1701 E. Plano Parkway, Suite 150
Plano, Texas 75074
Phone: (972) 509-2566
Fax: (972) 509-0073

Certification Test Report

CFR 47 FCC Part 2
Part 27, Subparts C and L
Part 90, Subparts I and S

Model: ION-M90/17P

FCC ID NO.: BCR-M5B9017

Project Code: W7197-1

Revision: 0

Prepared for:	Andrew Corporation 108 Rand Park Drive Garner, North Carolina 27529
Author:	Tom Tidwell, Manager of Wireless Services
Issued:	19 September, 2007

Report Summary

NTS Plano

Accreditation Numbers: FCC: 101741
IC: 46405-4319 File # IC-4319A-1

Applicant: Andrew Corporation
108 Rand Park Drive
Garner, North Carolina 27529

Customer Representative: Michael Williamson

EUT Description:

EUT Description	Manufacturer	Model	Revision	Serial Number
The EUT is an extension unit that operates as part of the ION-M optical distribution system.	Andrew Wireless Systems Gmbh	ION-M90/17P	00	11

Intelligent Optical Network: The ION-M system can use is build with three types of remote units: The Main Unit ION-M80-85/19P, the Extension Unit ION-M90/17P, and the Combiner Unit ION-M80/9/17/19CU. The ION-M90/17P extension unit is connected to the main unit (ION-M80-85/19P). The extension unit is optimized for GMSK, EDGE and WCDMA, AMPS, LMR, and Analogue modulations.

Test Summary

Appendix	Test/Requirement Description	Deviations from:			Pass / Fail	Applicable Rule Parts
		Base Standard	Test Basis	NTS Procedure		
A	RF Power Output	No	No	No	PASS	CFR 47, Part 2, Para. 2.1046 CFR 47, Part 27, Para. 27.50 CFR 47, Part 90, Para. 90.205
B	Modulation Characteristics	No	No	No	PASS	CFR 47, Part 2, Para. 2.1047 CFR 47, Part 90, Para. 90.207
C	Occupied Bandwidth	No	No	No	PASS	CFR 47, Part 2, Para. 2.1049 CFR 47, Part 27, Para. 27.53 CFR 47, Part 90, Para. 90.210
D	Spurious Emissions at Antenna Terminals	No	No	No	PASS	CFR 47, Part 2, Para. 2.1051 CFR 47, Part 27, Para. 27.53 CFR 47, Part 90, Para. 90.210
E	Field Strength of Spurious Radiation	No	No	No	PASS	CFR 47, Part 2, Para. 2.1053 CFR 47, Part 27, Para. 27.53 CFR 47, Part 90, Para. 90.210
F	Frequency Stability	No	No	No	PASS	CFR 47, Part 2, Para. 2.1055 CFR 47, Part 27, Para. 27.54 CFR 47, Part 90, Para. 90.214

Test Result: The product presented for testing complied with test requirements as shown above.

This is to certify that the preceding report is true and correct to the best of my knowledge.

Robert Stevens,
Quality Assurance Manager

Tom Tidwell,
Wireless Test Engineer

Table of Contents

Register of revisions

Revision	Reason for Revision	Release Date
0	Original	19 Sept., 2007

INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Plano to demonstrate compliance of the ION-M90/17P to FCC Parts 27 and 90, in accordance with the certification requirements of CFR 47, Part 2.

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	Intelligent Optical Network	ION-M90/17P	00	13
RF Exposure Classification	Fixed. The antennas are mounted using a wall or pole mounting kit provided by the manufacturer..			
Channels/Frequency Range	935-940, 2110-2155 MHz Downlink Since this device operates in all of the above frequency bands it is used in the following radio services: AWS (Advanced Wireless Services) — Part 27 LMR (Land Mobile Radio) — Part 90 The device can operate in the above bands simultaneously in a single configuration, therefore the certification for the device is done as a composite(Part 27/Part 90) filing.			
Power	**Downlink:** +43 dBm (20 watts) at antenna port. This is the rating at the output of the ION-M90/17P extension unit. All measurements except rf power ouput were made at the output of the combiner unit thus the measured rf power is approximately 3 dB lower than the rated power. RF output power was measured at the output of the extension unit since this is how the unit is rated.			
Emission Designator:	**F3E (analogue)** **F9W (CDMA, CDMA2000, W-CDMA)** **G7W (EDGE)** **GXW (GSM)** **DXW (TDMA)**			
TX antenna details	Antenna selection is made at the time of licensing			
Functional Description	The ION system transports signals on the RF layer in a very cost-effective manner enabling multiple operators to use multiple technologies and move their signals simultaneously from a cluster of base station to a number of remote locations over the same fiber.			

2.1.1 EUT POWER

Voltage	120 Vac, 60 Hz

Number of Feeds	Single phase (L1 and Neutral)

2.2 EUT CABLES

Quantity	Model/Type	Routing		Shielded / Unshielded	Description	Cable Length (m)
		From	To			
1		EUT	AC power main	Unshielded	Power cord	1.25
1	Gore	IQ Signal Generator	EUT	Shielded (coaxial)	Coaxial cable	1.5
1	Gore	EUT	50 ohm load	Shielded (coaxial)	Coaxial cable	2

2.3 MODE OF OPERATION DURING TESTS

The device was tested in one basic operating mode:

- Downlink, maximum rf output power with the device set to maximum rf gain and fed with the maximum rf input power.

While operating in this mode, the device was tested with variations in the following parameters:

The rf input level was adjusted until no further increase in rf output power was noted. It was noted that this rf input level was ≥ the maximum rf input level on the specification sheet in the user/installation manual.

In each band the rf input frequency was set to three channels (lowest, mid, and highest).

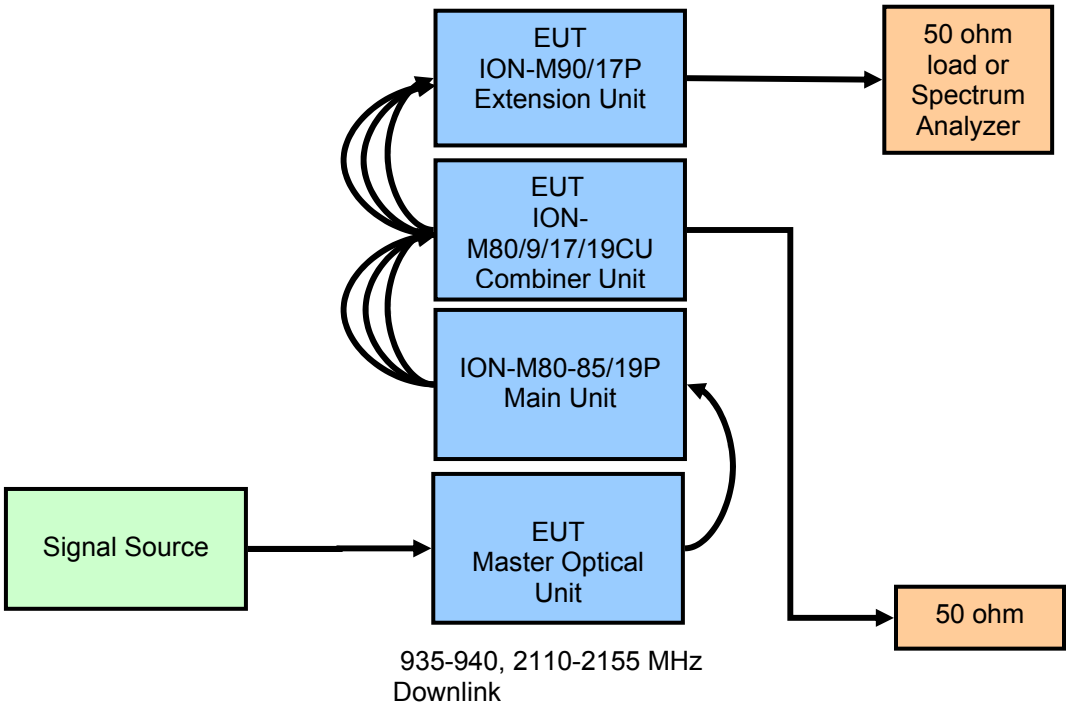
3.0 SUPPORT EQUIPMENT

3.1 CONFIGURATION

The radio was activated using customer-supplied test software. The software allowed the test engineer to change modulation modes and data rates as well as transmit channel.

3.2 TEST BED/PERIPHERAL CABLES

.



MASTER unit: This unit is connected directly to a base station transceiver. Its function is to take the rf input from the base station transmitter (downlink direction) and convert the rf signal to an optical signal. This optical signal is then sent via fiber to the main unit where it is converted back to rf and processed. In the Uplink direction the master unit takes an incoming optical signal from the main unit and converts it to an rf signal which it then feeds to the base station receiver via coaxial cable.

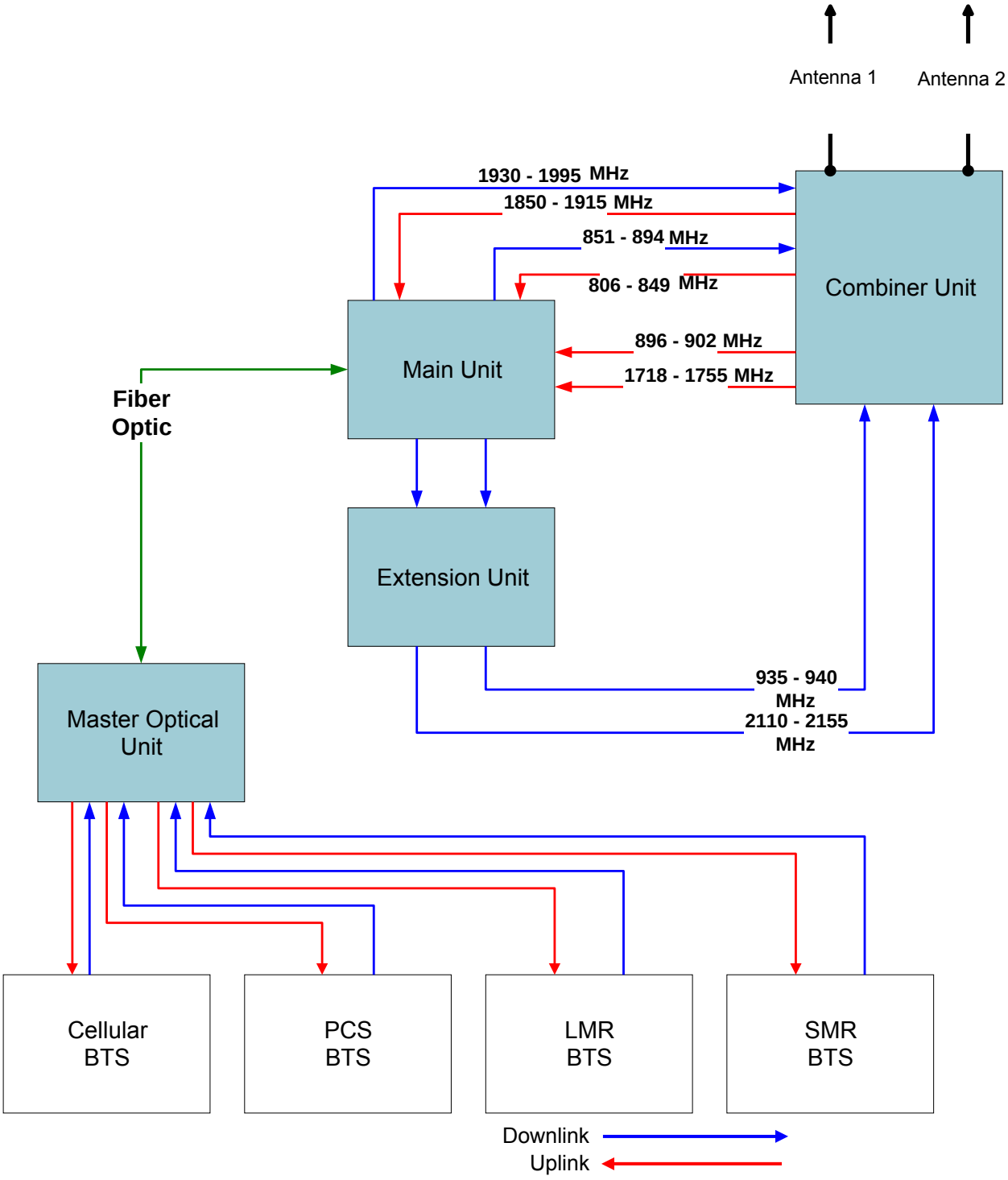
MAIN unit: This unit connects to the master optical unit via fiber optic cable. In the downlink direction it converts the optical signal received from the master optical unit to an rf signal, filters, and amplifies the signal and then feeds it to the combiner unit. In the uplink direction this unit receives a signal from the combiner unit and converts the rf signal to an optical signal which is then fed to the master optical unit via fiber.

COMBINER unit: In the downlink direction this unit receives an rf signal from the main unit which it then passively routes to one of two antenna ports. In the uplink direction the combiner unit accepts an off-air signal from a mobile device which it then passively routes to the proper rf port of the main unit.

EXTENSION unit: The extension unit has the same function as the main unit. In the downlink direction it receives rf signals from the main unit, amplifies and filters these signals, and then feeds them to the combining unit via short coaxial cables. In the uplink direction the extension unit receives rf signals from the antennas, amplifies and filters these signals and then feeds them to the main unit via short coaxial cables.

None of these units operate stand-alone.

System Diagram



APPENDICES

APPENDIX A: 2.1046 RF POWER OUTPUT

A.1. Base Standard & Test Basis

Base Standard	FCC PART 2.1046
Test Basis	TIA 603-C, 2004
Test Method	TIA 603-C, 2004

A.2. Specifications

22.913 RF power output limits

(a) *Maximum ERP.* In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:
(1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,
(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

Applicable RF Power Limit from Above: 500 watts

24.232 Power and antenna height limits.

(a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph 24.232(b).
(b) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, are limited to 3280 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.
(c) Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Applicable RF Power Limit from Above: 1640 watts EIRP

27.50 Power and antenna height limits.

(d) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands:

(1) The power of each fixed or base station transmitting in the 2110–2155 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to a peak equivalent isotropically radiated power (EIRP) of 3280 watts. The power of each fixed or base station transmitting in the 2110–2155 MHz band from any other location is limited to a peak EIRP of 1640 watts. A licensee operating a base or fixed station utilizing a power of more than 1640 watts EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025–2110 MHz band. Operations above 1640 watts EIRP must also be

coordinated in advance with the following licensees within 120 kilometers (75 miles) of the base or fixed station: all Broadband Radio Service (BRS) licensees authorized under part 27 in the 2155–2160 MHz band and all AWS licensees in the 2110–2155 MHz band.
(2) Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to a peak EIRP of 1 watt. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground, and mobile and portable stations must employ a means for limiting power to the minimum necessary for successful communications.

90.205 Power output limits

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized to applicants whose license applications for new stations are filed after August 18, 1995 is as follows:

(a) *Below 25 MHz.* For single sideband operations (J3E emission), the maximum transmitter peak envelope power is 1000 watts.
(b) *25–50 MHz.* The maximum transmitter output power is 300 watts.
(c) *72–76 MHz.* The maximum effective radiated power (ERP) for stations operating on fixed frequencies is 300 watts. Stations operating on mobile-only frequencies are limited to one watt transmitter output power.
(d) *150–174 MHz.* (1) The maximum allowable station ERP is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 1. Applicants requesting an ERP in excess of that listed in table 1 must submit an engineering analysis based upon generally accepted engineering practices and standards that includes coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.
(2) Applications for stations where special circumstances exist that make it necessary to deviate from the ERP and antenna heights in Table 1 will be submitted to the frequency coordinator accompanied by a technical analysis, based upon generally accepted engineering practices and standards, that demonstrates that the requested station parameters will not produce a signal strength in excess of 37 dBu at any point along the edge of the requested service area. The coordinator may then recommend any ERP appropriate to meet this condition.
(3) An applicant for a station with a service area radius greater than 40 km (25 mi) must justify the requested service area radius, which will be authorized only in accordance with table 1, note 4. For base stations with service areas greater than 80 km, all operations 80 km or less from the base station will be on a primary basis and all operations outside of 80 km from the base station will be on a secondary basis and will be entitled to no protection from primary operations.

Table 1_150-174 MHz_Maximum ERP/Reference HAAT for a Specific Service Area Radius

	Service area radius (km)									
	3	8	13	16	24	32	40	48[4]	64[4]	80[4]
Max. EIRP (w) [1]	1	28	178	500[2]	500[2]	500[2]	500[2]	500[2]	500[2]	500[2]
Up to ref. HAAT (m) [3]	15	15	15	15	33	65	110	160	380	670

(1) Maximum ERP indicated provides for a 37 dBu signal strength at the edge of the service area per FCC Report R-6602, Fig. 19 (See § 73.699, Fig.10).
(2) Maximum ERP of 500 watts allowed. Signal strength at the service area contour may be less than 37 dBu.
(3) When the actual antenna HAAT is greater than the reference HAAT, the allowable ERP will be reduced in accordance with the following equation:
$ERP_{allow} = ERP_{max} \times (HAAT_{ref} / HAAT_{actual})$ [2]
(4) Applications for this service area radius may be granted upon specific request with justification and must include a technical demonstration that the signal strength at the edge of the service area does not exceed 37 dBu.

(e) *217–220 MHz.* Limitations on power and antenna heights are specified in §90.259.

(f) *220–222 MHz.* Limitations on power and antenna heights are specified in §90.729.

(g) *421–430 MHz.* Limitations on power and antenna heights are specified in §90.279.
(h) *450–470 MHz.* (1) The maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with table 2. Applicants requesting an ERP in excess of that listed in table 2 must submit an engineering analysis based upon generally accepted engineering practices and standards that includes coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.
(2) Applications for stations where special circumstances exist that make it necessary to deviate from the ERP and antenna heights in Table 2 will be submitted to the frequency coordinator accompanied by a technical analysis, based upon generally accepted engineering practices and standards, that demonstrates that the requested station parameters will not produce a signal strength in excess of 39 dBu at any point along the edge of the requested service area. The coordinator may then recommend any ERP appropriate to meet this condition.
(3) An applicant for a station with a service area radius greater than 32 km (20 mi) must justify the requested service area radius, which may be authorized only in accordance with table 2, note 4. For base stations with service areas greater than 80 km, all operations 80 km or less from the base station will be on a primary basis and all operations outside of 80 km from the base station will be on a secondary basis and will be entitled to no protection from primary operations.

