Radio Equipment Directive-Radio
for
Shandong USR IOT Technology Limited

Serial to GPRS Module
Model No.: USR-GM3, USR-GM3s, USR-GPRS232-7S3, USR-GPRS232-730, USR-GPRS232-702, USR-GPRS232-703, USR-GPRS232-704, USR-GPRS232-705, USR-GPRS232-732, USR-GPRS232-734

Prepared for	:	Shandong USR IOT Technology Limited
Address	:	Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin Qu, 250101, Jinan, Shandong, China

Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
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Report Number	:	R0116051022T
Date of Test	:	Jun. 02~ Sept. 27, 2016
Date of Report	:	Sept. 30, 2016

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Test Report

TEST REPORT

Applicant	:	Shandong USR IOT Technology Limited
Manufacturer	:	Shandong USR IOT Technology Limited
EUT	:	Serial to GPRS Module
Model No.	:	USR-GM3, USR-GM3s, USR-GPRS232-7S3, USR-GPRS232-730, USR-GPRS232-702, USR-GPRS232-703, USR-GPRS232-704, USR-GPRS232-705, USR-GPRS232-732, USR-GPRS232-734
Serial No.	:	N.A.
Trade Mark	:	®
Rating	:	DC 3.8V, 750mA

Measurement Procedure Used:

ETSI EN 301 511 V12.1.1 (2015-06)

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 301 511 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Jun. 02~ Sept. 27, 2016

Prepared by : (Tested Engineer / Baron Wen)

Reviewer : (Project Manager / Amy Ding)

Approved & Authorized Signer : (Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Serial to GPRS Module
Model Number	:	USR-GM3, USR-GM3s, USR-GPRS232-7S3, USR-GPRS232-730, USR-GPRS232-702, USR-GPRS232-703, USR-GPRS232-704, USR-GPRS232-705, USR-GPRS232-732, USR-GPRS232-734 (Note: All samples are the same except the model number and colour, so we prepare "USR-GM3" for test only.)
Rated Power Supply Voltage	:	AC 230V, 50Hz for adapter
Adapter	:	Model No.: DQS151-120100-VC Input: AC 100-240V, 50/60Hz, 0.4A Max Output: DC 12.0V, 1.0A
Frequency	:	GPRS900: 880.2-914.8MHz(TX), 925.2-959.8MHz(RX) GPRS1800: 1710.2-1784.8MHz (TX), 1805.2-1879.8MHz (RX)
Test Modulation	:	GSM/GPRS: GMSK
Antenna Gain	:	GSM 900: 2.5 dBi GSM 1800: 2.5 dBi
GPRS Multislot Class	:	8/10/12
Applicant	:	Shandong USR IOT Technology Limited
Address	:	Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin Qu, 250101, Jinan, Shandong, China
Manufacturer	:	Shandong USR IOT Technology Limited
Address	:	Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin Qu, 250101, Jinan, Shandong, China
Factory	:	Shandong USR IOT Technology Limited
Address	:	Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin Qu, 250101, Jinan, Shandong, China
Date of receiver	:	Jun. 02, 2016
Date of Test	:	Jun. 02~ Sept. 27, 2016

1.2. Description of Test Facility

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

CNAS - LAB Code: L3503
Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021
Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, July 06, 2016.

IC-Registration No.: 8058A-1
Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, Jun. 13, 2016.

Test Location
All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.3. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal) Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.4. Test Standards

ETSI EN 301 511 V12.1.1 (2015-06) Global System for Mobile communications (GSM);Harmonized EN for mobile stations in the GSM 900 and GSM 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC)

Note: All radiated measurements were made in all three orthogonal. The values reported are the maximum values.

2. MEASURING DEVICE AND TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 16, 2016	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 16, 2016	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 16, 2016	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 19, 2016	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 19, 2016	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Apr. 16, 2016	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
8	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Jun 30, 2016	1 Year
9	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Jun 30, 2016	1 Year
10	DC Power supply	IV	IV-8080	YQSB0096	Jun 30, 2016	1 Year
11	TEMP&HUMI PROGRAMMABLE CHAMBER	Bell Group	BE-THK-150M8	SE-0137	Mar. 16, 2016	1 Year
12	UNIVERSAL RADIO COMMUNICATION TESTER	Rohde & Schwarz	CMU 200	114196	Jun. 30, 2016	1 Year
13	UNIVERSAL RADIO COMMUNICATION TESTER	Rohde & Schwarz	CMU 500	114196	Jun. 30, 2016	1 Year
14	Filter	COM-MW	ZHPF-BM1100-6000-0730	1307006523	Jun. 25, 2016	1 Year
15	Filter	COM-MW	COM-MW/ZHPF-M3.5-18G-3834	B2015094550	Jun 25, 2016	1 Year

3. Technical Test

3.1. Test conditions

Test Environment Conditions:

Relative Humidity:	30…75%
Air Pressure:	98…102kPa
Temperature:	Normal Temperature (NT)= +25℃ Low Temperature (LT) = -10℃ High Temperature (HT)= +55℃
Voltage of the EUT:	Normal Voltage (NV) = 230V Low Voltage (LV) = 207V High Voltage (HV) =253V

4. Summary of Test

3GPP TS 51.010-1 Item	EN 301 511 Reference	TEST DESCRIPTION	EGSM 900	DCS 1800
12.1.1	4.2.12	Conducted spurious emissions - MS allocated a channel	Pass	Pass
		Voltage High	Pass	Pass
		Voltage Low	Pass	Pass
12.1.2	4.2.13	Conducted spurious emissions - MS in idle mode	Pass	Pass
		Voltage High	Pass	Pass
		Voltage Low	Pass	Pass
12.2.1	4.2.16	Radiated spurious emissions - MS allocated a channel	Pass	Pass
		Voltage High	Pass	Pass
		Voltage Low	Pass	Pass
12.2.2	4.2.17	Radiated spurious emissions - MS in idle mode	Pass	Pass
		Voltage High	Pass	Pass
		Voltage Low	Pass	Pass
13.1	4.2.1	Transmitter – Frequency error and phase error	N/A	N/A
		Temperature High, Voltage High	N/A	N/A
		Temperature High, Voltage Low	N/A	N/A
		Temperature Low, Voltage High	N/A	N/A
		Temperature Low, Voltage Low	N/A	N/A
		Vibration（X axis）	N/A	N/A
		Vibration（Y axis）	N/A	N/A
		Vibration（Z axis）	N/A	N/A
13.2	4.2.2	Transmitter – Frequency error under multipath and interference conditions	N/A	N/A
		Temperature High, Voltage High	N/A	N/A
		Temperature High, Voltage Low	N/A	N/A
		Temperature Low, Voltage High	N/A	N/A
		Temperature Low, Voltage Low	N/A	N/A
13.3.4.1	4.2.5	Transmitter output power and burst timing - MS with external antenna	N/A	N/A
		Temperature High, Voltage High	N/A	N/A
		Temperature High, Voltage Low	N/A	N/A
		Temperature Low, Voltage High	N/A	N/A
		Temperature Low, Voltage Low	N/A	N/A
13.4	4.2.6	Transmitter - Output RF spectrum	N/A	N/A

3GPP TS 51.010-1 Item	EN 301 511 Reference	TEST DESCRIPTION	EGSM 900	DCS 1800
		Temperature High, Voltage High	N/A	N/A
		Temperature High, Voltage Low	N/A	N/A
		Temperature Low, Voltage High	N/A	N/A
		Temperature Low, Voltage Low	N/A	N/A
13.16.1	4.2.4	Frequency error and phase error in GPRS multislot configuration	Pass	Pass
		Temperature High, Voltage High	Pass	Pass
		Temperature High, Voltage Low	Pass	Pass
		Temperature Low, Voltage High	Pass	Pass
		Temperature Low, Voltage Low	Pass	Pass
		Vibration（X axis）	Pass	Pass
		Vibration（Y axis）	Pass	Pass
		Vibration（Z axis）	Pass	Pass
13.16.2-1	4.2.10	Transmitter output power in GPRS multislot configuration - MS with external antenna connector	Pass	Pass
		Temperature High, Voltage High	Pass	Pass
		Temperature High, Voltage Low	Pass	Pass
		Temperature Low, Voltage High	Pass	Pass
		Temperature Low, Voltage Low	Pass	Pass
13.16.3	4.2.11	Output RF spectrum in GPRS multislot configuration	Pass	Pass
		Temperature High, Voltage High	Pass	Pass
		Temperature High, Voltage Low	Pass	Pass
		Temperature Low, Voltage High	Pass	Pass
		Temperature Low, Voltage Low	Pass	Pass
14.7.1	4.2.20	Receiver Blocking and spurious response - speech channels	Pass	Pass
13.17.1	4.2.22	Frequency error and Modulation accuracy in EGPRS Configuration	N/A	N/A
13.17.2	4.2.23	Frequency error under multipath and interference conditions in EGPRS Configuration	N/A	N/A
13.17.3	4.2.24	EGPRS Transmitter output power	N/A	N/A
13.17.4	4.2.25	Output RF spectrum in EGPRS configuration	N/A	N/A
14.18.5	4.2.26	Blocking and spurious response in EGPRS configuration	N/A	N/A

Note1: We only show typical and worst test plot in the following test.
Note2: VH: Voltage High; VL: Voltage Low
TH: Temperature High; TL: Temperature Low

Measurement Uncertainty

Emissions		
Test Item	**Description**	**Uncertainty**
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB

5. §4.2.16-RADIATED SPURIOUS EMISSIONS-MS ALLOCATED A CHANNEL

5.1. Standard Requirement

Table 5:

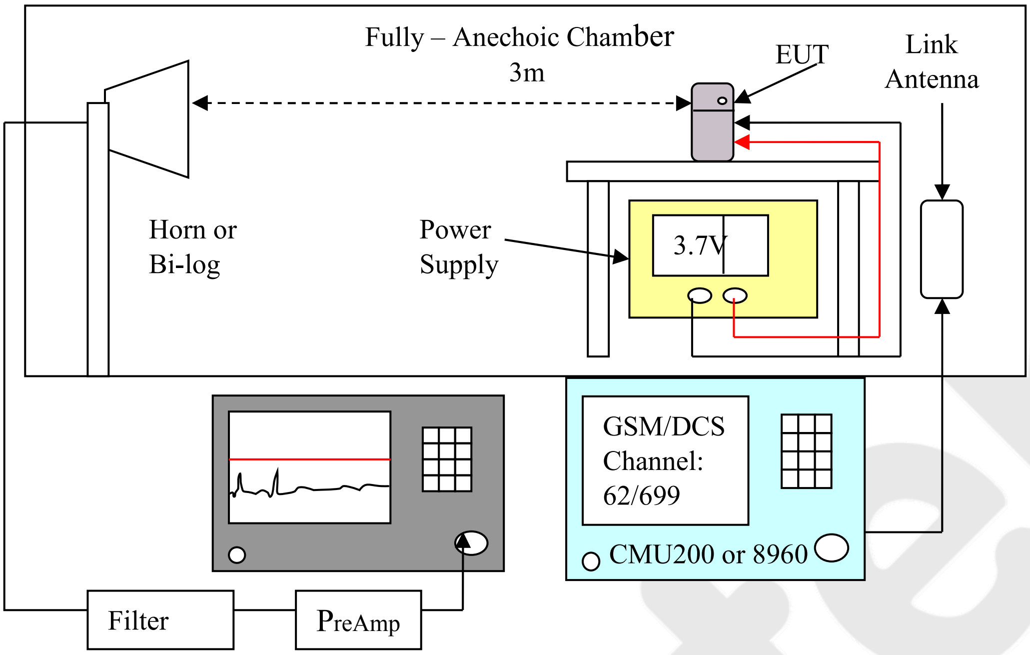
Frequency range	Power level in dBm		
	GSM 400, GSM 700, GSM 850, GSM 900	**DCS 1800**	**PCS 1900**
30MHz to 1GHz	-36	-36	-36
1GHz to 4GHz	-30		-30
1GHz to 1710MHz		-30	
1710MHz to 1785MHz		-36	
1785MHz to 4GHz		-30	

Table 6:

Frequency range	Frequency offset	Filter bandwidth	Approx video bandwidth
30MHz to 50MHz 50MHz to 500MHz excl. relevant TX band: GSM450: 450.4MHz to 457.6MHz GSM480: 478MHz to 486MHz 500MHz to 4GHz Excl. relevant TX band: GSM750: 777MHz to 792MHz GSM850: 824 MHz to 849MHz P-GSM: 890MHz to 915MHz E-GSM: 880MHz to 915MHz DCS: 1710MHz to 1785MHz PCS1900: 1850MHz to 1910MHz Relevant TX band: GSM450: 450.4MHz to 457.6MHz GSM480: 478.8MHz to 486MHz GSM750: 777MHz to 792MHz GSM850: 824MHz to 849MHz P-GSM: 890 MHz to 915MHz E-GSM: 880 MHz to 915MHz DCS: 1710MHz to 1785MHz PCS: 1900:1850MHz to 1910MHz	- - 0 to 10MHz >= 10MHz >= 20MHz >= 30MHz (offset from edge of relevant TX band) 1.8MHz to 6.0MHz > 6.0MHz (offset from carrier)	10kHz 100kHz 100kHz 300kHz 1MHz 3MHz 30kHz 100kHz	30kHz 300kHz 300kHz 1MHz 3MHz 3MHz 100kHz 300kHz

Note1: The filter and video bandwidths, and frequency offsets are only correct for measurements on an MS transmitting on a channel in the Mid ARFCN range.
Note2: Due to practical implementation of a SS, the video bandwidth is restricted to a maximum of 3MHz.

5.2. Test Setup



5.3. 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 30MHz to 4GHz.

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 an emission has been detected, the MS shall be rotated to obtain maximum response and the effective radiated power of the emission 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, is set according to table 6. 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 2: This ensures that both the active times (MS transmitting) and the quiet times are measured.

NOTE 3: 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 900MHz, 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]).

5.4. Test Result

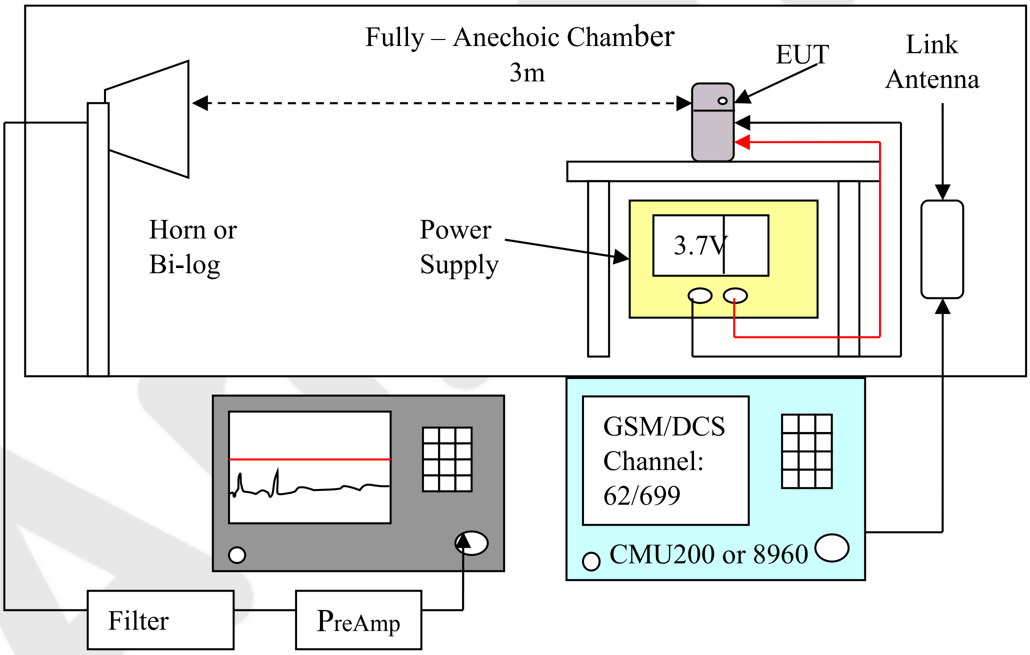
PASS.

6. §4.2.17-RADIATED SPURIOUS EMISSIONS-MS IN IDLE MODE

6.1. Standard Requirement

Frequency range	Power level in dBm	
	GSM400, GSM900, DCS1800	GSM700, GSM850, PCS1900
30MHz to 880MHz	-57	-57
880MHz to 915MHz	-59	-57
915MHz to 1000MHz	-57	-57
1GHz to 1710MHz	-47	
1710MHz to 1785MHz	-53	
1785 MHz to 4GHz	-47	
1GHz to 1850MHz		-47
1850MHz to 1910MHz		-53
1910MHz to 4GHz		-47

6.2. Test Setup



6.3. 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 30MHz to 4GHz.
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 900MHz, the test antenna
separation from the MS may be reduced to 1 meter.

Frequency range	Filter bandwidth	Video bandwidth
30 MHz to 50 MHz 50 MHz to 4 GHz	10 kHz 100 kHz	30 kHz 300 kHz

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]).

6.4. Test Result

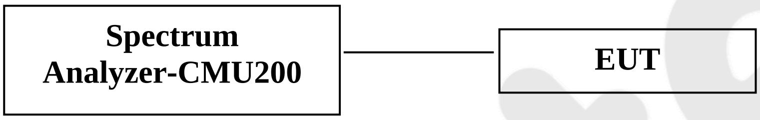
PASS.

7. §4.2.1-TRANSMITTER-FREQUENCY ERROR AND PHASE ERROR

7.1. Standard Requirement

The MS carrier frequency shall be accurate to within 0.1ppm, or accurate to within 0.1ppm compared to signals received from the BS. The RMS phase error for each burst shall not be greater than 5 degrees. The maximum peak deviation during the useful part of each burst shall not be greater than 20 degrees.

7.2. Test Setup



7.3. 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.

c.1) The sampled array of at least 294 phase measurements is represented by the vector:
$\varnothing_m = \varnothing_m(0)...\varnothing_m(n)$
where the number of samples in the array n+1 >= 294.

c.2) The calculated array, at the corresponding sampling instants, is represented by the vector:
$\varnothing_c = \varnothing_c(0)...\varnothing_c(n).$

c.3) The error array is represented by the vector:

$$\varnothing_e = \{\varnothing_m(0) - \varnothing_c(0)\}.........\{\varnothing_m(n) - \varnothing_c(n)\} = \varnothing_e(0)...\varnothing_e(n).$$

c.4) The corresponding sample numbers form a vector t = t(0)...t(n).

$$k = \frac{\sum_{j=0}^{j=n} t(j) * \varnothing_e(j)}{\sum_{j=0}^{j=n} t(j)^2}$$

c.5) By regression theory the slope of the samples with respect to t is k where:

$\varnothing_e(j) - k*t(j)$.

c.6) The frequency error is given by k/(360 * (), where is the sampling interval in s and all phase samples are measured in degrees.

$$\varnothing_e(RMS) = \left[\frac{\sum_{j=0}^{j=n} \{\varnothing_e(j) - k * t(j)\}^2}{n+1}\right]^{1/2}$$

c.7) The individual phase errors from the regression line are given by:

c.8) The RMS value of the phase errors is given by:

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, 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 1: 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).

7.4. Test Result

PASS.

8. §4.2.2-Transmitter-Frequency error under multi path and interference conditions

8.1. Standard Requirement

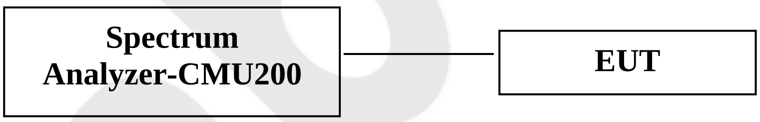
The MS carrier frequency error for each burst shall be accurate to within 0.1ppm, or 0.1ppm compared to signals received from the BS for signal levels down to 3dB below reference sensitivity level under normal condition and extreme conditions. The MS carrier frequency error for each burst shall be accurate to within 0.1ppm, or 0.1ppm compared to signals received from the BS for 3 dB less carrier to interference ratio than the reference interference ratios.

