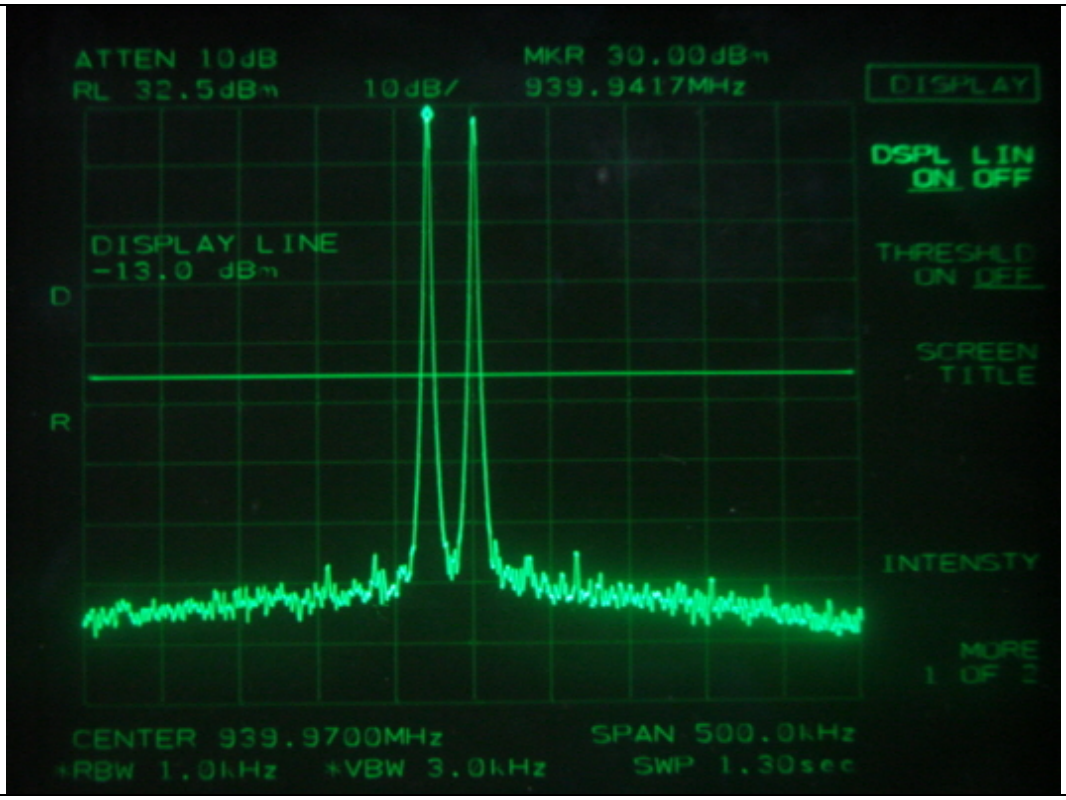
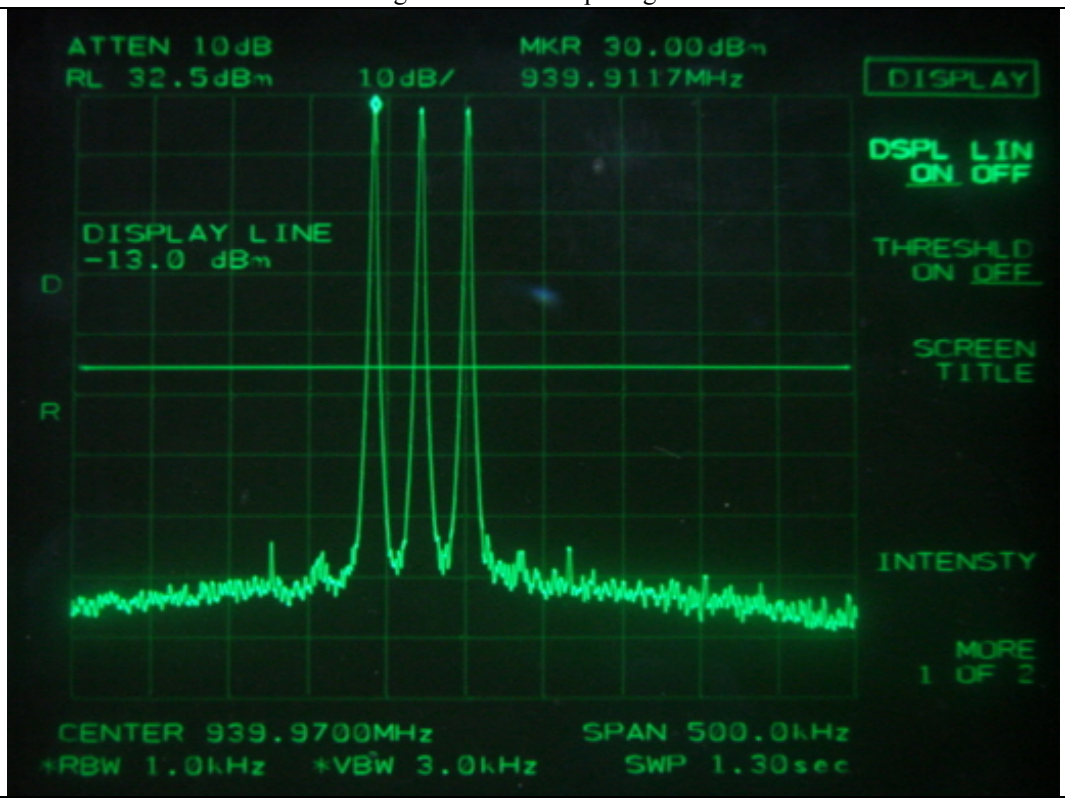


High Channel – 2 input signals



High Channel – 3 input signals

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9.6.2 Test Result for Spurious emission

