FCC
RF Test Report

Product Name:
Fixed Wireless Terminal

Model Number:
ETS3125i

Report No: SYBH(Z-RF)009012011-3
FCC ID：QISETS3125I-I

Reliability Laboratory of Huawei Technologies Co., Ltd.

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Notice

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Notice 2

Modification Information:

Modification Information

Modification Information	1	
	2	
	3	Not Applicable!
	4	
	5	
	6	
	7	

REPORT ON	**RF TEST OF Fixed Wireless Terminal**
	M/N: ETS3125i
REGULATION	**FCC CFR47 Part 2: Subpart J;**
	FCC CFR47 Part 24: Subpart E;
START OF TEST	**Jan.10, 2011**
END OF TEST	**Jan.13, 2011**
Final Judgement:	**Pass**

Approved By	**2011-01-15**	**Chenxiaohong**	Chen Xiaohong
	Date	**Name**	**Signature**
Reviewed By	**2011-01-14**	**xuguangyi**	Xuguangyi
	Date	**Name**	**Signature**
Operator	**2011-01-13**	**Luxiaoguang**	Lu Xiaoguang
	Date	**Name**	**Signature**

REPORT BODY CONTENT

1 SUMMARY

The table below summarizes the measurements and results for the HUAWEI GSM Fixed Wireless Terminal. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
2.1046	24.232	Effective Radiated Power of Transmitter	PASS
2.1046	24.232	Conducted Power of Transmitter	PASS
2.1047	/	Modulation Characteristics	PASS
2.1049	/	Occupied Bandwidth	PASS
2.1051	24.238	Band Edges Compliance	PASS
2.1051	24.238	Spurious Emission at Antenna Terminal	PASS
2.1055	24.235	Frequency Stability	PASS
2.1053	24.238	Radiated Spurious Emissions	(See Note)

Note: The Radiated Spurious Emissions' test results are shown in the EMC report.

2 PRODUCT DESCRIPTION

2.1 Production Information

2.1.1 General Description

The HUAWEI ETS3125i Fixed Wireless Terminal is based on the Global System for Mobile Communications (GSM) technology. It provides the voice service, SMS service and supports two saving modes for the contacts and the SMS, the SIM card and the Fixed Wireless Terminal， It support GSM and the GSM frequency band includes GSM850 and PCS1900.

2.1.2 Support function and Service

The HUAWEI Fixed Wireless Terminal support the function and service as follows:

Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
Voice and data	Modulation: GMSK	TM1	GSM

Note: * The specified test conditions & settings are defined in 3GPP TS51.010 V5.4.0, the test conditions & settings are defined in 3GPP TS51.010 V5.4.0

2.2 Modification Information

For original equipment, following table is not application.

Modification Information

Model Number	Board/Module	Original Version	New Version	Modify Information
Not applicable				

3 TEST SITE DESCRIPTION

The test site of:

Huawei Technologies Co. Ltd.
P.O. Box 518129
Huawei base, bantian,
Longgang District, Shenzhen, China

3.1 Testing Period

The test have been performed during the period of

Jan. 10, 2011 –Jan. 13, 2011

3.2 General Set up Description

TM1: GSM Mode with GMSK Modulation

4 PRODUCT DESCRIPTION

4.1 Technical Characteristics

4.1.1 Frequency Range

Frequency Range

Uplink band:	1850 to 1910 MHz
Downlink band:	1930 to 1990 MHz

4.1.2 Channel Spacing / Separation

Channel Spacing / Separation

	GSM
Channel spacing	200kHz
Channel separation:	200kHz

4.1.3 Type of Emission

Type of Emission

	GSM
Emission Designation:	300KGXW (GMSK),

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

4.1.4 Environmental Requirements

Environmental Requirements

Minimum temperature:	- 10 °C
Maximum temperature:	+ 45 °C
Relative Humidity:	5%-95%RH

4.1.5 Power Source

Power Source

AC voltage nominal:	~120V
AC voltage range	~100V-240V
AC current maximal:	0.5A

4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (9).

Please reference the document Tune-up Procedure in TCF.

4.1.7 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8).

The voltage and current of RF IC in the final stage is:

Applied RF module DC Voltages and Currents

Voltage:	⎓ 2.85V
Current:	2A According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)

4.2 EUT Identification List

4.2.1 Board Information

Board Information

ETS3125i Fixed Wireless Terminal			
ETS3125i			
Board and Module			
Equipment Designation / Description	Hardware Version	Serial Number	Remarks
MAINBOARD	MG1FC312EM WG1FP3125I	731052104582	ETS3125i

4.2.2 Adapter Technical Data

…

Adapter	1	HUAWEI Technologies Co.,Ltd.	732800975	Adapter Model: HF-050065U1 Input Voltage : 100-240V ~50/60Hz, 0.2A Output Voltage: ⎓ 5.0V 650mA Rated Power: 3.25W
Battery				
NI-MH Battery	1	HUAWEI Technologies Co.,Ltd.	HGB-2A10x3	Rated capacity: 1000mAh Nominal Voltage: ⎓ +3.5V Charging Voltage: ⎓ +4.2V
NI-MH Battery	1	HUAWEI Technologies Co.,Ltd.	HGB-AAA600x3	Rated capacity: 600mAh Nominal Voltage: ⎓ +3.5V Charging Voltage: ⎓ +4.2V

4.2.3 FCC Identification

Grantee Code: **QIS**
Product Code: **ETS3125i**
FCC Identification: **QISETS3125I-I**

5 MAIN TEST INSTRUMENTS

Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	12.23.2011
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	12.23.2011
Receiver	R&S	ESIB 26	100318	11.29.2011
Receiver	R&S	ESCS30	830245/018	11.29.2011
Pre-Amplifier	Agilent	8447D	2944A10146	12.21.2011
Pre-Amplifier	Agilent	83017A	3950M00246	12.04.2011
Loop Antenna	Schwarzbeck	FMZB1516	1516115	12.20.2011
BiLog Antenna	Schaffner	CBL 6112B	2536	12.25.2011
Horn Antenna	ETS-Lindgren	3117	00062533	12.05.2011
Horn Antenna	ETS-Lindgren	3116	00031541	11.20.2011
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	12.27.2011
Signal Generator	R&S	SMT06	830264/009	11.29.2011
Signal Generator	R&S	SMU200A	3605062516	12.08.2011
Signal Generator	R&S	SMR 40	100325	12.09.2011
Power Supply	Keithley	2306	1045337	11.20.2011
Climate Chamber	WEISS	ACS-1	3604040034	12.14.2011
Universal Radio Communication Tester	R&S	CMU200	108035	12.04.2011
Wireless communication test set	Agilent	8960	GB43461081	12.15.2011
Power Splitter	Agilent	11667B	3586M000159	11.20.2011
Spectrum Analyzer	Agilent	E4440A	N/A	12.26.2011

6 TRANSMITTER MEASUREMENTS

6.1 Effective Radiated Power of Transmitter (EIRP)

6.1.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	55%
Test Configurations:	TM1 at frequency Bottom, Middle, Top

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24.232

6.1.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.1.2.3 Limits

Compliance with part 24.232, mobile/portable stations are limited to 2 watts EIRP peak power. W(dBm)= 10*log ($W_{In\ mwatts}$).

Limits

Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

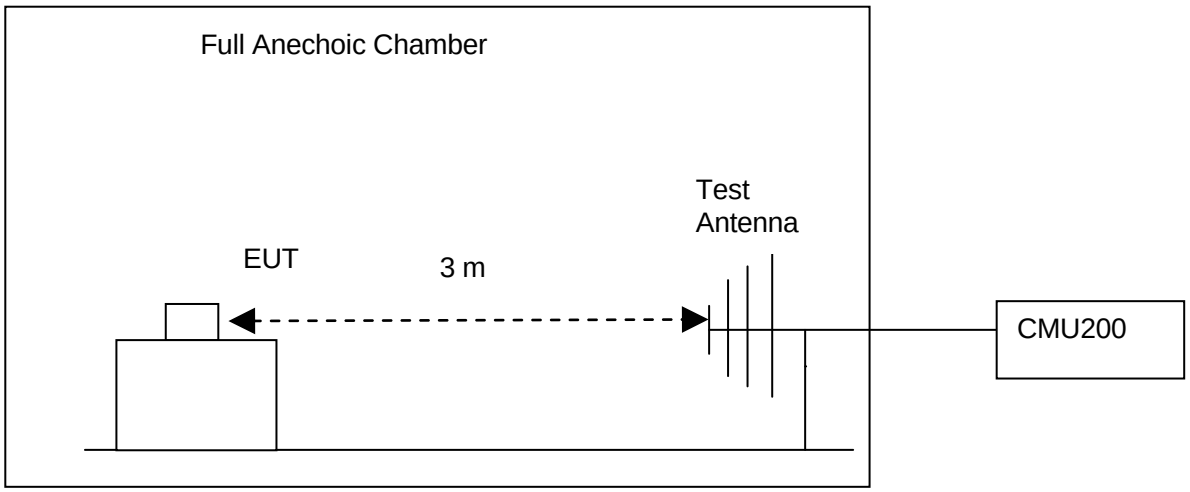
6.1.3 Test Method and Setup

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Fixed Wireless Terminal to the wireless communication tester R&S CMU200 via the air interface. The band class is set as PCS.
(b) Test the Radiated maximum output power by the CMU200 received from test antenna.
(c) Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal

generator to get the same received power recorded in step (b) on CMU200, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated..

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum EIRP

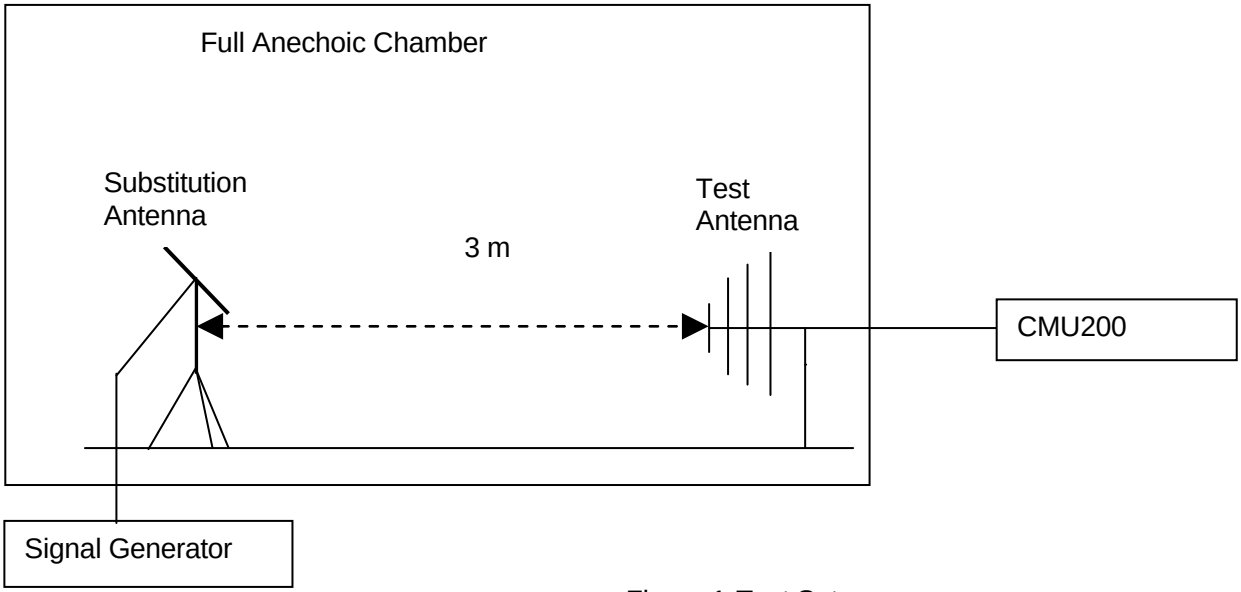


Figure 1. Test Set-up

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.
There is a constant difference of 2.15 dB between EIRP and ERP.
EIRP (dBm) = ERP (dBm) + 2.15 (ITU-R Recommendation SM.329-10).

6.1.4 Measurement Results

6.1.4.1 Pre-test Results

Measurement Results

		RF Output Power (EIRP)					
TEST CONDITIONS		Channel512(B) 1850.2MHz		Channel661 (M) 1880MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T_{nom} (25 °C) V_{nom} (3.7V)	28.59	33	28.85	33	28.95	33

6.1.4.2 Substitution Results

Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	Limit [dBm]	Result
TM1	1850.2	28.59	Horn Ant.	24.84	4.6	1.0	28.44	33	Pass
TM1	1880.0	28.85	Horn Ant.	25.11	4.6	1.0	28.71	33	Pass
TM1	1909.8	28.95	Horn Ant.	25.09	4.8	1.0	28.89	33	Pass

Note: a, For get the EIRP (Efficient Isotropically Radiated Power) in substitution method, the following formula should take to calculate it,

EIRP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBi]

NOTE: SGP- Signal Generator Level

b, A GSM/GPRS/EDGE signal with bandwidth of 200kHz are created by the vector generator R&S SMU200A.

c, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 200kHz for TM1.

