

FCC TEST REPORT

Test report No.: EMC- FCC- R0210
FCC ID: TQ8-AT241E6AN
Type of equipment: DIGITAL CAR AVN SYSTEM
Basic Model Name: AT241E6AN
Applicant: Hyundai Mobis Co., Ltd.
FCC Rule Part(s): FCC Part 22 Subpart H and Part 24 Subpart E
Frequency Range: CDMA800 (824.70 MHz ~ 848.31 MHz)
CDMA1 900 (1 851.25 MHz ~ 1 908.75 MHz)
Test result: Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.

The results of testing in this report apply to the product/system which was tested only.

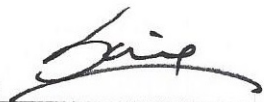
Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of receipt: 2014. 10. 17

Date of test: 2014. 12. 26 ~ 2015. 01. 15

Issued date: 2015. 01. 15

Tested by:



KIM, SUNG SIN

Approved by:



YU, SANG HOON

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1. Client information

Applicant: Hyundai Mobis Co., Ltd.
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Telephone number: +82-31-260-0098
Facsimile number: +82-31-899-1788
Contact person: Seung-Hoon Choe / csh@mobis.co.kr

Manufacturer: Hyundai Mobis Co., Ltd.
Address: 95, Sayang 2-Gil, Munbaek-Myeon, Jincheon-Gun,
Chungcheongbuk-Do 365-862 Korea

2. Laboratory information

Address

EMC compliance Ltd.

480-5, Sin-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea

Telephone Number: 82-70-5008-1021 Facsimile Number: 82-505-299-8311

Certificate

KOLAS No.: 231

FCC Site Designation No.: KR0040

FCC Site Registration No.: 687132

VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849

IC Site Registration No.:8035A-2

SITE MAP



EMC compliance Ltd.

480-5, Sin-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea

82-70-5008-1021 (Main) 82-505-299-8311 (Fax)

3. Description of E.U.T.

3.1 Basic description

Applicant	Hyundai Mobis Co., Ltd.
Address of Applicant	203, Teheran-ro, Gangnam-gu, Seoul, 135-977, Korea
Manufacturer	Hyundai Mobis Co., Ltd.
Address of Manufacturer	95, Sayang 2-Gil, MunBaek-Myeon, Jinchun-Gun, Chungcheongbuk-Do 365-862 Korea
Type of equipment	DIGITAL CAR AVN SYSTEM
Basic Model	AT241E6AN
Serial number	N/A

3.2 General description

Frequency Range	824.70 MHz ~ 848.31 MHz (CDMA800) 1 851.25 MHz ~ 1 908.75 MHz (CDMA1 900) 779.5 MHz ~ 784.5 MHz (LTE Band 13) 1 710.7 MHz ~ 1 754.3 MHz (LTE Band 4) 2 402 MHz ~ 2 480 MHz (Bluetooth) 2 412 MHz ~ 2 462 MHz (802.11b/g/n_HT20)
Type of Modulation	1xRTT, 1xEV-DO (CDMA800, CDMA1 900) QPSK, 16QAM (LTE Band 13, LTE Band 4) IEEE 802.11b/g/n_HT20 (WiFi) GFSK, $\pi/4$ DQPSK, 8DPSK (Bluetooth)
Number of Channels	Proto type Antenna
Antenna Gain	4.27 dBi (CDMA800) 2.30 dBi (CDMA1 900) 2.64 dBi (LTE Band 13) 1.87 dBi (LTE Band 4) 4.12 dBi (WiFi) -3.26 dBi (Bluetooth)
Transmit Power	20.7 dBm (CDMA800) 17.9 dBm (CDMA1 900) 23.65 dBm (LTE Band 13) 24.04 dBm (LTE Band 4) 23.36 dBm (WiFi) 5.36 dBm (Bluetooth)
Power supply	DC 12 V*

* Declared by the applicant.

3.3 Test frequency Test mode

The transmitter has a maximum average output power as follows:

* 1xRTT

-Cellular Band-

Frequency (MHz)	Service Option (SO)	Channel
824.70	RC5 9 (Loopback)	1 013
836.52		384
848.31		777

-PCS Band-

Frequency (MHz)	Service Option (SO)	Channel
1 851.25	RC5 55 (Loopback)	25
1 880.00		600
1 908.75		1 175

* 1xEV-DO

-Cellular Band-

Frequency (MHz)	RTAP Rate	Channel
824.70	1xEV-DO(RelA) RETAP 128	1 013
836.52		384
848.31		777

-PCS Band-

Frequency (MHz)	RTAP Rate	Channel
1 851.25	1xEV-DO(RelA) RETAP 128	25
1 880.00		600
1 908.75		1 175

CDMA (800 / 1 900)

We found out the test mode with the highest power level after we investigated average output power of all the modulations and (or) data rates for each mode. So we chose below test mode as a representative of worst case.

- CDMA (800) 1xRTT : RC5 / 9 (Loopback), 1xEV-DO Rel.A : RETAP / 128
- CDMA (1 900) 1xRTT : RC1 / 55 (Loopback), 1xEV-DO Rel.A : RETAP / 128

3.4 Test Voltage

Mode	Voltage
Norminal voltage	DC 12 V

4. Summary of test results

4.1 Standards & results

FCC Part 22 Subpart H and Part 24 Subpart E			
FCC Rule Reference	Parameter	Report Section	Test Result
§2.1046, §22.913(a) §24.232(c)	RF Radiated Output Power	5.1	C
§2.1053, §22.917(a) §24.238(a)	Spurious Radiated Emission	5.2	C
§2.1046	Conducted Output Power	5.3	C
§2.1049	26 dB Bandwidth	5.4	C
§24.232(d)	Peak-Average Ratio	5.5	C
§2.1051, §22.917(a) §24.238(a)	Spurious Emission at Antenna Terminal	5.6	C
§2.1055, §22.355 §24.235	Frequency Stability	5.7	C
§22.917(a), §24.238(a)	Band Edge	5.8	C
§15.207(a)	Conducted Emission	-	N/A ₁₎
Note: C = complies NC = Not complies NT = Not tested NA = Not Applicable N/A ₁₎ : The test is not applicable since the EUT is not the device that is designed to be connected to the public utility(AC) power line(This EUT is automotive device)			

4.2 Uncertainty

Measurement Item	Expanded Uncertainty $U = KUc$ (K = 2)	
Conducted RF power	± 1.36 dB	
Conducted Spurious Emissions	± 1.52 dB	
Radiated Spurious Emissions	30 MHz ~ 300 MHz:	+ 4.94 dB, - 5.06 dB
		+ 4.93 dB, - 5.05 dB
	300 MHz ~ 1 000 MHz:	+ 4.97 dB, - 5.08 dB
		+ 4.84 dB, - 4.96 dB
	1 GHz ~ 25 GHz:	+ 6.03 dB, - 6.05 dB

5. Test results

5.1 RF Radiated Output Power

5.1.1 Measurement Procedure

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 3 MHz and the video bandwidth was set to 3 MHz.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dB m, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

5.1.2 Limit

FCC §22.913(a), The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.FCC §24.232(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

5.1.3 Test Result

CDMA 800 1xRTT mode

Frequency (MHz)	Ant. Pol. (H/V)	E.R.P.		Limit (mW)
		(dBm)	(mW)	
824.70	H	19.80	95.50	7 000
824.70	V	19.60	91.20	7 000
836.52	H	18.70	74.13	7 000
836.52	V	20.50	112.20	7 000
848.31	H	23.10	204.17	7 000
848.31	V	21.90	154.88	7 000

CDMA 1 900 1xRTT mode

Frequency (MHz)	Ant. Pol. (H/V)	E.R.P.		Limit (mW)
		(dBm)	(mW)	
1 851.25	H	23.80	239.88	2 000
1 851.25	V	24.30	269.15	2 000
1 880.00	H	24.90	309.03	2 000
1 880.00	V	23.60	229.09	2 000
1 908.75	H	24.90	309.03	2 000
1 908.75	V	24.50	281.84	2 000

CDMA 800 1xEV-DO mode

Frequency (MHz)	Ant. Pol. (H/V)	E.R.P.		Limit (mW)
		(dBm)	(mW)	
824.70	H	22.20	165.96	7 000
824.70	V	21.50	141.25	7 000
836.52	H	23.40	218.78	7 000
836.52	V	22.40	173.78	7 000
848.31	H	22.50	177.83	7 000
848.31	V	22.30	169.82	7 000

CDMA 1 900 1xEV-DO mode

Frequency (MHz)	Ant. Pol. (H/V)	E.R.P.		Limit (mW)
		(dBm)	(mW)	
1 851.25	H	24.60	288.40	2 000
1 851.25	V	23.30	213.80	2 000
1 880.00	H	24.00	251.19	2 000
1 880.00	V	24.80	302.00	2 000
1 908.75	H	24.70	295.12	2 000
1 908.75	V	24.80	302.00	2 000

5.2 Spurious radiated emission

5.2.1 Measurement Procedure

1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 3 MHz and the video bandwidth was set to 3 MHz.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

5.2.2 Limit

§ 22.917(a) and §24.238 (a) Out of band emissions. The power of any emission outside of the Authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least $43+10\log(P)$ dB.

5.2.3 Test Result

CDMA 800 1xEV-DO mode

Low Channel (824.70 MHz)

Limit = $43+10\log(P)$ dB = 32.8 dBc

(P = 19.8 dBm = 0.095 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
3 145.75	H	19.8	-43.7	63.5	-13.0	30.7

Middle Channel (836.52 MHz)

Limit = $43+10\log(P)$ dB = 33.5 dBc

(P = 20.5 dBm = 0.112 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 746.25	H	20.5	-56.2	76.7	-13.0	43.2
3 145.75	H	20.5	-46.2	66.7	-13.0	33.2

High Channel (848.31 MHz)

Limit = $43+10\log(P)$ dB = 36.1 dBc

(P = 23.1 dBm = 0.204 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 738.75	H	23.1	-53.6	76.7	-13.0	40.6
3 145.75	H	23.1	-46.9	70.0	-13.0	33.9

*Result = Operation Frequency Power level – Spurious level

*Margin=Limit – Spurious Level

CDMA 1 900 1xEV-DO mode

Low Channel (1 851.25 MHz)

Limit = $43+10\log(P)$ dB = 37.3 dBc

(P = 24.3 dBm = 0.269 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 931.50	H	24.3	-43.5	67.8	-13.0	30.5
2 448.50	H	24.3	-37.2	61.5	-13.0	24.2
3 145.50	H	24.3	-45.9	70.2	-13.0	32.9
3 703.50	V	24.3	-37.9	62.2	-13.0	24.9
5 554.00	V	24.3	-39.3	63.6	-13.0	26.3

Middle Channel (1 880.00 MHz)

Limit = $43+10\log(P)$ dB = 37.9 dBc

(P = 24.9 dBm = 0.309 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 737.00	V	24.9	-37.7	62.6	-13.0	24.7
1 746.00	V	24.9	-37.4	62.3	-13.0	24.4
2 448.25	V	24.9	-29.9	54.8	-13.0	16.9
3 146.00	H	24.9	-46.4	71.3	-13.0	33.4
3 759.50	V	24.9	-44.3	69.2	-13.0	31.3
5 639.50	H	24.9	-37.4	62.3	-13.0	24.4

High Channel (1 908.75 MHz)

Limit = $43+10\log(P)$ dB = 37.9 dBc

(P = 24.9 dBm = 0.309 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 989.25	H	24.9	-41.9	66.8	-13.0	28.9
3 145.50	H	24.9	-46.0	70.9	-13.0	33.0
3 818.50	H	24.9	-43.8	68.7	-13.0	30.8
5 727.00	H	24.9	-36.6	61.5	-13.0	23.6

*Result = Operation Frequency Power level – Spurious level

*Margin=Limit – Spurious Level

CDMA 800 1xEV-DO mode

Low Channel (824.70 MHz)

Limit = $43+10\log(P)$ dB = 35.2 dBc

(P = 22.2 dBm = 0.165 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 736.50	H	22.2	-53.6	75.8	-13.0	40.6
3 145.75	H	22.2	-43.5	65.7	-13.0	30.5

Middle Channel (836.52 MHz)

Limit = $43+10\log(P)$ dB = 36.4 dBc

(P = 23.4 dBm = 0.218 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 736.50	H	23.4	-46.1	69.5	-13.0	33.1
3 145.75	H	23.4	-47.2	70.6	-13.0	34.2

High Channel (848.31 MHz)

Limit = $43+10\log(P)$ dB = 35.5 dBc

(P = 22.5 dBm = 0.178 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 737.25	V	22.5	-50.9	73.4	-13.0	37.9
1 754.50	V	22.5	-53.0	75.5	-13.0	40.0
3 145.75	H	22.5	-46.7	69.2	-13.0	33.7

*Result = Operation Frequency Power level – Spurious level

*Margin=Limit – Spurious Level

CDMA 1 900 1xEV-DO mode

Low Channel (1 851.25 MHz)

Limit = $43+10\log(P)$ dB = 37.6 dBc

(P = 24.6 dBm = 0.288 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 931.00	H	24.6	-44.0	68.6	-13.0	31.0
3 146.00	H	24.6	-46.1	70.7	-13.0	33.1
3 702.50	V	24.6	-38.6	63.2	-13.0	25.6
5 554.50	V	24.6	-36.9	61.5	-13.0	23.9

Middle Channel (1 880.00 MHz)

Limit = $43+10\log(P)$ dB = 37.8 dBc

(P = 24.8 dBm = 0.301 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
1 960.25	H	24.8	-41.9	66.7	-13.0	28.9
3 145.50	H	24.8	-46.0	70.8	-13.0	33.0
3 759.50	V	24.8	-44.0	68.8	-13.0	31.0
5 639.50	H	24.8	-37.5	62.3	-13.0	24.5

High Channel (1 908.75 MHz)

Limit = $43+10\log(P)$ dB = 37.8 dBc

(P = 24.8 dBm = 0.301 W)

Frequency (MHz)	Ant. Pol. (H/V)	Operation Frequency Power level (dBm)	Spurious Level (dBm)	*Result (dBc)	Limit (dBc)	*Margin
3 146.00	H	24.8	-46.0	70.8	-13.0	33.0
3 817.50	V	24.8	-43.0	67.8	-13.0	30.0
5 725.50	H	24.8	-36.6	61.4	-13.0	23.6

*Result = Operation Frequency Power level – Spurious level

*Margin=Limit – Spurious Level

5.3 Conducted Output Power

5.3.1 Measurement Procedure

1. The RF output of the transmitter was connected to the input of the Mobile Communication Test Unit through sufficient attenuation.
2. The EUT was set up for the max. output power with pseudo random data modulation.
3. The power was measured with Mobile Communication Test unit.

