

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR PCS LICENSED TRANSMITTER

Test Report No. : E126R-006
AGR No. : A125A-116
Applicant : SOLiD, Inc.
Address : 10,9th Floor, SOLiD Space, Pangyoyeok-ro 220, Bundang-gu, Seongnam-si,
Gyeonggi-do, 463-400, Korea
Manufacturer : SOLiD, Inc.
Address : 10,9th Floor, SOLiD Space, Pangyoyeok-ro 220, Bundang-gu, Seongnam-si,
Gyeonggi-do, 463-400, Korea
Type of Equipment : RDU MODULE(1900P/AWS-1)
FCC ID. : W6U1900PAWS1R
Model Name : RDU 1900P+AWS-1_R
Serial number : N/A
Total page of Report : 173 pages (including this page)
Date of Incoming : May 10, 2012
Date of issue : June 05, 2012

SUMMARY

The equipment complies with the regulation; **FCC Part 24 Subpart E and Part 27 Subpart C**.

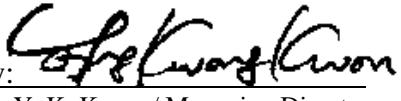
This test report only contains the result of a single test of the sample supplied for the examination.

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

Prepared by:

Ki-Hong, Nam / Senior Engineer
EMC/RF Center
ONETECH Corp.

Reviewed by:


Y. K. Kwon / Managing Director
EMC/RF Center
ONETECH Corp.

CONTENTS

	PAGE
1. VERIFICATION OF COMPLIANCE.....	5
2. TEST SUMMARY.....	6
2.1 TEST ITEMS AND RESULTS.....	6
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS	6
2.3 RELATED SUBMITTAL(S) / GRANT(S)	6
2.4 PURPOSE OF THE TEST	6
2.5 TEST METHODOLOGY	6
2.6 TEST FACILITY	6
3. GENERAL INFORMATION.....	8
3.1 PRODUCT DESCRIPTION.....	8
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.	9
3.3 PERIPHERAL EQUIPMENT.....	9
3.4 MODE OF OPERATION DURING THE TEST.....	9
4. EUT MODIFICATIONS	9
5. RF POWER OUTPUT AT ANTENNA TERMINAL	10
5.1 OPERATING ENVIRONMENT	10
5.2 TEST SET-UP	10
5.3 TEST EQUIPMENT USED	10
5.4 TEST DATA	11
<i>5.4.1 Test Result for Part 24 E</i>	<i>11</i>
<i>5.4.2 Test Result for Part 27</i>	<i>12</i>
6. OCCUPIED BANDWIDTH	13
6.1 OPERATING ENVIRONMENT	13
6.2 TEST SET-UP	13
6.3 TEST EQUIPMENT USED	13
6.4 TEST DATA	14
<i>6.4.1 Test Result for Part 24 E</i>	<i>14</i>
<i>6.4.2 Test Result for Part 27</i>	<i>51</i>
7. SPURIOUS EMISSION AT ANTENNA TERMINAL.....	88
7.1 OPERATING ENVIRONMENT	88
7.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	88

7.3 TEST EQUIPMENT USED	88
7.4 TEST DATA	89
7.4.1 Test Result for Part 24E	89
7.4.2 Test Result for Part 27	109
8. SPURIOUS EMISSION AT ANTENNA TERMINAL AT BLOCK EDGES ± 1 MHZ.....	129
8.1 OPERATING ENVIRONMENT	129
8.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	129
8.3 TEST EQUIPMENT USED	129
8.4 TEST DATA	130
8.4.1 Test Result for Part 24E	130
8.4.2 Test Result for Part 27	137
9. INTERMODULATION TEST	144
9.1 OPERATING ENVIRONMENT	144
9.2 TEST SET-UP	144
9.3 TEST EQUIPMENT USED	144
9.4 TEST RESULT FOR PART 24E.....	145
9.4.1 Test Result for peak power	145
9.4.2 Test Result for Spurious emission.....	149
9.5 Test Result for Part 27	153
9.5.2 Test Result for Spurious emission.....	157
10. FIELD STRENGTH OF SPURIOUS RADIATION.....	161
10.1 OPERATING ENVIRONMENT	161
10.2 TEST SET-UP	161
10.3 TEST EQUIPMENT USED	161
10.4 TEST DATA FOR RADIATED EMISSION	162
10.4.1 Test result for Part 24E with AC 120V Power Supply.....	162
10.4.2 Test Result for Part 24E with DC - 48 V Power Supply	163
10.4.3 Test Result for Part 27 with AC 120 V Power Supply	164
10.4.4 Test Result for Part 27 with DC - 48 V Power Supply	165
11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION.....	166
11.1 OPERATING ENVIRONMENT	166
11.2 TEST SET-UP	166
11.3 TEST EQUIPMENT USED	166
11.4 TEST DATA	167
11.4.1 Test Result for Part 24E	167

<i>11.4.2 Test Result for Part 27</i>	168
12. FREQUENCY STABILITY WITH VOLTAGE VARIATION.....	169
12.1 OPERATING ENVIRONMENT	169
12.2 TEST SET-UP	169
12.3 TEST EQUIPMENT USED	169
12.4 TEST DATA	170
<i>12.4.1 Test Result for Part 24E with AC 120 V Power Supply.....</i>	<i>170</i>
<i>12.4.2 Test Result for Part 24E with DC - 48 V Power Supply</i>	<i>171</i>
<i>12.4.3 Test Result for Part 27 with AC 120 V Power Supply</i>	<i>172</i>
<i>12.4.4 Test Result for Part 27 with DC - 48 V Power Supply</i>	<i>173</i>
APPENDIX. MAXIMUM PERMISSIBLE EXPOSURE	174
1. RF EXPOSURE CALCULATION	174
2. CALCULATED MPE SAFE DISTANCE.....	174

1. VERIFICATION OF COMPLIANCE

APPLICANT : SOLiD, Inc.
ADDRESS : 10,9th Floor, SOLiD Space, Pangyoek-ro 220, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-400, Korea
CONTACT PERSON : Mr. Kangyeob, Bae / Director
TELEPHONE NO : +82-31-627-6292
FCC ID : W6U1900PAWS1R
MODEL NAME : RDU 1900P+AWS-1_R
SERIAL NUMBER : N/A
DATE : June 05, 2012

EQUIPMENT CLASS	PCB - PCS Licensed Transmitter
EQUIPMENT DESCRIPTION	RDU MODULE(1900P/AWS-1)
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4: 2009, EIA/TAI-603B
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	PART 24 Subpart E and PART 27 Subpart C
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER(S) 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.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
2.1046(a), 24.232, 27.50(d)	RF Power Output at Antenna Terminals	Met the Limit / PASS
2.1047	Modulation Characteristics	PASS (See Note 1)
2.1049, 24.238	Occupied Bandwidth, Bandwidth Limitation	Met the Limit / PASS
2.1049	Band Edge	Met the Limit / PASS
2.1051, 24.238(a), 27.53(g)	Spurious Emissions at Antenna Terminals	Met the Limit / PASS
2.1053, 24.238(a), 27.53(g)	Field strength of Spurious Radiation	Met the Limit / PASS
24.235, 24.235, 27.54	Frequency Stability with Temperature variation	Met the requirement / PASS
24.235, 24.235, 27.54	Frequency stability with primary voltage variation	Met the requirement / PASS
2.1093	RF Exposure	See Note 2

Note1: The Equipment under Test (EUT) is a signal booster which reproduces the modulated input signal, which was received by optic cable, so the EUT meets the requirement.

Note2: 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 3 m from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 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)

301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. The Onetech Corp. has been accredited as a Conformity Assessment Body (CAB) with designation number KR0013.

3. GENERAL INFORMATION

3.1 Product Description

The SOLiD, Inc., Model RDU 1900P+AWS-1_R (referred to as the EUT in this report) is a RDU MODULE(1900P/AWS-1) 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, Model No: 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 1900P+AWS-1_R, FCC ID: W6U1900PAWS1R 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(1900P/AWS-1)
LIST OF EACH OSC. or CRY. FREQ.(FREQ.>=1 MHz)		14.74 MHz
EMISSION DESIGNATOR		F9W(CDMA, EVDO, WCDMA), G7W(GSM, EDGE), D7W(LTE)
OPERATING FREQUENCY	1900P	1 930 MHz ~ 1 995 MHz
	AWS-1	2 110 MHz ~ 2 155 MHz
RF OUTPUT POWER		30 dBm
CHANNEL SEPARATION		GSM(200 kHz), EDGE(200 kHz), CDMA(1.25 MHz) EVDO(1.25 MHz), WCDMA(5 MHz), LTE(5 MHz)
DC VOLTAGE & CURRENT INTO FINAL AMPLIFIER		DC 27 V, Max 1 A
ELECTRICAL RATING		AC 120 V, 0.97 A, - 48 Vdc
OPERATING TEMPERATURE		-10 °C ~ 50 °C

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 1900P+AWS-1_R	SOLiD, Inc.	W6U1900PAWS1R	RDU MODULE(1900P/AWS-1) (EUT)	-
SMJ100A	Rohde & Schwarz	N/A	Vector Signal Generator	EUT

3.4 Mode of operation during the test

The EUT was received signal from signal generator and then each modulation, GSM, EDGE, CDMA, EVDO, WCDMA and LTE was configured for maximum signal gain and bandwidth. Also the EUT supports dual band, PCS and AWS band, so the EUT was tested 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.

4. EUT MODIFICATIONS

- None

5. RF POWER OUTPUT at ANTENNA TERMINAL

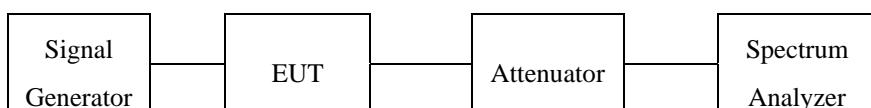
5.1 Operating environment

Temperature : 24.0 °C
Relative humidity : 52 %R.H.

5.2 Test set-up

The RF signal from the signal generator(s) was injected to the EUT by cable. 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.



5.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - E4432B	HP	Signal Generator	US38440950	June 10, 2011 (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	Jun. 10, 2011 (1Y)
■ - FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)
■ - 67-30-43	Aeroflex Weinschel	Power Attenuator	CA5760	Nov. 30, 2011 (1Y)

All test equipment used is calibrated on a regular basis.

5.4 Test data

5.4.1 Test Result for Part 24 E

- Test Date : May 31, 2012
- Test Result : PASSED

Modulation	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
GSM	Low	1 930.20	-14.80	30.00	1.00	100.00
	Middle	1 962.60	-14.70	30.00		
	High	1 994.80	-14.80	30.00		
EDGE	Low	1 930.20	-14.90	30.00	1.00	100.00
	Middle	1 962.60	-14.80	30.00		
	High	1 994.80	-14.70	30.00		
CDMA	Low	1 931.25	-14.90	30.00	1.00	100.00
	Middle	1 967.50	-14.70	30.00		
	High	1 993.75	-14.90	30.00		
1xEVDO	Low	1 931.25	-14.80	30.00	1.00	100.00
	Middle	1 967.50	-14.90	30.00		
	High	1 993.75	-14.90	30.00		
WCDMA	Low	1 932.40	-14.90	30.00	1.00	100.00
	Middle	1 962.40	-14.80	30.00		
	High	1 992.60	-14.80	30.00		
LTE	Low	1 932.50	-14.70	30.00	1.00	100.00
	Middle	1 962.50	-14.90	30.00		
	High	1 992.50	-14.70	30.00		

Tested by: Ki-Hong, Nam / Project Engineer

5.4.2 Test Result for Part 27

- . Test Date : May 31, 2012
- . Test Result : PASSED

Modulation	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
GSM	Low	2 110.20	-14.90	30.00	1.00	100.00
	Middle	2 132.60	-14.70	30.00		
	High	2 154.80	-14.90	30.00		
EDGE	Low	2 110.20	-14.80	30.00	1.00	100.00
	Middle	2 132.60	-14.70	30.00		
	High	2 154.80	-14.90	30.00		
CDMA	Low	2 111.25	-14.80	30.00	1.00	100.00
	Middle	2 132.50	-14.70	30.00		
	High	2 153.75	-14.80	30.00		
1xEVDO	Low	2 111.25	-14.70	30.00	1.00	100.00
	Middle	2 132.50	-14.90	30.00		
	High	2 153.75	-14.90	30.00		
WCDMA	Low	2 112.40	-14.80	30.00	1.00	100.00
	Middle	2 132.50	-14.70	30.00		
	High	2 152.60	-14.90	30.00		
LTE	Low	2 115.00	-14.80	30.00	1.00	100.00
	Middle	2 132.50	-14.90	30.00		
	High	2 150.00	-14.80	30.00		

Tested by: Ki-Hong, Nam / Project Engineer

6. OCCUPIED BANDWIDTH

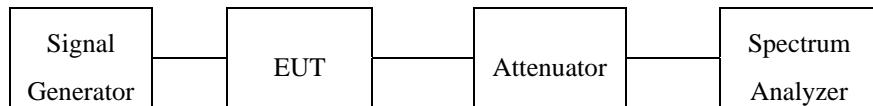
6.1 Operating environment

Temperature : 24.0 °C
 Relative humidity : 52 %R.H.

6.2 Test set-up

The RF signal from the signal generator(s) was injected to the EUT by cable. 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.



6.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ - E4432B	HP	Signal Generator	US38440950	June 10, 2011 (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	Jun. 10, 2011 (1Y)
■ - FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)
■ - 67-30-43	Aeroflex Weinschel	Power Attenuator	CA5760	Nov. 30, 2011 (1Y)

All test equipment used is calibrated on a regular basis.

6.4 Test data

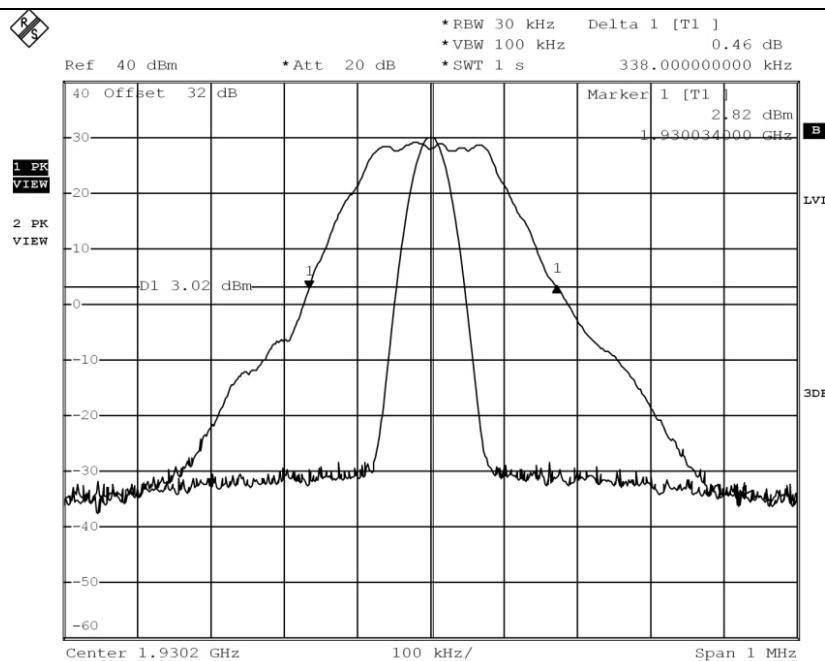
6.4.1 Test Result for Part 24 E

- Test Date : May 31, 2012
- Test Result : PASSED

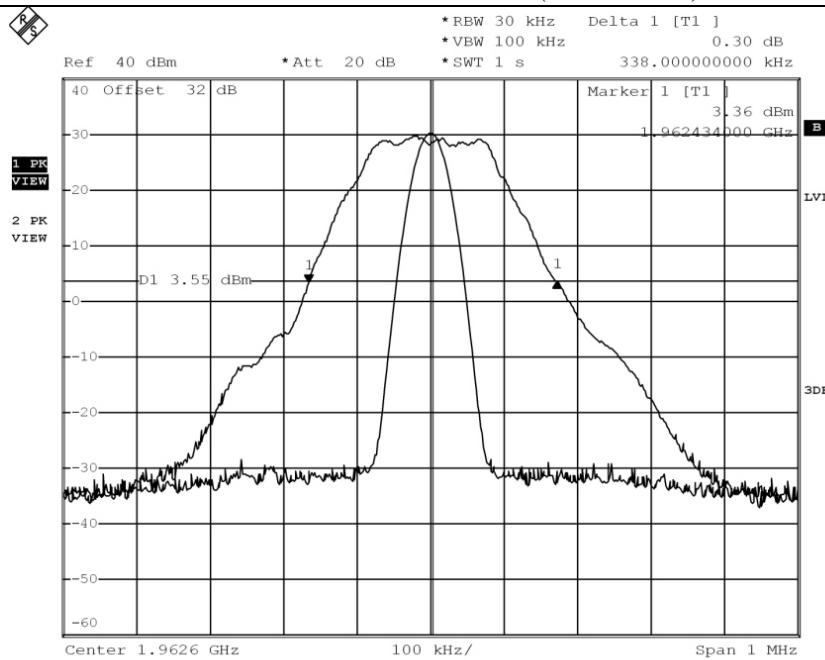
Modulation	Channel	26 dB Bandwidth (kHz)	99 % Occupied Bandwidth (kHz)
GSM	Low	338	248
	Middle	338	248
	High	338	248
EDGE	Low	324	250
	Middle	324	252
	High	324	252
CDMA	Low	1 520	1 320
	Middle	1 520	1 320
	High	1 520	1 320
1xEVDO	Low	1 520	1 320
	Middle	1 520	1 320
	High	1 520	1 320
WCDMA	Low	4 660	4 180
	Middle	4 660	4 180
	High	4 660	4 180
LTE	Low	5 000	4 540
	Middle	5 000	4 540
	High	5 000	4 520