Table 2_450-470 MHz_Maximum ERP/Reference HAAT for a Specific Service Area Radius

	Service area radius (km)									
	3	8	13	16	24	32	40	48[4]	64[4]	80[4]
Max. EIRP (w) [1]	2	100	500[2]	500[2]	500[2]	500[2]	500[2]	500[2]	500[2]	500[2]
Up to ref. HAAT (m) [3]	15	15	15	27	63	125	250	410	950	2700

(1) Maximum ERP indicated provides for a 37 dBu signal strength at the edge of the service area per FCC Report R-6602, Fig. 19 (See § 73.699, Fig.10).
(2) Maximum ERP of 500 watts allowed. Signal strength at the service area contour may be less than 37 dBu.
(3) When the actual antenna HAAT is greater than the reference HAAT, the allowable ERP will be reduced in accordance with the following equation:
$ERP_{allow} = ERP_{max} \times (HAAT_{ref} / HAAT_{actual})$ [2]
(4) Applications for this service area radius may be granted upon specific request with justification and must include a technical demonstration that the signal strength at the edge of the service area does not exceed 37 dBu.

(i) *470–512 MHz.* Power and height limitations are specified in §§90.307 and 90.309.
(j) *764–776 MHz, 794–824 MHz, 851–869 MHz, 896–901 MHz and 935–940 MHz.* Power and height limitations are specified in §90.635.
(k) *902–928 MHz.* LMS systems operating pursuant to subpart M of this part in the 902–927.25 MHz band will be authorized a maximum of 30 watts ERP. LMS equipment operating in the 927.25–928 MHz band will be authorized a maximum of 300 watts ERP. ERP must be measured as peak envelope power. Antenna heights will be as specified in §90.353(h).
(l) *929–930 MHz.* Limitations on power and antenna heights are specified in §90.494.
(m) *1427–1429.5 MHz and 1429.5–1432 MHz.* Limitations on power are specified in §90.259.
(n) *2450–2483.5 MHz.* The maximum transmitter power is 5 watts.
(o) *4940–4990 MHz.* Limitations on power are specified in §90.1215.
(p) *5850–5925 MHz*. Power and height limitations are specified in subpart M of this part.
(q) *All other frequency bands.* Requested transmitter power will be considered and authorized on a case by case basis.
(r) The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with §90.203(a)(1)] for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

A.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
None						

A.4. Test Procedure

TIA 603-C, 2004 and 24.232(d)

A.5. Test Results

The EUT is in compliance with the limits as specified above. The maximum rf output power at the antenna terminals is 20 watts.

A.6. Operating Mode During Test

The transmitter was tested while in a continuous transmit mode. The EUT was tuned to a low, middle, and high channel in both the downlink (base to mobile) and uplink (mobile to base) directions. In the course of this testing, it was found that operating the device with a fixed rf gain and adjusting rf input signal to obtain maximum rf output power produced the worst-case results.

A.7. Sample Calculation

Rf power(watts) = $10^{(\text{rf power(dBm)}/10)}$ x 1000

A.8. Test Data

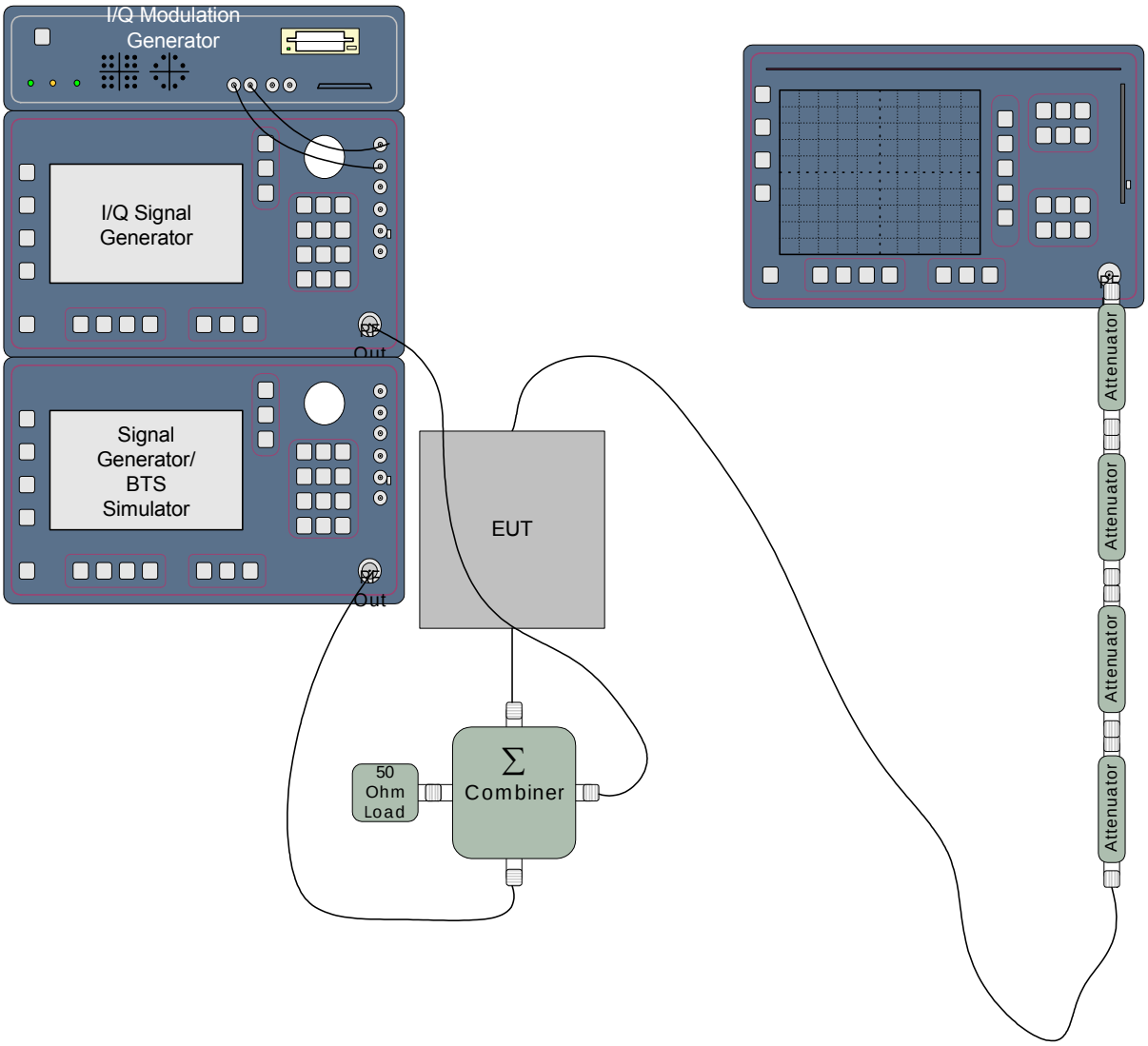
Signal Path	Modulation Mode	RF Power Output at Antenna Terminals (dBm)
DL	F9W (IS-95 CDMA)	43.0
DL	F9W (W-CDMA)	42.7
DL	DXW (TDMA)	43.1
DL	GSM	42.8
DL	GSM EDGE	43.0
DL	Analogue	43.0

Note: RF power output was measured using a spectrum analyzer set to Peak detector with RBW set to 10 MHz and VBW set to 10 MHz. The rf power output was measured at the lowest channel, middle channel, and upper channel in each band. The worst-case results are reported. Power was measured at the input to the combiner unit since this is the way the unit is rated.

*DL = Downlink (BTS to Mobile) path

Test Date: July 6, 2007

A.9. Test Diagram



A.10. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX B: 2.1047 MODULATION CHARACTERISTICS

B.1. Base Standard & Test Basis

Base Standard	FCC 2.1047
Test Basis	FCC 2.1047 Modulation Characteristics
Test Method	TIA 603-C, 2004

B.2. Specifications

2.1047 – Modulation Characteristics

(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
(c) *Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power.* A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.
(d) *Other types of equipment.* A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

B.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

B.4. Test Method

This device does not generate any modulation signals but only repeats a modulated rf waveform.

B.5. Test Results

Not applicable – The device does not produce a baseband signal but simply repeats a modulated rf waveform.

Test Data Summary

Emission Designators

IS-95 CDMA: F9W
CDMA2000: F9W
W-CDMA: F9W
TDMA: DXW
GSM: GXW
GSM EDGE: G7W
Analogue: F3E

B.6. Test Diagram

N/A

B.7. Tested By

Name: Tom Tidwell
Function: Manager of Wireless Services

APPENDIX C: 2.10.49 OCCUPIED BANDWIDTH

C.1. Base Standard & Test Basis

Base Standard	FCC 2.1049
Test Basis	FCC 2.1049 Occupied Bandwidth
Test Method	TIA 603-C, 2004

C.2. Specifications

22.917 Occupied Bandwidth limits

(b) The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

24.238 Emission limitations for Broadband PCS equipment

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

27.53 Emission limits for AWS equipment

(g) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

90.210 Emission masks.

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating in the frequency bands governed under this part.

Applicable Emission Masks		
Frequency (MHz)	Mask for equipment with audio low-pass filter	Mask for equipment without audio low-pass filter
Below 25(1)	A or B	A or C
25 – 50	B	C
72 – 76	B	C
150 – 174(2)	B, D, or E	C, D, or E
150 paging only	B	C
220 – 222	F	F
421 – 512(2)	B, D, or E	C, D, or E
450 paging only	B	G
806 – 809 / 851 - 854	B	H
809 – 824 / 854 – 869(3)	B	G
896 – 901 / 935 – 940	I	J
902 – 928(4)	K	K
929 – 930	B	G
4940 – 4990	L or M	L or M
5850 - 5925(4)	-	-
All other bands	B	C

(1) Equipment using single sideband J3E emission must the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.
(2) Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth Must meet the requirements of Emission Mask E.
(3) Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of § 90.691.
(4) DSRCS Roadside Units equipment in the 5850-5925 MHz band is governed under subpart M of this part.

C.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

C.4. Test Method

TIA 603-C, 2004 and 24.238(b)

The modulated rf carrier fed to the device during testing is described below:

Analogue

2.5 kHz tone modulating the carrier with a frequency deviation of +/- 3 kHz

EDGE

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: 8PSK
Bit Rate: 270 kbit/sec
Filter: GSM EDGE

GSM

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: GMSK
Symbol Rate: 270 kbit/sec
Filter: GSM

TDMA(NADC)

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: π/4DQPSK
Bit Rate: 27kbit/sec
Filter: NADC

IS-95 CDMA carrier:

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: QPSK 2 b/sym
Symbol Rate: 1.2288 Msym/sec
Filter: IS-95 + Equalizer

W-CDMA carrier:

Data source: PRBS(Pseudo-Random Bit Sequence)
Modulation: OQPSK
Symbol Rate: 4.096 MHz
Sequence Length: 65536 sym
Filter: Root Cosine
Roll Off: 0.1
Window Function: Hanning

C.5. Test Results

Compliant. The rf input and output of the device was plotted to demonstrate that the modulated carrier is not degraded as a result of processing by the device under test.

C.6. Deviations from Normal Operating Mode During Test

None.

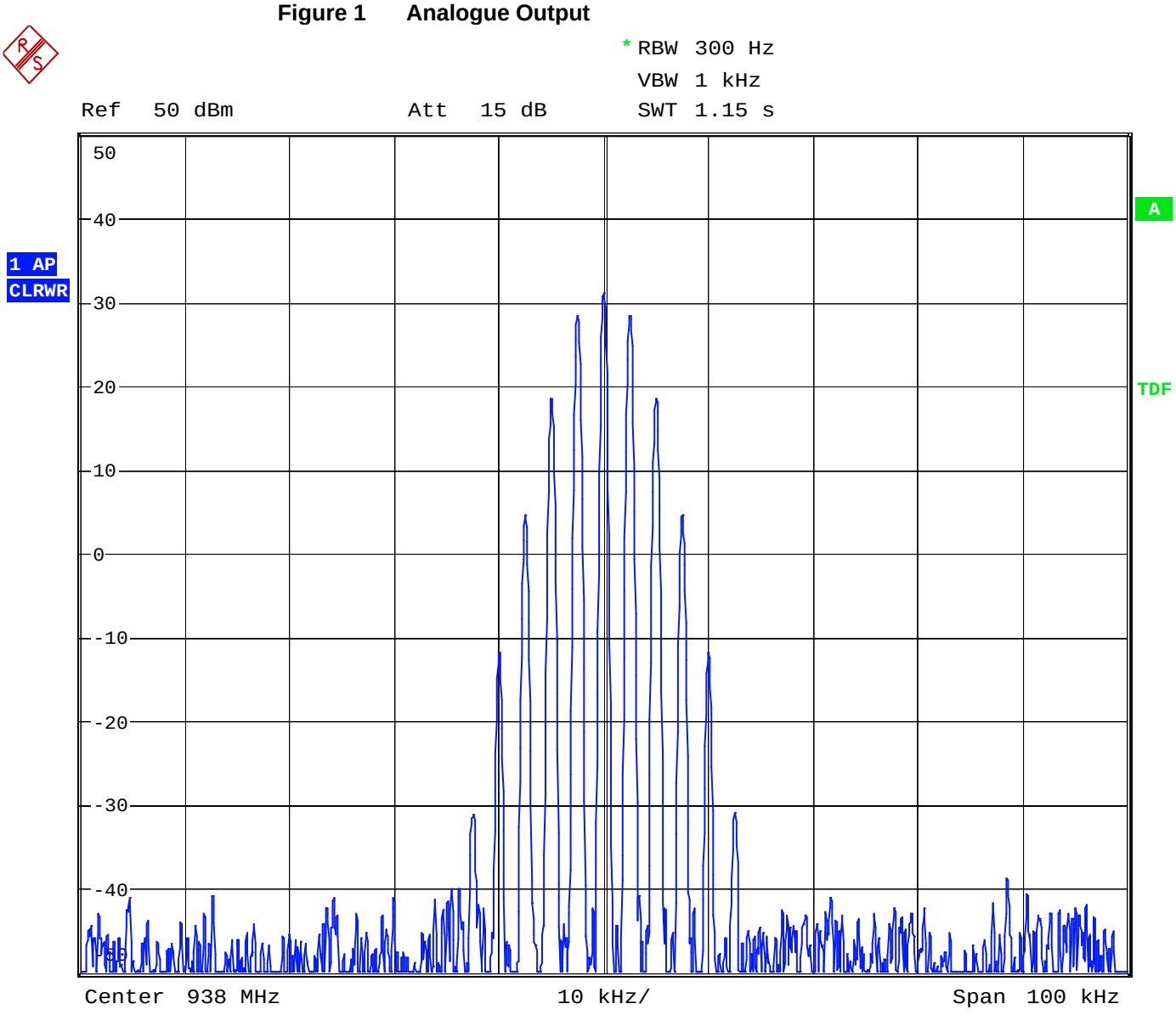
C.7. Sample Calculation

None.

C.8. Test Data

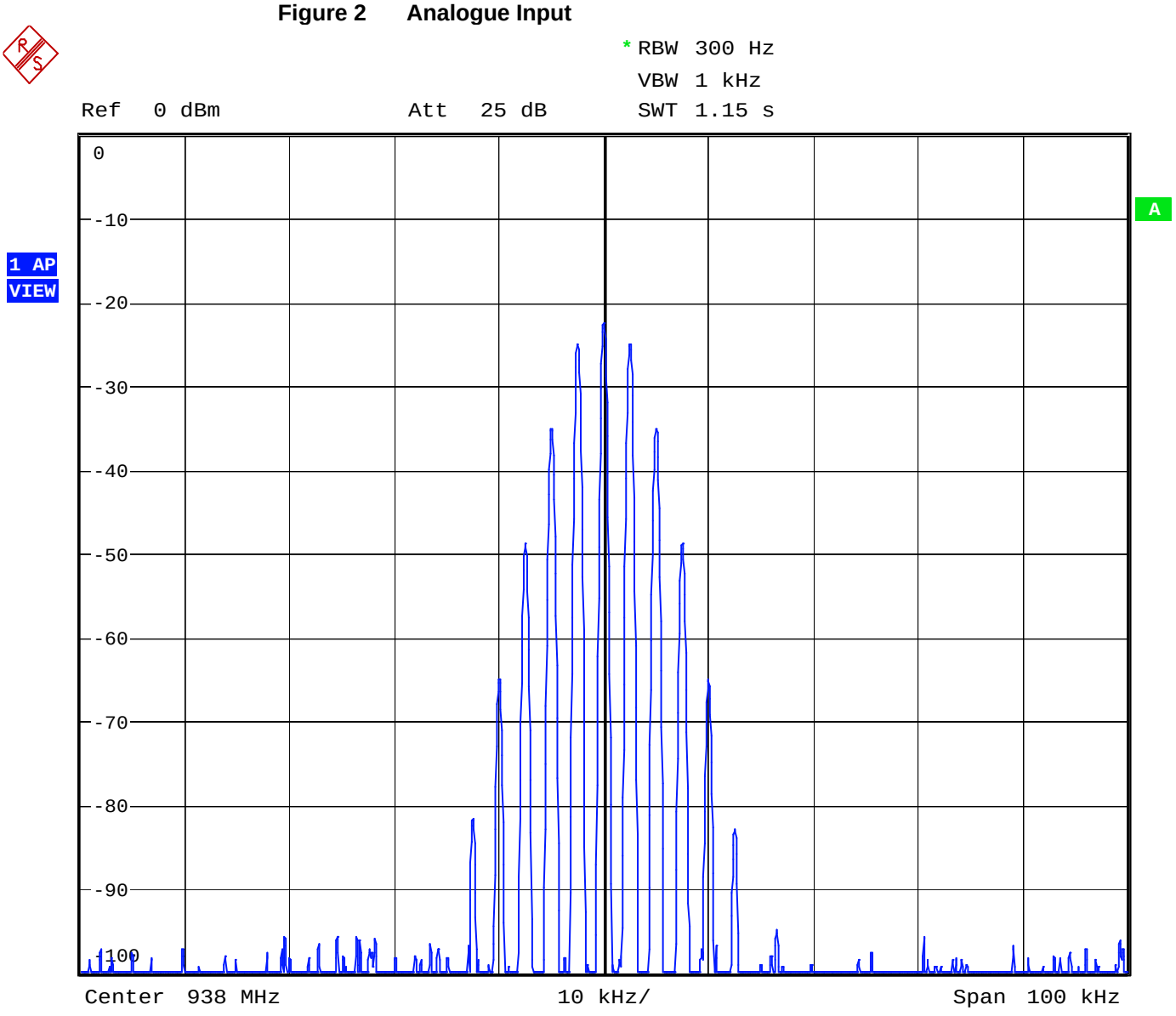
See plots following.

