Radio
Measurement and Test Report

For

Shenzhen Concox Information Techology Co., Ltd

4/F, Building C, Gaoxinqi Industrial Park, Liuxian 1st Road, No.67 Xin'an Street Bao'an District, Shenzhen, China

Test Standard(s):	ETSI EN 301 511 V12.5.1 (2017-03)
Product Description:	GPS VEHICLE TRACKER
Tested Model:	X3
Report No.:	STR18038161E-1
Tested Date:	2018-03-15 to 2018-04-09
Issued Date:	2018-04-09
Tested By:	Mike Shi / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Mike Shi

Silin Chen

Jandyso

Shenzhen SEM.Test Technology Co.,Ltd. Approved

Prepared By:

Shenzhen SEM.Test Technology Co., Ltd.
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C (518101)
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Manufacturer: Shenzhen Concox Information Techology Co., Ltd

Address of manufacturer: 4/F, Building C, Gaoxinqi Industrial Park, Liuxian 1st Road, No.67 Xin'an Street Bao'an District, Shenzhen, China

General Description of EUT	
Product Name:	GPS VEHICLE TRACKER
Brand Name:	/
Model No.:	X3
Adding Model(s):	GT810
Rated Voltage:	DC Port: DC12V/24V; Battery: DC 3.7V
Adapter Model:	/
Battery Capacity:	450mAh
Software Version:	NT37_10_A1D_D23_R0_V02_WM_20180322_1004
Hardware Version:	NT37_MB_V1.2
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT	
2G	
Support Networks:	GSM, GPRS
Support Bands:	GSM900, DCS1800
Frequency Range:	GSM900: Tx: 880-915MHz, Rx: 925-960MHz
	DCS1800: Tx: 1710-1785MHz, Rx: 1805-1880MHz
RF Output Power:	GSM900: 32.80dBm, GSM1800: 29.30dBm
Modulation Type:	GMSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM900: -0.5dBi, DCS1800:0dBi
GPRS Class:	Class 12

1.2 Test Standards

The tests were performed according to following standards:

ETSI EN 301 511 V12.5.1 (2017-03) Global System for Mobile communications (GSM); Mobile Stations (MS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
ETSI TS 151 010-1 V13.4.0 (2017-08) Digital cellular telecommunications system (Phase 2+) (GSM); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP TS 51.010-1 version 13.4.0 Release 13)

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which maybe results in lowering the emission/immunity should be checked to ensure that compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 511,
The equipment under test (EUT) was configured to measure its highest possible emission level. For more detail refer 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 has been tested under typical operating condition. The Applicant provide software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Test Mode List		
Test Mode	Description	Remark
TM1	GSM900	Transmitting/ Receiving/Idle
TM2	DCS1800	Transmitting/ Receiving/Idle

Test Conditions					
	NTNV	LTLV	LTHV	HTHV	HTLV
Temperature (°C)	20	-20	-20	45	45
Voltage (V)	3.7	3.5	4.2	4.2	3.5
Relative humidity	55 %.				
ATM Pressure:	1019 mbar				

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
Power Cord; UL1007 22# KKSGT810-2000MM	2.0	Unshielded	Without Core
relay socket: HVF4-1C	0.1	Unshielded	Without Core
Pasted microphone: SS-17033001	2.8	Unshielded	Without Core
Audio line: 2468 24#*2 KKSGT810-29-100mm	0.1	Unshielded	Without Core
SOS switch extension line: 2468 24AWG 2000mm	2.0	Unshielded	Without Core
Input-output extension line: KKSGT06E-3P	2.0	Unshielded	Without Core

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
AUX Cable	0.5	Unshielded	Without Core

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Speaker	AngSi Technology	OontZ Angle 3ULTRA	/
Relay	Tianbo	TRV3-L-12V-S-ZF	/

1.6 Measurement Uncertainty

3GPP TS 51.010-1	Test Description	Uncertainty
12.1.1	Conducted spurious emissions-MS Allocated a Channel	
	Emissions@100kHz<f<2GHz	1.0dB
	Emissions@2GHz <f<12.75GHz	1.0dB
12.1.2	Conducted spurious emissions- MS in Idle Mode	
	Emissions@100kHz<f<2GHz	1.0dB
	Emissions@2GHz <f<12.75GHz	1.0dB
12.2.1	Radiated spurious emissions	
12.2.2	Emissions@30-200MHz	4.52dB
	Emissions@0.2-1GHz	5.56dB
	Emissions@1-6GHz	3.84dB
	Emissions@6-18GHz	3.92dB
13.1	Frequency error and phase error	Freq
13.2	Frequency error under multipath and interference conditions	Err<5Hz
13.16.1	Frequency error and phase error in GPRS multislot configuration	RMS Phase Err
13.17.1	Frequency error and Modulation accuracy in EGPRS Configuration	1.0degrees
13.17.2	Frequency error under multipath and interference conditions in EGPRS Configuration	Peak Phase Error 5.0degrees
13.3.4.1	Transmitter output power and burst timing	0.6dB
13.16.2.4.1	Transmitter output power in GPRS multislot configuration	
13.17.3.4.1	EGPRS Transmitter output power	
13.4	Output RF spectrum	0.6dB
13.16.3	Transmitter output power in GPRS(or EGPRS)multislot configuration	
13.17.4		
14.7.1	Receiver Blocking and spurious response -	
14.18.5	speech channels	
	Blocking and spurious response in EGPRS Configuration	
	Wanted Signal@f<2GHz	0.6 dB
	Blocking Signal@100kHz<f<2GHz	1.7 dB
	Blocking Signal@2GHz<f<12.75GHz	1.7 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.7 Test Equipment List and Details

Kind of Equipment	Manufacturer	Type	S/N	Cal Date	Due Date
Equipment list of <Shenzhen SEM.Test Technology Co., Ltd.>					
Test SIM card	-	-	-	N/A	N/A
GSM Tester	Rohde & Schwarz	CMU200	104036	2017-06-12	2018-06-11
Spectrum Analyzer	Agilent	E4407B	MY41440400	2017-06-12	2018-06-11
Spectrum Analyzer	Agilent	N9020A	US47140102	2017-06-12	2018-06-11
Signal Generator	Agilent	83752A	3610A01453	2017-06-12	2018-06-11
Vector Signal Generator	Agilent	N5182A	MY47070202	2017-06-12	2018-06-11
Power Divider	Weinschel	1506A	PM204	2017-06-12	2018-06-11
Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2017-06-12	2018-06-11
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2017-06-12	2018-06-11
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2017-06-12	2018-06-11
Amplifier	Agilent	8447F	3113A06717	2017-06-12	2018-06-11
Amplifier	C&D	PAP-1G18	2002	2017-06-12	2018-06-11
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2018-06-07
Horn Antenna	ETS	3117	00086197	2017-06-08	2018-06-07

2. SUMMARY OF TEST RESULTS

Test Item	Test Requirement ESTI EN301 511	Test Method ETSI TS151010-1	Verdict
GSM			
Transmitter - Frequency error and phase error	Section 4.2.1	Clause 13.1	PASS
Transmitter - Frequency error under multipath and interference conditions	Section 4.2.2	Clause 13.2	PASS
Transmitter output power and burst timing	Section 4.2.5	Clause 13.3	PASS
Transmitter - Output RF spectrum	Section 4.2.6	Clause 13.4	PASS
Conducted spurious emissions - MS allocated a channel	Section 4.2.12	Clause 12.1.1	PASS
Conducted spurious emissions - MS in idle mode	Section 4.2.13	Clause 12.1.2	PASS
Receiver Blocking and spurious response - speech channels	Section 4.2.20	Clause 14.7.1	PASS
Intermodulation rejection – speech channels	Section 4.2.32	Clause 14.6.1	PASS
AM suppression - speech channels	Section 4.2.35	Clause 14.8.1	PASS
Adjacent channel rejection – speech channels (TCH/FS)	Section 4.2.38	Clause 14.5.1	PASS
Reference sensitivity - TCH/FS	Section 4.2.42	Clause 14.2.1	PASS
Reference sensitivity - FACCH/F	Section 4.2.43	Clause 14.2.3	PASS
GPRS			
Frequency error and phase error in GPRS multislot configuration	Section 4.2.4	Clause 13.16.1	PASS
Transmitter output power in GPRS multislot configuration	Section 4.2.10	Clause 13.16.2	PASS
Output RF spectrum in GPRS multislot configuration	Section 4.2.11	Clause 13.16.3	PASS
Intermodulation rejection – control channels	Section 4.2.33	Clause 14.6.2	PASS
AM suppression - control channels	Section 4.2.36	Clause 14.8.2	PASS
Adjacent channel rejection – control channels	Section 4.2.39	Clause 14.5.2	PASS
Minimum Input level for Reference erformance - GPRS	Section 4.2.44	Clause 14.16.5	PASS
Radiated spurious emissions			
Radiated spurious emissions - MS allocated a channel	Section 4.2.16	Clause 12.2.1	PASS
Radiated spurious emissions - MS in idle mode	Section 4.2.17	Clause 12.2.2	PASS

3. Essential radio test suites

3.1 Frequency error and phase error

Clause 13.1 of TS 151 010-1 applies.

3.1.1 Definition and applicability

The frequency error is the difference in frequency, after adjustment for the effect of the modulation and phase error, between the RF transmission from the MS and either:
- the RF transmission from the BS, or
- the nominal frequency for the ARFCN used.

The phase error is the difference in phase, after adjustment for the effect of the frequency error, between the RF transmission from the MS and the theoretical transmission according to the intended modulation.
The requirements and this test apply to GSM900 and DCS1800 MS.

3.1.2 Conformance requirements

Frequency error

For all measured bursts, the frequency error, derived in step c.6), shall be less than 0,1 ppm, except for GSM 400 MS where a value of 0,2 ppm shall be used.

Phase error

For all measured bursts, the RMS phase error, derived in step c.8), shall not exceed 5 degrees.
For all measured bursts, each individual phase error, derived in step c.7), shall not exceed 20 degrees.

3.1.3 Test procedure

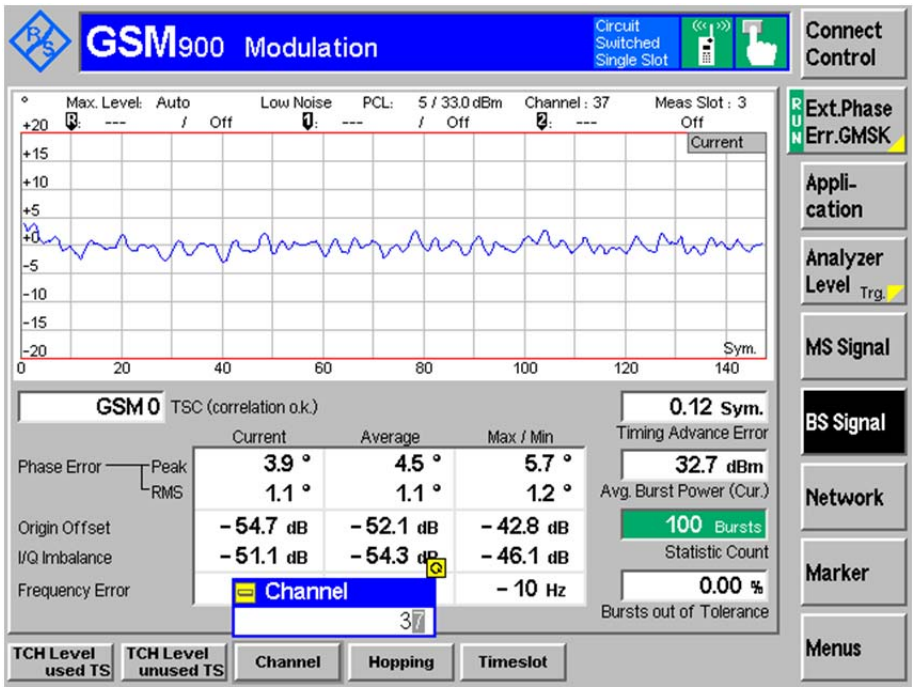
Please refer to ETSI TS 51.010-1 Sub-clause 13.1.4 for the measurement method.

3.1.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GSM900	897.4	PASS	PASS	PASS	PASS	PASS
DCS1800	1747.4	PASS	PASS	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

Mode	PCL	Frequency Error (Hz)	Limit (Hz)	Result	Phase error (degree)		Limit (degree)	Result
GSM900	5	-10	89.7	PASS	RMS	1.2	5	PASS
					Peak	5.7	20	PASS
	19	-20	89.7	PASS	RMS	1.1	5	PASS
					Peak	3.5	20	PASS
DCS1800	0	-30	174.7	PASS	RMS	1.2	5	PASS
					Peak	-5.4	20	PASS
	15	-30	174.7	PASS	RMS	1.2	5	PASS
					Peak	9.0	20	PASS

GSM900

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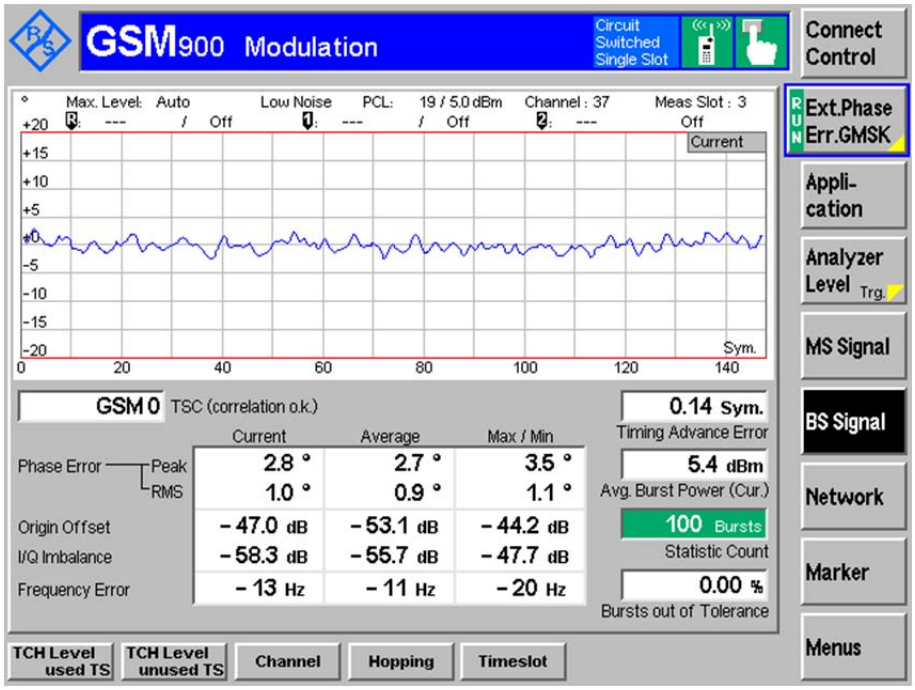
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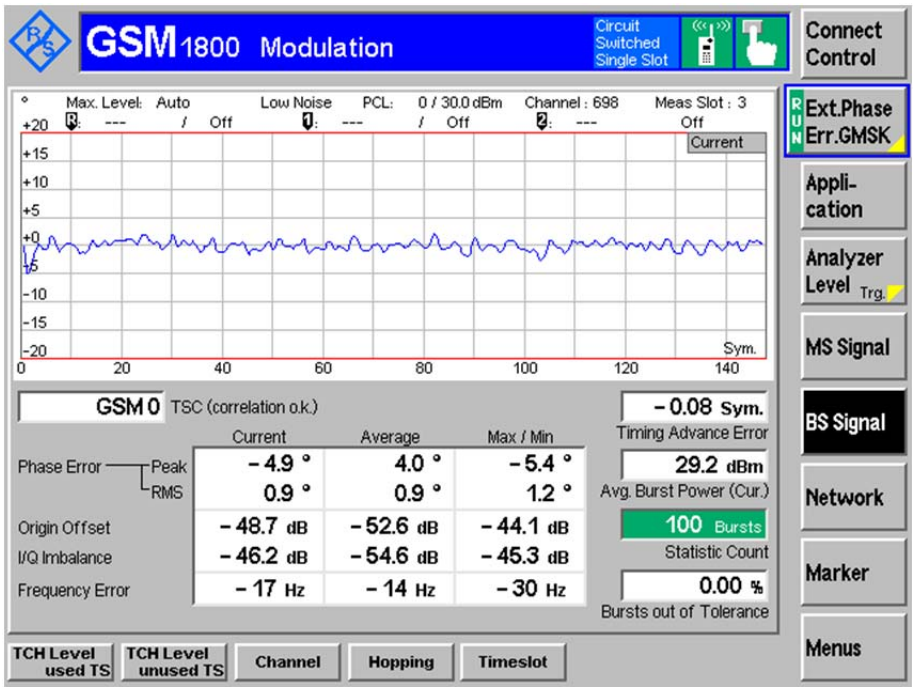
DCS1800



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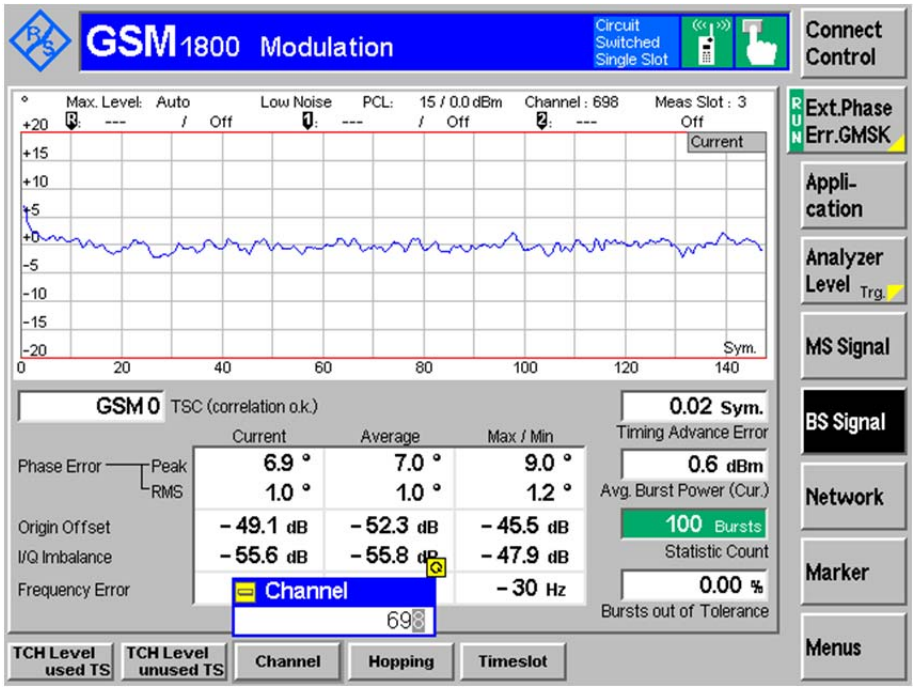


PCL=15

3.2 Frequency error under multipath and interference conditions

Clause 13.2 of TS 151 010-1 applies.