5.3.2 Limit

Requirements: CFR 47, Section §2.1046

5.3.3 Test Result

CDMA 800 1xRTT mode (Preliminary Measurement Results @ Middle channel)

Radio Configuration (RC)	Service Option (SO)	Average Output Power (dBm)		
		Ch. 1 013 / 824.70 MHz	Ch. 384 / 836.52 MHz	Ch. 777 / 848.31 MHz
RC1 (Fwd1, Rvs1)	1 (Voice)			
	2 (Loopback)	24.46	24.62	24.23
	3 (Voice)			
	6 (SMS)			
	55 (Loopback)	24.47	24.52	24.28
	68 (Voice)			
	70 (Voice)			
RC2 (Fwd2, Rvs2)	9 (Loopback)	24.45	24.53	24.26
	14 (SMS)			
	17 (Voice)			
	55 (Loopback)	24.43	24.51	24.25
	32768 (Voice)			
RC3 (Fwd3, Rvs3)	1 (Voice)			
	2 (Loopback)	24.43	24.67	24.24
	3 (Voice)			
	6 (SMS)			
	55 (Loopback)	24.44	24.66	24.26
	32 (+F-SCH)	24.47	24.68	24.24
	32 (+SCH)	24.50	24.73	24.26
	68 (Voice)			
RC4 (Fwd4, Rvs3)	70 (Voice)			
	1 (Voice)			
	2 (Loopback)	24.51	24.71	24.27
	3 (Voice)			
	6 (SMS)			
	55 (Loopback)	24.56	24.66	24.36
	32 (+F-SCH)	24.50	24.72	24.28
	32 (+SCH)	24.52	24.76	24.26
RC5 (Fwd5, Rvs4)	68 (Voice)			
	70 (Voice)			
	9 (Loopback)	24.46	24.69	24.28
	14 (SMS)			
	17 (Voice)			
	55 (Loopback)	24.48	24.68	24.28
	32768 (Voice)			

5.3.2 Test Result

CDMA 1 900 1xRTT mode (Preliminary Measurement Results @ Middle channel)

Radio Configuration (RC)	Service Option (SO)	Average Output Power (dBm)		
		Ch. 25 / 1 851.25 Mhz	Ch. 600 / 1 880.00 Mhz	Ch. 1 175 / 1 908.75 Mhz
RC1 (Fwd1, Rvs1)	1 (Voice)			
	2 (Loopback)	23.96	24.32	24.35
	3 (Voice)			
	6 (SMS)			
	55 (Loopback)	23.99	24.33	24.35
	68 (Voice)			
RC2 (Fwd2, Rvs2)	70 (Voice)			
	9 (Loopback)	23.98	24.29	24.34
	14 (SMS)			
	17 (Voice)			
	55 (Loopback)	23.97	24.33	24.36
RC3 (Fwd3, Rvs3)	32768 (Voice)			
	1 (Voice)			
	2 (Loopback)	24.12	24.44	24.32
	3 (Voice)			
	6 (SMS)			
	55 (Loopback)	24.12	24.44	24.36
	32 (+F-SCH)	24.13	24.43	24.40
	32 (+SCH)	24.15	24.45	24.37
	68 (Voice)			
RC4 (Fwd4, Rvs3)	70 (Voice)			
	1 (Voice)			
	2 (Loopback)	24.14	24.47	24.41
	3 (Voice)			
	6 (SMS)			
	55 (Loopback)	24.13	24.46	24.38
	32 (+F-SCH)	24.14	24.45	24.40
	32 (+SCH)	24.15	24.45	24.38
RC5 (Fwd5, Rvs4)	68 (Voice)			
	70 (Voice)			
	9 (Loopback)	24.16	24.45	24.37
	14 (SMS)			
	17 (Voice)			
	55 (Loopback)	24.15	24.46	24.39
	32768 (Voice)			

CDMA 800 1xEV-DO mode (Preliminary Measurement Results @ Middle channel)

Application Protocol	Rate	Average Output Power (dBm)		
		Ch. 1 013 / 824.70 MHz	Ch. 384 / 836.52 MHz	Ch. 777 / 848.31 MHz
RETAP	128	24.49	24.59	24.13
	256	24.47	24.52	24.13
	512	24.45	24.54	24.11
	768	24.41	24.54	24.06
	1024	24.46	24.56	24.08
	1536	24.48	24.57	24.07
	2048	24.45	24.54	24.10
	3072	24.44	24.56	24.11
	4096	24.42	24.55	24.09
	6144	24.45	24.52	24.09
	8192	24.46	24.51	24.06
	12288	24.47	24.53	24.10
FETAP	4(1024,2,128)	24.47	24.58	24.11

CDMA 1 900 1xEV-DO mode (Preliminary Measurement Results @ Middle channel)

Application Protocol	Rate	Average Output Power (dBm)		
		Ch. 25 / 1 851.25 MHz	Ch. 600 / 1 880.00 MHz	Ch. 1 175 / 1 908.75 MHz
RETAP	128	24.61	24.40	24.52
	256	24.59	24.35	24.40
	512	24.60	24.37	24.42
	768	24.58	24.38	24.47
	1024	24.53	24.38	24.50
	1536	24.54	24.39	24.39
	2048	24.56	24.36	24.34
	3072	24.55	24.37	24.29
	4096	24.59	24.35	24.34
	6144	24.51	24.37	24.38
	8192	24.52	24.38	24.31
	12288	24.51	24.36	24.44
FETAP	4(1024,2,128)	25.21	24.18	24.41

5.4 26 dB Bandwidth

5.4.1 Measurement Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through Sufficient attenuation.
2. The resolution bandwidth of the spectrum analyzer was set.
3. 26 dB bandwidth was measured with Mobile Communication Test unit for each channel.

5.4.2 Limit

Requirements: CFR 47, Section §2.1049.

5.4.3 Test Result

CDMA 800 1xRTT mode

Band	Mode	Frequency (MHz)	26dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
CDMA 800	1xRTT	824.70	1.42	1.27
	RC4	836.52	1.43	1.27
	32 (+SCH)	848.31	1.43	1.27

CDMA 1 900 1xRTT mode

Band	Mode	Frequency (MHz)	26dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
CDMA 1 900	1xRTT	1 851.25	1.42	1.27
	RC4	1 880.00	1.42	1.27
	2 (Loopback)	1 908.75	1.42	1.27

CDMA 800 1xEV-DO mode

Band	Mode	Frequency (MHz)	26dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
CDMA 800	1xEV-DO(RelA)	824.70	1.43	1.27
	RETAP	836.52	1.42	1.27
	128	848.31	1.42	1.27

CDMA 1 900 1xEV-DO mode

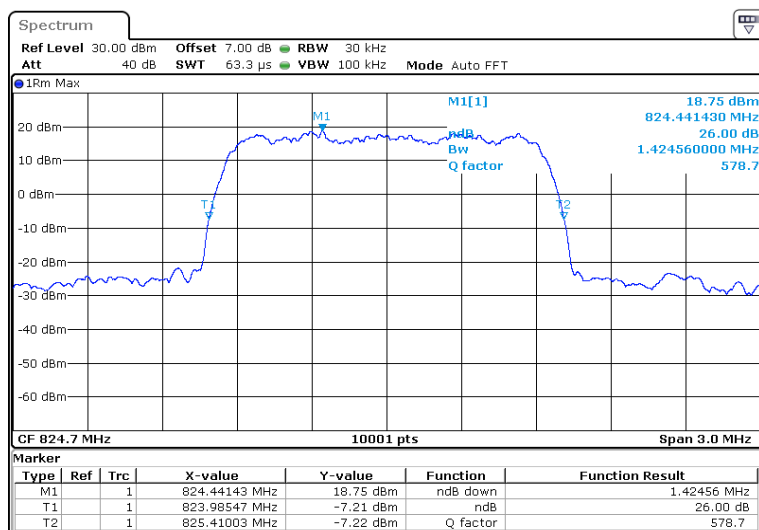
Band	Mode	Frequency (MHz)	26dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
CDMA 1 900	1xEV-DO(RelA)	1 851.25	1.43	1.27
	RETAP	1 880.00	1.43	1.27
	128	1 908.75	1.43	1.27

5.4.4 Test Plot

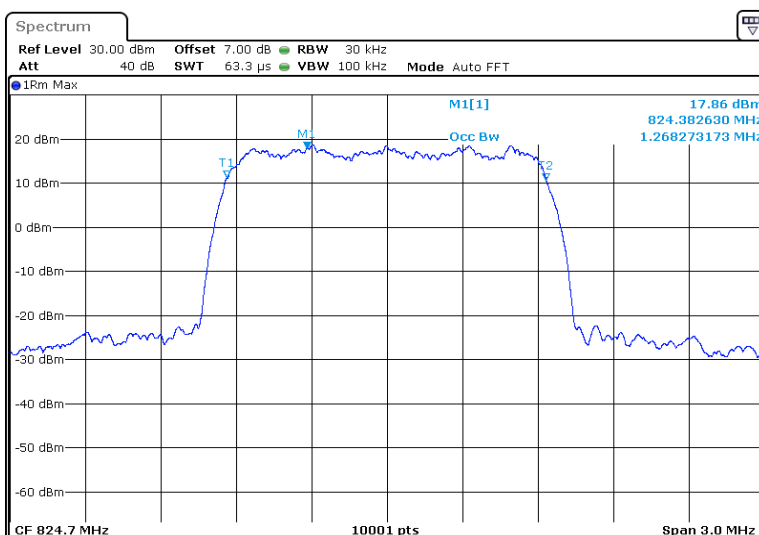
CDMA 800 1xRTT mode

Low Channel (824.70 MHz)

-26dB Bandwidth

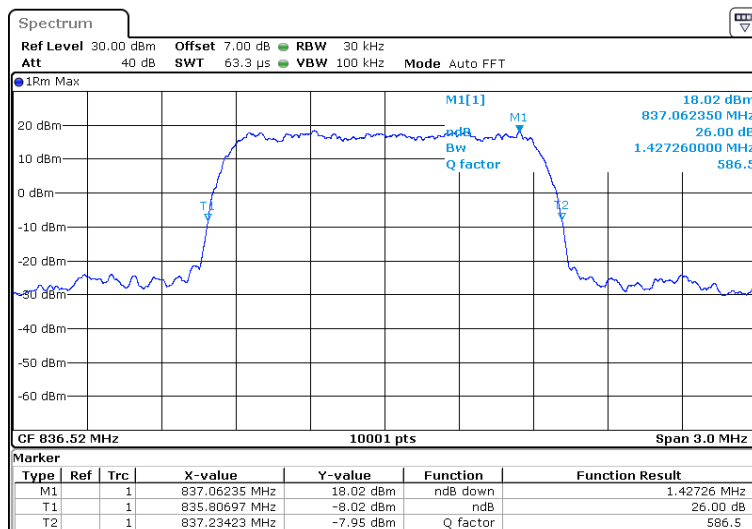


-Occupied Bandwidth

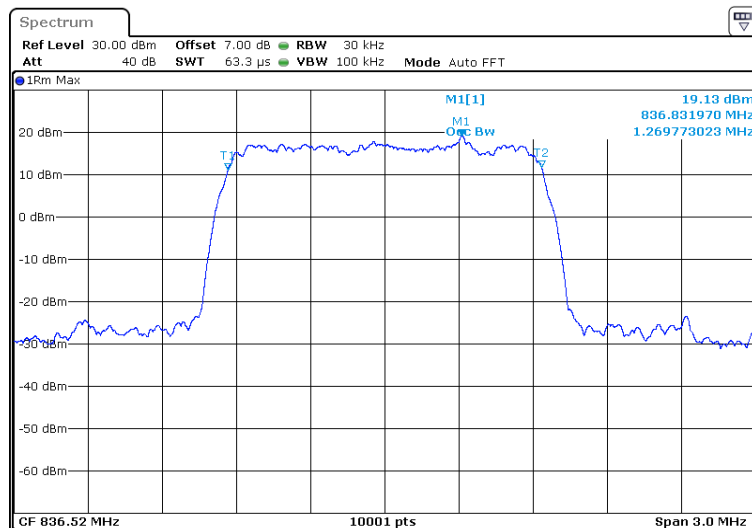


Middle Channel (836.52 MHz)