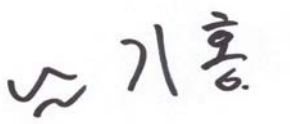
-. Test Date : May 25, 2011

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Measured Value	Result
935.030	1	< -13 dBm	Pass
935.030 & 935.06	2		
935.030 & 935.06 & 935.09	3		
939.970	1	< -13 dBm	Pass
939.970 & 939.940	2		
939.970 & 939.940 & 939.910	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 : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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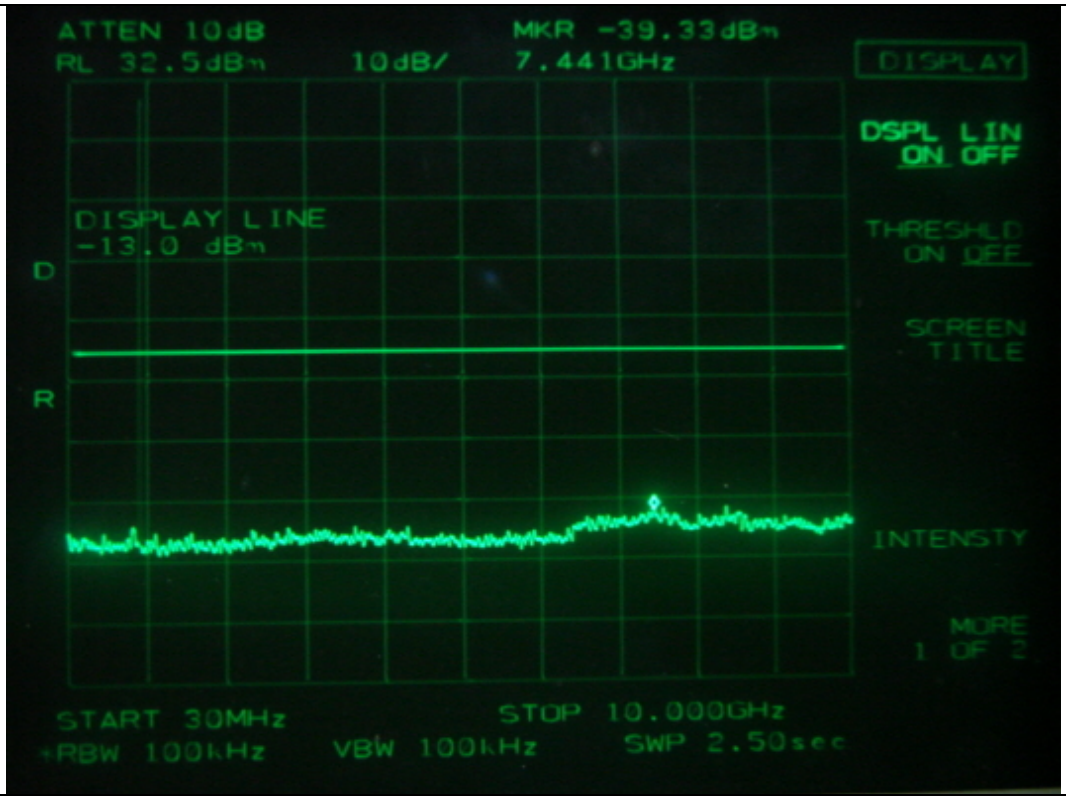
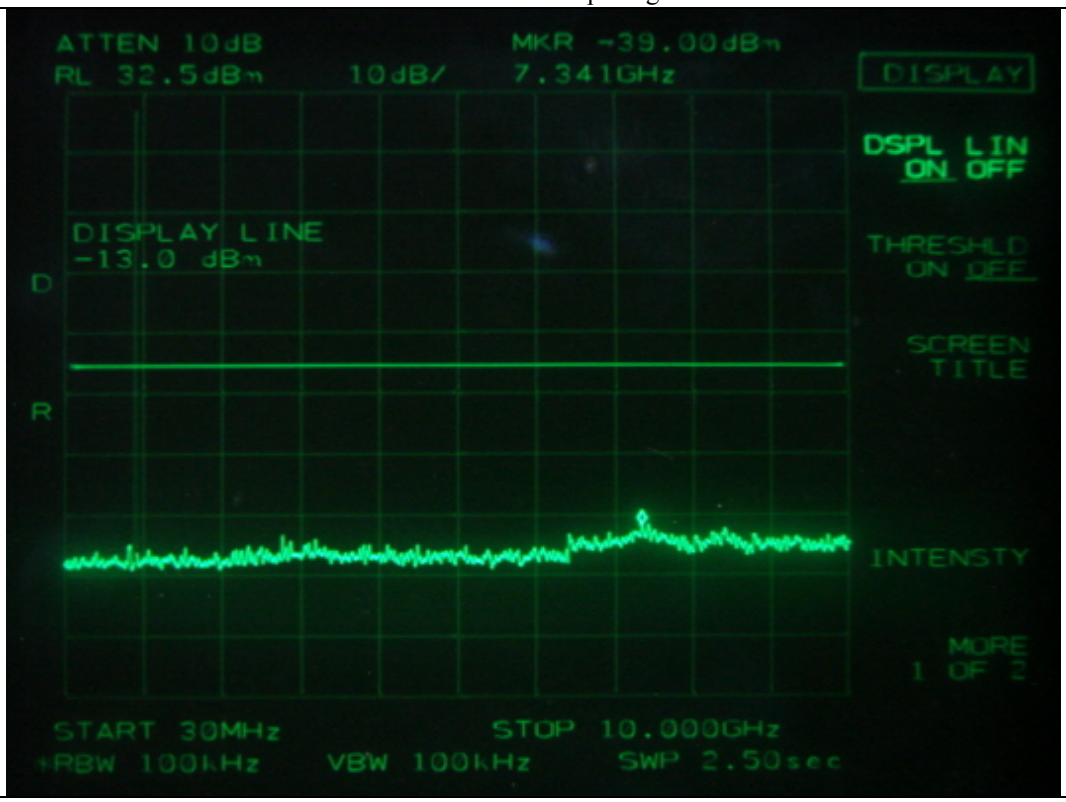
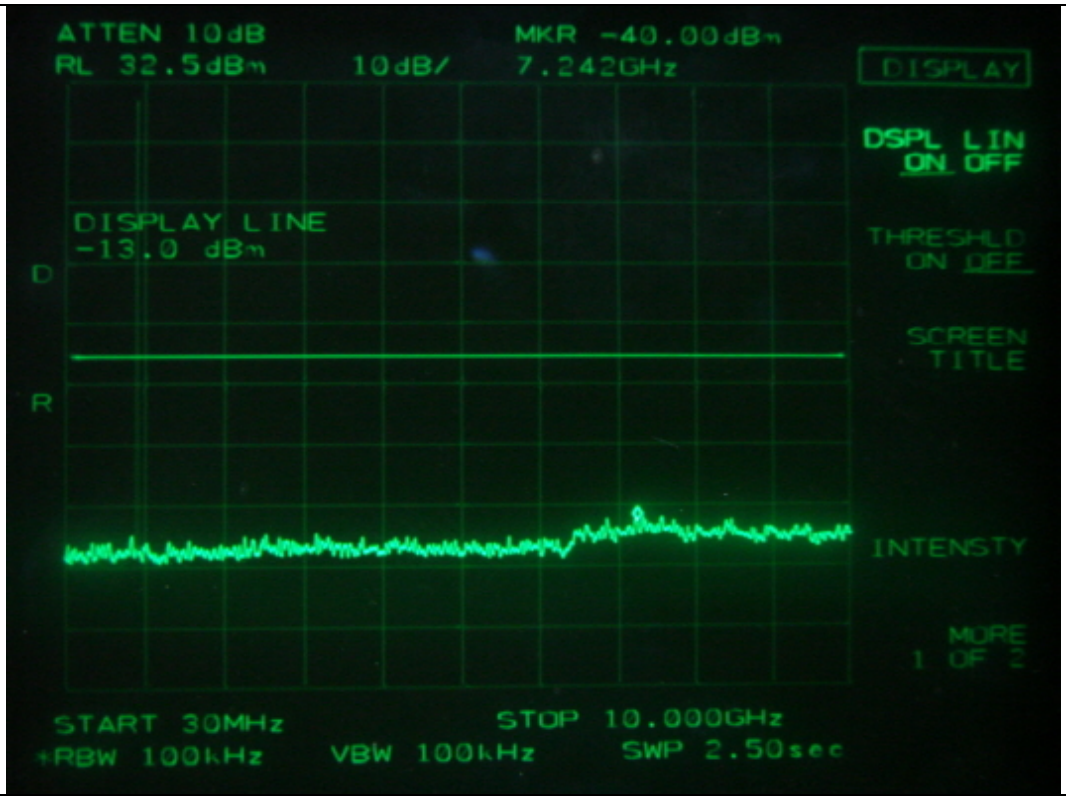


Low Channel – 1 input signal

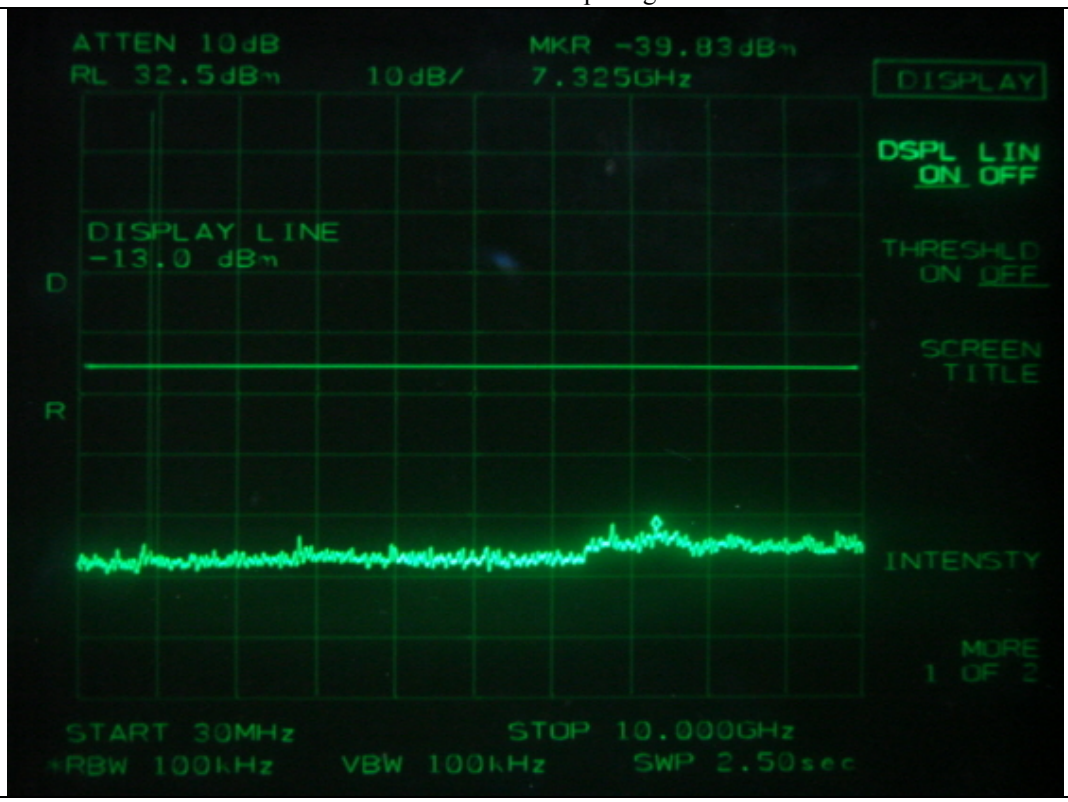


Low Channel – 2 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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)

