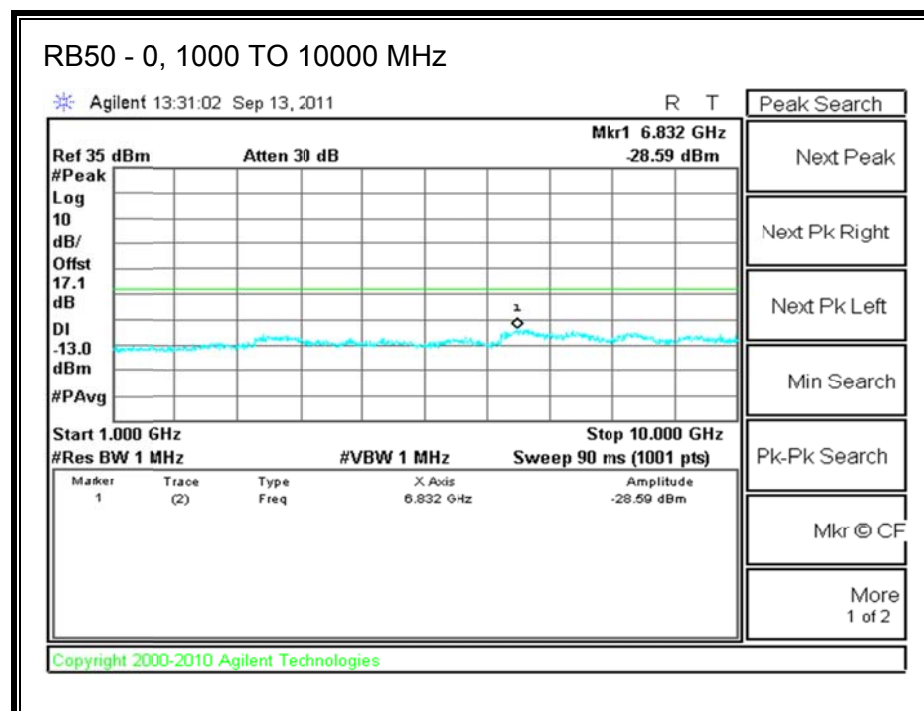
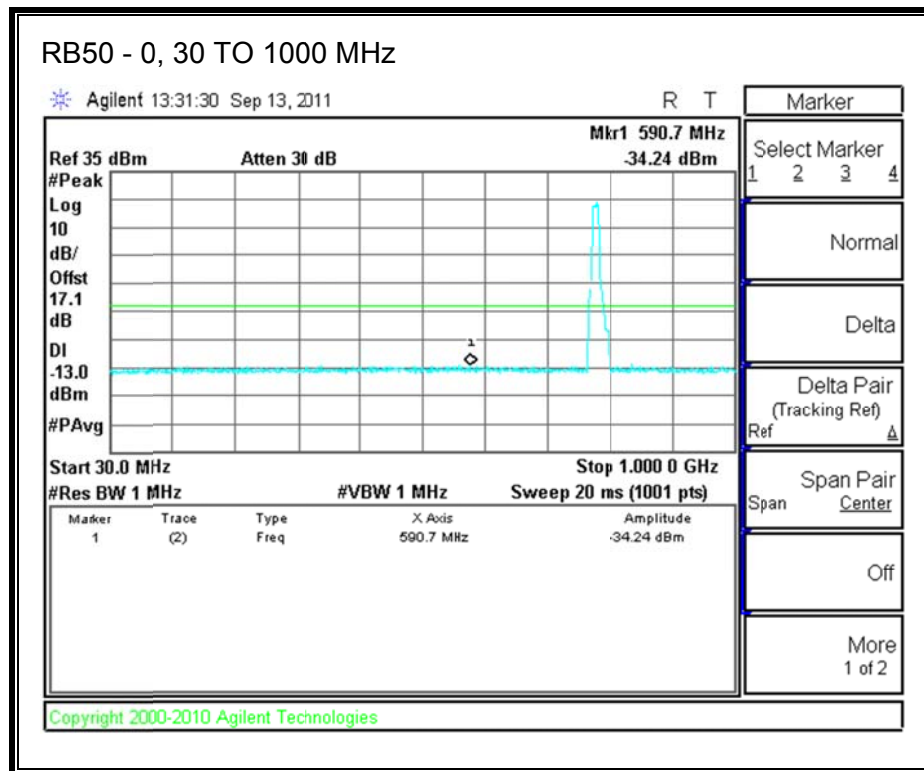




Peak-To-Average Ratio:

Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
QPSK	5	RB1 0	779.5	27.16	24.28	2.88
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB1 24	779.5	28.09	24.28	3.81
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB12-6	779.5	28	23.38	4.62
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB25 0	779.5	28.56	23.27	5.29
*Peak Reading = Average Reading + Peak-to-Average Ratio						

Peak-To-Average Ratio:

Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
16QAM	5	RB1 0	779.5	27.2	23.29	3.91
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB1 49	779.5	28.35	23.22	5.13
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB25 12	779.5	27.92	22.2	5.72
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB50 0	779.5	28.71	22.5	6.21
*Peak Reading = Average Reading + Peak-to-Average Ratio						

Peak-To-Average Ratio:

Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
QPSK	5	RB1 0	782	27.61	24.27	3.34
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB1 24	782	27.75	24.28	3.47
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB12-6	782	28.5	23.18	5.32
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB25 0	782	28.84	23.33	5.51
*Peak Reading = Average Reading + Peak-to-Average Ratio						

Peak-To-Average Ratio:

Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
16QAM	5	RB1 0	782	27.69	23.27	4.42
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB1 24	782	28.37	23.19	5.18
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB12-6	782	28.41	22.23	6.18
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB25 0	782	29.15	22.58	6.57
*Peak Reading = Average Reading + Peak-to-Average Ratio						

Peak-To-Average Ratio:

Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
QPSK	5	RB1 0	784.5	28.05	24.29	3.76
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB1 24	784.5	27.75	24.28	3.47
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB12-6	784.5	28.48	23.29	5.19
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	5	RB25 0	784.5	28.89	23.33	5.56
*Peak Reading = Average Reading + Peak-to-Average Ratio						

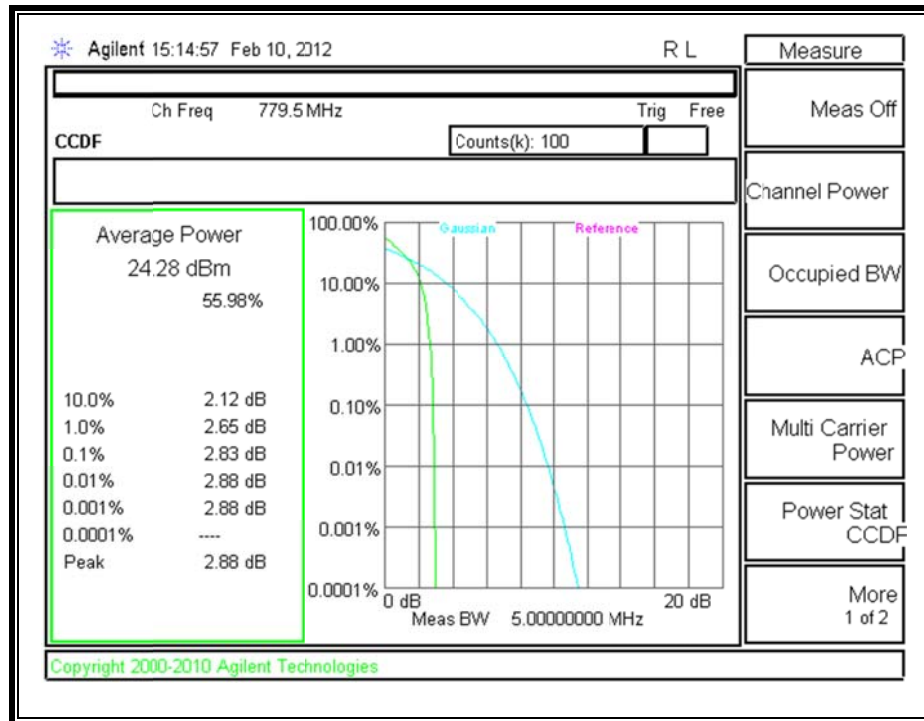
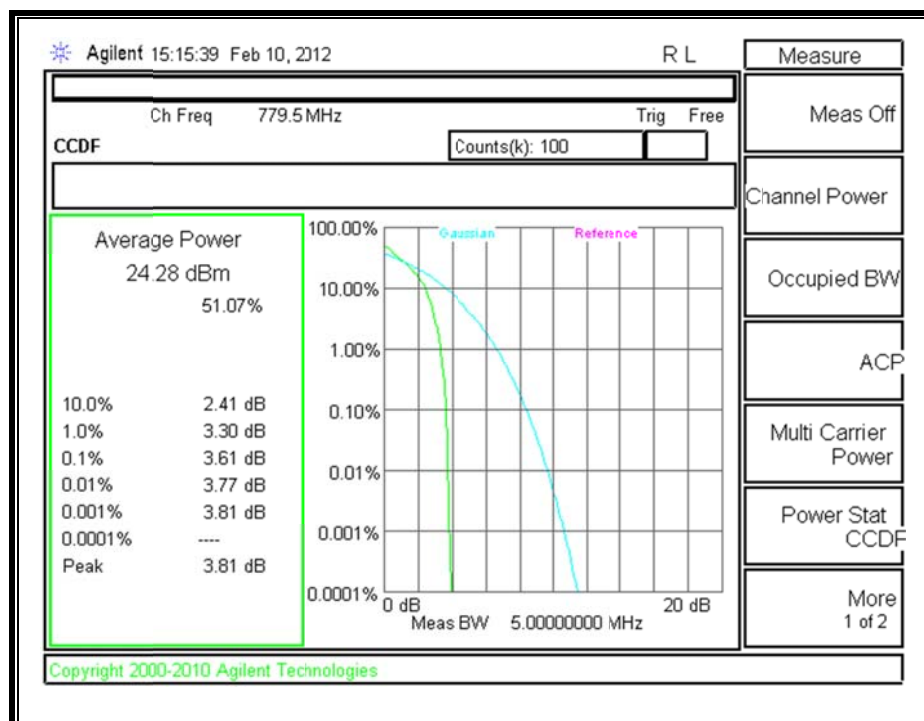
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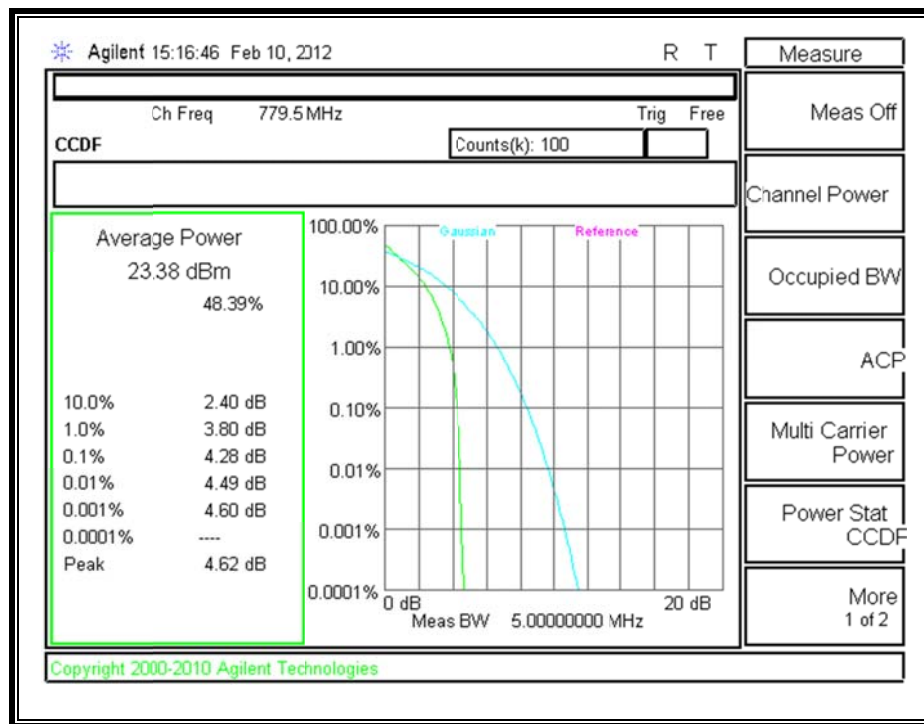
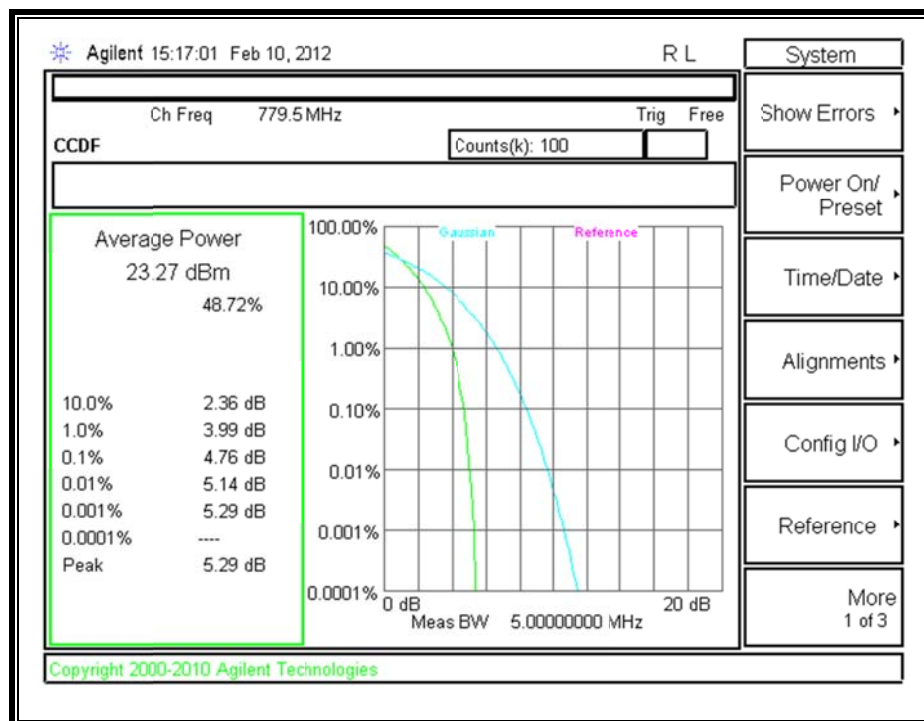
Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
16QAM	5	RB1 0	784.5	28.17	23.27	4.9
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB1 24	784.5	27.91	23.33	4.58
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB12-6	784.5	28.7	22.36	6.34
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB25 0	784.5	28.67	22.36	6.31
*Peak Reading = Average Reading + Peak-to-Average Ratio						

