SPECTRUM REPORT (GSM)

Applicant:	Pointer Telocation Inc.
Address of Applicant:	Pointer Telocation 7751 NW 48th street suite 395 Doral Florida 33166 Doral USA
Manufacturer/Factory:	Pointer Telocation Inc.
Address of Manufacturer/Factory:	Pointer Telocation 7751 NW 48th street suite 395 Doral Florida 33166 Doral USA

Equipment Under Test (EUT)

Product Name:	Cello Family
Model No.:	Cello-CANiQ K-line - CT7800136-000, Cello-IQ - CT7800123-000, Cello-CANiQ- CT7800137-000, Cello CANiQ (DTCO) - CT7800138-000
Trade Mark:	Pointer
Applicable standards:	ETSI EN 301 511 V12.5.1 (2017-03)
Date of sample receipt:	December 03, 2018
Date of Test:	December 04-12, 2018
Date of report issue:	December 13, 2018
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/53/EU are considered.

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*December 13, 2018*	*Original*

Prepared By: *Tiger Chen* ***Date:*** *December 13, 2018*

Project Engineer

Check By: *Robinson Lo* ***Date:*** *December 13, 2018*

Reviewer

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4 Test Summary

Radio Spectrum Matter (RSM) Part of Transmitter		
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Transmitter – Frequency error and phase error	Clause 4.2.1	Complied
Transmitter – Frequency error under multi path and interference conditions	Clause 4.2.2	Complied
Transmitter output power and burst timing	Clause 4.2.5	Complied
Transmitter - Output RF spectrum	Clause 4.2.6	Complied
Frequency error and phase error in GPRS multislot configuration	Clause 4.2.4	Complied
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Radio Spectrum Matter (RSM) Part of Receiver		
Test Item	Test Method	Result
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Adjacent channel rejection - EGPRS	Clause 4.2.40	Complied
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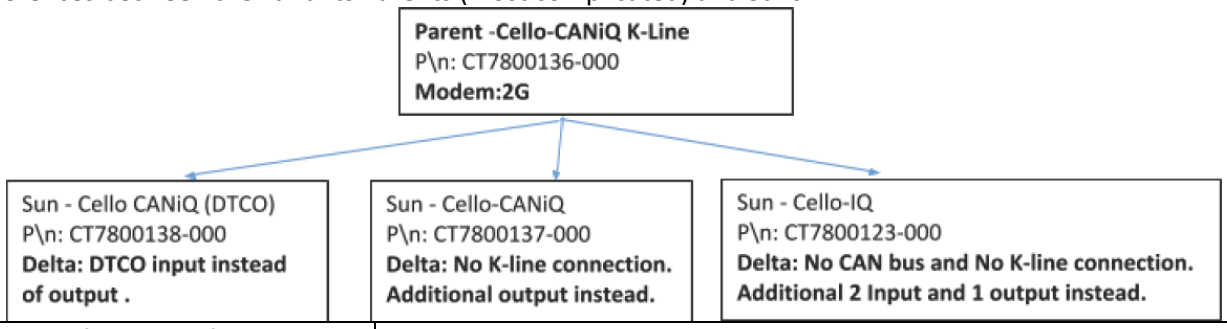
Minimum Input level for Reference Performance - GPRS	Clause 4.2.44	Complied
Minimum Input level for Reference Performance - EGPRS	Clause 4.2.45	Complied

5 General Information

5.1 General Description of EUT

Product Name:	Cello Family
Model No.:	Cello-CANiQ K-line - CT7800136-000, Cello-IQ - CT7800123-000, Cello-CANiQ- CT7800137-000, Cello CANiQ (DTCO) - CT7800138-000
Test Model No:	Cello-CANiQ K-line - CT7800136-000
Differences between the variants Parents (most complicated) and Suns :  	
Hardware Version:	PB1031 REV-E
Software Version:	38
Support Networks:	GSM, GPRS, EGPRS
TX Frequency:	E-GSM900: 880---915MHz DCS1800: 1710---1785MHz
Modulation Type:	GSM/GPRS: GMSK EGPRS: GMSK/8PSK
Antenna Type:	Integral Antenna
Antenna Gain:	2.00dBi
EGPRS/GPRS Class:	Class 12
Release Version:	R99
Power Supply:	DC 9-32V or DC 3.7V, 3.7Wh, 1000mAh by Lithium Ion Polymer Battery

5.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383, January 08, 2018.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

5.3 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China
Tel: 0755-27798480
Fax: 0755-27798960

5.4 Objective

The following type approved report of a radio equipment and system (RES) is prepared on behalf of the Pointer Telocation Inc. in accordance with EN 301 511 V12.5.1 (2017-03), Global System for Mobile communications (GSM); Harmonized EN for mobile stations in the EGSM 900 and DCS1800 bands.
The objective of the manufacturer is to determine compliance with EN 301 511 12.5.1 (2017-03), Global System for Mobile communications (GSM); Harmonized EN for mobile stations in the GSM 900 and GSM 1800 bands.
In order to determine compliance, the manufacturer or a contracted laboratory makes measurements and takes the necessary steps to ensure that the equipment complies with the appropriate technical standards.
Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the immunity should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing and/or I/O cable changes, etc.)

6 Test Instruments List

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019

7 System Test Configuration

7.1 Justification

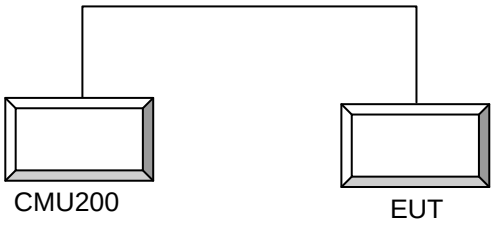
The EUT and test equipment were configured for testing according to EN 301 511 V12.5.1.

The EUT was tested in the normal operating mode to represent worst-case results during the final qualification test.

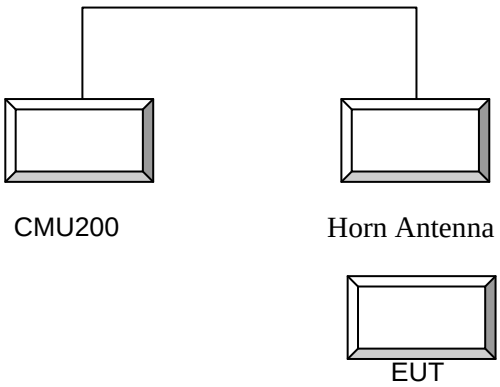
The EUT was tested with a dummy battery.

7.2 Test Setup

Conducted method



Radiated method



7.3 Environmental Conditions for Testing

General conditions (GC) as stated in TS 151 010-1 Annex 1 A1.1 apply.

Normal and extreme test conditions (TC) as stated in TS 151 010-1 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 voltagesIvoltage of 4.2V.

If not other noted, the temperature was in range of +15ºC to +35ºC, 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 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.

Item	Normal condition	Extreme condition			
		HVHT	LVHT	HVLT	LVLT
Temperature	+15ºC to + 35ºC	+55ºC	+55ºC	0ºC	0ºC
Voltage(DC)	12V	32V	9V	32V	9V
Humidity	20%-95%				

7.4 Measurement uncertainty

Measurement uncertainty for all the testing in this report is within the limit specified in 3GPP TS 51.010-1 Annex 5 for GSM and 3GPP TS 34.121-1 Annex F for WCDMA and 3GPP TS 36.521-1 Annex F for LTE.

Output power	±1dB
Wideband selective power	±1.5dB
Inband selective power	<1.6dB
Frequency Error	±5Hz
Conducted emissions	±3dB
Radiated emissions	±5dB

7.5 Test channel

onducted Power (dBm)						
Band	GSM900			DCS1800		
Channel	975	60	124	512	700	885
Frequency	880.2	902	914.8	1710.2	1747.8	1784.8
GSM (GMSK, 1 TX slot)	32.70	32.56	**32.81**	**30.90**	30.32	29.69
GPRS (GMSK, 1 TX slot)	32.56	32.50	32.54	29.84	29.26	28.76
GPRS (GMSK, 2 TX slot)	30.41	30.40	30.41	26.90	26.81	27.01
GPRS (GMSK, 3 TX slot)	29.45	29.40	29.38	25.83	26.13	25.98
GPRS (GMSK, 4 TX slot)	28.22	28.37	28.36	25.30	25.20	25.09
EGPRS (8PSK, 1 TX slot)	28.83	28.76	28.78	28.09	28.02	27.81
EGPRS (8PSK, 2 TX slot)	24.35	24.37	24.55	23.18	23.02	23.02
EGPRS (8PSK, 3 TX slot)	24.34	24.35	24.51	22.08	21.95	21.96
EGPRS (8PSK, 4 TX slot)	23.19	23.19	23.32	20.81	20.88	20.86

8 Measurement Data and Measurement Result

8.1 Transmitter Requirement

8.1.1 Frequency Error and Phase Error

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.1 and TS 151 010-1 clause 13.1

Limit

Frequency error: less than 0.1 ppm

Phase error:

RMS phase error: not exceed 5 degrees

Individual phase error: not exceed 20 degrees

Test Procedure

a. For one transmitted burst, the SS captures the signal as a series of phase samples over the period of the burst. These samples are evenly distributed over the duration of the burst with a minimum sampling rate of 2/T, where T is the modulation symbol period. The received phase trajectory is then represented by this array of at least 294 samples.

b. The SS then calculates, from the known bit pattern and the formal definition of the modulator contained in 3GPP TS 05.04, the expected phase trajectory.

c. From a) and b) the phase trajectory error is calculated, and a linear regression line computed through this phase trajectory error. The slope of this regression line is the frequency error of the mobile transmitter relative to the simulator reference. The difference between the regression line and the individual sample points is the phase error of that point.

Test result ***Complied***

Measurement Data

Operation mode:	*GSM900*	*Test channel:*	*60*

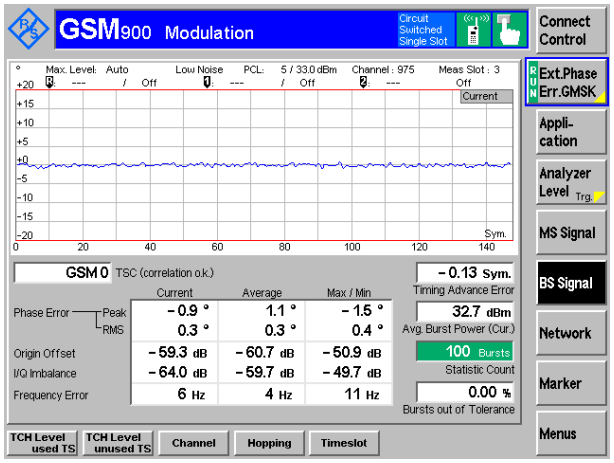
MS under maximum level							
Test Condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase Type	Phase Error (degree)	Limit (degree)	Result
Normal	7	90.2	Pass	RMS	0.3	5	Pass
				Peak	1.0	20	Pass
LT LV	8	90.2	Pass	RMS	0.4	5	Pass
				Peak	1.1	20	Pass
LT HV	7	90.2	Pass	RMS	0.3	5	Pass
				Peak	0.9	20	Pass
HT LV	11	90.2	Pass	RMS	0.3	5	Pass
				Peak	1.0	20	Pass
HT HV	10	90.2	Pass	RMS	0.3	5	Pass
				Peak	1.4	20	Pass
Vibration	12	90.2	Pass	RMS	0.4	5	Pass
				Peak	0.8	20	Pass
MS under minimum level							
Test Condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase Type	Phase Error (degree)	Limit (degree)	Result
Normal	4	90.2	Pass	RMS	0.4	5	Pass
				Peak	1.3	20	Pass
LT LV	11	90.2	Pass	RMS	0.5	5	Pass
				Peak	1.4	20	Pass
LT HV	10	90.2	Pass	RMS	0.3	5	Pass
				Peak	1.1	20	Pass
HT LV	11	90.2	Pass	RMS	0.5	5	Pass
				Peak	1.8	20	Pass
HT HV	11	90.2	Pass	RMS	0.5	5	Pass
				Peak	1.3	20	Pass
Vibration	13	90.2	Pass	RMS	0.4	5	Pass
				Peak	1.1	20	Pass

Operation mode:	*DCS1800*	*Test channel:*	*700*

MS under maximum level							
Test Condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase Type	Phase Error (degree)	Limit (degree)	Result
Normal	8	174.78	Pass	RMS	0.6	5	Pass
				Peak	2.3	20	Pass
LT LV	9	174.78	Pass	RMS	0.7	5	Pass
				Peak	2.3	20	Pass
LT HV	11	174.78	Pass	RMS	1.1	5	Pass
				Peak	3.6	20	Pass
HT LV	14	174.78	Pass	RMS	0.5	5	Pass
				Peak	1.5	20	Pass
HT HV	9	174.78	Pass	RMS	0.5	5	Pass
				Peak	1.4	20	Pass
Vibration	10	174.78	Pass	RMS	0.6	5	Pass
				Peak	2.4	20	Pass
MS under minimum level							
Test Condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase Type	Phase Error (degree)	Limit (degree)	Result
Normal	10	174.78	Pass	RMS	0.6	5	Pass
				Peak	1.9	20	Pass
LT LV	11	174.78	Pass	RMS	0.7	5	Pass
				Peak	2.2	20	Pass
LT HV	13	174.78	Pass	RMS	0.6	5	Pass
				Peak	2.3	20	Pass
HT LV	18	174.78	Pass	RMS	0.5	5	Pass
				Peak	1.8	20	Pass
HT HV	11	174.78	Pass	RMS	0.4	5	Pass
				Peak	2.8	20	Pass
Vibration	19	174.78	Pass	RMS	0.7	5	Pass
				Peak	2.4	20	Pass

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	GSM900	Test Condition:	Normal	Test channel:	975



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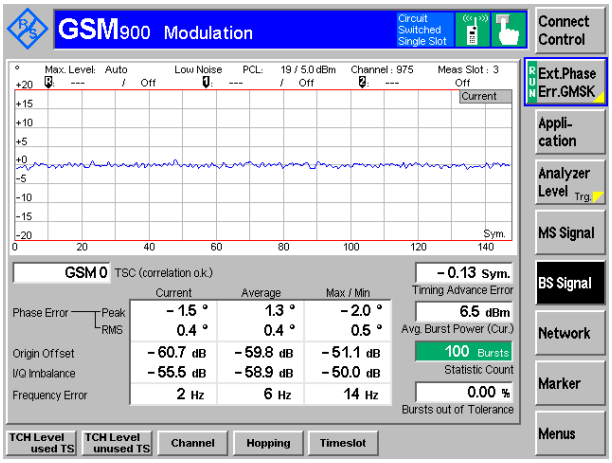

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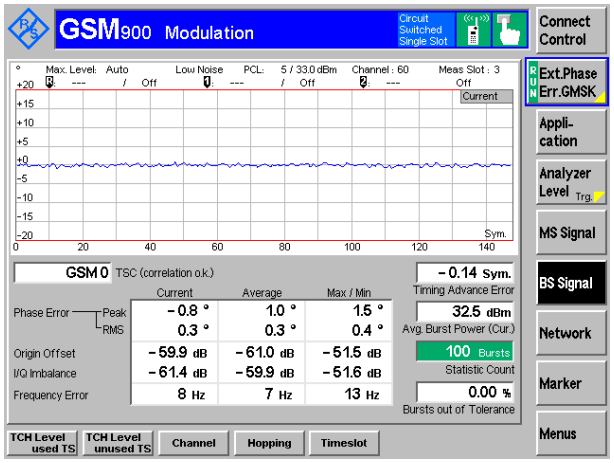
Operation mode:	GSM900	Test Condition:	Normal	Test channel:	60



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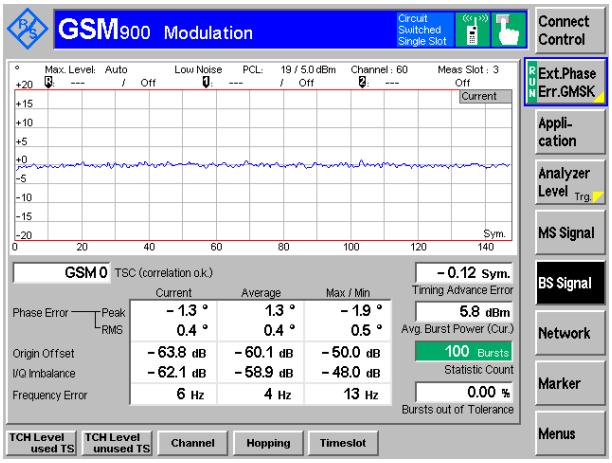

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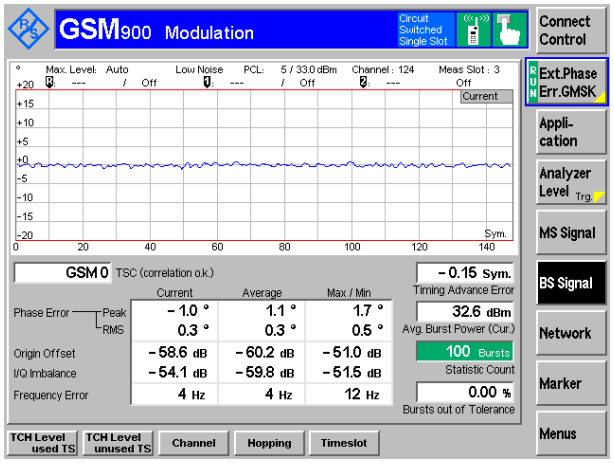
Operation mode:	GSM900	Test Condition:	Normal	Test channel:	124



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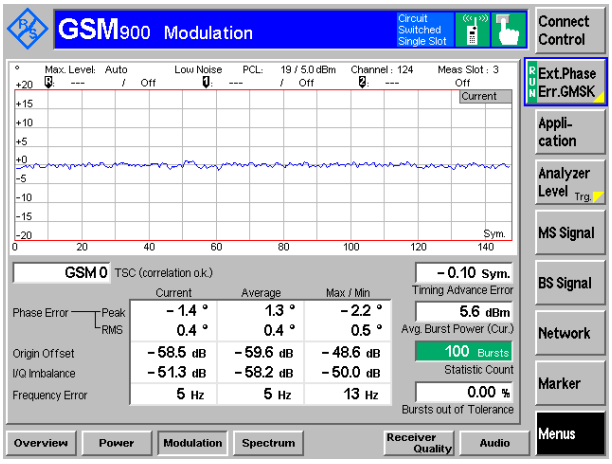

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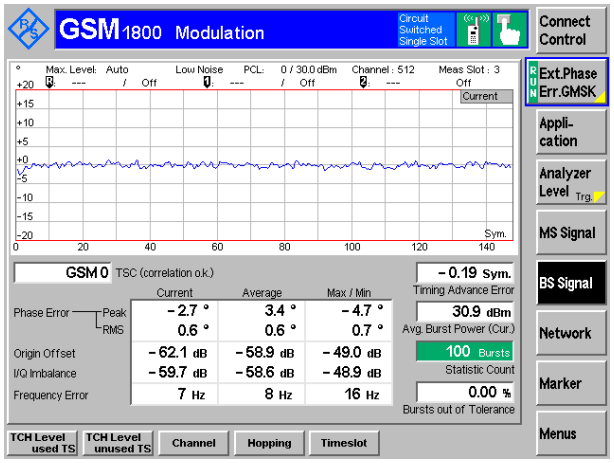
Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	512



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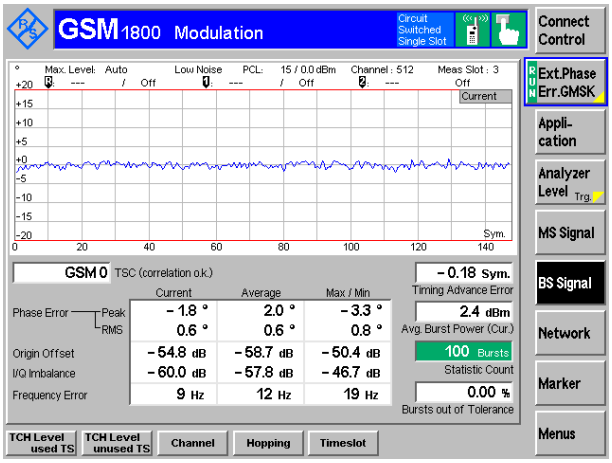

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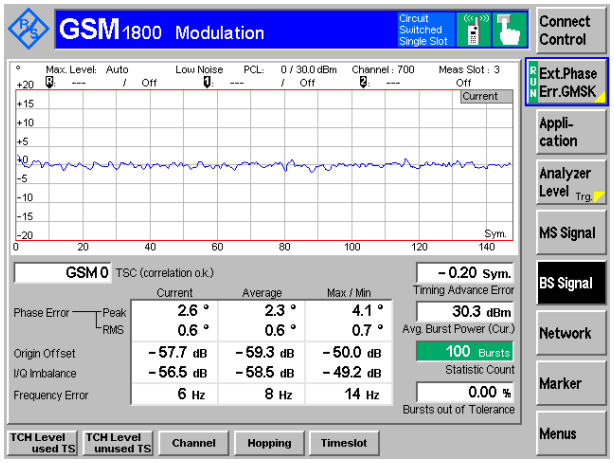
Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	700



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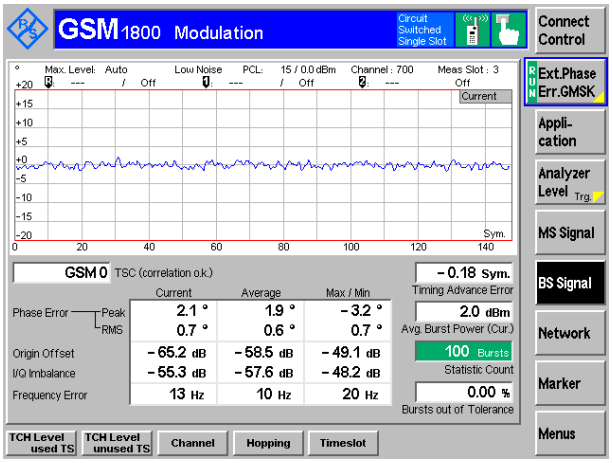

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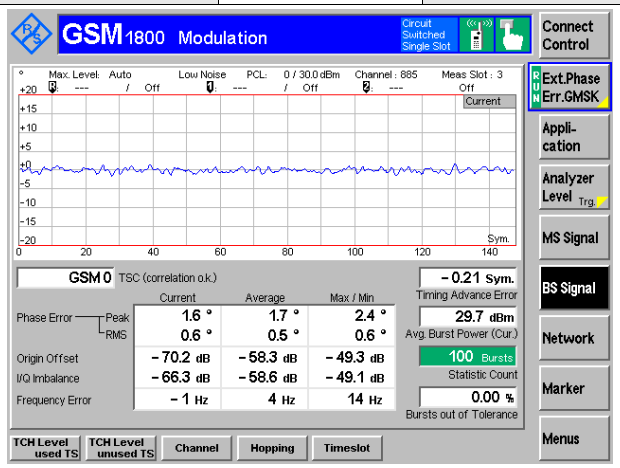
Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	885



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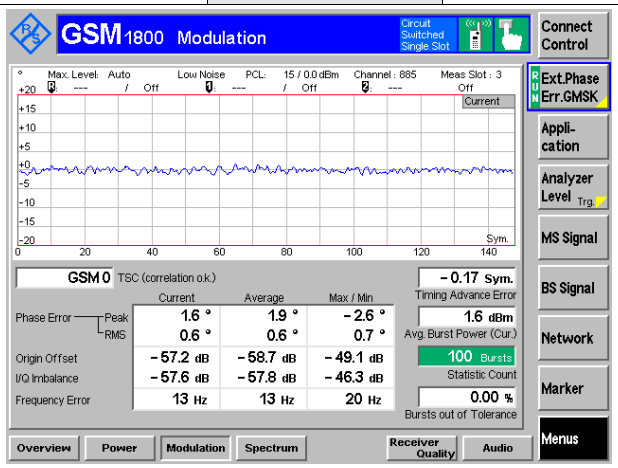

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8.1.2 Frequency Error Under Multipath and Interference Conditions

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.2 and TS 151 010-1 clause 13.2

Limit

GSM 900		DCS 1800	
Condition	Limit	Condition	Limit
RA250	±300 Hz	RA130	±400 Hz
HT100	±180 Hz	HT100	±350 Hz
TU50	±160 Hz	TU50	±260 Hz
TU3	±230 Hz	TU1.5	±320 Hz

Test Procedure

a. The level of the serving cell BCCH is set to 10 dB above the reference sensitivity level( ) and the Fading function set to RA. The SS waits 30 s for the MS to stabilize to these conditions. The SS is set up to capture the first burst transmitted by the MS during call establishment. A call is initiated by the SS on a channel in the mid ARFCN range as described for the generic call set up procedure but to a TCH at level 10 dB above the reference sensitivity level( ) and fading function set to RA

b. The SS calculates the frequency accuracy of the captured burst as described in test 13.1.

c. The SS sets the serving cell BCCH and TCH to the reference sensitivity level( ) applicable to the type of MS, still with the fading function set to RA and then waits 30 s for the MS to stabilize to these conditions.

d. The SS shall capture subsequent bursts from the traffic channel in the manner described in test 13.1

e. The SS calculates the frequency accuracy of the captured burst as described in test 13.1.

f. Steps d) and e) are repeated for 5 traffic channel bursts spaced over a period of not less than 20 s.

g. The initial conditions are established again and steps a) to f) are repeated but with the fading function set to HT100 (HT200 for GSM 400, HT120 for GSM 700).

h. The initial conditions are established again and steps a) to f) are repeated but with the fading function set toTU50 (TU100 for GSM 400, TU 60 for GSM 700).

i. The initial conditions are established again and steps a) and b) are repeated but with the following differences:
- the levels of the BCCH and TCH are set to 18 dB above reference sensitivity level( ).
- two further independent interfering signals are sent on the same nominal carrier frequency as the BCCH
- and TCH and at a level 10 dB below the level of the TCH and modulated with random data, including the mid amble.
- the fading function for all channels is set to TUlow.

j. The SS waits 100 s for the MS to stabilize to these conditions.

k. Repeat steps d) to f), except that at step f) the measurement period must be extended to 200 s and the number of measurements increased to 20.

l. The initial conditions are established again and steps a) to k) are repeated for ARFCN in the Low ARFCN range.

m. The initial conditions are established again and steps a) to k) are repeated for ARFCN in the High ARFCN range.

n. Repeat step h) under extreme test conditions

Test result	***Complied***

Measurement Data

Operation mode:	*GSM900*	*Test channel:*	*60*

Test Condition		Frequency error (Hz)		Limit (Hz)	Result
		maximum power	minimum power		
Normal	RA250	33	33	±300 Hz	Pass
	HT100	34	50	±180 Hz	
	TU50	21	41	±160 Hz	
	TU3	45	56	±230 Hz	
LT LV	RA250	31	47	±300 Hz	Pass
	HT100	33	37	±180 Hz	
	TU50	31	22	±160 Hz	
	TU3	36	37	±230 Hz	
LT HV	RA250	32	21	±300 Hz	Pass
	HT100	29	44	±180 Hz	
	TU50	57	25	±160 Hz	
	TU3	43	56	±230 Hz	
HT LV	RA250	37	50	±300 Hz	Pass
	HT100	22	33	±180 Hz	
	TU50	26	48	±160 Hz	
	TU3	58	35	±230 Hz	
HT HV	RA250	26	40	±300 Hz	Pass
	HT100	29	32	±180 Hz	
	TU50	48	29	±160 Hz	
	TU3	56	47	±230 Hz	

Operation mode:	*DCS 1800*	*Test channel:*	*700*

Test Condition		Frequency error (Hz)		Limit (Hz)	Result
		maximum power	minimum power		
Normal	RA130	31	30	±400 Hz	Pass
	HT100	29	38	±350 Hz	
	TU50	55	21	±260 Hz	
	TU1.5	36	47	±320 Hz	
LT LV	RA130	25	31	±400 Hz	Pass
	HT100	42	34	±350 Hz	
	TU50	41	30	±260 Hz	
	TU1.5	50	32	±320 Hz	
LT HV	RA130	36	60	±400 Hz	Pass
	HT100	42	57	±350 Hz	
	TU50	41	55	±260 Hz	
	TU1.5	26	20	±320 Hz	
HT LV	RA130	52	60	±400 Hz	Pass
	HT100	58	43	±350 Hz	
	TU50	34	54	±260 Hz	
	TU1.5	53	48	±320 Hz	
HT HV	RA130	52	22	±400 Hz	Pass
	HT100	37	53	±350 Hz	
	TU50	31	24	±260 Hz	
	TU1.5	20	21	±320 Hz	

8.1.3 Transmitter Output Power and Burst Timing

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.5 and TS 151 010-1 clause 13.3

Limit

1. The MS maximum output power shall be with a tolerance of ±2 dB under normal conditions for GMSK modulation
2. The MS maximum output power shall be with a tolerance of ±2,5 dB under extreme conditions for GMSK modulation
3. The nominal output power levels 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
4. The nominal output power levels 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
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)
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:
   - Under normal conditions; 3GPP TS 05.05, sub clause 4.5.2.
   - Under extreme conditions; 3GPP TS 05.05, sub clause 4.5.2, 3GPP TS 05.05 annex D in sub clauses 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:
   - Under normal conditions; 3GPP TS 05.10, sub clause 6.4.
   - Under extreme conditions; 3GPP TS 05.10, sub clause 6.4, 3GPP TS 05.05 annex D in sub clauses 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:
   - Under normal conditions; 3GPP TS 05.05, sub clause 4.5.2.
   - Under extreme conditions; 3GPP TS 05.05, sub clause 4.5.2, 3GPP TS 05.05 annex D in sub clause D.2.1 and D.2.2.
10. The MS shall use a TA value of 0 for the Random Access burst sent:
    - Under normal conditions; 3GPP TS 05.10, sub clause 6.6.
    - Under extreme conditions; 3GPP TS 05.10, sub clause 6.6, 3GPP TS 05.05 annex D in sub clause D.2.1 and D.2.2.

