RADIO TEST REPORT
ETSI EN 301 511 V12.5.1 (2017-03)

for

Sonoff GSM/GPRS Smart Switch

MODEL: Sonoff G1
Sonoff G2, Sonoff G12, Sonoff G14,
Sonoff G16, Sonoff G18, Sonoff G22, Sonoff G24,
Sonoff G26, Sonoff G28

Trademark: SONOFF

Test Report Number: BCTC-FY170603852-4E

Issued Date: Jul. 19, 2017

Issued for

ITEAD Intelligent Systems Co., Ltd

5F, Building A, Yuxing Multiple-use Building, Huaya Industrial Park, Jihua Road., Longhua Dist, Shenzhen, GD, 518000, China

Issued for

Shenzhen BCTC Testing Co., Ltd.

BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China

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TEST RESULT CERTIFICATION

Applicant's name	:	**ITEAD Intelligent Systems Co., Ltd**
Address	:	5F, Building A, Yuxing Multiple-use Building, Huaya Industrial Park, Jihua Road., Longhua Dist, Shenzhen, GD, 518000, China
Manufacture's Name	:	**ITEAD Intelligent Systems Co., Ltd**
Address	:	5F, Building A, Yuxing Multiple-use Building, Huaya Industrial Park, Jihua Road., Longhua Dist, Shenzhen, GD, 518000, China

Product description

Product name	:	Sonoff GSM/GPRS Smart Switch
Trademark	:	SONOFF
Model and/or type reference	:	Sonoff G1
Serial Model	:	Sonoff G2, Sonoff G12, Sonoff G14, Sonoff G16, Sonoff G18, Sonoff G22, Sonoff G24, Sonoff G26, Sonoff G28
Standards	:	ETSI EN 301 511 V12.5.1 (2017-03)

This device described above has been tested by Shenzhen BCTC Testing Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with 2014/53/EU RED Directive Art.3.2 requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test	:	
Date (s) of performance of tests	:	Jul. 14 - Jul. 19, 2017
Date of Issue	:	Jul. 19, 2017
Test Result	:	**Pass**

Prepared by(Engineer):	Sky Huang	Sky Huang
Reviewer(Supervisor):	Jade Yang	Jade Yang
Approved(Manager):	Carson Zhang	Carson Zhang

This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen BCTC Testing Co., Ltd.

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1. SUMMARY OF TEST RESULTS

Leading Reference Documents For Testing:

No.	Identity	Document Title
1	ETSI EN 301 511 V12.5.1 (2017-03)	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 RED directive (2014/53/EU)

Specific Reference Documents For Testing:

No.	Identity	Document Title
2	ETSI TS 151 010-1 V9.5.0 (2011-08)	Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP TS 51.010-1 version 9.5.0 Release 9)

1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.
Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
CNAS Registration No.:L6046

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Sonoff GSM/GPRS Smart Switch
Trademark	SONOFF
Model Name	Sonoff G1
Serial Model	Sonoff G2, Sonoff G12, Sonoff G14, Sonoff G16, Sonoff G18, Sonoff G22, Sonoff G24, Sonoff G26, Sonoff G28
Frequency Range	GSM 900/1800Mhz
Modulation Mode:	GSM / DCS: GMSK
Power Class:	GSM900: 4, GSM1800: 1
Multislot Class:	GPRS: Class12
Operating Voltage	90V~250V AC 50Hz-60Hz 3000W 16A
Antenna:	Internal antenna
Hard Ware Version	N/A
Soft Ware Version	N/A

2.2 LIST OF TEST EQUIPMENTS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	160400005	2016.08.25	2017.08.24	1 year
2	Test Receiver	R&S	ESPI	101318	2016.08.25	2017.08.24	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2016.08.25	2017.08.24	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.08.25	2017.08.24	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.08.25	2017.08.24	1 year
6	Horn Antenna	EM	EM-AH-20180	2011071402	2016.08.25	2017.08.24	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.08.25	2017.08.24	1 year
8	Amplifier	EM	EM-30180	060538	2016.08.25	2017.08.24	1 year
9	Loop Antenna	ARA	PLA-2030/B	1029	2016.08.25	2017.08.24	1 year
10	Power Meter	R&S	NRVS	100696	2016.08.25	2017.08.24	1 year
11	Signal Generator	R&S	SMT 06	832080/007	2016.08.25	2017.08.24	1 year
12	Temperature & Humitidy Chamber	GIANT FORCE	GTH-056P	GF-94454-1	2016.08.25	2017.08.24	1 year
13	Power Sensor (AV)	R&S	URV5-Z4	0395.1619.05	2016.08.25	2017.08.24	1 year
14	Unversal radio communication tester	R&S	CMU200	1100.008.02	2016.08.25	2017.08.24	1 year
15	Power Splitter	HP	11636A	05914	2016.08.25	2017.08.24	1 year
16	RF Communication Test	HP	8920B	--	2016.08.25	2017.08.24	1 year
17	Wireless Communication Test	Agilent	E5515C	--	2016.08.25	2017.08.24	1 year

2.3 TYPE OF MOBILE STATION AND ADDITIONAL INFORMATION

Table A.2: Type of Mobile Station (Re. ETSI EN 301 511 Annex A)

Item	Type of Mobile Station	Support	Mnemonic
1	HSCSD Multislot MS	NO	Type_HSCSD_Multislot
2	R-GSM MS	NO	Type_R-GSM
3	Support of GPRS Multislot class on the uplink	YES	Type_GPRS_Multislot_uplink
4	EGPRS	NO	Type_EGPRS
5	EGPRS capable of 8PSK in Uplink, of all Multislot classes	NO	Type_EGPRS_8PSK_uplink

Type A.3: Additional information (Re. ETSI EN 301 511 Annex A)

Item	Additional Information	Support	Mnemonic
1	Telephony.	YES	TSPC_Serv_TS11
2	Permanent Antenna Connector	YES	TSPC_AddInfo_PermAntenna

2.4 TEST ENVIRONMENT/CONDITIONS

Normal Temperature (NT):	20 ... 25 °C
Relative Humidity:	30 ... 75 %
Air Pressure:	980 ... 1020 hPa
Extreme Temperature:	Low Temperature (LT) = -10°C High Temperature (HT) = 55°C
Extreme Voltage of the EUT (Declared by manufacturer):	Normal Voltage (NV) = 3.7V Low Voltage (LV) = 3.33V High Voltage (HV) = 4.07V

Note: The High Voltage 3.33V and Low Voltage 4.07V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage. The High temperature and Low temperature was declared by manufacturer

3. SUMMARY OF TEST REPORT

EN 301 511V9.0.2	Description of Test	Result
Section 4.2.1	Transmitter – Frequency error and phase error	PASS
Section 4.2.2	Transmitter – Frequency error under multi path and interference conditions	N/A
Section 4.2.3	Transmitter – Frequency error and Phase Error in HSCSD Multi slot Configuration	N/A
Section 4.2.4	Frequency error and phase error in GPRS multi slot configuration	PASS
Section 4.2.5	Transmitter output power and burst timing	PASS
Section 4.2.6	Transmitter – Output RF spectrum	PASS
Section 4.2.7	Transmitter output power and burst timing in HSCSD multi slot configuration	N/A
Section 4.2.8	Transmitter – Output RF spectrum in HSCSD multi slot configuration	N/A
Section 4.2.9	Transmitter – Output RF spectrum for MS supporting the R-GSM frequency band	N/A
Section 4.2.10	Transmitter output power in GPRS multi slot configuration	PASS
Section 4.2.11	Output RF spectrum in GPRS multi slot configuration	PASS
Section 4.2.12	Conducted spurious emissions – MS allocated a channel	PASS
Section 4.2.13	Conducted spurious emission – MS in idle mode	PASS
Section 4.2.14	Conducted spurious emissions for MS supporting the R-GSM frequency band – MS allocated a channel	N/A
Section 4.2.15	Conducted spurious emissions for MS supporting the R-GSM frequency band – MS in idle mode	N/A
Section 4.2.16	Radiated spurious emissions – MS allocated a channel	PASS
Section 4.2.17	Radiated spurious emissions – MS in idle mode	PASS
Section 4.2.18	Radiated spurious emissions for MS supporting the R-GSM frequency band – MS allocated a channel	N/A
Section 4.2.19	Radiated spurious emissions for MS supporting the R-GSM frequency band – MS in idle mode	N/A
Section 4.2.20	Receiver blocking and spurious responses – speech channels	PASS
Section 4.2.21	Receiver blocking and spurious response – speech channels for MS supporting the R-GSM frequency band	N/A
Section 4.2.22	Frequency error and modulation accuracy in EGPRS configuration	N/A
Section 4.2.23	Frequency error under multi path and interference conditions in EGPRS configuration	N/A
Section 4.2.24	EGPRS Transmitter output power	N/A
Section 4.2.25	Output RF spectrum in EGPRS configuration	N/A
Section 4.2.26	Blocking and spurious response in EGPRS configuration	N/A

NOTE:
N/A Test not applicable
PASS EUT Pass this test case

3.1 TRANSMITTER – FREQUENCY ERROR AND PHASE ERROR

Standard Applicable

Clause 13.1 of TS 151 010-1 V9.5.0 (2011-08)applies.

Definition and applicability

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

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

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

Conformance requirements

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

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

Environmental Conditions

Temperature	25
Relative Humidity	56%
ATM Pressure	100.2kPa

Test Results: Pass.

Please refer to following tables.