3.2.1 Definition and applicability

The frequency error under multipath and interference conditions is a measure of the ability of the MS to maintain frequency synchronization with the received signal under conditions of Doppler shift, multipath reception and interference.

The requirements and this test apply to GSM900 and DCS1800 MS.

3.2.2 Conformance requirements

1. The MS carrier frequency error for each burst shall be accurate to within 0,1 ppm (0,2 ppm for GSM 400), or 0,1ppm (0,2 ppm for GSM 400) compared to signals received from the BS for signal levels down to 3 dB below the reference sensitivity level.
   1.1 Under normal conditions; 3GPP TS 05.10, subclauses 6 and 6.1.
   1.2 Under extreme conditions; 3GPP TS 05.10, subclauses 6 and 6.1; 3GPP TS 05.05 annex D in subclauses D.2.1 and D.2.2.
2. The MS carrier frequency error for each burst shall be accurate to within 0,1 ppm (0,2 ppm for GSM 400), or 0,1 ppm (0,2 ppm for GSM 400) compared to signals received from the BS for 3 dB less carrier to interference ratio than the reference interference ratios (3GPP TS 05.10, subclauses 6 and 6.1).

3.2.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 13.2.4 for the measurement method.

3.2.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GSM900	897.4	PASS	PASS	PASS	PASS	PASS
DCS1800	1747.4	PASS	PASS	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

Test Conditions	GSM900 Channel37			
	TU3(Hz)	TU50(Hz)	HAT100(Hz)	RA 250(Hz)
Normal	123	-72	101	-184
HTHV	39	-120	-44	51
HTLV	104	-134	61	20
LTHV	-28	-72	-28	-242
LTLV	36	57	160	99
Limit (Hz)	±230	±160	±180	±300
Test Result	PASS	PASS	PASS	PASS

Test Conditions	DCS1800 Channel 698			
	TU1.5(Hz)	TU50(Hz)	HT100(Hz)	RA 130(Hz)
Normal	-70	-171	-75	84
HTHV	-191	-75	-203	-216
HTLV	100	-65	-152	170
LTHV	-155	-59	-159	-203
LTLV	55	-121	102	158
Limit (Hz)	±320	±260	±350	±400
Test Result	PASS	PASS	PASS	PASS

3.3 Transmitter output power and burst timing

Clause 13.3 of ETSI TS 151 010-1 applies.

3.3.1 Definition and applicability

The transmitter output power is the average value of the power delivered to an artificial antenna or radiated by the MS and its integral antenna, over the time that the useful information bits of one burst are transmitted.
The transmitting burst timing is the envelope of the RF power transmitted with respect to time. The timings are referenced to the transition from bit 13 to bit 14 of the Training Sequence ("midamble") before differential decoding. The timing of the modulation is referenced to the timing of the received signal from the SS.

The requirements and this test apply to GSM900 and DCS1800 MS.

3.3.2 Conformance requirements

1. The MS maximum output power shall be as defined in 3GPP TS 05.05, subclause 4.1.1, table for GMSK modulation, according to its power class, with a tolerance of ±2 dB under normal conditions; 3GPP TS 05.05, subclause 4.1.1, table for GMSK modulation.
2. The MS maximum output power shall be as defined in 3GPP TS 05.05, subclause 4.1.1, table for GMSK modulation, according to its power class, with a tolerance of ±2,5 dB under extreme conditions; 3GPP TS 05.05, subclause 4.1.1, table for GMSK modulation; 3GPP TS 05.05 annex D in subclauses D.2.1 and D.2.2.
3. The power control levels shall have the nominal output power levels as defined in 3GPP TS 05.05,subclause 4.1.1, from the lowest power control level up to the maximum output power corresponding to the class of the MS (for tolerance on maximum output power see conformance requirements 1), with a tolerance of ±3 dB,±4 dB or ±5 dB under normal conditions; 3GPP TS 05.05, subclause 4.1.1.
4. The power control levels shall have the nominal output power levels as defined in 3GPP TS 05.05, 4.1.1, from the lowest power control level up to the maximum output power corresponding to the class of the MS (for tolerance on maximum output power see conformance requirements 2), with a tolerance of ±4 dB, ±5 dB or ±6 dB under extreme conditions; 3GPP TS 05.05, subclause 4.1.1; 3GPP TS 05.05 annex D subclauses D.2.1 and D.2.2.
5. The output power actually transmitted by the MS at consecutive power control levels shall form a monotonic sequence and the interval between power control levels shall be 2 ± 1,5 dB (1 ± 1dB between power control level 30 and 31 for PCS 1 900); 3GPP TS 05.05, subclause 4.1.1.
6. The transmitted power level relative to time for a normal burst shall be within the power/time template given in 3GPP TS 05.05, annex B in figure B.1:
   6.1 Under normal conditions; 3GPP TS 05.05, subclause 4.5.2.
   6.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.5.2, 3GPP TS 05.05 annex D in subclauses D.2.1 and D.2.2.
7. When accessing a cell on the RACH and before receiving the first power command during a communication on a DCCH or TCH (after an IMMEDIATE ASSIGNMENT), all GSM, class 1 and class 2 DCS 1 800 and PCS 1 900 MS shall use the power control level defined by the MS_TXPWR_MAX_CCH parameter broadcast on the BCCH of the cell, or if MS_TXPWR_MAX_CCH corresponds to a power control level not supported by the MS as defined by its power class, the MS shall act as though the closest supported power control level had been broadcast. A Class 3 DCS 1 800 MS shall use the POWER_OFFSET parameter.

8. The transmissions from the MS to the BS, measured at the MS antenna, shall be 468,75 - TA bit periods behind the transmissions received from the BS, where TA is the last timing advance received from the current serving BS. The tolerance on these timings shall be ±1 bit period:
   8.1 Under normal conditions; 3GPP TS 05.10, subclause 6.4.
   8.2 Under extreme conditions; 3GPP TS 05.10, subclause 6.4, 3GPP TS 05.05 annex D in subclauses D.2.1 and D.2.2.
9. The transmitted power level relative to time for a random access burst shall be within the power/time template given in 3GPP TS 05.05, annex B in figure B.3:
   9.1 Under normal conditions; 3GPP TS 05.05, subclause 4.5.2.
   9.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.5.2, 3GPP TS 05.05 annex D in subclauses D.2.1 and D.2.2.
10. The MS shall use a TA value of 0 for the Random Access burst sent:
    10.1 Under normal conditions; 3GPP TS 05.10, subclause 6.6.
    10.2 Under extreme conditions; 3GPP TS 05.10, subclause 6.6, 3GPP TS 05.05 annex D in subclauses D.2.1 and D.2.2.
11. In addition, if the network indicates support for MS power reduction by broadcasting parameter INIT_PWR_RED (see 3GPP TS 44.018) and if the latest RLA-value, RLA_C or RLA_P (see section 6.1) for the measured signal strength from the BTS the MS is accessing is -48 dBm or higher immediately before the access attempt, the MS power shall not exceed.
    PRED = min{(MS_TXPWR_MAX_CCH, (LB_MS_TXPWR_MAX_CCH + Band_offset), (P5- INIT_ PWR_ RED)} for GSM 400, GSM 700, T-GSM 810, GSM 850 and GSM 900 and
    PRED = min{ MS_TXPWR_MAX_CCH, (P0+2-INIT_PWR_RED)} for DCS 1800 and PCS 1900,where P5 and P0 are the power control levels for respective band in 3GPP TS 45.005.
    The power reduction only applies for the first transmission of the access burst on the RACH. If the initial transmission fails due to no response from the network, the MS shall not apply power reduction in remaining transmissions. The power reduction also applies for DCCH or TCH (after an IMMEDIATE ASSIGNMENT) under the same received signal strength conditions until the ordered power control level in the SACCH L1 header differs from MS_TXPWR_MAX_CCH or LB_MS_TXPWR_MAX_CCH + Band_offset, whichever is applicable or a L3 message with a valid power control command is received.
    If INIT_PWR_RED is not broadcast, no power reduction shall apply.
    3GPP TS 45.008, subclause 4.2, 3GPP TS 44.018, subclause 10.5.2.33b.11.1 Under normal conditions; 3GPP TS 05.10, subclause 6.6.

3.3.3 Test procedure

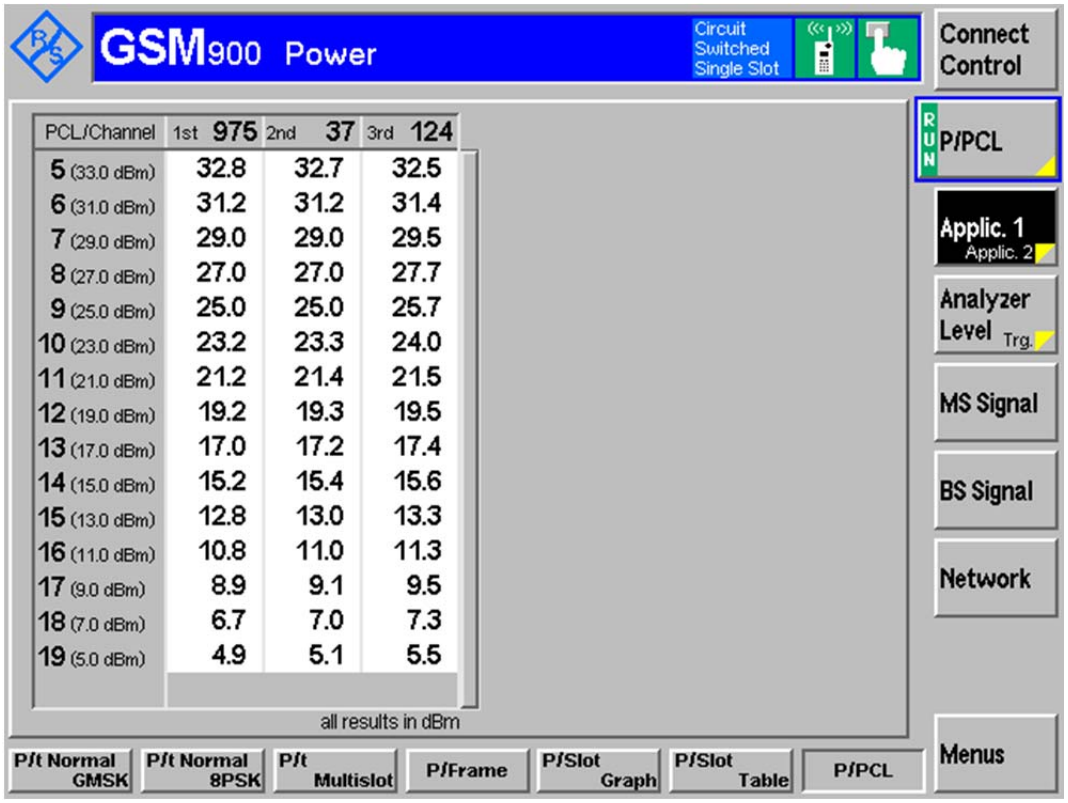
Please refer to ETSI TS 51.010-1 Sub-clause 13.3.4 for the measurement method.

3.3.4 Test result

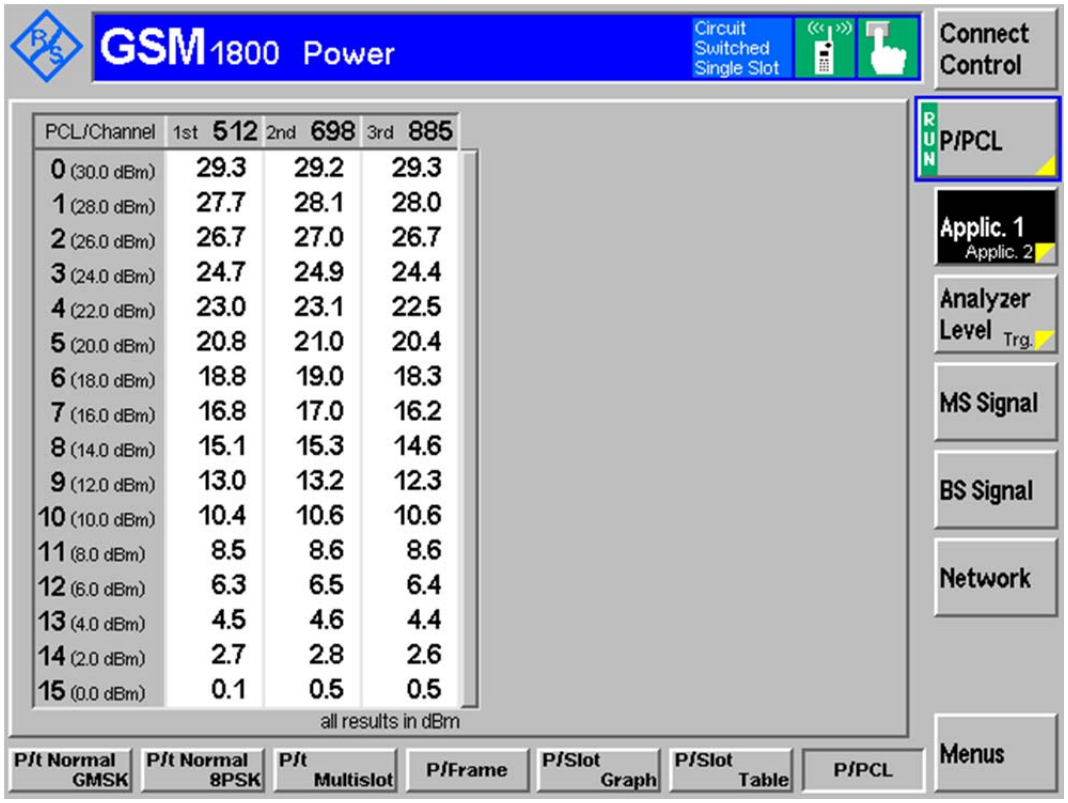
Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GSM900	880.2	PASS	PASS	PASS	PASS	PASS
	897.4	PASS	PASS	PASS	PASS	PASS
	914.8	PASS	PASS	PASS	PASS	PASS
DCS1800	1710.2	PASS	PASS	PASS	PASS	PASS
	1747.4	PASS	PASS	PASS	PASS	PASS
	1784.8	PASS	PASS	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

GSM900



DCS1800



3.4 Transmitter output RF spectrum

Clause 13.4 of TS 151 010-1 applies.

3.4.1 Definition and applicability

The output RF spectrum is the relationship between the frequency offset from the carrier and the power, measured in a specified bandwidth and time, produced by the MS due to the effects of modulation and power ramping.
The requirements and this test apply to GSM900 and DCS1800.

3.4.2 Conformance requirements

1. The level of the output RF spectrum due to the modulation shall be no more than the following lowest measurement limits:

- - 36dBm below 600kHz offset from the carrier,
- - 51dBm for E-GSM900 or –56dBm for DCS1800 from 600kHz out to less than 1800kHz offset from carrier,
- - 46dBm for E-GSM900 or –51dBm for DCS1800 at and beyond 1800kHz offset from the carrier, but with the following exceptions at up to –36dBm:
- - up to three bands of 200kHz width centered on a frequency which is an integer multiple of 200kHz in the combined range 600kHz to 6000kHz and below the carrier,
- - up to 12 bands of 200kHz width centered on a frequency which is an integer multiple of 200kHz at more than 6000kHz offset from the carrier.

1.1 Under normal conditions.
1.2 Under extreme conditions.

2. The level of the output RF spectrum due the switching transient shall be no more than given in table 13.9 and table 13.10 of TS 151 010-1 clause 13.4.

2.1 Under normal conditions.
2.2 Under extreme conditions.

3. When allocated a channel the power emitted by the MS, in the band 935MHz to 960MHz shall be no more than –79dBm, in the band 925 to 935MHz shall be no more than –67dBm and in the band 1805 to 1880MHz shall be no more than –71dBm except in five measurements in each of the bands 925 to 960MHz and 1805 to 1880MHz where exceptions at up to –36dBm are permitted.

