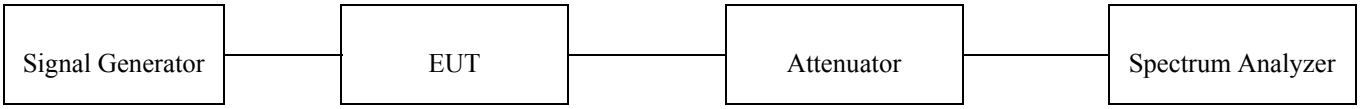
8. BAND EDGE MEASUREMENT

8.1 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.



8.2 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2010 (1Y)
■ -	E4432B	HP	Signal Generator	US38440950	Jun. 10, 2010 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2011 (1Y)
■ -	AMU200A	R/S	Baseband signal generator and fading simulator	100360	Aug. 28, 2010 (1Y)
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010 (1Y)

All test equipment used is calibrated on a regular basis.

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8.3 Test data

8.3.1 Test Result for SISO mode

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

-. Test Date : February 16 ~ 17, 2011

-. Temperature : 25 °C

-. Relative humidity : 47 % R.H.

-. Result : PASSED

Channel	Modulation	Measured Frequency (MHz)	Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	QPSK	728.000	-24.04	0.67	-23.37	-13.00	-10.37
		727.900	-24.85	0.67	-24.18	-18.22	-5.96
		723.000	-45.83	0.67	-45.16	-13.00	-32.16
	16QAM	728.000	-24.07	0.67	-23.40	-13.00	-10.40
		727.900	-24.86	0.67	-24.19	-18.22	-5.97
		723.000	-45.85	0.67	-45.18	-13.00	-32.18
	64QAM	728.000	-24.02	0.67	-23.35	-13.00	-10.35
		727.900	-24.82	0.67	-24.15	-8.22	-15.93
		723.000	-45.77	0.67	-45.10	-13.00	-32.10
High	QPSK	757.000	-23.18	0.67	-22.51	-13.00	-9.51
		757.100	-23.92	0.67	-23.25	-18.22	-5.03
		762.000	-46.25	0.67	-45.58	-13.00	-32.58
	16QAM	757.000	-23.21	0.67	-22.54	-13.00	-9.54
		757.100	-23.98	0.67	-23.31	-18.22	-5.09
		762.000	-46.33	0.67	-45.66	-13.00	-32.66
	64QAM	757.000	-23.22	0.67	-22.55	-13.00	-9.55
		757.100	-23.90	0.67	-23.23	-18.22	-5.01
		762.000	-46.23	0.67	-45.56	-13.00	-32.56

Tested by: Ki-Hong, Nam / Senior Engineer

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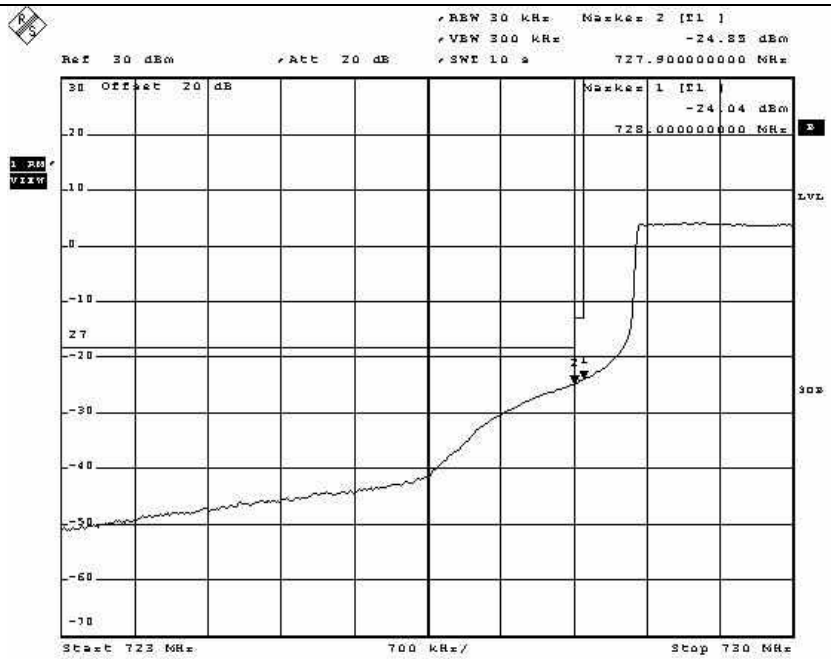
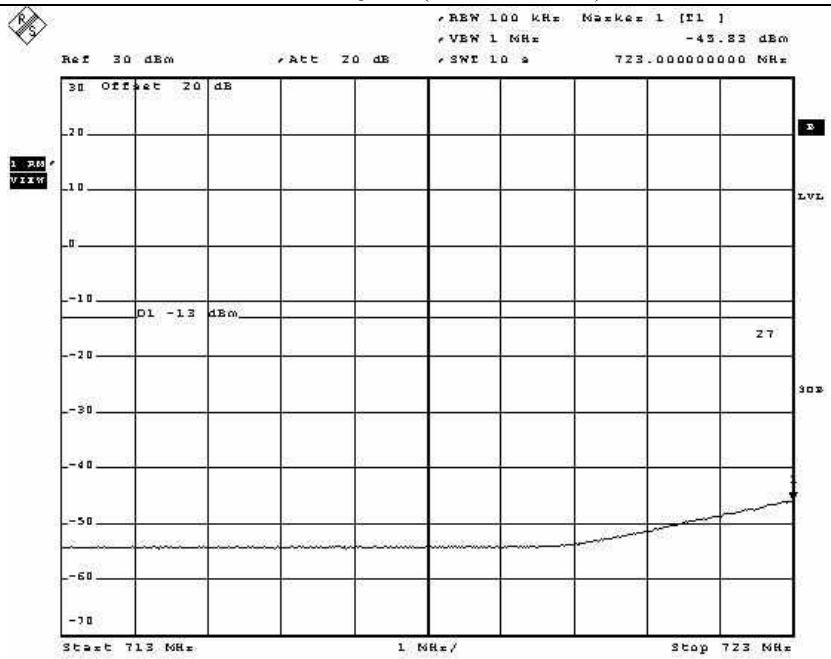


QPSK (Low Channel 1)



QPSK (Low Channel 2)

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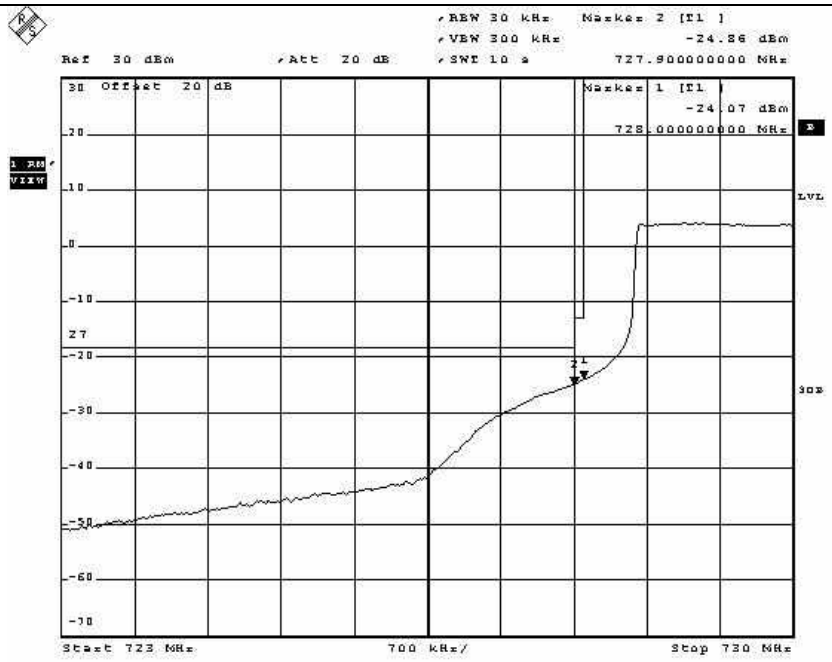
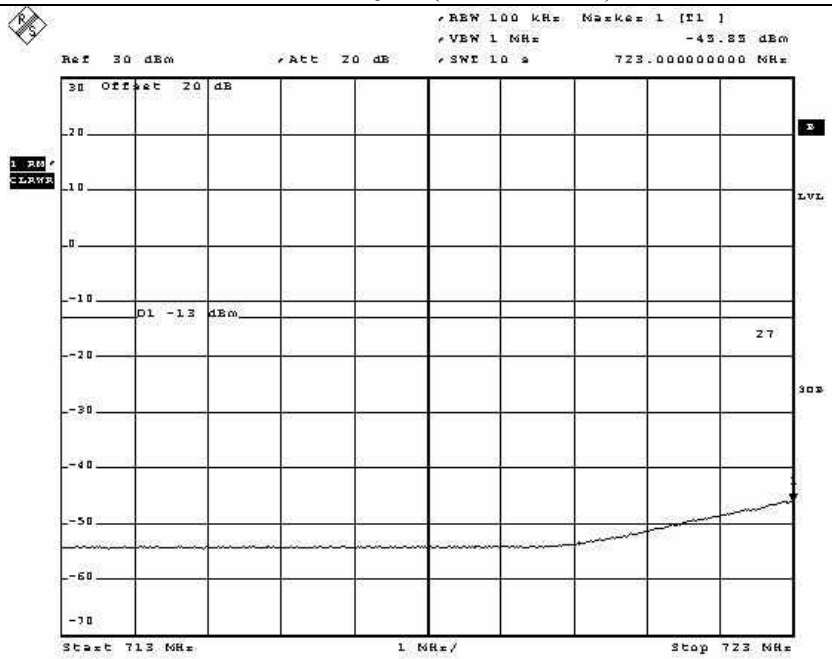


16QAM (Low Channel 1)



16QAM (Low Channel 2)

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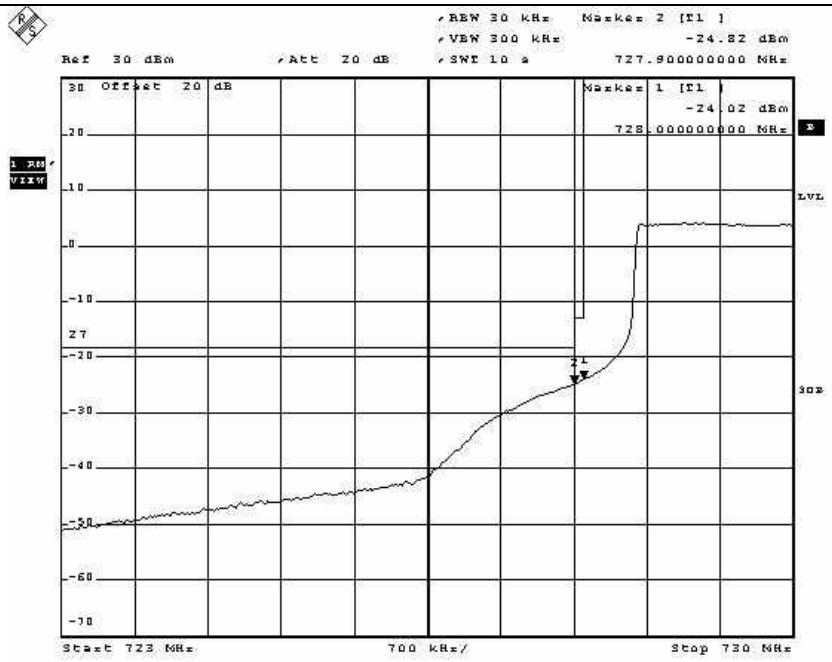
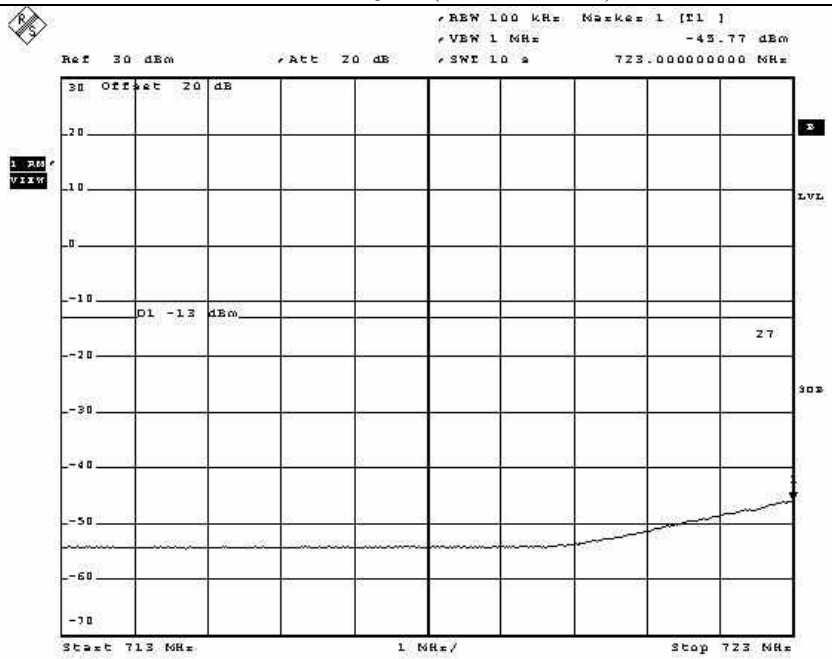


64QAM (Low Channel 1)



64QAM (Low Channel 2)

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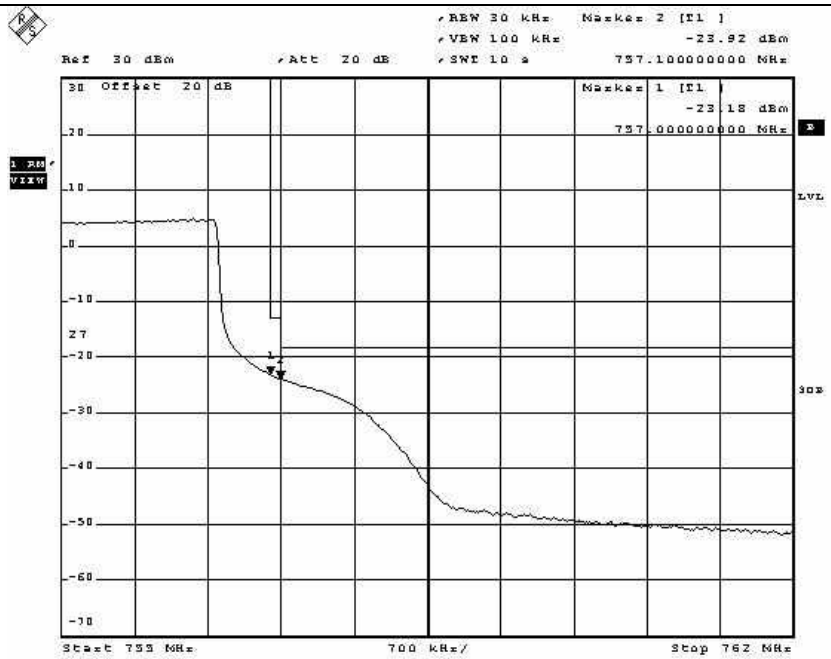
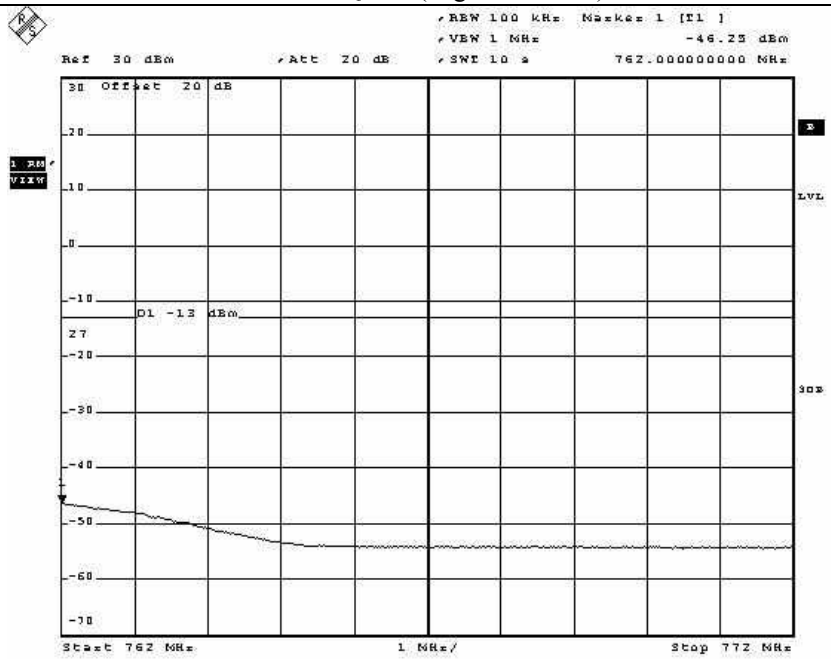


QPSK (High Channel 1)



QPSK (High Channel 2)

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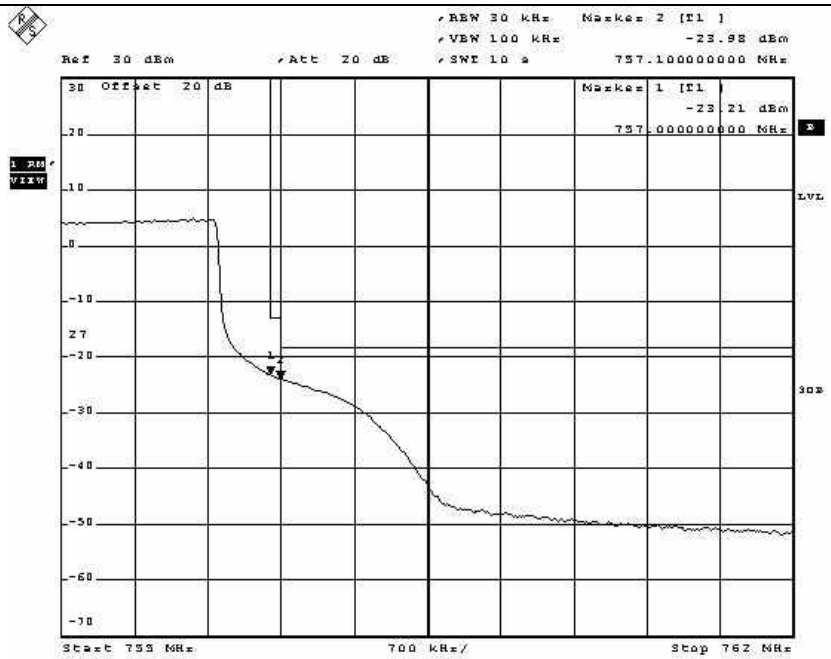
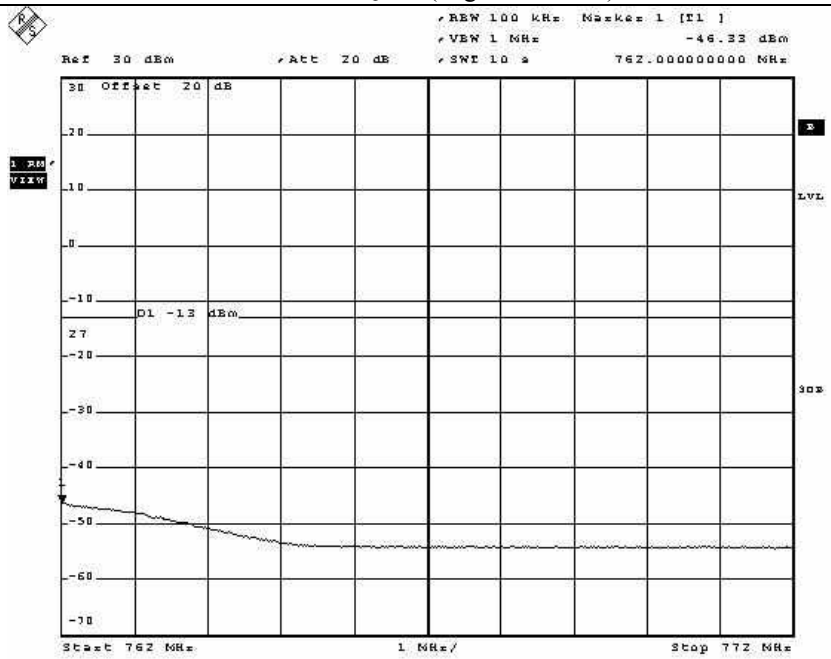


16QAM (High Channel 1)



16QAM (High Channel 2)

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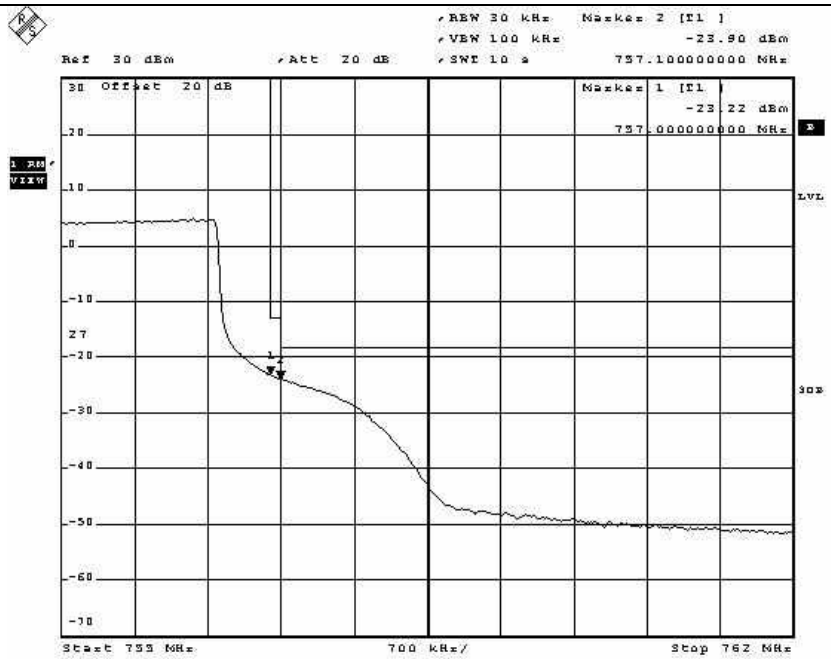

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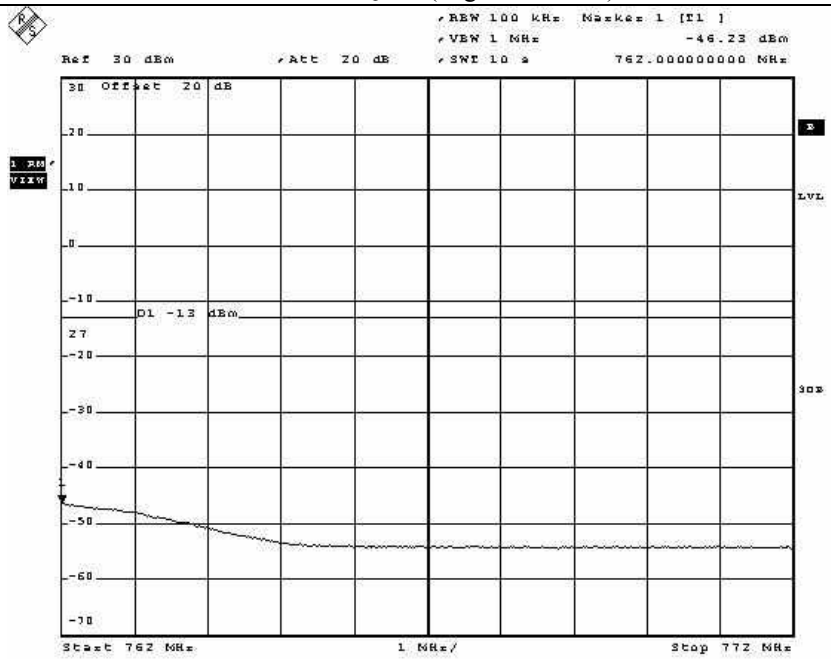

64QAM (High Channel 2)

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8.3.2 Test Result for MIMO mode

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

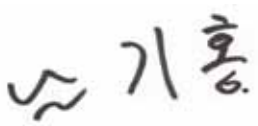
-. Test Date : February 18 ~ 21, 2011

-. Temperature : 22 °C

-. Relative humidity : 48 % R.H.

