LTA
Laboratory for Test & Approval Co.,Ltd.

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Kisantelecom

Dates of Tests: March 2~7, 2011
Test Report S/N: LR500111103A
Test Site : LTA CO., LTD.

FCC ID **T7MSTR250D01C**

APPLICANT **Kisan Telecom Co., Ltd.**

TEST REPORT

FCC Part 22(H)/Part 24(E) Certification

Classification	:	**PCS Licensed Transmitter**
Manufacturing Description	:	**Dual Optical DAS Repeater**
Manufacturer	:	**Kisan Telecom Co., Ltd.**
Model name	:	**STR250D01C**
Test Device Serial No.:	:	**Identification**
FCC Rule Part(s)	:	**§22(H), §24(E), §2**
Downlink	:	**869~894MHz (CDMA 850)**
	:	**1930~1990MHz (PCS 1900)**
Uplink	:	**N/A (Optical)**
Rated RF Output Power	:	**10W (40dBm)**
Type Modulation	:	**CDMA / PCS CDMA**
Emission Designators:	:	**F9W**
Data of issue	:	**March 7, 2011**

This test report is issued under the authority of:

Hyun-Chae You, Manager

The test was supervised by:

Il-Shin kim, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NVLAP
NVLAP LAB CODE 200723-0

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1. General information's

1-1 Test Performed

Company name : LTA Co., Ltd.

Address : 243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822

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Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2011-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2011-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2011-04-22	FCC filing
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration
IC	CANADA	IC5799	2012-05-14	IC filing

2. Information's about test item

2-1 Client & Manufacturer

Company name	:	Kisan Telecom Co., Ltd.
Address	:	2F, Segi Bldg., 66-2 Bangyi-Dong Songpa-Gu, Seoul, 138-828, Korea
Telephone	:	+82 2-3433-8341

2-3 Equipment Under Test (EUT)

Classification	:	PCS Licensed Transmitter
Trade name	:	Optical DAS Repeater
Model name	:	STR250D01C
Serial number	:	Identification
Date of receipt	:	March 2, 2011
EUT condition	:	Pre-production, not damaged
Downlink	:	869~894MHz (CDMA 850)
		1930~1990MHz (PCS 1900)
Uplink	:	N/A (Optical)
Max gain	:	50dB
Frequency Tolerance	:	±0.2 ppm
Emission Designators	:	F9W
Power Input	:	120Vac

2-3 The dc voltages applied to and dc currents

Module name		The current consumption of each module (mA)							
		29	Vdc	9	Vdc	6.5	Vdc	5.5	Vdc
1	HPA 16W	2900							
2	SOU					500			
3	FSK MODEM			110					
4	RRBS / RRCHS					1500		1200	
5	RFBS / RFCHS					1500		1200	
6	NMS B'D			700					
	-								
Supply current for each voltage (A)		5.8		0.81		6.5		4.8	

2-4 Tested frequency

Mode	TX (MHz)
CDMA 850	869.88
	881.52
	893.31
PCS 1900	1931.25
	1960.00
	1987.50

2.5 Mode of Operation

The EUT was powered by 120VAC. The EUT was configured for maximum gain, 50dB. Repeater simulators were used to provide the input signals to the EUT. Tests were performed with CDMA modulations. The input power was the maximum declared by the manufacturer.

3. Test Report

3.1 Summary of tests

Parameter	**Status**
Transmitter Requirements	
RF Power Output	C
Occupied Bandwidth, Input/Output Comparison	C
Out-of-Band Emissions at antenna terminal	C
Intermodulation Test	C
Transmitter Spurious Radiation	C
Out of Band Rejection	-
Frequency Stability	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are to be tested to the ANSI/TIA-603-C-2004 standard

3.2 Results Of Tests

3.2.1 RF Power Output

1. Test Procedure

The EUT RF output was connected to Powermeter. The EUT was setup to transmit continuously with maximum power. A spectrum analyzer was setup to measure peak power. Measurements were performed at three frequencies (low, middle, and high channels) with all modulations.

2. Test Results

Modulation : CDMA 850

	Freq. Tuned (MHz)	Power Input (dBm)	Power output (dBm)	Power Output (W)
Low	870.51	-10.21	39.91	9.79
Middle	881.52	-10.25	39.93	9.84
High	893.31	-10.15	39.87	9.71

Modulation : PCS 1900

	Freq. Tuned (MHz)	Power Input (dBm)	Power output (dBm)	Power Output (W)
Low	1931.25	-10.15	39.95	9.89
Middle	1960.00	-10.21	39.87	9.71
High	1987.05	-10.19	39.81	9.57

3.2.2 Occupied Bandwidth, Input/Output Comparison

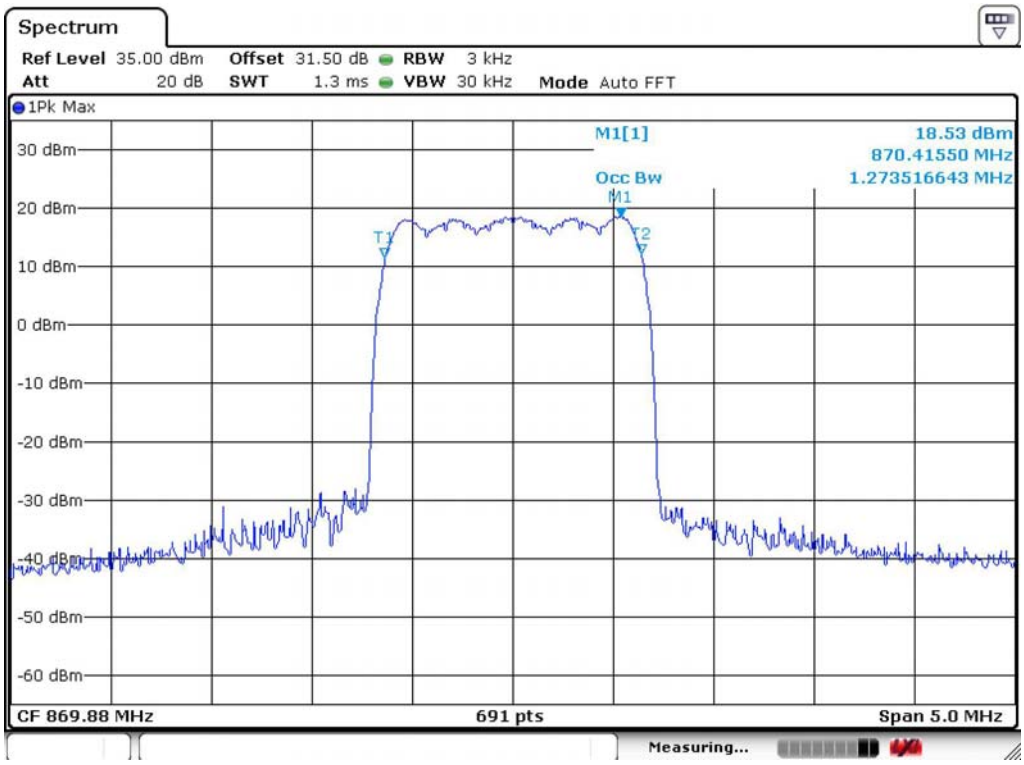
1. Test Procedure

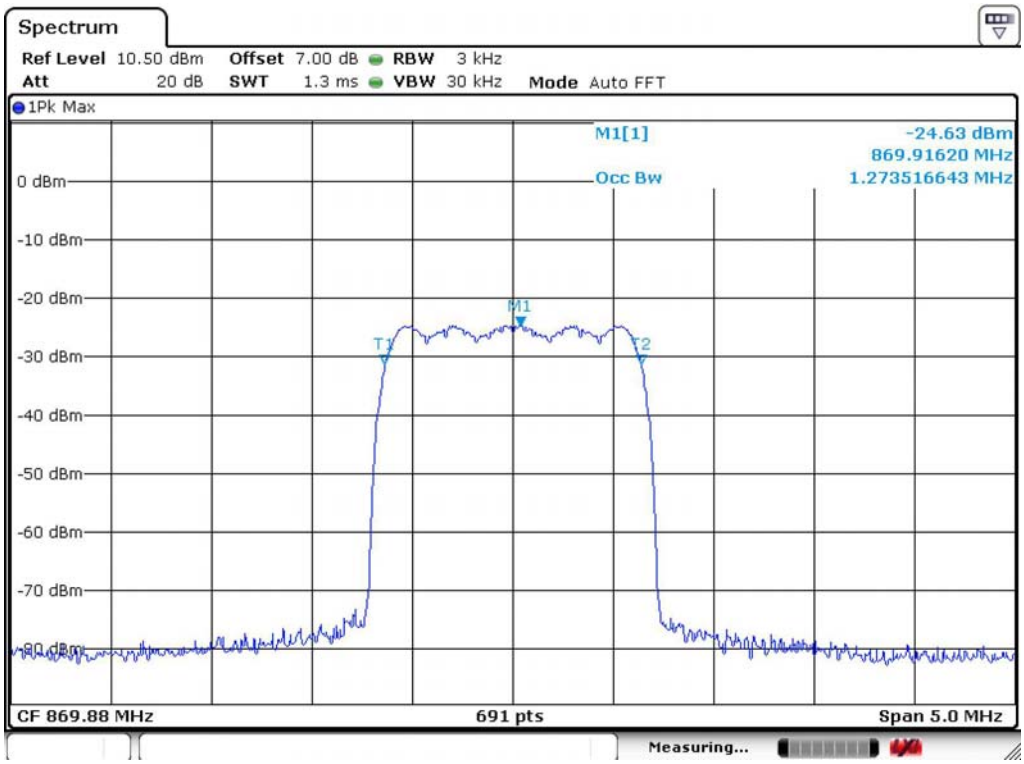
The EUT RF ports were connected to Spectrum analyzer. The EUT was setup to transmit maximum power. The spectrum analyzer was setup to measure the Occupied Bandwidth (defined as the 99% Power Bandwidth). The Occupied Bandwidth was measured at the input and output ports of the EUT at the middle channels for each type of modulation

