8. BAND EDGE MEASUREMENT

8.1 Operating environment

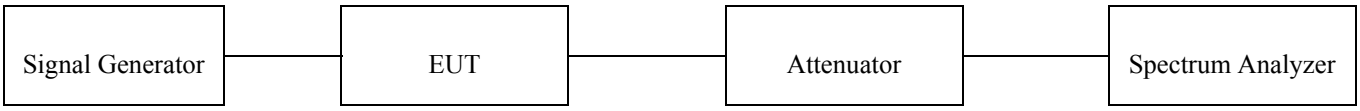
Temperature : 24 °C

Relative humidity : 48 % R.H.

8.2 Test set-up for conducted measurement

The RF signal from the signal generator(s) was injected to the EUT and the amplified RF signal at the output of the EUT was connected to the power meter or spectrum analyzer. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation.

The resolution bandwidth and video bandwidth of the spectrum analyzer was set according to the regulation and sufficient scans were taken to show any out of band emissions.



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	E4432B	HP	Signal Generator	US38440950	June 10, 2010
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 04, 2010
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010

All test equipment used is calibrated on a regular basis.

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EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

8.4 Test data

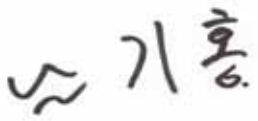
8.4.1 Test Result for Part 22 H

-. Test Date : August 05 ~ 09, 2010

-. Result : PASSED BY –14.77 dB at low channel of WCDMA Mode

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)
TDMA	Low	869.00	-30.77	-13.00
	High	894.00	-32.28	
GSM	Low	869.00	-31.55	
	High	894.00	-32.93	
EDGE	Low	868.97	-35.27	-13.00
	High	894.02	-33.10	
CDMA	Low	869.00	-37.90	
	High	894.00	-42.08	
1xEVDO	Low	869.00	-38.11	-13.00
	High	894.00	-42.18	
WCDMA	Low	869.00	-27.77	
	High	894.00	-29.08	

According to Part 22H, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.



Tested by: Ki-Hong, Nam / Project Engineer

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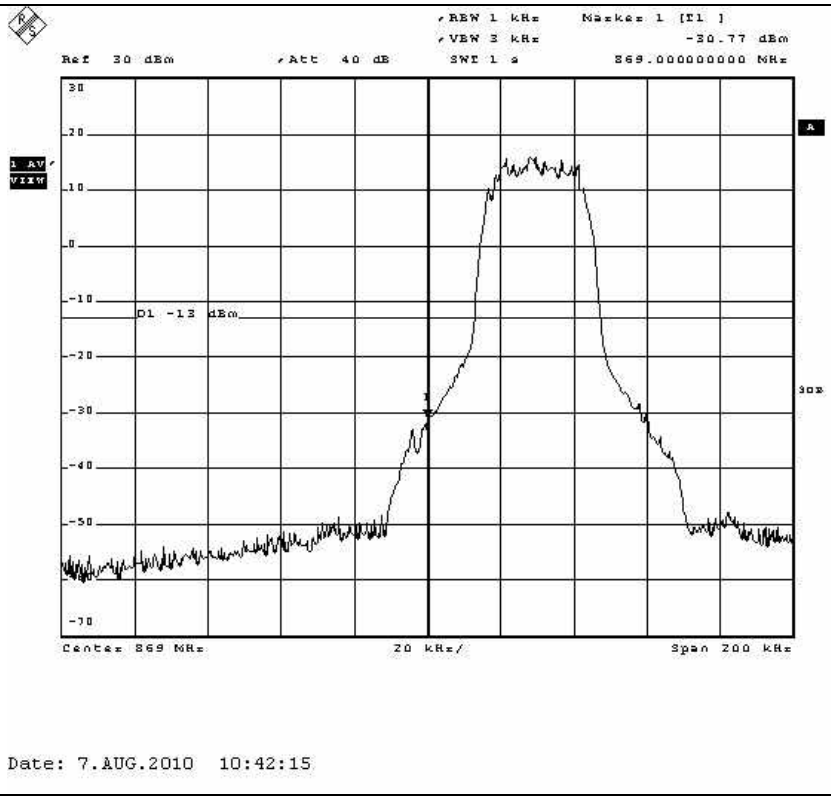
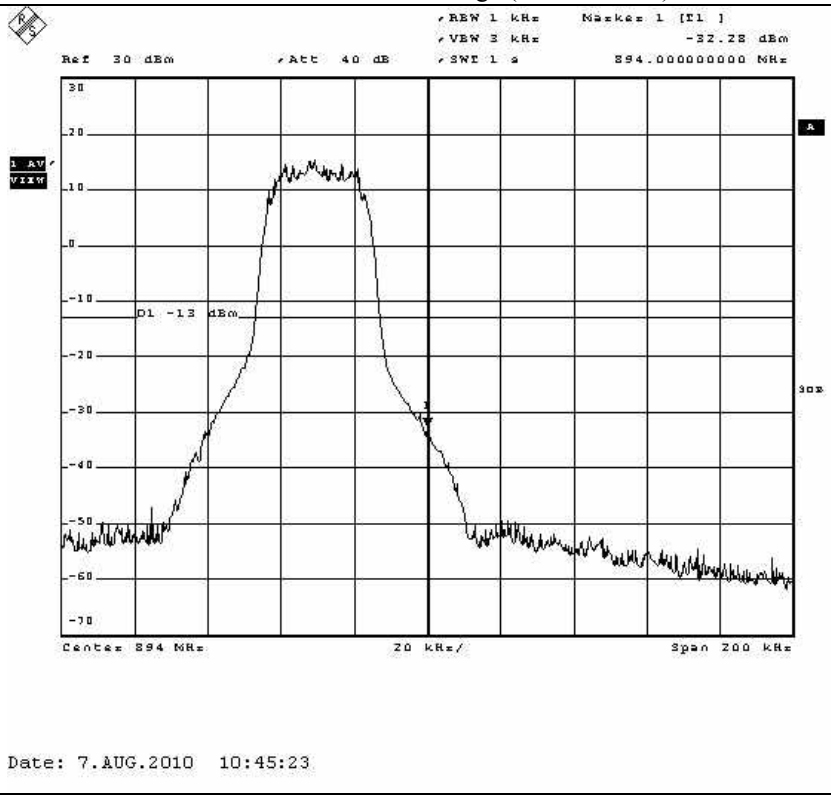


TDMA – Band Edge (Low Channel)



TDMA – Band Edge (High Channel)

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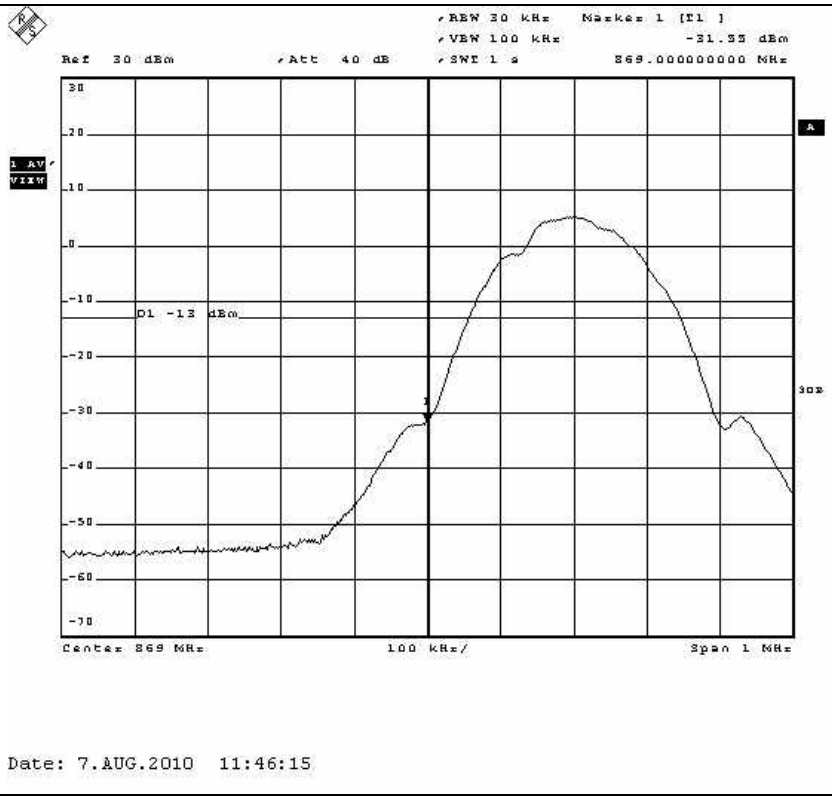
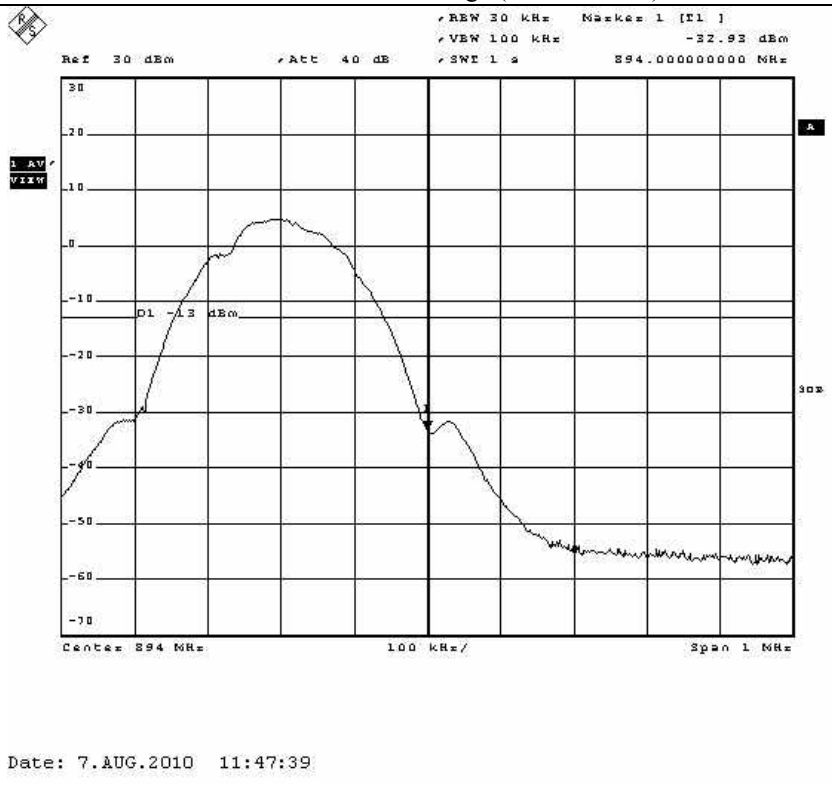


GSM – Band Edge (Low Channel)



GSM – Band Edge (High Channel)

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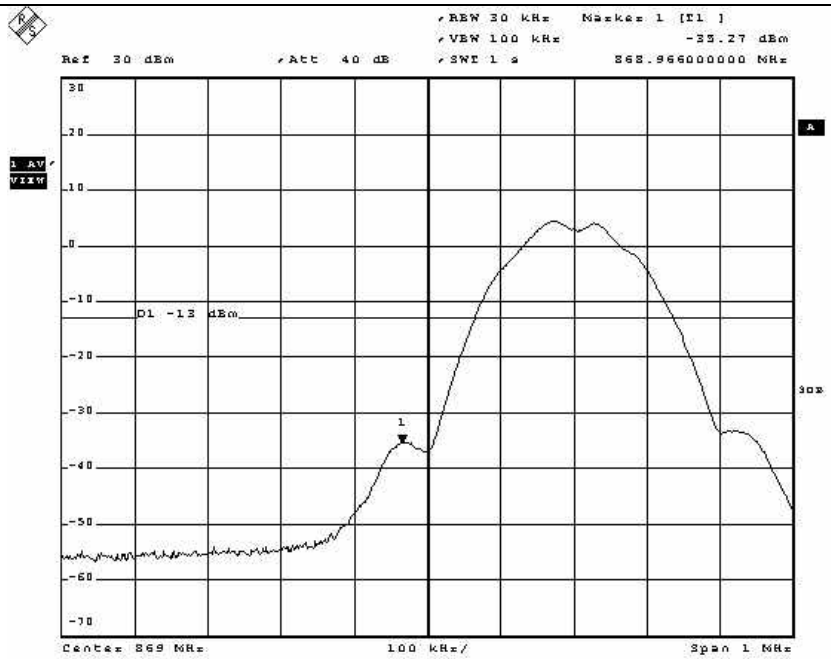
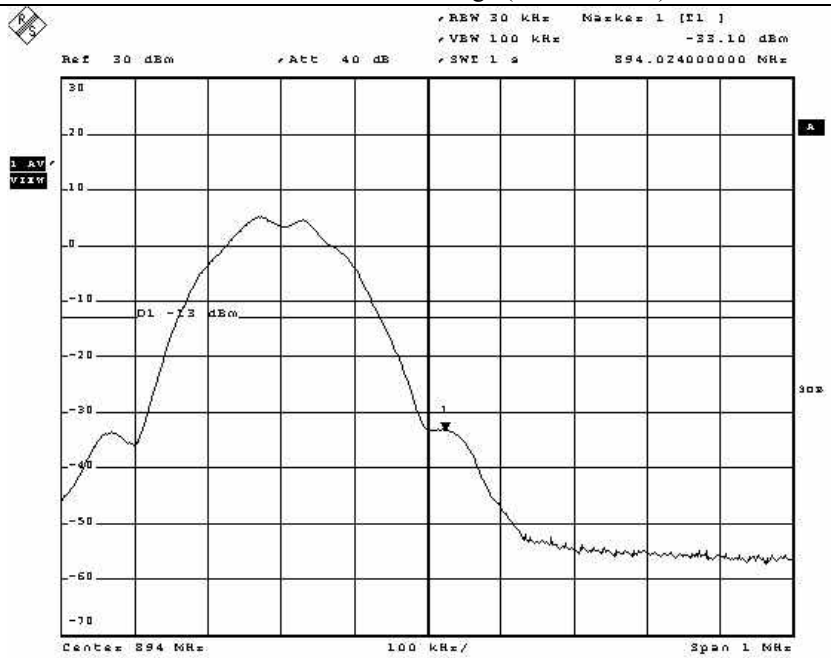


EDGE – Band Edge (Low Channel)



EDGE – Band Edge (High Channel)

