

FCC Part 22H & 24E Measurement and Test Report

For

Worldwide telecom limited

2F Block C; Shenfang Building, Zhen Hualu, Futian, Shenzhen.

FCC ID: 2ARO3-WF99

FCC Rules:	FCC Part 22H, FCC Part 24E			
Product Description:	Mobile phone			
Tested Model:	<u>WF99</u>			
Report No.:	<u>WTX19X07051158W-1</u>			
Sample Receipt Date:	<u>2019-07-26</u>			
Tested Date:	2019-07-26 to 2019-08-26			
Issued Date:	<u>2019-08-27</u>			
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM Test Technology Co., Ltd.



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Report version

Version No.	Date of issue	Description	
Rev.00	2019-08-27	Original	
/	/	/	



1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information	
Applicant:	Worldwide telecom limited
Address of applicant:	2F Block C; Shenfang Building, Zhen Hualu, Futian,
	Shenzhen.
Manufacturer:	Worldwide telecom limited
Address of manufacturer:	2F Block C; Shenfang Building, Zhen Hualu, Futian,
	Shenzhen.

General Description of EUT:		
Product Name:	Mobile phone	
Brand Name:	WOLKI	
Model No.:	WF99	
Adding Model(s):	/	
Rated Voltage:	DC3.7V	
Battery:	/	
Adapter Model:	WCH03 Input: AC100-240V, 50/60Hz, 0.15A; Output: DC5V, 500mA	
Software Version:	/	
Hardware Version:	/	

Note: The test data is gathered from a production sample provided by the manufacturer.

Technical Characteristics of EUT:		
2G		
Support Networks:	GSM, GPRS	
Support Band:	GSM850/PCS1900	
Uplink Frequency:	GSM/GPRS 850: 824~849MHz	
Oplink Frequency.	GSM/GPRS 1900: 1850~1910MHz	
	GSM/GPRS 850: 869~894MHz	
Downlink Frequency:	GSM/GPRS 1900: 1930~1990MHz	
Max RF Output Power:	GSM850: 32.19dBm, GSM1900: 29.81dBm	
Type of Emission:	GSM850: 250KGXW, GSM1900: 248KGXW	
Type of Modulation:	GMSK	
Type of Antenna:	Integral Antenna	
Antenna Gain:	GSM850: 0.6dBi; GSM1900: 0.8dBi	
GPRS Class:	Class 12	



1.2 Test Standards

The tests were performed according to following standards:

 FCC Rules Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
 FCC Rules Part 22: PRIVATE LAND MOBILE RADIO SERVICES.
 FCC Rules Part 24: PUBLIC MOBILE SERVICES
 TIA/EIA 603 E March 2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
 ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
 KDB 971168 D01 Power Meas License Digital Systems v03r01: MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with TIA/EIA 603 E/ KDB 971168/ ANSI C63.26 The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List				
Test Mode	Description	Remark		
TM1	GSM 850	Low, Middle, High Channels		
TM2	GPRS 850	Low, Middle, High Channels		
TM3	GSM 1900	Low, Middle, High Channels		
TM4	GPRS 1900	Low, Middle, High Channels		

Testing Configure			
Support Band	Support Standard	Channel Frequency(MHz)	Channel Number
		824.2	128
GSM 850	GSM/GPRS	836.6	190
		848.8	251
		1850.2	512
PCS 1900	GSM/GPRS	1880.0	661
		1909.8	810
Note: the transmitter ha	s been tested on the communica	tions mode of GSM, GPRS, com	pliance test and record the
worst case.			

Test Conditions			
Temperature:	22~25 °C		
Relative Humidity:	50~55 %.		
ATM Pressure:	1019 mbar		

EUT Cable List and Details				
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite	
/	/	/	/	

Special Cable List and Details				
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite	
/	/	/	/	

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/



1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	± 0.42 dB
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Frequency Stability	Conducted	2.3%
Transmitter Spurious Emissions	Conducted	± 0.42 dB
		30-200MHz ±4.52dB
Transmitter Sourious Emissions	Radiated	0.2-1GHz ±5.56dB
Transmitter Spurious Emissions	Kaulated	1-6GHz ±3.84dB
		6-18GHz ±3.92dB



1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT 1075	Communication	Rohde &	CMW500	149650	2019-04-30	2020 04 20
SEMT-1075	Tester	Schwarz	CMW500	148650	2019-04-30	2020-04-29
SEMT-1063	GSM Tester	Rohde &	CMU200	114403	2019-04-30	2020-04-29
SEM1-1005	USM Tester	Schwarz	CM0200	114403	2019-04-30	2020-04-29
SEMT-1072	Spectrum	Agilent	E4407B	MY41440400	2019-04-30	2020-04-29
SEM1-1072	Analyzer	Aglicit	E4407B	11111111111111111	2019-04-30	2020-04-29
SEMT-1079	Spectrum	Agilent	N9020A	US47140102	2019-04-30	2020-04-29
	Analyzer	8				
SEMT-1080	Signal	Agilent	83752A	3610A01453	2019-04-30	2020-04-29
	Generator					
SEMT-1081	Vector Signal	Agilent	N5182A	MY47070202	2019-04-30	2020-04-29
GED (TE 1020	Generator		15064	D (204	2010 04 20	2020.04.20
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2019-04-30	2020-04-29
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2019-04-30	2020-04-29
SEMT-1031	Spectrum	Rohde &	FSP30	836079/035	2019-04-30	2020-04-29
	Analyzer	Schwarz				
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2019-04-30	2020-04-29
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2019-04-30	2020-04-29
SEMT-1008	Amplifier	C&D	PAP-1G18	2002	2019-04-30	2020-04-29
SEMT-1043	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-04-30	2020-04-29
SLWI-1007	Broadband	Senwarz beek	1 WIZD 1510	7113	2017-05-05	2021-03-04
SEMT-1068	Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1168	Pre-amplifier	Direction	PAP-0126	14141-12838	2019-04-30	2020-04-29
SEMIT 1100		Systems Inc.	1111 0120	1111112030	2019 01 30	2020 01 29
SEMT-1169	Pre-amplifier	Direction	PAP-2640	14145-14153	2019-04-30	2020-04-29
	-	Systems Inc.				
SEMT-1163	Spectrum	Rohde &	FSP40	100612	2019-04-30	2020-04-29
	Analyzer	Schwarz				
SEMT-1170	DRG Horn	A.H.	SAS-574	571	2019-05-05	2021-05-04
	Antenna	SYSTEMS	NOACO	N 1145 450075	2010 04 20	2020.04.20
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2019-04-30	2020-04-29
SEMT-1055	RF Limiter	ATTEN	AT-BSF-0820~0920	/	2019-04-30	2020-04-29
SEMT-1056	RF Limiter	ATTEN	AT-BSF-1710~1910	/	2019-04-30	2020-04-29
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2019-04-30	2020-04-29
SEMT-C001	Cable	Zheng DI Zheng DI	LL142-07-07-10M(A)	/	2019-03-18	2020-03-17
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2019-03-18	2020-03-17
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2019-03-18	2020-03-17



SEMT-C004	Cable	Zheng DI	2M0RFC	/	2019-03-18	2020-03-17
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17

Software List				
Description	Manufacturer	Model	Version	
EMI Test Software	Fored	EZ-EMC	RA-03A1	
(Radiated Emission)*	Farad	EZ-EIVIC	KA-05A1	
EMI Test Software	David		DA 0241	
(Conducted Emission)*	Farad	EZ-EMC	RA-03A1	

*Remark: indicates software version used in the compliance certification testing

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§1.1307, §2.1093	RF Exposure	Compliant
§22.913(a), §24.232(c)	RF Output Power	Compliant
§24.51	Peak-to-average Ratio (PAR) of Transmitter	Compliant
\$22.917(b), \$24.238(b)	Emission Bandwidth	Compliant
§22.917(a), §24.238(a)	Spurious Emissions at Antenna Terminal	Compliant
§22.917(a), §24.238(a)	Spurious Radiation Emissions	Compliant
§22.917(a), §24.238(a)	Out of Band Emissions	Compliant
§22.355, §24.235	Frequency Stability	Compliant



3. RF Exposure

3.1 Standard Applicable

According to §1.1307 and §2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the SAR report.