TEST RESULT

Frequency error and phase error

GSM900(Middle channel)

0.1ppm means 90.2 Hz for frequency 902.0 MHz

GSM900	test condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase error (deg)		Limit (deg)	Result
Referency Frequency 902 (MHZ)	Normal	1	90.2	Pass	RMS	0.9	5	Pass
					Peak	2.4	20	Pass
	L.V.L.T.	3	90.2	Pass	RMS	1.0	5	Pass
					Peak	2.3	20	Pass
	L.V.H.T.	-2	90.2	Pass	RMS	1.2	5	Pass
					Peak	2.2	20	Pass
	H.V.L.T.	5	90.2	Pass	RMS	0.9	5	Pass
					Peak	2.5	20	Pass
	H.V.H.T	-3	90.2	Pass	RMS	1.1	5	Pass
					Peak	3.0	20	Pass
	Vibration(X)	10	90.2	Pass	RMS	1.5	5	Pass
					Peak	2.4	20	Pass
	Vibration(Y)	-39	90.2	Pass	RMS	1.6	5	Pass
					Peak	3.7	20	Pass
	Vibration(Z)	-32	90.2	Pass	RMS	0.9	5	Pass
					Peak	4.3	20	Pass

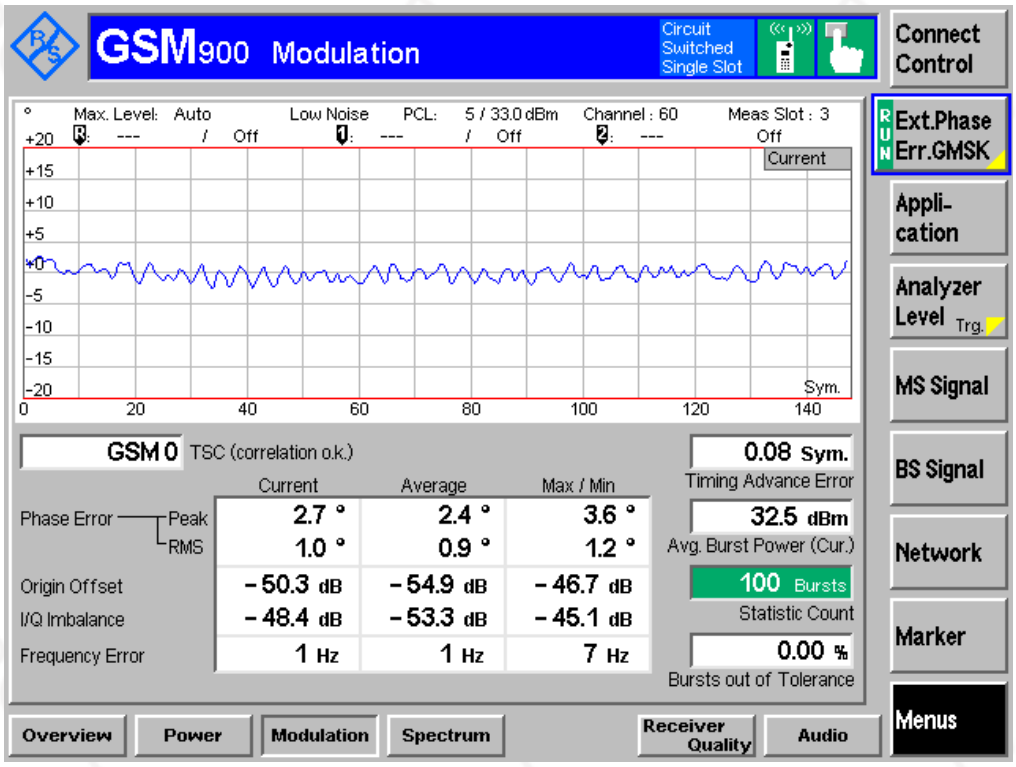
MS under maximum power control level

GSM900	test condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase error (deg)		Limit (deg)	Result
Referency Frequency 902 (MHZ)	Normal	13	90.2	Pass	RMS	0.8	5	Pass
					Peak	2.0	20	Pass
	L.V.L.T.	16	90.2	Pass	RMS	1.1	5	Pass
					Peak	2.3	20	Pass
	L.V.H.T.	-14	90.2	Pass	RMS	1.2	5	Pass
					Peak	2.7	20	Pass
	H.V.L.T.	15	90.2	Pass	RMS	0.9	5	Pass
					Peak	3.0	20	Pass
	H.V.H.T	23	90.2	Pass	RMS	1.2	5	Pass
					Peak	2.6	20	Pass
	Vibration(X)	12	90.2	Pass	RMS	1.1	5	Pass
					Peak	2.7	20	Pass
	Vibration(Y)	-17	90.2	Pass	RMS	0.9	5	Pass
					Peak	3.1	20	Pass
	Vibration(Z)	25	90.2	Pass	RMS	0.8	5	Pass
					Peak	2.7	20	Pass

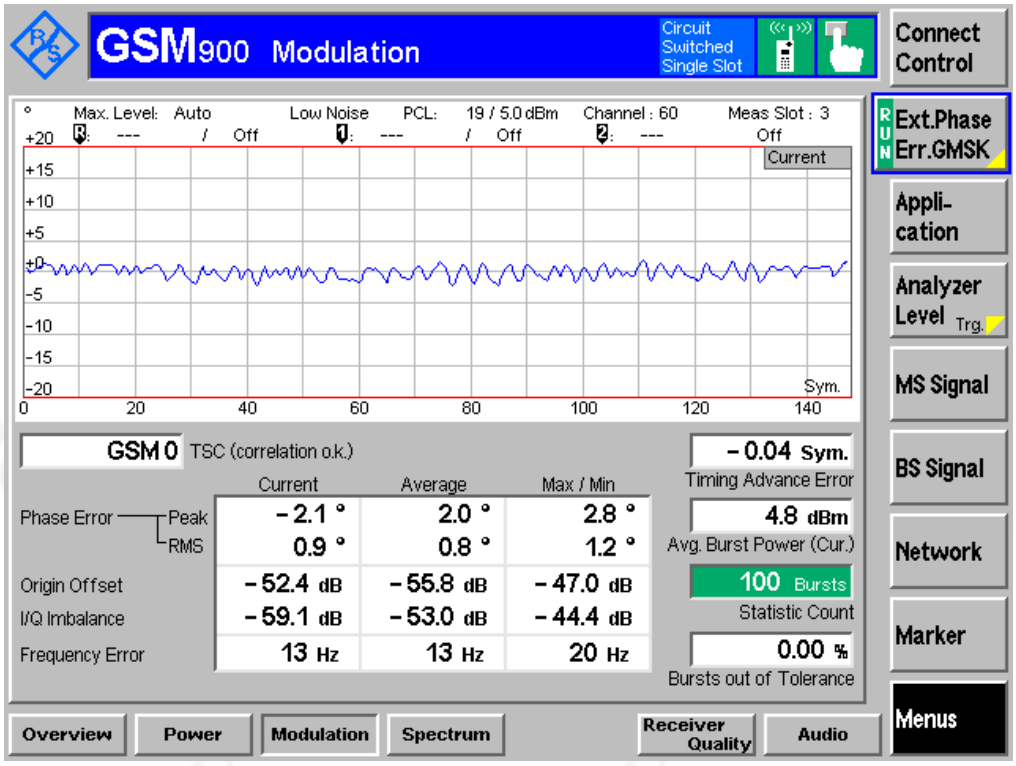
MS under minimum power control level

Normal Condition:

Power Control Level 5 (Middle Channel)



Power Control Level 19 (Middle Channel)



GSM1800(Middle channel)

0.1ppm means 174.78 Hz for frequency 1747.8 MHz

DCS1800	test condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase error (deg)		Limit (deg)	Result
Referency Frequency 1747.8 (MHZ)	Normal	10	174.78	Pass	RMS	0.8	5	Pass
					Peak	2.4	20	Pass
	L.V.L.T.	11	174.78	Pass	RMS	0.9	5	Pass
					Peak	3.0	20	Pass
	L.V.H.T.	-5	174.78	Pass	RMS	1.2	5	Pass
					Peak	3.0	20	Pass
	H.V.L.T.	-13	174.78	Pass	RMS	0.7	5	Pass
					Peak	2.3	20	Pass
	H.V.H.T	9	174.78	Pass	RMS	1.5	5	Pass
					Peak	2.2	20	Pass
	Vibration(X)	-8	174.78	Pass	RMS	1.1	5	Pass
					Peak	2.5	20	Pass
	Vibration(Y)	6	174.78	Pass	RMS	1.3	5	Pass
					Peak	2.7	20	Pass
	Vibration(Z)	-8	174.78	Pass	RMS	0.9	5	Pass
					Peak	2.6	20	Pass

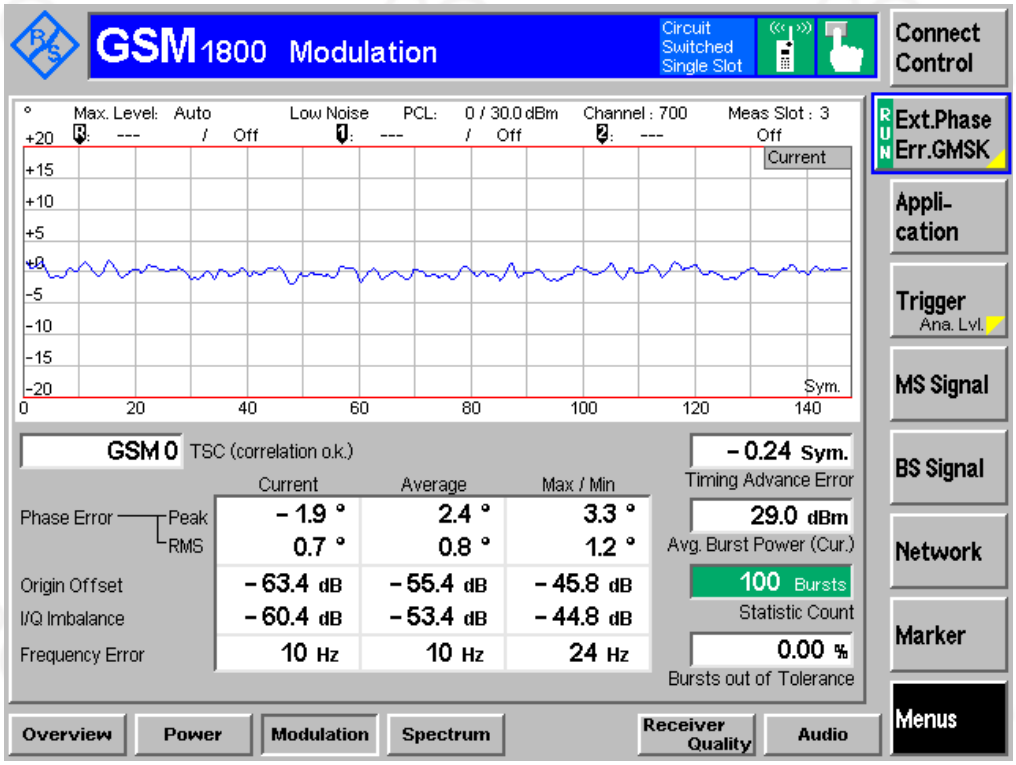
MS under maximum power control level

DCS1800	test condition	Frequency Error (Hz)	Limit (Hz)	Result	Phase error (deg)		Limit (deg)	Result
Referency Frequency 1747.8 (MHZ)	Normal	23	174.78	Pass	RMS	0.8	5	Pass
					Peak	2.2	20	Pass
	L.V.L.T.	-25	174.78	Pass	RMS	1.1	5	Pass
					Peak	2.6	20	Pass
	L.V.H.T.	18	174.78	Pass	RMS	0.9	5	Pass
					Peak	2.3	20	Pass
	H.V.L.T.	16	174.78	Pass	RMS	0.7	5	Pass
					Peak	2.7	20	Pass
	H.V.H.T	15	174.78	Pass	RMS	1.2	5	Pass
					Peak	2.9	20	Pass
	Vibration(X)	19	174.78	Pass	RMS	1.2	5	Pass
					Peak	2.8	20	Pass
	Vibration(Y)	8	174.78	Pass	RMS	1.3	5	Pass
					Peak	2.1	20	Pass
	Vibration(Z)	-16	174.78	Pass	RMS	0.9	5	Pass
					Peak	3.0	20	Pass