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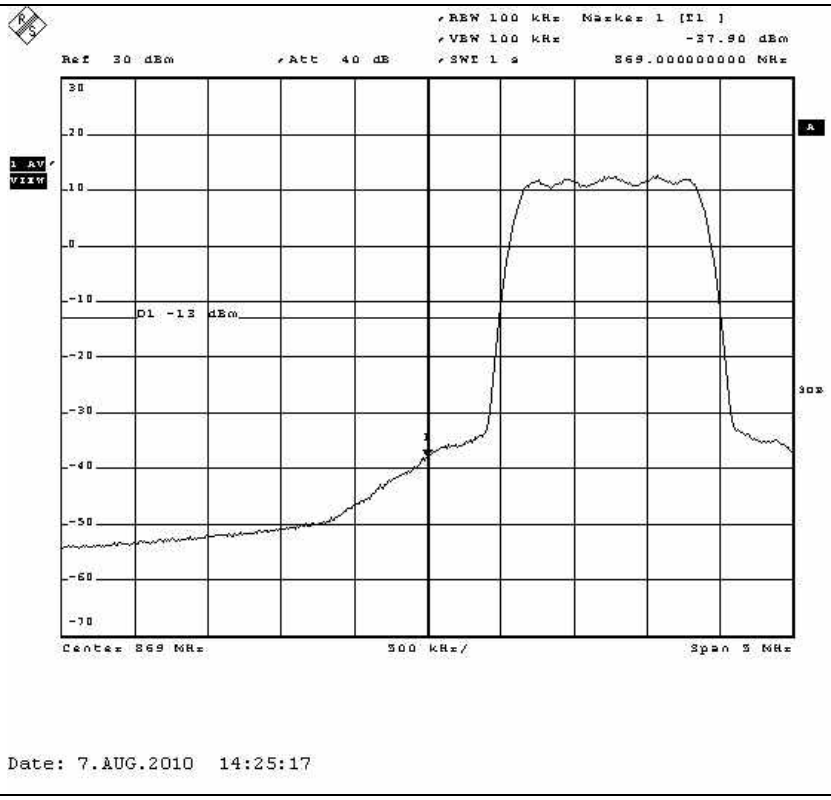
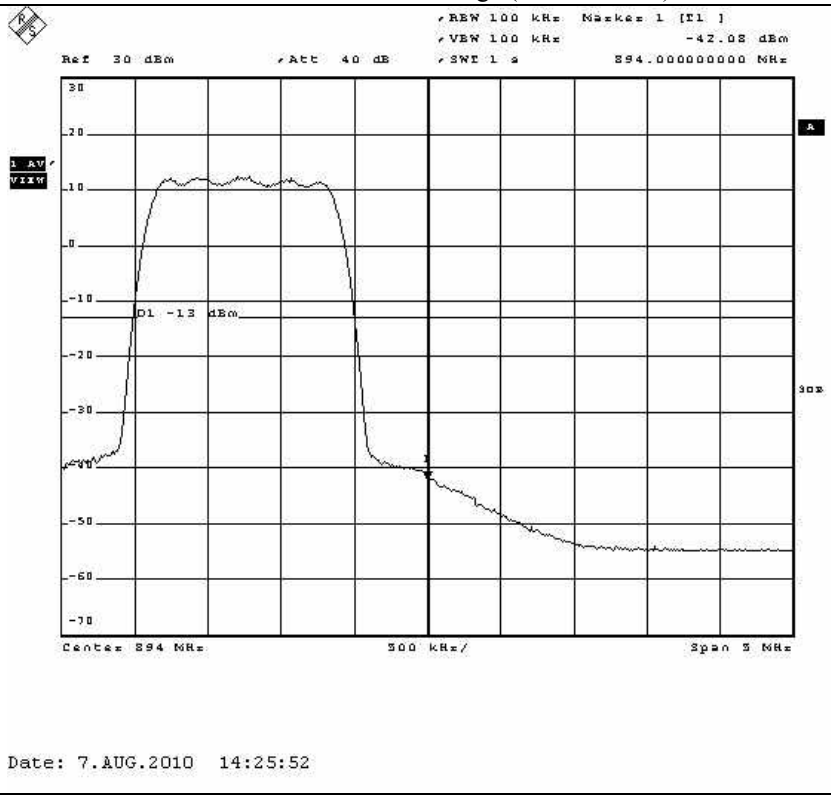


CDMA – Band Edge (Low Channel)



CDMA – Band Edge (High Channel)

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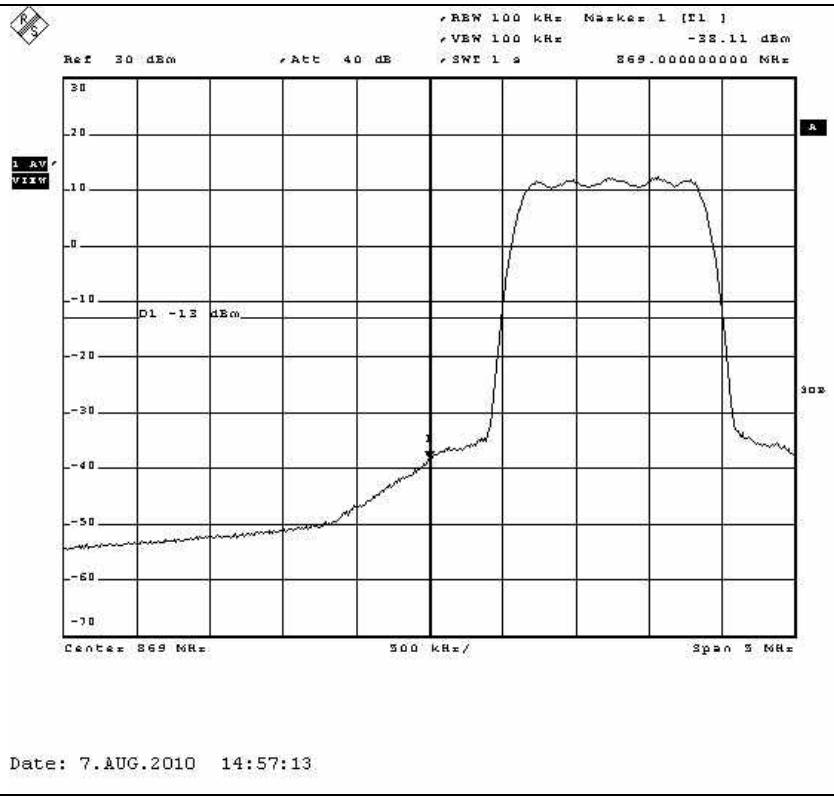
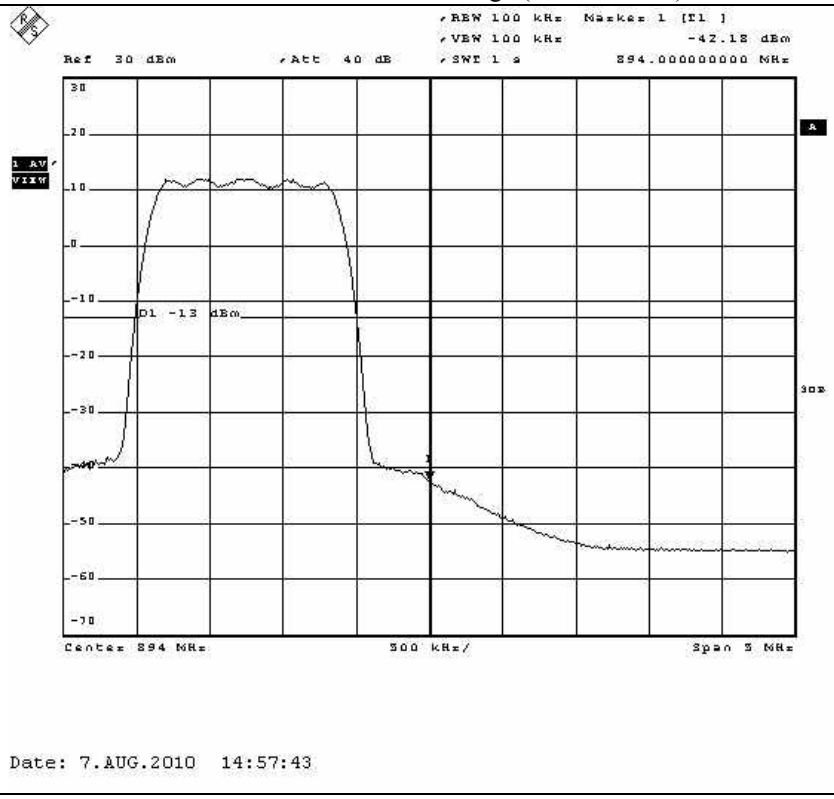


1xEVDO – Band Edge (Low Channel)



1xEVDO – Band Edge (High Channel)

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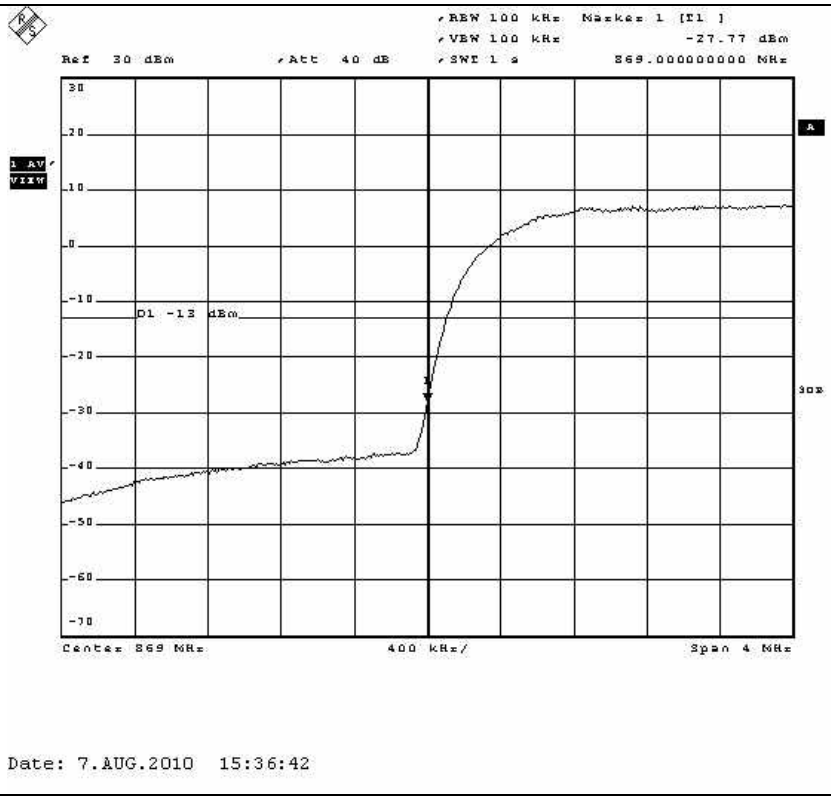
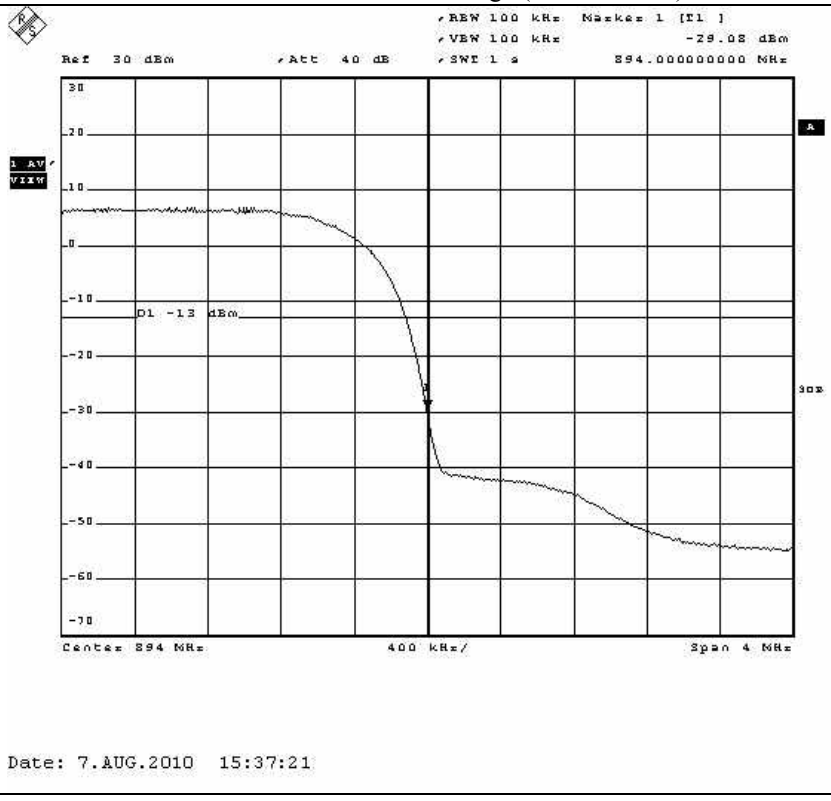
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



WCDMA – Band Edge (Low Channel)



WCDMA – Band Edge (High Channel)

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8.4.2 Test Result for Part 27 Subpart C §27.53 (c)(5)

-. Test Date : August 05 ~ 09, 2010

-. Result : PASSED

Modulation	Measured Frequency (MHz)	Max. Measured Value (dBm)
QPSK	742.71	-35.40
	745.90	-28.87
	746.00	-28.11
	756.00	-28.08
	756.10	-28.81
	760.25	-39.00
16QAM	742.71	-35.40
	745.90	-28.82
	746.00	-28.06
	756.00	-28.06
	756.10	-28.82
	760.25	-38.93
64QAM	742.71	-35.37
	745.90	-28.80
	746.00	-28.26
	756.00	-28.03
	756.10	-28.82
	760.25	-38.96

Tested by: Ki-Hong, Nam / Project Engineer

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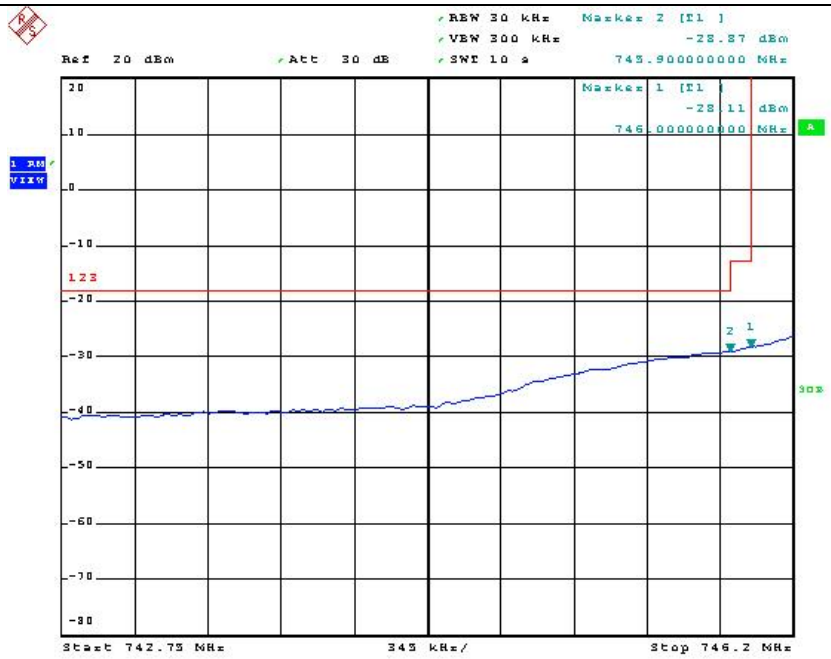
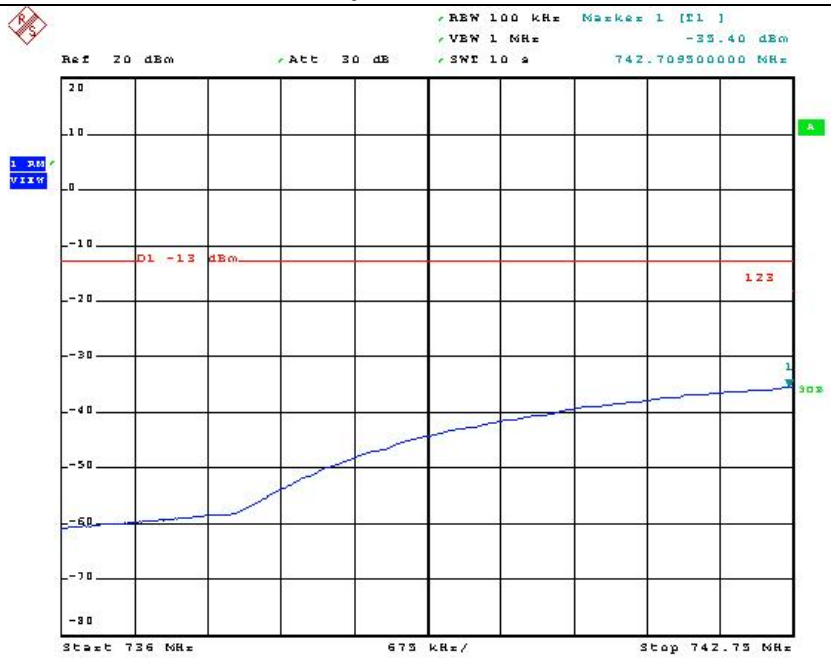