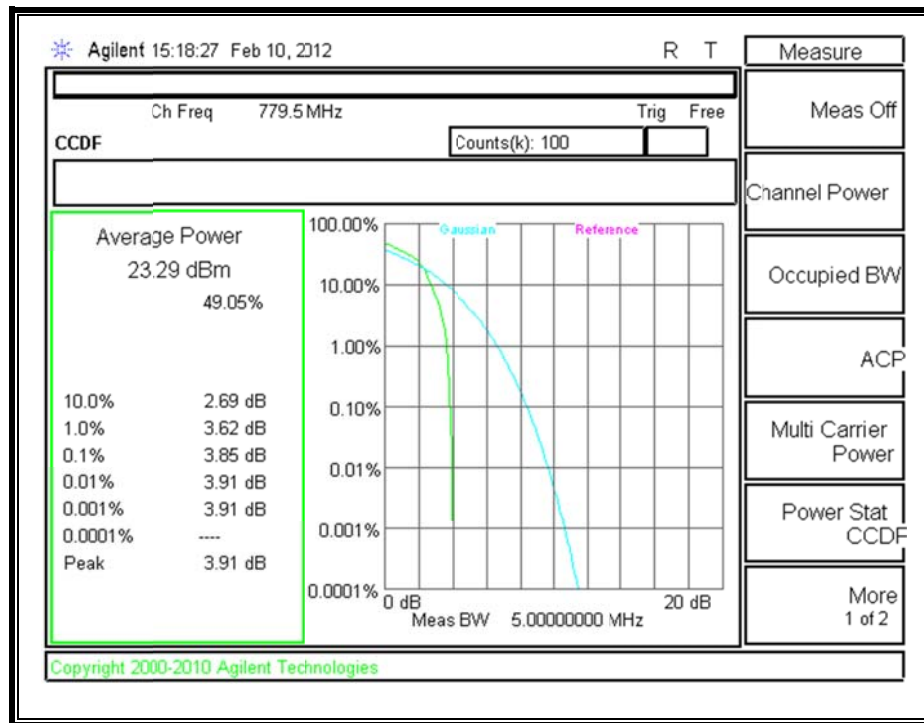
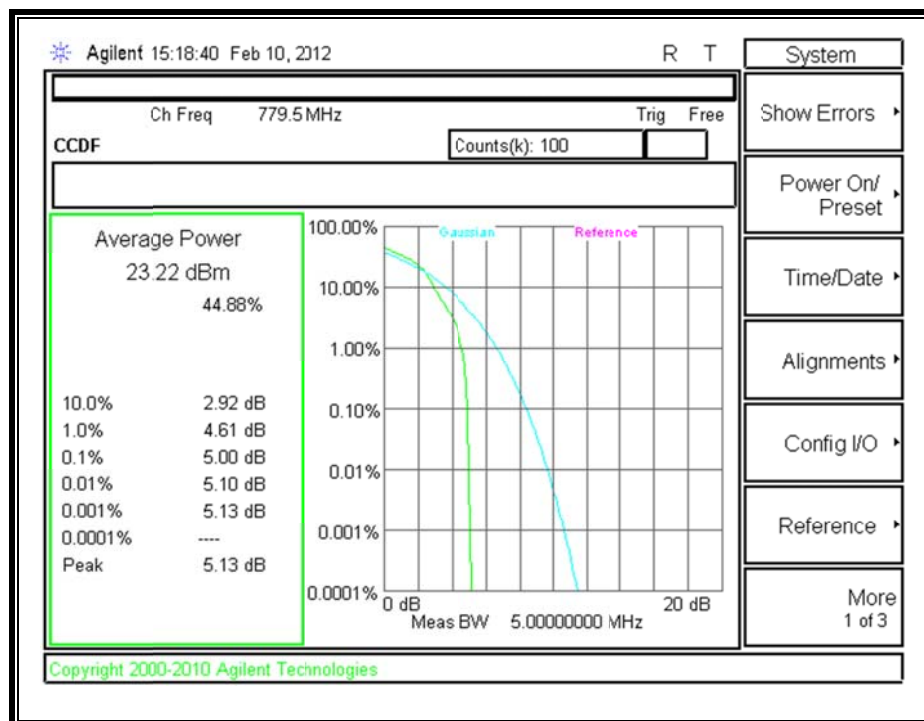
Peak-To-Average Ratio:

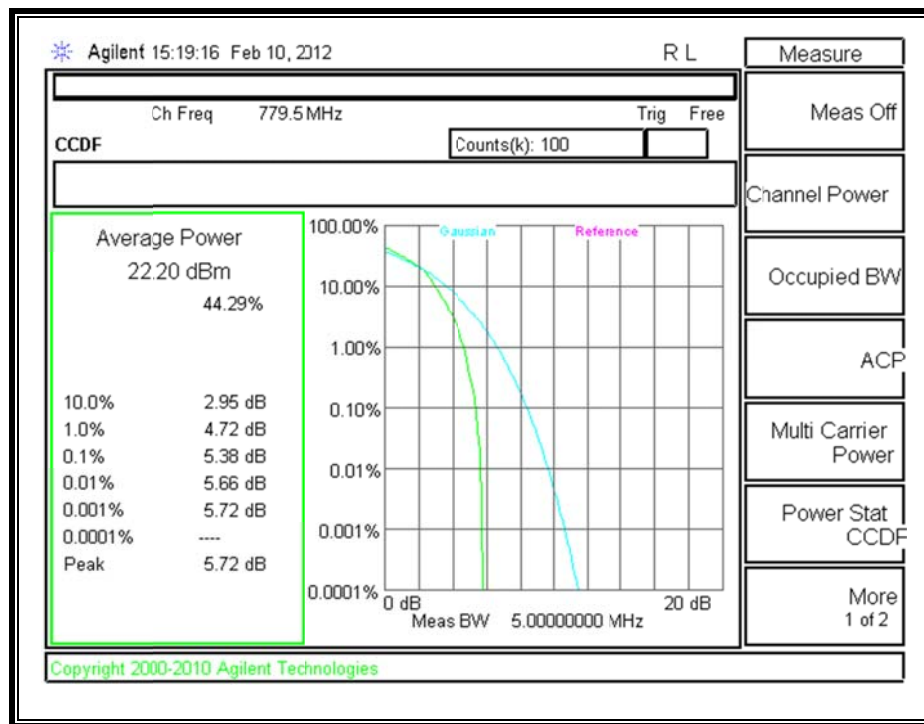
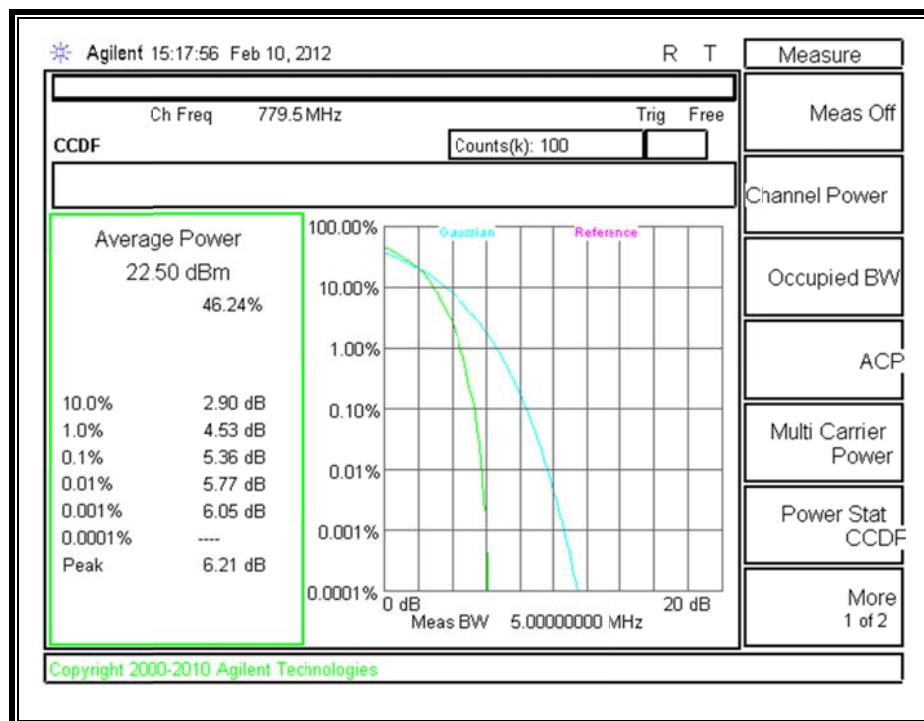
Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
QPSK	10	RB1 0	782	27.39	24.3	3.09
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	10	RB1 49	782	27.86	24.2	3.66
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	10	RB25 12	782	29.02	23.32	5.70
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
QPSK	10	RB50 0	782	28.85	23.15	5.70
*Peak Reading = Average Reading + Peak-to-Average Ratio						

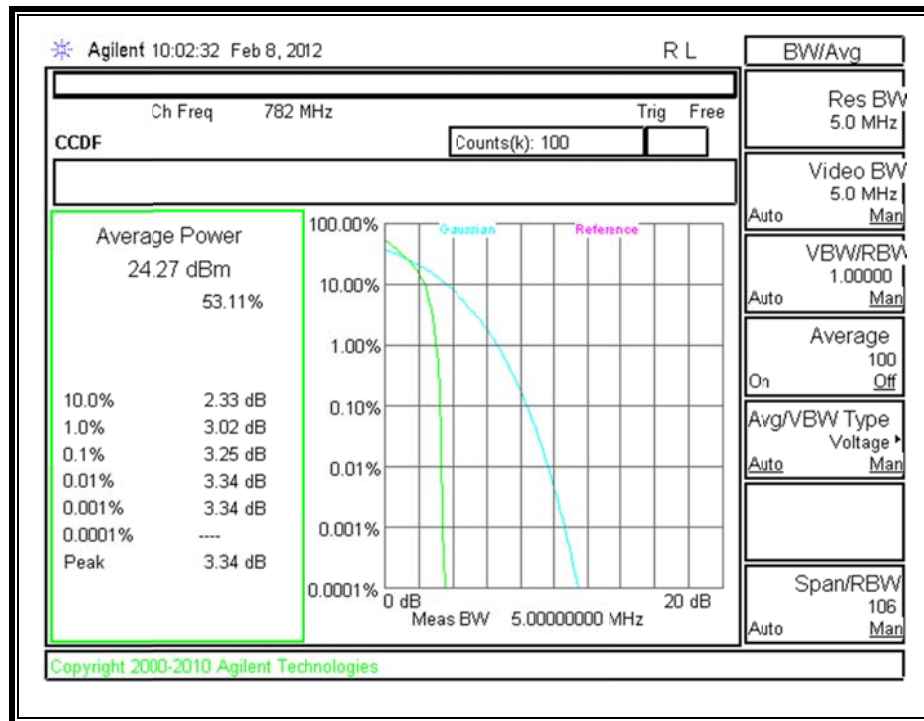
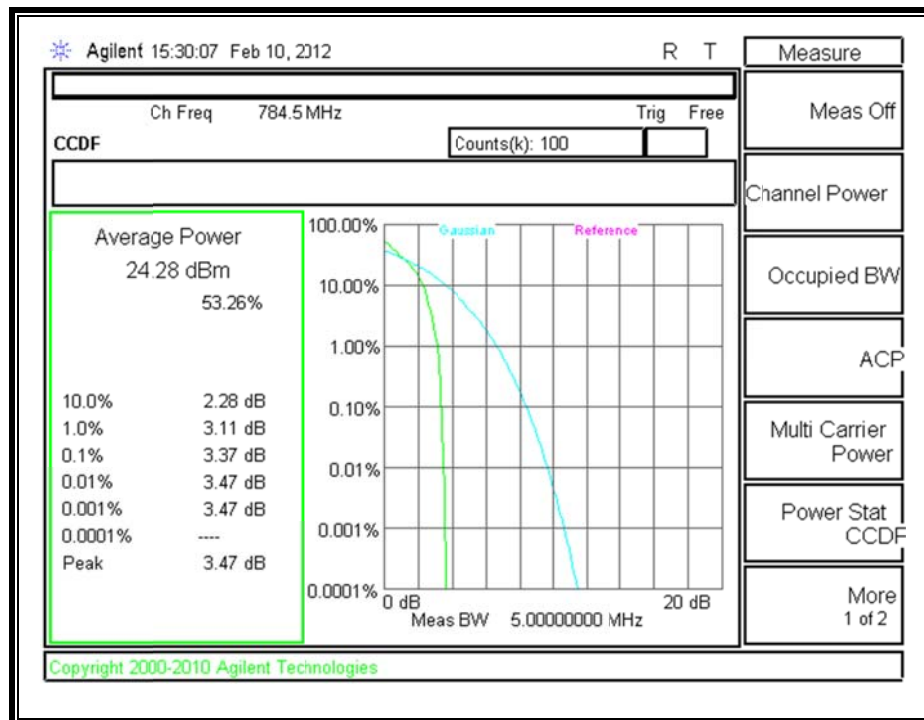
Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
16QAM	10	RB1 0	782	27.38	23.24	4.14
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	10	RB1 49	782	28.05	23.41	4.64
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	10	RB25 12	782	28.68	22.18	6.50
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	10	RB50 0	782	29.49	22.23	7.26
*Peak Reading = Average Reading + Peak-to-Average Ratio						

779.5MHz, 5MHz QPSK, RB1 0**779.5MHz, 5MHz QPSK, RB1 24**

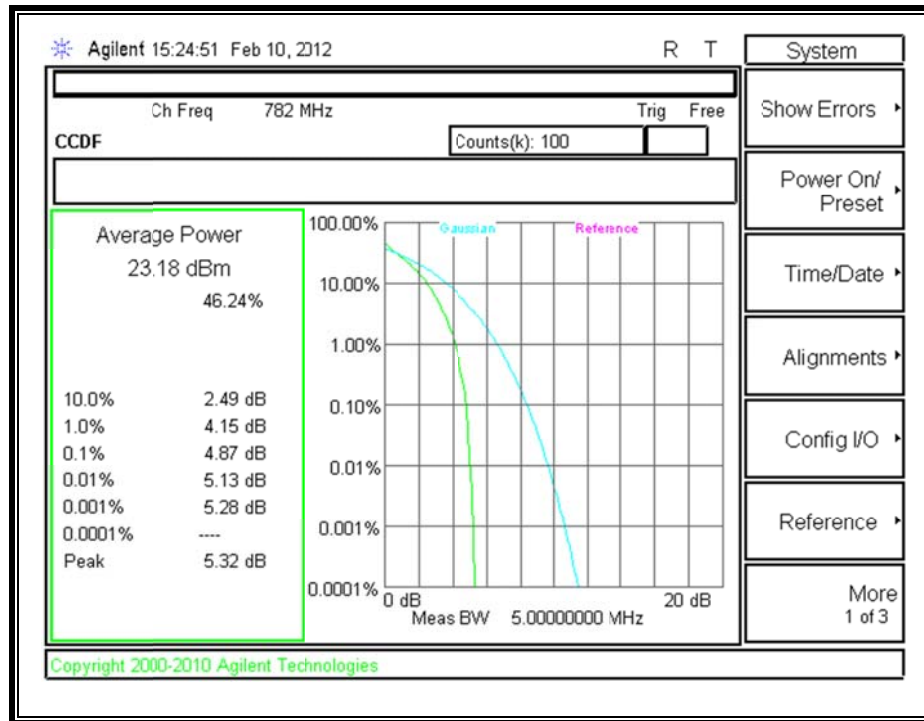
779.5MHz, 5MHz QPSK, RB12 6**779.5MHz, 5MHz QPSK, RB25 0**

779.5MHz, 5MHz 16QAM, RB1 0**779.5MHz, 5MHz 16QAM, RB1 24**

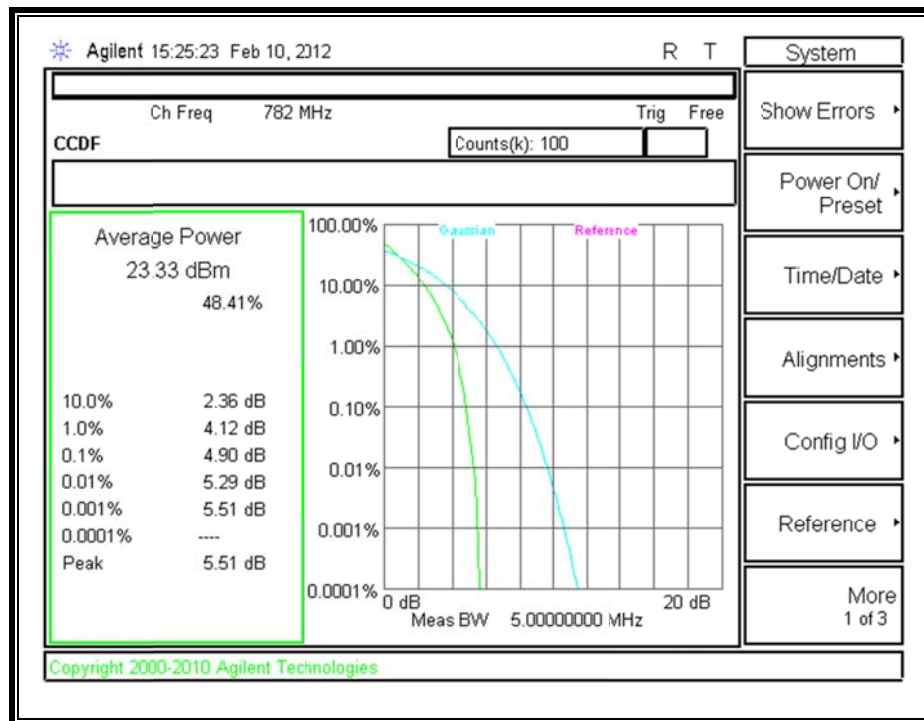
779.5MHz, 5MHz 16QAM, RB12 6**779.5MHz, 5MHz 16QAM, RB25 0**