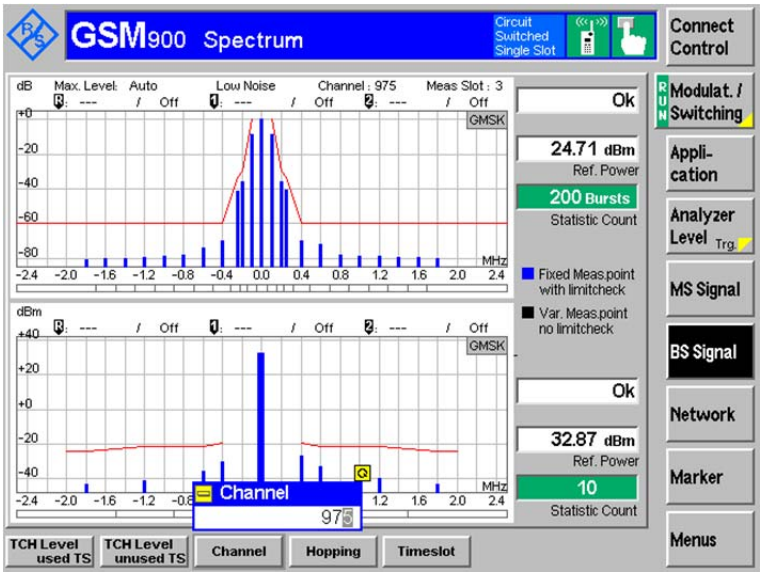
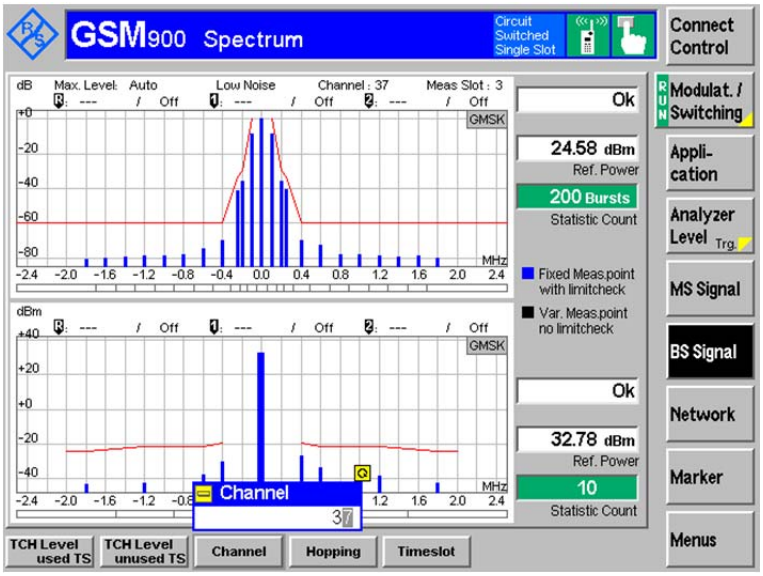
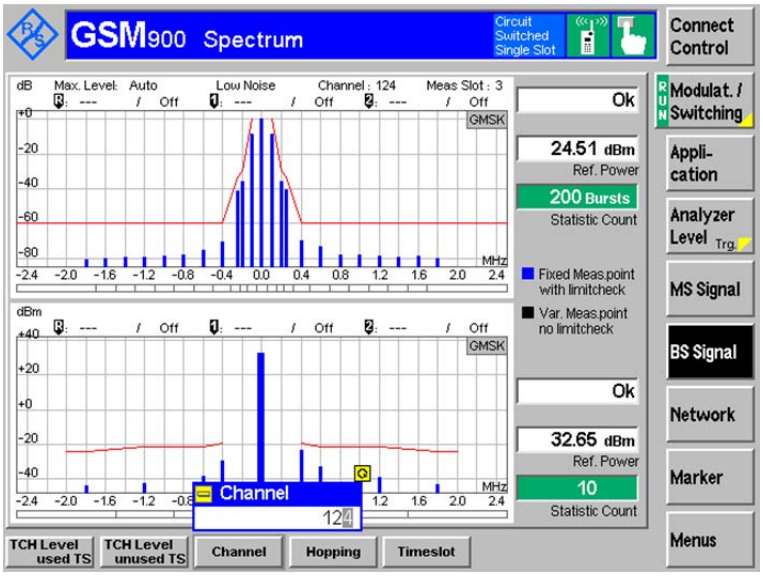
3.4.3 Test procedure

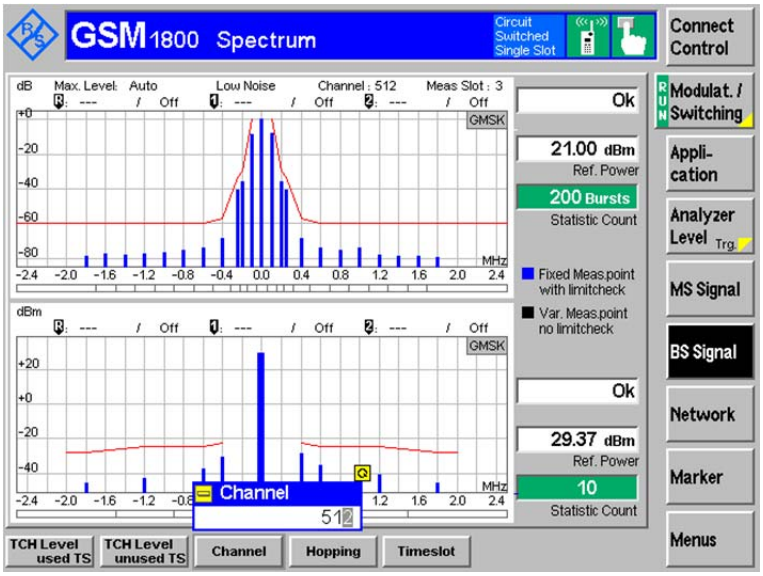
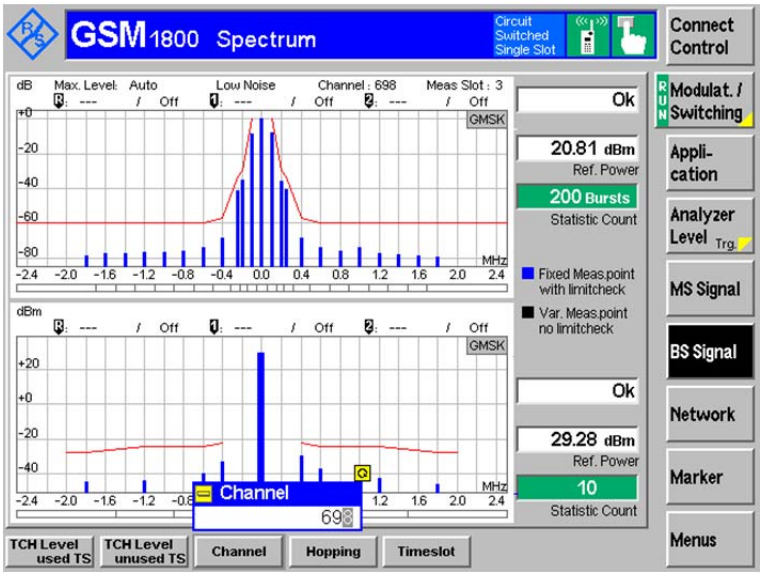
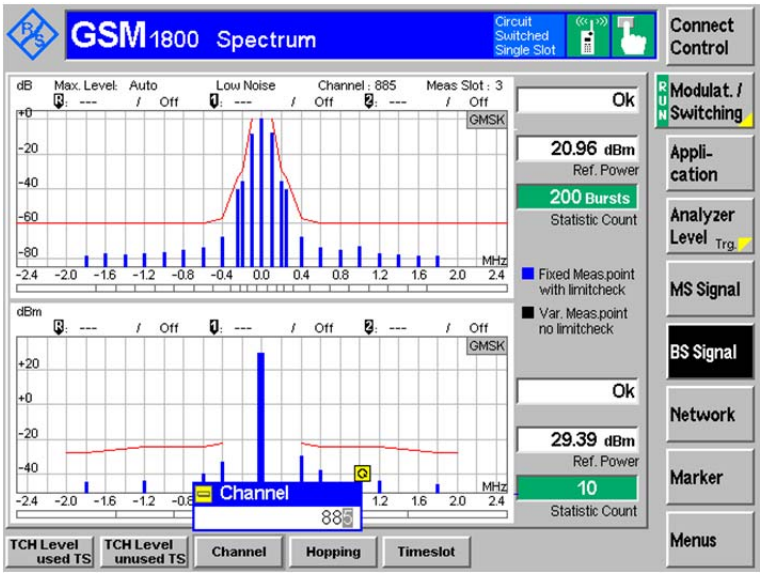
Please refer to ETSI TS 51.010-1 Sub-clause 13.3.4 for the measurement method.

3.4.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GSM900	880.2	PASS	PASS	PASS	PASS	PASS
	897.4	PASS	PASS	PASS	PASS	PASS
	914.8	PASS	PASS	PASS	PASS	PASS
DCS1800	1710.2	PASS	PASS	PASS	PASS	PASS
	1747.4	PASS	PASS	PASS	PASS	PASS
	1784.8	PASS	PASS	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

GSM900	
Low Channel	
Middle Channel	
High Channel	

DCS1800	
Low Channel	
Middle Channel	
High Channel	

3.5 Conducted spurious emissions – MS allocated a channel

Clause 12.1.1 of TS 151 010-1 applies.

3.5.1 Definition and applicability

Conducted spurious emissions, when the MS has been allocated a channel, are emissions from the antenna connector at frequencies other than those of the carrier and sidebands associated with normal modulation.

The requirements and this test apply to GSM900 and DCS1800 MS with a permanent antenna connector.

3.5.2 Conformance requirements

The conducted spurious power emitted by the MS, when allocated a channel, shall be no more than the levels in following table:

Frequency range	Power level in dBm	
	E-GSM900	DCS1800
9kHz to 1GHz	-36	-36
1GHz to 12,75GHz	-30	
1GHz to 1,71GHz		-30
1,71GHz to 1,785GHz		-36
1,785GHz to 12,75GHz		-30

1.1 Under normal voltage conditions.

1.2 Under extreme voltage conditions.

3.5.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 12.1.1 for the measurement method.

3.5.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	NTLV	NTHV
GSM900	897.4	PASS	PASS	PASS
DCS1800	1747.4	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

GSM900 Middle Channel				
Frequency Bandwidth (MHz)	RBW	Result Level (dBm)	Limit (dBm)	Result
0.009-0.1	1k	-39.34	-36	PASS
0.1-50	10k	-39.68	-36	PASS
50-500	100k	-41.78	-36	PASS
500-850	3M	-41.58	-36	PASS
850-860	1M	-40.31	-36	PASS
860-870	300k	-41.27	-36	PASS
870-880	100k	-38.89	-36	PASS
915-925	100k	-43.92	-36	PASS
960-1000	3M	-40.27	-36	PASS
1000-1805	3M	-39.58	-30	PASS
1805-12750	3M	-39.36	-30	PASS
1.8MHz-6MHz offset from the carrier frequency	30k	-38.80	-36	PASS
more than 6MHz offset from the carrier frequency	100k	-43.09	-36	PASS

DCS1800 Middle Channel				
Frequency Bandwidth (MHz)	RBW	Result Level (dBm)	Limit (dBm)	Result
0.009-0.1	1k	-41.31	-36	PASS
0.1-50	10k	-40.87	-36	PASS
50-500	100k	-41.66	-36	PASS
500-925	3M	-38.86	-36	PASS
960-1000	3M	-42.90	-36	PASS
1000-1680	3M	-42.81	-30	PASS
1680-1690	1M	-41.93	-30	PASS
1690-1700	300k	-39.01	-30	PASS
1700-1710	100k	-38.68	-30	PASS
1785-1795	100k	-41.52	-30	PASS
1795-1805	300k	-38.87	-30	PASS
1880-12750	3M	-39.54	-30	PASS
1.8MHz-6MHz offset from the carrier frequency	30k	-42.71	-36	PASS
more than 6MHz offset from the carrier frequency	100k	-40.10	-36	PASS

3.6 Conducted spurious emissions – MS in idle mode

Clause 12.1.2 of TS 151 010-1 applies.

3.6.1 Definition and applicability

Conducted spurious emissions are any emissions from the antenna connector when the MS is in idle mode.

3.6.2 Conformance requirements

1. The conducted spurious power emitted by the MS, when in idle mode, shall be no more than the levels in following table:

Frequency range	Power level in dBm
9kHz to 880MHz	-57
880MHz to 915MHz	-59
915MHz to 1GHz	-57
1GHz to 1,71GHz	-47
1,71GHz to 1,785GHz	-53
1,785GHz to 12,75GHz	-47

1.1 Under normal voltage conditions.
1.2 Under extreme voltage conditions.

3.6.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 12.1.2 for the measurement method.

3.6.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	NTLV	NTHV
GSM900	897.4	PASS	PASS	PASS
DCS1800	1747.4	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

GSM900 Middle Channel				
Frequency Bandwidth (MHz)	RBW	Result Level (dBm)	Limit (dBm)	Result
0.009-0.1	1k	-68.95	-57	PASS
0.1-50	10k	-65.22	-57	PASS
50-880	100k	-68.66	-57	PASS
880-915	100k	-68.83	-59	PASS
915-1000	100k	-67.61	-57	PASS
1000-1710	100k	-62.45	-47	PASS
1710-1785	100k	-63.95	-53	PASS
1785-12570	100k	-53.69	-47	PASS

DCS1800 Middle Channel				
Frequency Bandwidth (MHz)	RBW	Result Level (dBm)	Limit (dBm)	Result
0.009-0.1	1k	-66.36	-57	PASS
0.1-50	10k	-62.61	-57	PASS
50-880	100k	-64.10	-57	PASS
880-915	100k	-70.56	-59	PASS
915-1000	100k	-61.78	-57	PASS
1000-1710	100k	-64.34	-47	PASS
1710-1785	100k	-64.00	-53	PASS
1785-12570	100k	-60.83	-47	PASS

3.7 Radiated spurious emissions – MS allocated a channel

Clause 12.2.1 of TS 151 010-1 applies.

3.7.1 Definition and applicability

Radiated spurious emissions, when the MS has been allocated a channel, are any emissions radiated by the cabinet and structure of the mobile station, including all interconnecting cables.

The requirements and this test apply to GSM900 and DCS1800 MS.

3.7.2 Conformance requirements

1. The radiated spurious power emitted by the MS, when allocated a channel, shall be no more than the levels in following table under normal voltage conditions.
2. The radiated spurious power emitted by the MS, when allocated a channel, shall be no more than the levels in following table under extreme voltage conditions

Frequency range	Power level in dBm	
	E-GSM900	DCS1800
30MHz to 1GHz	-36	-36
1GHz to4GHz		
1GHz to 1,71GHz	-30	-30
1,71GHz to 1,785GHz		-36
1,785GHz to 4GHz		-30

1.1 Under normal voltage conditions.

1.2 Under extreme voltage conditions.

3.7.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 12.2.1 for the measurement method.

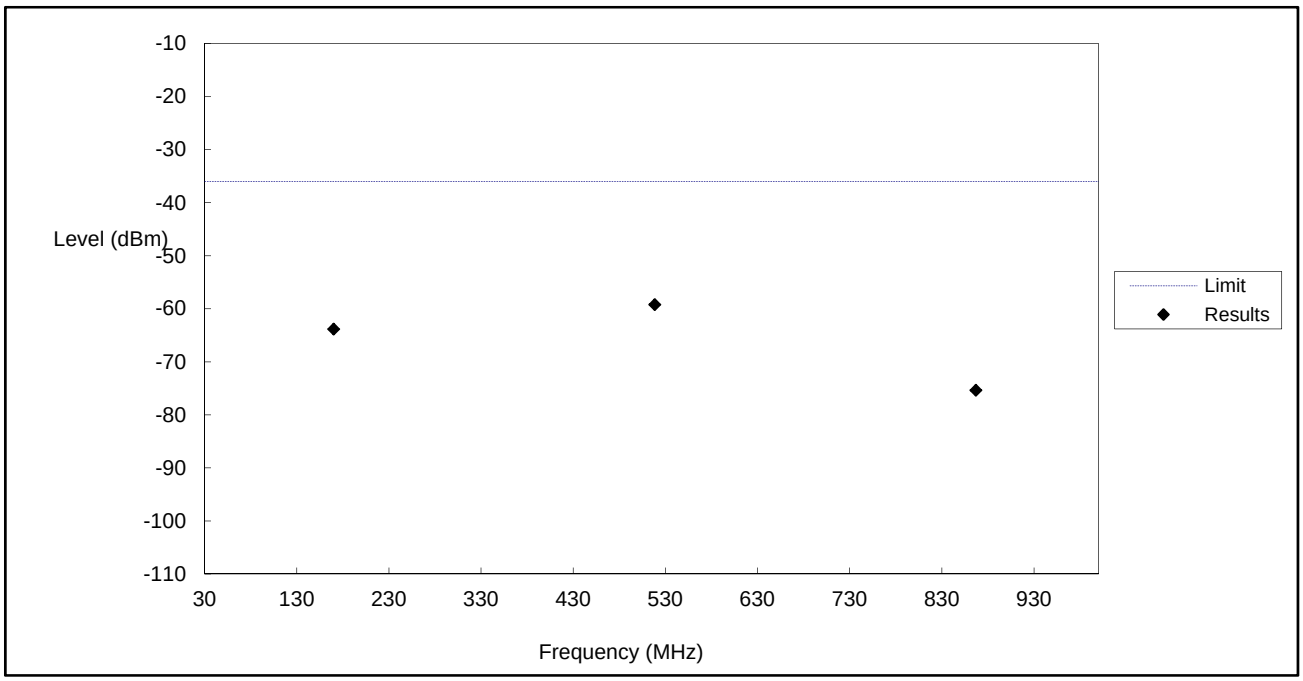
3.7.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	NTLV	NTHV
GSM900	897.4	PASS	PASS	PASS
DCS1800	1747.4	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

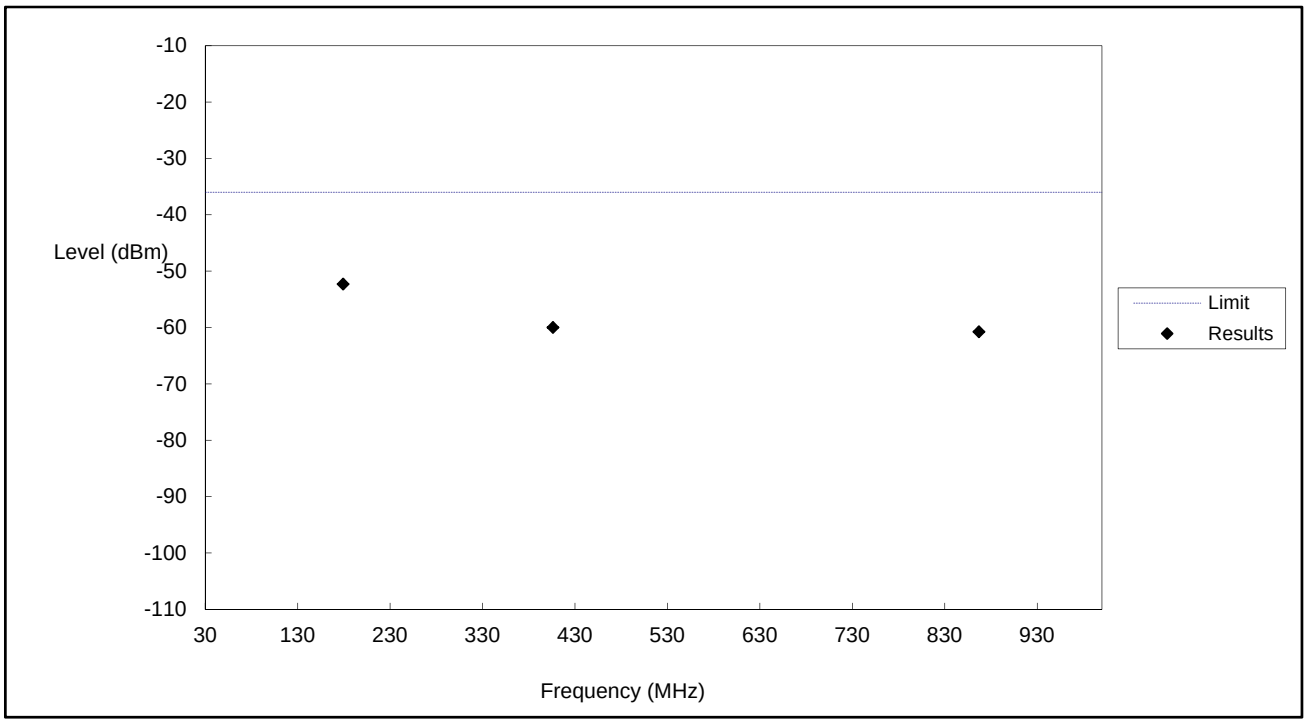
➢ Radiated Spurious Emissions(30MHz-1GHz)