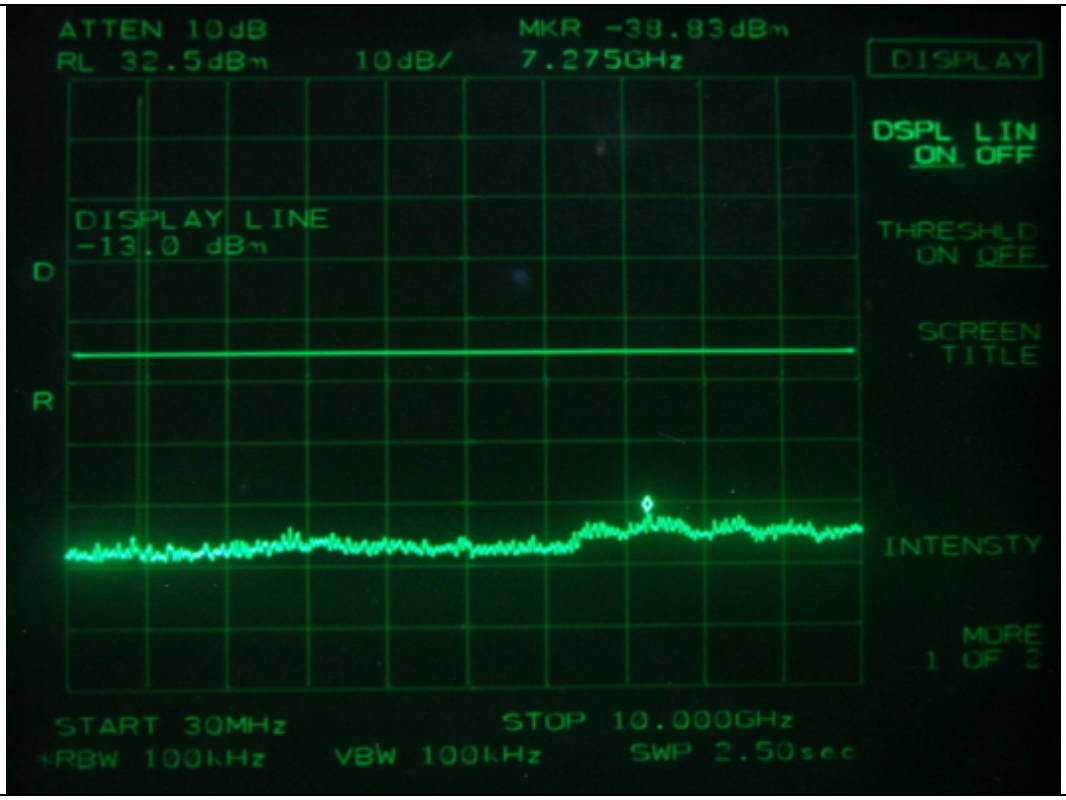


Low Channel – 3 input signals

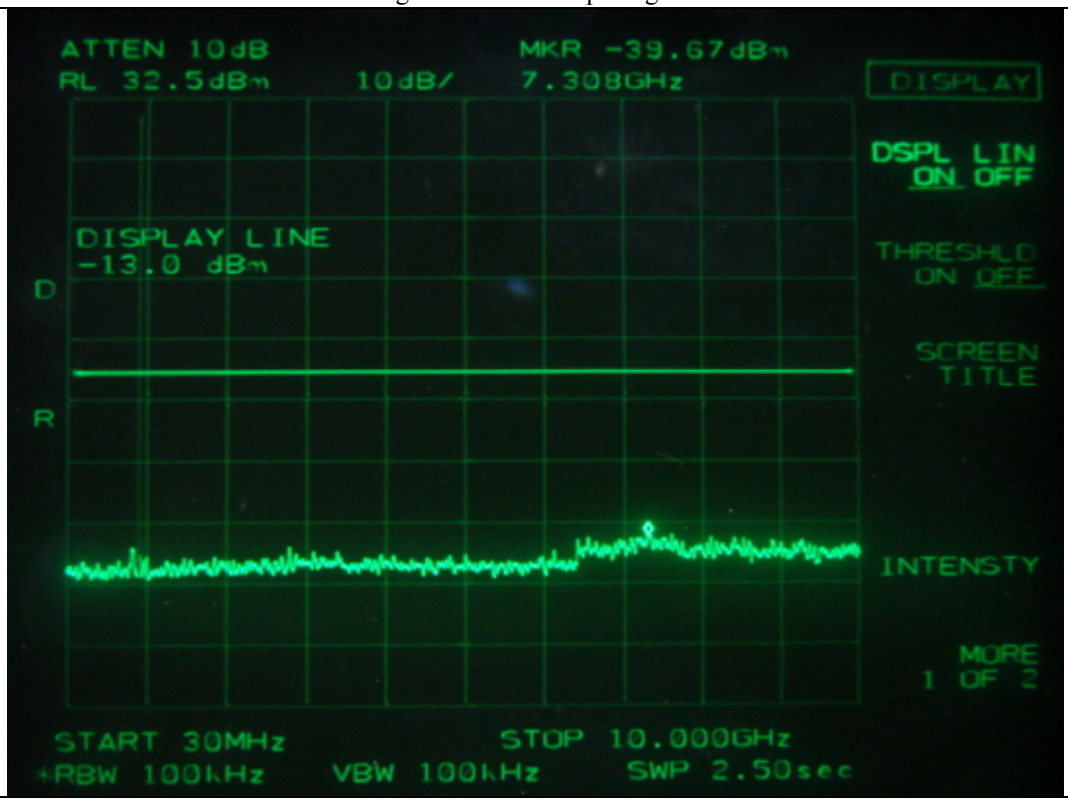


High Channel – 1 input signal

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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 : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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)

9.7 Test Result for 900I+PA (940 MHz ~ 941 MHz)

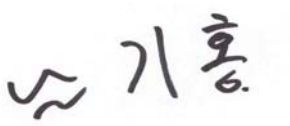
9.7.1 Test Result for peak power

-. Test Date : May 25, 2012

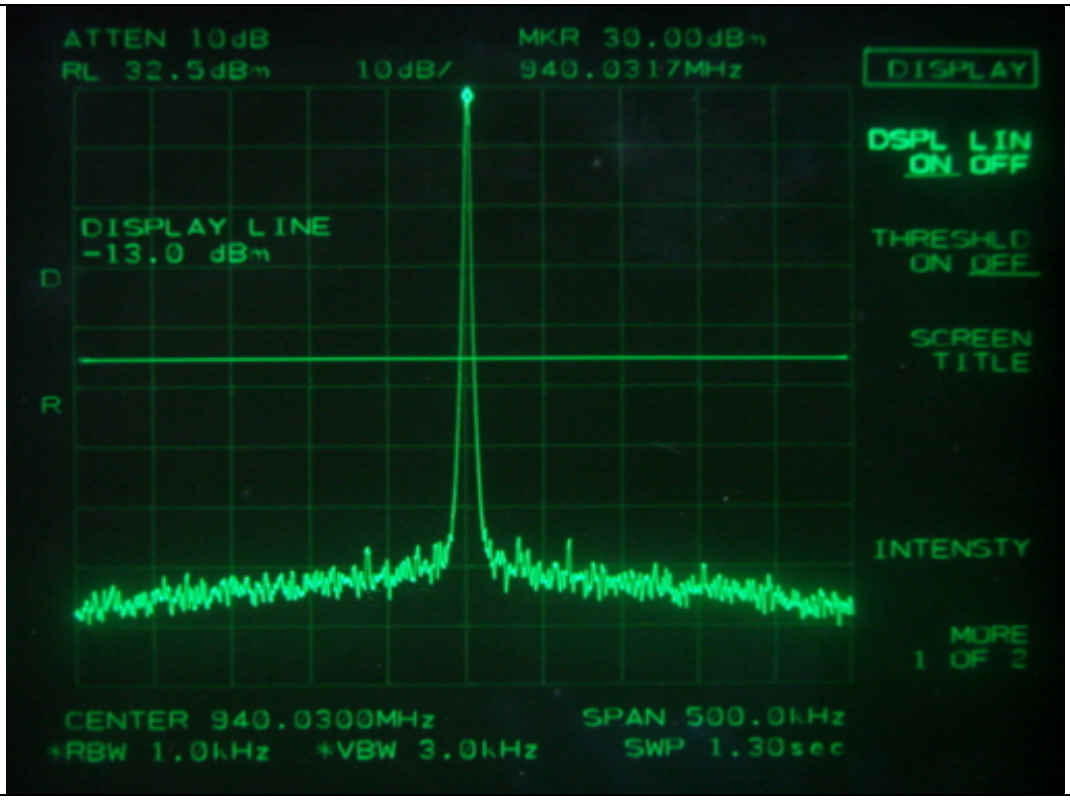
-. Test Result : Pass

-. Modulation : No-Modulation

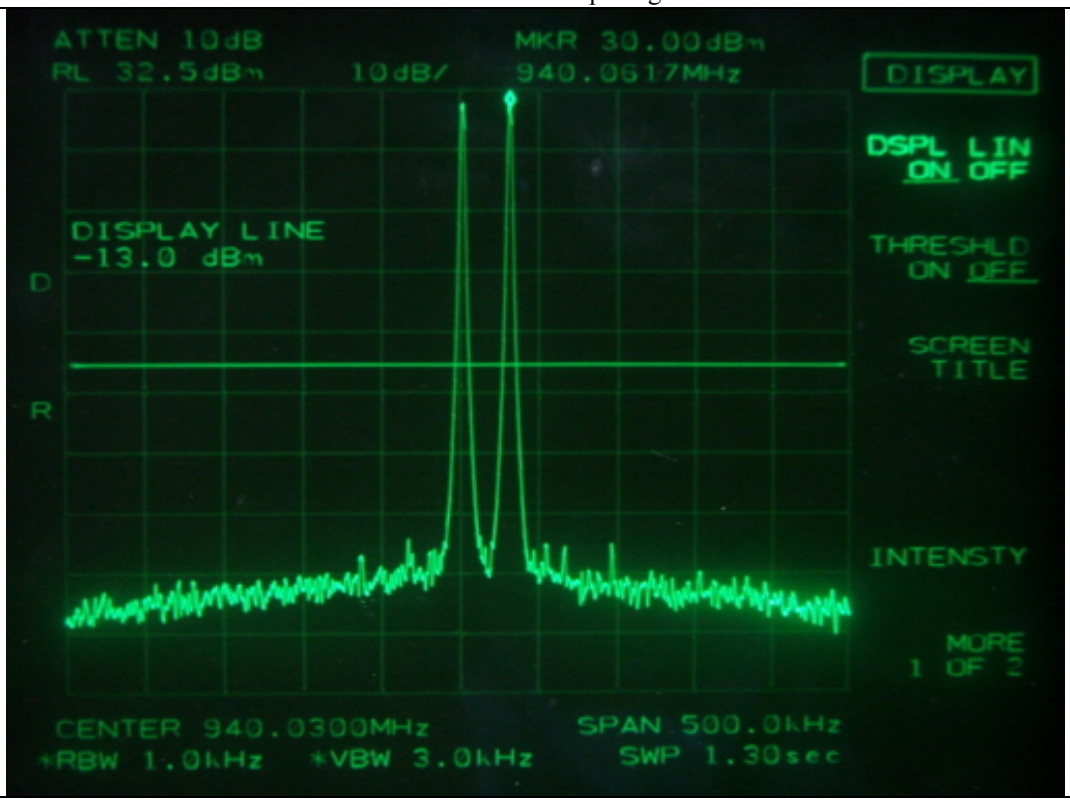
Frequency (MHz)	Number of Input Channel	Input Power (dBm)	Output Power (dBm)
940.03	1	-14.80	30.00
940.030 & 940.06	2	-14.90	30.00
940.030 & 940.06 & 940.09	3	-14.70	30.00
940.970	1	-14.90	30.00
940.970 & 940.940	2	-14.70	30.00
940.970 & 940.940 & 940.910	3	-14.70	30.00