Figure 1 Analogue Output



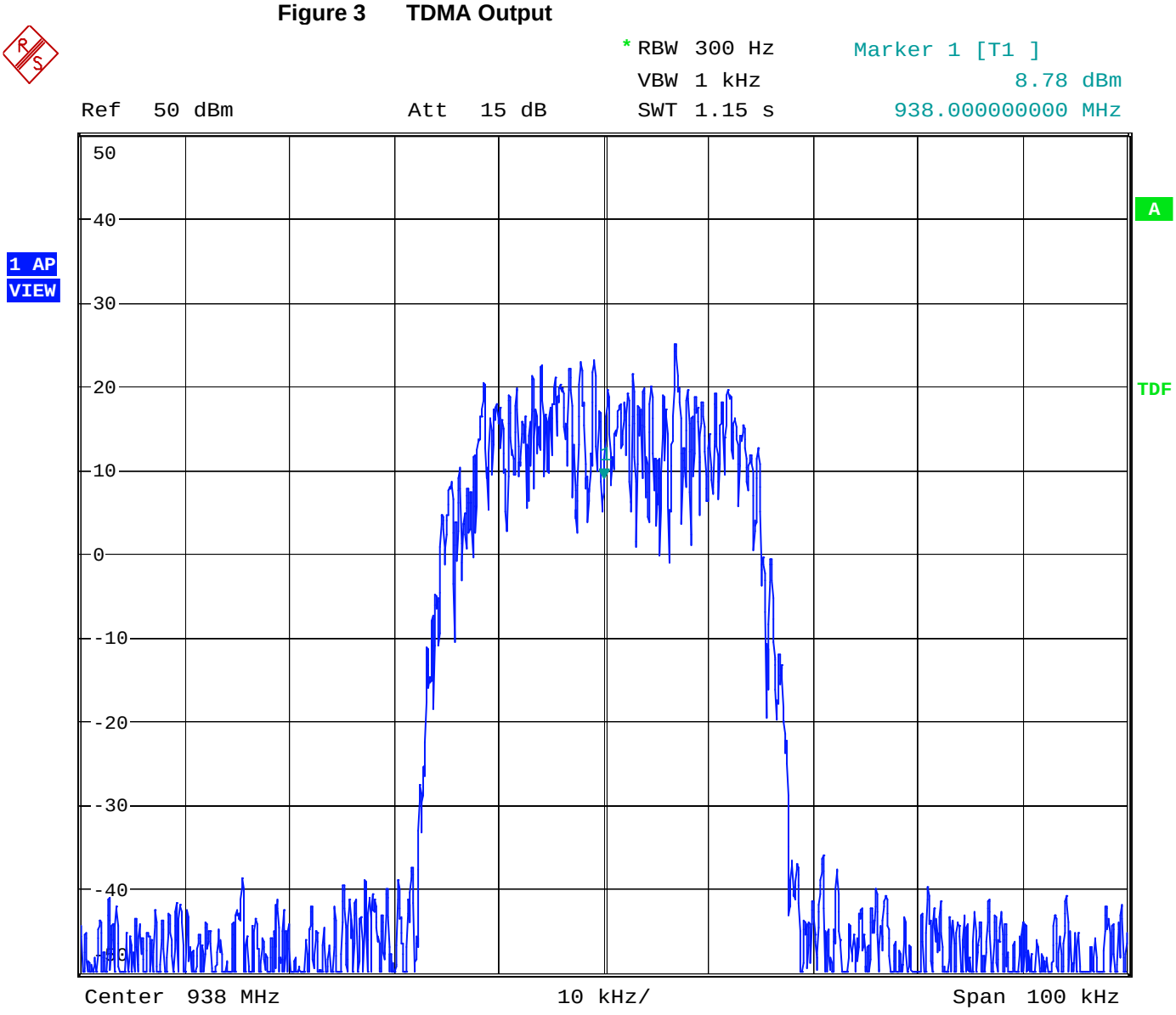
Date: 17.JUL.2007 08:47:24

Figure 2 Analogue Input



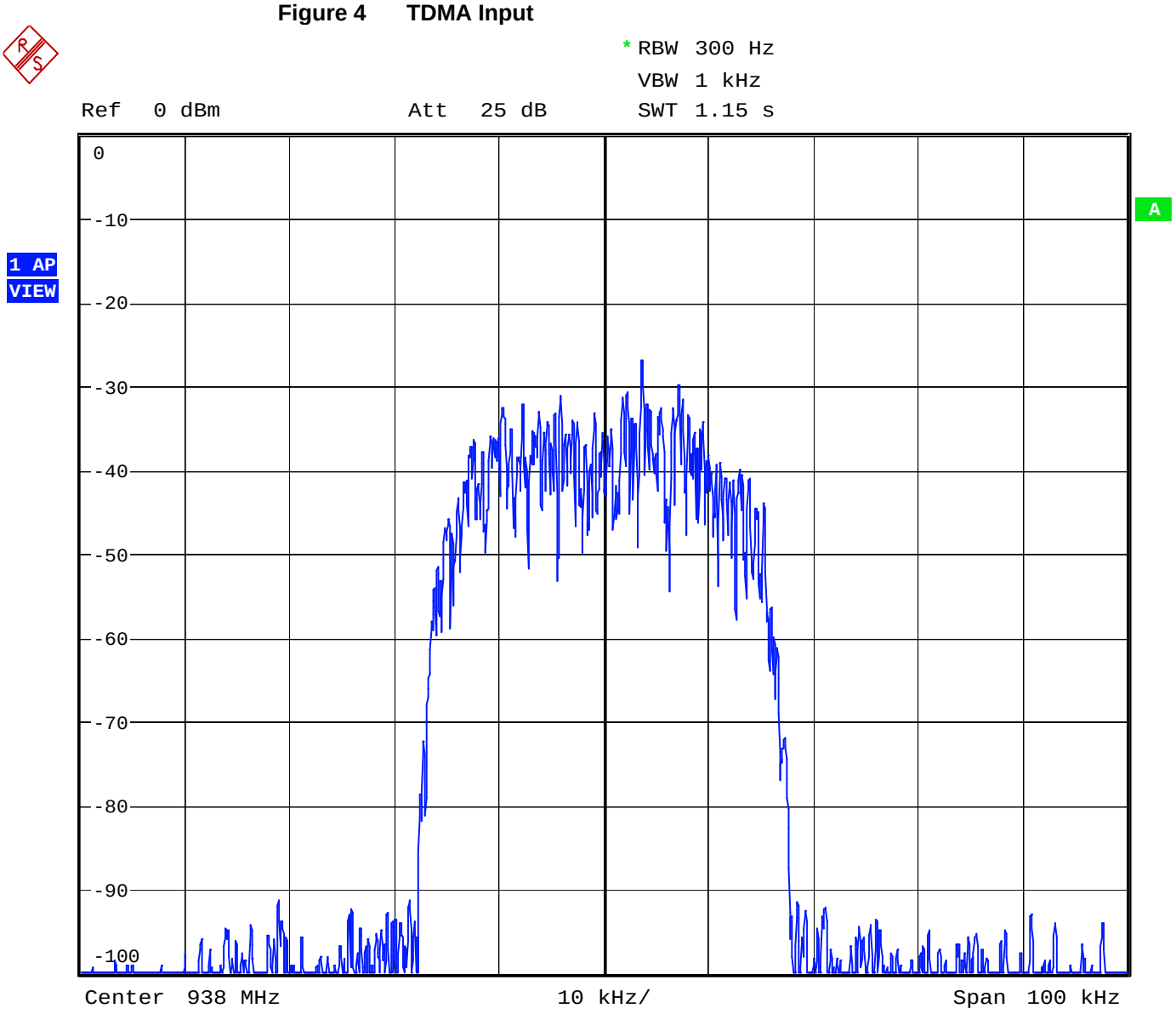
Date: 17.JUL.2007 14:10:37

Figure 3 TDMA Output



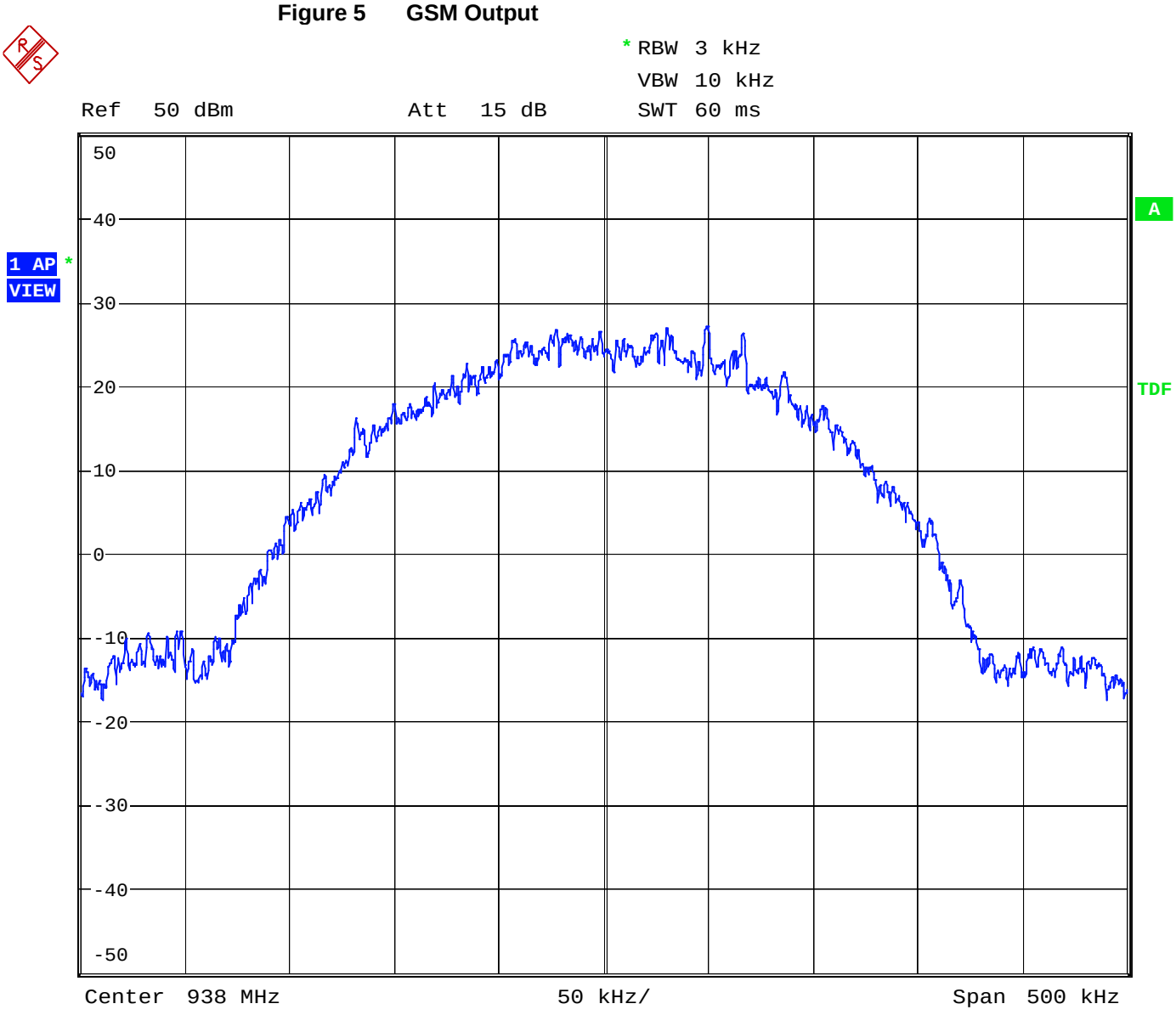
Date: 17.JUL.2007 08:25:48

Figure 4 TDMA Input



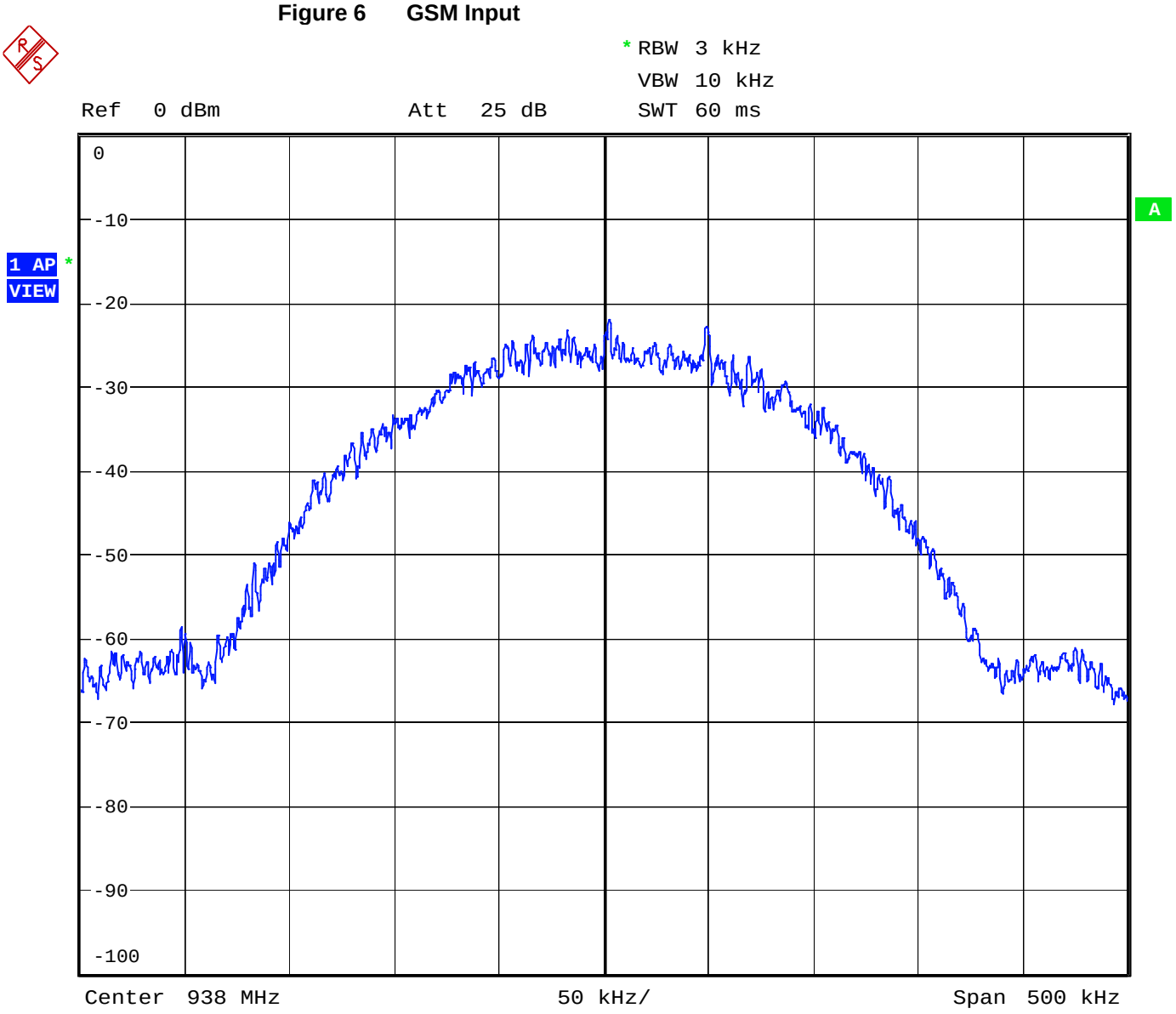
Date: 17.JUL.2007 14:12:39

Figure 5 GSM Output



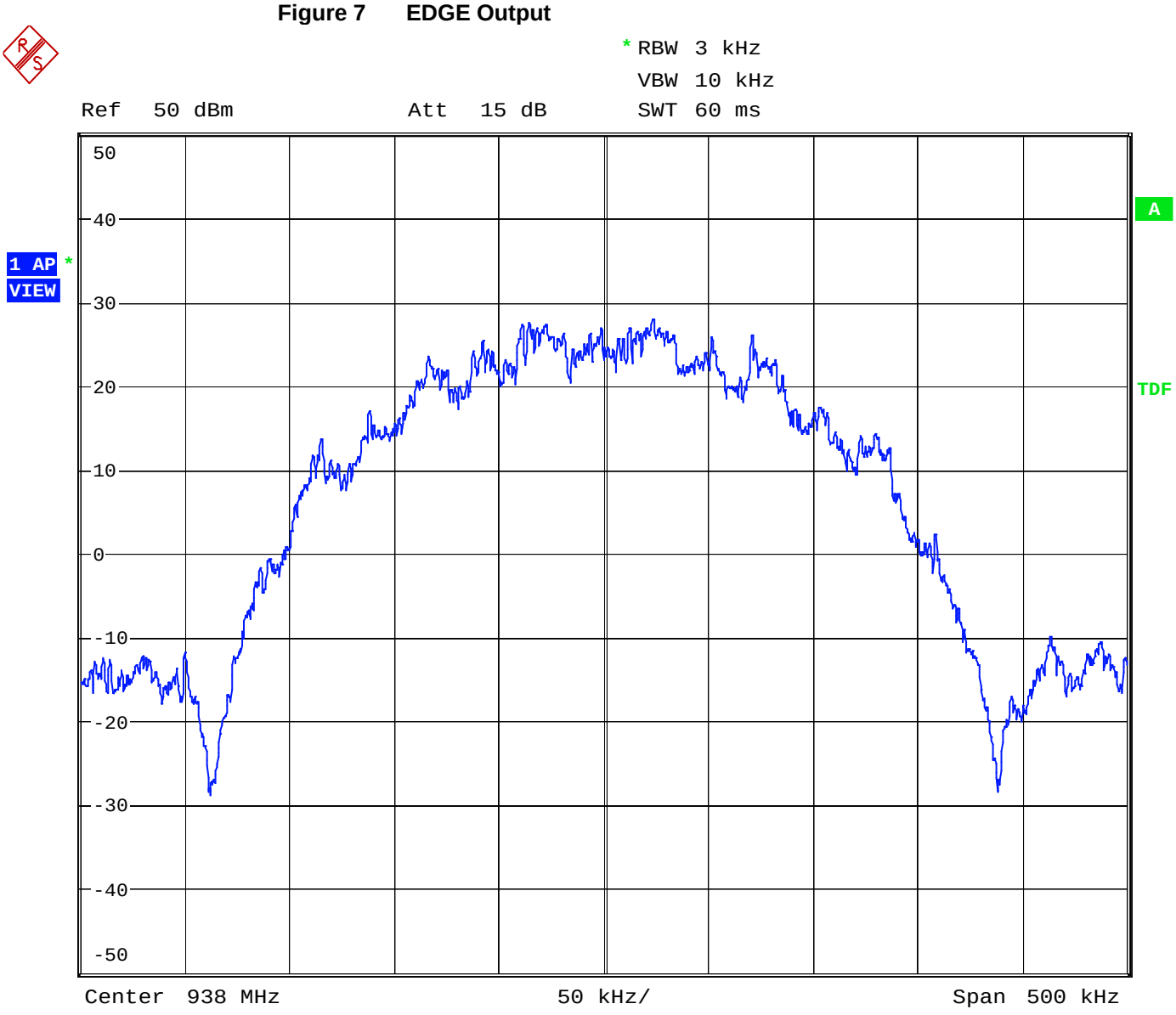
Date: 17.JUL.2007 09:12:12

Figure 6 GSM Input



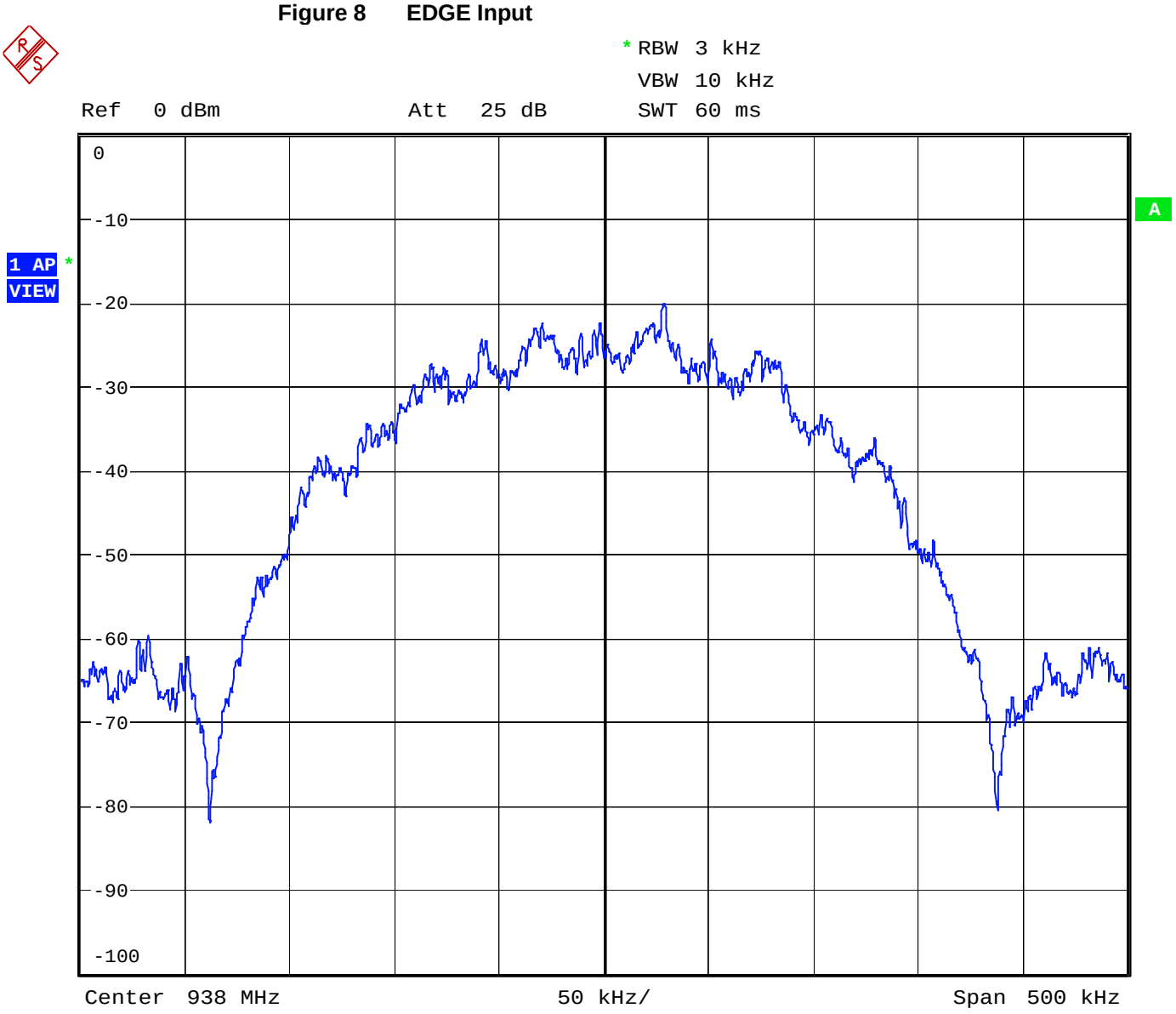
Date: 17.JUL.2007 14:15:06

Figure 7 EDGE Output



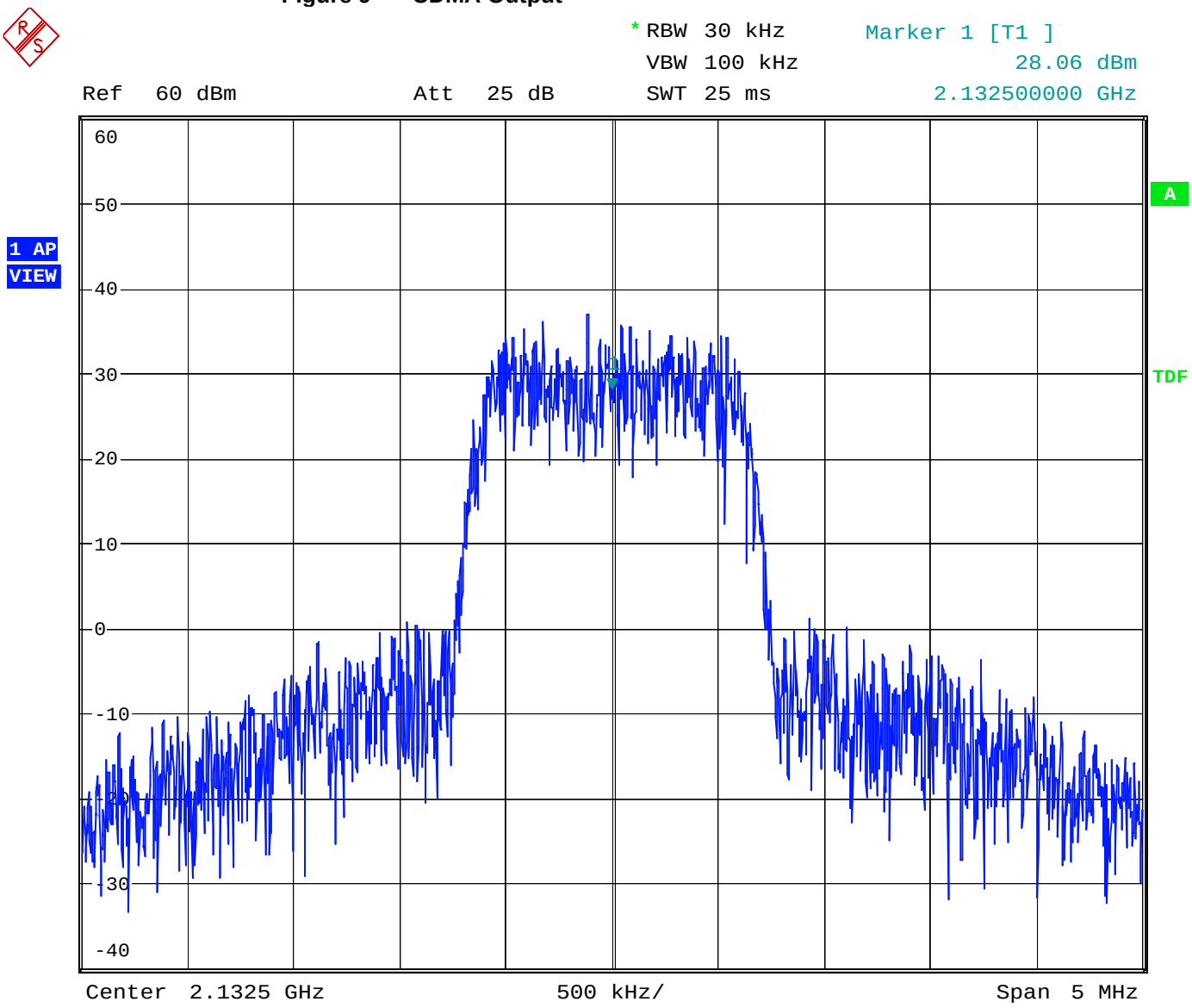
Date: 17.JUL.2007 09:12:55

Figure 8 EDGE Input



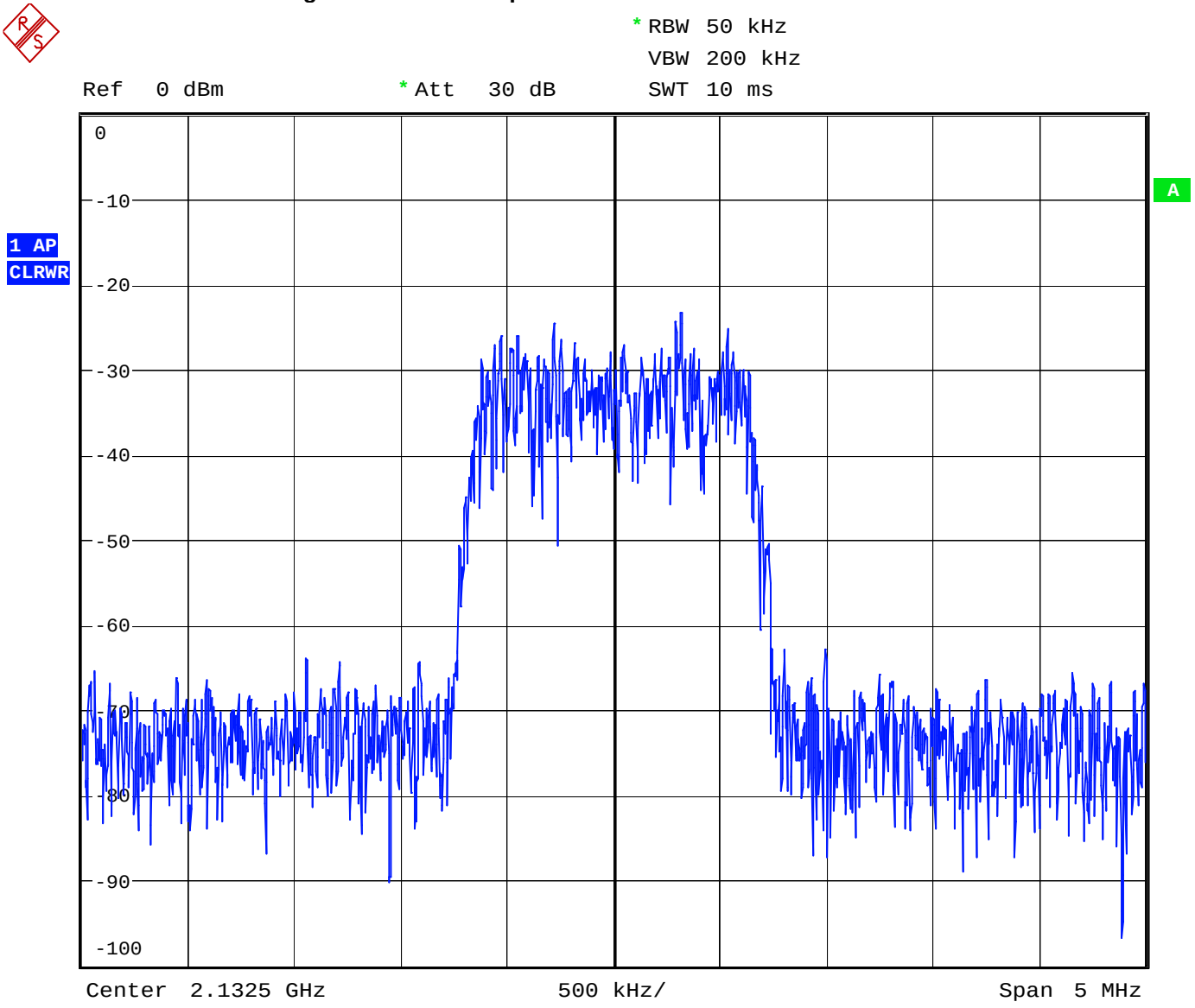
Date: 17.JUL.2007 14:16:30

Figure 9 CDMA Output



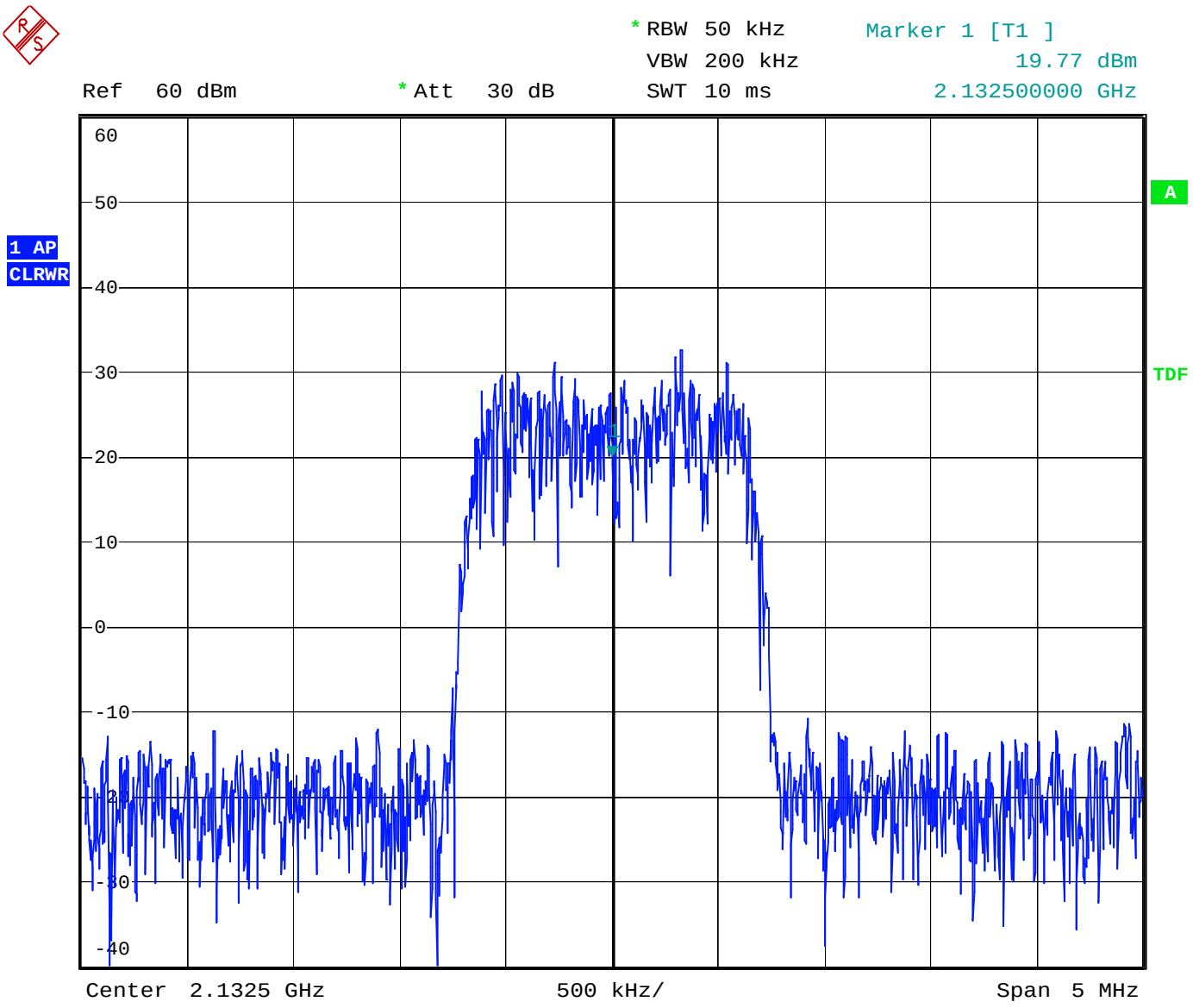
Date: 17.JUL.2007 09:38:10

Figure 10 CDMA Input



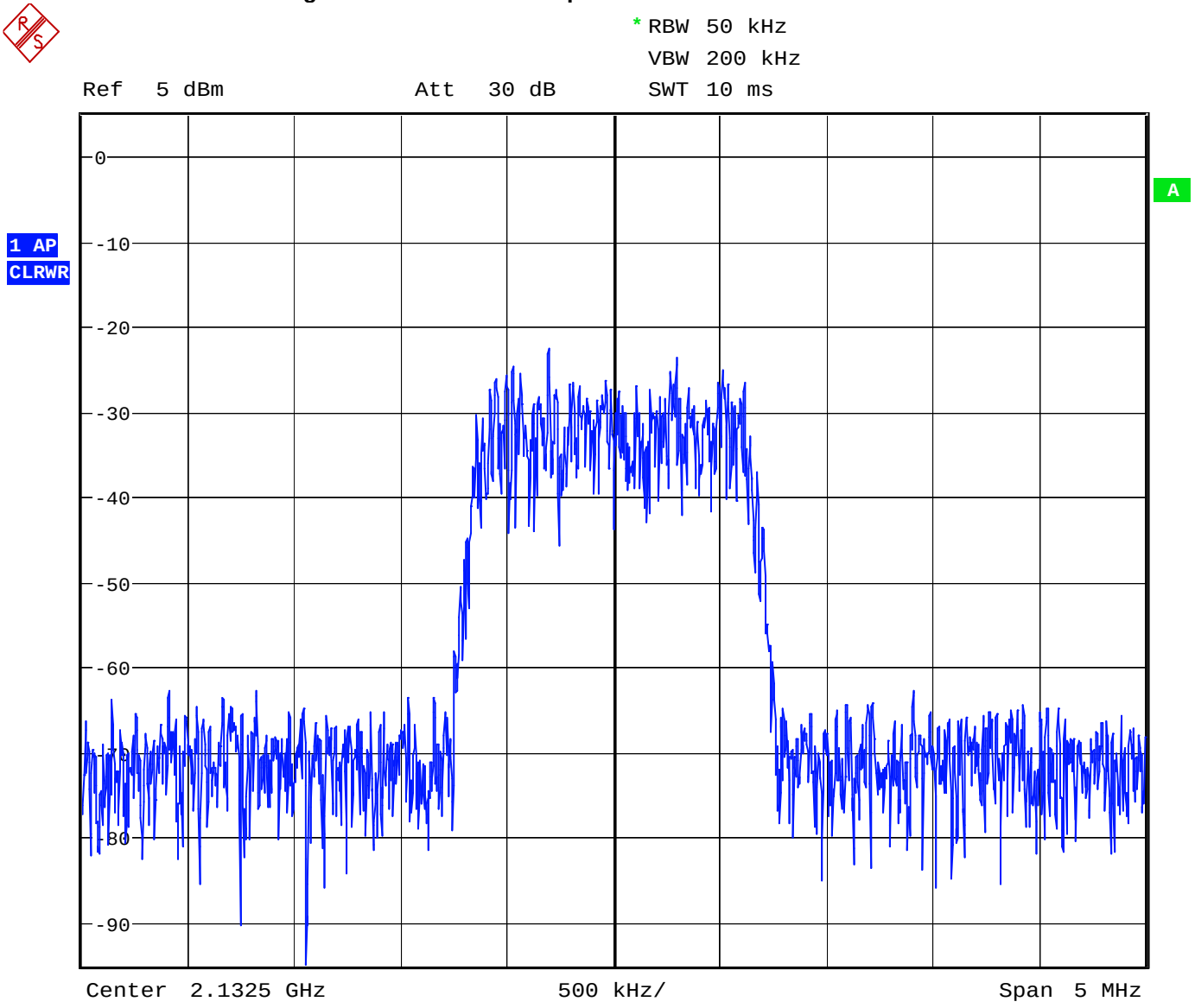
Date: 17.JUL.2007 14:45:35

Figure 11 CDMA 2000 Output



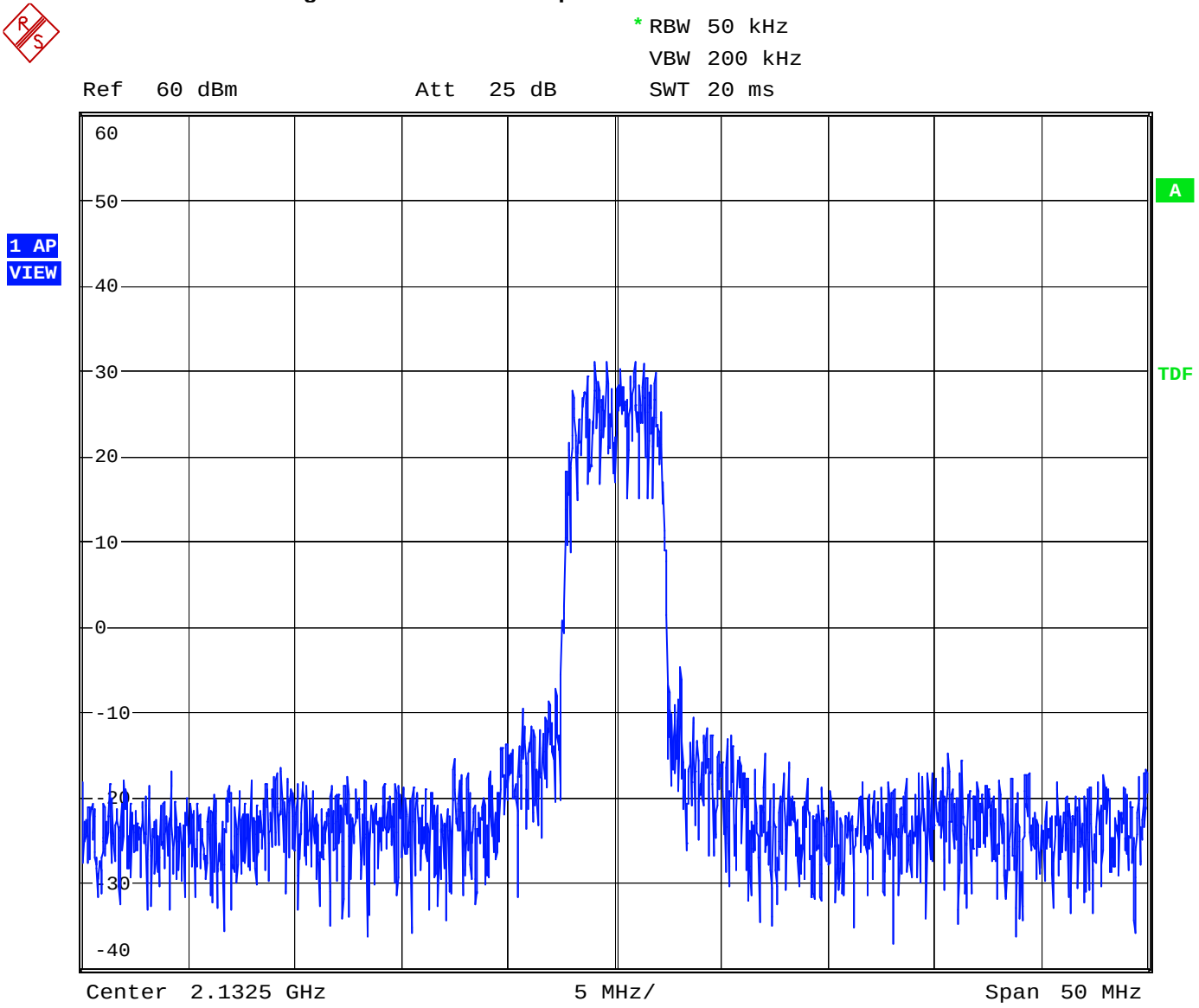
Date: 17.JUL.2007 14:40:40

Figure 12 CDMA 2000 Input