6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1 at frequency Bottom, Middle, Top

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.2.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.2.2.3 Limits

Compliance with part 24.232, in no any case may the peak power of a mobile station transmitter exceed 2 W. The calculated longitude EIRP by following formula:

EIRP(dBm)= 10*log ($EIRP_{in\ mW}$).

And for conducted power, we can use Antenna Gain to calculate the limit. So the conducted power:

P_{cod}.(dBm)=EIRP(dBm)- Gain(dBi).
and Gain (dBi)= Gain(dBd)+ 2.15dB

Limits

Maximum Output Power (Watts)	< 2 Watts（33dBm）
Antenna Gain(dBi):	2.5
Maximum Conducted Output Power (dBm)	< 30.5dBm

6.2.3 Test Method and Setup

(a)For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, Conducted maximum power shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Fixed Wireless Terminal to the wireless communication tester CMU200 via the antenna connector. The band class is set as PCS.
(b)Test the Conducted maximum output power by the CMU200.

Test setup

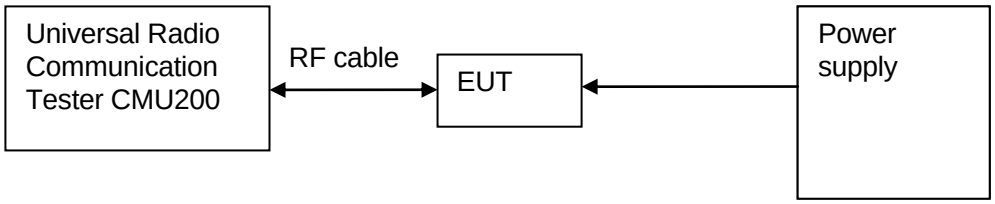


Figure 2. Test Set-up

6.2.4 Measurement Results

Measurement Results

		RF Output Power(Conducted)					
TEST CONDITIONS		Channel512(B) 1850.2MHz		Channel661 (M) 1880MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T_{nom} (25 °C) V_{nom} (3.7V)	28.59	30.5	28.85	30.5	28.95	30.5

6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.

6.3 Modulation Characteristics

6.3.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1 at frequency Middle

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.3.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 24 subpart E.

Limits

Limits	Not applicable

6.3.3 Test Method and Setup

Connect the Fixed Wireless Terminal to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as PCS; the Fixed Wireless Terminal's output is matched with 50 Ω load, test method was according to 3GPP TS 51.010 and TS 34.121. The waveform quality and constellation of the Fixed Wireless Terminal was tested.

Test setup

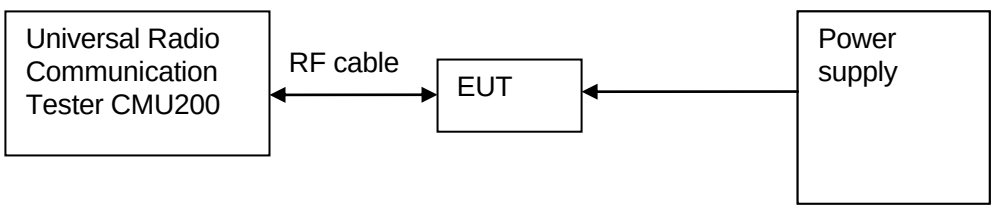


Figure 3. Test Set-up

6.3.4 Measurement Results

Measurement Results

		Modulation Characteristic
TEST CONDITIONS		Channel661(M) 1880MHz
		Measured
		TM1
T_{nom} (25 °C)	V_{nom} (3.7)	Refer to Appendix A

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix A.

6.4 Occupied Bandwidth

6.4.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1 at frequency Bottom, Middle, Top

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 24 subpart E

6.4.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.4.2.3 Limits

No specific occupied bandwidth requirement in part 24 subpart E, but the occupied bandwidth was defined in part 2.1049: the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Limits

Upper /lower frequency limits	0.5% of the mean power

6.4.3 Test Method and Setup

Fixed Wireless Terminal was connected to the Spectrum Analyzer AGILENT E4440A via the one RF connector. The band class is set as PCS; The EUT was controlled to transmit maximum power. Measure and record the occupied bandwidth of the EUT by the AGILENT E4440A.

The OBW, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

Refer to 47CFR part2.1049 section (g)&(h).
(g) Transmitter in which the modulating base band comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for

which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.
(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudorandom generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

For TM1 following RBW and VBW are employed:
Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)
Video bandwidth (VBW): 10 kHz

Test Set-up

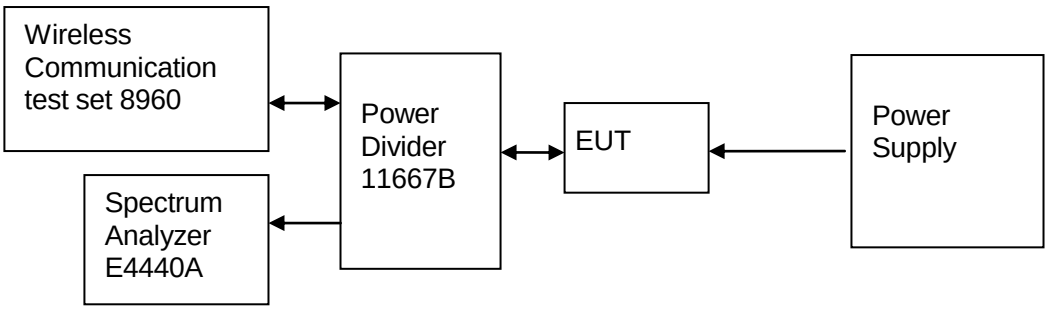


Figure 4. Test Set-up

6.4.4 Measurement Results

Measurement Results

TEST CONDITIONS		Occupied Bandwidth		
		Channel512 (B) 1850.2MHz	Channel661 (M) 1880MHz	Channel810 (T) 1909.8MHz
		Measured (KHz) TM1	Measured (KHz) TM1	Measured (KHz) TM1
T_{nom} (25 °C) V_{nom} (3.7V)	99%	0.2521	0.2544	0.2530

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B.

6.5 Band Edges Compliance

6.5.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	TM1 at frequency Bottom, Top

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

6.5.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.5.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P（W）. (Whereas P is the rated power of the EUT).

Limits

	TM1
Rated Power:	30 dBm
Required attenuation:	43+10log (1) = 43 , 30 dBm - 43 dB
Absolute level	- 13 dBm

6.5.3 Test Method and Setup

The EUT was connected to the Spectrum Analyzer AGILENT E4440A via the one RF connector; the band class is set as PCS. The EUT was controlled to transmit maximum power. Measure and record band edges compliance of the EUT by the AGILENT E4440A.

The limit is -13dBm.

For TM1 following RBW and VBW are employed:

Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)
Video bandwidth (VBW): 10 kHz

Test Set-up

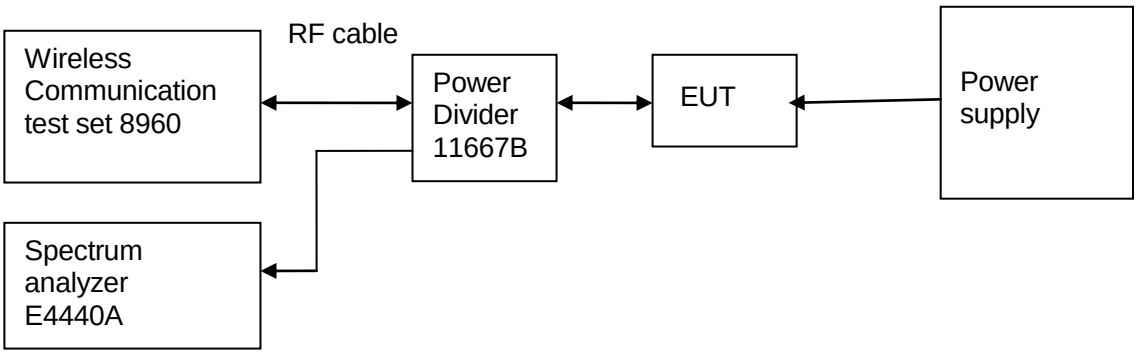


Figure 5. Test Set-up

6.5.4 Measurement Results

Measurement Results outside Band Edges-- Single Carrier

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode	Spurious Level measured [dBm]	FCC limit	Result
PCS	T_{nom} (25 °C), V_{nom} (3.7V)					
	1850.2	512	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1909.8	810	TM1	<-13(See appendix C)	- 13 dBm	Pass

6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix C.

6.6 Spurious Emission at Antenna Terminal

6.6.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	50 %
Test Configurations:	TM1 at frequency Bottom, Middle ,Top

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

6.6.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Recommended GSM/EDGE MS conformance specification

6.6.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P. (Whereas P is the rated power of the EUT).

Limits

	TM1
Rated Power:	30 dBm
Required attenuation:	43+10log (1) = 43 , 30 dBm - 43 dB
Absolute level	- 13 dBm

6.6.3 Test Method and Setup

The EUT was connected to the Spectrum analyzer AGILENT E4440A via the one RF connector, the band class is set as PCS. The EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT by the AGILENT E4440A.

According to part 24.238, the defined measurement bandwidth as following:

24.238 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30MHz: 10 kHz;
Measurement bandwidth (RBW) for 30 MHz up to 20GHz: 1MHz;

Test Set-up

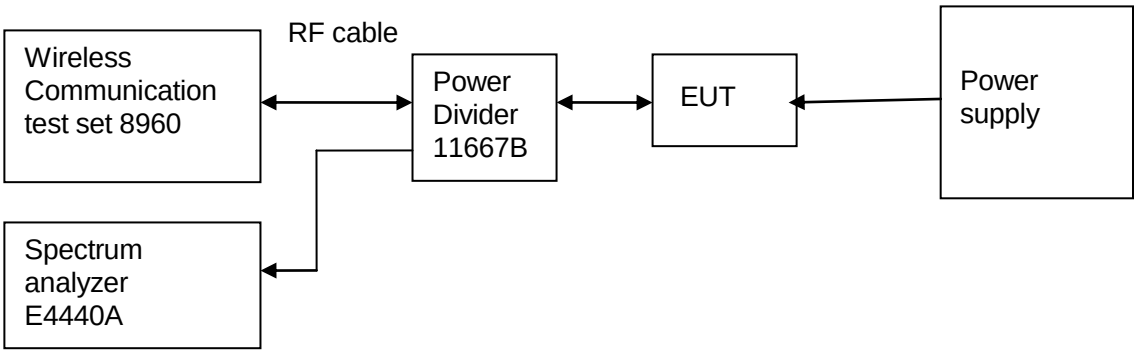


Figure 6. Test Set-up

6.6.4 Measurement Results

Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 512(B)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 661(M)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 810(T)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass

6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix D.

6.7 Frequency Stability

6.7.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	TM1 at frequency M

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 24.235

6.7.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.7.2.3 Limits

No specific frequency stability requirement in part 2.1055 and part 24.235.

6.7.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30 ° to +50 ° centigrade for all equipment except that specified in subparagraphs
(2) and (3) of paragraph 2.1055

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10^{o} centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

The EUT can only work in such extreme voltage 3.5V and 4.2V，so here the EUT is tested in the 3.5V and 4.2V

Test Set up

Connect the EUT to the Wireless Communication test set 8960 via the connector. Then measure the frequency error by the Wireless Communication test set 8960. The EUT's output is matched with a 50 Ω load.

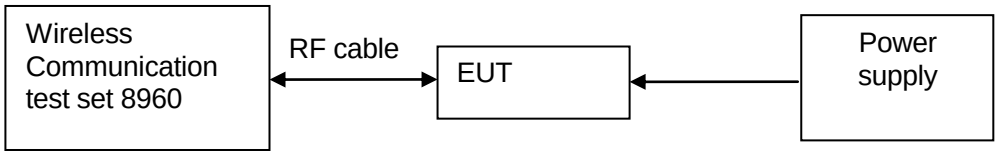


Figure 7. Test Set up

6.7.4 Measurement Results

6.7.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 3.7V DC Channel No.661(1880.0MHz)**

Measurement Results vs. Variation of Temperature

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	30	1880.0	9	Pass
-20 °C	30	1880.0	15	Pass
-10 °C	30	1880.0	11	Pass
0 °C	30	1880.0	8	Pass
+10 °C	30	1880.0	19	Pass
+20 °C	30	1880.0	17	Pass
+30 °C	30	1880.0	20	Pass
+40 °C	30	1880.0	15	Pass
+50 °C	30	1880.0	18	Pass

6.7.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 661(1880.0MHz)**

Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.75	30	1880.0	17	Pass
5	30	1880.0	16	Pass
5.6	30	1880.0	19	Pass

6.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.

