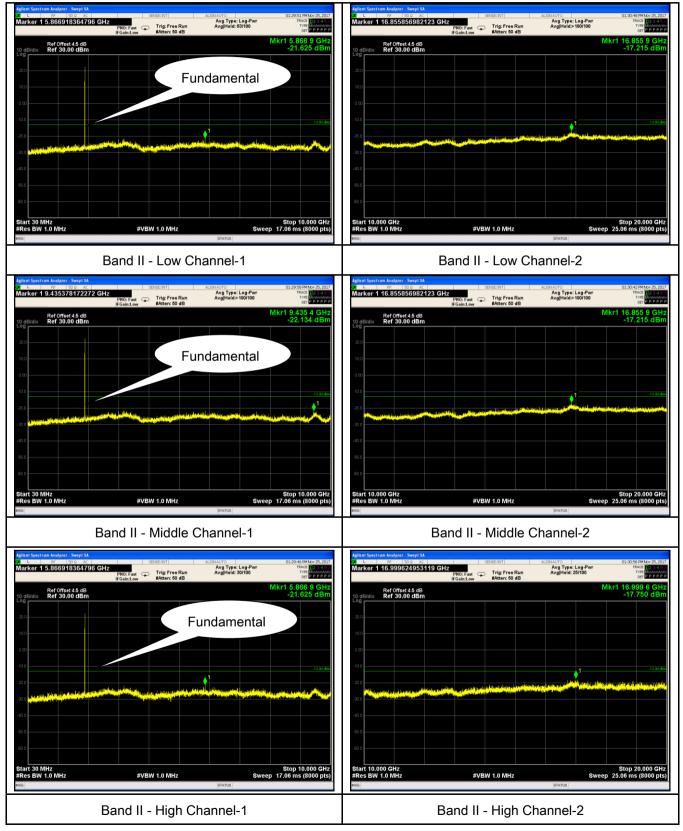


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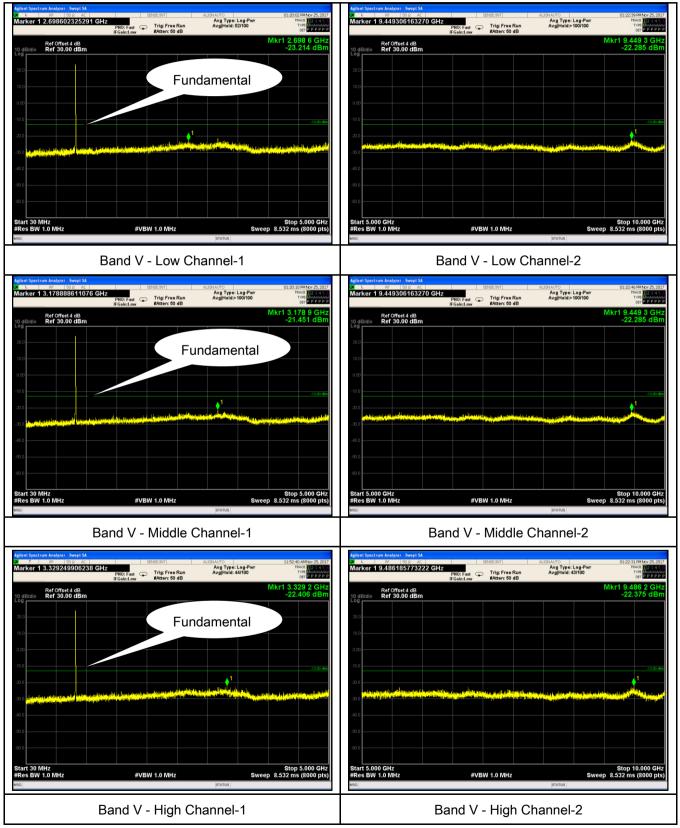




