

**6.5 Test data for Uplink**

- Test Date : November 03, 2014  
- Test Result : Pass

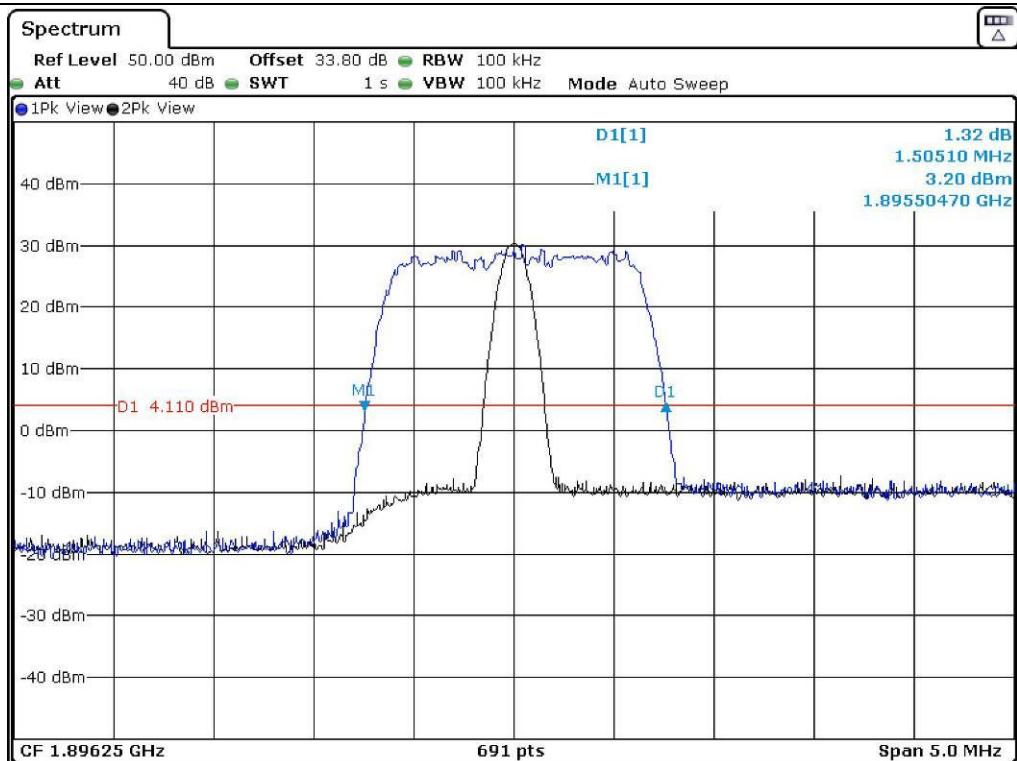
Modulation	Channel	26 dB Bandwidth (kHz)	99 % Occupied Bandwidth (kHz)
CDMA 2000	Low	1.51	1.31
	Middle	1.53	1.33
	High	1.51	1.31
LTE 5 M	QPSK	4.62	4.10
LTE 10 M	QPSK	9.29	8.68
LTE 15 M	QPSK	13.98	13.24

Remark: 1. According to above result, the carrier frequency shall be within the frequency block edges.

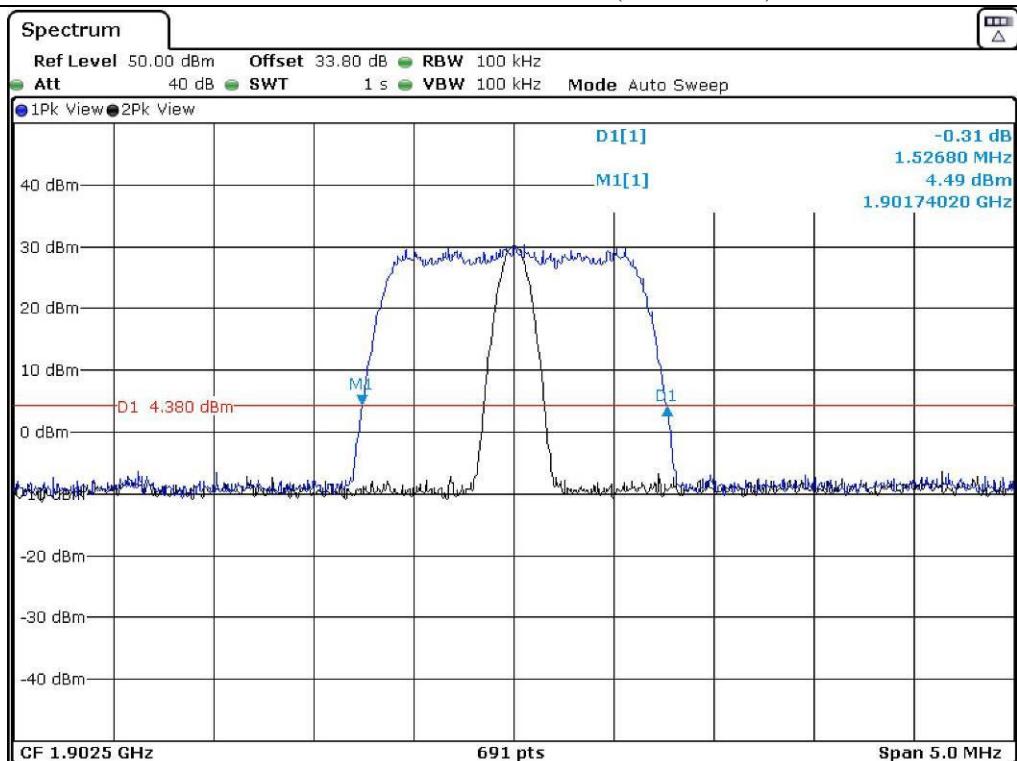
2. As a result of preliminary testing., the formal test was performed with the maximum payload mode of worst cases for QPSK.



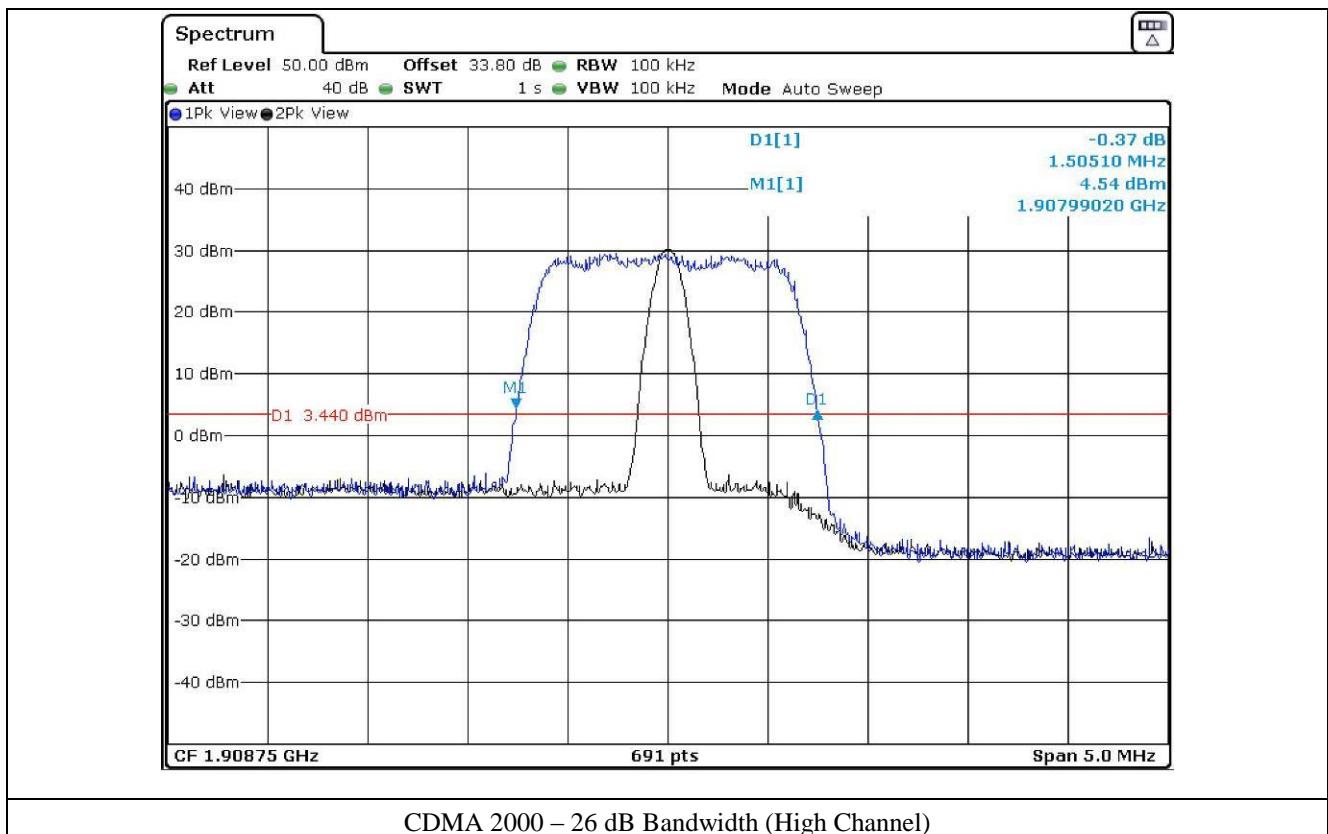
Tested by: hyung-kwon, Oh / Project Engineer

