

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LICENSED TRANSMITTER

Test Report No.	: E148R-053
AGR No.	: A147A-071
Applicant	: SAMSUNG Electronics Co., Ltd.
Address	: (Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea
Manufacturer	: SAMSUNG Electronics Co., Ltd.
Address	: (Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea
Type of Equipment	: Outdoor Pico eNB
FCC ID.	: A3LSLS-BP008Q
Model Name	: SLS-BP008Q
Serial number	: N/A
Total page of Report	: 235 pages (including this page)
Date of Incoming	: July 28, 2014
Date of issue	: August 13, 2014

SUMMARY

The equipment complies with the regulation; **FCC Part 27 Subpart C.**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by: Ki-Hong, Nam / Senior Engineer
ONETECH Corp.

Approved by: Gea-Won, Lee
Gea-Won, Lee / Managing Director
ONETECH Corp.

CONTENTS

	PAGE
1. VERIFICATION OF COMPLIANCE	7
2. TEST SUMMARY.....	8
2.1 TEST ITEMS AND RESULTS	8
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS.....	8
2.3 RELATED SUBMITTAL(S) / GRANT(S)	8
2.4 PURPOSE OF THE TEST	8
2.5 TEST METHODOLOGY.....	8
2.6 TEST FACILITY.....	8
3. GENERAL INFORMATION.....	9
3.1 PRODUCT DESCRIPTION.....	9
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.....	9
3.3 PERIPHERAL EQUIPMENT	10
3.4 MODE OF OPERATION DURING THE TEST	10
4. EUT MODIFICATIONS.....	11
5. CONDUCTED OUTPUT POWER.....	12
5.1 OPERATING ENVIRONMENT	12
5.2 APPLICABLE STANDARD	12
5.3 TEST SET-UP	12
5.4 TEST EQUIPMENT USED	12
5.5 TEST DATA FOR PORT 0	13
5.5.1 Test Result (20 MHz/1 Carrier)	13
5.5.2 Test Result (20 MHz/2 Carrier)	20
5.5.3 Test Result (20 MHz/3 Carrier)	27
5.6 TEST DATA FOR PORT 1	34
5.6.1 Test Result (20 MHz/1 Carrier)	34
5.6.2 Test Result (20 MHz/2 Carrier)	41
5.6.3 Test Result (20 MHz/3 Carrier)	48
5.7 TEST DATA FOR MULTIPLE TRANSMIT	55

5.7.1 Test Result (20 MHz/1 Carrier)	55
5.7.2 Test Result (20 MHz/2 Carrier)	56
5.7.3 Test Result (20 MHz/3 Carrier)	57
6. OCCUPIED BANDWIDTH.....	58
6.1 OPERATING ENVIRONMENT	58
6.2 TEST SET-UP	58
6.3 TEST EQUIPMENT USED	58
6.4 TEST DATA FOR PORT 0	59
6.4.1 Test Result (20 MHz/1 Carrier)	59
6.4.2 Test Result (20 MHz/2 Carrier)	72
6.4.3 Test Result (20 MHz/3 Carrier)	85
6.5 TEST DATA FOR PORT 1	98
6.5.1 Test Result (20 MHz/1 Carrier)	98
6.5.2 Test Result (20 MHz/2 Carrier)	111
6.5.3 Test Result (20 MHz/3 Carrier)	124
7. SPURIOUS EMISSION AT ANTENNA TERMINAL	137
7.1 OPERATING ENVIRONMENT	137
7.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	137
7.3 TEST EQUIPMENT USED	137
7.4 TEST DATA FOR PORT 0	138
7.4.1 Test Result (20 MHz/1 Carrier)	138
7.4.2 Test Result (20 MHz/2 Carrier)	148
7.4.3 Test Result (20 MHz/3 Carrier)	158
7.5 TEST DATA FOR PORT 1	168
7.5.1 Test Result (20 MHz/1 Carrier)	168
7.5.2 Test Result (20 MHz/2 Carrier)	178
7.5.3 Test Result (20 MHz/3 Carrier)	188
8. BAND EDGE MEASUREMENT	198
8.1 OPERATING ENVIRONMENT	198
8.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	198

8.3 TEST EQUIPMENT USED	198
8.4 TEST DATA FOR PORT 0	199
8.4.1 Test Result (20 MHz/1 Carrier)	199
8.4.2 Test Result (20 MHz/2 Carrier)	203
8.4.3 Test Result (20 MHz/3 Carrier)	207
8.5 TEST DATA FOR PORT 1	211
8.5.1 Test Result (20 MHz/1 Carrier)	211
8.5.2 Test Result (20 MHz/2 Carrier)	215
8.5.3 Test Result (20 MHz/3 Carrier)	219
9. FIELD STRENGTH OF SPURIOUS RADIATION	223
9.1 OPERATING ENVIRONMENT	223
9.2 TEST SET-UP	223
9.3 TEST EQUIPMENT USED	223
9.4 TEST DATA FOR RADIATED EMISSION	224
9.4.1 Test Result (20 MHz/1 Carrier)	224
9.4.2 Test Result (20 MHz/2 Carrier)	225
9.4.3 Test Result (20 MHz/3 Carrier)	226
10. FREQUENCY STABILITY WITH TEMPERATURE VARIATION.....	227
10.1 OPERATING ENVIRONMENT	227
10.2 TEST SET-UP	227
10.3 TEST EQUIPMENT USED	227
10.4 TEST DATA (20 MHz/1 CARRIER)	228
10.5 TEST DATA (20 MHz/2 CARRIER)	228
10.6 TEST DATA (20 MHz/3 CARRIER)	229
11. FREQUENCY STABILITY WITH VOLTAGE VARIATION.....	230
11.1 OPERATING ENVIRONMENT	230
11.2 TEST SET-UP	230
11.3 TEST EQUIPMENT USED	230
11.4 TEST DATA (20 MHz/1 CARRIER)	231
11.5 TEST DATA (20 MHz/2 CARRIER)	231

11.6 TEST DATA (20 MHz/3 CARRIER)	231
12. MAXIMUM PERMISSIBLE EXPOSURE	232
12.1 RF EXPOSURE CALCULATION	232
12.2 CALCULATED MPE SAFE DISTANCE.....	232
12.2.1 Test data for Port 0	232
12.2.2 Test data for Port 1	234

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E148R-053	August 13, 2014	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

APPLICANT : SAMSUNG Electronics Co., Ltd.
 ADDRESS : (Maetan-dong) 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742,
 Republic of Korea
 CONTACT PERSON : HWAN-YOUL, KIM / Senior Research Engineer
 TELEPHONE NO : +82-31-279-3092
 FCC ID : A3LSLS-BP008Q
 MODEL NAME : SLS-BP008Q
 SERIAL NUMBER : N/A
 DATE : August 13, 2014

EQUIPMENT CLASS	TNB – Licensed Non-Broadcast Station Transmitter
EQUIPMENT DESCRIPTION	Outdoor Pico eNB
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	TIA-603-D-2010
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC Part 27 Subpart C
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	10 m semi anechoic chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
2.1046, 27.50(h)	Conducted Output Power	Met the Limit / PASS
2.1049, 27.53(m)	Occupied Bandwidth, Bandwidth Limitation	Met the Limit / PASS
2.1051, 27.53(m)	Band Edge	Met the Limit / PASS
2.1051, 27.53(m)	Spurious Emissions at Antenna Terminals	Met the Limit / PASS
2.1051, 27.53(m)	Field strength of Spurious Radiation	Met the Limit / PASS
2.1055(a)(1), 27.54	Frequency Stability with Temperature variation	Met the requirement / PASS
2.1055(d), 27.54	Frequency stability with primary voltage variation	Met the requirement / PASS

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original Grant

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

2.5 Test Methodology

Radiated testing was performed according to the procedures in TIA-603-D-2010 and was performed at a distance of 10 m and 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-666/ T-1842 IC (Industry Canada) – Registration No. Site# 3736-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation No. 85

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. GENERAL INFORMATION

3.1 Product Description

The SAMSUNG Electronics Co., Ltd., Models SLS-BP008Q(referred to as the EUT in this report) are Outdoor Pico eNB. It provides mobile communications services to subscribers according to the air interface standard.

The Outdoor Pico eNB transmits/receives radio signals to/from the UE and processes the modulation and demodulation of packet traffic signals. The Outdoor Pico eNB is also responsible for packet scheduling and radio bandwidth allocation and performs handover via interface with the EPC

The Outdoor Pico eNB can be installed vertically or horizontally; and it can be installed on the wall, pole or rack by using the installation brackets. The Outdoor Pico eNB is an all-in-one unit. If a fault occurs, the unit must be replaced with new one. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Outdoor Pico eNB	
LIST OF EACH OSC. or CRY. FREQ.(FREQ. >= 1 MHz)	20 MHz	
EMISSION DESIGNATOR	QPSK, 16QAM, 64QAM	
OPERATING FREQUENCY	2 496 MHz ~ 2 690 MHz	
CHANNEL BANDWIDTH	1 Carrier - 20 MHz 2 Carrier – 40 MHz 3 Carrier – 60 MHz	
RF OUTPUT POWER	Port 0	1 Carrier: 5.140 437 W 2 Carrier: 6.194 411 W 3 Carrier: 6.025 596 W
	Port 1	1 Carrier: 5.128 614 W 2 Carrier: 6.067 363 W 3 Carrier: 6.011 737 W
ELECTRICAL RATING	AC 120 V ~ 240 V	

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3.3 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	FCC ID	Description	Connected to
SLS-BP008Q	SAMSUNG Electronics Co., Ltd.	A3LSLS-BP008Q	Outdoor Pico eNB (EUT)	Notebook PC
NT301E5C-A65S	SAMSUNG Electronics Co., Ltd.	N/A	Notebook PC	EUT

3.4 Mode of operation during the test

The EUT was operated in a manner representative of the typical usage of the equipment. During all testing, system components were manipulated within the confines of typical usage to maximize each emission. All Modulation (QPSK, 16 QAM and 64 QAM) modes were tested.

For the above testing, following frequencies per channel were selected for each modulation.

1. 1 Carrier

Modulation	Channel	Frequency(MHz)	Modulation	Channel	Frequency(MHz)
16 QAM	Low	2 506	QPSK	Low	2 506
	Middle	2 590		Middle	2 590
	High	2 680		High	2 680
64 QAM	Low	2 506			
	Middle	2 590			
	High	2 680			

2. 2 Carrier

Modulation	Channel	Frequency(MHz)	Modulation	Channel	Frequency(MHz)
16 QAM	Low	2 516	QPSK	Low	2 516
	Middle	2 600		Middle	2 600
	High	2 670		High	2 670
64 QAM	Low	2 516			
	Middle	2 600			
	High	2 670			

3.3 Carrier

Modulation	Channel	Frequency(MHz)	Modulation	Channel	Frequency(MHz)
16 QAM	Low	2 526	QPSK	Low	2 526
	Middle	2 610		Middle	2 610
	High	2 660		High	2 660
64 QAM	Low	2 526			
	Middle	2 610			
	High	2 660			

4. EUT MODIFICATIONS

-. None

5. CONDUCTED OUTPUT POWER

5.1 Operating environment

Temperature : 24 °C
Relative humidity : 47 % R.H.

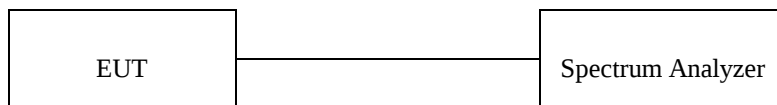
5.2 Applicable Standard

According to FCC §2.1046 & 27.50(h)

Main, booster and base stations. (i) The maximum EIRP of a main, booster or base station shall not exceed 33 dBW + 10log(X/Y) dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

5.3 Test set-up

The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation. RF output power was measured by channel power measurement function of the spectrum analyzer with RMS detector mode.



5.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV30	R/S	FSV30 Signal Analyzer	101372	Apr. 28, 2014 (1Y)
■ -	67-30-43	Aeroflex/Weinschel, Inc.	Attenuator	CA5760	Nov. 05, 2013 (1Y)
■ -	WA49-20-43	Weinschel Associates	Attenuator	A192	Apr. 04, 2014 (1Y)
■ -	DH-60	Dea Kwang Elec.	Slidacs	N/A	Sep. 03, 2013 (1Y)

All test equipment used is calibrated on a regular basis.

5.5 Test data for Port 0

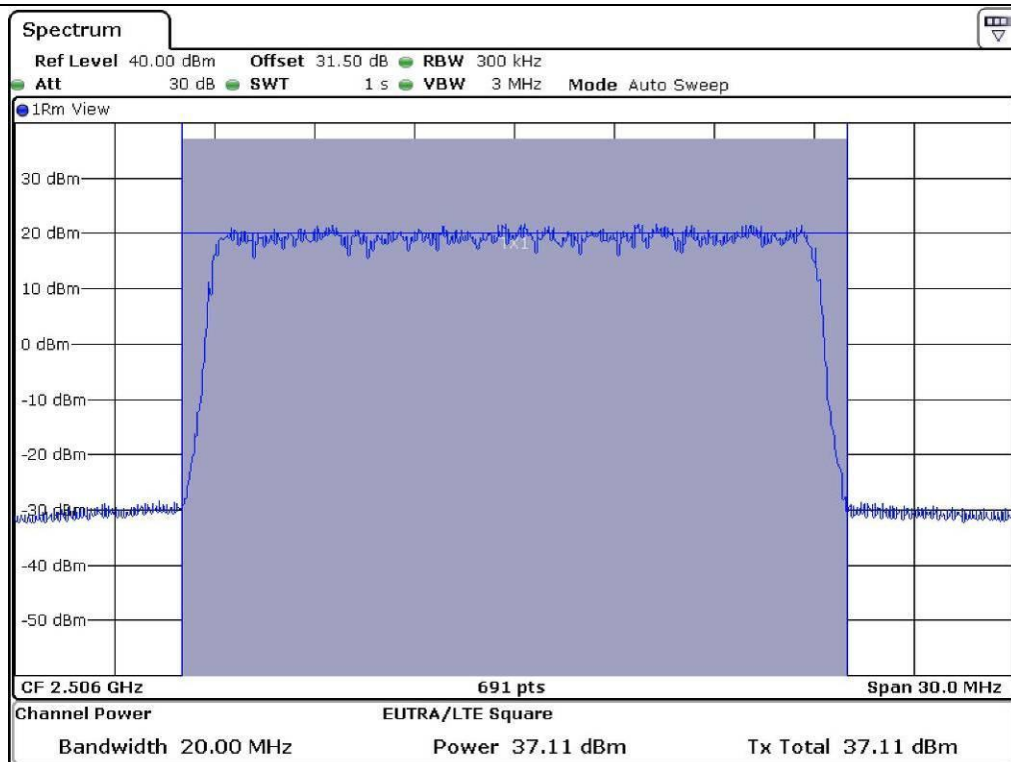
5.5.1 Test Result (20 MHz/1 Carrier)

-. Test Date : July 31, 2014
-. Measurement Function : Channel Power
-. Detector Mode : RMS detector
-. Test Result : Pass

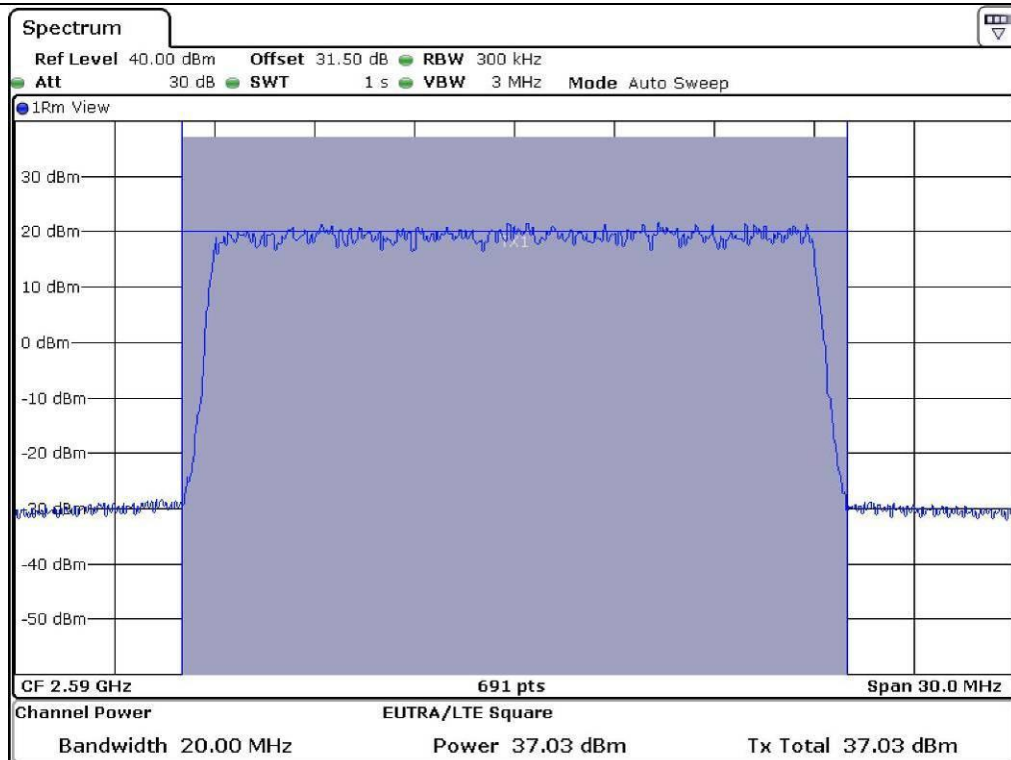
Modulation	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)
16 QAM	Low	2 506	37.11	5.140 437	7 255
	Middle	2 590	37.03	5.046 613	
	High	2 680	36.96	4.965 923	
64 QAM	Low	2 506	37.11	4.920 395	
	Middle	2 590	37.03	4.977 371	
	High	2 680	36.96	4.965 923	
QPSK	Low	2 506	37.06	5.081 594	
	Middle	2 590	37.02	5.035 006	
	High	2 680	37.09	5.116 818	



