ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LICENSED TRANSMITTER

Test Report No.	**: E131R-024**
AGR No.	**: A131A-053**
Applicant	**: SOLiD, Inc.**
Address	**: 10,9th Floor, SOLiD Space, Pangyoyeok-ro 220, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea 463-400**
Manufacturer	**: SOLiD, Inc.**
Address	**: 10,9th Floor, SOLiD Space, Pangyoyeok-ro 220, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea 463-400**
Type of Equipment	**: RDU Module**
FCC ID.	**: W6U850C700PSD**
Model Name	**: RDU 850C+700PS(D)**
Serial number	**: N/A**
Total page of Report	**: 132 pages (including this page)**
Date of Incoming	**: January 03, 2013**
Date of issue	**: January 21, 2013**

SUMMARY

The equipment complies with the regulation; **FCC Part 22 Subpart H and 90 Subpart I**

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
EMC/RF Center
ONETECH Corp.

Approved by: Y. K. Kwon / Exe. Managing Director
EMC/RF Center
ONETECH Corp.

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E131R-024	January 21, 2013	Initial Issue	All

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: SOLiD, Inc.
ADDRESS	: 10,9th Floor, SOLiD Space, Pangyoyeok-ro 220, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea 463-400
CONTACT PERSON	: Mr. Kangyeob, Bae / Director
TELEPHONE NO	: +82-31-627-6292
FCC ID	: W6U850C700PSD
MODEL NAME	: RDU 850C+700PS(D)
SERIAL NUMBER	: N/A
DATE	: January 21, 2013

EQUIPMENT CLASS	PCB - PCS Licensed Transmitter
EQUIPMENT DESCRIPTION	RDU Module(850C+700PS)
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4: 2009, EIA/TIA-603-C
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC Part 22 Subpart H and 90 Subpart I
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 m open area test site

-. 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.

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2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
2.1046(a), 22.913(a), 90.205	RF Power Output at Antenna Terminals	Met the Limit / PASS
2.1047	Modulation Characteristics	PASS (See Note 1)
2.1049, 90.210	Occupied Bandwidth, Bandwidth Limitation	Met the Limit / PASS
2.1049, 22.917	Band Edge	Met the Limit / PASS
2.1051, 22.917, 90.210	Spurious Emissions at Antenna Terminals	Met the Limit / PASS
2.1053, 22.917, 90.210	Field strength of Spurious Radiation	Met the Limit / PASS
2.1055, 22.355, 90.213	Frequency Stability with Temperature variation	Met the requirement / PASS
2.1055, 22.355, 90.213	Frequency stability with primary voltage variation	Met the requirement / PASS
1.1307(b)	RF Safety	See Note 2

Note 1: The Equipment under Test (EUT) is an amplifier which reproduces the modulated input signal, so the EUT meets the requirement

Note 2: End users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance, because the applicant does not provide an antenna for sale with the EUT

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 ANSI C63.4: 2009 & EIA/TIA-603-C: 2004 and was performed at a distance of 10 m and 3 m from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Commission on August 21, 2008. (Registration Number: 340658)

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3. GENERAL INFORMATION

3.1 Product Description

The SOLiD, Inc., Models RDU 850C+700PS(D)(referred to as the EUT in this report) is a RDU Module that shall be plugged in ROU (Remote Optic Unit). The ROU can be equipped with up to 3 RDUs (Remote Drive Unit), a RPSU (Remote Power Supply Unit), a RCPU (Remote Central Processor Unit), a R-Optic (Remote Optic), a SIU (System Interface Unit) and a Multiplexer. The System, SMDR-NH124 consists of ROU, BIU (BTS Interface Unit), ODU (Optic Distribution Unit), and OEU (Optic Expansion Unit). Except for ROU, the RF output ports of other units are connected to coaxial cable each other. ROU receives TX optical signals from ODU or OEU and converts them into RF signals. The converted RF signals are amplified through High Power Amp in a corresponding RDU, combined with multiplexer module and then radiated to the antenna port.

When receiving RX signals through the antenna port, this unit filters out-of-band signals in a corresponding RDU and sends the results to Remote Optic Module to make electronic-optical conversion of them. After converted, the signals are sent to an upper device of ODU or OEU. ROU can be equipped with up to three RDUs (Remote Drive Unit) and the module is composed of maximal Dual Band, but this report only covers RDU 850C+700PS(D), FCC ID: W6U850C700PSD and other modules shall be issued with other test report number. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE		RDU Module
LIST OF EACH OSC. or CRY. FREQ.(FREQ. >= 1 MHz)		14.74 MHz
EMISSION DESIGNATOR		F9W(CDMA, 1xEVDO, WCDMA), G7W(GSM, EDGE), GXW(iDEN), F8W(SMR), D7W(LTE)
OPERATING FREQUENCY	850C	869 MHz – 894 MHz,
	700PS(D)	758 MHz – 775 MHz
CHANNEL SEPARATION		CDMA (1.25 MHz), 1xEVDO (1.25 MHz), WCDMA (5 MHz), GSM (200 kHz),EDGE (200 kHz), iDEN (25 kHz), SMR (12.5 kHz), LTE (5 MHz)
RF OUTPUT POWER		30 dBm
DC VOLTAGE & CURRENT INTO FINAL AMPLIFIER	850C	27 Vdc, 2 A
	700PS(D)	27 Vdc, 2 A
ELECTRICAL RATING		AC 120 V and DC -48 V
OPERATING TEMPERATURE		-10 °C ~ 50 °C

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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
RDU 850C+700PS(D)	SOLiD, Inc.	W6U850C700PSD	RDU Module (EUT)	Signal Generator
SMJ100A	Rohde & Schwarz	N/A	Vector Signal Generator	EUT

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3.4 Mode of operation during the test

The EUT was received signal form signal generator and then each modulation was configured for maximum signal gain and bandwidth. Also the EUT supports dual band, 850C and 700PS and modulation type for GSM, EDGE, CDMA, 1x EVDO, WCDMA, iDEN, SMR, and LTE band, so the EUT was tested each Modulation at each band.. 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. The applicant does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports on the EUT for radiated spurious emission testing.

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

1. Coverage band: 850C

Modulation	Channel	Frequency(MHz)	Modulation	Channel	Frequency(MHz)
GSM / EDGE	Low	869.20	WCDMA	Low	871.40
	Middle	881.60		Middle	881.00
	High	893.80		High	891.60
CDMA / 1xEVDO	Low	870.25			
	Middle	881.50			
	High	892.75			

2. Coverage band: 700PS (D)

Modulation	Channel	Frequency(MHz)	Modulation	Channel	Frequency(MHz)
iDEN	Low	758.025 0	LTE	Low	760.500 0
	Middle	766.500 0		Middle	766.500 0
	High	774.975 0		High	772.500 0
SMR	Low	758.012 5			
	Middle	766.500 0			
	High	774.987 5			

4. EUT MODIFICATIONS

-. None

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5. RF POWER OUTPUT at ANTENNA TERMINAL

5.1 Operating environment

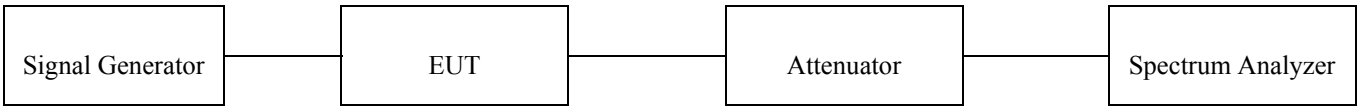
Temperature : (20 ~ 21) °C

Relative humidity : 51 % R.H.

5.2 Test set-up

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.

RF output power was measured by channel power measurement function of the spectrum analyzer with RMS detector mode.



5.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
☐ -	E4432B	HP	Signal Generator	US38440950	Jun. 01, 2012 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 02, 2012 (1Y)
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 12, 2012 (1Y)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 04, 2012 (1Y)
■ -	FSV30	R/S	Spectrum Analyzer	101372	May. 31, 2012 (1Y)
■ -	SA-26B-6	VENTRIX	Attenuator	N/A	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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5.4 Test data

5.4.1 Test Result for Part 22 H (850C)

-. Test Date : January 10, 2013

-. Measurement Function : Channel Power

-. Detector Mode : RMS detector

-. Test Result : Pass

Modulation	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
GSM	Low	869.20	-9.90	30.00	1.000 000	100.00
	Middle	881.60	-9.90	30.00		
	High	893.80	-9.80	30.00		
EDGE	Low	869.20	-9.80	30.00	1.000 000	
	Middle	881.60	-9.70	30.00		
	High	893.80	-9.80	30.00		
CDMA	Low	870.25	-9.90	30.00	1.000 000	
	Middle	881.50	-9.90	30.00		
	High	892.75	-9.80	30.00		
1xEVDO	Low	870.25	-9.80	30.00	1.000 000	
	Middle	881.50	-9.90	30.00		
	High	892.75	-9.80	30.00		
WCDMA	Low	871.40	-9.70	30.00	1.000 000	
	Middle	881.00	-9.80	30.00		
	High	891.60	-9.80	30.00		

Tested by: Ki-Hong, Nam / Senior Engineer

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5.4.2 Test Result for Part 90 (700PS (D))

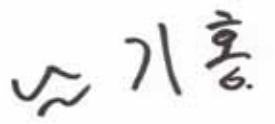
-. Test Date : January 15, 2013

-. Measurement Function : Channel Power

-. Detector Mode : RMS detector

-. Test Result : Pass

Modulation	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
IDEN	Low	758.025 0	-9.80	30.00	1.000 000	100.00
	Middle	766.500 0	-9.90	30.00		
	High	774.975 0	-9.80	30.00		
SMR	Low	758.012 5	-9.70	30.00	1.000 000	
	Middle	766.500 0	-9.80	30.00		
	High	774.987 5	-9.80	30.00		
LTE	Low	760.500 0	-9.90	30.00	1.000 000	
	Middle	766.500 0	-9.80	30.00		
	High	772.500 0	-9.80	30.00		



Tested by: Ki-Hong, Nam / Senior Engineer

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6. OCCUPIED BANDWIDTH

6.1 Operating environment

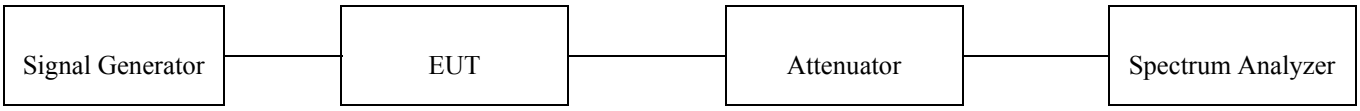
Temperature : (20 ~ 21) °C

Relative humidity : 51 % R.H.

6.2 Test set-up

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.

For the testing, the RBW was set to 1 % to 3 % of the - 26 dB bandwidth. The VBW is set to 3 times the RBW and sweep time is coupled.



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■ -	SA-26B-6	VENTRIX	Attenuator	N/A	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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6.4 Test data

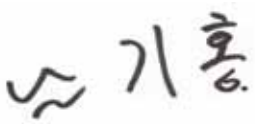
6.4.1 Test Result for Part 22 H (850C)

-. Test Date : January 10, 2013

-. Test Result : Pass

Modulation	Channel	26 dB Bandwidth (kHz)	99 % Occupied Bandwidth (kHz)
GSM	Low	335.7	247.5
	Middle	335.7	247.5
	High	335.7	247.5
EDGE	Low	324.2	250.4
	Middle	324.2	251.8
	High	324.2	250.4
CDMA	Low	1 526.8	1 324.2
	Middle	1 526.8	1 316.9
	High	1 526.8	1 316.9
1xEVDO	Low	1 526.8	1 324.2
	Middle	1 526.8	1 324.2
	High	1 526.8	1 324.2
WCDMA	Low	4 674.0	4 182.3
	Middle	4 674.0	4 182.3
	High	4 674.0	4 167.9

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



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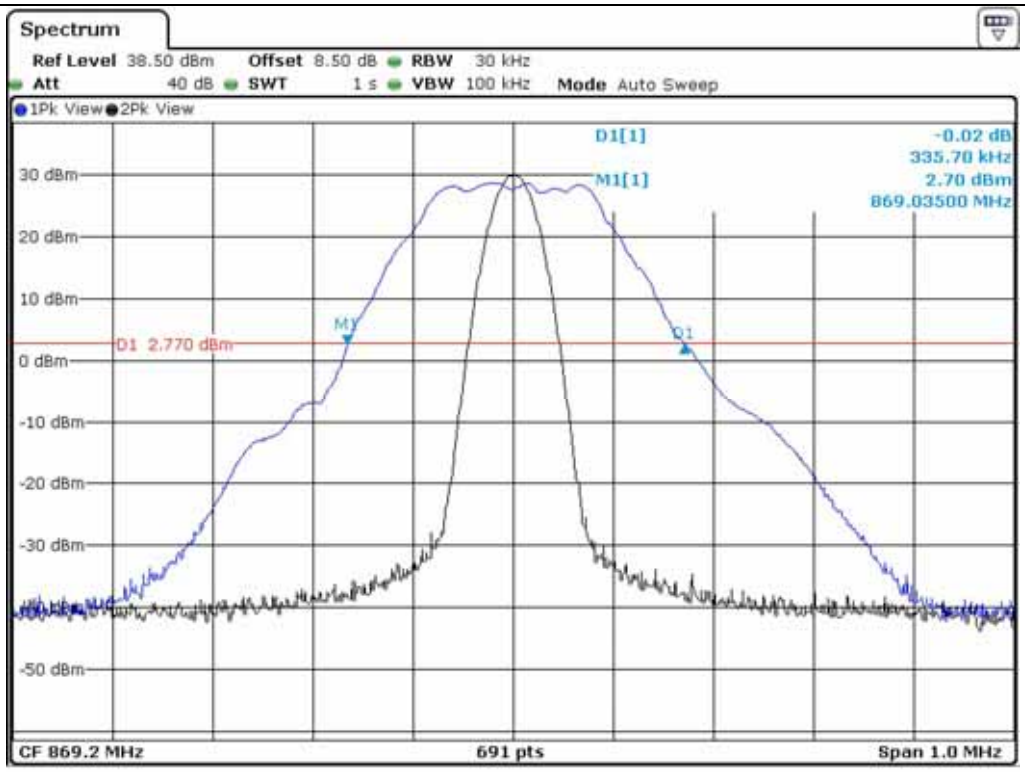
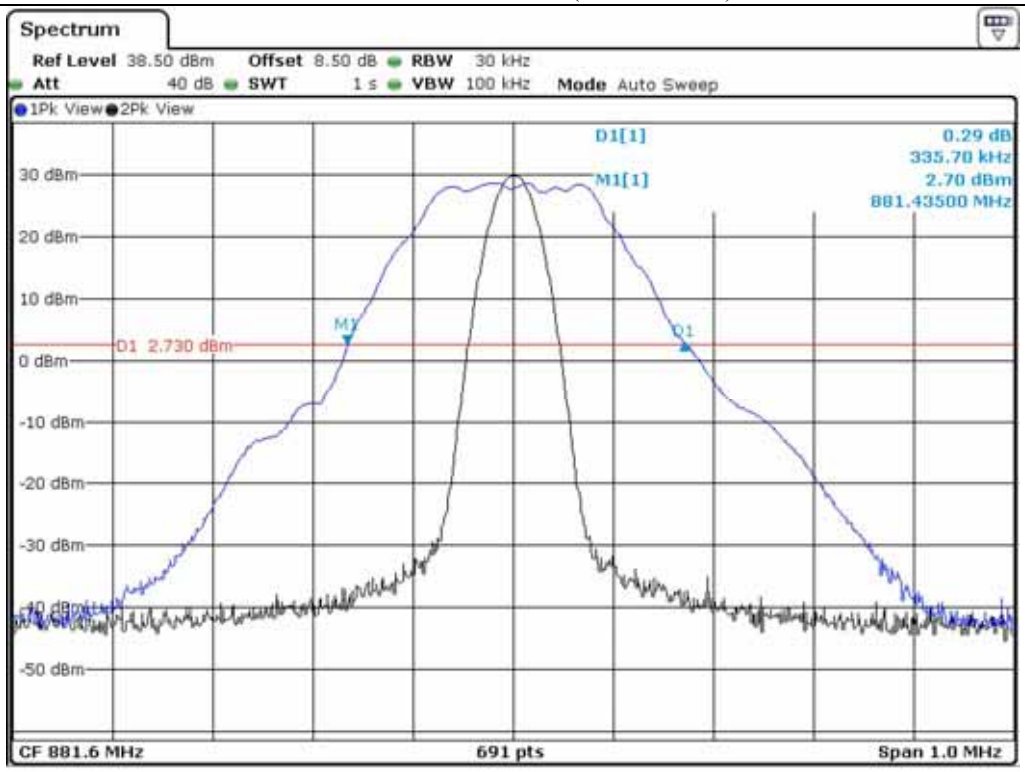


GSM – 26 dB Bandwidth (Low Channel)



GSM – 26 dB Bandwidth (Middle Channel)

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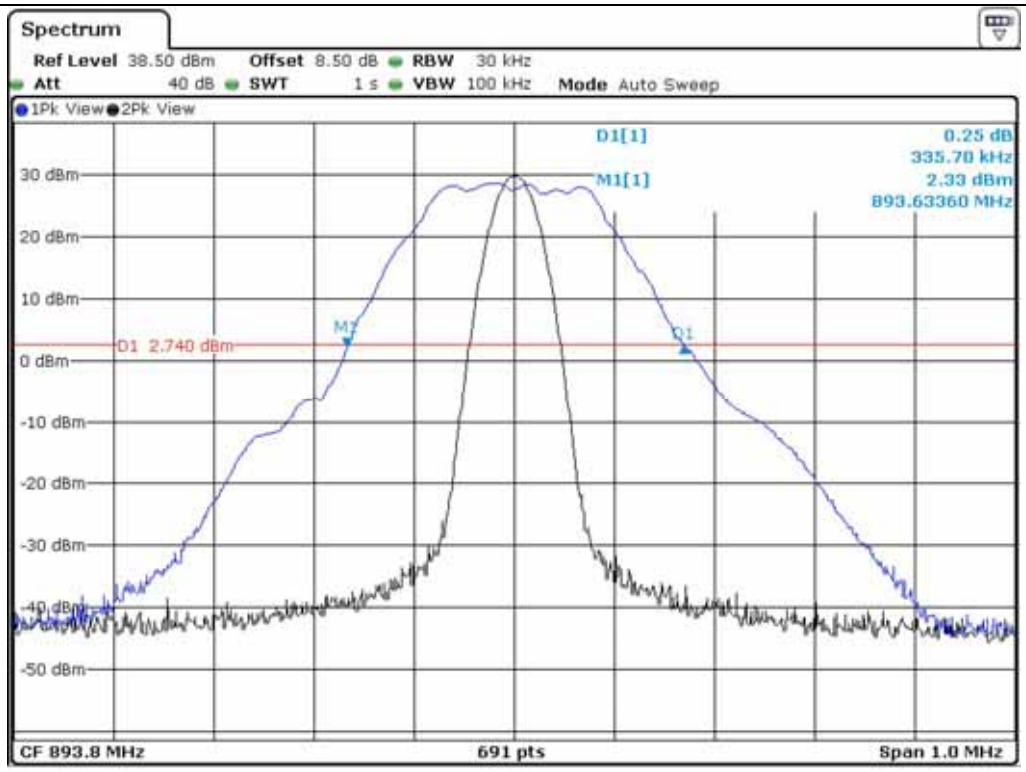

GSM – 26 dB Bandwidth (High Channel)

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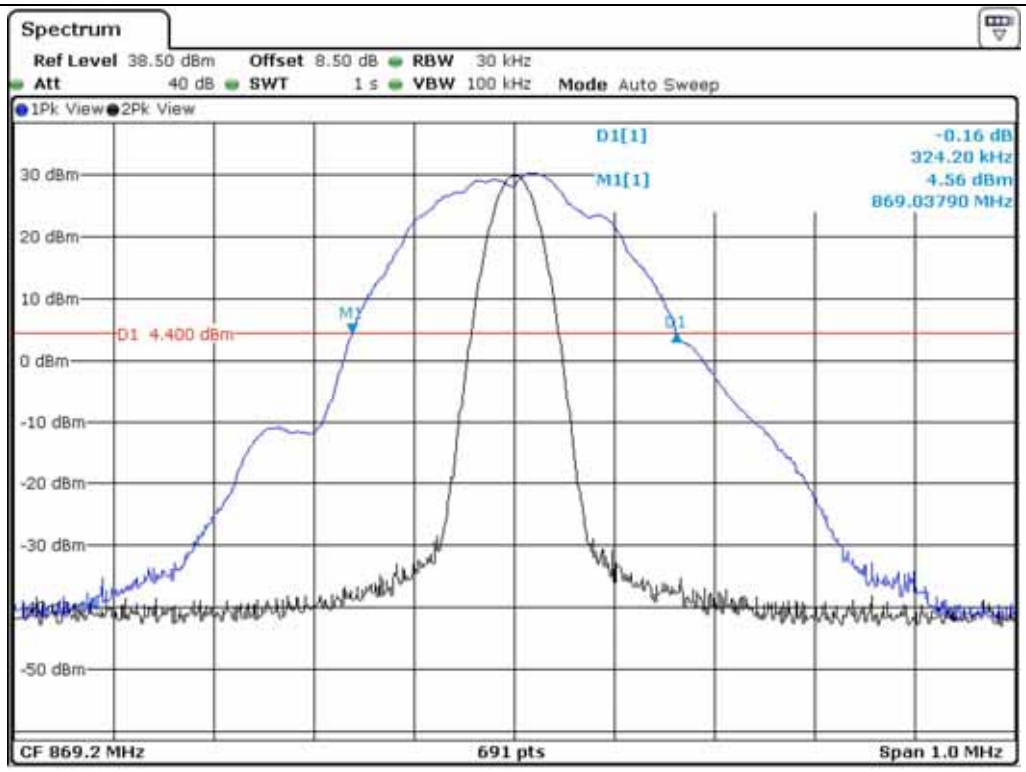
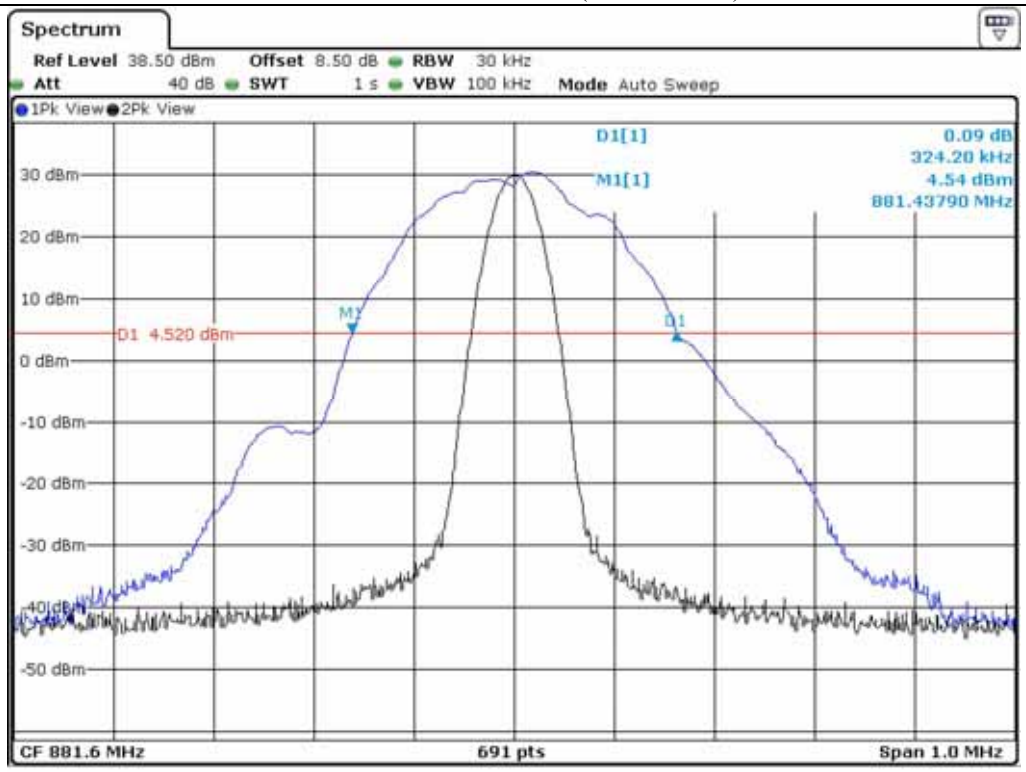


EDGE – 26 dB Bandwidth (Low Channel)



EDGE – 26 dB Bandwidth (Middle Channel)

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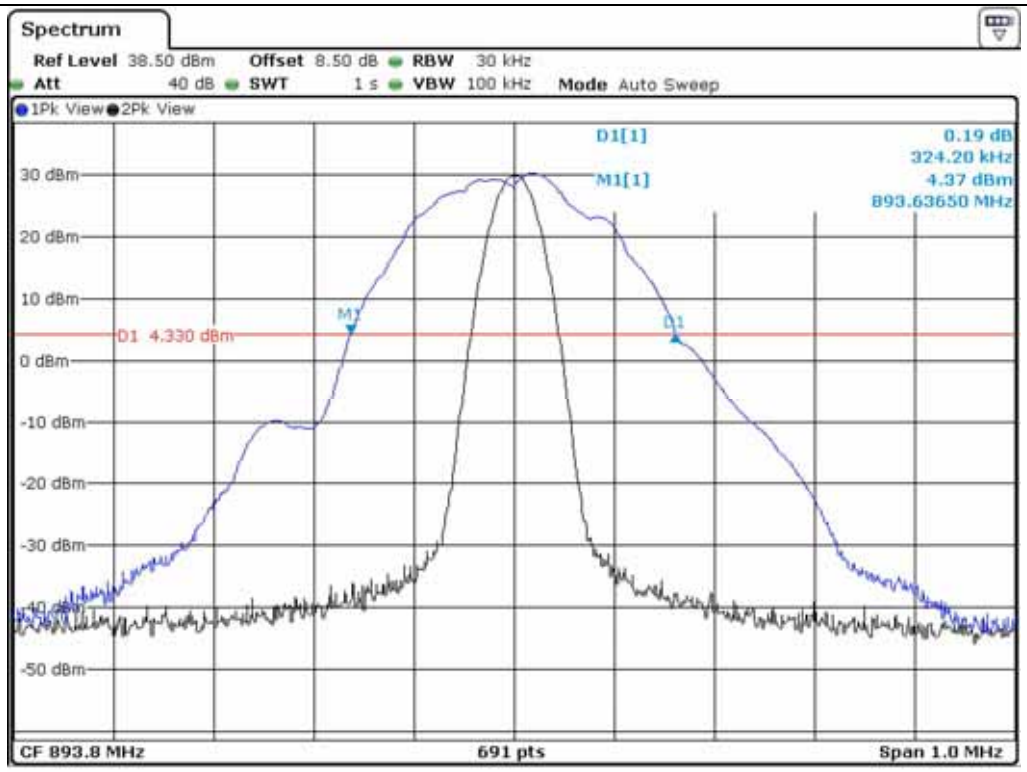
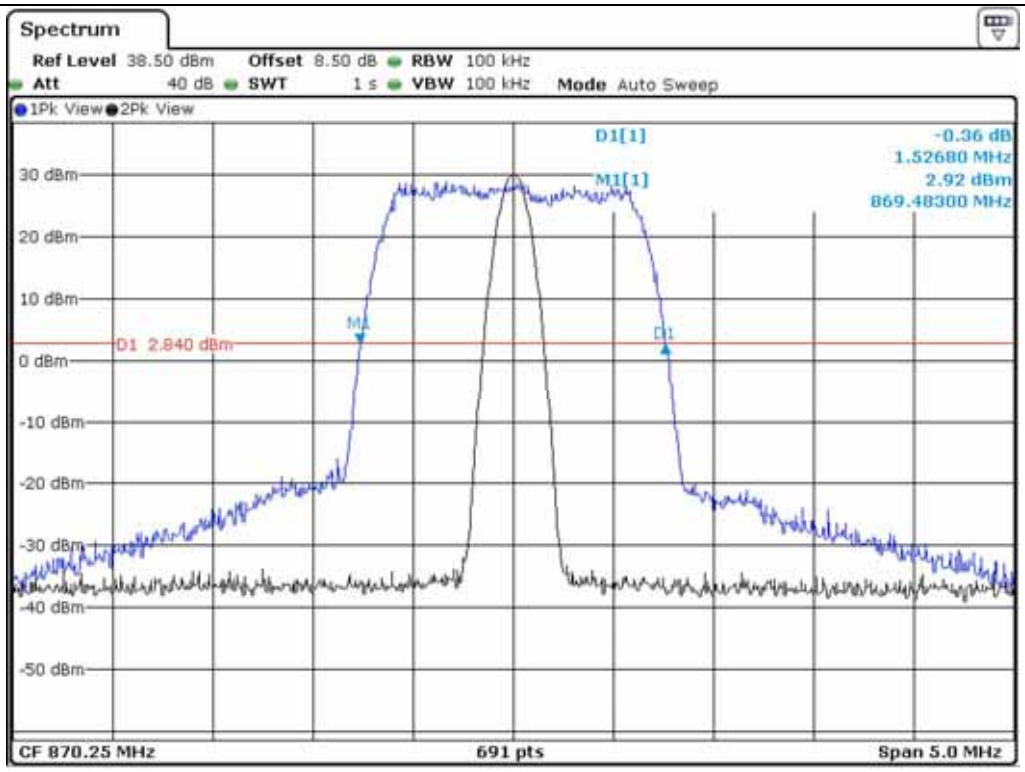
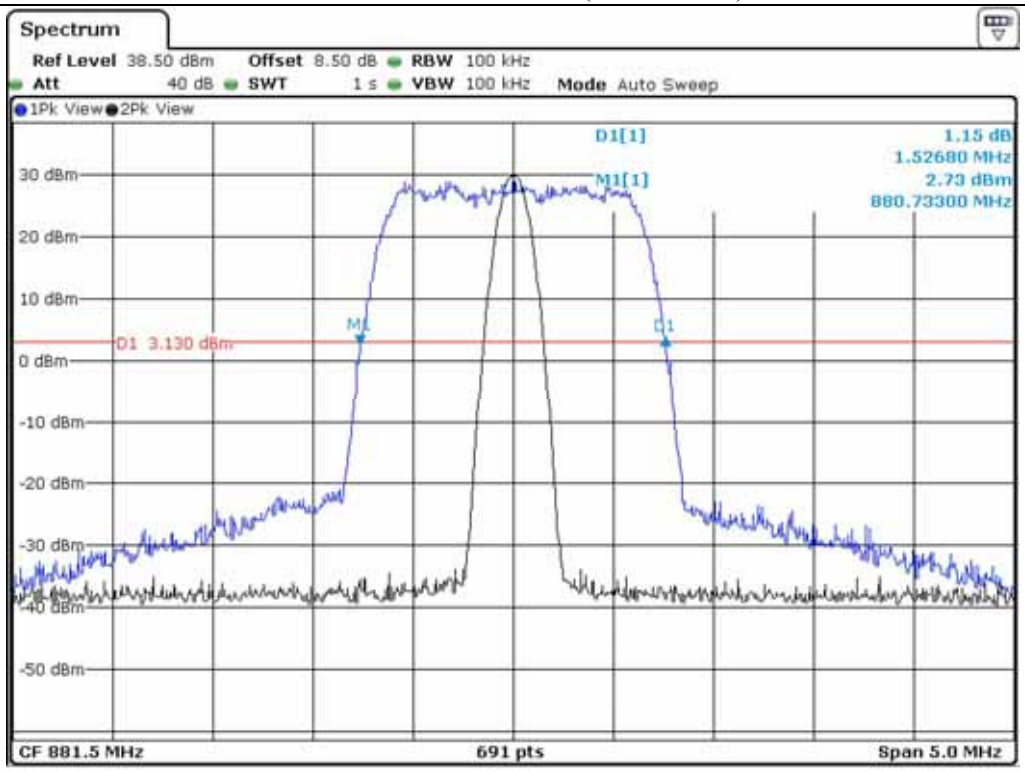


EDGE – 26 dB Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

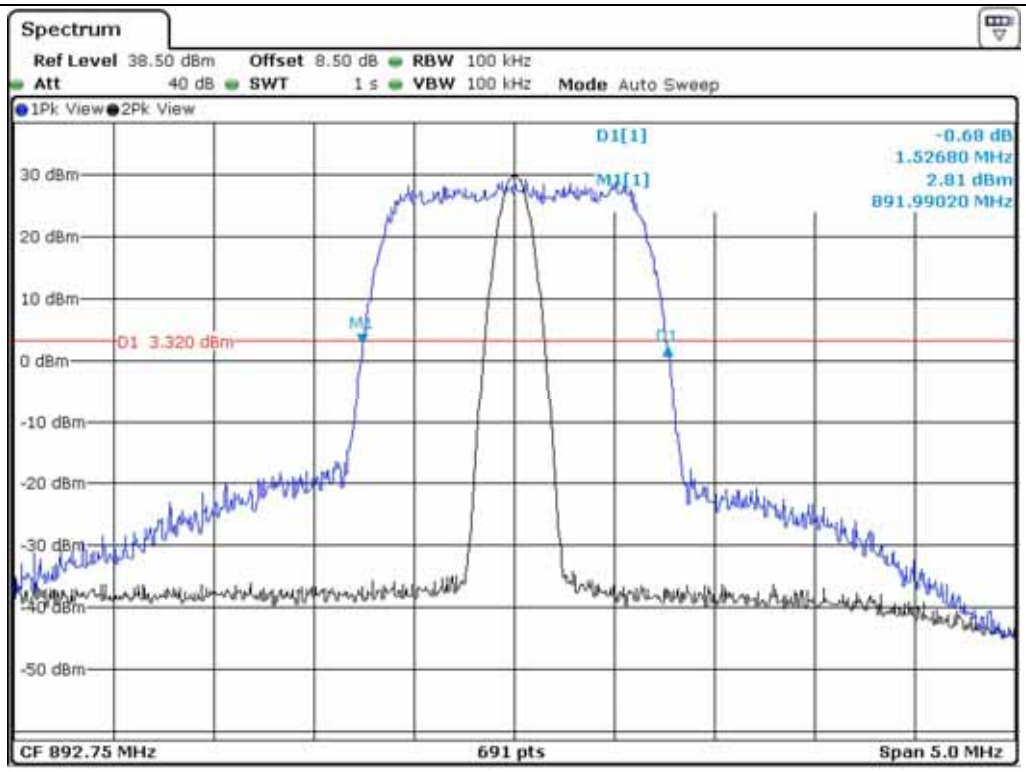


CDMA – 26 dB Bandwidth (Low Channel)



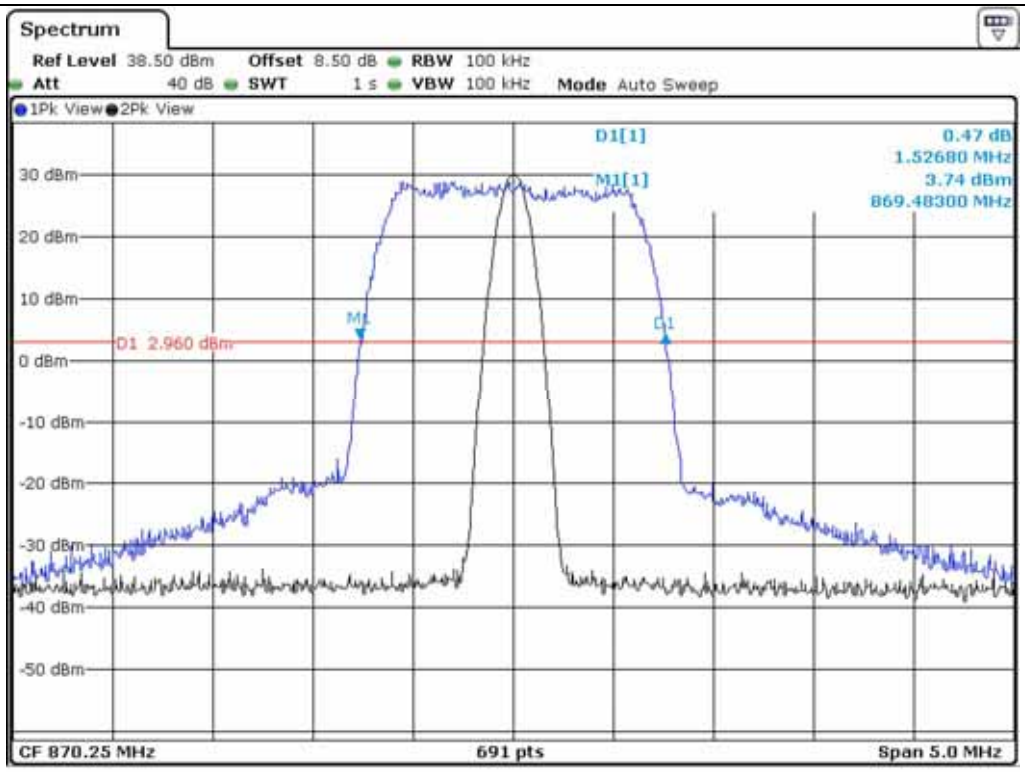
CDMA – 26 dB Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

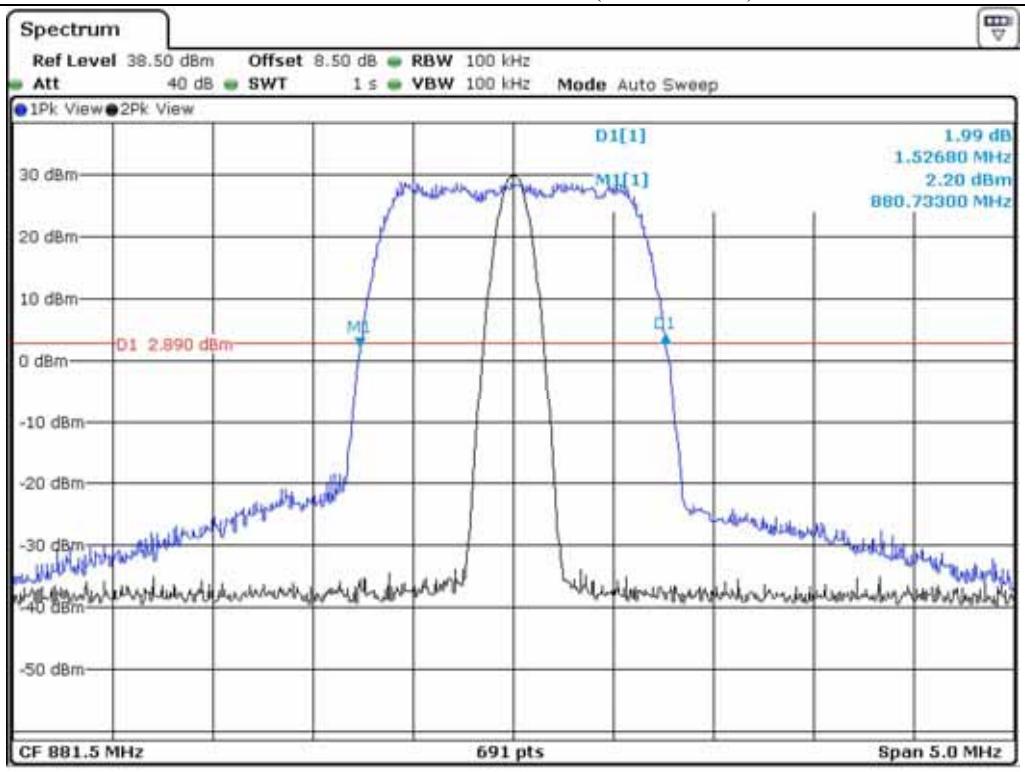


CDMA – 26 dB Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

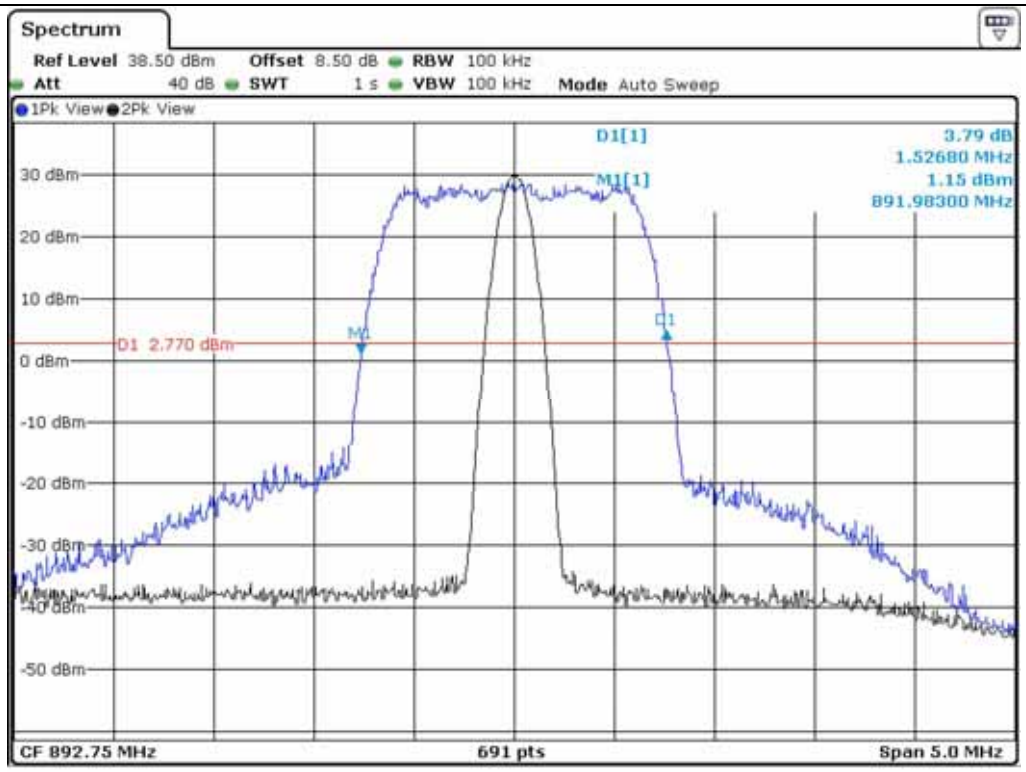


1xEVDO – 26 dB Bandwidth (Low Channel)



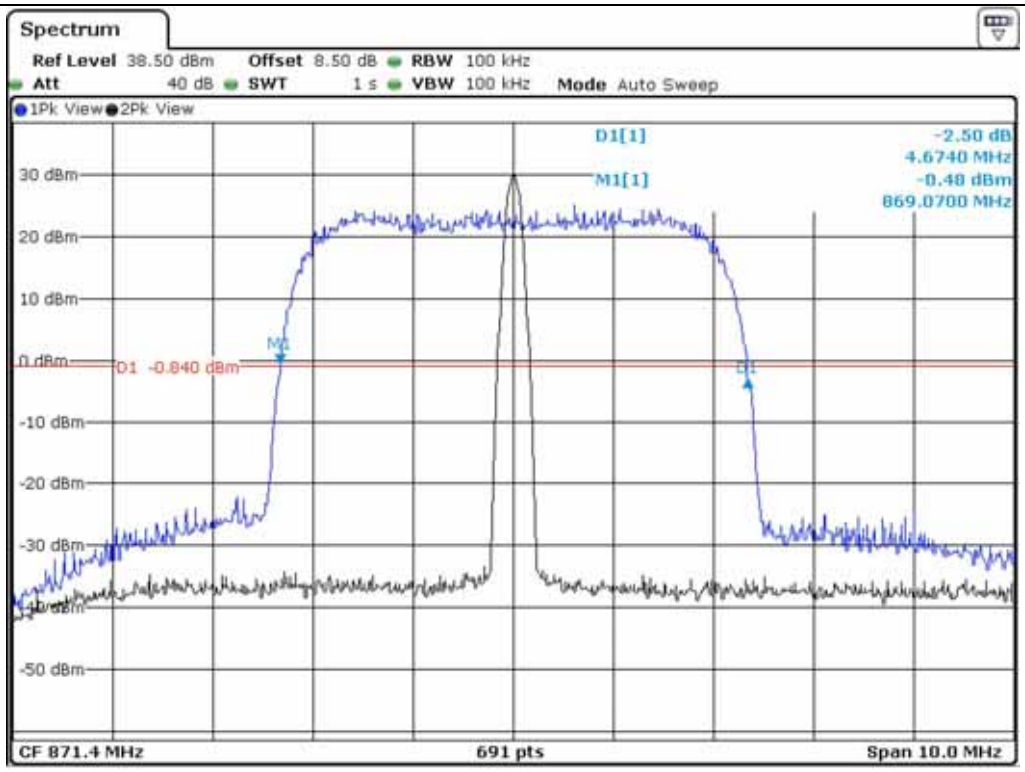
1xEVDO – 26 dB Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

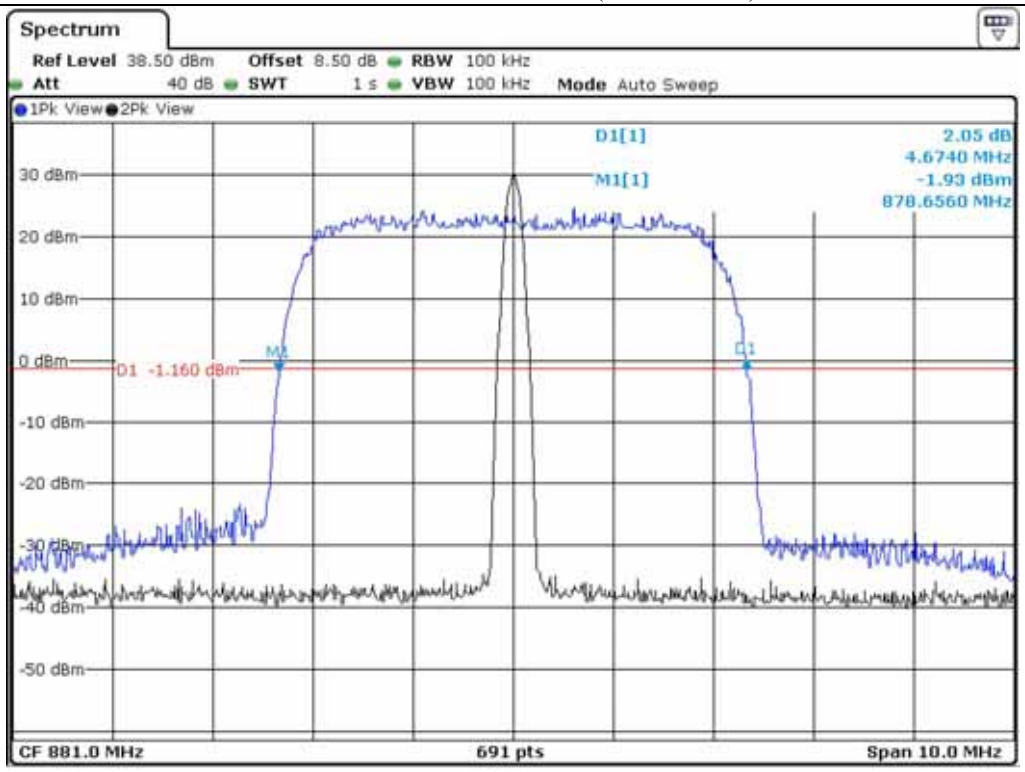


1xEVDO – 26 dB Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

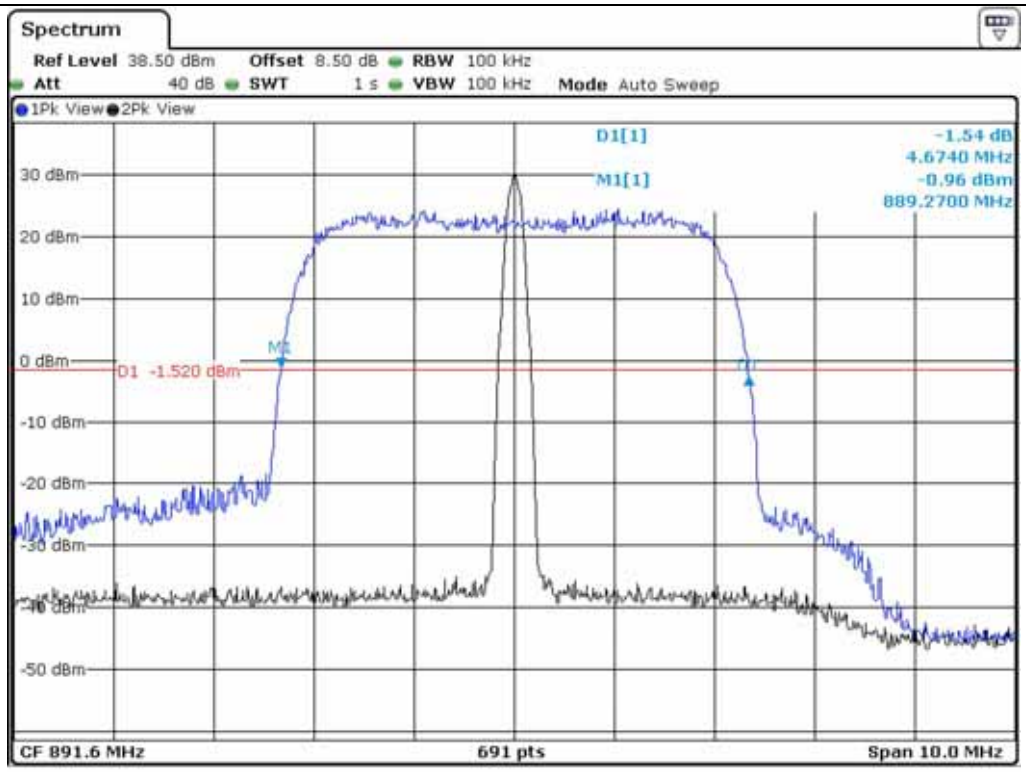


WCDMA – 26 dB Bandwidth (Low Channel)



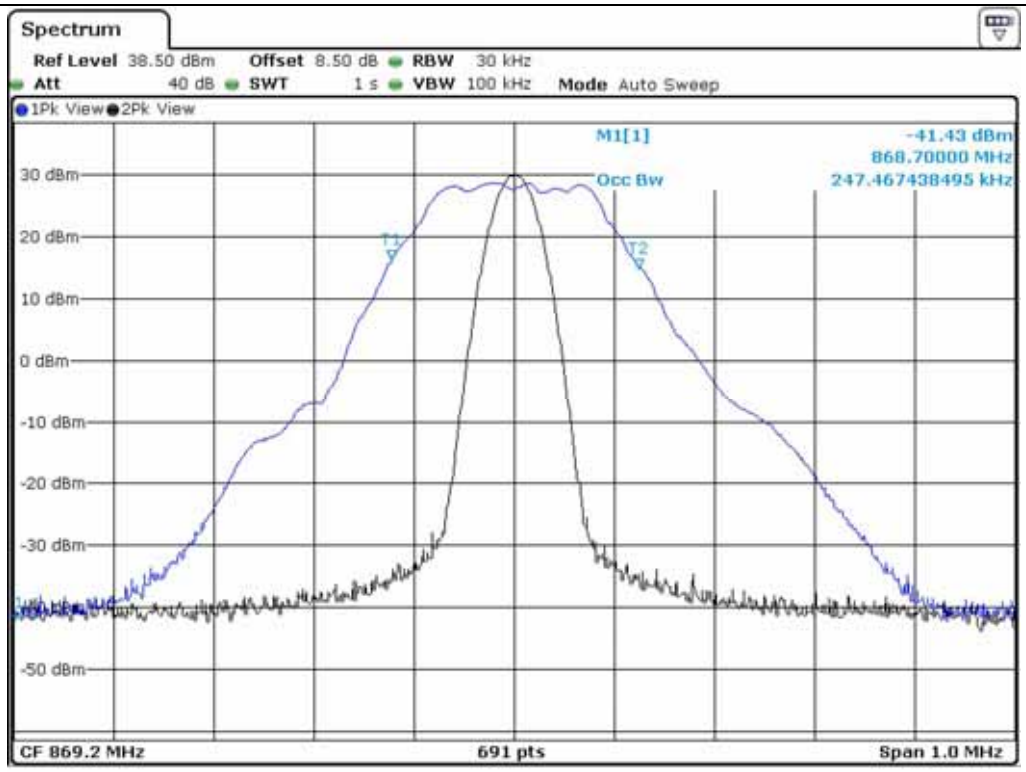
WCDMA – 26 dB Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

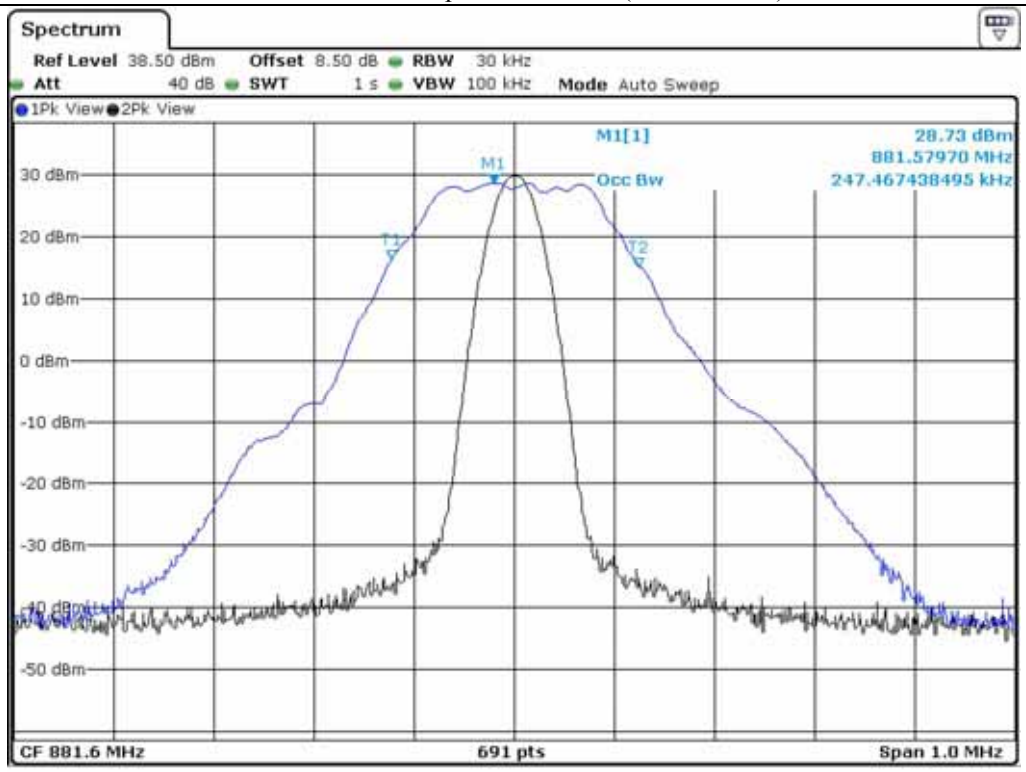


WCDMA – 26 dB Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

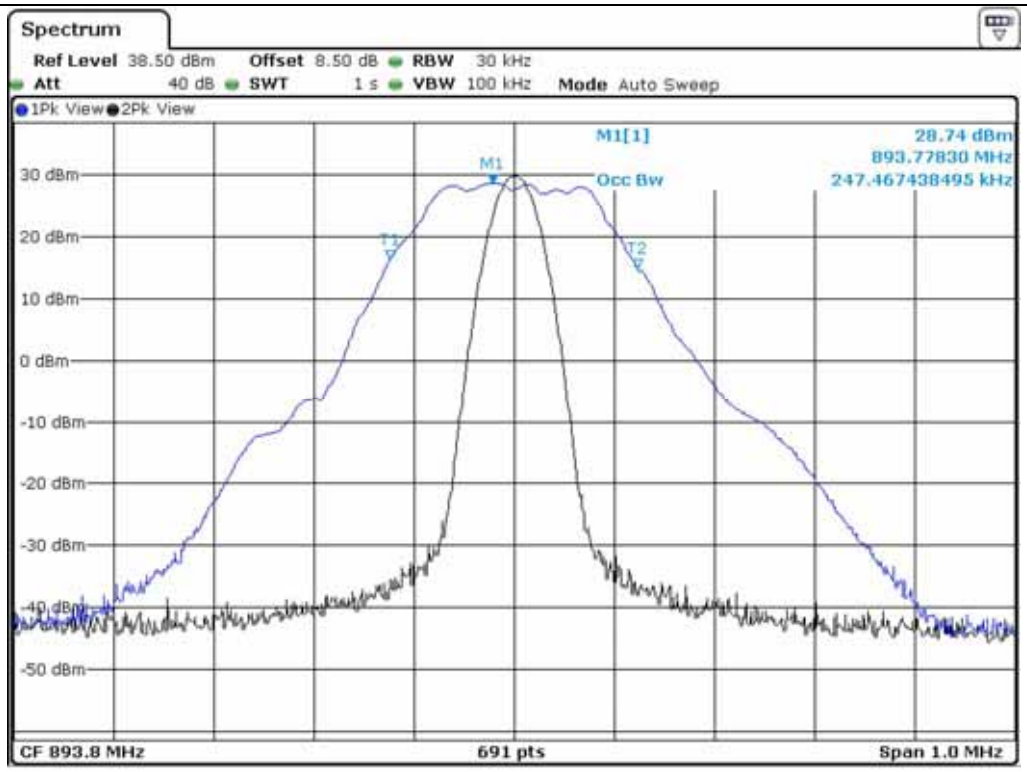


GSM – 99 % Occupied Bandwidth (Low Channel)



