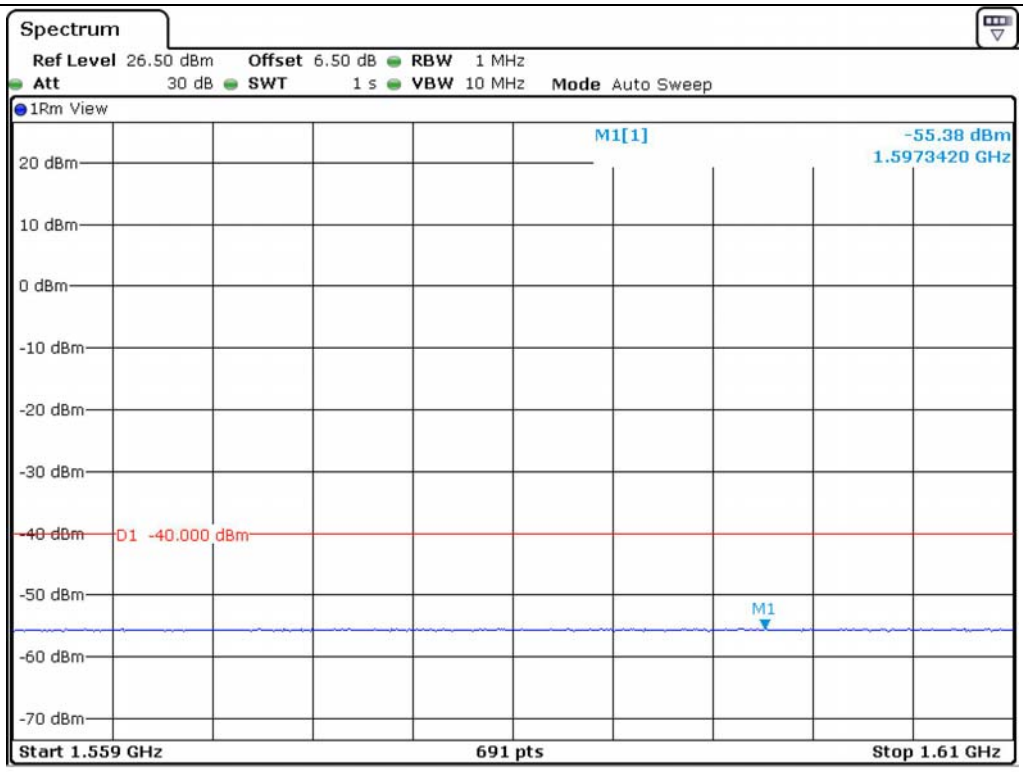
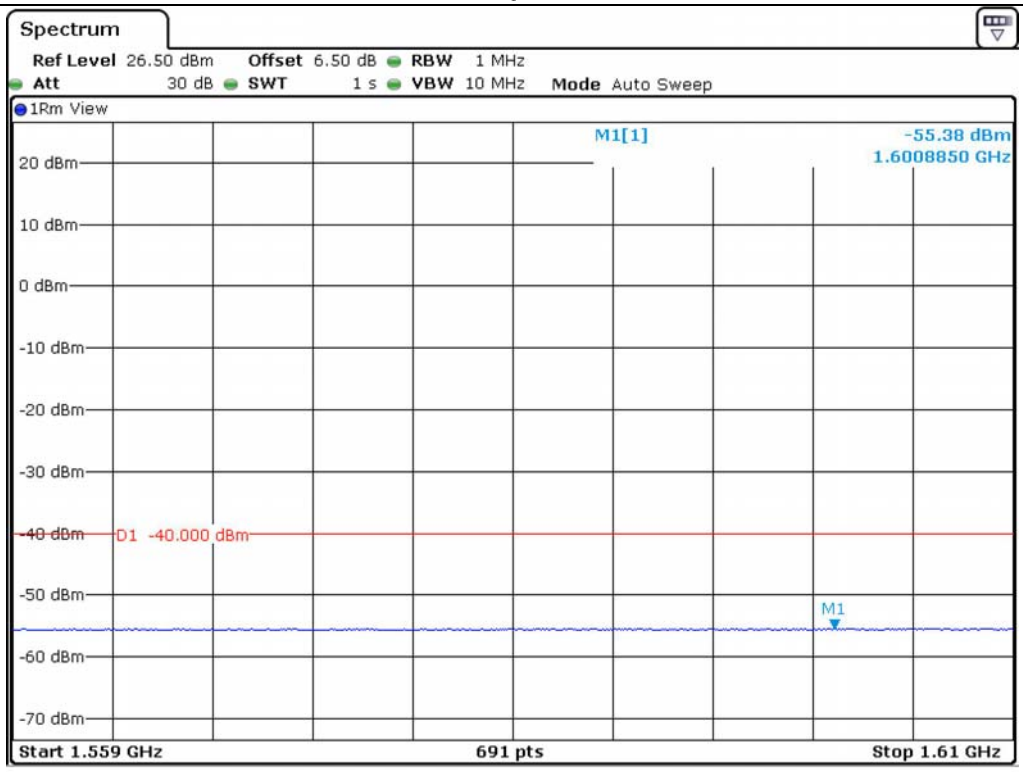


16 QAM



64 QAM

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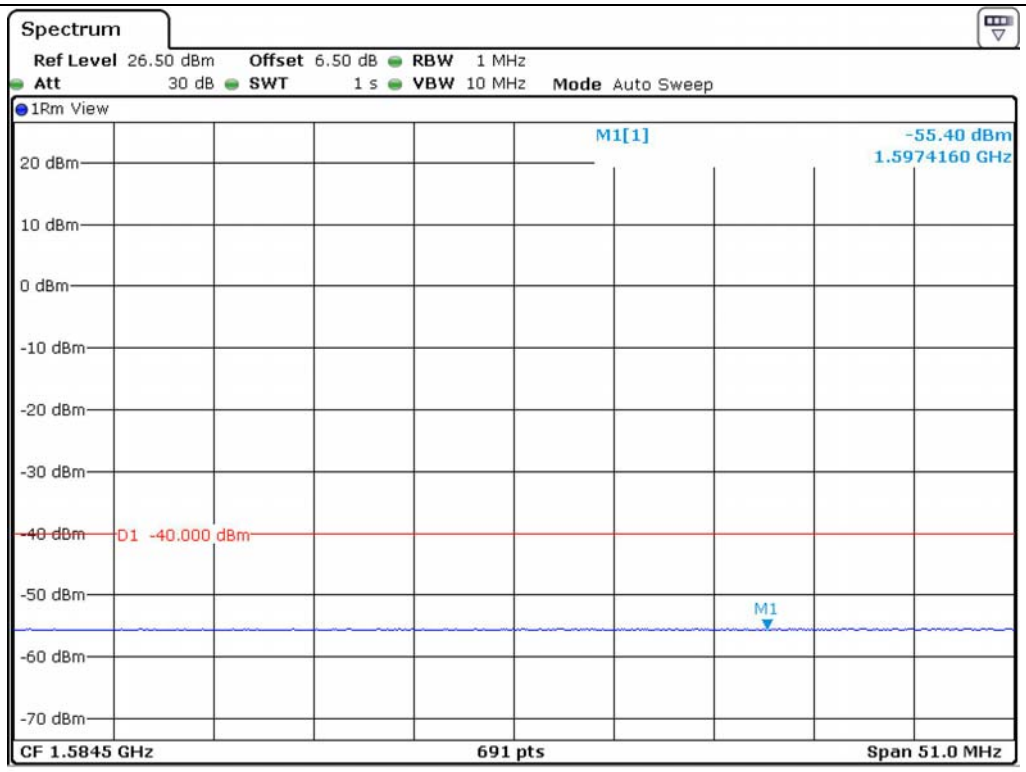

QPSK

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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8. BAND EDGE MEASUREMENT

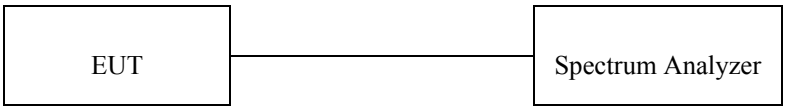
8.1 Operating environment

Temperature : 26 °C

Relative humidity : 45 % R.H.

8.2 Test set-up for conducted measurement

The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation. The resolution bandwidth and video bandwidth of the spectrum analyzer was set according to the regulation and sufficient scans were taken to show any out of band emissions.



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV30	R/S	FSV30 Signal Analyzer	101372	May 20, 2013 (1Y)
■ -	SA-26B-6	VENTRIX	6 dB Attenuator	CA5760	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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8.4 Test data for Output Port 0

8.4.1 Test Result for Part 27 C (AWS-1, 5 MHz)

-. Test Date : October 11, 2013

-. Result : Pass

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
16 QAM	Low	2 110.000	-35.99	-13.00	22.99
	High	2 155.000	-34.70		21.70
64 QAM	Low	2 110.000	-35.38		22.38
	High	2 155.000	-34.44		21.44
QPSK	Low	2 110.000	-35.67		22.67
	High	2 155.000	-34.72		21.72

According to Part 27C, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.

Tested by: Hong-Kyu, Lee/ Engineer

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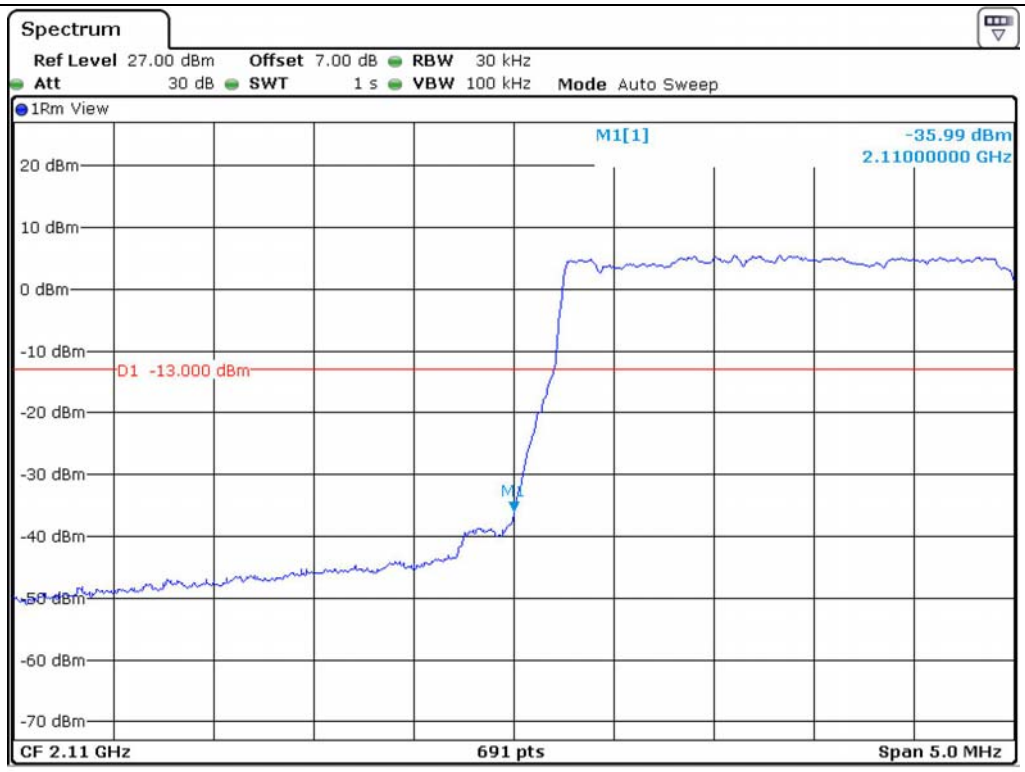
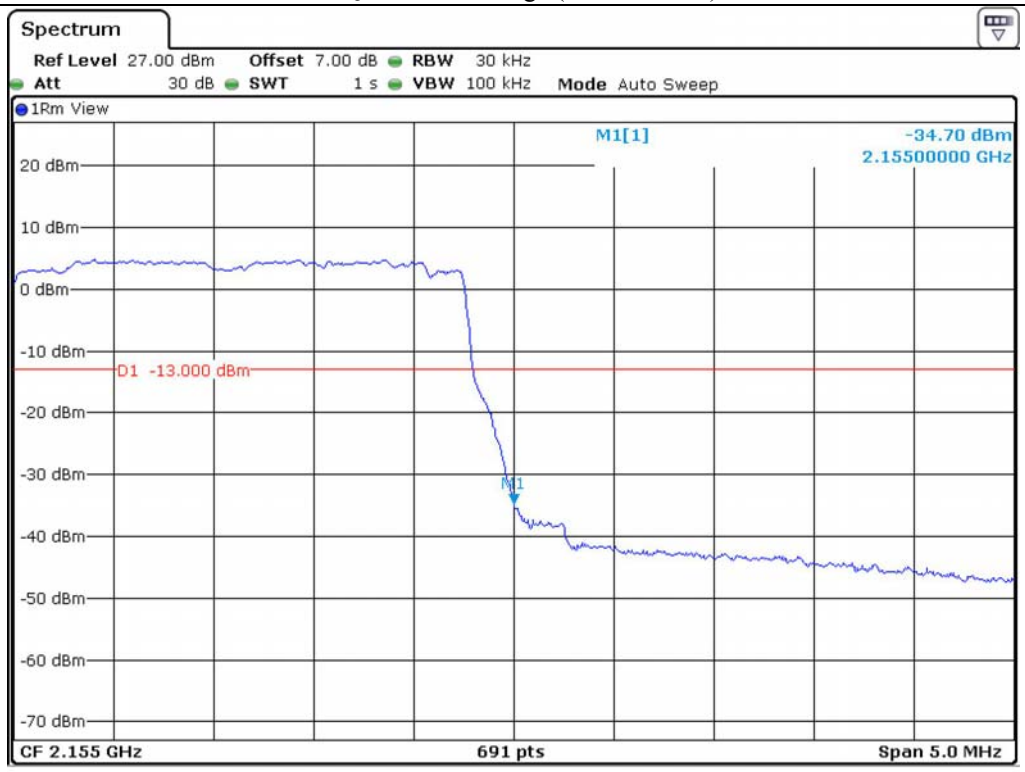


16 QAM – Band Edge (Low Channel)



16 QAM – Band Edge (High Channel)

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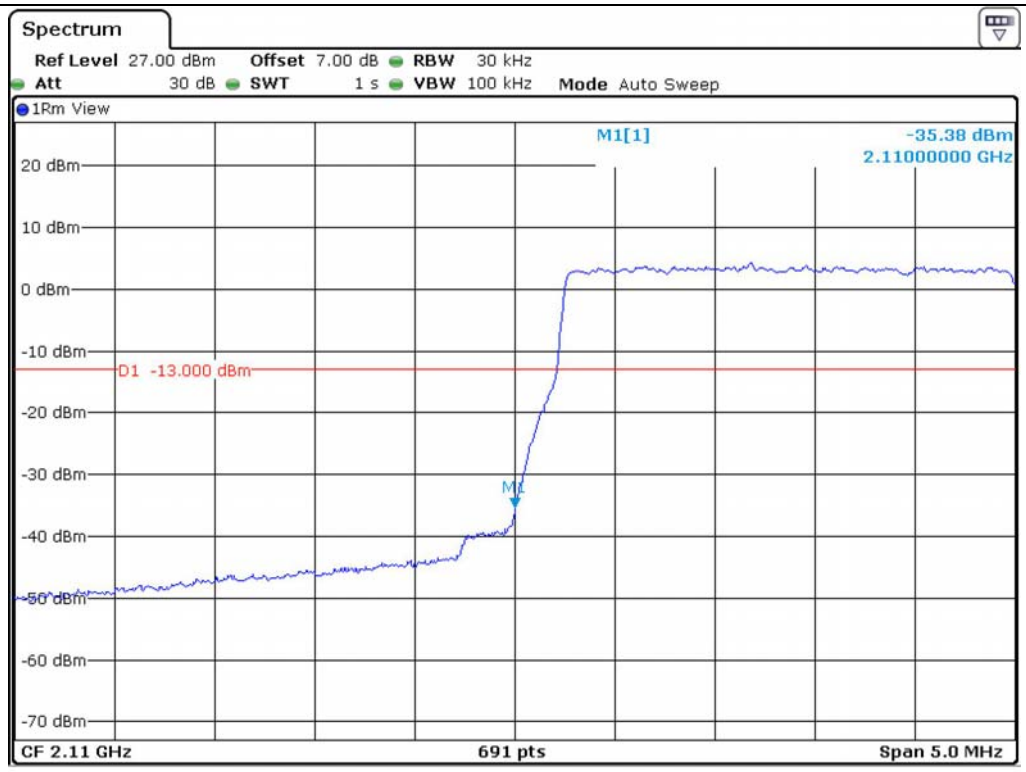
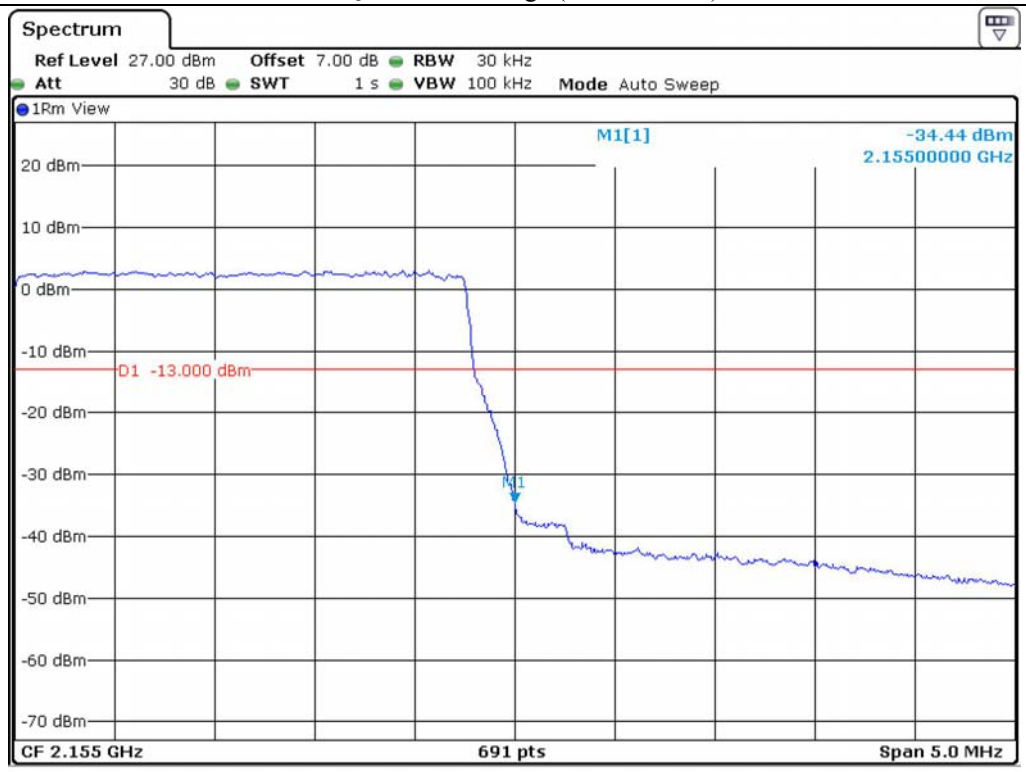


