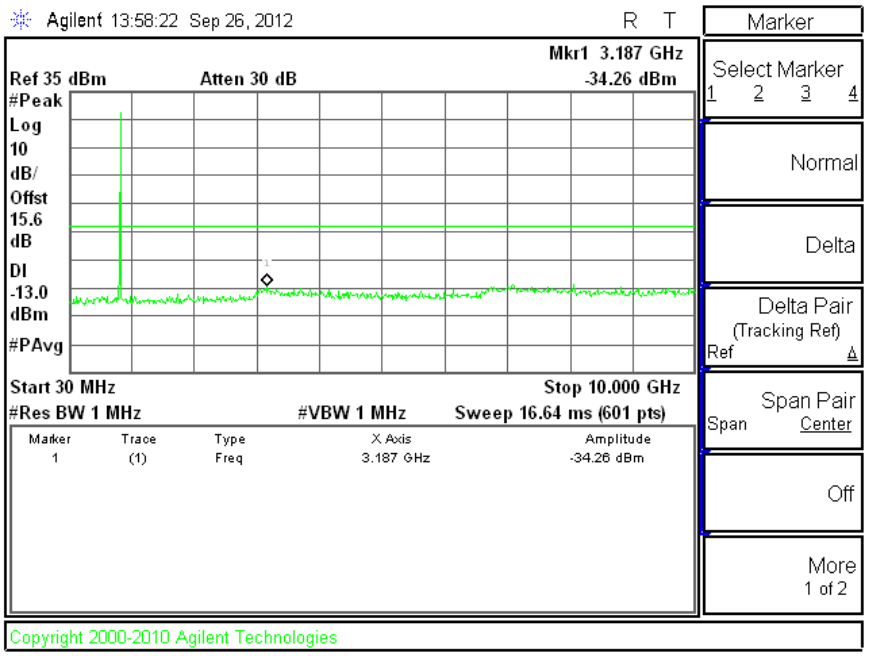
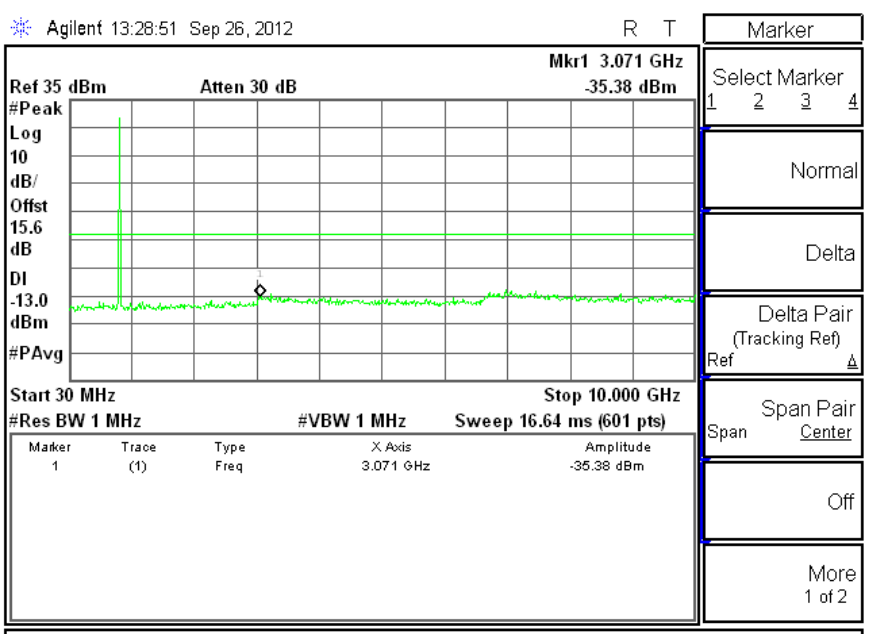
High, RB1-0, 30 TO 10000 MHz

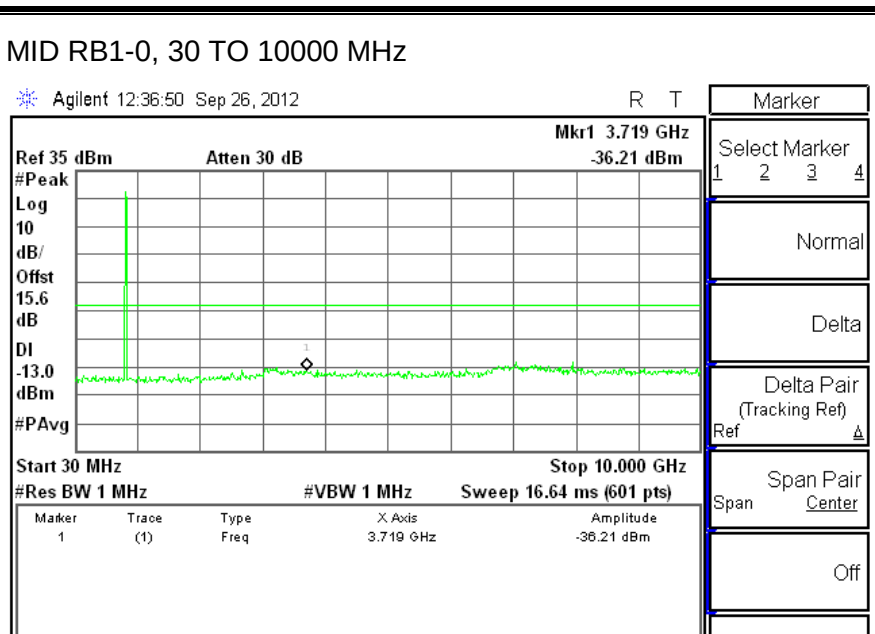


16QAM

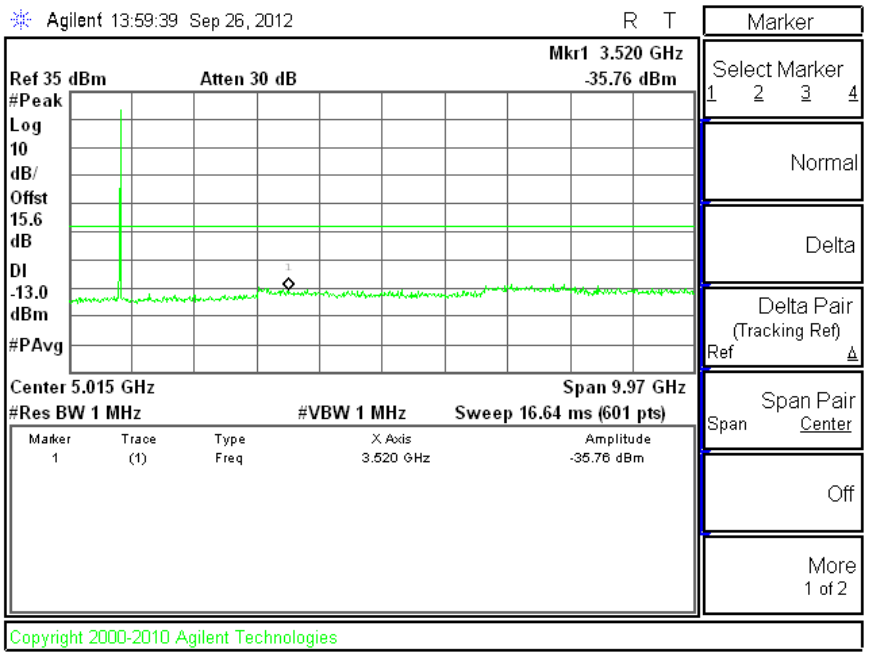
LOW, RB1-0, 30 TO 10000 MHz



MID RB1-0, 30 TO 10000 MHz



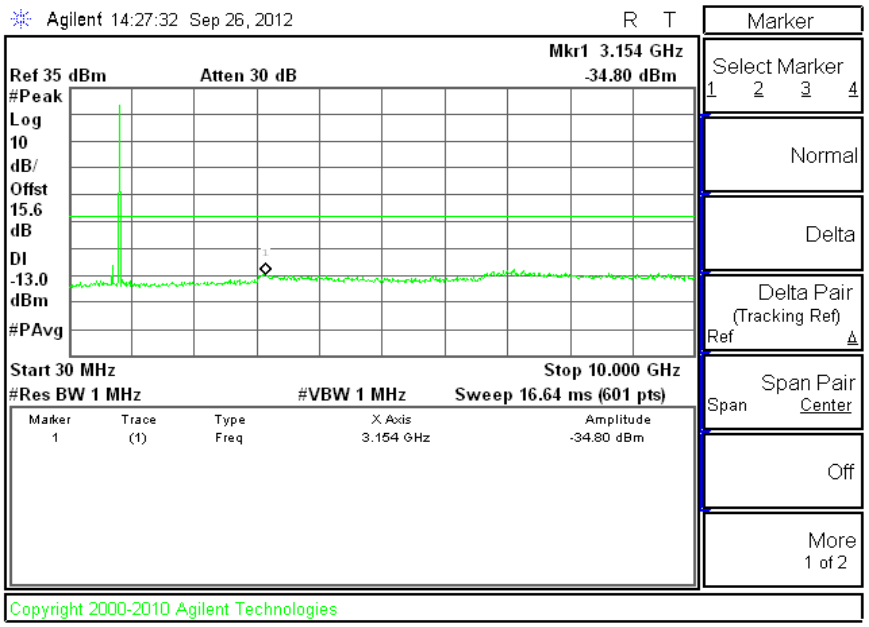
HIGH, RB1-0, 30 TO 10000 MHz



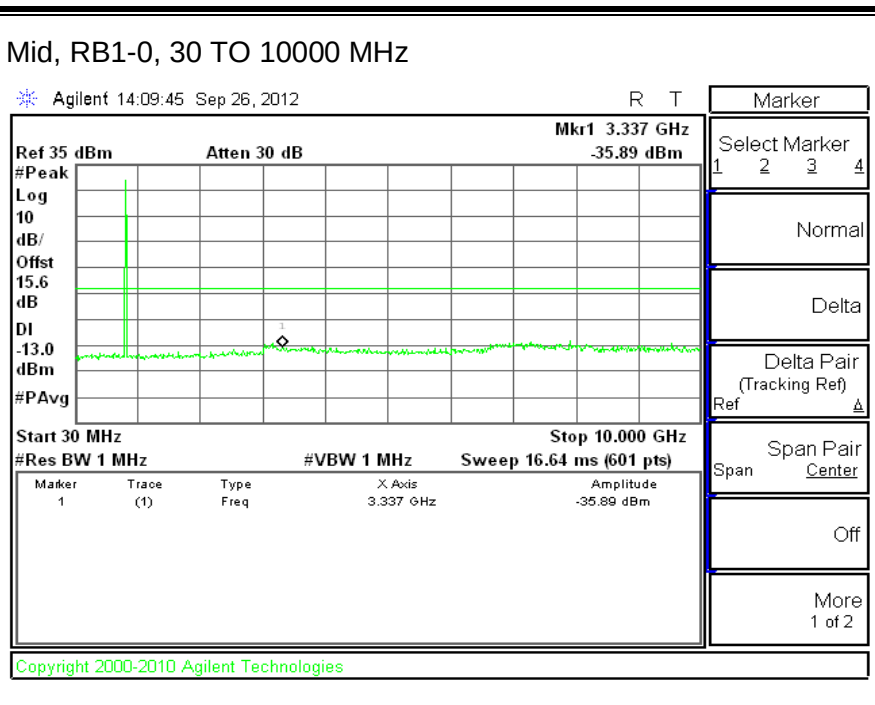
Band 5 (5 MHz BANDWIDTH)

QPSK

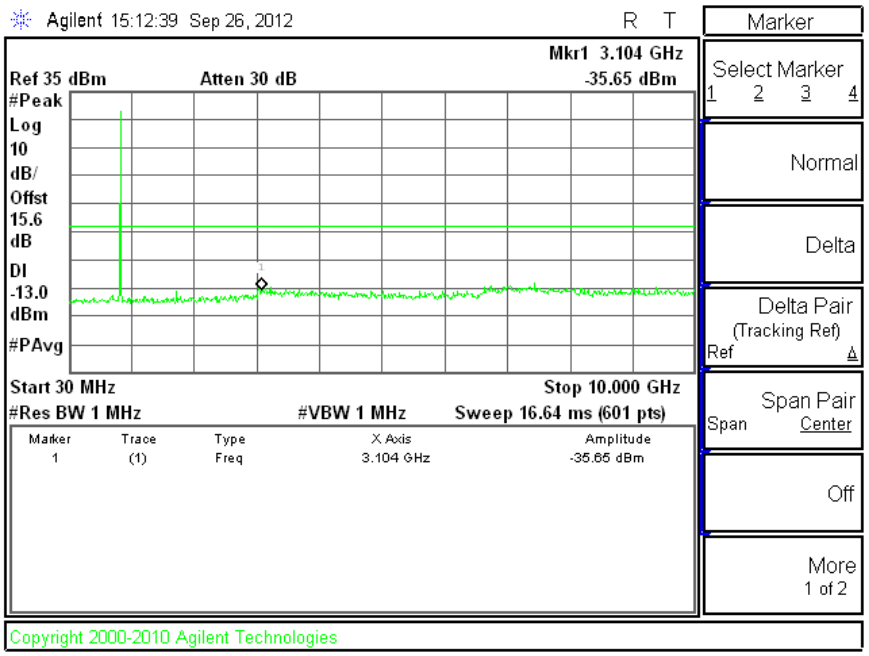
LOW, RB1-0, 30 TO 10000 MHz



Mid, RB1-0, 30 TO 10000 MHz

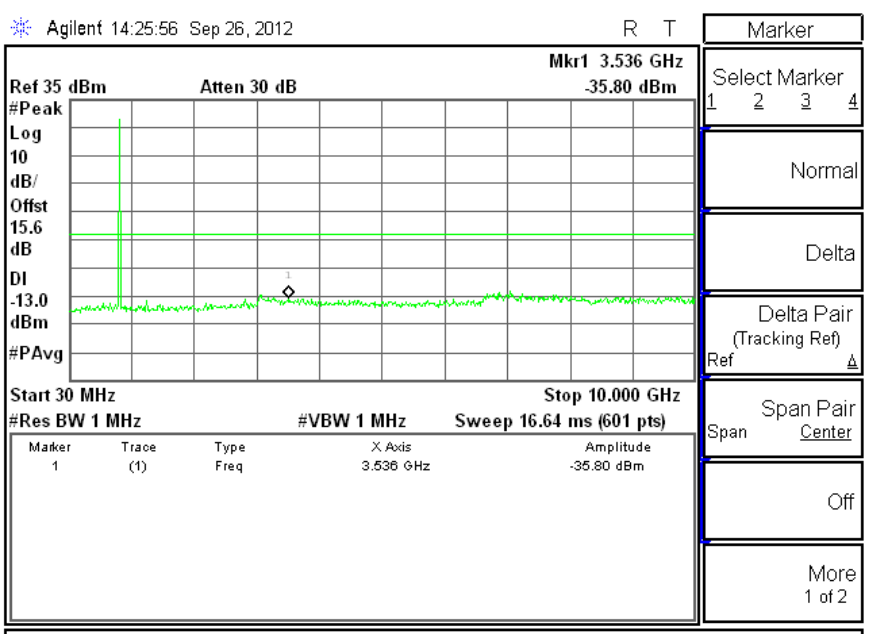


High, RB1-0, 30 TO 10000 MHz

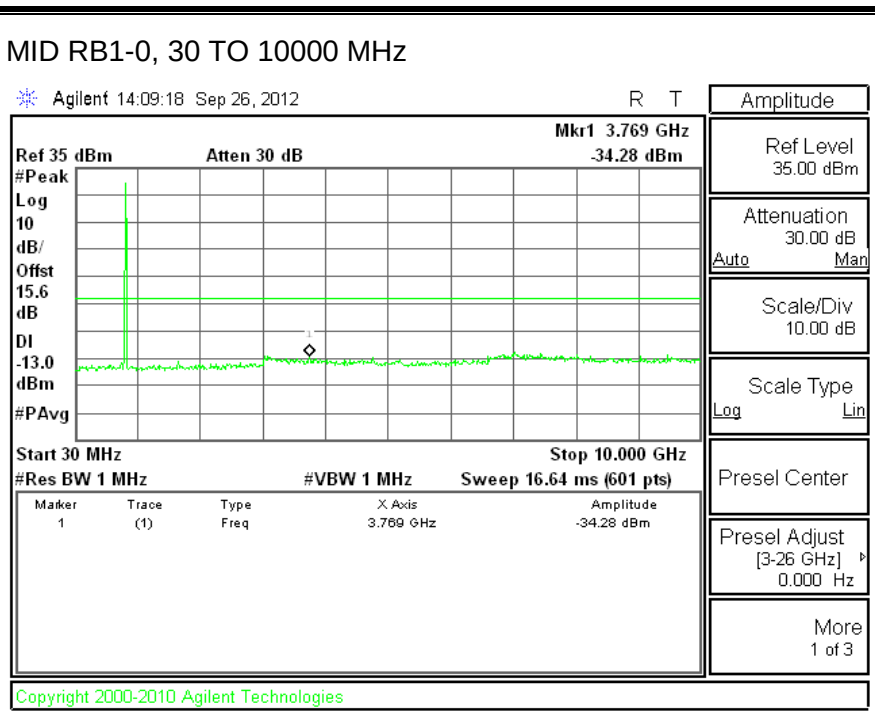


16QAM

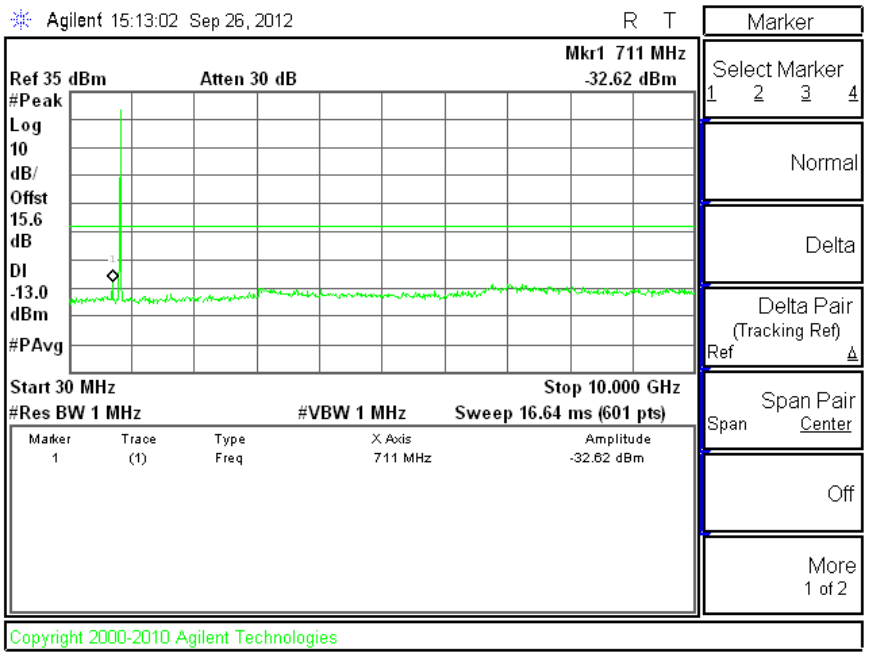
LOW, RB1-0, 30 TO 10000 MHz



MID RB1-0, 30 TO 10000 MHz



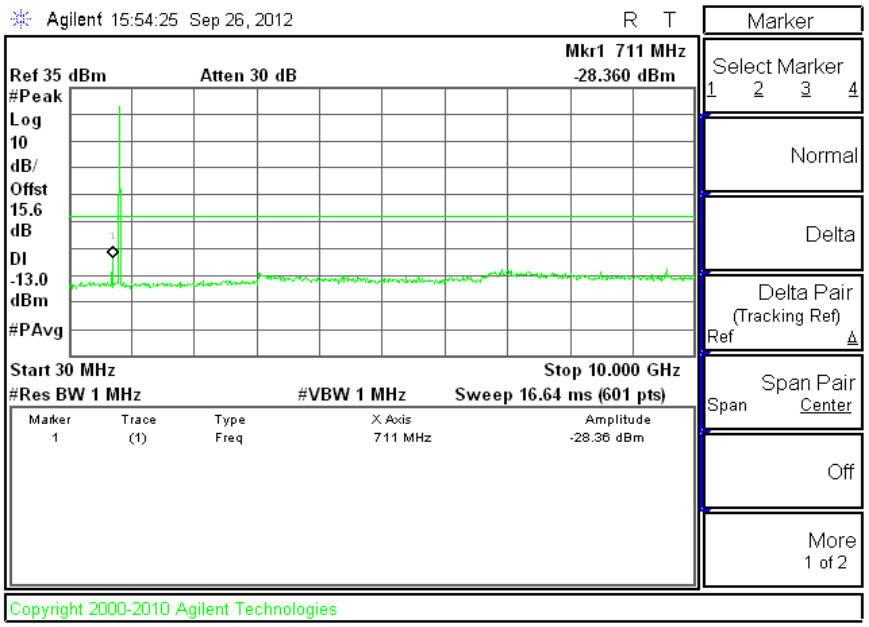
HIGH, RB1-0, 30 TO 10000 MHz



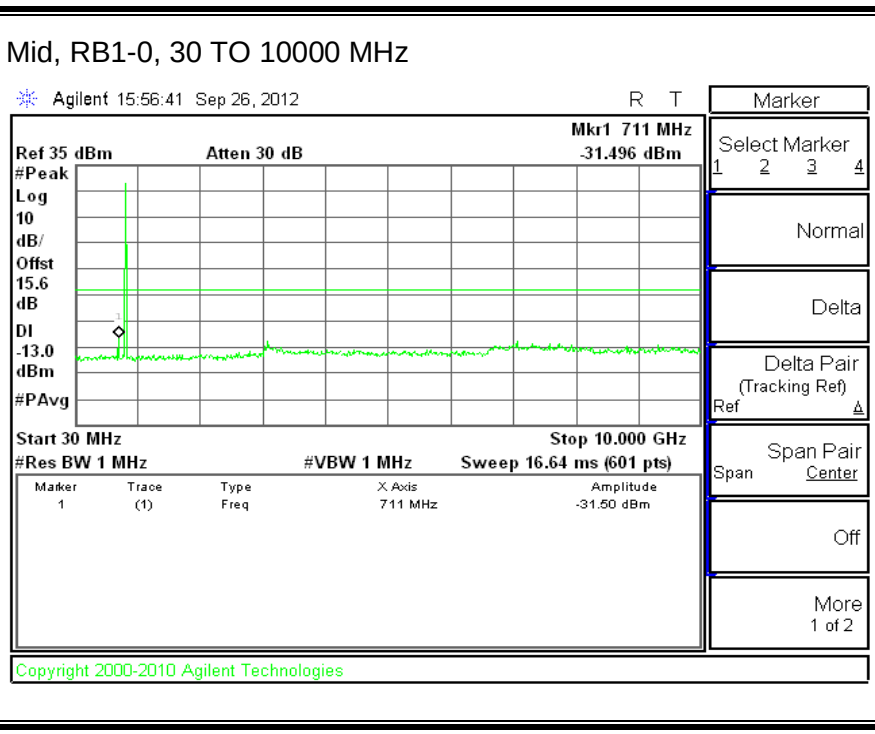
Band 5 (10 MHz BANDWIDTH)

