

# Radio Measurement and Test Report

For

**Vonino EElectronics LTD.**

**Miramar Tower 10F-No.1010, 132 Nathan Road, Tsim Sha Tsui , Kowloon,  
Hong Kong**

**Test Standard(s):** EN 301 511 V12.1.1(2015-06)

**Product Description:** Smart Phone

**Tested Model:** VOLT X

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Vonino EElectronics LTD.  
 Address of applicant: Miramar Tower 10F-No.1010, 132 Nathan Road, Tsim Sha Tsui , Kowloon, Hong Kong

Manufacturer: Gui zhou Fortuneship Technology Co., Ltd.  
 Address of manufacturer: No. 4 Plant, High-tech Industrial Park, Xinpu Economic Development Zone) Jingkai Road, Xinpu Jingkai District, Xinpu New District, Zunyi City, Guizhou Province, P. R. China

General Description of EUT	
Product Name:	Smart Phone
Brand Name:	vonino
Model No.:	VOLT X
Adding Model(s):	/
Rated Voltage:	DC 3.8V by Battery
Battery Capacity:	4000mAh
Adapter Model:	JT288-05100 Input: 100-240Vac, 50/60Hz, 0.15A Output: 5.0V $\overline{=}$ , 1A
Software Version:	Vonino_v1.1.1_20161130
Hardware Version:	F1-4G-V60-CF9-KS670
<p><i>Note: The test data is gathered from a production sample, provided by the manufacturer. Test is carry on SIM1 which is the worst case</i></p>	

Technical Characteristics of EUT	
<b>2G</b>	
Support Networks:	GSM, GPRS, EDGE
Support Bands:	GSM900, DCS1800
Frequency Range:	GSM900: Tx: 880-915MHz, Rx: 925-960MHz DCS1800: Tx: 1710-1785MHz, Rx: 1805-1880MHz
RF Output Power:	GSM900: 31.36dBm, GSM1800: 28.89dBm EDGE900: 23.55Bm,EDGE1800: 22.87dBm
Modulation Type:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM900: -0.4dBi, DCS1800:0.5dBi
GPRS/EDGE Class:	Class 12

## 1.2 Test Standards

The following report is prepared on behalf of the Vonino EElectronics LTD. in accordance with ETSI EN 301511 V12.1.1, Global System for Mobile communications (GSM); Harmonized EN for mobile stations in the GSM 900 and DCS1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC). Standard ETSI EN 301 511 V12.1.1(2015-06) is the harmonized standard for testing of GSM900/1800 mobile stations with GPRS functionality. It is the standard used under provisions of Directive 1999/5/EC (R&TTE Directive) Article 3.2. This standard refers to ETSI TS 151 010-1 V12.2.0, which is based on ETSI Specification GSM 11.10-1 version 8.1.1 Release 1999 for “Digital cellular telecommunication systems (Phase2+): Mobile stations conformance specifications”.

Every time when standard TS 151 010-1 is mentioned in this test report without version or date than TS 151 010-1 V12.2.0 is the only valid reference.

*The objective of the manufacturer* is to determine compliance with ETSI EN 301511 V12.1.1, Global System for Mobile communications (GSM); Harmonized EN for mobile stations in the GSM 900 and DCS1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC)

Abbreviations and acronyms you may find in ETSI Technical Report ETR 350 November 1996.

*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 Facility

- **FCC – Registration No.: 934118**

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

- **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.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

### 1.4 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	2016-06-04	2017-06-03
Spectrum Analyzer	Agilent	E4407B	MY41440400	2016-06-04	2017-06-03
Spectrum Analyzer	Agilent	N9020A	US47140102	2016-06-04	2017-06-03
Signal Generator	Agilent	83752A	3610A01453	2016-06-04	2017-06-03
Vector Signal Generator	Agilent	N5182A	MY47070202	2016-06-04	2017-06-03
Power Divider	Weinschel	1506A	PM204	2016-06-04	2017-06-03
Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2016-06-04	2017-06-03
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2016-06-04	2017-06-03
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03

## 1.5 Environmental Conditions for Testing

General conditions (GC) as stated in TS 151 010-1 V12.2.0 Annex 1 A1.1 apply. Normal and extreme test conditions (TC) as stated in TS 151 010-1 V12.2.0 Annex 1 A1.2 apply.

For extreme test conditions (TC2.2) the manufacturer declared the low voltage to 3.3 V (for Lithium-Ion battery). Higher extreme voltage of 4.2V.

If not other noted, the temperature was in range of +15 °C to +35 °C, the relative humidity was in the range of 20% to 95% and the DC power supply voltage was set to 3.7V (normal test conditions TC2.1).

Note: The relative humidity during all the tests is higher than the mentioned 20%-75% in TS 151 010-1 V12.2.0 for test conditions. Since the weather situation in the testing area gives always this humidity level, all tests are performed within this range. No extra notification in the single test clauses is done.

Table 1 Parameters for normal test conditions TC2.1

Normal	
Temperature:	+15 °C to + 35 °C
Voltage	3.8V
Humidity	20%-95%

Table 2 Parameters for extreme test conditions TC2.2

	HTHV	HTLV	LTHV	LTLV
Temperature:	+55 °C	+55 °C	-10 °C	-10 °C
Voltage	4.2V	3.3V	4.2V	3.3V

For the Vibration requirements (TC4) as stated in TS 151 010-1 V12.2.0 Annex 1 A1.2.4 the following conditions apply

Table 3 Parameter for vibration requirements TC4

Vibration	
Frequency in Hz	ASD in m2/s3
5-20	0,96
20-500	0,96 at 20 Hz, thereafter -5dB/octave

## 2. SUMMARY OF TEST RESULTS

Conformance requirement according to EN 301 511				
No.	Reference	EN-R (note)	TS 151 010-1 Clause	Result
1	4.2.1	Transmitter – Frequency error and phase error	13.1	Yes
2	4.2.2	Transmitter – Frequency error under multipath and interference conditions	13.2	Yes
3	4.2.3	Transmitter – Frequency error and phase error and phase error in HSCSD multislot configuration	13.6	N/A
4	4.2.4	Frequency error and phase error in GPRS multislot configuration	13.16.1	Yes
5	4.2.5	Transmitter output power and burst timing	13.3	Yes
6	4.2.6	Transmitter – Output RF spectrum	13.4	Yes
7	4.2.7	Transmitter output power and burst timing in HSCSD multislot configurations	13.7	N/A
8	4.2.8	Transmitter – Output RF spectrum HSCSD multislot configuration	13.8	N/A
9	4.2.9	Transmitter – Output RF spectrum for MS supporting the R-GSM frequency band	13.9	N/A
10	4.2.10	Transmitter output power in GPRS multislot configuration	13.16.2	Yes
11	4.2.11	Output RF spectrum in GPRS multislot configuration	13.16.3	Yes
12	4.2.12	Conducted spurious emissions – MS allocated a channel	12.1.1	Yes
13	4.2.13	Conducted spurious emissions – MS in idle mode	12.1.2	Yes
14	4.2.14	Conducted spurious emissions for MS supporting the R-GSM frequency band – MS allocated a channel	12.3.1	N/A
15	4.2.15	Conducted spurious emissions for MS supporting the R-GSM frequency band – MS in idle mode	12.3.2	N/A
16	4.2.16	Radiated spurious emissions – MS allocated a channel	12.2.1	Yes
17	4.2.17	Radiated spurious emissions – MS in idle mode	12.2.2	Yes
18	4.2.18	Radiated spurious emissions for MS supporting the R-GSM frequency band – MS allocated a channel	12.4.1	N/A
19	4.2.19	Radiated spurious emissions for MS supporting the R-GSM frequency band – MS in idle mode	12.4.2	N/A
20	4.2.20	Receiver blocking and spurious response – speech channels	14.7.1	Yes
21	4.2.21	Receiver blocking and spurious response – speech channels for MS supporting the R-GSM frequency band	14.7.3	N/A
22	4.2.22	Frequency error and Modulation accuracy in EGPRS Configuration	13.17.1	Yes
23	4.2.23	Frequency error under multipath and interference conditions in EGPRS Configuration	13.17.2	Yes
24	4.2.24	EGPRS Transmitter output power	13.17.3	Yes
25	4.2.25	Output RF spectrum in EGPRS configuration	13.17.4	Yes
26	4.2.26	Blocking and spurious response in EGPRS configuration	14.18.5	Yes
26	4.2.26	Blocking and spurious response in EGPRS configuration	14.18.5	Yes
Yes	<b>Test shall be performed and pass</b>			
No	<b>Test not applicable</b>			



### 3. Essential radio test suites

#### 3.1 Frequency error and phase error

Clause 13.1 of TS 151 010-1 V12.2.0 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

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.

Table Conformance requirements in relation to the test conditions

Conformance requirement	Normal	HTHV	HTLV	LTHV	LTLV	Vibration
1. MS carrier frequency E-GSM900	√	√	√	√	√	√
1. MS carrier frequency DCS1800	√	√	√	√	√	√
2. RMS phase error E-GSM900	√	√	√	√	√	√
2. RMS phase error DCS1800	√	√	√	√	√	√
3. Maximum peak deviation E-GSM900	√	√	√	√	√	√
3. Maximum peak deviation DCS1800	√	√	√	√	√	√

### 3.1.3 Set up for testing

Procedures and conditions described in clause 13.1.4 where applied. All required parameter have been checked and adjusted in Agilent 8960 and R&S CMU200 before any measurement was performed.

Test equipment: Agilent 8960 + R&S CMU200 with options, Climate chamber, vibration equipment, AC/DC regulated power supply, DC Voltmeter, test SIM card

### 3.1.4 Test result

Test Result Frequency Error and Phase Error						
Test Conditions	MS carrier frequency(Hz)		RMS phase error(deg)		Maximum peak deviation(deg)	
	E-GSM900	DCS1800	E-GSM900	DCS1800	E-GSM900	DCS1800
Normal	39.09	78.13	1.43	-1.90	3.81	9.52
HTHV	40.00	-30.63	0.48	0.48	3.81	7.14
HTLV	46.36	18.75	0.95	0.48	3.81	7.62
LTHV	37.27	-89.38	-1.43	0.95	1.90	-0.95
LTLV	46.36	-56.88	-2.38	0.48	1.43	-9.05
Vibration	-44.55	25.63	1.43	-0.48	7.14	-5.24
Max. measured error	46.36	-89.38	-2.38	-1.90	7.14	9.52
Max. permitted error	89Hz	171Hz	5deg	5deg	20deg	20deg
Measurement uncertainty	±5Hz	±5Hz	±1deg	±1deg	±5deg	±5deg

### 3.2 Frequency error under multipath and interference conditions

Clause 13.2 of TS 151 010-1 V12.2.0 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, or 0,1 ppm compared to signals received from the BS for signal levels down to 3 dB below the reference sensitivity level.
2. The MS carrier frequency error for each burst shall be accurate to within 0,1 ppm, or 0,1 ppm compared to signals received from the BS for 3 dB less carrier to interference ratio than the reference interference ratios.

Table Conformance requirements in relation to the test conditions

Conformance requirement	Normal	HTHV	HTLV	LTHV	LTLV
1. MS carrier frequency error E-GSM900	√	√	√	√	√
1. MS carrier frequency error DCS1800	√	√	√	√	√
2. MS carrier frequency error E-GSM900	√	√	√	√	√
2. MS carrier frequency error DCS1800	√	√	√	√	√

#### 3.2.3 Set up for testing

Procedures and conditions described in clause 13.2.4 where applied. All required parameter have been checked and adjusted in CMU200 and SMIQ before any measurement was performed.

Test equipment: R&S CMU200 + option K20, K21, K22, K23, K24, K27, K28, K29, K42, K65 B12, B41, B52, B54, B66, B56 + R&S SMIQ 03HD + option SM-B1, SMIQB11, 2xSMIQB12, SMIQB14, SMIQB17, SMIQB20, Climate chamber, AC/DC regulated power supply, DC Voltmeter

### 3.2.4 Test result

Frequency error under multipath and interference conditions (Hz)												
Test Conditions	Channel 975				Channel 37				Channel 124			
	TU3	TU50	HAT 100	RA 250	TU3	TU50	HAT 100	RA 250	TU3	TU50	HAT 100	RA 250
Normal	-24.29	-18.57	56.67	89.05	68.10	37.62	-76.19	46.19	58.10	7.14	-65.71	99.52
HTHV	-23.33	50.00	26.67	-61.43	-28.57	-55.71	-30.00	43.33	-79.52	61.90	-63.81	-53.81
HTLV	56.67	28.10	46.67	-129.52	-106.67	60.48	7.62	-75.71	74.29	-22.86	34.29	-1.43
LTHV	100.48	-12.86	19.05	-65.24	-109.52	41.90	-71.43	-95.24	-28.57	-64.76	-72.38	-74.76
LTLV	-93.33	23.81	63.33	-6.19	20.00	9.52	-2.86	-104.76	95.24	-71.90	-60.00	-45.71
Limit (Hz)	±230	±160	±180	±300	±230	±160	±180	±300	±230	±160	±180	±300
Measurement Uncertainty in Hz: ±5 Hz												

Frequency error under multipath and interference conditions (Hz)												
Test Conditions	Channel 512				Channel 698				Channel 885			
	TU1.5	TU50	HT 100	RA 130	TU1.5	TU50	HT 100	RA 130	TU1.5	TU50	HT 100	RA 130
Normal	-10.95	20.48	-5.24	-5.71	-30.95	-121.90	14.76	-24.29	-29.52	101.43	-110.00	-115.24
HTHV	27.62	40.00	83.81	-157.14	-104.29	101.43	-35.71	136.19	-44.29	32.38	44.76	-168.57
HTLV	-71.43	-37.62	-75.24	121.43	74.76	36.67	-93.81	-120.00	139.52	6.67	-46.19	181.90
LTHV	-116.19	-20.95	65.71	94.29	-150.48	50.95	-49.05	-85.24	94.29	42.38	-109.05	150.48
LTLV	-84.29	-65.24	-56.67	-160.48	117.62	35.71	4.29	165.24	-16.67	-91.43	153.33	-121.43
Limit (Hz)	±320	±260	±350	±400	±320	±260	±350	±400	±320	±260	±350	±400
Measurement Uncertainty in Hz: ±5 Hz												

### 3.3 Transmitter output power and burst timing

Clause 13.3 of ETSI TS 151 010-1 V12.2.0 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 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.

