FCC Test Report

Report No.: AGC00377170303FE02

FCC ID	:	2AHZ5HAFURYUMAX
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Smart Phone
BRAND NAME	:	HAFURY
MODEL NAME	:	UMAX
CLIENT	:	Shenzhen Huafurui Technology Co., Ltd.
DATE OF ISSUE	:	Apr. 10, 2017
STANDARD(S)	:	FCC Part 22H & 24E&27(L) Rules
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd.

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr. 10, 2017	Valid	Original Report

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1. VERIFICATION OF COMPLIANCE

Applicant	Shenzhen Huafurui Technology Co., Ltd.
Address	Unit 1401 14/F, Jin qi zhi gu mansion Liu xian street ,Xili, Nan shan district Shenzhen, China.
Manufacturer	Shenzhen Huafurui Technology Co., Ltd.
Address	Unit 1401 14/F, Jin qi zhi gu mansion Liu xian street ,Xili, Nan shan district Shenzhen, China.
Product Designation	Smart Phone
Brand Name	HAFURY
Test Model	UMAX
Date of test	Mar. 25, 2017~Apr. 08, 2017
Deviation	None
Condition of Test Sample	Normal

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA- 603-D-2010. The sample tested as described in this report is in compliance with the FCC Rules Part 22H& 24E and 27(L).

The test results of this report relate only to the tested sample identified in this report.

Tested By	Donjon Huang(Huang Dongyang)	Apr. 08, 2017
Reviewed By	Bart Xie(Xie Xiaobin)	Apr. 10, 2017
Approved By	Solger Zhang(Zhang Hongyi) Authorized Officer	Apr. 10, 2017

2. GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Smart Phone
Hardware version:	V1.1
Software version:	CUBOT_HAFURY_UMAX_V01_20170210
Frequency Bands:	☒GSM 850 ☒PCS 1900 (U.S. Bands) ☒GSM 900 ☒DCS 1800 (Non-U.S. Bands) ☒UMTS FDD Band II ☒UMTS FDD Band V ☒UMTS FDD Band IV (U.S. Bands) ☒UMTS FDD Band I ☐UMTS FDD Band VIII (Non-U.S. Bands)
Antenna:	PIFA Antenna
Type of Modulation	GSM / GPRS : GMSK WCDMA : QPSK
Antenna gain	GSM850: -6.3Bi ;PCS1900: -3.87dBi Band II: -3.87dBi; Band IV: -4.56dBi; Band V: -6.30dBi
Power Supply:	DC 3.8V by battery
Battery parameter:	DC 3.8V/4100mAh
Adapter Input:	AC100-240V, 50-60Hz, 0.15A
Adapter Output:	DC5V,1A
Dual Card:	WCDMA / GSM Card Slot GSM Card Slot
GPRS Class	12
Extreme Vol. Limits:	DC3.4 V to 4.35V (Normal: DC3.8 V)
Extreme Temp. Tolerance	-10℃ to +50℃
*** Note: The High Voltage DC4.35V and Low Voltage DC3.4V were declared by manufacturer, The EUT couldn't be operating normally with higher or lower voltage. Other functions have been performed according to verification procedure except for Bluetooth and MS function. Card 1 can't transmit with Card 2 simultaneously.	

***** Note:** 1.The maximum power levels are GSM for MCS-4**:** GMSK link, and RMC 12.2kbps mode for WCDMA band II, WCDMA band V, WCDMA IV only these modes were used for all tests.

2. We found out the test mode with the highest power level after we analyze all the data rates. So we chose the worst case as a representative.

GSM/WCDMA Card Slot :

	Maximum ERP/EIRP (dBm)	Max. Conducted Power (dBm)	Max. Average Burst Power (dBm)
GSM 850	30.49	32.04	31.54
PCS 1900	28.28	28.82	28.14
UMTS BAND II	20.24	23.52	20.66
UMTS BAND IV	19.45	23.21	20.61
UMTS BAND V	19.77	23.20	19.80

GSM Card Slot :

	Maximum ERP/EIRP (dBm)	Max. Conducted Power (dBm)	Max. Average Burst Power (dBm)
GSM 850	30.34	31.98	31.45
PCS 1900	28.21	28.75	28.10

2.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AHZ5HAFURYUMAX**, filing to comply with the FCC Part 22H&24E&27L requirements.

2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI/TIA-603-D-2010, and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.
KDB 971168 D01 Power Meas License Digital Systems v02r02

2.4 TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China,
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents of ANSI/TIA-603-D-2010.

2.5 MEASUREMENT INSTRUMENTS

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9168	D69250	Mar 1, 2016	Feb 28, 2018
Trilog Broadband Antenna(substituted antenna) (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 3, 2016	July 2, 2018
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96221	July 3, 2016	July 2, 2017
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 5, 2016	June 4, 2017
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 5, 2016	June 4, 2017
Spectrum analyzer	Agilent	E4407B	MY46185649	June 5, 2016	June 4, 2017
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 10, 2016	July 9, 2017
Horn Antenna(substituted antenna) (1G-18GHz)	ETS LINDGREN	3117	00034609	Mar 1, 2016	Feb 28, 2018

Spectrum Analyzer	Agilent	E4411B	MY4511453	July 3, 2016	July 2, 2017
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 6, 2016	July 5, 2017
RF Cable	SCHWARZBECK	AK9515H	96220	July 7, 2016	July 6, 2017
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 5, 2016	June 4, 2017
Artificial Mains Network	Narda	L2-16B	000WX31025	July 7, 2016	July 6, 2017
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 7, 2016	July 6, 2017
RF Cable	SCHWARZBECK	AK9515E	96222	July 3, 2016	July 2, 2017
Shielded Room	CHENGYU	843	PTS-002	June 5, 2016	June 4, 2017
COMMUNICATION TESTER	AGILENT	8960	GB46490550	July 24,2016	July 23, 2017
RF attenuator	N/A	RFA20db	68	N/A	N/A
Signal Generator	AGILENT	N5182A	MY50140530	Oct 10,2016	Oct 09,2017
Signal Generator(substituted equipment)	AGILENT	E8257D	MY45141029	Oct 10,2016	Oct 09,2017

2.6 SPECIAL ACCESSORIES

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

3.3 GENERAL TECHNICAL REQUIREMENTS

Item Number	Item Description		FCC Rules
1	Output Power	Conducted output power	2.1046/22.913(a) (2) / 24.232 (c) /27.50(d)(2)
		Radiated output power	
2	Peak-to-Average Ratio	Peak-to-Average Ratio	24.232(d) /27.50(d)(5)
3	Spurious Emission	Conducted spurious emission	2.1051 / 22.917 / 24.238/27.53(h)
		Radiated spurious emission	
4	Mains Conducted Emission		15.107 / 15.207
5	Frequency Stability		2.1055/22.355 /24.235/27.54
6	Occupied Bandwidth		2.1049 (h)(i)
7	Emission Bandwidth		22.917(a)/24.238(a) /27.53(h)
8	Band Edge		22.917(a)/24.238(a) /27.53(h)

3.4 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	Smart Phone	UMAX	2AHZ5HAFURYUMAX	EUT
2	Adapter	UMAX	DC5V /1A	Accessory
3	Battery	UMAX	DC3.8V/4100mAh	Accessory
4	Earphone	N/A	N/A	Accessory
5	USB Cable	N/A	N/A	Accessory

***Note: All the accessories have been used during the test. The following “EUT” in setup diagram means EUT system.

4. SUMMARY OF TEST RESULTS

Item Number	Item Description		FCC Rules	Result
1	Output Power	Conducted Output Power	2.1046/22.913(a) (2) / 24.232 (c) /27.50(d)(2)	Pass
		Radiated Output Power		
2	Peak-to-Average Ratio	Peak-to-Average Ratio	24.232(d) /27.50(d)(5)	Pass
3	Spurious Emission	Conducted Spurious Emission	2.1051 / 22.917 / 24.238/27.53(h)	Pass
		Radiated Spurious Emission		
4	Mains Conducted Emission		15.107 / 15.207	Pass
5	Frequency Stability		2.1055/22.355 /24.235/27.54	Pass
6	Occupied Bandwidth		2.1049 (h)(i)	Pass
7	Emission Bandwidth		22.917(a)/24.238(a) /27.53(h)	Pass
8	Band Edge		22.917(a)/24.238(a) /27.53(h)	Pass

5. DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMU 200) to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GSM and PCS frequency band.

*****Note:** 1.GSM/GPRS 850, GSM/GPRS 1900, WCDMA/HSPA band II, WCDMA/HSPA band V, WCDMA band VI mode have been tested during the test.

2. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions

3. All antenna port conducted emissions testing was performed on a test bench with the antenna Port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

6. OUTPUT POWER

6.1 CONDUCTED OUTPUT POWER

6.1.1 MEASUREMENT METHOD

The transmitter output port was connected to base station.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Measure the maximum burst average power and average power for other modulation signal.

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes (GSM/GPRS850, GSM/GPRS1900, WCDMA/HSPA band II, WCDMA/HSPA band V, WCDMA band VI) at 3 typical channels (the Top Channel, the Middle Channel and the Bottom Channel) for each band.

6.1.2 MEASUREMENT RESULT

Conducted Output Power Limits for GSM850		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM	33 dBm (2W)	- 2
Conducted Output Power Limits for PCS1900		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM	30 dBm (1W)	- 2
Conducted Output Power Limits for UMTS band II		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
WCDMA	24 dBm (0.25W)	- 2
Conducted Output Power Limits for UMTS band IV		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
WCDMA	24 dBm (0.25W)	- 2
Conducted Output Power Limits for UMTS band V		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
WCDMA	24 dBm (0.25W)	- 2

GSM 850:

Mode	Frequency (MHz)	Reference Power	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GSM850	824.2	33	32.04	-0.96	31.54	-9	22.54
	836.6	33	31.96	-1.04	31.46	-9	22.46
	848.8	33	31.66	-1.34	31.18	-9	22.18
GPRS850 (1 Slot)	824.2	33	31.67	-1.33	31.04	-9	22.04
	836.6	33	31.27	-1.73	30.61	-9	21.61
	848.8	33	31.58	-1.42	30.91	-9	21.91
GPRS850 (2 Slot)	824.2	30	28.87	-1.13	28.29	-6	22.29
	836.6	30	28.64	-1.36	27.90	-6	21.90
	848.8	30	28.68	-1.32	28.04	-6	22.04
GPRS850 (3 Slot)	824.2	28.23	27.31	-0.92	26.80	-4.26	22.54
	836.6	28.23	27.42	-0.81	26.97	-4.26	22.71
	848.8	28.23	27.41	-0.82	26.84	-4.26	22.58
GPRS850 (4 Slot)	824.2	27	26.02	-0.98	25.33	-3	22.33
	836.6	27	26.02	-0.98	25.20	-3	22.20
	848.8	27	25.69	-1.31	25.18	-3	22.18

PCS 1900:

Mode	Frequency (MHz)	Reference Power	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GSM1900	1850.2	30	28.72	-1.28	28.10	-9	19.10
	1880	30	28.54	-1.46	27.98	-9	18.98
	1909.8	30	**28.82**	-1.18	**28.14**	-9	19.14
GPRS1900 (1 Slot)	1850.2	30	28.08	-1.92	28.02	-9	19.02
	1880	30	28.12	-1.88	28.18	-9	19.18
	1909.8	30	28.26	-1.74	27.91	-9	18.91
GPRS1900 (2 Slot)	1850.2	27	26.07	-0.93	25.62	-6	19.62
	1880	27	26.08	-0.92	25.75	-6	19.75
	1909.8	27	26.13	-0.87	25.61	-6	19.61
GPRS1900 (3 Slot)	1850.2	25.23	24.32	-0.91	24.14	-4.26	19.88
	1880	25.23	24.44	-0.79	23.81	-4.26	19.55
	1909.8	25.23	24.42	-0.81	23.68	-4.26	19.42

GPRS1900 (4 Slot)	1850.2	24	23.11	-0.89	22.58	-3	19.58
	1880	24	23.13	-0.87	22.53	-3	19.53
	1909.8	24	23.16	-0.84	22.77	-3	19.77

UMTS BAND II

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power
WCDMA 1900 RMC	1852.6	24	**23.52**	-0.48	**20.66**
	1880	24	23.48	-0.52	20.50
	1907.4	24	23.38	-0.62	20.58
WCDMA 1900 AMR	1852.6	24	23.12	-0.88	20.32
	1880	24	23.13	-0.87	20.44
	1907.4	24	22.91	-1.09	20.32
HSDPA Subtest 1	1852.6	24	22.89	-1.11	20.06
	1880	24	22.78	-1.22	19.84
	1907.4	24	22.56	-1.44	19.96
HSDPA Subtest 2	1852.6	24	22.69	-1.31	19.97
	1880	24	22.90	-1.10	19.71
	1907.4	24	22.48	-1.52	19.91
HSDPA Subtest 3	1852.6	24	22.90	-1.10	19.57
	1880	24	22.71	-1.29	19.83
	1907.4	24	22.36	-1.64	19.91
HSDPA Subtest 4	1852.6	24	22.69	-1.31	19.89
	1880	24	22.95	-1.05	19.71
	1907.4	24	22.52	-1.48	19.95
HSUPA Subtest 1	1852.6	24	22.47	-1.53	19.91
	1880	24	22.65	-1.35	19.80
	1907.4	24	22.43	-1.57	19.75
HSUPA Subtest 2	1852.6	24	22.42	-1.58	19.27
	1880	24	22.40	-1.60	19.30
	1907.4	24	22.30	-1.70	19.34
HSUPA Subtest 3	1852.6	24	22.04	-1.96	19.16
	1880	24	21.85	-2.15	19.16
	1907.4	24	22.35	-1.65	19.09

HSUPA Subtest 4	1852.6	24	22.51	-1.49	19.56
	1880	24	22.64	-1.36	19.55
	1907.4	24	22.34	-1.66	19.78
HSUPA Subtest 5	1852.6	24	22.60	-1.40	19.86
	1880	24	22.78	-1.22	19.54
	1907.4	24	22.26	-1.74	19.85

UMTS BAND IV

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power
WCDMA 1700 RMC	1712.4	24	23.09	-0.91	20.44
	1732.6	24	**23.21**	-0.79	**20.61**
	1752.6	24	23.07	-0.93	20.56
WCDMA 1700 AMR	1712.4	24	22.28	-1.72	19.70
	1732.6	24	22.40	-1.60	19.87
	1752.6	24	22.26	-1.74	18.67
HSDPA Subtest 1	1712.4	24	22.15	-1.85	19.54
	1732.6	24	22.10	-1.90	19.44
	1752.6	24	22.12	-1.88	19.68
HSDPA Subtest 2	1712.4	24	22.28	-1.72	19.31
	1732.6	24	22.34	-1.66	19.59
	1752.6	24	22.19	-1.81	19.45
HSDPA Subtest 3	1712.4	24	21.99	-2.01	19.24
	1732.6	24	21.96	-2.04	19.42
	1752.6	24	21.94	-2.06	19.42
HSDPA Subtest 4	1712.4	24	21.95	-2.05	19.40
	1732.6	24	21.92	-2.08	19.10
	1752.6	24	21.69	-2.31	19.18
HSUPA Subtest 1	1712.4	24	22.31	-1.69	19.27
	1732.6	24	22.27	-1.73	19.23
	1752.6	24	22.14	-1.86	19.13
HSUPA Subtest 2	1712.4	24	22.09	-1.91	18.97
	1732.6	24	22.14	-1.86	19.24
	1752.6	24	22.02	-1.98	19.09