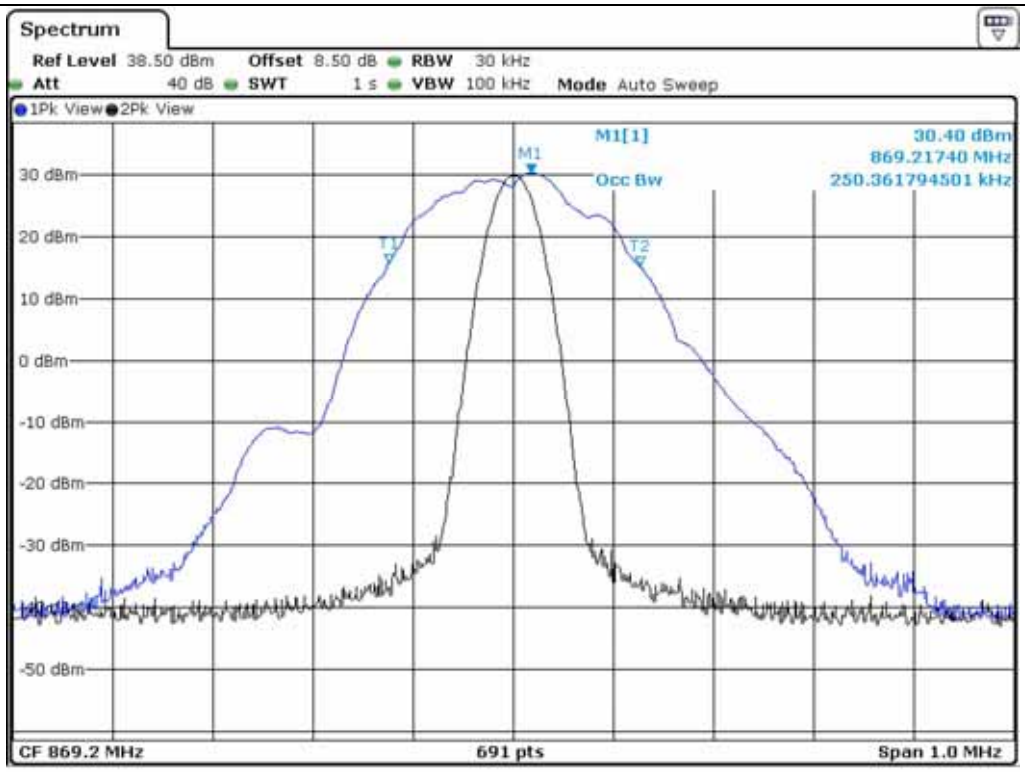
GSM – 99 % Occupied Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

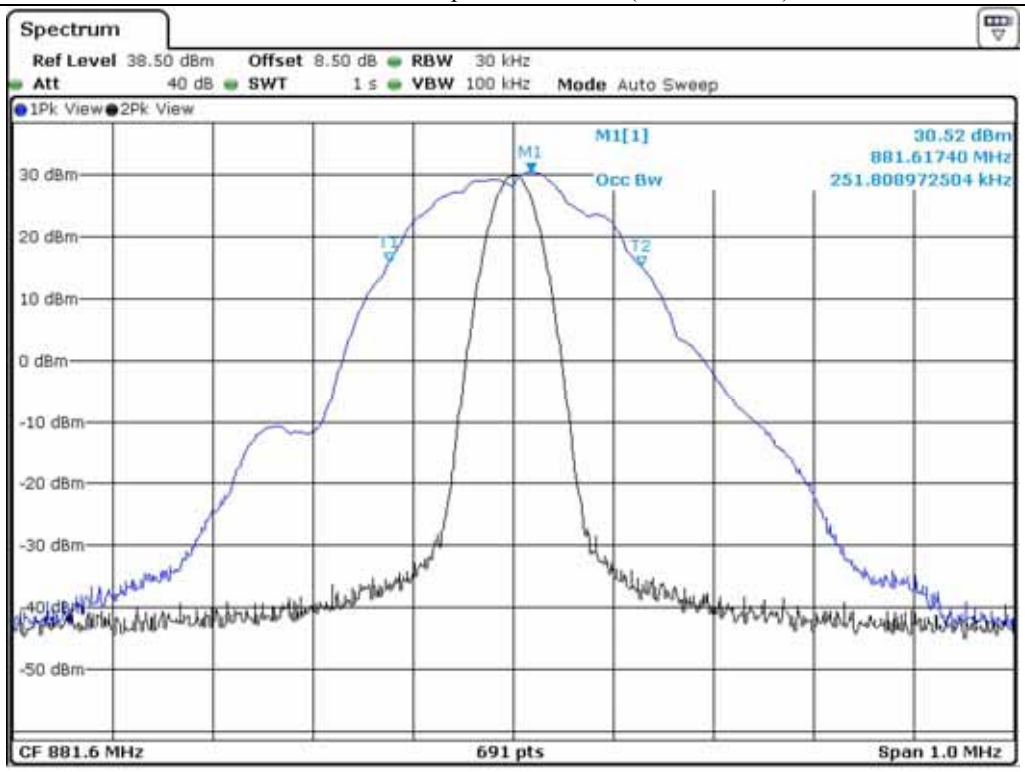


GSM – 99 % Occupied Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

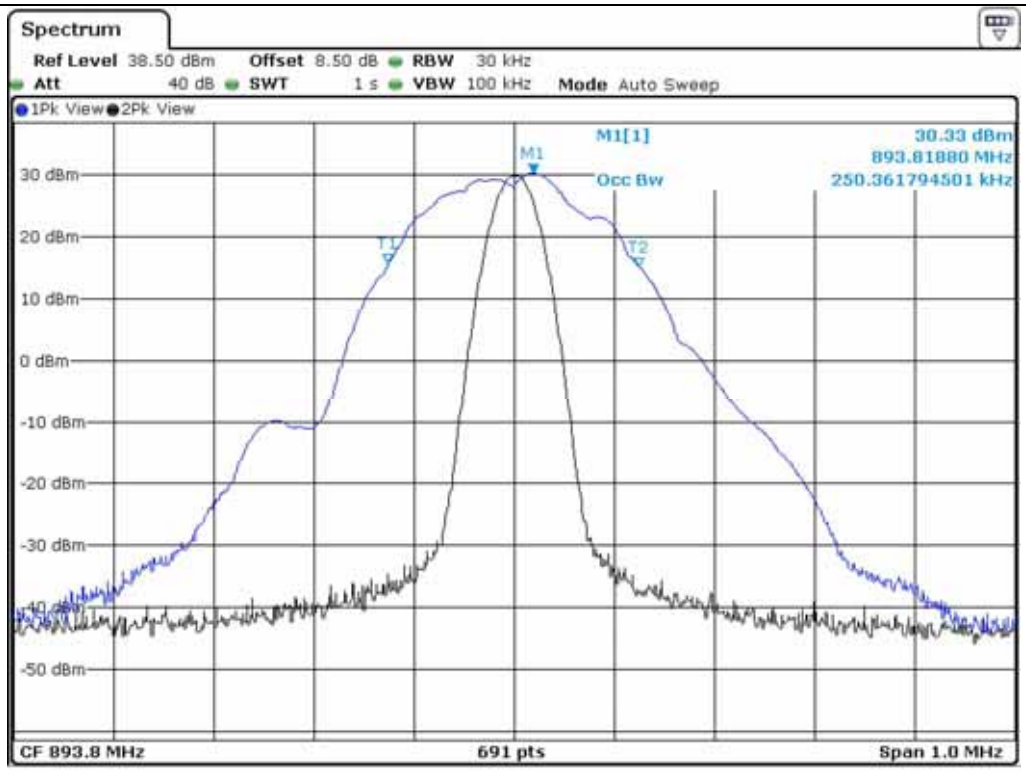


EDGE – 99 % Occupied Bandwidth (Low Channel)



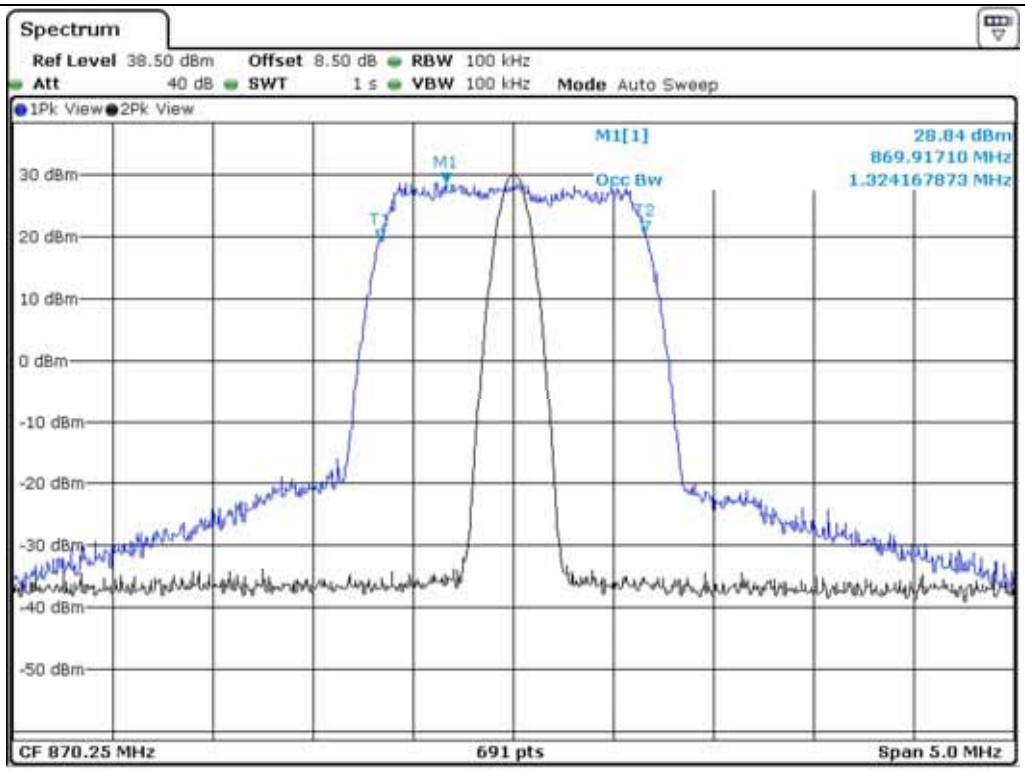
EDGE – 99 % Occupied Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

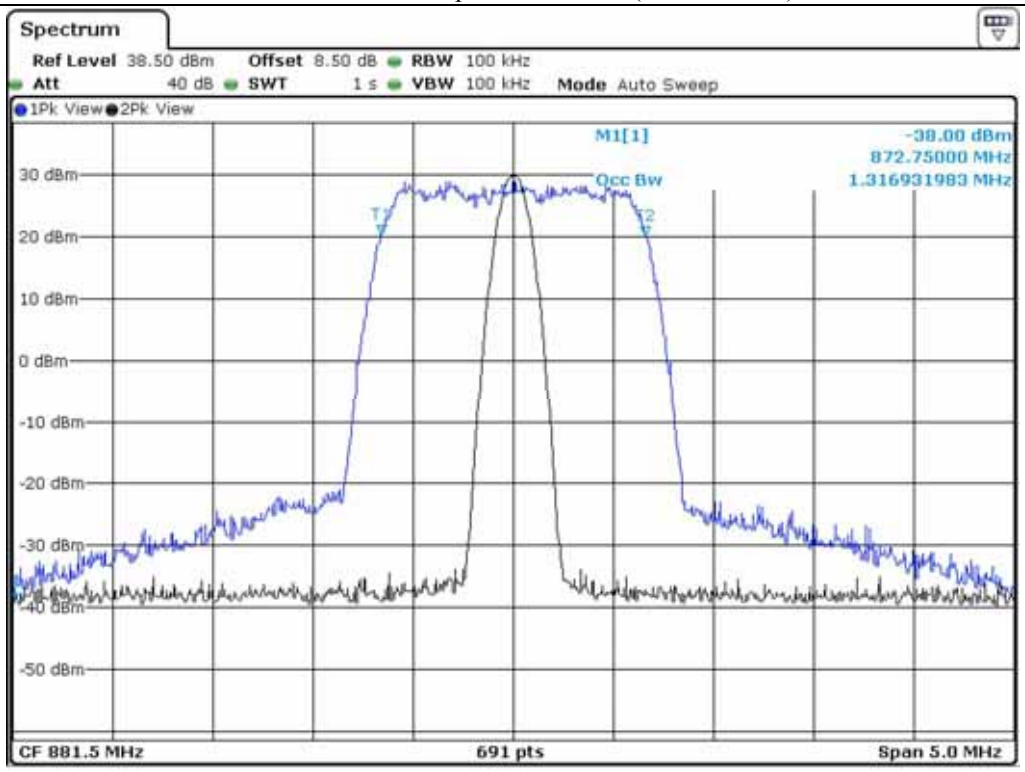


EDGE – 99 % Occupied Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

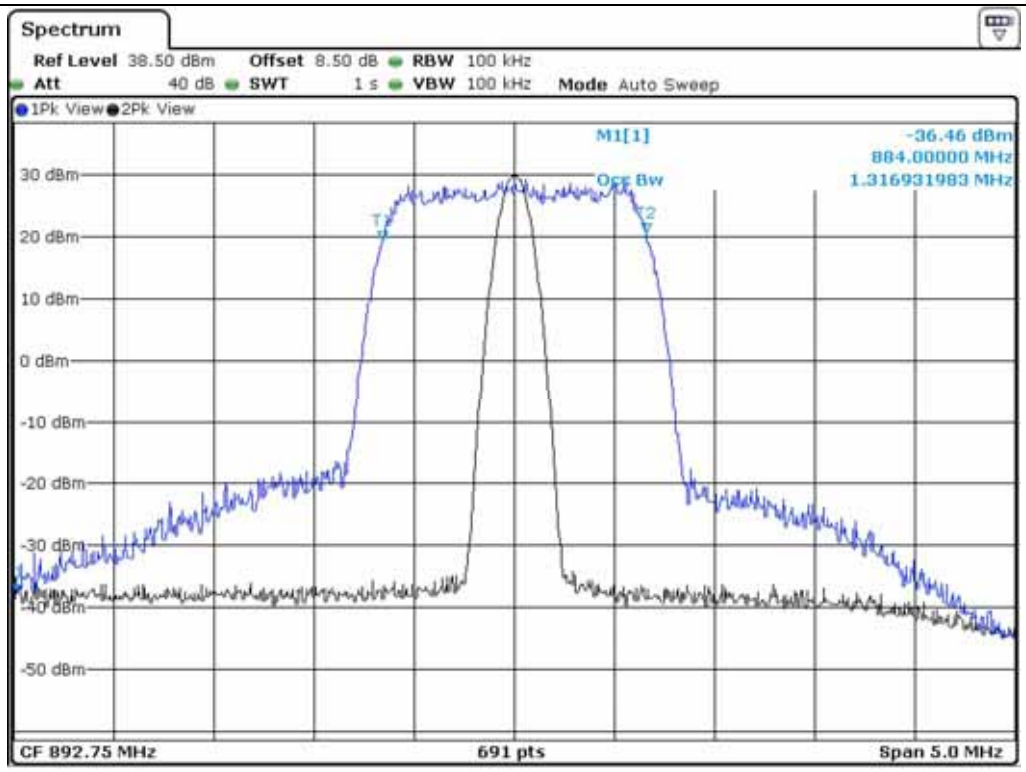


CDMA – 99 % Occupied Bandwidth (Low Channel)



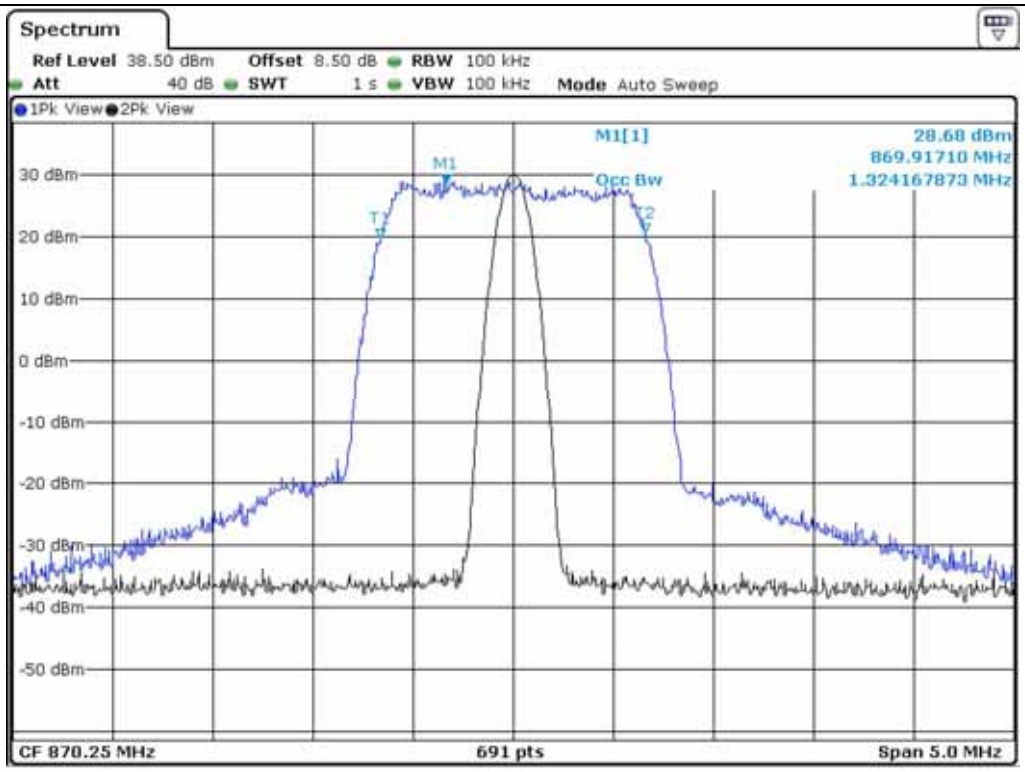
CDMA – 99 % Occupied Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

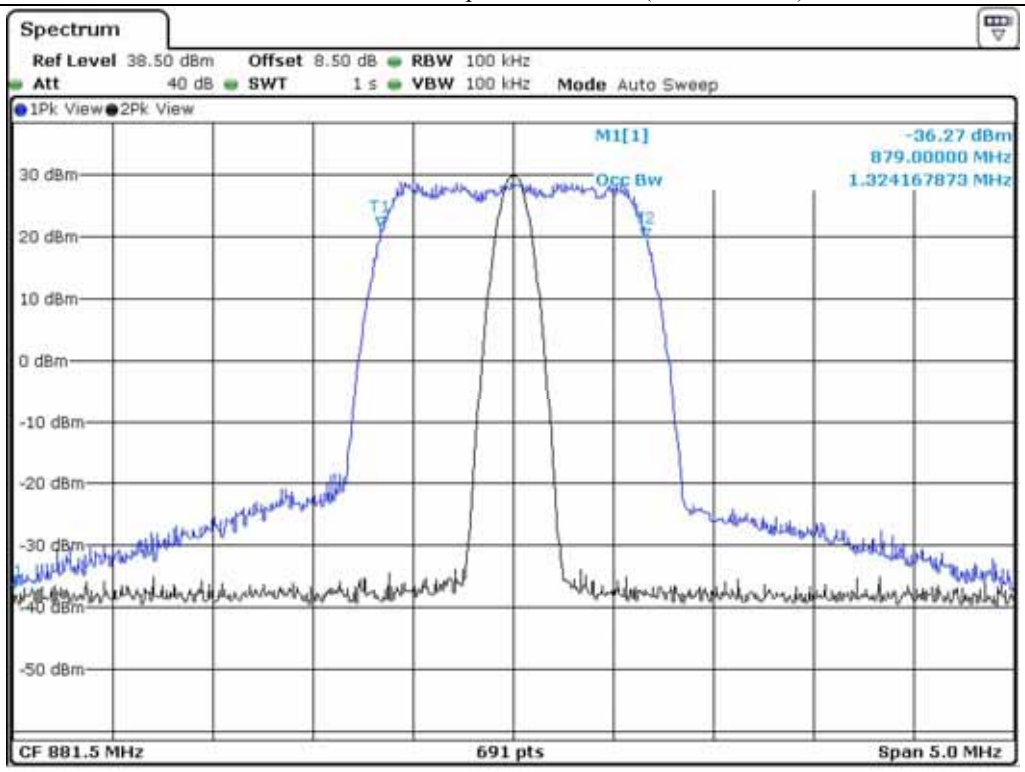


CDMA – 99 % Occupied Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

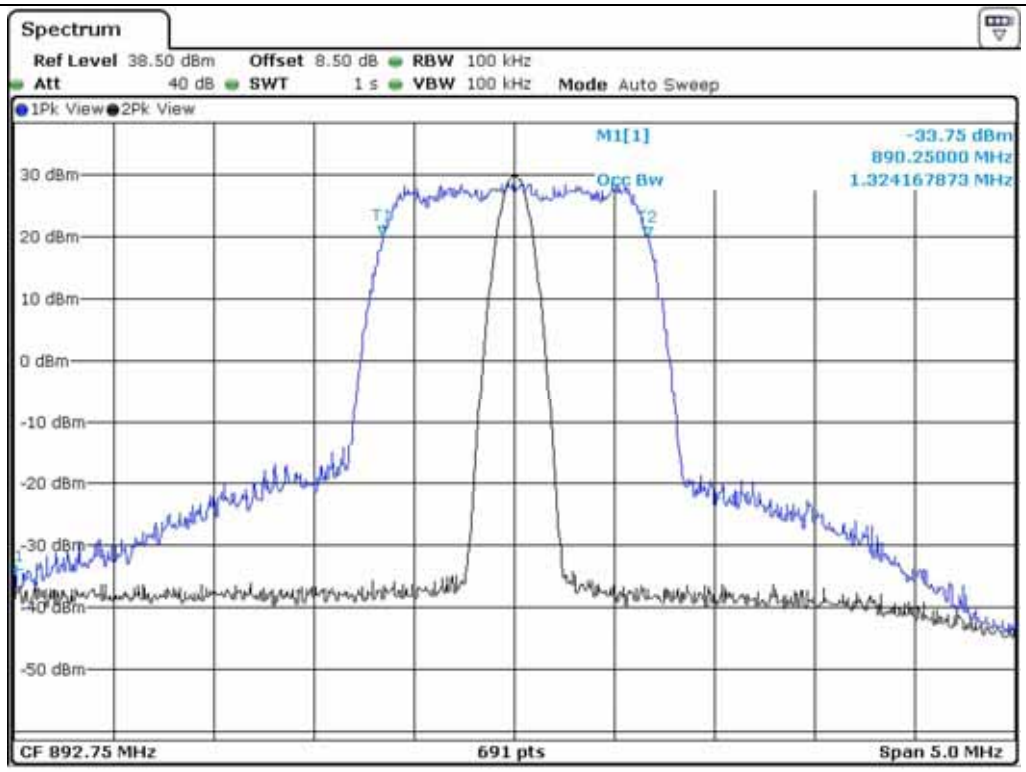


1xEVDO – 99 % Occupied Bandwidth (Low Channel)



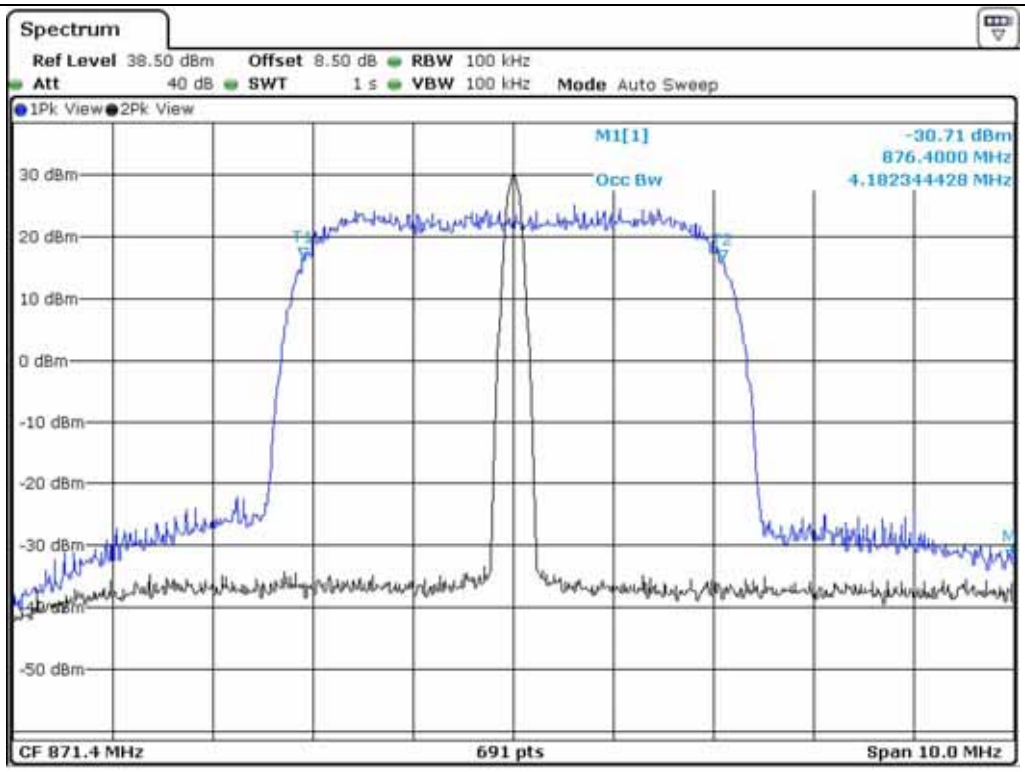
1xEVDO – 99 % Occupied Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

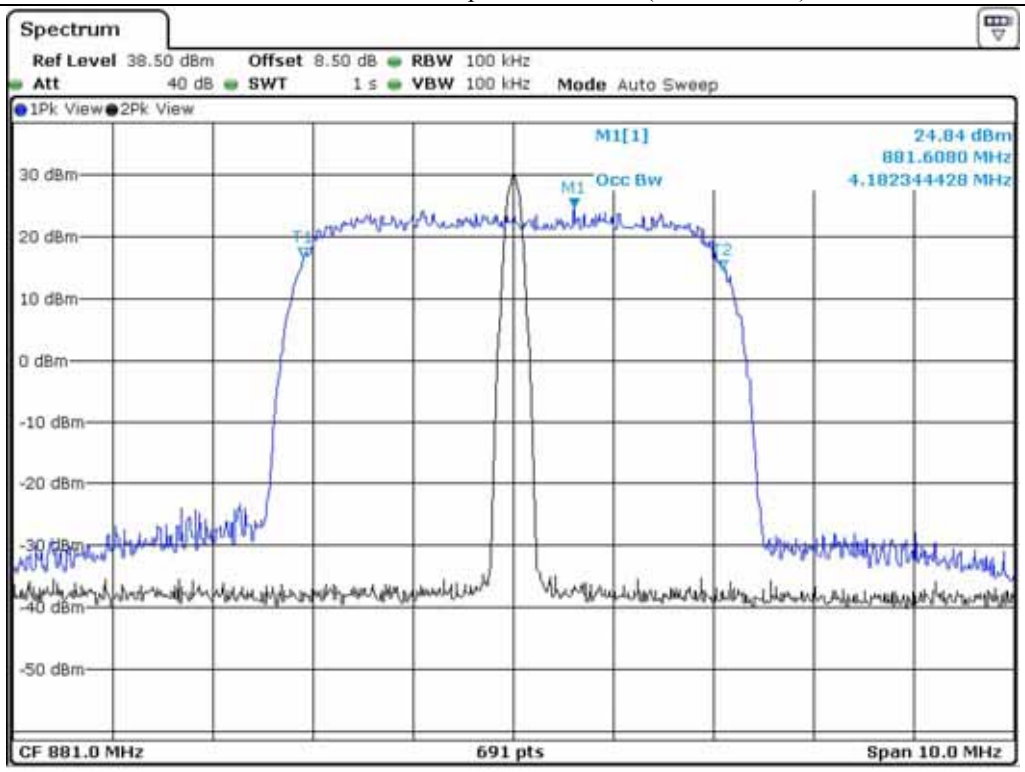


1xEVDO – 99 % Occupied Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

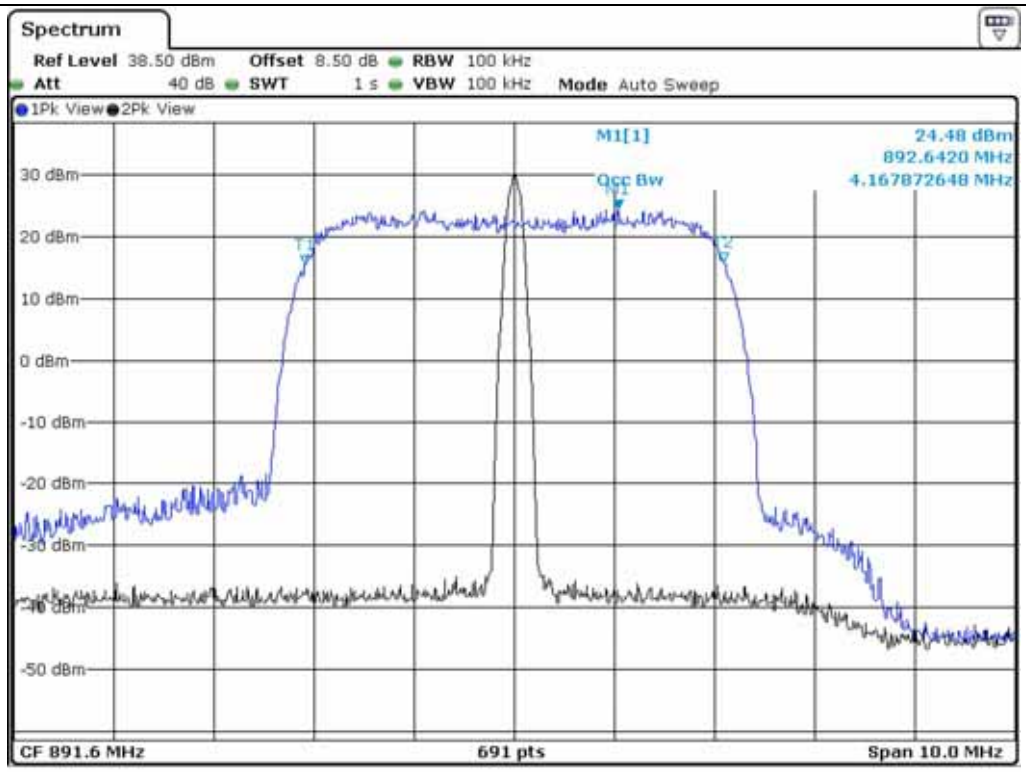


WCDMA – 99 % Occupied Bandwidth (Low Channel)



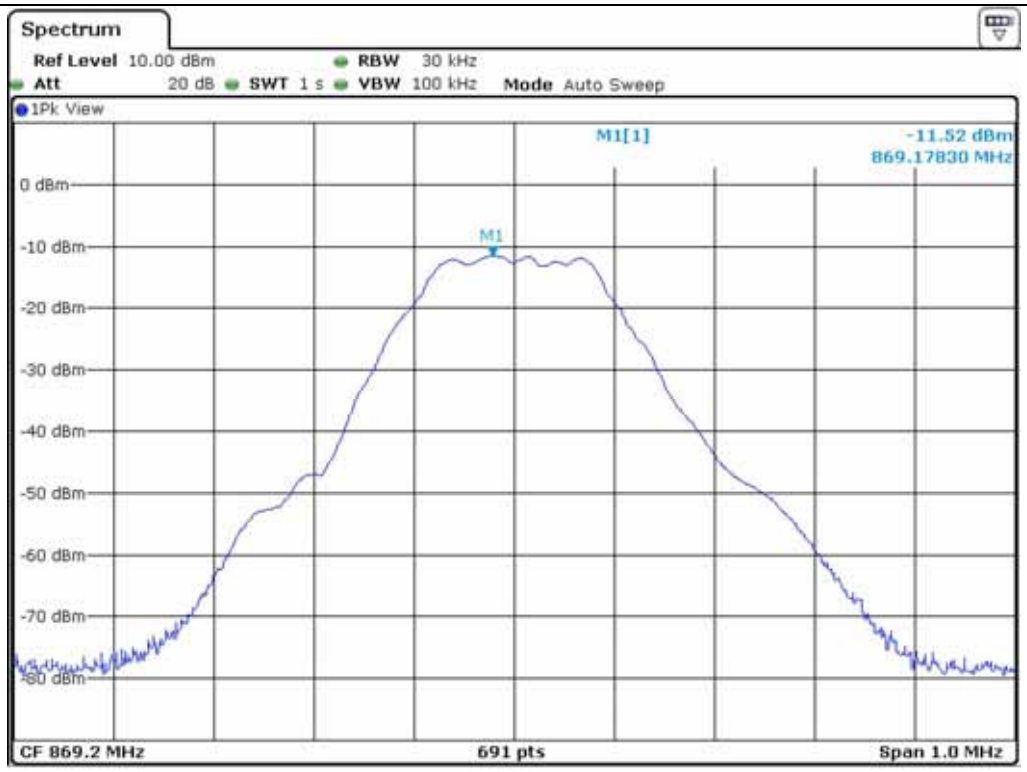
WCDMA – 99 % Occupied Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

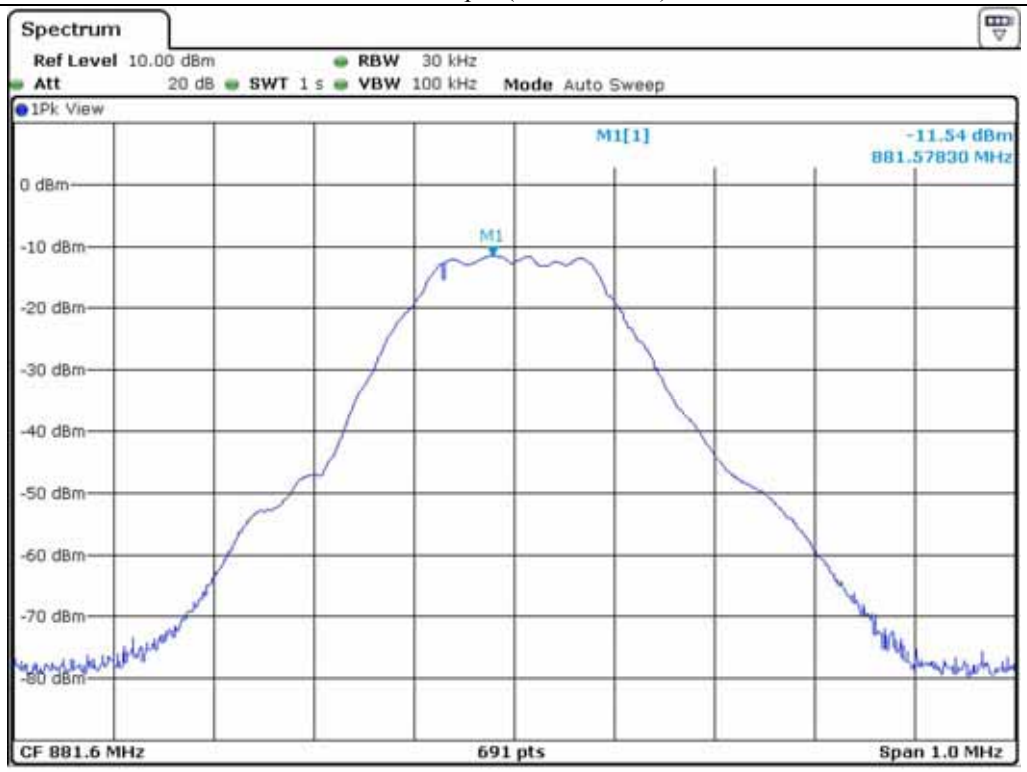


WCDMA – 99 % Occupied Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



GSM – Input (Low Channel)



GSM – Input (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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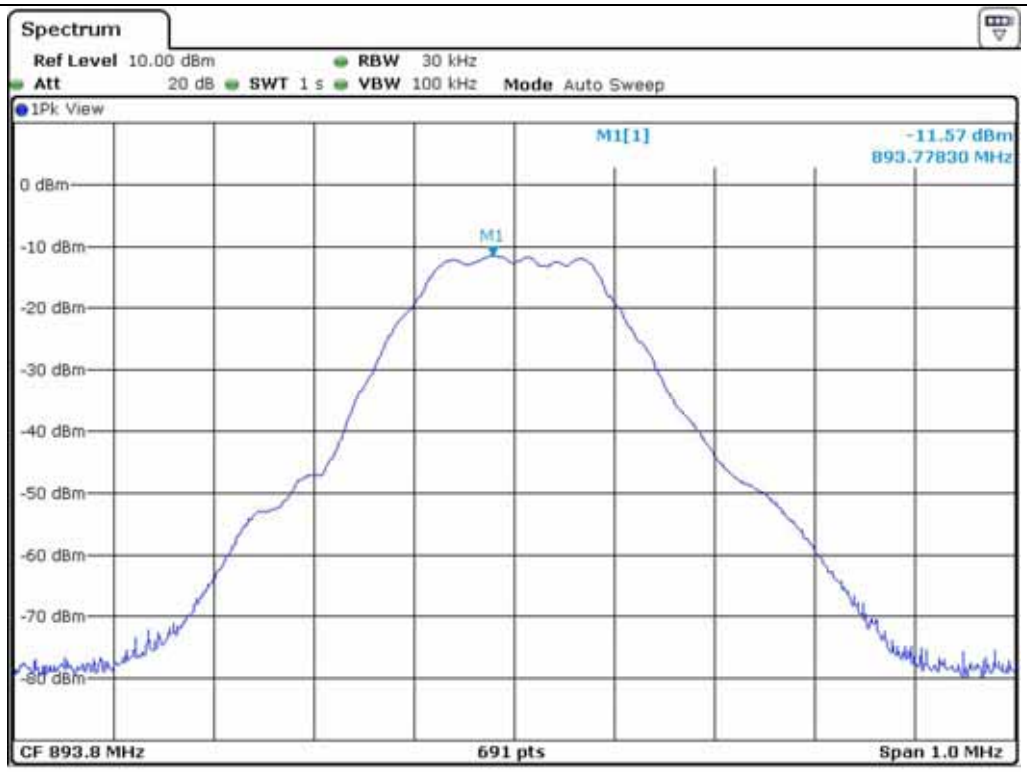
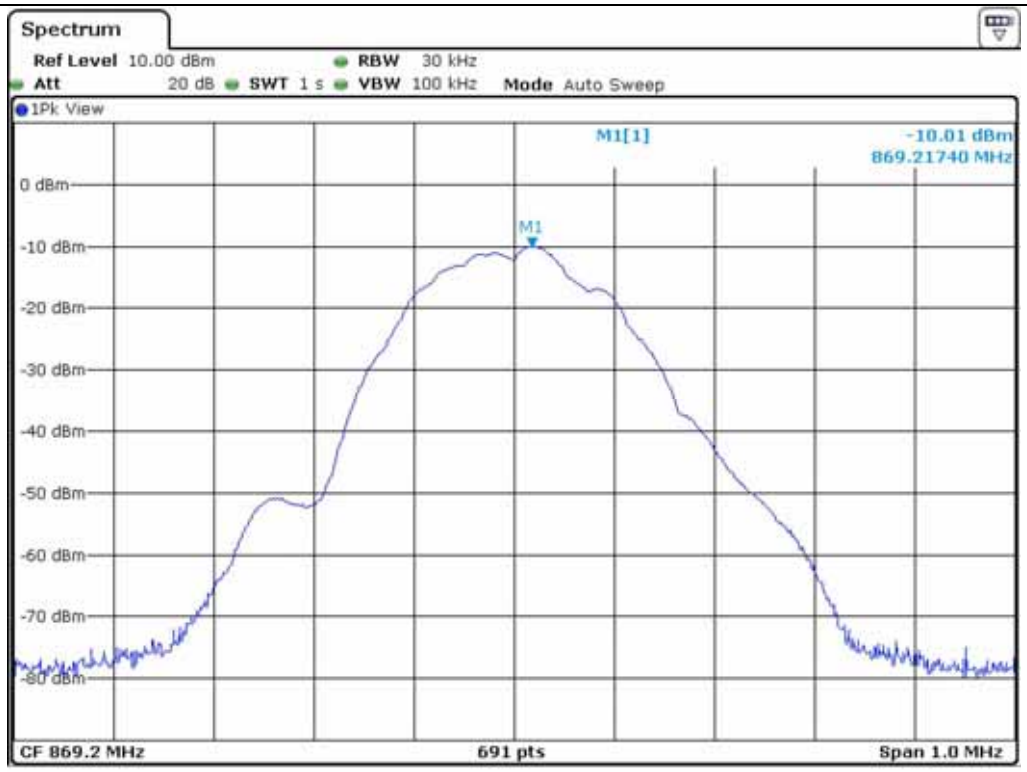
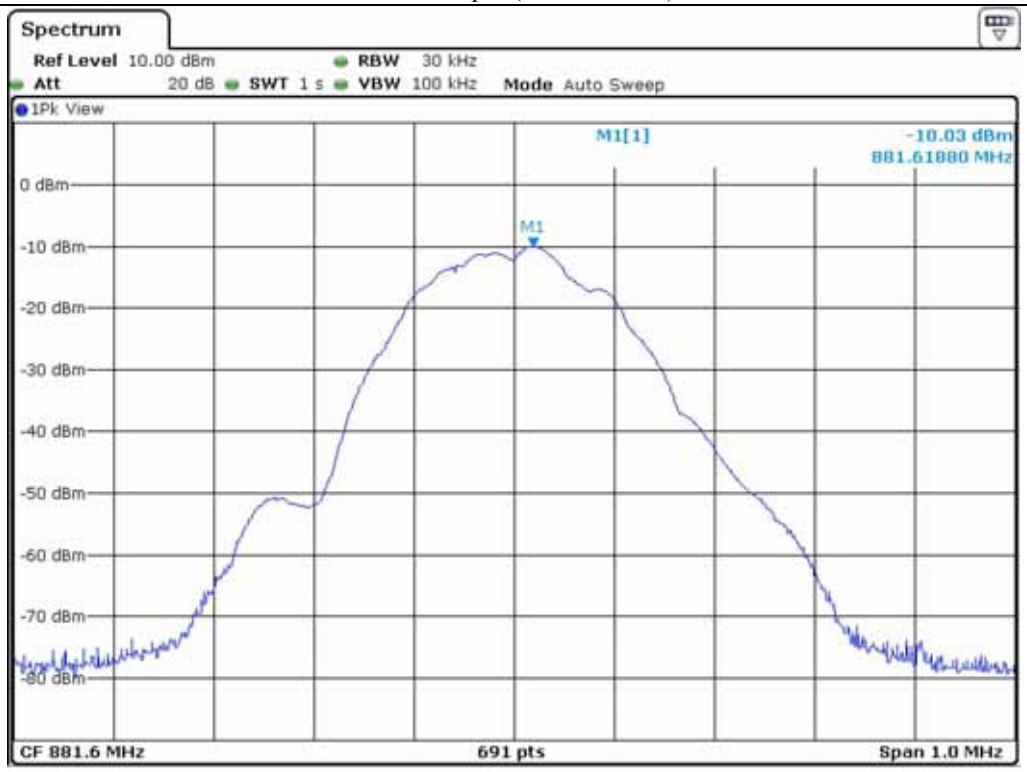


GSM – Input (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

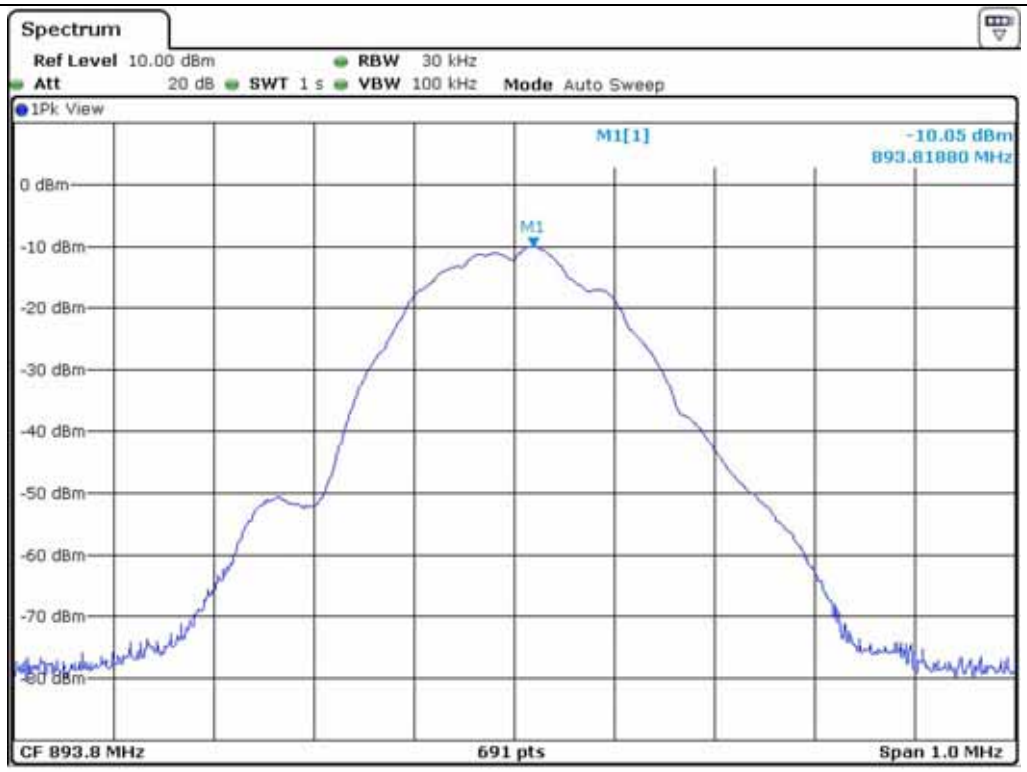


EDGE – Input (Low Channel)



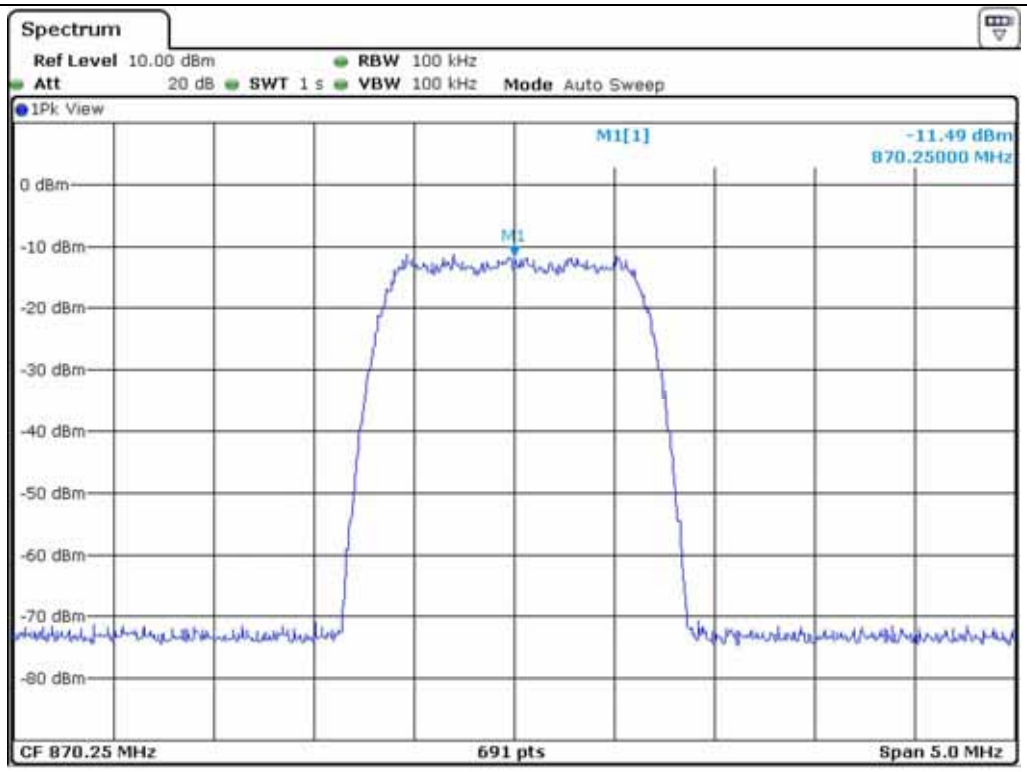
EDGE – Input (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

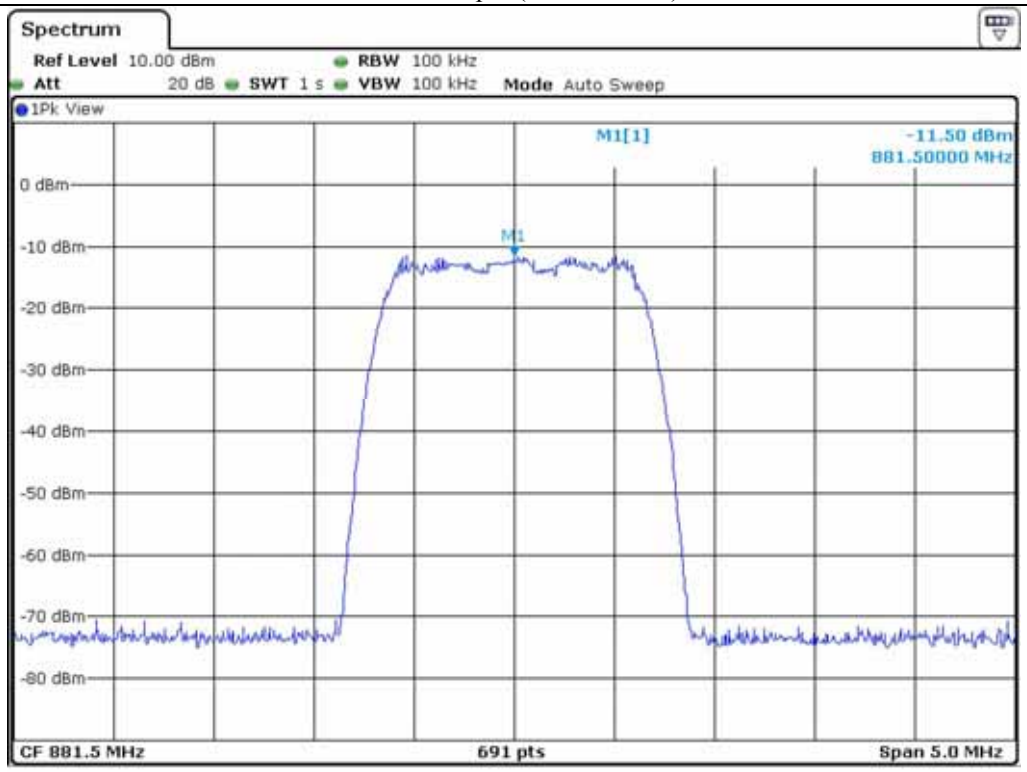


EDGE – Input (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

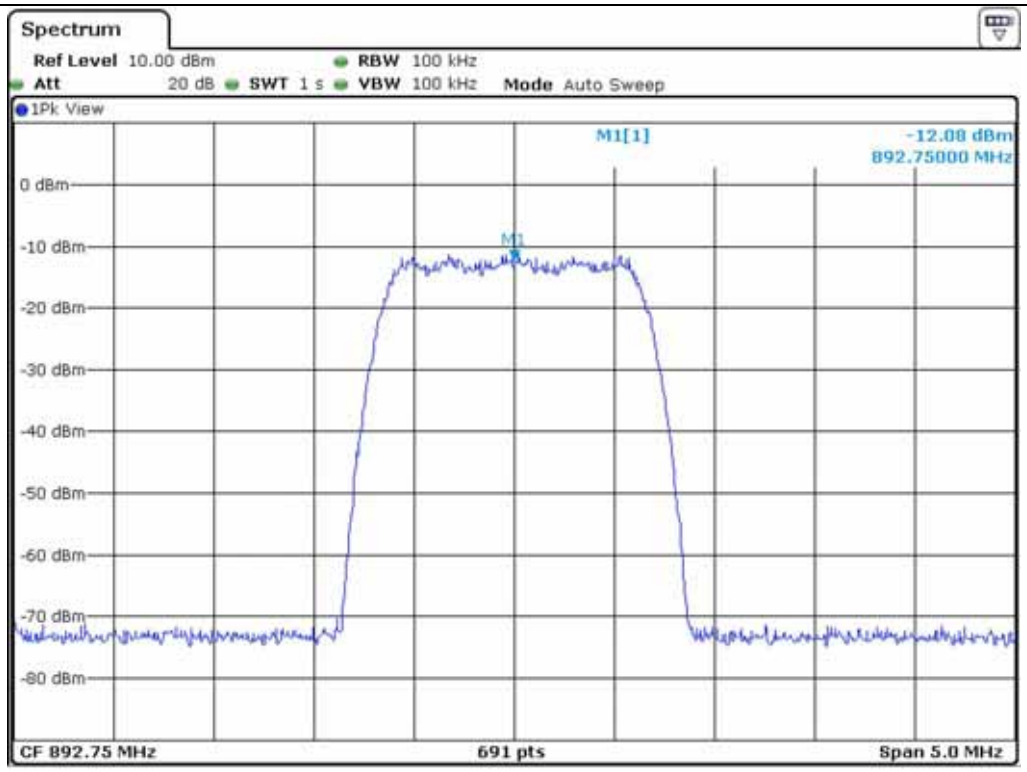


CDMA – Input (Low Channel)



