

FCC RF Test Report

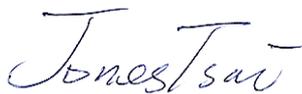
APPLICANT : ZTE CORPORATION
EQUIPMENT : CDMA/EVDO/LTE CPE
BRAND NAME : ZTE
MODEL NAME : MF275U
FCC ID : SRQ-MF275U
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was received on May 06, 2014 and testing was completed on Jun. 03, 2014. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-C-2004 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.



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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	N/A	PASS	-
3.2	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	-
3.1	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
3.1	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.3	§2.1049 §22.917(b) §24.238(b)	Occupied Bandwidth	N/A	PASS	-
3.4	§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	< 43+10log ₁₀ (P[Watts])	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	Conducted Spurious Emission	< 43+10log ₁₀ (P[Watts])	PASS	-
3.6	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log ₁₀ (P[Watts])	PASS	Under limit 38.38 dB at 7520.000 MHz
3.7	§2.1055 §22.355 §24.235	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-

1 General Description

1.1 Applicant

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong,
518057, P. R. China

1.2 Manufacturer

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong,
518057, P. R. China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	CDMA/EVDO/LTE CPE
Brand Name	ZTE
Model Name	MF275U
FCC ID	SRQ-MF275U
EUT supports Radios application	CDMA/EV-DO/LTE/ WLAN 2.4GHz 802.11b/g/n HT20/HT40/ WLAN 5GHz 802.11a/n HT20/HT40
HW Version	dcmB
SW Version	MF275U1.0.3
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	CDMA2000 BC0: 824.70 MHz ~ 848.31 MHz CDMA2000 BC1: 1851.25 MHz ~ 1908.75 MHz
Rx Frequency	CDMA2000 BC0: 869.70 MHz ~ 893.31 MHz CDMA2000 BC1: 1931.25 MHz ~ 1988.75 MHz
Maximum Output Power to Antenna	CDMA2000 BC0 : 25.41 dBm CDMA2000 BC1 : 25.89 dBm
Antenna Type	Dipole Antenna
Antenna Gain	CDMA Antenna:1xRTT CDMA2000 BC0 : 0.80 dBi CDMA2000 BC1 : 2.42 dBi CDMA Antenna: 1xEV-DO CDMA2000 BC0 : 0.10 dBi CDMA2000 BC1 : 3.00 dBi
Type of Modulation	CDMA2000 : QPSK CDMA2000 1xEV-DO : QPSK/8PSK

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	CDMA2000 BC0 1xRTT	QPSK	0.25	0.03 ppm	1M28F9W
Part 24	CDMA2000 BC1 1xRTT	QPSK	0.68	0.01 ppm	1M28F9W

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.		
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
Test Site No.	Sporton Site No.		FCC Registration No.
	TH01-KS	03CH01-KS	149928

Note: The test site complies with ANSI C63.4 2003 requirement.

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 2, 22(H), 24(E)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r01
- FCC KDB 412172 D01 Determining ERP and ERIP v01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r01 with maximum output power.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for CDMA2000 BC0.
2. 30 MHz to 19000 MHz for CDMA2000 BC1.

Test Modes		
Band	Radiated TCs	Conducted TCs
CDMA2000 BC0	■ 1xRTT Link Mode	■ 1xRTT Link Mode
CDMA2000 BC1	■ 1xRTT Link Mode	■ 1xRTT Link Mode

Note: The maximum power levels are chosen to test as the worst case configuration as follows:

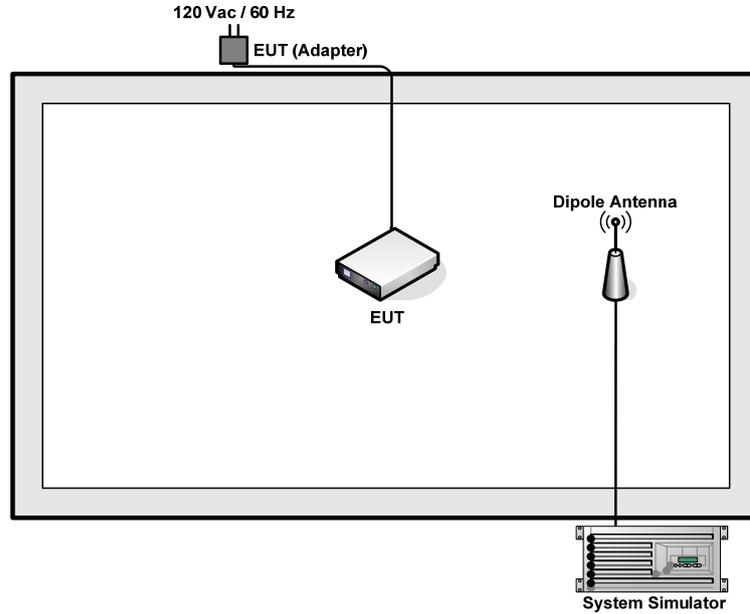
1xRTT RC3+SO55 mode for CDMA2000 BC0,

1xRTT RC3+SO55 mode for CDMA2000 BC1, only these modes were used for all tests.

Conducted Power Measurement Results:

Conducted Power (*Unit: dBm)						
Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC1 SO55	25.39	25.31	25.09	25.88	25.61	24.52
1xRTT RC3 SO55	25.41	25.32	25.11	25.89	25.62	24.53
1xRTT RC3 SO32(+ F-SCH)	25.40	25.30	25.10	25.86	25.60	24.50
1xRTT RC3 SO32(+SCH)	25.40	25.30	25.09	25.87	25.60	24.51
1xEV-DO RTAP 153.6kbps	24.82	24.43	24.31	24.92	24.63	24.52
1xEV-DO RETAP 4096Bits	24.80	24.40	24.30	24.90	24.60	24.50

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	N/A

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 5.2 dB and a 10dB attenuator.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 5.2 + 10 = 15.2 \text{ (dB)} \end{aligned}$$

3 Test Result

3.1 Conducted Output Power and ERP/EIRP Measurement

3.1.1 Description of the Conducted Output Power and ERP/EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for Band 850.

The EIRP of mobile transmitters must not exceed 2 Watts for Band 1900.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

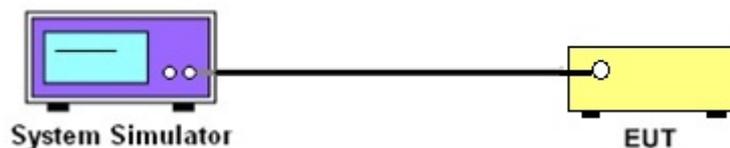
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum average power for CDMA

3.1.4 Test Setup





3.1.5 Test Result of Conducted Output Power

Cellular Band ($G_T - L_C = 0.8\text{dB}$)			
Modes	CDMA 2000 1xRTT		
Test Status	RC3+SO55		
Channel	1013 (Low)	384 (Mid)	777 (High)
Frequency (MHz)	824.70	836.52	848.31
Conducted Power P_T (dBm)	25.41	25.32	25.11
Conducted Power P_T (Watts)	0.35	0.34	0.32
ERP(dBm)	24.06	23.97	23.76
ERP(Watts)	0.25	0.25	0.24

PCS Band ($G_T - L_C = 2.42\text{dB}$)			
Modes	CDMA 2000 1xRTT		
Test Status	RC3+SO55		
Channel	25 (Low)	600 (Mid)	1175 (High)
Frequency (MHz)	1851.25	1880.00	1908.75
Conducted Power P_T (dBm)	25.89	25.62	24.53
Conducted Power P_T (Watts)	0.39	0.36	0.28
EIRP(dBm)	28.31	28.04	26.95
EIRP(Watts)	0.68	0.64	0.50



Cellular Band ($G_T - L_C = 0.1\text{dB}$)			
Modes	CDMA 2000 1xEV-DO Rev. A		
Test Status	RTAP 153.6K		
Channel	1013 (Low)	384 (Mid)	777 (High)
Frequency (MHz)	824.70	836.52	848.31
Conducted Power P_T (dBm)	24.82	24.43	24.31
Conducted Power P_T (Watts)	0.30	0.28	0.27
ERP(dBm)	22.77	22.38	22.26
ERP(Watts)	0.19	0.17	0.17

PCS Band ($G_T - L_C = 3.00\text{dB}$)			
Modes	CDMA 2000 1xEV-DO Rev. A		
Test Status	RTAP 153.6K		
Channel	25 (Low)	600 (Mid)	1175 (High)
Frequency (MHz)	1851.25	1880.00	1908.75
Conducted Power P_T (dBm)	24.92	24.63	24.52
Conducted Power P_T (Watts)	0.31	0.29	0.28
EIRP(dBm)	27.92	27.63	27.52
EIRP(Watts)	0.62	0.58	0.56

Note:

$EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.2 Peak-to-Average Ratio

3.2.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

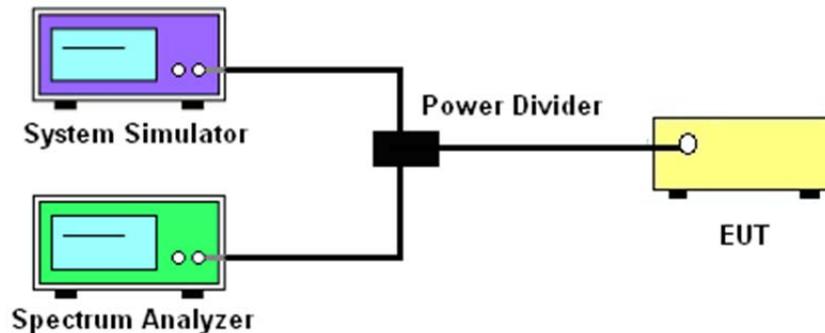
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option on the spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

3.2.4 Test Setup



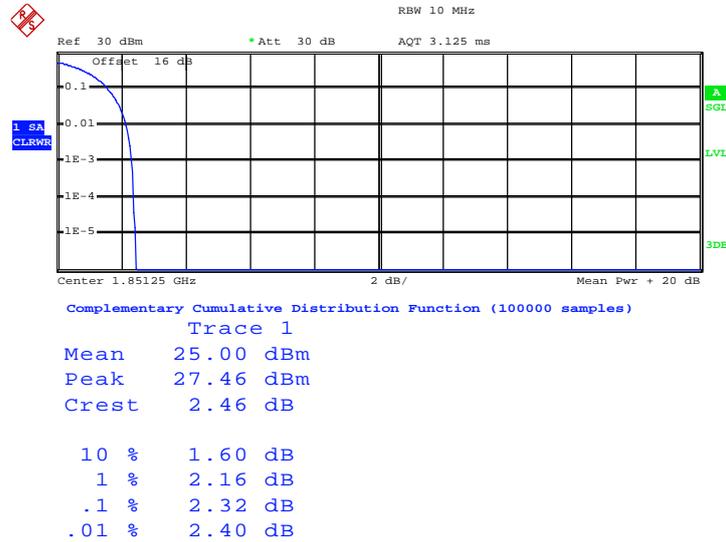
3.2.5 Test Result of Peak-to-Average Ratio