QPSK

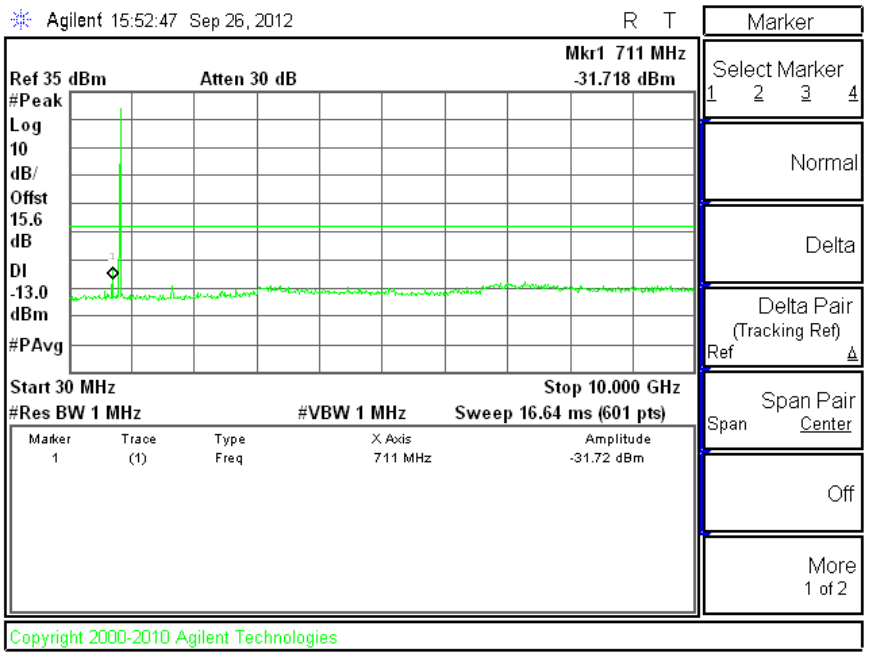
LOW, RB1-0, 30 TO 10000 MHz



Mid, RB1-0, 30 TO 10000 MHz

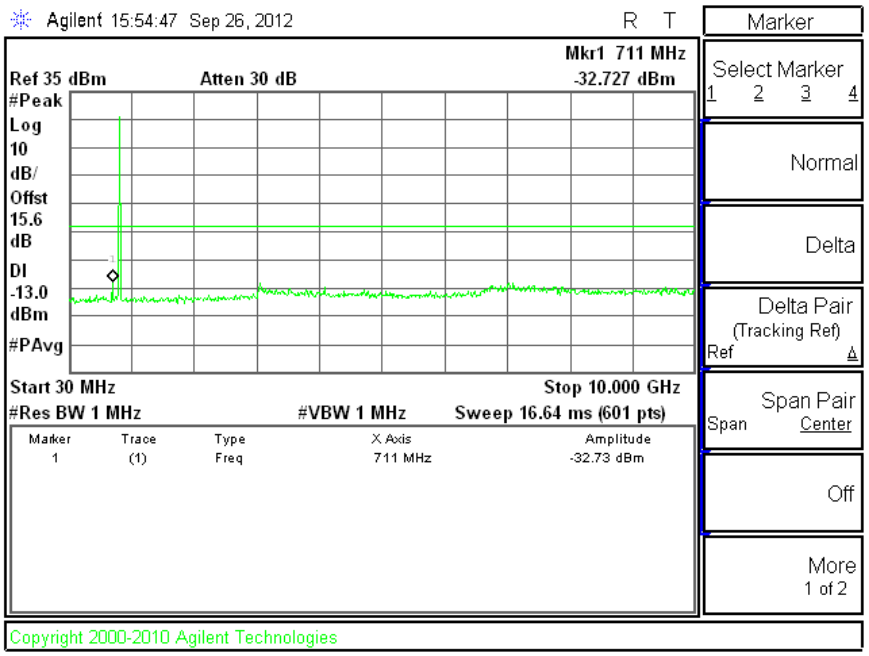


High, RB1-0, 30 TO 10000 MHz

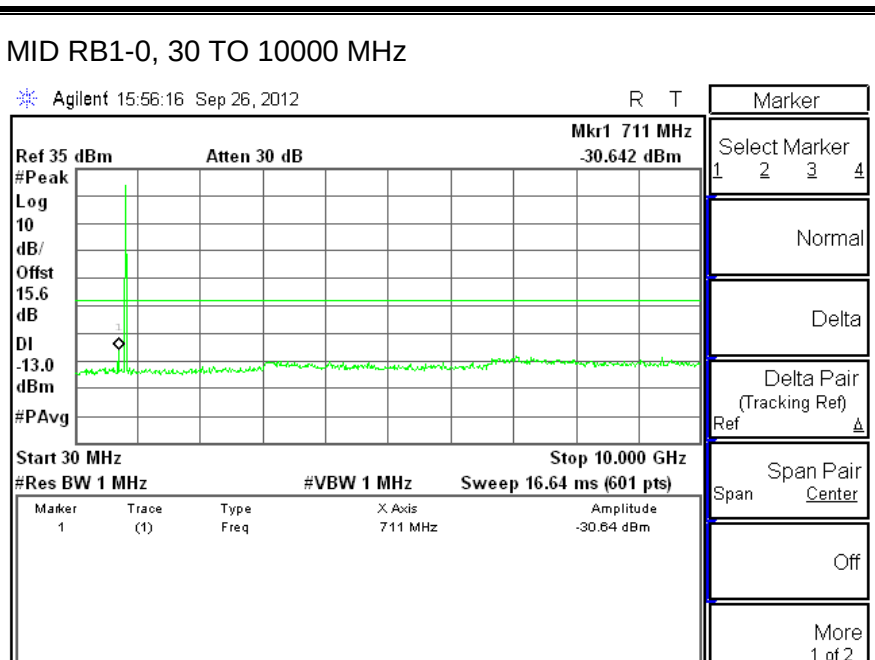


16QAM

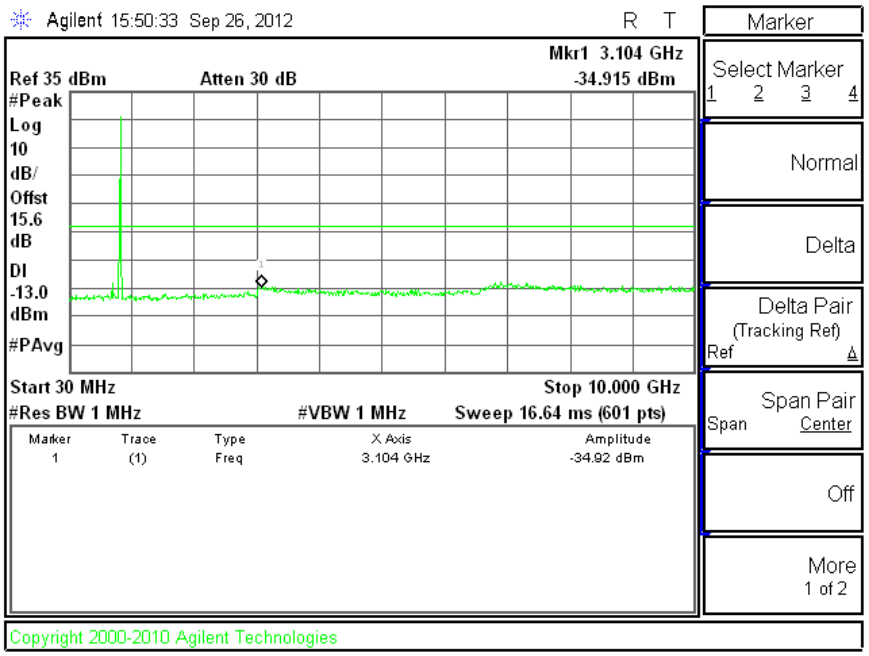
LOW, RB1-0, 30 TO 10000 MHz



MID RB1-0, 30 TO 10000 MHz



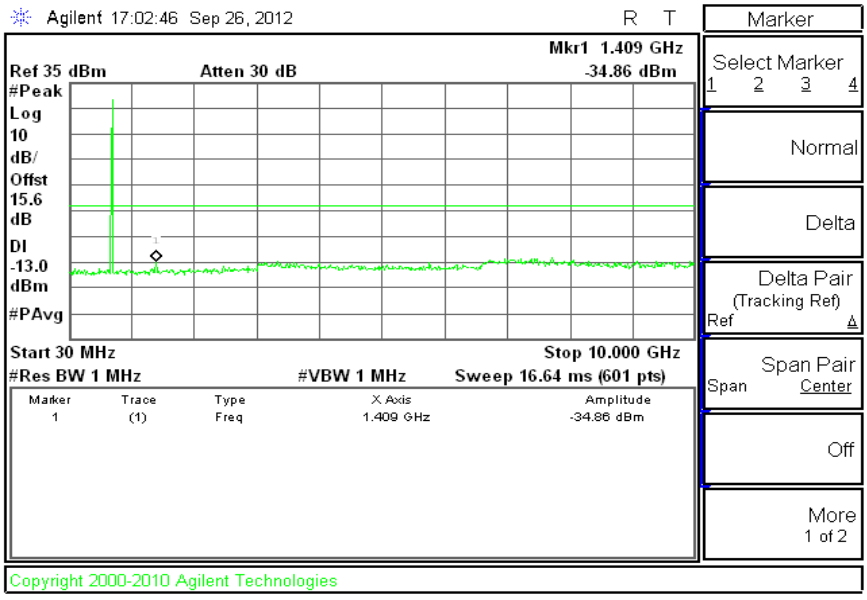
HIGH, RB1-0, 30 TO 10000 MHz



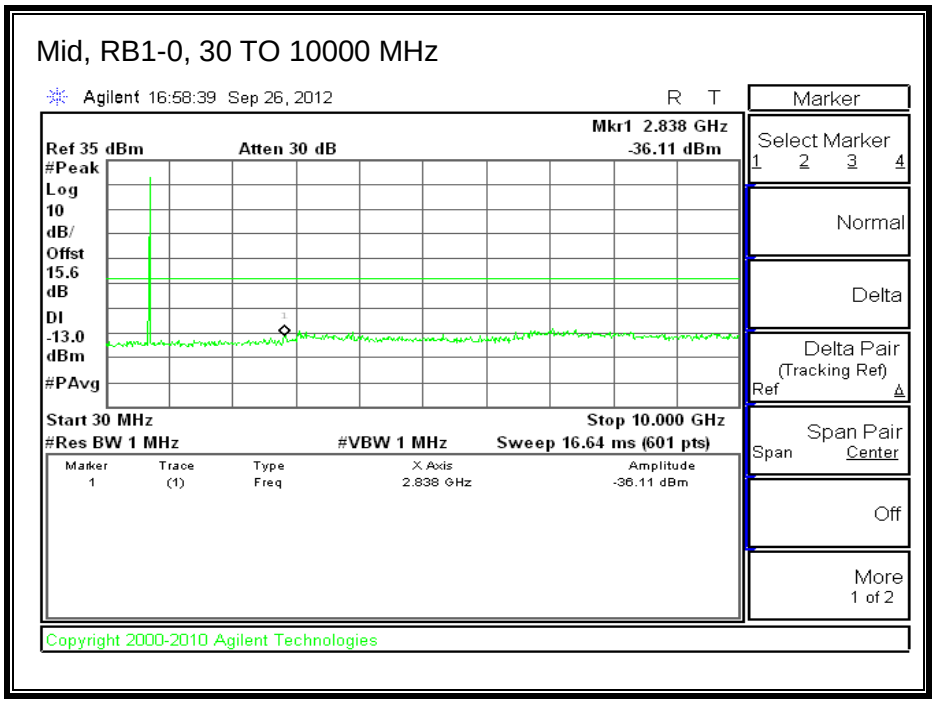
8.3.6. LTE BAND 17

QPSK (5 MHz BANDWIDTH)

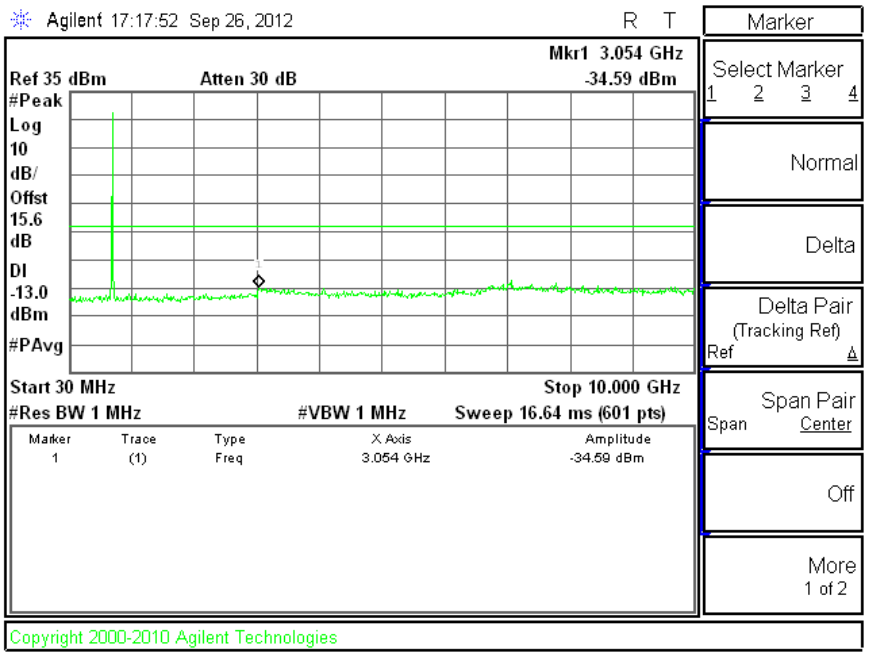
LOW, RB1-0, 30 TO 10000 MHz



Mid, RB1-0, 30 TO 10000 MHz

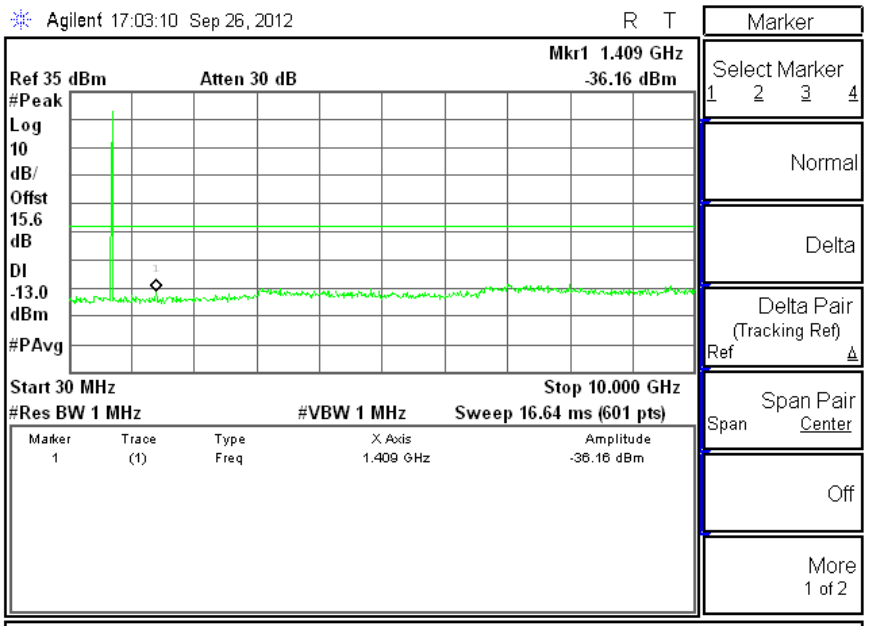


High, RB1-0, 30 TO 10000 MHz

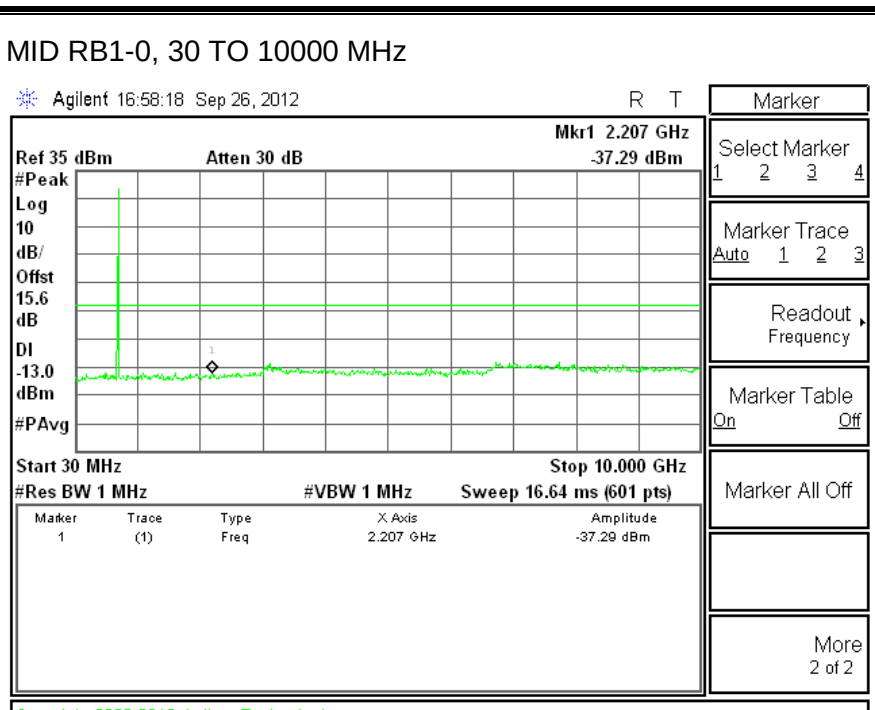


16QAM

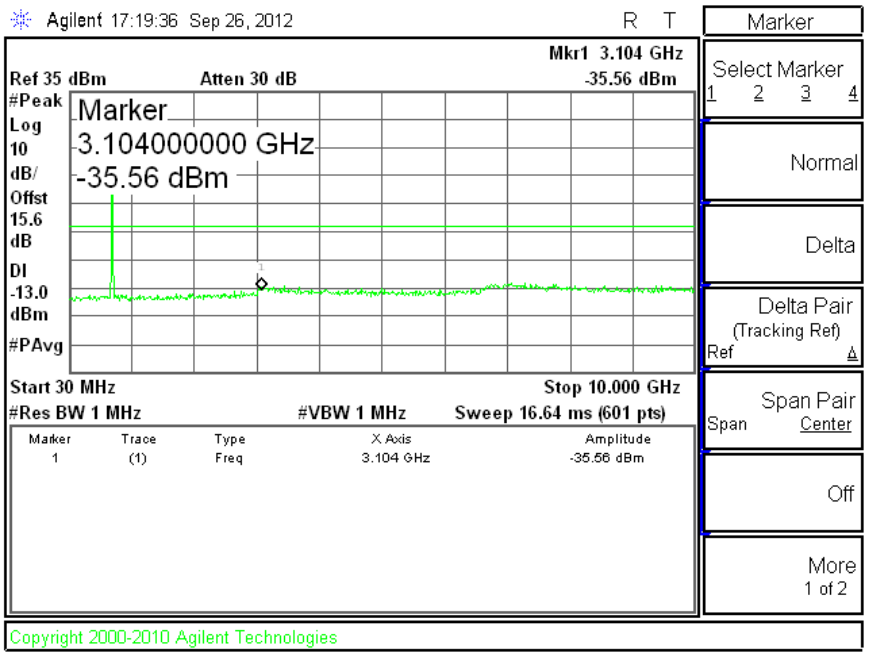
LOW, RB1-0, 30 TO 10000 MHz



MID RB1-0, 30 TO 10000 MHz



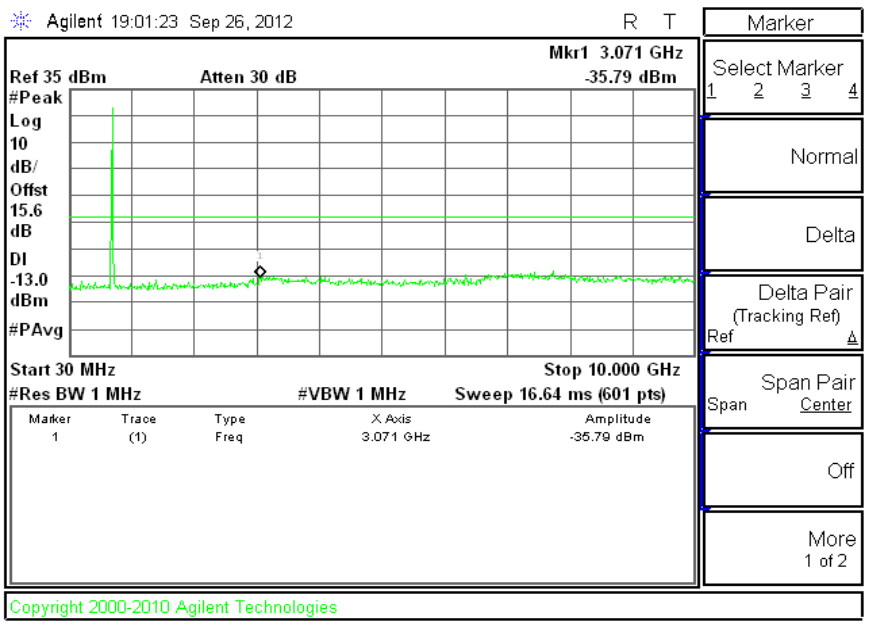
HIGH, RB1-0, 30 TO 10000 MHz



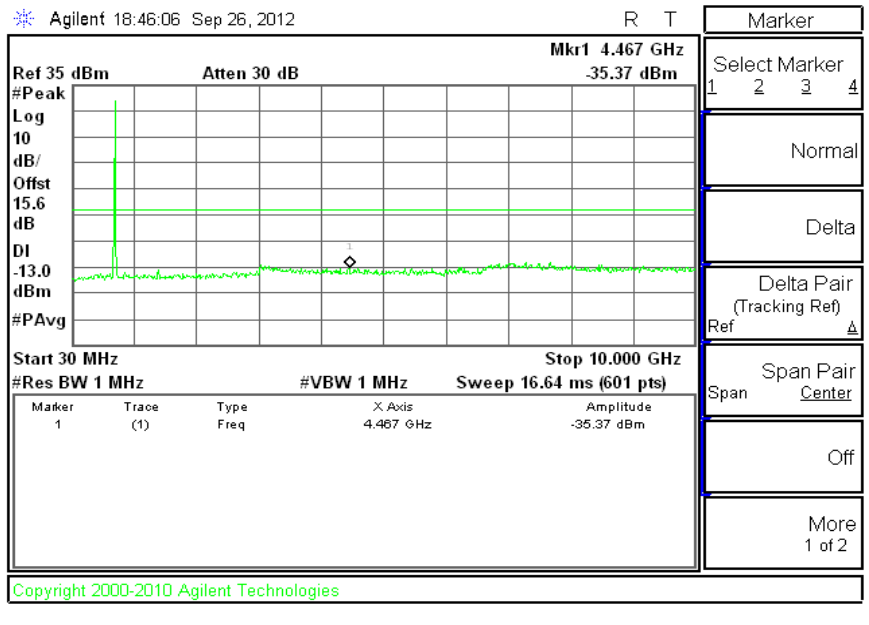
Band 17 (10 MHz BANDWIDTH)