4. RF Output Power

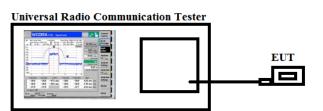
4.1 Standard Applicable

According to §22.913(a)(2), the ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to \$24.232 (c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

4.2 Test Procedure

Conducted output power test method:



- Radiated power test method:
- 1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 measurement procedure.
- 2. 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.
- 3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 4. 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.

4.3 Summary of Test Results/Plots



> Max. Radiated Power

Mode	Channel	Antenna Polar	ERP (dBm)	Limit (dBm)	Result
	129	V	28.14		
	128	Н	21.25		
CSM850	100	V	28.03	-29.45	Daga
GSM850	190	Н	21.42	<38.45	Pass
	251	V	28.35		
		Н	21.78		
	100	V	29.12		
	128	Н	22.42		
GPRS850	190	V	29.74	-29.45	Decc
GFK5850	251	Н	22.40	<38.45	Pass
		V	29.38		
	231	Н	22.28		

Mode	Channel	Antenna Polar	EIRP (dBm)	Limit (dBm)	Result
	512	V	27.47		
	512	Н	20.62		
DCS1000	661	V	27.85	-22.00	Daga
PCS1900	661	Н	20.14	<33.00	Pass
	810	V	27.36		
		Н	20.63		
	510	V	27.41		
	512	Н	20.85		
CDDS1000	661	V	27.08	-22.00	Pass
GPRS1900	810	Н	20.39	<33.00	Pass
		V	27.11		
	810	Н	20.48		



> Max. Conducted Power (Average power)

Conducted Average power (dBm)						
Band	GSM850				PCS1900	
Channel	128	128 190 251			661	810
Frequency(MHz)	824.20	824.20 836.60 848.80		1850.20	1880.00	1909.80
GSM	31.89	32.05	32.13	29.71	29.17	28.51
GPRS(1Slot)	31.86	32.11	32.19	29.81	29.29	28.44



5. Peak-to-average Ratio (PAR) of Transmitter

5.1 Standard Applicable

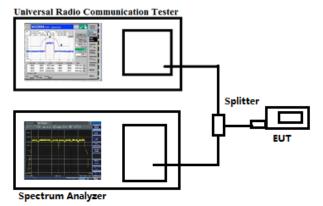
According to \$24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of \$24.51, 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.

5.2 Test Procedure

According with KDB 971168

- 1. The signal analyzer's CCDF measurement profile is enabled
- 2. Frequency = carrier center frequency
- 3. Measurement BW > Emission bandwidth of signal
- 4. The signal analyzer was set to collect one million samples to generate the CCDF curve
- 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal " RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the " on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Configuration for the emission bandwidth testing:



5.3 Summary of Test Results

PCS1900				
Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GSM	661	1850.2	4.58	13
GPRS(1 Slot)	661	1850.2	4.32	13

Note: Only the worst case was selected to record.



6. Emission Bandwidth

6.1 Standard Applicable

According to §22.917(b), 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.

According to §24.238(b), 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.

6.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

Universal Radio Communication Tester Splitter Spectrum Analyzer

Test Configuration for the emission bandwidth testing:

6.3 Summary of Test Results/Plots



EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
	128	824.20	245.1206	314.769
GSM 850 (GMSK)	190	836.60	248.0628	316.683
	251	848.80	249.5104	315.173
	128	824.20	246.9931	317.564
GPRS850 (GMSK,1Slot)	190	836.60	245.2764	322.093
	251	848.80	247.4083	319.274
	512	1850.20	246.7805	315.937
PCS1900 (GMSK)	661	1880.00	244.1375	313.992
(0	810	1909.80	247.3424	317.049
	512	1850.20	246.8524	309.590
GPRS1900 (GMSK,1Slot)	661	1880.00	248.2552	318.072
	810	1909.80	247.1423	316.920



	GSM850
	Agilent R T Freq/Channel
	Ch Freq 824.2 MHz Trig Free Center Freq 824.200000 MHz
	Ref 40.5 dBm Atten 45 dB Start Freq
	#Peak Stop Freq Log
Low Channel	0ffst 6.5 dB
	Center 824.2 MHz Span 1 MHz 0.00000000 Hz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts) 0.00000000 Hz
	Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track 245.1206 kHz x dB -26.00 dB On Off
	Transmit Freq Error -2.364 kHz Scale Type x dB Bandwidth 314.769 kHz Log
	Ch Freq 836.6 MHz Trig Free Center Freq 836.60000 MHz
	Start Freq 836.100000 MHz
	#Peak Stop Freq 10 5,7
Middle Channel	dB/ CF Step 0ffst 0 6.5 0 dB 0
	Center 836.6 MHz Span 1 MHz Freq Offset #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts) 0.00000000 Hz
	Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track 248.0628 kHz x dB -26.00 dB Off
	Transmit Freq Error -1.786 kHz Scale Type x dB Bandwidth 316.683 kHz Log
	★ Agilent R T Freq/Channel
	Ch Freq 848.8 MHz Trig Free Center Freq 848.800000 MHz
	Ref 40.5 dBm Atten 45 dB Start Freq
High Channel	#Peak Stop Freq Log Stop Freq 10 Stop Freq dB/ Stop Freq
	Offst 000000000000000000000000000000000000
	Center 848.8 MHz Span 1 MHz 0.00000000 Hz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)
	Occupied Bandwidth Occ BW % Pwr 99.00 % 249.5104 kHz x dB -26.00 dB
	Transmit Freq Error -312.961 Hz Scale Type x dB Bandwidth 315.173 kHz Log



	GPRS850
	* Agilent R T Freq/Channel
	Ch Freq 824.2 MHz Trig Free Center Freq 824.20000 MHz
	Start Freq Ref 40.5 dBm Atten 45 dB
	#Peak Stop Freq Log
Low Channel	Offst 000000000000000000000000000000000000
	Center 824.2 MHz Span 1 MHz 0.00000000 Hz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)
	Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track On Off 246.9931 kHz x dB -26.00 dB Off Off
	Transmit Freq Error -850.922 Hz Scale Type x dB Bandwidth 317.564 kHz Log
	Ch Freq 836.6 MHz Trig Free Center Freq Occupied Bandwidth 836.60000 MHz
	Start Freq 836.100000 MHz
	Ref 40.5 dBm Atten 45 dB #Peak Log 10 Stop Freq 837.100000 MHz
Middle Channel	dB/ Offst 6.5
	dB M/L Freq Offset Center 836.6 MHz Span 1 MHz 0.00000000 Hz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)
	Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track On 245.2764 kHz x dB -26.00 dB On On
	Transmit Freq Error 311.107 Hz Scale Type x dB Bandwidth 322.093 kHz Log
	Addient R T recent
	Ch Freq 848.8 MHz Trig Free Center Freq
	Start Freq
High Channel	Ref 40.5 dBm Atten 45 dB 848.300000 MHz #Peak
	10 043-300000 kHz
	dB Image: Content of the second
	#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 247 4083 kHz × dB -26.00 dB
	247.4083 kHz x dB -26.00 dB Scale Type Transmit Freq Error 243.358 Hz Scale Type x dB Bandwidth 319.274 kHz Log