64 QAM – Band Edge (Low Channel)



64 QAM– Band Edge (High Channel)

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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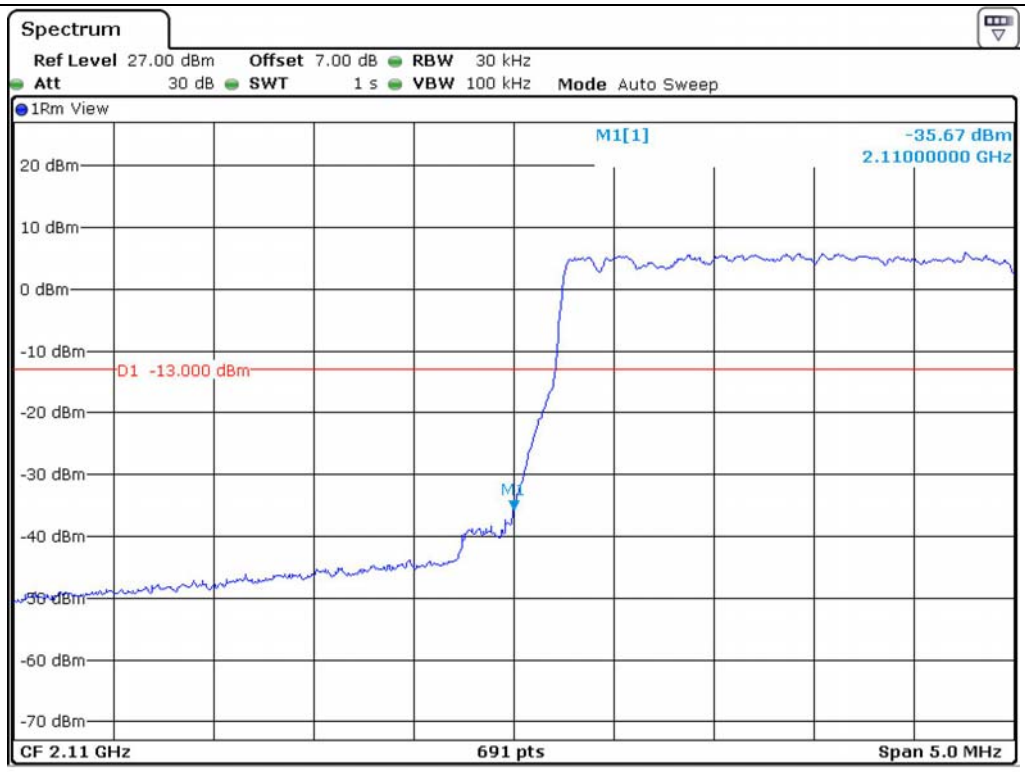
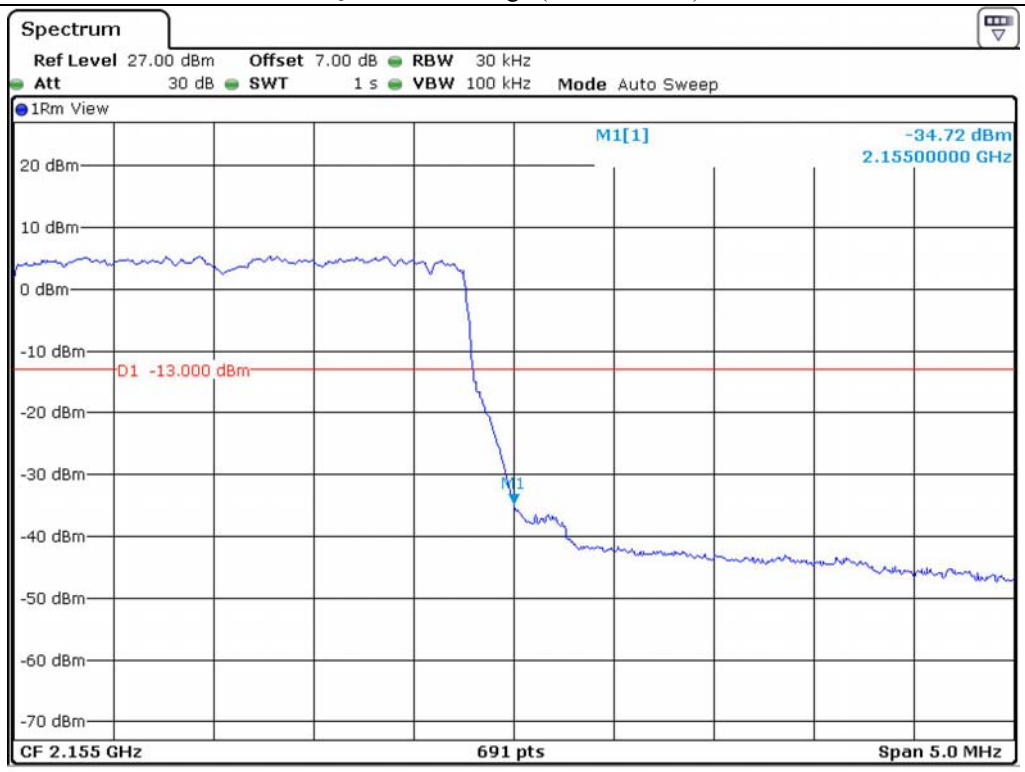


QPSK– Band Edge (Low Channel)



QPSK– Band Edge (High Channel)

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8.4.2 Test Result for Part 27 C (AWS-1, 10 MHz)

-. Test Date : October 11, 2013

-. Result : Pass

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
16 QAM	Low	2 110.000	-42.46	-13.00	29.46
	High	2 155.000	-41.63		28.63
64 QAM	Low	2 110.000	-43.36		30.36
	High	2 155.000	-40.80		27.80
QPSK	Low	2 110.000	-42.35		29.35
	High	2 155.000	-40.44		27.44

According to Part 27C, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.

Tested by: Hong-Kyu, Lee/ Engineer

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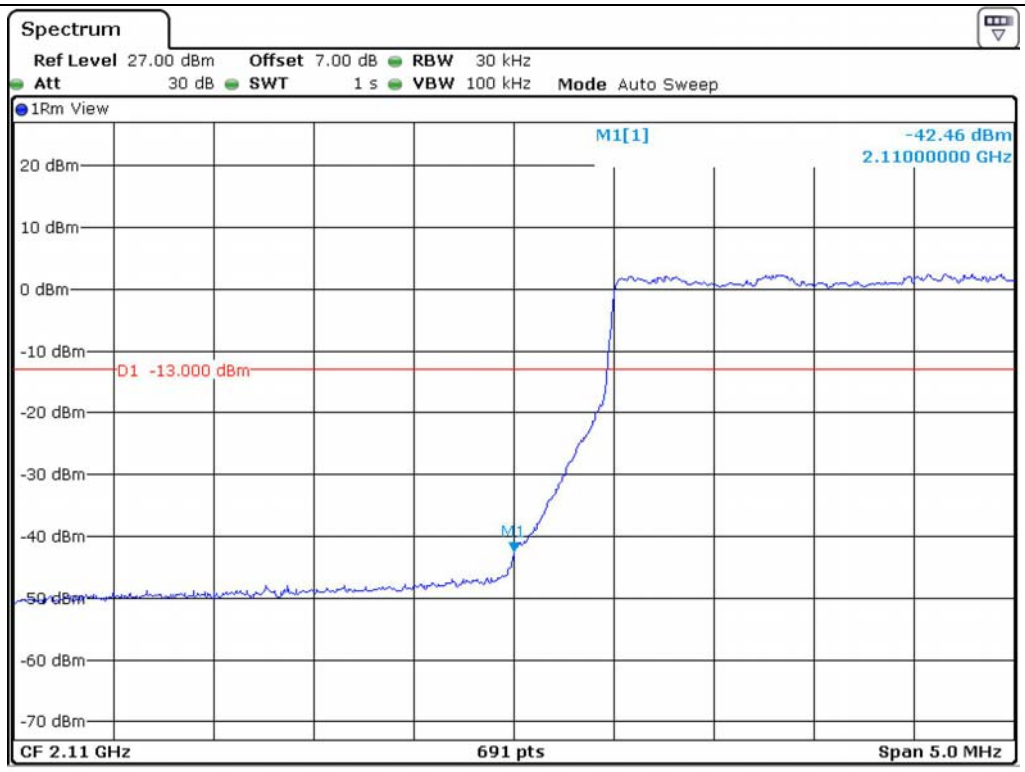
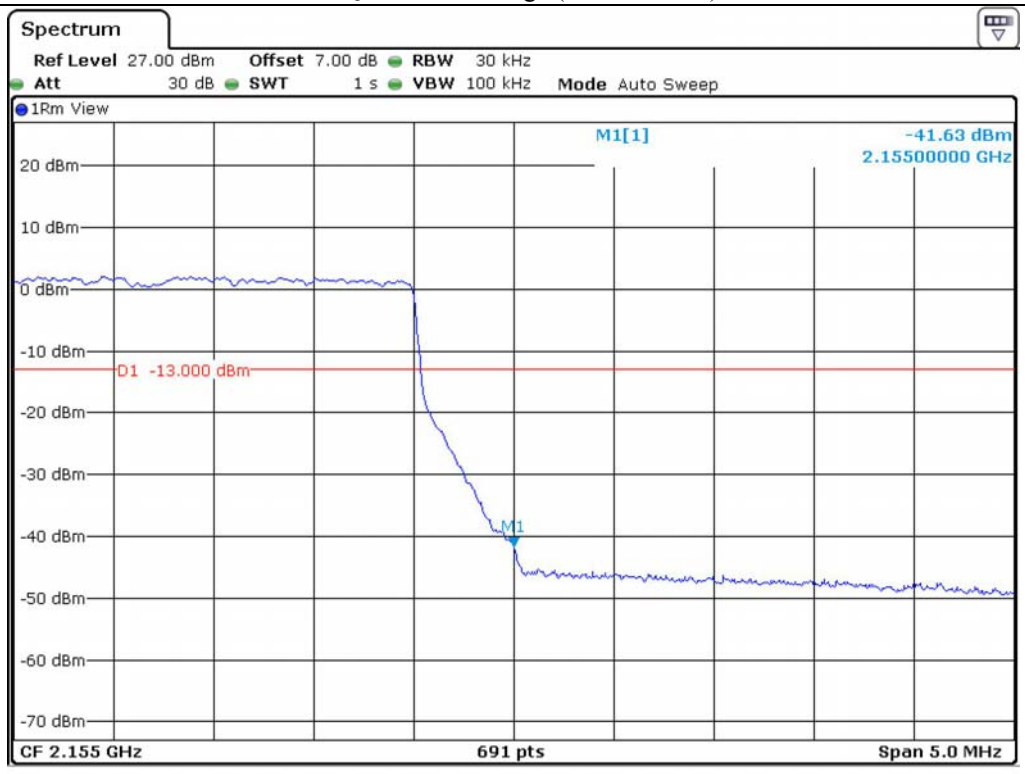


16 QAM – Band Edge (Low Channel)



16 QAM – Band Edge (High Channel)

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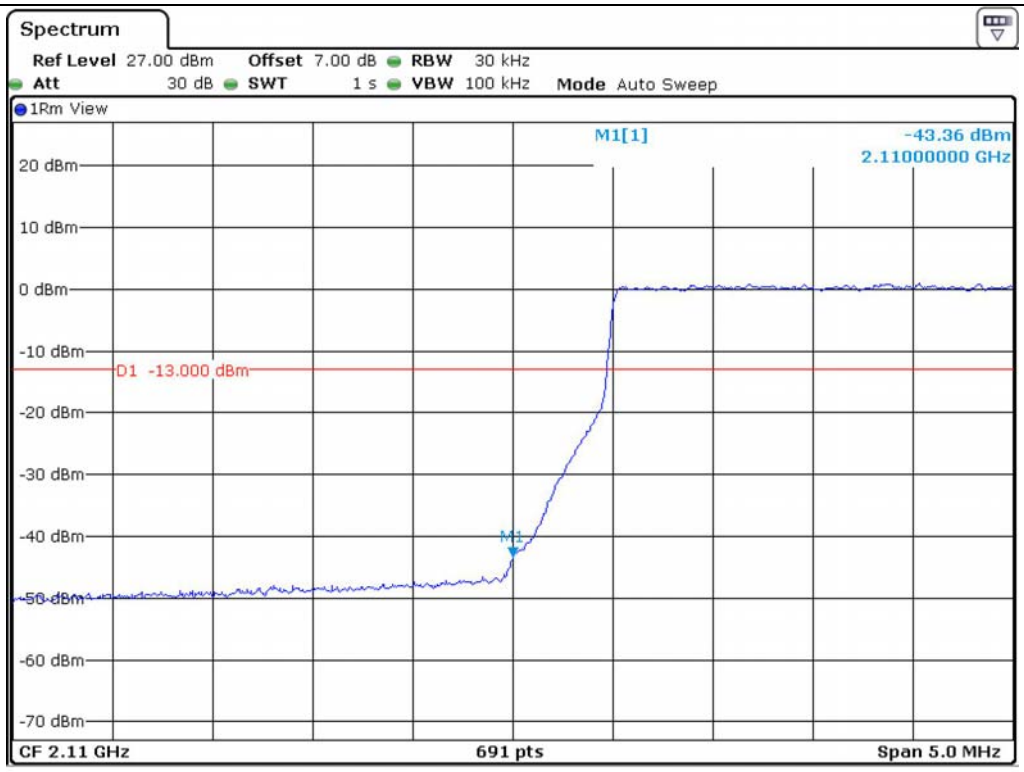
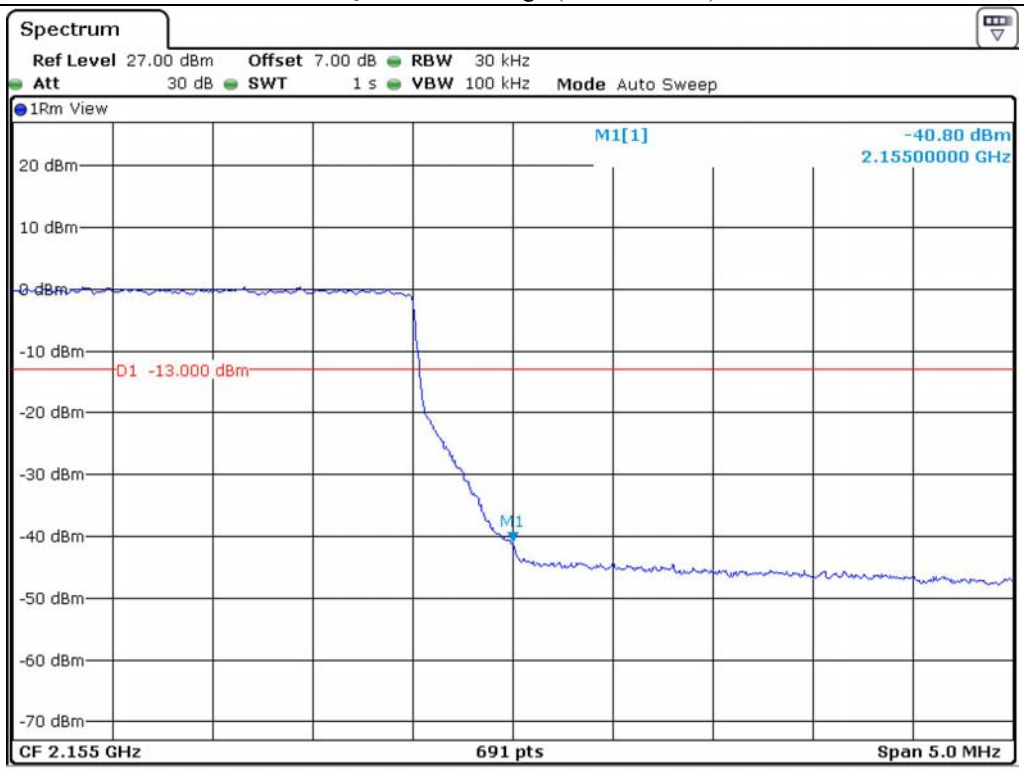


64 QAM – Band Edge (Low Channel)



64 QAM– Band Edge (High Channel)

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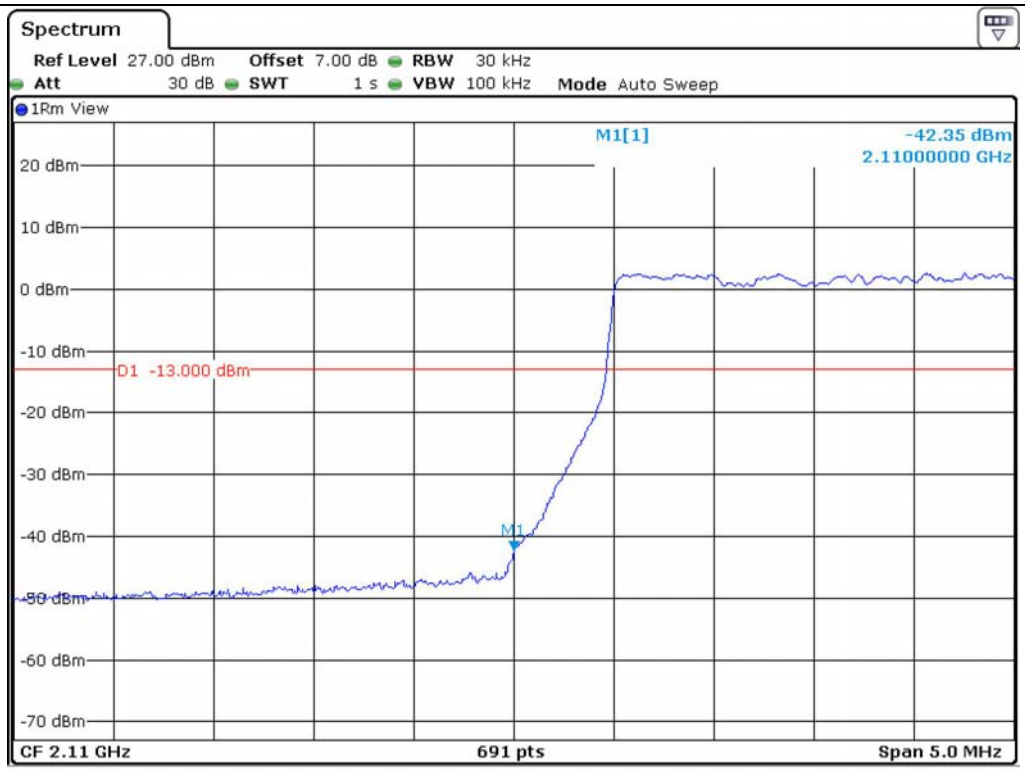
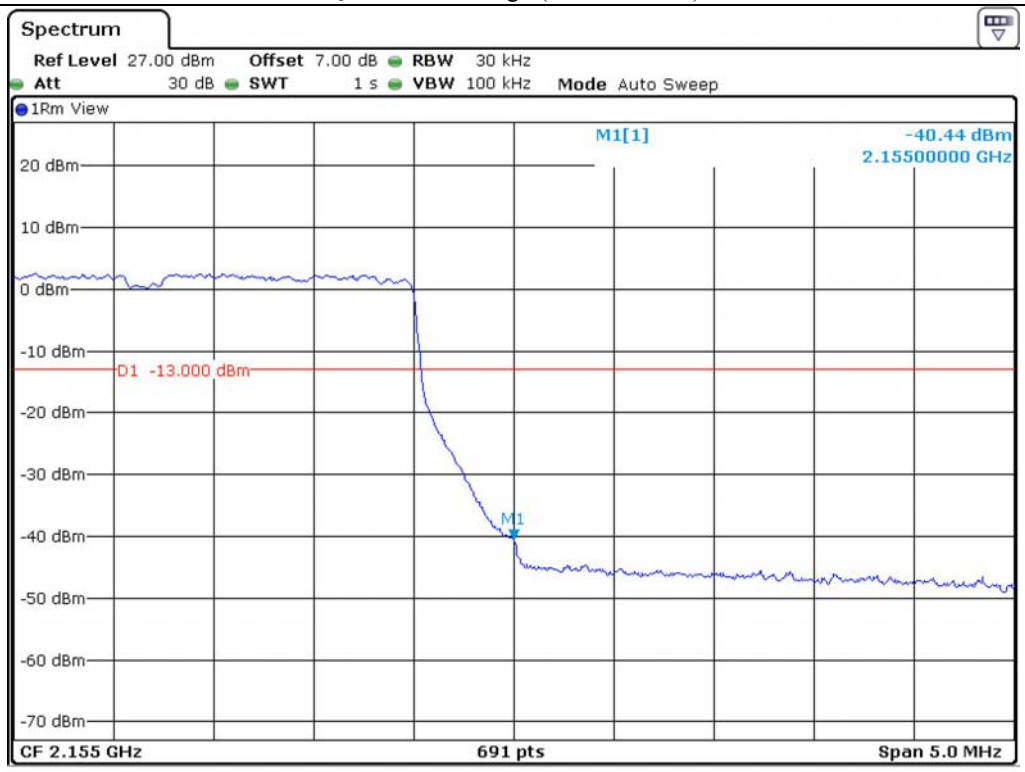


QPSK– Band Edge (Low Channel)



QPSK– Band Edge (High Channel)

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8.5.3 Test Result for Part 27 C (700LTE)

-. Test Date : October 07, 2013

-. Frequency range : 30 MHz ~ 15 GHz

-. Result : Pass

Modulation	Measured Frequency (MHz)	Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
16 QAM	745.674	-48.74	1.15	-47.59	18.22	65.81
	745.964	-48.71	1.15	-47.56	13.00	60.56
	739.922	-46.20	1.15	-45.05	13.00	58.05
	761.152	-46.89	1.15	-45.74	13.00	58.74
64 QAM	745.790	-48.98	1.15	-47.83	18.22	66.05
	745.993	-46.57	1.15	-45.42	13.00	58.42
	739.936	-46.21	1.15	-45.06	13.00	58.06
	761.195	-47.12	1.15	-45.97	13.00	58.97
QPSK	745.501	-49.06	1.15	-47.91	18.22	66.13
	745.964	-48.62	1.15	-47.47	13.00	60.47
	739.907	-46.00	1.15	-44.85	13.00	57.85
	761.022	-46.61	1.15	-45.46	13.00	58.46

From CFR 27.53(c)(5): Compliance with the provisions of paragraphs (c) (1) and (c) (2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may b employed.