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

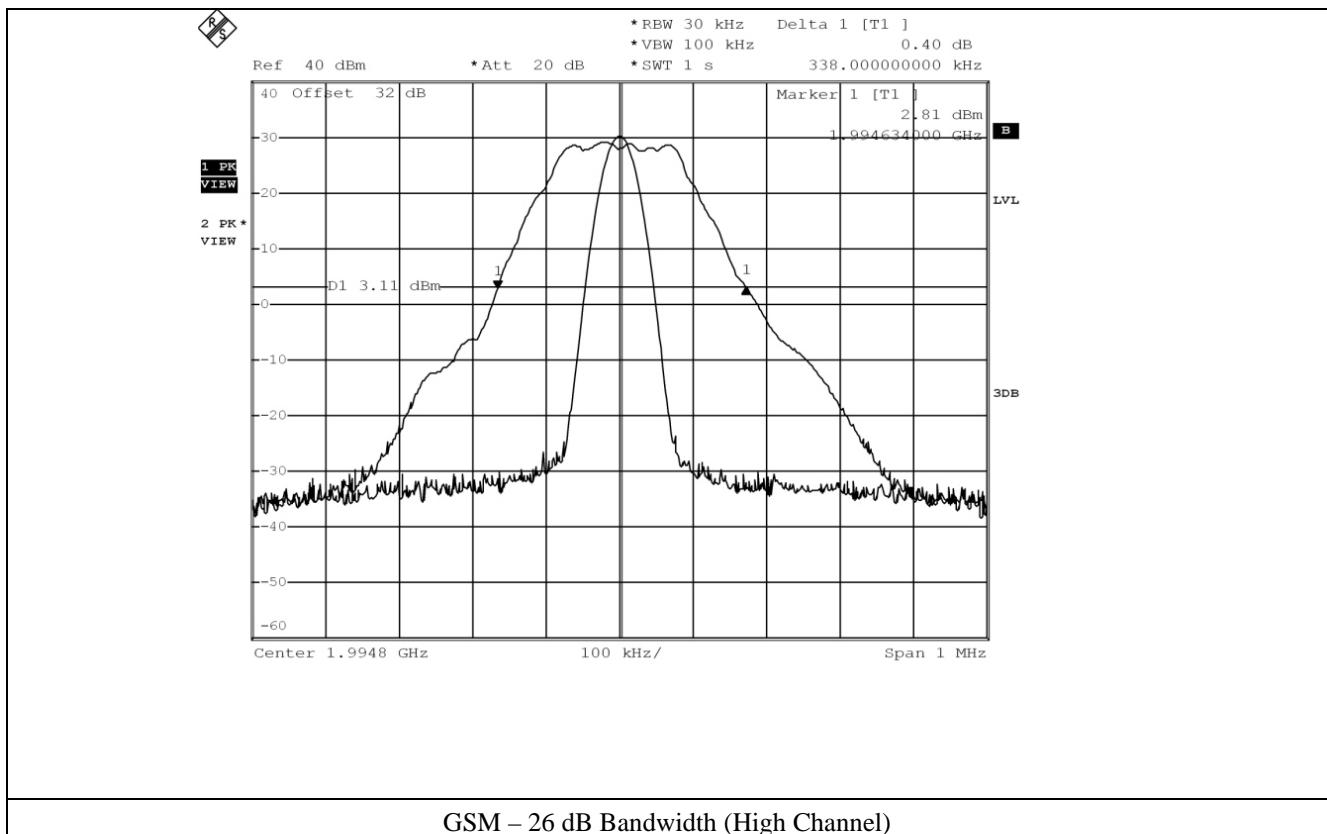
Tested by: Ki-Hong, Nam / Project Engineer

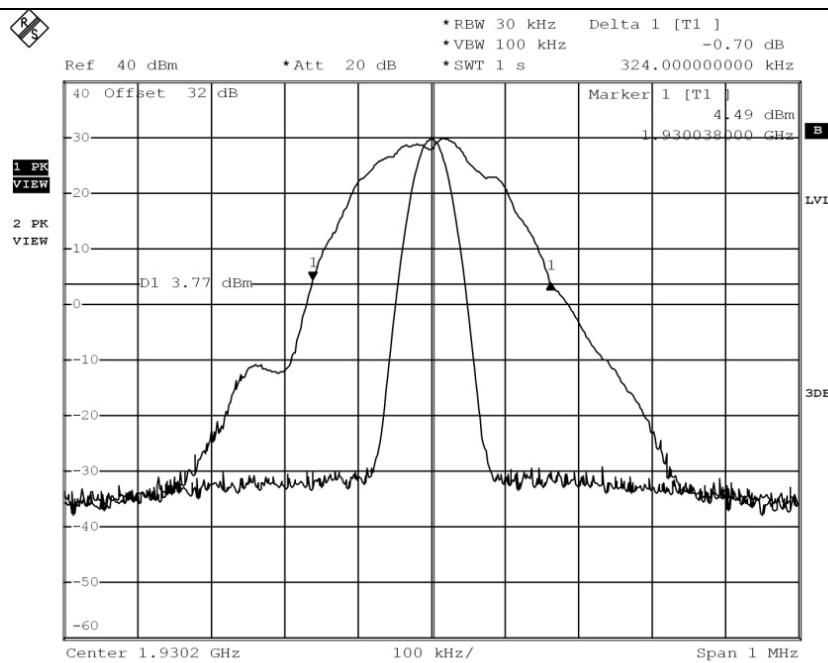


GSM – 26 dB Bandwidth (Low Channel)

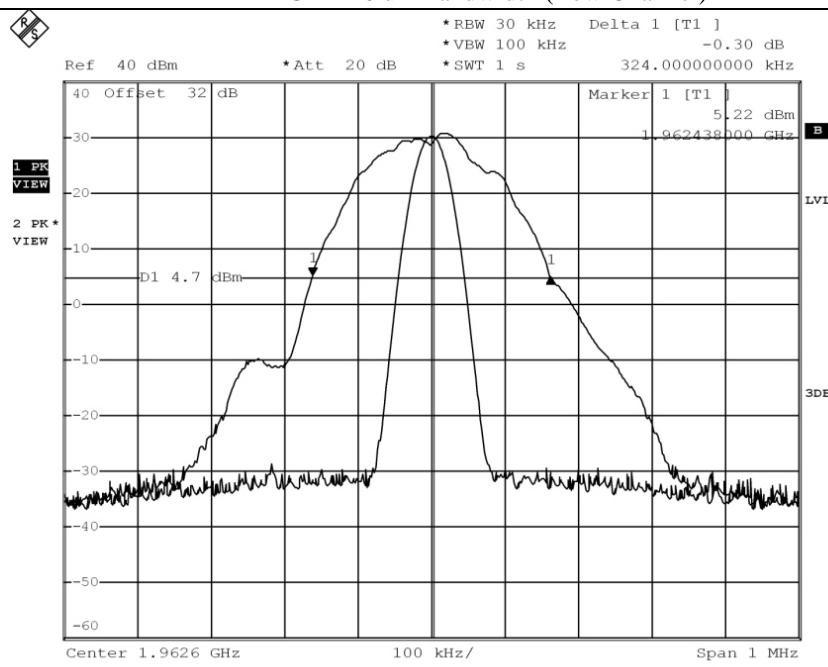


GSM – 26 dB Bandwidth (Middle Channel)

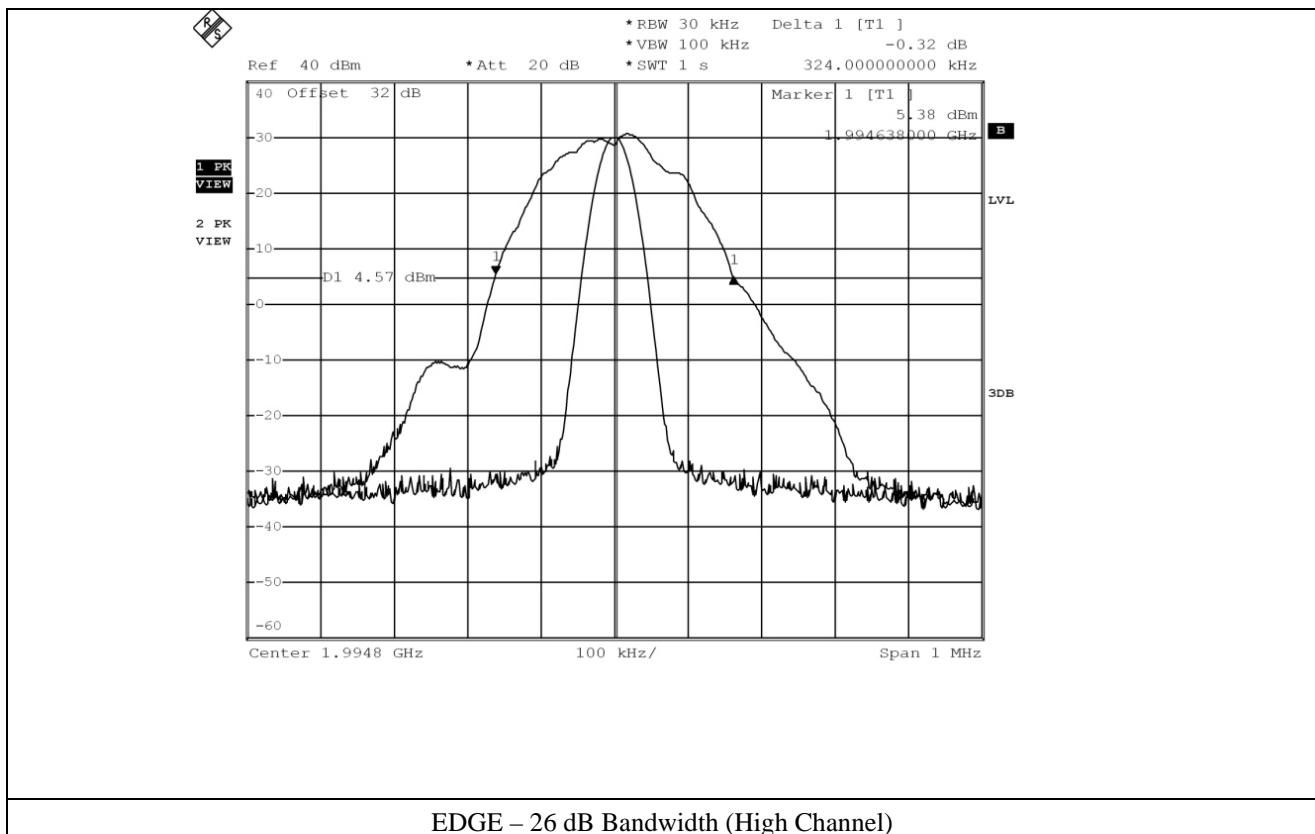


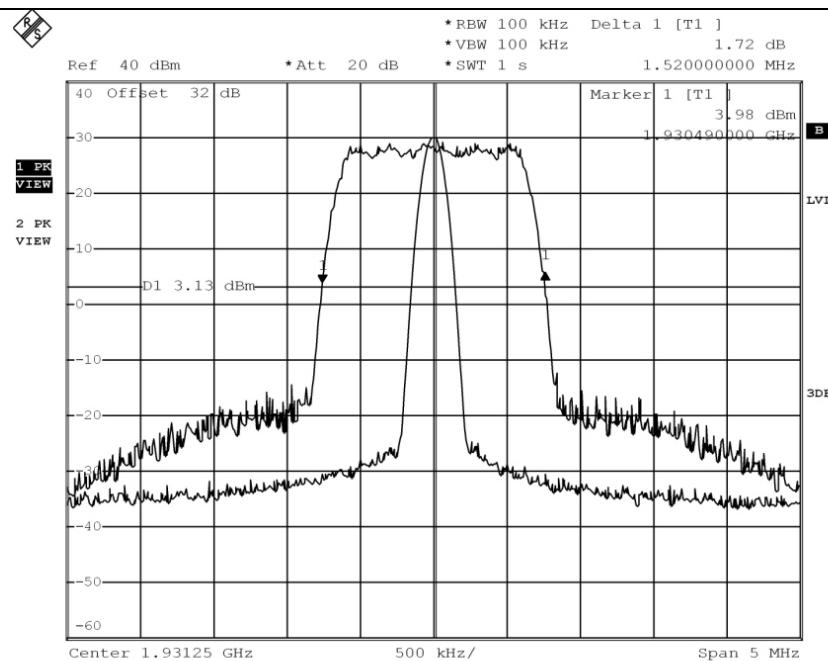


EDGE – 26 dB Bandwidth (Low Channel)

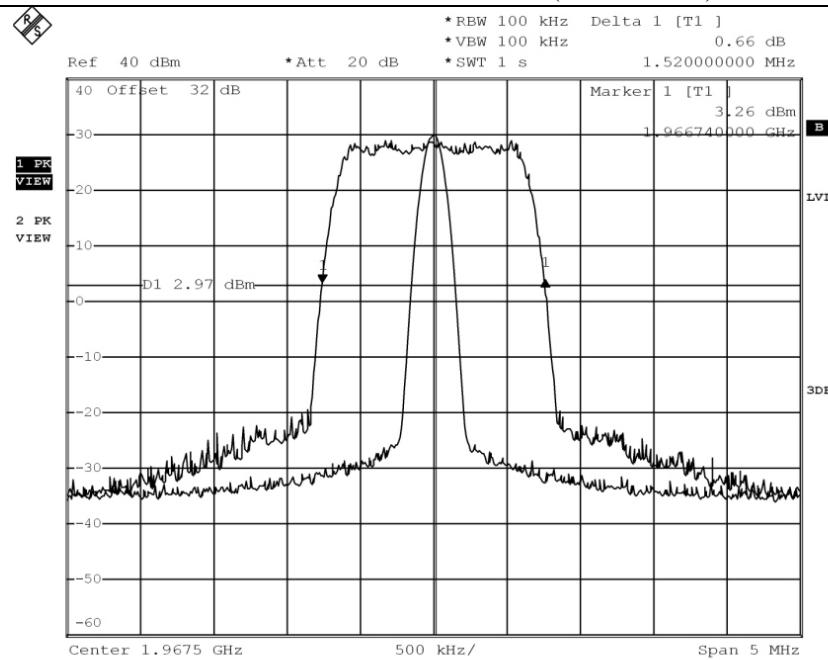


EDGE – 26 dB Bandwidth (Middle Channel)

