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TEST REPORT

REPORT NO.: 2014RE121

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Applicant : FINGERTEC WORLDWIDE SDN BHD (528531-X)
No.6,8 & 10
Jalan BK 3/2
Bandar Kinrara
47180 Puchong
Selangor

Manufacturer : WAVECOM SA
3 Esplanade De Foncet
9244 Issy Les Moulineux Cedex
France

Product : GSM MODULE

Reference Standard /
Method of test : SKMM WTS GSM-MT Rev.1.01:2007
(3.2 Technical requirements: Radio Frequency) /
ETSI EN 301 511 V9.0.2 (2003-03)

Description of sample : Brand Name : WAVECOM
Model / Type : Q24 Plus
Serial No. : Q24PL001

Date Received of
Complete Application : 24 March 2014

Job No./Ref.No. : J 20131410576

Description of test
result : The submitted test sample as described in this test report complied
with the conformance requirement of the respective clauses in the
above Reference Standard.

Issued date : 04 APR 2014

Approved Signatory

(HAFIZAH BINTI ZAINAL ABIDDIN)
Testing Executive

(ZARISMAIL ABD RAHMAN)
Head
Radio Frequency and Electromagnetic
Compatibility Testing Section (RFEMCT)
Testing Services Department

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 - b) Obtaining an injunction from Court (cost on a solicitor-client basis to be borne by the Applicant);
 - c) Refusing to accept any further Product for Testing Services from the Applicant or whosoever related to the Applicant, whether subsidiary or otherwise;
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NOTES:

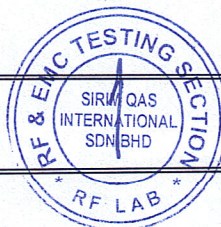
1. All tests were carried out at ambient temperature of +15°C to + 35°C and relative humidity of 20% to 75%.

Ambient temperature (minimum) : 26°C
Ambient temperature (maximum) : 27°C
Relative Humidity (minimum) : 47%
Relative Humidity (maximum) : 48%

2. Date of test sample(s) received:
 - a) 1st submission : 24/03/2014
3. Date of sample(s) tested :
 - a) 1st test (GPRS) : 24/03/2014

Tested by : Nuryusman Ariff Bin Mohd Junus

Reviewed by : Hafizah Binti Zainal Abiddin



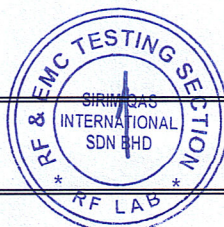
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1.0 REPORT OF SUMMARY

A brief summary of tests carried out is shown below

1.1 GPRS

Test	Test Description	Result	
		GSM 900	GSM 1800
4.2.1	Frequency Error and Phase Error in GPRS Multislot Configuration	PASS	PASS
4.2.2	Transmitter Output Power in GPRS Multislot Configuration	PASS	PASS
4.2.3	Output RF Spectrum in GPRS Multislot Configuration	PASS	PASS



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2.0 TECHNICAL CHARACTERISTIC OF EQUIPMENT UNDER TEST

Type of Product : Module /Dongle
 Stand Alone
 Combined Equipment

Mode of Transmission : Continuous
 Burst
 Intermittent

Mode of Modulation : GPRS : Gaussian Minimum Shift Keying (GMSK)

Operating Voltage : AC: Vac
 DC: 12.0 Vdc

Operating Frequency Band : GSM 900 Transmit : 880 MHz ~ 915 MHz
 Receive : 925 MHz ~ 960 MHz

DCS 1800 Transmit : 1710.2 MHz ~ 1784.8 MHz
 Receive : 1805.2 MHz ~ 1879.8 MHz

Transmitter RF Power GSM 900 : Power Class 4
 DCS 1800 : Power Class 1

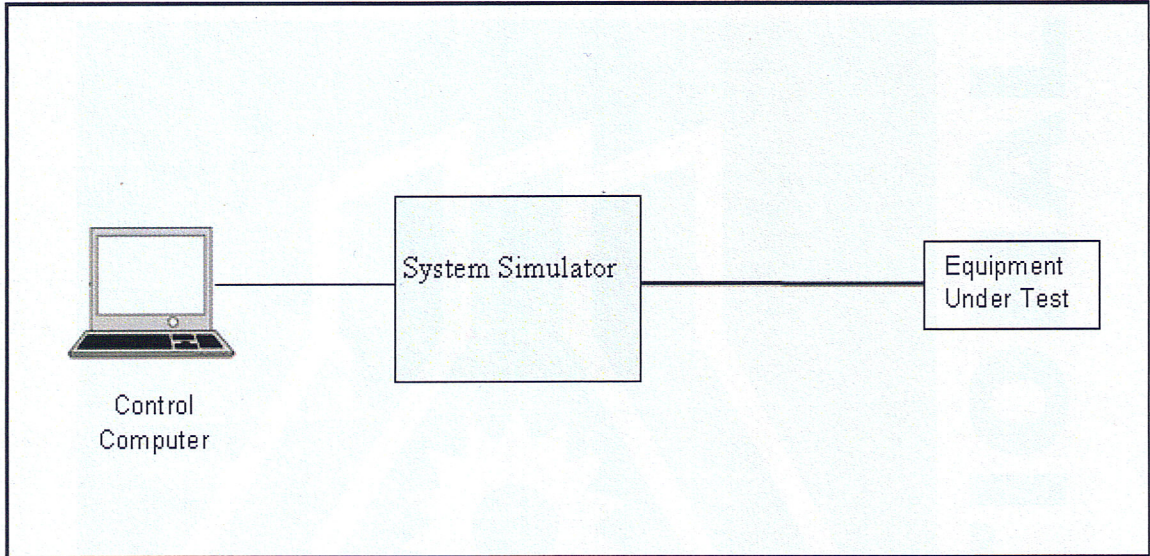
Type of measurement : Effective radiated
 Conducted

IMEI Number (SIM 1) : 357273-03-936849-5

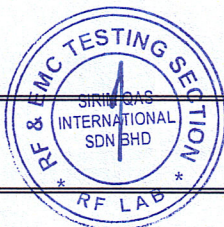


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3.0 TEST SETUP



The measurement setup for GSM/GPRS testing



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4.0 TEST RESULT

4.1 EUT Description

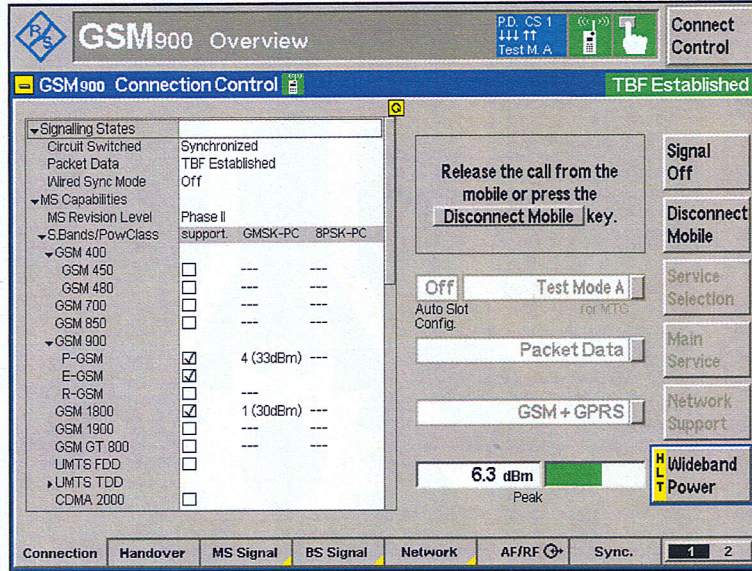


Figure 1

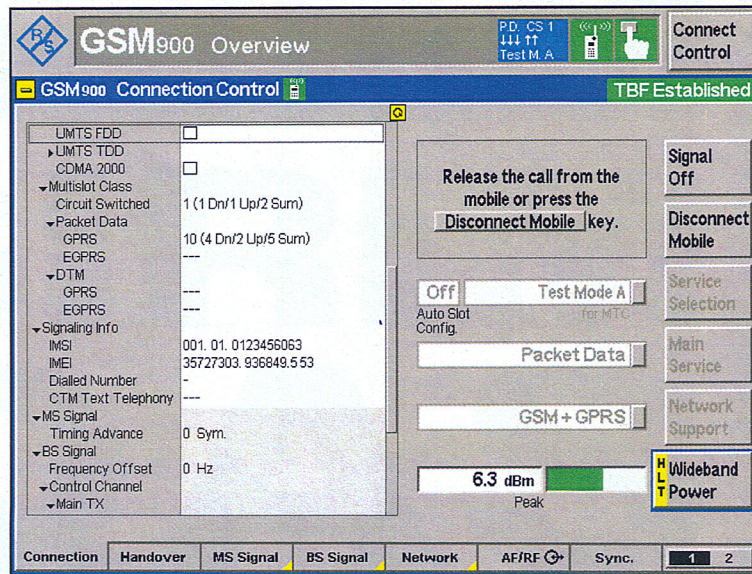
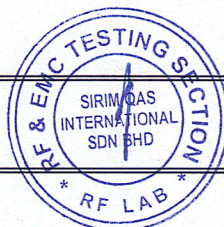