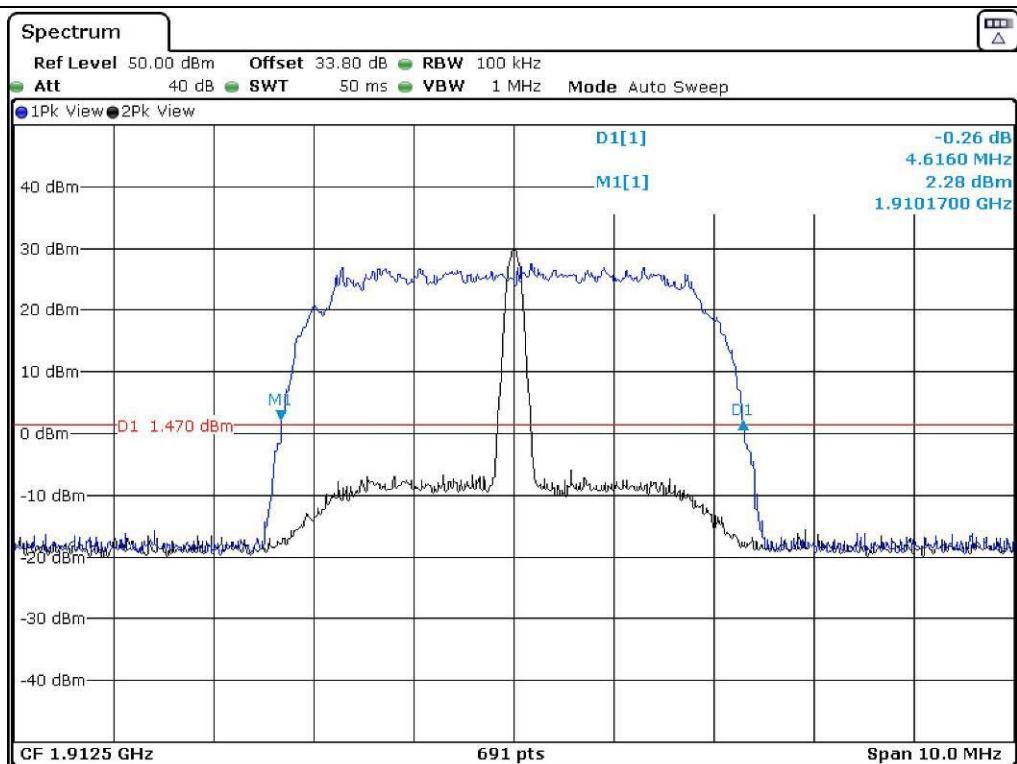


#### CDMA 2000 – 26 dB Bandwidth (Low Channel)

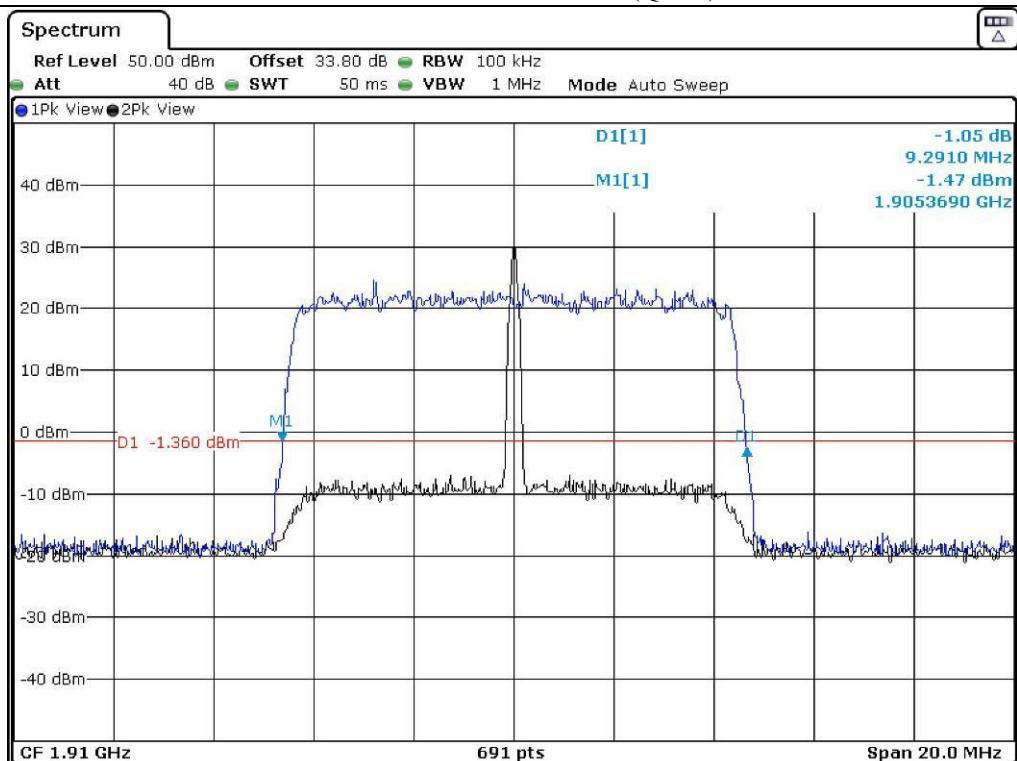


#### CDMA 2000 – 26 dB Bandwidth (Middle Channel)

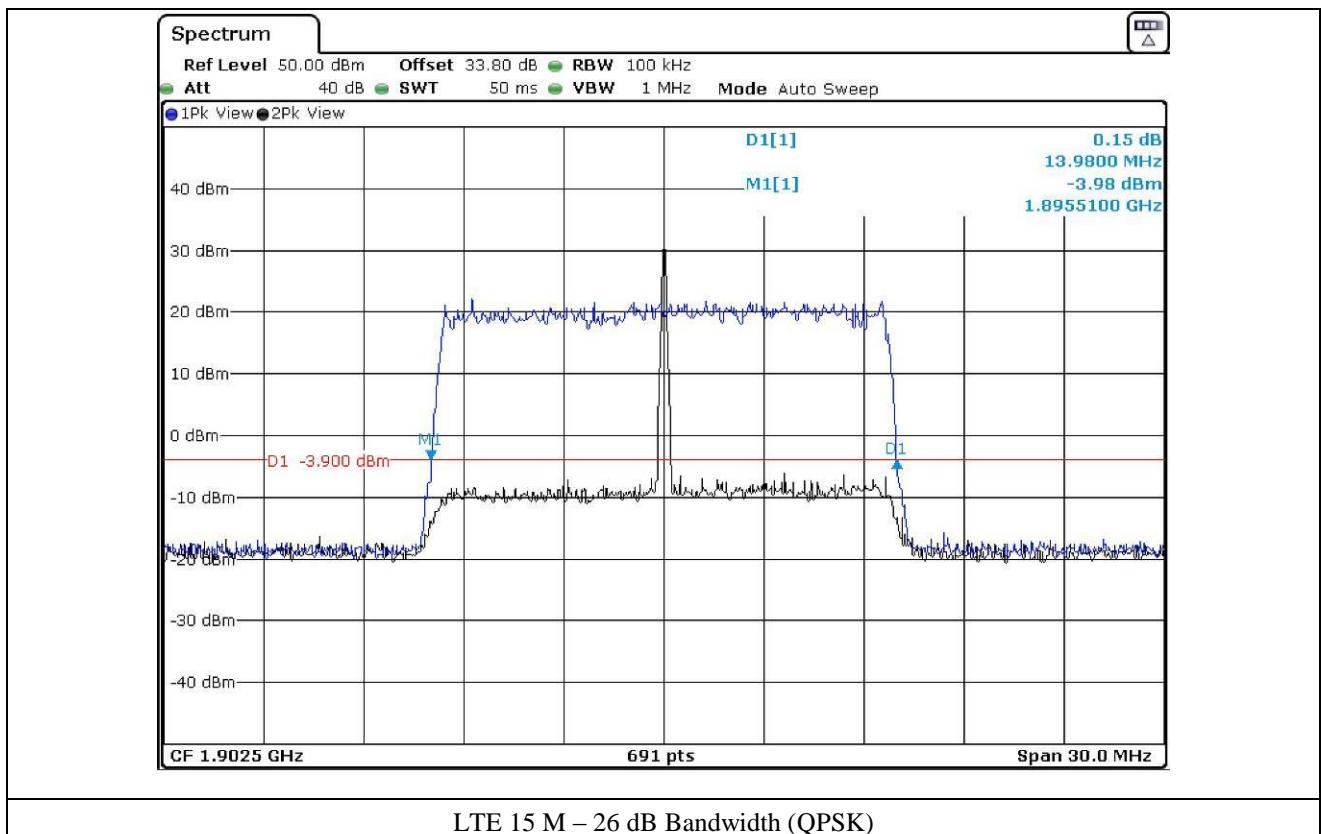


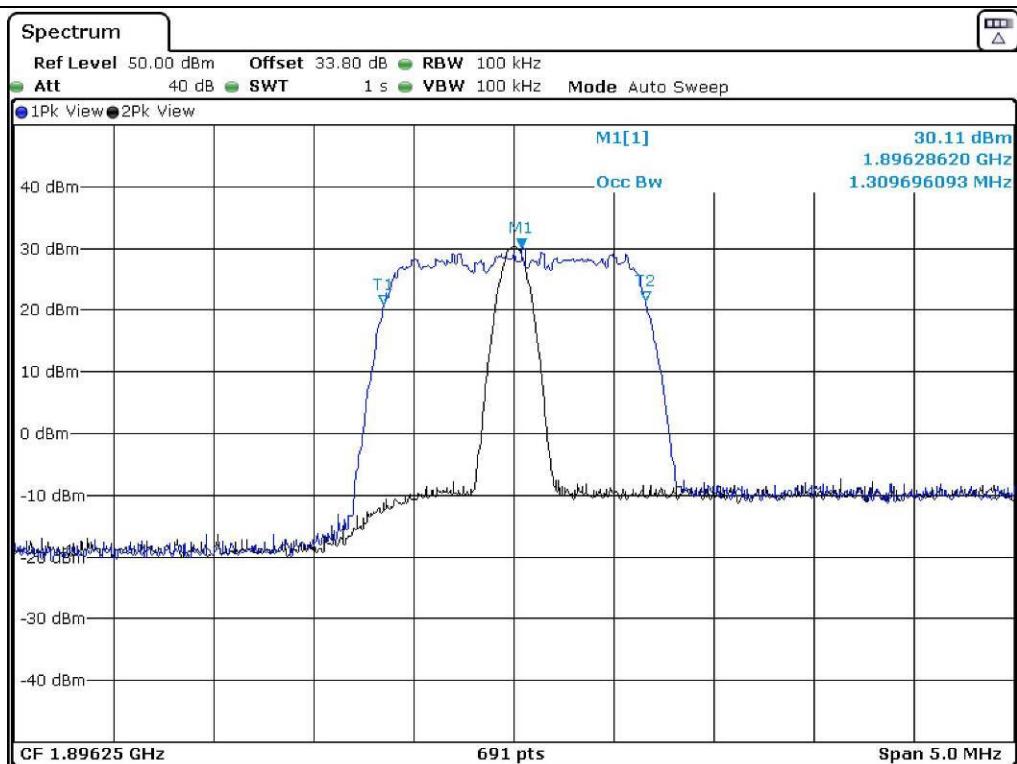


## LTE 5 M – 26 dB Bandwidth (QPSK)

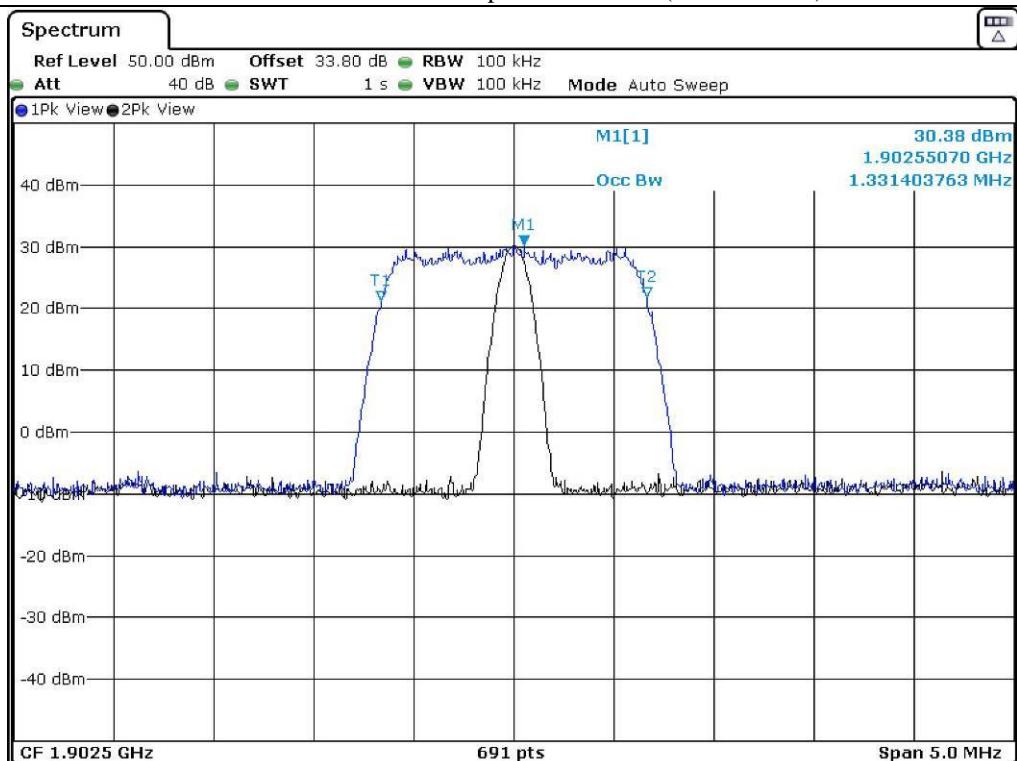


## LTE 10 M – 26 dB Bandwidth (QPSK)

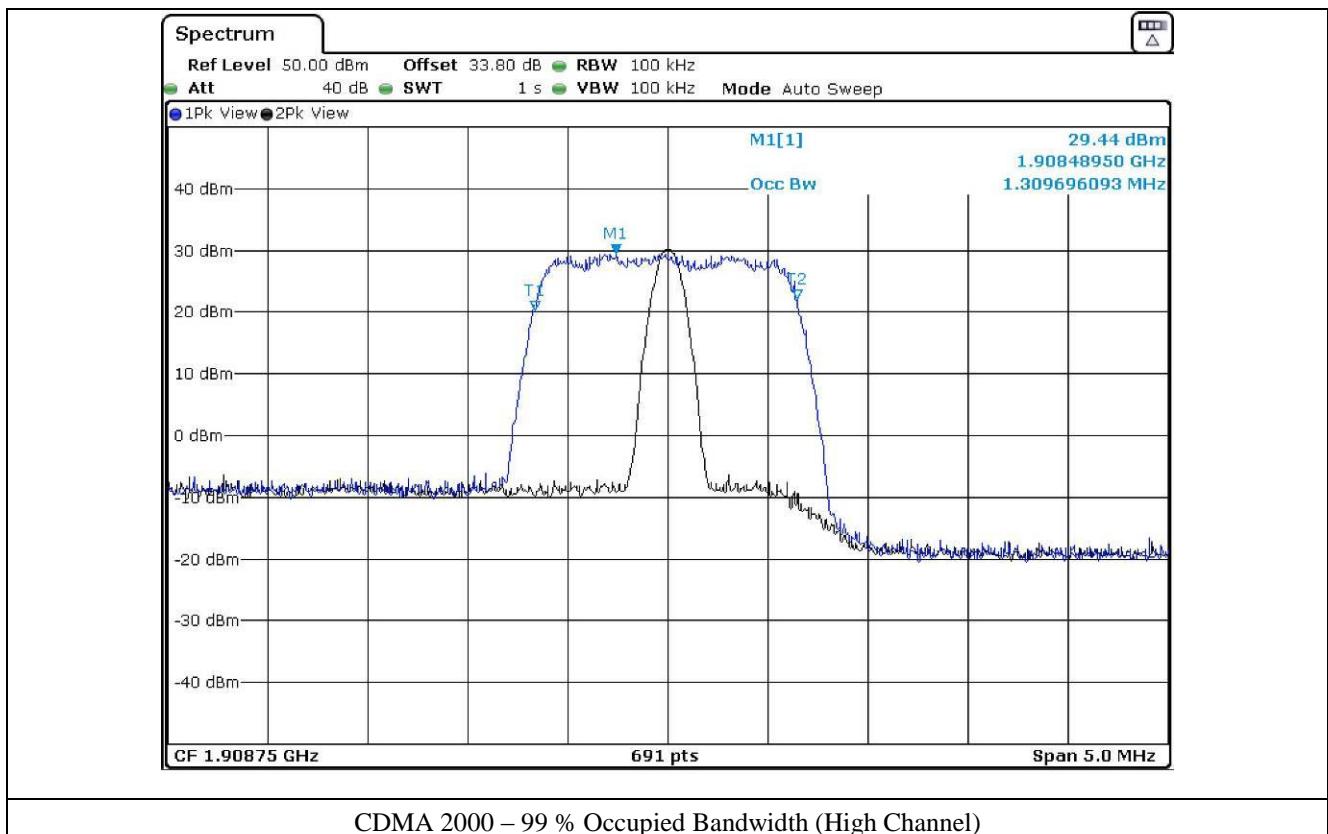


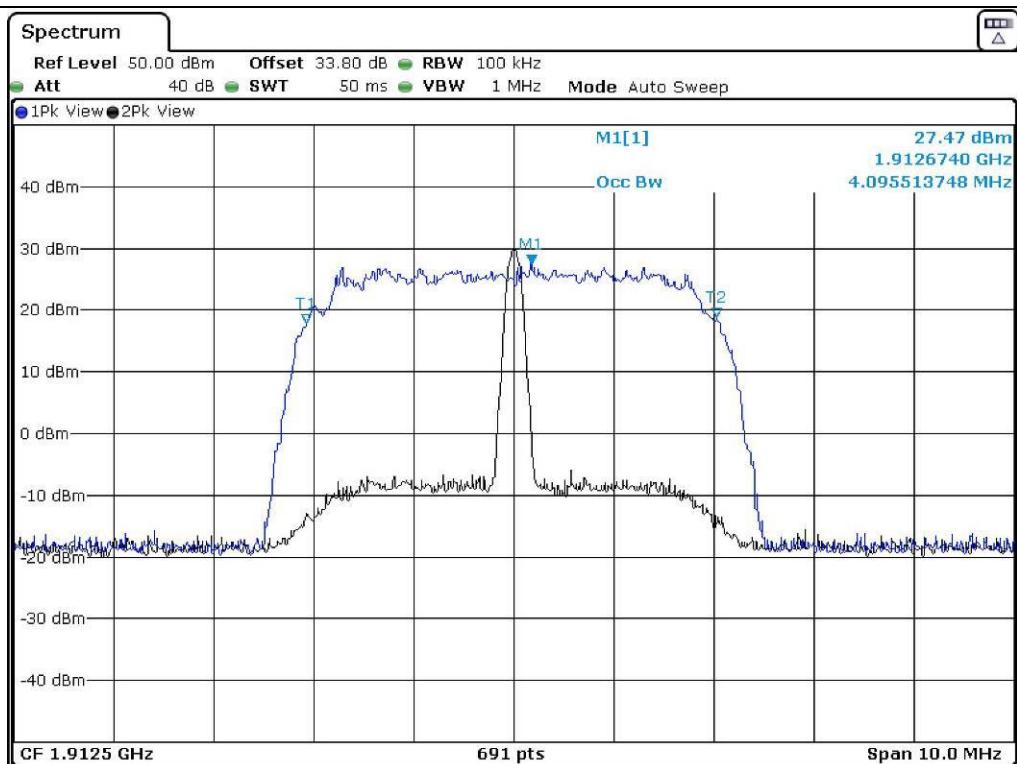
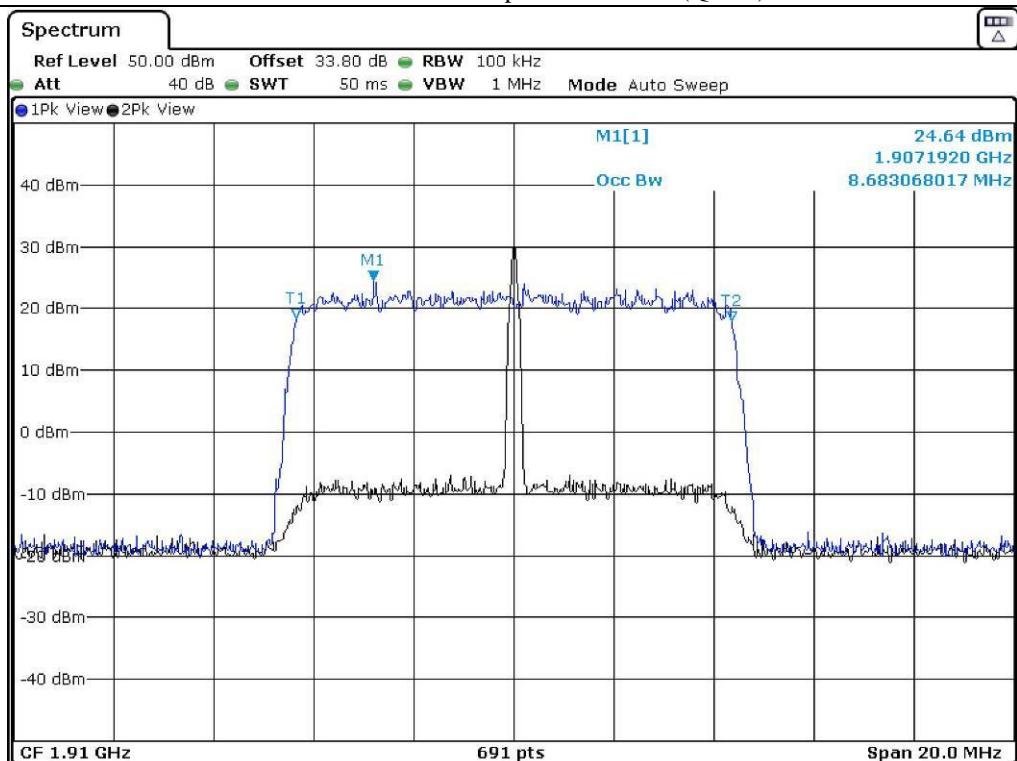


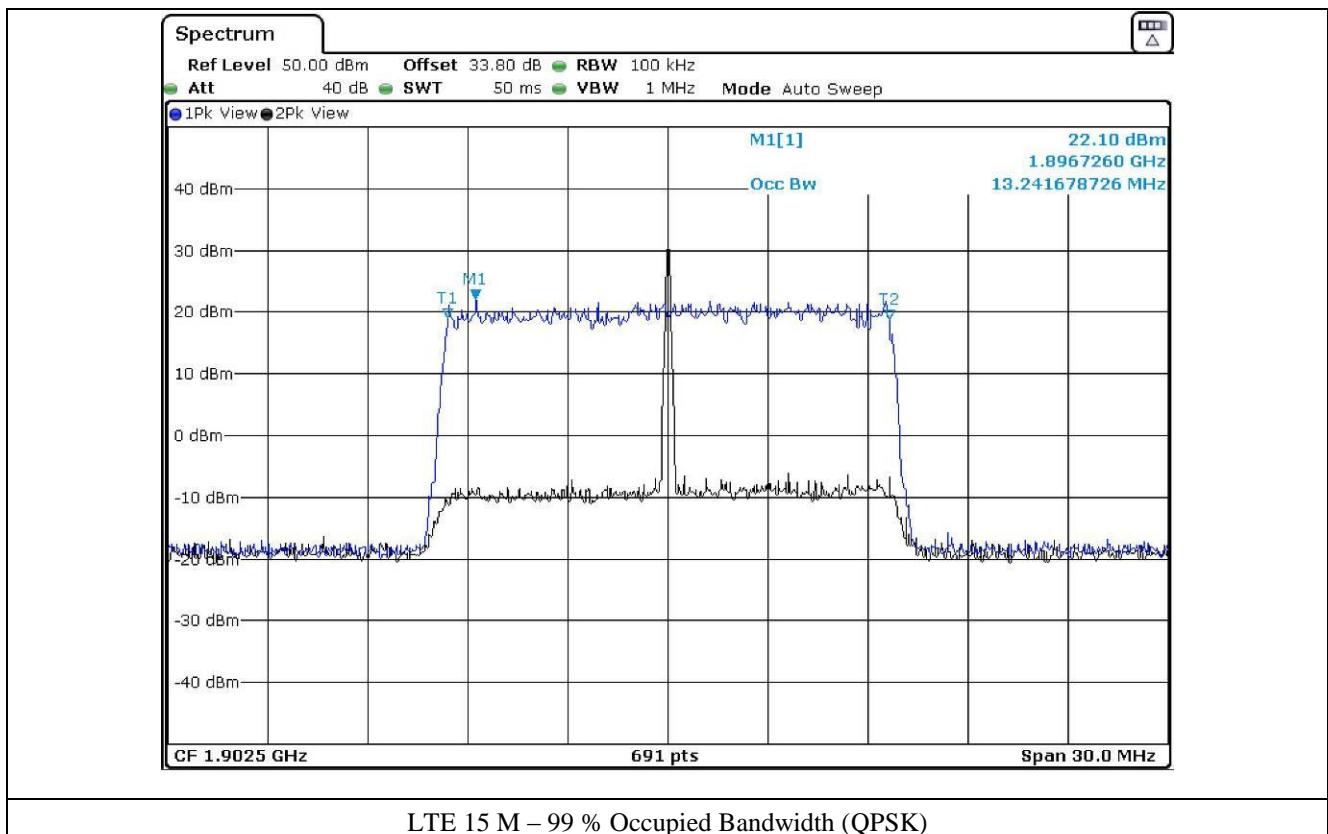
## CDMA 2000 – 99 % Occupied Bandwidth (Low Channel)