CDMA2000 BC1			
Modes	CDMA 2000 1xRTT		
Channel	25 (Low)	600 (Mid)	1175 (High)
Frequency (MHz)	1851.25	1880	1908.75
Peak-to-Average Ratio (dB)	2.32	3.00	2.68

3.2.6 Test Result (Plots) of Peak-to-Average Ratio

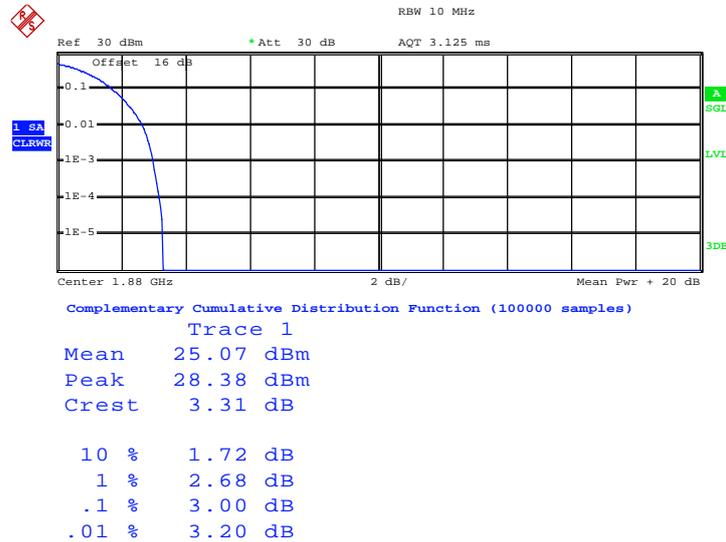
Band :	CDMA2000 BC1	Test Mode :	1xRTT Link (QPSK)
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Peak-to-Average Ratio on Channel 25 (1851.25 MHz)



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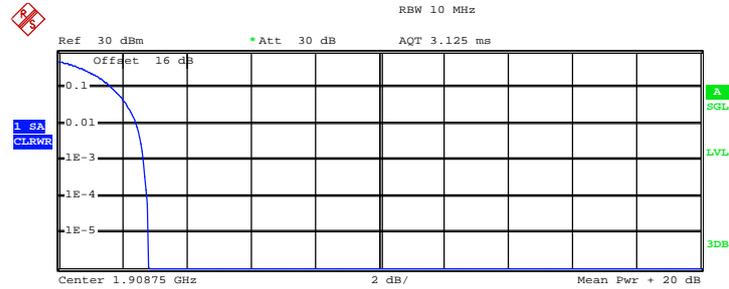
Peak-to-Average Ratio on Channel 600 (1880 MHz)



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Peak-to-Average Ratio on Channel 1175 (1908.75 MHz)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean	23.85 dBm
Peak	26.68 dBm
Crest	2.84 dB
10 %	1.68 dB
1 %	2.44 dB
.1 %	2.68 dB
.01 %	2.80 dB

Date: 28.MAY.2014 18:10:36

3.3 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.3.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

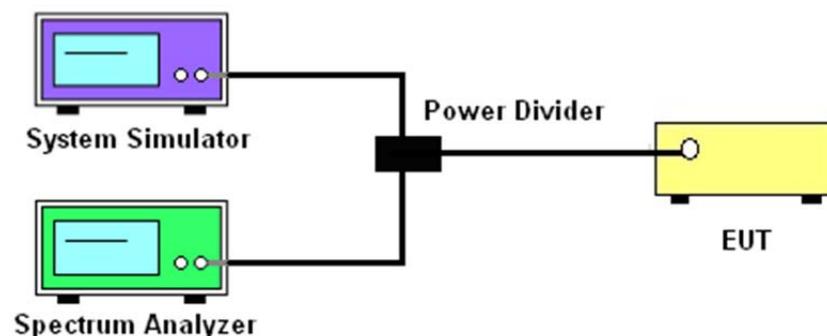
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.
4. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

3.3.4 Test Setup





3.3.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

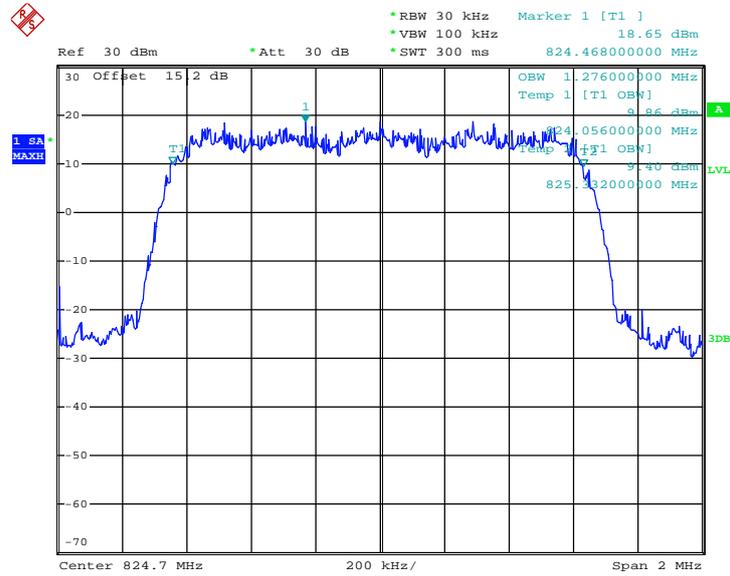
CDMA2000 BC0			
Test Mode	CDMA 2000 1xRTT		
Test Status	RC3+SO55		
Channel	1013 (Low)	384 (Mid)	777 (High)
Frequency (MHz)	824.70	836.52	848.31
99% OBW (MHz)	1.276	1.276	1.280
26dB BW (MHz)	1.420	1.424	1.432

CDMA2000 BC1			
Test Mode	CDMA 2000 1xRTT		
Test Status	RC3+SO55		
Channel	25 (Low)	600 (Mid)	1175 (High)
Frequency (MHz)	1851.25	1880.00	1908.75
99% OBW (MHz)	1.284	1.276	1.280
26dB BW (MHz)	1.456	1.424	1.444

3.3.6 Test Result (Plots) of Occupied Bandwidth and 26dB Bandwidth

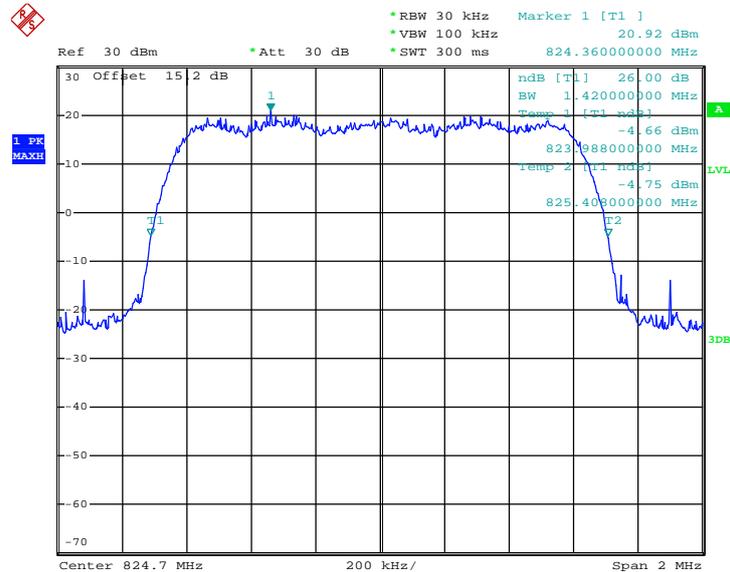
Band :	CDMA2000 BC0	Test Mode :	1xRTT_RC3+SO55 (QPSK)
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99% Occupied Bandwidth Plot on Channel 1013 (824.7 MHz)



Date: 28.MAY.2014 16:45:39

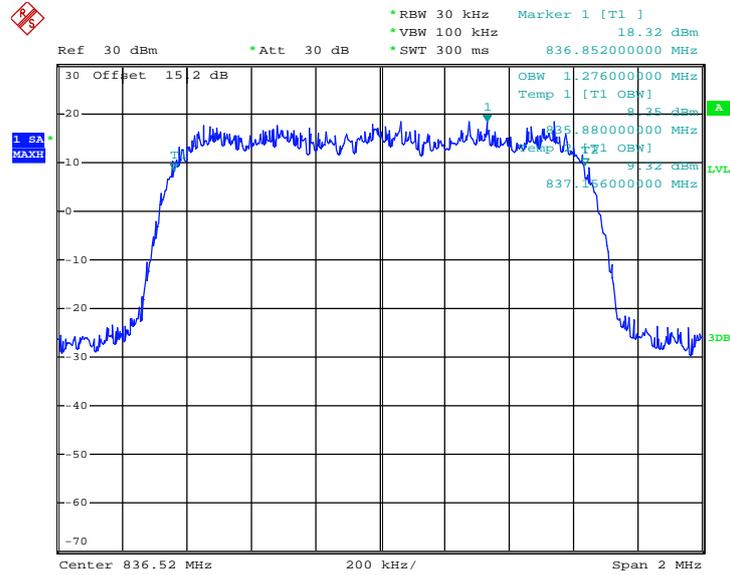
26dB Bandwidth Plot on Channel 1013 (824.7 MHz)



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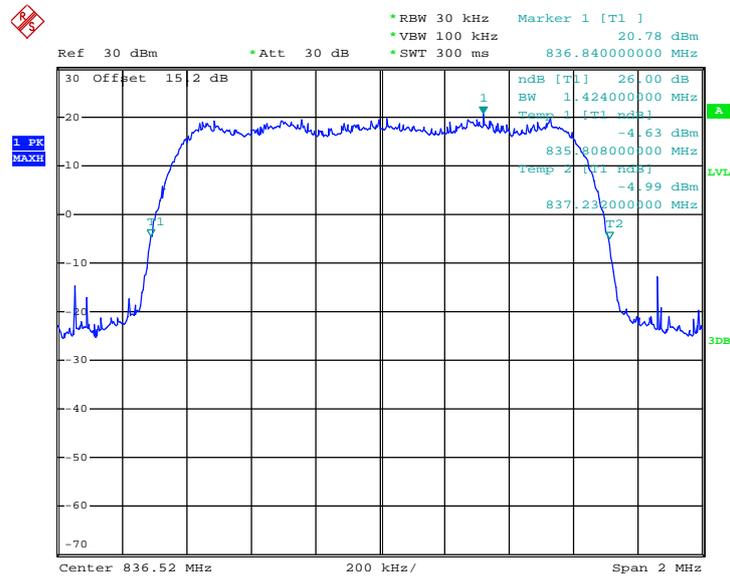


99% Occupied Bandwidth Plot on Channel 384 (836.52 MHz)