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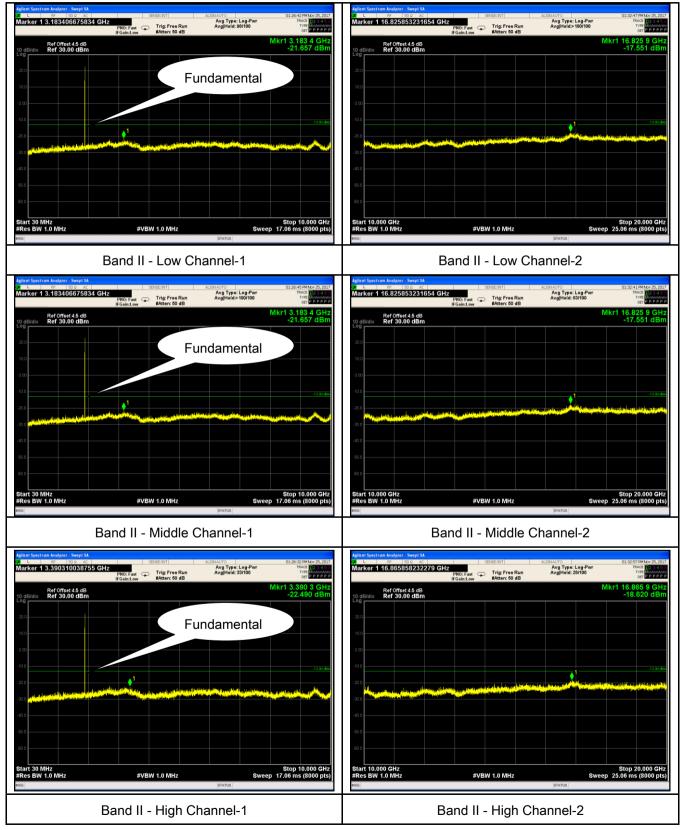
HSDPA:

UMTS-FDD Band V (Part 22H)





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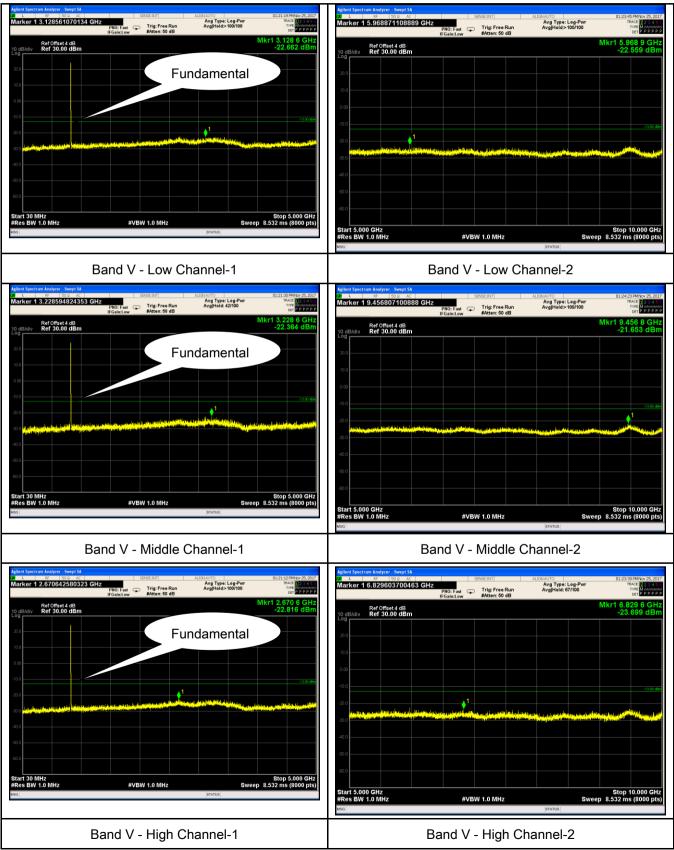