QPSK

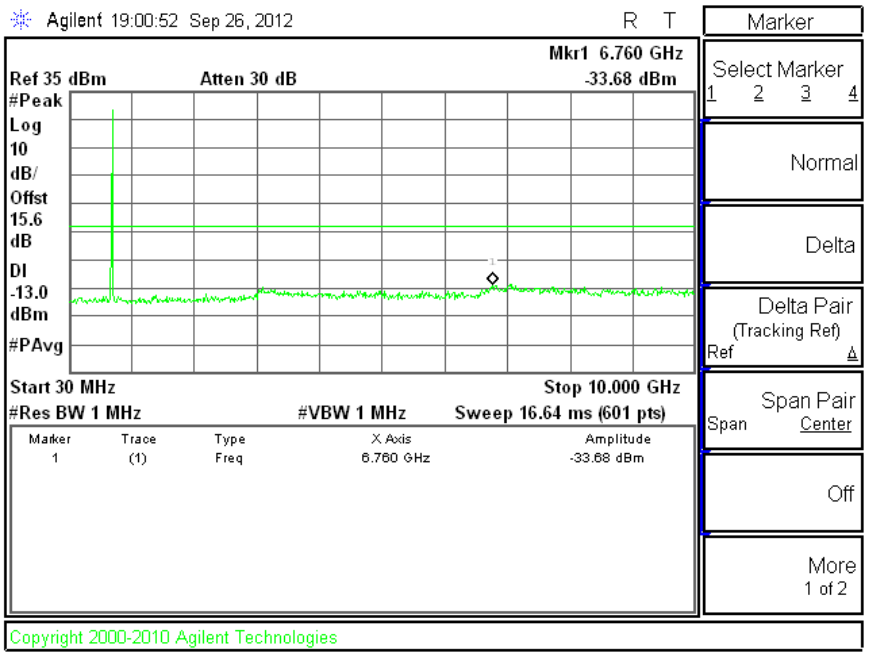
LOW, RB1-0, 30 TO 10000 MHz



Mid, RB1-0, 30 TO 10000 MHz

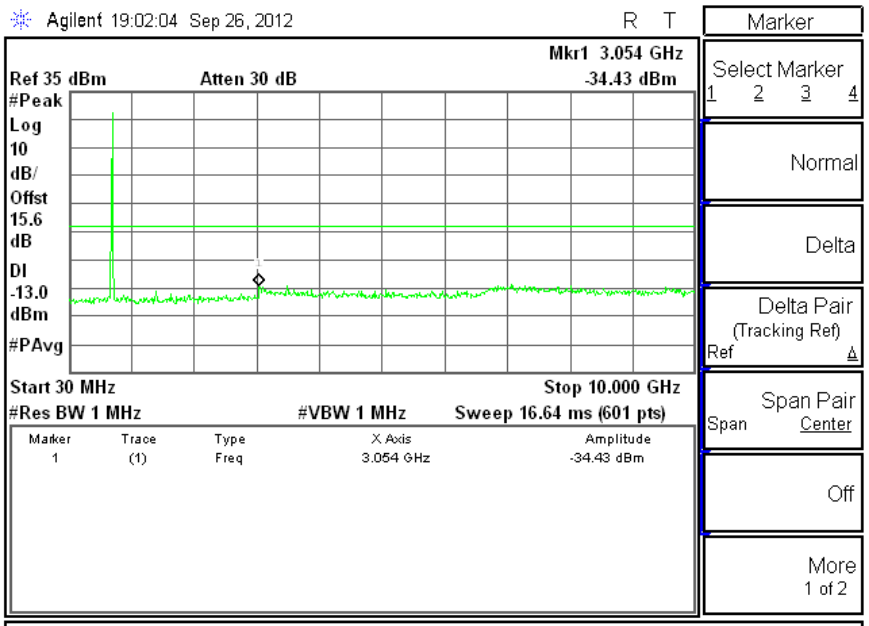


High, RB1-0, 30 TO 10000 MHz

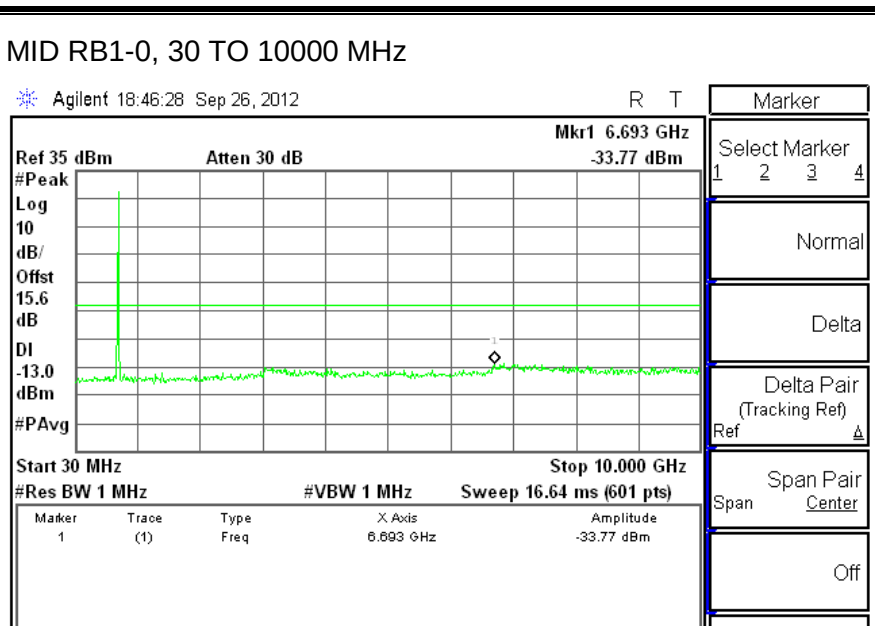


16QAM

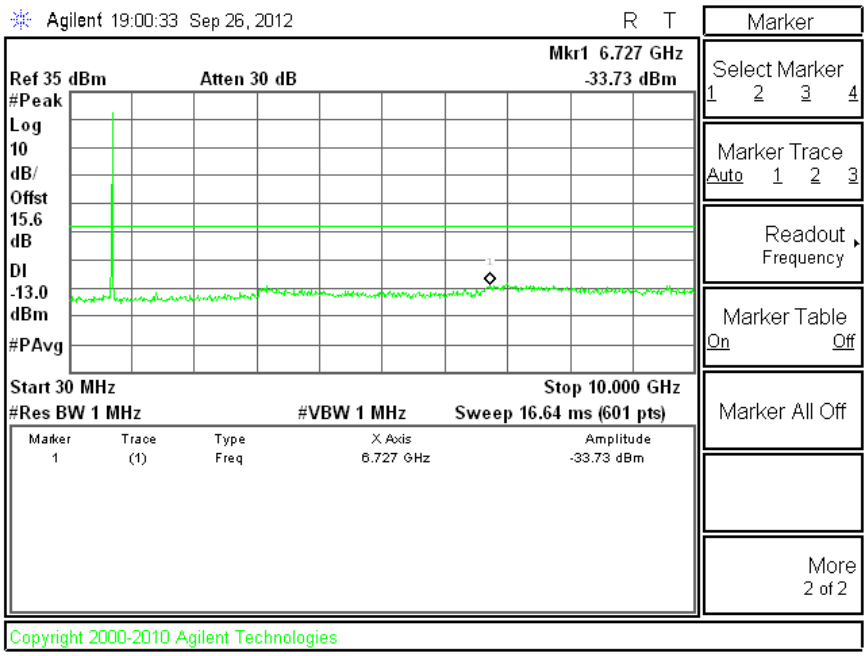
LOW, RB1-0, 30 TO 10000 MHz



MID RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz



8.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54

LIMITS

§22.355 & RSS-132 4.3 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

RSS-133 6.3 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use Agilent 8960 and CMW 500 with Frequency Error measurement capability.

- Temp. = −30° to +50°C
- Voltage = 3.8 V dc (85% - 115%)

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC 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 +50ºC is reached.
Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

MODES TESTED

- GPRS, EGPRS
- WCDMA
- LTE BAND 2
- LTE BAND 4
- LTE BAND 5
- LTE BAND 17

RESULTS

See the following pages.

CELL, GPRS MODULATION – MID CHANNEL

Reference Frequency: Cellular Mid Channel 836.600037 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.599999	0.045	2.5
3.80	40	836.599995	0.050	2.5
3.80	30	836.600004	0.039	2.5
3.80	***20***	***836.600037***	***0***	2.5
3.80	10	836.600088	-0.061	2.5
3.80	0	836.600085	-0.057	2.5
3.80	-10	836.600080	-0.051	2.5
3.80	-20	836.600058	-0.025	2.5
3.80	-30	836.600001	0.043	2.5

Reference Frequency: Cellular Mid Channel 836.600037 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	836.600037	***0***	***2.5***
4.30	20	836.600010	*0.032*	2.5
3.40	20	836.600065	*-0.033*	2.5
End Volt(3.2)	20	836.600048	*-0.013*	2.5

PCS, GPRS MODULATION – MID CHANNEL

Reference Frequency: PCS Mid Channel 1880.000077 Hz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (*C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000132	-0.029	2.5
3.80	40	1880.000132	-0.029	2.5
3.80	30	1880.000148	-0.038	2.5
3.80	***20***	**1880.000077**	***0***	***2.5***
3.80	10	1880.000261	-0.098	2.5
3.80	0	1880.000238	-0.086	2.5
3.80	-10	1880.000180	-0.055	2.5
3.80	-20	1880.000018	0.031	2.5
3.80	-30	1880.000015	0.033	2.5

Reference Frequency: PCS Mid Channel 1880.000077 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (*C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	**1880.000077**	***0.000***	***2.5***
4.30	20	1880.000014	*0.033*	2.5
3.40	20	1880.000131	*-0.029*	2.5
End Volt(3.2)	20	1880.000118	*-0.022*	2.5

CELL, EGPRS MODULATION – MID CHANNEL

Reference Frequency: Cellular Mid Channel 836.600056 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.500 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (°C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.80	50	836.600002	0.065	2.5
3.80	40	836.599972	0.100	2.5
3.80	30	836.600003	0.063	2.5
3.80	***20***	***836.600056***	***0***	2.5
3.80	10	836.600125	-0.082	2.5
3.80	0	836.600123	-0.080	2.5
3.80	-10	836.600116	-0.072	2.5
3.80	-20	836.600018	0.045	2.5
3.80	-30	836.600013	0.051	2.5

Reference Frequency: Cellular Mid Channel 836.600056 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.500 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (°C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.80	***20***	**836.600056**	***0***	***2.5***
4.30	20	836.600022	*0.041*	2.5
3.40	20	836.600083	*-0.032*	2.5
End Volt(3.2)	20	836.600076	*-0.024*	2.5

PCS, EGPRS MODULATION – MID CHANNEL

Reference Frequency: PCS Mid Channel 1880.000027 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (*C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.80	50	1879.999988	0.021	2.5
3.80	40	1879.999974	0.028	2.5
3.80	30	1879.999993	0.018	2.5
3.80	***20***	**1880.000027**	***0***	***2.5***
3.80	10	1880.000099	-0.038	2.5
3.80	0	1880.000094	-0.036	2.5
3.80	-10	1880.000109	-0.044	2.5
3.80	-20	1880.000135	-0.057	2.5
3.80	-30	1880.000084	-0.030	2.5

Reference Frequency: PCS Mid Channel 1880.000027 MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (*C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.80	***20***	**1880.000027**	***0.000***	***2.5***
4.30	20	1880.000070	*-0.023*	2.5
3.40	20	1880.000090	*-0.034*	2.5
End Volt(3.2)	20	1880.000075	*-0.026*	2.5

CELL WCDMA – MID CH

Reference Frequency: Cellular Mid Channel 835.999995 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2090.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.000006	-0.013	2.5
3.80	40	836.000006	-0.013	2.5
3.80	30	836.000008	-0.016	2.5
3.80	***20***	***835.999995***	***0***	2.5
3.80	10	836.000004	-0.011	2.5
3.80	0	835.999994	0.001	2.5
3.80	-10	836.000005	-0.012	2.5
3.80	-20	835.999980	0.018	2.5
3.80	-30	835.999995	0.000	2.5

Reference Frequency: Cellular Mid Channel 835.999995MHz @ 20°C Limit: to stay +- 2.5 ppm = 2090.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	**835.999995**	***0***	***2.5***
4.30	20	836.000006	*-0.013*	2.5
3.40	20	836.000004	*-0.011*	2.5
End Volt(3.2)	20	836.000011	*-0.019*	2.5

PCS WCDMA – MID CHANNEL

Reference Frequency: PCS Mid Channel 1880.000008MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (ºC)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000010	-0.0011	2.5
3.80	40	1880.000010	-0.0011	2.5
3.80	30	1880.000008	0.0000	2.5
3.80	***20***	**1880.000008**	***0***	***2.5***
3.80	10	1880.000009	-0.0005	2.5
3.80	0	1880.000006	0.0011	2.5
3.80	-10	1880.000007	0.0005	2.5
3.80	-20	1880.000010	-0.0011	2.5
3.80	-30	1880.000009	-0.0005	2.5

Reference Frequency: PCS Mid Channel 1880.000008MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (ºC)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	**1880.000008**	***0***	***2.5***
4.30	20	1880.000014	-0.0032	2.5
3.40	20	1880.000020	-0.0064	2.5
End Volt(3.2)	20	1880.000016	-0.0043	2.5

QPSK, LTE BAND 2 – 1880.0 MHz

Reference Frequency: LTE Band 1880.000009 MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000016	-0.004	2.5
3.80	40	1880.000018	-0.005	2.5
3.80	30	1880.000012	-0.002	2.5
3.80	***20***	***1880.000009***	***0.000***	2.5
3.80	10	1880.000015	-0.003	2.5
3.80	0	1880.000014	-0.003	2.5
3.80	-10	1880.000018	-0.005	2.5
3.80	-20	1880.000017	-0.004	2.5
3.80	-30	1880.000017	-0.004	2.5

Reference Frequency: Cellular Mid Channel 1880.000009 MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***1880.000009***	***0***	***2.5***
4.30	20	1880.000014	*-0.003*	2.5
3.40	20	1880.000014	*-0.003*	2.5
End Voltage(3.2)	20	1880.000015	*-0.003*	2.5

16QAM-LTE BAND 2 – 1880.0 MHz

Reference Frequency: LTE Band 1880.000007 MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1880.000015	-0.004	2.5
3.80	40	1880.000016	-0.005	2.5
3.80	30	1880.000016	-0.005	2.5
3.80	***20***	***1880.000007***	***0***	2.5
3.80	10	1880.000016	-0.005	2.5
3.80	0	1880.000015	-0.004	2.5
3.80	-10	1880.000015	-0.004	2.5
3.80	-20	1880.000015	-0.004	2.5
3.80	-30	1880.000016	-0.005	2.5

Reference Frequency: LTE Band 2, Mid Channel 1880.000007 MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***1880.000007***	***0***	***2.5***
4.30	20	1880.000015	*-0.004*	2.5
3.40	20	1880.000016	*-0.005*	2.5
End Voltage(3.2)	20	1880.000016	*-0.005*	2.5

LTE BAND 4 – 1732.5 MHz QPSK

Reference Frequency: LTE Band 4_Mid Channel 1732.499993 MHz @ 20°C Limit: to stay +- 2.5 ppm = 4331.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1732.499998	-0.0029	2.5
3.80	40	1732.500000	-0.0040	2.5
3.80	30	1732.499999	-0.0035	2.5
3.80	***20***	***1732.499993***	***0***	2.5
3.80	10	*1732.499999*	-0.0035	2.5
3.80	0	*1732.499997*	-0.0023	2.5
3.80	-10	1732.499999	-0.0035	2.5
3.80	-20	*1732.499998*	-0.0029	2.5
3.80	-30	1732.499998	-0.0029	2.5

Reference Frequency: LTE Band 4_Mid Channel 1732.499993 MHz @ 20°C Limit: to stay +- 2.5 ppm = 4331.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***1732.499993***	***0***	***2.5***
4.30	20	1732.499988	*0.0029*	2.5
3.40	20	1732.499984	*0.0052*	2.5
End Volt(3.2)	20	1732.499989	*0.0023*	2.5

LTE BAND 4 – 1732.5 MHZ, 16QAM

Reference Frequency: LTE Band 4_Mid Channle 1732.499992 MHz @ 20°C Limit: to stay +- 2.5 ppm = 4331.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1732.499998	-0.003	2.5
3.80	40	1732.499984	0.005	2.5
3.80	30	1732.499986	0.003	2.5
3.80	***20***	***1732.499992***	***0.000***	2.5
3.80	10	1732.499984	0.005	2.5
3.80	0	1732.499984	0.005	2.5
3.80	-10	1732.499986	0.003	2.5
3.80	-20	1732.499986	0.003	2.5
3.80	-30	1732.499986	0.003	2.5

Reference Frequency: LTE Band 4_Mid Channel 1732.499992MHz @ 20°C Limit: to stay +- 2.5 ppm = 4331.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***1732.499992***	***0***	***2.5***
4.30	20	1732.499987	*0.003*	2.5
3.40	20	1732.499985	*0.004*	2.5
End Volt(3.2)	20	1732.499989	*0.002*	2.5

LTE BAND 5 – 836.5MHz. QPSK

Reference Frequency: LTE Band 17_Mid Channe 836.500004 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.500012	-0.010	2.5
3.80	40	836.500012	-0.010	2.5
3.80	30	836.500008	-0.005	2.5
3.80	***20***	***836.500004***	***0***	2.5
3.80	10	836.500003	0.001	2.5
3.80	0	836.499998	0.007	2.5
3.80	-10	836.499996	0.010	2.5
3.80	-20	836.499997	0.008	2.5
3.80	-30	836.499998	0.007	2.5

Reference Frequency: LTE Band 17_Mid channel 836.500004 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***836.500004***	***0***	***2.5***
4.30	20	836.500008	-0.005	2.5
3.40	20	836.500006	-0.002	2.5
End Volt(3.2)	20	836.500003	0.001	2.5

LTE BAND 5 – 836.5 MHz, 16QAM

Reference Frequency: LTE Band 17_Mid Channel 836.500012 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vac)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.500010	0.002	2.5
3.80	40	836.500015	-0.004	2.5
3.80	30	836.500014	-0.002	2.5
3.80	***20***	***836.500012***	***0***	2.5
3.80	10	836.500009	0.004	2.5
3.80	0	836.500006	0.007	2.5
3.80	-10	836.500004	0.010	2.5
3.80	-20	836.500003	0.011	2.5
3.80	-30	836.500003	0.011	2.5

Reference Frequency: LTE Band 17_Mid Channel 36.500012 MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.250 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vac)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***836.500012***	***0***	***2.5***
4.30	20	836.500005	*0.008*	2.5
3.40	20	836.500004	*0.010*	2.5
End Volt(3.2)	20	836.500010	*0.002*	2.5

LTE BAND 17 – 7110 MHz, QPSK

Reference Frequency: LTE Band 17_Mid Channe 710.000004 MHz @ 20°C Limit: to stay +- 2.5 ppm = 1775.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	710.000008	-0.006	2.5
3.80	40	710.000008	-0.006	2.5
3.80	30	710.000008	-0.006	2.5
3.80	***20***	***710.000004***	***0***	2.5
3.80	10	710.000008	-0.006	2.5
3.80	0	710.000008	-0.006	2.5
3.80	-10	710.000008	-0.006	2.5
3.80	-20	710.000009	-0.007	2.5
3.80	-30	710.000008	-0.006	2.5

Reference Frequency: LTE Band 17_Mid channel 710.000004 MHz @ 20°C Limit: to stay +- 2.5 ppm = 1775.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***710.000004***	***0***	***2.5***
4.30	20	710.000007	-0.004	2.5
3.40	20	710.000008	-0.006	2.5
End Volt(3.2)	20	710.000008	-0.006	2.5

LTE BAND 17 – 710 MHz, 16QAM

Reference Frequency: LTE Band 17_Mid Channel 710.000005 MHz @ 20°C Limit: to stay +- 2.5 ppm = 1775.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vac)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	710.000009	-0.006	2.5
3.80	40	710.000009	-0.006	2.5
3.80	30	710.000009	-0.006	2.5
3.80	***20***	***710.000005***	***0***	2.5
3.80	10	710.000008	-0.004	2.5
3.80	0	710.000009	-0.006	2.5
3.80	-10	710.000008	-0.004	2.5
3.80	-20	710.000009	-0.006	2.5
3.80	-30	710.000010	-0.007	2.5

Reference Frequency: LTE Band 17_Mid Channel 710.000005MHz @ 20°C Limit: to stay +- 2.5 ppm = 1775.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vac)	Temperature (°C)	(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***710.000005***	***0***	***2.5***
4.30	20	710.000008	*-0.004*	2.5
3.40	20	710.000010	*-0.007*	2.5
End Volt(3.2)	20	710.000010	*-0.007*	2.5

9. RADIATED TEST RESULTS

9.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, and §27.50

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.

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.

27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

§ 90.635 Limitations on power and antenna height.

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

(b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

Table—Equivalent Power and Antenna Heights for Base Stations in the 851–869 MHz and 935–940 MHz Bands Which Have a Requirement for a 32 km (20 mi) Service Area Radius

Antenna height (ATT) meters (feet)	Effective radiated power (watts)[1,2,4]
Above 1,372 (4,500)	65
Above 1,220 (4,000) to 1,372 (4,500)	70
Above 1,067 (3,500) to 1,220 (4,000)	75
Above 915 (3,000) to 1,067 (3,500)	100
Above 763 (2,500) to 915 (3,000)	140
Above 610 (2,000) to 763 (2,500)	200
Above 458 (1,500) to 610 (2,000)	350
Above 305 (1,000) to 458 (1,500)	600
Up to 305 (1,000)	31,000

1Power is given in terms of effective radiated power (ERP).

2Applicants in the Los Angeles, CA, area who demonstrate a need to serve both the downtown and fringe areas will be permitted to utilize an ERP of 1 kw at the following mountaintop sites: Santiago Park, Sierra Peak, Mount Lukens, and Mount Wilson.

3Stations with antennas below 305 m (1,000 ft) (AAT) will be restricted to a maximum power of 1 kw (ERP).

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17

MODES TESTED

- GPRS, EGPRS
- WCDMA, HSUPA
- LTE BAND 2
- LTE BAND 4
- LTE BAND 5
- LTE BAND 17

TEST RESULTS

Mode	Channel	f (MHz)	ERP (PEAK)	
			dBm	mW
GPRS	128	824.20	31.97	1573.98
	190	836.60	32.14	1636.82
	251	848.80	32.11	1625.55
EGPRS	128	824.20	30.17	1039.92
	190	836.60	30.24	1056.82
	251	848.80	30.01	1002.31

Mode	Channel	f (MHz)	EIRP (PEAK)	
			dBm	mW
GPRS	512	1852.40	31.21	1321.30
	661	1880.00	30.95	1244.51
	810	1909.80	30.72	1180.32
EGPRS	512	1852.40	30.90	1230.27
	661	1880.00	31.09	1285.29
	810	1909.80	30.82	1207.81

Mode	Channel	f (MHz)	ERP (AVERAGE)	
			dBm	mW
UMTS,REL 99	4357	826.40	20.97	125.03
	4405	836.00	21.14	130.02
	4455	846.00	21.11	129.12

Mode	Channel	f (MHz)	EIRP (PEAK)	
			dBm	mW
UMTS,REL 99	9662	1852.40	26.92	492.04
	9800	1880.00	27.59	574.12
	9938	1907.60	28.64	731.14

Mode	Channel	f (MHz)	ERP (AVERAGE)	
			dBm	mW
UMTS, HSUPA	4357	826.40	19.60	91.20
	4405	836.00	19.54	89.95
	4455	846.00	20.21	104.95

Mode	Channel	f (MHz)	EIRP (PEAK)	
			dBm	mW
UMTS, HSUPA	9662	1850.20	28.57	719.45
	9800	1880.00	28.81	760.33
	9938	1907.60	28.65	732.82

EIRP LTE Band 2 (1.4MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
1.4 MHZ BAND QPSK	6/0	1850.7	30.50	1122.02
		1880.0	30.44	1106.62
		1909.3	30.76	1191.24
1.4 MHZ BAND 16QAM	6/0	1850.7	29.49	889.20
		1880.0	29.33	857.04
		1909.3	29.71	935.41

EIRP LTE Band 2 (3MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
3.0 MHZ BAND QPSK	15/0	1851.5	30.47	1114.29
		1880.0	30.75	1188.50
		1908.5	30.71	1177.61
3.0 MHZ BAND 16QAM	15/0	1851.5	29.51	893.31
		1880.0	29.74	941.89
		1908.5	29.78	950.60

EIRP LTE Band 2 (5MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
5.0 MHZ BAND QPSK	25/0	1852.5	30.51	1124.60
		1880.0	30.83	1210.60
		1907.5	30.84	1213.39
5.0 MHZ BAND 16QAM	25/0	1852.5	29.56	903.65
		1880.0	29.82	959.40
		1907.5	29.87	970.51

EIRP LTE Band 2 (10MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
10.0 MHZ BAND QPSK	50/0	1855.0	30.71	1177.61
		1880.0	30.62	1153.45
		1905.0	30.32	1076.47
10.0 MHZ BAND 16QAM	50/0	1855.0	29.26	843.33
		1880.0	29.62	916.22
		1905.0	29.22	835.60

EIRP LTE Band 2 (15MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
15.0 MHZ BAND QPSK	75/0	1857.5	30.56	1137.63
		1880.0	30.29	1069.05
		1902.5	30.72	1180.32
15.0 MHZ BAND 16QAM	75/0	1857.5	29.63	918.33
		1880.0	29.29	849.18
		1902.5	29.52	895.36

EIRP LTE Band 2 (20MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(PEAK)	
			dBm	mW
20.0 MHZ BAND QPSK	100/0	1860.0	30.59	1145.51
		1880.0	30.29	1069.05
		1900.0	30.72	1180.32
20.0 MHZ BAND 16QAM	100/0	1860.0	29.62	916.22
		1880.0	29.29	849.18
		1900.0	29.72	937.56

EIRP LTE Band 4 (1.4 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
1.4 MHZ BAND QPSK	6/0	1710.7	28.78	755.09
		1732.5	28.06	639.73
		1754.3	28.45	699.84
1.4 MHZ BAND 16QAM	6/0	1710.7	27.28	534.56
		1732.5	27.06	508.16
		1754.3	26.95	495.45

EIRP LTE Band 4 (3 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
3.0 MHZ BAND QPSK	15/0	1711.5	28.78	755.09
		1732.5	28.66	734.51
		1753.5	28.95	785.24
3.0 MHZ BAND 16QAM	15/0	1711.5	27.78	599.79
		1732.5	27.66	583.45
		1753.5	27.95	623.73

EIRP LTE Band 4 (5 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
5.0 MHZ BAND QPSK	25/0	1712.5	27.80	602.56
		1732.5	29.06	805.38
		1752.5	28.45	699.84
5.0 MHZ BAND 16QAM	25/0	1712.5	26.38	434.51
		1732.5	28.06	639.73
		1752.5	27.45	555.90

EIRP LTE Band 4 (10 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
10.0 MHZ BAND QPSK	50/0	1715.0	28.28	672.98
		1732.5	28.26	669.88
		1750.0	28.41	693.43
10.0 MHZ BAND 16QAM	50/0	1715.0	27.38	547.02
		1732.5	27.26	532.11
		1750.0	27.71	590.20

EIRP LTE Band 4 (15 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
15.0 MHZ BAND QPSK	75/0	1715.0	27.88	613.76
		1732.5	28.06	639.73
		1750.0	28.05	638.26
15.0 MHZ BAND 16QAM	75/0	1715.0	27.28	534.56
		1732.5	27.06	508.16
		1750.0	27.05	506.99

EIRP LTE Band 4 (20 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	EIRP(Peak)	
			dBm	mW
20.0 MHZ BAND QPSK	100/0	1715.0	28.68	737.90
		1732.5	28.16	654.64
		1750.0	28.45	699.84
20.0 MHZ BAND 16QAM	100/0	1715.0	27.68	586.14
		1732.5	27.16	520.00
		1750.0	27.45	555.90