Test Procedure

a. Measurement of normal burst transmitter output power.
   - The SS takes power measurement samples evenly distributed over the duration of one burst with a sampling rate of at least 2/T, where T is the bit duration. The samples are identified in time with respect to the modulation on the burst. The SS identifies the centre of the useful 147 transmitted bits, i.e. the transition from bit 13 to bit 14 of the mid amble, as the timing reference.
   - The transmitter output power is calculated as the average of the samples over the 147 useful bits. This is also used as the 0 dB reference for the power/time template.

b. Measurement of normal burst timing delay.
The burst timing delay is the difference in time between the timing reference identified in a) and the corresponding transition in the burst received by the MS immediately prior to the MS transmit burst sampled.

c. Measurement of normal burst power/time relationship.
The array of power samples measured in a) are referenced in time to the centre of the useful transmitted bits and in power to the 0 dB reference, both identified in a).

d. Steps a) to c) are repeated with the MS commanded to operate on each of the power control levels defined, even those not supported by the MS.

e. The SS commands the MS to the maximum power control level supported by the MS and steps a) to c) are repeated for ARFCN in the Low and High ranges.

f. Measurement of access burst transmitter output power.
   - The SS causes the MS to generate an Access Burst on an ARFCN in the Mid ARFCN range, this could be either by a handover procedure or a new request for radio resource. In the case of a handover procedure the Power Level indicated in the HANDOVER COMMAND message is the maximum power control level supported by the MS.
   - The SS takes power measurement samples evenly distributed over the duration of the access burst as described in a). However, in this case the SS identifies the centre of the useful bits of the burst by identifying the transition from the last bit of the synch sequence.
   - The transmitter output power is calculated as the average of the samples over the 87 useful bits of the burst. This is also used as the 0 dB reference for the power/time template.

g. Measurement of access burst timing delay.
The burst timing delay is the difference in time between the timing reference identified in f) and the MS received data on the common control channel.

h. Measurement of access burst power/time relationship.
The array of power samples measured in f) are referenced in time to the centre of the useful transmitted bits and in power to the 0 dB reference, both identified in f).

i. The SS commands the MS to the maximum power control level supported by the MS and steps a) to c) are repeated for ARFCN in the Low and High ranges.

j. Depending on the method used in step f) to cause the MS to send an Access Burst, the SS sends either a HANDOVER COMMAND with power control level set to 10 or it changes the System Information elements MS_TXPWR_MAX_CCH and for DCS 1 800 the POWER_OFFSET on the serving cell BCCH in order to limit the MS transmit power on the Access Burst to power control level 10 (+23 dBm for GSM 400, GSM 700, GSM 850, and GSM 900 or +10 dBm for DCS 1 800 and PCS 1 900) and then steps f) to h) are repeated.

k. Steps a) to i) are repeated under extreme test conditions (annex 1, TC2.2) except that the repeats at step d) are only performed for power control level 10 and the minimum power control level of the MS.

Test result ***Complied***

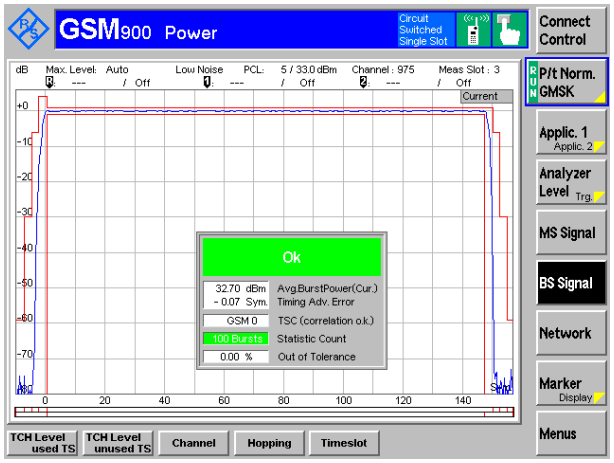
GSM900: Lowest channel 975						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
5	32.70	32.58	32.17	32.06	32.07	Pass
6	30.20	30.40	30.31	30.60	30.20	
7	28.26	28.89	28.36	28.28	28.85	
8	26.14	26.78	26.00	26.51	26.45	
9	24.00	24.33	24.01	24.21	24.73	
10	22.94	22.60	22.61	22.21	22.06	
11	20.59	20.99	20.41	20.99	20.96	
12	18.86	18.60	18.01	18.65	18.22	
13	16.84	16.53	16.62	16.75	16.15	
14	14.78	14.04	14.57	14.23	14.32	
15	12.72	12.12	12.90	12.04	12.57	
16	10.68	10.50	10.29	11.00	10.60	
17	8.66	8.79	8.44	8.38	8.31	
18	6.62	6.80	7.00	6.31	6.56	
19	6.61	5.12	5.09	5.11	5.23	

GSM900: Middle channel 60						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
5	32.56	32.78	32.15	32.56	32.10	Pass
6	30.06	30.52	30.15	30.90	30.83	
7	28.02	28.09	28.65	28.52	28.06	
8	26.00	26.91	26.45	26.15	26.32	
9	23.96	24.11	24.82	24.74	24.29	
10	20.90	22.17	22.70	22.70	22.52	
11	17.86	20.68	20.48	20.28	20.40	
12	15.82	18.79	18.53	18.89	18.85	
13	13.80	16.39	16.14	16.59	16.53	
14	11.74	14.78	14.20	14.98	14.61	
15	9.68	12.58	12.97	12.26	12.28	
16	7.64	10.54	10.19	10.67	10.73	
17	6.18	8.90	8.87	8.57	8.06	
18	5.72	6.33	6.21	6.78	6.57	
19	5.85	5.28	5.29	5.85	5.64	

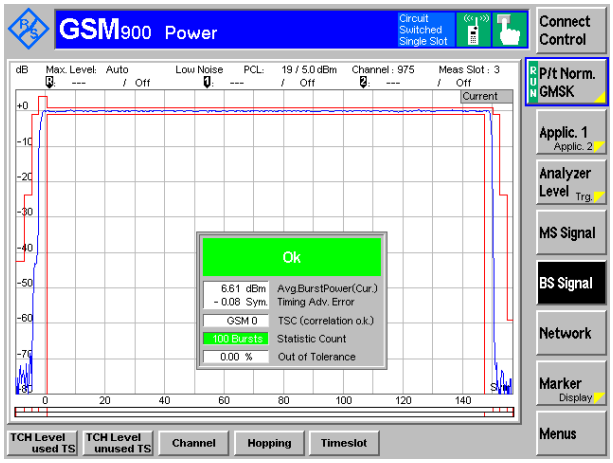
GSM900: Highest channel 124						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
5	32.81	32.55	32.08	32.37	32.42	Pass
6	30.34	30.19	30.20	30.15	30.37	
7	28.30	28.19	28.60	28.49	28.37	
8	26.28	26.47	26.02	26.63	26.54	
9	24.24	24.42	24.57	24.18	24.51	
10	22.18	22.98	22.15	22.22	22.38	
11	20.14	20.49	20.07	20.87	20.57	
12	18.10	18.08	18.17	18.17	18.59	
13	16.08	16.77	16.63	16.57	16.76	
14	14.02	14.94	14.14	14.72	14.79	
15	12.96	12.17	12.58	12.03	12.50	
16	10.92	10.58	10.34	10.82	10.05	
17	8.90	8.21	8.34	8.97	8.13	
18	6.89	6.64	6.56	6.38	6.87	
19	5.62	5.55	5.29	5.87	5.80	

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	GSM900	Test Condition:	Normal	Test channel:	975

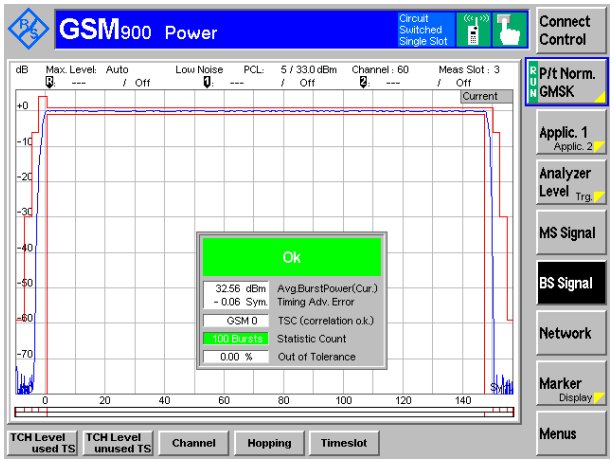


Level 5



Level 19

Operation mode:	GSM900	Test Condition:	Normal	Test channel:	60



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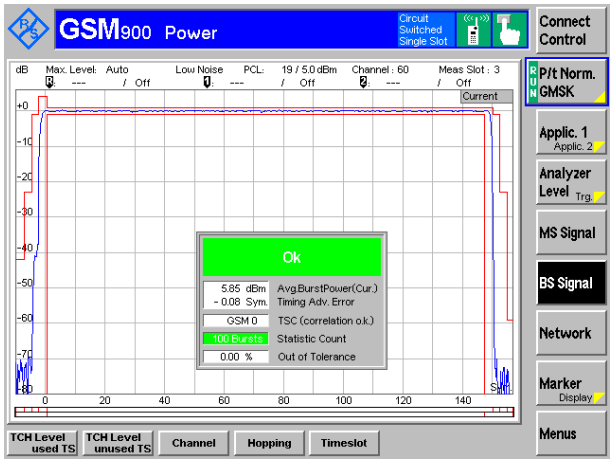
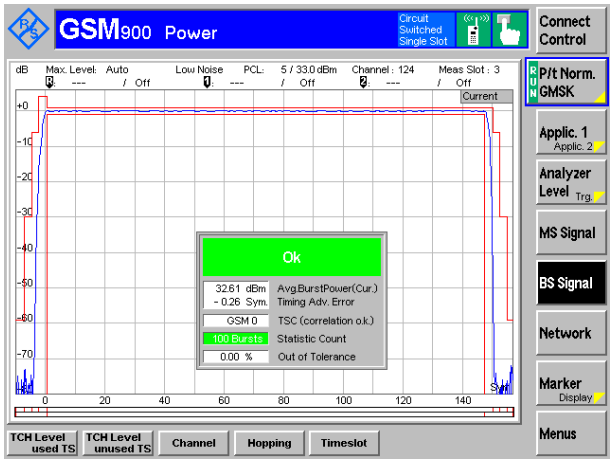
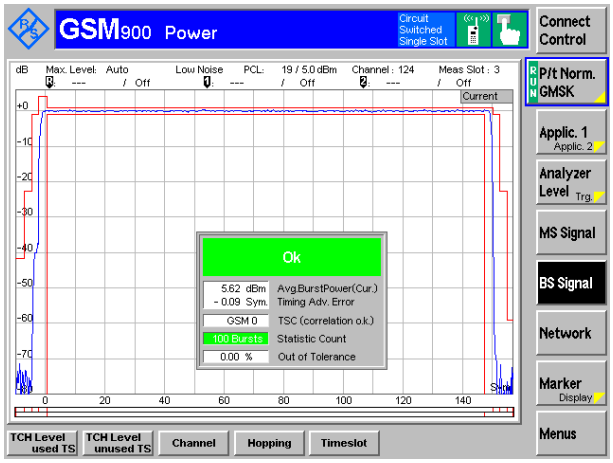


Level 19

Operation mode:	GSM900	Test Condition:	Normal	Test channel:	124



Level 5



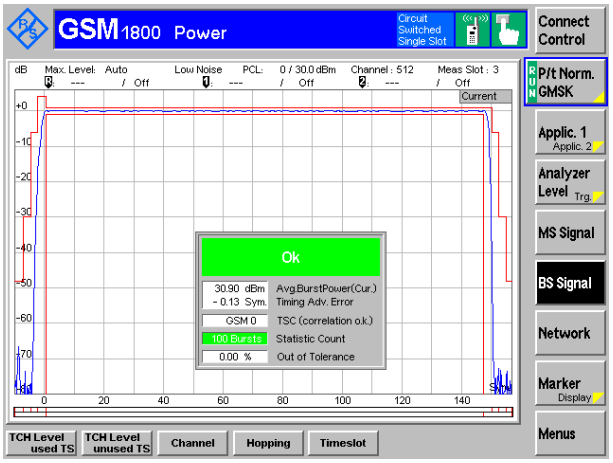
Level 19

DCS1800: Lowest channel 512						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
0	30.90	30.50	30.15	30.57	30.90	Pass
1	28.21	28.27	28.14	28.58	28.08	
2	26.17	26.74	26.92	26.59	26.88	
3	24.15	24.89	24.15	24.76	24.21	
4	22.11	22.24	22.55	22.83	22.61	
5	20.05	20.11	20.56	20.06	20.26	
6	18.01	18.94	18.51	18.15	18.54	
7	16.97	16.85	16.35	16.32	16.28	
8	14.95	14.11	14.99	14.03	14.78	
9	12.89	12.87	12.84	12.19	12.28	
10	10.83	10.25	10.25	10.93	10.22	
11	8.79	8.33	8.53	8.32	8.90	
12	6.77	6.25	6.98	6.47	6.08	
13	5.31	5.96	5.87	5.07	5.03	
14	4.20	4.98	4.79	4.92	4.36	
15	3.39	3.46	3.42	3.79	3.13	

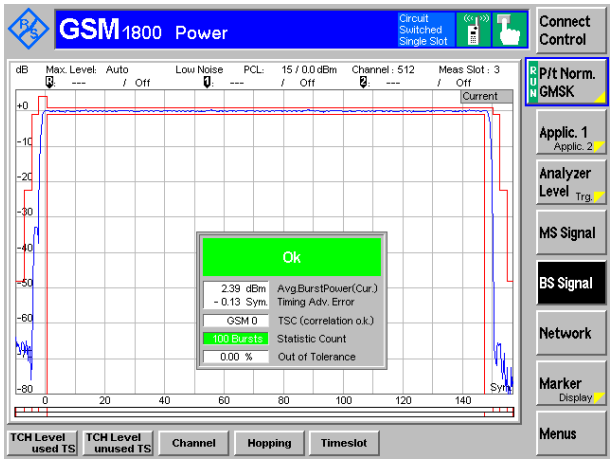
DCS1800: Middle channel 700						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
0	30.32	29.70	29.68	29.19	29.87	Pass
1	27.89	26.58	26.38	26.96	26.44	
2	25.73	25.12	25.12	25.14	25.18	
3	23.87	23.23	23.69	23.91	23.78	
4	21.83	21.83	21.23	21.10	21.05	
5	18.77	18.23	18.71	18.41	18.91	
6	16.73	16.35	16.26	16.52	16.72	
7	14.69	14.90	14.25	14.48	14.43	
8	12.67	13.60	13.92	13.52	13.95	
9	10.61	10.25	10.01	10.89	10.02	
10	8.55	8.30	8.27	8.03	8.34	
11	6.51	6.42	6.02	6.27	6.36	
12	4.49	4.00	4.77	4.17	4.45	
13	3.45	3.77	3.25	3.01	3.18	
14	2.39	2.70	2.38	2.21	2.35	
15	1.99	1.13	1.31	1.70	1.84	

DCS1800: Highest channel 885						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
0	29.69	28.64	28.82	28.75	28.30	Pass
1	27.16	26.14	26.38	26.74	26.42	
2	25.80	25.56	25.45	25.40	25.23	
3	23.54	23.30	23.36	23.33	23.94	
4	21.50	21.33	21.82	21.42	21.89	
5	19.44	19.97	19.05	19.54	19.53	
6	17.40	17.14	17.81	17.25	17.29	
7	15.36	15.29	15.54	15.98	15.62	
8	13.34	13.80	13.35	13.34	13.47	
9	11.28	11.45	11.65	11.86	11.48	
10	9.22	9.20	9.01	9.68	9.53	
11	7.18	7.72	7.87	7.42	7.36	
12	5.16	5.17	5.73	5.15	5.38	
13	4.12	4.69	4.84	4.42	4.05	
14	3.16	3.40	3.91	3.58	3.40	
15	1.61	1.50	1.97	1.35	1.12	

Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	512

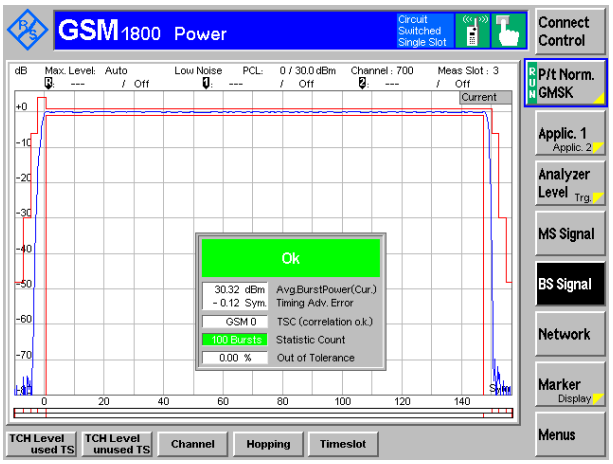


Level 0

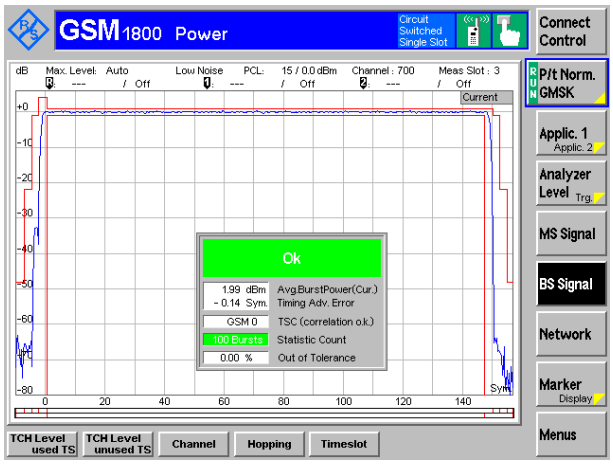


Level 15

Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	700

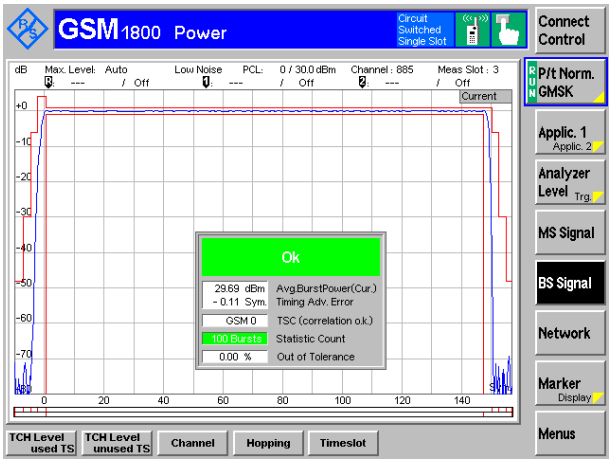


Level 0

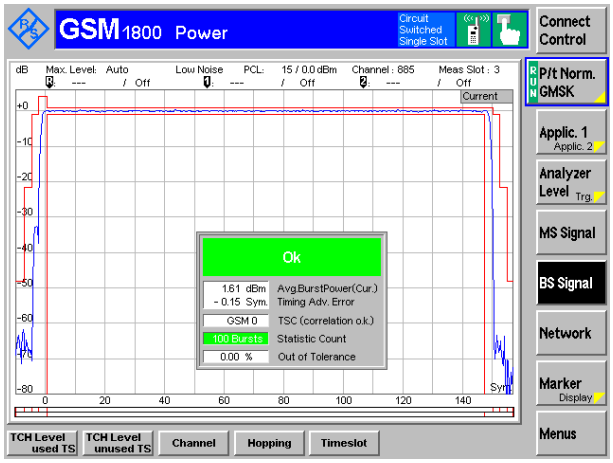


Level 15

Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	885



Level 0



Level 15

8.1.4 Transmitter-Output RF Spectrum

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.6 and TS 151 010-1 clause 13.4

Limit

a. -36 dBm: below 600 kHz offset from the carrier;

-51 dBm: for GSM 400, GSM 700, T_GSM 810, 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, T_GSM 810, 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;

b. 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 6000 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.

c. Spurious emissions in the MS receive bands.

Band (MHz)	Spurious emissions level (dBm)	
	GSM 400, T-GSM 810,, GSM 900 and DCS 1 800	GSM 700, GSM 850 and PCS 1 900
460.4 – 467.6 (GSM 400 MS only)	-67	-
488.8 - 496 (GSM 400 MS only)	-67	-
850 to 866 (T-GSM 810 MS only)	-79	-
925 to 935	-67	-
935 to 960	-79	-
1 805 to 1 880	-71	-
728 to 736	-	-73
736 to 746	-	-79
747 to 757	-	-79
757 to 763	-	-73
869 to 894	-	-79
1 930 to 1 990	-	-71

Test Procedure

a. In steps b) to h) the FT is equal to the hop pattern ARFCN in the Mid ARFCN range.

b. The other settings of the spectrum analyzer are set as follows:

- Zero frequency scan;
- Resolution bandwidth: 30 kHz;
- Video bandwidth: 30 kHz;
- Video averaging: may be used, depending on the implementation of the test.

The video signal of the spectrum analyzer is "gated" such that the spectrum generated by at least 40 of the bits 87 to 132 of the burst is the only spectrum measured. This gating may be analogue or numerical, dependent upon the design of the spectrum analyzer. Only measurements during transmitted bursts on the nominal carrier of the measurement are included. The spectrum analyzer averages over the gated period and over 200 or 50 such bursts, using numerical and/or video averaging.

The MS is commanded to its maximum power control level.

c. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured over 50 bursts at all multiples of 30 kHz offset from FT to < 1 800 kHz.

d. The resolution and video bandwidth on the spectrum analyzer are adjusted to 100 kHz and the measurements are made at the following frequencies:

- on every ARFCN from 1 800 kHz offset from the carrier to the edge of the relevant transmit band for each measurement over 50 bursts;
- at 200 kHz intervals over the 2 MHz either side of the relevant transmit band for each measurement over 50 bursts.

e. The MS is commanded to its minimum power control level. The spectrum analyzer is set again as in b).

f. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured over 200 bursts at the following frequencies:

FT;

FT + 100 kHz FT - 100 kHz;

FT + 200 kHz FT - 200 kHz;

FT + 250 kHz FT - 250 kHz;

FT + 200 kHz * N FT - 200 kHz * N;

where N = 2, 3, 4, 5, 6, 7, and 8; and FT = RF channel nominal centre frequency

g. The spectrum analyzer settings are adjusted to:

- Zero frequency scan;
- Resolution bandwidth: 30 kHz;
- Video bandwidth: 100 kHz;
- Peak hold.

The spectrum analyzer gating of the signal is switched off.

The MS is commanded to its maximum power control level.

h. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured at the following frequencies:

FT + 400 kHz FT - 400 kHz;

FT + 600 kHz FT - 600 kHz;

FT + 1,2 MHz FT - 1,2 MHz;

FT + 1,8 MHz FT - 1,8 MHz;

where FT = RF channel nominal centre frequency.

The duration of each measurement (at each frequency) will be such as to cover at least 10 burst transmissions at FT.

i. Step h) is repeated for power control levels 7 and 11.

j. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured at the following frequencies:

k. Steps b), f), g) and h) are repeated with FT equal to the hop pattern ARFCN in the High ARFCN range except that in step g) the MS is commanded to power control level 11 rather than maximum power.

l. Steps a) b) f) g) and h) are repeated under extreme test conditions (annex 1, TC2.2). except that at step g) the MS is commanded to power control level 11.

Test result ***Complied***

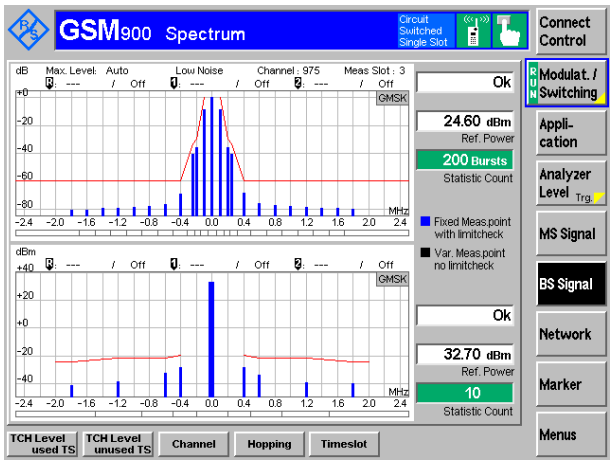
Measurement Data

GSM900						
Test Condition	Lowest channel 975		Middle channel 60		Highest channel 124	
	Level 5	Level 19	Level 5	Level 19	Level 5	Level 19
Normal	Pass	Pass	Pass	Pass	Pass	Pass
LT LV	Pass	Pass	Pass	Pass	Pass	Pass
LT HV	Pass	Pass	Pass	Pass	Pass	Pass
HT LV	Pass	Pass	Pass	Pass	Pass	Pass
HT HV	Pass	Pass	Pass	Pass	Pass	Pass

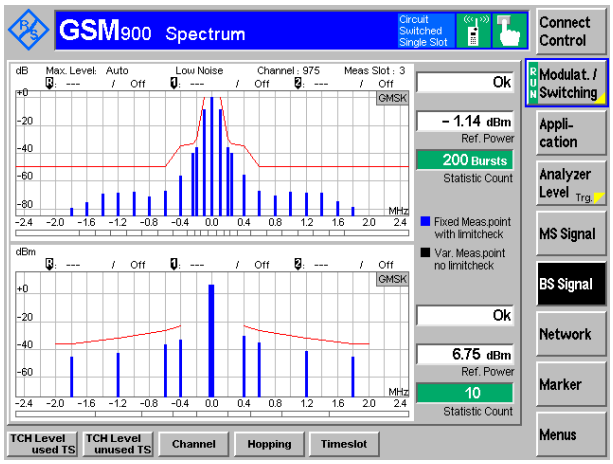
DCS1800						
Test Condition	Lowest channel 512		Middle channel 700		Highest channel 885	
	Level 0	Level 15	Level 0	Level 15	Level 0	Level 15
Normal	Pass	Pass	Pass	Pass	Pass	Pass
LT LV	Pass	Pass	Pass	Pass	Pass	Pass
LT HV	Pass	Pass	Pass	Pass	Pass	Pass
HT LV	Pass	Pass	Pass	Pass	Pass	Pass
HT HV	Pass	Pass	Pass	Pass	Pass	Pass

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	GSM900	Test Condition:	Normal	Test channel:	975