Figure 2



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4.2 GPRS

4.2.1 Frequency Error and Phase Error in GPRS Multislot Configuration

4.2.1.1 GSM 900

Test Case	ARFCN ($\Gamma_{CH} = 3$ [33 dBm])			Result
	124 (High)	62 (Middle)	975 (Low)	
Frequency Error (Hz)	Refer to Figure 3 (i) to 3 (iii)			PASS
Peak Phase Error (°)				PASS
RMS Phase Error (°)				PASS

Test Case	ARFCN ($\Gamma_{CH} = 17$ [5 dBm])			Result
	124 (High)	62 (Middle)	975 (Low)	
Frequency Error (Hz)	Refer to Figure 4 (i) to 4 (iii)			PASS
Peak Phase Error (°)				PASS
RMS Phase Error (°)				PASS

Limit ETSI TS 151 010-1 : clause 13.16.1.5.1

Frequency error (Hz) shall not exceed 0.1ppm	GSM 900 MHz	< 90Hz
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Limit ETSI TS 151 010-1 : clause 13.16.1.5.2

Peak phase error (°)	< 20°
RMS phase error (°)	< 5°



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4.2.1.2 DCS 1800

Test Case	ARFCN ($\Gamma_{CH} = 3$ [30 dBm])			
	885 (High)	698 (Middle)	512 (Low)	Result
Frequency Error (Hz)	Refer to Figure 5 (i) to 5 (iii)			PASS
Peak Phase Error (°)				PASS
RMS Phase Error (°)				PASS

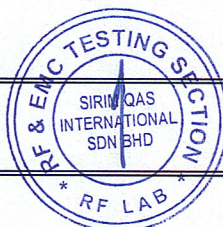
Test Case	ARFCN ($\Gamma_{CH} = 18$ [0 dBm])			
	885 (High)	698 (Middle)	512 (Low)	Result
Frequency Error (Hz)	Refer to Figure 6 (i) to 6 (iii)			PASS
Peak Phase Error (°)				PASS
RMS Phase Error (°)				PASS

Limit ETSI TS 151 010-1 : clause 13.16.1.5.1

Frequency error (Hz) shall not exceed 0.1ppm	DCS 1800 MHz	< 180 Hz
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Limit ETSI TS 151 010-1 : clause 13.16.1.5.2

Peak phase error (°)	< 20°
RMS phase error (°)	< 5°



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4.2.2 Transmitter Output Power in GPRS Multislot Configuration

4.2.2.1 GSM 900

Test Case	ARFCN ($\Gamma_{CH} = 3$ [33 dBm])			Result
	124 (High)	62 (Middle)	975 (Low)	
Output Power and Burst Timing	Refer to Figure 7 (i) to 7 (iii)			PASS

Test Case	ARFCN ($\Gamma_{CH} = 17$ [5 dBm])			Result
	124 (High)	62 (Middle)	975 (Low)	
Output Power and Burst Timing	Refer to Figure 8 (i) to 8 (iii)			PASS

Limit ETSI TS 151 010-1 : clause 13.16.2

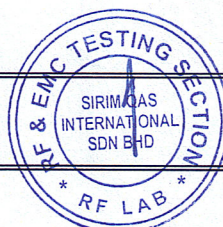
Power class					Power control level (note 4)	GAMMA_TN (Γ_{CH})	Transmitter output power (note 2,3) dBm	Tolerances	
2	3	4	5	normal				extreme	
*					2	0	39	± 2 dB	± 2.5 dB
*	*				3	1	37	± 3 dB (note 1)	± 4 dB (note 1)
*	*				4	2	35	± 3 dB	± 4 dB
*	*	*			5	3	33	± 3 dB (note 1)	± 4 dB (note 1)
*	*	*			6	4	31	± 3 dB	± 4 dB
*	*	*	*		7	5	29	± 3 dB (note 1)	± 4 dB (note 1)
*	*	*	*		8	6	27	± 3 dB	± 4 dB
*	*	*	*		9	7	25	± 3 dB	± 4 dB
*	*	*	*		10	8	23	± 3 dB	± 4 dB
*	*	*	*		11	9	21	± 3 dB	± 4 dB
*	*	*	*		12	10	19	± 3 dB	± 4 dB
*	*	*	*		13	11	17	± 3 dB	± 4 dB
*	*	*	*		14	12	15	± 3 dB	± 4 dB
*	*	*	*		15	13	13	± 3 dB	± 4 dB
*	*	*	*		16	14	11	± 5 dB	± 6 dB
*	*	*	*		17	15	9	± 5 dB	± 6 dB
*	*	*	*		18	16	7	± 5 dB	± 6 dB
*	*	*	*		19	17	5	± 5 dB	± 6 dB

NOTE 1: When the power control level corresponds to the power class of the MS, then the tolerances shall be 2.0 dB under normal test conditions and 2.5 dB under extreme test conditions.

NOTE 2: For R99 and Rel-4, the maximum output power in a multislot configuration must be lower within the limits defined in table 13.16.2-2a. From Rel-5 onwards, the maximum output power in a multislot configuration may be lower within the limits defined in table 13.16.2-2b.

NOTE 3: For a MS using reduced interslot dynamic range in multislot configurations, the MS may restrict the interslot 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.

NOTE 4: There is no requirement to test power control levels 16-28



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4.2.2.2 DCS 1800

Test Case	ARFCN ($\Gamma_{CH} = 3$ [30 dBm])			Result
	885 (High)	698 (Middle)	512 (Low)	
Output Power and Burst Timing	Refer to Figure 9 (i) to 9 (iii)			PASS

Test Case	ARFCN ($\Gamma_{CH} = 18$ [0 dBm])			Result
	885 (High)	698 (Middle)	512 (Low)	
Output Power and Burst Timing	Refer to Figure 10 (i) to 10 (iii)			PASS

Limit ETSI TS 151 010-1 : clause 13.16.2

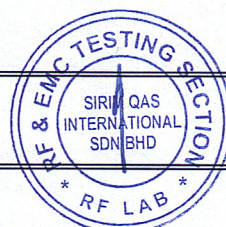
Power class			Power control level (note 4)	GAMMA_TN (Γ_{CH})	Transmitter output power (note 2,3)	Tolerances	
1	2	3			dBm	normal	extreme
		*	29	0	36	± 2.0 dB	± 2.5 dB
		*	30	1	34	± 3.0 dB	± 4.0 dB
		*	31	2	32	± 3.0 dB	± 4.0 dB
*		*	0	3	30	± 3.0 dB (note 1)	± 4.0 dB (note1)
*		*	1	4	28	± 3.0 dB	± 4.0 dB
*		*	2	5	26	± 3.0 dB	± 4.0 dB
*	*	*	3	6	24	± 3.0 dB (note 1)	± 4.0 dB (note1)
*	*	*	4	7	22	± 3.0 dB	± 4.0 dB
*	*	*	5	8	20	± 3.0 dB	± 4.0 dB
*	*	*	6	9	18	± 3.0 dB	± 4.0 dB
*	*	*	7	10	16	± 3.0 dB	± 4.0 dB
*	*	*	8	11	14	± 3.0 dB	± 4.0 dB
*	*	*	9	12	12	± 4.0 dB	± 5.0 dB
*	*	*	10	13	10	± 4.0 dB	± 5.0 dB
*	*	*	11	14	8	± 4.0 dB	± 5.0 dB
*	*	*	12	15	6	± 4.0 dB	± 5.0 dB
*	*	*	13	16	4	± 4.0 dB	± 5.0 dB
*	*	*	14	17	2	± 5.0 dB	± 6.0 dB
*	*	*	15	18	0	± 5.0 dB	± 6.0 dB

NOTE 1: When the power control level corresponds to the power class of the MS, then the tolerances shall be 2,0 dB under normal test conditions and 2,5 dB under extreme test conditions.