-. Result : PASSED

Channel	Modulation	Measured Frequency (MHz)	Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	QPSK	728.000	-32.48	0.67	-31.81	-13.00	-18.81
		727.900	-33.26	0.67	-32.59	-18.22	-14.37
		723.000	-52.06	0.67	-51.39	-13.00	-38.39
	16QAM	728.000	-32.46	0.67	-31.79	-13.00	-18.79
		727.900	-33.26	0.67	-32.59	-18.22	-14.37
		723.000	-51.99	0.67	-51.32	-13.00	-38.32
	64QAM	728.000	-32.50	0.67	-31.83	-13.00	-18.83
		727.900	-33.25	0.67	-32.58	-8.22	-24.36
		723.000	-51.91	0.67	-51.24	-13.00	-38.24
High	QPSK	757.000	-27.73	0.67	-27.06	-13.00	-14.06
		757.100	-28.48	0.67	-27.81	-18.22	-9.59
		762.000	-50.40	0.67	-49.73	-13.00	-36.73
	16QAM	757.000	-27.73	0.67	-27.06	-13.00	-14.06
		757.100	-28.42	0.67	-27.75	-18.22	-9.53
		762.000	-50.42	0.67	-49.75	-13.00	-36.75
	64QAM	757.000	-27.71	0.67	-27.04	-13.00	-14.04
		757.100	-28.46	0.67	-27.79	-18.22	-9.57
		762.000	-50.39	0.67	-49.72	-13.00	-36.72



Tested by: Ki-Hong, Nam / Senior Engineer

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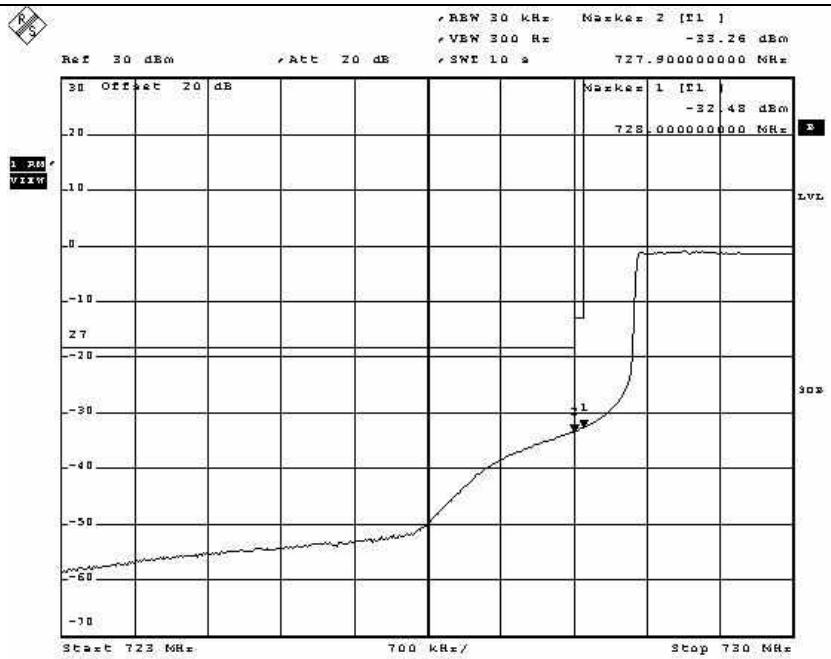
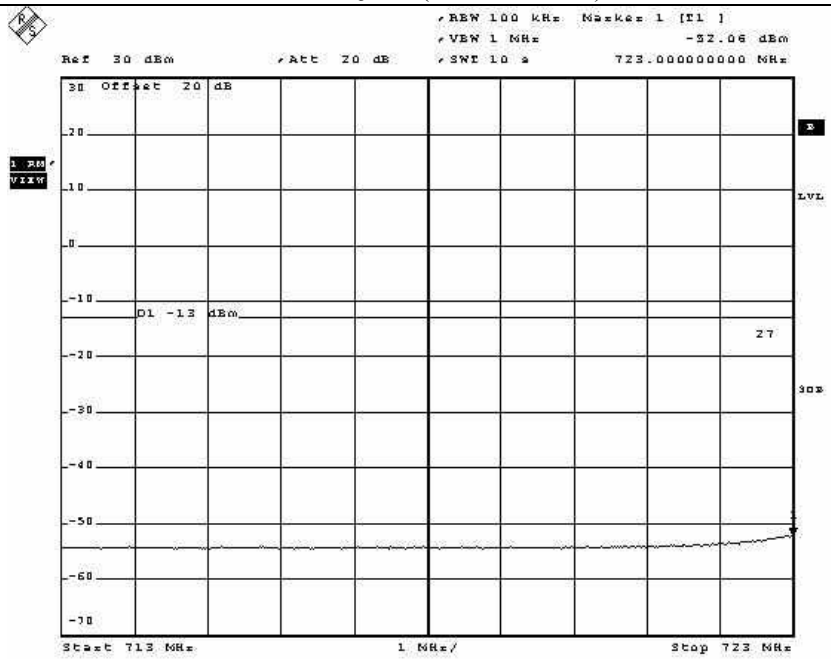
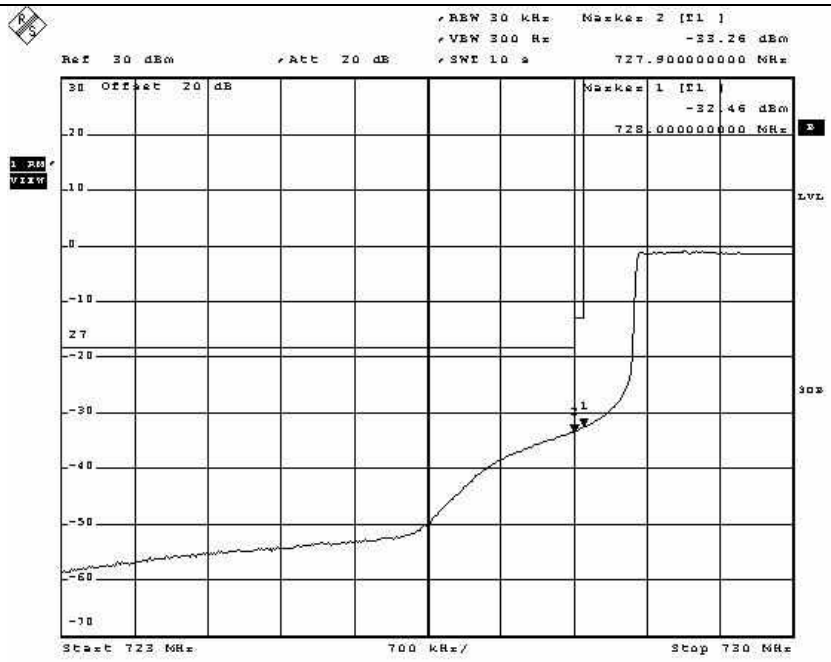


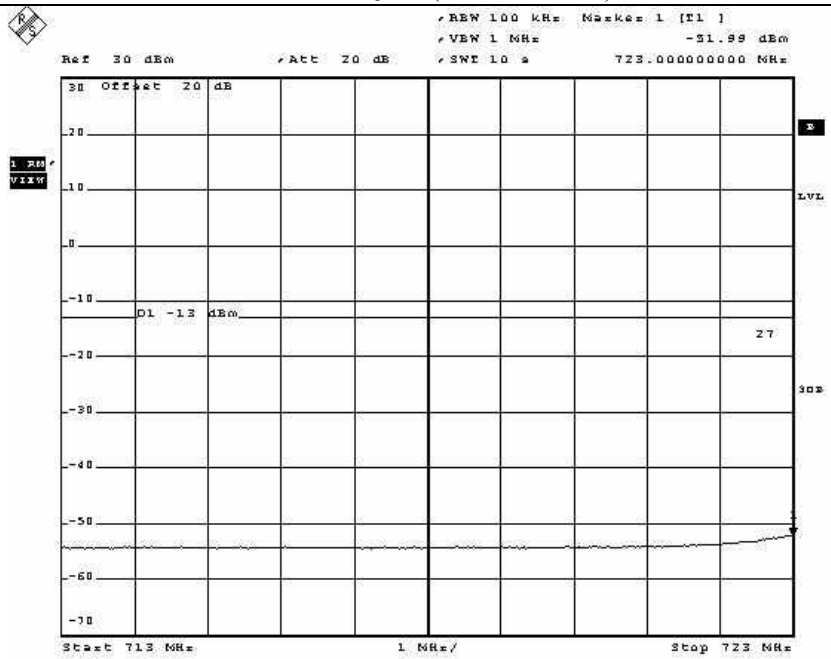
QPSK (Low Channel 1)



QPSK (Low Channel 2)



16QAM (Low Channel 1)



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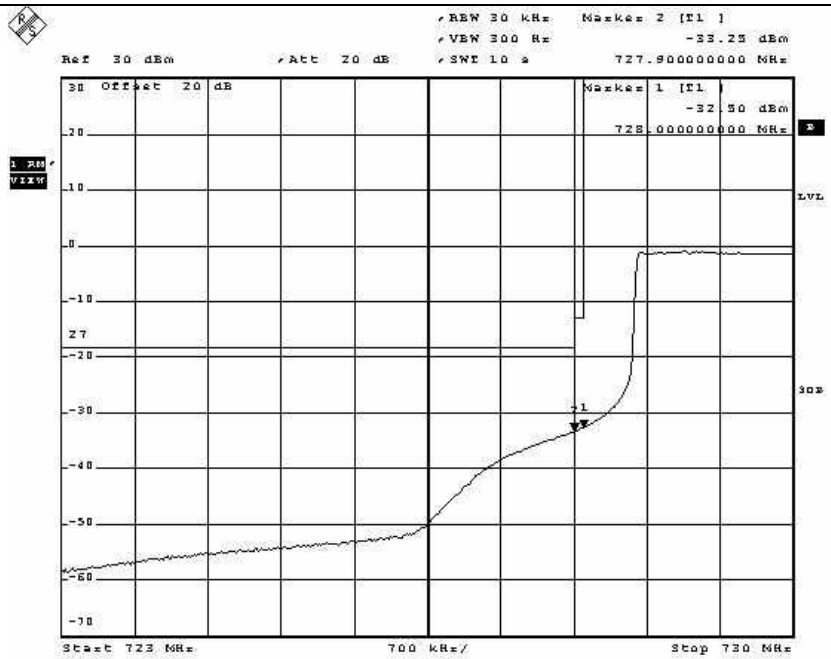
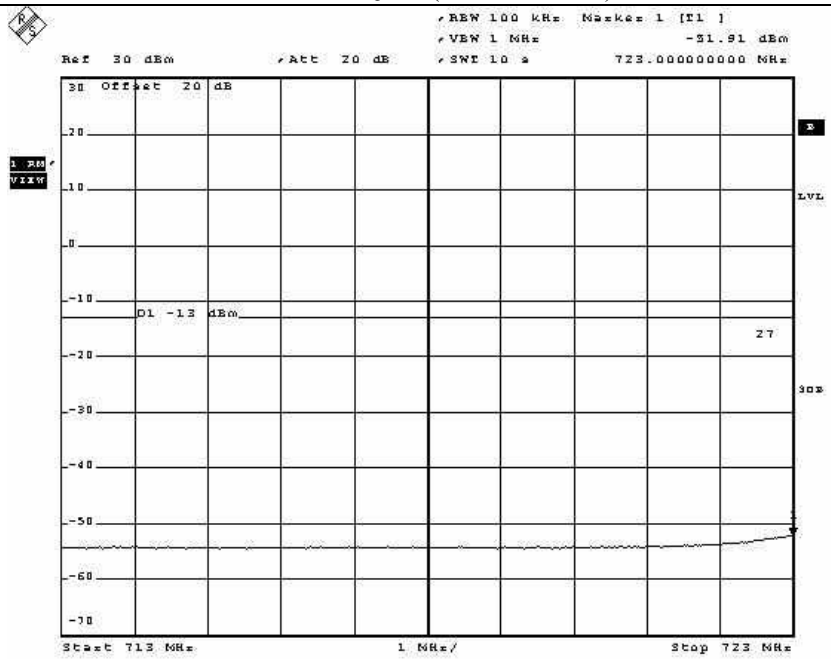


64QAM (Low Channel 1)



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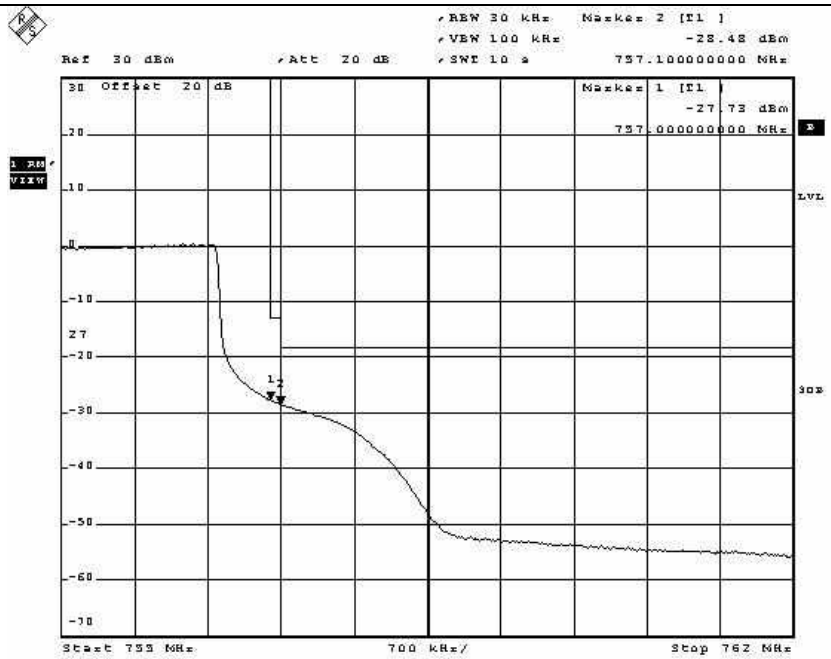
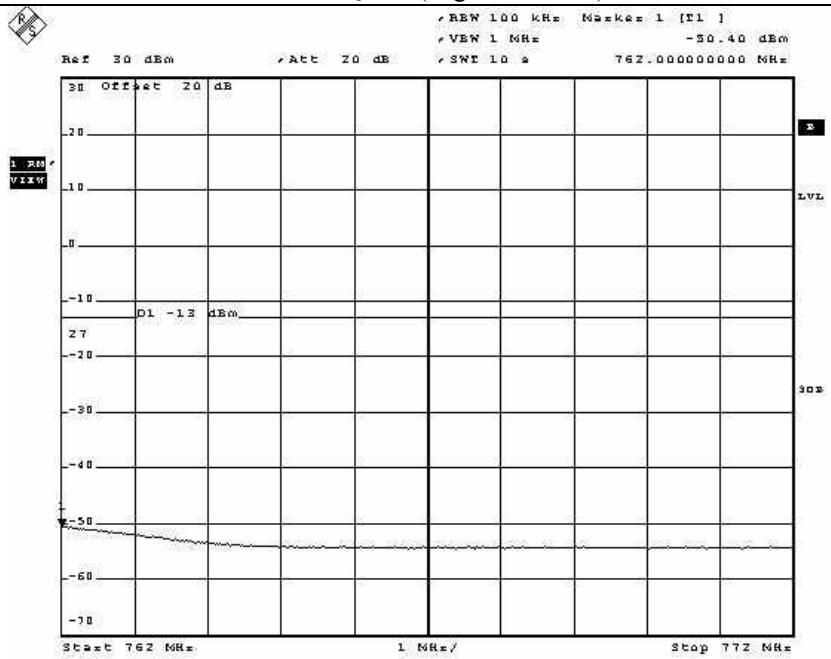


QPSK (High Channel 1)



QPSK (High Channel 2)

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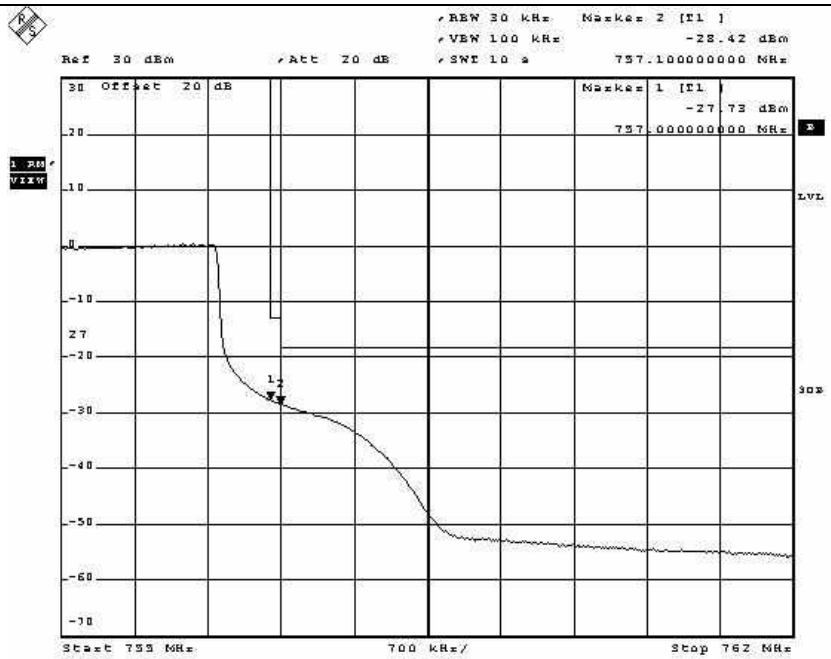
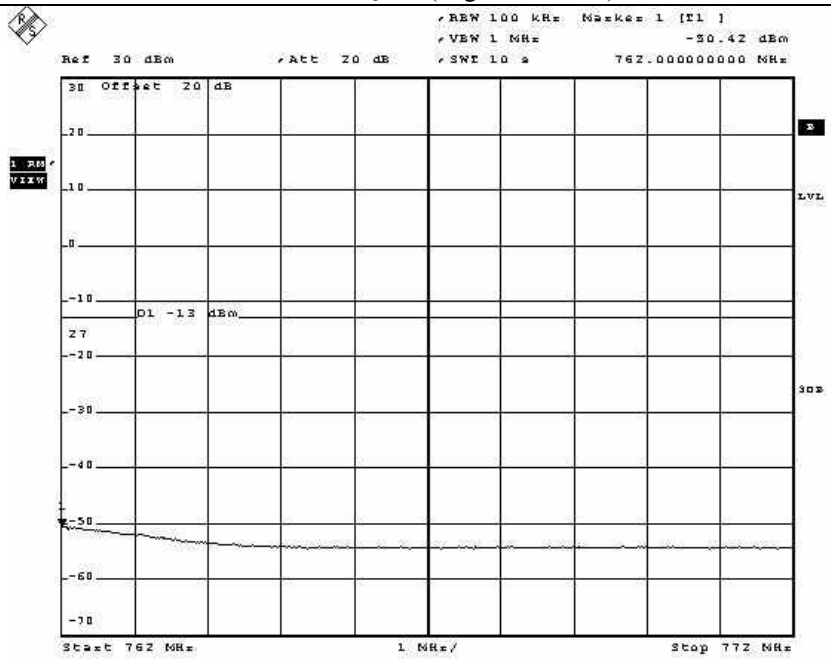


16QAM (High Channel 1)



16QAM (High Channel 2)

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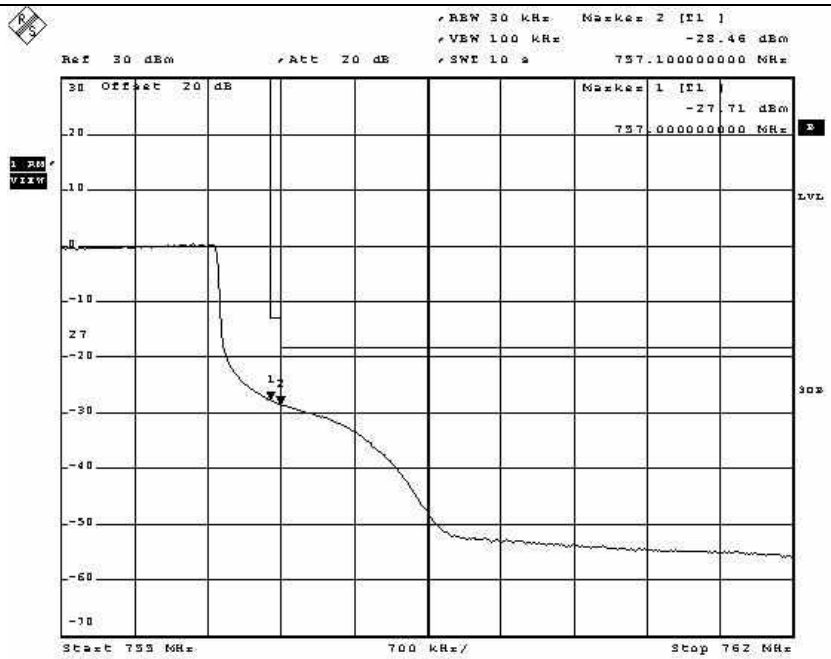
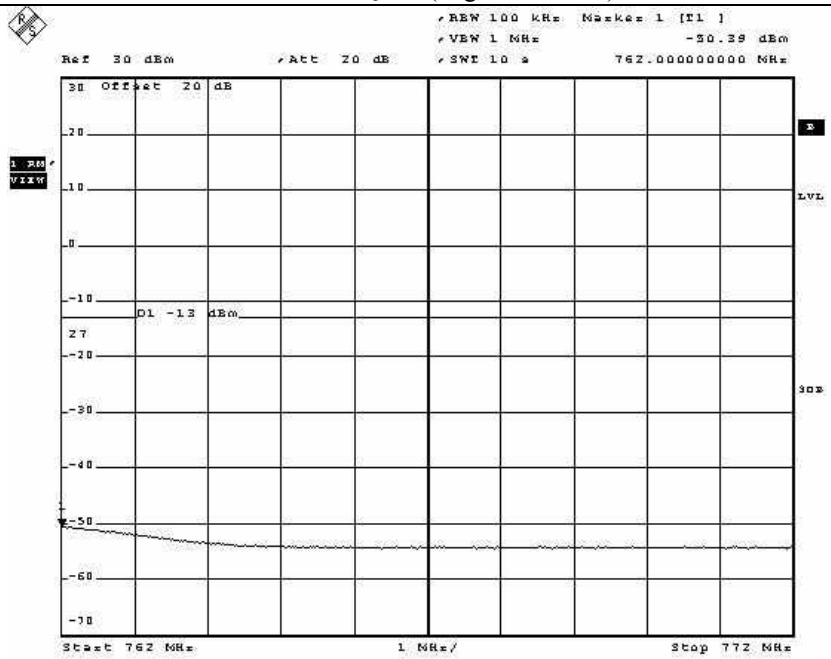


64QAM (High Channel 1)



64QAM (High Channel 2)

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon 1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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8.3.3 Test Result for SISO+MIMO mode

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

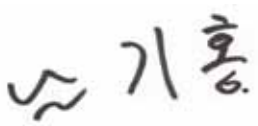
-. Test Date : February 22 ~ 23, 2011

-. Temperature : 25 °C

-. Relative humidity : 45 % R.H.

-. Result : PASSED

Channel	Modulation	Measured Frequency (MHz)	Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	QPSK	728.000	-24.05	0.67	-23.38	-13.00	-10.38
		727.900	-24.85	0.67	-24.18	-18.22	-5.96
		723.000	-45.80	0.67	-45.13	-13.00	-32.13
	16QAM	728.000	-24.06	0.67	-23.39	-13.00	-10.39
		727.900	-24.81	0.67	-24.14	-18.22	-5.92
		723.000	-45.82	0.67	-45.15	-13.00	-32.15
	64QAM	728.000	-24.05	0.67	-23.38	-13.00	-10.38
		727.900	-24.87	0.67	-24.20	-8.22	-15.98
		723.000	-45.80	0.67	-45.13	-13.00	-32.13
High	QPSK	757.000	-22.72	0.67	-22.05	-13.00	-9.05
		757.100	-23.47	0.67	-22.80	-18.22	-4.58
		762.000	-44.75	0.67	-44.08	-13.00	-31.08
	16QAM	757.000	-22.69	0.67	-22.02	-13.00	-9.02
		757.100	-23.41	0.67	-22.74	-18.22	-4.52
		762.000	-44.70	0.67	-44.03	-13.00	-31.03
	64QAM	757.000	-22.73	0.67	-22.06	-13.00	-9.06
		757.100	-23.45	0.67	-22.78	-18.22	-4.56
		762.000	-44.74	0.67	-44.07	-13.00	-31.07



Tested by: Ki-Hong, Nam / Senior Engineer

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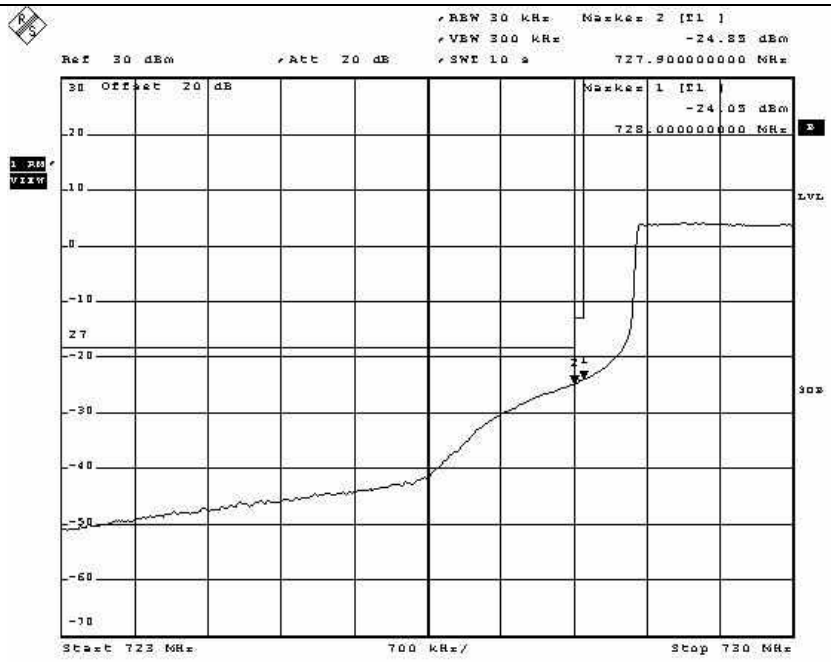
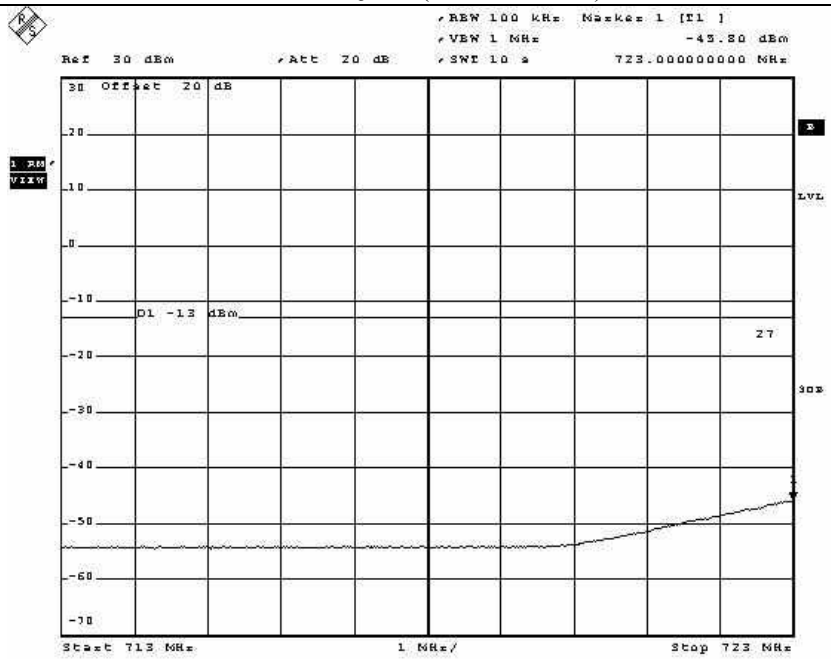
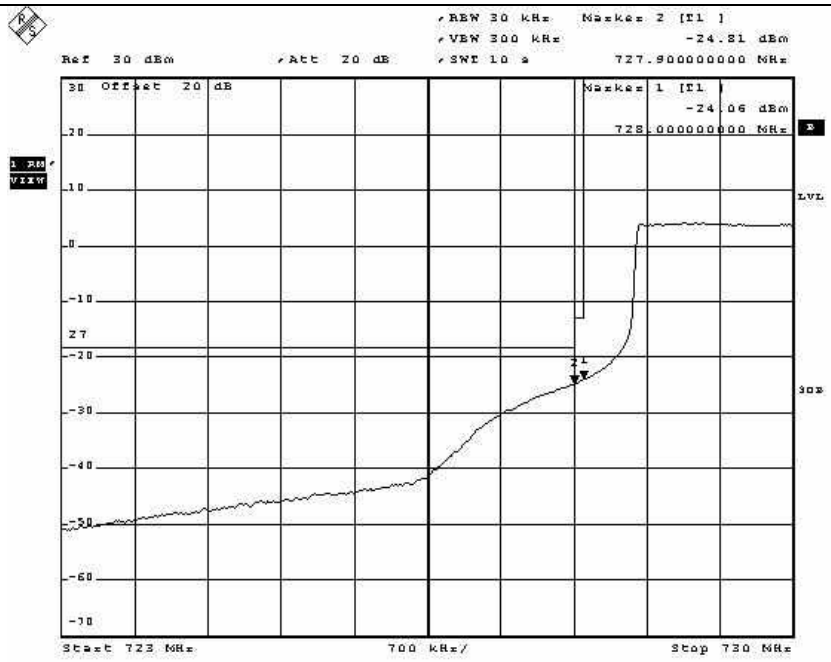


