SK TECH CO., LTD.

Certificate of Compliance

Test Report No.:	**SKTTRT-080703-009**		
Applicant:	**SEWON TELETECH, INC.**		
Applicant Address:	881 Gwanyang2, Dongan, Anyang, Gyeonggi, South Korea		
Manufacturer:	**SEWON TELETECH, INC.**		
Manufacturer Address:	881 Gwanyang2, Dongan, Anyang, Gyeonggi, South Korea		
Device Under Test:	**Slim RU**		
FCC ID:	**WGUSTS843HMD**	**Model Name:**	**STS800-43HM-D**
Brand/Trade Name:	**-**		
Receipt No.:	SKTEU08-0548	**Date of receipt:**	June 23, 2008
Date of Issue:	July 3, 2008		
Location of Testing:	**SK TECH CO., LTD.** #820-2, Wolmoon-ri, Wabu-up, Namyangju-si, Kyunggi-do, 472-905 South Korea		
Test Procedure:	**TIA-603-C (December 2004), ANSI C63.4**		
Test Specification:	**FCC Part 22H, Part 15B**		
FCC Equipment Class:	**AMP-Amplifier**		
Test Result:	The above-mentioned device has been tested and passed.		

Tested & Reported by: *Seung-Taek, Shim* **Approved by**: *Jong-Soo, Yoon*

2008. 07. 03 *2008. 07. 03*

Signature *Date* *Signature* *Date*

Other Aspects:	**-**
Abbreviations:	**· OK, Pass = passed · Fail = failed · N/A = not applicable**

☞
- **This test report is not permitted to copy partly and entirely without our permission.**
- **This test result is dependent on only equipment to be used.**
- **This test result is based on a single evaluation of submitted samples of the above mentioned.**

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1. GENERAL

These tests were performed using the test procedure outlined in TIA-603-C and ANSI C63.4, 2003, and in accordance with the limits set forth in FCC Part 22, Part 15 and Part 2. The EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards.

We attest to the accuracy of data. All measurements reported herein were performed by SK TECH CO., LTD. and were made under Chief Engineer's supervision.
We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

2. TEST SITE

SK TECH CO., LTD.

2.1 Location

#820-2, Wolmoon-ri, Wabu-up, Namyangju-si, Kyunggi-do, 472-905 South Korea
(FCC Registered Test Site Number: 90752)

This test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.
This laboratory is recognized as a Conformity Assessment Body (CAB) for CAB's Designation Number: **KR0007** by FCC, is accredited by NVLAP for NVLAP Lab. Code: **200220-0**.

2.2 List of Test and Measurement Instruments

No.	Description	Manufacturer	Model #	Serial #	Calibrated until	Used
1	Spectrum Analyzer	Agilent	E4405B	US40520856	2008.07	☒
2	EMC Spectrum Analyzer	Agilent	E7405A	US40240203	2009.02	☒
3	EMI Test Receiver	Rohde&Schwarz	ESIB40	100277	2009.02	☒
4	EMI Test Receiver	Rohde&Schwarz	ESVS10	825120/008	2008.08	☐
5	EMI Test Receiver	Rohde&Schwarz	ESHS10	862970/019	2008.07	☒
6	Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	836679/018	2008.07	☒
7	Pre-amplifier	HP	8447F	3113A05153	2009.02	☒
8	Pre-amplifier	MITEQ	AFS44	1116321	2009.02	☐
9	Pre-amplifier	MITEQ	AFS44	1116322	2009.03	☒
10	Power Meter	Agilent	E4417A	MY45100426	2008.07	☐
11	Power Meter	Agilent	E4418B	US39402176	2009.01	☒
12	Power Sensor	Agilent	E9327A	MY44420696	2008.07	☐
13	Power Sensor	Agilent	8482A	MY41094094	2008.07	☒
14	Attenuator (30dB)	BIRD	75-A-MFN-30	9640	2008.07	☒
15	Attenuator (20dB)	Weinschel	40-20-34	1003	2008.07	☒
16	Attenuator (10dB)	HP	8491B	38067	2008.07	☒
17	Oscilloscope	Agilent	54820A	US40240160	2009.03	☐
18	Diode detector	Agilent	8473C	1882A03173	2009.02	☐
19	High Pass Filter	Wainwright	WHKX3.0/18G	8	2008.07	☒
20	VHF Precision Dipole Antenna (TX/RX)	Schwarzbeck	VHAP	1014 / 1015	2008.11	☒
21	UHF Precision Dipole Antenna (TX/RX)	Schwarzbeck	UHAP	989 / 990	2008.11	☒
22	Loop Antenna	Schwarzbeck	HFH2-Z2	863048/019	2008.12	☐
23	TRILOG Broadband Antenna	Schwarzbeck	VULB9160	3141	2009.05	☒
24	Horn Antenna	AH Systems	SAS-200/571	304	N/A	☒
25	Horn Antenna	EMCO	3115	00040723	2009.03	☒
26	Horn Antenna	EMCO	3115	00056768	2009.05	☒
27	Vector Signal Generator	Agilent	E4438C	MY42080359	2008.07	☒
28	PSG analog signal generator	Agilent	E8257D-520	MY45141255	2008.07	☒
29	DC Power Supply	HP	6622A	3448A03950	2008.07	☐
30	DC Power Supply	HP	6268B	2542A-07856	2008.07	☒
31	Digital Multimeter	HP	HP3458A	2328A14389	2009.03	☒
32	PCS Interface	HP	83236B	3711J00881	2009.03	☐
33	CDMA Mobile Test Set	HP	8924C	US35360253	2009.03	☐
34	Hygro/Thermo Graph	SATO	PC-5000TRH-II	-	2009.03	☒
35	Temperature/Humidity Chamber	All Three	ATM-50M	20030425	2009.03	☐
36	Temperature/Humidity Chamber	DAEJIN	DJ-THC02	06071	2009.03	☐