ERP LTE Band 5 (1.4 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
1.4MHz Band QASK	1/0	824.7	20.59	114.55
		836.5	20.64	115.88
		848.3	20.83	121.06
1.4MHz Band 16QAM	1/0	824.7	19.57	90.57
		836.5	19.64	92.04
		848.3	19.91	97.95

ERP LTE Band 5 (3 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
3.0 MHZ BAND QPSK	1/0	825.5	20.64	115.88
		836.5	20.92	123.59
		847.5	20.51	112.46
3.0 MHZ BAND 16QAM	1/0	825.5	19.67	92.68
		836.5	19.94	98.63
		847.5	19.61	91.41

ERP LTE Band 5 (5 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
5MHz Band QASK	1/0	826.5	20.59	114.55
		836.5	20.87	122.18
		846.5	20.71	117.76
5MHz Band 16QAM	1/0	826.5	19.57	90.57
		836.5	19.94	98.63
		846.5	19.81	95.72

ERP LTE Band 5 (10 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
10.0 MHZ BAND QPSK	1/0	829.0	20.61	115.08
		836.5	20.64	115.88
		844.0	20.71	117.76
10.0 MHZ BAND 16QAM	1/0	829.0	19.67	92.68
		836.5	19.74	94.19
		844.0	19.71	93.54

ERP LTE Band 17 (5 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
5MHz Band QASK	1/0	706.5	19.22	83.56
		710.0	18.92	77.98
		713.5	19.12	81.66
5MHz Band 16QAM	1/0	706.5	18.22	66.37
		710.0	18.12	64.86
		713.5	18.12	64.86

ERP LTE Band 17 (10 MHz BANDWIDTH)

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
10.0 MHZ BAND QPSK	1/0	709.0	19.22	83.56
		710.0	18.92	77.98
		711.0	19.12	81.66
10.0 MHZ BAND 16QAM	1/0	709.0	18.32	67.92
		710.0	18.12	64.86
		711.0	18.22	66.37

9.1.1. GSM

GPRS (Cellular Band)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 850 MHz BAND_GPRS MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
824.20	32.47	V	0.5	0.0	31.97	38.5	-6.5	
824.20	23.67	H	0.5	0.0	23.17	38.5	-15.3	
836.60	32.64	V	0.5	0.0	32.14	38.5	-6.3	
836.60	23.41	H	0.5	0.0	22.91	38.5	-15.5	
848.80	32.61	V	0.5	0.0	32.11	38.5	-6.3	
848.80	23.72	H	0.5	0.0	23.22	38.5	-15.2	

Rev. 3.17.11

EGPRS (Cellular Band)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 850 MHz BAND_EGPRS MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
824.20	30.67	V	0.5	0.0	30.17	38.5	-8.3	
824.20	21.95	H	0.5	0.0	21.45	38.5	-17.0	
836.60	30.74	V	0.5	0.0	30.24	38.5	-8.2	
836.60	21.28	H	0.5	0.0	20.78	38.5	-17.7	
848.80	30.51	V	0.5	0.0	30.01	38.5	-8.4	
848.80	21.68	H	0.5	0.0	21.18	38.5	-17.3	

Rev. 3.17.11

GPRS (PCS Band)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 1900 MHz BAND_GPRS MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.850	18.5	V	0.85	8.62	26.31	33.0	-6.7	
1.850	23.6	H	0.85	8.47	31.21	33.0	-1.8	
1.880	17.9	V	0.85	8.46	25.48	33.0	-7.5	
1.880	23.4	H	0.85	8.36	30.95	33.0	-2.1	
1.910	17.9	V	0.85	8.30	25.38	33.0	-7.6	
1.910	23.3	H	0.85	8.25	30.72	33.0	-2.3	

Rev. 3.17.11

EGPRS (PCS Band)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 1900 MHz BAND_EGPRS MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.850	18.6	V	0.85	8.62	26.39	33.0	-6.6	
1.850	23.3	H	0.85	8.47	30.91	33.0	-2.1	
1.880	18.0	V	0.85	8.46	25.61	33.0	-7.4	
1.880	23.6	H	0.85	8.36	31.09	33.0	-1.9	
1.910	18.0	V	0.85	8.30	25.45	33.0	-7.6	
1.910	23.4	H	0.85	8.25	30.82	33.0	-2.2	

Rev. 3.17.11

9.1.2. WCDMA

REL 99 (Cellular Band)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 850 MHz BAND_REL. 99 MODE
Average

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
826.40	21.47	V	0.5	0.0	20.97	38.5	-17.5	
826.40	13.90	H	0.5	0.0	13.40	38.5	-25.0	
836.60	21.64	V	0.5	0.0	21.14	38.5	-17.3	
836.60	13.50	H	0.5	0.0	13.00	38.5	-25.5	
846.60	21.61	V	0.5	0.0	21.11	38.5	-17.3	
846.60	14.50	H	0.5	0.0	14.00	38.5	-24.4	

Rev. 3.17.11

REL 99 (PCS Band)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 1900 MHz BAND_REL 99 MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.852	17.2	V	0.85	8.62	24.98	33.0	-8.0	
1.852	19.3	H	0.85	8.47	26.92	33.0	-6.1	
1.880	16.4	V	0.85	8.46	23.98	33.0	-9.0	
1.880	20.1	H	0.85	8.36	27.59	33.0	-5.4	
1.908	16.6	V	0.85	8.30	24.04	33.0	-9.0	
1.908	21.2	H	0.85	8.25	28.64	33.0	-4.4	

Rev. 3.17.11

HSUPA (Cellular Band)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12u14526
Date: 10/04/12
Test Engineer: Chin Pang
Configuration: EUT and AC Adapter
Mode: TX, 850MHz BAND WCDMA HSUPA
Average

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
826.40	20.10	V	0.5	0.0	19.60	38.5	-18.8	
826.40	15.70	H	0.5	0.0	15.20	38.5	-23.2	
836.00	20.04	V	0.5	0.0	19.54	38.5	-18.9	
836.00	15.40	H	0.5	0.0	14.90	38.5	-23.5	
846.00	20.71	V	0.5	0.0	20.21	38.5	-18.2	
846.00	15.20	H	0.5	0.0	14.70	38.5	-23.7	

Rev. 3.17.11

HSDPA (PCS Band)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 10/04/12
Test Engineer: Chin Pang
Configuration: EUT and AC Adapter
Mode: TX, UMTS, PCS band, HSUPA
Peak

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (244639001) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.852	20.8	V	0.85	8.62	28.57	33.0	-4.4	
1.852	11.1	H	0.85	8.47	18.72	33.0	-14.3	
1.880	21.2	V	0.85	8.46	28.81	33.0	-4.2	
1.880	10.9	H	0.85	8.36	18.36	33.0	-14.6	
1.908	21.2	V	0.85	8.30	28.65	33.0	-4.4	
1.908	11.0	H	0.85	8.25	18.40	33.0	-14.6	

Rev. 3.17.11

9.1.3. LTE Band 2

QPSK (1,4MHz Bandwidth)

PEAK

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 1.4MHz BW_QPSK MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.8507	19.5	V	0.85	8.62	27.27	33.0	-5.7	
1.8507	22.9	H	0.85	8.47	30.50	33.0	-2.5	
1.8800	19.2	V	0.85	8.46	26.85	33.0	-6.2	
1.8800	22.9	H	0.85	8.36	30.44	33.0	-2.6	
1.9093	19.2	V	0.85	8.30	26.61	33.0	-6.4	
1.9093	23.4	H	0.85	8.25	30.76	33.0	-2.2	

Rev. 3.17.11

16QAM Band 2 (1.4 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 1.4MHz BW_16QAM MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.8507	18.5	V	0.85	8.62	26.25	33.0	-6.8	
1.8507	21.9	H	0.85	8.47	29.49	33.0	-3.5	
1.8800	20.3	V	0.85	8.46	27.94	33.0	-5.1	
1.8800	21.8	H	0.85	8.36	29.33	33.0	-3.7	
1.9093	18.1	V	0.85	8.30	25.58	33.0	-7.4	
1.9093	22.3	H	0.85	8.25	29.71	33.0	-3.3	

Rev. 3.17.11

QPSK Band 2 (3 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 3.0MHz BW_QPSK MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.8515	19.6	V	0.85	8.62	27.32	33.0	-5.7	
1.8515	22.9	H	0.85	8.47	30.47	33.0	-2.5	
1.8800	20.3	V	0.85	8.46	27.88	33.0	-5.1	
1.8800	23.2	H	0.85	8.36	30.75	33.0	-2.3	
1.9085	19.2	V	0.85	8.30	26.65	33.0	-6.4	
1.9085	23.3	H	0.85	8.25	30.71	33.0	-2.3	

Rev. 3.17.11

16QAM Band 2 (3 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 3.0MHz BW_16QAM MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.8515	18.7	V	0.85	8.62	26.48	33.0	-6.5	
1.8515	21.9	H	0.85	8.47	29.51	33.0	-3.5	
1.8800	19.3	V	0.85	8.46	26.86	33.0	-6.1	
1.8800	22.2	H	0.85	8.36	29.74	33.0	-3.3	
1.9085	18.2	V	0.85	8.30	25.67	33.0	-7.3	
1.9085	22.4	H	0.85	8.25	29.78	33.0	-3.2	

Rev. 3.17.11

QPSK Band 2 (5 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 5.0MHz BW_QPSK MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.8525	19.8	V	0.85	8.62	27.59	33.0	-5.4	
1.8525	22.9	H	0.85	8.47	30.51	33.0	-2.5	
1.8800	20.2	V	0.85	8.46	27.83	33.0	-5.2	
1.8800	23.3	H	0.85	8.36	30.83	33.0	-2.2	
1.9075	19.5	V	0.85	8.30	26.92	33.0	-6.1	
1.9075	23.4	H	0.85	8.25	30.84	33.0	-2.2	

Rev. 3.17.11

16QAM Band 2 (5 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 5.0MHz BW_16QAM MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.8525	18.9	V	0.85	8.62	26.69	33.0	-6.3	
1.8525	21.9	H	0.85	8.47	29.56	33.0	-3.4	
1.8800	19.2	V	0.85	8.46	26.80	33.0	-6.2	
1.8800	22.3	H	0.85	8.36	29.82	33.0	-3.2	
1.9075	18.4	V	0.85	8.30	25.87	33.0	-7.1	
1.9075	22.5	H	0.85	8.25	29.87	33.0	-3.1	

Rev. 3.17.11

QPSK Band 2 (10 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 10MHz BW_QPSK MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.855	20.2	V	0.85	8.62	27.93	33.0	-5.1	
1.855	23.1	H	0.85	8.47	30.71	33.0	-2.3	
1.880	20.1	V	0.85	8.46	27.73	33.0	-5.3	
1.880	23.1	H	0.85	8.36	30.62	33.0	-2.4	
1.905	19.4	V	0.85	8.30	26.81	33.0	-6.2	
1.905	22.9	H	0.85	8.25	30.32	33.0	-2.7	

Rev. 3.17.11

16QAM Band 2 (10 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 10.0MHz BW_16QAM MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.855	19.2	V	0.85	8.62	26.94	33.0	-6.1	
1.855	21.6	H	0.85	8.47	29.26	33.0	-3.7	
1.880	19.1	V	0.85	8.46	26.73	33.0	-6.3	
1.880	22.1	H	0.85	8.36	29.62	33.0	-3.4	
1.905	18.5	V	0.85	8.30	25.92	33.0	-7.1	
1.905	21.8	H	0.85	8.25	29.22	33.0	-3.8	

Rev. 3.17.11

QPSK Band 2 (15 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 15.0MHz BW_QPSK MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.8575	20.4	V	0.85	8.62	28.14	33.0	-4.9	
1.8575	22.9	H	0.85	8.47	30.56	33.0	-2.4	
1.8800	20.2	V	0.85	8.46	27.79	33.0	-5.2	
1.8800	22.8	H	0.85	8.36	30.29	33.0	-2.7	
1.9025	18.8	V	0.85	8.30	26.26	33.0	-6.7	
1.9025	23.3	H	0.85	8.25	30.72	33.0	-2.3	

Rev. 3.17.11

16QAM Band 2 (15 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 15.0MHz BW_16QAM MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.8575	19.3	V	0.85	8.62	27.10	33.0	-5.9	
1.8575	22.0	H	0.85	8.47	29.63	33.0	-3.4	
1.8800	18.8	V	0.85	8.46	26.44	33.0	-6.6	
1.8800	21.8	H	0.85	8.36	29.29	33.0	-3.7	
1.9025	17.8	V	0.85	8.30	25.26	33.0	-7.7	
1.9025	22.1	H	0.85	8.25	29.52	33.0	-3.5	

Rev. 3.17.11

QPSK Band 2 (20 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 20.0MHz BW_QPSK MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.860	20.5	V	0.85	8.62	28.27	33.0	-4.7	
1.860	23.0	H	0.85	8.47	30.59	33.0	-2.4	
1.880	20.1	V	0.85	8.46	27.70	33.0	-5.3	
1.880	22.8	H	0.85	8.36	30.29	33.0	-2.7	
1.900	18.8	V	0.85	8.30	26.20	33.0	-6.8	
1.900	23.3	H	0.85	8.25	30.72	33.0	-2.3	

Rev. 3.17.11

16QAM Band 2 (20 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14526
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 2, 20.0MHz BW_16QAM MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.860	19.8	V	0.85	8.62	27.59	33.0	-5.4	
1.860	22.0	H	0.85	8.47	29.62	33.0	-3.4	
1.880	19.1	V	0.85	8.46	26.70	33.0	-6.3	
1.880	21.8	H	0.85	8.36	29.29	33.0	-3.7	
1.900	17.7	V	0.85	8.30	25.19	33.0	-7.8	
1.900	22.3	H	0.85	8.25	29.72	33.0	-3.3	

Rev. 3.17.11

9.1.4. LTE BAND 4

QPSK Band 4 (1.4 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 1.4MHz BW_QPSK

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7107	21.0	V	0.85	8.62	28.78	30.0	-1.2	
1.7107	11.1	H	0.85	8.47	18.69	30.0	-11.3	
1.7325	20.5	V	0.85	8.46	28.06	30.0	-1.9	
1.7325	11.3	H	0.85	8.36	18.81	30.0	-11.2	
1.7543	21.0	V	0.85	8.30	28.45	30.0	-1.6	
1.7543	12.6	H	0.85	8.25	19.98	30.0	-10.0	

Rev. 3.17.11

16QAM Band 4 (1.4 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 1.4MHz BW_16QAM

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7107	19.5	V	0.85	8.62	27.28	30.0	-2.7	
1.7107	11.1	H	0.85	8.47	18.69	30.0	-11.3	
1.7325	19.5	V	0.85	8.46	27.06	30.0	-2.9	
1.7325	11.2	H	0.85	8.36	18.71	30.0	-11.3	
1.7543	19.5	V	0.85	8.30	26.95	30.0	-3.1	
1.7543	12.7	H	0.85	8.25	20.08	30.0	-9.9	

Rev. 3.17.11

QPSK Band 4 (3 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 3MHz BW_QPSK

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7115	21.0	V	0.85	8.62	28.78	30.0	-1.2	
1.7115	11.1	H	0.85	8.47	18.69	30.0	-11.3	
1.7325	21.1	V	0.85	8.46	28.66	30.0	-1.3	
1.7325	11.3	H	0.85	8.36	18.81	30.0	-11.2	
1.7535	21.5	V	0.85	8.30	28.95	30.0	-1.1	
1.7535	12.6	H	0.85	8.25	19.98	30.0	-10.0	

Rev. 3.17.11

16QAM Band 4 (3 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 3MHz BW_16QAM

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7115	20.0	V	0.85	8.62	27.78	30.0	-2.2	
1.7115	10.1	H	0.85	8.47	17.69	30.0	-12.3	
1.7325	20.1	V	0.85	8.46	27.66	30.0	-2.3	
1.7325	10.3	H	0.85	8.36	17.81	30.0	-12.2	
1.7535	20.5	V	0.85	8.30	27.95	30.0	-2.1	
1.7535	11.6	H	0.85	8.25	18.98	30.0	-11.0	

Rev. 3.17.11

QPSK Band 4 (5 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 5MHz BW_QPSK

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7125	20.1	V	0.85	8.62	27.88	30.0	-2.1	
1.7125	10.2	H	0.85	8.47	17.79	30.0	-12.2	
1.7325	21.5	V	0.85	8.46	29.06	30.0	-0.9	
1.7325	10.4	H	0.85	8.36	17.91	30.0	-12.1	
1.7525	21.0	V	0.85	8.30	28.45	30.0	-1.6	
1.7525	11.7	H	0.85	8.25	19.08	30.0	-10.9	

Rev. 3.17.11

16QAM Band 4 (5 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 5MHz BW_16QAM

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7125	18.6	V	0.85	8.62	26.38	30.0	-3.6	
1.7125	11.2	H	0.85	8.47	18.79	30.0	-11.2	
1.7325	20.5	V	0.85	8.46	28.06	30.0	-1.9	
1.7325	11.4	H	0.85	8.36	18.91	30.0	-11.1	
1.7525	20.0	V	0.85	8.30	27.45	30.0	-2.6	
1.7525	12.7	H	0.85	8.25	20.08	30.0	-9.9	

Rev. 3.17.11

QPSK Band 4 (10 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 10MHz BW_QPSK MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.712	20.5	V	0.85	8.62	28.28	30.0	-1.7	
1.712	11.6	H	0.85	8.47	19.19	30.0	-10.8	
1.732	20.7	V	0.85	8.46	28.26	30.0	-1.7	
1.732	11.7	H	0.85	8.36	19.21	30.0	-10.8	
1.753	21.0	V	0.85	8.30	28.41	30.0	-1.6	
1.753	12.6	H	0.85	8.25	19.98	30.0	-10.0	

Rev. 3.17.11

16QAM Band 4 (10 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 09/27/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 10MHz BW_16QAM MODE

Test Equipment:
Receiving: Horn T59, and Camber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.712	19.6	V	0.85	8.62	27.38	30.0	-2.6	
1.712	10.6	H	0.85	8.47	18.19	30.0	-11.8	
1.732	19.7	V	0.85	8.46	27.26	30.0	-2.7	
1.732	10.7	H	0.85	8.36	18.21	30.0	-11.8	
1.753	20.3	V	0.85	8.30	27.71	30.0	-2.3	
1.753	11.9	H	0.85	8.25	19.28	30.0	-10.7	

Rev. 3.17.11

QPSK Band 4 (15 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 15MHz BW_QPSK

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7175	20.1	V	0.85	8.62	27.88	30.0	-2.1	
1.7175	11.8	H	0.85	8.47	19.39	30.0	-10.6	
1.7325	20.5	V	0.85	8.46	28.06	30.0	-1.9	
1.7325	11.9	H	0.85	8.36	19.41	30.0	-10.6	
1.7475	20.6	V	0.85	8.30	28.05	30.0	-2.0	
1.7475	13.4	H	0.85	8.25	20.78	30.0	-9.2	

Rev. 3.17.11

16QAM Band 4 (15 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 15MHz BW_16QAM

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7175	19.5	V	0.85	8.62	27.28	30.0	-2.7	
1.7175	10.8	H	0.85	8.47	18.39	30.0	-11.6	
1.7325	19.5	V	0.85	8.46	27.06	30.0	-2.9	
1.7325	10.9	H	0.85	8.36	18.41	30.0	-11.6	
1.7475	19.6	V	0.85	8.30	27.05	30.0	-3.0	
1.7475	12.4	H	0.85	8.25	19.78	30.0	-10.2	

Rev. 3.17.11

QPSK Band 4 (20 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 20MHz BW_QPSK

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7200	20.9	V	0.85	8.62	28.68	30.0	-1.3	
1.7200	11.9	H	0.85	8.47	19.49	30.0	-10.5	
1.7325	20.6	V	0.85	8.46	28.16	30.0	-1.8	
1.7325	11.9	H	0.85	8.36	19.41	30.0	-10.6	
1.7450	21.0	V	0.85	8.30	28.45	30.0	-1.6	
1.7450	13.5	H	0.85	8.25	20.88	30.0	-9.1	

Rev. 3.17.11

16QAM Band4 (20 MHz BANDWIDTH)

High Frequency Fundamental Measurement
Compliance Certification Services Chamber B

Company: Apple
Project #: 12U14507
Date: 10/01/12
Test Engineer: Roy Zheng
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE BAND 4, 20MHz BW_16QAM

Test Equipment:
Receiving: Horn T59, and Chamber B SMA Cables
Substitution: Horn T217 Substitution, 4ft SMA Cable (245182002) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.7200	19.9	V	0.85	8.62	27.68	30.0	-2.3	
1.7200	10.8	H	0.85	8.47	18.39	30.0	-11.6	
1.7325	19.6	V	0.85	8.46	27.16	30.0	-2.8	
1.7325	11.0	H	0.85	8.36	18.51	30.0	-11.5	
1.7450	20.0	V	0.85	8.30	27.45	30.0	-2.6	
1.7450	12.4	H	0.85	8.25	19.78	30.0	-10.2	

Rev. 3.17.11

9.1.5. LTE BAND 5

QPSK Band 5 (1.4 MHz BANDWIDTH)

AVERAGE

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER AND HEADSET
Mode: LTE BAND 5, 1.4MHz BW AND QPSK MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
Low Ch, RB1-0, QPSK								
829.00	21.09	V	0.5	0.0	20.59	38.5	-17.9	
829.00	15.30	H	0.5	0.0	14.80	38.5	-23.6	
Mid Ch, RB1-0, QPSK								
836.50	21.14	V	0.5	0.0	20.64	38.5	-17.8	
836.50	14.42	H	0.5	0.0	13.92	38.5	-24.5	
High Ch, RB1-0, QPSK								
844.00	21.33	V	0.5	0.0	20.83	38.5	-17.6	
844.00	14.30	H	0.5	0.0	13.80	38.5	-24.6	

Rev. 3.17.11

QPSK Band 5 (1.4 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER AND HEADSET
Mode: LTE BAND 5, 1.4MHz BW AND 16QAM MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
Low Ch, RB1-0, QPSK								
829.00	20.07	V	0.5	0.0	19.57	38.5	-18.9	
829.00	14.40	H	0.5	0.0	13.90	38.5	-24.5	
Mid Ch, RB1-0, QPSK								
836.50	20.14	V	0.5	0.0	19.64	38.5	-18.8	
836.50	13.50	H	0.5	0.0	13.00	38.5	-25.5	
High Ch, RB1-0, QPSK								
844.00	20.41	V	0.5	0.0	19.91	38.5	-18.5	
844.00	13.50	H	0.5	0.0	13.00	38.5	-25.4	

Rev. 3.17.11

QPSK Band 5 (3 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER AND HEADSET
Mode: LTE BAND 5, 3MHz BW AND QPSK MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
Low Ch, RB1-0, QPSK								
829.00	21.14	V	0.5	0.0	20.64	38.5	-17.8	
829.00	15.60	H	0.5	0.0	15.10	38.5	-23.3	
Mid Ch, RB1-0, QPSK								
836.50	21.42	V	0.5	0.0	20.92	38.5	-17.5	
836.50	14.36	H	0.5	0.0	13.86	38.5	-24.6	
High Ch, RB1-0, QPSK								
844.00	21.01	V	0.5	0.0	20.51	38.5	-17.9	
844.00	14.50	H	0.5	0.0	14.00	38.5	-24.4	

Rev. 3.17.11

16QAM Band 5 (3 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER AND HEADSET
Mode: LTE BAND 5, 3MHz BW AND 16QAM MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
Low Ch, RB1-0, QPSK								
829.00	20.17	V	0.5	0.0	19.67	38.5	-18.8	
829.00	14.70	H	0.5	0.0	14.20	38.5	-24.2	
Mid Ch, RB1-0, QPSK								
836.50	20.44	V	0.5	0.0	19.94	38.5	-18.5	
836.50	13.50	H	0.5	0.0	13.00	38.5	-25.5	
High Ch, RB1-0, QPSK								
844.00	20.11	V	0.5	0.0	19.61	38.5	-18.8	
844.00	13.50	H	0.5	0.0	13.00	38.5	-25.4	

Rev. 3.17.11

QPSK Band 5 (5 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER AND HEADSET
Mode: LTE BAND 5, 5MHz BW AND QPSK MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
Low Ch, RB1-0, QPSK								
829.00	21.09	V	0.5	0.0	20.59	38.5	-17.9	
829.00	15.40	H	0.5	0.0	14.90	38.5	-23.5	
Mid Ch, RB1-0, QPSK								
836.50	21.37	V	0.5	0.0	20.87	38.5	-17.6	
836.50	14.34	H	0.5	0.0	13.84	38.5	-24.6	
High Ch, RB1-0, QPSK								
844.00	21.21	V	0.5	0.0	20.71	38.5	-17.7	
844.00	14.50	H	0.5	0.0	14.00	38.5	-24.4	