7 SYSTEM MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

System Measurement Uncertainty

Items		Extended Uncertainty
Effective Isotropically Radiated Power of Transmitter	EIRP (dBm)	U=3dB; k=2
Band Width	Magnitude (%)	U=0.2%; k=2
Band Edge Compliance	Disturbance Power（dBm）	U=2.0dB; k=2
Conducted Spurious Emission at Antenna Terminal	Disturbance Power（dBm）	U=2.0dB; k=2
Frequency Stability	Frequency Accuracy(ppm)	U=0.21ppm; k=2

8 APPENDICES

Appendix A	Measurement Results Modulation Characteristics	4 pages
Appendix B	Measurement Results Occupied Bandwidth	4 pages
Appendix C	Measurement Results Band Edges Compliance	3 pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	13 pages

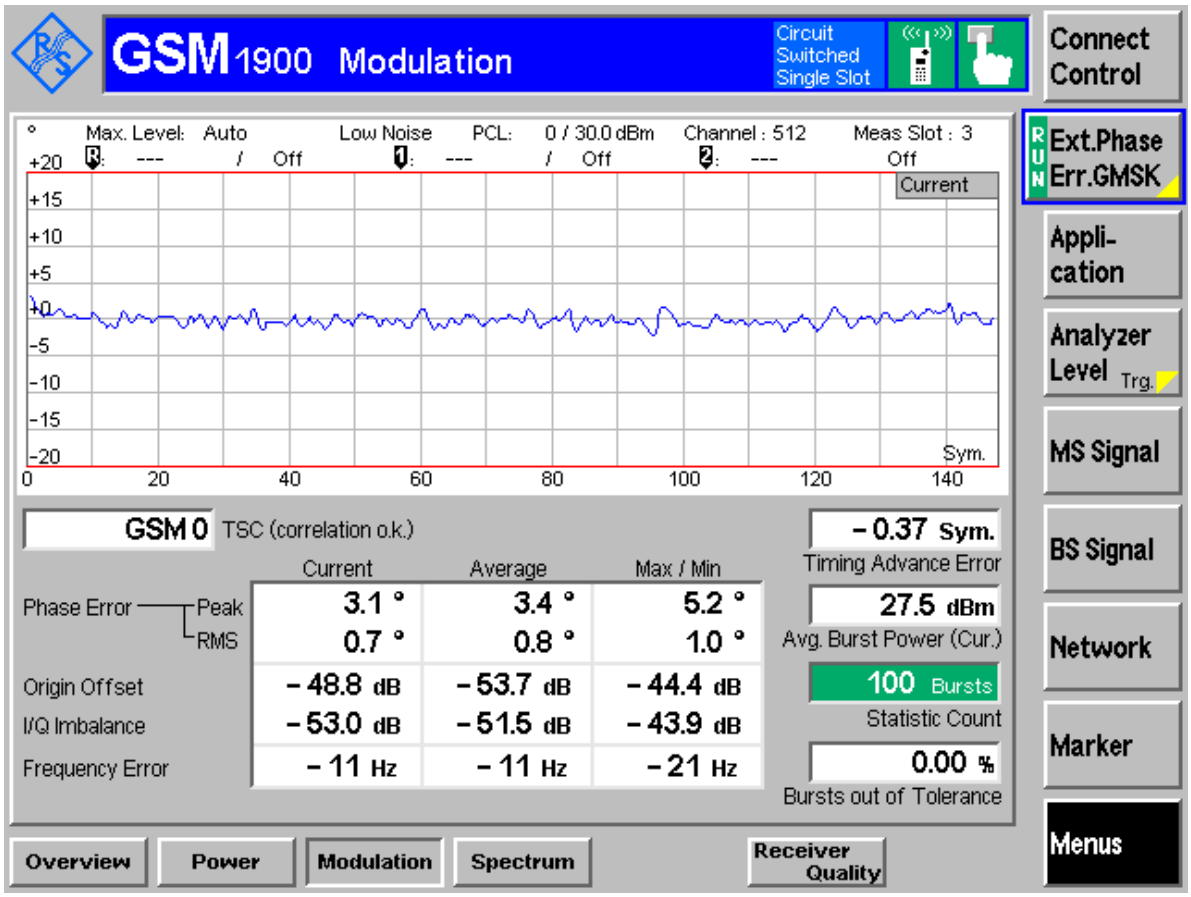
(END OF REPORT)

Appendix A

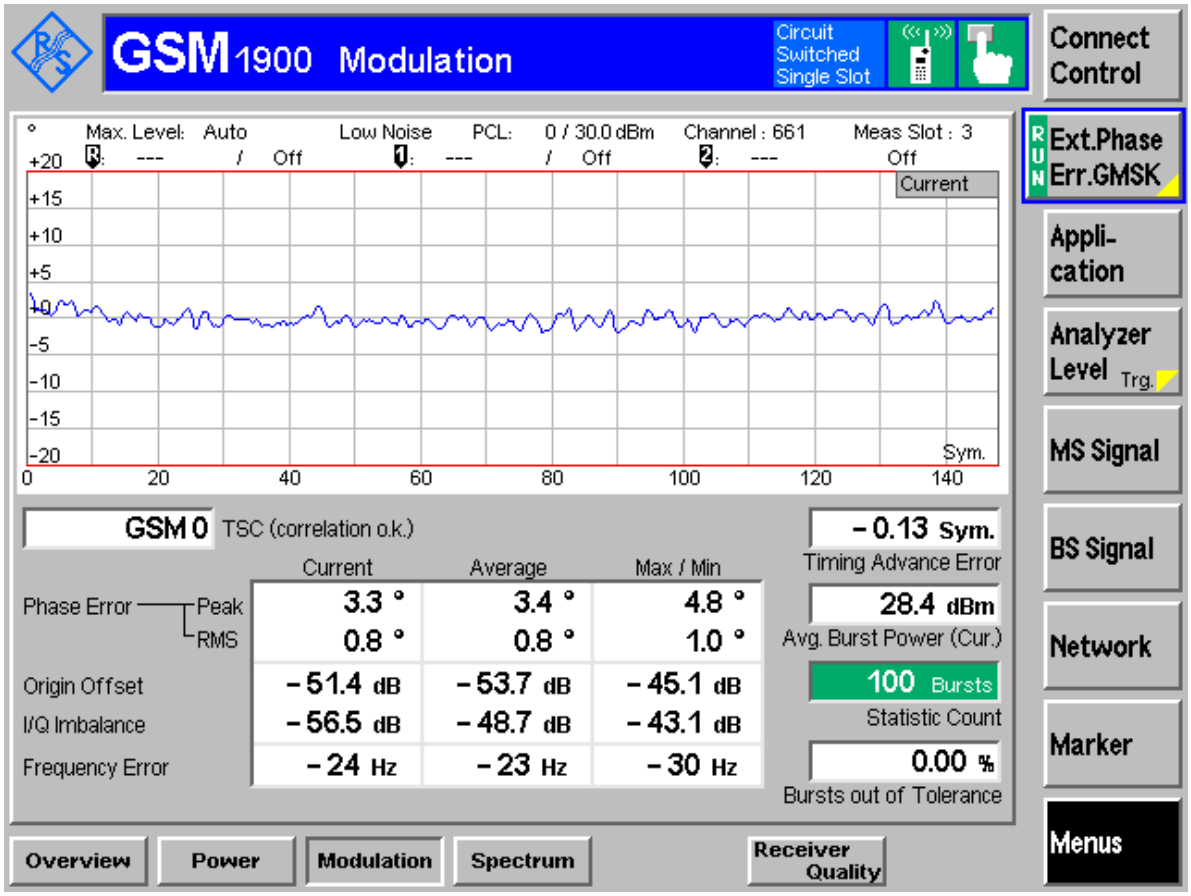
Modulation Characteristics

According to FCC Part 2.1047 & Part24 Subpart E

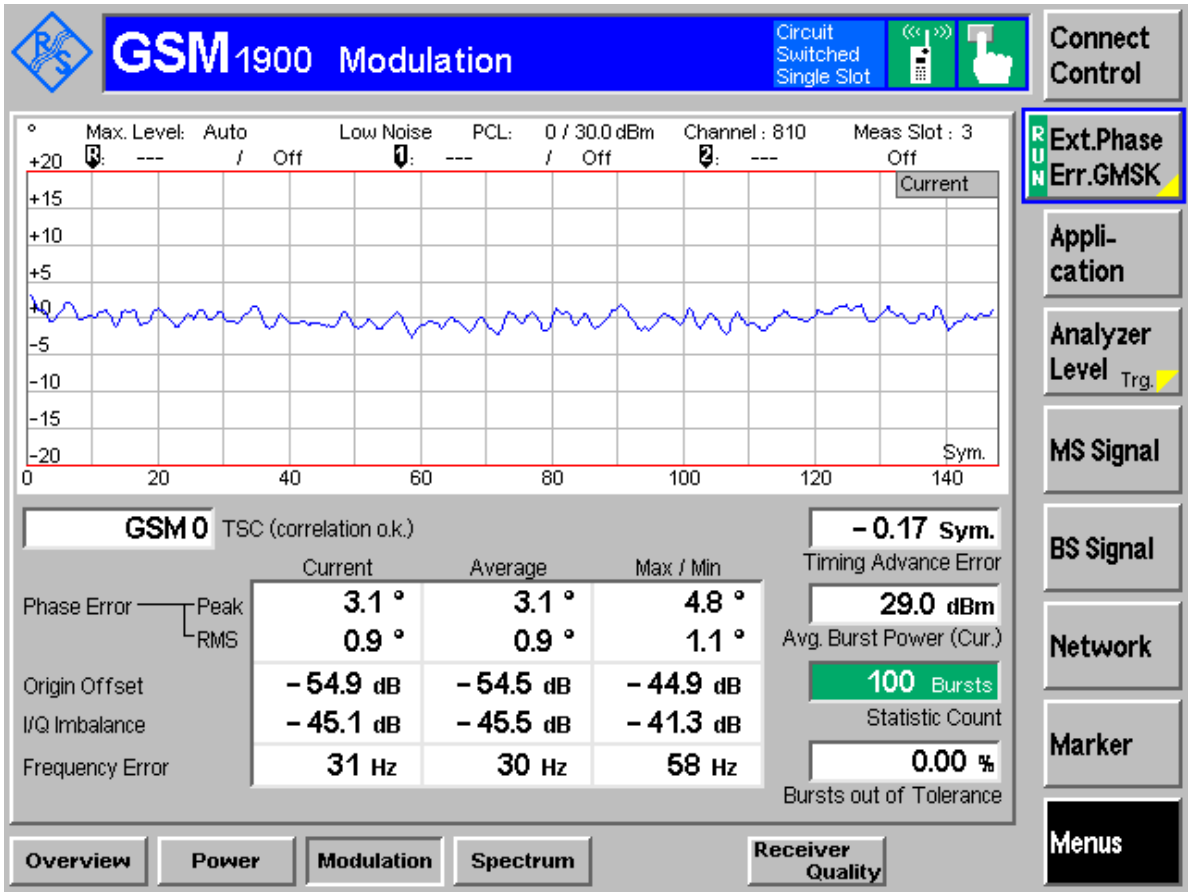
TM1:GSM
Channel 512



Channel 661


GSM 1900 Modulation
Circuit Switched Single Slot
Connect Control
Max. Level: Auto
Low Noise
PCL: 0 / 30.0 dBm
Channel : 661
Meas Slot : 3
Ext.Phase Err.GMSK
Current
Appli-cation
Analyzer Level Trg.
MS Signal
BS Signal
Network
Marker
Menus
GSM 0
TSC (correlation o.k.)
Current
Average
Max / Min
Phase Error
Peak
RMS
3.3 °
0.8 °
3.4 °
0.8 °
4.8 °
1.0 °
Origin Offset
I/Q Imbalance
Frequency Error
-51.4 dB
-56.5 dB
-24 Hz
-53.7 dB
-48.7 dB
-23 Hz
-45.1 dB
-43.1 dB
-30 Hz
-0.13 Sym.
Timing Advance Error
28.4 dBm
Avg. Burst Power (Cur.)
100 Bursts
Statistic Count
0.00 %
Bursts out of Tolerance
Overview
Power
Modulation
Spectrum
Receiver Quality
Sym.

