

## 8.4. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235

### LIMITS

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

RSS-133 6.3 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  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 CMW 500 with Frequency Error measurement capability.

- Temp. =  $-30^{\circ}$  to  $+50^{\circ}\text{C}$
- Voltage = (85% - 115%)

### **Frequency Stability vs Temperature:**

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

### **Frequency Stability vs Voltage:**

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

### MODES TESTED

- LTE Band 2
- LTE Band 5

### RESULTS

See the following pages.

**QPSK, LTE BAND 2 – 1880.0 MHz**

Reference Frequency: LTE Band 2_1880.000004 MHz @ 20°C Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1879.999987	0.009	2.5
3.80	40	1879.999987	0.009	2.5
3.80	30	1879.999983	0.011	2.5
3.80	<b>20</b>	<b>1880.000004</b>	<b>0</b>	2.5
3.80	10	1879.999985	0.010	2.5
3.80	0	1879.999989	0.008	2.5
3.80	-10	1879.999986	0.010	2.5
3.80	-20	1879.999987	0.009	2.5
3.80	-30	1879.999987	0.009	2.5

Reference Frequency: LTE Band 2_Mid Channel 1880.000004 MHz @ 20°C Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
<b>3.80</b>	<b>20</b>	<b>1880.000004</b>	<b>0</b>	<b>2.5</b>
4.20	20	1879.999990	0.007	2.5
3.40	20	1879.999989	0.008	2.5
End Voltage(3.3)	20	1879.999987	0.009	2.5

**16QAM-LTE BAND 2 – 1880.0 MHz**

Reference Frequency: LTE Band 2_1879.999980 MHz @ 20°C Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	1879.999961	0.010	2.5
3.80	40	1879.999959	0.011	2.5
3.80	30	1879.999960	0.011	2.5
3.80	<b>20</b>	<b>1879.999980</b>	<b>0</b>	2.5
3.80	10	1879.999961	0.010	2.5
3.80	0	1879.999961	0.010	2.5
3.80	-10	1879.999964	0.009	2.5
3.80	-20	1879.999960	0.011	2.5
3.80	-30	1879.999964	0.009	2.5

Reference Frequency: LTE Band 2_Mid Channel 1879.999980 MHz @ 20°C Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
<b>3.80</b>	<b>20</b>	<b>1879.999980</b>	<b>0</b>	<b>2.5</b>
4.20	20	1879.999965	0.008	2.5
3.40	20	1879.999979	0.001	2.5
End Voltage(3.2)	20	1879.999978	0.001	2.5

**LTE BAND 5 – 836.5MHz, QPSK**

Reference Frequency: LTE Band 5_Mid Channe 836.500006 MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.500010	-0.005	2.5
3.80	40	836.500011	-0.006	2.5
3.80	30	836.500010	-0.005	2.5
<b>3.80</b>	<b>20</b>	<b>836.500006</b>	<b>0</b>	<b>2.5</b>
3.80	10	836.500011	-0.006	2.5
3.80	0	836.500011	-0.006	2.5
3.80	-10	836.500012	-0.007	2.5
3.80	-20	836.500012	-0.007	2.5
3.80	-30	836.500011	-0.006	2.5

Reference Frequency: LTE Band 5_Mid channel 836.500006 MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.250 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
<b>3.80</b>	<b>20</b>	<b>836.500006</b>	<b>0</b>	<b>2.5</b>
4.20	20	836.500011	-0.006	2.5
3.40	20	836.500010	-0.005	2.5
End Volt(3.2)	20	836.500005	0.001	2.5

**LTE BAND 5 – 836.5 MHz, 16QAM**

Reference Frequency: LTE Band 5_Mid Channel 836.500003 MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.250 Hz				
Power Supply (Vac)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	50	836.500000	0.004	2.5
3.80	40	836.500006	-0.004	2.5
3.80	30	836.500006	-0.004	2.5
<b>3.80</b>	<b>20</b>	<b>836.500003</b>	<b>0</b>	<b>2.5</b>
3.80	10	836.500006	-0.004	2.5
3.80	0	836.500008	-0.006	2.5
3.80	-10	836.500007	-0.005	2.5
3.80	-20	836.500007	-0.005	2.5
3.80	-30	836.500008	-0.006	2.5

Reference Frequency: LTE Band 5_Mid Channel 36.500003 MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2091.250 Hz				
Power Supply (Vac)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
<b>3.80</b>	<b>20</b>	<b>836.500003</b>	<b>0</b>	<b>2.5</b>
4.20	20	836.500007	-0.005	2.5
3.30	20	836.500006	-0.004	2.5
End Volt(3.2)	20	836.500002	0.001	2.5

## **9. RADIATED TEST RESULTS**

### **9.1. RADIATED POWER (ERP & EIRP)**

#### **RULE PART(S)**

FCC: §2.1046, §22.913 and §24.232

#### **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.

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.

#### **TEST PROCEDURE**

ANSI / TIA / EIA 603C Clause 2.2.17

KDB 971168 v02r01 RF power output using broadband peak and average power meter method.

#### **MODES TESTED**

- LTE Band 2
- LTE Band 5

#### **RESULTS**

**9.1.1. LAT / PORT A**

**LTE BAND 2 (1.4 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
1.4MHz Band QPSK	6/0	1850.7	<b>29.10</b>	812.83
		1880.0	28.78	755.09
		1909.3	28.74	748.17
1.4MHz Band 16QAM	6/0	1850.7	<b>28.10</b>	645.65
		1880.0	27.88	613.76
		1909.3	27.74	594.29

**LTE Band 2 (3.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
3.0MHz Band QPSK	15/0	1851.5	28.90	776.25
		1880.0	<b>29.18</b>	827.94
		1908.5	28.74	748.17
3.0MHz Band 16QAM	15/0	1851.5	27.80	602.56
		1880.0	<b>28.18</b>	657.66
		1908.5	27.84	608.14

**LTE Band 2 (5.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
5.0MHz Band QPSK	25/0	1852.5	29.50	891.25
		1880.0	29.98	995.41
		1907.5	<b>30.04</b>	1009.25
5.0MHz Band 16QAM	25/0	1852.5	28.50	707.95
		1880.0	29.08	809.10
		1907.5	<b>29.24</b>	839.46

**LTE Band 2 (10.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
10.0MHz Band QPSK	50/0	1855.0	29.70	933.25
		1880.0	<b>30.38</b>	1091.44
		1905.0	30.34	1081.43
10.0MHz Band 16QAM	50/0	1855.0	28.80	758.58
		1880.0	29.41	872.97
		1905.0	<b>29.44</b>	879.02

**LTE Band 2 (15.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
15MHz Band QPSK	75/0	1857.5	29.90	977.24
		1880.0	30.08	1018.59
		1902.5	<b>30.14</b>	1032.76
15MHz Band 16QAM	75/0	1857.5	28.90	776.25
		1880.0	29.08	809.10
		1902.5	<b>29.24</b>	839.46

**LTE Band 2 (20.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
20.0MHz Band QPSK	100/0	1860.0	30.10	1023.29
		1880.0	<b>30.68</b>	1169.50
		1900.0	30.04	1009.25
20MHz Band 16QAM	100/0	1860.0	29.10	812.83
		1880.0	<b>29.58</b>	907.82
		1900.0	29.04	801.68

**LTE BAND 5 (1.4 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
1.4MHz Band QPSK	1/0	824.7	19.20	83.18
		836.5	<b>20.10</b>	102.33
		848.3	19.70	93.33
1.4MHz Band 16QAM	1/0	824.7	18.10	64.57
		836.5	<b>19.00</b>	79.43
		848.3	18.60	72.44

**LTE Band 5 (3.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
3.0 MHZ BAND QPSK	1/0	825.5	19.10	81.28
		836.5	<b>19.70</b>	93.33
		847.5	19.30	85.11
3.0 MHZ BAND 16QAM	1/0	825.5	18.00	63.10
		836.5	<b>18.60</b>	72.44
		847.5	18.60	72.44

**LTE Band 5 (5.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
5MHz Band QPSK	1/0	826.5	19.20	83.18
		836.5	<b>19.70</b>	93.33
		846.5	19.30	85.11
5MHz Band 16QAM	1/0	826.5	18.10	64.57
		836.5	<b>18.60</b>	72.44
		846.5	18.30	67.61

**LTE Band 5 (10.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
10.0 MHZ BAND QPSK	1/0	829.0	19.20	83.18
		836.5	<b>20.60</b>	114.82
		844.0	19.90	97.72
10.0 MHZ BAND 16QAM	1/0	829.0	18.10	64.57
		836.5	<b>19.80</b>	95.50
		844.0	19.00	79.43

**9.1.2. UAT / PORT B**

**LTE Band 2 (1.4 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
1.4MHz Band QPSK	6/0	1850.7	<b>21.60</b>	144.54
		1880.0	21.58	143.88
		1909.3	21.14	130.02
1.4MHz Band 16QAM	6/0	1850.7	<b>20.70</b>	117.49
		1880.0	20.68	116.95
		1909.3	20.24	105.68

**LTE Band 2 (3.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
3.0MHz Band QPSK	15/0	1851.5	<b>21.60</b>	144.54
		1880.0	21.48	140.60
		1908.5	21.04	127.06
3.0MHz Band 16QAM	15/0	1851.5	<b>20.70</b>	117.49
		1880.0	20.48	111.69
		1908.5	20.14	103.28

**LTE Band 2 (5.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
5.0MHz Band QPSK	25/0	1852.5	<b>22.00</b>	158.49
		1880.0	21.88	154.17
		1907.5	21.04	127.06
5.0MHz Band 16QAM	25/0	1852.5	<b>21.00</b>	125.89
		1880.0	20.98	125.31
		1907.5	20.14	103.28

**LTE Band 2 (10.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
10.0MHz Band QPSK	50/0	1855.0	<b>22.40</b>	173.78
		1880.0	22.38	172.98
		1905.0	21.04	127.06
10.0MHz Band 16QAM	50/0	1855.0	<b>21.40</b>	138.04
		1880.0	21.08	128.23
		1905.0	20.14	103.28

**LTE Band 2 (15.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
15MHz Band QPSK	75/0	1857.5	<b>22.00</b>	158.49
		1880.0	21.98	157.76
		1902.5	21.44	139.32
15MHz Band 16QAM	75/0	1857.5	<b>21.10</b>	128.82
		1880.0	21.08	128.23
		1902.5	20.54	113.24

**LTE Band 2 (20.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	EIRP (Peak)	
			dBm	mW
20.0MHz Band QPSK	100/0	1860.0	21.70	147.91
		1880.0	<b>22.28</b>	169.04
		1900.0	21.34	136.14
20MHz Band 16QAM	100/0	1860.0	20.70	117.49
		1880.0	<b>21.28</b>	134.28
		1900.0	21.24	133.05



**LTE Band 5 (1.4 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
1.4MHz Band QPSK	1/0	824.7	18.60	72.44
		836.5	18.90	77.62
		848.3	<b>19.80</b>	95.50
1.4MHz Band 16QAM	1/0	824.7	17.60	57.54
		836.5	17.90	61.66
		848.3	<b>18.80</b>	75.86

**LTE Band 5 (3.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
3.0 MHZ BAND QPSK	1/0	825.5	18.80	75.86
		836.5	18.90	77.62
		847.5	<b>19.30</b>	85.11
3.0 MHZ BAND 16QAM	1/0	825.5	17.90	61.66
		836.5	18.00	63.10
		847.5	<b>18.40</b>	69.18

**LTE Band 5 (5.0 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
5MHz Band QPSK	1/0	826.5	18.90	77.62
		836.5	<b>18.90</b>	77.62
		846.5	18.80	75.86
5MHz Band 16QAM	1/0	826.5	17.90	61.66
		836.5	<b>18.00</b>	63.10
		846.5	17.80	60.26

**LTE Band 5 (10 MHz BAND WIDTH)**

Mode	RB/RB SIZE	f (MHz)	ERP (Average)	
			dBm	mW
10.0 MHZ BAND QPSK	1/0	829.0	<b>18.80</b>	75.86
		836.5	18.70	74.13
		844.0	18.70	74.13
10.0 MHZ BAND 16QAM	1/0	829.0	<b>17.90</b>	61.66
		836.5	17.70	58.88
		844.0	17.70	58.88

**LAT / PORT A**

**LTE BAND 2**

**QPSK Band 2 (1.4 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 1.4MHz BW QPSK, Peak, RB6-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	19.4	V	1.50	7.94	25.84	33.0	-7.2	
1.851	21.8	H	1.50	8.80	29.10	33.0	-3.9	
Mid Ch								
1.880	19.3	V	1.50	7.95	25.75	33.0	-7.3	
1.880	21.6	H	1.50	8.68	28.78	33.0	-4.2	
High Ch								
1.909	18.8	V	1.50	7.97	25.27	33.0	-7.7	
1.909	21.7	H	1.50	8.57	28.74	33.0	-4.3	
Rev. 3.17.11								

**16QAM Band 2 (1.4 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 1.4MHz BW 16QAM, Peak, RB6-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	18.4	V	1.50	7.94	24.84	33.0	-8.2	
1.851	20.8	H	1.50	8.80	28.10	33.0	-4.9	
Mid Ch								
1.880	18.3	V	1.50	7.95	24.75	33.0	-8.3	
1.880	20.7	H	1.50	8.68	27.88	33.0	-5.1	
High Ch								
1.909	18.0	V	1.50	7.97	24.47	33.0	-8.5	
1.909	20.7	H	1.50	8.57	27.74	33.0	-5.3	
Rev. 3.17.11								

**QPSK Band 2 (3.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 3MHz BW QPSK, Peak, RB15-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	19.3	V	1.50	7.94	25.74	33.0	-7.3	
1.852	21.6	H	1.50	8.80	28.90	33.0	-4.1	
Mid Ch								
1.880	19.7	V	1.50	7.95	26.15	33.0	-6.9	
1.880	22.0	H	1.50	8.68	29.18	33.0	-3.8	
High Ch								
1.909	19.0	V	1.50	7.97	25.47	33.0	-7.5	
1.909	21.7	H	1.50	8.57	28.74	33.0	-4.3	
Rev. 3.17.11								