QPSK Bottom Side Band



QPSK Bottom Side Band

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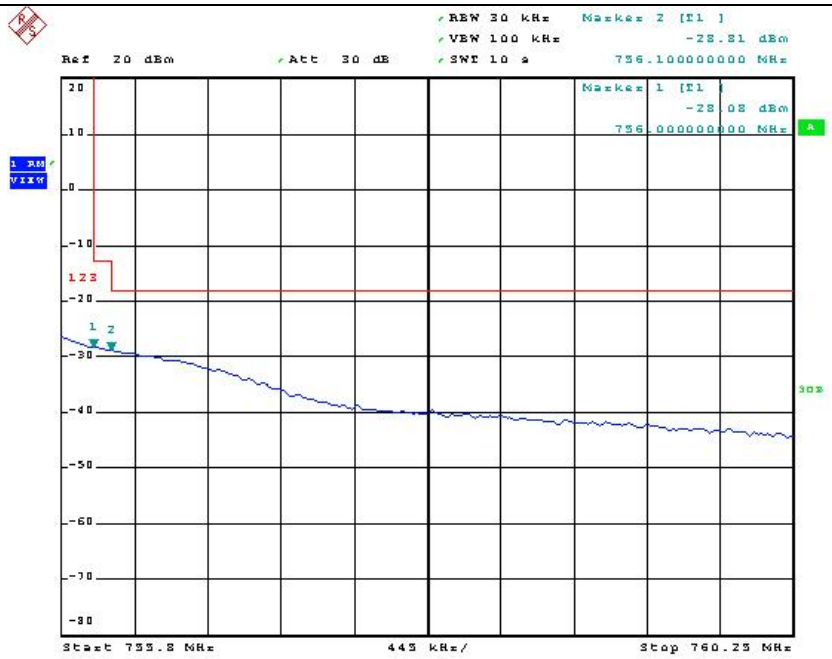
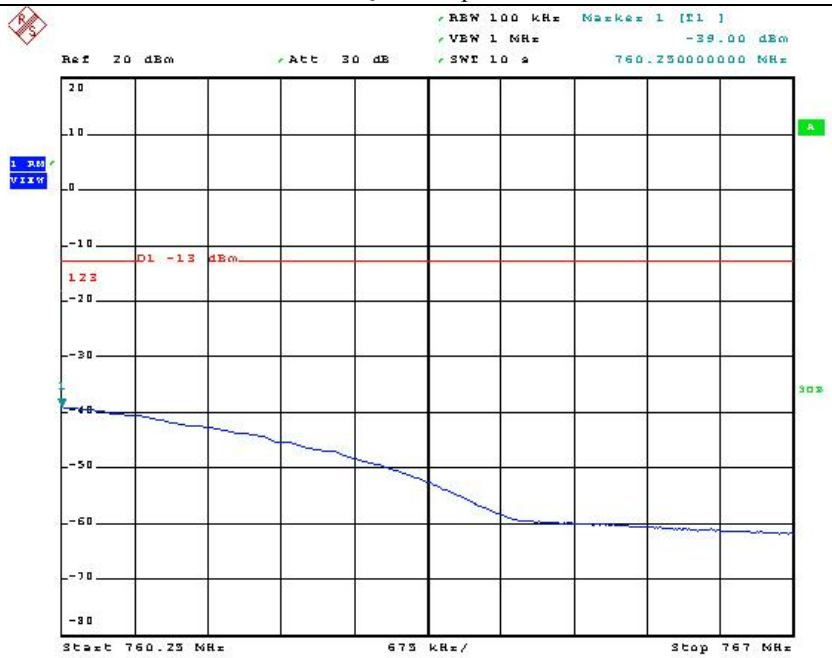


QPSK Top Side Band



QPSK Top Side Band

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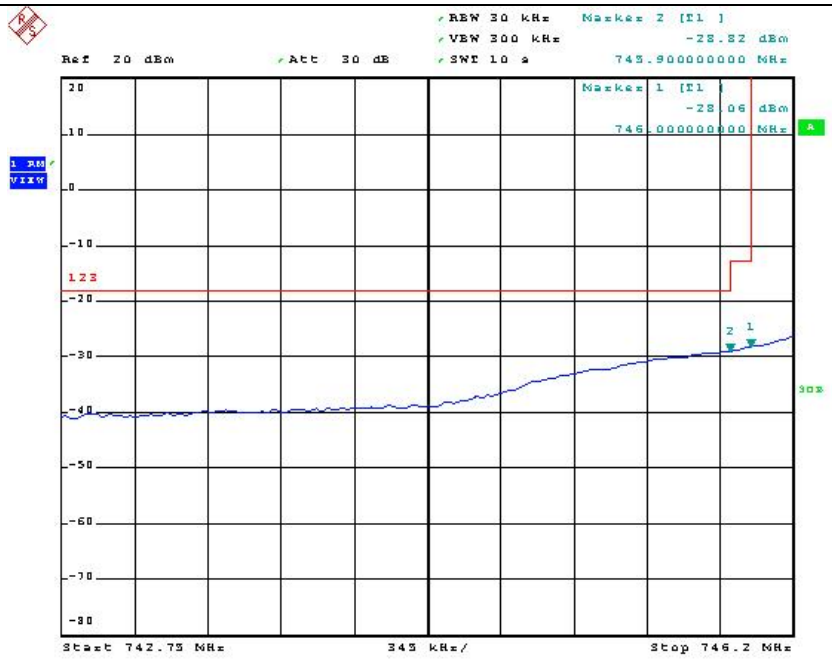
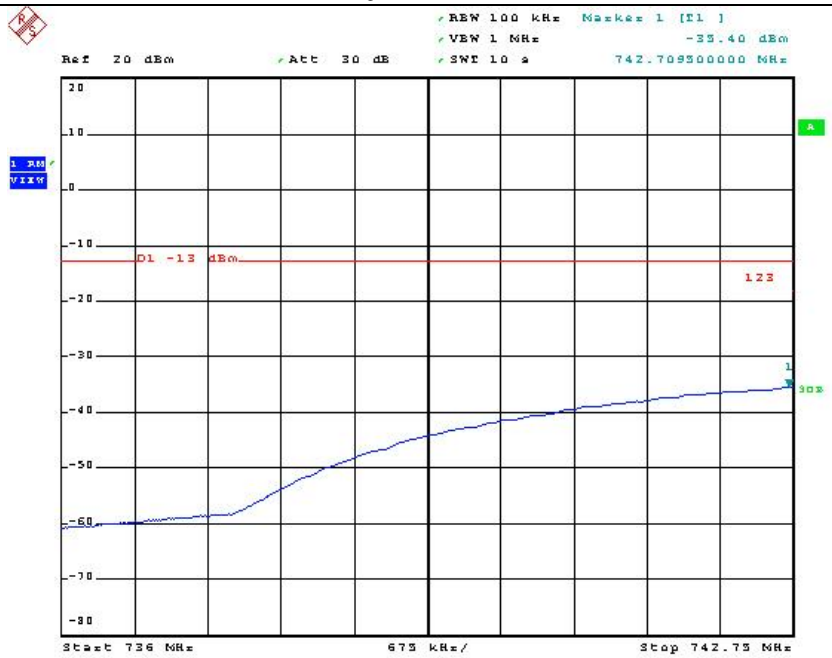


16QAM Bottom Side Band



16QAM Bottom Side Band

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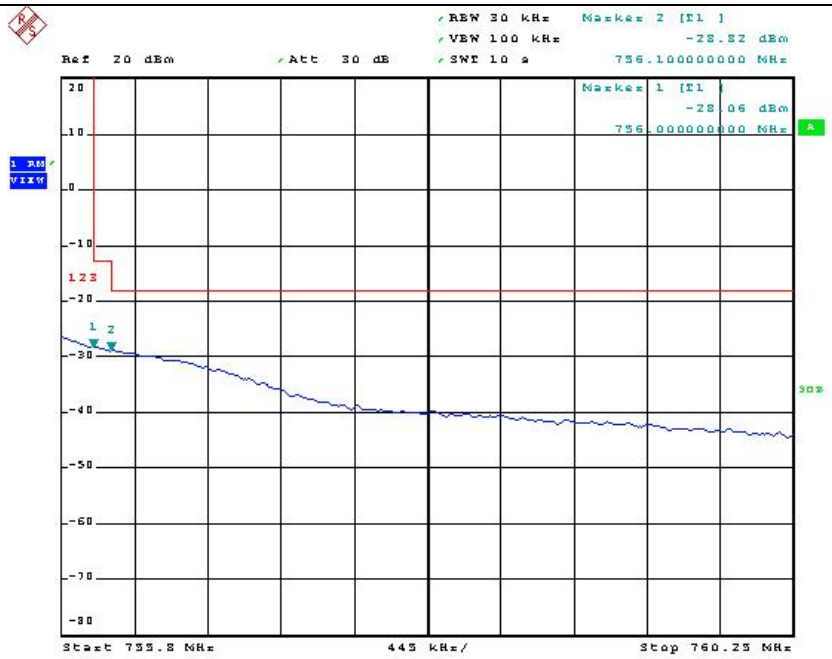
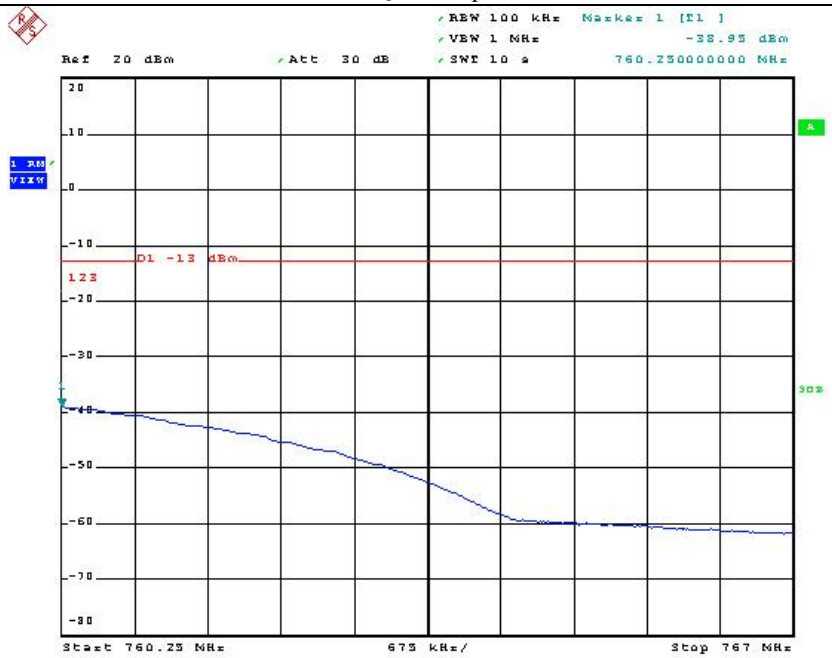
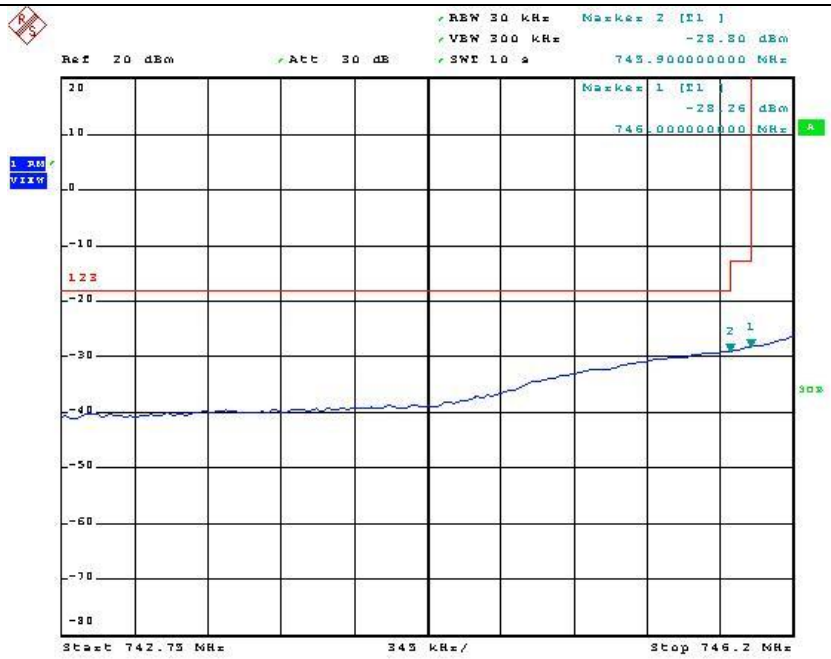