HSUPA Subtest 3	1712.4	24	22.08	-1.92	19.25
	1732.6	24	22.09	-1.91	19.30
	1752.6	24	21.97	-2.03	19.28
HSUPA Subtest 4	1712.4	24	21.89	-2.11	19.22
	1732.6	24	21.65	-2.35	19.54
	1752.6	24	21.92	-2.08	19.52
HSUPA Subtest 5	1712.4	24	21.76	-2.24	19.31
	1732.6	24	21.66	-2.34	19.35
	1752.6	24	21.59	-2.41	19.38

UMTS BAND V

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power
WCDMA 850 RMC	826.6	24	23.14	-1.12	19.77
	836.4	24	22.98	-1.22	19.55
	846.4	24	**23.20**	-1.39	**19.80**
WCDMA 850 AMR	826.6	24	22.16	-1.04	19.64
	836.4	24	22.32	-1.26	19.59
	846.4	24	22.10	-1.51	19.48
HSDPA Subtest 1	826.6	24	22.62	-1.01	19.51
	836.4	24	22.13	-1.62	19.20
	846.4	24	22.00	-2.10	18.88
HSDPA Subtest 2	826.6	24	21.72	-1.48	19.41
	836.4	24	22.08	-1.56	19.30
	846.4	24	21.78	-1.56	19.16
HSDPA Subtest 3	826.6	24	21.45	-1.89	19.72
	836.4	24	21.60	-2.05	19.29
	846.4	24	22.49	-1.07	19.27
HSDPA Subtest 4	826.6	24	22.63	-1.05	19.27
	836.4	24	22.24	-1.49	19.36
	846.4	24	21.37	-1.97	19.09
HSUPA Subtest 1	826.6	24	21.91	-1.39	19.10
	836.4	24	21.92	-1.34	19.37
	846.4	24	21.79	-1.42	19.16

HSUPA Subtest 2	826.6	24	22.56	-1.34	19.23
	836.4	24	21.56	-1.88	19.24
	846.4	24	22.13	-1.52	18.81
HSUPA Subtest 3	826.6	24	22.34	-1.26	19.31
	836.4	24	21.96	-1.44	19.21
	846.4	24	22.03	-1.75	19.33
HSUPA Subtest 4	826.6	24	21.99	-1.68	19.26
	836.4	24	22.03	-1.54	19.28
	846.4	24	22.23	-1.40	19.31
HSUPA Subtest 5	826.6	24	21.87	-1.64	19.27
	836.4	24	22.00	-1.89	19.25
	846.4	24	21.86	-1.48	19.10

According to 3GPP 25.101 sub-clause 6.2.2 , the maximum output power is allowed to be reduced by following the table.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
Note: CM=1 for β_c/β_d=12/15, β_{hs}/β_c=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensate for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

6.2 RADIATED OUTPUT POWER

6.2.1 MEASUREMENT METHOD

The measurements procedures specified in ANSI/TIA-603-D-2010 were applied.

1. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signal operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT operating at its maximum duty cycle, at maximum power, and at the approximate frequencies.
2. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
3. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as ARpl=Pin + 2.15 - Pr. The ARpl is the attenuation of “reference path loss”, and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl
4. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
5. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
6. The EUT is then put into continuously transmitting mode at its maximum power level.
7. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.
8. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).
9. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi...

6.2.2 PROVISIONS APPLICABLE

This is the test for the maximum radiated power from the EUT. Rule Part 24.232(b) and 27.50(d)(4) specifies, “Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power” and 24.232(c) and 27.50(d)(4) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.” Rule Part 22.913(a) specifies “Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.”

Mode	Nominal Peak Power
GSM 850	<=38.45 dBm (7W)
PCS 1900	<=33 dBm (2W)
UMTS BAND II	<=33 dBm (2W)
UMTS BAND IV	<=33 dBm (2W)
UMTS BAND V	<=38.45 dBm (7W)

6.2.3 MEASUREMENT RESULT

Radiated Power (E.I.R.P) for GSM 850				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P(dBm)	Polarization Of Max. ERP	
GSM 850	824.2	30.14	Horizontal	Pass
	836.6	**30.49**	Horizontal	Pass
	848.8	30.42	Horizontal	Pass
	824.2	28.33	Vertical	Pass
	836.6	28.51	Vertical	Pass
	848.8	22.21	Vertical	Pass

Radiated Power (E.I.R.P) for PCS 1900				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P(dBm)	Polarization Of Max. E.I.R.P.	
PCS 1900	1850.2	27.94	Horizontal	Pass
	1880.0	27.44	Horizontal	Pass
	1909.8	**28.28**	Horizontal	Pass
	1850.2	25.54	Vertical	Pass
	1880.0	25.20	Vertical	Pass
	1909.8	25.52	Vertical	Pass

Radiated Power (E.I.R.P) for UMTS band II				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P (dBm)	Polarization Of Max. E.I.R.P.	
UMTS Band II	1852.6	**20.24**	Horizontal	Pass
	1880	19.90	Horizontal	Pass
	1907.4	19.41	Horizontal	Pass
	1852.6	18.71	Vertical	Pass
	1880	18.77	Vertical	Pass
	1907.4	18.86	Vertical	Pass

Radiated Power (E.I.R.P) for UMTS band IV				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P (dBm)	Polarization Of Max. E.I.R.P.	
UMTS Band IV	1712.4	18.97	Horizontal	Pass
	1732.6	**19.45**	Horizontal	Pass
	1752.6	18.93	Horizontal	Pass
	1712.4	16.69	Vertical	Pass
	1732.6	16.98	Vertical	Pass
	1752.6	16.48	Vertical	Pass

Radiated Power (E.I.R.P) for UMTS band V				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P (dBm)	Polarization Of Max. E.I.R.P.	
UMTS Band V	826.6	19.71	Horizontal	Pass
	836.4	**19.77**	Horizontal	Pass
	846.4	19.73	Horizontal	Pass
	826.6	17.43	Vertical	Pass
	836.4	17.22	Vertical	Pass
	846.4	17.67	Vertical	Pass

Note: Above is the worst mode data.

6.3. PEAK-TO-AVERAGE RATIO

6.3.1 MEASUREMENT METHOD

Use one of the procedures presented in 4.1 to measure the total peak power and record as PPk. Use one of the applicable procedures presented 4.2 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

PAPR (dB) = PPk (dBm) - PAvg (dBm).

6.3.2 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

6.3.3 MEASUREMENT RESULT

Modes	GSM850(GSM)		
Channel	128	190	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.6	848.8
Peak-To-Average Ratio (dB)/GSM	0.51	0.50	0.52

Modes	PCS 1900 (GSM)		
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency (MHz)	1850.2	1880	1909.8
Peak-To-Average Ratio (dB)/GSM	0.52	0.51	0.53

Modes	UMTS BAND II		
Channel	9663	9800	9937
	(Low)	(Mid)	(High)
Frequency (MHz)	1852.6	1880	1907.4
Peak-To-Average Ratio (dB)	2.58	2.47	2.55

Modes	UMTS BAND IV		
Channel	1887	1987	2087
	(Low)	(Mid)	(High)
Frequency (MHz)	1712.4	1732.6	1752.6
Peak-To-Average Ratio (dB)	2.75	2.63	2.70

Modes	UMTS BAND V		
Channel	4358	4407	4457
	(Low)	(Mid)	(High)
Frequency (MHz)	826.6	836.6	846.4
Peak-To-Average Ratio (dB)	2.42	2.77	2.31

7. OCCUPIED BANDWIDTH

7.1 TEST OVERVIEW

1. The Occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper Frequency limits, the mean power radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.
2. RBW=1~5% of the expected OBW, VBW>=3 x RBW, Detector=Peak, Trace mode=max hold, Sweep=auto couple, and the trace was allowed to stabilize.

7.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

7.3 Measurement Result

APPENDIX A:BANDWIDTH

Test Results

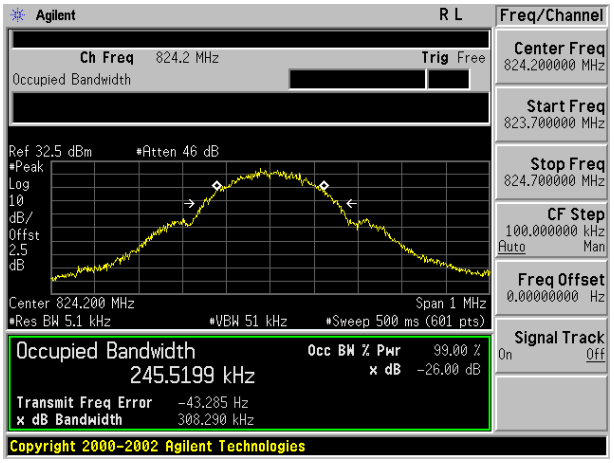
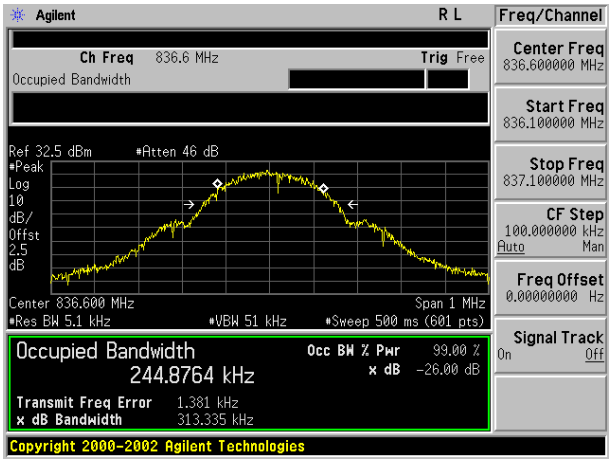
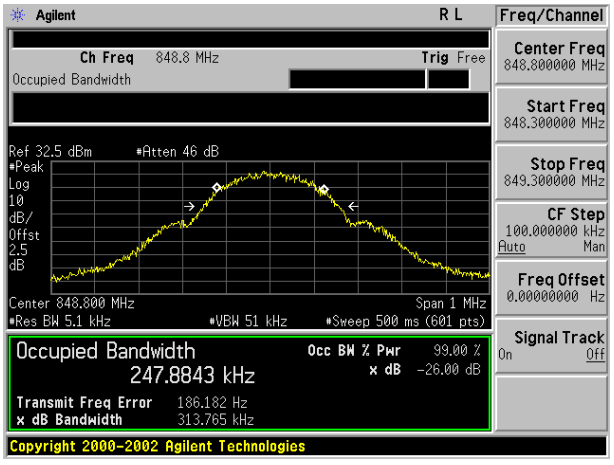
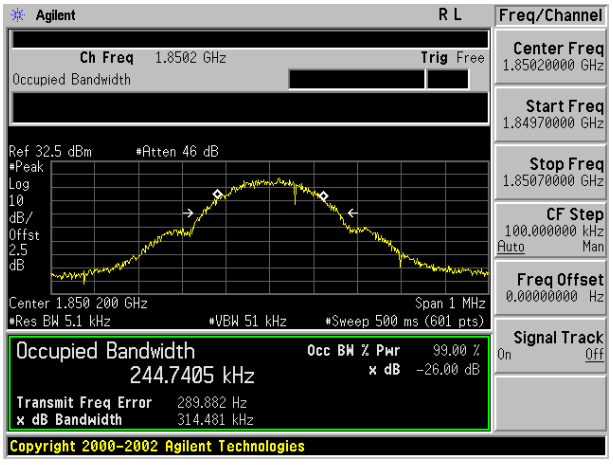
Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
GSM850	GSM	LCH	245.52	308.29	PASS
		MCH	244.88	313.34	PASS
		HCH	247.88	313.76	PASS

Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
GSM1900	GSM	LCH	244.74	314.48	PASS
		MCH	244.43	311.63	PASS
		HCH	245.49	312.28	PASS

For GSM

Test Band=GSM850/GSM1900

Test Mode=GSM

GSM 850-LCH	GSM 850-MCH
	
GSM 850-HCH	**GSM 1900-LCH**
	
GSM 1900-MCH	**GSM 1900-HCH**

Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
WCDMA 850	UMTS	LCH	4141.6	4696	PASS
		MCH	4156.9	4692	PASS
		HCH	4145.2	4676	PASS

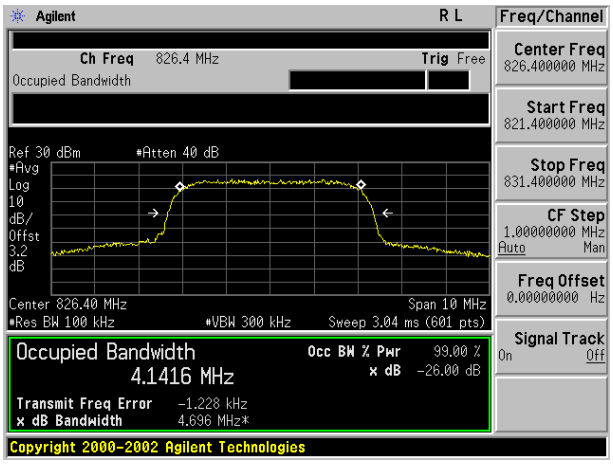
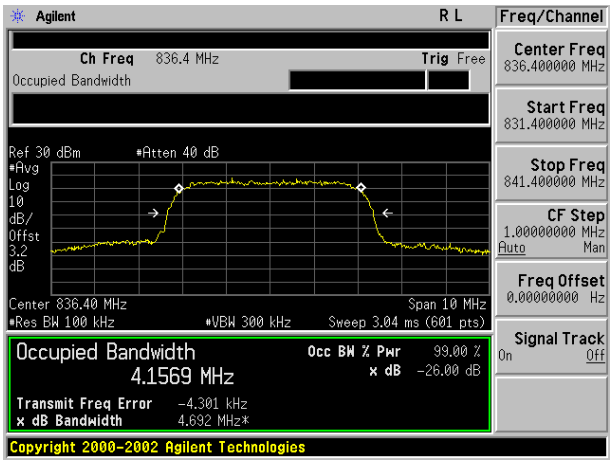
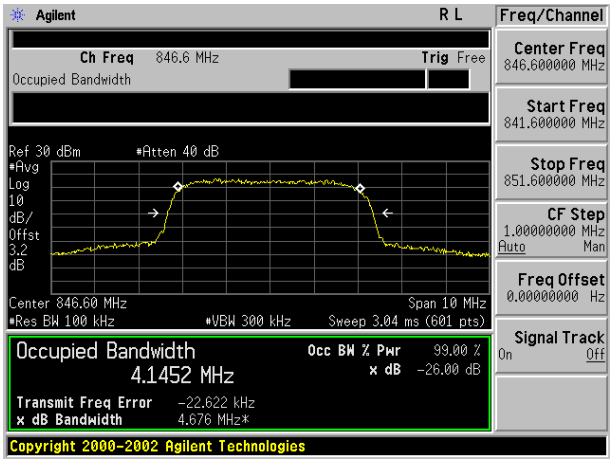
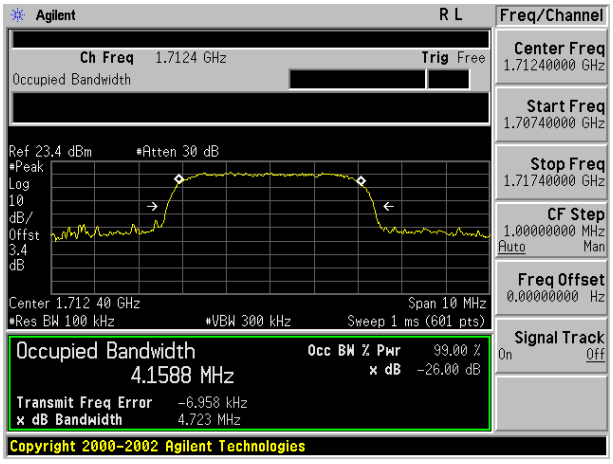
Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
WCDMA 1700	UMTS	LCH	4158.8	4723	PASS
		MCH	4172.5	4719	PASS
		HCH	4152.5	4711	PASS