Table:

Requirements for frequency error under multi path, Doppler shift and interference conditions

GSM850 and EGSM900		DCS1800	
Propagation Condition	Permitted frequency error	Propagation Condition	Permitted frequency error
RA250	±300Hz	RA130	±400Hz
HT100	±180Hz	HT100	±350Hz
TU50	±160Hz	TU50	±260Hz
TU3	±230Hz	TU1.5	±320Hz

8.2. Test Setup



8.3. Test Procedure

a) The level of the serving cell BCCH is set to 10dB above the reference sensitivity level( ) and the Fading function set to RA. The SS waits 30s 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 10dB 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 30s 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.
NOTE: Due to the very low signal level at the MS receiver input the MS receiver is liable to error. The "looped back" bits are therefore also liable to error, and hence the SS does not know the expected bit sequence. The SS will have to demodulate the received signal to derive (error free) the transmitter burst bit pattern. Using this bit pattern the SS can calculate the expected phase trajectory according to the definition within 3GPP TS 05.04.

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 20s.
g) The initial conditions are established again and steps a) to f) are repeated but with the fading function set to HT100 (HT200 for GSM400, HT120 for GSM700).

h) The initial conditions are established again and steps a) to f) are repeated but with the fading function set toTU50 (TU100 for GSM400, TU 60 for GSM700).

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 18dB 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 10dB below the level of the TCH and modulated with random data, including the mid amble.
- the fading function for all channels is set to TU low.

j) The SS waits 100s 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 200s 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

8.4. Test Result

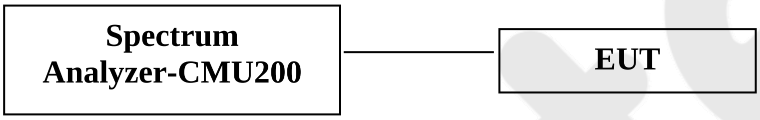
PASS.

9. §4.2.4-Frequency error and phase error in GPRS multislot configuration

9.1. Standard Requirement

The MS carrier frequency shall be accurate to within 0.1ppm compared to signals received from the BS. The RMS phase error (difference between the phase error trajectory and its linear regression on the active part of the time slot) for each burst shall not be greater than 5 degrees. The maximum peak deviation during the useful part of each burst shall not be greater than 20 degrees.

9.2. Test Setup



9.3. 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.

f) 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.

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

h) 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).
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).

c.1) The sampled array of at least 294 phase measurements is represented by the vector:

$\varnothing_m = \varnothing_m(0)...\varnothing_m(n)$

where the number of samples in the array n+1 ≥ 294.

c.2) The calculated array, at the corresponding sampling instants, is represented by the vector:

$\varnothing_c = \varnothing_c(0)...\varnothing_c(n)$.

c.3) The error array is represented by the vector:

$\varnothing_e = \{\varnothing_m(0) - \varnothing_c(0)\}.........\{\varnothing_m(n) - \varnothing_c(n)\} = \varnothing_e(0)...\varnothing_e(n)$.

c.4) The corresponding sample numbers form a vector t = t(0)...t(n).

c.5) By regression theory the slope of the samples with respect to t is k where:

$$k = \frac{\sum_{j=0}^{j=n} t(j) * \varnothing_e(j)}{\sum_{j=0}^{j=n} t(j)^2}$$

c.6) The frequency error is given by k/(360 * g), where g is the sampling interval in s and all phase samples are measured in degrees.

c.7) The individual phase errors from the regression line are given by:

$\varnothing_e(j) - k*t(j)$.

c.8) The RMS value $\varnothing_e$ of the phase errors is given by:

$$\varnothing_e(RMS) = \left[\frac{\sum_{j=0}^{j=n} \{\varnothing_e(j) - k * t(j)\}^2}{n+1} \right]^{1/2}$$

9.4. Test Result

PASS.

10. §4.2.5-TRANSMITTER OUTPUT POWER AND BURST TIMING

10.1. Standard Requirement

1. The MS maximum output power shall be as defined in 3GPP TS 05.05, sub clause 4.1.1, table for GMSK modulation, according to its power class, with a tolerance of ±2dB under normal conditions; 3GPP TS 05.05, sub clause 4.1.1, table for GMSK modulation.

2. The MS maximum output power shall be as defined in 3GPP TS 05.05, sub clause 4.1.1, table for GMSK modulation, according to its power class, with a tolerance of ±2.5dB under extreme conditions; 3GPP TS 05.05, sub clause 4.1.1, table for GMSK modulation; 3GPP TS 05.05 annex D in subclasses D.2.1 and D.2.2.

3. The power control levels shall have the nominal output power levels as defined in 3GPP TS 05.05, sub clause 4.1.1, from the lowest power control level up to the maximum output power corresponding to the class of the MS (for tolerance on maximum output power see conformance requirements 1), with a tolerance of ±3dB, ±4dB or ±5dB under normal conditions; 3GPP TS 05.05, sub clause 4.1.1.

4. The power control levels shall have the nominal output power levels as defined in 3GPP TS 05.05, 4.1.1, from the lowest power control level up to the maximum output power corresponding to the class of the MS (for tolerance on maximum output power see conformance requirements 2), with a tolerance of ±4dB, ±5dB or ±6dB under extreme conditions; 3GPP TS 05.05, sub clause 4.1.1; 3GPP TS 05.05 annex D subclasses D.2.1and D.2.2.

5. The output power actually transmitted by the MS at consecutive power control levels shall form a monotonic sequence and the interval between power control levels shall be 2±1,5dB (1±1dB between power control level 30 and 31 for PCS1900); 3GPP TS 05.05, sub clause 4.1.1.

6. The transmitted power level relative to time for a normal burst shall be within the power/time template given in 3GPP TS 05.05, annex B in figure B.1:
6.1 Under normal conditions; 3GPP TS 05.05, sub clause 4.5.2.
6.2 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.

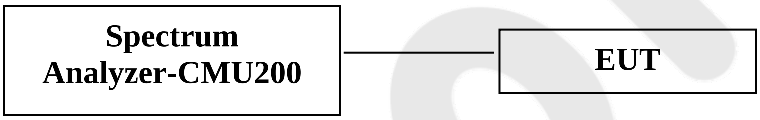
7. When accessing a cell on the RACH and before receiving the first power command during a communication on a DCCH or TCH (after an IMMEDIATE ASSIGNMENT), all GSM, class 1 and class 2 DCS1800 and PCS1900 MS shall use the power control level defined by the MS_TXPWR_MAX_CCH parameter broadcast on the BCCH of the cell, or if MS_TXPWR_MAX_CCH corresponds to a power control level not supported by the MS as defined by its power class, the MS shall act as though the closest supported power control level had been broadcast. A Class 3 DCS1800 MS shall use the POWER_OFFSET parameter.

8. The transmissions from the MS to the BS, measured at the MS antenna, shall be 468.75 - TA bit periods behind the transmissions received from the BS, where TA is the last timing advance received from the current serving BS. The tolerance on these timings shall be ±1 bit period:
8.1 Under normal conditions; 3GPP TS 05.10, sub clause 6.4.
8.2 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:
9.1 Under normal conditions; 3GPP TS 05.05, sub clause 4.5.2.
9.2 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:
10.1 Under normal conditions; 3GPP TS 05.10, sub clause 6.6.
10.2 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.

10.2. Test Setup



10.3. 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 0dB 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 0dB 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. In the case of an Access Burst the MS shall use the Power Level indicated in the MS_TXPWR_MAX_CCH parameter. If the power class of the MS is DCS 1800 Class 3, the MS shall also use the POWER_OFFSET parameter.
- 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 centre of the burst is then five data bits prior to this point and is used as the timing reference.
- 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 0dB 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) is referenced in time to the centre of the useful transmitted bits and in power to the 0 dB reference, both identified in f).

i) 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 DCS1800 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 (+23dBm for GSM400, GSM700, GSM850, and GSM900 or +10dBm for DCS1800 and PCS1900) and then steps f) to h) are repeated.

j) 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.

10.4. Test Result

PASS.

11. §4.2.6-TRANSMITTER-OUTPUT RF SPECTRUM ERROR

11.1. Standard Requirement

According to EN 301 511, section 4.2.6, the level of the output RF spectrum due to modulation shall be no more than that given in ETSI TS 151 010-1, sub clause 13.4.5, table Table 13-6) GSM400, GSM700, T-GSM810, GSM850 and GSM900 Spectrum due to modulation out to less than 1800kHz offset, Table 13-7) DCS1800 Spectrum due to modulation out to less than 1800kHz offset, Table 13-9) Spectrum due to modulation from 1800kHz offset to the edge of the transmit band (wideband noise), Table 13-10) Spurious emissions in the MS receive bands.

For GSM400, T-GSM810, GSM900 and DCS1800 MS the spurious emissions in the bands 850MHz to 866MHz, 925MHz to 935MHz, 935MHz to 960MHz and 1805MHz to 1880MHz, measured in step d), shall not exceed the values shown in table 13-10 except in up to five measurements in the band 925MHz to 960 MHz and five measurements in the band 1805MHz to 1880MHz where a level up to -36dBm is permitted. For GSM 400 MS, in addition, the MS spurious emissions in the bands 460.4MHz to 467.6MHz and 488,8 MHz to 496MHz shall not exceed the value of -67dBm, except in up to three measurements in each of the bands 460.4MHz to 467.6MHz and 488.8MHz to 496MHz where a level up to -36dBm is permitted. For GSM700, GSM850 and PCS1900 MS the spurious emissions in the bands 698MHz to 716MHz, 747MHz to 762MHz, 869MHz to 894MHz and 1930MHz to 1990MHz shall not exceed the values shown in table 13-10 except in up to five measurements in each of the bands 698MHz to 716MHz, 747MHz to 762MHz, 869 MHz to 894MHz and 1930MHz to 1990MHz where a level up to -36dBm is permitted.

Table 13-10: 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	-	-79
736 to 746	-	-73
747 to 757	-	-79
757 to 763	-	-73
869 to 894	-	-79
1 930 to 1 990	-	-71

11.2. Test Setup

Spectrum Analyzer-CMU200 —— **EUT**

11.3. 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: 30kHz;
- Video bandwidth: 30kHz;
- 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 < 1800kHz.

d) The resolution and video bandwidth on the spectrum analyzer are adjusted to 100kHz and the measurements are made at the following frequencies:
- on every ARFCN from 1800kHz offset from the carrier to the edge of the relevant transmit band for each measurement over 50 bursts;
- at 200kHz intervals over the 2MHz 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 + 100kHz FT - 100kHz; FT + 200kHz FT - 200kHz;
FT + 250kHz FT - 250kHz; FT + 200kHz * N FT - 200kHz * 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: 30kHz;
- Video bandwidth: 100kHz;

- 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 + 400kHz FT - 400kHz; FT + 600kHz FT - 600kHz;
FT + 1.2MHz FT - 1.2MHz; FT + 1.8MHz FT - 1.8MHz;
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) Steps b), f), g) and h) are repeated with FT equal to the hop pattern ARFCN in the Low ARFCN range except that in step g) the MS is commanded to power control level 11 rather than maximum power.

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.

11.4. Test Result

PASS.

12. §4.2.10-Transmitter output power in GPRS multislot configuration

12.1. Standard Requirement

The MS maximum output power shall be as defined in 3GPP TS 05.05, subclause 4.1.1, first table, according to its power class, with a tolerance of ±2dB under normal conditions; 3GPP TS 05.05, subclause 4.1.1, first table.

The MS maximum output power shall be as defined in 3GPP TS 05.05, subclause 4.1.1, first table, According to its power class, with a tolerance of ±2,5 dB under extreme conditions; 3GPP TS 05.05, subclause 4.1.1, first table; 3GPP TS 05.05 annex D subclauses D.2.1 and D.2.2.

The power control levels shall have the nominal output power levels as defined in 3GPP TS 05.05, subclause 4.1.1, third table (for GSM400, GSM700, GSM850 and GSM900), fourth table (for DCS1800) or fifth table (for PCS1900), 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 ±3dB, ±4dB or ±5dB under normal conditions; 3GPP TS 05.05, subclause 4.1.1, third, fourth or fifth table.

The power control levels shall have the nominal output power levels as defined in 3GPP TS 05.05, Subclause 4.1.1, third table (for GSM400, GSM700, GSM850 and GSM900), fourth table (for DCS 1 800) or fifth table (for PCS1900), from the lowest power control level up to the maximum output power corresponding to the class of the MS (for tolerance on maximum output power see conformance requirements 2), with a tolerance of ±4 dB, ±5 dB or ±6 dB under extreme conditions; 3GPP TS 05.05, subclause 4.1.1, third, fourth or fifth table; 3GPP TS 05.05 annex D Subclauses D.2.1 and D.2.2.

The output power actually transmitted by the MS at consecutive power control levels shall form a Monotonic sequence and the interval between power control levels shall be 2±1,5dB (1±1dB between power control level 30 and 31 for PCS1900); 3GPP TS 05.05, subclause 4.1.1.

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 figure B1. In 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 respected during the useful part of each burst and at the beginning and the end of the series of consecutive bursts. The output power during the guard period between every two consecutive active timeslots shall not exceed the level allowed for the useful part of the first timeslot or the level allowed for the useful part of the second timeslot plus 3 dB, whichever is the highest:

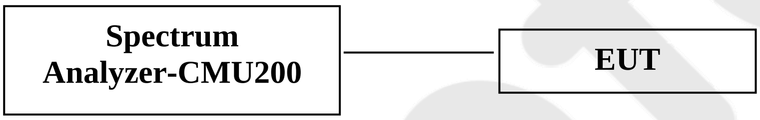
6.1 Under normal conditions; 3GPP TS 05.05, subclause 4.5.2.Under extreme conditions; 3GPP TS 05.05, subclause 4.5.2, 3GPP TS 05.05 annex D subclauses D.2.1 and D.2.2.

When accessing a cell on the PRACH or RACH and before receiving the first power control parameters during packet transfer on PDCH, all GSM and class 1 and class 2 DCS1800 and PCS 1900 MS shall use the power control level defined by the GPRS_MS_TXPWR_MAX_CCH parameter broadcast on the PBCCH or MS_TXPWR_MAX_CCH parameter broadcast on the BCCH of the cell. When MS_TXPWR_MAX_CCH is received on the BCCH, a class 3 DCS1800 MS shall add to it the value POWER_OFFSET broadcast on the BCCH. If MS_XPWR_MAX_CCH or the sum defined by: MS_TXPWR_MAX_CCH plus POWER_OFFSET 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.

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 figure B.3:

8.1 Under normal conditions; 3GPP TS 05.05, subclause 4.5.2.
8.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.5.2, 3GPP TS 05.05 annex D subclauses D.2.1 and D.2.2.

12.2. Test Setup



12.3. 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 midamble, 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 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).
Steps a) to b) are repeated on each timeslot within the multislot configuration with the MS commanded to operate on each of the power control levels defined, even those not supported by the MS.

c) The SS commands the MS to the maximum power control level supported by the MS and steps a)
to b) are repeated on each timeslot within the multislot configuration for ARFCN in the Low and High ranges.
The SS commands the MS to the maximum power control level in the first timeslot allocated

within the multislot configuration and to the minimum power control level in the second timeslot allocated. Any further timeslots allocated are to be set to the maximum power control level. Steps
to b) and corresponding measurements on each timeslot within the multislot configuration are repeated.
Measurement of access burst transmitter output power

d) The SS causes the MS to generate an Access Burst on an ARFCN in the Mid ARFCN range, this could be either by a cell re-selection or a new request for radio resource. In the case of a cell re-selection procedure the Power Level indicated in the PSI3 message is the maximum power control level supported by the MS. In the case of an Access Burst the MS shall use the Power Level indicated in the GPRS_MS_TXPWR_MAX_CCH parameter. If the power class of the MS is DCS1800 Class 3 and the Power Level is indicated by the MS_TXPWR_MAX_CCH parameter, the MS shall also use the POWER_OFFSET parameter.

e) 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 centre of the burst is then five data bits prior to this point and is used as the timing reference.

f) 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.
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).

g) Depending on the method used in step f) to cause the MS to send an Access Burst, the SS sends either a PACKET CELL CHANGE ORDER along with power control level set to 10 in PSI3 parameter GPRS_MS_TXPWR_MAX_CCH or it changes the (Packet) System Information elements (GPRS_)MS_TXPWR_MAX_CCH and for DCS1800 the POWER_OFFSET on the serving cell PBCCH/BCCH in order to limit the MS transmit power on the Access Burst to power control level 10 (+23dBm for GSM400, GSM700, GSM850 and GSM900 or +10dBm for DCS1800 and PCS1900) and then steps f) to g) are repeated.

h) Steps a) to h) 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.

12.4. Test Result

PASS.

13. §4.2.11-Output RF spectrum in GPRS multislot configuration

13.1. Standard Requirement

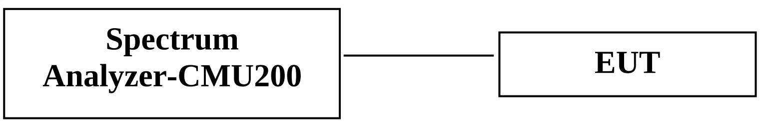
According to EN 301 511, section 4.2.11, the level of the output RF spectrum due to modulation shall be no more than that given in ETSI TS 151 010-1, sub clause 13.16.3, table 13.16.3-1: GSM400, GSM700, GSM850 and GSM900 Spectrum due to modulation out to less than 1800kHz offset; table 13.16.3-2: DCS1800 Spectrum due to modulation out to less than 1800kHz offset; Table 13.16.3-4: Spectrum due to modulation from 1800kHz offset to the edge of the transmit band (wideband noise); table 13.16.3-5: Spurious emissions in the MS receive bands.

For GSM400, GSM900 and DCS1800 MS the MS spurious emissions in the bands 925MHz to 935MHz, 935 MHz to 960MHz and 1805MHz to 1880MHz, measured in step d), shall not exceed the values shown in table 13.16.3-5 except in up to five measurements in the band 925MHz to 960MHz and five measurements in the band 1805MHz to 1880MHz where a level up to -36dBm is permitted. For GSM 400 MS, in addition, the MS spurious emissions in the bands 460.4MHz to 467.6MHz and 488,8 MHz to 496MHz shall not exceed the value of -67dBm, except in up to three measurements in each of the bands 460.4MHz to 467.6MHz and 488.8MHz to 496MHz where a level up to -36dBm is permitted. For GSM700 and GSM850 the spurious emissions in the bands 747MHz to 757MHz, 757MHz to 762MHz, 869MHz to 894MHz and 1930MHz to 1 990 MHz shall not exceed the values shown in table 13.16.3-4 except in up to five measurements in each of the bands 747MHz to 762MHz, 869MHz to 894MHz and 1930MHz to 1990MHz where a level up to -36dBm is permitted. For PCS1900 MS the spurious emissions in the bands 869MHz to 894MHz and 1930MHz to 1990MHz shall not exceed the values shown in table 13.16.3-5 except in up to five measurements in each of the bands 869MHz to 894MHz and 1930MHz to 1990MHz where a level up to -36dBm is permitted.

Table 13.16.3-5: Spurious emissions in the MS receive bands

Band (MHz)	Spurious emissions level (dBm)	
	GSM 400, GSM 900 and DCS 1 800	GSM 700 GSM 850 PCS 1 900
925 to 935	-67	
935 to 960	-79	
1805 to 1880	-71	
728 to 736		-79
736 to 746		-73
747 to 757		-79
757 to763		-73
869 to 894		-79
1930 to 1990		-71

13.2. Test Setup



13.3. Test Procedure

NOTE: When averaging is in use during frequency hopping mode, the averaging only includes bursts transmitted when the hopping carrier corresponds to the nominal carrier of the measurement.

In steps b) to h) the FT is equal to the hop pattern ARFCN in the Mid ARFCN range.
The other settings of the spectrum analyzer are set as follows:
Zero frequency scan;
Resolution bandwidth: 30kHz;
Video bandwidth: 30kHz;
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 in one of the active time slots 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 in every transmitted time slot.
By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured over 50 bursts at all multiples of 30kHz offset from FT to < 1800kHz.
The resolution and video bandwidth on the spectrum analyzer are adjusted to 100kHz and the measurements are made at the following frequencies: on every ARFCN from 1800kHz offset from the carrier to the edge of the relevant transmit band for each measurement over 50 bursts. at 200kHz intervals over the 2MHz either side of the relevant transmit band for each measurement over 50 bursts.