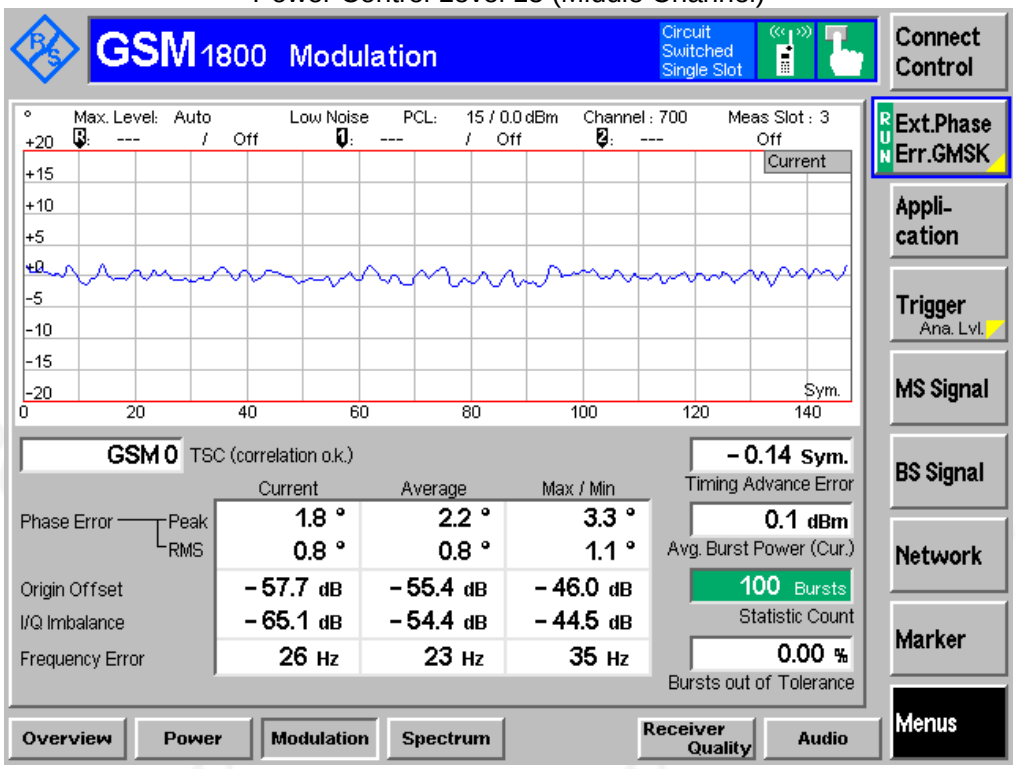
MS under minimum power control level

Normal Condition:

Power Control Level 0 (Middle Channel)



Power Control Level 15 (Middle Channel)



3.2 TRANSMITTER – FREQUENCY ERROR UNDER MULTIPATH AND INTERFERENCE CONDITIONS

Standard Applicable

Clause 13.2 of TS 151 010-1 V9.5.0 (2011-08)applies.

Definition and applicability

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

Conformance requirements

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

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

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

Environmental Conditions

Temperature	25
Relative Humidity	65%
ATM Pressure	101.5kPa

Test Results: Pass.

Please refer to following tables.

TEST RESULT

MS under maximum control level:5

GSM900	test condition		Frequency Error (Hz)	Limit (Hz)	Result
EGSM900 Ref. Freq. 902 (MHz)	Normal	RA250	-115	±300	Pass
		HT100	-37	±180	Pass
		TU50	-36	±160	Pass
		TU3	-25	±230	Pass
	L.V.L.T.	RA250	-122	±300	Pass
		HT100	-47	±180	Pass
		TU50	-42	±160	Pass
		TU3	-33	±230	Pass
	L.V.H.T.	RA250	-105	±300	Pass
		HT100	-26	±180	Pass
		TU50	-28	±160	Pass
		TU3	-24	±230	Pass
	H.V.L.T.	RA250	-130	±300	Pass
		HT100	-53	±180	Pass
		TU50	-56	±160	Pass
		TU3	-58	±230	Pass
	H.V.H.T	RA250	-115	±300	Pass
		HT100	-29	±180	Pass
		TU50	-38	±160	Pass
		TU3	-29	±230	Pass

MS under maximum control level:19

GSM900	test condition		Frequency Error (Hz)	Limit (Hz)	Result
EGSM900 Ref. Freq. 902 (MHz)	Normal	RA250	-115	±300	Pass
		HT100	-37	±180	Pass
		TU50	-36	±160	Pass
		TU3	-25	±230	Pass
	L.V.L.T.	RA250	-122	±300	Pass
		HT100	-47	±180	Pass
		TU50	-42	±160	Pass
		TU3	-33	±230	Pass
	L.V.H.T.	RA250	-105	±300	Pass
		HT100	-26	±180	Pass
		TU50	-28	±160	Pass
		TU3	-24	±230	Pass
	H.V.L.T.	RA250	-130	±300	Pass
		HT100	-53	±180	Pass
		TU50	-56	±160	Pass
		TU3	-58	±230	Pass
	H.V.H.T	RA250	-115	±300	Pass
		HT100	-29	±180	Pass
		TU50	-38	±160	Pass
		TU3	-29	±230	Pass

MS under maximum control level:0

GSM1800	test condition		Frequency Error (Hz)	Limit (Hz)	Result
DCS1800 Ref. Freq. 1747.8 (MHz)	Normal	RA130	46	±400	Pass
		HT100	-38	±350	Pass
		TU50	-38	±260	Pass
		TU1.5	-39	±320	Pass
	L.V.L.T.	RA130	31	±400	Pass
		HT100	-29	±350	Pass
		TU50	-38	±260	Pass
		TU1.5	-30	±320	Pass
	L.V.H.T.	RA130	15	±400	Pass
		HT100	-24	±350	Pass
		TU50	17	±260	Pass
		TU1.5	19	±320	Pass
	H.V.L.T.	RA130	63	±400	Pass
		HT100	34	±350	Pass
		TU50	-26	±260	Pass
		TU1.5	-46	±320	Pass
	H.V.H.T	RA130	36	±400	Pass
		HT100	-33	±350	Pass
		TU50	-26	±260	Pass
		TU1.5	-46	±320	Pass

MS under maximum control level:15

GSM1800	test condition		Frequency Error (Hz)	Limit (Hz)	Result
DCS1800 Ref. Freq. 1747.8 (MHz)	Normal	RA130	46	±400	Pass
		HT100	-38	±350	Pass
		TU50	-38	±260	Pass
		TU1.5	-39	±320	Pass
	L.V.L.T.	RA130	31	±400	Pass
		HT100	-29	±350	Pass
		TU50	-38	±260	Pass
		TU1.5	-30	±320	Pass
	L.V.H.T.	RA130	15	±400	Pass
		HT100	-24	±350	Pass
		TU50	17	±260	Pass
		TU1.5	19	±320	Pass
	H.V.L.T.	RA130	63	±400	Pass
		HT100	34	±350	Pass
		TU50	-26	±260	Pass
		TU1.5	-46	±320	Pass
	H.V.H.T	RA130	36	±400	Pass
		HT100	-33	±350	Pass
		TU50	-26	±260	Pass
		TU1.5	-46	±320	Pass

3.3 FREQUENCY ERROR AND PHASE ERROR IN GPRS MULTISLOT CONFIGURATION

Applicable Standard

According to EN 301 511, section 4.2.4, The MS carrier frequency shall be accurate to within 0,1 ppm 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.

Test Procedure

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

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

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

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

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

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

g) The MS is hard mounted on a vibration table and vibrated at the frequency/amplitudes specified in annex 1, TC4. During the vibration steps a) to f) are repeated.

NOTE: If the call is terminated when mounting the MS to the vibration table, it will be necessary to establish the initial conditions again before repeating steps a) to f).

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

i) Steps a) to f) are repeated under extreme test conditions

Environmental Conditions

Temperature	25
Relative Humidity	65%
ATM Pressure	101.5kPa

Test Results: N/A. Please refer to following tables.

3.4 TRANSMITTER-- OUTPUT POWER AND BURST TIMING

Standard Application

According to EN 301 511, section 4.2.5:

Definition and applicability

The transmitter output power is the average value of the power delivered to an artificial antenna or radiated by the MS and its integral antenna, over the time that the useful information bits of one burst are transmitted.

The transmitting burst timing is the envelope of the RF power transmitted with respect to time. The timings are referenced to the transition from bit 13 to bit 14 of the Training Sequence (“midamble”) before differentialdecoding. The timing of the modulation is referenced to the timing of the received signal from the SS.

The requirements and this test apply to GSM900 and DCS1800 MS

Environmental Conditions

Temperature	25
Relative Humidity	56%
ATM Pressure	100.5kPa

TEST RESULT: Pass

Please refer to following tables.