Channel 810

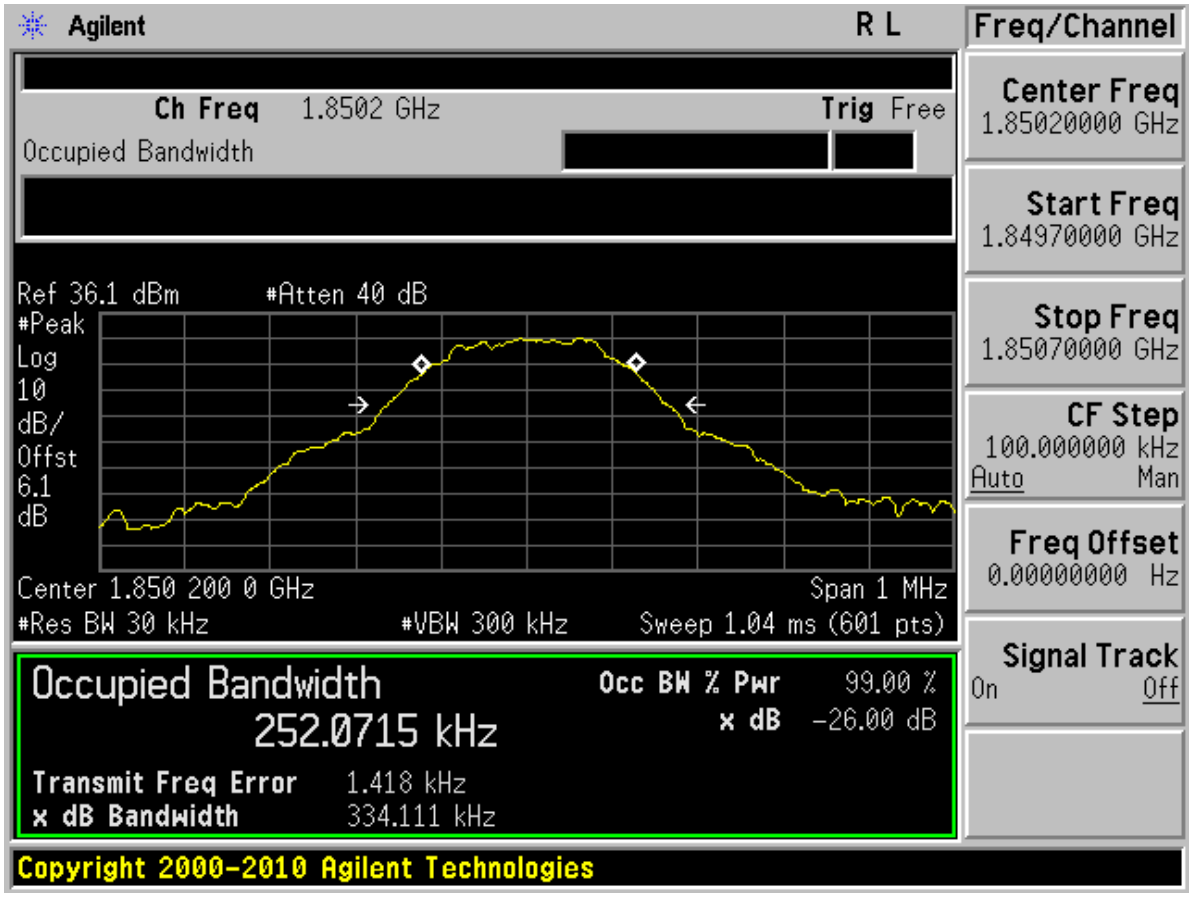

GSM 1900 Modulation
Circuit Switched Single Slot
Connect Control
Max. Level: Auto
Low Noise
PCL: 0 / 30.0 dBm
Channel : 810
Meas Slot : 3
Ext.Phase Err.GMSK
Current
Appli-cation
Analyzer Level Trg.
MS Signal
BS Signal
Network
Marker
Menus
GSM 0
TSC (correlation o.k.)
Current
Average
Max / Min
Phase Error
Peak
RMS
3.1 °
0.9 °
3.1 °
0.9 °
4.8 °
1.1 °
Origin Offset
I/Q Imbalance
Frequency Error
-54.9 dB
-45.1 dB
31 Hz
-54.5 dB
-45.5 dB
30 Hz
-44.9 dB
-41.3 dB
58 Hz
-0.17 Sym.
Timing Advance Error
29.0 dBm
Avg. Burst Power (Cur.)
100 Bursts
Statistic Count
0.00 %
Bursts out of Tolerance
Overview
Power
Modulation
Spectrum
Receiver Quality