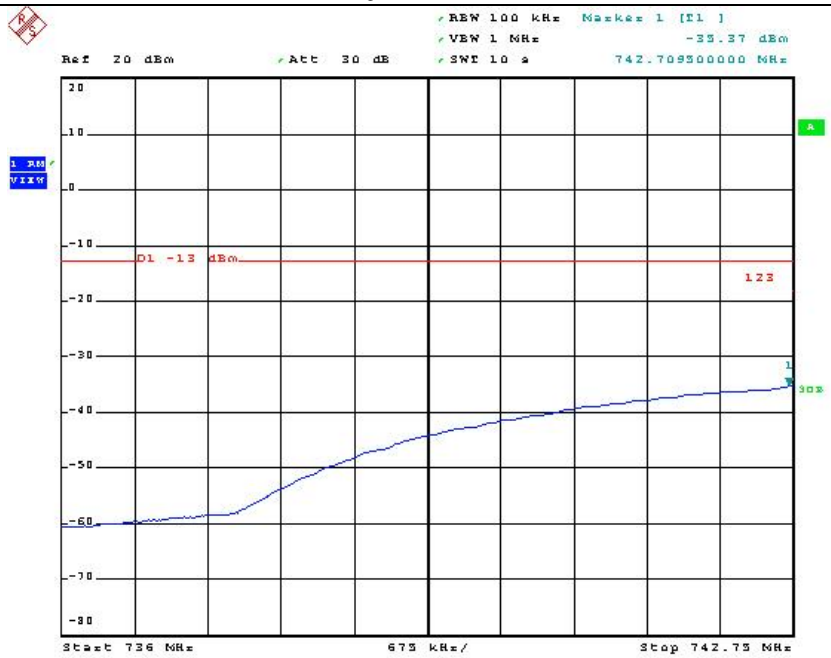
16QAM Top Side Band



16QAM Top Side Band



64QAM Bottom Side Band



64QAM Bottom Side Band

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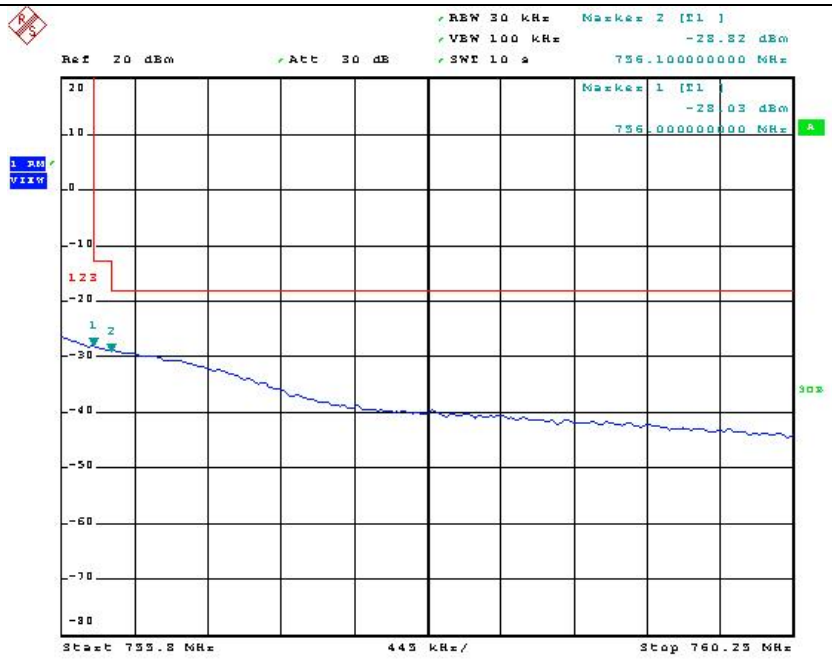
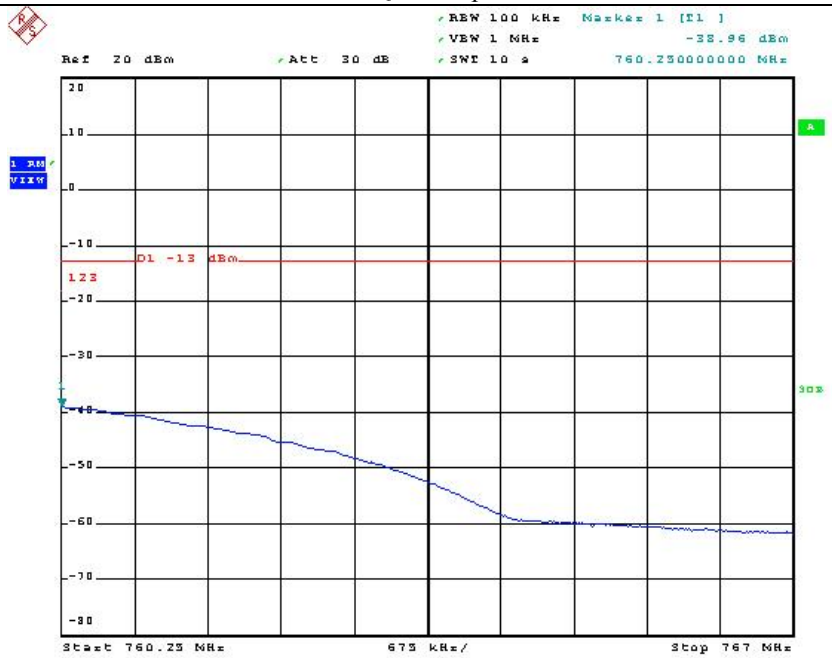


64QAM Top Side Band



64QAM Top Side Band

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9. INTERMODULATION TEST

9.1 Operating environment

Temperature : 24 °C

Relative humidity : 48 % R.H.

9.2 Test set-up

The RF signal from the signal generator(s) was injected to the EUT and the amplified RF signal at the output of the EUT was connected to the power meter or spectrum analyzer. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation.

Two input signals are equal in level and were sent to the input of the EUT.

9.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	E4432B	HP	Signal Generator	US38440950	June 10, 2010
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 04, 2010
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010

All test equipment used is calibrated on a regular basis.

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9.4 Test data

9.4.1 Test data for Part 22 H

-. Test Date : August 05 ~ 09, 2010

-. Test Result : Pass

	Channel	Measured
1 Carrier	Low	< -13 dBm
	High	< -13 dBm
2 Carrier	Low	< -13 dBm
	High	< -13 dBm
3 Carrier	Low	< -13 dBm
	High	< -13 dBm

Remark: Intermodulation products must be attenuated below the rated power of the EUT at least 43 + 10log (Pw), equivalent to -13 dBm. Please refer to test data hereinafter.

Tested by: Ki-Hong, Nam / Project Engineer

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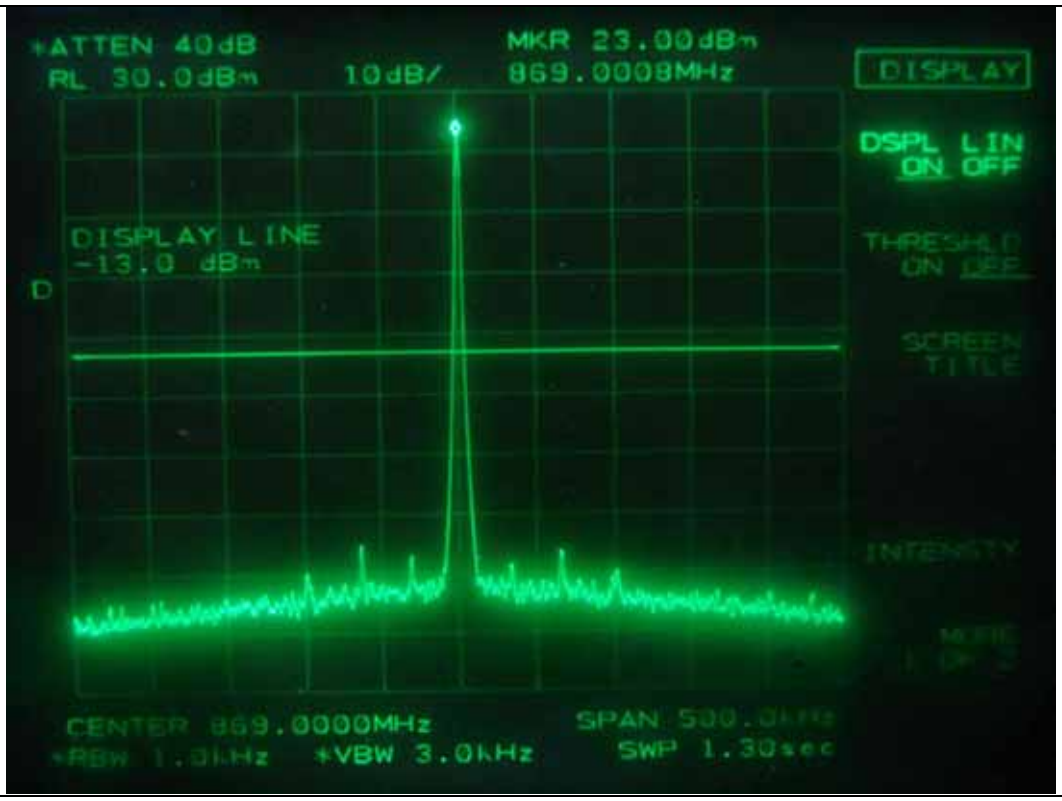
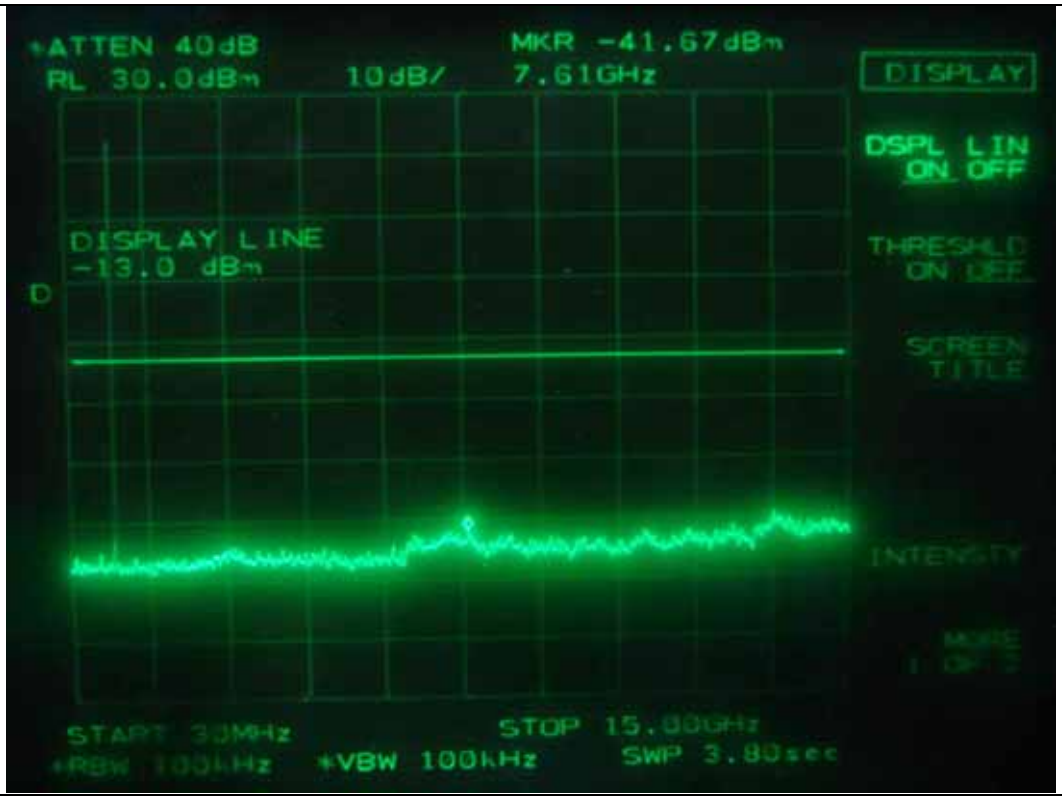


1 Carrier – Low Channel



1 Carrier – Low Channel

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

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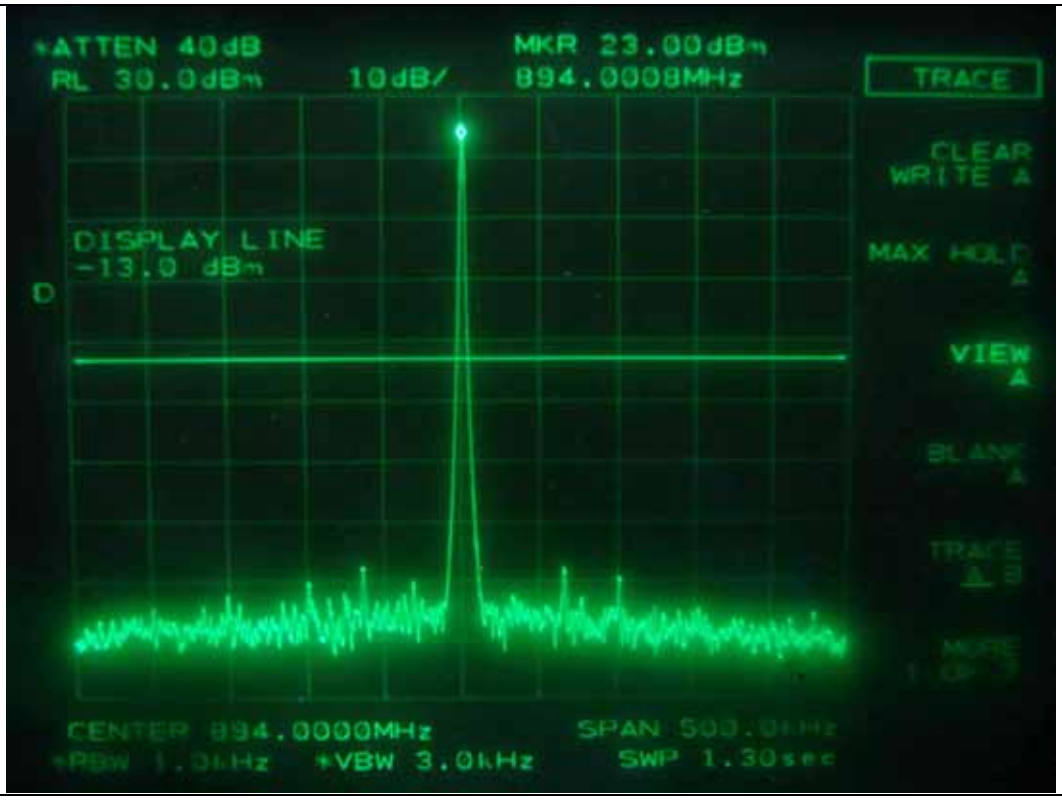
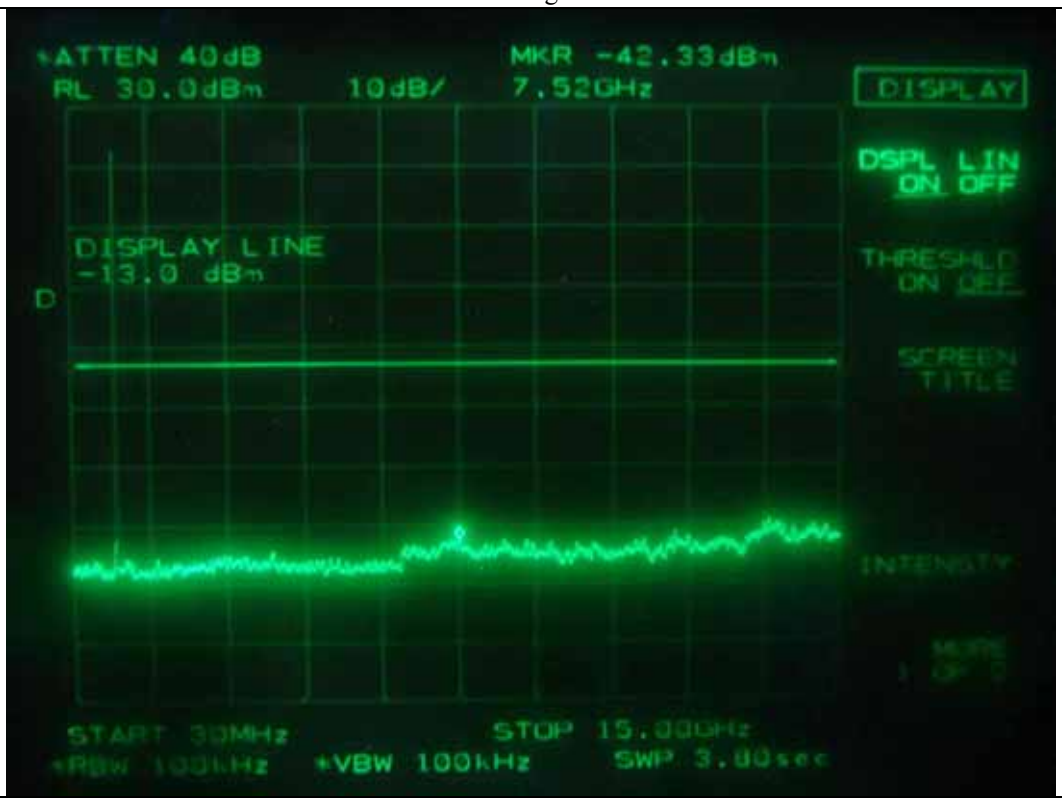