2.3 Test Date

Date of Test: June 26, 2008 ~ July 02, 2008

2.4 Test Environment

See each test item's description.

3. DESCRIPTION OF THE EQUIPMENT UNDER TEST

The EUT is a 20 Watt CDMA single channel power amplifier. This power amplifier is used in BTS (Base station Transceiver Subsystem) in the downlink spectrum of 850 Cellular band.

3.1 Rating and Physical Characteristics

Power source **		+27 VDC		
Frequency Range		DL / 869 ~ 894 MHz (25 MHz)		
Modulation		CDMA		
Total Rated Output Power		20 W / 1 FA		
Input Power range		-10 dBm		
Frequency Translation		☒ F1 - F1	☐ F1 - F2	☐ NA
		☐ Software	☐ Duplexer Change	☒ Full Band Coverage
TX Gain		53.0 ± 1.0 dB		
RX Gain		24 ± 1.0 dB		
In/Out VSWR		1.5:1		
Over Power / VSWR Protection		45 + 0.7 dBm / Alarm 3:1		
Dimension		19" Rack Enclosure. Max 2U heights		
External Ports	TX/RX_A ANT	(N Female) DL Transmitter antenna / UL receiver antenna port		
	RX_B ANT	(N Female) UL receiver antenna port		
	RF TX IN	(SMA Female) DL signal source from Transceiver Block in BTS		
	RF RX_A OUT	(SMA Female) UP signal to Transceiver Block in BTS		
	RF RX_B OUT	(SMA Female) UP signal to Transceiver Block in BTS		
	TX_TP	(SMA Female) Coupling Test point (DL TX)		
	RX_A TP	(SMA Female) Coupling Test point (UP RX)		
	RX_B TP	(SMA Female) Coupling Test point (UP RX)		
	MASTER	(RJ-45, RS485) signal port from/to BTS		
	SLAVE (× 2)	(RJ-45, RS485) signal port from/to 2nd RU, 3rd RU		
	TEST	(RJ45, RS232C)Debug/Test port		
	PSU ALM	PSU Alarm: RPSU status monitoring port		

** DC voltage is supplied from the DC/DC converter in the BTS rack.

3.2 Equipment Modifications

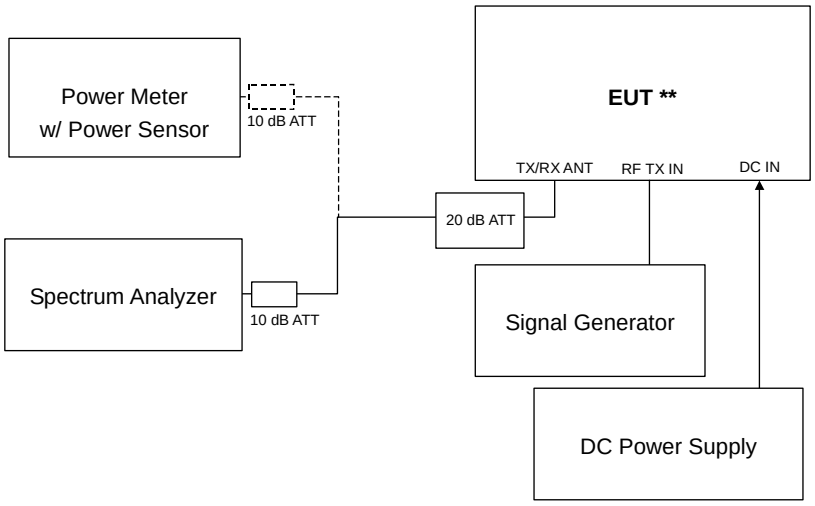
None

3.3 Submitted Documents

Block diagram / Schematic diagram / Tune up procedure / Part List / Instruction manual

4. MEASUREMENT CONDITIONS

4.1 Description of test configuration



** Non-used RF ports were terminated during the tests.

[System Block Diagram of Test Configuration]