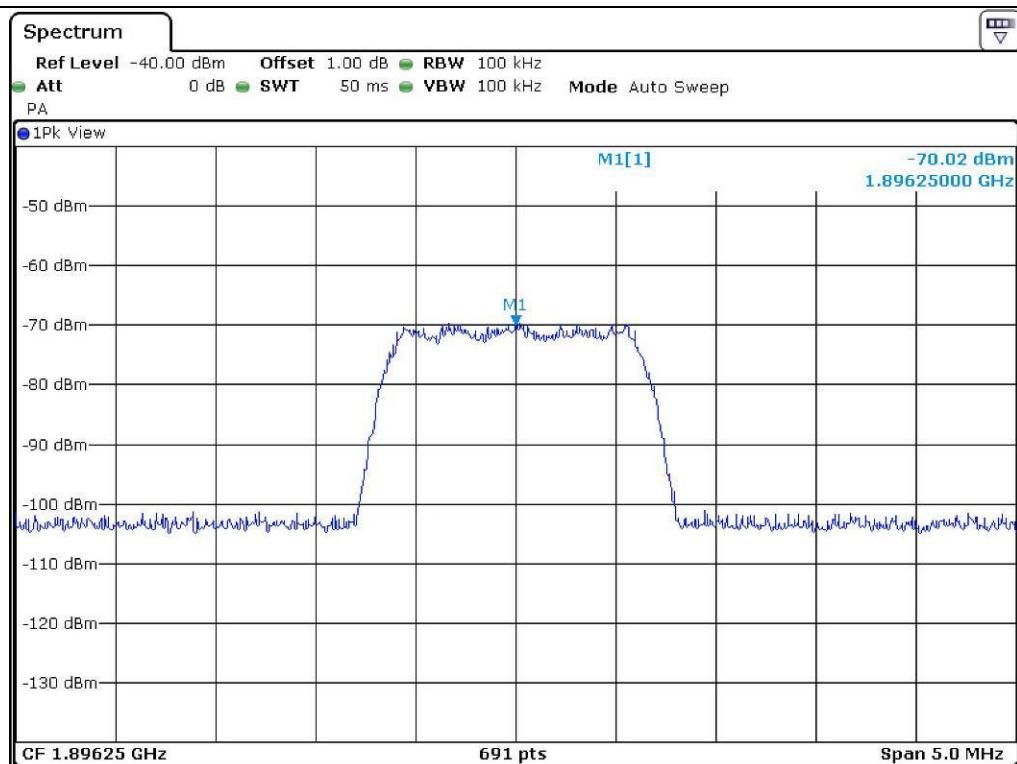


## CDMA 2000 – 99 % Occupied Bandwidth (Middle Channel)

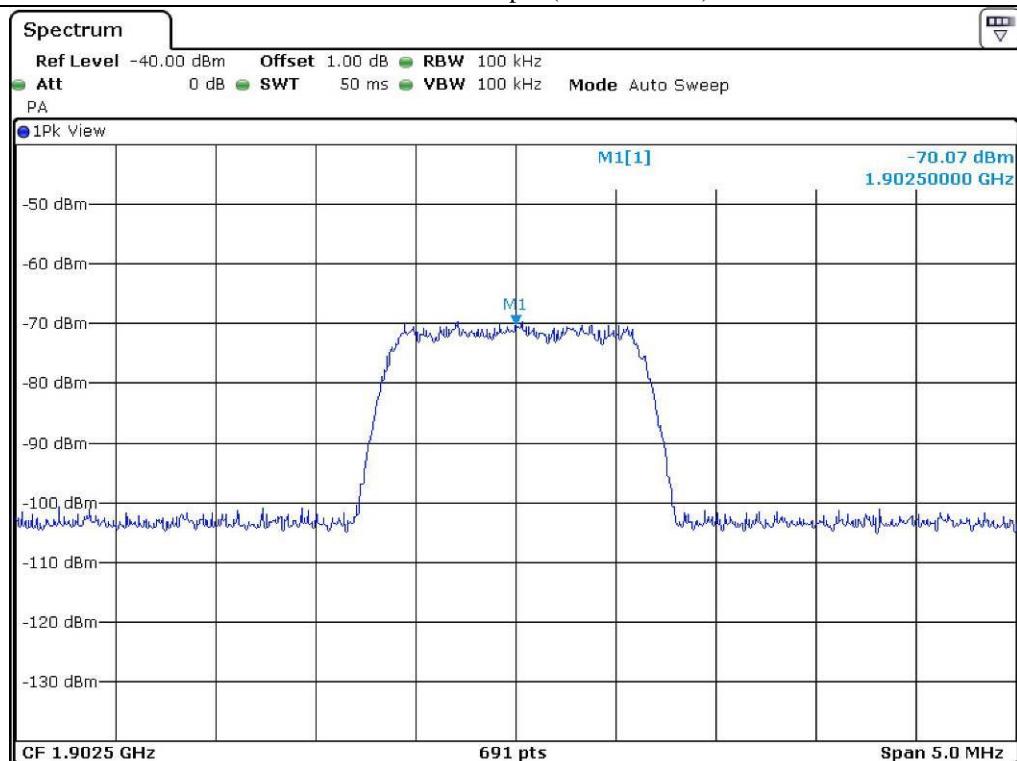



**LTE 5 M – 99 % Occupied Bandwidth (QPSK)**

**LTE 10 M – 99 % Occupied Bandwidth (QPSK)**

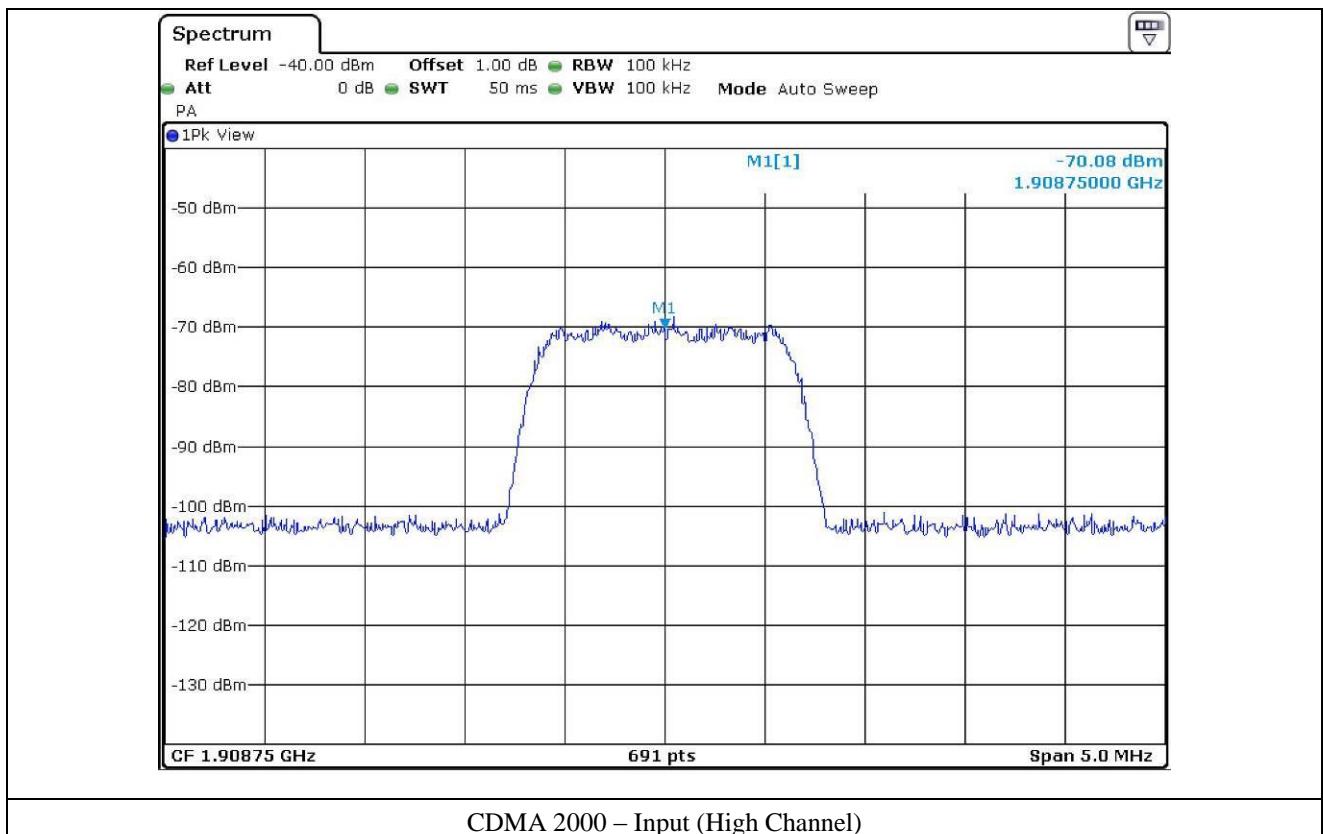


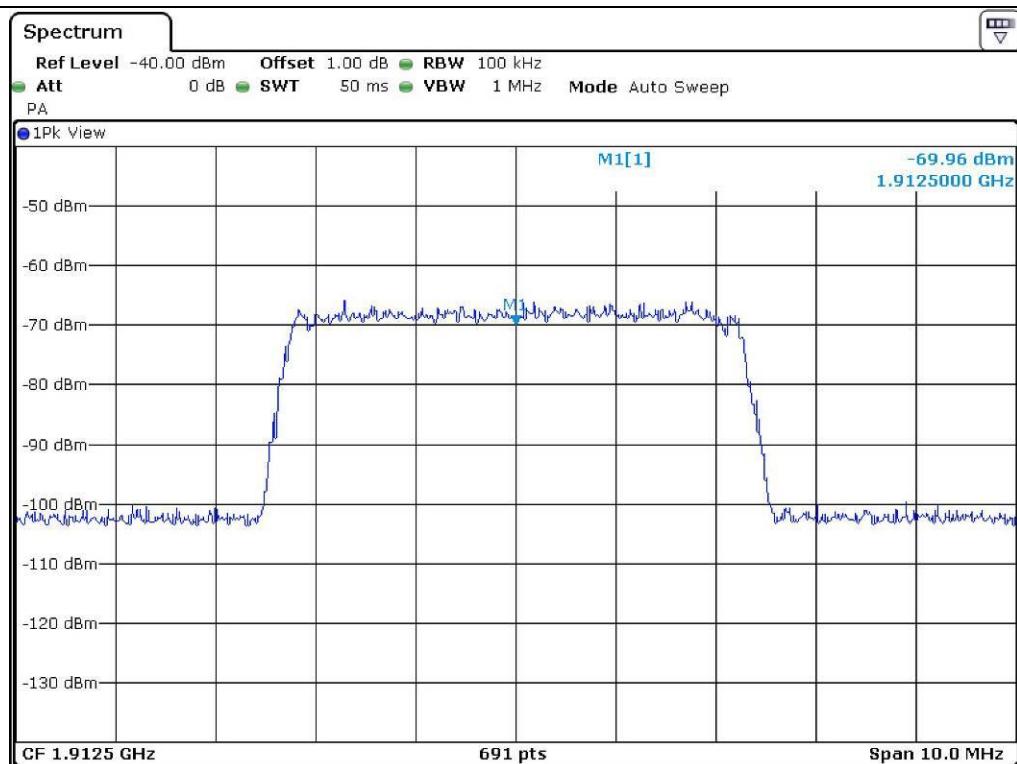


#### CDMA 2000 – Input (Low Channel)

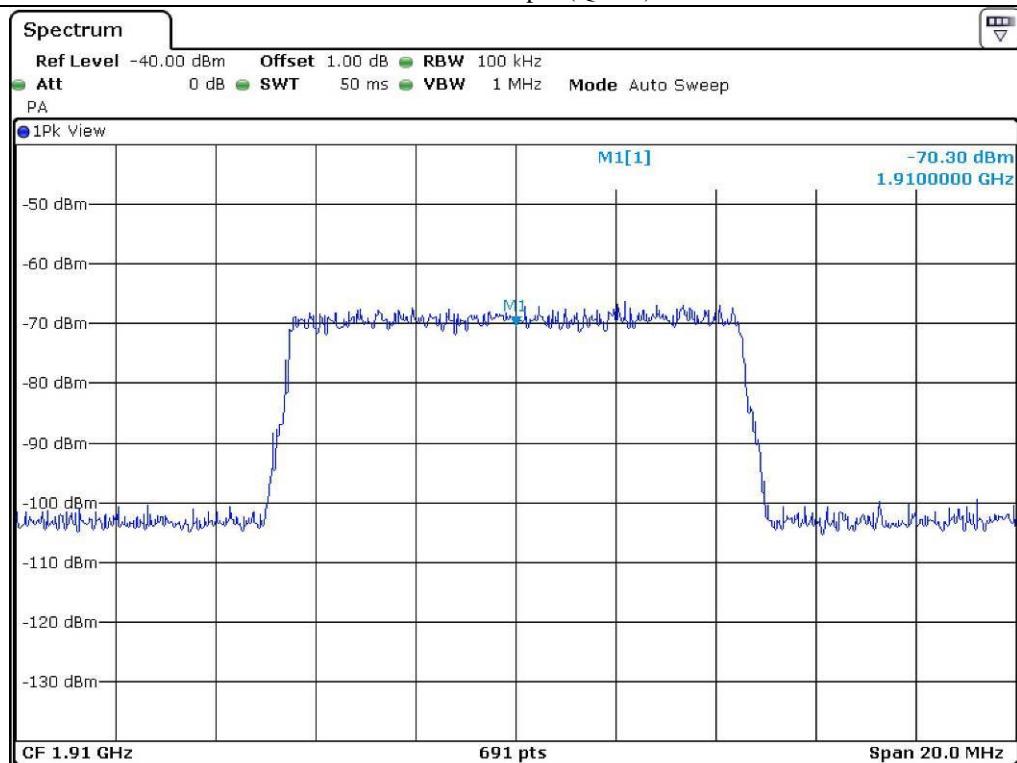


#### CDMA 2000 – Input (Middle Channel)

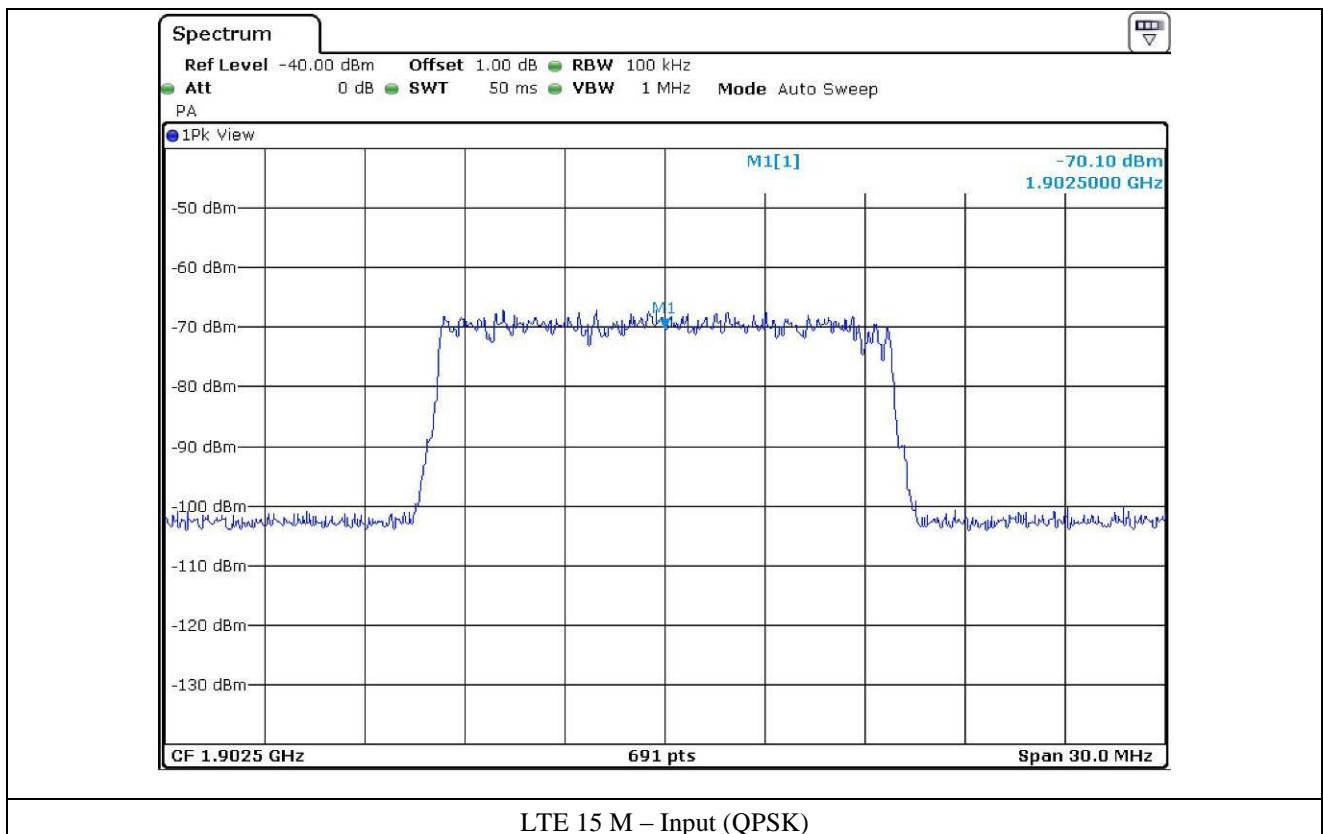




#### LTE 5 M – Input (QPSK)



#### LTE 10 M – Input (QPSK)



## 7. SPURIOUS EMISSION AT ANTENNA TERMINAL

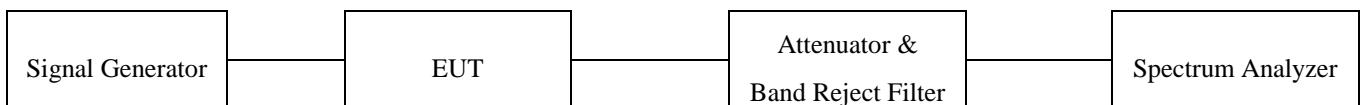
### 7.1 Operating environment

Temperature : 25 °C  
Relative humidity : 50 % R.H.

### 7.2 Test set-up for conducted measurement

The RF signal from the signal generator(s) was injected to the EUT and the amplified RF signal at the output of the EUT was connected to the power meter or spectrum analyzer. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation.

The resolution bandwidth and video bandwidth of the spectrum analyzer was set at 1 MHz and sufficient scans were taken to show any out of band emissions up to 20 GHz.



### 7.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - SMJ100A	Rohde & Schwarz	Signal Generator	101038	Oct. 08, 2014 (1Y)
■ - FSV30	Rohde & Schwarz	Signal Analyzer	101372	Apr. 28, 2014(1Y)
■ - WRCT 1850/2170- Wainwright 5/40-10SSK	Instruments GmbH	Tunable Band Reject Filter	20	Oct. 10, 2014 (1Y)

All test equipment used is calibrated on a regular basis.

#### 7.4 Test data for Downlink

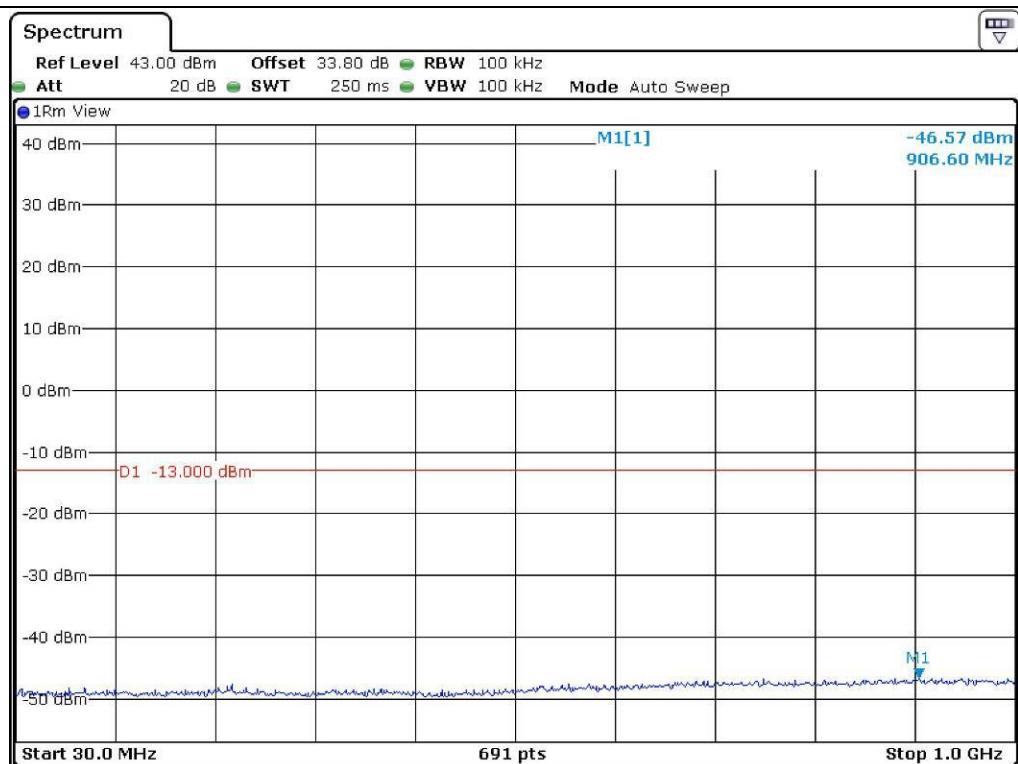
- Test Date : November 04, 2014
- Frequency range : 30 MHz ~ 20.0 GHz
- Result : PASSED BY 6.00 dB at CDMA 2000 Mode

Modulation	Harmonic Frequency (MHz)		Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
CDMA 2000	Low	906.60	-46.57	0.50	-46.07	-13.00	33.07
		19 601.00	-27.61	8.50	-19.11		6.11
	Middle	958.60	-46.37	0.53	-45.84		32.84
		19 601.00	-27.50	8.50	-19.00		6.00
	High	895.40	-46.51	0.48	-46.03		33.03
		19 601.00	-27.55	8.50	-19.05		6.05
LTE 5 M	QPSK	898.20	-46.56	0.48	-46.08	-13.00	33.08
		19 601.00	-27.69	8.50	-19.19		6.19
LTE 10 M	QPSK	873.00	-46.56	0.46	-46.10	-13.00	33.10
		19 601.00	-27.60	8.50	-19.10		6.10
LTE 15 M	QPSK	864.50	-46.40	0.45	-45.95	-13.00	32.95
		19 601.00	-27.55	8.50	-19.05		6.05
Other frequencies up to 15 GHz have margin more than 20 dB.							