1 Carrier – High Channel



1 Carrier – High Channel

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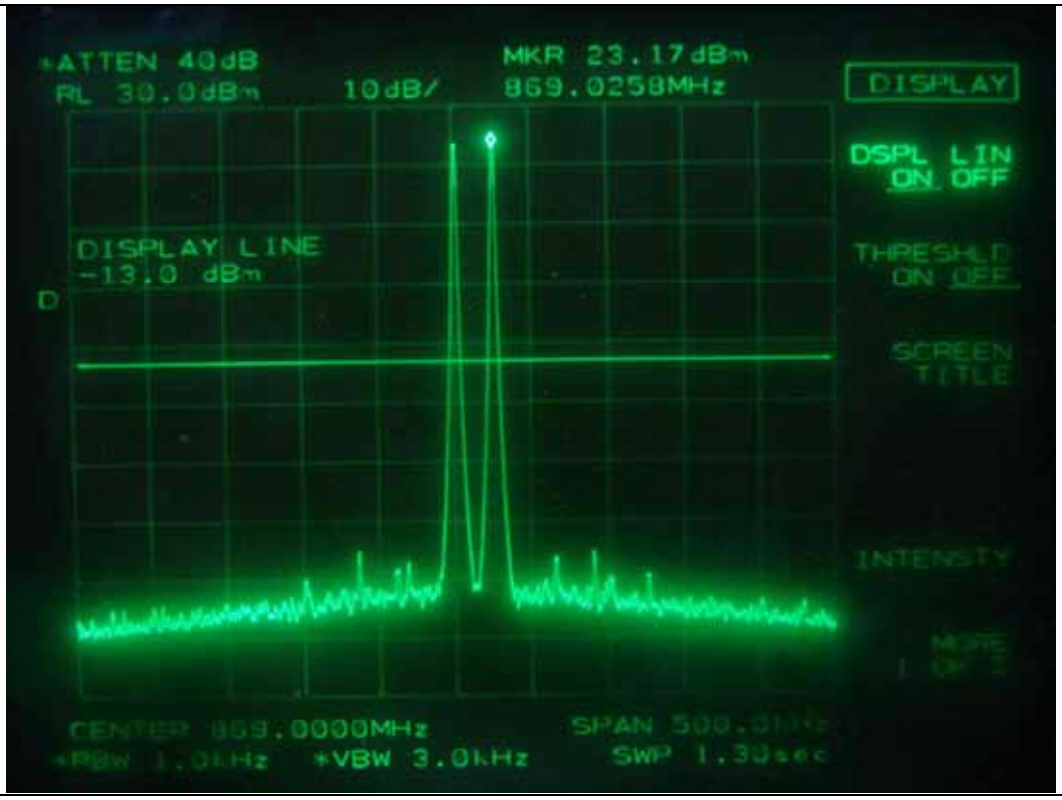

2 Carrier – Low Channel

2 Carrier – Low Channel

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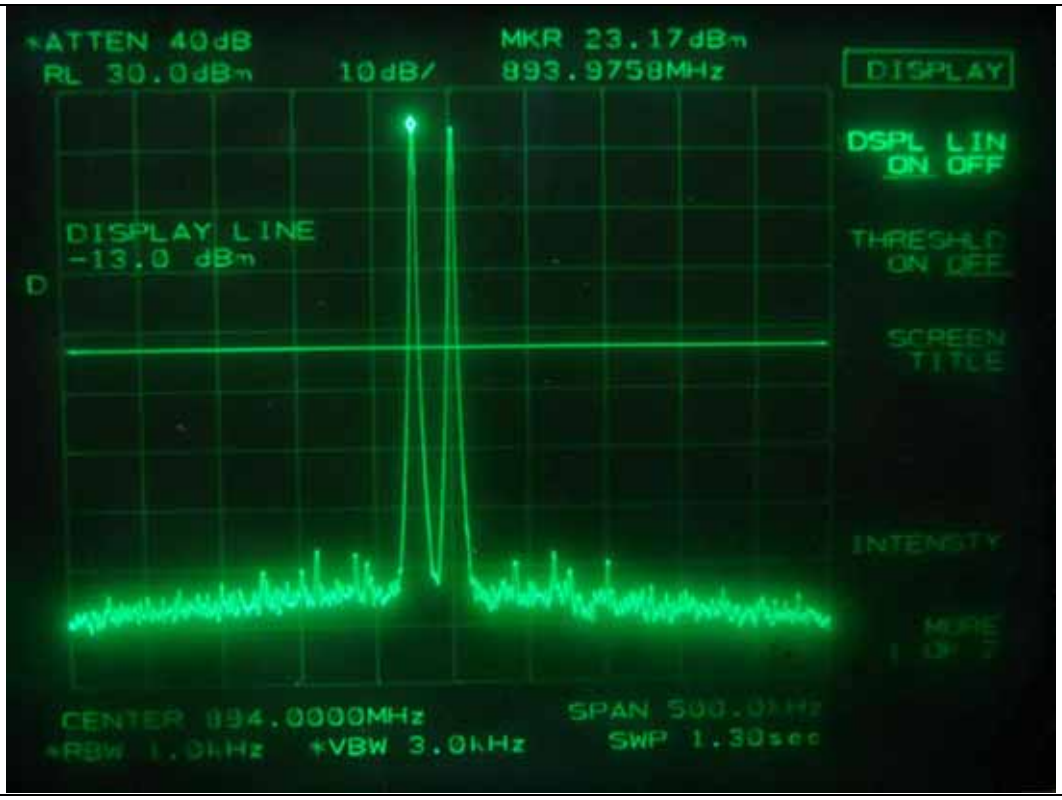
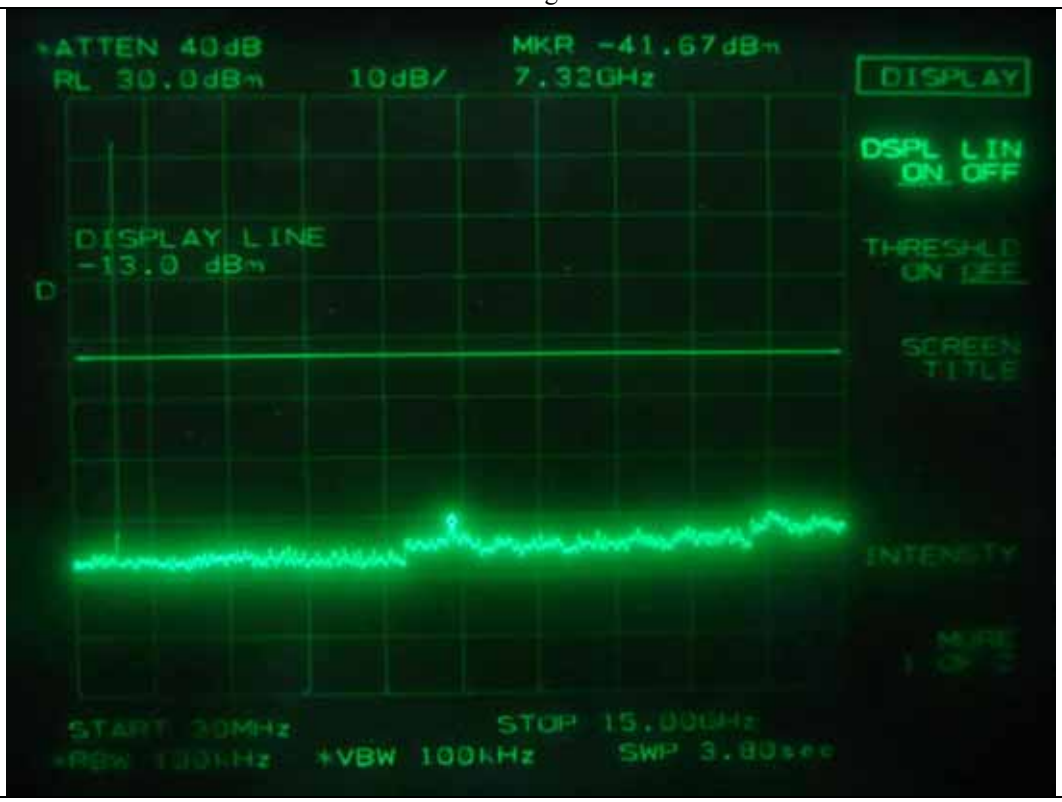


2 Carrier – High Channel



2 Carrier – High Channel

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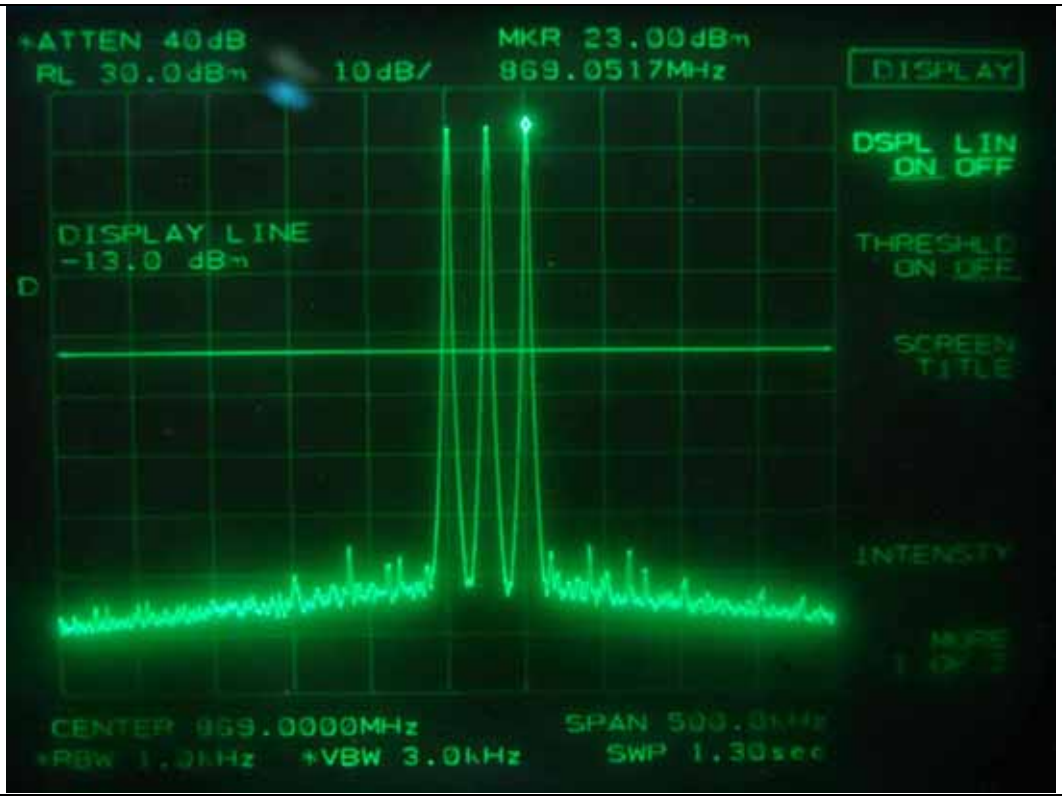
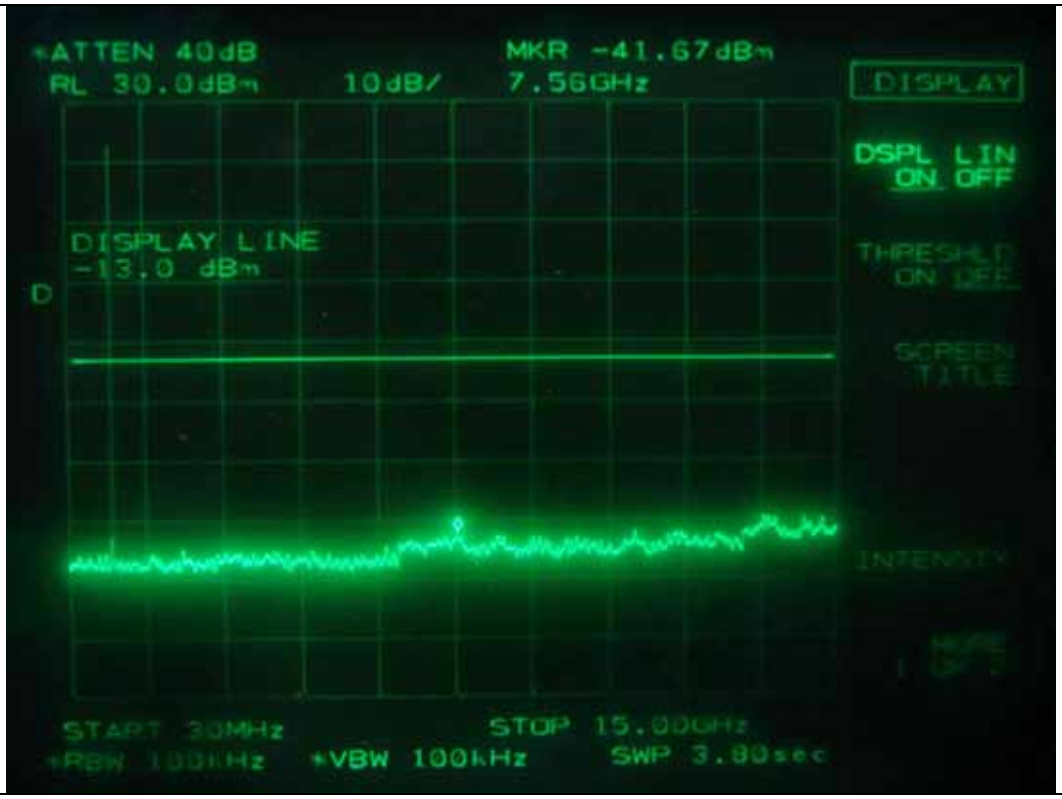