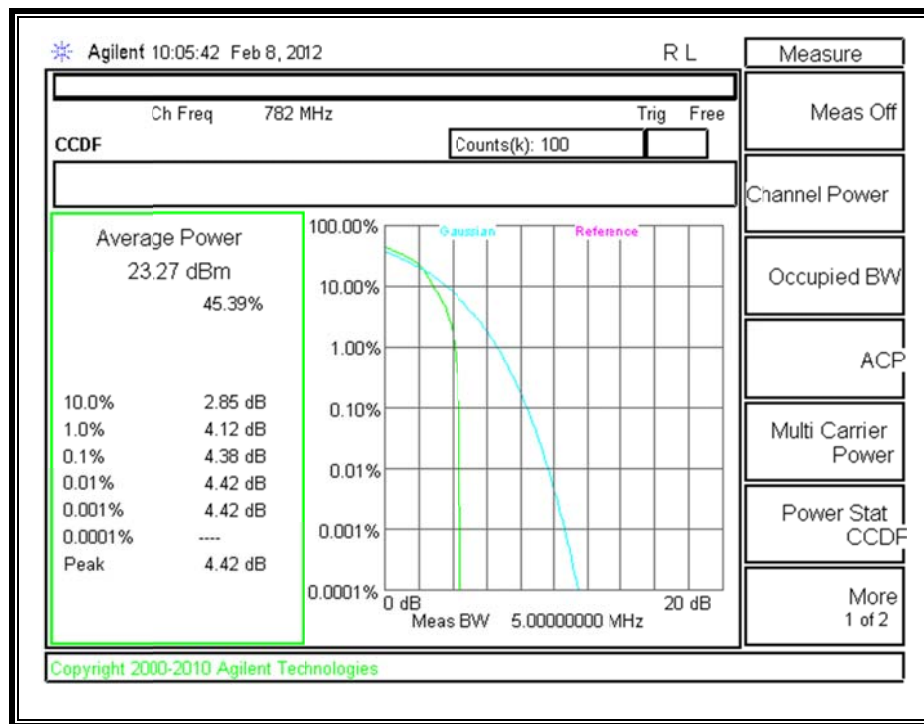
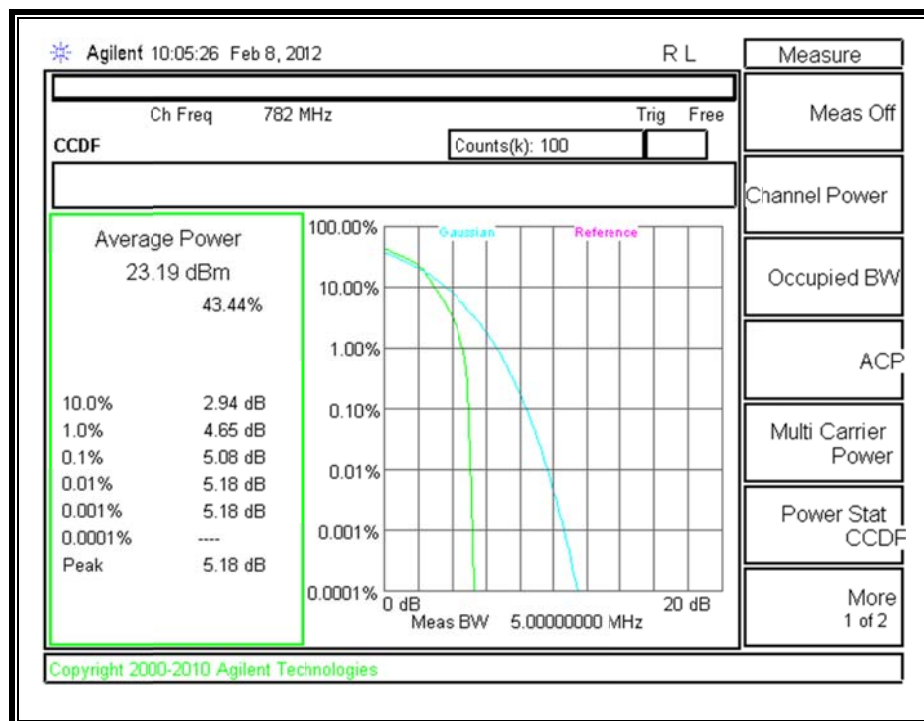
782MHz, 5MHz_QPSK, RB1 0**782MHz, 5MHz_QPSK, RB1 24**

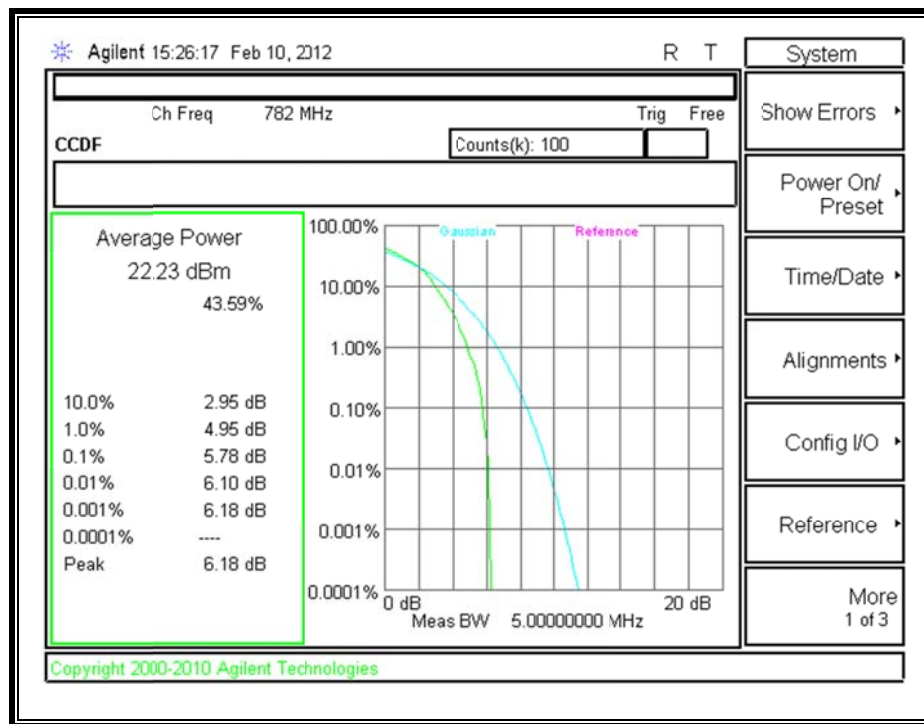
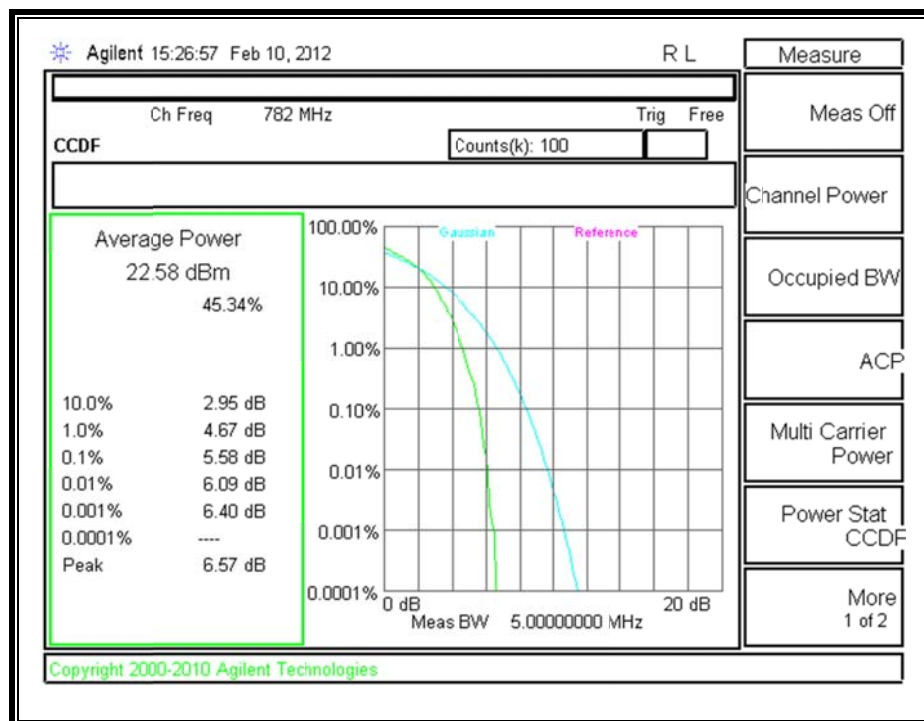
782MHz, 5MHz QPSK, RB12 6

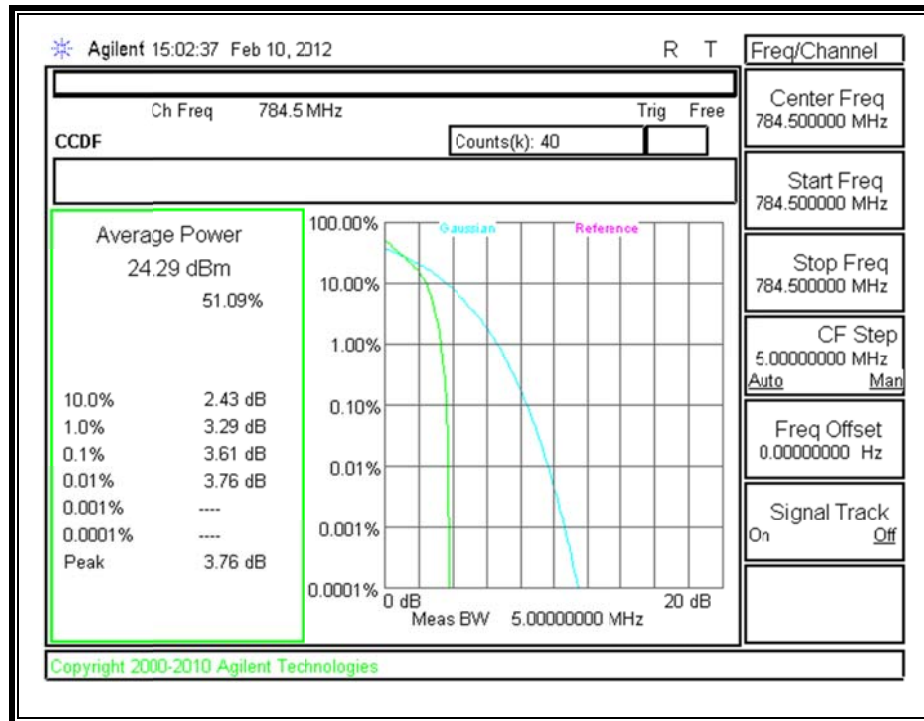
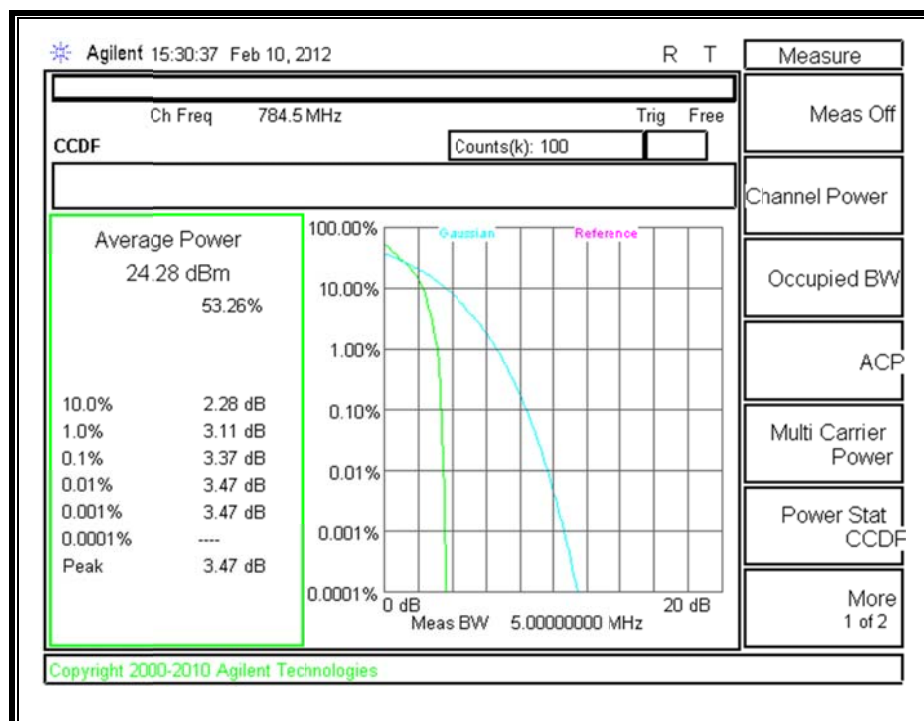


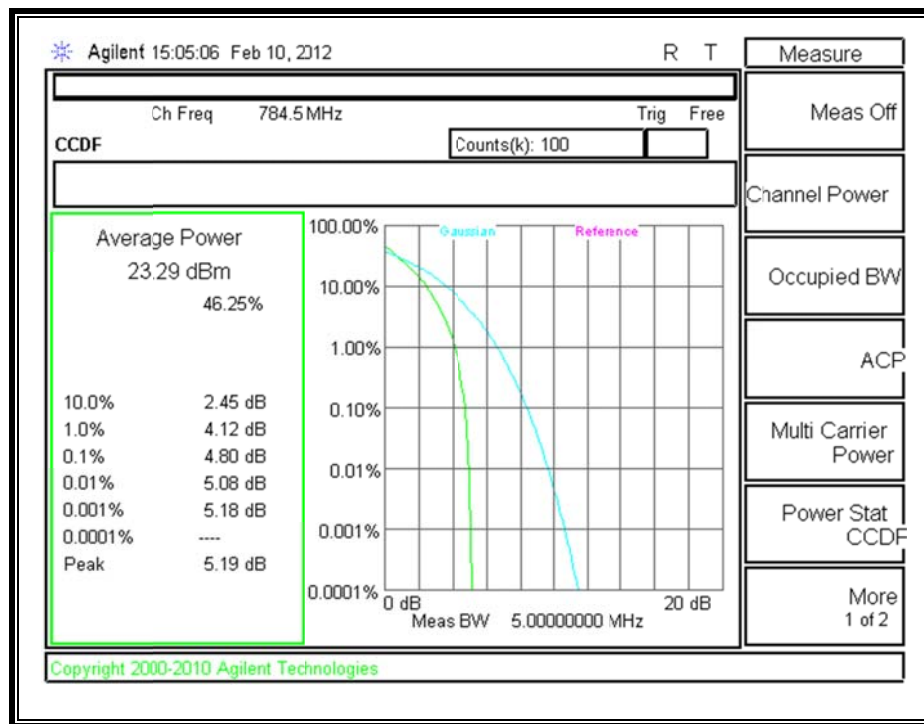
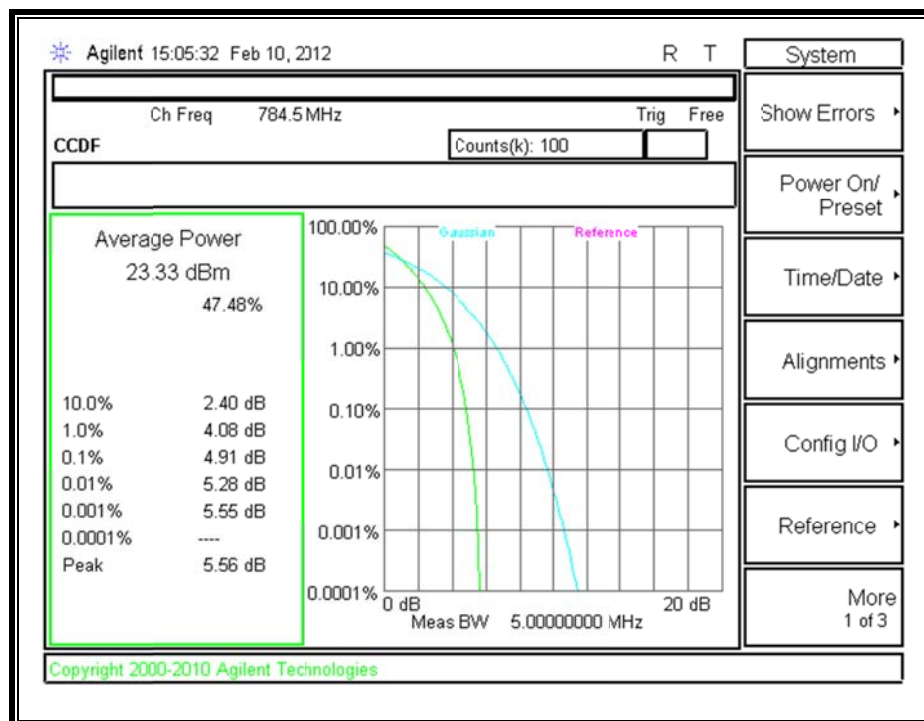
782MHz, 5MHz QPSK, RB25 0