	PCS1900	
	* Agilent R T TracoView	
Low Channel		
	Ch Freq 1.8502 GHz Trig Free Occupied Bandwidth 1 2 3	
	Clear Write	
	#Peak Max Hold Log Annon Anno Annon A	
	Offst 6.5 dB	
	Center 1.85 GHz View #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)	
	Occupied Bandwidth Occ BW % Pwr 99.00 % Blank 246.7805 kHz x dB -26.00 dB	
	Transmit Freq Error -2.880 kHz More x dB Bandwidth 315.937 kHz 1 of 2	
Middle Channel	Agilent R T Ch Freq 1.88 GHz Trig Free	
	Occupied Bandwidth 1.88000000 GHz	
	Start Freq 1.87950000 GHz	
	#Peak Stop Freq Log 10	
	dB/ Offst CF Step 100.000000 kHz 6.5 Auto	
	Center 1.88 GHz Span 1 MHz Freq Offset	
	#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts) Signal Track Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track On Off 244.1375 kHz x dB -26.00 dB -26.00 dB Off Off	
	Z44. I 37 3 KHZ Scale Type Transmit Freq Error 1.143 kHz x dB Bandwidth 313.992 kHz	
High Channel	* Agilent R T Trace/View	
	Ch Freq 1.9098 GHz Trig Free Occupied Bandwidth 1 2 3	
	Clear Write Ref 40.5 dBm Atten 45 dB	
	#Peak Max Hold 10 4	
	dB/ Offst 6.5 dB	
	Center 1.91 GHz Span 1 MHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)	
	Occupied Bandwidth OccuBW % Pwr 99.00 % Blank 247.3424 kHz x dB -26.00 dB -26.00 dB	



	GPRS1900
	* Agilent R T Trace/View
Low Channel	Ch Freq 1.8502 GHz Trig Free Trace
	Clear Write
	Ref 40.5 dBm Atten 45 dB #Peak
	dB/ Offst 6.5 dB
	Center 1.85 GHz Span 1 MHz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)
	Occupied Bandwidth Occ BW % Pwr 99.00 % Blank 246.8524 kHz x dB -26.00 dB
	Transmit Freq Error -250.867 Hz More x dB Bandwidth 309.590 kHz 1 of 2
	* Agilent R T Trace/View
Middle Channel	Ch Freq 1.88 GHz Trig Free Trace Occupied Bandwidth 1 2 3
	Clear Write
	Ref 40.5 dBm Atten 45 dB #Peak
	dB/ Offst 6.5 dB
	Center 1.88 GHz #Res BW 10 kHz #Res BW 10 kHz Ket WBW 30 kHz Ket W
	Occupied Bandwidth Occ BW % Pwr 99.00 % Blank 248.2552 kHz x dB -26.00 dB
	Transmit Freq Error 1.889 kHz More x dB Bandwidth 318.072 kHz 1 of 2
High Channel	
	Ch Freq 1.9098 GHz Trig Free Center Freq Occupied Bandwidth 1.90980000 GHz
	Start Freq 1.90930000 GHz
	#Peak Stop Freq 10 1.91030000 GHz
	dB/ 2pr CF Step 0ffst 0000000 kHz 100.000000 kHz 6.5 0000000 kHz Auto
	Center 1.91 GHz System 1 MHz Freq Offset #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts) Freq Offset
	Occupied Bandwidth Occ BW % Pwr 99.00 % Signal Track 247.1423 kHz x dB -26.00 dB On Off
	Transmit Freq Error -466.306 Hz x dB Bandwidth 316.920 kHz Scale Type Log Lin



7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

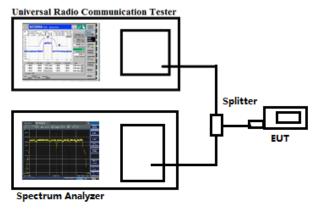
According to 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P) dB$.

According to \$24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P) dB$.

7.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:

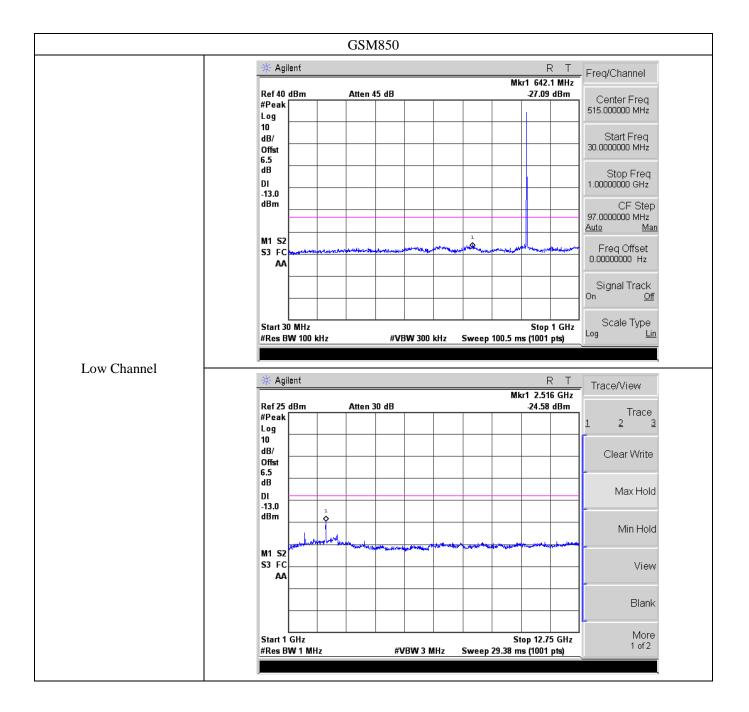


7.3 Summary of Test Results/Plots

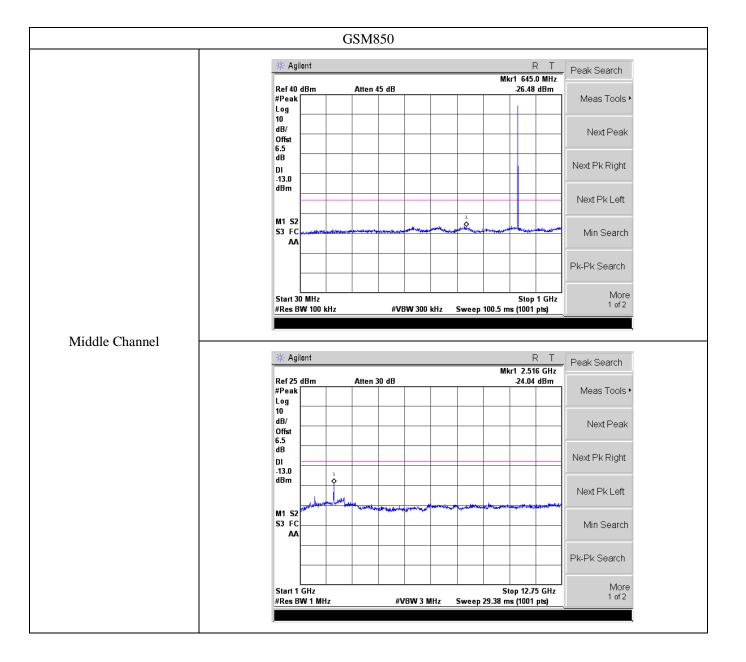
Note: Pre-scan mode WCDMA/HSDPA/HSUPA find the worst case at WCDMA mode and recorded in the test report.