4.2 List of Peripherals

Equipment Type	Manufacturer	Model	S/N
None	-	-	-

4.3 Type of Used Cables

#	START		END		CABLE	
	NAME	I/O PORT	NAME	I/O PORT	LENGTH(m)	SHIELDED
1	EUT	DC IN	DC Power Supply	DC OUT	2.5	NO

4.4 Uncertainty

Measurement Item	Combined Standard Uncertainty Uc	Expanded Uncertainty U = *k*Uc (*k* = 2)
Conducted RF power	± 1.49 dB	± 2.98dB
Radiated disturbance	± 2.30 dB	± 4.60 dB
Conducted disturbance	± 1.96 dB	± 3.92 dB

5. TEST AND MEASUREMENTS

Summary of Test Results

Requirement	CFR 47 Section	Report Section	Test Result
RF Power Output	2.1046, 22.913	5.1	PASS
Modulation Characteristics	2.1047	N/A	N/A*
Occupied Bandwidth	2.1049	5.2	PASS
Spurious Emissions at Antenna Terminals	2.1051; 22.917	5.3	PASS
Field Strength of Spurious Radiation	2.1053; 22.917	5.4	PASS
Frequency Stability	2.1055; 22.917	N/A	N/A**
AC Power line conducted emissions	15.107	N/A	N/A***

* The EUT does not support the ability to modulate voice.

** The EUT does not contain frequency translation.

*** DC voltage is supplied from the DC/DC converter in the BTS rack.

5.1 RF POWER OUTPUT

5.1.1 Regulation

According to §2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

According to §2.1046(b), for single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in 2.1046(b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

According to §2.1046(c), for measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

According to § 22.913 Effective radiated power limits, the effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

According to § 22.913 (a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts.

5.1.2 Test Procedure

RF power output measurements were made at the RF output terminals using an attenuator and spectrum analyzer or power meter. This test was performed in all applicable modulations.

5.1.3 Test Results: PASS

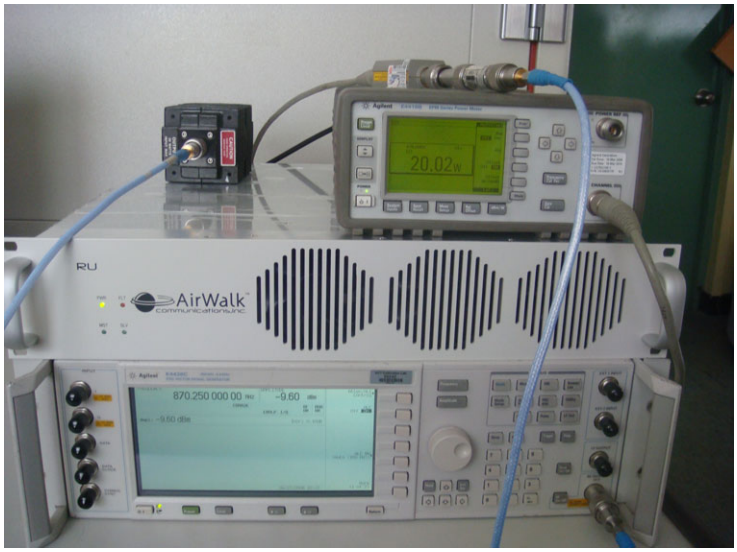
Table 1: Measured values of the RF Power Output

Modulation	Frequency (MHz)	Input Power (dBm)	Modulated Power Output (W)
CDMA	870.25	-9.67	20.02
	881.50	-9.95	20.03
	892.75	-9.87	20.03

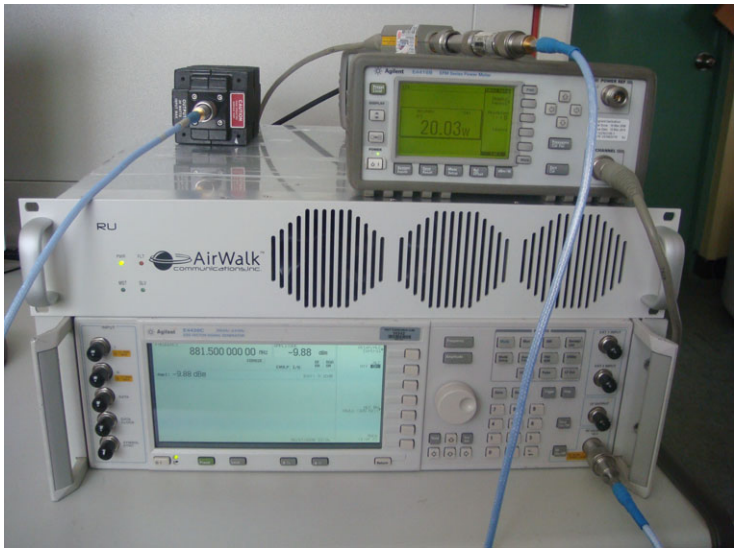
We took the insertion loss of the cables and attenuators into consideration within the measuring instrument as an offset.