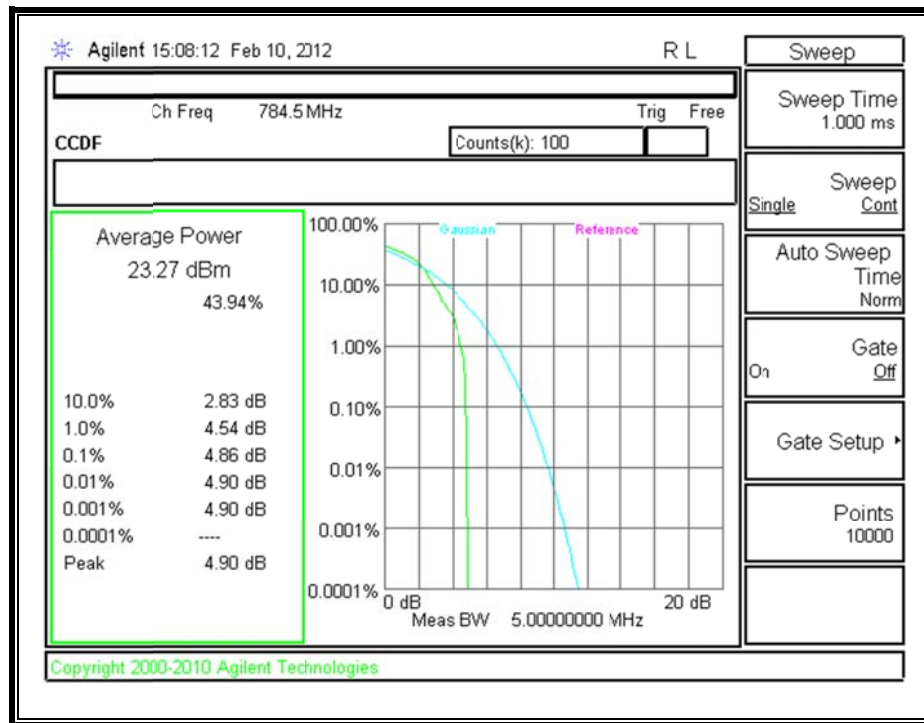
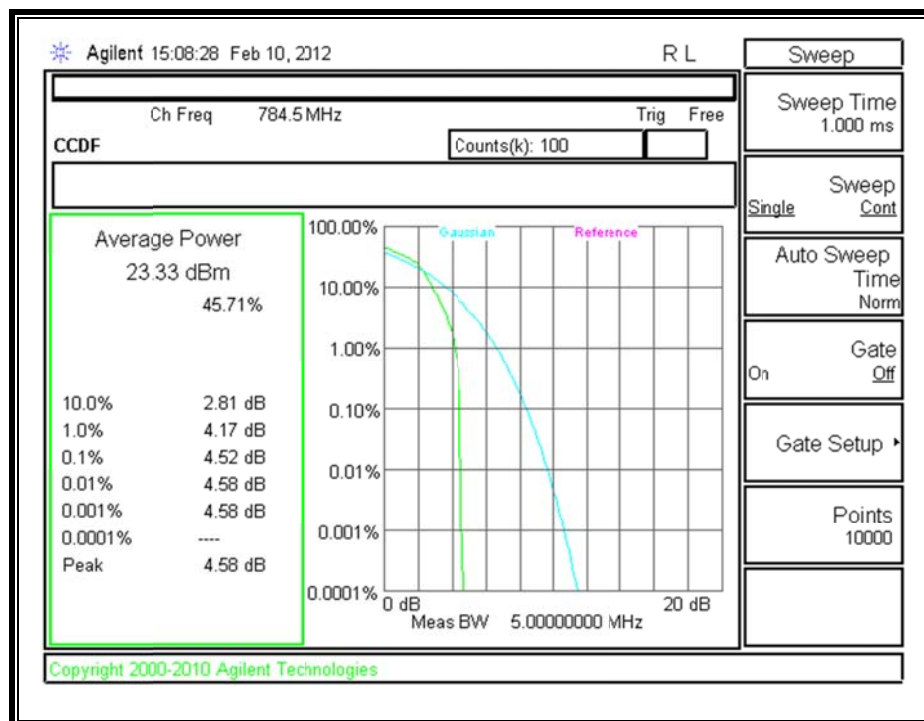


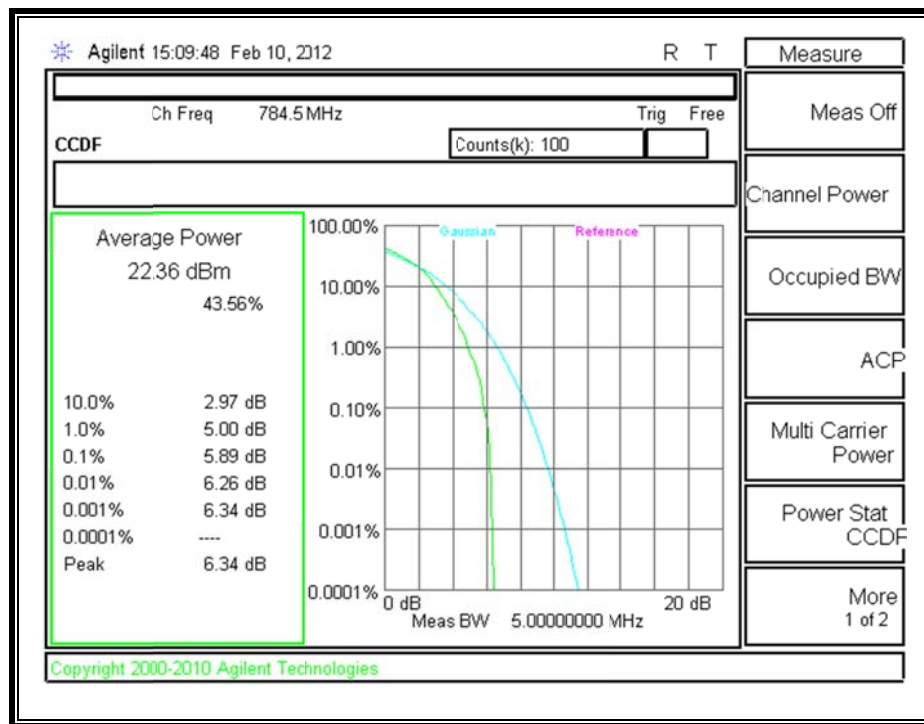
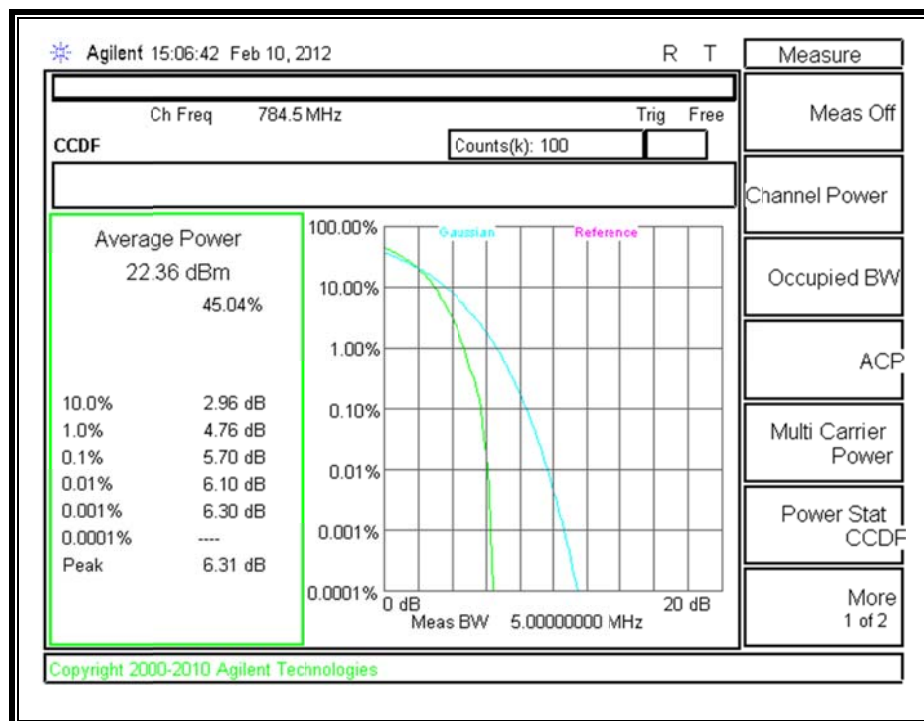
782MHz, 5MHz 16QAM, RB1 0**782MHz, 5MHz 16QAM, RB1 24**

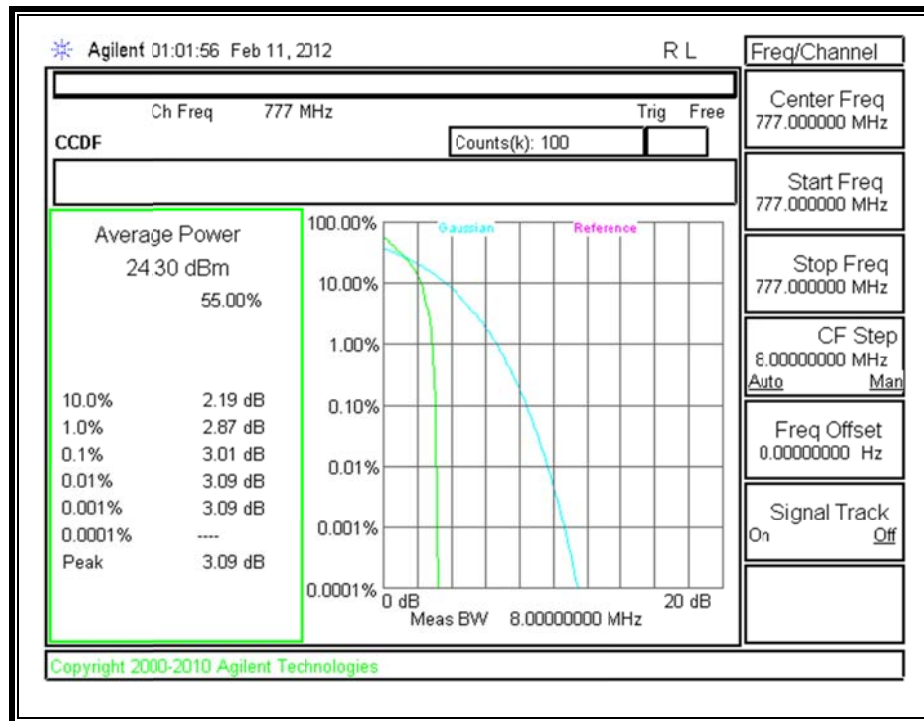
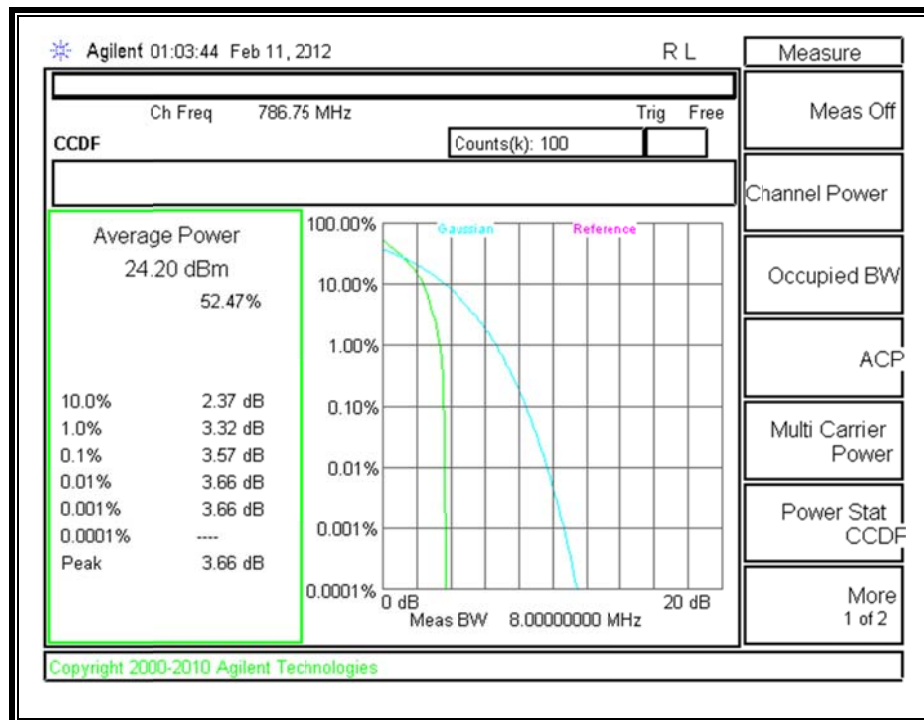
782MHz, 5MHz 16QAM, RB12 6**782MHz, 5MHz 16QAM, RB25 0**