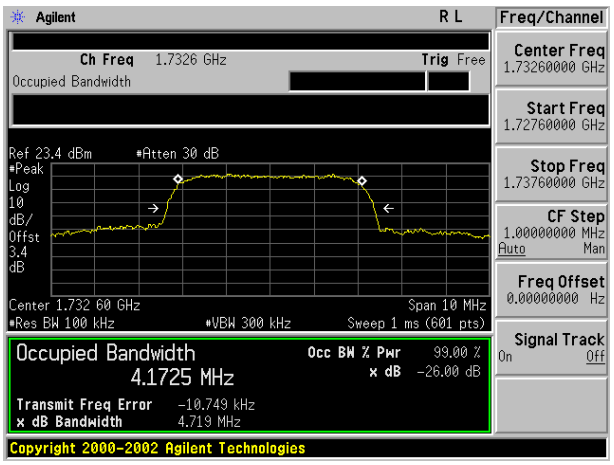
Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
WCDMA 1900	UMTS	LCH	4168.5	4728	PASS
		MCH	4171.7	4712	PASS
		HCH	4199.6	4755	PASS

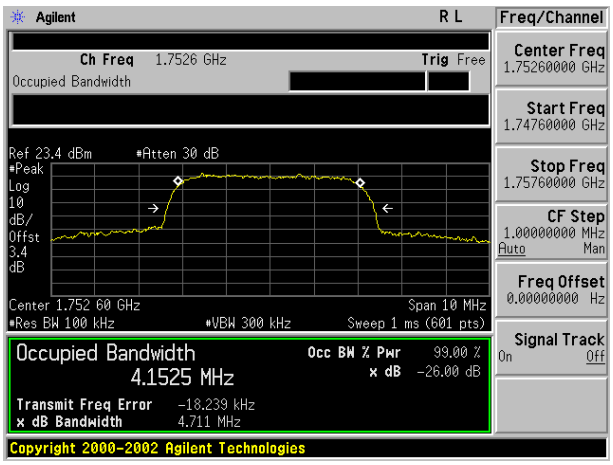
For WCDMA

Test Band=WCDMA850/WCDMA1900

Test Mode=UMTS

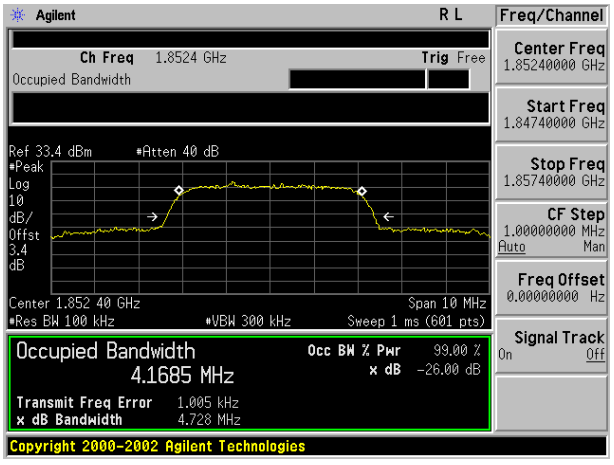
WCDMA 850-LCH	WCDMA 850-MCH
	
WCDMA 850-HCH	WCDMA 1700-LCH
	
WCDMA 1700-MCH	WCDMA 1700-HCH

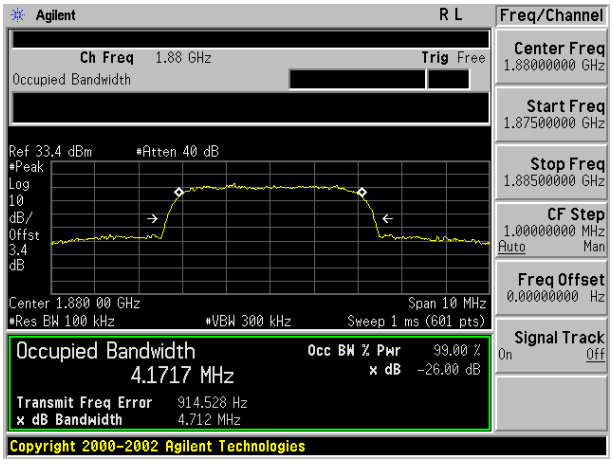




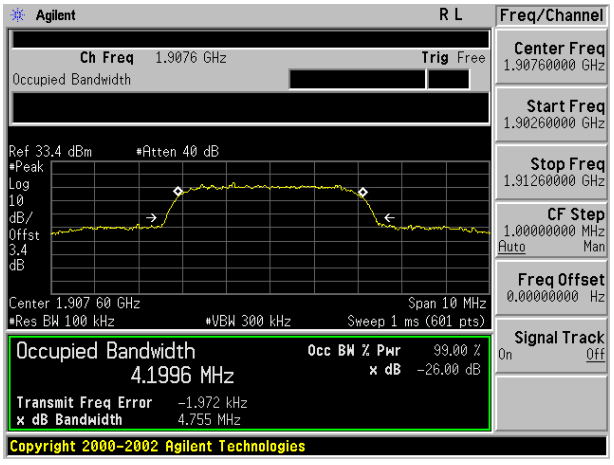
WCDMA 1900-LCH

WCDMA 1900-MCH





WCDMA 1900-HCH



8. BAND EDGE

8.1 measurement method

1. All out of band emissions are measured with an analyzer spectrum connected to the antenna terminal of the EUT while the EUT at its maximum duty cycle, at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration
2. The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.
3. Start and stop frequency were set such that the band edge would be placed in the center of the plot.
4. Span was set large enough so as to capture all out of band emissions near the band edge.
5. RBW>1% of the emission bandwidth, VBW >=3 x RBW, Detector=RMS, Number of points>=2 x Span/RBW, Trace mode=max hold, Sweep time=auto couple, and the trace was allowed to stabilize

8.2 PROVISIONS APPLICABLE

As Specified in FCC rules of 22.917(a) & 24.238(a) & /27.53(h) and KDB 971168 V02r02

8.3 Measurement Result

APPENDIX B: BAND EDGES COMPLIANCE

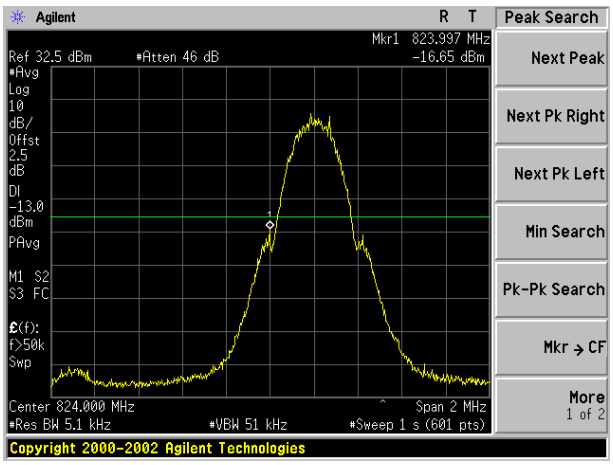
Test Results

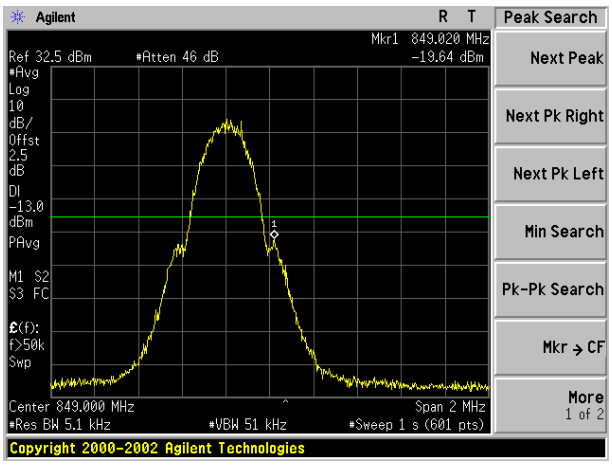
For GSM

Test Band=GSM850/GSM1900

Test Mode=GSM

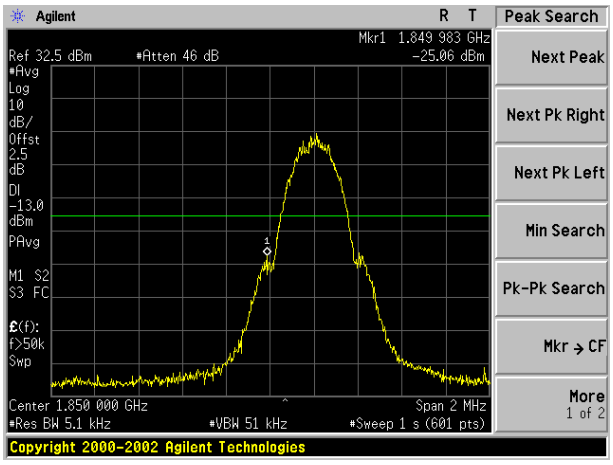
GSM 850-LCH	GSM 850-HCH

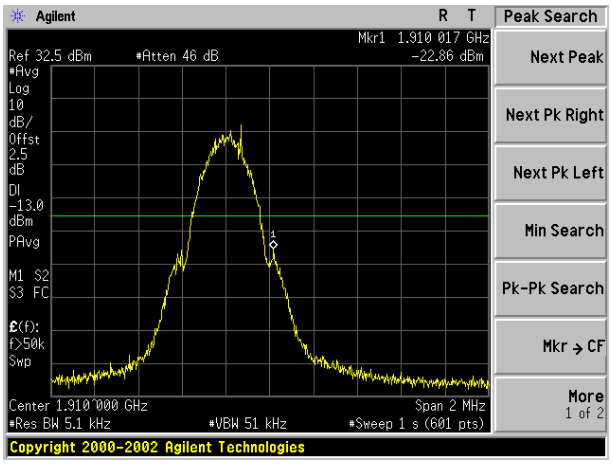




GSM 1900-LCH

GSM 1900-HCH

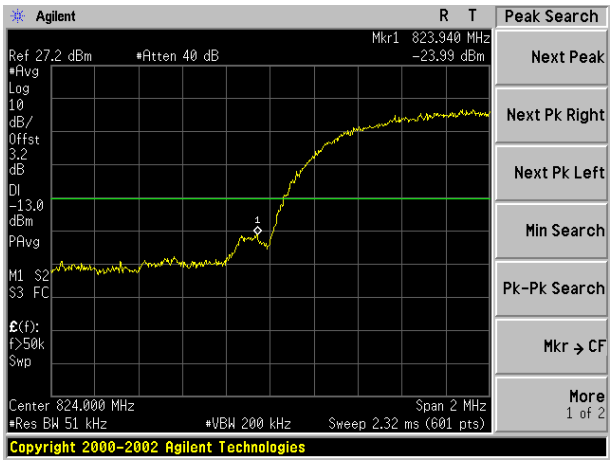
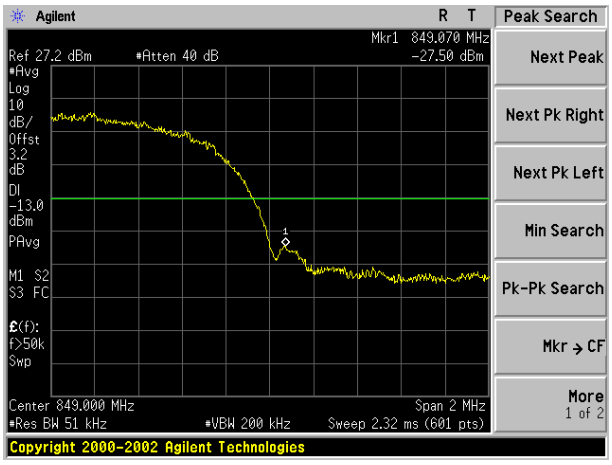
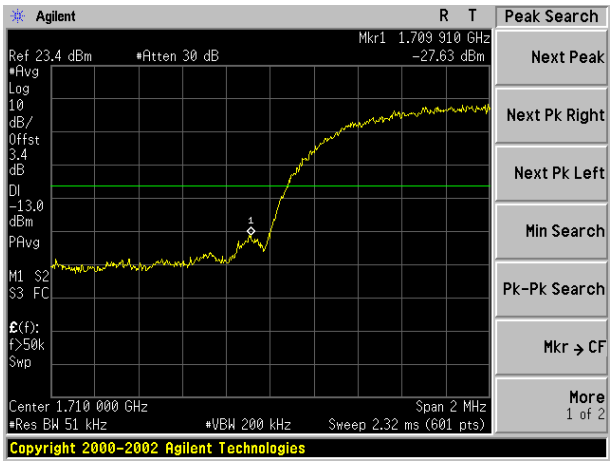
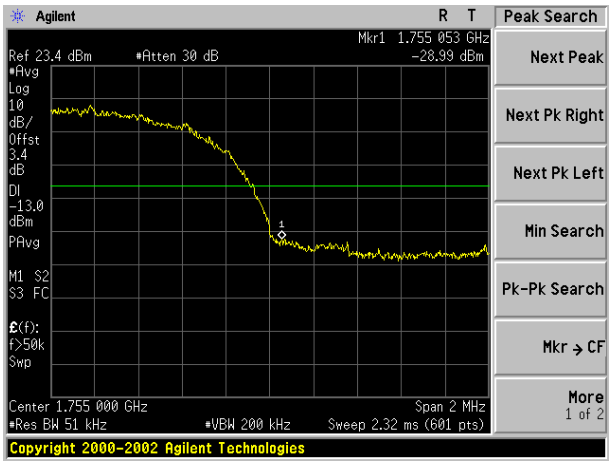


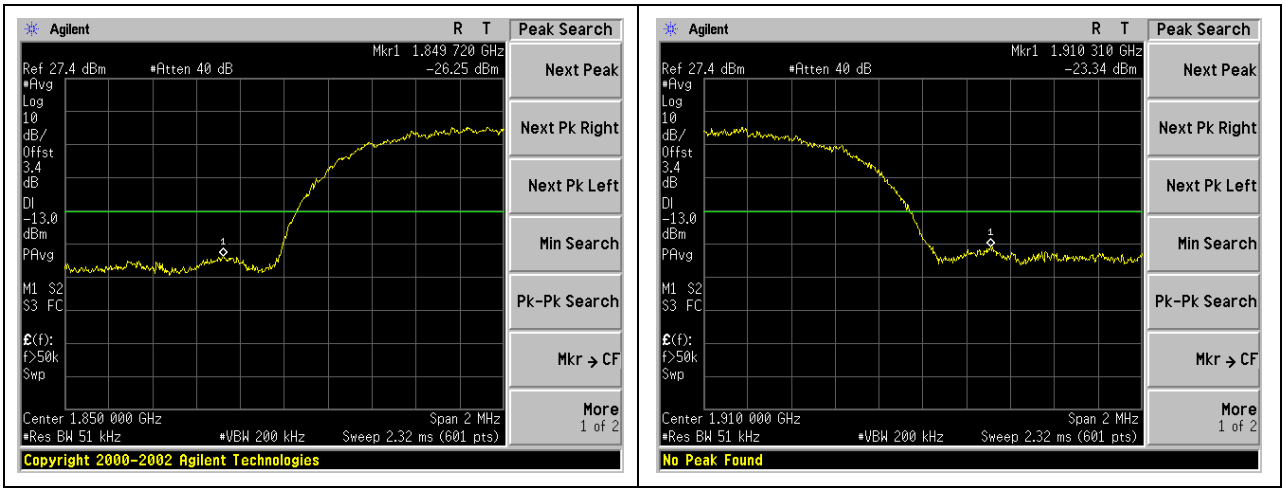


For WCDMA

Test Band=WCDMA850/WCDMA1700/WCDMA1900

Test Mode=UMTS

WCDMA 850-LCH	WCDMA 850-HCH
	
WCDMA 1700-LCH	**WCDMA 1700-HCH**
	
WCDMA 1900-LCH	**WCDMA 1900-HCH**


Agilent
R T
Peak Search
Mkr1 1.849 720 GHz
Ref 27.4 dBm
#Atten 40 dB
-26.25 dBm
#Avg
Log
10
dB/
Offst
3.4
dB
Dl
-13.0
dBm
PAvg
M1 S2
S3 FC
£(f):
f>50k
Swp
Center 1.850 000 GHz
#Res BW 51 kHz
#VBW 200 kHz
Span 2 MHz
Sweep 2.32 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Copyright 2000-2002 Agilent Technologies
Agilent
R T
Peak Search
Mkr1 1.910 310 GHz
Ref 27.4 dBm
#Atten 40 dB
-23.34 dBm
#Avg
Log
10
dB/
Offst
3.4
dB
Dl
-13.0
dBm
PAvg
M1 S2
S3 FC
£(f):
f>50k
Swp
Center 1.910 000 GHz
#Res BW 51 kHz
#VBW 200 kHz
Span 2 MHz
Sweep 2.32 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
No Peak Found

9. SPURIOUS EMISSION

9.1 CONDUCTED SPURIOUS EMISSION

9.1.1 MEASUREMENT METHOD

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. The level of the carrier and the various conducted spurious and harmonic frequency is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10^{th} harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration.

2. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM 850, data taken from 30 MHz to 9 GHz.

3. Determine EUT transmit frequencies: the following typical channels were chosen to conducted emissions testing.

Typical Channels for testing of GSM 850	
Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8

Typical Channels for testing of PCS 1900	
Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

Typical Channels for testing of UMTS band II	
Channel	Frequency (MHz)
9663	1852.6
9800	1880
9937	1907.4

Typical Channels for testing of UMTS band IV	
Channel	Frequency (MHz)
1887	1712.4
1987	1732.6
2087	1752.6

Typical Channels for testing of UMTS band V	
Channel	Frequency (MHz)
4358	826.6
4407	836.4
4457	846.4

9.1.2 PROVISIONS APPLICABLE

On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

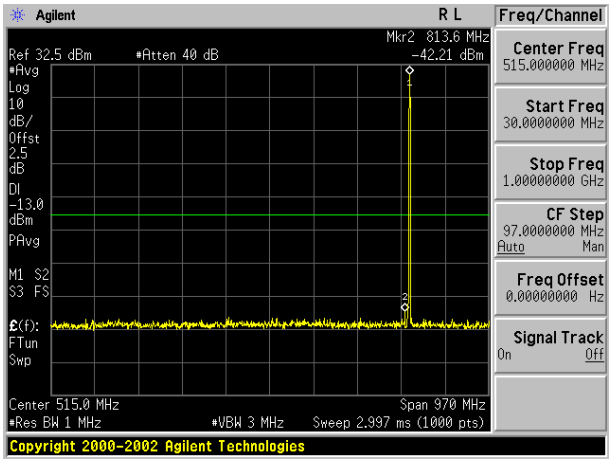
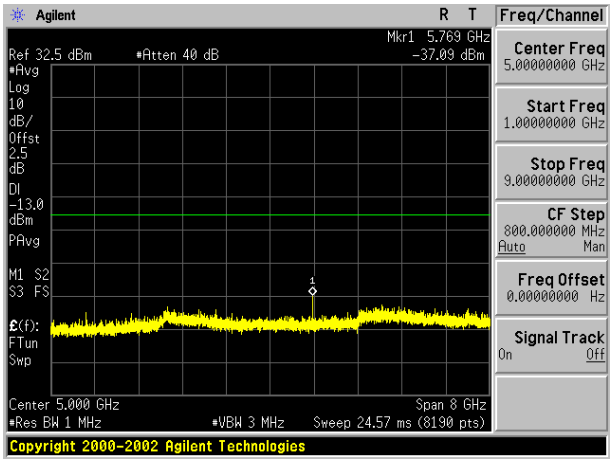
9.1.3 MEASUREMENT RESULT

APPENDIX C: SPURIOUS EMISSION AT ANTENNA TERMINAL

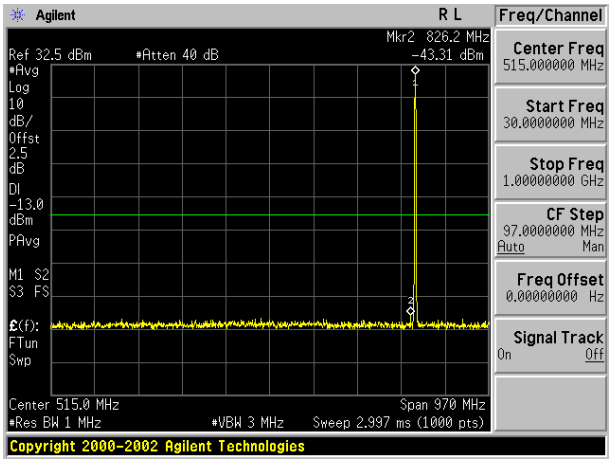
Test Results

Test Band=GSM850/GSM1900

Test Mode=GSM

GSM 850-LCH	GSM 850-LCH
	

GSM 850-MCH



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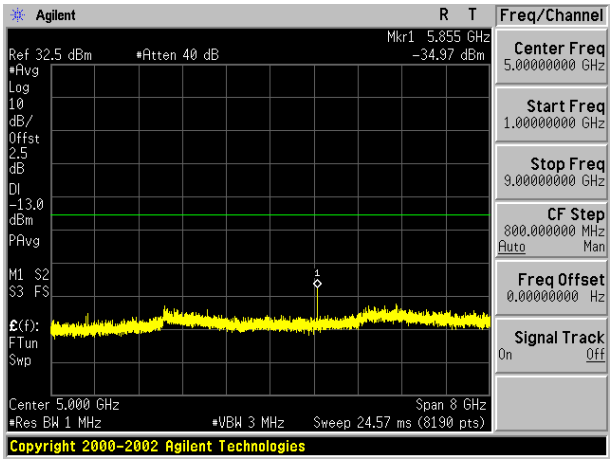

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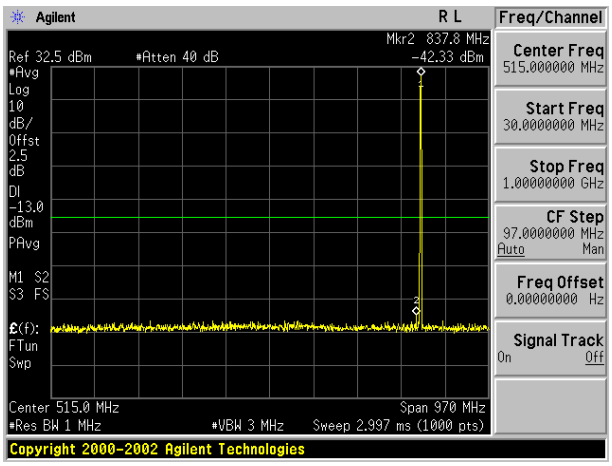

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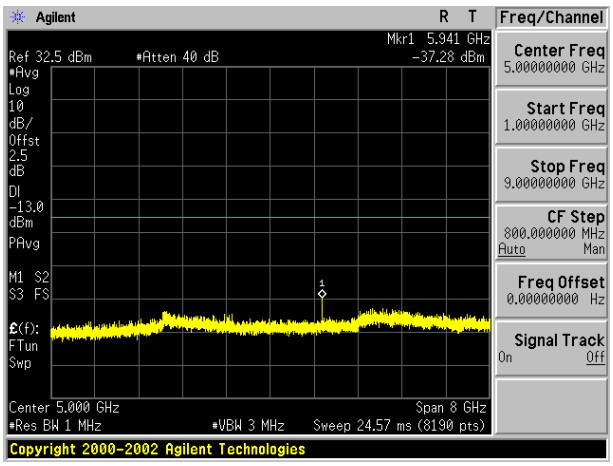

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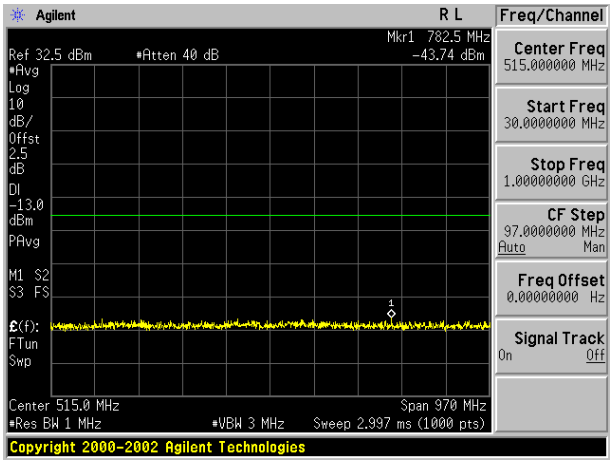

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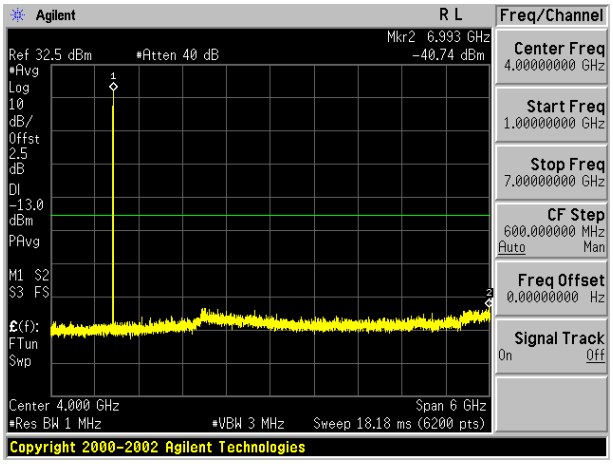

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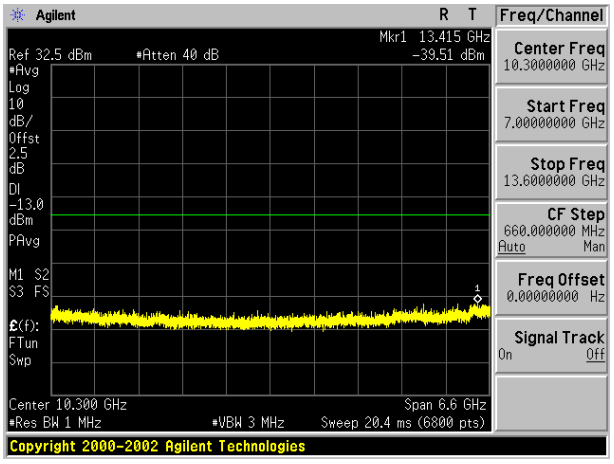	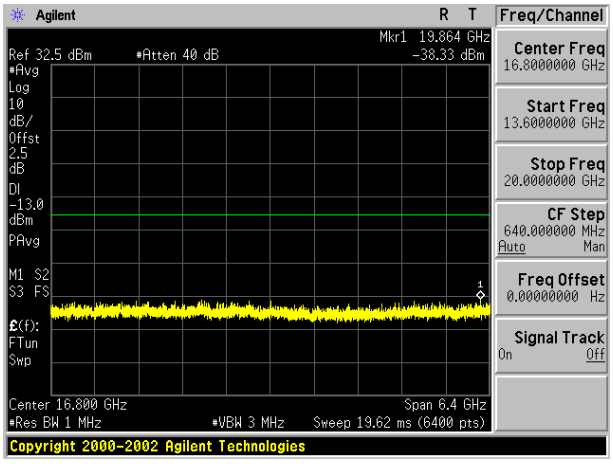
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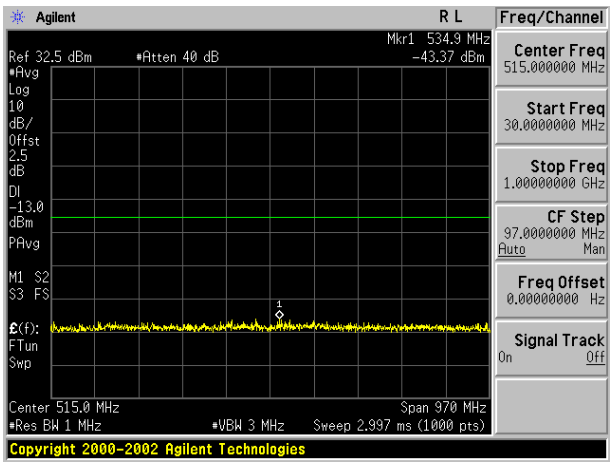	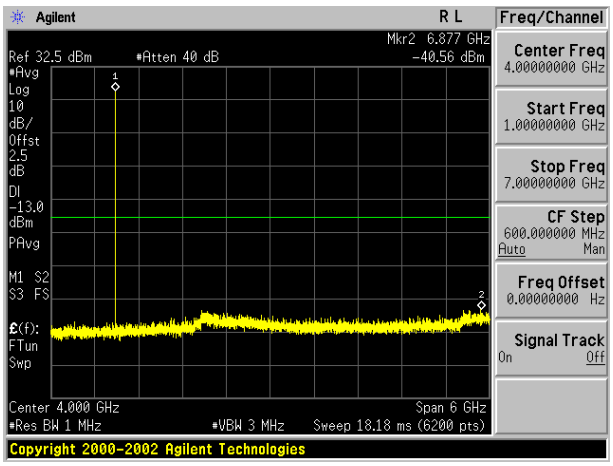

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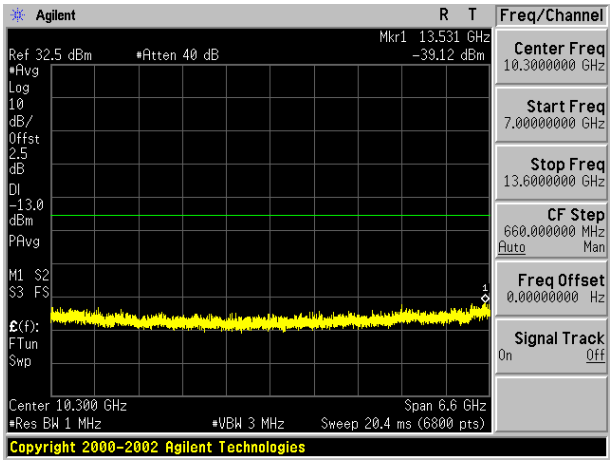	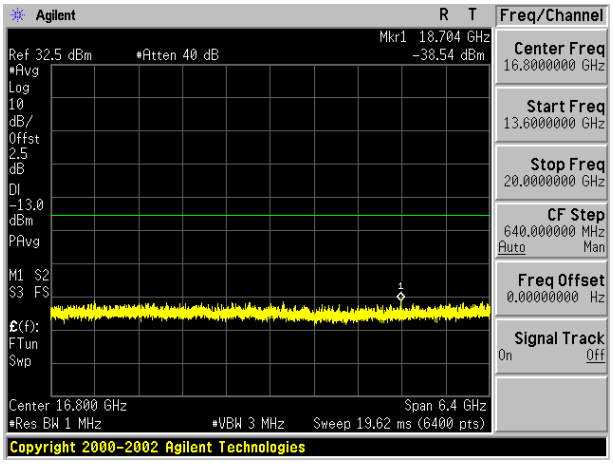