-26dB Bandwidth

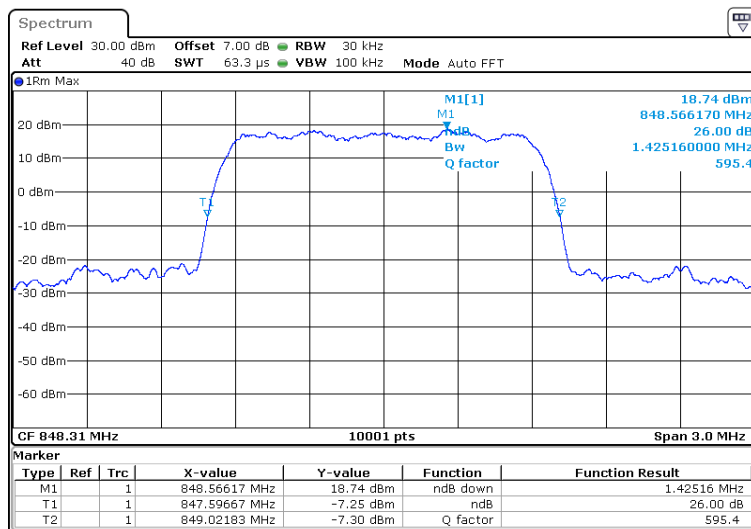


-Occupied Bandwidth

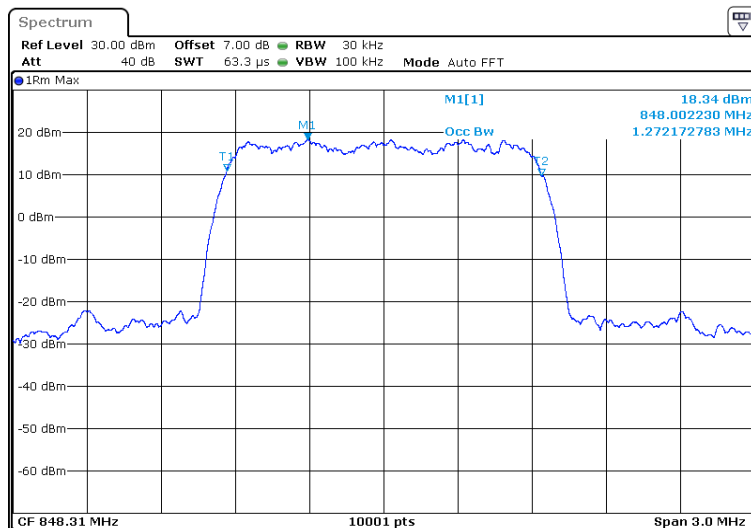


High Channel (848.31 MHz)

-26dB Bandwidth



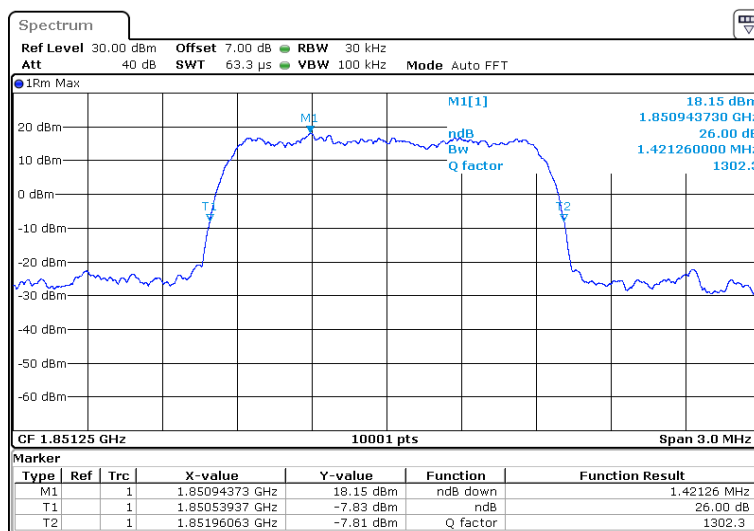
-Occupied Bandwidth



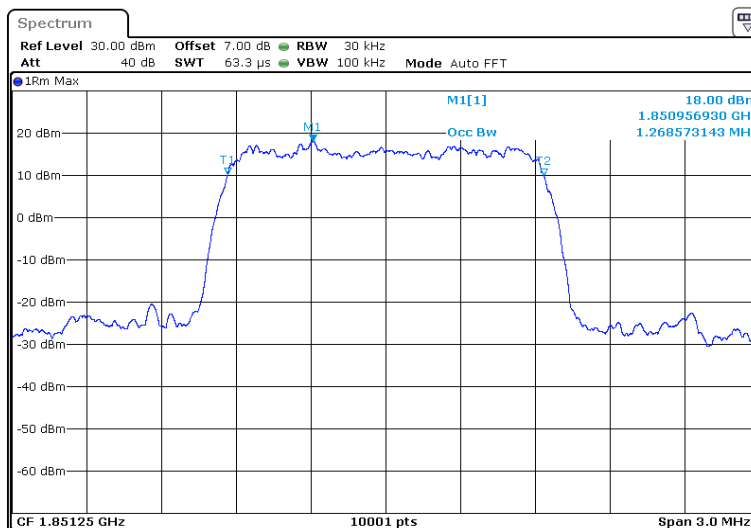
CDMA 1 900 1xRTT mode

Low Channel (1 851.25 MHz)

-26dB Bandwidth

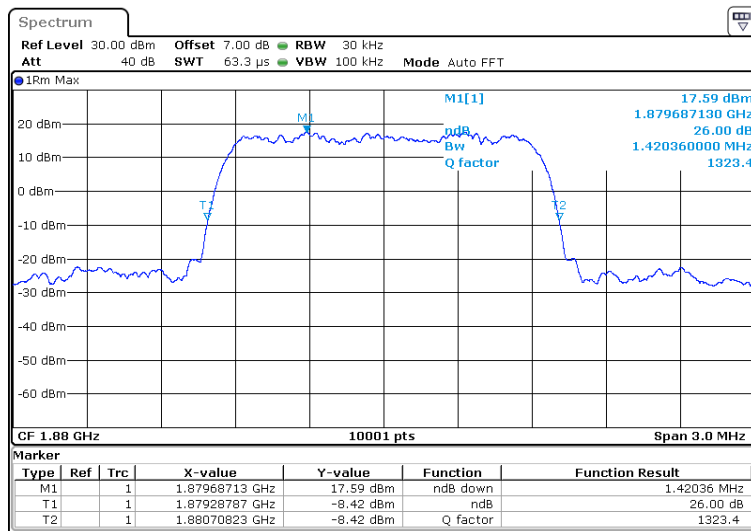


-Occupied Bandwidth

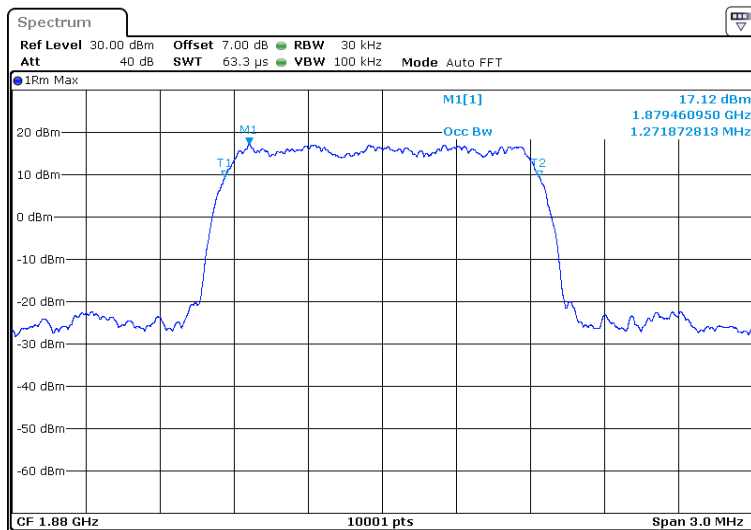


Middle Channel (1 880.00 MHz)

-26dB Bandwidth

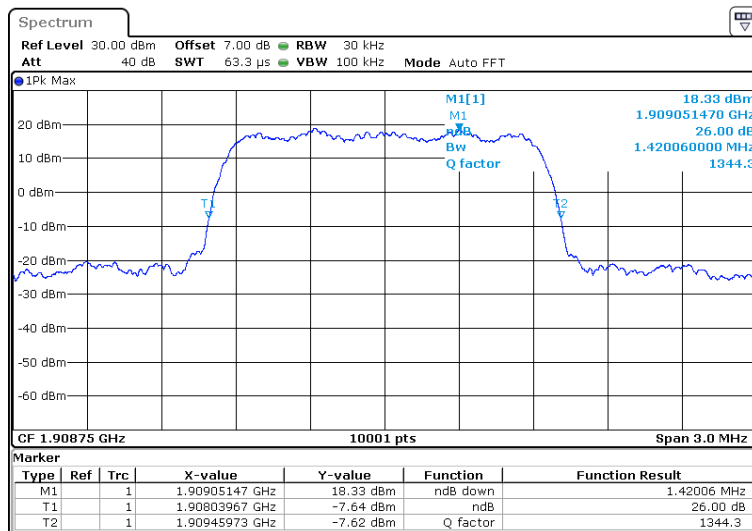


-Occupied Bandwidth

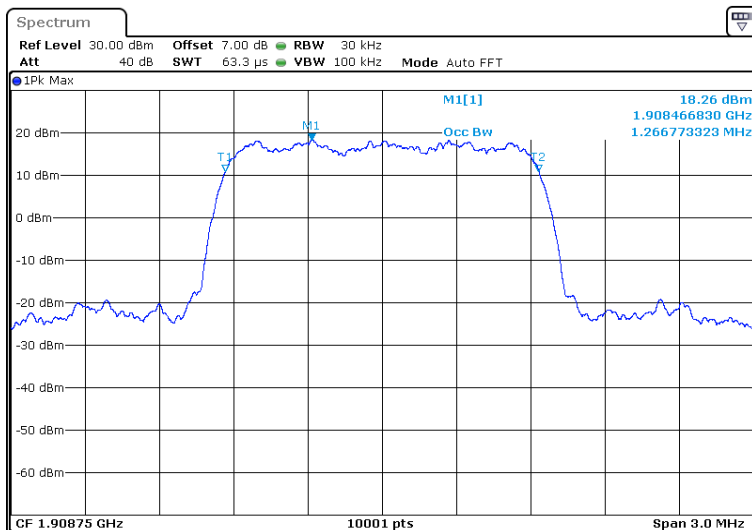


High Channel (1 908.75 MHz)

-26dB Bandwidth



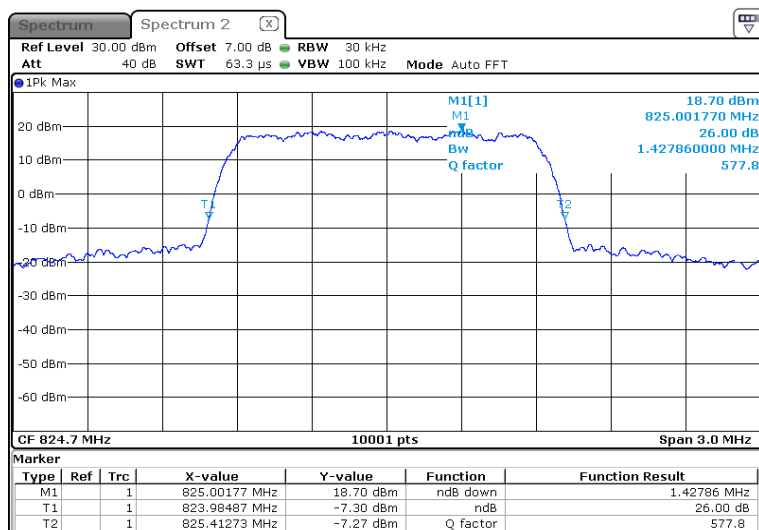
-Occupied Bandwidth



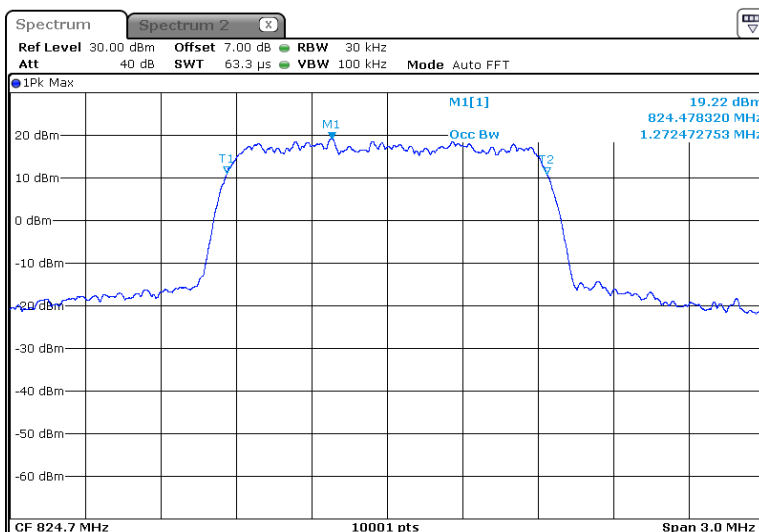
CDMA 800 1xEV-DO mode

Low Channel (824.70 MHz)