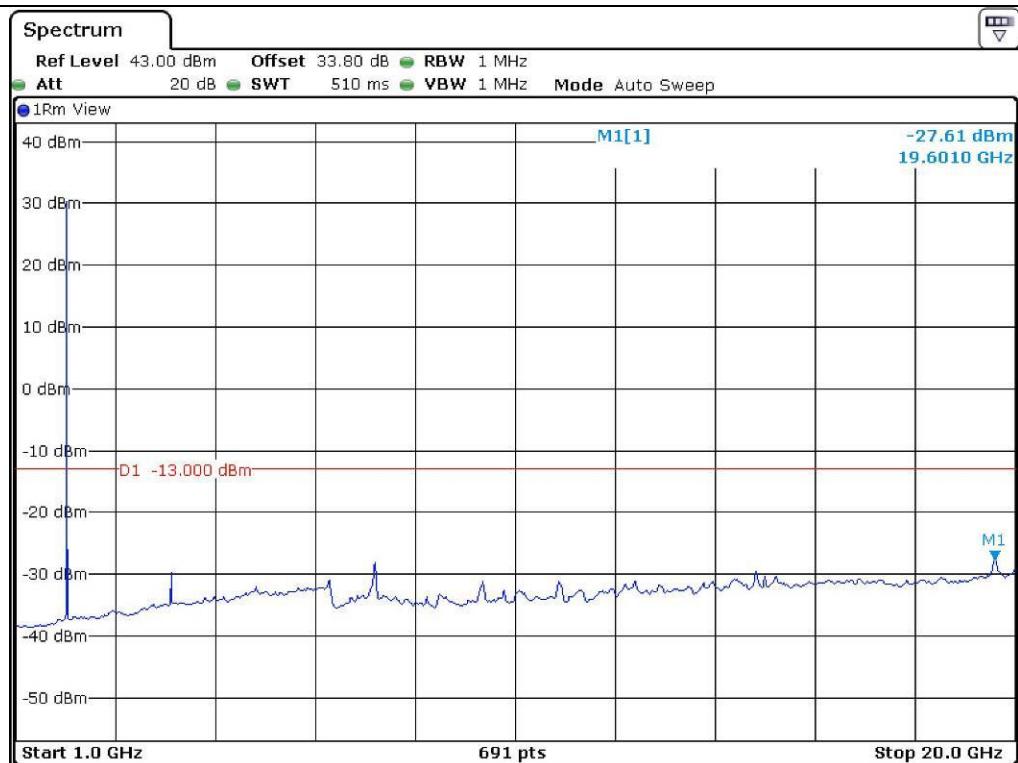
According to Part 24E, out of band emission shall be attenuated by  $43 + 10 \log (P) \text{ dBc}$ , equates to -13.0 dBm.

As a result of preliminary testing., the formal test was performed with the maximum payload mode of worst cases for QPSK.

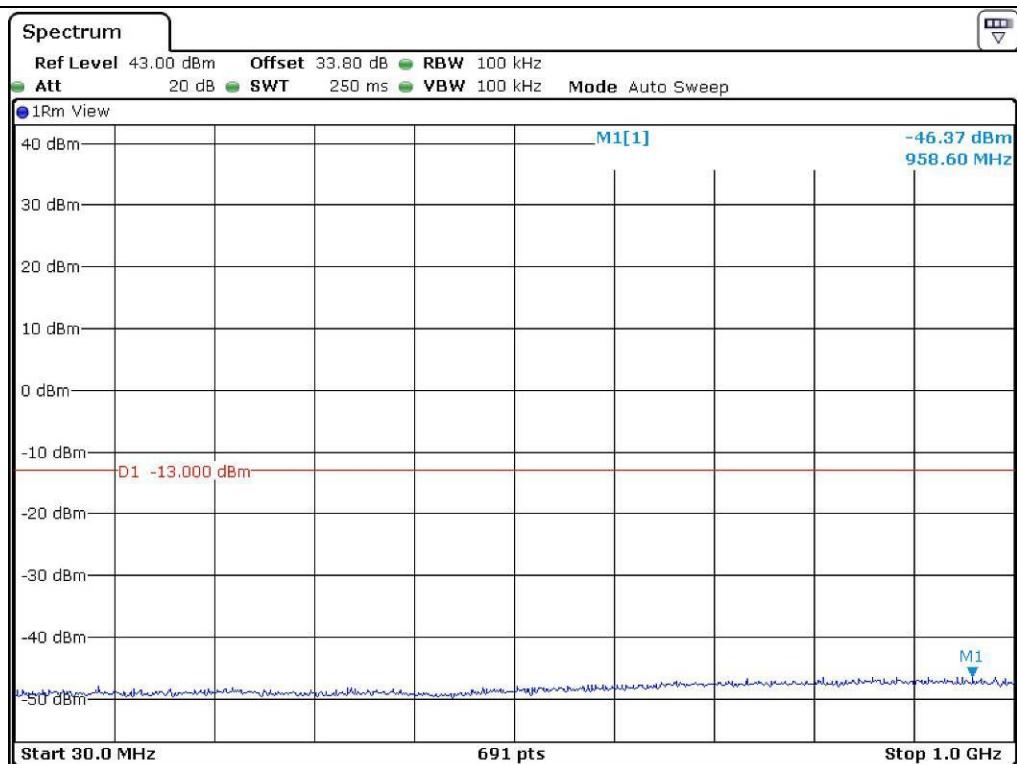
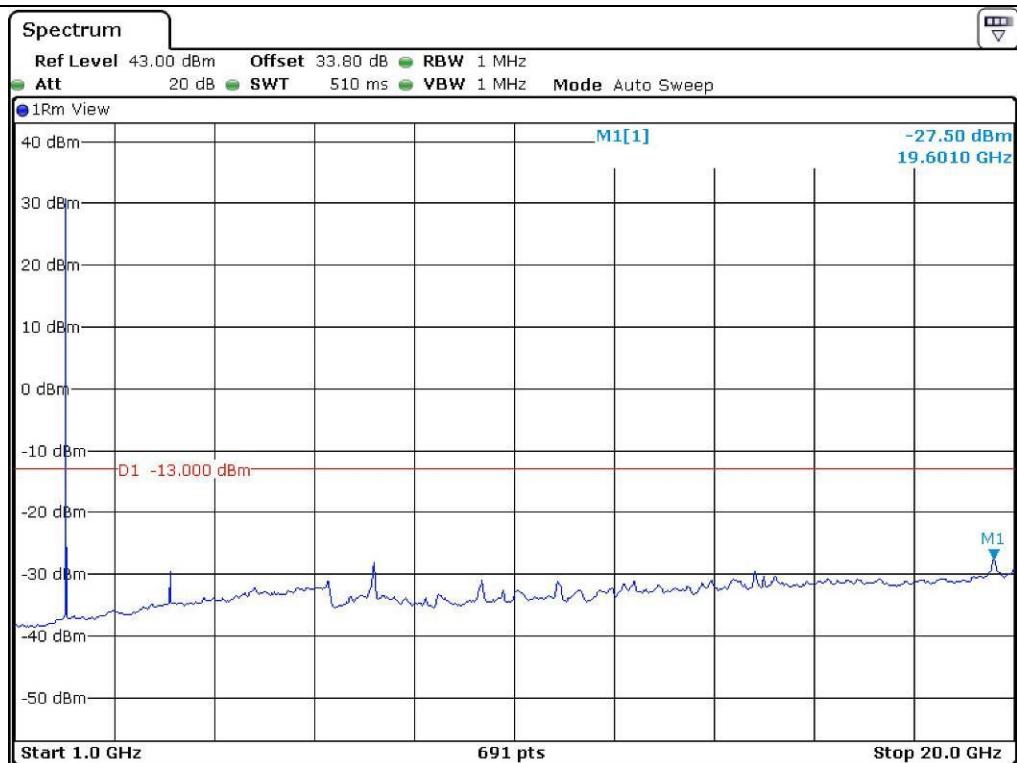
Tested by: hyung-kwon, Oh / Project Engineer