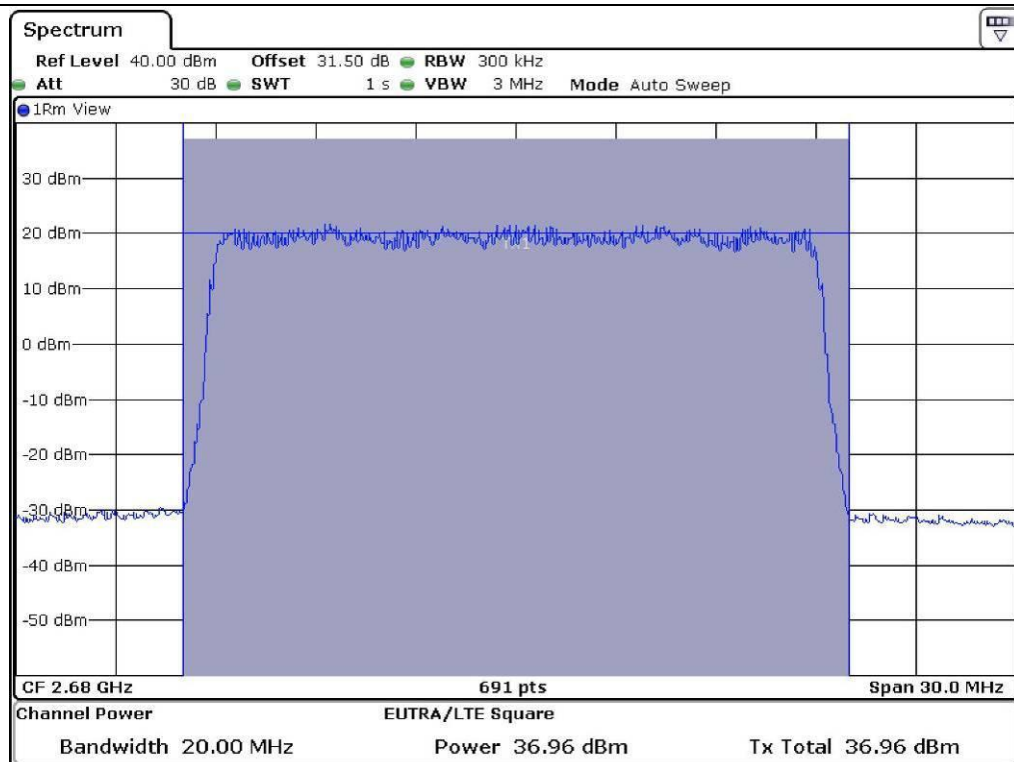
Tested by: Tae-Ho, Kim / Project Engineer