For GSM400, GSM900 and DCS1800:
at 200kHz intervals over the band 925MHz to 960MHz for each measurement over 50 bursts.

at 200kHz intervals over the band 180MHz to 1880MHz for each measurement over 50 bursts.

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

By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured over 200 bursts at the following frequencies:
FT + 100kHz FT - 100kHz;
FT + 200kHz FT - 200kHz;
FT + 250kHz FT - 250kHz;
FT + 200kHz * N FT - 200kHz * N;
where N = 2, 3, 4, 5, 6, 7, and 8;

and FT = RF channel nominal centre frequency.
Steps a) to f) is repeated except that in step a) the spectrum analyzer is gated so that the burst of the next active time slot is measured.

The spectrum analyzer settings are adjusted to:
Zero frequency scan;
-Resolution bandwidth: 30kHz;
Video bandwidth: 100kHz;
Peak hold.

The spectrum analyzer gating of the signal is switched off.
The MS is commanded to its maximum power control level in every transmitted time slot.
By tuning the spectrum analyzer centre frequency to the measurement frequencies the power level is measured at the following frequencies:
FT + 400kHz FT - 400kHz;
FT + 600kHz FT - 600kHz;
FT + 1.2MHz FT – 1.2MHz;
FT + 1.8MHz FT – 1.8MHz;
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.

Step i) is repeated for power control levels 7 and 11.
Steps b), f), h) and i) are repeated with FT equal to the hop pattern ARFCN in the Low ARFCN range except that in step h) the MS is commanded to power control level 11 rather than maximum power.

Steps b), f), h) and i) are repeated with FT equal to the hop pattern ARFCN in the High ARFCN range except that in step h) the MS is commanded to power control level 11 rather than maximum power.
Steps a) b) f) h), and i) are repeated under extreme test conditions (annex 1, TC2.2). except that at
step h) the MS is commanded to power control level 11.

13.4. Test Result

PASS.

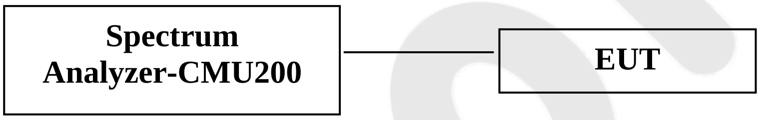
14. §4.2.12-CONDUCTED SPURIOUS EMISSIONS-MS ALLOCATED A CHANNEL

14.1. Standard Requirement

According to EN 301 511, section 4.2.12, the conducted spurious power emitted by the MS, when allocated a channel, shall be no more than the levels in table 1:

Frequency range	Power level in dBm		
	GSM 400, GSM 700, GSM 850, GSM 900	DCS 1 800	PCS 1 900
9 kHz to 1 GHz	-36	-36	-36
1 GHz to 12,75 GHz	-30		-30
1 GHz to 1 710 MHz		-30	
1 710 MHz to 1 785 MHz		-36	
1 785 MHz to 12,75 GHz		-30	

14.2. Test Setup



14.3. Test Procedure

a) Measurements are made in the frequency range 100kHz to 12.75GHz. 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 6dB, delivered into a 50Ω load.

The measurement bandwidth based on a 5 pole synchronously tuned filter is according to table 2. 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
100 kHz to 50 MHz	-	10 kHz	30 kHz
50 MHz to 500 MHz excl. relevant TX band: GSM 450: 450,4 MHz to 457,6 MHz; GSM 480: 478,8 MHz to 486 MHz, and the RX bands: For GSM 400 MS: 460,4 MHz to 467,6 MHz; 488,8 MHz to 496 MHz.	-	100 kHz	300 kHz

Frequency range	Frequency offset	Filter bandwidth	Approx video bandwidth
500 MHz to 12,75 GHz, excl. relevant TX band: GSM 750: 777 MHz to 792 MHz GSM 850: 824 MHz to 849 MHz; P-GSM: 890 MHz to 915 MHz; E-GSM: 880 MHz to 915 MHz; DCS: 1 710 MHz to 1 785 MHz, PCS 1 900: 1 850 MHz to 1 910 MHz; and the RX bands: For GSM 400 MS, GSM 900 MS and DCS 1 800 MS: 925 MHz to 960 MHz; 1 805 MHz to 1 880 MHz. For GSM 700 MS, GSM 850 MS and PCS 1 900 MS: 747 MHz to 762 MHz; 869 MHz to 894 MHz; 1 930 MHz to 1 990 MHz	0 to 10 MHz >= 10 MHz >= 20 MHz >= 30 MHz (offset from edge of relevant TX band)	100 kHz 300 kHz 1 MHz 3 MHz	300 kHz 1 MHz 3 MHz 3 MHz
relevant TX band: GSM 450: 450,4 MHz to 457,6 MHz GSM 480: 478,8 MHz to 486 MHz GSM 750: 777 MHz to 792 MHz GSM 850: 824 MHz to 849 MHz P-GSM: 890 MHz to 915 MHz E-GSM: 880 MHz to 915 MHz DCS: 1 710 MHz to 1 785 MHz PCS 1 900: 1 850 MHz to 1 910 MHz	1,8 to 6,0 MHz > 6,0 MHz (offset from carrier)	30 kHz 100 kHz	100 kHz 300 kHz
NOTE 1: The excluded RX bands are tested in subclause 13.4. NOTE 2: The filter and video bandwidths, and frequency offsets are only correct for measurements on an MS transmitting on a channel in the Mid ARFCN range. NOTE 3: Due to practical implementation, the video bandwidth is restricted to a maximum of 3 MHz.			

14.4. Test Result

PASS.

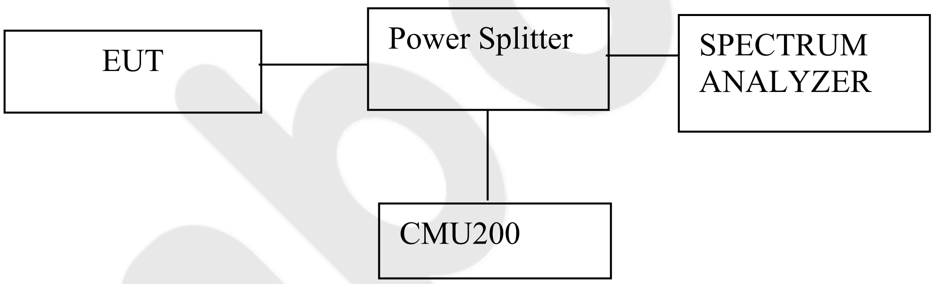
15. §4.2.13-CONDUCTED SPURIOUS EMISSIONS-MS IN IDLE MODE

15.1. Standard Requirement

According to EN 301 511 V12.1.1 (2015-06), section 4.2.13, the conducted spurious power emitted by the MS, when in idle mode, shall be no more than the levels in table 12.4:

Frequency range		Power level in dBm	
		GSM 400, T-GSM 810 GSM 900, DCS 1 800	GSM 700, GSM 850, PCS 1 900
9 kHz to	880 MHz	-57	-57
880 MHz to	915 MHz	-59	-57
915 MHz to	1000 MHz	-57	-57
1 GHz to	1 710 MHz	-47	
1 710 MHz to	1 785 MHz	-53	
1 785 MHz to	12,75 GHz	-47	
1 GHz to	1 850 MHz		-47
1 850 MHz to	1 910 MHz		-53
1 910 MHz to	12,75 GHz		-47

15.2. Test Setup



15.3. Test Procedure

a) Measurements are made in the frequency range 100kHz to 12.75GHz. Spurious emissions are measured as the power level of any discrete signal, higher than the requirement in table 12.4 minus 6dB, delivered into a 50(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.

Table 4

Frequency range	Filter bandwidth	Video bandwidth
100 kHz to 50 MHz	10 kHz	30 kHz
50 MHz to 12,75 GHz	100 kHz	300 kHz

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

15.4. Test Result

PASS.

16. §4.2.20-RECEIVER BLOCKING AND SPURIOUS RESPONSE-SPEECH CHANNELS

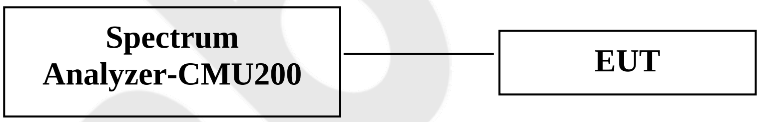
16.1. Standard Requirement

The blocking characteristics of the receiver are specified separately for in-band and out-of-band performance as Identified in 3GPP TS 05.05 sub clause 5.1.
The reference sensitivity performance as specified in table 1 of 3GPP TS 05.05 shall be met when the following Signals are simultaneously input to the receiver:
- a useful signal at frequency f0, 3 dB above the reference sensitivity level as specified in 3GPP TS 05.05 sub clause 6.2;
- a continuous, static sine wave signal at a level as in the table of 3GPP TS 05.05 sub clause 5.1 and at a Frequency (f) which is an integer multiple of 200kHz;
with the following exceptions, called spurious response frequencies:

a) GSM700, GSM850 and GSM900: in band, for a maximum of six occurrences (which if grouped shall not exceed three contiguous occurrences per group);

b) out of band, for a maximum of 24 occurrences (which if below f0 and grouped shall not exceed three contiguous occurrences per group).
where the above performance shall be met when the continuous sine wave signal (f) is set to a level of 70dBμV(emf) (i.e. -43dBm). 3GPP TS 05.05, sub clause 5.1.

16.2. Test Setup



16.3. 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 100kHz to 12.75GHz, where FB is an integer multiple of 200kHz.
However, frequencies in the range FR ±600kHz 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 200kHz channels most closely approximating the absolute frequency of the calculated blocking signal frequency) are the combined frequencies from i), ii) and iii) below:

i) The total frequency range formed by:
E-GSM900 the frequencies between Flo + (IF1 + IF2 + ... + IFn + 17,5 MHz) and Flo - (IF1 + IF2 + ... + IFn + 17.5MHz).
And the frequencies +100MHz and -100MHz from the edge of the relevant receive band.
Measurements are made at 200kHz intervals.
ii) The three frequencies IF1, IF1 + 200kHz, IF1 - 200kHz.
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 100kHz to 12.75GHz.
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.

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

Table 14-28a: Level of unwanted signals

	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

Table 14-28a: Level of unwanted signals

FREQUENCY	GSM 900 Small MS	GSM 900 Other MS	DCS 1 800
	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

Table 14-28a: Level of unwanted signals

FREQUENCY	GSM 900 Small MS	GSM 900 Other MS	DCS 1 800
	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

Table 14-28d: Level of unwanted signals

FREQUENCY	GSM 750	GSM 850
	LEVEL IN dBµVemf( )	
FR ±600 kHz to FR ±800 kHz	70	70
FR ±800 kHz to FR ±1,6 MHz	70	70
FR ±1,6 MHz to FR ±3 MHz	80	80
727 MHz to FR - 3 MHz	90	-
FR + 3 MHz to 782 MHz	90	-
849 MHz to FR - 3 MHz	-	90
FR + 3 MHz to 914 MHz	-	90
100 kHz to < 727 MHz	113	-
> 782 MHz to 12,75 GHz	113	-
100 kHz to < 849 MHz	-	113
> 914 MHz to 12,75 GHz	-	113

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 905MHz to < 915MHz is relaxed to 108dB(Vemf( ).
NOTE 3: For a GSM 450 small MS the level of the unwanted signal in the band 450.4MHz to < 457.6MHz is relaxed to 108dB(Vemf( ). For a GSM480 small MS the level of the unwanted signal in the band
478,8MHz to < 486MHz is relaxed to 108dB(Vemf( ).

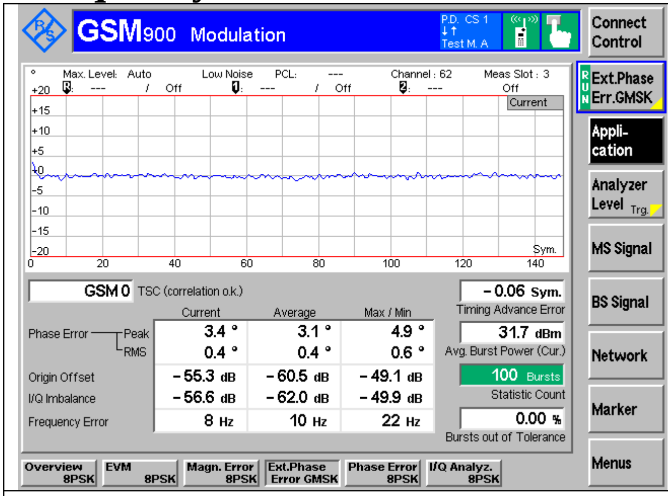
e) The SS compares the data of the signal that it sends to the MS with the signal which is looped back from the receiver after demodulation and decoding, and checks the frame erasure indication.
The SS tests the RBER compliance for the bits of class II, by examining sequences of at least the minimum 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 ±200kHz away. If either of these two frequencies fail then the next channel 200kHz beyond is also tested. This process is repeated until all channels constituting the group of failures is known.

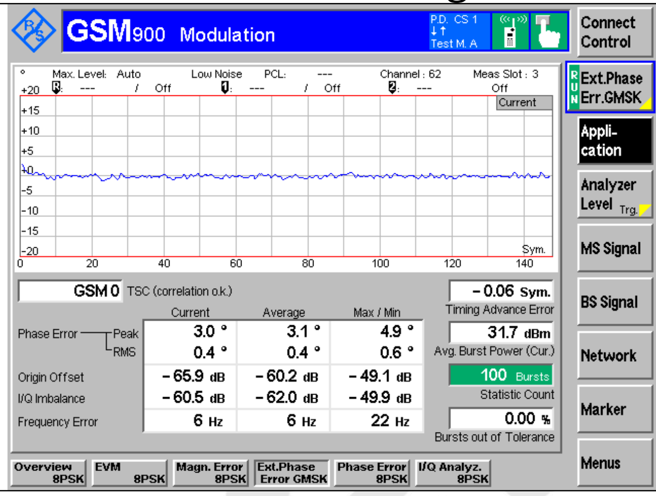
16.4. Test Result

PASS.

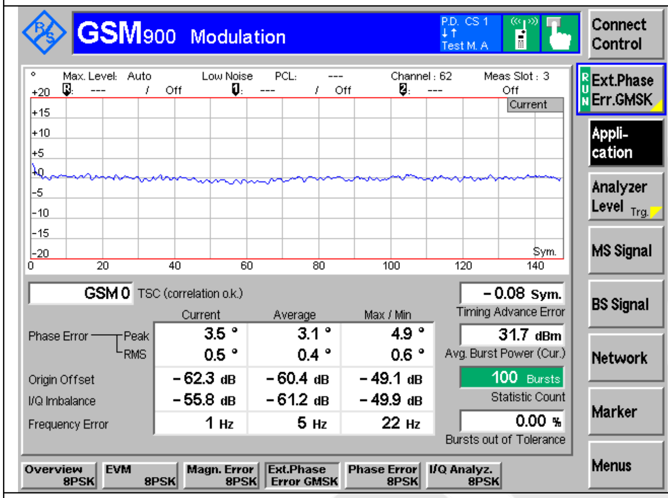
APPENDIX I (TEST RESULTS)
Frequency Error And Phase Error in GPRS Multi-Slot Configuration



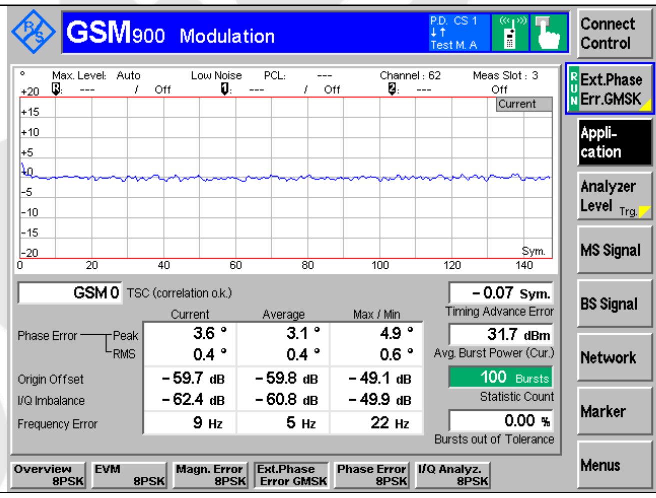
GPRS900, Mid Channel, normal



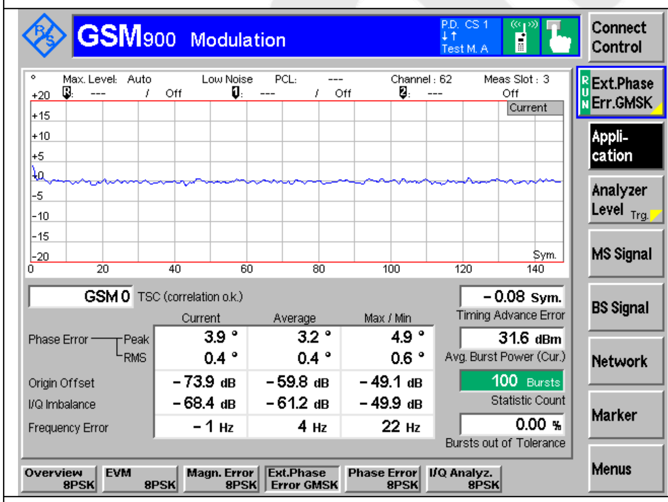
GPRS900, Mid Channel, TL/VL



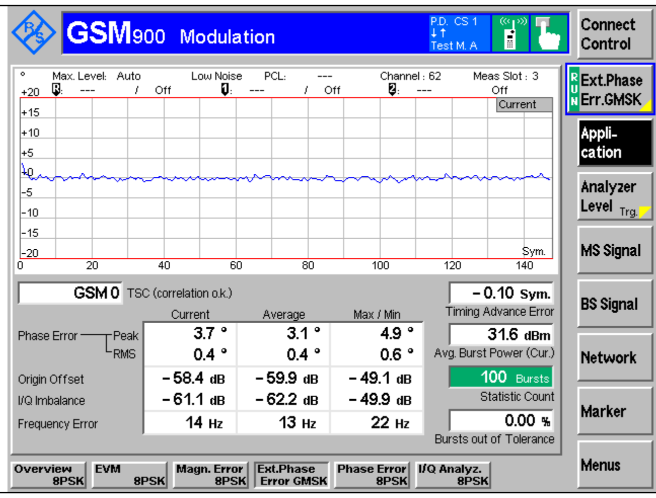
GPRS900, Mid Channel, TL/VH



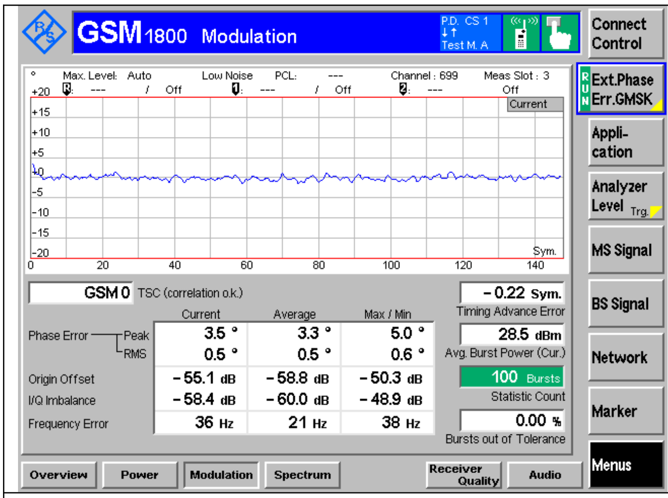
GPRS900, Mid Channel, TH/VL



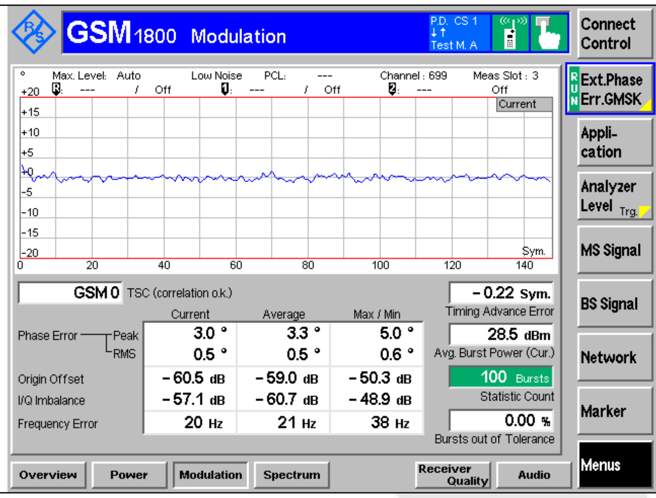
GPRS900, Mid Channel, TH/VH



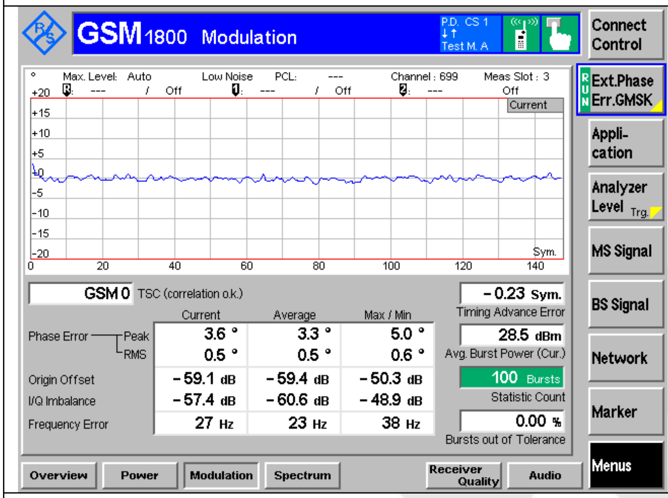
GPRS900, Mid Channel, normal, vibration X axis (Worst Case)