2. Test Results : Complies

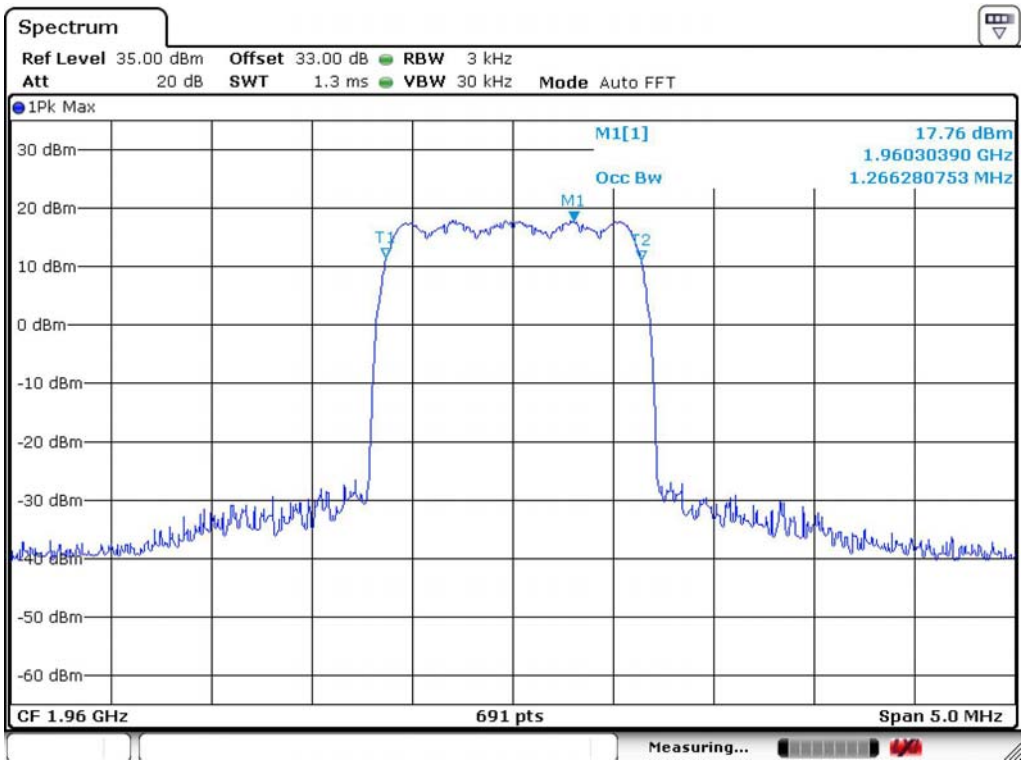
Refer to the following Graphs.

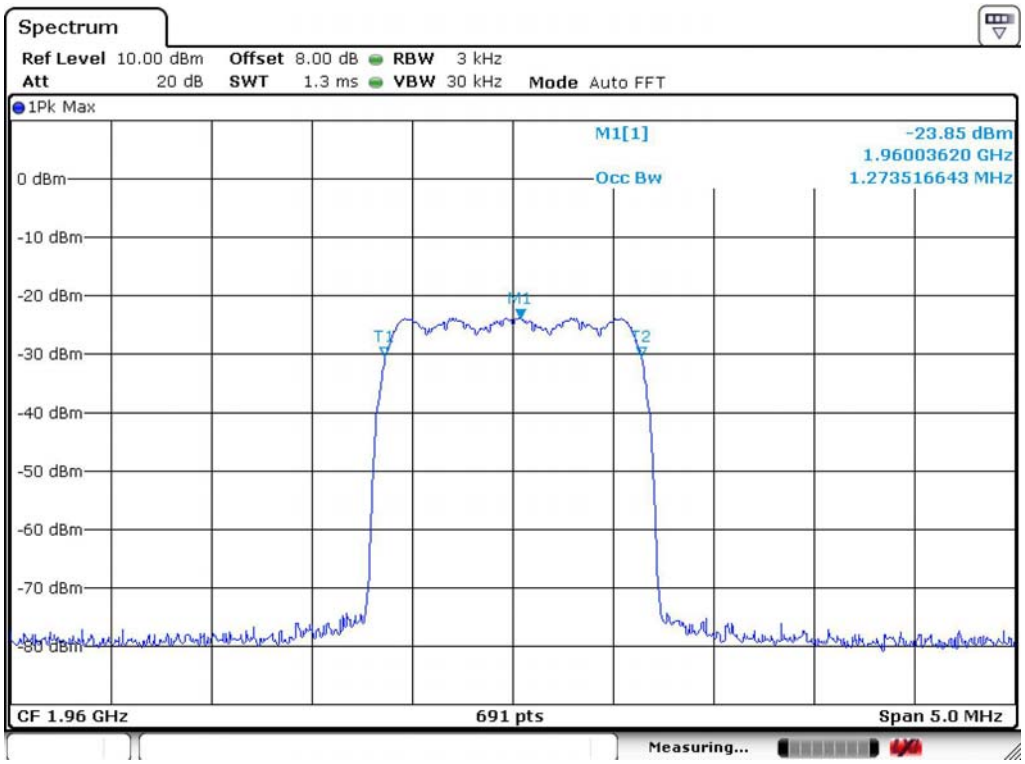
Input/Output Bandwidth Comparison – CDMA850





Input/Output Bandwidth Comparison – PCS 1900





3.2.3 Out-of-Band Emissions at antenna terminal

1. Requirement

The power of any emissions 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. Note: That corresponds to the level of -13 dBm for any out-of-band and spurious emissions.

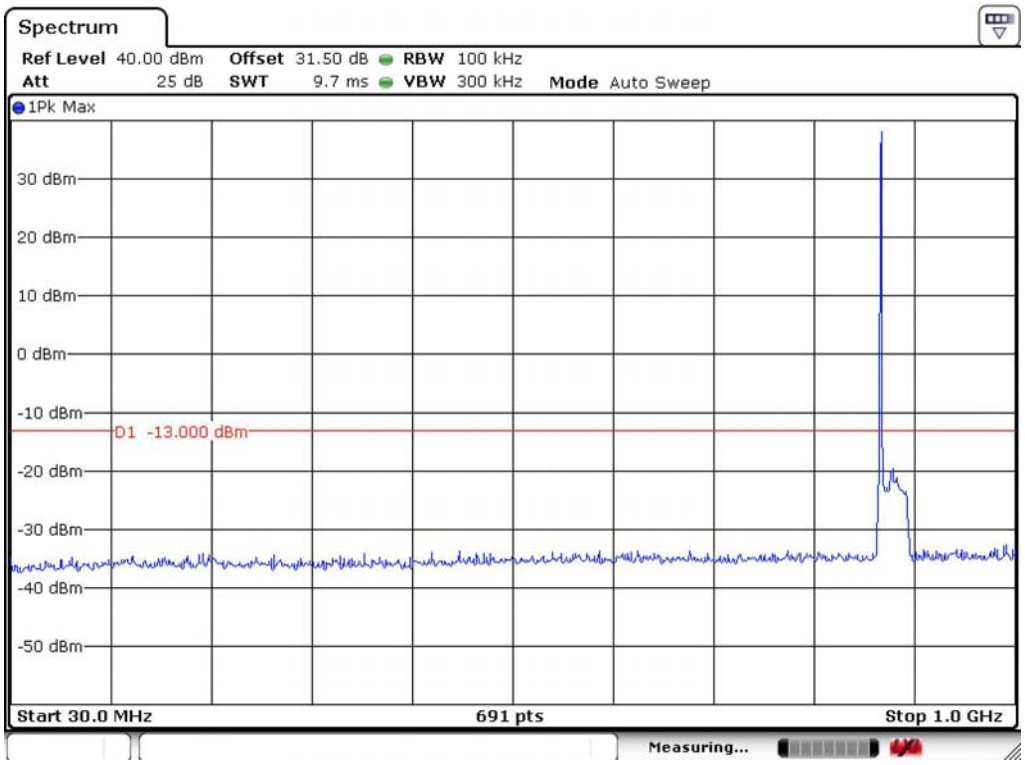
2. Test Procedure

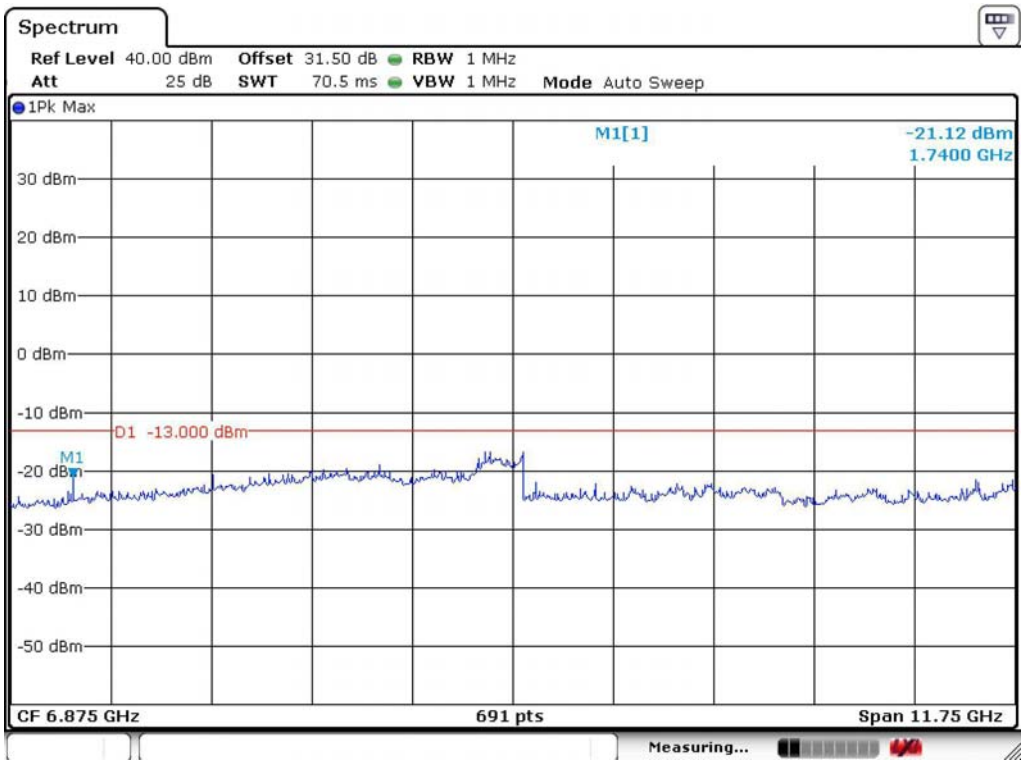
The EUT RF output was connected to spectrum analyzer. The EUT was setup to transmit the maximum power. The spectrum analyzer resolution bandwidth (RBW) was set to 1 MHz in the PCS band and 100 kHz in the Cell band. For measurements at the band edges, the resolution bandwidth (RBW) was set to 100 kHz. Measurements were performed at three frequencies at the low, middle, and high channels for all modulations types. Intermodulation was performed by injecting two modulated signals into the EUT. One signal was set at the bandedge of either the Up Link or Down Link band and the other signal was set 6 MHz away.