Rev. 3.17.11

16QAM Band 5 (5 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER AND HEADSET
Mode: LTE BAND 5, 5MHz BW AND 16QAM MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
Low Ch, RB1-0, QPSK								
829.00	20.07	V	0.5	0.0	19.57	38.5	-18.9	
829.00	14.50	H	0.5	0.0	14.00	38.5	-24.4	
Mid Ch, RB1-0, QPSK								
836.50	20.44	V	0.5	0.0	19.94	38.5	-18.5	
836.50	13.30	H	0.5	0.0	12.80	38.5	-25.7	
High Ch, RB1-0, QPSK								
844.00	20.31	V	0.5	0.0	19.81	38.5	-18.6	
844.00	13.50	H	0.5	0.0	13.00	38.5	-25.4	

Rev. 3.17.11

QPSK Band 5 (10 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER AND HEADSET
Mode: LTE BAND 5, 10MHz BW AND QPSK MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
Low Ch, RB1-0, QPSK								
829.00	21.11	V	0.5	0.0	20.61	38.5	-17.8	
829.00	15.90	H	0.5	0.0	15.40	38.5	-23.0	
Mid Ch, RB1-0, QPSK								
836.50	21.14	V	0.5	0.0	20.64	38.5	-17.8	
836.50	14.82	H	0.5	0.0	14.32	38.5	-24.1	
High Ch, RB1-0, QPSK								
844.00	21.21	V	0.5	0.0	20.71	38.5	-17.7	
844.00	15.50	H	0.5	0.0	15.00	38.5	-23.4	

Rev. 3.17.11

16QAM Band 5 (10 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber B

Company: APPLE
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER AND HEADSET
Mode: LTE BAND 5, 10MHz BW AND 16QAM MODE

Test Equipment:
Receiving: Sunol T122, and Chamber B 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
Low Ch, RB1-0, QPSK								
829.00	20.17	V	0.5	0.0	19.67	38.5	-18.8	
829.00	14.90	H	0.5	0.0	14.40	38.5	-24.0	
Mid Ch, RB1-0, QPSK								
836.50	20.24	V	0.5	0.0	19.74	38.5	-18.7	
836.50	14.00	H	0.5	0.0	13.50	38.5	-25.0	
High Ch, RB1-0, QPSK								
844.00	20.21	V	0.5	0.0	19.71	38.5	-18.7	
844.00	14.50	H	0.5	0.0	14.00	38.5	-24.4	

Rev. 3.17.11

9.1.6. LTE BAND 17

QPSK, Band 17 (5 MHz BANDWIDTH)

AVERAGE

High Frequency Substitution Measurement
Compliance Certification Services Chamber A

Company: Apple
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 17, 5.0MHz BW_QPSK MODE

Test Equipment:
Receiving: Sunol T243, and Chamber A 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
706.50	19.72	V	0.5	0.0	19.22	34.8	-15.6	
706.50	11.35	H	0.5	0.0	10.85	34.8	-24.0	
710.00	19.42	V	0.5	0.0	18.92	34.8	-15.9	
710.00	11.55	H	0.5	0.0	11.05	34.8	-23.8	
713.50	19.62	V	0.5	0.0	19.12	34.8	-15.7	
713.50	11.75	H	0.5	0.0	11.25	34.8	-23.6	

Rev. 3.17.11

16QAM Band 17 (5 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber A

Company: Apple
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 17, 5.0MHz BW_16QAM MODE

Test Equipment:
Receiving: Sunol T243, and Chamber A 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
706.50	18.72	V	0.5	0.0	18.22	34.8	-16.6	
706.50	10.35	H	0.5	0.0	9.85	34.8	-25.0	
710.00	18.62	V	0.5	0.0	18.12	34.8	-16.7	
710.00	10.65	H	0.5	0.0	10.15	34.8	-24.7	
713.50	18.62	V	0.5	0.0	18.12	34.8	-16.7	
713.50	10.85	H	0.5	0.0	10.35	34.8	-24.5	

Rev. 3.17.11

QPSK Band 17 (10 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber A

Company: Apple
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 17, 10.0MHz BW_QPSK MODE

Test Equipment:
Receiving: Sunol T243, and Chamber A 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
709.00	19.72	V	0.5	0.0	19.22	34.8	-15.6	
709.00	11.35	H	0.5	0.0	10.85	34.8	-24.0	
710.00	19.42	V	0.5	0.0	18.92	34.8	-15.9	
710.00	11.25	H	0.5	0.0	10.75	34.8	-24.1	
711.00	19.62	V	0.5	0.0	19.12	34.8	-15.7	
711.00	11.55	H	0.5	0.0	11.05	34.8	-23.8	

Rev. 3.17.11

16QAM Band 17 (10 MHz BANDWIDTH)

High Frequency Substitution Measurement
Compliance Certification Services Chamber A

Company: Apple
Project #: 12U14526
Date: 09/26/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, LTE band 17, 10.0MHz BW_16QAM MODE

Test Equipment:
Receiving: Sunol T243, and Chamber A 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
709.00	18.82	V	0.5	0.0	18.32	34.8	-16.5	
709.00	10.35	H	0.5	0.0	9.85	34.8	-25.0	
710.00	18.62	V	0.5	0.0	18.12	34.8	-16.7	
710.00	10.35	H	0.5	0.0	9.85	34.8	-25.0	
711.00	18.72	V	0.5	0.0	18.22	34.8	-16.6	
711.00	10.55	H	0.5	0.0	10.05	34.8	-24.8	

Rev. 3.17.11

9.2. PEAK-TO-AVERAGE RATIO

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

WCDMA

Peak-To-Average Ratio:

Mode	Channel Band-width (KHZ)	Modulation	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
			*Peak	Average	
UMTS	5	REL99	27.54	24.49	3.05

Mode	Channel Band-width (MHZ)	Ch. No.	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
			*Peak	Average	
UMTS	5	HSDPA	28.34	23.38	4.96

*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	
QPSK	1.4	RB1-0	836.5	28.89	23.75	5.14

Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	1.4	RB1-0	836.5	28.7	23.86	4.84

*Peak Reading = Average Reading + Peak-to-Average Ratio

LTE BAND 5

Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
QPSK	3	RB1-0	836.5	29.23	23.71	5.52
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	3	RB1-0	836.5	29.24	22.48	6.76
*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	
QPSK	5	RB1-0	836.5	29.43	23.92	5.51
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB1-0	836.5	29.5	23.09	6.41
*Peak Reading = Average Reading + Peak-to-Average Ratio						

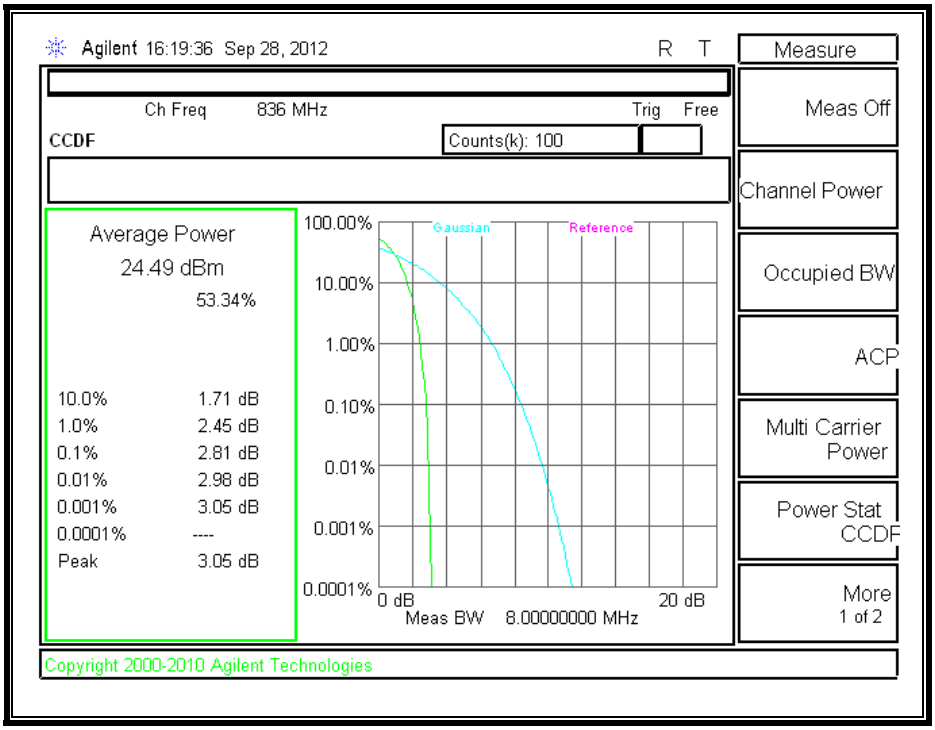
Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
QPSK	10	RB1-0	836.5	28.96	23.86	5.1
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	10	RB1-0	836.5	28.92	22.55	6.37
*Peak Reading = Average Reading + Peak-to-Average Ratio						

LTE BAND 17

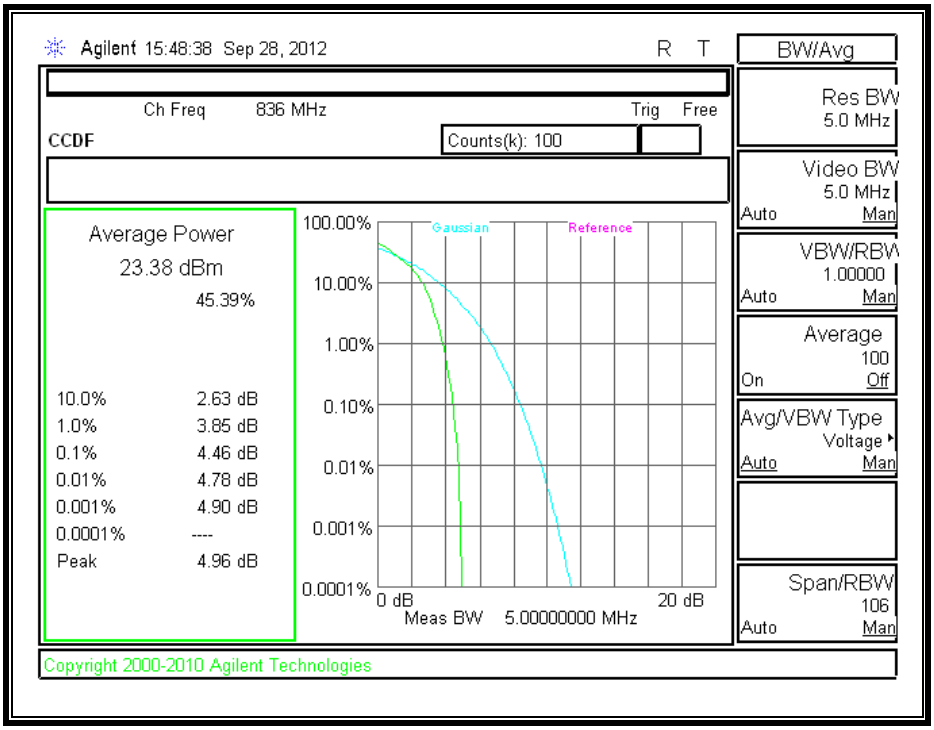
Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
QPSK	5	RB1-0	710	28.77	24.06	4.71
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB1-0	710	28.79	23.31	5.48
*Peak Reading = Average Reading + Peak-to-Average Ratio						

Mode	Channel Band-width (MHZ)	Modulation	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio (PAR)
				*Peak	Average	
QPSK	10	RB1-0	710	28.86	23.97	4.89
Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	10	RB1-0	710	28.93	22.83	6.1
*Peak Reading = Average Reading + Peak-to-Average Ratio						