Appendix B

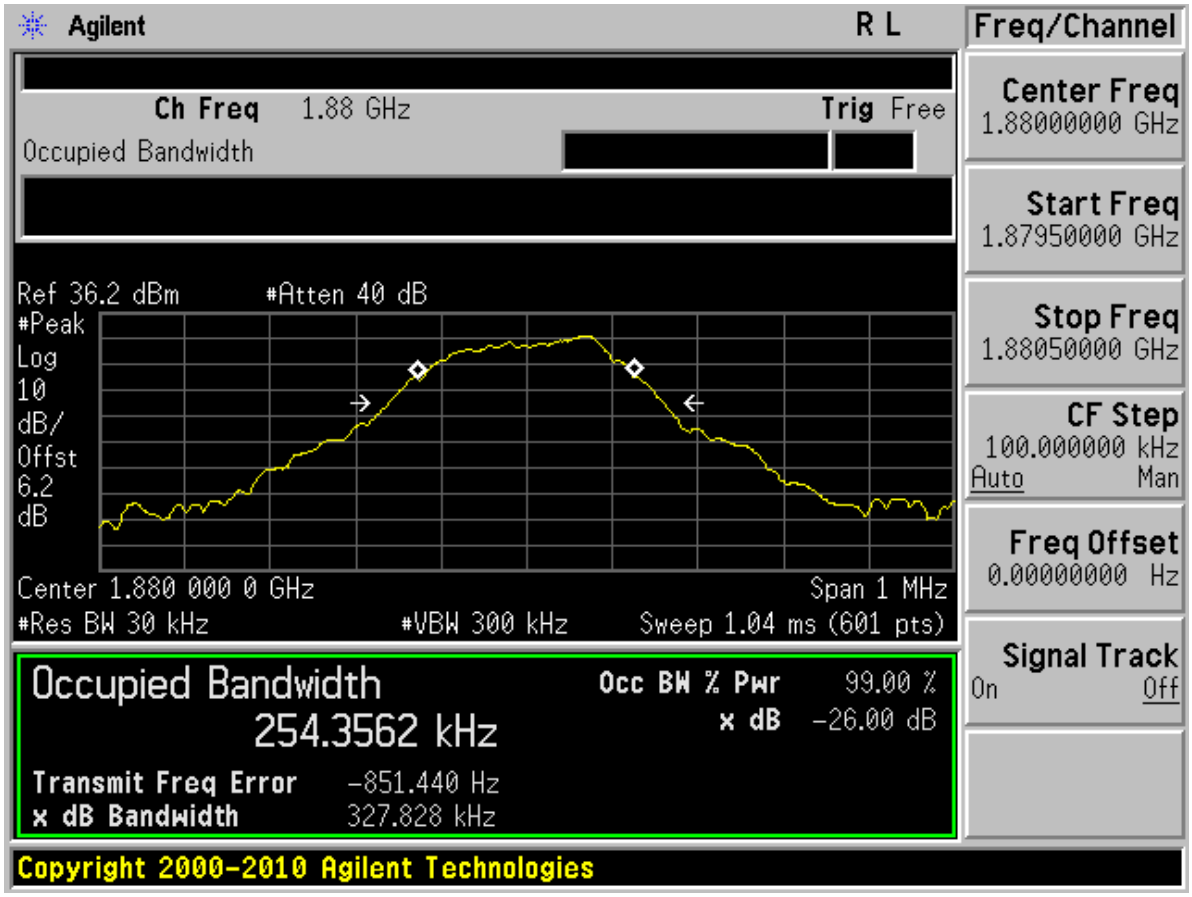
Occupied Bandwidth

According to FCC Part 2.1049 & Part 24 Subpart E

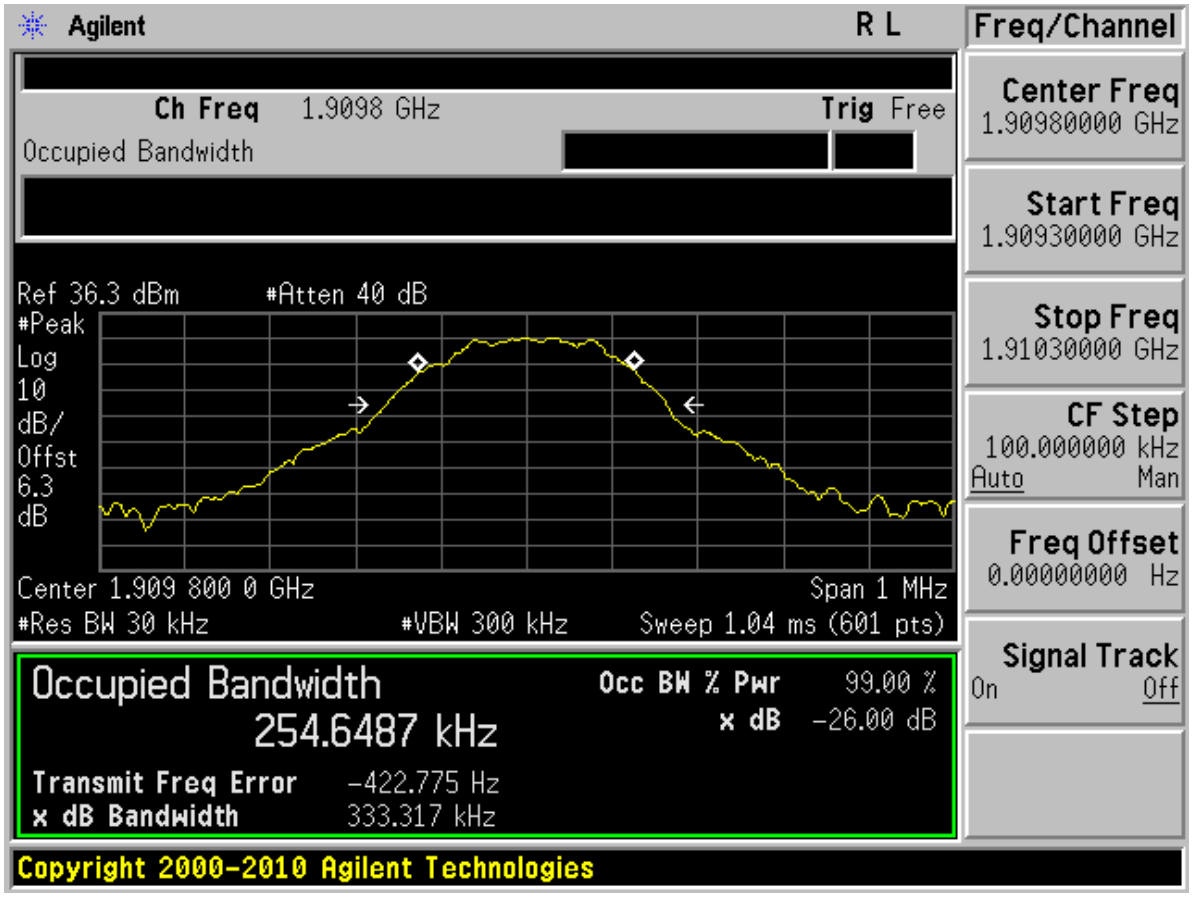
Channel 512（TM1:GSM）



Channel 661（TM1:GSM）



Channel 810（TM1:GSM）

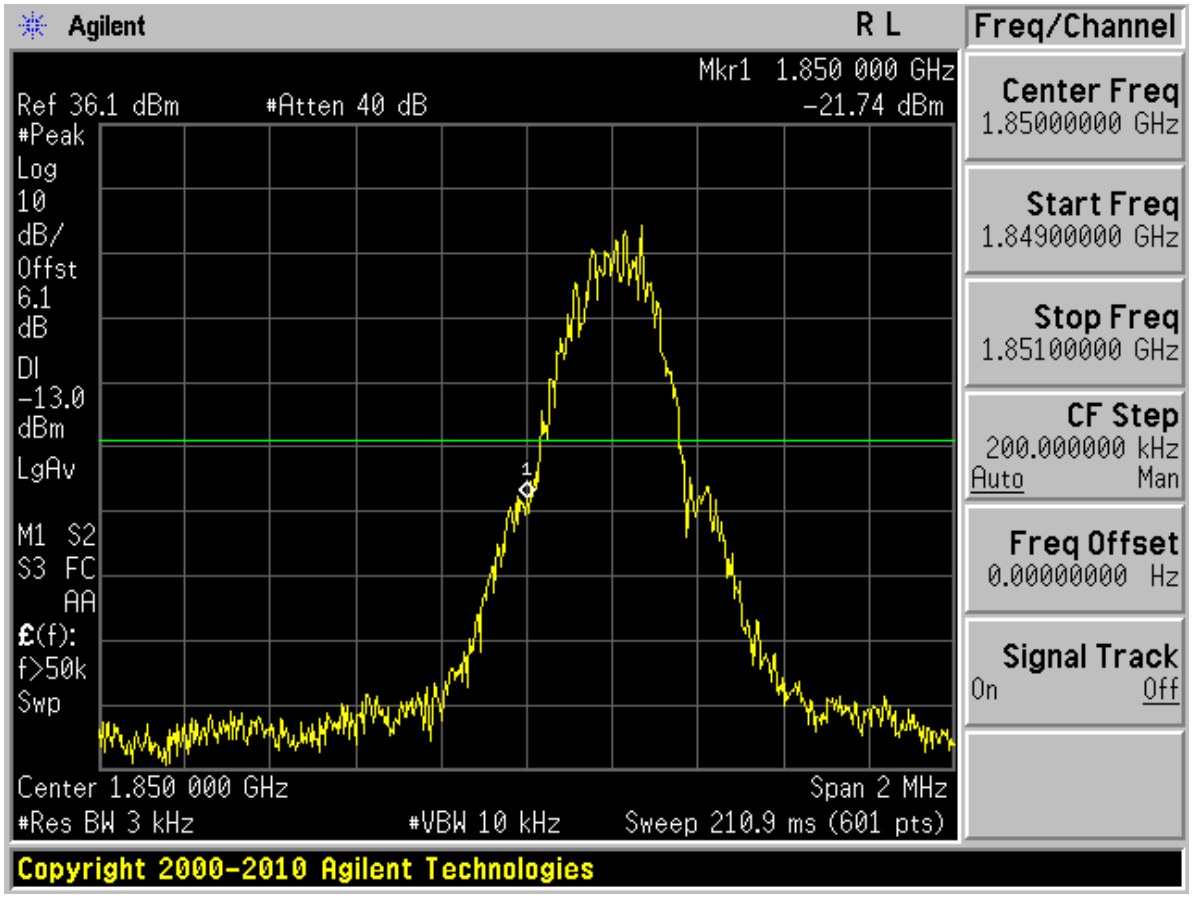


Appendix C

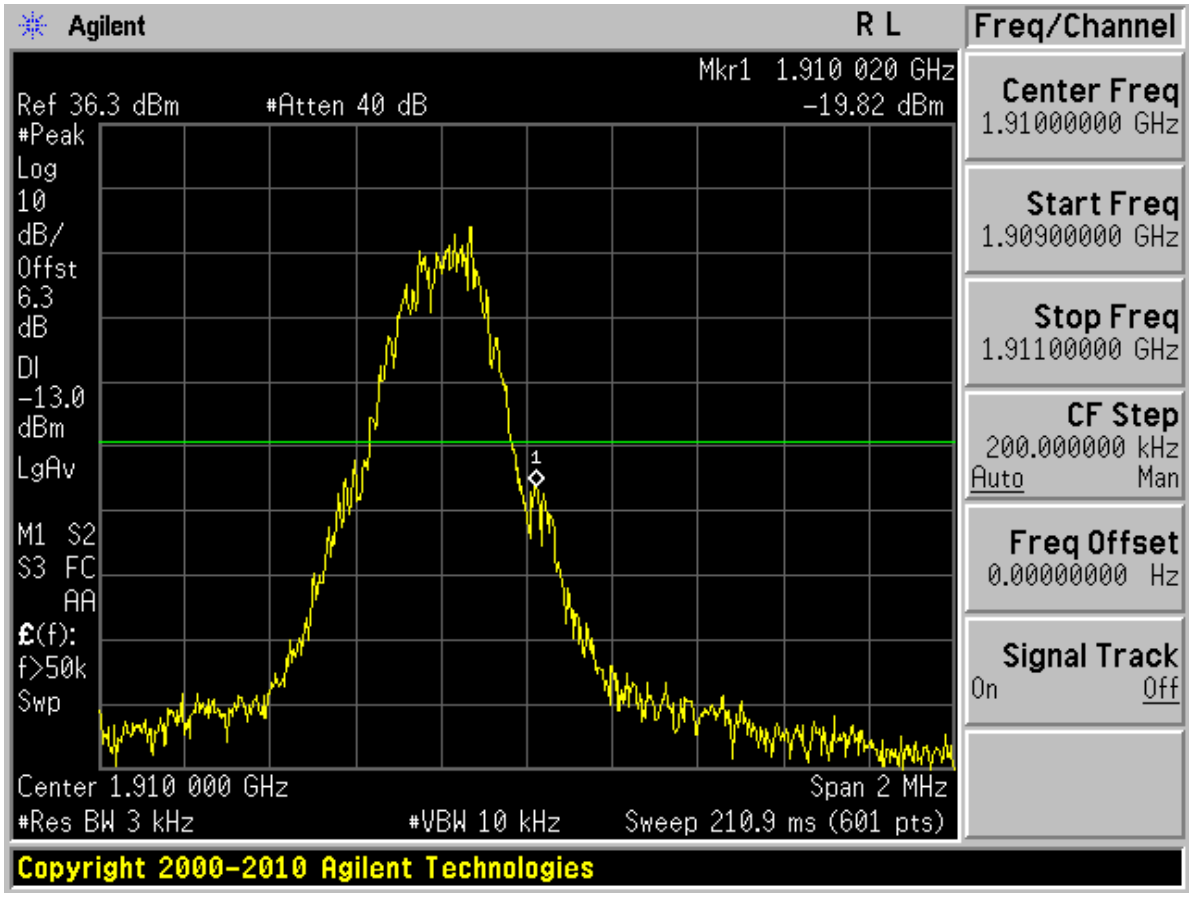
Band Edges Compliance

According to FCC Part 2.1051 & 24.238

TM1:GSM
Left Edge
Channel 512



Right Edge
Channel 810



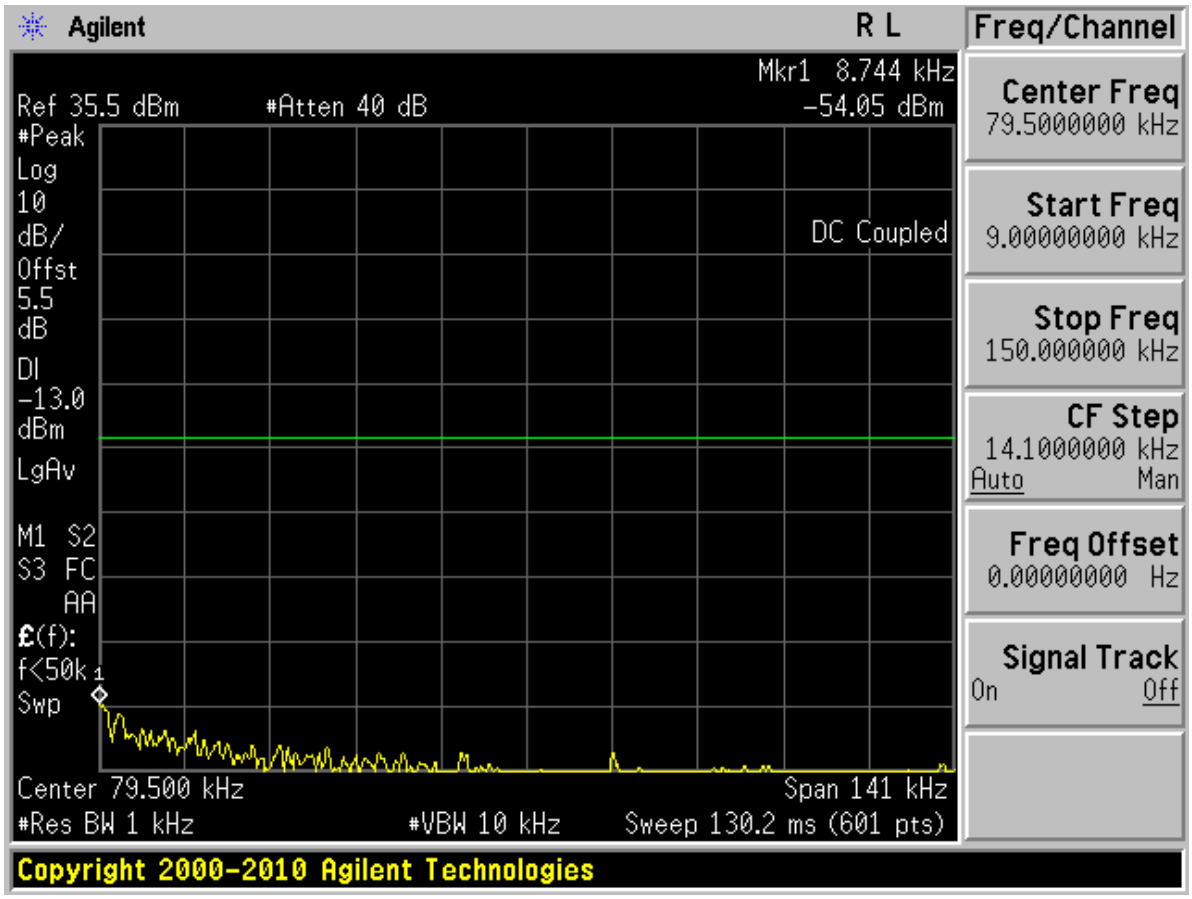
Appendix D

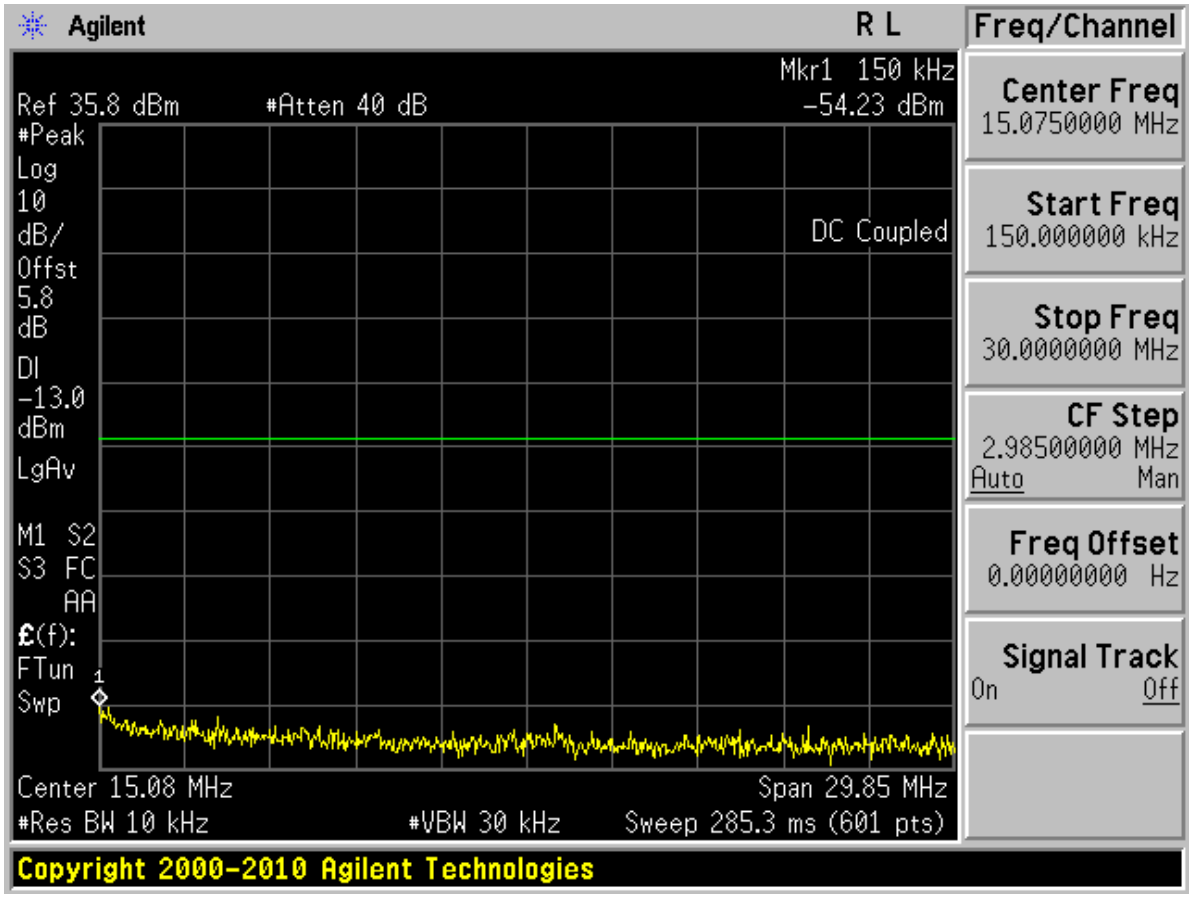