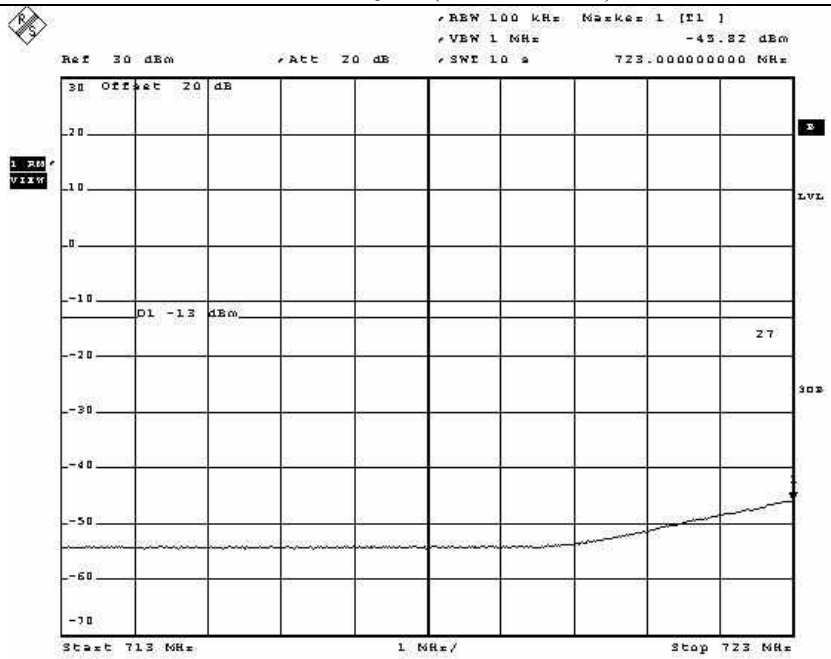
QPSK (Low Channel 1)



QPSK (Low Channel 2)



16QAM (Low Channel 1)



16QAM (Low Channel 2)

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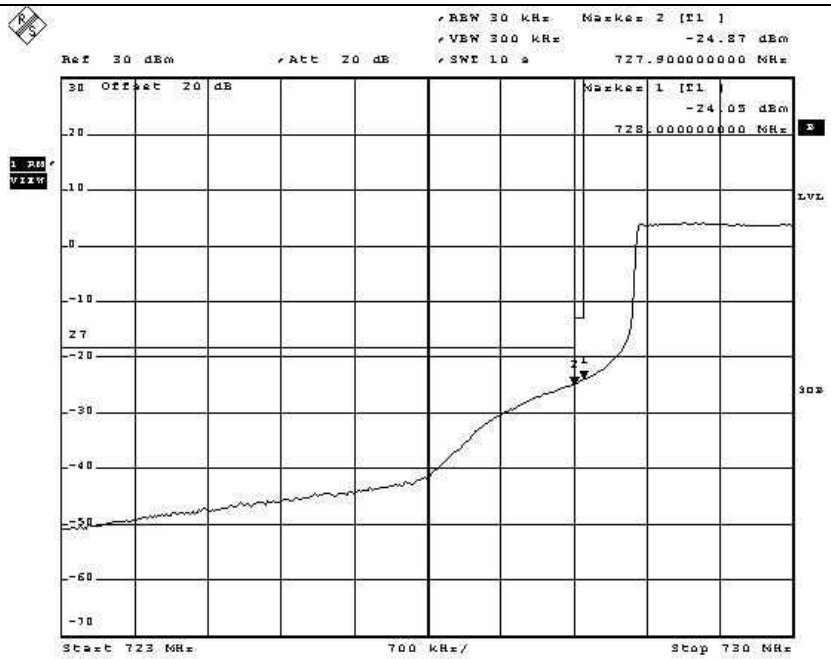
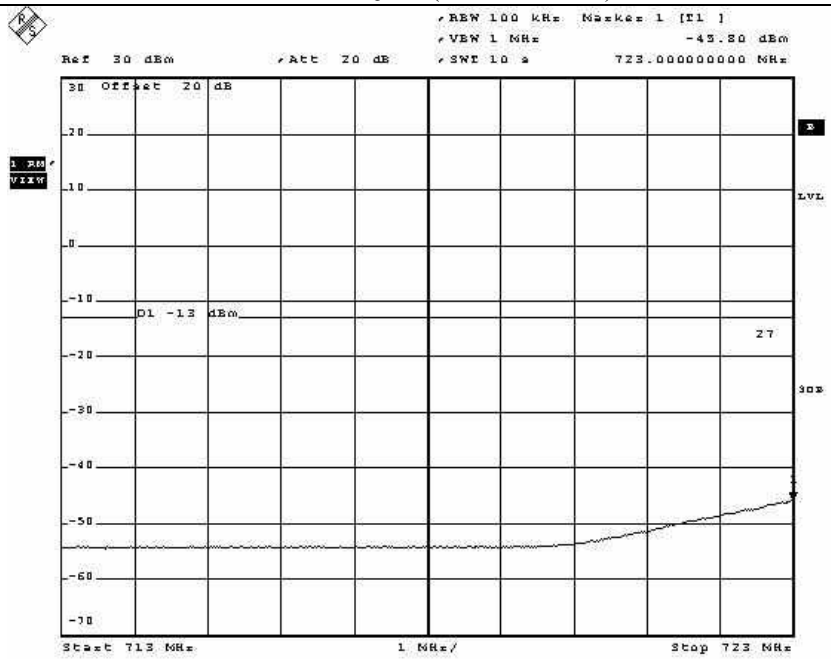


64QAM (Low Channel 1)



64QAM (Low Channel 2)

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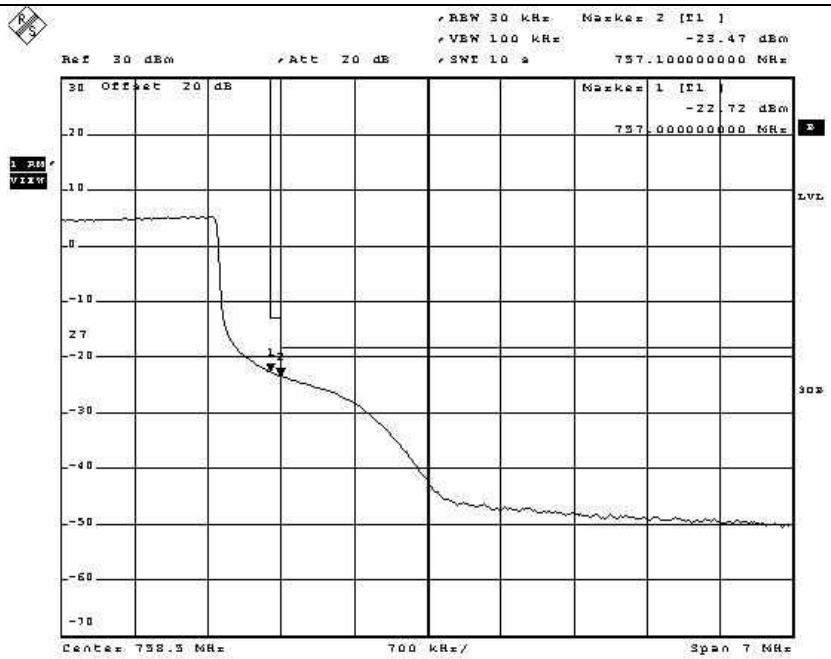
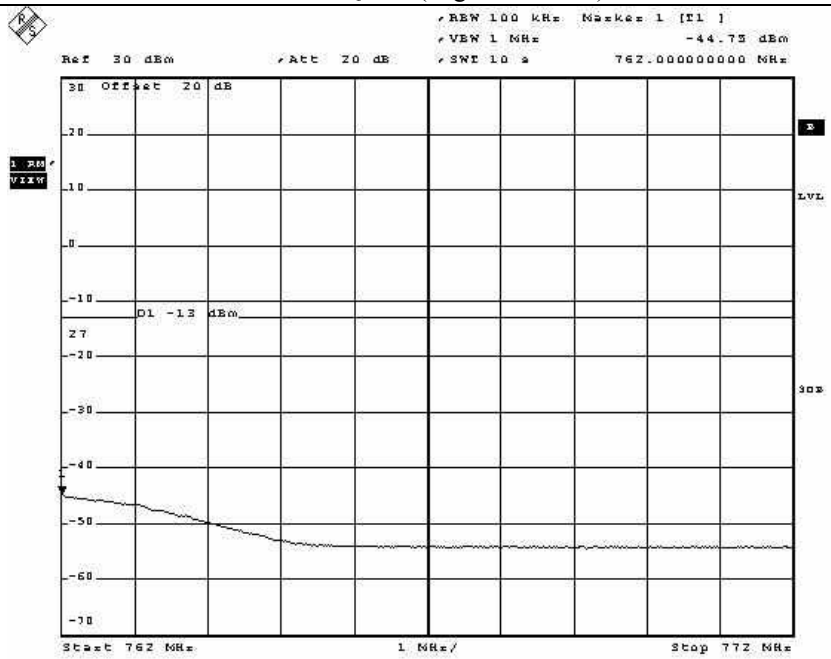


QPSK (High Channel 1)



QPSK (High Channel 2)

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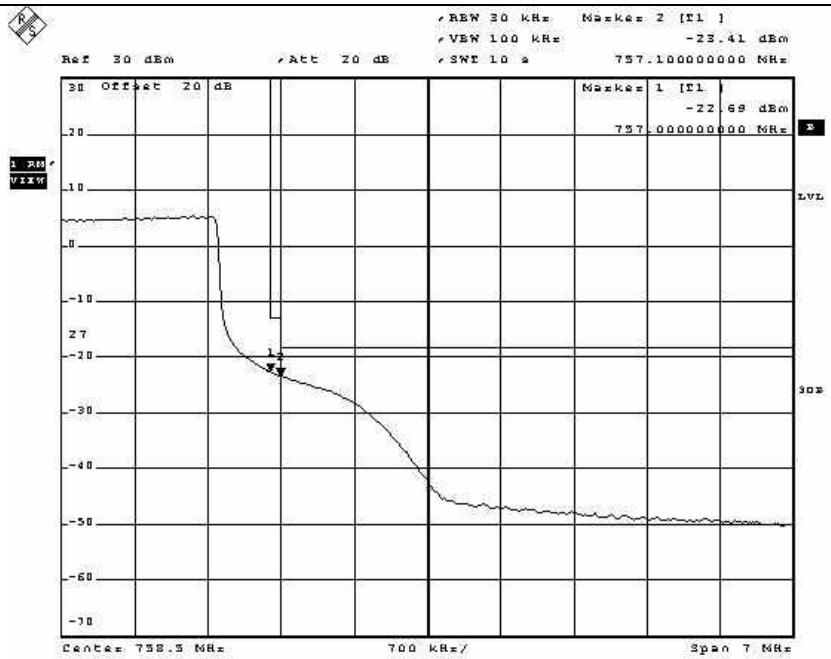

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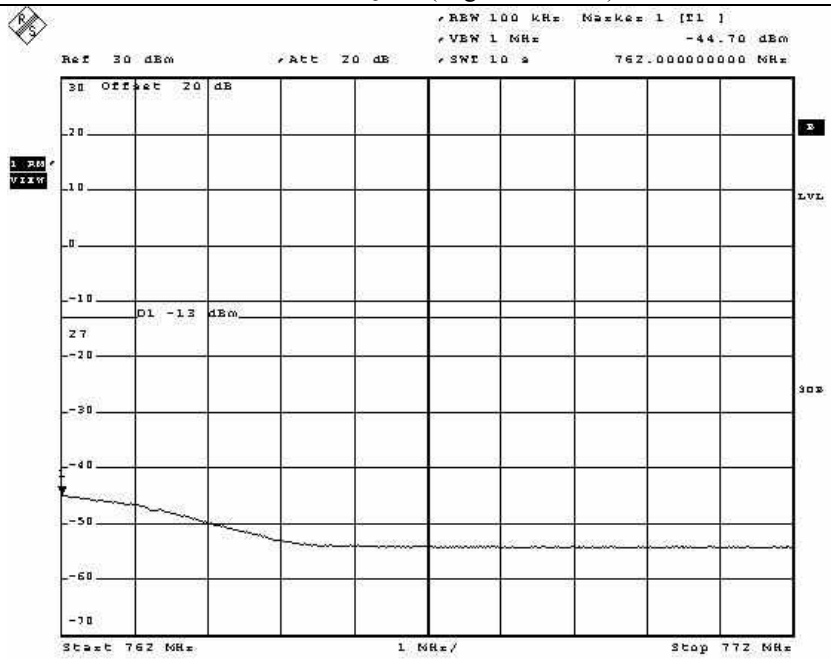

16QAM (High Channel 2)

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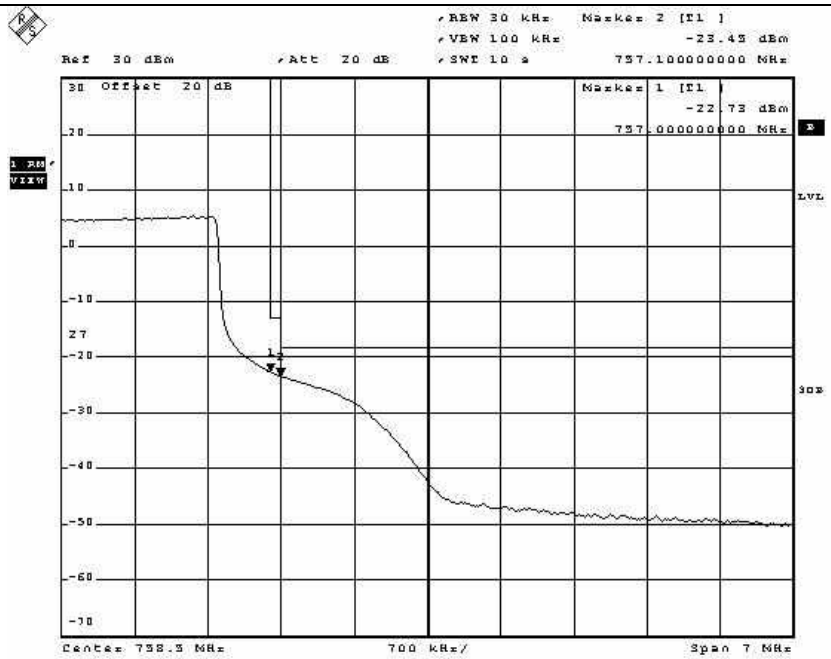
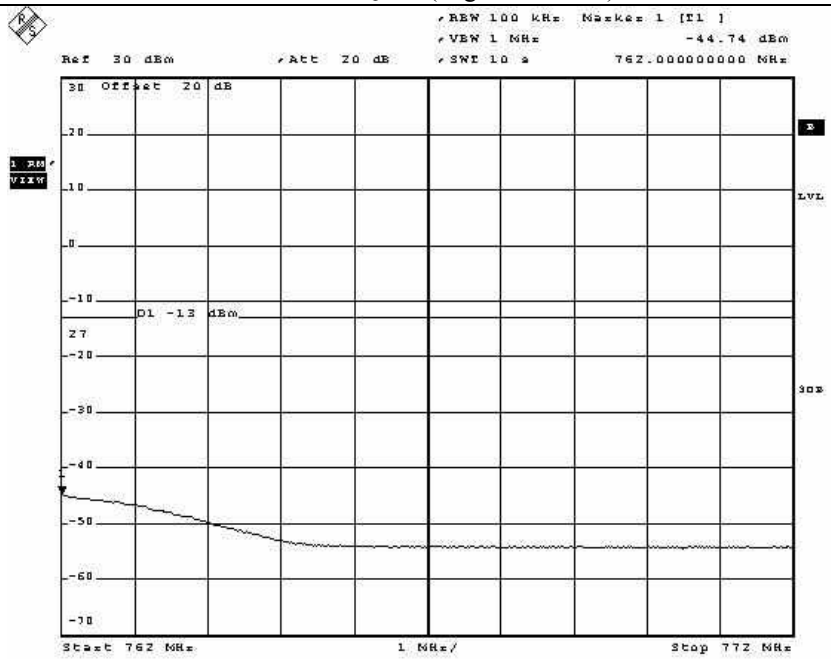


64QAM (High Channel 1)



64QAM (High Channel 2)

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9. INTERMODULATION TEST

9.1 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.

9.2 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2010 (1Y)
■ -	E4432B	HP	Signal Generator	US38440950	Jun. 10, 2010 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2011 (1Y)
■ -	AMU200A	R/S	Baseband signal generator and fading simulator	100360	Aug. 28, 2010 (1Y)
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010 (1Y)

All test equipment used is calibrated on a regular basis.

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9.3 Test data

9.3.1 Test Result for SISO mode

9.3.1.1 Test Result for peak power

-. Test Date : February 16 ~ 17, 2011

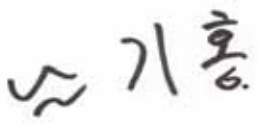
-. Temperature : 25 °C

-. Relative humidity : 47 % R.H.

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Input Power (dBm)	Output Power (dBm)
733.000	1	-9.90	29.83
733.000 & 733.025	2	-9.83	29.83
733.000 & 733.025 & 733.050	3	-9.90	29.83
752.000	1	-9.80	30.00
752.000 & 751.975	2	-9.90	30.00
752.000 & 751.975 & 751.950	3	-9.85	30.00



Tested by: Ki-Hong, Nam / Senior Engineer

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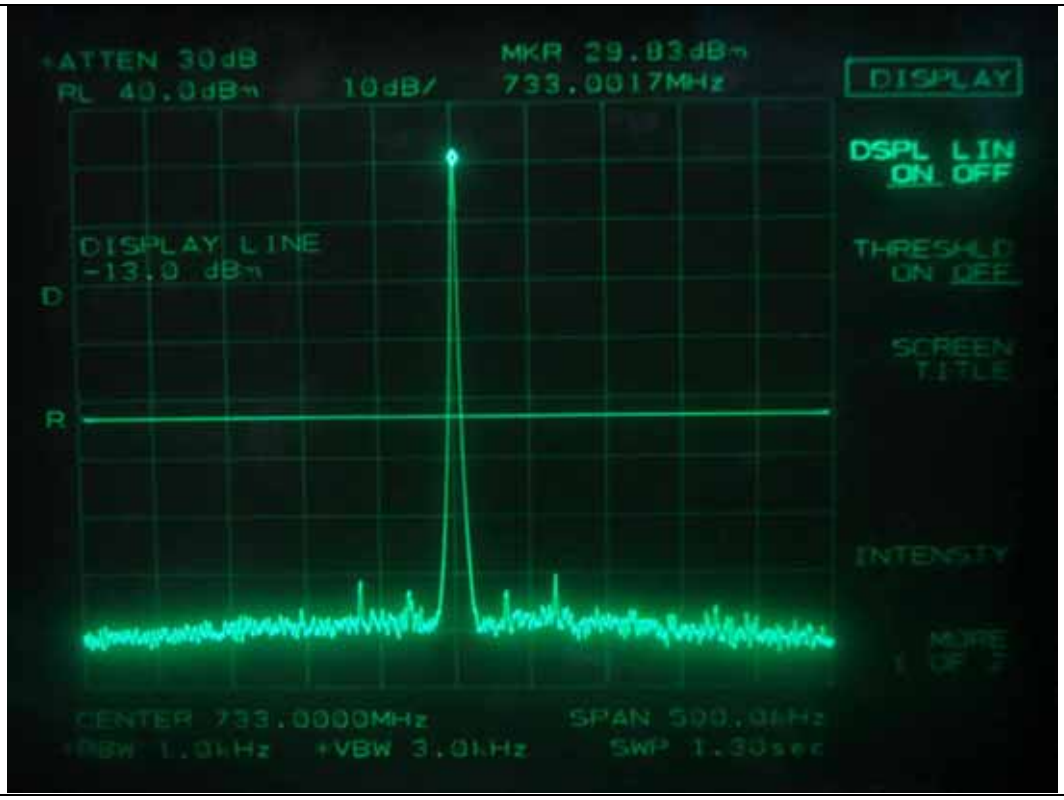
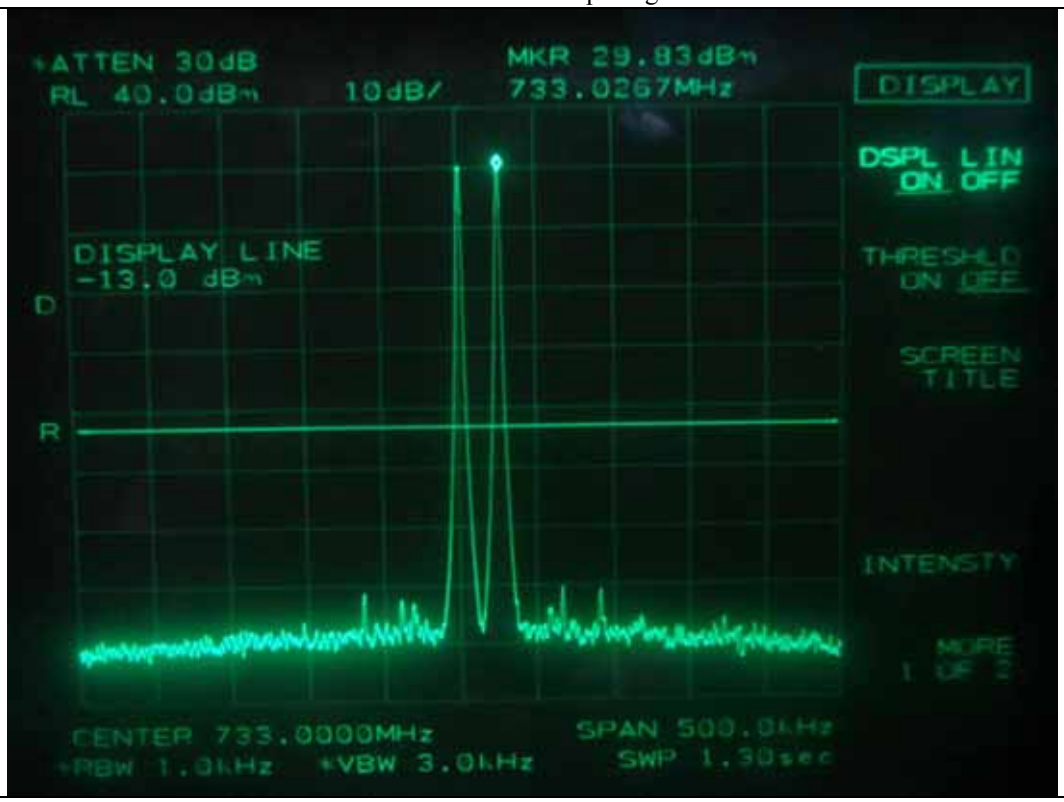


Low Channel – 1 input signal



Low Channel – 2 input signals

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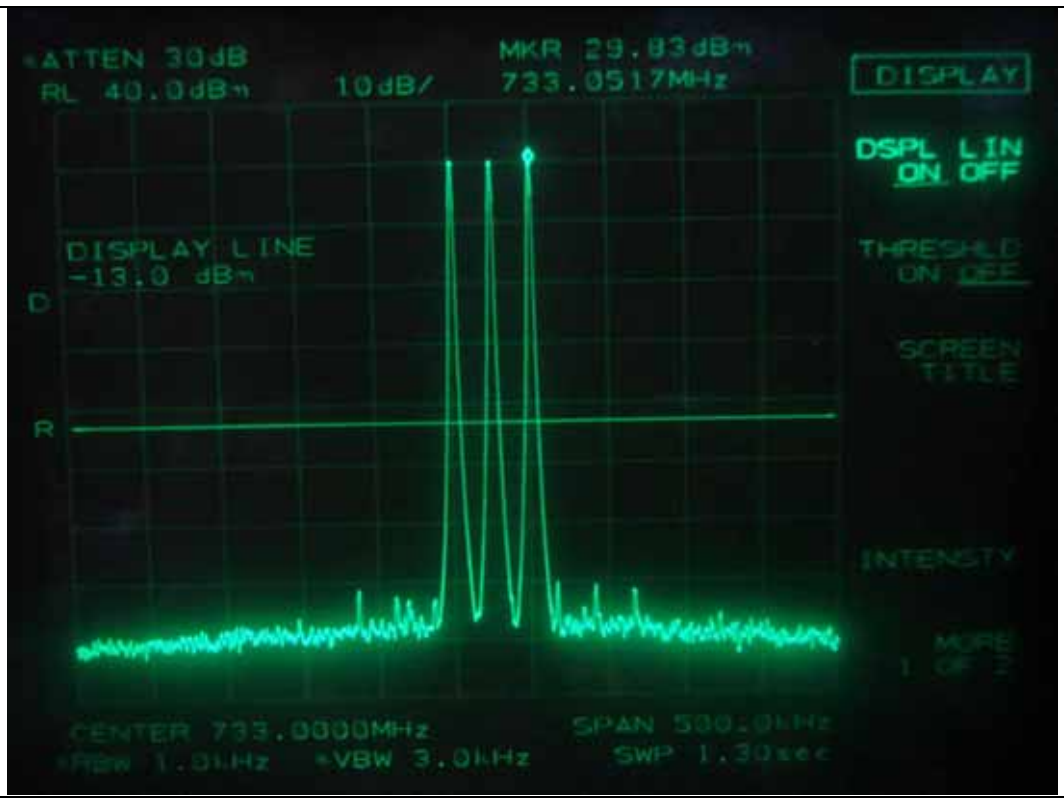
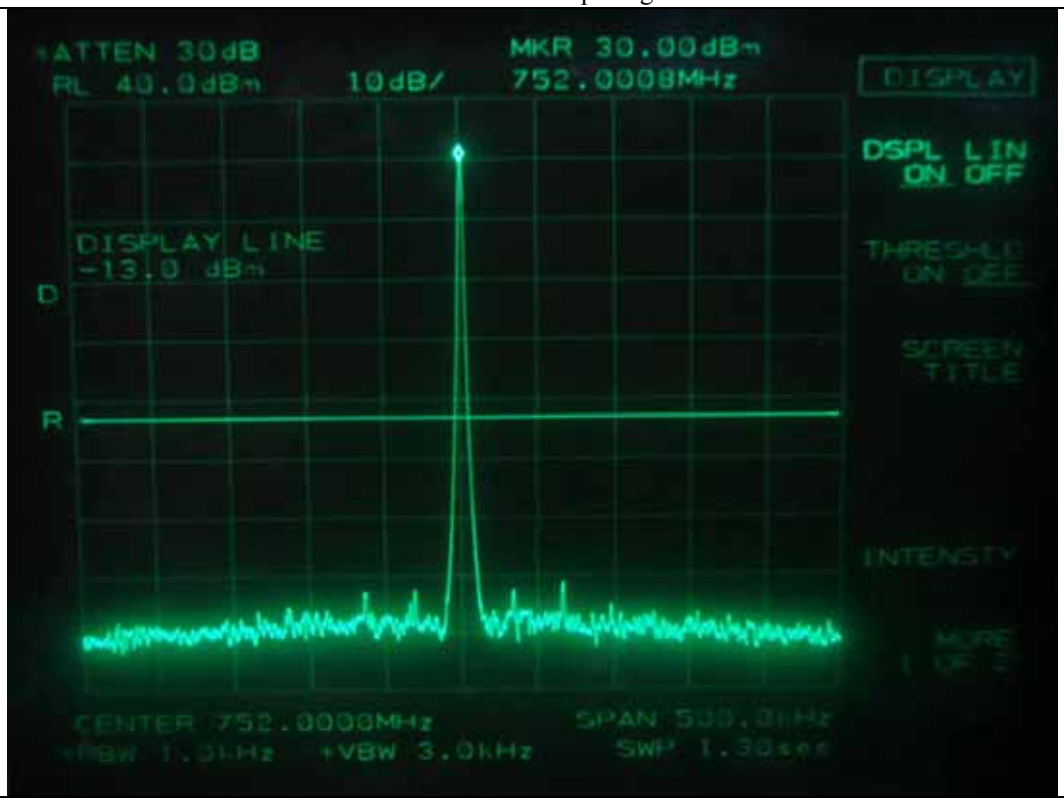