-26dB Bandwidth

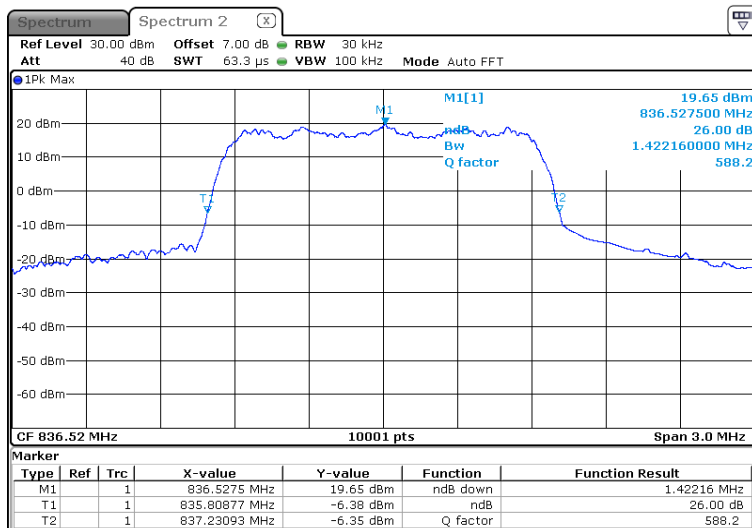


-Occupied Bandwidth

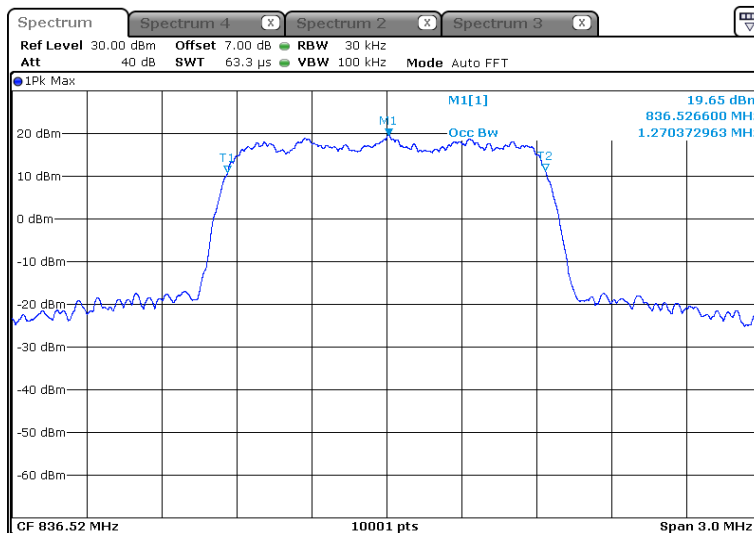


Middle Channel (836.52 MHz)

-26dB Bandwidth

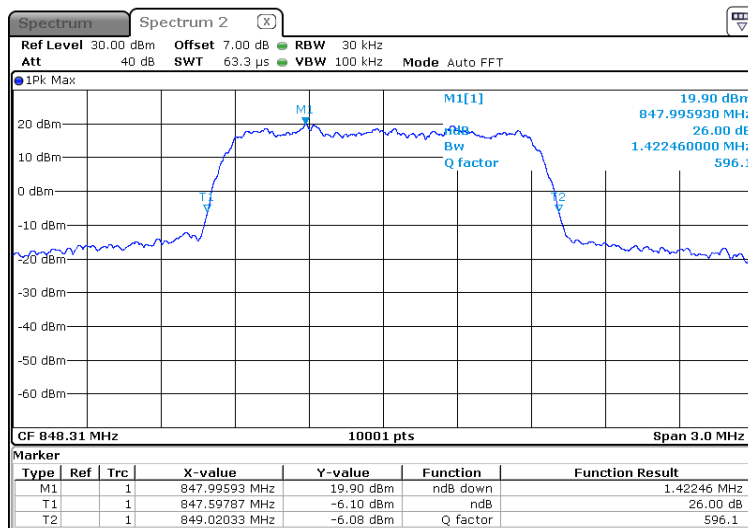


-Occupied Bandwidth

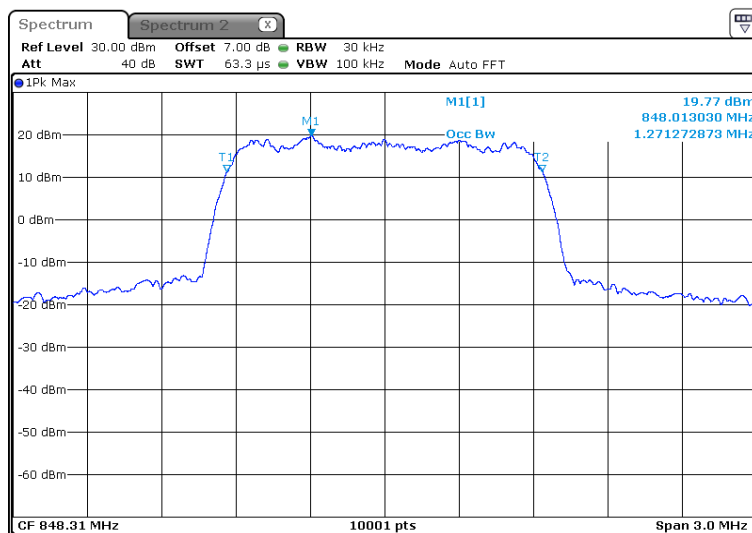


High Channel (848.31 MHz)

-26dB Bandwidth



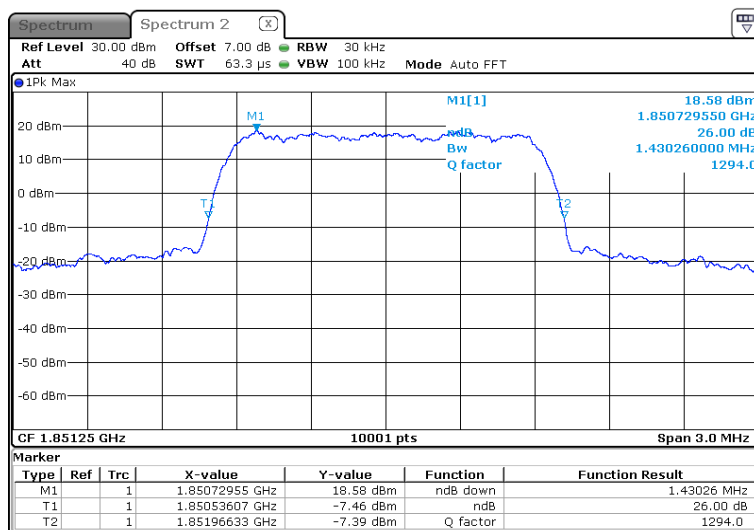
-Occupied Bandwidth



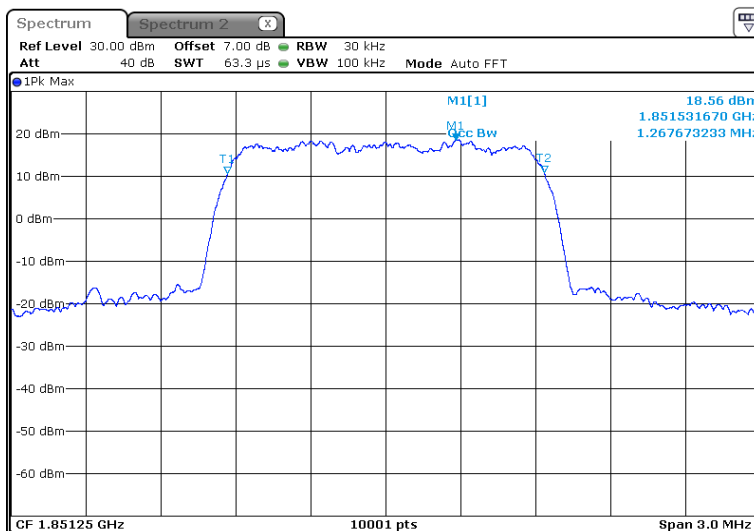
CDMA 1 900 1xEV-DO mode

Low Channel (1 851.25 MHz)

-26dB Bandwidth

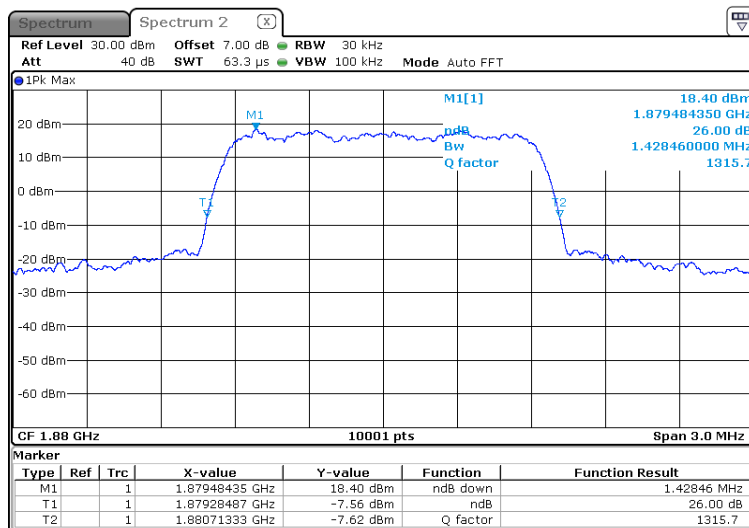


-Occupied Bandwidth

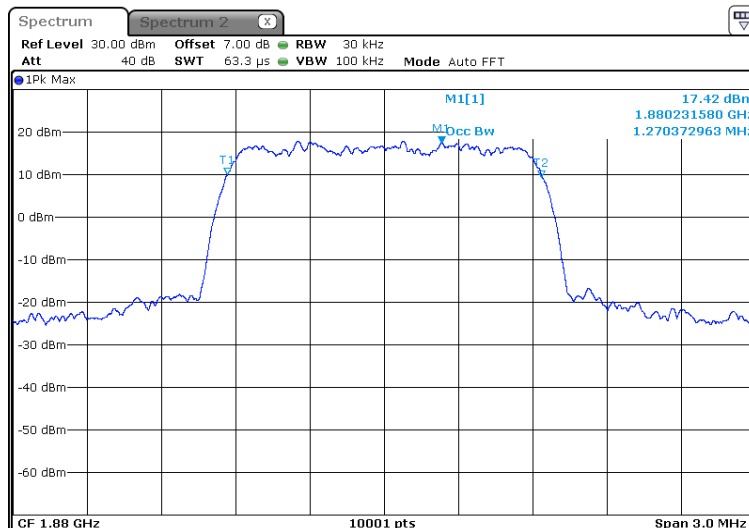


Middle Channel (1 880.00 MHz)

-26dB Bandwidth

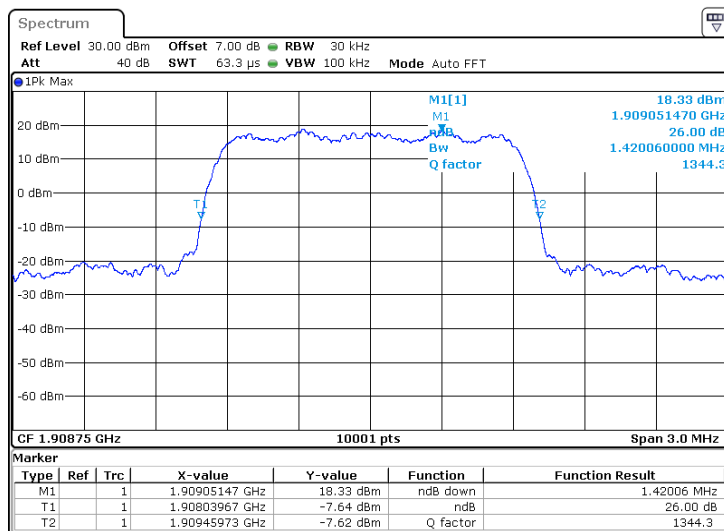


-Occupied Bandwidth

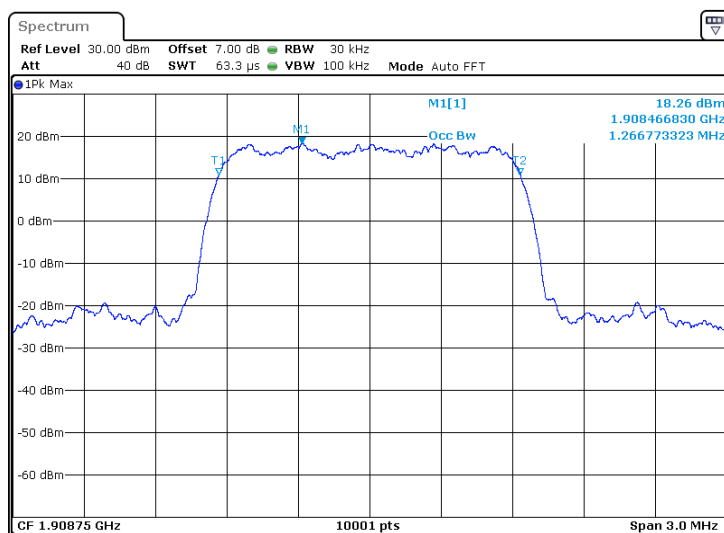


High Channel (1 908.75 MHz)

-26dB Bandwidth



-Occupied Bandwidth



5.5 Peak-Average Ratio

5.5.1 Measurement Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through Sufficient attenuation.
2. The CCDF function of the spectrum analyzer was set.
3. PAR was measured with spectrum analyzer for each channel.