Spurious Emission at Antenna Terminal

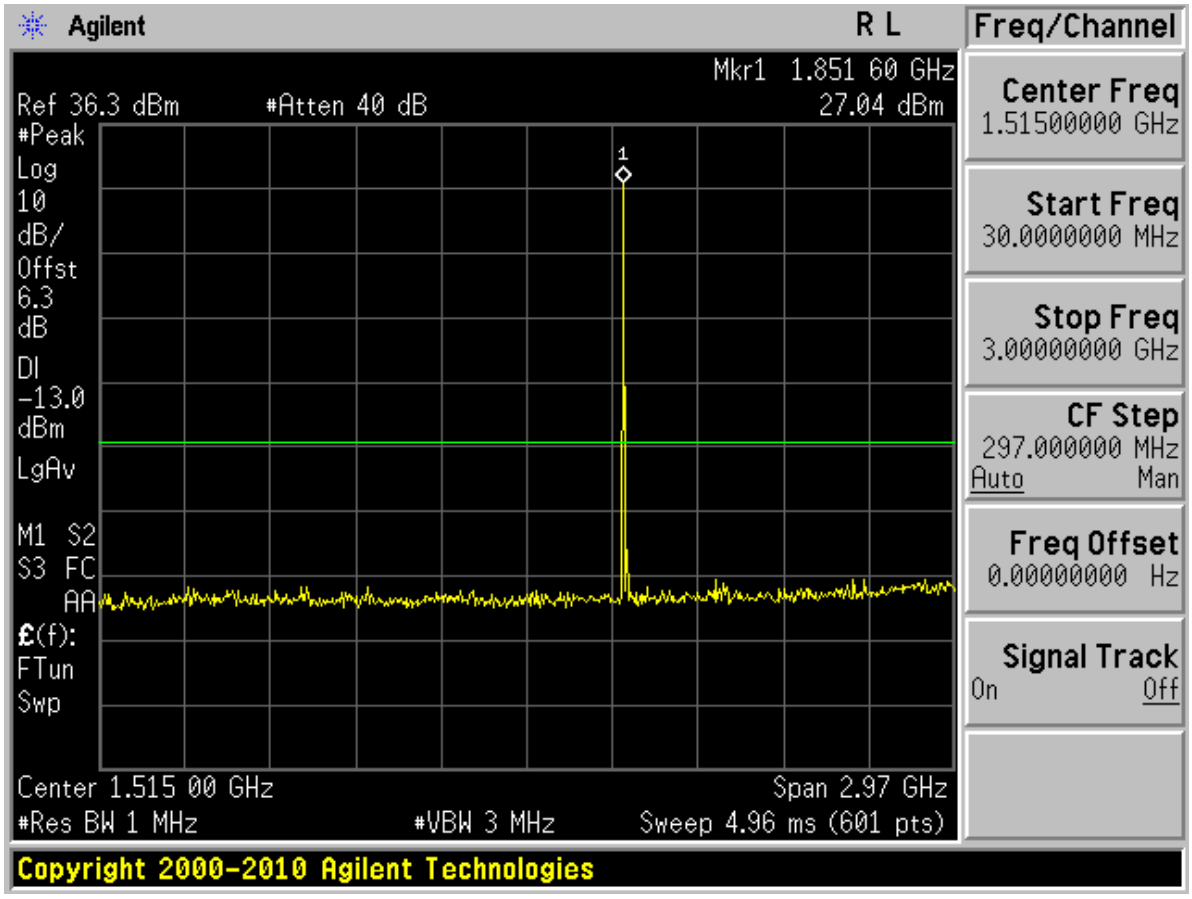
According to FCC Part 2.1051 & 24.238

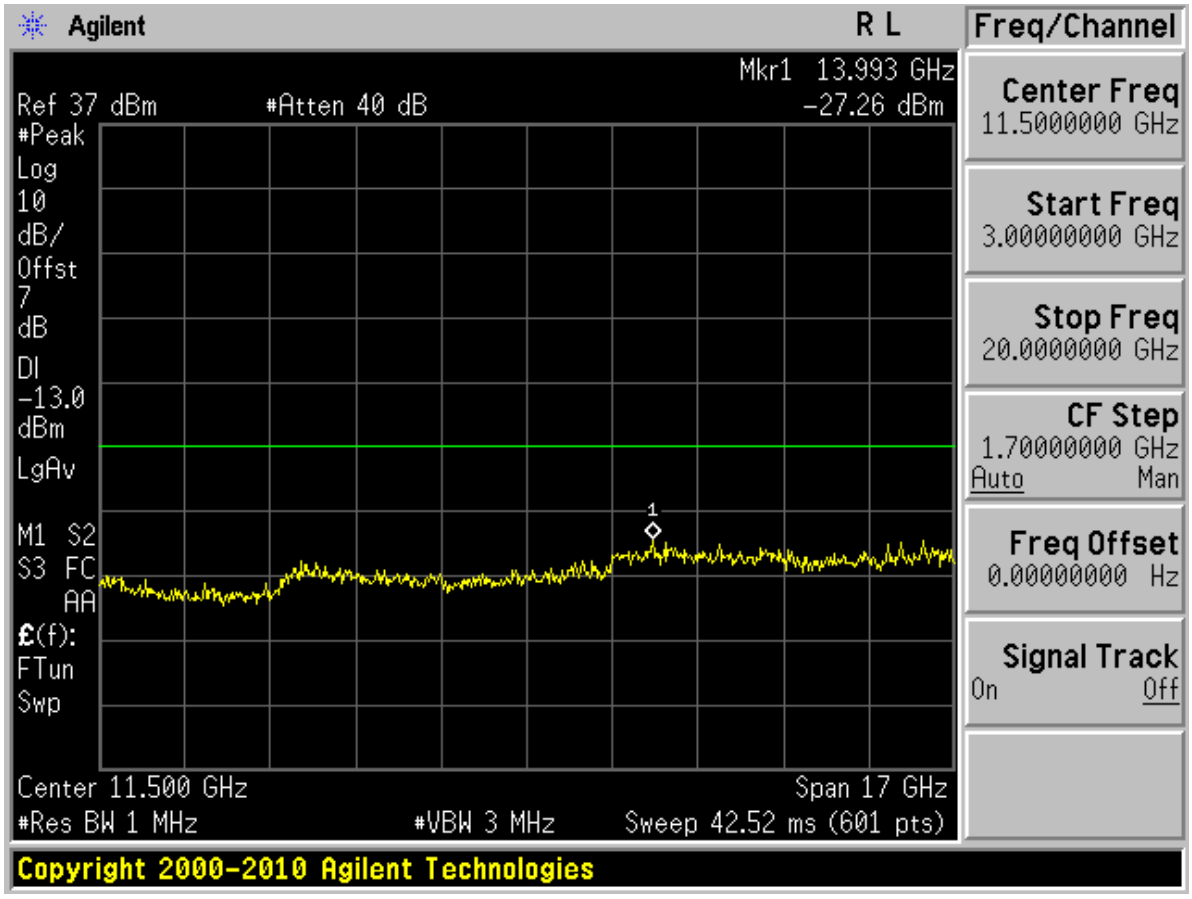
1.1 TM1:GSM

Channel 512

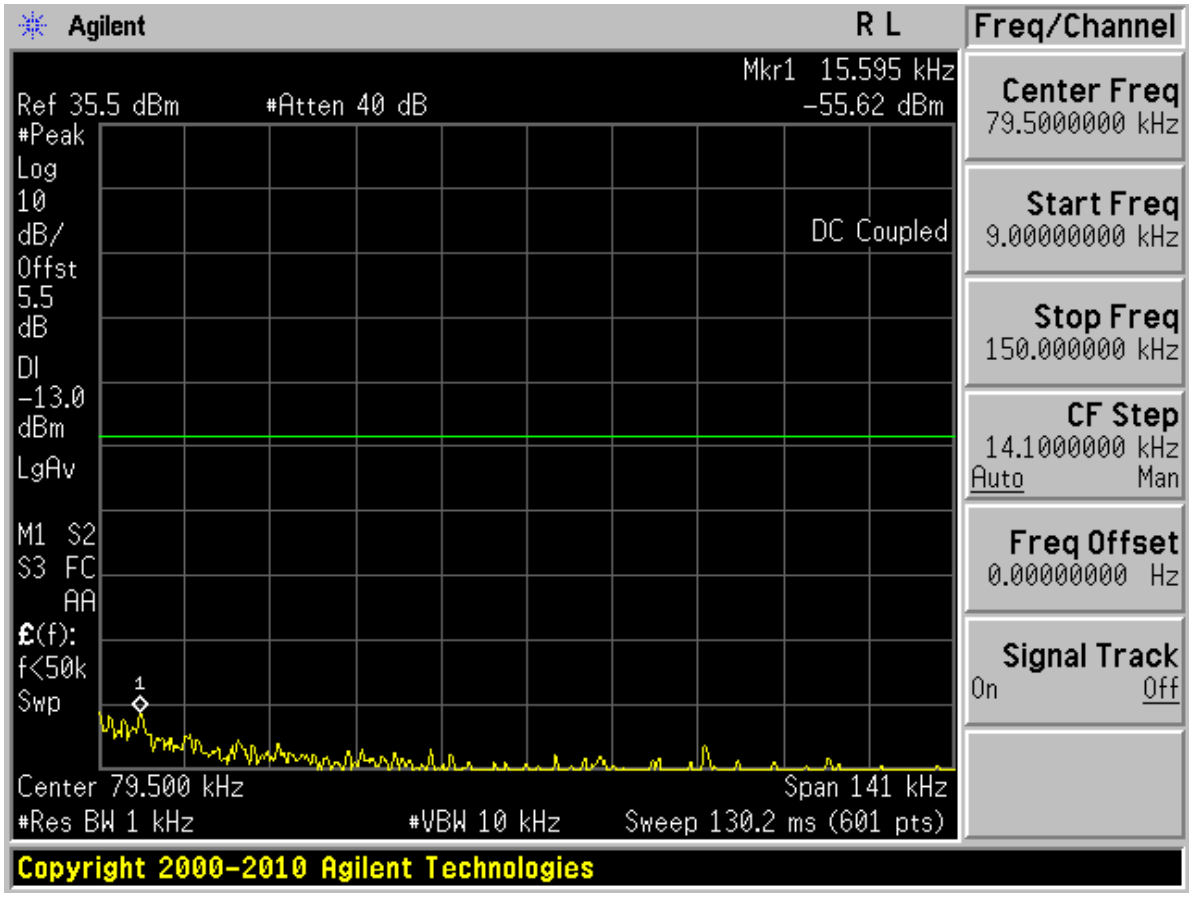


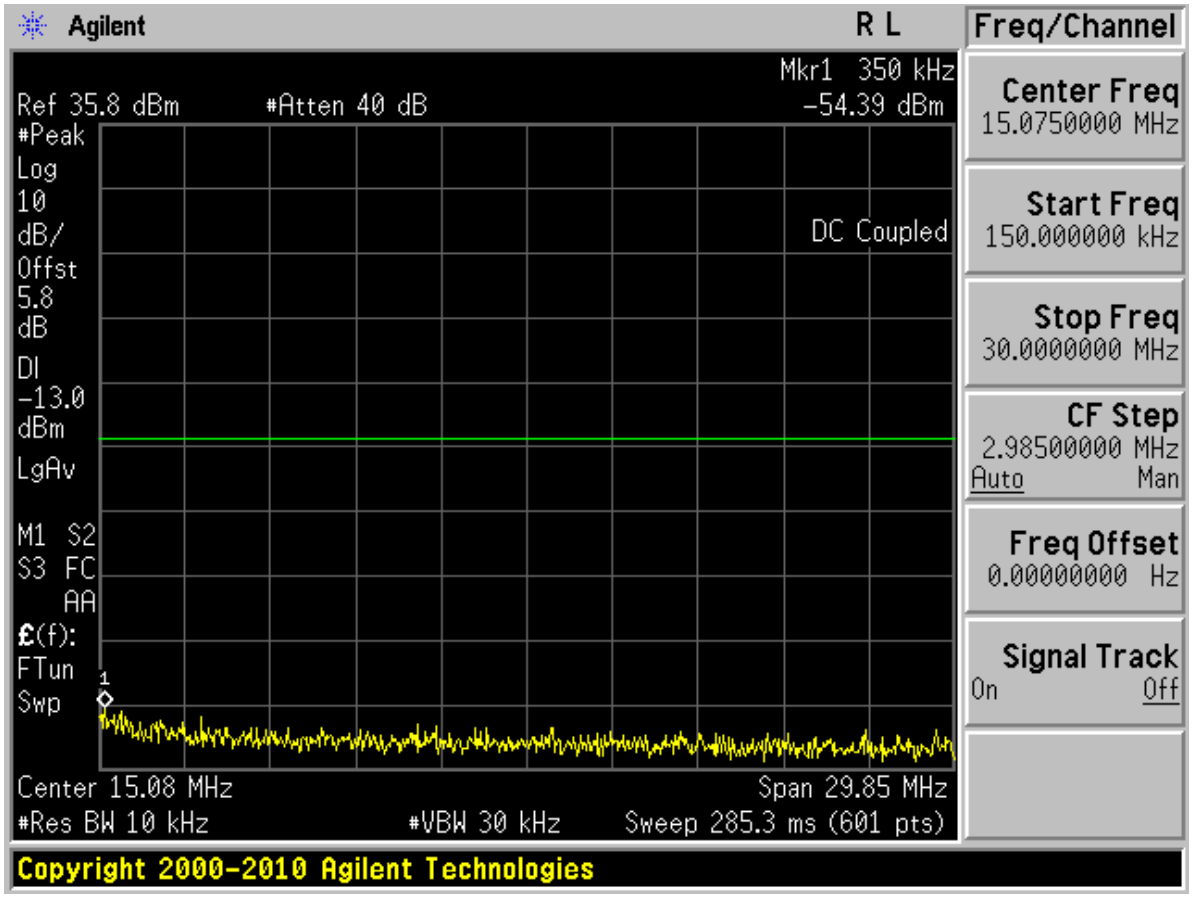

Agilent
R L
Freq/Channel
Mkr1 150 kHz
Ref 35.8 dBm
#Atten 40 dB
-54.23 dBm
#Peak
Log
10
dB/
Offst
5.8
dB
Dl
-13.0
dBm
LgAv
DC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 285.3 ms (601 pts)
Copyright 2000-2010 Agilent Technologies