Table Conformance requirements in relation to the test conditions

Conformance requirement	Normal	HTHV	HTLV	LTHV	LTLV
1. Maximum output power E-GSM900	√				
1. Maximum output power DCS1800	√				
2. Maximum output power E-GSM900		√	√	√	√
2. Maximum output power DCS1800		√	√	√	√
3. Power control levels E-GSM900	√				
3. Power control levels DCS1800	√				
4. Power control levels E-GSM900		√	√	√	√
4. Power control levels DCS1800		√	√	√	√
5. Power control levels form monotonic sequence E-GSM900	√				
5. Power control levels form monotonic sequence DCS 1800	√				
6. Transmitted power in time/power template E-GSM900 for normal burst	√	√	√	√	√
6. Transmitted power in time/power template DCS 1800 for normal burst	√	√	√	√	√
7. Use of MS_TXPWR_MAX_CCH E-GSM900	√				
7. Use of MS_TXPWR_MAX_CCH DCS 1800	√				
8. Transmission from MS to BS 468,75 TA bits behind E-GSM900	√	√	√	√	√
8. Transmission from MS to BS 468,75 TA bits behind DCS 1800	√	√	√	√	√
9. Transmitted power in time/power template E-GSM900 for random access burst	√	√	√	√	√
9. Transmitted power in time/power template DCS 1800 for random access burst	√	√	√	√	√
10. MS uses TA value 0 for random access burst E-GSM900	√	√	√	√	√
10. MS uses TA value 0 for random access burst DCS 1800	√	√	√	√	√

### 3.3.3 Set up for testing

Procedures and conditions described in clause 13.3.4.1 (Method of test for equipment with permanent antenna connector) where applied. All required parameter have been checked and adjusted in Agilent 8960 before any measurement was done.

Test equipment: Agilent 8960 with options, Climate chamber, AC/DC regulated power supply, DC Voltmeter, test SIM card

### 3.3.4 Test result

Table 4 Test result overview

Conformance requirement	
1, 2	Table 11
3, 4, 5	Table 12 to Table 17
6.1, 6.2	Table 18
9.1, 9.2	Table 19

EUT Power Class: GSM900 Class 4 (33dBm)  
DCS1800 Class 1 (30dBm)

Test result transmitter maximum output power in dBm						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	31.09	31.16	31.36	28.54	28.89	28.78
HTHV	31.01	31.11	31.31	28.51	28.85	28.72
HTLV	31.05	31.12	31.32	28.50	28.83	28.75
LTHV	31.03	31.15	31.35	28.53	28.81	28.71
LTLV	31.08	31.16	31.31	28.52	28.86	28.76
Max. permitted error	Tnom +/-2dB Tmin, Tmax +/-2,5dB			Tnom +/-2dB Tmin, Tmax +/-2,5dB		
Measurement uncertainty: <+/-1,6dB						

Test result transmitter output power, power control levels						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Max. permitted error	Tnom +/-2dB Tmin, Tmax +/-2,5dB			Tnom +/-2dB Tmin, Tmax +/-2,5dB		
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

Transmitted power relative to time for normal burst						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

Test result transmitted power relative to time for access burst						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

Note: "ok" stand for "The power / time relationship is in side the permitted range".

Conformance requirements 5, 7, 8 and 10 are proofed to be fulfilled during the operation of Agilent 8960 for testing other conformance requirements.



### 3.4 Transmitter output RF spectrum

Clause 13.4 of TS 151 010-1 V12.2.0 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 V12.2.0 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.

Table 5 Conformance requirements in relation to the test conditions

Comformance requirement	Normal	HTHV	HTLV	LTHV	LTLV
1. MS output spectrum due to modulation E-GSM900	√	√	√	√	√
1. MS output spectrum due to modulation DCS1800	√	√	√	√	√
2. MS output spectrum due to switching transients E-GSM900	√	√	√	√	√
2. MS output spectrum due to switching transients DCS1800	√	√	√	√	√
3. By allocated channel power in various bands should be below a certain limit E-GSM900	√	-	-	-	-
3. By allocated channel power in various bands should be below a certain limit DCS1800	√	-	-	-	-

### 3.4.3 Set up for testing

Procedures and conditions described in clause 13.4.4.2 where applied. All required parameter have been checked and adjusted in Agilent 8960 before any measurement was performed.

Test equipment: Agilent 8960 with options, Climate chamber, AC/DC regulated, power supply, DC Voltmeter, test SIM card

### 3.4.4 Test result

Refer to appendix 1 for measurement results/plots.

Test result output RF spectrum						
Test Conditions	MS output spectrum due to modulation		MS output spectrum due to swithing transients		By allocated channel power in various bands	
	E-GSM900	DCS1800	E-GSM900	DCS1800	E-GSM900	DCS1800
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Limit	Refer to table 13-6, 7, 9, 10, 11, 12 in TS 151 010-1					
Measurement uncertainty	+/-1,0dB below 600kHz offset, +/-2dB for more than 600kHz offset					

### 3.5 Conducted spurious emissions – MS allocated a channel

Clause 12.1.1 of TS 151 010-1 V12.2.0 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.

The table shows the conformance requirements in relation to the test conditions.

Conformance requirement	Normal Voltage: 3.7V	Low Voltage: 3.3V
1. Spurious emission when allocated a channel E-GSM900	√	√
1. Spurious emission when allocated channel DCS1800	√	√

#### 3.5.3 Set up for testing

Procedures and conditions described in clause 12.1.1.4 where applied. All required parameter have been checked and adjusted in CMU200 and ESCS30 before any measurement was done.

### 3.5.4 Test result

Frequency Bandwidth	RBW	Max.level	E-GSM900			Result
			Test Channel = 37			
			TNVL	TNVN	TNVH	
9kHz~100kHz	1k	-36	-55.24	-61.90	-48.10	Pass
100kHz~50MHz	10k	-36	-48.10	-44.76	-69.52	Pass
50MHz~500MHz	100k	-36	-53.81	-42.86	-43.33	Pass
500MHz~850MHz	3M	-36	-50.95	-47.14	-48.57	Pass
850MHz~860MHz	1M	-36	-50.48	-65.24	-44.29	Pass
860MHz~870MHz	300k	-36	-66.19	-44.76	-56.67	Pass
870MHz~880MHz	100k	-36	-60.48	-52.86	-44.76	Pass
915MHz~925MHz	100k	-36	-53.81	-70.48	-52.86	Pass
960MHz~1GHz	3M	-36	-50.48	-58.10	-67.62	Pass
1GHz~1805MHz	3M	-30	-71.43	-71.43	-64.29	Pass
1880MHz~12.75GHz	3M	-30	-68.10	-62.38	-64.29	Pass
1.8MHz~6MHz offset from the carrier frequency	30k	-36	-58.57	-48.57	-43.81	Pass
more than 6MHz offset from the carrier frequency	100k	-36	-69.52	-67.14	-67.14	Pass
Frequency bandwidth	RBW	Max.level	DCS1800			Result
			Test Channel = 698			
			TNVL	TNVN	TNVH	
9kHz~100kHz	1k	-36	-61.90	-59.05	-70.48	Pass
100kHz~50MHz	10k	-36	-51.90	-44.29	-59.05	Pass
50MHz~500MHz	100k	-36	-52.38	-65.24	-62.86	Pass
500MHz~925MHz	3M	-36	-70.00	-70.00	-54.29	Pass
960MHz~1GHz	3M	-36	-62.86	-61.43	-70.00	Pass
1GHz~1680MHz	3M	-30	-70.48	-60.95	-62.38	Pass
1680MHz~1690MHz	1M	-30	-43.81	-60.95	-51.90	Pass
1690MHz~1700MHz	300k	-30	-45.24	-58.10	-49.52	Pass
1700MHz~1710MHz	100k	-30	-62.38	-50.48	-46.67	Pass
1785MHz~1795MHz	100k	-30	-45.71	-51.43	-45.24	Pass
1795MHz~1805MHz	300k	-30	-62.86	-71.43	-66.67	Pass
1880MHz~12.75GHz	3M	-30	-59.52	-64.29	-51.90	Pass
1.8MHz~6MHz offset from the carrier frequency	30k	-36	-60.00	-60.95	-55.24	Pass
more than 6MHz offset from the carrier frequency	100k	-36	-60.95	-50.95	-54.29	Pass

Measurement uncertainty	+/-1dB	+/-1dB
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### 3.6 Conducted spurious emissions – MS in idle mode

Clause 12.1.2 of TS 151 010-1 V12.2.0 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.

The table shows the conformance requirements in relation to the test conditions.

Conformance requirement	Normal Voltage: 3.7V	Low Voltage: 3.3V
1. Spurious emission in idle mode E-GSM900	√	√
1. Spurious emission in idle mode DCS1800	√	√

### 3.6.3 Set up for testing

Procedures and conditions described in clause 12.1.2.4 where applied. All required parameter have been checked and adjusted in R&S CMU200 and R&S ESCS30 before any measurement was done.

### 3.6.4 Test result

Frequency Bandwidth	RBW	Max.level	E-GSM900			Result
			Test Channel = 62			
			TNVL	TNVN	TNVH	
9kHz~100kHz	1k	-57	-70.00	-66.67	-70.00	Pass
100kHz~50MHz	10k	-57	-66.19	-70.00	-64.29	Pass
50MHz~880MHz	100k	-57	-70.48	-67.14	-71.43	Pass
880MHz~915MHz	100k	-59	-65.71	-63.81	-67.14	Pass
915MHz~1000MHz	100k	-57	-63.81	-64.76	-69.05	Pass
1GHz~1710MHz	100k	-47	-69.52	-65.24	-61.90	Pass
1710MHz~1785MHz	100k	-53	-71.43	-66.19	-64.76	Pass
1785MHz~12.75GHz	100k	-47	-70.00	-71.43	-68.10	Pass
Frequency bandwidth	RBW	Max.level	DCS1800			Result
			Test Channel = 698			
			TNVL	TNVN	TNVH	
9kHz~100kHz	1k	-57	-69.05	-66.67	-63.33	Pass
100kHz~50MHz	10k	-57	-67.62	-62.38	-67.14	Pass
50MHz~880MHz	100k	-57	-65.24	-64.29	-66.19	Pass
880MHz~915MHz	100k	-59	-68.10	-63.81	-70.48	Pass
915MHz~1000MHz	100k	-57	-67.14	-68.10	-69.05	Pass
1GHz~1710MHz	100k	-47	-70.95	-62.86	-63.81	Pass
1710MHz~1785MHz	100k	-53	-70.00	-68.10	-70.00	Pass
1785MHz~12.75GHz	100k	-47	-67.14	-64.76	-61.90	Pass

Measurement uncertainty	+/-1dB	+/-1dB
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### 3.7 Radiated spurious emissions – MS allocated a channel

Clause 12.2.1 of TS 151 010-1 V12.2.0 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 to 4GHz	-30	
1GHz to 1,71GHz		-30
1,71GHz to 1,785GHz		-36
1,785GHz to 4GHz		-30

The table shows the conformance requirements in relation to the test conditions.

Conformance requirement	Normal Voltage: 3.7V	High Voltage: 4.2V	Low Voltage: 3.3V
1. Spurious emission when allocated a channel E-GSM900	√	√	√
1. Spurious emission when allocated a channel DCS1800	√	√	√

### 3.7.3 Set up for testing

Procedures and conditions described in clause 12.2.1.4 where applied. All required parameter have been checked and adjusted in R&S CMU200, R&S ESCS30 before any measurement was done.