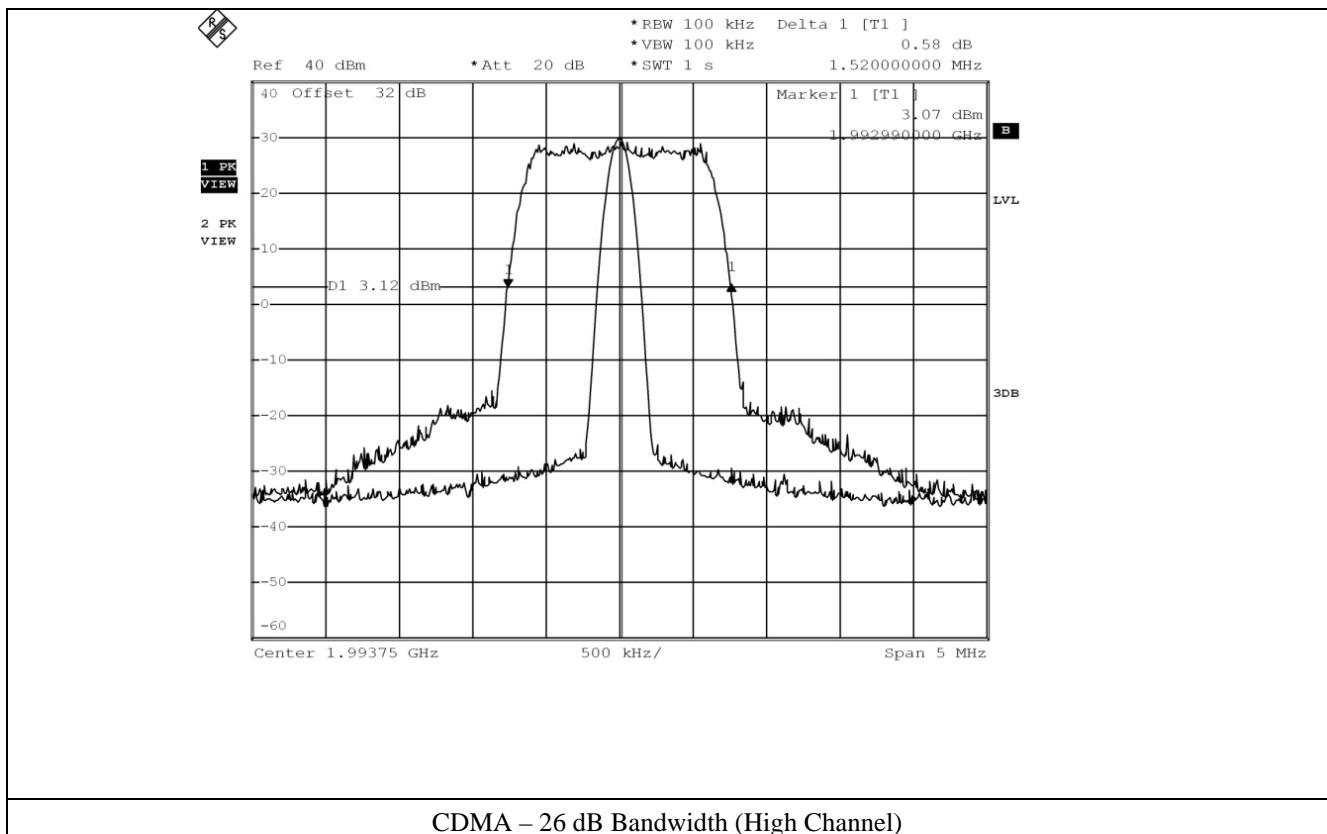


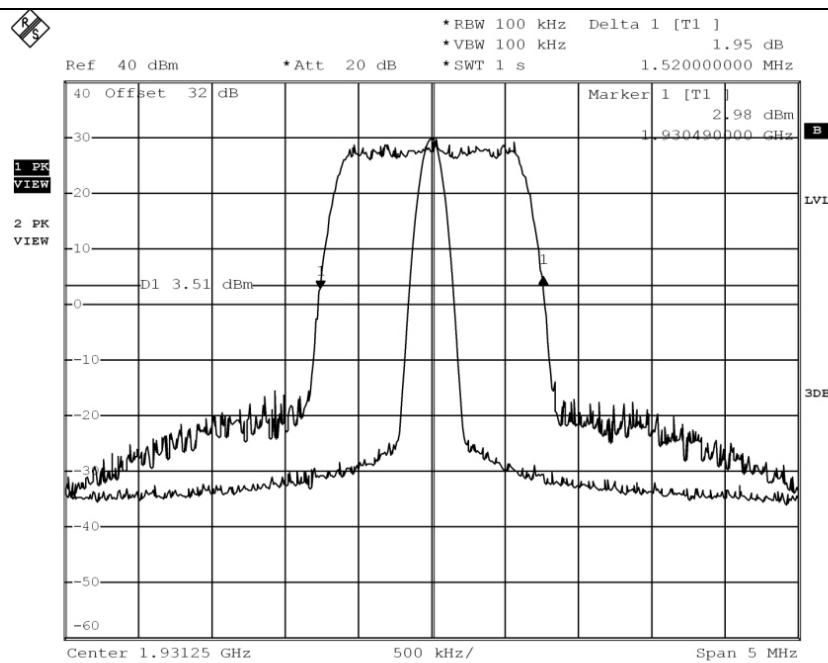


CDMA – 26 dB Bandwidth (Low Channel)

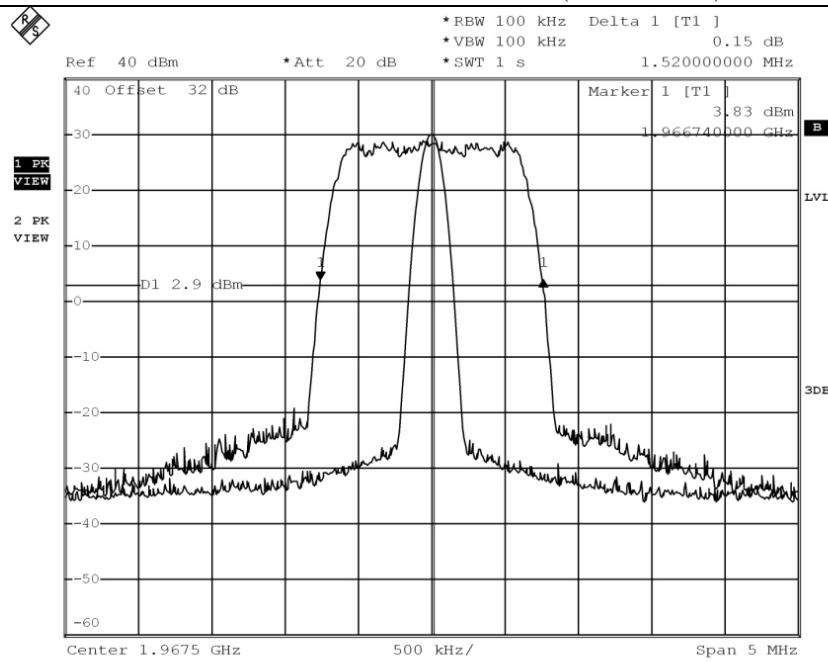


CDMA – 26 dB Bandwidth (Middle Channel)

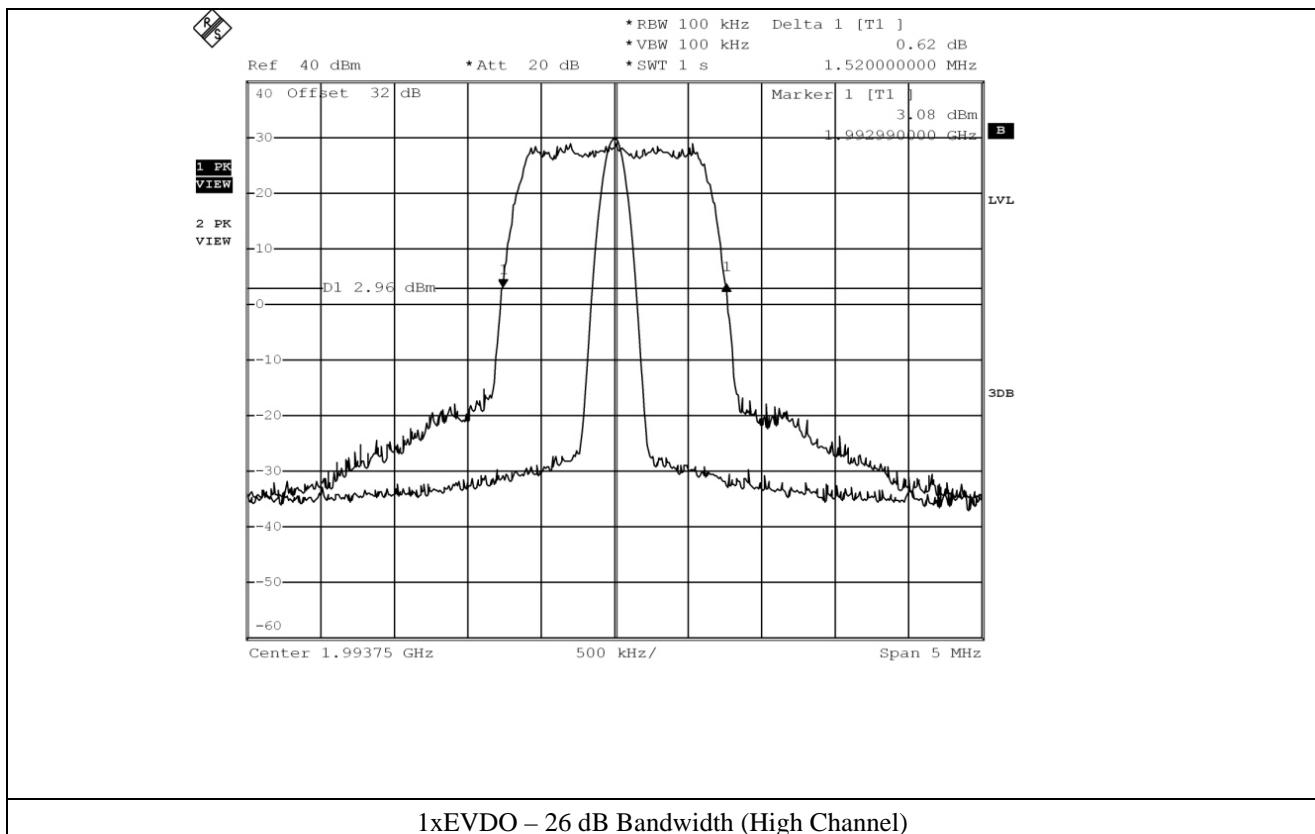


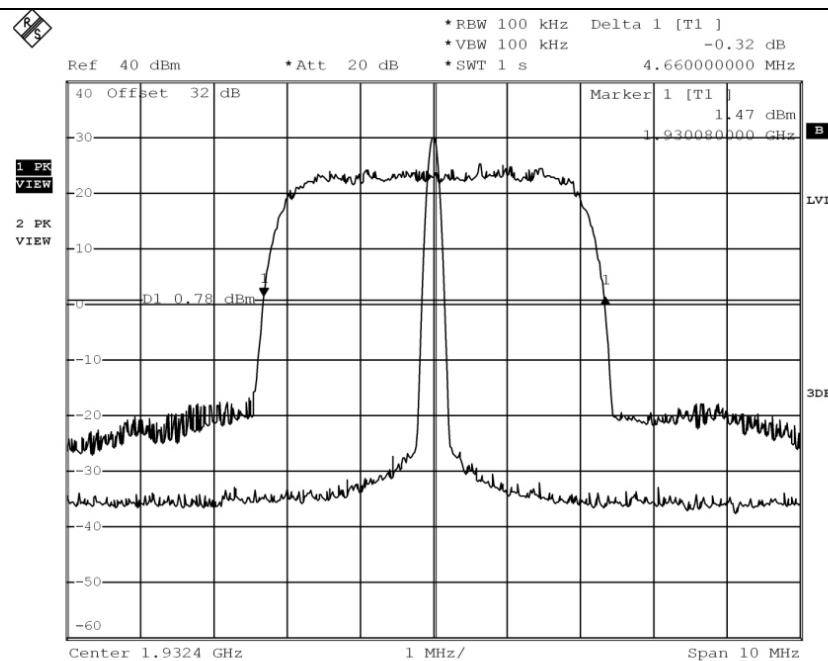


1xEVDO – 26 dB Bandwidth (Low Channel)

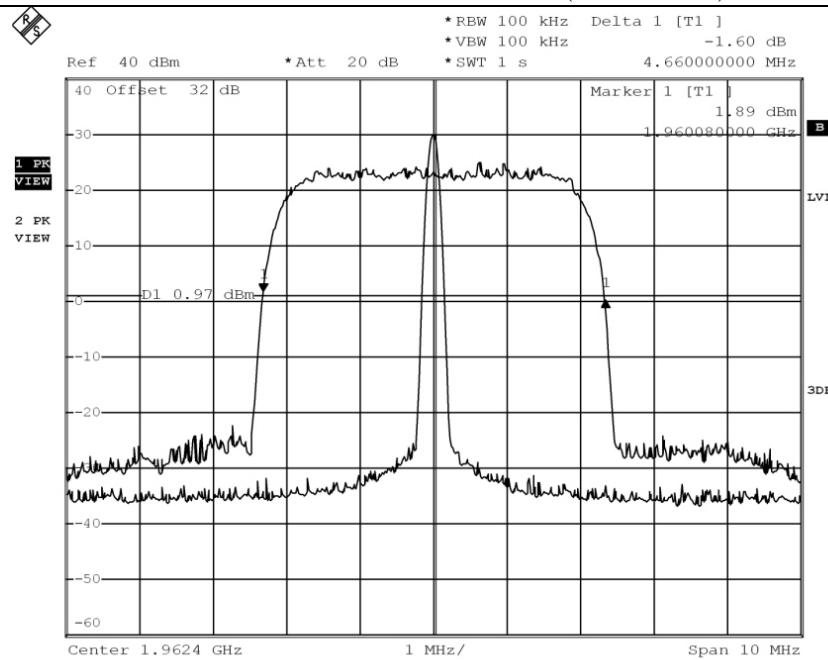


1xEVDO – 26 dB Bandwidth (Middle Channel)

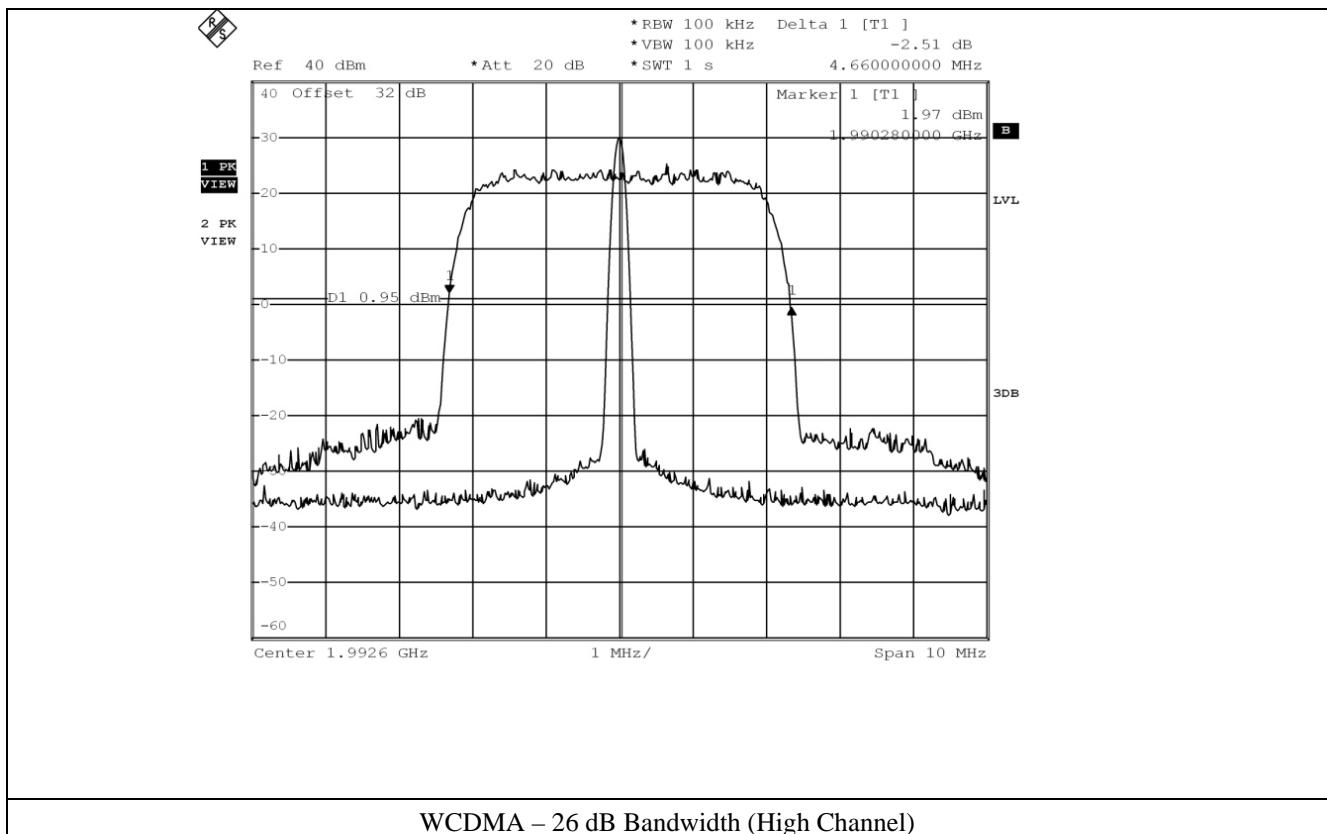


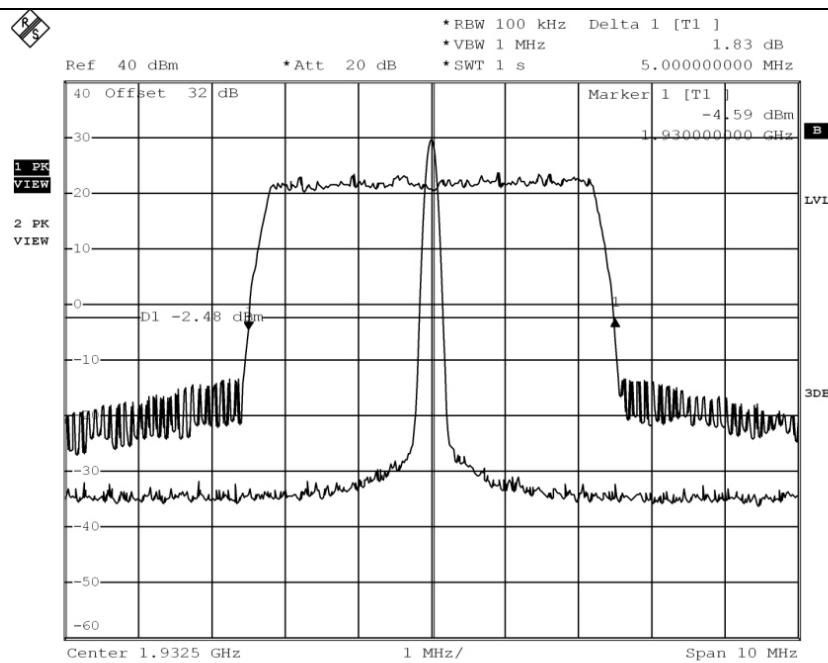


WCDMA – 26 dB Bandwidth (Low Channel)