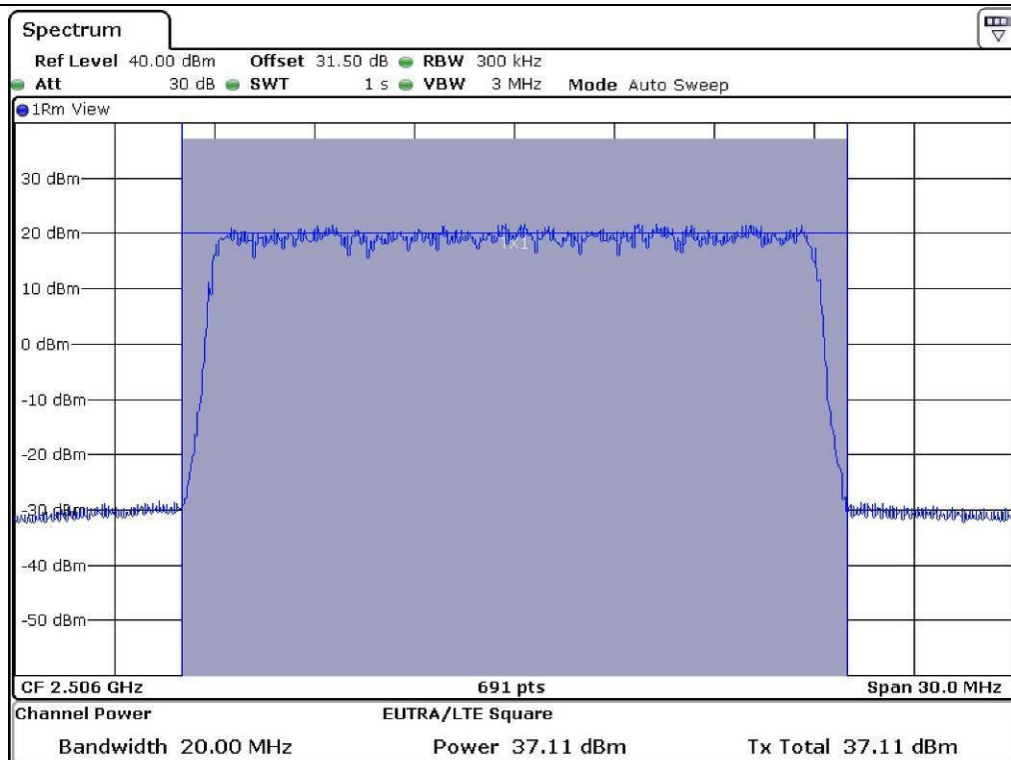
16 QAM – Low Channel



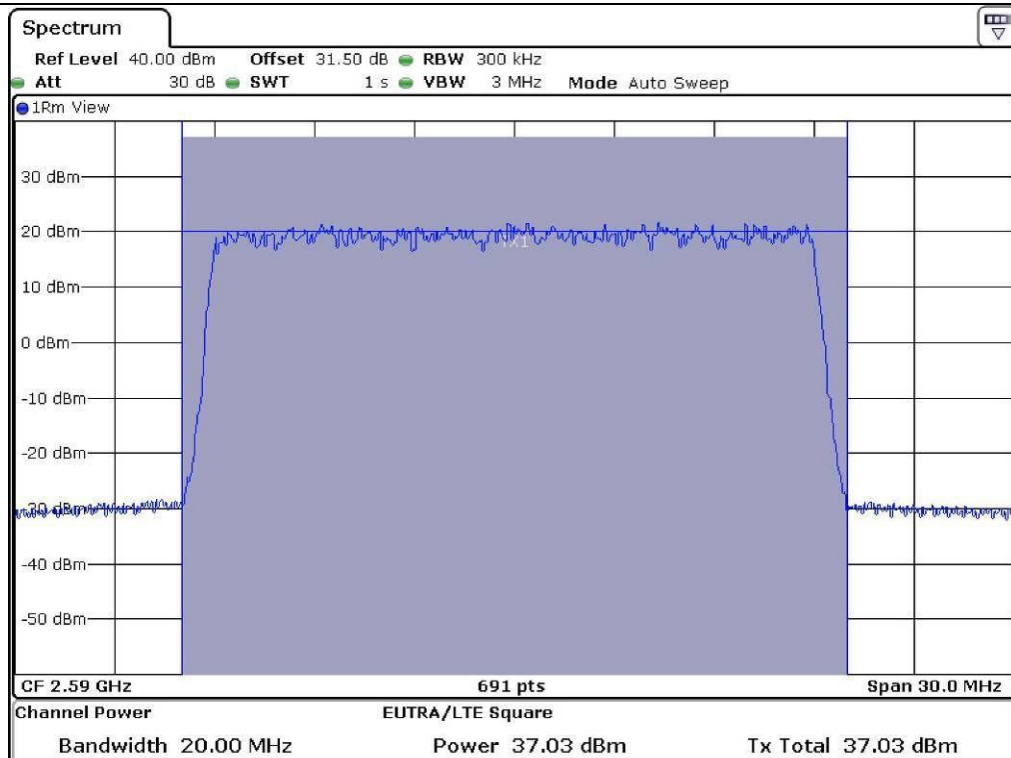
16 QAM – Middle Channel



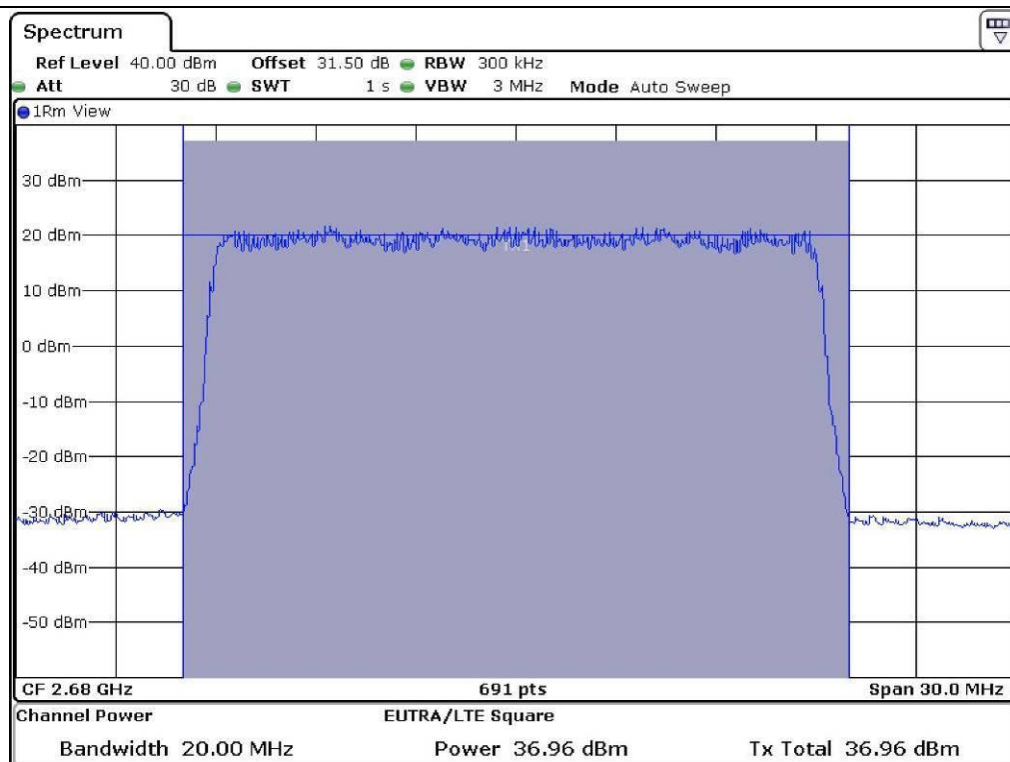
16 QAM – High Channel



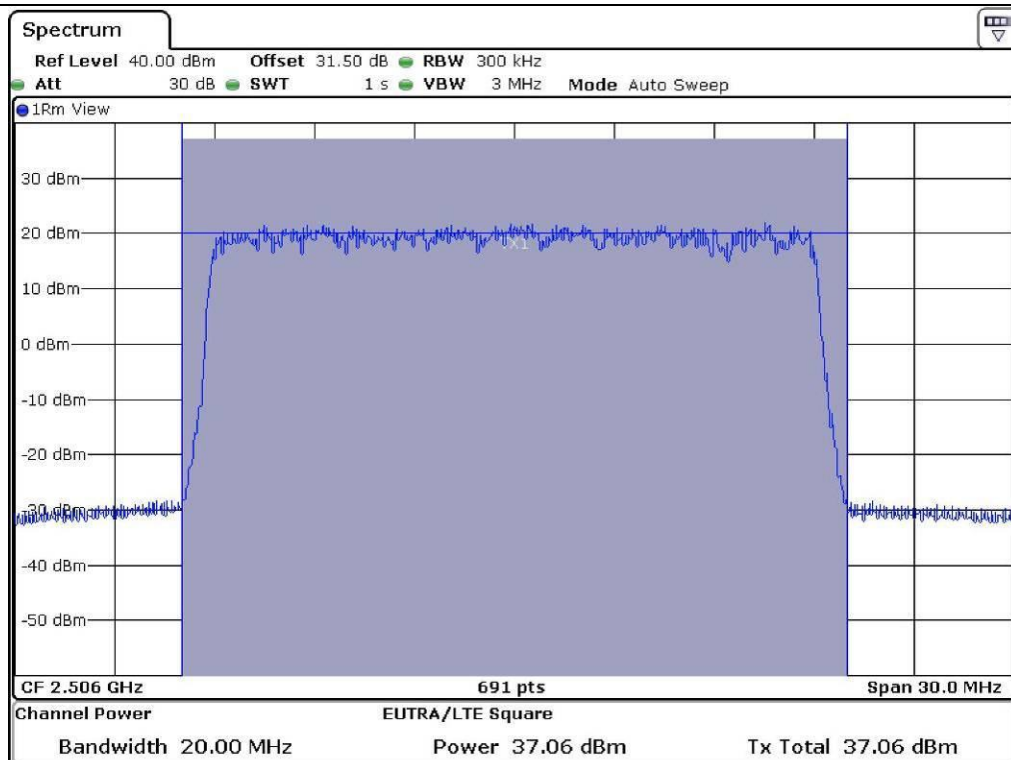
64 QAM – Low Channel



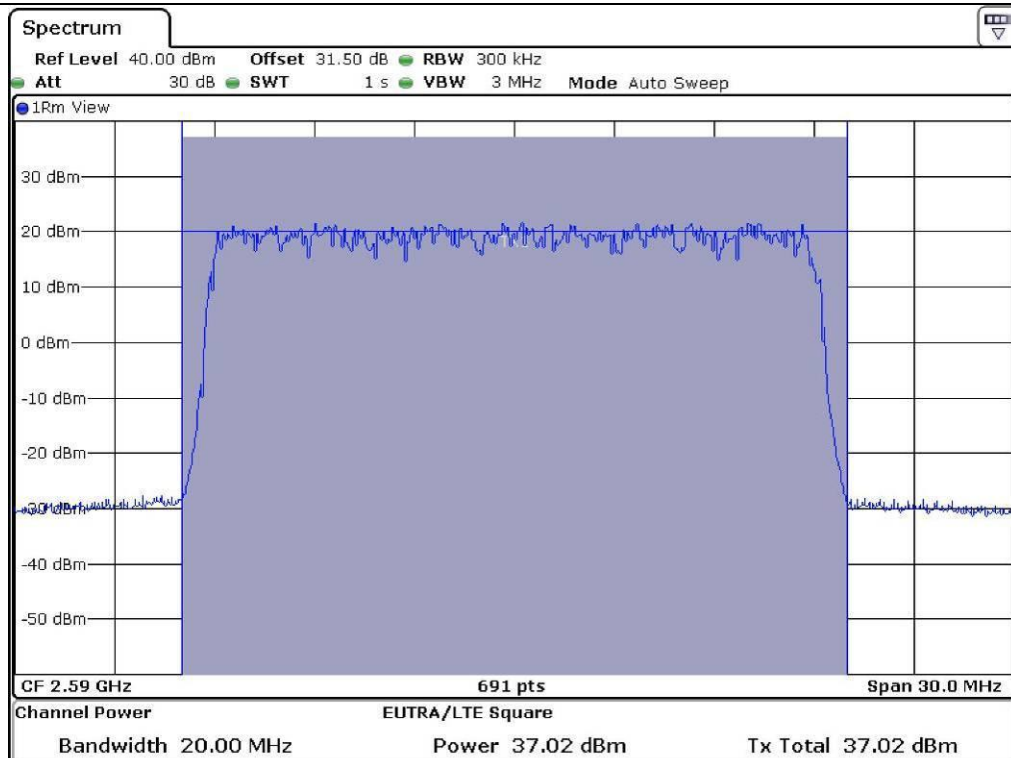
64 QAM – Middle Channel



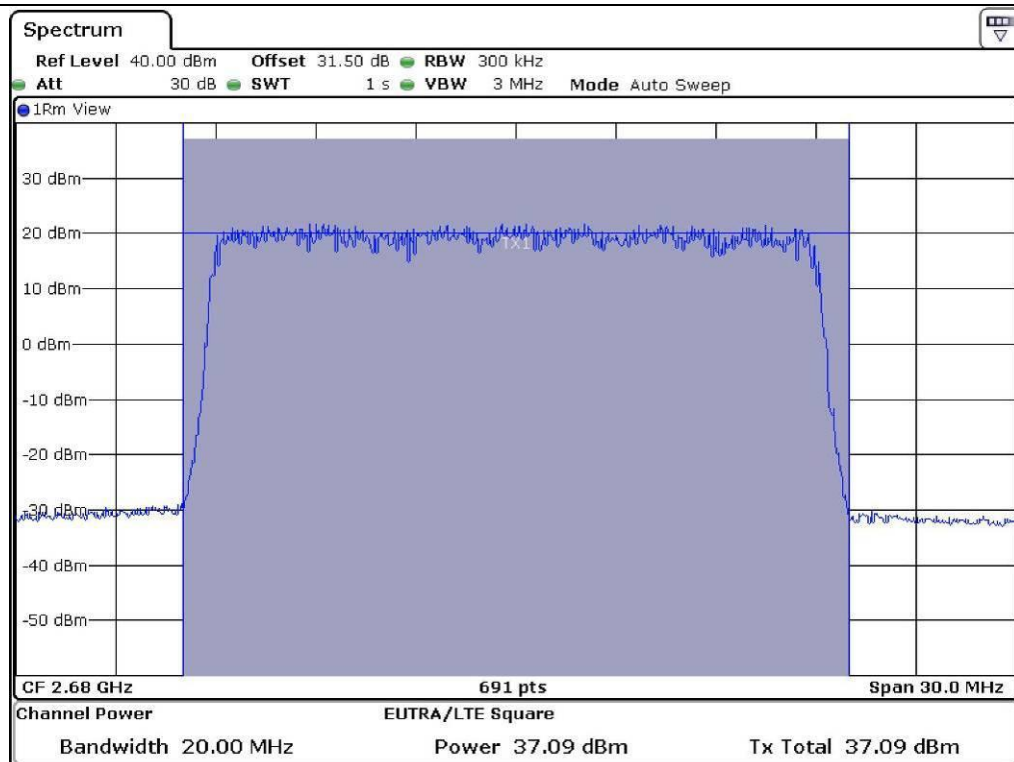
64 QAM – High Channel



QPSK – Low Channel



QPSK – Middle Channel



QPSK – High Channel

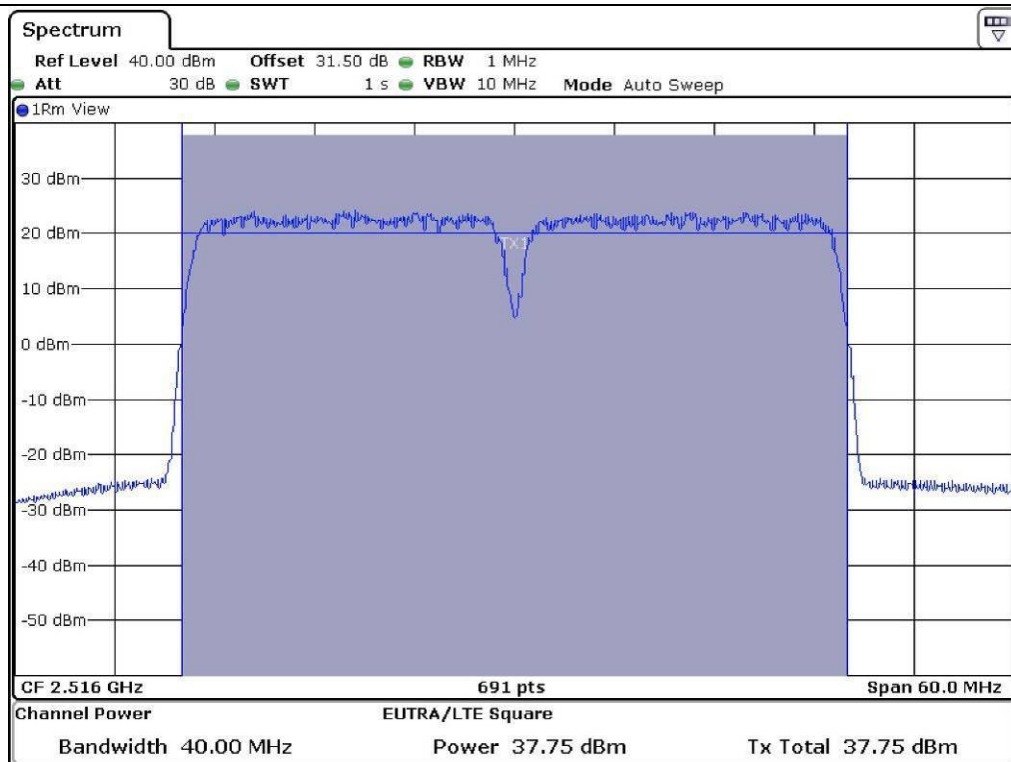
5.5.2 Test Result (20 MHz/2 Carrier)

-. Test Date : July 31, 2014
-. Measurement Function : Channel Power
-. Detector Mode : RMS detector
-. Test Result : Pass

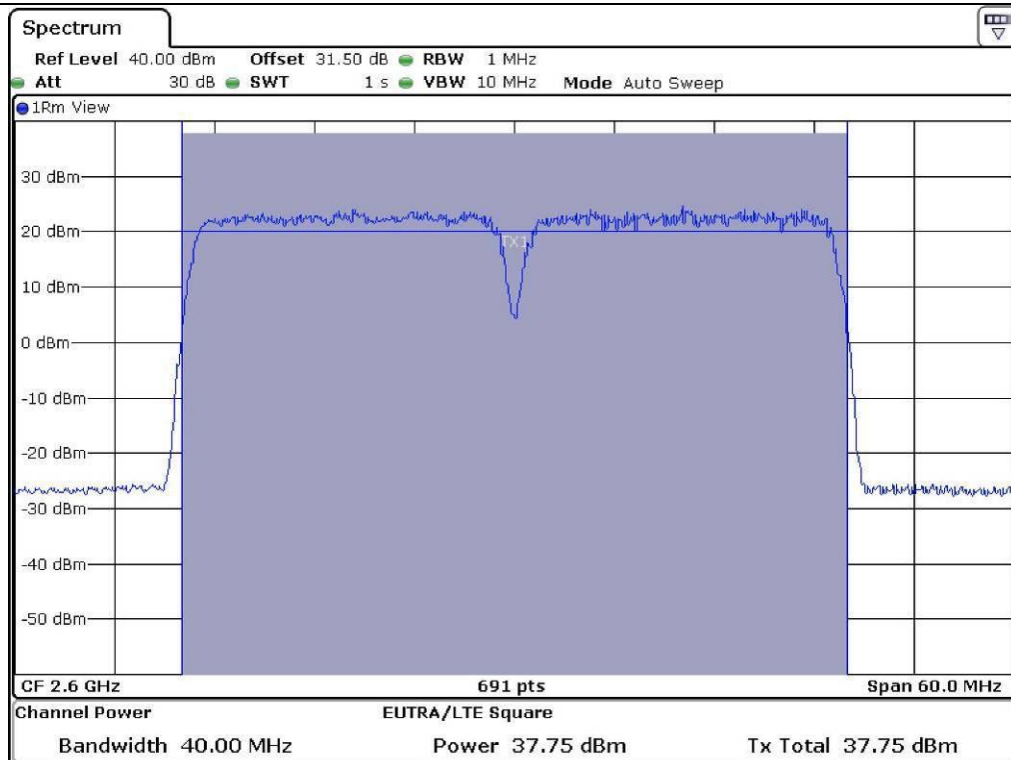
Modulation	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)
16 QAM	Low	2 516	37.75	5.956 621	14 511
	Middle	2 600	37.75	5.956 621	
	High	2 670	37.87	6.123 504	
64 QAM	Low	2 516	37.77	5.984 116	
	Middle	2 600	37.79	6.011 737	
	High	2 670	37.82	6.053 409	
QPSK	Low	2 516	37.76	5.970 353	
	Middle	2 600	37.88	6.137 620	
	High	2 670	37.92	6.194 411	



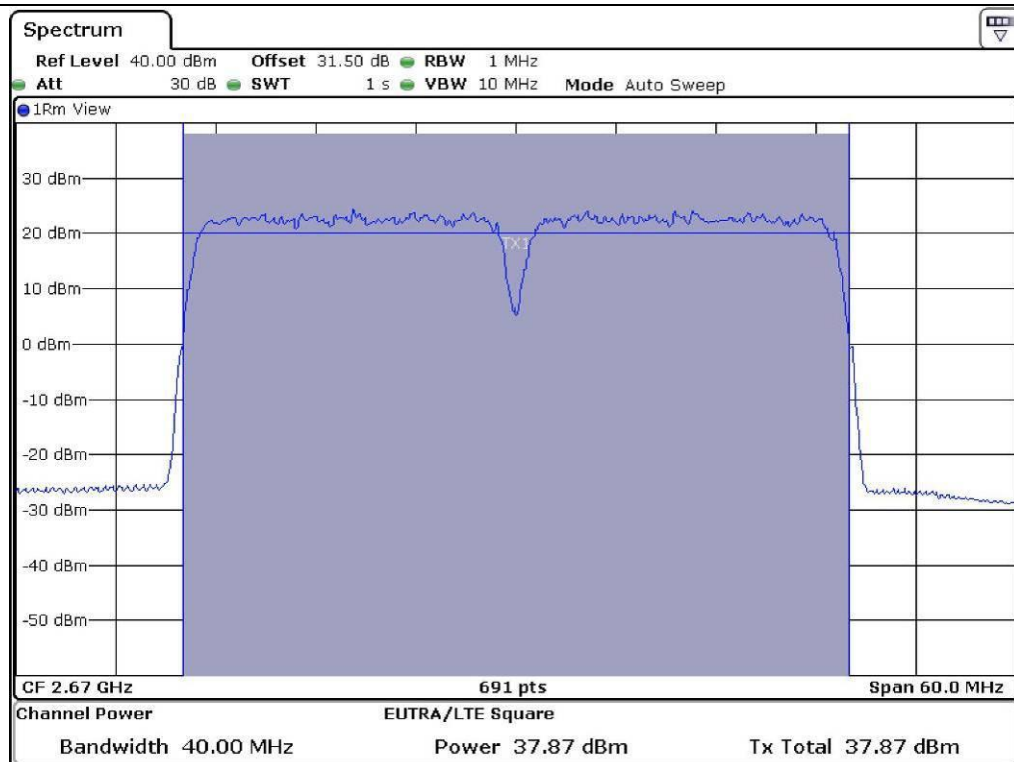
Tested by: Tae-Ho, Kim / Project Engineer