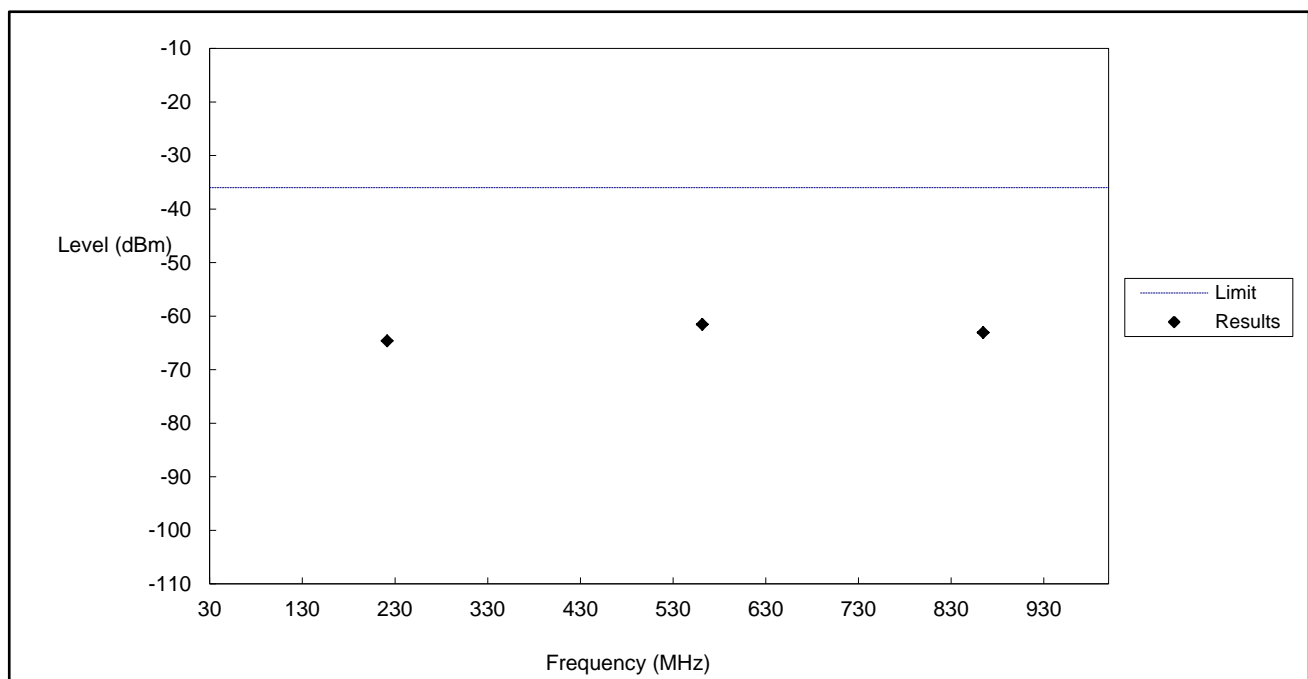
### 3.7.4 Test result

Measurement uncertainty	+/-1dB	+/-1dB
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*Radiated Spurious Emissions(30MHz-1GHz)*

*Test Mode: Traffic(Band 900-worst case)*

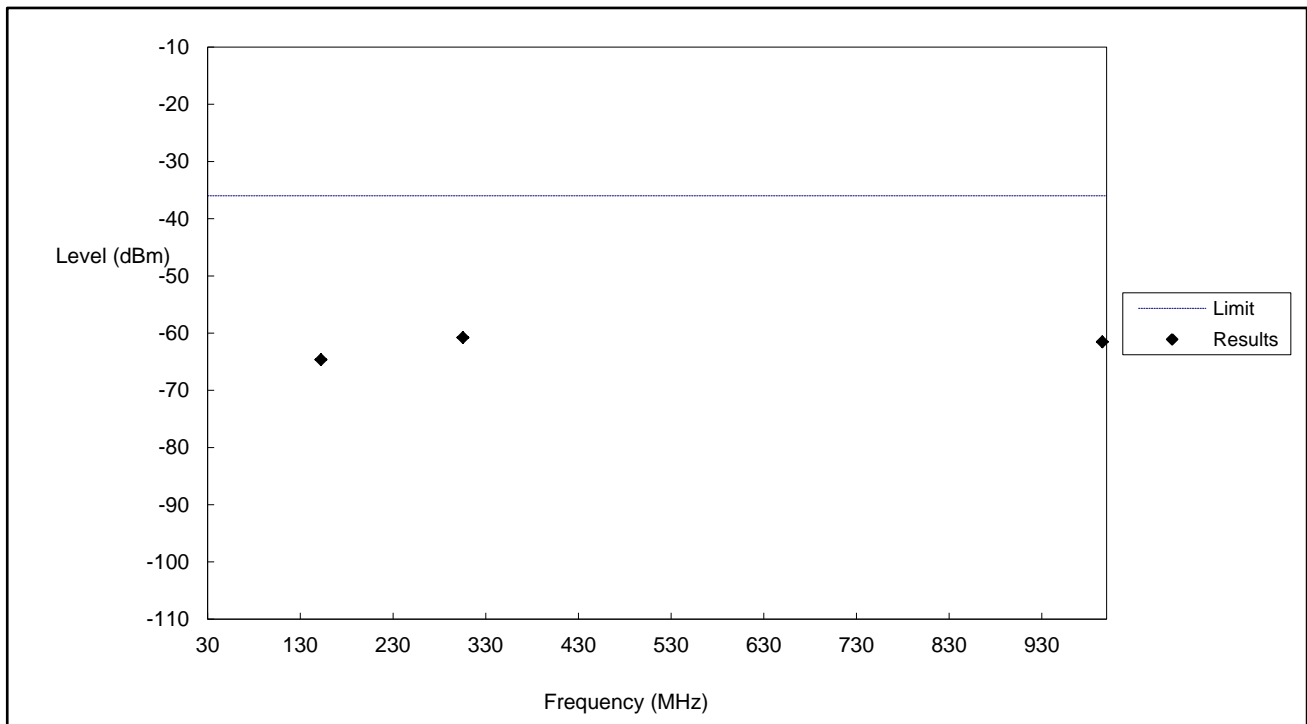
*Horizontal:*



No.	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	221.5385	-64.62	-36.00	-28.62	RMS
2	561.5385	-61.54	-36.00	-25.54	RMS
3	864.6154	-63.08	-36.00	-27.08	RMS



Vertical:

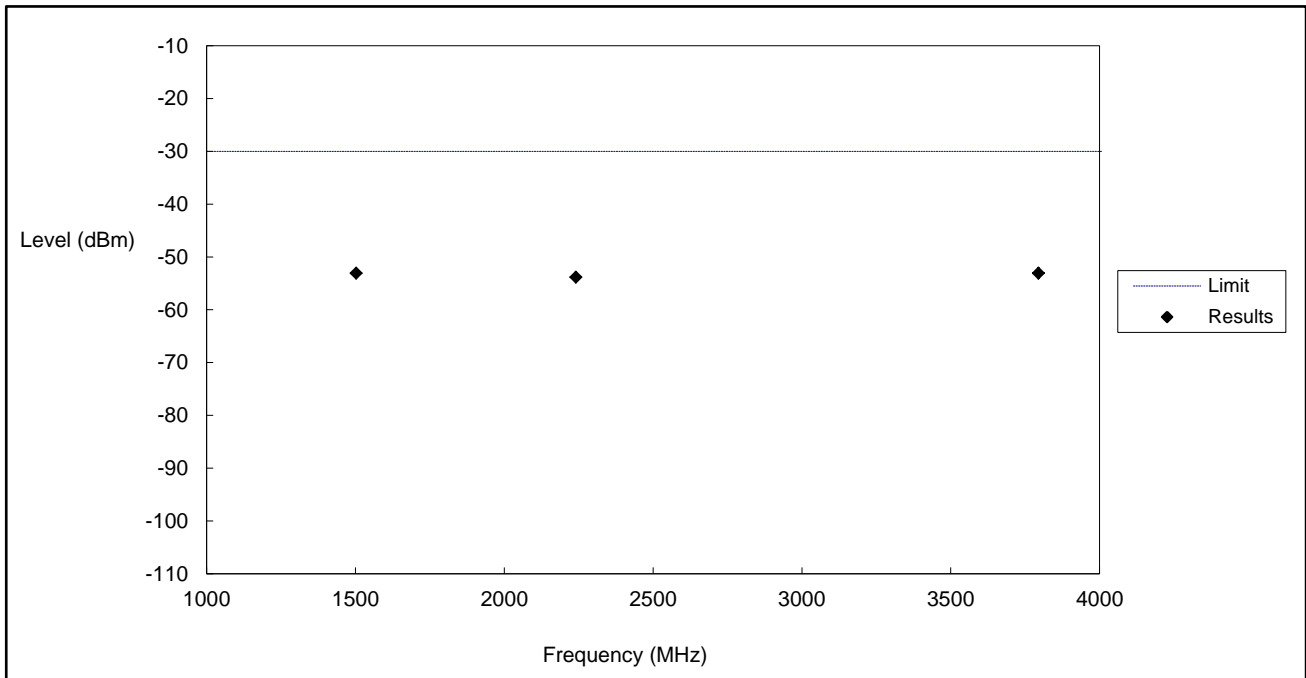


No.	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	152.3077	-64.62	-36.00	-28.62	RMS
2	305.3846	-60.77	-36.00	-24.77	RMS
3	995.3846	-61.54	-36.00	-25.54	RMS

*Radiated Spurious Emissions(above 1GHz)*

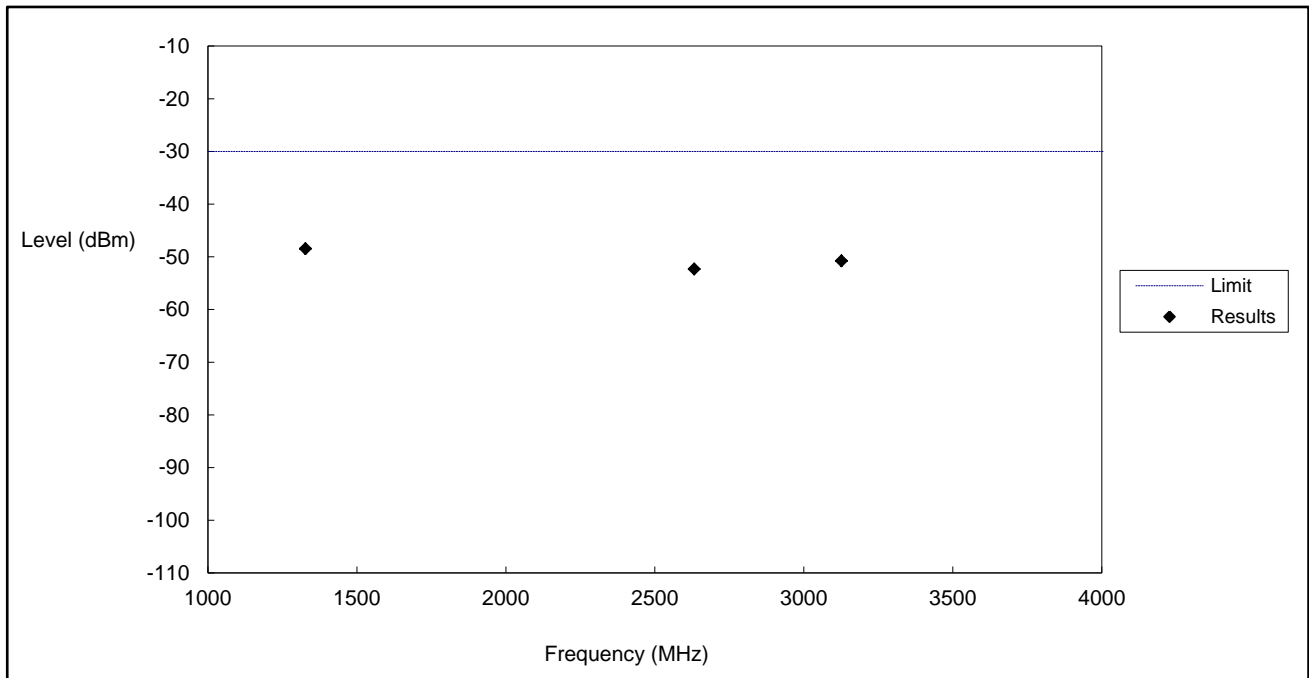
*Test Mode: Traffic(Band 900-worst case)*

*Horizontal:*



No.	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1502.3077	-53.08	-30.00	-23.08	RMS
2	2240.7692	-53.85	-30.00	-23.85	RMS
3	3794.6154	-53.08	-30.00	-23.08	RMS

Vertical:

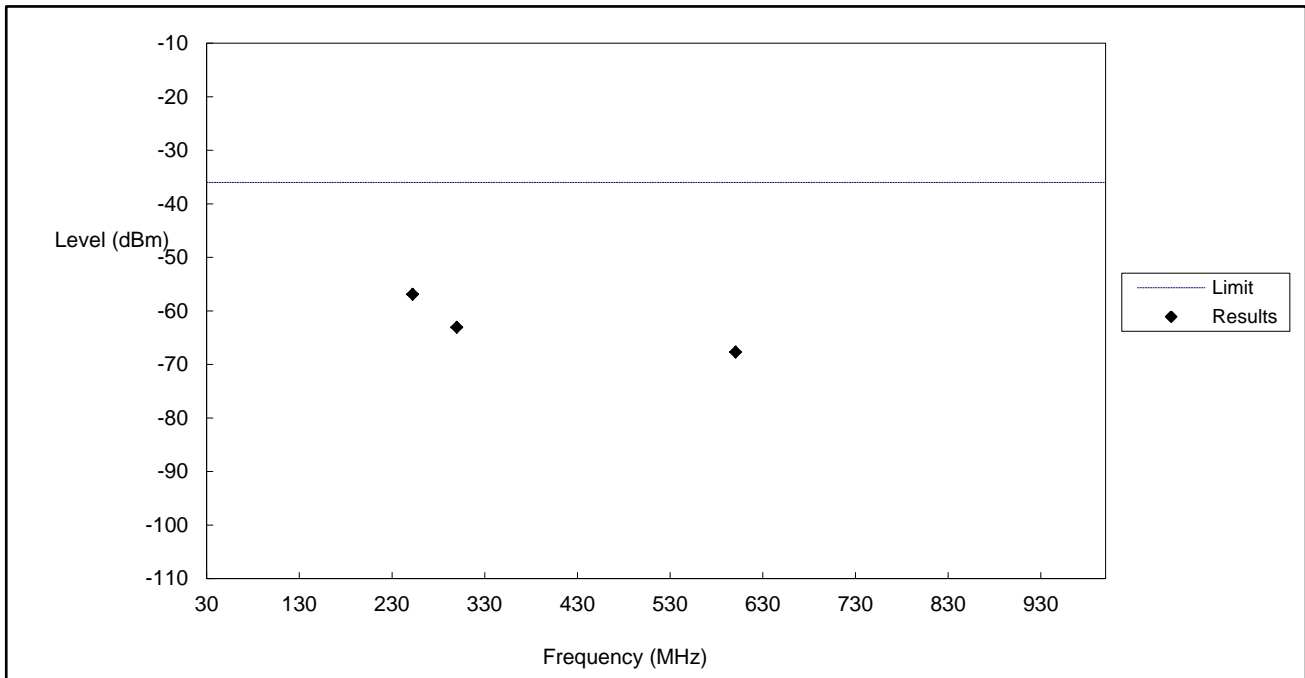


No.	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1327.6923	-48.46	-30.00	-18.46	RMS
2	2632.3077	-52.31	-30.00	-22.31	RMS
3	3126.1538	-50.77	-30.00	-20.77	RMS