**16QAM Band 2 (3.0 MHz BAND WIDTH)**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/10/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT Only  
**Mode:** LTE band 2, 3MHz BW  
 16QAM, Peak, RB15-0

**Test Equipment:**

Receiving: Horn T59, and Chamber D SMA Cables  
 Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch</b>								
1.852	18.2	V	1.50	7.94	24.64	33.0	-8.4	
1.852	20.5	H	1.50	8.80	27.80	33.0	-5.2	
<b>Mid Ch</b>								
1.880	18.7	V	1.50	7.95	25.15	33.0	-7.9	
1.880	21.0	H	1.50	8.68	28.18	33.0	-4.8	
<b>High Ch</b>								
1.909	18.1	V	1.50	7.97	24.57	33.0	-8.4	
1.909	20.8	H	1.50	8.57	27.84	33.0	-5.2	

Rev. 3.17.11

**QPSK Band 2 (5.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 5MHz BW						
		QPSK, Peak, RB25-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.853	19.9	V	1.50	7.94	26.34	33.0	-6.7	
1.853	22.2	H	1.50	8.80	29.50	33.0	-3.5	
Mid Ch								
1.880	20.5	V	1.50	7.95	26.95	33.0	-6.1	
1.880	22.8	H	1.50	8.68	29.98	33.0	-3.0	
High Ch								
1.908	20.1	V	1.50	7.97	26.57	33.0	-6.4	
1.908	23.0	H	1.50	8.57	30.04	33.0	-3.0	
Rev. 3.17.11								

**16QAM Band 2 (5.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/10/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT Only							
<b>Mode:</b>		LTE band 2, 5MHz BW 16QAM, Peak, RB25-0							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Chamber D SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch									
1.853	19.0	V	1.50	7.94	25.44	33.0	-7.6		
1.853	21.2	H	1.50	8.80	28.50	33.0	-4.5		
Mid Ch									
1.880	19.7	V	1.50	7.95	26.15	33.0	-6.9		
1.880	21.9	H	1.50	8.68	29.08	33.0	-3.9		
High Ch									
1.908	19.2	V	1.50	7.97	25.67	33.0	-7.3		
1.908	22.2	H	1.50	8.57	29.24	33.0	-3.8		
Rev. 3.17.11									

**QPSK Band 2 (10.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 10MHz BW QPSK, Peak, RB50-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.855	20.2	V	1.50	7.94	26.64	33.0	-6.4	
1.855	22.4	H	1.50	8.80	29.70	33.0	-3.3	
Mid Ch								
1.880	20.9	V	1.50	7.95	27.35	33.0	-5.7	
1.880	23.2	H	1.50	8.68	30.38	33.0	-2.6	
High Ch								
1.905	20.5	V	1.50	7.97	26.97	33.0	-6.0	
1.905	23.3	H	1.50	8.57	30.34	33.0	-2.7	
Rev. 3.17.11								



**16QAM Band 2 (10.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/10/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT Only							
<b>Mode:</b>		LTE band 2, 10MHz BW 16QAM, Peak, RB50-0							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Chamber D SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch									
1.855	19.3	V	1.50	7.94	25.74	33.0	-7.3		
1.855	21.5	H	1.50	8.80	28.80	33.0	-4.2		
Mid Ch									
1.880	20.0	V	1.50	7.95	26.45	33.0	-6.6		
1.880	22.2	H	1.50	8.68	29.41	33.0	-3.6		
High Ch									
1.905	19.4	V	1.50	7.97	25.87	33.0	-7.1		
1.905	22.4	H	1.50	8.57	29.44	33.0	-3.6		
Rev. 3.17.11									

**LTE QPSK Band 2 (15.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 15MHz BW						
		QPSK, Peak, RB75-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.858	20.1	V	1.50	7.94	26.54	33.0	-6.5	
1.858	22.6	H	1.50	8.80	29.90	33.0	-3.1	
Mid Ch								
1.880	20.1	V	1.50	7.95	26.55	33.0	-6.5	
1.880	22.9	H	1.50	8.68	30.08	33.0	-2.9	
High Ch								
1.903	20.2	V	1.50	7.97	26.67	33.0	-6.3	
1.903	23.1	H	1.50	8.57	30.14	33.0	-2.9	
Rev. 3.17.11								

**16QAM Band 2 (15.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/10/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT Only							
<b>Mode:</b>		LTE band 2, 15MHz BW 16QAM, Peak, RB75-0							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Chamber D SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch									
1.858	19.2	V	1.50	7.94	25.64	33.0	-7.4		
1.858	21.6	H	1.50	8.80	28.90	33.0	-4.1		
Mid Ch									
1.880	19.1	V	1.50	7.95	25.55	33.0	-7.5		
1.880	21.9	H	1.50	8.68	29.08	33.0	-3.9		
High Ch									
1.903	19.2	V	1.50	7.97	25.67	33.0	-7.3		
1.903	22.2	H	1.50	8.57	29.24	33.0	-3.8		
Rev. 3.17.11									

**QPSK Band 2 (20.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 20MHz BW QPSK, Peak, RB100-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.860	20.1	V	1.50	7.94	26.54	33.0	-6.5	
1.860	22.8	H	1.50	8.80	30.10	33.0	-2.9	
Mid Ch								
1.880	21.0	V	1.50	7.95	27.45	33.0	-5.6	
1.880	23.5	H	1.50	8.68	30.68	33.0	-2.3	
High Ch								
1.900	20.1	V	1.50	7.97	26.57	33.0	-6.4	
1.900	23.0	H	1.50	8.57	30.04	33.0	-3.0	
Rev. 3.17.11								

**16QAM Band 2 (20.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/10/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT Only							
<b>Mode:</b>		LTE band 2, 20MHz BW 16QAM, Peak, RB100-0							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Chamber D SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch									
1.860	19.2	V	1.50	7.94	25.64	33.0	-7.4		
1.860	21.8	H	1.50	8.80	29.10	33.0	-3.9		
Mid Ch									
1.880	20.0	V	1.50	7.95	26.45	33.0	-6.6		
1.880	22.4	H	1.50	8.68	29.58	33.0	-3.4		
High Ch									
1.900	19.1	V	1.50	7.97	25.57	33.0	-7.4		
1.900	22.0	H	1.50	8.57	29.04	33.0	-4.0		
Rev. 3.17.11									

**LAT LTE BAND 5**

**QPSK Band 5 (1.4 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 1.4MHz BW QPSK, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
824.70	19.80	V	0.6	0.0	19.20	38.5	-19.2	
824.70	8.00	H	0.6	0.0	7.40	38.5	-31.0	
Mid Ch								
836.50	20.70	V	0.6	0.0	20.10	38.5	-18.3	
836.50	8.00	H	0.6	0.0	7.40	38.5	-31.0	
High Ch								
848.30	20.30	V	0.6	0.0	19.70	38.5	-18.7	
848.30	7.64	H	0.6	0.0	7.04	38.5	-31.4	
Rev. 3.17.11								

**16QAM Band 5 (1.4 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 1.4MHz BW 16QAM, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
824.70	18.70	V	0.6	0.0	18.10	38.5	-20.3	
824.70	7.00	H	0.6	0.0	6.40	38.5	-32.0	
Mid Ch								
836.50	19.60	V	0.6	0.0	19.00	38.5	-19.4	
836.50	7.00	H	0.6	0.0	6.40	38.5	-32.0	
High Ch								
848.30	19.20	V	0.6	0.0	18.60	38.5	-19.8	
848.30	6.64	H	0.6	0.0	6.04	38.5	-32.4	
Rev. 3.17.11								

**QPSK Band 5 (3.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 3MHz BW						
		QPSK, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
825.50	19.70	V	0.6	0.0	19.10	38.5	-19.3	
825.50	8.00	H	0.6	0.0	7.40	38.5	-31.0	
Mid Ch								
836.50	20.30	V	0.6	0.0	19.70	38.5	-18.7	
836.50	8.00	H	0.6	0.0	7.40	38.5	-31.0	
High Ch								
847.50	19.90	V	0.6	0.0	19.30	38.5	-19.1	
847.50	7.64	H	0.6	0.0	7.04	38.5	-31.4	
Rev. 3.17.11								



**16QAM Band 5 (3.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 3MHz BW 16QAM, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
<b>Low Ch</b>								
825.50	18.60	V	0.6	0.0	18.00	38.5	-20.4	
825.50	7.00	H	0.6	0.0	6.40	38.5	-32.0	
<b>Mid Ch</b>								
836.50	19.20	V	0.6	0.0	18.60	38.5	-19.8	
836.50	7.00	H	0.6	0.0	6.40	38.5	-32.0	
<b>High Ch</b>								
847.50	19.20	V	0.6	0.0	18.60	38.5	-19.8	
847.50	7.44	H	0.6	0.0	6.84	38.5	-31.6	
Rev. 3.17.11								

**QPSK Band 5 (5.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 5MHz BW						
		QPSK, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
826.50	19.80	V	0.6	0.0	19.20	38.5	-19.2	
826.50	8.00	H	0.6	0.0	7.40	38.5	-31.0	
Mid Ch								
836.50	20.30	V	0.6	0.0	19.70	38.5	-18.7	
836.50	8.10	H	0.6	0.0	7.50	38.5	-30.9	
High Ch								
846.50	19.90	V	0.6	0.0	19.30	38.5	-19.1	
846.50	7.54	H	0.6	0.0	6.94	38.5	-31.5	
Rev. 3.17.11								

**16QAM Band 5 (5.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 5MHz BW 16QAM, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
826.50	18.70	V	0.6	0.0	18.10	38.5	-20.3	
826.50	7.00	H	0.6	0.0	6.40	38.5	-32.0	
Mid Ch								
836.50	19.20	V	0.6	0.0	18.60	38.5	-19.8	
836.50	7.10	H	0.6	0.0	6.50	38.5	-31.9	
High Ch								
846.50	18.90	V	0.6	0.0	18.30	38.5	-20.1	
846.50	6.84	H	0.6	0.0	6.24	38.5	-32.2	
Rev. 3.17.11								

**QPSK Band 5 (10.0 MHz BAND WIDTH)**

<b>High Frequency Substitution Measurement Compliance Certification Services Chamber D</b>									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/10/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		LTE Band 5 , 10MHz BW QPSK, Average, RB1-0							
<b>Test Equipment:</b>									
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)									
Substitution: Dipole S/N: 00022117, 4ft SMA Cable Warehouse.									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes	
<b>Low Ch</b>									
829.00	19.80	V	0.6	0.0	19.20	38.5	-19.2		
829.00	7.90	H	0.6	0.0	7.30	38.5	-31.1		
<b>Mid Ch</b>									
836.50	21.20	V	0.6	0.0	20.60	38.5	-17.8		
836.50	8.00	H	0.6	0.0	7.40	38.5	-31.0		
<b>High Ch</b>									
844.00	20.50	V	0.6	0.0	19.90	38.5	-18.5		
844.00	7.74	H	0.6	0.0	7.14	38.5	-31.3		
Rev. 3.17.11									

**16QAM Band 5 (10.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/10/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 10MHz BW 16QAM, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
829.00	18.70	V	0.6	0.0	18.10	38.5	-20.3	
829.00	7.00	H	0.6	0.0	6.40	38.5	-32.0	
Mid Ch								
836.50	20.40	V	0.6	0.0	19.80	38.5	-18.6	
836.50	7.00	H	0.6	0.0	6.40	38.5	-32.0	
High Ch								
844.00	19.60	V	0.6	0.0	19.00	38.5	-19.4	
844.00	7.34	H	0.6	0.0	6.74	38.5	-31.7	
Rev. 3.17.11								

**UAT / PORT B**

**LTE BAND 2**

**QPSK Band 2 (1.4 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 1.4MHz BW						
		QPSK, Peak, RB6-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	13.6	V	1.50	7.94	20.04	33.0	-13.0	
1.851	14.3	H	1.50	8.80	21.60	33.0	-11.4	
Mid Ch								
1.880	13.4	V	1.50	7.95	19.85	33.0	-13.2	
1.880	14.4	H	1.50	8.68	21.58	33.0	-11.4	
High Ch								
1.909	13.8	V	1.50	7.97	20.27	33.0	-12.7	
1.909	14.1	H	1.50	8.57	21.14	33.0	-11.9	
Rev. 3.17.11								

**16QAM Band 2 (1.4 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 1.4MHz BW						
		16QAM, Peak, RB6-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.851	12.6	V	1.50	7.94	19.04	33.0	-14.0	
1.851	13.4	H	1.50	8.80	20.70	33.0	-12.3	
Mid Ch								
1.880	12.4	V	1.50	7.95	18.85	33.0	-14.2	
1.880	13.5	H	1.50	8.68	20.68	33.0	-12.3	
High Ch								
1.909	12.9	V	1.50	7.97	19.37	33.0	-13.6	
1.909	13.2	H	1.50	8.57	20.24	33.0	-12.8	
Rev. 3.17.11								

**QPSK Band 2 (3.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 3MHz BW						
		QPSK, Peak, RB15-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	13.4	V	1.50	7.94	19.84	33.0	-13.2	
1.852	14.3	H	1.50	8.80	21.60	33.0	-11.4	
Mid Ch								
1.880	14.1	V	1.50	7.95	20.55	33.0	-12.5	
1.880	14.3	H	1.50	8.68	21.48	33.0	-11.5	
High Ch								
1.909	13.9	V	1.50	7.97	20.37	33.0	-12.6	
1.909	14.0	H	1.50	8.57	21.04	33.0	-12.0	
Rev. 3.17.11								



**16QAM Band 2 (3.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/11/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT Only							
<b>Mode:</b>		LTE band 2, 3MHz BW 16QAM, Peak, RB15-0							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Chamber D SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch									
1.852	12.5	V	1.50	7.94	18.94	33.0	-14.1		
1.852	13.4	H	1.50	8.80	20.70	33.0	-12.3		
Mid Ch									
1.880	13.1	V	1.50	7.95	19.55	33.0	-13.5		
1.880	13.3	H	1.50	8.68	20.48	33.0	-12.5		
High Ch									
1.909	13.0	V	1.50	7.97	19.47	33.0	-13.5		
1.909	13.1	H	1.50	8.57	20.14	33.0	-12.9		
Rev. 3.17.11									