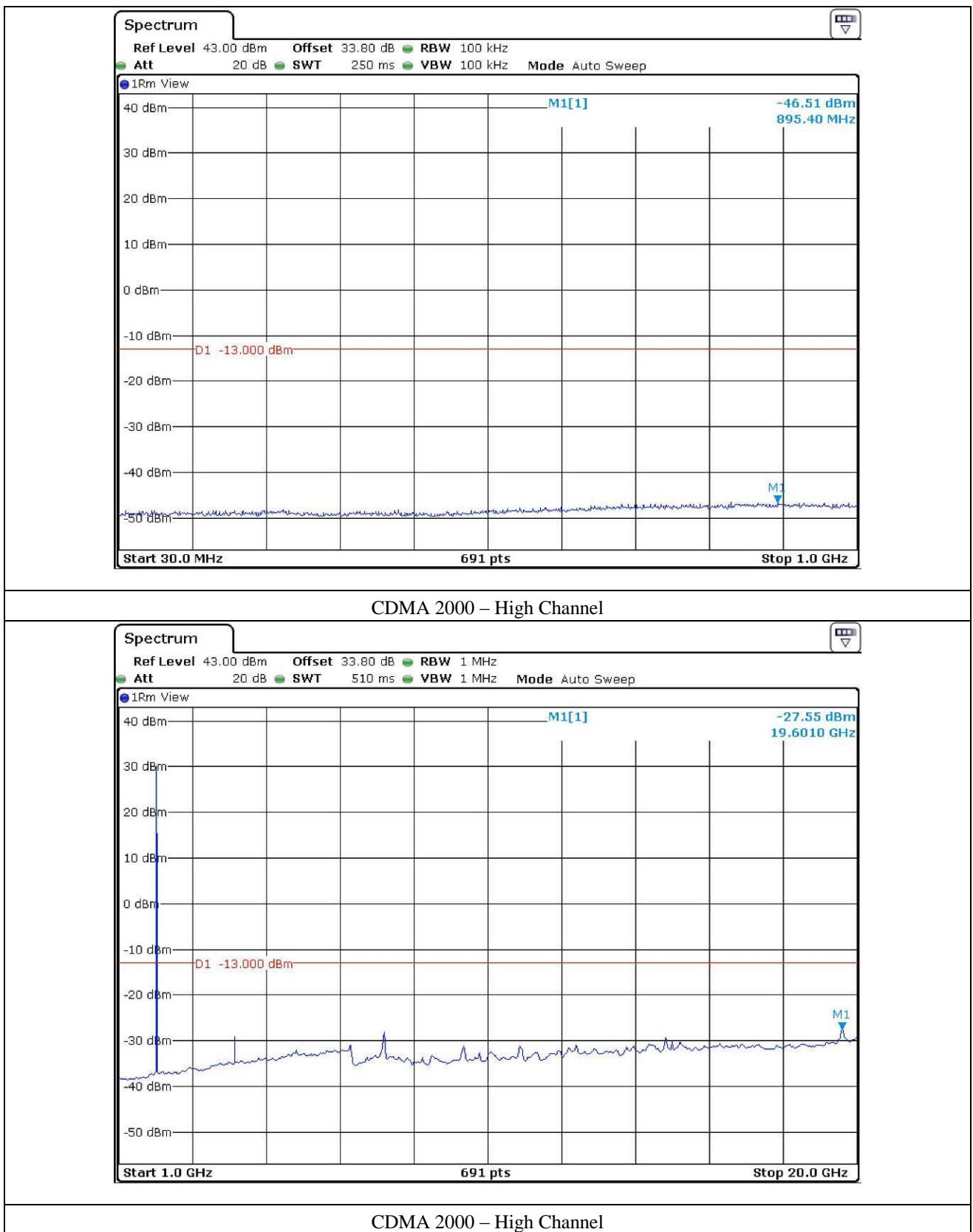


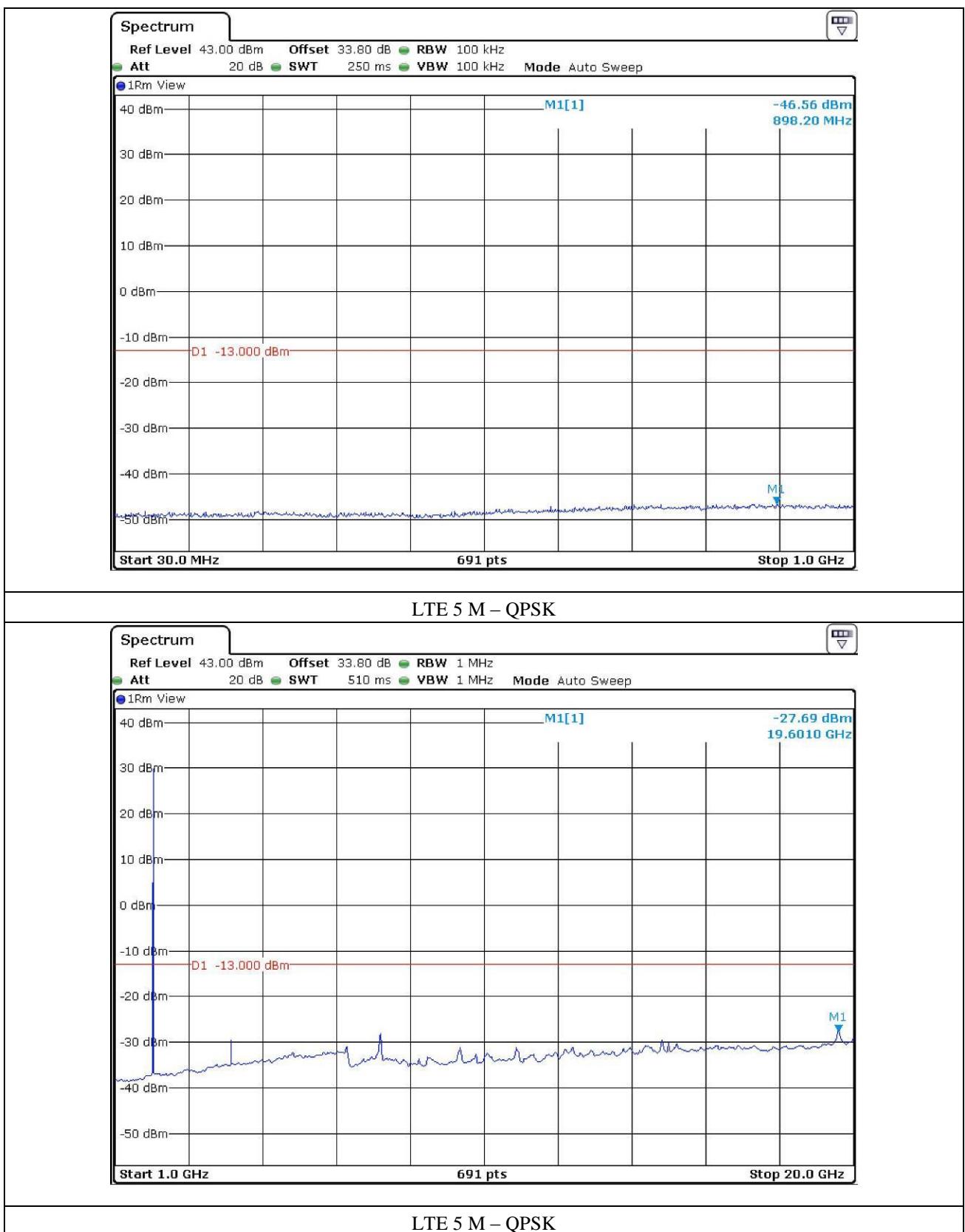
CDMA 2000 – Low Channel

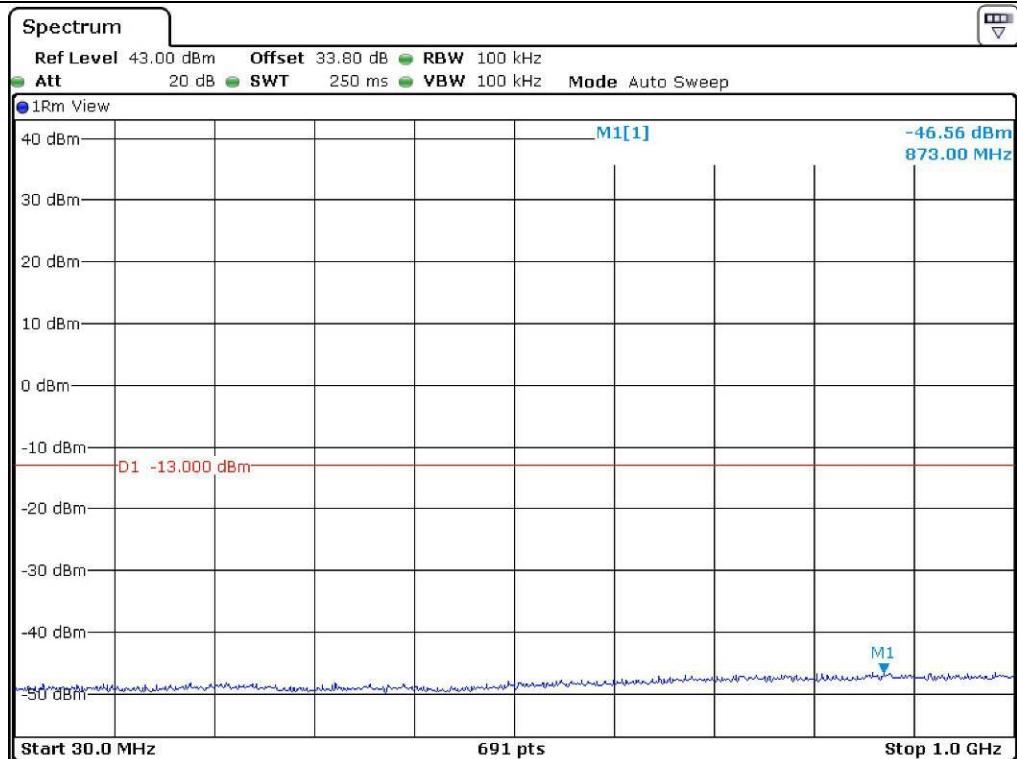


CDMA 2000 – Low Channel

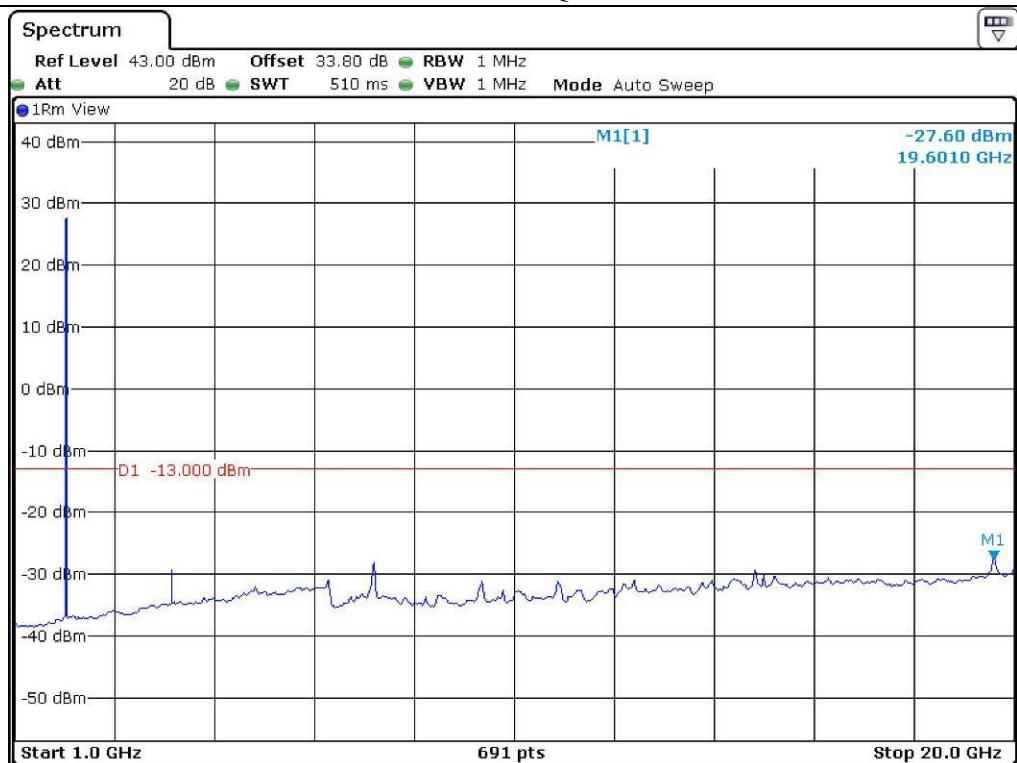

**CDMA 2000 – Middle Channel**

**CDMA 2000 – Middle Channel**



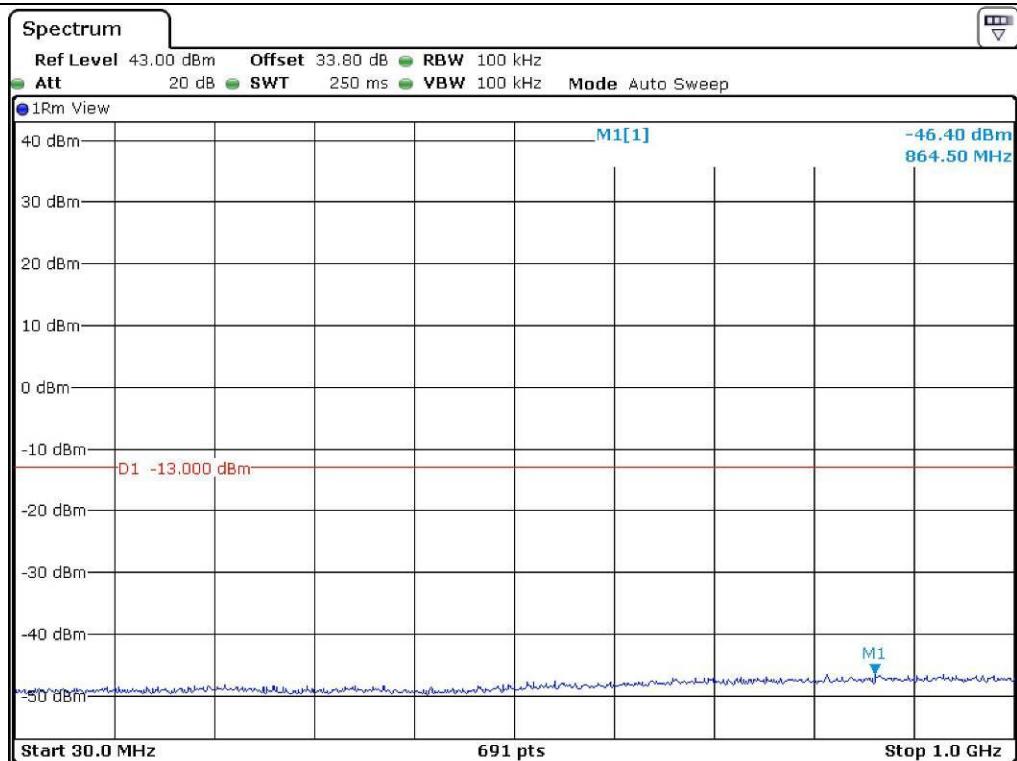




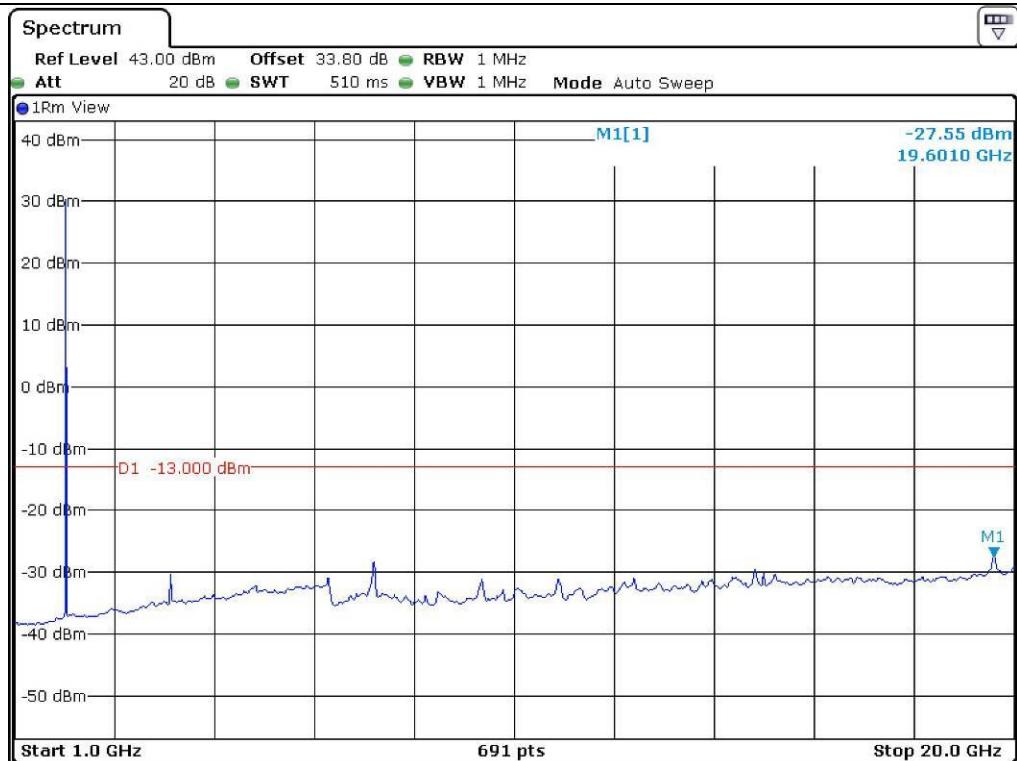
### LTE 10 M – QPSK



### LTE 10 M – QPSK



### LTE 15 M – QPSK



### LTE 15 M – QPSK

## 7.5 Test data for Uplink

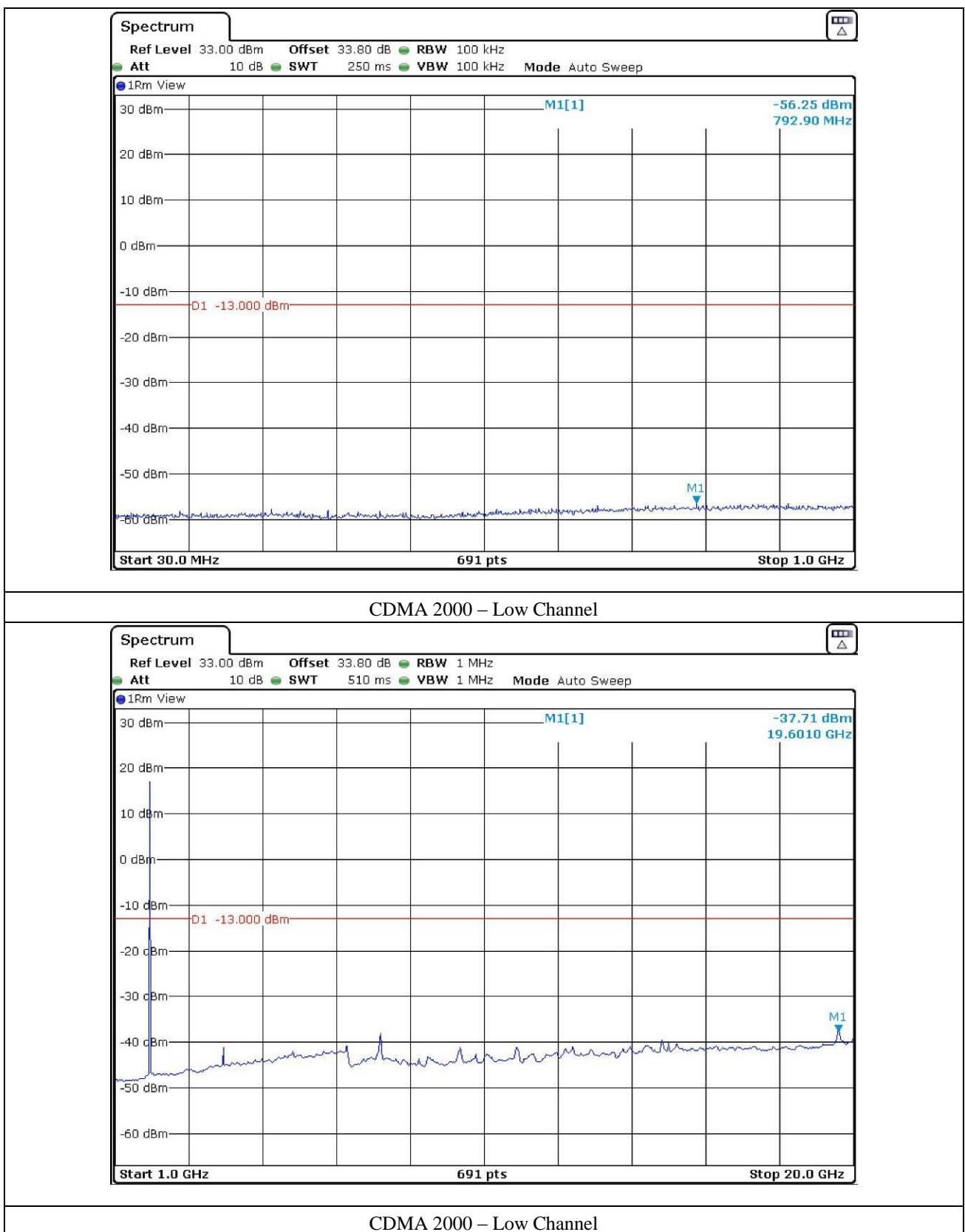
- Test Date :
- Frequency range : 30 MHz ~ 26.5 GHz
- Result : PASSED BY 16.10 dB at LTE 10 M Mode

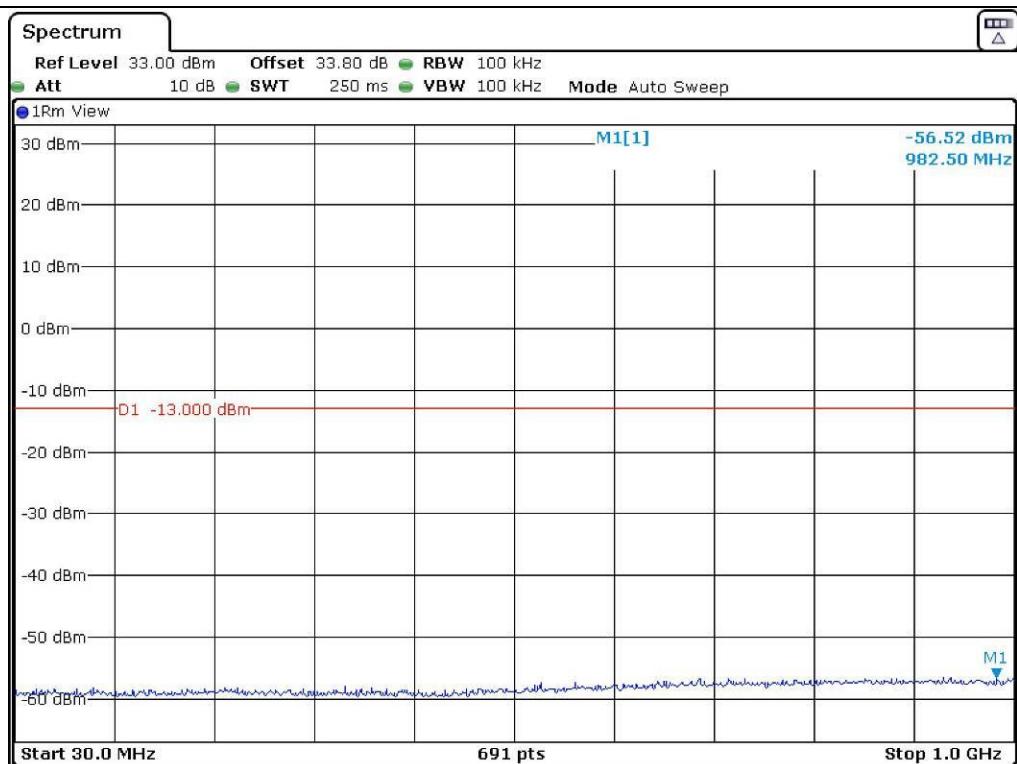
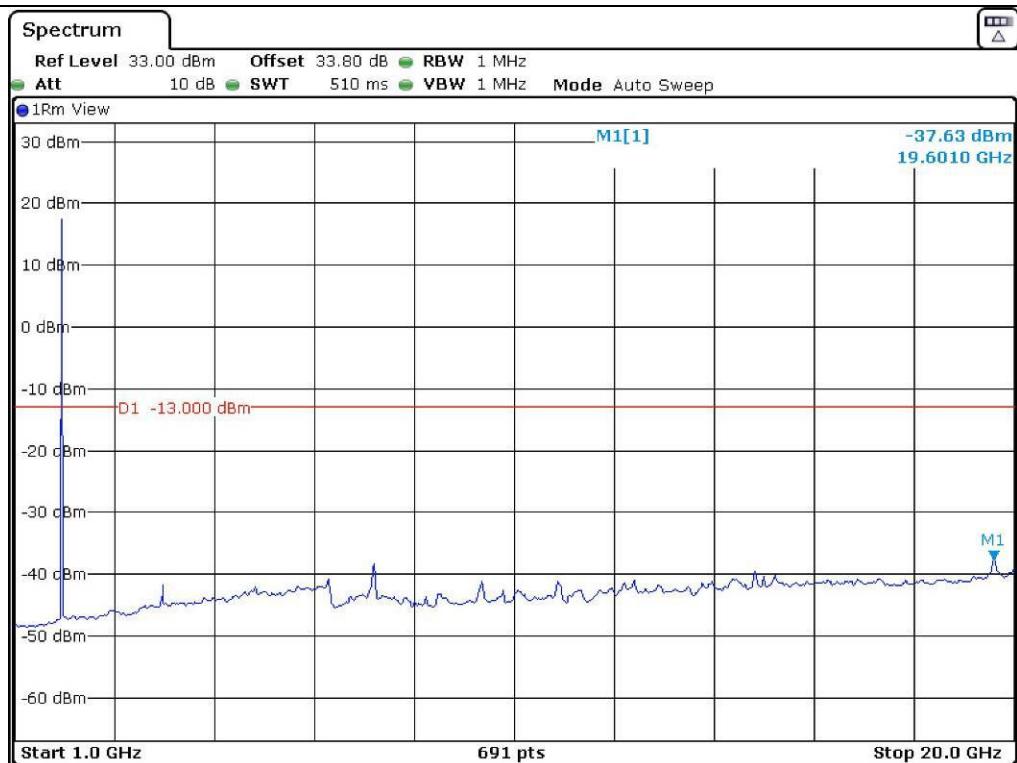
Modulation	Harmonic Frequency (MHz)		Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
CDMA 2000	Low	792.90	-56.25	0.42	-55.83	-13.00	42.83
		19 601.00	-37.71	8.50	-29.21		16.21
	Middle	982.50	-56.52	0.57	-55.95		42.95
		19 601.00	-37.63	8.50	-29.13		16.13
	High	870.20	-56.64	0.46	-56.18		43.18
		19 601.00	-37.68	8.50	-29.18		16.18
LTE 5 M	QPSK	766.30	-56.45	0.40	-56.05	-13.00	43.05
		19 601.00	-37.77	8.50	-29.27		16.27
LTE 10 M	QPSK	953.00	-56.52	0.53	-55.99	-13.00	42.99
		19 601.00	-37.60	8.50	-29.10		16.10
LTE 15 M	QPSK	836.50	-56.32	0.44	-55.88	-13.00	42.88
		19 601.00	-37.68	8.50	-29.18		16.18
Other frequencies up to 15 GHz have margin more than 20 dB.							

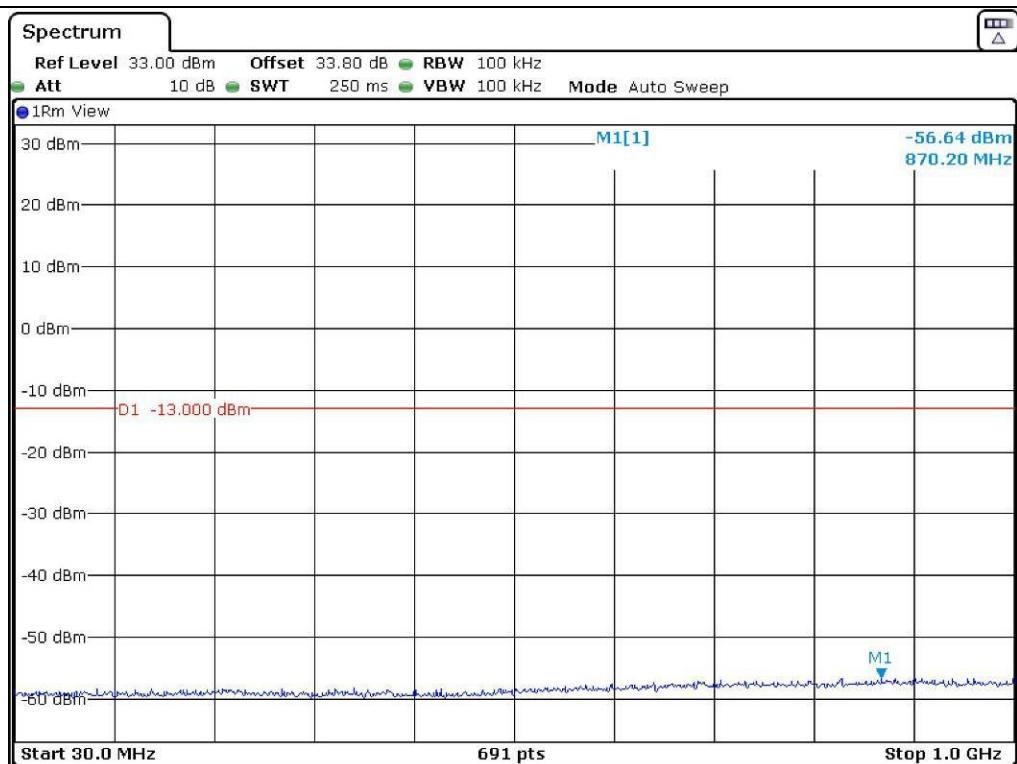
According to Part 24E, out of band emission shall be attenuated by  $43 + 10 \log (P) \text{ dBc}$ , equates to -13.0 dBm.