Figure 1: Photographs of the measurement of RF Power Output

CDMA Downlink Low CH



CDMA Downlink Mid CH



CDMA Downlink Hi CH

5.2 OCCUPIED BANDWIDTH

5.2.1 Regulation

According to §2.1049, the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of part 2.1049 (a) through (i) as applicable.

5.2.2 Test Procedure

The modulation characteristics of signal generator's carrier was measured first at a maximum RF level declared by the applicant. The signal generator was then connected to either the Uplink or Downlink input at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.

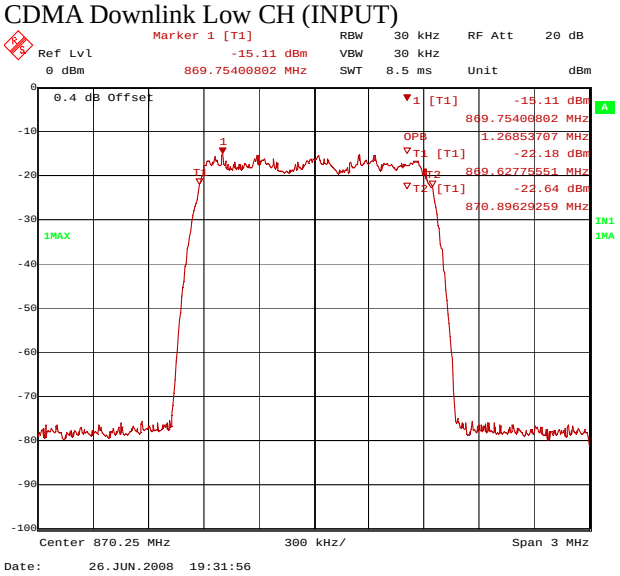
5.2.3 Test Results: PASS

Table 2: Measured values of the Occupied Bandwidth

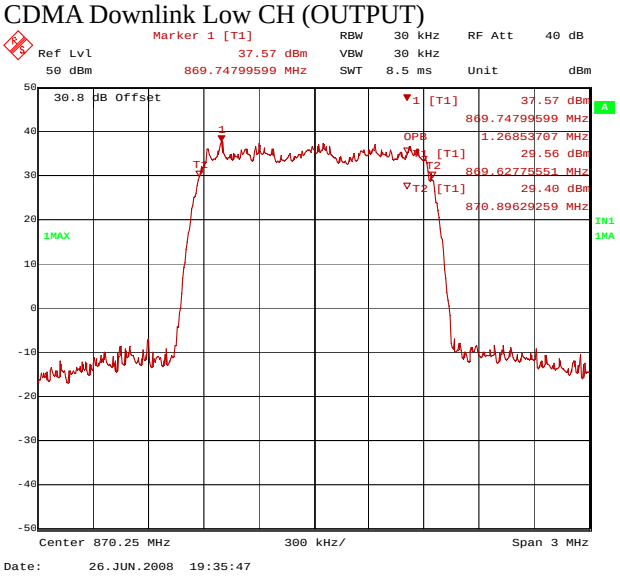
Modulation	Frequency (MHz)	Occupied Bandwidth (MHz)	
		INPUT	OUTPUT
CDMA	870.25	1.27	1.27
	881.50	1.27	1.27
	892.75	1.27	1.27

Figure 2: Plot of the Occupied Bandwidth

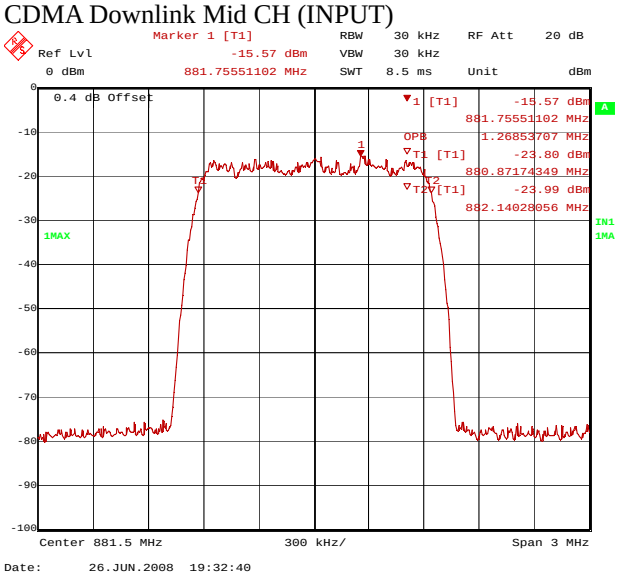
CDMA Downlink Low CH (INPUT)