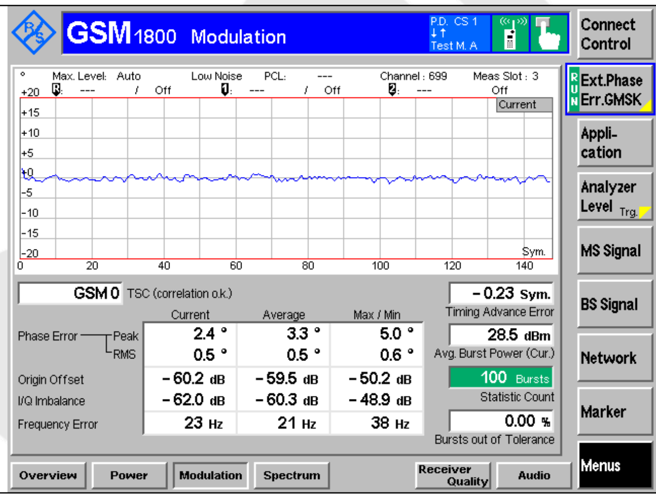
GPRS1800, Mid Channel, normal



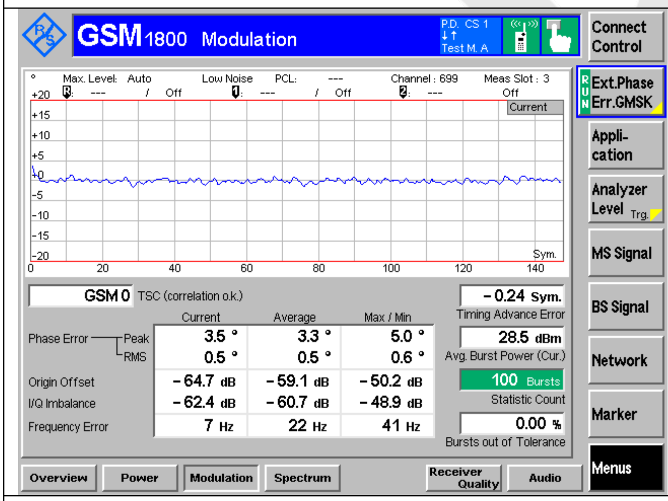
GPRS1800, Mid Channel, TL/VL



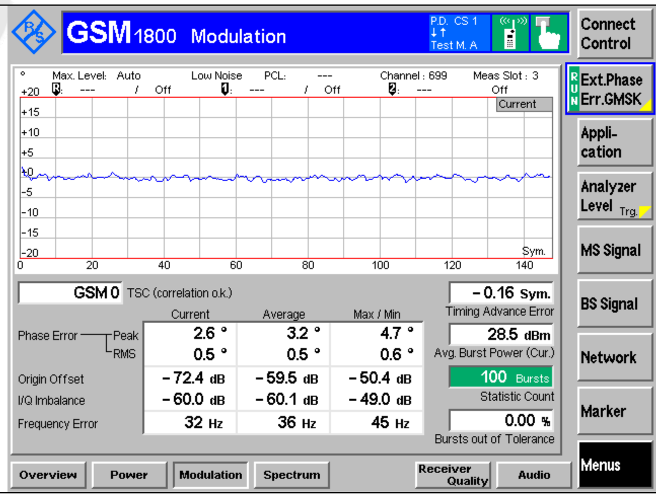
GPRS1800, Mid Channel, TL/VH



GPRS1800, Mid Channel, TH/VL

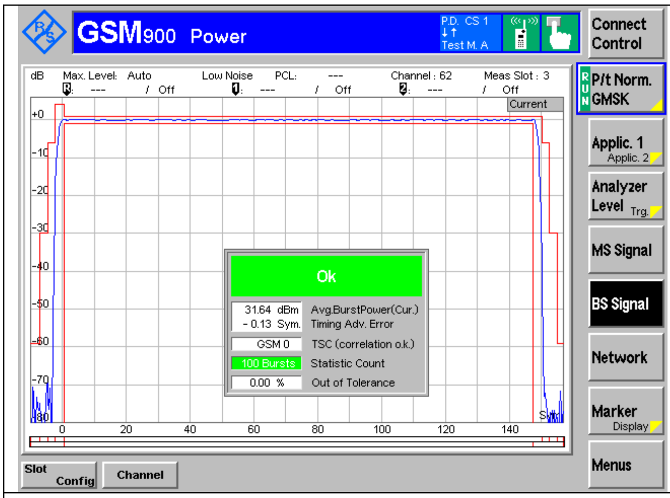


GPRS1800, Mid Channel, TH/VH

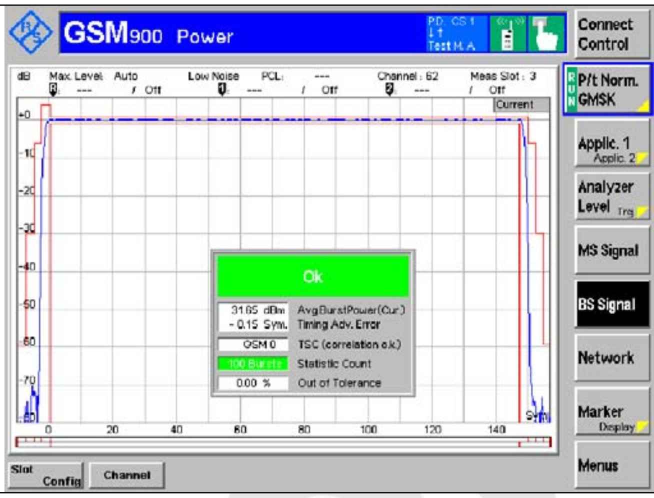


GPRS1800, Mid Channel, normal, vibration X axis (Worst Case)

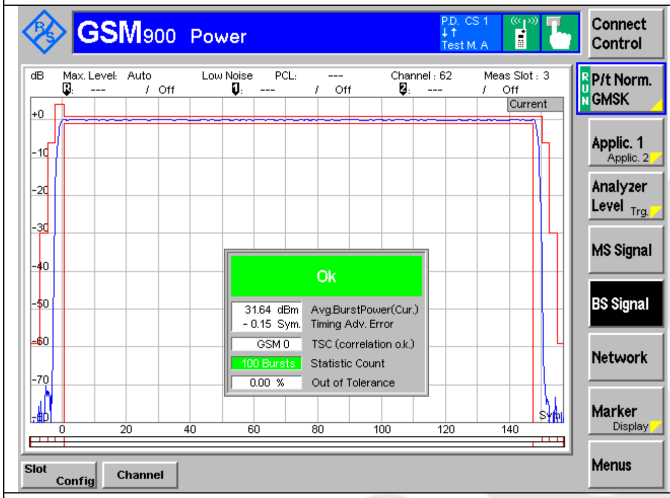
TX Output Power in GPRS Multi-Slot Configuration



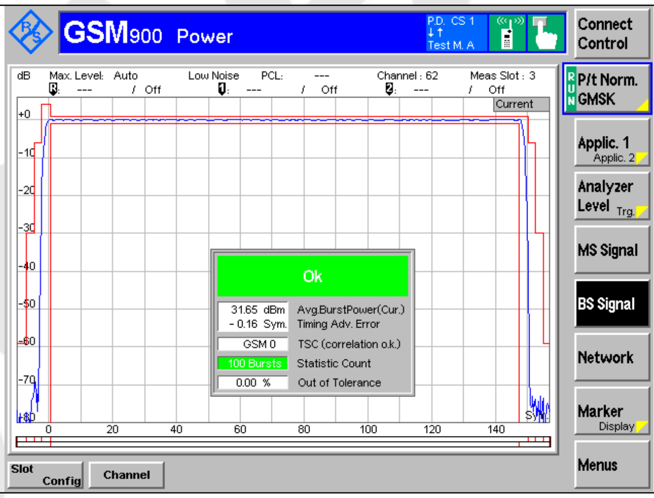
GPRS900, Mid Channel, normal



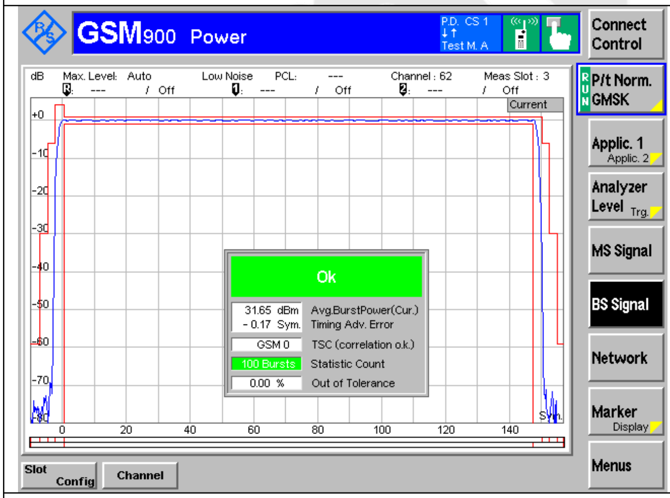
GPRS900, Mid Channel, TL/VL



GPRS900, Mid Channel, TL/VH



GPRS900, Mid Channel, TH/VL



GPRS900, Mid Channel, TH/VH

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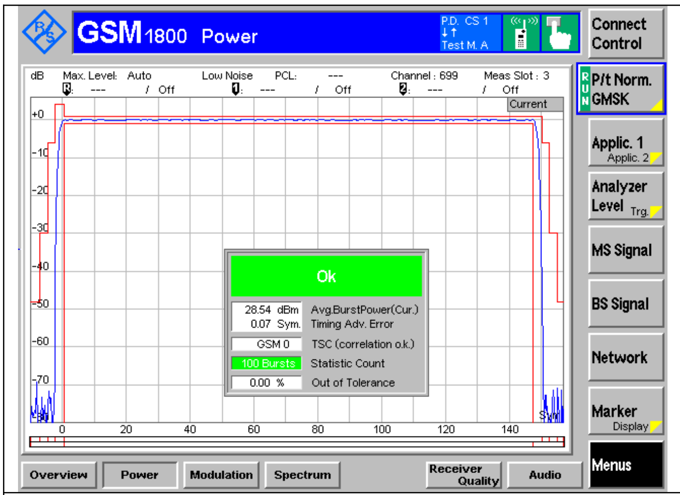
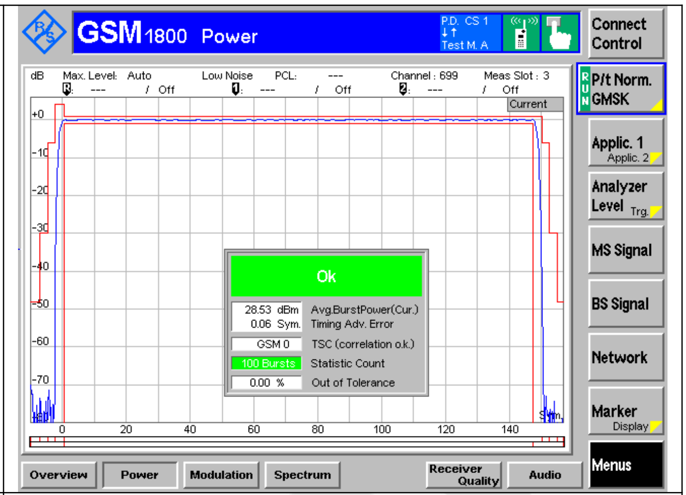
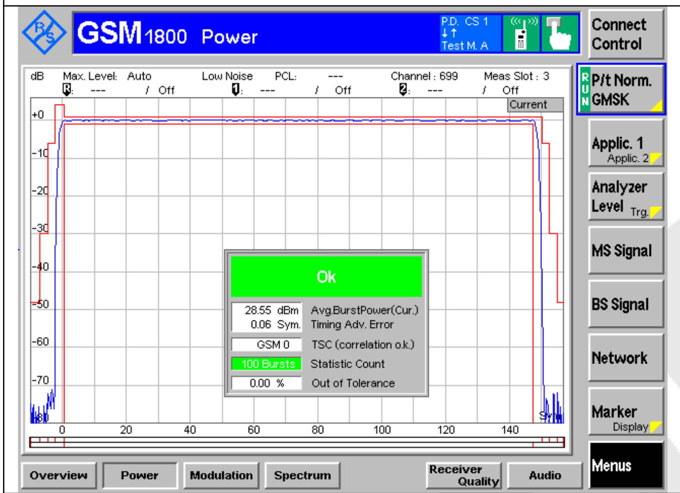


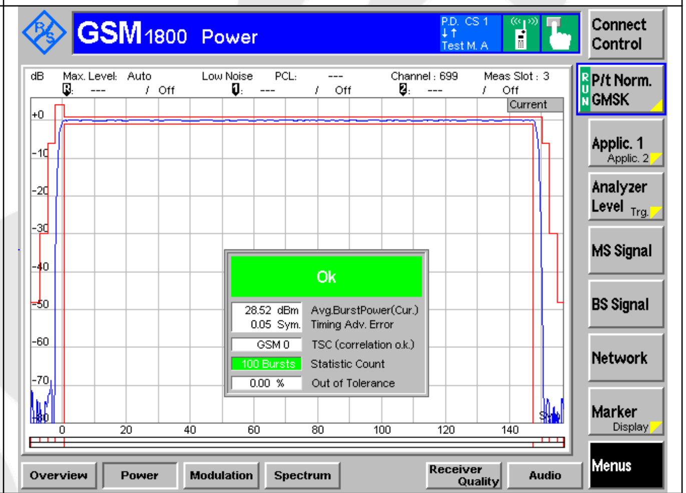
GPRS1800, Mid Channel, normal



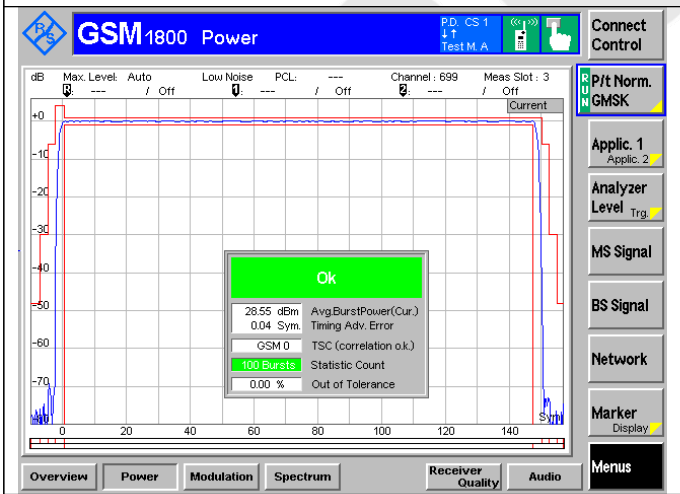
GPRS1800, Mid Channel, TL/VL



GPRS1800, Mid Channel, TL/VH



GPRS1800, Mid Channel, TH/VL



GPRS1800, Mid Channel, TH/VH

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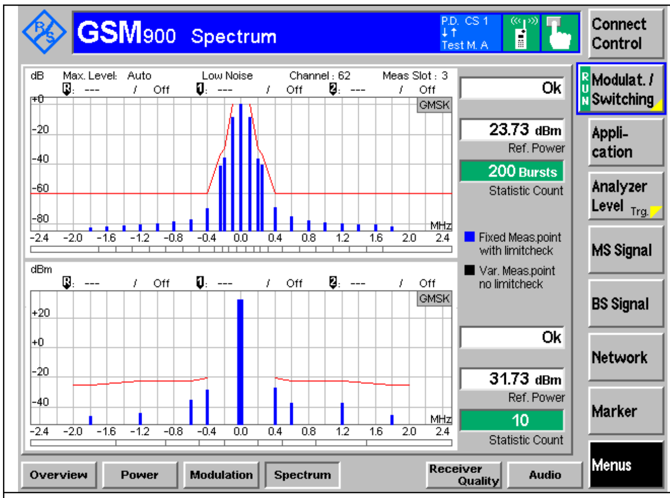
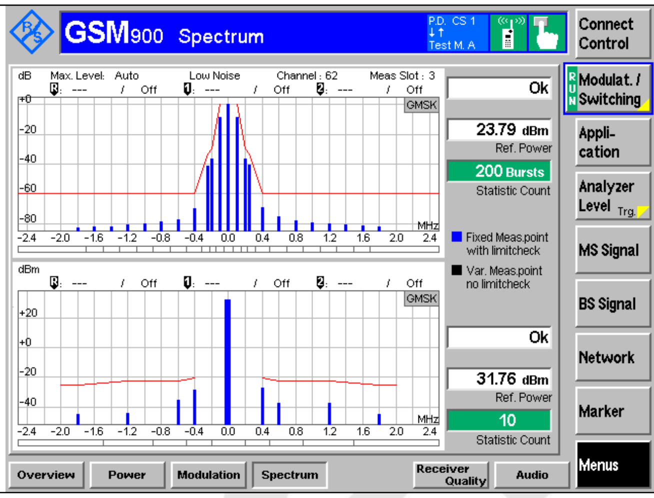
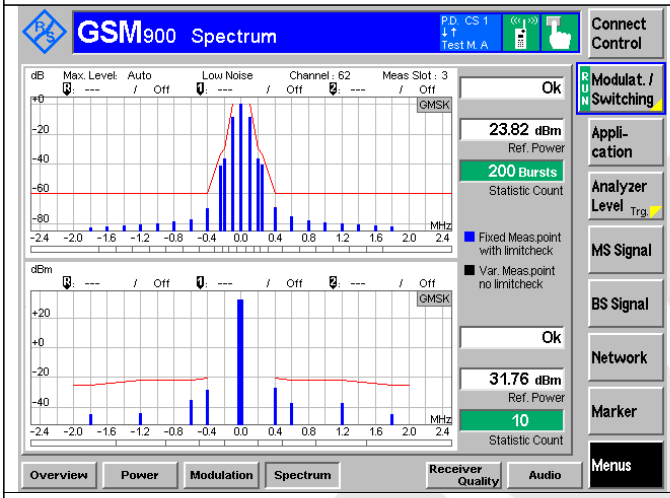
Transmitter Output Spectrum Mask in GPRS Multi-Slot Configuration