3. Test Results : Complies

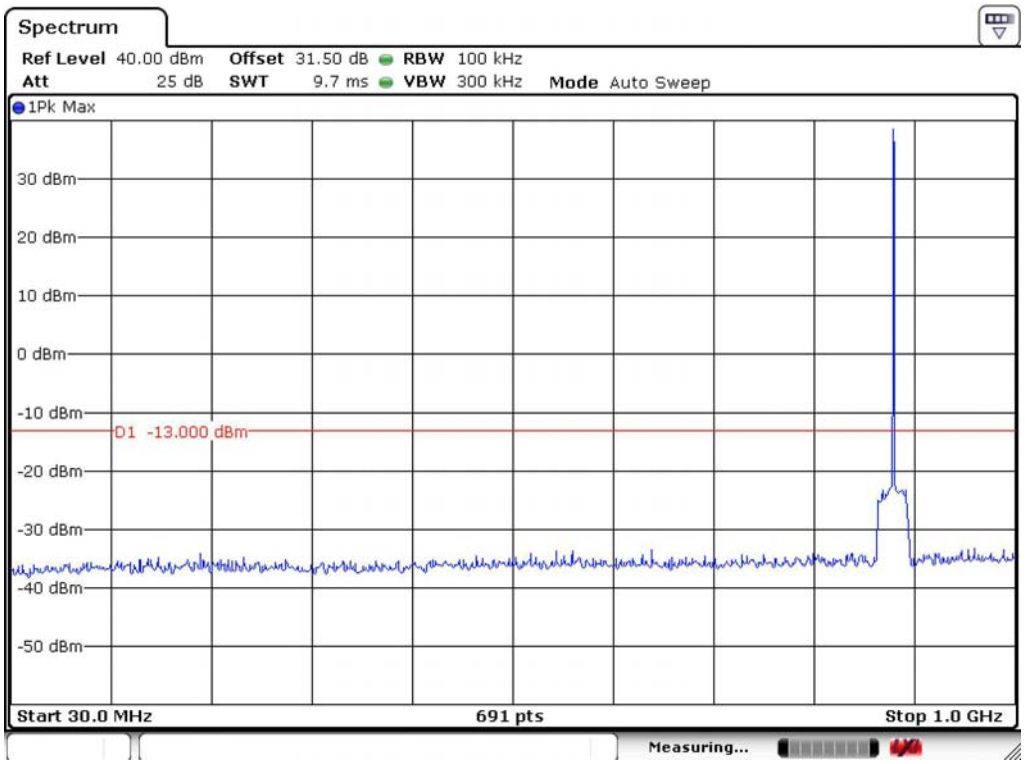
Refer to the following Graphs.

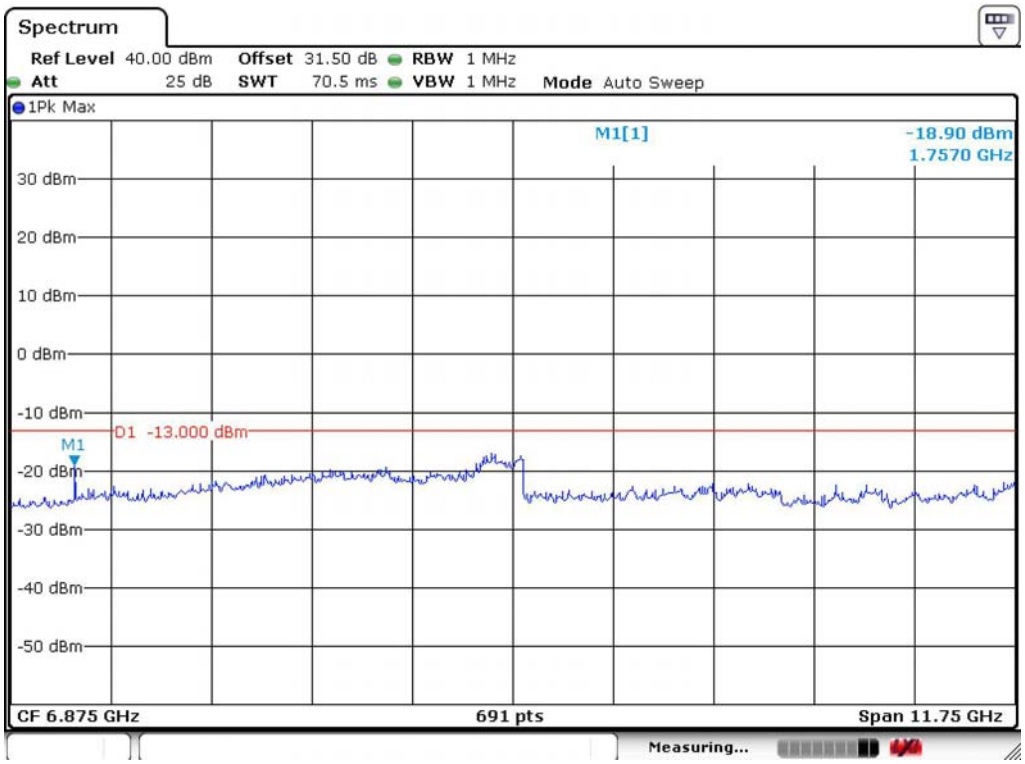
Antenna Terminal Spurious Emissions, CDMA 850, Low



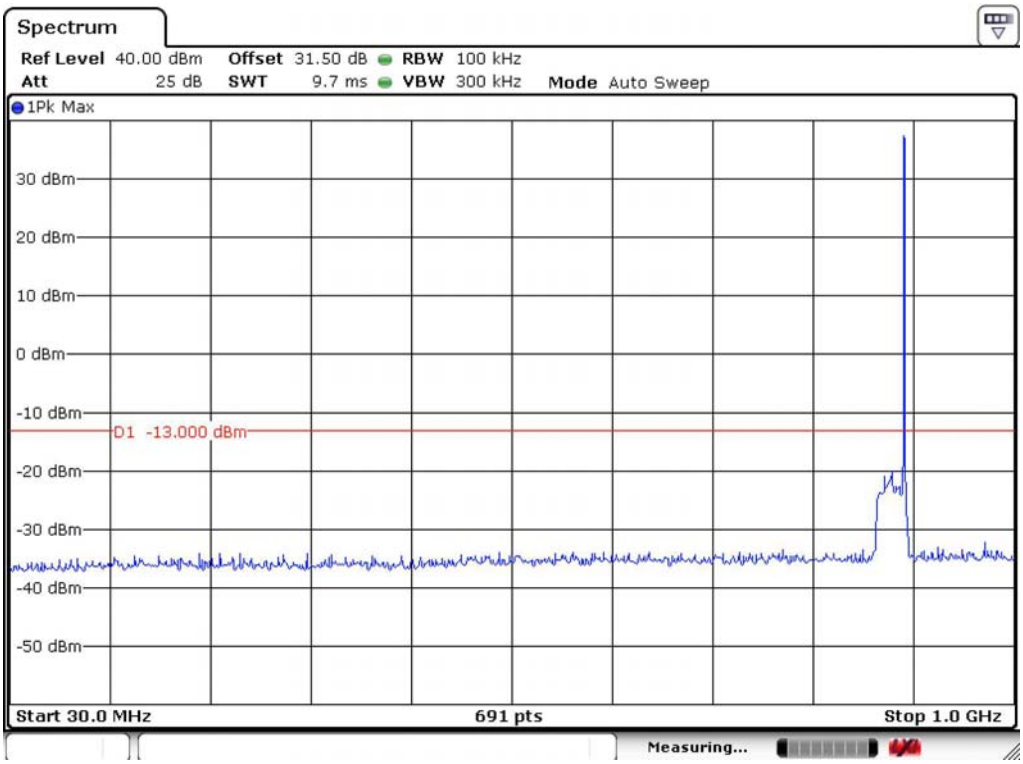


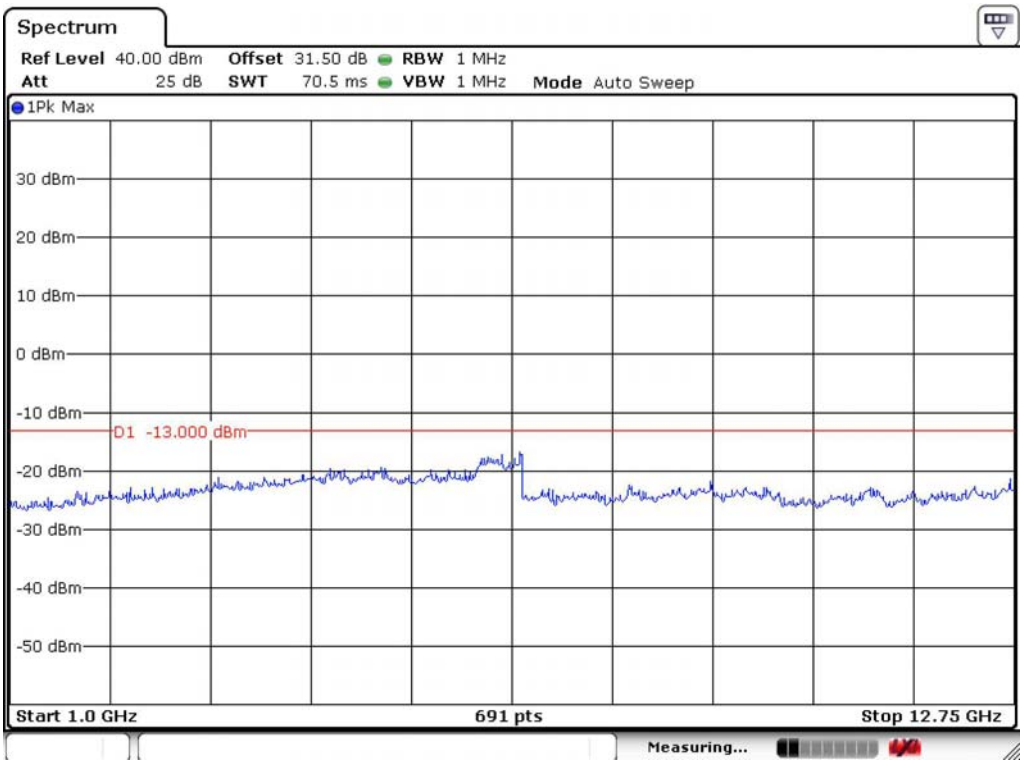
Antenna Terminal Spurious Emissions, CDMA 850, Middle