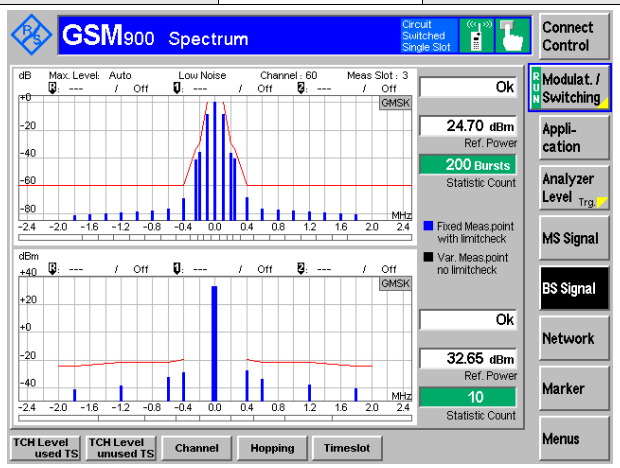


Y=5

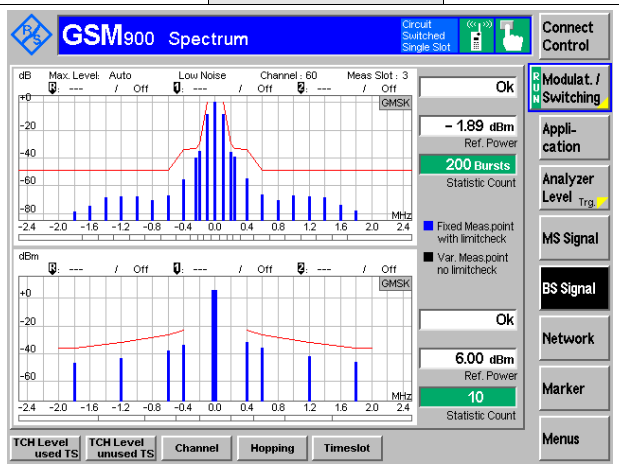


Y=19

Operation mode:	GSM900	Test Condition:	Normal	Test channel:	60

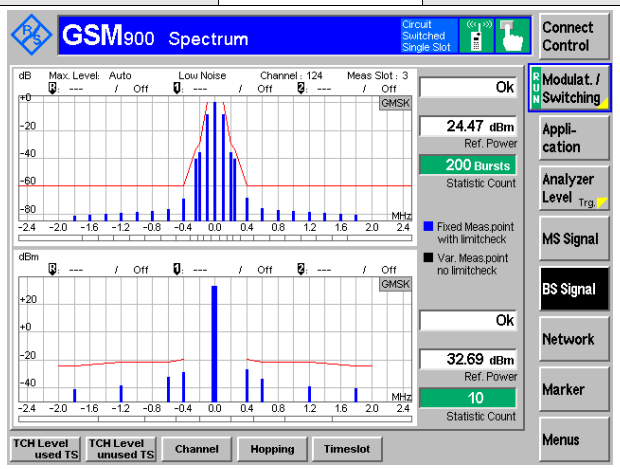


Y=5

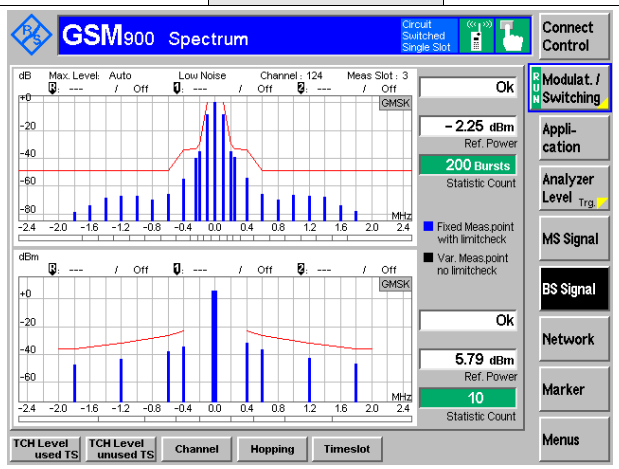


Y=19

Operation mode:	GSM900	Test Condition:	Normal	Test channel:	124

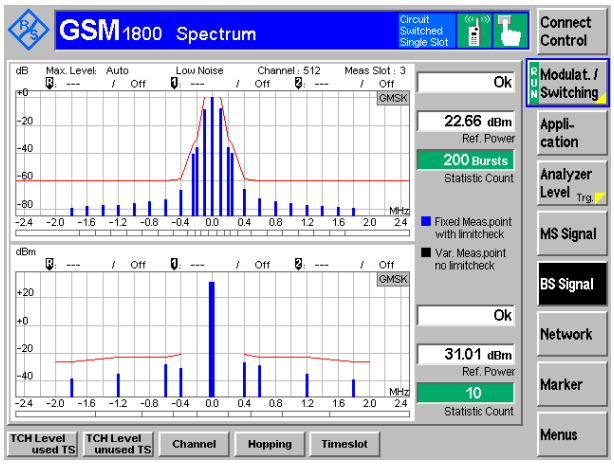


Y=5

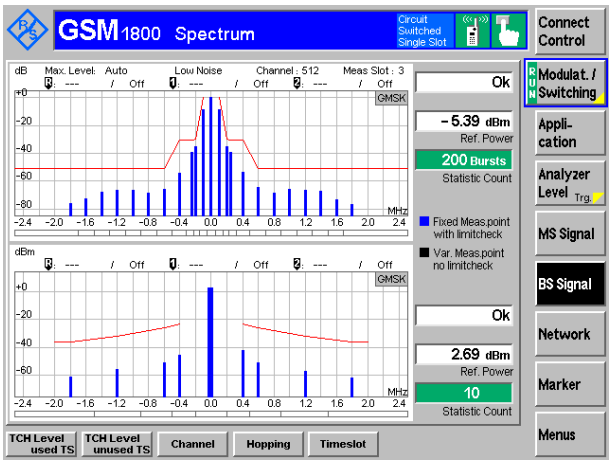


Y=19

Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	512

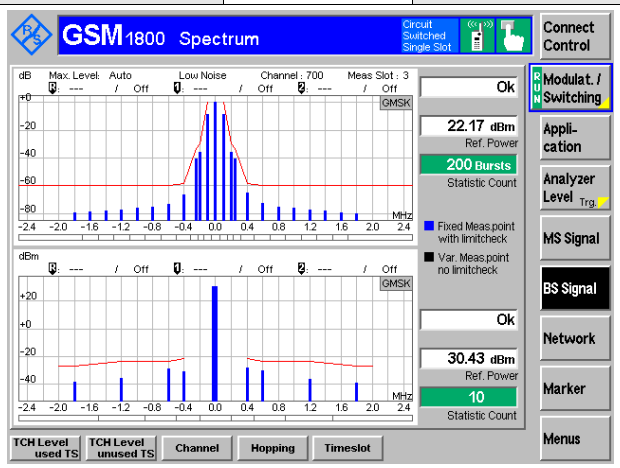


Y=0

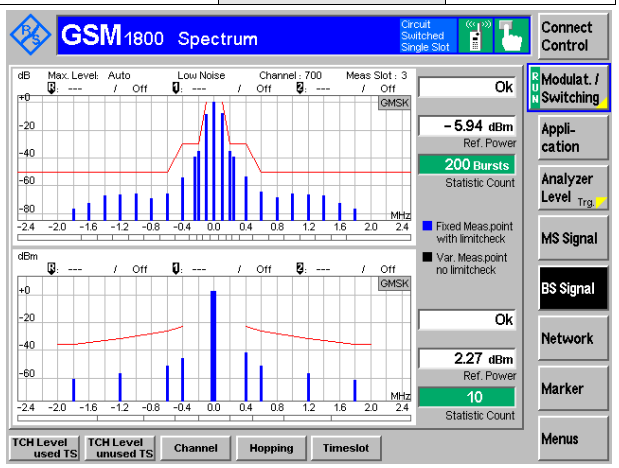


Y=15

Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	700

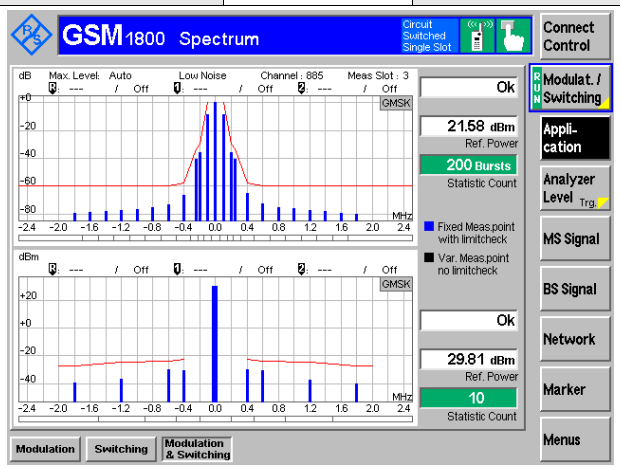


Y=0



Y=15

Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	885



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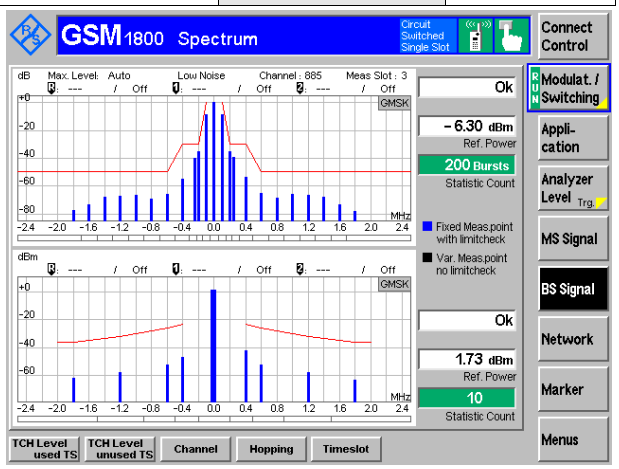


Y=15

Spurious Emissions in the MS receive bands:

GSM900: Middle channel 60							
Frequency Range (MHz)	Frequency (MHz)	Normal	LT LV	LT HV	HT LV	HT HV	Limit (dBm)
925-935	926.44	-74.69	-84.52	-77.93	-80.81	-79.54	-67.00
	931.58	-75.35	-83.02	-82.6	-79.89	-78.65	-67.00
935-960	936.19	-84.39	-75.6	-73.93	-73.25	-71.88	-79.00
	952.09	-76.53	-83.6	-76.43	-75.15	-71.68	-79.00

DCS1800: Middle channel 700							
Frequency Range (MHz)	Frequency (MHz)	Normal	LT LV	LT HV	HT LV	HT HV	Limit (dBm)
1805-1880	1816.14	-78.93	-75.15	-83.43	-80.62	-76.57	-71.00
	1832.12	-83.79	-72.38	-84.1	-80.58	-72.44	-71.00
	1845.61	-73.81	-75.25	-71.26	-77.02	-80.39	-71.00
	1869.45	-81.88	-84.78	-76.28	-76.59	-74.09	-71.00

8.2 Receiver Requirement

8.2.1 Blocking and Spurious Response - Speech Channels

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.20 and TS 151 010-1 clause 14.7.1

Limit

GSM900: A maximum of six failures in the frequency band 915 MHz to 980 MHz (which, if grouped, shall not exceed three 200 kHz channels per group).
A maximum of 24 failures in the combined bands 100 kHz to 915 MHz and 980 MHz to 12,75 GHz (which, if below FR and grouped, shall not exceed three 200 kHz channels per group).

DCS1800: A maximum of twelve failures in the band 1 785 MHz to 1 920 MHz (which, if grouped, shall not exceed three 200 kHz channels per group).
A maximum of 24 in the combined bands 100 kHz to 1 785 MHz and 1 920 MHz to 12,75 GHz (which, if below FR and grouped, shall not exceed three 200 kHz channels per group).

Test Procedure

a. The SS produces a static wanted signal and a static interfering signal at the same time. The amplitude of the wanted signal is set to 4 dB above the reference sensitivity level.

b. The unwanted signal is a C.W. signal (Standard test signal IO) of frequency FB. It is applied in turn on the subset of frequencies calculated in step c) in the overall range 100 kHz to 12,75 GHz, where FB is an integer multiple of 200 kHz.
However, frequencies in the range FR ±600 kHz are excluded.
NOTE: Allowance must be made for possible spurious signals arising from the SS. These are particularly likely at sub harmonic frequencies nFB where n = 2, 3, 4, 5, etc.

c. The frequencies at which the test is performed (adjusted to an integer multiple of 200 kHz channels most closely approximating the absolute frequency of the calculated blocking signal frequency) are the combined frequencies from i), ii) and iii) below:

d. i) The total frequency range formed by:
E-GSM 900 the frequencies between Flo + (IF1 + IF2 + ... + IFn + 17,5 MHz) and Flo - (IF1 + IF2 + ... + IFn + 17,5 MHz).
DCS 1 800 the frequencies between Flo + (IF1 + IF2 + ... +IFn + 37,5 MHz) and Flo - (IF1 + IF2 + ... + IFn + 37,5 MHz).

ii) The three frequencies IF1, IF1 + 200 kHz, IF1 - 200 kHz.

iii) The frequencies:

mFlo + IF1;
mFlo - IF1;
mFR;
where m is all positive integers greater than or equal to 2 such that either sum lies in the range 100 kHz to 12,75 GHz.
The frequencies in step ii) and iii) lying in the range of frequencies defined by step i) above need not be repeated.
Where:
Flo - local oscillator applied to first receiver mixer
IF1 ... IFn - are the n intermediate frequencies
Flo, IF1, IF2 ... IFn - shall be declared by the manufacturer in the PIXIT statement 3GPP TS 51.010-1 annex 3.

e. The level of the unwanted signal is set according to table 14-28.

	GSM 900		DCS 1 800
	Small MS	Other MS	
FREQUENCY	LEVEL IN dBμVemf( )		
FR ±600 kHz to FR ±800 kHz	70	75	70
FR ±800 kHz to FR ±1,6 MHz	70	80	70
FR ±1,6 MHz to FR ±3 MHz	80	90	80
915 MHz to FR - 3 MHz	90	90	-
FR + 3 MHz to 980 MHz	90	90	-
1 785 MHz to FR - 3 MHz	-	-	87
FR + 3 MHz to 1 920 MHz	-	-	87
835 MHz to < 915 MHz	113	113	
> 980 MHz to 1 000 MHz	113	113	
100 kHz to < 835 MHz	90	90	
> 1 000 MHz to 12,75 GHz	90	90	
100 kHz to 1 705 MHz	-	-	113
> 1 705 MHz to < 1 785 MHz	-	-	101
> 1 920 MHz to 1 980 MHz	-	-	101
> 1 980 MHz to 12,75 GHz	-	-	90

NOTE 1: These values differ from 3GPP TS 05.05 because of practical generator limits in the SS.

NOTE 2: For an E-GSM 900 MS the level of the unwanted signal in the band 905 MHz to < 915 MHz is relaxed to 108 dBuVemf( ).

NOTE 3: For a GSM 450 small MS the level of the unwanted signal in the band 450,4 MHz to < 457,6 MHz is relaxed to 108 dBuVemf( ). For a GSM 480 small MS the level of the unwanted signal in the band. 478,8 MHz to < 486 MHz is relaxed to 108 dBuVemf( ).

f. The SS compares the data of the signal that it sends to the MS with the signal which is looped back from the receiver after demodulation and decoding, and checks the frame erasure indication.
The SS tests the RBER compliance for the bits of class II, by examining sequences of at least the minimum number of samples of consecutive bits of class II, where bits are taken only from those frames for which no bad frame indication was given. The number of error events is recorded.
If a failure is indicated it is noted and counted towards the allowed exemption totals.
In the case of failures discovered at the predicted frequencies at steps f ii), iii) or iv) the test is repeated on the adjacent channels ±200 kHz away. If either of these two frequencies fail then the next channel 200 kHz beyond is also tested. This process is repeated until all channels constituting the group of failures is known.

Test result ***Complied***

Measurement Data

GSM 900				
Test Channel	FBER (%)	Number of test samples	Limit (%)	Result
975	0.006	10000	2.439	pass
60	0.000	10000	2.439	pass
124	0.001	10000	2.439	pass

DCS1800				
Test Channel	FBER (%)	Number of test samples	Limit (%)	Result
513	0.000	10000	2.439	pass
700	0.002	10000	2.439	pass
884	0.000	10000	2.439	pass

8.2.2 Intermodulation rejection - Speech Channels

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.32 and TS 151 010-1 clause 14.6.1

Limit

The error rate measured in this test shall not exceed the test limit error rate values given in table 14-25.

This shall apply under normal condition and under any combination of normal and extreme test voltages and ambient temperature, and with the two interfering signals at either side of the wanted frequency.

Table 14-25: Limits for intermodulation rejection

Channel	Propagation conditions	Type of measurement	Test limit error rate %	Minimum No. of samples
TCH/FS Class II	Static	RBER	2,439	8 200

Test Procedure

Test according to TS 151 010-1 clause 14.6.1.4.2

Test result ***Complied***

Measurement Data

GSM 900				
Test Channel	RBER (%)	Number of test samples	Limit (%)	Result
975	0.000	8200	2.439	pass
60	0.000	8200	2.439	pass
124	0.000	8200	2.439	pass

DCS1800				
Test Channel	RBER (%)	Number of test samples	Limit (%)	Result
513	0.000	8200	2.439	pass
700	0.000	8200	2.439	pass
884	0.000	8200	2.439	pass

8.2.3 AM Suppression - Speech Channels

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.35 and TS 151 010-1 clause 14.8.1

Limit

The error rate measured in this test shall not exceed the test limit error rate values given in table 14-33.

Table 14-33: Limits for AM suppression

Channel	Propagation conditions	Type of measurement	Test limit error rate %	Minimum No. of samples
TCH/FS Class II	Static	RBER	2,439	8 200

Test Procedure

Test according to TS 151 010-1 clause 14.8.1.4.2

Test result ***Complied***

Measurement Data

GSM 900				
Test Channel	RBER (%)	Number of test samples	Limit (%)	Result
975	0.000	8200	2.439	pass
60	0.000	8200	2.439	pass
124	0.000	8200	2.439	pass

DCS1800				
Test Channel	RBER (%)	Number of test samples	Limit (%)	Result
513	0.000	8200	2.439	pass
700	0.000	8200	2.439	pass
884	0.000	8200	2.439	pass

8.2.4 Adjacent Channel Rejection - Speech Channels(TCH/FS)

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.38 and TS 151 010-1 clause 14.5.1.1

Limit

The error rates measured in this test shall not exceed the test limit error rate given in table 14-22. This shall apply for any combination of normal and extreme test voltages and ambient temperature, and with the interfering signals at either side of the wanted frequency.

The parameter α can range from 1 to 1,6. The value of α for the RBER test on TCH/FS class Ib bits under particular measurement conditions shall be the same as that determined in the FER test on TCH/FS under the same conditions.

Table 14-22: Limits for adjacent channel selectivity

			GSM 400, GSM 700, T-GSM 810, GSM 850 and GSM 900		DCS 1 800 and PCS 1 900	
Interference at	Channel	Type of measurement	Test limit error rate %	Minimum No. of samples	Test limit error rate %	Minimum No. of samples
200 kHz	TCH/FS	FER	6,742*α	8 900	3,371*α	17 800
	class Ib	RBER	0,420/α	1 000 000	0,270/α	2 000 000
	class II	RBER	8,333	600 000	8,333	1 200 000
400 kHz	TCH/FS	FER	6,742*α	8 900	3,371*α	17 800
Interferer	class Ib	RBER	0,420/α	1 000 000	0,270/α	2 000 000
TUhight	class II	RBER	8,333	600 000	8,333	1 200 000
400 kHz	TCH/FS	FER	11,461*α	8 900	5,714*α	10 500
Interferer	class Ib	RBER	0,756/α	1 000 000	0,483/α	1 200 000
Static	class II	RBER	9,167	600 000	9,167	720 000

Test Procedure

Test according to TS 151 010-1 clause 14.5.1.1.4.2

Test result ***Complied***

Measurement Data

GSM 900				
Test Channel	RBER (%)	Number of test samples	Limit (%)	Result
975	0.000	8900	6.742	pass
60	0.000	8900	6.742	pass
124	0.000	8900	6.742	pass

DCS1800				
Test Channel	RBER (%)	Number of test samples	Limit (%)	Result
513	0.000	17800	3.371	pass
700	0.000	17800	3.371	pass
884	0.000	17800	3.371	pass

8.2.5 Reference Sensitivity - TCH/FS

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.42 and TS 151 010-1 clause 14.2.1.

Limit

The error rates measured for different channels and under the different propagation conditions, under any combination of normal and extreme test voltages and ambient temperatures, shall not exceed the test limit error rate values given in table 14-5 or 14-6.

Where α is a parameter which can range from 1 to 1.6. The value of α for a RBER test on TCH/FS class Ib bits under particular measurement conditions shall be the same as that determined in the FER test on TCH/FS under the same conditions.

Table 14-5: Limits for GSM 400, GSM 700, T-GSM 810, GSM 850 and GSM 900 sensitivity

Channels	Propagation conditions TUhigh		Propagation conditions RA		Propagation conditions HT		Static conditions	
	Test limit error rate %	Minimum No. of samples	Test limit error rate %	Minimum No. of samples	Test limit error rate %	Minimum No. of samples	Test limit error rate %	Minimum No. of samples
TCH/FS								
FER	6,742*α	8 900					0,122*α	164 000
class Ib(RBER)	0,42/α	1 000 000					0,41/α	20 000 000
class II(RBER)	8,333	120 000	7,5	24 000	9,333	60 000	2,439	8 200

Table 14-6: Limits for DCS 1 800 and PCS 1 900 sensitivity

Channels	Propagation conditions TUhigh		Propagation conditions RA		Propagation conditions HT		Static conditions	
	Test limit error rate %	Minimum No. of samples	Test limit error rate %	Minimum No. of samples	Test limit error rate %	Minimum No. of samples	Test limit error rate %	Minimum No. of samples
TCH/FS								
FER	4,478*α	13 400					0,122*α	164 000
class Ib(RBER)	0,32/α	1 500 000					0,41/α	20 000 000
class II(RBER)	8,333	60 000	7,5	24 000	9,333	30 000	2,439	8 200

Test Procedure

Test according to TS 151 010-1 clause 14.2.1.4.2

Test result ***Complied***

Measurement Data

GSM 900				
Test Channel	RBER (%)	Number of test samples	Limit (%)	Result
975	0.000	8900	6.742	pass
60	0.000	8900	6.742	pass
124	0.000	8900	6.742	pass

DCS1800				
Test Channel	RBER (%)	Number of test samples	Limit (%)	Result
513	0.000	13400	4.478	pass
700	0.000	13400	4.478	pass
884	0.000	13400	4.478	pass

8.2.6 Reference Sensitivity - FACCH/F

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.43 and TS 151 010-1 clause 14.2.3.

Limit

The error rates measured shall not exceed the test limit error rate values given in table 14-9.

Table 14-9: Limits for FACCH/F sensitivity

			GSM 400, GSM 700, T-GSM 810, GSM 850 and GSM 900		DCS 1 800 and PCS 1 900	
Channels	Type of measurements	Propagation	Test limit error rate %	Minimum No of samples	Test limit error rate %	Minimum No of samples
FACCH/F	FER	TUhigh	8,961	6696	4,368	13736

Test Procedure

Test according to TS 151 010-1 clause 14.2.3.4.2

Test result ***Complied***

Measurement Data

GSM 900				
Test Channel	FER (%)	Number of test samples	Limit (%)	Result
975	0.000	6696	8.961	pass
60	0.000	6696	8.961	pass
124	0.000	6696	8.961	pass

DCS1800				
Test Channel	FER (%)	Number of test samples	Limit (%)	Result
513	0.000	13736	4.368	pass
700	0.000	13736	4.368	pass
884	0.000	13736	4.368	pass

8.3 GPRS Transmitter Requirement

8.3.1 Frequency Error and Phase Error in GPRS Multislot Configuration

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.4 and TS 151 010-1 clause 13.16.1

Limit

Frequency error: less than 0.1 ppm

Phase error:

RMS phase error: not exceed 5 degrees.

Individual phase error: not exceed 20 degrees.

Test Procedure

a. For one transmitted burst on the last slot of the multislot configuration, the SS captures the signal as a series of phase samples over the period of the burst. These samples are evenly distributed over the duration of the burst with a minimum sampling rate of 2/T, where T is the modulation symbol period. The received phase trajectory is then represented by this array of at least 294 samples.

b. The SS then calculates, from the known bit pattern and the formal definition of the modulator contained in 3GPP TS 05.04, the expected phase trajectory

c. From a) and b) the phase trajectory error is calculated, and a linear regression line computed through this phase trajectory error. The slope of this regression line is the frequency error of the mobile transmitter relative to the simulator reference. The difference between the regression line and the individual sample points is the phase error of that point.

d. Steps a) to c) are repeated for 20 bursts, not necessarily contiguous.

e. The SS instructs the MS to its maximum power control level by setting the power control parameter ALPHA (α) to 0 and GAMMA_TN (ΓCH) for each timeslot to the desired power level in the Packet Uplink Assignment message (Closed Loop Control, see 3GPP TS 05.08, clause B.2), all other conditions remaining constant. Steps a) to d) are repeated.

f. The SS instructs the MS to the minimum power control level, all other conditions remaining constant. Steps a) to d) are repeated.

g. The MS is hard mounted on a vibration table and vibrated at the frequency/amplitudes specified in annex 1, TC4. During the vibration steps a) to f) are repeated.
NOTE: If the call is terminated when mounting the MS to the vibration table, it will be necessary to establish the initial conditions again before repeating steps a) to f).

h. The MS is re-positioned on the vibration table in the two orthogonal planes to the plane used in step g). For each of the orthogonal planes step g) is repeated.

i. Steps a) to f) are repeated under extreme test conditions (see annex 1, TC2.2).

Test result ***Complied***

Measurement Data

Operation mode:	*GSM900 (GPRS)*	*Test channel:*	*60*

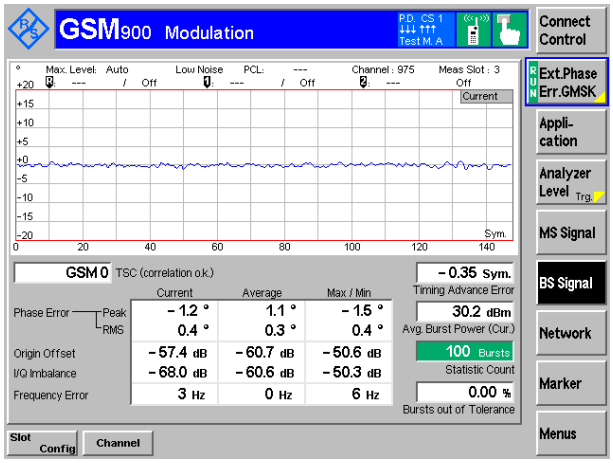
MS under maximum level							
Test Condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase Type	Phase Error (degree)	Limit (degree)	Result
Normal	0	90.2	Pass	RMS	0.3	5	Pass
				Peak	1.1	20	Pass
LT LV	1	90.2	Pass	RMS	0.5	5	Pass
				Peak	1.3	20	Pass
LT HV	2	90.2	Pass	RMS	0.4	5	Pass
				Peak	1.2	20	Pass
HT LV	5	90.2	Pass	RMS	0.3	5	Pass
				Peak	1.1	20	Pass
HT HV	4	90.2	Pass	RMS	0.2	5	Pass
				Peak	1.0	20	Pass
Vibration	7	90.2	Pass	RMS	0.1	5	Pass
				Peak	0.9	20	Pass
MS under minimum level							
Test Condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase Type	Phase Error (degree)	Limit (degree)	Result
Normal	1	90.2	Pass	RMS	0.4	5	Pass
				Peak	1.3	20	Pass
LT LV	5	90.2	Pass	RMS	0.2	5	Pass
				Peak	0.9	20	Pass
LT HV	7	90.2	Pass	RMS	0.1	5	Pass
				Peak	0.8	20	Pass
HT LV	14	90.2	Pass	RMS	0.09	5	Pass
				Peak	0.7	20	Pass
HT HV	12	90.2	Pass	RMS	0.08	5	Pass
				Peak	0.6	20	Pass
Vibration	13	90.2	Pass	RMS	0.07	5	Pass
				Peak	0.5	20	Pass

Operation mode:	DCS1800 (GPRS)	Test channel:	700

MS under maximum level							
Test Condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase Type	Phase Error (degree)	Limit (degree)	Result
Normal	2	174.78	Pass	RMS	0.6	5	Pass
				Peak	1.8	20	Pass
LT LV	10	174.78	Pass	RMS	0.6	5	Pass
				Peak	1.8	20	Pass
LT HV	11	174.78	Pass	RMS	0.5	5	Pass
				Peak	1.7	20	Pass
HT LV	9	174.78	Pass	RMS	0.4	5	Pass
				Peak	1.6	20	Pass
HT HV	7	174.78	Pass	RMS	0.3	5	Pass
				Peak	1.5	20	Pass
Vibration	8	174.78	Pass	RMS	0.2	5	Pass
				Peak	1.4	20	Pass
MS under minimum level							
Test Condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase Type	Phase Error (degree)	Limit (degree)	Result
Normal	4	174.78	Pass	RMS	0.6	5	Pass
				Peak	1.9	20	Pass
LT LV	10	174.78	Pass	RMS	0.5	5	Pass
				Peak	1.8	20	Pass
LT HV	16	174.78	Pass	RMS	0.4	5	Pass
				Peak	1.7	20	Pass
HT LV	12	174.78	Pass	RMS	0.3	5	Pass
				Peak	1.6	20	Pass
HT HV	15	174.78	Pass	RMS	0.2	5	Pass
				Peak	1.5	20	Pass
Vibration	19	174.78	Pass	RMS	0.1	5	Pass
				Peak	1.4	20	Pass

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	GSM900 (GPRS)	Test Condition:	Normal	Test channel:	975