GSM900			
Test mode:	Traffic Mode	Polarity:	Horizontal



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	170.0000	-63.85	-36.00	-27.85	RMS
2	518.4615	-59.23	-36.00	-23.23	RMS
3	866.9231	-75.38	-36.00	-39.38	RMS

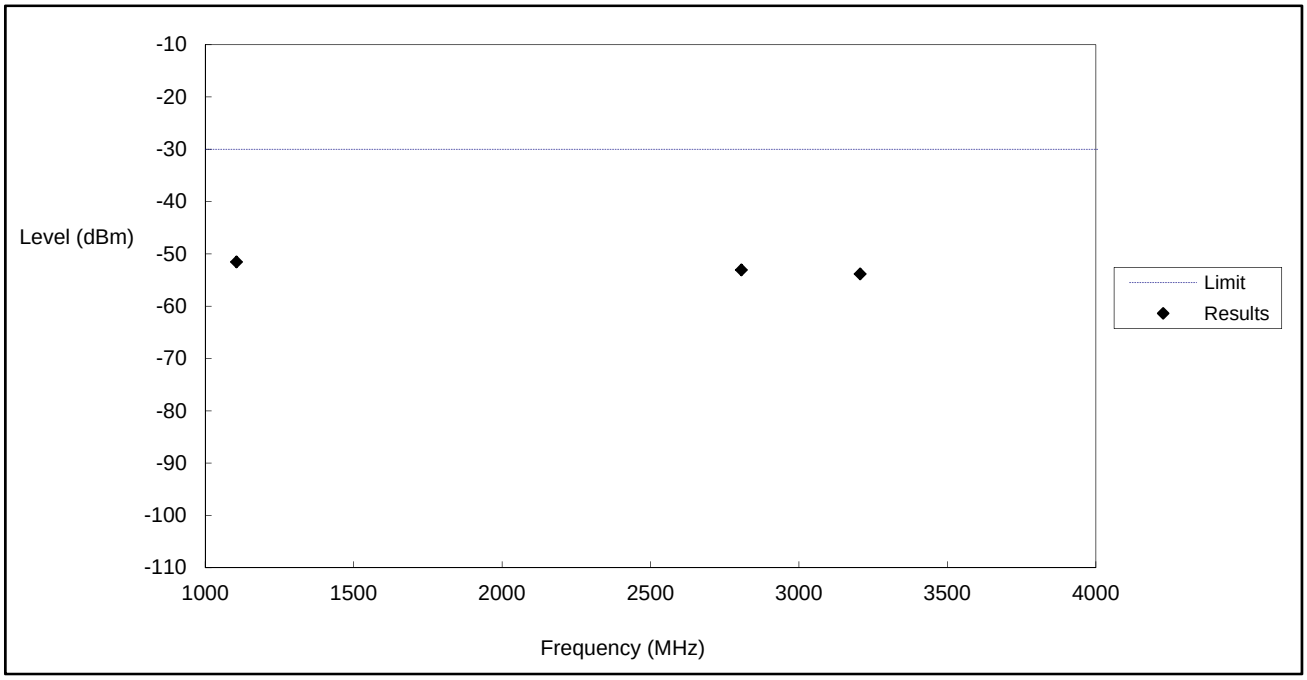
Test mode:	Traffic Mode	Polarity:	Vertical



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	179.2308	-52.31	-36.00	-16.31	RMS
2	406.1538	-60.00	-36.00	-24.00	RMS
3	866.9231	-60.77	-36.00	-24.77	RMS

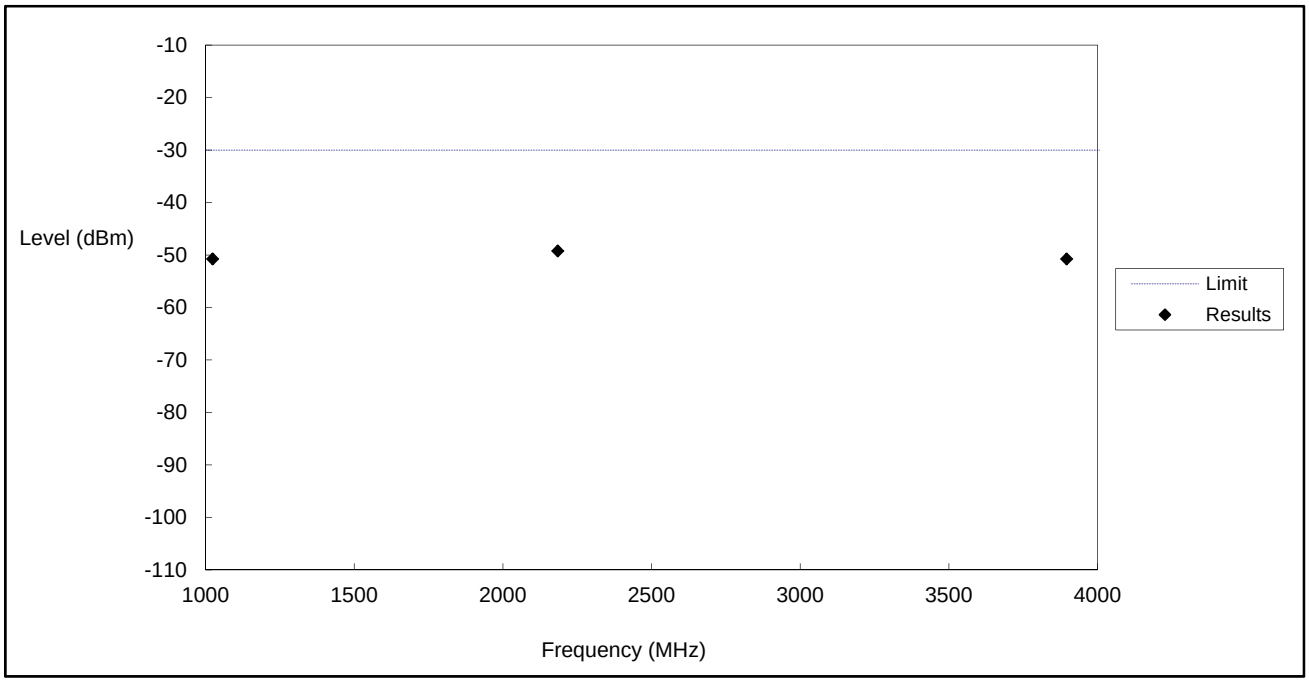
➢ Radiated Spurious Emissions(Above 1GHz)

Test mode:	Traffic Mode	Polarity:	Horizontal



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	1105.3846	-51.54	-30.00	-21.54	RMS
2	2806.1538	-53.08	-30.00	-23.08	RMS
3	3206.1538	-53.85	-30.00	-23.85	RMS

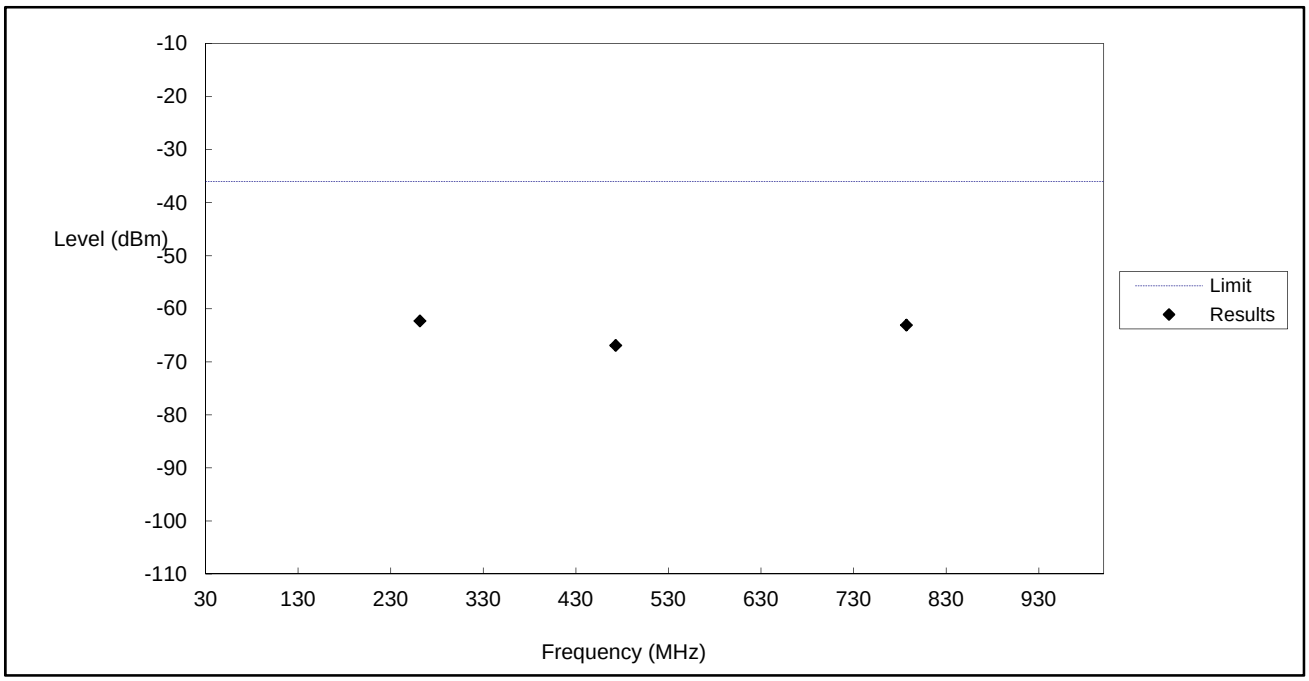
Test mode:	Traffic Mode	Polarity:	Vertical



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	1023.8462	-50.77	-30.00	-20.77	RMS
2	2184.6154	-49.23	-30.00	-19.23	RMS
3	3896.1538	-50.77	-30.00	-20.77	RMS

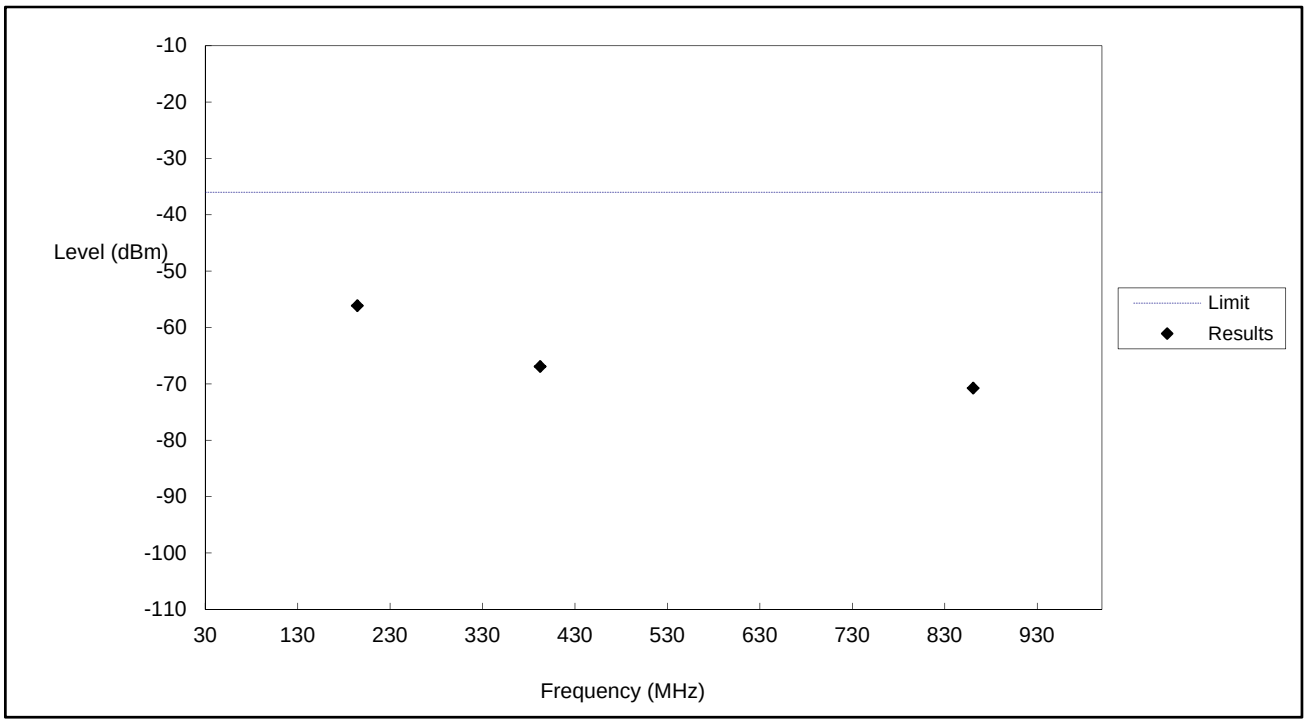
➢ Radiated Spurious Emissions(30MHz-1GHz)

DCS1800			
Test mode:	Traffic Mode	Polarity:	Horizontal



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	261.5385	-62.31	-36.00	-26.31	RMS
2	473.0769	-66.92	-36.00	-30.92	RMS
3	786.9231	-63.08	-36.00	-27.08	RMS

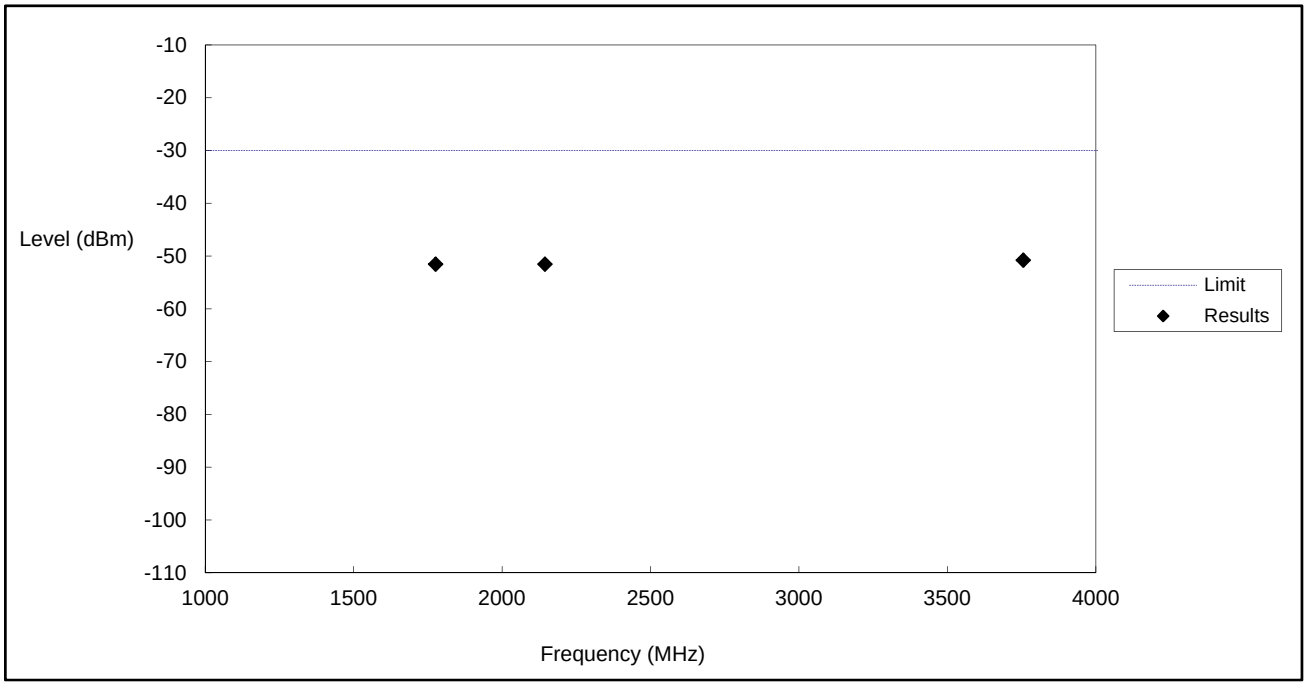
Test mode:	Traffic Mode	Polarity:	Vertical



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	52.3077	-66.15	-36.00	-30.15	RMS
2	423.8462	-60.00	-36.00	-24.00	RMS
3	776.1538	-66.92	-36.00	-30.92	RMS

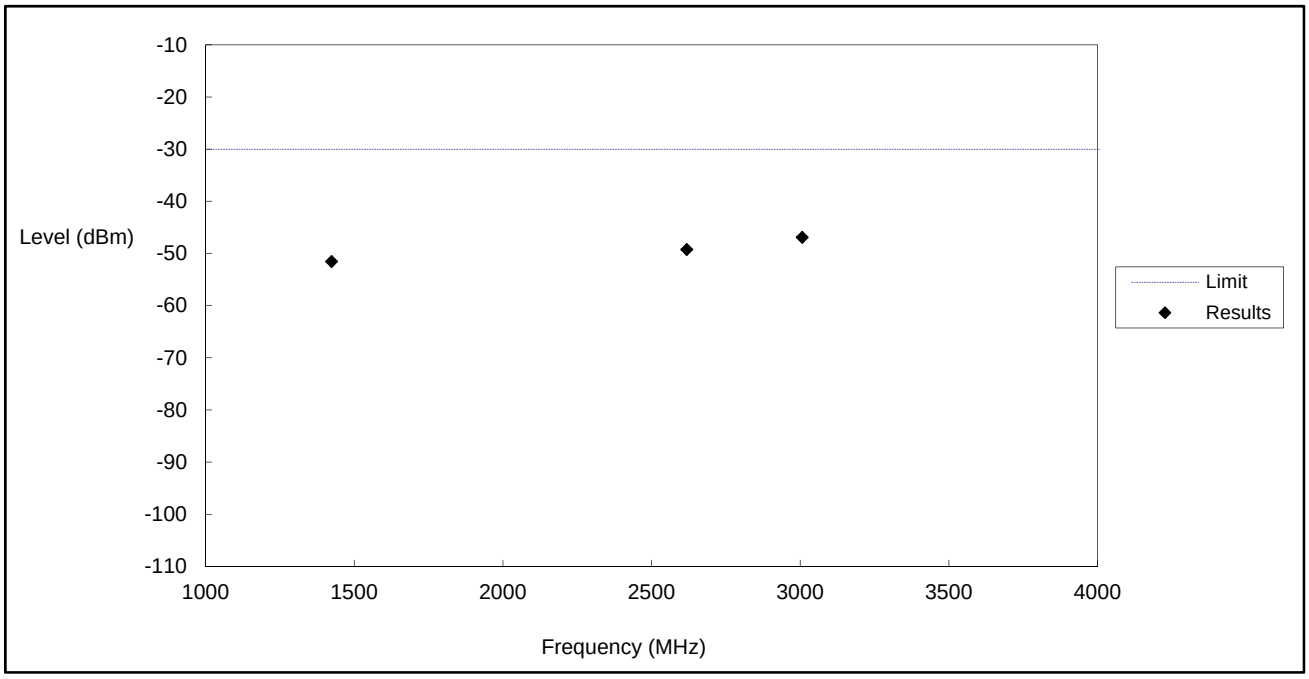
➢ Radiated Spurious Emissions(Above 1GHz)

Test mode:	Traffic Mode	Polarity:	Horizontal



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	1776.1538	-51.54	-30.00	-21.54	RMS
2	2144.6154	-51.54	-30.00	-21.54	RMS
3	3755.3846	-50.77	-30.00	-20.77	RMS

Test mode:	Traffic Mode	Polarity:	Vertical



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	1423.8462	-51.54	-30.00	-21.54	RMS
2	2618.4615	-49.23	-30.00	-19.23	RMS
3	3006.9231	-46.92	-30.00	-16.92	RMS

3.8 Radiated spurious emissions – MS in idle mode

Clause 12.2.2 of TS 151 010-1 applies.