GSM900 Output Power

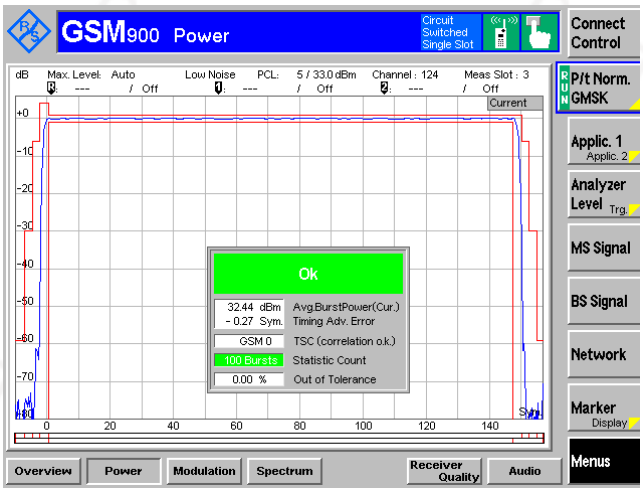
High Channel F =914.80 MHz						
Power Control Level	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
5	32.44	32.15	32.30	32.19	32.40	Pass
6	30.70	30.57	30.60	30.71	30.64	Pass
7	29.23	29.31	29.25	29.19	29.18	Pass
8	27.23	27.35	27.19	27.19	27.35	Pass
9	25.21	25.29	25.36	25.21	25.25	Pass
10	23.12	23.15	23.16	23.19	23.40	Pass
11	21.10	21.26	21.30	21.28	21.34	Pass
12	18.91	19.25	18.98	19.12	19.06	Pass
13	17.12	17.26	17.36	17.42	17.52	Pass
14	15.12	15.41	15.36	15.09	15.26	Pass
15	12.91	12.89	12.71	12.69	13.01	Pass
16	10.90	10.78	10.86	10.79	10.85	Pass
17	8.9	8.56	8.96	8.89	8.95	Pass
18	7.14	7.19	7.26	7.30	7.21	Pass
19	4.54	4.23	4.60	4.46	4.30	Pass

Middle Channel F = 902.0 MHz						
Power Control Level	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
5	32.52	32.58	32.5	32.6	32.48	Pass
6	30.70	30.76	30.68	30.78	30.66	Pass
7	29.21	29.27	29.19	29.29	29.17	Pass
8	27.21	27.27	27.19	27.29	27.17	Pass
9	25.13	25.19	25.11	25.21	25.09	Pass
10	23.15	23.21	23.13	23.23	23.11	Pass
11	21.20	21.26	21.18	21.28	21.16	Pass
12	19.12	19.18	19.12	19.24	19.08	Pass
13	17.31	17.35	17.29	17.39	17.27	Pass
14	15.31	15.37	15.29	15.39	15.27	Pass
15	13.12	13.18	13.1	13.2	13.08	Pass
16	11.01	11.07	10.99	11.09	10.97	Pass
17	9.12	9.18	9.1	9.2	9.08	Pass
18	7.31	7.37	7.29	7.39	7.27	Pass
19	4.84	4.92	4.82	4.92	4.8	Pass

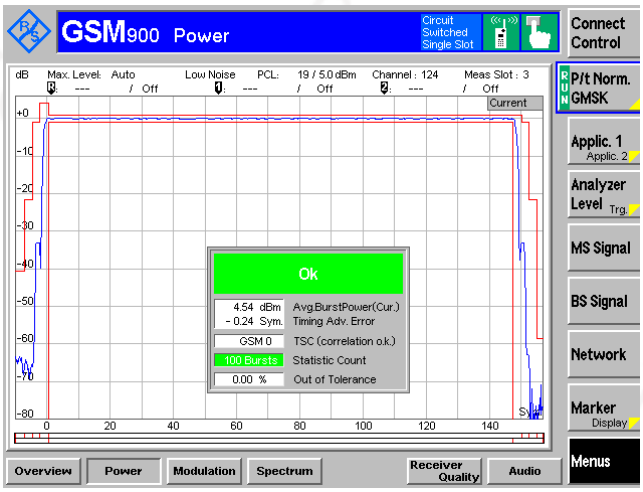
Low Channel F = 880.2 MHz						
Power Control Level	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
5	32.66	32.72	32.64	32.74	32.62	Pass
6	30.80	30.86	30.78	30.78	30.46	Pass
7	29.31	29.35	29.29	29.39	29.23	Pass
8	27.41	27.47	27.39	27.49	27.37	Pass
9	25.32	25.38	25.3	25.4	25.28	Pass
10	23.31	23.37	23.29	23.39	23.27	Pass
11	21.12	21.18	21.1	21.2	21.13	Pass
12	19.02	19.08	19.03	19.1	18.98	Pass
13	17.23	17.29	17.21	17.31	17.19	Pass
14	15.26	15.32	15.24	15.34	15.22	Pass
15	13.05	13.11	13.03	13.13	13.01	Pass
16	10.92	10.98	10.9	11.21	10.88	Pass
17	9.02	9.08	9.36	9.12	8.98	Pass
18	7.1	7.16	7.12	7.18	7.16	Pass
19	4.61	4.67	4.59	4.69	4.54	Pass

GSM900

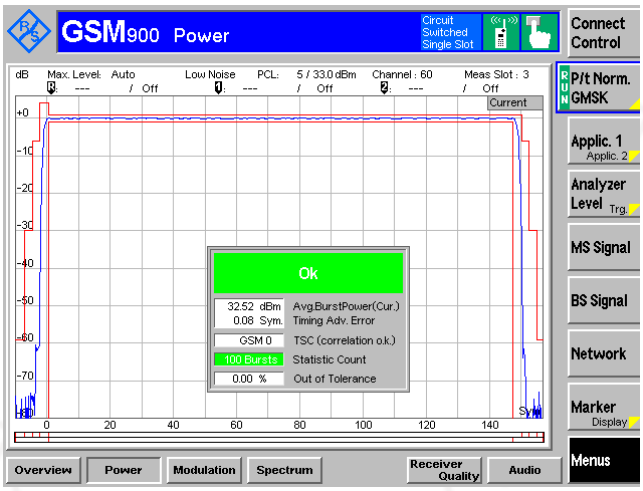
Normal Condition Power Control Level 5, High Channel



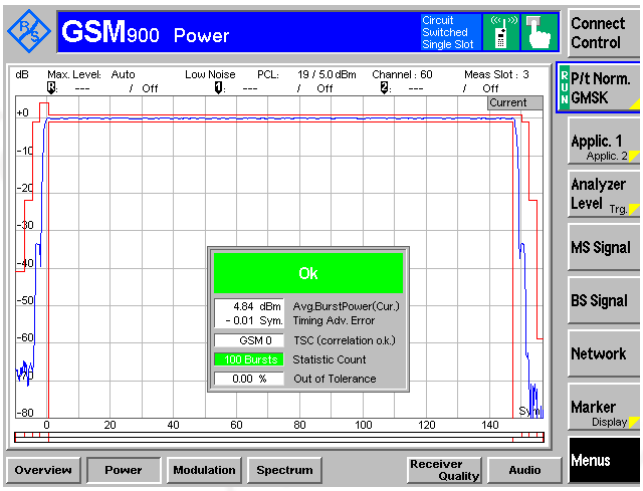
Normal Condition Power Control Level 19, High Channel



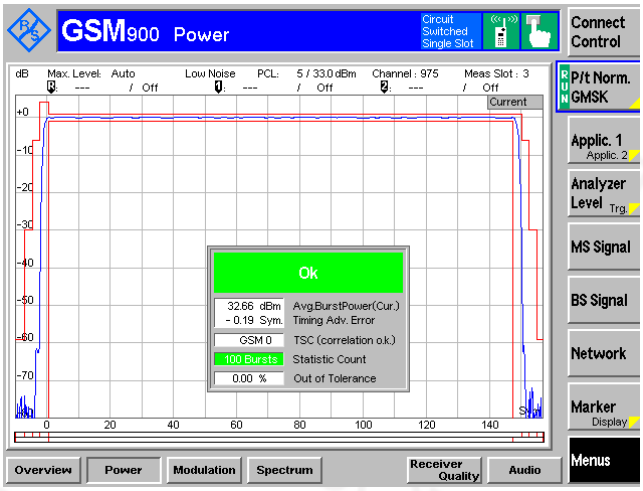
Normal Condition Power Control Level 5, Middle Channel



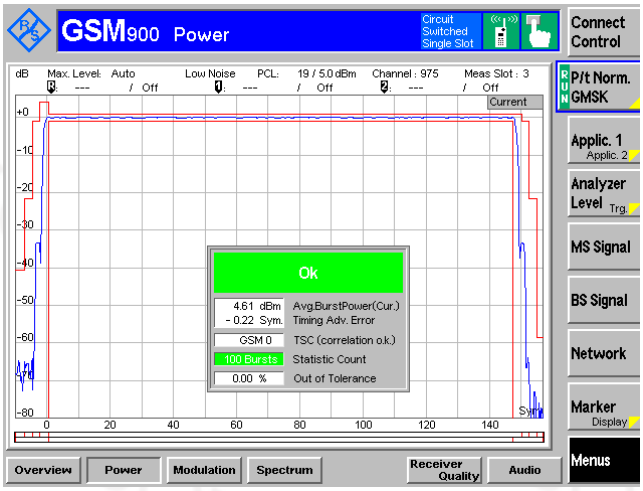
Normal Condition Power Control Level 19, Middle Channel



Normal Condition Power Control Level 5, Low Channel



Normal Condition Power Control Level 19, Low Channel



GSM 1800 Output Power

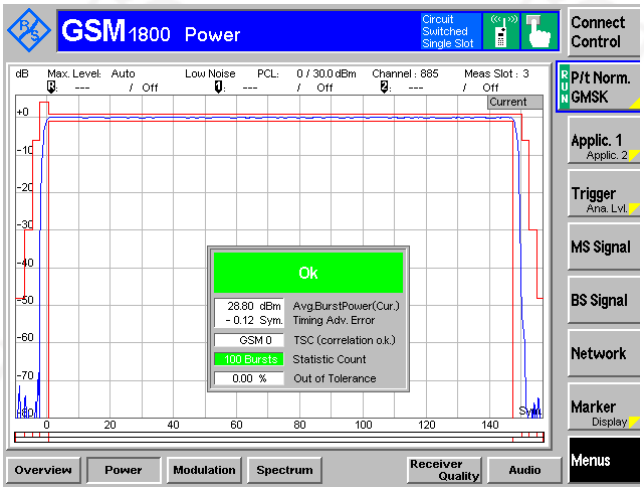
High Channel F = 1784.8 MHz						
Power Control Level	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
0	28.80	28.86	28.78	28.88	28.76	Pass
1	26.80	26.86	26.77	26.88	26.76	Pass
2	25.21	25.27	25.19	25.29	25.17	Pass
3	23.12	23.18	23.12	23.23	23.09	Pass
4	20.91	20.97	20.89	20.90	20.87	Pass
5	18.81	18.87	18.79	18.89	18.77	Pass
6	16.82	16.88	16.8	16.9	16.78	Pass
7	14.51	14.57	14.49	14.59	14.47	Pass
8	12.41	12.47	12.39	12.49	12.37	Pass
9	10.31	10.37	10.26	10.39	10.27	Pass
10	8.21	8.27	8.19	8.29	8.17	Pass
11	6.10	6.16	6.09	6.14	6.06	Pass
12	4.13	4.19	4.11	4.21	4.06	Pass
13	2.21	2.27	2.19	2.25	2.17	Pass
14	0.20	0.26	0.18	0.28	0.16	Pass
15	-0.90	28.86	28.78	28.88	28.76	Pass