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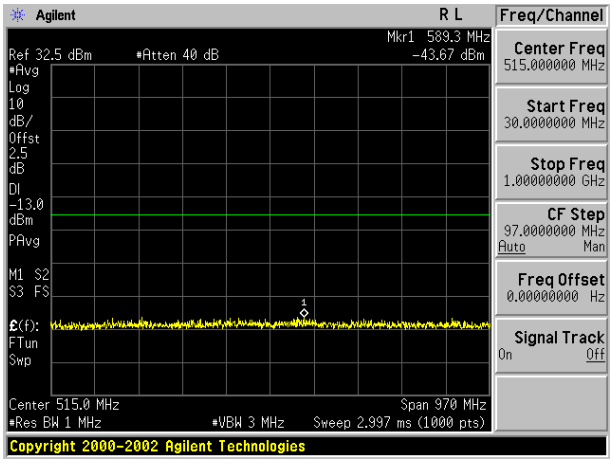	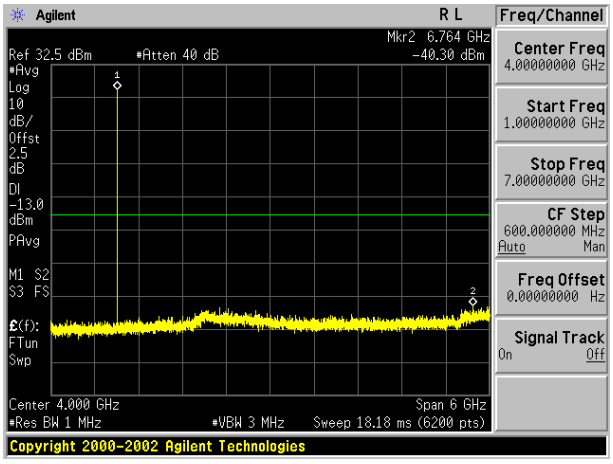
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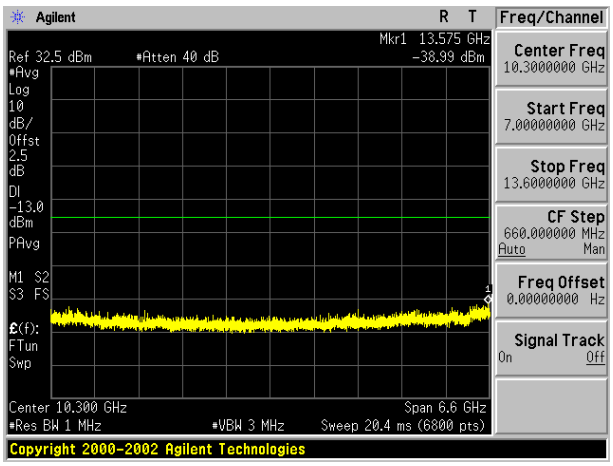	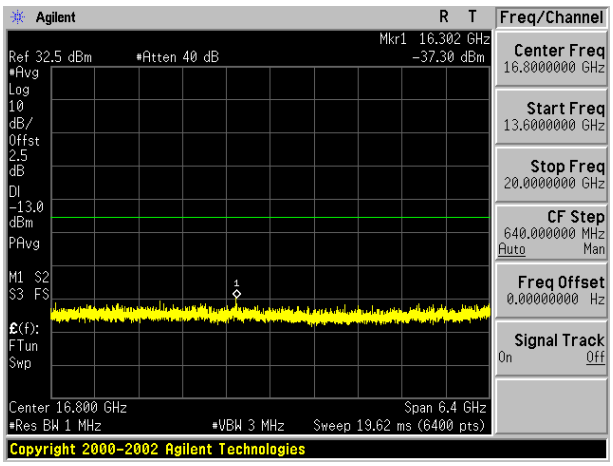

Test Band=WCDMA850/WCDMA1700/WCDMA1900

Test Mode=UMTS

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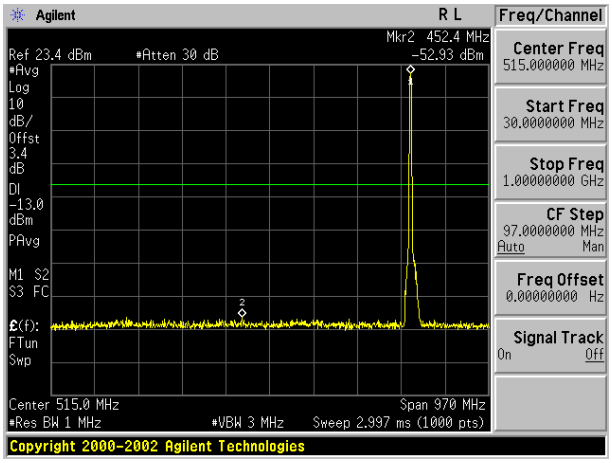	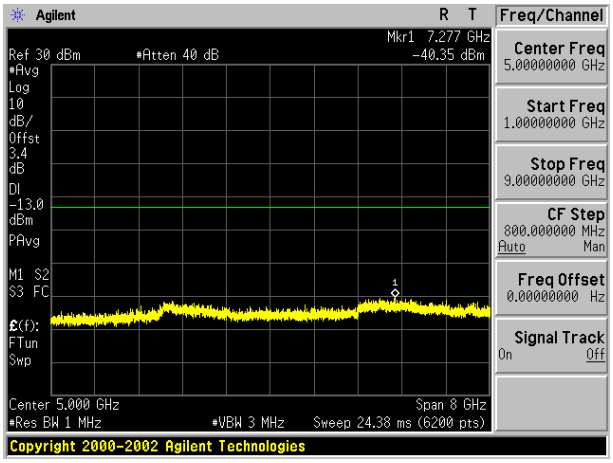
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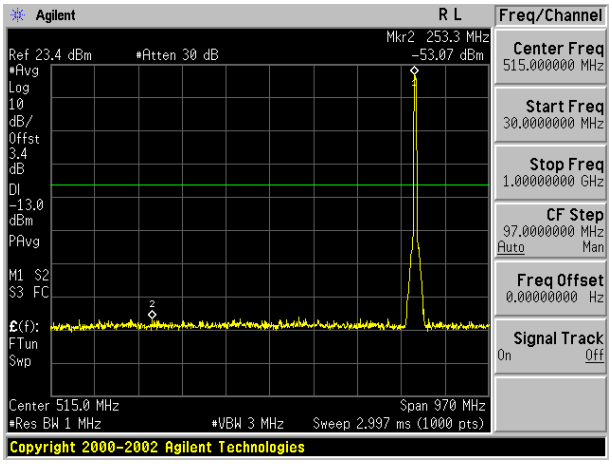	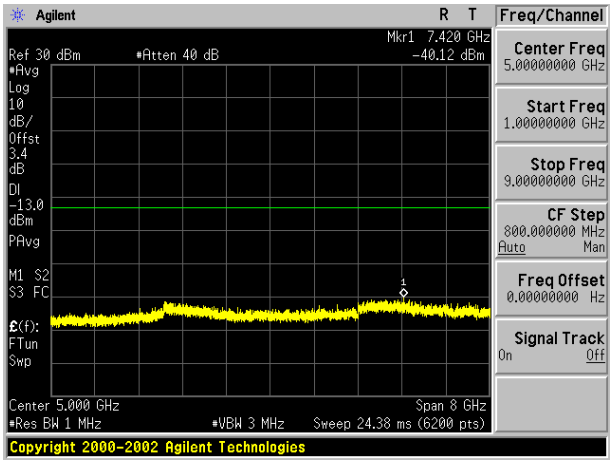
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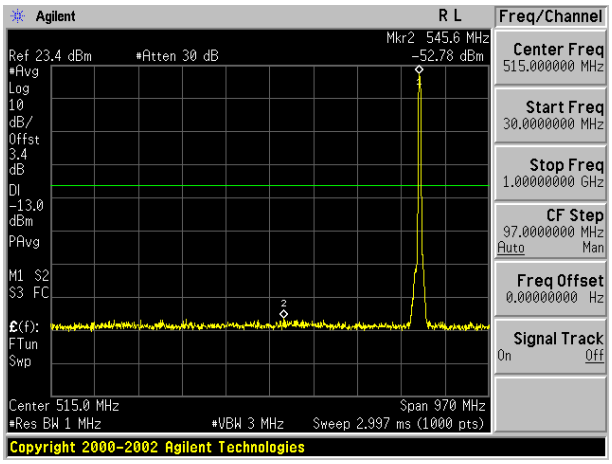	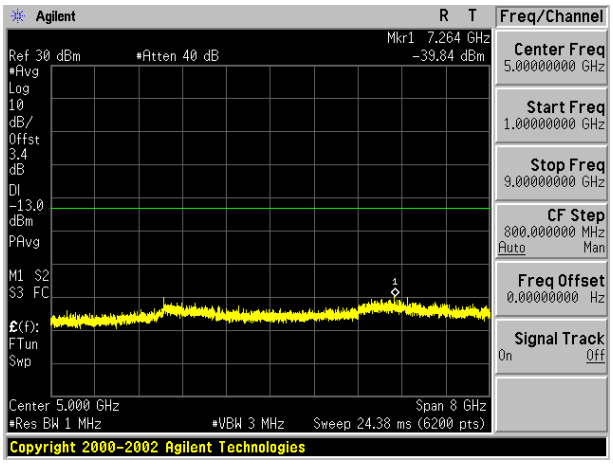

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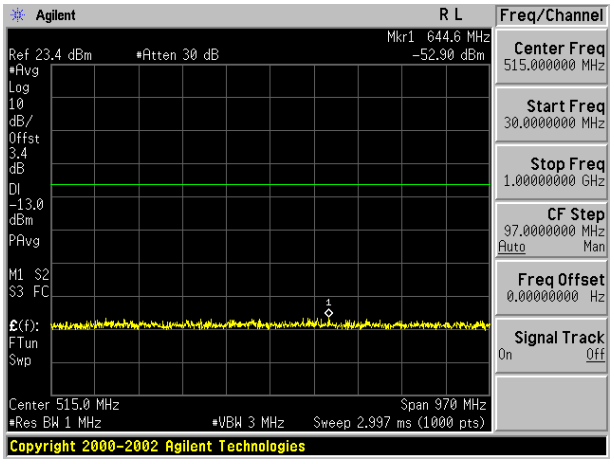	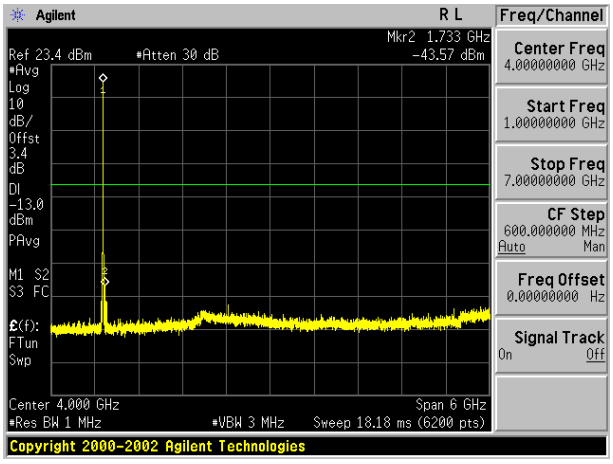

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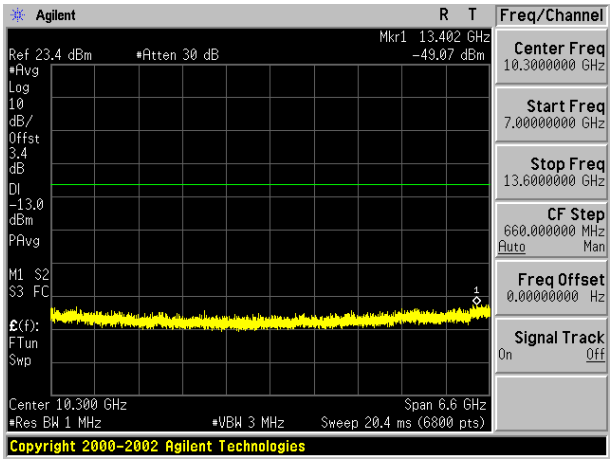	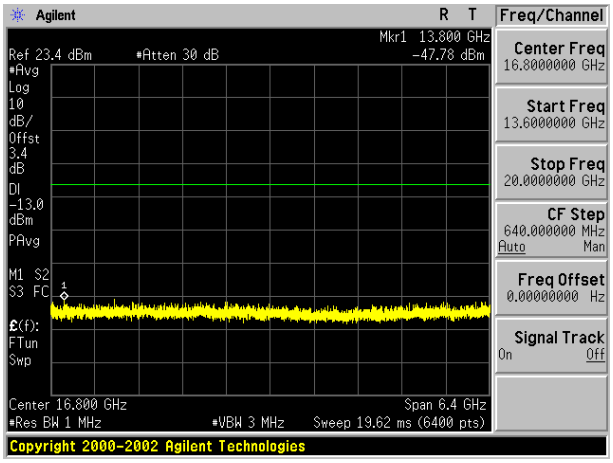

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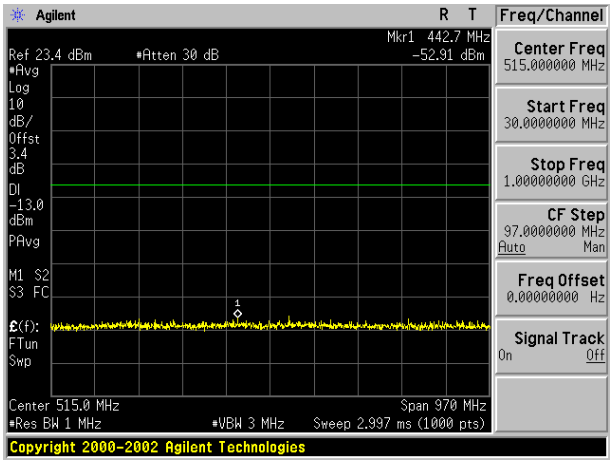	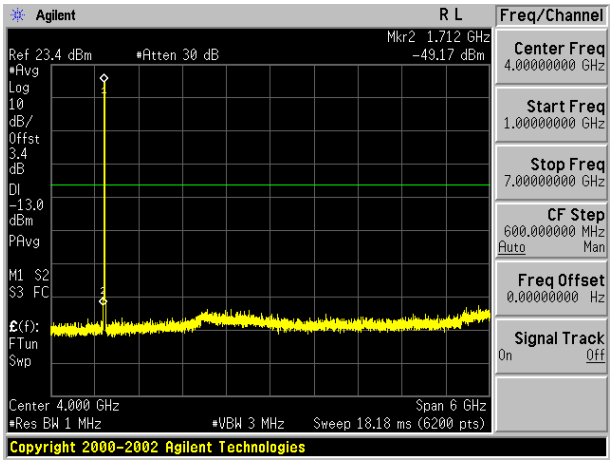

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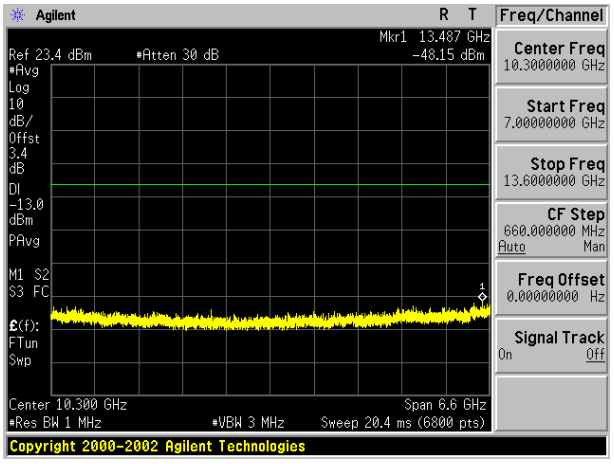	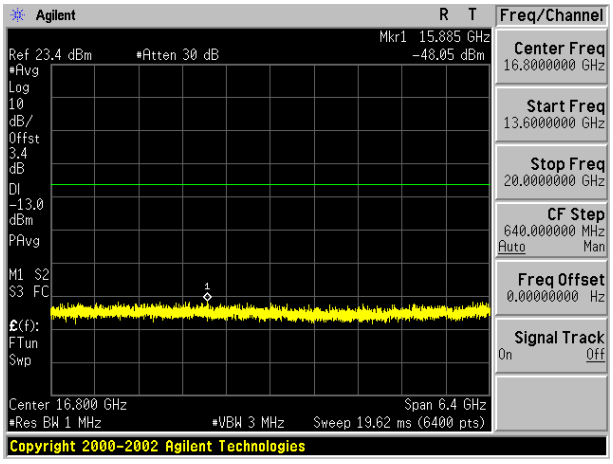