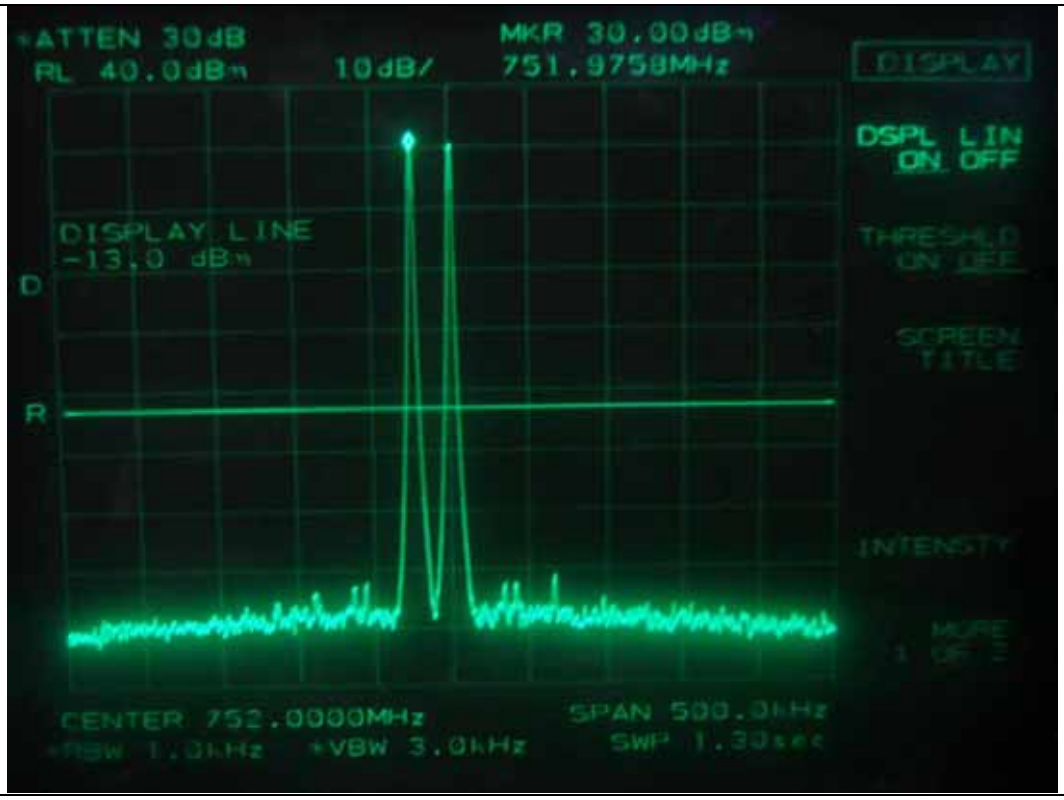
Low Channel – 3 input signals



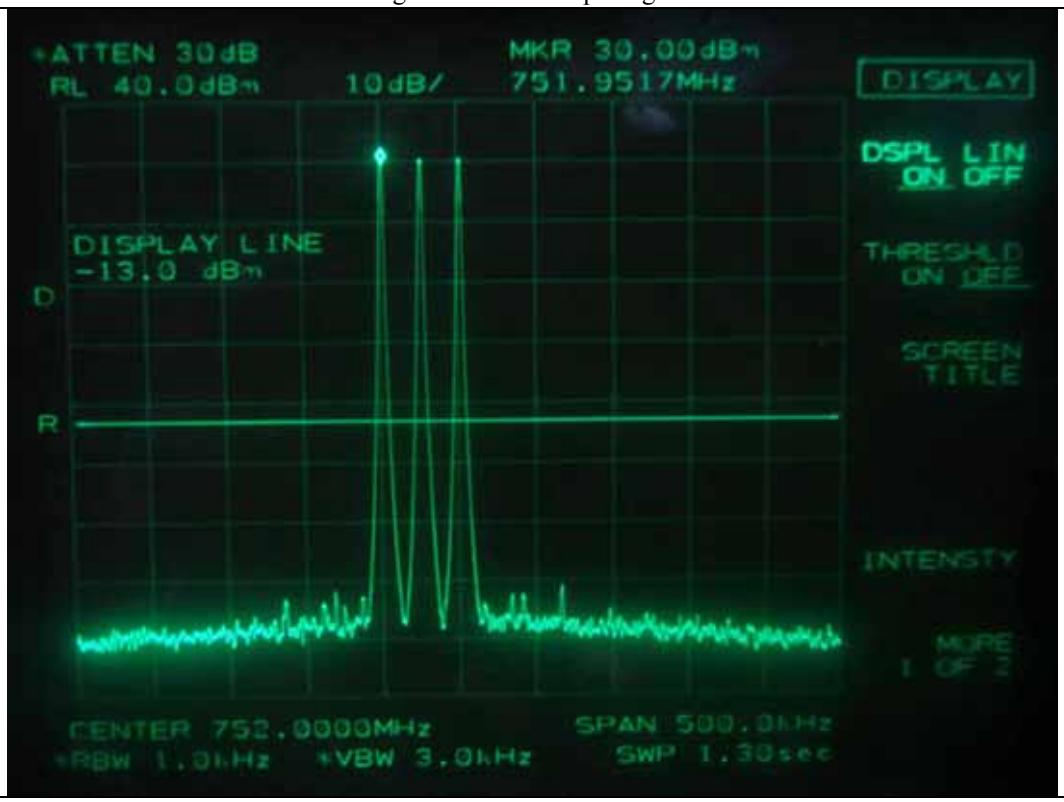
High Channel – 1 input signal

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon 1-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)



High Channel – 2 input signals



High Channel – 3 input signals

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon 1-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)

9.3.1.2 Test Result for Spurious emission

-. Test Date : February 16 ~ 17, 2011

-. Temperature : 25 °C

-. Relative humidity : 47 % R.H.

-. Test Result : Pass

-. Modulation : No-Modulation

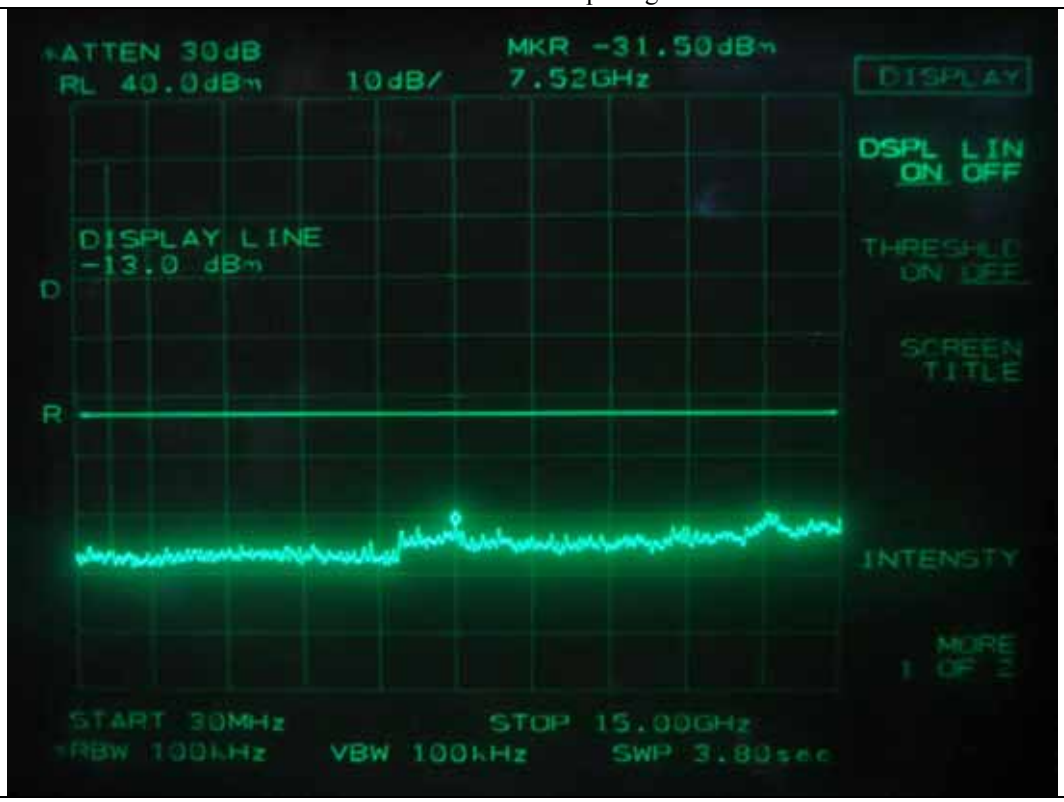
Frequency (MHz)	Number of Input Channel	Measured Value	Result
733.000	1	< -13 dBm	Pass
733.000 & 733.025	2		
733.000 & 733.025 & 733.050	3		
752.000	1	< -13 dBm	Pass
752.000 & 751.975	2		
752.000 & 751.975 & 751.950	3		

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 / Senior Engineer

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon 1-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)

Low Channel – 1 input signal

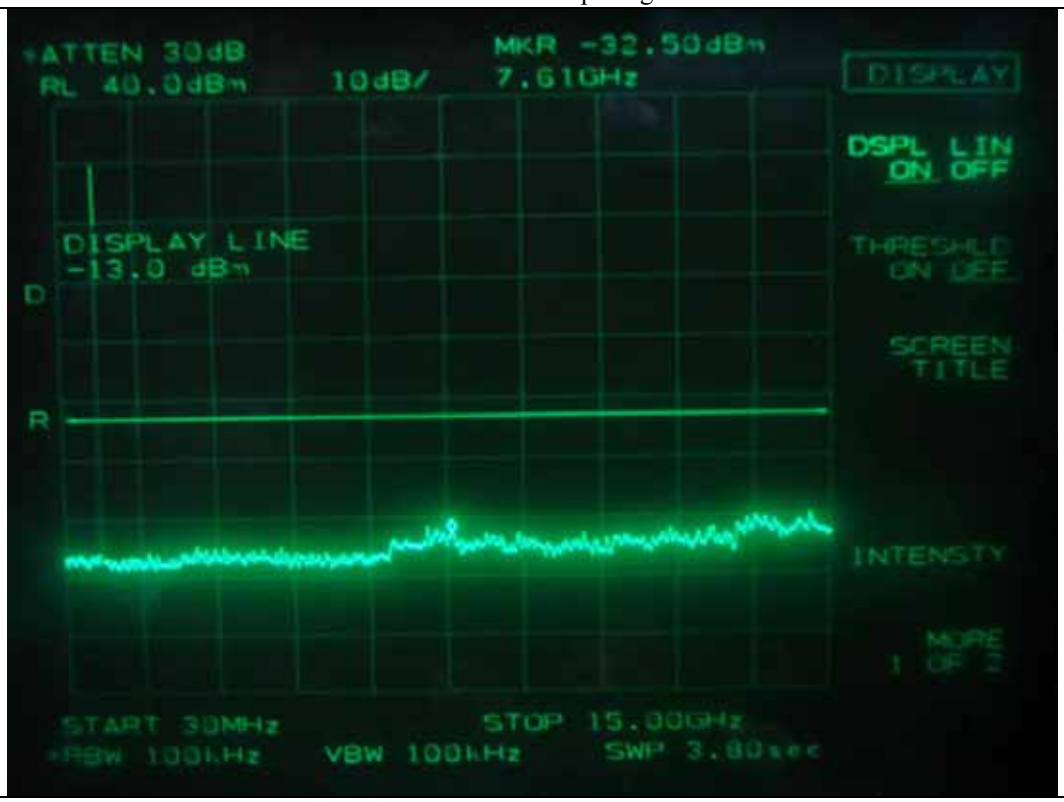


Low Channel – 2 input signals

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

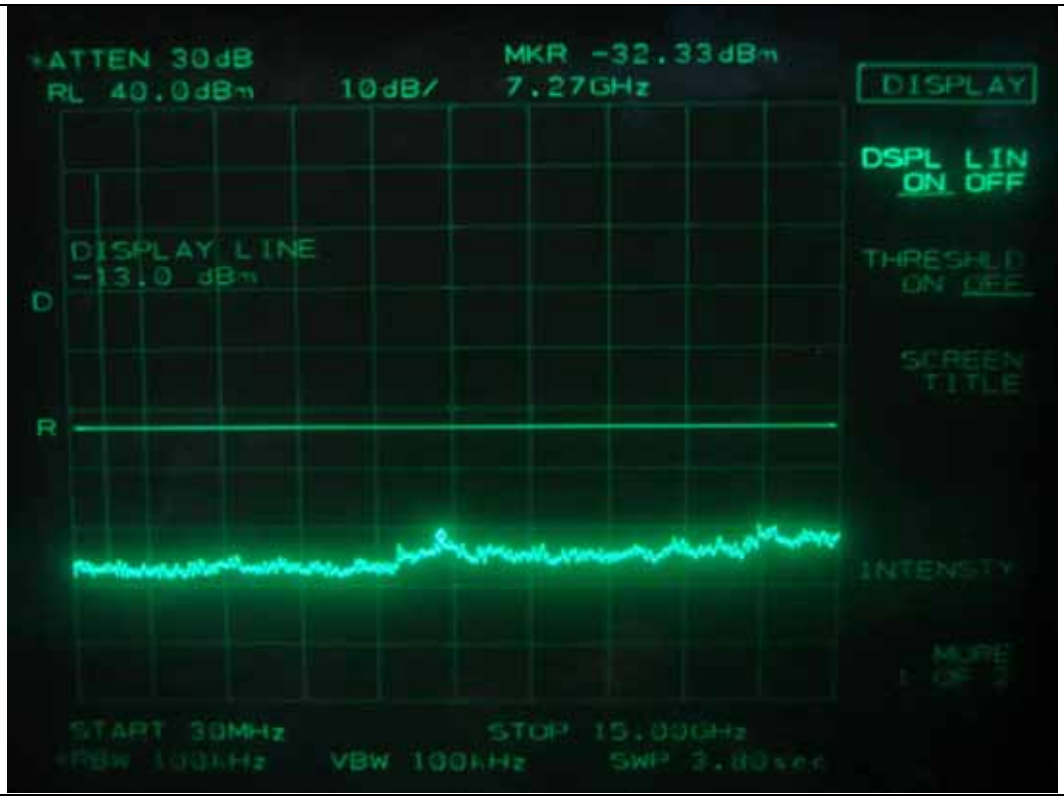
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

Low Channel – 3 input signals

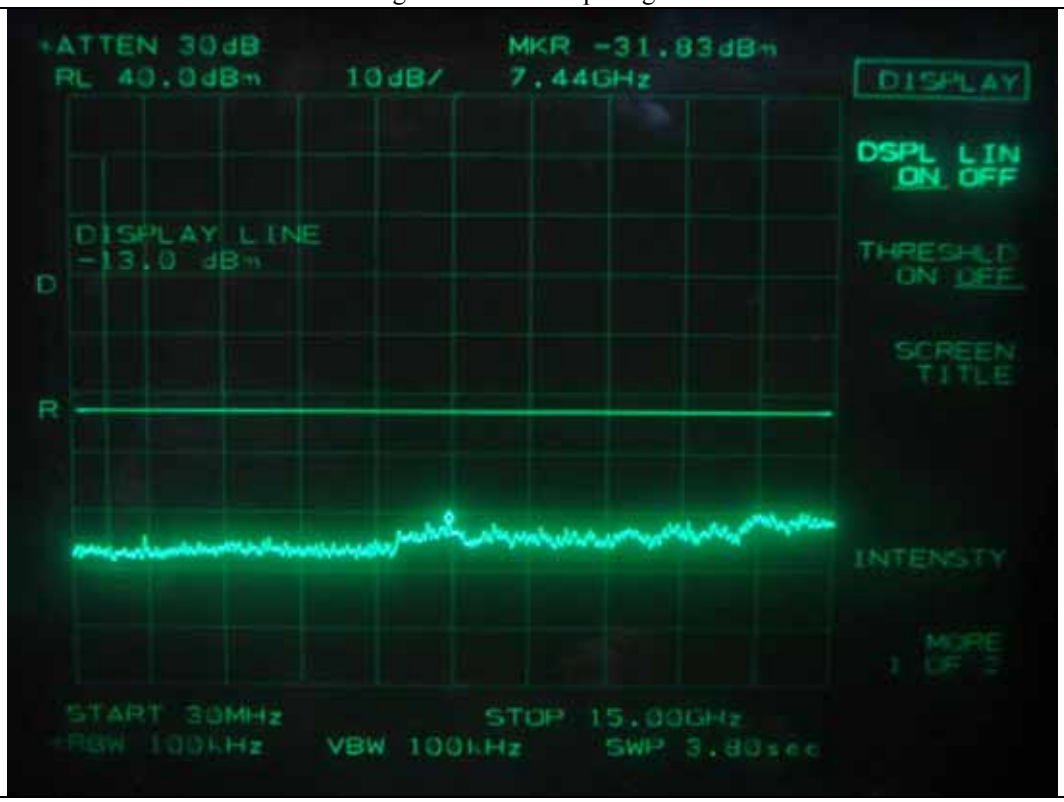


High Channel – 1 input signal

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon 1-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)



High Channel – 2 input signals



High Channel – 3 input signals

HEAD OFFICE : #505 SK Apt. Factory, 223-28 Sangdaewon 1-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do 462-705 Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
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9.3.2 Test Result for MIMO mode

9.3.2.1 Test Result for peak power

-. Test Date : February 18 ~ 21, 2011

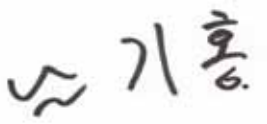
-. Temperature : 22 °C

-. Relative humidity : 48 % R.H.

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Input Power (dBm)	Output Power (dBm)
733.000	1	-9.90	25.83
733.000 & 733.025	2	-9.95	25.83
733.000 & 733.025 & 733.050	3	-9.90	25.83
752.000	1	-9.80	26.00
752.000 & 751.975	2	-9.80	26.00
752.000 & 751.975 & 751.950	3	-9.90	26.00



Tested by: Ki-Hong, Nam / Senior Engineer

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

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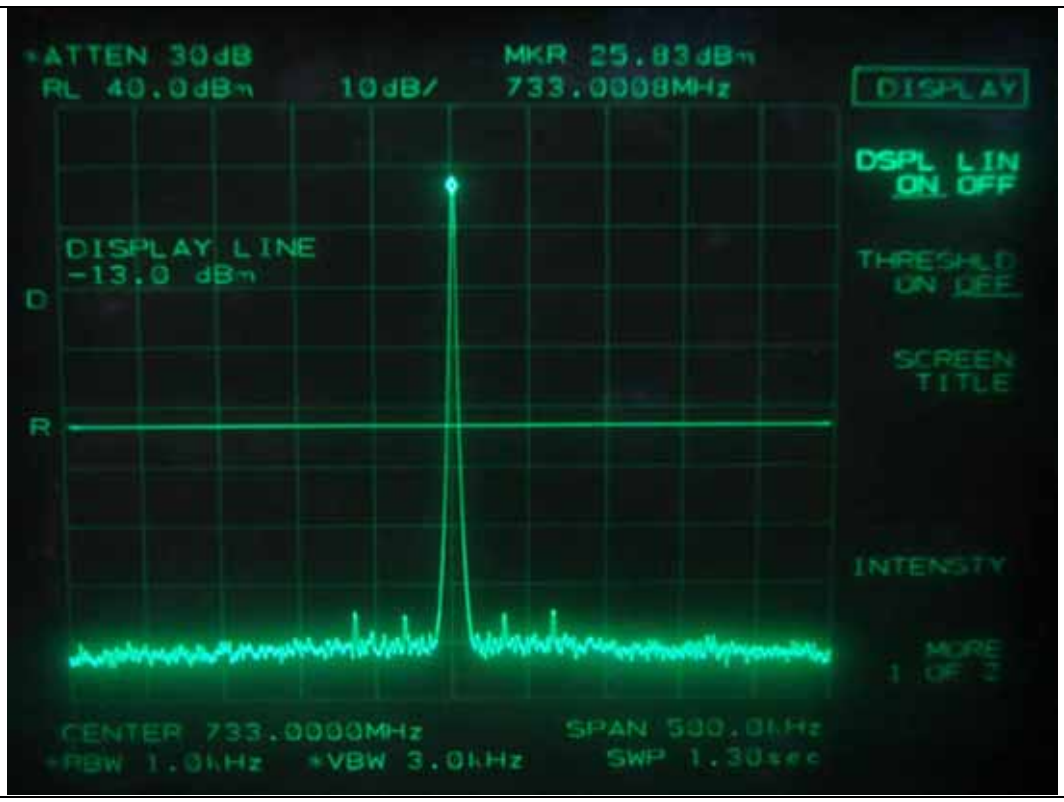
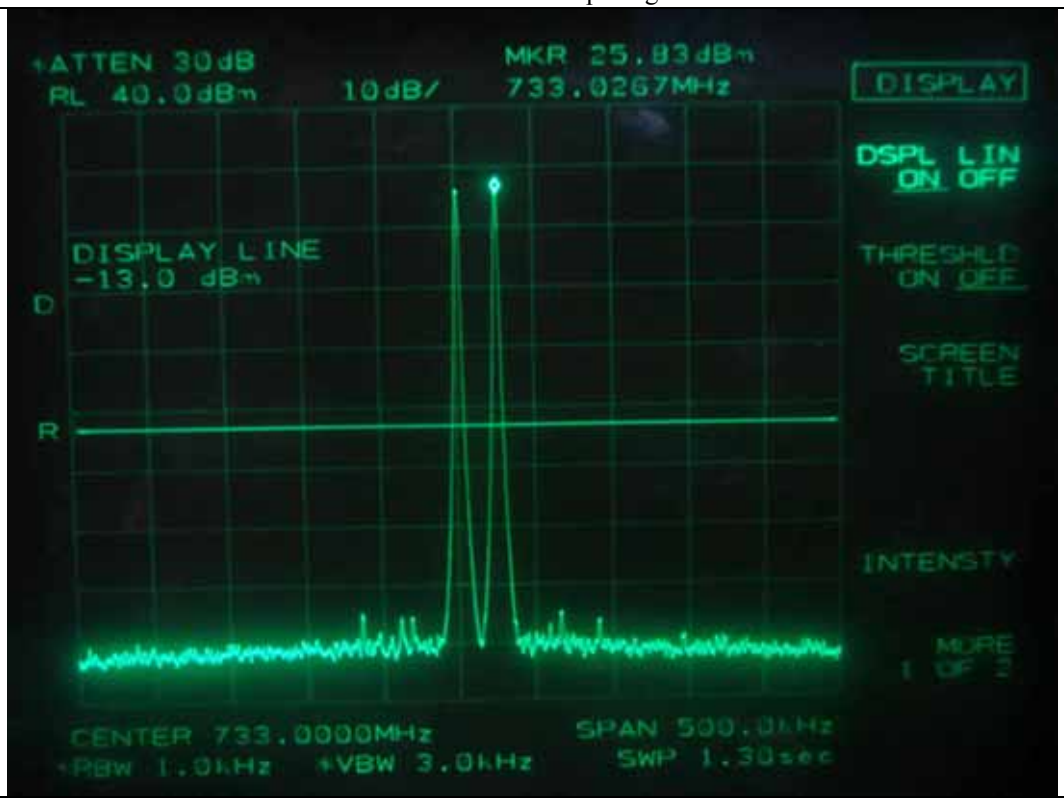