Date: 28.MAY.2014 16:45:17

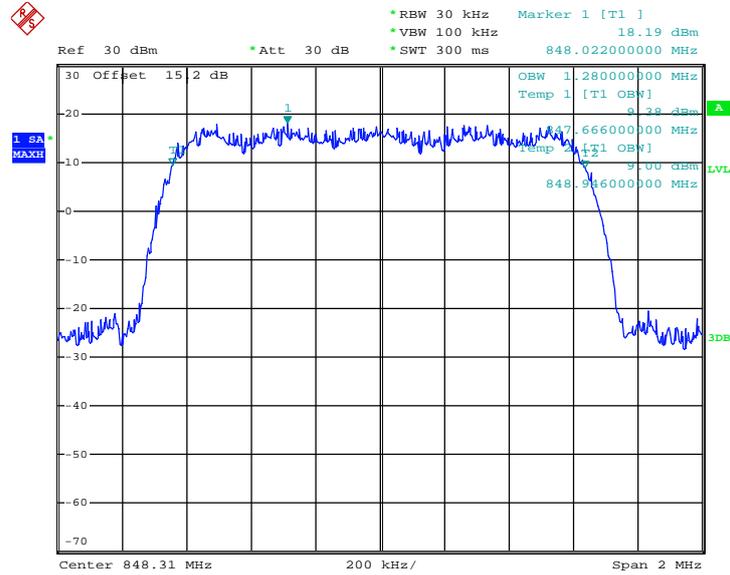
26dB Bandwidth Plot on Channel 384 (836.52 MHz)



Date: 28.MAY.2014 16:41:50

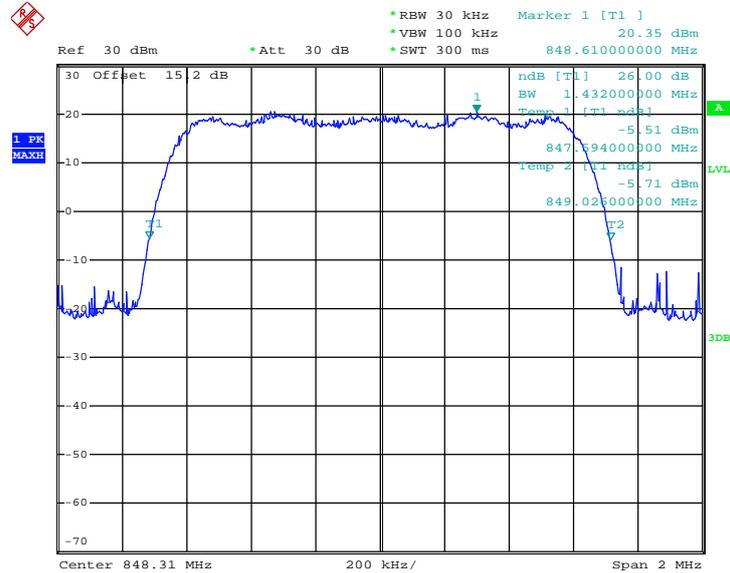


99% Occupied Bandwidth Plot on Channel 777 (848.31 MHz)



Date : 28.MAY.2014 16:44:54

26dB Bandwidth Plot on Channel 777 (848.31 MHz)

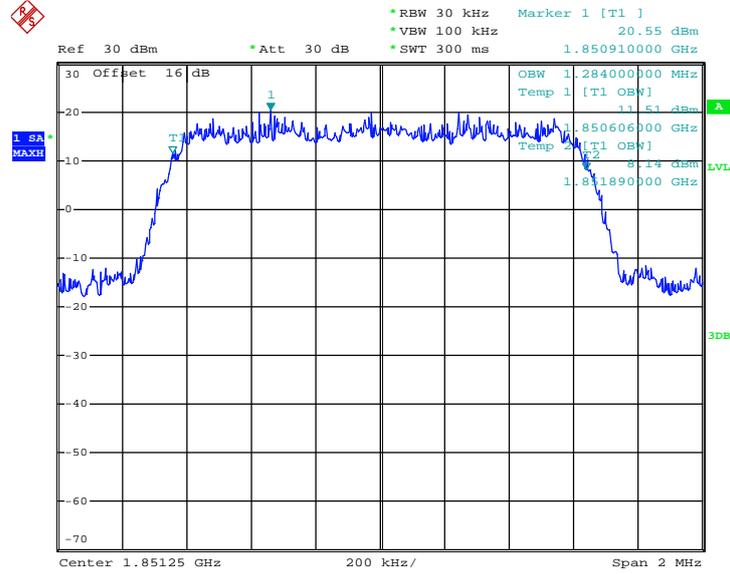


Date : 28.MAY.2014 16:43:55



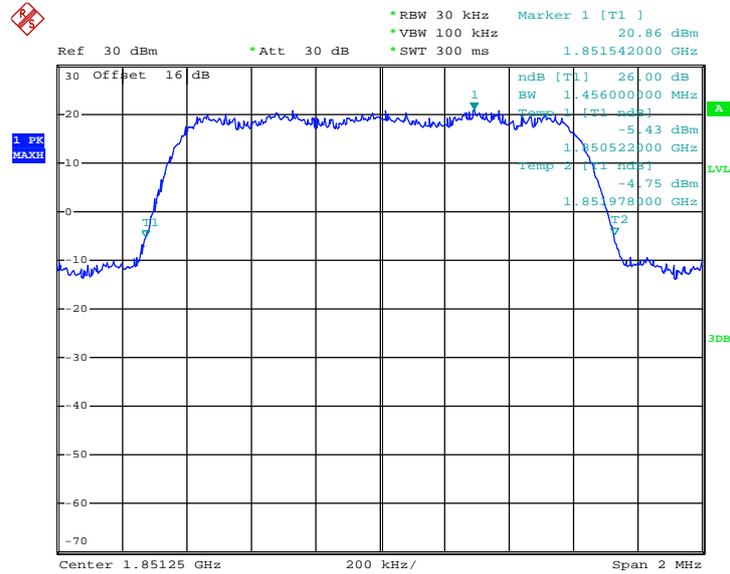
Band :	CDMA2000 BC1	Test Mode :	1xRTT_RC3+SO55 (QPSK)
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99% Occupied Bandwidth Plot on Channel 25 (1851.25 MHz)



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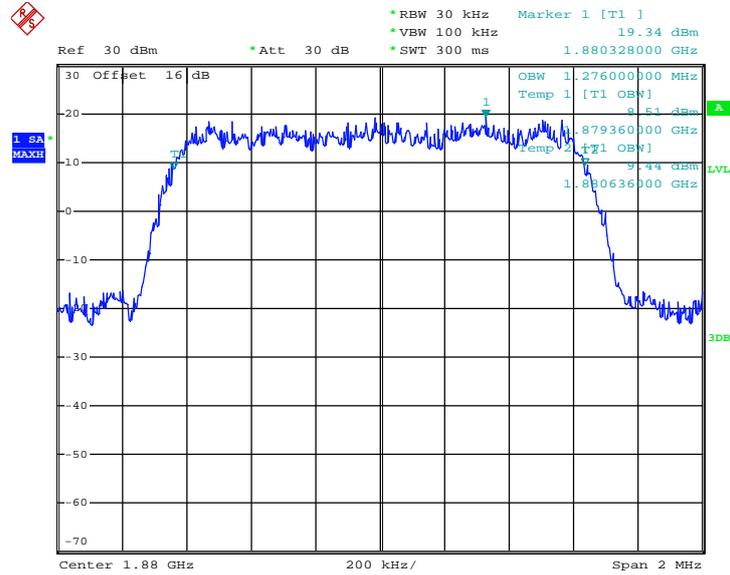
26dB Bandwidth Plot on Channel 25 (1851.25 MHz)



Date: 28.MAY.2014 18:07:50

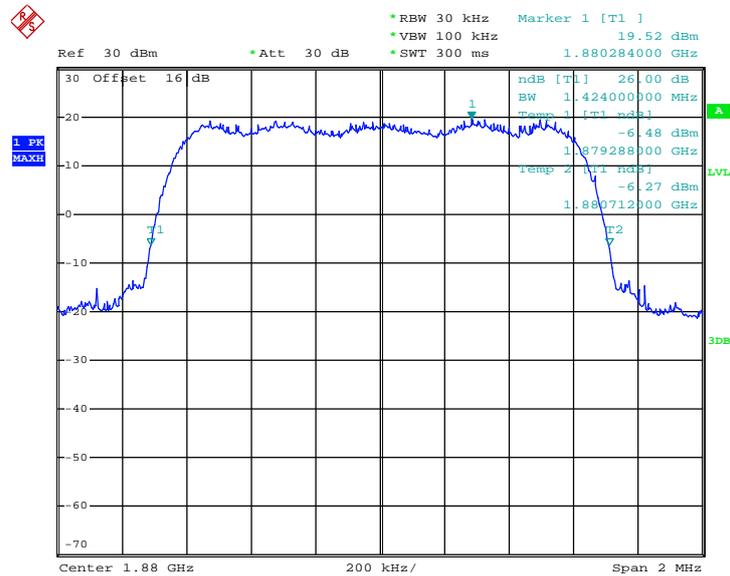


99% Occupied Bandwidth Plot on Channel 600 (1880.0 MHz)



Date: 28.MAY.2014 18:02:47

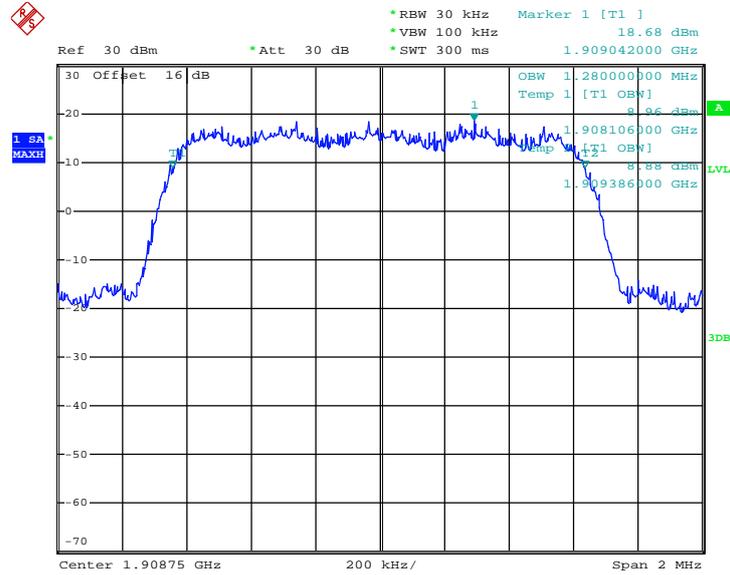
26dB Bandwidth Plot on Channel 600 (1880.0 MHz)