Tested by: Ki-Hong, Nam / Senior Engineer

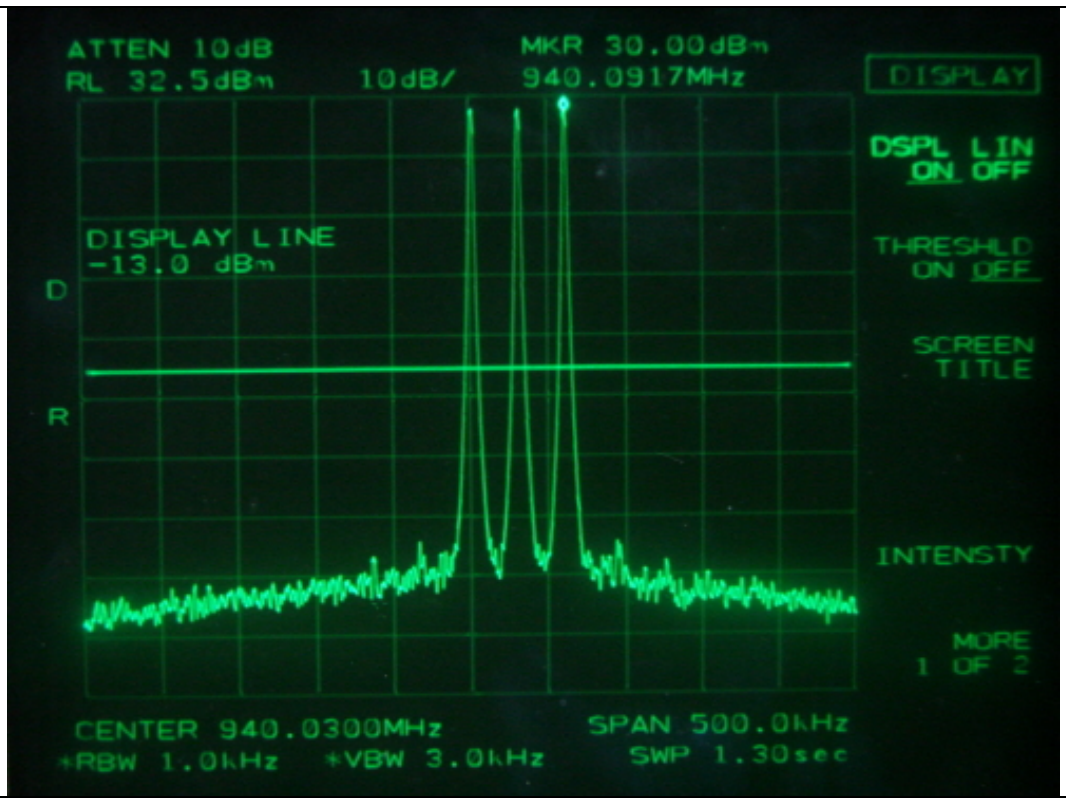


Low Channel – 1 input signal

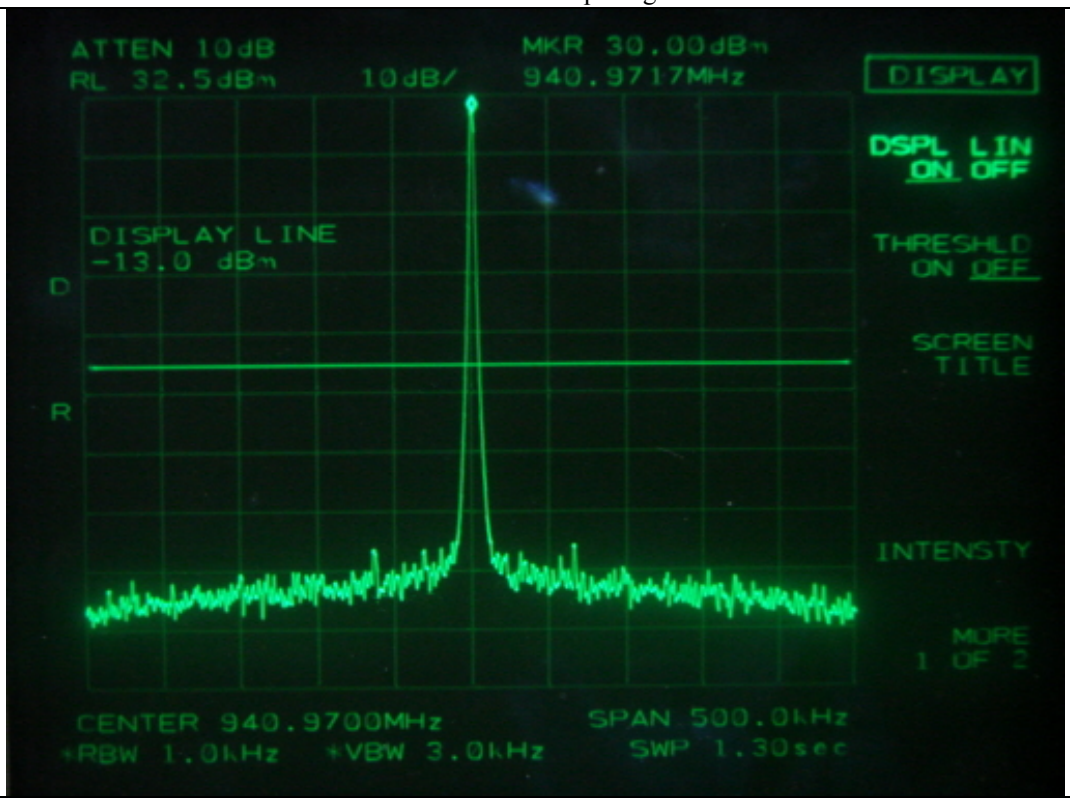


Low Channel – 2 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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 : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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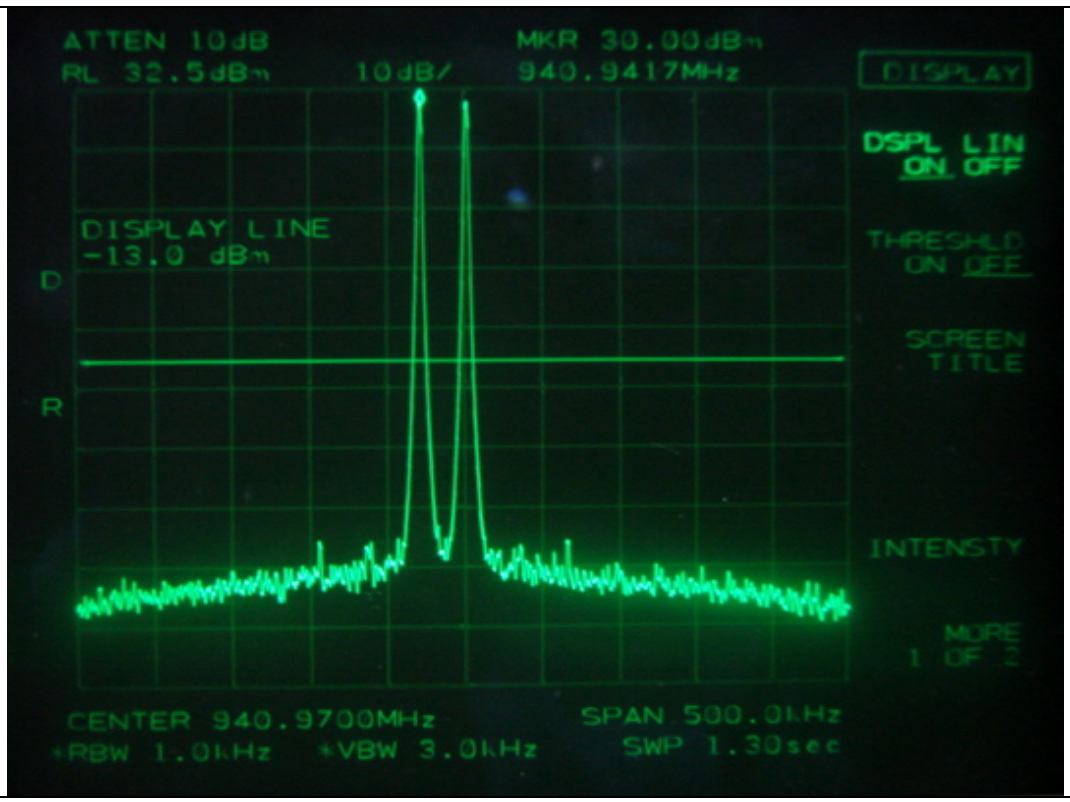
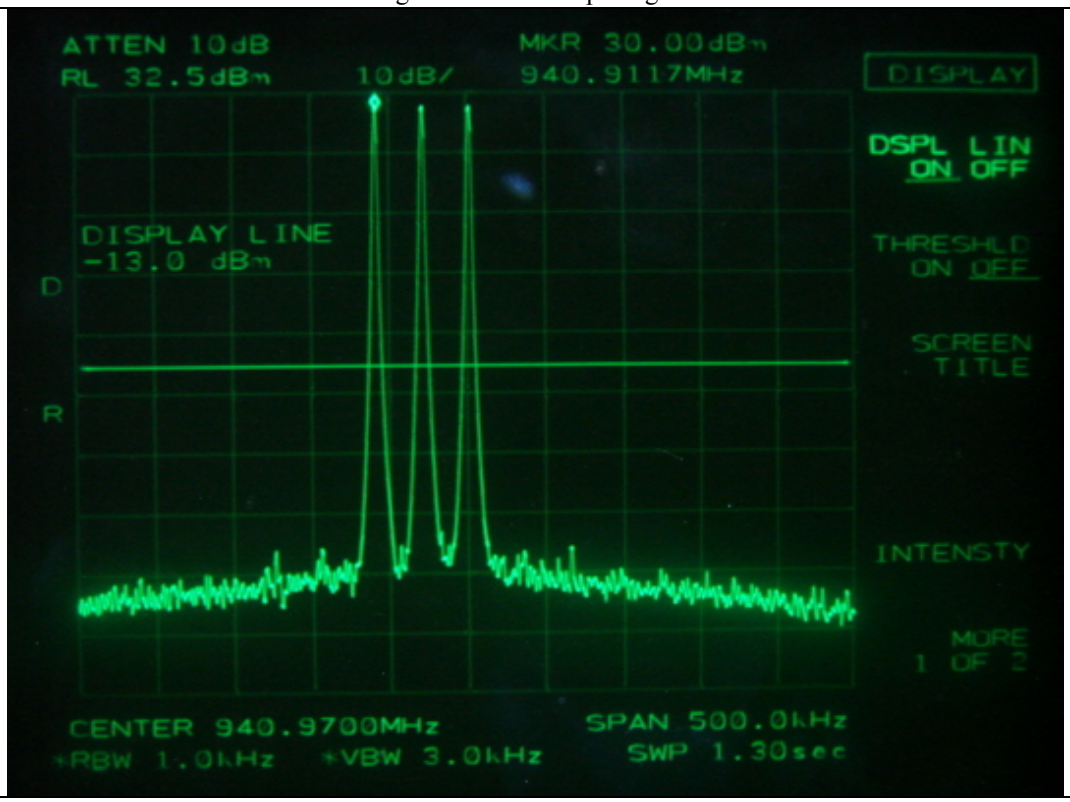