3 Carrier – Low Channel



3 Carrier – Low Channel

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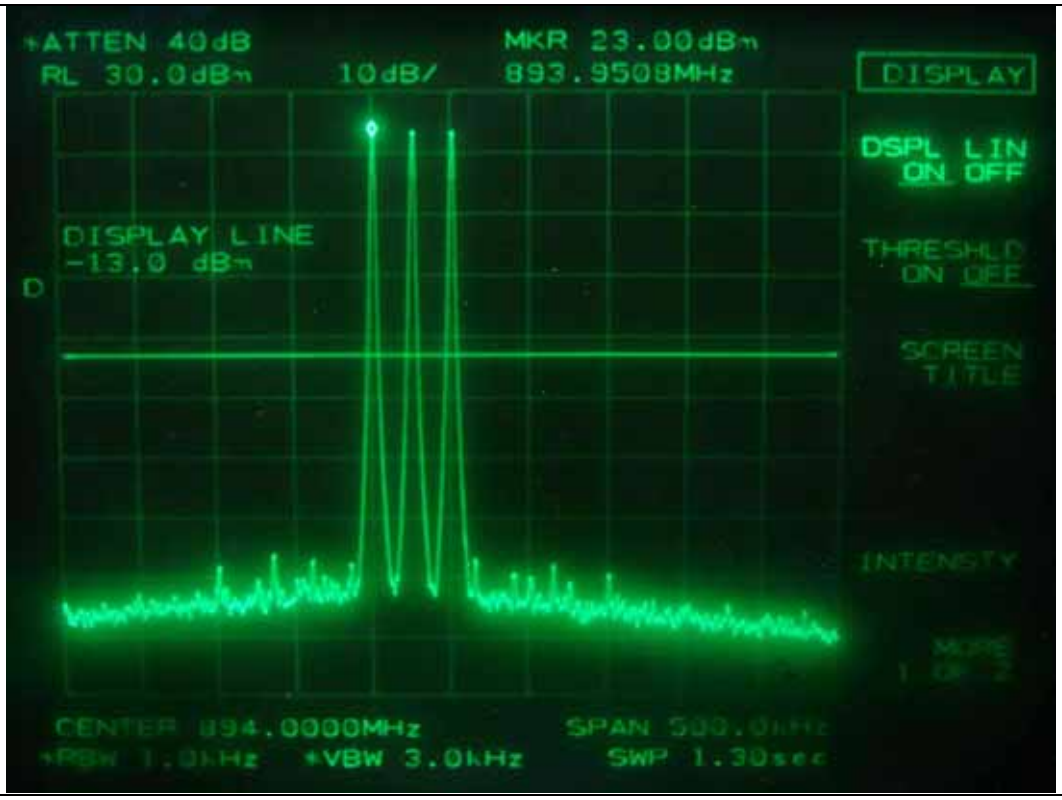

3 Carrier – High Channel

3 Carrier – High Channel

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10. FIELD STRENGTH OF SPURIOUS RADIATION

10.1 Operating environment

Temperature : 28 °C
Relative humidity : 50 % R.H.

10.2 Test set-up

The radiated emissions measurements were on the 3 m, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.
The frequency spectrum from 30 MHz to up to 10th harmonic of the fundamental frequency was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. The test was performed by placing the EUT on 3-orthogonal axis. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.
The maximum radiated emission was recorded and used as reference for the effective radiated power measurement. The EUT was then replaced by a tuned dipole antenna or Horn antenna and was oriented for vertical polarization and then the length was adjusted to correspond to the frequency of the transmitter. The substitution antenna was connected to a signal generator with a coaxial cable. The receiving antenna height was raised and lowered again through the specified range of height until maximum signal level is detected by the measuring receiver. The signal to the substitution antenna was adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the EUT radiated power measured, corrected for the change of input attenuation setting of the measuring receiver. The signal generator level was recorded and corrected by the power loss in the cable between the signal generator and substitution antenna and further corrected for the gain of the dipole antenna or horn antenna used relative to an ideal tuned dipole antenna. The measurement was repeated with the test antenna and the substitution antenna oriented for horizontal polarization. The measure of the effective radiated power is the larger of the two levels recorded.

10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESVD	Rohde & Schwarz	EMI Test Receiver	838453/018	Nov. 20, 2009
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	83051A	Agilent	Preamplifier	3950M00201	June 11, 2010
■ -	E4432B	Hewlett-Packard	Signal Generator	US38440950	June 10, 2010
■ -	83650L	Hewlett-Packard	Signal Generator	3844A00415	June 10, 2010
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	June 17, 2009(2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	June 17, 2009(2Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 04, 2010
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010

All test equipment used is calibrated on a regular basis.

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10.4 Test data for radiated emission

10.4.1 Test result for Part 22 H with AC 120 V Power Supply

10.4.1.1 Operating Mode: TDMA

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –38.86 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
869.03	62.88	-2.79	-0.18	H	3.33	-6.30	-	-
	62.50	-1.08		V		-4.59	-	-
Test Data for Middle Channel								
881.50	62.33	-3.34	-0.36	H	3.33	-7.03	-	-
	62.67	-0.91		V		-4.60	-	-
Test Data for High Channel								
893.97	62.50	-3.17	-0.53	H	3.33	-7.03	-	-
	62.17	-1.41		V		-5.27	-	-
140.10	28.00	-51.83	1.47	V	1.50	-51.86	-13.00	-38.86
171.30	17.00	-64.50	1.97	H	1.67	-60.86	-13.00	-47.86
250.00	17.30	-68.33	1.60	H	2.00	-64.73	-13.00	-51.73
951.90	15.10	-64.17	-0.45	H	3.42	-61.20	-13.00	-48.20
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.1.2 Operating Mode: GSM

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –39.03 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
869.20	62.67	-3.00	-0.19	H	3.33	-6.52	-	-
	62.45	-1.13		V		-4.65	-	-
Test Data for Middle Channel								
881.60	62.83	-2.84	-0.36	H	3.33	-6.53	-	-
	62.50	-1.08		V		-4.77	-	-
Test Data for High Channel								
893.80	62.42	-3.25	-0.52	H	3.33	-7.10	-	-
	62.33	-1.25		V		-5.10	-	-
140.10	27.83	-52.00	1.47	V	1.50	-52.03	-13.00	-39.03
171.30	17.17	-64.33	1.97	H	1.67	-64.03	-13.00	-51.03
250.00	17.50	-68.13	1.60	H	2.00	-68.53	-13.00	-55.53
951.90	15.33	-63.94	-0.45	V	3.42	-67.81	-13.00	-54.81
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

10.4.1.3 Operating Mode: EDGE

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –38.36 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
869.20	62.50	-3.17	-0.19	H	3.33	-6.69	-	-
	62.20	-1.38		V		-4.90	-	-
Test Data for Middle Channel								
881.60	61.83	-2.84	-0.36	H	3.33	-6.53	-	-
	62.55	-1.03		V		-4.72	-	-
Test Data for High Channel								
893.80	62.50	-3.17	-0.52	H	3.33	-7.02	-	-
	62.15	-1.43		V		-5.28	-	-
140.10	28.50	-51.33	1.47	V	1.50	-51.36	-13.00	-38.36
171.30	16.92	-64.58	1.97	H	1.67	-64.28	-13.00	-51.28
250.00	17.00	-68.63	1.60	H	2.00	-69.03	-13.00	-56.03
951.90	15.33	-63.94	-0.45	V	3.42	-67.81	-13.00	-54.81
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

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10.4.1.4 Operating Mode: CDMA

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –39.36 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
870.25	62.67	-3.00	-0.20	H	3.33	-6.53	-	-
	62.72	-0.86		V		-4.39	-	-
Test Data for Middle Channel								
881.50	62.83	-2.84	-0.36	H	3.33	-6.53	-	-
	62.50	-1.08		V		-4.77	-	-
Test Data for High Channel								
892.75	62.92	-2.75	-0.51	H	3.33	-6.59	-	-
	62.48	-1.10		V		-4.94	-	-
140.10	27.50	-52.33	1.47	V	1.50	-52.36	-13.00	-39.36
171.30	17.00	-64.50	1.97	H	1.67	-64.20	-13.00	-51.20
250.00	16.83	-68.80	1.60	H	2.00	-69.20	-13.00	-56.20
951.90	14.92	-64.35	-0.45	V	3.42	-68.22	-13.00	-55.22
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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10.4.1.5 Operating Mode: 1xEVDO

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –38.69 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
870.25	62.72	-2.95	-0.20	H	3.33	-6.48	-	-
	62.25	-1.33		V		-4.86	-	-
Test Data for Middle Channel								
881.50	62.33	-3.34	-0.36	H	3.33	-7.03	-	-
	62.10	-1.48		V		-5.17	-	-
Test Data for High Channel								
892.75	62.83	-2.84	-0.51	H	3.33	-6.68	-	-
	62.45	-1.13		V		-4.97	-	-
140.10	28.17	-51.66	1.47	V	1.50	-51.69	-13.00	-38.69
171.30	17.33	-64.17	1.97	H	1.67	-63.87	-13.00	-50.87
250.00	16.83	-68.80	1.60	H	2.00	-69.20	-13.00	-56.20
951.90	15.50	-63.77	-0.45	V	3.42	-67.64	-13.00	-54.64
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.1.6 Operating Mode: WCDMA

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –39.36 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
871.40	62.67	-3.00	-0.22	H	3.33	-6.55	-	-
	62.33	-1.25		V		-4.80	-	-
Test Data for Middle Channel								
881.00	62.50	-3.17	-0.35	H	3.33	-6.85	-	-
	62.17	-1.41		V		-5.09	-	-
Test Data for High Channel								
891.60	62.83	-2.84	-0.49	H	3.33	-6.66	-	-
	62.33	-1.25		V		-5.07	-	-
140.10	27.50	-52.33	1.47	V	1.50	-52.36	-13.00	-39.36
171.30	16.83	-64.67	1.97	H	1.67	-64.37	-13.00	-51.37
250.00	17.50	-68.13	1.60	H	2.00	-68.53	-13.00	-55.53
951.90	15.33	-63.94	-0.45	V	3.42	-67.81	-13.00	-54.81
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

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10.4.2 Test Result for Part 22 H with DC - 48 V Power Supply

10.4.2.1 Operating Mode: TDMA

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –39.19 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
869.03	62.92	-2.75	-0.18	H	3.33	-6.26	-	-
	62.50	-1.08		V		-4.59	-	-
Test Data for Middle Channel								
881.50	62.83	-2.84	-0.36	H	3.33	-6.53	-	-
	62.44	-1.14		V		-4.83	-	-
Test Data for High Channel								
893.97	62.72	-2.95	-0.53	H	3.33	-6.81	-	-
	62.33	-1.25		V		-5.11	-	-
140.10	27.67	-52.16	1.47	V	1.50	-52.19	-13.00	-39.19
171.30	17.50	-64.00	1.97	H	1.67	-63.70	-13.00	-50.70
250.00	16.83	-68.80	1.60	H	2.00	-69.20	-13.00	-56.20
951.90	15.50	-63.77	-0.45	V	3.42	-67.64	-13.00	-54.64
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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10.4.2.2 Operating Mode: GSM

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –39.36 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
869.20	62.42	-3.25	-0.19	H	3.33	-6.77	-	-
	62.33	-1.25		V		-4.77	-	-
Test Data for Middle Channel								
881.60	62.67	-3.00	-0.36	H	3.33	-6.69	-	-
	62.48	-1.10		V		-4.79	-	-
Test Data for High Channel								
893.80	62.80	-2.87	-0.52	H	3.33	-6.72	-	-
	62.25	-1.33		V		-5.18	-	-
140.10	27.50	-52.33	1.47	V	1.50	-52.36	-13.00	-39.36
171.30	16.83	-64.67	1.97	H	1.67	-64.37	-13.00	-51.37
250.00	17.50	-68.13	1.60	H	2.00	-68.53	-13.00	-55.53
951.90	15.83	-63.44	-0.45	V	3.42	-67.31	-13.00	-54.31
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

10.4.2.3 Operating Mode: EDGE

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –38.53 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
869.20	62.92	-2.75	-0.19	H	3.33	-6.27	-	-
	62.67	-0.91		V		-4.43	-	-
Test Data for Middle Channel								
881.60	62.83	-2.84	-0.36	H	3.33	-6.53	-	-
	62.50	-1.08		V		-4.77	-	-
Test Data for High Channel								
893.80	62.72	-2.95	-0.52	H	3.33	-6.80	-	-
	62.42	-1.16		V		-5.01	-	-
140.10	28.33	-51.50	1.47	V	1.50	-51.53	-13.00	-38.53
171.30	17.50	-64.00	1.97	H	1.67	-63.70	-13.00	-50.70
250.00	17.67	-67.96	1.60	H	2.00	-68.36	-13.00	-55.36
951.90	15.50	-63.77	-0.45	V	3.42	-67.64	-13.00	-54.64
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.2.4 Operating Mode: CDMA

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –39.19 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
870.25	62.83	-2.84	-0.20	H	3.33	-6.37	-	-
	62.55	-1.03		V		-4.56	-	-
Test Data for Middle Channel								
881.50	62.78	-2.89	-0.36	H	3.33	-6.58	-	-
	62.41	-1.17		V		-4.86	-	-
Test Data for High Channel								
892.75	62.95	-2.72	-0.51	H	3.33	-6.56	-	-
	62.78	-0.80		V		-4.64	-	-
140.10	27.67	-52.16	1.47	V	1.50	-52.19	-13.00	-39.19
171.30	17.17	-64.33	1.97	H	1.67	-64.03	-13.00	-51.03
250.00	17.67	-67.96	1.60	H	2.00	-68.36	-13.00	-55.36
951.90	15.33	-63.94	-0.45	V	3.42	-67.81	-13.00	-54.81
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.2.5 Operating Mode: 1xEVDO

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –39.36 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
870.25	62.83	-2.84	-0.20	H	3.33	-6.37	-	-
	62.50	-1.08		V		-4.61	-	-
Test Data for Middle Channel								
881.50	62.70	-2.97	-0.36	H	3.33	-6.66	-	-
	62.33	-1.25		V		-4.94	-	-
Test Data for High Channel								
892.75	62.90	-2.77	-0.51	H	3.33	-6.61	-	-
	62.17	-1.41		V		-5.25	-	-
140.10	27.50	-52.33	1.47	V	1.50	-52.36	-13.00	-39.36
171.30	17.33	-64.17	1.97	H	1.67	-63.87	-13.00	-50.87
250.00	17.00	-68.63	1.60	H	2.00	-69.03	-13.00	-56.03
951.90	15.67	-63.60	-0.45	V	3.42	-67.47	-13.00	-54.47
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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10.4.2.6 Operating Mode: WCDMA

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –38.53 dB at 140.10 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
871.40	62.50	-3.17	-0.22	H	3.33	-6.72	-	-
	62.33	-1.25		V		-4.80	-	-
Test Data for Middle Channel								
881.00	62.67	-3.00	-0.35	H	3.33	-6.68	-	-
	62.10	-1.48		V		-5.16	-	-
Test Data for High Channel								
891.60	62.83	-2.84	-0.49	H	3.33	-6.66	-	-
	62.43	-1.15		V		-4.97	-	-
140.10	28.33	-51.50	1.47	V	1.50	-51.53	-13.00	-38.53
171.30	16.78	-64.72	1.97	H	1.67	-64.42	-13.00	-51.42
250.00	17.50	-68.13	1.60	H	2.00	-68.53	-13.00	-55.53
951.90	15.00	-64.27	-0.45	V	3.42	-68.14	-13.00	-55.14
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.3 Test Result for Part 27 C with AC 120 V Power Supply