Date: 21.MAY.2014 22:04:03

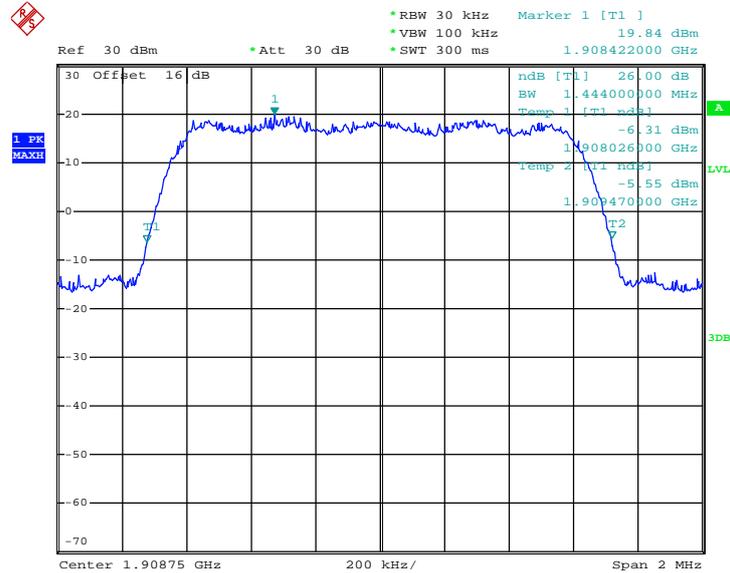


99% Occupied Bandwidth Plot on Channel 1175 (1908.75 MHz)



Date: 28.MAY.2014 18:03:47

26dB Bandwidth Plot on Channel 1175 (1908.75 MHz)



Date: 28.MAY.2014 18:09:25

3.4 Band Edge Measurement

3.4.1 Description of Band Edge Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

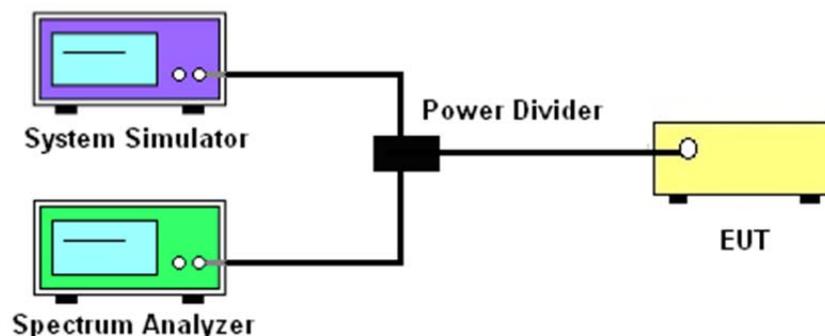
1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The band edges of low and high channels for the highest RF powers were measured.
4. The RBW was replaced by 10 kHz, slightly smaller than the value in (2), due to the spectrum analyzer limitation to set the exact value. A worst case correction factor of $10 \cdot \log (1\% \text{ emission-BW/measurement RBW})$ was compensated.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$

$$= -13\text{dBm}.$$

3.4.4 Test Setup

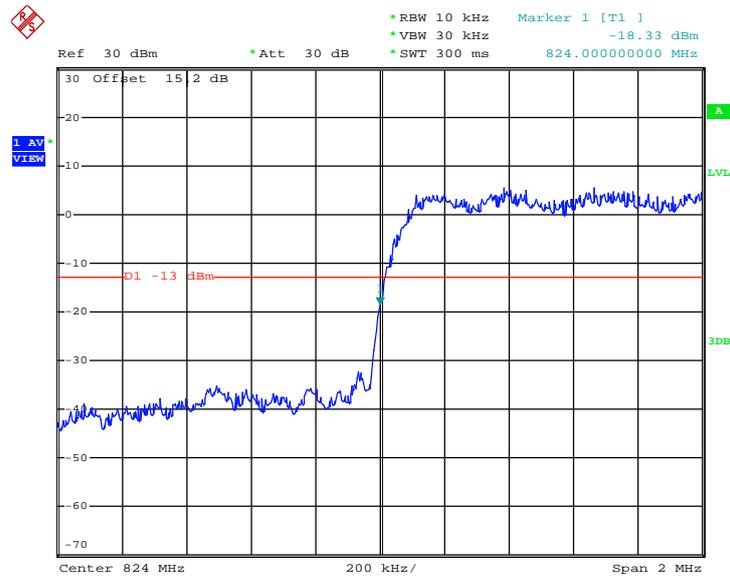




3.4.5 Test Result (Plots) of Conducted Band Edge

Band :	CDMA2000 BC0	Test Mode :	1xRTT_RC3+SO55 (QPSK)
Correction Factor :	1.56dB	Maximum 26dB Bandwidth :	1.432MHz
Band Edge :	-16.77dBm	Measurement Value :	-18.33dBm

Lower Band Edge Plot on Channel 1013 (824.7 MHz)



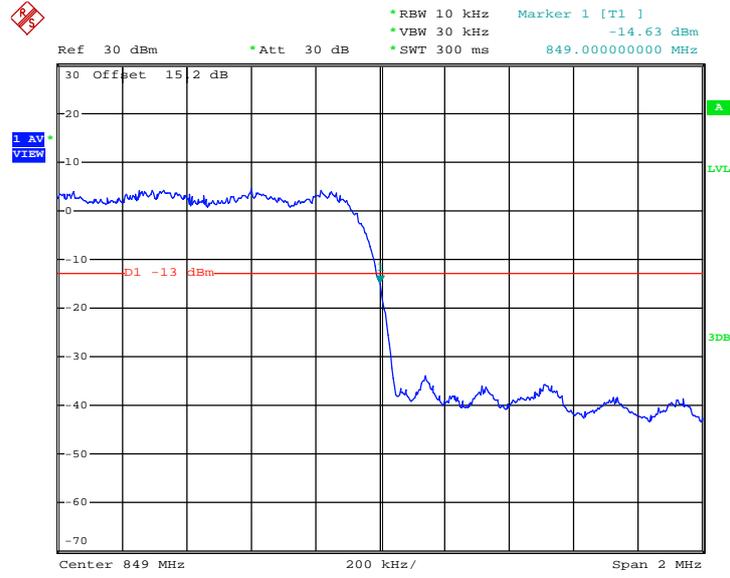
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1. Correction Factor(dB)= 10log(1% Emission BW/RBW)
2. Band Edge= Measurement Value + Correction Factor(dB)



Band :	CDMA2000 BC0	Test Mode :	1xRTT_RC3+SO55 (QPSK)
Correction Factor :	1.56dB	Maximum 26dB Bandwidth :	1.432MHz
Band Edge :	-13.07dBm	Measurement Value :	-14.63dBm

Higher Band Edge Plot on Channel 777 (848.31 MHz)



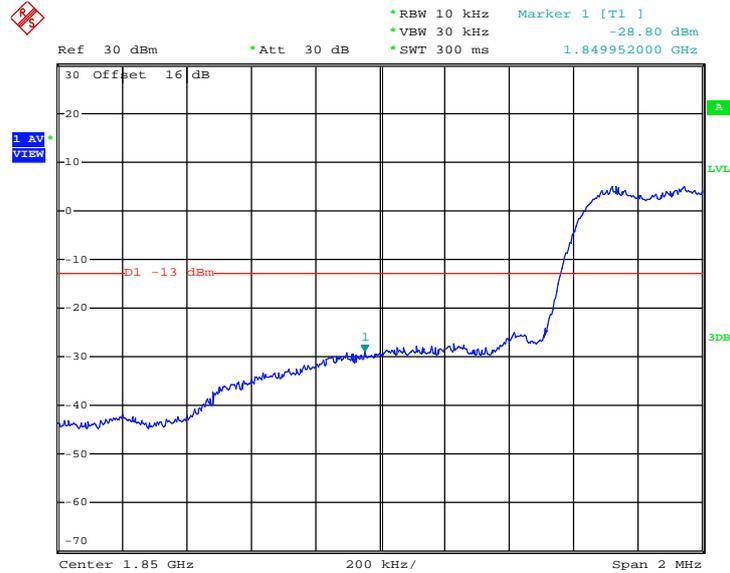
Date: 28.MAY.2014 17:11:46

1. Correction Factor(dB)= 10log(1% Emission BW/RBW)
2. Band Edge= Measurement Value + Correction Factor(dB)



Band :	CDMA2000 BC1	Test Mode :	1xRTT_RC3+SO55 (QPSK)
Correction Factor :	1.63dB	Maximum 26dB Bandwidth :	1.456MHz
Band Edge :	-27.17dBm	Measurement Value :	-28.80dBm

Lower Band Edge Plot on Channel 25 (1851.25 MHz)



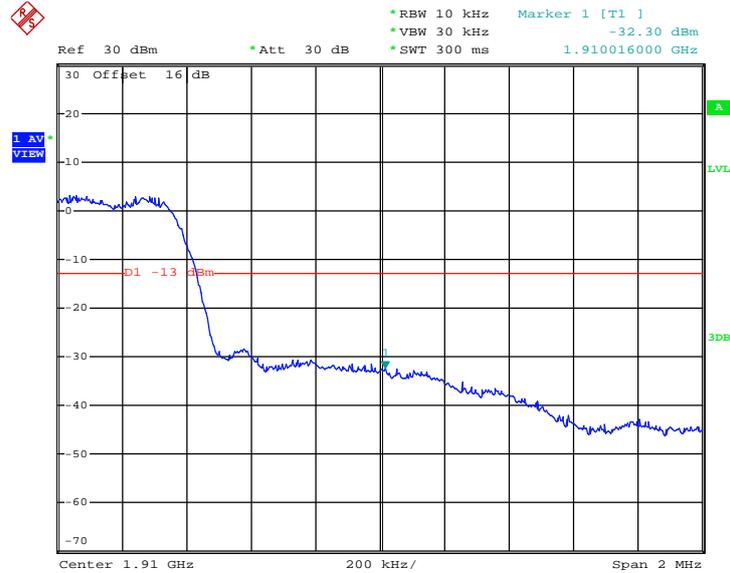
Date: 28.MAY.2014 17:58:38

1. Correction Factor(dB)= $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)



Band :	CDMA2000 BC1	Test Mode :	1xRTT_RC3+SO55 (QPSK)
Correction Factor :	1.63dB	Maximum 26dB Bandwidth :	1.456MHz
Band Edge :	-30.67dBm	Measurement Value :	-32.30dBm

Higher Band Edge Plot on Channel 1175 (1908.75 MHz)



Date: 28.MAY.2014 17:57:41

1. Correction Factor(dB)= $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)

3.5 Conducted Spurious Emission Measurement

3.5.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

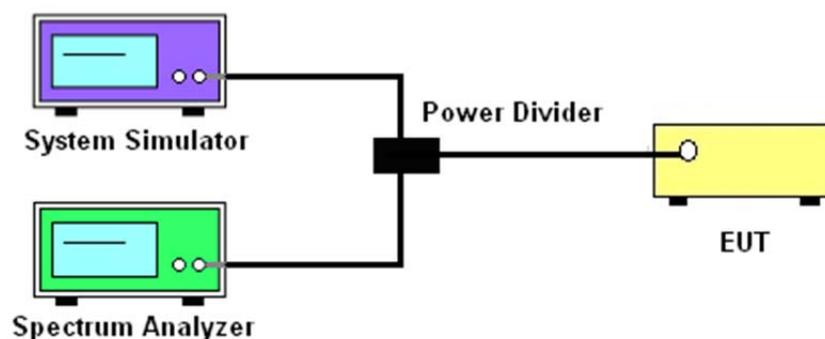
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13\text{dBm}$.