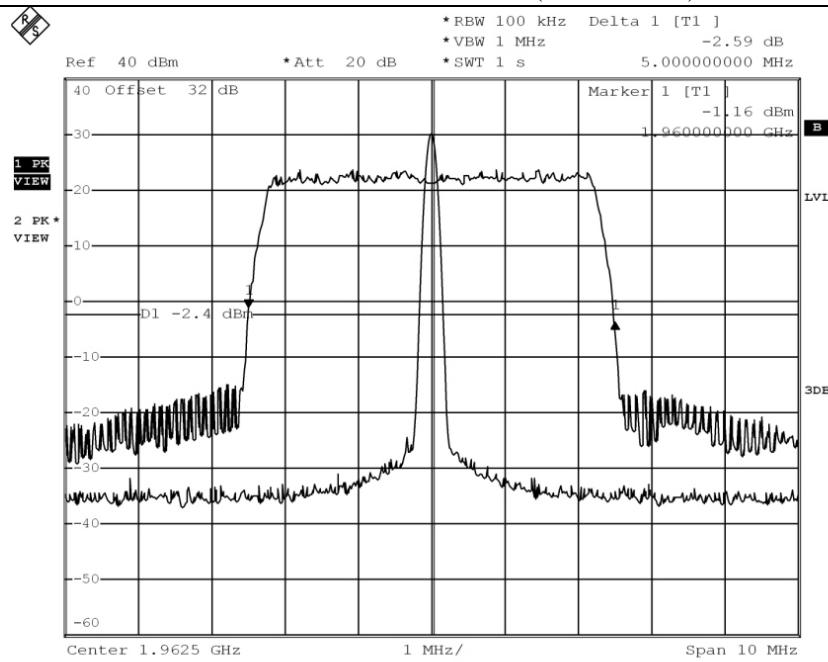


WCDMA – 26 dB Bandwidth (Middle Channel)

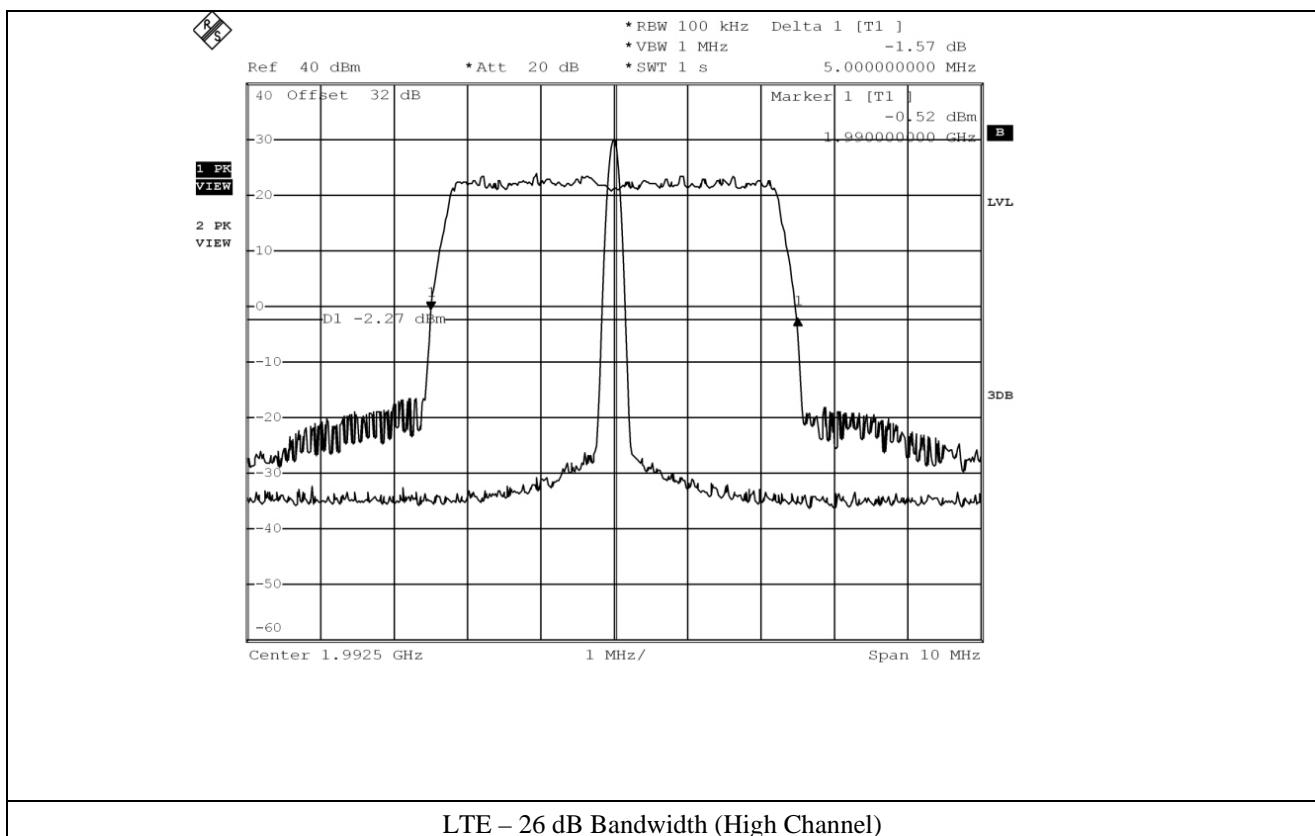


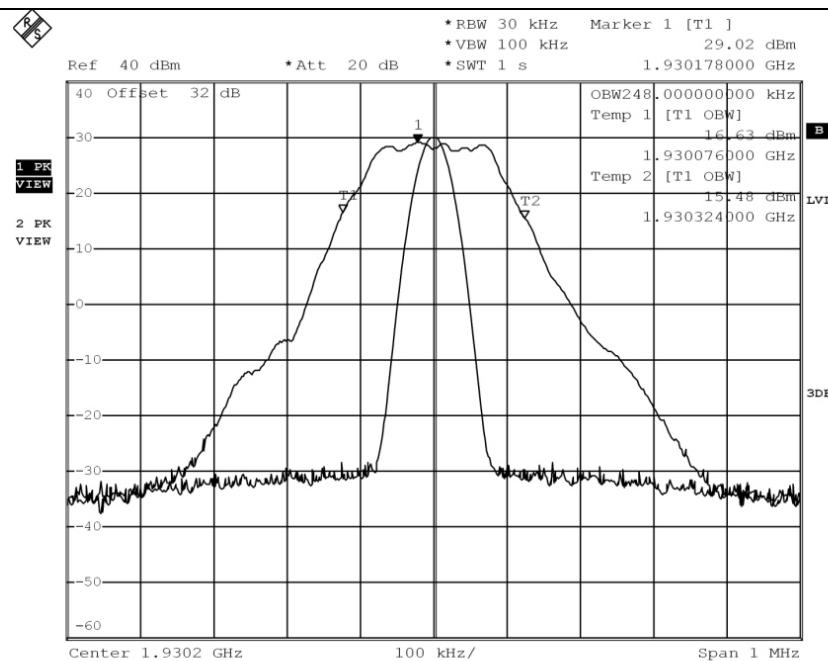


LTE – 26 dB Bandwidth (Low Channel)

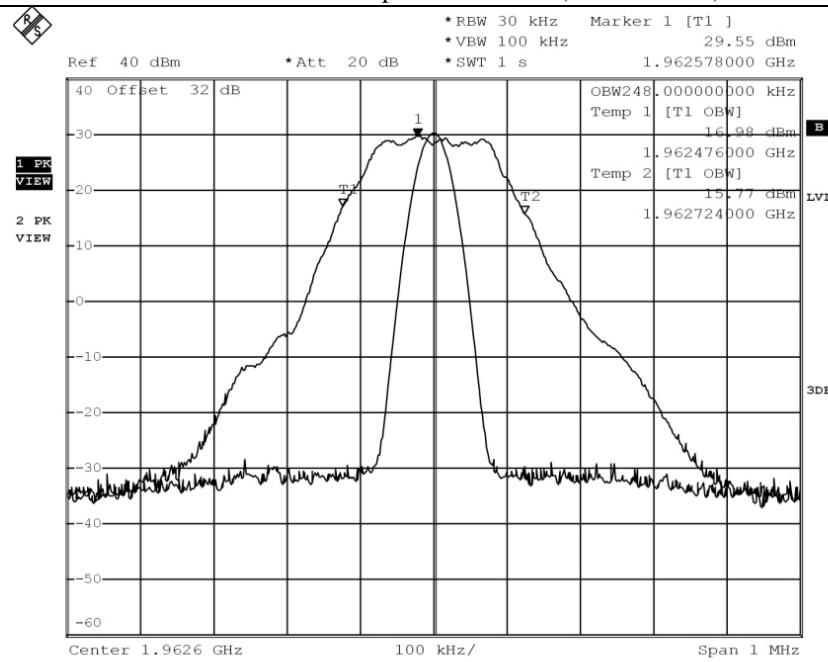


LTE – 26 dB Bandwidth (Middle Channel)

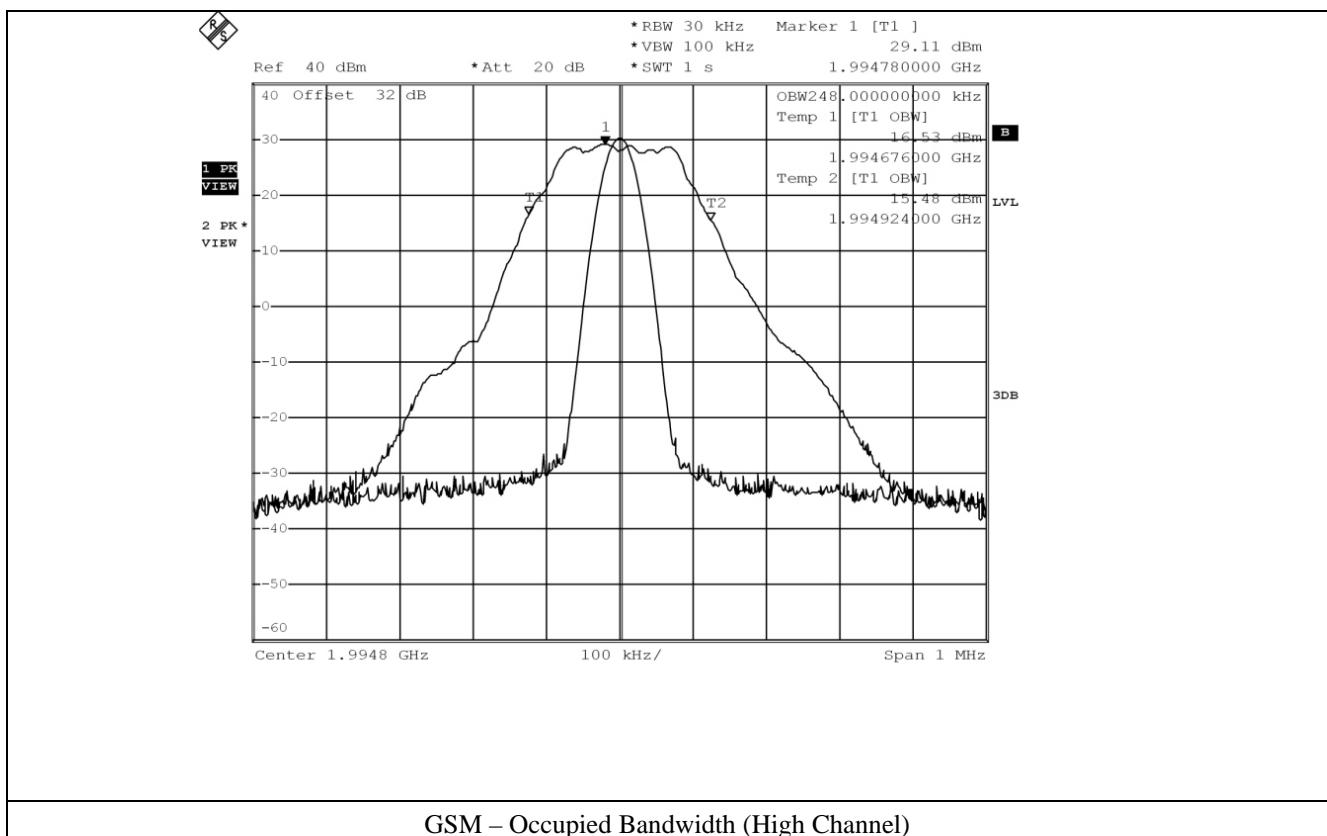


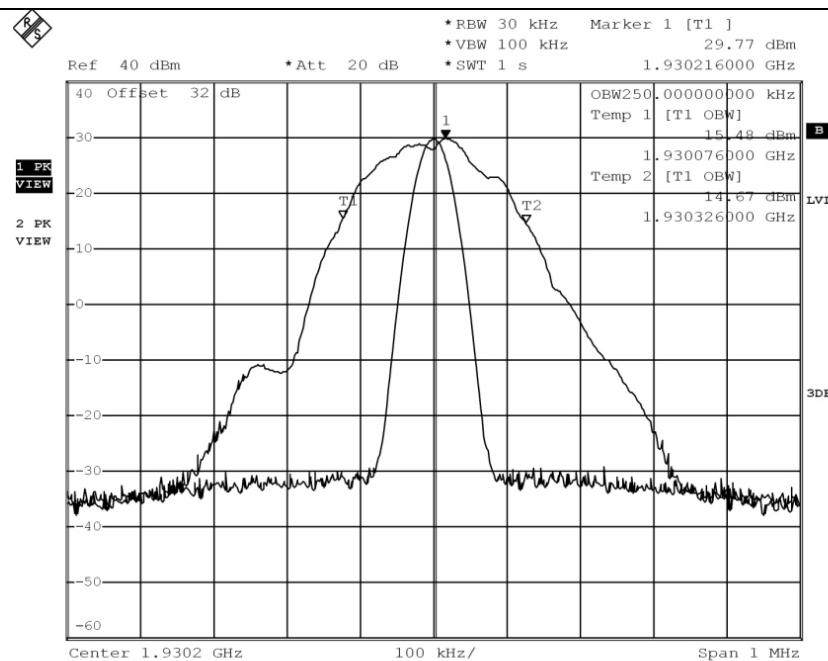


GSM – Occupied Bandwidth (Low Channel)

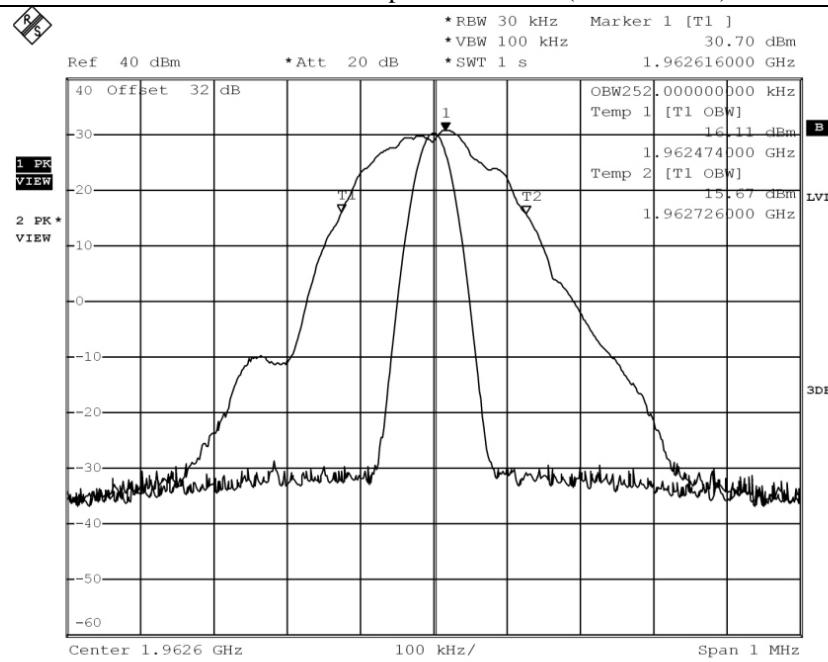


GSM – Occupied Bandwidth (Middle Channel)