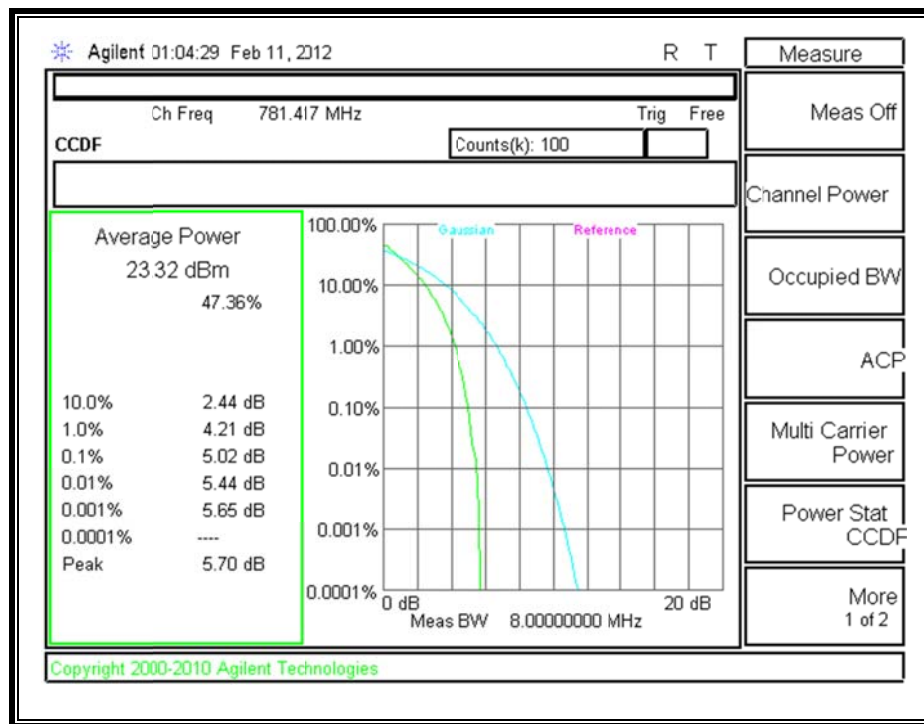
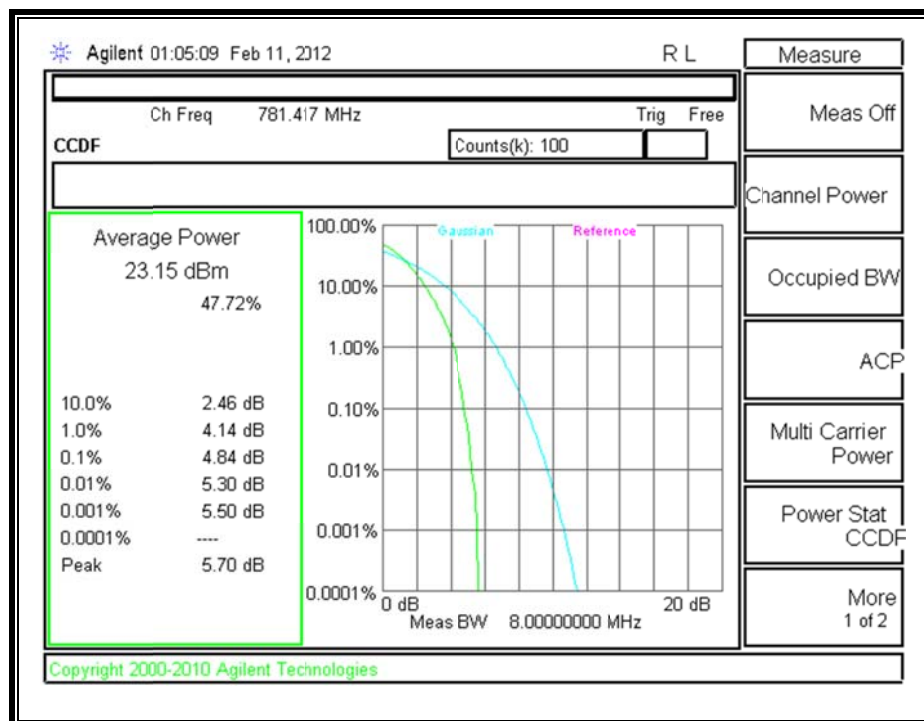
784.5MHz, 5MHz QPSK, RB1 0**784.5MHz, 5MHz QPSK, RB1 24**

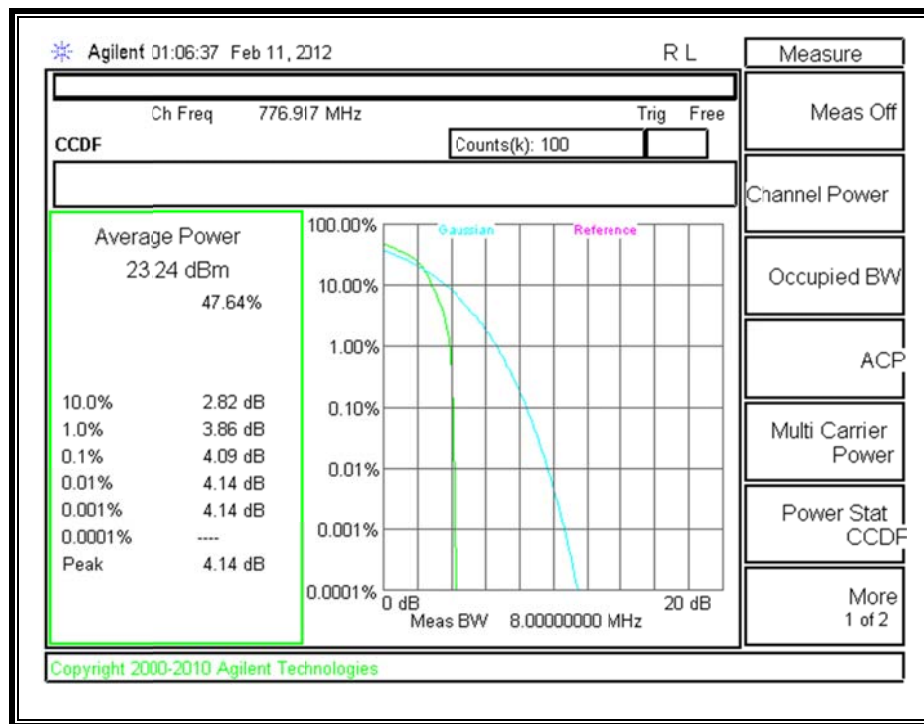
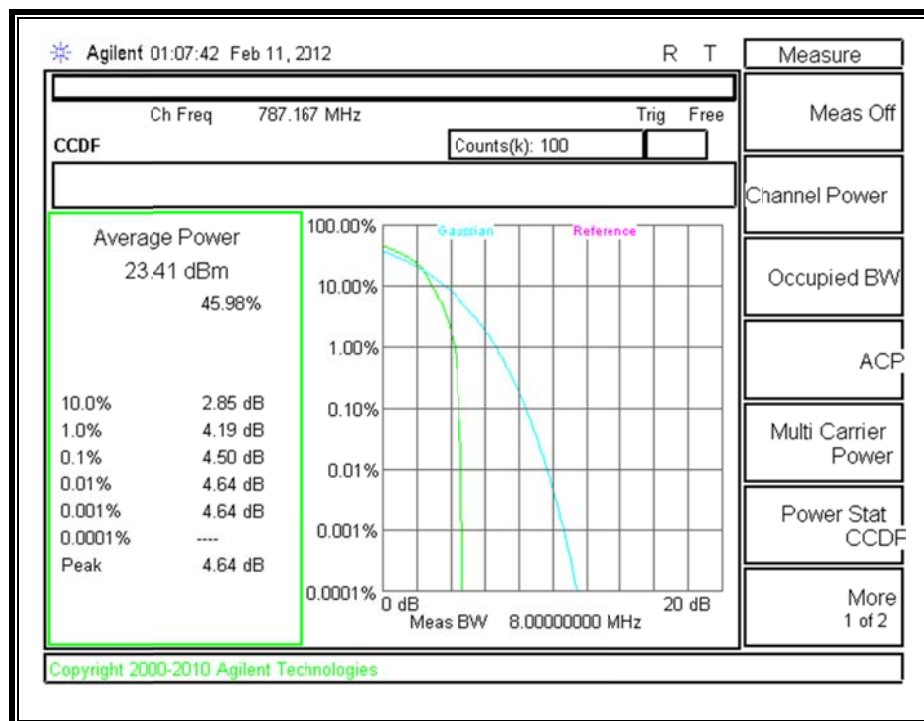
784.5MHz, 5MHz QPSK, RB12 6**784.5MHz, 5MHz QPSK, RB25 0**

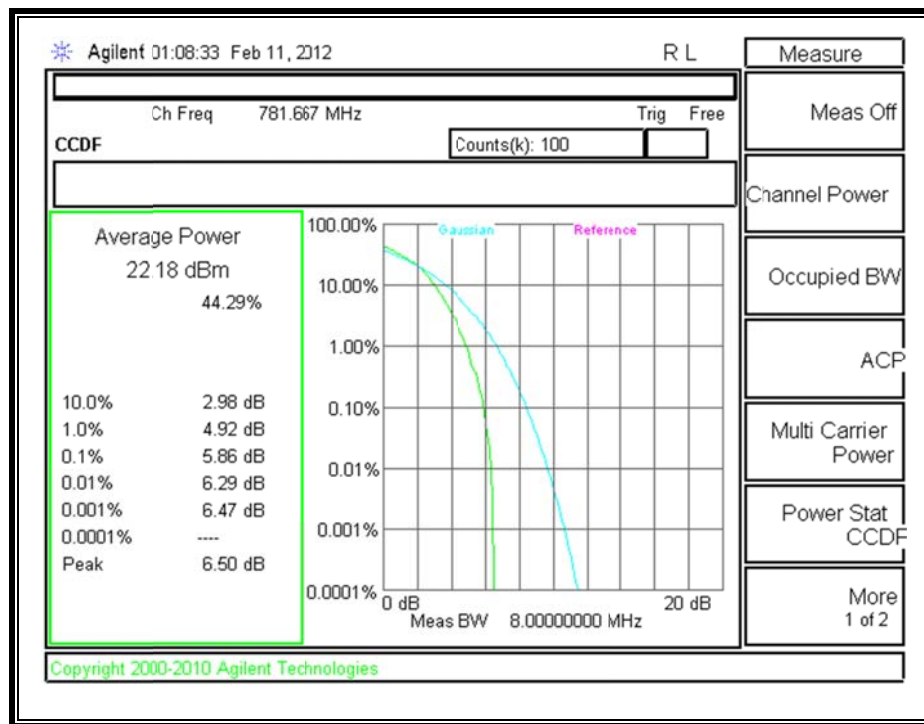
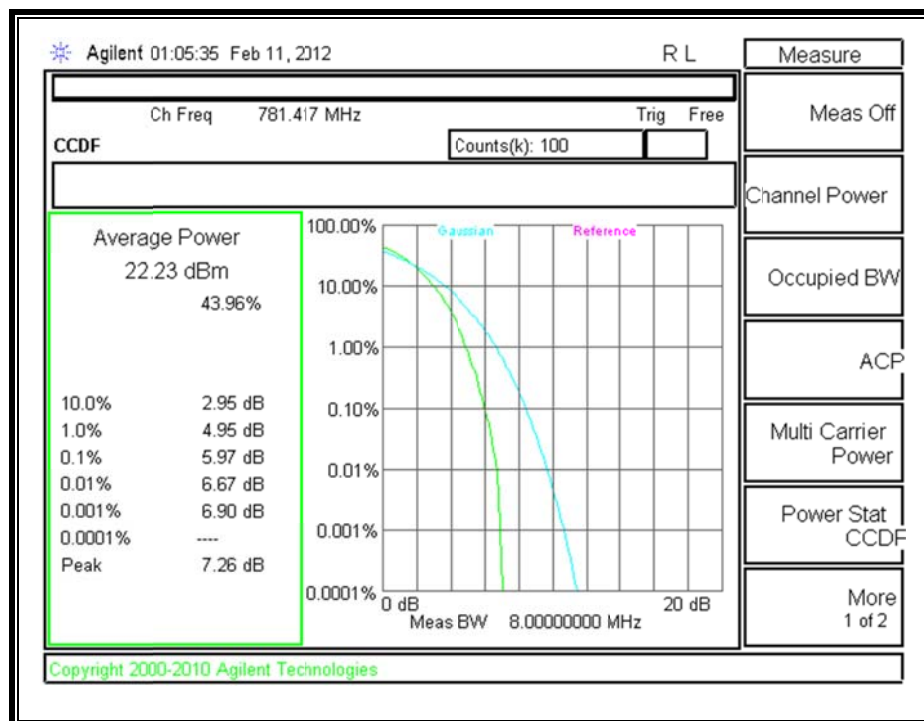
784.5MHz, 5MHz 16QAM, RB1 0**784.5MHz, 5MHz 16QAM, RB1 24**

784.5MHz, 5MHz 16QAM, RB12 6**784.5MHz, 5MHz 16QAM, RB25 0**

782MHz, 10MHz QPSK, RB1 0**782MHz, 10MHz QPSK, RB1 49**

782MHz, 10MHz QPSK, RB25 12**782MHz, 10MHz QPSK, RB50 0**

782MHz, 10MHz 16QAM, RB1 0**782MHz, 10MHz 16QAM, RB1 49**

782MHz, 10MHz 16QAM, RB25 12**782MHz, 10MHz 16QAM, RB50 0**

8.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §27C

LIMITS

- § 27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Use Agilent 8960 with Frequency Error measurement capability.

- Temp. = -30° to +50°C
- Voltage = 3.8Vdc

Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

MODES TESTED

- LTE BAND 13

RESULTS

See the following pages.

LTE BAND 13 – QPSK, 782 MHz 5MHz)

Reference Frequency: PCS Mid Channel 781.999993MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 1955.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	781.999995	-0.004	2.5
3.80	40	781.999996	-0.005	2.5
3.80	30	781.999994	-0.003	2.5
3.80	20	781.999992	0	2.5
3.80	10	781.999992	0.000	2.5
3.80	0	781.999993	-0.001	2.5
3.80	-10	781.999994	-0.003	2.5
3.80	-20	781.999991	0.001	2.5
3.80	-30	781.999990	0.003	2.5

Reference Frequency: PCS Mid Channel 781.999992MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 1955.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	781.999998	0	2.5
3.40	20	781.999990	0.010	2.5
4.20	20	781.999993	0.006	2.5
3.0V (End Point)	20	781.999989	0.012	2.5

LTE BAND 13 – 16QAM, 782 MHz (5MHz)

Reference Frequency: PCS Mid Channel 781.999992MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 1955.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	781.999998	-0.004	2.5
3.80	40	781.999995	0.000	2.5
3.80	30	781.999996	-0.001	2.5
3.80	20	781.999995	0	2.5
3.80	10	781.999994	0.001	2.5
3.80	0	781.999995	0.000	2.5
3.80	-10	781.999995	0.000	2.5
3.80	-20	781.999995	0.000	2.5
3.80	-30	781.999992	0.004	2.5

Reference Frequency: PCS Mid Channel 781.999995MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 1955.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	781.999995	0	2.5
3.40	20	781.999993	0.003	2.5
4.20	20	781.999994	0.001	2.5
3.0V (End Point)	20	781.999990	0.006	2.5

LTE BAND 13 – QPSK, 782 MHz (10MHz)

Reference Frequency: PCS Mid Channel 781.999993MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 1955.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	782.000020	-0.035	2.5
3.80	40	782.000012	-0.024	2.5
3.80	30	781.999994	-0.001	2.5
3.80	20	781.999993	0	2.5
3.80	10	782.000010	-0.022	2.5
3.80	0	782.000039	-0.059	2.5
3.80	-10	782.000012	-0.024	2.5
3.80	-20	781.999992	0.001	2.5
3.80	-30	781.999996	-0.004	2.5

Reference Frequency: PCS Mid Channel 781.999993MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 1955.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	781.999993	0	2.5
3.40	20	781.999996	-0.003	2.5
4.20	20	781.999923	0.090	2.5
3.0V (End Point)	20	781.999989	0.005	2.5

LTE BAND 13 – 16QAM, 782 MHz (10MHz)

Reference Frequency: PCS Mid Channel 781.999992MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 1955.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	782.000034	-0.054	2.5
3.80	40	782.000023	-0.040	2.5
3.80	30	782.000008	-0.020	2.5
3.80	20	781.999992	0	2.5
3.80	10	782.000022	-0.038	2.5
3.80	0	782.000017	-0.032	2.5
3.80	-10	782.000008	-0.020	2.5
3.80	-20	782.000006	-0.018	2.5
3.80	-30	782.000011	-0.024	2.5

Reference Frequency: PCS Mid Channel 781.999992MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 1955.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	20	781.999992	0	2.5
3.40	20	781.999953	0.050	2.5
4.20	20	781.999994	-0.003	2.5
3.0V (End Point)	20	781.999998	-0.008	2.5

9. RADIATED TEST RESULTS

9.1. RADIATED POWER (ERP)

RULE PART(S)

FCC: §27.50 (b) (10)

LIMITS

27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.

TEST PROCEDURE

ANSI / TIA / EIA 603C

KDB 971168 D01 Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems.