Middle Channel F = 1747.8 MHz						
Power Control Level	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
0	29.03	29.07	28.57	29.17	28.82	Pass
1	27.10	27.80	27.30	27.70	28.00	Pass
2	25.51	25.50	25.00	25.40	25.70	Pass
3	23.41	23.50	23.00	23.40	23.51	Pass
4	21.32	21.70	21.20	21.20	21.90	Pass
5	19.35	19.70	19.20	19.60	19.73	Pass
6	17.23	17.70	17.20	17.56	17.90	Pass
7	15.14	15.31	15.20	15.60	15.24	Pass
8	13.16	13.70	13.20	13.36	13.90	Pass
9	11.03	11.60	11.10	11.50	11.80	Pass
10	8.91	9.30	9.10	9.50	9.80	Pass
11	6.93	7.60	7.10	7.50	7.80	Pass
12	4.95	5.14	5.10	5.50	5.80	Pass
13	3.13	3.60	3.10	3.50	3.80	Pass
14	1.35	1.60	1.10	1.50	1.80	Pass
15	0.14	29.07	28.57	29.17	28.82	Pass

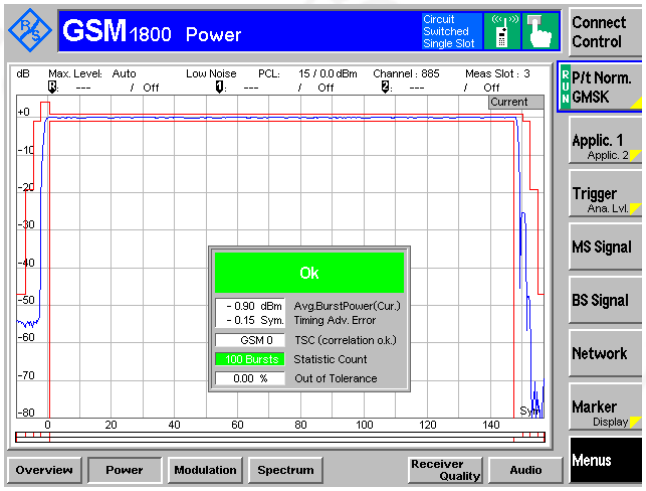
Low Channel F = 1710.2 MHz						
Power Control Level	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
0	30.05	30.11	30.07	30.13	30.01	Pass
1	28.63	28.68	28.61	28.71	28.59	Pass
2	27.12	27.18	27.15	27.27	27.06	Pass
3	25.24	25.32	25.22	25.32	25.27	Pass
4	23.31	23.35	23.29	23.39	23.27	Pass
5	21.42	21.48	21.4	21.5	21.38	Pass
6	19.53	19.59	19.51	19.61	19.49	Pass
7	17.42	17.48	17.4	17.5	17.38	Pass
8	15.53	15.59	15.51	15.61	15.49	Pass
9	13.64	13.7	13.62	13.72	13.6	Pass
10	11.82	11.88	11.87	11.78	11.78	Pass
11	10.13	10.19	10.11	10.21	10.09	Pass
12	8.43	8.49	8.41	8.51	8.39	Pass
13	6.84	6.95	6.82	6.92	6.82	Pass
14	5.37	5.43	5.35	5.45	5.33	Pass
15	4.30	30.11	30.03	30.13	30.01	Pass

DCS1800

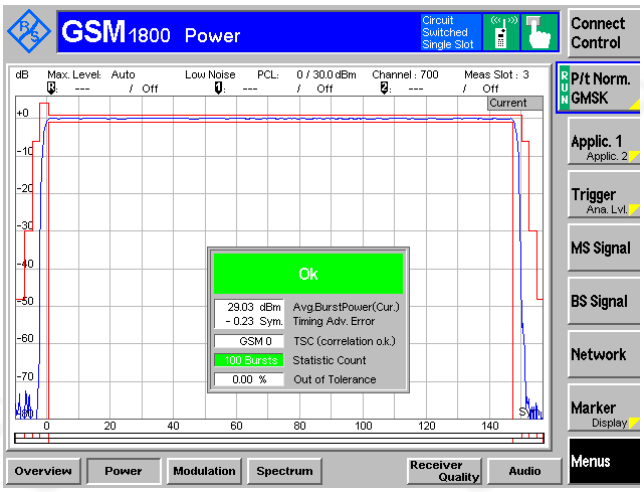
Normal Condition Power Control Level 0, High Channel



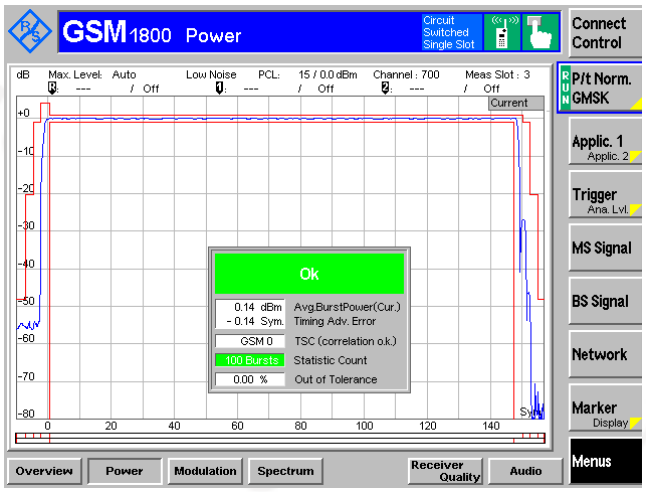
Normal Condition Power Control Level 15, High Channel



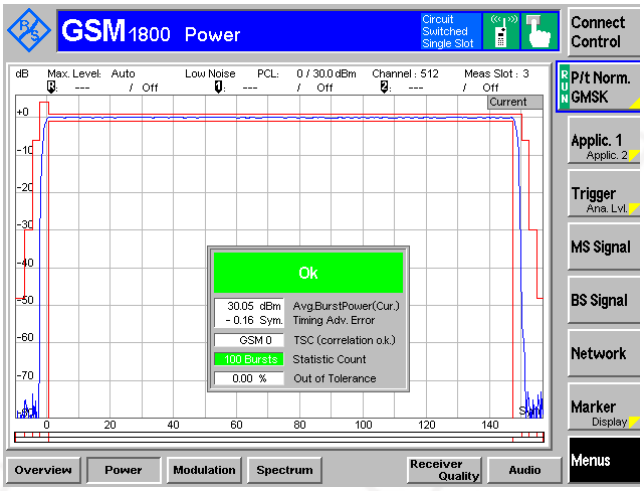
Normal Condition Power Control Level 0, Middle Channel



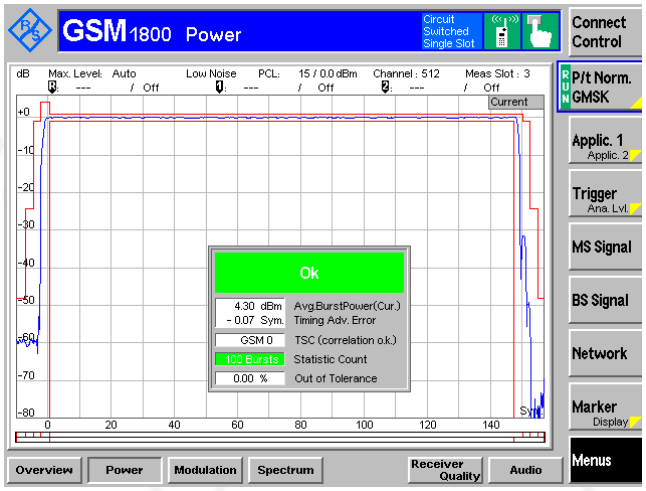
Normal Condition Power Control Level 15, Middle Channel



Normal Condition Power Control Level 0, Low Channel



Normal Condition Power Control Level 15, Low Channel



3.5 TRANSMITTER – OUTPUT RF SPECTRUM

Applicable Standard

Requirements: According to EN 301 511, section 4.2.6,

Test Procedure

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

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

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

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

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

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

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

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

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

FT;

FT + 100 kHz FT - 100 kHz;

FT + 200 kHz FT - 200 kHz;

FT + 250 kHz FT - 250 kHz;

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

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

g) The spectrum analyzer settings are adjusted to:

- Zero frequency scan;

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

The spectrum analyzer gating of the signal is switched off.

The MS is commanded to its maximum power control level.

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

FT + 400 kHz FT - 400 kHz;

FT + 600 kHz FT - 600 kHz;

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

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

where FT = RF channel nominal centre frequency.

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

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

j) 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.

Environmental Conditions

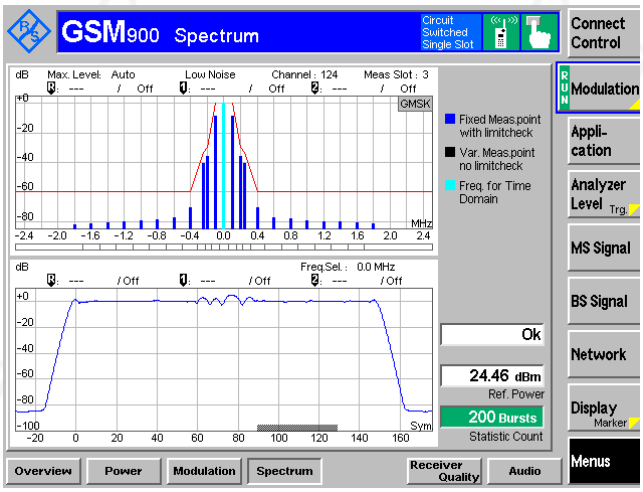
Temperature	25° C
Relative Humidity	56%
ATM Pressure	100.2kPa

Test Results: Pass.

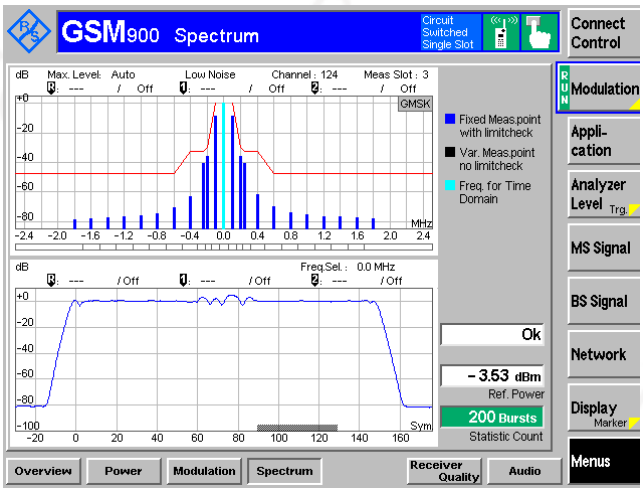
Please refer to following tables.