Please refer to the following test plots

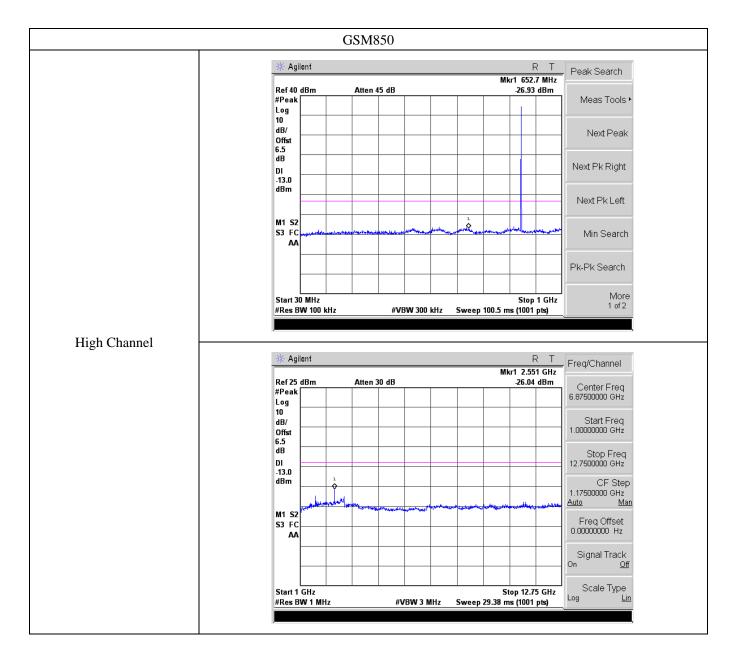




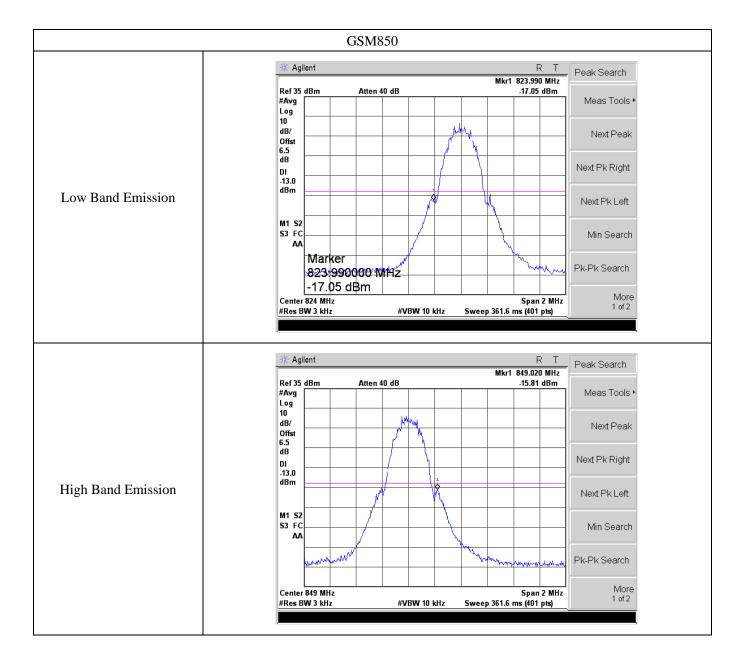




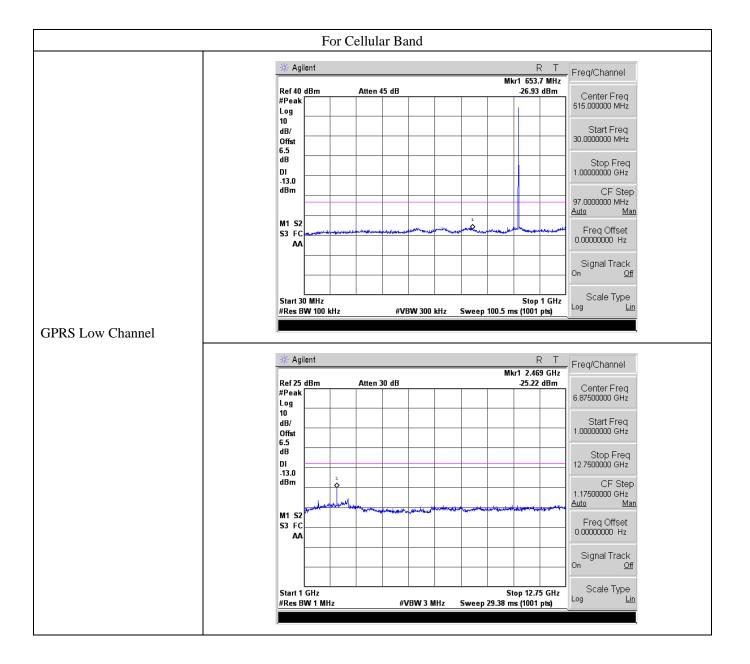




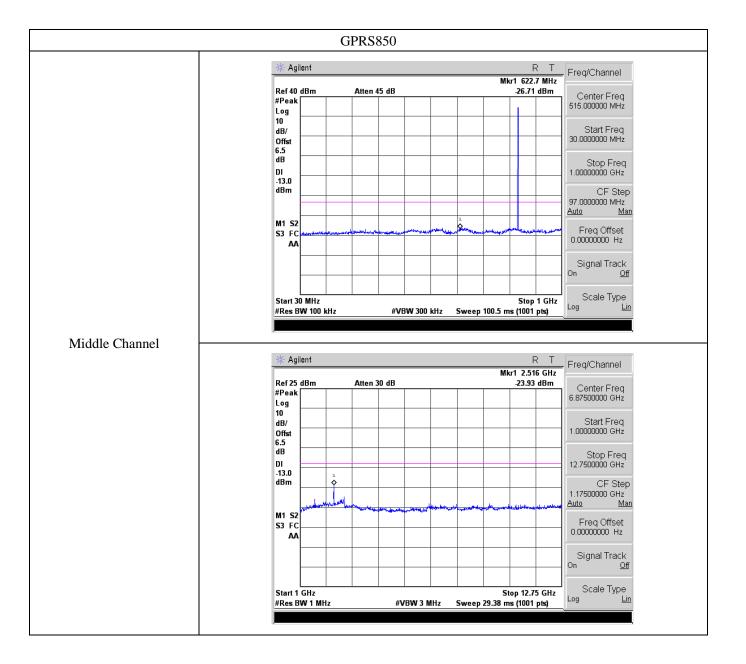






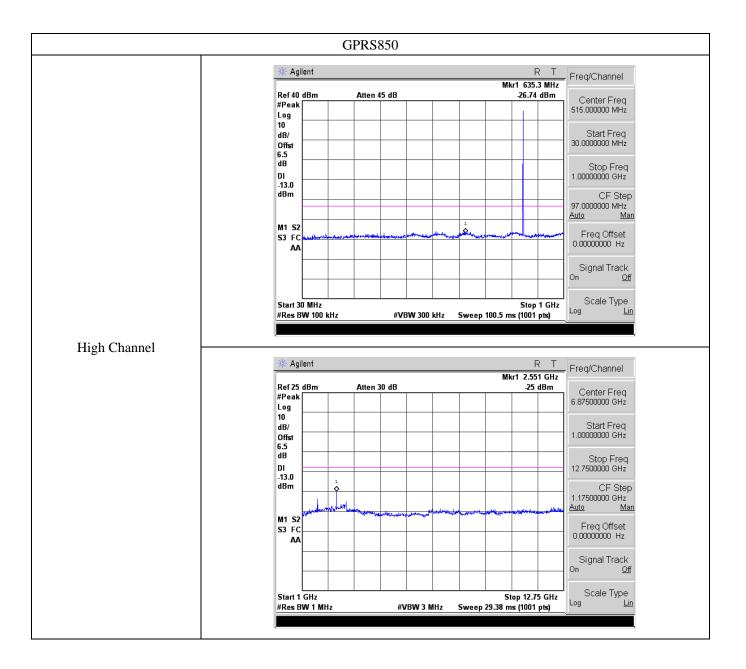




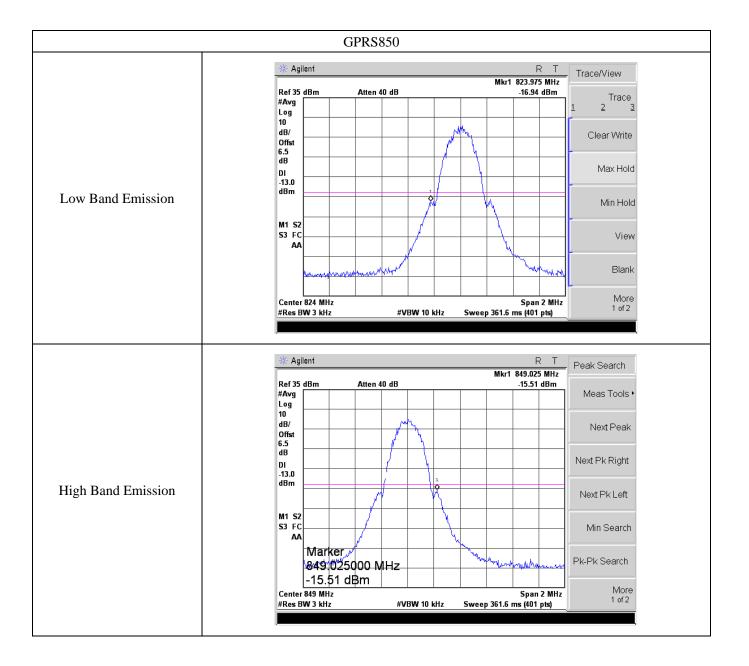




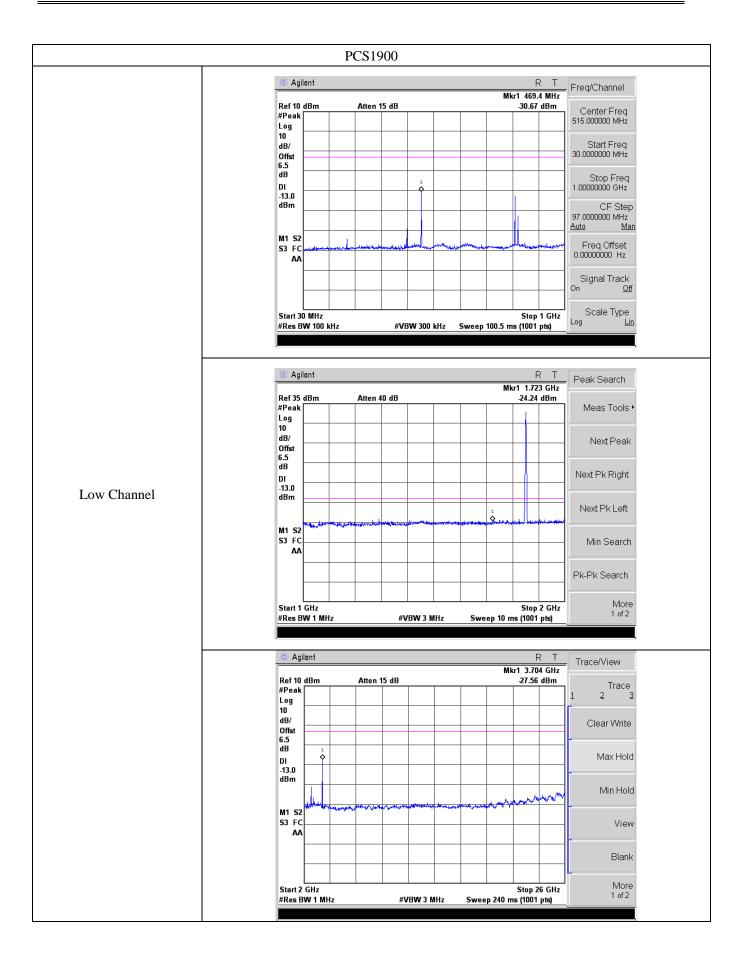




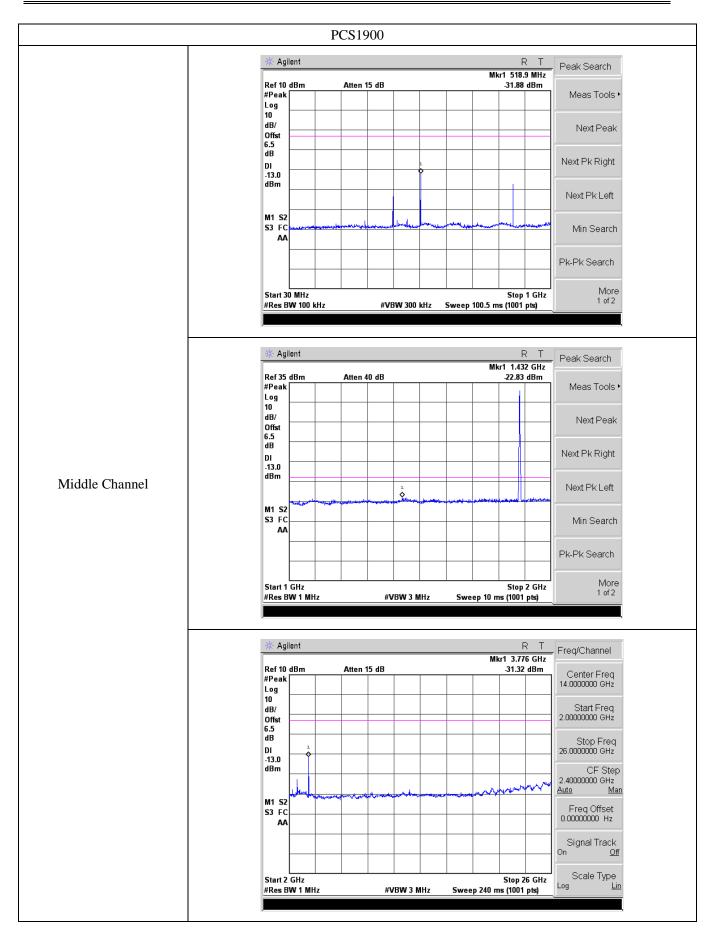




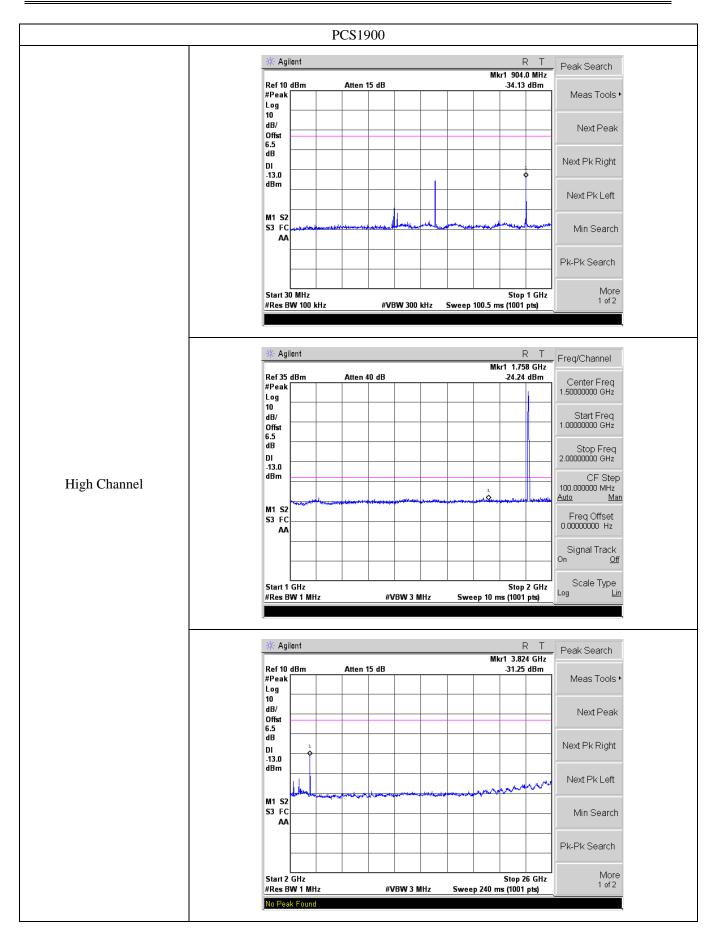




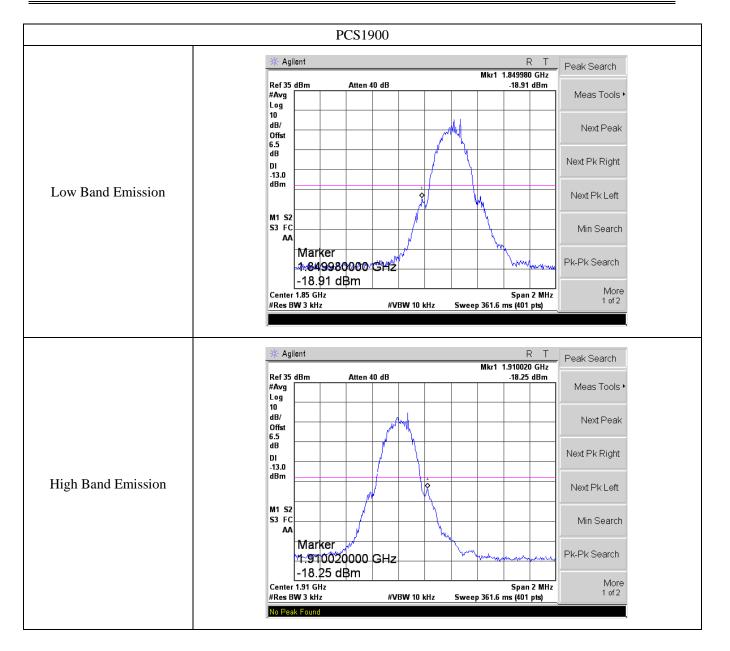




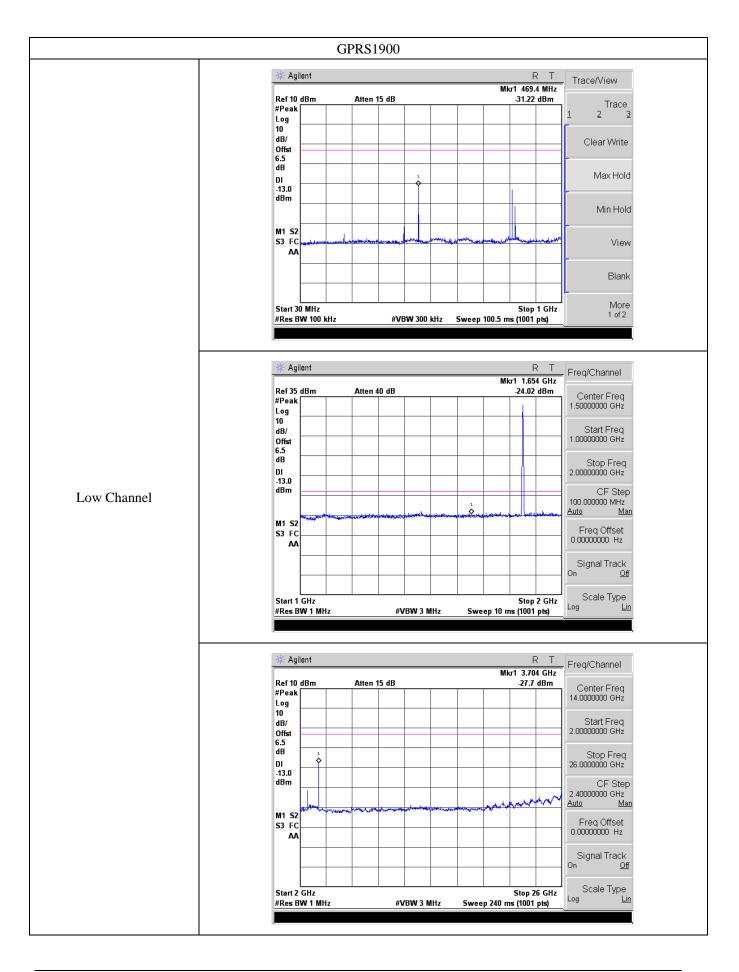




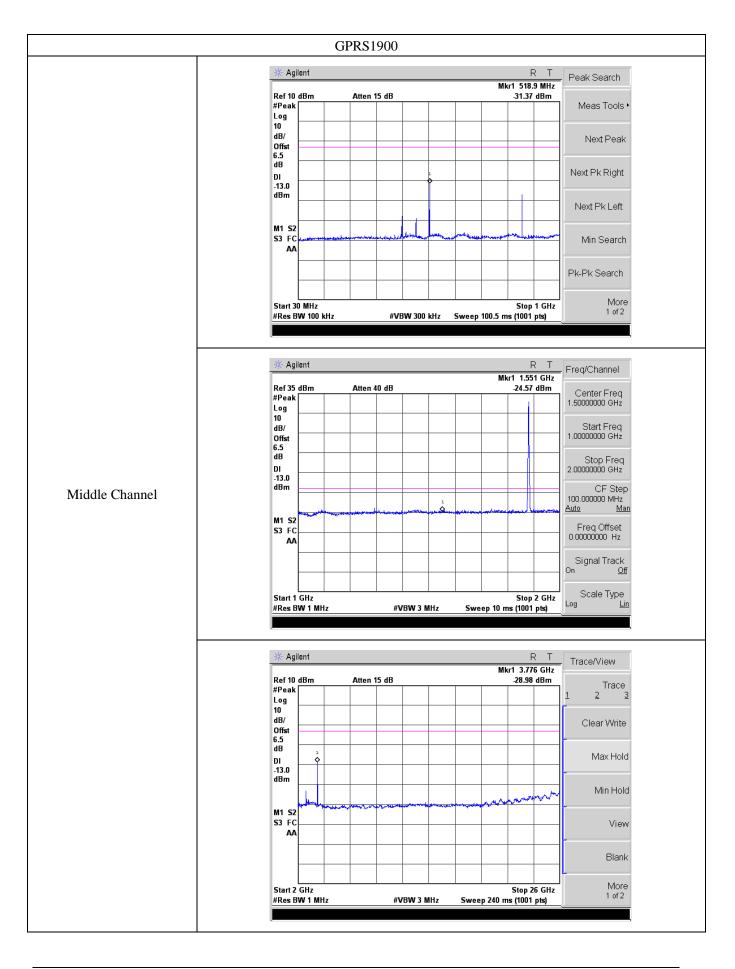




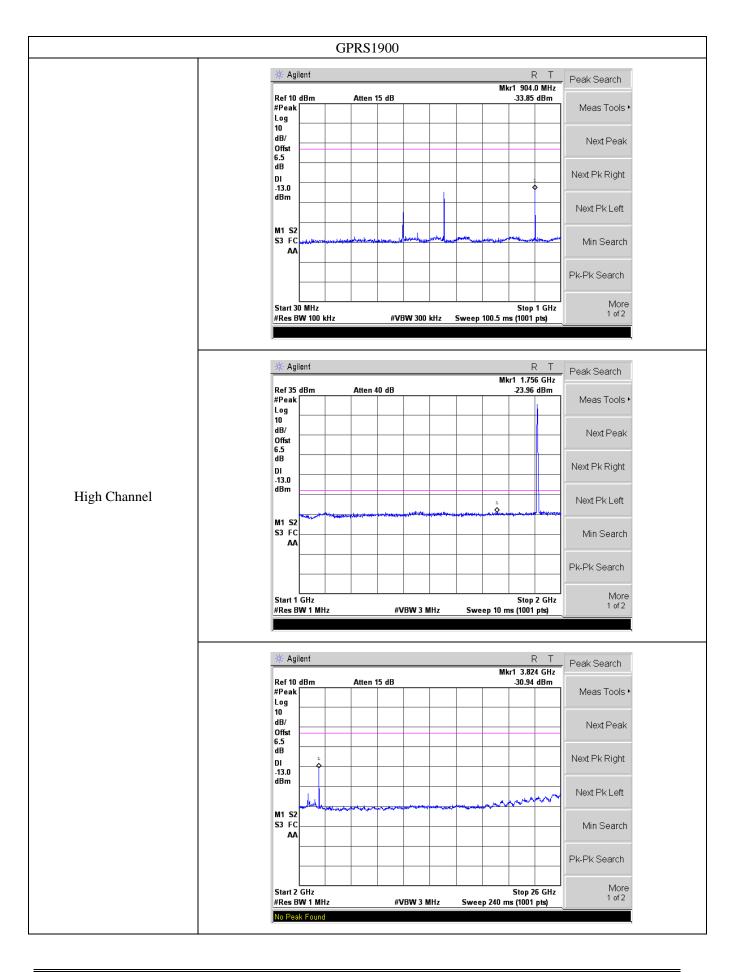
















	GPRS1900	
	∦ Agilent R Mkr1 1.849980 G	
	Ref 35 dBm Atten 40 dB -18.91 dB #Avg Log	
	10 dB/ Offst 6.5	Next Peak
	dB Di -13.0 dBm	Next Pk Right
Low Band Emission		Next Pk Left
	M1 S2 S3 FC AA	Min Search
	Marker -1-849980000 CH2 -18.91 dBm	Pk-Pk Search
	Center 1.85 GHz Span 2 M #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts	