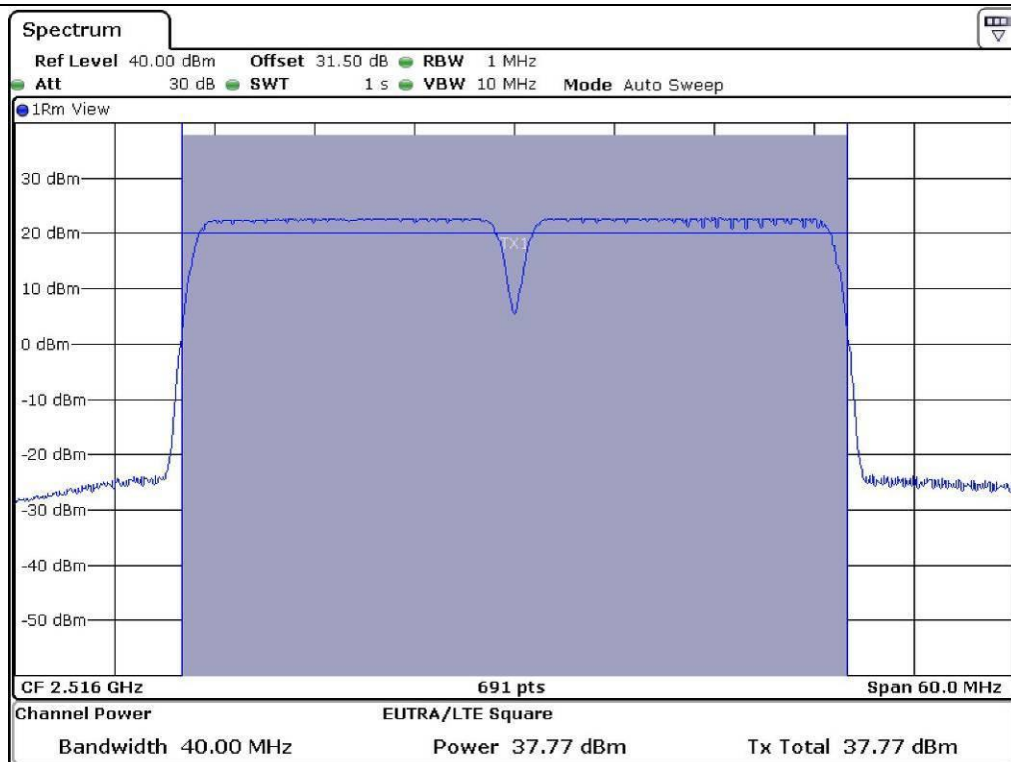
16 QAM – Low Channel



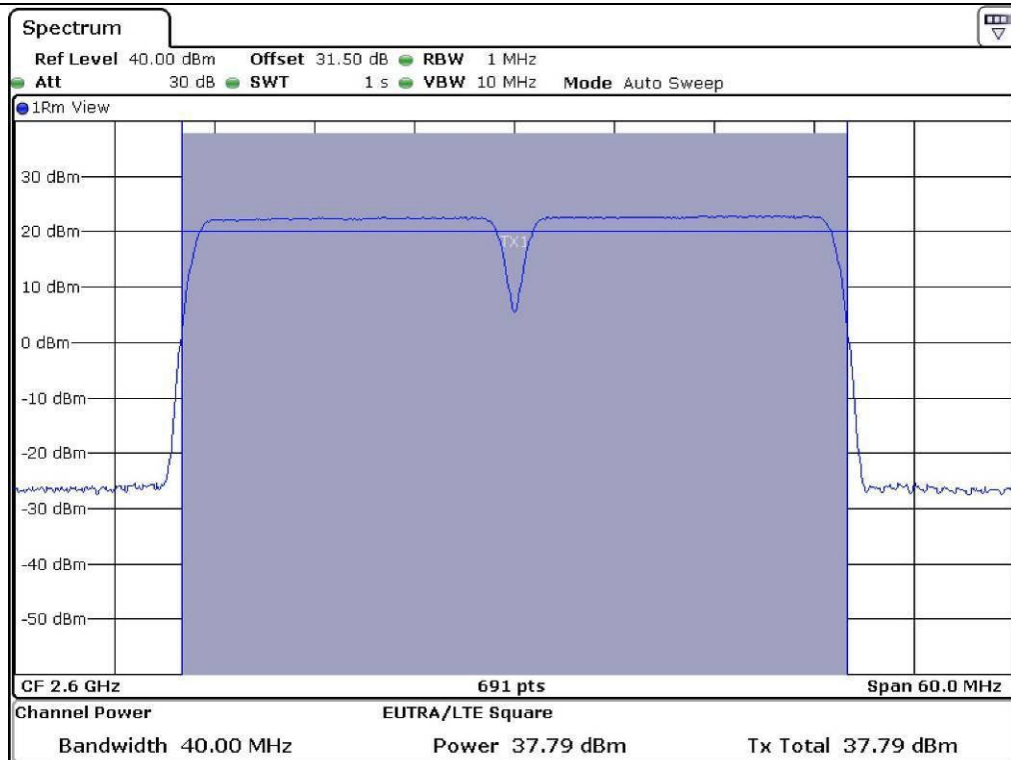
16 QAM – Middle Channel



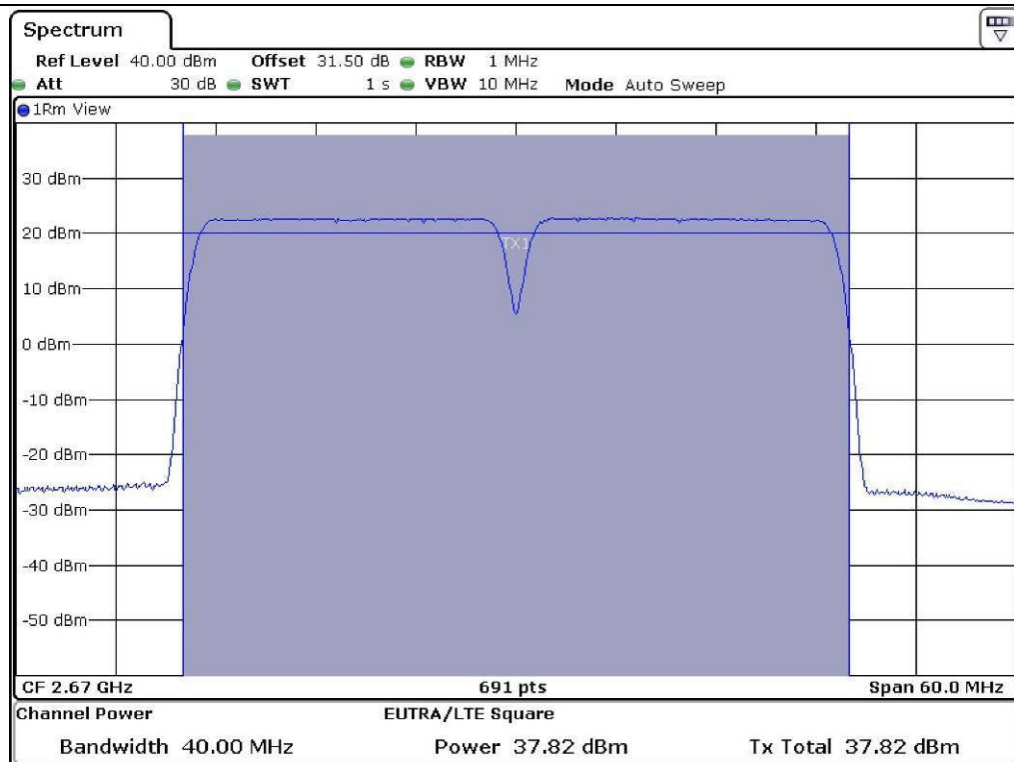
16 QAM – High Channel



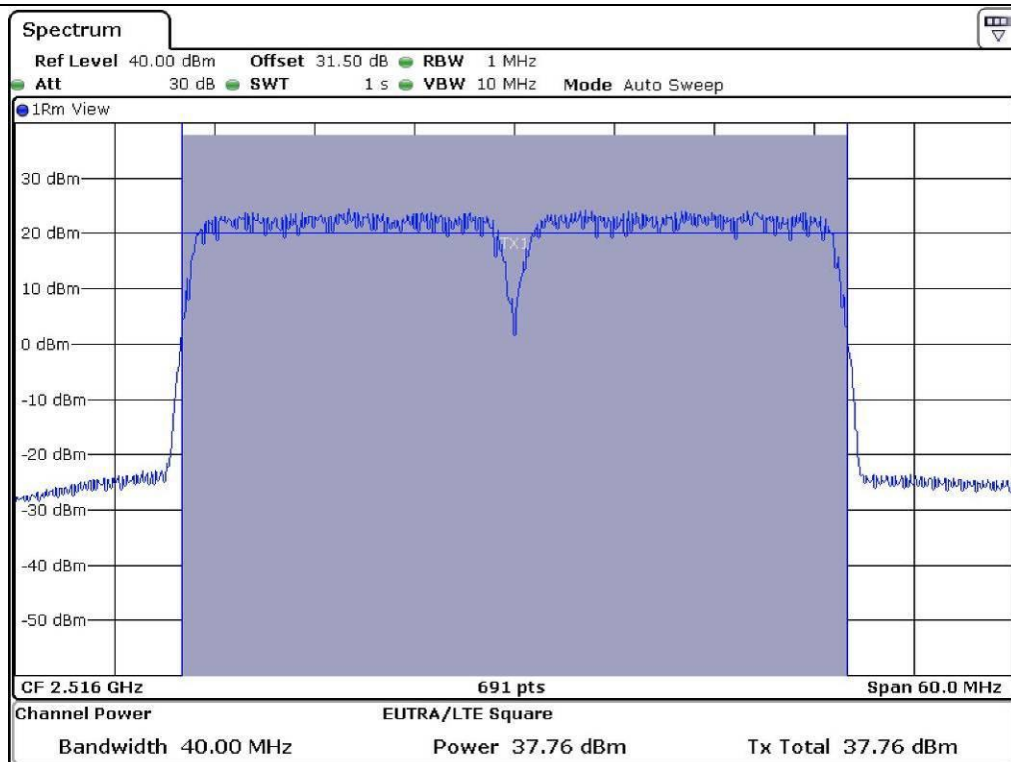
64 QAM – Low Channel



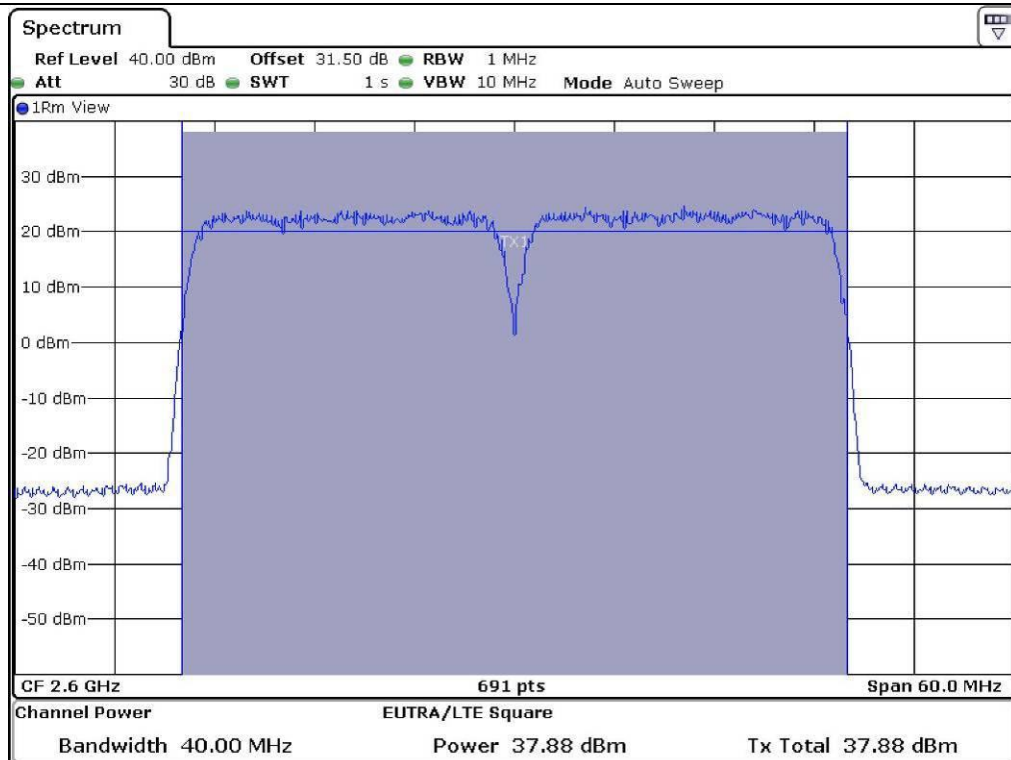
64 QAM – Middle Channel



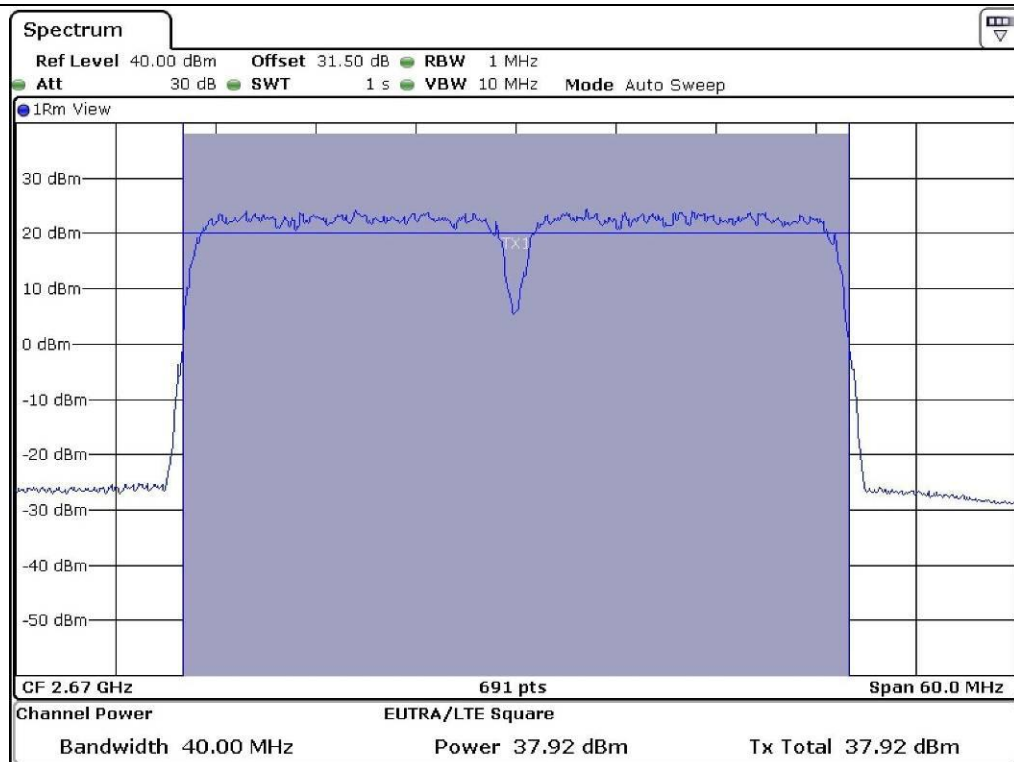
64 QAM – High Channel



QPSK – Low Channel



QPSK – Middle Channel



QPSK – High Channel

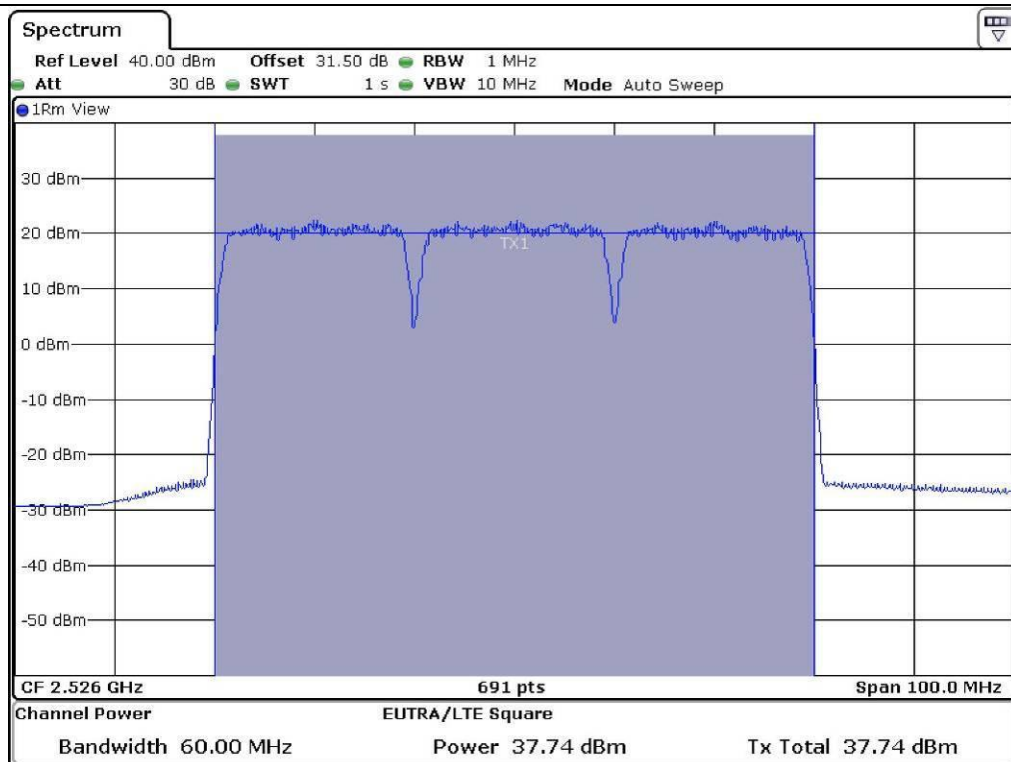
5.5.3 Test Result (20 MHz/3 Carrier)

-. Test Date : July 31, 2014
-. Measurement Function : Channel Power
-. Detector Mode : RMS detector
-. Test Result : Pass

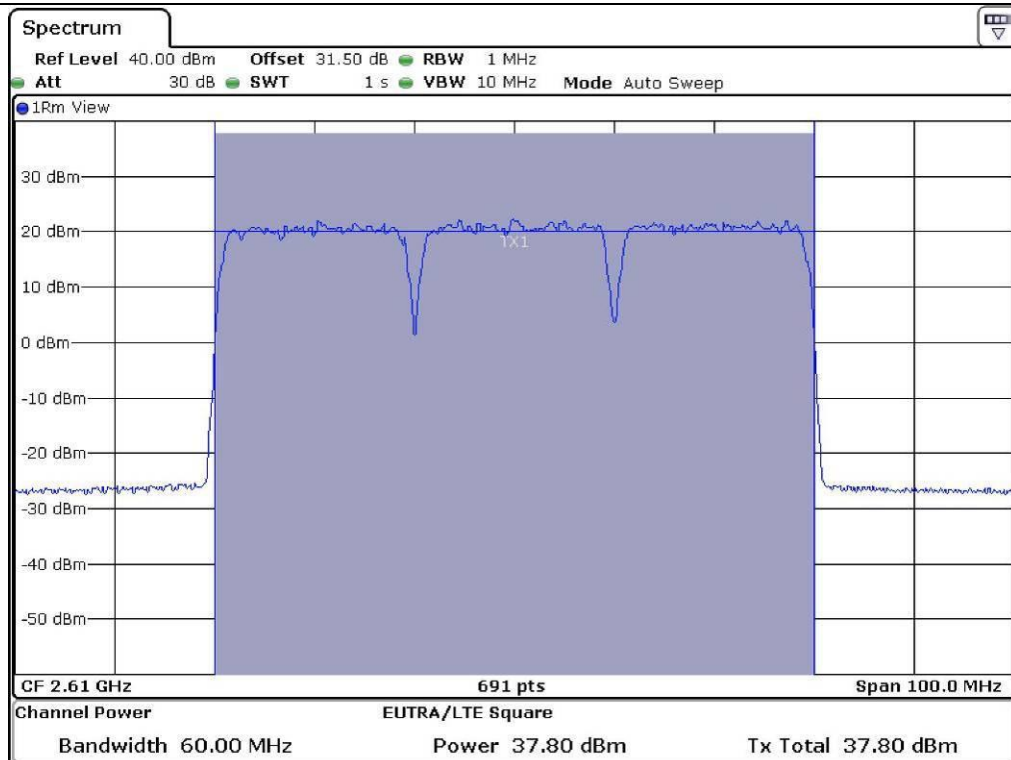
Modulation	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)
16 QAM	Low	2 526	37.74	5.942 922	21 766
	Middle	2 610	37.80	6.025 596	
	High	2 660	37.78	5.997 911	
64 QAM	Low	2 526	37.70	5.888 437	
	Middle	2 610	37.67	5.847 901	
	High	2 660	37.67	5.847 901	
QPSK	Low	2 526	37.76	5.970 353	
	Middle	2 610	37.79	6.011 737	
	High	2 660	37.74	5.942 922	



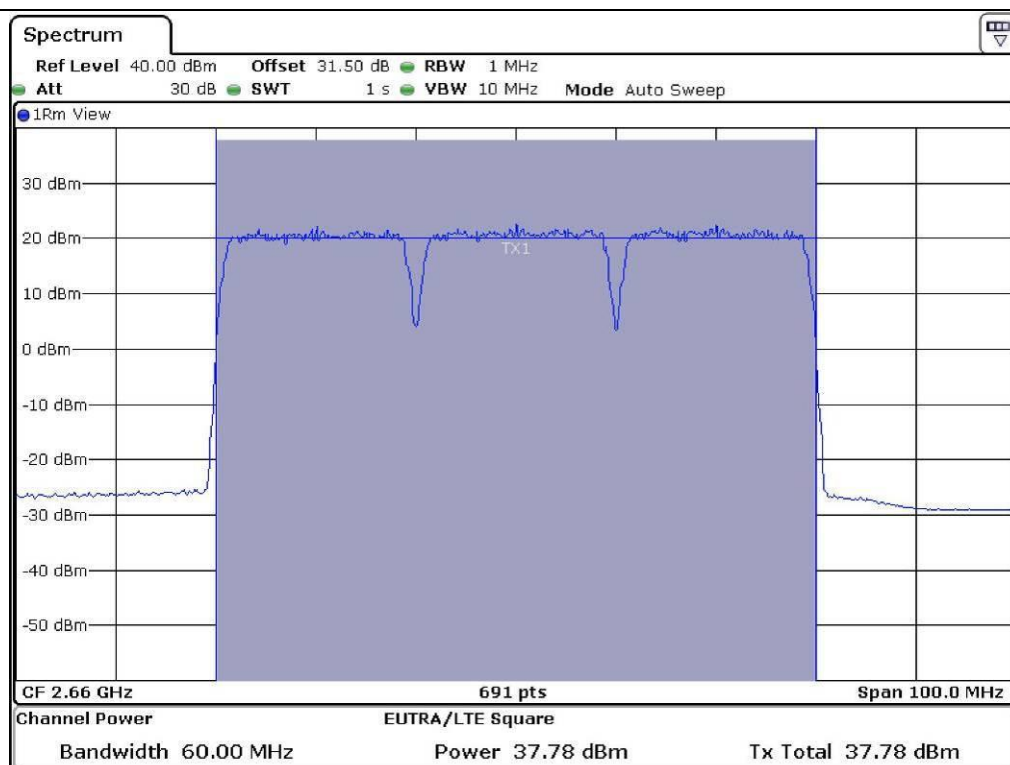
Tested by: Tae-Ho, Kim / Project Engineer