NOTE 2: For R99 and Rel-4, the maximum output power in a multislot configuration must be lower within the limits defined in table 13.16.2-2a. From Rel-5 onwards, the maximum output power in a multislot configuration may be lower within the limits defined in table 13.16.2-2b.

NOTE 3: For a MS using reduced interslot dynamic range in multislot configurations, 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.

NOTE 4: There is no requirement to test power control levels 16-28.



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4.2.3 Output RF spectrum in GPRS Multislot Configuration

4.2.3.1 GSM 900

Test Case	ARFCN ($\Gamma_{CH} = 3$ [33 dBm])			
	124 (High)	62 (Middle)	975 (Low)	Result
Spectrum due to Switching	Refer to Figure 11 (i) to 11 (iii)			PASS
Spectrum due to Modulation				PASS

Test Case	ARFCN ($\Gamma_{CH} = 17$ [5 dBm])			
	124 (High)	62 (Middle)	975 (Low)	Result
Spectrum due to Switching	Refer to Figure 12 (i) to 12 (iii)			PASS
Spectrum due to Modulation				PASS

4.2.3.2 DCS 1800

Test Case	ARFCN ($\Gamma_{CH} = 3$ [30 dBm])			
	885 (High)	698 (Middle)	512 (Low)	Result
Spectrum due to Switching	Refer to Figure 13 (i) to 13 (iii)			PASS
Spectrum due to Modulation				PASS

Test Case	ARFCN ($\Gamma_{CH} = 18$ [0 dBm])			
	885 (High)	698 (Middle)	512 (Low)	Result
Spectrum due to Switching	Refer to Figure 14 (i) to 14 (iii)			PASS
Spectrum due to Modulation				PASS



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Limit ETSI TS 151 010-1 : clause 13.16.3.5

For the modulation sidebands out to less than 1 800 kHz offset from the carrier frequency (FT) measured in step the measured power level in dB relative to the power level measured at FT, for all types of MS, shall not exceed the limits derived from the values shown in table 13.16.3-1 for GSM 900, table 13.16.3-2 for DCS 1 800 according to the actual transmit power and frequency offset from FT. However any failures in the combined range 600 kHz to less than 1 800 kHz above and below the carrier may be counted towards the exceptions allowed in test requirements c) below.

Table 13.26.3-1: GSM 900 Spectrum due to modulation out to less than 1 800 kHz offset

Power level (dBm)	power levels in dB relative to the measurement at FT				
	Frequency offset (kHz)				
	0-100	200	250	400	600 to < 1 800
39	+0,5	-30	-33	-60	-66
37	+0,5	-30	-33	-60	-64
35	+0,5	-30	-33	-60	-62
<=33	+0,5	-30	-33	-60	-60
The values above are subject to the minimum absolute levels (dBm) below.					
	-36	-36	-36	-36	-51

Table 13.16.3-2: DCS 1 800 Spectrum due to modulation out to less than 1 800 kHz offset

Power level (dBm)	power levels in dB relative to the measurement at FT				
	Frequency offset (kHz)				
	0-100	200	250	400	600 to < 1 800
<= 36	+0,5	-30	-33	-60	-60
The values above are subject to the minimum absolute levels (dBm) below.					
	-36	-36	-36	-36	-56

For the modulation sidebands from 1 800 kHz offset from the carrier frequency (FT) and out to 2 MHz beyond the edge of the relevant transmit band, measured in step d), the measured power level in dB relative to the power level measured at FT, shall not exceed the values shown in table 13.16.3-4 according to the actual transmit power, frequency offset from FT and system on which the MS is designed to operate. However any failures in the combined range 1 800 kHz to 6 MHz above and below the carrier may be counted towards the exceptions allowed in test requirements c) below, and any other failures may be counted towards the exceptions allowed in test requirements d) below.

Table 13.16.3-4: Spectrum due to modulation from 1 800 kHz offset to the edge of the transmit band (wideband noise)

Power Level (dBm)	power levels in dB relative to the measurement at FT					
	GSM 400, GSM 700, GSM 850 and GSM 900			DCS 1 800		
	Frequency offset kHz			Frequency offset kHz		
	1 800 to < 3 000	3 000 to < 6 000	>= 6 000		1 800 to < 6 000	>= 6 000
39	-69	-71	-77	36	-71	-79
37	-67	-69	-75	34	-69	-77
35	-65	-67	-73	32	-67	-75
<=33	-63	-65	-71	30	-65	-73
				28	-63	-71
				26	-61	-69
				<=24	-59	-67
The values above are subject to the minimum absolute levels (dBm) below						
	-46	-46	-46		-51	-51

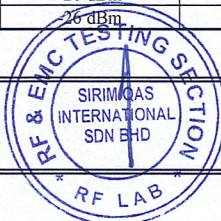
For the power ramp sidebands of the power levels must not exceed the values shown in table 13.16.3-6 for GSM 900 or table 13.16.3-7 for DCS 1 800

Table 13.16.3-6: GSM Spectrum due to switching transients

Power level	Maximum level for various offsets from carrier frequency			
	400 kHz	600 kHz	1200 kHz	1 800 kHz
39 dBm	-13 dBm	-21 dBm	-21 dBm	-24 dBm
37 dBm	-15 dBm	-21 dBm	-21 dBm	-24 dBm
35 dBm	-17 dBm	-21 dBm	-21 dBm	-24 dBm
33 dBm	-19 dBm	-21 dBm	-21 dBm	-24 dBm
31 dBm	-21 dBm	-23 dBm	-23 dBm	-26 dBm
29 dBm	-23 dBm	-25 dBm	-25 dBm	-28 dBm
27 dBm	-23 dBm	-26 dBm	-27 dBm	-30 dBm
25 dBm	-23 dBm	-26 dBm	-29 dBm	-32 dBm
23 dBm	-23 dBm	-26 dBm	-31 dBm	-34 dBm
<= +21 dBm	-23 dBm	-26 dBm	-32 dBm	-36 dBm

Table 13.16.3-7: DCS 1 800 Spectrum due to switching transients

Power level	Maximum level for various offsets from carrier frequency			
	400 kHz	600 kHz	1200 kHz	1 800 kHz
36 dBm	-16 dBm	-21 dBm	-21 dBm	-24 dBm
34 dBm	-18 dBm	-21 dBm	-21 dBm	-24 dBm
32 dBm	-20 dBm	-22 dBm	-22 dBm	-25 dBm
30 dBm	-22 dBm	-24 dBm	-24 dBm	-27 dBm
28 dBm	-23 dBm	-25 dBm	-25 dBm	-29 dBm
26 dBm	-23 dBm	-26 dBm	-28 dBm	-31 dBm
24 dBm	-23 dBm	-26 dBm	-30 dBm	-33 dBm
22 dBm	-23 dBm	-26 dBm	-31 dBm	-35 dBm
<= +21 dBm	-23 dBm	-26 dBm	-32 dBm	-36 dBm



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5.0 GRAPH

GPRS

Graph Frequency Error and Phase Error in GPRS Multislot Configuration
 GSM 900, $\Gamma_{CH} = 3$ [33 dBm]