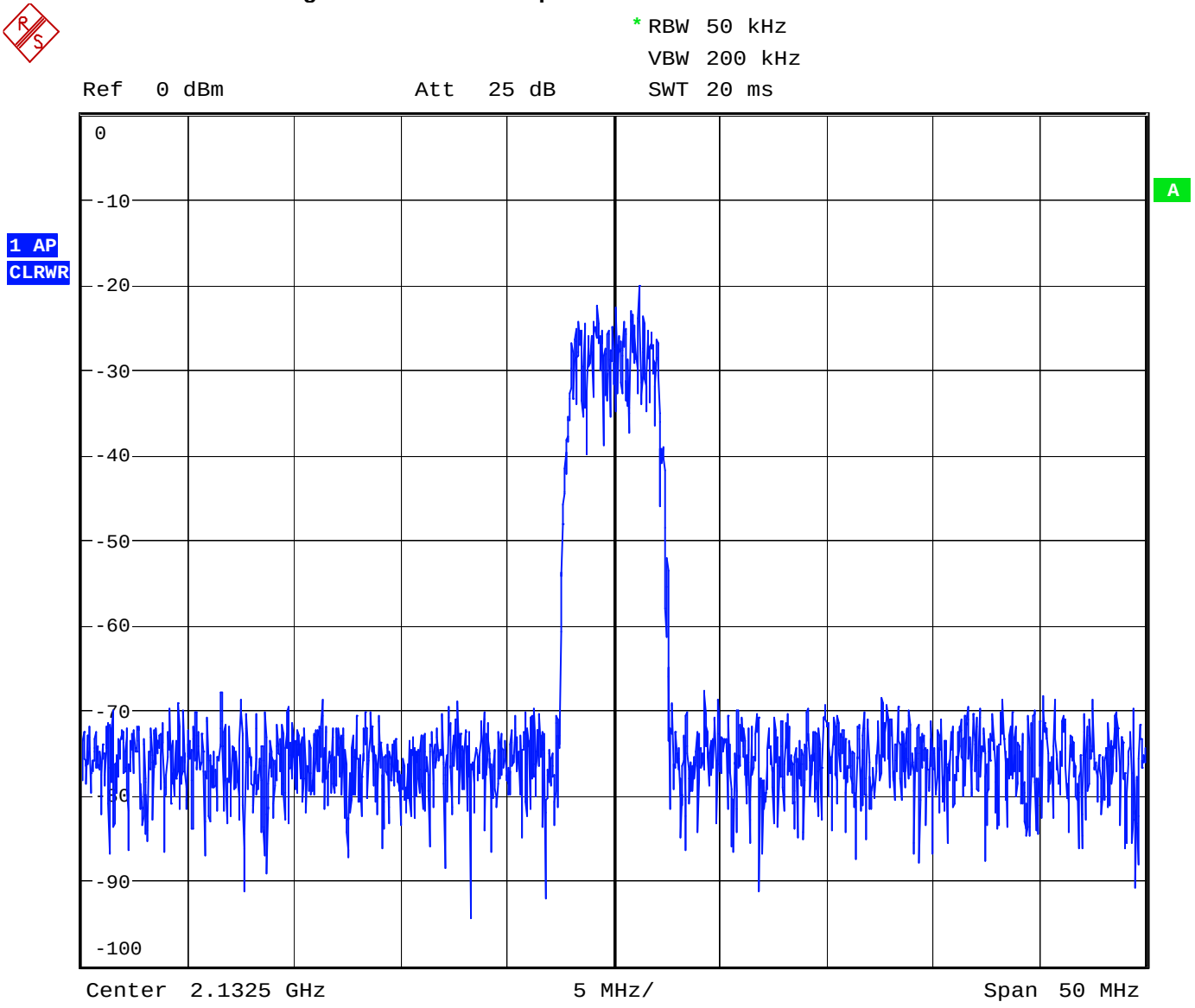
Date: 17.JUL.2007 14:30:59

Figure 13 W-CDMA Output



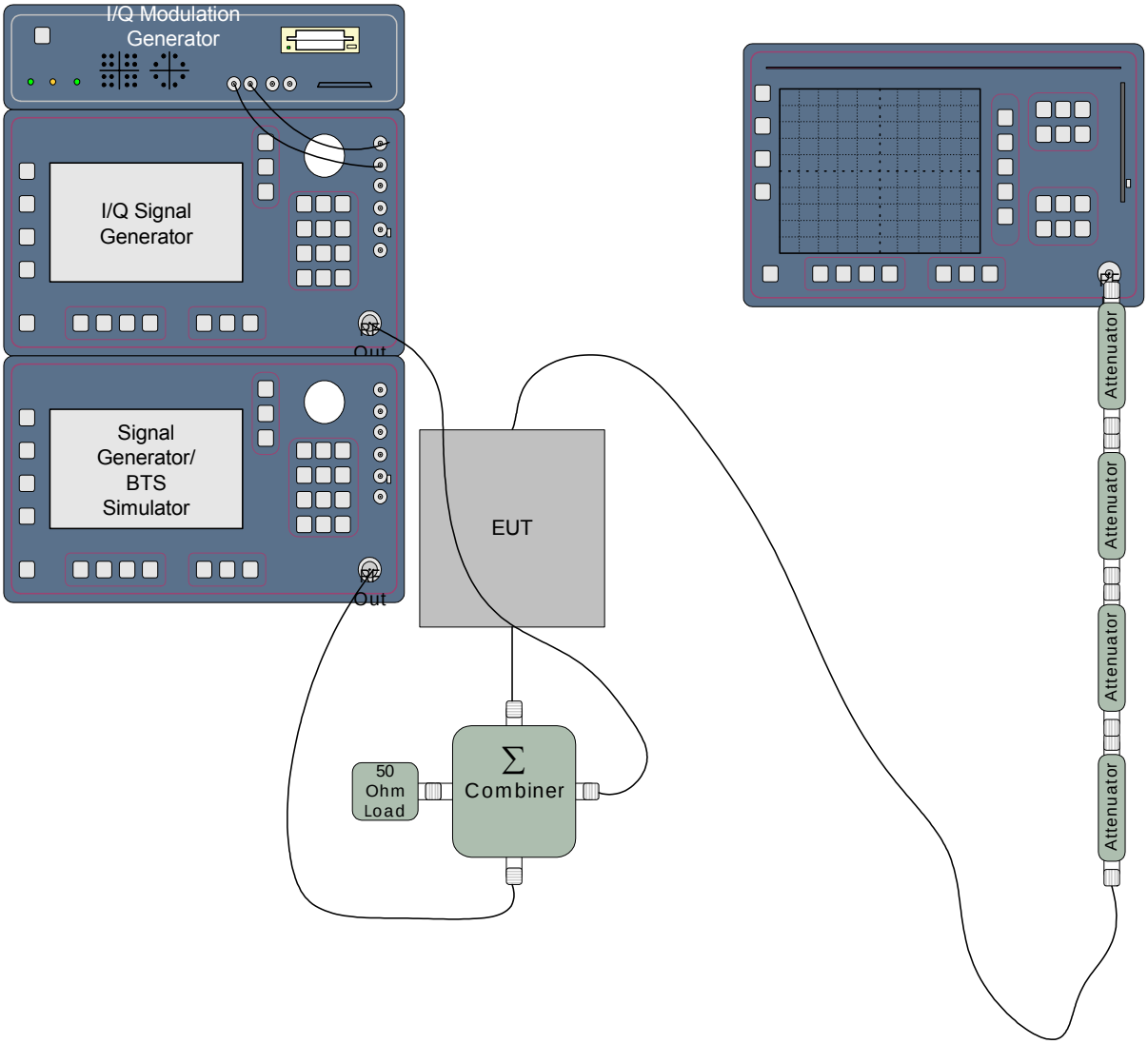
Date: 17.JUL.2007 09:40:13

Figure 14 W-CDMA Input



Date: 17.JUL.2007 14:32:26

C.9. Test Diagram



C.10. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX D: 2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

D.1. Base Standard & Test Basis

Base Standard	FCC 2.1051
Test Basis	FCC 2.1051 Spurious Emissions at Antenna Terminals
Test Method	TIA 603-C, 2004

D.2. Specifications

22.917 Emission limits for Cellular equipment

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

24.238 Emission limitations for Broadband PCS equipment

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

27.53 Emission limits for AWS equipment

(g) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

90.210 Emission masks.

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part,

the table in this section specifies the emission masks for equipment operating in the frequency bands governed under this part.

Applicable Emission Masks		