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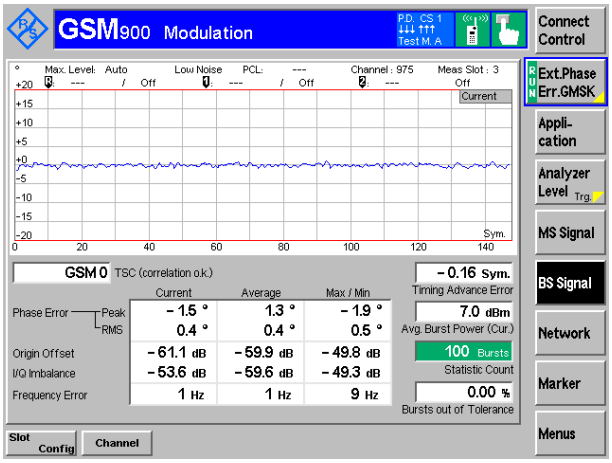
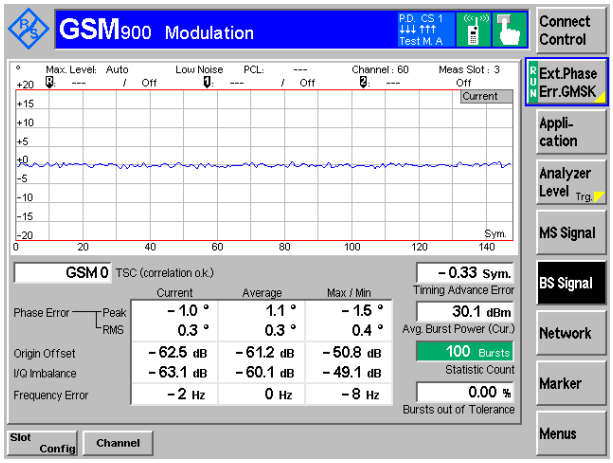


Y=17

Operation mode:	GSM900 (GPRS)	Test Condition:	Normal	Test channel:	60



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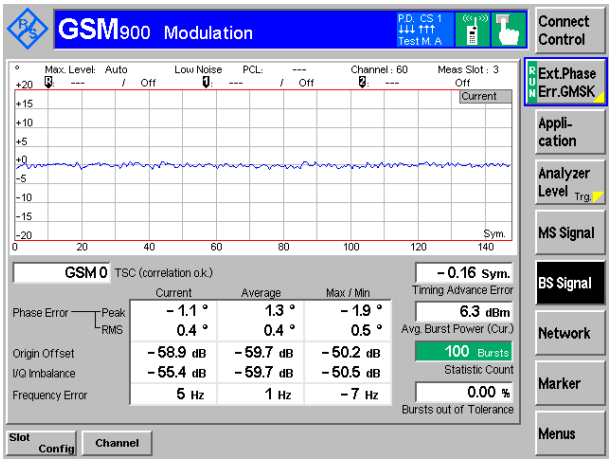
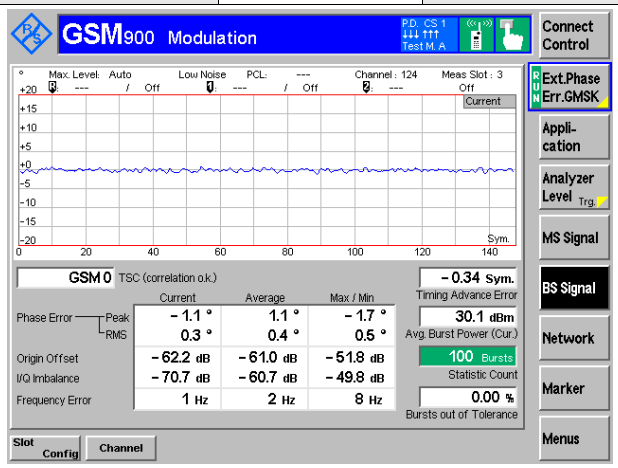


Y=17

Operation mode:	GSM900 (GPRS)	Test Condition:	Normal	Test channel:	60



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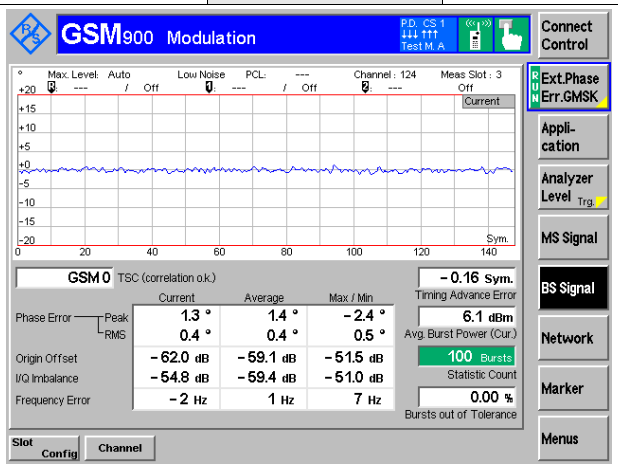
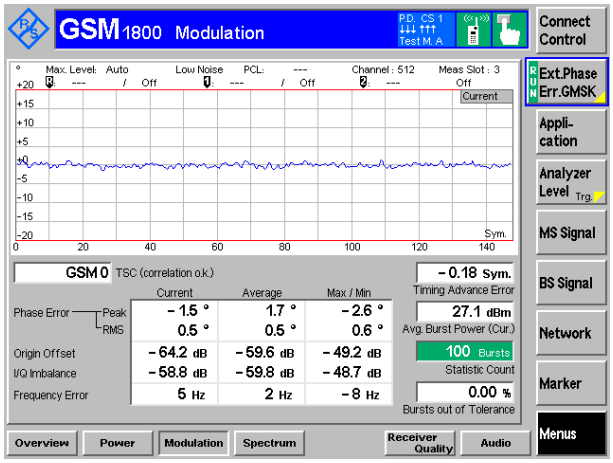


Y=17

Operation mode:	DCS1800 (GPRS)	Test Condition:	Normal	Test channel:	512



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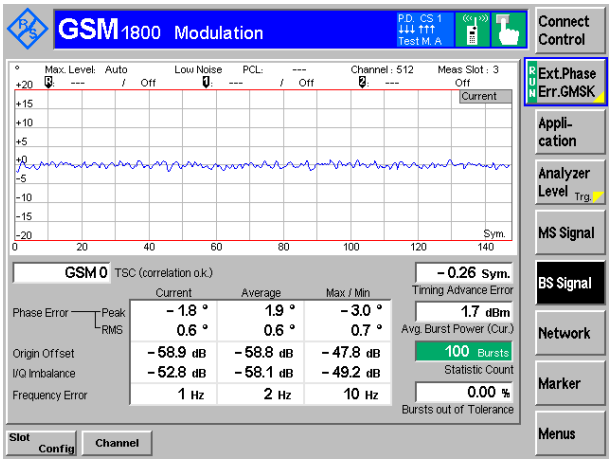
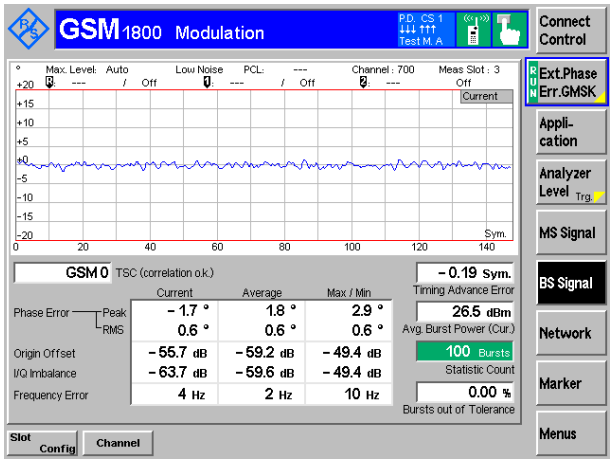


Y=18

Operation mode:	DCS1800 (GPRS)	Test Condition:	Normal	Test channel:	700



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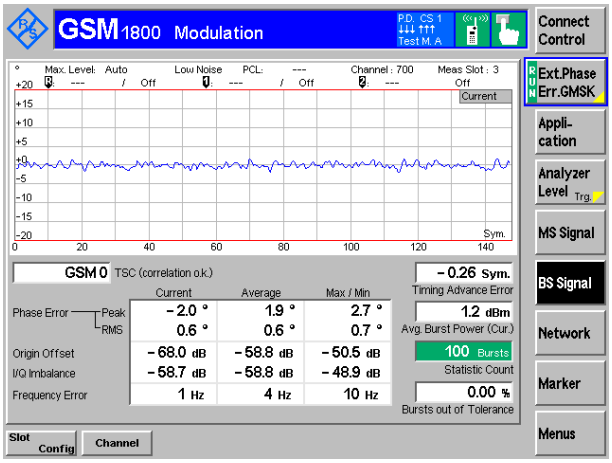
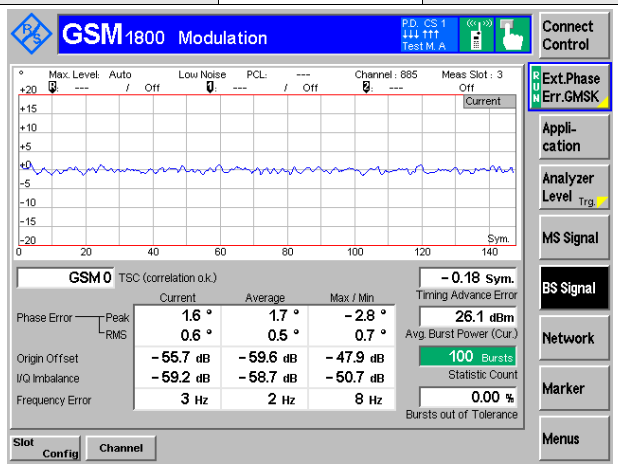


Y=18

Operation mode:	DCS1800 (GPRS)	Test Condition:	Normal	Test channel:	885



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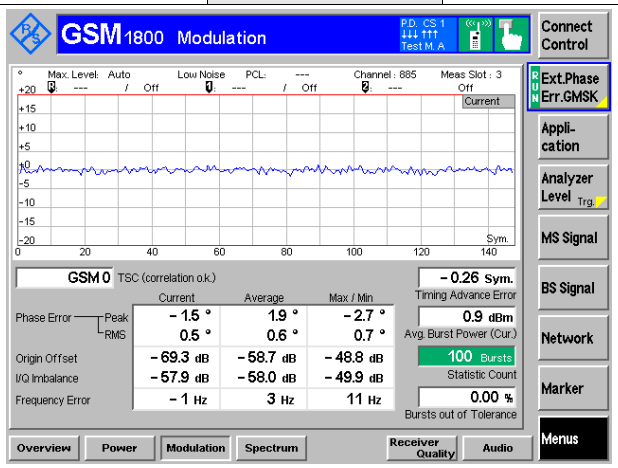


Y=18

8.3.2 Transmitter Output Power in GPRS Multislot Configuration

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.10 and TS 151 010-1 clause 13.16.2

Limit

1. The MS maximum output power shall be with a tolerance of ±2 dB under normal conditions
2. The MS maximum output power shall be with a tolerance of ±2,5 dB under extreme conditions
3. The nominal output power levels 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
4. The nominal output power levels 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
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)
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:
   - Under normal conditions; 3GPP TS 05.05, sub clause 4.5.2.
   - Under extreme conditions; 3GPP TS 05.05, sub clause 4.5.2, 3GPP TS 05.05 annex D in sub clauses 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:
   - Under normal conditions; 3GPP TS 05.10, sub clause 6.4.
   - Under extreme conditions; 3GPP TS 05.10, sub clause 6.4, 3GPP TS 05.05 annex D in sub clauses 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:
   - Under normal conditions; 3GPP TS 05.05, sub clause 4.5.2.
   - Under extreme conditions; 3GPP TS 05.05, sub clause 4.5.2, 3GPP TS 05.05 annex D in sub clause D.2.1 and D.2.2.
10. The MS shall use a TA value of 0 for the Random Access burst sent:
    - Under normal conditions; 3GPP TS 05.10, sub clause 6.6.
    - Under extreme conditions; 3GPP TS 05.10, sub clause 6.6, 3GPP TS 05.05 annex D in sub clause D.2.1 and D.2.2.

Test Procedure

a. Measurement of normal burst transmitter output power.
   - The SS takes power measurement samples evenly distributed over the duration of one burst with a sampling rate of at least 2/T, where T is the bit duration. The samples are identified in time with respect to the modulation on the burst. The SS identifies the centre of the useful 147 transmitted bits, i.e. the transition from bit 13 to bit 14 of the mid amble, as the timing reference.
   - The transmitter output power is calculated as the average of the samples over the 147 useful bits. This is also used as the 0 dB reference for the power/time template.

b. Measurement of normal burst timing delay.
The burst timing delay is the difference in time between the timing reference identified in a) and the corresponding transition in the burst received by the MS immediately prior to the MS transmit burst sampled.

c. Measurement of normal burst power/time relationship.
The array of power samples measured in a) are referenced in time to the centre of the useful transmitted bits and in power to the 0 dB reference, both identified in a).

d. Steps a) to c) are repeated with the MS commanded to operate on each of the power control levels defined, even those not supported by the MS.

e. The SS commands the MS to the maximum power control level supported by the MS and steps a) to c) are repeated for ARFCN in the Low and High ranges.

f. Measurement of access burst transmitter output power.
   - The SS causes the MS to generate an Access Burst on an ARFCN in the Mid ARFCN range, this could be either by a handover procedure or a new request for radio resource. In the case of a handover procedure the Power Level indicated in the HANDOVER COMMAND message is the maximum power control level supported by the MS.
   - The SS takes power measurement samples evenly distributed over the duration of the access burst as described in a). However, in this case the SS identifies the centre of the useful bits of the burst by identifying the transition from the last bit of the synch sequence.
   - The transmitter output power is calculated as the average of the samples over the 87 useful bits of the burst. This is also used as the 0 dB reference for the power/time template.

g. Measurement of access burst timing delay.
The burst timing delay is the difference in time between the timing reference identified in f) and the MS received data on the common control channel.

h. Measurement of access burst power/time relationship.
The array of power samples measured in f) are referenced in time to the centre of the useful transmitted bits and in power to the 0 dB reference, both identified in f).

i. The SS commands the MS to the maximum power control level supported by the MS and steps a) to c) are repeated for ARFCN in the Low and High ranges.

j. Depending on the method used in step f) to cause the MS to send an Access Burst, the SS sends either a HANDOVER COMMAND with power control level set to 10 or it changes the System Information elements MS_TXPWR_MAX_CCH and for DCS 1 800 the POWER_OFFSET on the serving cell BCCH in order to limit the MS transmit power on the Access Burst to power control level 10 (+23 dBm for GSM 400, GSM 700, GSM 850, and GSM 900 or +10 dBm for DCS 1 800 and PCS 1 900) and then steps f) to h) are repeated.

k. Steps a) to i) are repeated under extreme test conditions (annex 1, TC2.2) except that the repeats at step d) are only performed for power control level 10 and the minimum power control level of the MS.

Test result ***Complied***

Measurement Data

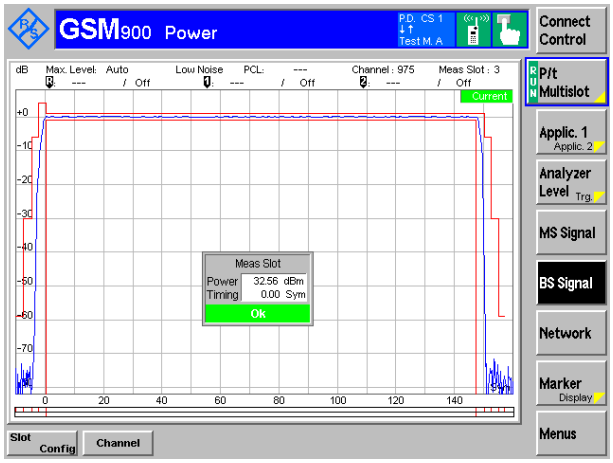
GSM900 (GPRS): Lowest channel 975						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	32.56	32.06	32.22	32.55	32.38	Pass
4	30.12	26.10	26.43	26.28	26.83	
5	28.21	28.08	28.78	28.43	28.49	
6	26.35	26.71	26.25	26.35	26.85	
7	24.31	24.90	24.71	24.40	24.54	
8	22.37	22.60	22.79	22.00	22.58	
9	20.20	20.32	20.78	20.03	20.07	
10	18.36	18.25	18.91	18.10	18.51	
11	16.42	16.88	16.12	16.59	16.50	
12	14.18	14.62	14.46	14.81	14.35	
13	12.14	12.72	12.33	12.10	12.21	
14	10.29	10.61	10.24	10.39	10.91	
15	8.79	8.26	8.82	8.81	8.29	
16	6.53	6.34	6.66	6.91	6.49	
17	6.77	6.14	6.97	6.58	6.89	

GSM900 (GPRS): Middle channel 60						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	32.50	32.71	32.25	32.06	32.34	Pass
4	30.03	26.95	26.66	26.67	26.60	
5	28.12	28.59	28.66	28.29	28.02	
6	26.08	26.73	26.69	26.34	26.18	
7	24.01	24.20	24.72	24.16	24.81	
8	22.21	22.53	22.44	22.75	22.52	
9	20.22	20.17	20.22	20.67	20.85	
10	18.18	18.99	18.73	18.06	18.64	
11	16.23	16.41	16.12	16.17	16.59	
12	14.18	14.75	14.16	14.32	14.10	
13	12.10	12.82	12.25	12.67	12.57	
14	10.26	10.14	10.21	10.20	10.47	
15	8.04	8.19	8.47	8.62	8.38	
16	6.11	6.84	6.40	6.95	6.74	
17	6.01	6.05	6.13	6.57	6.83	

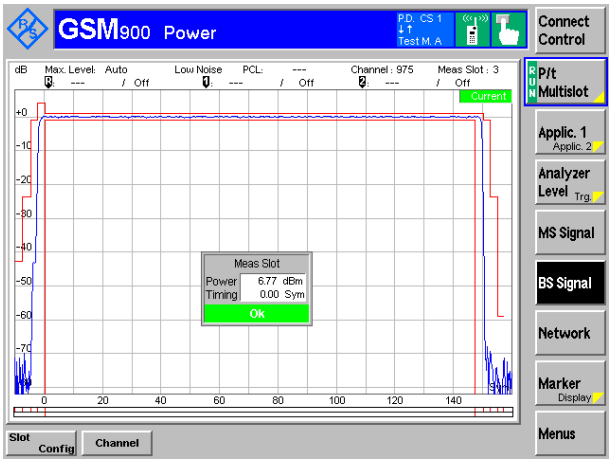
GSM900 (GPRS): Highest channel 124						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	32.54	32.43	32.12	32.17	32.39	Pass
4	30.25	26.89	26.47	26.08	26.62	
5	28.22	28.02	28.19	28.49	28.49	
6	26.28	26.90	26.33	26.69	26.40	
7	24.26	24.95	24.08	24.70	24.62	
8	22.20	22.91	22.98	22.30	22.46	
9	20.27	20.11	20.02	20.94	20.78	
10	18.22	18.86	18.36	18.91	18.06	
11	16.26	16.62	16.02	16.52	16.75	
12	14.24	14.38	14.22	14.99	14.64	
13	12.30	12.83	12.70	12.48	12.69	
14	10.34	10.80	10.15	10.32	10.25	
15	8.38	8.64	8.02	8.16	8.50	
16	6.56	6.25	6.44	6.24	6.20	
17	5.79	5.43	5.66	5.23	5.19	

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	GSM900 (GPRS)	Test Condition:	Normal	Test channel:	975

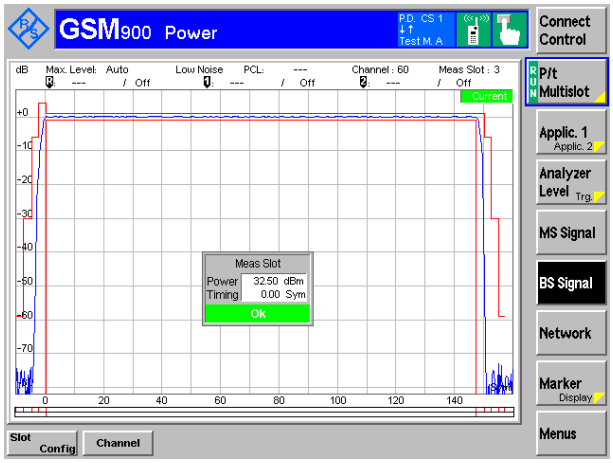


Level 3



Level 17

Operation mode:	GSM900 (GPRS)	Test Condition:	Normal	Test channel:	60



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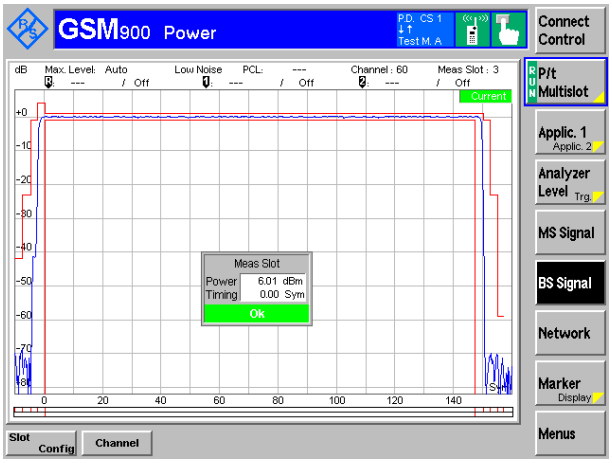
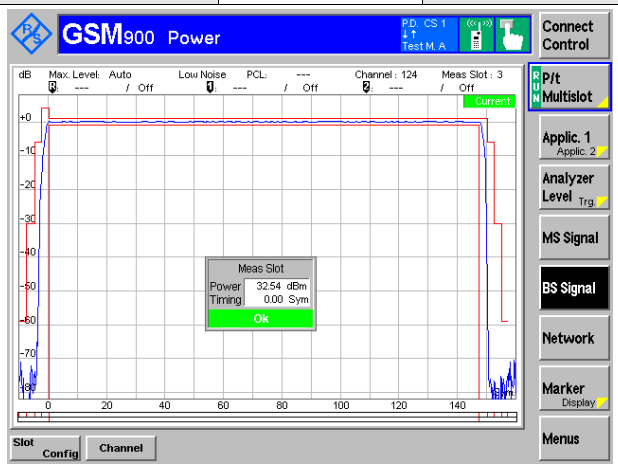
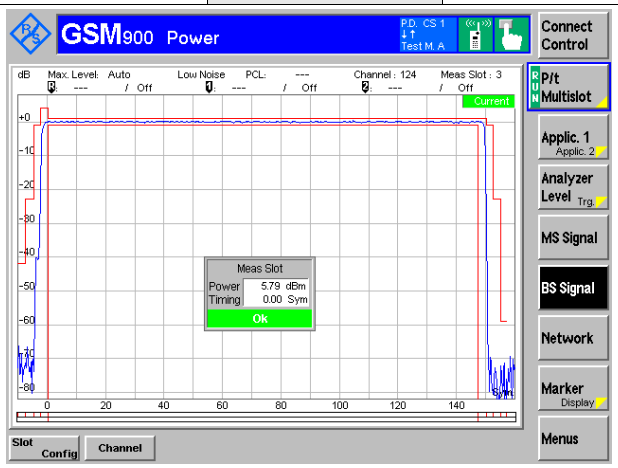


Level 17

Operation mode:	GSM900 (GPRS)	Test Condition:	Normal	Test channel:	124



Level 3



Level 17

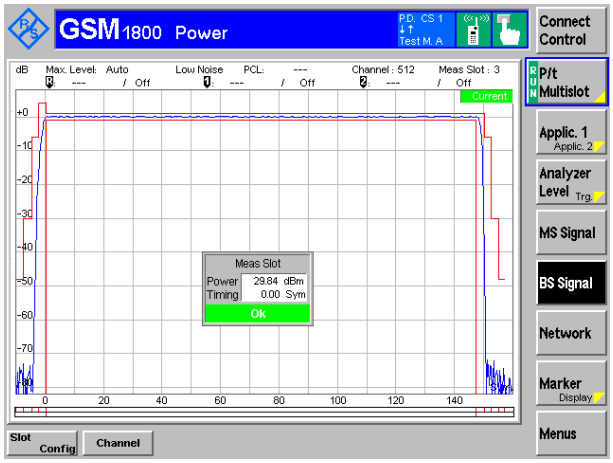
DCS1800 (GPRS): Lowest channel 512						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
0	29.84	28.61	28.93	28.97	28.36	Pass
1	26.10	26.98	26.72	26.27	26.51	
2	24.14	24.01	24.96	24.11	24.10	
3	22.22	23.00	22.31	22.57	22.24	
4	20.29	20.85	20.10	20.39	20.85	
5	18.37	18.89	18.30	18.87	18.21	
6	16.45	16.87	16.38	16.72	16.80	
7	14.52	14.30	14.94	14.22	14.26	
8	12.60	12.40	12.90	12.18	12.41	
9	10.47	10.81	10.08	10.45	10.28	
10	8.75	8.21	8.34	8.63	8.76	
11	6.83	6.70	6.52	6.89	6.11	
12	4.90	4.03	4.67	4.35	4.65	
13	3.98	3.81	3.11	3.25	3.95	
14	2.07	2.81	2.37	2.23	2.73	
15	1.56	1.71	1.44	1.77	1.73	

DCS1800 (GPRS): Middle channel 700						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
0	29.26	28.25	28.54	28.81	28.95	Pass
1	26.29	26.60	26.22	26.45	26.53	
2	24.16	24.13	24.24	24.91	24.20	
3	22.21	22.04	22.17	22.26	22.61	
4	20.02	20.71	20.05	20.10	20.56	
5	18.05	18.78	18.88	18.77	18.10	
6	16.09	16.73	16.45	16.36	16.25	
7	14.12	14.41	14.41	14.68	14.72	
8	12.15	12.33	12.11	12.36	12.96	
9	10.18	10.71	10.27	10.56	10.02	
10	8.22	8.09	8.80	8.87	8.98	
11	6.25	6.68	6.29	6.43	6.21	
12	4.28	4.13	4.53	4.65	4.37	
13	3.31	3.53	3.47	3.09	3.92	
14	2.11	2.11	2.09	2.04	2.90	
15	1.08	1.30	1.26	1.51	1.35	

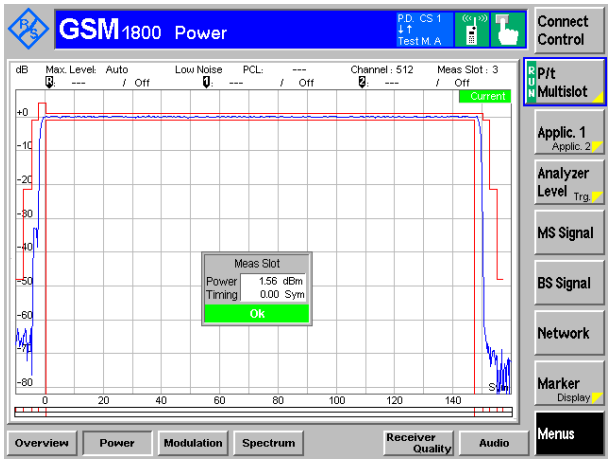
DCS1800 (GPRS): Highest channel 885						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
0	28.76	28.39	28.31	28.31	28.11	Pass
1	26.74	26.89	26.30	26.47	26.58	
2	24.31	24.51	24.92	24.87	24.44	
3	22.12	22.88	22.65	22.90	23.00	
4	20.14	20.43	20.57	20.20	20.56	
5	18.25	18.62	18.23	18.51	18.50	
6	16.02	16.86	16.79	16.13	16.20	
7	14.23	14.97	14.04	14.38	14.02	
8	12.10	12.52	12.44	12.34	12.03	
9	10.34	10.78	10.54	10.47	10.34	
10	8.40	8.85	8.56	8.98	8.13	
11	6.11	6.02	6.86	6.93	6.22	
12	5.10	5.32	5.59	5.12	5.23	
13	4.16	4.74	4.89	4.87	4.34	
14	2.82	2.04	2.03	2.28	2.94	
15	0.75	0.63	0.39	0.87	0.73	

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	DCS1800 (GPRS)	Test Condition:	Normal	Test channel:	512

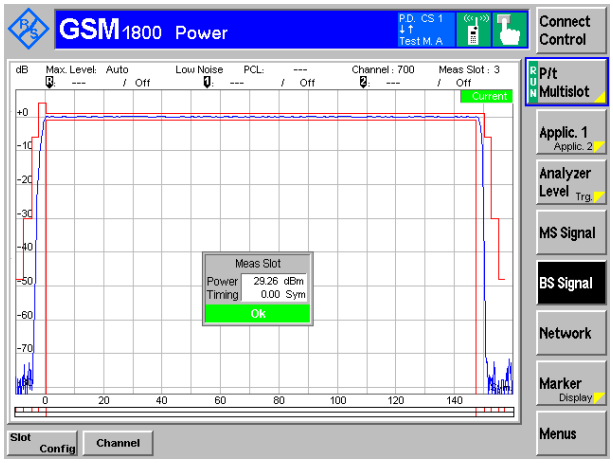


Level 3



Level 18

Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	700



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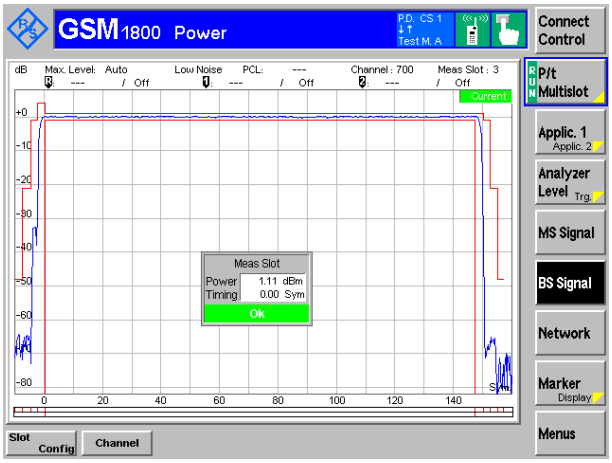
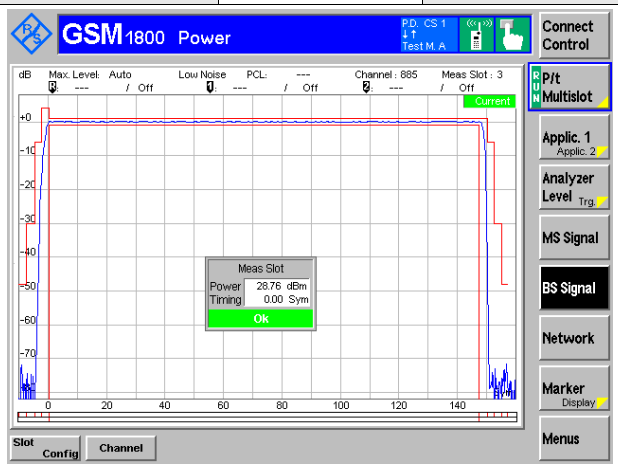
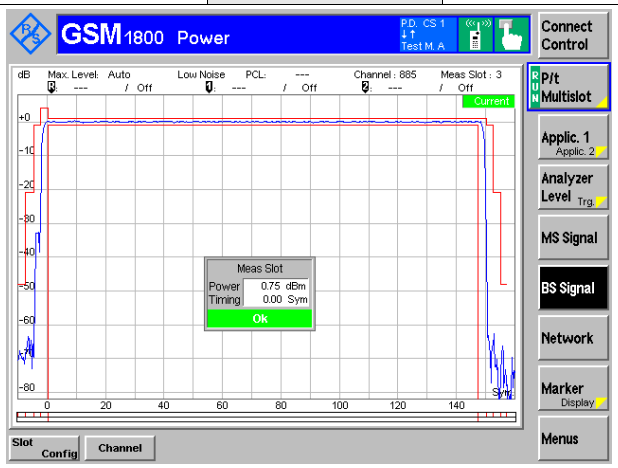


Level 18

Operation mode:	DCS1800	Test Condition:	Normal	Test channel:	885



Level 3



Level 18

8.3.3 Output RF Spectrum in GPRS Multislot Configuration

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.11 and TS 151 010-1 clause 13.16.2

Limit

a. -36 dBm: below 600 kHz offset from the carrier;

-51 dBm: for GSM 400, GSM 700, T_GSM 810, 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, T_GSM 810, 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;

b. 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 6000 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.

c. Spurious emissions in the MS receive bands.