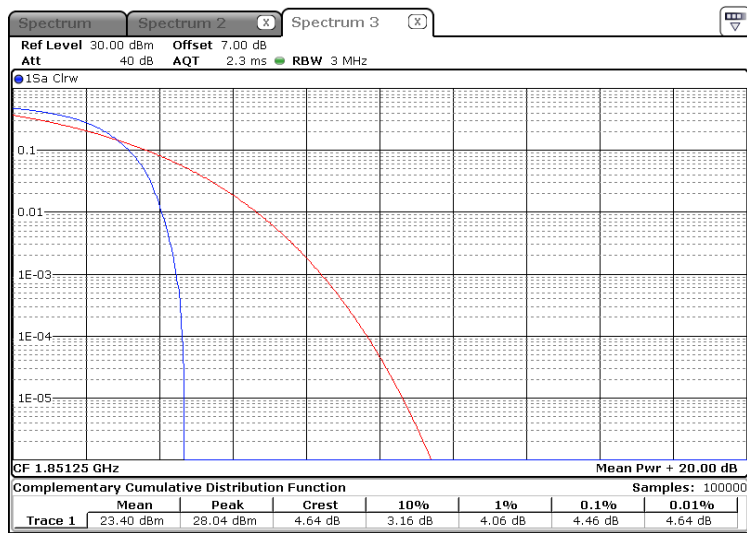
5.5.2 Limit

§24.232(d) Power measurements for transmissions by stations authorized under this section may be Made either in accordance with a Commission-approved average power technique or in compliance with Paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

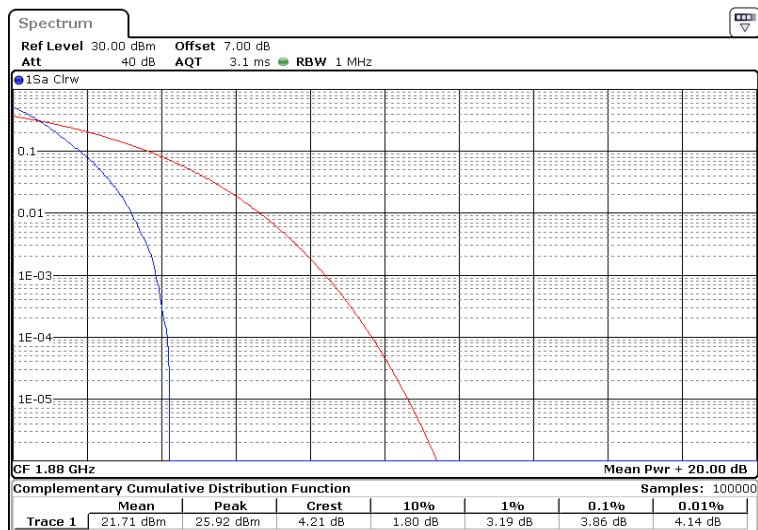
5.5.3 Test Result

CDMA 1 900 1xRTT mode

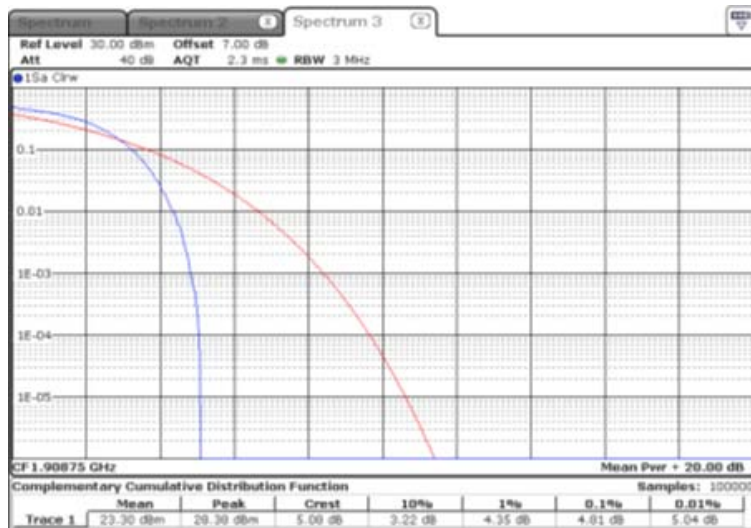
Low Channel (1 851.25 MHz)



Middle Channel (1 880.00 MHz)

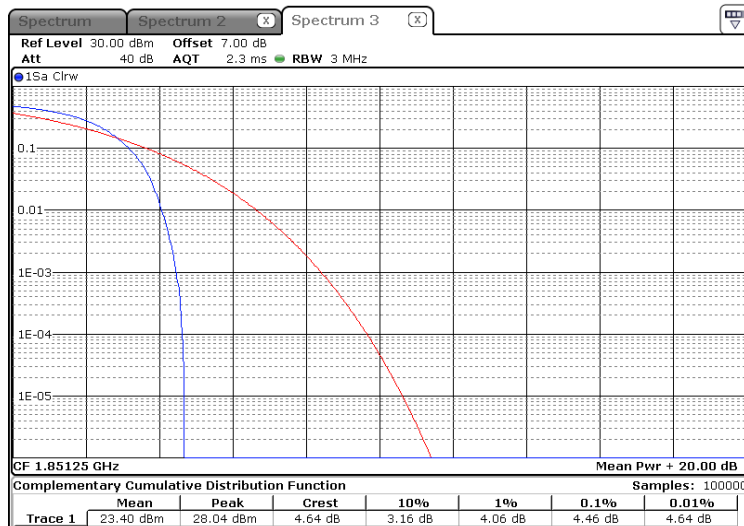


High Channel (1 908.75 MHz)

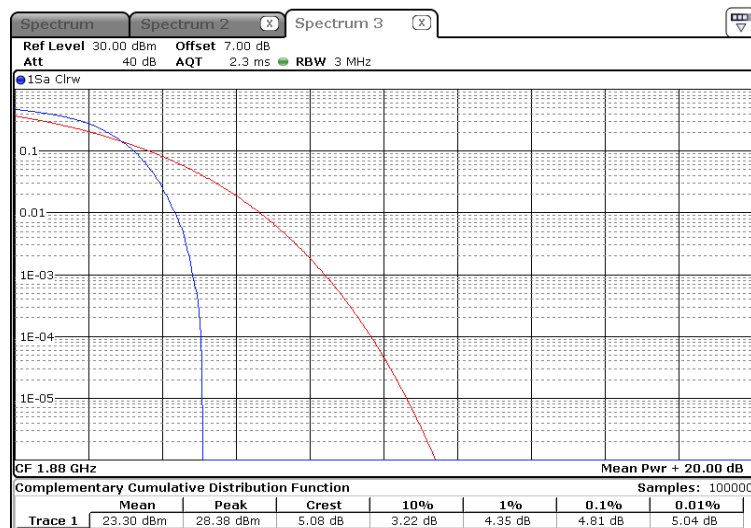


CDMA 1 900 1xEV-DO mode

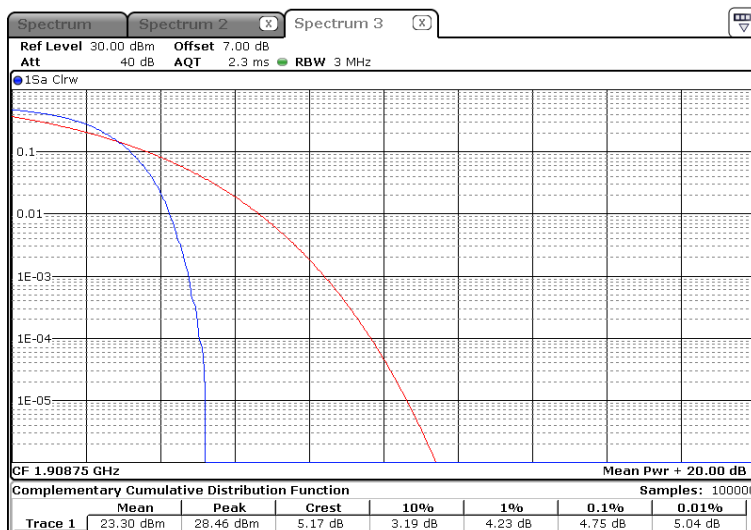
Low Channel (1 851.25 MHz)



Middle Channel (1 880.00 MHz)



High Channel (1 908.75 MHz)



5.6 Spurious Emissions at Antenna Terminal

5.6.1 Measurement Procedure

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to Show any out of band emissions up to 10th harmonic.

5.6.2 Limit

§22.917(a) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least $43 + 10\log(P)$ dB.

5.6.3 Test Result

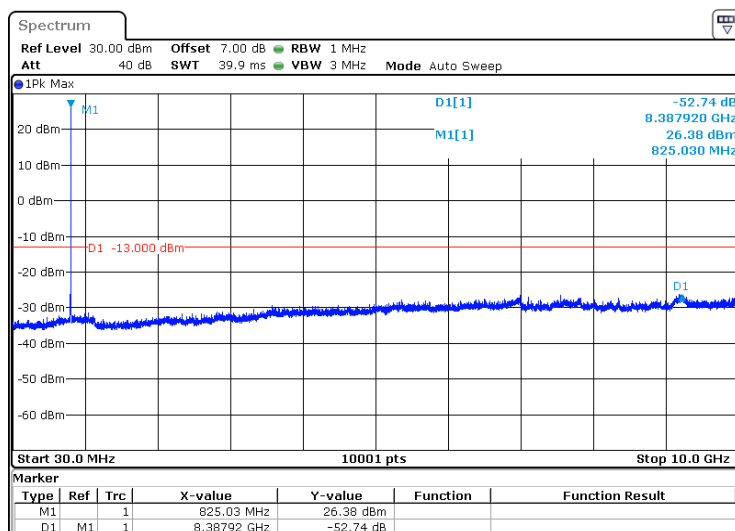
Limit = $43 + 10\log(P)$ dB

CDMA 800 1xRTT mode

Low Channel (824.70 MHz)

Limit = $43 + 10\log(P)$ dB = 39.38 dBc

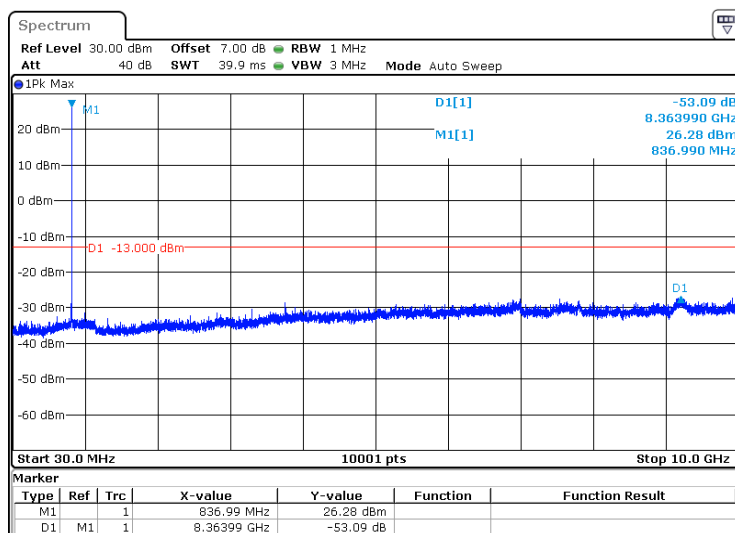
(P = 26.38 dBm = 0.435 W)



Middle Channel (836.52 MHz)