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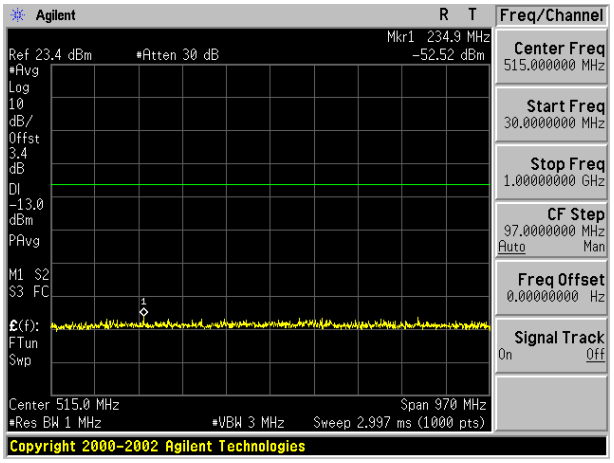	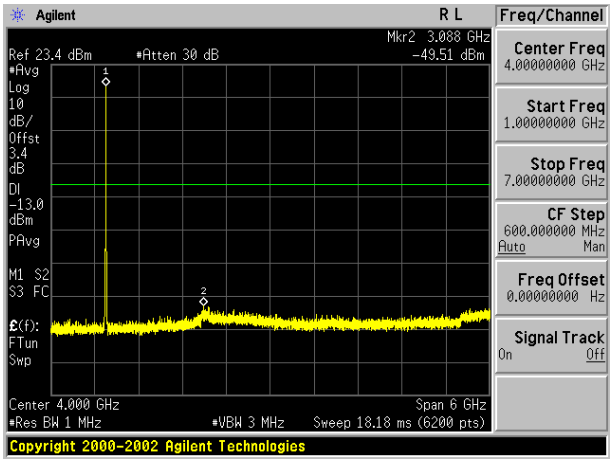

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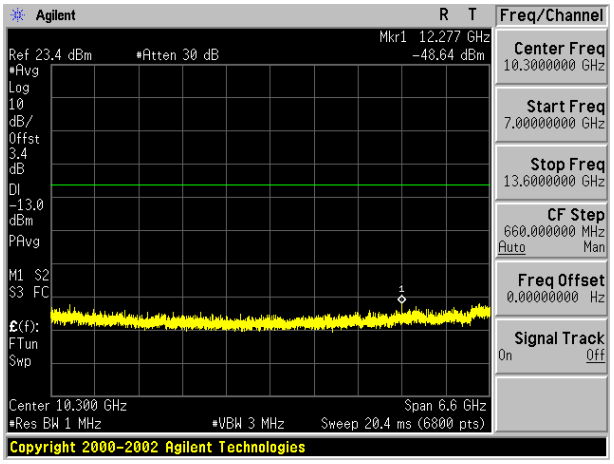	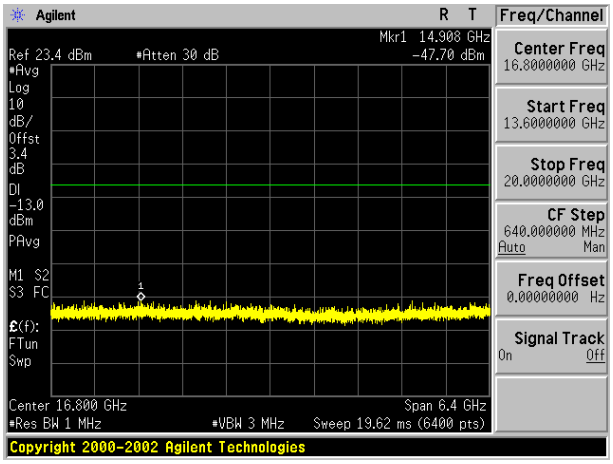

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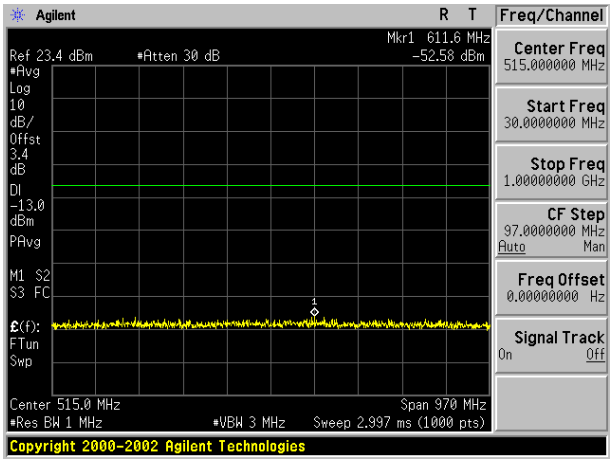	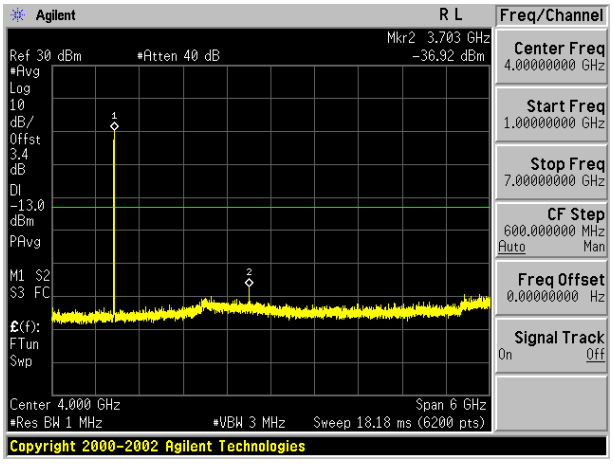

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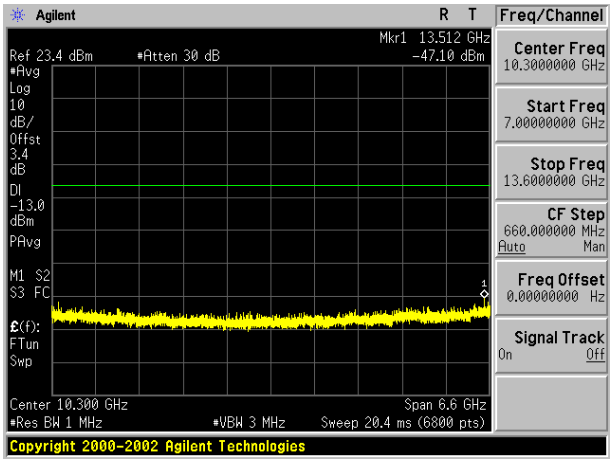	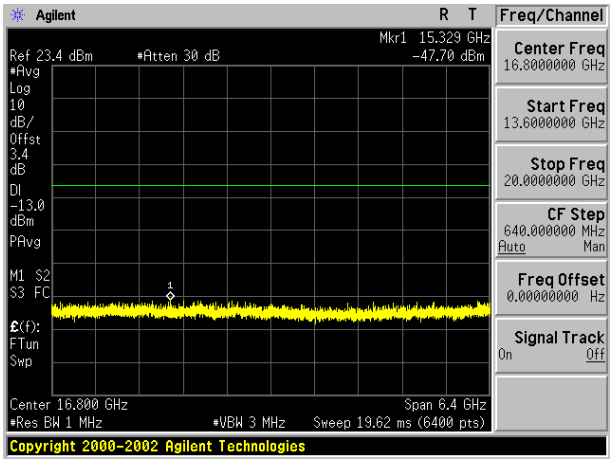

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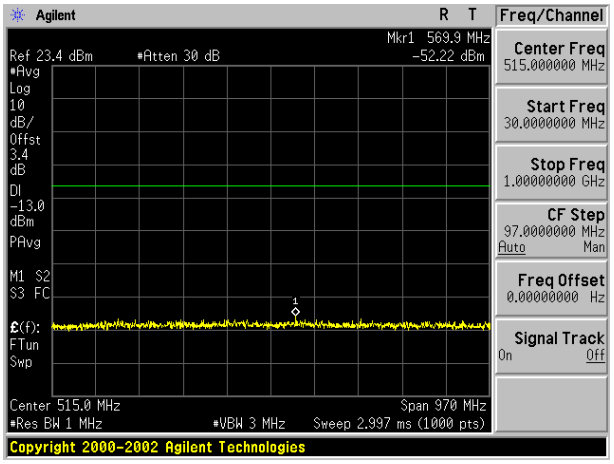	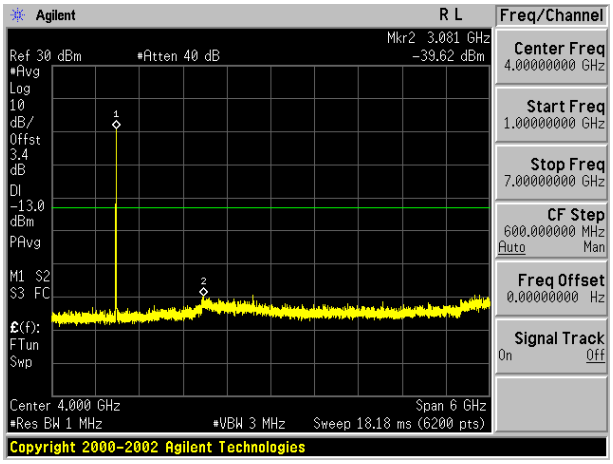

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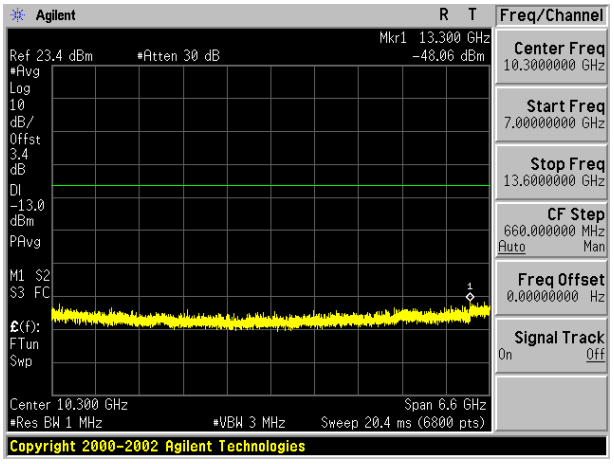	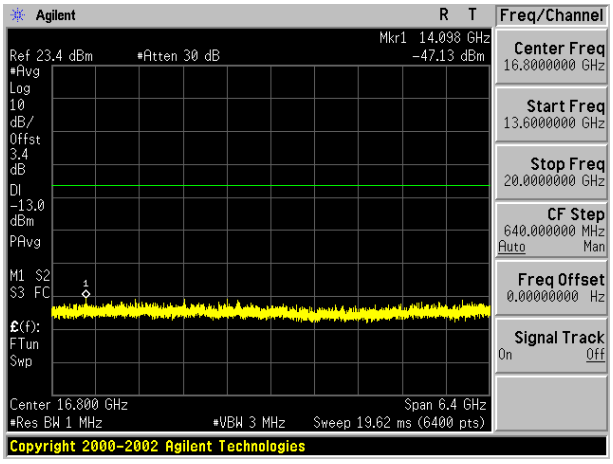

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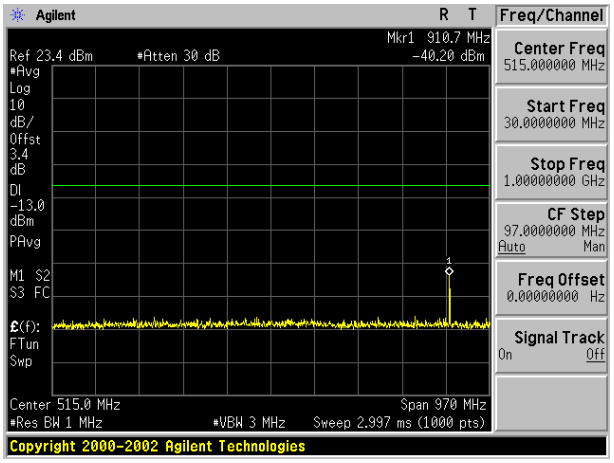	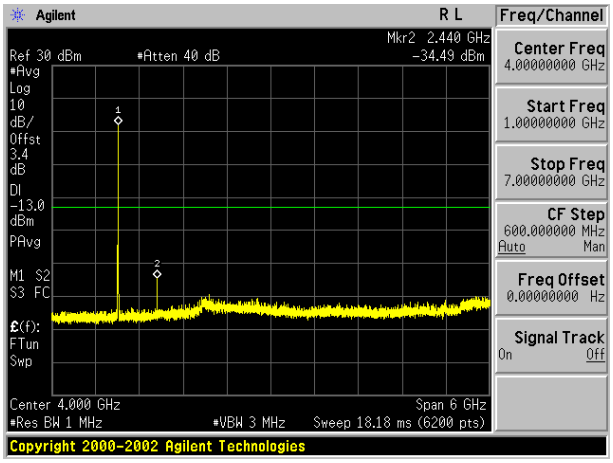

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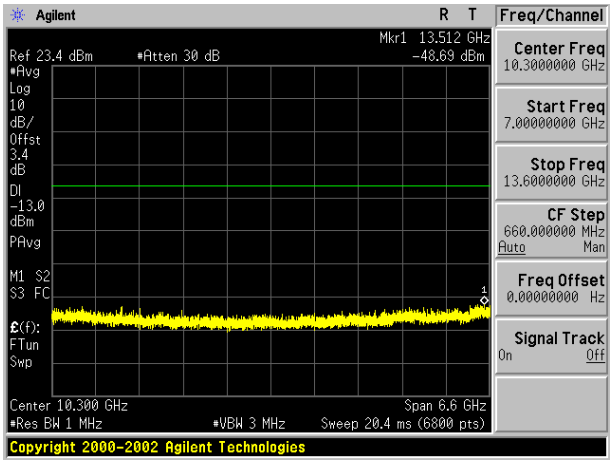
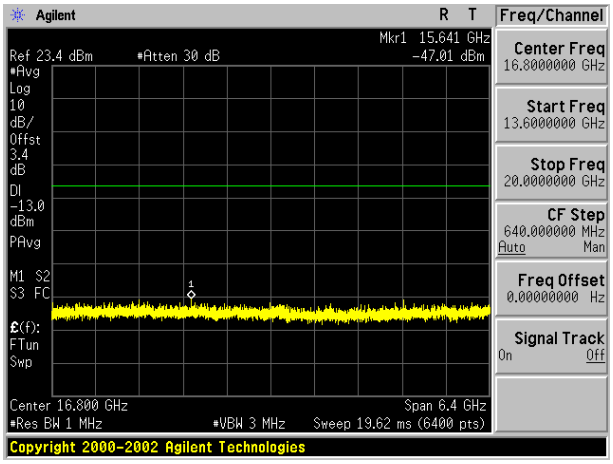
	

Note: 1. Below 30MHZ no Spurious found and The worst case record in the report.