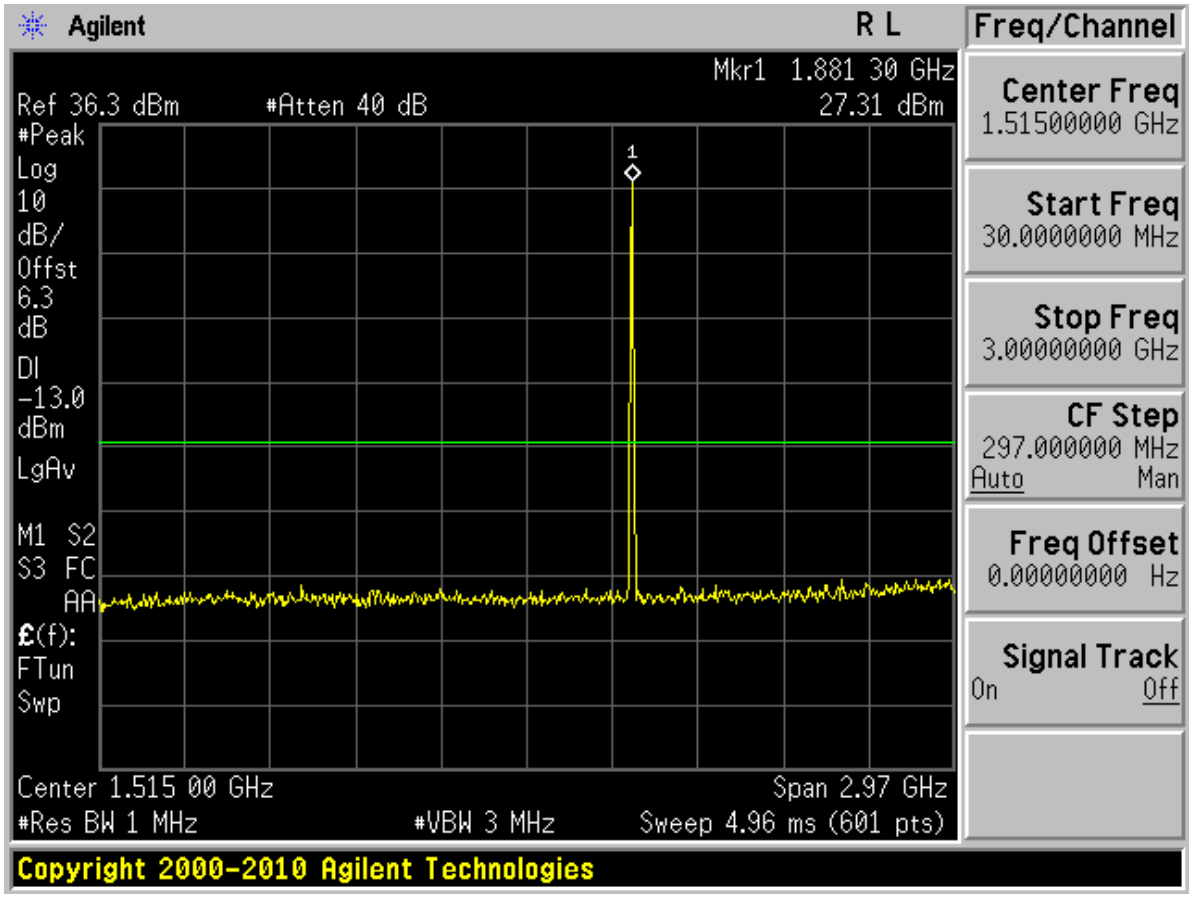

Agilent
R L
Freq/Channel
Mkr1 1.851 60 GHz
Ref 36.3 dBm
#Atten 40 dB
27.04 dBm
#Peak
Log
10
dB/
Offst
6.3
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
1.51500000 GHz
Start Freq
30.0000000 MHz
Stop Freq
3.00000000 GHz
CF Step
297.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 1.515 00 GHz
Span 2.97 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 4.96 ms (601 pts)
Copyright 2000-2010 Agilent Technologies

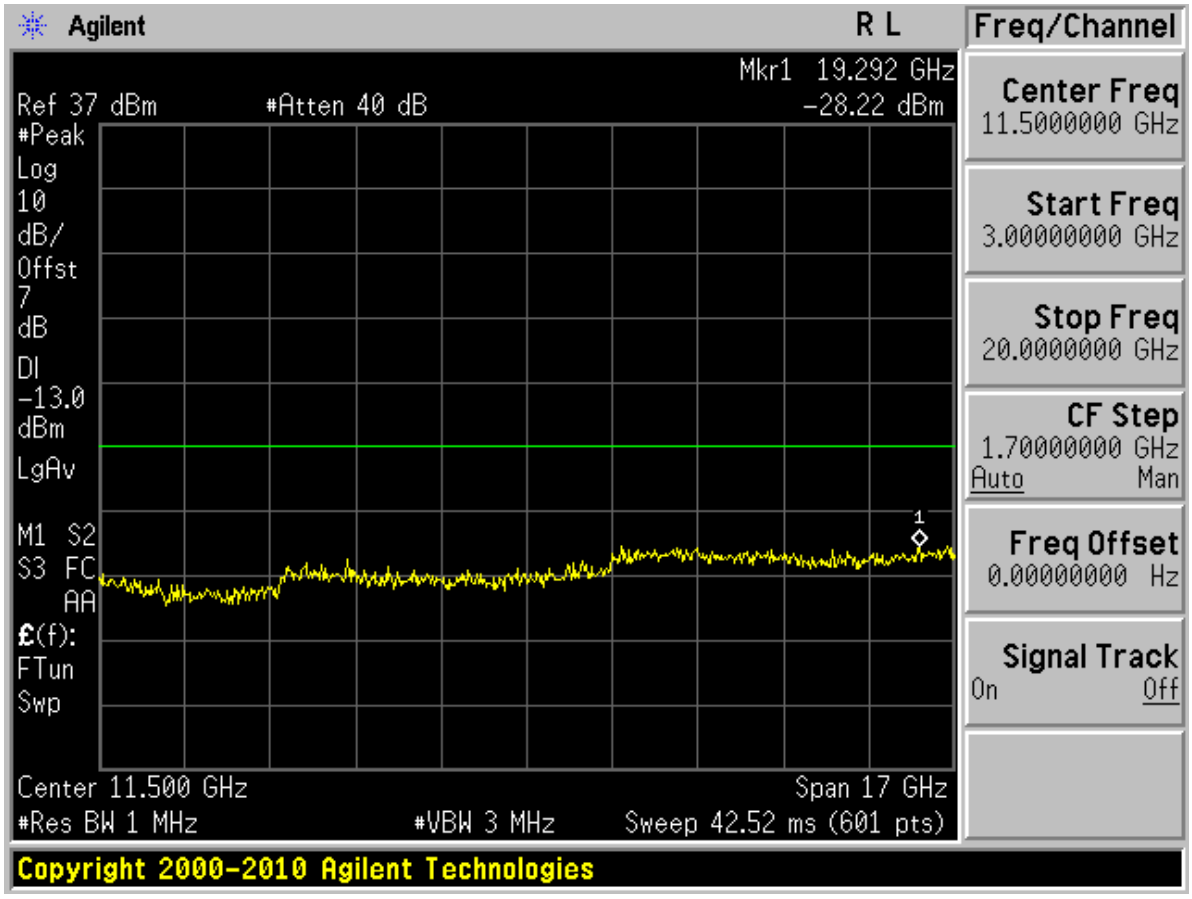

Agilent
R L
Freq/Channel
Mkr1 13.993 GHz
-27.26 dBm
Ref 37 dBm
#Atten 40 dB
#Peak
Log
10
dB/
Offst
7
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
11.5000000 GHz
Start Freq
3.00000000 GHz
Stop Freq
20.0000000 GHz
CF Step
1.70000000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 11.500 GHz
Span 17 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 42.52 ms (601 pts)
Copyright 2000-2010 Agilent Technologies

Channel 661

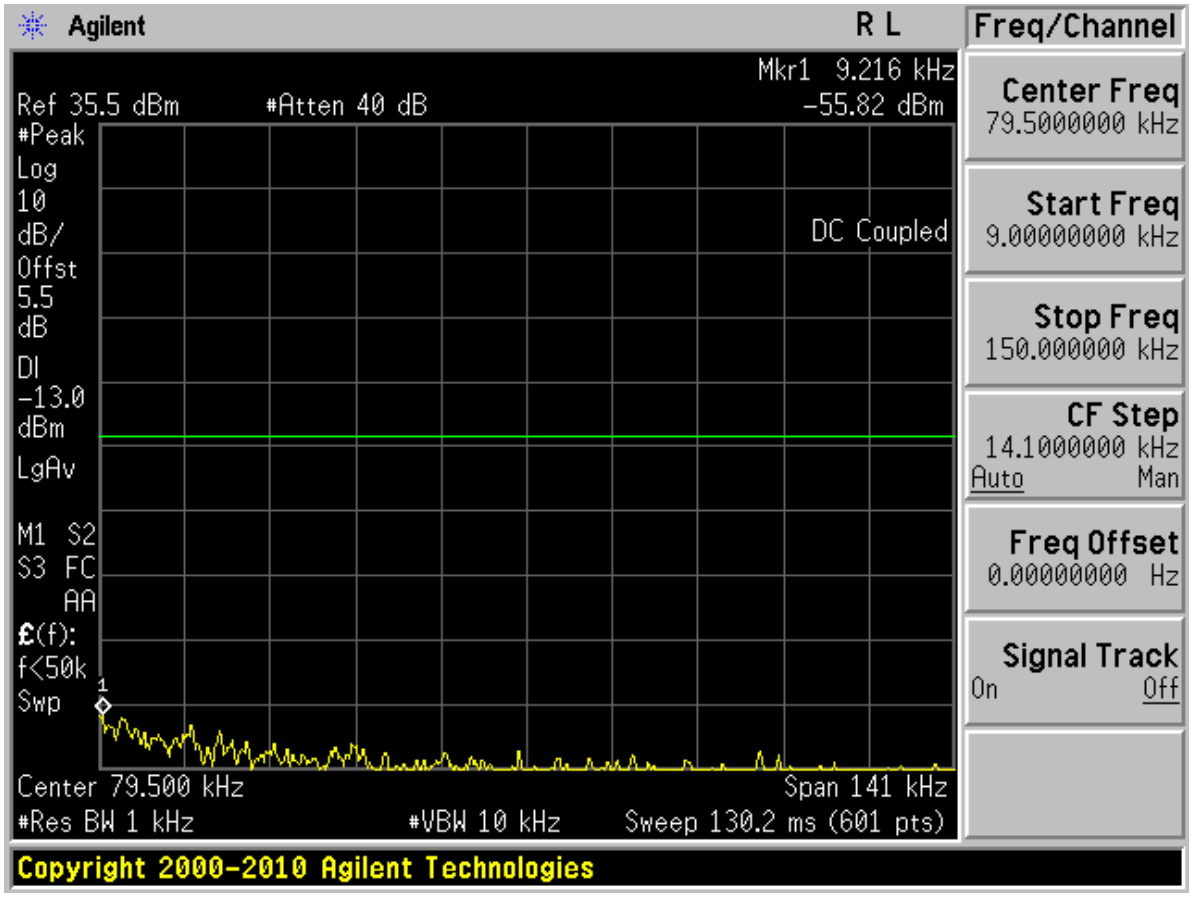

Agilent
R L
Freq/Channel
Mkr1 15.595 kHz
Ref 35.5 dBm
#Atten 40 dB
-55.62 dBm
#Peak
Log
10
dB/
Offst
5.5
dB
Dl
-13.0
dBm
LgAv
DC Coupled
M1 S2
S3 FC
AA
£(f):
f<50k
Swp
Center Freq
79.5000000 kHz
Start Freq
9.00000000 kHz
Stop Freq
150.000000 kHz
CF Step
14.1000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 79.500 kHz
Span 141 kHz
#Res BW 1 kHz
#VBW 10 kHz
Sweep 130.2 ms (601 pts)
Copyright 2000-2010 Agilent Technologies