WCDMA850, REL 99

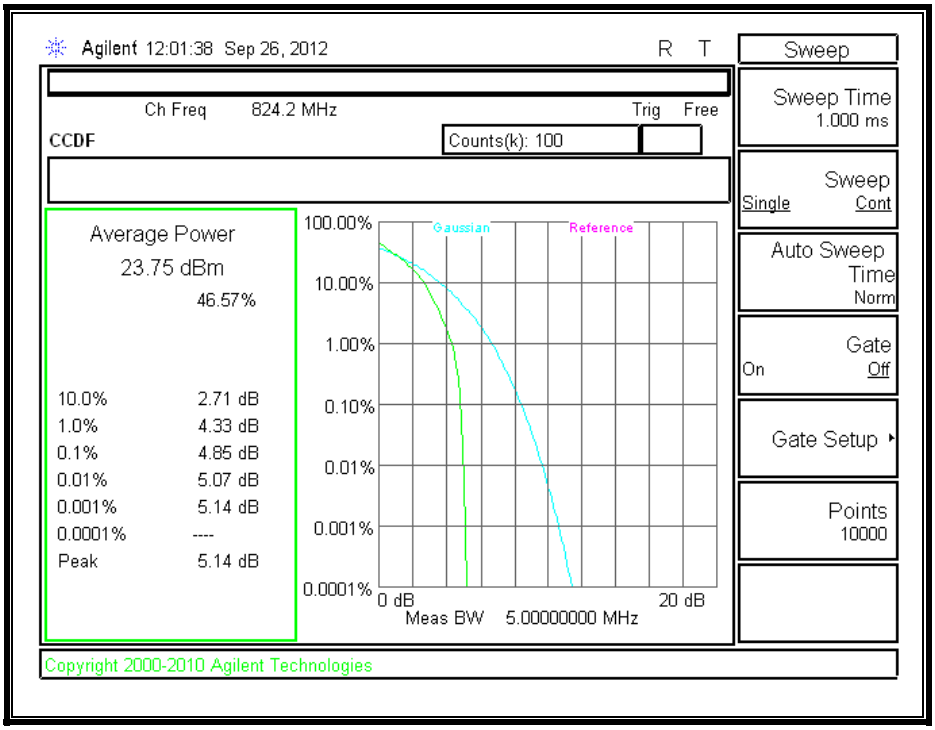


WCDMA850, HSDPA

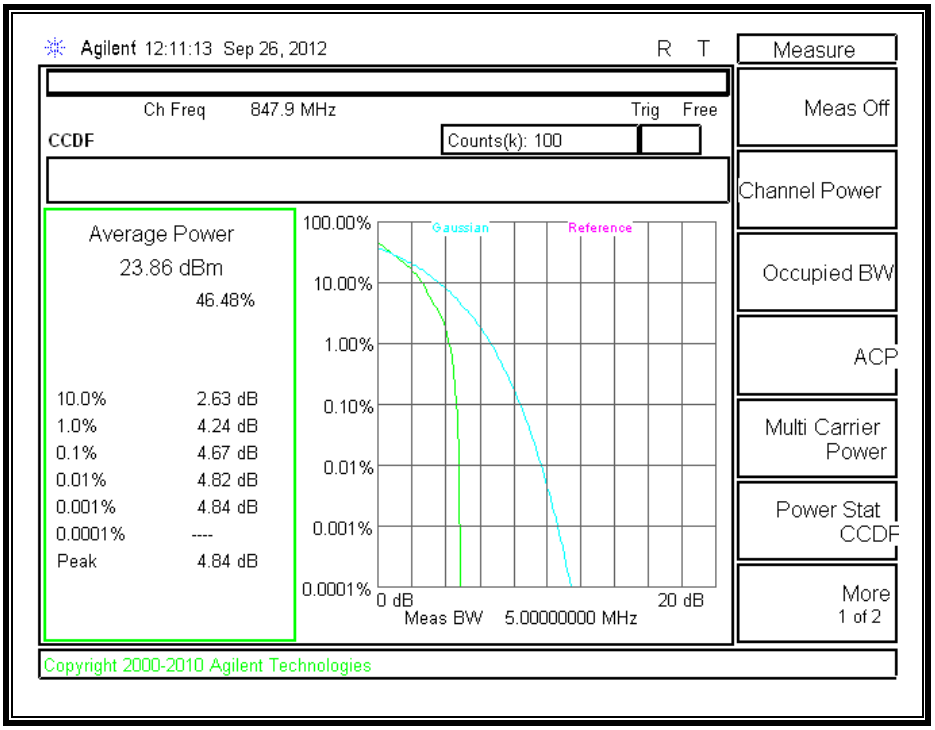


LTE BAND 5

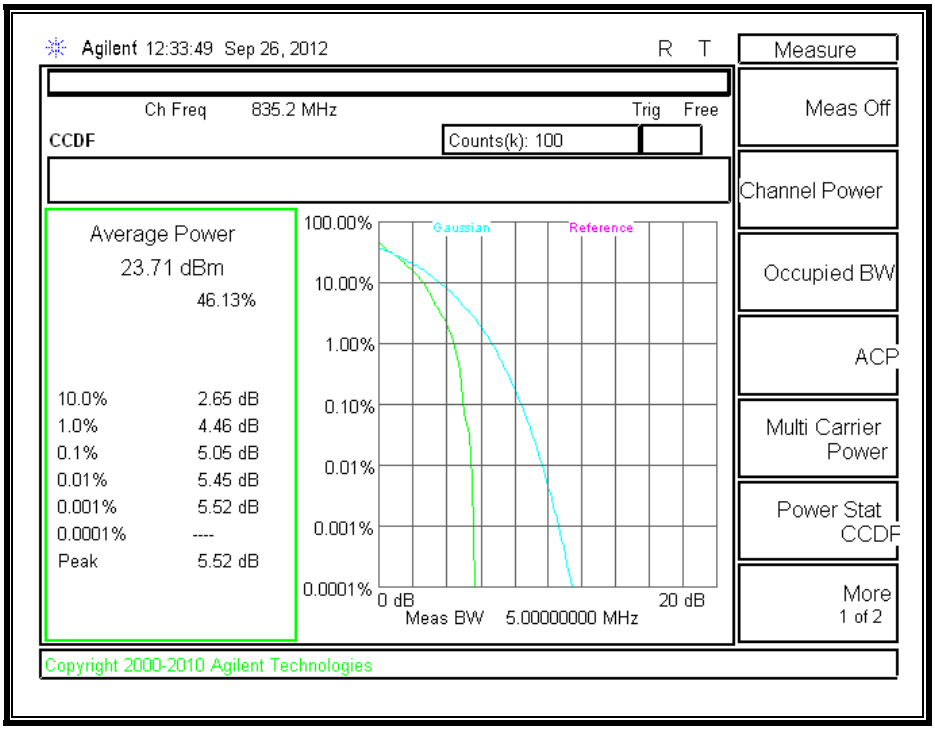
1.4MHz_QPSK



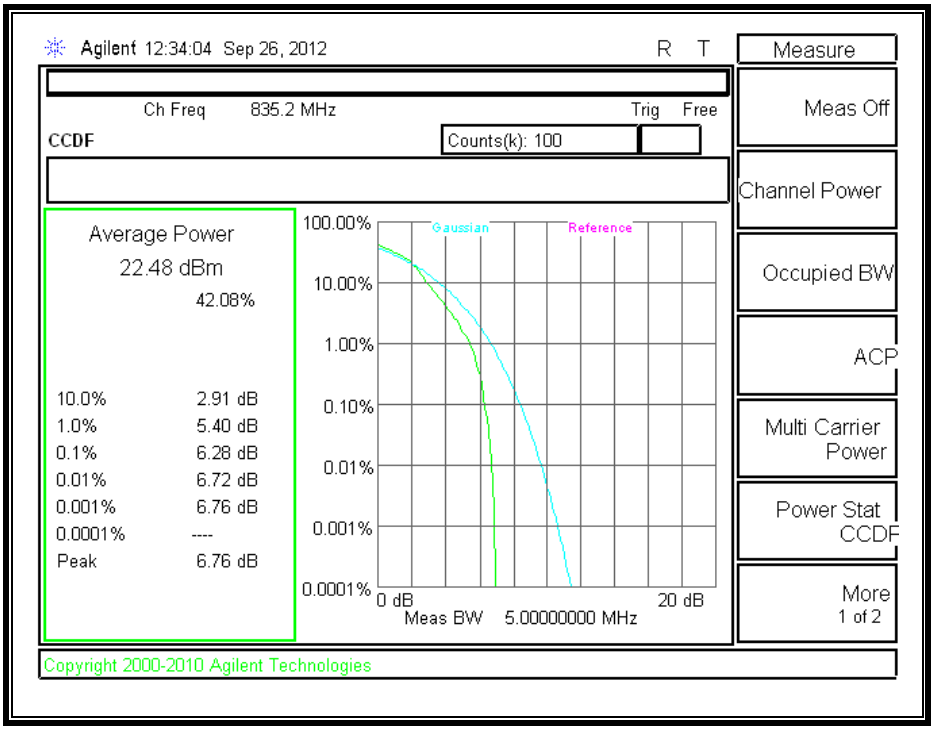
1.4MHz_16QAM



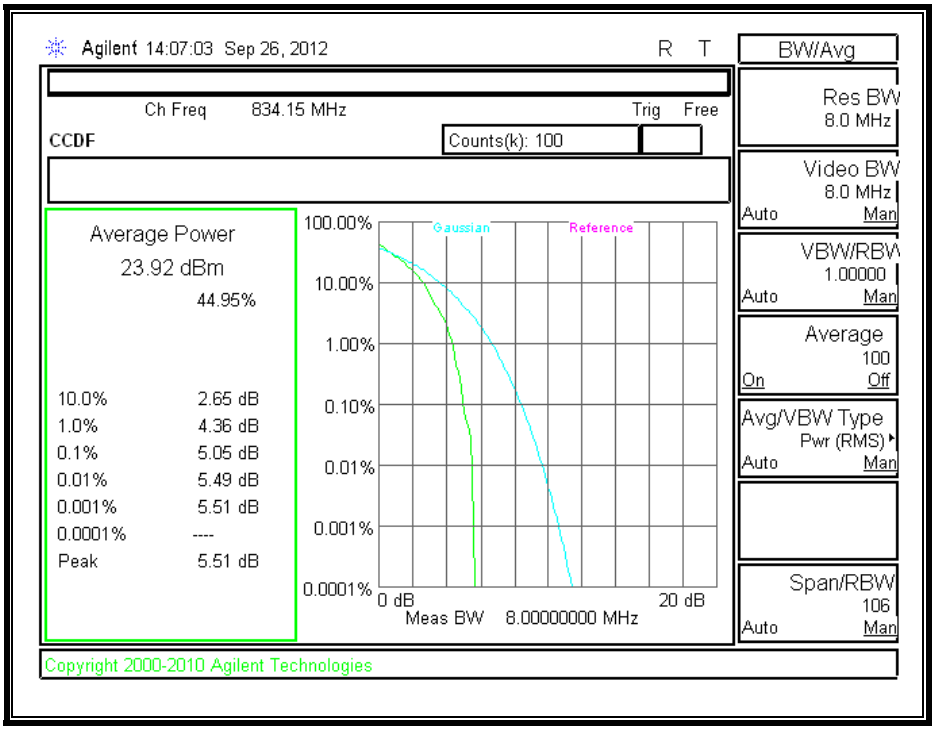
3MHz_QPSK, RB1-0



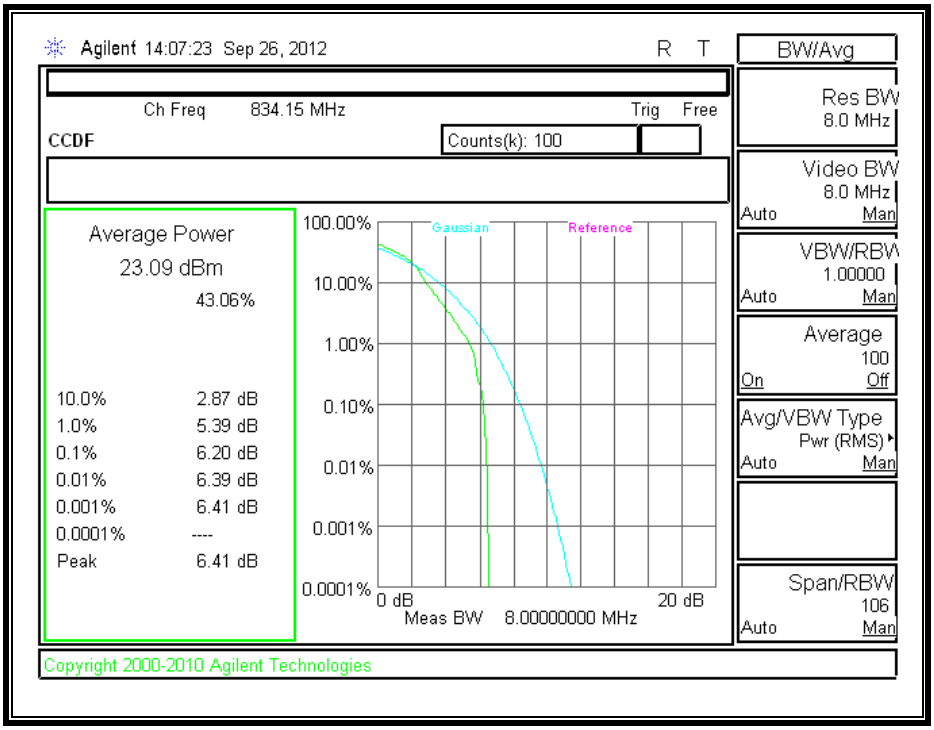
3MHz_16QAM



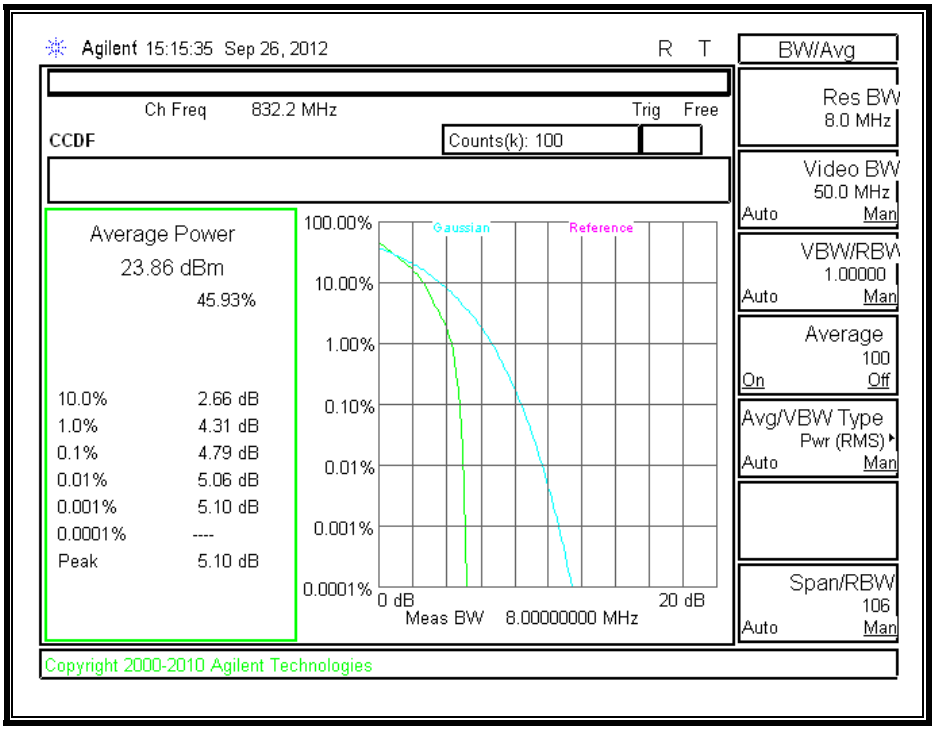
5MHz_QPSK



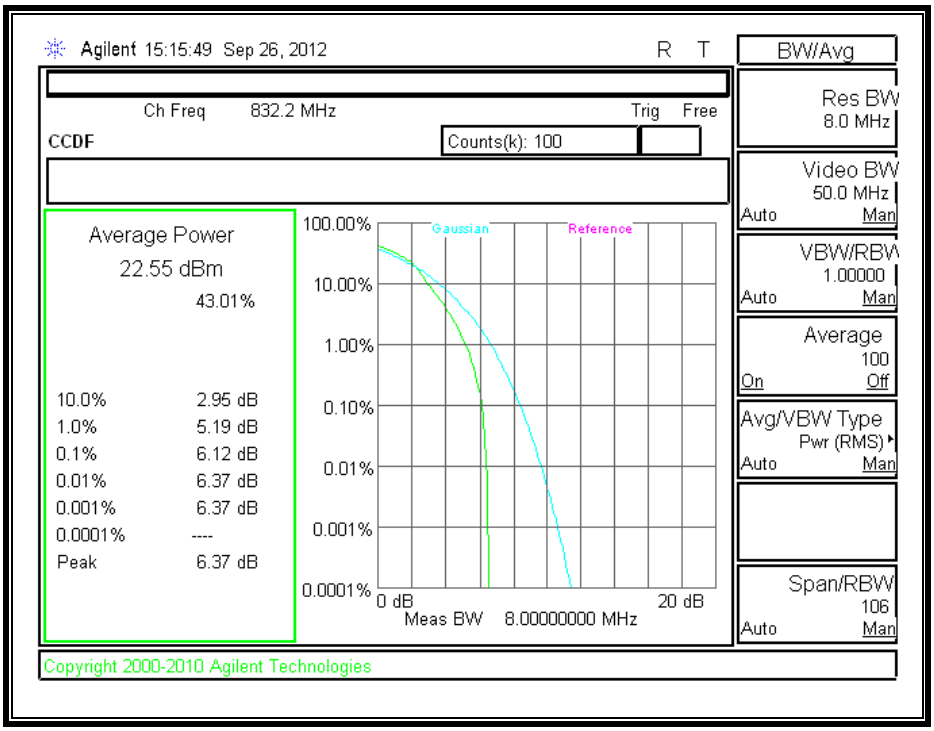
5MHz_16QAM



10MHz_QPSK

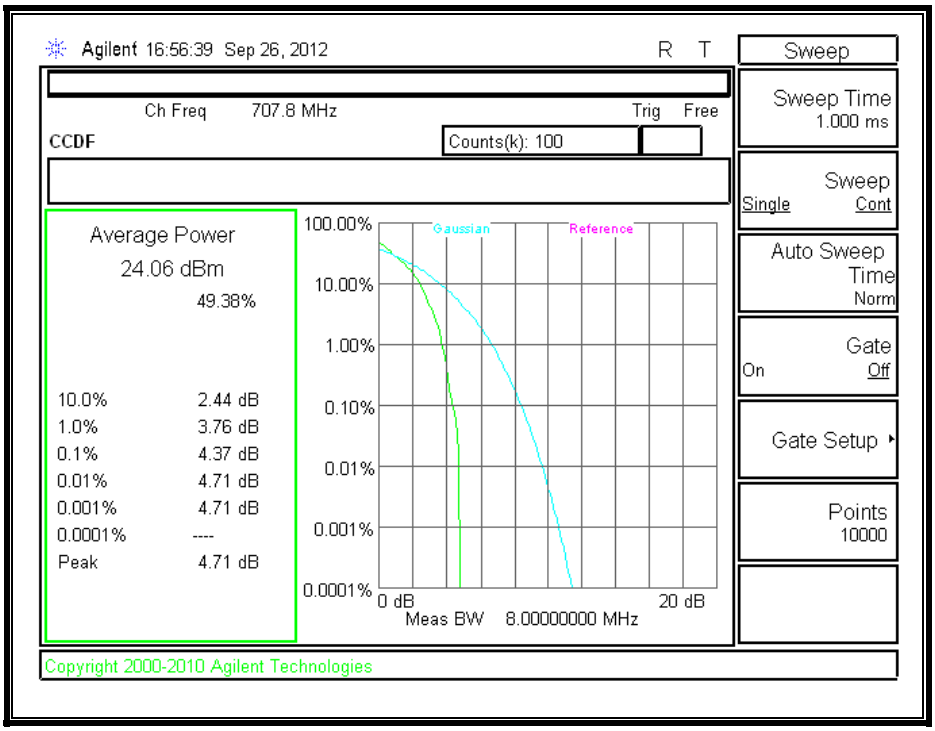


10MHz_16QAM

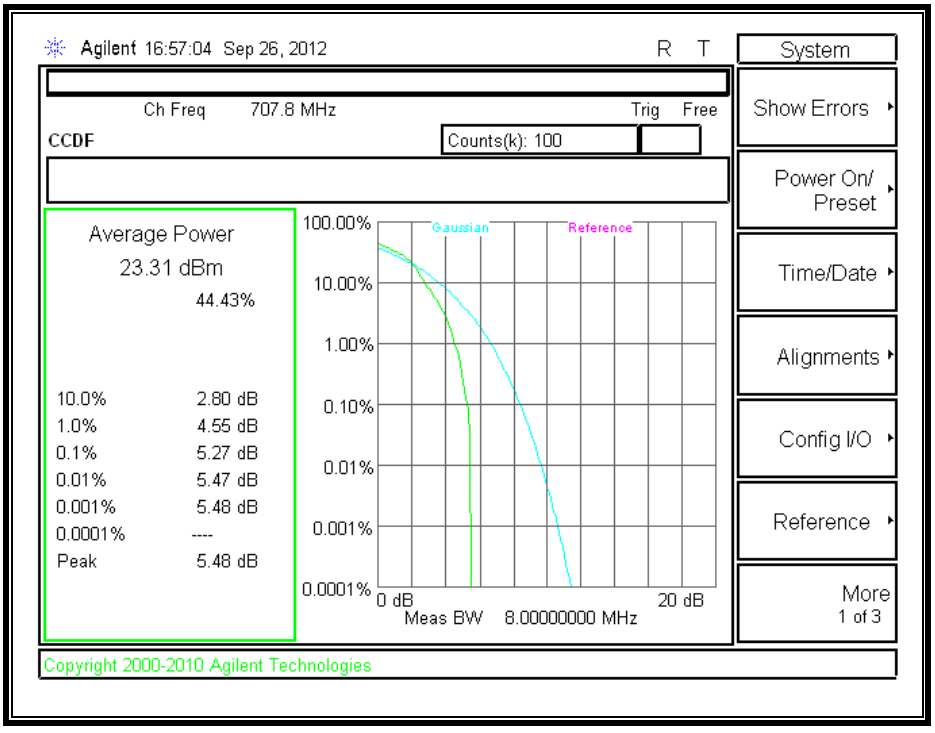


LTE BAND 17

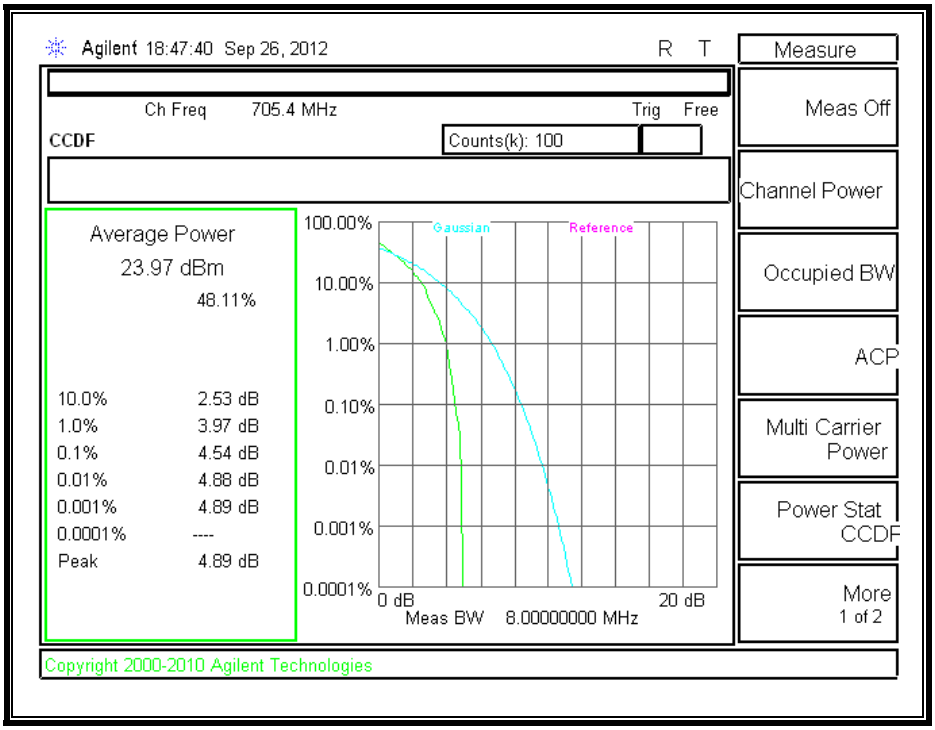
5MHz_QPSK



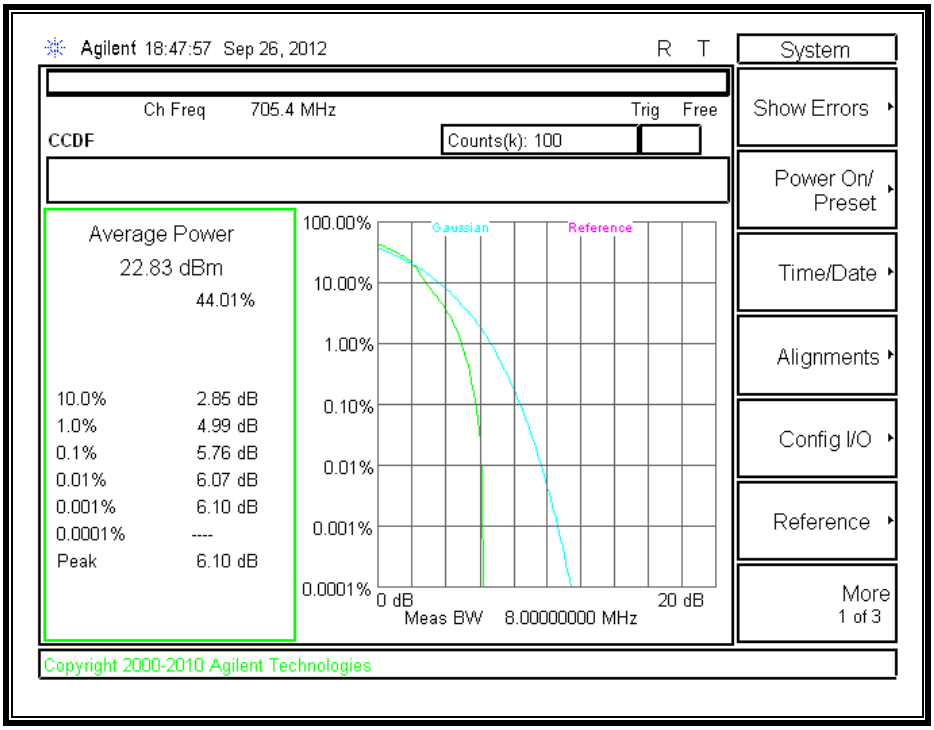
5MHz_16QAM



10MHz_QPSK, RB1-0



10MHz_16QAM



9.3. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, and §27.53

LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. 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.

§27.53 (g) For operations in the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(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:

- GPRS and EGPRS
- WCDMA, REL 99 and HSUPA
- LTE BAND 2
- LTE BAND 4
- LTE BAND 5
- LTE BAND 17

RESULTS

GPRS (Cellular Band)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: APPLE
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 850 MHz BAND_GPRS MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.2MHz)									
1.648	-22.8	V	3.0	35.5	1.0	-57.3	-13.0	-44.3	
2.473	-7.0	V	3.0	35.4	1.0	-41.4	-13.0	-28.4	
3.297	-24.3	V	3.0	35.5	1.0	-58.8	-13.0	-45.8	
1.648	-28.3	H	3.0	35.5	1.0	-62.8	-13.0	-49.8	
2.473	-13.8	H	3.0	35.4	1.0	-48.2	-13.0	-35.2	
3.297	-24.7	H	3.0	35.5	1.0	-59.3	-13.0	-46.3	
Mid Ch, (836.6MHz)									
1.673	-24.0	V	3.0	35.5	1.0	-58.6	-13.0	-45.6	
2.510	-7.4	V	3.0	35.4	1.0	-41.8	-13.0	-28.8	
3.346	-24.1	V	3.0	35.5	1.0	-58.6	-13.0	-45.6	
1.673	-27.7	H	3.0	35.5	1.0	-62.2	-13.0	-49.2	
2.510	-12.7	H	3.0	35.4	1.0	-47.1	-13.0	-34.1	
3.346	-24.7	H	3.0	35.5	1.0	-59.2	-13.0	-46.2	
High Ch, (848.8MHz)									
1.698	-25.2	V	3.0	35.5	1.0	-59.8	-13.0	-46.8	
2.546	-6.2	V	3.0	35.4	1.0	-40.6	-13.0	-27.6	
3.395	-24.0	V	3.0	35.5	1.0	-58.5	-13.0	-45.5	
1.698	-27.1	H	3.0	35.5	1.0	-61.6	-13.0	-48.6	
2.546	-9.8	H	3.0	35.4	1.0	-44.2	-13.0	-31.2	
3.395	-24.7	H	3.0	35.5	1.0	-59.2	-13.0	-46.2	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

EGPRS (Cellular Band)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: APPLE
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 850 MHz BAND_EGPRS MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.2MHz)									
1.648	-28.6	V	3.0	35.5	1.0	-63.1	-13.0	-50.1	
2.473	-13.1	V	3.0	35.4	1.0	-47.5	-13.0	-34.5	
3.297	-24.0	V	3.0	35.5	1.0	-58.5	-13.0	-45.5	
1.648	-27.8	H	3.0	35.5	1.0	-62.4	-13.0	-49.4	
2.473	-20.9	H	3.0	35.4	1.0	-55.3	-13.0	-42.3	
3.297	-22.8	H	3.0	35.5	1.0	-57.3	-13.0	-44.3	
Mid Ch, (836.6MHz)									
1.673	-27.9	V	3.0	35.5	1.0	-62.5	-13.0	-49.5	
2.510	-13.9	V	3.0	35.4	1.0	-48.3	-13.0	-35.3	
3.346	-24.2	V	3.0	35.5	1.0	-58.8	-13.0	-45.8	
1.673	-26.5	H	3.0	35.5	1.0	-61.1	-13.0	-48.1	
2.510	-23.6	H	3.0	35.4	1.0	-58.0	-13.0	-45.0	
3.346	-24.2	H	3.0	35.5	1.0	-58.7	-13.0	-45.7	
High Ch, (848.8MHz)									
1.698	-29.2	V	3.0	35.5	1.0	-63.7	-13.0	-50.7	
2.546	-7.4	V	3.0	35.4	1.0	-41.9	-13.0	-28.9	
3.395	-23.6	V	3.0	35.5	1.0	-58.1	-13.0	-45.1	
1.698	-26.4	H	3.0	35.5	1.0	-60.9	-13.0	-47.9	
2.546	-17.8	H	3.0	35.4	1.0	-52.2	-13.0	-39.2	
3.395	-23.4	H	3.0	35.5	1.0	-57.9	-13.0	-44.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

WCDMA REL 99 (Cellular Band)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: APPLE
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, 850MHz BAND WCDMA MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.4MHz)									
1.653	-12.2	V	3.0	35.5	1.0	-46.7	-13.0	-33.7	
2.479	-18.2	V	3.0	35.4	1.0	-52.7	-13.0	-39.7	
3.306	-14.5	V	3.0	35.5	1.0	-49.0	-13.0	-36.0	
1.653	-23.0	H	3.0	35.5	1.0	-57.5	-13.0	-44.5	
2.479	-24.2	H	3.0	35.4	1.0	-58.7	-13.0	-45.7	
3.306	-14.4	H	3.0	35.5	1.0	-48.9	-13.0	-35.9	
Mid Ch, (836.6MHz)									
1.673	-10.3	V	3.0	35.5	1.0	-44.8	-13.0	-31.8	
2.510	-21.0	V	3.0	35.4	1.0	-55.4	-13.0	-42.4	
3.346	-21.7	V	3.0	35.5	1.0	-56.2	-13.0	-43.2	
1.673	-20.8	H	3.0	35.5	1.0	-55.3	-13.0	-42.3	
2.510	-23.9	H	3.0	35.4	1.0	-58.4	-13.0	-45.4	
3.346	-21.6	H	3.0	35.5	1.0	-56.1	-13.0	-43.1	
High Ch, (846.6MHz)									
1.693	-8.8	V	3.0	35.5	1.0	-43.3	-13.0	-30.3	
2.540	-15.0	V	3.0	35.4	1.0	-49.4	-13.0	-36.4	
3.386	-21.2	V	3.0	35.5	1.0	-55.7	-13.0	-42.7	
1.693	-19.1	H	3.0	35.5	1.0	-53.6	-13.0	-40.6	
2.540	-21.9	H	3.0	35.4	1.0	-56.3	-13.0	-43.3	
3.386	-22.4	H	3.0	35.5	1.0	-56.9	-13.0	-43.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

WCDMA HSUPA (Cellular Band)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12u14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and AC Adapter
Mode: TX, WCDMA 850MHz, HSUPA

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	FCC Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Channel (826.4MHz)									
1.653	-26.4	V	3.0	35.5	1.0	-60.9	-13.0	-47.9	
2.479	-23.3	V	3.0	35.4	1.0	-57.7	-13.0	-44.7	
1.653	-26.5	H	3.0	35.5	1.0	-61.0	-13.0	-48.0	
2.479	-25.9	H	3.0	35.4	1.0	-60.3	-13.0	-47.3	
Mid Channel (836MHz)									
1.672	-25.7	V	3.0	35.5	1.0	-60.2	-13.0	-47.2	
2.508	-22.2	V	3.0	35.4	1.0	-56.6	-13.0	-43.6	
1.672	-25.4	H	3.0	35.5	1.0	-59.9	-13.0	-46.9	
2.508	-25.5	H	3.0	35.4	1.0	-60.0	-13.0	-47.0	
High Channel (846MHz)									
1.692	-25.4	V	3.0	35.5	1.0	-59.9	-13.0	-46.9	
2.538	-24.2	V	3.0	35.4	1.0	-58.6	-13.0	-45.6	
1.692	-25.5	H	3.0	35.5	1.0	-60.0	-13.0	-47.0	
2.538	-25.7	H	3.0	35.4	1.0	-60.2	-13.0	-47.2	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

GPRS (PCS Band)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:	APPLE
Project #:	12U14526
Date:	10/1/2012
Test Engineer:	MENGISTU MEKURIA
Configuration:	EUT WITH AC ADAPTER
Mode:	TX, 1900 MHz BAND_GPRS MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1850.20MHz)									
3.705	-23.1	V	3.0	35.4	1.0	-57.4	-13.0	-44.4	
5.557	-22.0	V	3.0	35.4	1.0	-56.4	-13.0	-43.4	
3.705	-25.0	H	3.0	35.4	1.0	-59.4	-13.0	-46.4	
5.557	-20.5	H	3.0	35.4	1.0	-54.9	-13.0	-41.9	
Mid Ch, (1880.00MHz)									
3.760	-24.1	V	3.0	35.3	1.0	-58.5	-13.0	-45.5	
5.640	-21.7	V	3.0	35.4	1.0	-56.1	-13.0	-43.1	
3.760	-24.8	H	3.0	35.3	1.0	-59.1	-13.0	-46.1	
5.640	-20.1	H	3.0	35.4	1.0	-54.5	-13.0	-41.5	
High Ch, (1909.80MHz)									
3.815	-24.7	V	3.0	35.3	1.0	-59.0	-13.0	-46.0	
5.723	-22.0	V	3.0	35.4	1.0	-56.5	-13.0	-43.5	
3.815	-23.7	H	3.0	35.3	1.0	-58.0	-13.0	-45.0	
5.723	-20.1	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.

EGPRS (PCS Band)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: APPLE
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT with AC Adapter
Mode: TX, 1900MHz BAND EGPRS MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1850.20MHz)									
3.705	-24.6	V	3.0	35.4	1.0	-59.0	-13.0	-46.0	
5.557	-21.9	V	3.0	35.4	1.0	-56.3	-13.0	-43.3	
3.705	-25.0	H	3.0	35.4	1.0	-59.3	-13.0	-46.3	
5.557	-21.8	H	3.0	35.4	1.0	-56.2	-13.0	-43.2	
Mid Ch, (1880.00MHz)									
3.760	-25.2	V	3.0	35.3	1.0	-59.5	-13.0	-46.5	
5.640	-21.4	V	3.0	35.4	1.0	-55.9	-13.0	-42.9	
3.760	-23.8	H	3.0	35.3	1.0	-58.1	-13.0	-45.1	
5.640	-20.8	H	3.0	35.4	1.0	-55.2	-13.0	-42.2	
High Ch, (1909.80MHz)									
3.815	-23.4	V	3.0	35.3	1.0	-57.7	-13.0	-44.7	
5.723	-22.2	V	3.0	35.4	1.0	-56.6	-13.0	-43.6	
3.815	-22.2	H	3.0	35.3	1.0	-56.5	-13.0	-43.5	
5.723	-20.5	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.