2. As no emission found in standby or receive mode, no recording in this report.

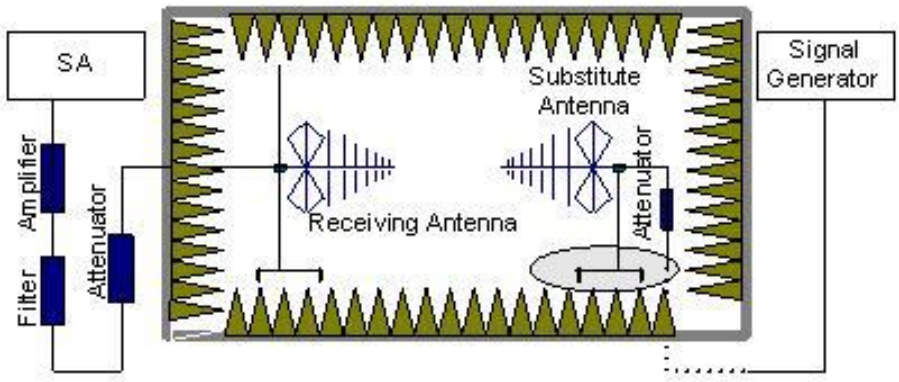
9.2 RADIATED SPURIOUS EMISSION

9.2.1 MEASUREMENT METHOD

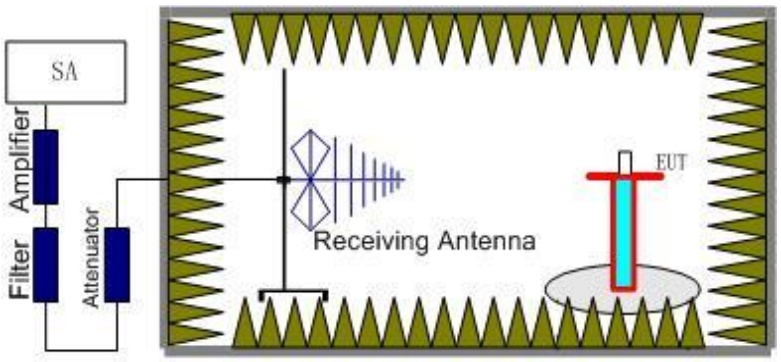
The measurements procedures specified in TIA-603-D-2010 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on all modes at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

The procedure of radiated spurious emissions is as follows:

a) Pre-calibration With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as, RSE=Rx（dBuV）+CL（dB）+SA（dB）+Gain（dBi）-107（dBuV to dBm）The SA is calibrated using following setup.



b) EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth.



Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of all modes. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.

The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below: $Power=P_{Mea}+A_{Rpl}$

9.2.2 PROVISIONS APPLICABLE

(a) On any frequency outside a licensee’s frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Note: only result the worst condition of each test mode:

9.2.3 MEASUREMENT RESULT

GSM 850:

The Worst Test Results for Channel 251/848.8 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1687.34	-45.42	-5.01	-50.43	-13.00	Horizontal
2459.52	-41.44	-2.18	-43.62	-13.00	Vertical
3644.51	-42.83	3.46	-39.37	-13.00	Vertical
4542.86	-44.09	2.79	-41.30	-13.00	Horizontal

PCS 1900:

The Worst Test Results for Channel 810/1909.8MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1431.25	-48.30	-3.22	-51.52	-13.00	Vertical
2568.41	-46.59	-0.24	-46.83	-13.00	Vertical
3647.15	-42.97	3.98	-38.99	-13.00	Horizontal
4569.41	-44.75	11.56	-33.19	-13.00	Vertical
5686.34	-45.66	17.89	-27.77	-13.00	Horizontal

UMTS band II:

The Worst Test Results for Channel 9938/1907.4MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
2000.00	-35.70	-2.25	-37.95	-13.00	Vertical
9548.50	-44.67	-3.03	-47.70	-13.00	Horizontal
13367.40	-45.27	-1.87	-47.14	-13.00	Horizontal
15277.80	-47.53	8.52	-39.01	-13.00	Vertical
17931.60	-43.71	18.7	-25.01	-13.00	Horizontal

HSPA band IV:

The Worst Test Results for Channel 2087/1752.5MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1536.98	-48.09	9.7	-38.39	-13.00	Vertical
2536.41	-47.41	11.6	-35.81	-13.00	Horizontal
3786.52	-49.34	14.89	-34.45	-13.00	Horizontal
5123.56	-46.89	13.87	-33.02	-13.00	Vertical
6615.32	-44.23	19.76	-24.47	-13.00	Horizontal

UMTS band V:

The Worst Test Results for Channel 4458/846.4MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1598.26	-51.13	-2.26	-53.39	-13.00	Vertical
2365.78	-42.29	-3.12	-45.41	-13.00	Horizontal
4967.65	-44.30	-1.74	-46.04	-13.00	Horizontal
6457.86	-50.75	8.74	-42.01	-13.00	Vertical
7896.56	-49.26	17.89	-31.37	-13.00	Horizontal

Note: ARpl= Factor=Antenna Factor+ Cable loss-Amplifier gain.

The “Factor” value can be calculated automatically by software of measurement system.

Below 30MHZ no Spurious found and The worst case record in the report.

10. MAINS CONDUCTED EMISSION

10.1 MEASUREMENT METHOD

The measurement procedure specified in ANSI/TIA-603-D-2010 was used for testing. Conducted Emission was measured with travel charger.

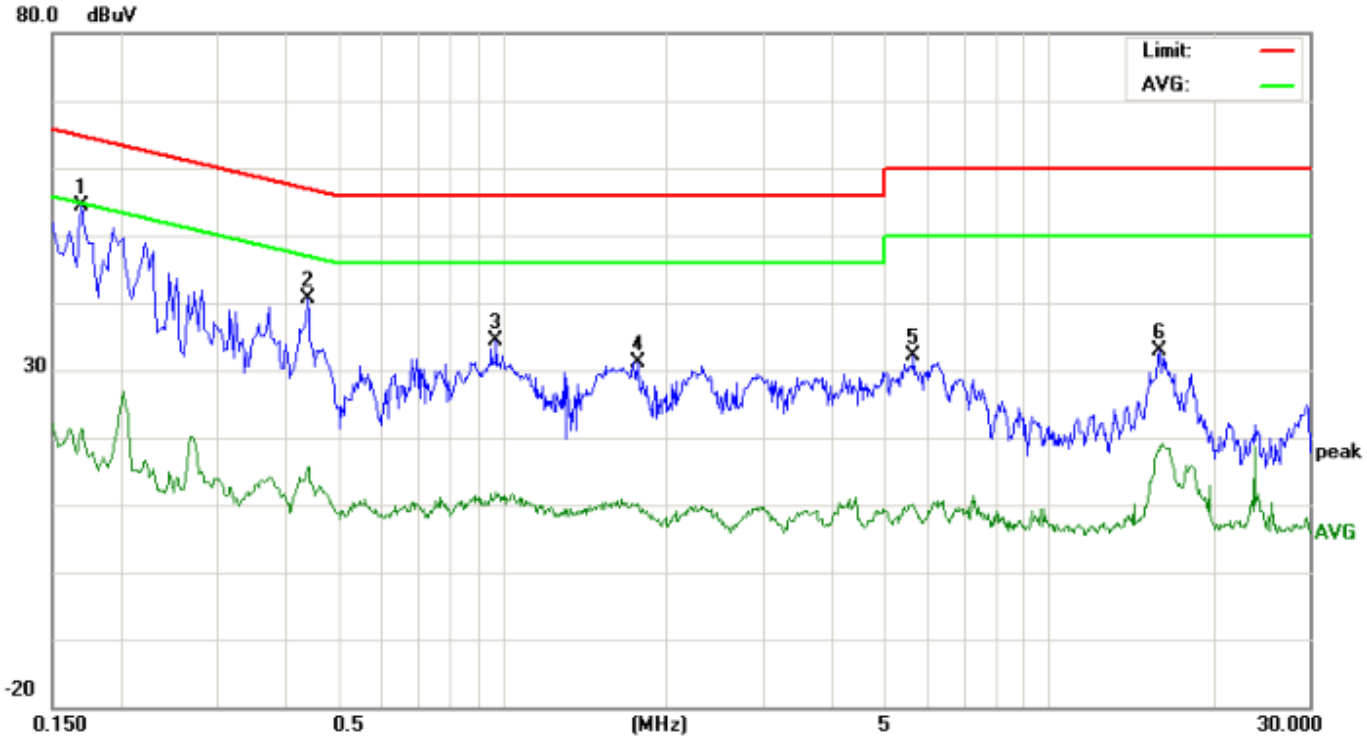
10.2 PROVISIONS APPLICABLE

Frequency of Emission (MHz)	Conducted Limit(dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50
*Decreases with the logarithm of the frequency. *The lower limit shall apply at the transition frequency.		

Note: The GSM850 mode is the worst condition and the test result as following:

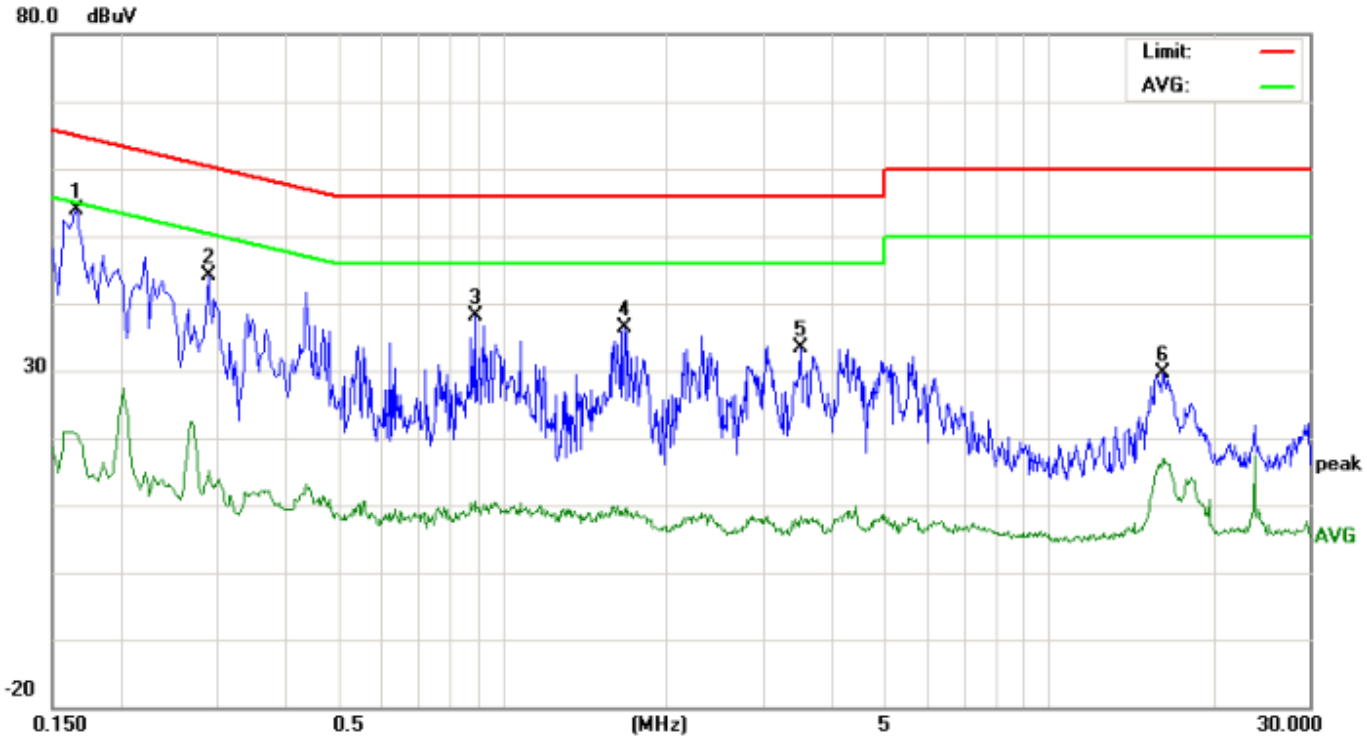
10.3 MEASUREMENT RESULT

LINE CONDUCTED EMISSION – L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1700	44.19		11.31	10.18	54.37		21.49	64.96	54.96	-10.59	-33.47	P	
2	0.4420	30.37		5.34	10.36	40.73		15.70	57.02	47.02	-16.29	-31.32	P	
3	0.9740	24.00		1.37	10.38	34.38		11.75	56.00	46.00	-21.62	-34.25	P	
4	1.7740	20.90		-0.24	10.29	31.19		10.05	56.00	46.00	-24.81	-35.95	P	
5	5.6740	21.87		-0.03	10.26	32.13		10.23	60.00	50.00	-27.87	-39.77	P	
6	15.9660	22.80		8.41	10.11	32.91		18.52	60.00	50.00	-27.09	-31.48	P	

LINE CONDUCTED EMISSION – N



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1660	43.80		10.37	10.18	53.98		20.55	65.15	55.15	-11.17	-34.60	P	
2	0.2900	33.76		4.89	10.29	44.05		15.18	60.52	50.52	-16.47	-35.34	P	
3	0.8940	27.81		0.11	10.40	38.21		10.51	56.00	46.00	-17.79	-35.49	P	
4	1.6740	26.18		-1.15	10.32	36.50		9.17	56.00	46.00	-19.50	-36.83	P	
5	3.5180	22.95		-2.23	10.51	33.46		8.28	56.00	46.00	-22.54	-37.72	P	
6	16.1540	19.56		6.69	10.11	29.67		16.80	60.00	50.00	-30.33	-33.20	P	

11. FREQUENCY STABILITY

11.1 MEASUREMENT METHOD

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -10℃.
3.With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for PCS 1900 band , channel 190 for GSM 850 band, channel 9400 for UMTS band II and channel 4175 for UMTS band V measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4.Repeat the above measurements at 10℃ increments from -10℃ to +55℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +55℃.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10℃ increments from +55℃ to -10℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9.At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

11.2 PROVISIONS APPLICABLE

11.2.1 For Hand carried battery powered equipment

According to the ANSI/TIA-603-D-2010, the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.4V DC and 4.2V DC, with a nominal voltage of 4.2 DC V. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

11.2.2 For equipment powered by primary supply voltage

According to the ANSI/TIA-603-D-2010, the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment, the normal environment temperature is 20^{o}C.

11.3 MEASUREMENT RESULT

Appendix D:Frequency Stability

Test Results

Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.(V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM 850	GSM	LCH	TN	VL	8.39	0.01	±2.5	PASS
			TN	VN	5.36	0.01	±2.5	PASS
			TN	VH	10.14	0.01	±2.5	PASS
		MCH	TN	VL	4.84	0.01	±2.5	PASS
			TN	VN	9.81	0.01	±2.5	PASS
			TN	VH	4.07	0.00	±2.5	PASS
		HCH	TN	VL	7.36	0.01	±2.5	PASS
			TN	VN	4.65	0.01	±2.5	PASS
			TN	VH	3.68	0.00	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM 1900	GSM	LCH	TN	VL	-16.92	-0.01	±2.5	PASS
			TN	VN	-17.18	-0.01	±2.5	PASS
			TN	VH	-13.24	-0.01	±2.5	PASS
		MCH	TN	VL	-13.37	-0.01	±2.5	PASS
			TN	VN	-20.15	-0.01	±2.5	PASS
			TN	VH	-15.30	-0.01	±2.5	PASS
		HCH	TN	VL	-9.49	0.00	±2.5	PASS
			TN	VN	-6.59	0.00	±2.5	PASS
			TN	VH	-12.91	-0.01	±2.5	PASS

Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM850	GSM	LCH	VN	-10	7.43	0.01	±2.5	PASS
			VN	0	7.43	0.01	±2.5	PASS
			VN	10	6.59	0.01	±2.5	PASS
			VN	20	7.36	0.01	±2.5	PASS
			VN	30	9.43	0.01	±2.5	PASS
			VN	40	8.98	0.01	±2.5	PASS
			VN	50	5.81	0.01	±2.5	PASS
GSM850	GSM	MCH	VN	-10	4.84	0.01	±2.5	PASS
			VN	0	5.42	0.01	±2.5	PASS
			VN	10	6.91	0.01	±2.5	PASS
			VN	20	8.27	0.01	±2.5	PASS
			VN	30	3.23	0.00	±2.5	PASS
			VN	40	8.14	0.01	±2.5	PASS
			VN	50	5.36	0.01	±2.5	PASS
GSM850	GSM	HCH	VN	-10	6.26	0.01	±2.5	PASS
			VN	0	8.65	0.01	±2.5	PASS
			VN	10	5.23	0.01	±2.5	PASS
			VN	20	5.55	0.01	±2.5	PASS
			VN	30	7.17	0.01	±2.5	PASS
			VN	40	5.62	0.01	±2.5	PASS
			VN	50	7.30	0.01	±2.5	PASS

.