High Channel – 2 input signals



High Channel – 3 input signals

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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)

9.7.2 Test Result for Spurious emission

-. Test Date : May 25, 2012

-. Test Result : Pass

-. Modulation : No-Modulation

Frequency (MHz)	Number of Input Channel	Measured Value	Result
940.030	1	< -13 dBm	Pass
940.030 & 940.06	2		
940.030 & 940.06 & 940.09	3		
940.970	1	< -13 dBm	Pass
940.970 & 940.940	2		
940.970 & 940.940 & 940.910	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 : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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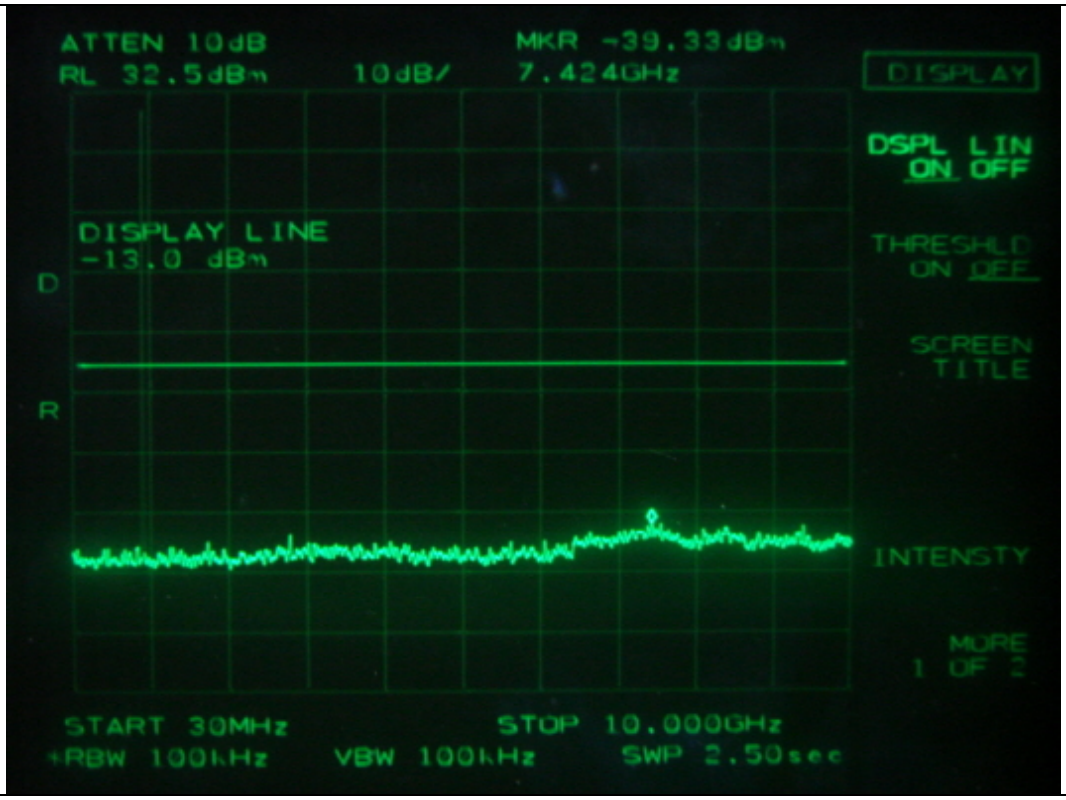
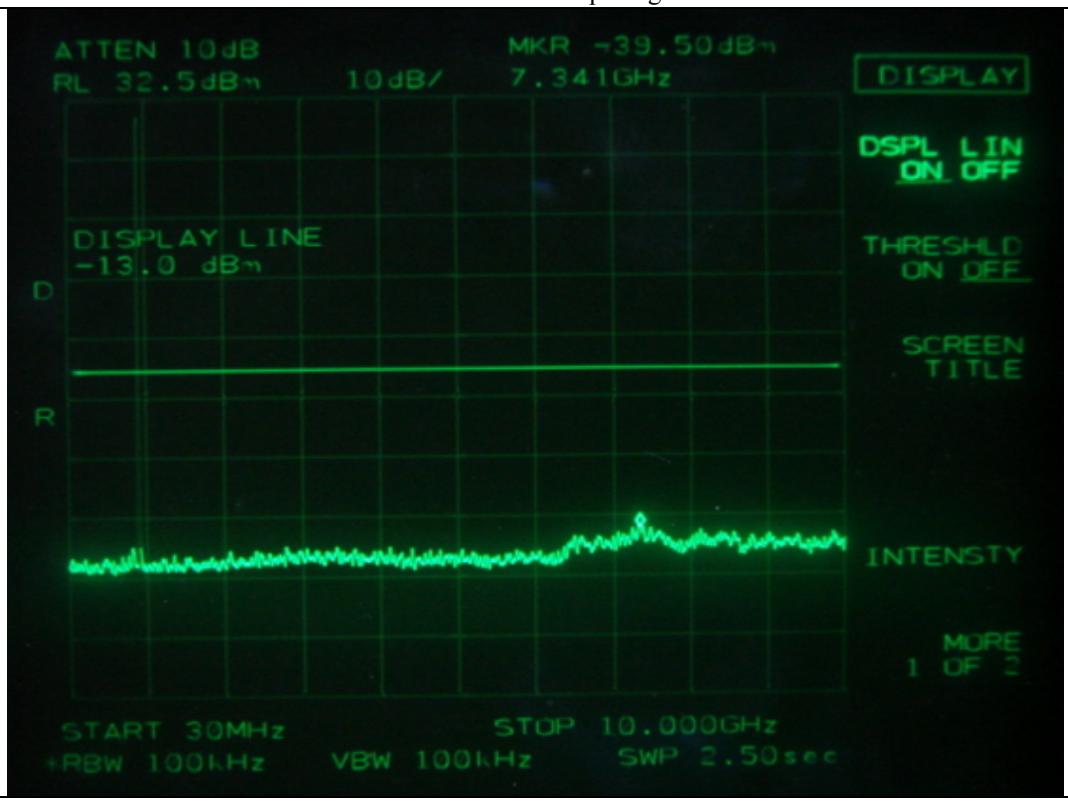
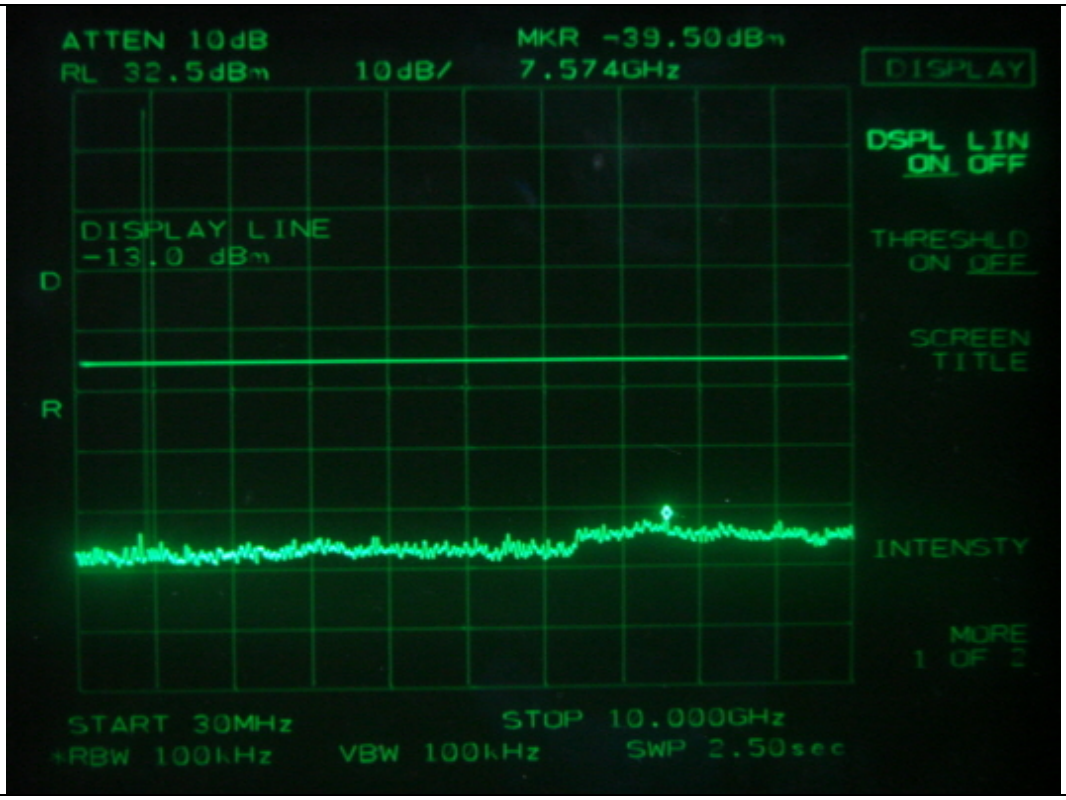