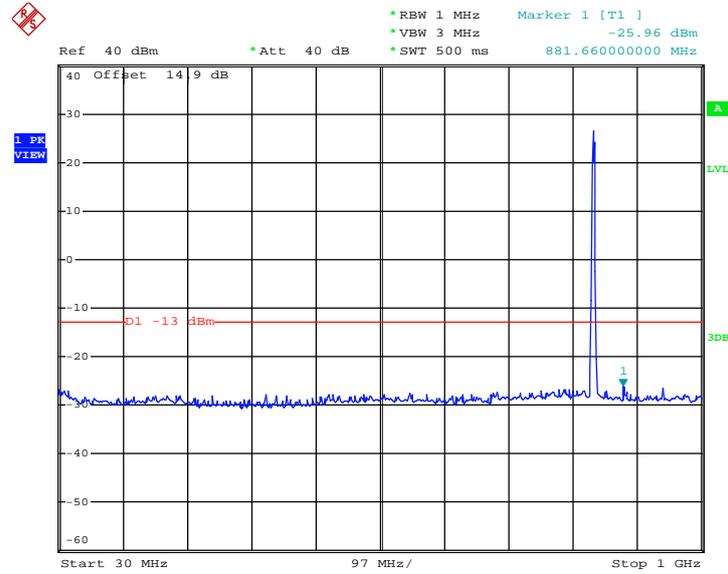
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Spurious Emission

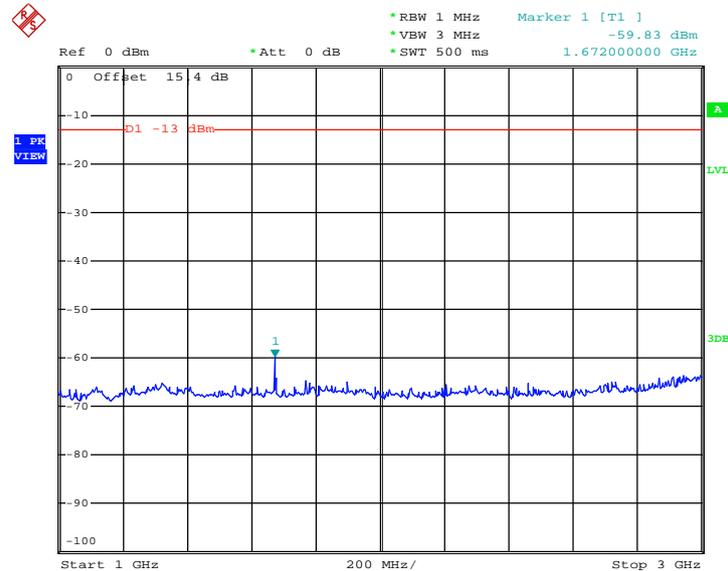
Band :	CDMA2000 BC0	Channel :	CH384
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Frequency :	836.52 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 28.MAY.2014 17:07:47

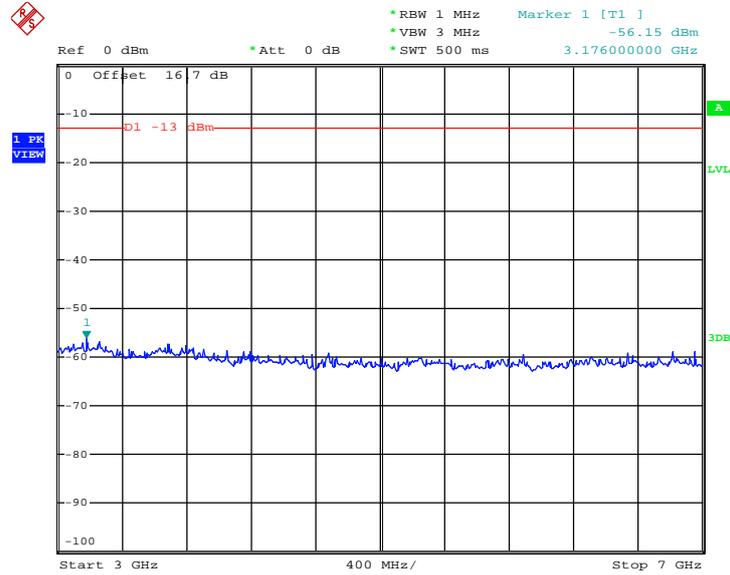
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 28.MAY.2014 17:08:31

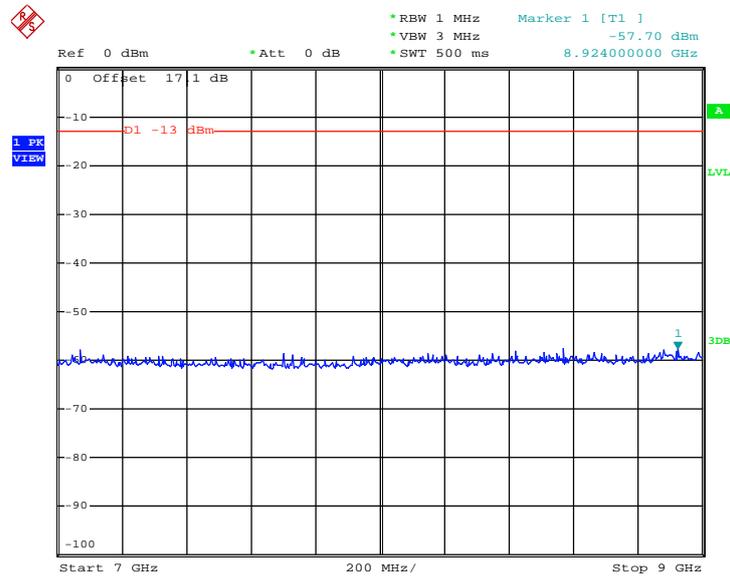


Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 28.MAY.2014 17:08:55

Conducted Spurious Emission Plot between 7GHz ~ 9GHz

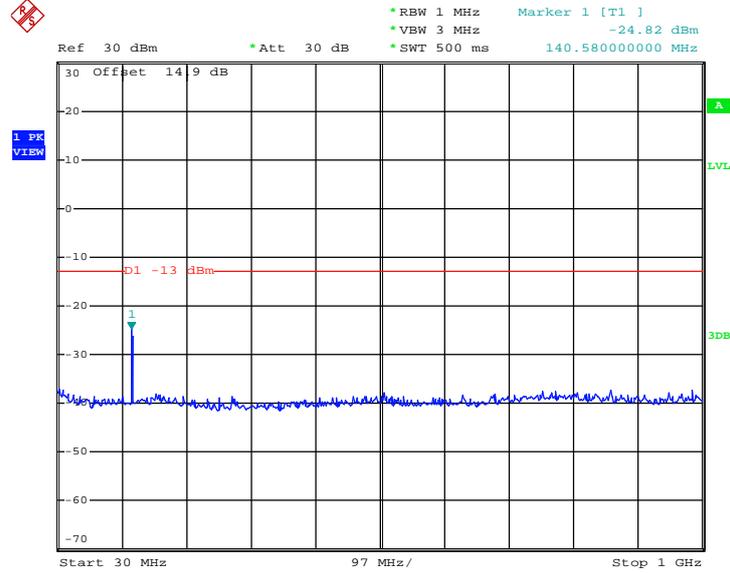


Date: 28.MAY.2014 17:09:21



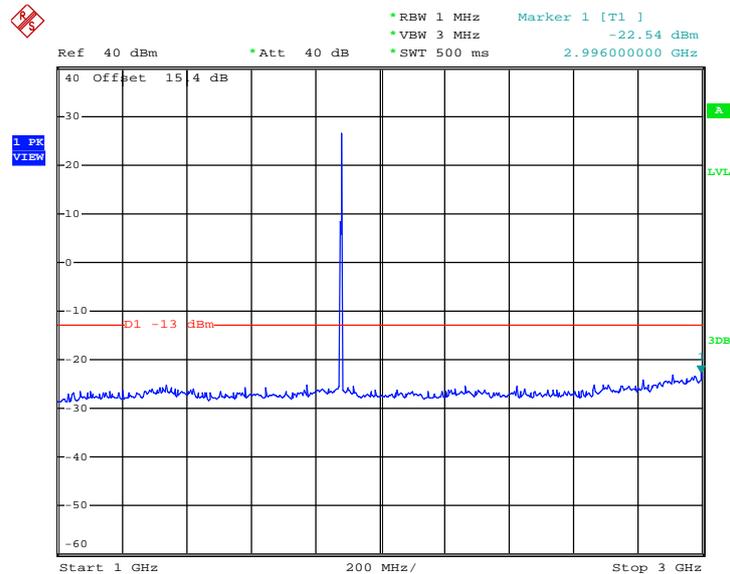
Band :	CDMA2000 BC1	Channel :	CH600
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 28.MAY.2014 18:13:02

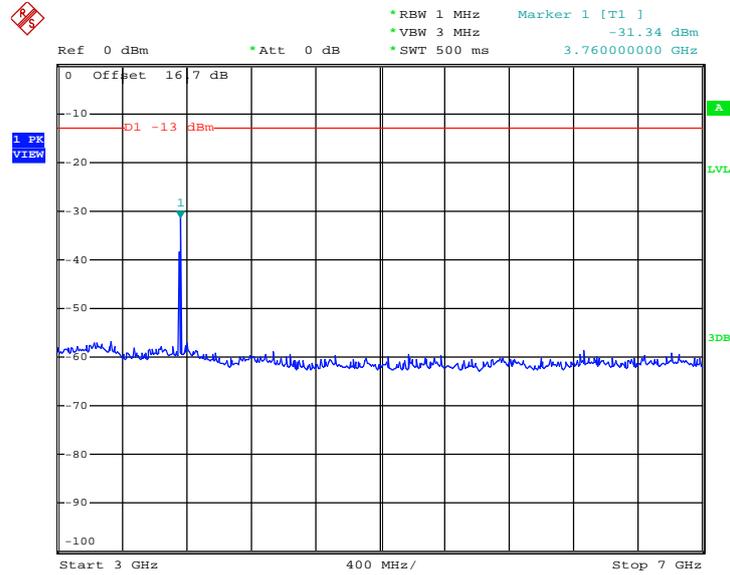
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 28.MAY.2014 18:13:44