**QPSK Band 2 (5.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 5MHz BW						
		QPSK, Peak, RB25-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.853	14.1	V	1.50	7.94	20.54	33.0	-12.5	
1.853	14.7	H	1.50	8.80	22.00	33.0	-11.0	
Mid Ch								
1.880	14.8	V	1.50	7.95	21.25	33.0	-11.8	
1.880	14.7	H	1.50	8.68	21.88	33.0	-11.1	
High Ch								
1.908	14.5	V	1.50	7.97	20.97	33.0	-12.0	
1.908	14.0	H	1.50	8.57	21.04	33.0	-12.0	
Rev. 3.17.11								

**16QAM Band 2 (5.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/11/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT Only							
<b>Mode:</b>		LTE band 2, 5MHz BW 16QAM, Peak, RB25-0							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Chamber D SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch									
1.853	13.2	V	1.50	7.94	19.64	33.0	-13.4		
1.853	13.7	H	1.50	8.80	21.00	33.0	-12.0		
Mid Ch									
1.880	13.8	V	1.50	7.95	20.25	33.0	-12.8		
1.880	13.8	H	1.50	8.68	20.98	33.0	-12.0		
High Ch									
1.908	13.7	V	1.50	7.97	20.17	33.0	-12.8		
1.908	13.1	H	1.50	8.57	20.14	33.0	-12.9		
Rev. 3.17.11									

**QPSK Band 2 (10.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 10MHz BW						
		QPSK, Peak, RB50-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.855	14.3	V	1.50	7.94	20.74	33.0	-12.3	
1.855	15.1	H	1.50	8.80	22.40	33.0	-10.6	
Mid Ch								
1.880	14.3	V	1.50	7.95	20.75	33.0	-12.3	
1.880	15.2	H	1.50	8.68	22.38	33.0	-10.6	
High Ch								
1.905	14.4	V	1.50	7.97	20.87	33.0	-12.1	
1.905	14.0	H	1.50	8.57	21.04	33.0	-12.0	
Rev. 3.17.11								

**16QAM Band 2 (10.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 10MHz BW 16QAM, Peak, RB50-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.855	13.3	V	1.50	7.94	19.74	33.0	-13.3	
1.855	14.1	H	1.50	8.80	21.40	33.0	-11.6	
Mid Ch								
1.880	13.4	V	1.50	7.95	19.85	33.0	-13.2	
1.880	13.9	H	1.50	8.68	21.08	33.0	-11.9	
High Ch								
1.905	13.8	V	1.50	7.97	20.27	33.0	-12.7	
1.905	13.1	H	1.50	8.57	20.14	33.0	-12.9	
Rev. 3.17.11								

**QPSK Band 2 (15.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 15MHz BW QPSK, Peak, RB75-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.858	14.4	V	1.50	7.94	20.84	33.0	-12.2	
1.858	14.7	H	1.50	8.80	22.00	33.0	-11.0	
Mid Ch								
1.880	15.0	V	1.50	7.95	21.45	33.0	-11.6	
1.880	14.8	H	1.50	8.68	21.98	33.0	-11.0	
High Ch								
1.903	14.9	V	1.50	7.97	21.37	33.0	-11.6	
1.903	14.4	H	1.50	8.57	21.44	33.0	-11.6	
Rev. 3.17.11								

**EIRP LTE 16QAM Band 2 (15.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/11/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT Only							
<b>Mode:</b>		LTE band 2, 15MHz BW 16QAM, Peak, RB75-0							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Chamber D SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch									
1.858	13.4	V	1.50	7.94	19.84	33.0	-13.2		
1.858	13.8	H	1.50	8.80	21.10	33.0	-11.9		
Mid Ch									
1.880	14.1	V	1.50	7.95	20.55	33.0	-12.5		
1.880	13.9	H	1.50	8.68	21.08	33.0	-11.9		
High Ch									
1.903	14.0	V	1.50	7.97	20.47	33.0	-12.5		
1.903	13.5	H	1.50	8.57	20.54	33.0	-12.5		
Rev. 3.17.11									

**QPSK Band 2 (20.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT Only						
<b>Mode:</b>		LTE band 2, 20MHz BW QPSK, Peak, RB100-0						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Chamber D SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.860	14.3	V	1.50	7.94	20.74	33.0	-12.3	
1.860	14.4	H	1.50	8.80	21.70	33.0	-11.3	
Mid Ch								
1.880	14.8	V	1.50	7.95	21.25	33.0	-11.8	
1.880	15.1	H	1.50	8.68	22.28	33.0	-10.7	
High Ch								
1.900	14.8	V	1.50	7.97	21.27	33.0	-11.7	
1.900	14.3	H	1.50	8.57	21.34	33.0	-11.7	
Rev. 3.17.11								



**16QAM Band 2 (20.0 MHz BAND WIDTH)**

High Frequency Fundamental Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/11/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT Only							
<b>Mode:</b>		LTE band 2, 20MHz BW 16QAM, Peak, RB100-0							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Chamber D SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
Low Ch									
1.860	13.3	V	1.50	7.94	19.74	33.0	-13.3		
1.860	13.4	H	1.50	8.80	20.70	33.0	-12.3		
Mid Ch									
1.880	13.9	V	1.50	7.95	20.35	33.0	-12.7		
1.880	14.1	H	1.50	8.68	21.28	33.0	-11.7		
High Ch									
1.900	14.2	V	1.50	7.97	20.67	33.0	-12.3		
1.900	14.2	H	1.50	8.57	21.24	33.0	-11.8		
Rev. 3.17.11									

**UAT LTE BAND 5**

**QPSK (1.4 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 1.4MHz BW QPSK, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
824.70	19.20	V	0.6	0.0	18.60	38.5	-19.8	
824.70	7.00	H	0.6	0.0	6.40	38.5	-32.0	
Mid Ch								
836.50	19.50	V	0.6	0.0	18.90	38.5	-19.5	
836.50	7.00	H	0.6	0.0	6.40	38.5	-32.0	
High Ch								
848.30	20.40	V	0.6	0.0	19.80	38.5	-18.6	
848.30	6.64	H	0.6	0.0	6.04	38.5	-32.4	
Rev. 3.17.11								

**16QAM Band 5 (1.4 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 1.4MHz BW 16QAM, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
824.70	18.20	V	0.6	0.0	17.60	38.5	-20.8	
824.70	7.00	H	0.6	0.0	6.40	38.5	-32.0	
Mid Ch								
836.50	18.50	V	0.6	0.0	17.90	38.5	-20.5	
836.50	7.00	H	0.6	0.0	6.40	38.5	-32.0	
High Ch								
848.30	19.40	V	0.6	0.0	18.80	38.5	-19.6	
848.30	6.94	H	0.6	0.0	6.34	38.5	-32.1	
Rev. 3.17.11								

**QPSK Band 5 (3.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/11/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		LTE Band 5 , 3MHz BW QPSK, Average, RB1-0							
<b>Test Equipment:</b>									
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)									
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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									
825.50	19.40	V	0.6	0.0	18.80	38.5	-19.6		
825.50	7.00	H	0.6	0.0	6.40	38.5	-32.0		
Mid Ch									
836.50	19.50	V	0.6	0.0	18.90	38.5	-19.5		
836.50	7.00	H	0.6	0.0	6.40	38.5	-32.0		
High Ch									
847.50	19.90	V	0.6	0.0	19.30	38.5	-19.1		
847.50	6.84	H	0.6	0.0	6.24	38.5	-32.2		
Rev. 3.17.11									

**16QAM Band 5 (3.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 3MHz BW 16QAM, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
825.50	18.50	V	0.6	0.0	17.90	38.5	-20.5	
825.50	6.70	H	0.6	0.0	6.10	38.5	-32.3	
Mid Ch								
836.50	18.60	V	0.6	0.0	18.00	38.5	-20.4	
836.50	6.70	H	0.6	0.0	6.10	38.5	-32.3	
High Ch								
847.50	19.00	V	0.6	0.0	18.40	38.5	-20.0	
847.50	6.64	H	0.6	0.0	6.04	38.5	-32.4	
Rev. 3.17.11								

**QPSK Band 5 (5.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 5MHz BW						
		QPSK, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
826.50	19.50	V	0.6	0.0	18.90	38.5	-19.5	
826.50	7.50	H	0.6	0.0	6.90	38.5	-31.5	
Mid Ch								
836.50	19.50	V	0.6	0.0	18.90	38.5	-19.5	
836.50	7.30	H	0.6	0.0	6.70	38.5	-31.7	
High Ch								
846.50	19.40	V	0.6	0.0	18.80	38.5	-19.6	
846.50	6.94	H	0.6	0.0	6.34	38.5	-32.1	
Rev. 3.17.11								

**16QAM Band 5 (5.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 5MHz BW 16QAM, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
826.50	18.50	V	0.6	0.0	17.90	38.5	-20.5	
826.50	6.50	H	0.6	0.0	5.90	38.5	-32.5	
Mid Ch								
836.50	18.60	V	0.6	0.0	18.00	38.5	-20.4	
836.50	6.40	H	0.6	0.0	5.80	38.5	-32.6	
High Ch								
846.50	18.40	V	0.6	0.0	17.80	38.5	-20.6	
846.50	6.04	H	0.6	0.0	5.44	38.5	-33.0	
Rev. 3.17.11								

**QPSK Band 5 (10.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 10MHz BW						
		QPSK, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable 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								
829.00	19.40	V	0.6	0.0	18.80	38.5	-19.6	
829.00	7.40	H	0.6	0.0	6.80	38.5	-31.6	
Mid Ch								
836.50	19.30	V	0.6	0.0	18.70	38.5	-19.7	
836.50	7.10	H	0.6	0.0	6.50	38.5	-31.9	
High Ch								
844.00	19.30	V	0.6	0.0	18.70	38.5	-19.7	
844.00	6.94	H	0.6	0.0	6.34	38.5	-32.1	
Rev. 3.17.11								



**16QAM Band 5 (10.0 MHz BAND WIDTH)**

High Frequency Substitution Measurement Compliance Certification Services Chamber D								
<b>Company:</b>		Apple						
<b>Project #:</b>		13U15037						
<b>Date:</b>		06/11/13						
<b>Test Engineer:</b>		Mona Hua						
<b>Configuration:</b>		EUT only						
<b>Mode:</b>		LTE Band 5 , 10MHz BW 16QAM, Average, RB1-0						
<b>Test Equipment:</b>								
Receiving: Sunol T243, and Chamber D N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 4ft SMA Cable Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
<b>Low Ch</b>								
829.00	18.50	V	0.6	0.0	17.90	38.5	-20.5	
829.00	6.50	H	0.6	0.0	5.90	38.5	-32.5	
<b>Mid Ch</b>								
836.50	18.30	V	0.6	0.0	17.70	38.5	-20.7	
836.50	6.10	H	0.6	0.0	5.50	38.5	-32.9	
<b>High Ch</b>								
844.00	18.30	V	0.6	0.0	17.70	38.5	-20.7	
844.00	6.04	H	0.6	0.0	5.44	38.5	-33.0	
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.

### LTE BAND 5

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	28.35	24.32	4.03

Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	1.4	RB1 0	836.5	28.48	23.27	5.21

\*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	3	RB1 0	836.5	28.29	24.2	4.09

Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	3	RB1 0	836.5	28.37	23.16	5.21

\*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	28.19	24.28	3.91

Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	5	RB1 0	1880	28.33	23.24	5.09

\*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	29.36	22.98	6.38

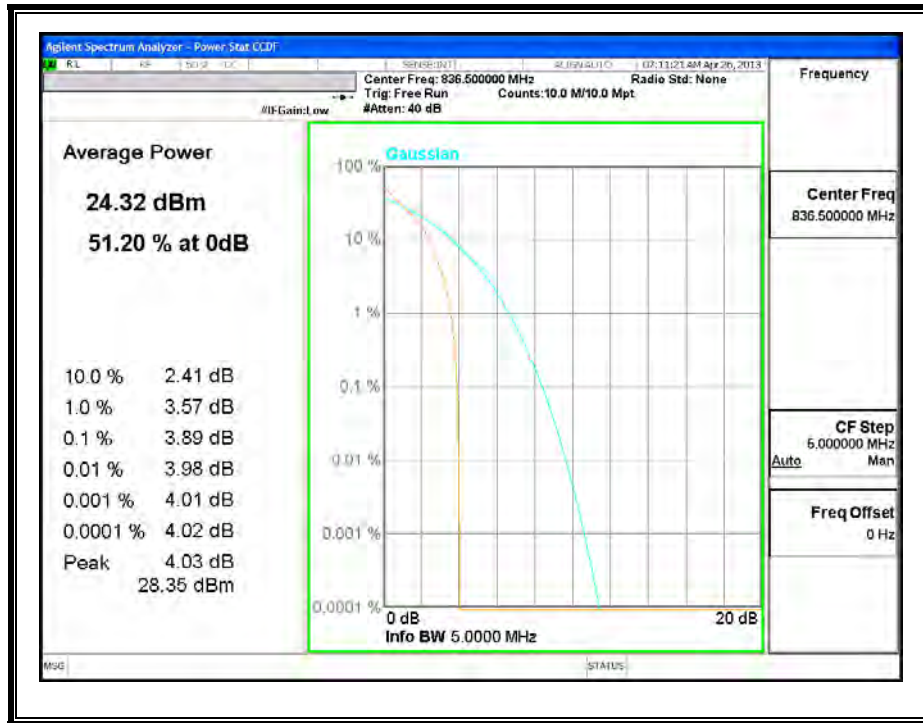
  

Mode	Channel Band-width	Ch. No.	f (MHz)	Couducted Power (dBm)		Peak-to-Average Ratio
				*Peak	Average	
16QAM	10	RB1 0	836.5	29.4	22.04	7.36