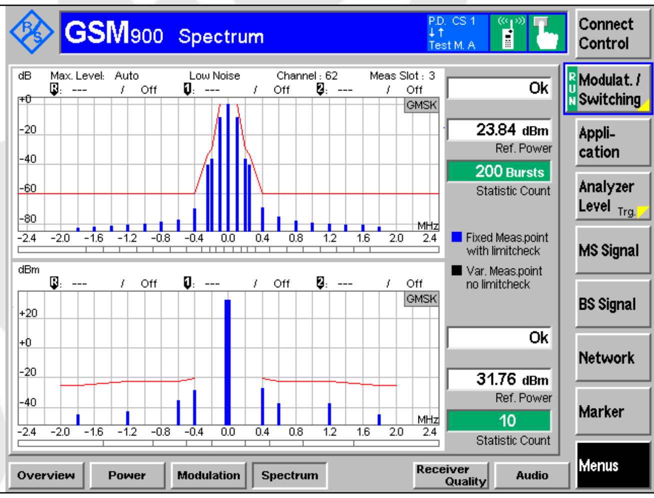
GPRS900, Mid Channel, normal



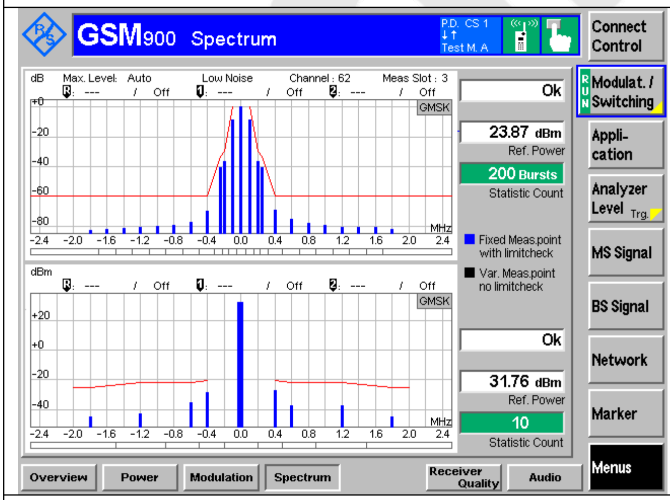
GPRS900, Mid Channel, TL/VL



GPRS900, Mid Channel, TL/VH



GPRS900, Mid Channel, TH/VL



GPRS900, Mid Channel, TH/VH

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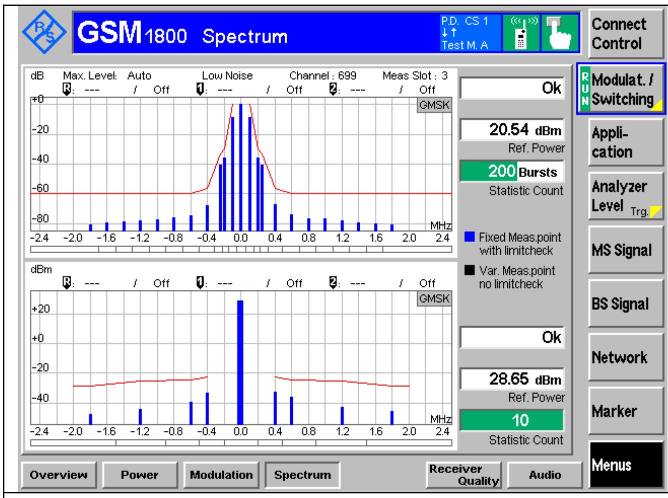
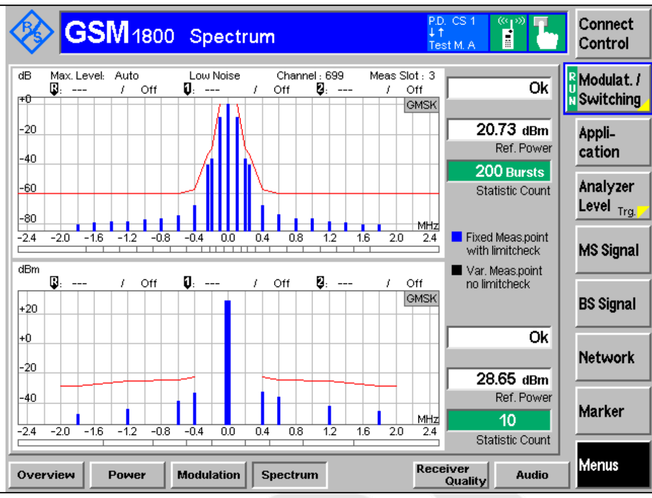
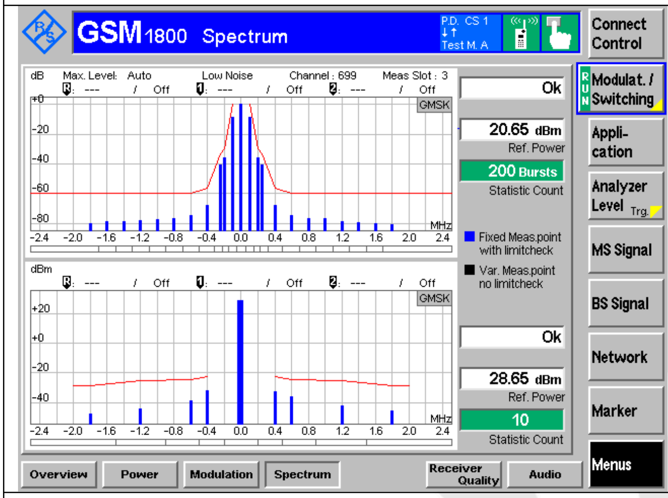


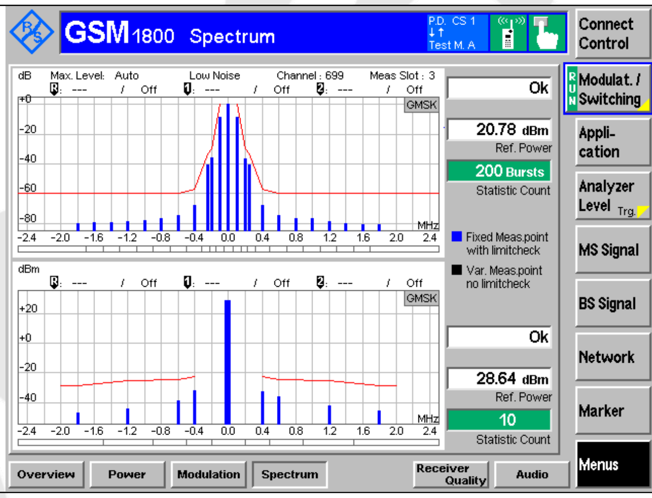
GPRS1800, Mid Channel, normal



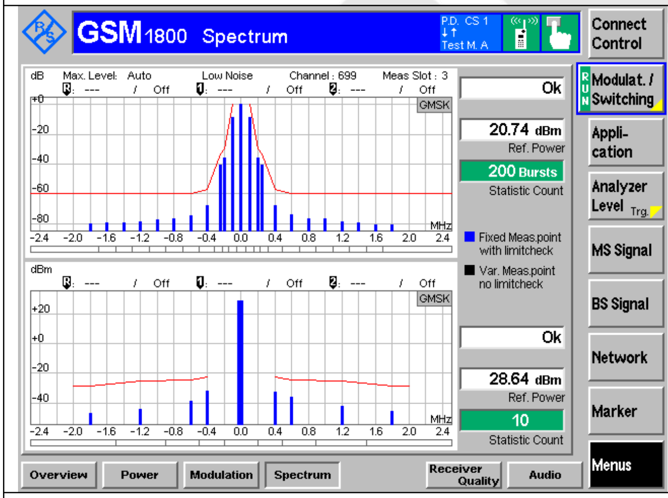
GPRS1800, Mid Channel, TL/VL



GPRS1800, Mid Channel, TL/VH



GPRS1800, Mid Channel, TH/VL



GPRS1800, Mid Channel, TH/VH

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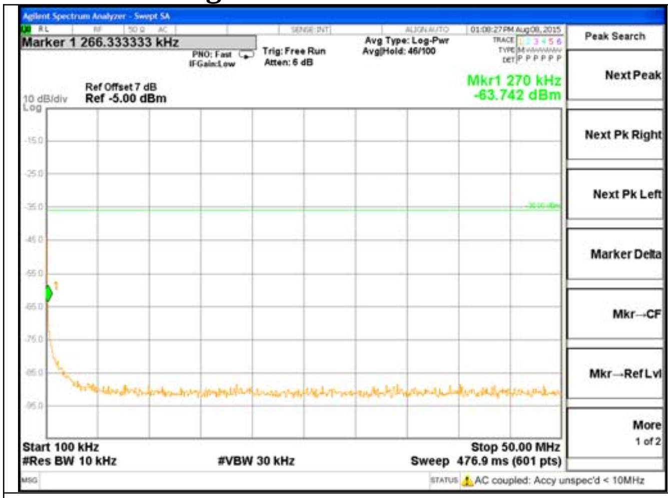
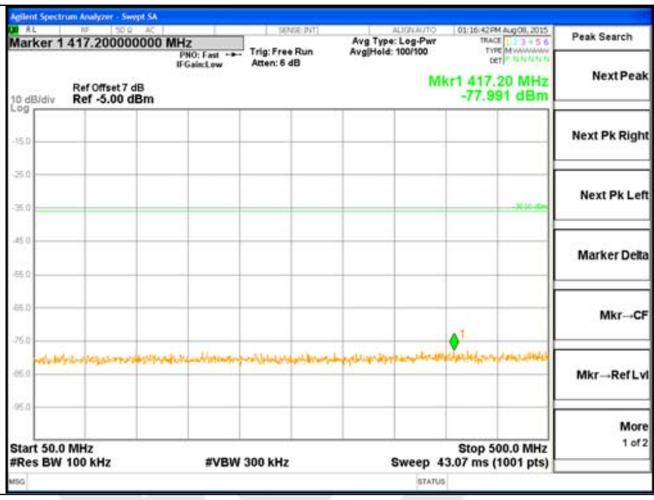
CONDUCTED SPURIOUS EMISSION - MS ALLOCATED A CHANNEL

GPRS900

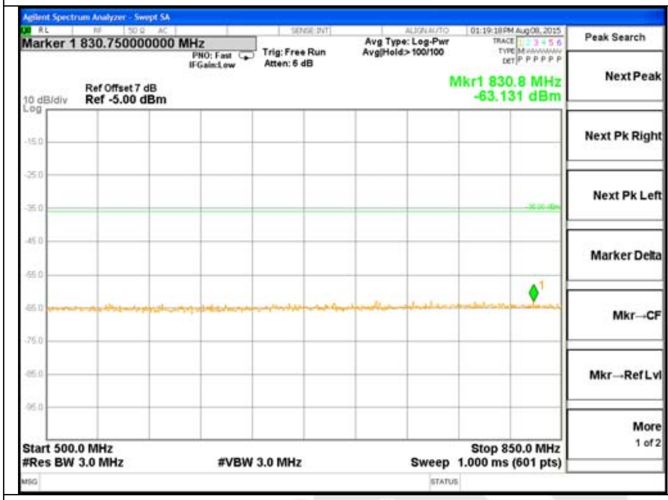
Normal Voltage Condition at Middle Channel



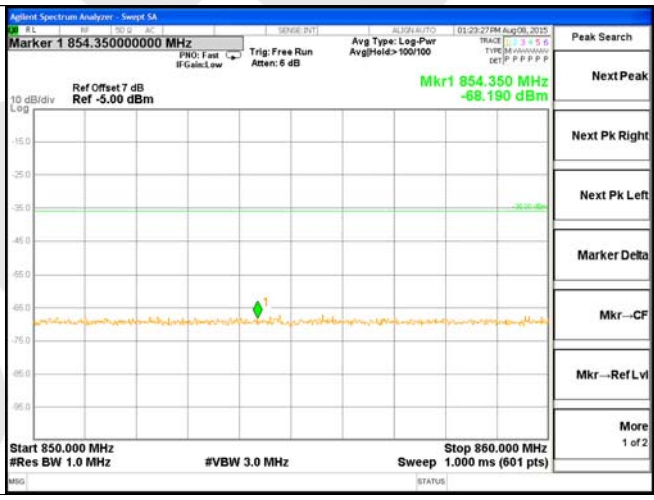
100kHz-50MHz



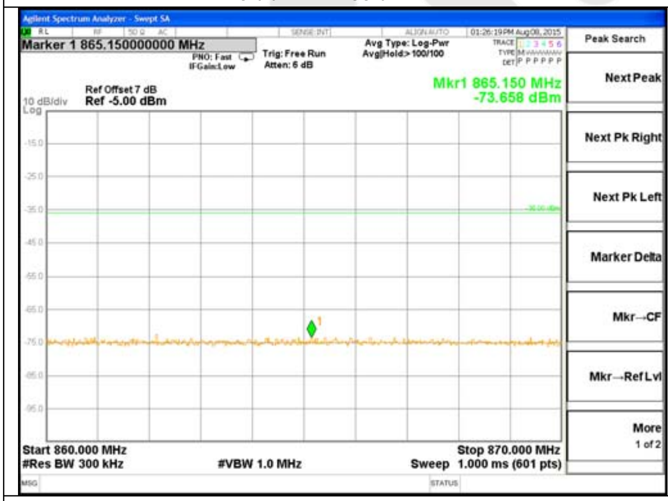
50MHz-500MHz



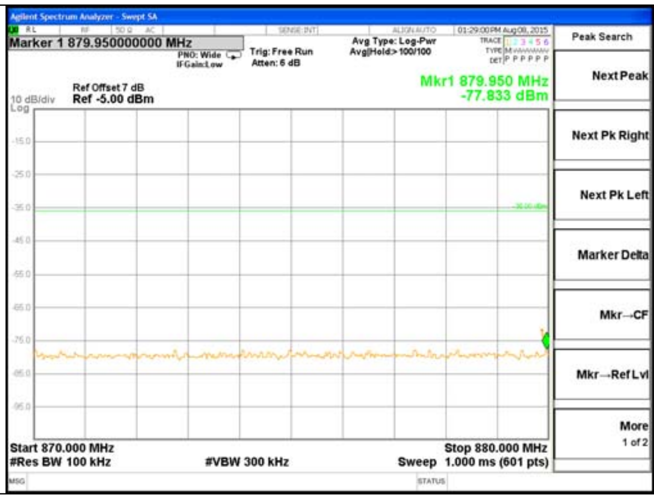
500MHz-850MHz



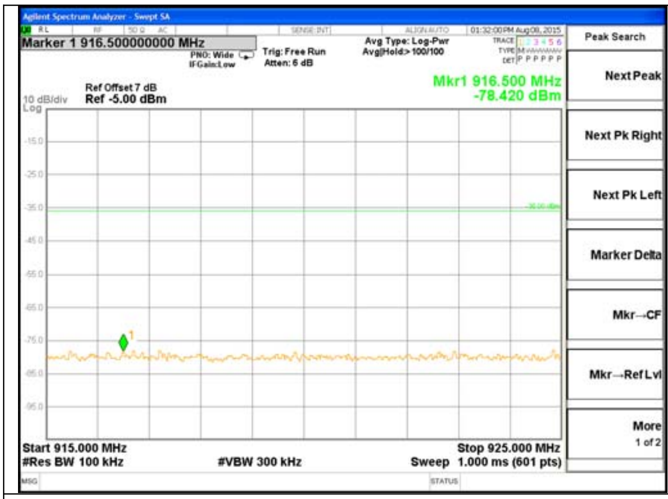
850MHz-860MHz



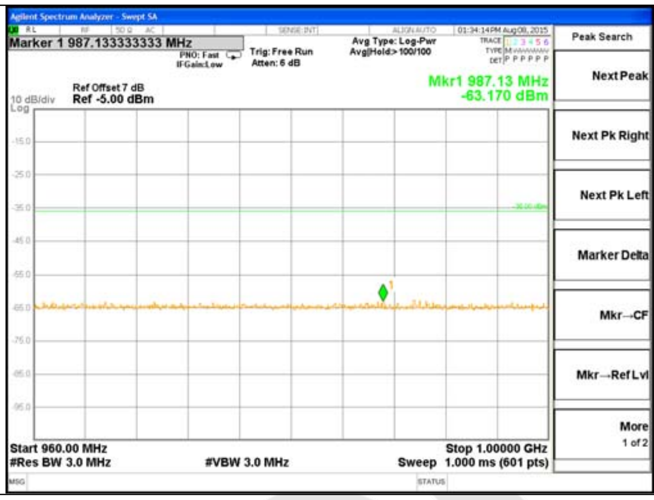
860MHz-870MHz



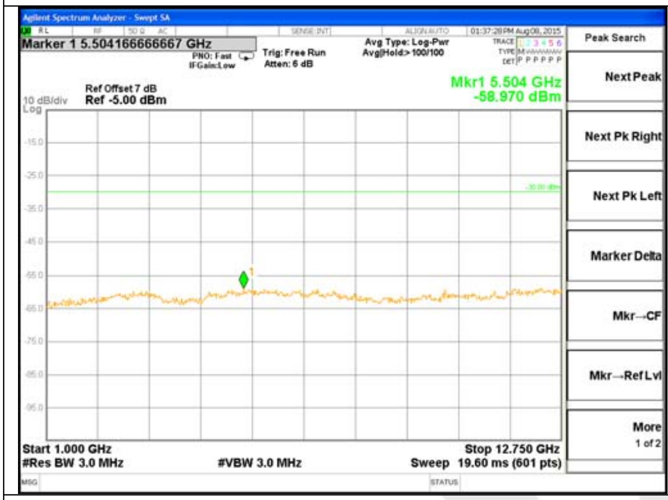
870MHz-880MHz



915MHz-925MHz



960MHz-1GHz



1GHz-12.75GHz

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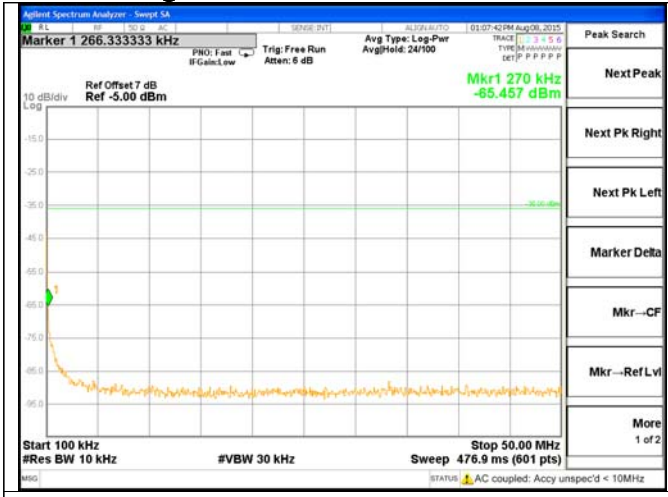
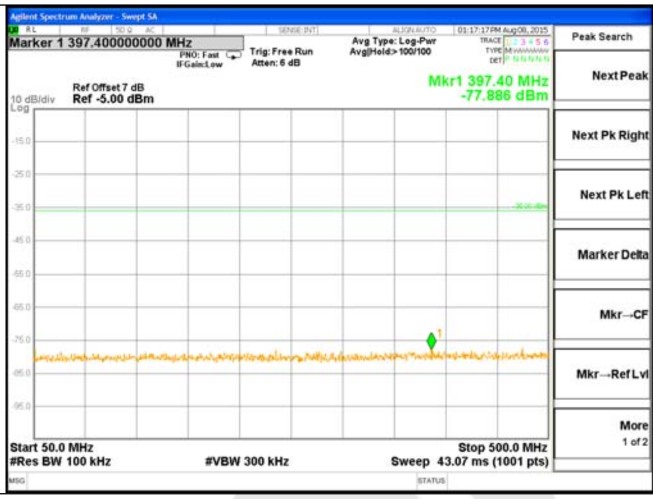
GPRS900