Low Channel – 1 input signal



Low Channel – 2 input signals

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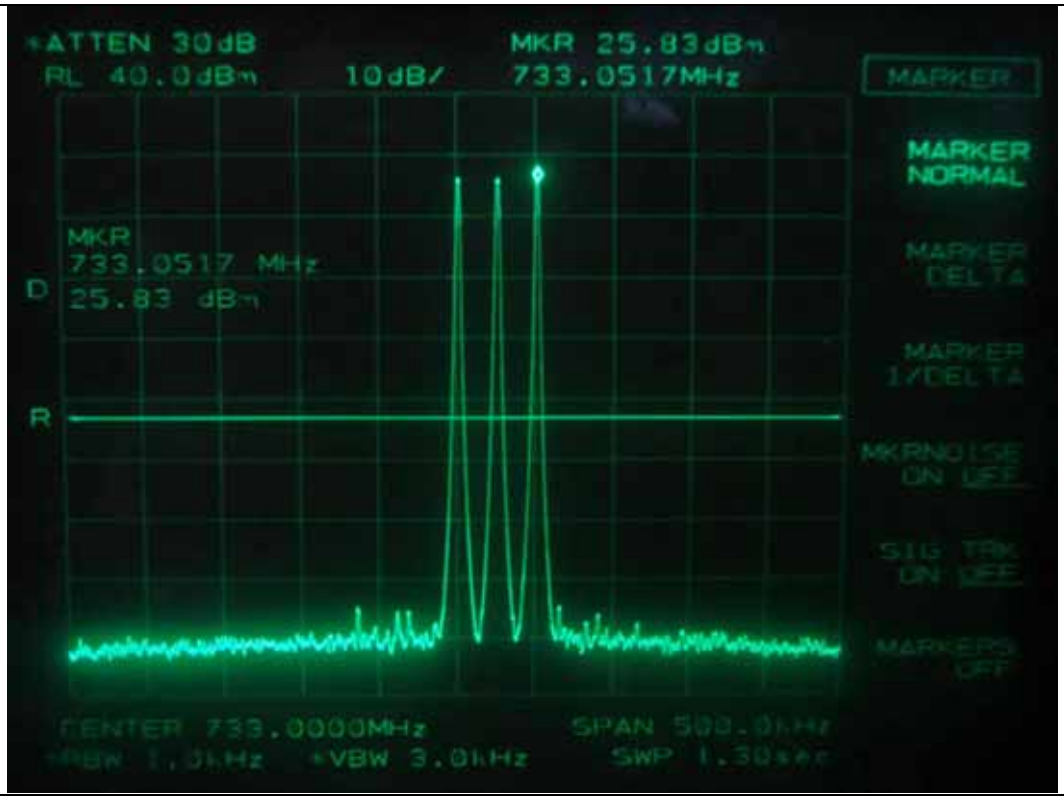
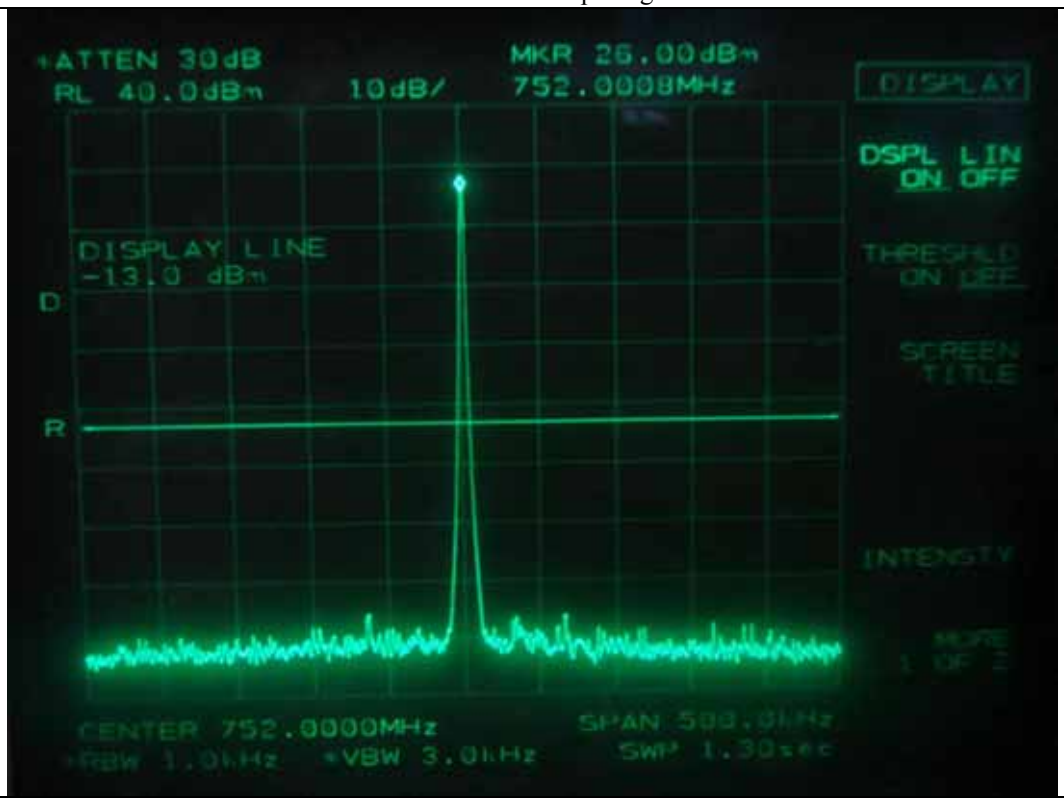


Low Channel – 3 input signals



High Channel – 1 input signal

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

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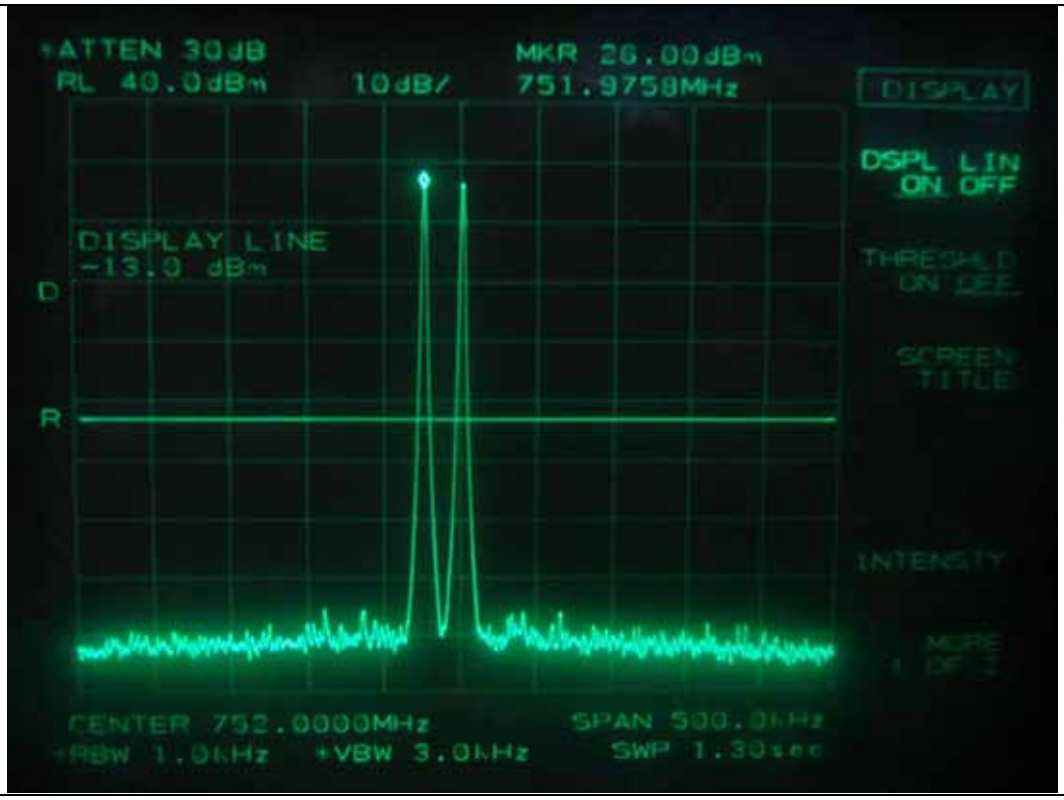
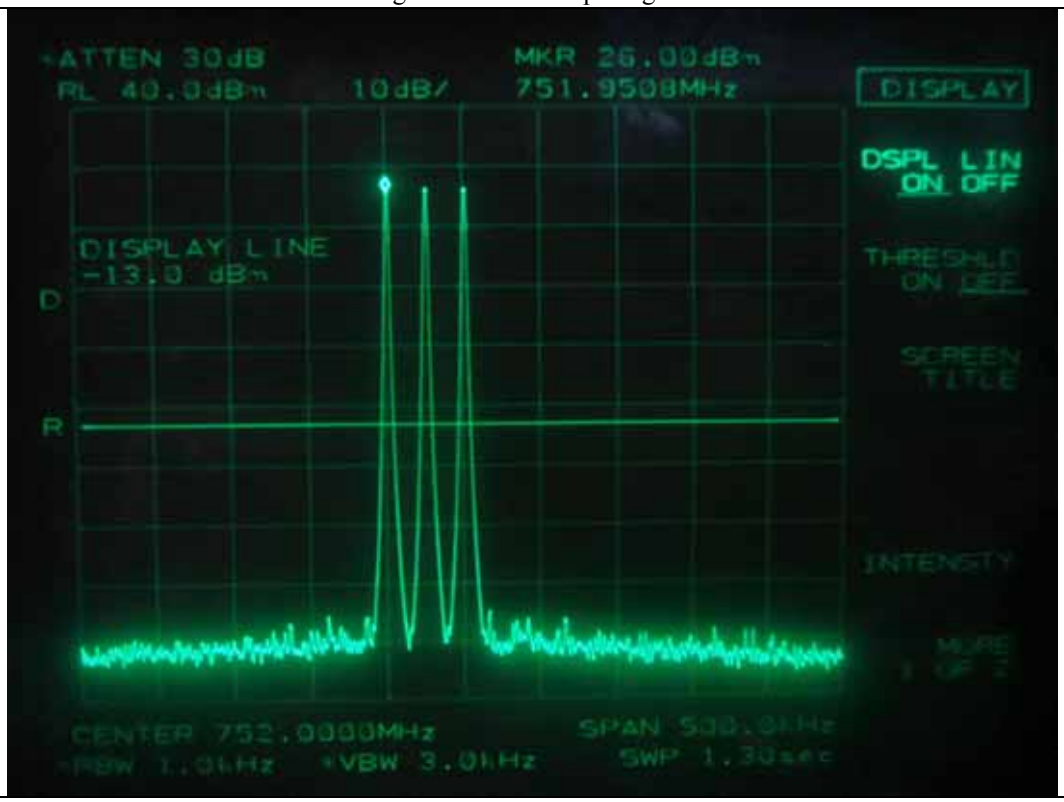


High Channel – 2 input signals



High Channel – 3 input signals

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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)

9.3.2.2 Test Result for Spurious emission

-. Test Date : February 18 ~ 21, 2011

-. Temperature : 22 °C

-. Relative humidity : 48 % R.H.

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Measured Value	Result
733.000	1	< -13 dBm	Pass
733.000 & 733.025	2		
733.000 & 733.025 & 733.050	3		
752.000	1	< -13 dBm	Pass
752.000 & 751.975	2		
752.000 & 751.975 & 751.950	3		

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 / Senior Engineer

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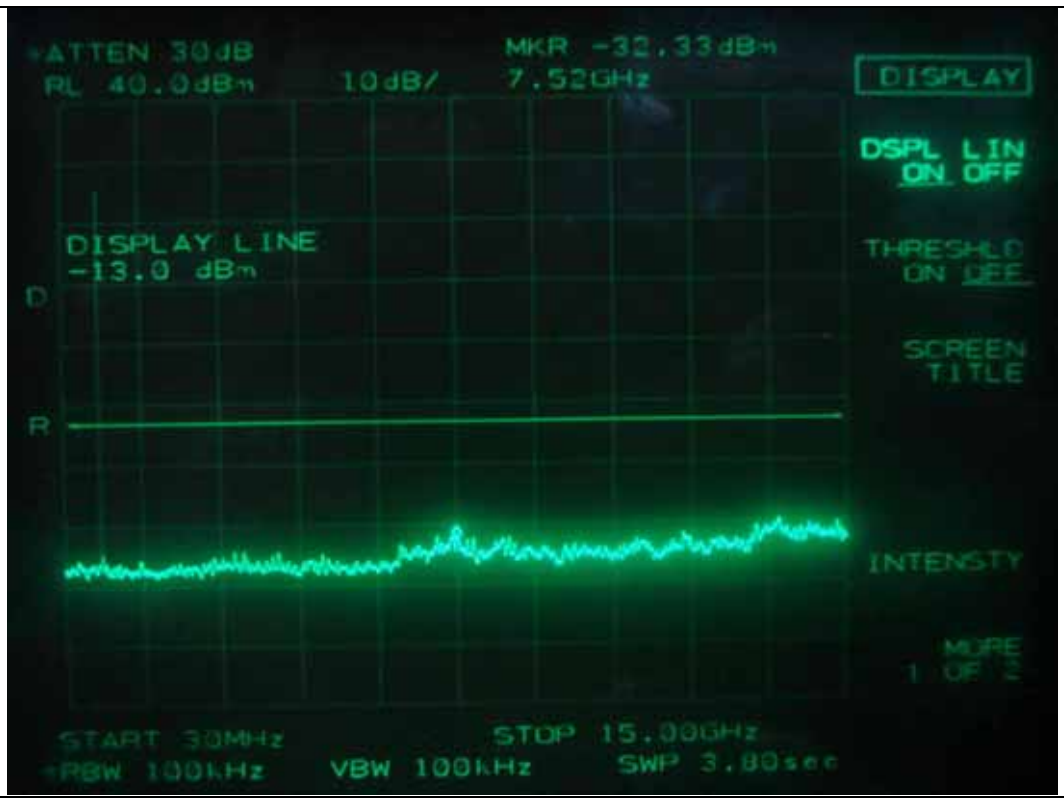
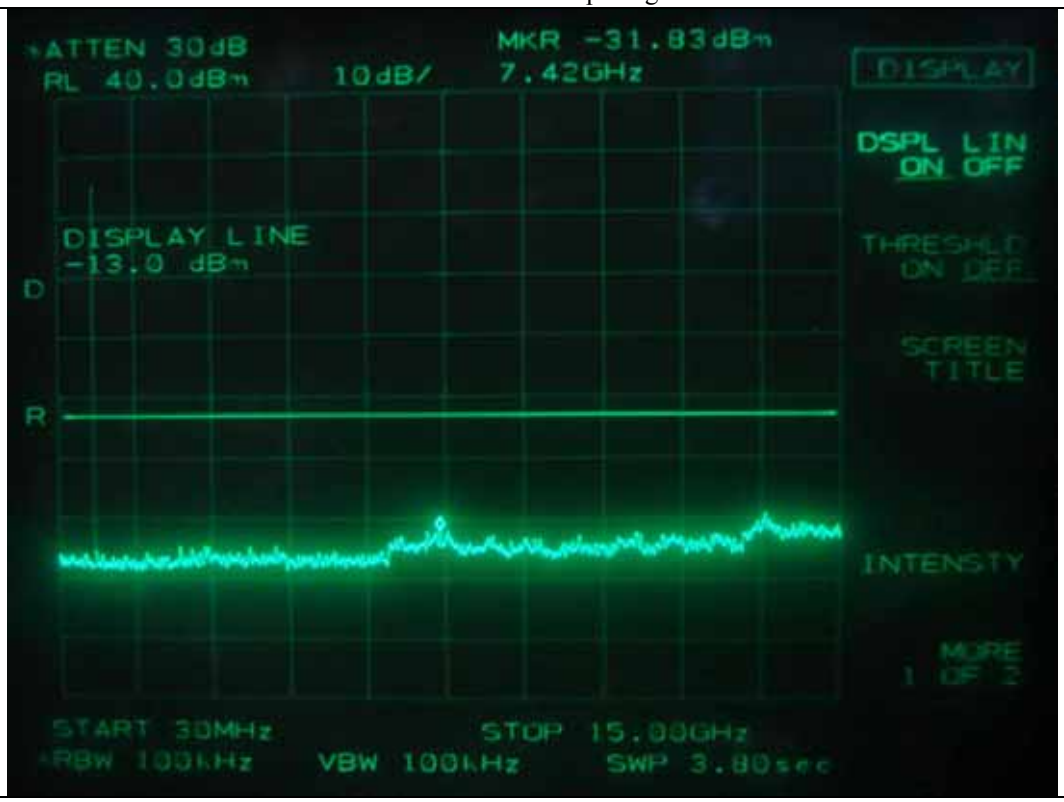


Low Channel – 1 input signal



Low Channel – 2 input signals

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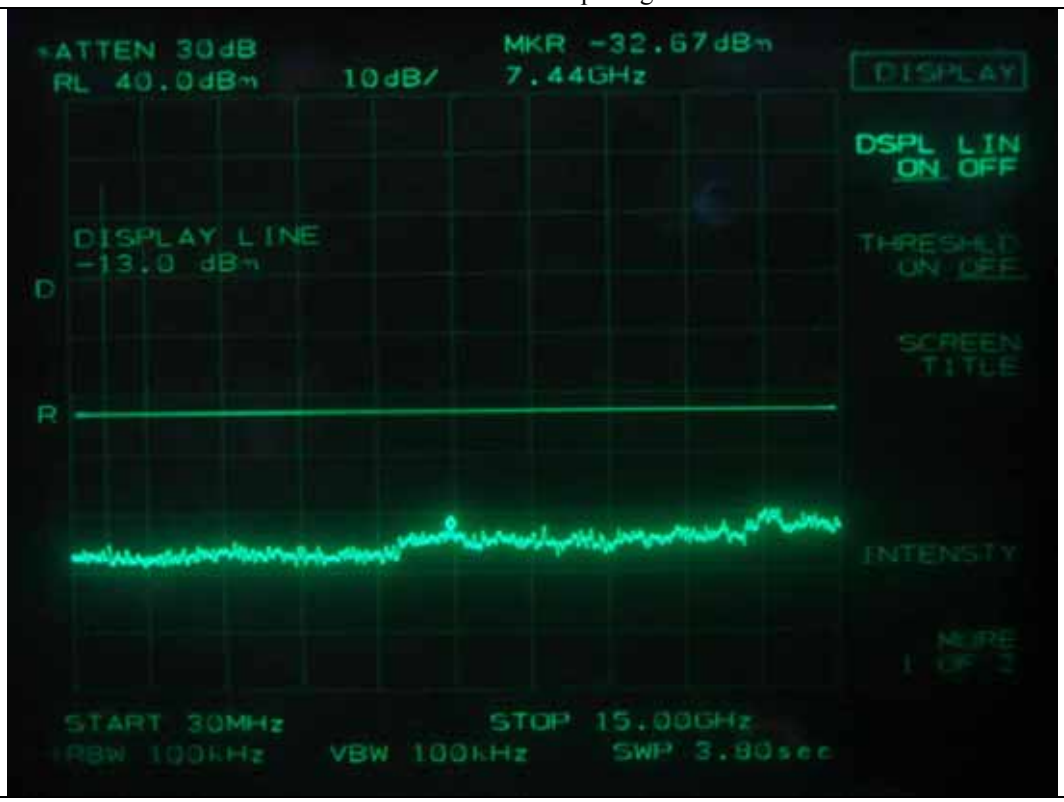
Low Channel – 3 input signals



High Channel – 1 input signal

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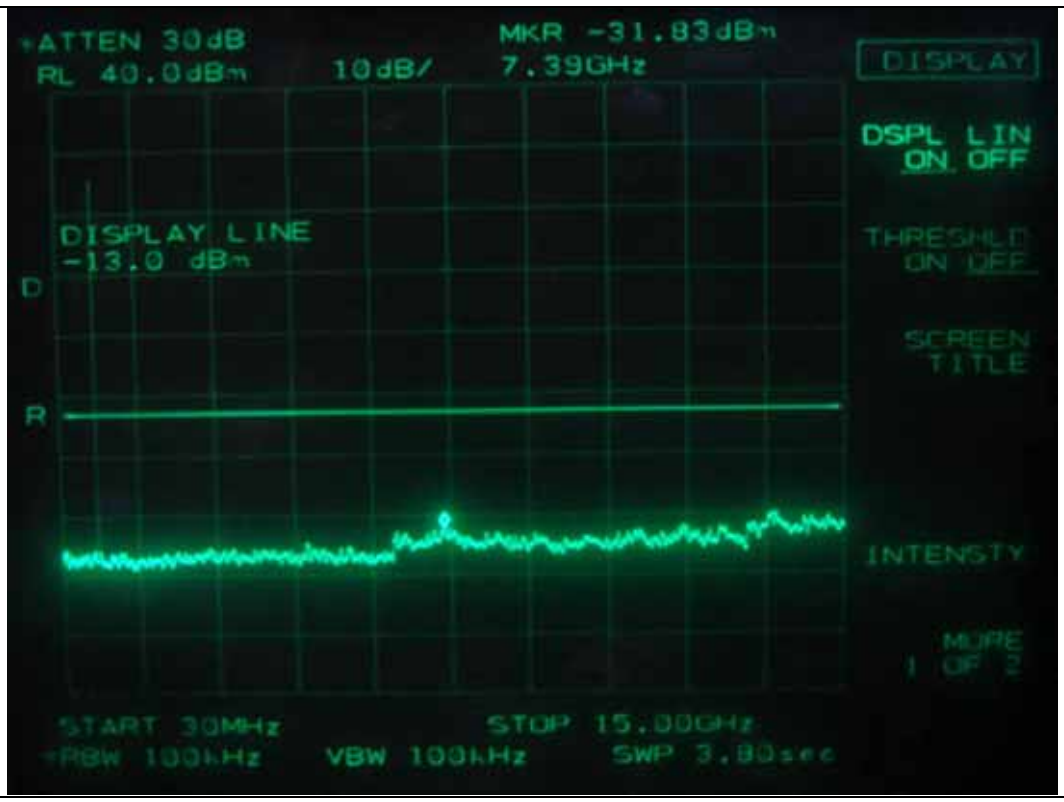
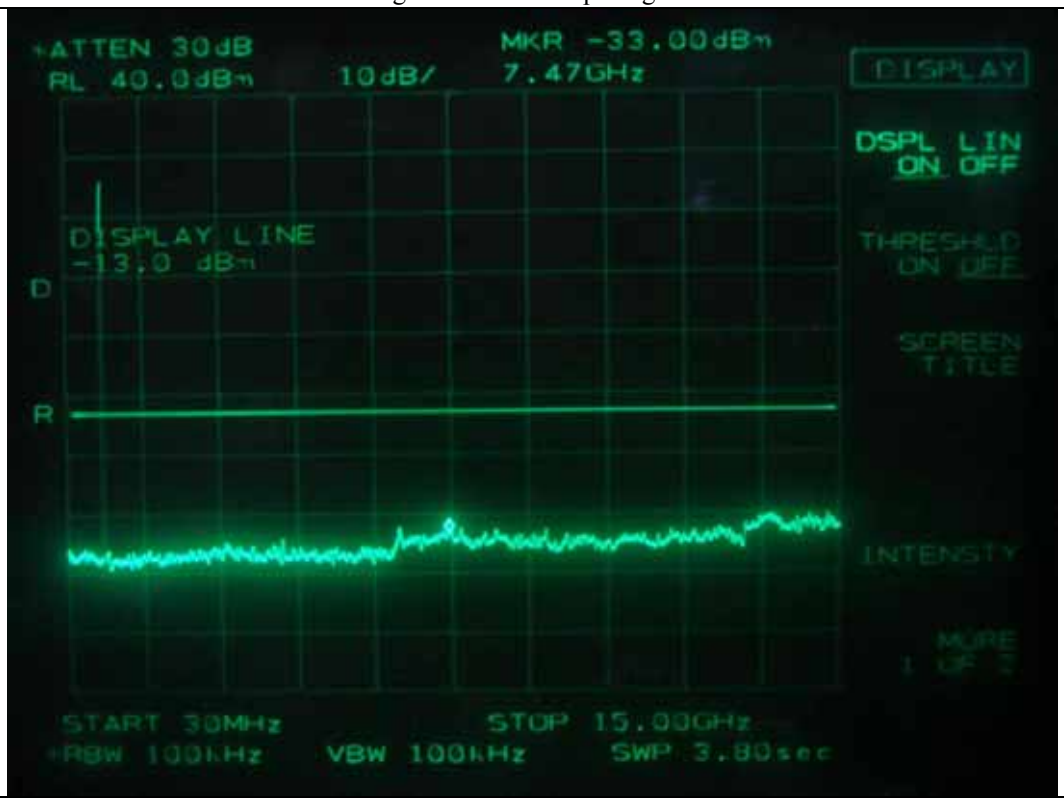


High Channel – 2 input signals



High Channel – 3 input signals

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9.3.3 Test Result for SISO+MIMO mode

9.3.3.1 Test Result for peak power

-. Test Date : February 22 ~ 23, 2011

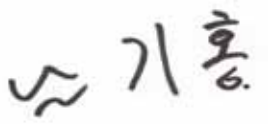
-. Temperature : 25 °C

-. Relative humidity : 45 % R.H.