WCDMA REL 99 (PCS Band)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/01/12
Test Engineer: MENGISTU MEKURIA
Configuration: EUT WITH AC ADAPTER
Mode: TX, PCS BAND WCDMA MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1852.4MHz)									
3.705	-18.2	V	3.0	35.4	1.0	-52.6	-13.0	-39.6	
5.557	-15.4	V	3.0	35.4	1.0	-49.8	-13.0	-36.8	
3.705	-19.5	H	3.0	35.4	1.0	-53.9	-13.0	-40.9	
5.557	-13.4	H	3.0	35.4	1.0	-47.8	-13.0	-34.8	
Mid Ch, (1880.00MHz)									
3.760	-19.6	V	3.0	35.3	1.0	-53.9	-13.0	-40.9	
5.640	-15.3	V	3.0	35.4	1.0	-49.7	-13.0	-36.7	
3.760	-20.0	H	3.0	35.3	1.0	-54.3	-13.0	-41.3	
5.640	-14.2	H	3.0	35.4	1.0	-48.7	-13.0	-35.7	
High Ch, (1907.60MHz)									
3.815	-18.1	V	3.0	35.3	1.0	-52.4	-13.0	-39.4	
5.723	-14.2	V	3.0	35.4	1.0	-48.7	-13.0	-35.7	
3.815	-19.7	H	3.0	35.3	1.0	-54.0	-13.0	-41.0	
5.723	-13.1	H	3.0	35.4	1.0	-47.5	-13.0	-34.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

WCDMA HSUPA (PCS Band)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and AC Adapter
Mode: TX, PCS BAND WCDMA, HSUPA

Chamber	Pre-amplifer	Filter	Limit
5m Chamber B	T145 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3.704	-21.2	V	3.0	35.4	1.0	-55.5	-13.0	-42.5	
5.557	-18.8	V	3.0	35.4	1.0	-53.2	-13.0	-40.2	
3.704	-21.1	H	3.0	35.4	1.0	-55.4	-13.0	-42.4	
5.557	-17.2	H	3.0	35.4	1.0	-51.6	-13.0	-38.6	
Mid Ch, 1880.0MHz									
3.760	-20.1	V	3.0	35.3	1.0	-54.5	-13.0	-41.5	
5.640	-18.3	V	3.0	35.4	1.0	-52.7	-13.0	-39.7	
3.760	-20.9	H	3.0	35.3	1.0	-55.2	-13.0	-42.2	
5.640	-18.0	H	3.0	35.4	1.0	-52.5	-13.0	-39.5	
High Ch, 1907.6MHz									
3.815	-20.5	V	3.0	35.3	1.0	-54.8	-13.0	-41.8	
5.723	-19.2	V	3.0	35.4	1.0	-53.7	-13.0	-40.7	
3.815	-19.9	H	3.0	35.3	1.0	-54.2	-13.0	-41.2	
5.723	-16.8	H	3.0	35.4	1.0	-51.2	-13.0	-38.2	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/27/12
Test Engineer: Roy Zheng
Configuration: EUT with AC adapter and Earphone
Mode: TX, LTE Band 2, 1.4MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.7MHz									
3.701	-21.3	V	3.0	36.8	1.0	-57.1	-13.0	-44.1	
5.552	-17.7	V	3.0	36.3	1.0	-53.0	-13.0	-40.0	
3.701	-21.7	H	3.0	36.8	1.0	-57.5	-13.0	-44.5	
5.552	-18.2	H	3.0	36.3	1.0	-53.5	-13.0	-40.5	
Mid Ch, (1880.0MHz)									
3.760	-21.4	V	3.0	36.8	1.0	-57.1	-13.0	-44.1	
5.640	-18.2	V	3.0	36.3	1.0	-53.6	-13.0	-40.6	
3.760	-20.5	H	3.0	36.8	1.0	-56.3	-13.0	-43.3	
5.640	-17.8	H	3.0	36.3	1.0	-53.1	-13.0	-40.1	
High Ch, 1909.3MHz									
3.819	-20.1	V	3.0	36.7	1.0	-55.8	-13.0	-42.8	
5.728	-18.3	V	3.0	36.3	1.0	-53.6	-13.0	-40.6	
3.819	-21.2	H	3.0	36.7	1.0	-57.0	-13.0	-44.0	
5.728	-17.7	H	3.0	36.3	1.0	-53.0	-13.0	-40.0	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT w/AC Adapter and Earphone
Mode: TX, LTE Band 2, 1.4 MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.7MHz									
3.710	-22.5	V	3.0	36.8	1.0	-58.3	-13.0	-45.3	
5.565	-18.0	V	3.0	36.3	1.0	-53.3	-13.0	-40.3	
3.710	-22.0	H	3.0	36.8	1.0	-57.8	-13.0	-44.8	
5.565	-10.3	H	3.0	36.3	1.0	-45.6	-13.0	-32.6	
Mid Ch, (1880.0MHz)									
3.760	-23.1	V	3.0	36.8	1.0	-58.9	-13.0	-45.9	
5.640	-18.4	V	3.0	36.3	1.0	-53.7	-13.0	-40.7	
3.760	-22.8	H	3.0	36.8	1.0	-58.6	-13.0	-45.6	
5.640	-14.0	H	3.0	36.3	1.0	-49.3	-13.0	-36.3	
High Ch, 1909.3MHz									
3.810	-21.7	V	3.0	36.7	1.0	-57.5	-13.0	-44.5	
5.715	-19.4	V	3.0	36.3	1.0	-54.7	-13.0	-41.7	
3.810	-22.5	H	3.0	36.7	1.0	-58.2	-13.0	-45.2	
5.715	-14.8	H	3.0	36.3	1.0	-50.1	-13.0	-37.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (3 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/28/12
Test Engineer: Roy Zheng
Configuration: EUT with AC Adapter and Earphone
Mode: TX, LTE Band 2, 3MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1851.5MHz									
3.704	-21.0	V	3.0	36.8	1.0	-56.8	-13.0	-43.8	
5.555	-18.7	V	3.0	36.3	1.0	-54.0	-13.0	-41.0	
3.704	-21.7	H	3.0	36.8	1.0	-57.5	-13.0	-44.5	
5.555	-17.7	H	3.0	36.3	1.0	-53.0	-13.0	-40.0	
Mid Ch, (1880.0MHz)									
3.760	-21.1	V	3.0	36.8	1.0	-56.9	-13.0	-43.9	
5.640	-19.0	V	3.0	36.3	1.0	-54.3	-13.0	-41.3	
3.760	-21.4	H	3.0	36.8	1.0	-57.2	-13.0	-44.2	
5.640	-17.7	H	3.0	36.3	1.0	-53.0	-13.0	-40.0	
High Ch, 1908.5MHz									
3.805	-20.2	V	3.0	36.7	1.0	-55.9	-13.0	-42.9	
5.708	-19.5	V	3.0	36.3	1.0	-54.8	-13.0	-41.8	
3.805	-21.6	H	3.0	36.7	1.0	-57.4	-13.0	-44.4	
5.708	-17.5	H	3.0	36.3	1.0	-52.8	-13.0	-39.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (3 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT AC Adapter and Earphone
Mode: TX, LTE Band 2, 3MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1851.5MHz									
3.704	-22.9	V	3.0	36.8	1.0	-58.7	-13.0	-45.7	
5.555	-18.7	V	3.0	36.3	1.0	-54.0	-13.0	-41.0	
3.704	-22.3	H	3.0	36.8	1.0	-58.1	-13.0	-45.1	
5.555	-15.5	H	3.0	36.3	1.0	-50.7	-13.0	-37.7	
Mid Ch, (1880.0MHz)									
3.760	-22.1	V	3.0	36.8	1.0	-57.8	-13.0	-44.8	
5.640	-18.0	V	3.0	36.3	1.0	-53.4	-13.0	-40.4	
3.760	-21.8	H	3.0	36.8	1.0	-57.6	-13.0	-44.6	
5.640	-12.0	H	3.0	36.3	1.0	-47.3	-13.0	-34.3	
High Ch, 1908.5MHz									
3.805	-20.4	V	3.0	36.7	1.0	-56.1	-13.0	-43.1	
5.708	-18.5	V	3.0	36.3	1.0	-53.8	-13.0	-40.8	
3.805	-21.0	H	3.0	36.7	1.0	-56.7	-13.0	-43.7	
5.708	-12.8	H	3.0	36.3	1.0	-48.1	-13.0	-35.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (5 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT AC adapter and Earphone
Mode: TX, LTE Band 2, 5MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.5MHz									
3.705	-21.3	V	3.0	36.8	1.0	-57.1	-13.0	-44.1	
5.557	-18.7	V	3.0	36.3	1.0	-54.0	-13.0	-41.0	
3.705	-21.0	H	3.0	36.8	1.0	-56.8	-13.0	-43.8	
5.557	-18.6	H	3.0	36.3	1.0	-53.9	-13.0	-40.9	
Mid Ch, (1880.0MHz)									
3.760	-21.3	V	3.0	36.8	1.0	-57.1	-13.0	-44.1	
5.640	-19.2	V	3.0	36.3	1.0	-54.5	-13.0	-41.5	
3.760	-22.5	H	3.0	36.8	1.0	-58.3	-13.0	-45.3	
5.640	-17.8	H	3.0	36.3	1.0	-53.1	-13.0	-40.1	
High Ch, 1907.5MHz									
3.815	-21.4	V	3.0	36.7	1.0	-57.1	-13.0	-44.1	
5.722	-18.5	V	3.0	36.3	1.0	-53.8	-13.0	-40.8	
3.815	-20.8	H	3.0	36.7	1.0	-56.5	-13.0	-43.5	
5.722	-18.6	H	3.0	36.3	1.0	-53.9	-13.0	-40.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (5 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT AC Adapter and Earphone
Mode: TX, LTE Band 2, 5MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.5MHz									
3.705	-21.8	V	3.0	36.8	1.0	-57.6	-13.0	-44.6	
5.557	-19.1	V	3.0	36.3	1.0	-54.4	-13.0	-41.4	
3.705	-22.6	H	3.0	36.8	1.0	-58.4	-13.0	-45.4	
5.557	-18.0	H	3.0	36.3	1.0	-53.3	-13.0	-40.3	
Mid Ch, (1880.0MHz)									
3.760	-22.2	V	3.0	36.8	1.0	-57.9	-13.0	-44.9	
5.640	-19.2	V	3.0	36.3	1.0	-54.5	-13.0	-41.5	
3.760	-21.1	H	3.0	36.8	1.0	-56.8	-13.0	-43.8	
5.640	-18.8	H	3.0	36.3	1.0	-54.1	-13.0	-41.1	
High Ch, 1907.5MHz									
3.815	-22.4	V	3.0	36.7	1.0	-58.1	-13.0	-45.1	
5.722	-19.3	V	3.0	36.3	1.0	-54.6	-13.0	-41.6	
3.815	-21.7	H	3.0	36.7	1.0	-57.4	-13.0	-44.4	
5.722	-18.8	H	3.0	36.3	1.0	-54.1	-13.0	-41.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (10 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT with AC adapter and Earphone
Mode: TX, LTE Band 2, 10MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1855MHz									
3.701	-22.4	V	3.0	36.8	1.0	-58.2	-13.0	-45.2	
5.552	-20.5	V	3.0	36.3	1.0	-55.8	-13.0	-42.8	
3.701	-22.7	H	3.0	36.8	1.0	-58.5	-13.0	-45.5	
5.552	-18.6	H	3.0	36.3	1.0	-53.9	-13.0	-40.9	
Mid Ch, (1880.0MHz)									
3.760	-22.7	V	3.0	36.8	1.0	-58.5	-13.0	-45.5	
5.640	-19.1	V	3.0	36.3	1.0	-54.4	-13.0	-41.4	
3.760	-22.1	H	3.0	36.8	1.0	-57.8	-13.0	-44.8	
5.640	-18.4	H	3.0	36.3	1.0	-53.7	-13.0	-40.7	
High Ch, (1905 MHz)									
3.819	-20.9	V	3.0	36.7	1.0	-56.6	-13.0	-43.6	
5.728	-18.2	V	3.0	36.3	1.0	-53.5	-13.0	-40.5	
3.819	-21.4	H	3.0	36.7	1.0	-57.2	-13.0	-44.2	
5.728	-18.7	H	3.0	36.3	1.0	-54.0	-13.0	-41.0	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (10 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT with AC adapter and Earphone
Mode: TX, LTE Band 2, 10MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1855 MHz)									
3.701	-22.7	V	3.0	36.8	1.0	-58.5	-13.0	-45.5	
5.552	-19.4	V	3.0	36.3	1.0	-54.7	-13.0	-41.7	
3.701	-21.9	H	3.0	36.8	1.0	-57.7	-13.0	-44.7	
5.552	-19.2	H	3.0	36.3	1.0	-54.5	-13.0	-41.5	
Mid Ch, (1880.0MHz)									
3.760	-22.5	V	3.0	36.8	1.0	-58.3	-13.0	-45.3	
5.640	-18.7	V	3.0	36.3	1.0	-54.0	-13.0	-41.0	
3.760	-21.7	H	3.0	36.8	1.0	-57.5	-13.0	-44.5	
5.640	-18.6	H	3.0	36.3	1.0	-53.9	-13.0	-40.9	
High Ch, (1905 MHz)									
3.819	-21.7	V	3.0	36.7	1.0	-57.4	-13.0	-44.4	
5.728	-19.8	V	3.0	36.3	1.0	-55.1	-13.0	-42.1	
3.819	-21.7	H	3.0	36.7	1.0	-57.4	-13.0	-44.4	
5.728	-17.4	H	3.0	36.3	1.0	-52.7	-13.0	-39.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (15MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT w/ AC Adapter and Earphone
Mode: TX, LTE Band 2, 15MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1857.5MHz)									
3.715	-22.2	V	3.0	36.8	1.0	-58.0	-13.0	-45.0	
5.573	-19.7	V	3.0	36.3	1.0	-55.0	-13.0	-42.0	
3.715	-22.0	H	3.0	36.8	1.0	-57.8	-13.0	-44.8	
5.573	-18.5	H	3.0	36.3	1.0	-53.8	-13.0	-40.8	
Mid Ch, (1880.0MHz)									
3.760	-22.7	V	3.0	36.8	1.0	-58.5	-13.0	-45.5	
5.640	-20.1	V	3.0	36.3	1.0	-55.4	-13.0	-42.4	
3.760	-22.3	H	3.0	36.8	1.0	-58.1	-13.0	-45.1	
5.640	-18.8	H	3.0	36.3	1.0	-54.1	-13.0	-41.1	
High Ch, (1902.5MHz)									
3.805	-21.5	V	3.0	36.7	1.0	-57.3	-13.0	-44.3	
5.708	-18.9	V	3.0	36.3	1.0	-54.2	-13.0	-41.2	
3.805	-20.5	H	3.0	36.7	1.0	-56.2	-13.0	-43.2	
5.708	-18.6	H	3.0	36.3	1.0	-53.9	-13.0	-40.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (15MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT w/ AC Adapter and Earphone
Mode: TX, LTE Band 2, 15MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1857.5MHz)									
3.715	-22.3	V	3.0	36.8	1.0	-58.1	-13.0	-45.1	
5.573	-18.7	V	3.0	36.3	1.0	-54.0	-13.0	-41.0	
3.715	-21.5	H	3.0	36.8	1.0	-57.3	-13.0	-44.3	
5.573	-18.3	H	3.0	36.3	1.0	-53.6	-13.0	-40.6	
Mid Ch, (1880.0MHz)									
3.760	-21.7	V	3.0	36.8	1.0	-57.5	-13.0	-44.5	
5.640	-18.8	V	3.0	36.3	1.0	-54.2	-13.0	-41.2	
3.760	-21.9	H	3.0	36.8	1.0	-57.6	-13.0	-44.6	
5.640	-18.2	H	3.0	36.3	1.0	-53.5	-13.0	-40.5	
High Ch, (1902.5MHz)									
3.805	-22.3	V	3.0	36.7	1.0	-58.1	-13.0	-45.1	
5.708	-19.3	V	3.0	36.3	1.0	-54.6	-13.0	-41.6	
3.805	-21.5	H	3.0	36.7	1.0	-57.2	-13.0	-44.2	
5.708	-18.4	H	3.0	36.3	1.0	-53.7	-13.0	-40.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 2 (20 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT w/AC Adapter and Earphone
Mode: TX, LTE Band 2, 20MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1860MHz)									
3.720	-21.8	V	3.0	36.8	1.0	-57.6	-13.0	-44.6	
5.580	-19.6	V	3.0	36.3	1.0	-54.9	-13.0	-41.9	
3.720	-22.4	H	3.0	36.8	1.0	-58.2	-13.0	-45.2	
5.580	-19.4	H	3.0	36.3	1.0	-54.6	-13.0	-41.6	
Mid Ch, (1880.0MHz)									
3.760	-22.8	V	3.0	36.8	1.0	-58.6	-13.0	-45.6	
5.640	-19.3	V	3.0	36.3	1.0	-54.6	-13.0	-41.6	
3.760	-22.4	H	3.0	36.8	1.0	-58.2	-13.0	-45.2	
5.640	-18.4	H	3.0	36.3	1.0	-53.7	-13.0	-40.7	
High Ch, (1900MHz)									
3.800	-21.7	V	3.0	36.7	1.0	-57.5	-13.0	-44.5	
5.700	-18.6	V	3.0	36.3	1.0	-53.9	-13.0	-40.9	
3.800	-21.1	H	3.0	36.7	1.0	-56.8	-13.0	-43.8	
5.700	-18.5	H	3.0	36.3	1.0	-53.8	-13.0	-40.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 2 (20MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/02/12
Test Engineer: Roy Zheng
Configuration: EUT w/ AC Adapter and Earphone
Mode: TX, LTE Band 2, 20MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1860MHz)									
3.720	-21.7	V	3.0	36.8	1.0	-57.5	-13.0	-44.5	
5.580	-18.8	V	3.0	36.3	1.0	-54.1	-13.0	-41.1	
3.720	-20.5	H	3.0	36.8	1.0	-56.3	-13.0	-43.3	
5.580	-18.8	H	3.0	36.3	1.0	-54.1	-13.0	-41.1	
Mid Ch, (1880.0MHz)									
3.760	-21.8	V	3.0	36.8	1.0	-57.6	-13.0	-44.6	
5.640	-19.6	V	3.0	36.3	1.0	-54.9	-13.0	-41.9	
3.760	-22.6	H	3.0	36.8	1.0	-58.3	-13.0	-45.3	
5.640	-18.9	H	3.0	36.3	1.0	-54.2	-13.0	-41.2	
High Ch, (1900MHz)									
3.800	-21.2	V	3.0	36.7	1.0	-57.0	-13.0	-44.0	
5.700	-20.0	V	3.0	36.3	1.0	-55.3	-13.0	-42.3	
3.800	-21.4	H	3.0	36.7	1.0	-57.2	-13.0	-44.2	
5.700	-18.5	H	3.0	36.3	1.0	-53.8	-13.0	-40.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 4 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and AC Adapter
Mode: LTE Band 4, 1.4MHz BW
QPSK

Chamber	Pre-amplifer	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
Low Ch, 1710.7MHz									
3.421	-21.0	V	3.0	35.5	1.0	-55.4	-13.0	-42.4	
5.132	-18.3	V	3.0	35.3	1.0	-52.6	-13.0	-39.6	
3.421	-21.6	H	3.0	35.5	1.0	-56.1	-13.0	-43.1	
5.132	-18.2	H	3.0	35.3	1.0	-52.5	-13.0	-39.5	
Mid Ch, 1732.50MHz									
3.464	-20.5	V	3.0	35.5	1.0	-54.9	-13.0	-41.9	
5.160	-18.5	V	3.0	35.3	1.0	-52.8	-13.0	-39.8	
3.464	-22.0	H	3.0	35.5	1.0	-56.4	-13.0	-43.4	
5.160	-18.1	H	3.0	35.3	1.0	-52.4	-13.0	-39.4	
High Ch, 1754.3MHz									
3.509	-21.6	V	3.0	35.4	1.0	-56.1	-13.0	-43.1	
5.263	-18.5	V	3.0	35.3	1.0	-52.9	-13.0	-39.9	
3.509	-20.8	H	3.0	35.4	1.0	-55.3	-13.0	-42.3	
5.263	-17.5	H	3.0	35.3	1.0	-51.8	-13.0	-38.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 4 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and AC Adapter
Mode: LTE Band 4, 1.4MHz BW
16QAM

Chamber	Pre-amplifer	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
Low Ch, 1710.7MHz									
3.421	-22.0	V	3.0	35.5	1.0	-56.4	-13.0	-43.4	
5.132	-19.1	V	3.0	35.3	1.0	-53.4	-13.0	-40.4	
3.421	-22.6	H	3.0	35.5	1.0	-57.1	-13.0	-44.1	
5.132	-19.0	H	3.0	35.3	1.0	-53.3	-13.0	-40.3	
Mid Ch, 1732.50MHz									
3.464	-21.5	V	3.0	35.5	1.0	-55.9	-13.0	-42.9	
5.160	-19.7	V	3.0	35.3	1.0	-54.0	-13.0	-41.0	
3.464	-22.9	H	3.0	35.5	1.0	-57.3	-13.0	-44.3	
5.160	-19.4	H	3.0	35.3	1.0	-53.7	-13.0	-40.7	
High Ch, 1754.3MHz									
3.508	-22.3	V	3.0	35.4	1.0	-56.8	-13.0	-43.8	
5.263	-19.4	V	3.0	35.3	1.0	-53.8	-13.0	-40.8	
3.508	-21.7	H	3.0	35.4	1.0	-56.2	-13.0	-43.2	
5.263	-18.5	H	3.0	35.3	1.0	-52.8	-13.0	-39.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 4 (3 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT w/ AC Adapter and Earphone
Mode: LTE Band 4, 3MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 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
Low Ch, 1711.5MHz									
3.423	-21.3	V	3.0	37.0	1.0	-57.3	-13.0	-44.3	
5.135	-17.9	V	3.0	36.3	1.0	-53.2	-13.0	-40.2	
3.423	-20.8	H	3.0	37.0	1.0	-56.8	-13.0	-43.8	
5.135	-17.5	H	3.0	36.3	1.0	-52.8	-13.0	-39.8	
Mid Ch, 1732.50MHz									
3.465	-21.6	V	3.0	37.0	1.0	-57.6	-13.0	-44.6	
5.160	-18.3	V	3.0	36.3	1.0	-53.6	-13.0	-40.6	
3.465	-20.7	H	3.0	37.0	1.0	-56.7	-13.0	-43.7	
5.160	-17.8	H	3.0	36.3	1.0	-53.0	-13.0	-40.0	
High Ch, 1753.5MHz									
3.507	-21.5	V	3.0	37.0	1.0	-57.5	-13.0	-44.5	
5.235	-18.2	V	3.0	36.3	1.0	-53.4	-13.0	-40.4	
3.490	-21.4	H	3.0	37.0	1.0	-57.4	-13.0	-44.4	
5.235	-17.3	H	3.0	36.3	1.0	-52.5	-13.0	-39.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 4 (3 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT w/AC Adapter and Earphone
Mode: LTE Band 4, 3MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 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
Low Ch, 1711.5MHz									
3.423	-22.2	V	3.0	37.0	1.0	-58.2	-13.0	-45.2	
5.135	-18.8	V	3.0	36.3	1.0	-54.1	-13.0	-41.1	
3.423	-21.8	H	3.0	37.0	1.0	-57.8	-13.0	-44.8	
5.135	-18.3	H	3.0	36.3	1.0	-53.6	-13.0	-40.6	
Mid Ch, 1732.50MHz									
3.465	-22.4	V	3.0	37.0	1.0	-58.4	-13.0	-45.4	
5.160	-19.0	V	3.0	36.3	1.0	-54.3	-13.0	-41.3	
3.465	-22.0	H	3.0	37.0	1.0	-58.0	-13.0	-45.0	
5.160	-18.6	H	3.0	36.3	1.0	-53.8	-13.0	-40.8	
High Ch, 1753.5MHz									
3.507	-22.5	V	3.0	37.0	1.0	-58.5	-13.0	-45.5	
5.235	-19.1	V	3.0	36.3	1.0	-54.3	-13.0	-41.3	
3.507	-22.2	H	3.0	37.0	1.0	-58.2	-13.0	-45.2	
5.235	-18.1	H	3.0	36.3	1.0	-53.3	-13.0	-40.3	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 4 (5 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT w/ AC Adapter and Earphone
Mode: LTE Band 4, 5MHz BW
QPSK

Chamber	Pre-amplifer	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
Low Ch, 1712.5MHz									
3.425	-20.9	V	3.0	35.5	1.0	-55.4	-13.0	-42.4	
5.138	-18.1	V	3.0	35.3	1.0	-52.4	-13.0	-39.4	
3.425	-20.9	H	3.0	35.5	1.0	-55.4	-13.0	-42.4	
5.138	-18.4	H	3.0	35.3	1.0	-52.7	-13.0	-39.7	
Mid Ch, 1732.50MHz									
3.465	-21.3	V	3.0	35.5	1.0	-55.8	-13.0	-42.8	
5.198	-17.2	V	3.0	35.3	1.0	-51.6	-13.0	-38.6	
3.465	-21.3	H	3.0	35.5	1.0	-55.7	-13.0	-42.7	
5.198	-17.6	H	3.0	35.3	1.0	-51.9	-13.0	-38.9	
High Ch, 1752.5MHz									
3.505	-20.5	V	3.0	35.4	1.0	-54.9	-13.0	-41.9	
5.258	-18.6	V	3.0	35.3	1.0	-53.0	-13.0	-40.0	
3.505	-21.3	H	3.0	35.4	1.0	-55.8	-13.0	-42.8	
5.258	-17.5	H	3.0	35.3	1.0	-51.8	-13.0	-38.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 4 (5 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT w/ AC Adapter and Earphone
Mode: LTE Band 4, 5MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 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
Low Ch, 1712.5MHz									
3.425	-22.2	V	3.0	37.0	1.0	-58.2	-13.0	-45.2	
5.138	-18.8	V	3.0	36.3	1.0	-54.0	-13.0	-41.0	
3.425	-22.4	H	3.0	37.0	1.0	-58.4	-13.0	-45.4	
5.138	-18.8	H	3.0	36.3	1.0	-54.1	-13.0	-41.1	
Mid Ch, 1732.50MHz									
3.465	-22.3	V	3.0	37.0	1.0	-58.3	-13.0	-45.3	
5.198	-18.2	V	3.0	36.2	1.0	-53.5	-13.0	-40.5	
3.465	-22.1	H	3.0	37.0	1.0	-58.1	-13.0	-45.1	
5.198	-18.5	H	3.0	36.2	1.0	-53.7	-13.0	-40.7	
High Ch, 1752.5MHz									
3.505	-21.5	V	3.0	37.0	1.0	-57.5	-13.0	-44.5	
5.258	-19.4	V	3.0	36.3	1.0	-54.7	-13.0	-41.7	
3.505	-22.6	H	3.0	37.0	1.0	-58.5	-13.0	-45.5	
5.258	-18.6	H	3.0	36.3	1.0	-53.8	-13.0	-40.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 4 (10 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and AC Adapter
Mode: LTE Band 4, 10MHz BW
QPSK