GSM900

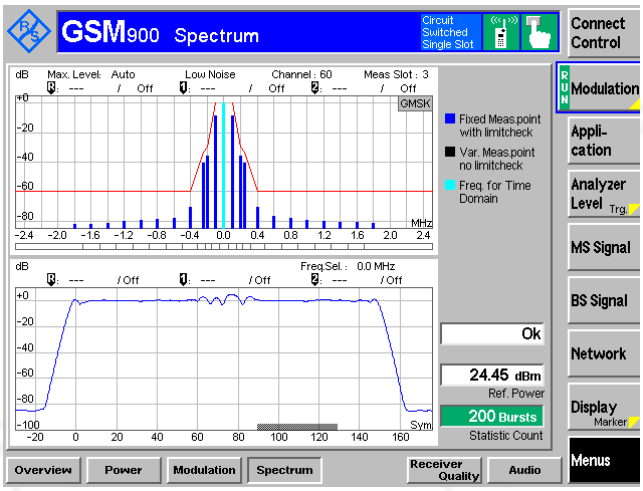
Normal Condition Power Control Level 5, High Channel



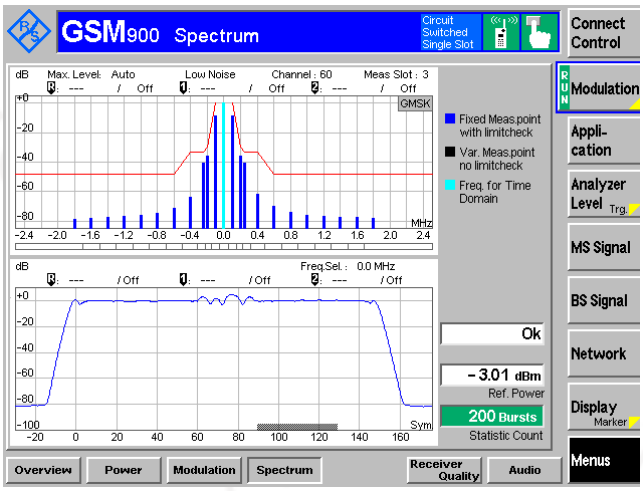
Normal Condition Power Control Level 19, High Channel



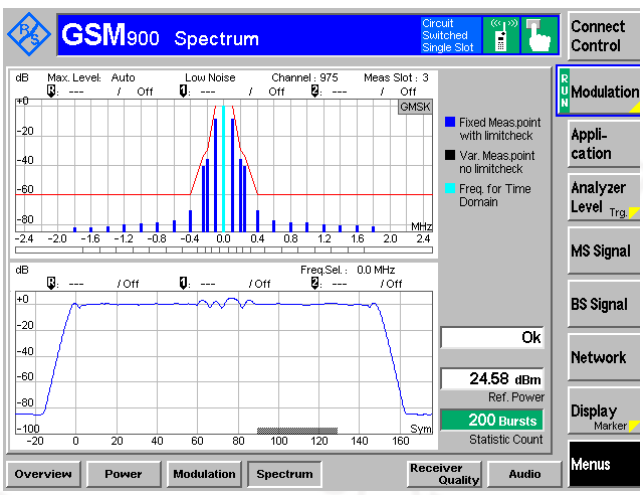
Normal Condition Power Control Level 5, Middle Channel



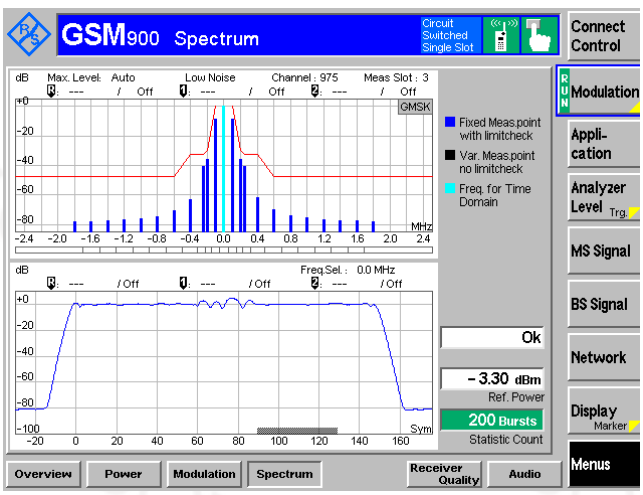
Normal Condition Power Control Level 19, Middle Channel



Normal Condition Power Control Level 5, Low Channel

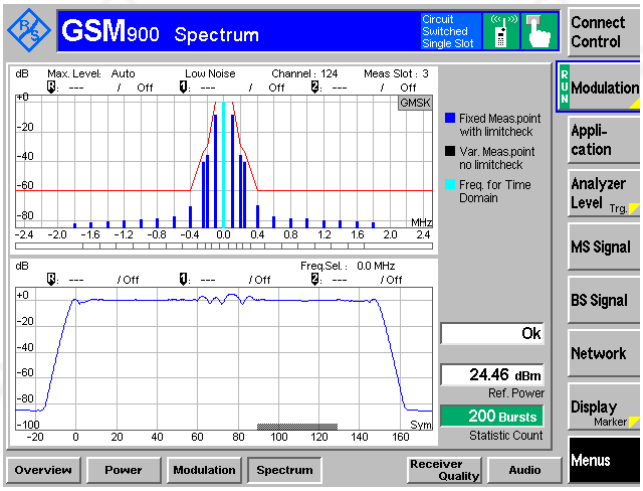


Normal Condition Power Control Level 19, Low Channel

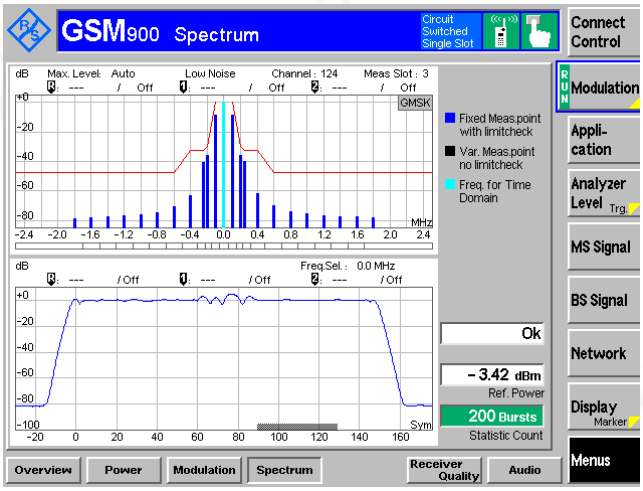


Extreme Condition

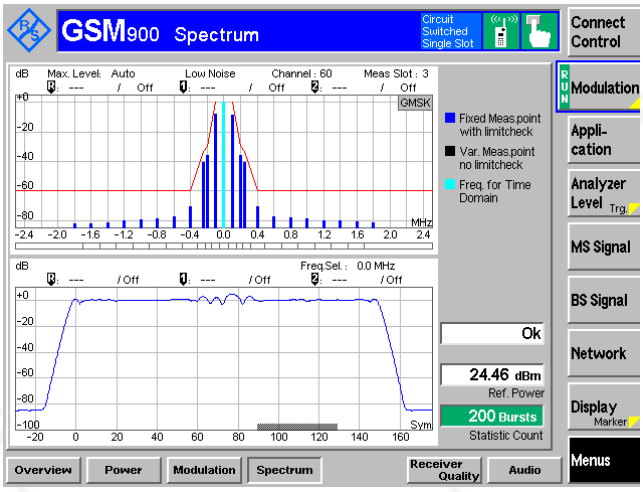
HT,HV Condition Power Control Level 5, High Channel



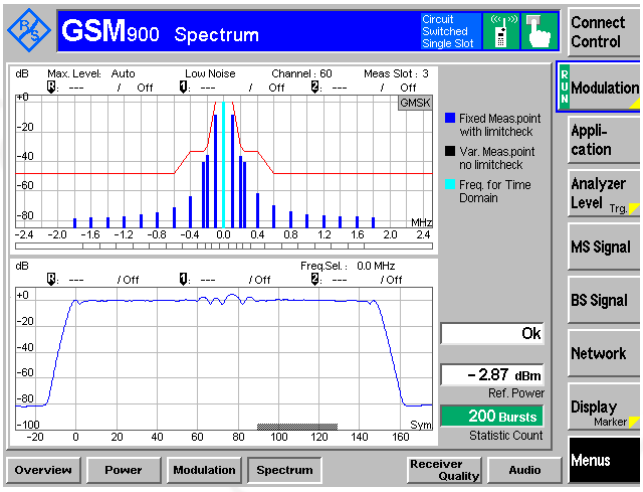
HT,HV Condition Power Control Level 19, High Channel



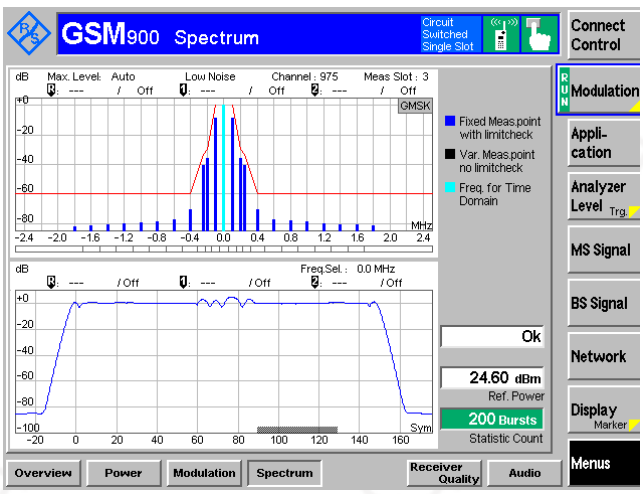
HT,HV Condition Power Control Level 5, Middle Channel



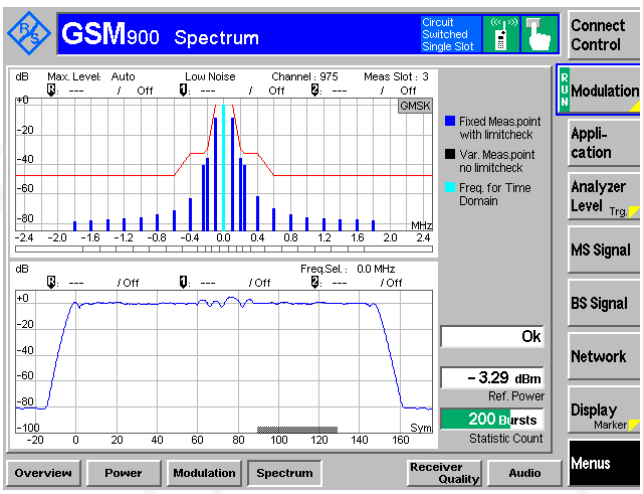
HT,HV Condition Power Control Level 19, Middle Channel