Band (MHz)	Spurious emissions level (dBm)	
	GSM 400, T-GSM 810,, GSM 900 and DCS 1 800	GSM 700, GSM 850 and PCS 1 900
460.4 – 467.6 (GSM 400 MS only)	-67	-
488.8 - 496 (GSM 400 MS only)	-67	-
850 to 866 (T-GSM 810 MS only)	-79	-
925 to 935	-67	-
935 to 960	-79	-
1 805 to 1 880	-71	-
728 to 736	-	-73
736 to 746	-	-79
747 to 757	-	-79
757 to 763	-	-73
869 to 894	-	-79
1 930 to 1 990	-	-71

Test Procedure

a. In steps b) to h) the FT is equal to the hop pattern ARFCN in the Mid ARFCN range.

b. The other settings of the spectrum analyzer are set as follows:

- Zero frequency scan;
- Resolution bandwidth: 30 kHz;
- Video bandwidth: 30 kHz;
- Video averaging: may be used, depending on the implementation of the test.

The video signal of the spectrum analyzer is "gated" such that the spectrum generated by at least 40 of the bits 87 to 132 of the burst is the only spectrum measured. This gating may be analogue or numerical, dependent upon the design of the spectrum analyzer. Only measurements during transmitted bursts on the nominal carrier of the measurement are included. The spectrum analyzer averages over the gated period and over 200 or 50 such bursts, using numerical and/or video averaging.

The MS is commanded to its maximum power control level.

c. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured over 50 bursts at all multiples of 30 kHz offset from FT to < 1 800 kHz.

d. The resolution and video bandwidth on the spectrum analyzer are adjusted to 100 kHz and the measurements are made at the following frequencies:

- on every ARFCN from 1 800 kHz offset from the carrier to the edge of the relevant transmit band for each measurement over 50 bursts;
- at 200 kHz intervals over the 2 MHz either side of the relevant transmit band for each measurement over 50 bursts.

e. The MS is commanded to its minimum power control level. The spectrum analyzer is set again as in b).

f. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured over 200 bursts at the following frequencies:

FT;

FT + 100 kHz FT - 100 kHz;

FT + 200 kHz FT - 200 kHz;

FT + 250 kHz FT - 250 kHz;

FT + 200 kHz * N FT - 200 kHz * N;

where N = 2, 3, 4, 5, 6, 7, and 8; and FT = RF channel nominal centre frequency

g. The spectrum analyzer settings are adjusted to:

- Zero frequency scan;
- Resolution bandwidth: 30 kHz;
- Video bandwidth: 100 kHz;
- Peak hold.

The spectrum analyzer gating of the signal is switched off.

The MS is commanded to its maximum power control level.

h. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured at the following frequencies:

FT + 400 kHz FT - 400 kHz;

FT + 600 kHz FT - 600 kHz;

FT + 1,2 MHz FT - 1,2 MHz;

FT + 1,8 MHz FT - 1,8 MHz;

where FT = RF channel nominal centre frequency.

The duration of each measurement (at each frequency) will be such as to cover at least 10 burst transmissions at FT.

i. Step h) is repeated for power control levels 7 and 11.

j. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured at the following frequencies:

k. Steps b), f), g) and h) are repeated with FT equal to the hop pattern ARFCN in the High ARFCN range except that in step g) the MS is commanded to power control level 11 rather than maximum power.

l. Steps a) b) f) g) and h) are repeated under extreme test conditions (annex 1, TC2.2). except that at step g) the MS is commanded to power control level 11.

Test result ***Complied***

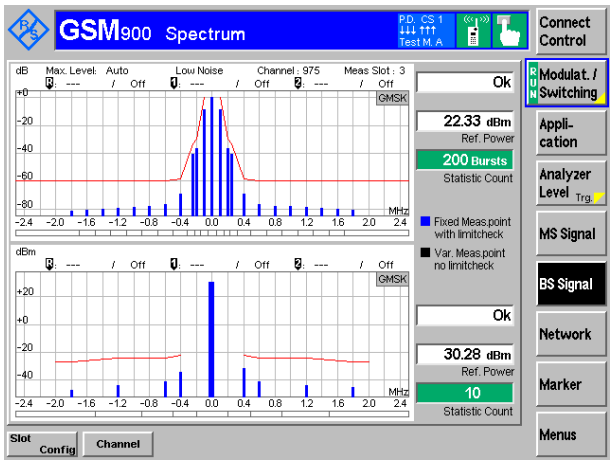
Measurement Data

GSM900 (GPRS)						
Test Condition	Channel 975		Channel 60		Channel 124	
	Level 3	Level 17	Level 3	Level 17	Level 3	Level 17
Normal	Pass	Pass	Pass	Pass	Pass	Pass
LT LV	Pass	Pass	Pass	Pass	Pass	Pass
LT HV	Pass	Pass	Pass	Pass	Pass	Pass
HT LV	Pass	Pass	Pass	Pass	Pass	Pass
HT HV	Pass	Pass	Pass	Pass	Pass	Pass

DCS1800 (GPRS)						
Test Condition	Channel 512		Channel 700		Channel 885	
	Level 3	Level 18	Level 3	Level 18	Level 3	Level 18
Normal	Pass	Pass	Pass	Pass	Pass	Pass
LT LV	Pass	Pass	Pass	Pass	Pass	Pass
LT HV	Pass	Pass	Pass	Pass	Pass	Pass
HT LV	Pass	Pass	Pass	Pass	Pass	Pass
HT HV	Pass	Pass	Pass	Pass	Pass	Pass

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	*GSM900 (GPRS)*	Test Condition:	Normal	Test channel:	975



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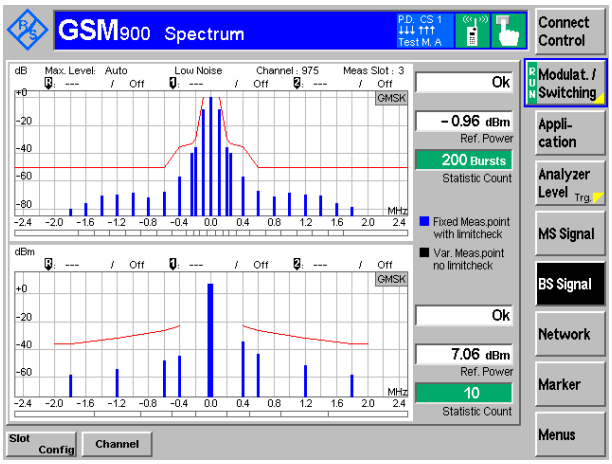
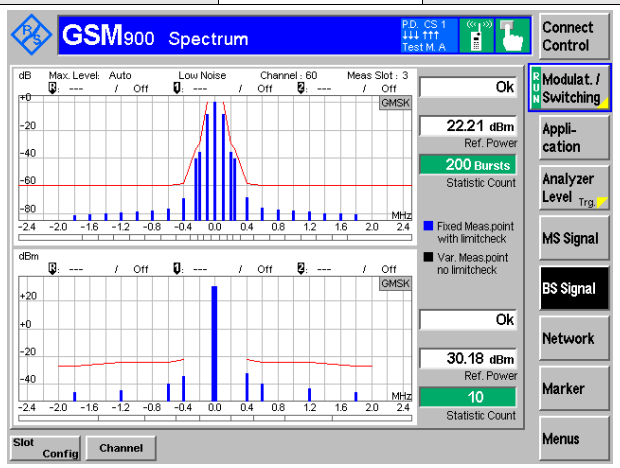
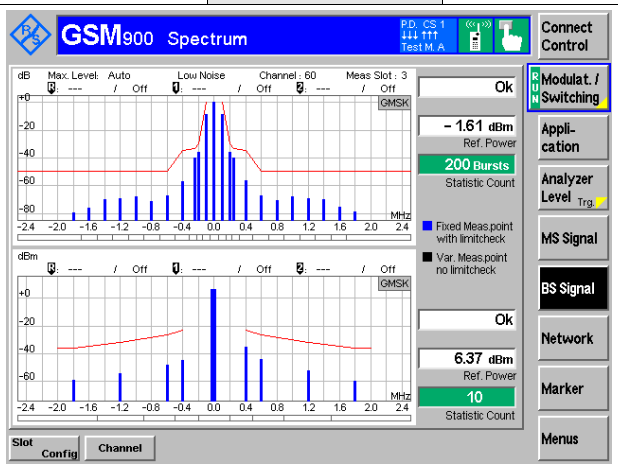


Y=17

Operation mode:	*GSM900 (GPRS)*	Test Condition:	Normal	Test channel:	60

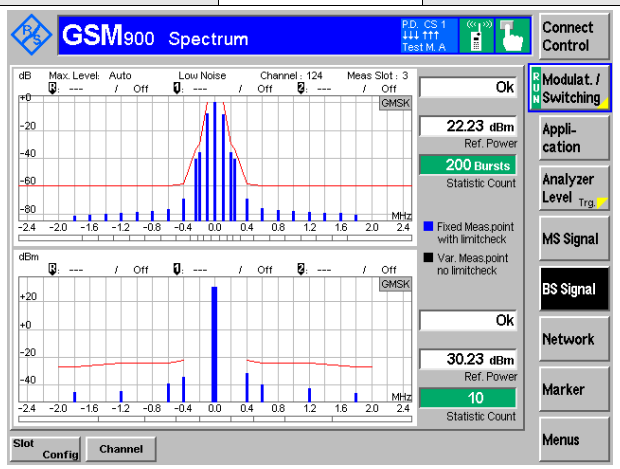


Y=3

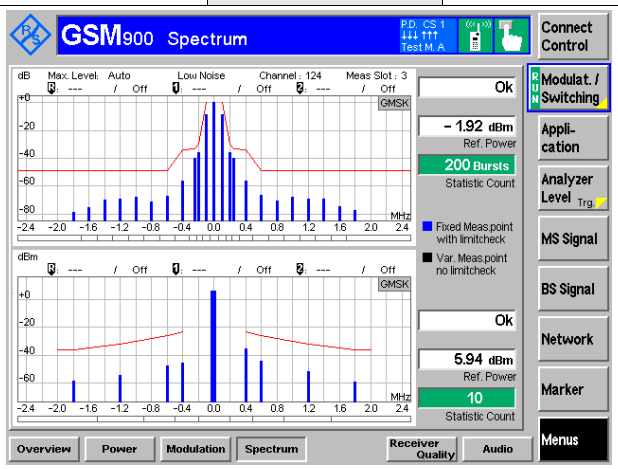


Y=17

Operation mode:	*GSM900 (GPRS)*	Test Condition:	Normal	Test channel:	124

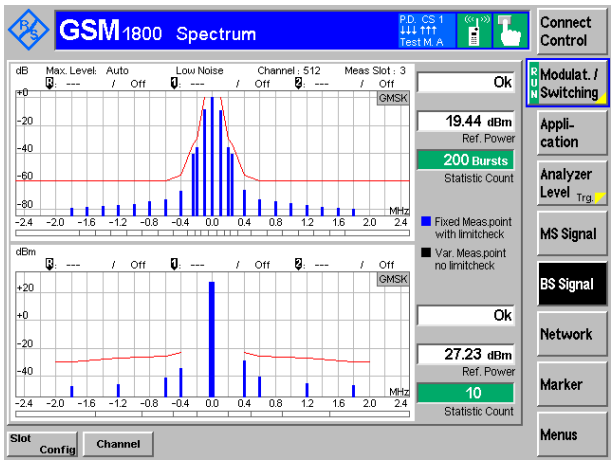


Y=3

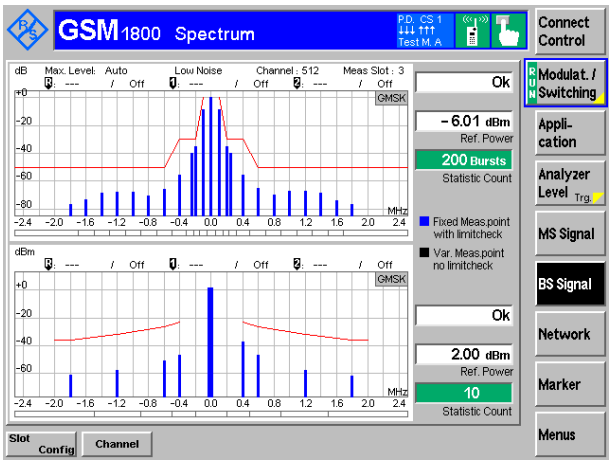


Y=17

Operation mode:	DCS1800 (GPRS)	Test Condition:	Normal	Test channel:	512

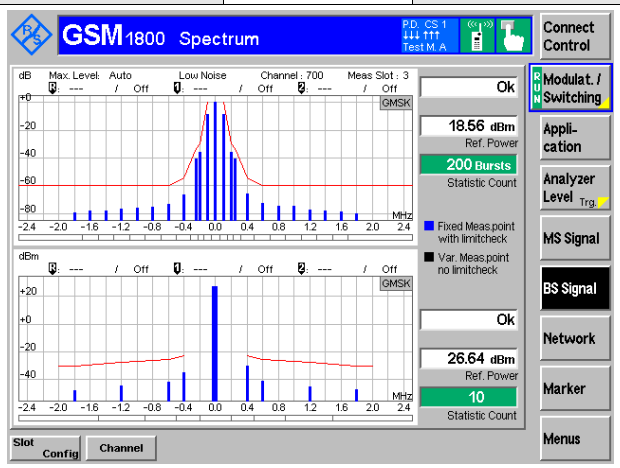


Y=3

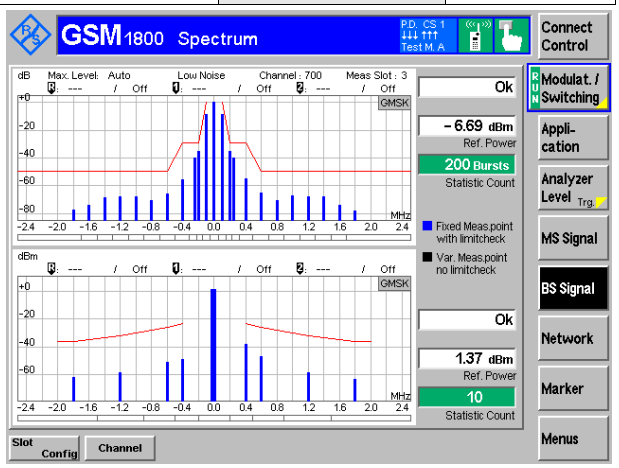


Y=18

Operation mode:	DCS1800 (GPRS)	Test Condition:	Normal	Test channel:	700

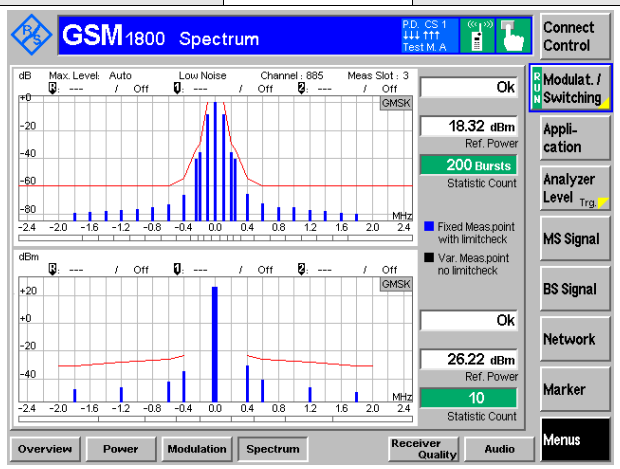


Y=3

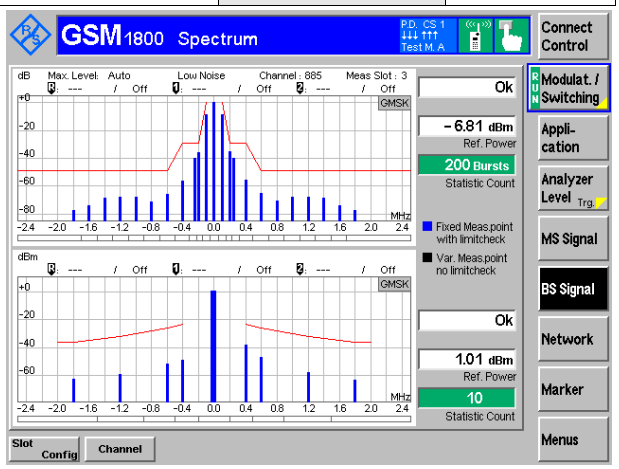


Y=18

Operation mode:	DCS1800 (GPRS)	Test Condition:	Normal	Test channel:	885



Y=3



Y=18

Spurious Emissions in the MS receive bands:

GSM900 (GPRS): Middle channel 60							
Frequency Range (MHz)	Frequency (MHz)	Normal	LT LV	LT HV	HT LV	HT HV	Limit (dBm)
925-935	926.44	-83.56	-79.03	-72.84	-83.23	-83.87	-67.00
	931.43	-77.32	-83.52	-74.69	-82.99	-81.82	-67.00
935-960	939.19	-84.21	-82.22	-79.57	-82.25	-74.04	-79.00
	951.05	-84.28	-82.67	-75.41	-75.69	-79.03	-79.00

DCS1800 (GPRS): Middle channel 700							
Frequency Range (MHz)	Frequency (MHz)	Normal	LT LV	LT HV	HT LV	HT HV	Limit (dBm)
1805-1880	1823.14	-72.91	-71.71	-83.81	-83.98	-80.48	-71.00
	1841.01	-84.42	-74.76	-71.33	-75.11	-71.78	-71.00
	1858.88	-80.74	-79.32	-77.84	-76.37	-76.45	-71.00
	1874.96	-83.67	-82.89	-83.41	-81.64	-74.92	-71.00

8.4 GPRS Receiver Requirement

8.4.1 Minimum Input level for Reference Performance - GPRS

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.44 and TS 151 010-1 clause 14.16.1

Limit

1. The block error rate (BLER) performance shall not exceed 10 % at input levels according to the table below.

Type of channel		Propagation conditions				
		static	TUhigh (no FH)	TUhigh (ideal FH)	RA (no FH)	HT (no FH)
GSM 400, GSM 700, GSM 850 and GSM 900						
PDTCH/CS-1	dBm	-104	-104	-104	-104	-103
PDTCH/CS-2	dBm	-104	-100	-101	-101	-99
PDTCH/CS-3	dBm	-104	-98	-99	-98	-96
PDTCH/CS-4	dBm	-101	-90	-90	*	*
DCS 1 800 and PCS 1 900						
PDTCH/CS-1	dBm	-104	-104	-104	-104	-103
PDTCH/CS-2	dBm	-104	-100	-100	-101	-99
PDTCH/CS-3	dBm	-104	-98	-98	-98	-94
PDTCH/CS-4	dBm	-101	-88	-88	*	*

2 The block error rate (BLER) performance shall not exceed 1 % at input levels according to the table below.

Type of channel		Propagation conditions				
		static	TUhigh (no FH)	TUhigh (ideal FH)	RA (no FH)	HT (no FH)
GSM 400, GSM 700, GSM 850 and GSM 900						
USF/CS-1	dBm	< -104	-101	-103	-103	-101
USF/CS-2 to 4	dBm	< -104	-103	-104	-104	-104
DCS 1 800 and PCS 1 900						
USF/CS-1	dBm	< -104	-103	-103	-103	-101
USF/CS-2 to 4	dBm	< -104	-104	-104	-104	-103

3. The BLER shall not exceed the conformance requirements given in 1. - 2. under extreme conditions; 3GPP TS

05.05, subclause 6.2 and annex D subclauses D.2.1 and D.2.2.

4. The reference sensitivity performance specified above need not be met in the following cases:
for MS at the static channel, if the received level on either of the two adjacent timeslots to the wanted exceed the wanted timeslot by more than 20 dB;

for MS on a multislot configuration, if the received level on any of the timeslots belonging to the same multislot configuration as the wanted time slot, exceed the wanted time slot by more than 6 dB;

The interfering adjacent time slots shall be static with valid GSM signals in all cases;3GPP TS 05.05, subclause 6.2.

5. For an MS allocated a USF on a PDCH with a random RF input or a valid PDCH signal with a random USF not equal to the allocated USF, the overall reception shall be such that the MS shall detect the allocated USF in less than 1% of the radio blocks. This requirement shall be met for all input levels up to -40 dBm.

Test Procedure

Test according to TS 151 010-1 clause 14.16.1.4.2

Test result ***Complied***

Measurement Data

GSM 900			
Test Channel	BLER (%)	Limit (%)	Result
975	0.000	10.00	pass
60	0.000	10.00	pass
124	0.000	10.00	pass

DCS 1800			
Test Channel	BLER (%)	Limit (%)	Result
512	0.000	10.00	pass
700	0.000	10.00	pass
885	0.000	10.00	pass

8.5 EGPRS Transmitter Requirement

8.5.1 Frequency Error and Modulation Accuracy in EGPRS Configuration

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.26 and TS 151 010-1 clause 13.17.1

Limit

1. For all measured bursts, the frequency error, derived in step c.4), shall be less than 10E-7.
2. For all measured bursts, the RMS EVM, derived in step c.3) shall not exceed 9.0 % under normal conditions and 10.0% under extreme conditions.
3. The (averaged) value of peak EVM derived in step g) shall not exceed 30 %.
4. The 95:th percentile value derived in step i) shall not exceed 15 %.
5. The origin offset suppression derived in subclause 13.17.1.4.2 step h) shall exceed 30 dB for MS.

Test Procedure

a. For one transmitted burst on the last slot of the multislot configuration, the SS captures the transmitted signal by taking at least four samples per symbol.

b. The SS shall generate the ideal transmitter signal as a reference. The ideal transmitter signal can be constructed from a priori knowledge of the transmitted symbols or from the demodulated symbols of the transmitted burst. In the latter case

c. For each symbol in the useful part of the burst excluding tail bits, the SS shall calculate the error vector magnitude as:

$$EVM(k) = \sqrt{\frac{|E(k)|^2}{\frac{\sum_{k \in K} |S(k)|^2}{N}}}$$

The peak value of symbol EVM in the useful part of the burst, excluding tail bits, is noted.

d. The SS shall calculate the value for Origin Offset Suppression for the burst as:

e. Steps a) to e) are repeated for a total of 200 bursts.

f. The peak values of symbol EVM noted in step d) are averaged for the 200 measured bursts.

g. The SS instructs the MS to its maximum power control level by setting the power control parameter ALPHA (α) to 0 and GAMMA_TN (ΓCH) for each timeslot to the desired power level in the Packet Uplink Assignment or Packet Timeslot Reconfigure message (Closed Loop Control, see 3GPP TS 05.08, clause B.2), all other conditions remaining constant. Steps a) to i) are repeated.

h. The SS instructs the MS to the minimum power control level, all other conditions remaining constant. Steps a) to i) are repeated.

i. Steps a) to i) are repeated under extreme test conditions (see annex 1, TC2.2).