3.8.1 Definition and applicability

Radiated spurious emissions, when the MS is in idle mode, are any emissions radiated by the cabinet and structure of the mobile station, including all interconnecting cables.

The requirements and this test apply to GSM900 and DCS1800 MS.

3.8.2 Conformance requirements

1. The radiated spurious power emitted by the MS, when in idle mode, shall be no more than the levels in following table under normal voltage conditions.
2. The radiated spurious power emitted by the MS, when allocated a channel, shall be no more than the levels in following table under extreme voltage conditions.

Frequency range	Power level in dBm
30MHz to 880MHz	-57
880Mhz to 915MHz	-59
915MHz to 1GHz	-57
1GHz to 1,71GHz	-47
1,71GHz to 1,785GHz	-53
1,785GHz to 4 GHz	-47

1.1 Under normal voltage conditions.
1.2 Under extreme voltage conditions.

3.8.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 12.2.2 for the measurement method.

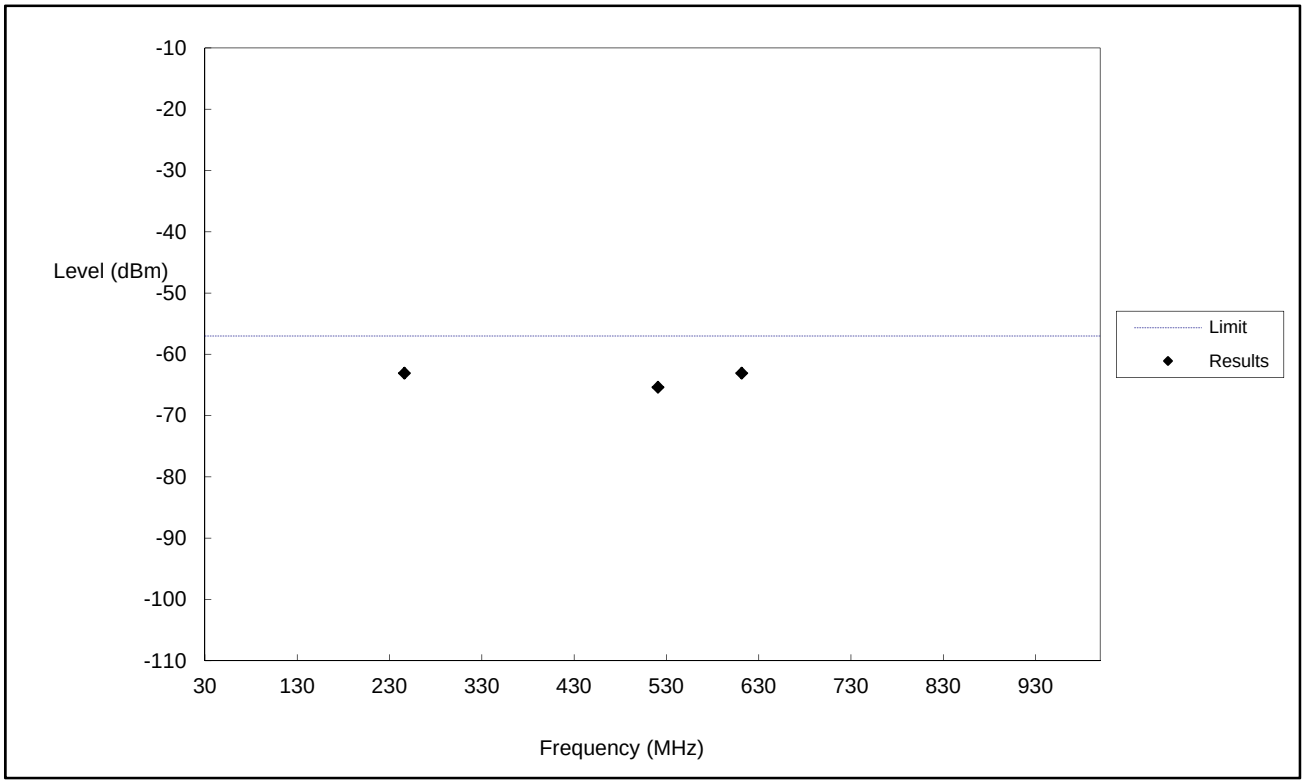
3.8.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	NTLV	NTHV
GSM900	897.4	PASS	PASS	PASS
DCS1800	1747.4	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

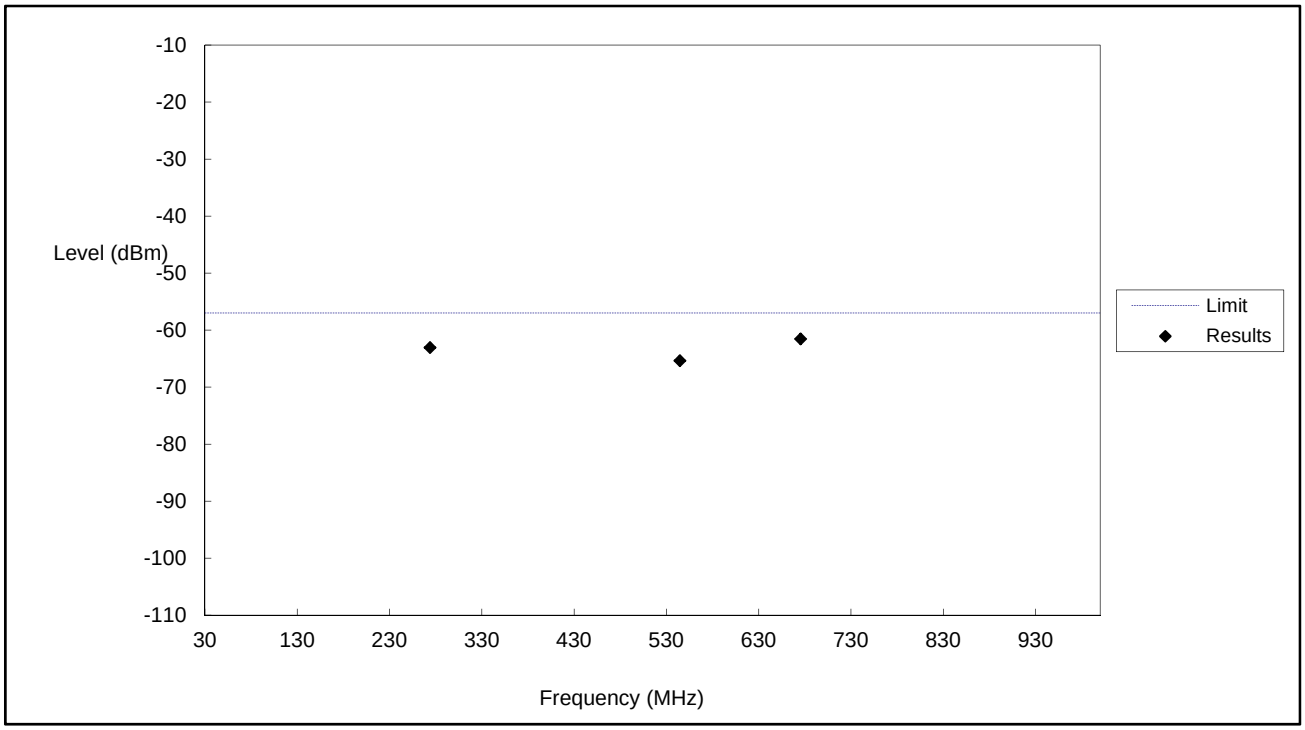
➢ Radiated Spurious Emissions(30MHz-1GHz)

GSM900			
Test mode:	Idle Mode	Polarity:	Horizontal



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	246.1538	-63.08	-57.00	-6.08	RMS
2	520.7692	-65.38	-57.00	-8.38	RMS
3	611.5385	-63.08	-57.00	-6.08	RMS

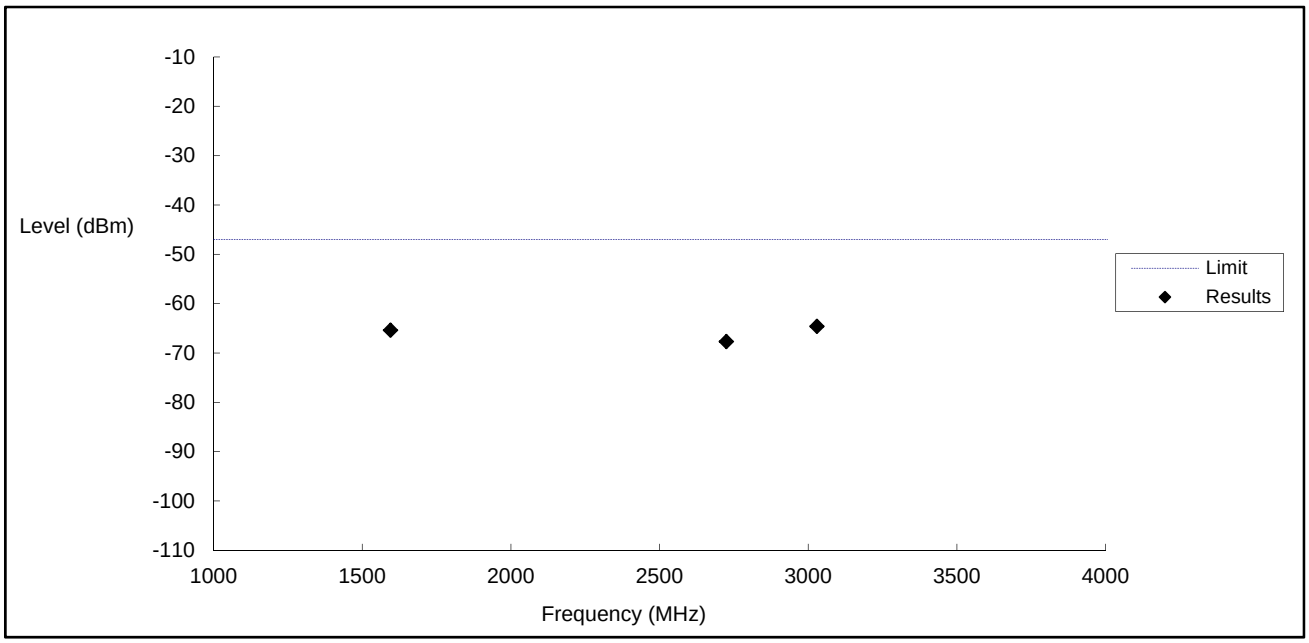
Test mode:	Idle Mode	Polarity:	Vertical



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	273.8462	-63.08	-57.00	-6.08	RMS
2	544.6154	-65.38	-57.00	-8.38	RMS
3	675.3846	-61.54	-57.00	-4.54	RMS

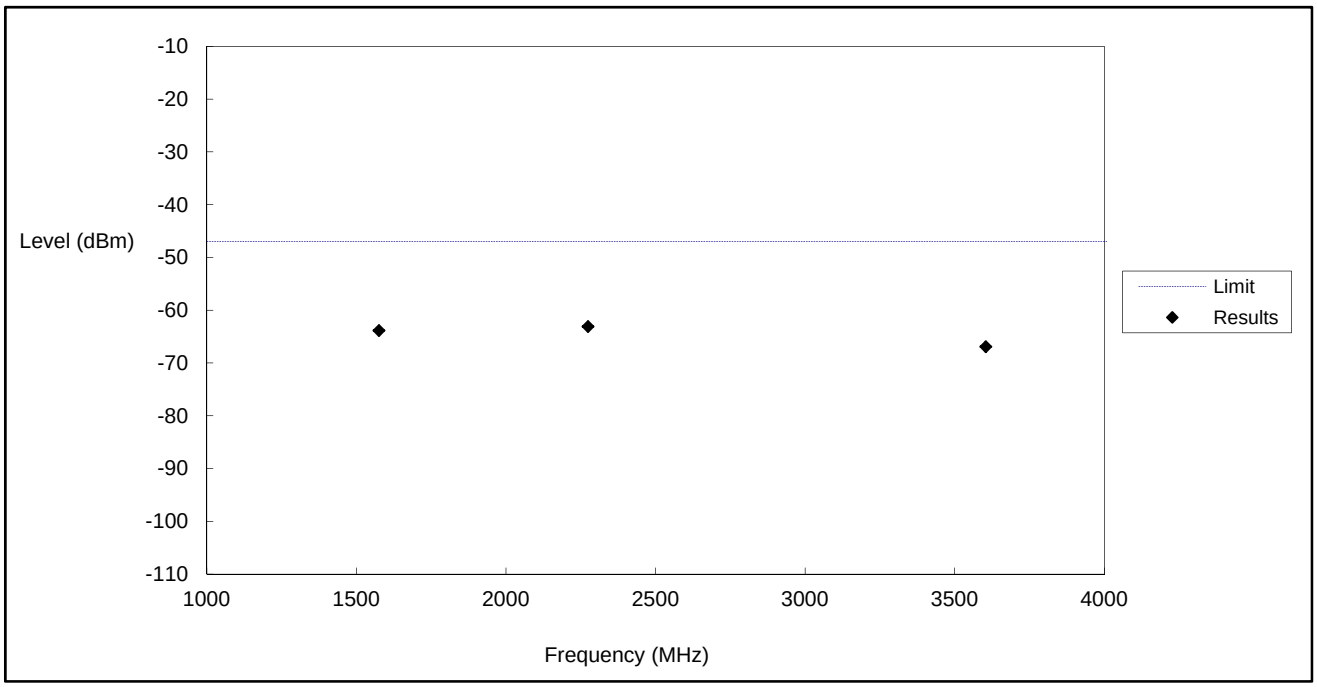
➢ Radiated Spurious Emissions(Above 1GHz)

Test mode:	Idle Mode	Polarity:	Horizontal



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	1595.3846	-65.38	-47.00	-18.38	RMS
2	2724.6154	-67.69	-47.00	-20.69	RMS
3	3029.2308	-64.62	-47.00	-17.62	RMS

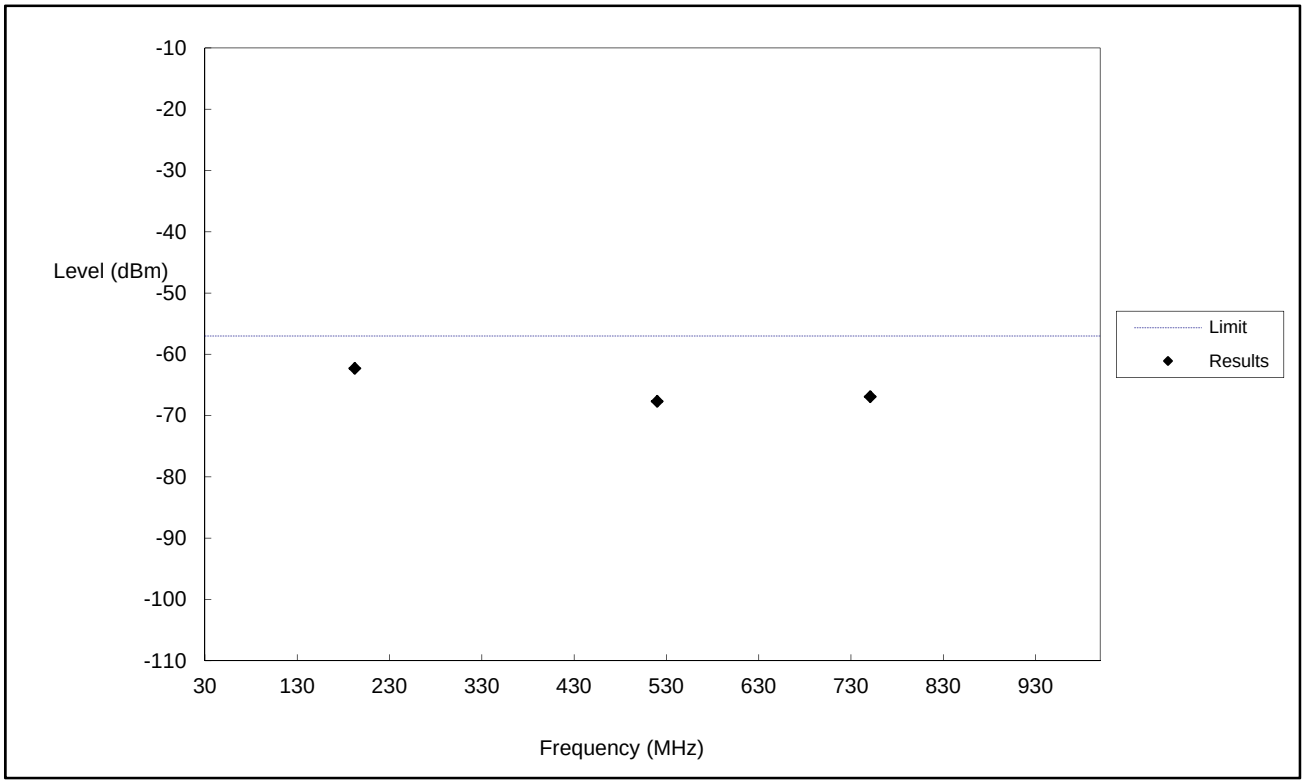
Test mode:	Idle Mode	Polarity:	Vertical



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	1575.3846	-63.85	-47.00	-16.85	RMS
2	2274.6154	-63.08	-47.00	-16.08	RMS
3	3603.8462	-66.92	-47.00	-19.92	RMS