Frequency (MHz)	Mask for equipment with audio low-pass filter	Mask for equipment without audio low-pass filter
Below 25(1)	A or B	A or C
25 – 50	B	C
72 – 76	B	C
150 – 174(2)	B, D, or E	C, D, or E
150 paging only	B	C
220 – 222	F	F
421 – 512(2)	B, D, or E	C, D, or E
450 paging only	B	G
806 – 809 / 851 - 854	B	H
809 – 824 / 854 – 869(3)	B	G
896 – 901 / 935 – 940	I	J
902 – 928(4)	K	K
929 – 930	B	G
4940 – 4990	L or M	L or M
5850 - 5925(4)	-	-
All other bands	B	C

(1) Equipment using single sideband J3E emission must the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.

(2) Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth Must meet the requirements of Emission Mask E.

(3) Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of § 90.691.

(4) DSRCS Roadside Units equipment in the 5850-5925 MHz band is governed under subpart M of this part.

D.3. Measurement Uncertainty

Expanded Uncertainty (K=2)
+1.11/-1.22

D.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

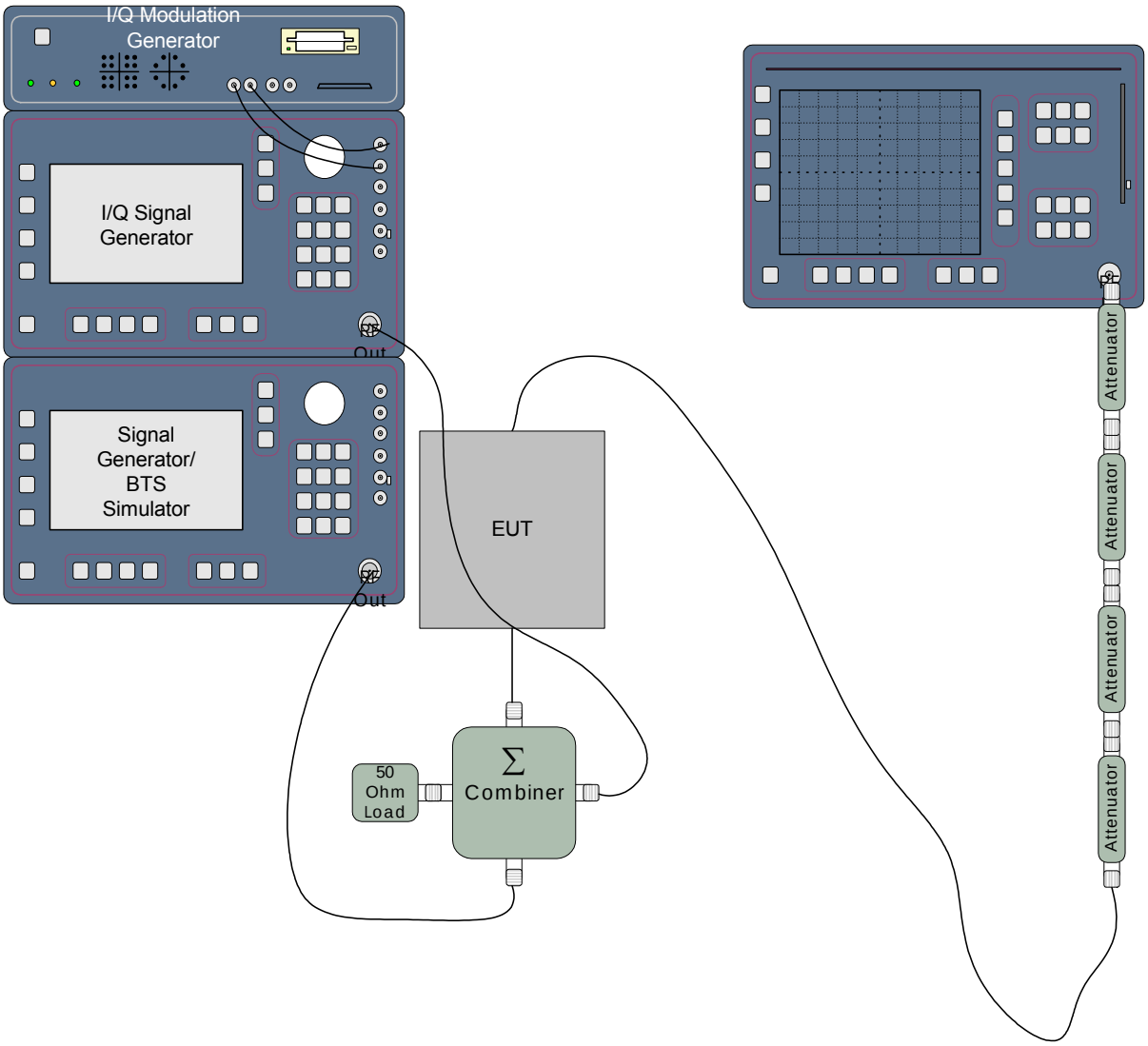
D.5. Test Results

Complies. All emissions meet the out of band limits.