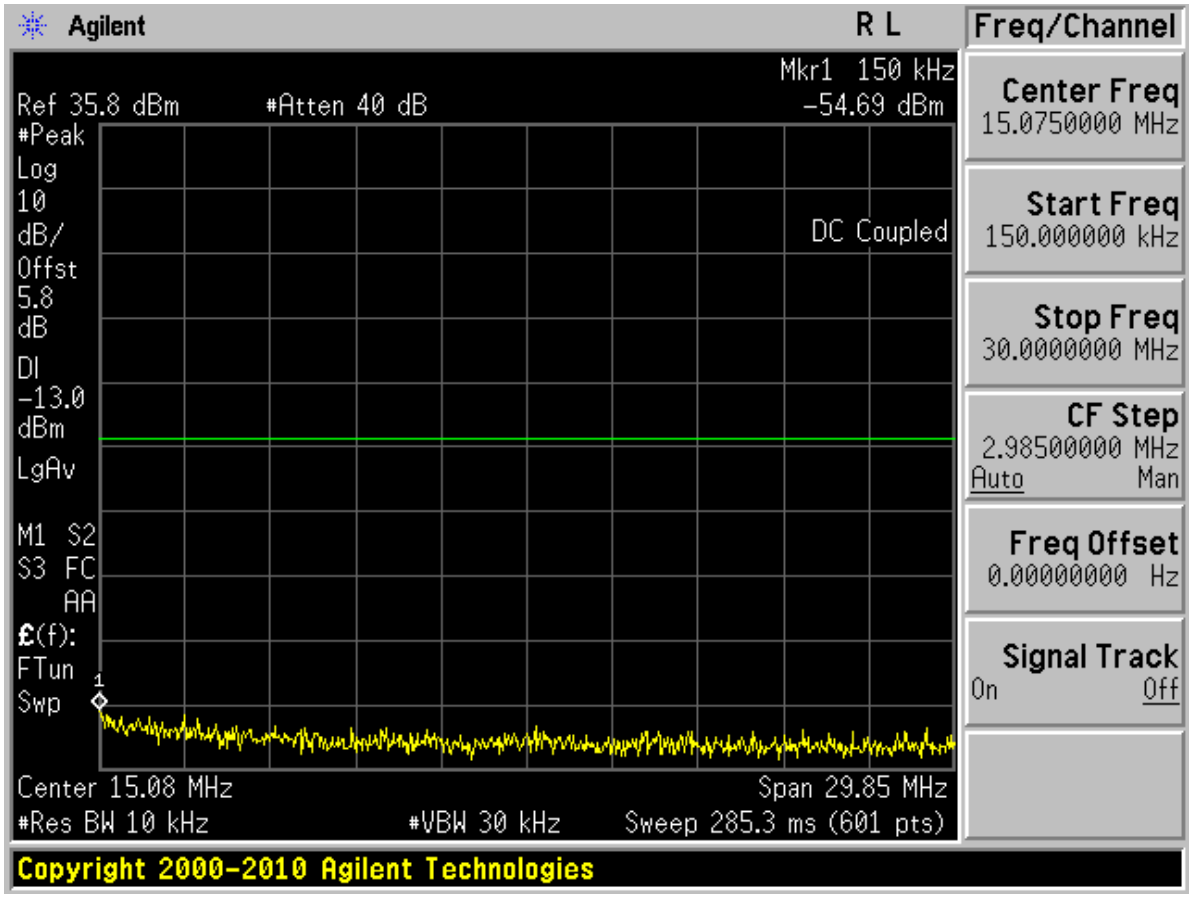

Agilent
R L
Freq/Channel
Mkr1 350 kHz
Ref 35.8 dBm
#Atten 40 dB
-54.39 dBm
#Peak
Log
10
dB/
Offst
5.8
dB
Dl
-13.0
dBm
LgAv
DC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 285.3 ms (601 pts)
Copyright 2000-2010 Agilent Technologies

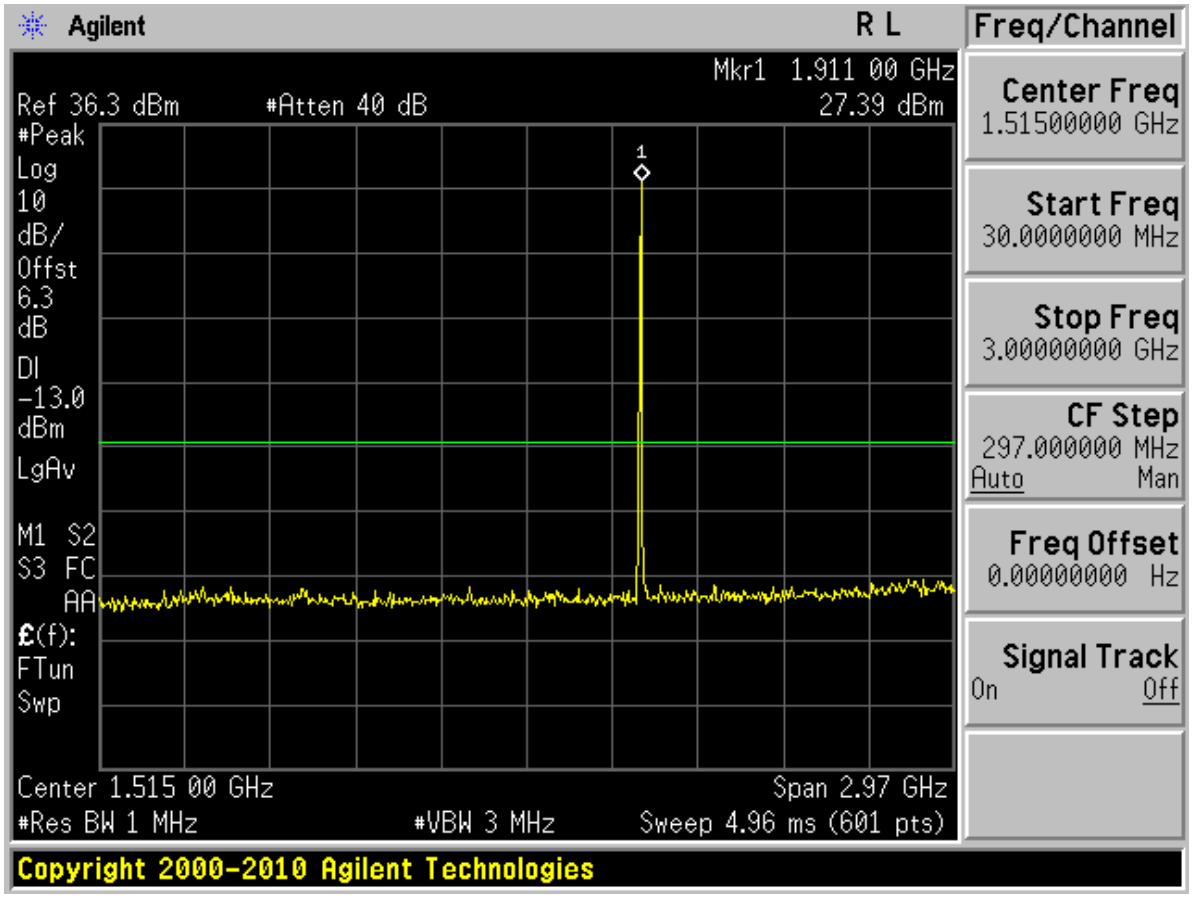

Agilent
R L
Freq/Channel
Mkr1 1.881 30 GHz
Ref 36.3 dBm
#Atten 40 dB
27.31 dBm
#Peak
Log
10
dB/
Offst
6.3
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
1.51500000 GHz
Start Freq
30.0000000 MHz
Stop Freq
3.00000000 GHz
CF Step
297.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 1.515 00 GHz
Span 2.97 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 4.96 ms (601 pts)
Copyright 2000-2010 Agilent Technologies

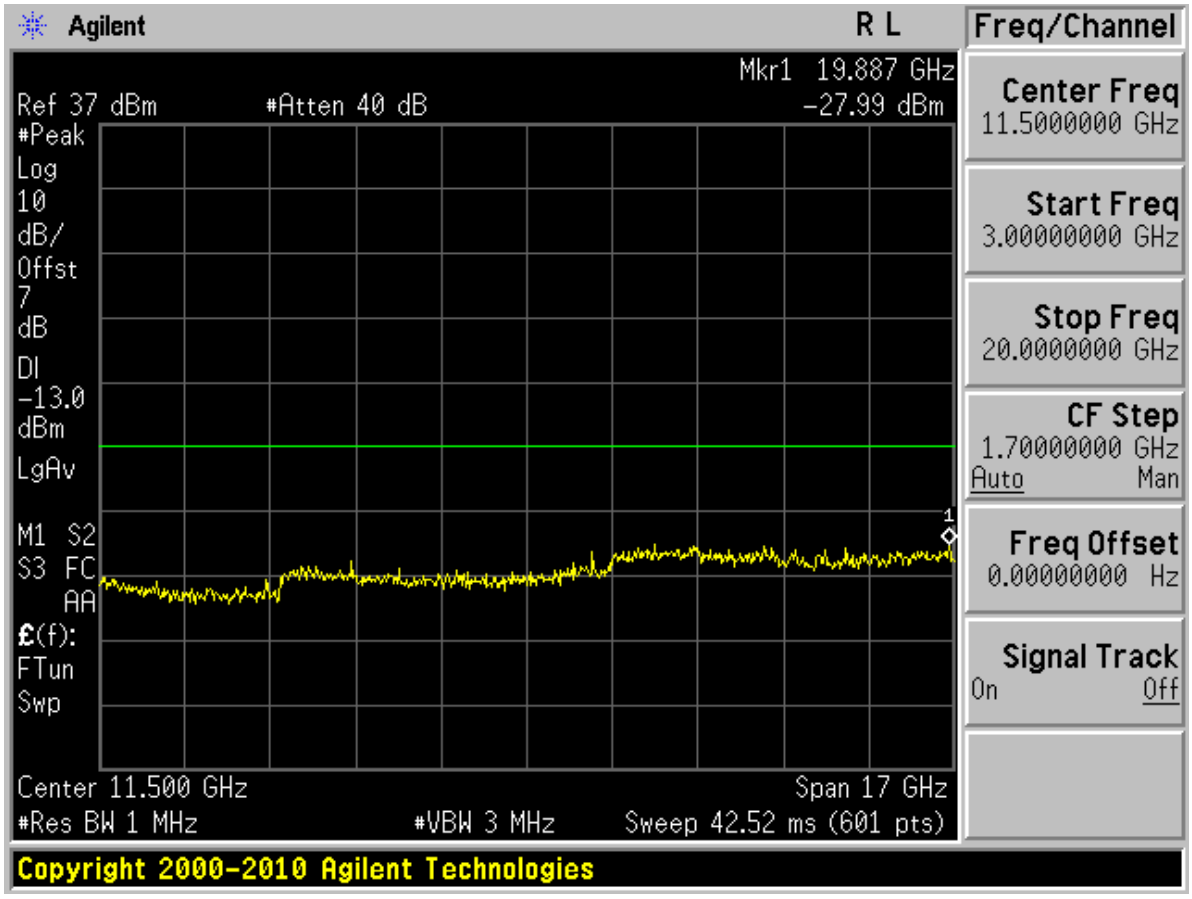

Agilent
R L
Freq/Channel
Mkr1 19.292 GHz
Ref 37 dBm
#Atten 40 dB
-28.22 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
11.5000000 GHz
Start Freq
3.00000000 GHz
Stop Freq
20.0000000 GHz
CF Step
1.70000000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 11.500 GHz
Span 17 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 42.52 ms (601 pts)
Copyright 2000-2010 Agilent Technologies

Channel 810


Agilent
R L
Freq/Channel
Mkr1 9.216 kHz
Ref 35.5 dBm
#Atten 40 dB
-55.82 dBm
#Peak
Log
10
dB/
Offst
5.5
dB
Dl
-13.0
dBm
LgAv
DC Coupled
M1 S2
S3 FC
AA
£(f):
f<50k
Swp
Center Freq
79.5000000 kHz
Start Freq
9.00000000 kHz
Stop Freq
150.000000 kHz
CF Step
14.1000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 79.500 kHz
Span 141 kHz
#Res BW 1 kHz
#VBW 10 kHz
Sweep 130.2 ms (601 pts)
Copyright 2000-2010 Agilent Technologies


Agilent
R L
Freq/Channel
Mkr1 150 kHz
Ref 35.8 dBm
#Atten 40 dB
-54.69 dBm
#Peak
Log
10
dB/
Offst
5.8
dB
Dl
-13.0
dBm
LgAv
DC Coupled
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
15.0750000 MHz
Start Freq
150.000000 kHz
Stop Freq
30.0000000 MHz
CF Step
2.98500000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 15.08 MHz
Span 29.85 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 285.3 ms (601 pts)
Copyright 2000-2010 Agilent Technologies


Agilent
R L
Freq/Channel
Mkr1 1.911 00 GHz
27.39 dBm
Ref 36.3 dBm
#Atten 40 dB
#Peak
Log
10
dB/
Offst
6.3
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
1.51500000 GHz
Start Freq
30.0000000 MHz
Stop Freq
3.00000000 GHz
CF Step
297.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 1.515 00 GHz
Span 2.97 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 4.96 ms (601 pts)
Copyright 2000-2010 Agilent Technologies


Agilent
R L
Freq/Channel
Mkr1 19.887 GHz
Ref 37 dBm
#Atten 40 dB
-27.99 dBm
#Peak
Log
10
dB/
Offst
7
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
11.5000000 GHz
Start Freq
3.00000000 GHz
Stop Freq
20.0000000 GHz
CF Step
1.70000000 GHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 11.500 GHz
Span 17 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 42.52 ms (601 pts)
Copyright 2000-2010 Agilent Technologies