*Radiated Spurious Emissions(30MHz-1GHz)*

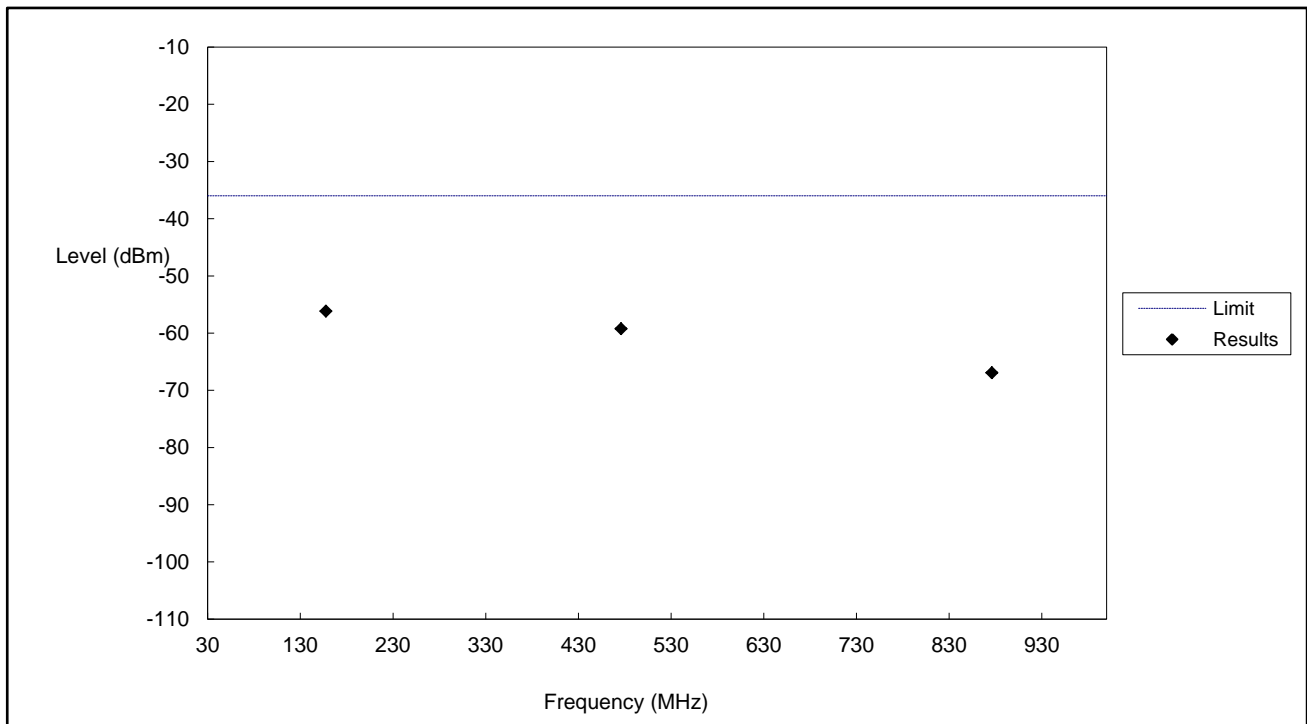
*Test Mode: Traffic(Band 1800-worst case)*

*Horizontal:*



No.	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	252.3077	-56.92	-36.00	-20.92	RMS
2	300.0000	-63.08	-36.00	-27.08	RMS
3	600.7692	-67.69	-36.00	-31.69	RMS

Vertical:

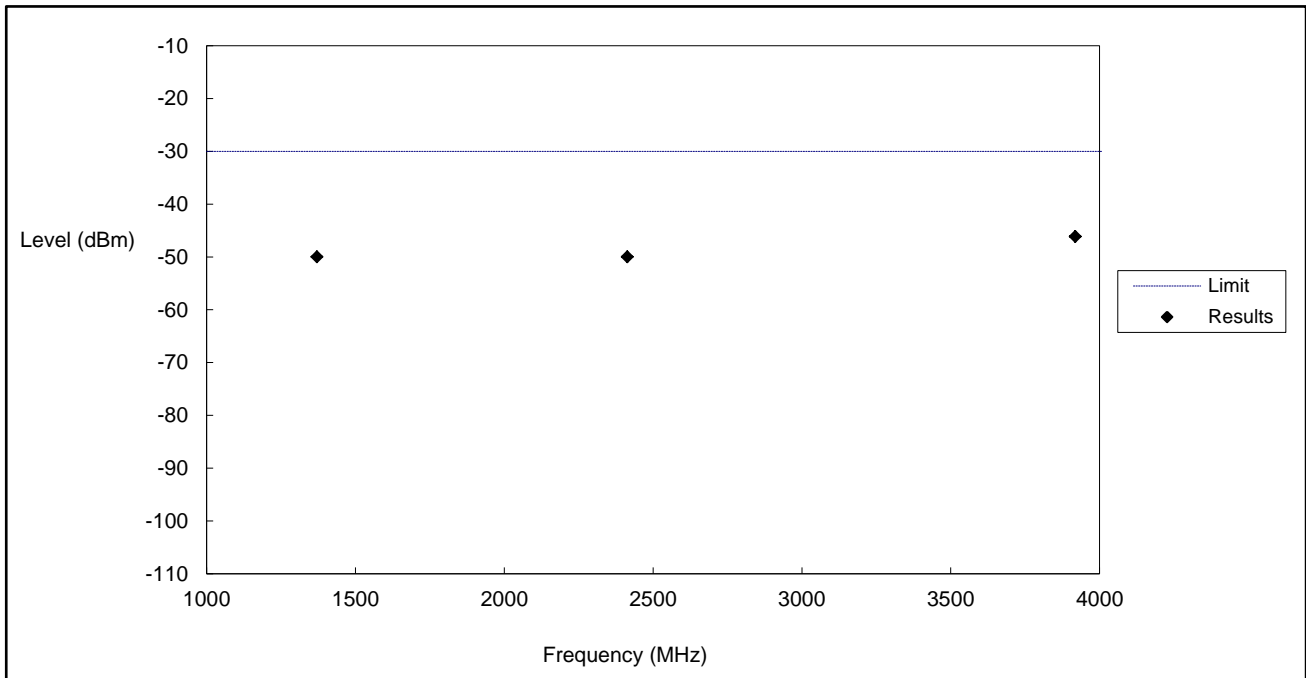


No.	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	157.6923	-56.15	-36.00	-20.15	RMS
2	476.1538	-59.23	-36.00	-23.23	RMS
3	876.1538	-66.92	-36.00	-30.92	RMS

*Radiated Spurious Emissions(above 1GHz)*

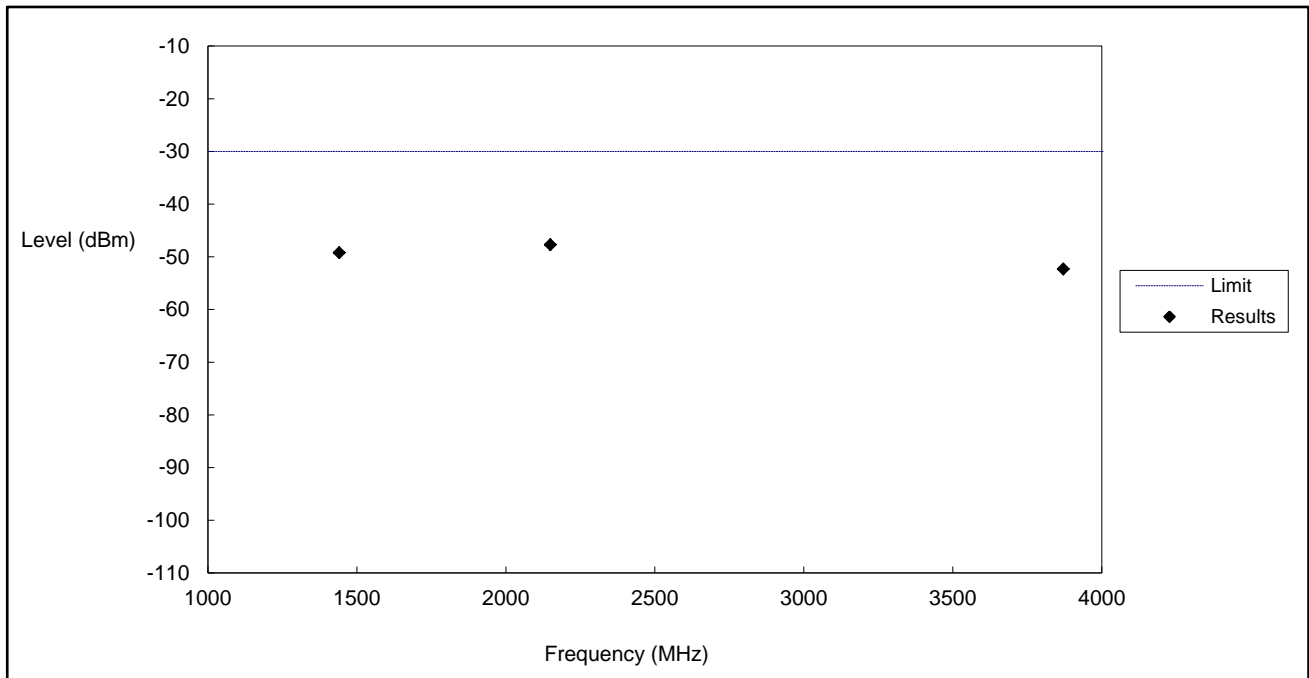
*Test Mode: Traffic(Band 1800-worst case)*

*Horizontal:*



No.	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1370.7692	-50.00	-30.00	-20.00	RMS
2	2413.0769	-50.00	-30.00	-20.00	RMS
3	3918.4615	-46.15	-30.00	-16.15	RMS

Vertical:



No.	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	1440.7692	-49.23	-30.00	-19.23	RMS
2	2149.2308	-47.69	-30.00	-17.69	RMS
3	3870.7692	-52.31	-30.00	-12.31	RMS

Test Result: Pass

### 3.8 Radiated spurious emissions – MS in idle mode

Clause 12.2.2 of TS 151 010-1 V12.2.0 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

The table shows the conformance requirements in relation to the test conditions.

Conformance requirement	Normal Voltage: 3.7V	High Voltage: 4.2V	Low Voltage: 3.3V
1. Spurious emission when allocated a channel E-GSM900	√	√	√
1. Spurious emission when allocated a channel DCS1800	√	√	√



### 3.8.3 Set up for testing

Procedures and conditions described in clause 12.2.2.4 where applied. All required parameter have been checked and adjusted in R&S CMU200, R&S ESCS30 before any measurement was done.

### 3.8.4 Test result

Frequency range	GSM 900				DCS 1800			
	Normal Conditions(dBm)		Extreme Conditions(dBm)		Normal Conditions(dBm)		Extreme Conditions(dBm)	
	Result	Limit	Result	Limit	Result	Limit	Result	Limit
30 MHz to 880 MHz	-69.52	-57	-65.24	-57	-67.14	-57	-62.86	-57
880 MHz to 915 MHz	-69.05	-59	-64.29	-59	-63.33	-59	-64.29	-59
915 MHz to 1000 MHz	-65.24	-57	-62.86	-57	-68.57	-57	-62.86	-57
1 GHz to 1710 MHz	-69.52	-47	-67.14	-47	-70.95	-47	-62.86	-47
1710 MHz to 1785 MHz	-68.10	-53	-68.57	-53	-68.57	-53	-65.24	-53
1785 MHz to 4000 MHz	-67.62	-47	-64.29	-47	-68.10	-47	-62.38	-47

Measurement uncertainty	+/-1dB (+/-2dB for limits lower than -47dB)	+/-1dB (+/-2dB for limits lower than -47dB)
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Test Result: Pass

### 3.9 Receiver blocking and spurious response – Speech channels

Clause 14.7.1 of TS 151 010-1 V12.2.0 applies.

#### 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  $f_0$  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  $-43\text{dBm}$ .

#### 3.9.3 Set up for testing

Procedures and conditions described in clause 14.7.1.4 where applied. All required parameter have been checked and adjusted in R&S CMU200 and R&S SMR20 before any measurement was done.