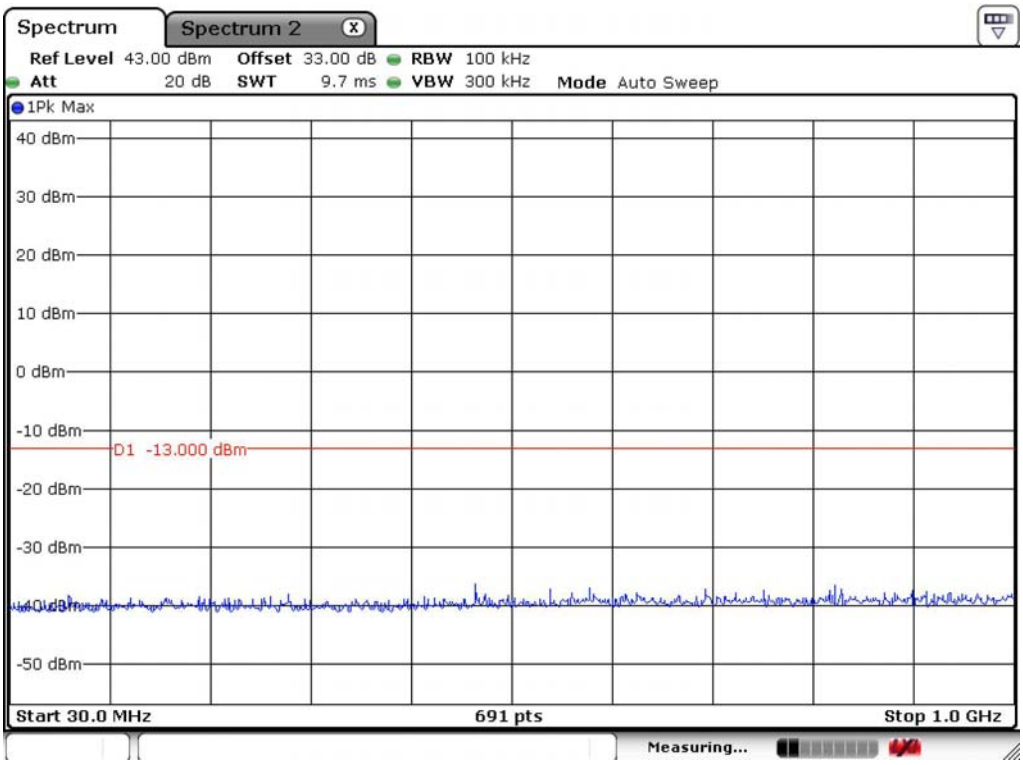


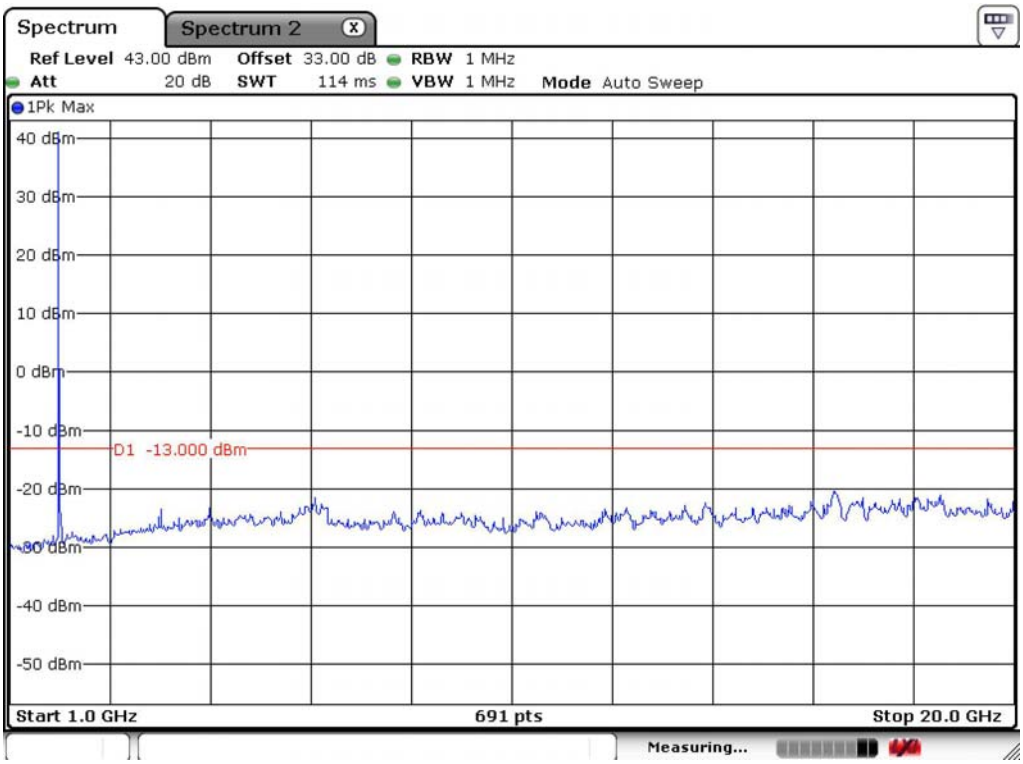
Antenna Terminal Spurious Emissions, CDMA 850, High



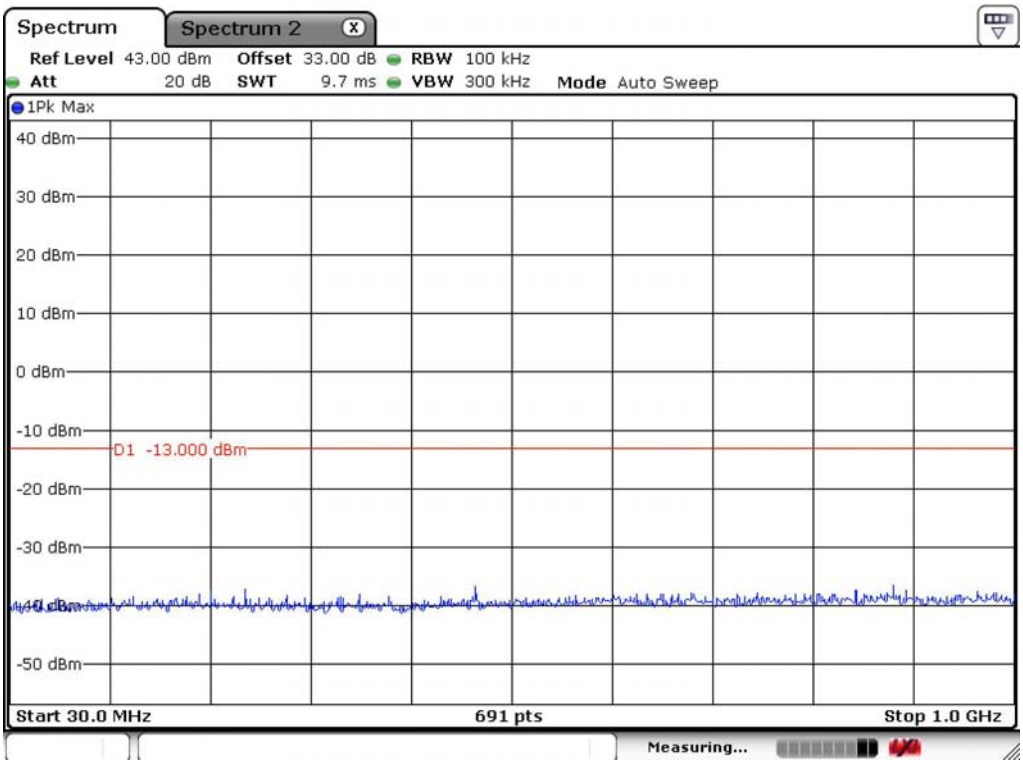


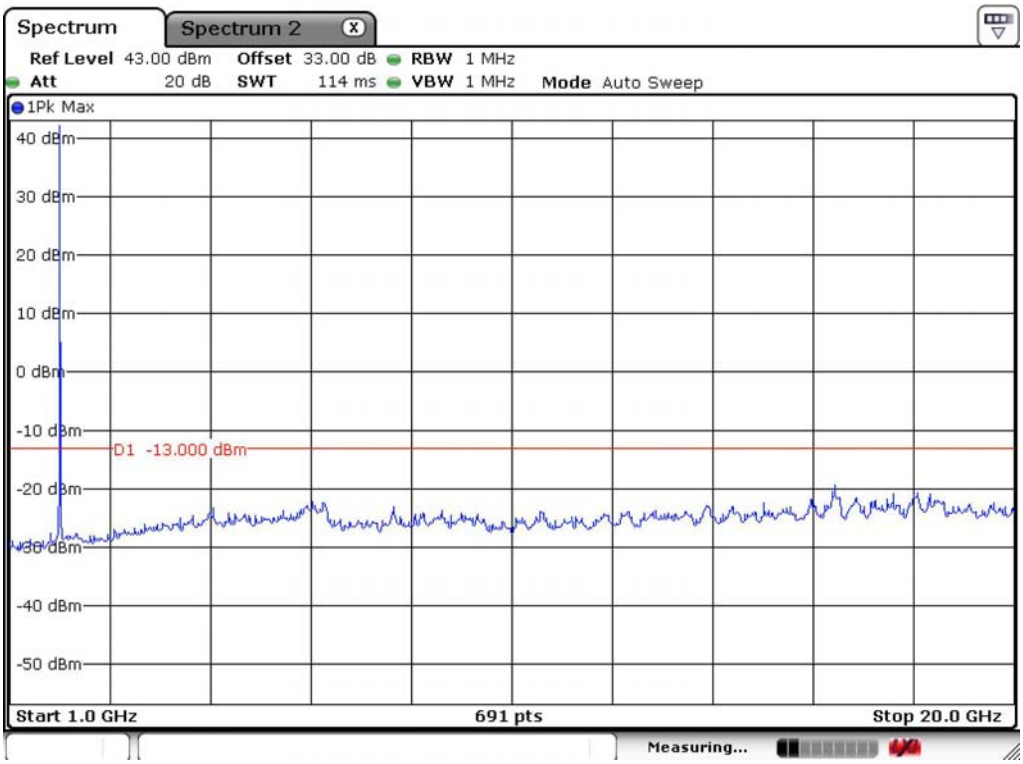
Antenna Terminal Spurious Emissions, PCS 1900, Low



