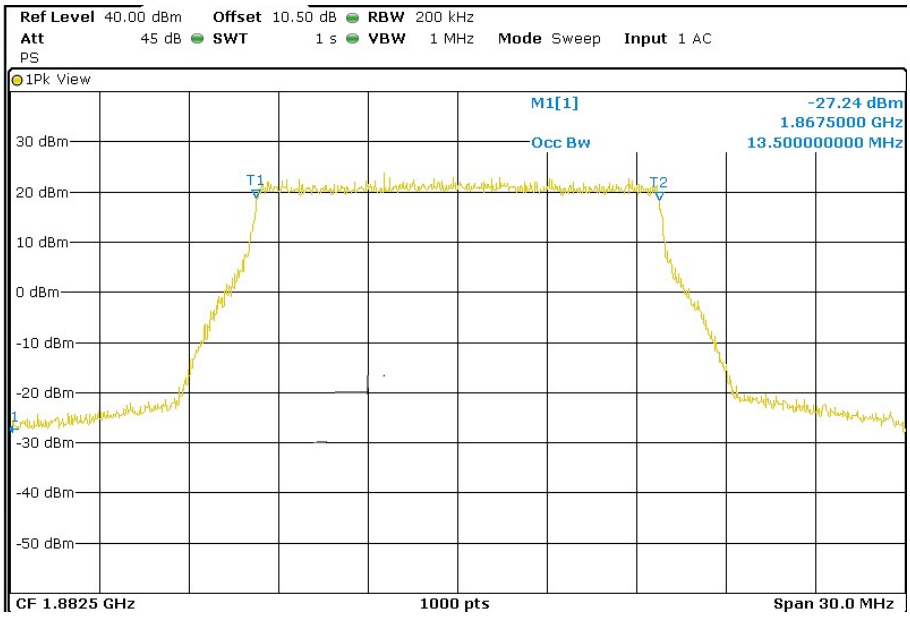


Marker

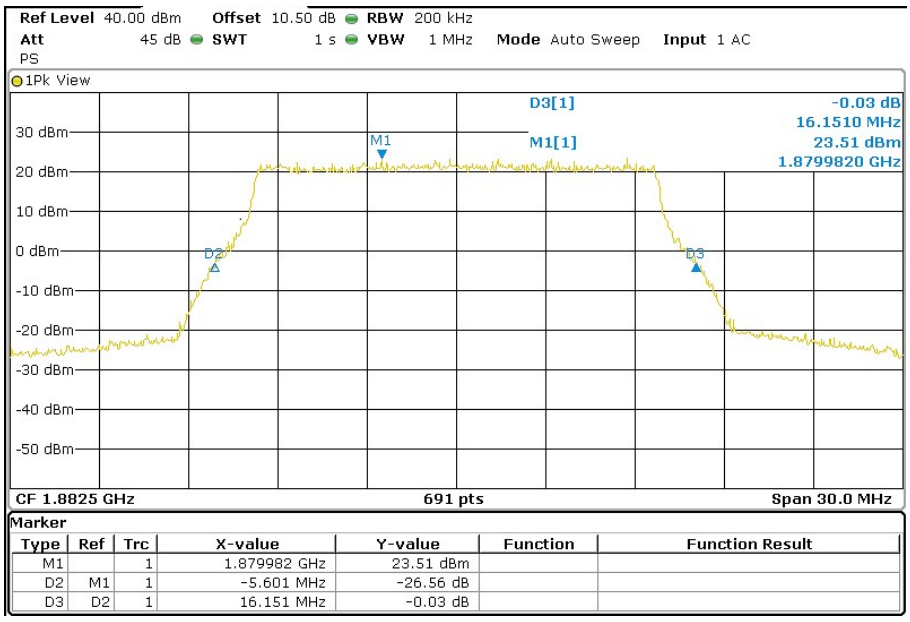
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.858368 GHz	23.07 dBm		
D2	M1	1	-8.981 MHz	-26.47 dB		
D3	D2	1	16.059 MHz	0.34 dB		

TEST RESULTS (Cont):	

Middle Channel 99% Occupied Bandwidth



Middle Channel -26dBc Bandwidth kHz



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.879982 GHz	23.51 dBm		
D2	M1	1	-5.601 MHz	-26.56 dB		
D3	D2	1	16.151 MHz	-0.03 dB		