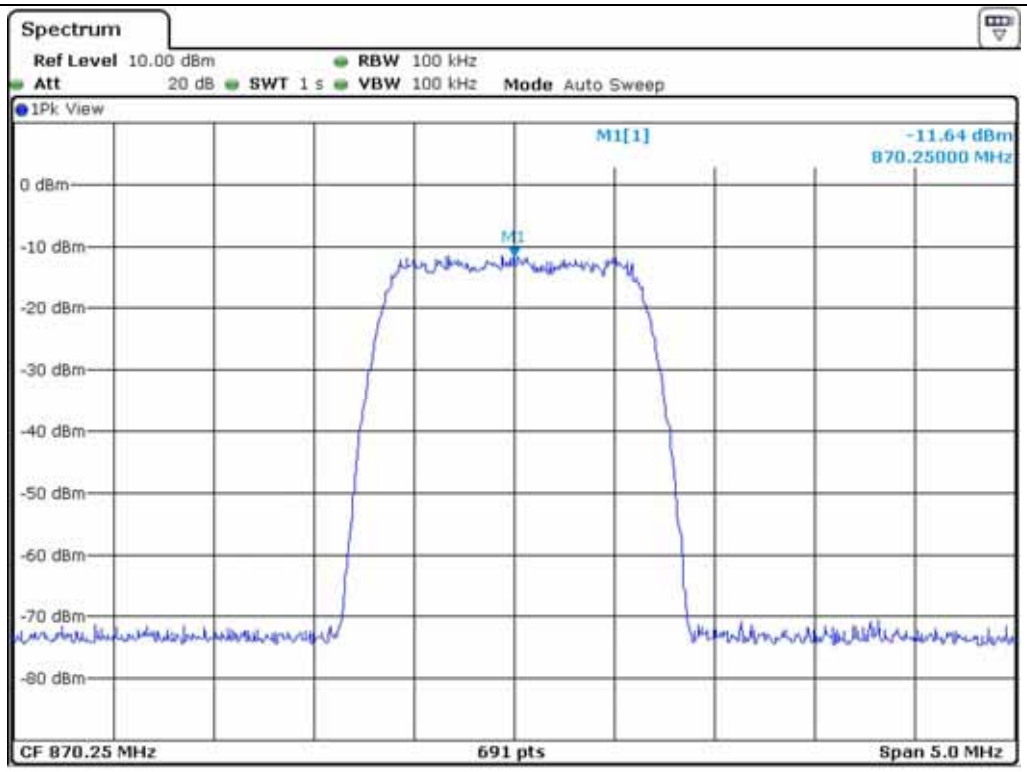
CDMA – Input (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

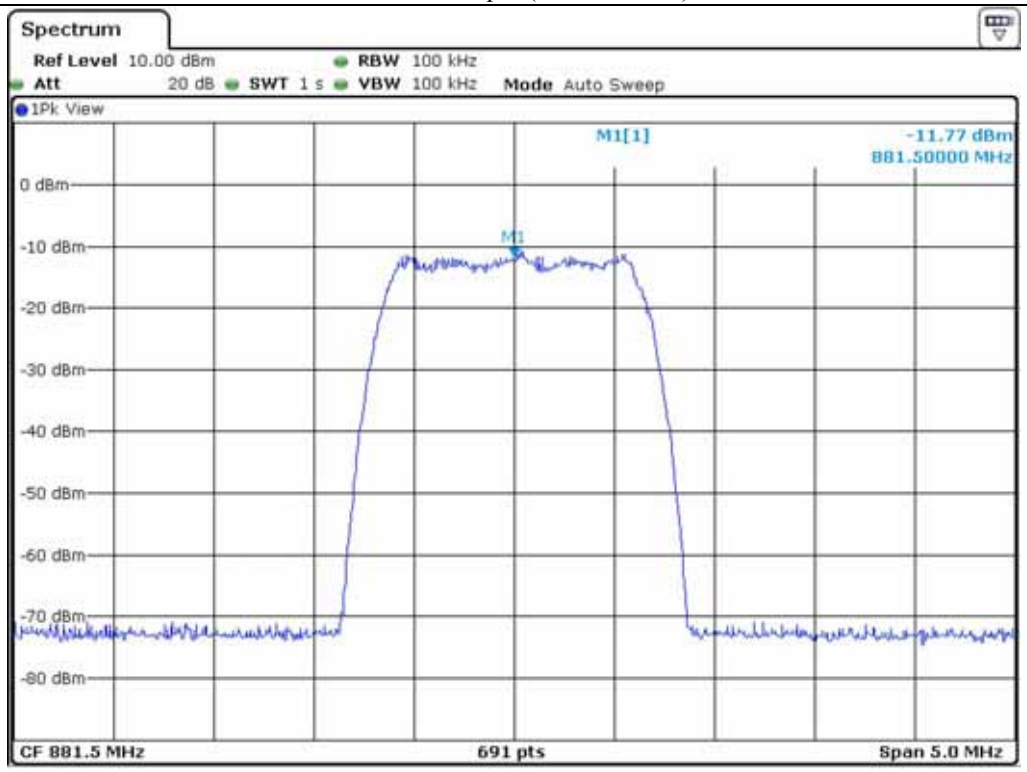


CDMA – Input (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

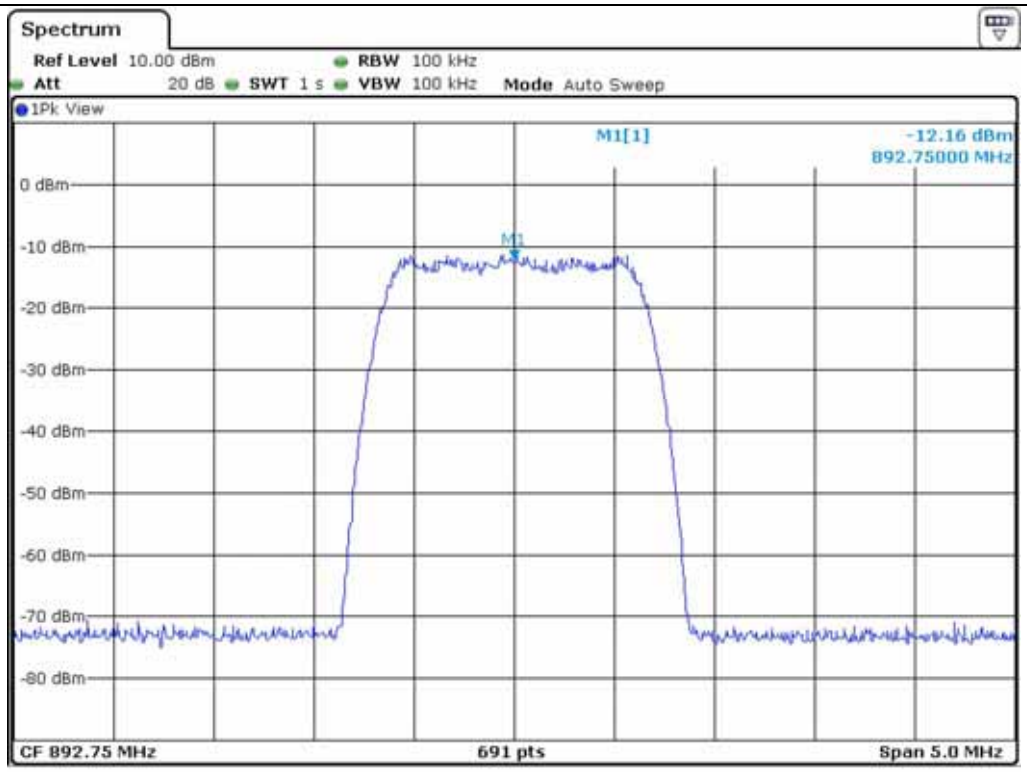


1xEVDO – Input (Low Channel)



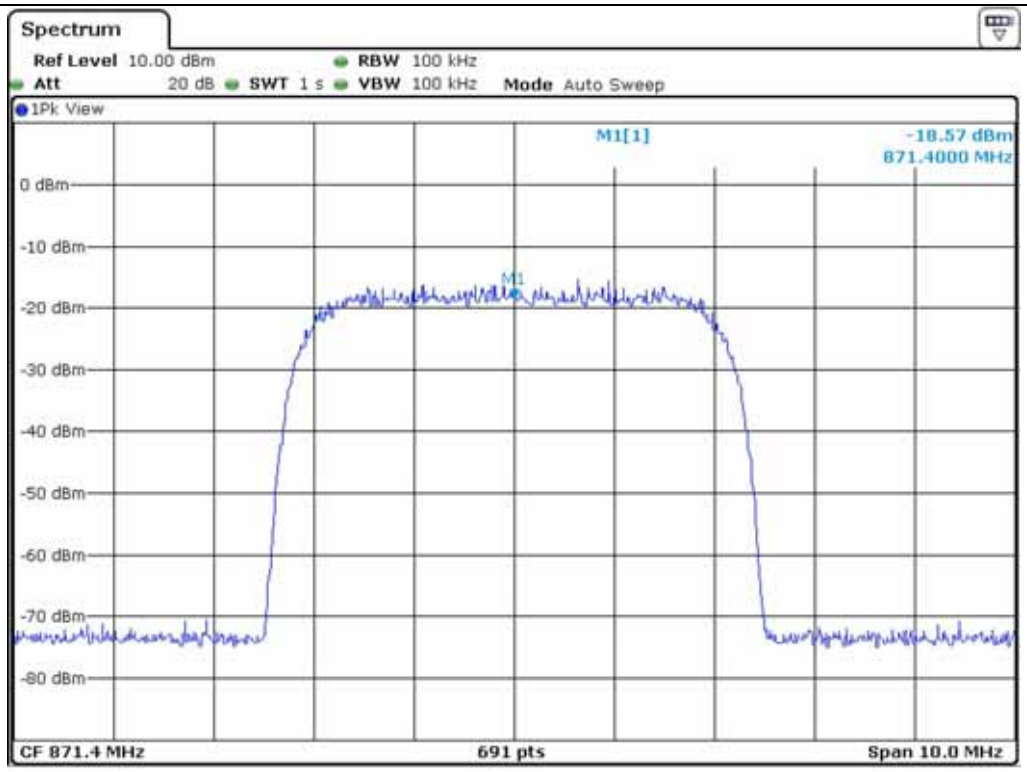
1xEVDO – Input (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

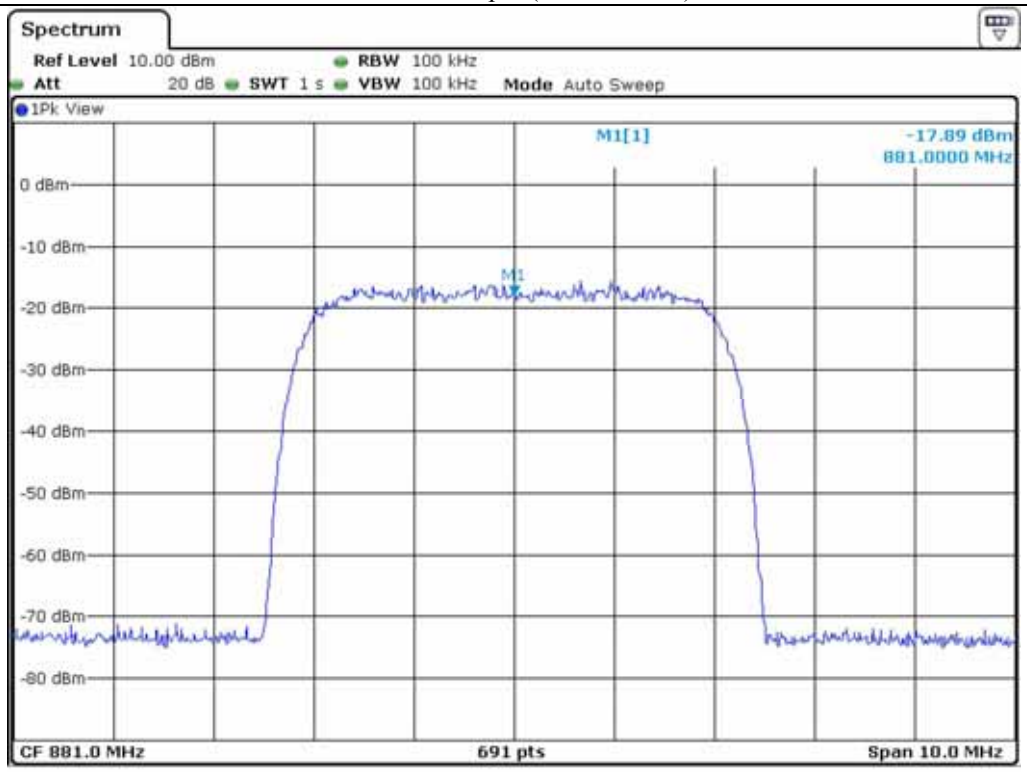


1xEVDO – Input (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

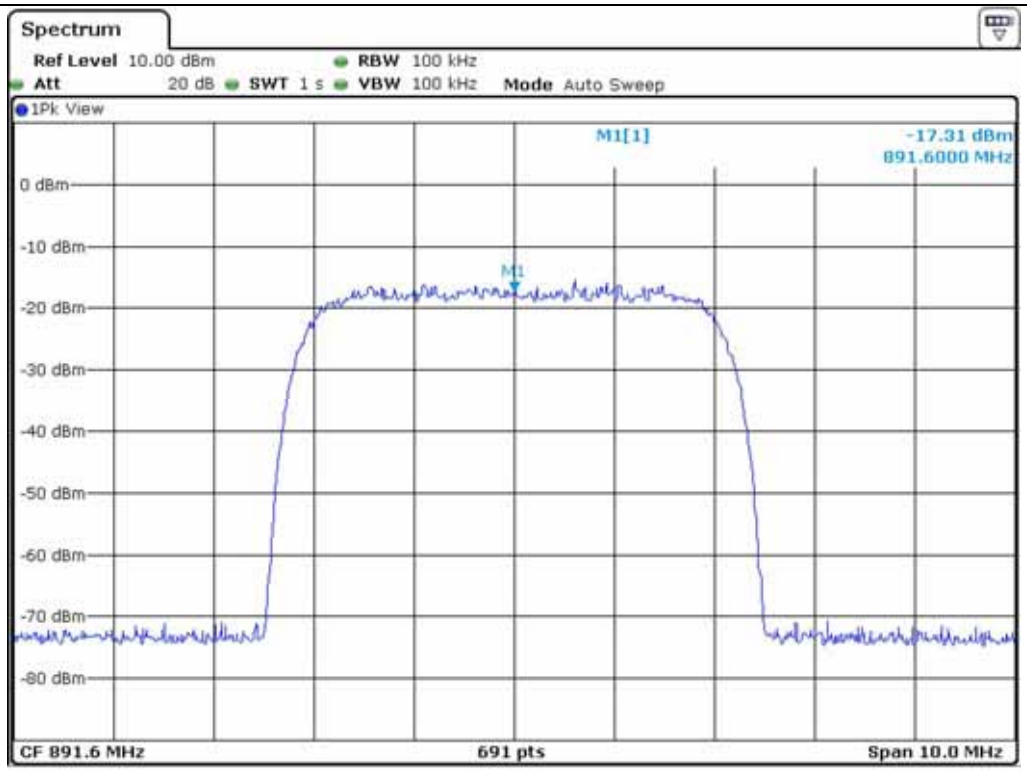


WCDMA – Input (Low Channel)



WCDMA – Input (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



WCDMA – Input (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

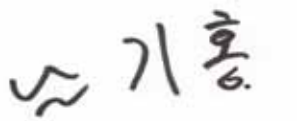
6.4.2 Test Result for Part 90 (700PS(D))

-. Test Date : January 15, 2013

-. Test Result : Pass

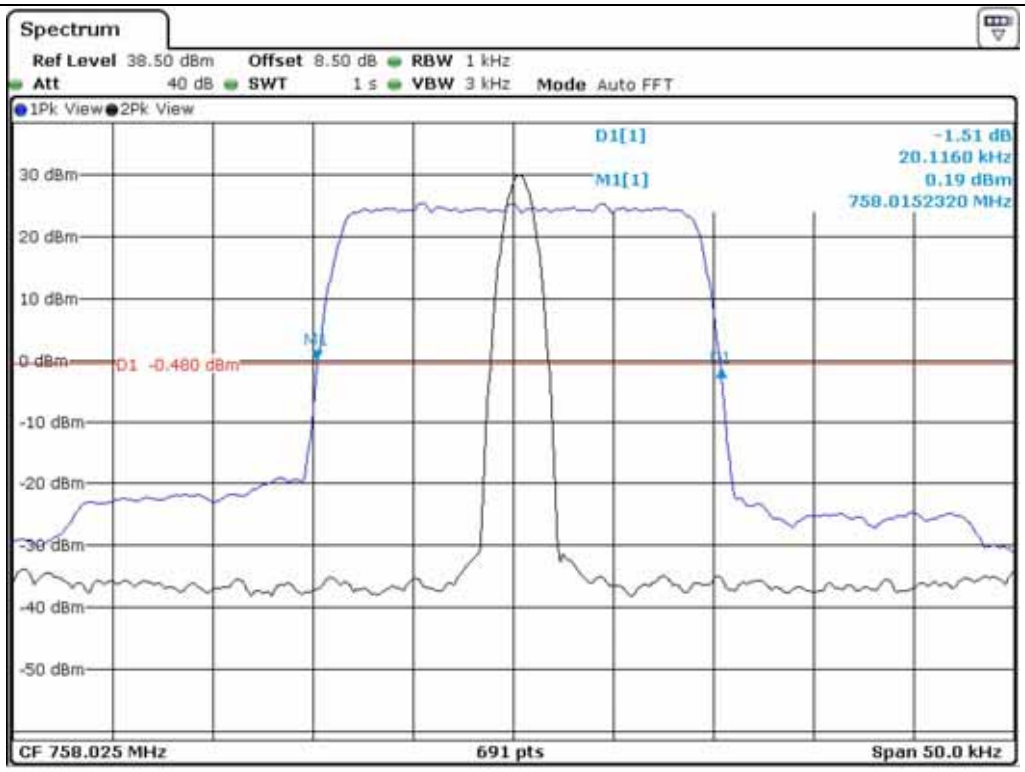
Modulation	Channel	26 dB Bandwidth (kHz)	99 % Occupied Bandwidth (kHz)
IDEN	Low	20.12	18.09
	Middle	20.12	18.02
	High	20.19	18.02
SMR	Low	14.62	12.30
	Middle	14.62	12.30
	High	14.62	12.30
LTE	Low	4 964.00	4 515.00
	Middle	4 964.00	4 515.00
	High	4 964.00	4 515.00

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

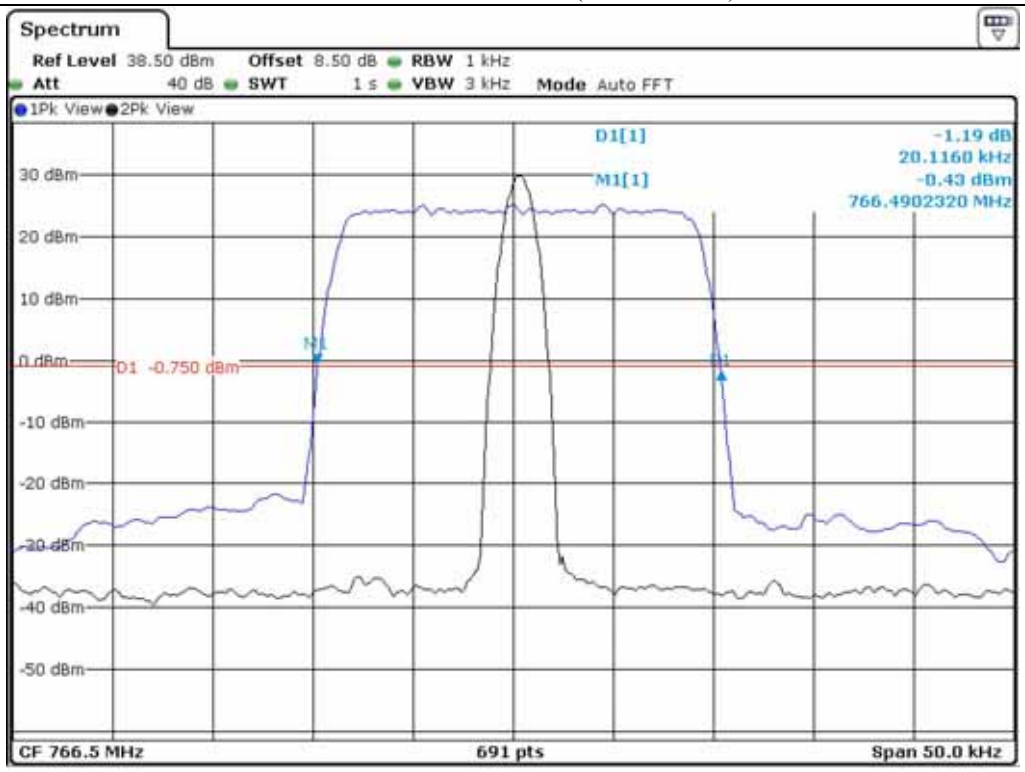


Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

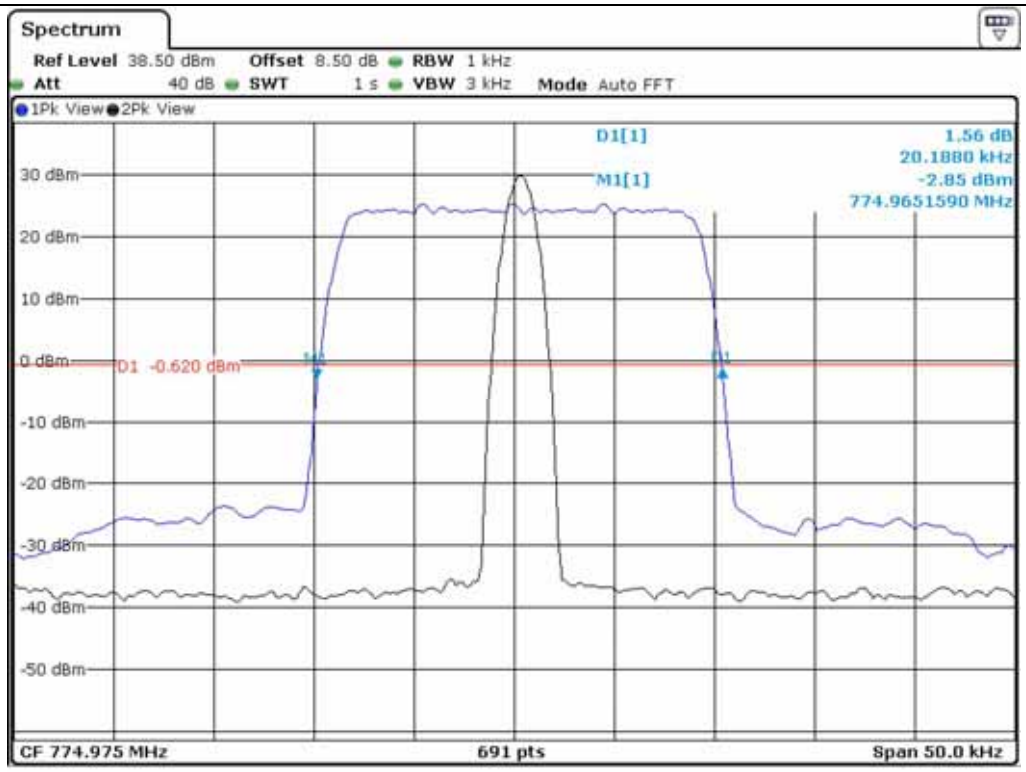


IDEN – 26 dB Bandwidth (Low Channel)



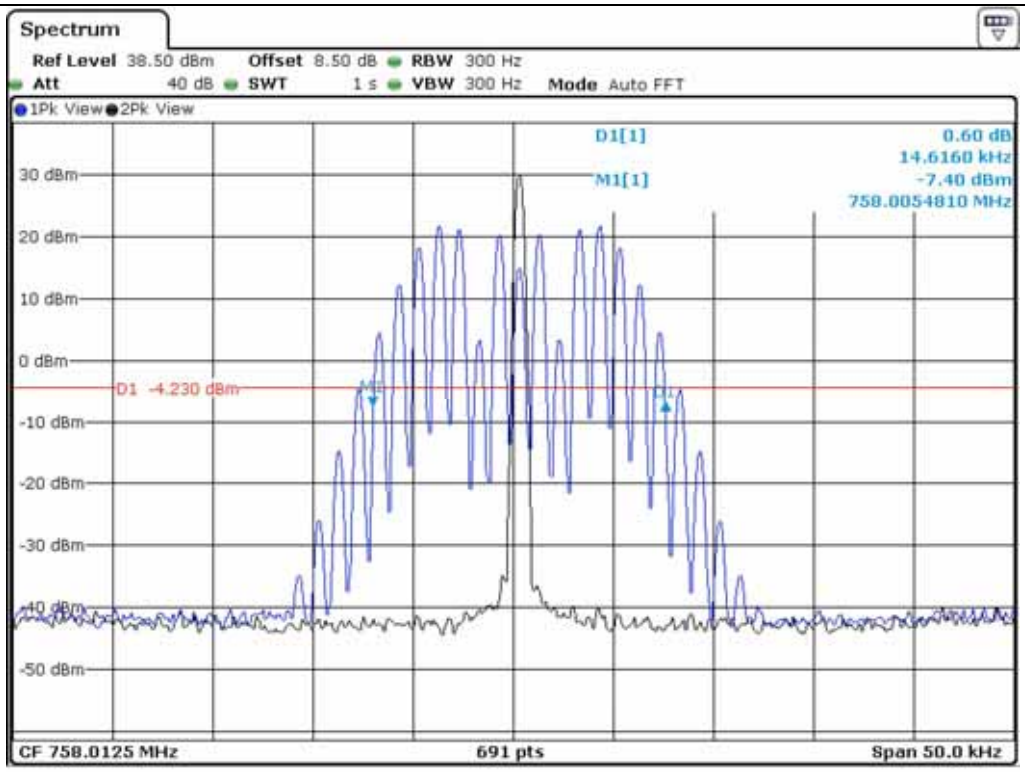
IDEN – 26 dB Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

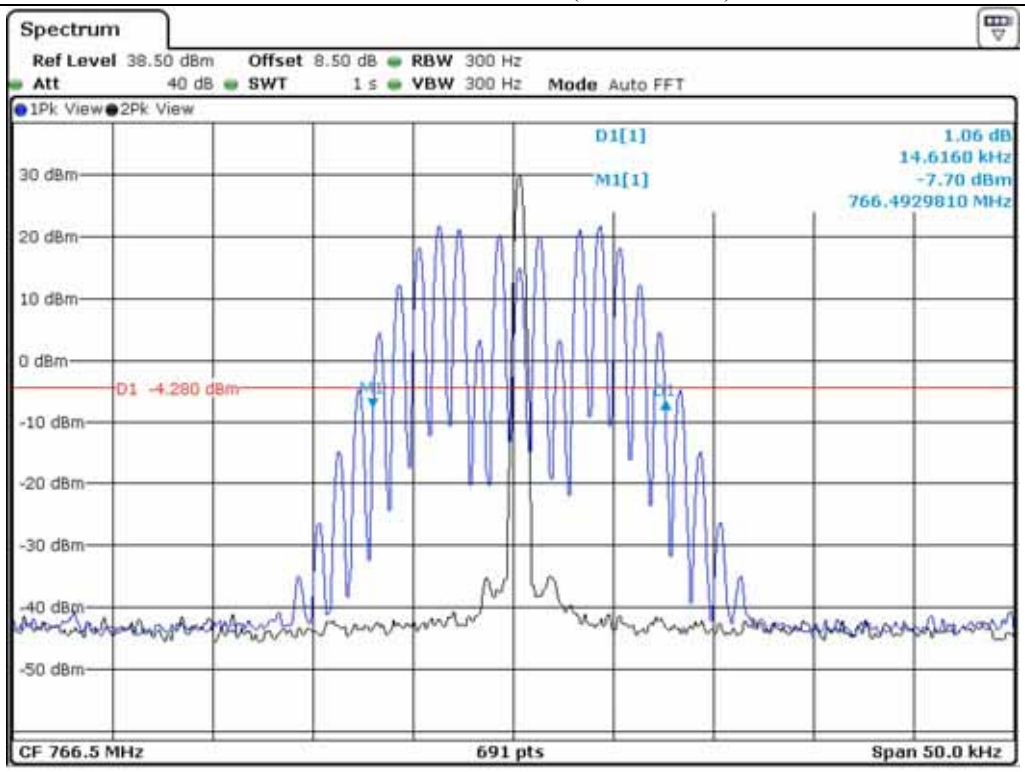


IDEN – 26 dB Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

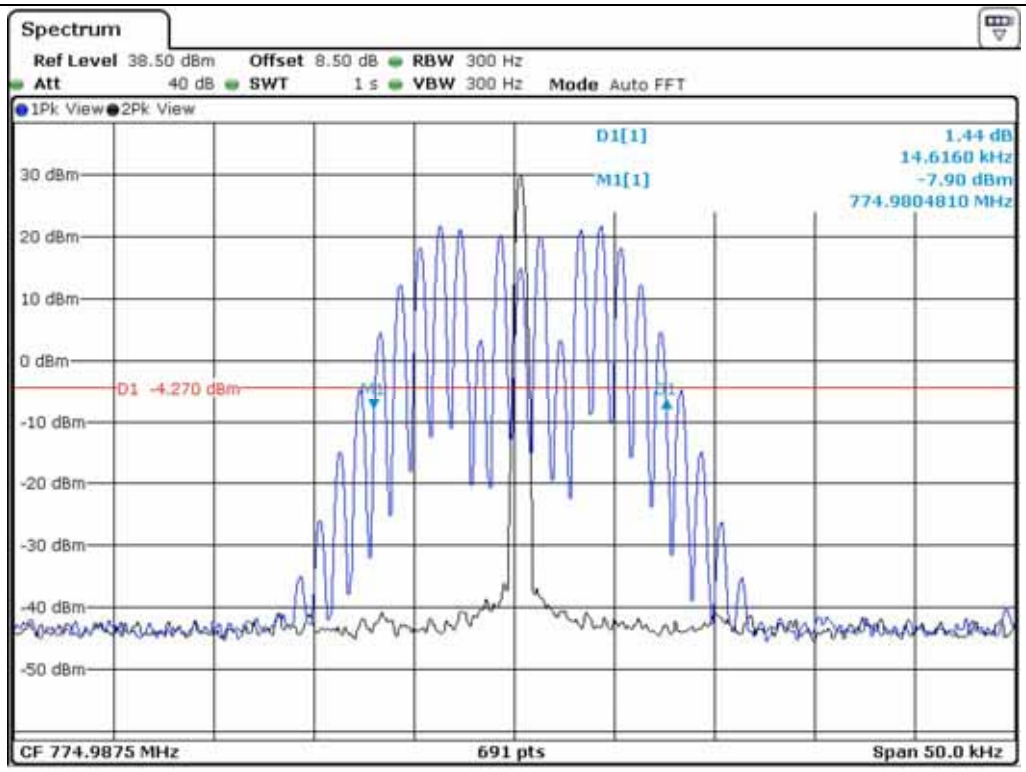


SMR – 26 dB Bandwidth (Low Channel)



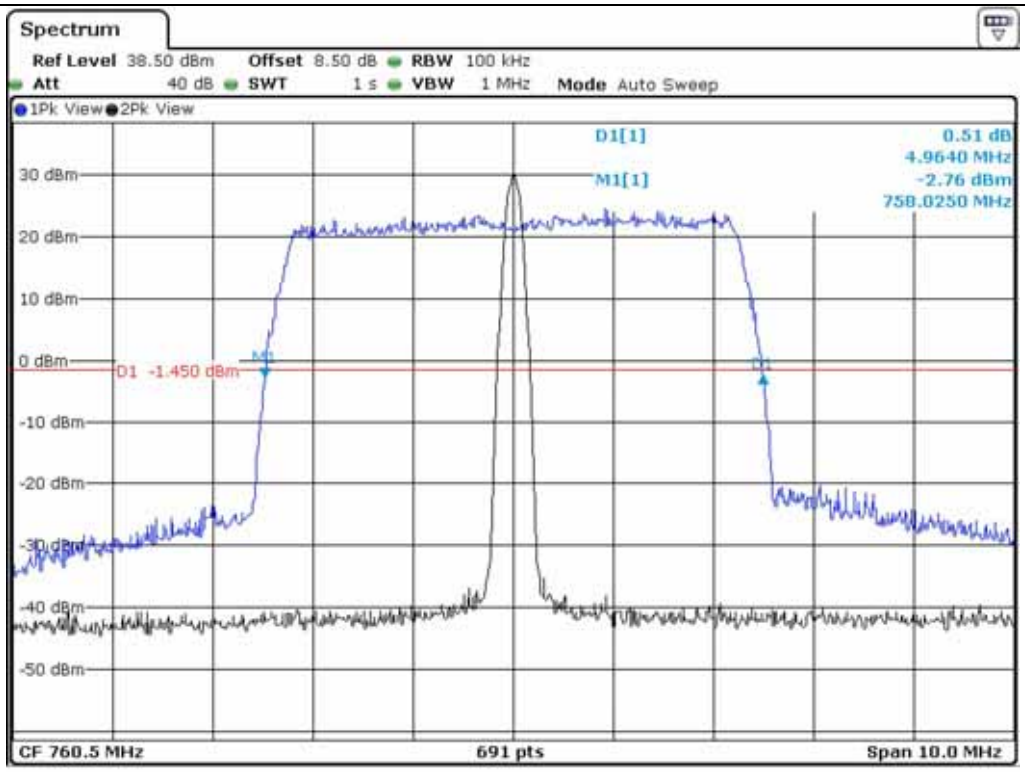
SMR – 26 dB Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

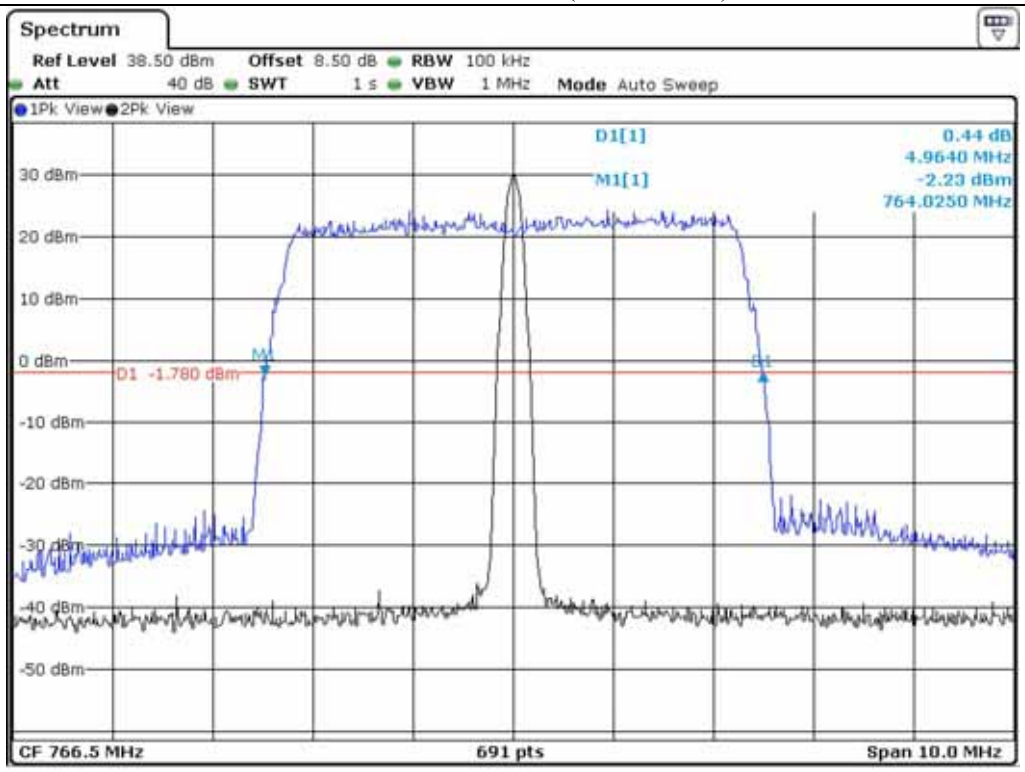


SMR – 26 dB Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

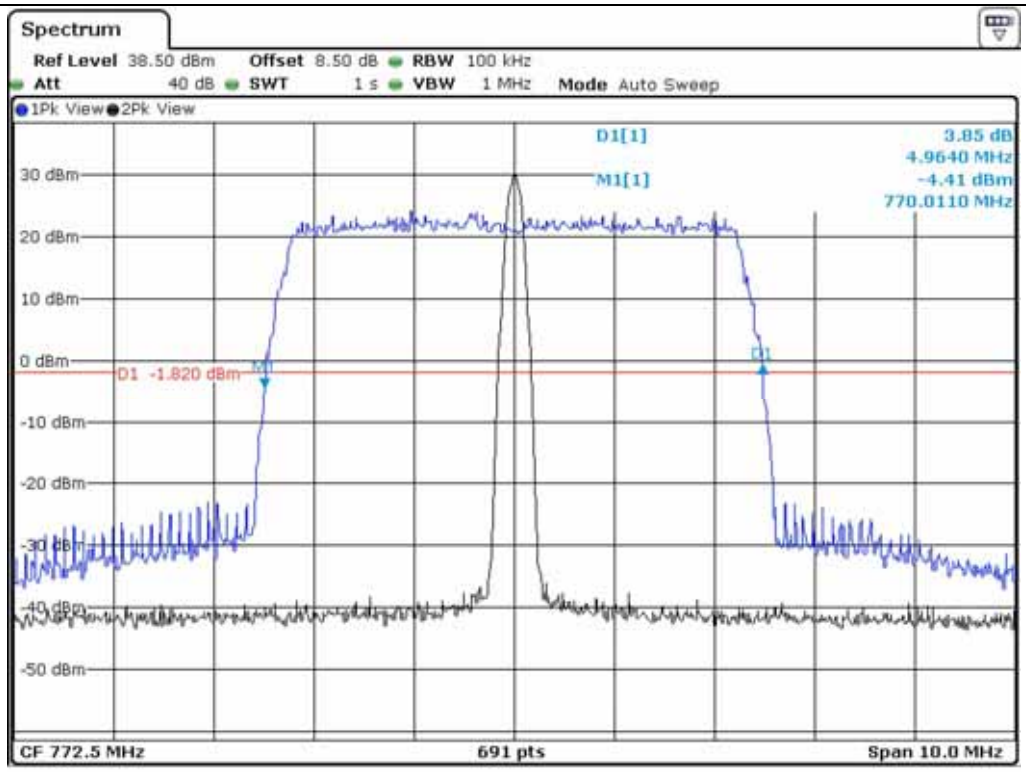


LTE – 26 dB Bandwidth (Low Channel)



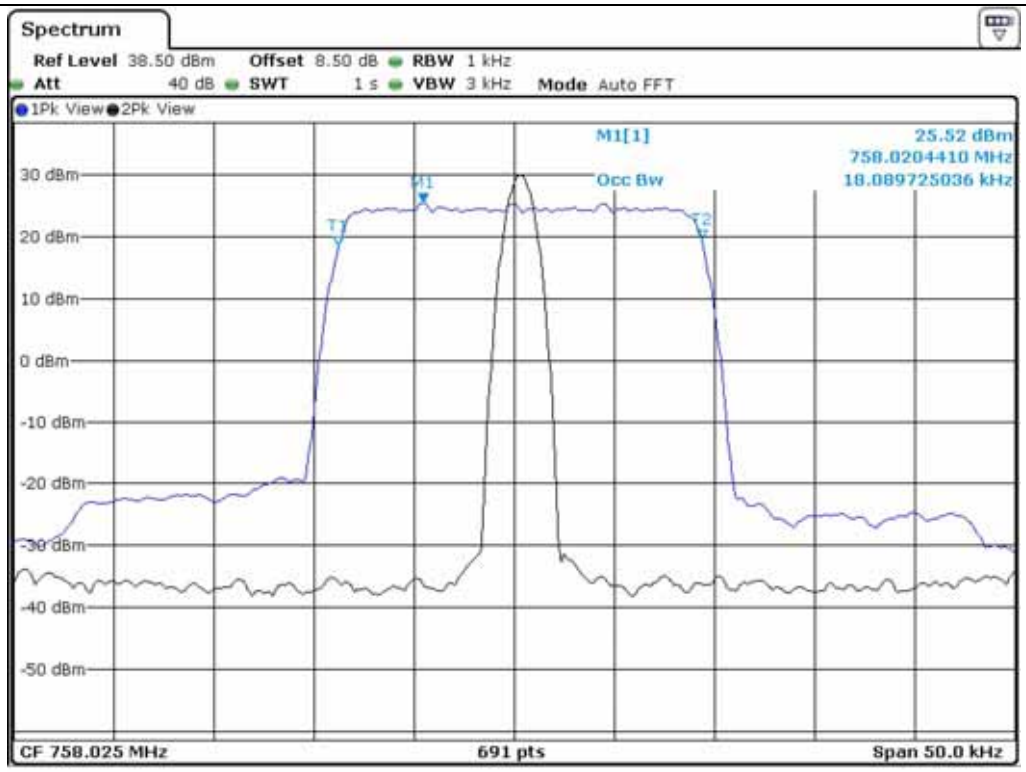
LTE – 26 dB Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

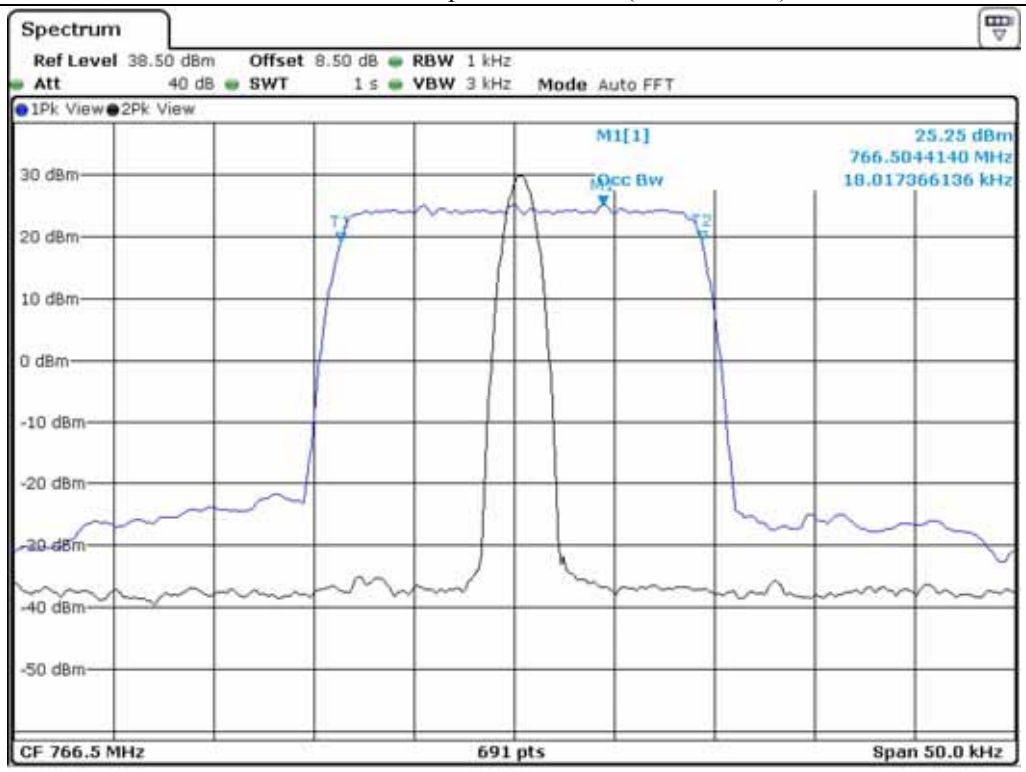


LTE – 26 dB Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

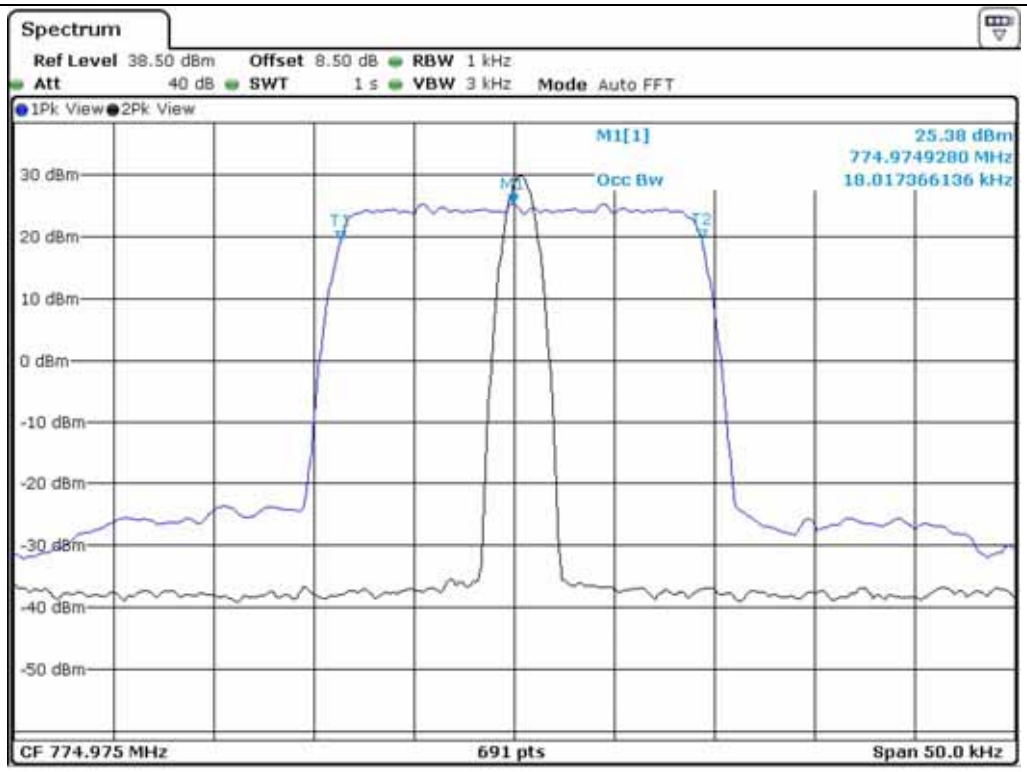


IDEN – 99 % Occupied Bandwidth (Low Channel)



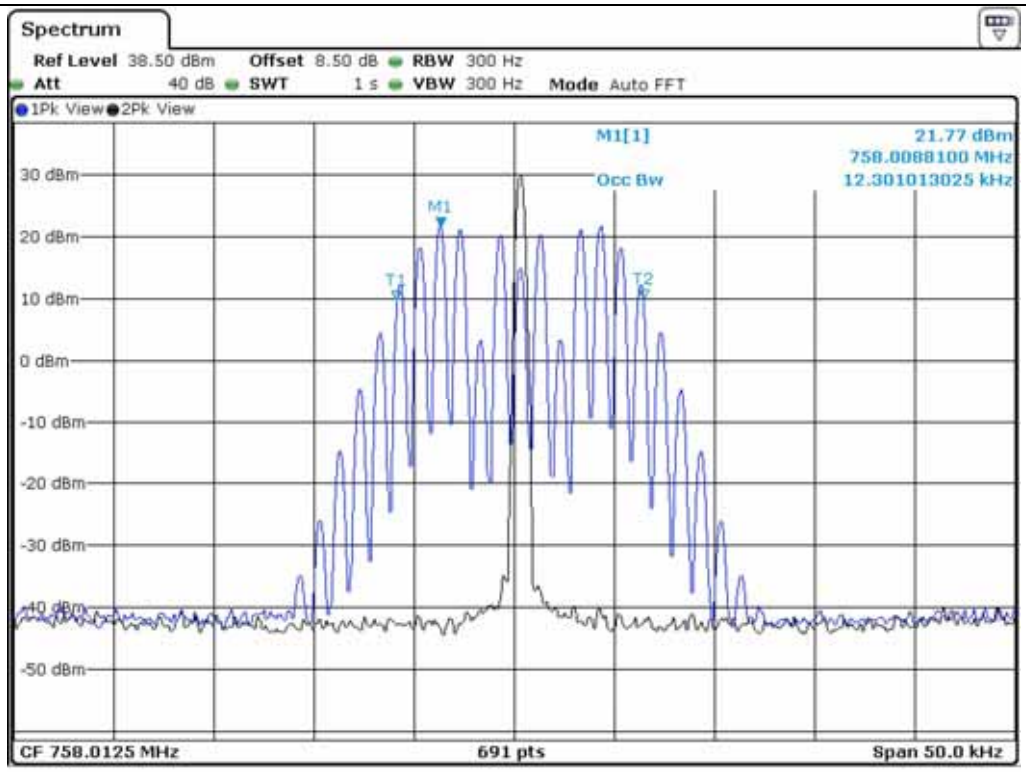
IDEN – 99 % Occupied Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

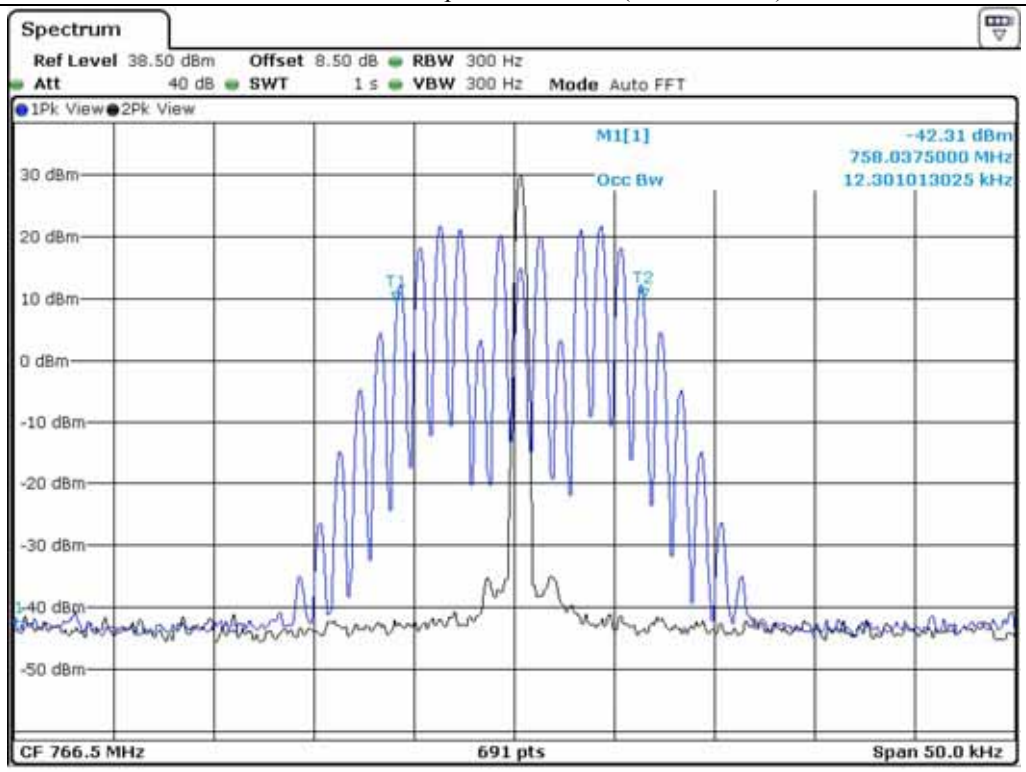


IDEN – 99 % Occupied Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

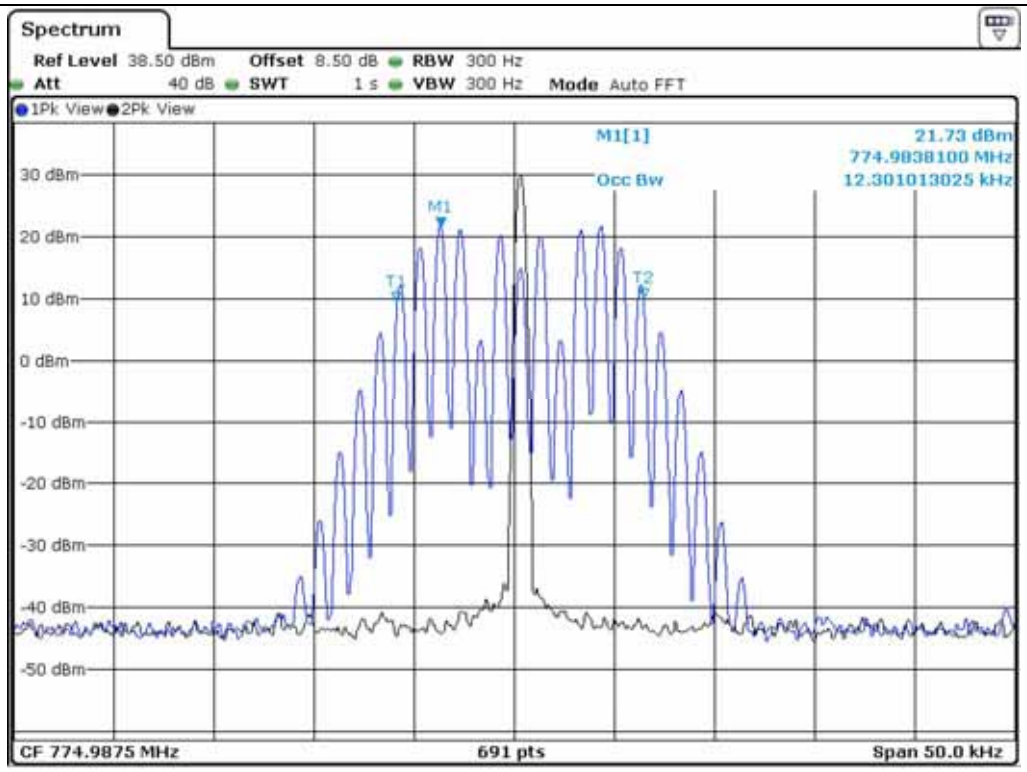


SMR – 99 % Occupied Bandwidth (Low Channel)



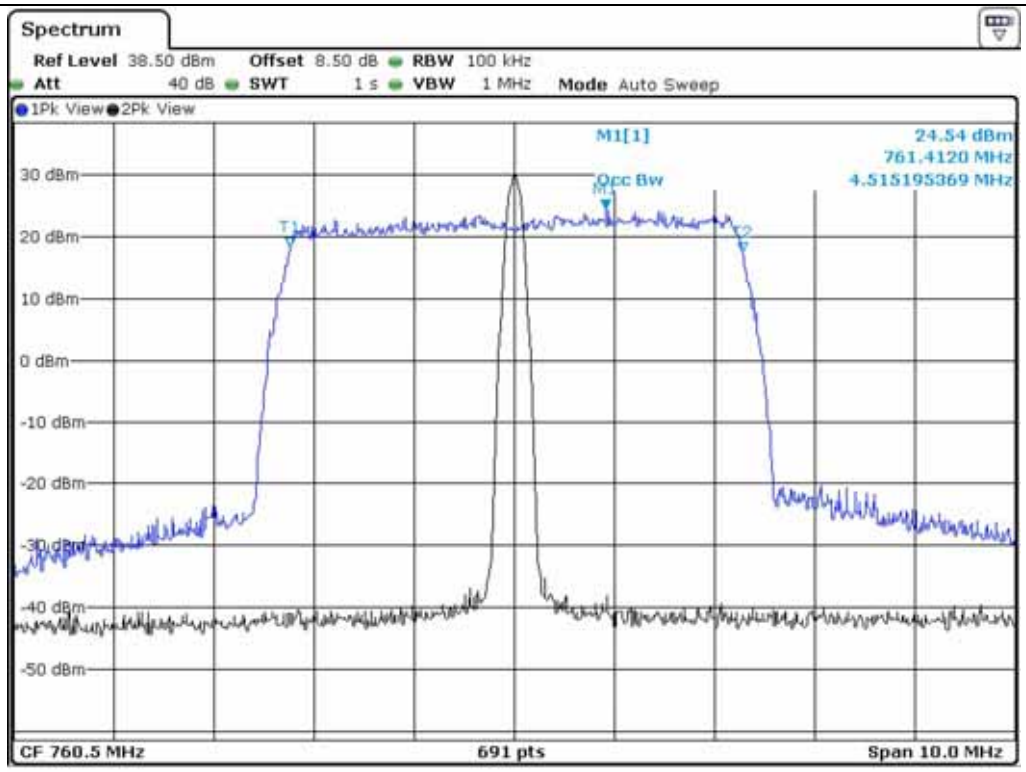
SMR – 99 % Occupied Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