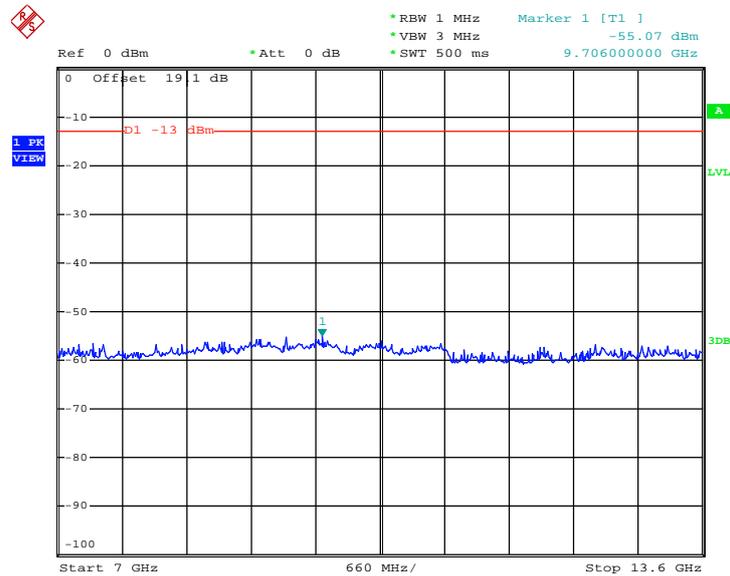


Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 28.MAY.2014 18:21:54

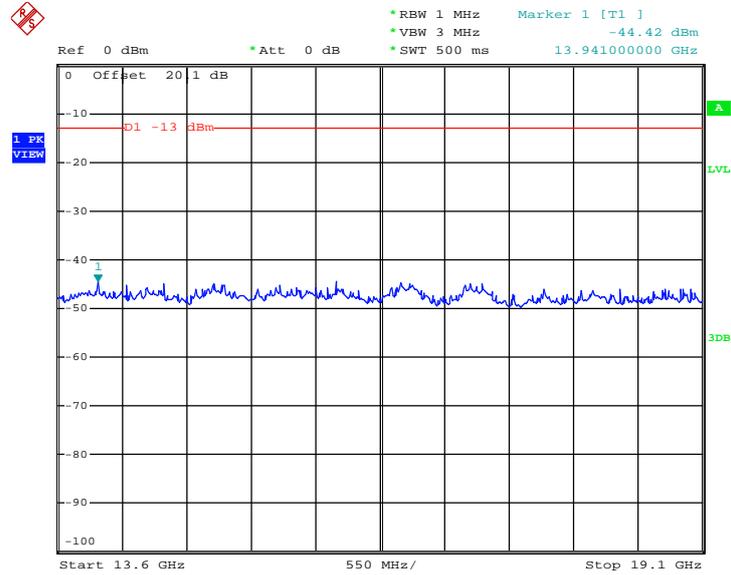
Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 28.MAY.2014 18:22:23



Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz



Date: 28.MAY.2014 18:22:46



3.6 Field Strength of Spurious Radiation Measurement

3.6.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.6.2 Measuring Instruments

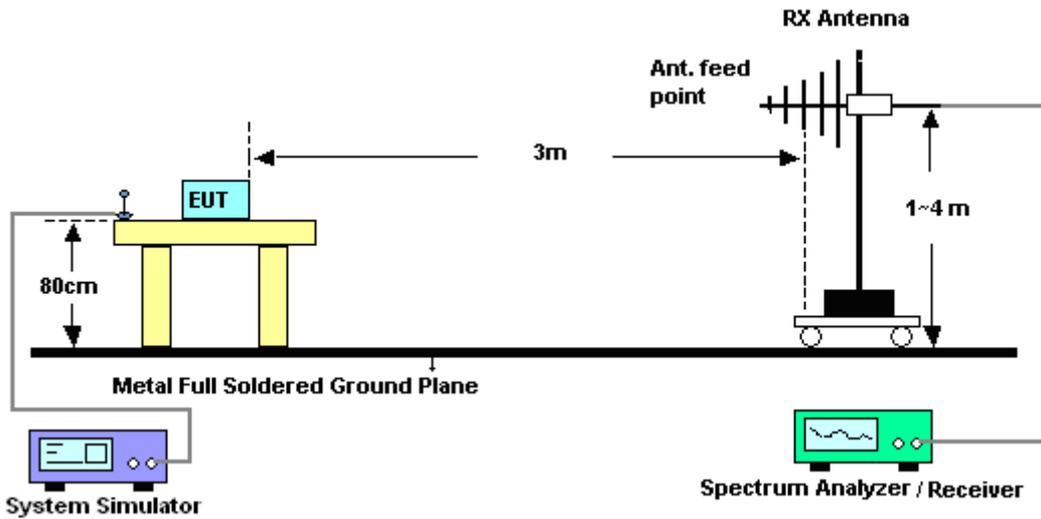
The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

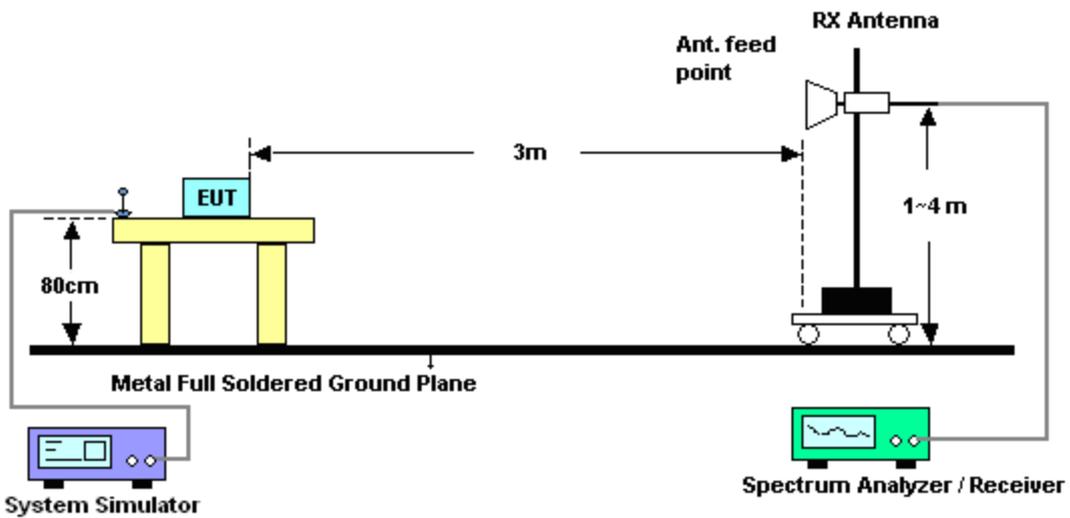
1. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$

3.6.4 Test Setup

For radiated emissions from 30MHz to 1GHz



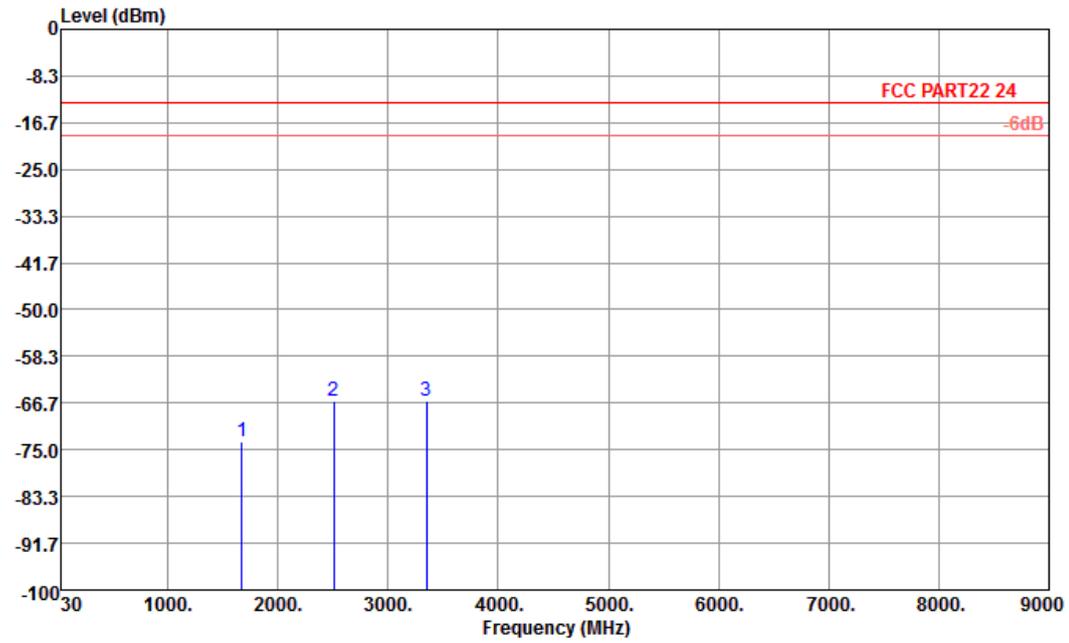
For radiated emissions above 1GHz





3.6.5 Test Result of Field Strength of Spurious Radiated

Band :	CDMA2000 BC0	Temperature :	22~23°C
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Relative Humidity :	40~41%
Test Engineer :	Jun Liu	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

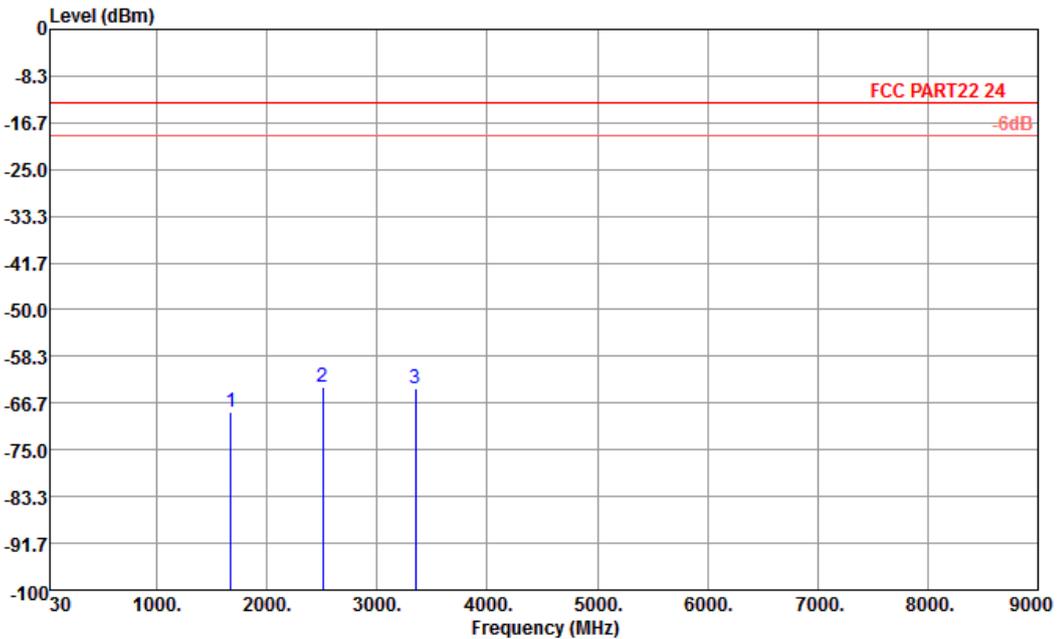


Site : 03CH01-KS
 Condition : FCC PART22 24 HF_EIRP_FACTOR130726 HORIZONTAL

Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-73.67	-13	-60.67	-64.79	-74.32	0.57	3.37	H	Pass
2510	-66.25	-13	-53.25	-64.92	-68.48	0.78	5.16	H	Pass
3346	-66.22	-13	-53.22	-65.85	-69.86	0.87	6.66	H	Pass