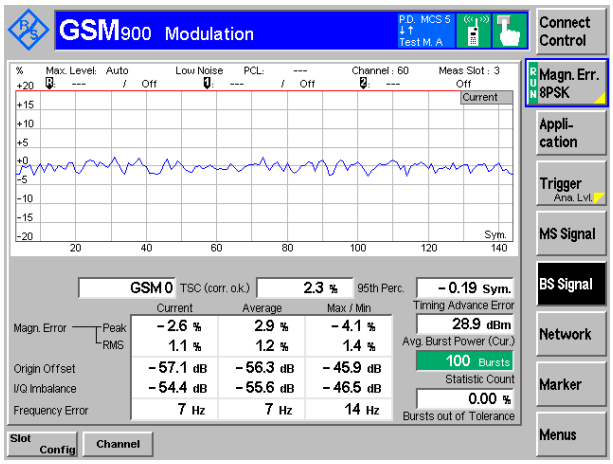
Test result ***Complied***

Measurement Data

Test Condition	GSM900 (EGPRS)		DCS1800 (EGPRS)	
	Channel 60		Channel 700	
	Level 3	Level 17	Level 5	Level 19
Normal	Pass	Pass	Pass	Pass
LT LV	Pass	Pass	Pass	Pass
LT HV	Pass	Pass	Pass	Pass
HT LV	Pass	Pass	Pass	Pass
HT HV	Pass	Pass	Pass	Pass

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	*GSM900 (EGPRS)*	Test Condition:	Normal	Test channel:	60



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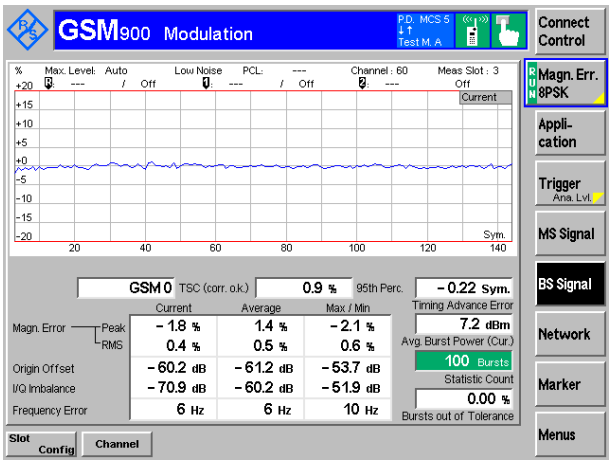
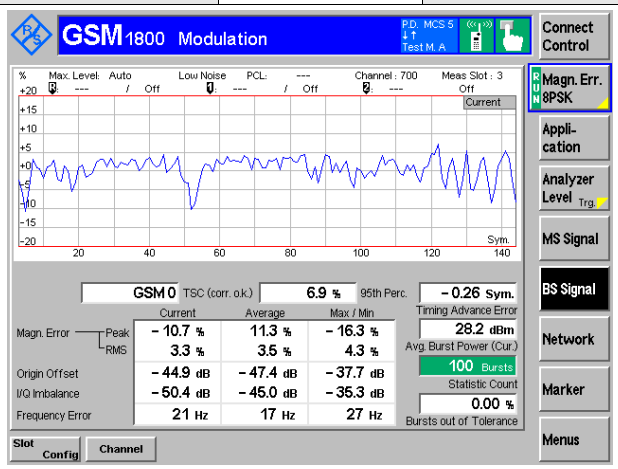


Y=17

Operation mode:	*DCS1800 (EGPRS)*	Test Condition:	Normal	Test channel:	700



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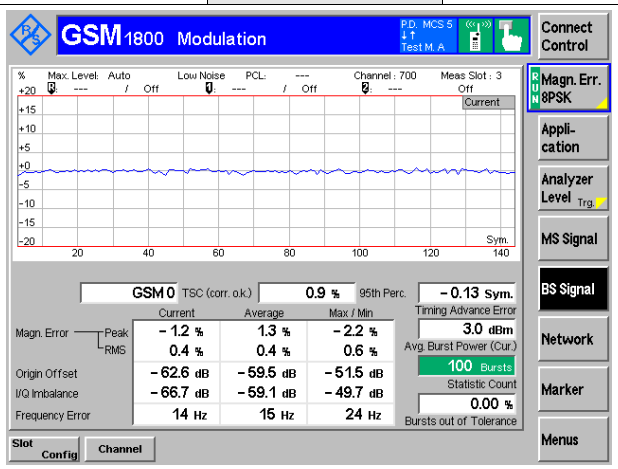


Y=18

8.5.2 Frequency Error Under Multipath and Interference Conditions in EGPRS Configuration

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.27 and TS 151 010-1 clause 13.2

Limit

GSM 850 and GSM 900		DCS 1800	
Condition	Limit	Condition	Limit
RA250	±300 Hz	RA130	±400 Hz
HT100	±180 Hz	HT100	±350 Hz
TU50	±160 Hz	TU50	±260 Hz
TU3	±230 Hz	TU1.5	±320 Hz

Test Procedure

a. Procedure for 16QAM frequency error under multipath and interference conditions

b. The SS transmits packets under static conditions, using DAS-8 coding. The SS is set up to capture the first burst transmitted by the MS during the uplink TBF. EGPRS Switched Radio Block Loop Back Mode is initiated by the SS according to the procedure defined in 3GPP TS44.014 section 5.5.1 on a PDTCH/DAS-8 channel in the mid ARFCN range. The PDTCH level is set to 10 dB above the input signal level at reference sensitivity performance for PDTCH/ DAS-8 applicable to the type of MS and the fading function is set to RA. 16QAM modulated downlink transmission shall be utilised.

c. The SS calculates the frequency accuracy of the captured burst as described in test 13.17.1a.

d. The SS sets the serving cell BCCH and PDTCH to the PDTCH input signal level at reference sensitivity performance for PDTCH/ DAS-8, still with the fading function set to RA and then waits 30 s for the MS to stabilize to these conditions.

e. The SS shall capture subsequent bursts from the traffic channel in the manner described in test 13.17.1a.

f. The SS calculates the frequency accuracy of the captured burst as described in test 13.17.1a.

g. Steps d) and e) are repeated for 5 traffic channel bursts spaced over a period of not less than 20 seconds.

h. Both downlink and uplink TBFs are terminated. The initial conditions are established again and steps a) to f) are repeated but with the fading function set to HT200 for GSM 400, HT120 for GSM700 and HT100 for all other bands.

i. Both downlink and uplink TBFs are terminated. The initial conditions are established again and steps a) to f) are repeated but with the fading function set to TU100 for GSM 400, TU60 for GSM700 and TU50 for all other bands.

j. Both downlink and uplink TBFs are terminated. The initial conditions are established again and steps a) and b) are repeated but with the following differences:
- the levels of the BCCH and PDTCH are set to – 72,5 dBm + Corr. Corr = the correction factor for reference performance according to Spec 45.005 sub clause 6.2.
- two further independent 16QAM modulated interfering signals are sent on the same nominal carrier frequency as the BCCH and PDTCH and at a level 20,5 dB below the level of the PDTCH and modulated with random data, including the midamble.
- the fading function for all channels including the interfering signals is set to TUlow.
- the SS waits 100 s for the MS to stabilize to these conditions.

k. Repeat steps d) to f), except that at step f) the measurement period must be extended to 200 s and the number of measurements increased to 20.

l. The initial conditions are established again and steps a) to j) are repeated for ARFCN in the Low

ARFCN range.

m. The initial conditions are established again and steps a) to j) are repeated for ARFCN in the High ARFCN range.

n. Repeat step h) under extreme test conditions (see annex 1, TC2.2).

Test result ***Complied***

Measurement Data

Operation mode:	*GSM900 (EGPRS)*	*Test channel:*	*60*

Test Condition		Frequency error (Hz)		Limit (Hz)	Result
		maximum power	minimum power		
Normal	RA250	57	52	±300 Hz	Pass
	HT100	50	58	±180 Hz	
	TU50	40	55	±160 Hz	
	TU3	61	60	±230 Hz	
LV LT	RA250	63	66	±300 Hz	
	HT100	55	64	±180 Hz	
	TU50	54	68	±160 Hz	
	TU3	51	60	±230 Hz	
LV HT	RA250	57	55	±300 Hz	
	HT100	45	46	±180 Hz	
	TU50	59	58	±160 Hz	
	TU3	52	64	±230 Hz	
HV LT	RA250	49	68	±300 Hz	
	HT100	65	66	±180 Hz	
	TU50	44	54	±160 Hz	
	TU3	64	54	±230 Hz	
HV HT	RA250	55	43	±300 Hz	
	HT100	55	48	±180 Hz	
	TU50	44	51	±160 Hz	
	TU3	68	64	±230 Hz	

Operation mode:	*DCS 1800 (EGPRS)*	*Test channel:*	*700*

Test Condition		Frequency error (Hz)		Limit (Hz)	Result
		maximum power	minimum power		
Normal	RA130	52	51	±400 Hz	Pass
	HT100	46	66	±350 Hz	
	TU50	63	40	±260 Hz	
	TU1.5	60	40	±320 Hz	
LT LV	RA130	57	54	±400 Hz	
	HT100	49	47	±350 Hz	
	TU50	43	59	±260 Hz	
	TU1.5	55	47	±320 Hz	
LT HV	RA130	41	63	±400 Hz	
	HT100	47	56	±350 Hz	
	TU50	61	40	±260 Hz	
	TU1.5	46	64	±320 Hz	
HT LV	RA130	55	61	±400 Hz	
	HT100	53	41	±350 Hz	
	TU50	62	61	±260 Hz	
	TU1.5	40	51	±320 Hz	
HT HV	RA130	60	49	±400 Hz	
	HT100	66	60	±350 Hz	
	TU50	66	68	±260 Hz	
	TU1.5	47	65	±320 Hz	

8.5.3 EGPRS Transmitter Output Power

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.28 and TS 151 010-1 clause 13.17.3

Limit

1. The MS maximum output power for 16-QAM modulated signal shall be as defined in 3GPP TS 45.005, subclause 4.1.1, second table, according to its power class, with a tolerances of ±2 dB, ±3 dB, +3/-4 dB defined under normal conditions in the 3GPP TS 45.005, 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 45.005 subclause 4.1.1, sixth table, according to its power class, with a tolerance of ±3 dB under normal conditions; 3GPP TS 45.005, subclause 4.1.1, second and seventh 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 ±2dB
2. The MS maximum output power for 16-QAM modulated signal shall be as defined in 3GPP TS 45.005, subclause 4.1.1, second table, according to its power class, with a tolerances of ±2,5 dB, ±4 dB, +4/-4,5 dB defined under extreme conditions in the 3GPP TS 45.005, 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 45.005 subclause 4.1.1, sixth table, according to its power class, with a tolerance of ±4 dB under extreme conditions; 3GPP TS 45.005, subclause 4.1.1, second and seventh table; 3GPP TS 45.005 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 ±2,5 dB.
3. The MS maximum output power for 16-QAM modulated signal shall be as defined in 3GPP TS 45.005, subclause 4.1.1, second table, according to its power class, with a tolerances of ±2,5 dB, ±4 dB, +4/-4,5 dB defined under extreme conditions in the 3GPP TS 45.005, 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 45.005 subclause 4.1.1, sixth table, according to its power class, with a tolerance of ±4 dB under extreme conditions; 3GPP TS 45.005, subclause 4.1.1, second and seventh table; 3GPP TS 45.005 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 ±2,5 dB.
4. The MS maximum output power for 16-QAM modulated signal shall be as defined in 3GPP TS 45.005, subclause 4.1.1, second table, according to its power class, with a tolerances of ±2,5 dB, ±4 dB, +4/-4,5 dB defined under extreme conditions in the 3GPP TS 45.005, 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 45.005 subclause 4.1.1, sixth table, according to its power class, with a tolerance of ±4 dB under extreme conditions; 3GPP TS 45.005, subclause 4.1.1, second and seventh table; 3GPP TS 45.005 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 ±2,5 dB. The MS maximum output power for 16-QAM modulated signal shall be as defined in 3GPP TS 45.005, subclause 4.1.1, second table, according to its power class, with a tolerances of ±2,5 dB, ±4 dB, +4/-4,5 dB defined under extreme conditions in the 3GPP TS 45.005, 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 45.005 subclause 4.1.1, sixth table, according to its power class, with a tolerance of ±4 dB under extreme conditions; 3GPP TS 45.005, subclause 4.1.1, second and seventh table; 3GPP TS 45.005 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 ±2,5 dB.

5. For 16-QAM, 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; 3GPP TS 45.005, 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 45.005, annex B, figure B.5 for 16-QAM and 32- QAM modulated signal at normal symbol rate. 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 45.005, subclause 4.5.2.
   6.2 Under extreme conditions; 3GPP TS 45.005, subclause 4.5.2, 3GPP TS 45.005 annex D subclauses D.2.1 and D.2.2.
   On a multislot uplink configuration the MS may restrict the interslot output power control range to a 10 dB window, on a TDMA frame basis. On those timeslots where the ordered power level is more than 10 dB lower than the applied power level of the highest power timeslot, the MS shall transmit at a lowest possible power level within 10 dB range from the highest applied power level, if not transmitting at the actual ordered power level.

Test Procedure

a. With the initial conditions set according to subclause 13.17.3.4.2.1 the test procedure in subclause 13.17.3.4.1.2 is followed up to and including step e), except that in step a), when measurements are done at maximum power for ARFCN in the Low, Mid and High range, the measurement is made eight times with the MS rotated by n*45 degrees for all values of n in the range 0 to 7. The measurements taken are received transmitter output power measurements rather than transmitter output power measurements, the output power measurement values can be derived as follows.

b. Assessment of test site loss for scaling of received output power measurements. The MS is replaced by a half-wave dipole, resonating at the centre frequency of the transmit band, connected to an RF generator. The frequency of the RF signal generator is set to the frequency of the ARFCN used for the 24 measurements in step a), the output power is adjusted to reproduce the received transmitter output power averages recorded in step a). For each indication the power, delivered by the generator (in Watts) to the half-wave dipole, is recorded. These values are recorded in the form Pnc, where n = MS rotation and c = channel number. For each channel number used compute:

$$\text{Pac(Watts into dipole)} = \frac{1}{8} * \sum_{n=0}^{n=7} \text{Pnc}$$

from which: Pac (Tx dBm) = 10log10(Pac) + 30 + 2,15 The difference, for each of the three channels, between the actual transmitter output power averaged over the 8 measurement orientations and the received transmitter output power at orientation n = 0 is used to scale the received measurement results to actual transmitter output powers for all measured power control levels and ARFCN, which can then be checked against the requirements.

c. Temporary antenna connector calibration factors (transmit) A modified test sample equipped with a temporary antenna connector is placed in a climatic test chamber and is linked to the SS by means of the temporary antenna connector. Under normal test conditions, the power measurement and calculation parts of steps a) to e) of subclause 13.17.3.4.1.2 are repeated except that the repeats at step d) are only performed for power control level 10 and the minimum nominal output power level supported by the MS.
   NOTE 1: The values noted here are related to the output transmitter carrier power levels under normal test conditions, which are known after step b). Therefore frequency dependent calibration

factors that account for the effects of the temporary antenna connector can be determined.

d. Measurements at extreme test conditions.
NOTE 2: Basically the procedure for extreme conditions is: - the power/time template is tested in the "normal" way; - the radiated power is measured by measuring the difference with respect to the radiated power under normal test conditions.
Under extreme test conditions steps a) to e) of subclause 13.17.3.4.1.2 are repeated except that the repeats at step d) are only performed for power control level 10 and the minimum nominal output power level supported by the MS.
The transmitter output power under extreme test conditions is calculated for each burst type, power control level and for every frequency used by adding the frequency dependent calibration factor, determined in c), to the values obtained at extreme conditions in this step

Test result ***Complied***

Measurement Data

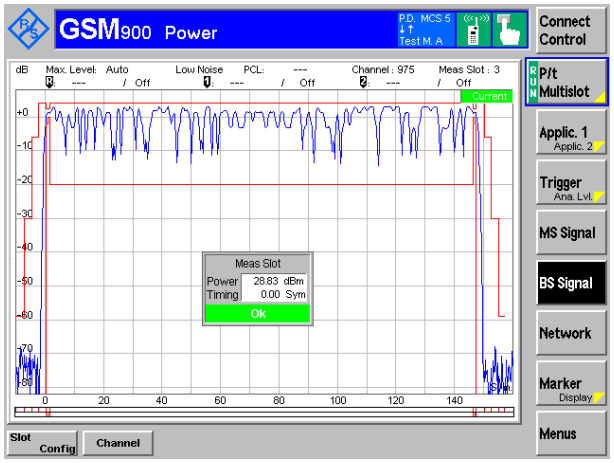
GSM900 (EGPRS): Lowest channel 975						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	28.83	28.43	28.61	27.47	27.60	Pass
4	26.13	26.68	26.97	26.86	26.26	
5	24.65	24.46	24.80	24.70	24.34	
6	21.16	22.87	22.39	22.91	22.37	
7	19.63	20.64	20.17	20.77	20.78	
8	18.14	18.88	18.93	18.46	18.28	
9	16.65	16.31	16.80	16.12	16.45	
10	15.16	15.06	15.35	15.94	15.40	
11	13.67	13.04	13.56	13.15	13.94	
12	12.18	12.46	12.15	12.38	12.49	
13	10.69	10.78	10.78	10.14	10.29	
14	9.19	9.47	9.24	9.72	9.72	
15	7.70	8.70	8.50	8.33	8.97	
16	6.21	7.86	7.82	7.12	7.00	
17	7.21	6.39	6.68	6.84	6.22	

GSM900 (EGPRS): Middle channel 60						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	28.76	28.23	27.29	28.39	28.07	Pass
4	26.10	26.82	26.27	26.04	26.65	
5	24.68	24.81	24.06	24.81	24.31	
6	22.19	22.38	22.41	22.37	22.13	
7	20.69	20.36	20.16	20.88	20.54	
8	18.17	18.43	18.16	18.02	18.55	
9	16.67	16.25	16.68	16.85	16.43	
10	15.18	15.76	15.23	15.74	15.05	
11	13.68	13.61	13.07	13.44	13.98	
12	12.18	12.13	12.86	12.35	12.81	
13	10.69	10.81	10.42	10.03	10.48	
14	9.19	9.50	9.31	9.78	9.89	
15	7.69	8.15	8.51	8.58	8.69	
16	6.20	7.83	7.45	7.43	7.31	
17	7.14	6.73	6.83	6.97	6.58	

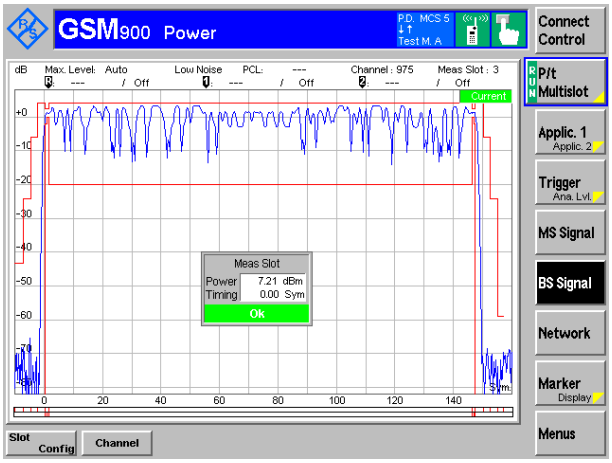
GSM900 (EGPRS): Highest channel 124						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	28.78	28.24	28.63	28.07	27.12	Pass
4	26.52	26.74	26.15	26.71	26.96	
5	25.03	24.19	24.02	24.59	24.91	
6	24.59	22.91	22.58	22.12	22.36	
7	23.54	20.15	20.02	20.32	20.27	
8	21.05	18.13	18.11	18.23	18.37	
9	19.56	16.78	16.80	16.64	16.36	
10	17.07	15.47	15.37	15.31	15.25	
11	15.58	13.87	13.82	14.00	13.13	
12	12.09	12.93	12.35	12.84	13.00	
13	10.60	10.40	10.09	10.85	10.77	
14	9.11	9.35	9.60	9.77	9.55	
15	7.62	8.31	8.51	8.78	8.16	
16	6.13	7.59	7.66	7.77	7.58	
17	6.98	6.01	6.84	6.37	6.51	

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	GSM900 (EGPRS)	Test Condition:	Normal	Test channel:	975

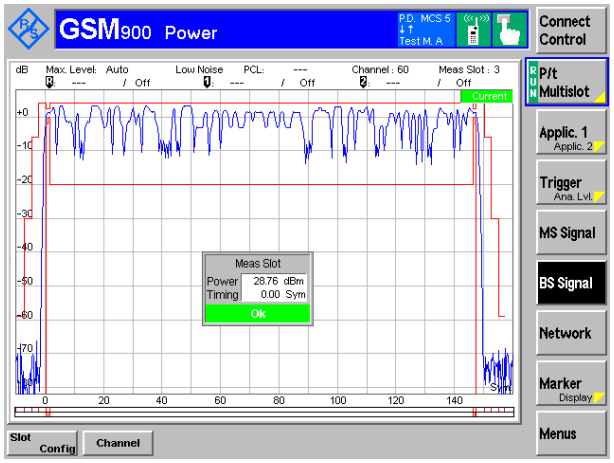


Level 3

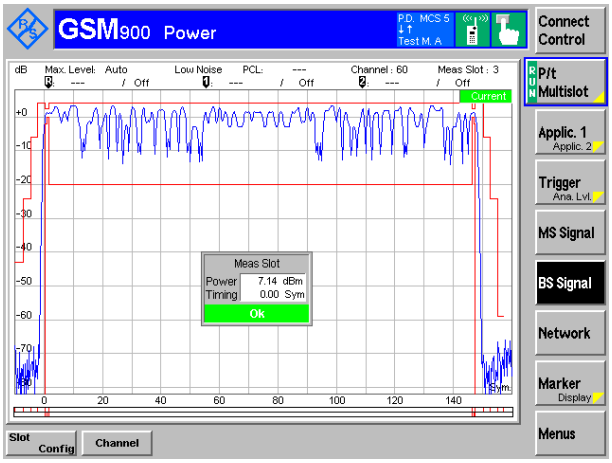


Level 17

Operation mode:	GSM900 (EGPRS)	Test Condition:	Normal	Test channel:	60

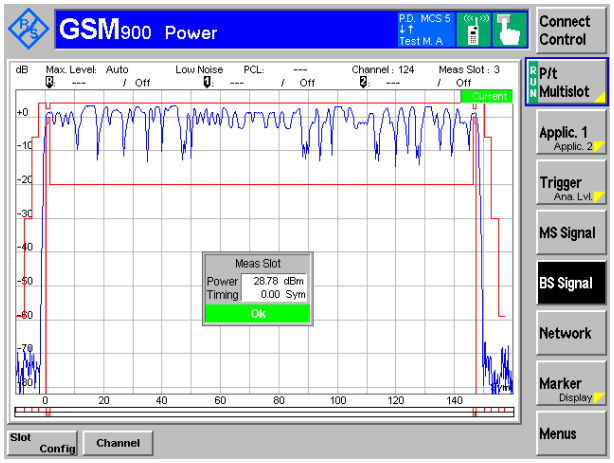


Level 3

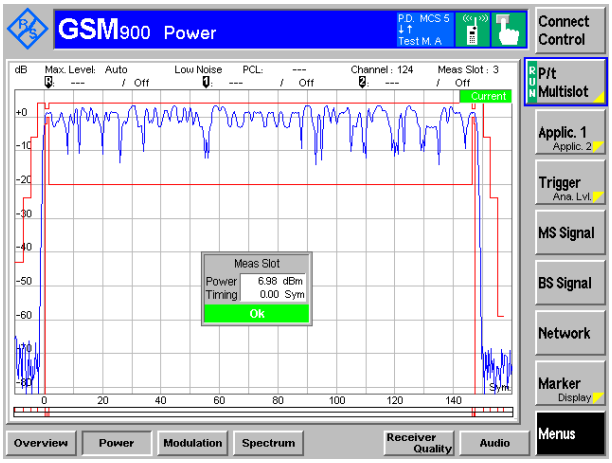


Level 17

Operation mode:	GSM900 (EGPRS)	Test Condition:	Normal	Test channel:	124



Level 3



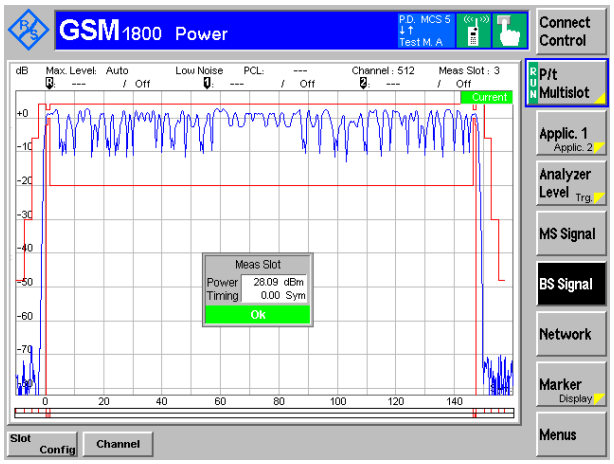
Level 17

DCS1800 (EGPRS): Lowest channel 512						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	28.09	27.31	27.89	27.81	28.36	Pass
4	26.86	26.62	26.90	26.77	26.17	
5	24.24	24.21	24.26	24.95	24.92	
6	22.62	22.46	22.96	22.45	22.76	
7	20.99	20.52	20.14	20.65	20.82	
8	18.37	18.08	18.21	18.39	18.98	
9	16.75	16.00	16.20	16.15	16.45	
10	14.13	14.57	14.84	14.72	14.74	
11	12.50	12.51	12.01	12.94	12.46	
12	10.88	10.61	10.47	10.73	10.05	
13	8.26	8.31	8.91	8.15	8.95	
14	7.15	7.02	7.78	7.77	6.98	
15	6.01	6.34	6.07	6.29	6.46	
16	4.02	4.12	4.70	4.32	4.65	
17	3.30	3.89	3.78	3.18	3.89	
18	2.84	2.51	2.82	2.52	2.09	
DCS1800 (EGPRS): Lowest channel 700						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	28.02	28.11	28.85	28.01	28.25	Pass
4	24.19	26.14	26.07	26.87	26.98	
5	22.54	24.97	24.33	24.95	24.46	
6	20.53	22.23	22.96	22.92	22.68	
7	18.86	20.61	20.82	20.01	20.57	
8	16.20	18.82	18.09	18.57	18.85	
9	14.53	16.64	16.96	16.74	16.28	
10	12.87	14.33	14.73	14.86	14.68	
11	10.20	12.94	12.75	12.79	12.98	
12	9.54	10.13	10.79	10.96	10.90	
13	8.87	8.90	8.37	8.89	8.42	
14	7.21	7.14	7.53	7.12	7.69	
15	6.24	6.90	6.27	6.61	6.62	
16	4.52	4.53	4.09	4.20	4.84	
17	3.23	3.02	3.33	3.34	3.61	
18	2.85	2.23	2.88	2.47	2.50	

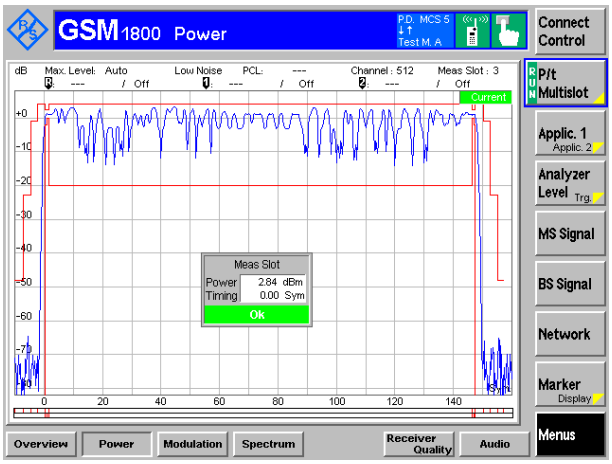
DCS1800 (EGPRS): Lowest channel 885						
Power Control Level	Output Power (dBm)					Result
	Normal	LT LV	LT HV	HT LV	HT HV	
3	27.81	28.39	28.30	28.21	28.14	Pass
4	25.66	26.34	26.82	26.94	26.53	
5	23.49	24.58	24.10	24.85	24.65	
6	21.49	22.59	22.55	22.37	22.30	
7	19.77	20.78	20.67	20.36	20.88	
8	17.04	18.05	18.77	18.31	18.75	
9	14.32	16.18	16.02	16.17	16.32	
10	12.60	14.30	14.29	14.75	14.39	
11	10.88	12.29	12.69	12.34	12.52	
12	9.15	10.83	10.71	10.74	10.33	
13	8.43	8.38	8.76	8.99	8.98	
14	7.71	7.97	7.82	7.58	7.18	
15	6.02	6.51	6.94	6.53	6.92	
16	4.29	4.42	4.46	4.49	4.09	
17	3.27	3.96	3.78	3.94	3.91	
18	2.53	2.54	2.90	2.55	2.32	

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	DCS1800 (EGPRS)	Test Condition:	Normal	Test channel:	512

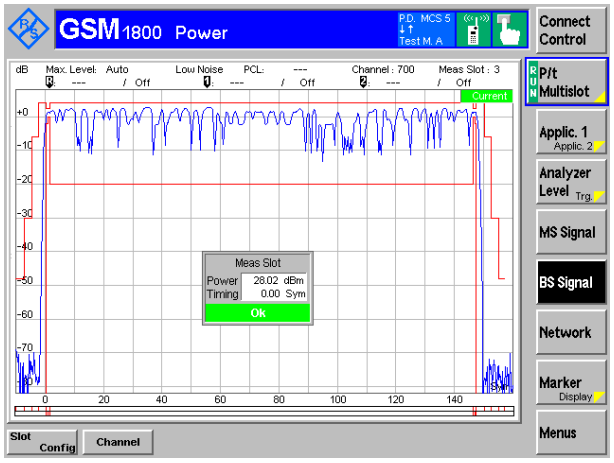


Level 3

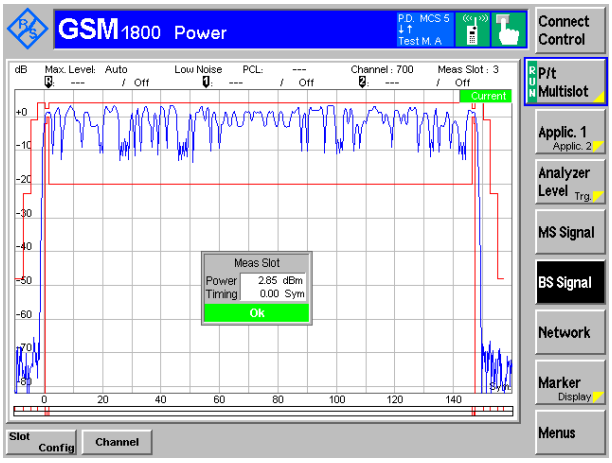


Level 18

Operation mode:	DCS1800 (EGPRS)	Test Condition:	Normal	Test channel:	700

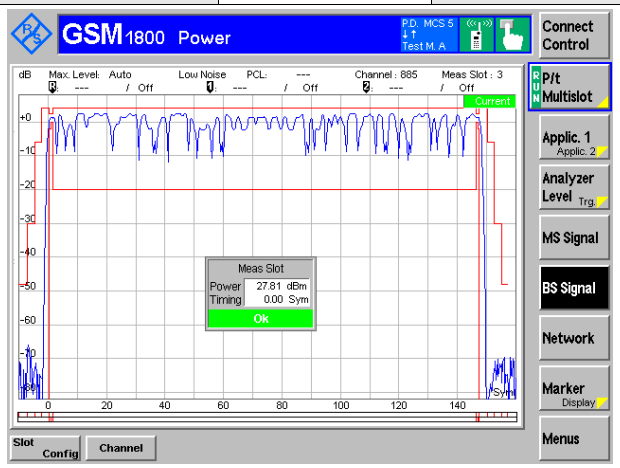


Level 3

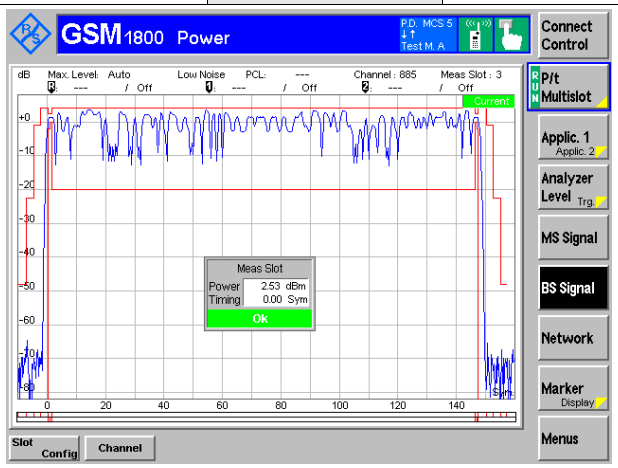


Level 18

Operation mode:	DCS1800 (EGPRS)	Test Condition:	Normal	Test channel:	885



Level 3



Level 18

8.5.4 Output RF Spectrum in EGPRS Configuration

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.29 and TS 151 010-1 clause 13.17.4

Limit

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 05.05, subclause 4.3.3.*

Test Procedure

m. In steps b) to h) the FT is equal to the hop pattern ARFCN in the Mid ARFCN range.

n. The other settings of the spectrum analyzer are set as follows:

   - Zero frequency scan;
   - Resolution bandwidth: 30 kHz;
   - Video bandwidth: 30 kHz;
   - Video averaging: may be used, depending on the implementation of the test.