	Center 1.85 GHz Span 2 M #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts	T Peak Search
	Center 1.85 GHz Span 2 M #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts Agilent R Ref 35 dBm Atten 40 dB -18.25 dB #Avg Log Log	T Peak Search
	Center 1.85 GHz Span 2 h #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts #Ref 35 dBm Atten 40 dB 11.910020 G #Avg	T Peak Search
	Center 1.85 GHz Span 2 h #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts #Ref 35 dBm Atten 40 dB -18.25 dB #Avg	T Peak Search Meas Tools •
High Band Emission	Center 1.85 GHz Span 2 h #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts #Ref 35 dBm Atten 40 dB -18.25 dB #Avg	T Peak Search Meas Tools • Next Peak
High Band Emission	Center 1.85 GHz Span 2 h #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts #Ref 35 dBm Atten 40 dB 18.25 dB #Agg 18.25 dB 18.25 dB 10 10 10 13.0 0 0 M1 S2 3 FC 0	T Peak Search Meas Tools • Next Peak Next Pk Right
High Band Emission	Center 1.85 GHz Span 2 h #Res BW 3 kHz #VBW 10 kHz Sweep 361.6 ms (401 pts #Ref 35 dBm Atten 40 dB 18.25 dB #Avg	T Peak Search Meas Tools • Next Peak Next Pk Right Next Pk Left



8. Spurious Radiated Emissions

8.1 Standard Applicable

According to 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P) dB$.

According to \$24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P) dB$.

8.2 Test Procedure

- 1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 measurement procedure.
- 2. 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.
- 3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 4. 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.

Spurious attenuation limit in dB = $43+10 \text{ Log}_{10}$ (power out in Watts)

8.3 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

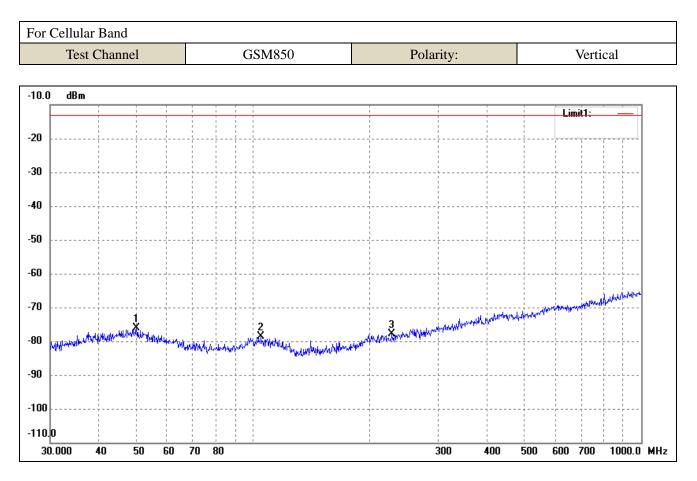


Spurious Emissions Below 1GHz

	Test C	Channe	1				G	SM850		Pola	rity:		Horizonta			1	
											-						
-10.0	dBm					-	-							_			_
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-60																 	