Band :	CDMA2000 BC0	Temperature :	22~23°C
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Relative Humidity :	40~41%
Test Engineer :	Jun Liu	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

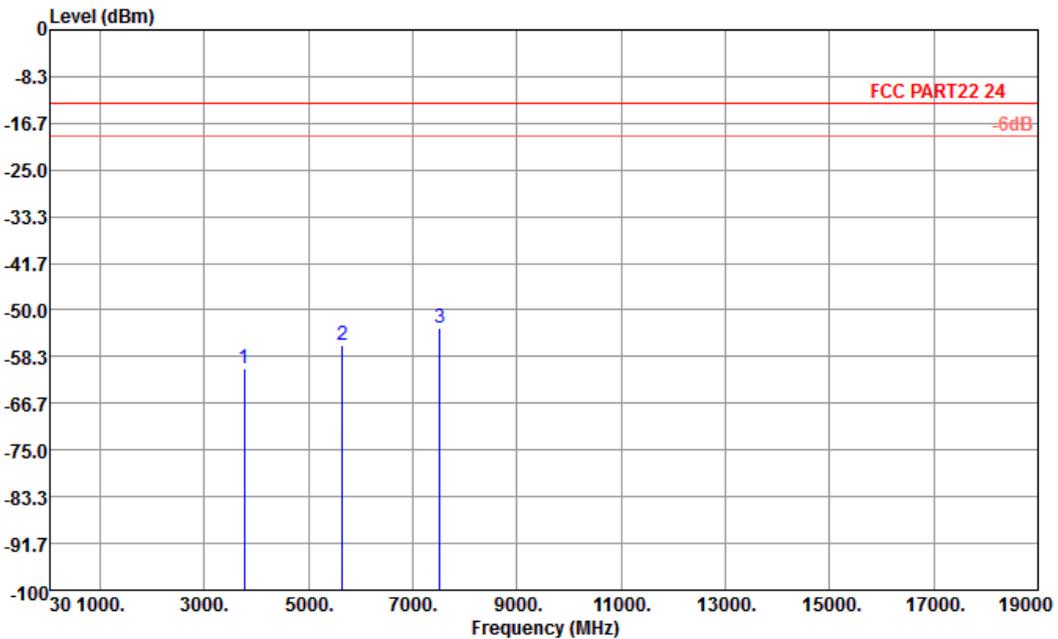


Site : 03CH01-KS
 Condition : FCC PART22 24 HF_EIRP_FACTOR130726 VERTICAL

Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-68.21	-13	-55.21	-64.41	-68.86	0.57	3.37	V	Pass
2510	-63.83	-13	-50.83	-66.26	-66.06	0.78	5.16	V	Pass
3346	-63.95	-13	-50.95	-65.01	-67.59	0.87	6.66	V	Pass



Band :	CDMA2000 BC1	Temperature :	22~23°C
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Relative Humidity :	40~41%
Test Engineer :	Jun Liu	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

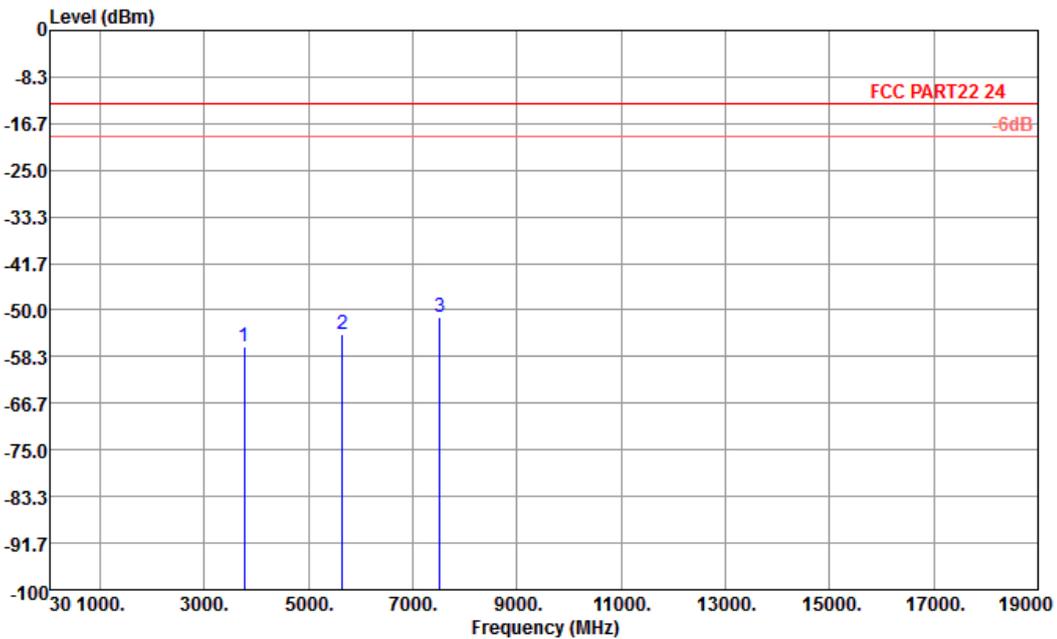


Site : 03CH01-KS
 Condition : FCC PART22 24 HF_EIRP_FACTOR130726 HORIZONTAL

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3760	-60.39	-13	-47.39	-63.74	-66.77	0.78	7.16	H	Pass
5640	-56.13	-13	-43.13	-66.19	-64.67	1.04	9.58	H	Pass
7520	-53.33	-13	-40.33	-64.87	-63.44	1.35	11.46	H	Pass



Band :	CDMA2000 BC1	Temperature :	22~23°C
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Relative Humidity :	40~41%
Test Engineer :	Jun Liu	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

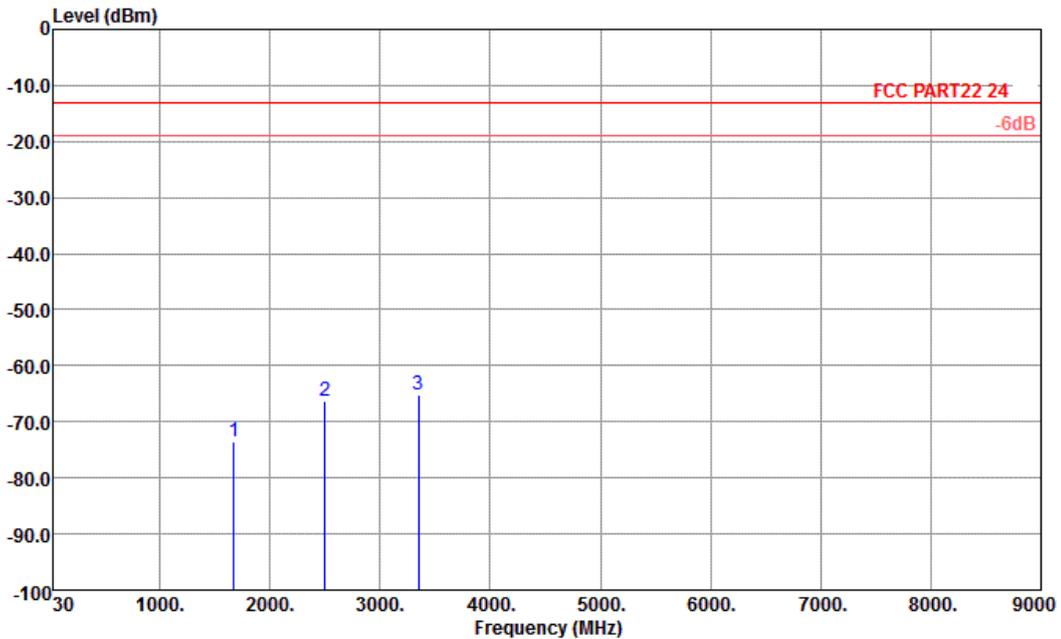


Site : 03CH01-KS
 Condition : FCC PART22 24 HF_EIRP_FACTOR130726 VERTICAL

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3760	-56.45	-13	-43.45	-64.85	-62.83	0.78	7.16	V	Pass
5640	-54.29	-13	-41.29	-66.94	-62.83	1.04	9.58	V	Pass
7520	-51.38	-13	-38.38	-65.47	-61.49	1.35	11.46	V	Pass



Band :	CDMA2000 BC0	Temperature :	22~23°C
Test Mode :	1xEV-DO Rev. A_RTAP 153.6K (QPSK)	Relative Humidity :	40~41%
Test Engineer :	Jun Liu	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

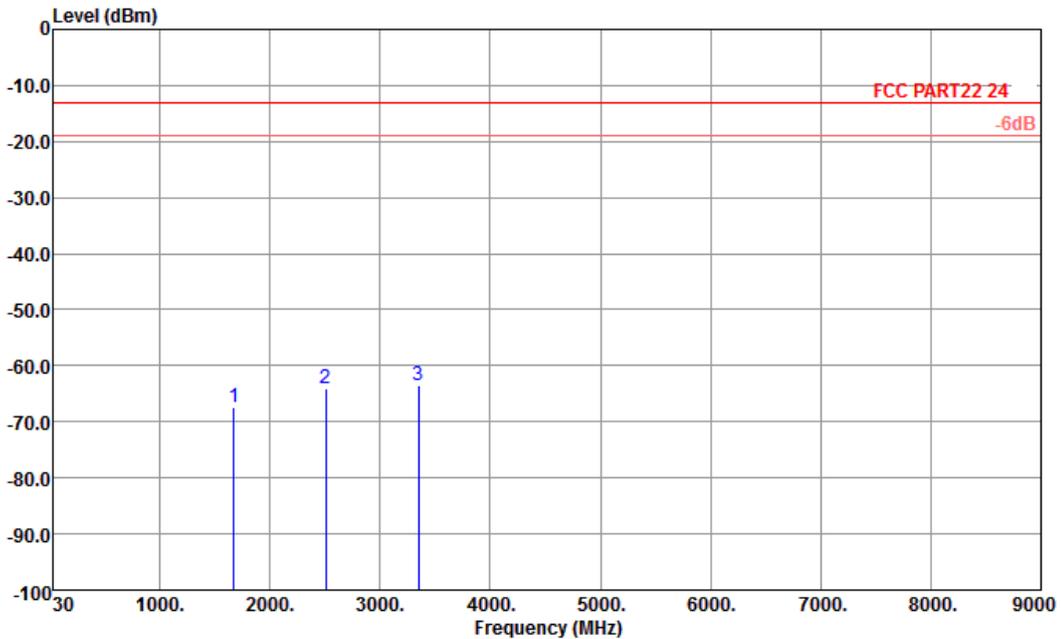


Site : 03CH01-KS
 Condition : FCC PART22 24 HF_EIRP_FACTOR130726 HORIZONTAL

Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-73.64	-13	-60.64	-64.76	-74.29	0.57	3.37	H	Pass
2504	-66.27	-13	-53.27	-64.94	-68.50	0.78	5.16	H	Pass
3350	-65.27	-13	-52.27	-64.90	-68.91	0.87	6.66	H	Pass