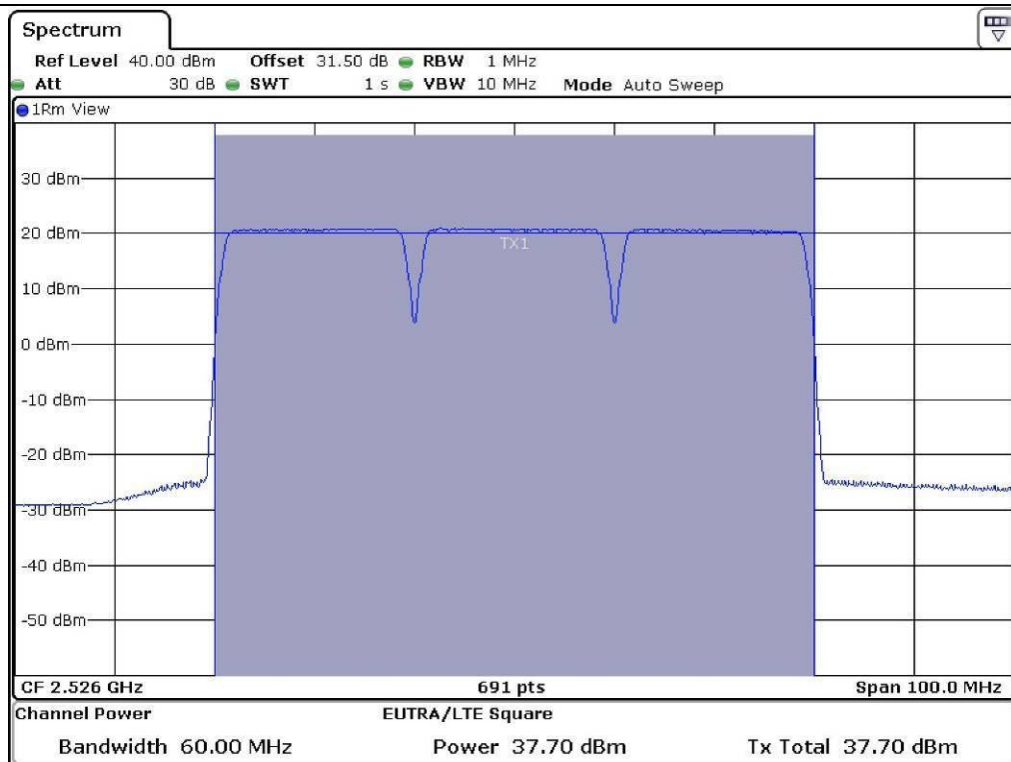
16 QAM – Low Channel



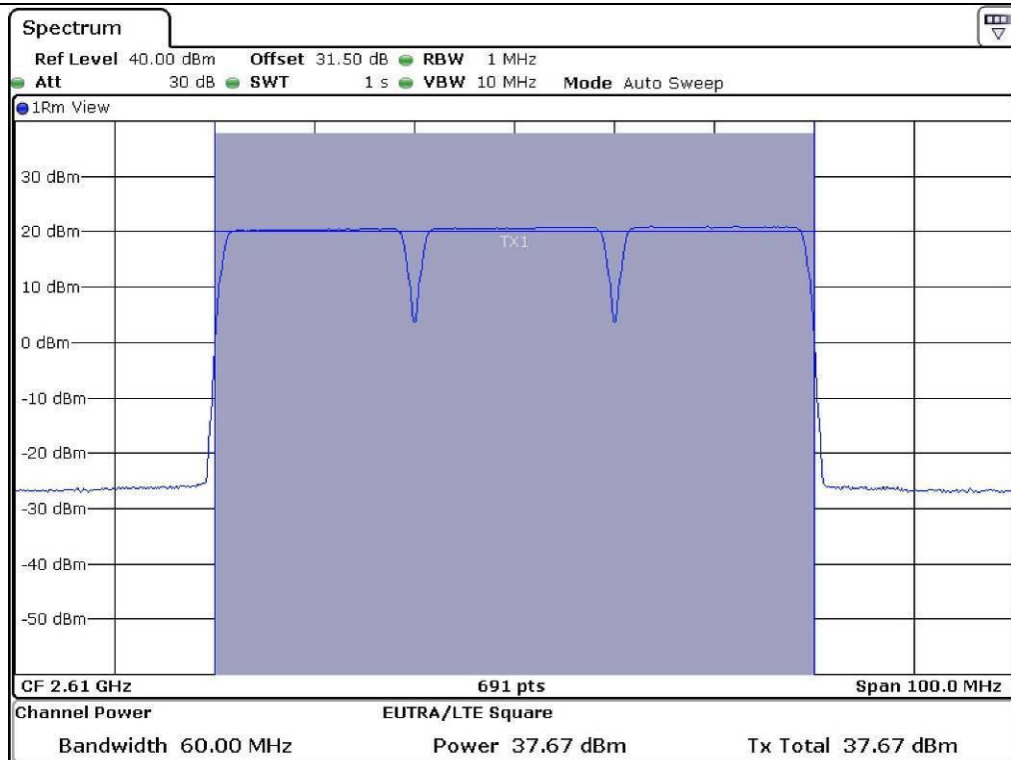
16 QAM – Middle Channel



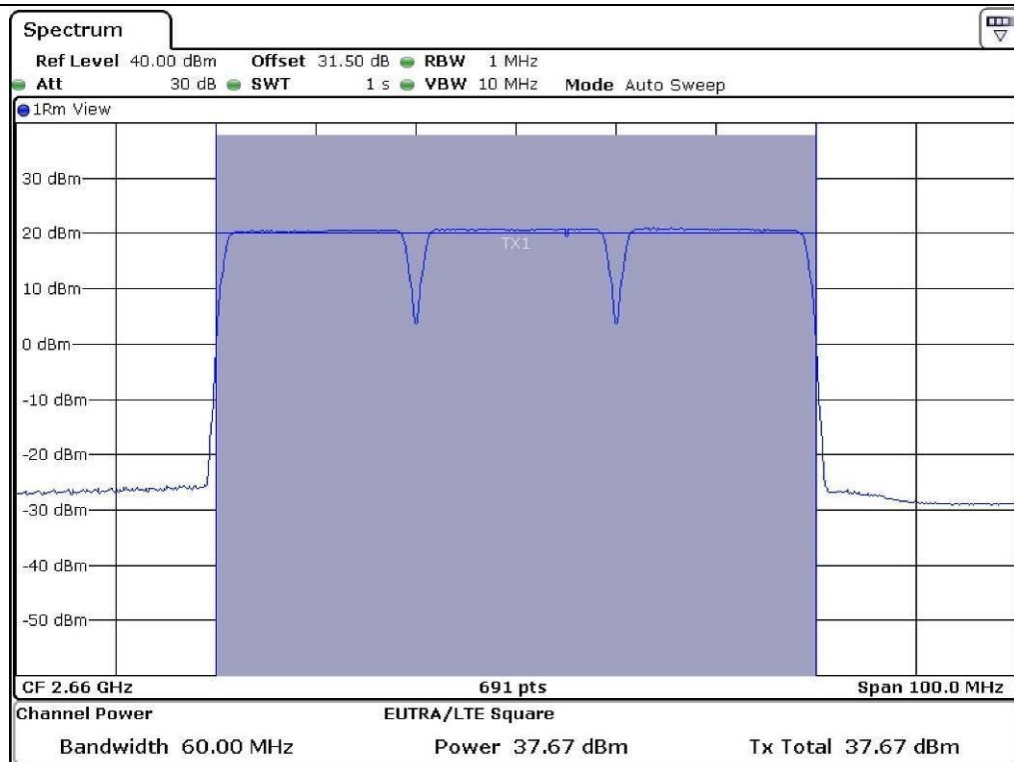
16 QAM – High Channel



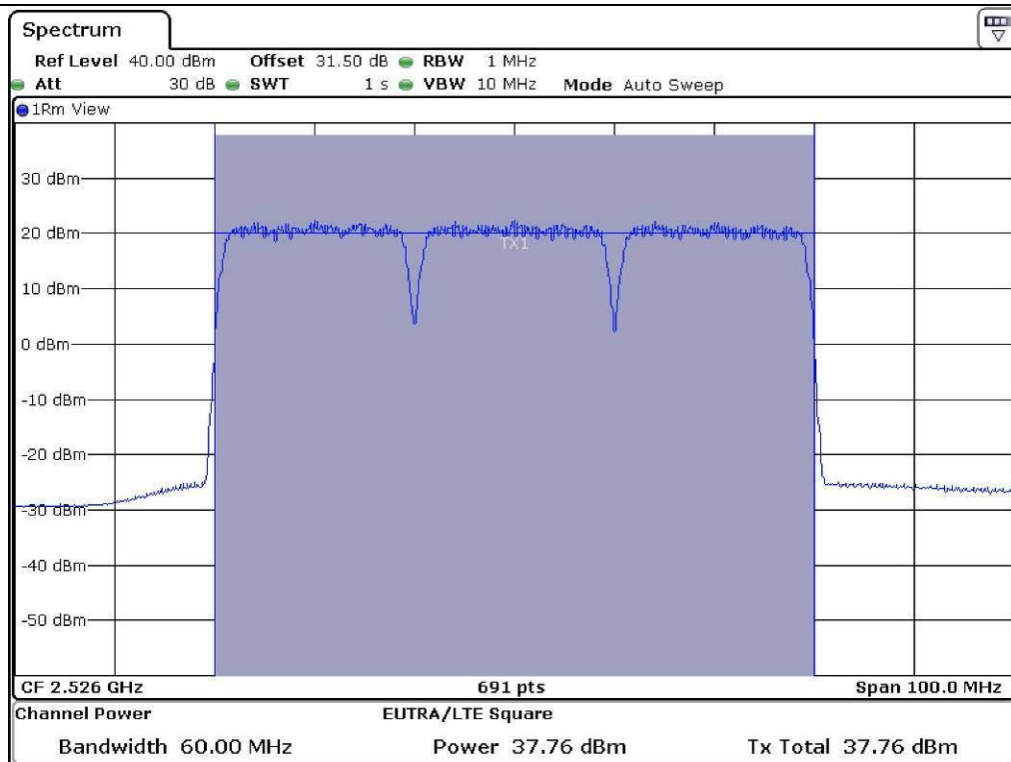
64 QAM – Low Channel



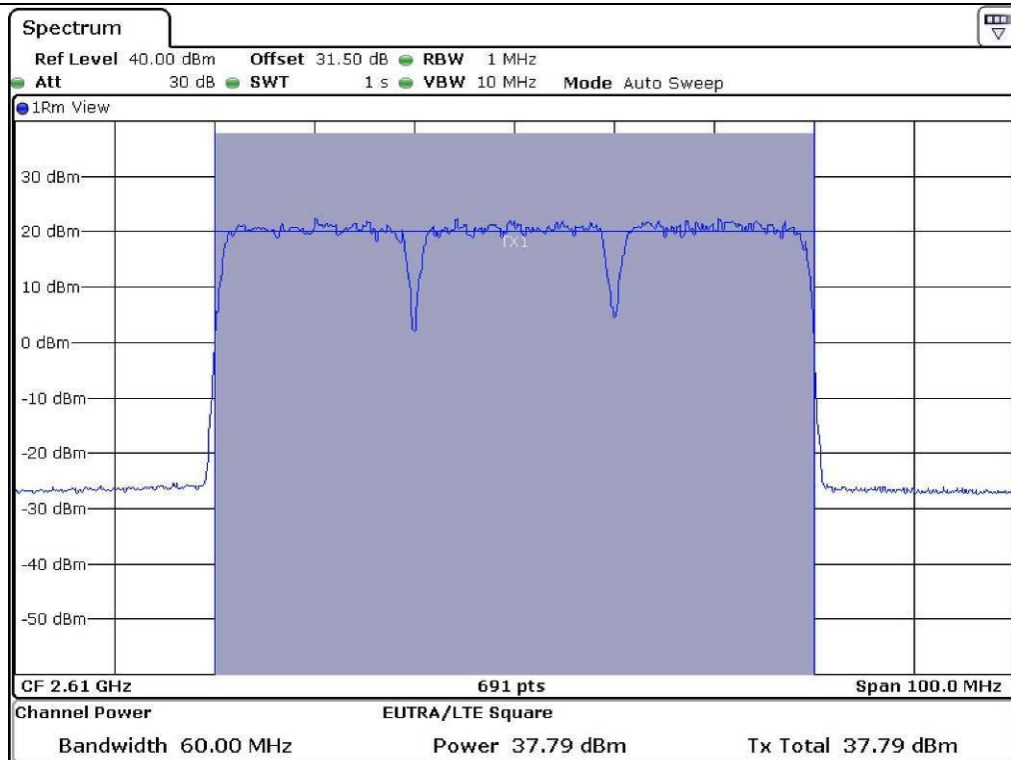
64 QAM – Middle Channel



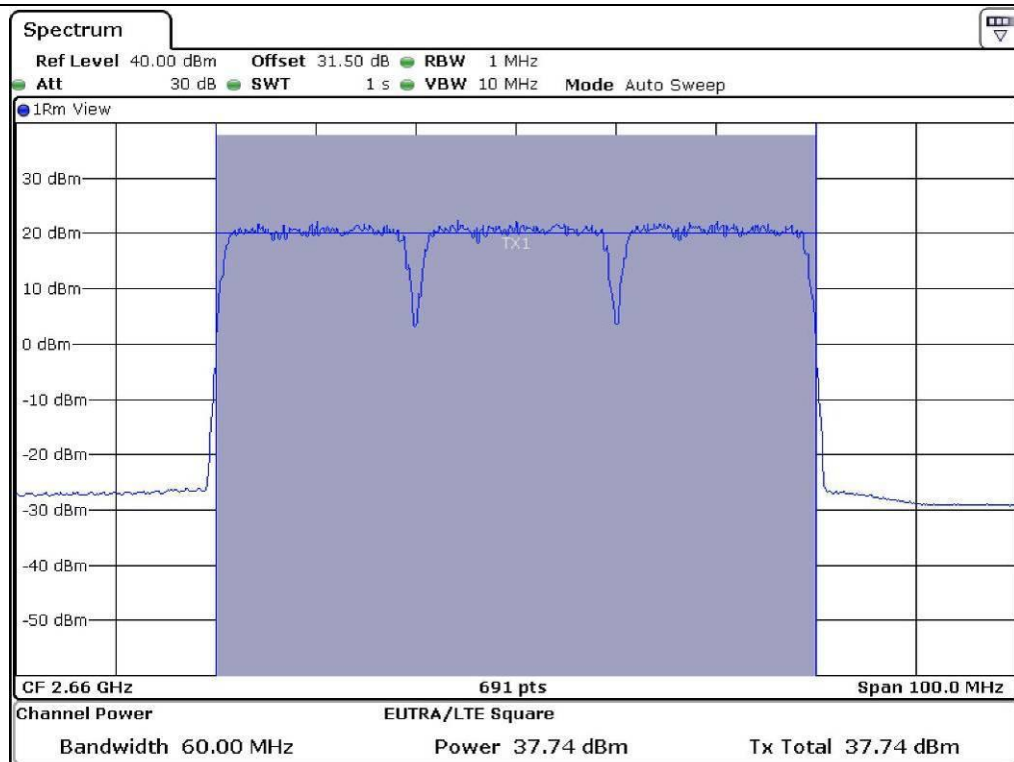
64 QAM – High Channel



QPSK – Low Channel



QPSK – Middle Channel



QPSK – High Channel

5.6 Test data for Port 1

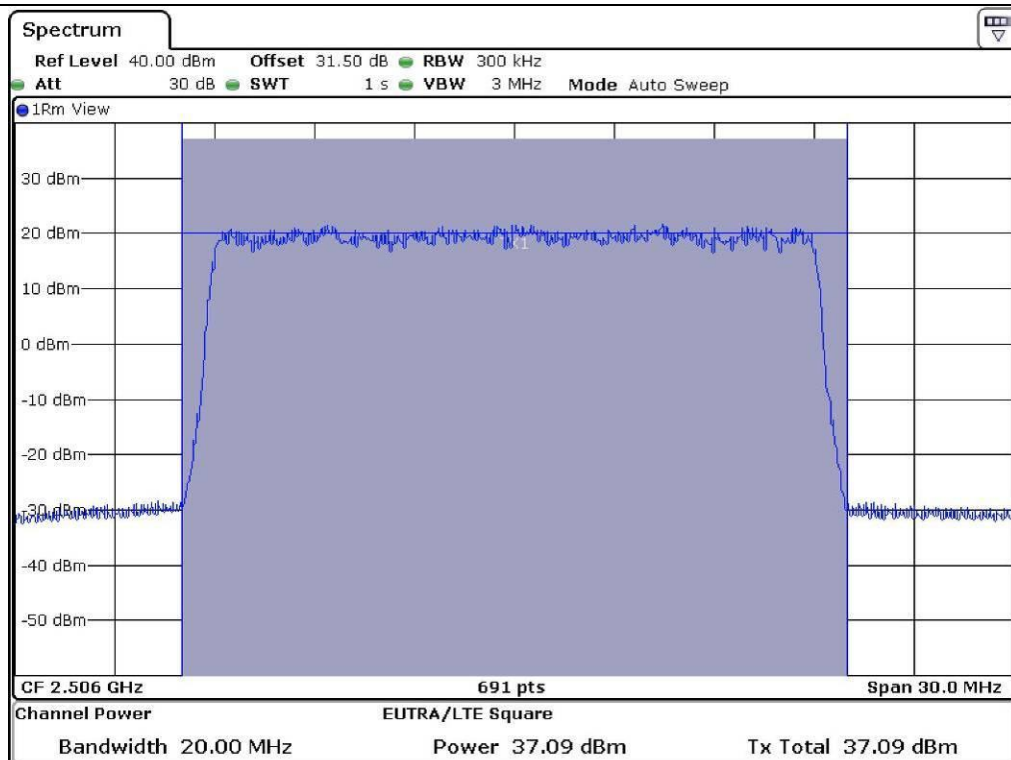
5.6.1 Test Result (20 MHz/1 Carrier)

-. Test Date : July 31, 2014
-. Measurement Function : Channel Power
-. Detector Mode : RMS detector
-. Test Result : Pass