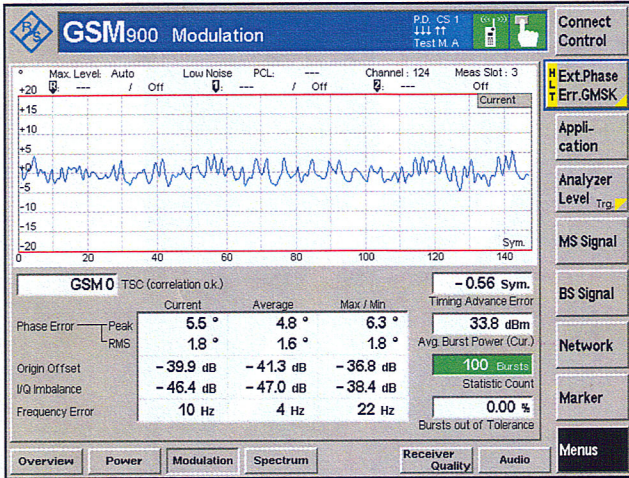


FIGURE 3(i):Channel 124

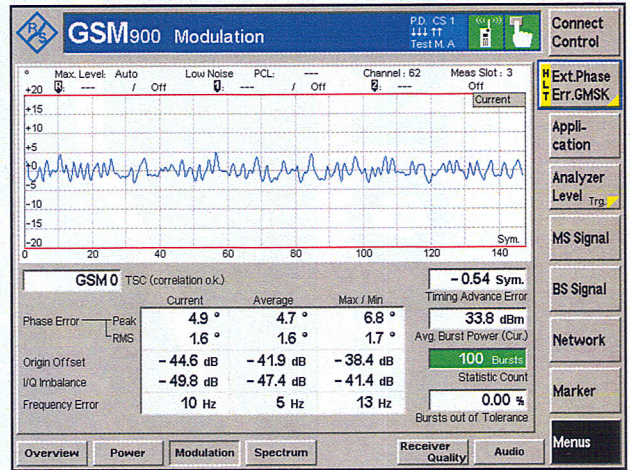


FIGURE 3(ii):Channel 62

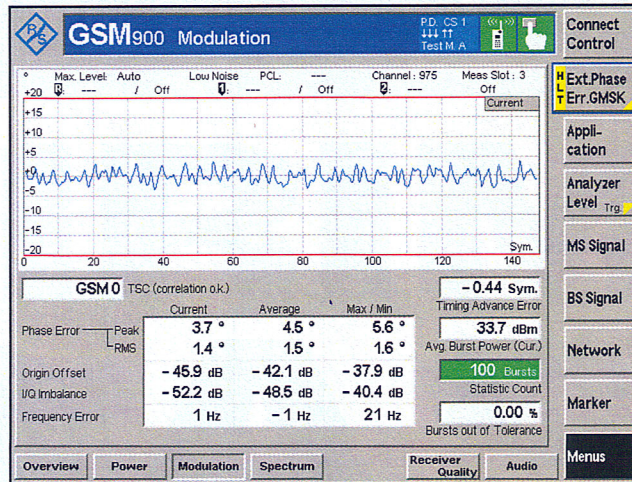


FIGURE 3(iii):Channel 975



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Graph Frequency Error and Phase Error in GPRS Multislot Configuration
 GSM 900, $\Gamma_{CH} = 17$ [5 dBm]

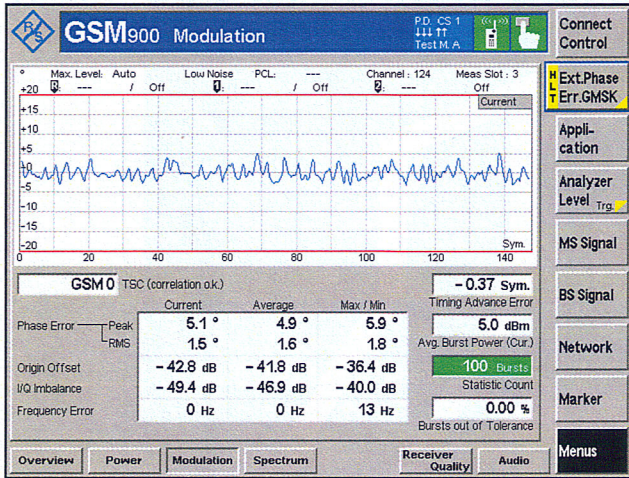


FIGURE 4(i):Channel 124

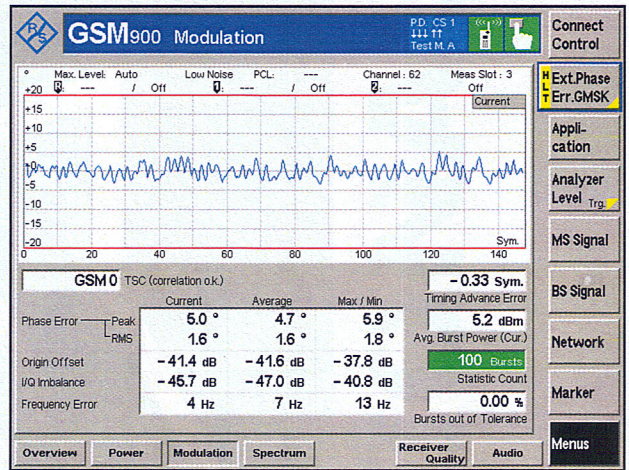


FIGURE 4(ii):Channel 62

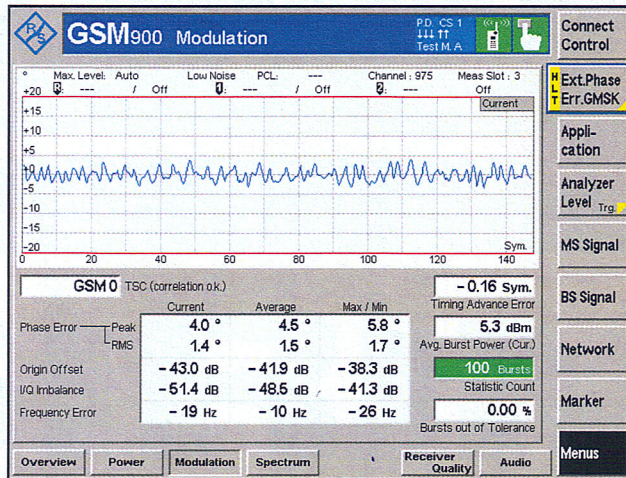


FIGURE 4(iii):Channel 975



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Graph Frequency Error and Phase Error in GPRS Multislot Configuration
DCS 1800, $\Gamma_{CH} = 3$ [30 dBm]

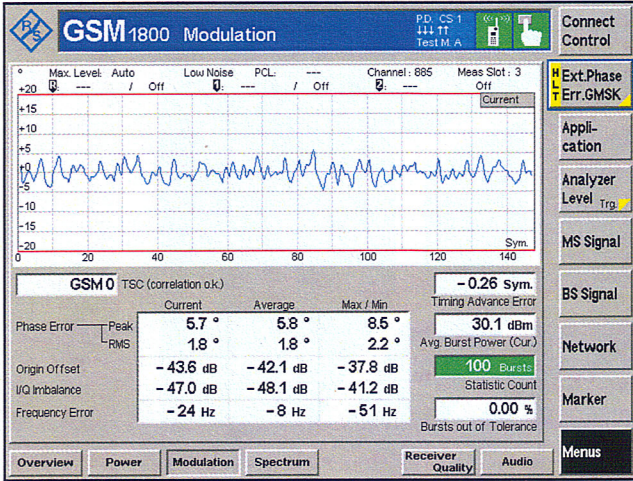


FIGURE 5(i):Channel 885

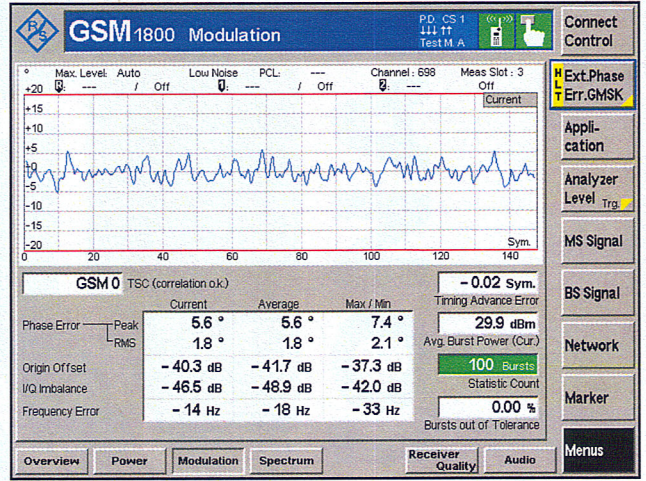


FIGURE 5(ii):Channel 698

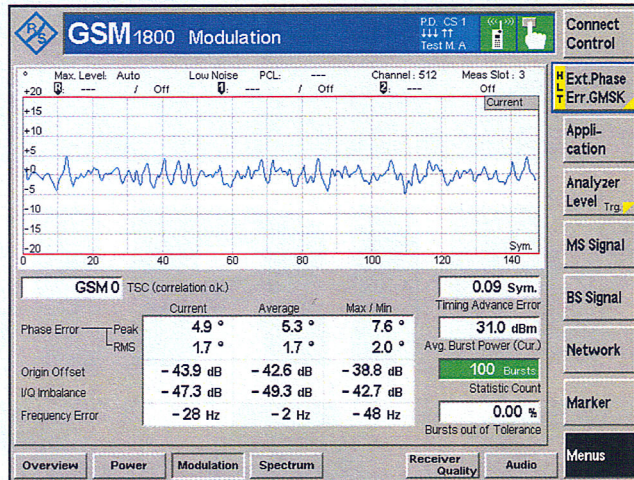
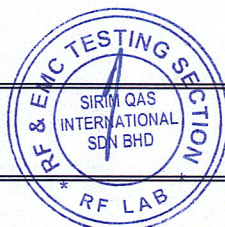