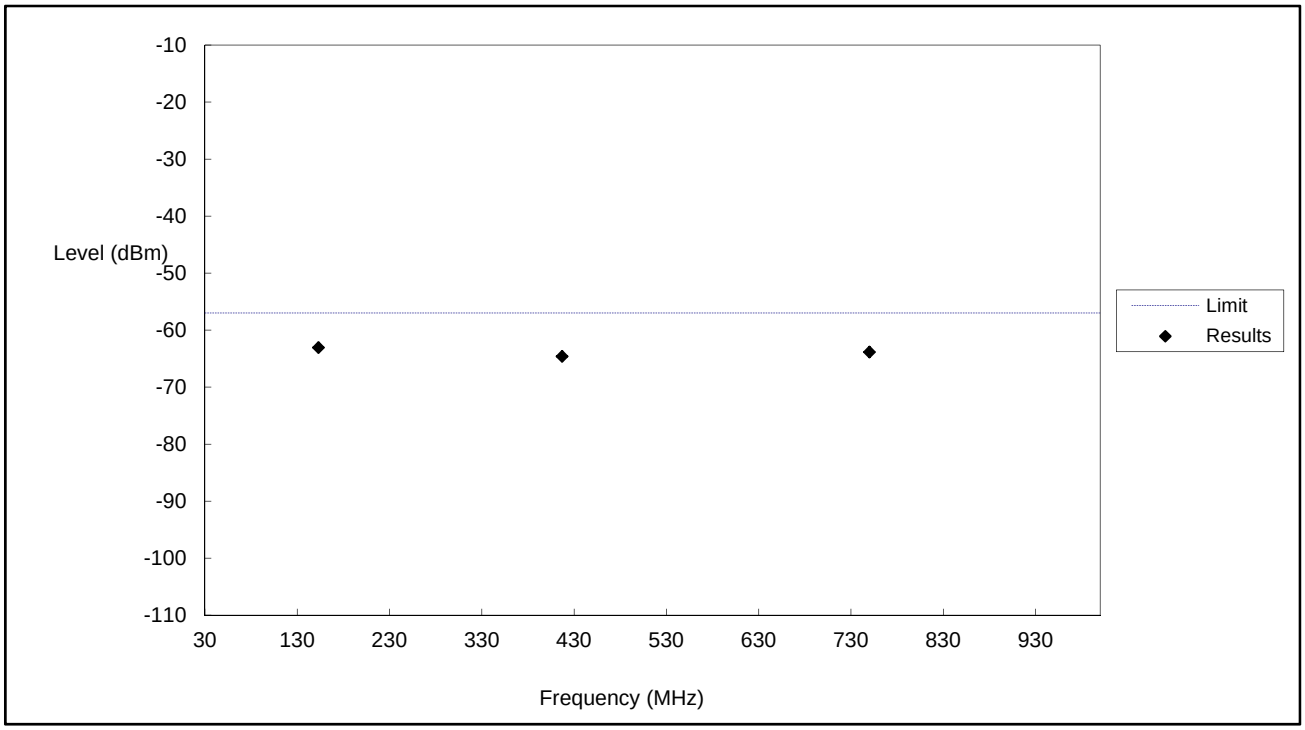
➢ Radiated Spurious Emissions(30MHz-1GHz)

DCS1800			
Test mode:	Idle Mode	Polarity:	Horizontal



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	192.3077	-62.31	-57.00	-5.31	RMS
2	520.0000	-67.69	-57.00	-10.69	RMS
3	750.7692	-66.92	-57.00	-9.92	RMS

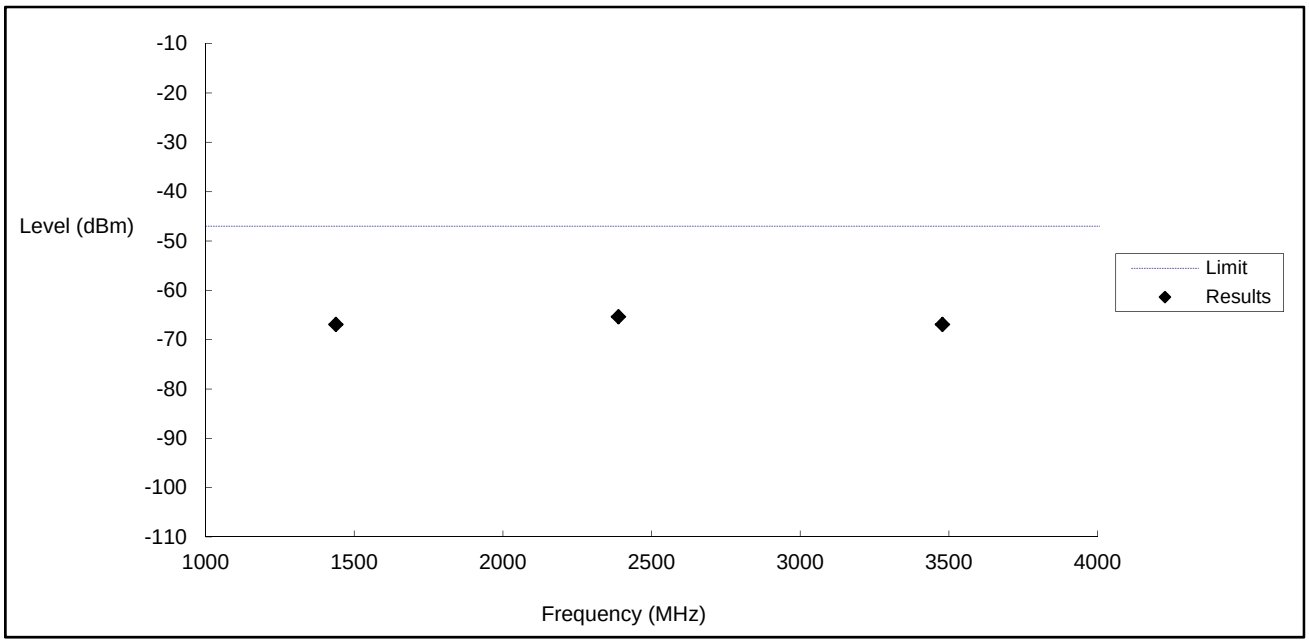
Test mode:	Idle Mode	Polarity:	Vertical



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	153.0769	-63.08	-57.00	-6.08	RMS
2	416.9231	-64.62	-57.00	-7.62	RMS
3	750.0000	-63.85	-57.00	-6.85	RMS

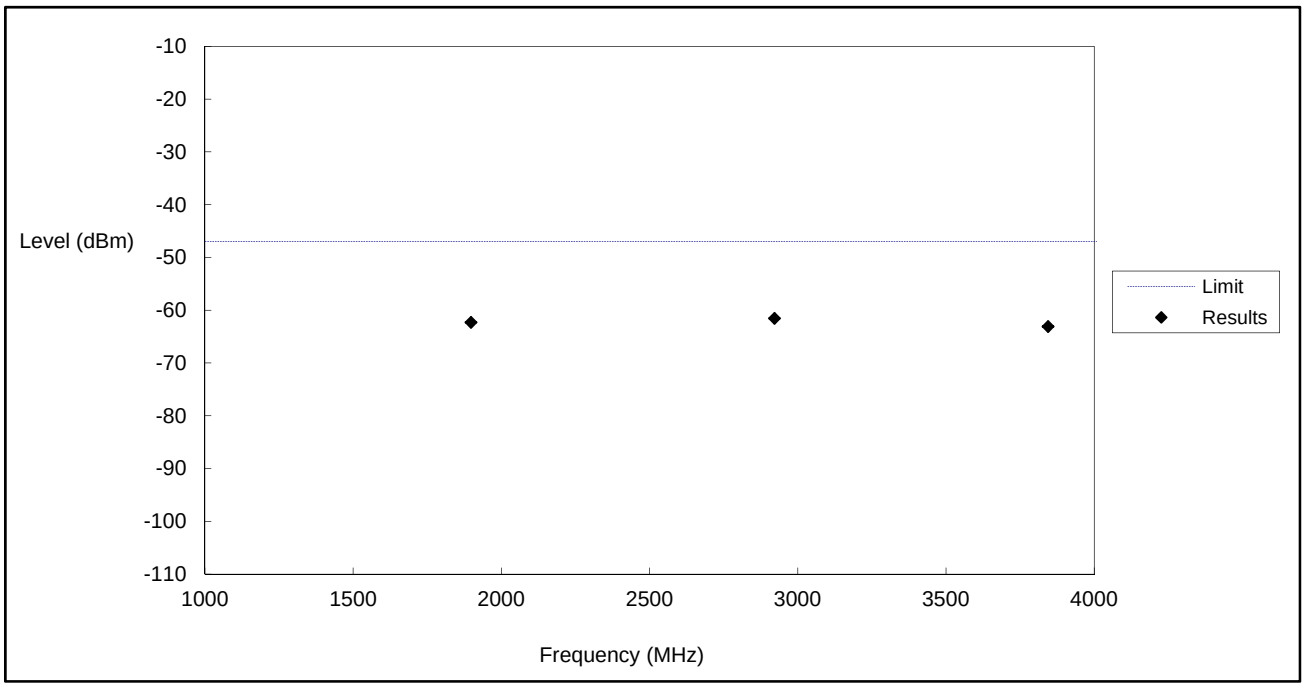
➢ Radiated Spurious Emissions(Above 1GHz)

Test mode:	Idle Mode	Polarity:	Horizontal



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	1438.4615	-66.92	-47.00	-19.92	RMS
2	2388.4615	-65.38	-47.00	-18.38	RMS
3	3478.4615	-66.92	-47.00	-19.92	RMS

Test mode:	Idle Mode	Polarity:	Vertical



No.	Frequency	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dB)	
1	1897.6923	-62.31	-47.00	-15.31	RMS
2	2921.5385	-61.54	-47.00	-14.54	RMS
3	3844.6154	-63.08	-47.00	-16.08	RMS

3.9 Receiver blocking and spurious response – Speech channels

Clause 14.7.1 of TS 151 010-1applies.

3.9.1 Definition and applicability

Blocking is a measure of the ability of the receiver to receive a modulated wanted signal in the presence of an unwanted input signal, on frequencies other than those of the spurious response or the adjacent channels, without exceeding a given degradation.

The requirements and this test apply MS supporting speech.

3.9.2 Conformance requirements

1. The blocking characteristics of the receiver are specified separately for in-band and out-band performance as identified in GSM 05.05 clause 5.1.
The reference sensitivity performance as specified in table 1 of GSM 05.05 shall be met when the following signals are simultaneously input to the receiver:
- a useful signal at frequency f_0, 3dB above the reference sensitivity level as specified in GSM 05.05 clause 6.2;
- a continuous, static sine wave signal at a level as in the table of GSM 05.05 clause 5.1 and at a frequency (f) which is integer multiple of 200kHz.

With the following exceptions, called spurious response frequencies:

a) E-GSM900: in band, for a maximum of six occurrences (which if grouped shall not exceed three contiguous occurrences per group);

b) out of band, for a maximum of 24 occurrences (which if below fo and grouped shall not exceed three contiguous occurrences per group).

Where the above performance shall be met when the continuous sine wave signal (f) is set to a level –43dBm.

3.8.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.7.1 for the measurement method.

3.9.4 Test result

Worst case Test Data as below:

Test Mode	Test Frequency (MHz)	FBER(%)	Number of test samples	Limit(%)	Result
GSM900	880.2	0.703	10000	2.439	PASS
	897.4	0.881	10000	2.439	PASS
	914.8	1.525	10000	2.439	PASS
DCS1800	1710.2	0.993	10000	2.439	PASS
	1747.4	0.901	10000	2.439	PASS
	1784.8	0.702	10000	2.439	PASS

3.10 Frequency error and phase error in GPRS multisolt configuration

Clause 13.16.1 of TS 151 010-1 applies.

3.10.1 Definition and applicability

The frequency error is the difference in frequency, after adjustment for the effect of the modulation and phase error, between the RF transmission from the MS and either:
- the RF transmission from the BS, or
- the nominal frequency for the ARFCN used.

The phase error is the difference in phase, after adjustment for the effect of the frequency error, between the RF transmission from the MS and the theoretical transmission according to the intended modulation.
The requirements and this test apply to GPRS 900 and GPRS 1800 MS.

3.10.2 Conformance requirements

1. MS carrier frequency shall be accurate to within 0,1 ppm compared to signals received from the BS.
2. The RMS phase error (difference between the phase error trajectory and its linear regression on the active part of the time slot) for each burst shall not be greater than 5 degrees.
3. The maximum peak deviation during the useful part of each burst shall not be greater than 20 degrees.

All this requirements apply for normal test conditions, vibration test conditions and under extreme test conditions.

3.10.3 Test procedure

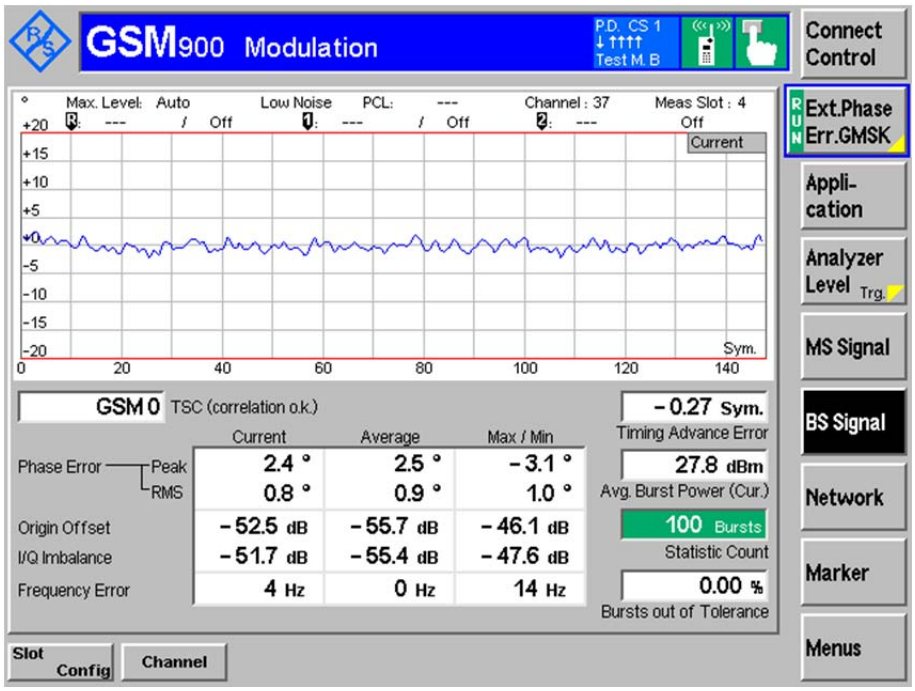
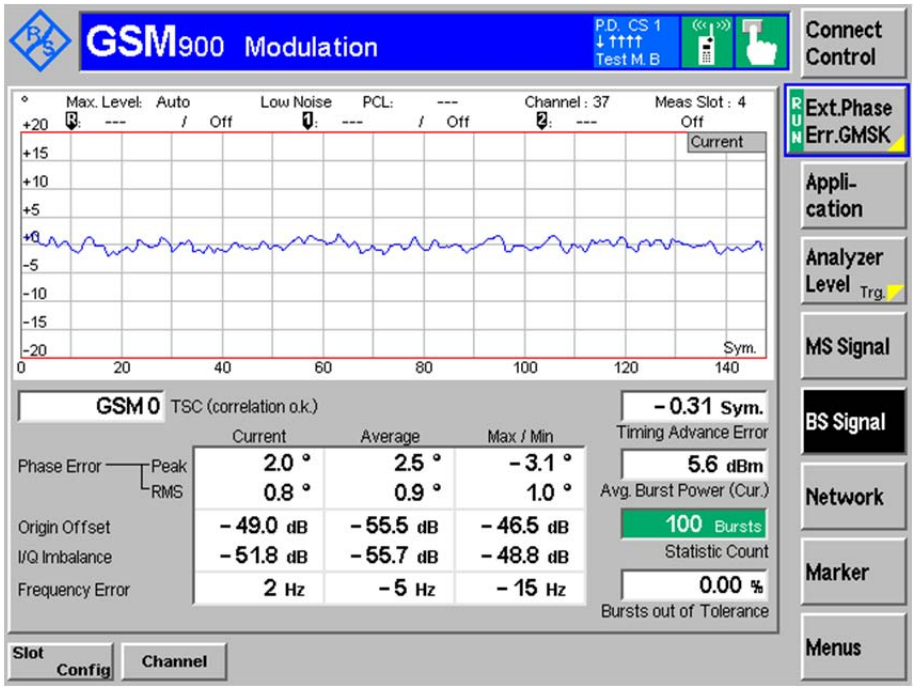
Please refer to ETSI TS 51.010-1 Sub-clause 13.16.1 for the measurement method.