Tested by: Hong-Kyu, Lee/ Engineer

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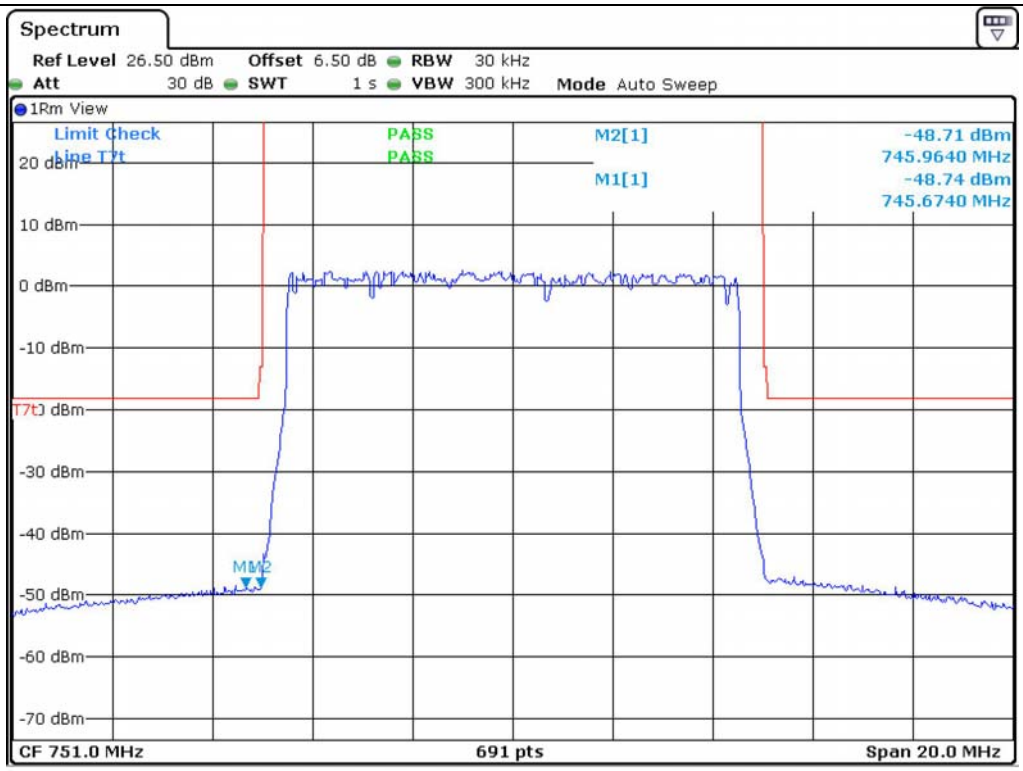

16 QAM

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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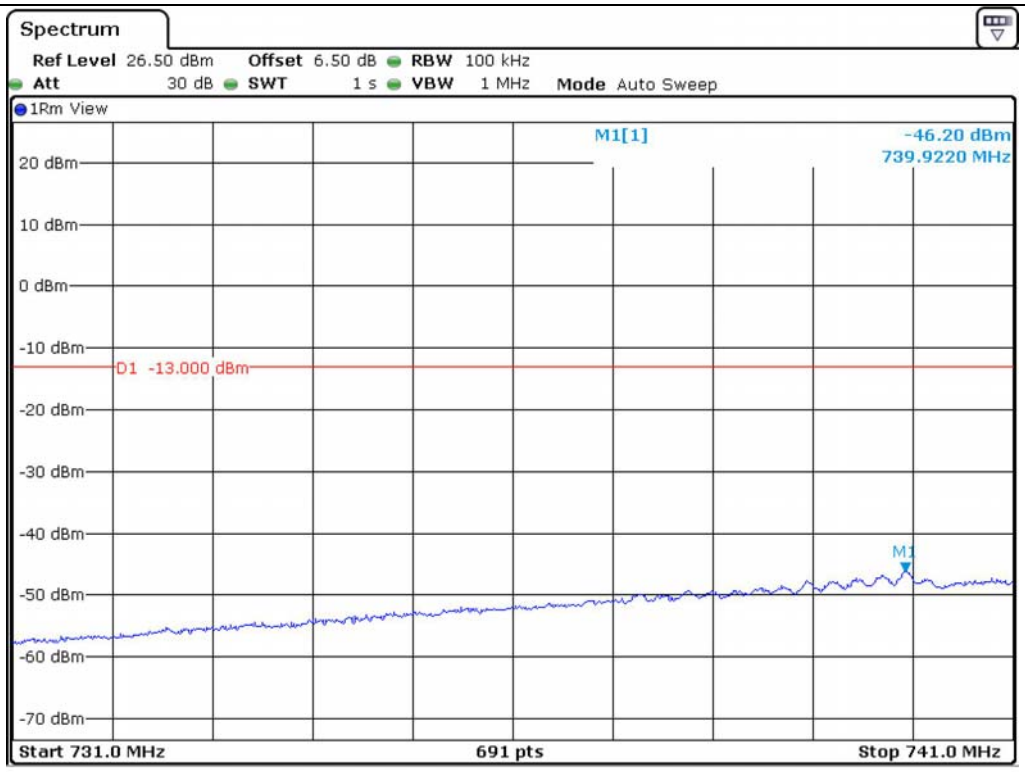
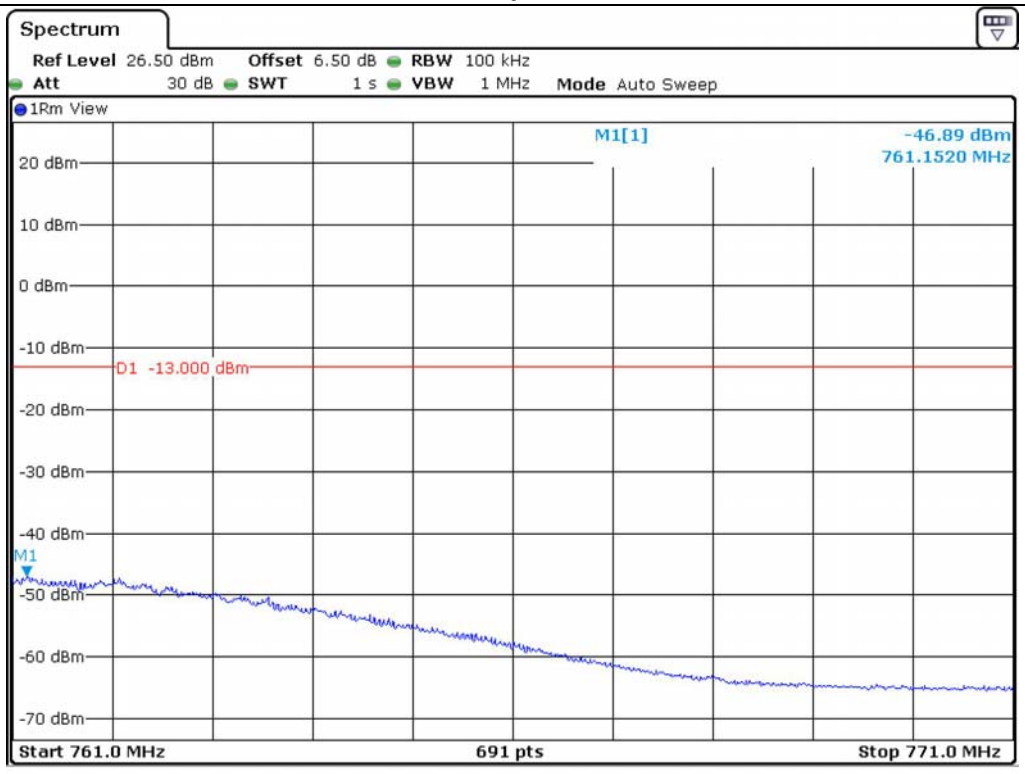


16 QAM



16 QAM

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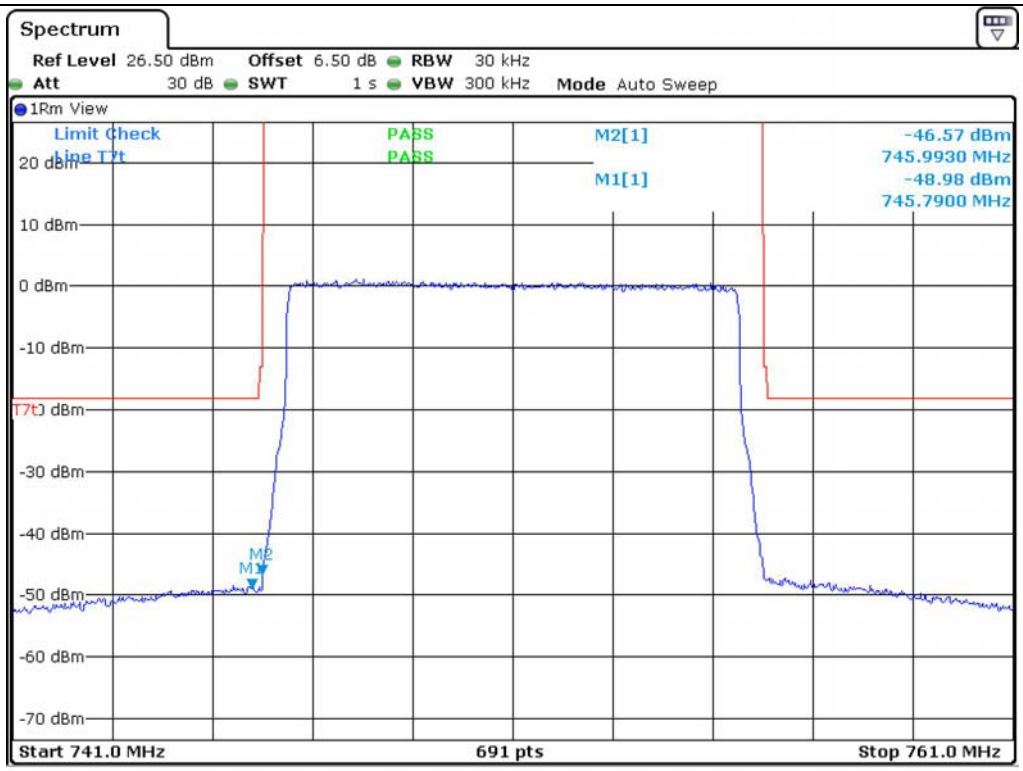

64 QAM

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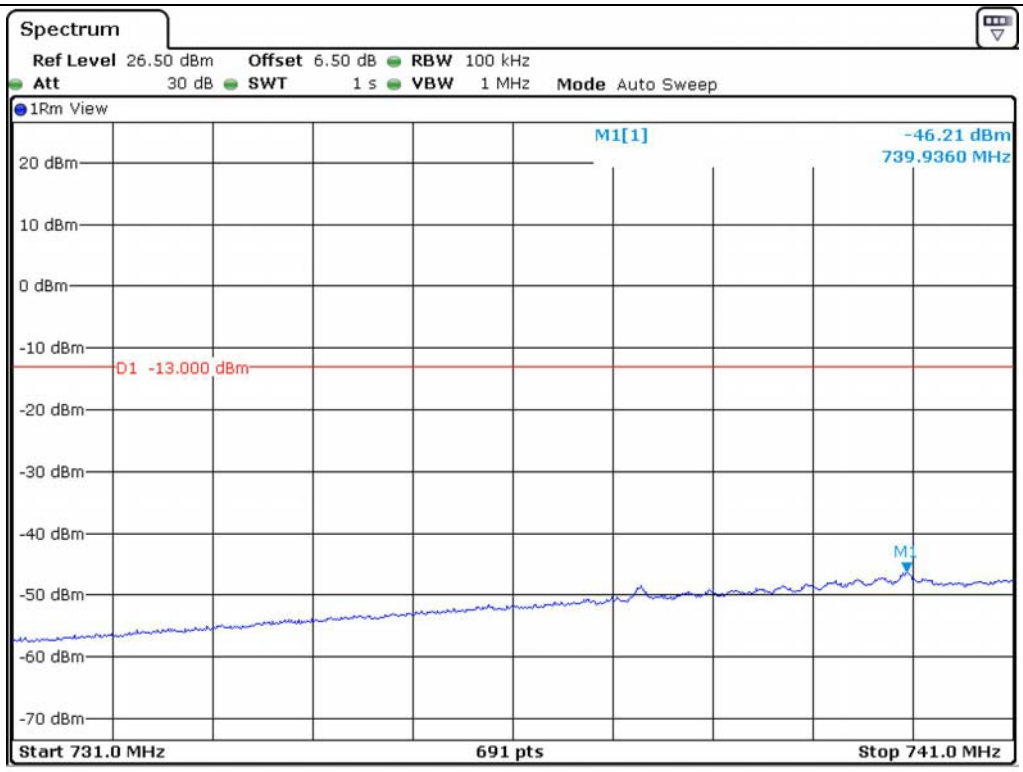
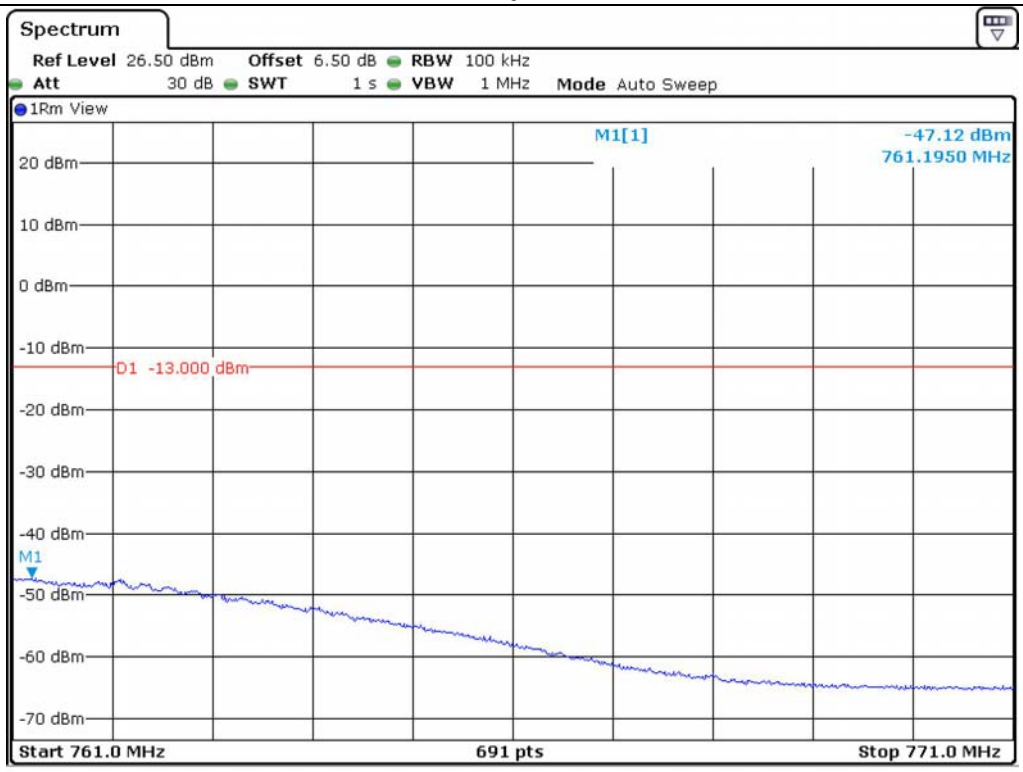


64 QAM



64 QAM

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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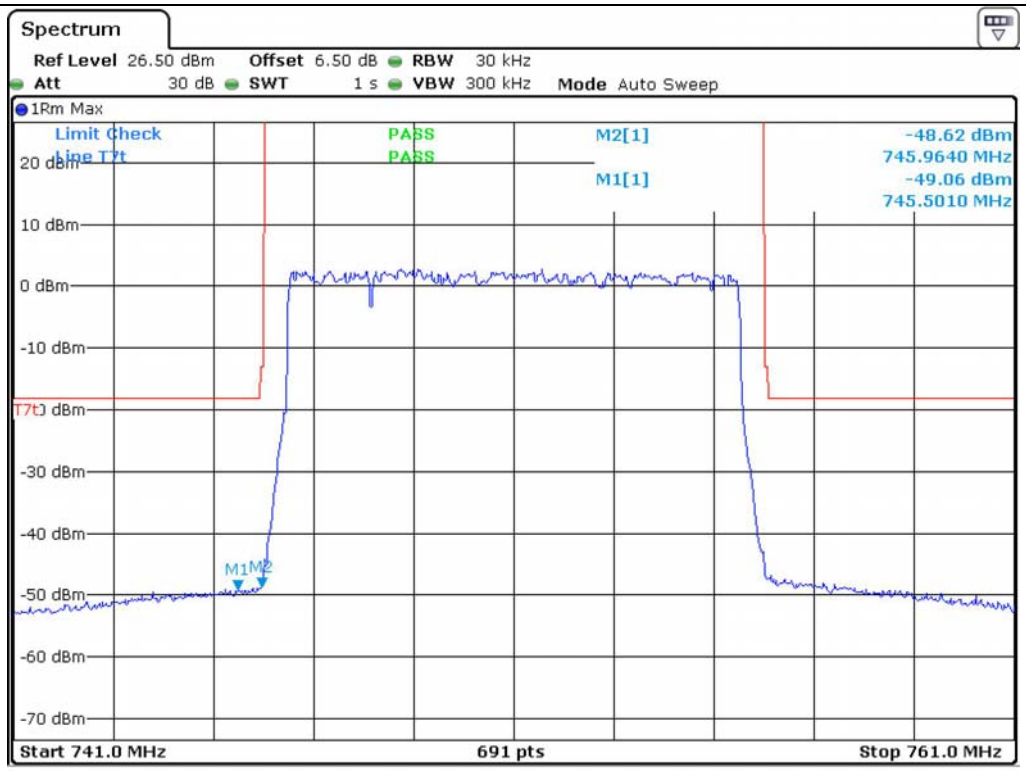