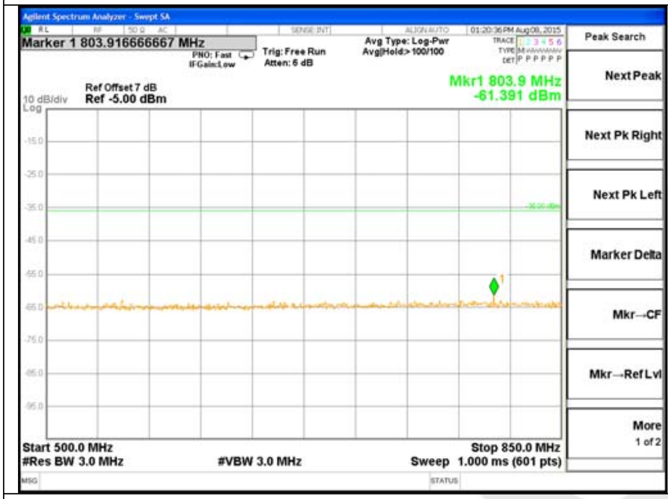
Low Voltage Condition at Middle Channel



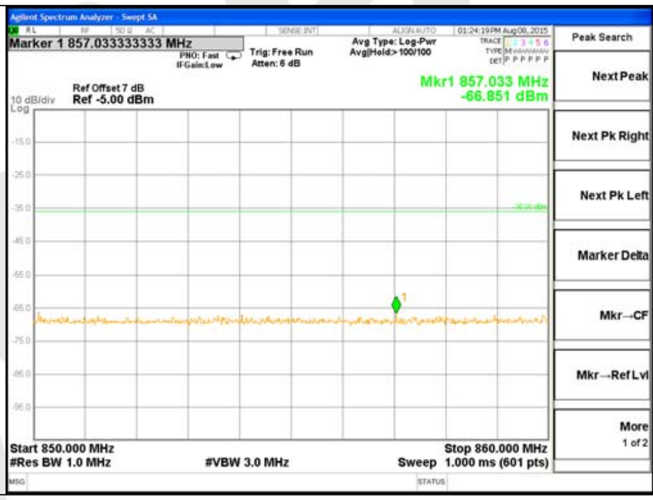
100kHz-50MHz



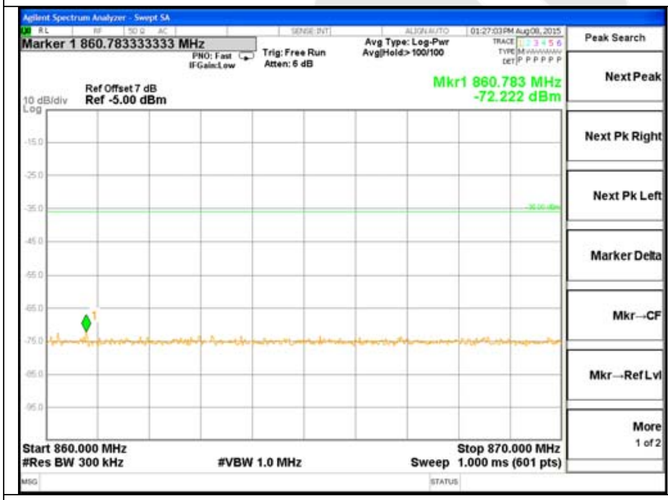
50MHz-500MHz



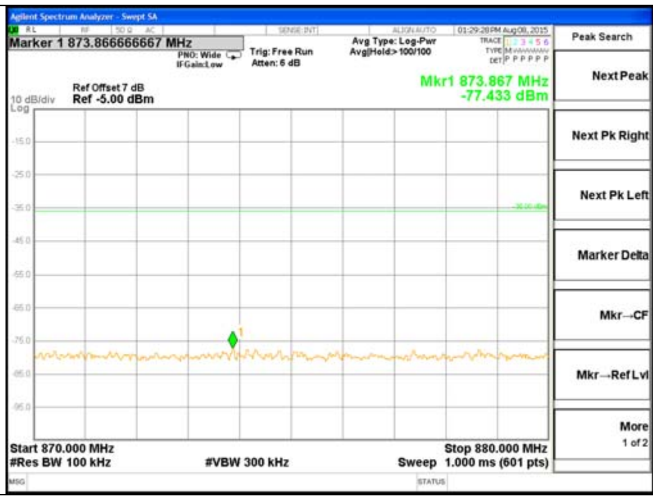
500MHz-850MHz



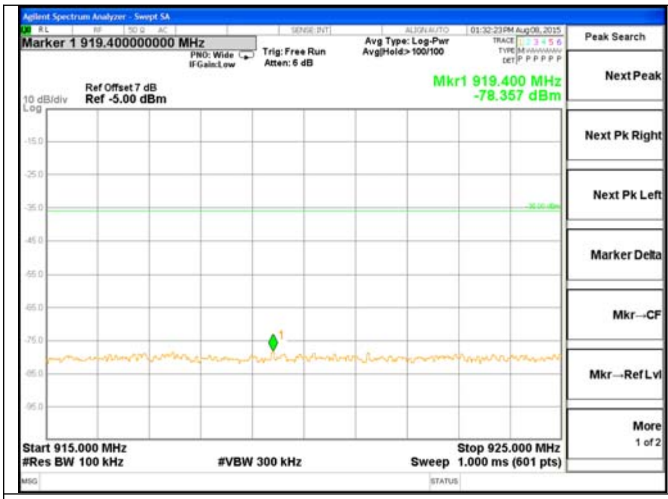
850MHz-860MHz



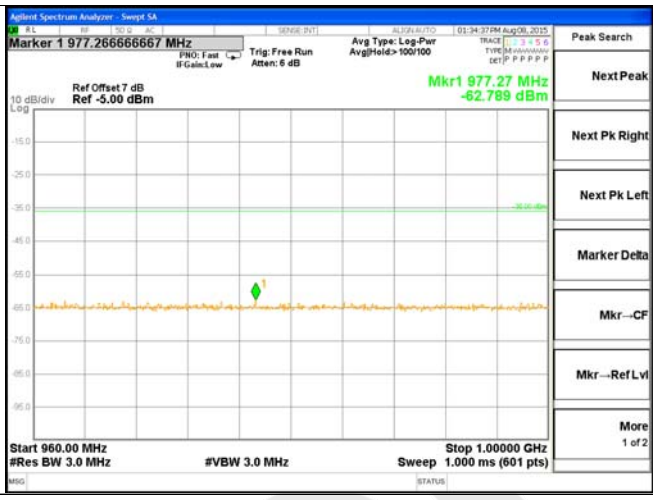
860MHz-870MHz



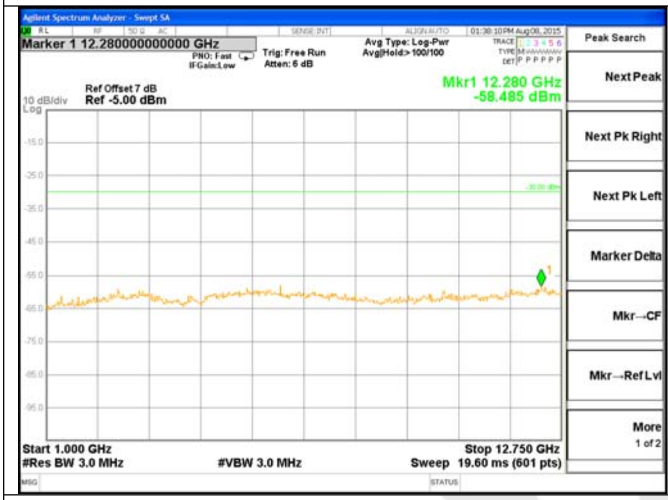
870MHz-880MHz



915MHz-925MHz



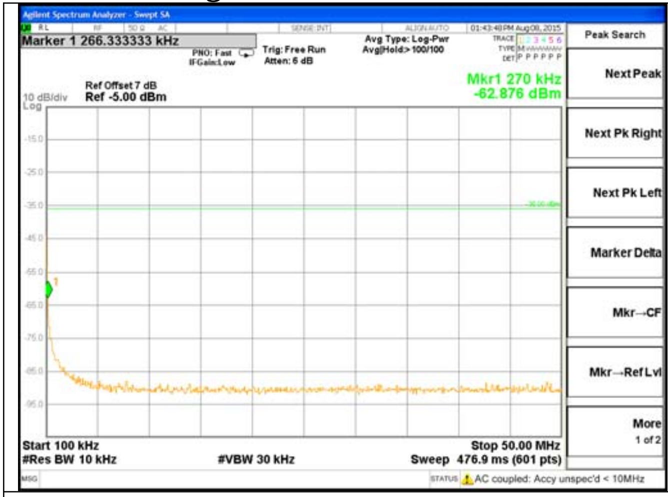
960MHz-1GHz



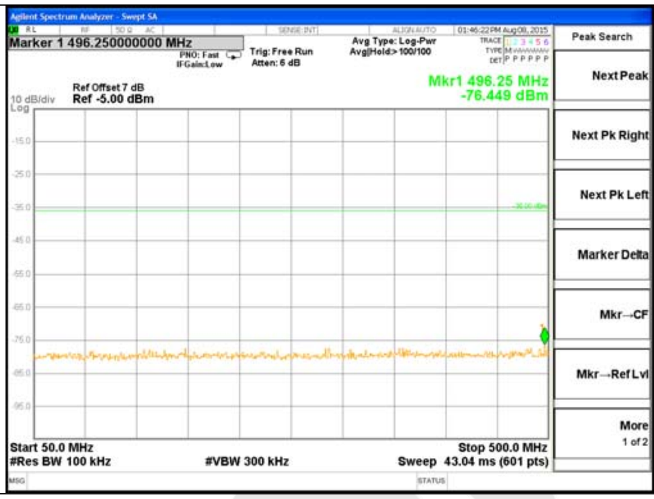
1GHz-12.75GHz

GPRS1800

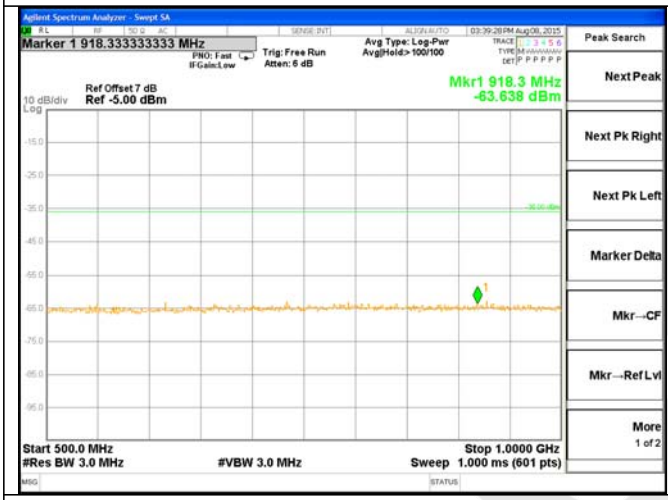
Normal Voltage Condition at Middle Channel



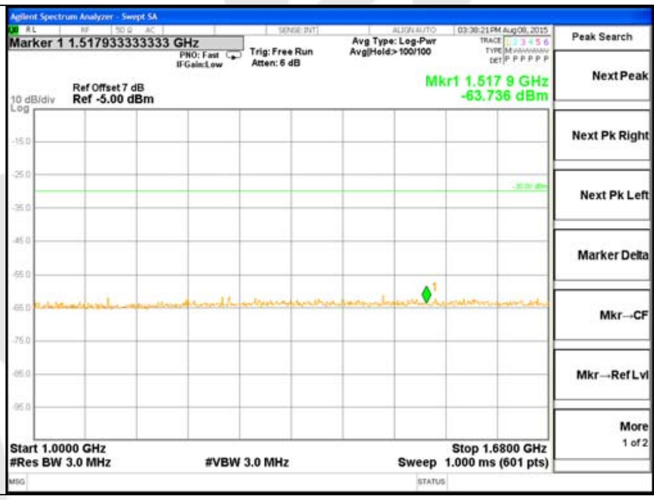
100kHz-50MHz



50MHz-500MHz

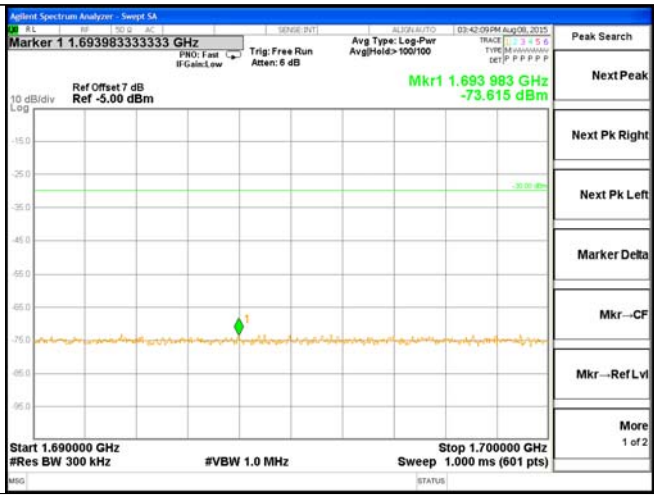


500MHz-1GHz

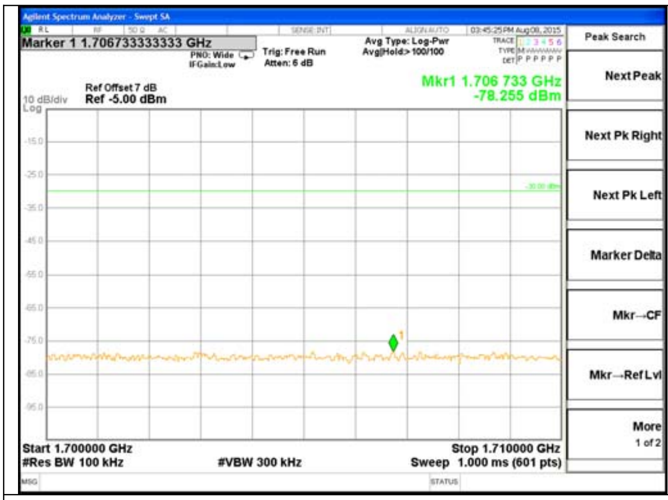
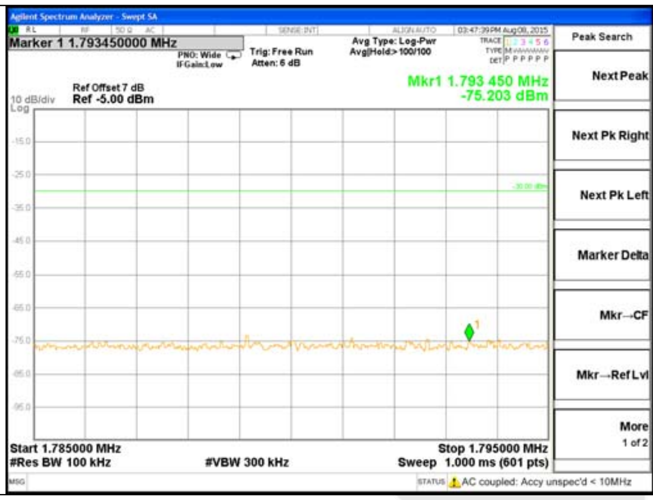
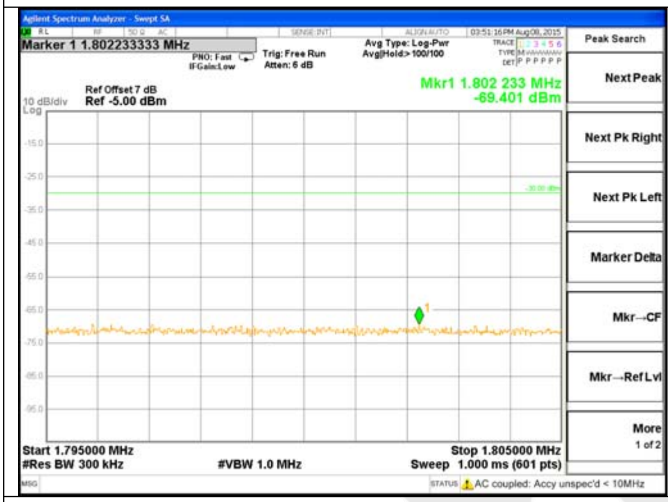
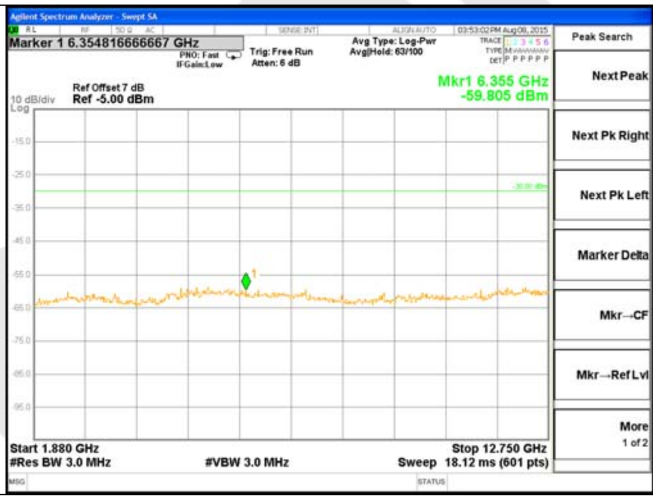


1GHz-1.68GHz

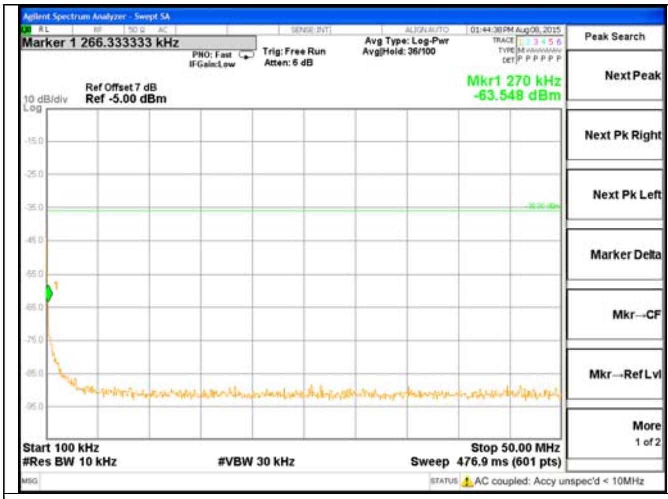
1.68GHz-1.69GHz



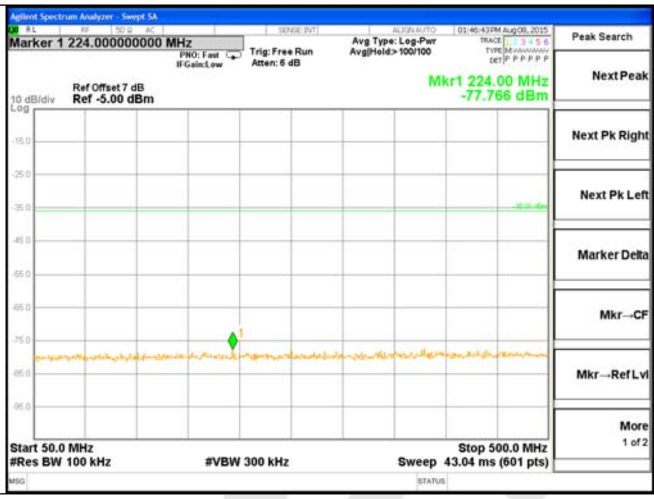
1.69GHz-1.7GHz

	
1.7GHz-1.71GHz	1.785GHz-1.795GHz
	
1.795GHz-1.805GHz	1.88GHz-12.75GHz

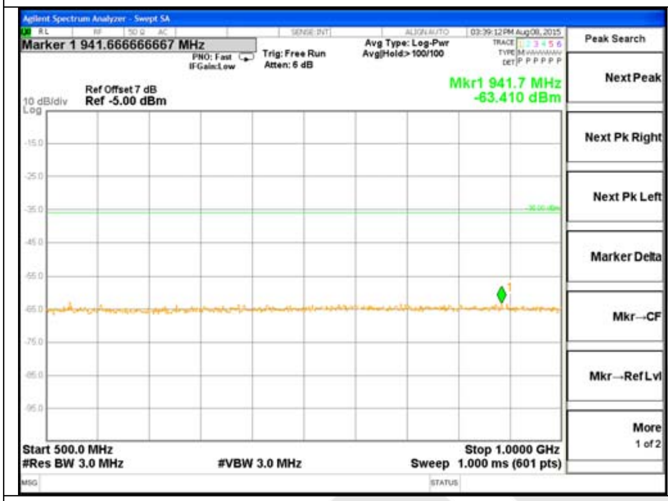
GPRS1800
Low Extreme Voltage Condition at Middle Channel