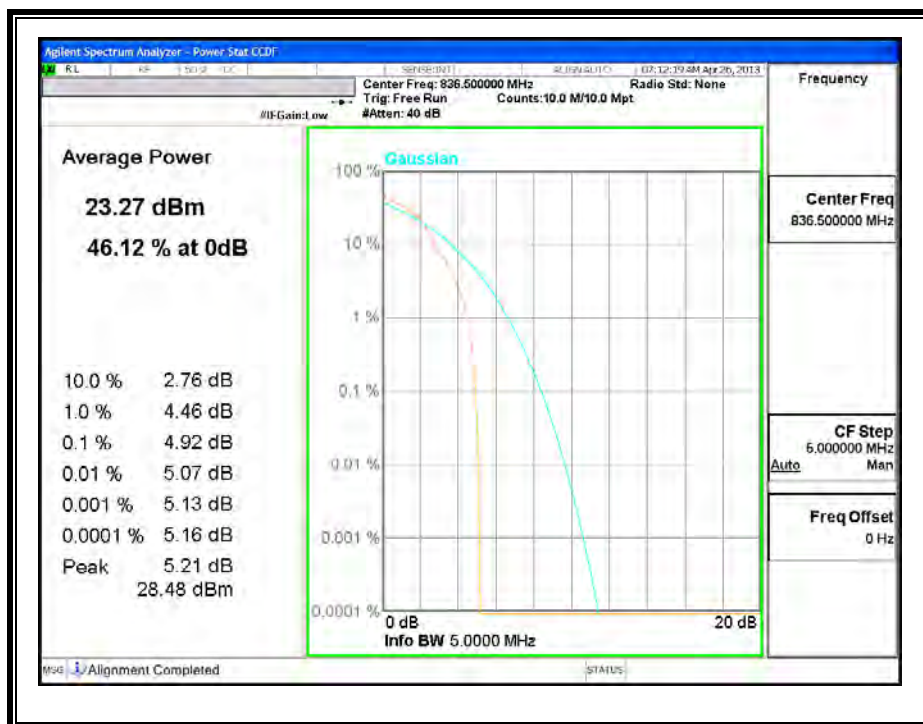
\*Peak Reading = Average Reading + Peak-to-Average Ratio