-70			, , , , ,								, , ,	3		when	hum	front	Norma
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30).000 4	40 !	50	60	70	80					300	400	500	600	700	10	DO. 0

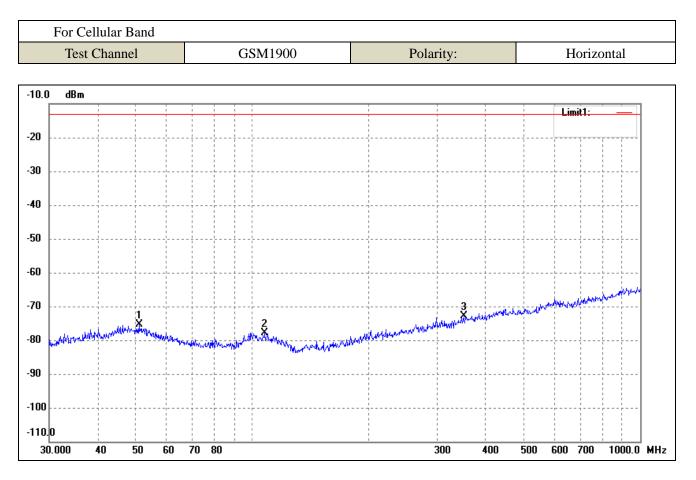
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	()	(cm)	
1	51.1209	-75.81	0.55	-75.26	-13.00	-62.26	138	100	peak
2	107.8877	-76.55	-1.25	-77.80	-13.00	-64.80	150	100	peak
3	426.5210	-77.27	5.61	-71.66	-13.00	-58.66	66	100	peak



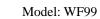


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	()	(cm)	
1	50.0566	-76.84	0.80	-76.04	-13.00	-63.04	230	100	peak
2	104.9033	-77.37	-1.30	-78.67	-13.00	-65.67	337	100	peak
3	227.6906	-77.59	-0.37	-77.96	-13.00	-64.96	71	100	peak

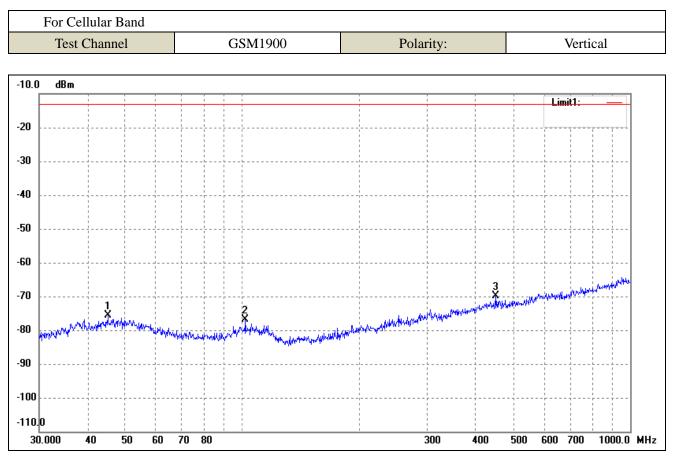




No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	()	(cm)	
1	51.1209	-75.81	0.55	-75.26	-13.00	-62.26	348	100	peak
2	107.8877	-76.55	-1.25	-77.80	-13.00	-64.80	245	100	peak
3	351.7079	-76.57	3.79	-72.78	-13.00	-59.78	63	100	peak