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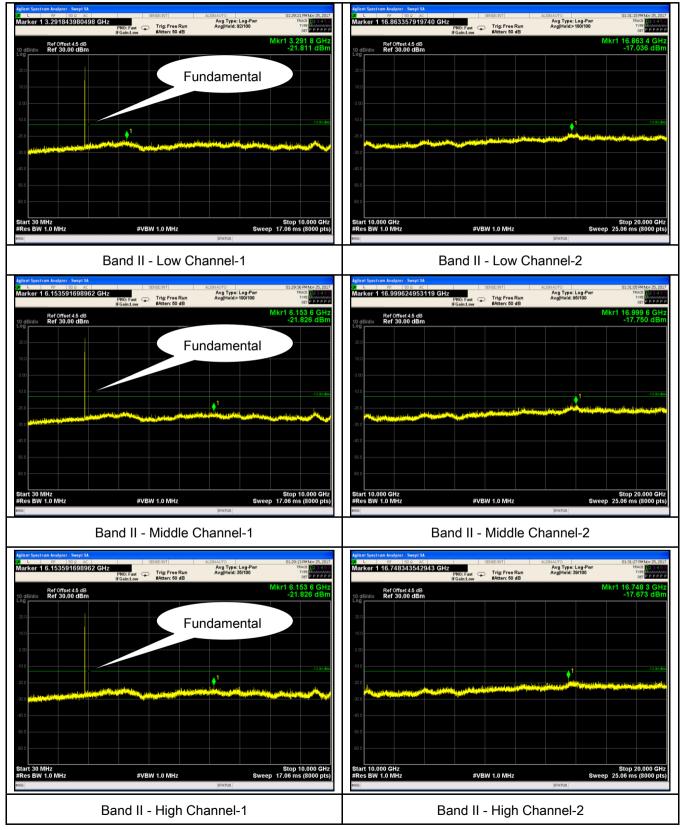
HSUPA:

UMTS-FDD Band V (Part 22H)





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6.6 Spurious Radiated Emissions

Temperature	23 °C
Relative Humidity	55%
Atmospheric Pressure	1012mbar
Test date :	December 04, 2017
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable					
§2.1053, §22.917 & §24.238	a)	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.						
Test setup	EUT& Support Units Turn Table Ground Plane Test Receiver							
Test Procedure	 The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. Sample Calculation: EUT Field Strength = Raw Amplitude (dBµV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used) 							



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			•	
Remark				
Result	Pass	🗖 Fail		
Test Data	✓ Yes	N/A		
Test Plot	Yes (See below)) 🔽 N/A		



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Cellular Band (Part 22H) result

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1648.4	-43.84	V	7.95	0.67	-36.56	-13	-23.56
1648.4	-44.26	Н	7.95	0.67	-36.98	-13	-23.98
847.8	-53.62	V	6.16	0.46	-47.92	-13	-34.92
919.8	-53.79	Н	6.21	0.43	-48.01	-13	-35.01

Low channel

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673.2	-42.74	V	7.95	0.67	-35.46	-13	-22.46
1673.2	-44.85	Н	7.95	0.67	-37.57	-13	-24.57
452.1	-52.75	V	6	0.29	-47.04	-13	-34.04
494.9	-52.08	Н	5.96	0.32	-46.44	-13	-33.44

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1697.6	-42.88	V	7.95	0.68	-35.61	-13	-22.61
1697.6	-44.81	Н	7.95	0.68	-37.54	-13	-24.54
723.7	-52.44	V	6.17	0.45	-46.72	-13	-33.72
534	-53.54	Н	5.99	0.28	-47.83	-13	-34.83

Note:

1, The testing has been conformed to 10*848.8MHz=8,488MHz

2, All other emissions more than 30 dB below the limit

3,GSM voice, GPRS and EGPRS mode were investigated. The results above show only the worse cases

4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.



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PCS Band (Part24E) result

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3700.4	-48.93	V	10.25	1	-39.68	-13	-26.68
3700.4	-49.83	Н	10.25	1	-40.58	-13	-27.58
840	-52.37	V	6.23	0.42	-46.56	-13	-33.56
953.7	-53.58	Н	6.21	0.45	-47.82	-13	-34.82

Low channel

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-47.78	V	10.25	1.01	-38.54	-13	-25.54
3760	-49.65	Н	10.25	1.01	-40.41	-13	-27.41
329	-53.75	V	3.69	0.2	-50.26	-13	-37.26
607.7	-54.41	Н	6.14	0.38	-48.65	-13	-35.65

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3819.6	-48.75	V	10.36	1.02	-39.41	-13	-26.41
3819.6	-49.47	н	10.36	1.02	-40.13	-13	-27.13
571.6	-52.88	V	6.12	0.41	-47.17	-13	-34.17
562.3	-52.57	Н	6.09	0.38	-46.86	-13	-33.86

Note:

1, The testing has been conformed to 10*1909.8MHz=19,098MHz

2, All other emissions more than 30 dB below the limit

3,GSM voice, GPRS and EGPRS mode were investigated. The results above show only the worse cases

4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.