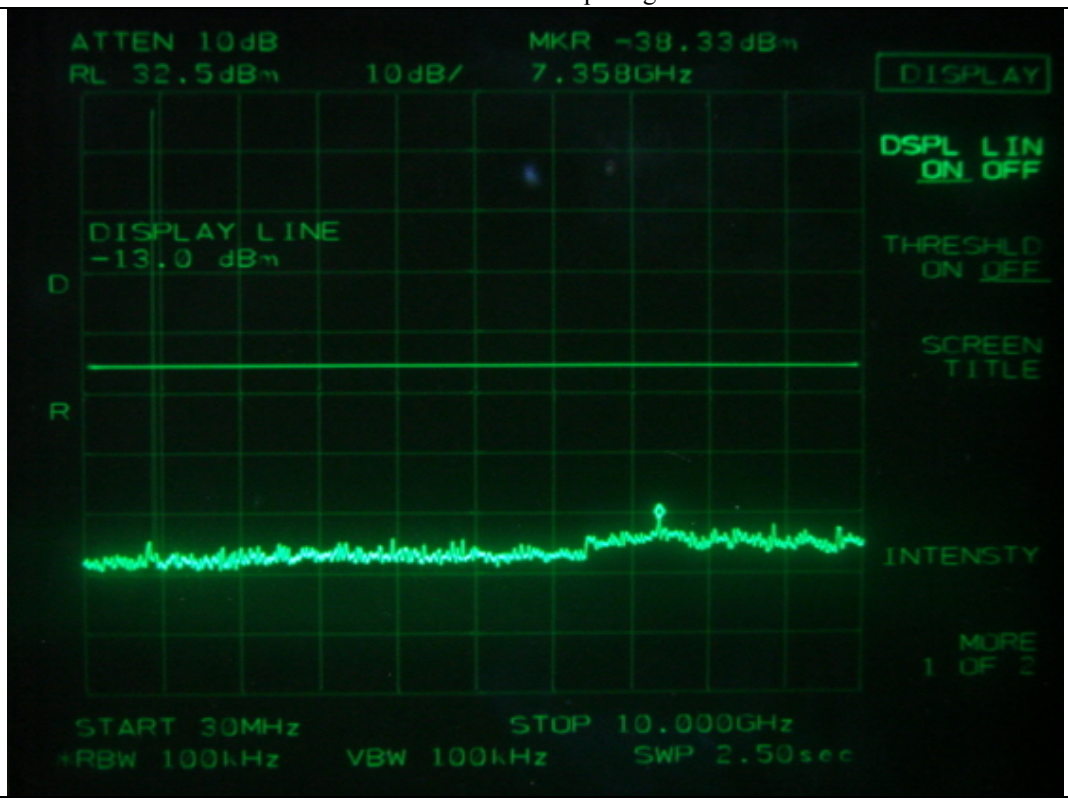
Low Channel – 1 input signal



Low Channel – 2 input signals

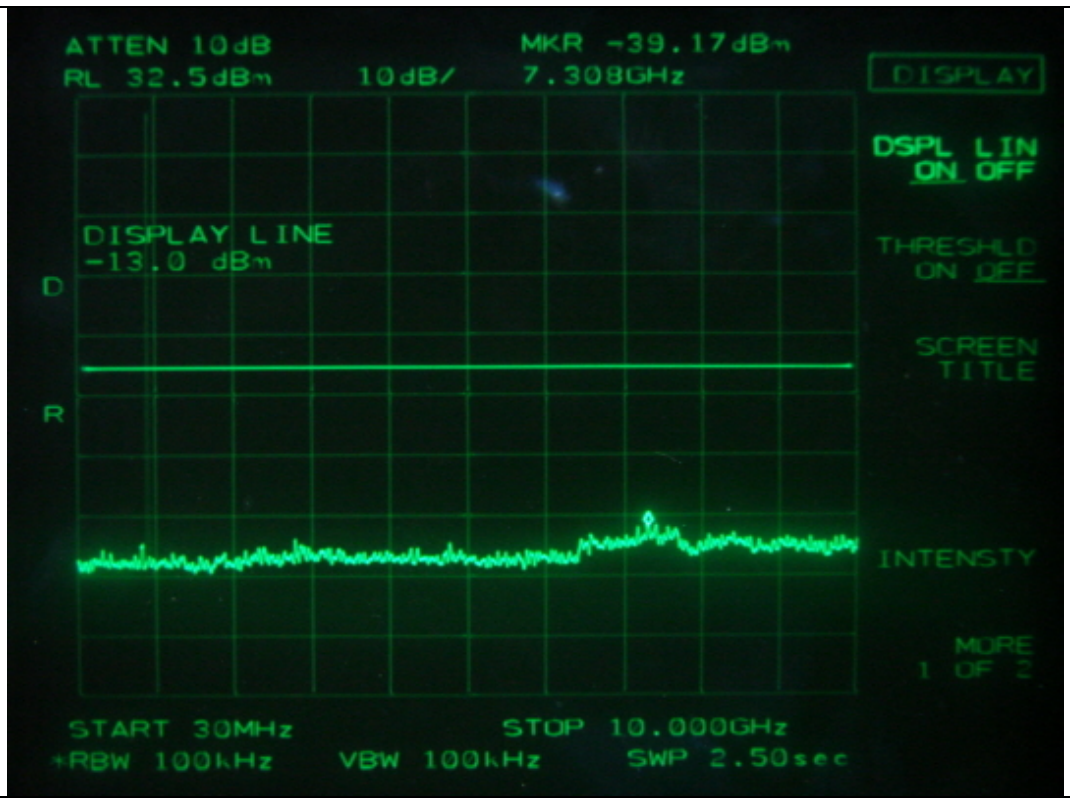


Low Channel – 3 input signals

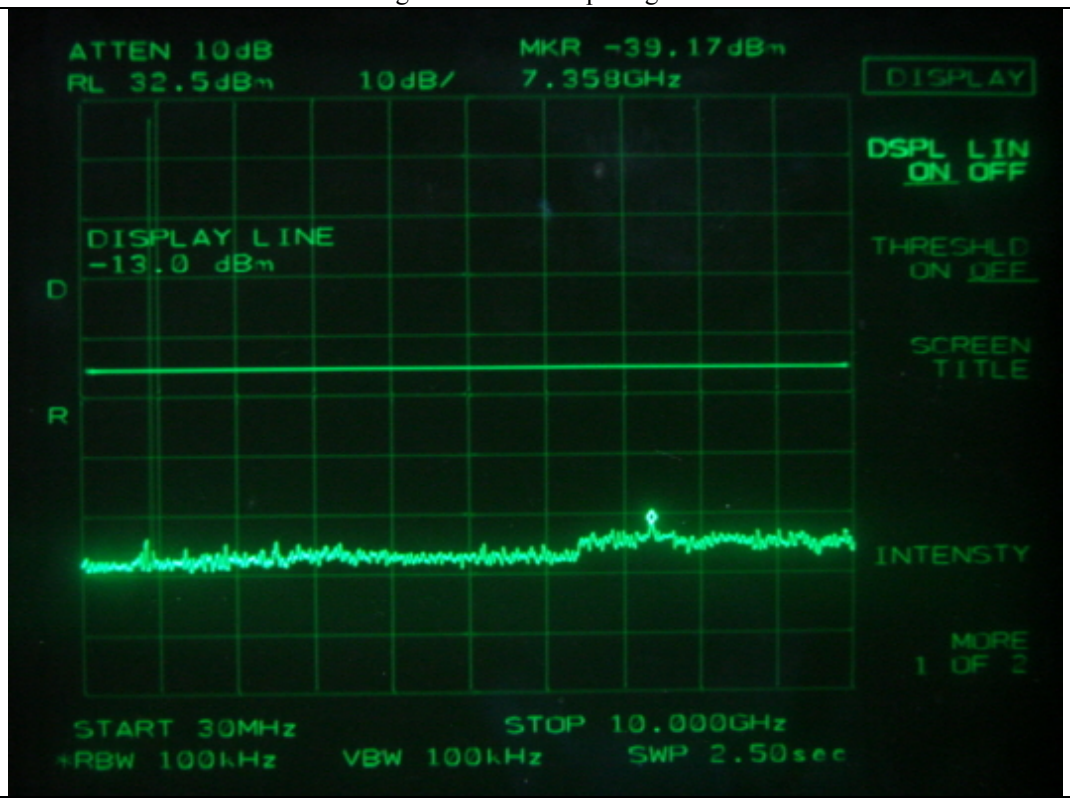


High Channel – 1 input signal

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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

10. FIELD STRENGTH OF SPURIOUS RADIATION

10.1 Operating environment

Temperature : 28 °C
Relative humidity : 45 %R.H.