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Input Power (dBm)	Output Power (dBm)
733.000	1	-9.85	30.00
733.000 & 733.025	2	-9.90	30.00
733.000 & 733.025 & 733.050	3	-9.85	30.00
752.000	1	-9.80	30.17
752.000 & 751.975	2	-9.85	30.33
752.000 & 751.975 & 751.950	3	-9.90	30.17



Tested by: Ki-Hong, Nam / Senior Engineer

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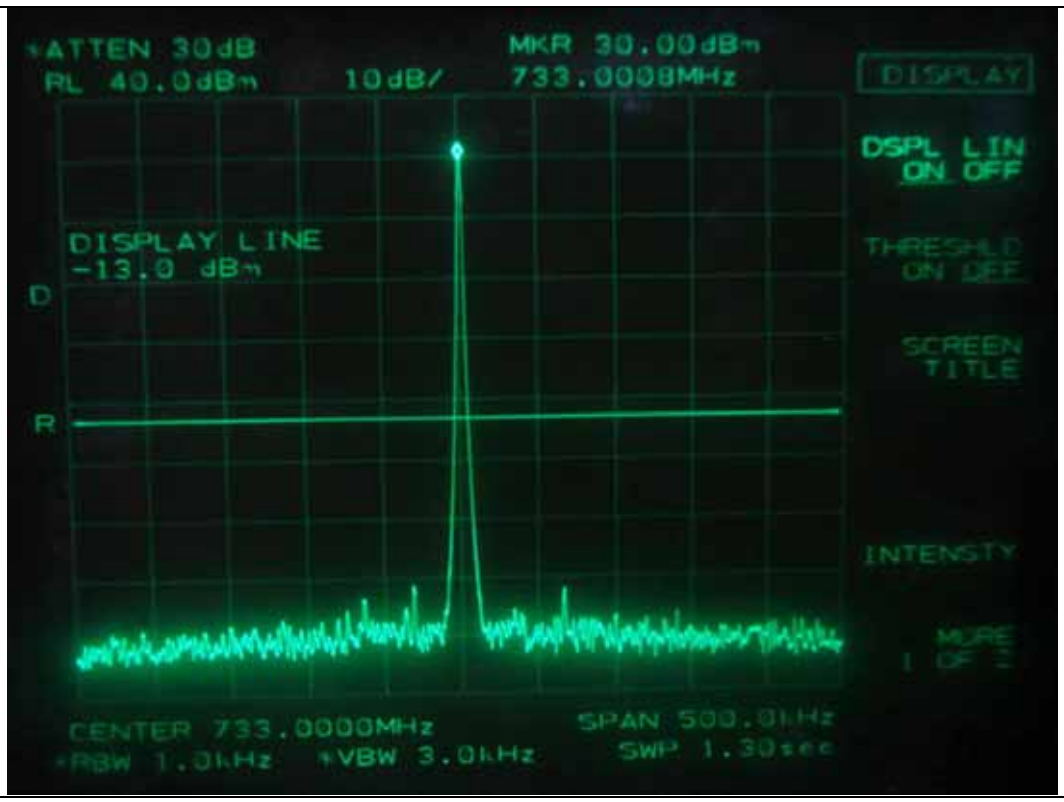
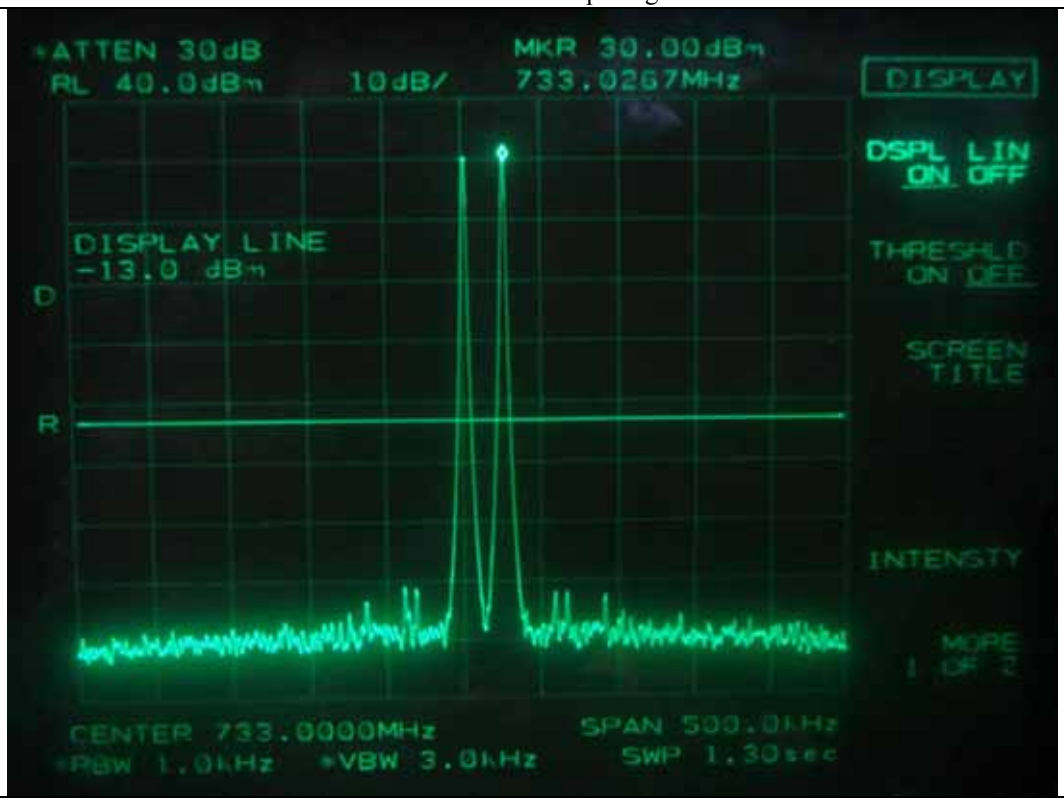


Low Channel – 1 input signal



Low Channel – 2 input signals

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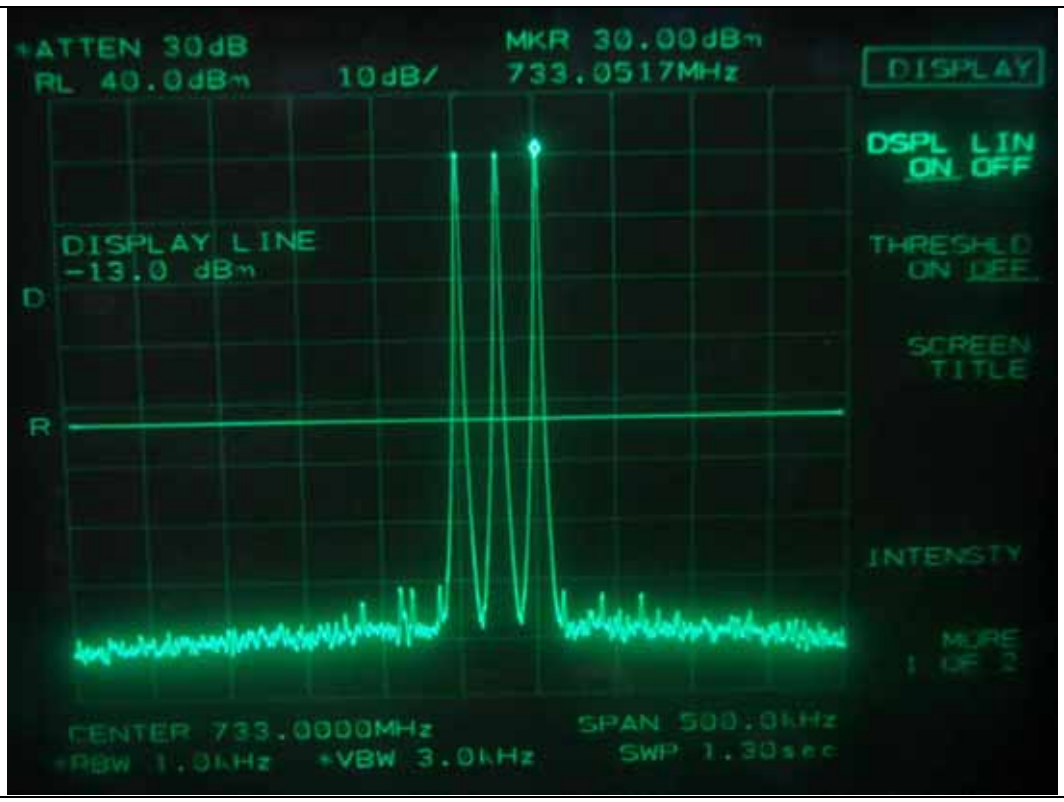
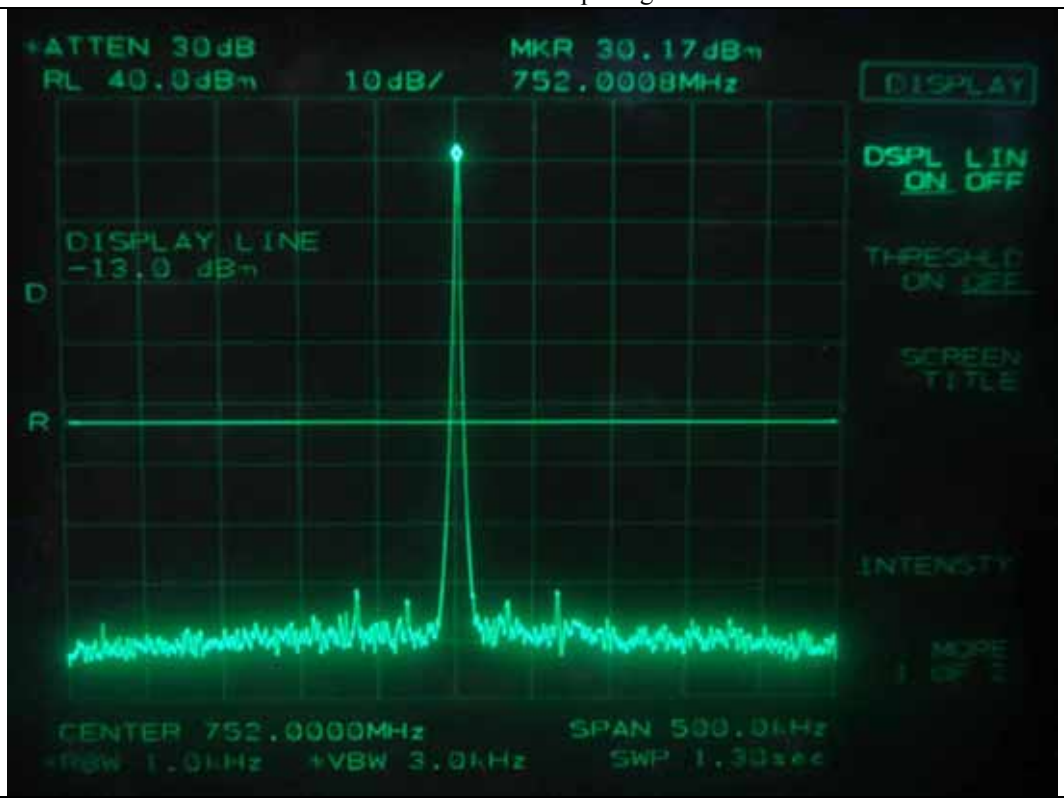


Low Channel – 3 input signals



High Channel – 1 input signal

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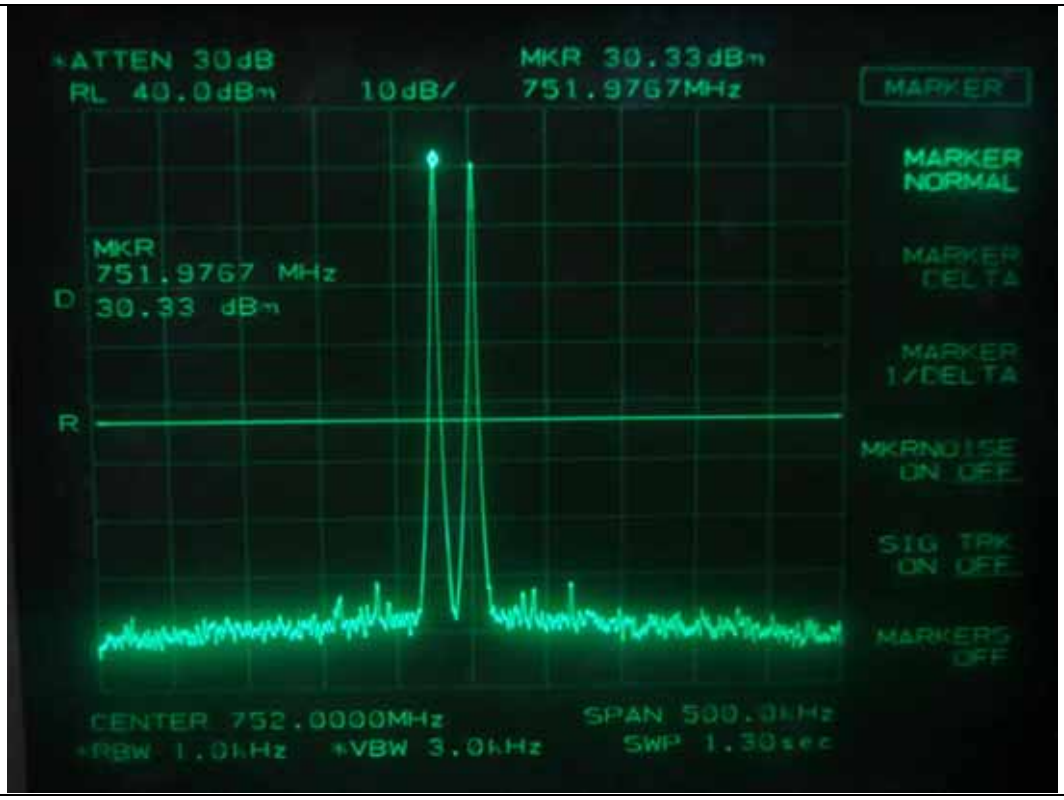
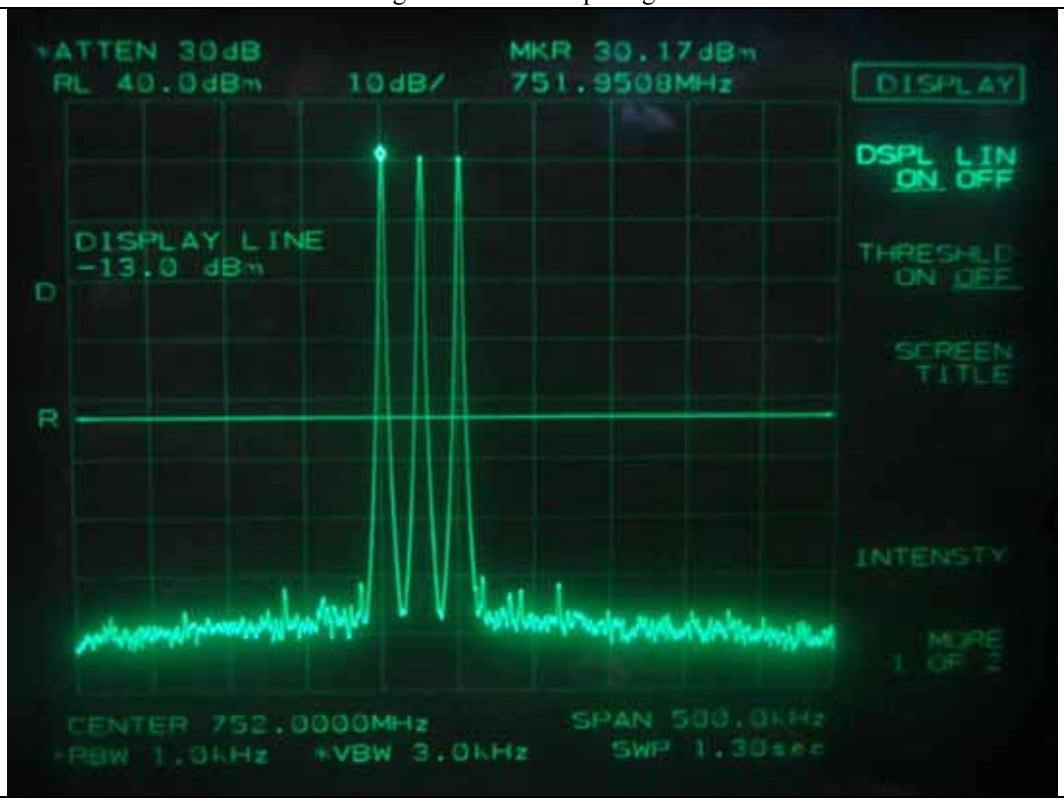


High Channel – 2 input signals



High Channel – 3 input signals

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9.3.3.2 Test Result for Spurious emission

-. Test Date : February 22 ~ 23, 2011

-. Temperature : 25 °C

-. Relative humidity : 45 % R.H.

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Measured Value	Result
733.000	1	< -13 dBm	Pass
733.000 & 733.025	2		
733.000 & 733.025 & 733.050	3		
752.000	1	< -13 dBm	Pass
752.000 & 751.975	2		
752.000 & 751.975 & 751.950	3		

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 / Senior Engineer

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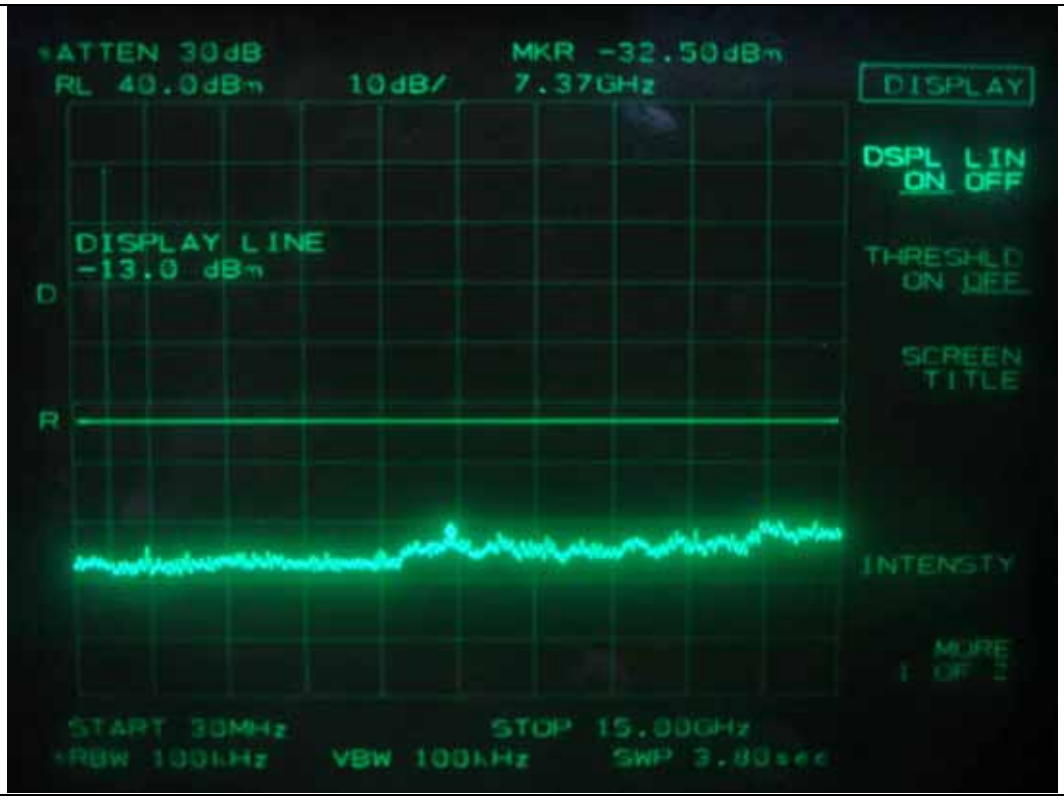
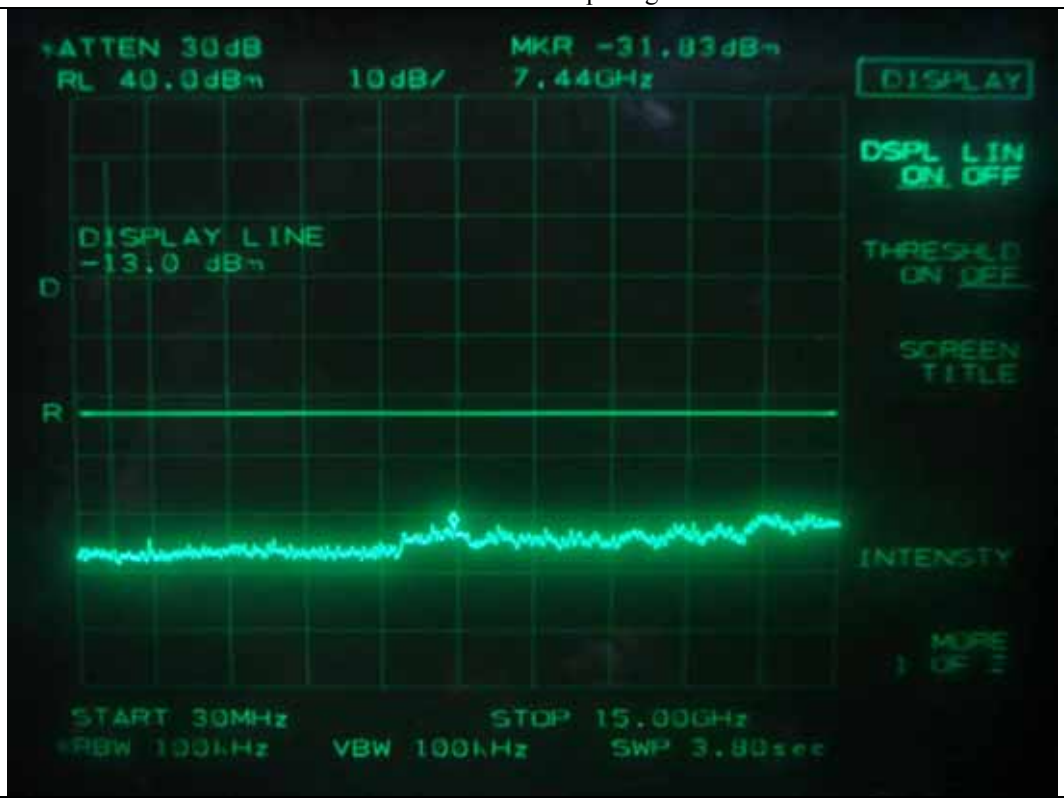


Low Channel – 1 input signal



Low Channel – 2 input signals

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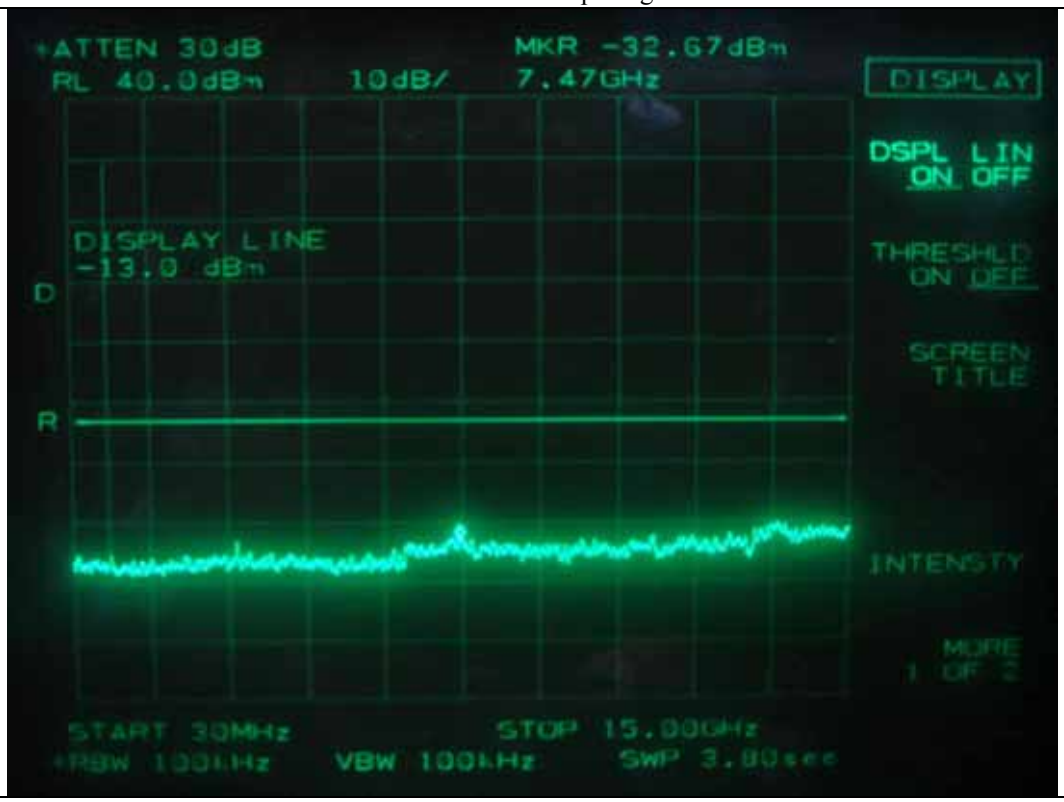
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

Low Channel – 3 input signals



High Channel – 1 input signal

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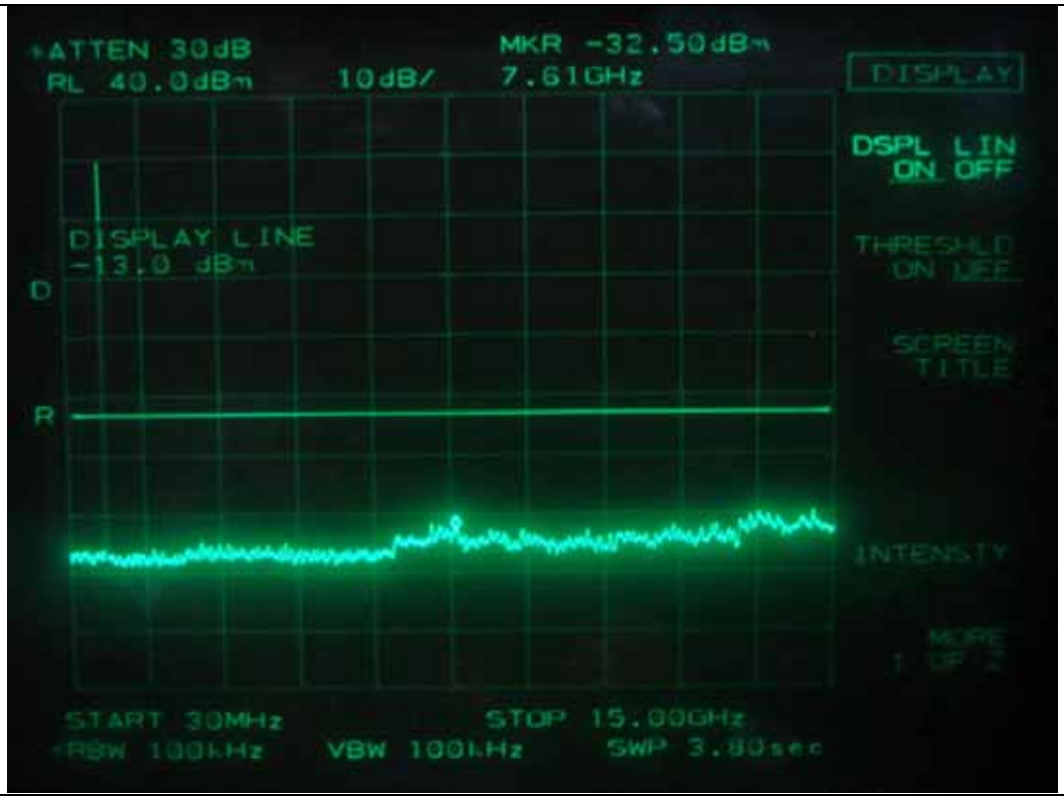
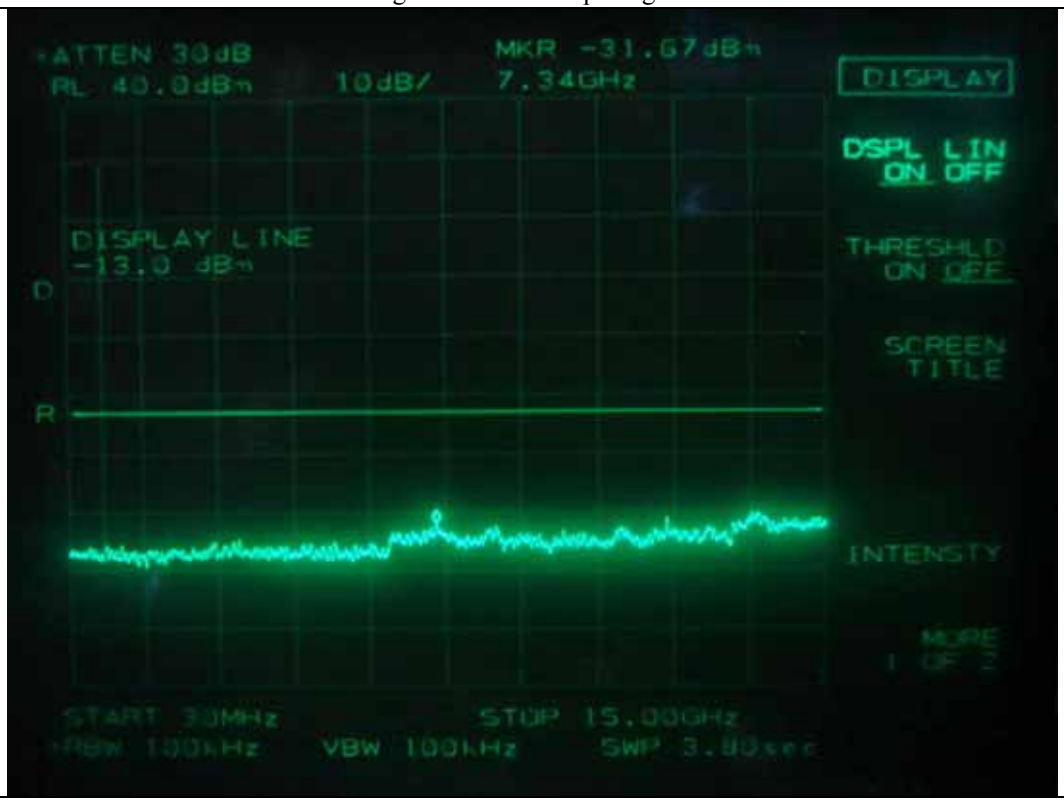
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



High Channel – 2 input signals



High Channel – 3 input signals

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10. FIELD STRENGTH OF SPURIOUS RADIATION