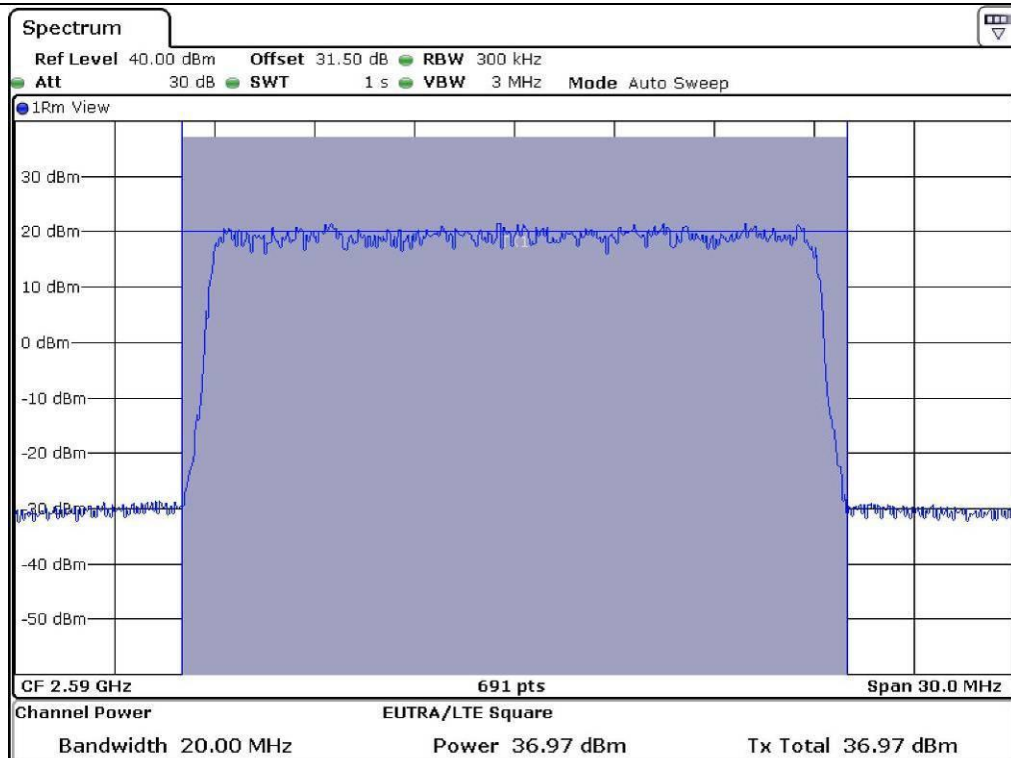
Modulation	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)
16 QAM	Low	2 506	37.09	5.116 818	7 255
	Middle	2 590	36.97	4.977 371	
	High	2 680	36.99	5.000 345	
64 QAM	Low	2 506	36.97	4.977 371	
	Middle	2 590	37.03	5.046 613	
	High	2 680	36.98	4.988 845	
QPSK	Low	2 506	36.95	4.954 502	
	Middle	2 590	36.99	5.000 345	
	High	2 680	37.10	5.128 614	



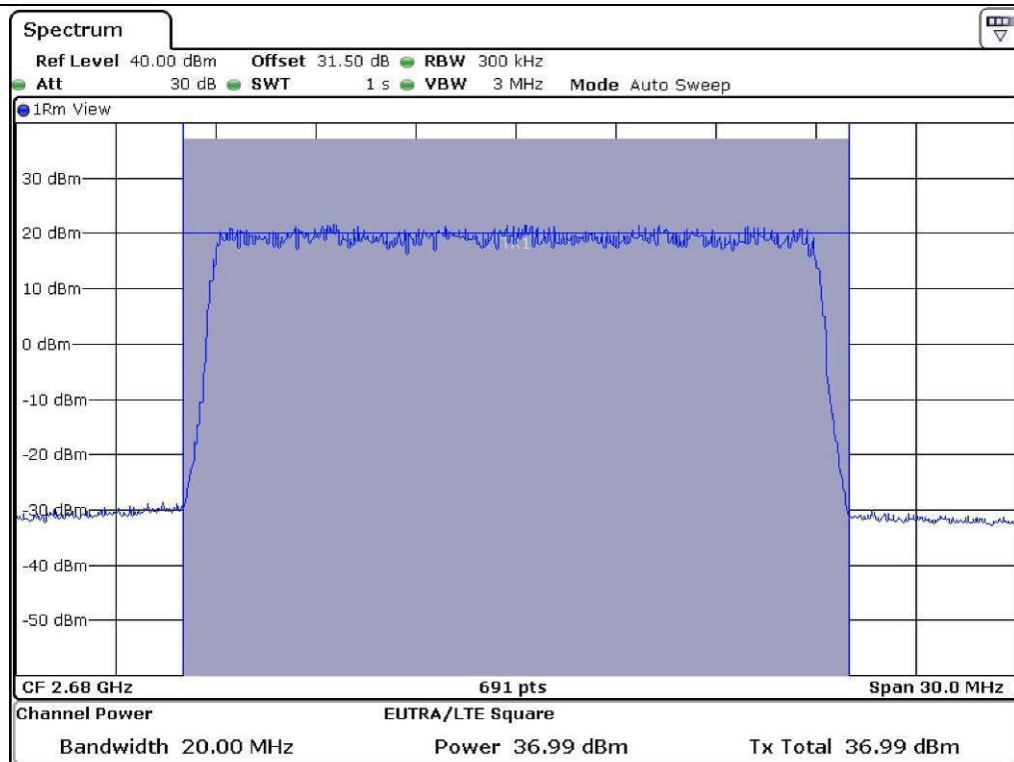
Tested by: Tae-Ho, Kim / Project Engineer