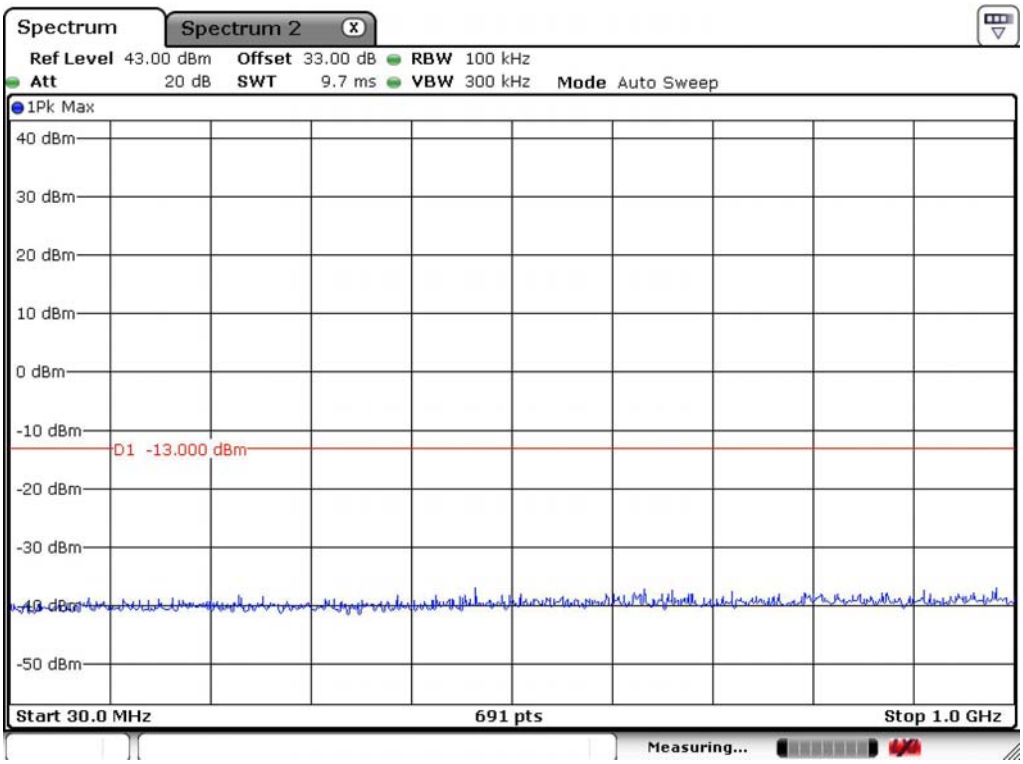


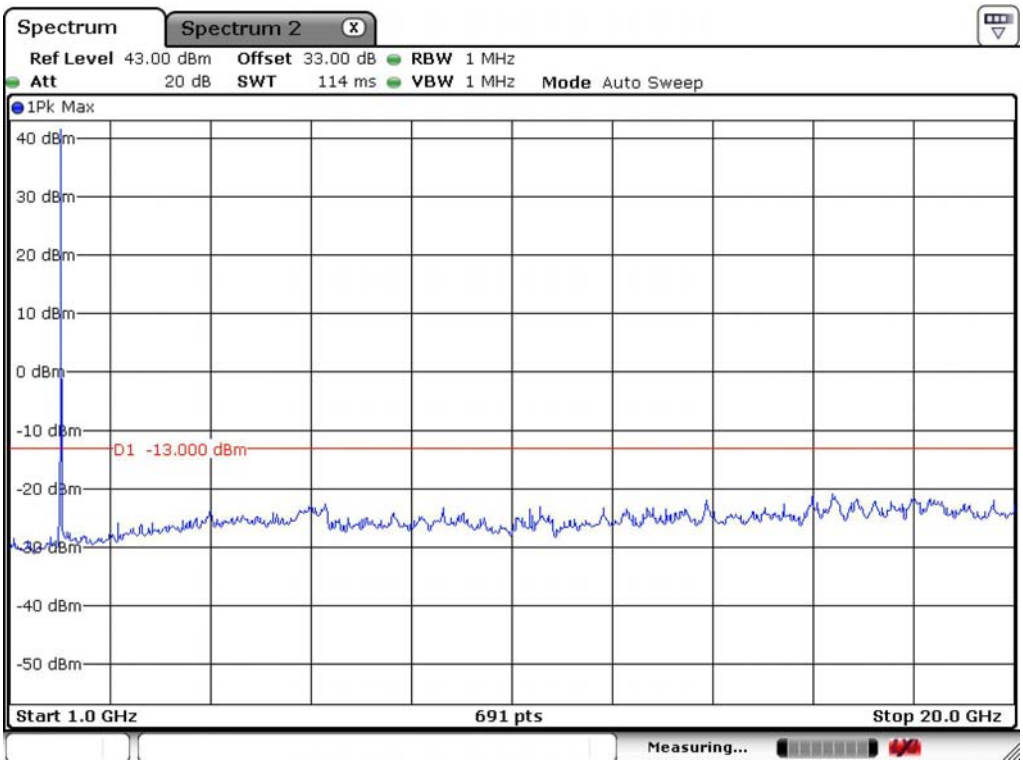
Antenna Terminal Spurious Emissions, PCS 1900, Middle