10.1 Operating environment

Temperature : 11 °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. (Interval)
■ -	ESVD	Rohde & Schwarz	EMI Test Receiver	838453/018	Oct. 05, 2010 (1Y)
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	Jun. 10, 2010 (1Y)
■ -	83051A	Agilent	Preamplifier	3950M00201	Jun. 11, 2010 (1Y)
■ -	E4432B	Hewlett-Packard	Signal Generator	US38440950	Jun. 10, 2010 (1Y)
■ -	83650L	Hewlett-Packard	Signal Generator	3844A00415	Jun. 10, 2010 (1Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Jun. 17, 2009 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Jun. 17, 2009 (2Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2011 (1Y)
■ -	AMU200A	R/S	Baseband signal generator and fading simulator	100360	Aug. 28, 2010 (1Y)
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010 (1Y)

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 SISO mode with AC 120 V Power Supply

10.4.1.1 Operating Mode: QPSK

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.62 dB at 36.80 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.50	-2.91	1.07	H	3.33	-5.17	-	-
		64.50	-4.67		V		-6.93	-	-
Middle	743.00	66.67	-2.73	1.03	H	3.33	-5.03	-	-
		64.83	-4.30		V		-6.60	-	-
High	752.00	66.45	-2.95	0.98	H	3.33	-5.30	-	-
		64.50	-4.65		V		-7.00	-	-
36.80		21.33	-67.67	1.55	V	0.50	-66.62	-13.00	-53.62
67.50		16.80	-74.80	1.77	V	0.84	-72.19	-13.00	-59.19
167.60		18.50	-70.50	1.88	H	1.67	-66.95	-13.00	-53.95
200.00		15.00	-71.50	1.83	H	1.67	-68.00	-13.00	-55.00
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.1.2 Operating Mode: 16QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.45 dB at 36.80 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.67	-2.74	1.07	H	3.33	-5.00	-	-
		64.50	-4.67		V		-6.93	-	-
Middle	743.00	66.83	-2.57	1.03	H	3.33	-4.87	-	-
		65.00	-4.13		V		-6.43	-	-
High	752.00	66.67	-2.73	0.98	H	3.33	-5.08	-	-
		64.67	-4.48		V		-6.83	-	-
36.80		21.50	-67.50	1.55	V	0.50	-66.45	-13.00	-53.45
67.50		16.67	-74.93	1.77	V	0.84	-72.32	-13.00	-59.32
167.60		18.83	-70.17	1.88	H	1.67	-66.62	-13.00	-53.62
200.00		15.33	-71.17	1.83	H	1.67	-67.67	-13.00	-54.67
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior 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)

10.4.1.3 Operating Mode: 64QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.45 dB at 167.60 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.83	-2.58	1.07	H	3.33	-4.84	-	-
		65.00	-4.17		V		-6.43	-	-
Middle	743.00	66.67	-2.73	1.03	H	3.33	-5.03	-	-
		64.83	-4.30		V		-6.60	-	-
High	752.00	66.50	-2.90	0.98	H	3.33	-5.25	-	-
		64.45	-4.70		V		-7.05	-	-
36.80		21.17	-67.83	1.55	V	0.50	-66.78	-13.00	-53.78
67.50		16.50	-75.10	1.77	V	0.84	-72.49	-13.00	-59.49
167.60		19.00	-70.00	1.88	H	1.67	-66.45	-13.00	-53.45
200.00		15.17	-71.33	1.83	H	1.67	-67.83	-13.00	-54.83
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.2 Test Result for SISO mode with DC -48 V Power Supply

10.4.2.1 Operating Mode: QPSK

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

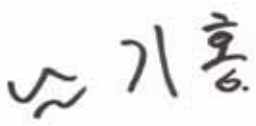
-. Measurement distance : 3 m

-. Result : PASSED BY –54.33 dB at 172.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.75	-2.66	1.07	H	3.33	-4.92	-	-
		64.80	-4.37		V		-6.63	-	-
Middle	743.00	66.83	-2.57	1.03	H	3.33	-4.87	-	-
		65.00	-4.13		V		-6.43	-	-
High	752.00	66.67	-2.73	0.98	H	3.33	-5.08	-	-
		64.50	-4.65		V		-7.00	-	-
40.00		20.50	-68.50	1.66	V	0.50	-67.34	-13.00	-54.34
75.00		18.00	-72.00	1.86	V	0.84	-69.30	-13.00	-56.30
172.00		18.33	-71.00	2.00	H	1.67	-67.33	-13.00	-54.33
200.00		15.50	-71.00	1.83	H	1.67	-67.50	-13.00	-54.50
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.2.2 Operating Mode: 16QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

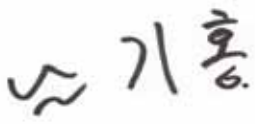
-. Measurement distance : 3 m

-. Result : PASSED BY –54.33 dB at 200.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.83	-2.58	1.07	H	3.33	-4.84	-	-
		64.76	-4.41		V		-6.67	-	-
Middle	743.00	66.50	-2.90	1.03	H	3.33	-5.20	-	-
		64.83	-4.30		V		-6.60	-	-
High	752.00	66.83	-2.57	0.98	H	3.33	-4.92	-	-
		64.67	-4.48		V		-6.83	-	-
40.00		20.33	-68.67	1.66	V	0.50	-67.51	-13.00	-54.51
75.00		18.50	-71.50	1.86	V	0.84	-68.80	-13.00	-55.80
172.00		18.00	-71.33	2.00	H	1.67	-67.66	-13.00	-54.66
200.00		15.67	-70.83	1.83	H	1.67	-67.33	-13.00	-54.33
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

10.4.2.3 Operating Mode: 64QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.99 dB at 172.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.67	-2.74	1.07	H	3.33	-5.00	-	-
		64.50	-4.67		V		-6.93	-	-
Middle	743.00	66.83	-2.57	1.03	H	3.33	-4.87	-	-
		64.83	-4.30		V		-6.60	-	-
High	752.00	66.67	-2.73	0.98	H	3.33	-5.08	-	-
		64.50	-4.65		V		-7.00	-	-
40.00		20.00	-69.00	1.66	V	0.50	-67.84	-13.00	-54.84
75.00		18.33	-71.67	1.86	V	0.84	-68.97	-13.00	-55.97
172.00		18.67	-70.66	2.00	H	1.67	-66.99	-13.00	-53.99
200.00		15.50	-71.00	1.83	H	1.67	-67.50	-13.00	-54.50
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.3 Test Result for MIMO mode with AC 120 V Power Supply

10.4.3.1 Operating Mode: QPSK

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.95 dB at 36.80 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	61.50	-7.91	1.07	H	3.33	-10.17	-	-
		59.83	-9.34		V		-11.60	-	-
Middle	743.00	61.67	-7.73	1.03	H	3.33	-10.03	-	-
		60.00	-9.13		V		-11.43	-	-
High	752.00	61.33	-8.07	0.98	H	3.33	-10.42	-	-
		59.67	-9.48		V		-11.83	-	-
36.80		21.00	-68.00	1.55	V	0.50	-66.95	-13.00	-53.95
67.50		17.00	-74.60	1.77	V	0.84	-71.99	-13.00	-58.99
167.60		18.00	-71.00	1.88	H	1.67	-67.45	-13.00	-54.45
200.00		14.83	-71.67	1.83	H	1.67	-68.17	-13.00	-55.17
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.3.2 Operating Mode: 16QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

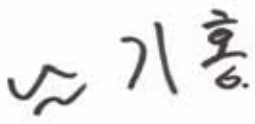
-. Measurement distance : 3 m

-. Result : PASSED BY –53.62 dB at 36.80 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	61.33	-8.08	1.07	H	3.33	-10.34	-	-
		59.67	-9.50		V		-11.76	-	-
Middle	743.00	61.50	-7.90	1.03	H	3.33	-10.20	-	-
		59.83	-9.30		V		-11.60	-	-
High	752.00	61.17	-8.23	0.98	H	3.33	-10.58	-	-
		59.50	-9.65		V		-12.00	-	-
36.80		21.33	-67.67	1.55	V	0.50	-66.62	-13.00	-53.62
67.50		17.50	-74.10	1.77	V	0.84	-71.49	-13.00	-58.49
167.60		17.83	-71.17	1.88	H	1.67	-67.62	-13.00	-54.62
200.00		15.00	-71.50	1.83	H	1.67	-68.00	-13.00	-55.00
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

10.4.3.3 Operating Mode: 64QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.45 dB at 36.80 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	61.50	-7.91	1.07	H	3.33	-10.17	-	-
		59.75	-9.42		V		-11.68	-	-
Middle	743.00	61.83	-7.57	1.03	H	3.33	-9.87	-	-
		60.00	-9.13		V		-11.43	-	-
High	752.00	61.33	-8.07	0.98	H	3.33	-10.42	-	-
		59.75	-9.40		V		-11.75	-	-
36.80		21.50	-67.50	1.55	V	0.50	-66.45	-13.00	-53.45
67.50		17.33	-74.27	1.77	V	0.84	-71.66	-13.00	-58.66
167.60		17.67	-71.33	1.88	H	1.67	-67.78	-13.00	-54.78
200.00		15.50	-71.00	1.83	H	1.67	-67.50	-13.00	-54.50
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.4 Test Result for MIMO mode with DC -48 V Power Supply

10.4.4.1 Operating Mode: QPSK

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

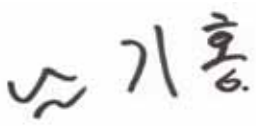
-. Measurement distance : 3 m

-. Result : PASSED BY –53.84 dB at 40.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	61.67	-7.74	1.07	H	3.33	-10.00	-	-
		60.17	-9.00		V		-11.26	-	-
Middle	743.00	61.50	-7.90	1.03	H	3.33	-10.20	-	-
		59.83	-9.30		V		-11.60	-	-
High	752.00	61.83	-7.57	0.98	H	3.33	-9.92	-	-
		60.17	-8.98		V		-11.33	-	-
40.00		21.00	-68.00	1.66	V	0.50	-66.84	-13.00	-53.84
75.00		17.83	-72.17	1.86	V	0.84	-69.47	-13.00	-56.47
172.00		18.17	-71.16	2.00	H	1.67	-67.49	-13.00	-54.49
200.00		15.67	-70.83	1.83	H	1.67	-67.33	-13.00	-54.33
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



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10.4.4.2 Operating Mode: 16QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.67 dB at 40.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	61.50	-7.91	1.07	H	3.33	-10.17	-	-
		59.83	-9.34		V		-11.60	-	-
Middle	743.00	61.33	-8.07	1.03	H	3.33	-10.37	-	-
		59.75	-9.38		V		-11.68	-	-
High	752.00	61.17	-8.23	0.98	H	3.33	-10.58	-	-
		59.60	-9.55		V		-11.90	-	-
40.00		21.17	-67.83	1.66	V	0.50	-66.67	-13.00	-53.67
75.00		18.00	-72.00	1.86	V	0.84	-69.30	-13.00	-56.30
172.00		18.50	-70.83	2.00	H	1.67	-67.16	-13.00	-54.16
200.00		15.50	-71.00	1.83	H	1.67	-67.50	-13.00	-54.50
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.4.3 Operating Mode: 64QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

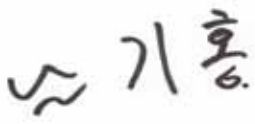
-. Measurement distance : 3 m

-. Result : PASSED BY –53.67 dB at 40.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	61.72	-7.69	1.07	H	3.33	-9.95	-	-
		60.10	-9.07		V		-11.33	-	-
Middle	743.00	61.50	-7.90	1.03	H	3.33	-10.20	-	-
		59.83	-9.30		V		-11.60	-	-
High	752.00	61.33	-8.07	0.98	H	3.33	-10.42	-	-
		59.67	-9.48		V		-11.83	-	-
40.00		21.33	-67.83	1.66	V	0.50	-66.67	-13.00	-53.67
75.00		17.83	-72.17	1.86	V	0.84	-69.47	-13.00	-56.47
172.00		18.17	-71.16	2.00	H	1.67	-67.49	-13.00	-54.49
200.00		15.67	-70.83	1.83	H	1.67	-67.33	-13.00	-54.33
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.5 Test Result for SISO+MIMO mode with AC 120 V Power Supply

10.4.5.1 Operating Mode: QPSK

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

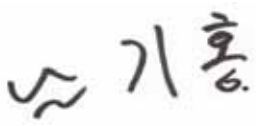
-. Measurement distance : 3 m

-. Result : PASSED BY –53.45 dB at 36.80 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.83	-2.58	1.07	H	3.33	-4.84	-	-
		65.00	-4.17		V		-6.43	-	-
Middle	743.00	66.72	-2.68	1.03	H	3.33	-4.98	-	-
		64.50	-4.63		V		-6.93	-	-
High	752.00	66.95	-2.45	0.98	H	3.33	-4.80	-	-
		64.67	-4.48		V		-6.83	-	-
36.80		21.50	-67.50	1.55	V	0.50	-66.45	-13.00	-53.45
67.50		18.00	-73.60	1.77	V	0.84	-70.99	-13.00	-57.99
167.60		17.50	-71.50	1.88	H	1.67	-67.95	-13.00	-54.95
200.00		15.50	-71.00	1.83	H	1.67	-67.50	-13.00	-54.50
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



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10.4.5.2 Operating Mode: 16QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

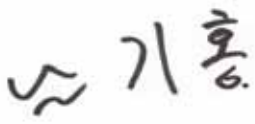
-. Measurement distance : 3 m

-. Result : PASSED BY –53.62 dB at 36.80 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.67	-2.74	1.07	H	3.33	-5.00	-	-
		64.50	-4.67		V		-6.93	-	-
Middle	743.00	66.83	-2.57	1.03	H	3.33	-4.87	-	-
		64.83	-4.30		V		-6.60	-	-
High	752.00	66.90	-2.50	0.98	H	3.33	-4.85	-	-
		64.75	-4.40		V		-6.75	-	-
36.80		21.33	-67.67	1.55	V	0.50	-66.62	-13.00	-53.62
67.50		18.50	-73.10	1.77	V	0.84	-70.49	-13.00	-57.49
167.60		17.17	-71.83	1.88	H	1.67	-68.28	-13.00	-55.28
200.00		15.67	-70.83	1.83	H	1.67	-67.33	-13.00	-54.33
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.5.3 Operating Mode: 64QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

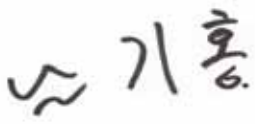
-. Measurement distance : 3 m

-. Result : PASSED BY –53.28 dB at 36.80 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.92	-2.49	1.07	H	3.33	-4.75	-	-
		64.83	-4.34		V		-6.60	-	-
Middle	743.00	66.83	-2.57	1.03	H	3.33	-4.87	-	-
		64.67	-4.46		V		-6.76	-	-
High	752.00	66.75	-2.65	0.98	H	3.33	-5.00	-	-
		64.50	-4.65		V		-7.00	-	-
36.80		21.67	-67.33	1.55	V	0.50	-66.28	-13.00	-53.28
67.50		18.00	-73.60	1.77	V	0.84	-70.99	-13.00	-57.99
167.60		17.50	-71.50	1.88	H	1.67	-67.95	-13.00	-54.95
200.00		15.33	-71.17	1.83	H	1.67	-67.67	-13.00	-54.67
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.6 Test Result for SISO+MIMO mode with DC -48 V Power Supply

10.4.6.1 Operating Mode: QPSK

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

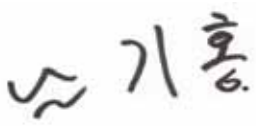
-. Measurement distance : 3 m

-. Result : PASSED BY –53.51 dB at 40.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.67	-2.74	1.07	H	3.33	-5.00	-	-
		64.50	-4.67		V		-6.93	-	-
Middle	743.00	66.75	-2.65	1.03	H	3.33	-4.95	-	-
		64.67	-4.46		V		-6.76	-	-
High	752.00	66.83	-2.57	0.98	H	3.33	-4.92	-	-
		64.67	-4.48		V		-6.83	-	-
40.00		21.33	-67.67	1.66	V	0.50	-66.51	-13.00	-53.51
75.00		18.50	-71.50	1.86	V	0.84	-68.80	-13.00	-55.80
172.00		18.00	-71.33	2.00	H	1.67	-67.66	-13.00	-54.66
200.00		15.33	-71.17	1.83	H	1.67	-67.67	-13.00	-54.67
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

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10.4.6.2 Operating Mode: 16QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.34 dB at 40.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.83	-2.58	1.07	H	3.33	-4.84	-	-
		64.75	-4.42		V		-6.68	-	-
Middle	743.00	66.95	-2.45	1.03	H	3.33	-4.75	-	-
		64.83	-4.30		V		-6.60	-	-
High	752.00	66.67	-2.73	0.98	H	3.33	-5.08	-	-
		64.50	-4.65		V		-7.00	-	-
40.00		21.50	-67.50	1.66	V	0.50	-66.34	-13.00	-53.34
75.00		18.33	-71.67	1.86	V	0.84	-68.97	-13.00	-55.97
172.00		18.17	-71.16	2.00	H	1.67	-67.49	-13.00	-54.49
200.00		15.17	-71.33	1.83	H	1.67	-67.83	-13.00	-54.83
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

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10.4.6.3 Operating Mode: 64QAM

-. Test Date : February 25, 2011

-. Resolution bandwidth : 1 MHz

-. Video bandwidth : 1 MHz

-. Frequency range : 1 GHz ~ 20 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY –53.67 dB at 40.00 MHz

Channel	Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Low	733.00	66.83	-2.58	1.07	H	3.33	-4.84	-	-
		64.67	-4.50		V		-6.76	-	-
Middle	743.00	66.75	-2.65	1.03	H	3.33	-4.95	-	-
		64.50	-4.63		V		-6.93	-	-
High	752.00	66.90	-2.50	0.98	H	3.33	-4.85	-	-
		64.83	-4.32		V		-6.67	-	-
40.00		21.17	-67.83	1.66	V	0.50	-66.67	-13.00	-53.67
75.00		18.50	-71.50	1.86	V	0.84	-68.80	-13.00	-55.80
172.00		18.50	-70.83	2.00	H	1.67	-67.16	-13.00	-54.16
200.00		15.67	-70.83	1.83	H	1.67	-67.33	-13.00	-54.33
Other frequencies have margin more than 20 dB.									

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Senior Engineer

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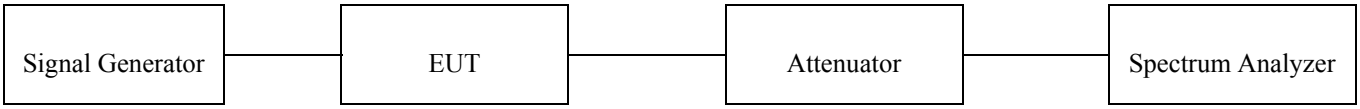
11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

11.1 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 min 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.



11.2 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2010 (1Y)
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 01, 2010 (1Y)
■ -	SSE-43CI-A	Samkun	Chamber	060712	Jun. 11, 2010 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2011 (1Y)
■ -	AMU200A	R/S	Baseband signal generator and fading simulator	100360	Aug. 28, 2010 (1Y)
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010 (1Y)

All test equipment used is calibrated on a regular basis.

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11.3 Test data

11.3.1 Test Result for SISO mode with AC 120 V Power Supply

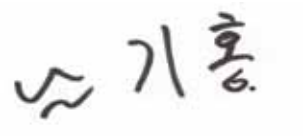
-. Test Date : February 16 ~ 17, 2011

-. Temperature : 25 °C

-. Relative humidity : 47 % R.H.

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	743 000 000	743 000 001	0.001 3	Within the Authorized Frequency block
-20		743 000 000	0.000 0	
-10		743 000 002	0.002 7	
0		743 000 001	0.001 3	
10		743 000 001	0.001 3	
20		743 000 002	0.002 7	
30		743 000 000	0.000 0	
40		743 000 000	0.000 0	
50		743 000 001	0.001 3	



Tested by: Ki-Hong, Nam / Senior Engineer

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11.3.2 Test Result for SISO mode with DC -48 V Power Supply

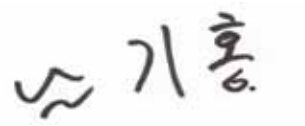
-. Test Date : February 16 ~ 17, 2011

-. Temperature : 25 °C

-. Relative humidity : 47 % R.H.

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	743 000 000	743 000 000	0.000 0	Within the Authorized Frequency block
-20		743 000 002	0.002 7	
-10		743 000 002	0.002 7	
0		743 000 000	0.000 0	
10		743 000 000	0.000 0	
20		743 000 001	0.001 3	
30		743 000 002	0.002 7	
40		743 000 000	0.000 0	
50		743 000 002	0.002 7	



Tested by: Ki-Hong, Nam / Senior Engineer

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11.3.3 Test Result for MIMO mode with AC 120 V Power Supply

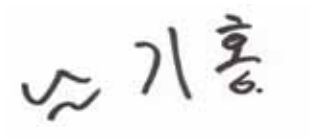
-. Test Date : February 18 ~ 21, 2011

-. Temperature : 22 °C

-. Relative humidity : 48 % R.H.

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	743 000 000	743 000 001	0.001 3	Within the Authorized Frequency block
-20		743 000 001	0.001 3	
-10		743 000 000	0.000 0	
0		743 000 002	0.002 7	
10		743 000 001	0.001 3	
20		743 000 000	0.000 0	
30		743 000 002	0.002 7	
40		743 000 001	0.001 3	
50		743 000 001	0.001 3	



Tested by: Ki-Hong, Nam / Senior Engineer

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11.3.4 Test Result for MIMO mode with DC -48 V Power Supply

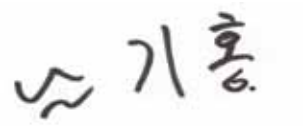
-. Test Date : February 18 ~ 21, 2011

-. Temperature : 22 °C

-. Relative humidity : 48 % R.H.

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	743 000 000	743 000 002	0.002 7	Within the Authorized Frequency block
-20		743 000 001	0.001 3	
-10		743 000 001	0.001 3	
0		743 000 002	0.002 7	
10		743 000 002	0.002 7	
20		743 000 001	0.001 3	
30		743 000 000	0.000 0	
40		743 000 001	0.001 3	
50		743 000 002	0.002 7	



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11.3.5 Test Result for SISO+MIMO mode with AC 120 V Power Supply

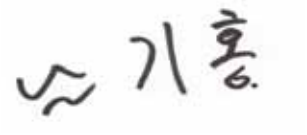
-. Test Date : February 22 ~ 23, 2011

-. Temperature : 25 °C

-. Relative humidity : 45 % R.H.

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	743 000 000	743 000 001	0.001 3	Within the Authorized Frequency block
-20		743 000 001	0.001 3	
-10		743 000 002	0.002 7	
0		743 000 000	0.000 0	
10		743 000 002	0.002 7	
20		743 000 001	0.001 3	
30		743 000 002	0.002 7	
40		743 000 000	0.000 0	
50		743 000 002	0.002 7	



Tested by: Ki-Hong, Nam / Senior Engineer

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11.3.6 Test Result for SISO+MIMO mode with DC -48 V Power Supply

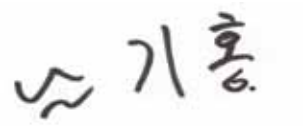
-. Test Date : February 22 ~ 23, 2011

-. Temperature : 25 °C

-. Relative humidity : 45 % R.H.

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	743 000 000	743 000 000	0.000 0	Within the Authorized Frequency block
-20		743 000 001	0.001 3	
-10		743 000 000	0.000 0	
0		743 000 002	0.002 7	
10		743 000 002	0.002 7	
20		743 000 000	0.000 0	
30		743 000 001	0.001 3	
40		743 000 002	0.002 7	
50		743 000 000	0.000 0	



Tested by: Ki-Hong, Nam / Senior Engineer

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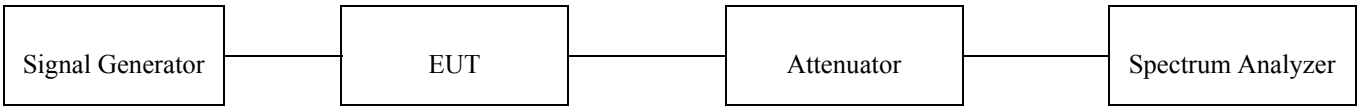
12. FREQUENCY STABILITY WITH VOLTAGE VARIATION

12.1 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.



12.2 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2010 (1Y)
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 01, 2010 (1Y)
■ -	2350A	HP	30 dB Attenuator Assembly	2350A03133	Jun. 10, 2010 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2011 (1Y)
■ -	AMU200A	R/S	Baseband signal generator and fading simulator	100360	Aug. 28, 2010 (1Y)
■ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2010 (1Y)

All test equipment used is calibrated on a regular basis.

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12.3 Test data

12.3.1 Test Result for SISO mode with AC 120 V Power Supply

-. Test Date : February 16 ~ 17, 2011

-. Temperature : 25 °C

-. Relative humidity : 47 % R.H.

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	743 000 000	743 000 001	0.001 3	Within the Authorized Frequency block
120 (100 %)		743 000 000	0.000 0	
102 (85 %)		743 000 002	0.002 7	

Tested by: Ki-Hong, Nam / Senior Engineer

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12.3.2 Test Result for SISO mode with DC -48 V Power Supply

-. Test Date : February 16 ~ 17, 2011

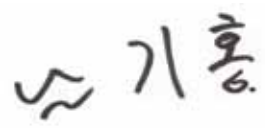
-. Temperature : 25 °C

-. Relative humidity : 47 % R.H.

-. Rated Supply Voltage : - 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	743 000 000	743 000 001	0.001 3	Within the Authorized Frequency block
- 48 (100 %)		743 000 001	0.001 3	
- 40.8 (85 %)		743 000 002	0.002 7	



Tested by: Ki-Hong, Nam / Senior Engineer

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12.3.3 Test Result for MIMO mode with AC 120 V Power Supply

-. Test Date : February 18 ~ 21, 2011

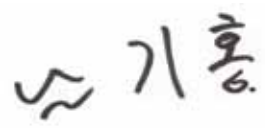
-. Temperature : 22 °C

-. Relative humidity : 48 % R.H.

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	743 000 000	743 000 000	0.000 0	Within the Authorized Frequency block
120 (100 %)		743 000 000	0.000 0	
102 (85 %)		743 000 002	0.002 7	



Tested by: Ki-Hong, Nam / Senior Engineer

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12.3.4 Test Result for MIMO mode with DC -48 V Power Supply

-. Test Date : February 18 ~ 21, 2011

-. Temperature : 22 °C

-. Relative humidity : 48 % R.H.

-. Rated Supply Voltage : - 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	743 000 000	743 000 001	0.001 3	Within the Authorized Frequency block
- 48 (100 %)		743 000 001	0.001 3	
- 40.8 (85 %)		743 000 000	0.000 0	

Tested by: Ki-Hong, Nam / Senior Engineer

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12.3.5 Test Result for SISO+MIMO mode with AC 120 V Power Supply

-. Test Date : February 22 ~ 23, 2011

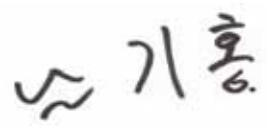
-. Temperature : 25 °C

-. Relative humidity : 45 % R.H.