FIGURE 5(iii):Channel 512



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Graph Frequency Error and Phase Error in GPRS Multislot Configuration
DCS 1800, $\Gamma_{CH} = 18$ [0 dBm]

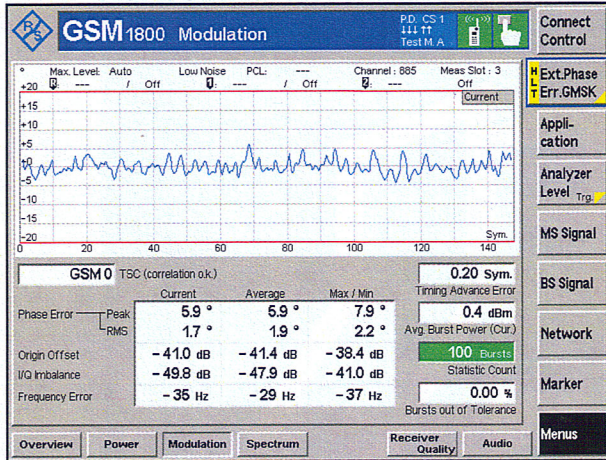


FIGURE 6(i):Channel 885

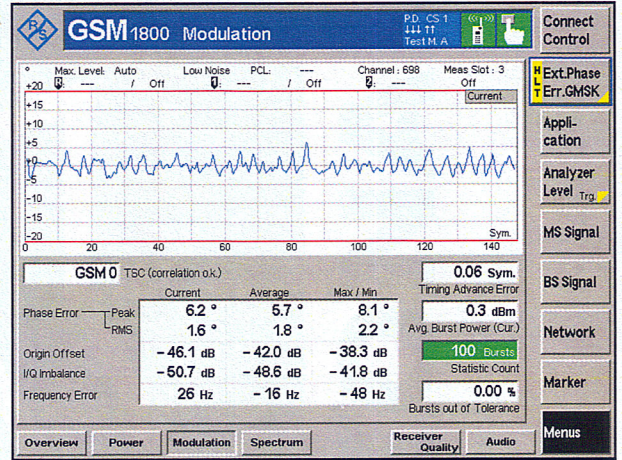


FIGURE 6(ii):Channel 698

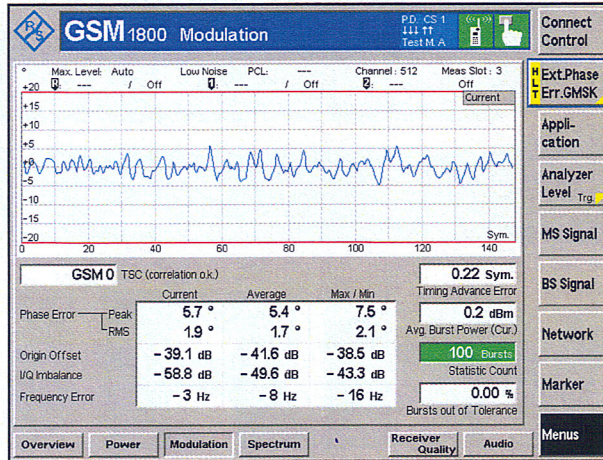


FIGURE 6(iii):Channel 512



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Graph Transmitter Output Power in GPRS Multislot Configuration
 GSM 900, $\Gamma_{CH} = 3$ [33 dBm]

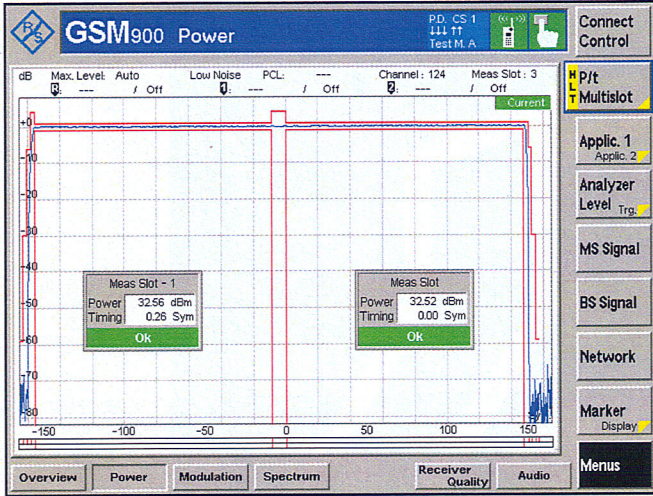


FIGURE 7(i):Channel 124

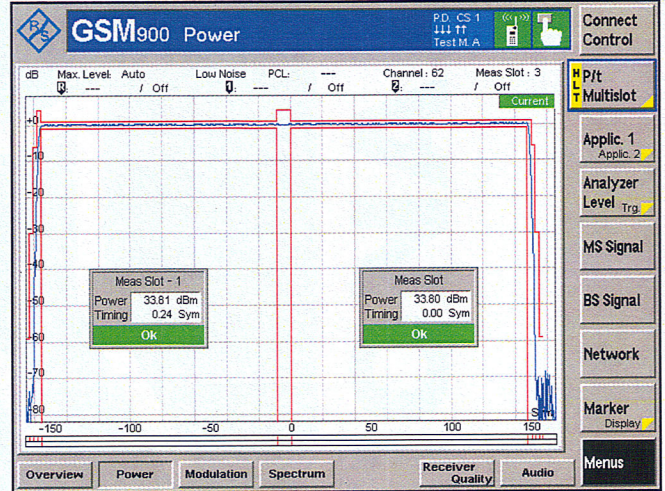


FIGURE 7(ii):Channel 62

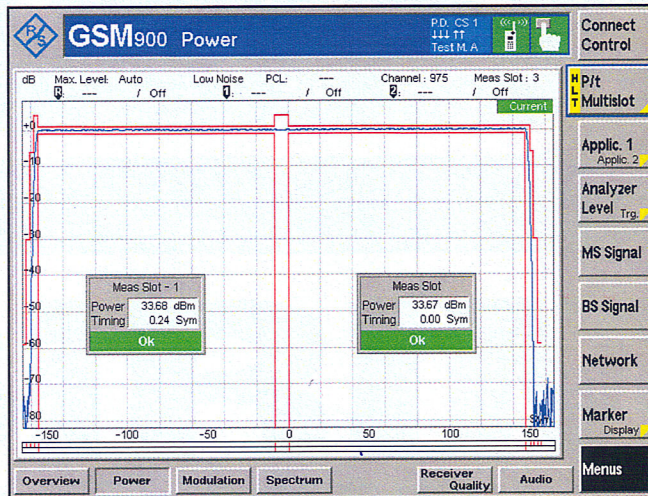


FIGURE 7(iii):Channel 975



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Graph Transmitter Output Power in GPRS Multislot Configuration
 GSM 900, $\Gamma_{CH} = 17$ [5 dBm]