Out-of-Band Emissions limit is 43 + 10 log(P) which relates to -13 dBm absolute power.

Attenuation limit = 43 + 10 log(20) = 56 dB

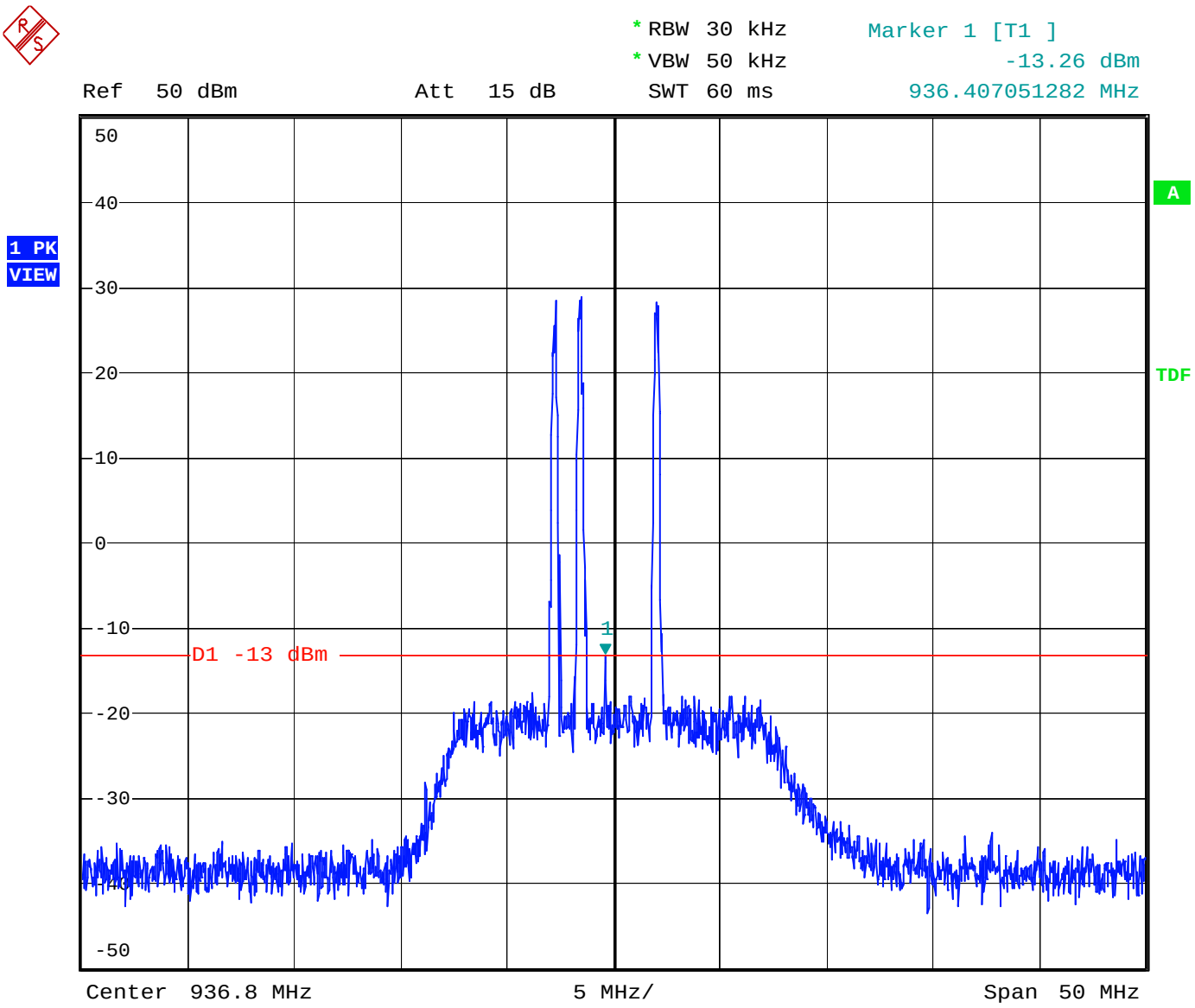
D.6. Test Diagram



D.7. Test Data

See following pages.
Note: All measurements are made at the output of the combiner unit.

Figure 15 **3rd Order Inter-modulation Spurious - Downlink – GSM**



Date: 2.JUL.2007 10:35:53

Figure 16 3rd Order Inter-modulation Spurious - Downlink –EDGE

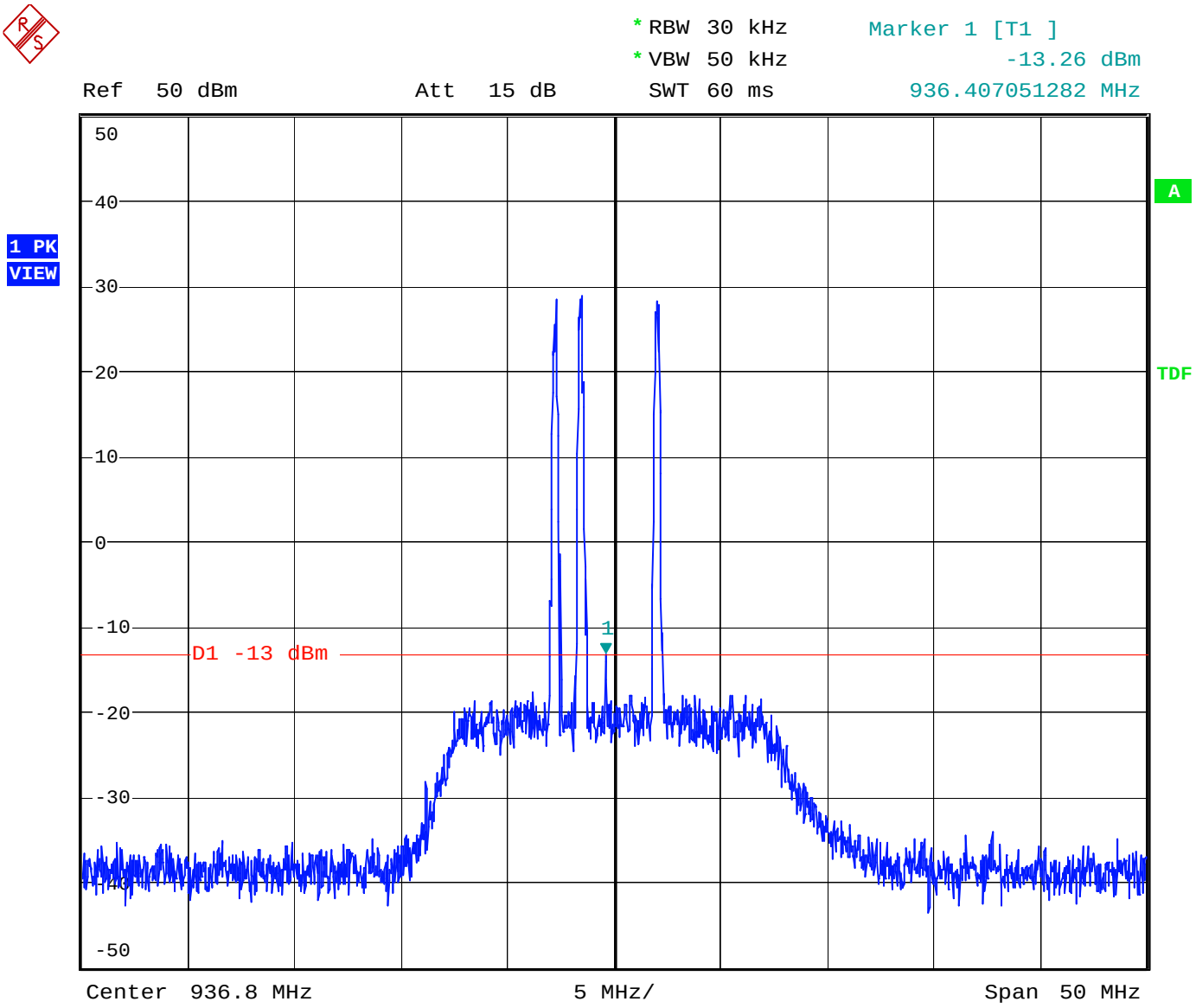
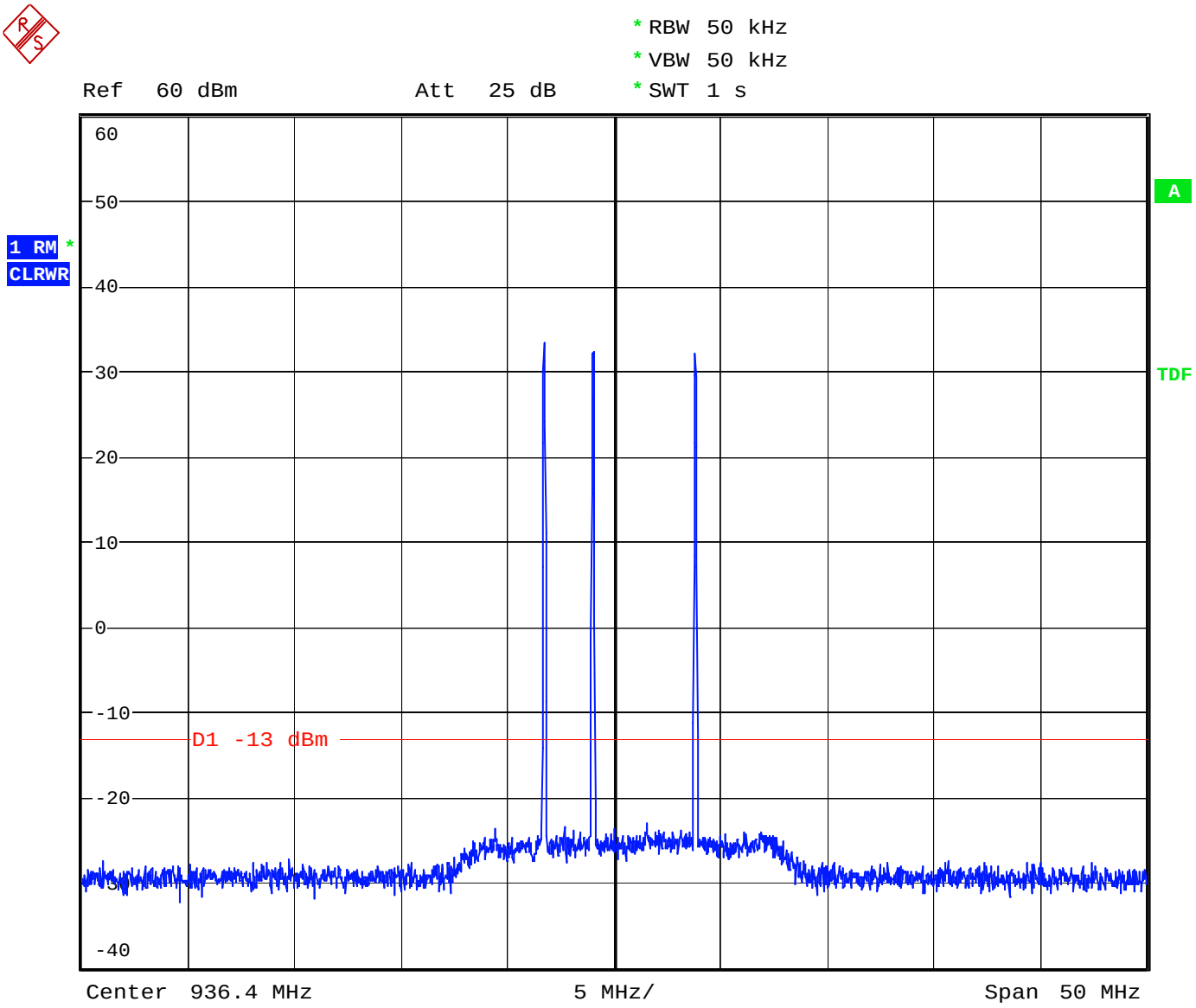
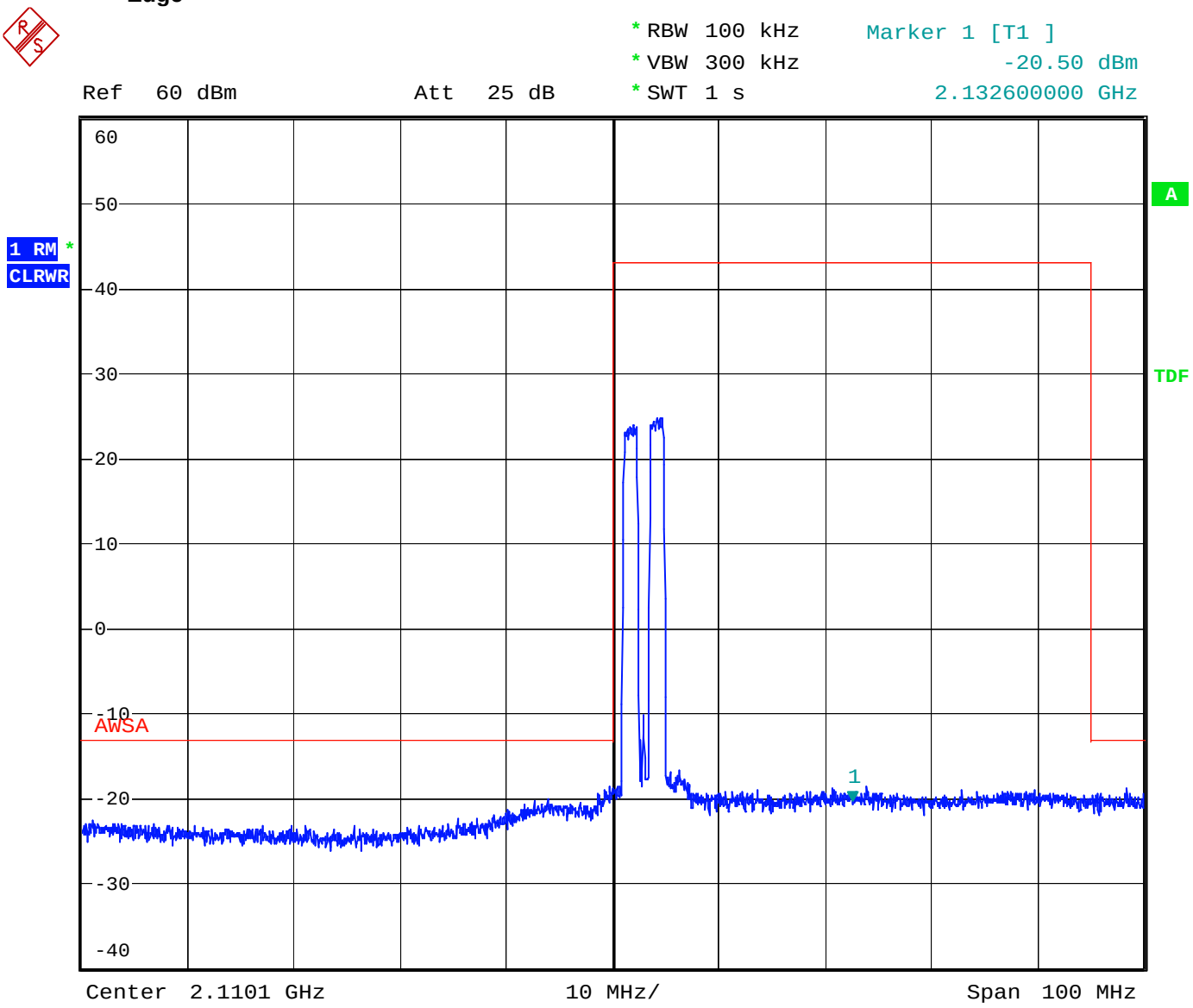