Limit = $43 + 10\log(P)$ dB = 39.28 dBc

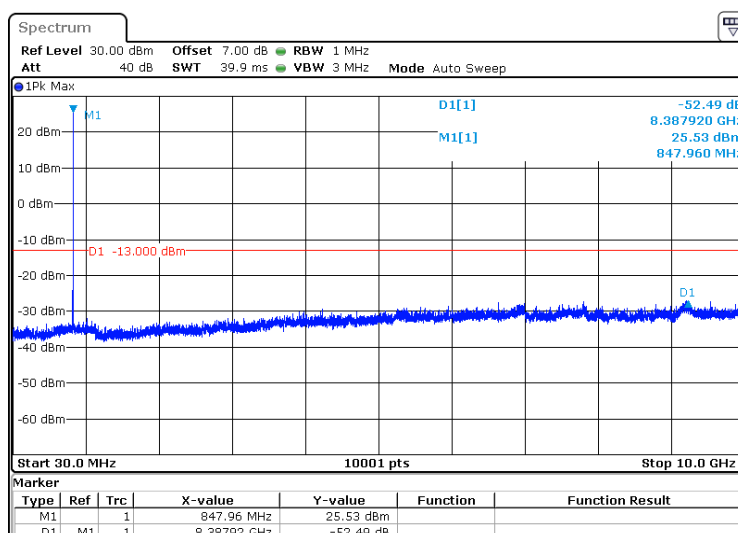
(P = 26.28 dBm = 0.425 W)



High Channel (848.31 MHz)

Limit = $43 + 10\log(P)$ dB = 38.53 dBc

(P = 25.53 dBm = 0.357 W)

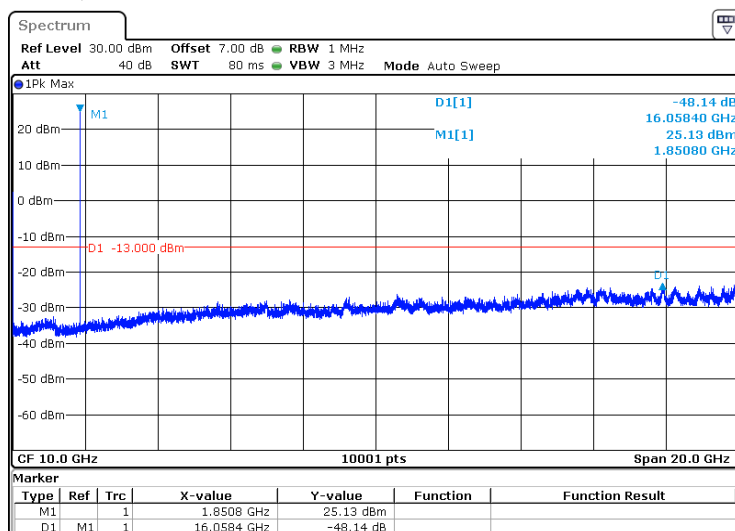


CDMA 1 900 1xRTT mode

Low Channel (1 851.25 MHz)

Limit = $43 + 10 \log(P)$ dB = 38.13 dBc

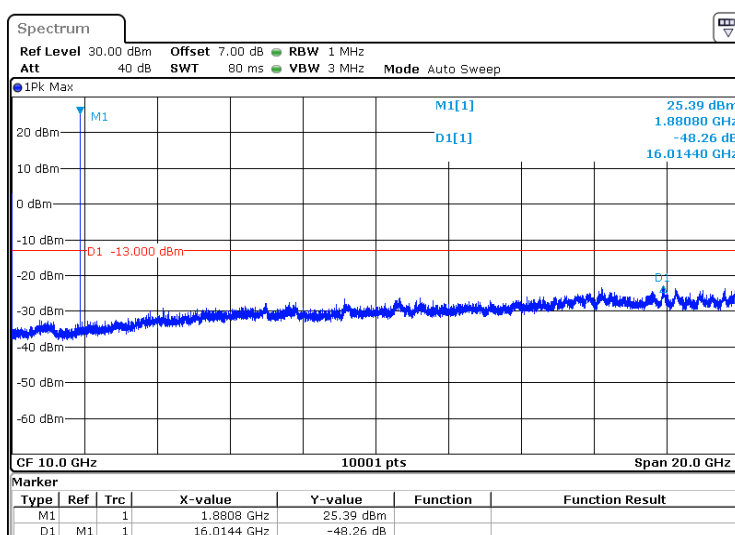
(P = 25.13 dBm = 0.326 W)



Middle Channel (1 880.00 MHz)

Limit = $43 + 10 \log(P)$ dB = 38.39 dBc

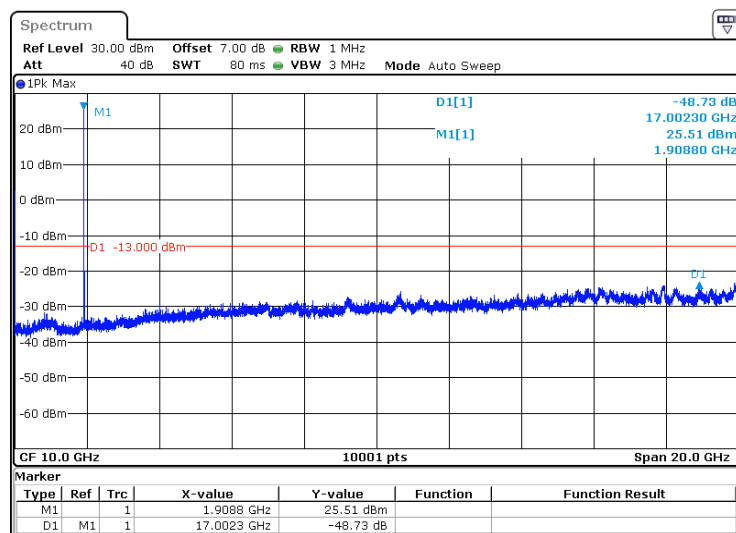
(P = 25.39 dBm = 0.346 W)



High Channel (1 908.75 MHz)

Limit = $43 + 10\log(P)$ dB = 38.51 dBc

(P = 25.51dBm = 0.356 W)

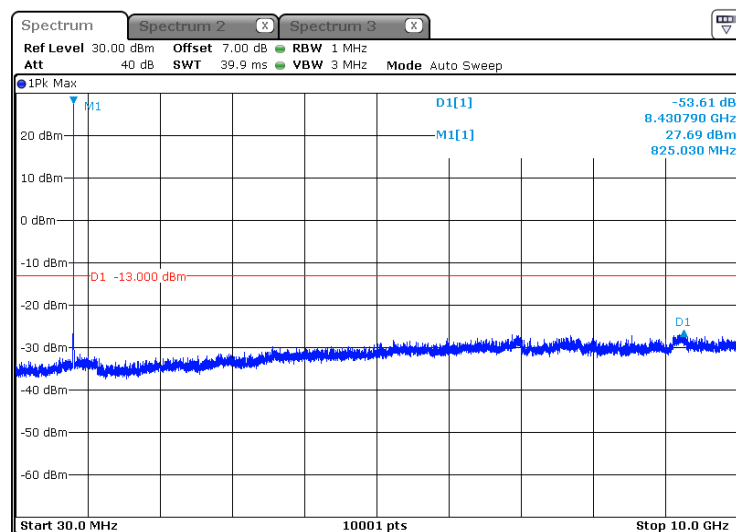


CDMA 800 1xEV-DO mode

Low Channel (824.70 MHz)

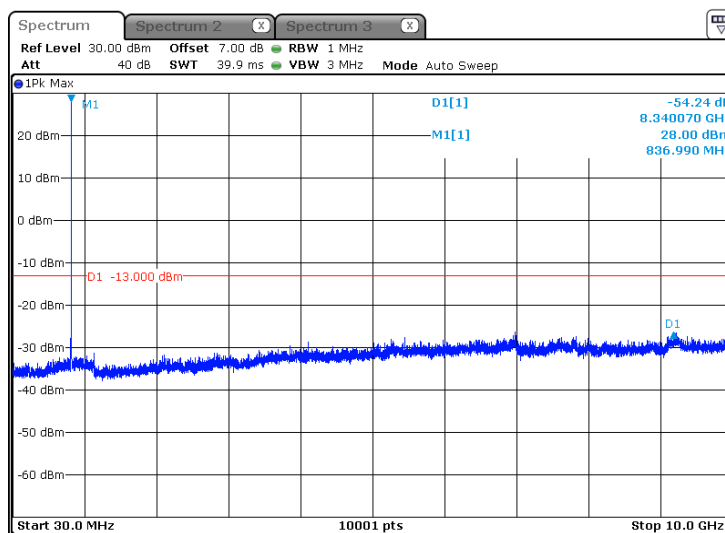
Limit = $43 + 10\log(P)$ dB = 40.69 dBc

(P = 27.69 dBm = 0.587 W)



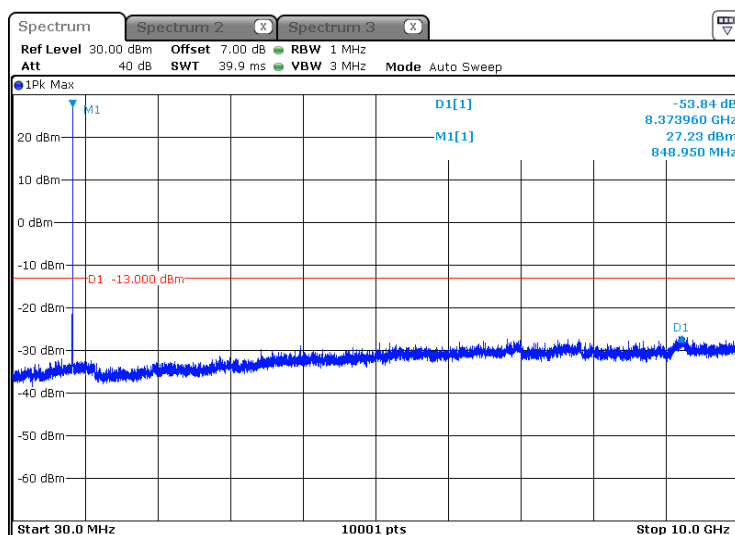
Middle Channel (836.52 MHz)

Limit = $43 + 10\log(P)$ dB = 41.00 dBc
(P = 28.0 dBm = 0.631 W)



High Channel (848.31 MHz)

Limit = $43 + 10\log(P)$ dB = 40.23 dBc
(P = 27.23 dBm = 0.528 W)

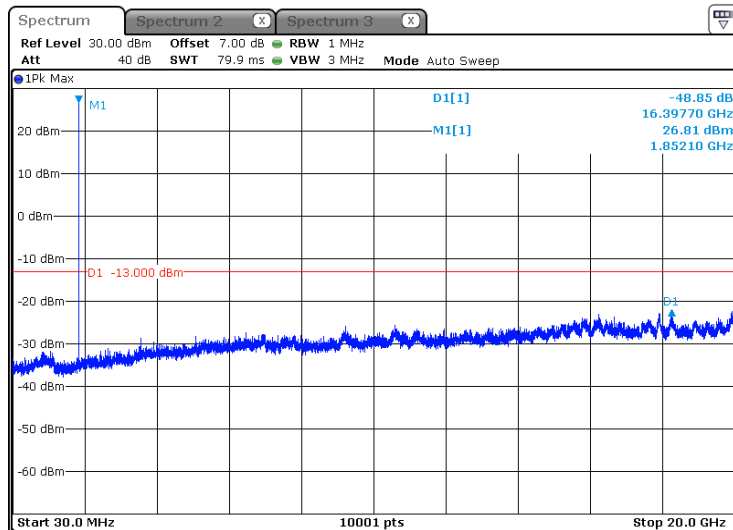


CDMA 1 900 1xEV-DO mode

Low Channel (1 851.25 MHz)

Limit = $43 + 10\log(P)$ dB = 39.81 dBc

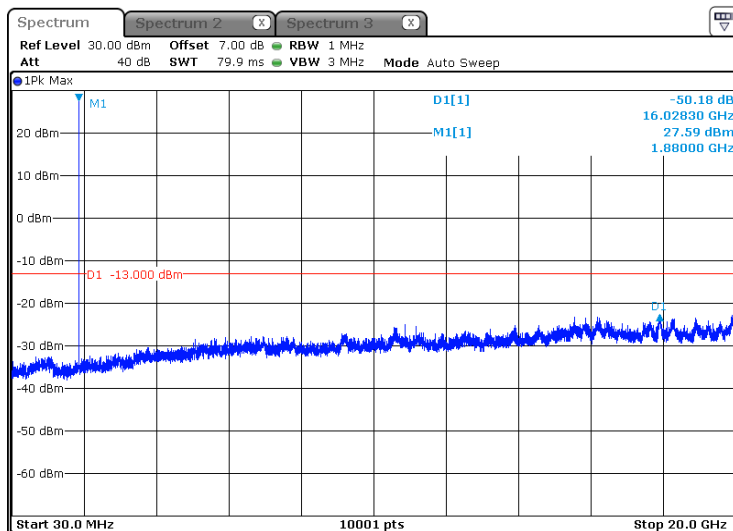
(P = 26.81 dBm = 0.480 W)



Middle Channel (1 880.00 MHz)

Limit = $43 + 10\log(P)$ dB = 40.59 dBc

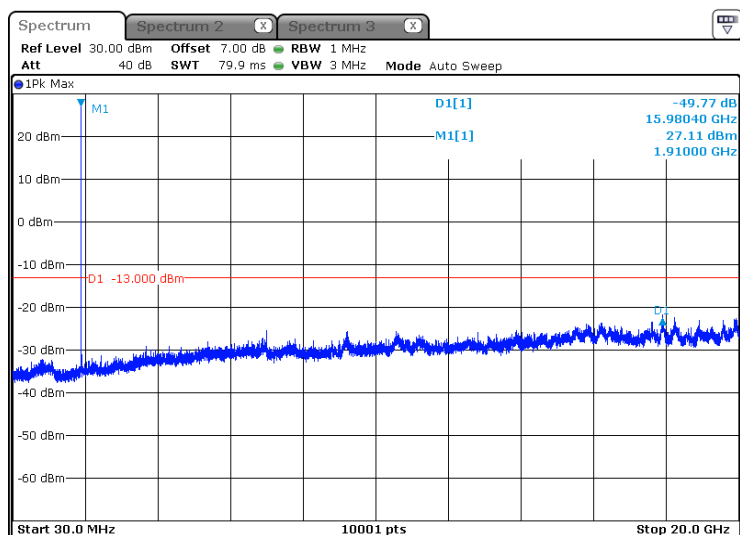
(P = 27.59 dBm = 0.574 W)



High Channel (1 908.75 MHz)

Limit = $43 + 10\log(P)$ dB = 40.11 dBc

(P = 27.11 dBm = 0.514 W)



5.7 Band Edge

5.7.1 Measurement Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through Sufficient attenuation.
2. The center of the spectrum analyzer was set to block edge frequency.