**LTE BAND 5**

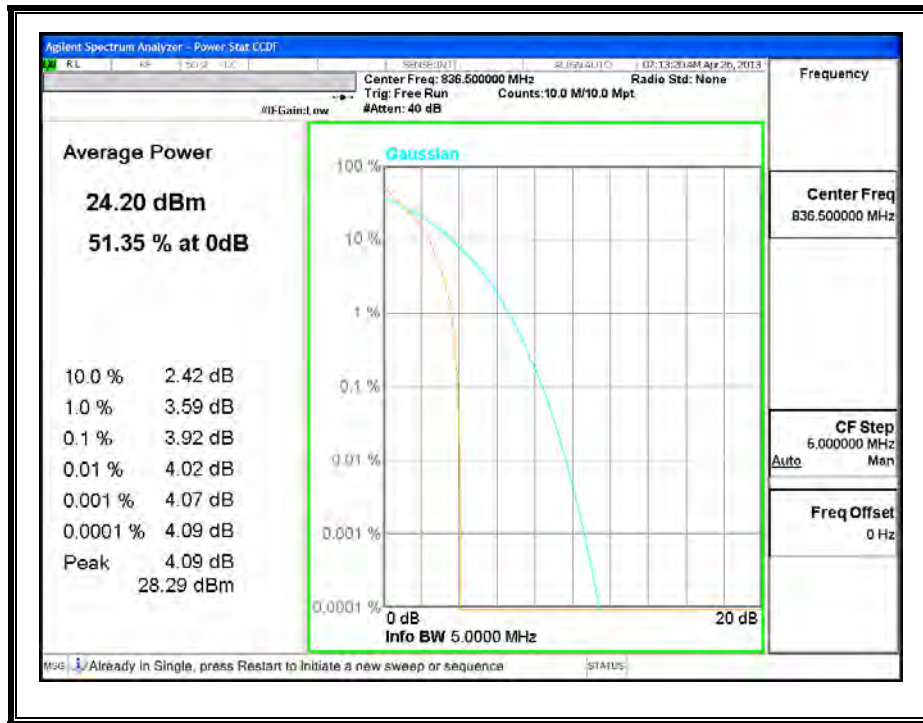
**1.4MHz QPSK**



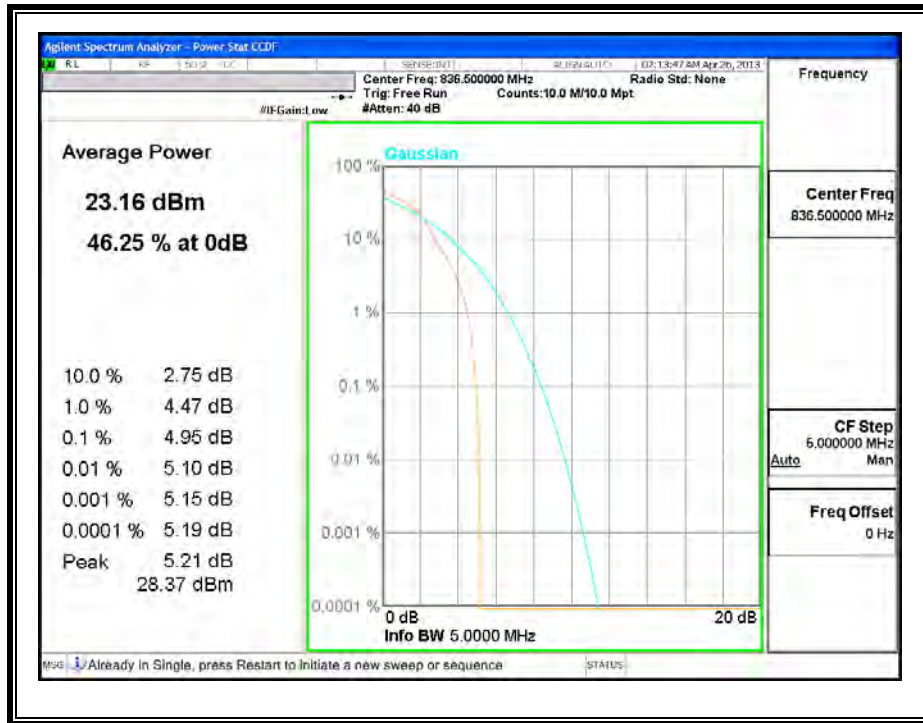
**1.4MHz 16QAM**



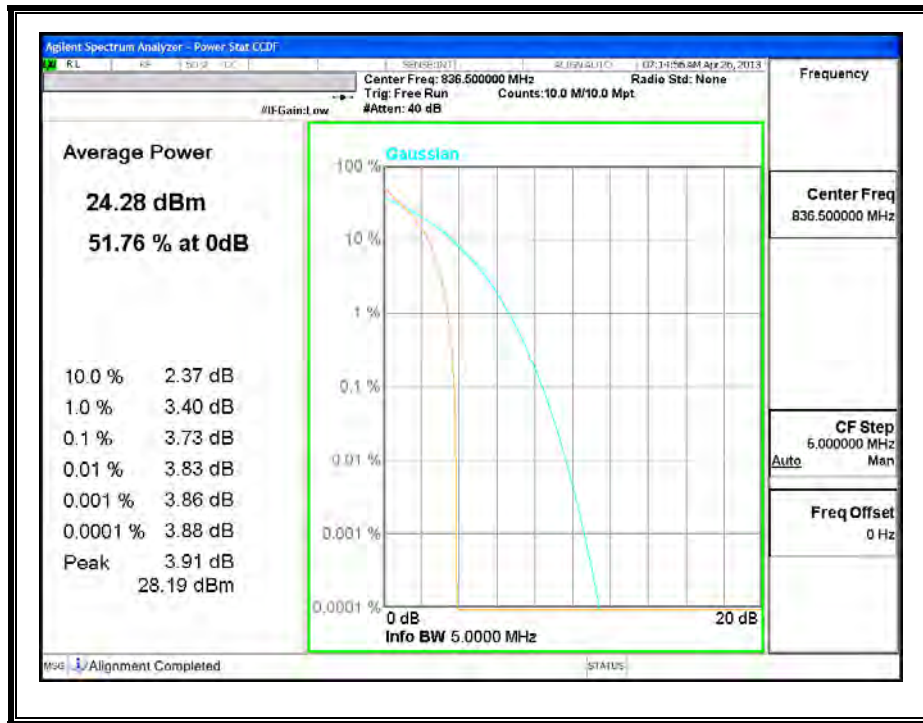
**3.0MHz QPSK, RB1-0**



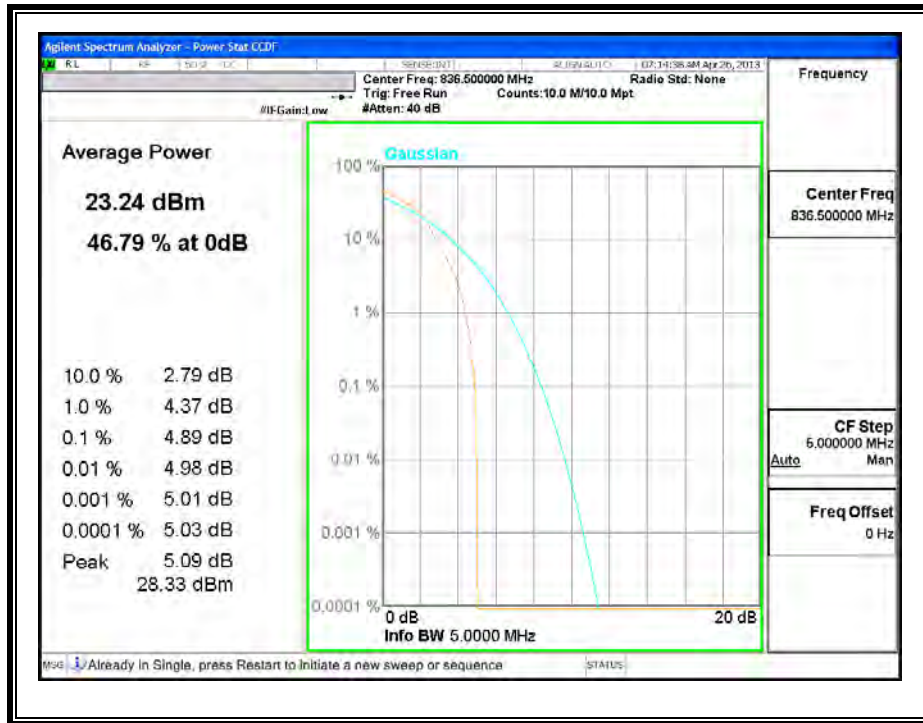
**3.0MHz 16QAM**



**5.0MHz QPSK**

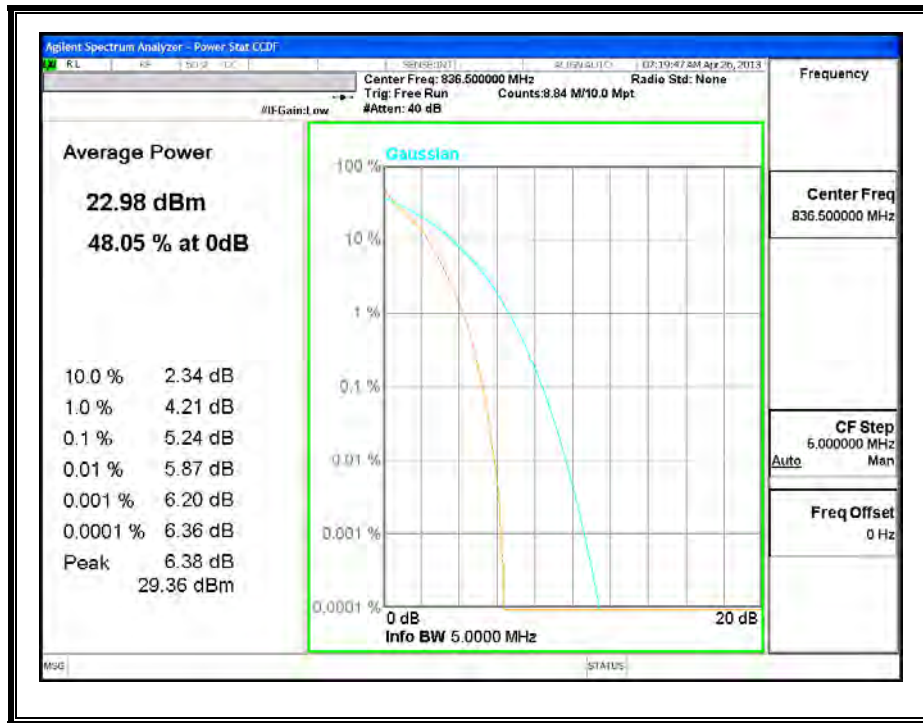


**5.0MHz 16QAM**

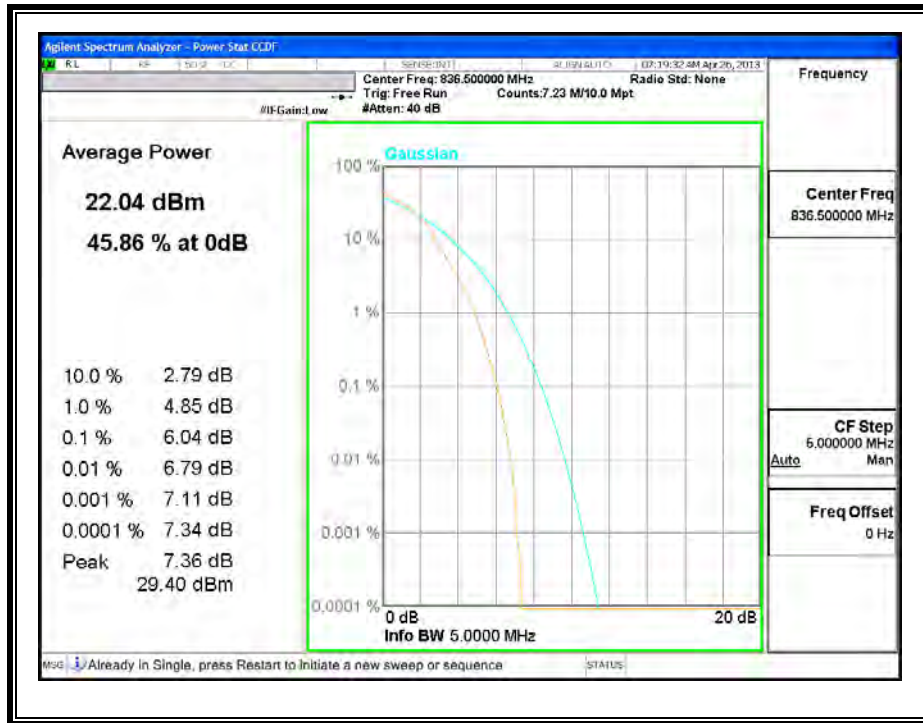




**10MHz QPSK**



**10MHz 16QAM**



### **9.3. FIELD STRENGTH OF SPURIOUS RADIATION**

#### **RULE PART(S)**

FCC: §2.1053, §22.917, §24.238

#### **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.

#### **TEST PROCEDURE**

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

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

#### **MODES TESTED**

- LTE BAND 2 and 5

#### **RESULTS**



**9.3.1. LAT / PORT A**

**LTE BAND 2**

**QPSK Band 2 (1.4 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/05/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX LTE band 2, 1.4MHz, QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1850.7 MHz)</b>									
3.701	-26.6	V	3.0	30.2	1.0	-55.8	-13.0	-42.8	
5.552	-30.5	V	3.0	28.4	1.0	-57.9	-13.0	-44.9	
3.701	-25.8	H	3.0	30.2	1.0	-55.0	-13.0	-42.0	
5.552	-30.1	H	3.0	28.4	1.0	-57.5	-13.0	-44.5	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-27.2	V	3.0	30.1	1.0	-56.4	-13.0	-43.4	
5.640	-29.8	V	3.0	28.3	1.0	-57.1	-13.0	-44.1	
3.760	-27.3	H	3.0	30.1	1.0	-56.4	-13.0	-43.4	
5.640	-29.6	H	3.0	28.3	1.0	-56.9	-13.0	-43.9	
<b>High Ch, (1909.3 MHz)</b>									
3.819	-26.5	V	3.0	30.1	1.0	-55.6	-13.0	-42.6	
5.728	-29.0	V	3.0	28.2	1.0	-56.2	-13.0	-43.2	
3.819	-27.1	H	3.0	30.1	1.0	-56.2	-13.0	-43.2	
5.728	-29.4	H	3.0	28.2	1.0	-56.6	-13.0	-43.6	
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  
 Project #: 13U15037  
 Date: 06/05/13  
 Test Engineer: Mona Hua  
 Configuration: EUT only  
 Mode: TX, LTE band 2, 1.4MHz, 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1850.7 MHz)</b>									
3.701	-27.4	V	3.0	30.2	1.0	-56.6	-13.0	-43.6	
5.552	-31.3	V	3.0	28.4	1.0	-58.7	-13.0	-45.7	
3.701	-26.8	H	3.0	30.2	1.0	-56.0	-13.0	-43.0	
5.552	-30.9	H	3.0	28.4	1.0	-58.3	-13.0	-45.3	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-28.1	V	3.0	30.1	1.0	-57.3	-13.0	-44.3	
5.640	-30.8	V	3.0	28.3	1.0	-58.1	-13.0	-45.1	
3.760	-27.2	H	3.0	30.1	1.0	-56.3	-13.0	-43.3	
5.640	-30.5	H	3.0	28.3	1.0	-57.8	-13.0	-44.8	
<b>High Ch, (1909.3 MHz)</b>									
3.819	-27.5	V	3.0	30.1	1.0	-56.6	-13.0	-43.6	
5.728	-29.9	V	3.0	28.2	1.0	-57.1	-13.0	-44.1	
3.819	-28.0	H	3.0	30.1	1.0	-57.1	-13.0	-44.1	
5.728	-30.4	H	3.0	28.2	1.0	-57.6	-13.0	-44.6	

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

**QPSK Band 2 (3.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/05/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 3MHz, QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1851.5 MHz)</b>									
3.703	-27.5	V	3.0	30.2	1.0	-56.7	-13.0	-43.7	
5.555	-30.7	V	3.0	28.4	1.0	-58.1	-13.0	-45.1	
3.703	-27.2	H	3.0	30.2	1.0	-56.4	-13.0	-43.4	
5.555	-29.7	H	3.0	28.4	1.0	-57.1	-13.0	-44.1	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-26.9	V	3.0	30.1	1.0	-56.1	-13.0	-43.1	
5.640	-31.2	V	3.0	28.3	1.0	-58.5	-13.0	-45.5	
3.760	-26.7	H	3.0	30.1	1.0	-55.8	-13.0	-42.8	
5.640	-30.0	H	3.0	28.3	1.0	-57.3	-13.0	-44.3	
<b>High Ch, (1908.5 MHz)</b>									
3.817	-27.2	V	3.0	30.1	1.0	-56.3	-13.0	-43.3	
5.726	-30.2	V	3.0	28.2	1.0	-57.4	-13.0	-44.4	
3.817	-27.0	H	3.0	30.1	1.0	-56.1	-13.0	-43.1	
5.726	-30.0	H	3.0	28.2	1.0	-57.2	-13.0	-44.2	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 2 (3.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/05/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE band 2, 3MHz, 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1851.5 MHz)</b>									
3.703	-28.4	V	3.0	30.2	1.0	-57.6	-13.0	-44.6	
5.555	-31.7	V	3.0	28.4	1.0	-59.1	-13.0	-46.1	
3.703	-28.1	H	3.0	30.2	1.0	-57.3	-13.0	-44.3	
5.555	-30.6	H	3.0	28.4	1.0	-58.0	-13.0	-45.0	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-27.9	V	3.0	30.1	1.0	-57.1	-13.0	-44.1	
5.640	-32.1	V	3.0	28.3	1.0	-59.4	-13.0	-46.4	
3.760	-27.7	H	3.0	30.1	1.0	-56.8	-13.0	-43.8	
5.640	-31.0	H	3.0	28.3	1.0	-58.3	-13.0	-45.3	
<b>High Ch, (1908.5 MHz)</b>									
3.817	-27.3	V	3.0	30.1	1.0	-56.4	-13.0	-43.4	
5.726	-31.2	V	3.0	28.2	1.0	-58.4	-13.0	-45.4	
3.817	-28.0	H	3.0	30.1	1.0	-57.1	-13.0	-44.1	
5.726	-31.0	H	3.0	28.2	1.0	-58.2	-13.0	-45.2	

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

**QPSK Band 2 (5.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

Company: Apple  
 Project #: 13U15037  
 Date: 06/05/13  
 Test Engineer: Mona Hua  
 Configuration: EUT only  
 Mode: TX, LTE band 2, 5MHz, QPSK

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1852.5 MHz)</b>									
3.705	-26.4	V	3.0	30.2	1.0	-55.6	-13.0	-42.6	
5.558	-30.8	V	3.0	28.4	1.0	-58.1	-13.0	-45.1	
3.705	-25.7	H	3.0	30.2	1.0	-54.9	-13.0	-41.9	
5.558	-29.7	H	3.0	28.4	1.0	-57.1	-13.0	-44.1	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-26.7	V	3.0	30.1	1.0	-55.9	-13.0	-42.9	
5.640	-31.1	V	3.0	28.3	1.0	-58.4	-13.0	-45.4	
3.760	-27.5	H	3.0	30.1	1.0	-56.6	-13.0	-43.6	
5.640	-29.6	H	3.0	28.3	1.0	-56.9	-13.0	-43.9	
<b>High Ch, (1907.5 MHz)</b>									
3.815	-25.5	V	3.0	30.1	1.0	-54.6	-13.0	-41.6	
5.723	-30.8	V	3.0	28.2	1.0	-58.0	-13.0	-45.0	
3.815	-26.4	H	3.0	30.1	1.0	-55.5	-13.0	-42.5	
5.723	-29.3	H	3.0	28.2	1.0	-56.5	-13.0	-43.5	

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

**16QAM Band 2 (5.0 MHz BANDWIDTH)**

Compliance Certification Services									
Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		13U15037							
Date:		06/05/13							
Test Engineer:		Mona Hua							
Configuration:		EUT only							
Mode:		TX, LTE band 2, 5MHz, 16QAM							
Chamber		Pre-amplifier		Filter		Limit			
3m Chamber D		T1458449B		Filter 1		Part 24			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch. (1852.5 MHz)									
3.705	-27.3	V	3.0	30.2	1.0	-56.5	-13.0	-43.5	
5.558	-31.8	V	3.0	28.4	1.0	-59.1	-13.0	-46.1	
3.705	-26.7	H	3.0	30.2	1.0	-55.9	-13.0	-42.9	
5.558	-30.6	H	3.0	28.4	1.0	-58.0	-13.0	-45.0	
Mid Ch. (1880 MHz)									
3.760	-27.6	V	3.0	30.1	1.0	-56.8	-13.0	-43.8	
5.640	-32.1	V	3.0	28.3	1.0	-59.4	-13.0	-46.4	
3.760	-28.4	H	3.0	30.1	1.0	-57.5	-13.0	-44.5	
5.640	-30.6	H	3.0	28.3	1.0	-57.9	-13.0	-44.9	
High Ch. (1907.5 MHz)									
3.815	-26.4	V	3.0	30.1	1.0	-55.5	-13.0	-42.5	
5.723	-31.9	V	3.0	28.2	1.0	-59.1	-13.0	-46.1	
3.815	-27.3	H	3.0	30.1	1.0	-56.4	-13.0	-43.4	
5.723	-30.3	H	3.0	28.2	1.0	-57.5	-13.0	-44.5	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**QPSK Band 2 (10.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/05/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 10MHz, QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1855 MHz)</b>									
3.710	-27.2	V	3.0	30.2	1.0	-56.4	-13.0	-43.4	
5.565	-31.2	V	3.0	28.4	1.0	-58.5	-13.0	-45.5	
3.710	-26.4	H	3.0	30.2	1.0	-55.6	-13.0	-42.6	
5.565	-29.8	H	3.0	28.4	1.0	-57.2	-13.0	-44.2	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-25.6	V	3.0	30.1	1.0	-54.8	-13.0	-41.8	
5.640	-31.7	V	3.0	28.3	1.0	-59.0	-13.0	-46.0	
3.760	-27.6	H	3.0	30.1	1.0	-56.7	-13.0	-43.7	
5.640	-29.7	H	3.0	28.3	1.0	-57.0	-13.0	-44.0	
<b>High Ch, (1905 MHz)</b>									
3.810	-26.4	V	3.0	30.1	1.0	-55.5	-13.0	-42.5	
5.715	-31.2	V	3.0	28.2	1.0	-58.4	-13.0	-45.4	
3.810	-27.3	H	3.0	30.1	1.0	-56.4	-13.0	-43.4	
5.715	-29.6	H	3.0	28.2	1.0	-56.8	-13.0	-43.8	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 2 (10.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/05/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 10MHz, 16QAM							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1855 MHz)</b>									
3.710	-28.2	V	3.0	30.2	1.0	-57.4	-13.0	-44.4	
5.565	-32.2	V	3.0	28.4	1.0	-59.5	-13.0	-46.5	
3.710	-27.3	H	3.0	30.2	1.0	-56.5	-13.0	-43.5	
5.565	-30.7	H	3.0	28.4	1.0	-58.1	-13.0	-45.1	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-26.4	V	3.0	30.1	1.0	-55.6	-13.0	-42.6	
5.640	-32.6	V	3.0	28.3	1.0	-59.9	-13.0	-46.9	
3.760	-28.6	H	3.0	30.1	1.0	-57.7	-13.0	-44.7	
5.640	-30.5	H	3.0	28.3	1.0	-57.8	-13.0	-44.8	
<b>High Ch, (1905 MHz)</b>									
3.810	-27.2	V	3.0	30.1	1.0	-56.3	-13.0	-43.3	
5.715	-32.2	V	3.0	28.2	1.0	-59.4	-13.0	-46.4	
3.810	-28.3	H	3.0	30.1	1.0	-57.4	-13.0	-44.4	
5.715	-30.4	H	3.0	28.2	1.0	-57.6	-13.0	-44.6	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									



**QPSK Band 2 (15.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/05/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 15MHz, QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1857.5 MHz)</b>									
3.715	-26.9	V	3.0	30.2	1.0	-56.1	-13.0	-43.1	
5.573	-29.6	V	3.0	28.3	1.0	-56.9	-13.0	-43.9	
3.715	-27.4	H	3.0	30.2	1.0	-56.6	-13.0	-43.6	
5.573	-29.1	H	3.0	28.3	1.0	-56.5	-13.0	-43.5	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-25.6	V	3.0	30.1	1.0	-54.8	-13.0	-41.8	
5.646	-30.8	V	3.0	28.3	1.0	-58.1	-13.0	-45.1	
3.760	-27.0	H	3.0	30.1	1.0	-56.1	-13.0	-43.1	
5.646	-30.2	H	3.0	28.3	1.0	-57.5	-13.0	-44.5	
<b>High Ch, (1902.5 MHz)</b>									
3.805	-26.4	V	3.0	30.1	1.0	-55.5	-13.0	-42.5	
5.708	-30.0	V	3.0	28.2	1.0	-57.3	-13.0	-44.3	
3.805	-27.5	H	3.0	30.1	1.0	-56.6	-13.0	-43.6	
5.708	-29.3	H	3.0	28.2	1.0	-56.5	-13.0	-43.5	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 2 (15.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/05/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE band 2, 15MHz, 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1857.5 MHz)</b>									
3.715	-27.9	V	3.0	30.2	1.0	-57.1	-13.0	-44.1	
5.573	-30.5	V	3.0	28.3	1.0	-57.8	-13.0	-44.8	
3.715	-28.4	H	3.0	30.2	1.0	-57.6	-13.0	-44.6	
5.573	-30.1	H	3.0	28.3	1.0	-57.5	-13.0	-44.5	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-26.6	V	3.0	30.1	1.0	-55.8	-13.0	-42.8	
5.646	-31.8	V	3.0	28.3	1.0	-59.1	-13.0	-46.1	
3.760	-27.8	H	3.0	30.1	1.0	-56.9	-13.0	-43.9	
5.646	-31.1	H	3.0	28.3	1.0	-58.4	-13.0	-45.4	
<b>High Ch, (1902.5 MHz)</b>									
3.805	-27.4	V	3.0	30.1	1.0	-56.5	-13.0	-43.5	
5.708	-30.9	V	3.0	28.2	1.0	-58.2	-13.0	-45.2	
3.805	-28.5	H	3.0	30.1	1.0	-57.6	-13.0	-44.6	
5.708	-30.3	H	3.0	28.2	1.0	-57.5	-13.0	-44.5	