10.2 Test set-up

The radiated emissions measurements were on the 3 meters, 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 and 4.0 meters 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)
☐ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	Jun. 10, 2011 (1Y)
■ -	83051A	Agilent	Preamplifier	3950M00201	Jun. 11, 2011 (1Y)
☐ -	E4432B	Hewlett-Packard	Signal Generator	US38440950	Jun. 10, 2011 (1Y)
☐ -	83650L	Hewlett-Packard	Signal Generator	3844A00415	Jun. 10, 2011 (1Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Aug. 23, 2011 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 23, 2011 (2Y)
☐ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Aug. 23, 2011 (2Y)
☐ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170179	Aug. 23, 2011 (2Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2012 (1Y)
☐ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 16, 2011 (1Y)
■ -	FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)

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)

10.4 Test data for radiated emission

10.4.1 Test Result for 800PS

10.4.1.1 Test Voltage: AC 120 V

-. Test Date : May 23,2012

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY -45.03 dB at 262.20 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								
851.025 0	63.50	-2.38	0.07	H	3.33	-5.64	-	-
	64.30	-0.55		V		-3.81	-	-
Test Data for Middle Channel								
860.000 0	62.83	-2.84	0.01	H	3.33	-6.16	-	-
	64.50	-0.33		V		-3.65	-	-
Test Data for High Channel								
868.975 0	63.67	-1.91	-0.18	H	3.33	-5.42	-	-
	64.33	-0.31		V		-3.82	-	-
100.10	26.50	-58.98	1.22	V	0.50	-58.26	-13.00	-45.26
110.40	24.33	-61.50	1.53	V	1.50	-58.47	-13.00	-45.47
262.20	22.50	-62.43	2.57	V	1.83	-58.03	-13.00	-45.03
858.10	23.67	-63.20	2.92	V	2.17	-58.11	-13.00	-45.11

Tabulated test data for Restricted Band

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

Tested by: Ki-Hong, Nam / Project Engineer

10.4.1.2 Test Voltage: DC -48 V

-. Test Date : May 23, 2012

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

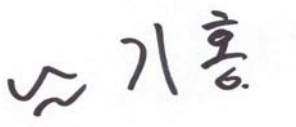
-. Measurement distance : 3 m

-. Result : PASSED BY -44.88 dB at 100.10 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								
851.025 0	63.330	-2.55	0.07	H	3.33	-4.07	-	-
	64.25	-0.60		V		-2.12	-	-
Test Data for Middle Channel								
860.000 0	63.50	-2.17	0.01	H	3.33	-3.76	-	-
	64.33	-0.50		V		-2.09	-	-
Test Data for High Channel								
868.975 0	63.83	-1.75	-0.18	H	3.33	-3.55	-	-
	64.50	-0.14		V		-1.94	-	-
100.10	26.33	-59.15	1.22	V	0.50	-57.88	-13.00	-44.88
110.40	25.00	-60.83	1.53	H	1.50	-59.61	-13.00	-46.61
262.20	22.50	-62.43	2.57	H	1.83	-61.27	-13.00	-48.27
858.10	23.83	-63.04	2.92	V	2.17	-63.68	-13.00	-50.68

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Project Engineer

10.4.2 Test Result for 900I+PA (929 MHz ~ 930 MHz)

10.4.2.1 Test Voltage: AC 120 V

-. Test Date : May 25, 2012

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

-. Measurement distance : 3 m

-. Result : PASSED BY -44.20 dB at 262.20 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 Middle Channel								
929.500	62.50	-3.55	-0.52	H	3.50	-7.57		
	63.83	-0.47		V		-4.49		
100.10	26.50	-58.98	1.22	V	0.50	-58.09	-13.00	-45.09
110.40	24.83	-61.00	1.53	H	1.50	-58.30	-13.00	-45.30
262.20	23.00	-61.93	2.57	H	1.83	-57.20	-13.00	-44.20
858.10	23.67	-63.20	2.92	V	2.17	-58.28	-13.00	-45.28

Tabulated test data for Restricted Band

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

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)

10.4.2.2 Test Voltage: DC -48 V

-. Test Date : May 25, 2012

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

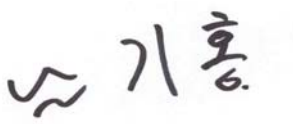
-. Measurement distance : 3 m

-. Result : PASSED BY -44.20 dB at 262.20 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 Middle Channel								
929.500 0	62.33	-3.72	-0.52	H	3.50	-7.74		
	63.67	-0.63		V		-4.65		
100.10	26.67	-58.81	1.22	V	0.50	-58.09	-13.00	-45.09
110.40	24.50	-61.33	1.53	H	1.50	-58.30	-13.00	-45.30
262.20	23.33	-61.60	2.57	H	1.83	-57.20	-13.00	-44.20
858.10	23.50	-63.37	2.92	V	2.17	-58.28	-13.00	-45.28

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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10.4.3 Test Result for 900I+PA (935 MHz ~ 940 MHz)

10.4.3.1 Test Voltage: AC 120 V

-. Test Date : May 25, 2012

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

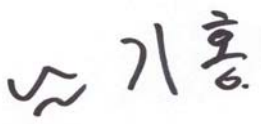
-. Measurement distance : 3 m

-. Result : PASSED BY -44.78 dB at 858.10 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								
935.012 5	62.33	-3.34	-0.51	H	3.50	-7.35	-	-
	63.83	-0.17		V		-4.18	-	-
Test Data for High Channel								
935.987 5	62.17	-3.49	-0.49	H	3.50	-7.48	-	-
	63.50	0.00		V		-3.99	-	-
100.10	26.83	-58.65	1.22	V	0.50	-57.93	-13.00	-44.93
110.40	24.50	-61.33	1.53	H	1.50	-58.30	-13.00	-45.30
262.20	22.67	-62.26	2.57	H	1.83	-57.86	-13.00	-44.86
858.10	24.00	-62.87	2.92	V	2.17	-57.78	-13.00	-44.78

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Project Engineer

10.4.3.2 Test Voltage: DC -48 V

-. Test Date : May 25, 2012

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

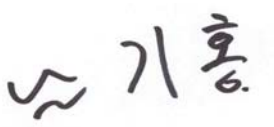
-. Measurement distance : 3 m

-. Result : PASSED BY -44.53 dB at 262.20 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								
935.012 5	62.50	-3.17	-0.51	H	3.50	-7.18	-	-
	64.00	0.00		V		-4.01	-	-
Test Data for High Channel								
935.987 5	62.00	-3.66	-0.49	H	3.50	-7.65	-	-
	63.33	-0.17		V		-4.16	-	-
100.10	26.50	-58.98	1.22	V	0.50	-58.26	-13.00	-45.26
110.40	24.67	-61.16	1.53	H	1.50	-58.13	-13.00	-45.13
262.20	23.00	-61.93	2.57	H	1.83	-57.53	-13.00	-44.53
858.10	23.83	-63.04	2.92	V	2.17	-57.95	-13.00	-44.95

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Project Engineer

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10.4.4 Test Result for 900I+PA (940 MHz ~ 941 MHz)

10.4.4.1 Test Voltage: AC 120 V

-. Test Date : May 25, 2012

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

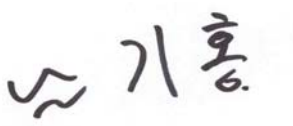
-. Measurement distance : 3 m

-. Result : PASSED BY -44.53 dB at 262.20 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 Middle Channel								
940.500 0	61.83	-3.83	-0.49	H	3.50	-7.82	-	-
	63.83	-0.10		V		-4.09	-	-
100.10	26.67	-58.81	1.22	V	0.50	-58.09	-13.00	-45.09
110.40	24.33	-61.50	1.53	H	1.50	-58.47	-13.00	-45.47
262.20	23.00	-61.93	2.57	H	1.83	-57.33	-13.00	-44.53
858.10	23.83	-63.04	2.92	V	2.17	-57.95	-13.00	-44.95

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Project Engineer

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10.4.4.2 Test Voltage: DC -48 V

-. Test Date : May 25, 2012

-. Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)

-. Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)

-. Frequency range : 30 MHz ~ 10 GHz

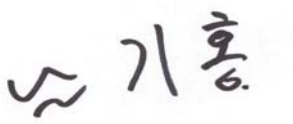
-. Measurement distance : 3 m

-. Result : PASSED BY -44.03 dB at 262.20 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 Middle Channel								
940.500 0	62.00	-3.66	-0.49	H	3.50	-7.65	-	-
	63.50	-0.43		V		-4.42	-	-
100.10	26.33	-59.15	1.22	V	0.50	-58.43	-13.00	-45.43
110.40	24.00	-61.83	1.53	H	1.50	-58.80	-13.00	-45.80
262.20	23.50	-61.43	2.57	H	1.83	-57.03	-13.00	-44.03
858.10	23.67	-63.20	2.92	V	2.17	-58.11	-13.00	-45.11

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

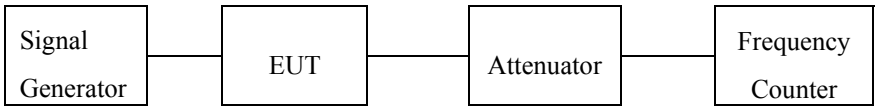
Temperature : 25 °C

Relative humidity : 50 %R.H.

11.2 Test set-up

The RF signal from the signal generator(s) was injected to the EUT by cable. The amplified RF signal at the output of the EUT was connected to the Frequency Counter. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable unmodulation.