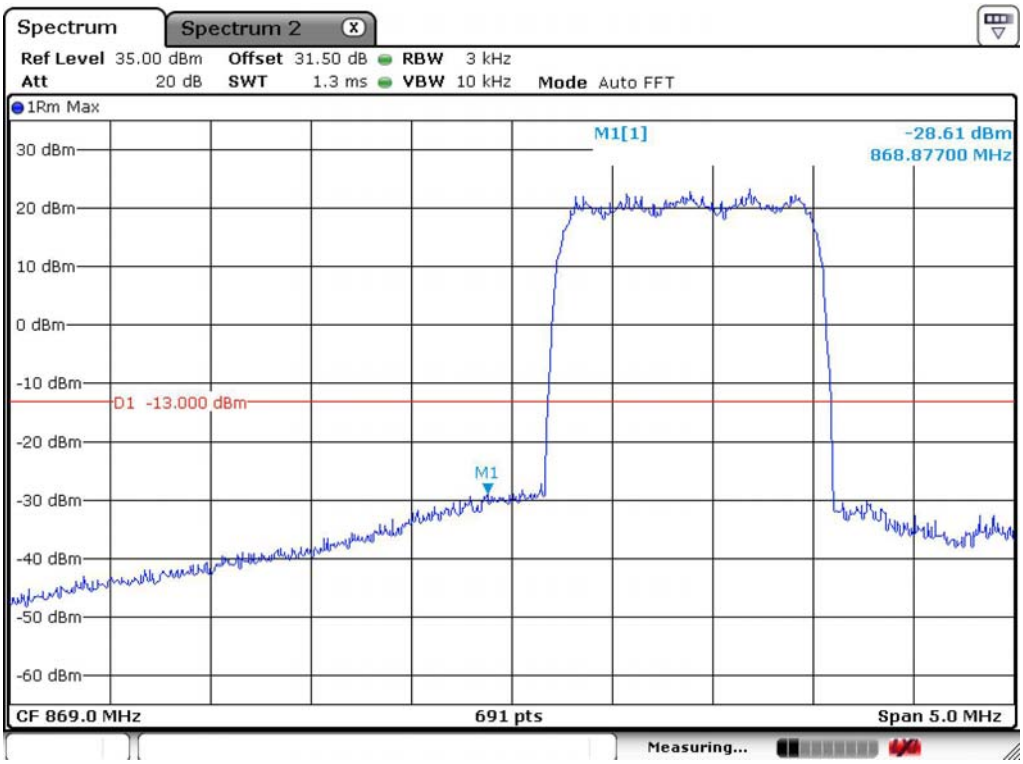


Antenna Terminal Spurious Emissions, PCS 1900, High

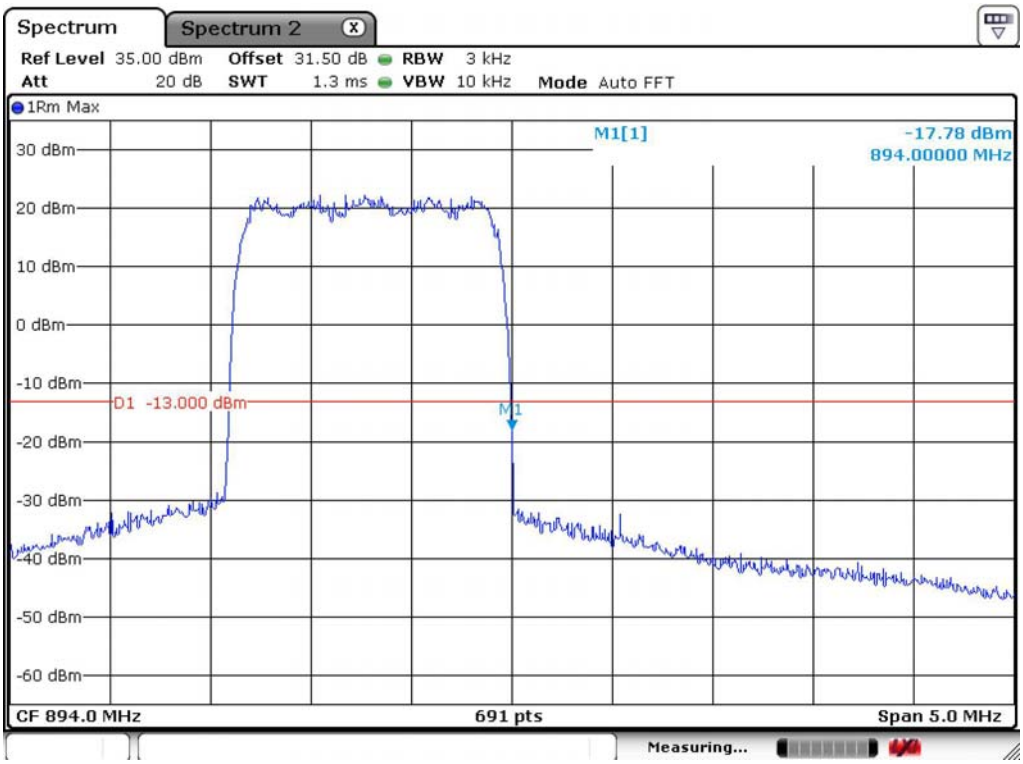




Band Edge Emissions, CDMA 850, Low

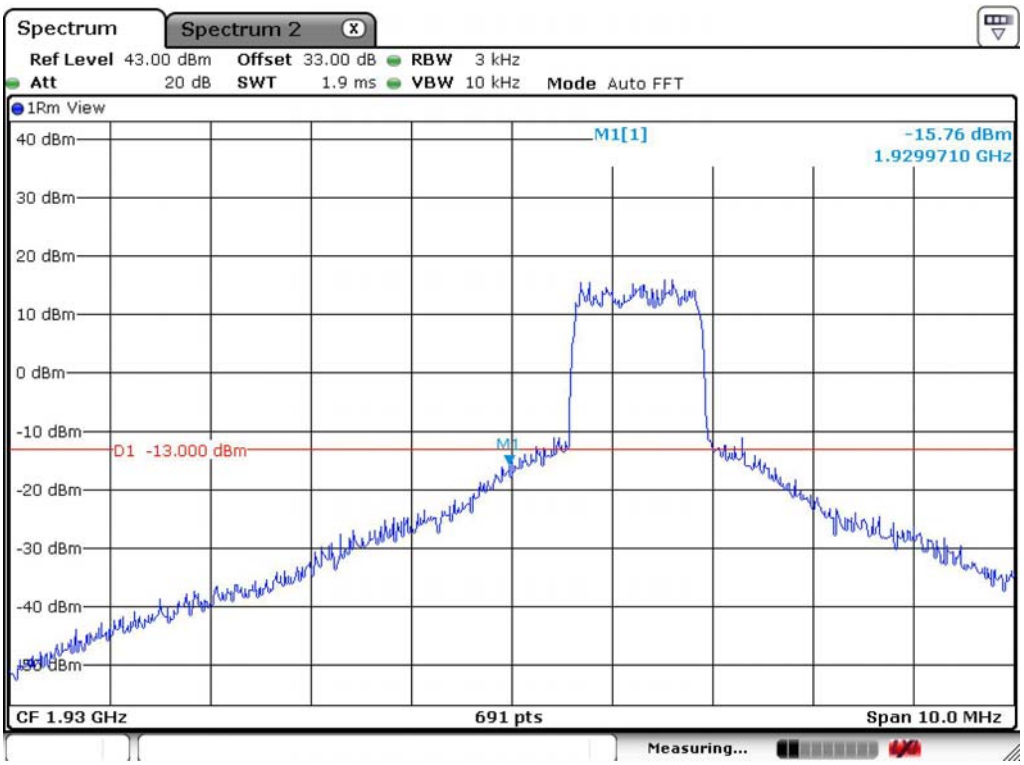


Band Edge Emissions, CDMA 850, High



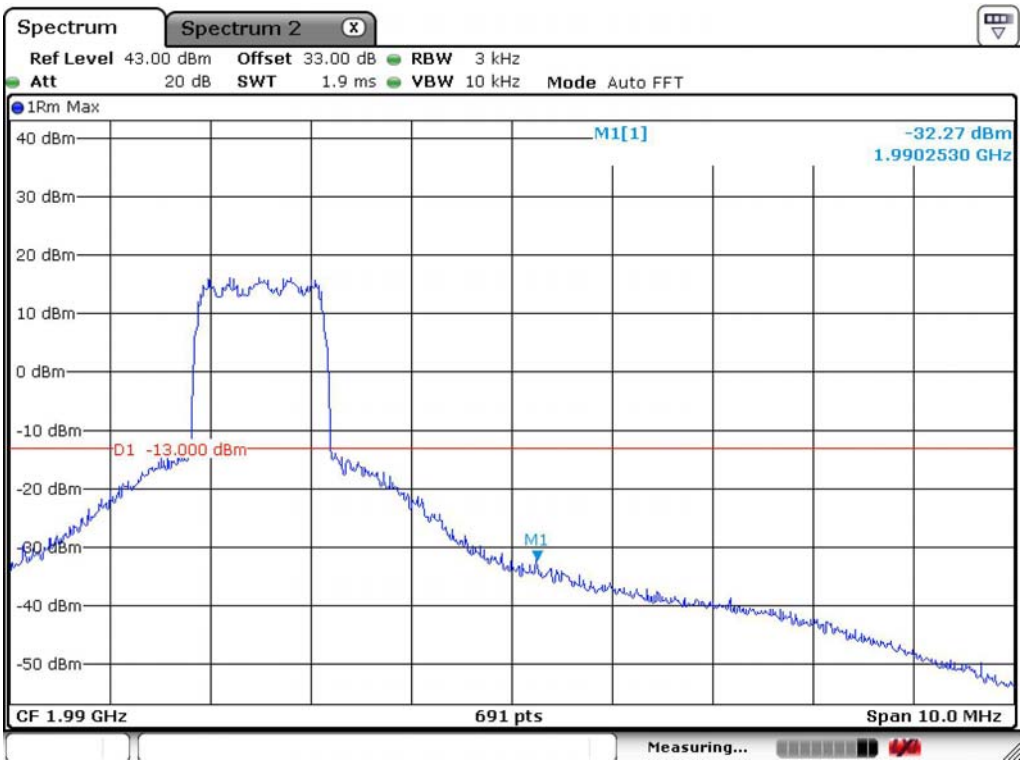
Band Edge Emissions, PCS 1900, Low

1930



Band Edge Emissions, PCS 1900, High

1990



3.2.4 Intermodulation

1. Requirement

the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P) dB. The limit of emission equal to –13dBm..

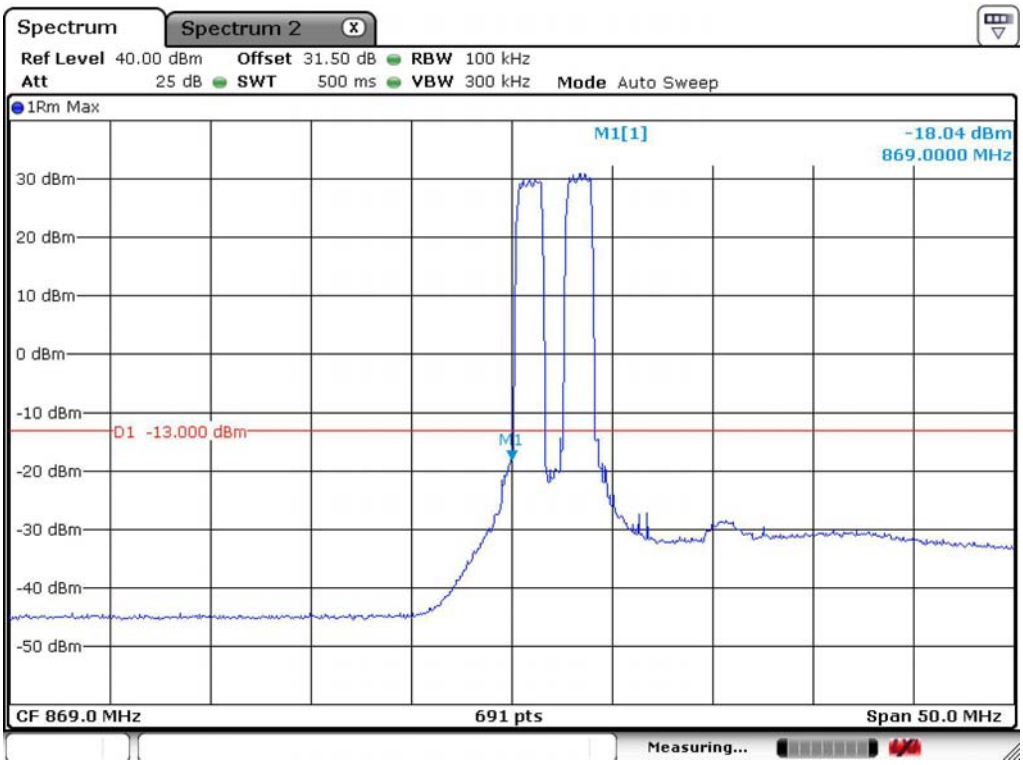
2. Test Procedure

Two RF signals set as inputs. The frequencies of both RF signals shall be within the repeater's operating band. The spacing between both RF signals shall be the minimum possible spacing applied in a network. The level of both RF input signals shall be increased, until the maximum rated output power per channel, as declared by the manufacturer, is reached.

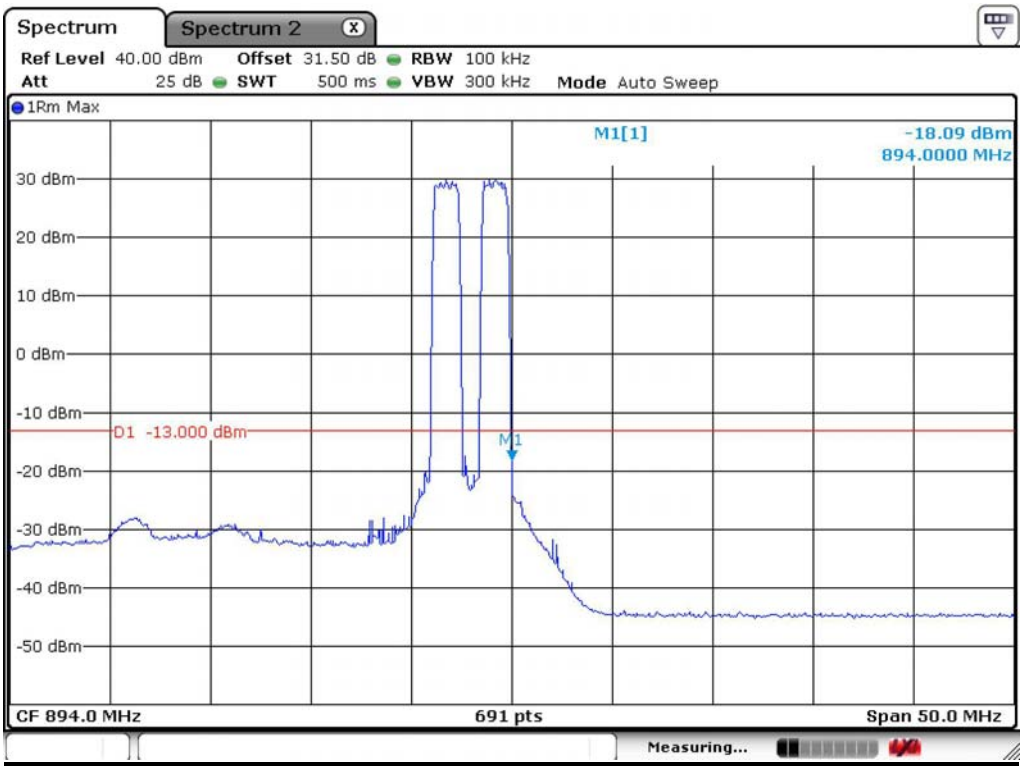
3. Test Results : Complies

Refer to the following Graphs.