As a result of preliminary testing., the formal test was performed with the maximum payload mode of worst cases for QPSK.

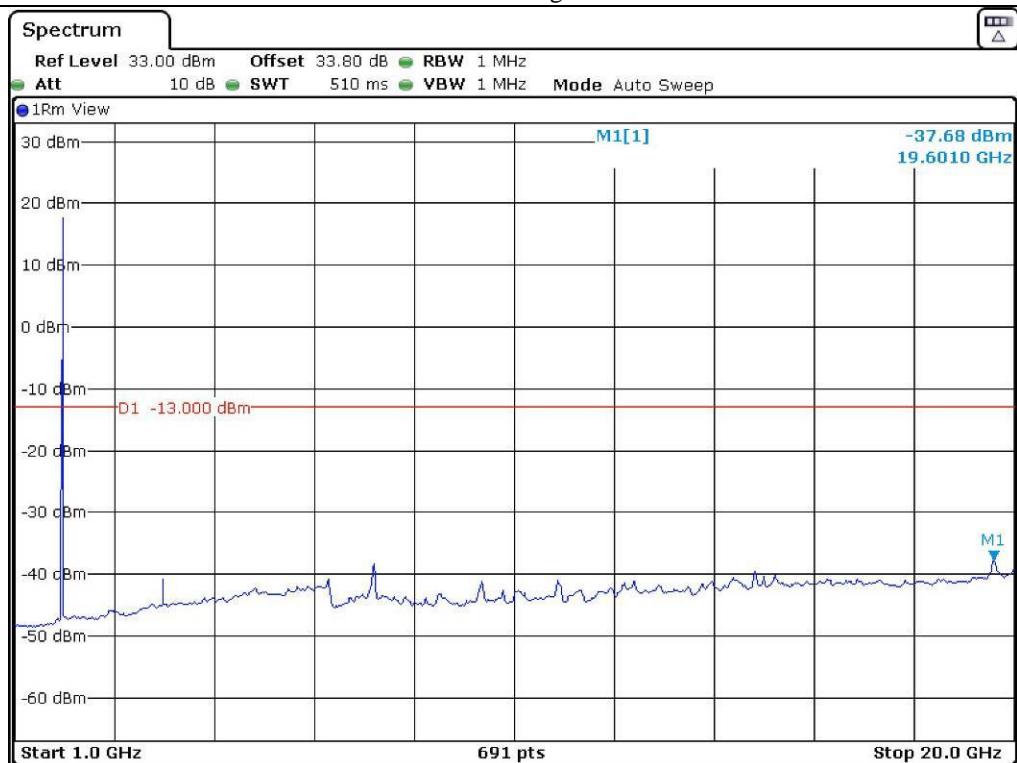
Tested by: hyung-kwon, Oh / Project Engineer



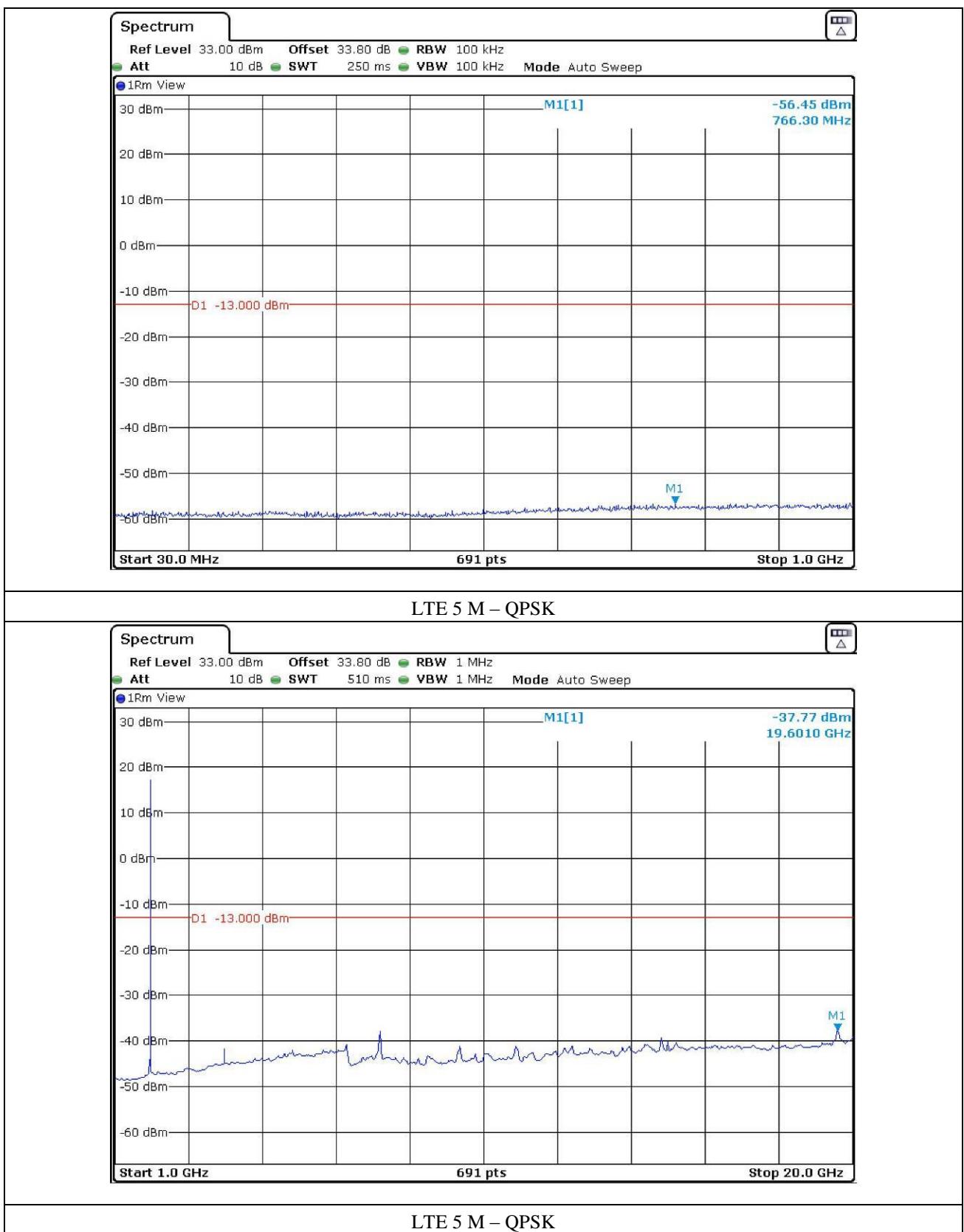

**CDMA 2000 – Middle Channel**

**CDMA 2000 – Middle Channel**

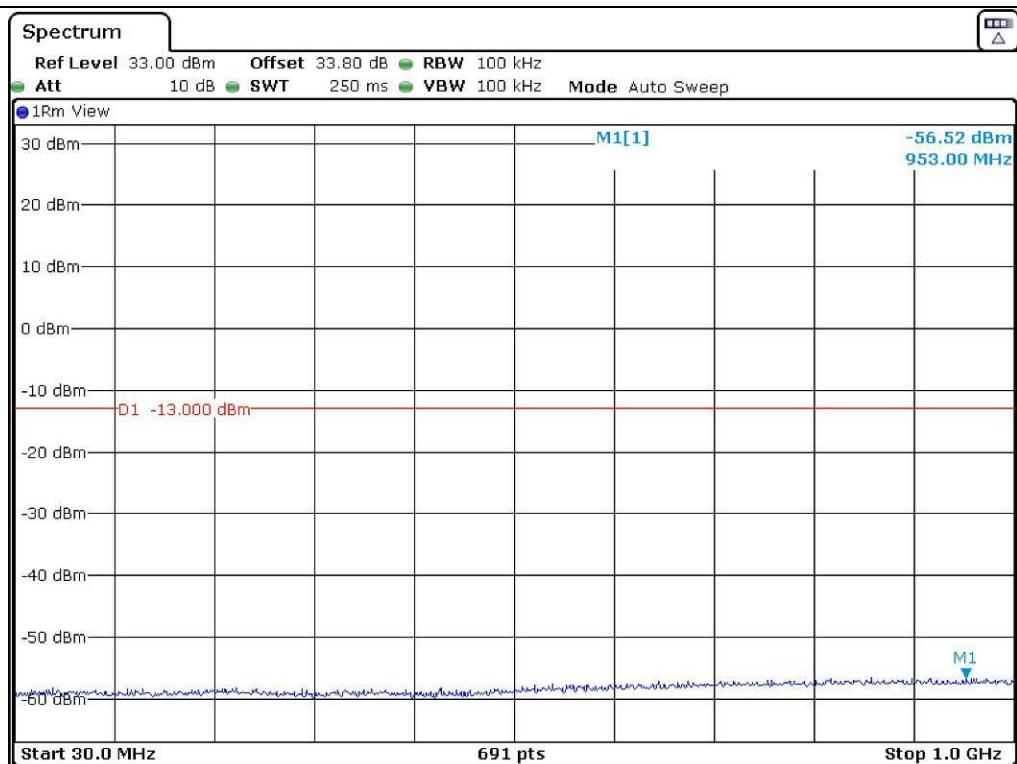
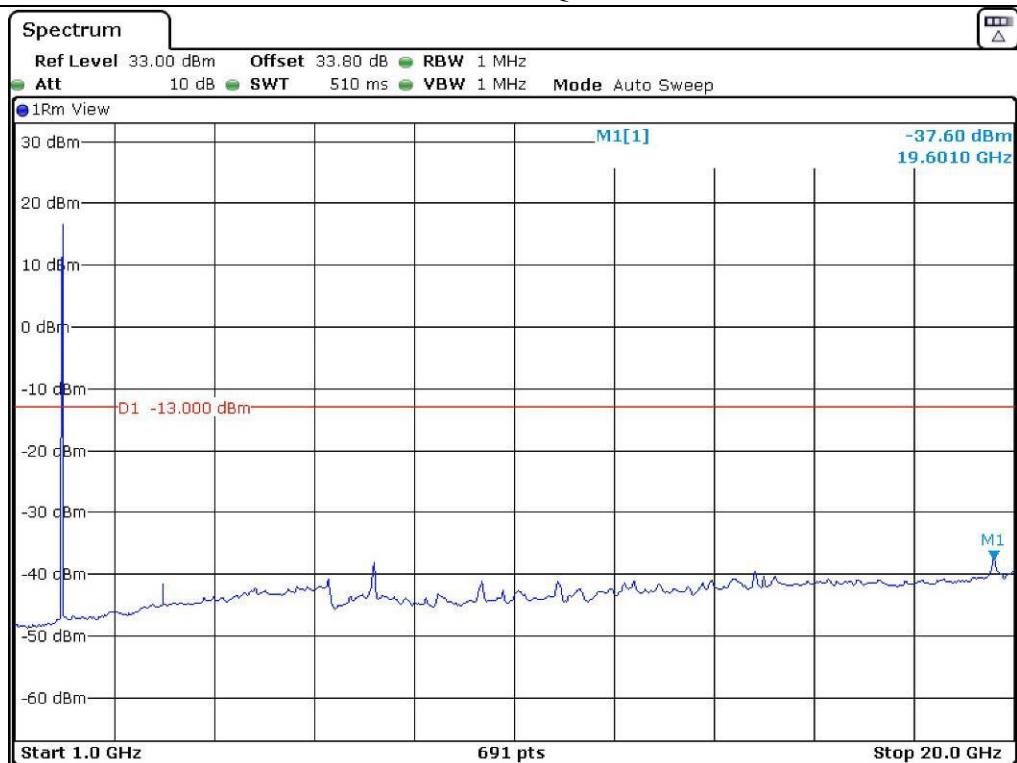


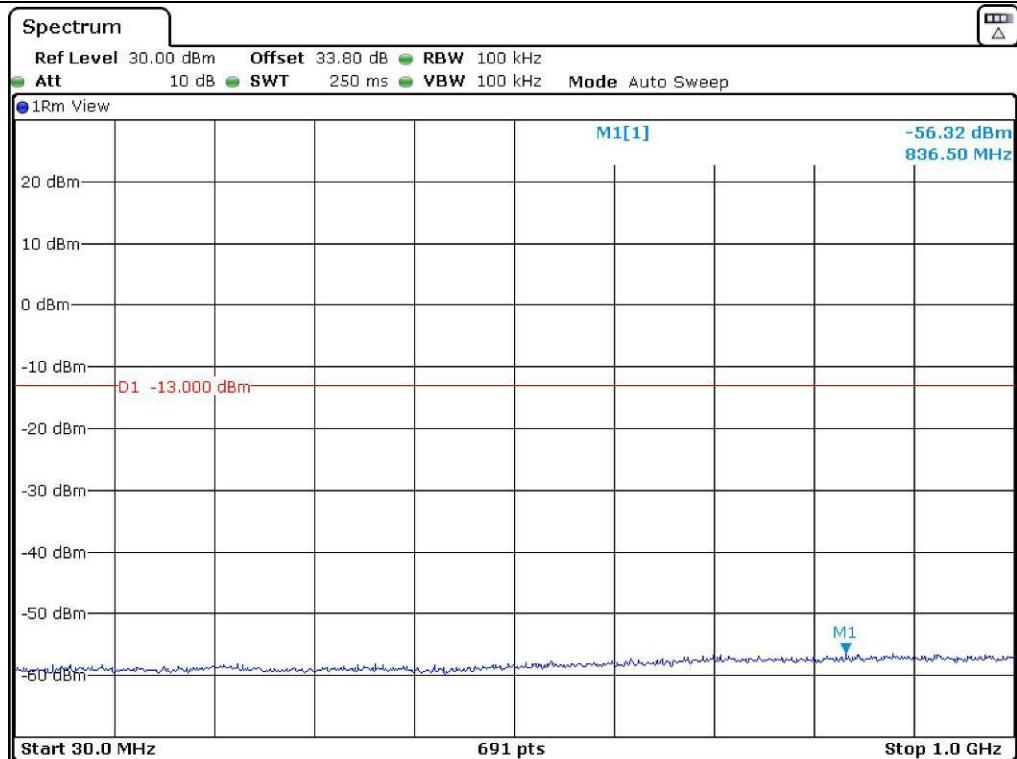
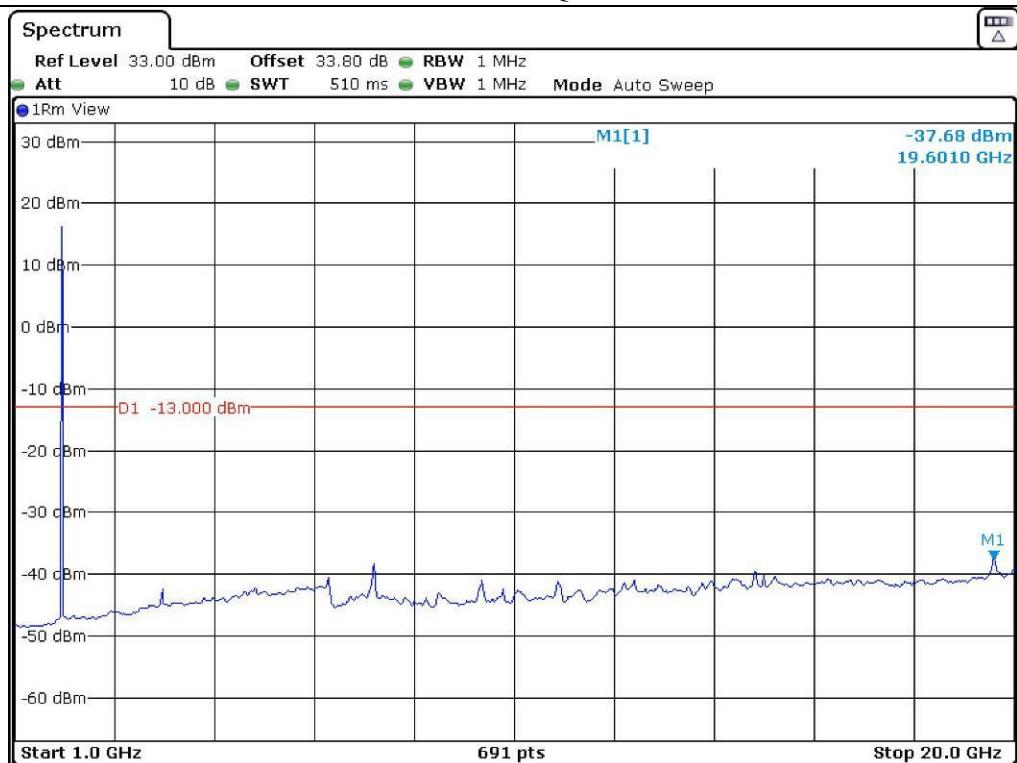
CDMA 2000 – High Channel



CDMA 2000 – High Channel




**LTE 10 M – QPSK**

**LTE 10 M – QPSK**


**LTE 15 M – QPSK**

**LTE 15 M – QPSK**

## 8. BAND EDGE MEASUREMENT

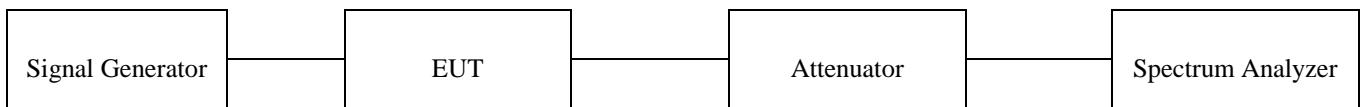
### 8.1 Operating environment

Temperature : 25 °C  
Relative humidity : 50 % R.H.

### 8.2 Test set-up for conducted measurement

The RF signal from the signal generator(s) was injected to the EUT and the amplified RF signal at the output of the EUT was connected to the power meter or spectrum analyzer. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation.

The resolution bandwidth and video bandwidth of the spectrum analyzer was set according to the regulation and sufficient scans were taken to show any out of band emissions.



### 8.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - SMJ100A	Rohde & Schwarz	Signal Generator	101038	Oct. 08, 2014 (1Y)
■ - FSV30	Rohde & Schwarz	Signal Analyzer	101372	Apr. 28, 2014(1Y)

All test equipment used is calibrated on a regular basis.