Figure 17 **3rd Order Inter-modulation Spurious - Downlink – Analogue**



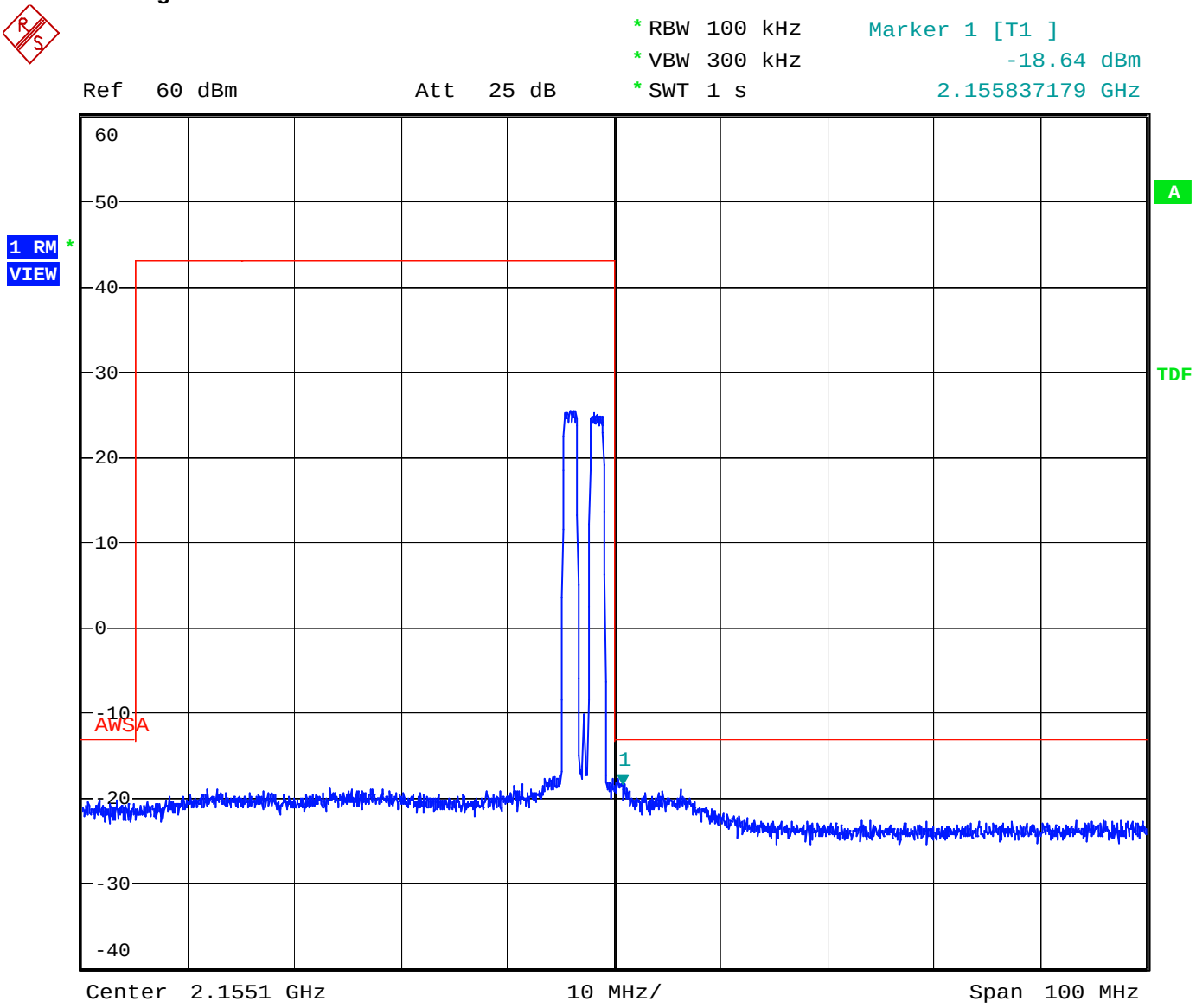
Date: 2.JUL.2007 14:14:21

Figure 18 3rd Order Inter-modulation Spurious - Downlink – IS-95 CDMA Lower Edge



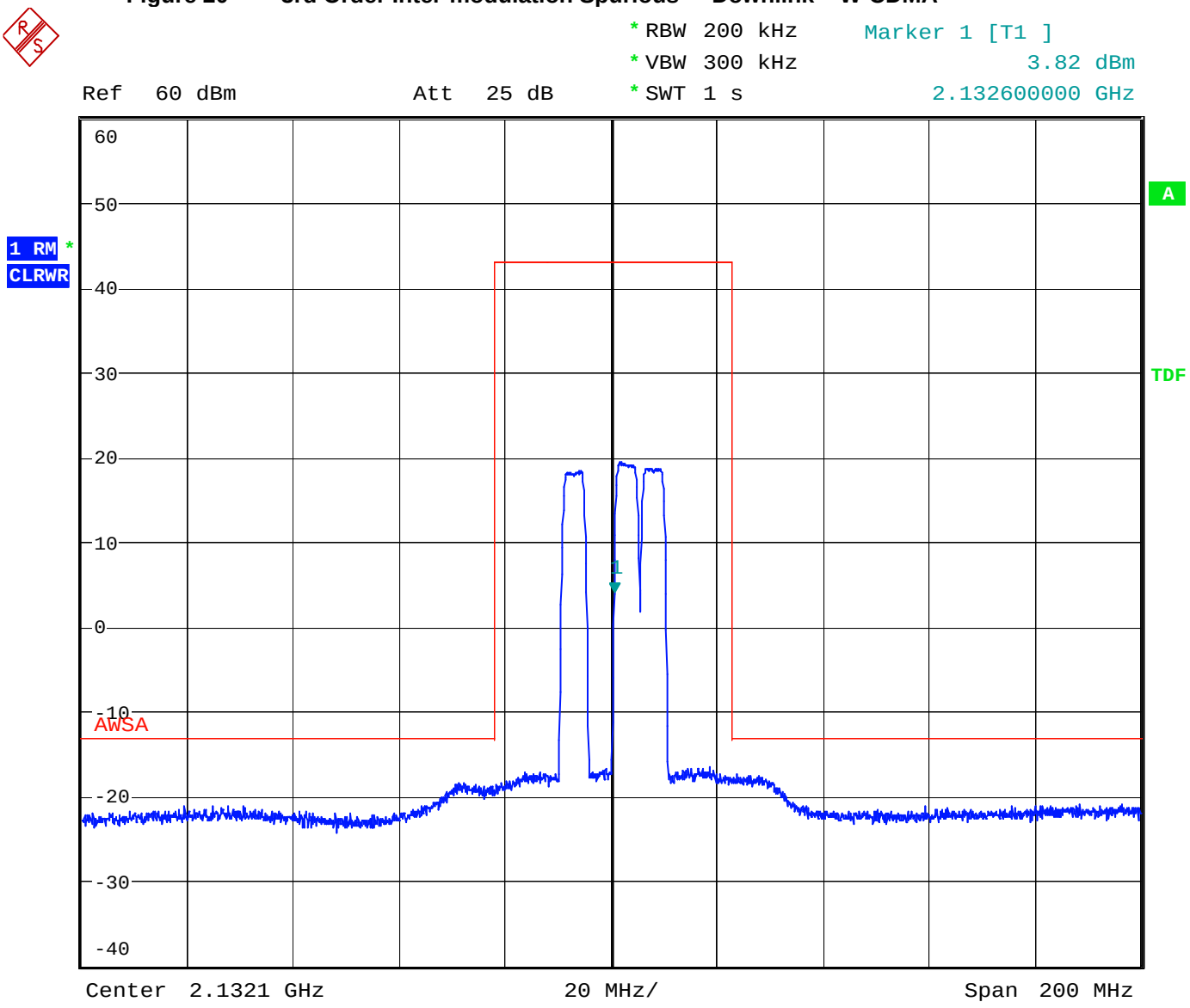
Date: 4.JUL.2007 08:03:57

Figure 19 3rd Order Inter-modulation Spurious - Downlink – IS-95 CDMA Upper Edge



Date: 4.JUL.2007 08:06:15

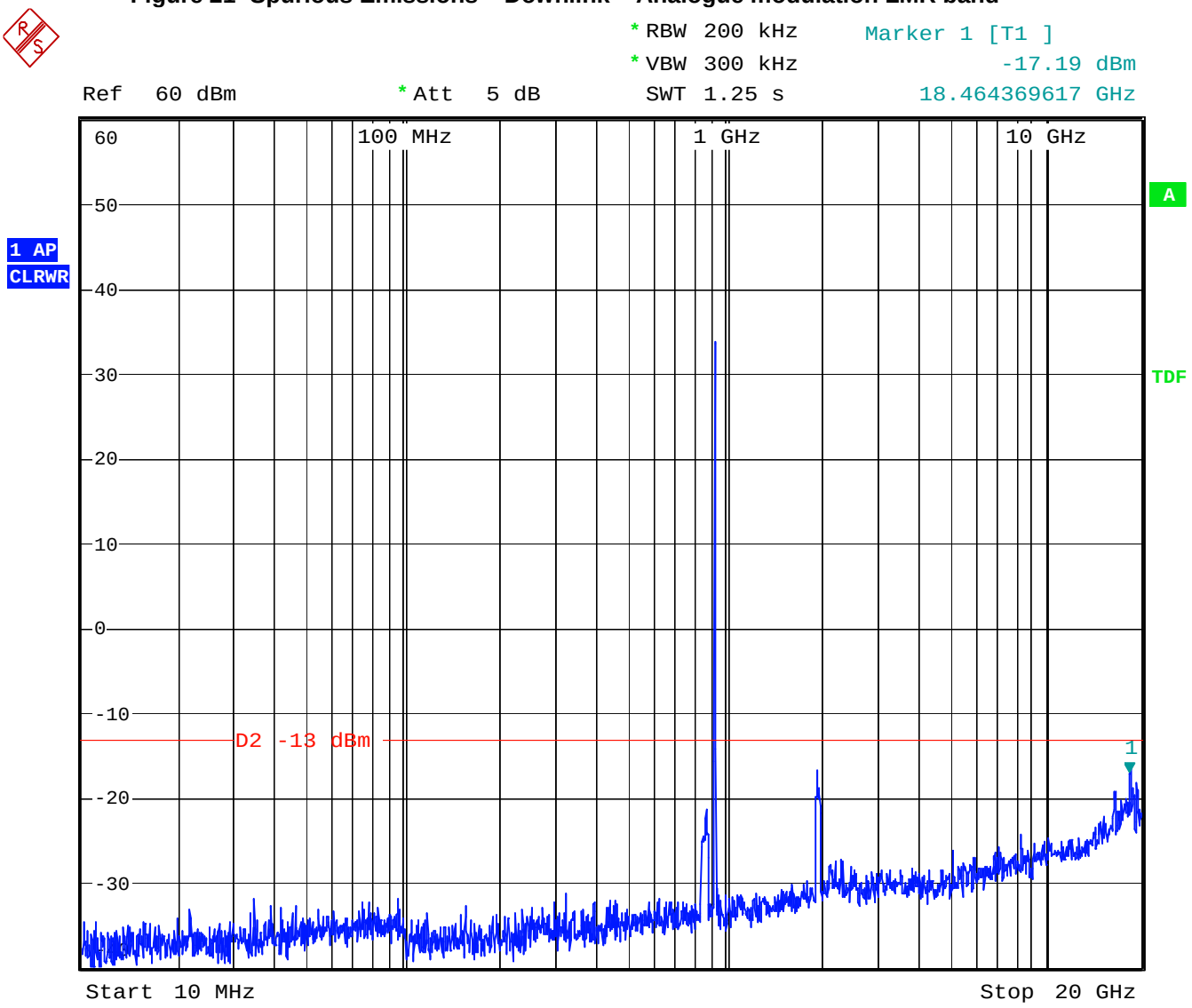
Figure 20 3rd Order Inter-modulation Spurious - Downlink – W-CDMA



Date: 4.JUL.2007 07:38:43

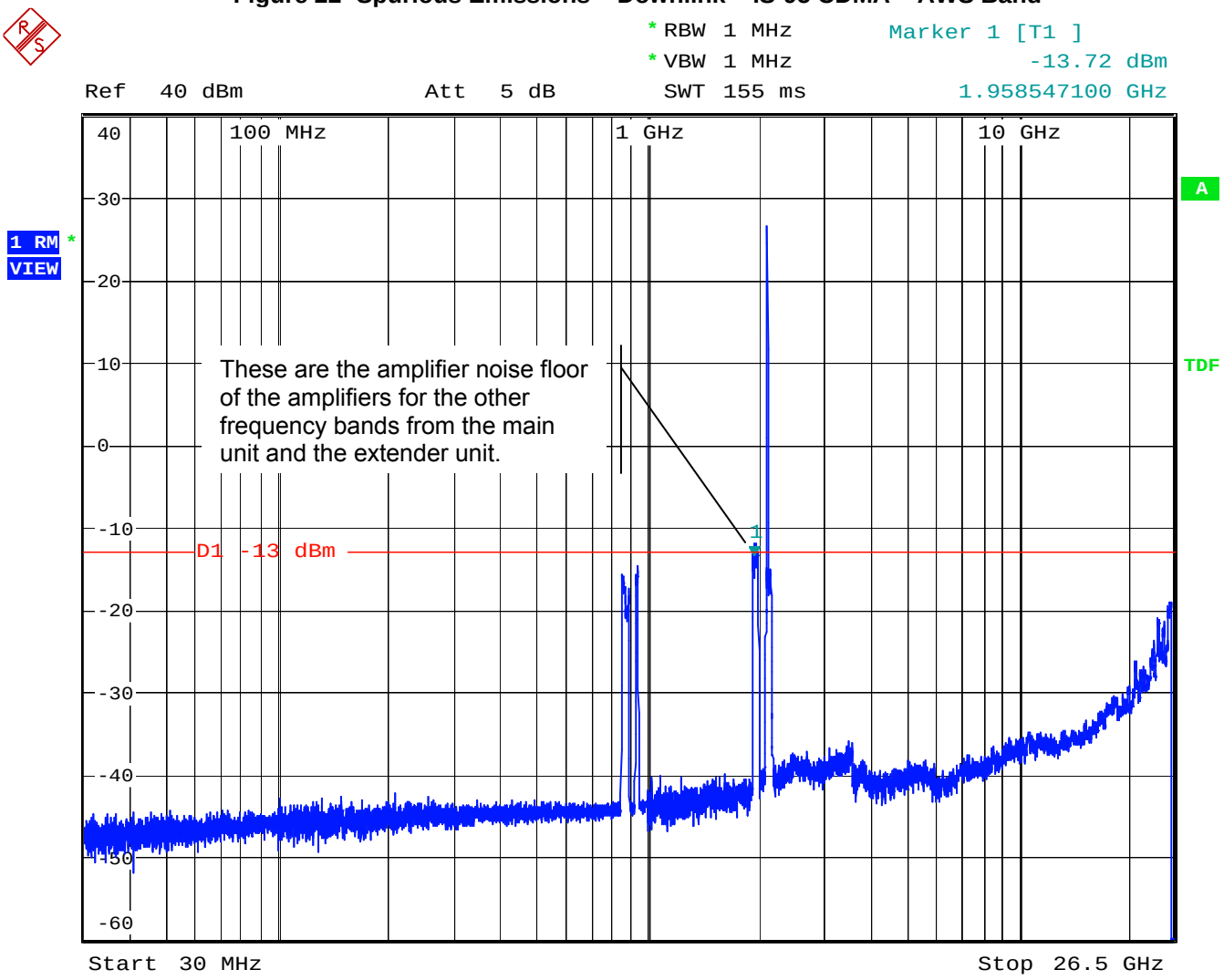
NOTE: Spurious emissions were measured with each modulation at low, mid, and high channels in each band of operation. The worst-case results are presented here.

Figure 21 Spurious Emissions – Downlink – Analogue modulation LMR band



Date: 22.JUN.2007 13:45:58

Figure 22 Spurious Emissions – Downlink – IS-95 CDMA – AWS Band



Date: 14.AUG.2007 15:06:15

D.8. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services
Date: 23 June – 4 July, 2007

APPENDIX E: 2.1053 FIELD STRENGTH OF SPURIOUS RADIATION

E.1. Base Standard & Test Basis

Base Standard	FCC 2.1053
Test Basis	FCC 2.1053 Field Strength of Spurious Radiation
Test Method	TIA 603-C, 2004 Substitution Antenna Method

E.2. Limits

22.917 Emission limits for Cellular equipment

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

24.238 Emission limitations for Broadband PCS equipment

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

27.53 Emission limits for AWS equipment

(g) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(3) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

90.210 Emission masks.

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating in the frequency bands governed under this part.

Applicable Emission Masks

Frequency (MHz)	Mask for equipment with audio low-pass filter	Mask for equipment without audio low-pass filter
Below 25(1)	A or B	A or C
25 – 50	B	C
72 – 76	B	C
150 – 174(2)	B, D, or E	C, D, or E
150 paging only	B	C
220 – 222	F	F
421 – 512(2)	B, D, or E	C, D, or E
450 paging only	B	G
806 – 809 / 851 - 854	B	H
809 – 824 / 854 – 869(3)	B	G
896 – 901 / 935 – 940	I	J
902 – 928(4)	K	K
929 – 930	B	G
4940 – 4990	L or M	L or M
5850 - 5925(4)	-	-
All other bands	B	C

(1) Equipment using single sideband J3E emission must the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.
(2) Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth Must meet the requirements of Emission Mask E.
(3) Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of § 90.691.
(4) DSRCS Roadside Units equipment in the 5850-5925 MHz band is governed under subpart M of this part.

E.3. Test Results

Compliant. The worst-case spurious emission level was -25.7 dBm at 3977.5 MHz. This level is 12.7 dB below the specification limit of -13 dBm. The spectrum was searched up to 22 GHz with the device operating on three channels in the Uplink direction and three channels in the Downlink direction.

E.4. Deviations from Normal Operating Mode During Test

None.