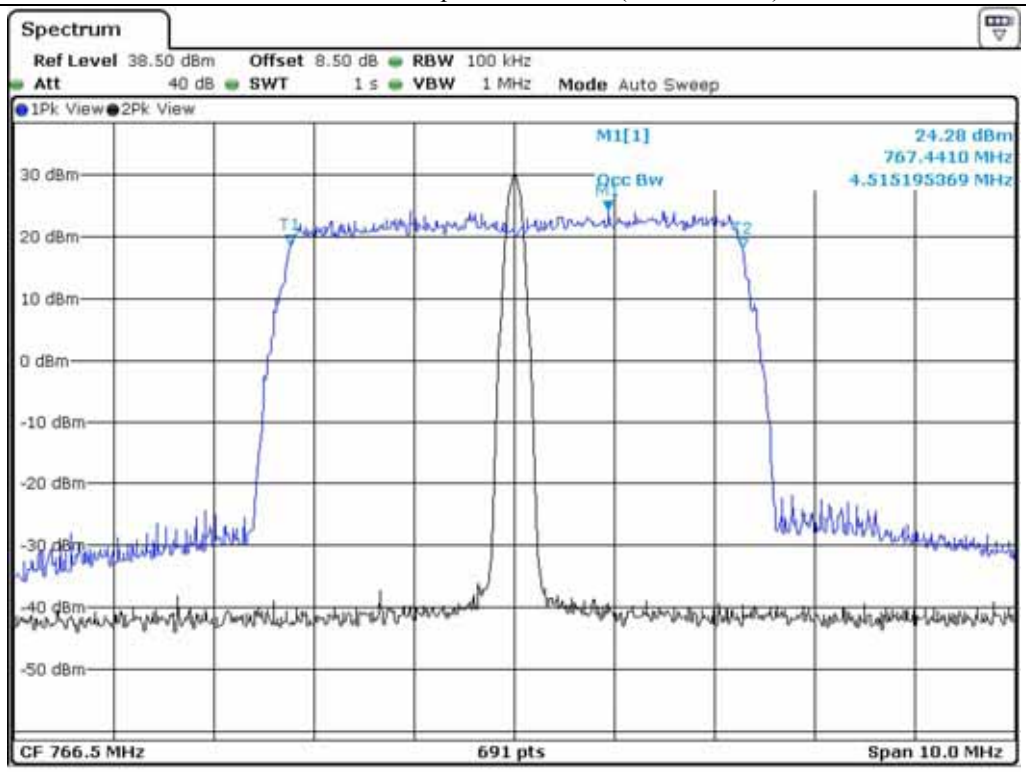


SMR – 99 % Occupied Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

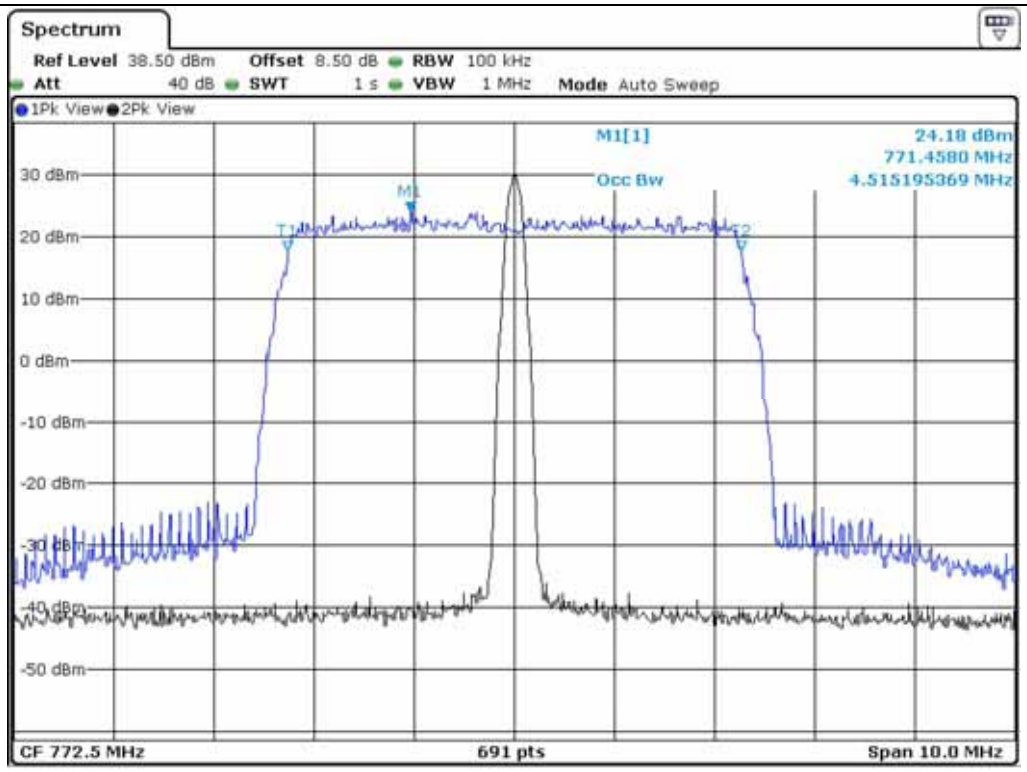


LTE – 99 % Occupied Bandwidth (Low Channel)



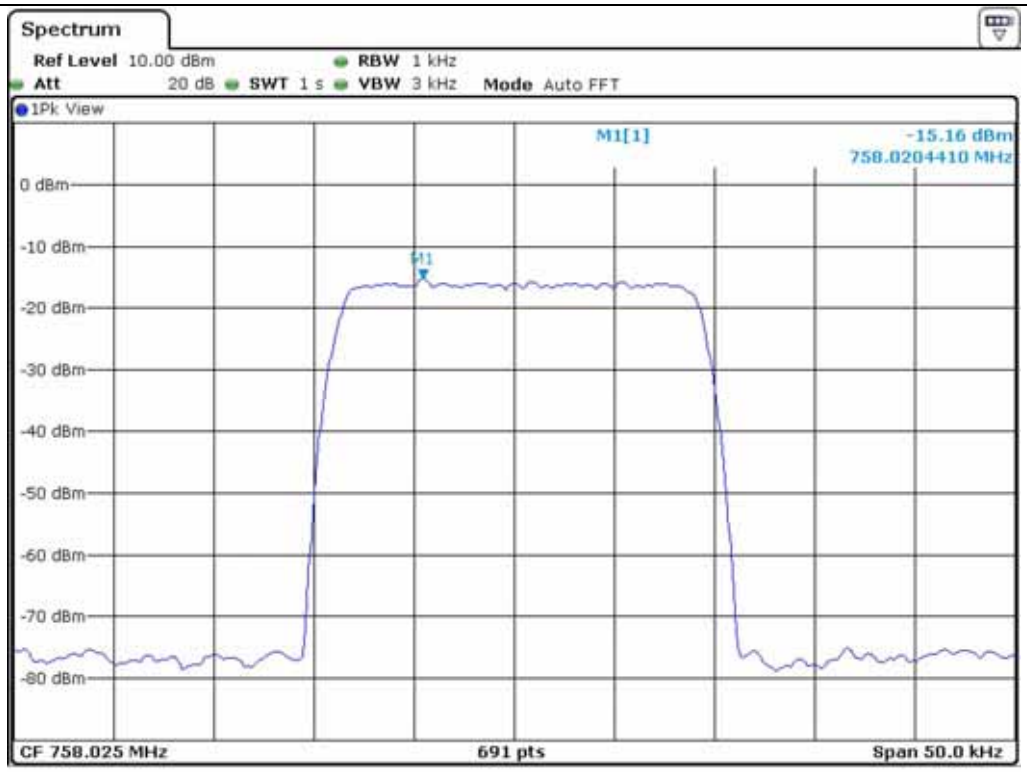
LTE – 99 % Occupied Bandwidth (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

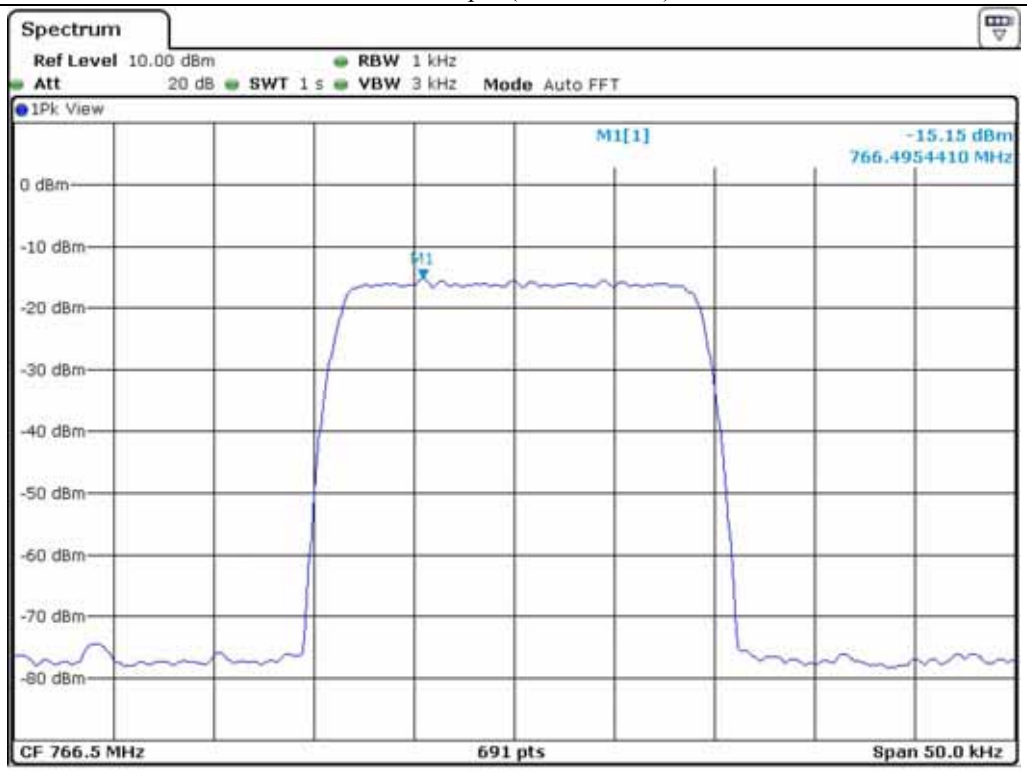


LTE – 99 % Occupied Bandwidth (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

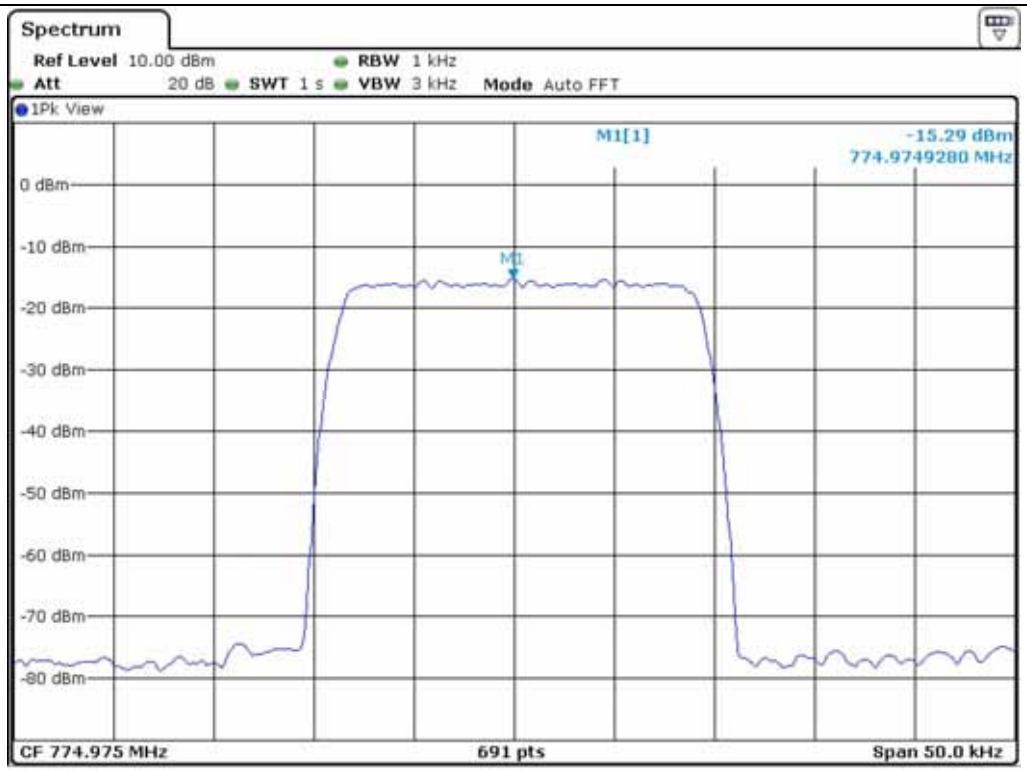


IDEN – Input (Low Channel)



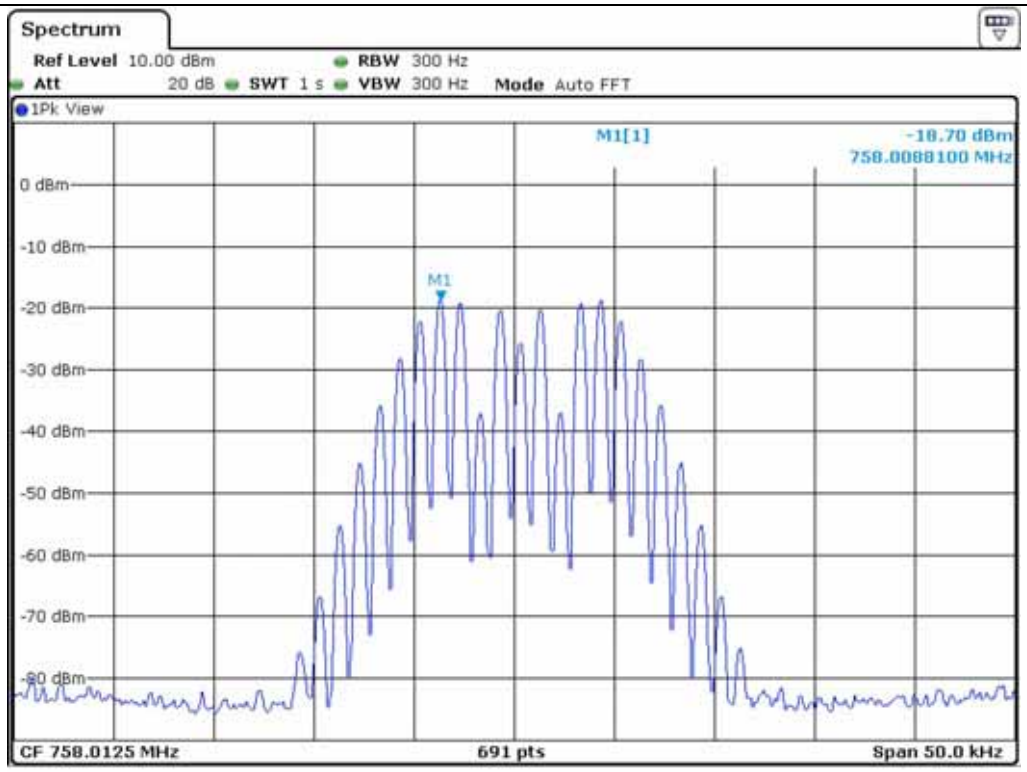
IDEN – Input (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

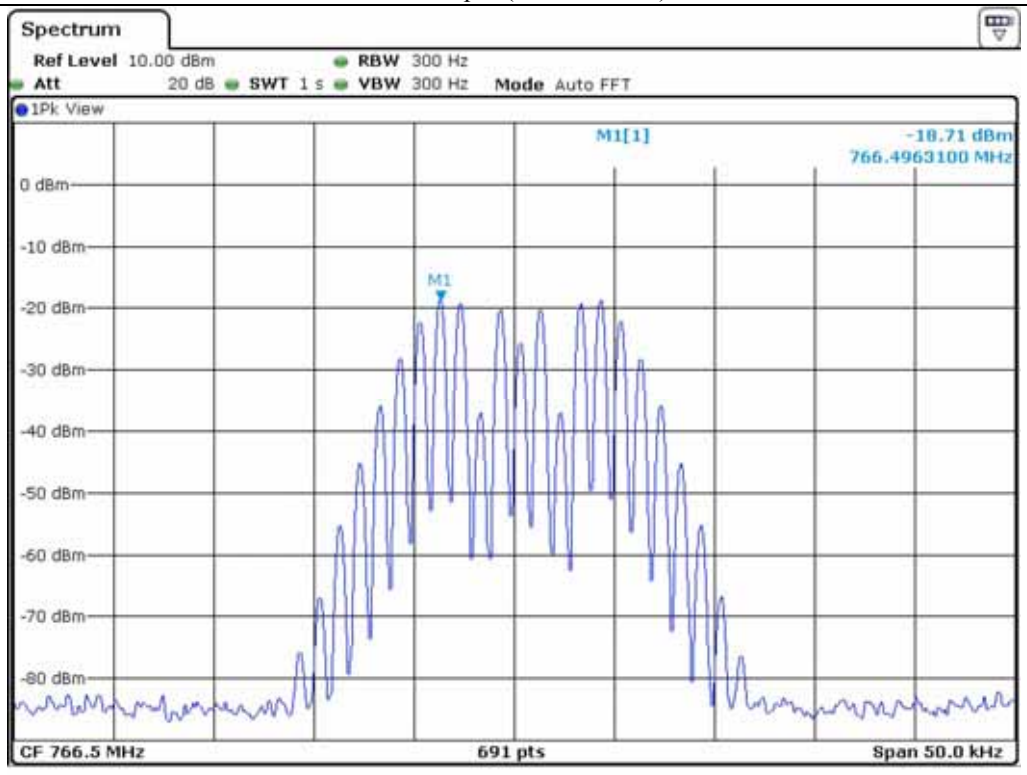


IDEN – Input (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

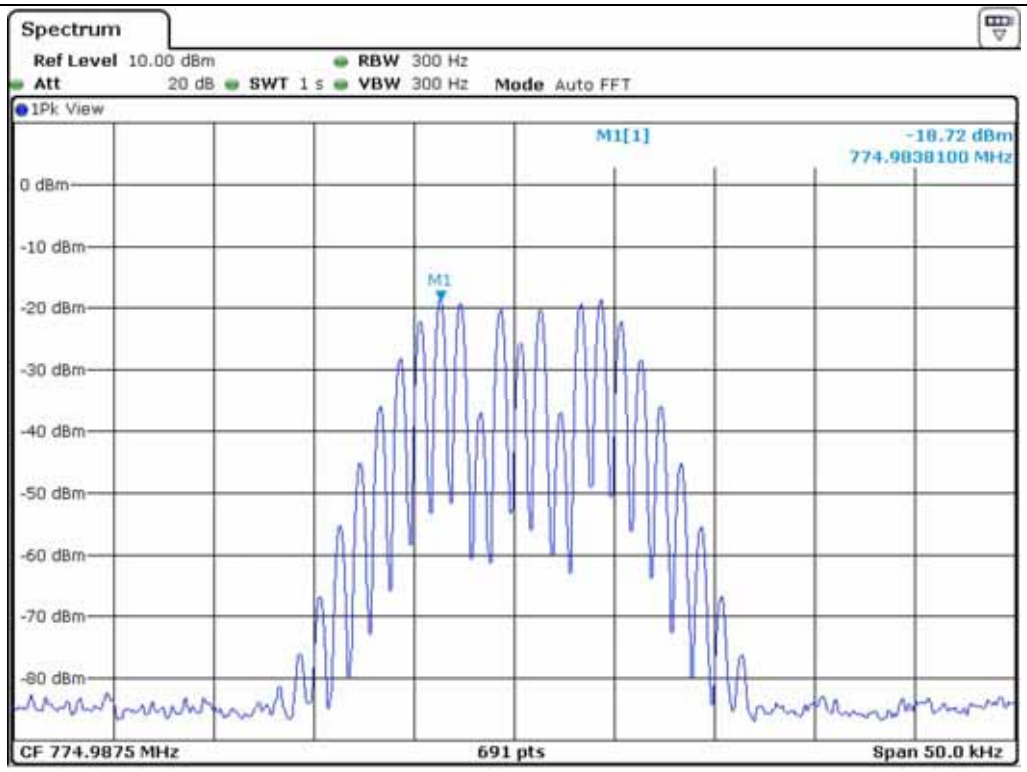


SMR – Input (Low Channel)



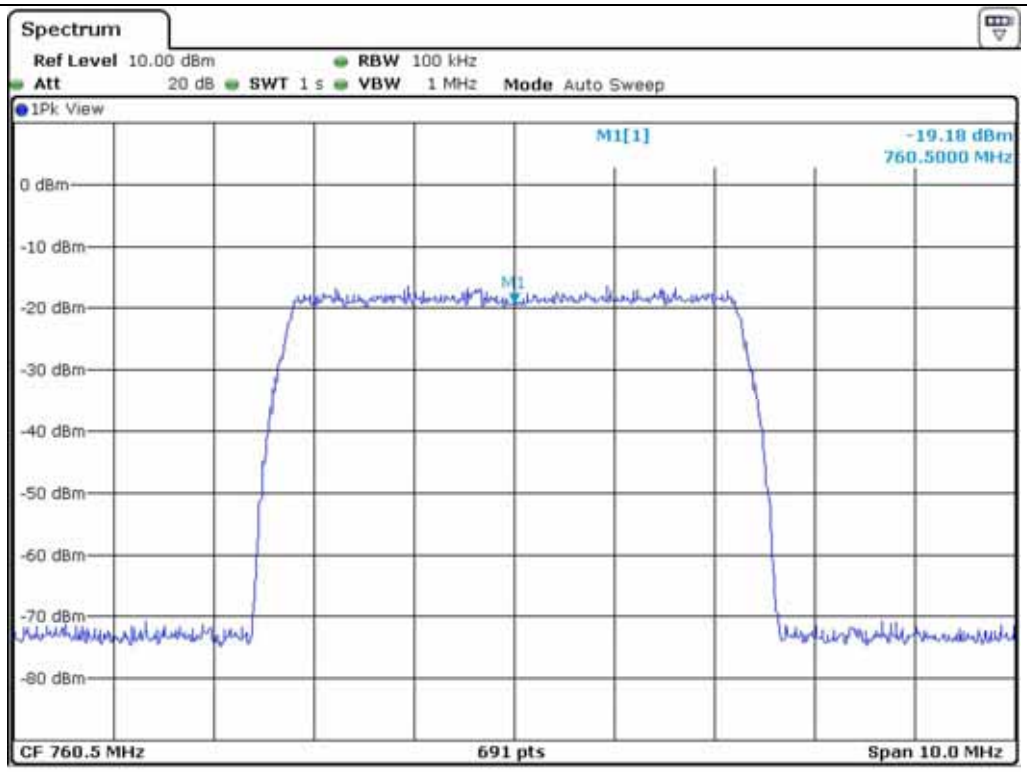
SMR – Input (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

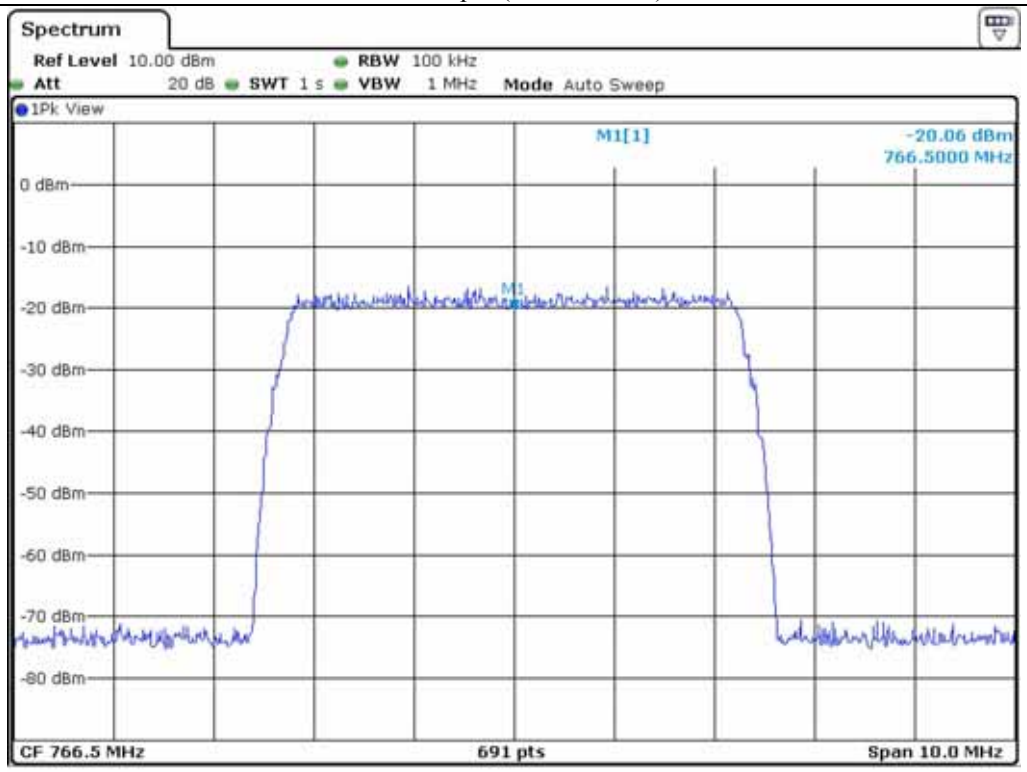


SMR – Input (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

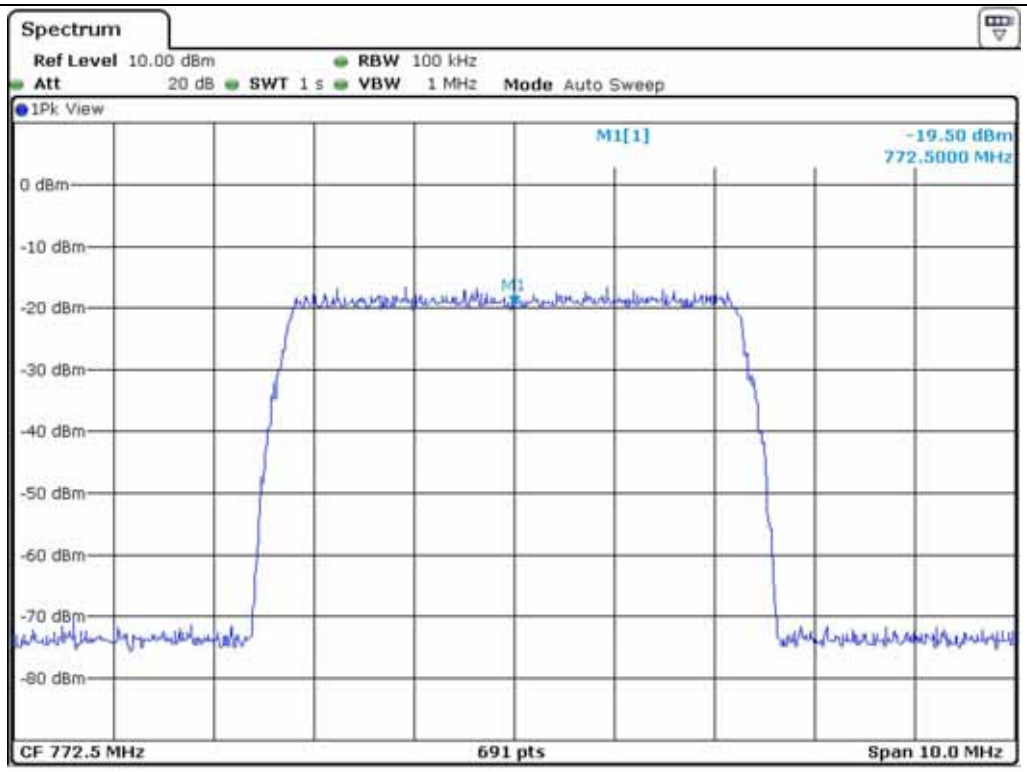


LTE – Input (Low Channel)



LTE – Input (Middle Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



LTE – Input (High Channel)

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7. SPURIOUS EMISSION AT ANTENNA TERMINAL

7.1 Operating environment

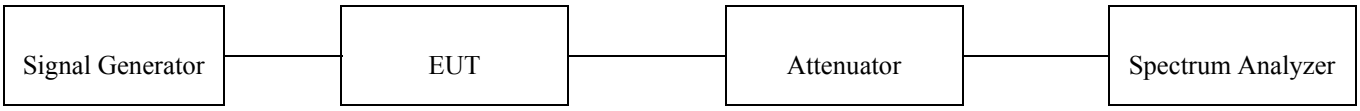
Temperature : 21 °C

Relative humidity : (50 ~ 51) % 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 10 GHz.



7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
☐ -	E4432B	HP	Signal Generator	US38440950	Jun. 01, 2012 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2012 (1Y)
☐ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 12, 2012 (1Y)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 04, 2012 (1Y)
☐ -	FSV30	R/S	Spectrum Analyzer	101372	May. 31, 2012 (1Y)
■ -	SA-26B-6	VENTRIX	Attenuator	N/A	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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7.4 Test data

7.4.1 Test Result for Part 22 H (850C)

-. Test Date : January 11, 2013

-. Frequency range : 30 MHz ~ 10 GHz

-. Result : Pass

Modulation	Harmonic Frequency (MHz)		Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
GSM	Low	665.40	-40.00	0.33	-39.67	-13.00	-26.67
		7 465.00	-26.83	2.50	-24.33		-11.33
	Middle	624.90	-40.50	0.33	-40.17		-27.17
		7 300.00	-26.33	2.50	-23.83		-10.83
	High	679.90	-40.83	0.33	-40.50		-27.50
		7 435.00	-27.17	2.50	-24.67		-11.67
EDGE	Low	642.70	-40.17	0.33	-39.84	-13.00	-26.84
		7 315.00	-26.67	2.50	-24.17		-11.17
	Middle	618.50	-40.67	0.33	-40.34		-27.34
		7 285.00	-27.00	2.50	-24.50		-11.50
	High	691.20	-40.00	0.33	-39.67		-26.67
		7 330.00	-26.67	2.50	-24.17		-11.17
CDMA	Low	610.40	-40.67	0.33	-40.34	-13.00	-27.34
		7 300.00	-26.50	2.50	-24.00		-11.00
	Middle	557.00	-40.17	0.33	-39.84		-26.84
		7 165.00	-27.17	2.50	-24.67		-11.67
	High	633.00	-40.33	0.33	-40.00		-27.00
		7 300.00	-26.50	2.50	-24.00		-11.00
1xEVDO	Low	624.90	-40.67	0.33	-40.34	-13.00	-27.34
		7 330.00	-27.00	2.50	-24.50		-11.50
	Middle	599.10	-40.33	0.33	-40.00		-27.00
		7 360.00	-27.67	2.50	-25.17		-12.17
	High	605.50	-40.50	0.33	-40.17		-27.17
		7 255.00	-26.83	2.50	-24.33		-11.33

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Modulation	Harmonic Frequency (MHz)		Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
WCDMA	Low	613.60	-40.83	0.33	-40.50	-13.00	-27.50
		7 270.00	-27.17	2.50	-24.67		-11.67
	Middle	639.50	-40.33	0.33	-40.00		-27.00
		7 300.00	-27.00	2.50	-24.50		-11.50
	High	709.00	-40.17	0.33	-39.84		-26.84
		7 315.00	-26.83	2.50	-24.33		-11.33

According to Part 22 H, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0 dBm.

Tested by: Ki-Hong, Nam / Senior Engineer

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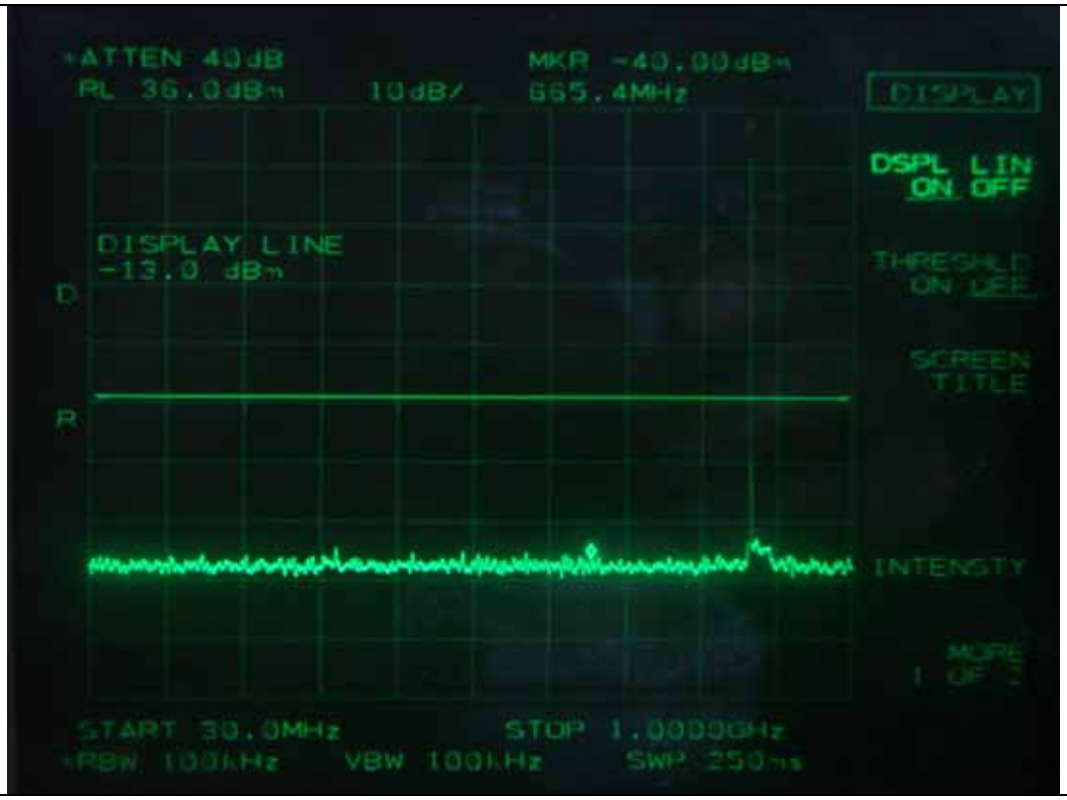
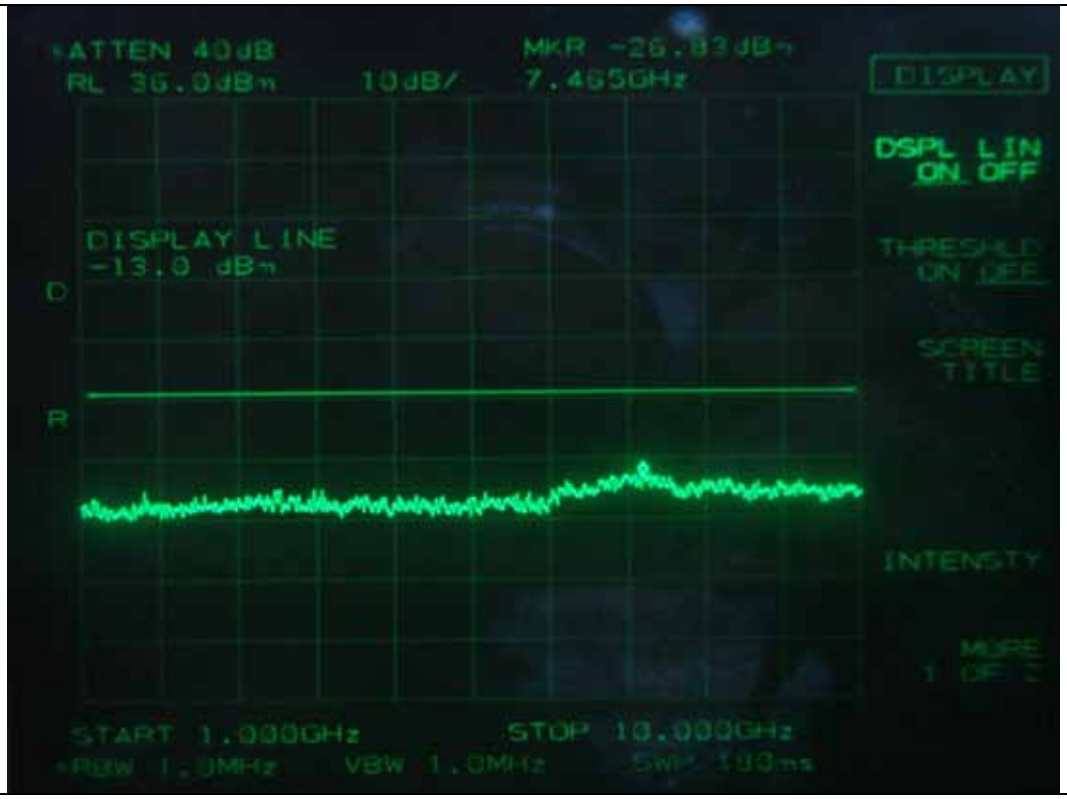


GSM – Low Channel



GSM – Low Channel

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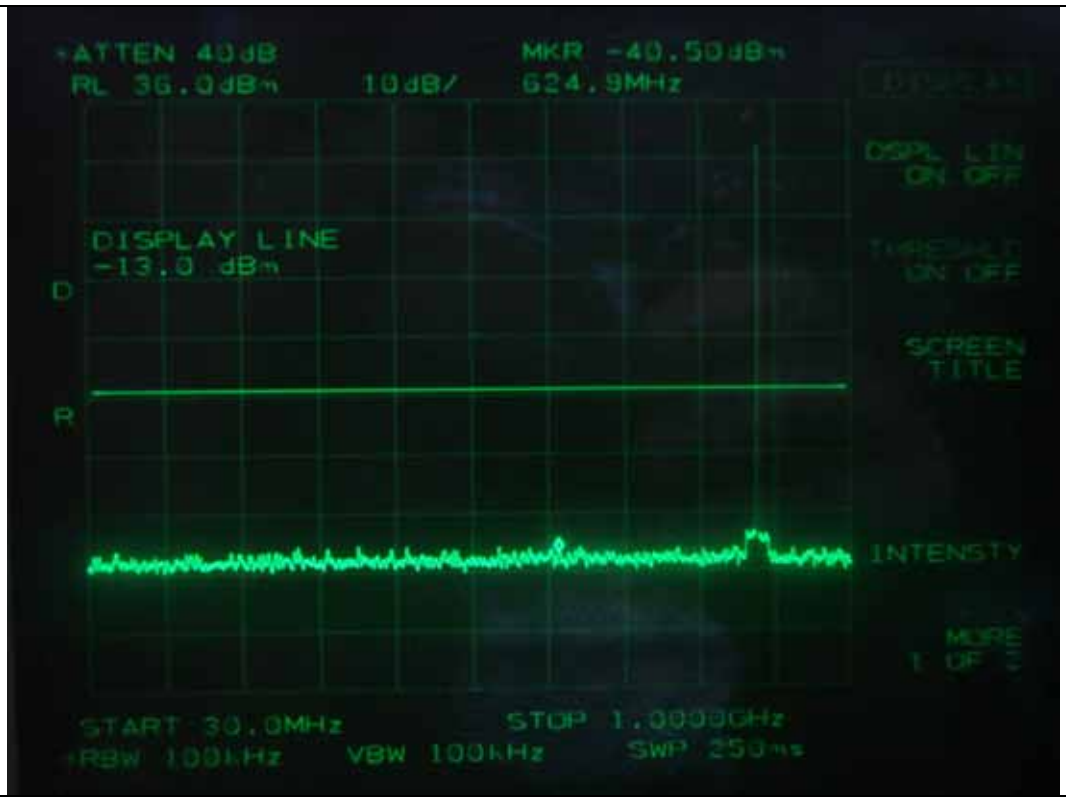
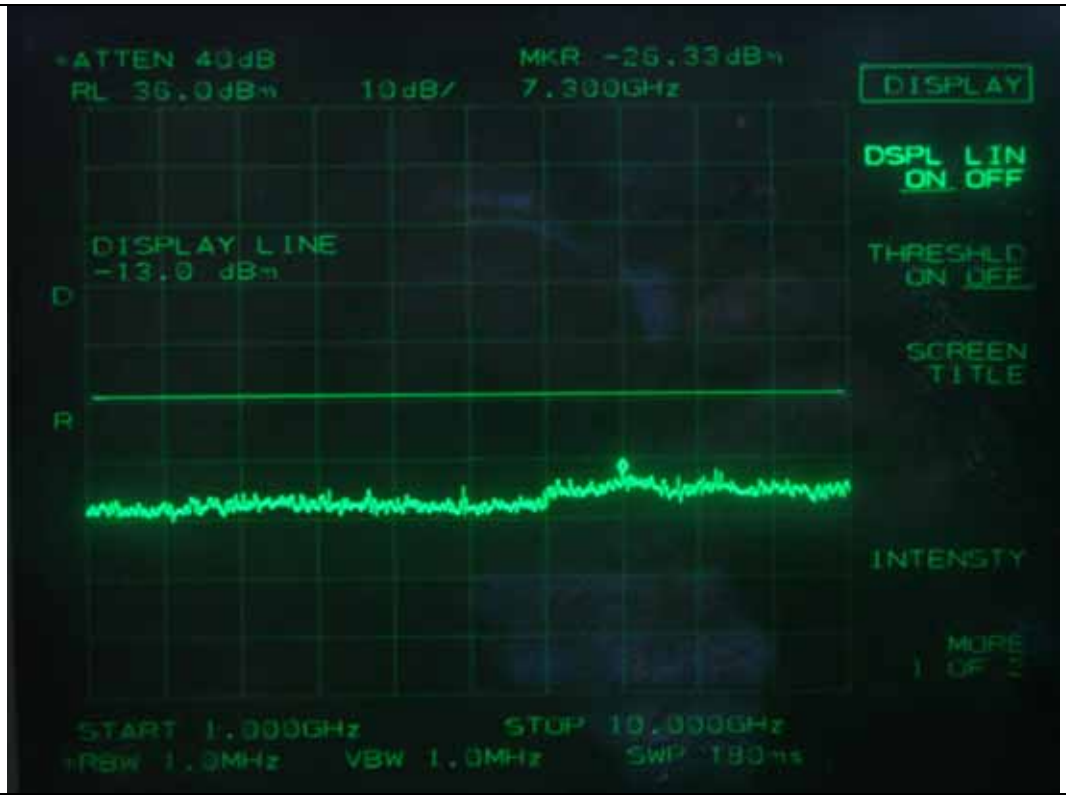


GSM – Middle Channel



GSM – Middle Channel

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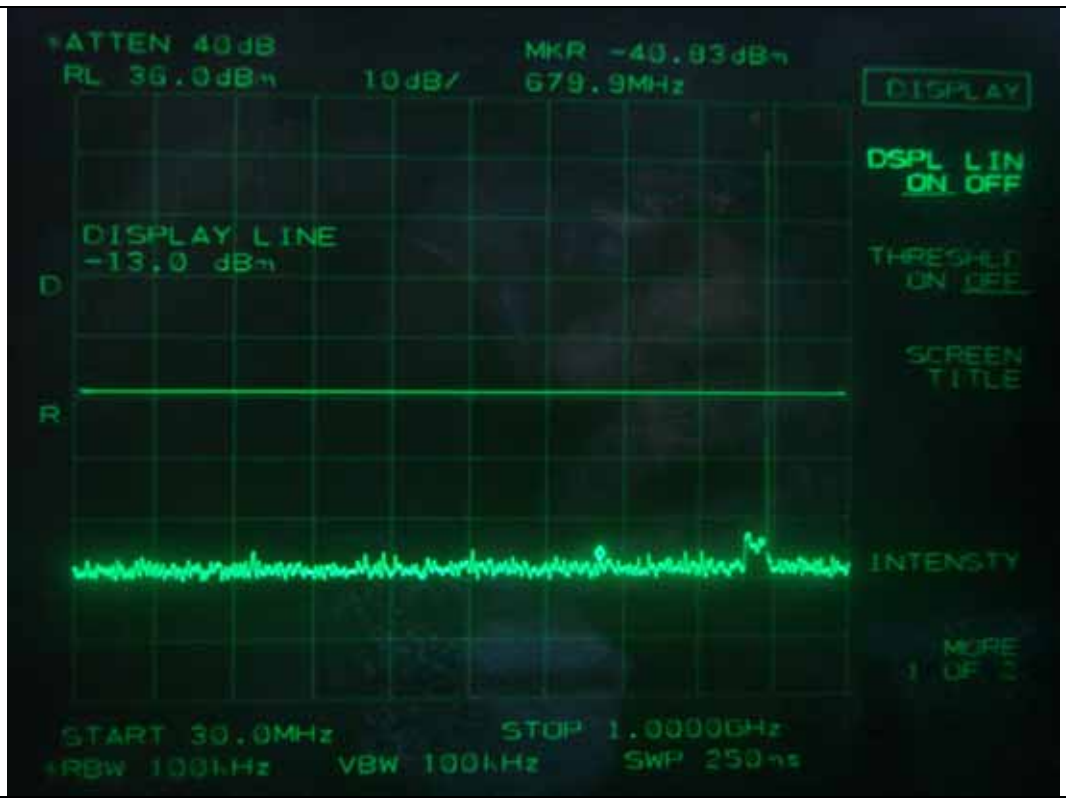
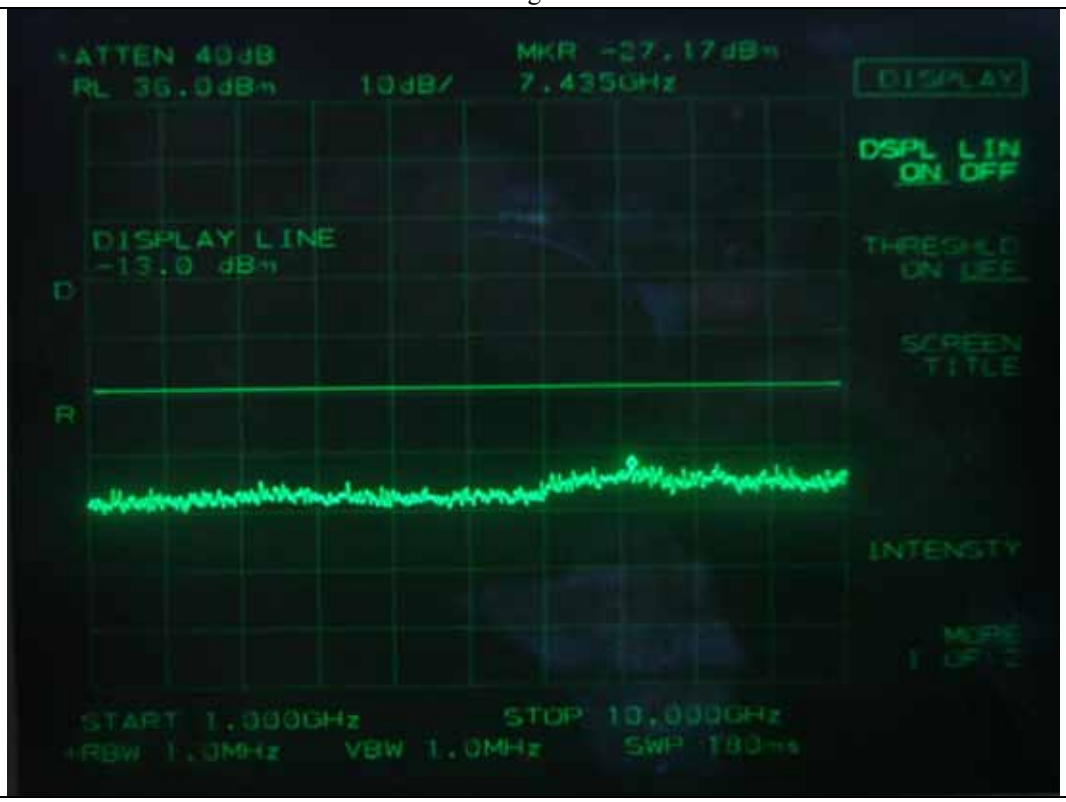


GSM – High Channel



GSM – High Channel

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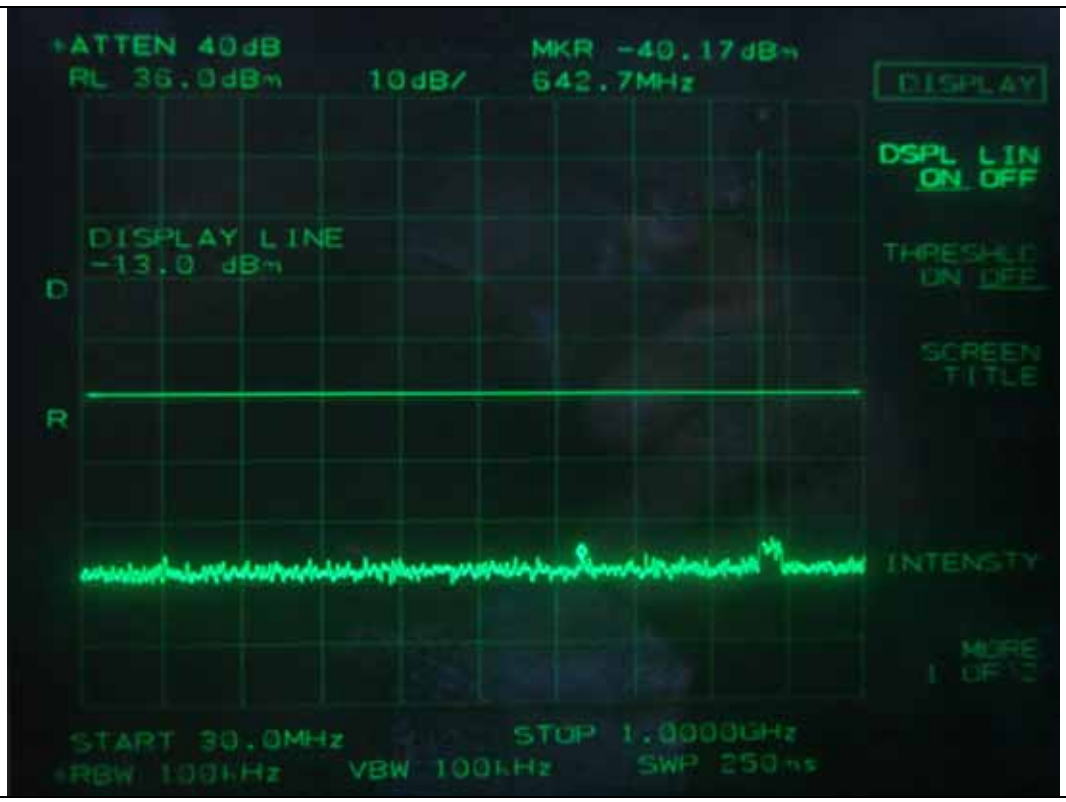
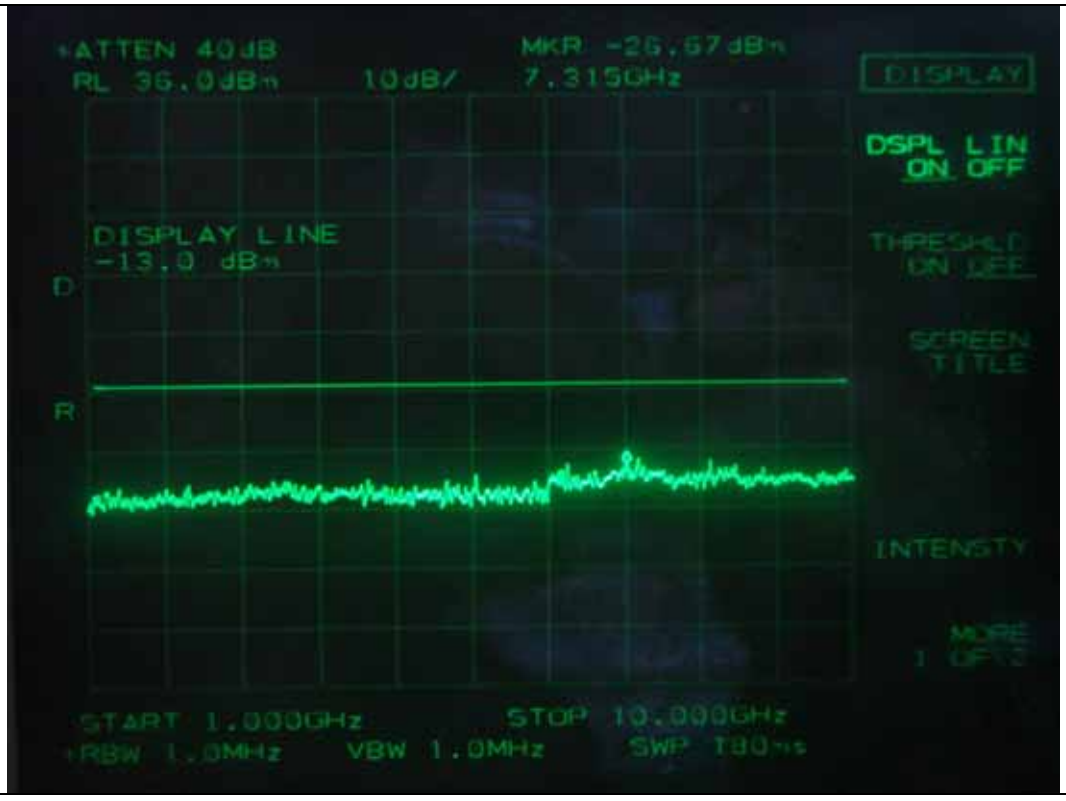


EDGE – Low Channel



EDGE – Low Channel

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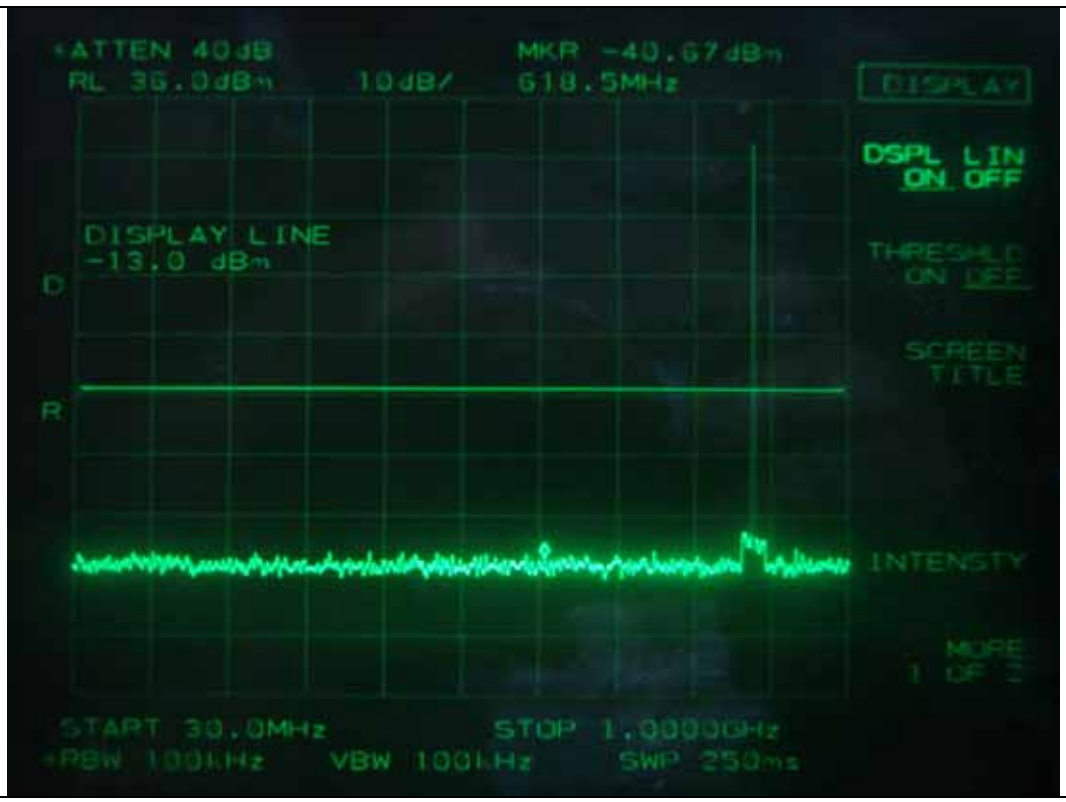
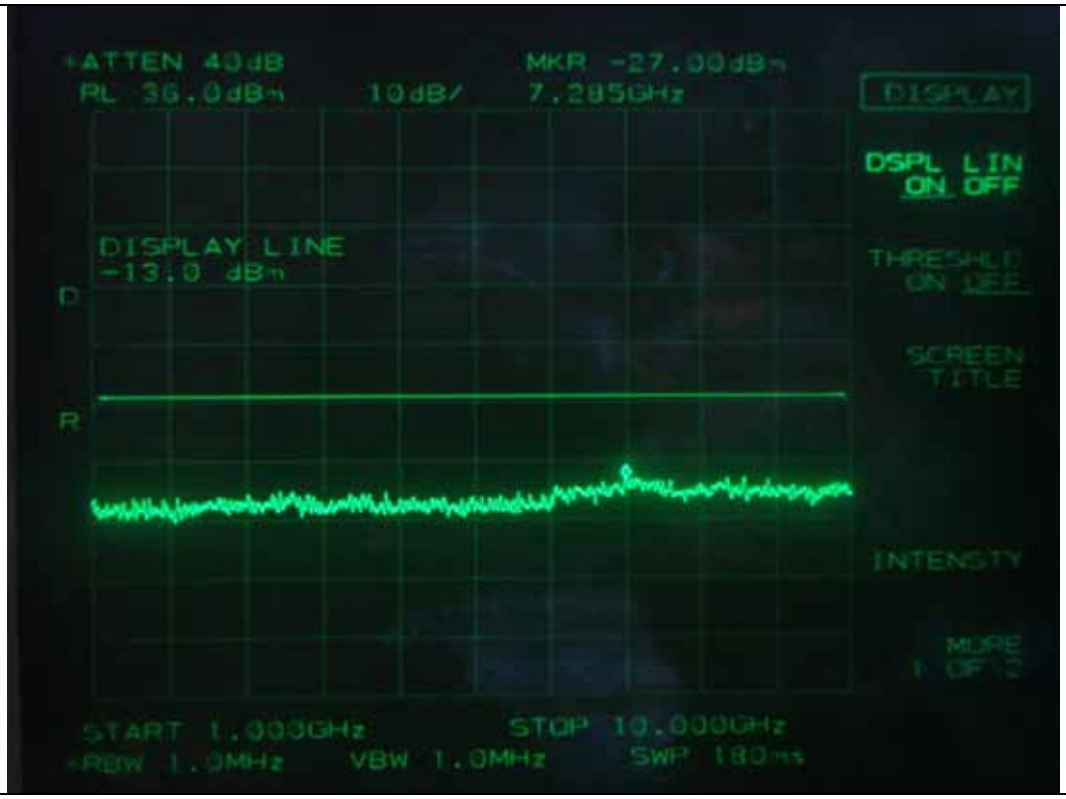