Test equipment: R&S CMU200, R&S SMR20

According to the requirements of TS 151 010, ARFCN 63 and ARFCN 700 was verified by tests.

The test in the defined frequency range was performed manually by setting the R&S SMR20 in the required steps and than watching the system simulator for the RBER result after transmitting the required set of samples.

### 3.9.4 Test result

GSM 900, TCH/FS (Traffic Channel /Full Speech)			
Test Frequency Range	Interference Level in dBuV emf	Error rate (%)	Result
FR +/- 600 kHz to FR +/- 800 kHz	70	0.00	Pass
FR +/- 800 kHz to FR +/- 1.6 MHz	70	0.01	Pass
FR +/- 1.6 MHz to FR +/- 3 MHz	80	0.00	Pass
915 MHz to FR -3 MHz	90	0.01	Pass
FR + 3 MHz to 980 MHz	90	0.02	Pass
825 MHz to < 915 MHz	113	0.02	Pass
980 MHz to 1000 MHz	113	0.02	Pass
100 kHz to < 825 MHz	113	0.02	Pass
1000 MHz to 12.75 GHz	113	0.02	Pass

DCS 1800, TCH/FS (Traffic Channel /Full Speech)			
Test Frequency Range	Interference Level in dBuV emf	Error rate (%)	Result
FR +/- 600 kHz to FR +/- 800 kHz	70	0.00	Pass
FR +/- 800 kHz to FR +/- 1.6 MHz	70	0.01	Pass
FR +/- 1.6 MHz to FR +/- 3 MHz	80	0.01	Pass
1785 MHz to FR -3 MHz	87	0.01	Pass
FR + 3 MHz to 1920 MHz	87	0.01	Pass
100 kHz to < 1705 MHz	113	0.01	Pass
1705 MHz to < 1785 MHz	101	0.01	Pass
1920 MHz to 1980 MHz	101	0.02	Pass
1980 MHz to 12.75 GHz	113	0.02	Pass

Refer to appendix 1 for measurement results.

### 3.10 Frequency error and phase error in GPRS multislot configuration

Clause 13.16.1 of TS 151 010-1 V12.2.0 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.

Table Conformance requirements in relation to the test conditions

Conformance requirement	Normal	HTHV	HTLV	LTHV	LTLV	Vibration
1. MS carrier frequency GPRS 900	√	√	√	√	√	√
1. MS carrier frequency GPRS 1800	√	√	√	√	√	√
2. RMS phase error GPRS 900	√	√	√	√	√	√
2. RMS phase error GPRS 1800	√	√	√	√	√	√
3. Maximum peak deviation GPRS 900	√	√	√	√	√	√
3. Maximum peak deviation GPRS 1800	√	√	√	√	√	√

### 3.10.3 Set up for testing

Procedures and conditions described in clause 13.1.4 where applied. All required parameter have been checked and adjusted in Agilent 8960 and R&S CMU200 before any measurement was performed.

Test equipment: Agilent 8960 + R&S CMU200 with options, Climate chamber, vibration equipment, AC/DC regulated power supply, DC Voltmeter, test SIM card

### 3.10.4 Test result

Test Result Frequency Error and Phase Error in GPRS multislot configuration						
Test Conditions	MS carrier frequency(Hz)		RMS phase error(deg)		Maximum peak deviation(deg)	
	E-GSM900	DCS1800	E-GSM900	DCS1800	E-GSM900	DCS1800
Normal	-25.45	56.88	-0.95	2.38	3.81	-0.95
HTHV	31.82	64.38	0.95	0.95	-4.29	0.95
HTLV	21.82	91.88	-0.95	2.38	2.86	-1.90
LTHV	-18.18	-87.50	0.95	-0.95	-5.24	5.24
LTLV	16.36	33.13	-0.95	-0.95	0.48	9.52
Vibration	-20.00	50.00	0.95	-0.95	7.14	-1.43
Max. measured error	31.82	91.88	-0.95	2.38	7.14	9.52
Max. permitted error	89Hz	171Hz	5deg	5deg	20deg	20deg
Measurement uncertainty	±5Hz	±5Hz	±1deg	±1deg	±5deg	±5deg

### 3.11 Transmitter output power in GPRS multislot configuration

Clause 13.16.2 of ETSI TS 151 010-1 V12.2.0 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.

Table Conformance requirements in relation to the test conditions

Conformance requirement	Normal	HTHV	HTLV	LTHV	LTLV
1. Maximum output power E-GSM900	√				
1. Maximum output power DCS1800	√				
2. Maximum output power E-GSM900		√	√	√	√
2. Maximum output power DCS1800		√	√	√	√
3. Power control levels E-GSM900	√				
3. Power control levels DCS1800	√				
4. Power control levels E-GSM900		√	√	√	√
4. Power control levels DCS1800		√	√	√	√
5. Power control levels form monotonic sequence E-GSM900	√				
5. Power control levels form monotonic sequence DCS 1800	√				
6. Transmitted power in time/power template E-GSM900 for normal burst	√	√	√	√	√
6. Transmitted power in time/power template DCS 1800 for normal burst	√	√	√	√	√
7. Use of MS_TXPWR_MAX_CCH E-GSM900	√				
7. Use of MS_TXPWR_MAX_CCH DCS 1800	√				
8. Transmission from MS to BS 468,75 TA bits behind E-GSM900	√	√	√	√	√
8. Transmission from MS to BS 468,75 TA bits behind DCS 1800	√	√	√	√	√
9. Transmitted power in time/power template E-GSM900 for random access burst	√	√	√	√	√
9. Transmitted power in time/power template DCS 1800 for random access burst	√	√	√	√	√
10. MS uses TA value 0 for random access burst E-GSM900	√	√	√	√	√
10. MS uses TA value 0 for random access burst DCS 1800	√	√	√	√	√

### 3.11.3 Set up for testing

Procedures and conditions described in clause 13.16.2.4 (Method of test for equipment with permanent antenna connector) where applied. All required parameter have been checked and adjusted in Agilent 8960 before any measurement was done.

Test equipment: Agilent 8960 with options, Climate chamber, AC/DC regulated power supply, DC Voltmeter, test SIM card

### 3.11.4 Test result

Table 27 Test result overview

Conformance requirement	
1, 2	Table 28
3, 4, 5	Table 29 to Table 34
6.1, 6.2	Table 35
9.1, 9.2	Table 36

EUT power class: GSM900 class 4 (33dBm)  
DCS1800 class 1 (30dBm)

Test result transmitter maximum output power with 4 uplink solts configuration (dBm)						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	27.49	27.62	27.86	24.83	25.47	25.85
HTHV	27.45	27.61	27.81	24.81	25.45	25.81
HTLV	27.43	27.58	27.84	24.80	25.43	25.82
LTHV	27.42	27.55	27.83	24.83	25.41	25.80
LTLV	27.46	27.62	27.82	24.81	25.46	25.85
Max. permitted error	Tnom +/-2dB Tmin, Tmax +/-2,5dB			Tnom +/-2dB Tmin, Tmax +/-2,5dB		
Permissible nominal reduction	3dB to 6dB			3dB to 6dB		
Measurement uncertainty: <+/-1,6dB						



Test result transmitter output power, power control levels						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Max. permitted error	Tnom +/-2dB Tmin, Tmax +/-2,5dB			Tnom +/-2dB Tmin, Tmax +/-2,5dB		
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

Transmitted power relative to time for normal burst						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

Test result transmitted power relative to time for access burst						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

Note: "ok" stand for "The power / time relationship is in side the permitted range".

Conformance requirements 5, 7, 8 and 10 are proofed to be fulfilled during the operation of Agilent 8960 for testing other conformance requirements.

### 3.12 Transmitter output RF spectrum in GPRS multislot configuration

Clause 13.16.3 of TS 151 010-1 V12.2.0 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 151 010-1 V12.2.0 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.

Table Conformance requirements in relation to the test conditions

Comformance requirement	Normal	HTHV	HTLV	LTHV	LTLV
1. MS output spectrum due to modulation E-GSM900	√	√	√	√	√
1. MS output spectrum due to modulation DCS1800	√	√	√	√	√
2. MS output spectrum due to switching transients E-GSM900	√	√	√	√	√
2. MS output spectrum due to switching transients DCS1800	√	√	√	√	√
3. By allocated channel power in various bands should below a certain limit E-GSM900	√	-	-	-	-
3. By allocated channel power in various bands should below a certain limit DCS1800	√	-	-	-	-

### 3.12.3 Set up for testing

Procedures and conditions described in clause 13.4.4.2 where applied. All required parameter have been checked and adjusted in Agilent 8960 before any measurement was performed.

Test equipment: Agilent 8960 with options, Climate chamber, AC/DC regulated, power supply, DC Voltmeter, test SIM card

### 3.12.4 Test result

Refer to appendix 1 for measurement results/plots.

Test result output RF spectrum						
Test Conditions	MS output spectrum due to modulation		MS output spectrum due to swithing transients		By allocated channel power in various bands	
	E-GSM900	DCS1800	E-GSM900	DCS1800	E-GSM900	DCS1800
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Limit	Refer to table 13-6, 7, 9, 10, 11, 12 in TS 151 010-1					
Measurement uncertainty	+/-1,0dB below 600kHz offset, +/-2dB for more than 600kHz offset					

### 3.13 Frequency error and Modulation accuracy in EGPRS Configuration

Clause 13.16.1 of TS 151 010-1 V12.2.0 applies.

#### 3.13.1 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 EGPRS 900 and EGPRS 1800 MS.

#### 3.13.2 Conformance requirements

1. The carrier frequency under 8PSK modulation shall be accurate to within 0,2 ppm for GSM 400 and 0,1 ppm for all other bands compared to signals received from the BS.
  - 1.1 Under normal conditions; 3GPP TS 05.10, subclause 6.1.
  - 1.2 Under extreme conditions; 3GPP TS 05.10, subclause 6.1; 3GPP TS 05.05, subclause 4.4; 3GPP TS 05.05, annex D subclauses D.2.1 and D.2.2.
2. The RMS EVM over the useful part of any burst of the 8-PSK modulated signal shall not exceed.
  - 2.1 9,0% Under normal conditions; 3GPP TS 05.05, subclause 4.6.2.1
  - 2.2 10,0% Under extreme conditions; 3GPP TS 05.05, subclause 4.6; 3GPP TS 05.05, annex D subclauses D.2.1 and D.2.2.
3. The peak EVM values averaged over at least 200 bursts of the 8PSK modulated signal shall be  $\leq 30\%$ .
  - 3.1 Under normal conditions; 3GPP TS 05.05, subclause 4.6.2.3.
  - 3.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.6.2.3; 3GPP TS 05.05, annex D subclauses D.2.1 and D.2.2.
4. The 95:th-percentile value of any burst of the 8-PSK modulated signal shall be  $\leq 15\%$ .
  - 4.1 Under normal conditions; 3GPP TS 05.05, subclause 4.6.2.4.
  - 4.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.6.2.4; 3GPP TS 05.05, annex D subclauses D.2.1 and D.2.2.
5. The Origin Offset Suppression for any 8PSK modulated signal shall exceed 30 dB.
  - 5.1 Under normal conditions; 3GPP TS 05.05, subclause 4.6.2.2.
  - 5.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.6.2.2; 3GPP TS 05.05, annex D subclauses D.2.1 and D.2.2.

Table Conformance requirements in relation to the test conditions

Conformance requirement	Normal	HTHV	HTLV	LTHV	LTLV	Vibration
1. MS carrier frequency EGPRS 900	√	√	√	√	√	√
1. MS carrier frequency EGPRS 1800	√	√	√	√	√	√
2. RMS EVM EGPRS 900	√	√	√	√	√	√
2. RMS EVM EGPRS 1800	√	√	√	√	√	√
3. Peak EVM EGPRS 900	√	√	√	√	√	√
3. Peak EVM EGPRS 1800	√	√	√	√	√	√
4. 95:th-percentile EGPRS 900	√	√	√	√	√	√
4. 95:th-percentile EGPRS 1800	√	√	√	√	√	√
5. Origin Offset Suppression EGPRS 900	√	√	√	√	√	√
5. Origin Offset Suppression EGPRS 1800	√	√	√	√	√	√

### 3.13.3 Set up for testing

Procedures and conditions described in clause 13.1.4 where applied. All required parameter have been checked and adjusted in Agilent 8960 and R&S CMU200 before any measurement was performed.