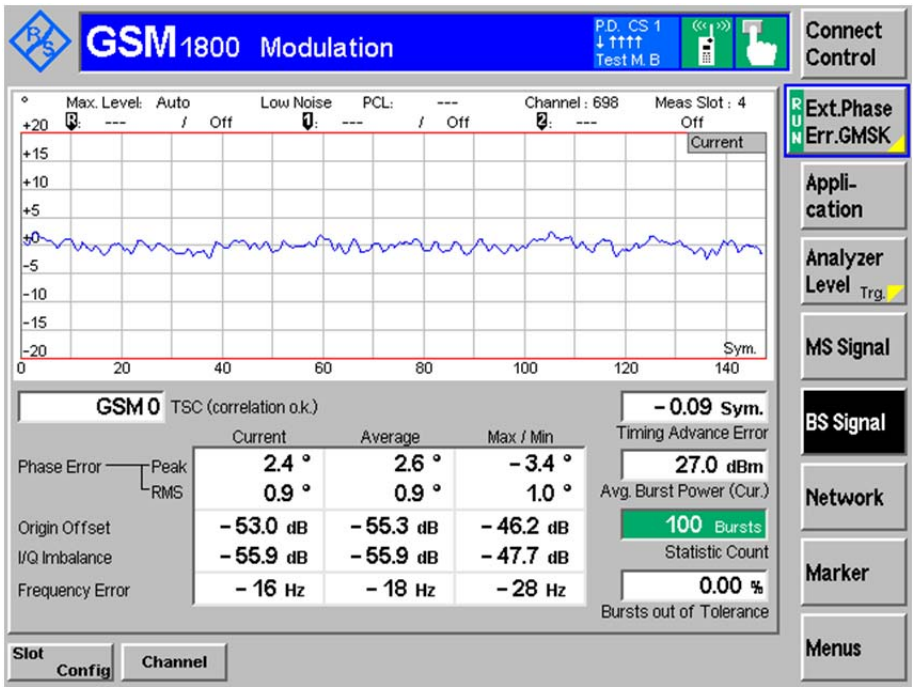
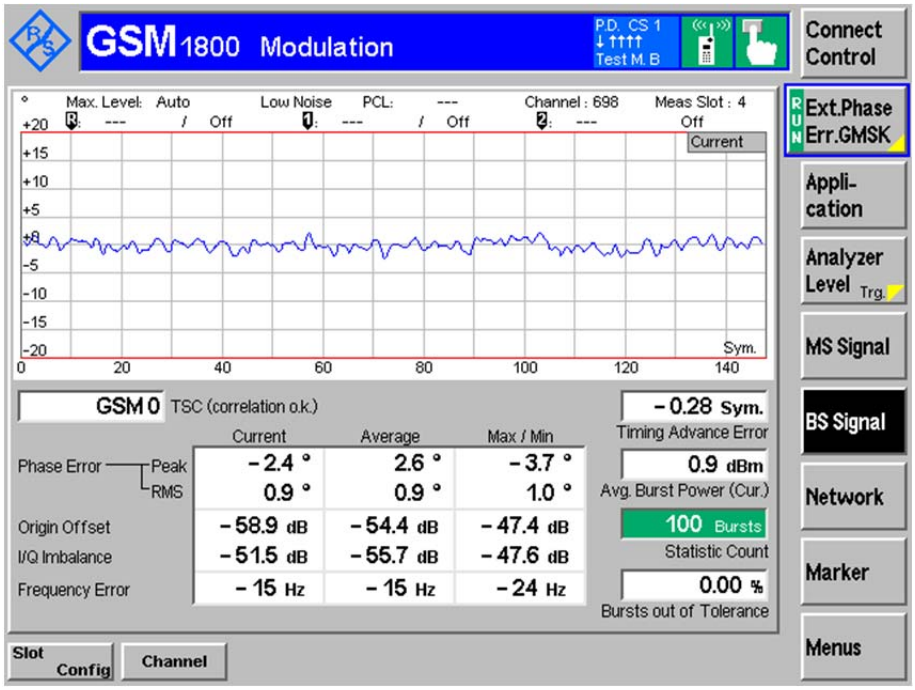
3.10.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GPRS900	897.4	PASS	PASS	PASS	PASS	PASS
GPRS1800	1747.4	PASS	PASS	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

Mode	PCL	Frequency Error (Hz)	Limit (Hz)	Result	Phase error (degree)		Limit (degree)	Result
GPRS900	3	14	89.7	PASS	RMS	1.0	5	PASS
					Peak	-3.1	20	PASS
	17	-15	89.7	PASS	RMS	1.0	5	PASS
					Peak	-3.1	20	PASS
GPRS1800	3	-28	174.7	PASS	RMS	1.0	5	PASS
					Peak	-3.4	20	PASS
	18	-24	174.7	PASS	RMS	1.0	5	PASS
					Peak	-3.7	20	PASS

GPRS900

PCL=3

PCL=17

GPRS1800

PCL=3

PCL=18

3.11 Transmitter output power in GPRS multisolt configuration

Clause 13.16.2 of ETSI TS 151 010-1 applies.

3.11.1 Definition and applicability

The transmitter output power is the average value of the power delivered to an artificial antenna or radiated by the MS and its integral antenna, over the time that the useful information bits of one burst are transmitted.
The transmitting burst timing is the envelope of the RF power transmitted with respect to time. The timings are referenced to the transition from bit 13 to bit 14 of the Training Sequence ("midamble") before differential decoding. The timing of the modulation is referenced to the timing of the received signal from the SS.

The requirements and this test apply to GPRS 900 and GPRS 1800 MS.

3.11.2 Conformance requirements

1. The MS maximum output power shall be according to its power class, with a tolerance of +/- 2dB under normal conditions.
2. The MS maximum output power shall be according to its power class, with a tolerance of +/- 2.5dB under extreme conditions.
3. The power control level shall have the nominal output power levels from the lowest power control level up to the maximum output power corresponding to the class of the MS, with a tolerance of +/- 3, 4 or 5dB under normal conditions.
4. The power control level shall have the nominal output power levels from the lowest power control level up to the maximum output power corresponding to the class of the MS, with a tolerance of +/- 4, 5 or 6dB under extreme conditions.
5. The output power actually transmitted by the MS at consecutive power control levels shall form a monotonic sequence and the interval between power control levels shall be 2 +/- 1,5dB.
6. The transmitted power level relative to time for a normal burst shall be within the power/time template under normal and extreme conditions.
7. When accessing a cell on the RACH and before receiving the first power command during a communication on a DCCH or TCH (after an IMMEDIATE ASSIGNMENT), all GSM and class 2 DCS1800 MS shall use the power control level defined by the MS_TXPWR_MAX_CCH parameter broadcast on the BCCH of the cell, or if MS_TXPWR_MAX_CCH corresponds to a power control level not supported by the MS as defined by its power class, the MS shall act as though the closest supported power control level had been broadcast. A class 3 DCS1800 MS shall use the POWER_OFFSET parameter.
8. The transmission from the MS to the BS, measured at the MS antenna, shall be 468,75 – TA bit periods behind the transmission received from the BS, where TA is the last timing advance received from the current serving BS. The tolerance on these timings shall be +/- 1 bit period.
9. The transmitted power level relative to time for a random access burst shall be within the power/time template under normal and extreme conditions.
10. The MS shall use a TA value 0 for the Random Access burst sent under normal and extreme conditions.

3.11.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 13.16.2 for the measurement method.

3.11.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GPRS900	897.4	PASS	PASS	PASS	PASS	PASS
GPRS1800	1747.4	PASS	PASS	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

GPRS900 Middle Channel		
Power Control Level	Output power(dBm)	Result
1 uplink slot		
3	32.67	PASS
4	30.83	PASS
5	28.87	PASS
6	26.81	PASS
7	24.75	PASS
8	22.47	PASS
9	20.83	PASS
10	18.63	PASS
11	16.46	PASS
12	14.75	PASS
13	12.80	PASS
14	10.75	PASS
15	8.61	PASS
16	6.50	PASS
17	4.70	PASS
2 uplink slot		
3	31.90	PASS
4 uplink slot		
3	28.17	PASS

GPRS1800 Middle Channel		
Power Control Level	Output power(dBm)	Result
1 uplink slot		
3	29.18	PASS
4	27.31	PASS
5	25.24	PASS
6	23.10	PASS
7	21.11	PASS
8	19.16	PASS
9	16.97	PASS
10	15.10	PASS
11	13.20	PASS
12	11.22	PASS
13	9.13	PASS
14	7.26	PASS
15	5.26	PASS
16	3.03	PASS
17	0.94	PASS
18	-0.91	PASS
2 uplink slot		
3	28.66	PASS
4 uplink slot		
3	27.38	PASS

3.12 Transmitter output RF spectrum in GPRS multisolt configuration

Clause 13.16.3 of TS 151 010-1 applies.

3.12.1 Definition and applicability

The output RF spectrum is the relationship between the frequency offset from the carrier and the power, measured in a specified bandwidth and time, produced by the MS due to the effects of modulation and power ramping.
The requirements and this test apply to GPRS 900 and GPRS 1800.

3.12.2 Conformance requirements

1. The level of the output RF spectrum due to the modulation shall be no more than the following lowest measurement limits:

- - 36dBm below 600kHz offset from the carrier,
- - 51dBm for E-GSM900 or –56dBm for DCS1800 from 600kHz out to less than 1800kHz offset from carrier,
- - 46dBm for E-GSM900 or –51dBm for DCS1800 at and beyond 1800kHz offset from the carrier, but with the following exceptions at up to –36dBm:
- - up to three bands of 200kHz width centered on a frequency which is an integer multiple of 200kHz in the combined range 600kHz to 6000kHz and below the carrier,
- - up to 12 bands of 200kHz width centered on a frequency which is an integer multiple of 200kHz at more than 6000kHz offset from the carrier.

1.1 Under normal conditions.
1.2 Under extreme conditions.

2. The level of the output RF spectrum due the switching transient shall be no more than given in table 13.9 and table 13.10 of TS 151 010-1clause 13.4.

2.1 Under normal conditions.
2.2 Under extreme conditions.

3. When allocated a channel the power emitted by the MS, in the band 935MHz to 960MHz shall be no more than –79dBm, in the band 925 to 935MHz shall be no more than –67dBm and in the band 1805 to 1880MHz shall be no more than –71dBm except in five measurements in each of the bands 925 to 960MHz and 1805 to 1880MHz where exceptions at up to –36dBm are permitted.

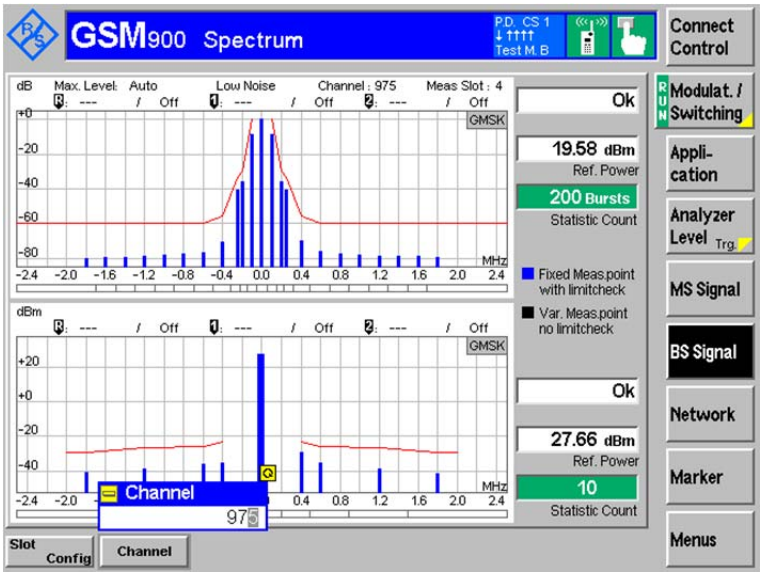
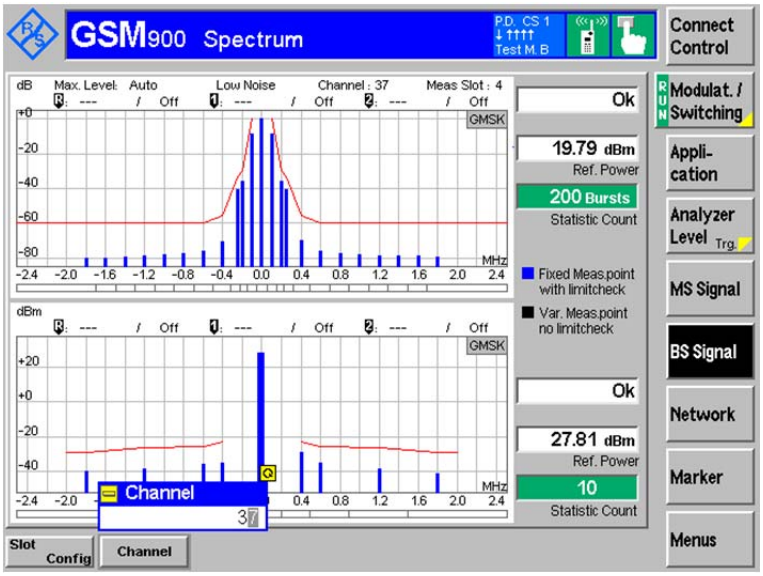
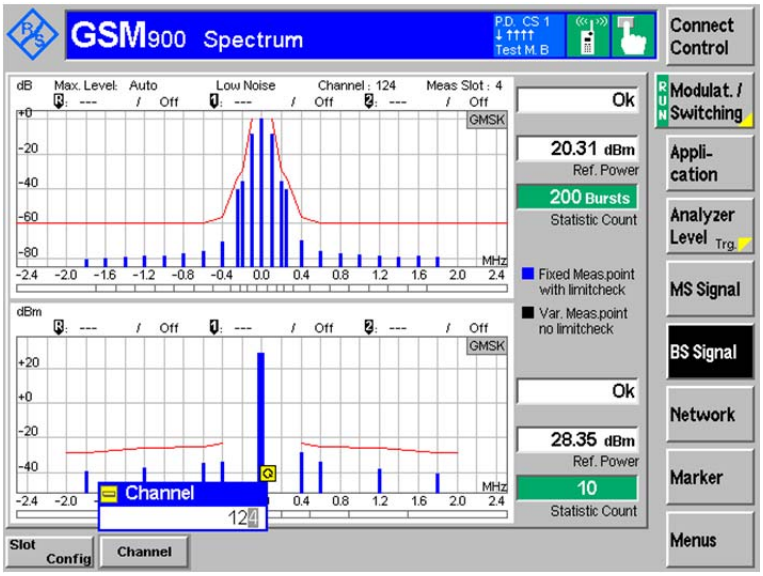
3.12.3 Test procedure

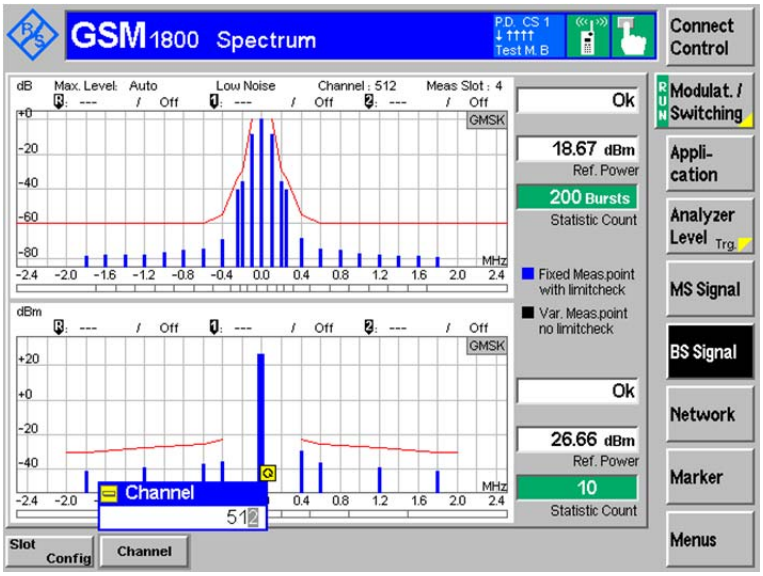
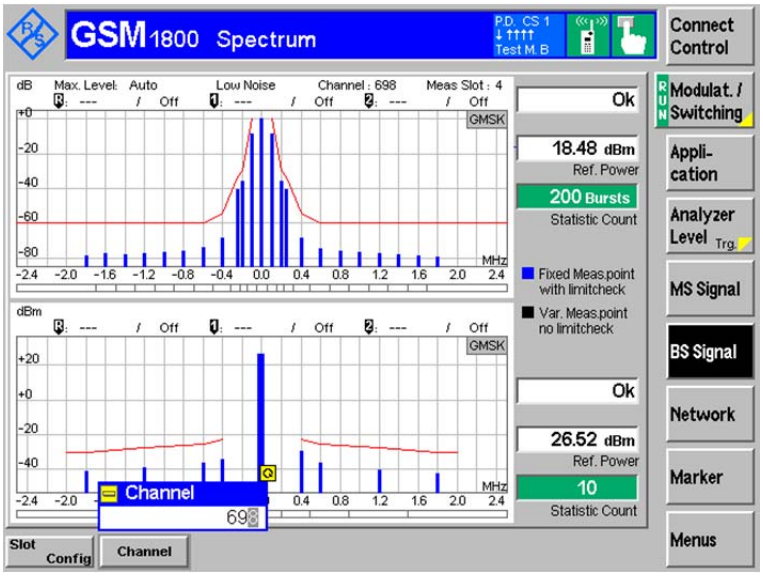
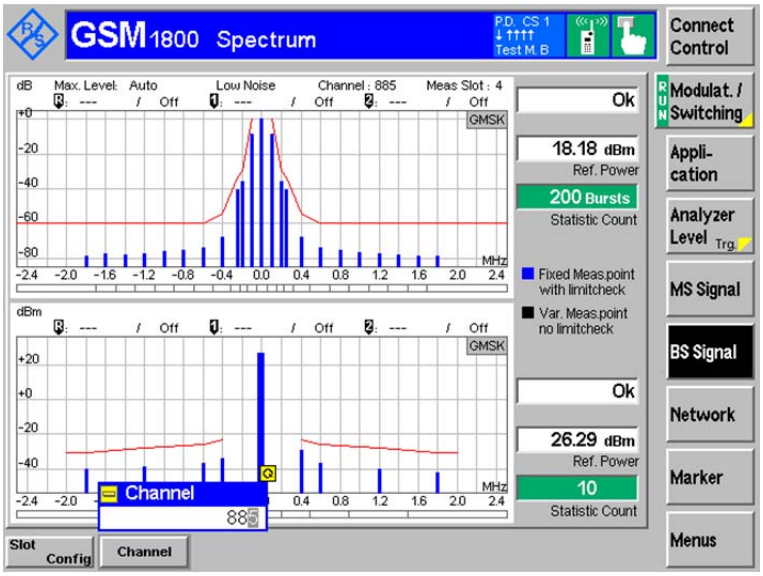
Please refer to ETSI TS 51.010-1 Sub-clause 13.16.3 for the measurement method.

3.12.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GPRS900	880.2	PASS	PASS	PASS	PASS	PASS
	897.4	PASS	PASS	PASS	PASS	PASS
	914.8	PASS	PASS	PASS	PASS	PASS
GPRS1800	1710.2	PASS	PASS	PASS	PASS	PASS
	1747.4	PASS	PASS	PASS	PASS	PASS
	1784.8	PASS	PASS	PASS	PASS	PASS

Worst case at NTNV Condition Test Data as below:

GPRS900	
Low Channel	
Middle Channel	
High Channel	

GPRS1800	
Low Channel	
Middle Channel	
High Channel	

3.13 Intermodulation rejection - speech channels

Clause 14.6.1 of TS 151 010-1 applies.