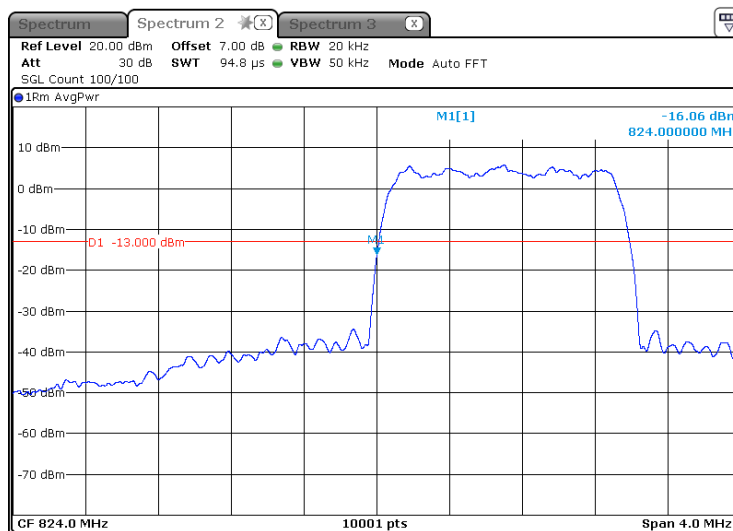
5.7.2 Limit

§22.917(a) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least $43 + 10\log(P)$ dB.

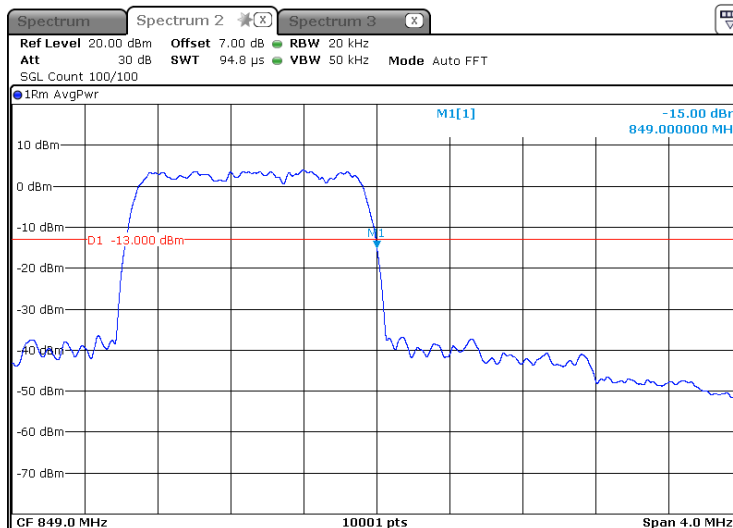
5.7.3 Test Result

CDMA 800 1xRTT mode (band edge)

Low Channel (824.70 MHz)

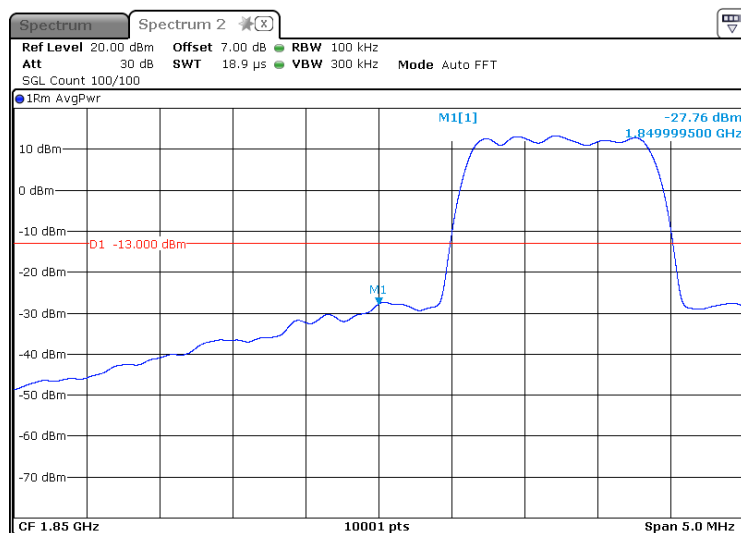


High Channel (848.31 MHz)

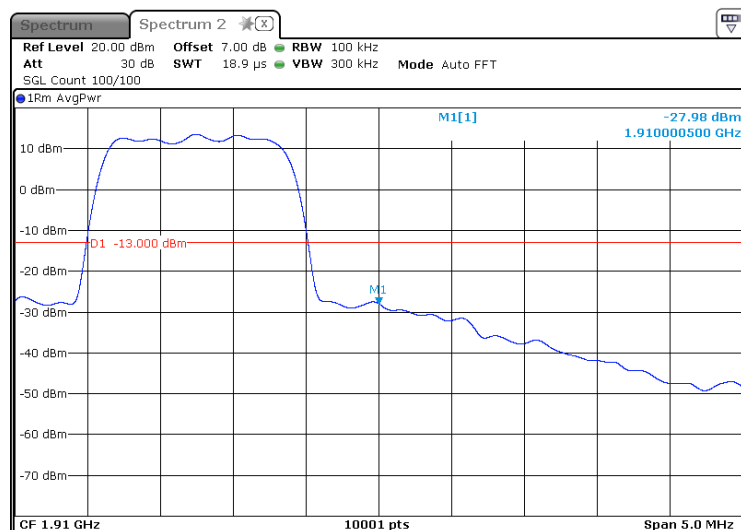


CDMA 1 900 1xRTT mode (band edge)

Low Channel (1 851.25 MHz)

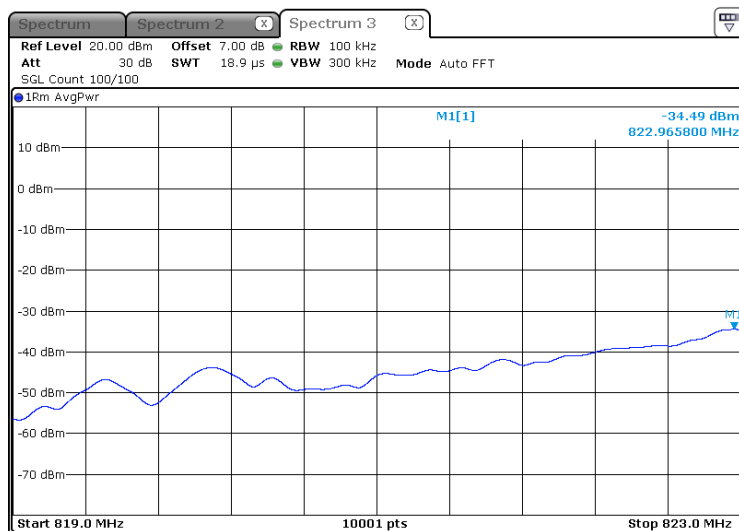


High Channel (1 908.75 MHz)

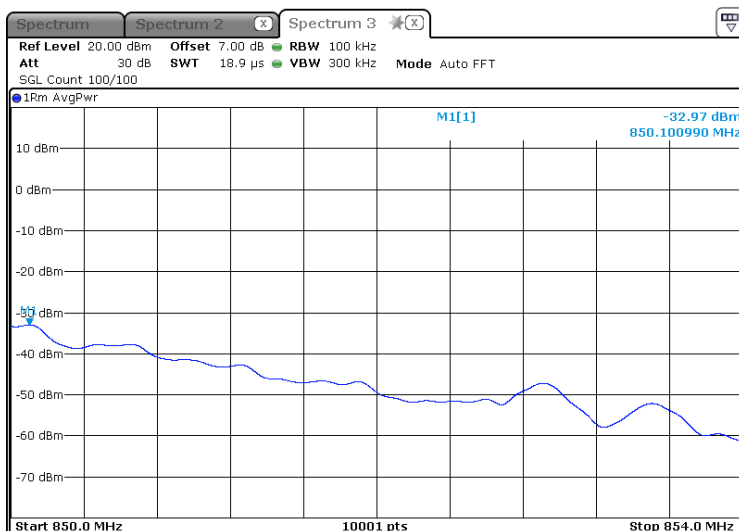


CDMA 800 1xRTT mode (4 MHz span)

Low Channel (824.70 MHz)

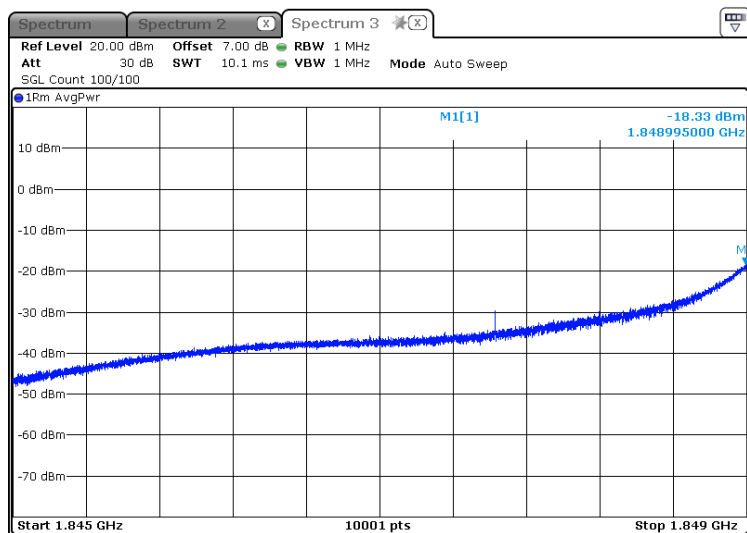


High Channel (848.31 MHz)

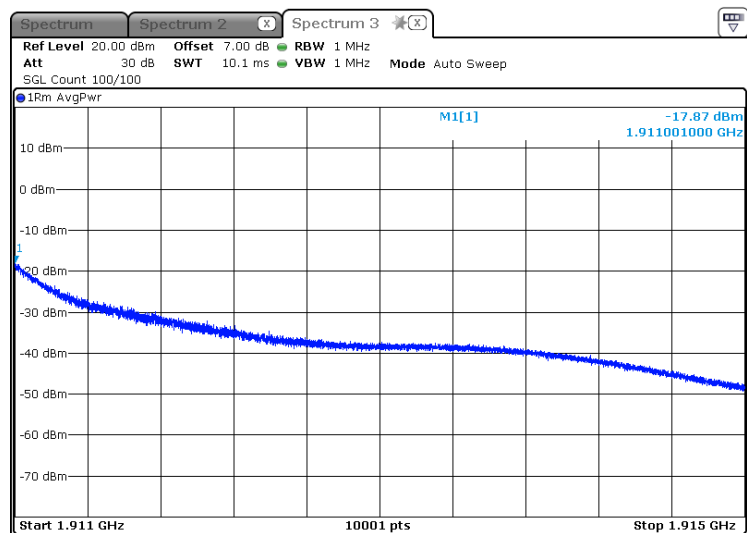


CDMA 1 900 1xRTT mode (4 MHz span)

Low Channel (1 851.25 MHz)