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM1900	GSM	LCH	VN	-10	-16.59	-0.01	±2.5	PASS
			VN	0	-19.37	-0.01	±2.5	PASS
			VN	10	-13.11	-0.01	±2.5	PASS
			VN	20	-14.85	-0.01	±2.5	PASS
			VN	30	-14.27	-0.01	±2.5	PASS
			VN	40	-13.75	-0.01	±2.5	PASS
			VN	50	-12.46	-0.01	±2.5	PASS
GSM1900	GSM	MCH	VN	-10	-18.85	-0.01	±2.5	PASS
			VN	0	-11.49	-0.01	±2.5	PASS
			VN	10	-16.92	-0.01	±2.5	PASS
			VN	20	-11.49	-0.01	±2.5	PASS
			VN	30	-17.18	-0.01	±2.5	PASS
			VN	40	-12.98	-0.01	±2.5	PASS
			VN	50	-10.85	-0.01	±2.5	PASS
GSM1900	GSM	HCH	VN	-10	-14.40	-0.01	±2.5	PASS
			VN	0	-15.82	-0.01	±2.5	PASS
			VN	10	-12.01	-0.01	±2.5	PASS
			VN	20	-6.65	0.00	±2.5	PASS
			VN	30	-7.30	0.00	±2.5	PASS
			VN	40	-8.78	0.00	±2.5	PASS
			VN	50	-10.85	-0.01	±2.5	PASS

Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA 850	UMTS	LCH	TN	VL	-2.59	0.00	±2.5	PASS
			TN	VN	-2.66	0.00	±2.5	PASS
			TN	VH	-0.85	0.00	±2.5	PASS
		MCH	TN	VL	-2.72	0.00	±2.5	PASS
			TN	VN	-2.66	0.00	±2.5	PASS
			TN	VH	1.01	0.00	±2.5	PASS
		HCH	TN	VL	-3.77	0.00	±2.5	PASS
			TN	VN	-2.66	0.00	±2.5	PASS
			TN	VH	-1.42	0.00	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA 1700	UMTS	LCH	TN	VL	-3.23	0.00	±2.5	PASS
			TN	VN	-8.83	-0.01	±2.5	PASS
			TN	VH	-5.19	0.00	±2.5	PASS
		MCH	TN	VL	-4.71	0.00	±2.5	PASS
			TN	VN	-8.83	0.00	±2.5	PASS
			TN	VH	-6.79	0.00	±2.5	PASS
		HCH	TN	VL	-1.01	0.00	±2.5	PASS
			TN	VN	-8.83	0.00	±2.5	PASS
			TN	VH	-6.67	0.00	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA 1900	UMTS	LCH	TN	VL	-2.73	0.00	±2.5	PASS
			TN	VN	0.52	0.00	±2.5	PASS
			TN	VH	-8.29	0.00	±2.5	PASS
		MCH	TN	VL	-4.76	0.00	±2.5	PASS
			TN	VN	0.52	-0.01	±2.5	PASS

			TN	VH	3.46	0.00	±2.5	PASS
		HCH	TN	VL	-10.35	-0.01	±2.5	PASS
			TN	VN	0.52	0.00	±2.5	PASS
			TN	VH	-4.94	0.00	±2.5	PASS

Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA 850	UMTS	LCH	VN	-10	-0.53	0.00	±2.5	PASS
			VN	0	-5.75	-0.01	±2.5	PASS
			VN	10	-4.76	-0.01	±2.5	PASS
			VN	20	-0.99	0.00	±2.5	PASS
			VN	30	-1.50	0.00	±2.5	PASS
			VN	40	-2.09	0.00	±2.5	PASS
			VN	50	-6.15	-0.01	±2.5	PASS
WCDMA 850	UMTS	MCH	VN	-10	-0.05	0.00	±2.5	PASS
			VN	0	-3.62	0.00	±2.5	PASS
			VN	10	-0.37	0.00	±2.5	PASS
			VN	20	-3.10	0.00	±2.5	PASS
			VN	30	-3.77	0.00	±2.5	PASS
			VN	40	1.33	0.00	±2.5	PASS
			VN	50	-2.99	0.00	±2.5	PASS
WCDMA 850	UMTS	HCH	VN	-10	0.49	0.00	±2.5	PASS
			VN	0	-0.66	0.00	±2.5	PASS
			VN	10	-1.05	0.00	±2.5	PASS
			VN	20	-3.22	0.00	±2.5	PASS
			VN	30	-0.05	0.00	±2.5	PASS
			VN	40	0.23	0.00	±2.5	PASS
			VN	50	-2.69	0.00	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA 1700	UMTS	LCH	VN	-10	-7.51	0.00	±2.5	PASS
			VN	0	-6.59	0.00	±2.5	PASS

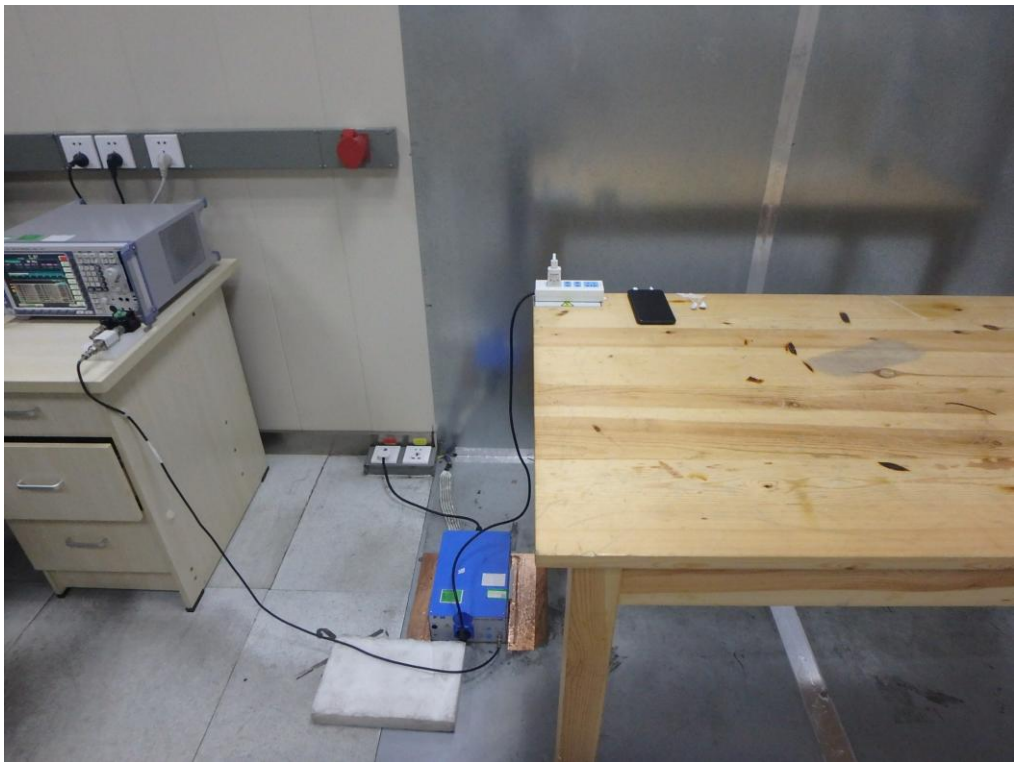
			VN	10	-6.41	0.00	±2.5	PASS
			VN	20	-4.52	0.00	±2.5	PASS
			VN	30	-9.37	-0.01	±2.5	PASS
			VN	40	-3.22	0.00	±2.5	PASS
			VN	50	-2.11	0.00	±2.5	PASS
WCDMA 1700	UMTS	MCH	VN	-10	-6.73	0.00	±2.5	PASS
			VN	0	-10.03	-0.01	±2.5	PASS
			VN	10	-3.95	0.00	±2.5	PASS
			VN	20	-4.18	0.00	±2.5	PASS
			VN	30	-4.36	0.00	±2.5	PASS
			VN	40	-2.93	0.00	±2.5	PASS
			VN	50	-10.03	-0.01	±2.5	PASS
WCDMA 1700	UMTS	HCH	VN	-10	-5.60	0.00	±2.5	PASS
			VN	0	-5.89	0.00	±2.5	PASS
			VN	10	-1.92	0.00	±2.5	PASS
			VN	20	-0.75	0.00	±2.5	PASS
			VN	30	-7.74	0.00	±2.5	PASS
			VN	40	-5.80	0.00	±2.5	PASS
			VN	50	-2.85	0.00	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
WCDMA 1900	UMTS	LCH	VN	-10	-7.28	0.00	±2.5	PASS
			VN	0	-2.15	0.00	±2.5	PASS
			VN	10	-3.37	0.00	±2.5	PASS
			VN	20	-5.22	0.00	±2.5	PASS
			VN	30	-3.68	0.00	±2.5	PASS
			VN	40	-4.71	0.00	±2.5	PASS
			VN	50	-10.94	-0.01	±2.5	PASS
WCDMA 1900	UMTS	MCH	VN	-10	-3.62	0.00	±2.5	PASS
			VN	0	-6.36	0.00	±2.5	PASS
			VN	10	-12.76	-0.01	±2.5	PASS
			VN	20	-4.24	0.00	±2.5	PASS
			VN	30	0.05	0.00	±2.5	PASS

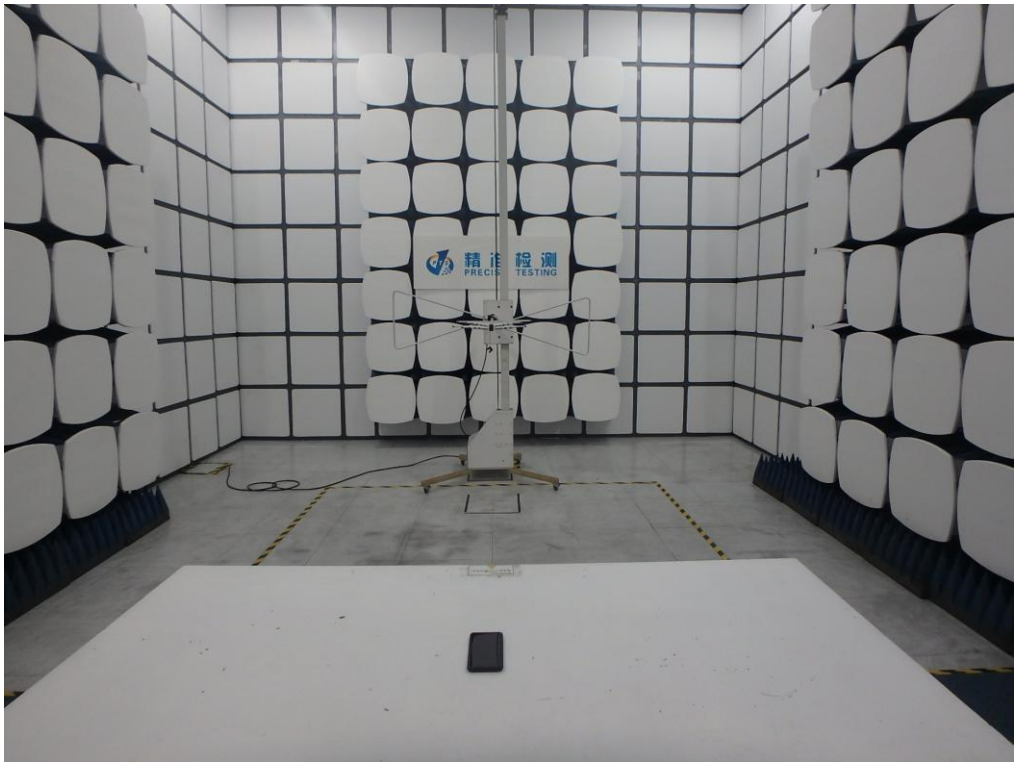
			VN	40	-3.30	0.00	±2.5	PASS
			VN	50	-1.54	0.00	±2.5	PASS
WCDMA 1900	UMTS	HCH	VN	-10	-9.45	0.00	±2.5	PASS
			VN	0	-8.13	0.00	±2.5	PASS
			VN	10	-7.61	0.00	±2.5	PASS
			VN	20	-5.66	0.00	±2.5	PASS
			VN	30	-8.91	0.00	±2.5	PASS
			VN	40	-6.64	0.00	±2.5	PASS
			VN	50	-1.69	0.00	±2.5	PASS

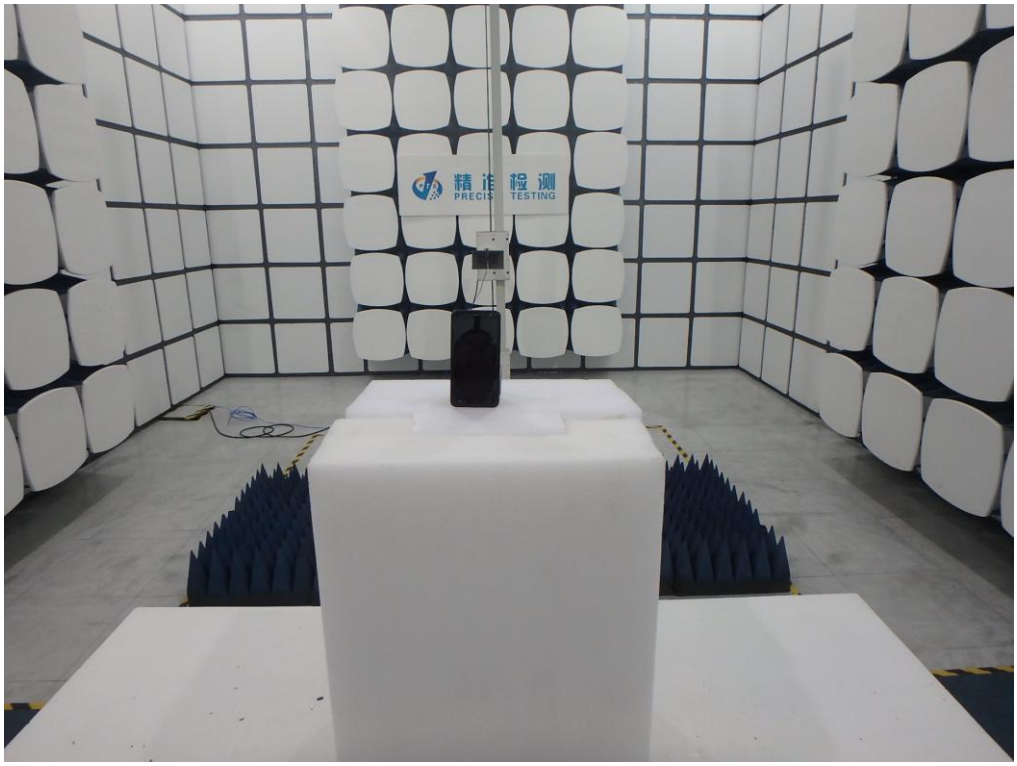
PHOTO GRAPHS OF TEST SETUP

CONDUCTED EMISSION



RADIATED SPURIOUS EMISSION





CONDUCTED MEASUREMENTS

----END OF REPORT----