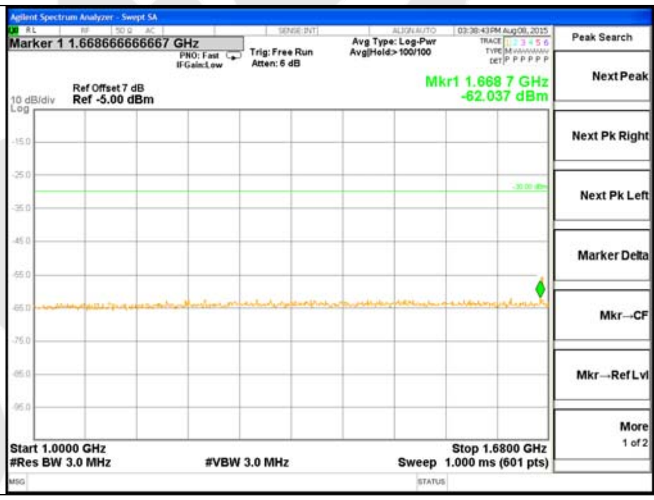
100kHz-50MHz



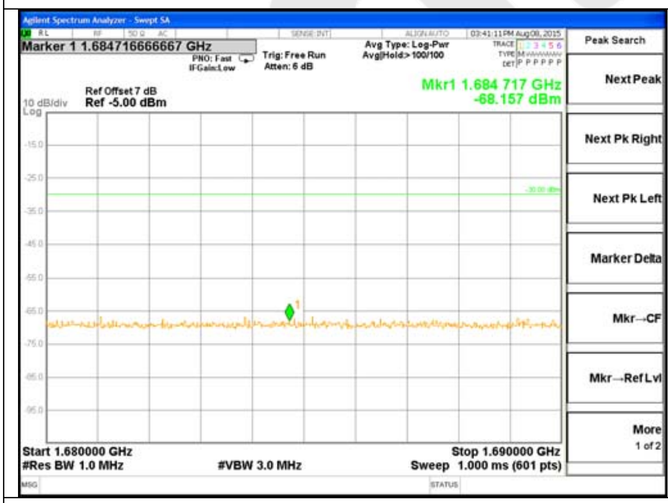
50MHz-500MHz



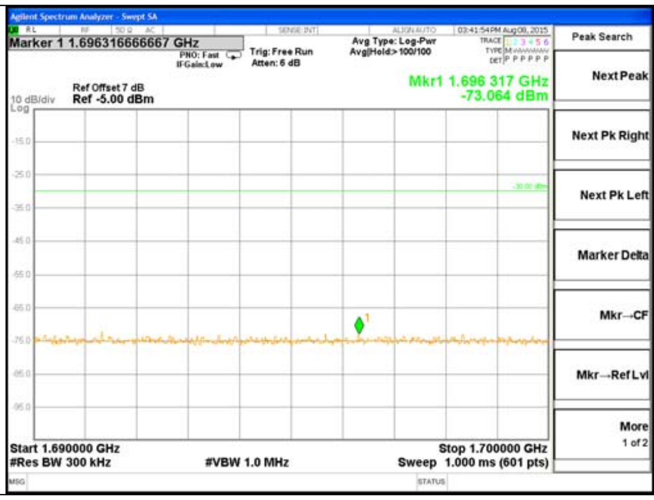
500MHz-1GHz



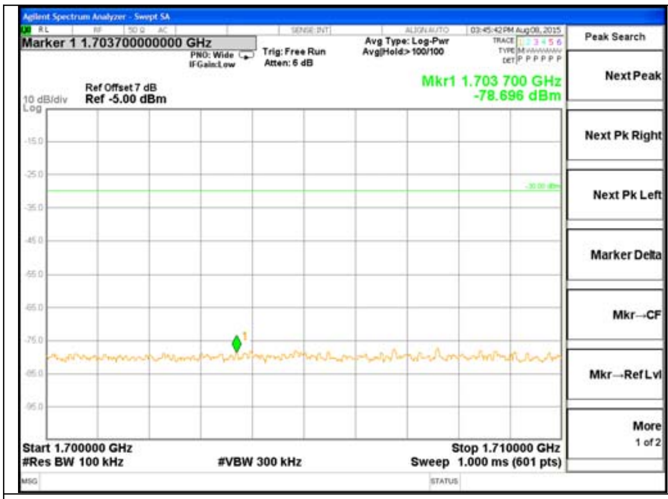
1GHz-1.68GHz



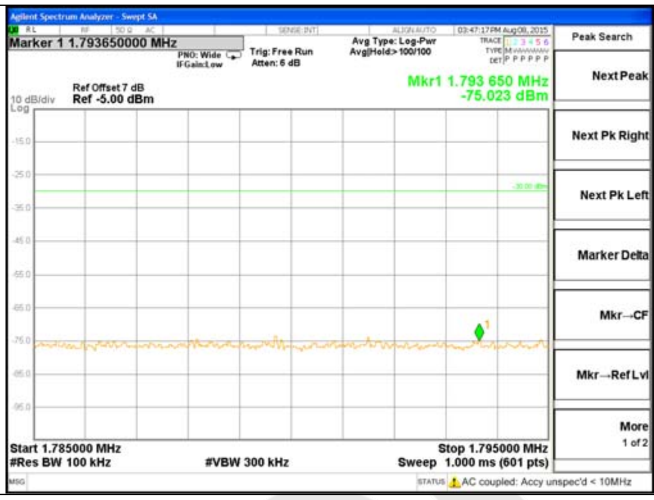
1.68GHz-1.69GHz



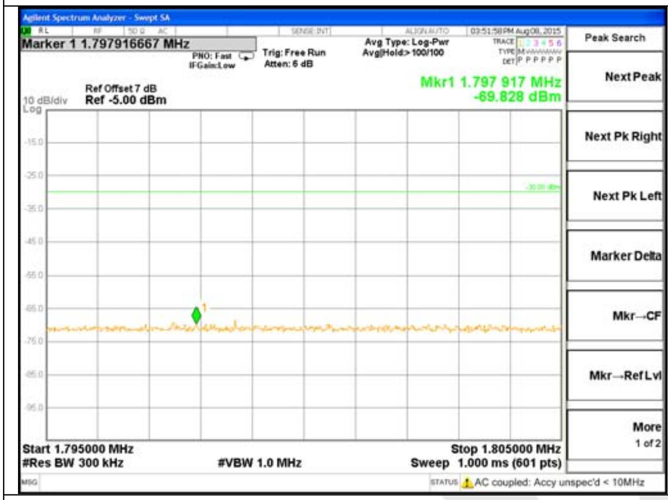
1.69GHz-1.7GHz



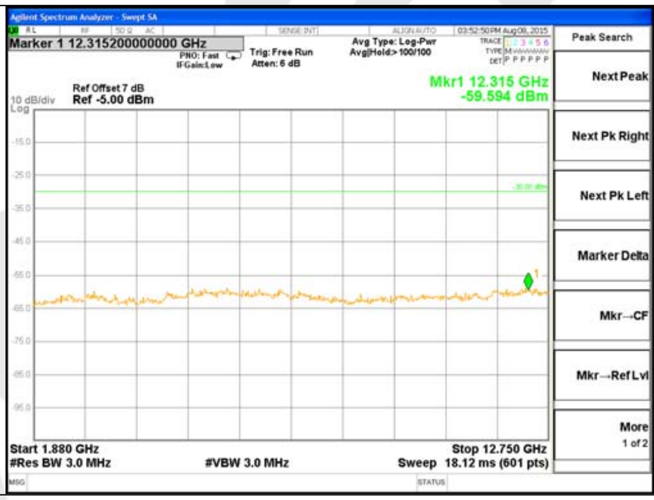
1.7GHz-1.71GHz



1.785GHz-1.795GHz



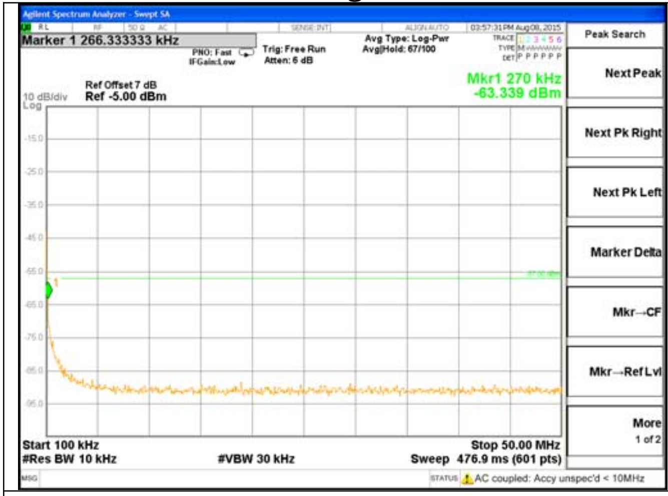
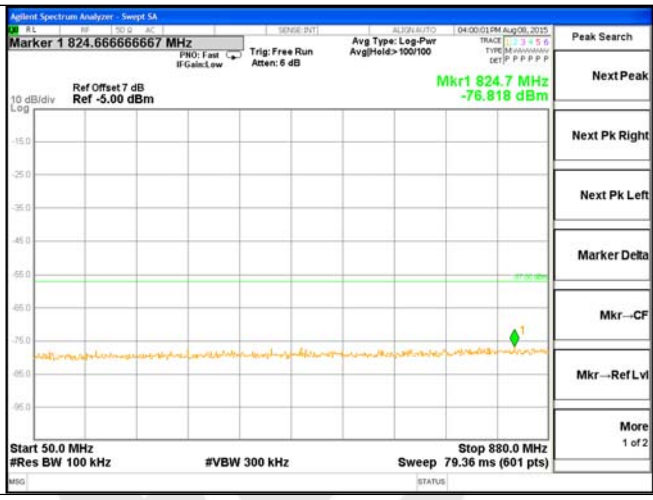
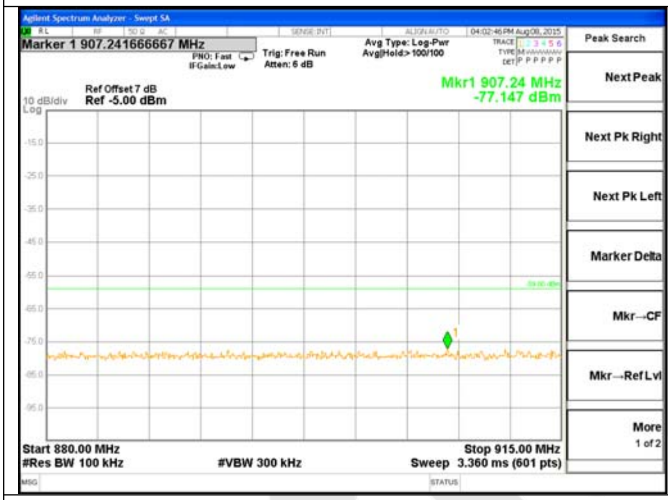
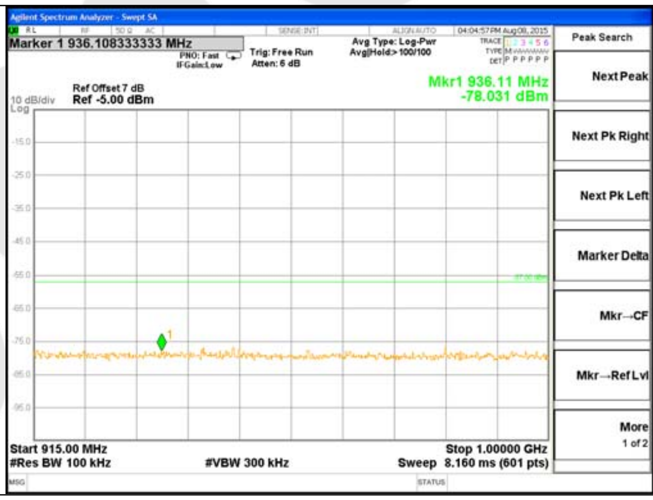
1.795GHz-1.805GHz

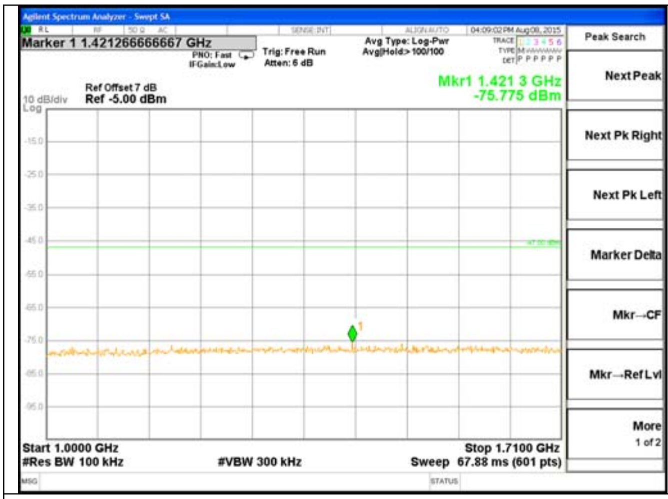


1.88GHz-12.75GHz

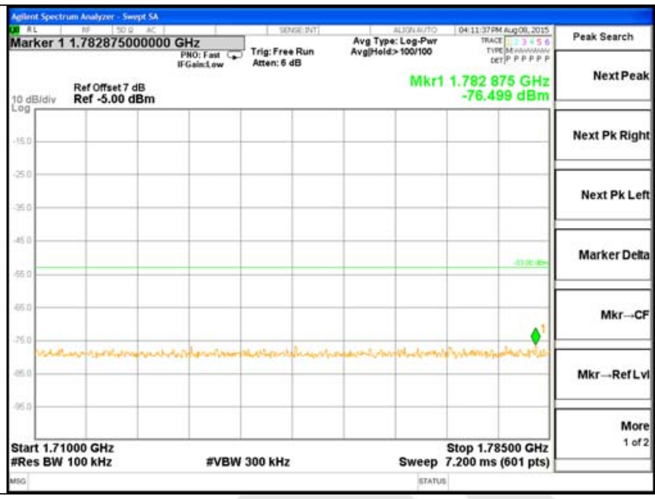
MS IN IDLE MODE

Test Plots
GPRS900 Normal Voltage Condition at Middle Channel

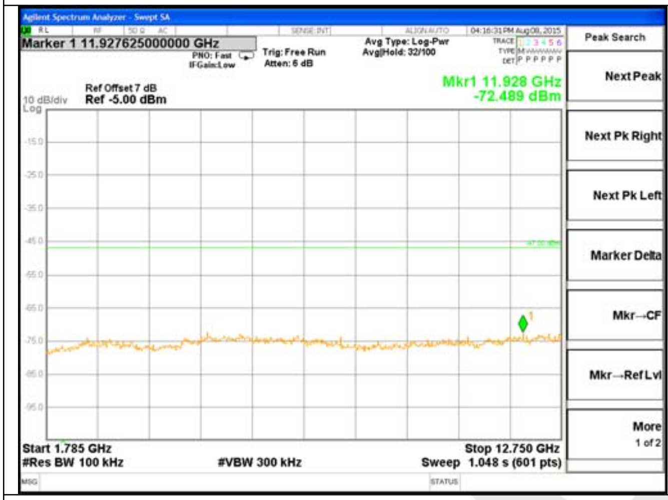
	
100kHz-50MHz	50MHz-880MHz
	
880MHz-915MHz	915MHz-1 GHz



1 GHz-1.71GHz



1.71GHz-1.785GHz



1.785GHz-12.75GHz

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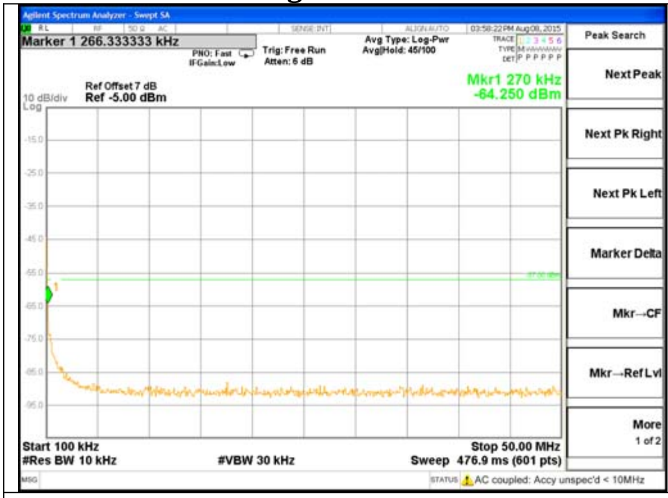
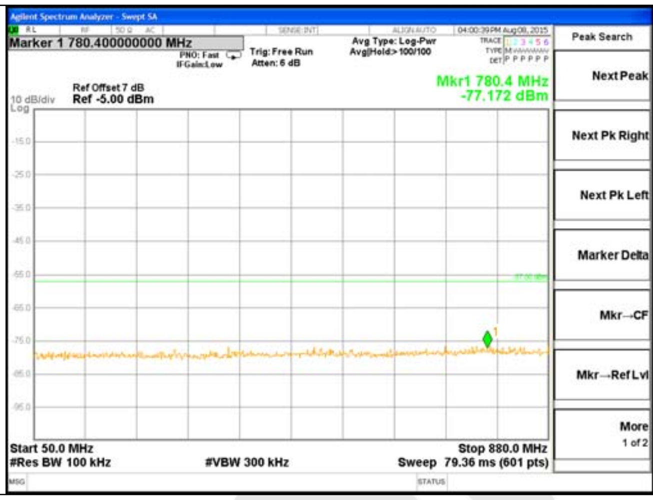
GPRS900

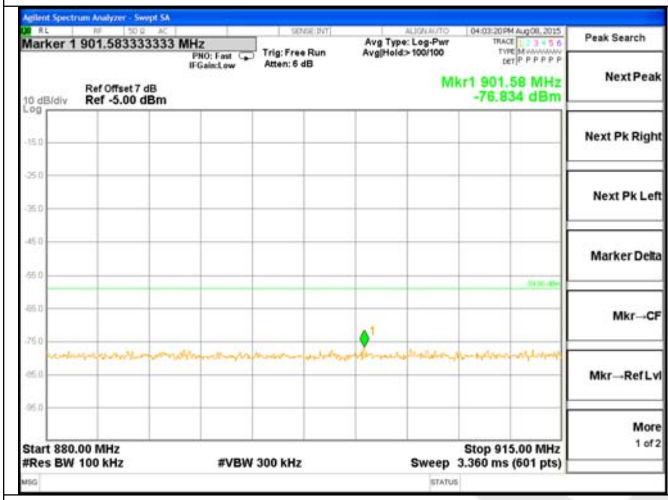
Low Extreme Voltage Condition at Middle Channel