QPSK

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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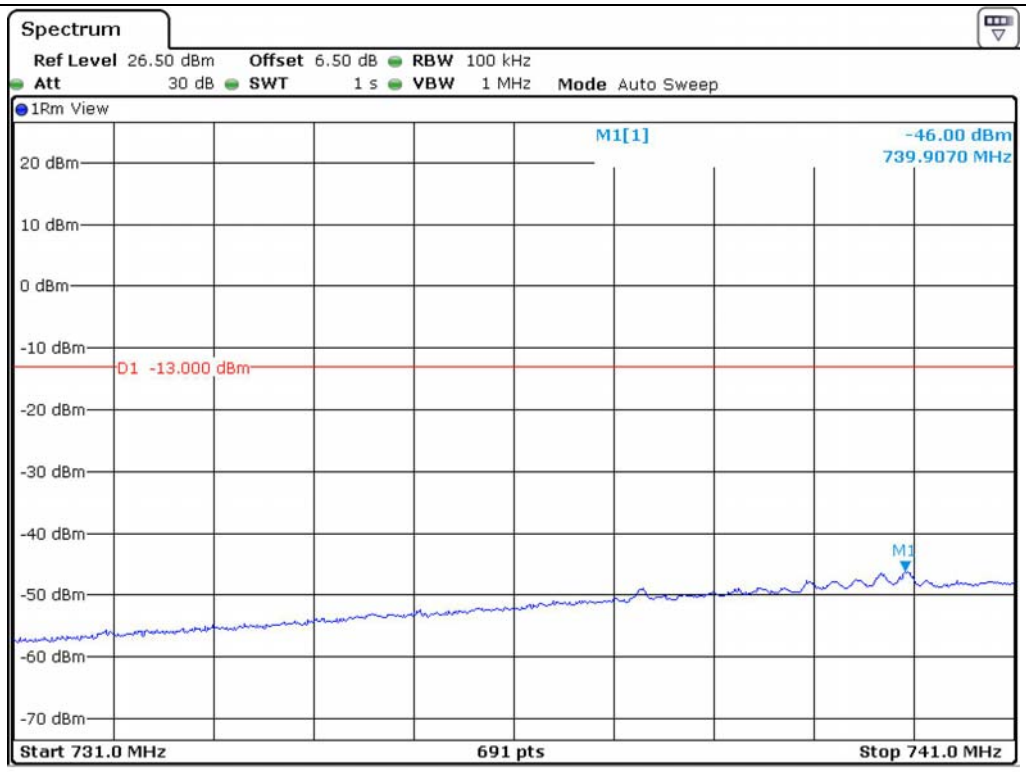
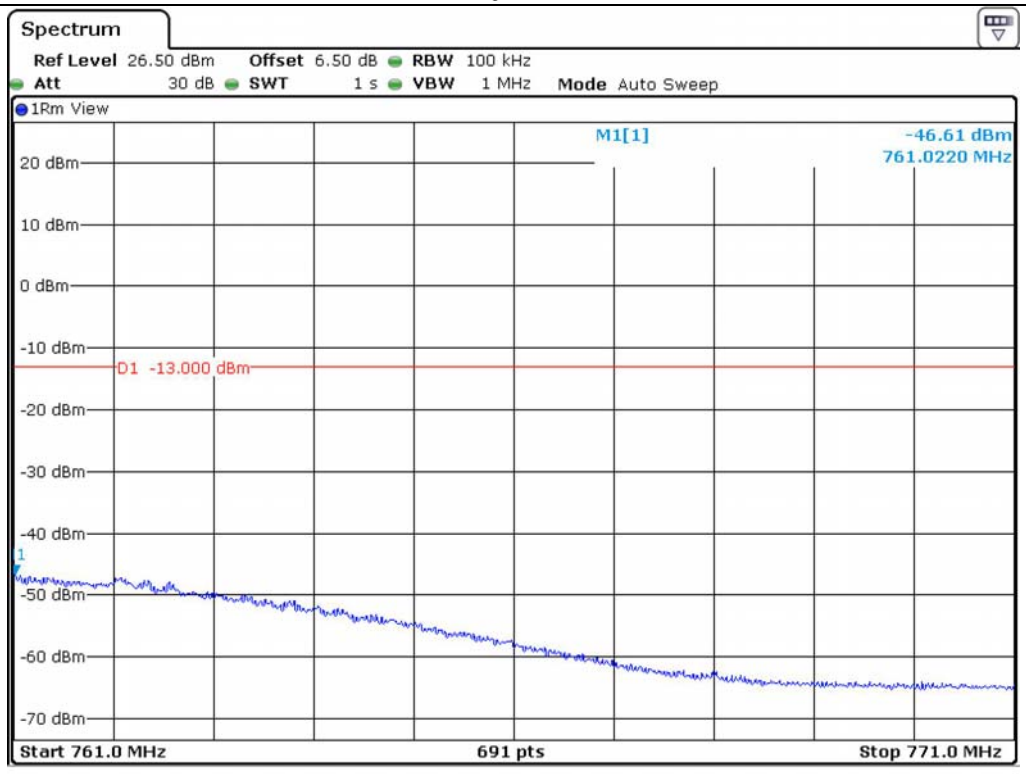


QPSK



QPSK

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8.5 Test data for Output Port 1

8.5.1 Test Result for Part 27 C (AWS-1, 5 MHz)

-. Test Date : October 11, 2013

-. Result : Pass

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
16 QAM	Low	2 110.000	-36.00	-13.00	23.00
	High	2 155.000	-33.79		20.79
64 QAM	Low	2 110.000	-35.83		22.83
	High	2 155.000	-34.85		21.85
QPSK	Low	2 110.000	-35.15		22.15
	High	2 155.000	-34.73		21.73

According to Part 27C, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.

Tested by: Hong-Kyu, Lee/ 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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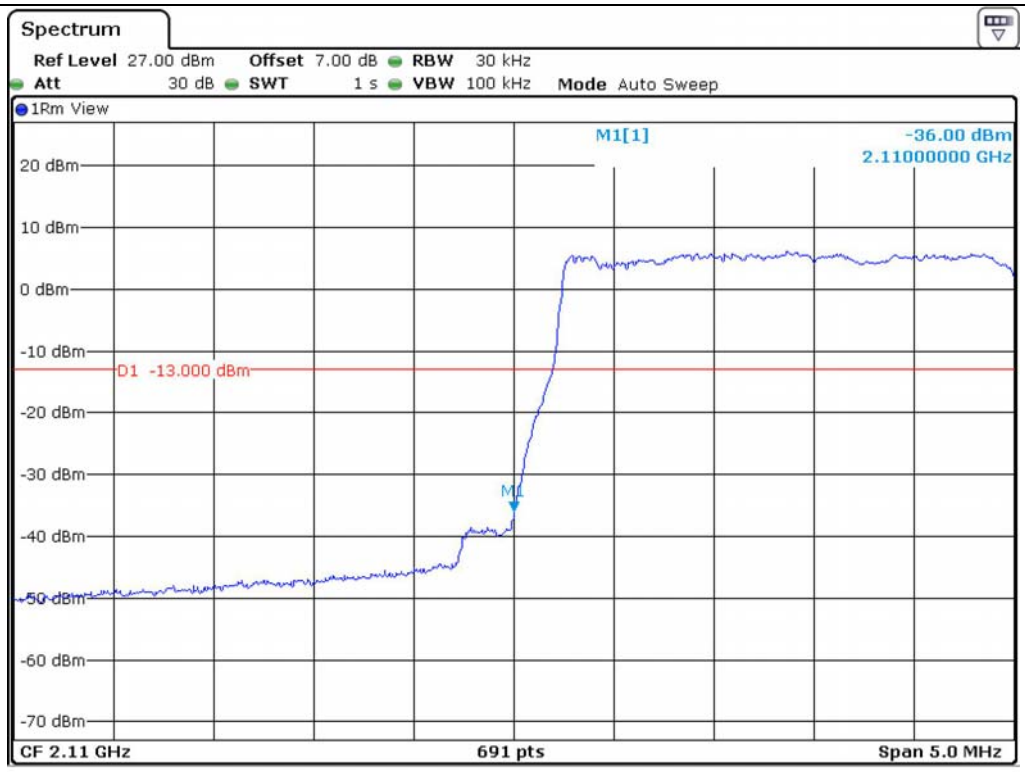
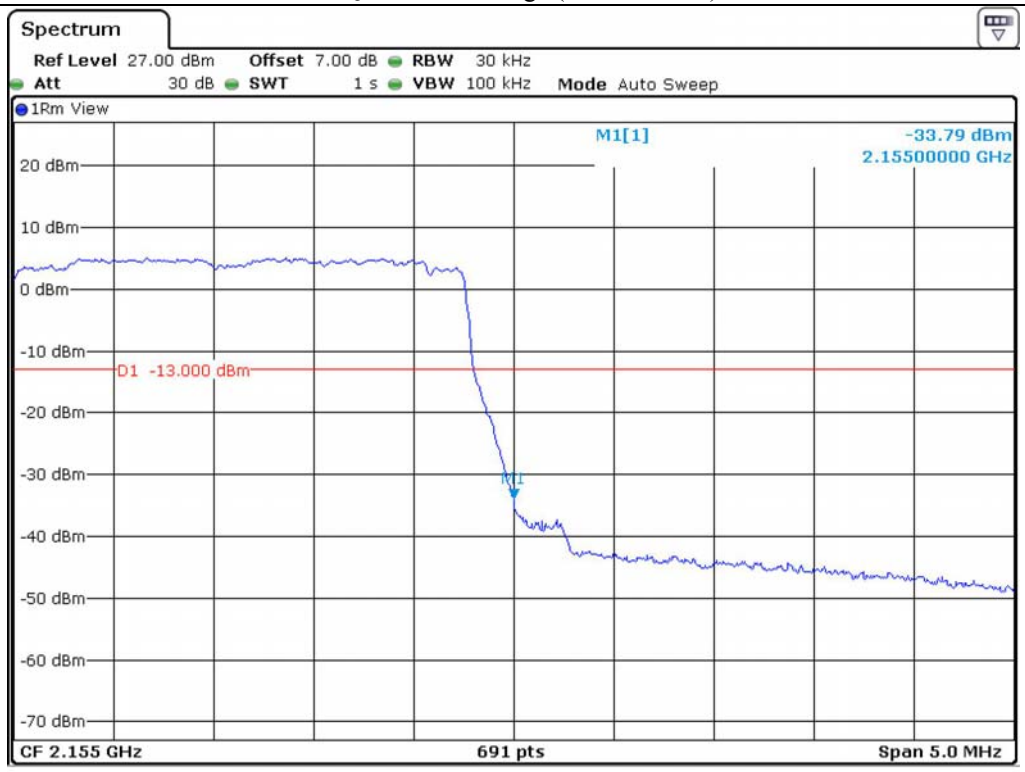


16 QAM – Band Edge (Low Channel)



16 QAM – Band Edge (High Channel)

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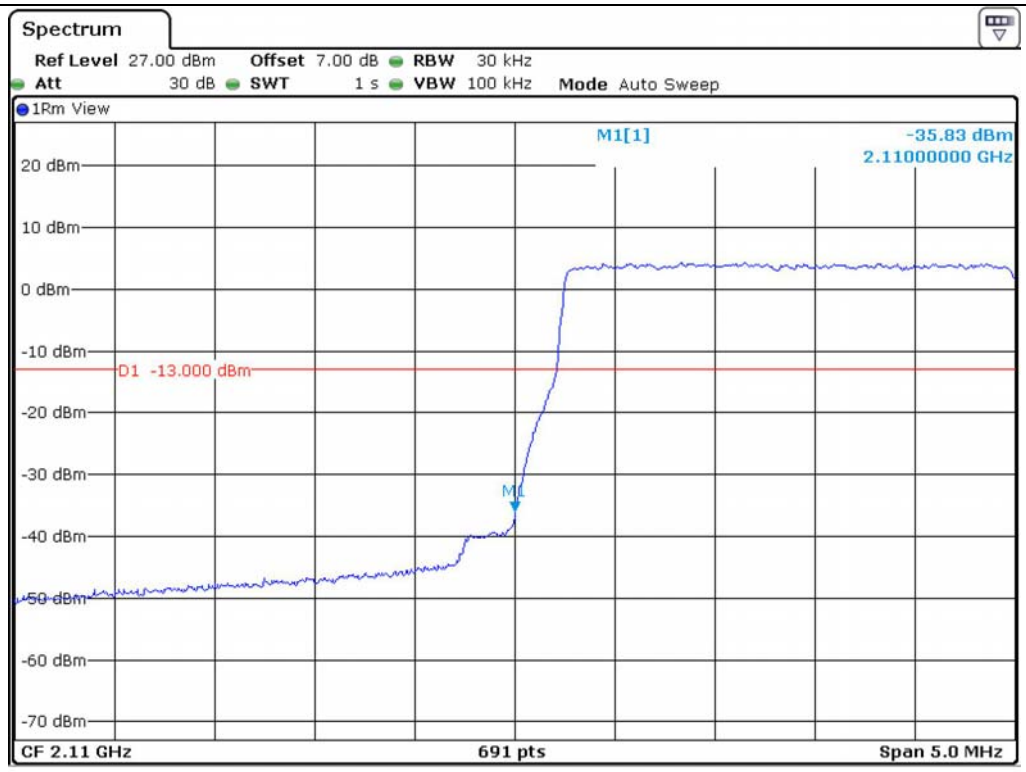
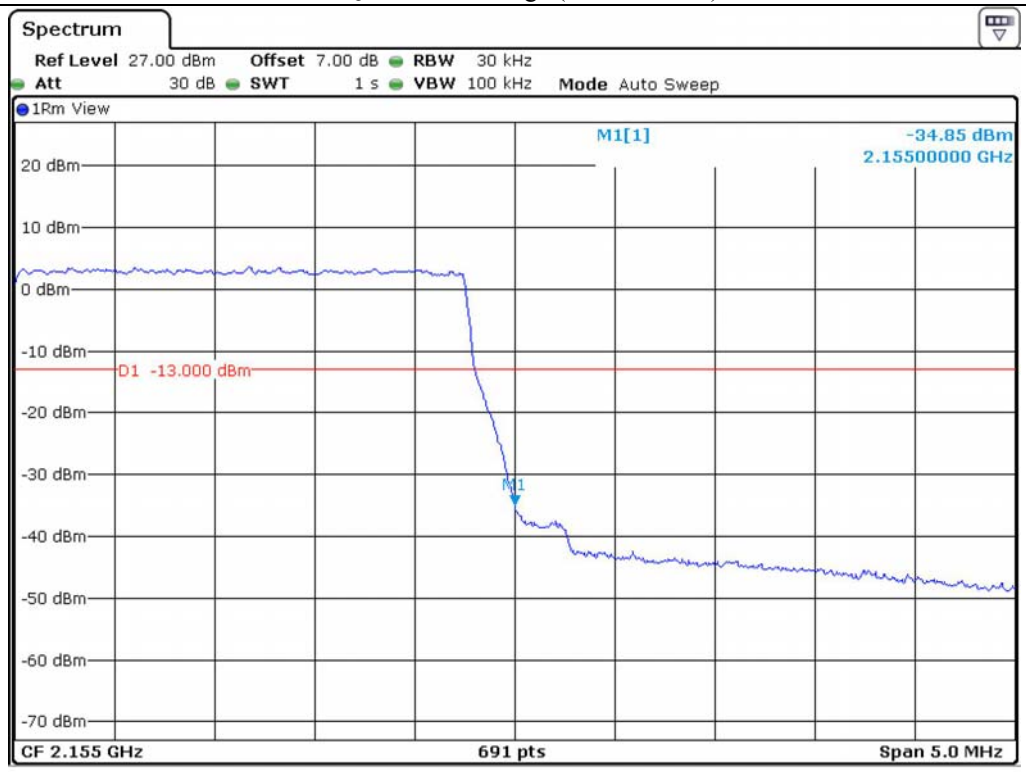


64 QAM – Band Edge (Low Channel)



64 QAM– Band Edge (High Channel)

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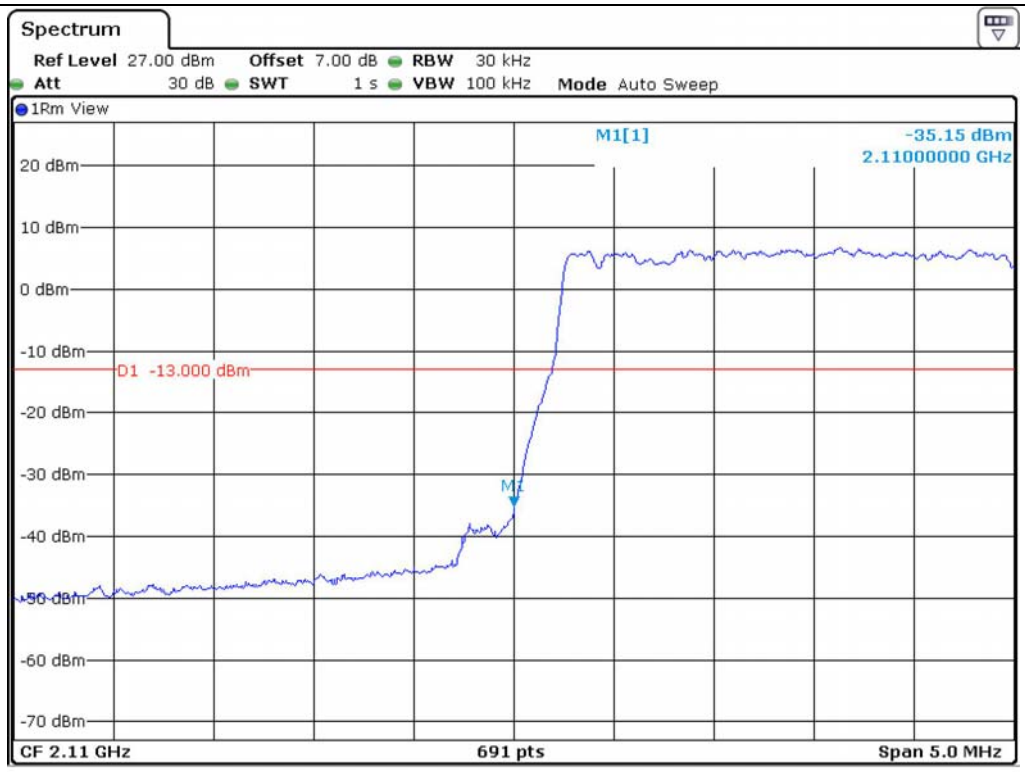
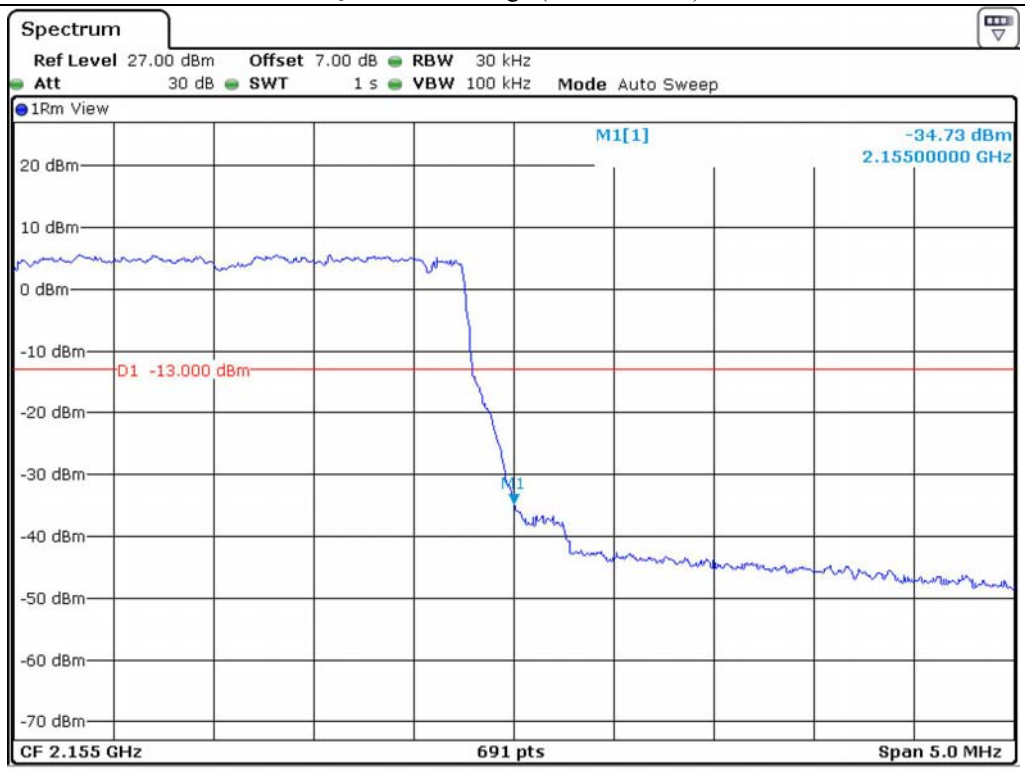


QPSK– Band Edge (Low Channel)



QPSK– Band Edge (High Channel)

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8.5.2 Test Result for Part 27 C (AWS-1, 10 MHz)

-. Test Date : October 11, 2013

-. Result : Pass

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
16 QAM	Low	2 110.000	-42.31	-13.00	29.31
	High	2 155.000	-41.47		28.47
64 QAM	Low	2 110.000	-42.97		29.97
	High	2 155.000	-41.79		28.79
QPSK	Low	2 110.000	-41.59		28.59
	High	2 155.000	-40.44		27.44

According to Part 27C, out of band emission shall be attenuated by 43 + 10 log (P) dBc, equates to -13.0dBm.