EDGE – Middle Channel



EDGE – Middle Channel

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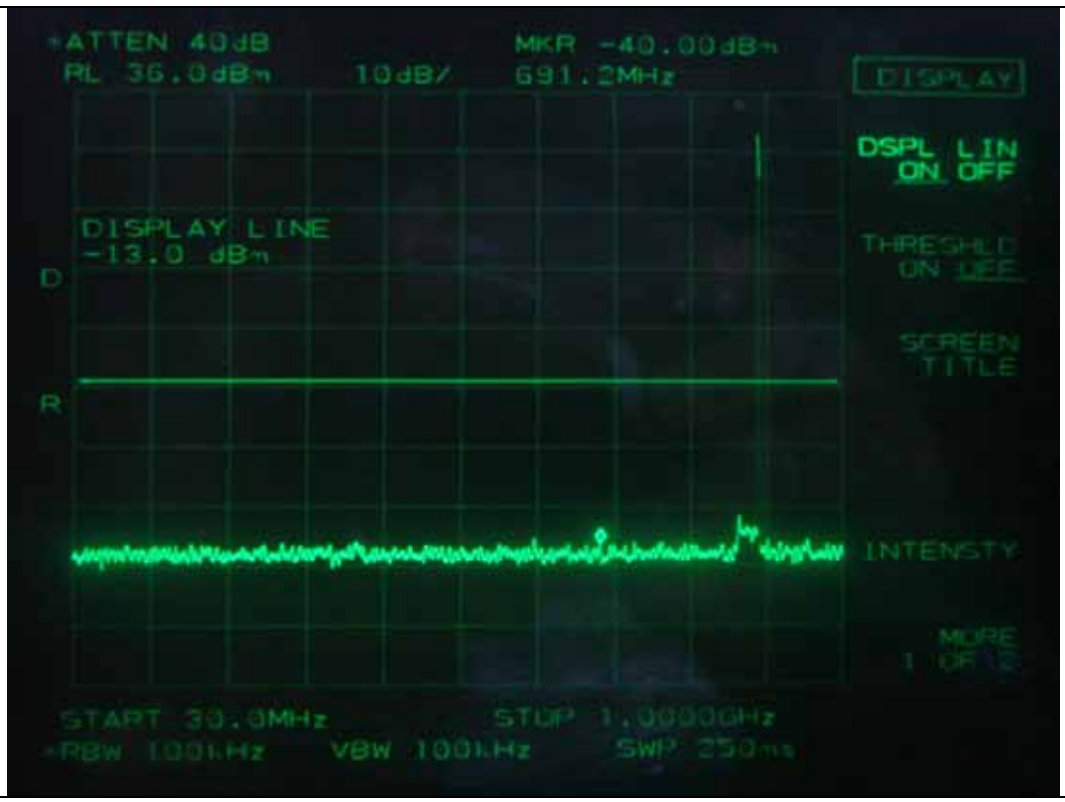
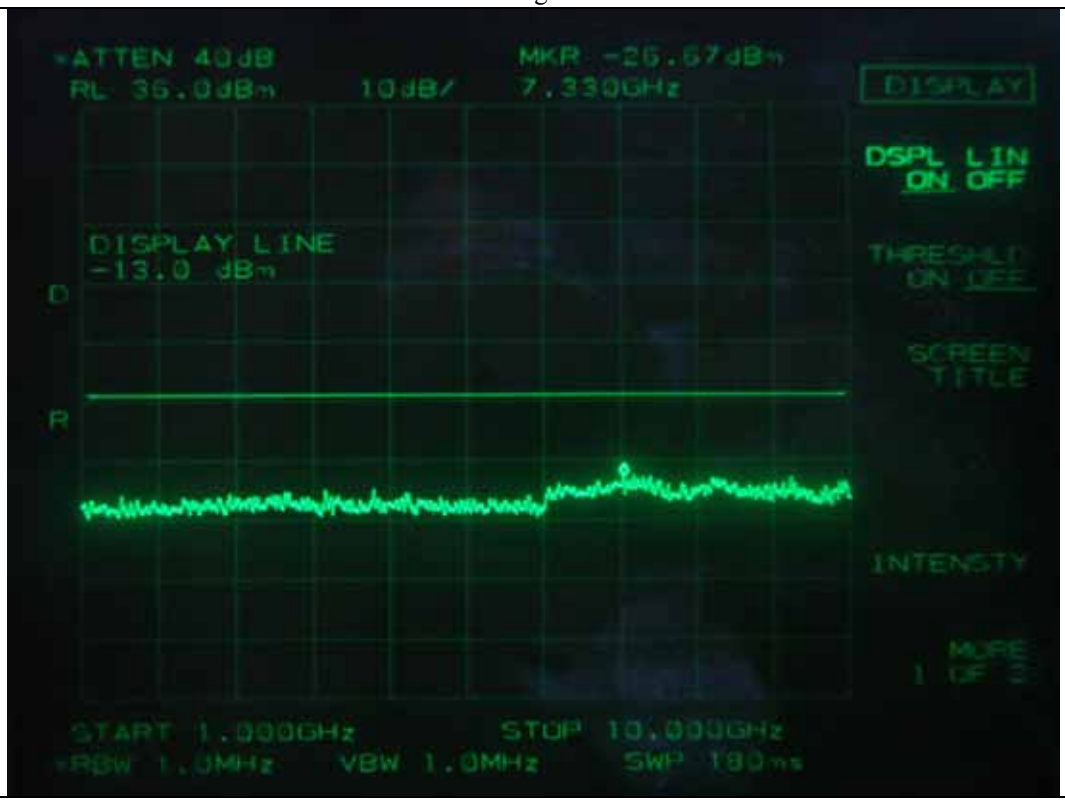


EDGE – High Channel



EDGE – High Channel

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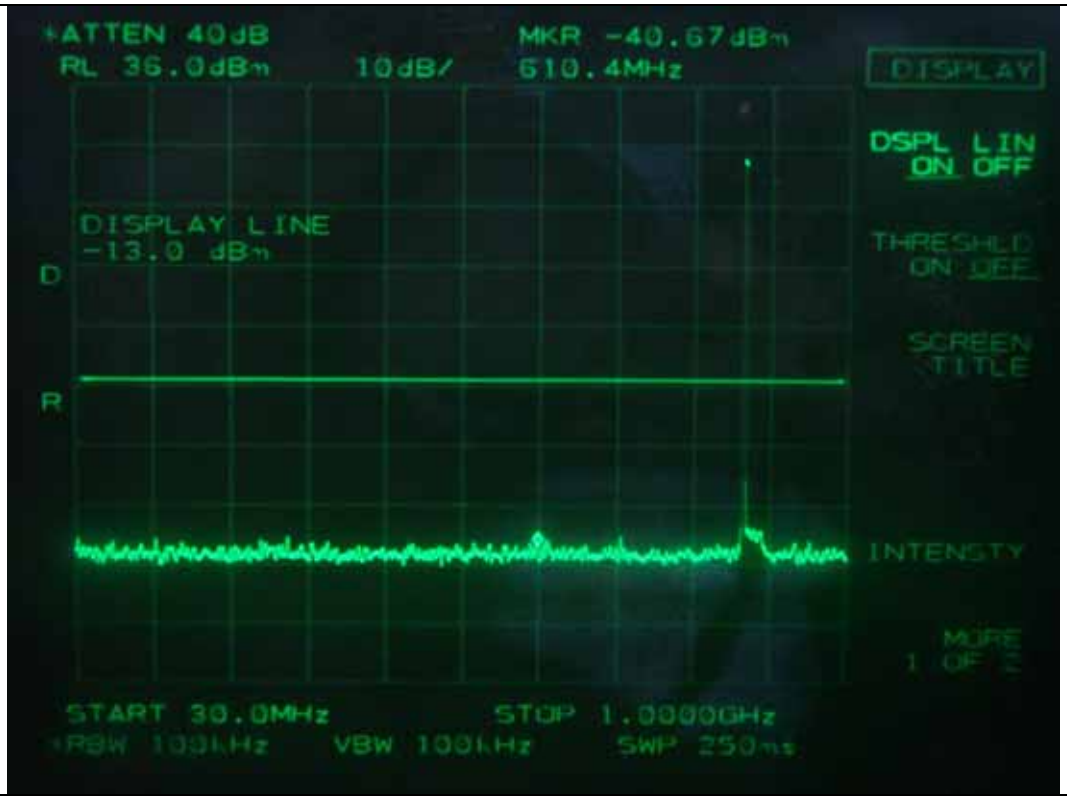
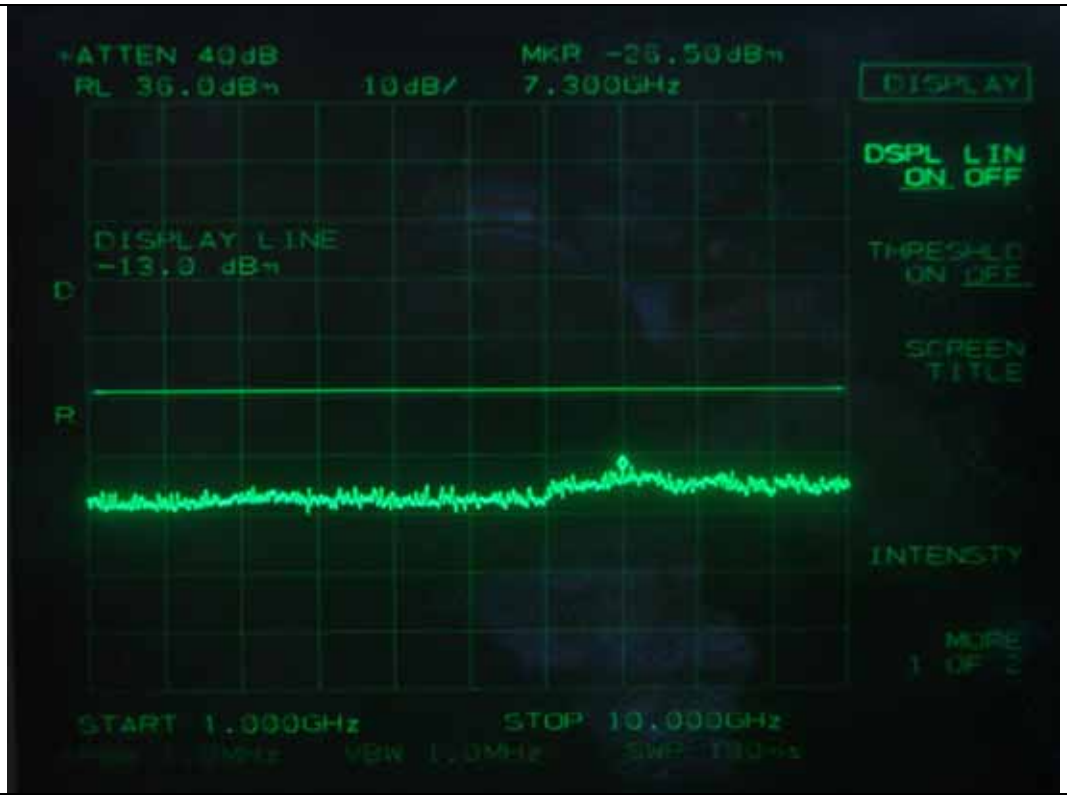


CDMA – Low Channel



CDMA – Low Channel

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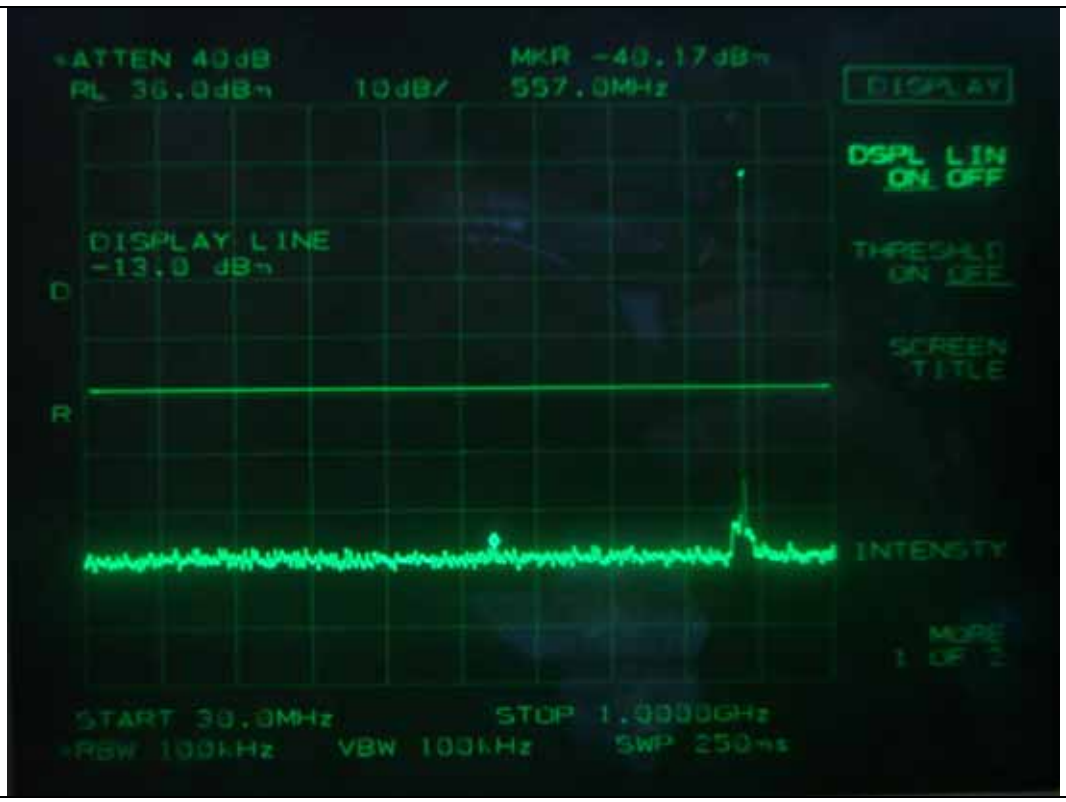
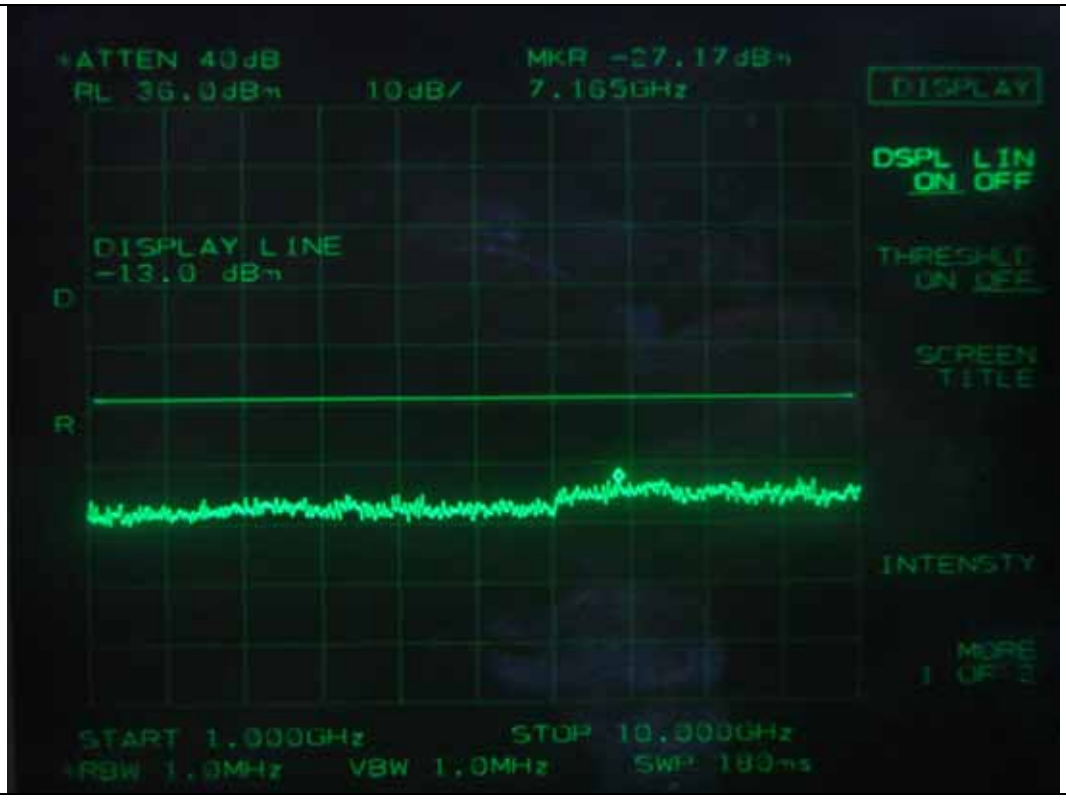


CDMA – Middle Channel



CDMA – Middle Channel

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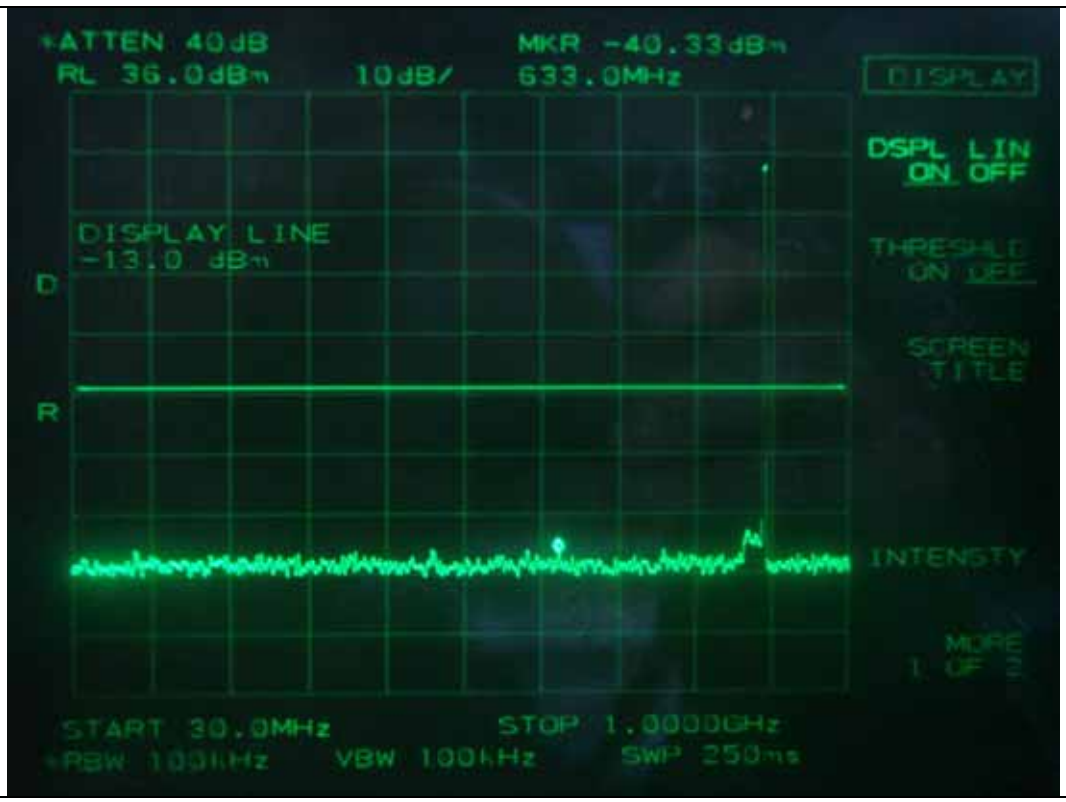
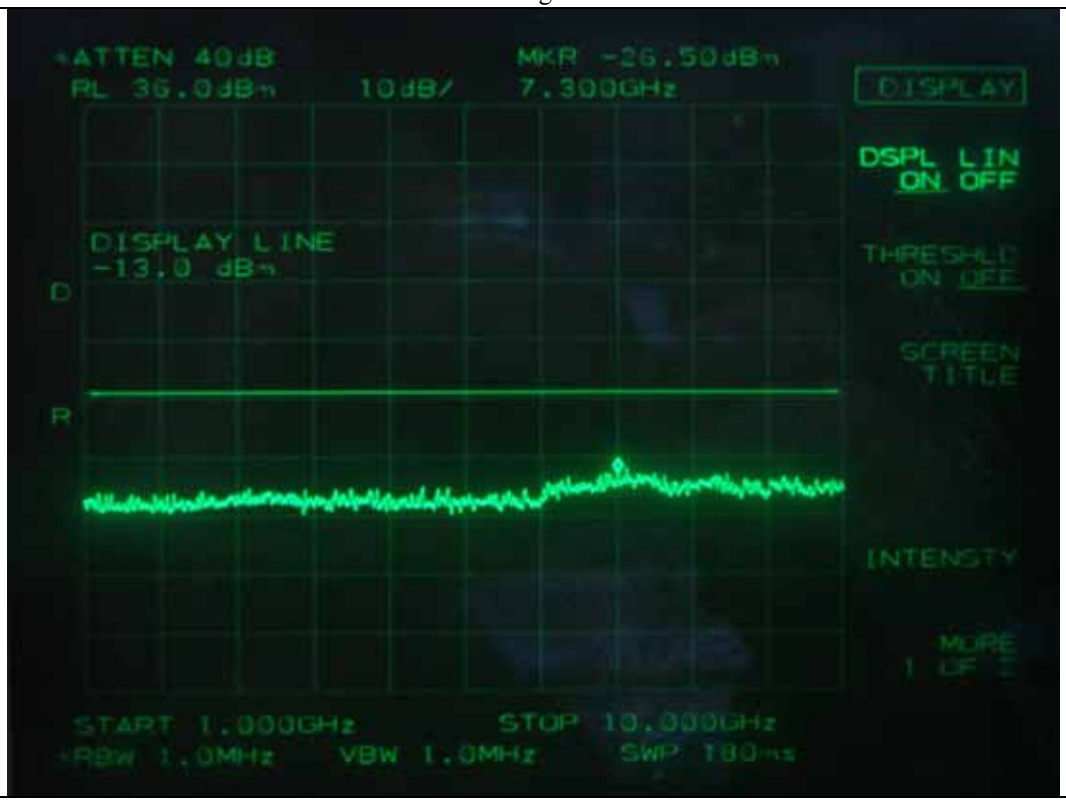


CDMA – High Channel



CDMA – High Channel

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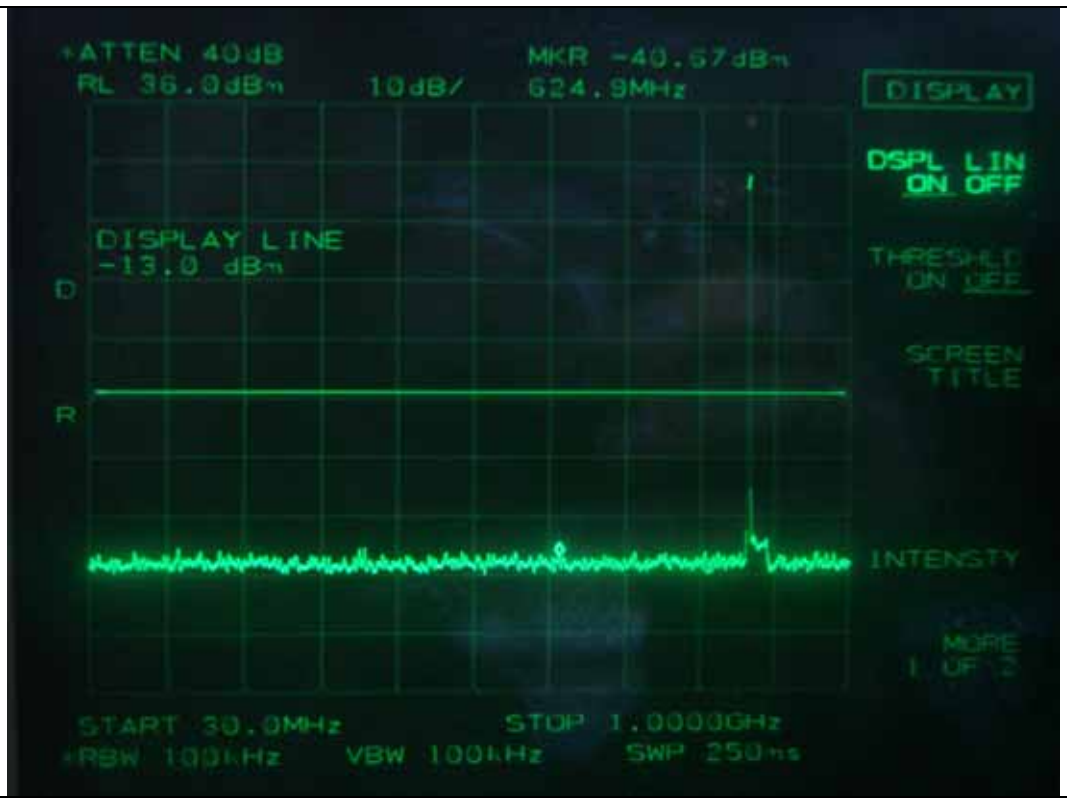
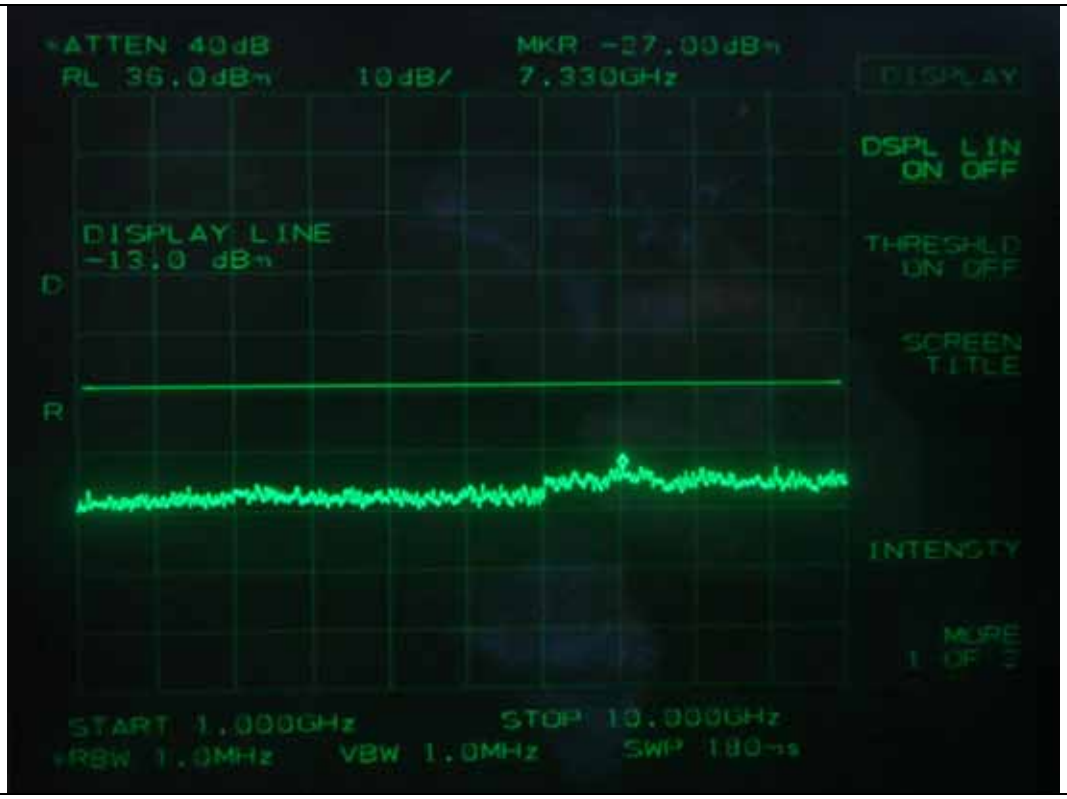


1xEVDO – Low Channel



1xEVDO – Low Channel

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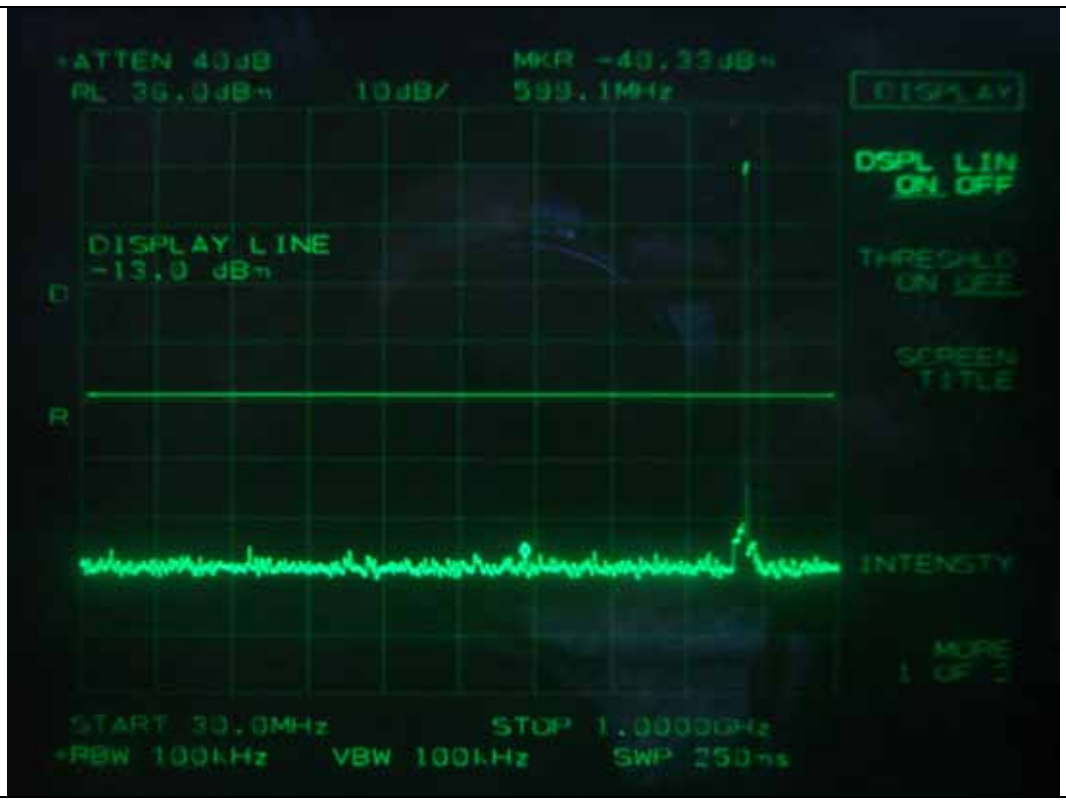
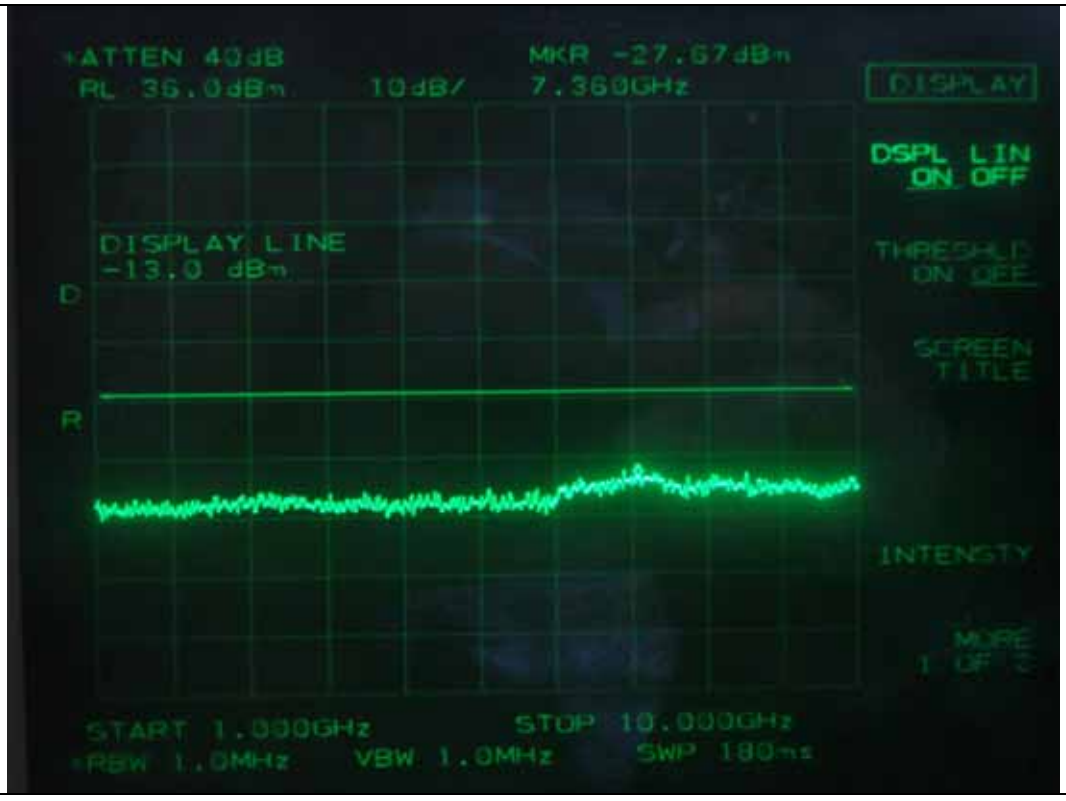


1xEVDO – Middle Channel



1xEVDO – Middle Channel

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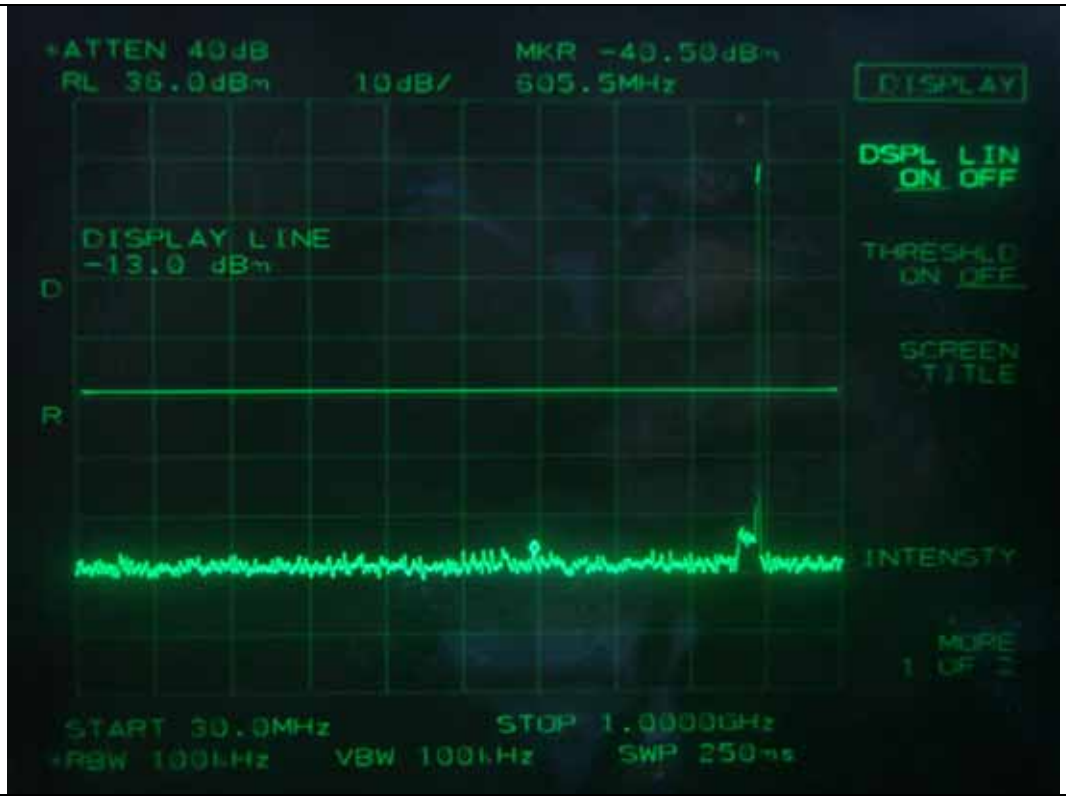
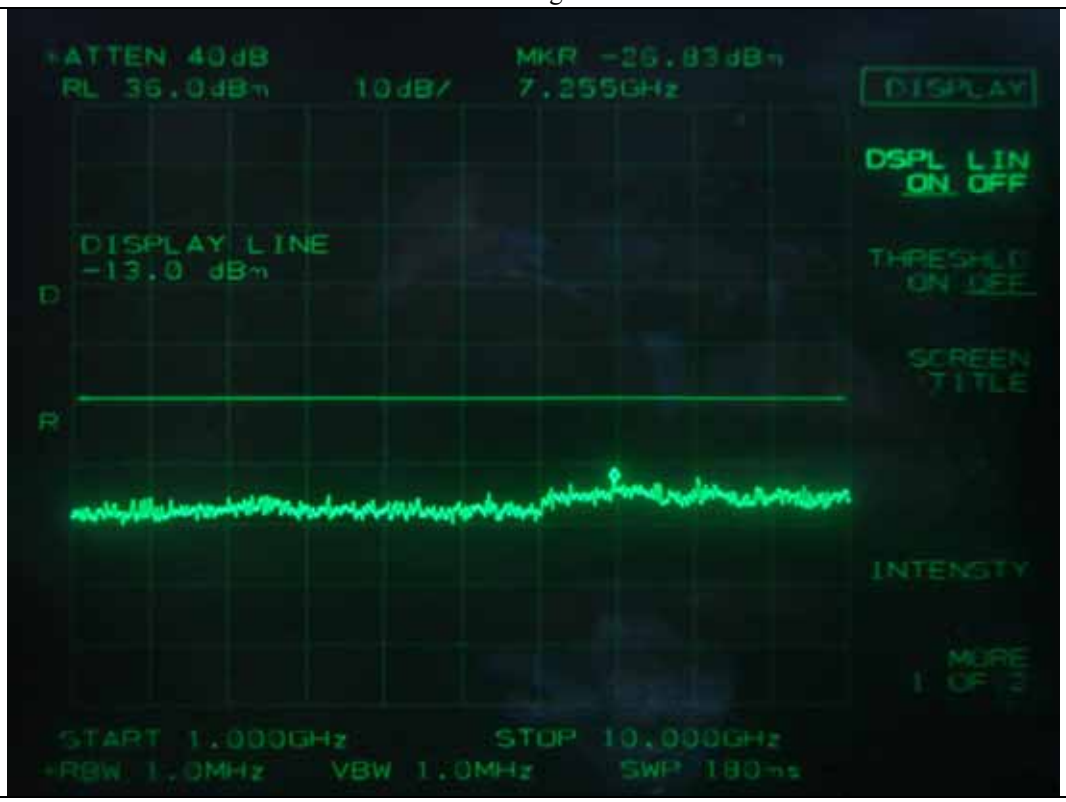


1xEVDO – High Channel



1xEVDO – High Channel

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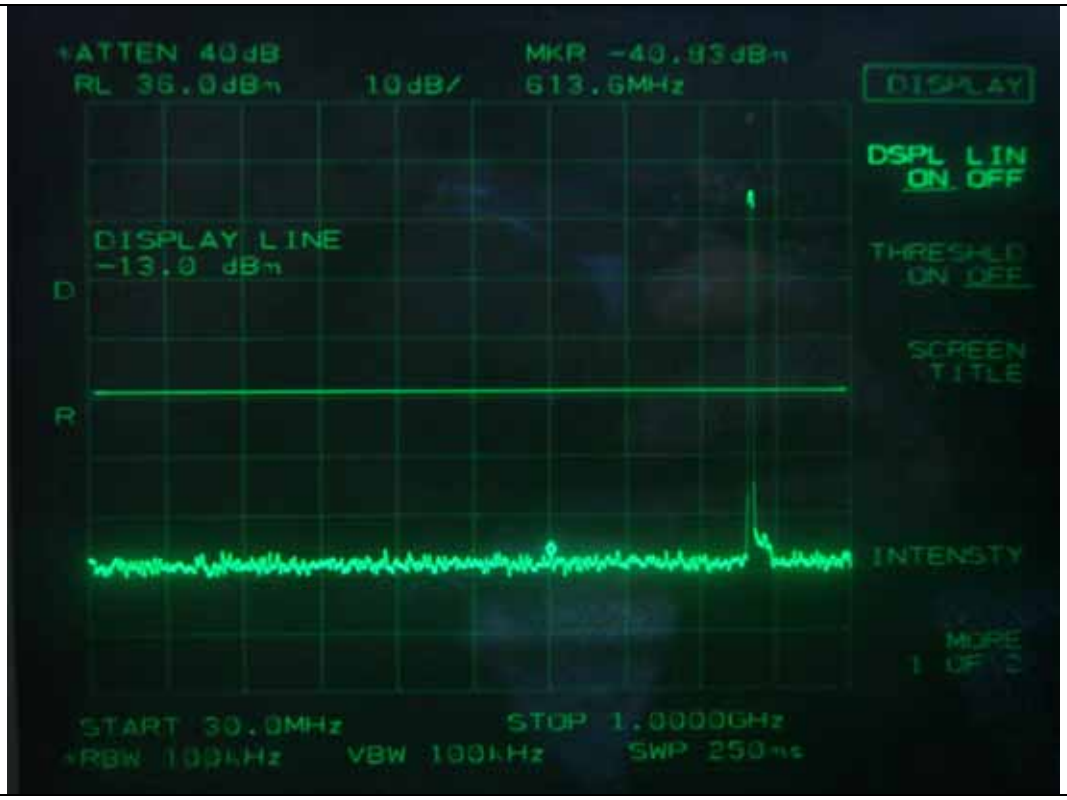
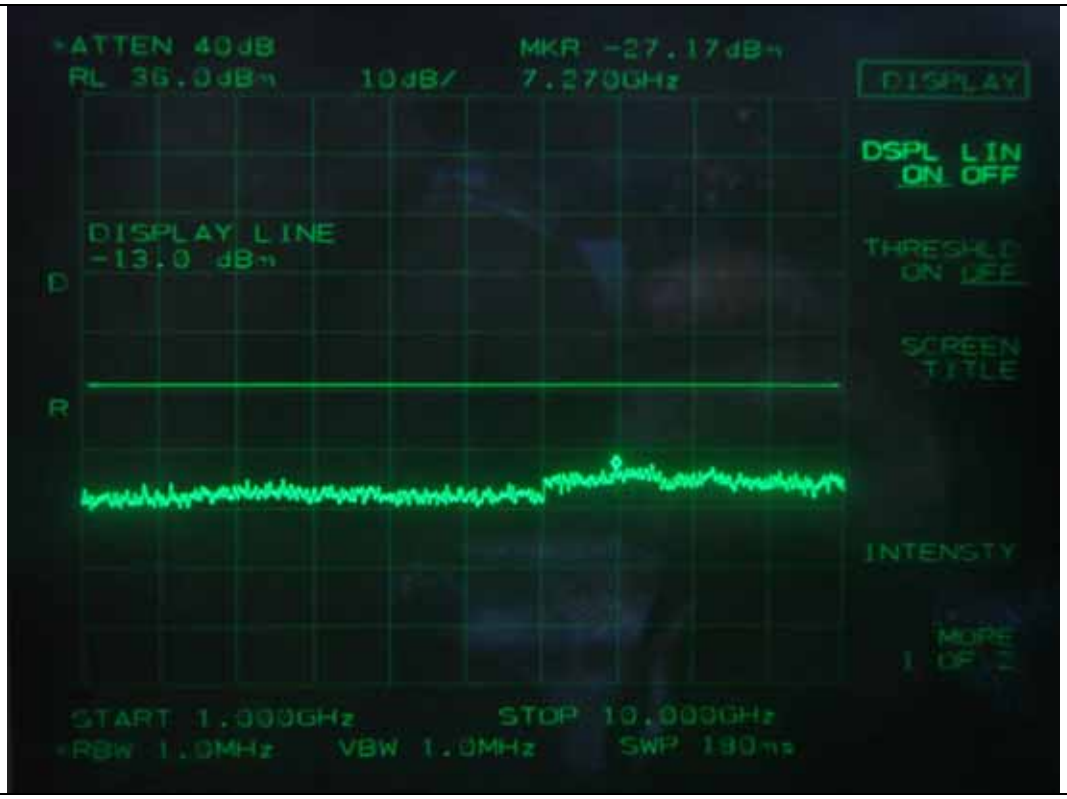


WCDMA – Low Channel



WCDMA – Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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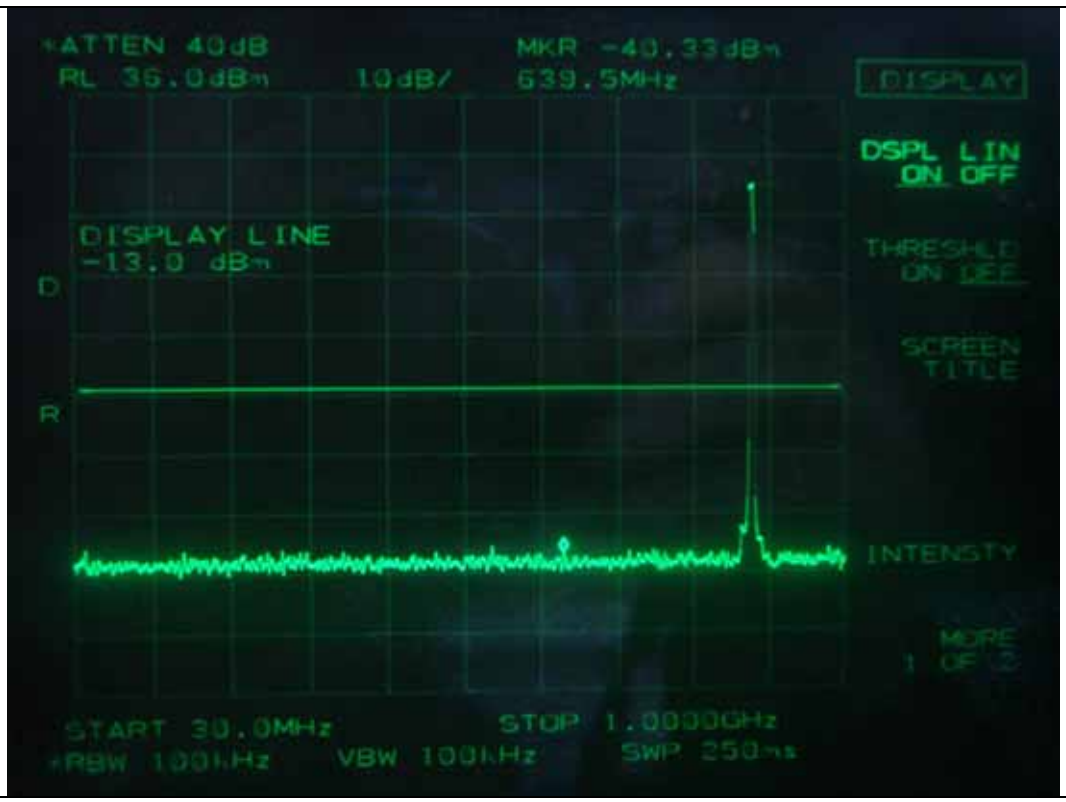
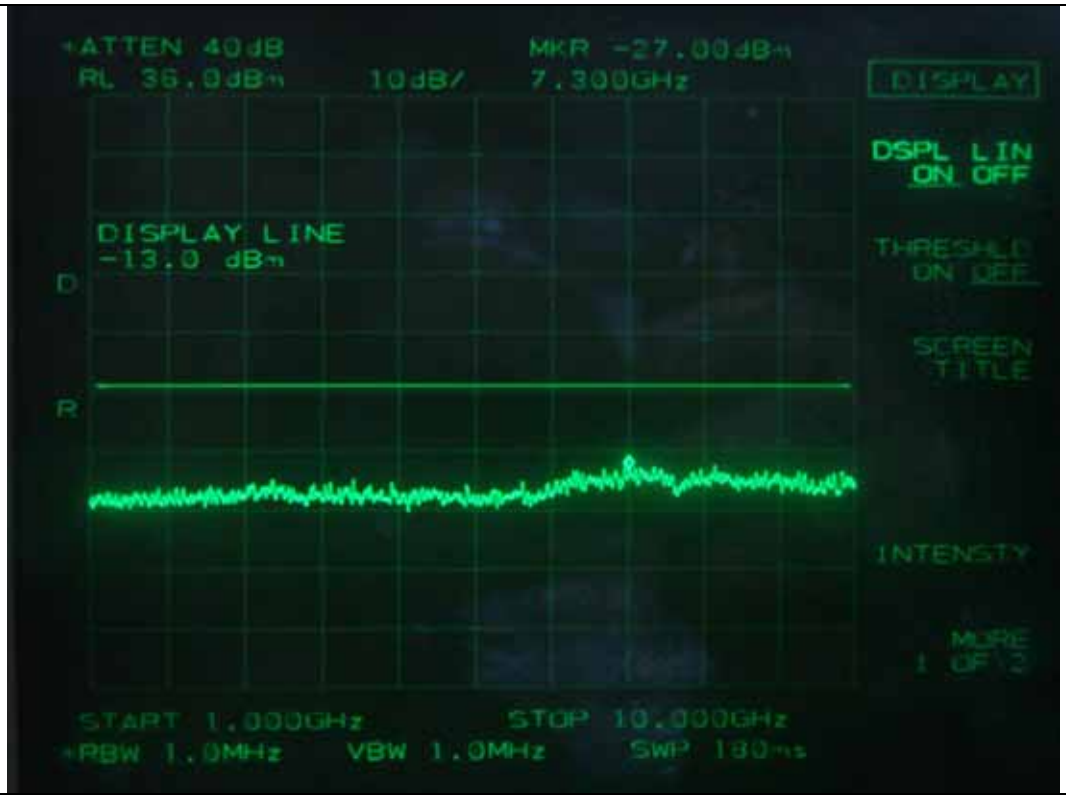


WCDMA – Middle Channel



WCDMA – Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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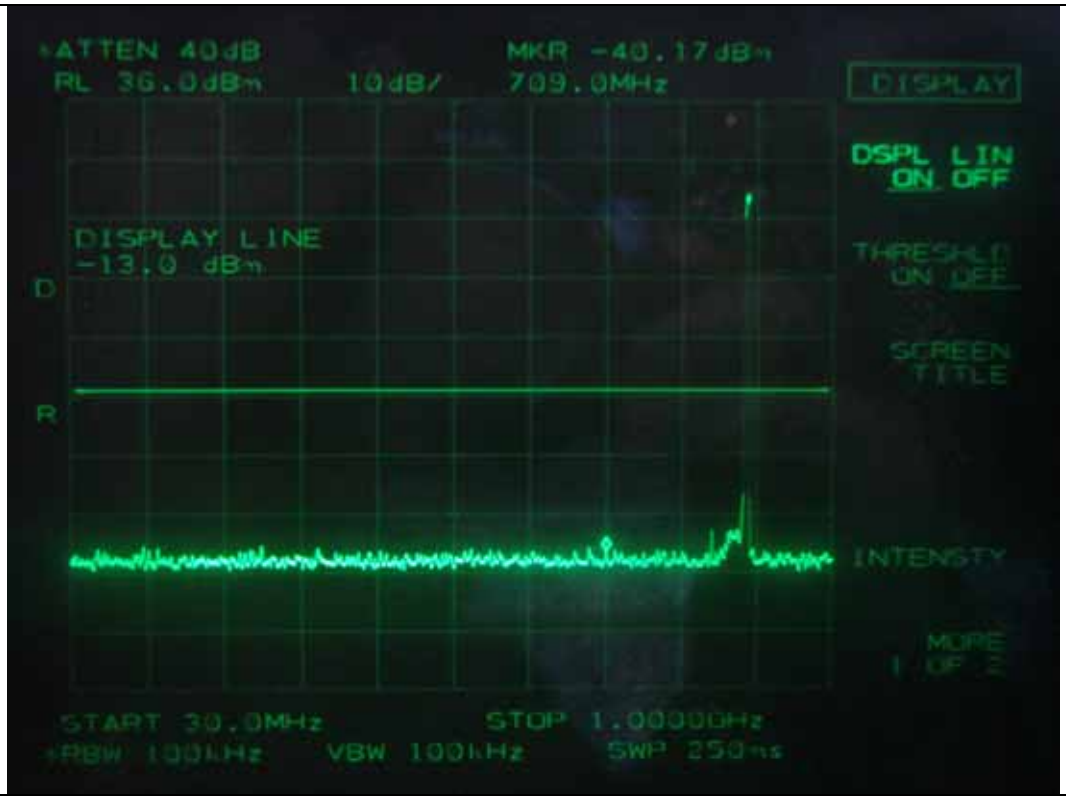
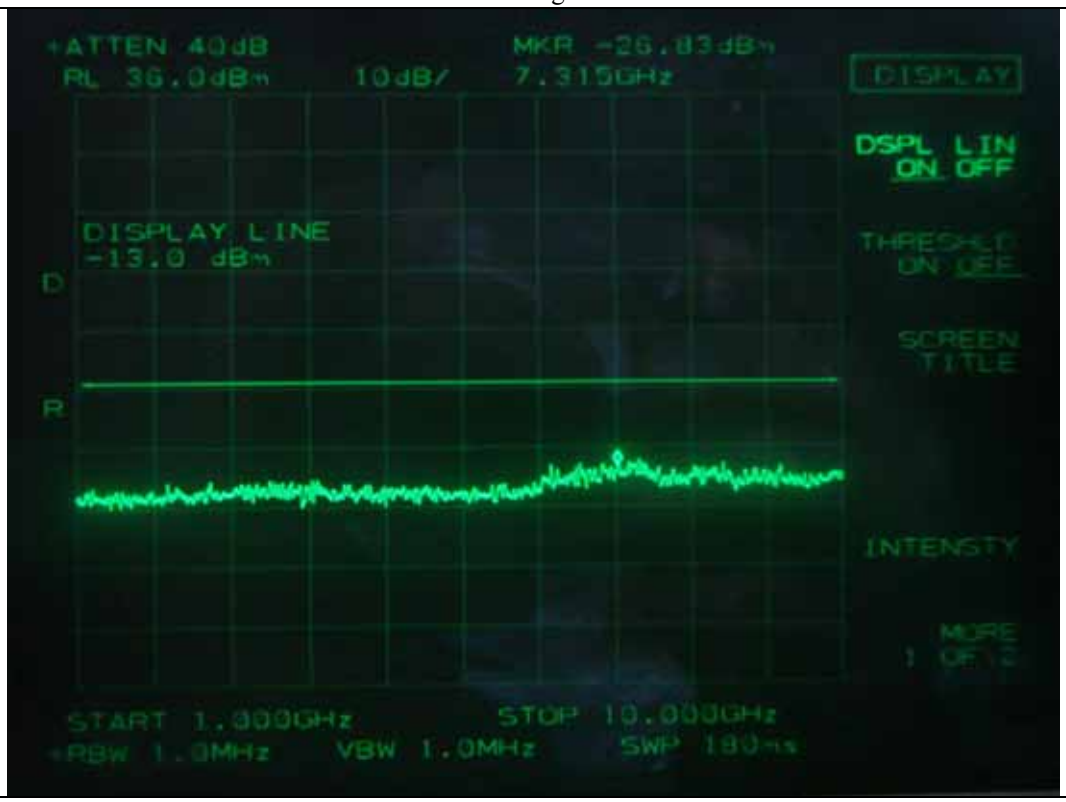


WCDMA – High Channel



WCDMA – High Channel

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

7.4.2 Test data for Part 90 (700PS(D))

-. Test Date : January 15, 2013

-. Frequency range : 30 MHz ~ 10 GHz

-. Result : Pass

Modulation	Harmonic Frequency (MHz)		Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
IDEN	Low	650.80	-40.50	0.33	-40.17	-13.00	-27.17
		7 330.00	-27.67	2.50	-25.17		-12.17
	Middle	578.10	-40.00	0.33	-39.67		-26.67
		7 315.00	-27.33	2.50	-24.83		-11.83
	High	620.10	-40.67	0.33	-40.34		-27.34
		7 390.00	-27.17	2.50	-24.67		-11.67
SMR	Low	552.20	-39.83	0.33	-39.50	-13.00	-26.50
		7 375.00	-27.67	2.50	-25.17		-12.17
	Middle	568.40	-40.67	0.33	-40.34		-27.34
		7 390.00	-27.00	2.50	-24.50		-11.50
	High	652.40	-40.33	0.33	-40.00		-27.00
		7 345.00	-27.50	2.50	-25.00		-12.00
LTE	Low	620.10	-40.50	0.33	-40.17	-13.00	-27.17
		7 300.00	-27.33	2.50	-24.83		-11.83
	Middle	624.90	-40.17	0.33	-39.84		-26.84
		7 375.00	-27.33	2.50	-24.83		-11.83
	High	649.20	-40.50	0.33	-40.17		-27.17
		7 330.00	-27.17	2.50	-24.67		-11.67

According to Part 90, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0 dBm.

Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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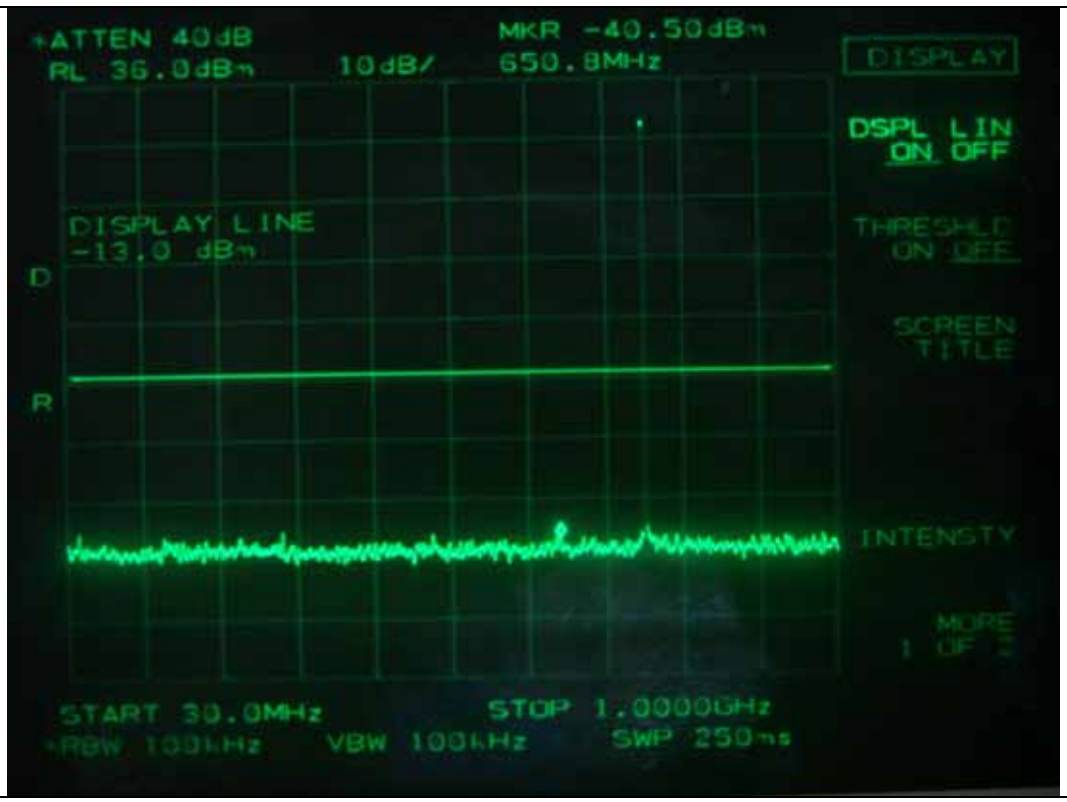
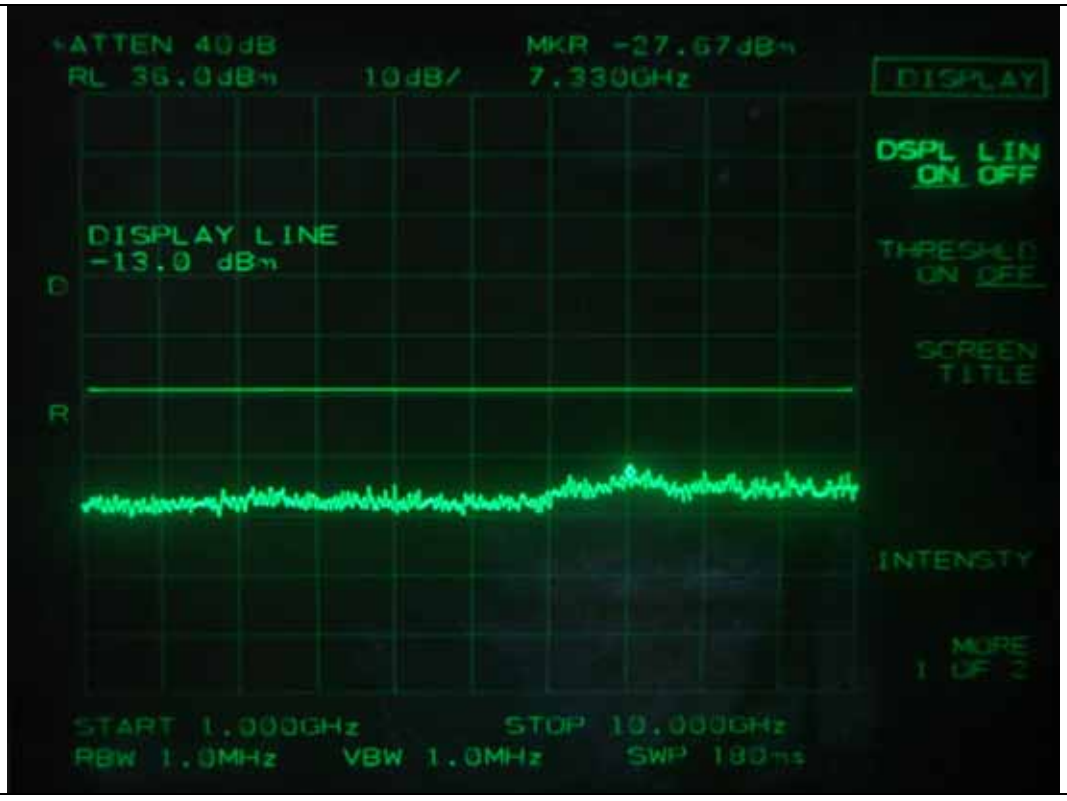


IDEN – Low Channel



IDEN – Low Channel

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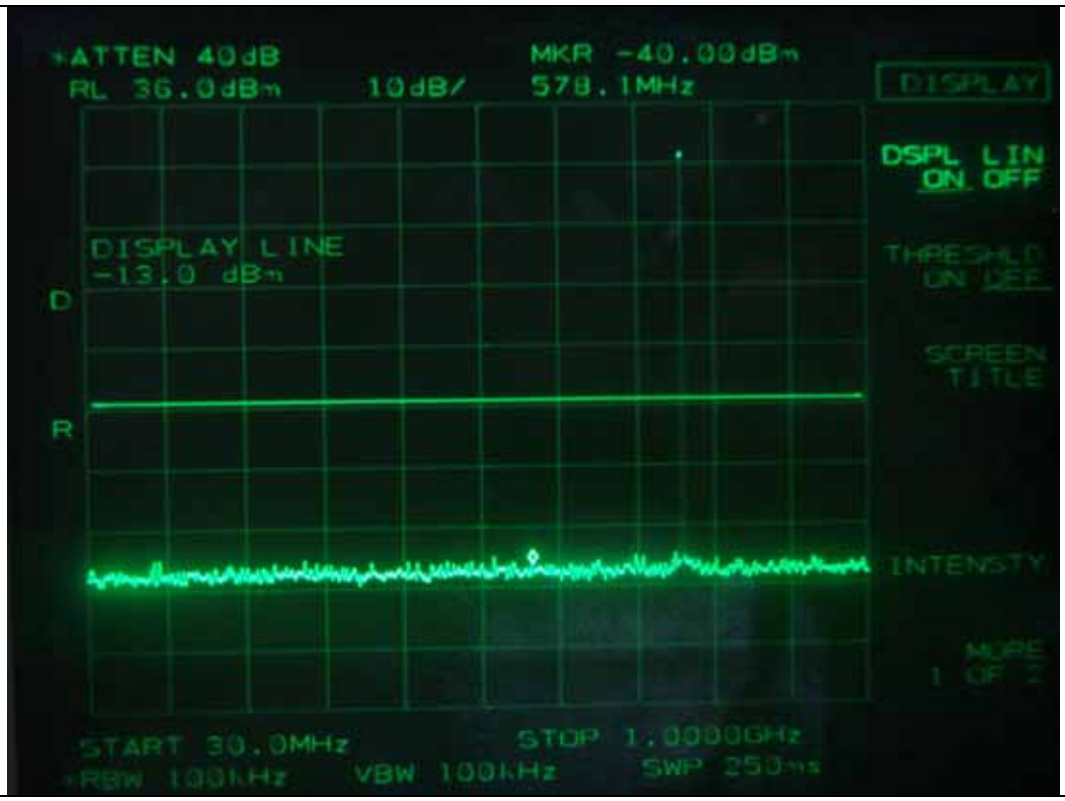
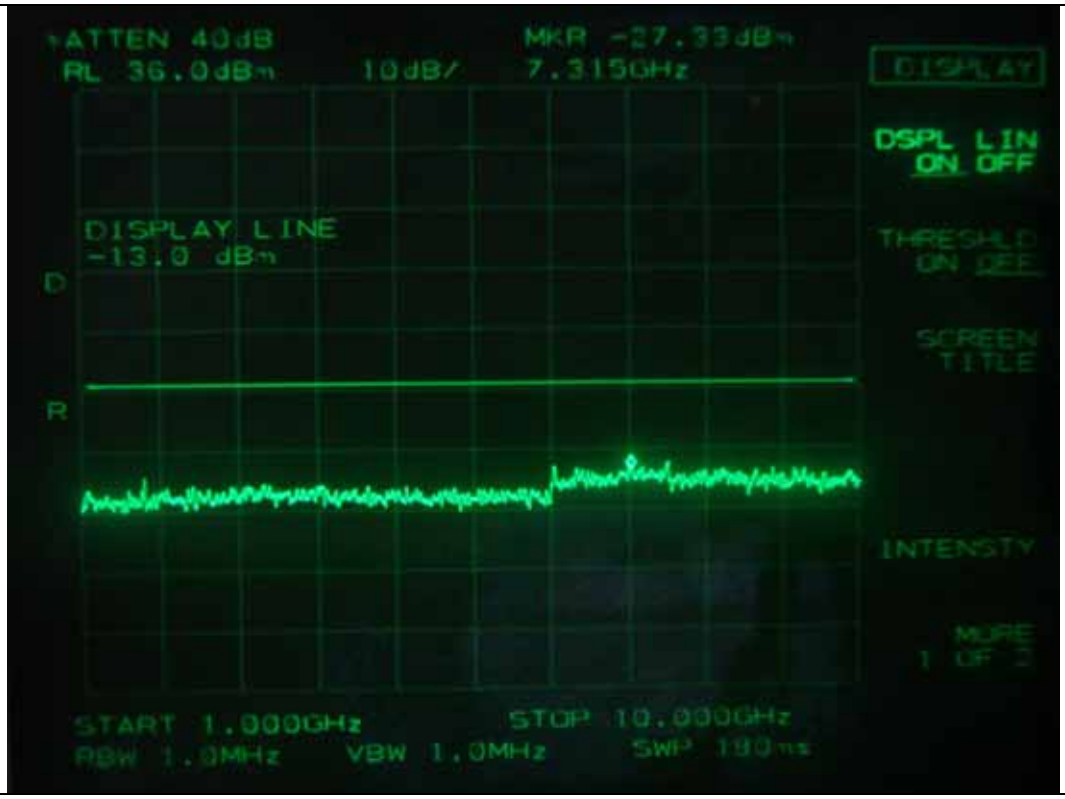


IDEN – Middle Channel



IDEN – Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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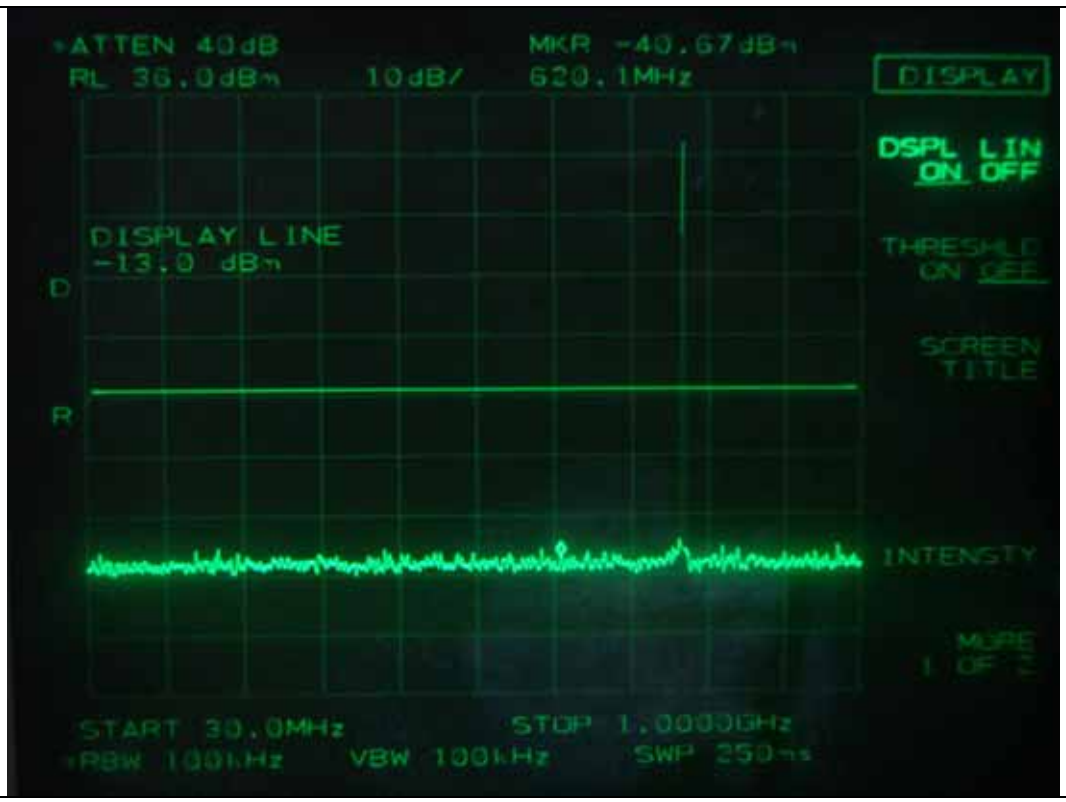
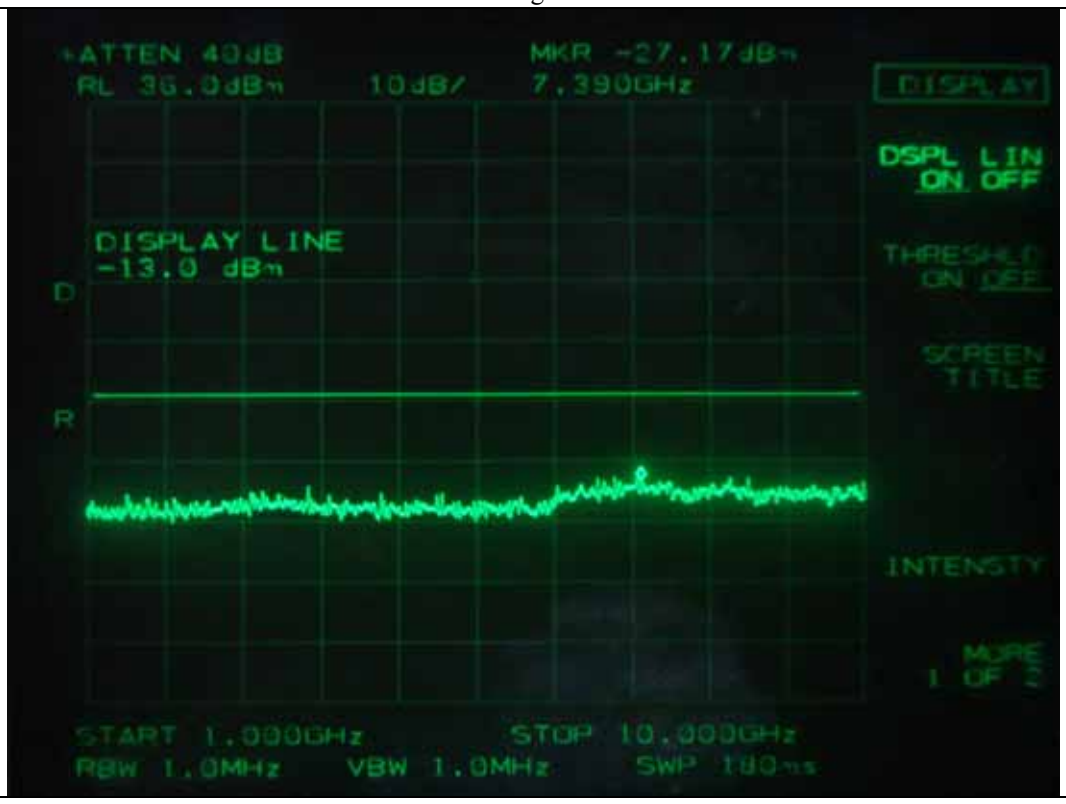


IDEN – High Channel



IDEN – High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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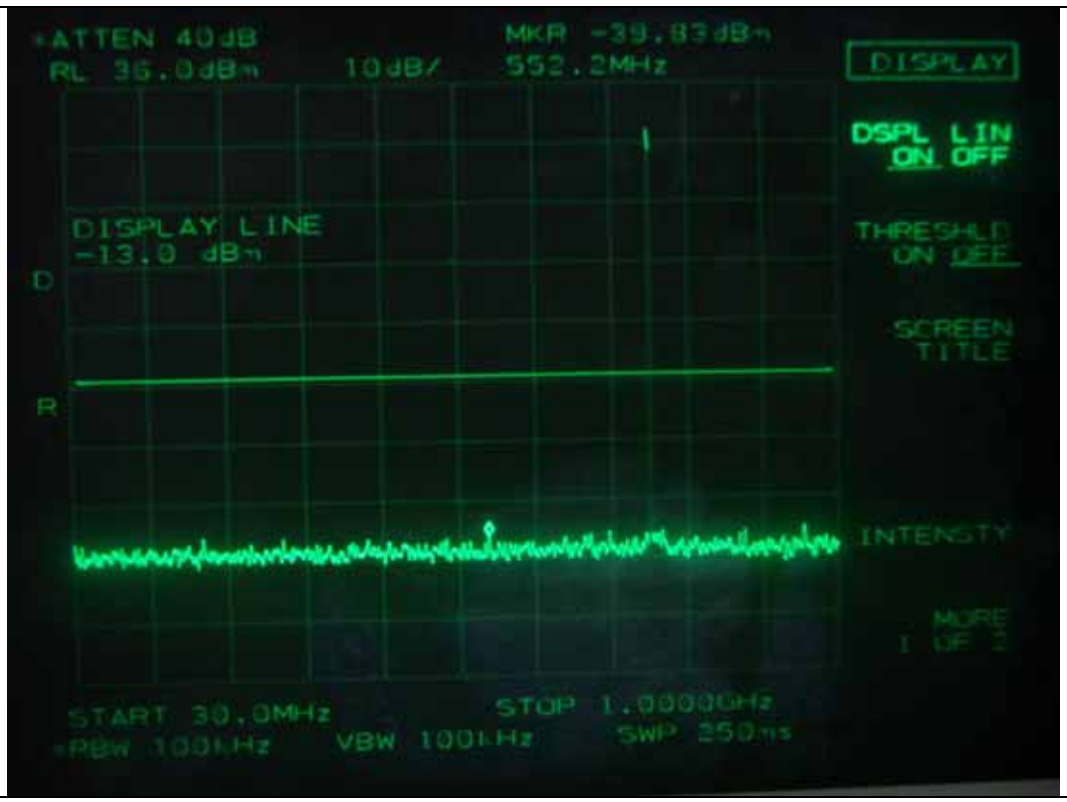
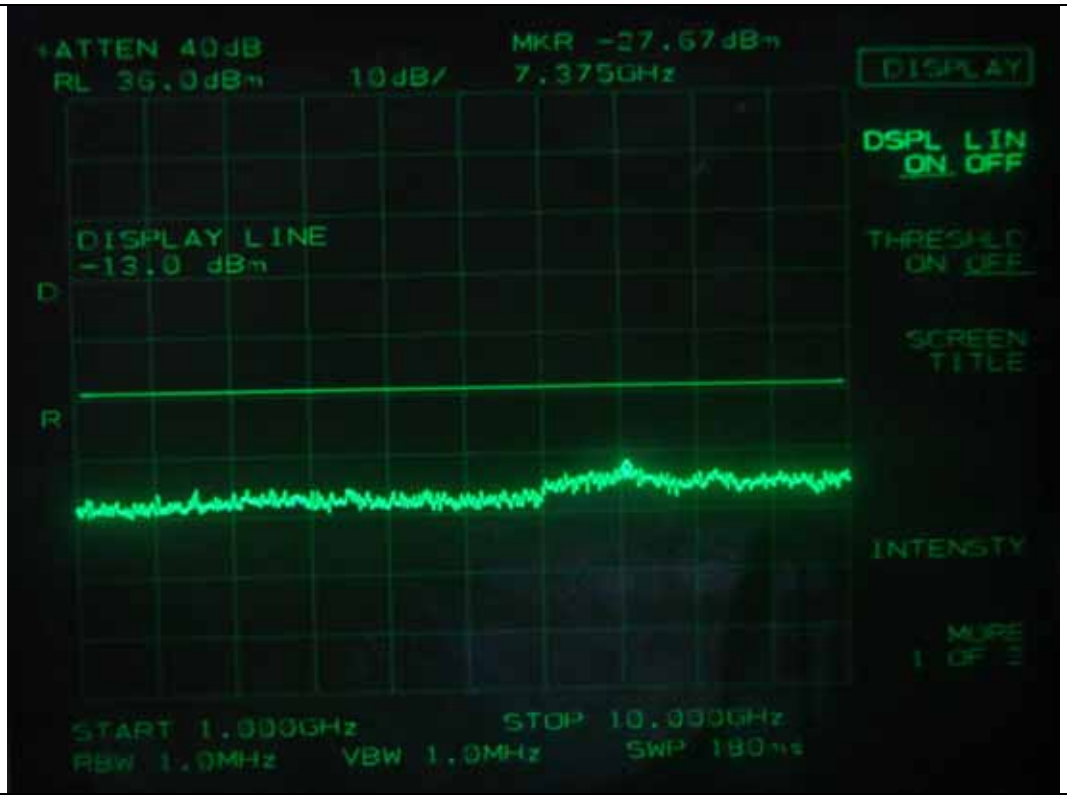


SMR – Low Channel



SMR – Low Channel

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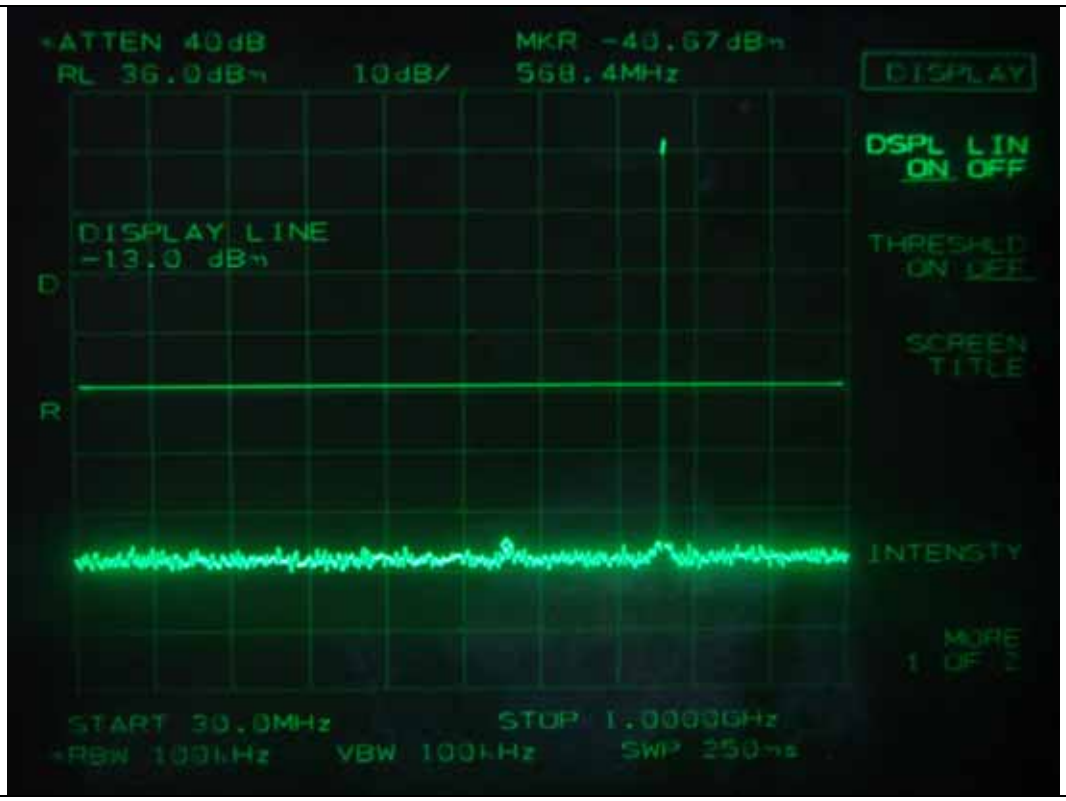
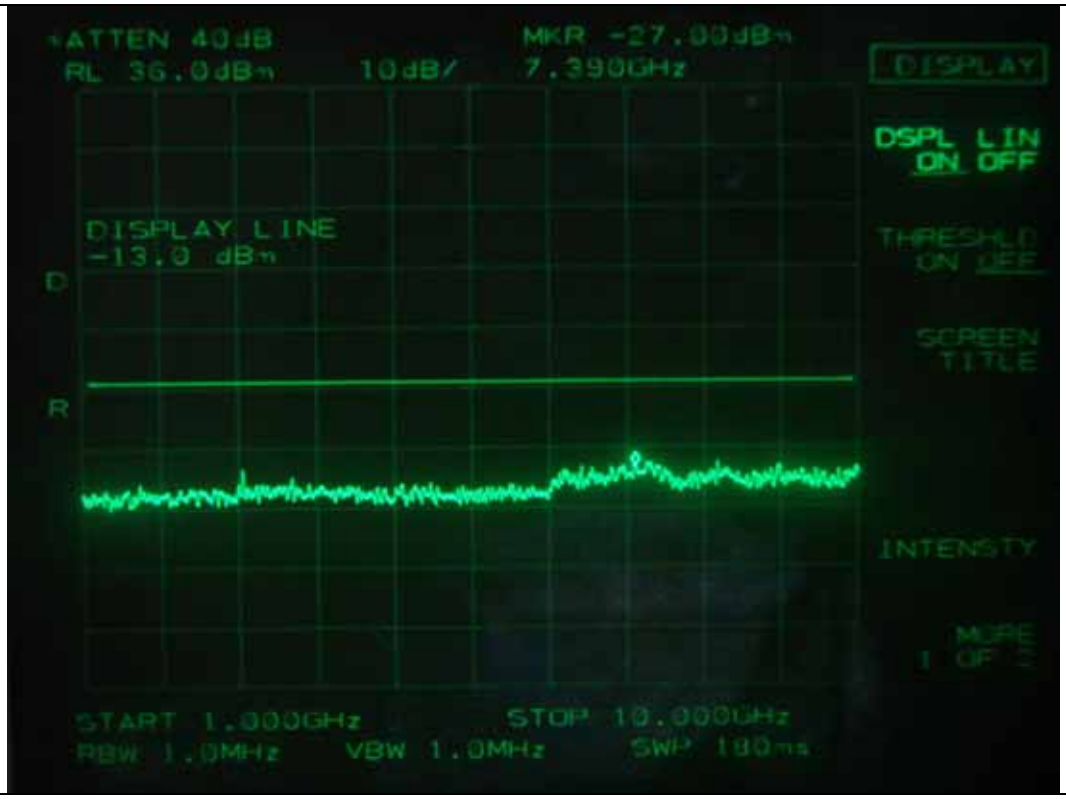


SMR – Middle Channel



SMR – Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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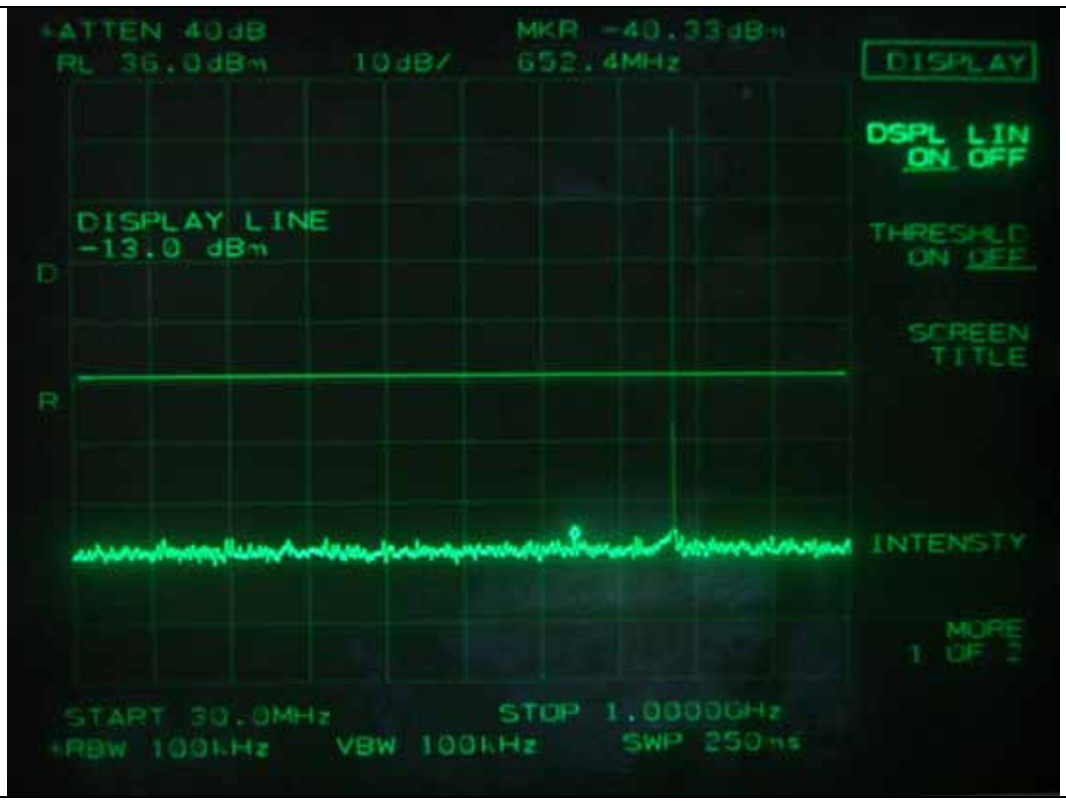
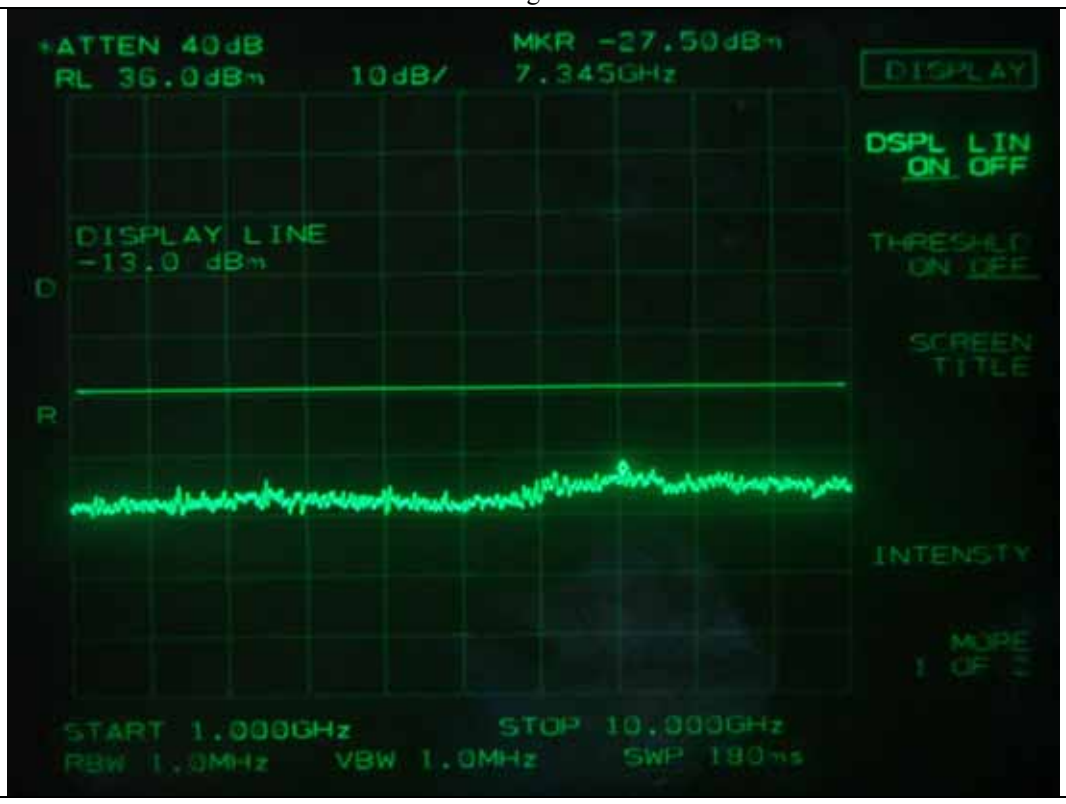


SMR – High Channel



SMR – High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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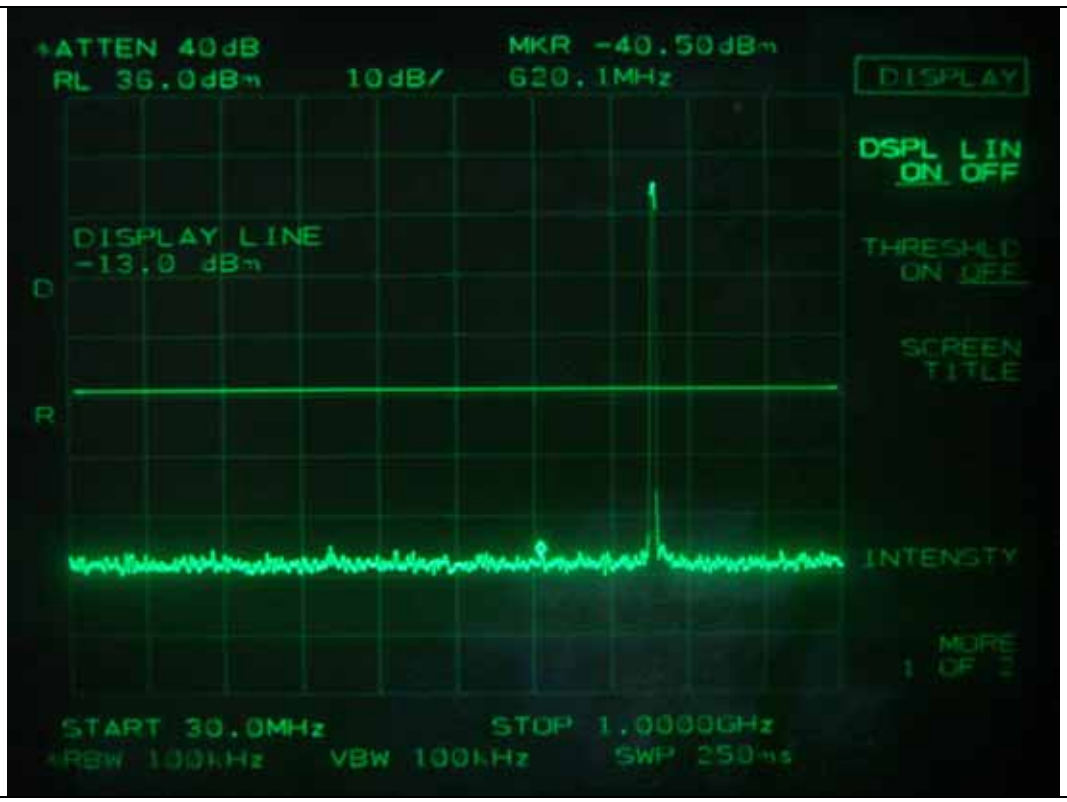
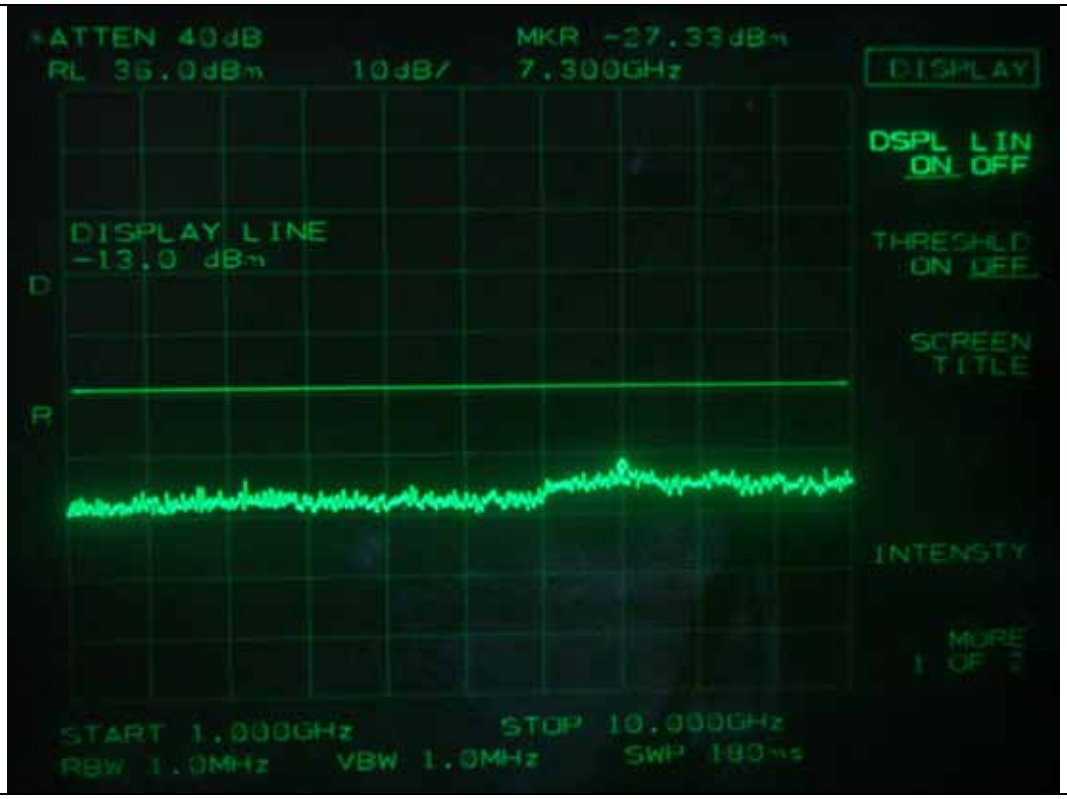


LTE – Low Channel



LTE – Low Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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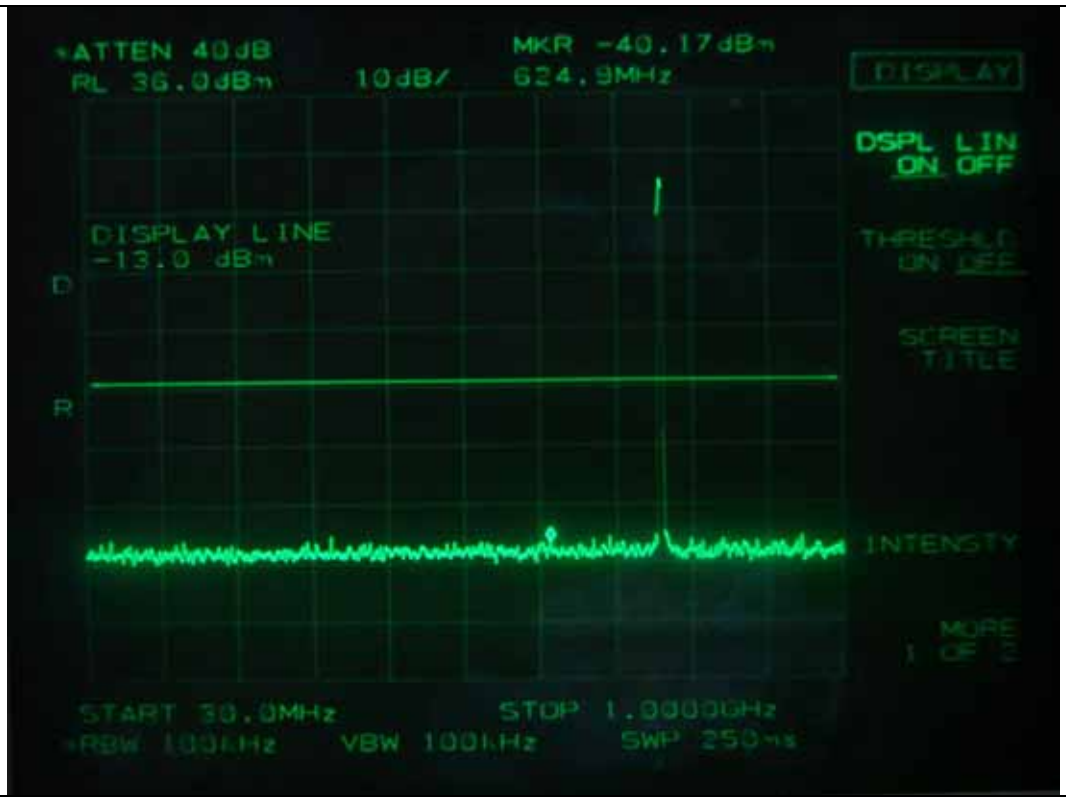
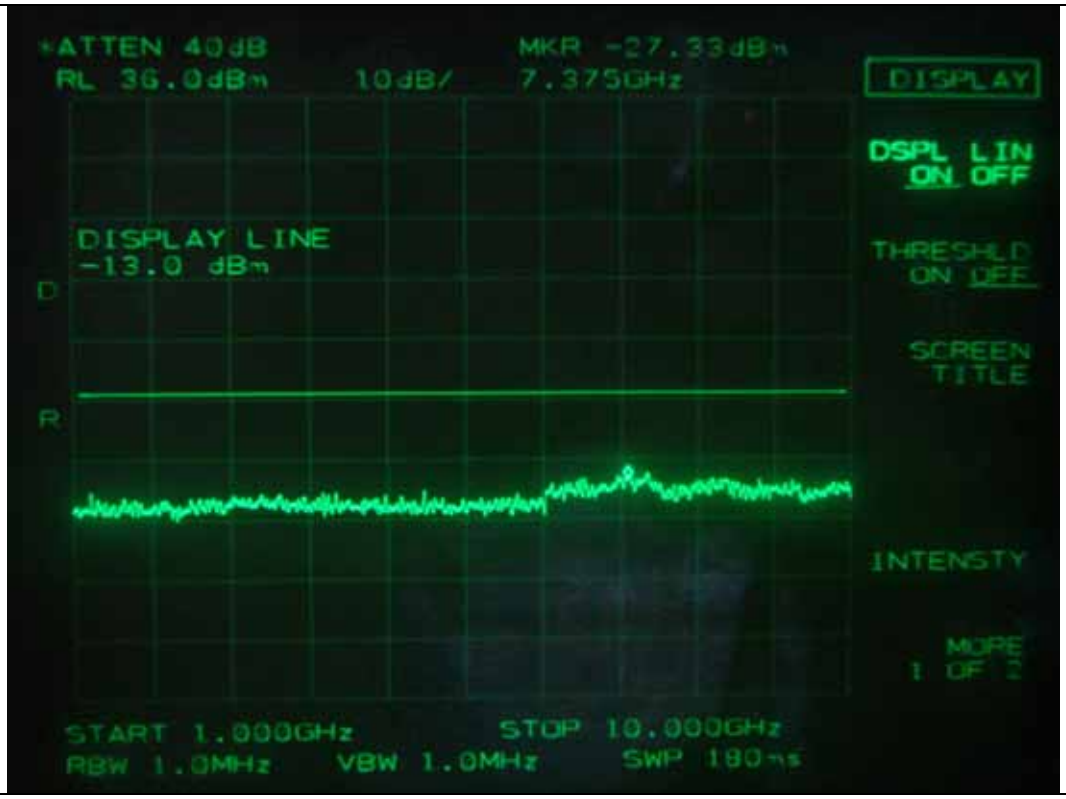


LTE – Middle Channel



LTE – Middle Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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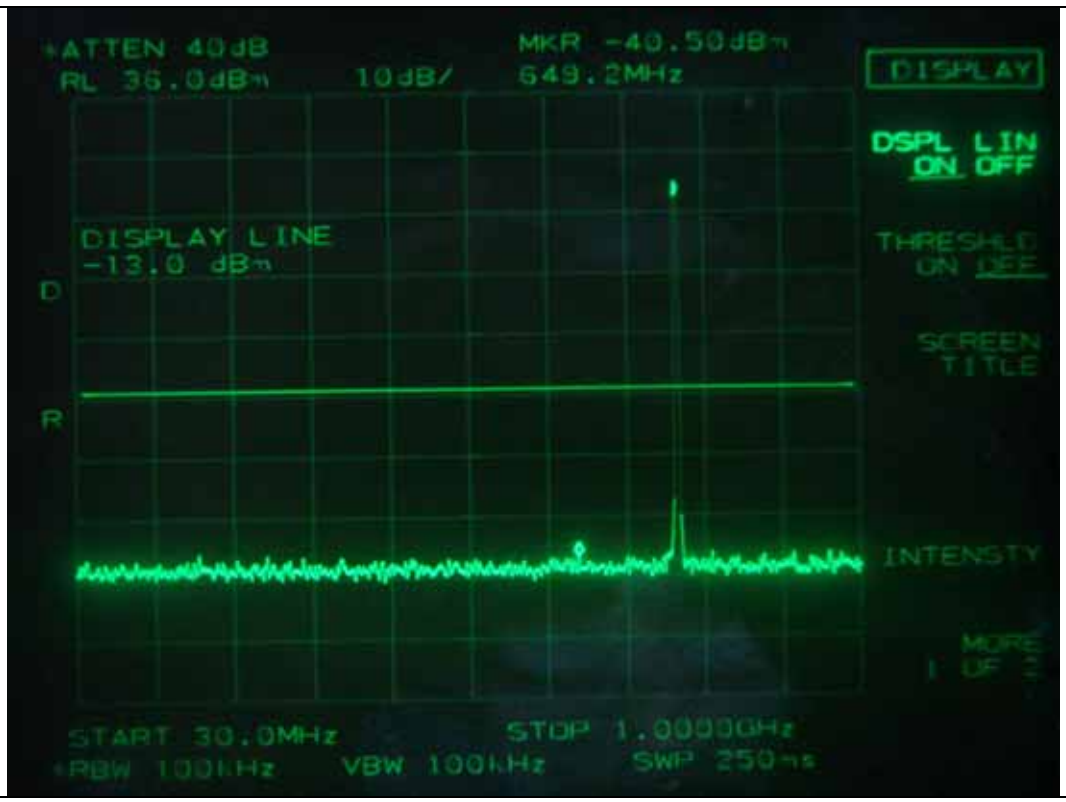
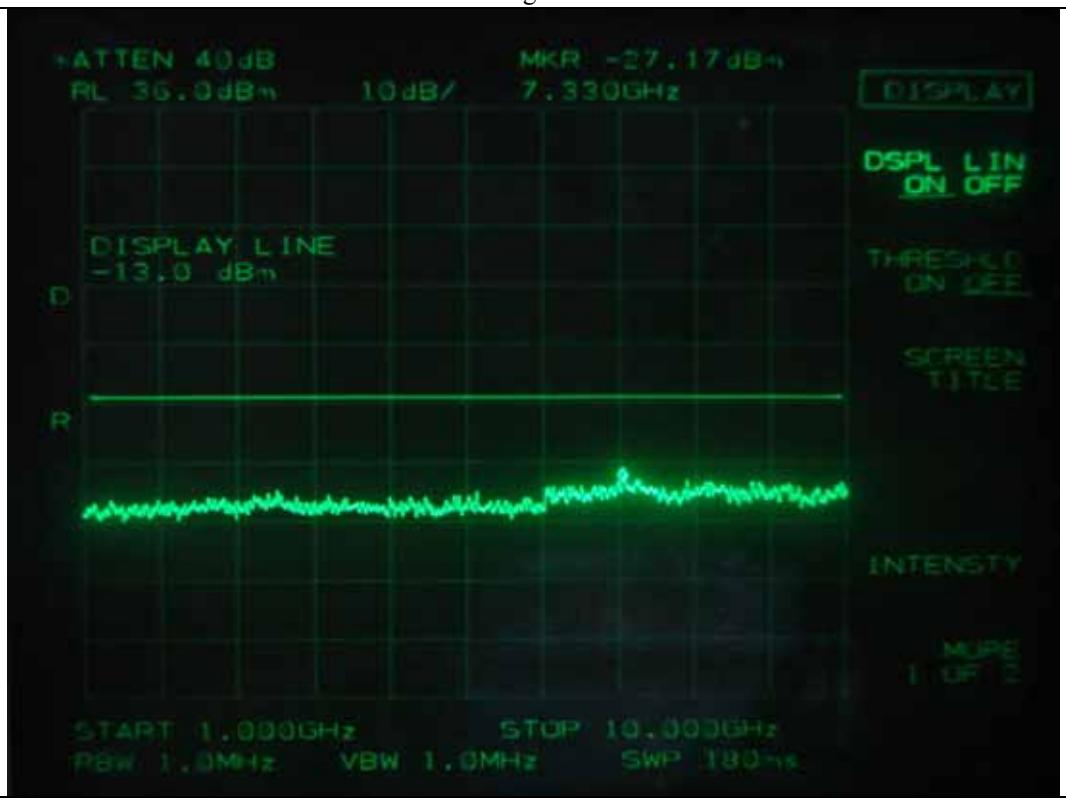


LTE – High Channel



LTE – High Channel

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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8. BAND EDGE MEASUREMENT

8.1 Operating environment

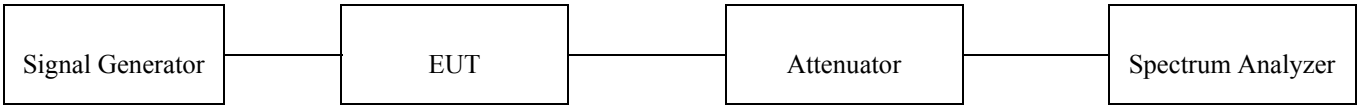
Temperature : 21 °C

Relative humidity : (50 ~ 51) % 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)
☐-	E4432B	HP	Signal Generator	US38440950	Jun. 01, 2012 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2012 (1Y)
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 12, 2012 (1Y)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 04, 2012 (1Y)
■ -	FSV30	R/S	Spectrum Analyzer	101372	May. 31, 2012 (1Y)
■ -	SA-26B-6	VENTRIX	Attenuator	N/A	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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8.4 Test data

8.4.1 Test Result for Part 22 H (850C)

-. Test Date : January 11, 2013

-. Result : Pass

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
GSM	Low	868.981	-24.00	-13.00	-11.00
	High	894.026	-27.15		-14.15
EDGE	Low	868.965	-29.04		-16.04
	High	894.003	-27.61		-14.61
CDMA	Low	869.000	-39.39		-26.39
	High	894.000	-41.54		-28.54
1xEVDO	Low	869.000	-39.36		-26.36
	High	894.000	-41.17		-28.17
WCDMA	Low	869.000	-34.83		-21.83
	High	894.000	-35.63		-22.63

According to Part 22H, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.

Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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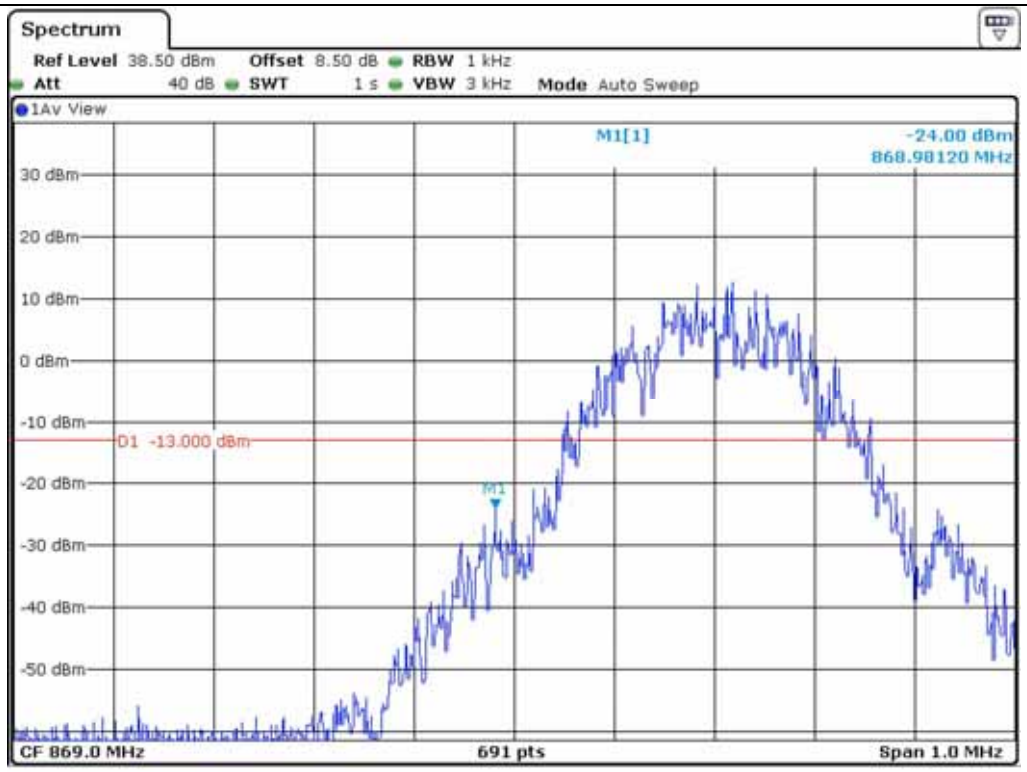
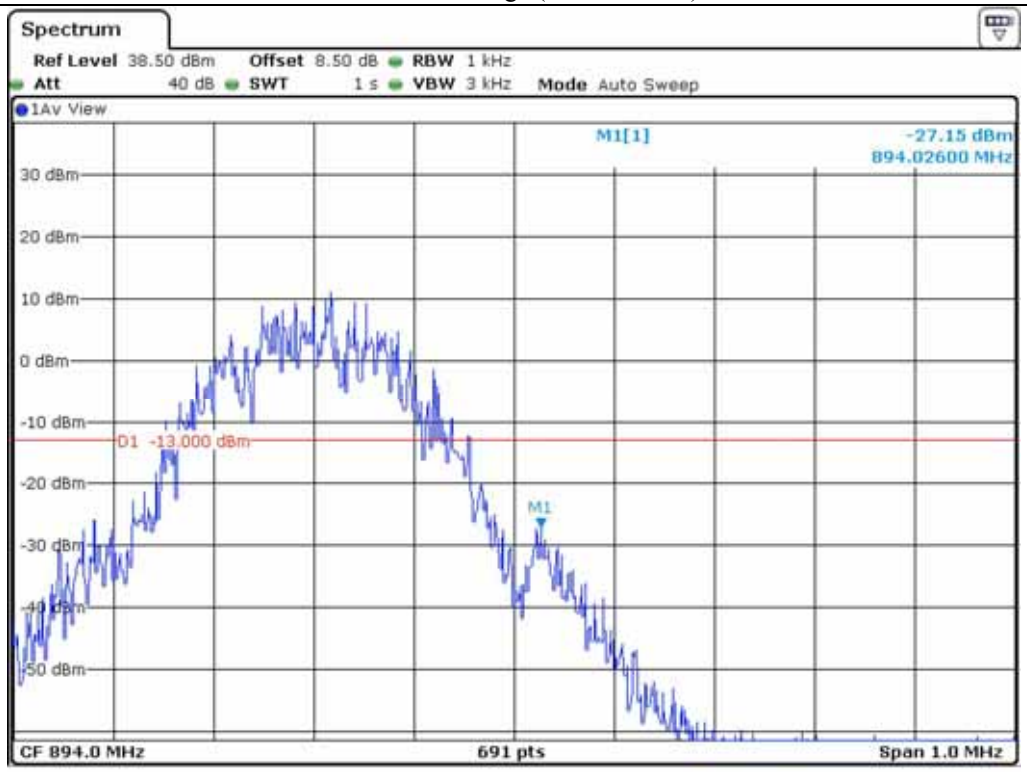


GSM – Band Edge (Low Channel)



GSM – Band Edge (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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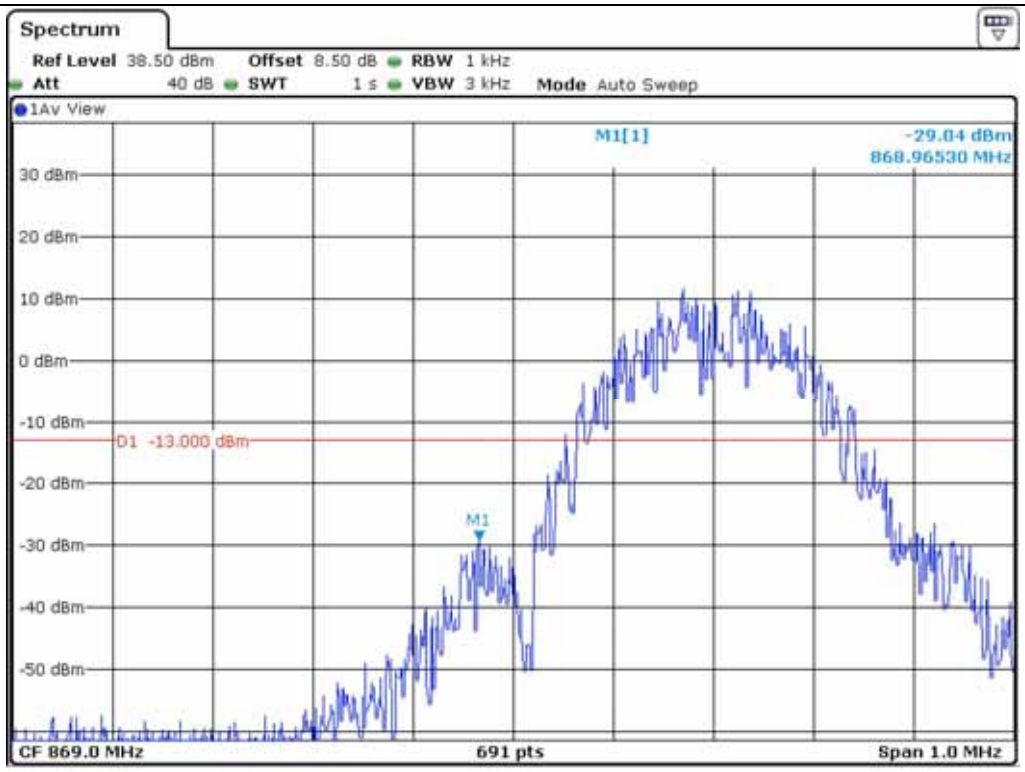
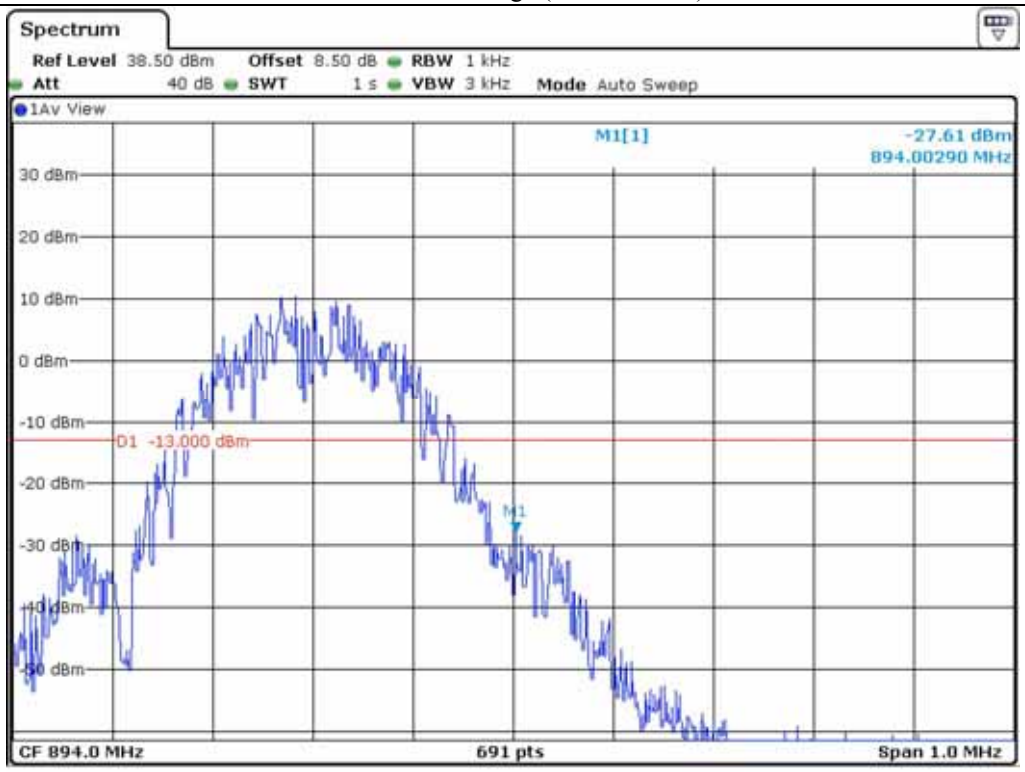


EDGE – Band Edge (Low Channel)



EDGE – Band Edge (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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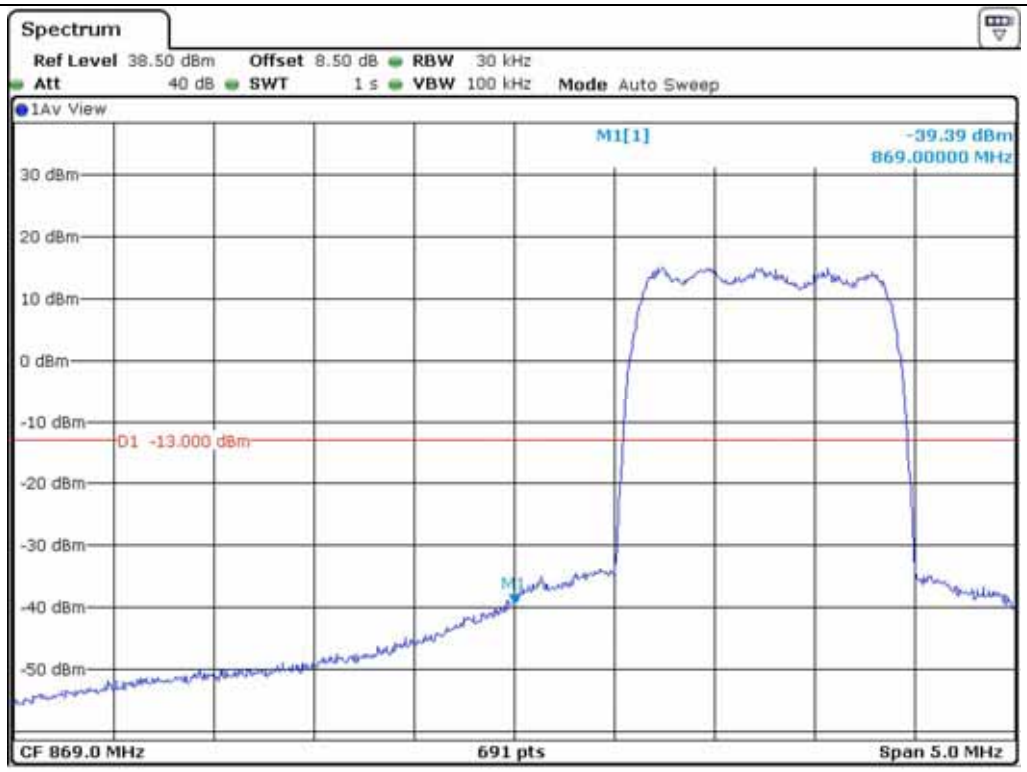
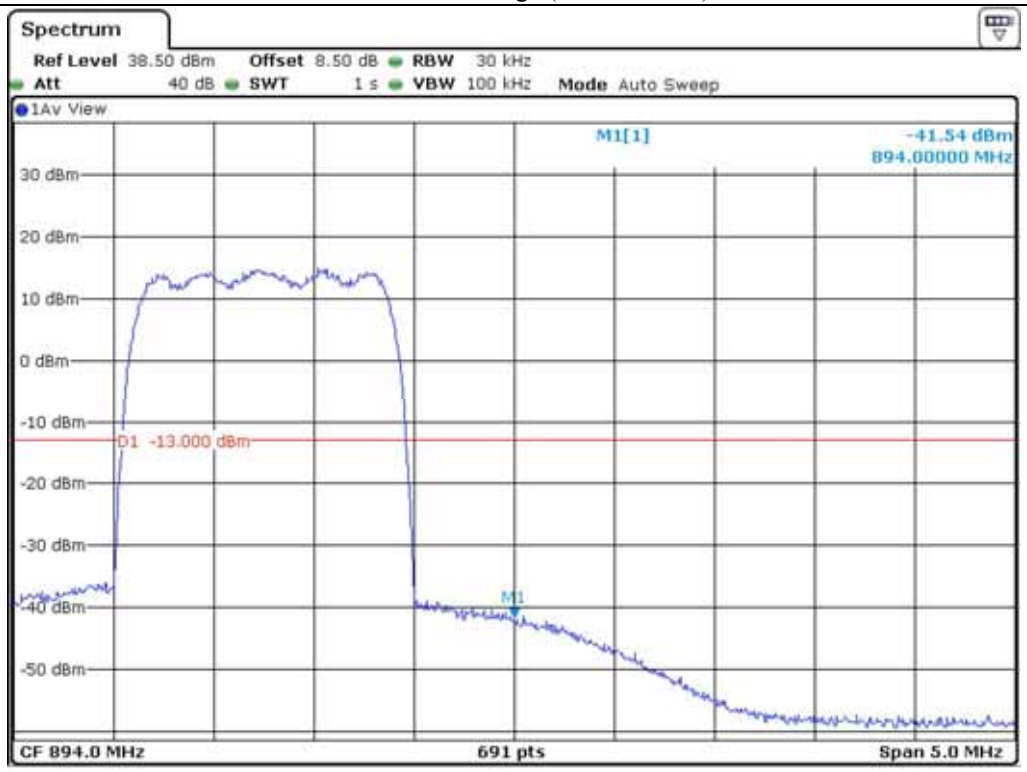


CDMA – Band Edge (Low Channel)



CDMA – Band Edge (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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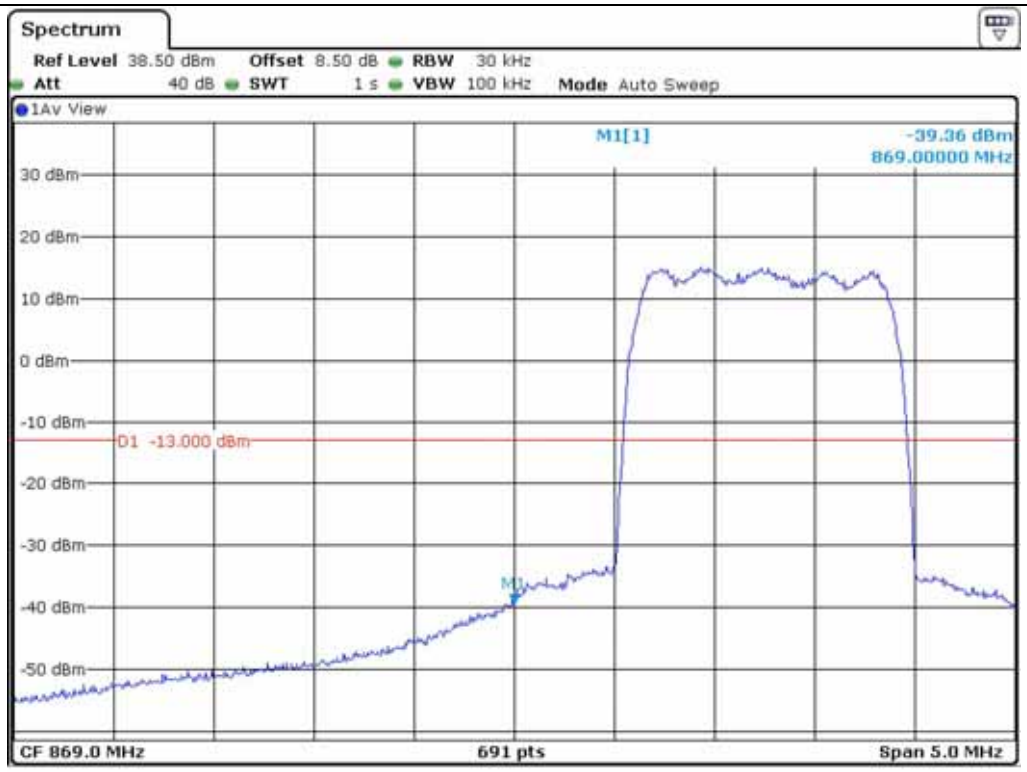
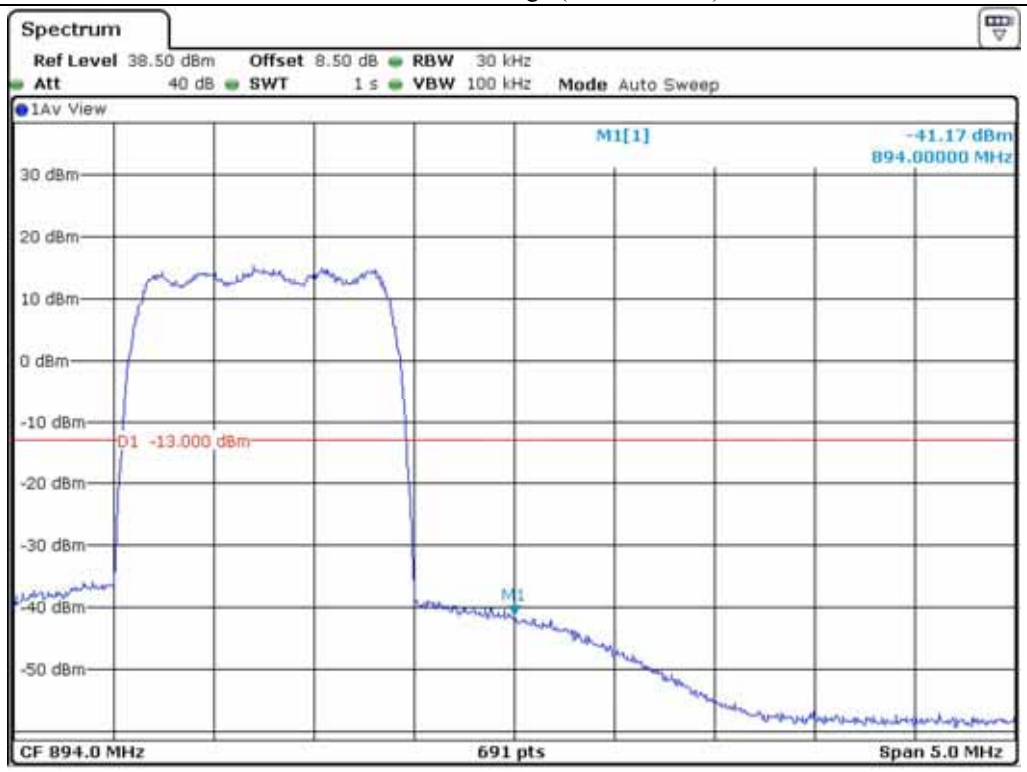


1xEVDO – Band Edge (Low Channel)



1xEVDO – Band Edge (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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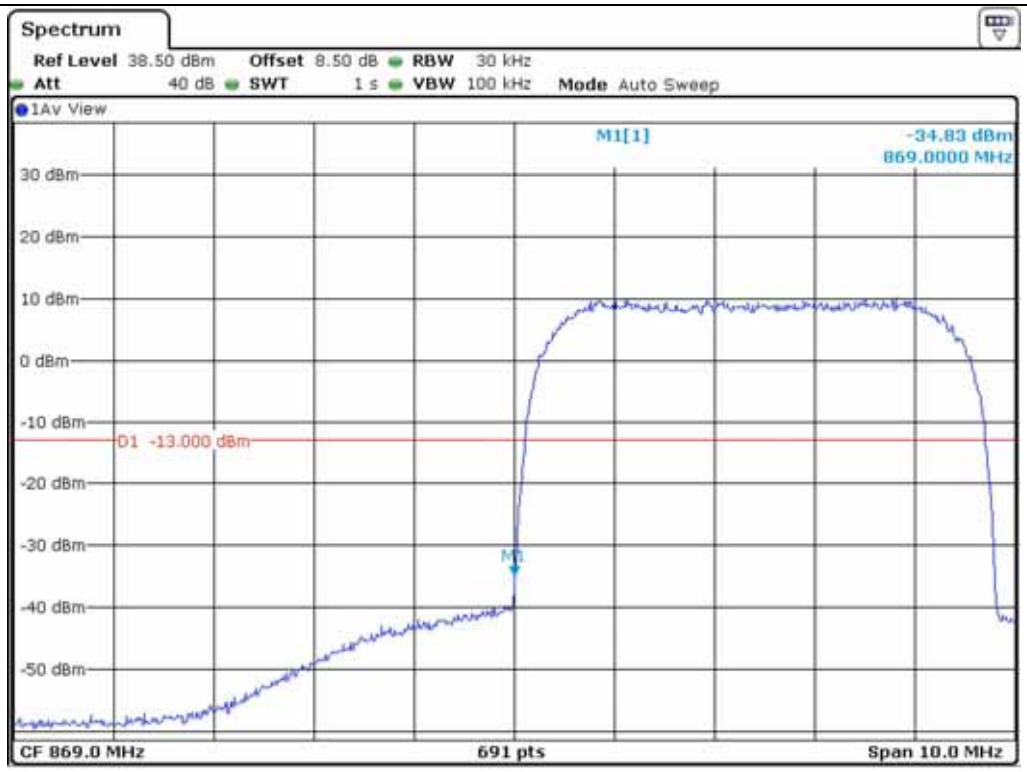
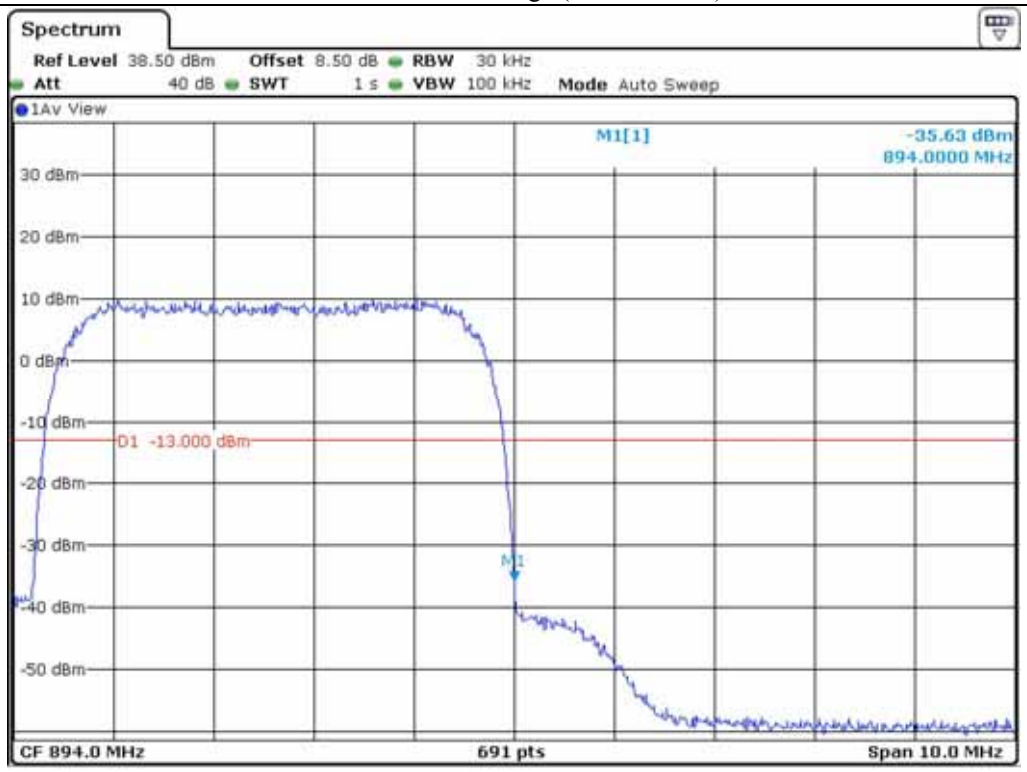


WCDMA – Band Edge (Low Channel)



WCDMA – Band Edge (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

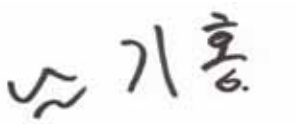
8.4.2 Test Result for Part 90 (700PS(D))

-. Test Date : January 15, 2013

-. Result : Pass

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
IDEN	Low	758.000	-43.09	-13.00	-30.09
	High	775.000	-45.59		-32.59
SMR	Low	758.000	-50.92		-37.92
	High	775.000	-51.87		-38.87
LTE	Low	758.000	-33.63		-20.63
	High	775.000	-34.85		-21.85

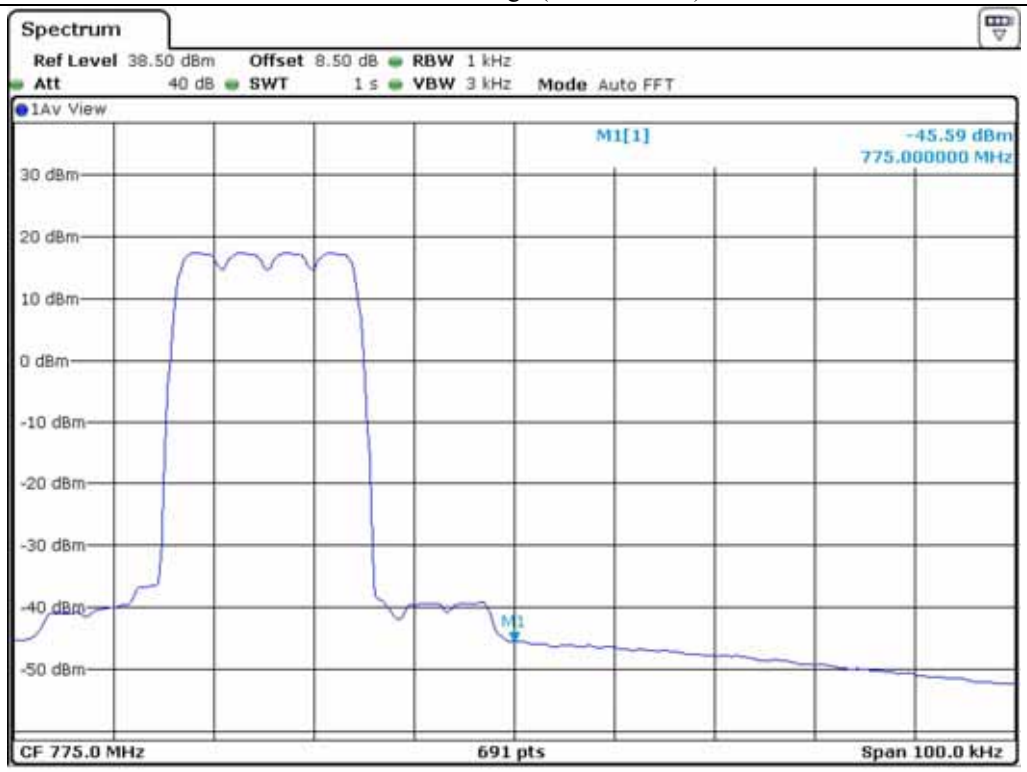
According to Part 90, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.



Tested by: Ki-Hong, Nam / Senior Engineer

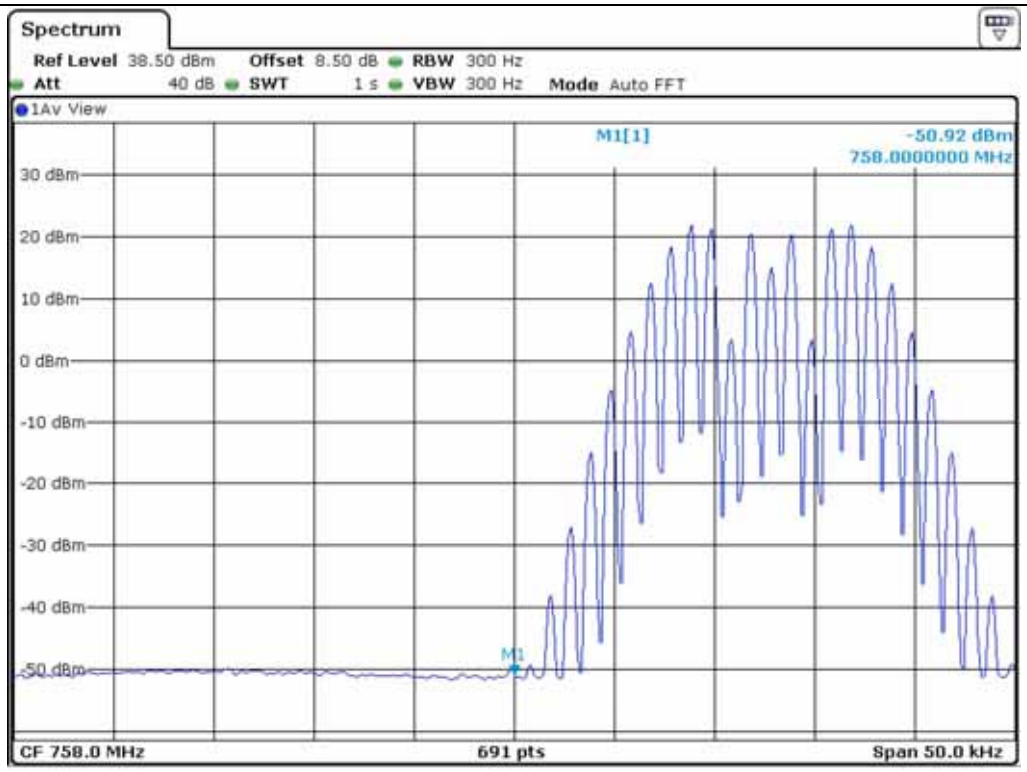
HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

IDEN – Band Edge (Low Channel)

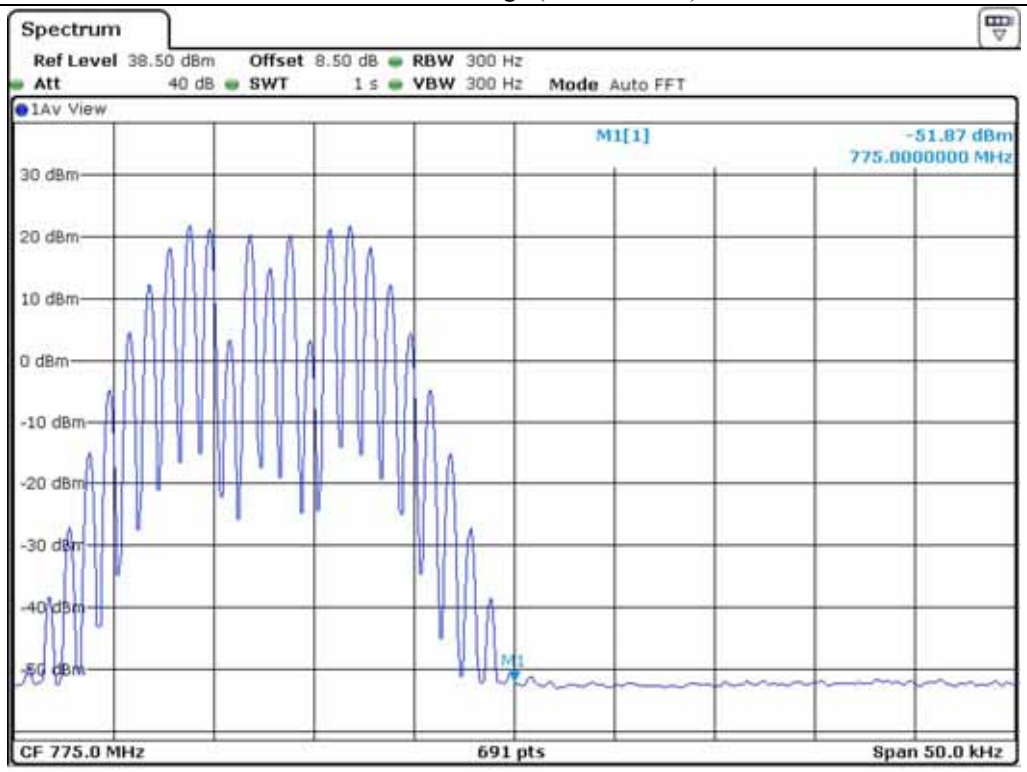


IDEN – Band Edge (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



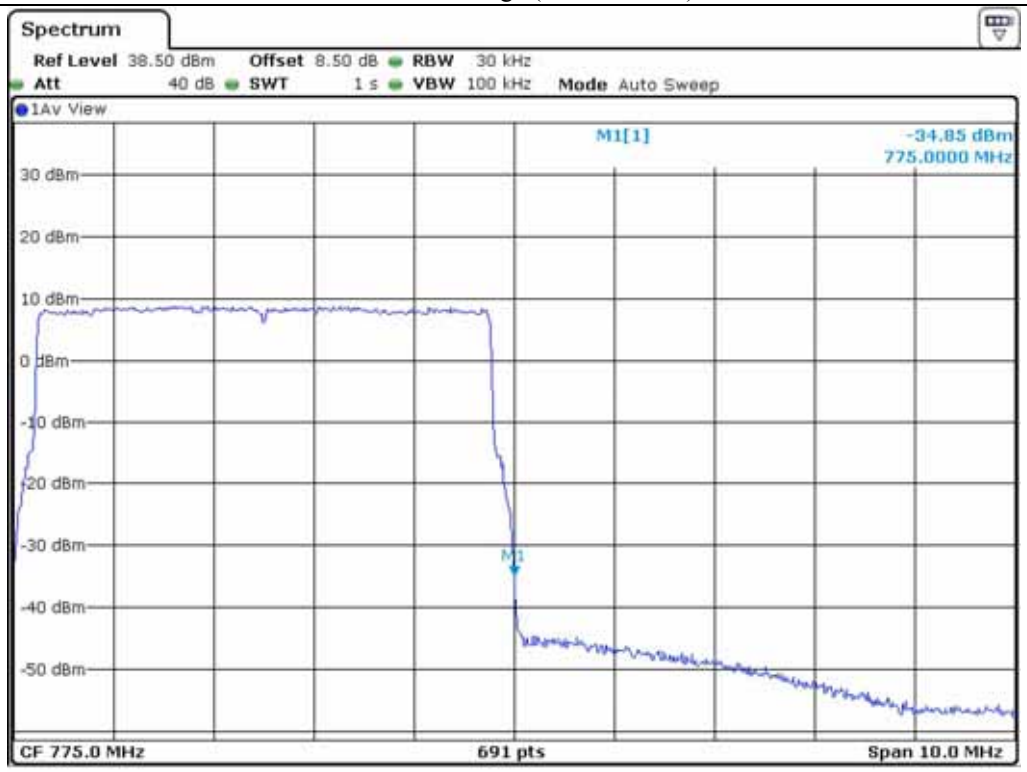
SMR – Band Edge (Low Channel)



SMR – Band Edge (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

LTE – Band Edge (Low Channel)



LTE – Band Edge (High Channel)

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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9. INTERMODULATION TEST

9.1 Operating environment

Temperature : (20 ~ 21) °C

Relative humidity : (49 ~ 50) % R.H.

9.2 Test set-up

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.

Two input signals are equal in level and were sent to the input of the EUT.

9.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
☐ -	E4432B	HP	Signal Generator	US38440950	Jun 01, 2012 (1Y)
■ -	SML03	R/S	Signal Generator	102598	Feb. 02, 2012 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 02, 2012 (1Y)
■ -	83650L	HP	Swept CW Generator	3844A00415	May 31, 2012 (1Y)
☐ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 12, 2012 (1Y)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 04, 2012 (1Y)
☐ -	FSV30	R/S	Spectrum Analyzer	101372	May. 31, 2012 (1Y)
■ -	SA-26B-6	VENTRIX	Attenuator	N/A	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.4 Test data

9.4.1 Test Result for Part 22 H (850C)

9.4.1.1 Test Result for peak power

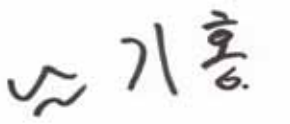
-. Test Date : January 11, 2013

-. Test Result : Pass

-. Modulation : No-Modulation

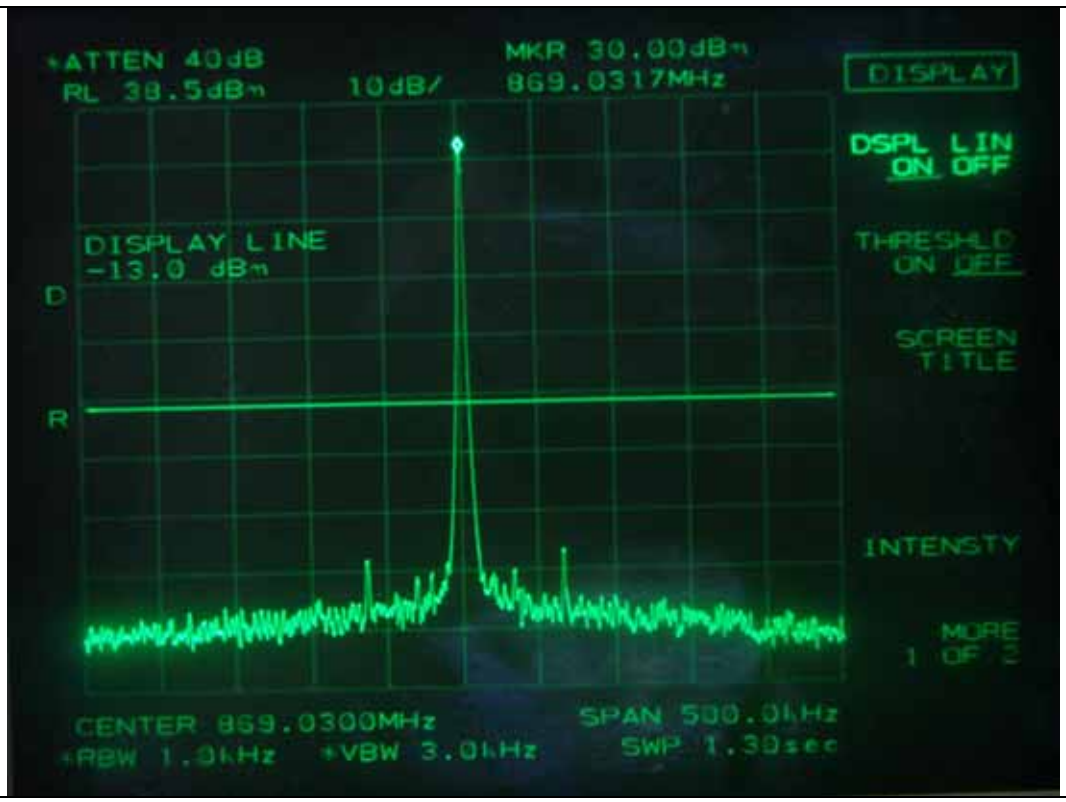
Frequency (MHz)	Number of Input Channel	Input Power (dBm)	Output Power (dBm)
869.030	1	-9.90	30.00
869.030 & 869.06	2	-9.80	30.17
869.030 & 869.06 & 869.09	3	-9.80	30.00
893.970	1	-9.70	30.17
893.970 & 893.940	2	-9.90	30.00
893.970 & 893.940 & 893.921 0	3	-9.80	30.00

Remark: Intermodulation products must be attenuated below the rated power of the EUT at least 43 + 10log (Pw), equivalent to -13 dBm. Please refer to test data hereinafter.

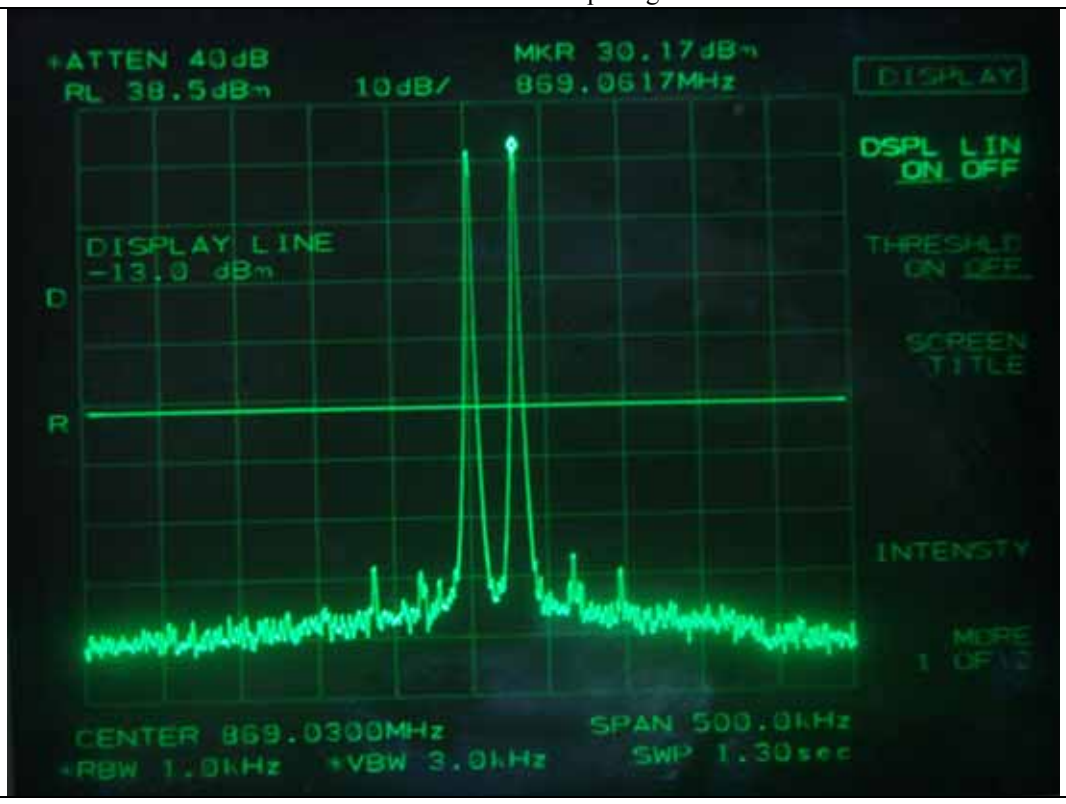


Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

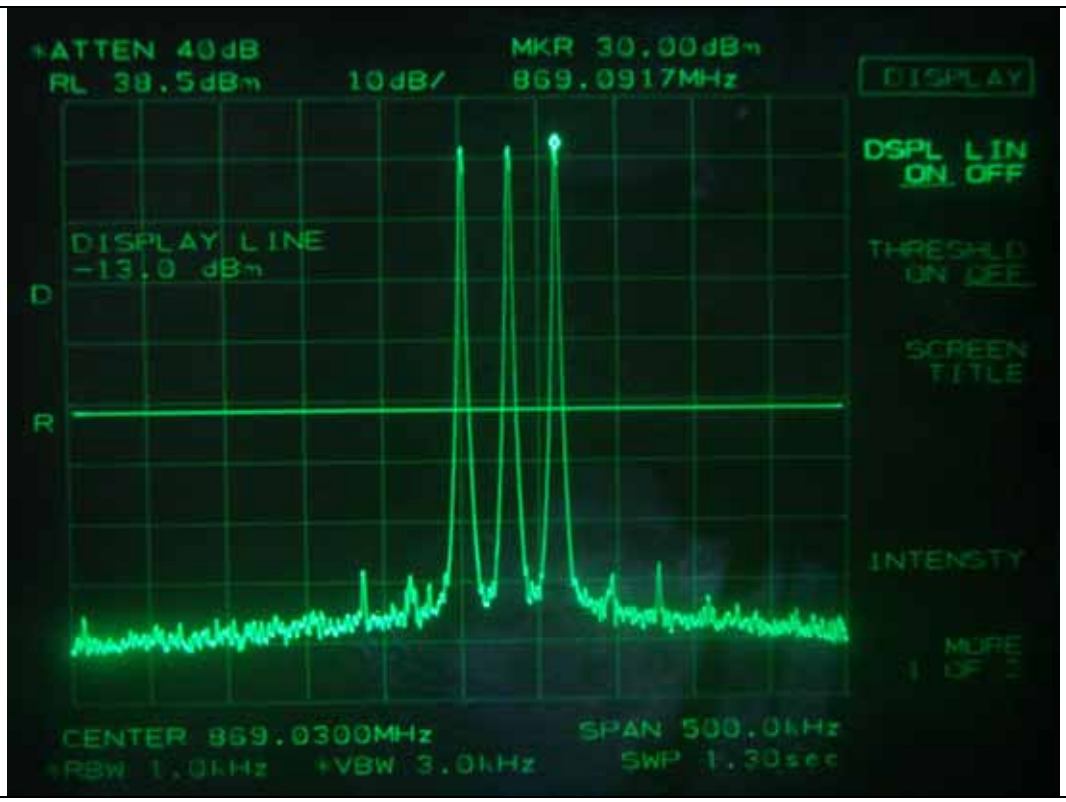


Low Channel – 1 input signal

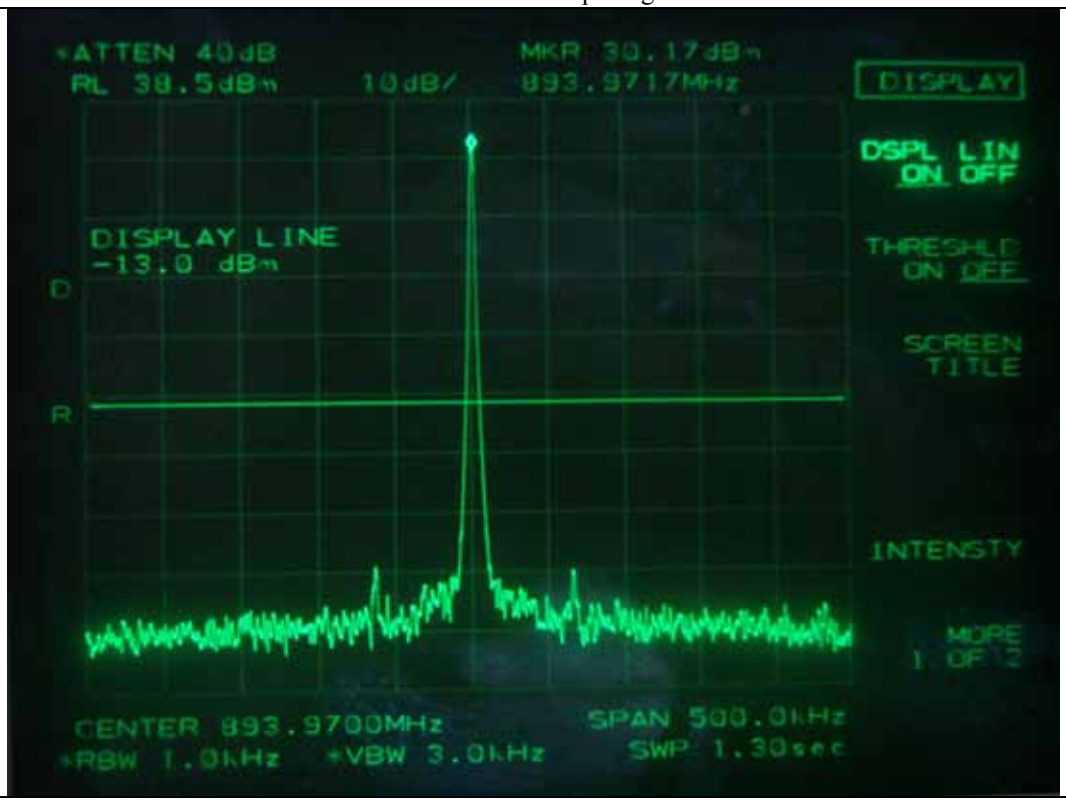


Low Channel – 2 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

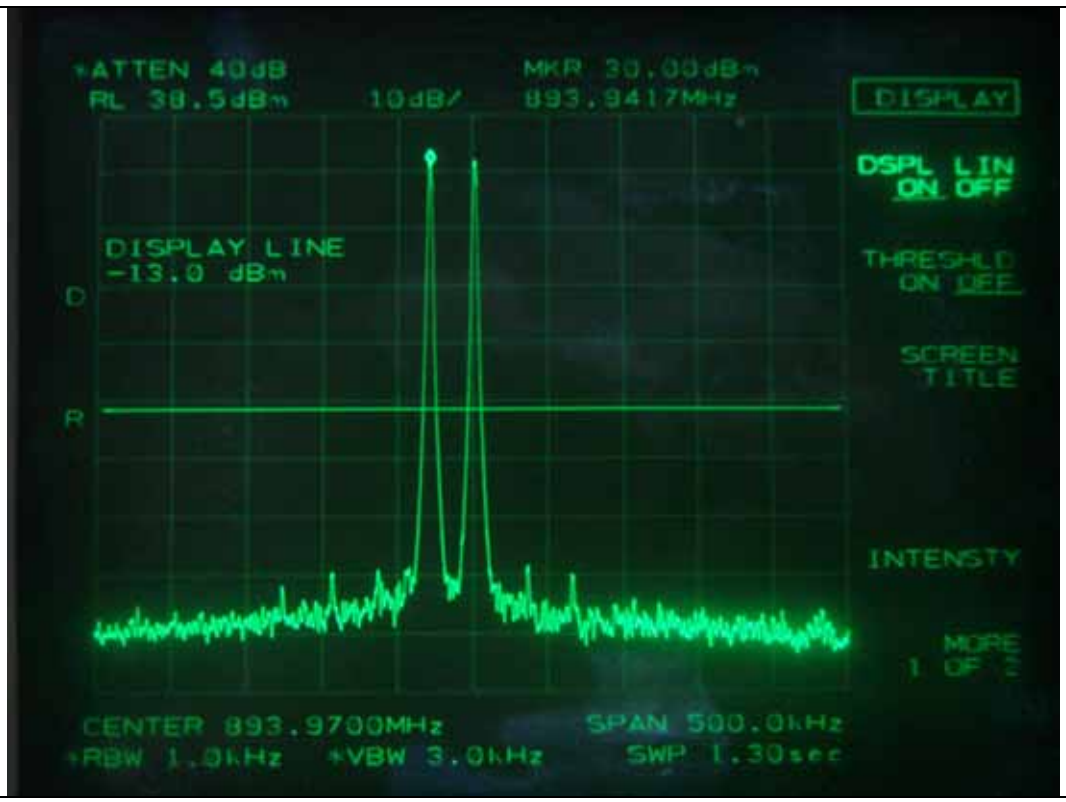


Low Channel – 3 input signals

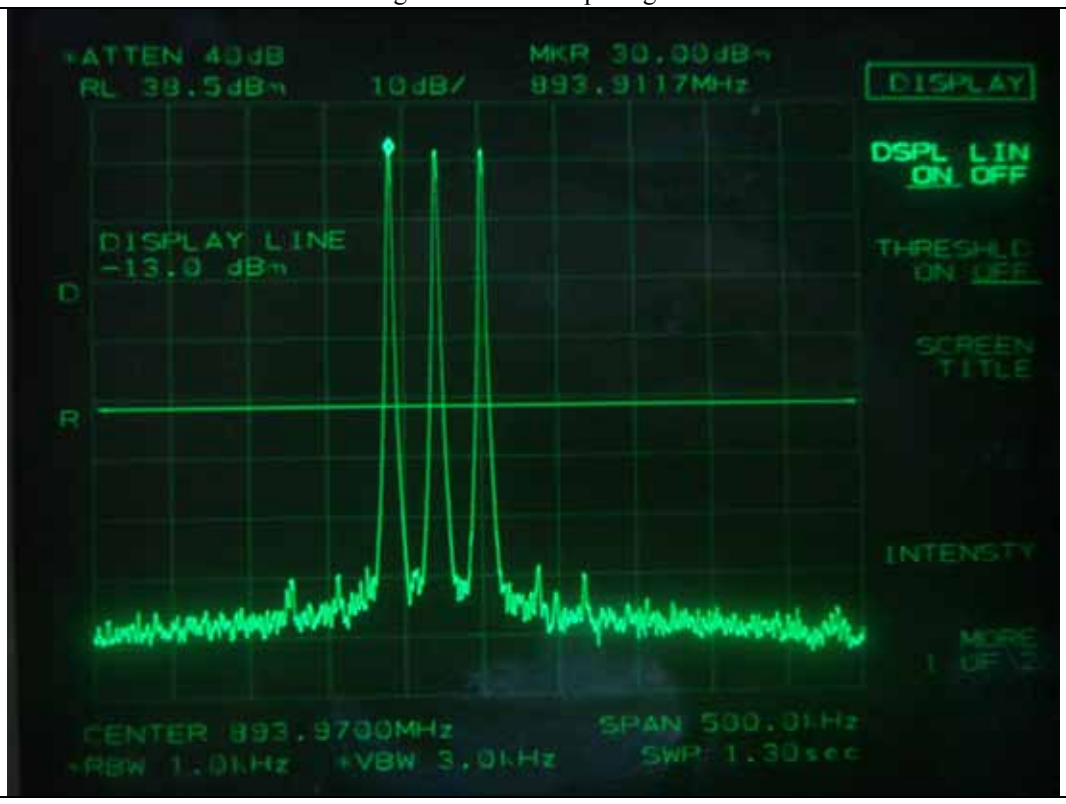


High Channel – 1 input signal

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



High Channel – 2 input signals



High Channel – 3 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.4.1.2 Test Result for Spurious emission

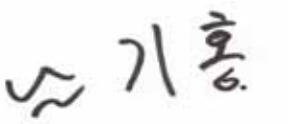
-. Test Date : January 11, 2013

-. Test Result : Pass

-. Modulation : No-Modulation

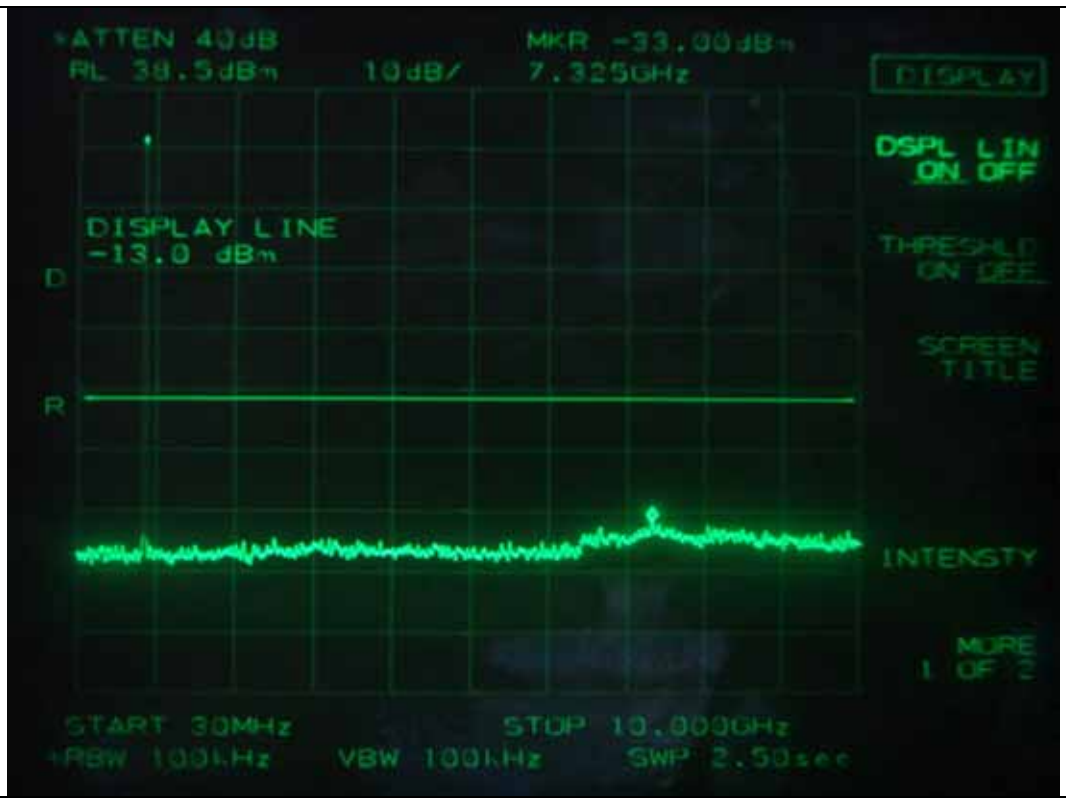
Frequency (MHz)	Number of Input Channel	Measured Value	Result
869.030	1	< -13 dBm	Pass
869.030 & 869.06	2		
869.030 & 869.06 & 869.09	3		
893.970	1	< -13 dBm	Pass
893.970 & 893.940	2		
893.970 & 893.940 & 893.921 0	3		

Remark: Intermodulation products must be attenuated below the rated power of the EUT at least 43 + 10log (Pw), equivalent to -13 dBm. Please refer to test data hereinafter.