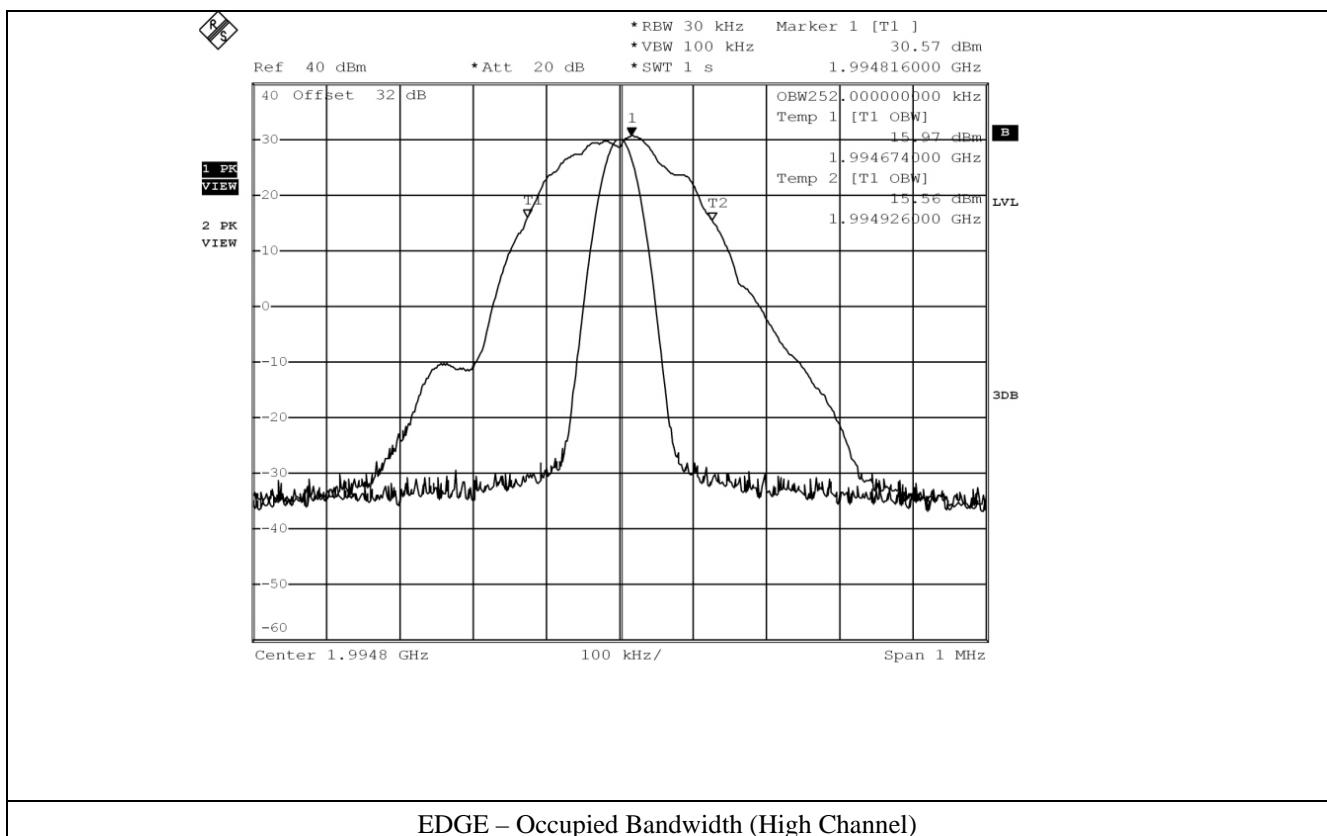


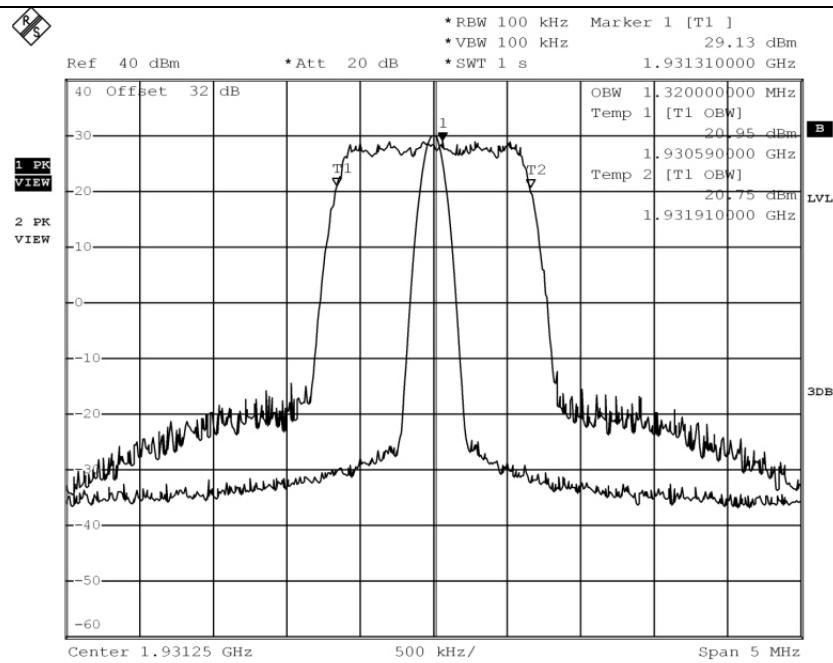


EDGE – Occupied Bandwidth (Low Channel)

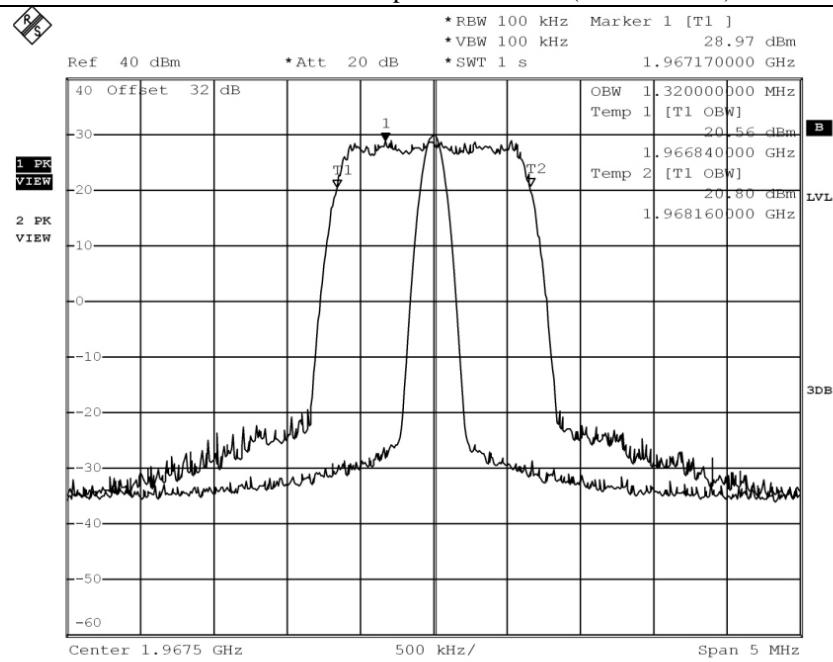


EDGE – Occupied Bandwidth (Middle Channel)





CDMA – Occupied Bandwidth (Low Channel)



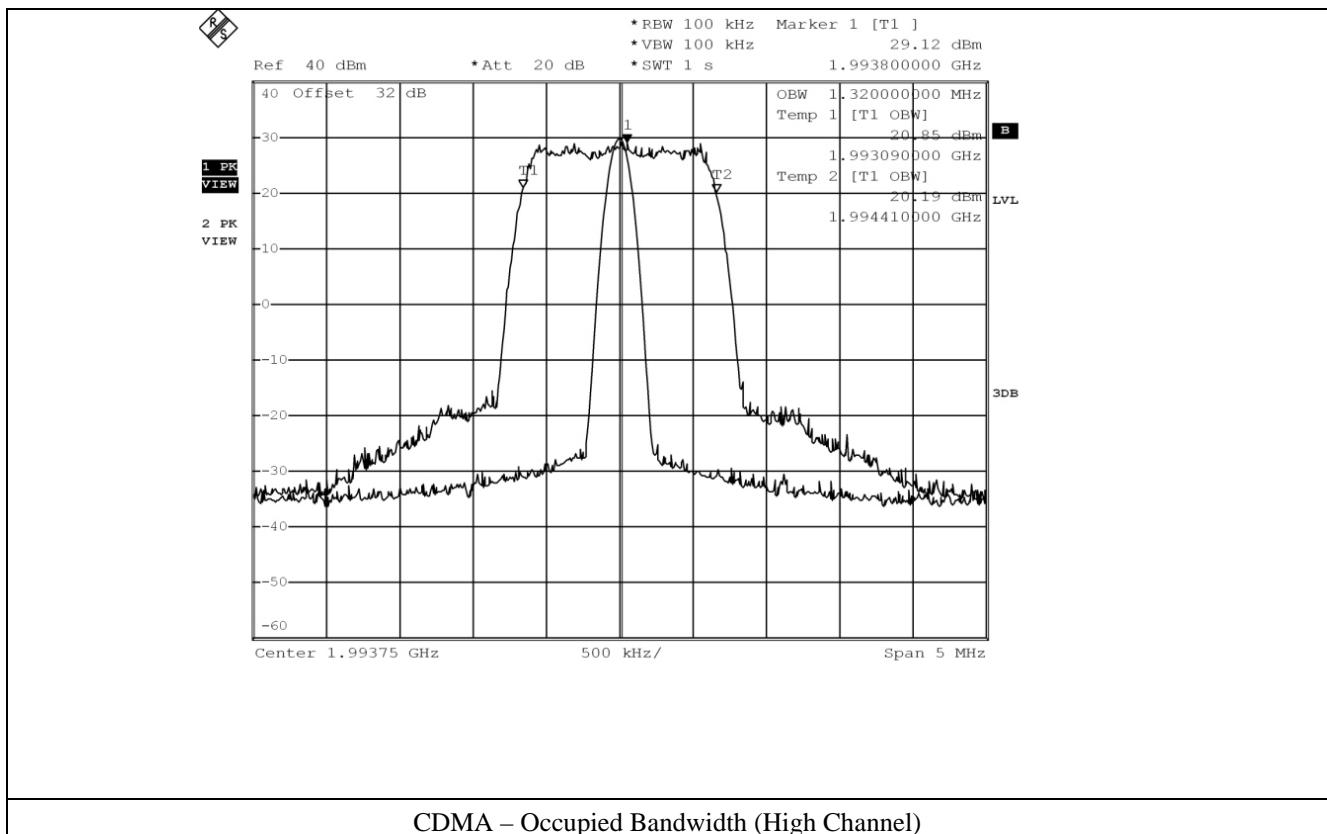
CDMA – Occupied Bandwidth (Middle Channel)

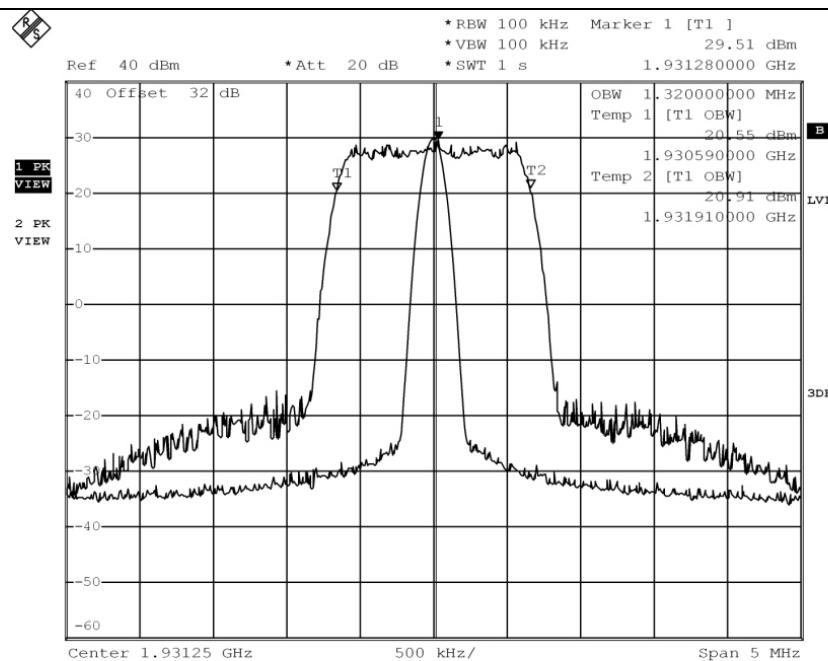
It should not be reproduced except in full, without the written approval of ONETECH.

EMC-003 (Rev.2)

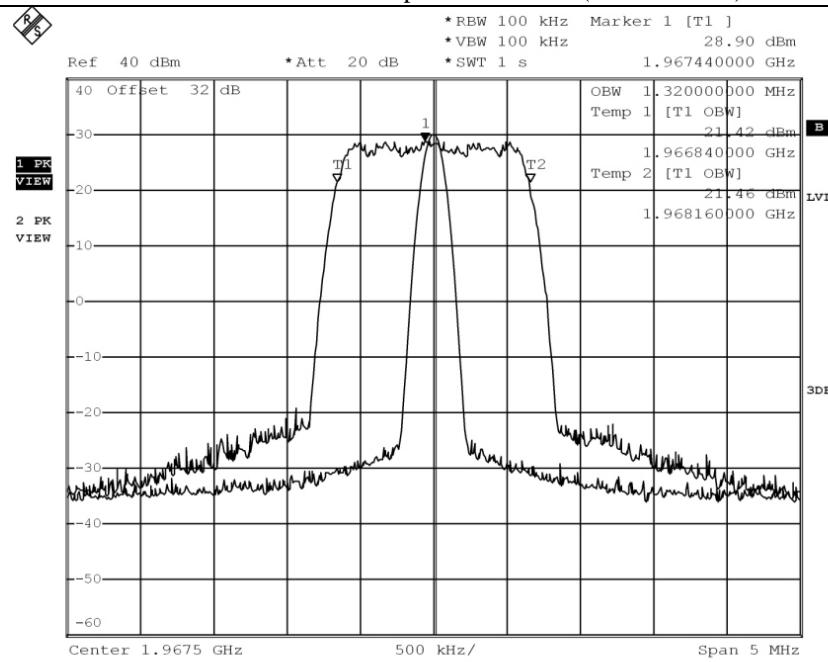
HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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

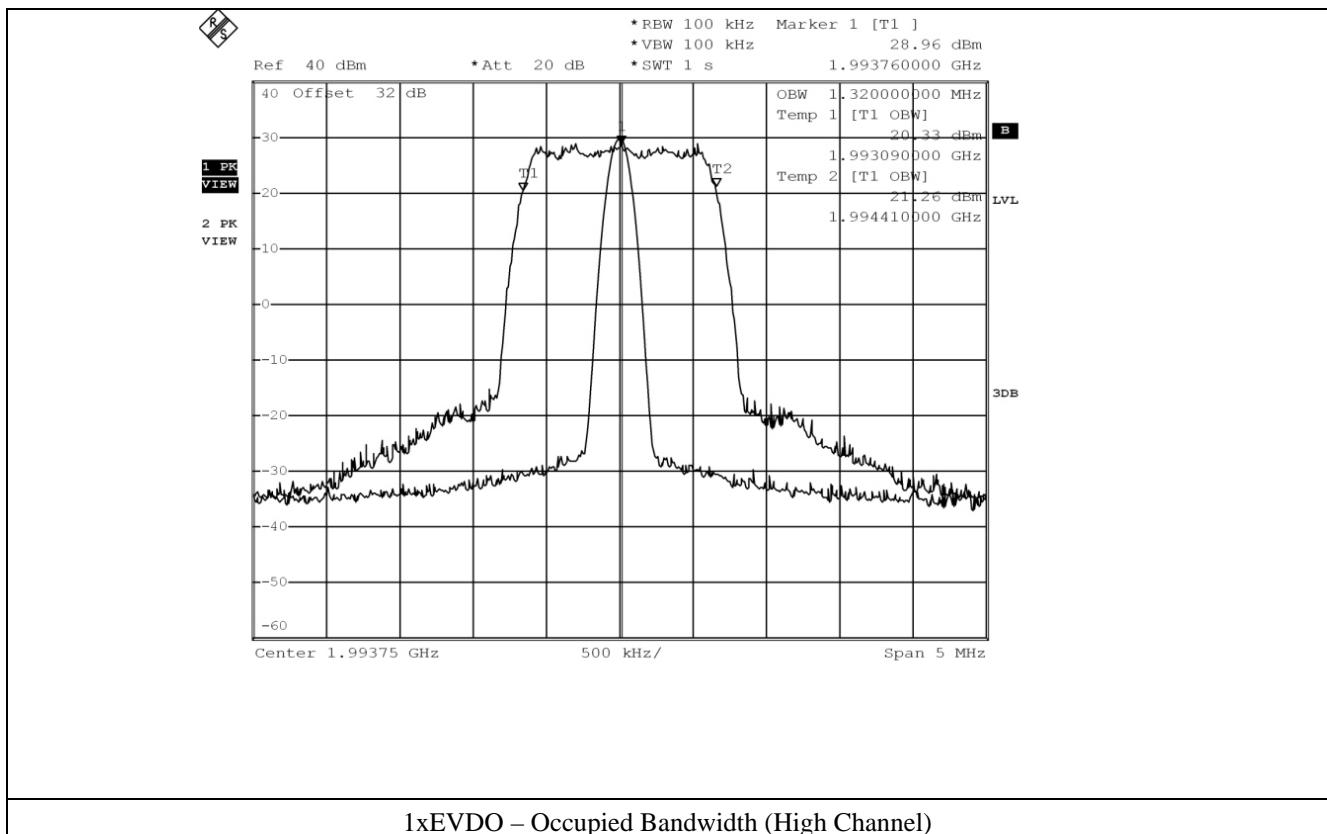


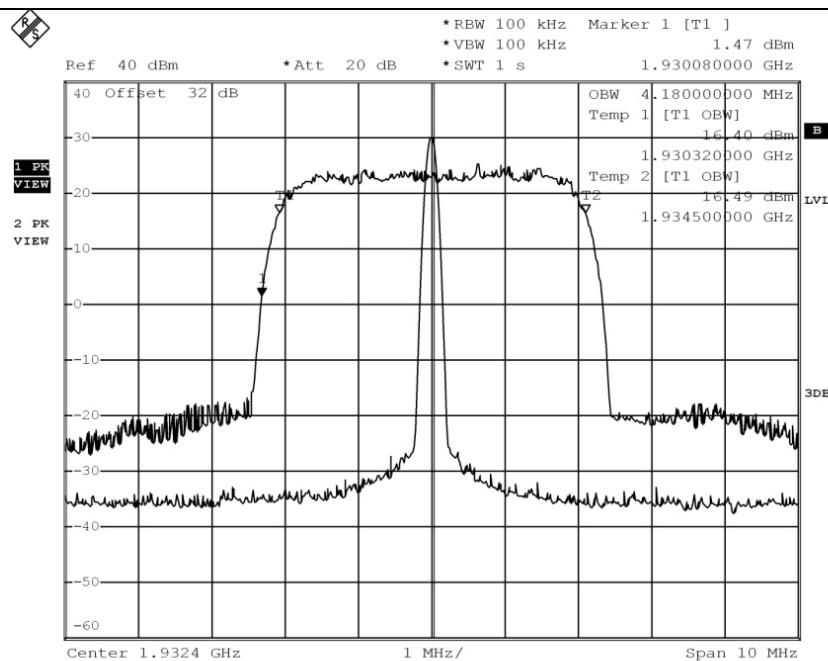


1xEVDO – Occupied Bandwidth (Low Channel)