Tested by: Hong-Kyu, Lee/ Engineer

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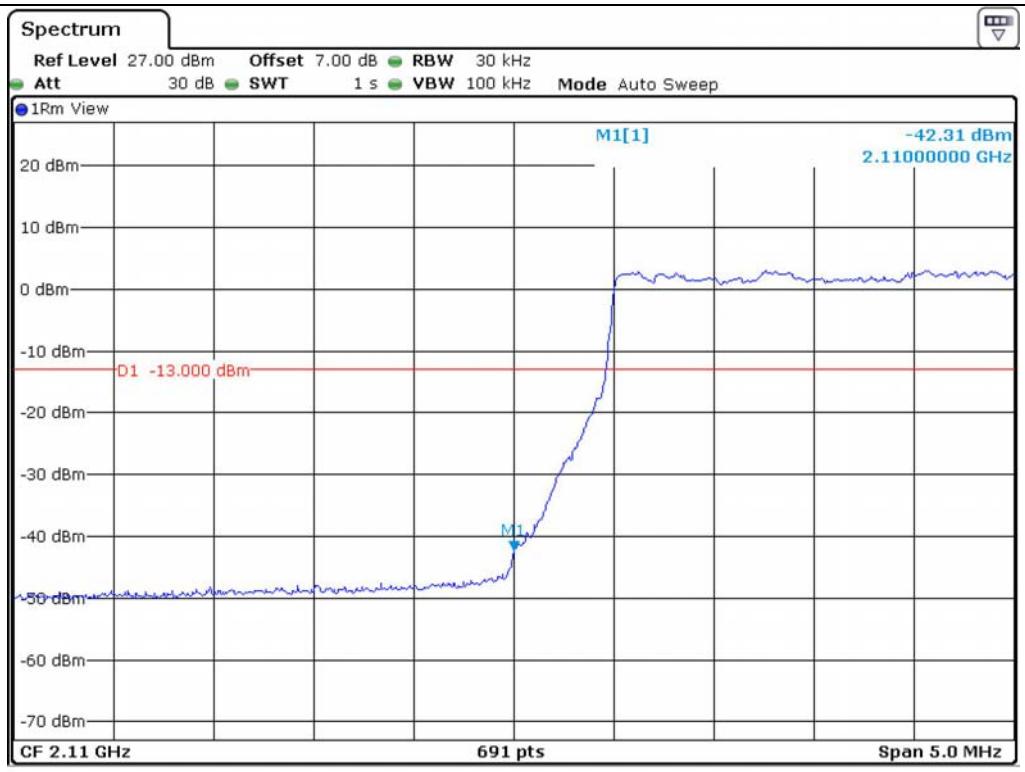
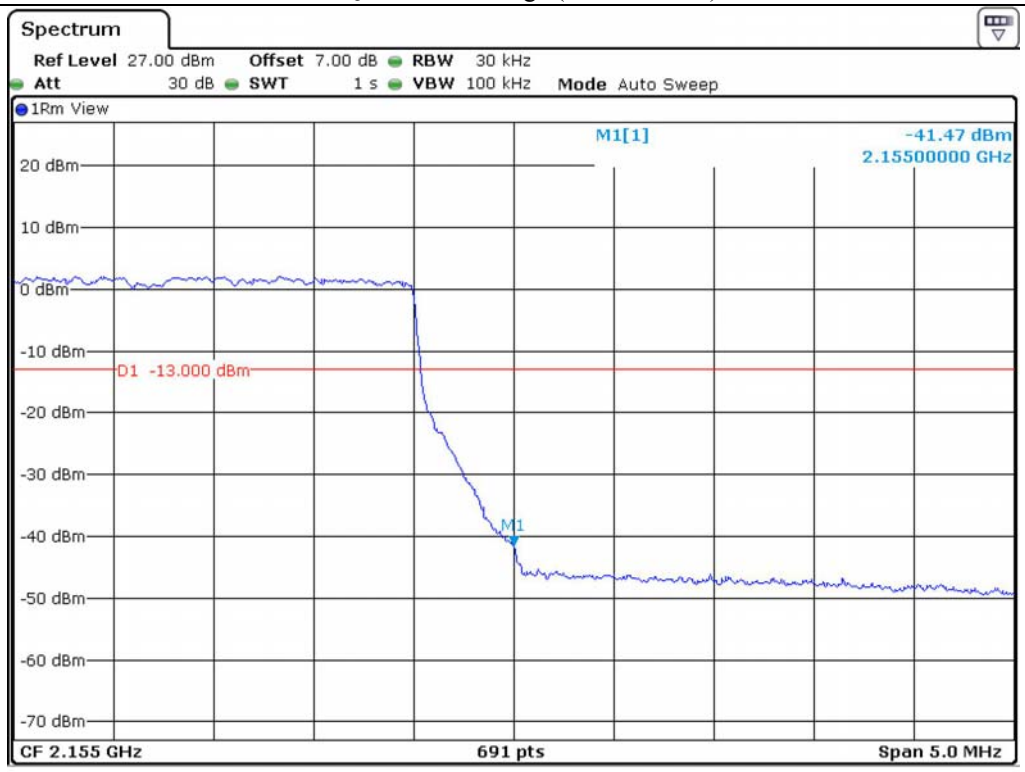


16 QAM – Band Edge (Low Channel)



16 QAM – Band Edge (High Channel)

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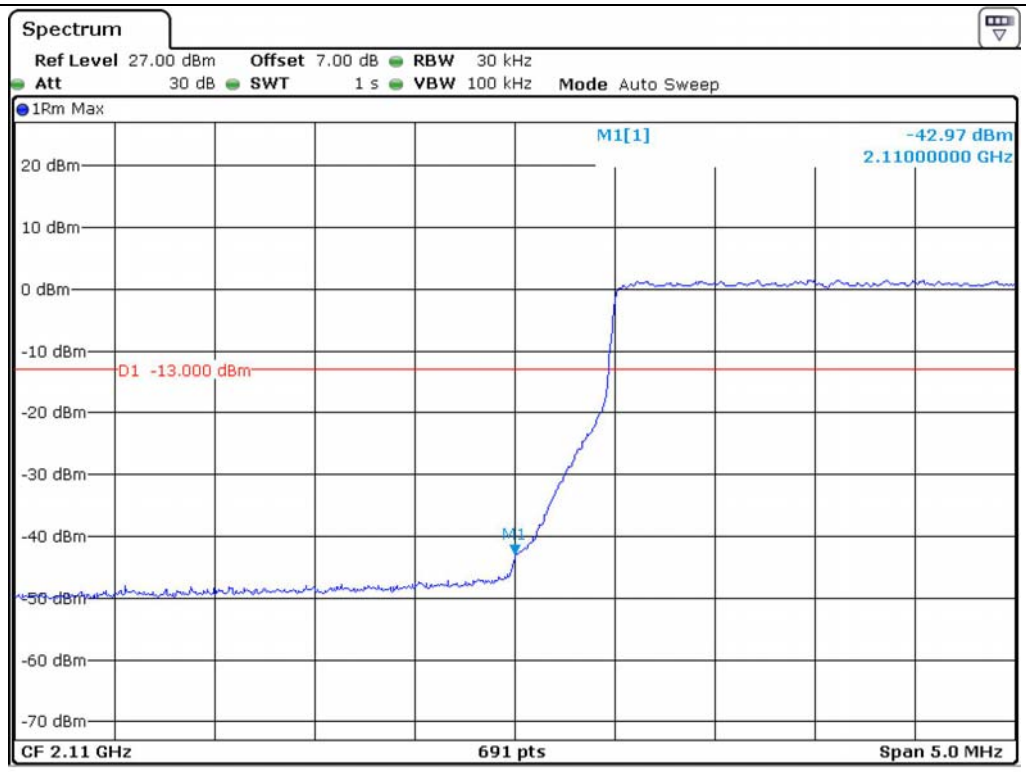
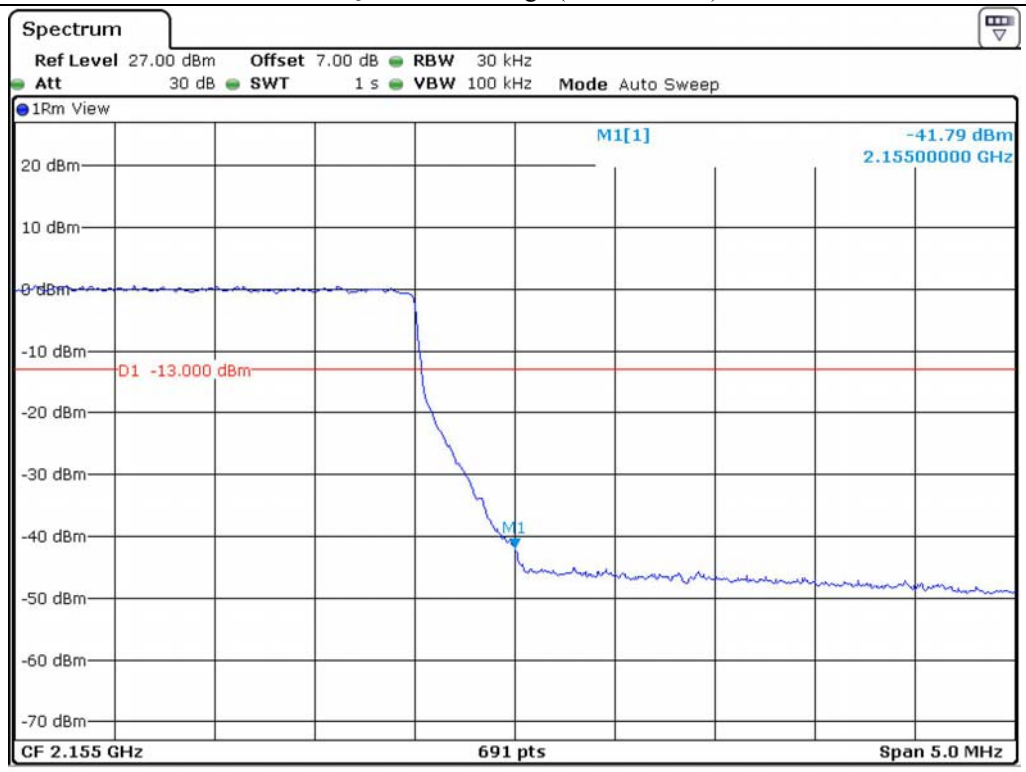


64 QAM – Band Edge (Low Channel)



64 QAM– Band Edge (High Channel)

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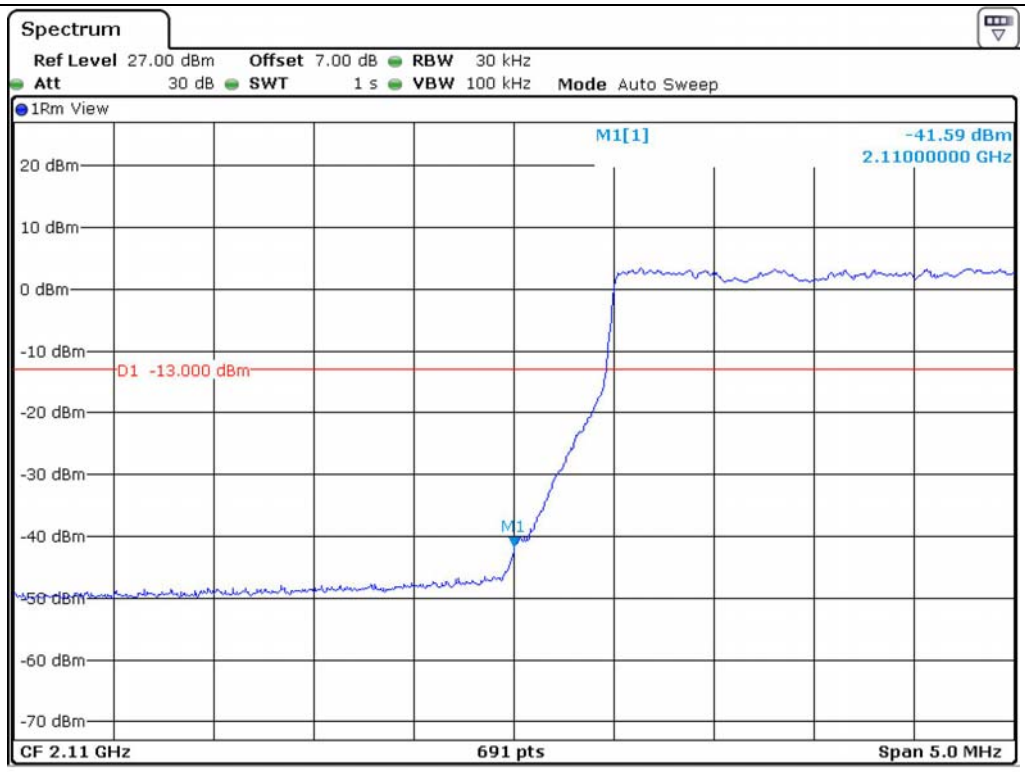
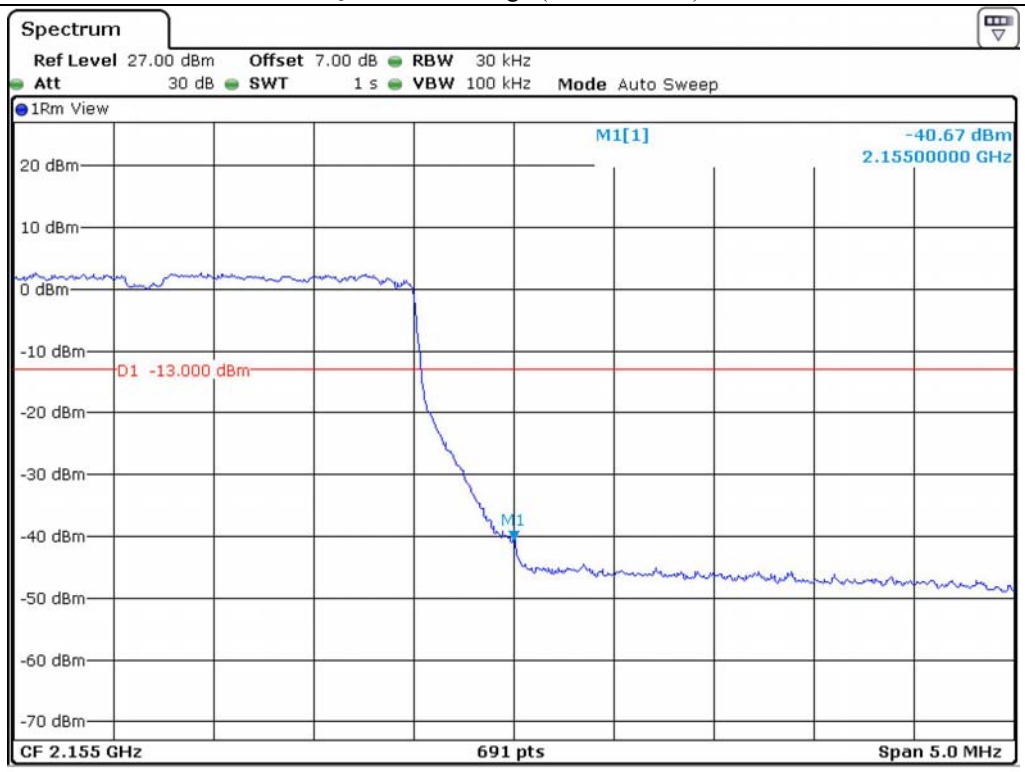


QPSK– Band Edge (Low Channel)



QPSK– Band Edge (High Channel)

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8.5.3 Test Result for Part 27 C (700LTE)

-. Test Date : October 07, 2013

-. Frequency range : 30 MHz ~ 15 GHz

-. Result : Pass

Modulation	Measured Frequency (MHz)	Measured Value (dBm)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
16 QAM	745.645	-49.08	1.15	-47.93	18.22	66.15
	745.935	-48.95	1.15	-47.80	13.00	60.80
	739.922	-46.36	1.15	-45.21	13.00	58.21
	761.051	-47.10	1.15	-45.95	13.00	58.95
64 QAM	745.645	-49.07	1.15	-47.92	18.22	66.14
	745.964	-48.79	1.15	-47.64	13.00	60.64
	737.288	-47.21	1.15	-46.06	13.00	59.06
	761.022	-47.65	1.15	-46.50	13.00	59.50
QPSK	745.559	-49.39	1.15	-48.24	18.22	66.46
	745.935	-48.70	1.15	-47.55	13.00	60.55
	739.922	-46.04	1.15	-44.89	13.00	57.89
	761.166	-47.14	1.15	-45.99	13.00	58.99

From CFR 27.53(c)(5): Compliance with the provisions of paragraphs (c) (1) and (c) (2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may b employed.