Chamber	Pre-amplifer	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
Low Ch, 1715MHz									
3.430	-21.2	V	3.0	35.5	1.0	-55.6	-13.0	-42.6	
5.145	-19.2	V	3.0	35.3	1.0	-53.5	-13.0	-40.5	
3.430	-21.3	H	3.0	35.5	1.0	-55.8	-13.0	-42.8	
5.145	-18.1	H	3.0	35.3	1.0	-52.5	-13.0	-39.5	
Mid Ch, 1732.50MHz									
3.456	-20.3	V	3.0	35.5	1.0	-54.8	-13.0	-41.8	
5.184	-17.5	V	3.0	35.3	1.0	-51.8	-13.0	-38.8	
3.456	-19.8	H	3.0	35.5	1.0	-54.3	-13.0	-41.3	
5.184	-17.8	H	3.0	35.3	1.0	-52.1	-13.0	-39.1	
High Ch, 1750MHz									
3.500	-21.2	V	3.0	35.4	1.0	-55.7	-13.0	-42.7	
5.250	-18.0	V	3.0	35.3	1.0	-52.3	-13.0	-39.3	
3.500	-20.8	H	3.0	35.4	1.0	-55.2	-13.0	-42.2	
5.250	-17.3	H	3.0	35.3	1.0	-51.6	-13.0	-38.6	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 4 (10 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Apple
Project #:	12U14507
Date:	10/03/12
Test Engineer:	Roy Zheng
Configuration:	EUT and AC Adapter
Mode:	LTE Band 4, 10MHz BW
	16QAM

Chamber	Pre-amplifer	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
Low Ch, 1715MHz									
3.430	-22.2	V	3.0	35.5	1.0	-56.7	-13.0	-43.7	
5.145	-19.8	V	3.0	35.3	1.0	-54.2	-13.0	-41.2	
3.430	-22.1	H	3.0	35.5	1.0	-56.6	-13.0	-43.6	
5.145	-19.7	H	3.0	35.3	1.0	-54.1	-13.0	-41.1	
Mid Ch, 1732.50MHz									
3.456	-21.5	V	3.0	35.5	1.0	-55.9	-13.0	-42.9	
5.184	-18.3	V	3.0	35.3	1.0	-52.6	-13.0	-39.6	
3.456	-20.9	H	3.0	35.5	1.0	-55.4	-13.0	-42.4	
5.184	-18.5	H	3.0	35.3	1.0	-52.9	-13.0	-39.9	
High Ch, 1750MHz									
3.500	-22.2	V	3.0	35.4	1.0	-56.6	-13.0	-43.6	
5.250	-19.0	V	3.0	35.3	1.0	-53.3	-13.0	-40.3	
3.500	-21.8	H	3.0	35.4	1.0	-56.2	-13.0	-43.2	
5.250	-18.2	H	3.0	35.3	1.0	-52.5	-13.0	-39.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 4 (15MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and AC Adapter
Mode: LTE Band 4, 15MHz BW
QPSK

Chamber	Pre-amplifer	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
Low Ch, 1717.5MHz									
3.435	-21.5	V	3.0	35.5	1.0	-56.0	-13.0	-43.0	
5.152	-18.5	V	3.0	35.3	1.0	-52.9	-13.0	-39.9	
3.435	-22.2	H	3.0	35.5	1.0	-56.7	-13.0	-43.7	
5.152	-17.7	H	3.0	35.3	1.0	-52.0	-13.0	-39.0	
Mid Ch, 1732.50MHz									
3.452	-21.5	V	3.0	35.5	1.0	-56.0	-13.0	-43.0	
5.178	-18.3	V	3.0	35.3	1.0	-52.6	-13.0	-39.6	
3.465	-21.1	H	3.0	35.5	1.0	-55.5	-13.0	-42.5	
5.198	-18.2	H	3.0	35.3	1.0	-52.5	-13.0	-39.5	
High Ch, 1747.5MHz									
3.495	-20.8	V	3.0	35.5	1.0	-55.2	-13.0	-42.2	
5.243	-18.4	V	3.0	35.3	1.0	-52.7	-13.0	-39.7	
3.495	-20.9	H	3.0	35.5	1.0	-55.3	-13.0	-42.3	
5.243	-17.5	H	3.0	35.3	1.0	-51.9	-13.0	-38.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 4 (15MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and AC Adapter
Mode: LTE Band 4, 15MHz BW
16QAM

Chamber	Pre-amplifer	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
Low Ch, 1717.5MHz									
3.435	-22.5	V	3.0	35.5	1.0	-57.0	-13.0	-44.0	
5.152	-19.3	V	3.0	35.3	1.0	-53.7	-13.0	-40.7	
3.435	-23.1	H	3.0	35.5	1.0	-57.6	-13.0	-44.6	
5.152	-18.9	H	3.0	35.3	1.0	-53.2	-13.0	-40.2	
Mid Ch, 1732.50MHz									
3.452	-22.5	V	3.0	35.5	1.0	-57.0	-13.0	-44.0	
5.178	-19.3	V	3.0	35.3	1.0	-53.6	-13.0	-40.6	
3.465	-22.3	H	3.0	35.5	1.0	-56.7	-13.0	-43.7	
5.198	-19.1	H	3.0	35.3	1.0	-53.4	-13.0	-40.4	
High Ch, 1747.5MHz									
3.495	-21.8	V	3.0	35.5	1.0	-56.2	-13.0	-43.2	
5.243	-19.2	V	3.0	35.3	1.0	-53.5	-13.0	-40.5	
3.495	-21.4	H	3.0	35.5	1.0	-55.8	-13.0	-42.8	
5.243	-18.7	H	3.0	35.3	1.0	-53.1	-13.0	-40.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 4 (20 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and Earphone
Mode: LTE Band 4, 20MHz BW
QPSK

Chamber	Pre-amplifer	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
Low Ch, 1720MHz									
3.422	-21.6	V	3.0	35.5	1.0	-56.0	-13.0	-43.0	
5.133	-18.4	V	3.0	35.3	1.0	-52.7	-13.0	-39.7	
3.422	-21.0	H	3.0	35.5	1.0	-55.5	-13.0	-42.5	
5.133	-17.7	H	3.0	35.3	1.0	-52.0	-13.0	-39.0	
Mid Ch, 1732.50MHz									
3.447	-21.5	V	3.0	35.5	1.0	-55.9	-13.0	-42.9	
5.171	-18.3	V	3.0	35.3	1.0	-52.6	-13.0	-39.6	
3.447	-20.5	H	3.0	35.5	1.0	-55.0	-13.0	-42.0	
5.171	-17.5	H	3.0	35.3	1.0	-51.8	-13.0	-38.8	
High Ch, 1745MHz									
3.475	-20.7	V	3.0	35.5	1.0	-55.2	-13.0	-42.2	
5.208	-18.1	V	3.0	35.3	1.0	-52.4	-13.0	-39.4	
3.472	-19.6	H	3.0	35.5	1.0	-54.0	-13.0	-41.0	
5.208	-17.0	H	3.0	35.3	1.0	-51.3	-13.0	-38.3	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 4 (20MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14526
Date: 10/03/12
Test Engineer: Roy Zheng
Configuration: EUT and Earphone
Mode: LTE Band 4, 20MHz BW
16QAM

Chamber	Pre-amplifer	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
Low Ch, 1720MHz									
3.422	-22.6	V	3.0	35.5	1.0	-57.0	-13.0	-44.0	
5.133	-19.4	V	3.0	35.3	1.0	-53.7	-13.0	-40.7	
3.422	-22.3	H	3.0	35.5	1.0	-56.8	-13.0	-43.8	
5.133	-18.6	H	3.0	35.3	1.0	-52.9	-13.0	-39.9	
Mid Ch, 1732.50MHz									
3.447	-22.5	V	3.0	35.5	1.0	-57.0	-13.0	-44.0	
5.171	-19.1	V	3.0	35.3	1.0	-53.4	-13.0	-40.4	
3.447	-21.5	H	3.0	35.5	1.0	-56.0	-13.0	-43.0	
5.171	-18.3	H	3.0	35.3	1.0	-52.6	-13.0	-39.6	
High Ch, 1745MHz									
3.475	-21.6	V	3.0	35.5	1.0	-56.1	-13.0	-43.1	
5.208	-18.7	V	3.0	35.3	1.0	-53.0	-13.0	-40.0	
3.472	-21.0	H	3.0	35.5	1.0	-55.4	-13.0	-42.4	
5.208	-17.9	H	3.0	35.3	1.0	-52.2	-13.0	-39.2	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 5 (1.4.0 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/27/12
Test Engineer: Roy Zheng
Configuration: EUT with AC adapter and Earphone
Mode: TX, LTE Band 5, 1.4MHz QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.7MHz)									
1.649	-15.6	V	3.0	38.2	1.0	-52.8	-13.0	-39.8	
2.474	-13.5	V	3.0	37.5	1.0	-50.0	-13.0	-37.0	
1.649	-19.7	H	3.0	38.2	1.0	-56.9	-13.0	-43.9	
2.474	-18.7	H	3.0	37.5	1.0	-55.2	-13.0	-42.2	
Mid Ch, (836.5MHz)									
1.673	-20.2	V	3.0	38.1	1.0	-57.3	-13.0	-44.3	
2.510	-14.0	V	3.0	37.5	1.0	-50.5	-13.0	-37.5	
1.673	-21.2	H	3.0	38.1	1.0	-58.3	-13.0	-45.3	
2.510	-15.9	H	3.0	37.5	1.0	-52.3	-13.0	-39.3	
High Ch, (848.3MHz)									
1.697	-13.5	V	3.0	38.1	1.0	-50.6	-13.0	-37.6	
2.545	-6.6	V	3.0	37.5	1.0	-43.1	-13.0	-30.1	
1.695	-21.0	H	3.0	38.1	1.0	-58.1	-13.0	-45.1	
2.545	-16.9	H	3.0	37.5	1.0	-53.3	-13.0	-40.3	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 5 (1.4 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/27/12
Test Engineer: Roy Zheng
Configuration: EUT with AC adapter and Earphone
Mode: TX, LTE Band 5, 1.4MHz 16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.7MHz)									
1.649	-16.4	V	3.0	38.2	1.0	-53.6	-13.0	-40.6	
2.474	-13.0	V	3.0	37.5	1.0	-49.5	-13.0	-36.5	
1.649	-19.1	H	3.0	38.2	1.0	-56.2	-13.0	-43.2	
2.474	-18.6	H	3.0	37.5	1.0	-55.1	-13.0	-42.1	
Mid Ch, (836.5MHz)									
1.673	-20.9	V	3.0	38.1	1.0	-58.0	-13.0	-45.0	
2.510	-11.9	V	3.0	37.5	1.0	-48.4	-13.0	-35.4	
1.673	-22.2	H	3.0	38.1	1.0	-59.3	-13.0	-46.3	
2.510	-14.9	H	3.0	37.5	1.0	-51.3	-13.0	-38.3	
High Ch, (848.3MHz)									
1.697	-19.0	V	3.0	38.1	1.0	-56.1	-13.0	-43.1	
2.545	-6.2	V	3.0	37.5	1.0	-42.7	-13.0	-29.7	
1.695	-20.0	H	3.0	38.1	1.0	-57.1	-13.0	-44.1	
2.545	-18.6	H	3.0	37.5	1.0	-55.1	-13.0	-42.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 5 (3 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/26/12
Test Engineer: ROY Zheng
Configuration: EUT with AC Adapter and Earphone
Mode: TX, LTE Band 5, 3MHz QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (825.5MHz)									
1.651	-18.0	V	3.0	38.2	1.0	-55.2	-13.0	-42.2	
2.477	-4.2	V	3.0	37.5	1.0	-40.7	-13.0	-27.7	
1.651	-18.2	H	3.0	38.2	1.0	-55.4	-13.0	-42.4	
2.477	-11.0	H	3.0	37.5	1.0	-47.5	-13.0	-34.5	
Mid Ch, (836.5MHz)									
1.673	-21.5	V	3.0	38.1	1.0	-58.6	-13.0	-45.6	
2.510	-5.5	V	3.0	37.5	1.0	-41.9	-13.0	-28.9	
1.673	-21.6	H	3.0	38.1	1.0	-58.7	-13.0	-45.7	
2.510	-16.1	H	3.0	37.5	1.0	-52.5	-13.0	-39.5	
High Ch, (847.5MHz)									
1.695	-17.0	V	3.0	38.1	1.0	-54.1	-13.0	-41.1	
2.543	-4.3	V	3.0	37.5	1.0	-40.7	-13.0	-27.7	
1.695	-18.6	H	3.0	38.1	1.0	-55.7	-13.0	-42.7	
2.543	-15.4	H	3.0	37.5	1.0	-51.8	-13.0	-38.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 5 (3 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/26/12
Test Engineer: ROY Zheng
Configuration: EUT with AC Adapter and Earphone
Mode: TX, LTE Band 5, 3MHz 16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (825.5MHz)									
1.651	-18.4	V	3.0	38.2	1.0	-55.6	-13.0	-42.6	
2.477	-5.5	V	3.0	37.5	1.0	-42.0	-13.0	-29.0	
1.651	-18.8	H	3.0	38.2	1.0	-56.0	-13.0	-43.0	
2.477	-12.0	H	3.0	37.5	1.0	-48.5	-13.0	-35.5	
Mid Ch, (836.5MHz)									
1.673	-21.9	V	3.0	38.1	1.0	-59.0	-13.0	-46.0	
2.510	-6.7	V	3.0	37.5	1.0	-43.2	-13.0	-30.2	
1.673	-21.8	H	3.0	38.1	1.0	-58.9	-13.0	-45.9	
2.510	-8.2	H	3.0	37.5	1.0	-44.6	-13.0	-31.6	
High Ch, (847.5MHz)									
1.695	-17.7	V	3.0	38.1	1.0	-54.7	-13.0	-41.7	
2.543	-5.1	V	3.0	37.5	1.0	-41.5	-13.0	-28.5	
1.695	-19.4	H	3.0	38.1	1.0	-56.5	-13.0	-43.5	
2.543	-17.7	H	3.0	37.5	1.0	-54.1	-13.0	-41.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 5 (5 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Project #: 12U14507
Date: 09/25/12
Test Engineer: Roy Zheng
Configuration: EUT with AC Adapter and Earphone
Mode: TX, LTE Band 5, 5MHz QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.5MHz)									
1.653	-16.1	V	3.0	38.1	1.0	-53.3	-13.0	-40.3	
2.480	-20.3	V	3.0	37.5	1.0	-56.7	-13.0	-43.7	
1.653	-18.4	H	3.0	38.1	1.0	-55.6	-13.0	-42.6	
2.480	-16.0	H	3.0	37.5	1.0	-52.5	-13.0	-39.5	
Mid Ch, (836.5MHz)									
1.673	-13.9	V	3.0	38.1	1.0	-51.0	-13.0	-38.0	
2.502	-11.2	V	3.0	37.5	1.0	-47.6	-13.0	-34.6	
1.673	-15.2	H	3.0	38.1	1.0	-52.3	-13.0	-39.3	
2.502	-8.9	H	3.0	37.5	1.0	-45.4	-13.0	-32.4	
High Ch, (846.5MHz)									
1.693	-9.7	V	3.0	38.1	1.0	-46.8	-13.0	-33.8	
2.532	-10.1	V	3.0	37.5	1.0	-46.5	-13.0	-33.5	
1.693	-16.0	H	3.0	38.1	1.0	-53.1	-13.0	-40.1	
2.540	-16.7	H	3.0	37.5	1.0	-53.1	-13.0	-40.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 5 (10 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/25/21
Test Engineer: Roy Zheng
Configuration: EUT with AC Adapter and Earphone
Mode: TX, LTE Band 5, 10MHz QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (829MHz)									
1.658	-14.1	V	3.0	38.1	1.0	-51.2	-13.0	-38.2	
2.487	-19.2	V	3.0	37.5	1.0	-55.7	-13.0	-42.7	
1.658	-19.4	H	3.0	38.1	1.0	-56.5	-13.0	-43.5	
2.487	-25.0	H	3.0	37.5	1.0	-61.4	-13.0	-48.4	
Mid Ch, (836.5MHz)									
1.673	-14.2	V	3.0	38.1	1.0	-51.3	-13.0	-38.3	
2.510	-4.7	V	3.0	37.5	1.0	-41.1	-13.0	-28.1	
1.673	-17.4	H	3.0	38.1	1.0	-54.5	-13.0	-41.5	
2.510	-7.5	H	3.0	37.5	1.0	-43.9	-13.0	-30.9	
High Ch, (844MHz)									
1.688	-21.6	V	3.0	38.1	1.0	-58.7	-13.0	-45.7	
2.532	-3.7	V	3.0	37.5	1.0	-40.2	-13.0	-27.2	
1.688	-21.1	H	3.0	38.1	1.0	-58.2	-13.0	-45.2	
2.532	-9.5	H	3.0	37.5	1.0	-45.9	-13.0	-32.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 5 (10 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/26/12
Test Engineer: Roy Zheng
Configuration: EUT with AC Adapter and Earphone
Mode: TX, LTE Band 5, 10MHz 16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (829MHz)									
1.658	-15.1	V	3.0	38.1	1.0	-52.2	-13.0	-39.2	
2.487	-19.2	V	3.0	37.5	1.0	-55.7	-13.0	-42.7	
1.658	-16.4	H	3.0	38.1	1.0	-53.5	-13.0	-40.5	
2.487	-26.0	H	3.0	37.5	1.0	-62.4	-13.0	-49.4	
Mid Ch, (836.5MHz)									
1.673	-13.9	V	3.0	38.1	1.0	-51.0	-13.0	-38.0	
2.510	-3.7	V	3.0	37.5	1.0	-40.2	-13.0	-27.2	
1.673	-16.9	H	3.0	38.1	1.0	-54.0	-13.0	-41.0	
2.510	-7.7	H	3.0	37.5	1.0	-44.2	-13.0	-31.2	
High Ch, (844MHz)									
1.688	-22.4	V	3.0	38.1	1.0	-59.5	-13.0	-46.5	
2.532	-4.3	V	3.0	37.5	1.0	-40.7	-13.0	-27.7	
1.688	-21.9	H	3.0	38.1	1.0	-59.0	-13.0	-46.0	
2.532	-6.1	H	3.0	37.5	1.0	-42.6	-13.0	-29.6	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 17 (5 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/28/12
Test Engineer: Roy Zheng
Configuration: EUT w/AC Adapter and earphone
Mode: TX, LTE band 17, 5MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 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
Low Ch (706.5 MHz)									
1.413	-28.1	V	3.0	38.6	1.0	-65.7	-13.0	-52.7	
2.120	-24.0	V	3.0	37.6	1.0	-60.7	-13.0	-47.7	
2.826	-23.3	V	3.0	37.4	1.0	-59.7	-13.0	-46.7	
1.413	-29.7	H	3.0	38.6	1.0	-67.3	-13.0	-54.3	
2.120	-26.1	H	3.0	37.6	1.0	-62.7	-13.0	-49.7	
2.826	-23.1	H	3.0	37.4	1.0	-59.5	-13.0	-46.5	
Mid Ch (710.0 MHz)									
1.420	-28.9	V	3.0	38.5	1.0	-66.4	-13.0	-53.4	
2.130	-24.2	V	3.0	37.6	1.0	-60.9	-13.0	-47.9	
2.840	-21.8	V	3.0	37.4	1.0	-58.2	-13.0	-45.2	
1.420	-29.3	H	3.0	38.5	1.0	-66.8	-13.0	-53.8	
2.130	-25.8	H	3.0	37.6	1.0	-62.5	-13.0	-49.5	
2.840	-22.5	H	3.0	37.4	1.0	-58.9	-13.0	-45.9	
High Ch, 713.									
1.427	-27.9	V	3.0	38.5	1.0	-65.5	-13.0	-52.5	
2.140	-23.8	V	3.0	37.6	1.0	-60.4	-13.0	-47.4	
2.854	-22.9	V	3.0	37.4	1.0	-59.3	-13.0	-46.3	
1.427	-29.9	H	3.0	38.5	1.0	-67.4	-13.0	-54.4	
2.140	-24.9	H	3.0	37.6	1.0	-61.6	-13.0	-48.6	
2.854	-23.8	H	3.0	37.4	1.0	-60.1	-13.0	-47.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 17 (5 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/28/12
Test Engineer: Roy Zheng
Configuration: EUT w/AC Adapter and earphone
Mode: TX, LTE band 17, 5MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 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
Low Ch (706.5 MHz)									
1.413	-28.6	V	3.0	38.6	1.0	-66.2	-13.0	-53.2	
2.120	-24.5	V	3.0	37.6	1.0	-61.1	-13.0	-48.1	
2.826	-23.2	V	3.0	37.4	1.0	-59.6	-13.0	-46.6	
1.413	-29.7	H	3.0	38.6	1.0	-67.2	-13.0	-54.2	
2.120	-25.9	H	3.0	37.6	1.0	-62.5	-13.0	-49.5	
2.826	-22.1	H	3.0	37.4	1.0	-58.5	-13.0	-45.5	
Mid Ch (710.0 MHz)									
1.420	-28.4	V	3.0	38.5	1.0	-66.0	-13.0	-53.0	
2.130	-24.4	V	3.0	37.6	1.0	-61.1	-13.0	-48.1	
2.840	-23.3	V	3.0	37.4	1.0	-59.7	-13.0	-46.7	
1.420	-28.5	H	3.0	38.5	1.0	-66.0	-13.0	-53.0	
2.130	-24.8	H	3.0	37.6	1.0	-61.4	-13.0	-48.4	
2.840	-23.4	H	3.0	37.4	1.0	-59.8	-13.0	-46.8	
High Ch, 713.									
1.427	-28.9	V	3.0	38.5	1.0	-66.4	-13.0	-53.4	
2.140	-24.2	V	3.0	37.6	1.0	-60.8	-13.0	-47.8	
2.854	-23.1	V	3.0	37.4	1.0	-59.5	-13.0	-46.5	
1.427	-30.0	H	3.0	38.5	1.0	-67.5	-13.0	-54.5	
2.140	-25.1	H	3.0	37.6	1.0	-61.8	-13.0	-48.8	
2.854	-22.7	H	3.0	37.4	1.0	-59.1	-13.0	-46.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

QPSK Band 17 (10 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/28/12
Test Engineer: Roy Zheng
Configuration: EUT w/ AC Adapter and earphone
Mode: TX, LTE band 17, 10MHz BW
QPSK

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 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
Mid Ch (710.0 MHz)									
1.420	-28.1	V	3.0	38.5	1.0	-65.7	-13.0	-52.7	
2.130	-24.4	V	3.0	37.6	1.0	-61.0	-13.0	-48.0	
2.840	-23.1	V	3.0	37.4	1.0	-59.5	-13.0	-46.5	
1.420	-28.7	H	3.0	38.5	1.0	-66.2	-13.0	-53.2	
2.130	-25.6	H	3.0	37.6	1.0	-62.3	-13.0	-49.3	
2.840	-23.0	H	3.0	37.4	1.0	-59.4	-13.0	-46.4	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

16QAM Band 17 (10 MHz BANDWIDTH)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Apple
Date: 09/28/12
Test Engineer: Roy Zheng
Configuration: EUT w/ AC Adapter and earphone
Mode: TX, LTE band 17, 10MHz BW
16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 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
Mid Ch (710.0 MHz)									
1.420	-28.9	V	3.0	38.5	1.0	-66.5	-13.0	-53.5	
2.130	-24.9	V	3.0	37.6	1.0	-61.6	-13.0	-48.6	
2.840	-22.3	V	3.0	37.4	1.0	-58.7	-13.0	-45.7	
1.420	-28.7	H	3.0	38.5	1.0	-66.2	-13.0	-53.2	
2.130	-25.3	H	3.0	37.6	1.0	-61.9	-13.0	-48.9	
2.840	-23.9	H	3.0	37.4	1.0	-60.3	-13.0	-47.3	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.