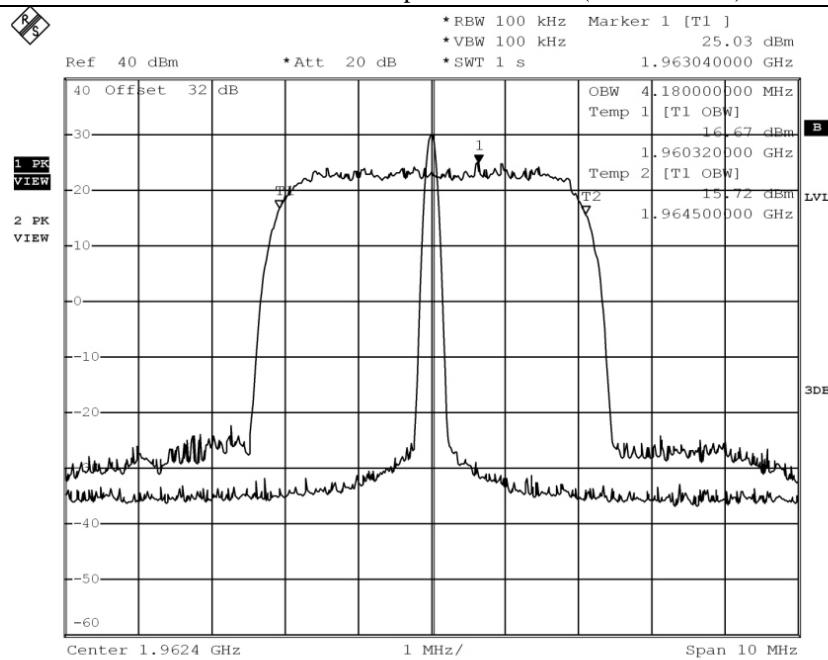


1xEVDO – Occupied Bandwidth (Middle Channel)

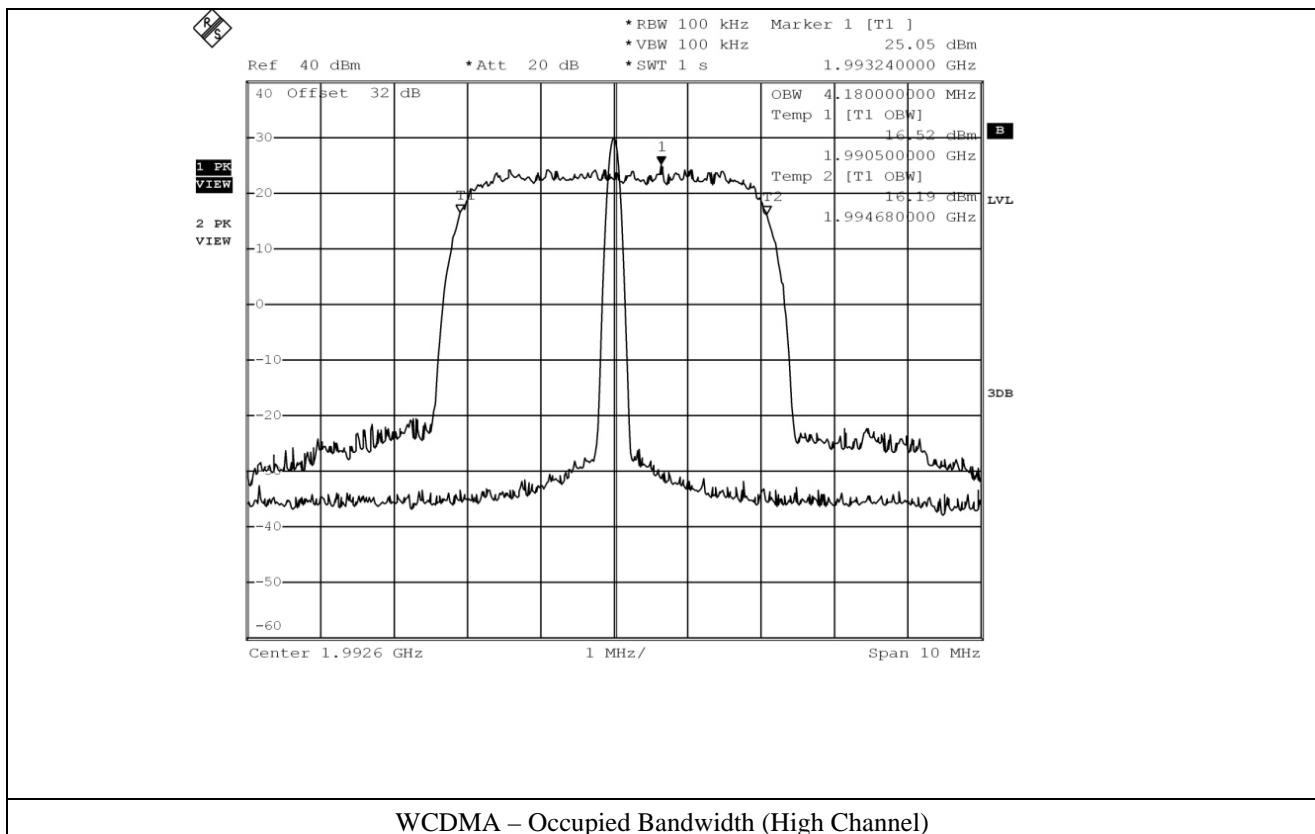


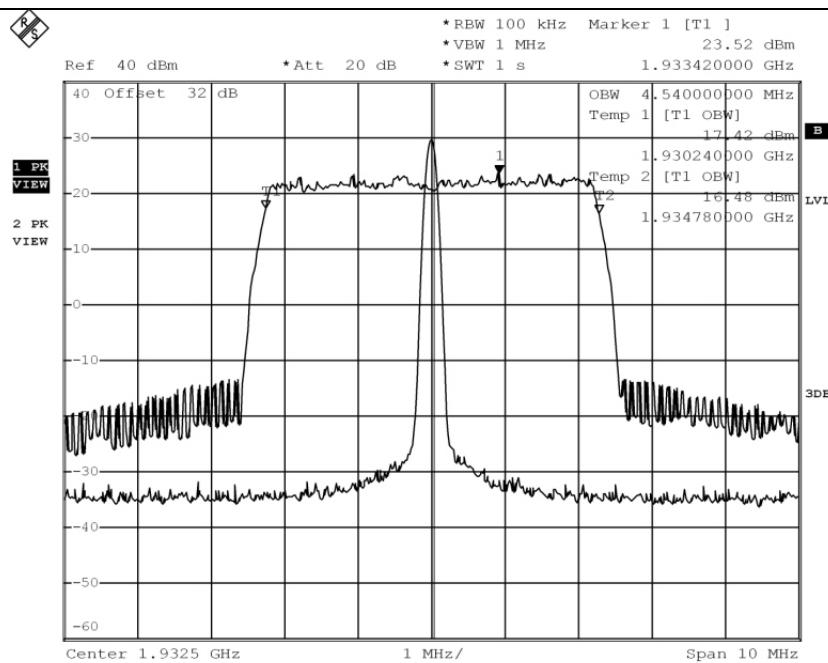


WCDMA – Occupied Bandwidth (Low Channel)

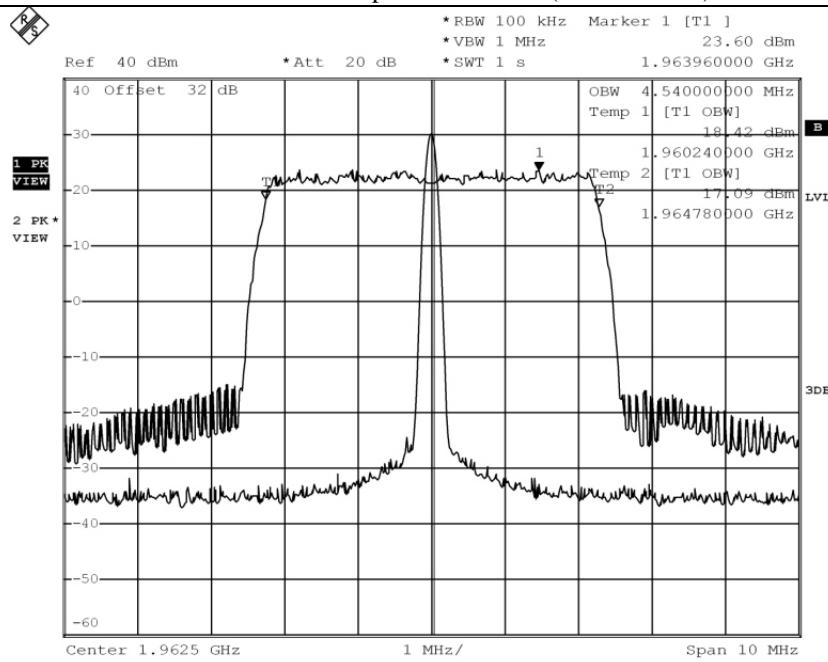


WCDMA – Occupied Bandwidth (Middle Channel)

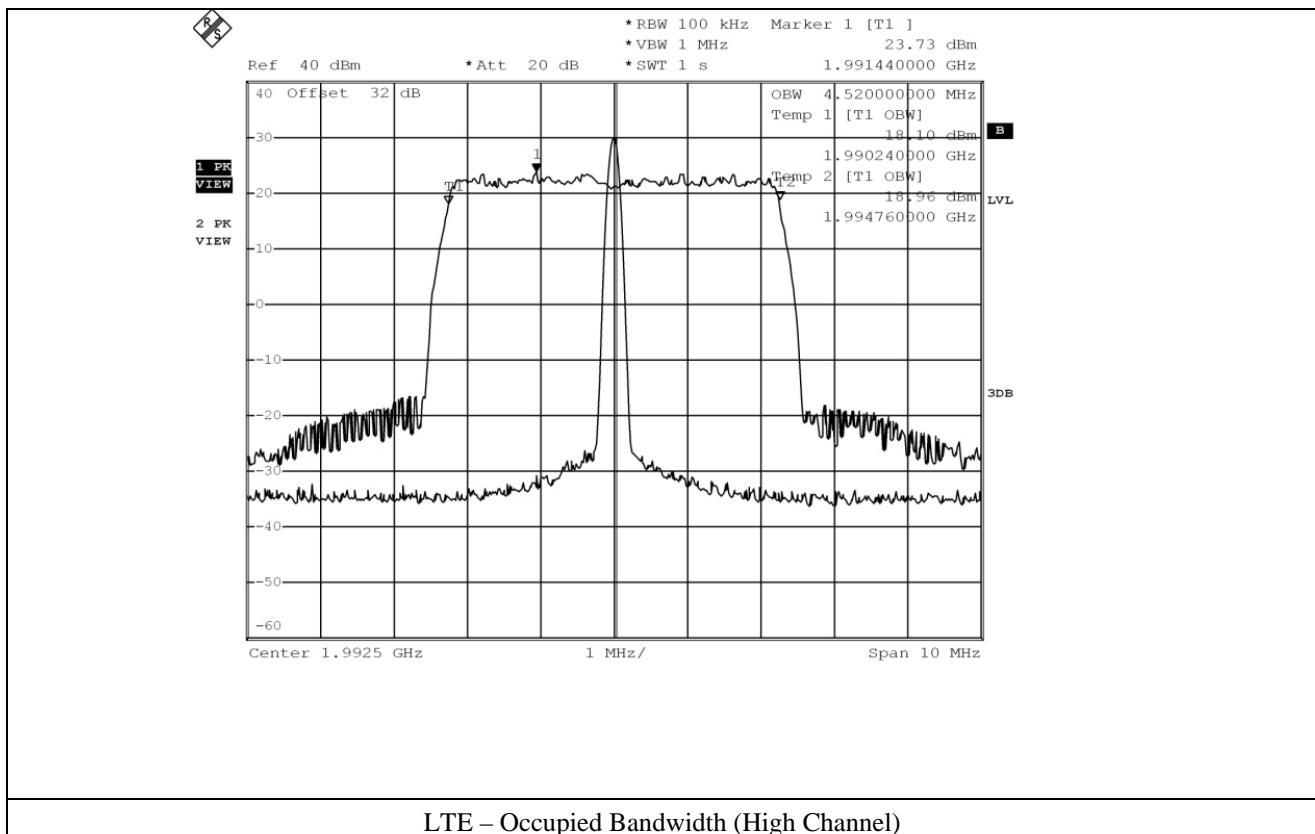


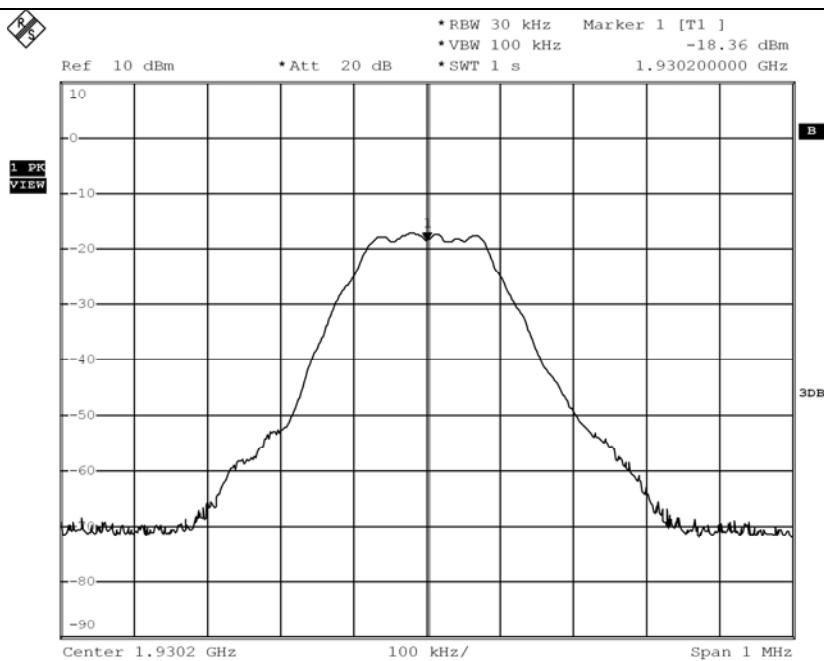


LTE – Occupied Bandwidth (Low Channel)

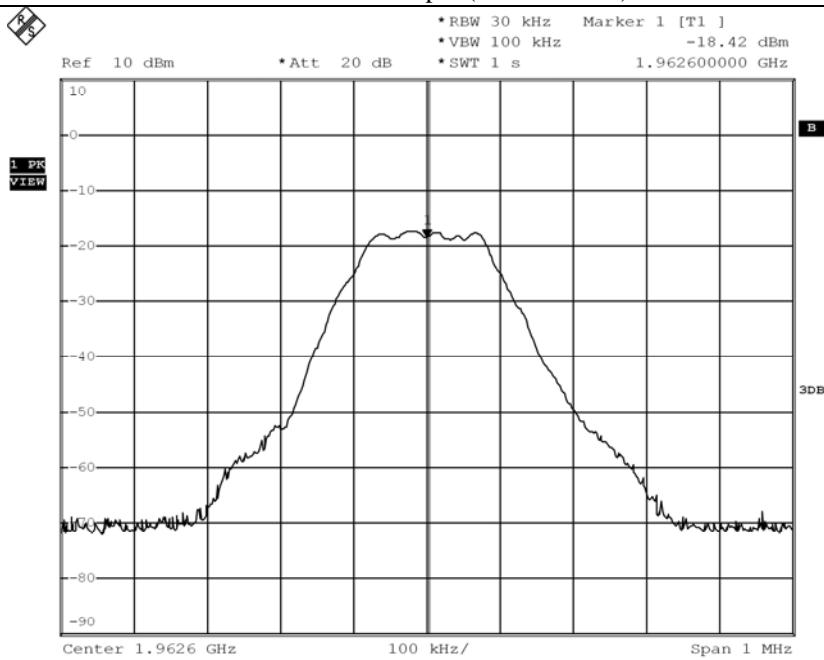


LTE – Occupied Bandwidth (Middle Channel)