HT,HV Condition Power Control Level 5, Low Channel

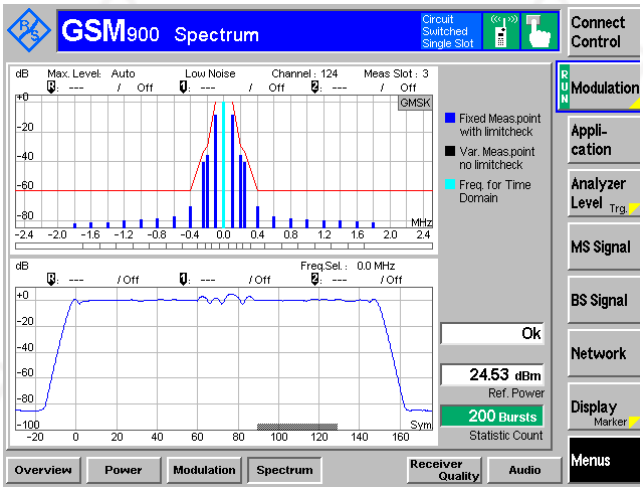


HT,HV Condition Power Control Level 19, Low Channel

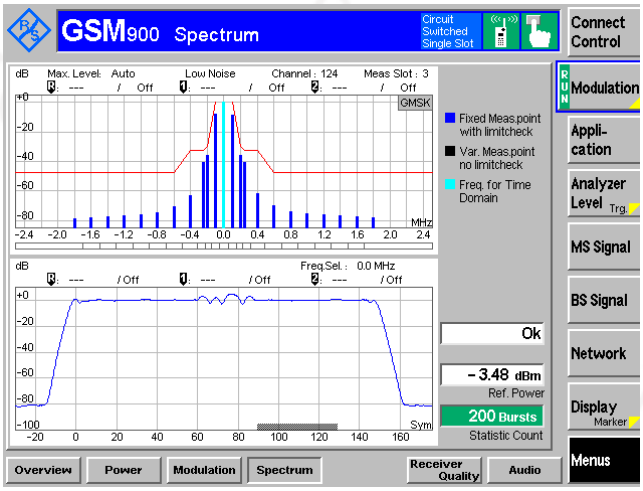


Extreme Condition

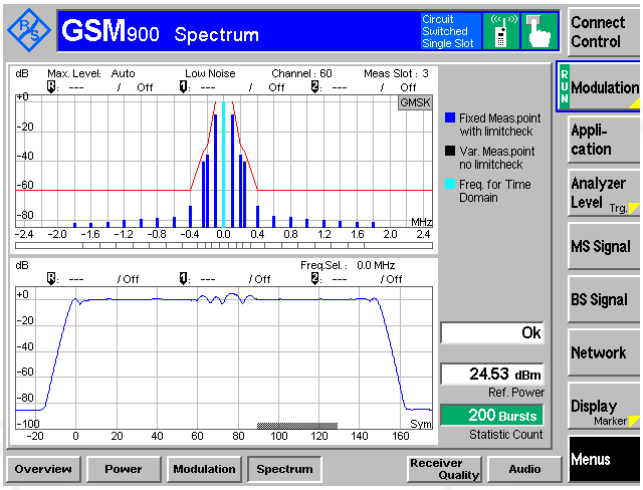
LT,HV Condition Power Control Level 5, High Channel



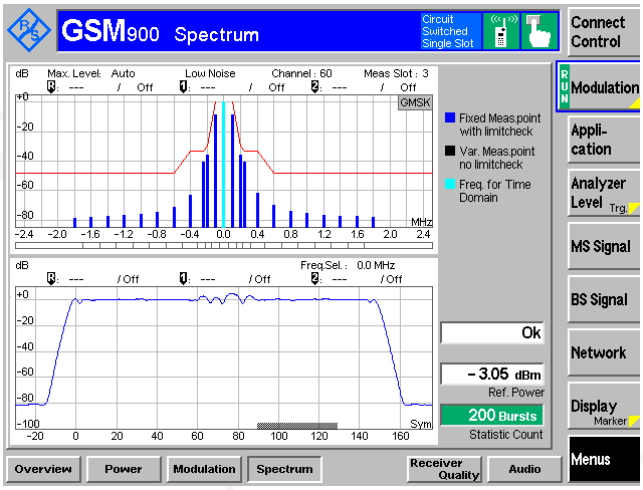
LT,HV Condition Power Control Level 19, High Channel



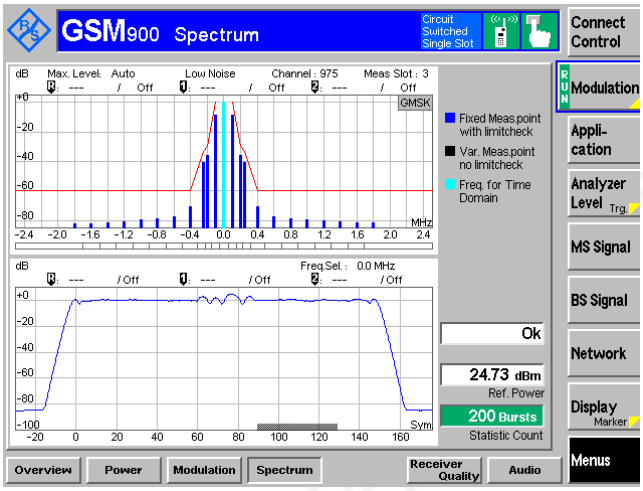
LT,HV Condition Power Control Level 5, Middle Channel



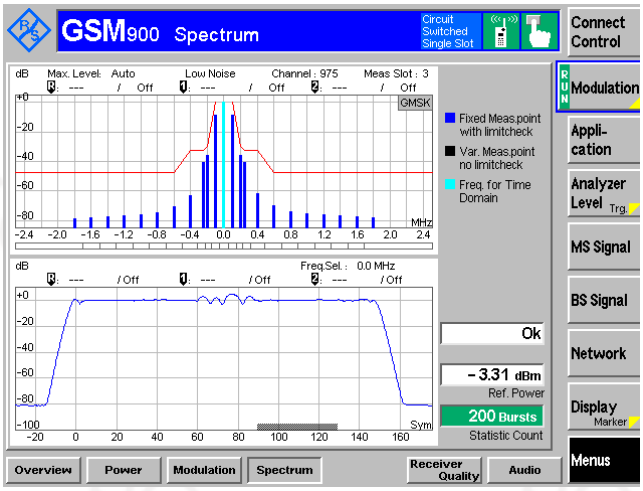
LT,HV Condition Power Control Level 19, Middle Channel



LT,HV Condition Power Control Level 5, Low Channel

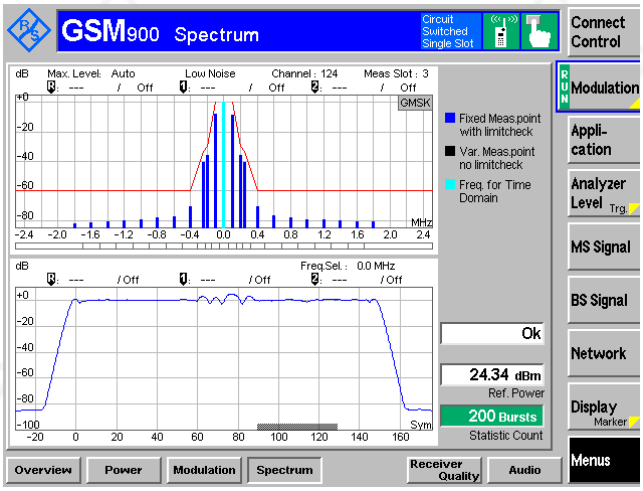


LT,HV Condition Power Control Level 19, Low Channel

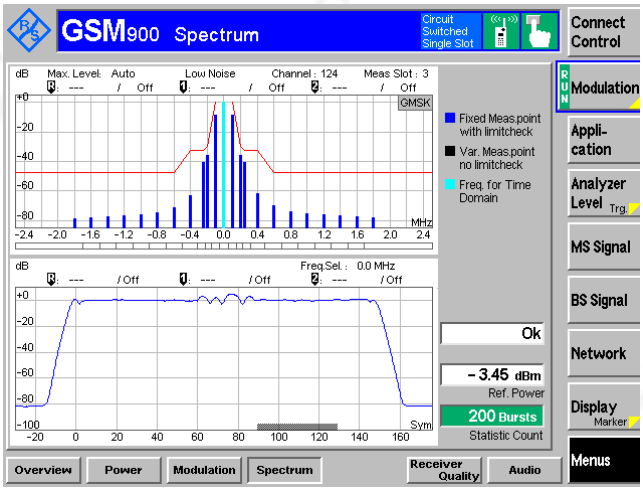


Extreme Condition

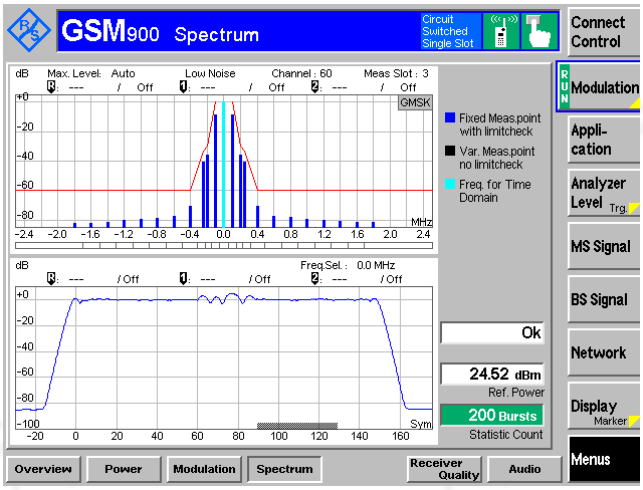
LT,LV Condition Power Control Level 5, High Channel



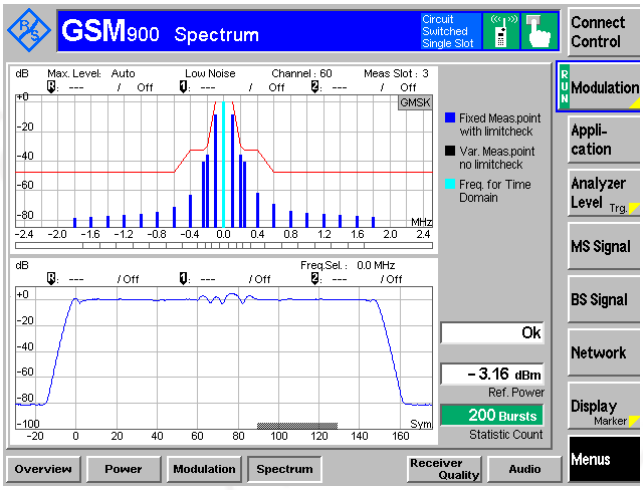
LT,LV Condition Power Control Level 19, High Channel