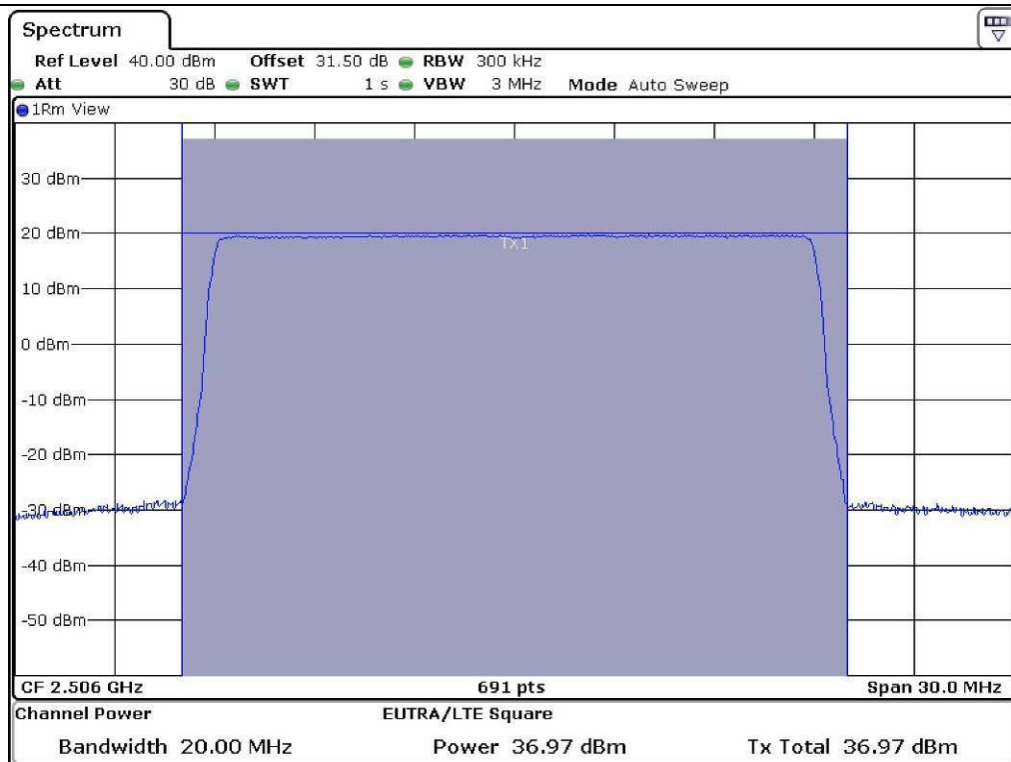
16 QAM – Low Channel



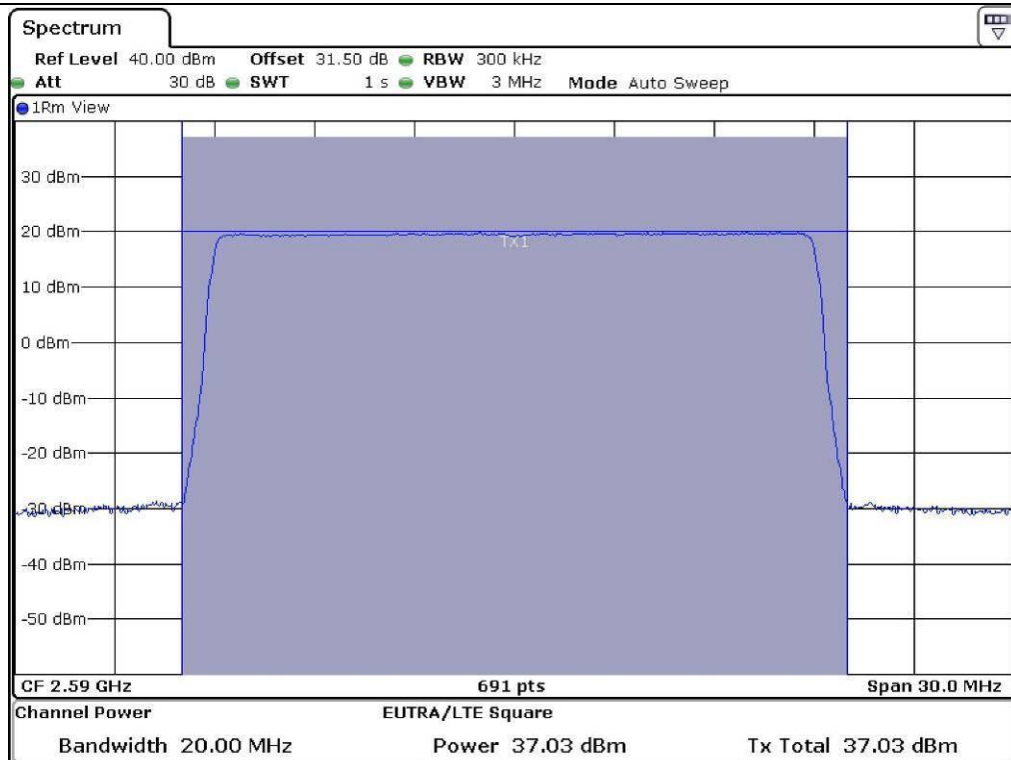
16 QAM – Middle Channel



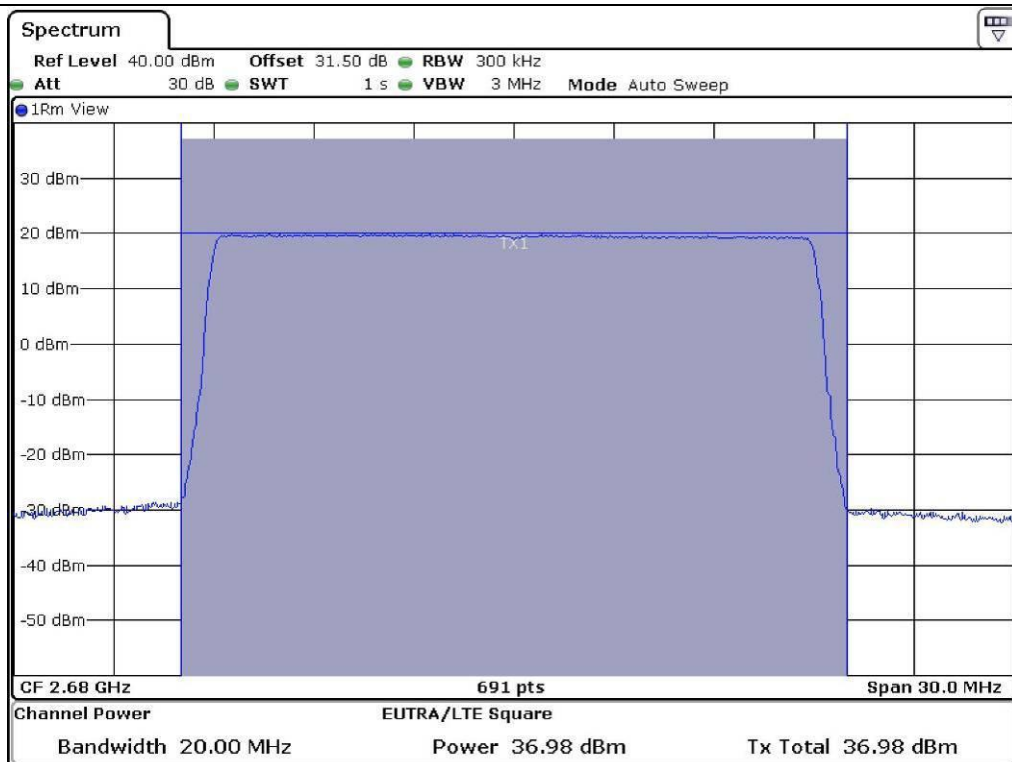
16 QAM – High Channel



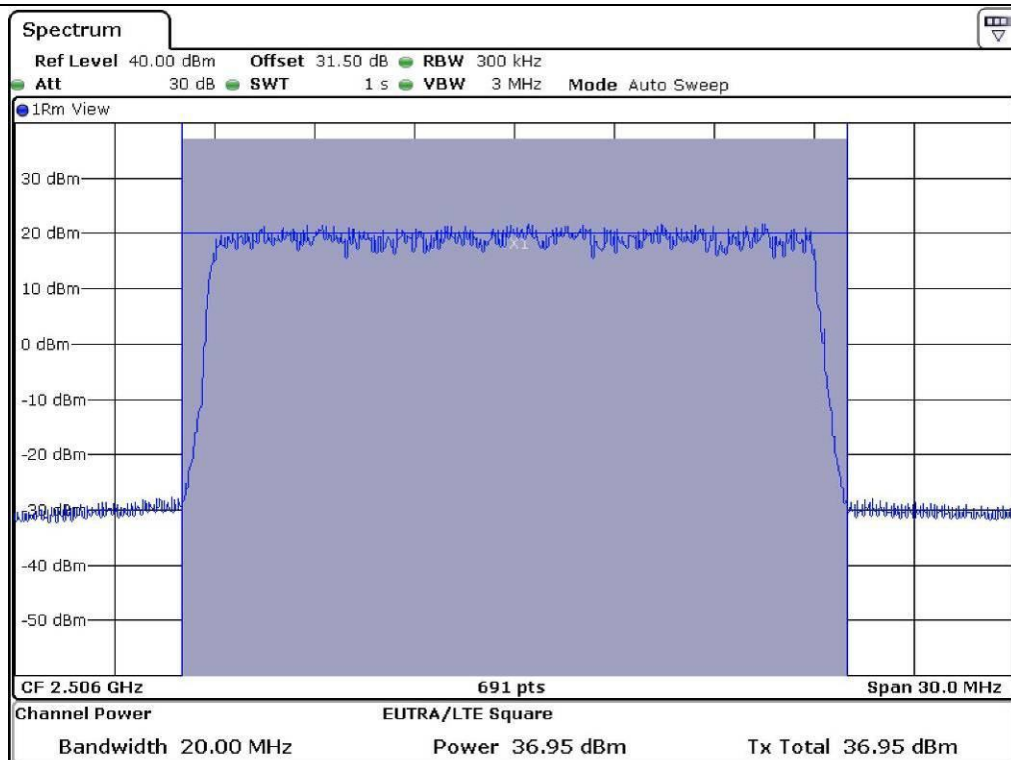
64 QAM – Low Channel



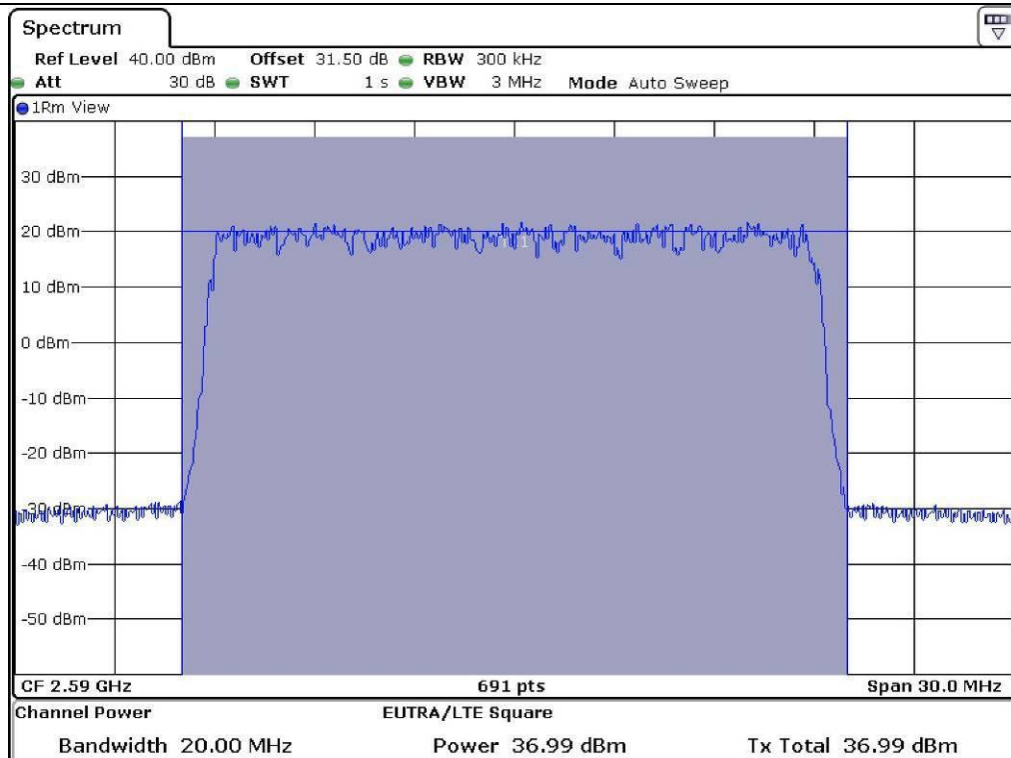
64 QAM – Middle Channel



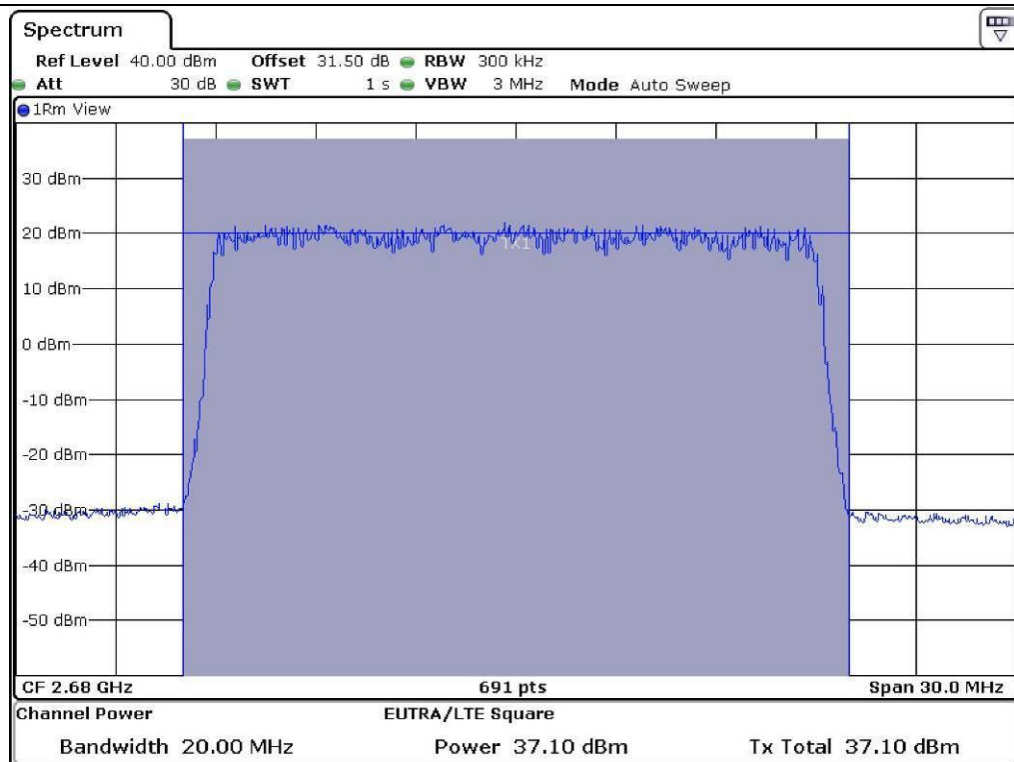
64 QAM – High Channel



QPSK – Low Channel



QPSK – Middle Channel



QPSK – High Channel

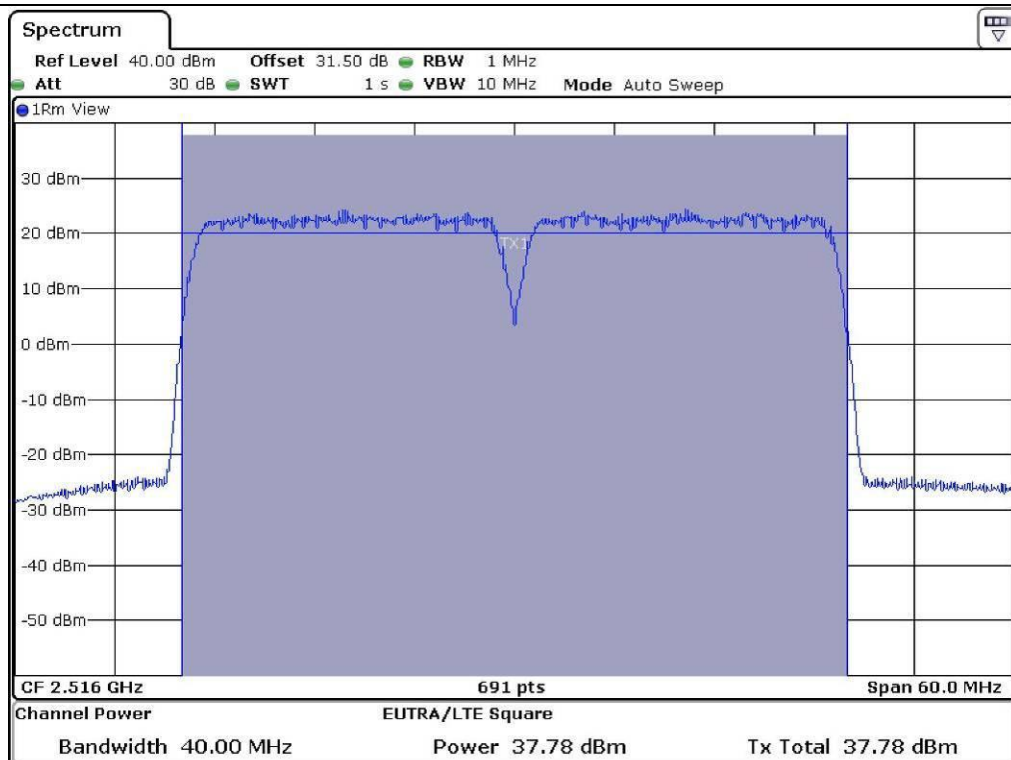
5.6.2 Test Result (20 MHz/2 Carrier)

-. Test Date : July 31, 2014
-. Measurement Function : Channel Power
-. Detector Mode : RMS detector
-. Test Result : Pass

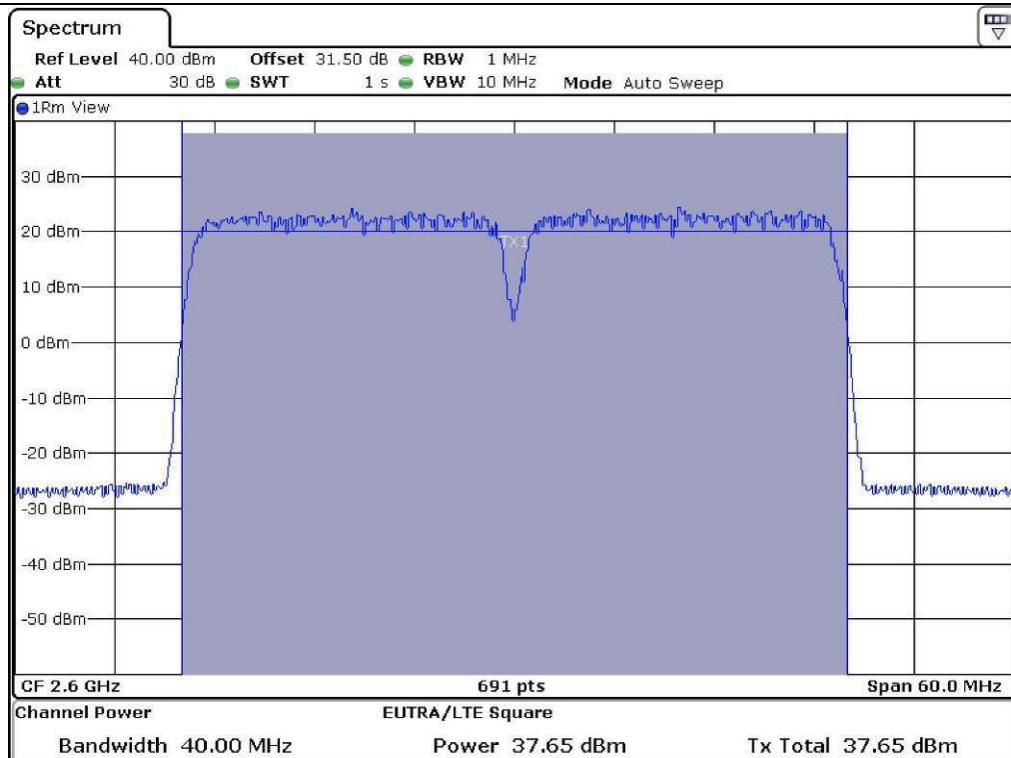
Modulation	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)
16 QAM	Low	2 516	37.78	5.997 911	14 511
	Middle	2 600	37.65	5.821 032	
	High	2 670	37.67	5.847 901	
64 QAM	Low	2 516	37.64	5.807 644	
	Middle	2 600	37.76	5.970 353	
	High	2 670	37.83	6.067 363	
QPSK	Low	2 516	37.74	5.942 922	
	Middle	2 600	37.81	6.039 486	
	High	2 670	37.83	6.067 363	



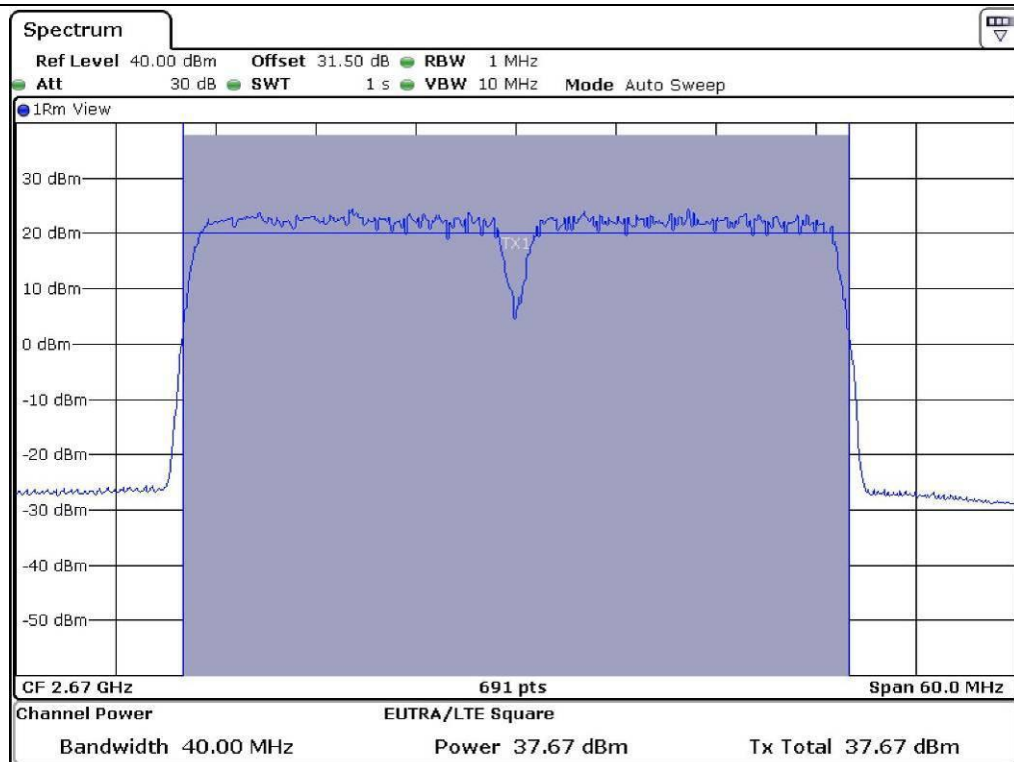
Tested by: Tae-Ho, Kim / Project Engineer