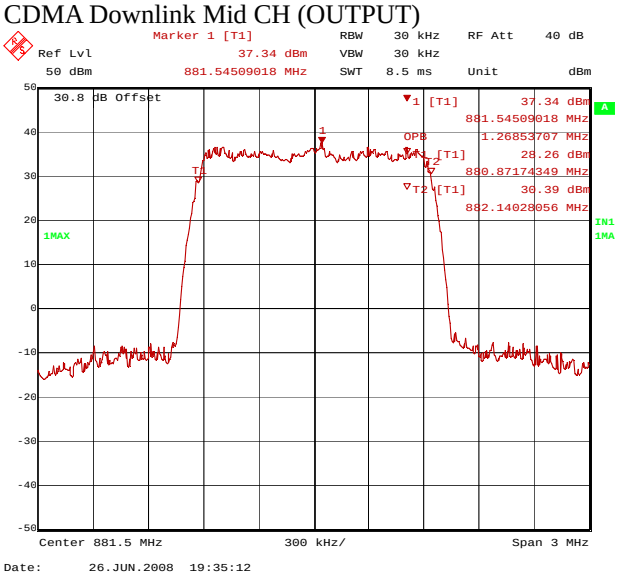
CDMA Downlink Low CH (OUTPUT)



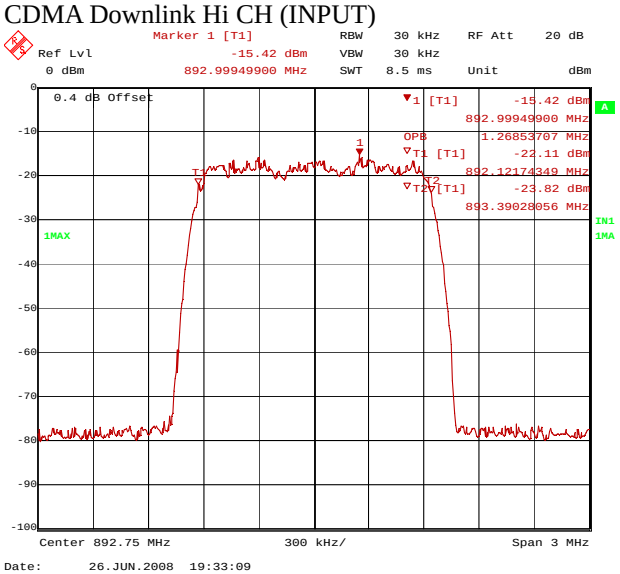
CDMA Downlink Mid CH (INPUT)



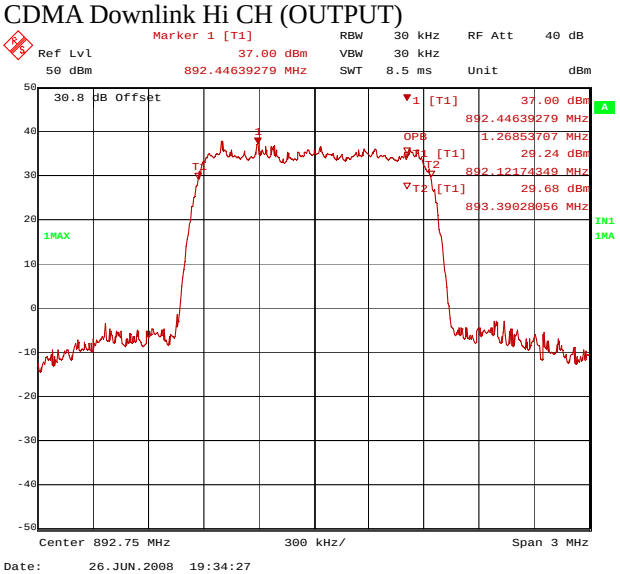
CDMA Downlink Mid CH (OUTPUT)



CDMA Downlink Hi CH (INPUT)



CDMA Downlink Hi CH (OUTPUT)



5.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

5.3.1 Regulation

According to §2.1051, measurement required: Spurious emissions at antenna terminals, the radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

According to §22.917 Emission limitations for cellular Equipment, The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

According to §22.917 (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+10log(P) dB.

5.3.2 Test Procedure

A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as declared by the applicant. A spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured. The spectrum analyzer was set to 1 MHz RBW. The spectrum was investigated from 30 MHz to the 10th harmonic of the carrier.

The inter-modulation measurements were performed in a similar manner as described above. The spectrum analyzer was set to 100 kHz. Two modulated carriers were injected into the EUT.
The two channels near each other should be separated by at least one operating channel width.
One carrier was set at the band edge of either the Uplink or Downlink band and the other was separated by at least one operating channel width. The in band spurious emissions were investigated.