#### 8.4 Test data for Downlink

- Test Date : November 04, 2014
- Result : PASSED BY 9.45 dB at CDMA 2000 Mode

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
CDMA 2000	Low	1 975.00	-22.45	-13.00	9.45
	High	1 990.00	-24.75		11.75
LTE 5 M_QPSK	Low	1 975.00	-22.93	-13.00	9.93
	High	1 995.00	-22.88		9.88
LTE 10 M_QPSK	Low	1 975.00	-26.26	-13.00	13.26
	High	1 995.00	-25.37		12.37
LTE 15 M_QPSK	Low	1 975.00	-26.90	-13.00	13.90
	High	1 995.00	-26.36		13.36

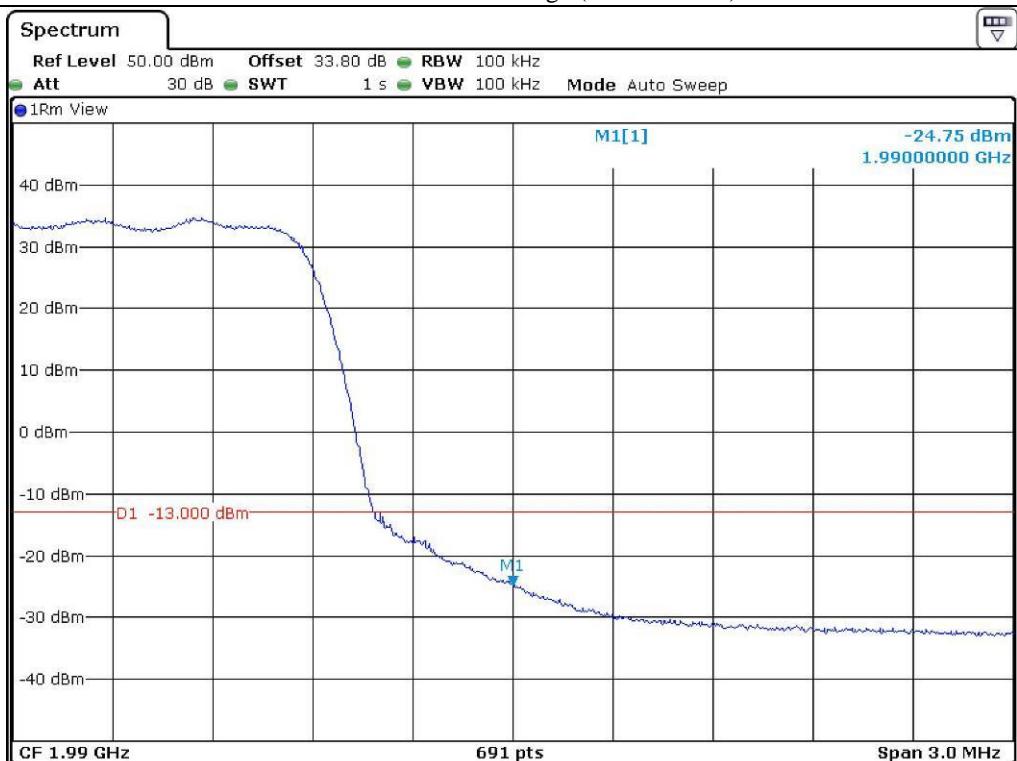
According to Part 24E, out of band emission shall be attenuated by  $43 + 10 \log (P)$  dBc, equates to -13.0dBm.

As a result of preliminary testing., the formal test was performed with the maximum payload mode of worst cases for QPSK.

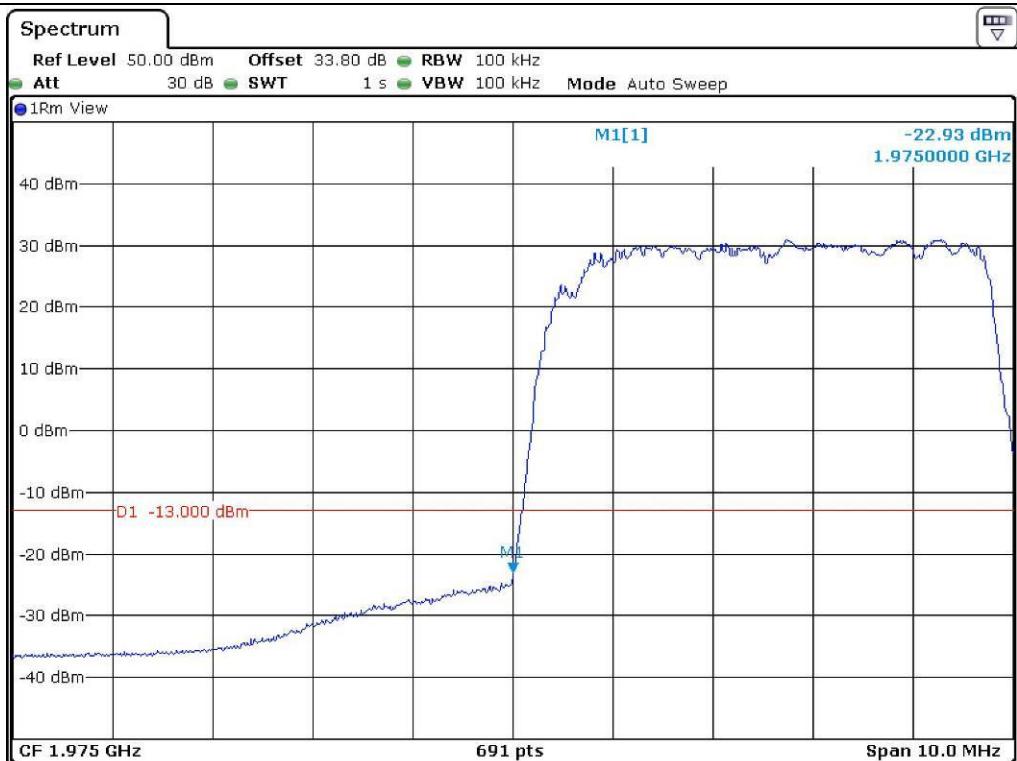
Tested by: hyung-kwon, Oh / Project Engineer



## CDMA 2000 – Band Edge (Low Channel)



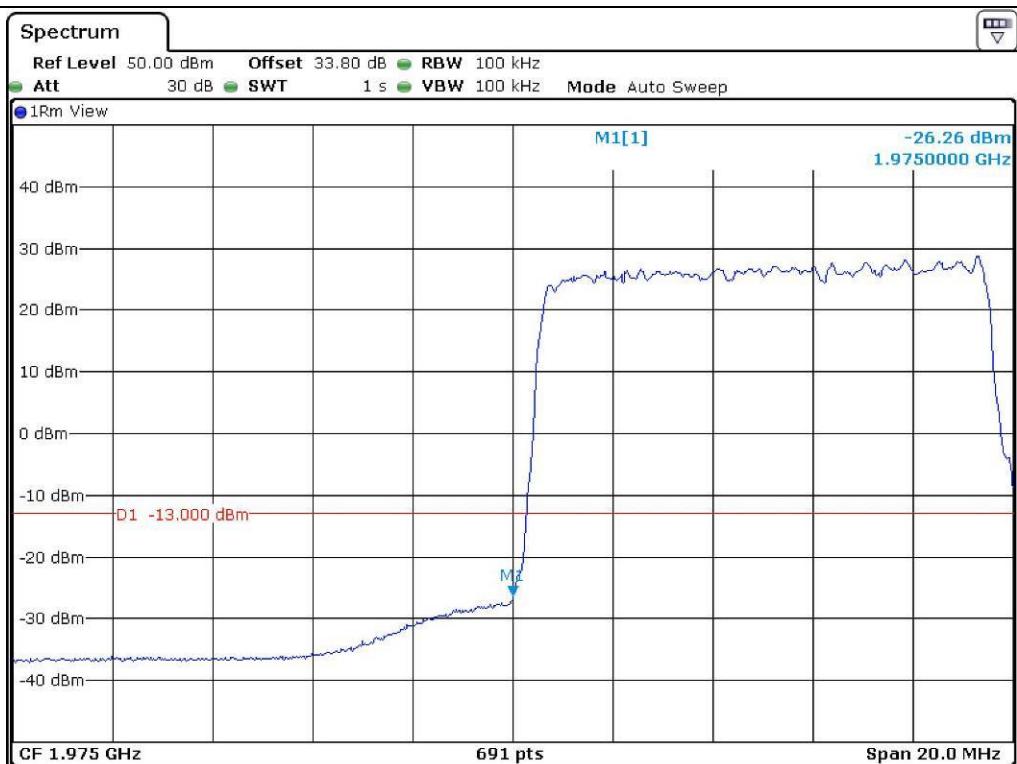
## CDMA 2000– Band Edge (High Channel)



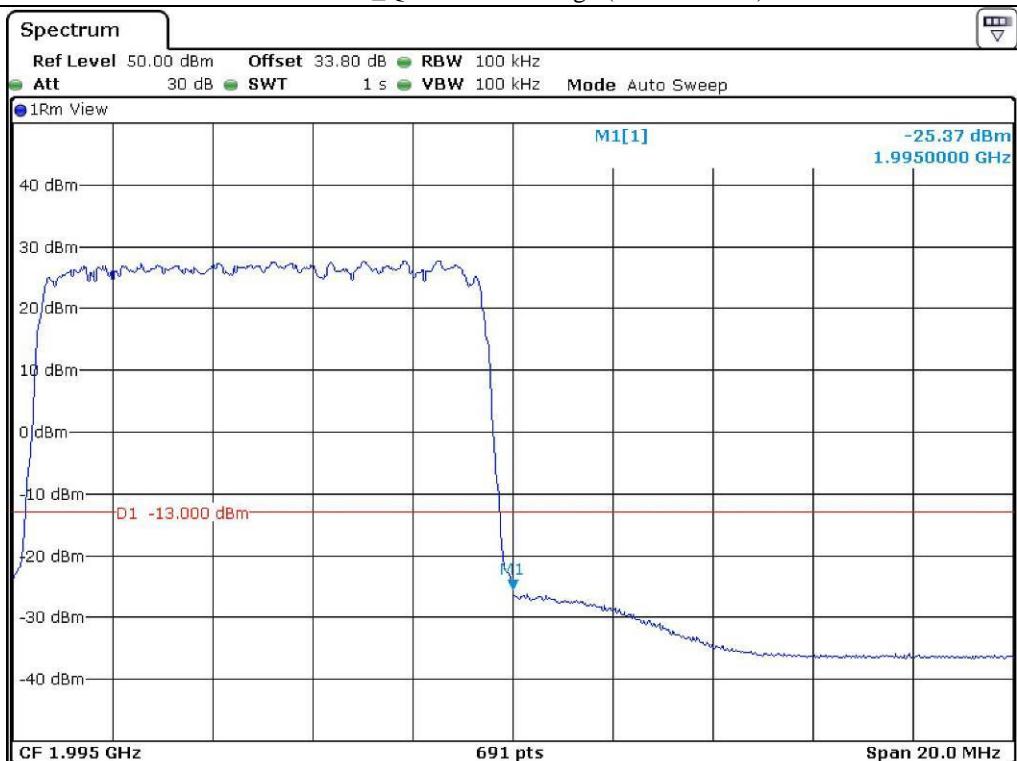
LTE 5 M\_QPSK – Band Edge (Low Channel)



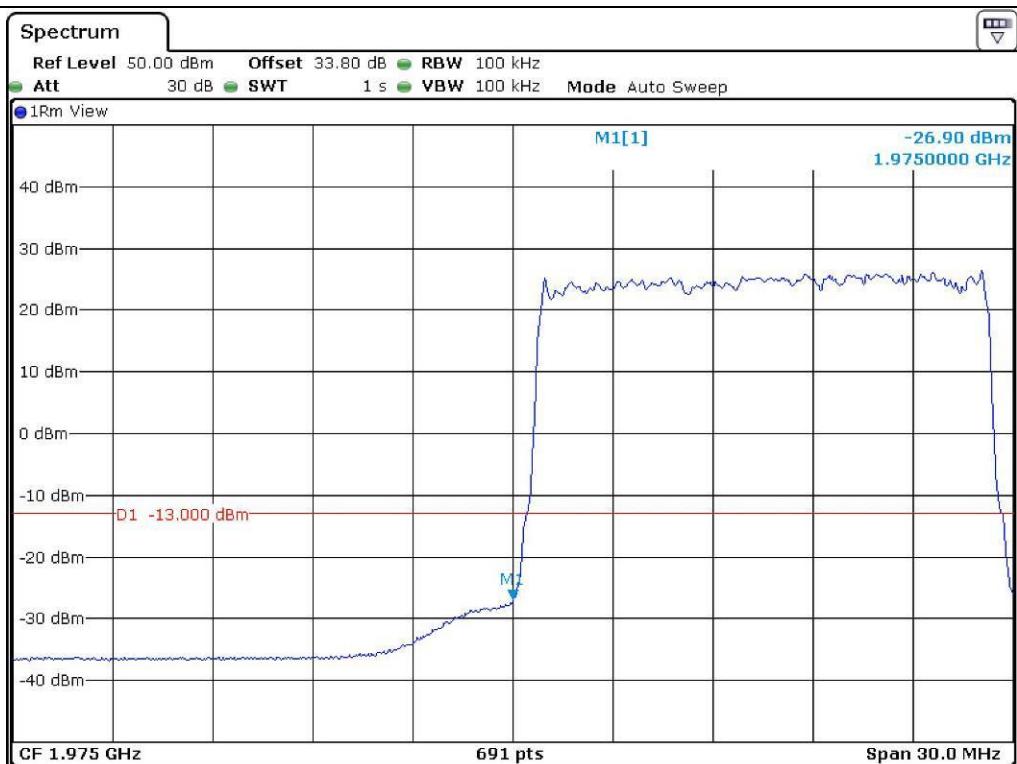
LTE 5 M\_QPSK – Band Edge (High Channel)



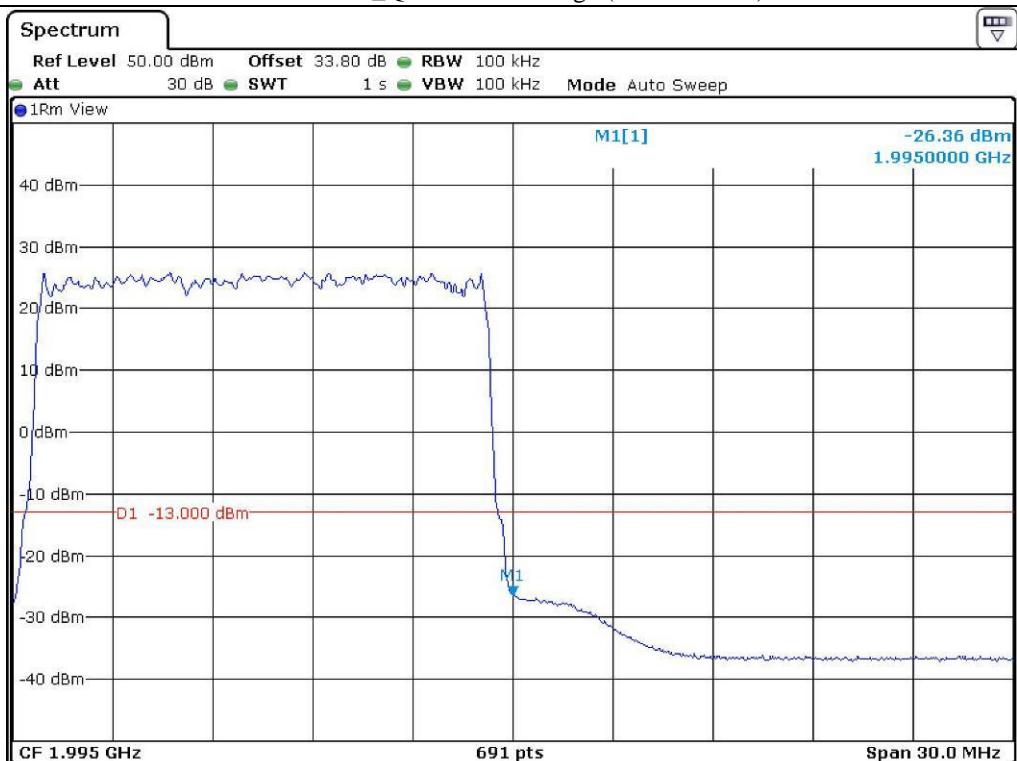
LTE 10 M\_QPSK – Band Edge (Low Channel)



LTE 10 M\_QPSK – Band Edge (High Channel)



LTE 15 M\_QPSK – Band Edge (Low Channel)



LTE 15 M\_QPSK – Band Edge (High Channel)