   The video signal of the spectrum analyzer is "gated" such that the spectrum generated by at least 40 of the bits 87 to 132 of the burst is the only spectrum measured. This gating may be analogue or numerical, dependent upon the design of the spectrum analyzer. Only measurements during transmitted bursts on the nominal carrier of the measurement are included. The spectrum analyzer averages over the gated period and over 200 or 50 such bursts, using numerical and/or video averaging.

The MS is commanded to its maximum power control level.

o. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured over 50 bursts at all multiples of 30 kHz offset from FT to < 1 800 kHz.

p. The resolution and video bandwidth on the spectrum analyzer are adjusted to 100 kHz and the measurements are made at the following frequencies:

- on every ARFCN from 1 800 kHz offset from the carrier to the edge of the relevant transmit band for each measurement over 50 bursts;
- at 200 kHz intervals over the 2 MHz either side of the relevant transmit band for each measurement over 50 bursts.

q. The MS is commanded to its minimum power control level. The spectrum analyzer is set again as in b).

r. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured over 200 bursts at the following frequencies:

FT;

FT + 100 kHz FT - 100 kHz;

FT + 200 kHz FT - 200 kHz;

FT + 250 kHz FT - 250 kHz;

FT + 200 kHz * N FT - 200 kHz * N;

where N = 2, 3, 4, 5, 6, 7, and 8; and FT = RF channel nominal centre frequency

s. The spectrum analyzer settings are adjusted to:

- Zero frequency scan;
- Resolution bandwidth: 30 kHz;
- Video bandwidth: 100 kHz;
- Peak hold.

The spectrum analyzer gating of the signal is switched off.

The MS is commanded to its maximum power control level.

t. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured at the following frequencies:

FT + 400 kHz FT - 400 kHz;

FT + 600 kHz FT - 600 kHz;

FT + 1,2 MHz FT - 1,2 MHz;

FT + 1,8 MHz FT - 1,8 MHz;

where FT = RF channel nominal centre frequency.

The duration of each measurement (at each frequency) will be such as to cover at least 10 burst transmissions at FT.

u. Step h) is repeated for power control levels 7 and 11.

v. By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured at the following frequencies:

w. Steps b), f), g) and h) are repeated with FT equal to the hop pattern ARFCN in the High ARFCN range except that in step g) the MS is commanded to power control level 11 rather than maximum power.

x. Steps a) b) f) g) and h) are repeated under extreme test conditions (annex 1, TC2.2). except that at step g) the MS is commanded to power control level 11.

Test result ***Complied***

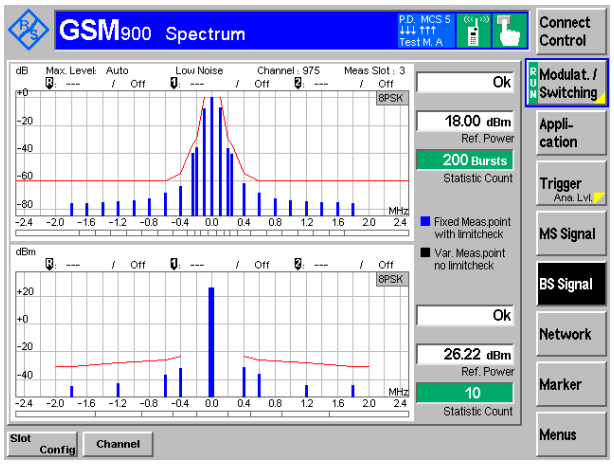
Measurement Data

GSM900						
Test Condition	Lowest channel		Middle channel		Highest channel	
	Level 3	Level 17	Level 3	Level 17	Level 3	Level 17
Normal	Pass	Pass	Pass	Pass	Pass	Pass
LT LV	Pass	Pass	Pass	Pass	Pass	Pass
LT HV	Pass	Pass	Pass	Pass	Pass	Pass
HT LV	Pass	Pass	Pass	Pass	Pass	Pass
HT HV	Pass	Pass	Pass	Pass	Pass	Pass

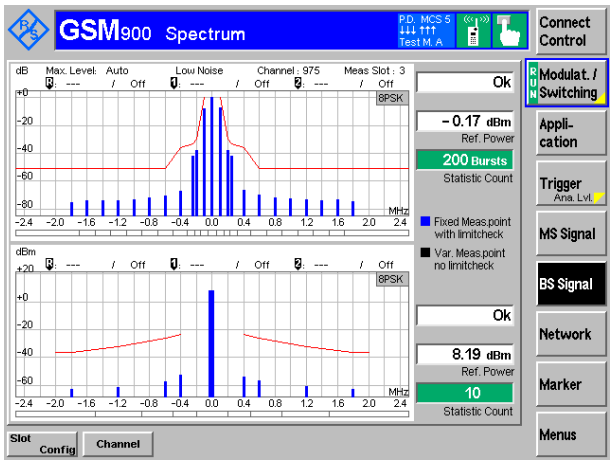
DCS1800						
Test Condition	Lowest channel		Middle channel		Highest channel	
	Level 3	Level 18	Level 3	Level 18	Level 3	Level 18
Normal	Pass	Pass	Pass	Pass	Pass	Pass
LT LV	Pass	Pass	Pass	Pass	Pass	Pass
LT HV	Pass	Pass	Pass	Pass	Pass	Pass
HT LV	Pass	Pass	Pass	Pass	Pass	Pass
HT HV	Pass	Pass	Pass	Pass	Pass	Pass

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Operation mode:	GSM900 (EGPRS)	Test Condition:	Normal	Test channel:	975

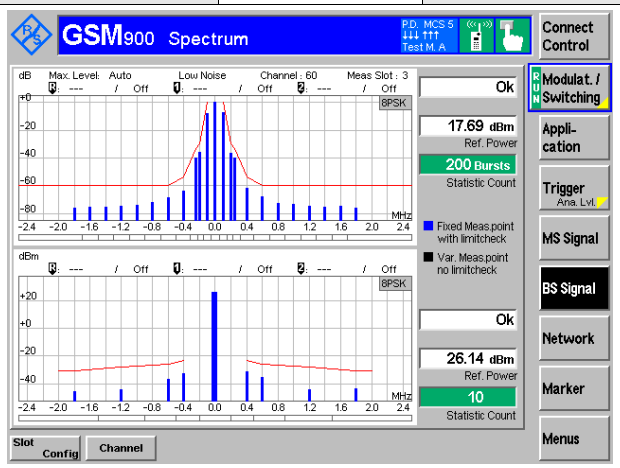


Y=3

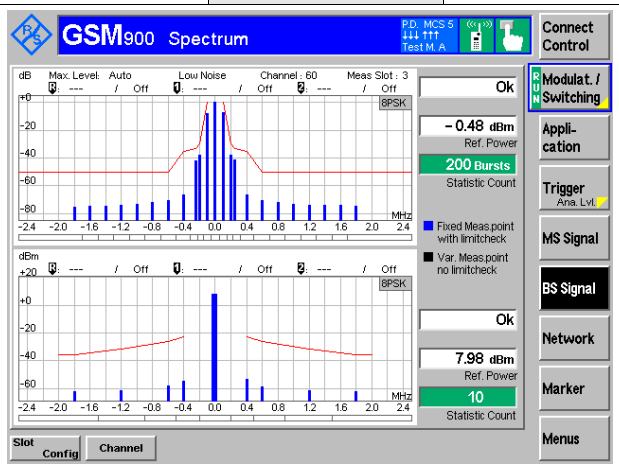


Y=17

Operation mode:	GSM900 (EGPRS)	Test Condition:	Normal	Test channel:	60

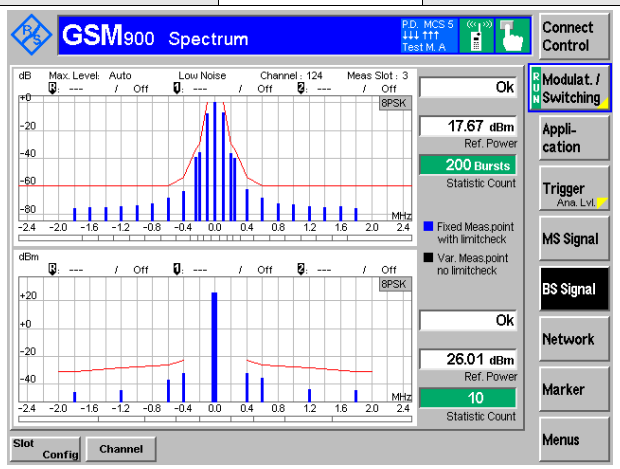


Y=3

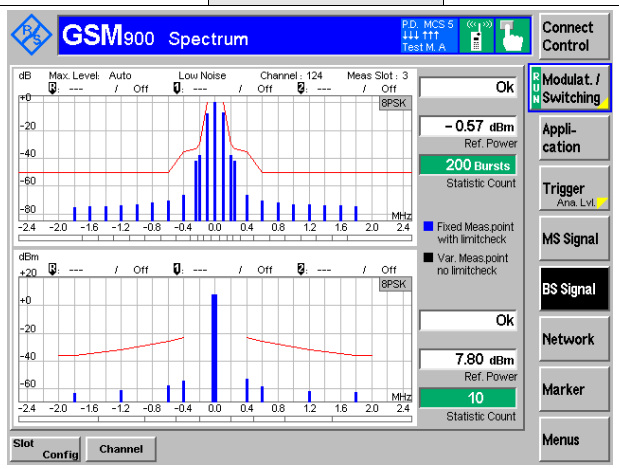


Y=17

Operation mode:	GSM900 (EGPRS)	Test Condition:	Normal	Test channel:	124

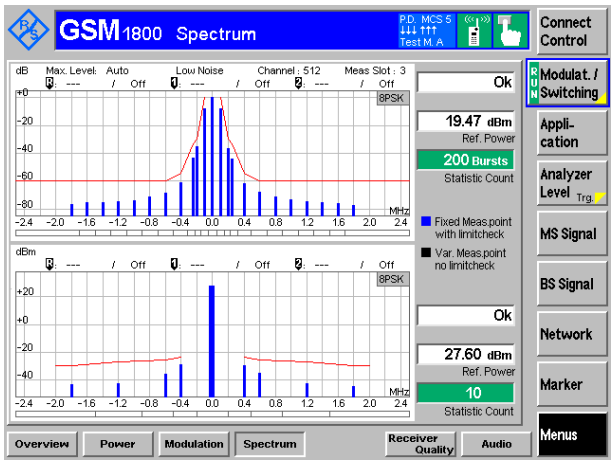


Y=3

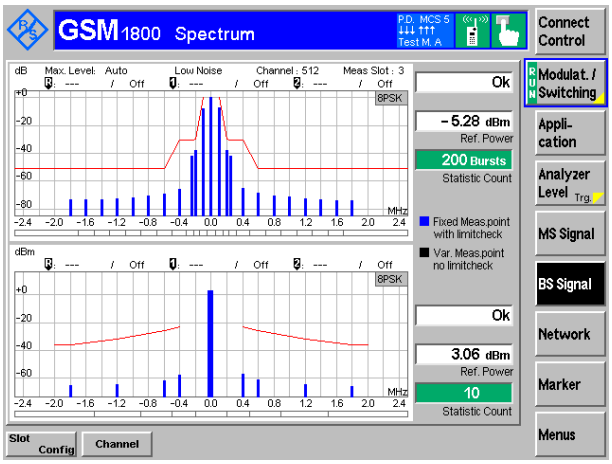


Y=17

Operation mode:	DCS1800 EGPRS)	Test Condition:	Normal	Test channel:	512

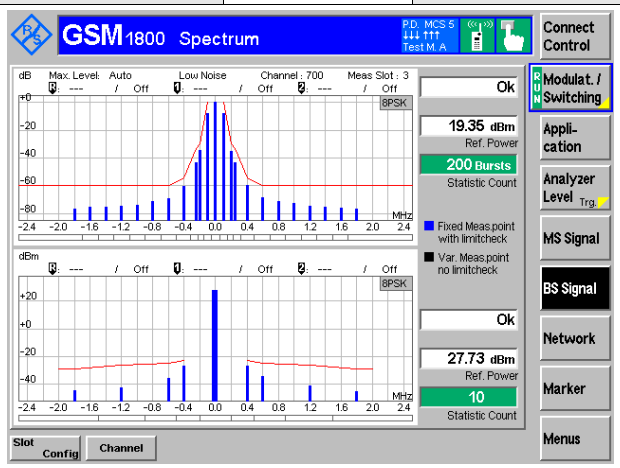


Y=3

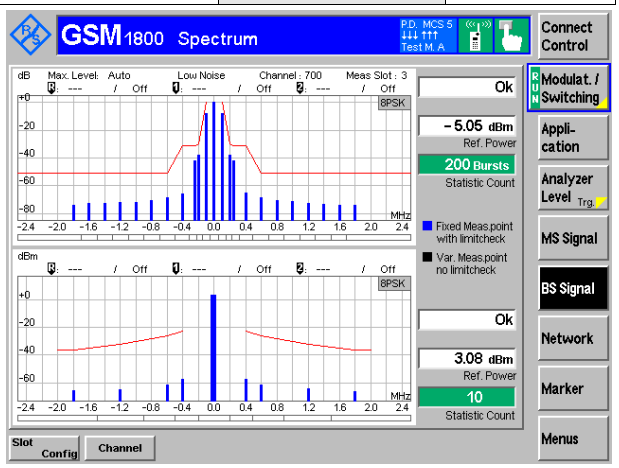


Y=18

Operation mode:	DCS1800(EGPRS)	Test Condition:	Normal	Test channel:	700

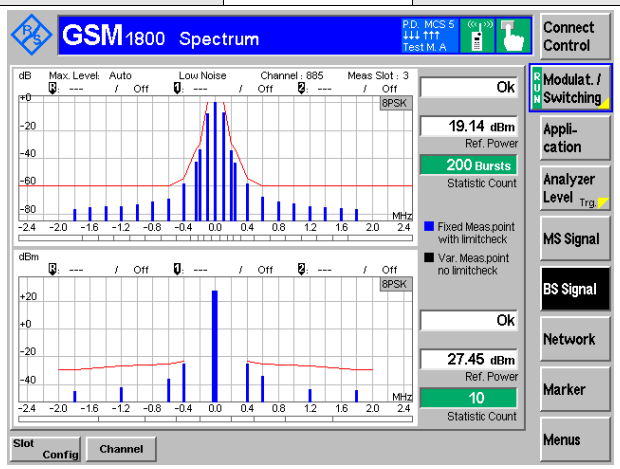


Y=3

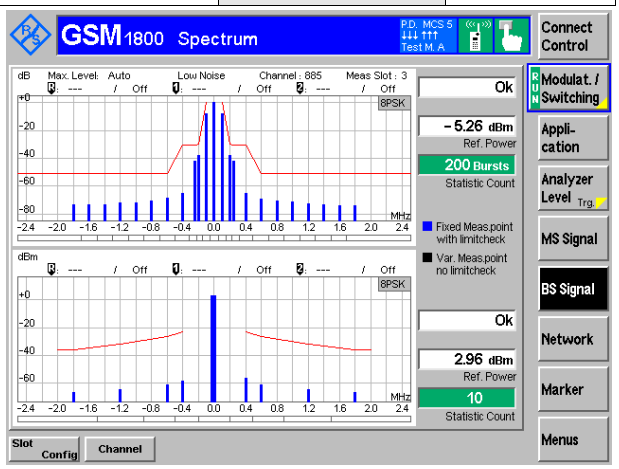


Y=18

Operation mode:	DCS1800 EGPRS)	Test Condition:	Normal	Test channel:	885



Y=3



Y=18

8.6 EGPRS Receiver Requirement

8.6.1 Blocking and spurious response in EGPRS Configuration

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.30 and TS 151 010-1 clause 14.18.5

Limit

GSM900: A maximum of six failures in the frequency band 915 MHz to 980 MHz (which, if grouped, shall not exceed three 200 kHz channels per group).
A maximum of 24 failures in the combined bands 100 kHz to 915 MHz and 980 MHz to 12,75 GHz (which, if below FR and grouped, shall not exceed three 200 kHz channels per group).

DCS1800: A maximum of twelve failures in the band 1 785 MHz to 1 920 MHz (which, if grouped, shall not exceed three 200 kHz channels per group).
A maximum of 24 in the combined bands 100 kHz to 1 785 MHz and 1 920 MHz to 12,75 GHz (which, if below FR and grouped, shall not exceed three 200 kHz channels per group).

Test Procedure

Test according to TS 151 010-1 clause 14.18.5.4

Test result ***Complied***

Measurement Data

GSM 900				
Test Channel	FBER (%)	Number of test samples	Limit (%)	Result
975	0.005	10000	2.439	pass
60	0.000	10000	2.439	pass
124	0.001	10000	2.439	pass

DCS1800				
Test Channel	FBER (%)	Number of test samples	Limit (%)	Result
513	0.000	10000	2.439	pass
700	0.000	10000	2.439	pass
884	0.004	10000	2.439	pass

8.6.2 Intermodulation rejection - EGPRS

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.34 and TS 151 010-1 clause 14.18.4

Limit

In the presence of two unwanted signals with a specific frequency relationship to the wanted signal frequency in both GMSK and 8-PSK modulations

1. 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; 3GPP TS 05.05, subclause 6.2.
2. The block error rate (BLER) performance for USF/MSC-1 to 9 shall not exceed 1 %; 3GPP TS 05.05, subclause 6.2.
3. The BLER shall not exceed the conformance requirements given in 1. - 2. under extreme conditions; 3GPP TS 05.05, subclause 6.2 and annex D subclauses D.2.1 and D.2.2.

Test Procedure

Test according to TS 151 010-1 clause 14.18.4.4

Test result ***Complied***

Measurement Data

GSM 900			
Test Channel	FBER (%)	Limit (%)	Result
975	0.000	10.00	pass
60	0.000	10.00	pass
124	0.000	10.00	pass

DCS 1800			
Test Channel	FBER (%)	Limit (%)	Result
512	0.000	10.00	pass
700	0.000	10.00	pass
885	0.000	10.00	pass

8.6.3 AM suppression - packet channels

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.37 and TS 151 010-1 clause 14.8.3

Limit

The error rates measured in this test shall not exceed the test limit error rate values given in table 14.8.3-2.

Table 14.8.3-2: Limits for AM suppression

Channel	Propagation conditions	Type of measurement	Test limit error rate %	Minimum No. of samples
MCS-5	Static	BLER	10	2000
USF/MCS-5	Static	BLER	1	20 000

Test Procedure

Test according to TS 151 010-1 clause 14.8.3.4.2

Test result ***Complied***

Measurement Data

GSM 900				
Test Channel	BLER (%)	Number of test samples	Limit (%)	Result
975	0.000	2000	10.00	pass
60	0.000	2000	10.00	pass
124	0.000	2000	10.00	pass

DCS1800				
Test Channel	BLER (%)	Number of test samples	Limit (%)	Result
513	0.000	2000	10.00	pass
700	0.000	2000	10.00	pass
884	0.000	2000	10.00	pass

8.6.4 Adjacent channel rejection - EGPRS

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.40 and TS 151 010-1 clause 14.18.3.

Limit

The block error rate (BLER) performance for PDTCH/MCS1 to 4 shall not exceed 10 %.
The block error rate (BLER) performance for PDTCH/MCS5 to 9 shall not exceed 10 % or 30 % depending on Coding Schemes.

Test Procedure

Test according to TS 151 010-1 clause 14.18.3.4

Test result ***Complied***

Measurement Data

GSM 900			
Test Channel	FBER (%)	Limit (%)	Result
975	0.000	10.00	pass
60	0.000	10.00	pass
124	0.000	10.00	pass

DCS 1800			
Test Channel	FBER (%)	Limit (%)	Result
512	0.000	10.00	pass
700	0.000	10.00	pass
885	0.000	10.00	pass

8.6.5 Minimum Input level for Reference Performance- EGPRS

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.45 and TS 151 010-1 clause 14.18.1

Limit

1. The block error rate (BLER) performance for PDTCH/MCS1 to 4 shall not exceed 10 % at input levels according to the table 14.18-3a; and for PDTCH/MCS5 to 9 shall not exceed 10 % or 30 % depending on Coding Schemes at input levels according to the table 14.18-3b.

Table 14.18-3a: PDTCH Sensitivity Input Level for GMSK modulation

Type of Channel		Propagation conditions				
		static	TUhigh (no FH)	TUhigh (ideal FH)	RA (no FH)	HT (no FH)
GSM 400, GSM 700, GSM 850 and GSM 900						
PDTCH/MCS-1	dBm	-104	-102,5	-103	-103	-102
PDTCH/MCS-2	dBm	-104	-100,5	-101	-100.5	-100
PDTCH/MCS-3	dBm	-104	-96,5	-96,5	-92,5	-95,5
PDTCH/MCS-4	dBm	-101,5	-91	-91	(note)	(note)
DCS 1 800 and PCS 1 900						
PDTCH/MCS-1	dBm	-104	-102,5	-103	-103	-101,5
PDTCH/MCS-2	dBm	-104	-100,5	-101	-100,5	-99,5
PDTCH/MCS-3	dBm	-104	-96,5	-96,5	-92,5	-94,5
PDTCH/MCS-4	dBm	-101,5	-90,5	-90,5	(note)	(note)
NOTE: PDTCH/MCS-4 can not meet the reference performance for some propagation conditions.						

Table 14.18-3b: PDTCH Sensitivity Input Level for MS for 8-PSK modulation

GSM 400, GSM 700, GSM 850 and GSM 900						
Type of channel		Propagation conditions				
		static	TUhigh (no FH)	TUhigh (ideal FH)	RA (no FH)	HT (no FH)
PDTCH/MCS-5	dBm	-98	-93	-94	-93	-92
PDTCH/MCS-6	dBm	-96	-91	-91,5	-88	-89
PDTCH/MCS-7	dBm	-93	-84	-84	(note 2)	-83 (note 3)
PDTCH/MCS-8	dBm	-90,5	-83 (note 3)	-83 (note 3)	(note 2)	(note 2)
PDTCH/MCS-9	dBm	-86	-78,5 (note 3)	-78,5 (note 3)	(note 2)	(note 2)
DCS 1 800 and PCS 1 900						
Type of channel		Propagation conditions				
		static	TUhigh (no FH)	TUhigh (ideal FH)	RA (no FH)	HT (no FH)
PDTCH/MCS-5	dBm	-98	-93,5	-93,5	-93	-89,5
PDTCH/MCS-6	dBm	-96	-91	-91	-88	-83,5
PDTCH/MCS-7	dBm	-93	-81,5	-80,5	(note 2)	(note 2)
PDTCH/MCS-8	dBm	-90,5	-80 (note 3)	-80 (note 3)	(note 2)	(note 2)
PDTCH/MCS-9	dBm	-86	(note 2)	(note 2)	(note 2)	(note 2)
NOTE 1: Ideal FH case assumes perfect decorrelation between bursts. This case may only be tested if such a decorrelation is ensured in the test. For TUhigh (ideal FH), sufficient decorrelation may be achieved with 4 frequencies spaced over 5 MHz.						
NOTE 2: PDTCH for MCS-x can not meet the reference performance for some propagation conditions.						
NOTE 3: Performance is specified at 30% BLER for some cases.						

2. The block error rate (BLER) performance for USF/MCS1 to 9 shall not exceed 1 % at input levels according to the tables 14.18-4a and 14.18-4b.

Table 14.18-4a: USF Sensitivity Input Level for GMSK modulation

Type of channel			Propagation conditions				
			static	TUhigh (no FH)	TUhigh (ideal FH)	RA (no FH)	HT (no FH)
GSM 400, GSM 700, GSM 850 and GSM 900							
USF/MCS-1	to 4	dBm	-104	-102,5	-104	-104	-102,5
DCS 1 800 and PCS 1 900							
USF/MCS-1 to 4		dBm	-104	-104	-104	-104	-102,5

Table 14.18-4b: USF Sensitivity Input Level for 8-PSK modulation

Type of Channel		Propagation conditions				
		static	TUhigh (no FH)	TUhigh (ideal FH)	RA (no FH)	HT (no FH)
GSM 400, GSM 700, GSM 850 and GSM 900						
USF/MCS-5 to 9	dBm	-102	-97,5	-99	-100	-99
DCS 1 800 and PCS 1 900						
USF/MCS-5 to 9	dBm	-102	-99	-99	-100	-99

Test Procedure

Test according to TS 151 010-1 clause 14.18.1.4

Test result ***Complied***

Measurement Data

GSM 900			
Test Channel	FBER (%)	Limit (%)	Result
975	0.000	10.00	pass
60	0.000	10.00	pass
124	0.000	10.00	pass

DCS 1800			
Test Channel	FBER (%)	Limit (%)	Result
512	0.000	10.00	pass
700	0.000	10.00	pass
885	0.000	10.00	pass

8.7 Conducted Spurious Emissions-MS Allocated a Channel

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.12 and TS 151 010-1 clause 12.1.1

Limit

Frequency range	Power level in dBm	
	GSM900	DCS1800
9KHz to 1GHz	-36	-36
1GHz to 12.75GHz	-30	-
1GHz to 1710MHz	-	-30
1710MHz to 1785MHz	-	-36
1785MHz to 12.75GHz	-	-30

Test Procedure

a. Measurements are made in the frequency range 100 kHz to 12,75 GHz. Spurious emissions are measured at the connector of the transceiver, as the power level of any discrete signal, higher than the requirement in table 1 minus 6 dB, delivered into a 50 Ω□load.
The measurement bandwidth based on a 5 pole synchronously tuned filter is according to below table, The power indication is the peak power detected by the measuring system.
The measurement on any frequency shall be performed for at least one TDMA frame period with the exception of the idle frame.

NOTE: This ensures that both the active times (MS transmitting) and the quiet times are measured.

b. The test is repeated under extreme voltage test conditions ([annex 1, TC2.2 and TC3]).