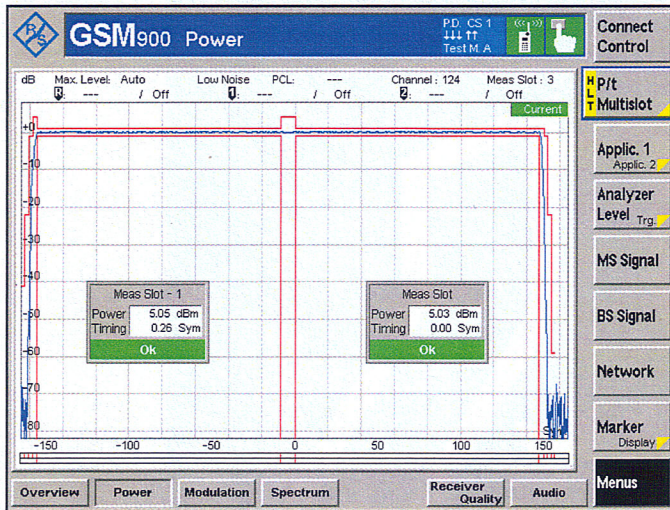


FIGURE 8(i):Channel 124

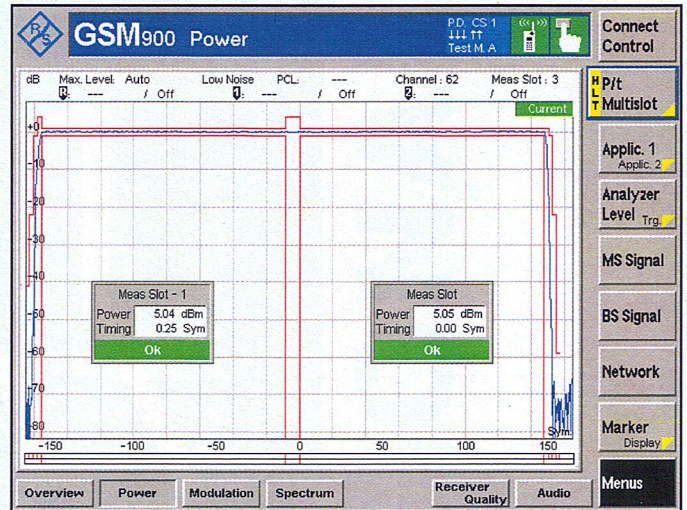


FIGURE 8(ii):Channel 62

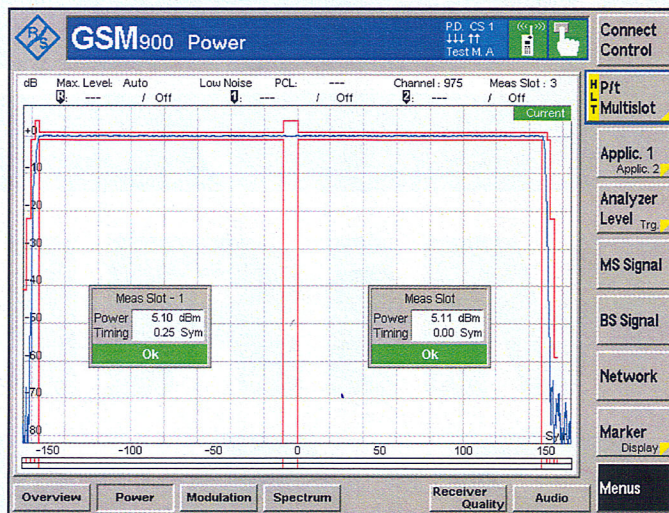
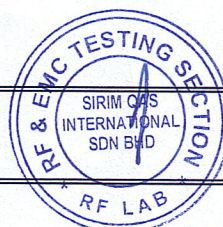


FIGURE 8(iii):Channel 975



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Graph Transmitter Output Power in GPRS Multislot Configuration
DCS 1800, $\Gamma_{CH} = 3$ [30 dBm]

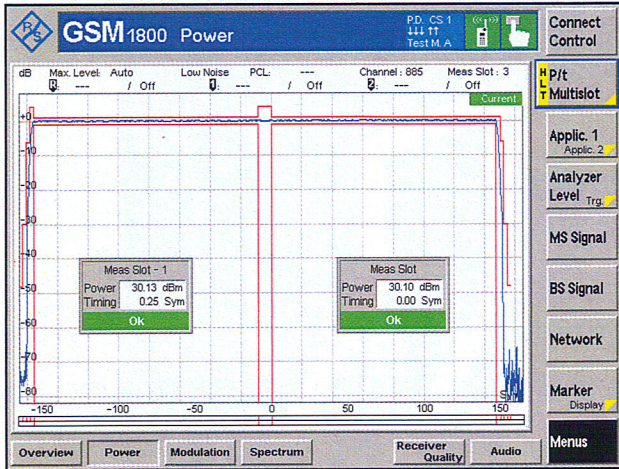


FIGURE 9(i):Channel 885

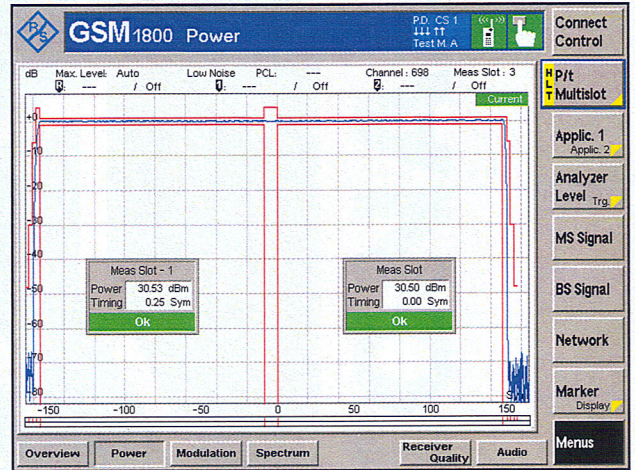


FIGURE 9(ii):Channel 698

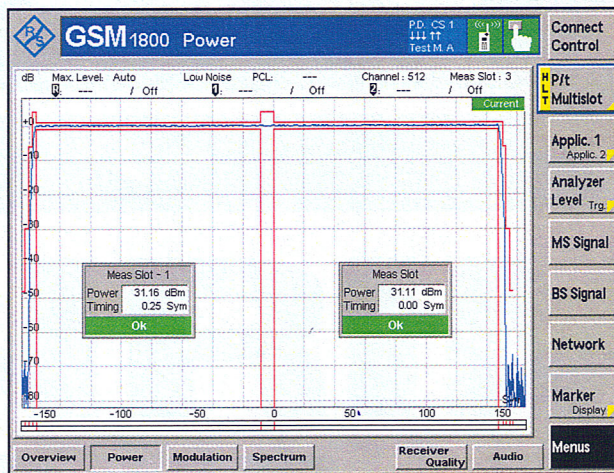


FIGURE 9(iii):Channel 512



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Graph Transmitter Output Power in GPRS Multislot Configuration
DCS 1800, $\Gamma_{CH} = 18$ [0 dBm]

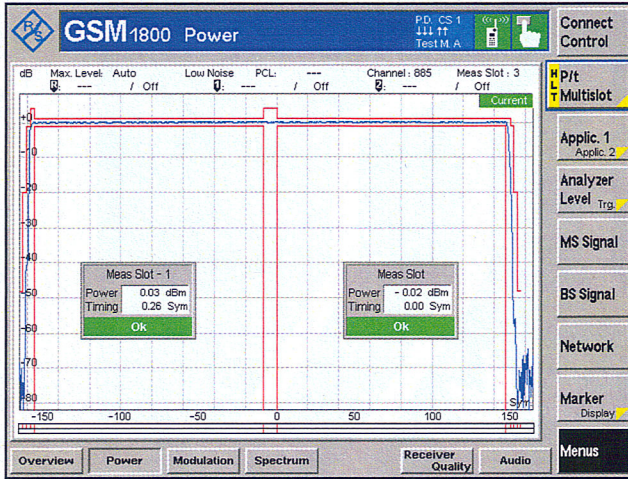


FIGURE 10(i):Channel 885

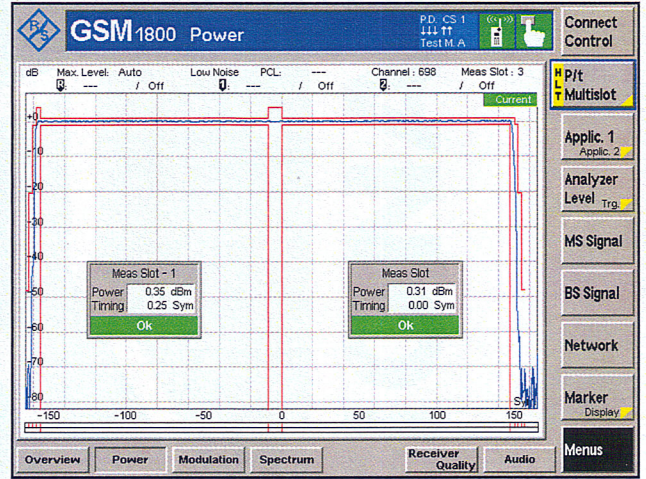


FIGURE 10(ii):Channel 698

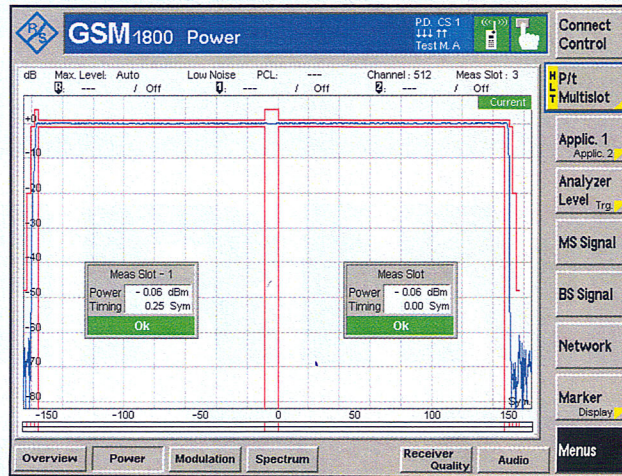
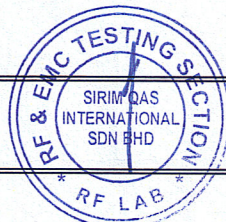