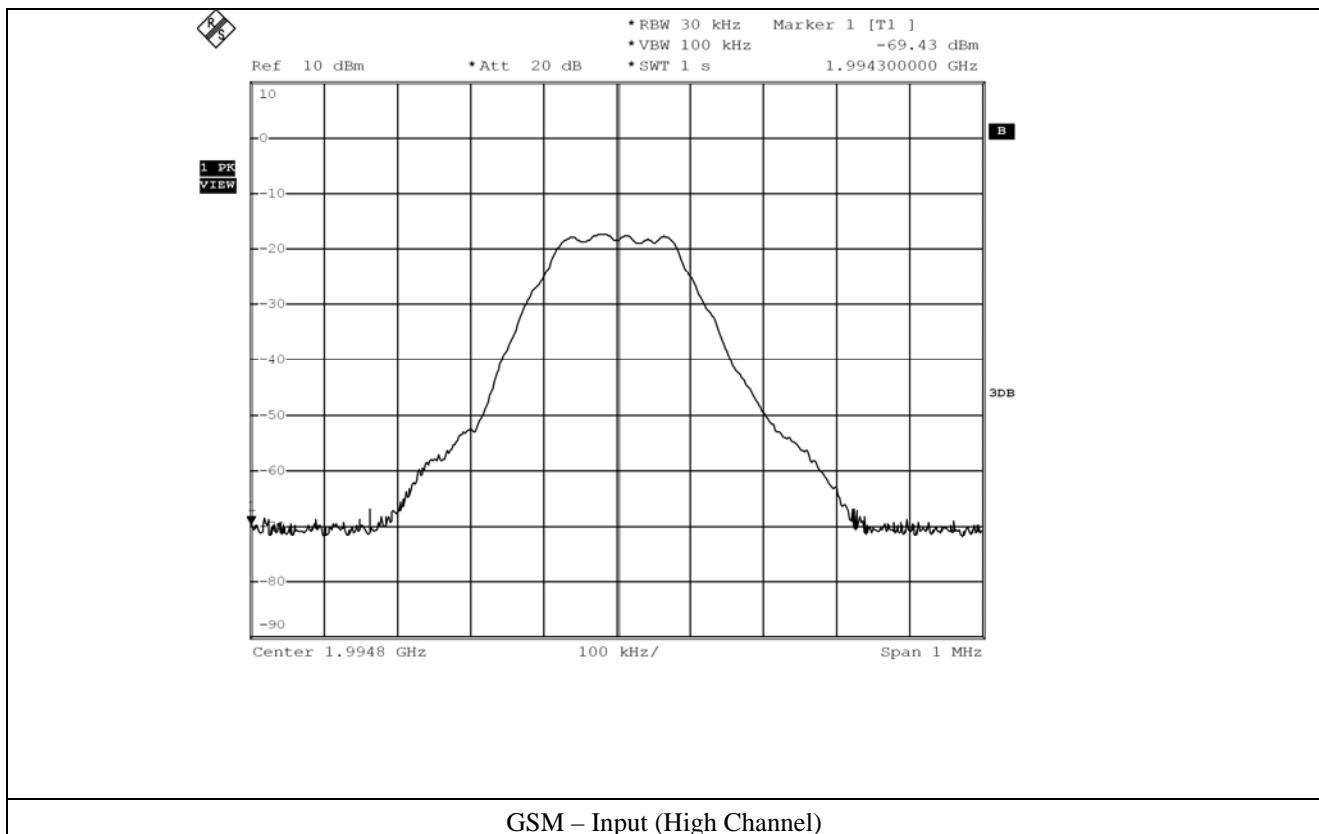


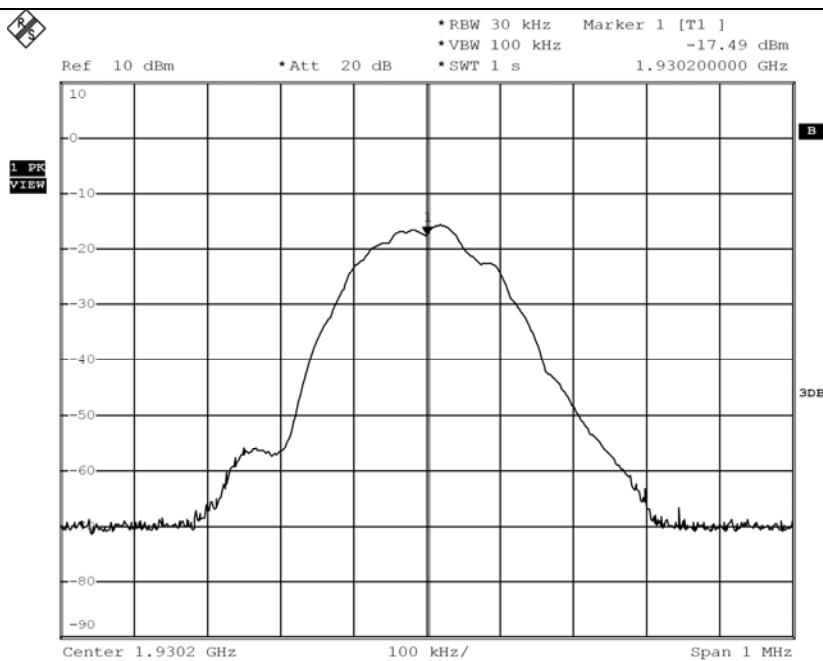


GSM – Input (Low Channel)

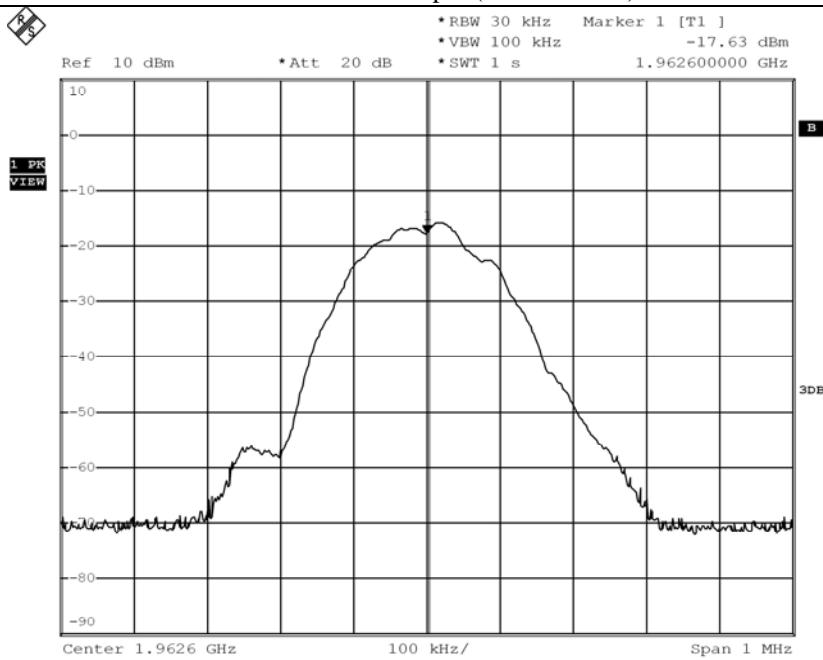


GSM – Input (Middle Channel)

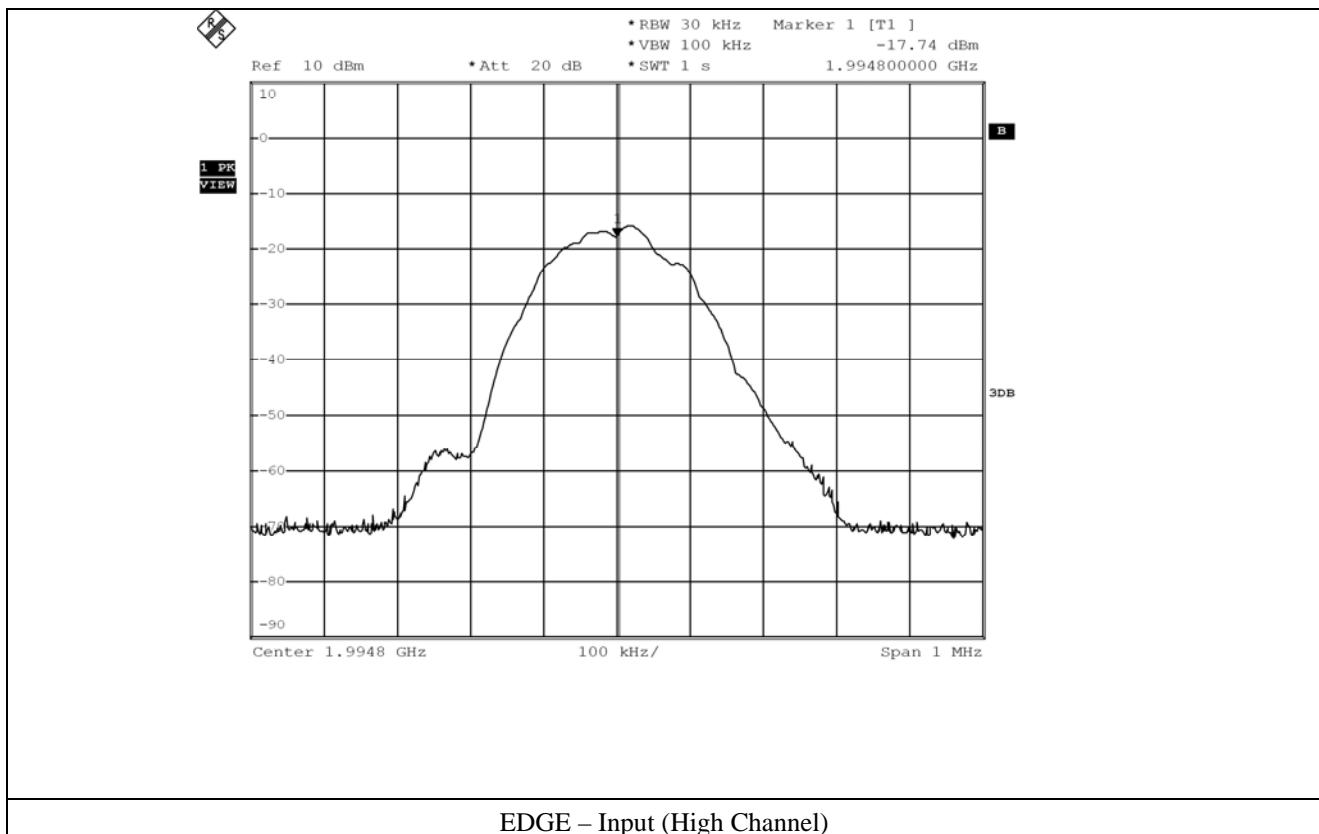


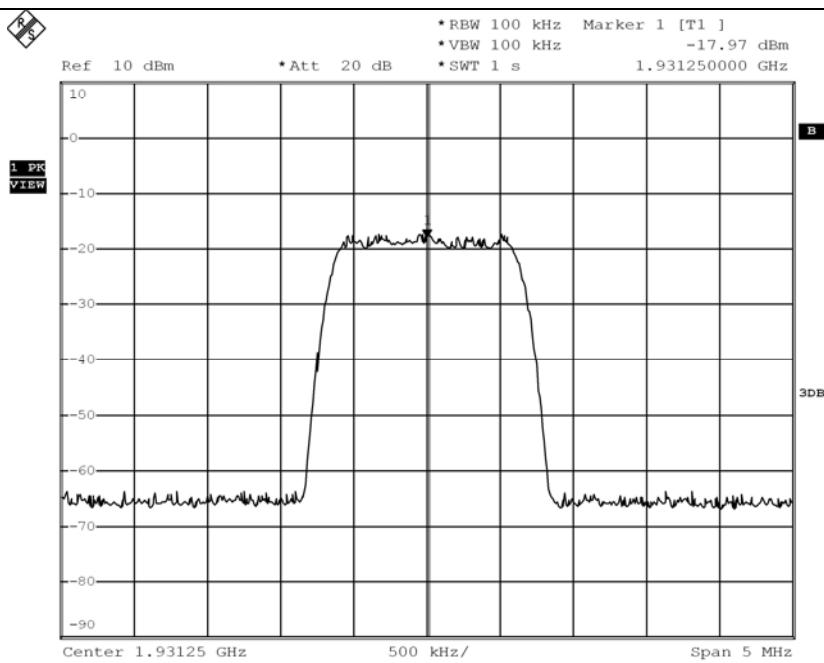


EDGE – Input (Low Channel)

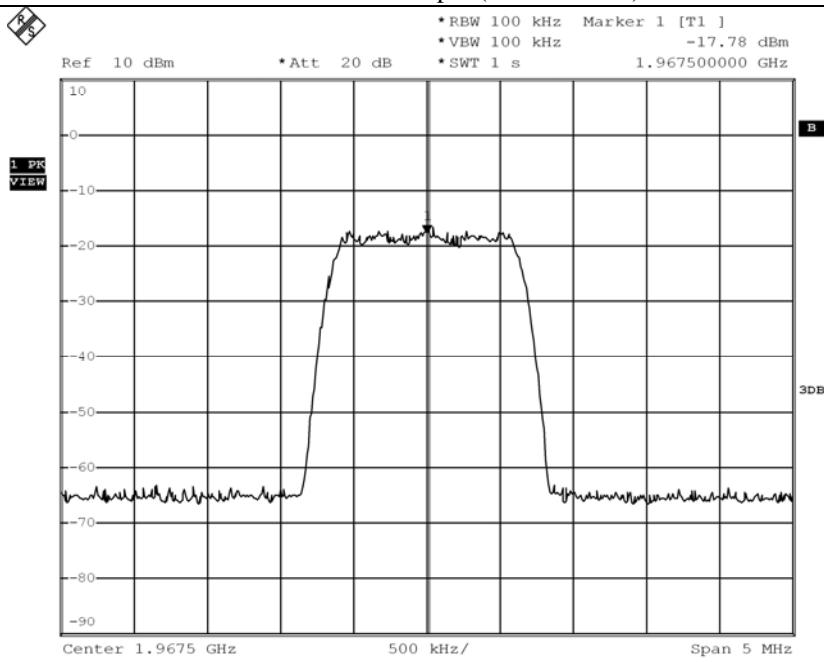


EDGE – Input (Middle Channel)

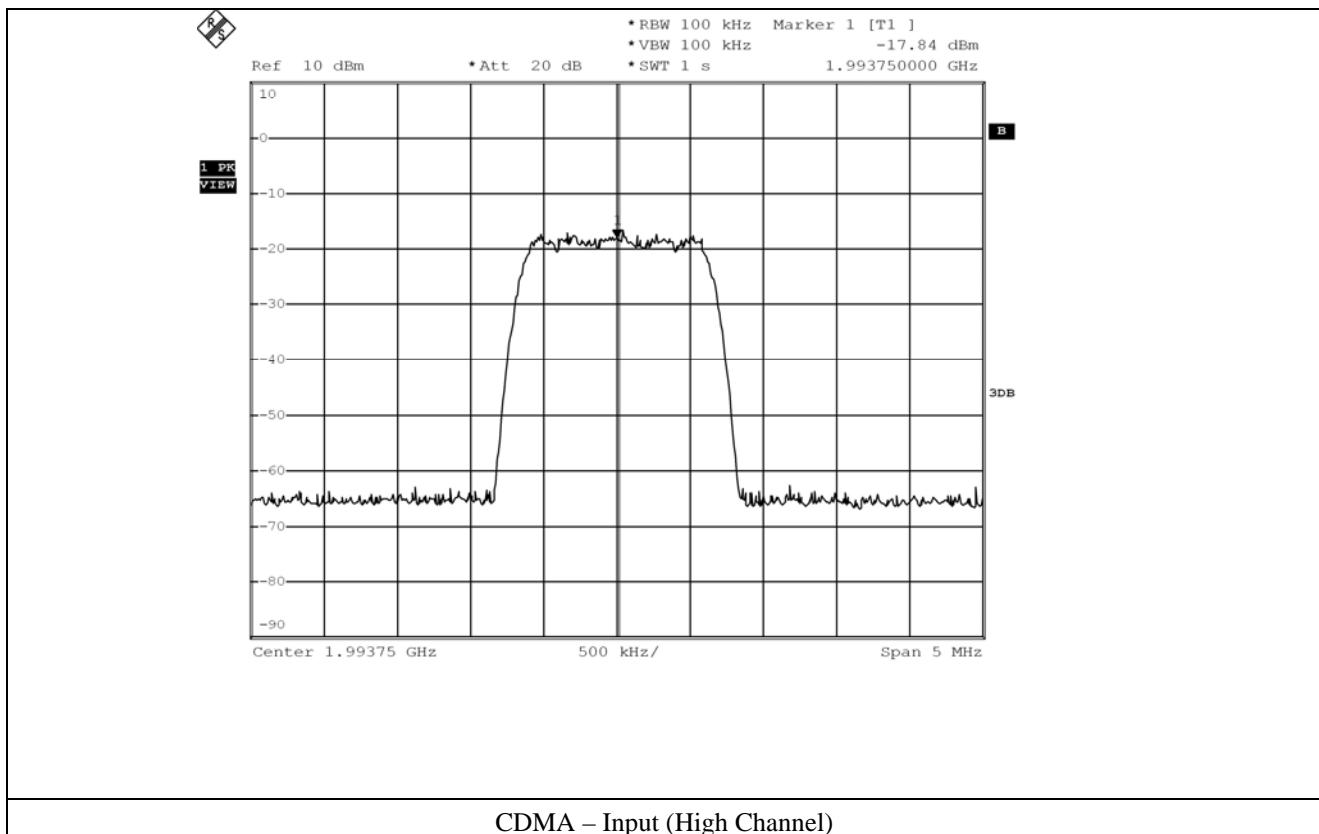


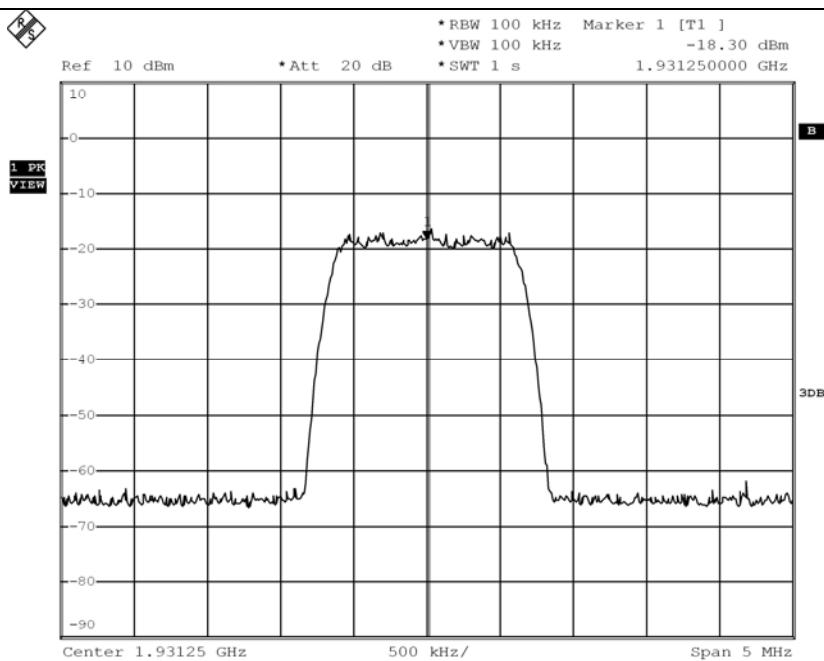


CDMA – Input (Low Channel)