Band :	CDMA2000 BC0	Temperature :	22~23°C
Test Mode :	1xEV-DO Rev. A_RTAP 153.6K (QPSK)	Relative Humidity :	40~41%
Test Engineer :	Jun Liu	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

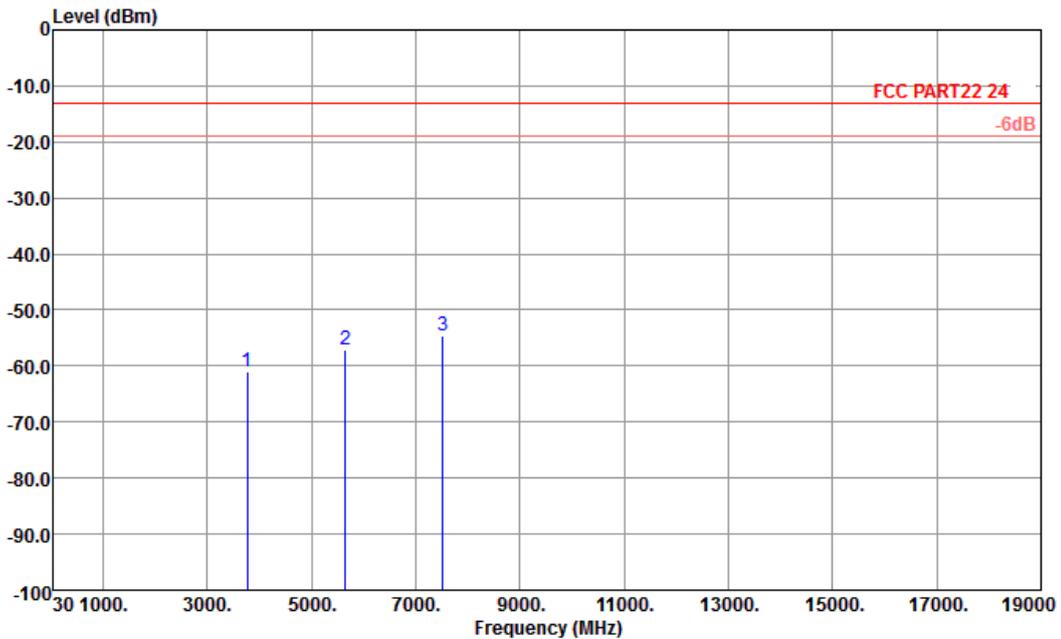


Site : 03CH01-KS
 Condition : FCC PART22 24 HF_EIRP_FACTOR130726 VERTICAL

Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-67.30	-13	-54.30	-63.50	-67.95	0.57	3.37	V	Pass
2508	-64.11	-13	-51.11	-66.54	-66.34	0.78	5.16	V	Pass
3346	-63.63	-13	-50.63	-64.69	-67.27	0.87	6.66	V	Pass



Band :	CDMA2000 BC1	Temperature :	22~23°C
Test Mode :	1xEV-DO Rev. A_RTAP 153.6K (QPSK)	Relative Humidity :	40~41%
Test Engineer :	Jun Liu	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

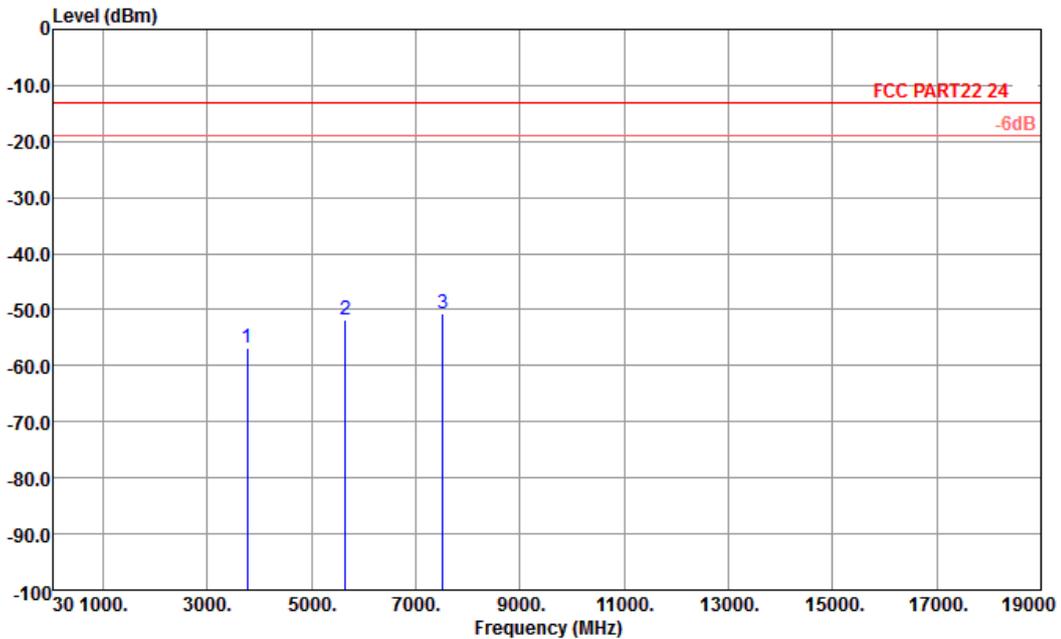


Site : 03CH01-KS
 Condition : FCC PART22 24 HF_EIRP_FACTOR130726 HORIZONTAL

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3764	-61.00	-13	-48.00	-64.35	-67.38	0.78	7.16	H	Pass
5640	-57.06	-13	-44.06	-67.12	-65.60	1.04	9.58	H	Pass
7520	-54.63	-13	-41.63	-66.17	-64.74	1.35	11.46	H	Pass



Band :	CDMA2000 BC1	Temperature :	22~23°C
Test Mode :	1xEV-DO Rev. A_RTAP 153.6K (QPSK)	Relative Humidity :	40~41%
Test Engineer :	Jun Liu	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-KS
 Condition : FCC PART22 24 HF_EIRP_FACTOR130726 VERTICAL

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3760	-56.85	-13	-43.85	-65.25	-63.23	0.78	7.16	V	Pass
5640	-51.94	-13	-38.94	-64.59	-60.48	1.04	9.58	V	Pass
7522	-50.58	-13	-37.58	-64.67	-60.69	1.35	11.46	V	Pass

3.7 Frequency Stability Measurement

3.7.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

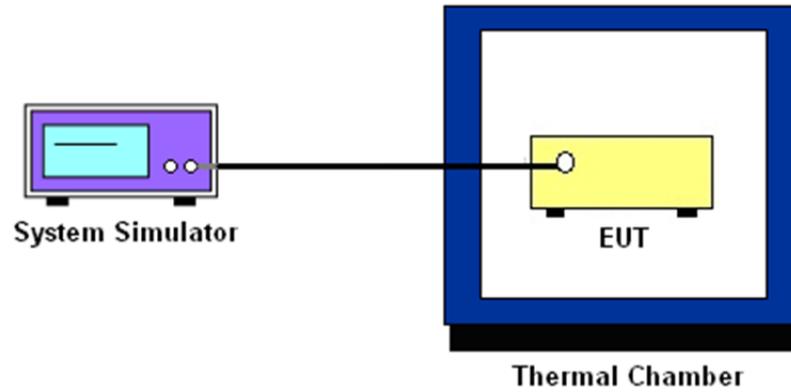
3.7.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C steps up to 50°C . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.7.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at $25\pm 5^{\circ}\text{C}$ and connected with the system simulator.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

3.7.5 Test Setup





3.7.6 Test Result of Temperature Variation

Band :	CDMA2000 BC0 1xRTT_RC3+SO55	Channel :	384
Limit (ppm) :	2.5	Frequency :	836.52 MHz

Temperature (°C)	Freq. Dev. (Hz)	Deviation (ppm)	Result
-30	-24	-0.03	PASS
-20	16	+0.02	
-10	15	+0.02	
0	-13	-0.02	
10	17	+0.02	
20	16	+0.02	
30	-15	-0.02	
40	14	+0.02	
50	11	+0.01	

Band :	CDMA2000 BC1 1xRTT_RC3+SO55	Channel :	600
Limit (ppm) :	2.5	Frequency :	1880.0 MHz

Temperature (°C)	Freq. Dev. (Hz)	Deviation (ppm)	Result
-30	22	+0.01	PASS
-20	18	+0.01	
-10	-16	-0.01	
0	14	+0.01	
10	11	+0.01	
20	-13	-0.01	
30	-17	-0.01	
40	15	+0.01	
50	12	+0.01	



3.7.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
CDMA2000 BC0 CH384	1xRTT RC3+SO55	3.7	11	+0.01	2.5	Pass
		BEP	-15	-0.02		
		4.2	17	+0.02		
CDMA2000 BC1 CH600	1xRTT RC3+SO55	3.7	-16	-0.01		
		BEP	-13	-0.01		
		4.2	15	+0.01		

Note:

- 1. Normal Voltage = 3.7V.
- 2. Battery End Point (BEP) = 3.5 V.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 28, 2013	May 21, 2014~ May 28, 2014	Dec. 27, 2014	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Dec. 10, 2013	May 21, 2014~ May 28, 2014	Dec. 09, 2014	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 05, 2013	May 17, 2014~ Jun. 03, 2014	Nov. 04, 2014	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP30	101399	9kHz~30GHz	May 04, 2014	May 17, 2014~ Jun. 03, 2014	May 03, 2015	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Jan. 08, 2014	May 17, 2014~ Jun. 03, 2014	Jan. 07, 2015	Radiation (03CH01-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 08, 2014	May 17, 2014~ Jun. 03, 2014	Jan. 07, 2015	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 18, 2013	May 17, 2014~ Jun. 03, 2014	Nov. 17, 2014	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Mar. 10, 2014	May 17, 2014~ Jun. 03, 2014	Mar. 09, 2015	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161073	1MHz~1GHz	May 04, 2014	May 17, 2014~ Jun. 03, 2014	May 03, 2015	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02371	1GHz~26.5GHz	Dec. 10, 2013	May 17, 2014~ Jun. 03, 2014	Dec. 09, 2014	Radiation (03CH01-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	May 17, 2014~ Jun. 03, 2014	NCR	Radiation (03CH01-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 17, 2014~ Jun. 03, 2014	NCR	Radiation (03CH01-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 17, 2014~ Jun. 03, 2014	NCR	Radiation (03CH01-KS)



5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.54
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