Test equipment: Agilent 8960 + R&S CMU200 with options, Climate chamber, vibration equipment, AC/DC regulated power supply, DC Voltmeter, test SIM card

### 3.13.4 Test result

EDGE, Test Result Frequency Error and Phase Error in EGPRS multislot configuration						
Test Conditions	MS carrier frequency		RMS EVM		Peak EVM	
	E-GSM900	DCS1800	E-GSM900	DCS1800	E-GSM900	DCS1800
Normal	12Hz	50Hz	2.5%	1.6%	4.6%	6.8%
HTHV	10Hz	51Hz	1.9%	1.7%	4.4%	7.3%
HTLV	12Hz	53Hz	2.2%	1.2%	4.8%	7.3%
LTHV	9Hz	55Hz	2.1%	1.3%	4.5%	7.0%
LTLV	15Hz	55Hz	2.2%	1.8%	4.8%	7.4%
Vibration	12Hz	51Hz	2.0%	1.6%	4.5%	7.1%
Max. measured error	15Hz	55Hz	2.5%	1.8%	4.8%	7.4%
Max. permitted error	89Hz	171Hz	N: 9%, E: 10%		30%	30%
Measurement uncertainty	±5Hz	±5Hz	±1%	±1%	±1%	±1%

N: Normal Test Condition

E: Extreme Test Condition

EDGE, Test Result Frequency Error and Phase Error in EGPRS multislot configuration						
Test Conditions	95:th-percentile		Orgin offset suppression		/	
	E-GSM900	DCS1800	E-GSM900	DCS1800	/	/
Normal	1.5%	2.6%	-47.4	-47.5	/	/
HTHV	1.4%	2.5%	-47.0	-47.5	/	/
HTLV	1.5%	2.5%	-47.3	-47.8	/	/
LTHV	1.4%	2.4%	-47.3	-47.8	/	/
LTLV	1.4%	2.0%	-47.9	-47.6	/	/
Vibration	1.3%	2.3%	-47.7	-47.6	/	/
Max. measured error	1.5%	2.6%	-47.0	-47.5	/	/
Max. permitted error	15%	15%	≥30dB	≥30dB	/	/
Measurement uncertainty	±1%	±1%	±1dB	±1dB	/	/

### 3.14 Frequency error under multipath and interference conditions in EGPRS Configuration

Clause 13.2 of TS 151 010-1 V12.2.0 applies.

#### 3.14.1 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.

#### 3.14.2 Conformance requirements

1. The MS carrier frequency error for each burst shall be accurate to within 0,1 ppm, or 0,1 ppm compared to signals received from the BS for signal levels down to 3 dB below the reference sensitivity level.
2. The MS carrier frequency error for each burst shall be accurate to within 0,1 ppm, or 0,1 ppm compared to signals received from the BS for 3 dB less carrier to interference ratio than the reference interference ratios.

Table Conformance requirements in relation to the test conditions

Conformance requirement	Normal	HTHV	HTLV	LTHV	LTLV
1. MS carrier frequency error E-GSM900	√	√	√	√	√
1. MS carrier frequency error DCS1800	√	√	√	√	√
2. MS carrier frequency error E-GSM900	√	√	√	√	√
2. MS carrier frequency error DCS1800	√	√	√	√	√

#### 3.14.3 Set up for testing

Procedures and conditions described in clause 13.2.4 where applied. All required parameter have been checked and adjusted in CMU200 and SMIQ before any measurement was performed.

Test equipment: R&S CMU200 + option K20, K21, K22, K23, K24, K27, K28, K29, K42, K65 B12, B41, B52, B54, B66, B56 + R&S SMIQ 03HD + option SM-B1, SMIQB11, 2xSMIQB12, SMIQB14, SMIQB17, SMIQB20, Climate chamber, AC/DC regulated power supply, DC Voltmeter

### 3.14.4 Test result

Frequency error under multipath and interference conditions (Hz)												
Test Conditions	Channel 975				Channel 37				Channel 124			
	TU3	TU50	HAT 100	RA 250	TU3	TU50	HAT 100	RA 250	TU3	TU50	HAT 100	RA 250
Normal	30.48	-68.10	41.43	-120.95	39.52	-20.48	66.67	-68.57	-66.67	21.43	46.67	90.95
HTHV	55.24	-42.86	1.90	-22.38	12.86	29.05	8.10	76.19	27.14	24.29	78.57	-111.43
HTLV	-56.67	-59.52	60.95	-22.86	-4.29	0.95	41.43	54.29	-34.76	53.33	-39.52	-132.86
LTHV	-84.76	-62.86	-59.05	61.90	-10.95	58.10	82.86	-21.43	4.29	-43.81	-11.90	20.00
LTLV	37.14	-66.19	58.10	-113.33	-57.14	37.14	11.90	-113.33	-85.24	-67.14	-11.90	-13.81
Limit (Hz)	±230	±160	±180	±300	±230	±160	±180	±300	±230	±160	±180	±300
Measurement Uncertainty in Hz: ±5 Hz												

Frequency error under multipath and interference conditions (Hz)												
Test Conditions	Channel 512				Channel 698				Channel 885			
	TU1.5	TU50	HT 100	RA 130	TU1.5	TU50	HT 100	RA 130	TU1.5	TU50	HT 100	RA 130
Normal	-46.19	-38.57	27.14	32.86	-62.86	3.33	151.90	49.05	-20.48	-52.86	-38.10	-136.19
HTHV	84.29	-98.10	-39.52	-130.95	125.71	27.14	166.19	-90.95	52.86	-13.81	-29.52	90.95
HTLV	63.81	67.62	-158.10	-69.05	10.48	8.10	27.62	-164.76	36.19	45.24	-85.71	-112.38
LTHV	-58.57	61.43	113.81	-138.57	-48.57	-38.10	165.24	-90.95	103.33	-104.76	-68.57	73.81
LTLV	41.90	53.33	-91.90	-168.10	98.10	109.05	39.52	-57.62	-133.33	-46.19	-40.00	-138.57
Limit (Hz)	±320	±260	±350	±400	±320	±260	±350	±400	±320	±260	±350	±400
Measurement Uncertainty in Hz: ±5 Hz												



### 3.15 Transmitter output power in EGPRS multislot configuration

Clause 13.16.2 of ETSI TS 151 010-1 V12.2.0 applies.

#### 3.15.1 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. Since the conformance requirement, test procedure and test requirement of GSMK modulated signal's output power are defined in subclause 13.16.2 for GPRS MS, being thereby defined also for all EGPRS MS in that section, only 8PSK modulated signal's output power conformance requirement, test procedure and test requirements are defined in this subclause.

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

#### 3.15.2 Conformance requirements

1. The MS maximum output power for 8-PSK modulated signal shall be as defined in 3GPP TS 05.05, subclause 4.1.1, second table, according to its power class, with a tolerances of  $\pm 2$  dB,  $\pm 3$  dB,  $+3/-4$  dB defined under normal conditions in the 3GPP TS 05.05, subclause 4.1.1, second table. From R99 onwards, the MS maximum output power in an uplink multislot configuration shall be as defined in 3GPP TS 05.05 subclause 4.1.1, sixth table, according to its power class, with a tolerance of  $\pm 3$  dB under normal conditions; 3GPP TS 05.05, subclause 4.1.1, second and sixth table. In case the MS supports the same maximum output power in an uplink multislot configuration as it supports for single slot uplink operation, the tolerance shall be  $\pm 2$  dB.
2. The MS maximum output power for 8-PSK modulated signal shall be as defined in 3GPP TS 05.05, subclause 4.1.1, second table, according to its power class, with a tolerances of  $\pm 2,5$  dB,  $\pm 4$  dB,  $+4/-4,5$  dB defined under extreme conditions in the 3GPP TS 05.05, subclause 4.1.1, second table. From R99 onwards, the MS maximum output power in an uplink multislot configuration shall be as defined in 3GPP TS 05.05 subclause 4.1.1, sixth table, according to its power class, with a tolerance of  $\pm 4$  dB under extreme conditions; 3GPP TS 05.05, subclause 4.1.1, second and sixth table; 3GPP TS 05.05 annex D in subclauses D.2.1 and D.2.2. In case the MS supports the same maximum output power in an uplink multislot configuration as it supports for single slot uplink operation, the tolerance shall be  $\pm 2,5$  dB.
3. The power control levels for 8-PSK shall have the nominal output power levels as defined in 3GPP TS 05.05, subclause 4.1.1, third table (for GSM 400, GSM 700, GSM 850 and GSM 900), fourth table (for DCS 1 800) or fifth table (for PCS 1 900), 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 requirement 1), with a tolerance of  $\pm 2$  dB,  $\pm 3$  dB, 4 dB or 5 dB under normal conditions; 3GPP TS 05.05, subclause 4.1.1, third, fourth or fifth table.

4. The power control levels for 8-PSK shall have the nominal output power levels as defined in 3GPP TS 05.05, subclause 4.1.1, third table (for GSM 400, GSM 700, GSM 850 and GSM 900), fourth table (for DCS 1 800) or fifth table (for PCS 1 900), 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  $\pm 2,5$  dB,  $\pm 4$  dB, 5 dB or 6 dB under extreme conditions; 3GPP TS 05.05, subclause 4.1.1, third, fourth or fifth table; 3GPP TS 05.05 annex D subclauses D.2.1 and D.2.2.
- 4a. From R99 onwards, the supported maximum output power for each number of uplink timeslots shall form a monotonic sequence. The maximum reduction of maximum output power from an allocation of n uplink timeslots to an allocation of n+1 uplink timeslots shall be equal to the difference of maximum permissible nominal reduction of maximum output power for the corresponding number of timeslots, as defined in 3GPP TS 05.05, subclause 4.1.1, sixth table.
5. For 8-PSK, 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  $2 \pm 1,5$  dB; 3GPP TS 05.05, subclause 4.1.1, from R99 onwards, in a multislot configuration, the first power control step down from the maximum output power is allowed to be in the range 0...2 dB
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 bottom figure for 8PSK modulated signal. In the case of Multislot Configurations where the bursts in two or more consecutive time slots are actually transmitted at the same frequency, the template of annex B shall be respected during the useful part of each burst and at the beginning and the end of the series of consecutive bursts. The output power during the guard period between every two consecutive active timeslots shall not exceed the level allowed for the useful part of the first timeslot, or the level allowed for the useful part of the second timeslot plus 3 dB, whichever is the highest.
- 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 subclauses D.2.1 and D.2.2.

Table Conformance requirements in relation to the test conditions

Comformance requirement	Normal	HTHV	HTLV	LTHV	LTLV
1. Maximum output power E-GSM900	√				
1. Maximum output power DCS1800	√				
2. Maximum output power E-GSM900		√	√	√	√
2. Maximum output power DCS1800		√	√	√	√
3. Power control levels E-GSM900	√				
3. Power control levels DCS1800	√				
4. Power control levels E-GSM900		√	√	√	√
4. Power control levels DCS1800		√	√	√	√
5. Power control levels form monotonic sequence E-GSM900	√				
5. Power control levels form monotonic sequence DCS 1800	√				
6. Transmitted power in time/power template E-GSM900 for normal burst	√	√	√	√	√
6. Transmitted power in time/power template DCS 1800 for normal burst	√	√	√	√	√
7. Use of MS_TXPWR_MAX_CCH E-GSM900	√				
7. Use of MS_TXPWR_MAX_CCH DCS 1800	√				
8. Transmission from MS to BS 468,75 TA bits behind E-GSM900	√	√	√	√	√
8. Transmission from MS to BS 468,75 TA bits behind DCS 1800	√	√	√	√	√
9. Transmitted power in time/power template E-GSM900 for random access burst	√	√	√	√	√
9. Transmitted power in time/power template DCS 1800 for random access burst	√	√	√	√	√
10. MS uses TA value 0 for random access burst E-GSM900	√	√	√	√	√
10. MS uses TA value 0 for random access burst DCS 1800	√	√	√	√	√

### 3.15.3 Set up for testing

Procedures and conditions described in clause 13.16.2.4 (Method of test for equipment with permanent antenna connector) where applied. All required parameter have been checked and adjusted in Agilent 8960 before any measurement was done.

Test equipment: Agilent 8960 with options, Climate chamber, AC/DC regulated power supply, DC Voltmeter, test SIM card

### 3.15.4 Test result

Table 42 Test result overview

Conformance requirement	
1, 2	Table 28
3, 4, 5	Table 29 to Table 34
6.1, 6.2	Table 35
9.1, 9.2	Table 36

EUT Power Class: GSM900 E2 (27dBm)  
DCS1800 E2 (26dBm)

EDGE, Test result transmitter maximum output power with 4 uplink solts configuration (dBm)						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	23.55	23.38	23.07	22.06	22.45	22.87
HTHV	23.51	23.32	23.01	22.02	22.41	22.81
HTLV	23.53	23.35	23.05	22.05	22.43	22.86
LTHV	23.50	23.34	23.03	22.01	22.45	22.83
LTLV	23.55	23.36	23.04	22.06	22.42	22.81
Max. permitted error	Tnom +/-2dB Tmin, Tmax +/-2,5dB			Tnom +/-2dB Tmin, Tmax +/-2,5dB		
Permissible nominal reduction	3dB to 6dB			3dB to 6dB		
Measurement uncertainty: <+/-1,6dB						

EDGE, Test result transmitter output power, power control levels						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Max. permitted error	Tnom +/-2dB Tmin, Tmax +/-2,5dB			Tnom +/-2dB Tmin, Tmax +/-2,5dB		
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

EDGE, Transmitted power relative to time for normal burst						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

EDGE, Test result transmitted power relative to time for access burst						
Test Conditions	E-GSM900			DCS 1800		
	Channel 975	Channel 37	Channel 124	Channel 512	Channel 698	Channel 885
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Measurement uncertainty refer to A5.3.4.2 in TS 151 010-1: +/-1dB						

Note: "ok" stand for "The power / time relationship is in side the permitted range".

Conformance requirements 5, 7, 8 and 10 are proofed to be fulfilled during the operation of Agilent 8960 for testing other conformance requirements.

### 3.16 Transmitter – output RF spectrum in EGPRS multislot configuration

Clause 13.16.3 of TS 151 010-1 V12.2.0 applies.

#### 3.16.1 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. Since the conformance requirement, test procedure and test requirement of GSMK modulated signal's output RF spectrum are defined in subclause 13.16.3 for GPRS MS, being thereby defined also for all EGPRS MS in that section, only 8PSK modulated signal's RF output spectrum conformance requirement, test procedure and test requirements are defined in this subclause.