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

**QPSK Band 2 (20.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/05/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE band 2, 20MHz, QPSK

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1860 MHz)</b>									
3.720	-26.7	V	3.0	30.2	1.0	-55.9	-13.0	-42.9	
5.580	-30.3	V	3.0	28.3	1.0	-57.7	-13.0	-44.7	
3.720	-27.6	H	3.0	30.2	1.0	-56.8	-13.0	-43.8	
5.580	-29.6	H	3.0	28.3	1.0	-56.9	-13.0	-43.9	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-26.4	V	3.0	30.1	1.0	-55.6	-13.0	-42.6	
5.640	-30.1	V	3.0	28.3	1.0	-57.4	-13.0	-44.4	
3.760	-27.0	H	3.0	30.1	1.0	-56.1	-13.0	-43.1	
5.640	-29.9	H	3.0	28.3	1.0	-57.2	-13.0	-44.2	
<b>High Ch, (1900 MHz)</b>									
3.800	-26.6	V	3.0	30.1	1.0	-55.7	-13.0	-42.7	
5.700	-30.7	V	3.0	28.2	1.0	-58.0	-13.0	-45.0	
3.800	-27.4	H	3.0	30.1	1.0	-56.5	-13.0	-43.5	
5.700	-29.6	H	3.0	28.2	1.0	-56.9	-13.0	-43.9	

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

**16QAM Band 2 (20.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/05/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE band 2, 20MHz, 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1860 MHz)</b>									
3.720	-27.7	V	3.0	30.2	1.0	-56.9	-13.0	-43.9	
5.580	-31.2	V	3.0	28.3	1.0	-58.6	-13.0	-45.6	
3.720	-28.5	H	3.0	30.2	1.0	-57.7	-13.0	-44.7	
5.580	-30.6	H	3.0	28.3	1.0	-57.9	-13.0	-44.9	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-27.4	V	3.0	30.1	1.0	-56.6	-13.0	-43.6	
5.640	-31.1	V	3.0	28.3	1.0	-58.4	-13.0	-45.4	
3.760	-27.9	H	3.0	30.1	1.0	-57.0	-13.0	-44.0	
5.640	-30.9	H	3.0	28.3	1.0	-58.2	-13.0	-45.2	
<b>High Ch, (1900 MHz)</b>									
3.800	-27.6	V	3.0	30.1	1.0	-56.7	-13.0	-43.7	
5.700	-31.7	V	3.0	28.2	1.0	-59.0	-13.0	-46.0	
3.800	-28.4	H	3.0	30.1	1.0	-57.5	-13.0	-44.5	
5.700	-30.5	H	3.0	28.2	1.0	-57.8	-13.0	-44.8	

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

**BAND 5**

**QPSK Band 5 (1.4 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

Company: Apple  
 Project #: 13U15037  
 Date: 06/05/13  
 Test Engineer: Mona Hua  
 Configuration: EUT only  
 Mode: TX, LTE B5 1.4M har QPSK

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (824.7MHz)</b>									
1.649	-16.2	V	3.0	32.7	1.0	-47.9	-13.0	-34.9	
2.474	-25.8	V	3.0	31.4	1.0	-56.2	-13.0	-43.2	
1.649	-16.4	H	3.0	32.7	1.0	-48.1	-13.0	-35.1	
2.474	-28.5	H	3.0	31.4	1.0	-58.9	-13.0	-45.9	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-18.0	V	3.0	32.6	1.0	-49.6	-13.0	-36.6	
2.510	-24.5	V	3.0	31.5	1.0	-55.0	-13.0	-42.0	
1.673	-20.9	H	3.0	32.6	1.0	-52.5	-13.0	-39.5	
2.510	-28.3	H	3.0	31.5	1.0	-58.8	-13.0	-45.8	
<b>High Ch, (848.3MHz)</b>									
1.697	-16.5	V	3.0	32.6	1.0	-48.0	-13.0	-35.0	
2.545	-26.1	V	3.0	31.4	1.0	-56.6	-13.0	-43.6	
1.697	-16.9	H	3.0	32.6	1.0	-48.4	-13.0	-35.4	
2.545	-27.7	H	3.0	31.4	1.0	-58.1	-13.0	-45.1	

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  
**Project #:** 13U15037  
**Date:** 06/05/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE B5 1.4M har 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (824.7MHz)</b>									
1.649	-17.2	V	3.0	32.7	1.0	-48.9	-13.0	-35.9	
2.474	-26.7	V	3.0	31.4	1.0	-57.1	-13.0	-44.1	
1.649	-17.4	H	3.0	32.7	1.0	-49.1	-13.0	-36.1	
2.474	-29.5	H	3.0	31.4	1.0	-59.9	-13.0	-46.9	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-19.0	V	3.0	32.6	1.0	-50.6	-13.0	-37.6	
2.510	-25.6	V	3.0	31.5	1.0	-56.1	-13.0	-43.1	
1.673	-21.9	H	3.0	32.6	1.0	-53.5	-13.0	-40.5	
2.510	-29.2	H	3.0	31.5	1.0	-59.7	-13.0	-46.7	
<b>High Ch, (848.3MHz)</b>									
1.697	-17.4	V	3.0	32.6	1.0	-48.9	-13.0	-35.9	
2.545	-27.1	V	3.0	31.4	1.0	-57.6	-13.0	-44.6	
1.697	-18.0	H	3.0	32.6	1.0	-49.5	-13.0	-36.5	
2.545	-28.7	H	3.0	31.4	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 5 (3.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/05/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE B5 3M har QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		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
<b>Low Ch, (825.5MHz)</b>									
1.651	-19.3	V	3.0	32.7	1.0	-51.0	-13.0	-38.0	
2.477	-25.4	V	3.0	31.4	1.0	-55.8	-13.0	-42.8	
1.651	-19.3	H	3.0	32.7	1.0	-51.0	-13.0	-38.0	
2.477	-28.8	H	3.0	31.4	1.0	-59.2	-13.0	-46.2	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-18.6	V	3.0	32.6	1.0	-50.2	-13.0	-37.2	
2.510	-25.9	V	3.0	31.5	1.0	-56.4	-13.0	-43.4	
1.673	-21.3	H	3.0	32.6	1.0	-52.9	-13.0	-39.9	
2.510	-27.8	H	3.0	31.5	1.0	-58.3	-13.0	-45.3	
<b>High Ch, (847.5MHz)</b>									
1.695	-18.2	V	3.0	32.6	1.0	-49.7	-13.0	-36.7	
2.543	-25.7	V	3.0	31.4	1.0	-56.1	-13.0	-43.1	
1.695	-17.9	H	3.0	32.6	1.0	-49.4	-13.0	-36.4	
2.543	-24.4	H	3.0	31.4	1.0	-54.8	-13.0	-41.8	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 5 (3.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/05/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE B5 3M har 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (825.5MHz)</b>									
1.651	-20.3	V	3.0	32.7	1.0	-52.0	-13.0	-39.0	
2.477	-26.3	V	3.0	31.4	1.0	-56.7	-13.0	-43.7	
1.651	-20.2	H	3.0	32.7	1.0	-51.9	-13.0	-38.9	
2.477	-29.8	H	3.0	31.4	1.0	-60.2	-13.0	-47.2	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-19.5	V	3.0	32.6	1.0	-51.1	-13.0	-38.1	
2.510	-26.8	V	3.0	31.5	1.0	-57.3	-13.0	-44.3	
1.673	-22.3	H	3.0	32.6	1.0	-53.9	-13.0	-40.9	
2.510	-28.8	H	3.0	31.5	1.0	-59.3	-13.0	-46.3	
<b>High Ch, (847.5MHz)</b>									
1.695	-19.0	V	3.0	32.6	1.0	-50.5	-13.0	-37.5	
2.543	-26.6	V	3.0	31.4	1.0	-57.0	-13.0	-44.0	
1.695	-18.8	H	3.0	32.6	1.0	-50.3	-13.0	-37.3	
2.543	-25.4	H	3.0	31.4	1.0	-55.8	-13.0	-42.8	

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



**QPSK Band 5 (5.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/05/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE B5 5M har QPSK

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (826.5MHz)</b>									
1.653	-16.4	V	3.0	32.7	1.0	-48.0	-13.0	-35.0	
2.480	-24.6	V	3.0	31.4	1.0	-55.0	-13.0	-42.0	
1.653	-17.5	H	3.0	32.7	1.0	-49.1	-13.0	-36.1	
2.480	-26.3	H	3.0	31.4	1.0	-56.7	-13.0	-43.7	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-21.4	V	3.0	32.6	1.0	-53.0	-13.0	-40.0	
2.510	-27.2	V	3.0	31.5	1.0	-57.7	-13.0	-44.7	
1.673	-19.4	H	3.0	32.6	1.0	-51.0	-13.0	-38.0	
2.510	-27.0	H	3.0	31.5	1.0	-57.5	-13.0	-44.5	
<b>High Ch, (846.5MHz)</b>									
1.693	-17.8	V	3.0	32.6	1.0	-49.3	-13.0	-36.3	
2.540	-25.2	V	3.0	31.4	1.0	-55.6	-13.0	-42.6	
1.693	-16.6	H	3.0	32.6	1.0	-48.1	-13.0	-35.1	
2.540	-27.3	H	3.0	31.4	1.0	-57.8	-13.0	-44.8	

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

**16QAM Band 5 (5.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/05/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE B5 5M har 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (826.5MHz)</b>									
1.658	-17.5	V	3.0	32.6	1.0	-49.2	-13.0	-36.2	
2.487	-25.5	V	3.0	31.4	1.0	-55.9	-13.0	-42.9	
1.658	-18.5	H	3.0	32.6	1.0	-50.1	-13.0	-37.1	
2.487	-27.1	H	3.0	31.4	1.0	-57.6	-13.0	-44.6	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-22.4	V	3.0	32.6	1.0	-54.0	-13.0	-41.0	
2.510	-28.1	V	3.0	31.5	1.0	-58.6	-13.0	-45.6	
1.673	-20.3	H	3.0	32.6	1.0	-51.9	-13.0	-38.9	
2.510	-28.0	H	3.0	31.5	1.0	-58.5	-13.0	-45.5	
<b>High Ch, (846.5MHz)</b>									
1.688	-18.9	V	3.0	32.6	1.0	-50.4	-13.0	-37.4	
2.532	-26.0	V	3.0	31.5	1.0	-56.5	-13.0	-43.5	
1.688	-17.4	H	3.0	32.6	1.0	-49.0	-13.0	-36.0	
2.532	-28.3	H	3.0	31.5	1.0	-58.8	-13.0	-45.8	

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

**QPSK Band 5 (10.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/05/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE B5 10M har QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		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
<b>Low Ch, (829MHz)</b>									
1.658	-22.9	V	3.0	32.6	1.0	-54.6	-13.0	-41.6	
2.487	-26.9	V	3.0	31.4	1.0	-57.3	-13.0	-44.3	
1.658	-21.9	H	3.0	32.6	1.0	-53.5	-13.0	-40.5	
2.487	-28.9	H	3.0	31.4	1.0	-59.4	-13.0	-46.4	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-21.9	V	3.0	32.6	1.0	-53.5	-13.0	-40.5	
2.510	-26.0	V	3.0	31.5	1.0	-56.5	-13.0	-43.5	
1.673	-21.2	H	3.0	32.6	1.0	-52.8	-13.0	-39.8	
2.510	-28.7	H	3.0	31.5	1.0	-59.2	-13.0	-46.2	
<b>High Ch, (844MHz)</b>									
1.688	-21.2	V	3.0	32.6	1.0	-52.7	-13.0	-39.7	
2.532	-26.2	V	3.0	31.5	1.0	-56.7	-13.0	-43.7	
1.688	-21.0	H	3.0	32.6	1.0	-52.6	-13.0	-39.6	
2.532	-28.5	H	3.0	31.5	1.0	-59.0	-13.0	-46.0	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 5 (10.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/05/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE B5 10M har 16QAM							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		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
<b>Low Ch, (829MHz)</b>									
1.658	-23.9	V	3.0	32.6	1.0	-55.6	-13.0	-42.6	
2.487	-27.9	V	3.0	31.4	1.0	-58.3	-13.0	-45.3	
1.658	-22.9	H	3.0	32.6	1.0	-54.5	-13.0	-41.5	
2.487	-20.0	H	3.0	31.4	1.0	-50.5	-13.0	-37.5	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-22.9	V	3.0	32.6	1.0	-54.5	-13.0	-41.5	
2.510	-26.8	V	3.0	31.5	1.0	-57.3	-13.0	-44.3	
1.673	-22.1	H	3.0	32.6	1.0	-53.7	-13.0	-40.7	
2.510	-29.7	H	3.0	31.5	1.0	-60.2	-13.0	-47.2	
<b>High Ch, (844MHz)</b>									
1.688	-22.1	V	3.0	32.6	1.0	-53.6	-13.0	-40.6	
2.532	-27.1	V	3.0	31.5	1.0	-57.6	-13.0	-44.6	
1.688	-22.0	H	3.0	32.6	1.0	-53.6	-13.0	-40.6	
2.532	-29.6	H	3.0	31.5	1.0	-60.1	-13.0	-47.1	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**9.3.2. UAT / PORT B**