FIGURE 10(iii):Channel 512



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Graph Output RF Spectrum in GPRS Multislot Configuration
 GSM 900, $\Gamma_{CH} = 3$ [33 dBm]

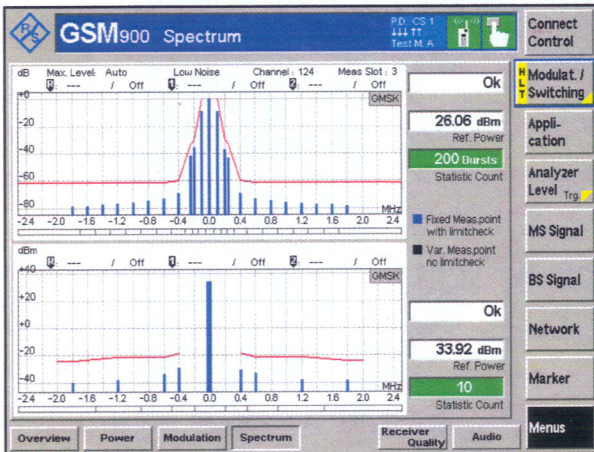


FIGURE 11(i):Channel 124

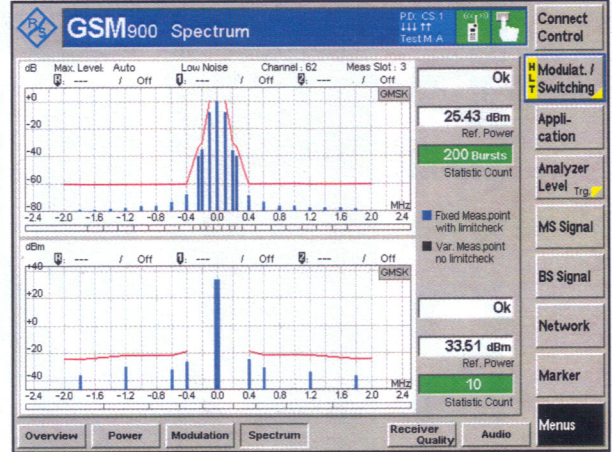


FIGURE 11(ii):Channel 62

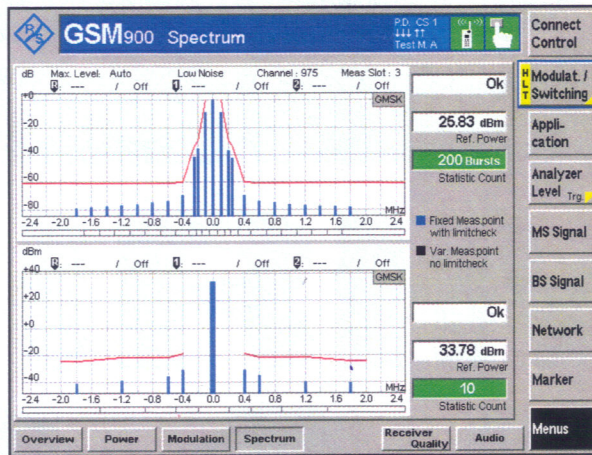
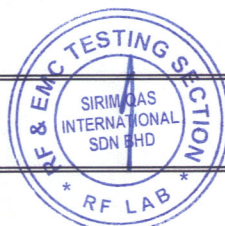


FIGURE 11(iii):Channel 975



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Graph Output RF Spectrum in GPRS Multislot Configuration
 GSM 900, $\Gamma_{CH} = 17 [5 \text{ dBm}]$

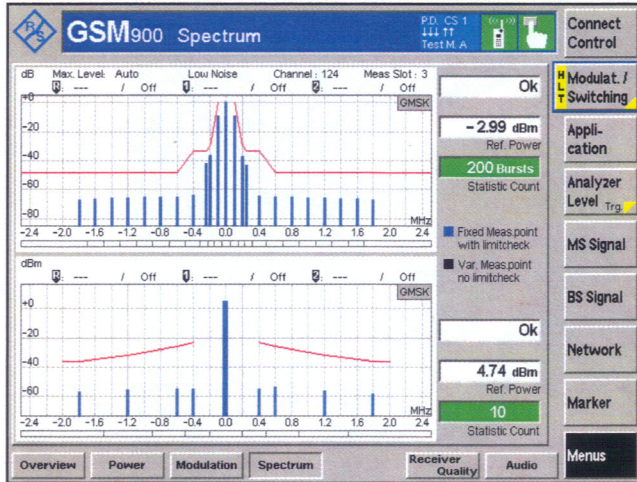


FIGURE 12(i):Channel 124

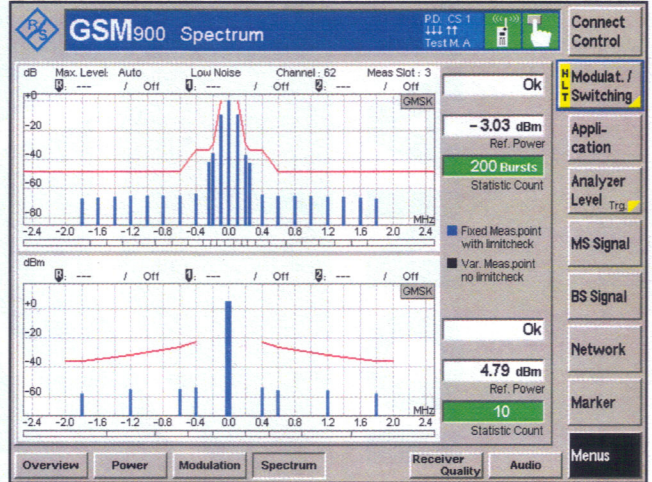


FIGURE 12(ii):Channel 62

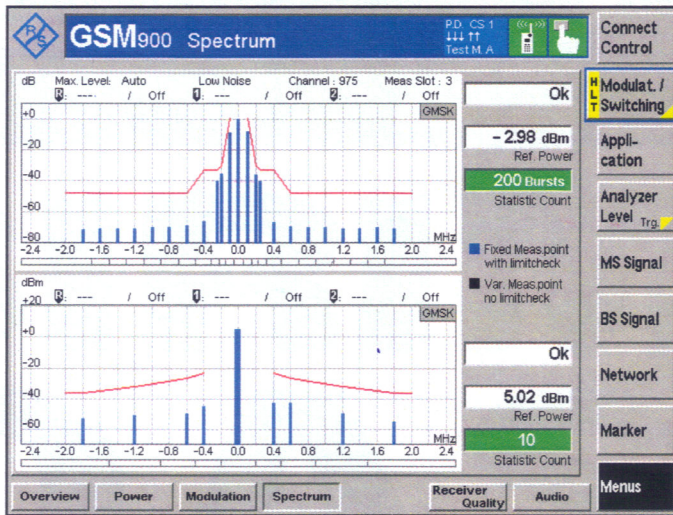
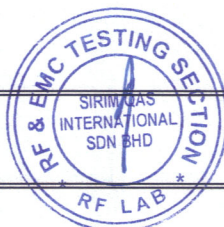


FIGURE 12(iii):Channel 975



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Graph Output RF Spectrum in GPRS Multislot Configuration
DCS 1800, $\Gamma_{CH} = 3$ [30 dBm]