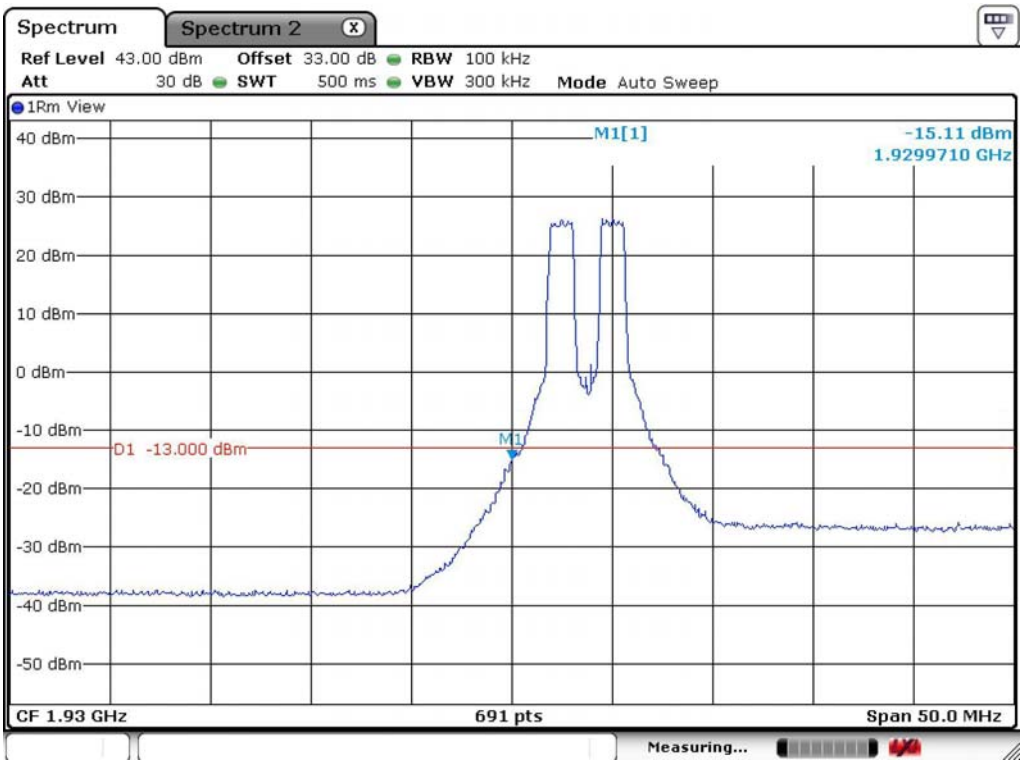
CDMA 850 Low



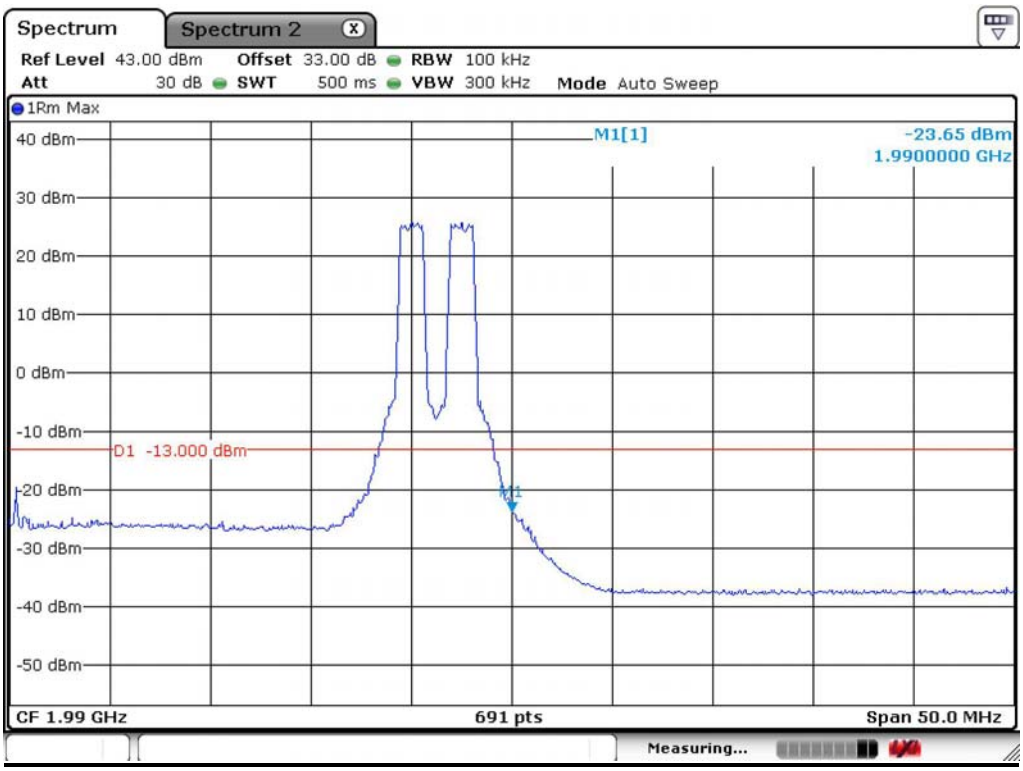
CDMA 850 High



PCS 1900 Low



PCS 1900 High



3.2.5 Transmitter Spurious Radiation

4. Requirement

The power of any emissions 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. Note: That corresponds to the level of -13 dBm for any radiated out-of-band and spurious emissions.

5. Test Procedure

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The frequency range up to 10-th harmonic of each of the three fundamental frequencies (low, middle, and high channels) was investigated. The worst case of emissions are reported. For spurious emissions attenuation, the substitution method was used. The EUT was substituted by a reference antenna (half-wave dipole - below 1 GHz, or Horn antenna - above 1GHz), connected to a signal generator. The signal generator output level (Vg in dBm) was adjusted to obtain the same reading as from EUT. The EIRP at the spurious emissions frequency was calculated as follows.

EIRP(dBm)= Vg + G (dBi)

The EUT output port was connected to a 50 Ω termination load.

6. Test Results : Complies

***** EIRP is calculated as: EIRP(dBm)= Vg(dBm) + G (dBi)

All other emissions not reported are more than 20 dB below the limit.

Transmitter Spurious Radiated Emissions – CDMA 850

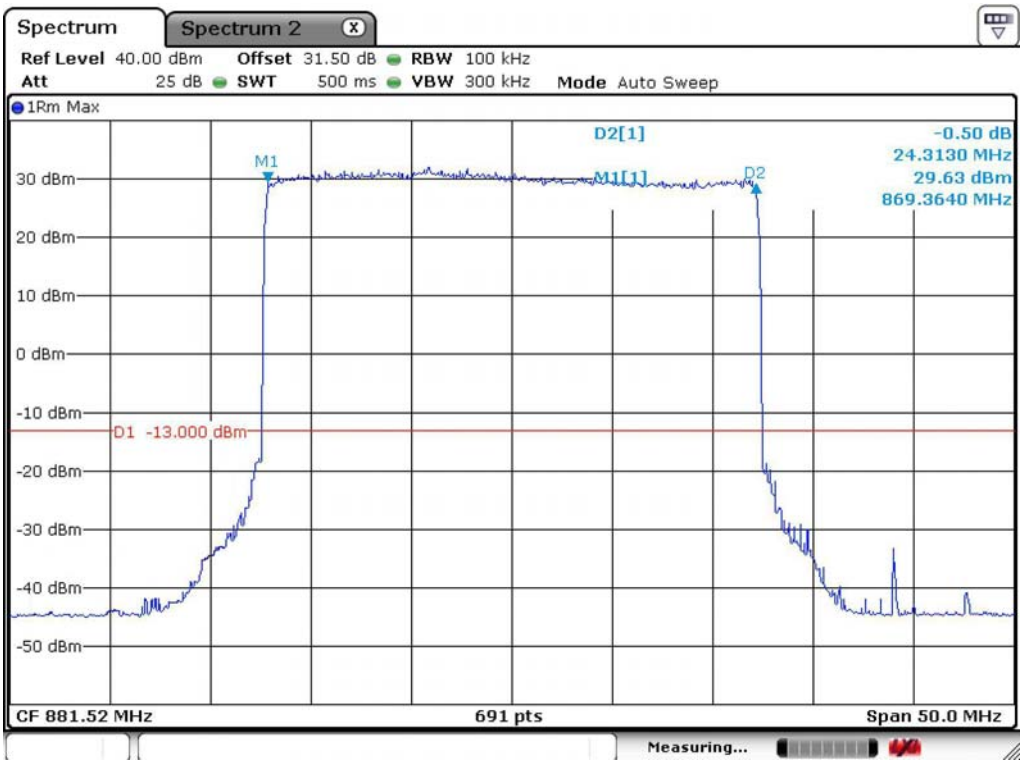
Frequency [MHz]	SA Reading [dBuV/m]	Signal Generator Output required to have the same SA Reading as from EUT [dBm]	EIRP [dBm]	Limit [dBm]	Margin [dB]
All other emissions not reported are more than 20 dB below the limit.					

Transmitter Spurious Radiated Emissions – PCS 1900

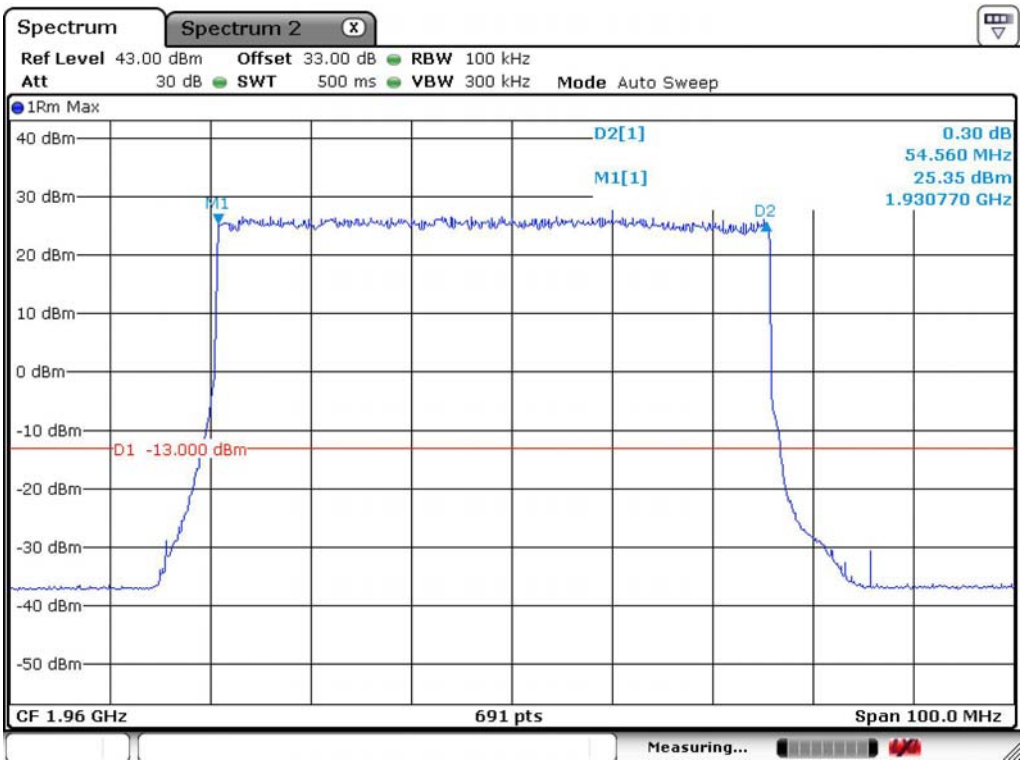
Frequency [MHz]	SA Reading [dBuV/m]	Signal Generator Output required to have the same SA Reading as from EUT [dBm]	EIRP [dBm]	Limit [dBm]	Margin [dB]
All other emissions not reported are more than 20 dB below the limit.					