**BAND 2**

**QPSK Band 2 (1.4 MHz BANDWIDTH)**

Compliance Certification Services									
Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		13U15037							
Date:		06/06/13							
Test Engineer:		Mona Hua							
Configuration:		EUT only							
Mode:		TX, LTE band 2, 1.4MHz, QPSK							
Chamber		Pre-amplifier			Filter		Limit		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1850.7 MHz)</b>									
3.701	-27.1	V	3.0	30.2	1.0	-56.3	-13.0	-43.3	
5.552	-31.3	V	3.0	28.4	1.0	-58.7	-13.0	-45.7	
3.701	-27.0	H	3.0	30.2	1.0	-56.2	-13.0	-43.2	
5.552	-30.5	H	3.0	28.4	1.0	-57.9	-13.0	-44.9	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-28.0	V	3.0	30.1	1.0	-57.2	-13.0	-44.2	
5.640	-31.2	V	3.0	28.3	1.0	-58.5	-13.0	-45.5	
3.760	-28.1	H	3.0	30.1	1.0	-57.2	-13.0	-44.2	
5.640	-30.5	H	3.0	28.3	1.0	-57.8	-13.0	-44.8	
<b>High Ch, (1909.3 MHz)</b>									
3.819	-27.3	V	3.0	30.1	1.0	-56.4	-13.0	-43.4	
5.728	-30.6	V	3.0	28.2	1.0	-57.8	-13.0	-44.8	
3.819	-28.0	H	3.0	30.1	1.0	-57.1	-13.0	-44.1	
5.728	-30.3	H	3.0	28.2	1.0	-57.5	-13.0	-44.5	
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  
 Project #: 13U15037  
 Date: 06/06/13  
 Test Engineer: Mona Hua  
 Configuration: EUT only  
 Mode: TX, LTE band 2, 1.4MHz, 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1850.7 MHz)</b>									
3.701	-28.1	V	3.0	30.2	1.0	-57.3	-13.0	-44.3	
5.552	-32.1	V	3.0	28.4	1.0	-59.5	-13.0	-46.5	
3.701	-27.9	H	3.0	30.2	1.0	-57.1	-13.0	-44.1	
5.552	-31.5	H	3.0	28.4	1.0	-58.9	-13.0	-45.9	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-29.0	V	3.0	30.1	1.0	-58.2	-13.0	-45.2	
5.640	-32.0	V	3.0	28.3	1.0	-59.3	-13.0	-46.3	
3.760	-29.0	H	3.0	30.1	1.0	-58.1	-13.0	-45.1	
5.640	-31.4	H	3.0	28.3	1.0	-58.7	-13.0	-45.7	
<b>High Ch, (1909.3 MHz)</b>									
3.819	-28.2	V	3.0	30.1	1.0	-57.3	-13.0	-44.3	
5.728	-31.5	V	3.0	28.2	1.0	-58.7	-13.0	-45.7	
3.819	-29.0	H	3.0	30.1	1.0	-58.1	-13.0	-45.1	
5.728	-31.4	H	3.0	28.2	1.0	-58.6	-13.0	-45.6	

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

**QPSK Band 2 (3.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 3MHz, QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1851.5 MHz)</b>									
3.703	-28.4	V	3.0	30.2	1.0	-57.6	-13.0	-44.6	
5.555	-31.2	V	3.0	28.4	1.0	-58.6	-13.0	-45.6	
3.703	-27.4	H	3.0	30.2	1.0	-56.6	-13.0	-43.6	
5.555	-30.5	H	3.0	28.4	1.0	-57.9	-13.0	-44.9	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-28.0	V	3.0	30.1	1.0	-57.2	-13.0	-44.2	
5.640	-31.8	V	3.0	28.3	1.0	-59.1	-13.0	-46.1	
3.760	-27.6	H	3.0	30.1	1.0	-56.7	-13.0	-43.7	
5.640	-30.5	H	3.0	28.3	1.0	-57.8	-13.0	-44.8	
<b>High Ch, (1908.5 MHz)</b>									
3.817	-28.4	V	3.0	30.1	1.0	-57.5	-13.0	-44.5	
5.726	-31.5	V	3.0	28.2	1.0	-58.7	-13.0	-45.7	
3.817	-27.6	H	3.0	30.1	1.0	-56.7	-13.0	-43.7	
5.726	-30.5	H	3.0	28.2	1.0	-57.7	-13.0	-44.7	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 2 (3.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 3MHz, 16QAM							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1851.5 MHz)</b>									
3.703	-29.3	V	3.0	30.2	1.0	-58.5	-13.0	-45.5	
5.555	-32.1	V	3.0	28.4	1.0	-59.5	-13.0	-46.5	
3.703	-28.3	H	3.0	30.2	1.0	-57.5	-13.0	-44.5	
5.555	-31.4	H	3.0	28.4	1.0	-58.8	-13.0	-45.8	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-29.1	V	3.0	30.1	1.0	-58.3	-13.0	-45.3	
5.640	-32.9	V	3.0	28.3	1.0	-60.2	-13.0	-47.2	
3.760	-28.5	H	3.0	30.1	1.0	-57.6	-13.0	-44.6	
5.640	-31.4	H	3.0	28.3	1.0	-58.7	-13.0	-45.7	
<b>High Ch, (1908.5 MHz)</b>									
3.817	-29.3	V	3.0	30.1	1.0	-58.4	-13.0	-45.4	
5.726	-32.3	V	3.0	28.2	1.0	-59.5	-13.0	-46.5	
3.817	-28.5	H	3.0	30.1	1.0	-57.6	-13.0	-44.6	
5.726	-31.4	H	3.0	28.2	1.0	-58.6	-13.0	-45.6	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									



**QPSK Band 2 (5.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

Company: Apple  
 Project #: 13U15037  
 Date: 06/06/13  
 Test Engineer: Mona Hua  
 Configuration: EUT only  
 Mode: TX, LTE band 2, 5MHz, QPSK

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1852.5 MHz)</b>									
3.705	-27.1	V	3.0	30.2	1.0	-56.3	-13.0	-43.3	
5.558	-31.4	V	3.0	28.4	1.0	-58.7	-13.0	-45.7	
3.705	-26.8	H	3.0	30.2	1.0	-56.0	-13.0	-43.0	
5.558	-30.5	H	3.0	28.4	1.0	-57.9	-13.0	-44.9	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-27.6	V	3.0	30.1	1.0	-56.8	-13.0	-43.8	
5.640	-32.0	V	3.0	28.3	1.0	-59.3	-13.0	-46.3	
3.760	-28.6	H	3.0	30.1	1.0	-57.7	-13.0	-44.7	
5.640	-30.3	H	3.0	28.3	1.0	-57.6	-13.0	-44.6	
<b>High Ch, (1907.5 MHz)</b>									
3.815	-26.4	V	3.0	30.1	1.0	-55.5	-13.0	-42.5	
5.723	-31.6	V	3.0	28.2	1.0	-58.8	-13.0	-45.8	
3.815	-27.6	H	3.0	30.1	1.0	-56.7	-13.0	-43.7	
5.723	-30.0	H	3.0	28.2	1.0	-57.2	-13.0	-44.2	

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

**16QAM Band 2 (5.0 MHz BANDWIDTH)**

Compliance Certification Services									
Above 1GHz High Frequency Substitution Measurement									
Company:		Apple							
Project #:		13U15037							
Date:		06/06/13							
Test Engineer:		Mona Hua							
Configuration:		EUT only							
Mode:		TX, LTE band 2, 5MHz, 16QAM							
Chamber		Pre-amplifier			Filter		Limit		
3m Chamber D		T1458449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch. (1852.5 MHz)									
3.705	-28.0	V	3.0	30.2	1.0	-57.2	-13.0	-44.2	
5.558	-32.3	V	3.0	28.4	1.0	-59.6	-13.0	-46.6	
3.705	-26.7	H	3.0	30.2	1.0	-55.9	-13.0	-42.9	
5.558	-31.3	H	3.0	28.4	1.0	-58.7	-13.0	-45.7	
Mid Ch. (1880 MHz)									
3.760	-28.5	V	3.0	30.1	1.0	-57.7	-13.0	-44.7	
5.640	-32.7	V	3.0	28.3	1.0	-59.0	-13.0	-47.0	
3.760	-29.5	H	3.0	30.1	1.0	-58.6	-13.0	-45.6	
5.640	-30.9	H	3.0	28.3	1.0	-58.2	-13.0	-45.2	
High Ch. (1907.5 MHz)									
3.815	-27.3	V	3.0	30.1	1.0	-56.4	-13.0	-43.4	
5.723	-32.7	V	3.0	28.2	1.0	-59.9	-13.0	-46.9	
3.815	-29.0	H	3.0	30.1	1.0	-58.1	-13.0	-45.1	
5.723	-31.1	H	3.0	28.2	1.0	-58.3	-13.0	-45.3	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**QPSK Band 2 (10.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/06/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE band 2, 10MHz, QPSK

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1855 MHz)</b>									
3.710	-28.2	V	3.0	30.2	1.0	-57.4	-13.0	-44.4	
5.565	-31.8	V	3.0	28.4	1.0	-59.1	-13.0	-46.1	
3.710	-27.4	H	3.0	30.2	1.0	-56.6	-13.0	-43.6	
5.565	-30.0	H	3.0	28.4	1.0	-57.4	-13.0	-44.4	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-26.3	V	3.0	30.1	1.0	-55.5	-13.0	-42.5	
5.640	-32.0	V	3.0	28.3	1.0	-59.3	-13.0	-46.3	
3.760	-29.0	H	3.0	30.1	1.0	-58.1	-13.0	-45.1	
5.640	-30.4	H	3.0	28.3	1.0	-57.7	-13.0	-44.7	
<b>High Ch, (1905 MHz)</b>									
3.810	-27.1	V	3.0	30.1	1.0	-56.2	-13.0	-43.2	
5.715	-31.5	V	3.0	28.2	1.0	-58.7	-13.0	-45.7	
3.810	-28.2	H	3.0	30.1	1.0	-57.3	-13.0	-44.3	
5.715	-30.1	H	3.0	28.2	1.0	-57.3	-13.0	-44.3	

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

**16QAM Band 2 (10.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 10MHz, 16QAM							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1855 MHz)</b>									
3.710	-29.2	V	3.0	30.2	1.0	-58.4	-13.0	-45.4	
5.565	-32.5	V	3.0	28.4	1.0	-59.8	-13.0	-46.8	
3.710	-28.4	H	3.0	30.2	1.0	-57.6	-13.0	-44.6	
5.565	-30.9	H	3.0	28.4	1.0	-58.3	-13.0	-45.3	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-27.1	V	3.0	30.1	1.0	-56.3	-13.0	-43.3	
5.640	-32.8	V	3.0	28.3	1.0	-60.1	-13.0	-47.1	
3.760	-29.9	H	3.0	30.1	1.0	-59.0	-13.0	-46.0	
5.640	-31.2	H	3.0	28.3	1.0	-58.5	-13.0	-45.5	
<b>High Ch, (1905 MHz)</b>									
3.810	-28.0	V	3.0	30.1	1.0	-57.1	-13.0	-44.1	
5.715	-32.0	V	3.0	28.2	1.0	-59.2	-13.0	-46.2	
3.810	-29.0	H	3.0	30.1	1.0	-58.1	-13.0	-45.1	
5.715	-30.8	H	3.0	28.2	1.0	-58.0	-13.0	-45.0	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**QPSK Band 2 (15.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 15MHz, QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1857.5 MHz)</b>									
3.715	-27.6	V	3.0	30.2	1.0	-56.8	-13.0	-43.8	
5.573	-30.2	V	3.0	28.3	1.0	-57.5	-13.0	-44.5	
3.715	-28.3	H	3.0	30.2	1.0	-57.5	-13.0	-44.5	
5.573	-29.6	H	3.0	28.3	1.0	-57.0	-13.0	-44.0	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-26.4	V	3.0	30.1	1.0	-55.6	-13.0	-42.6	
5.646	-31.5	V	3.0	28.3	1.0	-58.8	-13.0	-45.8	
3.760	-27.6	H	3.0	30.1	1.0	-56.7	-13.0	-43.7	
5.646	-30.4	H	3.0	28.3	1.0	-57.7	-13.0	-44.7	
<b>High Ch, (1902.5 MHz)</b>									
3.805	-27.0	V	3.0	30.1	1.0	-56.1	-13.0	-43.1	
5.708	-30.9	V	3.0	28.2	1.0	-58.2	-13.0	-45.2	
3.805	-28.7	H	3.0	30.1	1.0	-57.8	-13.0	-44.8	
5.708	-29.6	H	3.0	28.2	1.0	-56.8	-13.0	-43.8	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 2 (15.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 15MHz, 16QAM							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1857.5 MHz)</b>									
3.715	-28.5	V	3.0	30.2	1.0	-57.7	-13.0	-44.7	
5.573	-31.2	V	3.0	28.3	1.0	-58.5	-13.0	-45.5	
3.715	-29.3	H	3.0	30.2	1.0	-58.5	-13.0	-45.5	
5.573	-30.5	H	3.0	28.3	1.0	-57.9	-13.0	-44.9	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-27.3	V	3.0	30.1	1.0	-56.5	-13.0	-43.5	
5.646	-32.1	V	3.0	28.3	1.0	-59.4	-13.0	-46.4	
3.760	-28.5	H	3.0	30.1	1.0	-57.6	-13.0	-44.6	
5.646	-31.3	H	3.0	28.3	1.0	-58.6	-13.0	-45.6	
<b>High Ch, (1902.5 MHz)</b>									
3.805	-28.0	V	3.0	30.1	1.0	-57.1	-13.0	-44.1	
5.708	-31.7	V	3.0	28.2	1.0	-59.0	-13.0	-46.0	
3.805	-29.6	H	3.0	30.1	1.0	-58.7	-13.0	-45.7	
5.708	-30.4	H	3.0	28.2	1.0	-57.6	-13.0	-44.6	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**QPSK Band 2 (20.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/06/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE band 2, 20MHz, QPSK