10.4.3.1 Operating Mode: QPSK

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –46.94 dB at 132.70 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
751.00	63.33	-6.08	0.99	H	3.17	-8.26	-	-
	62.67	-5.30		V		-7.48	-	-
125.30	18.00	-62.50	1.49	H	1.41	-62.42	-13.00	-49.42
132.70	21.00	-62.92	1.48	H	1.50	-59.94	-13.00	-46.94
250.00	17.30	-68.33	1.60	H	2.00	-64.73	-13.00	-51.73
299.90	15.60	-68.92	1.84	H	2.17	-64.91	-13.00	-51.91
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.3.2 Operating Mode: 16QAM

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –49.44 dB at 132.70 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
751.00	63.50	-5.91	0.99	H	3.17	-8.09	-	-
	62.45	-5.52		V		-7.70	-	-
125.30	17.83	-62.67	1.49	V	1.41	-62.59	-13.00	-49.59
132.70	21.50	-62.42	1.48	H	1.50	-62.44	-13.00	-49.44
250.00	17.67	-67.96	1.60	H	2.00	-68.36	-13.00	-55.36
299.90	15.33	-69.19	1.84	V	2.17	-69.52	-13.00	-56.52
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.3.3 Operating Mode: 64QAM

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –49.09 dB at 125.30 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
751.00	63.45	-5.96	0.99	H	3.17	-8.14	-	-
	62.50	-5.47		V		-7.65	-	-
125.30	18.33	-62.17	1.49	V	1.41	-62.09	-13.00	-49.09
132.70	20.50	-63.42	1.48	H	1.50	-63.44	-13.00	-50.44
250.00	17.17	-68.46	1.60	H	2.00	-68.86	-13.00	-55.86
299.90	15.83	-68.69	1.84	V	2.17	-69.02	-13.00	-56.02
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.4 Test Result for Part 27 C with DC - 48 V Power Supply

10.4.4.1 Operating Mode: QPSK

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –46.94 dB at 132.70 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
751.00	63.67	-5.74	0.99	H	3.17	-7.92	-	-
	62.50	-5.47		V		-7.65	-	-
125.30	18.50	-62.00	1.49	V	1.41	-61.92	-13.00	-48.92
132.70	21.00	-62.92	1.48	H	1.50	-59.94	-13.00	-46.94
250.00	17.67	-67.96	1.60	H	2.00	-64.36	-13.00	-51.36
299.90	15.00	-69.52	1.84	V	2.17	-65.51	-13.00	-52.51
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.4.2 Operating Mode: 16QAM

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –49.59 dB at 125.30 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
751.00	63.50	-5.91	0.99	H	3.17	-8.09	-	-
	62.67	-5.30		V		-7.48	-	-
125.30	17.83	-62.67	1.49	V	1.41	-62.59	-13.00	-49.59
132.70	20.50	-63.42	1.48	H	1.50	-63.44	-13.00	-50.44
250.00	17.50	-68.13	1.60	H	2.00	-68.53	-13.00	-55.53
299.90	15.33	-69.19	1.84	V	2.17	-69.52	-13.00	-56.52
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

10.4.4.3 Operating Mode: 64QAM

-. Test Date : August 05 ~ 09, 2010

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –48.92 dB at 125.30 MHz

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
751.00	63.50	-5.91	0.99	H	3.17	-8.09	-	-
	62.17	-5.80		V		-7.98	-	-
125.30	18.50	-62.00	1.49	V	1.41	-61.92	-13.00	-48.92
132.70	21.33	-62.59	1.48	H	1.50	-62.61	-13.00	-49.61
250.00	17.83	-67.80	1.60	H	2.00	-68.20	-13.00	-55.20
299.90	15.00	-69.52	1.84	V	2.17	-69.85	-13.00	-56.85
Other frequencies have margin more than 20 dB.								

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Ki-Hong, Nam / Project Engineer

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11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

11.1 Operating environment

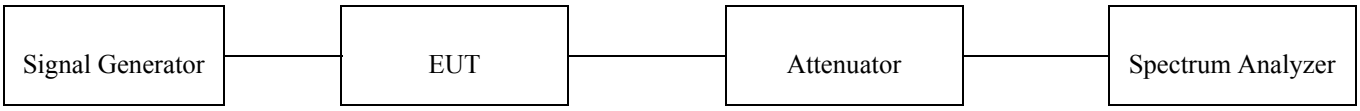
Temperature : 24 °C

Relative humidity : 48 % R.H.

11.2 Test set-up

The RF signal from the signal generator(s) was injected to the EUT and the amplified RF signal at the output of the EUT was connected to the power meter or spectrum analyzer. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation.

Turn EUT off and set chamber temperature to - 30 °C and then allow sufficient time (approximately 20 to 30 min. after chamber reach the assigned temperature) for EUT to stabilize. Turn on the EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from - 30 °C to +50 °C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.



11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 01, 2009
■ -	SSE-43CI-A	Samkun	Chamber	060712	June 11, 2010
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 04, 2010
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010

All test equipment used is calibrated on a regular basis.

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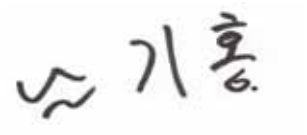
11.4 Test data

11.4.1 Test Result for Part 22 H with AC 120 V Power Supply

-. Test Date : August 05 ~ 09, 2010

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	881 500 000	881 500 001	0.001 1	Within the Authorized Frequency block
-20		881 500 000	0.000 0	
-10		881 500 001	0.001 1	
0		881 500 001	0.001 1	
10		881 500 000	0.000 0	
20		881 500 001	0.001 1	
30		881 500 000	0.000 0	
40		881 500 000	0.000 0	
50		881 500 000	0.000 0	



Tested by: Ki-Hong, Nam / Project Engineer

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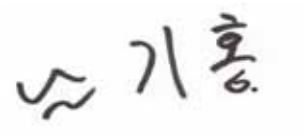
11.4.2 Test Result for Part 22 H with DC – 48 V Power Supply

-. Test Date : August 05 ~ 09, 2010

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	881 500 000	881 500 000	0.000 0	Within the Authorized Frequency block
-20		881 500 000	0.000 0	
-10		881 500 000	0.000 0	
0		881 500 001	0.001 1	
10		881 500 000	0.000 0	
20		881 500 001	0.001 1	
30		881 500 001	0.001 1	
40		881 500 001	0.001 1	
50		881 500 000	0.000 0	



Tested by: Ki-Hong, Nam / Project Engineer

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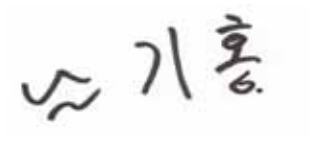
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

11.4.3 Test Result for Part 27 C with AC 120 V Power Supply

-. Test Date : August 05 ~ 09, 2010

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	751 000 000	751 000 000	0.000 0	Within the Authorized Frequency block
-20		751 000 001	0.001 3	
-10		751 000 000	0.000 0	
0		751 000 001	0.001 3	
10		751 000 001	0.001 3	
20		751 000 000	0.000 0	
30		751 000 001	0.001 3	
40		751 000 000	0.000 0	
50		751 000 001	0.001 3	



Tested by: Ki-Hong, Nam / Project Engineer

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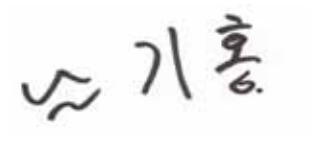
11.4.4 Test Result for Part 27 C with DC – 48 V Power Supply

-. Test Date : August 05 ~ 09, 2010

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	751 000 000	751 000 000	0.000 0	Within the Authorized Frequency block
-20		751 000 001	0.001 3	
-10		751 000 001	0.001 3	
0		751 000 001	0.001 3	
10		751 000 000	0.000 0	
20		751 000 000	0.000 0	
30		751 000 001	0.001 3	
40		751 000 001	0.001 3	
50		751 000 000	0.000 0	



Tested by: Ki-Hong, Nam / Project Engineer

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12. FREQUENCY STABILITY WITH VOLTAGE VARIATION

12.1 Operating environment

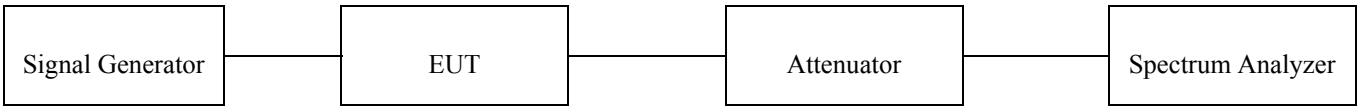
Temperature : 24 °C

Relative humidity : 48 % R.H.

12.2 Test set-up

The RF signal from the signal generator(s) was injected to the EUT and the amplified RF signal at the output of the EUT was connected to the power meter or spectrum analyzer. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation.

The RF output port of the EUT was connected to the input of the spectrum analyzer. The signal generator was set to center frequency for each band with an un-modulated signal. The voltage of EUT set to 115 % of the nominal value and then was reduced to 85 % of nominal voltage. The output frequency was recorded at each step.



12.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	8564E	HP	Spectrum Analyzer	3650A00756	June 10, 2010
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 01, 2009
■ -	2350A	HP	30 dB Attenuator Assembly	2350A03133	June 10, 2010
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 04, 2010
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010

All test equipment used is calibrated on a regular basis.

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12.4 Test data

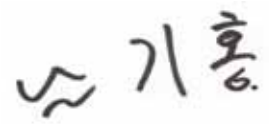
12.4.1 Test Result for Part 22 H with AC 120 V Power Supply

-. Test Date : August 05 ~ 09, 2010

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	881 500 000	881 500 000	0.000 0	Within the Authorized Frequency block
120 (100 %)		881 500 001	0.001 1	
102 (85 %)		881 500 001	0.001 1	



Tested by: Ki-Hong, Nam / Project Engineer

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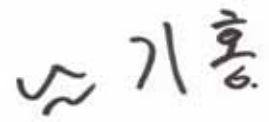
12.4.2 Test Result for Part 22 H with DC – 48 V Power Supply

-. Test Date : August 05 ~ 09, 2010

-. Rated Supply Voltage : - 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	881 500 000	881 500 000	0.000 0	Within the Authorized Frequency block
- 48 (100 %)		881 500 001	0.001 1	
- 40.8 (85 %)		881 500 000	0.000 0	



Tested by: Ki-Hong, Nam / Project Engineer

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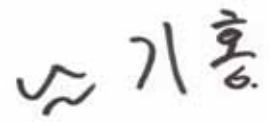
12.4.3 Test Result for Part 27 C with AC 120 V Power Supply

-. Test Date : August 05 ~ 09, 2010

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	751 000 000	751 000 000	0.000 0	Within the Authorized Frequency block
120 (100 %)		751 000 000	0.000 0	
102 (85 %)		751 000 001	0.001 3	



Tested by: Ki-Hong, Nam / Project Engineer

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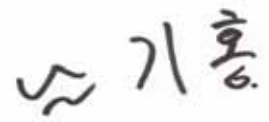
12.4.4 Test Result for Part 27 C with DC – 48 V Power Supply

-. Test Date : August 05 ~ 09, 2010

-. Rated Supply Voltage : 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	751 000 000	751 000 000	0.000 0	Within the Authorized Frequency block
- 48 (100 %)		751 000 001	0.001 3	
- 40.8 (85 %)		751 000 001	0.001 3	



Tested by: Ki-Hong, Nam / Project Engineer

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13. RADIATED EMISSION TEST

13.1 Operating environment

Temperature : 28 °C

Relative humidity : 50 % R.H.

13.2 Test set-up

The radiated emissions measurements were on the 3 m, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

13.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESVD	Rohde & Schwarz	Test Receiver	838453/018	Nov. 20, 2009
■ -	8566B	HP	Spectrum Analyzer	3407A08547	June 11, 2010
■ -	8447D	Hewlett Packard	Amplifier	2727A04987	June 11, 2010
■ -	MA240	HD GmbH	Antenna Master	N/A	N/A
■ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DS420S	HD GmbH	Turn Table	N/A	N/A
■ -	VHA9104	Schwarzbeck	Biconical Antenna	148533554	Mar. 30, 2010(2Y)
■ -	9108-A(495)	Schwarzbeck	Log Periodic Antenna	119782703	Mar. 30, 2010(2Y)

All test equipment used is calibrated on a regular basis.

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13.4 Test data

13.4.1 Test Result for Part 22 H with AC 120 V Power Supply

-. Test Date : August 09, 2010

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

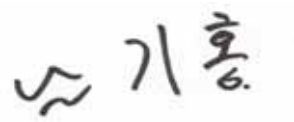
-. Measurement distance : 3 m

-. Result : Passed

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
35.30	17.60	V	1.60	300.00	16.23	1.02	34.85	49.08	-14.23
118.70	18.00	H	1.50	200.00	13.42	2.39	33.81	53.52	-19.71
139.90	27.60	H	1.50	260.00	14.64	2.50	44.74	53.52	-8.78
199.80	18.10	H	1.30	190.00	17.05	3.09	38.24	53.52	-15.28
420.10	16.50	H	1.60	130.00	17.84	4.12	38.46	56.44	-17.98
951.50	15.10	H	1.00	90.00	23.40	7.40	45.90	56.44	-10.54

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

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13.4.2 Test Result for Part 22 H with DC - 48 V Power Supply

-. Test Date : August 09, 2010

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

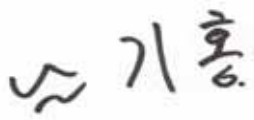
-. Measurement distance : 3 m

-. Result : Passed

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
71.40	24.00	V	1.30	290.00	6.67	2.10	32.77	49.08	-16.31
125.20	18.70	H	1.00	240.00	13.90	2.45	35.05	53.52	-18.47
132.60	19.00	H	1.00	250.00	14.27	2.50	35.77	53.52	-17.75
140.10	17.50	H	1.50	190.00	14.64	2.50	34.64	53.52	-18.88
325.10	17.00	H	1.60	170.00	14.88	3.60	35.48	56.44	-20.96
951.40	15.40	V	1.20	100.00	23.40	7.40	46.20	56.44	-10.24

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

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13.4.3 Test Result for Part 27 C with AC 120 V Power Supply

-. Test Date : August 09, 2010

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

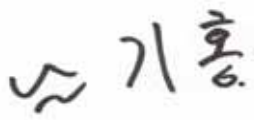
-. Measurement distance : 3 m

-. Result : Passed

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
35.30	18.40	V	1.30	260.00	16.23	1.02	35.65	49.08	-13.43
132.50	17.50	H	1.00	230.00	14.27	2.50	34.27	53.52	-19.25
140.10	28.00	H	1.00	200.00	14.64	2.50	45.14	53.52	-8.38
171.30	17.00	H	1.50	170.00	15.87	2.78	35.65	53.52	-17.87
249.90	17.30	H	1.50	150.00	17.39	3.40	38.09	56.44	-18.35
699.90	15.00	H	1.00	120.00	22.41	5.60	43.01	56.44	-13.43

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

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13.4.4 Test Result for Part 27 C with DC - 48 V Power Supply

-. Test Date : August 09, 2010

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

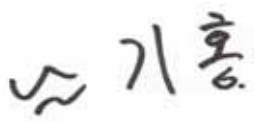
-. Measurement distance : 3 m

-. Result : Passed

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
74.50	24.30	V	1.30	260.00	6.48	2.10	32.88	49.08	-16.20
125.30	18.00	H	1.00	230.00	13.91	2.45	34.36	53.52	-19.16
132.70	21.00	H	1.00	320.00	14.28	2.50	37.78	53.52	-15.74
139.90	20.80	H	1.60	200.00	14.64	2.50	37.94	53.52	-15.58
299.90	15.60	H	1.50	150.00	19.63	3.60	38.83	56.44	-17.61
951.50	15.30	V	1.00	90.00	23.40	7.40	46.10	56.44	-10.34

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Senior Engineer

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14. CONDUCTED EMISSION TEST

14.1 Operating environment

Temperature : 25 °C

Relative humidity : 43 % R.H.