3.2.6 Out-of-Band Rejection

Downlink Band Pass – CDMA 850 mode



Downlink Band Pass – PCS 1900 mode



3.2.7 Frequency Stability

1. Requirement

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

2. Test Procedure

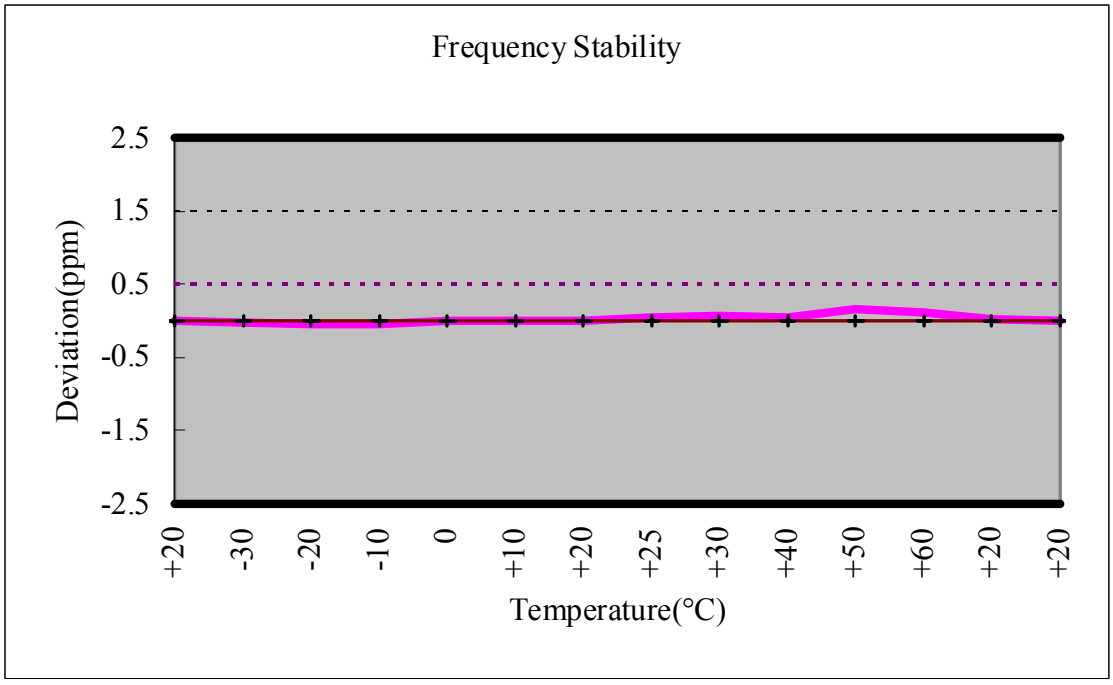
The EUT was placed inside the temperature chamber. The RF output port was connected to a spectrum analyzer. The EUT was setup to transmit the maximum power. After the temperature stabilized for approximately 20 minutes, the transmitting frequency was measured by the spectrum analyzer and recorded. At room temperature, the frequency was measured when the EUT was powered with the nominal voltage and with 85% and 115% of the nominal voltage.

3. Test Results : Complies

-refer to the next page

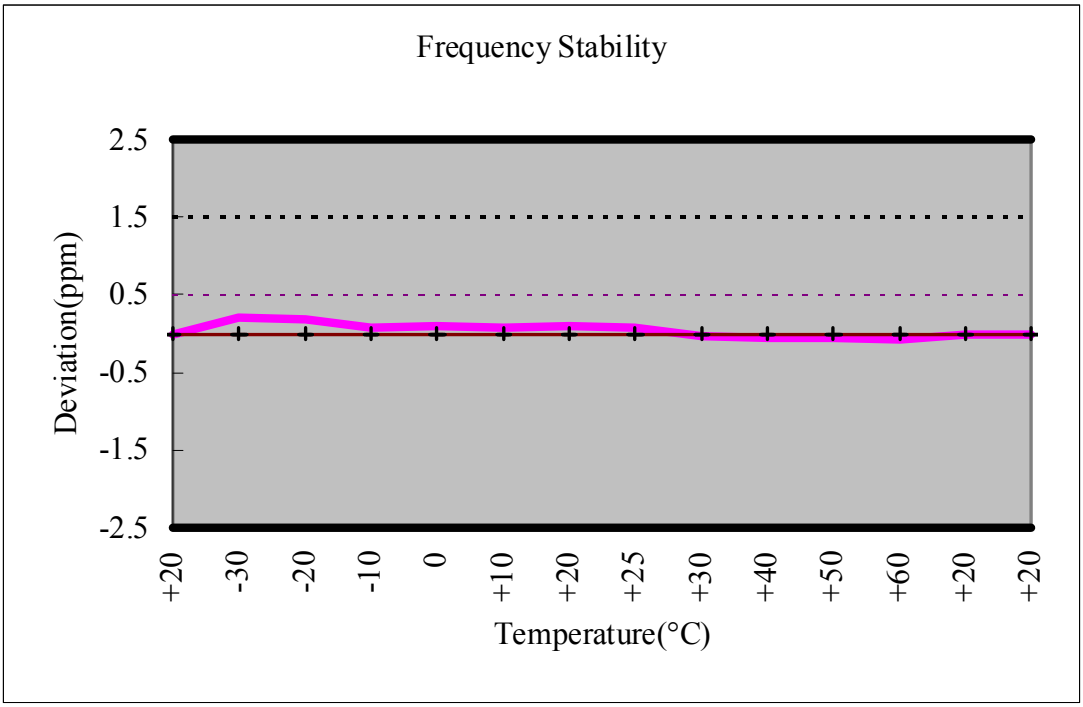
OPERATING FREQUENCY : 881,520,064 Hz
CHANNEL : 384(Mid)
REFERENCE VOLTAGE : 120 VAC
DEVIATION LIMIT : ± 0.00010 % or 1 ppm

VOLTAGE (%)	**POWER** (VAC)	TEMP (dB)	**FREQ** (Hz)	**Deviation** (%)
100%	120	+20(Ref)	881,520,064	0.000000
100%		-30	881,520,038	-0.000003
100%		-20	881,520,025	-0.000004
100%		-10	881,520,016	-0.000005
100%		0	881,520,067	0.000000
100%		+10	881,520,058	-0.000001
100%		+20	881,520,061	0.000000
100%		+25	881,520,109	0.000005
100%		+30	881,520,115	0.000006
100%		+40	881,520,097	0.000004
100%		+50	881,520,194	0.000015
100%		+60	881,520,164	0.000011
85%	102	+20	881,520,078	0.000002
115%	138	+20	881,520,071	0.000001



OPERATING FREQUENCY : 1,960,000,964 Hz
CHANNEL : 661(Mid)
REFERENCE VOLTAGE : 120 VAC
DEVIATION LIMIT : ± 0.00010 % or 1 ppm

VOLTAGE (%)	**POWER** (VAC)	TEMP (dB)	**FREQ** (Hz)	**Deviation** (%)
100%	120	+20(Ref)	1,960,000,964	0.000000
100%		-30	1,960,001,354	0.000020
100%		-20	1,960,001,308	0.000018
100%		-10	1,960,001,115	0.000008
100%		0	1,960,001,134	0.000009
100%		+10	1,960,001,125	0.000008
100%		+20	1,960,001,154	0.000010
100%		+25	1,960,001,133	0.000009
100%		+30	1,960,000,887	-0.000004
100%		+40	1,960,000,854	-0.000006
100%		+50	1,960,000,864	-0.000005
100%		+60	1,960,000,814	-0.000008
85%	102	+20	1,960,000,954	-0.000001
115%	138	+20	1,960,000,931	-0.000002



3.3 CONCLUSION

The data collected shows that the **Kisan Telecom Co., Ltd. Optical DAS Repeater FCC ID: T7MSTR250D01C** complies with all the requirements of Parts 2,22, 24 of the FCC Rules.

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APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	Spectrum Analyzer	FSV-30	100757	R&S	1 year	2011-01-24
2	Spectrum Analyzer	8563E	3425A02505	HP	1 year	2010-03-29
3	Spectrum Analyzer	8594E	3710A04074	HP	2 year	2009-10-12
4	Signal Generator	8648C	3623A02597	HP	1 year	2010-03-30
5	Signal Generator	83711B	US34490456	HP	1 year	2010-03-30
6	Attenuator (3dB)	8491A	37822	HP	1 year	2010-10-08
7	Attenuator (10dB)	8491A	63196	HP	1 year	2010-10-08
8	EMI Test Receiver	ESCI7	100722	R&S	1 year	2010-10-08
9	Horn Antenna(18 ~ 40GHz)	SAS-574	154	Schwarzbeck	2 year	2010-11-25
10	Horn Antenna(18 ~ 40GHz)	SAS-574	155	Schwarzbeck	2 year	2010-11-25
11	RF Amplifier	8447D	2949A02670	HP	2 year	2009-10-12
12	RF Amplifier	8449B	3008A02126	HP	1 year	2010-03-29
13	Test Receiver	ESHS10	828404/009	R&S	1 year	2010-03-29
14	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	2 year	2009-04-02
15	Log Periodic Antenna	VULP 9118	9118 A 401	SCHWARZBECK	2 year	2009-04-13
16	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	2 year	2009-04-13
17	Horn Antenna	3115	00055005	ETS LINDGREN	2 year	2009-03-16
18	Horn Antenna	BBHA 9120D	9120D122	SCHWARZBECK	2 year	2010-12-24
19	Dipole Antenna	VHA9103	2116	SCHWARZBECK	2 year	2010-11-25
20	Dipole Antenna	VHA9103	2117	SCHWARZBECK	2 year	2010-11-25
21	Dipole Antenna	VHA9105	2261	SCHWARZBECK	2 year	2010-11-25
22	Dipole Antenna	VHA9105	2262	SCHWARZBECK	2 year	2010-11-25
23	Hygro-Thermograph	THB-36	0041557-01	ISUZU	1 year	2010-04-12
24	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
25	Power Divider	11636A	6243	HP	1 year	2010-10-08
26	DC Power Supply	6622A	3448A03079	HP	1 year	2010-10-08
27	Frequency Counter	5342A	2826A12411	HP	1 year	2010-03-30
28	Power Meter	EPM-441A	GB32481702	HP	1 year	2010-03-29
29	Power Sensor	8481A	US41030291	HP	1 year	2010-10-08
30	Audio Analyzer	8903B	3729A18901	HP	1 year	2010-10-08
31	Modulation Analyzer	8901B	3749A05878	HP	1 year	2010-10-08
32	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2010-10-08
33	AC Power Supply	HK-80	LR001	Daelim Electoronics	-	-
34	Stop Watch	HS-3	601Q09R	CASIO	2 year	2010-03-31
35	LISN	ENV216	100408	R&S	1 year	2010-10-08
36	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	2 year	2010-05-13
37	Attenuator (30dB)	8498A	3318A10929	HP	1 year	2011-01-05