MODES TESTED

- LTE BAND 13

LTE BAND 13 (ERP), 5MHz

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
5 MHz BAND QPSK	1/0	779.5	23.62	230.14
	1/24		23.22	209.89
	12/6		22.52	178.65
	25/0		22.72	187.07
5 MHz BAND 16QAM	1/0		22.52	178.65
	1/24		21.82	152.05
	12/6		21.32	135.52
	25/0		21.92	155.60

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
5 MHz BAND QPSK	1/0	782.0	23.72	235.50
	1/24		23.17	207.49
	12/6		22.42	174.58
	25/0		22.92	195.88
5 MHz BAND 16QAM	1/0		22.62	182.81
	1/24		21.92	155.60
	12/6		21.42	138.68
	25/0		21.77	150.31

LTE BAND 13 (ERP), 5MHz

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
5 MHz BAND QPSK	1/0	784.5	23.64	231.21
	1/24		23.42	219.79
	12/6		22.62	182.81
	25/0		22.72	187.07
5 MHz BAND 16QAM	1/0		22.67	184.93
	1/24		21.82	152.05
	12/6		21.52	141.91
	25/0		21.92	155.60

LTE BAND 13 (ERP), 10MHz

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
10 MHz BAND QPSK	1/0	782.0	23.97	249.46
	1/49		23.17	207.49
	25/12		22.75	188.36
	50/0		23.34	215.77
10 MHz BAND 16QAM	1/0		22.82	191.43
	1/49		22.72	187.07
	25/12		21.72	148.59
	50/0		21.82	152.05

ERP LTE BAND 13 QPSK (5MHz)**779.5MHz****High Frequency Substitution Measurement
Compliance Certification Services Chamber B**

Company: Apple
Project #: 11U13938
Date: 02/09/11
Test Engineer: Chin Pang
Configuration: EUT only
Mode: TX, LTE BAND
 5MHz BW
 Average

Test Equipment:

Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)

Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
RB=1 & SRB=0, QPSK								
779.50	24.12	V	0.5	0.0	23.62	38.5	-14.8	
779.50	18.15	H	0.5	0.0	17.65	38.5	-20.8	
RB=1 & SRB=24, QPSK								
779.50	23.72	V	0.5	0.0	23.22	38.5	-15.2	
779.50	17.95	H	0.5	0.0	17.45	38.5	-21.0	
RB=12 & SRB=6, QPSK								
779.50	23.02	V	0.5	0.0	22.52	38.5	-15.9	
779.50	17.05	H	0.5	0.0	16.55	38.5	-21.9	
RB=25 & SRB=0 QPSK								
779.50	23.22	V	0.5	0.0	22.72	38.5	-15.7	
779.50	16.75	H	0.5	0.0	16.25	38.5	-22.2	

Rev. 3.17.11

ERP LTE BAND 13 16QAM (5MHz)**779.5MHz**

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		02/09/12						
Test Engineer:		Chin Pang						
Configuration:		EUT only						
Mode:		TX, LTE BAND						
		5MHz BW						
		Average						
Test Equipment:								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
RB=1 & SRE=0, 16QAM								
779.50	23.02	V	0.5	0.0	22.52	38.5	-15.9	
779.50	17.25	H	0.5	0.0	16.75	38.5	-21.7	
RB=1 & SRE=24, 16QAM								
779.50	22.32	V	0.5	0.0	21.82	38.5	-16.6	
779.50	16.95	H	0.5	0.0	16.45	38.5	-22.0	
RB=12 & SRB=6, 16QAM								
779.50	21.82	V	0.5	0.0	21.32	38.5	-17.1	
779.50	15.55	H	0.5	0.0	15.05	38.5	-23.4	
RB=25 & SRB=0 16QAM								
779.50	22.42	V	0.5	0.0	21.92	38.5	-16.5	
779.50	16.15	H	0.5	0.0	15.65	38.5	-22.8	
Rev. 3.17.11								

ERP LTE BAND 13 QPSK (5MHz)**782MHz**

High Frequency Substitution Measurement

Compliance Certification Services Chamber B

Company:

Project #:

Date:

Test Engineer:

Configuration:

Mode:

Apple

11U13938

02/09/11

Chin Pang

EUT only

TX, LTE BAND

5MHz BW

Average

Test Equipment:

Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)

Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
RB=1 & SRE=0, QPSK								
782.00	24.22	V	0.5	0.0	23.72	38.5	-14.7	
782.00	18.35	H	0.5	0.0	17.85	38.5	-20.6	
RB=1 & SRE=24, QPSK								
782.00	23.67	V	0.5	0.0	23.17	38.5	-15.3	
782.00	17.85	H	0.5	0.0	17.35	38.5	-21.1	
RB=12 & SRB=6, QPSK								
782.00	22.92	V	0.5	0.0	22.42	38.5	-16.0	
782.00	16.55	H	0.5	0.0	16.05	38.5	-22.4	
RB=25 & SRB=0 QPSK								
782.00	23.42	V	0.5	0.0	22.92	38.5	-15.5	
782.00	16.65	H	0.5	0.0	16.15	38.5	-22.3	

Rev. 3.17.11

ERP LTE BAND 13 16QAM (5MHz)**782MHz**

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		02/09/12						
Test Engineer:		Chin Pang						
Configuration:		EUT only						
Mode:		TX, LTE BAND 5MHz BW Average						
Test Equipment:								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
RB=1 & SRE=0, 16QAM								
782.00	23.12	V	0.5	0.0	22.62	38.5	-15.8	
782.00	17.35	H	0.5	0.0	16.85	38.5	-21.6	
RB=1 & SRE=24, 16QAM								
782.00	22.42	V	0.5	0.0	21.92	38.5	-16.5	
782.00	16.85	H	0.5	0.0	16.35	38.5	-22.1	
RB=12 & SRB=6, 16QAM								
782.00	21.92	V	0.5	0.0	21.42	38.5	-17.0	
782.00	15.32	H	0.5	0.0	14.82	38.5	-23.6	
RB=25 & SRB=0 16QAM								
782.00	22.27	V	0.5	0.0	21.77	38.5	-16.7	
782.00	16.05	H	0.5	0.0	15.55	38.5	-22.9	
Rev. 3.17.11								

ERP LTE BAND 13 QPSK (5MHz)**784.5MHz****High Frequency Substitution Measurement
Compliance Certification Services Chamber B**

Company: Apple
Project #: 11U13938
Date: 02/09/11
Test Engineer: Chin Pang
Configuration: EUT only
Mode: TX, LTE BAND
 5MHz BW
 Average

Test Equipment:

Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)

Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
RB=1 & SRE=0, QPSK								
784.50	24.14	V	0.5	0.0	23.64	38.5	-14.8	
784.50	17.95	H	0.5	0.0	17.45	38.5	-21.0	
RB=1 & SRE=24, QPSK								
784.50	23.92	V	0.5	0.0	23.42	38.5	-15.0	
784.50	17.85	H	0.5	0.0	17.35	38.5	-21.1	
RB=12 & SRB=6, QPSK								
784.50	23.12	V	0.5	0.0	22.62	38.5	-15.8	
784.50	16.85	H	0.5	0.0	16.35	38.5	-22.1	
RB=25 & SRB=0 QPSK								
784.50	23.22	V	0.5	0.0	22.72	38.5	-15.7	
784.50	16.75	H	0.5	0.0	16.25	38.5	-22.2	

Rev. 3.17.11

ERP LTE BAND 13 16QAM (5MHz)**784.5MHz****High Frequency Substitution Measurement
Compliance Certification Services Chamber B**

Company: Apple
Project #: 11U13938
Date: 02/09/12
Test Engineer: Chin Pang
Configuration: EUT only
Mode: TX, LTE BAND
 5MHz BW
 Average

Test Equipment:

Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)

Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
RB=1 & SRB=0, 16QAM								
784.50	23.17	V	0.5	0.0	22.67	38.5	-15.8	
784.50	17.55	H	0.5	0.0	17.05	38.5	-21.4	
RB=1 & SRB=24, 16QAM								
784.50	22.32	V	0.5	0.0	21.82	38.5	-16.6	
784.50	17.05	H	0.5	0.0	16.55	38.5	-21.9	
RB=12 & SRB=6, 16QAM								
784.50	22.02	V	0.5	0.0	21.52	38.5	-16.9	
784.50	15.75	H	0.5	0.0	15.25	38.5	-23.2	
RB=25 & SRB=0 16QAM								
784.50	22.42	V	0.5	0.0	21.92	38.5	-16.5	
784.50	16.15	H	0.5	0.0	15.65	38.5	-22.8	

Rev. 3.17.11

ERP LTE BAND 13 QPSK (10MHz)**782MHz**

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
Company:		Apple						
Project #:		11U13938						
Date:		11/18/11						
Test Engineer:		Chin Pang						
Configuration:		EUT only						
Mode:		TX, LTE BAND 10MHz BW Average						
Test Equipment:								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
RB=1 & SRE=0, QPSK								
782.00	24.47	V	0.5	0.0	23.97	38.5	-14.5	
782.00	22.45	H	0.5	0.0	21.95	38.5	-16.5	
RB=1 & SRE=49, QPSK								
782.00	23.67	V	0.5	0.0	23.17	38.5	-15.3	
782.00	15.35	H	0.5	0.0	14.85	38.5	-23.6	
RB=25 & SRB=12, QPSK								
782.00	23.25	V	0.5	0.0	22.75	38.5	-15.7	
782.00	15.35	H	0.5	0.0	14.85	38.5	-23.6	
RB=50 & SRB=0 QPSK								
782.00	23.84	V	0.5	0.0	23.34	38.5	-15.1	
782.00	16.35	H	0.5	0.0	15.85	38.5	-22.6	
Rev. 3.17.11								

ERP LTE BAND 13 16QAM**782MHz****High Frequency Substitution Measurement
Compliance Certification Services Chamber B**

Company: Apple
Project #: 11U13938
Date: 11/18/11
Test Engineer: Chin Pang
Configuration: EUT only
Mode: TX, LTE BAND
 10MHz BW
 Average

Test Equipment:

Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)
 Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
RB=1 & SRB=0, 16QAM								
782.00	23.32	V	0.5	0.0	22.82	38.5	-15.6	
782.00	21.75	H	0.5	0.0	21.25	38.5	-17.2	
RB=1 & SRB=49, 16QAM								
782.00	23.22	V	0.5	0.0	22.72	38.5	-15.7	
782.00	15.35	H	0.5	0.0	14.85	38.5	-23.6	
RB=25 & SRB=12, 16QAM								
782.00	22.22	V	0.5	0.0	21.72	38.5	-16.7	
782.00	15.35	H	0.5	0.0	14.85	38.5	-23.6	
RB=50 & SRB=0 16QAM								
782.00	22.32	V	0.5	0.0	21.82	38.5	-16.6	
782.00	15.35	H	0.5	0.0	14.85	38.5	-23.6	

Rev. 3.17.11

9.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §27.53 (c)(2)

LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED:

- LTE Band 13

RESULTS

5MHz BANDWIDTH**LTE BAND 13, QPSK****779.5MHz**

Compliance Certification Services									
Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/09/12							
Test Engineer:		Chin Pang							
Configuration:		EUT only							
Mode:		TX, LTE BAND MODE, 5MHz BW							
		QPSK							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
BAND 13 (779.5.0 MHz)									
RB1 0									
1.555	-25.8	V	3.0	35.6	1.0	-60.4	-13.0	-47.4	
2.332	-16.7	V	3.0	35.4	1.0	-51.1	-13.0	-38.1	
1.555	-25.2	H	3.0	35.6	1.0	-59.8	-13.0	-46.8	
2.332	-19.2	H	3.0	35.4	1.0	-53.7	-13.0	-40.7	
RB 1 24									
1.563	-24.9	V	3.0	35.6	1.0	-59.5	-13.0	-46.5	
2.345	-16.0	V	3.0	35.4	1.0	-50.4	-13.0	-37.4	
1.563	-25.6	H	3.0	35.6	1.0	-60.2	-13.0	-47.2	
2.345	-17.6	H	3.0	35.4	1.0	-52.0	-13.0	-39.0	
RB 12 6									
1.560	-26.2	V	3.0	35.6	1.0	-60.8	-13.0	-47.8	
2.338	-20.0	V	3.0	35.4	1.0	-54.4	-13.0	-41.4	
1.560	-25.6	H	3.0	35.6	1.0	-60.2	-13.0	-47.2	
2.338	-21.3	H	3.0	35.4	1.0	-55.8	-13.0	-42.8	
RB 25 0									
1.561	-26.4	V	3.0	35.6	1.0	-61.0	-13.0	-48.0	
2.336	-21.1	V	3.0	35.4	1.0	-55.5	-13.0	-42.5	
1.561	-25.8	H	3.0	35.6	1.0	-60.4	-13.0	-47.4	
2.336	-21.8	H	3.0	35.4	1.0	-56.3	-13.0	-43.3	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor									

LTE BAND 13, 16QAM**779.5MHz**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/09/12							
Test Engineer:		Chin Pang							
Configuration:		EUT only							
Mode:		TX, LTE BAND MODE, 5MHz BW 16QAM							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
BAND 13 (779.5.0 MHz)									
RB1 0									
1.555	-24.1	V	3.0	35.6	1.0	-58.7	-13.0	-45.7	
2.332	-16.0	V	3.0	35.4	1.0	-50.4	-13.0	-37.4	
1.555	-23.9	H	3.0	35.6	1.0	-58.5	-13.0	-45.5	
2.332	-17.5	H	3.0	35.4	1.0	-52.0	-13.0	-39.0	
RB 1 24									
1.563	-24.0	V	3.0	35.6	1.0	-58.6	-13.0	-45.6	
2.345	-15.0	V	3.0	35.4	1.0	-49.4	-13.0	-36.4	
1.563	-24.1	H	3.0	35.6	1.0	-58.7	-13.0	-45.7	
2.345	-16.8	H	3.0	35.4	1.0	-51.2	-13.0	-38.2	
RB 12 6									
1.560	-25.1	V	3.0	35.6	1.0	-59.7	-13.0	-46.7	
2.338	-19.9	V	3.0	35.4	1.0	-54.3	-13.0	-41.3	
1.560	-25.0	H	3.0	35.6	1.0	-59.6	-13.0	-46.6	
2.338	-20.2	H	3.0	35.4	1.0	-54.7	-13.0	-41.7	
RB 25 0									
1.561	-25.7	V	3.0	35.6	1.0	-60.3	-13.0	-47.3	
2.336	-18.3	V	3.0	35.4	1.0	-52.7	-13.0	-39.7	
1.561	-24.6	H	3.0	35.6	1.0	-59.2	-13.0	-46.2	
2.336	-20.8	H	3.0	35.4	1.0	-55.3	-13.0	-42.3	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE QPSK Radiated Measurement in 1559-1610MHz Band

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/10/12							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, LTE Band 13 5MHz 779.5MHz, QPSK							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
(779.5MHz), RB1 0, QPSK									
1.554	-24.5	V	3.0	35.6	1.0	-59.1	-40.0	-19.1	
1.554	-24.9	H	3.0	35.6	1.0	-59.5	-40.0	-19.5	
(779.5MHz), RB1 24, QPSK									
1.563	-23.0	V	3.0	35.6	1.0	-57.6	-40.0	-17.6	
1.563	-21.6	H	3.0	35.6	1.0	-56.2	-40.0	-16.2	
(779.5MHz), RB12 6 QPSK									
1.560	-24.4	V	3.0	35.6	1.0	-59.0	-40.0	-19.0	
1.560	-23.6	H	3.0	35.6	1.0	-58.2	-40.0	-18.2	
(779.5MHz), RB25 0, QPSK									
1.560	-25.9	V	3.0	35.6	1.0	-60.5	-40.0	-20.5	
1.560	-25.6	H	3.0	35.6	1.0	-60.2	-40.0	-20.2	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE 16QAM Radiated Measurement in 1559-1610MHz Band

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/10/12							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, LTE Band 13 5MHz 779.5MHz, 16QAM							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
(779.5MHz), RB1 0, 16QAM									
1.554	-25.7	V	3.0	35.6	1.0	-60.3	-40.0	-20.3	
1.554	-24.7	H	3.0	35.6	1.0	-59.3	-40.0	-19.3	
(779.5MHz), RB1 24, 16QAM									
1.563	-23.7	V	3.0	35.6	1.0	-58.3	-40.0	-18.3	
1.563	-20.6	H	3.0	35.6	1.0	-55.2	-40.0	-15.2	
(779.5MHz), RB12 6 16QAM									
1.560	-23.7	V	3.0	35.6	1.0	-58.3	-40.0	-18.3	
1.560	-24.9	H	3.0	35.6	1.0	-59.5	-40.0	-19.5	
(779.5MHz), RB25 0, 16QAM									
1.560	-25.4	V	3.0	35.6	1.0	-60.0	-40.0	-20.0	
1.560	-23.9	H	3.0	35.6	1.0	-58.5	-40.0	-18.5	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