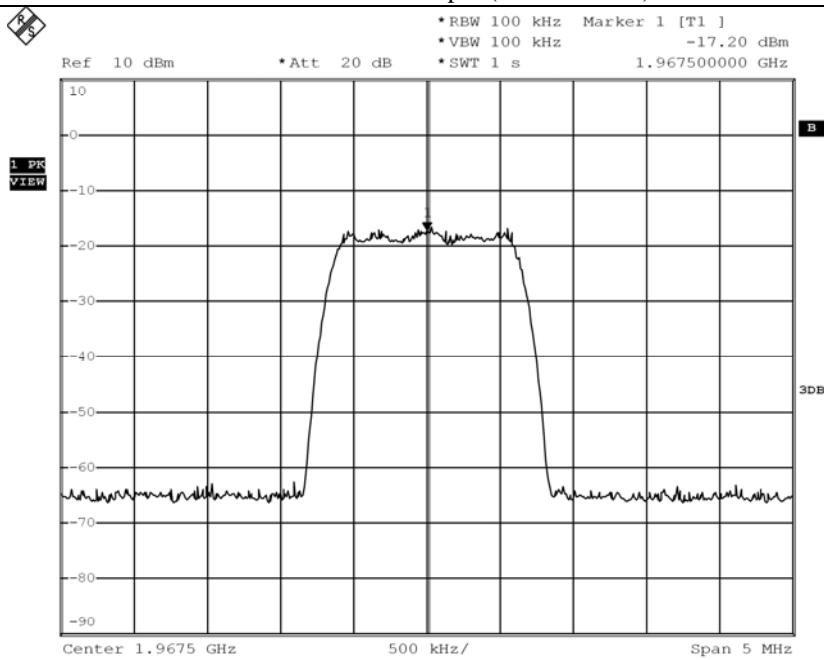


CDMA – Input (Middle Channel)

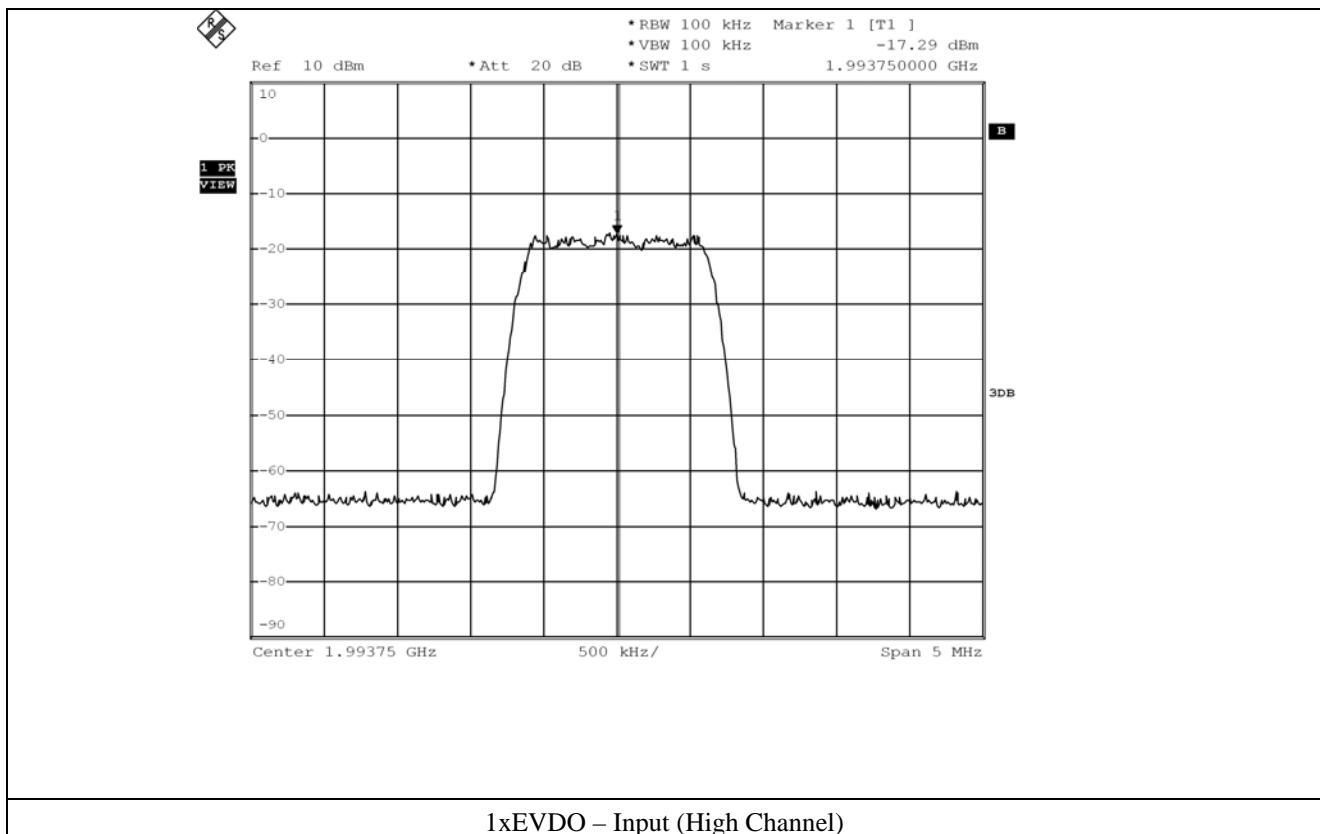


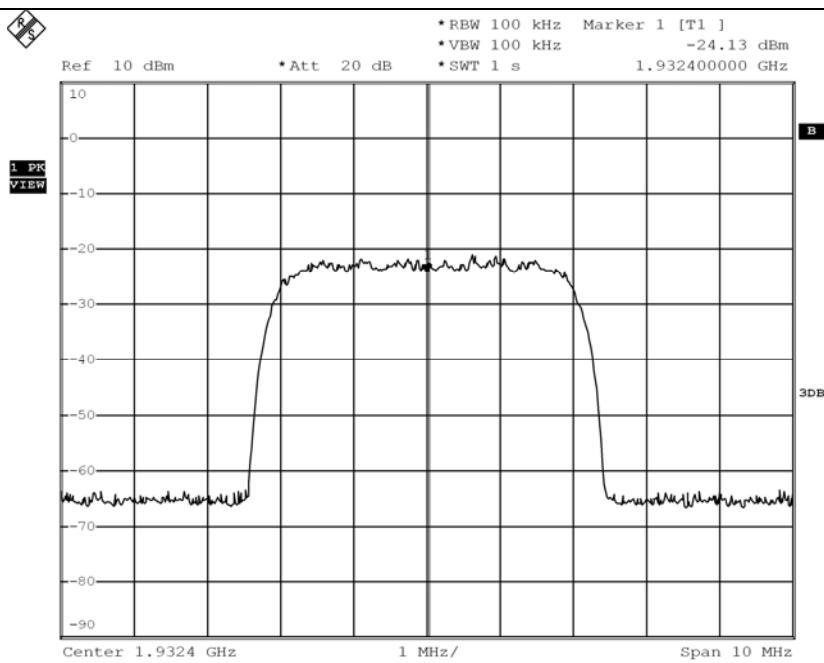


1xEVDO – Input (Low Channel)

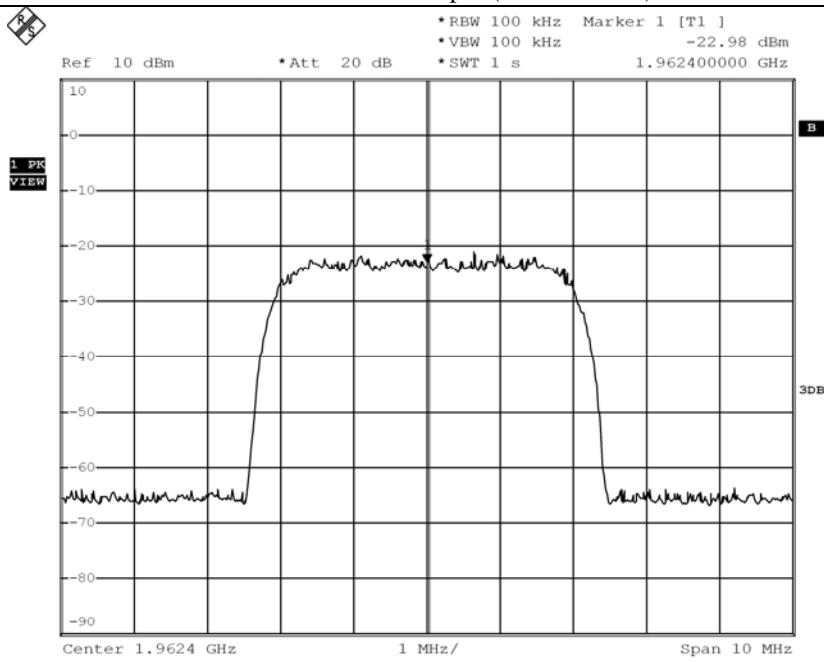


1xEVDO – Input (Middle Channel)

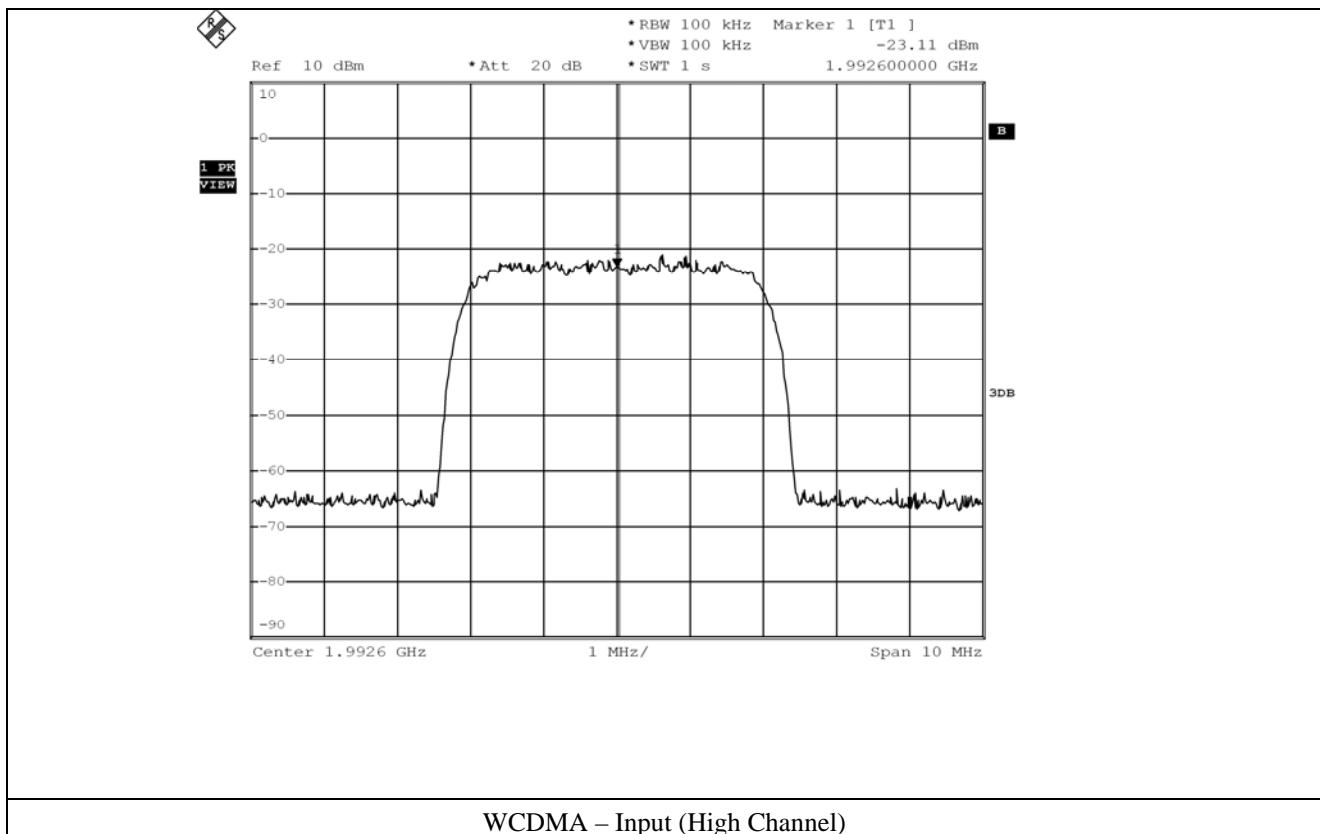


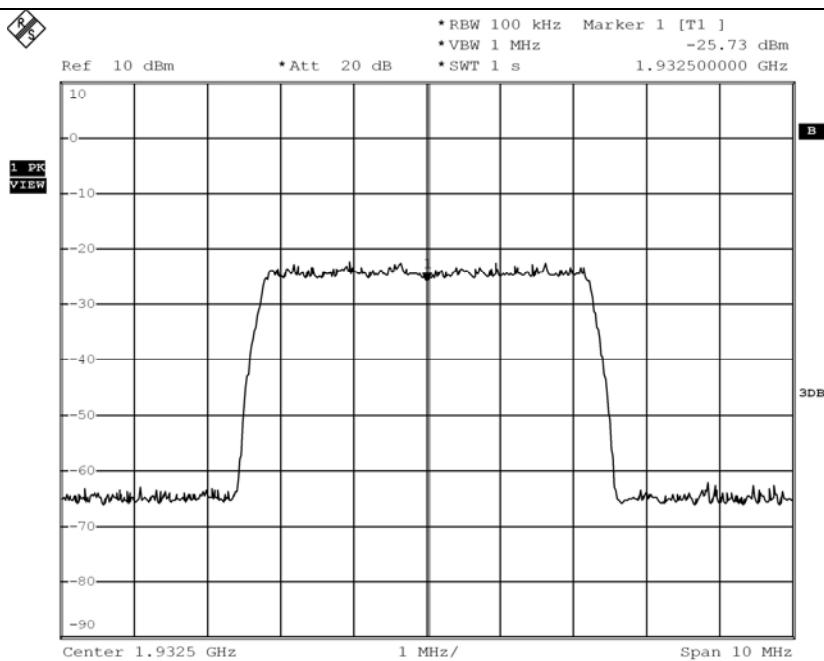


WCDMA – Input (Low Channel)

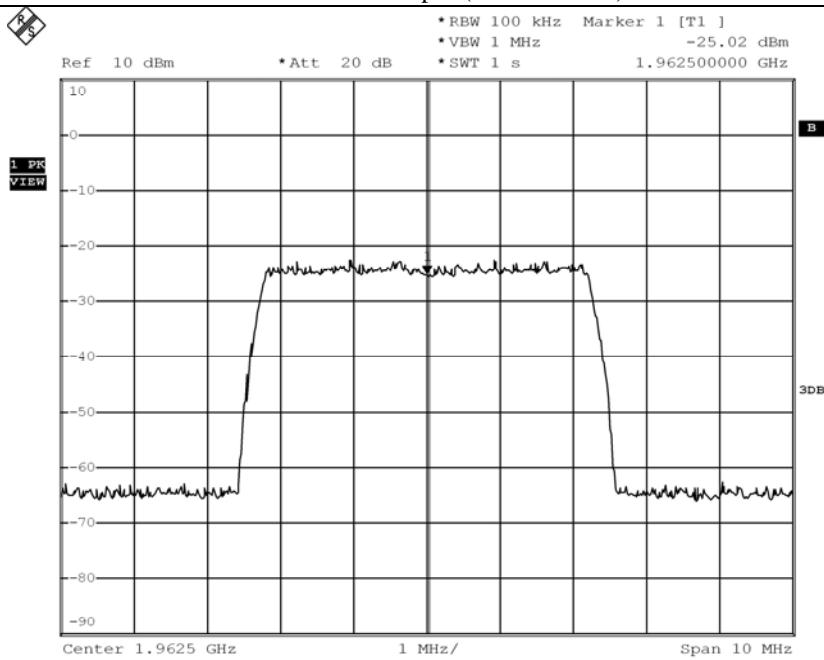


WCDMA – Input (Middle Channel)





LTE – Input (Low Channel)



LTE – Input (Middle Channel)