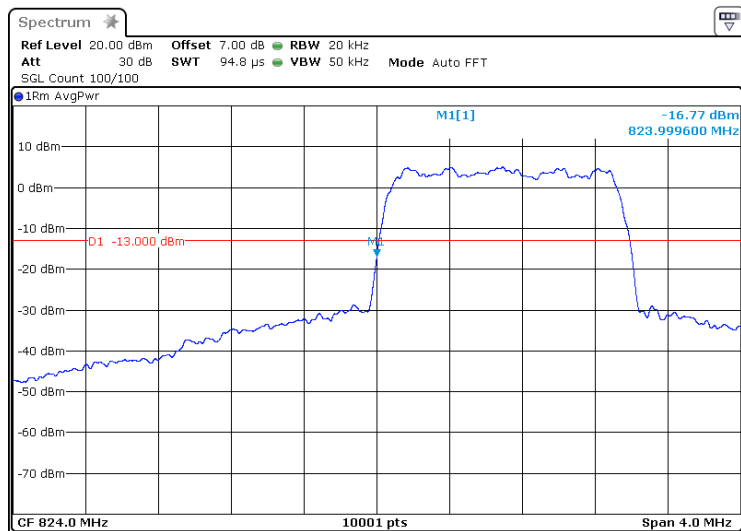


High Channel (1 908.75 MHz)

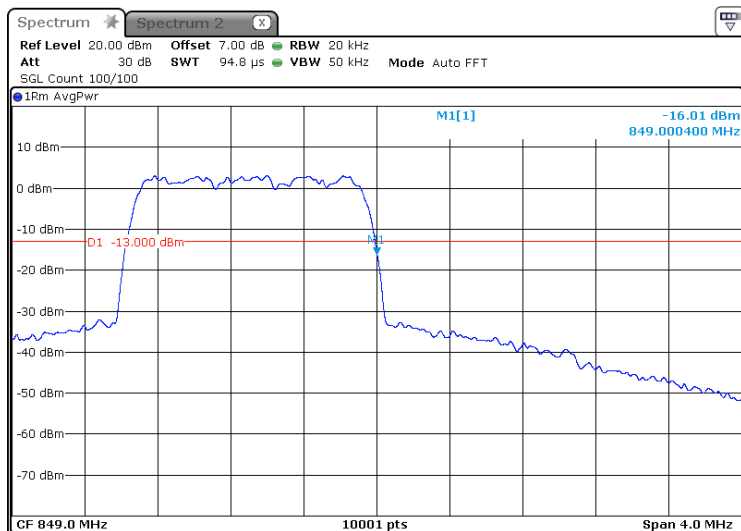


CDMA 800 1xEV-DO mode (band edge)

Low Channel (824.70 MHz)

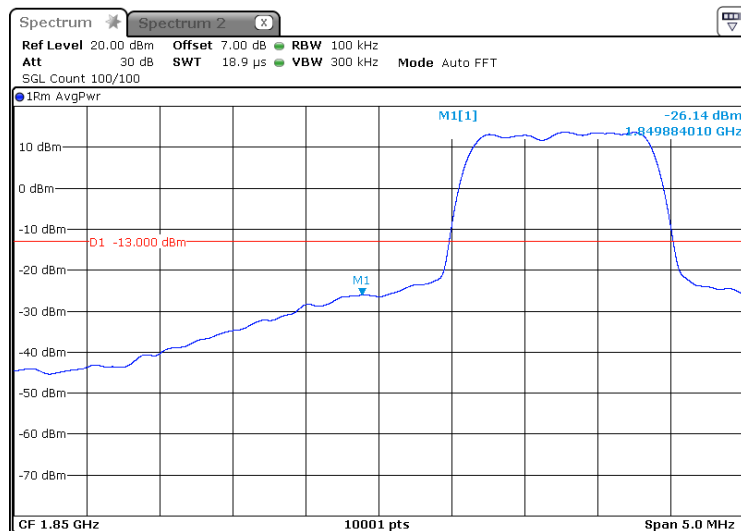


High Channel (848.31 MHz)



CDMA 1 900 1xEV-DO mode (band edge)

Low Channel (1 851.25 MHz)

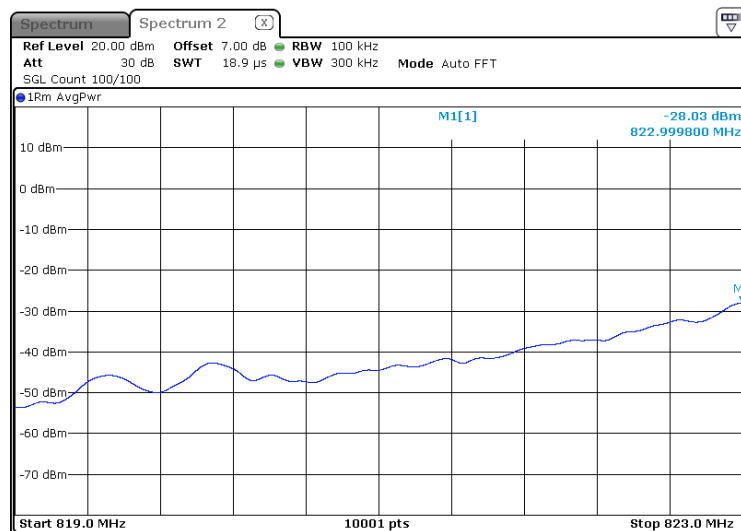


High Channel (1 908.75 MHz)

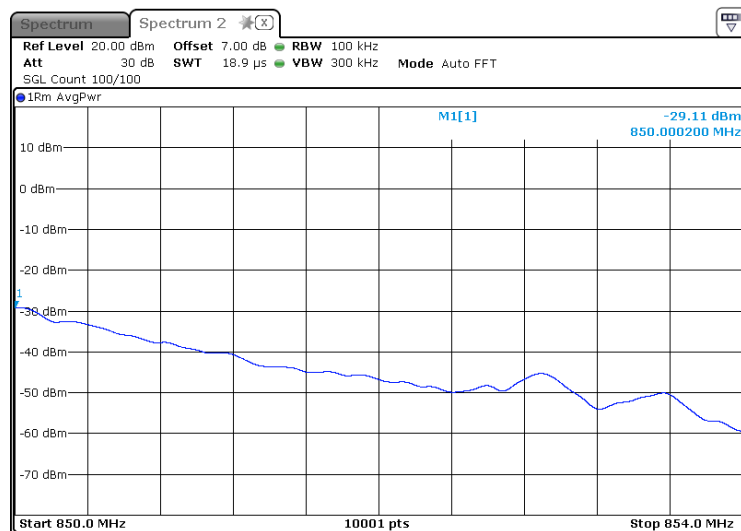


CDMA 800 1xEV-DO mode (4 MHz span)

Low Channel (824.70 MHz)

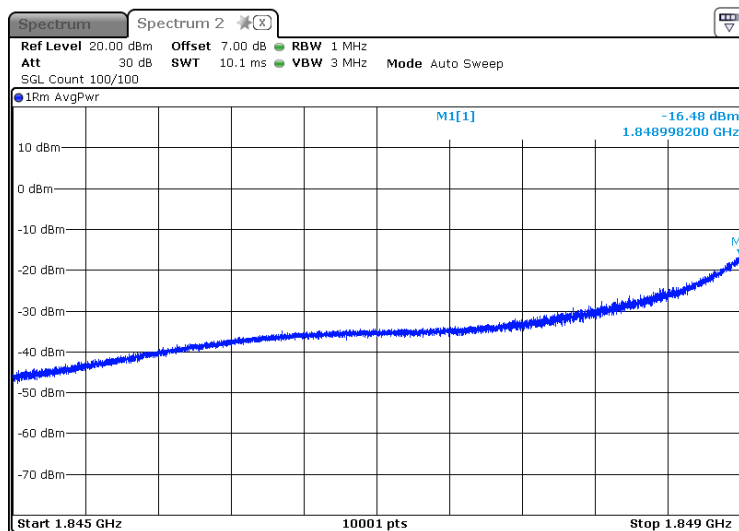


High Channel (848.31 MHz)

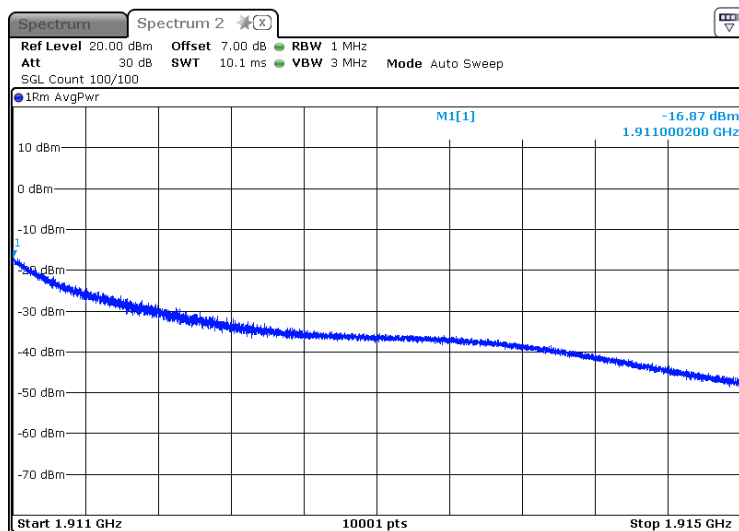


CDMA 1 900 1xEV-DO mode (4 MHz span)

Low Channel (1 851.25 MHz)



High Channel (1 908.75 MHz)



5.8 Frequency Stability

5.8.1 Measurement Procedure

1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC Power supply and the RF output was connected to a frequency counter via feed-through attenuators.
2. The EUT was placed inside the temperature chamber.
3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

5.8.2 Limit

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.

For Mobile devices operating in the 824 to 849 MHz band at a power level less than or equal to 3 Watts, The limit specified in Table C-1 is +/- 2.5 ppm.

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

5.8.3 Test Result

CDMA 800 1xRTT mode mode at middle channel

Voltage(%)	Power(V)	Temperature	Frequency Deviation	ppm
100	12	-30	2.10	0.00251
		-20	2.70	0.00323
		-10	3.60	0.00430
		0	2.90	0.00347
		10	3.60	0.00430
		20	3.20	Ref
		30	2.70	0.00323
		40	2.80	0.00335
		50	2.70	0.00323
85	10.2	20	2.20	0.00263
115	13.8	20	2.40	0.00287

CDMA 1 900 1xRTT mode mode at middle channel

Voltage(%)	Power(V)	Temperature	Frequency Deviation	ppm
100	12	-30	3.10	0.00371
		-20	2.90	0.00347
		-10	3.70	0.00442
		0	3.40	0.00406
		10	2.60	0.00311
		20	3.50	Ref
		30	2.50	0.00299
		40	2.30	0.00275
		50	3.50	0.00418
85	10.2	20	3.40	0.00406
115	13.8	20	2.70	0.00323

CDMA 800 1xEV-DO mode mode at middle channel

Voltage(%)	Power(V)	Temperature	Frequency Deviation	ppm
100	12	-30	2.90	0.00347
		-20	1.90	0.00227
		-10	2.10	0.00251
		0	3.40	0.00406
		10	3.40	0.00406
		20	4.40	Ref
		30	3.20	0.00383
		40	4.80	0.00574
		50	5.30	0.00634
85	10.2	20	3.10	0.00371
115	13.8	20	2.70	0.00323

CDMA 1 900 1xEV-DO mode mode at middle channel

Voltage(%)	Power(V)	Temperature	Frequency Deviation	ppm
100	12	-30	3.10	0.00371
		-20	3.20	0.00383
		-10	3.40	0.00406
		0	3.90	0.00466
		10	3.40	0.00406
		20	3.70	Ref
		30	3.10	0.00371
		40	3.60	0.00430
		50	3.10	0.00371
85	10.2	20	3.60	0.00430
115	13.8	20	3.70	0.00442

6. Test equipment used for test

	Description	Manufacturer	Model No.	Serial No.	Next Cal Date.
■	Wideband Power Sensor	R & S	NRP-Z81	100677	15.05.28
■	Attenuator	HP	8491A	18591	15.05.08
■	Spectrum Analyzer	R & S	FSV40	100989	15.01.29
■	DC Power Supply	Agilent	E3632A	MY400088000	15.12.11
■	Signal generator	R & S	SMR40	100007	15.06.10
■	Spectrum Analyzer	R & S	FSV40	100988	15.01.29
■	Amplifier	Sonoma Instrument	310N	293004	15.09.25
■	Turn Table	Innco Systems	DT2000S-1t	79	-
■	Antenna Mast	Innco Systems	MA4000-EP	303	-
■	Loop Antenna	R & S	HFH2-Z2	100355	15.06.19
■	Bi-Log Antenna	Schwarzbeck	VULB9163	552	16.05.14
■	Horn Antenna	ETS-LINDGREN	3117	155787	15.02.26
■	Broadband Preamplifier	Schwarzbeck	BBV9718	216	15.04.22
■	Attenuator	HP	8491A	16861	15.07.01
■	Highpass Filter	Wainwright Instruments GmbH	WHKX3.0/18G-12SS	44	15.02.05
■	EMI Test Receiver	R & S	ESCI	100001	15.06.24
■	Bluetooth Tester	TESCOM	TC-3000A	3000A310047	15.04.10
■	Power Divider	Aeroflex / Weinschel, Inc	1580-1	RM987	15.04.08
■	SPIRAL antenna	COBHAM	PSA-75301R/170	406827-0001	-
■	Horn antenna	ETS.lindgren	3116	00086632	15.10.20
■	Broadband Preamplifier	Schwarzbeck	BBV9721	2	15.05.09
■	Radio Communication Analyzer	Agilent	E5515C	GB41070179	15.11.12