The requirements and this test apply to EGPRS 900 and EGPRS 1800.

#### 3.16.2 Conformance requirements

1. The level of the output RF spectrum due to 8PSK modulation shall be no more than that given in 3GPP TS 05.05, subclause 4.2.1, with the following lowest measurement limits:

- -36 dBm below 600 kHz offset from the carrier;
- -51 dBm for GSM 400, GSM 700, GSM 850 and GSM 900 or -56 dBm for DCS 1 800 and PCS 1 900 from 600 kHz out to less than 1 800 kHz offset from the carrier;
- -46 dBm for GSM 400, GSM 700, GSM 850 and GSM 900 or -51 dBm for DCS 1 800 and PCS 1 900 at and beyond 1 800 kHz offset from the carrier;

but with the following exceptions at up to -36 dBm:

- up to three bands of 200 kHz width centred on a frequency which is an integer multiple of 200 kHz in the combined range 600 kHz to 6 000 kHz above and below the carrier;
- up to 12 bands of 200 kHz width centred on a frequency which is an integer multiple of 200 kHz at more than 6 000 kHz offset from the carrier.

1.1 Under normal conditions; 3GPP TS 05.05, subclause 4.2.1.

1.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.2.1; 3GPP TS 05.05, annex D subclauses D.2.1 and D.2.2.

2. The level of the output RF spectrum due to switching transients shall be no more than given in 3GPP TS 05.05, subclause 4.2.2, table "a) Mobile Station".

2.1 Under normal conditions; 3GPP TS 05.05, subclause 4.2.2.

2.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.2.2; 3GPP TS 05.05 annex D subclauses D.2.1 and D.2.2.

3. When allocated a channel, the power emitted by the GSM 400, GSM 900 and DCS 1800 MS, in the band 935 MHz to 960 MHz shall be no more than -79 dBm, in the band 925 MHz to 935 MHz shall be no more than -67 dBm and in the band 1 805 MHz to 1 880 MHz shall be no more than -71 dBm, except in five measurements in each of the bands 925 MHz to 960 MHz and 1 805 MHz to 1 880 MHz, where exceptions at up to -36 dBm are permitted. For GSM 400 mobiles, in addition, a limit of -67 dBm shall apply in the frequency bands 460,4 MHz to 467,6 MHz and 488,8 MHz to 496 MHz.

For GSM 700, GSM 850 and PCS 1 900, the power emitted by MS, in the band of 747 MHz to 757 MHz shall be no more than -79 dBm, in the band of 757 MHz to 762 MHz shall be no more than -73 dBm, in the band 869 MHz to 894 MHz shall be no more than -79 dBm, in the band 1 930 MHz to 1 990 MHz shall be no more than -71 dBm except in five measurements in each of the bands 747 MHz to 762 MHz, 869 MHz to 894 MHz and 1 930 MHz to 1 990 MHz where exceptions at up to -36 dBm are permitted; 3GPP TS 45.005, subclause 4.3.3.

Table Conformance requirements in relation to the test conditions

Comformance requirement	Normal	HTHV	HTLV	LTHV	LTLV
1. MS output spectrum due to modulation E-GSM900	√	√	√	√	√
1. MS output spectrum due to modulation DCS1800	√	√	√	√	√
2. MS output spectrum due to switching transients E-GSM900	√	√	√	√	√
2. MS output spectrum due to switching transients DCS1800	√	√	√	√	√
3. By allocated channel power in various bands should below a certain limit E-GSM900	√	-	-	-	-
3. By allocated channel power in various bands should below a certain limit DCS1800	√	-	-	-	-

### 3.16.3 Set up for testing

Procedures and conditions described in clause 13.4.4.2 where applied. All required parameter have been checked and adjusted in Agilent 8960 before any measurement was performed.

Test equipment: Agilent 8960 with options, Climate chamber, AC/DC regulated, power supply, DC Voltmeter, test SIM card

### 3.16.4 Test result

Refer to appendix 1 for measurement results/plots.

EDGE, Test result output RF spectrum						
Test Conditions	MS output spectrum due to modulation		MS output spectrum due to swithing transients		By allocated channel power in various bands	
	E-GSM900	DCS1800	E-GSM900	DCS1800	E-GSM900	DCS1800
Normal	ok	ok	ok	ok	ok	ok
HTHV	ok	ok	ok	ok	ok	ok
HTLV	ok	ok	ok	ok	ok	ok
LTHV	ok	ok	ok	ok	ok	ok
LTLV	ok	ok	ok	ok	ok	ok
Limit	Refer to table 13-6, 7, 9, 10, 11, 12 in TS 151 010-1					
Measurement uncertainty	+/-1,0dB below 600kHz offset, +/-2dB for more than 600kHz offset					



### 3.17 Receiver blocking and spurious response in EGPRS configuration

Clause 14.8.5 of TS 151 010-1 V12.2.0 applies.

#### 3.17.1 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.

#### 3.17.2 Conformance requirements

1. The blocking characteristics of the receiver are specified separately for in-band and out-of-band performance as identified in 3GPP TS 05.05 subclause 5.1
2. The block error rate (BLER) performance for PDTCH/MCS1 to 4 shall not exceed 10 % and for PDTCH/MCS5 to 9 shall not exceed 10 % or 30 % depending on Coding Schemes and for USF/MCS1 to 9 shall not exceed 1 % when the following signals are simultaneously input to the receiver; 3GPP TS 05.05, subclause 6.2:
  - a useful signal at frequency  $f_0$ , 3 dB above the reference sensitivity level specified in table 14.18-3a for GMSK modulation and table 14.18-3b for 8-PSK modulation for PDTCH channels; and in tables 14.18-4a for GMSK modulation and 14.18-4b for 8-PSK modulation for USF channel with correction values as specified in 3GPP TS 05.05 subclause 6.2;
  - a continuous, static sine wave unwanted signal at a level as in the table 14.18-9 below and at a frequency ( $f$ ) which is an integer multiple of 200 kHz.

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). 3GPP TS 05.05, subclause 5.1.  
DCS 1800: in band, for a maximum of twelve occurrences (which if grouped shall not exceed three contiguous occurrences per group). 3GPP TS 05.05, subclause 5.1
- b) out of band, for a maximum of 24 occurrences (which if below  $f_0$  and grouped shall not exceed three contiguous occurrences per group). 3GPP TS 05.05, subclause 5.1.

where the above performance shall be met when the continuous sine wave signal ( $f$ ) is set to a level of 70 dB $\mu$ V (emf) (i.e. -43 dBm). 3GPP TS 05.05, subclause 5.1.

### 3.17.3 Set up for testing

Procedures and conditions described in clause 14.18.5.4 where applied. All required parameter have been checked and adjusted in R&S CMU200 and R&S SMR20 before any measurement was done.

Test equipment: R&S CMU200, R&S SMR20

According to the requirements of TS 151 010, ARFCN 63 and ARFCN 700 was verified by tests.

The test in the defined frequency range was performed manually by setting the R&S SMR20 in the required steps and than watching the system simulator for the RBER result after transmitting the required set of samples.

### 3.17.4 Test result

EDGE, GSM 900, TCH/FS (Traffic Channel /Full Speech)			
Test Frequency Range	Interference Level in dBuV emf	Error rate (%)	Result
FR +/- 600 kHz to FR +/- 800 kHz	70	0.00	Pass
FR +/- 800 kHz to FR +/- 1.6 MHz	70	0.00	Pass
FR +/- 1.6 MHz to FR +/- 3 MHz	80	0.00	Pass
915 MHz to FR -3 MHz	90	0.01	Pass
FR + 3 MHz to 980 MHz	90	0.01	Pass
825 MHz to < 915 MHz	113	0.01	Pass
980 MHz to 1000 MHz	113	0.01	Pass
100 kHz to < 825 MHz	113	0.01	Pass
1000 MHz to 12.75 GHz	113	0.01	Pass

EDGE, DCS 1800, TCH/FS (Traffic Channel /Full Speech)			
Test Frequency Range	Interference Level in dBuV emf	Error rate (%)	Result
FR +/- 600 kHz to FR +/- 800 kHz	70	0.00	Pass
FR +/- 800 kHz to FR +/- 1.6 MHz	70	0.00	Pass
FR +/- 1.6 MHz to FR +/- 3 MHz	80	0.00	Pass
1785 MHz to FR -3 MHz	87	0.01	Pass
FR + 3 MHz to 1920 MHz	87	0.01	Pass
100 kHz to < 1705 MHz	113	0.01	Pass
1705 MHz to < 1785 MHz	101	0.01	Pass
1920 MHz to 1980 MHz	101	0.01	Pass
1980 MHz to 12.75 GHz	113	0.01	Pass

## EXHIBIT 1 - PRODUCT LABELING

Proposed CE Label Format

**Smart Phone**  
**Model: VOLT X**  
**Input: 5V $\bar{=}$ , 1A or Powered by 3.8V, 4000mAh**  
**Rechargeable Li-polymer Battery**  
**CE 0700**   
**Gui zhou Fortuneship Technology Co., Ltd.**

Specifications: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The 'CE' marking must be affixed to the EUT or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents. The 'CE' marking is allowed less than 5 mm but must clear. If the 'CE' marking is reduced or enlarged the proportions given in the above graduated drawing must be respected. The Importer name, address and Manufacturer name and address should indicate on marking label or packaging or in a document accompanying