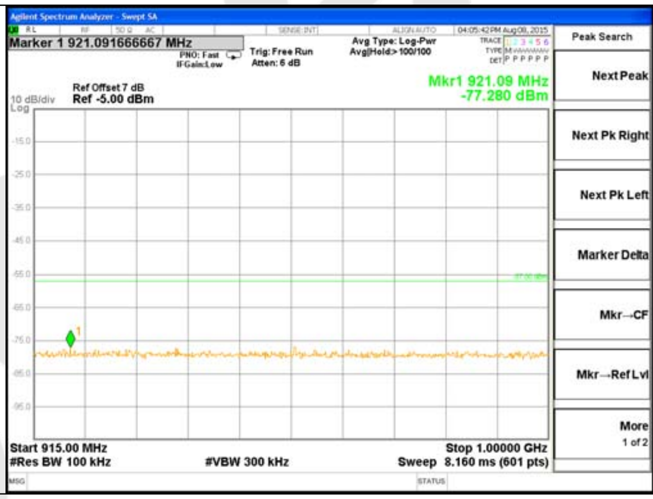
100kHz-50MHz



50MHz-880MHz



880MHz-915MHz



915MHz-1 GHz

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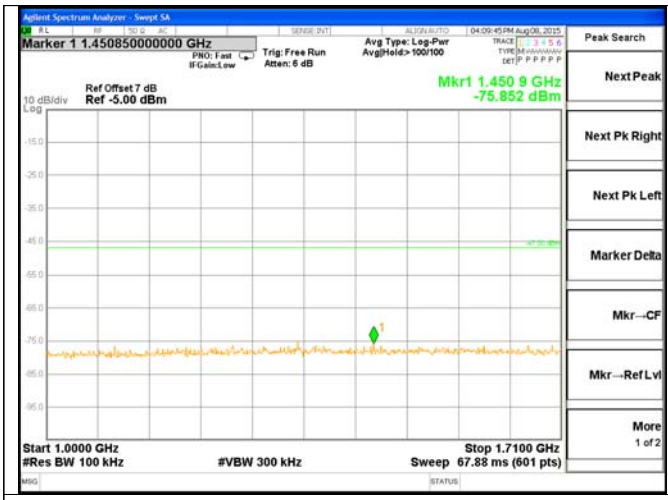
<td>
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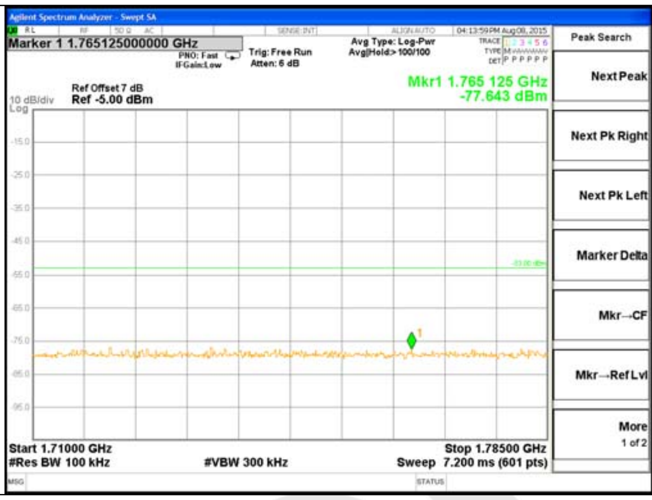
<td>
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<tr>
<td>1 GHz-1.71GHz</td>
<td>1.71GHz-1.785GHz</td>
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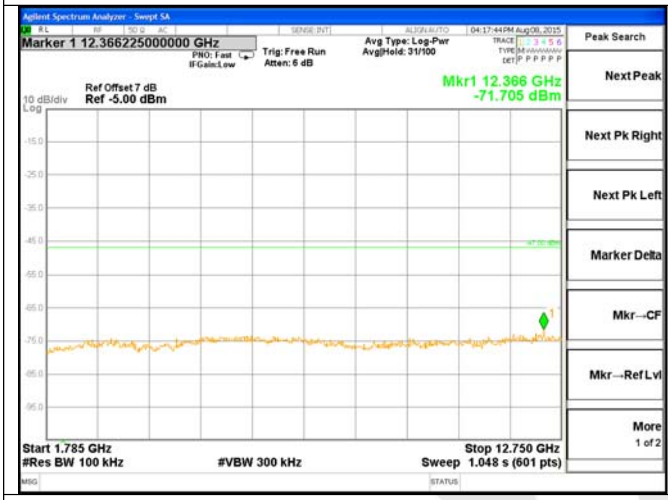
<td>
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<td>1.785GHz-12.75GHz</td>
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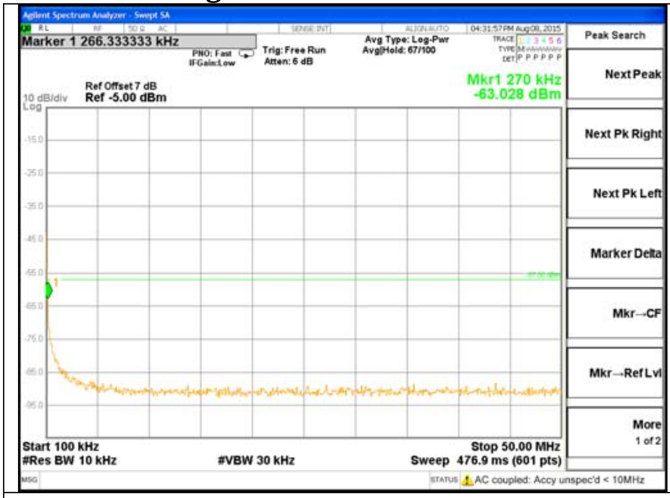
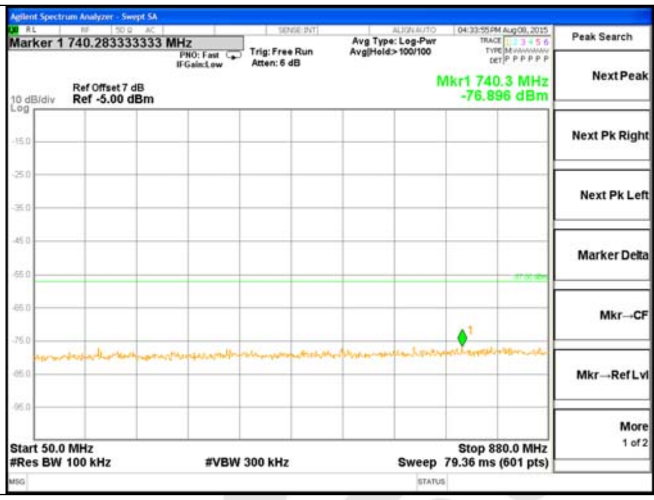
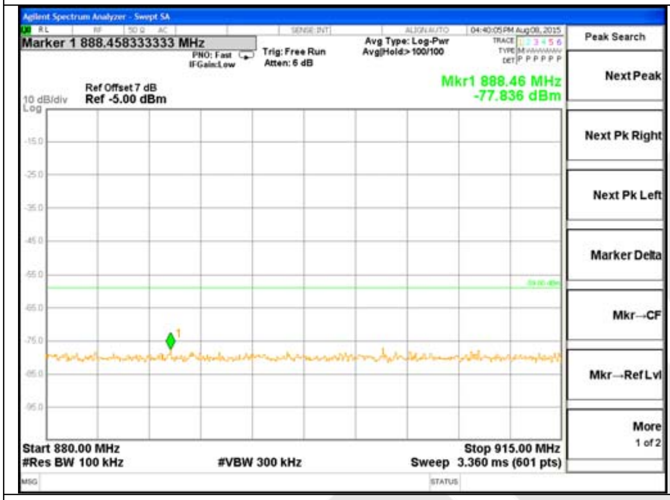
GPRS1800
Normal Voltage Condition at Middle Channel



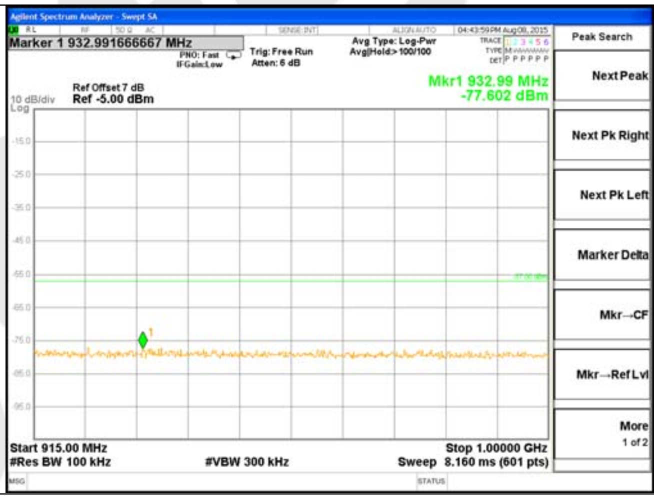
100kHz-50MHz



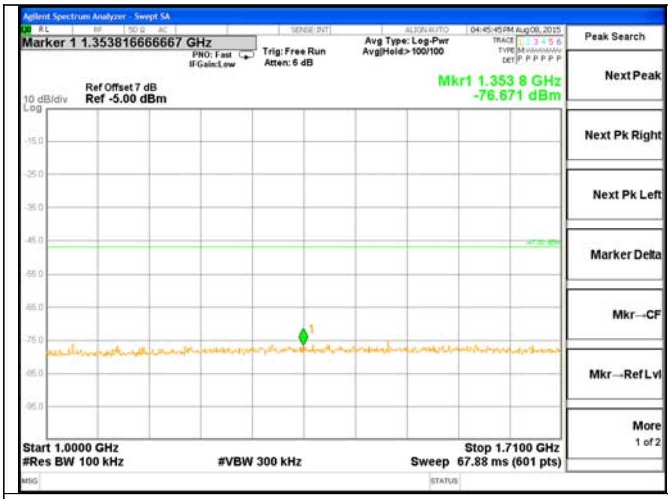
50MHz-880MHz



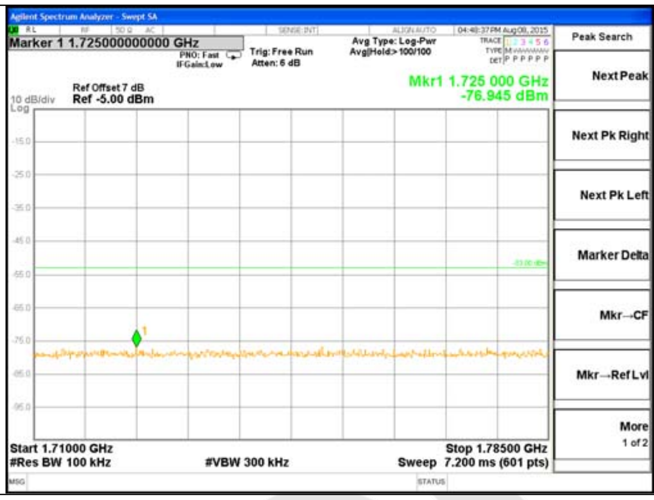
880MHz-915MHz



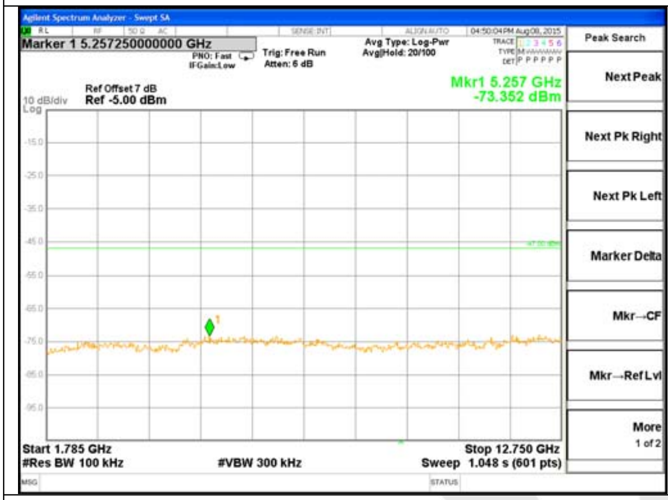
915MHz-1 GHz



1 GHz-1.71GHz



1.71GHz-1.785GHz



1.785GHz-12.75GHz

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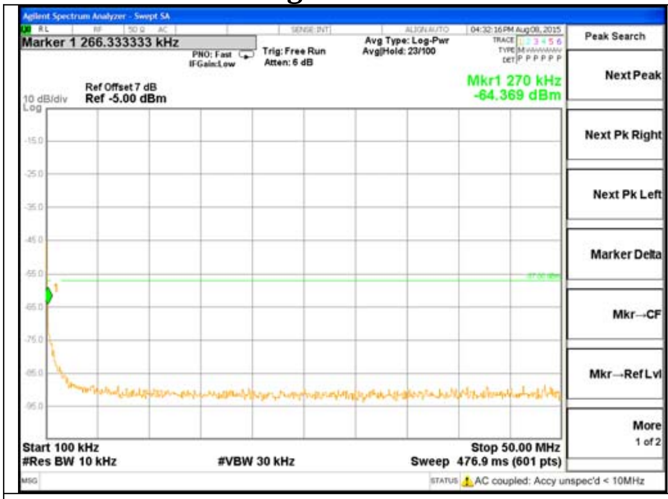
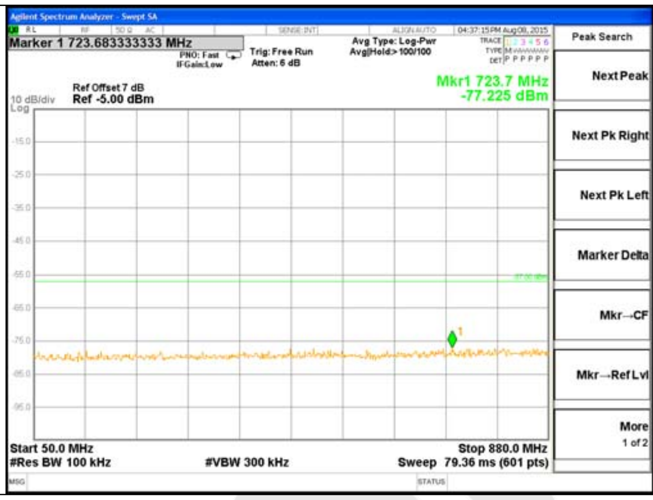
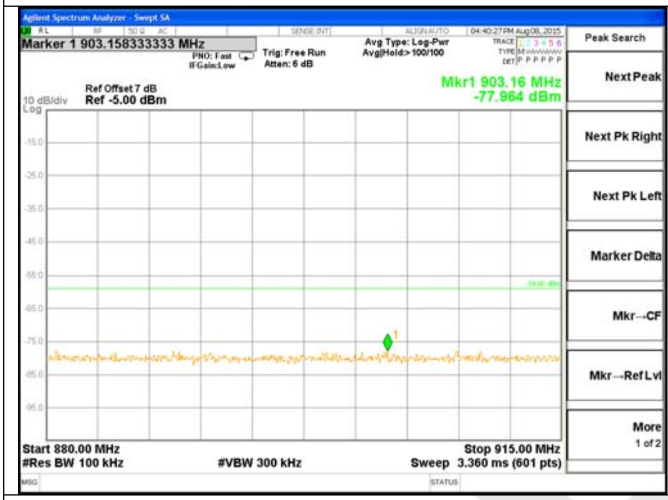
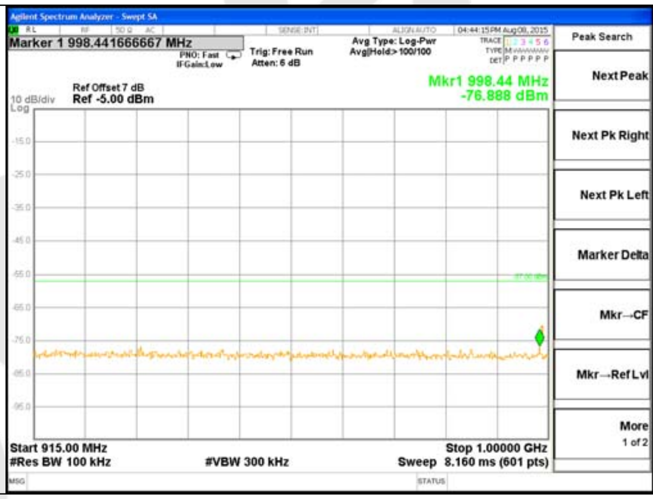
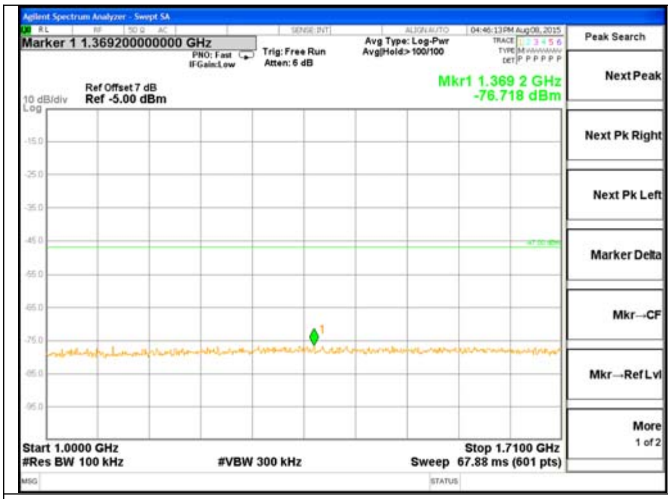
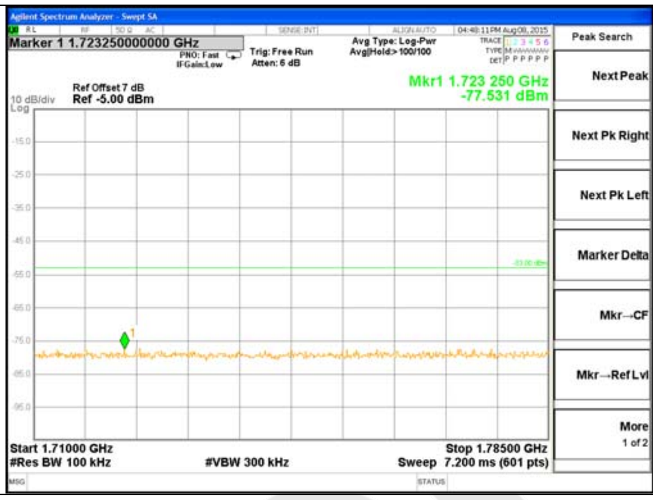
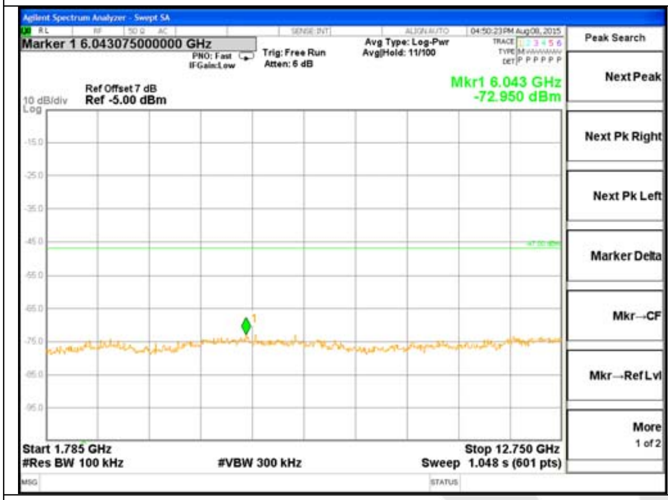
GPRS1800

Low Extreme Voltage Condition at Middle Channel

	
100kHz-50MHz	50MHz-880MHz
	
880MHz-915MHz	915MHz-1 GHz

	
1 GHz-1.71GHz	1.71GHz-1.785GHz
	/
1.785GHz-12.75GHz	/

RADIATED SPURIOUS EMISSIONS

MS ALLOCATED A CHANNEL

Below 1GHz

EUT: GPRS900 mode

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
204.5	-55.94	V	4.1	0.18	-52.02	-36	-16.02
326.3	-57.29	H	6.4	0.26	-51.15	-36	-15.15
469.8	-58.04	V	6.4	0.29	-51.93	-36	-15.93
617.5	-59.31	H	7.1	0.38	-52.59	-36	-16.59

EUT: GPRS1800 mode

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
204.7	-56.99	V	4.1	0.18	-53.07	-36	-17.07
327.1	-56.94	H	6.4	0.26	-50.80	-36	-14.80
468.8	-57.03	V	6.4	0.29	-50.92	-36	-14.92
618.2	-58.22	H	7.1	0.38	-51.50	-36	-15.50

Note:

1. The emission behaviour belongs to narrowband spurious emission.

2.Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

Above 1GHz

EUT: GPRS900 mode

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1804.8	-51.02	V	7.9	0.72	-43.84	-30	-13.84
2707.2	-52.33	V	9.12	0.86	-44.07	-30	-14.07
3609.6	-53.69	V	10.09	0.97	-44.57	-30	-14.57
1804.8	-50.74	H	7.9	0.72	-43.56	-30	-13.56
2707.2	-53.59	H	9.12	0.86	-45.33	-30	-15.33
3609.6	-54.07	H	10.09	0.97	-44.95	-30	-14.95

EUT: GPRS1800 mode

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
3495.2	-53.92	V	10.09	0.96	-44.79	-30	-14.79
1652.8	-56.07	V	7.95	0.67	-48.79	-30	-18.79
3495.2	-52.88	H	10.09	0.96	-43.75	-30	-13.75
1595.5	-55.49	H	7.95	0.67	-48.21	-30	-18.21

Note: *No more emissions were found for the succeeding harmonics only noise floor.*

RADIATED SPURIOUS EMISSIONS-MS IN IDLE MODE

The Spurious Emission was checked. No emissions were found and only noise floor.

APPENDIX II (TEST PHOTOGRAPHS)