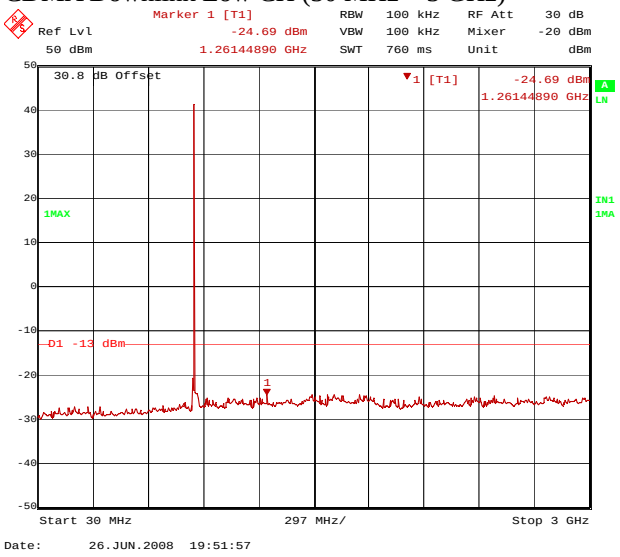
Out of Band Rejection was measured by injecting the swept CW signal into the EUT.
With the aid of a signal generator and spectrum analyzer, measure the 6 dB bandwidth of the amplifier (i.e. at the point where the gain has fallen by 6 dB). Measure the gain-versus-frequency response of the amplifier from the midband frequency f0 of the passband up to at least f0 ±250% of the 6 dB bandwidth. *[Remark: RF input level was about -23 dBm because the EUT is designed to be shutdown, when RF input level, which produces the maximum RF output power, is applied at the vicinity of pass bands]*

5.3.3 Test Results: PASS

The EUT complies with the requirements of this section.

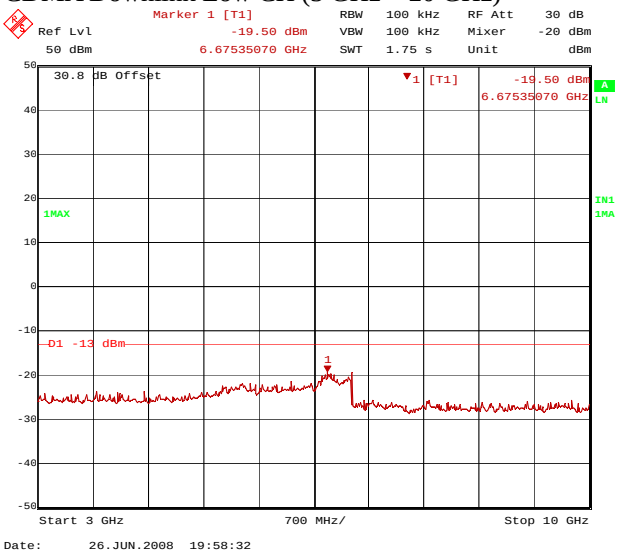
Figure 3: Plot of the Spurious Emissions at Antenna Terminals

CDMA Downlink Low CH (30 MHz ~ 3 GHz)



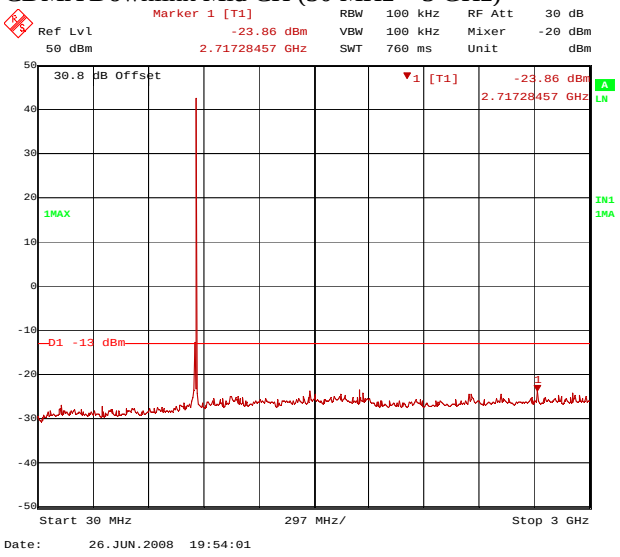
Date: 26.JUN.2008 19:51:57

CDMA Downlink Low CH (3 GHz ~ 20 GHz)



Date: 26.JUN.2008 19:58:32

CDMA Downlink Mid CH (30 MHz ~ 3 GHz)