5MHz BANDWIDTH**LTE BAND 13, QPSK****782MHz**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/10/12							
Test Engineer:		Chin Pang							
Configuration:		EUT only							
Mode:		TX, LTE BAND MODE, 5MHz BW QPSK							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
BAND 13 (782.0 MHz)									
RB1 0									
1.560	-15.9	V	3.0	35.6	1.0	-50.5	-13.0	-37.5	
2.340	-14.9	V	3.0	35.4	1.0	-49.3	-13.0	-36.3	
1.560	-19.6	H	3.0	35.6	1.0	-54.2	-13.0	-41.2	
2.340	-14.5	H	3.0	35.4	1.0	-49.0	-13.0	-36.0	
RB 1 24									
1.567	-21.7	V	3.0	35.6	1.0	-56.3	-13.0	-43.3	
2.352	-16.3	V	3.0	35.4	1.0	-50.7	-13.0	-37.7	
1.567	-23.0	H	3.0	35.6	1.0	-57.5	-13.0	-44.5	
2.352	-10.1	H	3.0	35.4	1.0	-44.5	-13.0	-31.5	
RB 12 6									
1.565	-20.3	V	3.0	35.6	1.0	-54.9	-13.0	-41.9	
2.347	-18.7	V	3.0	35.4	1.0	-53.1	-13.0	-40.1	
1.565	-22.4	H	3.0	35.6	1.0	-57.0	-13.0	-44.0	
2.347	-18.6	H	3.0	35.4	1.0	-53.0	-13.0	-40.0	
RB 25 0, QPSK									
1.564	-24.8	V	3.0	35.6	1.0	-59.3	-13.0	-46.3	
2.346	-18.7	V	3.0	35.4	1.0	-53.1	-13.0	-40.1	
1.564	-24.6	H	3.0	35.6	1.0	-59.2	-13.0	-46.2	
2.346	-19.6	H	3.0	35.4	1.0	-54.0	-13.0	-41.0	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE BAND 13, 16QAM**782MHz**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/10/12							
Test Engineer:		Chin Pang							
Configuration:		EUT only							
Mode:		TX, LTE BAND MODE, 5MHz BW 16QAM							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
BAND 13 (782.0 MHz)									
RB1 0									
1.560	-15.4	V	3.0	35.6	1.0	-50.0	-13.0	-37.0	
2.340	-15.1	V	3.0	35.4	1.0	-49.5	-13.0	-36.5	
1.560	-19.4	H	3.0	35.6	1.0	-54.0	-13.0	-41.0	
2.340	-13.4	H	3.0	35.4	1.0	-47.9	-13.0	-34.9	
RB 1 24									
1.568	-21.1	V	3.0	35.6	1.0	-55.7	-13.0	-42.7	
2.352	-17.3	V	3.0	35.4	1.0	-51.7	-13.0	-38.7	
1.568	-21.5	H	3.0	35.6	1.0	-56.1	-13.0	-43.1	
2.352	-12.7	H	3.0	35.4	1.0	-47.1	-13.0	-34.1	
RB 12 6									
1.563	-19.4	V	3.0	35.6	1.0	-54.0	-13.0	-41.0	
2.346	-18.7	V	3.0	35.4	1.0	-53.1	-13.0	-40.1	
1.563	-22.6	H	3.0	35.6	1.0	-57.2	-13.0	-44.2	
2.346	-18.4	H	3.0	35.4	1.0	-52.8	-13.0	-39.8	
RB 25 0									
1.564	-21.8	V	3.0	35.6	1.0	-56.4	-13.0	-43.4	
2.346	-17.0	V	3.0	35.4	1.0	-51.4	-13.0	-38.4	
1.564	-22.6	H	3.0	35.6	1.0	-57.2	-13.0	-44.2	
2.346	-18.1	H	3.0	35.4	1.0	-52.5	-13.0	-39.5	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE QPSK Radiated Measurement in 1559-1610MHz Band

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/10/12							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, LTE Band 13 5MHz 782MHz, QPSK							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
(782MHz), RB1 0, QPSK									
1.559	-17.1	V	3.0	35.6	1.0	-51.7	-40.0	-11.7	
1.559	-21.6	H	3.0	35.6	1.0	-56.2	-40.0	-16.2	
(782MHz), RB1 24, QPSK									
1.568	-23.3	V	3.0	35.6	1.0	-57.9	-40.0	-17.9	
1.568	-25.5	H	3.0	35.6	1.0	-60.1	-40.0	-20.1	
(782MHz), RB12 6 QPSK									
1.563	-16.4	V	3.0	35.6	1.0	-51.0	-40.0	-11.0	
1.563	-21.6	H	3.0	35.6	1.0	-56.2	-40.0	-16.2	
(782MHz), RB25 0, QPSK									
1.592	-22.0	V	3.0	35.6	1.0	-56.6	-40.0	-16.6	
1.573	-24.5	H	3.0	35.6	1.0	-59.1	-40.0	-19.1	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE 16QAM Radiated Measurement in 1559-1610MHz Band

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/10/12							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, LTE Band 13 5MHz 782MHz, 16QAM							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
(782MHz), RB1 0, 16QAM									
1.560	-23.4	V	3.0	35.6	1.0	-58.0	-40.0	-18.0	
1.560	-21.6	H	3.0	35.6	1.0	-56.2	-40.0	-16.2	
(782MHz), RB1 24, 16QAM									
1.568	-24.3	V	3.0	35.6	1.0	-58.9	-40.0	-18.9	
1.568	-21.5	H	3.0	35.6	1.0	-56.1	-40.0	-16.1	
(782MHz), RB12 6 16QAM									
1.563	-23.4	V	3.0	35.6	1.0	-58.0	-40.0	-18.0	
1.563	-23.6	H	3.0	35.6	1.0	-58.2	-40.0	-18.2	
(782MHz), RB25 0, 16QAM									
1.559	-24.4	V	3.0	35.6	1.0	-59.0	-40.0	-19.0	
1.559	-24.6	H	3.0	35.6	1.0	-59.2	-40.0	-19.2	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

5MHz BANDWIDTH**LTE BAND 13, QPSK****784.5MHz**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		2.9.12							
Test Engineer:		Chin Pang							
Configuration:		EUT only							
Mode:		TX, LTE BAND MODE, 5MHz BW QPSK							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
BAND 13 (784.5.0 MHz)									
RB1 0									
1.567	-27.3	V	3.0	35.6	1.0	-61.9	-13.0	-48.9	
2.350	-18.1	V	3.0	35.4	1.0	-52.5	-13.0	-39.5	
1.567	-25.6	H	3.0	35.6	1.0	-60.2	-13.0	-47.2	
2.350	-17.7	H	3.0	35.4	1.0	-52.1	-13.0	-39.1	
RB 1 24									
1.573	-26.5	V	3.0	35.6	1.0	-61.1	-13.0	-48.1	
2.360	-17.0	V	3.0	35.4	1.0	-51.4	-13.0	-38.4	
1.573	-26.1	H	3.0	35.6	1.0	-60.7	-13.0	-47.7	
2.360	-11.4	H	3.0	35.4	1.0	-45.8	-13.0	-32.8	
RB 12 6									
1.574	-26.5	V	3.0	35.6	1.0	-61.1	-13.0	-48.1	
2.354	-13.7	V	3.0	35.4	1.0	-48.1	-13.0	-35.1	
1.574	-27.0	H	3.0	35.6	1.0	-61.6	-13.0	-48.6	
2.354	-20.4	H	3.0	35.4	1.0	-54.8	-13.0	-41.8	
RB 25 0									
1.569	-27.7	V	3.0	35.6	1.0	-62.3	-13.0	-49.3	
2.354	-21.4	V	3.0	35.4	1.0	-55.8	-13.0	-42.8	
1.569	-26.5	H	3.0	35.6	1.0	-61.1	-13.0	-48.1	
2.354	-18.7	H	3.0	35.4	1.0	-53.1	-13.0	-40.1	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE BAND 13, 16QAM**784.5MHz**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		2.9.12							
Test Engineer:		Chin Pang							
Configuration:		EUT only							
Mode:		TX, LTE BAND MODE, 5MHz BW 16QAM							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
BAND 13 (784.5.0 MHz)									
RB1 0									
1.567	-26.7	V	3.0	35.6	1.0	-61.3	-13.0	-48.3	
2.350	-17.2	V	3.0	35.4	1.0	-51.6	-13.0	-38.6	
1.567	-24.9	H	3.0	35.6	1.0	-59.5	-13.0	-46.5	
2.350	-15.8	H	3.0	35.4	1.0	-50.2	-13.0	-37.2	
RB 1 24									
1.573	-26.0	V	3.0	35.6	1.0	-60.6	-13.0	-47.6	
2.360	-16.7	V	3.0	35.4	1.0	-51.1	-13.0	-38.1	
1.573	-24.0	H	3.0	35.6	1.0	-58.6	-13.0	-45.6	
2.360	-10.7	H	3.0	35.4	1.0	-45.1	-13.0	-32.1	
RB 12 6									
1.574	-25.9	V	3.0	35.6	1.0	-60.5	-13.0	-47.5	
2.354	-12.9	V	3.0	35.4	1.0	-47.3	-13.0	-34.3	
1.574	-25.9	H	3.0	35.6	1.0	-60.5	-13.0	-47.5	
2.354	-21.1	H	3.0	35.4	1.0	-55.5	-13.0	-42.5	
RB 25 0									
1.569	-27.1	V	3.0	35.6	1.0	-61.7	-13.0	-48.7	
2.354	-20.2	V	3.0	35.4	1.0	-54.6	-13.0	-41.6	
1.569	-26.3	H	3.0	35.6	1.0	-60.9	-13.0	-47.9	
2.354	-17.7	H	3.0	35.4	1.0	-52.1	-13.0	-39.1	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE QPSK Radiated Measurement in 1559-1610MHz Band

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/10/12							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, LTE Band 13 5MHz 784.5MHz, QPSK							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
(784.5MHz), RB1 0, QPSK									
1.565	-23.3	V	3.0	35.6	1.0	-57.9	-40.0	-17.9	
1.565	-21.6	H	3.0	35.6	1.0	-56.2	-40.0	-16.2	
(784.5MHz), RB1 24, QPSK									
1.560	-25.4	V	3.0	35.6	1.0	-60.0	-40.0	-20.0	
1.560	-23.6	H	3.0	35.6	1.0	-58.2	-40.0	-18.2	
(784.5MHz), RB12 6 QPSK									
1.558	-26.4	V	3.0	35.6	1.0	-61.0	-40.0	-21.0	
1.558	-24.6	H	3.0	35.6	1.0	-59.2	-40.0	-19.2	
(784.5MHz), RB25 0, QPSK									
1.560	-25.4	V	3.0	35.6	1.0	-60.0	-40.0	-20.0	
1.560	-24.1	H	3.0	35.6	1.0	-58.7	-40.0	-18.7	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE 16QAM Radiated Measurement in 1559-1610MHz Band

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		02/10/12							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, LTE Band 13 5MHz 784.5MHz, 16QAM							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
(784.5MHz), RB1 0, 16QAM									
1.565	-24.3	V	3.0	35.6	1.0	-58.9	-40.0	-18.9	
1.565	-23.4	H	3.0	35.6	1.0	-58.0	-40.0	-18.0	
(784.5MHz), RB1 24, 16QAM									
1.560	-26.7	V	3.0	35.6	1.0	-61.3	-40.0	-21.3	
1.560	-25.6	H	3.0	35.6	1.0	-60.2	-40.0	-20.2	
(784.5MHz), RB12 6 16QAM									
1.558	-23.2	V	3.0	35.6	1.0	-57.8	-40.0	-17.8	
1.558	-25.6	H	3.0	35.6	1.0	-60.2	-40.0	-20.2	
(784.5MHz), RB25 0, 16QAM									
1.560	-27.2	V	3.0	35.6	1.0	-61.8	-40.0	-21.8	
1.560	-25.9	H	3.0	35.6	1.0	-60.5	-40.0	-20.5	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE BAND 13, QPSK**782MHz**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project#:		11U13938							
Date:		10/20/11							
Test Engineer:		Chin Pang							
Configuration:		EUT only							
Mode:		TX, LTE BAND MODE, 10MHz BW QPSK							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
BAND 13 (782.0 MHz)									
RB 50 0, QPSK									
1.564	-28.0	V	3.0	35.6	1.0	-62.5	-13.0	-49.5	
2.346	-22.2	V	3.0	35.4	1.0	-56.6	-13.0	-43.6	
1.564	-27.4	H	3.0	35.6	1.0	-62.0	-13.0	-49.0	
2.346	-23.7	H	3.0	35.4	1.0	-58.1	-13.0	-45.1	
RB 1 49									
1.555	-28.0	V	3.0	35.6	1.0	-62.6	-13.0	-49.6	
2.333	-21.9	V	3.0	35.4	1.0	-56.3	-13.0	-43.3	
1.555	-26.5	H	3.0	35.6	1.0	-61.1	-13.0	-48.1	
2.333	-20.5	H	3.0	35.4	1.0	-55.0	-13.0	-42.0	
RB 25 12									
1.565	-27.1	V	3.0	35.6	1.0	-61.7	-13.0	-48.7	
2.347	-22.3	V	3.0	35.4	1.0	-56.7	-13.0	-43.7	
1.565	-26.7	H	3.0	35.6	1.0	-61.3	-13.0	-48.3	
2.347	-23.5	H	3.0	35.4	1.0	-57.9	-13.0	-44.9	
RB1 0									
1.564	-27.6	V	3.0	35.6	1.0	-62.1	-13.0	-49.1	
2.333	-20.7	V	3.0	35.4	1.0	-55.1	-13.0	-42.1	
1.564	-27.1	H	3.0	35.6	1.0	-61.7	-13.0	-48.7	
2.333	-20.0	H	3.0	35.4	1.0	-54.5	-13.0	-41.5	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE BAND 13, 16QAM**782MHz**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project#:		11U13938							
Date:		10/20/11							
Test Engineer:		Chin Pang							
Configuration:		EUT only							
Mode:		TX, LTE BAND NODE, 10MHz BW 16QAM							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
BAND 13 (782.0 MHz)									
RB 50 0, 16QAM									
1.564	-27.9	V	3.0	35.6	1.0	-62.4	-13.0	-49.4	
2.346	-22.7	V	3.0	35.4	1.0	-57.1	-13.0	-44.1	
1.564	-26.7	H	3.0	35.6	1.0	-61.3	-13.0	-48.3	
2.346	-24.4	H	3.0	35.4	1.0	-58.8	-13.0	-45.8	
RB 1 49									
1.573	-27.0	V	3.0	35.6	1.0	-61.6	-13.0	-48.6	
2.359	-21.1	V	3.0	35.4	1.0	-55.5	-13.0	-42.5	
1.573	-25.9	H	3.0	35.6	1.0	-60.5	-13.0	-47.5	
2.358	-20.0	H	3.0	35.4	1.0	-54.5	-13.0	-41.5	
RB 25 12									
1.565	-27.1	V	3.0	35.6	1.0	-61.7	-13.0	-48.7	
2.347	-22.2	V	3.0	35.4	1.0	-56.6	-13.0	-43.6	
1.565	-27.1	H	3.0	35.6	1.0	-61.7	-13.0	-48.7	
2.347	-24.1	H	3.0	35.4	1.0	-58.5	-13.0	-45.5	
RB1 0									
1.555	-27.8	V	3.0	35.6	1.0	-62.4	-13.0	-49.4	
2.333	-21.4	V	3.0	35.4	1.0	-55.8	-13.0	-42.8	
1.555	-27.0	H	3.0	35.6	1.0	-61.6	-13.0	-48.6	
2.333	-20.4	H	3.0	35.4	1.0	-54.9	-13.0	-41.9	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE QPSK Radiated Measurement in 1559-1610MHz Band