E.5. Sample Calculation

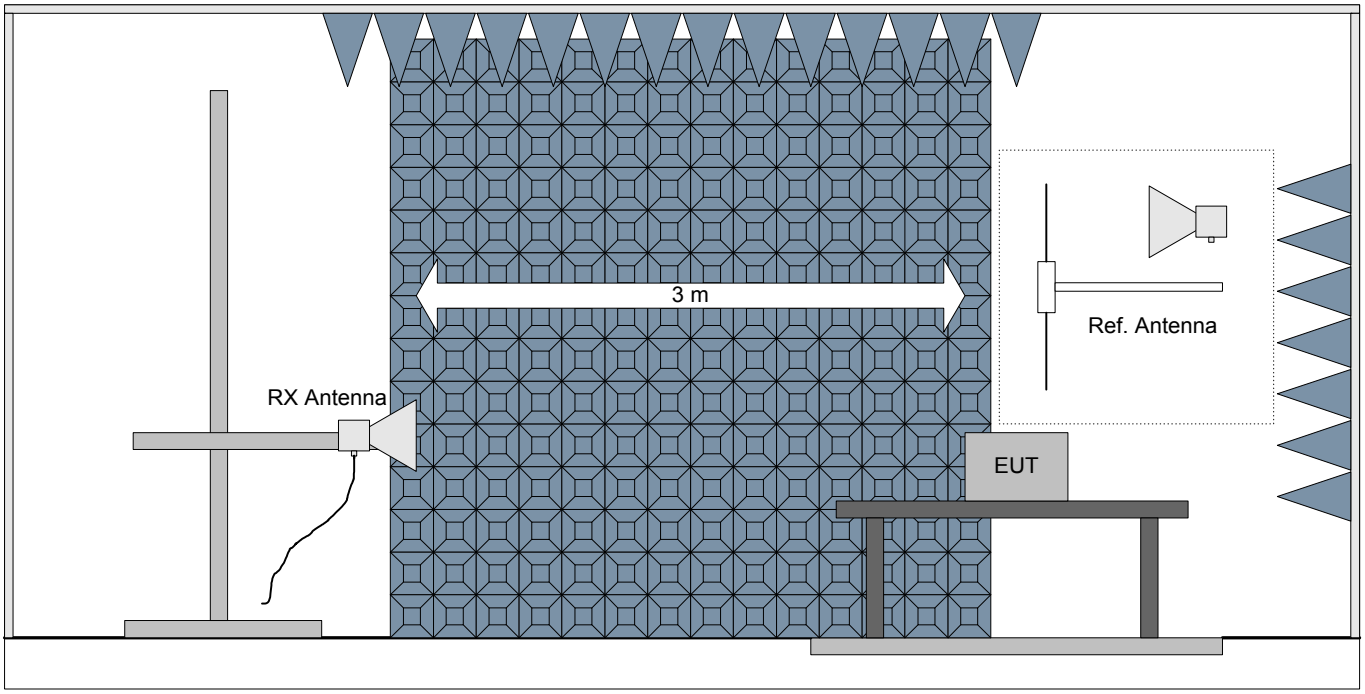
Final measured value (dBm) = Substitution level (dBm) + Antenna Gain (dBi)

Minimum attenuation limit (dB) = 43 + 10 log(P) where P = Peak power of the carrier in watts.

Min. Atten. Limit dB) = 43 + 10 * log(20 watts)
= 43 + 10 * 1.3
= 43 + 13
= 56 dB

43 dBm – 56 dB = -13 dBm

E.6. Test Diagram



Note: The EUT is set to repeat a signal at maximum rf output power into a coaxial load for this testing.

E.7. Test Data

Project No:	W7197	Test Method: EIA 603C	
Model:	ION-M8/9/17/19		
Comments:	The device was tested with three channels (Low, Mid, High) in each of the 5 bands.		
Tested by:	T. Tidwell	Date: 4 July , 2007	

Distance:	3 m	Standard:	CFR 47, Part 2	RBW: 1 MHz	VBW: Peak = RBW

Notes	Polarization	Frequency	Measured	Substitution Level	Substitution Antenna Gain	Final Measured Value		Peak Carrier Power		Limit	Margin
	(V/H)	(MHz)	(dBm)	(dBm)	(dBd)	(dBm)	(watts)	(dBm)	(watts)	(dBc)	(dB)
	H	3920	-102.5	-38.3	5.6	-32.7	5.37E-07	43	20	56.0	19.7
	V	3920	-102.5	-38.3	5.6	-32.7	5.37E-07	43	20	56.0	19.7
	H	1762	-100.2	-36.2	4.7	-31.5	7.08E-07	43	20	56.0	18.5
	V	1762	-100.2	-36.2	4.7	-31.5	7.08E-07	43	20	56.0	18.5
	H	1744	-100.6	-36.5	4.5	-32	6.31E-07	43	20	56.0	19.0
	V	1744	-100.6	-36.5	4.5	-32	6.31E-07	43	20	56.0	19.0
	H	1876	-100.2	-36.4	4.7	-31.7	6.76E-07	43	20	56.0	18.7
	V	1876	-100.2	-36.4	4.7	-31.7	6.76E-07	43	20	56.0	18.7
	H	4224	-105.4	-41.4	6.1	-35.3	2.95E-07	43	20	56.0	22.3
	V	4224	-105.4	-41.4	6.1	-35.3	2.95E-07	43	20	56.0	22.3
	H	10560	-104.5	-40.5	9.1	-31.4	7.24E-07	43	20	56.0	18.4
	V	10560	-104.5	-40.5	9.1	-31.4	7.24E-07	43	20	56.0	18.4
	H	5628	-105.8	-41.8	7.3	-34.5	3.55E-07	43	20	56.0	21.5
	V	5628	-105.8	-41.8	7.3	-34.5	3.55E-07	43	20	56.0	21.5
	H	21120	-98	-37	11.3	-25.7	2.69E-06	43	20	56.0	12.7
	V	21120	-98	-37	11.3	-25.7	2.69E-06	43	20	56.0	12.7

Notes: *(1) A positive margin indicates a passing result*
(2) If duty cycle correction is indicated, plots are included in the test report to validate the factor used.

NOTE: Measurements were made with the device operating in the following modes:
Maximum rf power output on low, mid, and high channels in the 935 – 940 MHz and 2110 – 2155 MHz bands. A CW signal was used in each case.

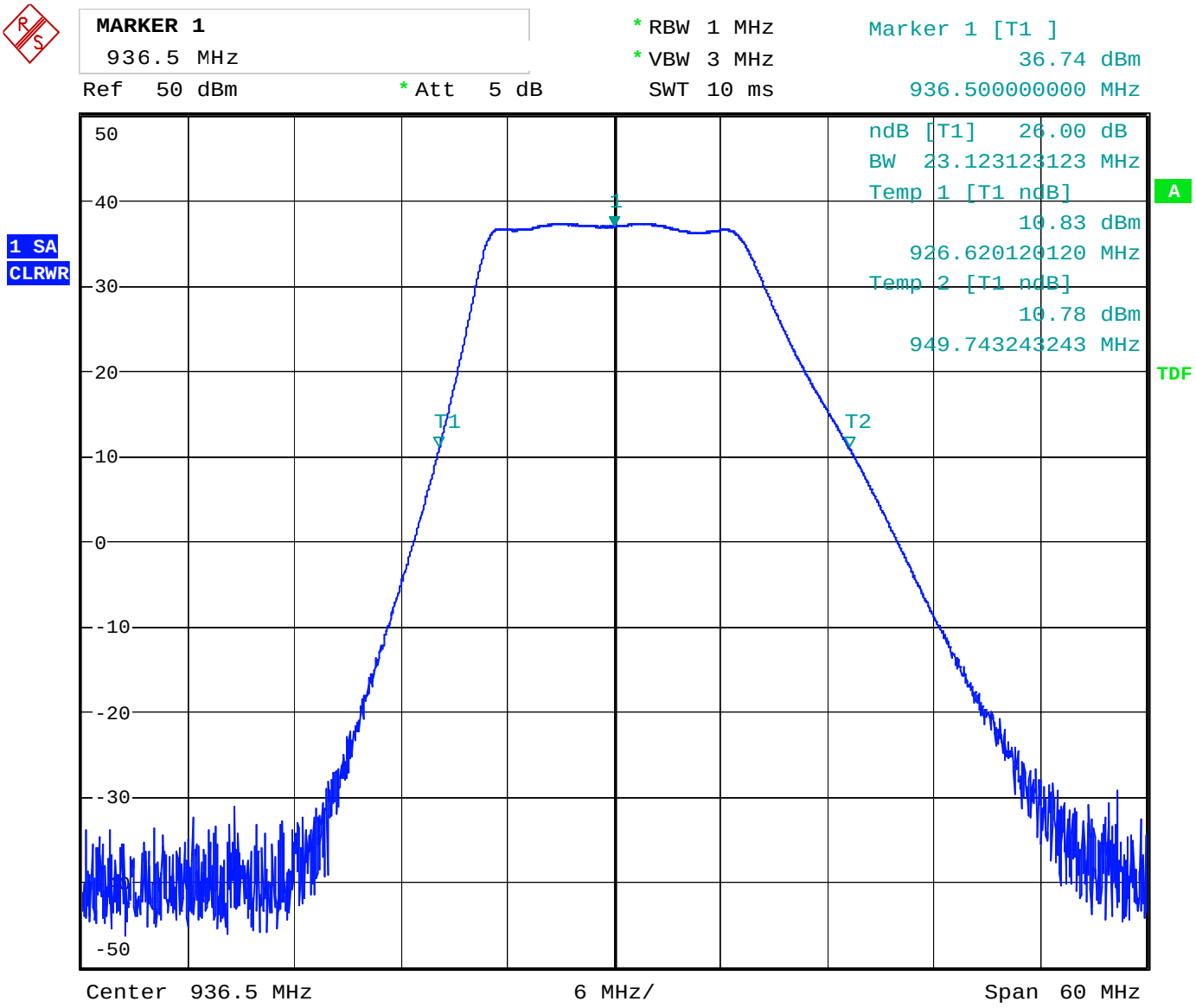
E.8. Test Photo

E.9. Tested By

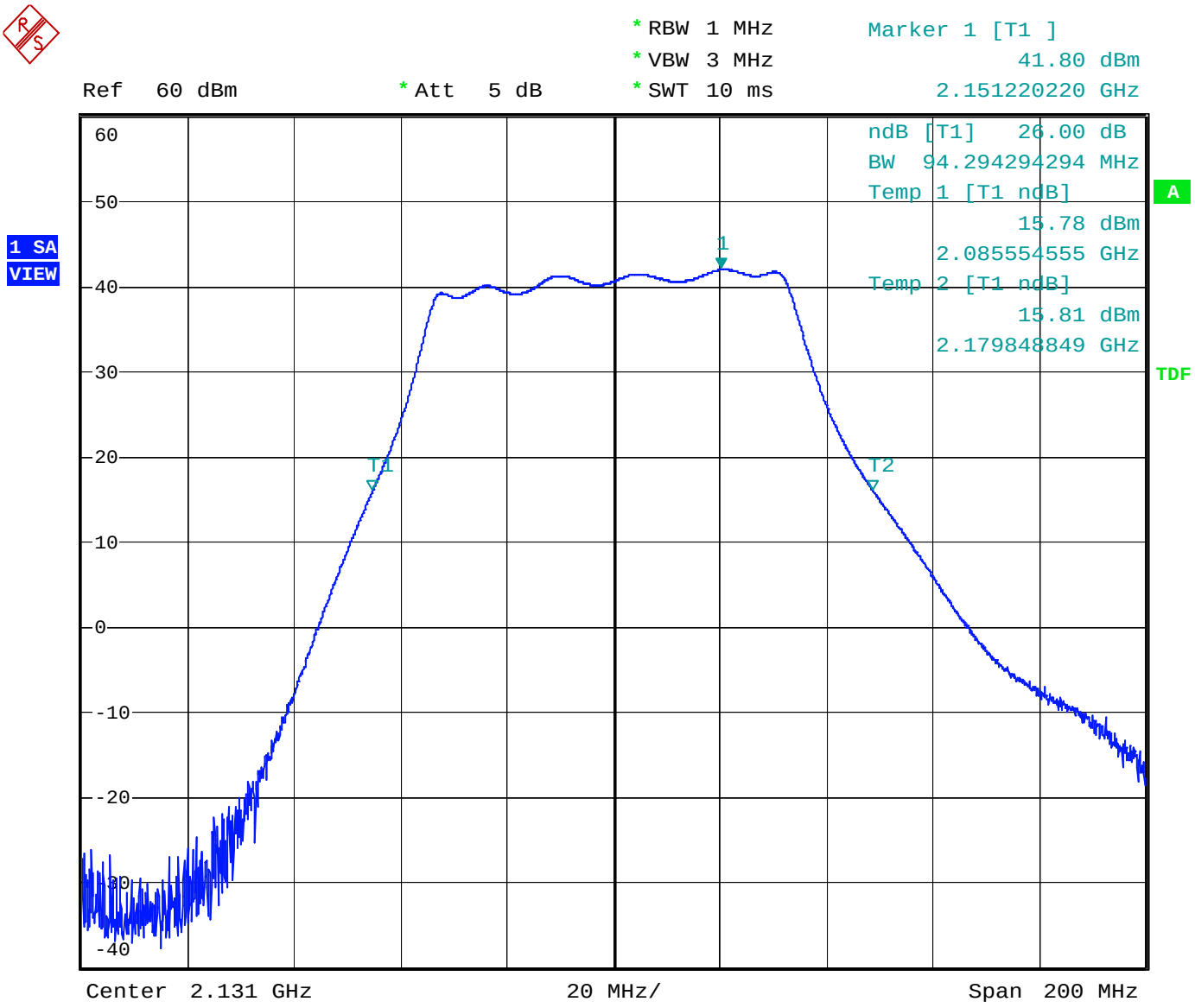
Name: Tom Tidwell,
Function: Manager of Wireless Services
Date: 7/4/2007

APPENDIX F: 2.1053 FILTER PLOTS

These plots demonstrate the filter band pass characteristics of the device.



Date: 21.JUN.2007 16:15:03



Date: 25.JUN.2007 10:00:36

APPENDIX G: 2.1055 FREQUENCY STABILITY

G.1. Base Standard & Test Basis

Base Standard	FCC 2.1055
Test Method	TIA 603-C, 2004

Specifications

22.355 Frequency stability limits for cellular equipment

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C–1 of this section.

Frequency range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile < 3 watts (ppm)
25 to 50.....	20.0	20.0	50.0
50 to 450.....	5.0	5.0	50.0
450 to 512.....	2.5	5.0	5.0
821 to 896.....	1.5	2.5	2.5
928 to 929.....	5.0	n/a	n/a
929 to 960.....	1.5	n/a	n/a
2110 to 2220.....	10.0	n/a	n/a

24.235 Frequency Stability

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

24.235 Frequency Stability

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

27.54 Frequency Stability

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

90.213 Frequency stability.

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Minimum Frequency Stability (parts per million)			
Frequency (MHz)			
Below 25[(2)]			
25 – 50			
72 – 76			

150 – 174			
216 – 220[5]			
220 – 222			
406 – 512[2]			
806 – 809 / 851 - 854			
809 – 824 / 854 – 869			
896 – 901 / 935 – 940			
902 – 928[4]			
929 – 930			
1427 – 1432[5]			
2450 – 2483.52[2]			
Above 2500[2]			

(1) Fixed and base stations with over 200 watts transmitter power must have a frequency stability of 50 ppm except for equipment used in the Public Safety Pool where the frequency stability is 100 ppm.
(2) For single sideband operations below 25 MHz, the carrier frequency must be maintained within 50 Hz of the authorized carrier frequency.
(3) Travelers information station transmitters operating from 530-1700 kHz and transmitters exceeding 200 watts peak envelope power used for disaster communications and long distance circuit operations pursuant to §§ 90.242 and 90.264 must maintain the carrier frequency to within 20 Hz of the authorized frequency.
(4) Stations operating in the 154.45 to 154.49 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm.
(5) In the 150-174 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.
(6) In the 150-174 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth or designed to operate on a frequency specifically designated for itinerant use or designed for low-power operation of two watts or less, must have a frequency stability of 5.0 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 2.0 ppm.
(7) In the 421-512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.
(8) In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.
(9) Fixed stations with output powers above 120 watts and necessary bandwidth less than 3 kHz must operate with a frequency stability of 100 ppm. Fixed stations with output powers less than 120 watts and using time-division multiplex, must operate with a frequency stability of 500 ppm.
(10) Except for DSRCS equipment in the 5850-5925 MHz band, frequency stability is to be specified in the station authorization. Frequency stability for DSRCS equipment in the 5850-5925 MHz band is specified in subpart M of this part.
(11) Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.
(12) Mobile units may utilize synchronizing signals from associated base stations to achieve the specified carrier stability.
(13) Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge, intermittently operated hand-held readers, and mobile transponders are not subject to frequency tolerance restrictions.
(14) Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

G.2. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

G.3. Test Results

Not Applicable. This device uses a common oscillator to down-convert and up-convert the modulated rf carrier so that the output frequency tracks the input frequency. This was determined by inspection of the schematics provided by the client.

G.4. Observations

None

G.5. Deviations from Normal Operating Mode During Test

None.

G.6. Sample Calculation

Frequency drift (ppm) = Frequency Drift (Hz)/Authorized frequency (MHz)

G.7. Test Data

None

G.8. Test Diagram

None

G.9. Tested By

.

Name:	Tom Tidwell,
Function:	Manager of Wireless Services

APPENDIX H: TEST EQUIPMENT LIST

H.1. Field Strength of Spurious Emissions 30 MHz – 26.5 GHz Measurement Equipment

Description	Manufacturer	Type/Model	Calibration Frequency	Cal Due	NTS Control No.
3m ANECHOIC CHAMBER					
RX Bilog Antenna	ETS	3142C	12 Months	8/17/07	E1288P
Ref. Horn Antenna	ETS	3115	12 Months	11/1/07	E1019P
RX Horn Antenna	ETS	3115	12 Months	-	E1022P
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/07	W1010P
Tunable Notch Filter	K&L Microwave	3TNF-1000/2000-N/N	N/A*	N/A*	S/N 614
Reference Antenna	ETS	3121 Dipole Set	12 months	8/8/07	S/N. 274
CONTROL ROOM					
Test Receiver	Rohde & Schwarz	FSQ 26	12 Months	9/21/07	W1020P
High Frequency - Cable 2	MegaPhase	NA	12 Months	8/23/07	W1011P
Amplifier	HP	8449B	12 Months	5/4/07	E1010P

H.2. Antenna Conducted Emissions Measurement Equipment

Instrument	Manufacturer	Model	Calibration Frequency	Calibration Due
ANTENNA CONDUCTED EMISSIONS				
Spectrum Analyzer	Rohde & Schwarz	FSQ 26	12 Months	9/21/07
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/07
10 dB attenuator	Weinschel	10DB50W	12 Months	8/23/07
10 dB attenuator	Wiltron	43KC-10	12 Months	8/23/07
20 dB attenuator	Inmet	36AH-20	12 Months	8/23/07
3 dB attenuator	Inmet	36AH-3	12 Months	8/23/07
3 dB attenuator	Inmet	36AH-3	12 Months	8/23/07
50 ohm loads	Amphenol	50R	12 Months	8/28/07
I/Q Signal Generator	Rohde & Schwarz	SMIQ 03	12 Months	8/25/07
I/Q Modulation Generator	Rohde & Schwarz	AMIQ	12 Months	8/28/07
Combiner	Mini-Circuits	ZFSC-2-2500	N/A	N/A*
IS-95 CDMA BTS simulator	Rohde & Schwarz	CMD80	N/A	N/A*

* This device was not used for calibrated measurements.

END OF DOCUMENT