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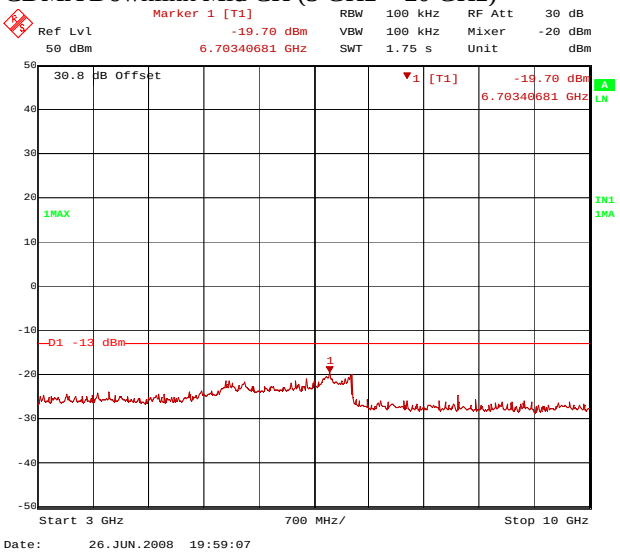
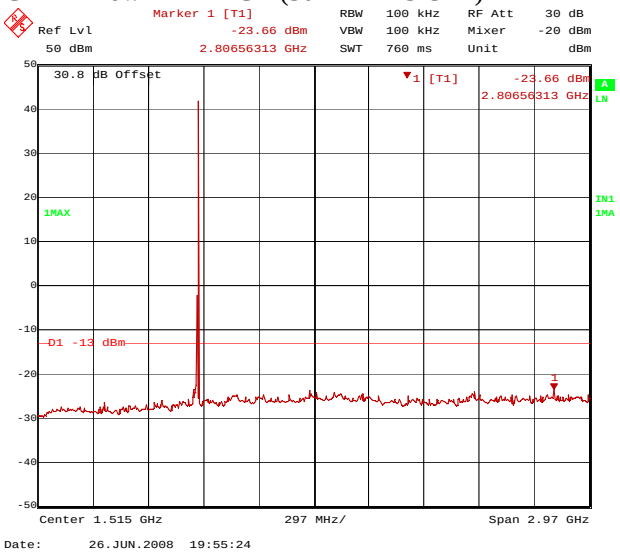
CDMA Downlink Mid CH (3 GHz ~ 20 GHz)



Date: 26.JUN.2008 19:59:07

CDMA Downlink Hi CH (30 MHz ~ 3 GHz)



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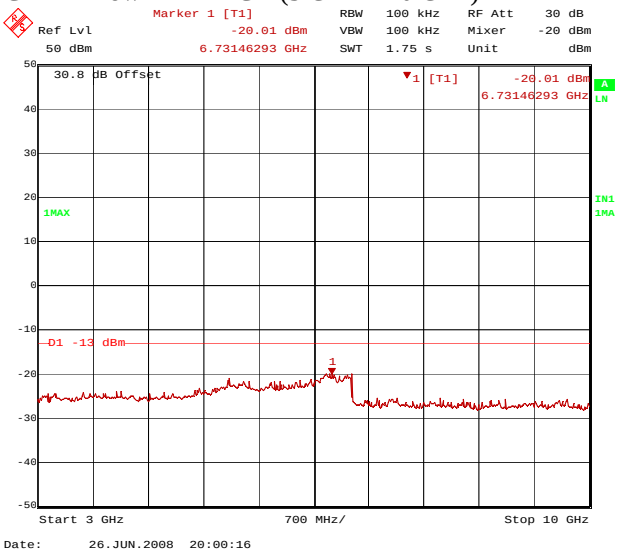
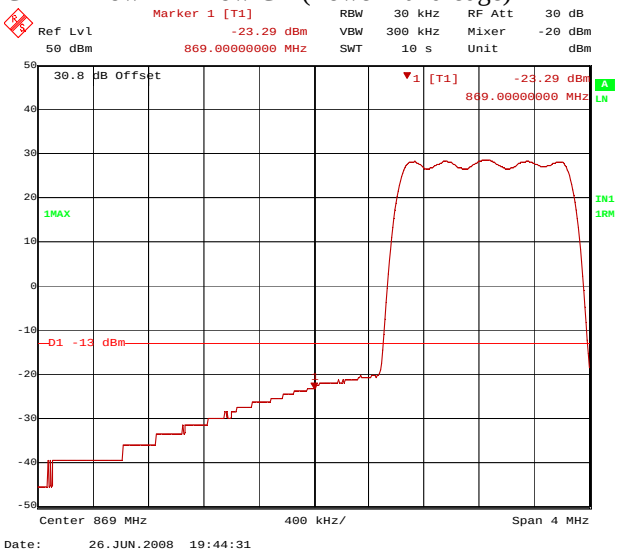
CDMA Downlink Hi CH (3 GHz ~ 20 GHz)