14.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

14.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESHS10	Rohde & Schwarz	EMI Test Receiver	834467/007	May 27, 2010
■ -	NSLK 8128	Schwarzbeck	AMN	8128-216	June 10, 2010
☐ -	3825/2	EMCO	AMN	9109-1867	June 10, 2010

All test equipment used is calibrated on a regular basis.

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14.4 Test data

14.4.1 Test Result for Part 22 H

-. Test Date : August 07, 2010

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Test Result : Passed by -22.80 dB at 5.95 MHz

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.16	N	54.62	79.00	-24.38
5.95	N	50.20	73.00	-22.80
6.19	H	47.46	73.00	-25.54
8.60	N	49.66	73.00	-23.34
9.18	H	48.00	73.00	-25.00
20.63	N	46.08	73.00	-26.92
Frequency (MHz)	**Line**	**Average (dBμV)**		**Margin (dB)**
		Emission level	**Limits**	
-				
-				

Line Conducted Emissions Tabulated Data

Remark : "H": Hot Line, "N": Neutral Line

Average mode was not measured, because peak values were under the Average limit.

See next page for an overview sweep performed with peak detector modes.

Tested by: Ki-Hong, Nam / Senior Engineer

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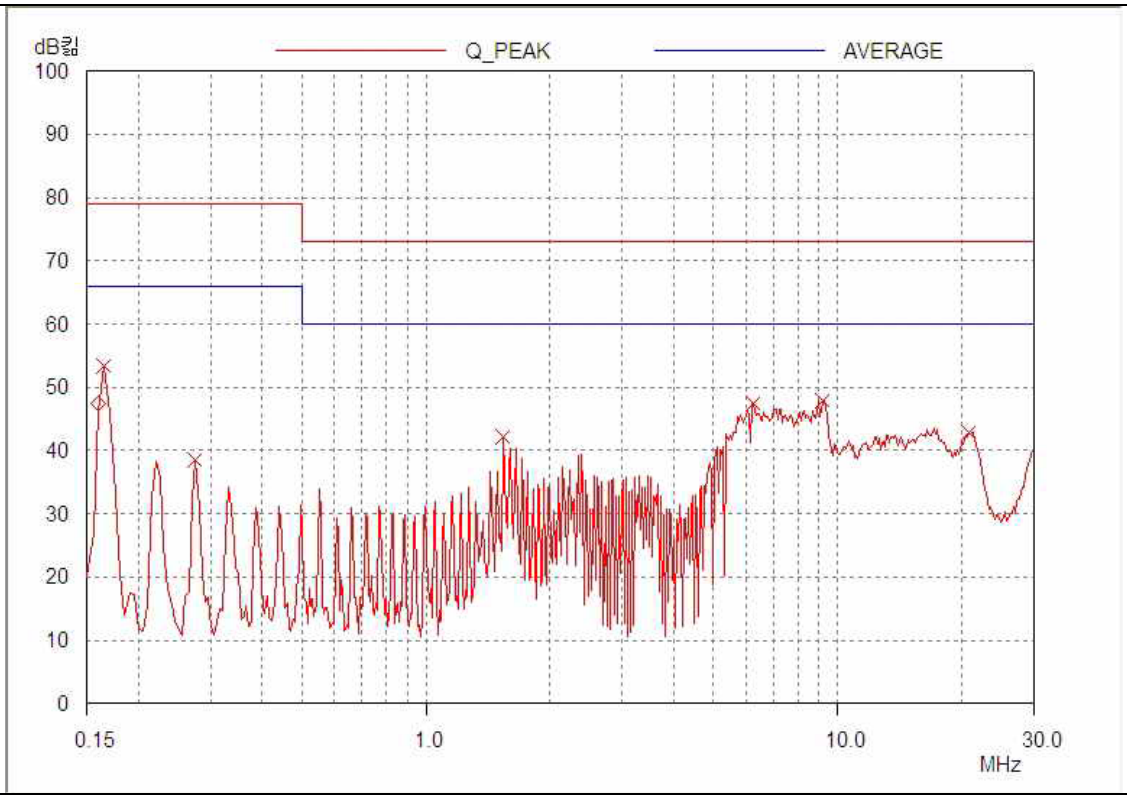
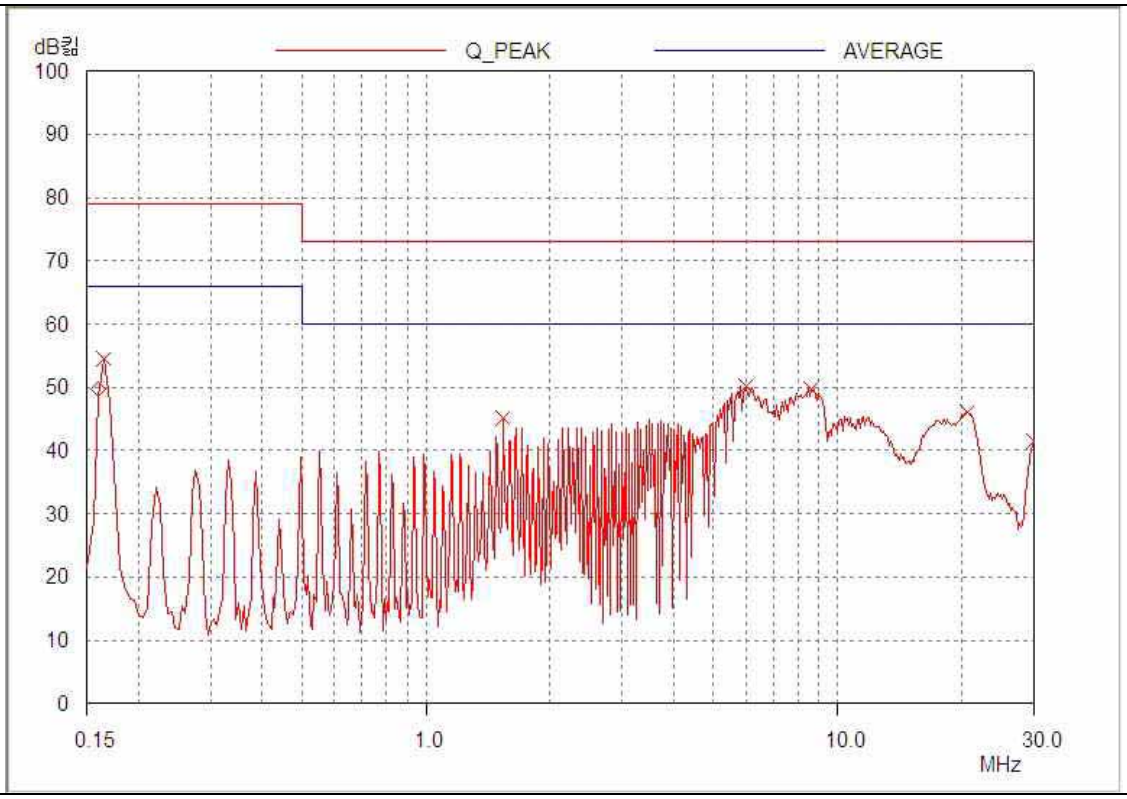


HOT LINE



NEUTRAL LINE

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14.4.2 Test Result for Part 27 C

-. Test Date : August 07, 2010

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Test Result : Passed by -22.82 dB at 8.26 MHz

Frequency (MHz)	Line	Peak (dBµV)		Margin (dB)
		Emission level	Q.P Limits	
0.16	N	53.39	79.00	-25.61
1.60	N	45.43	73.00	-24.57
6.04	N	49.72	73.00	-23.28
8.26	N	50.18	73.00	-22.82
9.30	H	48.14	73.00	-24.86
20.30	N	46.78	73.00	-26.22
Frequency (MHz)	**Line**	**Average (dBµV)**		**Margin (dB)**
		Emission level	**Limits**	
-				
-				

Line Conducted Emissions Tabulated Data

Remark : "H": Hot Line, "N": Neutral Line

Average mode was not measured, because peak values were under the Average limit.

See next page for an overview sweep performed with peak detector modes.

Tested by: Ki-Hong, Nam / Senior Engineer

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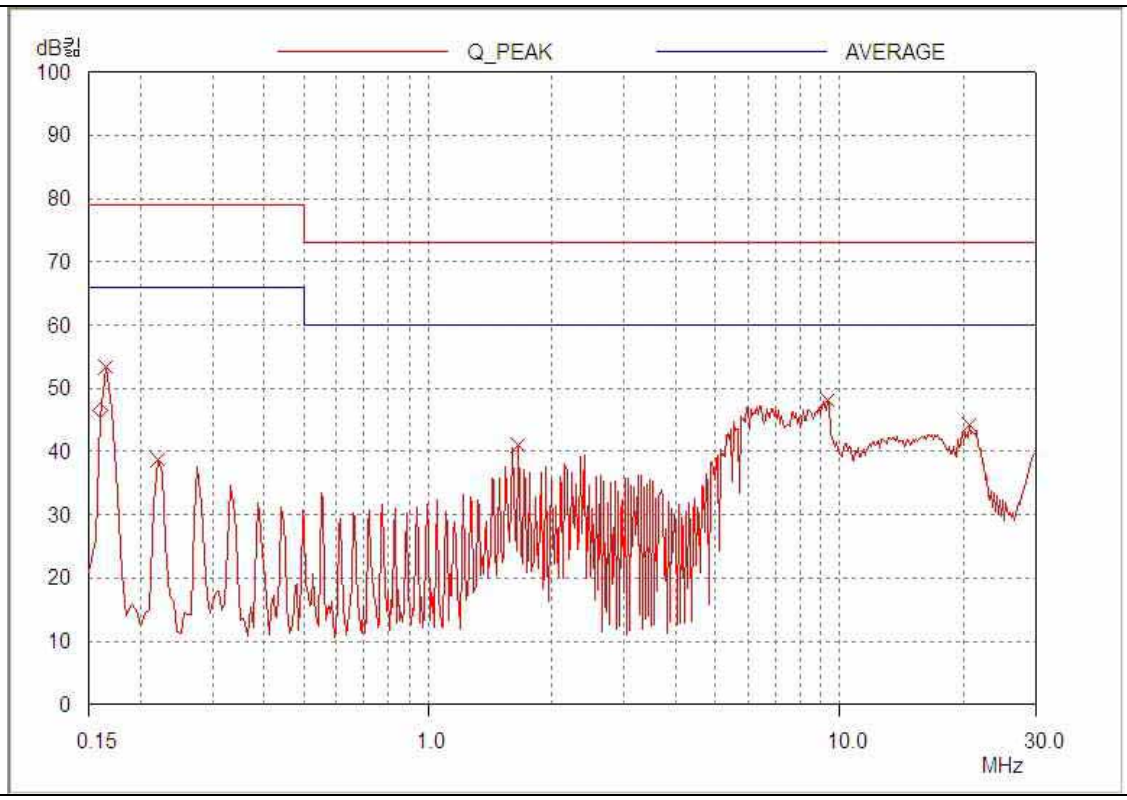
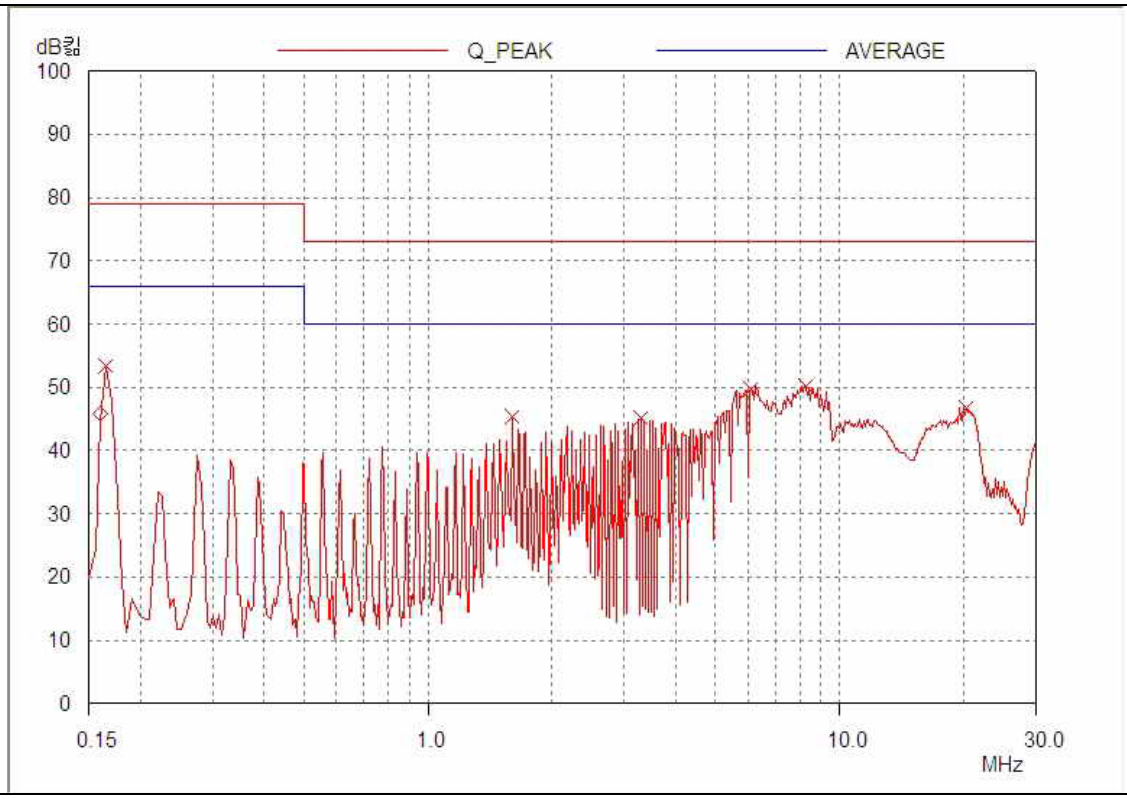


HOT LINE



NEUTRAL LINE

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