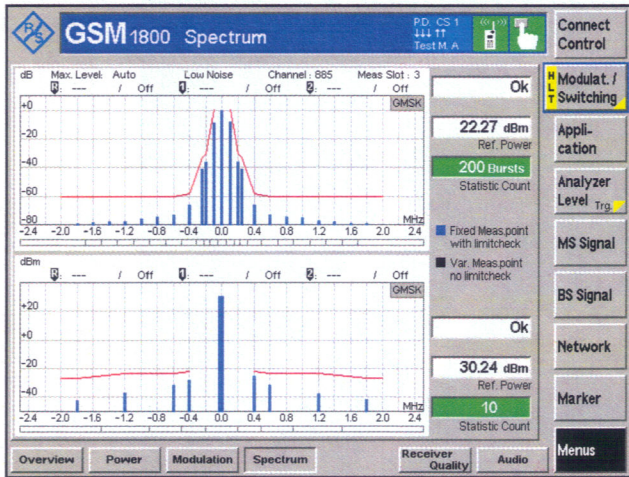


FIGURE 13(i):Channel 885

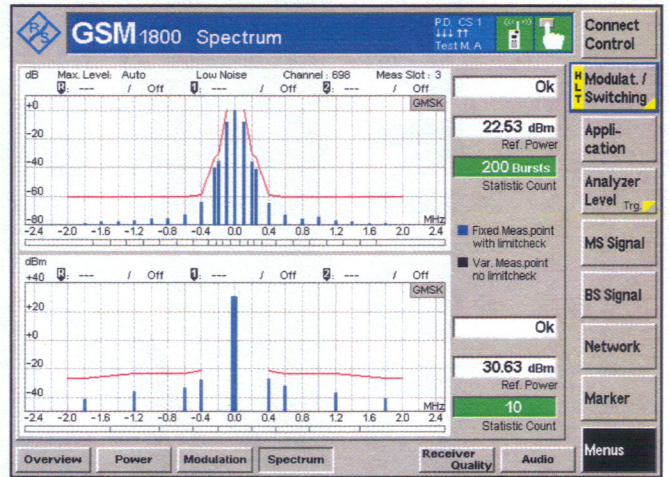


FIGURE 13(ii):Channel 698

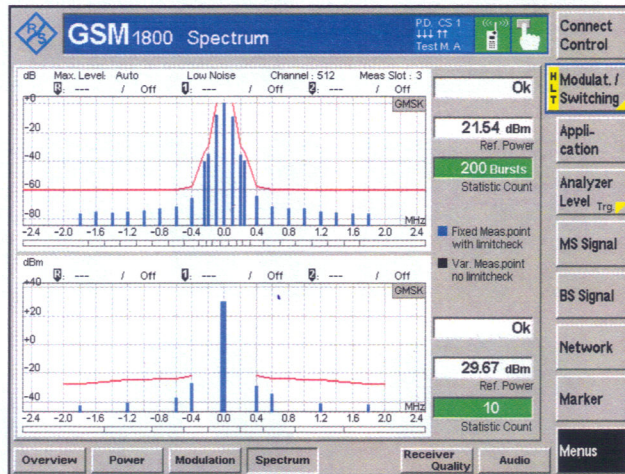
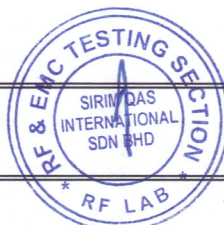


FIGURE 13(iii):Channel 512



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Graph Output RF Spectrum in GPRS Multislot Configuration
DCS 1800, $\Gamma_{CH} = 18$ [0 dBm]

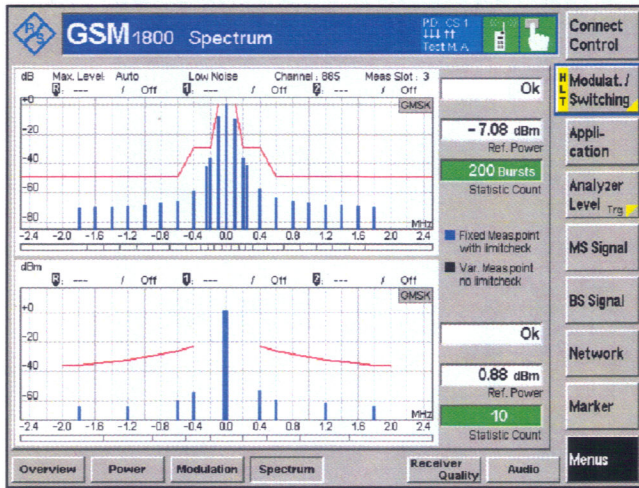


FIGURE 14(i):Channel 885

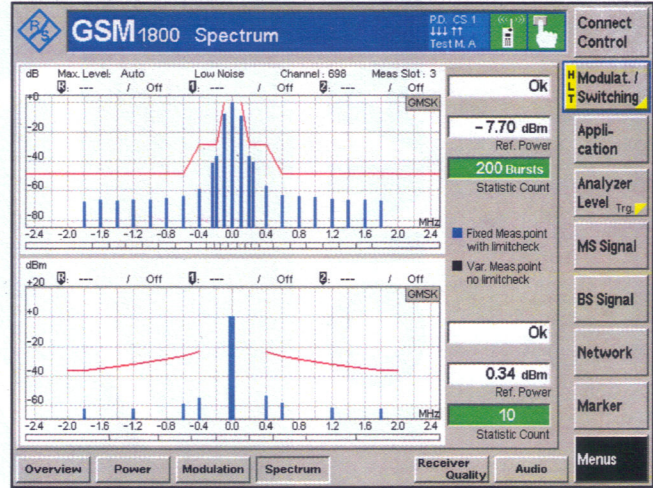


FIGURE 14(ii):Channel 698

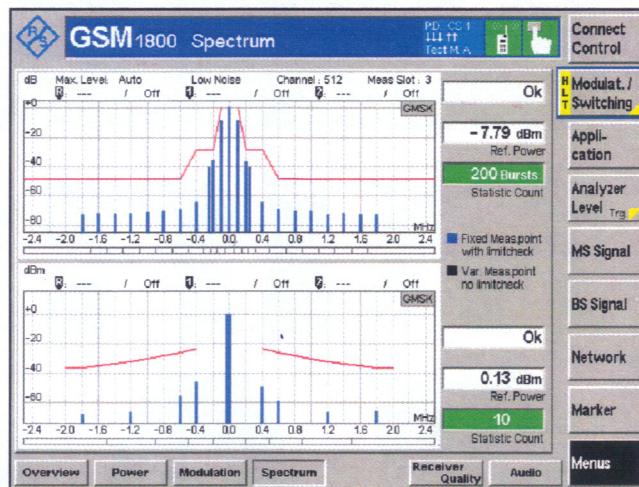


FIGURE 14(iii):Channel 512



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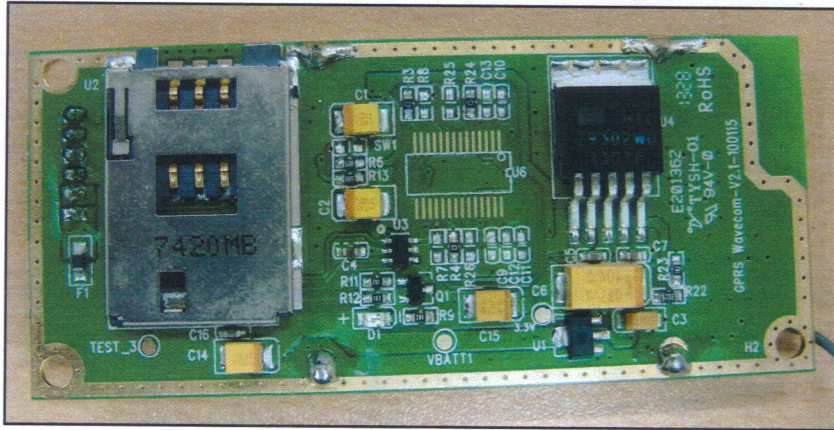
6.0 TEST INSTRUMENT

No.	Equipment	Brand	Model	Serial Number
1.	Universal Radio Communication	Rohde & Schwarz	CMU 200	118278



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7.0 PHOTOGRAPH



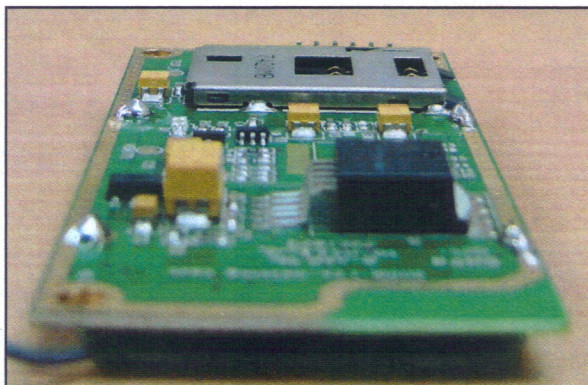
TOP VIEW



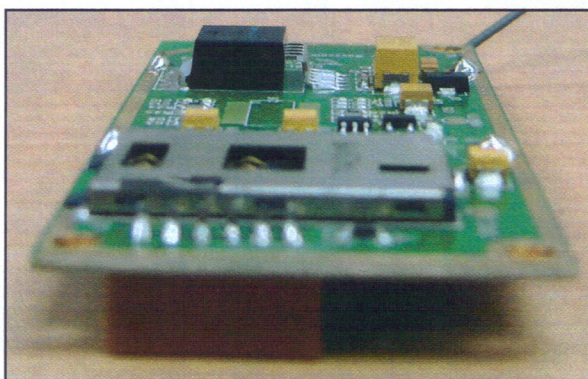
BOTTOM VIEW



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RIGHT SIDE VIEW



LEFT SIDE VIEW



PRODUCT MARKING