Tested by: Hong-Kyu, Lee/ Engineer

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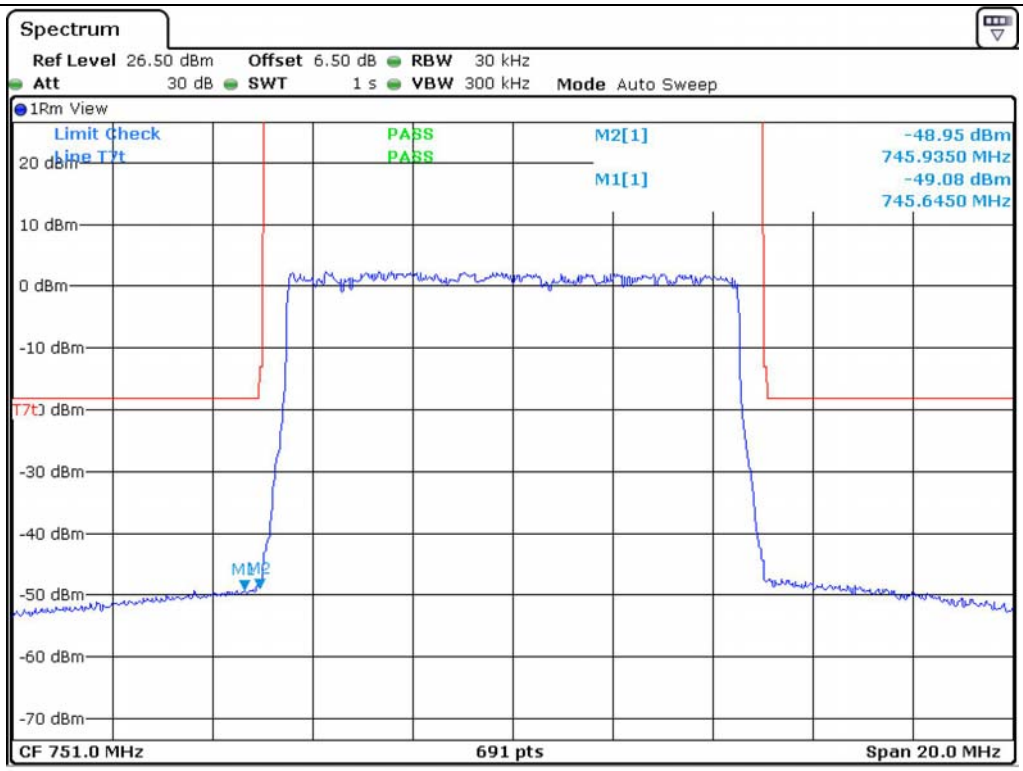

16 QAM

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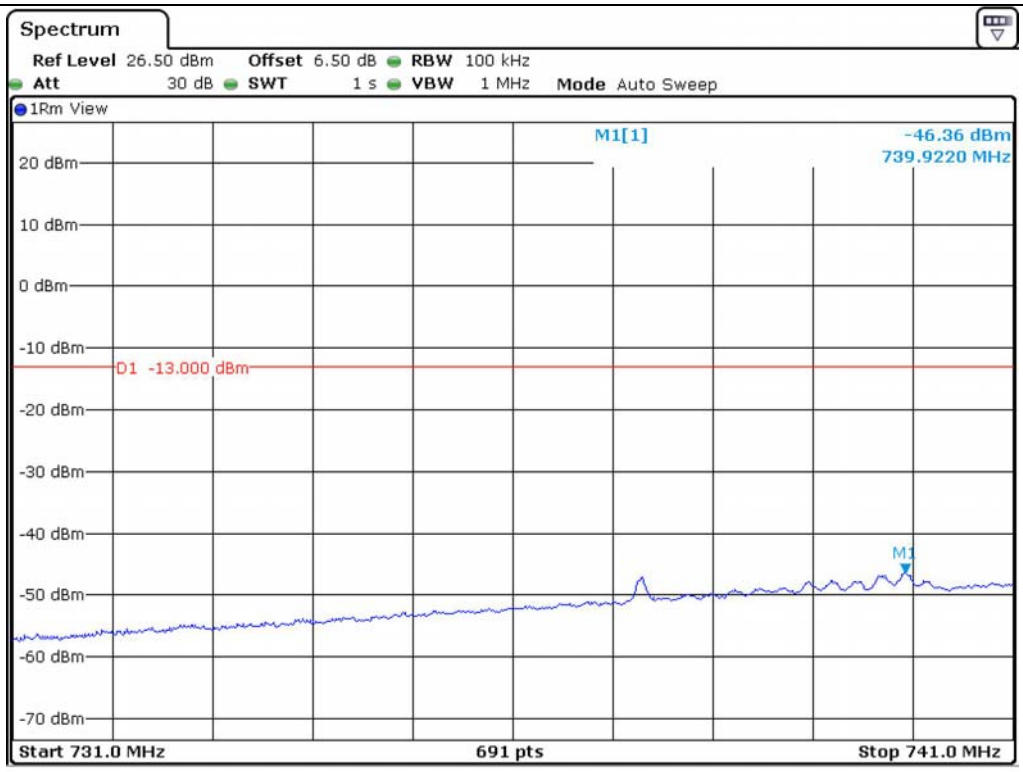
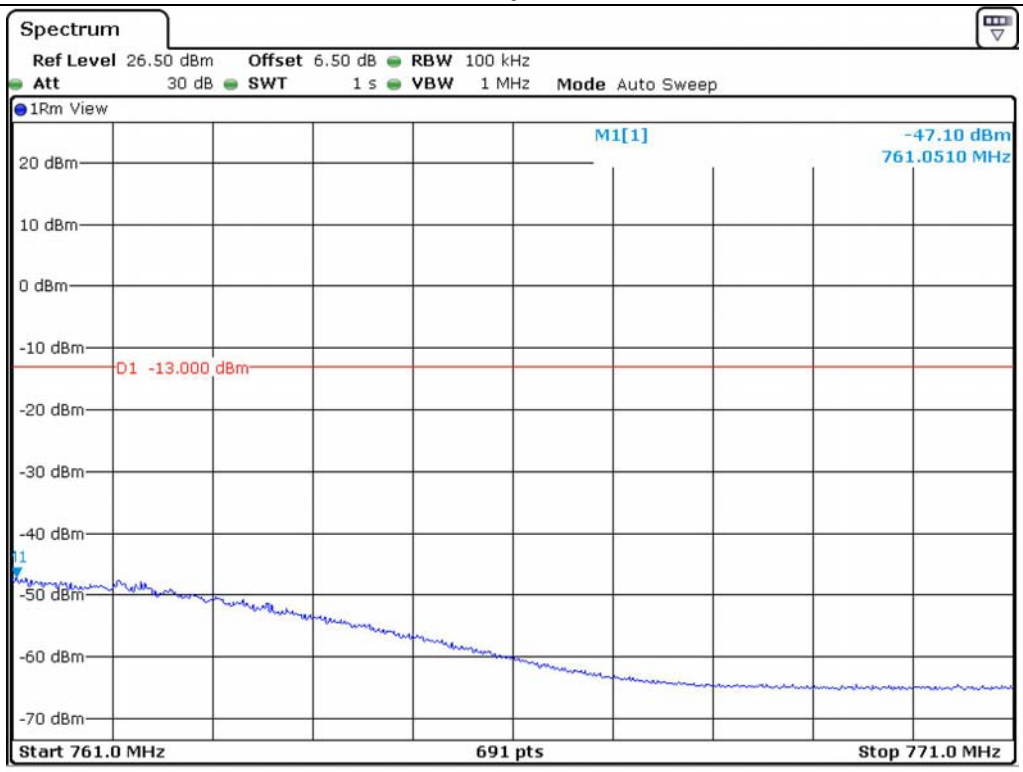


16 QAM



16 QAM

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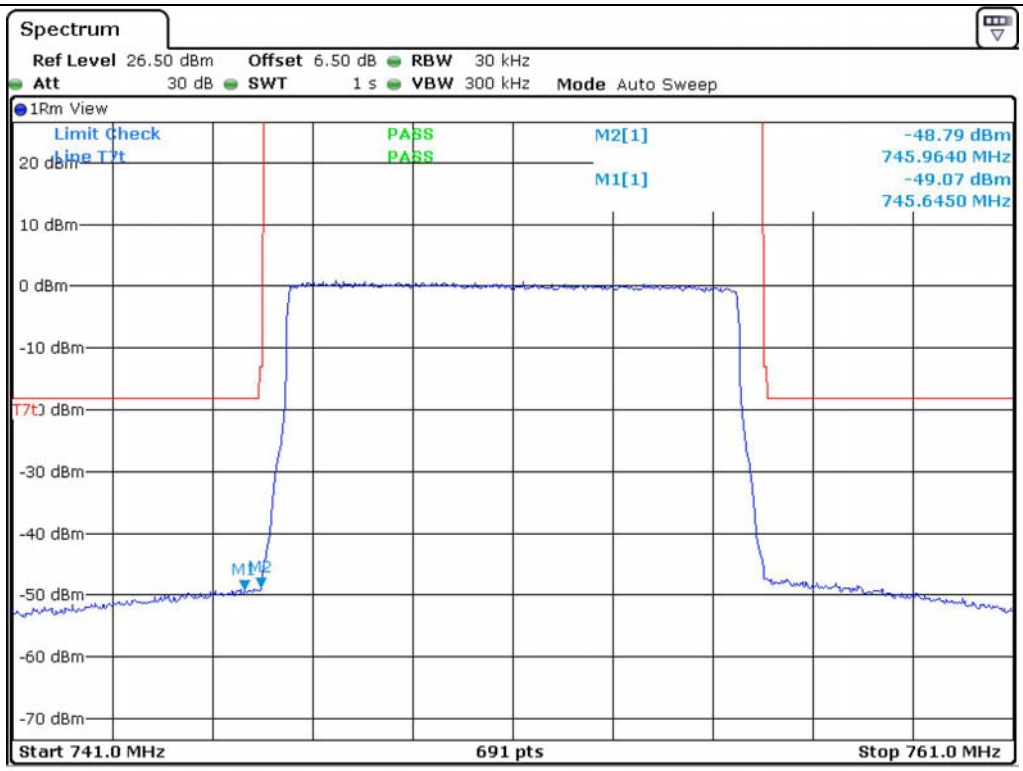

64 QAM

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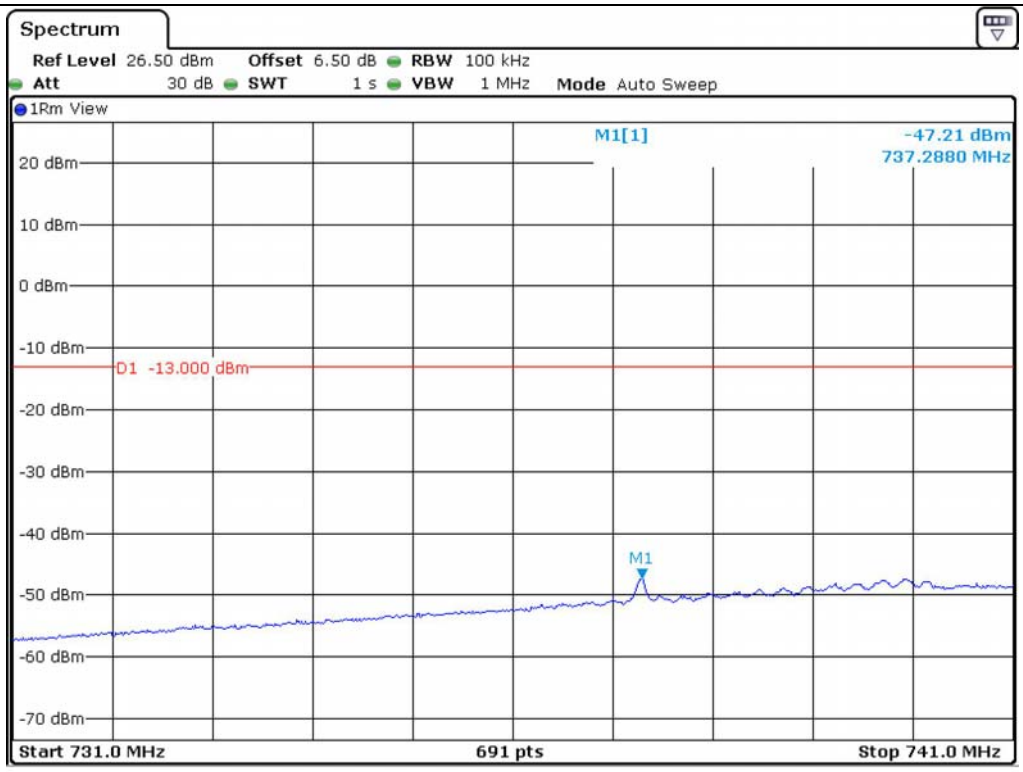
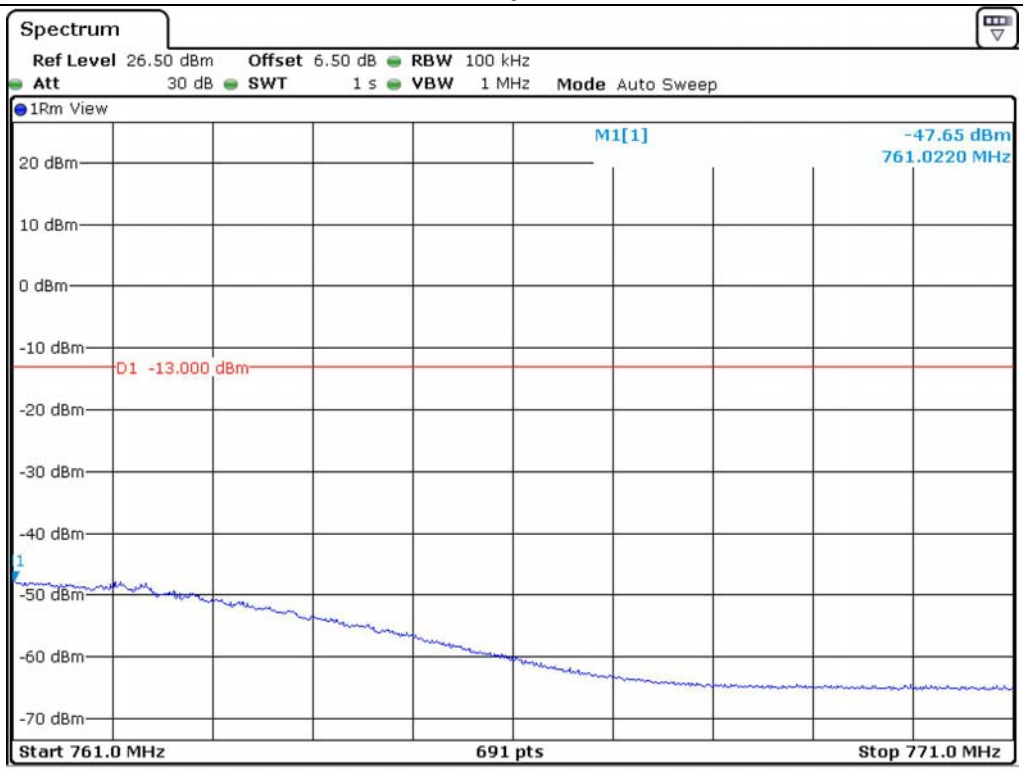


64 QAM



64 QAM

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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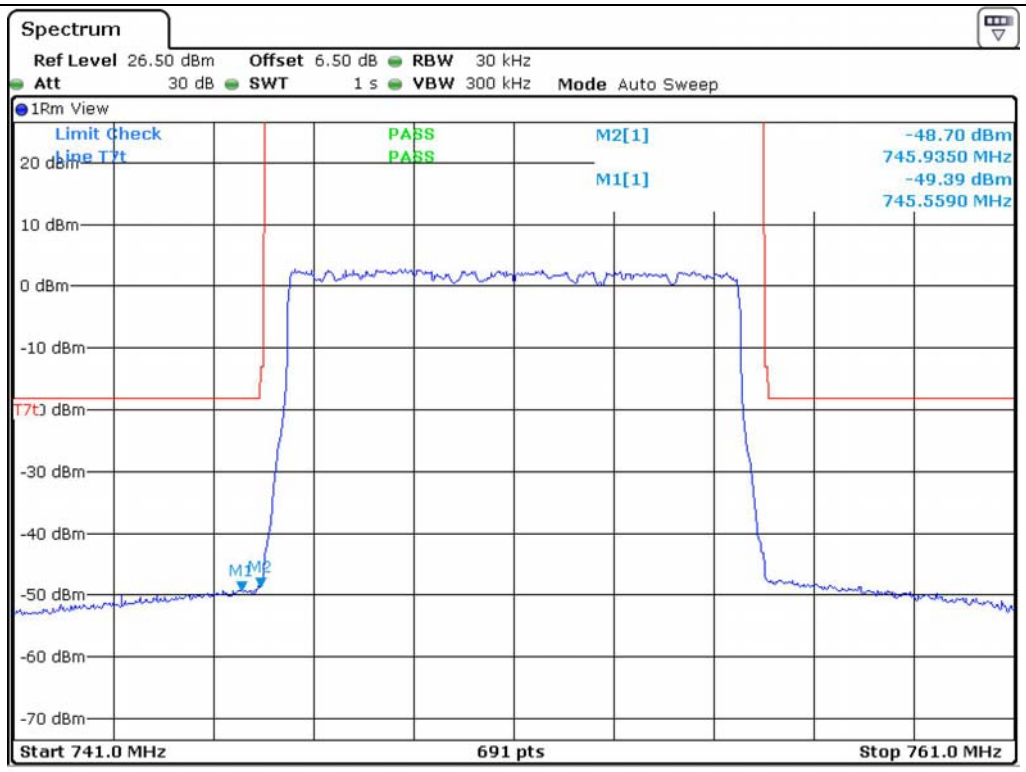