### Proposed Label Location on EUT

CE Label Location



## EXHIBIT 2 - EUT PHOTOGRAPHS

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EUT View 1



EUT View 2





EUT View 3



EUT Housing and Board View 1



### EUT Housing and Board View 2



### EUT Housing and Board View 3

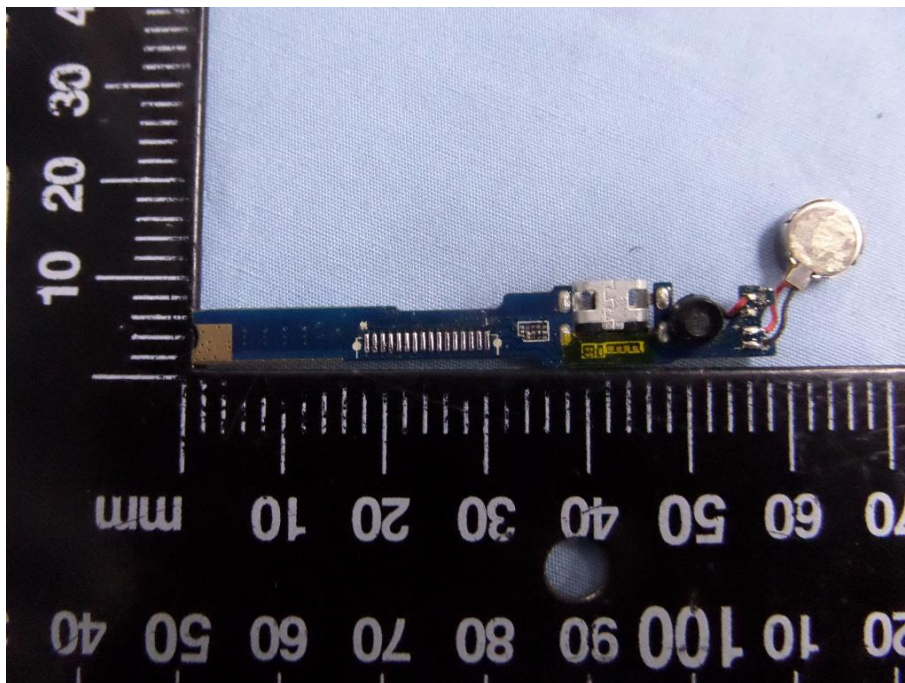


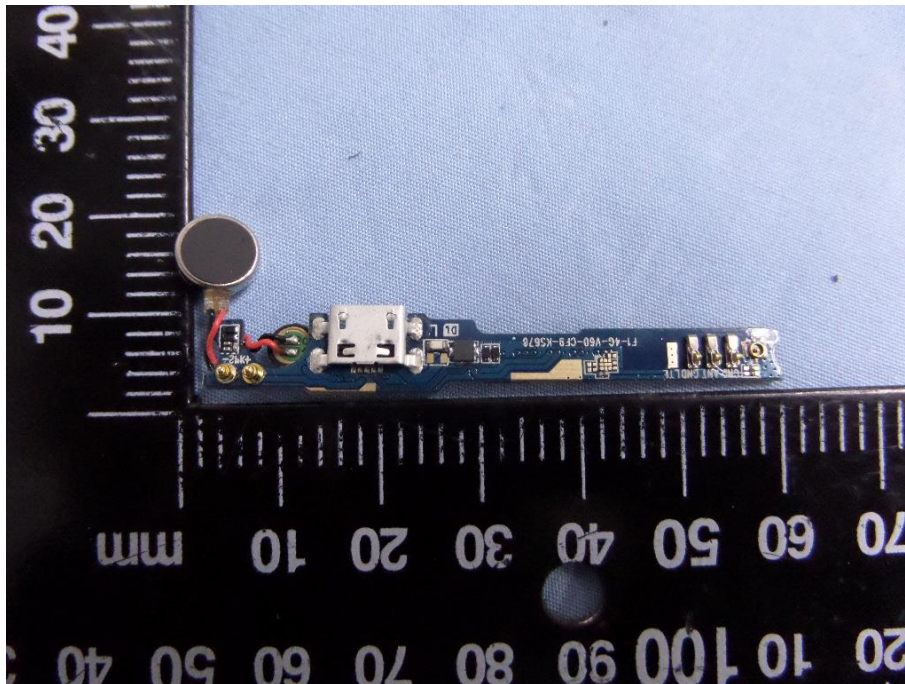
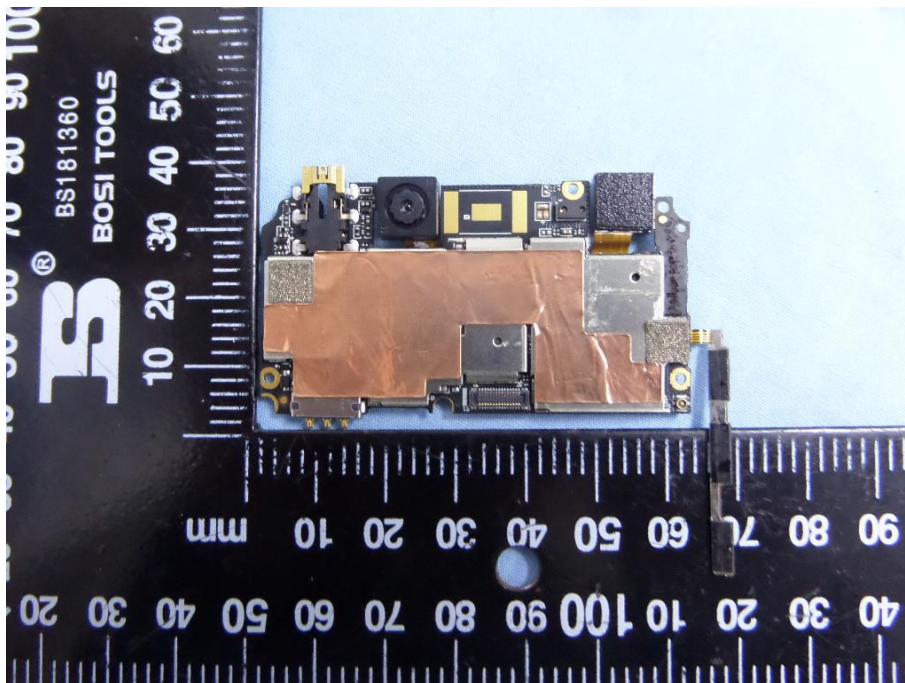


### EUT Housing and Board View 4

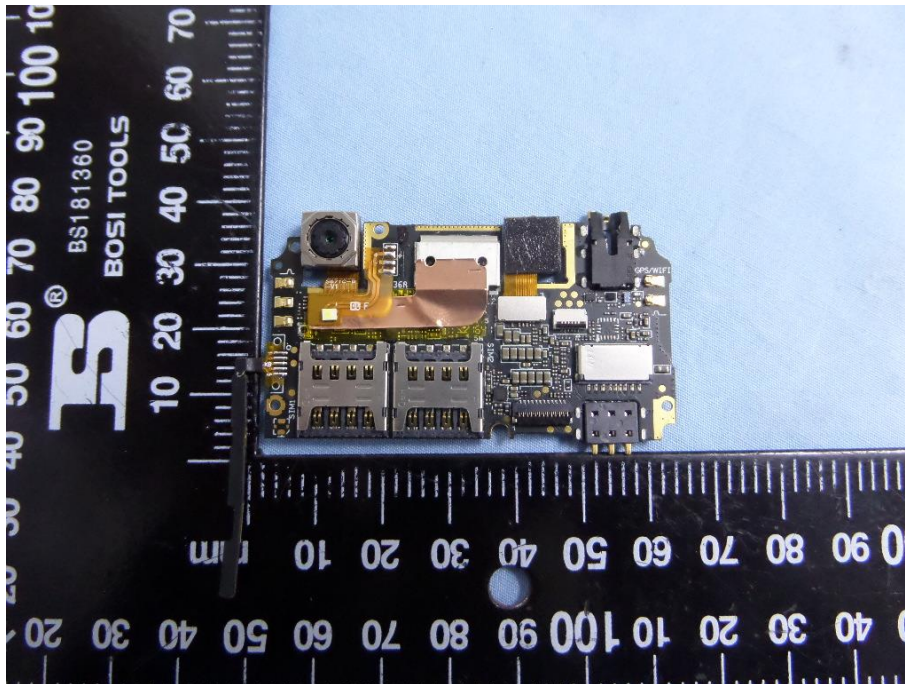
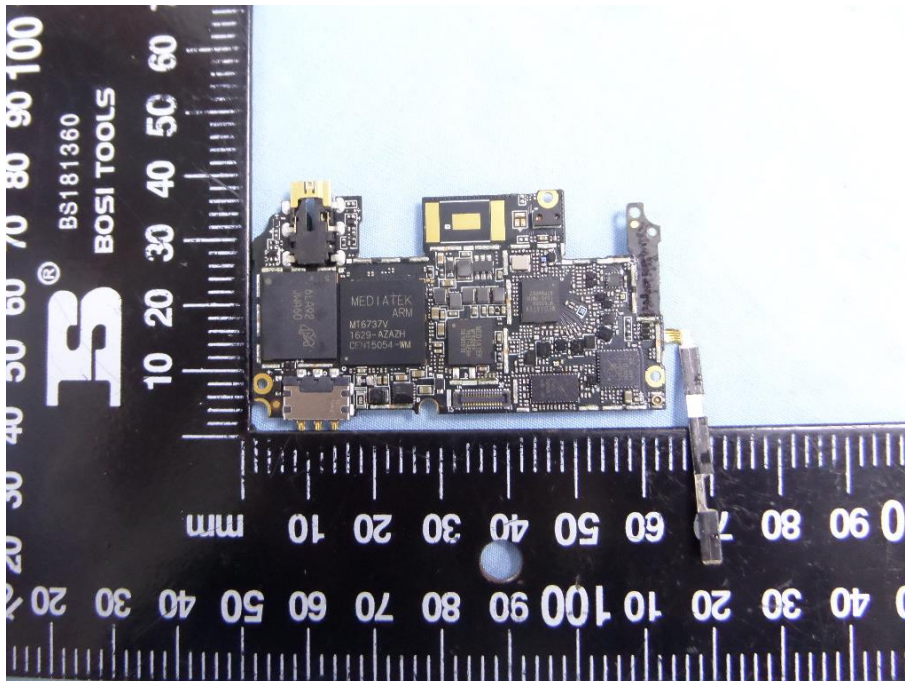


### Solder Board-Component View 1

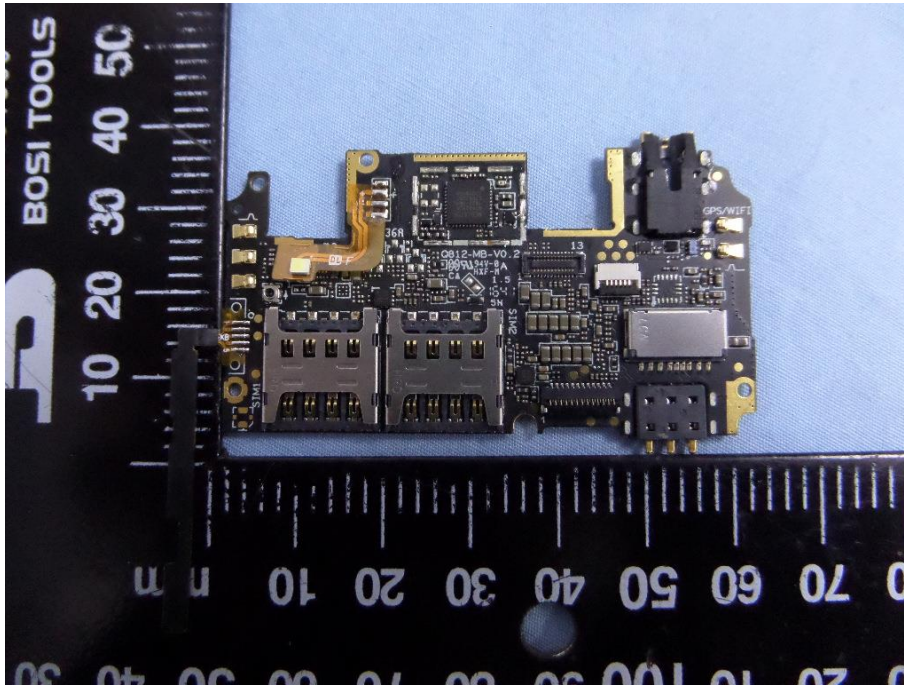


**Solder Board-Component View 2****Solder Board-Component View 3**

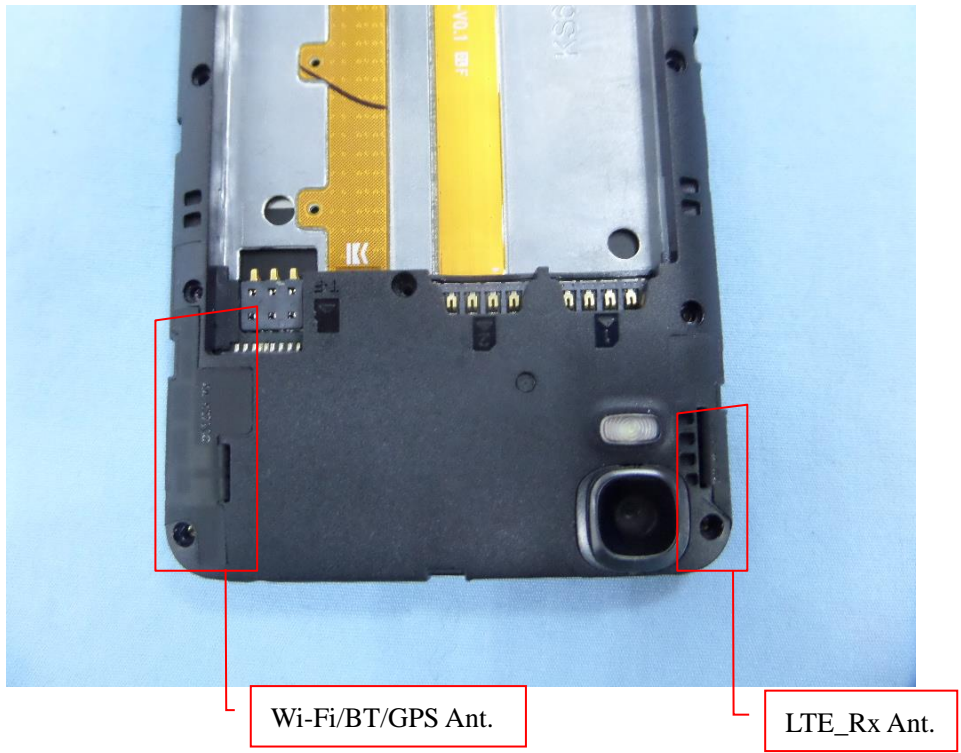


**Solder Board-Component View 4****Solder Board-Component View 5**

### Solder Board-Component View 6



### Antenna View



Wi-Fi/BT/GPS Ant.

LTE\_Rx Ant.



GSM/WCDMA/LTE Ant.



### EXHIBIT 3 - TEST SETUP PHOTOGRAPHS

#### Radio Test Suite 1



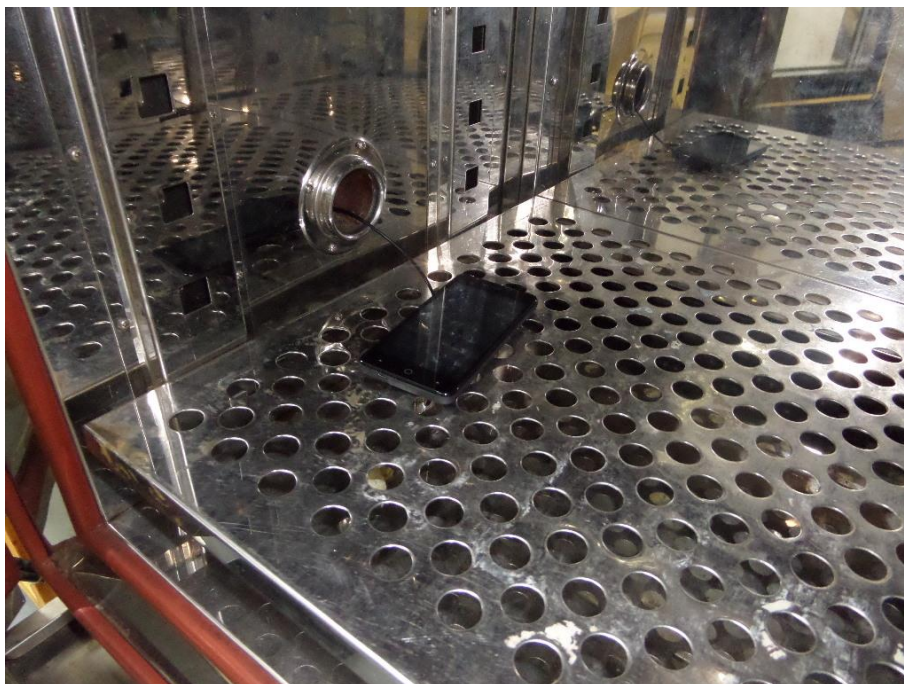
#### Spurious Emission Test Setup (Below 1GHz)



### Spurious Emission Test Setup (Above 1GHz)



### Extreme Condition Test Setup



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