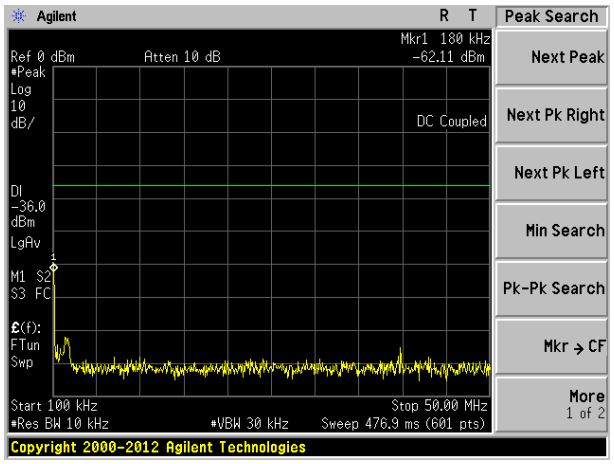
Frequency range	Frequency offset	Filter bandwidth	Approx video bandwidth
100KHz to 50MHz	-	10KHz	30KHz
50MHz to 500MHz	-	100KHz	300KHz
500MHz to 12.75GHz	0 to 10MHz ⩾10MHz ⩾20MHz ⩾30MHz	100KHz 300KHz 1MHz 3MHz	300KHz 1MHz 3MHz 3MHz

Test result ***Complied***

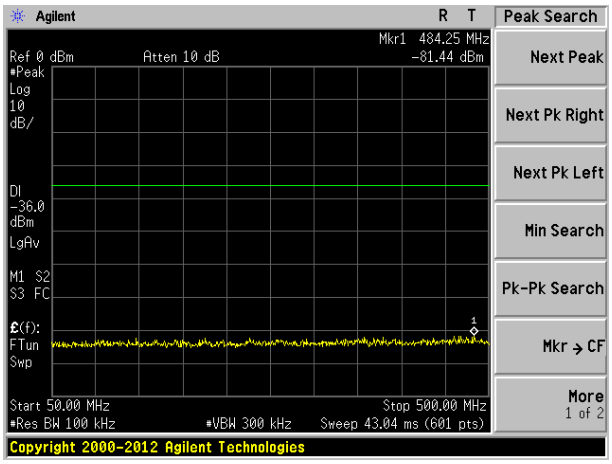
Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Measurement Data

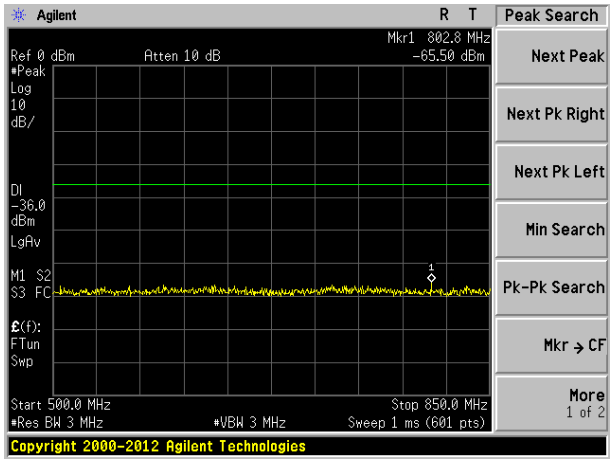
Operation mode:	GSM900	Test Condition:	Normal voltage	Test channel:	60



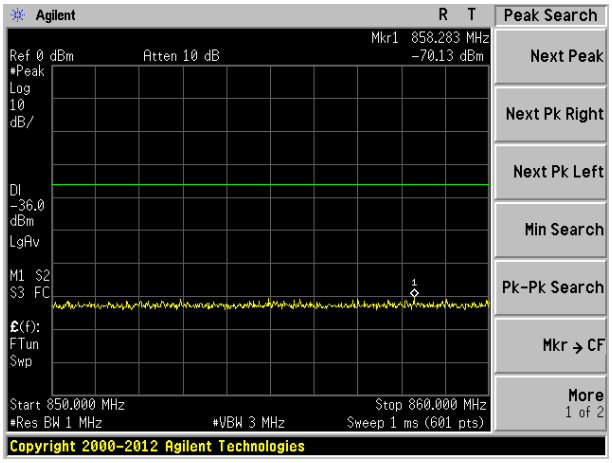
100KHz~50MHz



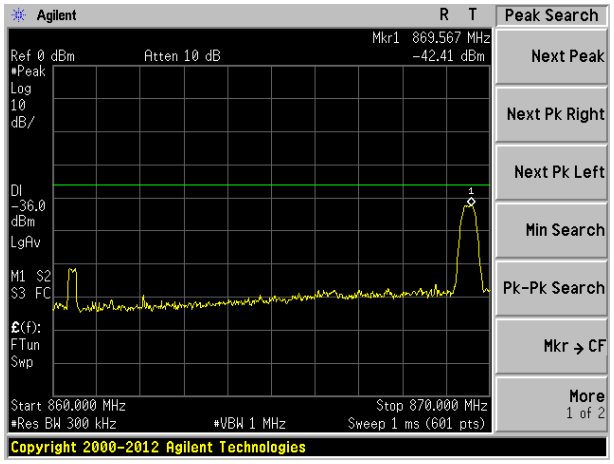
50MHz~500MHz



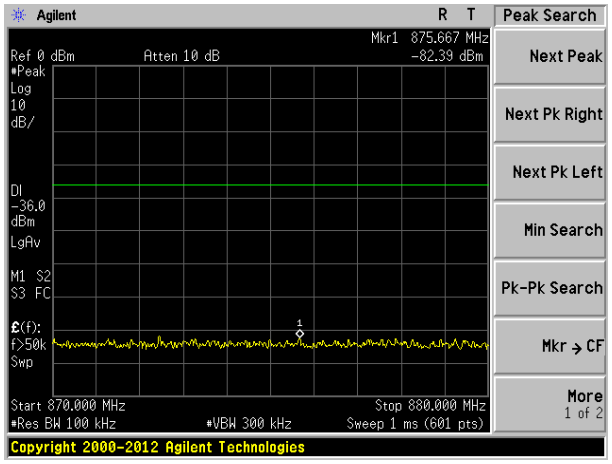
500MHz~850MHz



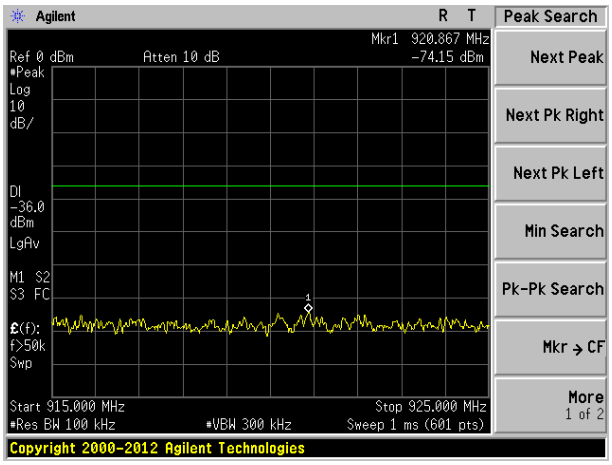
850MHz~860MHz



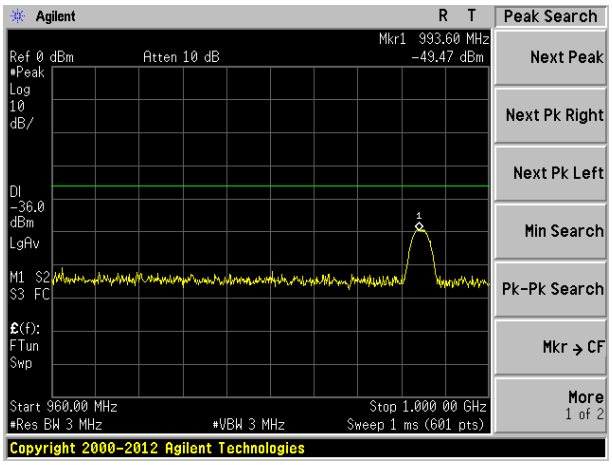
860MHz~870MHz



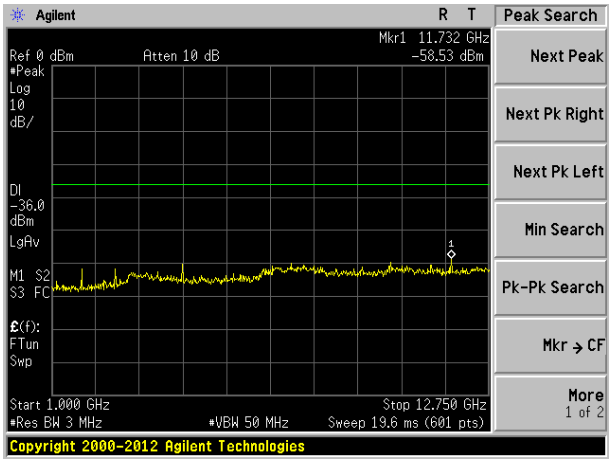
870MHz~880MHz



915MHz~925MHz

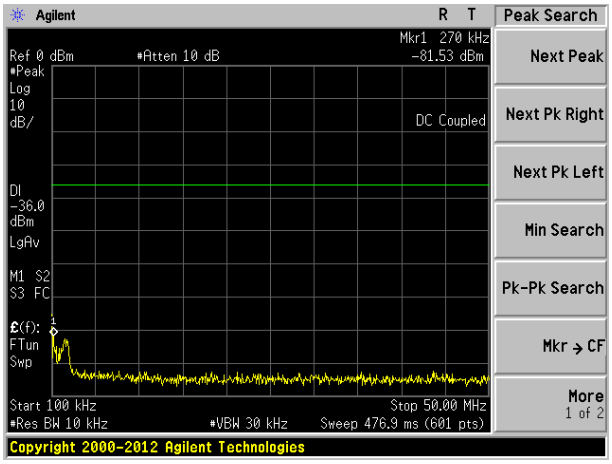


960MHz~1000MHz

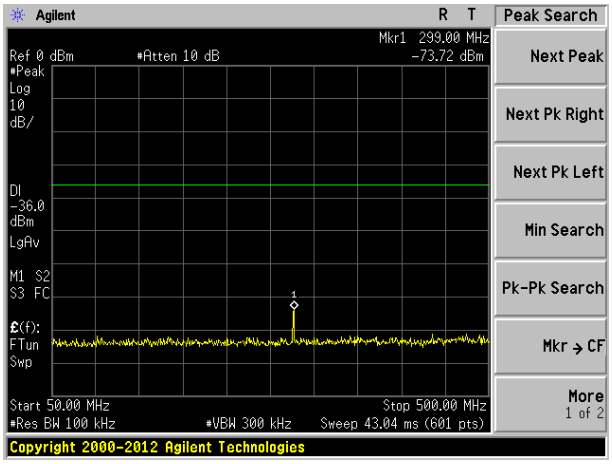


1GHz~12.75GHz

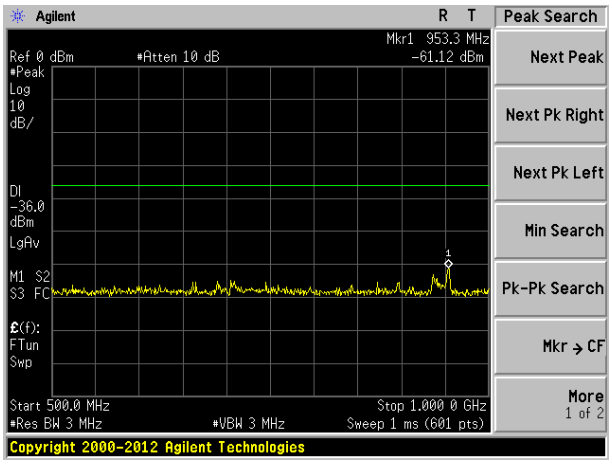
Operation mode:	DCS1800	Test Condition:	Normal voltage	Test channel:	700



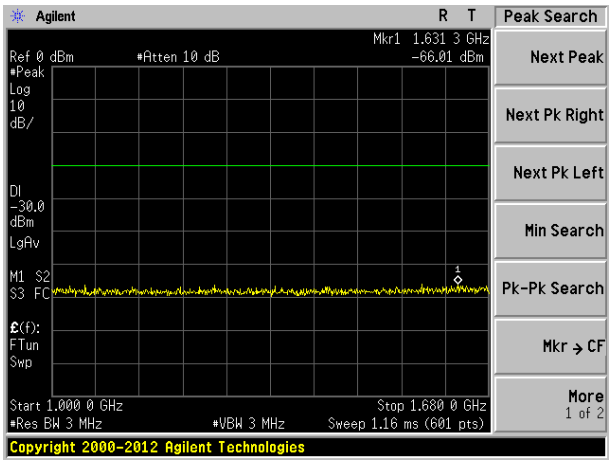
100KHz~50MHz



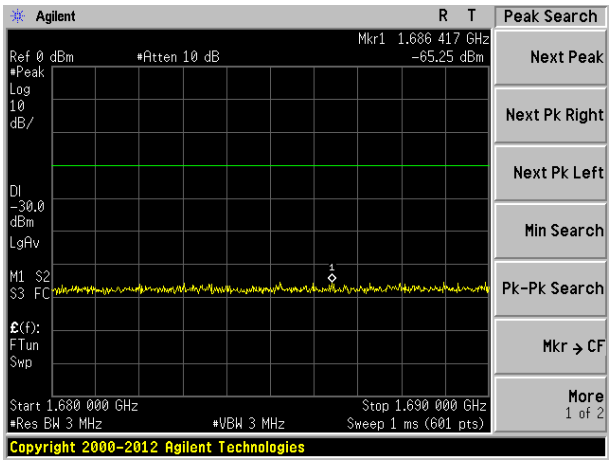
50MHz~500MHz



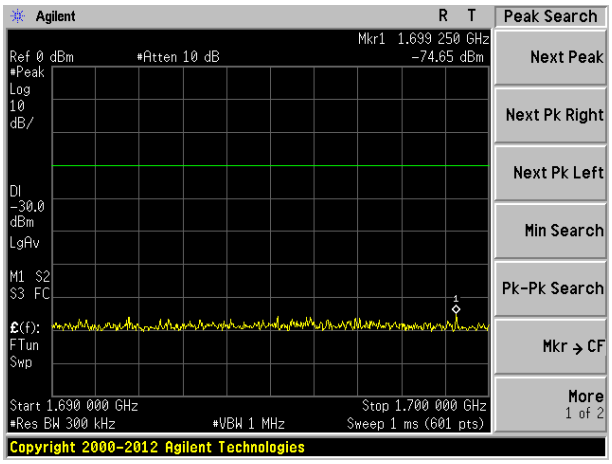
500MHz~1000MHz



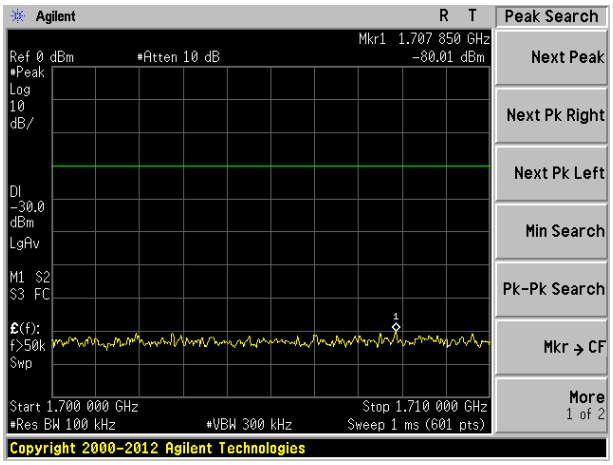
1000MHz~1680MHz



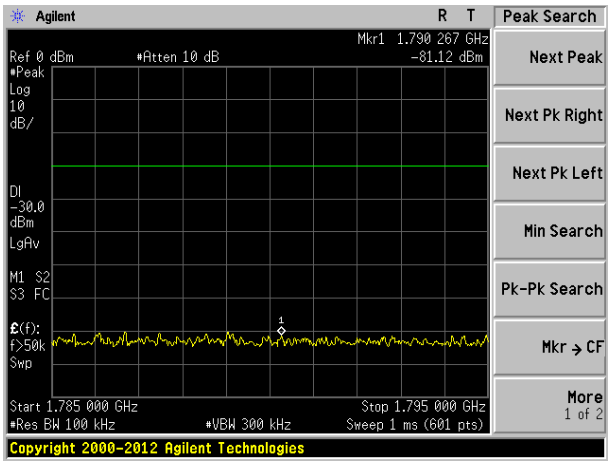
1.68GHz~1.69Hz



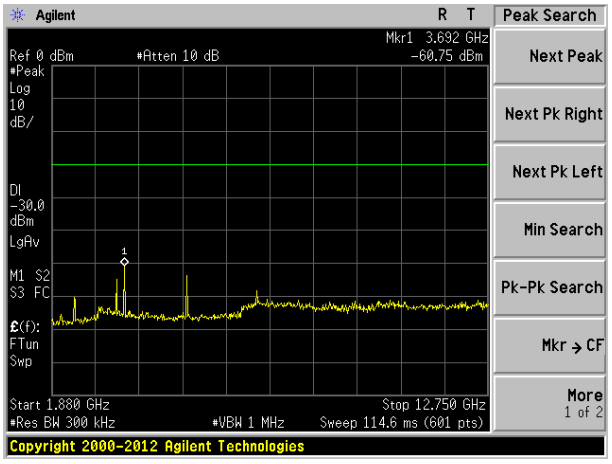
1.69GHz~1.70GHz



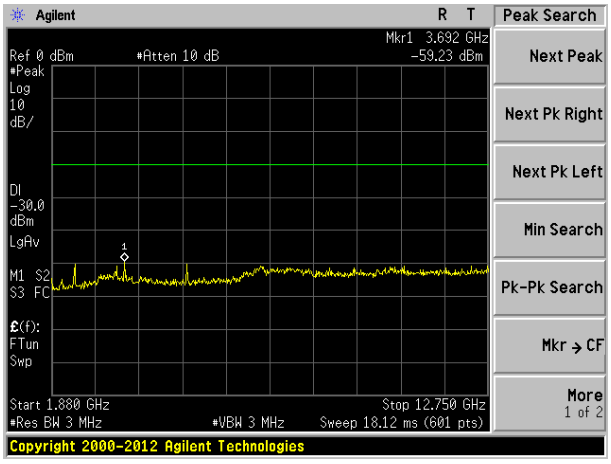
1.70GHz~1.710GHz



1.785GHz~1.795GHz



1.795GHz~1.805GHz



1.88GHz~12.75GHz

8.8 Conducted Spurious Emissions-MS in Idle Channel

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.13 and TS 151 010-1 clause 12.1.2

Limit

Frequency range	Limit (dBm)
9KHz to 880MHz	-57
880MHz to 915MHz	-59
915MHz to 1000MHz	-57
1GHz to 1710MHz	-47
1710MHz to 1785MHz	-53
1785MHz to 12.75GHz	-47

Test Procedure

a. Measurements are made in the frequency range 100 kHz to 12,75 GHz. Spurious emissions are measured as the power level of any discrete signal, higher than the requirement in table 12.4 minus 6 dB, delivered into a 50 Ω□load.
The measurement bandwidth based on a 5 pole synchronously tuned filter is set according to table 4.
The power indication is the peak power detected by the measuring system.
The measurement time on any frequency shall be such that it includes the time during which the MS receives a TDMA frame containing the paging channel.

Frequency range	Filter bandwidth	Video bandwidth
100KHz to 50MHz	10KHz	30KHz
50MHz to 12.75GHz	100KHz	300KHz

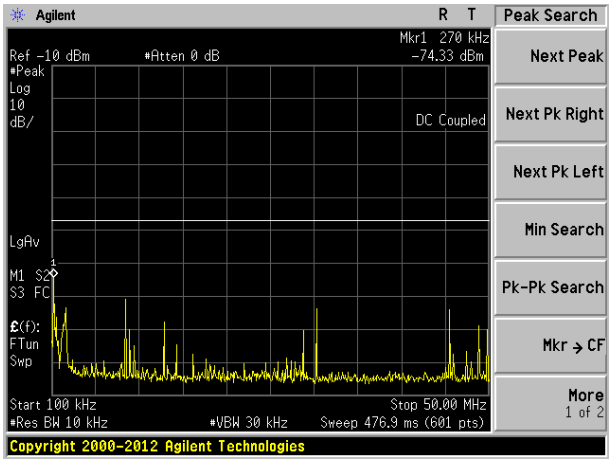
b. The test is repeated under extreme voltage test conditions ([annex 1, TC2.2 and TC3]).

Test result ***Complied***

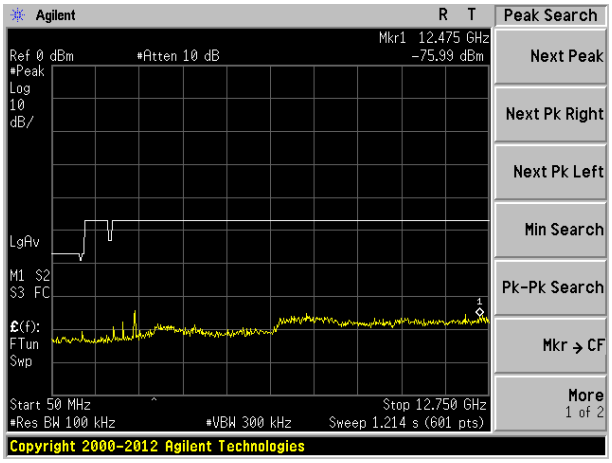
Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

Measurement Data

Operation mode:	GSM900	Test Condition:	Normal voltage	Test channel:	60

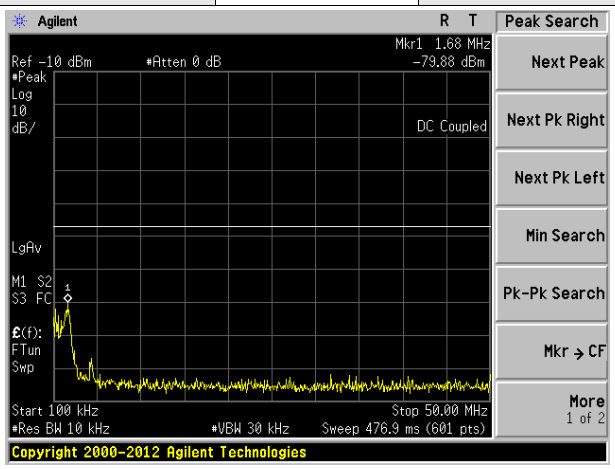


100KHz~50MHz

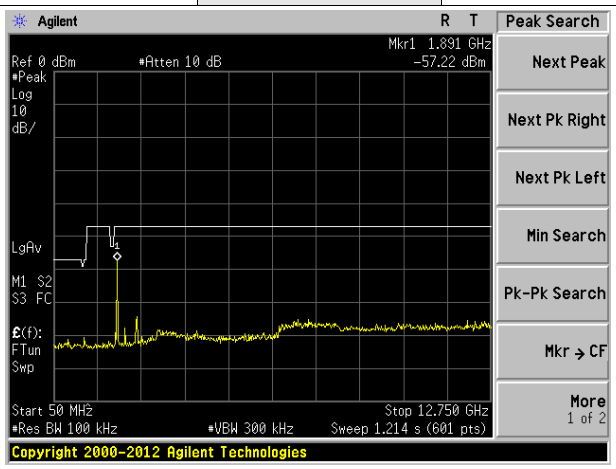


50MHz~12.75GHz

Operation mode:	DCS1800	Test Condition:	Normal voltage	Test channel:	700



100KHz~50MHz



50MHz~12.75GHz

8.9 Radiated Spurious Emissions-MS Allocated a Channel

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.16 and TS 151 010-1 clause 12.2.1

Limit

Frequency range	Power level in dBm	
	GSM900	DCS1800
30MHz to 1GHz	-36	-36
1GHz to 4GHz	-30	-
1GHz to 1710MHz	-	-30
1710MHz to 1785MHz	-	-36
1785MHz to 4GHz	-	-30

Test Procedure

a. a) Initially the test antenna is closely coupled to the MS and any spurious emission radiated by the MS is detected by the test antenna and receiver in the range 30 MHz to 4 GHz.
NOTE 1: This is a qualitative step to identify the frequency and presence of spurious emissions which are to be measured in subsequent steps.

b. The test antenna separation is set to the appropriate measurement distance and at each frequency at which a spurious emission has been detected the MS is rotated to obtain a maximum response. The effective radiated power of the emission is determined by a substitution measurement. In case of an anechoic shielded chamber pre-calibration may be used instead of a substitution measurement.

c. The measurement bandwidth based on a 5 pole synchronously tuned filter shall be according to table 8. The power indication is the peak power detected by the measuring system.
The measurement time on any frequency shall be such that it includes the time during which the MS receives a TDMA frame containing the paging channel
NOTE 2: For these filter bandwidths some difficulties may be experienced with noise floor above required measurement limit. This will depend on the gain of the test antenna, and adjustment of the measuring system bandwidth is permissible. Alternatively, for test frequencies above 900 MHz, the test antenna separation from the MS may be reduced to 1 meter.

d. The measurements are repeated with the test antenna in the orthogonal polarization plane.

e. The test is repeated under extreme voltage test conditions (see [Annex 1, TC2.2]).

Frequency range	Frequency offset	Filter bandwidth	Approx video bandwidth
30MHz to 50MHz	-	10KHz	30KHz
50MHz to 500MHz	-	100KHz	300KHz
500MHz to 12.75GHz	0 to 10MHz ⩾10MHz ⩾20MHz ⩾30MHz	100KHz 300KHz 1MHz 3MHz	300KHz 1MHz 3MHz 3MHz

Test result ***Complied***

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

GSM 900 Band, Normal Voltage, Test channel 60				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
91.55	Vertical	-70.72	-36.00	Pass
544.69	V	-71.23	-36.00	
1804.00	V	-56.77	-30.00	
2707.00	V	-55.33	-30.00	
3415.00	V	-53.49	-30.00	
97.70	Horizontal	-71.28	-36.00	
873.59	H	-71.19	-36.00	
1804.00	H	-56.80	-30.00	
2707.00	H	-54.71	-30.00	
3610.00	H	-52.99	-30.00	

GSM 1800 Band: Normal Voltage, Test channel 700				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
119.66	Vertical	-76.90	-36.00	Pass
667.10	V	-73.55	-36.00	
1280.00	V	-59.28	-30.00	
2580.00	V	-57.03	-30.00	
3600.00	V	-54.94	-30.00	
56.76	Horizontal	-75.96	-36.00	
913.16	H	-73.73	-36.00	
1280.00	H	-59.78	-30.00	
2580.00	H	-54.99	-30.00	
3600.00	H	-53.55	-30.00	

8.10 Radiated Spurious Emissions-MS in Idle Channel

Standard Applicable

According to Standard: ETSI EN301 511 section 4.2.17 and TS 151 010-1 clause 12.2.2

Limit

Frequency range	Limit (dBm)
9KHz to 880MHz	-57
880MHz to 915MHz	-59
915MHz to 1000MHz	-57
1GHz to 1710MHz	-47
1710MHz to 1785MHz	-53
1785MHz to 12.75GHz	-47

Test Procedure

a. Initially the test antenna is closely coupled to the MS and any spurious emission radiated by the MS is detected by the test antenna and receiver in the range 30 MHz to 4 GHz.
NOTE 1: This is a qualitative step to identify the frequency and presence of spurious emissions which are to be measured in subsequent steps.

b. The test antenna separation is set to the appropriate measurement distance and at each frequency at which a spurious emission has been detected the MS is rotated to obtain a maximum response. The effective radiated power of the emission is determined by a substitution measurement. In case of an anechoic shielded chamber pre-calibration may be used instead of a substitution measurement.

c. The measurement bandwidth based on a 5 pole synchronously tuned filter shall be according to table 8. The power indication is the peak power detected by the measuring system.
The measurement time on any frequency shall be such that it includes the time during which the MS receives a TDMA frame containing the paging channel
NOTE 2: For these filter bandwidths some difficulties may be experienced with noise floor above required measurement limit. This will depend on the gain of the test antenna, and adjustment of the measuring system bandwidth is permissible. Alternatively, for test frequencies above 900 MHz, the test antenna separation from the MS may be reduced to 1 meter.

d. The measurements are repeated with the test antenna in the orthogonal polarization plane.

e. The test is repeated under extreme voltage test conditions (see [Annex 1, TC2.2]).

Frequency range	Filter bandwidth	Video bandwidth
100KHz to 50MHz	10KHz	30KHz
50MHz to 12.75GHz	100KHz	300KHz

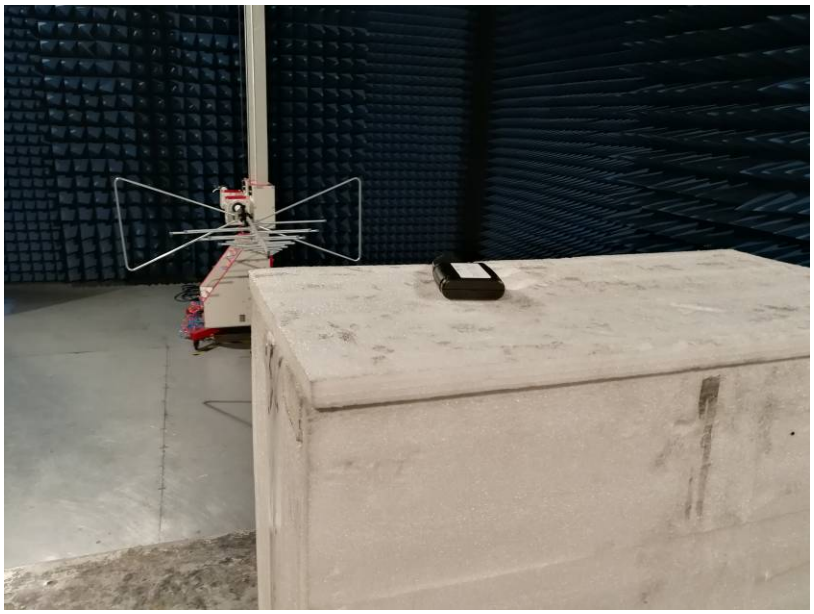
Test result ***Complied***

Have tested all kind of test conditions, all test results meet the standard requirement, so only show the test plots of normal condition in the report.

GSM 900 Band, Normal Voltage, Test channel 60				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
129.50	Vertical	-76.18	-57.00	Pass
450.87	V	-76.66	-57.00	
618.28	V	-71.49	-57.00	
1804.00	V	-52.69	-47.00	
2706.00	V	-53.72	-47.00	
3608.00	V	-54.91	-47.00	
125.14	Horizontal	-76.45	-57.00	
396.62	H	-77.35	-57.00	
557.43	H	-72.36	-57.00	
1804.00	H	-53.05	-47.00	
2706.00	H	-55.04	-47.00	
3608.00	H	-55.39	-47.00	

GSM 1800 Band: Normal Voltage, Test channel 700				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
67.18	Vertical	-69.83	-57.00	Pass
682.75	V	-72.97	-57.00	
860.73	V	-69.77	-57.00	
1336.00	V	-66.27	-47.00	
2548.00	V	-56.34	-47.00	
3495.00	V	-55.48	-47.00	
129.21	Horizontal	-70.77	-57.00	
646.42	H	-72.46	-57.00	
888.82	H	-70.70	-59.00	
1574.00	H	-67.02	-47.00	
2548.00	H	-57.57	-47.00	
3495.00	H	-56.68	-47.00	

9 Test Setup Photo



10 EUT Constructional Details

Reference to the test report No. GTS201807000021E01

------End------