## 8.5 Test data for Uplink

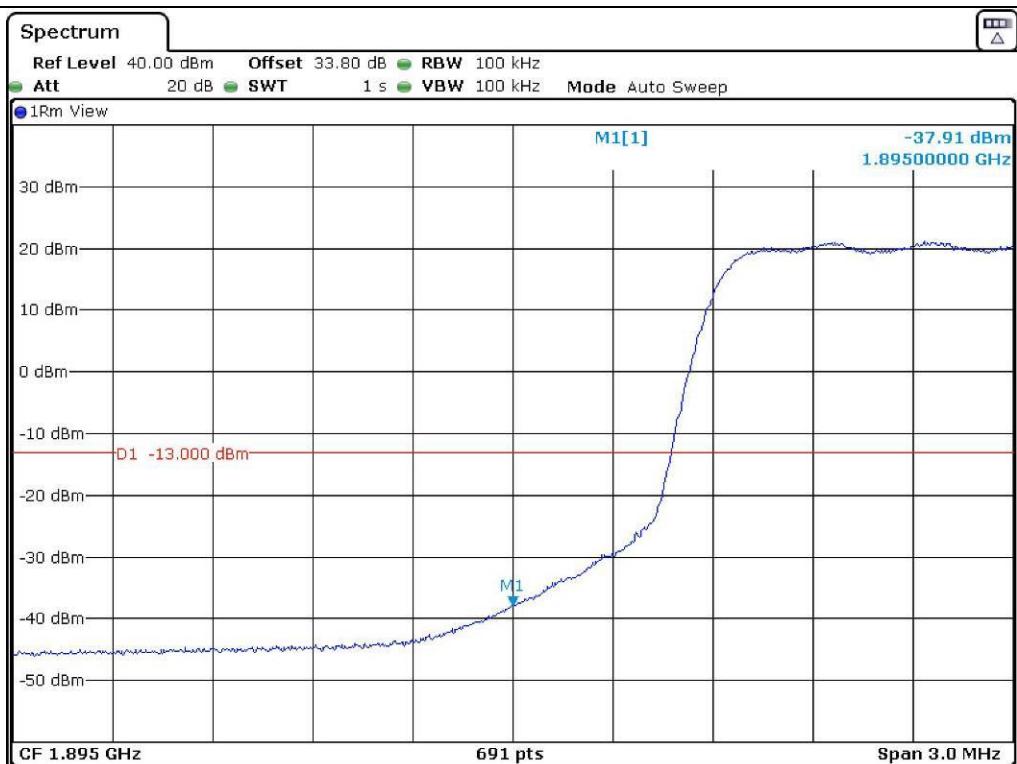
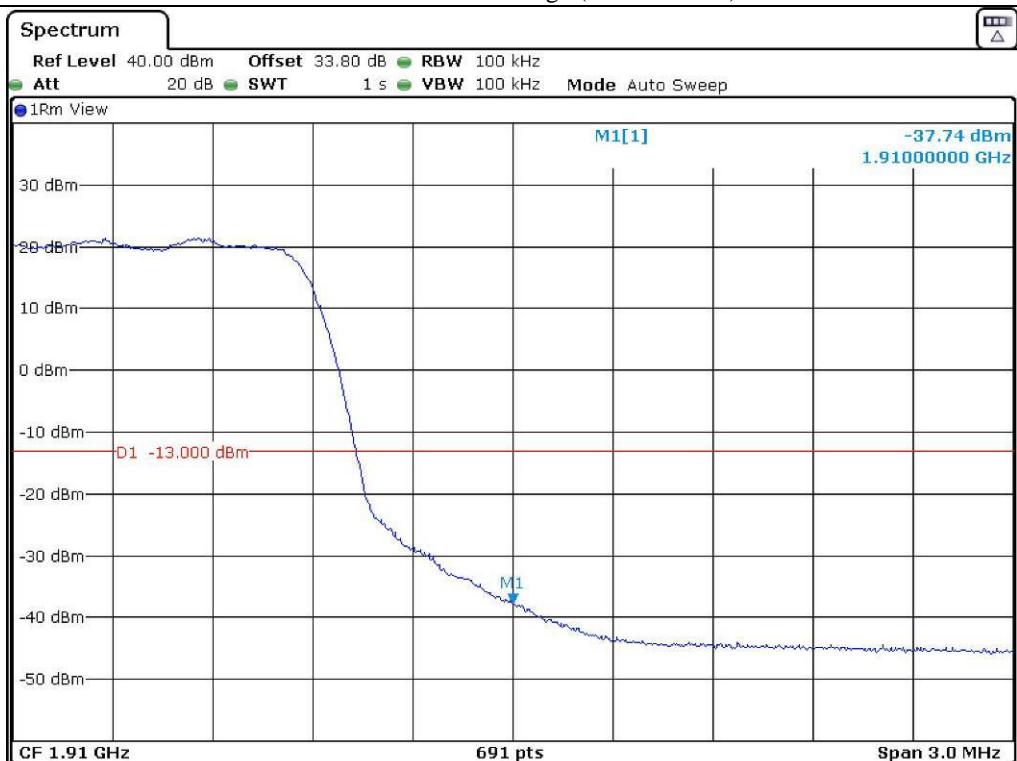
- Test Date : November 04, 2014
- Result : PASSED BY 23.59 dB at LTE 5 M\_QPSK Mode

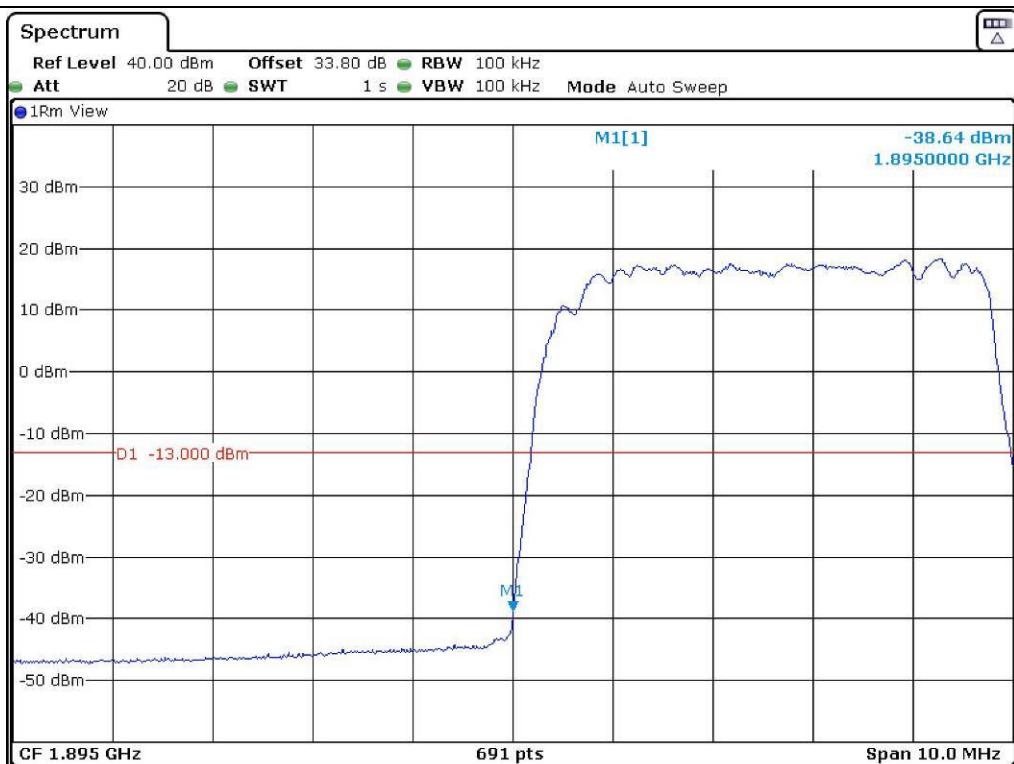
Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
CDMA 2000	Low	1 895.00	-37.91	-13.00	24.91
	High	1 910.00	-37.74		24.74
LTE 5 M_QPSK	Low	1 895.00	-38.64	-13.00	25.64
	High	1 915.00	-36.59		23.59
LTE 10 M_QPSK	Low	1 895.00	-39.86	-13.00	26.86
	High	1 915.00	-39.47		26.47
LTE 15 M_QPSK	Low	1 895.00	-41.07	-13.00	28.07
	High	1 915.00	-41.01		28.01

According to Part 24E, out of band emission shall be attenuated by  $43 + 10 \log (P) \text{ dBc}$ , equates to -13.0dBm.

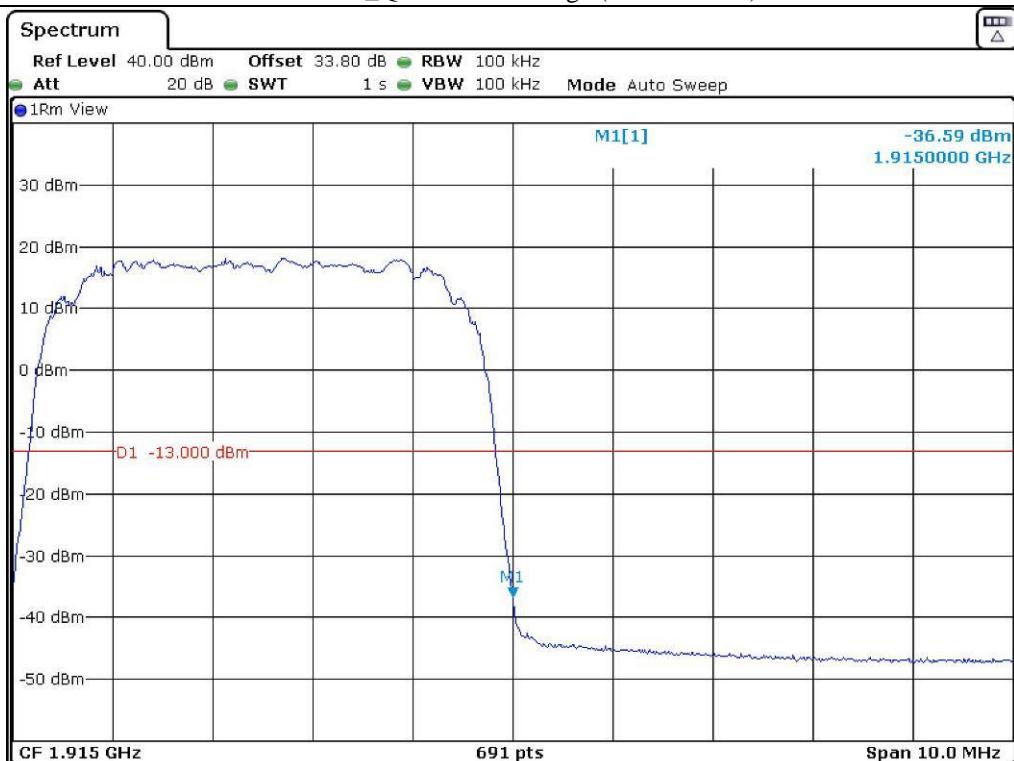
As a result of preliminary testing., the formal test was performed with the maximum payload mode of worst cases for QPSK.

Tested by: hyung-kwon, Oh / Project Engineer

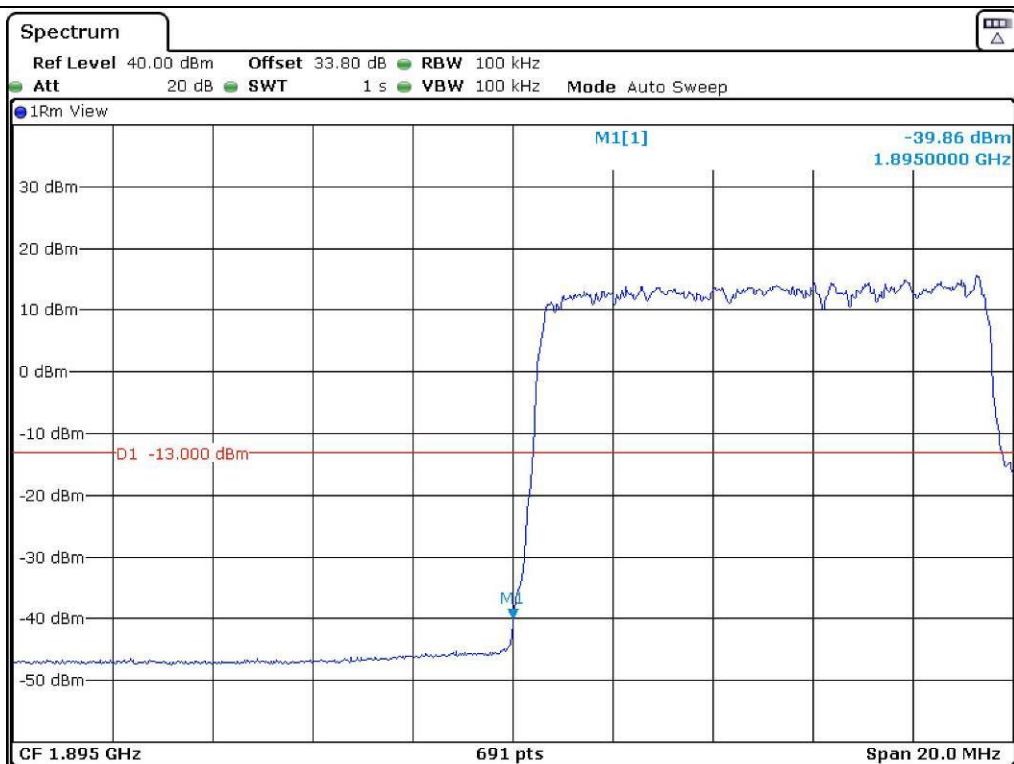

**CDMA 2000 – Band Edge (Low Channel)**

**CDMA 2000 – Band Edge (High Channel)**



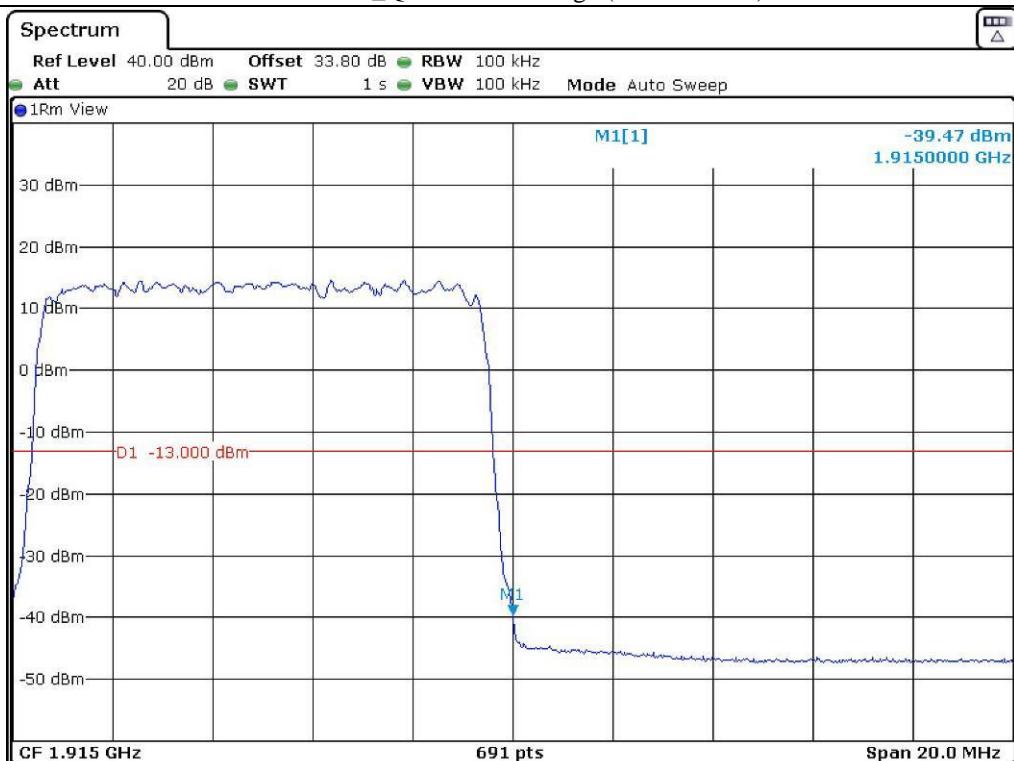
LTE 5 M\_QPSK – Band Edge (Low Channel)



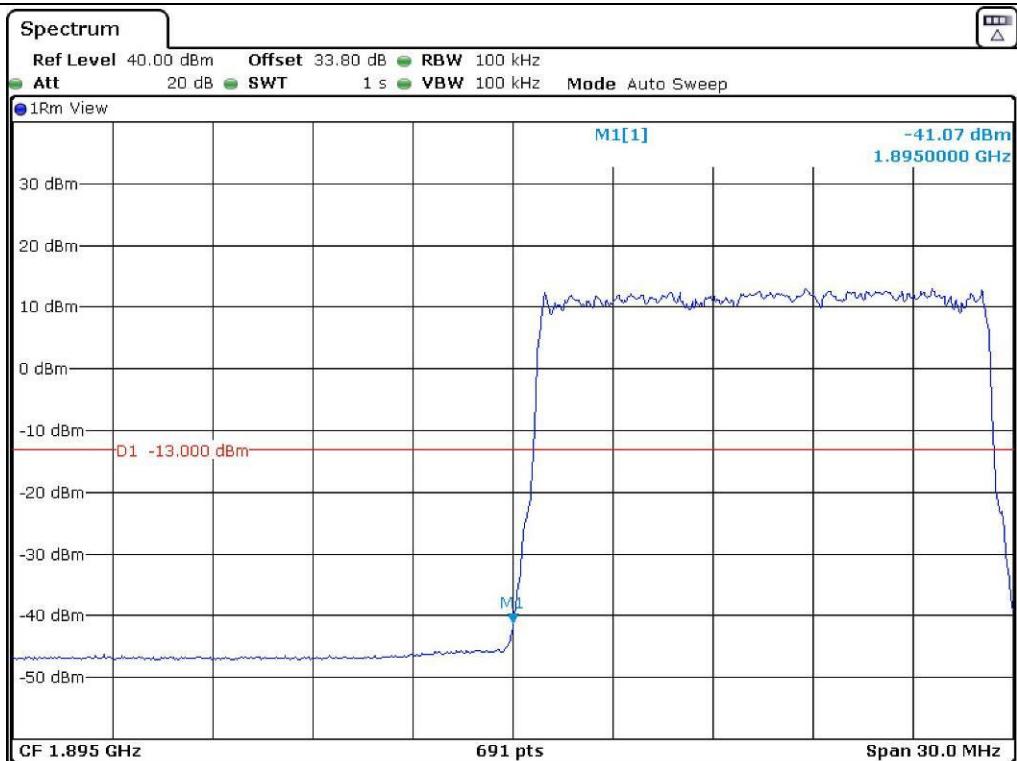
LTE 5 M\_QPSK – Band Edge (High Channel)



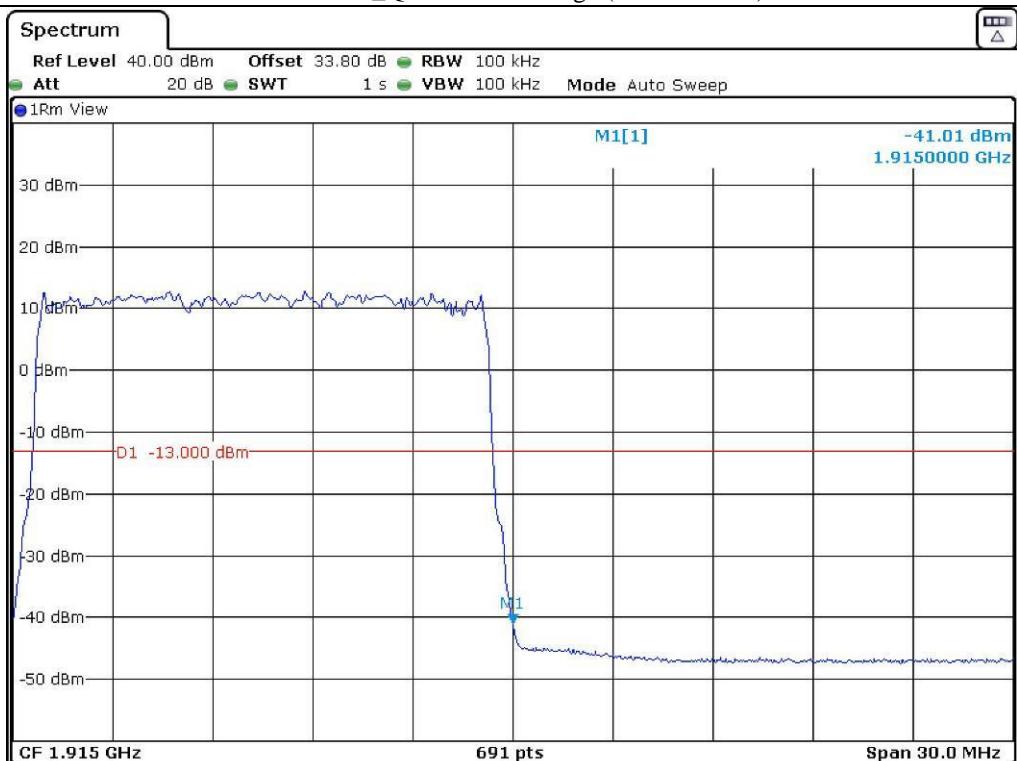
LTE 10 M\_QPSK – Band Edge (Low Channel)



LTE 10 M\_QPSK – Band Edge (High Channel)



LTE 15 M\_QPSK – Band Edge (Low Channel)



LTE 15 M\_QPSK – Band Edge (High Channel)