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

T145 8449B

Filter 1

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1860 MHz)</b>									
3.720	-27.1	V	3.0	30.2	1.0	-56.3	-13.0	-43.3	
5.580	-30.8	V	3.0	28.3	1.0	-58.2	-13.0	-45.2	
3.720	-28.2	H	3.0	30.2	1.0	-57.4	-13.0	-44.4	
5.580	-30.3	H	3.0	28.3	1.0	-57.6	-13.0	-44.6	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-27.2	V	3.0	30.1	1.0	-56.4	-13.0	-43.4	
5.640	-30.9	V	3.0	28.3	1.0	-58.2	-13.0	-45.2	
3.760	-27.5	H	3.0	30.1	1.0	-56.6	-13.0	-43.6	
5.640	-30.2	H	3.0	28.3	1.0	-57.5	-13.0	-44.5	
<b>High Ch, (1900 MHz)</b>									
3.800	-27.6	V	3.0	30.1	1.0	-56.7	-13.0	-43.7	
5.700	-30.9	V	3.0	28.2	1.0	-58.2	-13.0	-45.2	
3.800	-28.6	H	3.0	30.1	1.0	-57.7	-13.0	-44.7	
5.700	-30.0	H	3.0	28.2	1.0	-57.3	-13.0	-44.3	

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

**16QAM Band 2 (20.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE band 2, 20MHz, 16QAM							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		T145 8449B			Filter 1		Part 24		
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1860 MHz)</b>									
3.720	-28.1	V	3.0	30.2	1.0	-57.3	-13.0	-44.3	
5.580	-31.6	V	3.0	28.3	1.0	-59.0	-13.0	-46.0	
3.720	-29.1	H	3.0	30.2	1.0	-58.3	-13.0	-45.3	
5.580	-30.8	H	3.0	28.3	1.0	-58.1	-13.0	-45.1	
<b>Mid Ch, (1880 MHz)</b>									
3.760	-28.4	V	3.0	30.1	1.0	-57.6	-13.0	-44.6	
5.640	-31.9	V	3.0	28.3	1.0	-59.2	-13.0	-46.2	
3.760	-28.5	H	3.0	30.1	1.0	-57.6	-13.0	-44.6	
5.640	-31.1	H	3.0	28.3	1.0	-58.4	-13.0	-45.4	
<b>High Ch, (1900 MHz)</b>									
3.800	-28.5	V	3.0	30.1	1.0	-57.6	-13.0	-44.6	
5.700	-31.8	V	3.0	28.2	1.0	-59.1	-13.0	-46.1	
3.800	-29.3	H	3.0	30.1	1.0	-58.4	-13.0	-45.4	
5.700	-30.9	H	3.0	28.2	1.0	-58.2	-13.0	-45.2	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									



**UAT BAND 5**

**QPSK Band 5 (1.4 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

Company: Apple  
 Project #: 13U15037  
 Date: 06/06/13  
 Test Engineer: Roy Zheng  
 Configuration: EUT only  
 Mode: TX, LTE B5 1.4M har QPSK

**Chamber**  
 3m Chamber D

**Pre-amplifier**  
 T145 8449B

**Filter**  
 Filter 1

**Limit**  
 Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (824.7MHz)</b>									
1.649	-16.6	V	3.0	32.7	1.0	-48.3	-13.0	-35.3	
2.474	-26.2	V	3.0	31.4	1.0	-56.6	-13.0	-43.6	
1.649	-17.1	H	3.0	32.7	1.0	-48.8	-13.0	-35.8	
2.474	-29.1	H	3.0	31.4	1.0	-59.5	-13.0	-46.5	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-18.9	V	3.0	32.6	1.0	-50.5	-13.0	-37.5	
2.510	-25.2	V	3.0	31.5	1.0	-55.7	-13.0	-42.7	
1.673	-21.5	H	3.0	32.6	1.0	-53.1	-13.0	-40.1	
2.510	-28.7	H	3.0	31.5	1.0	-59.2	-13.0	-46.2	
<b>High Ch, (848.3MHz)</b>									
1.697	-17.3	V	3.0	32.6	1.0	-48.8	-13.0	-35.8	
2.545	-26.9	V	3.0	31.4	1.0	-57.4	-13.0	-44.4	
1.697	-17.7	H	3.0	32.6	1.0	-49.2	-13.0	-36.2	
2.545	-28.2	H	3.0	31.4	1.0	-58.6	-13.0	-45.6	

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  
**Project #:** 13U15037  
**Date:** 06/06/13  
**Test Engineer:** Roy Zheng  
**Configuration:** EUT only  
**Mode:** TX, LTE B5 1.4M har 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (824.7MHz)</b>									
1.649	-17.5	V	3.0	32.7	1.0	-49.2	-13.0	-36.2	
2.474	-27.1	V	3.0	31.4	1.0	-57.5	-13.0	-44.5	
1.649	-18.1	H	3.0	32.7	1.0	-49.8	-13.0	-36.8	
2.474	-30.1	H	3.0	31.4	1.0	-60.5	-13.0	-47.5	
<b>Mid Ch, (836.5MHz)</b>									
1.673	-20.1	V	3.0	32.6	1.0	-51.7	-13.0	-38.7	
2.510	-26.2	V	3.0	31.5	1.0	-56.7	-13.0	-43.7	
1.673	-22.4	H	3.0	32.6	1.0	-54.0	-13.0	-41.0	
2.510	-29.6	H	3.0	31.5	1.0	-60.1	-13.0	-47.1	
<b>High Ch, (848.3MHz)</b>									
1.697	-18.2	V	3.0	32.6	1.0	-49.7	-13.0	-36.7	
2.545	-27.8	V	3.0	31.4	1.0	-58.3	-13.0	-45.3	
1.697	-18.6	H	3.0	32.6	1.0	-50.1	-13.0	-37.1	
2.545	-28.1	H	3.0	31.4	1.0	-58.5	-13.0	-45.5	

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

**QPSK Band 5 (3.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE B5 3M har QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		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
<b>Low Ch, (825.5MHz)</b>									
1.648	-19.6	V	3.0	32.7	1.0	-51.3	-13.0	-38.3	
2.472	-26.0	V	3.0	31.4	1.0	-56.4	-13.0	-43.4	
1.648	-20.2	H	3.0	32.7	1.0	-51.9	-13.0	-38.9	
2.472	-29.3	H	3.0	31.4	1.0	-59.7	-13.0	-46.7	
<b>Mid Ch, (836.5MHz)</b>									
1.670	-19.1	V	3.0	32.6	1.0	-50.7	-13.0	-37.7	
2.505	-26.8	V	3.0	31.5	1.0	-57.3	-13.0	-44.3	
1.670	-22.1	H	3.0	32.6	1.0	-53.8	-13.0	-40.8	
2.505	-28.5	H	3.0	31.5	1.0	-59.0	-13.0	-46.0	
<b>High Ch, (847.5MHz)</b>									
1.694	-19.1	V	3.0	32.6	1.0	-50.6	-13.0	-37.6	
2.541	-26.2	V	3.0	31.4	1.0	-56.6	-13.0	-43.6	
1.694	-18.7	H	3.0	32.6	1.0	-50.2	-13.0	-37.2	
2.541	-25.2	H	3.0	31.4	1.0	-55.7	-13.0	-42.7	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 5 (3.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/06/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE B5 3M har 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (825.5MHz)</b>									
1.648	-20.5	V	3.0	32.7	1.0	-52.2	-13.0	-39.2	
2.472	-27.0	V	3.0	31.4	1.0	-57.4	-13.0	-44.4	
1.648	-21.2	H	3.0	32.7	1.0	-52.9	-13.0	-39.9	
2.472	-30.1	H	3.0	31.4	1.0	-60.5	-13.0	-47.5	
<b>Mid Ch, (836.5MHz)</b>									
1.670	-20.1	V	3.0	32.6	1.0	-51.7	-13.0	-38.7	
2.505	-27.7	V	3.0	31.5	1.0	-58.2	-13.0	-45.2	
1.670	-23.0	H	3.0	32.6	1.0	-54.7	-13.0	-41.7	
2.505	-29.4	H	3.0	31.5	1.0	-59.9	-13.0	-46.9	
<b>High Ch, (847.5MHz)</b>									
1.694	-20.1	V	3.0	32.6	1.0	-51.6	-13.0	-38.6	
2.541	-27.3	V	3.0	31.4	1.0	-57.7	-13.0	-44.7	
1.694	-19.7	H	3.0	32.6	1.0	-51.2	-13.0	-38.2	
2.541	-26.2	H	3.0	31.4	1.0	-56.7	-13.0	-43.7	

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

**QPSK Band 5 (5.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/06/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE B5 5M har QPSK

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (826.5MHz)</b>									
1.644	-16.9	V	3.0	32.7	1.0	-48.6	-13.0	-35.6	
2.466	-25.6	V	3.0	31.3	1.0	-55.9	-13.0	-42.9	
1.649	-18.4	H	3.0	32.7	1.0	-50.1	-13.0	-37.1	
2.473	-26.7	H	3.0	31.4	1.0	-57.1	-13.0	-44.1	
<b>Mid Ch, (836.5MHz)</b>									
1.654	-21.9	V	3.0	32.6	1.0	-53.6	-13.0	-40.6	
2.481	-27.7	V	3.0	31.4	1.0	-58.1	-13.0	-45.1	
1.668	-20.1	H	3.0	32.6	1.0	-51.7	-13.0	-38.7	
2.502	-28.3	H	3.0	31.5	1.0	-58.8	-13.0	-45.8	
<b>High Ch, (846.5MHz)</b>									
1.684	-18.3	V	3.0	32.6	1.0	-49.9	-13.0	-36.9	
2.527	-26.0	V	3.0	31.5	1.0	-56.4	-13.0	-43.4	
1.688	-17.4	H	3.0	32.6	1.0	-49.0	-13.0	-36.0	
2.532	-28.1	H	3.0	31.5	1.0	-58.6	-13.0	-45.6	

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

**16QAM Band 5 (5.0 MHz BANDWIDTH)**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Apple  
**Project #:** 13U15037  
**Date:** 06/06/13  
**Test Engineer:** Mona Hua  
**Configuration:** EUT only  
**Mode:** TX, LTE B5 5M har 16QAM

Chamber

Pre-amplifier

Filter

Limit

3m Chamber D

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
<b>Low Ch, (826.5MHz)</b>									
1.644	-17.9	V	3.0	32.7	1.0	-49.6	-13.0	-36.6	
2.466	-26.5	V	3.0	31.3	1.0	-56.8	-13.0	-43.8	
1.649	-19.3	H	3.0	32.7	1.0	-51.0	-13.0	-38.0	
2.473	-27.6	H	3.0	31.4	1.0	-58.0	-13.0	-45.0	
<b>Mid Ch, (836.5MHz)</b>									
1.654	-22.9	V	3.0	32.6	1.0	-54.6	-13.0	-41.6	
2.481	-28.5	V	3.0	31.4	1.0	-58.9	-13.0	-45.9	
1.668	-20.9	H	3.0	32.6	1.0	-52.5	-13.0	-39.5	
2.502	-29.3	H	3.0	31.5	1.0	-59.8	-13.0	-46.8	
<b>High Ch, (846.5MHz)</b>									
1.684	-19.2	V	3.0	32.6	1.0	-50.8	-13.0	-37.8	
2.527	-26.9	V	3.0	31.5	1.0	-57.3	-13.0	-44.3	
1.688	-18.5	H	3.0	32.6	1.0	-50.1	-13.0	-37.1	
2.532	-29.1	H	3.0	31.5	1.0	-59.6	-13.0	-46.6	

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

**QPSK Band 5 (10.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE B5 10M har QPSK							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		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
<b>Low Ch, (829MHz)</b>									
1.648	-24.1	V	3.0	32.7	1.0	-55.8	-13.0	-42.8	
2.472	-27.5	V	3.0	31.4	1.0	-57.9	-13.0	-44.9	
1.648	-23.8	H	3.0	32.7	1.0	-55.5	-13.0	-42.5	
2.472	-29.6	H	3.0	31.4	1.0	-60.0	-13.0	-47.0	
<b>Mid Ch, (836.5MHz)</b>									
1.662	-23.4	V	3.0	32.6	1.0	-55.0	-13.0	-42.0	
2.510	-26.8	V	3.0	31.5	1.0	-57.3	-13.0	-44.3	
1.662	-22.2	H	3.0	32.6	1.0	-53.8	-13.0	-40.8	
2.493	-29.0	H	3.0	31.5	1.0	-59.5	-13.0	-46.5	
<b>High Ch, (844MHz)</b>									
1.678	-21.6	V	3.0	32.6	1.0	-53.2	-13.0	-40.2	
2.517	-26.4	V	3.0	31.5	1.0	-56.9	-13.0	-43.9	
1.678	-21.5	H	3.0	32.6	1.0	-53.1	-13.0	-40.1	
2.517	-28.7	H	3.0	31.5	1.0	-59.2	-13.0	-46.2	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**16QAM Band 5 (10.0 MHz BANDWIDTH)**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Apple							
<b>Project #:</b>		13U15037							
<b>Date:</b>		06/06/13							
<b>Test Engineer:</b>		Mona Hua							
<b>Configuration:</b>		EUT only							
<b>Mode:</b>		TX, LTE B5 10M har 16QAM							
<b>Chamber</b>		<b>Pre-amplifier</b>			<b>Filter</b>		<b>Limit</b>		
3m Chamber D		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
<b>Low Ch, (829MHz)</b>									
1.648	-25.0	V	3.0	32.7	1.0	-56.7	-13.0	-43.7	
2.472	-28.5	V	3.0	31.4	1.0	-58.9	-13.0	-45.9	
1.648	-24.7	H	3.0	32.7	1.0	-56.4	-13.0	-43.4	
2.472	-30.3	H	3.0	31.4	1.0	-60.7	-13.0	-47.7	
<b>Mid Ch, (836.5MHz)</b>									
1.662	-24.3	V	3.0	32.6	1.0	-55.9	-13.0	-42.9	
2.510	-27.8	V	3.0	31.5	1.0	-58.3	-13.0	-45.3	
1.662	-23.1	H	3.0	32.6	1.0	-54.7	-13.0	-41.7	
2.493	-29.9	H	3.0	31.5	1.0	-60.4	-13.0	-47.4	
<b>High Ch, (844MHz)</b>									
1.678	-22.5	V	3.0	32.6	1.0	-54.1	-13.0	-41.1	
2.517	-27.3	V	3.0	31.5	1.0	-57.8	-13.0	-44.8	
1.678	-22.3	H	3.0	32.6	1.0	-53.9	-13.0	-40.9	
2.517	-29.8	H	3.0	31.5	1.0	-60.3	-13.0	-47.3	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									