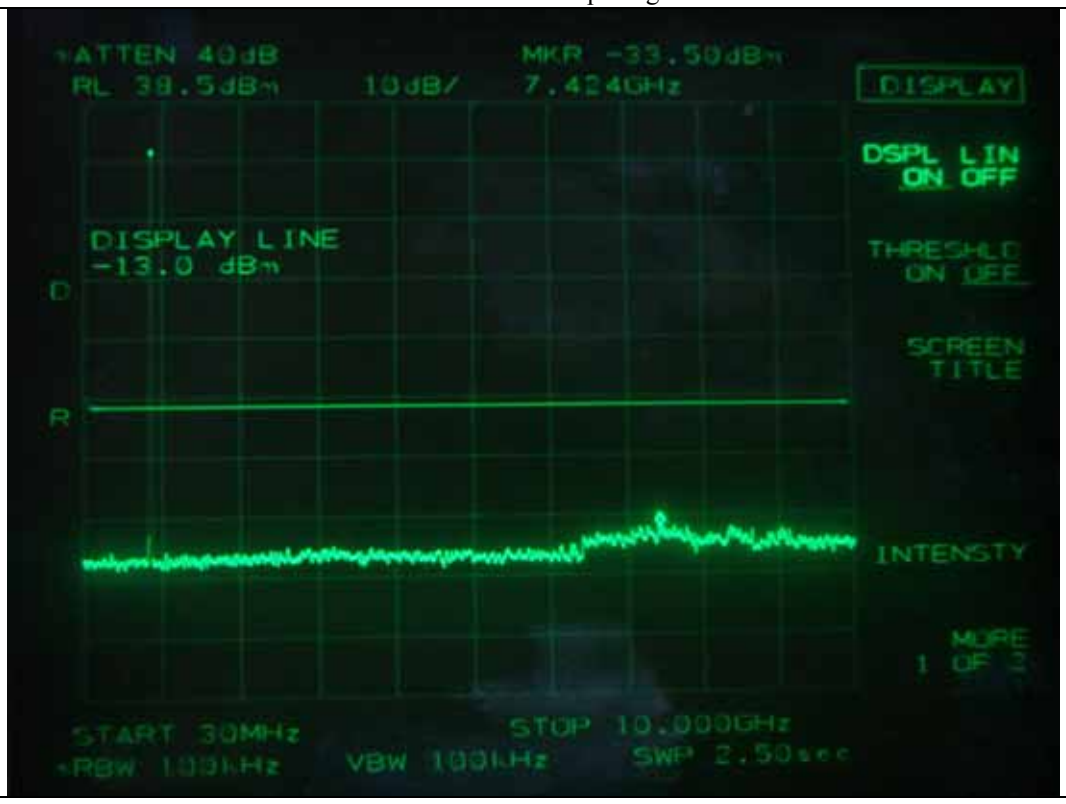


Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

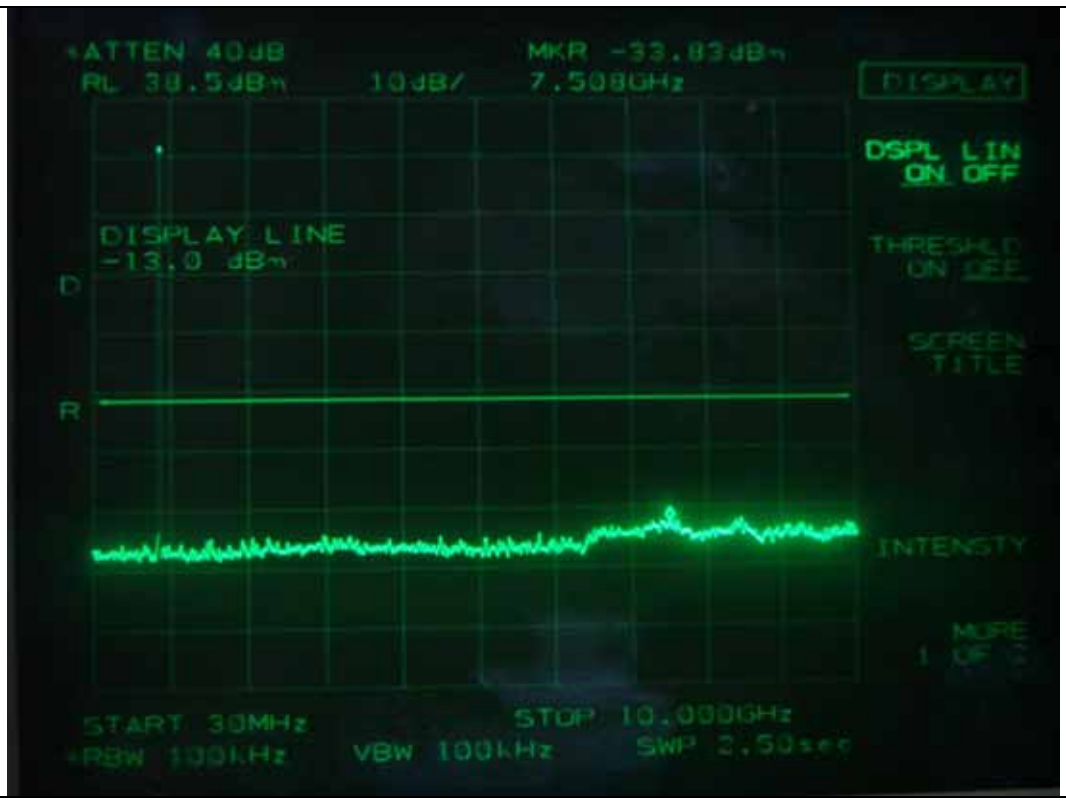


Low Channel – 1 input signal

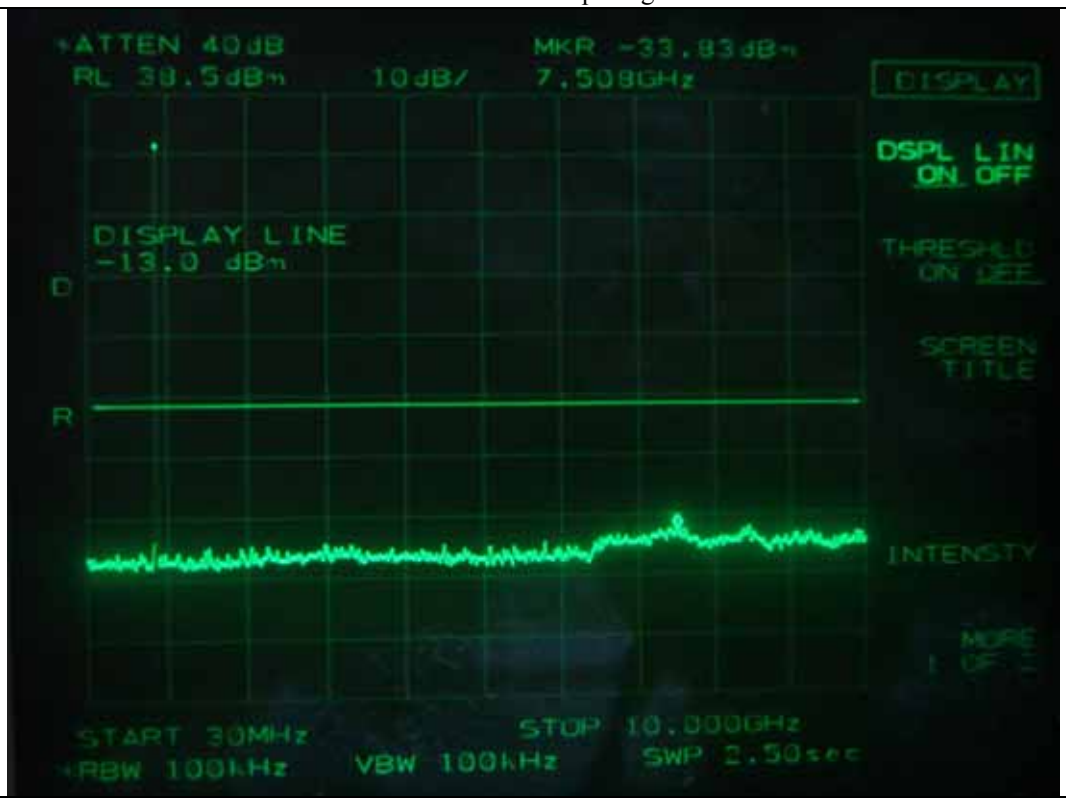


Low Channel – 2 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Low Channel – 3 input signals



High Channel – 1 input signal

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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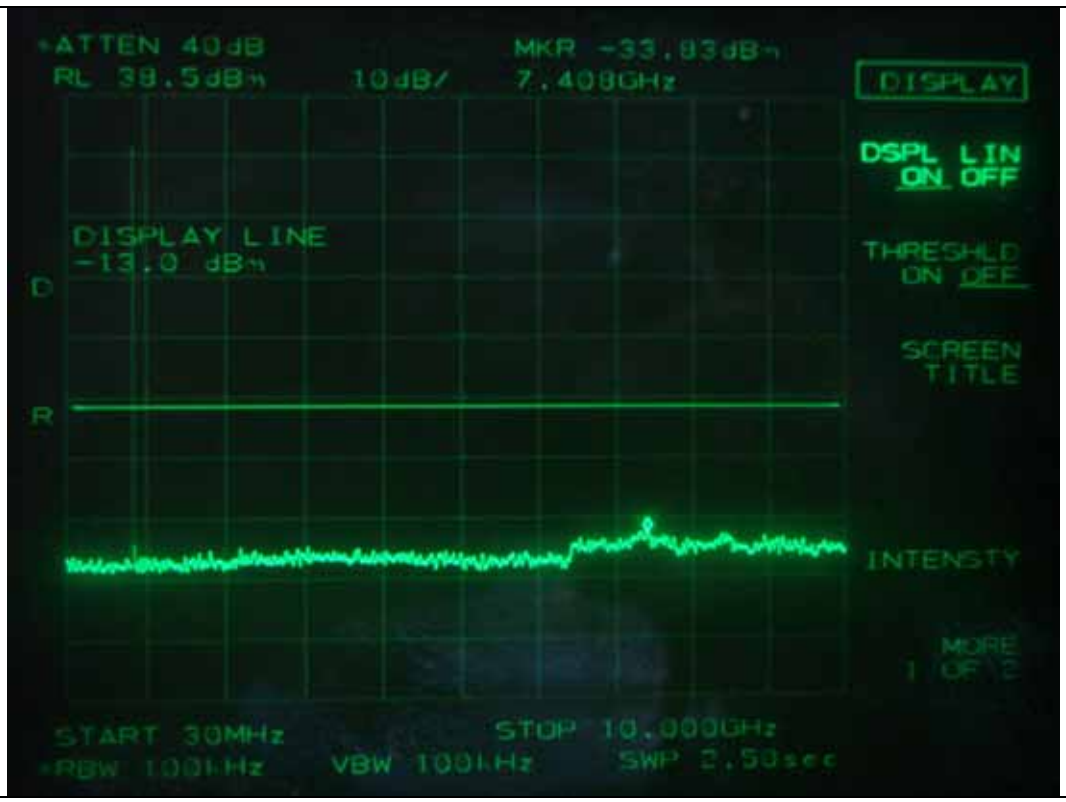
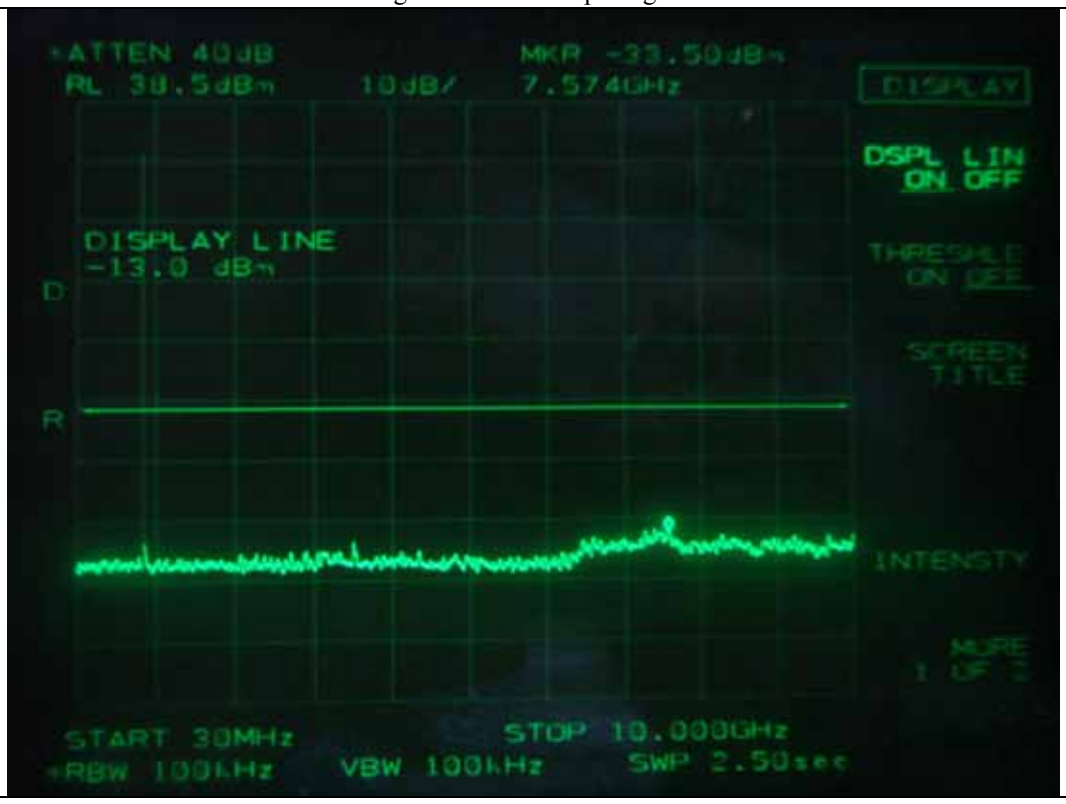


High Channel – 2 input signals



High Channel – 3 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.4.2 Test Result for Part 90 (700PS(D))

9.4.2.1 Test Result for peak power

-. Test Date : January 16, 2013

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Input Power (dBm)	Output Power (dBm)
758.030	1	-9.90	30.00
758.030 & 758.06	2	-9.90	30.00
758.030 & 758.06 & 758.09	3	-9.70	30.00
774.970	1	-9.70	30.00
774.970 & 774.940	2	-9.90	30.17
774.970 & 774.940 & 774.910	3	-9.90	30.00

Remark: Intermodulation products must be attenuated below the rated power of the EUT at least 43 + 10log (Pw), equivalent to -13 dBm. Please refer to test data hereinafter.

Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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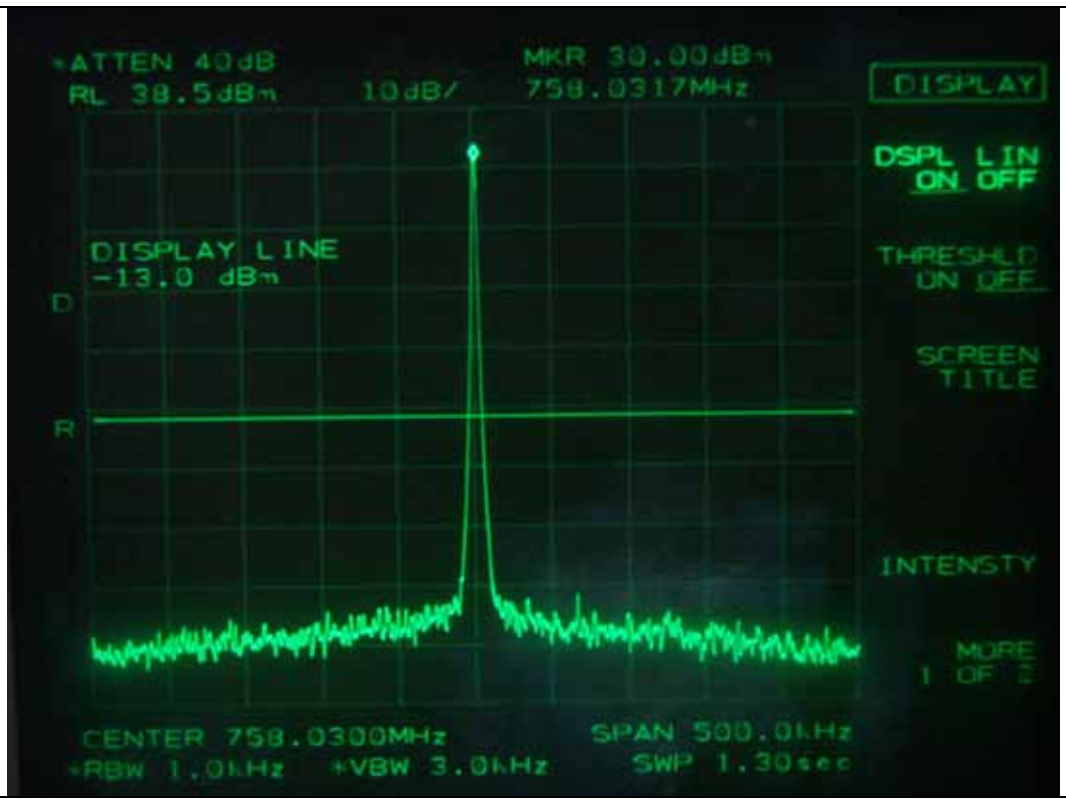
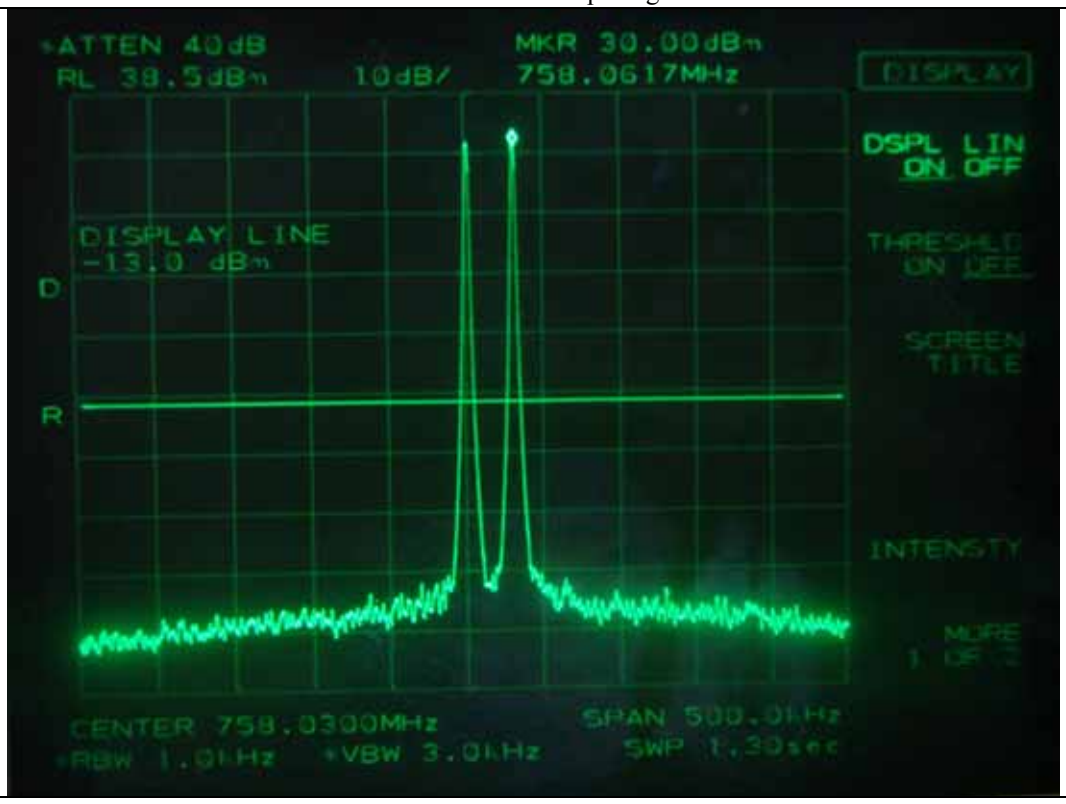
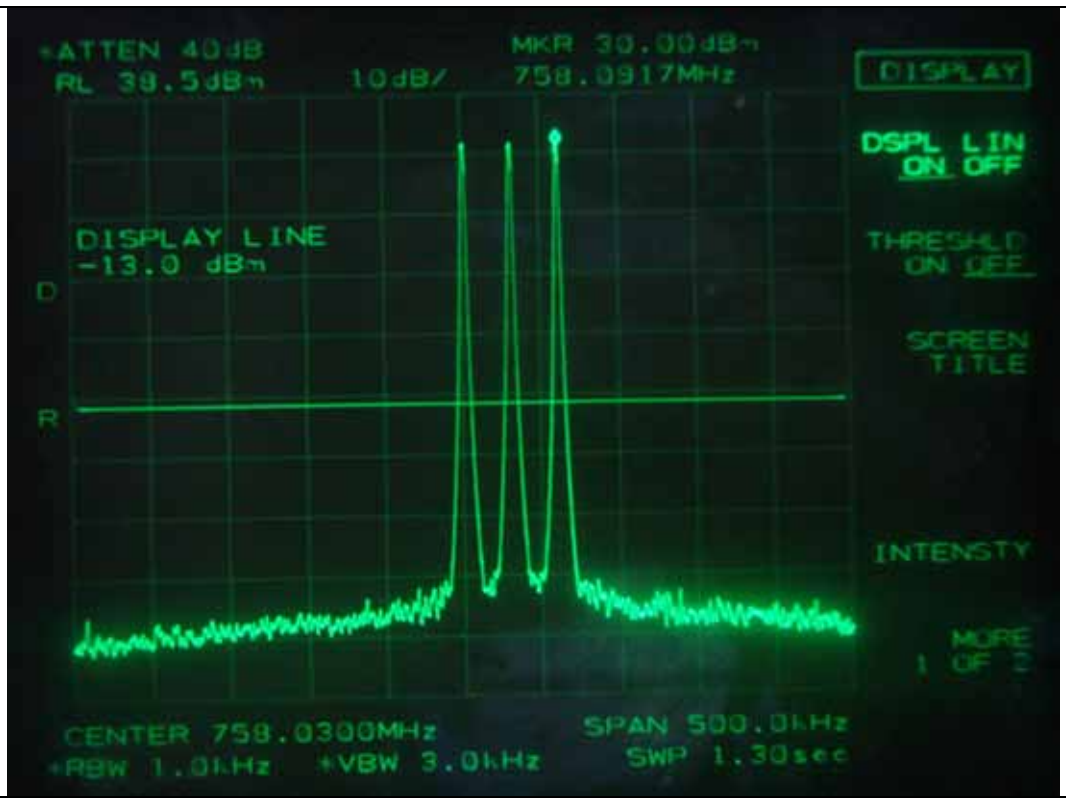


Low Channel – 1 input signal

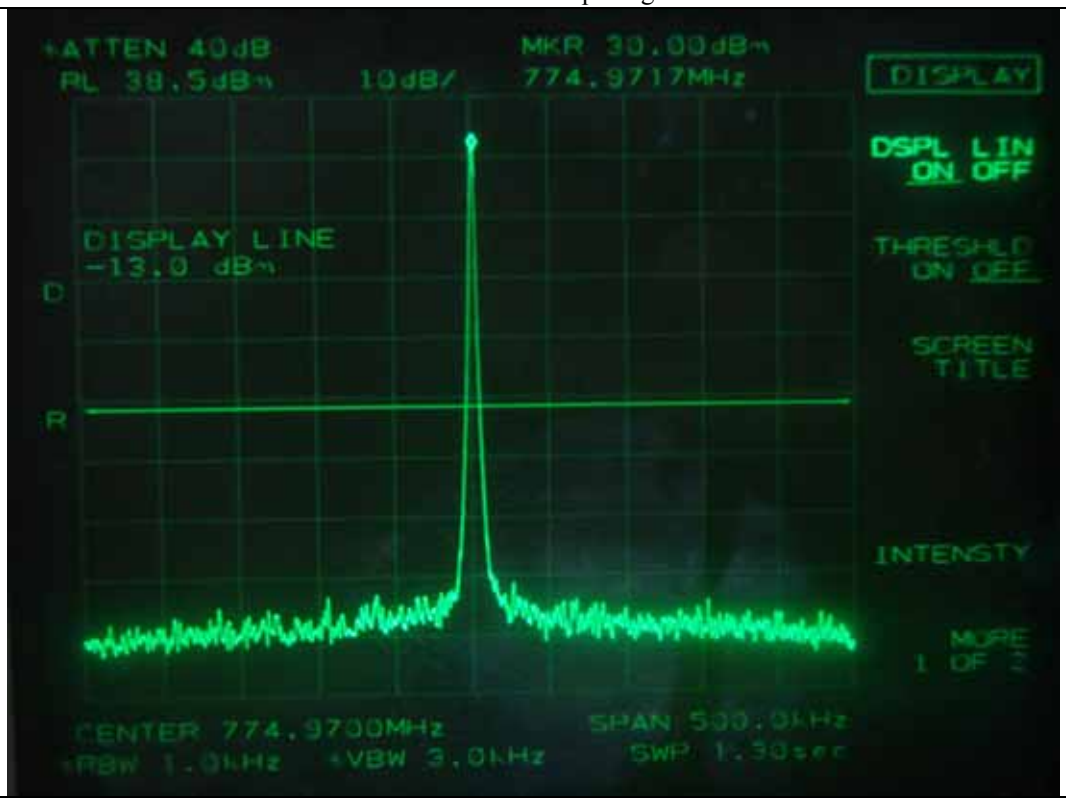


Low Channel – 2 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Low Channel – 3 input signals



High Channel – 1 input signal

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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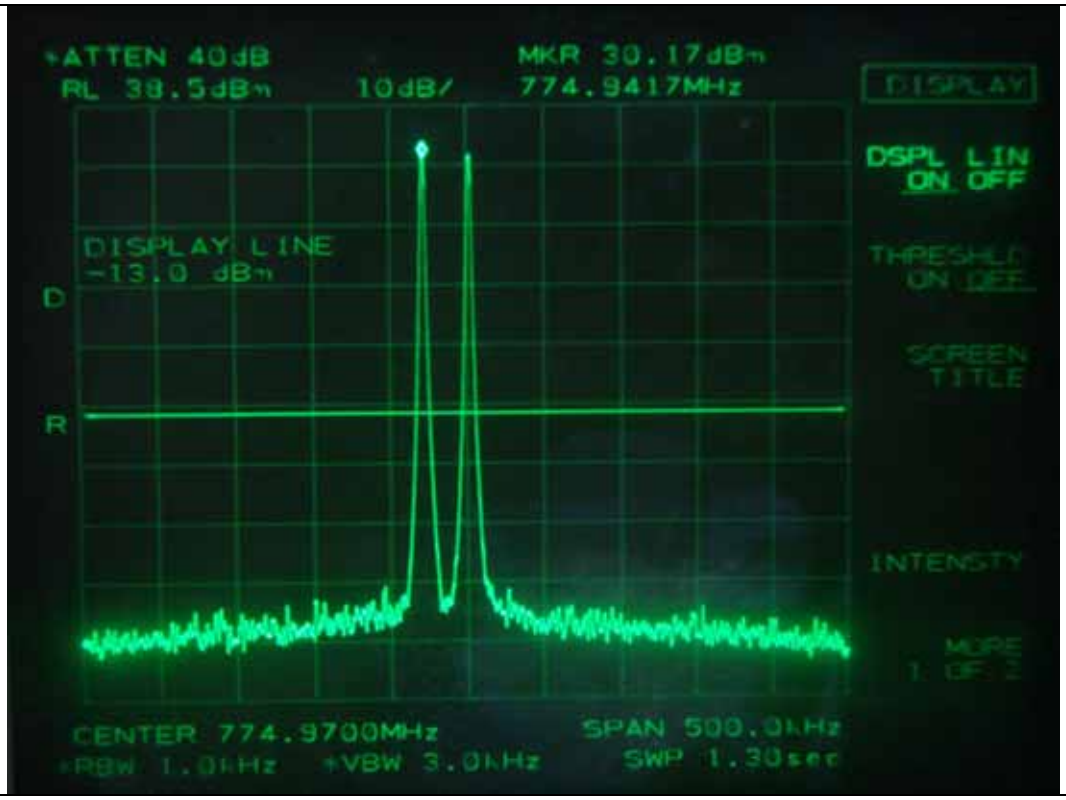
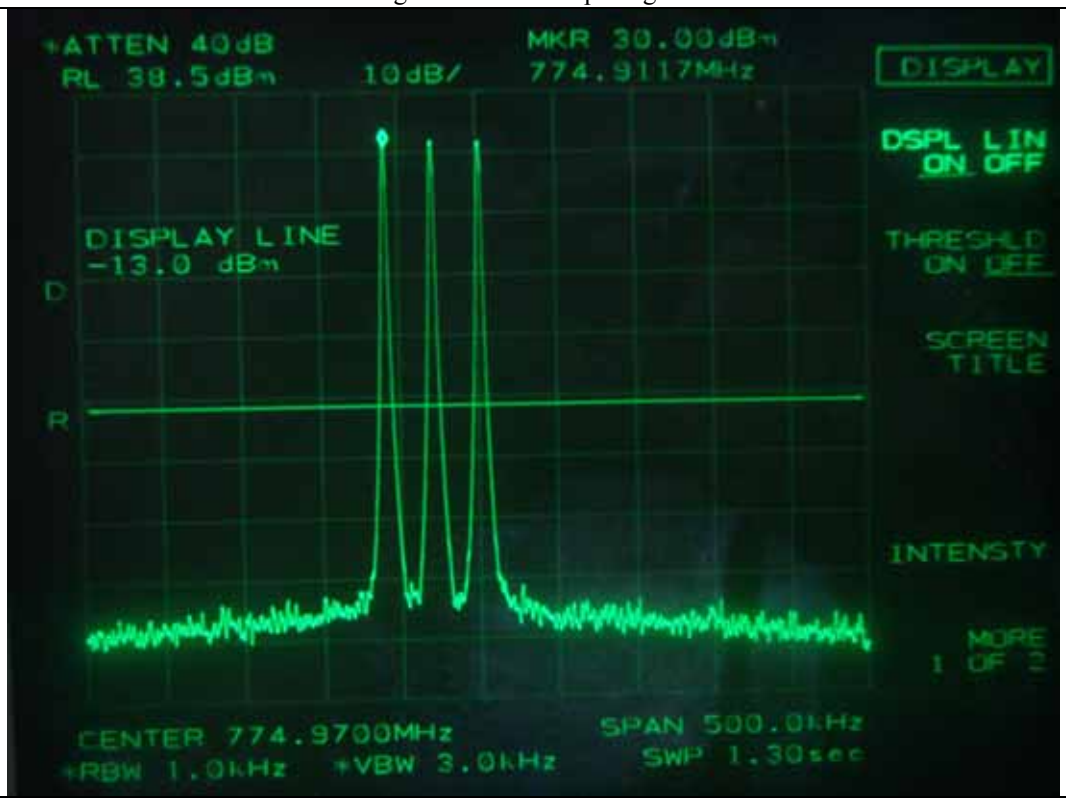


High Channel – 2 input signals



High Channel – 3 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9.4.2.2 Test Result for Spurious emission

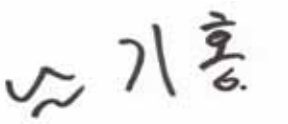
-. Test Date : January 16, 2013

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Measured Value	Result
758.030	1	< -13 dBm	Pass
758.030 & 758.06	2		
758.030 & 758.06 & 758.09	3		
774.970	1	< -13 dBm	Pass
774.970 & 774.940	2		
774.970 & 774.940 & 774.910	3		

Remark: Intermodulation products must be attenuated below the rated power of the EUT at least 43 + 10log (Pw), equivalent to -13 dBm. Please refer to test data hereinafter.



Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

Low Channel – 1 input signal

Low Channel – 2 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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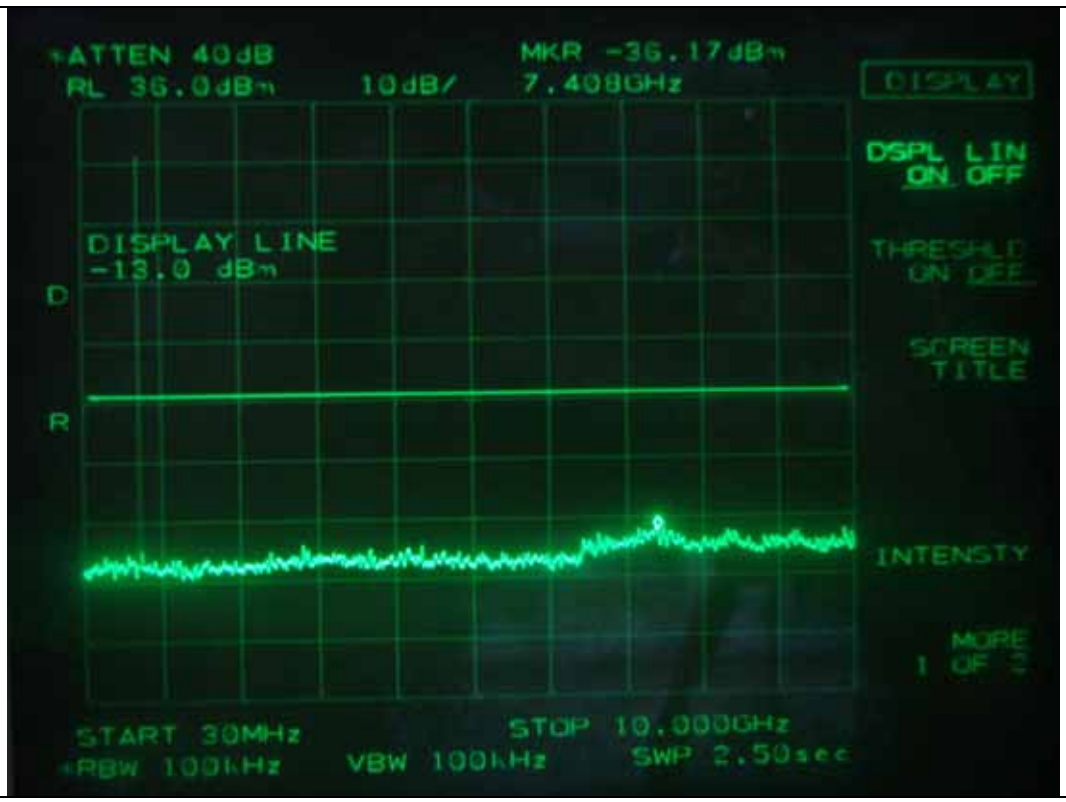
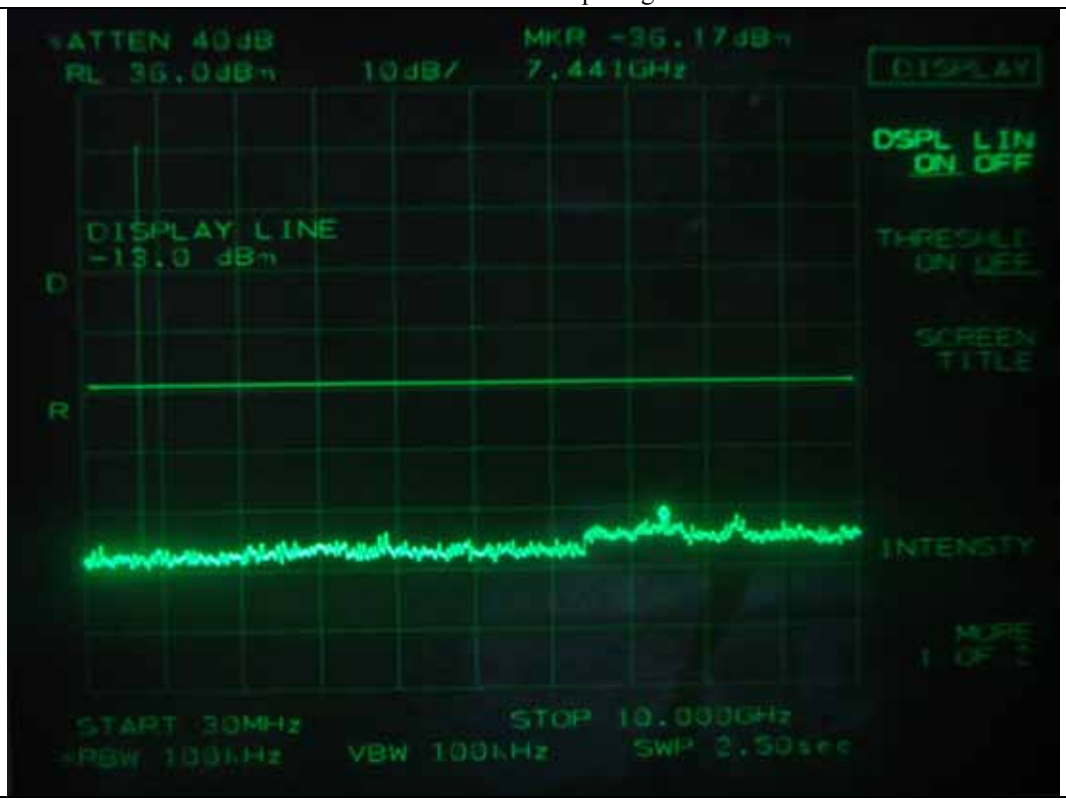
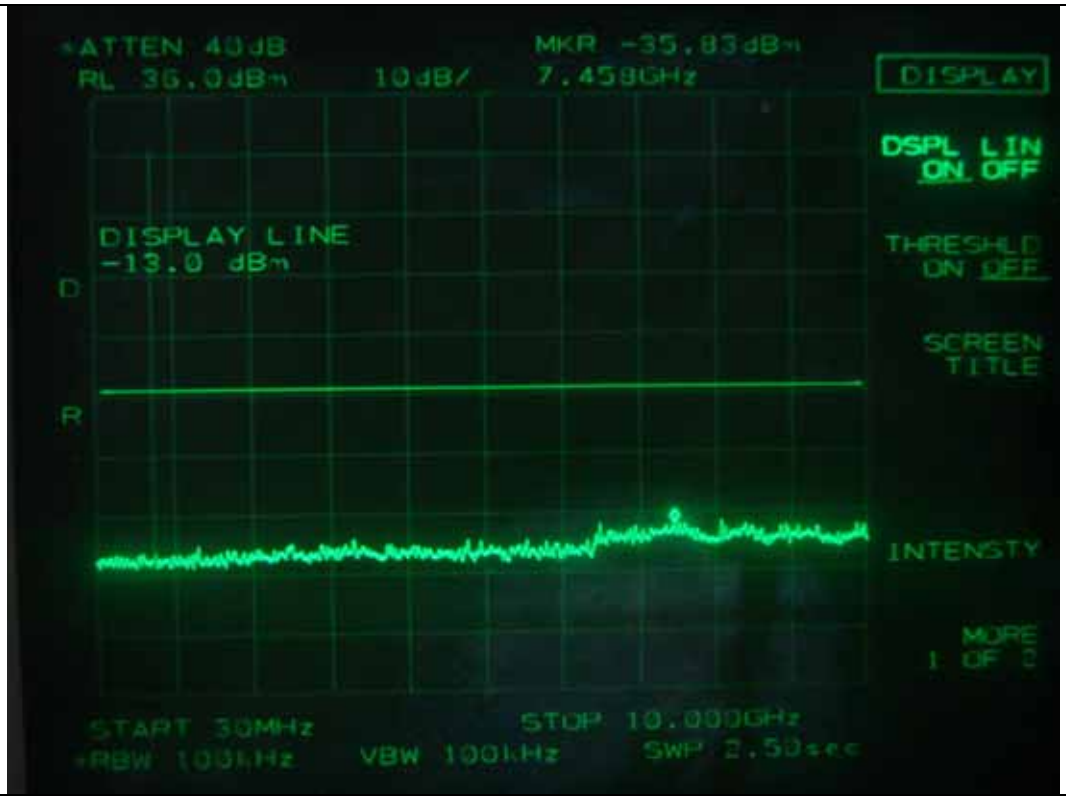


Low Channel – 3 input signals

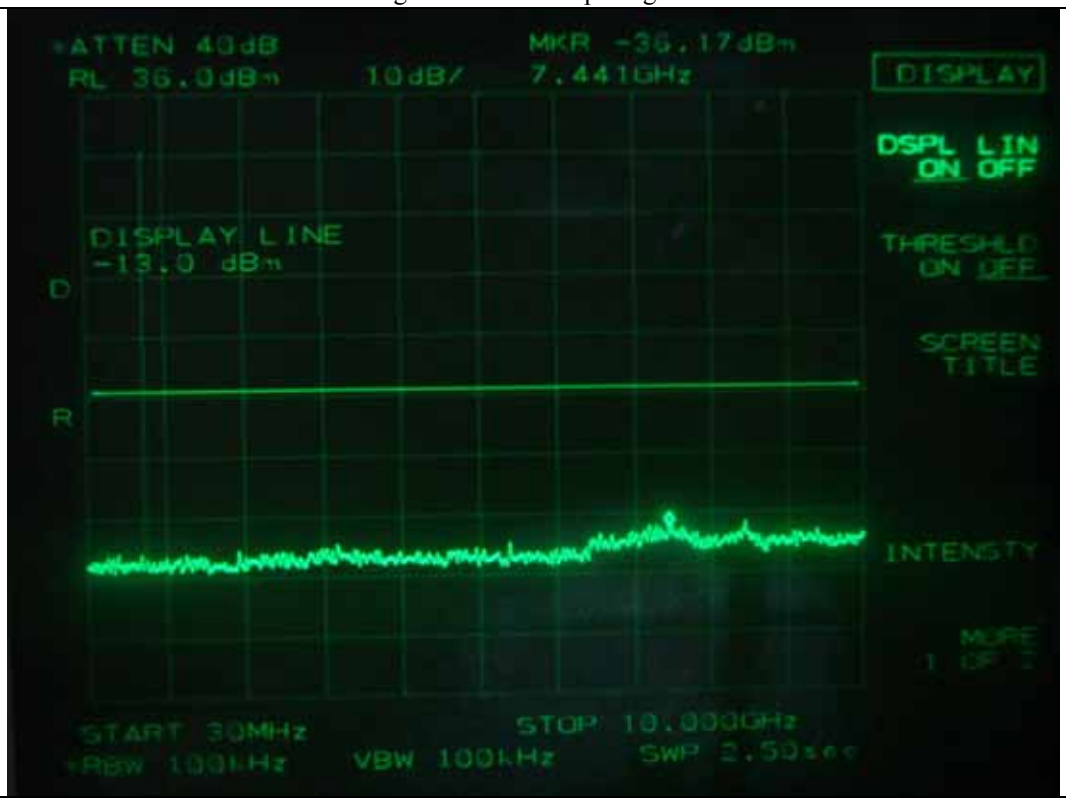


High Channel – 1 input signal

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



High Channel – 2 input signals



High Channel – 3 input signals

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10. FIELD STRENGTH OF SPURIOUS RADIATION

10.1 Operating environment

Temperature : 19 °C

Relative humidity : 45 % R.H.

10.2 Test set-up

The radiated emissions measurements were on the 3 m, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to up to 10th harmonic of the fundamental frequency was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. The test was performed by placing the EUT on 3-orthogonal axis. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

The maximum radiated emission was recorded and used as reference for the effective radiated power measurement. The EUT was then replaced by a tuned dipole antenna or Horn antenna and was oriented for vertical polarization and then the length was adjusted to correspond to the frequency of the transmitter. The substitution antenna was connected to a signal generator with a coaxial cable. The receiving antenna height was raised and lowered again through the specified range of height until maximum signal level is detected by the measuring receiver. The signal to the substitution antenna was adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the EUT radiated power measured, corrected for the change of input attenuation setting of the measuring receiver. The signal generator level was recorded and corrected by the power loss in the cable between the signal generator and substitution antenna and further corrected for the gain of the dipole antenna or horn antenna used relative to an ideal tuned dipole antenna. The measurement was repeated with the test antenna and the substitution antenna oriented for horizontal polarization. The measure of the effective radiated power is the larger of the two levels recorded.

10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESVD	Rohde & Schwarz	EMI Test Receiver	838453/018	Nov. 29, 2012 (1Y)
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	Apr. 04, 2012 (1Y)
■ -	83051A	Agilent	Preamplifier	3950M00201	Jun. 05, 2012 (1Y)
□ -	E4432B	Hewlett-Packard	Signal Generator	US38440950	Jun. 01, 2012 (1Y)
□ -	83650L	Hewlett-Packard	Signal Generator	3844A00415	May 31, 2012 (1Y)
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-255	Apr. 24, 2012 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Aug. 23, 2011 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 23, 2011 (2Y)
□ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Aug. 23, 2011 (2Y)
□ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170179	Aug. 23, 2011 (2Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 02, 2012 (1Y)
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 12, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

10.4 Test data for radiated emission

10.4.1 Test Result for Part 22 H (850C)

10.4.1.1 Input Voltage: AC 120 V

-. Test Date : January 17, 2013

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
869.03	65.30	-2.37	-0.18	H	3.33	-5.88	-	-
	67.85	-1.15		V		-4.66	-	-
Test Data for Middle Channel								
881.50	65.50	-2.13	-0.36	H	3.33	-5.82	-	-
	67.83	-1.00		V		-4.69	-	-
Test Data for High Channel								
893.97	65.17	-2.50	-0.53	H	3.33	-6.36	-	-
	68.17	-0.67		V		-4.53	-	-
100.100 0	26.50	-58.98	1.60	V	0.33	-57.71	-13.00	-44.71
110.400 0	25.00	-60.83	1.55	H	0.33	-58.95	-13.00	-45.95
262.200 0	22.50	-62.43	1.66	H	0.50	-60.27	-13.00	-47.27
858.100 0	23.67	-63.20	0.03	V	0.67	-62.50	-13.00	-49.50
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

10.4.1.2 Input Voltage: DC -48 V

-. Test Date : January 17, 2013

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
869.03	65.30	-2.37	-0.18	H	3.33	-5.88	-	-
	67.85	-1.15		V		-4.66	-	-
Test Data for Middle Channel								
881.50	65.50	-2.13	-0.36	H	3.33	-5.82	-	-
	67.83	-1.00		V		-4.69	-	-
Test Data for High Channel								
893.97	65.17	-2.50	-0.53	H	3.33	-6.36	-	-
	68.17	-0.67		V		-4.53	-	-
200.000 0	26.70	-58.98	1.83	H	0.66	-57.81	-13.00	-44.81
220.000 0	25.50	-60.83	1.74	H	0.66	-58.43	-13.00	-45.43
262.200 0	22.50	-62.43	1.66	H	0.50	-60.27	-13.00	-47.27
858.100 0	23.67	-63.20	0.03	V	0.67	-62.50	-13.00	-49.50
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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10.4.2 Test Result for Part 90(700PS(D))

10.4.2.1 Input Voltage: AC 120 V

-. Test Date : January 17, 2013

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

-. Measurement distance : 3 m

-. Result : Pass

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
758.012 5	56.00	-2.90	0.93	H	3.33	-5.30	-	-
	67.90	-1.05		V		-3.45	-	-
Test Data for Middle Channel								
766.500 0	66.17	-2.80	0.91	H	33.33	-5.22	-	-
	68.00	-1.00		V		-3.42	-	-
Test Data for High Channel								
774.987 5	65.83	-3.00	0.88	H	33.33	-5.45	-	-
	67.67	-1.17		V		-3.62	-	-
100.100 0	26.67	-58.81	1.60	V	0.33	-57.54	-13.00	-44.54
110.400 0	25.33	-60.50	1.55	H	0.33	-58.62	-13.00	-45.62
262.200 0	22.00	-62.93	1.66	H	0.50	-60.77	-13.00	-47.77
858.100 0	23.33	-63.54	0.03	V	0.67	-62.84	-13.00	-49.84

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

10.4.2.2 Input Voltage: DC -48 V

-. Test Date : January 17, 2013

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

-. Measurement distance : 3 m

-. Result : Pass

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
758.0125	56.10	-2.80	0.93	H	3.33	-5.20	-	-
	67.85	-1.10		V		-3.50	-	-
Test Data for Middle Channel								
766.5000	66.33	-2.96	0.91	H	3.33	-5.38	-	-
	68.17	-0.83		V		-3.25	-	-
Test Data for High Channel								
774.9875	65.67	-2.84	0.88	H	3.33	-5.29	-	-
	67.50	-1.00		V		-3.45	-	-
200.0000	26.50	-59.18	1.83	H	0.66	-58.01	-13.00	-45.01
220.0000	25.33	-61.00	1.74	H	0.66	-58.60	-13.00	-45.60
262.2000	22.83	-62.10	1.66	H	0.50	-59.94	-13.00	-46.94
858.1000	23.67	-63.20	0.03	V	0.67	-62.50	-13.00	-49.50

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Senior Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

11.1 Operating environment

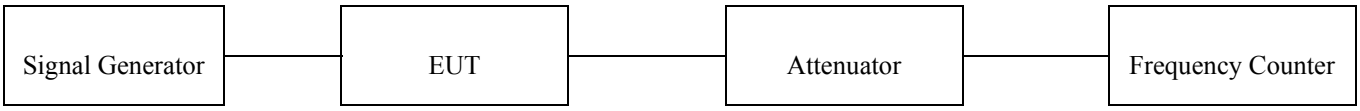
Temperature : (20 ~ 21) °C

Relative humidity : (49 ~ 50) % R.H.

11.2 Test set-up

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 unmodulation.

Turn EUT off and set chamber temperature to -30 °C and then allow sufficient time (approximately 20 min to 30 min after chamber reach the assigned temperature) for EUT to stabilize. Turn on the EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -30 °C to +50 °C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.



11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 14, 2012 (1Y)
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 10, 2012 (1Y)
■ -	SSE-43CI-A	Samkun	Chamber	060712	Jun. 01, 2012 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 02, 2012 (1Y)
☐ -	FSV30	R/S	Spectrum Analyzer	101372	May. 31, 2012 (1Y)
■ -	SA-26B-6	VENTRIX	Attenuator	N/A	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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11.4 Test data

11.4.1 Test Result for Part 22 H (850C)

-. Test Date : January 14, 2013

-. Result : Pass

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	881 500 000	881 500 000	0.000 0	Within the Authorized Frequency block
-20		881 500 001	0.001 1	
-10		881 500 001	0.001 1	
0		881 500 001	0.001 1	
10		881 500 000	0.000 0	
20		881 500 001	0.001 1	
30		881 500 001	0.001 1	
40		881 500 001	0.001 1	
50		881 500 002	0.002 3	

Tested by: Ki-Hong, Nam / Senior Engineer

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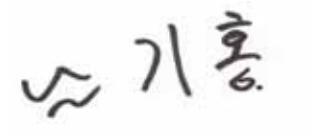
11.4.2 Test Result for Part 90 (700PS(D))

-. Test Date : January 16, 2013

-. Result : Pass

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	766 500 000	766 500 001	0.001 3	Within the Authorized Frequency block
-20		766 500 002	0.002 6	
-10		766 500 000	0.000 0	
0		766 500 001	0.001 3	
10		766 500 001	0.001 3	
20		766 500 002	0.002 6	
30		766 500 000	0.000 0	
40		766 500 001	0.001 3	
50		766 500 002	0.002 6	



Tested by: Ki-Hong, Nam / Senior Engineer

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13. FREQUENCY STABILITY WITH VOLTAGE VARIATION

13.1 Operating environment

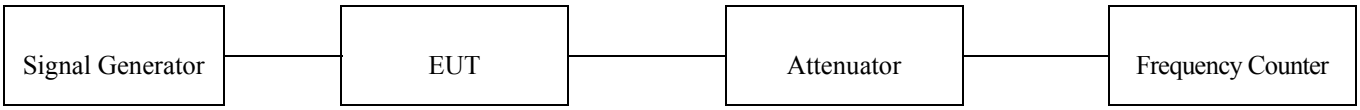
Temperature : (20 ~ 21) °C

Relative humidity : (49 ~ 50) % R.H.

13.2 Test set-up

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 CW Microwave Frequency Counter. The test was performed at Middle channel at each band using all applicable unmodulation.

The RF output port of the EUT was connected to the input of the spectrum analyzer. The signal generator was set to center frequency for each band with an un-modulated signal. The voltage of EUT set to 115 % of the nominal value and then was reduced to 85 % of nominal voltage. The output frequency was recorded at each step.



13.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 02, 2012 (1Y)
☐ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 12, 2012 (1Y)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 14, 2012 (1Y)
☐ -	FSV30	R/S	Spectrum Analyzer	101372	May. 31, 2012 (1Y)
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 10, 2012 (1Y)
■ -	DH-60	Dea Kwang Elec.	Slidacs	N/A	Sep 03, 2012 (1Y)
■ -	SA-26B-6	VENTRIX	Attenuator	N/A	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

13.4 Test data

13.4.1 Test Result for Part 22 H (850C)

13.4.1.1 Input Voltage: AC 120 V

-. Test Date : January 14, 2013

-. Result : Pass

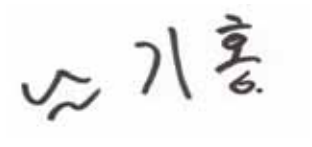
Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
115%	881 500 000	881 500 002	0.002 3	Within the Authorized Frequency block
100%		881 500 001	0.001 1	
85%		881 500 001	0.001 1	

13.4.1.2 Input Voltage: DC -48 V

-. Test Date : January 14, 2013

-. Result : Pass

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
115%	881 500 000	881 500 002	0.002 3	Within the Authorized Frequency block
100%		881 500 001	0.001 1	
85%		881 500 002	0.002 3	



Tested by: Ki-Hong, Nam / Senior Engineer

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

13.4.2 Test Result for Part 90 (700PS(D))

13.4.2.1 Input Voltage: AC 120 V

-. Test Date : January 16, 2013

-. Result : Pass

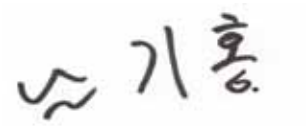
Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
115%	766 500 000	766 500 001	0.001 3	Within the Authorized Frequency block
100%		766 500 002	0.002 6	
85%		766 500 001	0.001 3	

13.4.2.2 Input Voltage: DC -48 V

-. Test Date : January 16, 2013

-. Result : Pass

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
115%	766 500 000	766 500 001	0.001 3	Within the Authorized Frequency block
100%		766 500 002	0.002 6	
85%		766 500 000	0.000 0	



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14. MAXIMUM PERMISSIBLE EXPOSURE

14.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are f/1500 mW/cm² for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm² for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$E = \sqrt{(30 * P * G)} / d$, and $S = E^2 / Z = E^2 / 377$, because 1 mW/cm² = 10 W/m²

Where

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

E = Electric filed strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combing equations and rearranging the terms to express the distance as a function of the remaining variable

$d = \sqrt{(30 * P * G) / (377 * 10 S)}$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 0.01 * d (m)

$d = 0.282 * \sqrt{(P * G) / S}$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm²

14.2 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Operating Band	Peak Output Power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	FCC Limit (mW/cm²)
	(dBm)	(mW)	Log	Linear			
850 C	30.0	1 000	2.0	1.58	14.75	0.32	0.58
700 PS	30	1 000	2.0	1.58	15.79	0.32	0.51

For calculating safe distance using the value mentioned in above table, for example 850 C band,

Safe distance, $D = 0.282 * \sqrt{(1\,000 * 1.58)/0.58} = 14.75$ cm

For getting power density at 20 cm separation in above table, following formula was used.

$S = P * G / (4\pi * R^2) = 1\,000 * 1.58 / (4 * 3.14 * 20\text{^}2) = 0.32$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

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