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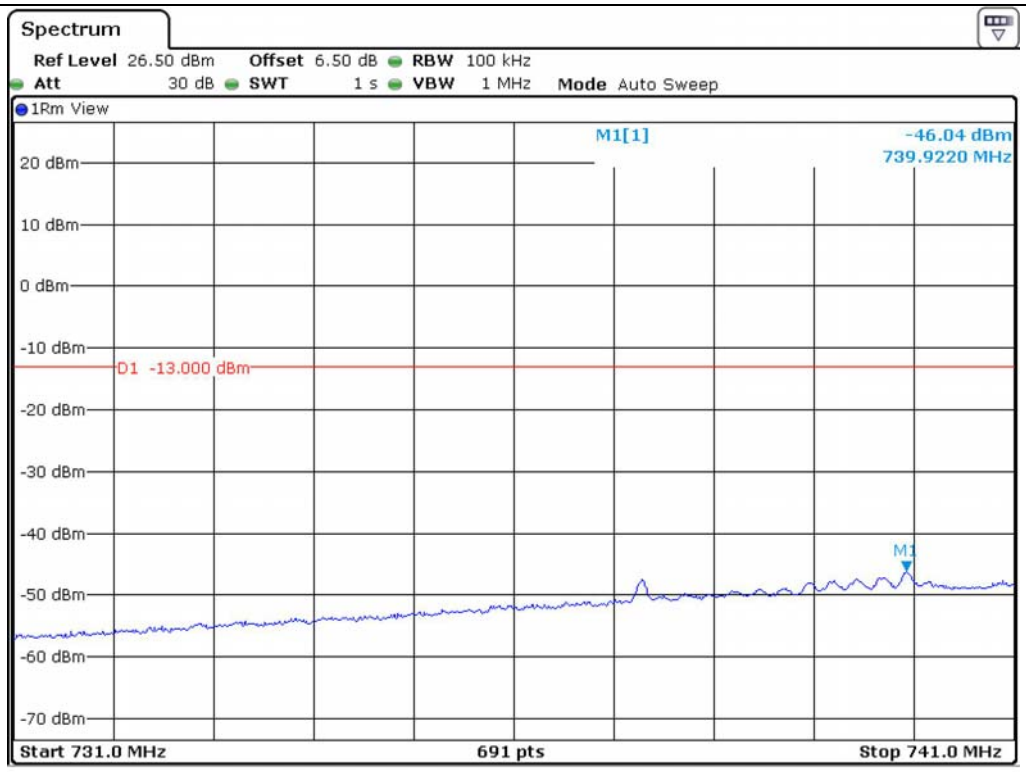
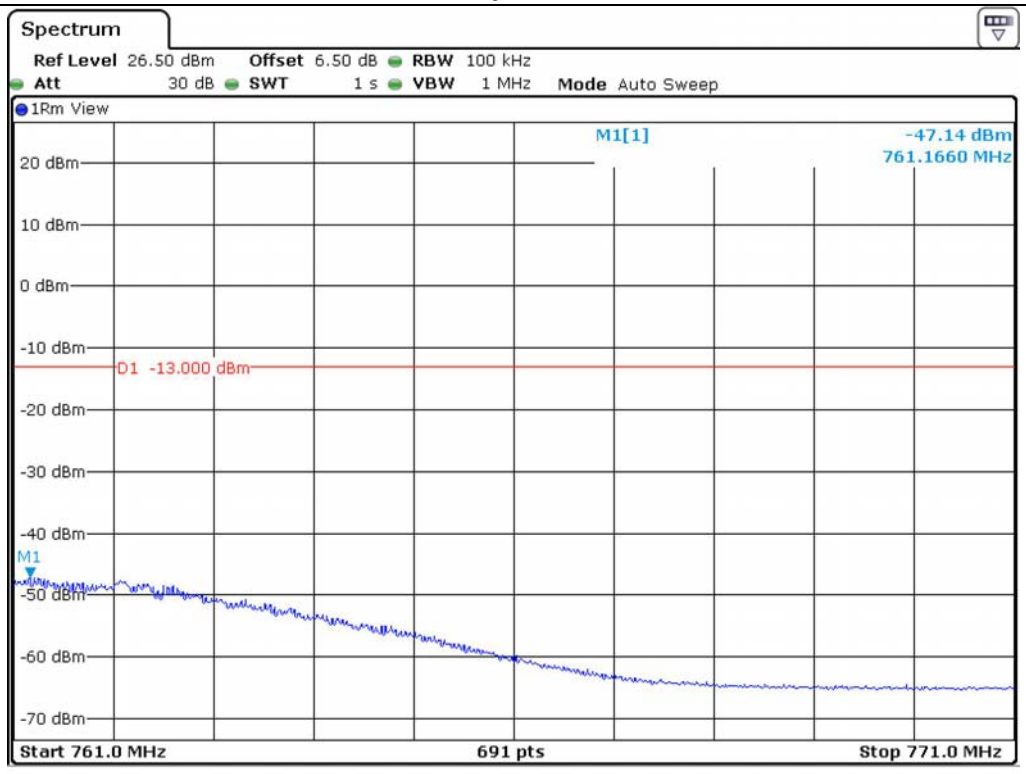


QPSK



QPSK

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9. FIELD STRENGTH OF SPURIOUS RADIATION

9.1 Operating environment

Temperature : 18 °C

Relative humidity : 45 % R.H.

9.2 Test set-up

The radiated emissions measurements were on the 10 m semi anechoic chamber. 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.

9.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	May 31, 2012 (1Y)
■ -	ESCI	Rohde & Schwarz	Test Receiver	101012	Feb. 06, 2013 (1Y)
■ -	310N	Sonoma Instrument	Pre-Amplifier	312544	May 30, 2012 (1Y)
■ -	SCU-18	Rohde & Schwarz	Pre-Amplifier	10041	Jan. 25, 2013 (1Y)
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-420	Apr. 24, 2012 (2Y)
■ -	3121C	EMCO	Dipole Antenna	9001-509	Dec. 06, 2011 (2Y)
■	83650L	HP	Swept CW Generator	3844A00415	May 31, 2012 (1Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 23, 2011 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Aug. 23, 2011 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Mar. 06, 2013 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170179	Mar. 06, 2013 (2Y)
■ -	83051A	Agilent	Microwave System Preamplifer	3950M00201	May 22, 2013 (1Y)

All test equipment used is calibrated on a regular basis.

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9.4 Test data for radiated emission

9.4.1 Test Result for Part 27 C (AWS-1) With Adapter (SHA65S12)

9.4.1.1 Test data for 5 MHz - 64 QAM

-. Test Date : October 15, 2013

-. 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 ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 112.50	113.38	3.40	10.78	H	2.87	11.31	-	-
	113.65	3.59		V		11.50	-	-
31.94	52.70	-52.72	1.05	V	0.18	-51.85	-13.00	38.85
62.01	51.60	-66.25	1.18	V	0.42	-65.49	-13.00	52.49
104.69	51.10	-66.13	2.28	V	0.58	-64.43	-13.00	51.43
107.60	51.90	-66.65	2.28	H	0.59	-64.96	-13.00	51.96
276.38	50.60	-65.11	1.43	H	0.96	-64.64	-13.00	51.64
966.04	51.10	-47.18	-0.03	V	1.89	-49.10	-13.00	36.10
Test Data for Middle Channel								
2 132.50	113.41	3.43	10.78	H	2.87	11.34	-	-
	113.73	3.67		V		11.58	-	-
31.94	52.50	-52.92	1.05	V	0.18	-52.05	-13.00	39.05
62.01	51.40	-66.45	1.18	V	0.42	-65.69	-13.00	52.69
104.69	51.30	-65.93	2.28	V	0.58	-64.23	-13.00	51.23
107.60	51.80	-66.75	2.28	H	0.59	-65.06	-13.00	52.06
276.38	50.40	-65.31	1.43	H	0.96	-64.84	-13.00	51.84
966.04	51.70	-46.58	-0.03	V	1.89	-48.50	-13.00	35.50

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Test Data for High Channel								
2 152.50	113.44	3.46	10.79	H	2.88	11.37	-	-
	113.75	3.69		V		11.60	-	-
31.94	52.90	-52.52	1.05	V	0.18	-51.65	-13.00	38.65
62.01	51.40	-66.45	1.18	V	0.42	-65.69	-13.00	52.69
104.69	51.60	-65.63	2.28	V	0.58	-63.93	-13.00	50.93
107.60	51.80	-66.75	2.28	H	0.59	-65.06	-13.00	52.06
276.38	50.80	-64.91	1.43	H	0.96	-64.44	-13.00	51.44
966.04	51.20	-47.08	-0.03	V	1.89	-49.00	-13.00	36.00
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.1.2 Test data for 5 MHz - 16 QAM

-. Test Date : October 15, 2013

-. 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 ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 112.50	113.25	3.27	10.78	H	2.87	11.18	-	-
	113.59	3.53		V		11.44	-	-
31.94	52.50	-52.92	1.05	V	0.18	-52.05	-13.00	39.05
62.01	51.20	-66.65	1.18	V	0.42	-65.89	-13.00	52.89
104.69	50.80	-66.43	2.28	V	0.58	-64.73	-13.00	51.73
107.60	51.80	-66.75	2.28	H	0.59	-65.06	-13.00	52.06
276.38	50.90	-64.81	1.43	H	0.96	-64.34	-13.00	51.34
966.04	50.70	-47.58	-0.03	V	1.89	-49.50	-13.00	36.50
Test Data for Middle Channel								
2 132.50	113.45	3.47	10.78	H	2.87	11.38	-	-
	113.67	3.61		V		11.52	-	-
31.94	52.30	-53.12	1.05	V	0.18	-52.25	-13.00	39.25
62.01	51.80	-66.05	1.18	V	0.42	-65.29	-13.00	52.29
104.69	51.60	-65.63	2.28	V	0.58	-63.93	-13.00	50.93
107.60	52.30	-66.25	2.28	H	0.59	-64.56	-13.00	51.56
276.38	50.70	-65.01	1.43	H	0.96	-64.54	-13.00	51.54
966.04	52.00	-46.28	-0.03	V	1.89	-48.20	-13.00	35.20

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Test Data for High Channel								
2 152.50	113.42	3.44	10.79	H	2.88	11.35	-	-
	113.69	3.63		V		11.54	-	-
31.94	52.70	-52.72	1.05	V	0.18	-51.85	-13.00	38.85
62.01	51.10	-66.75	1.18	V	0.42	-65.99	-13.00	52.99
104.69	51.50	-65.73	2.28	V	0.58	-64.03	-13.00	51.03
107.60	52.50	-66.05	2.28	H	0.59	-64.36	-13.00	51.36
276.38	51.40	-64.31	1.43	H	0.96	-63.84	-13.00	50.84
966.04	51.70	-46.58	-0.03	V	1.89	-48.50	-13.00	35.50
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

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9.4.1.3 Test data for 5 MHz - QPSK

-. Test Date : October 15, 2013

-. 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 ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 112.50	113.43	3.45	10.78	H	2.87	11.36	-	-
	113.61	3.55		V		11.46	-	-
31.94	52.50	-52.92	1.05	V	0.18	-52.05	-13.00	39.05
62.01	51.80	-66.05	1.18	V	0.42	-65.29	-13.00	52.29
104.69	51.00	-66.23	2.28	V	0.58	-64.53	-13.00	51.53
107.60	51.80	-66.75	2.28	H	0.59	-65.06	-13.00	52.06
276.38	50.50	-65.21	1.43	H	0.96	-64.74	-13.00	51.74
966.04	51.30	-46.98	-0.03	V	1.89	-48.90	-13.00	35.90
Test Data for Middle Channel								
2 132.50	113.44	3.46	10.78	H	2.87	11.37	-	-
	113.75	3.69		V		11.60	-	-
31.94	52.70	-52.72	1.05	V	0.18	-51.85	-13.00	38.85
62.01	51.70	-66.15	1.18	V	0.42	-65.39	-13.00	52.39
104.69	50.90	-66.33	2.28	V	0.58	-64.63	-13.00	51.63
107.60	51.50	-67.05	2.28	H	0.59	-65.36	-13.00	52.36
276.38	50.60	-65.11	1.43	H	0.96	-64.64	-13.00	51.64
966.04	51.50	-46.78	-0.03	V	1.89	-48.70	-13.00	35.70

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Test Data for High Channel								
2 152.50	113.41	3.43	10.79	H	2.88	11.34	-	-
	113.79	3.73		V		11.64	-	-
31.94	53.10	-52.32	1.05	V	0.18	-51.45	-13.00	38.45
62.01	51.70	-66.15	1.18	V	0.42	-65.39	-13.00	52.39
104.69	51.30	-65.93	2.28	V	0.58	-64.23	-13.00	51.23
107.60	51.40	-67.15	2.28	H	0.59	-65.46	-13.00	52.46
276.38	51.10	-64.61	1.43	H	0.96	-64.14	-13.00	51.14
966.04	51.50	-46.78	-0.03	V	1.89	-48.70	-13.00	35.70
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.1.4 Test data for 10 MHz - 64 QAM

-. Test Date : October 15, 2013

-. 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 ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 115.00	113.31	3.33	10.78	H	2.87	11.24	-	-
	113.74	3.68		V		11.59	-	-
31.94	52.40	-53.02	1.05	V	0.18	-52.15	-13.00	39.15
62.01	51.90	-65.95	1.18	V	0.42	-65.19	-13.00	52.19
104.69	51.50	-65.73	2.28	V	0.58	-64.03	-13.00	51.03
107.60	51.40	-67.15	2.28	H	0.59	-65.46	-13.00	52.46
276.38	50.40	-65.31	1.43	H	0.96	-64.84	-13.00	51.84
966.04	51.90	-46.38	-0.03	V	1.89	-48.30	-13.00	35.30
Test Data for Middle Channel								
2 132.50	113.64	3.66	10.78	H	2.87	-51.95	-	-
	113.82	3.76		V		-65.89	-	-
31.94	52.60	-52.82	1.05	V	0.18	-64.13	-13.00	38.95
62.01	51.20	-66.65	1.18	V	0.42	-65.89	-13.00	52.89
104.69	51.40	-65.83	2.28	V	0.58	-64.13	-13.00	51.13
107.60	51.70	-66.85	2.28	H	0.59	-65.16	-13.00	52.16
276.38	50.20	-65.51	1.43	H	0.96	-65.04	-13.00	52.04
966.04	51.70	-46.58	-0.03	V	1.89	-48.50	-13.00	35.50

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Test Data for High Channel								
2 150.00	113.82	3.84	10.79	H	2.88	11.75	-	-
	113.88	3.82		V		11.73	-	-
31.94	52.10	-53.32	1.05	V	0.18	-52.45	-13.00	39.45
62.01	51.40	-66.45	1.18	V	0.42	-65.69	-13.00	52.69
104.69	51.60	-65.63	2.28	V	0.58	-63.93	-13.00	50.93
107.60	51.70	-66.85	2.28	H	0.59	-65.16	-13.00	52.16
276.38	50.50	-65.21	1.43	H	0.96	-64.74	-13.00	51.74
966.04	51.30	-46.98	-0.03	V	1.89	-48.90	-13.00	35.90
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.1.5 Test data for 10 MHz - 16 QAM

-. Test Date : October 15, 2013

-. 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 ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 115.00	113.33	3.35	10.78	H	2.87	11.26	-	-
	113.70	3.64		V		11.55	-	-
31.94	52.60	-52.82	1.05	V	0.18	-51.95	-13.00	38.95
62.01	52.00	-65.85	1.18	V	0.42	-65.09	-13.00	52.09
104.69	51.70	-65.53	2.28	V	0.58	-63.83	-13.00	50.83
107.60	51.10	-67.45	2.28	H	0.59	-65.76	-13.00	52.76
276.38	50.10	-65.61	1.43	H	0.96	-65.14	-13.00	52.14
966.04	51.70	-46.58	-0.03	V	1.89	-48.50	-13.00	35.50
Test Data for Middle Channel								
2 132.50	113.59	3.61	10.78	H	2.87	11.52	-	-
	113.79	3.73		V		11.64	-	-
31.94	52.40	-53.02	1.05	V	0.18	-52.15	-13.00	39.15
62.01	51.50	-66.35	1.18	V	0.42	-65.59	-13.00	52.59
104.69	51.70	-65.53	2.28	V	0.58	-63.83	-13.00	50.83
107.60	51.90	-66.65	2.28	H	0.59	-64.96	-13.00	51.96
276.38	50.30	-65.41	1.43	H	0.96	-64.94	-13.00	51.94
966.04	51.80	-46.48	-0.03	V	1.89	-48.40	-13.00	35.40

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Test Data for High Channel								
2 150.00	113.85	3.87	10.79	H	2.88	11.78	-	-
	113.90	3.84		V		11.75	-	-
31.94	52.30	-53.12	1.05	V	0.18	-52.25	-13.00	39.25
62.01	51.60	-66.25	1.18	V	0.42	-65.49	-13.00	52.49
104.69	51.90	-65.33	2.28	V	0.58	-63.63	-13.00	50.63
107.60	51.80	-66.75	2.28	H	0.59	-65.06	-13.00	52.06
276.38	50.70	-65.01	1.43	H	0.96	-64.54	-13.00	51.54
966.04	51.40	-46.88	-0.03	V	1.89	-48.80	-13.00	35.80
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.1.6 Test data for 10 MHz - QPSK

-. Test Date : October 15, 2013

-. 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 ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 115.00	113.29	3.31	10.78	H	2.87	11.22	-	-
	113.71	3.65		V		11.56	-	-
31.94	52.20	-53.22	1.05	V	0.18	-52.35	-13.00	39.35
62.01	51.70	-66.15	1.18	V	0.42	-65.39	-13.00	52.39
104.69	51.30	-65.93	2.28	V	0.58	-64.23	-13.00	51.23
107.60	51.10	-67.45	2.28	H	0.59	-65.76	-13.00	52.76
276.38	50.20	-65.51	1.43	H	0.96	-65.04	-13.00	52.04
966.04	51.70	-46.58	-0.03	V	1.89	-48.50	-13.00	35.50
Test Data for Middle Channel								
2 132.50	113.60	3.62	10.78	H	2.87	11.53	-	-
	113.81	3.75		V		11.66	-	-
31.94	52.40	-53.02	1.05	V	0.18	-52.15	-13.00	39.15
62.01	50.90	-66.95	1.18	V	0.42	-66.19	-13.00	53.19
104.69	51.70	-65.53	2.28	V	0.58	-63.83	-13.00	50.83
107.60	51.80	-66.75	2.28	H	0.59	-65.06	-13.00	52.06
276.38	50.40	-65.31	1.43	H	0.96	-64.84	-13.00	51.84
966.04	51.30	-46.98	-0.03	V	1.89	-48.90	-13.00	35.90

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Test Data for High Channel								
2 150.00	113.85	3.87	10.79	H	2.88	11.78	-	-
	113.88	3.82		V		11.73	-	-
31.94	52.40	-53.02	1.05	V	0.18	-52.15	-13.00	39.15
62.01	51.10	-66.75	1.18	V	0.42	-65.99	-13.00	52.99
104.69	51.20	-66.03	2.28	V	0.58	-64.33	-13.00	51.33
107.60	51.80	-66.75	2.28	H	0.59	-65.06	-13.00	52.06
276.38	50.80	-64.91	1.43	H	0.96	-64.44	-13.00	51.44
966.04	51.50	-46.78	-0.03	V	1.89	-48.70	-13.00	35.70
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.2 Test Result for Part 27 C (AWS-1) With PoE (POE75U-1UP-S-R)

9.4.2.1 Test data for 5 MHz - 64 QAM

-. Test Date : October 15, 2013

-. 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 ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 112.50	113.27	3.29	10.78	H	2.87	11.20	-	-
	113.59	3.53		V		11.44	-	-
35.82	54.10	-54.67	1.12	V	0.25	-53.80	-13.00	40.80
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.80	-59.83	2.29	V	0.58	-58.12	-13.00	45.12
208.48	55.60	-62.32	1.53	H	0.85	-61.64	-13.00	48.64
970.88	44.90	-54.70	-0.68	H	1.93	-57.31	-13.00	44.31
Test Data for Middle Channel								
2 132.50	113.38	3.40	10.78	H	2.87	11.31	-	-
	113.69	3.63		V		11.54	-	-
35.82	54.20	-54.57	1.12	V	0.25	-53.70	-13.00	40.70
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.90	-59.73	2.29	V	0.58	-58.02	-13.00	45.02
208.48	55.30	-62.62	1.53	H	0.85	-61.94	-13.00	48.94
970.88	44.20	-55.40	-0.68	H	1.93	-58.01	-13.00	45.01

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Test Data for High Channel								
2 152.50	113.41	3.43	10.79	H	2.88	11.34	-	-
	113.71	3.65		V		11.56	-	-
35.82	54.70	-54.07	1.12	V	0.25	-53.20	-13.00	40.20
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.10	-60.53	2.29	V	0.58	-58.82	-13.00	45.82
208.48	55.60	-62.32	1.53	H	0.85	-61.64	-13.00	48.64
970.88	44.70	-54.90	-0.68	H	1.93	-57.51	-13.00	44.51
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.2.2 Test data for 5 MHz - 16 QAM

-. Test Date : October 15, 2013

-. 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 ~ 26.5 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 112.50	113.19	3.21	10.78	H	2.87	11.12	-	-
	113.54	3.48		V		11.39	-	-
35.82	54.40	-54.37	1.12	V	0.25	-53.50	-13.00	40.50
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.20	-60.43	2.29	V	0.58	-58.72	-13.00	45.72
208.48	55.90	-62.02	1.53	H	0.85	-61.34	-13.00	48.34
970.88	44.60	-55.00	-0.68	H	1.93	-57.61	-13.00	44.61
Test Data for Middle Channel								
2 132.50	113.41	3.43	10.78	H	2.87	11.34	-	-
	113.63	3.57		V		11.48	-	-
35.82	54.10	-54.67	1.12	V	0.25	-53.80	-13.00	40.80
99.84	56.70	-59.58	2.24	V	0.52	-57.86	-13.00	44.86
116.33	57.60	-60.03	2.29	V	0.58	-58.32	-13.00	45.32
208.48	54.80	-63.12	1.53	H	0.85	-62.44	-13.00	49.44
970.88	44.90	-54.70	-0.68	H	1.93	-57.31	-13.00	44.31