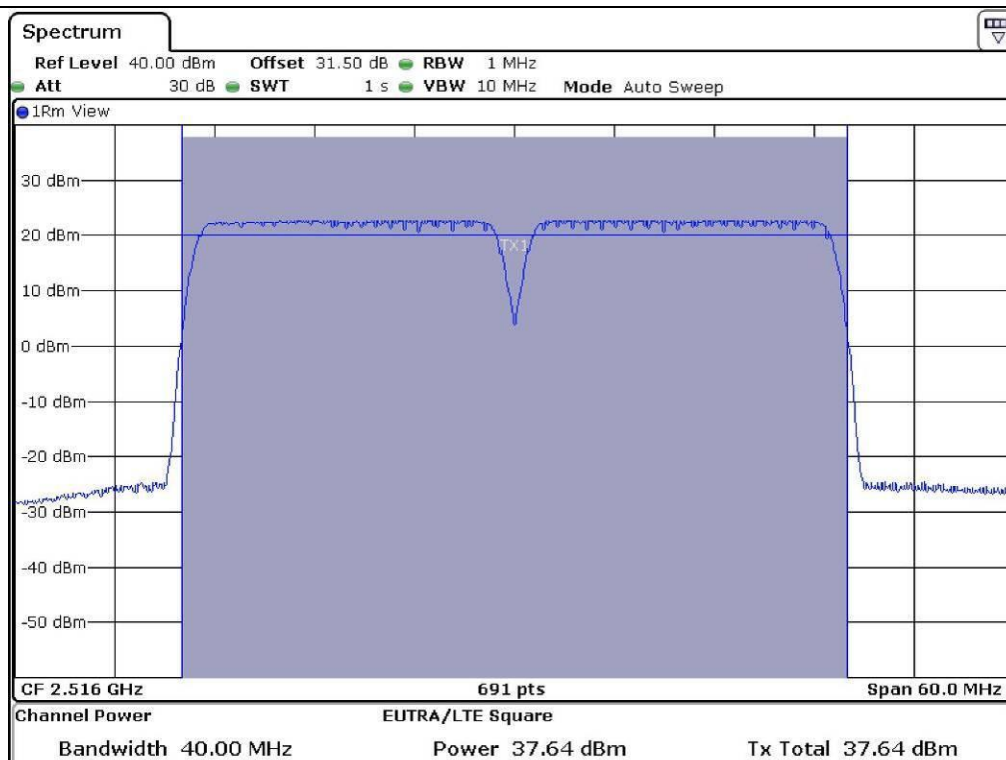
16 QAM – Low Channel



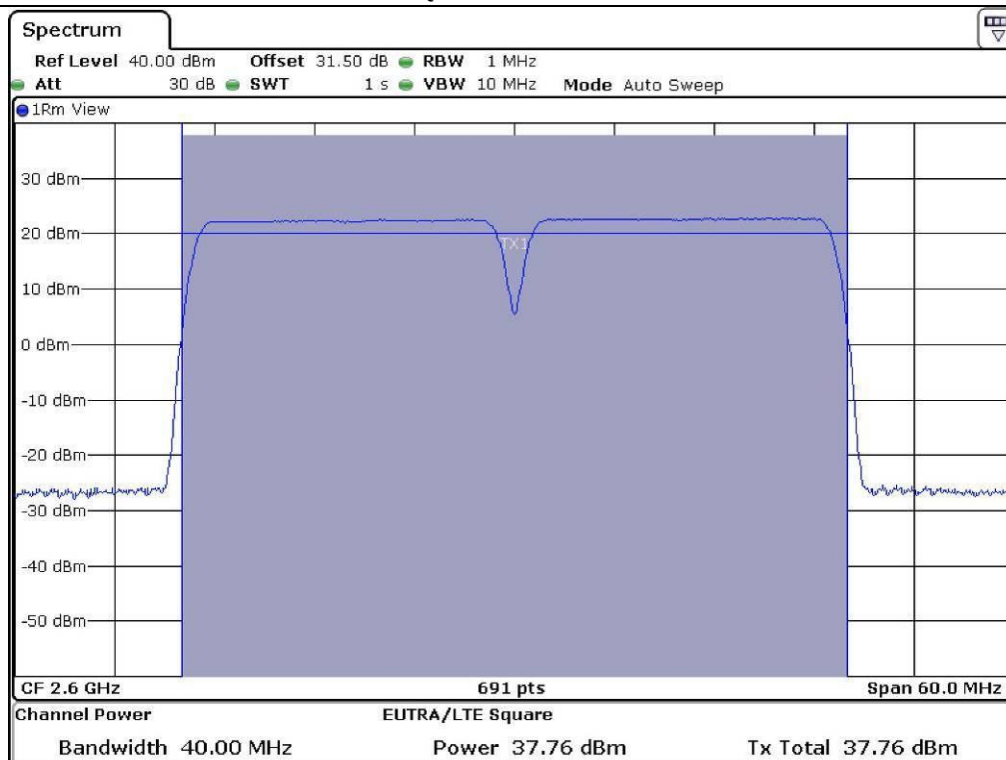
16 QAM – Middle Channel



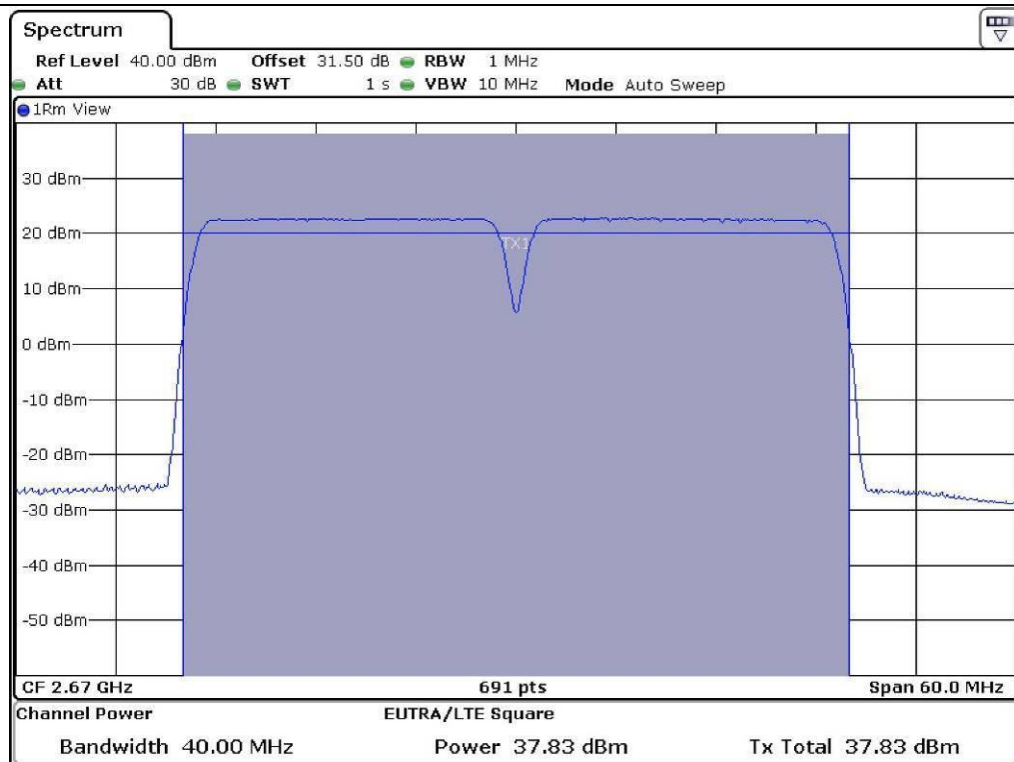
16 QAM – High Channel



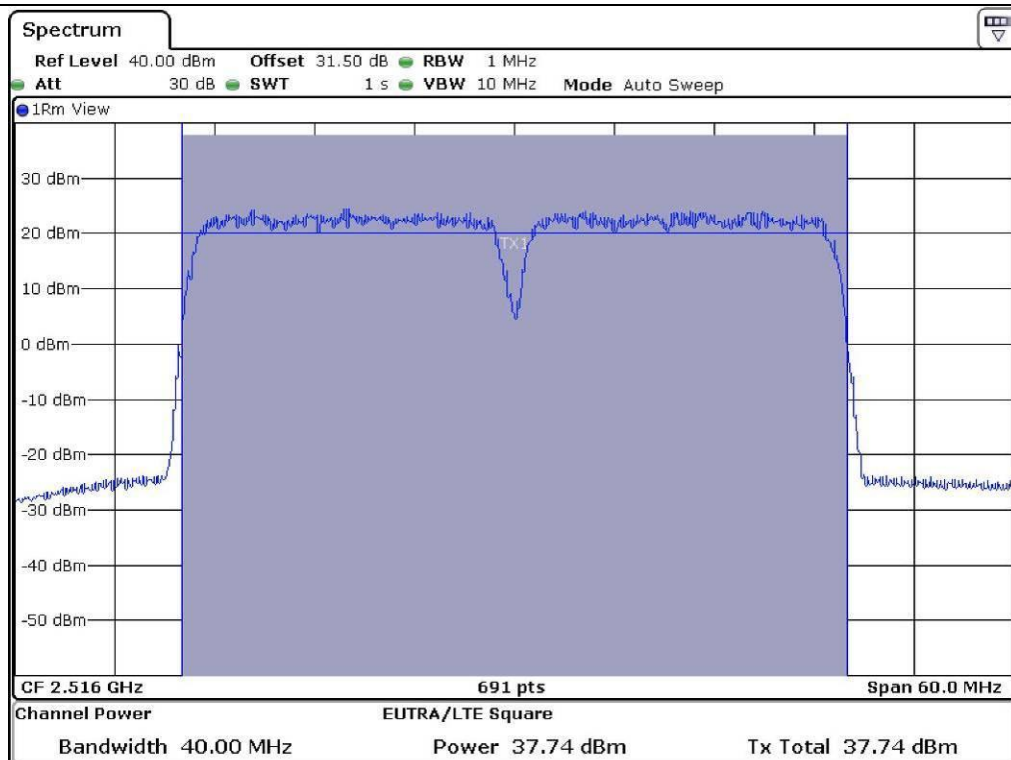
64 QAM – Low Channel



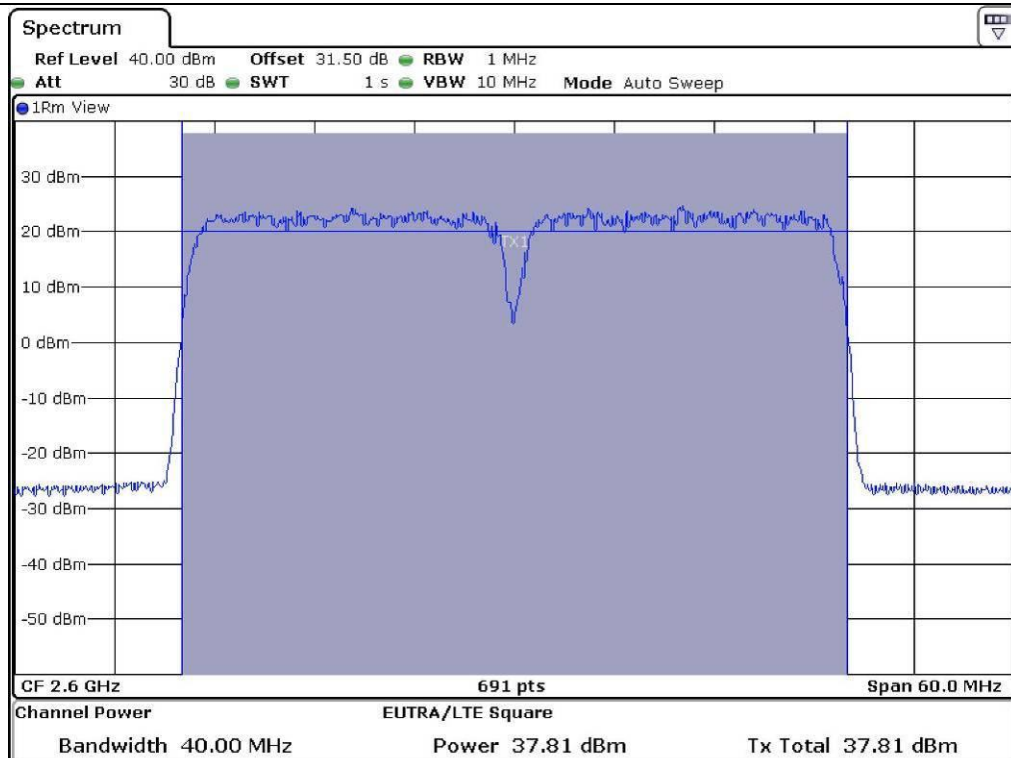
64 QAM – Middle Channel



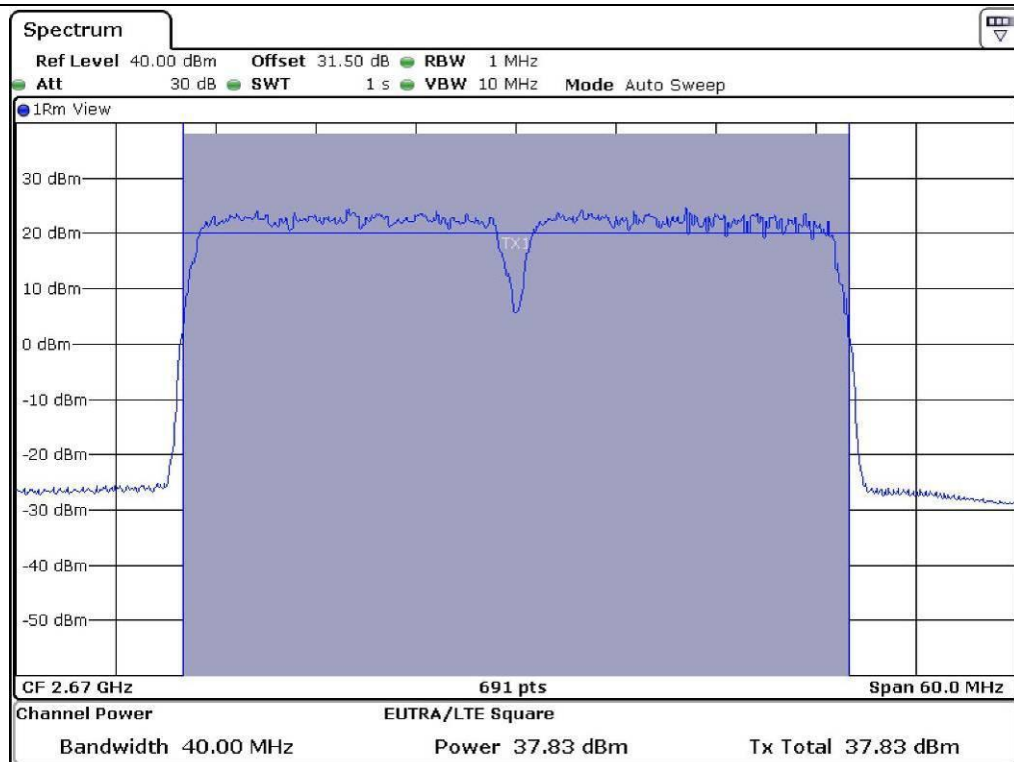
64 QAM – High Channel



QPSK – Low Channel



QPSK – Middle Channel



QPSK – High Channel

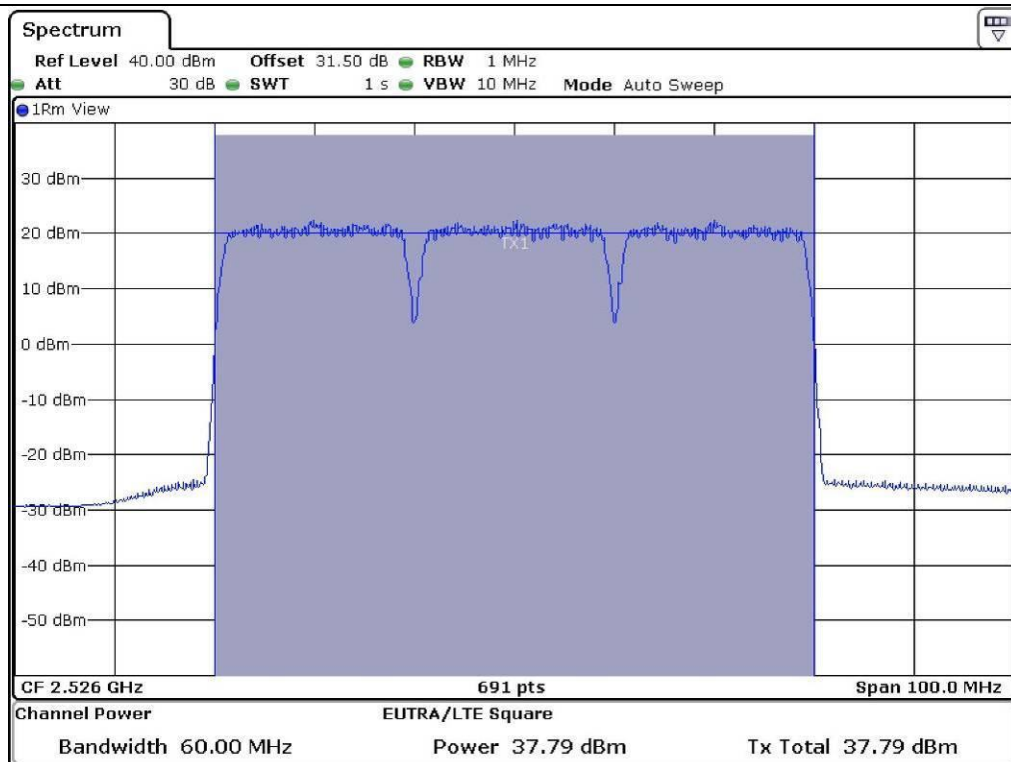
5.6.3 Test Result (20 MHz/3 Carrier)

-. Test Date : July 31, 2014
 -. Measurement Function : Channel Power
 -. Detector Mode : RMS detector
 -. Test Result : Pass

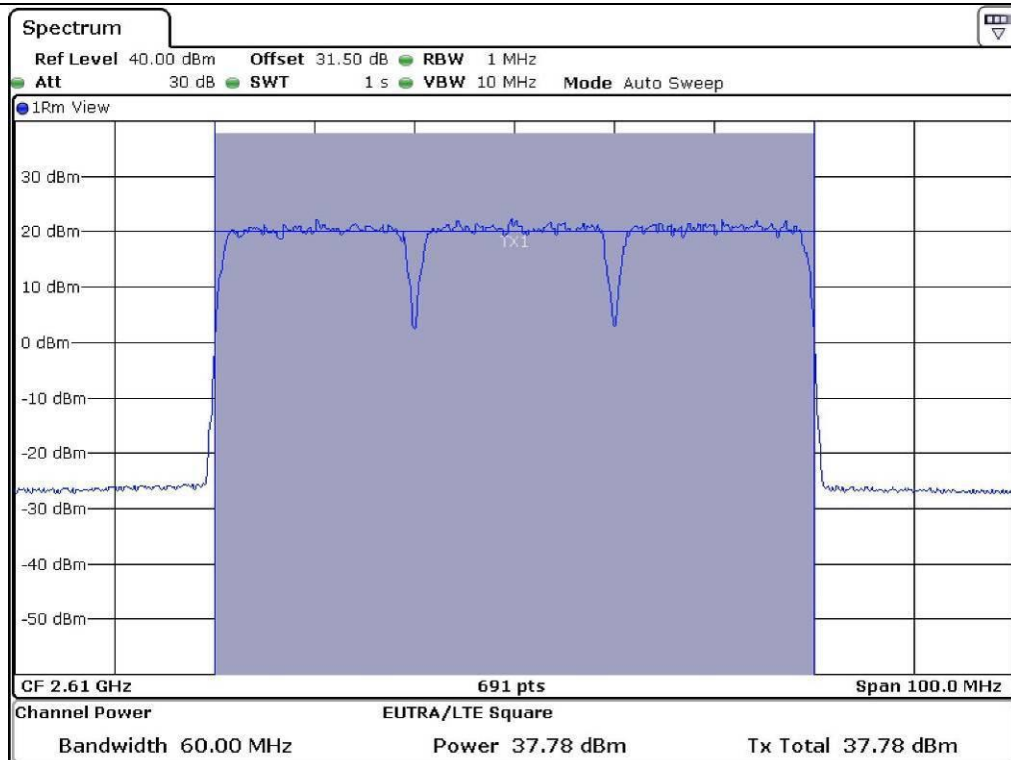
Modulation	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)
16 QAM	Low	2 526	37.79	6.011 737	21 766
	Middle	2 610	37.78	5.997 911	
	High	2 660	37.75	5.956 621	
64 QAM	Low	2 526	37.67	5.847 901	
	Middle	2 610	37.65	5.821 032	
	High	2 660	37.71	5.902 011	
QPSK	Low	2 526	37.75	5.956 621	
	Middle	2 610	37.72	5.915 616	
	High	2 660	37.71	5.902 011	



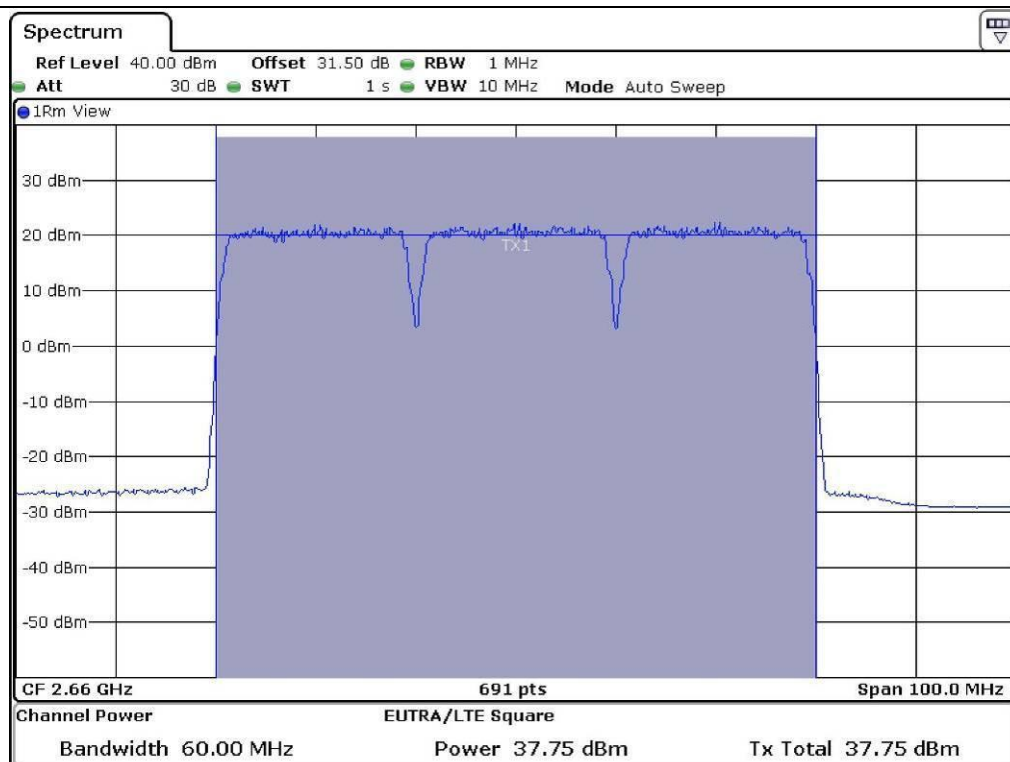
Tested by: Tae-Ho, Kim / Project Engineer



16 QAM – Low Channel



16 QAM – Middle Channel



16 QAM – High Channel