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UMTS-FDD Band V (Part 22H)

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1652.8	-47.29	V	7.95	0.67	-40.01	-13	-27.01
1652.8	-46.1	Н	7.95	0.67	-38.82	-13	-25.82
144.8	-52.92	V	3.71	0.21	-49.42	-13	-36.42
232.3	-52.82	Н	3.68	0.18	-49.32	-13	-36.32

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1670	-45.49	V	7.95	0.67	-38.21	-13	-25.21
1670	-45.51	Н	7.95	0.67	-38.23	-13	-25.23
710.6	-53.35	V	6.13	0.35	-47.57	-13	-34.57
253.4	-52.91	Н	3.72	0.17	-49.36	-13	-36.36

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1693.2	-47.35	V	7.95	0.68	-40.08	-13	-27.08
1693.2	-46.06	Н	7.95	0.68	-38.79	-13	-25.79
680.5	-52.46	V	6.14	0.39	-46.71	-13	-33.71
530.6	-53.32	Н	5.99	0.32	-47.65	-13	-34.65

Note:

1, The testing has been conformed to 10*846.6MHz=8,466MHz

2, All other emissions more than 30 dB below the limit

3,RMC, HSUPA and HSDPA mode were investigated. The results above show only the worse cases

4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.



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UMTS-FDD Band II (Part 24E)

Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3704.8	-48.98	V	10.25	1	-39.73	-13	-26.73
3704.8	-50.29	Н	10.25	1	-41.04	-13	-28.04
873.7	-54	V	6.15	0.44	-48.29	-13	-35.29
555.2	-52.27	Н	5.98	0.33	-46.62	-13	-33.62

Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-49.84	V	10.25	1.01	-40.6	-13	-27.6
3760	-50.28	Н	10.25	1.01	-41.04	-13	-28.04
583.7	-52.75	V	5.95	0.33	-47.13	-13	-34.13
752.4	-54.26	Н	6.21	0.45	-48.5	-13	-35.5

High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3815.2	-48.78	V	10.36	1.02	-39.44	-13	-26.44
3815.2	-49.69	Н	10.36	1.02	-40.35	-13	-27.35
593.7	-54.32	V	5.97	0.34	-48.69	-13	-35.69
361.8	-53.5	Н	6.01	0.33	-47.82	-13	-34.82

Note:

1, The testing has been conformed to 10*1907.6MHz=19,076MHz

2, All other emissions more than 30 dB below the limit

3, RMC , HSUPA and HSDPA mode were investigated. The results above show only the worse cases

4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case



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6.7 Band Edge

Temperature	26 °C
Relative Humidity	57%
Atmospheric Pressure	1025mbar
Test date :	November 25, 2017
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.	K
Test setup	Ba	EUT see Station Spectrum Analyzer	
Procedure	 The EUT was connected to Spectrum Analyzer and Base Station via power divider. The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100. 		
Remark			
Result	🔽 Pa	ss 🗖 Fail	
-	Yes Yes (S	ee below)	



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GSM Voice:

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.997	-20.055	-13
849.005	-18.888	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.997	-17.660	-13
1910.003	-17.900	-13

GPRS:

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.992	-16.894	-13
849.012	-17.764	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.997	-16.831	-13
1910.008	-17.592	-13



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EGPRS (MSC5):

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.997	-18.897	-13
849.003	-19.219	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.996	-16.076	-13
1910.003	-17.592	-13

RMC:

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.19	-20.820	-13
849.02	-26.870	-13

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.02	-26.147	-13
1910.01	-24.269	-13



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HSDPA:

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
822.83	-21.543	-13
849.89	-25.910	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.06	-25.915	-13
1910.01	-24.643	-13

HSUPA:

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
822.83	-20.813	-13
849.02	-27.150	-13

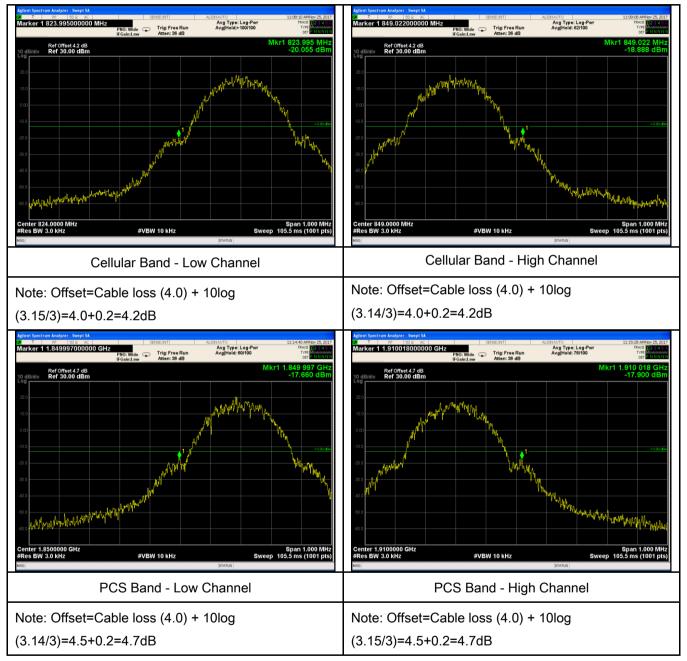
Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.13	-24.131	-13
1910.01	-24.765	-13



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GSM Voice:

Test Plots

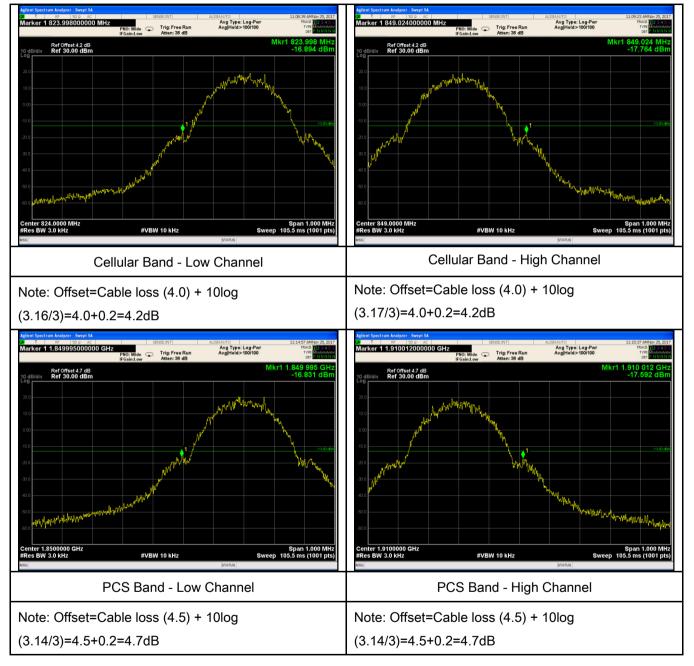




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GPRS:

Test Plots

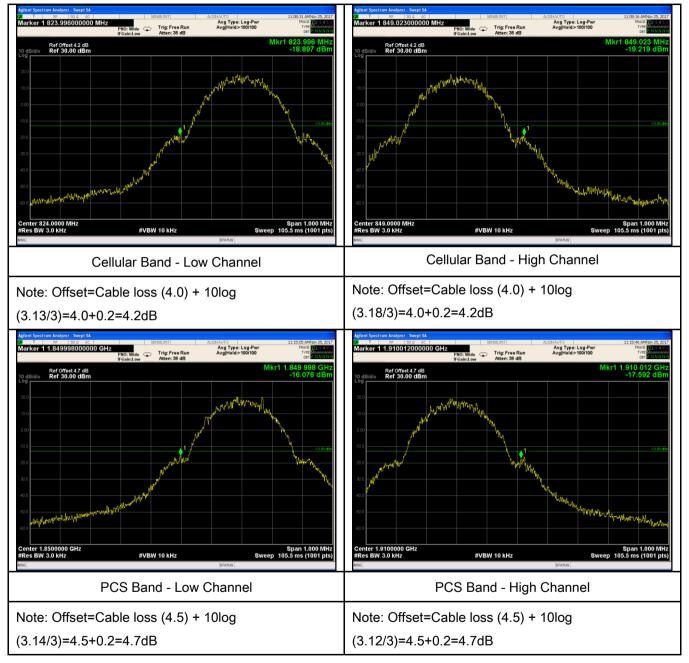




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EGPRS (MSC5):

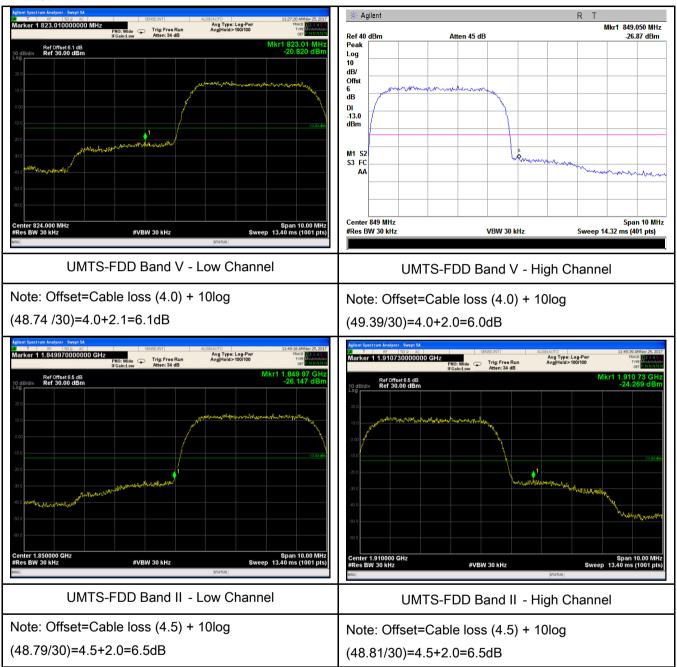
Test Plots





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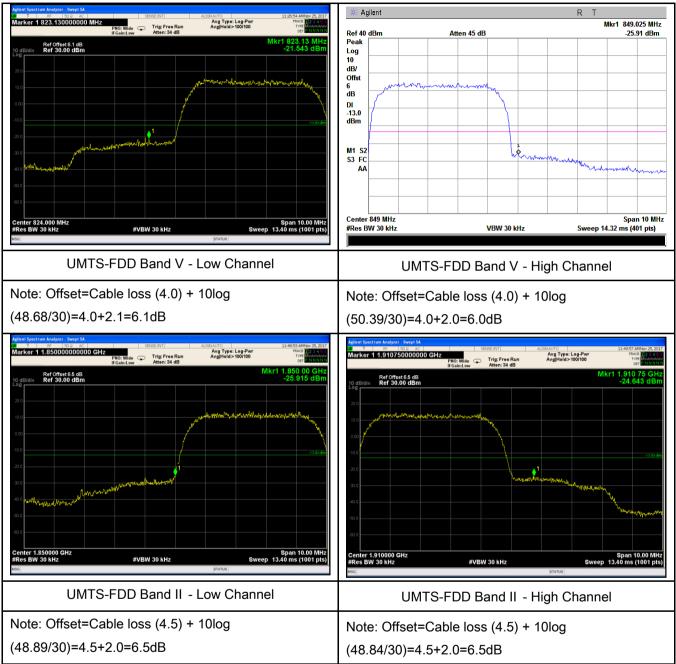
RMC:





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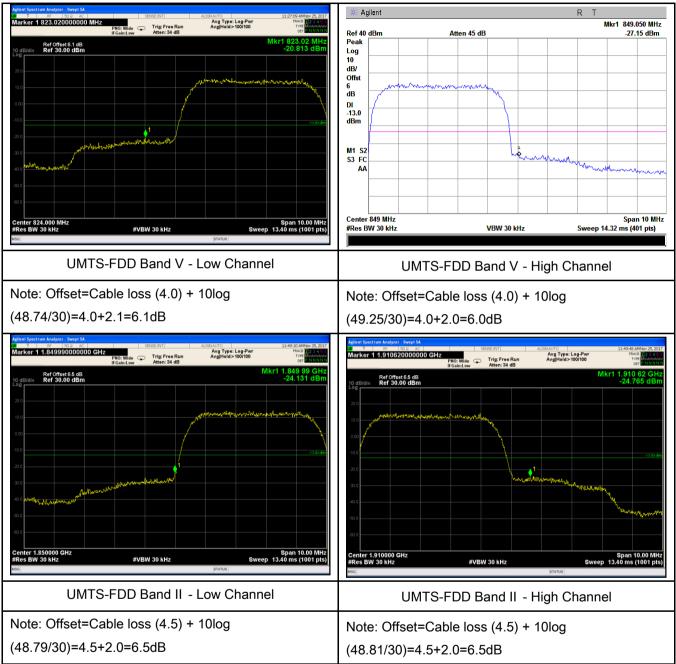
HSDPA:





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HSUPA:





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6.8 Frequency Stability

Temperature	24 °C
Relative Humidity	54%
Atmospheric Pressure	1020mbar
Test date :	November 29, 2017
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement				Applicable
		According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below: Frequency Tolerance for Transmitters in the Public Mobile Services				
		Frequency Range	Base, fixed	Mobile ≥ 3 watts	Mobile ≤ 3 watts	
§2.1055,		(MHz) 25 to 50	(ppm)	(ppm)	(ppm) 50.0	V
§22.355 &	a)	50 to 450	20.0 5.0	20.0 5.0	50.0	
§24.235		45 to 512	2.5	5.0	5.0	
		821 to 896	1.5	2.5	2.5	
		928 to 929	5.0	N/A	N/A	
		929 to 960.	1.5	N/A	N/A	
		2110 to 2220	10.0	N/A	N/A	
		According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.				
Test setup		Base Station Thermal Chamber				

1				
SIF	MIC	Test Report	17071294-FCC-R1	
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Procedure	 A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage. Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency. 			
Remark				
Result	Pass Fa	ail		
Test Data Yes				

Yes (See below)

Test Plot



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GSM Voice:

Cellular Band (Part 22H) result

Middle Channel, f₀ = 836.6 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10		21	0.0251	2.5
0	3.7	14	0.0167	2.5
10		15	0.0179	2.5
20		15	0.0179	2.5
30		17	0.0203	2.5
40		15	0.0179	2.5
50		21	0.0251	2.5
55		19	0.0227	2.5
25	4.2	17	0.0203	2.5
	3.5	19	0.0227	2.5

PCS Band (Part 24E) result

Middle Channel, f₀ = 1880 MHz					
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	
-10		19	0.0101	2.5	
0		18	0.0096	2.5	
10	3.7	15	0.0080	2.5	
20		13	0.0069	2.5	
30		13	0.0069	2.5	
40		13	0.0069	2.5	
50		22	0.0117	2.5	
55		17	0.0090	2.5	
25	4.2	21	0.0112	2.5	
	3.5	20	0.0106	2.5	



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RMC:

UMTS-FDD Band V (Part 22H)

Middle Channel, f₀ = 835 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10		20	0.0240	2.5
0	3.7	18	0.0216	2.5
10		17	0.0204	2.5
20		15	0.0180	2.5
30		14	0.0168	2.5
40		17	0.0204	2.5
50		22	0.0263	2.5
55		21	0.0251	2.5
25	4.2	18	0.0216	2.5
	3.5	18	0.0216	2.5

Middle Channel, f₀ = 1880 MHz					
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	
-10		21	0.0112	2.5	
0	3.7	18	0.0096	2.5	
10		17	0.0090	2.5	
20		13	0.0069	2.5	
30		15	0.0080	2.5	
40		17	0.0090	2.5	
50		20	0.0106	2.5	
55		21	0.0112	2.5	
25	4.2	20	0.0106	2.5	
	3.5	19	0.0101	2.5	