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Test Data for High Channel								
2 152.50	113.38	3.40	10.79	H	2.88	11.31	-	-
	113.62	3.56		V		11.47	-	-
35.82	55.10	-53.67	1.12	V	0.25	-52.80	-13.00	39.80
99.84	56.10	-60.18	2.24	V	0.52	-58.46	-13.00	45.46
116.33	56.80	-60.83	2.29	V	0.58	-59.12	-13.00	46.12
208.48	55.90	-62.02	1.53	H	0.85	-61.34	-13.00	48.34
970.88	44.90	-54.70	-0.68	H	1.93	-57.31	-13.00	44.31
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.2.3 Test data for 5 MHz - QPSK

-. Test Date : October 15, 2013

-. 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 ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 112.50	113.41	3.43	10.78	H	2.87	11.34	-	-
	113.55	3.49		V		11.40	-	-
35.82	54.10	-54.67	1.12	V	0.25	-53.80	-13.00	40.80
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.60	-60.03	2.29	V	0.58	-58.32	-13.00	45.32
208.48	55.80	-62.12	1.53	H	0.85	-61.44	-13.00	48.44
970.88	44.20	-55.40	-0.68	H	1.93	-58.01	-13.00	45.01
Test Data for Middle Channel								
2 132.50	113.42	3.44	10.78	H	2.87	11.35	-	-
	113.72	3.66		V		11.57	-	-
35.82	54.90	-53.87	1.12	V	0.25	-53.00	-13.00	40.00
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.60	-60.03	2.29	V	0.58	-58.32	-13.00	45.32
208.48	55.50	-62.42	1.53	H	0.85	-61.74	-13.00	48.74
970.88	44.30	-55.30	-0.68	H	1.93	-57.91	-13.00	44.91

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Test Data for High Channel								
2 152.50	113.34	3.36	10.79	H	2.88	11.27	-	-
	113.73	3.67		V		11.58	-	-
35.82	54.40	-54.37	1.12	V	0.25	-53.50	-13.00	40.50
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.80	-59.83	2.29	V	0.58	-58.12	-13.00	45.12
208.48	55.30	-62.62	1.53	H	0.85	-61.94	-13.00	48.94
970.88	44.80	-54.80	-0.68	H	1.93	-57.41	-13.00	44.41
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.2.4 Test data for 10 MHz - 64 QAM

-. Test Date : October 15, 2013

-. 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 ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 115.00	113.27	3.29	10.78	H	2.87	11.20	-	-
	113.67	3.61		V		11.52	-	-
35.82	54.90	-53.87	1.12	V	0.25	-53.00	-13.00	40.00
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.60	-60.03	2.29	V	0.58	-58.32	-13.00	45.32
208.48	55.60	-62.32	1.53	H	0.85	-61.64	-13.00	48.64
970.88	44.20	-55.40	-0.68	H	1.93	-58.01	-13.00	45.01
Test Data for Middle Channel								
2 132.50	113.59	3.61	10.78	H	2.87	11.52	-	-
	113.77	3.71		V		11.62	-	-
35.82	53.90	-54.87	1.12	V	0.25	-54.00	-13.00	41.00
99.84	56.10	-60.18	2.24	V	0.52	-58.46	-13.00	45.46
116.33	57.30	-60.33	2.29	V	0.58	-58.62	-13.00	45.62
208.48	55.80	-62.12	1.53	H	0.85	-61.44	-13.00	48.44
970.88	45.10	-54.50	-0.68	H	1.93	-57.11	-13.00	44.11

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Test Data for High Channel								
2 150.00	113.76	3.78	10.79	H	2.88	11.69	-	-
	113.82	3.76		V		11.67	-	-
35.82	54.70	-54.07	1.12	V	0.25	-53.20	-13.00	40.20
99.84	56.20	-60.08	2.24	V	0.52	-58.36	-13.00	45.36
116.33	57.60	-60.03	2.29	V	0.58	-58.32	-13.00	45.32
208.48	55.40	-62.52	1.53	H	0.85	-61.84	-13.00	48.84
970.88	44.50	-55.10	-0.68	H	1.93	-57.71	-13.00	44.71
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.2.5 Test data for 10 MHz - 16 QAM

-. Test Date : October 15, 2013

-. 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 ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 115.00	113.27	3.29	10.78	H	2.87	11.20	-	-
	113.65	3.59		V		11.50	-	-
35.82	54.90	-53.87	1.12	V	0.25	-53.00	-13.00	40.00
99.84	56.20	-60.08	2.24	V	0.52	-58.36	-13.00	45.36
116.33	57.20	-60.43	2.29	V	0.58	-58.72	-13.00	45.72
208.48	55.60	-62.32	1.53	H	0.85	-61.64	-13.00	48.64
970.88	44.20	-55.40	-0.68	H	1.93	-58.01	-13.00	45.01
Test Data for Middle Channel								
2 132.50	113.51	3.53	10.78	H	2.87	11.44	-	-
	113.73	3.67		V		11.58	-	-
35.82	54.80	-53.97	1.12	V	0.25	-53.10	-13.00	40.10
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.40	-60.23	2.29	V	0.58	-58.52	-13.00	45.52
208.48	55.80	-62.12	1.53	H	0.85	-61.44	-13.00	48.44
970.88	44.30	-55.30	-0.68	H	1.93	-57.91	-13.00	44.91

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Test Data for High Channel								
2 150.00	113.81	3.83	10.79	H	2.88	11.74	-	-
	113.86	3.80		V		11.71	-	-
35.82	54.20	-54.57	1.12	V	0.25	-53.70	-13.00	40.70
99.84	56.20	-60.08	2.24	V	0.52	-58.36	-13.00	45.36
116.33	56.90	-60.73	2.29	V	0.58	-59.02	-13.00	46.02
208.48	55.60	-62.32	1.53	H	0.85	-61.64	-13.00	48.64
970.88	44.90	-54.70	-0.68	H	1.93	-57.31	-13.00	44.31
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.2.6 Test data for 10 MHz - QPSK

-. Test Date : October 15, 2013

-. 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 ~ 20 GHz

-. Measurement distance : 3 m

-. Result : Pass

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								
2 115.00	113.18	3.20	10.78	H	2.87	11.11	-	-
	113.56	3.50		V		11.41	-	-
35.82	54.30	-54.47	1.12	V	0.25	-53.60	-13.00	40.60
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.10	-60.53	2.29	V	0.58	-58.82	-13.00	45.82
208.48	55.60	-62.32	1.53	H	0.85	-61.64	-13.00	48.64
970.88	44.90	-54.70	-0.68	H	1.93	-57.31	-13.00	44.31
Test Data for Middle Channel								
2 132.50	113.48	3.50	10.78	H	2.87	11.41	-	-
	113.63	3.57		V		11.48	-	-
35.82	54.70	-54.07	1.12	V	0.25	-53.20	-13.00	40.20
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.60	-60.03	2.29	V	0.58	-58.32	-13.00	45.32
208.48	55.30	-62.62	1.53	H	0.85	-61.94	-13.00	48.94
970.88	44.80	-54.80	-0.68	H	1.93	-57.41	-13.00	44.41

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Test Data for High Channel								
2 150.00	113.81	3.83	10.79	H	2.88	11.74	-	-
	113.83	3.77		V		11.68	-	-
35.82	54.40	-54.37	1.12	V	0.25	-53.50	-13.00	40.50
99.84	56.30	-59.98	2.24	V	0.52	-58.26	-13.00	45.26
116.33	57.90	-59.73	2.29	V	0.58	-58.02	-13.00	45.02
208.48	55.80	-62.12	1.53	H	0.85	-61.44	-13.00	48.44
970.88	44.60	-55.00	-0.68	H	1.93	-57.61	-13.00	44.61
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.3 Test Result for Part 27 C (700LTE) With Adapter (SHA65S12)

-. Test Date : October 15, 2013

-. 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 : Pass

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 64 QAM								
751.00	108.70	2.06	1.43	H	1.69	1.80	-	-
	108.90	5.62		V		5.36	-	-
31.94	64.70	-40.72	1.05	V	0.18	-39.85	-13.00	26.85
38.73	56.30	-52.47	1.13	V	0.28	-51.62	-13.00	38.62
108.57	49.30	-67.93	2.28	V	0.58	-66.23	-13.00	53.23
223.03	49.70	-66.31	1.54	V	0.86	-65.63	-13.00	52.63
942.75	48.50	-52.57	-0.03	H	1.88	-54.48	-13.00	41.48
Test Data for 16 QAM								
751.00	108.40	1.76	1.43	H	1.69	1.50	-	-
	108.80	5.52		V		5.26	-	-
31.94	64.50	-40.92	1.05	V	0.18	-40.05	-13.00	27.05
38.73	56.10	-52.67	1.13	V	0.28	-51.82	-13.00	38.82
108.57	49.40	-67.83	2.28	V	0.58	-66.13	-13.00	53.13
223.03	49.80	-66.21	1.54	V	0.86	-65.53	-13.00	52.53
942.75	48.30	-52.77	-0.03	H	1.88	-54.68	-13.00	41.68

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Test Data for QPSK								
751.00	108.50	1.86	1.43	H	1.69	1.60	-	-
	109.20	5.92		V		5.66	-	-
31.94	64.40	-41.02	1.05	V	0.18	-40.15	-13.00	27.15
38.73	56.70	-52.07	1.13	V	0.28	-51.22	-13.00	38.22
108.57	49.50	-67.73	2.28	V	0.58	-66.03	-13.00	53.03
223.03	49.20	-66.81	1.54	V	0.86	-66.13	-13.00	53.13
942.75	48.60	-52.47	-0.03	H	1.88	-54.38	-13.00	41.38
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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9.4.4 Test Result for Part 27 C (700LTE) With PoE (POE75U-1UP-S-R)

-. Test Date : October 15, 2013

-. 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 : Pass

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 64 QAM								
751.00	108.50	1.86	1.43	H	1.69	1.60	-	-
	108.60	5.32		V		5.06	-	-
35.82	54.80	-53.97	1.12	V	0.25	-53.10	-13.00	40.10
99.84	57.10	-59.18	2.24	V	0.52	-57.46	-13.00	44.46
116.33	57.80	-59.83	2.29	V	0.58	-58.12	-13.00	45.12
208.48	55.40	-62.52	1.53	H	0.85	-61.84	-13.00	48.84
970.88	44.90	-54.70	-0.68	H	1.93	-57.31	-13.00	44.31
Test Data for 16 QAM								
751.00	108.20	1.56	1.43	H	1.69	1.30	-	-
	108.60	5.32		V		5.06	-	-
35.82	54.60	-54.17	1.12	V	0.25	-53.30	-13.00	40.30
99.84	57.00	-59.28	2.24	V	0.52	-57.56	-13.00	44.56
116.33	57.40	-60.23	2.29	V	0.58	-58.52	-13.00	45.52
208.48	55.20	-62.72	1.53	H	0.85	-62.04	-13.00	49.04
970.88	44.40	-55.20	-0.68	H	1.93	-57.81	-13.00	44.81

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Test Data for QPSK								
751.00	108.30	1.66	1.43	H	1.69	1.40	-	-
	109.00	5.72		V		5.46	-	-
35.82	54.60	-54.17	1.12	V	0.25	-53.30	-13.00	40.30
99.84	56.80	-59.48	2.24	V	0.52	-57.76	-13.00	44.76
116.33	57.30	-60.33	2.29	V	0.58	-58.62	-13.00	45.62
208.48	55.10	-62.82	1.53	H	0.85	-62.14	-13.00	49.14
970.88	44.50	-55.10	-0.68	H	1.93	-57.71	-13.00	44.71
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

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

Tested by: Hong-Kyu, Lee/ Engineer

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10. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

10.1 Operating environment

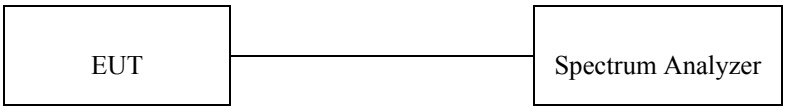
Temperature : 20 °C

Relative humidity : 42 % R.H.

10.2 Test set-up

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

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.



10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 10, 2012 (1Y)
■ -	SSE-43CI-A	Samkun	Chamber	060712	May 20, 2013 (1Y)
□ -	FSV30	R/S	FSV30 Signal Analyzer	101372	May 20, 2013 (1Y)
■ -	SA-26B-6	VENTRIX	6 dB Attenuator	CA5760	Dec. 06, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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10.4 Test data

10.4.1 Test Result for Part 27 C (AWS-1) With Adapter (SHA65S12)

-. Test Date : October 16, 2013

-. Result : Pass

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	2 132 500 000	2 132 500 457	0.214 3	Within the Authorized Frequency block
-20		2 132 500 413	0.193 7	
-10		2 132 500 394	0.184 8	
0		2 132 500 385	0.180 5	
10		2 132 500 329	0.154 3	
20		2 132 500 285	0.133 6	
30		2 132 500 248	0.116 3	
40		2 132 500 227	0.106 4	
50		2 132 500 213	0.099 9	

10.4.2 Test Result for Part 27 C (AWS-1) With PoE (POE75U-1UP-S-R)

-. Test Date : October 16, 2013

-. Result : Pass

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	2 132 500 000	2 132 500 424	0.198 8	Within the Authorized Frequency block
-20		2 132 500 397	0.186 2	
-10		2 132 500 364	0.170 7	
0		2 132 500 322	0.151 0	
10		2 132 500 314	0.147 2	
20		2 132 500 245	0.114 9	
30		2 132 500 142	0.066 6	
40		2 132 500 116	0.054 4	
50		2 132 500 084	0.039 4	

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10.4.3 Test Result for Part 27 C (700LTE) With Adapter (SHA65S12)

-. Test Date : October 15, 2013

-. Result : Pass

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	751 000 000	751 000 611	0.813 6	Within the Authorized Frequency block
-20		751 000 551	0.733 7	
-10		751 000 474	0.631 2	
0		751 000 328	0.436 8	
10		751 000 237	0.315 6	
20		751 000 202	0.269 0	
30		751 000 067	0.089 2	
40		751 000 063	0.083 9	
50		750 999 985	-0.020 0	

10.4.4 Test Result for Part 27 C (700LTE) With PoE (POE75U-1UP-S-R)

-. Test Date : October 15, 2013

-. Result : Pass

Temperature (˚C)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
-30	751 000 000	751 000 604	0.804 3	Within the Authorized Frequency block
-20		751 000 538	0.716 4	
-10		751 000 388	0.516 6	
0		751 000 314	0.418 1	
10		751 000 194	0.258 3	
20		751 000 142	0.189 1	
30		751 000 011	0.014 6	
40		750 999 989	-0.014 6	
50		750 999 894	-0.141 1	

Tested by: Hong-Kyu, Lee/ Engineer

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11. FREQUENCY STABILITY WITH VOLTAGE VARIATION

11.1 Operating environment

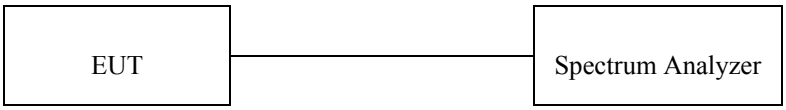
Temperature : 20 °C

Relative humidity : 42 % R.H.

12.2 Test set-up

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



11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	53152A	HP	Frequency Counter	US39270295	Dec. 10, 2012 (1Y)
□ -	FSV30	R/S	FSV30 Signal Analyzer	101372	May 20, 2013 (1Y)
■ -	SA-26B-6	VENTRIX	6 dB Attenuator	CA5760	Dec. 06, 2012 (1Y)
■ -	DH-60	Dea Kwang Elec.	Slidacs	N/A	Sep. 03, 2013 (1Y)
■ -	PAS60-12	KIKISUI Elec.	DC Power Supply	CA5760	Dec. 10, 2012 (1Y)

All test equipment used is calibrated on a regular basis.

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11.4 Test data

11.4.1 Test Result for 27 C (AWS-1) With Adapter (SHA65S12)

-. Test Date : October 16, 2013

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
13.8 (115 %)	2 132 500 000	2 132 500 285	0.133 6	Within the Authorized Frequency block
12.0 (100 %)		2 132 500 287	0.134 6	
10.2 (85 %)		2 132 500 285	0.133 6	

11.4.2 Test Result for 27 C (AWS-1) With PoE (POE75U-1UP-S-R)

-. Test Date : October 16, 2013

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
13.8 (115 %)	2 132 500 000	2 132 500 281	0.131 8	Within the Authorized Frequency block
12.0 (100 %)		2 132 500 285	0.133 6	
10.2 (85 %)		2 132 500 283	0.132 7	

Tested by: Hong-Kyu, Lee/ Engineer

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11.4.3 Test Result for Part 27 C (700LTE) With Adapter (SHA65S12)

-. Test Date : October 15, 2013

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
13.8 (115 %)	751 000 000	751 000 202	0.269 0	Within the Authorized Frequency block
12.0 (100 %)		751 000 202	0.269 0	
10.2 (85 %)		751 000 201	0.267 6	

11.4.4 Test Result for Part 27 C (700LTE) With PoE (POE75U-1UP-S-R)

-. Test Date : October 15, 2013

-. Result : PASSED

Voltage (Vdc)	Input Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
13.8 (115 %)	751 000 000	751 000 201	0.267 6	Within the Authorized Frequency block
12.0 (100 %)		751 000 200	0.266 3	
10.2 (85 %)		751 000 202	0.269 0	

Tested by: Hong-Kyu, Lee/ Engineer

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12. MAXIMUM PERMISSIBLE EXPOSURE

12.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are f/1500 mW/cm² for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm² for the frequency range between 1 500 MHz and 100 000 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

$d = \sqrt{(30 * P * G) / (377 * 10 S)}$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 0.01 * 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

12.2 Calculated MPE Safe Distance

12.2.1 For Part 27 C (AWS-1, 5 MHz)

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)
24.10	257.04	2.72	1.87	6.18	0.10	1.0

According to above table, safe safe distance, $D = 0.282 * \sqrt{257.04 * 1.87} = 6.18$ cm.

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

$S = P * G / (4\pi * R^2) = 257.04 * 1.87 / (4 * 3.14 * 20^2) = 0.10$

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

Remark: The Power Density of the above table was calculated for single frequency.

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12.2.2 For Part 27 C (AWS-1, 10 MHz)

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)
24.12	258.23	2.72	1.87	6.20	0.10	1.0

According to above table, safe safe distance, D = 0.282 * $\sqrt{258.23 * 1.87}$ = 6.20 cm.

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

$S = P * G / (4\pi * R^2) = 258.23 * 1.87 / (4 * 3.14 * 20^2) = 0.10$

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

Remark: The Power Density of the above table was calculated for single frequency.

12.2.3 For Part 27 C (700LTE)

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)
24.12	258.23	2.72	1.87	8.77	0.10	0.50

According to above table, safe distance, D = 0.282 * $\sqrt{258.23 * 1.87/0.50}$ = 8.77 cm.

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

$S = P * G / (4\pi * R^2) = 258.23 * 1.87 / (4 * 3.14 * 20^2) = 0.10$

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

Remark: The Power Density of the above table was calculated for single frequency.

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