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	743 000 000	743 000 002	0.002 7	Within the Authorized Frequency block
120 (100 %)		743 000 001	0.001 3	
102 (85 %)		743 000 001	0.001 3	



Tested by: Ki-Hong, Nam / Senior Engineer

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12.3.6 Test Result for SISO+MIMO mode with DC -48 V Power Supply

-. Test Date : February 22 ~ 23, 2011

-. Temperature : 25 °C

-. Relative humidity : 45 % R.H.

-. Rated Supply Voltage : - 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	743 000 000	743 000 000	0.000 0	Within the Authorized Frequency block
- 48 (100 %)		743 000 000	0.000 0	
- 40.8 (85 %)		743 000 001	0.001 3	

Tested by: Ki-Hong, Nam / Senior Engineer

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13. RADIATED EMISSION TEST

13.1 Operating environment

Temperature : 11 °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. (Interval)
■ -	ESVD	Rohde & Schwarz	Test Receiver	838453/018	Oct. 05, 2010 (1Y)
■ -	8566B	HP	Spectrum Analyzer	3407A08547	Jun. 11, 2010 (1Y)
■ -	8447D	Hewlett Packard	Amplifier	2727A04987	Jun. 11, 2010 (1Y)
■ -	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 SISO mode with AC 120 V Power Supply

-. Test Date : February 25, 2011

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

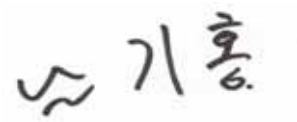
-. Measurement distance : 3 m

-. 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)
36.80	21.33	V	1.50	180.00	15.85	1.14	38.32	49.08	-10.76
67.50	16.80	V	1.00	180.00	7.26	2.00	26.06	49.08	-23.02
120.00	15.00	H	1.50	270.00	13.64	2.40	31.04	53.52	-22.48
144.50	17.17	H	1.80	270.00	14.79	2.55	34.51	53.52	-19.01
167.60	18.50	H	1.50	180.00	15.69	2.70	36.89	53.52	-16.63
200.00	15.00	H	1.00	-	17.06	3.10	35.16	53.52	-18.36

Tabulated test data for Radiated Electromagnetic Field

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



Tested by: Ki-Hong, Nam / Senior Engineer

13.4.2 Test Result for SISO mode with DC -48 V Power Supply

-. Test Date : February 25, 2011

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

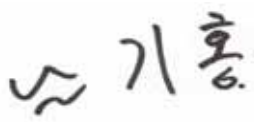
-. Measurement distance : 3 m

-. 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)
40.00	20.50	V	1.50	180.00	15.03	1.40	36.93	49.08	-12.15
75.00	18.00	V	1.00	180.00	6.45	2.10	26.55	49.08	-22.53
120.00	14.33	H	1.50	270.00	13.64	2.40	30.37	53.52	-23.15
150.50	17.50	H	1.80	270.00	15.00	2.61	35.11	53.52	-18.41
172.00	18.33	H	1.50	180.00	15.91	2.82	37.06	53.52	-16.46
200.00	15.50	H	1.00	-	17.06	3.10	35.66	53.52	-17.86

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 MIMO mode with AC 120 V Power Supply

-. Test Date : February 25, 2011

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

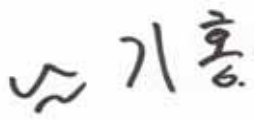
-. Measurement distance : 3 m

-. 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)
36.80	21.00	V	1.50	180.00	15.85	1.14	37.99	49.08	-11.09
67.50	17.00	V	1.00	180.00	7.26	2.00	26.26	49.08	-22.82
120.00	14.83	H	1.50	270.00	13.64	2.40	30.87	53.52	-22.65
144.50	17.33	H	1.80	270.00	14.79	2.55	34.67	53.52	-18.85
167.60	18.00	H	1.50	180.00	15.69	2.70	36.39	53.52	-17.13
200.00	14.83	H	1.00	0.00	17.06	3.10	34.99	53.52	-18.53

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 MIMO mode with DC -48 V Power Supply

-. Test Date : February 25, 2011

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

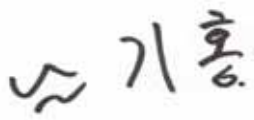
-. Measurement distance : 3 m

-. 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)
40.00	21.00	V	1.50	180.00	15.03	1.40	37.43	49.08	-11.65
75.00	17.83	V	1.00	180.00	6.45	2.10	26.38	49.08	-22.70
120.00	15.00	H	1.50	270.00	13.64	2.40	31.04	53.52	-22.48
150.50	18.00	H	1.80	270.00	15.00	2.61	35.61	53.52	-17.91
172.00	18.17	H	1.50	180.00	15.91	2.82	36.90	53.52	-16.62
200.00	15.67	H	1.00	0.00	17.06	3.10	35.83	53.52	-17.69

Tabulated test data for Radiated Electromagnetic Field

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



Tested by: Ki-Hong, Nam / Senior Engineer

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13.4.5 Test Result for SISO+MIMO mode with AC 120 V Power Supply

-. Test Date : February 25, 2011

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

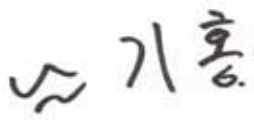
-. Measurement distance : 3 m

-. 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)
36.80	21.50	V	1.50	180.00	15.85	1.14	38.49	49.08	-10.59
67.50	18.00	V	1.00	180.00	7.26	2.00	27.26	49.08	-21.82
120.00	15.17	H	1.50	270.00	13.64	2.40	31.21	53.52	-22.31
144.50	18.33	H	1.80	270.00	14.79	2.55	35.67	53.52	-17.85
167.60	17.50	H	1.50	180.00	15.69	2.70	35.89	53.52	-17.63
200.00	15.50	H	1.00	-	17.06	3.10	35.66	53.52	-17.86

Tabulated test data for Radiated Electromagnetic Field

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



Tested by: Ki-Hong, Nam / Senior Engineer

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13.4.6 Test Result for SISO+MIMO mode with DC -48 V Power Supply

-. Test Date : February 25, 2011

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

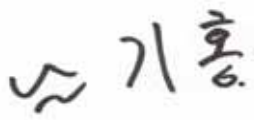
-. Measurement distance : 3 m

-. 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)
40.00	21.33	V	1.50	180.00	15.03	1.40	37.76	49.08	-11.32
75.00	18.50	V	1.00	180.00	6.45	2.10	27.05	49.08	-22.03
120.00	14.00	H	1.50	270.00	13.64	2.40	30.04	53.52	-23.48
150.50	17.17	H	1.80	270.00	15.00	2.61	34.78	53.52	-18.74
172.00	18.00	H	1.50	180.00	15.91	2.82	36.73	53.52	-16.79
200.00	15.33	H	1.00	-	17.06	3.10	35.49	53.52	-18.03

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 : 23 °C

Relative humidity : 35 % 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. (Interval)
■ -	ESHS10	Rohde & Schwarz	EMI Test Receiver	834467/007	May 27, 2010 (1Y)
■ -	NSLK 8128	Schwarzbeck	AMN	8128-216	Jun. 10, 2010 (1Y)
☐ -	3825/2	EMCO	AMN	9109-1867	Jun. 10, 2010 (1Y)

All test equipment used is calibrated on a regular basis.

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14.4 Test data

14.4.1 Test Result for SISO mode

-. Test Date : February 21, 2011

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Test Result : Passed by -27.77 dB at 0.24 MHz

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.24	N	51.23	79.00	-27.77
1.47	H	41.66	73.00	-31.34
1.86	H	42.14	73.00	-30.86
3.39	N	36.69	73.00	-36.31
10.74	H	38.83	73.00	-34.17
10.84	N	40.08	73.00	-32.92
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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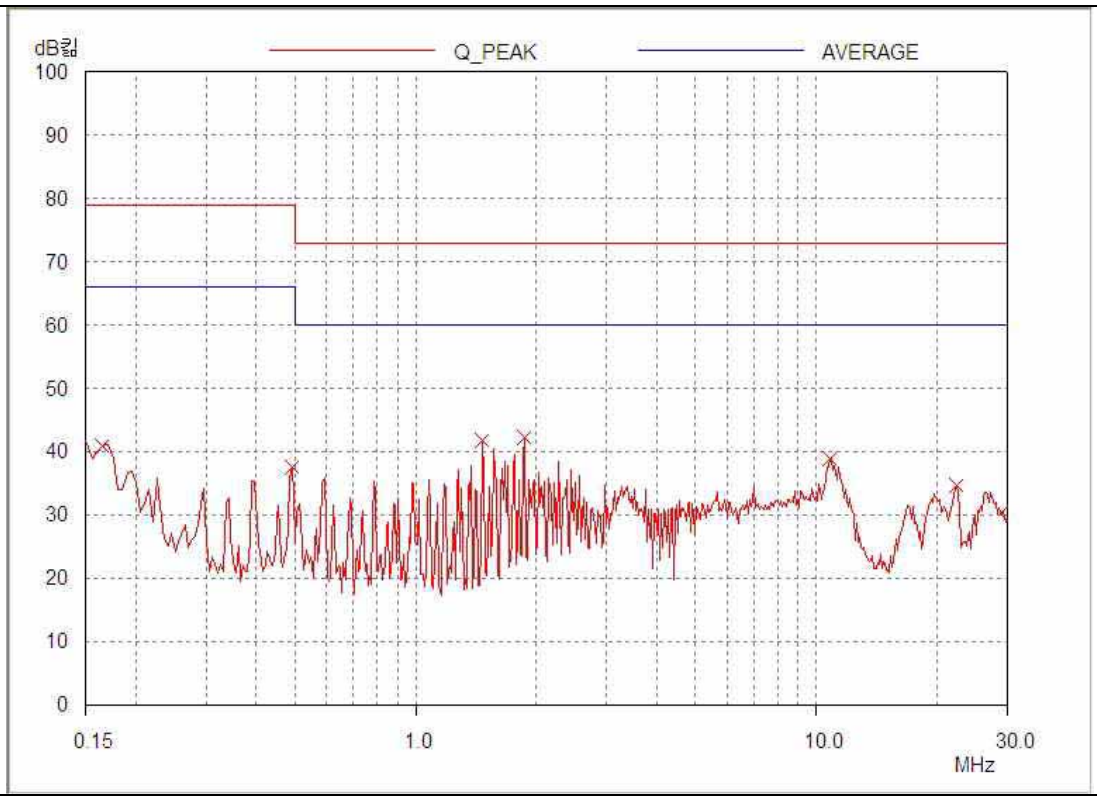
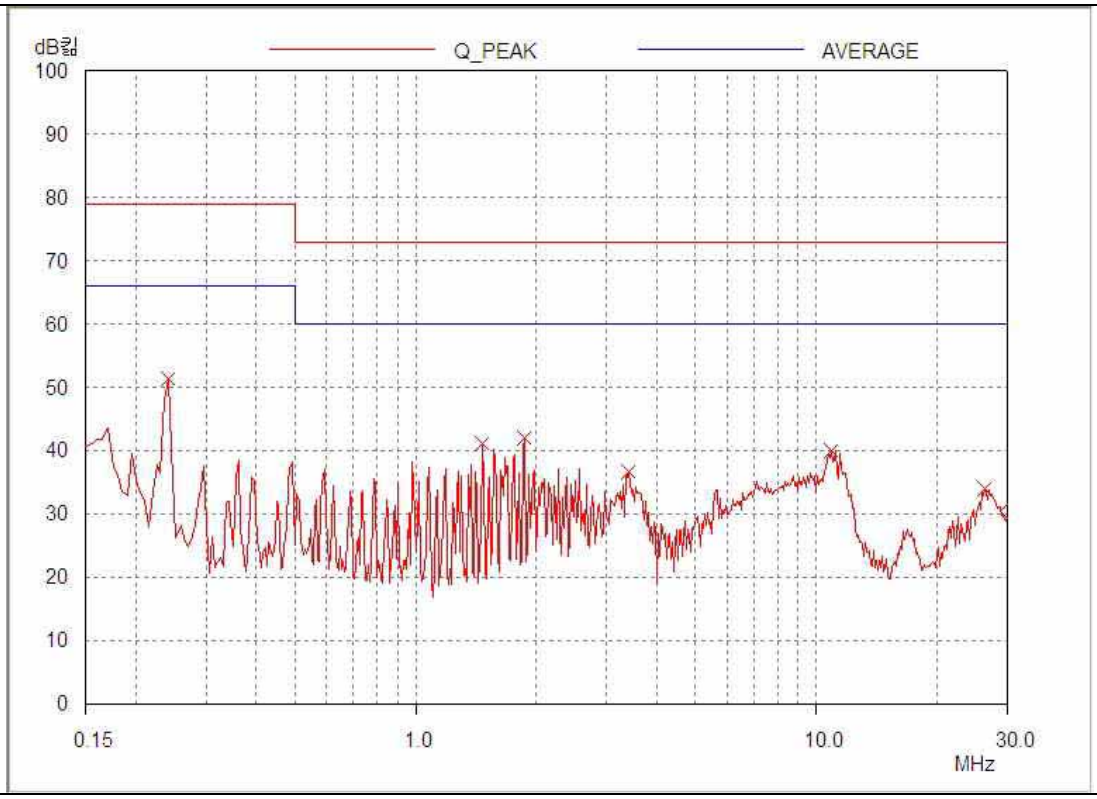


HOT LINE



NEUTRAL LINE

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14.4.2 Test Result for MIMO mode

-. Test Date : February 21, 2011

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Test Result : Passed by -30.41 dB at 1.47 MHz

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.17	N	43.02	79.00	-35.98
0.19	N	41.57	79.00	-37.43
1.47	H	42.59	73.00	-30.41
1.86	N	42.12	73.00	-30.88
10.59	N	40.22	73.00	-32.78
10.84	H	40.02	73.00	-32.98
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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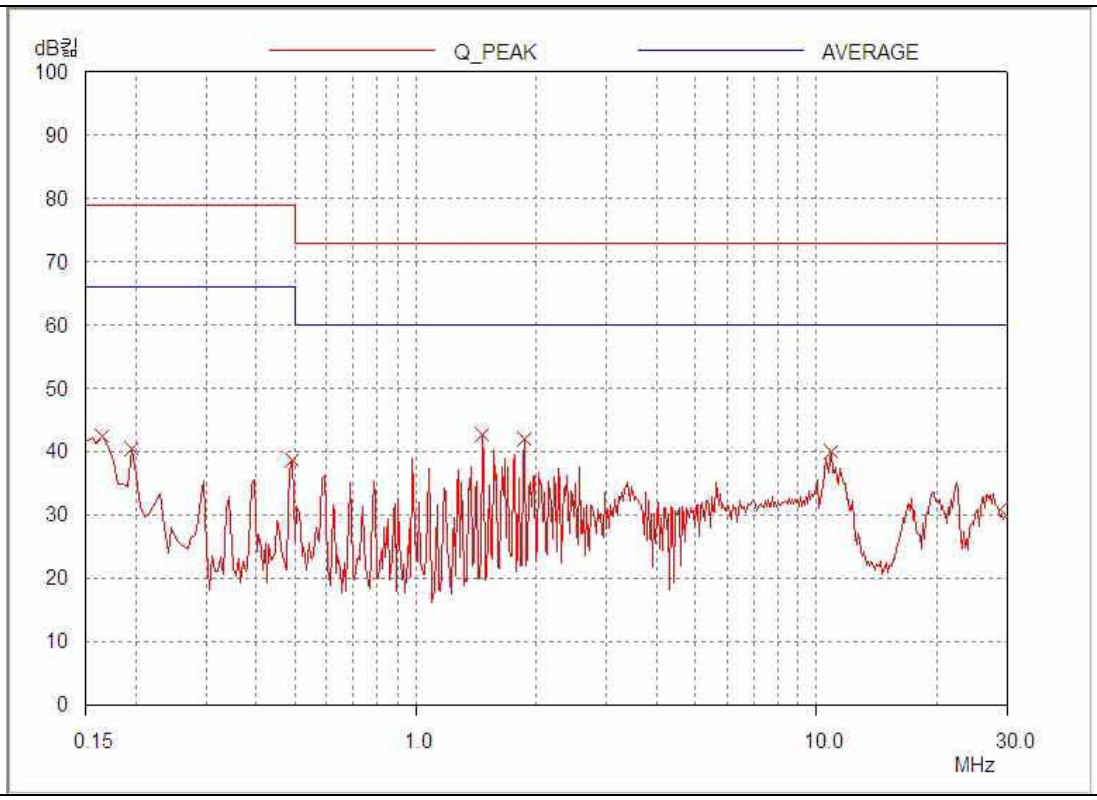
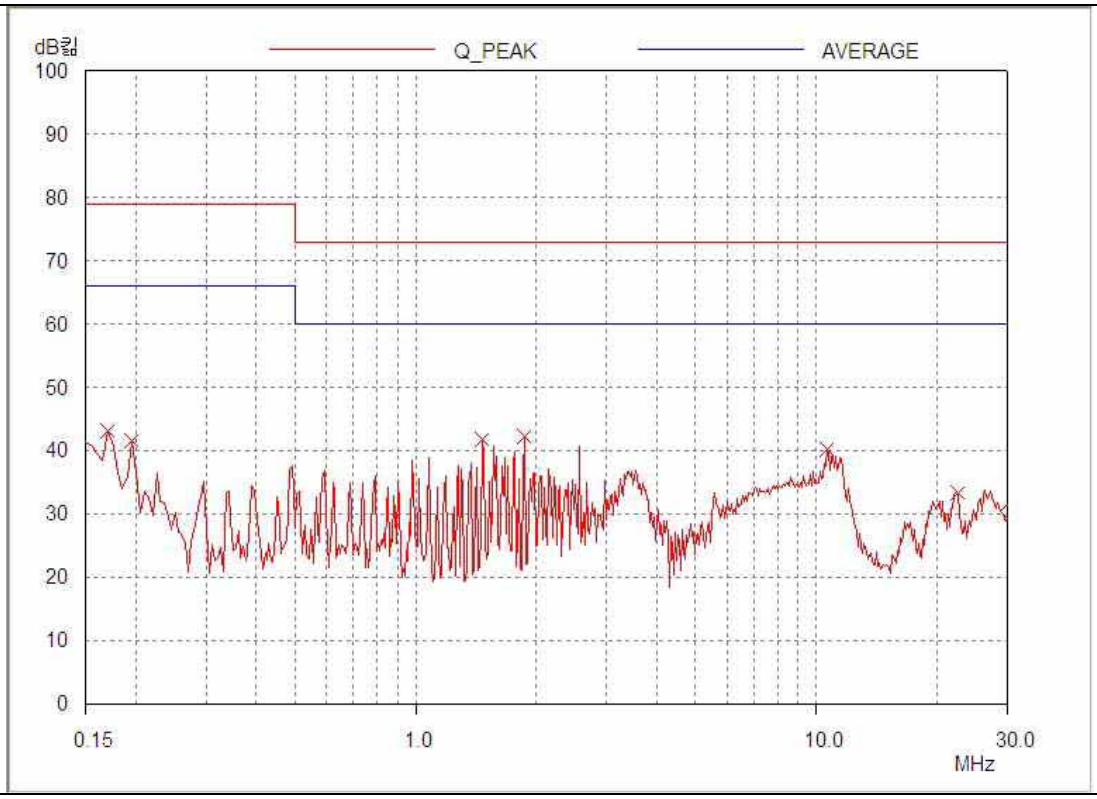


HOT LINE



NEUTRAL LINE

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14.4.3 Test Result for SISO+MIMO mode

-. Test Date : February 21, 2011

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Test Result : Passed by -30.63 dB at 1.47 MHz

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
1.47	N	42.37	73.00	-30.63
1.57	H	40.42	73.00	-32.58
1.76	H	39.44	73.00	-33.56
2.55	N	41.09	73.00	-32.91
10.56	H	39.94	73.00	-33.06
11.16	N	39.74	73.00	-33.26
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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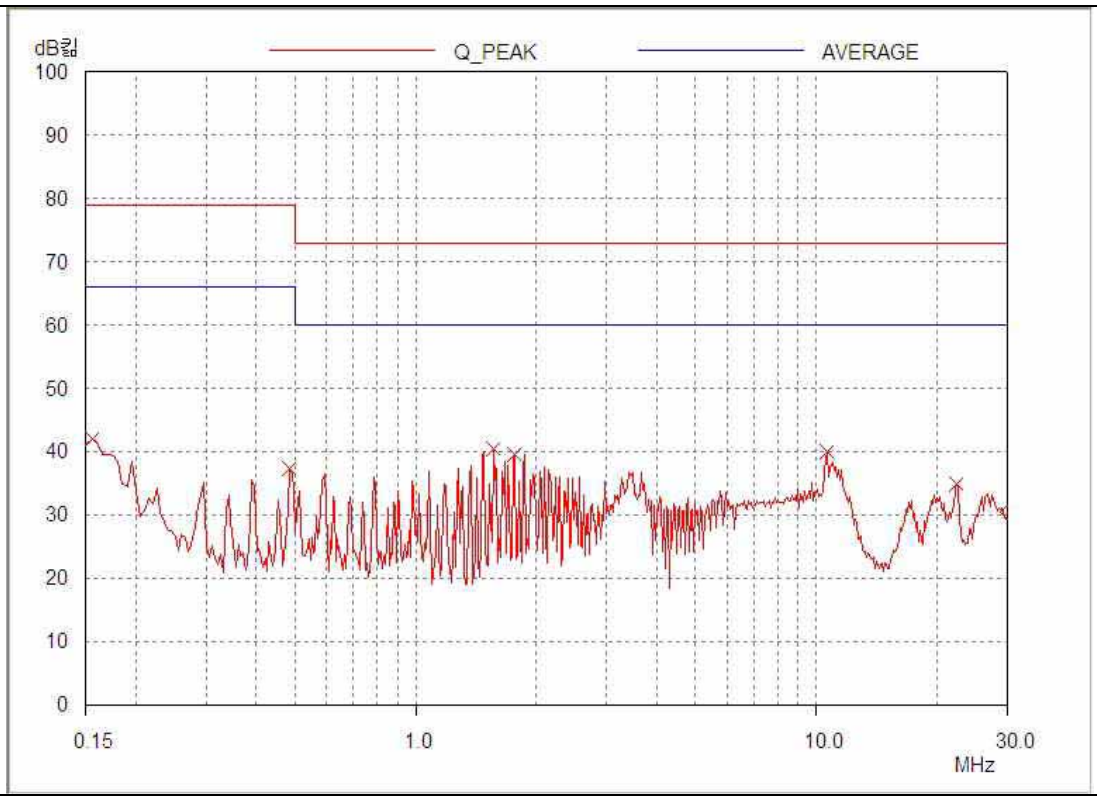
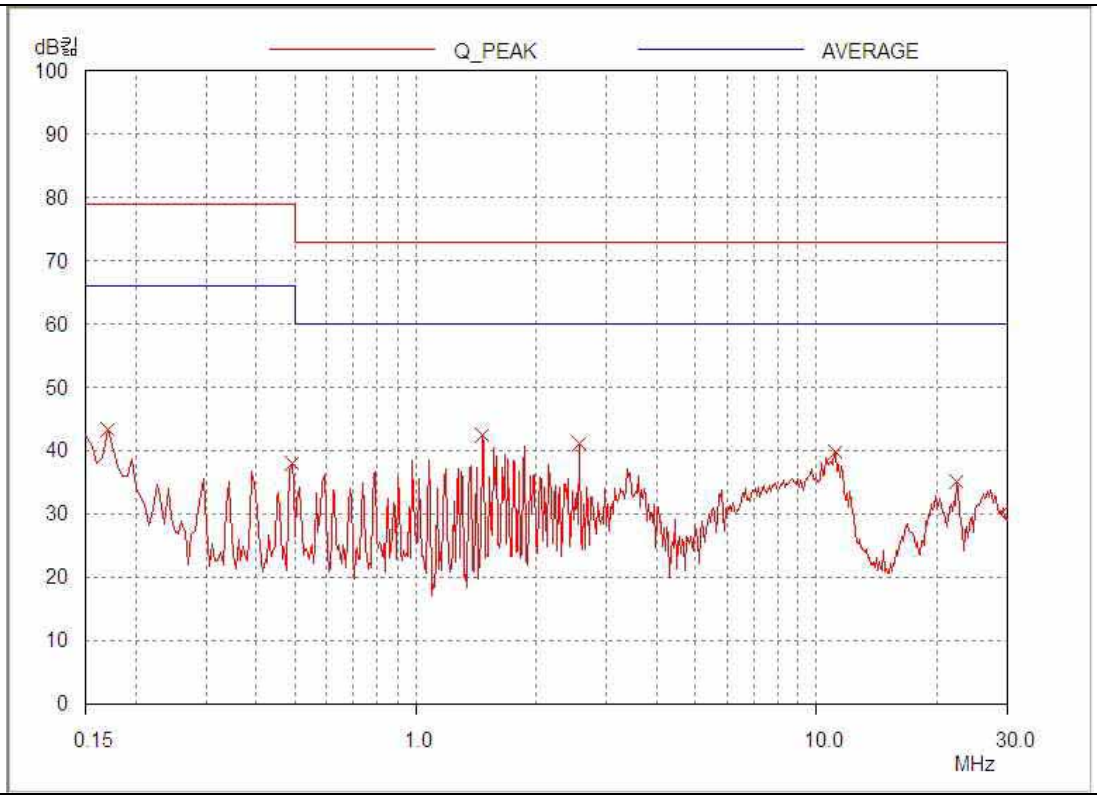


HOT LINE



NEUTRAL LINE

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15. MAXIMUM PERMISSIBLE EXPOSURE

15.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment is f/1500 mW/cm² (=0.485) the frequency range between 300 MHz and 1500 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$E = \sqrt{(30 * P * G)} / d$, and $S = E^2 / Z = E^2 / 754$, because 0.2 mW/cm² = 2 W/m²

Where

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

E = Electric filed strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combing equations and rearranging the terms to express the distance as a function of the remaining variable

$d = \sqrt{(30 * P * G) / (754 * S)}$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 100 * d (m)

$d = 0.199 * \sqrt{(P * G) / S}$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm²

15.2 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Peak Output Power		Antenna Gain		Safe Distance	Power Density (mW/cm²)	FCC Limit
(dBm)	(mW)	Log	Linear	(cm)	@ 20 cm Separation	(mW/cm²)
30.0	100.0	2.0	1.58	16.1	0.314	0.485

According to above table, safe safe distance, $D = 0.199 * \sqrt{(1000 * 1.58) / 0.49} = 16.14$ cm.

For getting power density at 20 cm separation in above table, following formula was used.

$S = P * G / (4\pi * R^2) = 1000.0 * 1.58 / (4 * 3.14 * 20\text{^}2) = 0.314$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

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