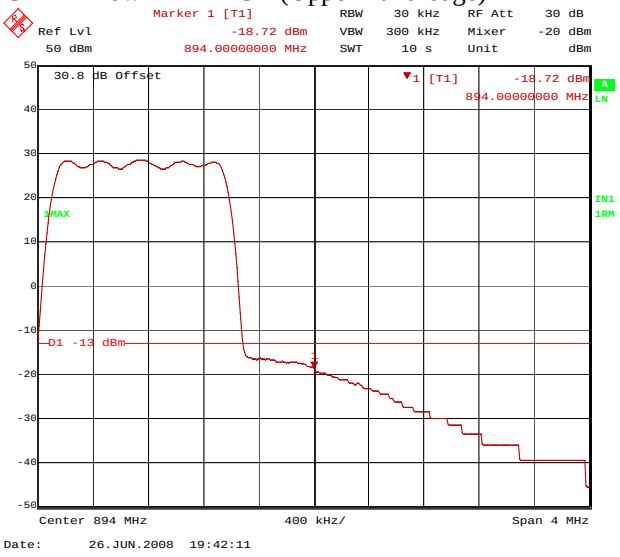


Date: 26.JUN.2008 20:00:16

CDMA Downlink Low CH (Lower Band-edge)



CDMA Downlink Hi CH (Upper Band-edge)



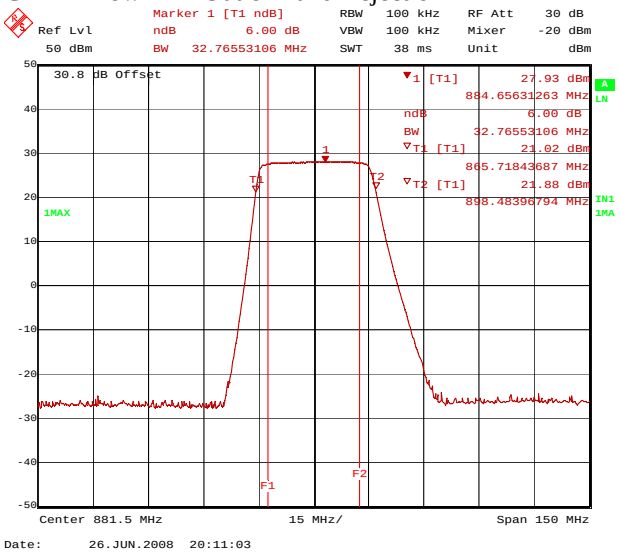
CDMA Downlink Low CH (Inter-modulation)

Not needed for Single Channel systems.

CDMA Downlink Hi CH (Inter-modulation)

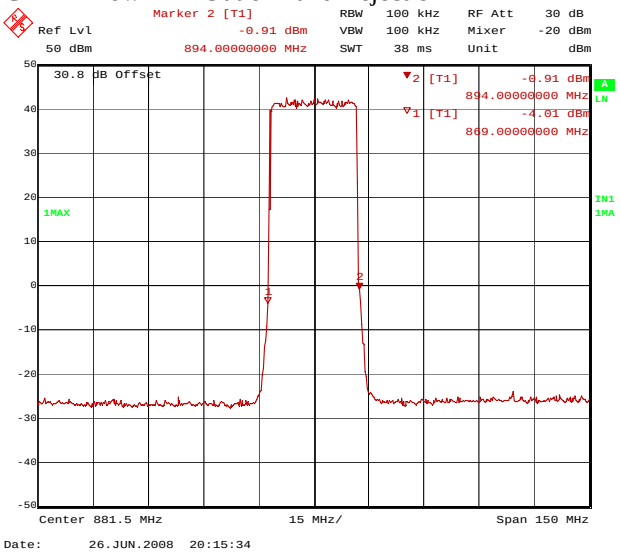
Not needed for Single Channel systems.

CDMA Downlink Out of Band Rejection



INPUT: swept (in-band & out-band) CW signal

CDMA Downlink Out of Band Rejection



INPUT: swept (in-band) CDMA signal

5.4 FIELD STRENGTH OF SPURIOUS RADIATION

5.4.1 Regulation

According to §2.1053(a), measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

According to §2.1053(b), the measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25MHz.
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the commission.

According to §22.917 Emission limitations for cellular Equipment, The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

According to §22.917 (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+10log(P) dB.

5.4.2 Test Procedure

The measurements were made in accordance with the procedures of TIA-603-C.

1. The EUT was set at a distance of 3 m from the receiving antenna.
2. The EUT RF ports were terminated to 50 ohm load.
3. The EUT was set to transmit at the low, middle and high channels of the transmitter frequency range at its maximum power level.
4. The EUT was rotated about 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission.
5. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated.
6. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value.

7. These steps were carried out with the receiving antenna in both vertical and horizontal polarization.
8. Harmonic emissions up to the 10th or 40GHz, which ever was the lesser, were investigated.

5.4.3 Test Results: **PASS**

Table 3: Measured values of the spurious emissions (Radiated)

Frequency (MHz)	RBW (kHz)	Pol. (V/H)	Reading (dBm)	Substitution Antenna Gain (dBd)	Power into Substitution Antenna (dBm)	ERP (dB/m)	Limit (dBm)	Margin [dB]

No emissions were detected at a level greater than 20 dB below the Limit.

ERP (dBm) = Power into Substitution Antenna (dBm) + Substitution Antenna Gain (dBd)

Margin (dB) = Limit (dBm) - ERP (dBm)