Turn EUT off and set chamber temperature to -30 °C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON 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. (Interval)
☐ -	E4432B	HP	Signal Generator	US38440950	June 10, 2011 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2012 (1Y)
☐ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 15, 2011 (1Y)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011 (1Y)
☐ -	FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)
■ -	53152A	R/S	CW Microwave Frequency Counter	US39270295	Dec. 30, 2011 (1Y)
■ -	67-30-43	Aeroflex Weinschel	Power Attenuator	CA5760	Nov. 30, 2011 (1Y)
■ -	SSE-43CI-A	Samkun Tech	Chamber	060712	Jun. 11, 2011 (1Y)

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)

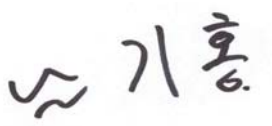
11.4 Test data

11.4.1 Test Result for 800PS

-. Test Date : May 23~24, 2012

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	860 000 000	860 000 002	0.002 3	Within the Authorized Frequency block
-20		860 000 001	0.001 2	
-10		860 000 000	0.000 0	
0		860 000 001	0.001 2	
10		860 000 002	0.002 3	
20		860 000 001	0.001 2	
30		860 000 000	0.000 0	
40		860 000 002	0.002 3	
50		860 000 001	0.001 2	



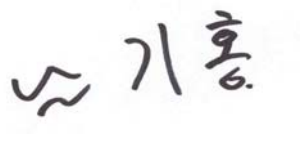
Tested by: Ki-Hong, Nam / Project Engineer

11.4.2 Test Result for 900I+PA (929 MHz ~ 930 MHz)

-. Test Date : May 25~26, 2012

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	929 500 000	929 500 000	0.000 0	Within the Authorized Frequency block
-20		929 500 002	0.002 2	
-10		929 500 001	0.001 1	
0		929 500 001	0.001 1	
10		929 500 000	0.000 0	
20		929 500 001	0.001 1	
30		929 500 002	0.002 2	
40		929 500 001	0.001 1	
50		929 500 002	0.002 2	



Tested by: Ki-Hong, Nam / Project Engineer

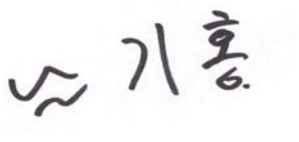
HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.4.3 Test Result for 900I+PA (935 MHz ~ 940 MHz)

-. Test Date : May 25~26, 2012

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	937 500 000	937 500 001	0.001 1	Within the Authorized Frequency block
-20		937 500 001	0.001 1	
-10		937 500 002	0.002 1	
0		937 500 000	0.000 0	
10		937 500 001	0.001 1	
20		937 500 002	0.002 1	
30		937 500 002	0.002 1	
40		937 500 000	0.000 0	
50		937 500 001	0.001 1	



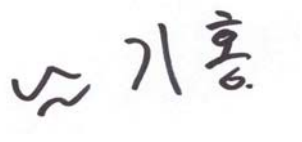
Tested by: Ki-Hong, Nam / Project Engineer

11.4.4 Test Result for 900I+PA (940 MHz ~ 941 MHz)

-. Test Date : May 25~26, 2009

-. Result : PASSED

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	940 500 000	940 500 002	0.002 1	Within the Authorized Frequency block
-20		940 500 001	0.001 1	
-10		940 500 001	0.001 1	
0		940 500 000	0.000 0	
10		940 500 000	0.000 0	
20		940 500 001	0.001 1	
30		940 500 002	0.002 1	
40		940 500 000	0.000 0	
50		940 500 001	0.001 1	



Tested by: Ki-Hong, Nam / Project Engineer

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12. FREQUENCY STABILITY WITH VOLTAGE VARIATION

12.1 Operating environment

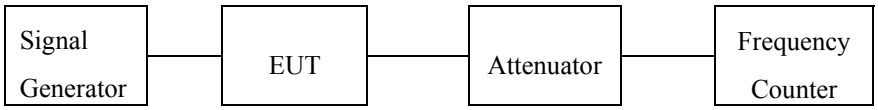
Temperature : 25 °C

Relative humidity : 50 %R.H.

12.2 Test set-up

The RF signal from the signal generator(s) was injected to the EUT by cable. The amplified RF signal at the output of the EUT was connected to the Frequency Counter. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable unmodulation.

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. (Interval)
☐ -	E4432B	HP	Signal Generator	US38440950	June 10, 2011 (1Y)
■ -	SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2012 (1Y)
☐ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 15, 2011 (1Y)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011 (1Y)
☐ -	FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)
■ -	53152A	R/S	CW Microwave Frequency Counter	US39270295	Dec. 30, 2011 (1Y)
■ -	DH-60	Dea Kwang Elec.	Slidacs	N/A	Sep 03, 2011 (1Y)
■ -	PAS60-12	KIKUSUI ELECTRONICS CORP.	DC Power Supply	JD001957	Apr. 05, 2012 (1Y)
■ -	67-30-43	Aeroflex Weinschel	Power Attenuator	CA5760	Nov. 30, 2011 (1Y)

All test equipment used is calibrated on a regular basis.

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12.4 Test data

12.4.1 Test Result for 800PS with AC 120 V Power Supply

-. Test Date : May 23~24, 2012

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	860 000 000	860 000 001	0.001 2	Within the Authorized Frequency block
120 (100 %)		860 000 001	0.001 2	
102 (85 %)		860 000 000	0.000 0	

Tested by: Ki-Hong, Nam / Project Engineer

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12.4.2 Test Result for 800PS with DC - 48 V Power Supply V

-. Test Date : May 23~24, 2012

-. Rated Supply Voltage : - 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	860 000 000	860 000 001	0.001 2	Within the Authorized Frequency block
- 48 (100 %)		860 000 002	0.002 3	
- 40.8 (85 %)		860 000 001	0.001 2	

Tested by: Ki-Hong, Nam / Project Engineer

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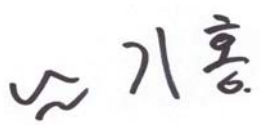
12.4.3 Test Result for 900I+PA (929 MHz ~ 930 MHz) with AC 120 V Power Supply

-. Test Date : May 25~26, 2009

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	929 500 000	929 500 002	0.002 2	Within the Authorized Frequency block
120 (100 %)		929 500 001	0.001 1	
102 (85 %)		929 500 001	0.001 1	



Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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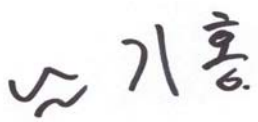
12.4.4 Test Result for 900I+PA (929 MHz ~ 930 MHz) with DC - 48 V Power Supply

-. Test Date : May 25~26, 2012

-. Rated Supply Voltage : - 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	929 500 000	929 500 001	0.001 1	Within the Authorized Frequency block
- 48 (100 %)		929 500 000	0.000 0	
- 40.8 (85 %)		929 500 001	0.001 1	



Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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)

12.4.5 Test Result for 900I+PA (935 MHz ~ 940 MHz) with AC 120 V Power Supply

-. Test Date : May 25~26, 2012

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	937 500 000	937 500 001	0.001 1	Within the Authorized Frequency block
120 (100 %)		937 500 002	0.002 1	
102 (85 %)		937 500 002	0.002 1	

Tested by: Ki-Hong, Nam / Project Engineer

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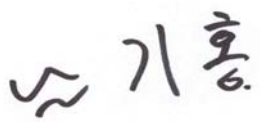
12.4.6 Test Result for 900I+PA (935 MHz ~ 940 MHz) with DC - 48 V Power Supply

-. Test Date : May 25~26, 2012

-. Rated Supply Voltage : - 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	937 500 000	937 500 001	0.001 1	Within the Authorized Frequency block
- 48 (100 %)		937 500 001	0.001 1	
- 40.8 (85 %)		937 500 000	0.000 0	



Tested by: Ki-Hong, Nam / Project Engineer

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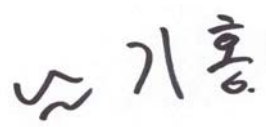
12.4.7 Test Result for 900I+PA (940 MHz ~ 941 MHz) with AC 120 V Power Supply

-. Test Date : May 25~26, 2012

-. Rated Supply Voltage : 120 Vac

-. Result : PASSED

Voltage (Vac)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
138 (115 %)	940 500 000	940 500 002	0.002 1	Within the Authorized Frequency block
120 (100 %)		940 500 001	0.001 1	
102 (85 %)		940 500 001	0.001 1	



Tested by: Ki-Hong, Nam / Project Engineer

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12.4.8 Test Result for 900I+PA (940 MHz ~ 941 MHz) with DC - 48 V Power Supply

-. Test Date : May 25~26, 2012

-. Rated Supply Voltage : - 48 Vdc

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
- 55.2 (115 %)	940 500 000	940 500 000	0.000 0	Within the Authorized Frequency block
- 48 (100 %)		940 500 002	0.002 1	
- 40.8 (85 %)		940 500 000	0.000 0	

Tested by: Ki-Hong, Nam / Project Engineer

HEAD OFFICE : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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13. MAXIMUM PERMISSIBLE EXPOSURE

13.1 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 for 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 $S = E^2 / Z = E^2 / 377$, because 1 mW/cm² = 10 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

$d = \sqrt{(30 * P * G) / (377 * S)}$

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

$d = 0.282 * \sqrt{(P * G) / S}$

Where

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

13.2 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)
30.00	1 000	2.0	1.58	14.9	0.32	0.57

According to above table, safe distance, $D = 0.282 * \sqrt{1\,000 * 1.58 / 0.57} = 14.9$ cm.

For getting power density at 80 cm separation in above table, following formula was used.

$S = P * G / (4\pi * R^2) = 1\,000 * 1.58 / (4 * 3.14 * 20\text{^}2) = 0.32$

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

Note: End users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance, because the applicant does not provide an antenna for sale with the EUT.

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