3.13.1 Definition and applicability

The intermodulation rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal frequency.
For E-GSM 900, R-GSM 900 and ER-GSM 900 MS this test is only performed in the P-GSM band.

3.13.2 Conformance requirements

In the presence of two unwanted signals with a specific frequency relationship to the wanted signal frequency the Class II RBER for TCH/FS shall meet the reference sensitivity performance of table 1 in 3GPP TS 05.05 subclause 5.3.

3.13.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.6.1 for the measurement method.

3.13.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GSM900	897.4	PASS	PASS	PASS	PASS	PASS
GSM1800	1747.4	PASS	PASS	PASS	PASS	PASS

Worst case Test Data as below:

Test Mode	Test Frequency (MHz)	RBER(%)	Number of test samples	Limit(%)	Result
GSM900	897.4	0.000	10000	2.439	PASS
DCS1800	1747.4	0.000	10000	2.439	PASS

3.14 Intermodulation rejection – control channels

Clause 14.6.2 of TS 151 010-1 applies.

3.14.1 Definition and applicability

The intermodulation rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal frequency.
For E-GSM 900, R-GSM 900 and ER-GSM 900 MS this test is only performed in the P-GSM band.

3.14.2 Conformance requirements

In the presence of two unwanted signals with a specific frequency relationship to the wanted signal frequency the FER for FACCH/F shall meet the reference sensitivity performance of table 1 in 3GPP TS 05.05 subclause 5.3.

3.14.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.6.2 for the measurement method.

3.14.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GSM900	897.4	PASS	PASS	PASS	PASS	PASS
GSM1800	1747.4	PASS	PASS	PASS	PASS	PASS

Worst case Test Data as below:

Test Mode	Test Frequency (MHz)	FER(%)	Number of test samples	Limit(%)	Result
GSM900	897.4	0.000	6 696	8.961	PASS
DCS1800	1747.4	0.000	13736	4.368	PASS

3.15 AM suppression - speech channels

Clause 14.8.1 of TS 151 010-1 applies.

3.15.1 Definition and applicability

AM suppression is a measure of the ability of the receiver to receive a modulated wanted input signal in the presence of an unwanted TDMA modulated interferer.

3.15.2 Conformance requirements

The reference sensitivity performance as specified in table 1 shall be met when the following signals are simultaneously input to the receiver:
- a useful signal at frequency f0, 3 dB above the reference sensitivity level as specified in 3GPP TS 05.05 subclause 5.2.
- a single frequency (f), in the relevant receive band, |f - f0| > 6MHz, which is an integer multiple of 200 kHz, a GSM TDMA signal modulated by any 148-bits subsequence of the 511-bits pseudo random bit sequence, defined in ITU-T Recommendation O.153 fascicle IV.4, at a level as defined in the table below. The interferer shall have one timeslot active and the frequency shall be at least 2 channels separated from any identified spurious responses. The transmitted bursts shall be synchronized to but, delayed in time between 61 and 86 bit periods relative to the bursts of the wanted signal. 3GPP TS 05.05, subclause 5.2.

3.15.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.8.1 for the measurement method.

3.15.4 Test result

Worst case Test Data as below:

Test Mode	Test Frequency (MHz)	RBER(%)	Number of test samples	Limit(%)	Result
GSM900	897.4	0.000	10000	2.439	PASS
DCS1800	1747.4	0.000	10000	2.439	PASS

3.16 AM suppression - control channels

Clause 14.8.2 of TS 151 010-1 applies.

3.16.1 Definition and applicability

AM suppression is a measure of the ability of the receiver to receive a modulated wanted input signal in the presence of an unwanted TDMA modulated interferer.

3.16.2 Conformance requirements

The reference sensitivity performance as specified in table 1 shall be met when the following signals are simultaneously input to the receiver:
- a useful signal at frequency f0, 3 dB above the reference sensitivity level as specified in 3GPP TS 05.05 subclause 5.2.
- a single frequency (f), in the relevant receive band, |f - f0| > 6MHz, which is an integer multiple of 200 kHz, a GSM TDMA signal modulated by any 148-bits subsequence of the 511-bits pseudo random bit sequence, defined in ITU-T Recommendation O.153 fascicle IV.4, at a level as defined in the table below. The interferer. shall have one timeslot active and the frequency shall be at least 2 channels separated from any identified spurious responses. The transmitted bursts shall be synchronized to but, delayed in time between 61 and 86 bit periods relative to the bursts of the wanted signal. 3GPP TS 05.05, subclause 5.2.

3.16.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.8.2 for the measurement method.

3.16.4 Test result

Worst case Test Data as below:

Test Mode	Test Frequency (MHz)	FER(%)	Number of test samples	Limit(%)	Result
GSM900	897.4	0.000	10000	2.439	PASS
DCS1800	1747.4	0.000	15000	2.439	PASS

3.17 Adjacent channel rejection - speech channels (TCH/FS)

Clause 14.5.1 of TS 151 010-1 applies.

3.17.1 Definition and applicability

The adjacent channel selectivity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted signal in the adjacent channel. The adjacent channel can be adjacent in the RF spectrum or in time. There are therefore two types of adjacent channel selectivity:
1) Adjacent RF channel selectivity which is specifically tested in this subclause.
2) Adjacent Time Slot selectivity, which is implicitly tested in test 14.2.1.

3.17.2 Conformance requirements

1. With adjacent channel interference at 200 kHz above and below the wanted signal and signal level 9 dB above the wanted signal level:
1.1 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the FER for TCH/FS shall be within the requirements of table 2 in 3GPP TS 05.05 subclause 6.3.
1.2 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the Class Ib RBER shall be within the requirements of table 2 in 3GPP TS 05.05 subclause 6.3.
1.3 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the Class II RBER shall be within the requirements of table 2 in 3GPP TS 05.05 subclause 6.3.
1.4 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the Class II RBER shall be within the requirements of table 2 in 3GPP TS 05.05 under extreme test conditions; 3GPP TS 05.05 subclause 6.3 and annex D subclauses D.2.1 and D.2.2.
2. For adjacent channel interference at 400 kHz above and below the wanted signal frequency and signal level 41 dB above the wanted signal level:
2.1 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the FER for TCH/FS shall be within the requirements of table 2 in 3GPP TS 05.05 subclause 6.3.
2.2 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the Class Ib RBER shall be within the requirements of table 2 in 3GPP TS 05.05 subclause 6.3.
2.3 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the Class II RBER shall be within the requirements of table 2 in 3GPP TS 05.05 subclause 6.3.
2.4 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the Class II RBER shall be within the requirements of table 2 in 3GPP TS 05.05 under extreme test conditions; 3GPP TS 05.05 subclause 6.3 and annex D subclauses D.2.1 and D.2.2.
If a system simulator does not support the faded interferer, a static adjacent interferer has to be used. The following requirements apply. 2.5 For a TUhigh faded wanted signal and a static adjacent channel interferer, the FER for TCH/FS shall be
better than:
GSM 400, GSM 700, GSM 850 and GSM 900: 10,2*α %; 3GPP TS 05.05, subclause 6.3;
DCS 1 800 and PCS 1 900: 5,1*α %; 3GPP TS 05.05, subclause 6.3.
2.6 For a TUhigh faded wanted signal and a static adjacent channel interferer, the Class Ib RBER shall be better than:

GSM 400, GSM 700, GSM 850 and GSM 900: 0,72/α %; 3GPP TS 05.05, subclause 6.3;
DCS 1 800 and PCS 1 900: 0,45/α %; 3GPP TS 05.05, subclause 6.3.
2.7 For a TUhigh faded wanted signal and a static adjacent channel interferer, the Class II RBER shall be better than:
GSM 400, GSM 700, GSM 850 and GSM 900: 8,8 %; 3GPP TS 05.05, subclause 6.3;
DCS 1 800 and PCS 1 900: 8,9 %; 3GPP TS 05.05, subclause 6.3.
2.8 For a TUhigh faded wanted signal and a static adjacent channel interferer, the Class II RBER shall be better than:
GSM 400, GSM 700, GSM 850 and GSM 900: 8,8 %;
DCS 1 800 and PCS 1 900: 8,9 %.
under extreme test conditions; 3GPP TS 05.05, subclause 6.3, annex D subclauses D.2.1 and D.2.2.
3GPP TS 45.05 subclause 2:
For T-GSM 810 the requirements for GSM 900 shall apply, apart for those parameters for which a separate requirement

3.17.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.5.1 for the measurement method.

3.17.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GSM900	897.4	PASS	PASS	PASS	PASS	PASS
GSM1800	1747.4	PASS	PASS	PASS	PASS	PASS

Worst case Test Data as below:

Test Mode	Interference at	Test Frequency (MHz)	FER/BLER(%)	Number of test samples	Limit(%)	Result
GSM900	200 kHz	897.4	0.000	10000	8.333	PASS
	400 kHz Interferer TUhight		0.000	1000000	8.333	PASS
	400 kHz Interferer Static		0.000	600000	9.167	PASS
DCS1800	200 kHz	1747.4	0.000	100000	8.333	PASS
	400 kHz Interferer TUhight		0.000	2000000	8.333	PASS
	400 kHz Interferer Static		0.000	1000000	9.167	PASS

3.18 Adjacent channel rejection - control channels

Clause 14.5.2 of TS 151 010-1 applies.

3.18.1 Definition and applicability

The adjacent channel selectivity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted signal in the adjacent channel. The adjacent channel can be the adjacent in the RF spectrum or in time. There are therefore two types of adjacent channel selectivity:
1) Adjacent RF channel selectivity which is specifically tested in this subclause.
2) Adjacent Time Slot selectivity, which is implicitly tested in test 14.2.1.

3.18.2 Conformance requirements

1. For adjacent channel interference at 200 kHz above and below the wanted signal frequency and signal level 9 dB
above the wanted signal level:
1.1 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the FER for the FACCH/F does not exceed the requirements of table 2 in 3GPP TS 05.05 subclause 6.3.
1.2 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the FER for the FACCH/F does not exceed the requirements of table 2 in 3GPP TS 05.05 under extreme test conditions; 3GPP TS 05.05 subclause 6.3, annex D subclauses D.2.1and D.2.2.
2. For adjacent channel interference at 400 kHz above and below the wanted signal frequency and signal level 41 dB above the wanted signal level:
2.1 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the FER for the FACCH/F does not exceed the requirements of table 2 in 3GPP TS 05.05 subclause 6.3.
2.2 For a TUhigh faded wanted signal and a TUhigh adjacent channel interferer, the FER for the FACCH/F does not exceed the requirements of table 2 in 3GPP TS 05.05 under extreme test conditions; 3GPP TS 05.05 subclause 6.3, annex D subclauses D.2.1and D.2.2.
If a system simulator does not support the faded interferer, a static adjacent interferer has to be used. The following requirements apply;
2 :
2. 3 For a TUhigh faded wanted signal and a static adjacent channel interferer, the FER for the FACCH/F shall be better than:
GSM 400, GSM 700, GSM 850 and GSM 900: 17,1 %; 3GPP TS 05.05, subclause 6.3;
DCS 1 800 and PCS 1 900: 6,1 %; 3GPP TS 05.05, subclause 6.3.
2. 4 For a TUhigh faded wanted signal and a static adjacent channel interferer, the FACCH/F shall be better than:
GSM 400, GSM 700, GSM 850 and GSM 900: 17,1 %;
DCS 1 800 and PCS 1 900: 6,1 %.
under extreme test conditions; 3GPP TS 05.05, subclause 6.3, annex D subclauses D.2.1 and D.2.2.
3GPP TS 45.05 subclause 2:
For T-GSM 810 the requirements for GSM 900 shall apply, apart for those parameters for which a separate requirement exists.

3.18.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.5.2 for the measurement method.

3.18.4 Test result

Test Mode	Test Frequency (MHz)	NTNV	HTHV	HTLV	LTHV	LTLV
GSM900	897.4	PASS	PASS	PASS	PASS	PASS
GSM1800	1747.4	PASS	PASS	PASS	PASS	PASS

Worst case Test Data as below:

Test Mode	Interference at	Channel	Test Frequency (MHz)	FER (%)	Number of test samples	Limit(%)	Result
GSM900	200 kHz	FACCH	897.4	0.000	16000	10.640	PASS
		F		0.000	16000	3.808	
	400 kHz Interferer faded	FACCH		0.000	16000	10.640	PASS
		F		0.000	16000	3.808	
	400 kHz Interferer Static	FACCH		0.000	16000	19.152	PASS
		F		0.000	16000	6.832	
DCS1800	200 kHz	FACCH	1747.4	0.000	16000	10.640	PASS
		F		0.000	16000	3.808	
	400 kHz Interferer faded	FACCH		0.000	16000	10.640	PASS
		F		0.000	16000	3.808	
	400 kHz Interferer Static	FACCH		0.000	16000	19.152	PASS
		F		0.000	16000	6.832	

3.19 Reference sensitivity - TCH/FS

Clause 14.2.1 of TS 151 010-1 applies.

3.19.1 Definition and applicability

The reference sensitivity is the signal level at the MS receiver input at which a certain BER and FER must be achieved. For E-GSM 900 MS this test is only performed in the P-GSM band

3.19.2 Conformance requirements

1. At reference sensitivity level, the TCH/FS FER shall meet the reference sensitivity performance of table 1 in 3GPP TS 05.05 subclause 6.2.
2 At reference sensitivity level, the TCH/FS class I RBER shall meet the reference sensitivity performance of table 1 in 3GPP TS 05.05 subclause 6.2.
3 At reference sensitivity level, the TCH/FS class II RBER shall meet the reference sensitivity, performance of table 1 in 3GPP TS 05.05 subclause 6.2.
4. At reference sensitivity level, the TCH/FS class II RBER shall meet the reference sensitivity, performance of table 1 in GSM under extreme conditions; 3GPP TS 05.05 subclause 6.2 and annex D subclauses D.2.1 and D.2.2.

3.19.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.2.1for the measurement method.

3.19.4 Test result

Test Band	Type of measurements	Propagation conditions TUhigh	Propagation conditions RA	Propagation conditions HT	Static conditions	Result
		Test limit error rate (%)	Test limit error rate (%)	Test limit error rate (%)	Test limit error rate (%)	
GSM900	FER	6,742* α			0.122* α	Pass
	RBER	0.420/ α			0.41/ α	
	RBER	8333	7.5	9333	2439	
GSM1800	FER	4478* α			0.122* α	Pass
	RBER	0.320/ α			0.41/ α	
	RBER	8333	7.5	9333	2439	

3.20 Reference sensitivity - FACCH/F

Clause 14.2.3of TS 151 010-1 applies.

3.20.1 Definition and applicability

The reference sensitivity for control channels is the signal level at the MS receiver input at which a certain FER must be achieved.

3.20.2 Conformance requirements

At reference sensitivity level, the FACCH/F FER shall meet the reference sensitivity performance of table 1 in 3GPP TS 05.05 subclause 6.2.

3.20.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.2.3for the measurement method.

3.20.4 Test result

Test Mode	Test Frequency (MHz)	FER(%)	Number of test samples	Limit(%)	Result
GSM900	897.4	0.000	10000	8.961	PASS
DCS1800	1747.4	0.000	15000	4.368	PASS

3.21 Minimum Input level for Reference Performance - GPRS

Clause 14.16.1of TS 151 010-1 applies.

3.21.1 Definition and applicability

The minimum input level is the signal level at the MS receiver input at which a certain BLER is met.

3.21.2 Conformance requirements

Please refer to ETSI TS 51.010-1 Sub-clause 14.16.1.2

3.21.3 Test procedure

Please refer to ETSI TS 51.010-1 Sub-clause 14.16.1 for the measurement method.

3.21.4 Test result

Test Band	Type of channel	Result
GPRS900	CS-1	Pass
	CS-2	Pass
	CS-3	Pass
	CS-4	Pass
	USF/CS-1	Pass
	USF/CS-2 to 4	Pass
GPRS1800	CS-1	Pass
	CS-2	Pass
	CS-3	Pass
	CS-4	Pass
	USF/CS-1	Pass
	USF/CS-2 to 4	Pass

EXHIBIT 1 - PRODUCT LABELING

Please refer to "ANNEX_EUT Label & Photos".

EXHIBIT 2 - EUT PHOTOGRAPHS

Please refer to "ANNEX_EUT Label & Photos".

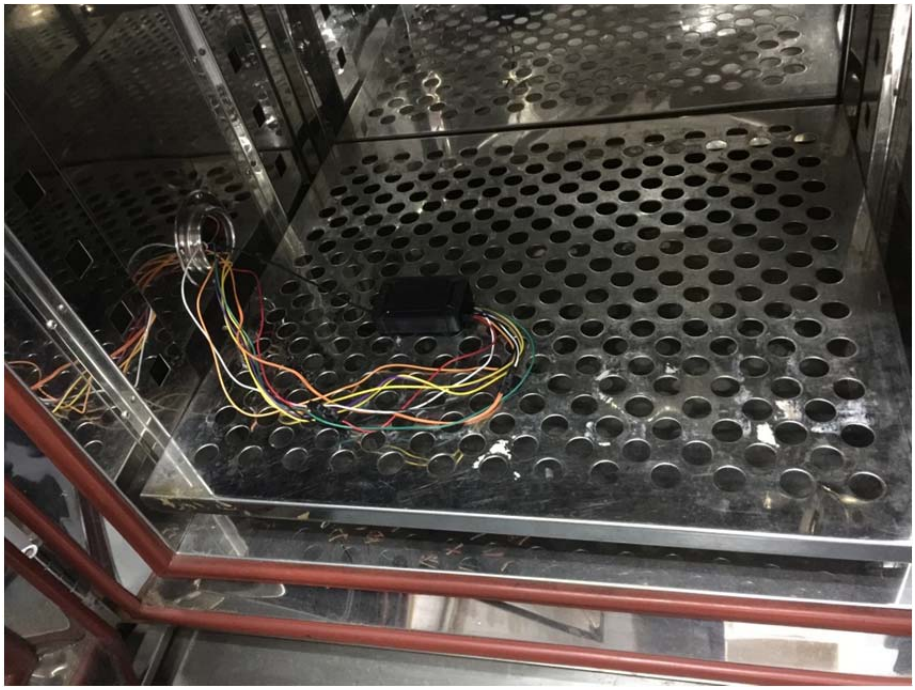
EXHIBIT 3 - TEST SETUP PHOTOGRAPHS

Radio Test Suite 1

Spurious Emission Test Setup (Below 1GHz)

Spurious Emission Test Setup (Above 1GHz)

Extreme Condition Test Setup



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