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		11/02/11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, LTE Band 13							
		782MHz, QPSK, 10MHz							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
(782MHz), RB1 0, QPSK									
1.600	-27.3	V	3.0	35.6	1.0	-61.9	-40.0	-21.9	
1.581	-24.4	H	3.0	35.6	1.0	-59.0	-40.0	-19.0	
(782MHz), RB1 49, QPSK									
1.602	-26.4	V	3.0	35.6	1.0	-60.9	-40.0	-20.9	
1.600	-27.2	H	3.0	35.6	1.0	-61.8	-40.0	-21.8	
(782MHz), RB25 12, QPSK									
1.564	-25.4	V	3.0	35.6	1.0	-60.0	-40.0	-20.0	
1.564	-22.6	H	3.0	35.6	1.0	-57.2	-40.0	-17.2	
(782MHz), RB50 0, QPSK									
1.592	-27.8	V	3.0	35.6	1.0	-62.4	-40.0	-22.4	
1.573	-27.6	H	3.0	35.6	1.0	-62.2	-40.0	-22.2	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

LTE 16QAM Radiated Measurement in 1559-1610MHz Band

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		11U13938							
Date:		11/02/11							
Test Engineer:		Chin Pang							
Configuration:		EUT with AC Adapter							
Mode:		TX, LTE Band 13 782MHz, 16QAM, 1(MHz)							
Chamber		Pre-amplifier		Filter		Limit			
5m Chamber B		T145 8449B		Filter 1		Part 27			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
(782MHz), RB1 0, 16QAM									
1.600	-28.1	V	3.0	35.6	1.0	-62.7	-40.0	-22.7	
1.577	-27.6	H	3.0	35.6	1.0	-62.2	-40.0	-22.2	
(782MHz), RB1 49, 16QAM									
1.592	-27.4	V	3.0	35.6	1.0	-61.9	-40.0	-21.9	
1.574	-26.5	H	3.0	35.6	1.0	-61.1	-40.0	-21.1	
(782MHz), RB25 12, 16QAM									
1.564	-25.4	V	3.0	35.6	1.0	-59.9	-40.0	-19.9	
1.564	-26.1	H	3.0	35.6	1.0	-60.7	-40.0	-20.7	
(782MHz), RB50 0, 16QAM									
1.600	-28.3	V	3.0	35.6	1.0	-62.8	-40.0	-22.8	
1.565	-27.9	H	3.0	35.6	1.0	-62.4	-40.0	-22.4	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

9.3. RECEIVER SPURIOUS EMISSIONS

LIMIT

RSS-Gen 7.2.2

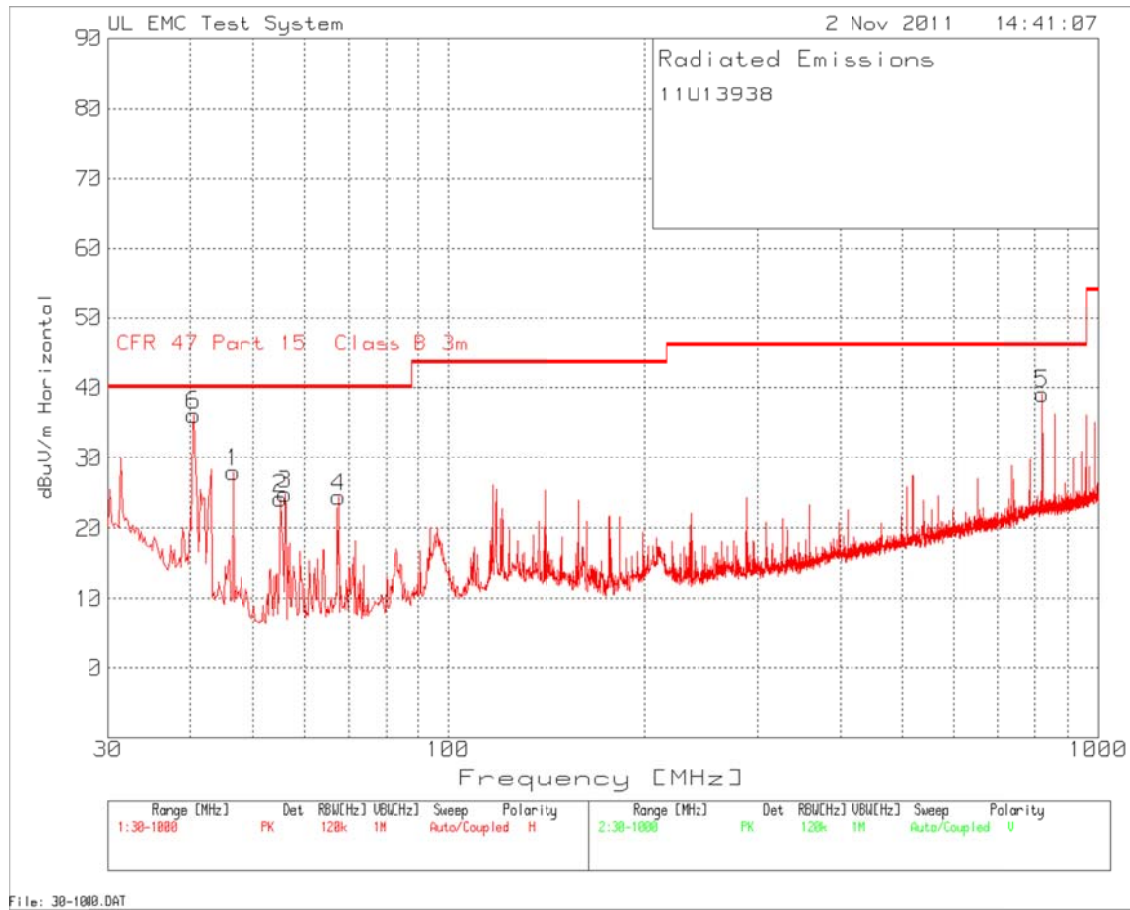
Spurious Emission Limits for Receivers:

Spurious Frequency (MHz)	Field Strength (microvolts/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

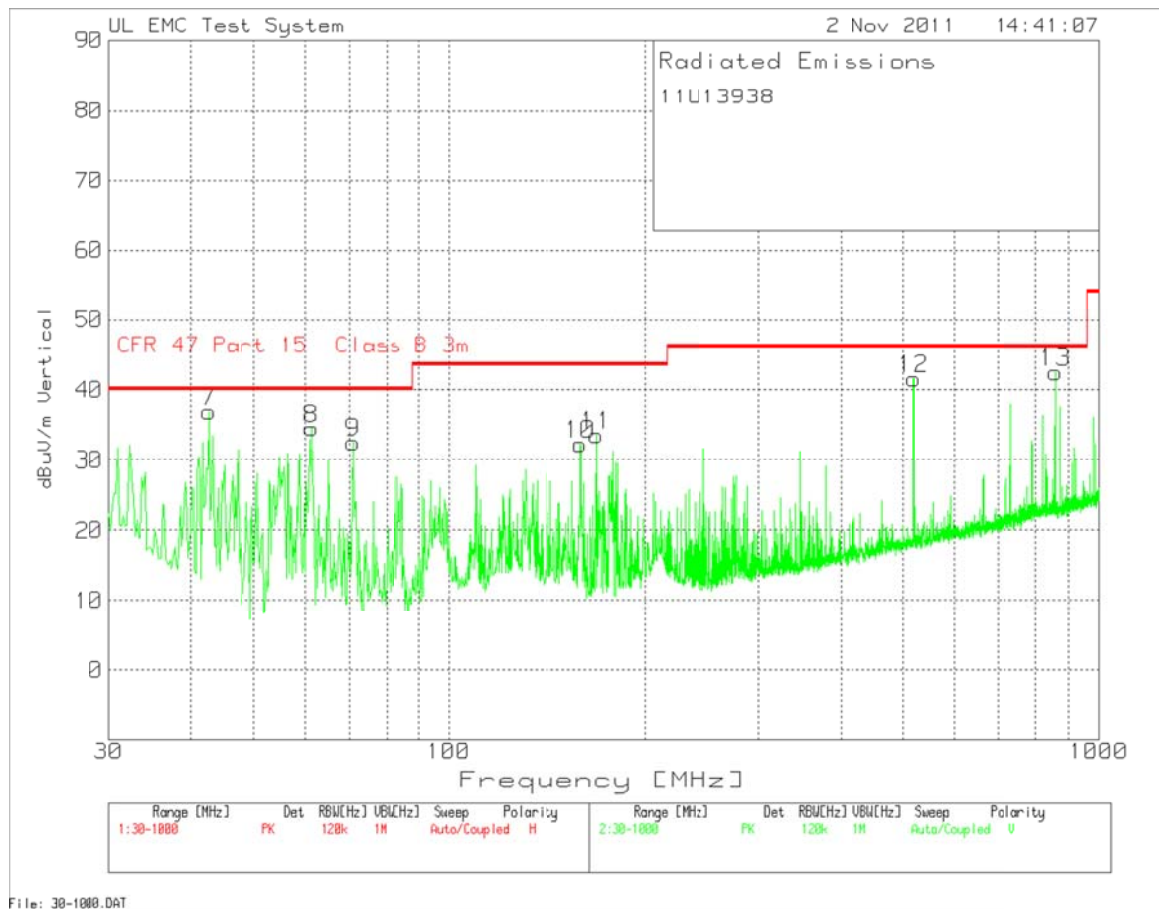
TEST PROCEDURE

The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (local oscillator frequency, intermediate frequency or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable and local oscillator frequencies.

RESULTS

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)**HORIZONTAL PLOT**

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

11U13938									
Range 1 30 - 1000MHz									
Frequency	Reading	Detector	Cable. los	Amp gain	Ant Factors.	Corrected	15 Class B	Margin	Polarity
46.4768	46.32	PK	1	-29.4	10.1	28.02	40	-11.98	Horz
55.1998	44.62	PK	1.1	-29.4	7.9	24.22	40	-15.78	Horz
55.9752	45.21	PK	1.1	-29.4	7.9	24.81	40	-15.19	Horz
67.6059	44.41	PK	1.2	-29.4	8.2	24.41	40	-15.59	Horz
823.2134	42.82	PK	4	-28.8	21.1	39.12	46	-6.88	Horz
40.4676	50.85	PK	0.9	-29.4	13.8	36.15	40	-3.85	Horz
Range 2 30 - 1000MHz									
Frequency	Reading	Detector	Cable. los	Amp gain	Ant Factors.	Corrected	15 Class B	Margin	Polarity
42.5999	52.9	PK	1	-29.4	12.5	37	40	-3	Vert
61.4029	54.84	PK	1.2	-29.4	7.9	34.54	40	-5.46	Vert
70.9013	52.49	PK	1.2	-29.4	8.2	32.49	40	-7.51	Vert
159.4884	48.73	PK	1.7	-29.1	10.9	32.23	43.5	-11.27	Vert
168.5991	50.47	PK	1.8	-29	10.3	33.57	43.5	-9.93	Vert
519.2646	50.77	PK	3.2	-29.4	17.1	41.67	46	-4.33	Vert
859.2686	45.85	PK	4.1	-28.7	21.3	42.55	46	-3.45	Vert

SPURIOUS EMISSIONS ABOVE 1000 MHz (WORST-CASE CONFIGURATION)

Note: No emissions were detected above the system noise floor.

9.4. POWER LINE CONDUCTED EMISSION

LIMIT

RSS-Gen 7.2.2

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radio communication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

Table 2 – AC Power Lines Conducted Emission Limits

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 [*]	56 to 46 [*]
0.5-5	56	46
5-30	60	50

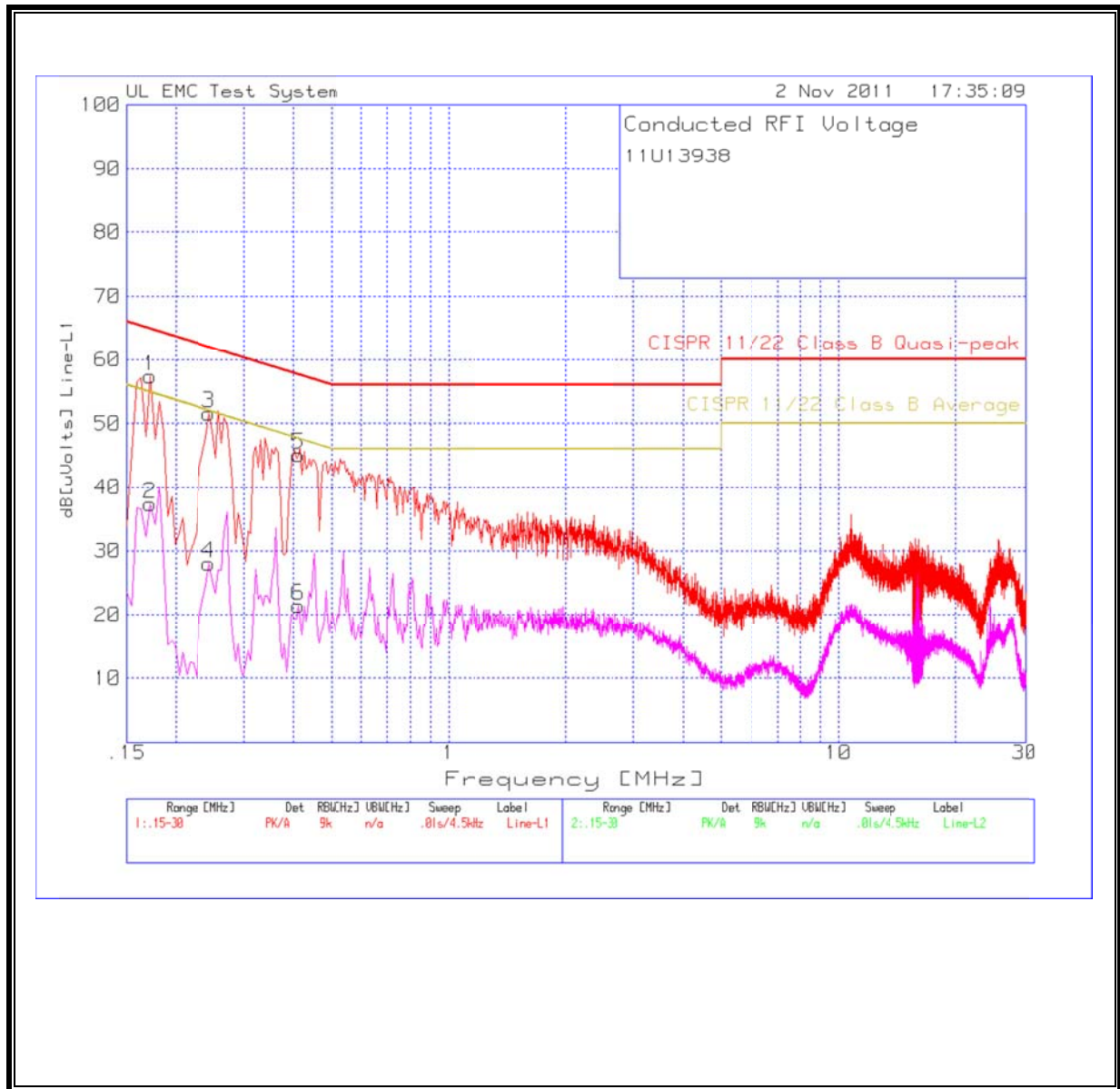
^{*}Decreases with the logarithm of the frequency.

RESULTS

6 WORST EMISSIONS

11U13938							
Line-L1 .15 - 30MHz							
Frequency	Reading	Detector	dB[uVolts]	Class B	GMargin	Class B	Margin
0.1725	57.35	PK	57.35	64.8	-7.45	54.8	2.55
0.1725	37.4	Av	37.4	-	-	54.8	-17.4
0.2445	51.56	PK	51.56	61.9	-10.34	51.9	-0.34
0.2445	28.02	Av	28.02	-	-	51.9	-23.88
0.411	45.15	PK	45.15	57.6	-12.45	47.6	-2.45
0.411	21.38	Av	21.38	-	-	47.6	-26.22
Line-L2 .15 - 30MHz							
Frequency	Reading	Detector	dB[uVolts]	Class B	GMargin	Class B	Margin
0.1635	57.13	PK	57.13	65.3	-8.17	55.3	1.83
0.1635	38.19	Av	38.19	-	-	55.3	-17.11
0.258	52.22	PK	52.22	61.5	-9.28	51.5	0.72
0.258	28.13	Av	28.13	-	-	51.5	-23.37
0.339	47.73	PK	47.73	59.2	-11.47	49.2	-1.47
0.339	24.06	Av	24.06	-	-	49.2	-25.14

LINE 1 RESULTS



LINE 2 RESULTS