No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	()	(cm)	
1	45.0583	-76.16	0.46	-75.70	-13.00	-62.70	247	100	peak
2	102.0014	-75.43	-1.34	-76.77	-13.00	-63.77	90	100	peak
3	451.1350	-75.36	5.41	-69.95	-13.00	-56.95	323	100	peak

Note: Margin= (Reading+ Correct)- Limit



Spurious Emissions Above 1GHz

➢ For Cellular Band_GSM850 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
		Low	Channel (824.2N	/Hz)		
1648.4	-35.69	4.94	-30.75	-13	-17.75	Н
2472.6	-42.93	8.46	-34.47	-13	-21.47	Н
1648.4	-34.57	4.94	-29.63	-13	-16.63	V
2472.6	-44.93	8.46	-36.47	-13	-23.47	V
		Middl	e Channel (836.6	MHz)		
1673.2	-35.24	5.11	-30.13	-13	-17.13	Н
2509.8	-41.96	8.54	-33.42	-13	-20.42	Н
1673.2	-36.58	5.11	-31.47	-13	-18.47	V
2509.8	-43.58	8.54	-35.04	-13	-22.04	V
		High	Channel (848.8N	/Hz)		
1697.6	-36.27	5.25	-31.02	-13	-18.02	Н
2546.4	-42.81	8.57	-34.24	-13	-21.24	Н
1697.6	-35.48	5.25	-30.23	-13	-17.23	V
2546.4	-43.12	8.57	-34.55	-13	-21.55	V

➢ For PCS Band_GSM1900 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
		Low	Channel (1850.21	MHz)		
3700.4	-42.75	10.54	-32.21	-13	-19.21	Н
5550.6	-48.22	13.37	-34.85	-13	-21.85	Н
3700.4	-42.62	10.54	-32.08	-13	-19.08	V
5550.6	-49.93	13.37	-36.56	-13	-23.56	V
		Midd	le Channel (1880	MHz)		
3760.0	-41.06	10.64	-30.42	-13	-17.42	Н
5640.0	-46.43	13.54	-32.89	-13	-19.89	Н
3760.0	-40.51	10.64	-29.87	-13	-16.87	V
5640.0	-48.85	13.54	-35.31	-13	-22.31	V
		High	Channel (1909.8	MHz)		
3819.6	-42.63	10.74	-31.89	-13	-18.89	Н
5729.4	-48.9	13.71	-35.19	-13	-22.19	Н
3819.6	-39.29	10.74	-28.55	-13	-15.55	V
5729.4	-47.89	13.71	-34.18	-13	-21.18	V

Note: Result=Reading+ Correct, Margin= Result- Limit

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



9. Frequency Stability

9.1 Standard Applicable

According to §22.355, §24.235 the limit is 2.5ppm.

9.2 Test Procedure

According to §2.1055, the following test procedure was performed. The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value. The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

9.3 Summary of Test Results/Plots

Note: 1. Worst case at GSM850/PCS1900/WCDMA B2/B5 middle channel 2. Normal Voltage NV=DC3.7V; Low Voltage LV=DC3.5V;High Voltage HV=DC4.2V



Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz											
Power supplied (Vdc)	Temperature (°C)	Frequen	cy error	Limit (nnm)	Result						
Power supplied (vdc)	Temperature (°C)	Hz	ppm	Limit (ppm)	Kesuit						
	-30	65	0.0772								
	-20	61	0.0726								
	-10	50	0.0598								
	0	45	0.0533	2.50							
NV	10	38	0.0451		Pass						
	20	32	0.0386								
	30	40	0.0478								
	40	47	0.0561								
	50	52	0.0616								
Re	ference Frequency: PO	CS1900 Middle ch	annel=661 channe	l=1880MHz							
Power supplied (Vdc)	Temperature (°C)	Frequen	cy error	Limit (ppm)	Result						
Power supplied (vdc)	Temperature (°C)	Hz	ppm	Linit (ppin)	Kesuit						
	-30	61	0.0323								
	-20	55	0.0295								
	-10	45	0.0241								
	0	39	0.0209								
NV	10	32	0.0168	2.50	Pass						
	20	25	0.0135								
	30	32	0.0172								
-	40	38	0.0200								
	50	45	0.0241								

> Frequency stability V.S. Temperature measurement



Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz										
Temperature ($^{\circ}$ C)	Power supplied	Frequen	cy error	Limit (ppm)	Result					
Temperature (°C)	(Vdc)	Hz	ppm	Linin (ppin)	Kesun					
	HV	57	0.0680							
25	NV	46	0.0552	2.50	Pass					
	LV	39	0.0469							
Reference	e Frequency: PCS190	0 (GSM link) Mid	dle channel=661 cl	hannel=1880MH	Z					
Tommonotiono (%)	Power supplied	Frequen	Frequency error		Decult					
Temperature ($^{\circ}$ C)	(Vdc)	Hz	ppm	Limit (ppm)	Result					
	HV	48	0.0254							
25	NV	44	0.0233	2.50	Pass					
	LV	34	0.0180							

➢ Frequency stability V.S. Voltage measurement



10. Modulation characteristics

10.1 Standard Applicable

According to §2.1047, measurements required: Modulation characteristics is given below:

(a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

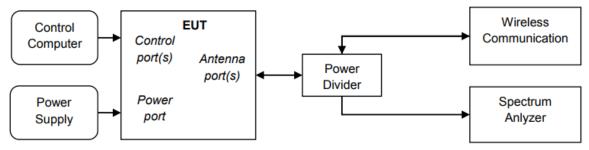
(b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of \$2.1049 for the occupied bandwidth tests.

(d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

10.2 Test Procedure

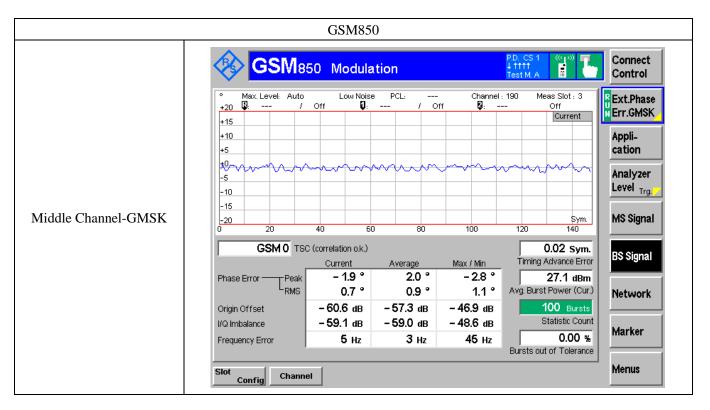
According to ANSI C63.26-2015 section 5.3.2, the following test setup was performed.

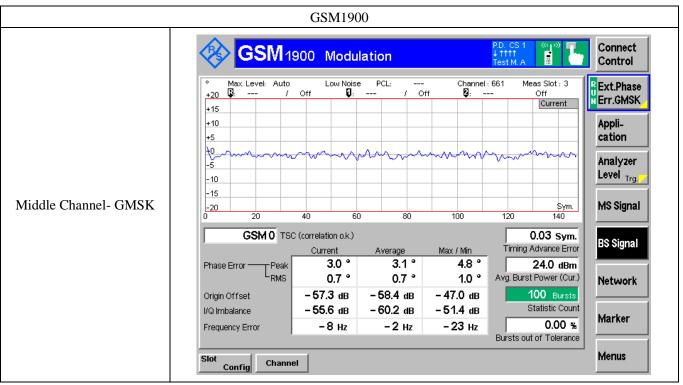


10.3 Summary of Test Results/Plots

Only the worst case was selected to record







***** END OF REPORT *****