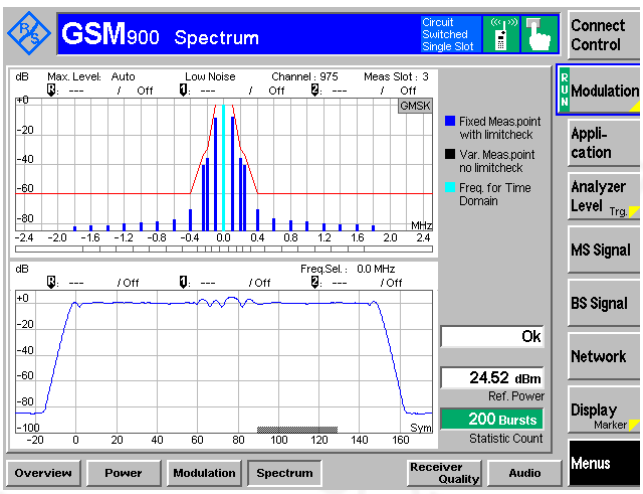
LT,LV Condition Power Control Level 5, Middle Channel



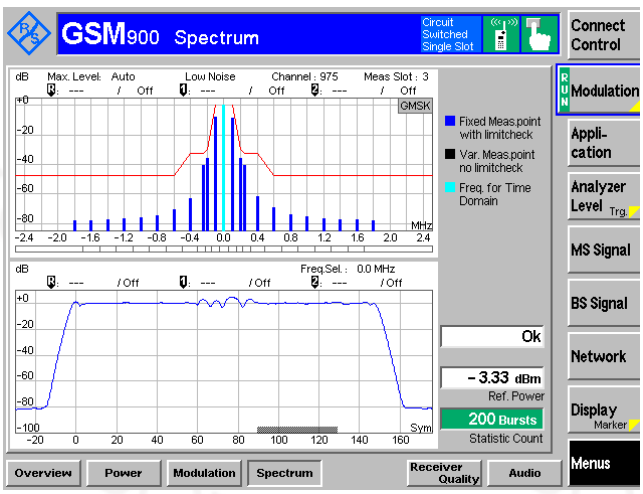
LT,LV Condition Power Control Level 19, Middle Channel



LT,LV Condition Power Control Level 5, Low Channel

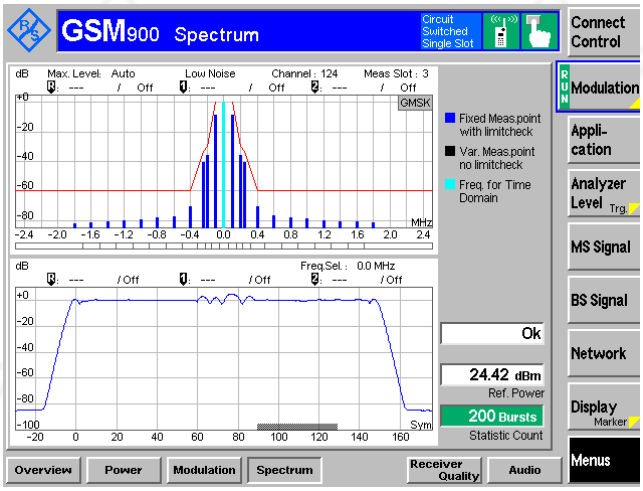


LT,LV Condition Power Control Level 19, Low Channel

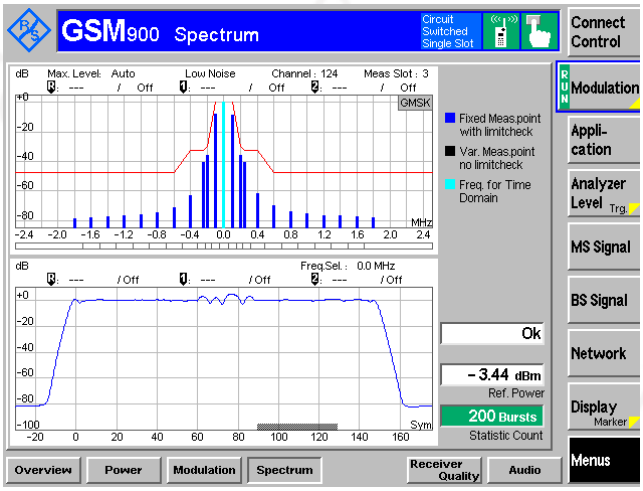


Extreme Condition

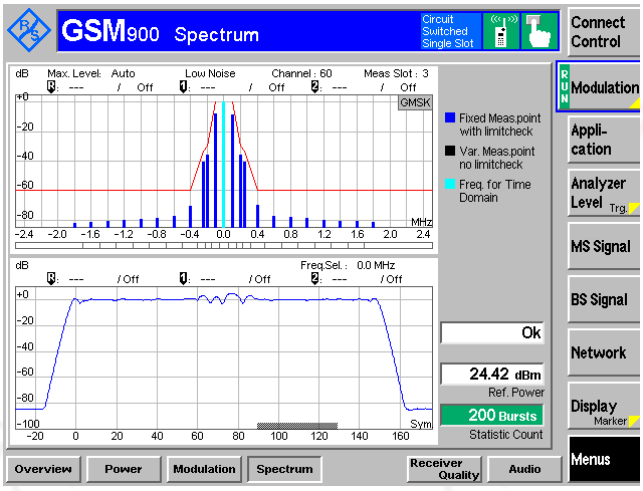
HT,LV Condition Power Control Level 5, High Channel



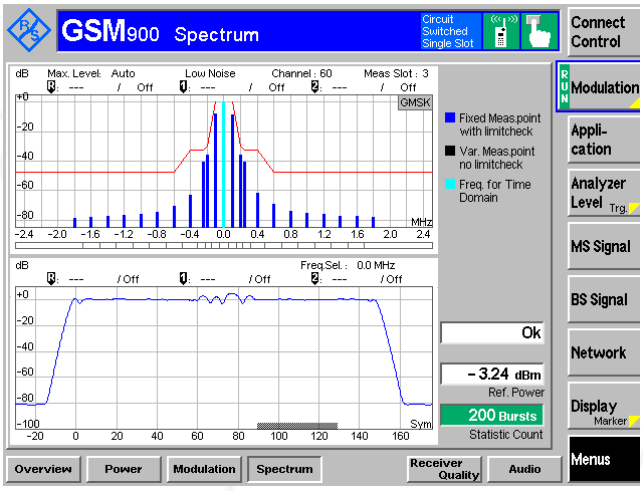
HT,LV Condition Power Control Level 19, High Channel



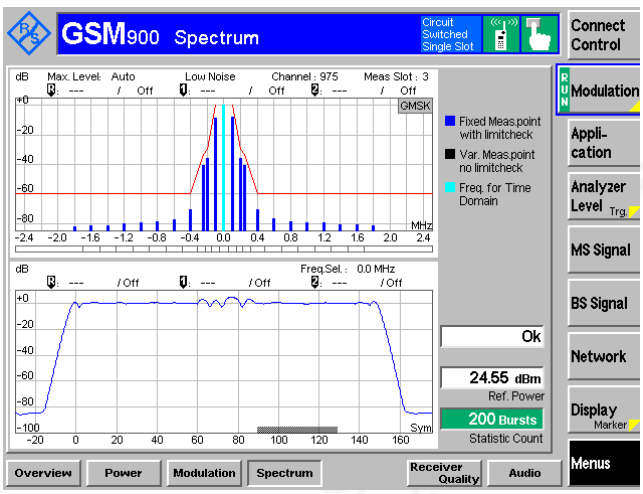
HT,LV Condition Power Control Level 5, Middle Channel



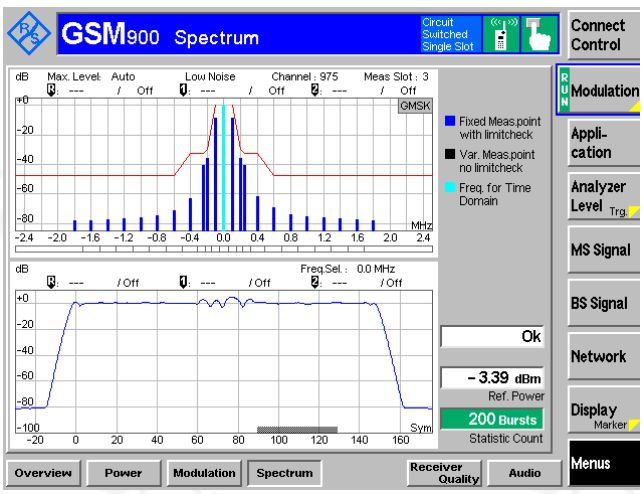
HT,LV Condition Power Control Level 19, Middle Channel



HT,LV Condition Power Control Level 5, Low Channel

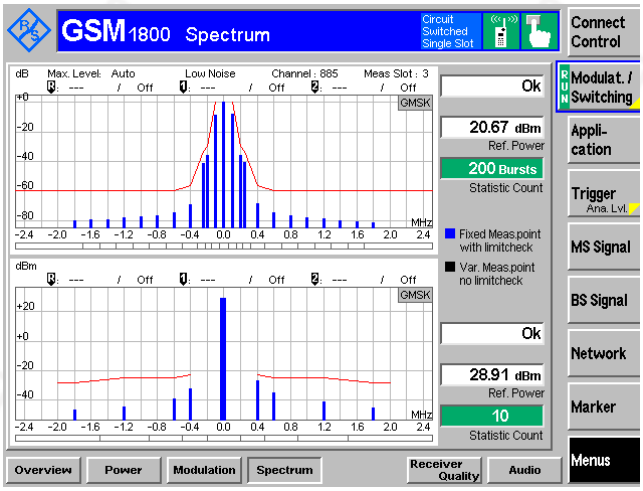


HT,LV Condition Power Control Level 19, Low Channel

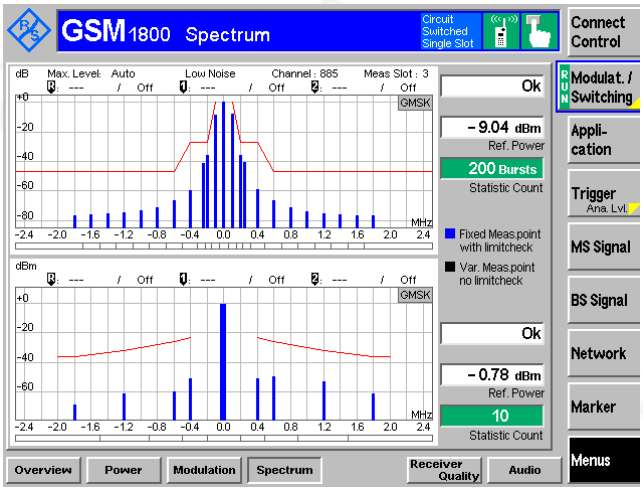


DSC1800

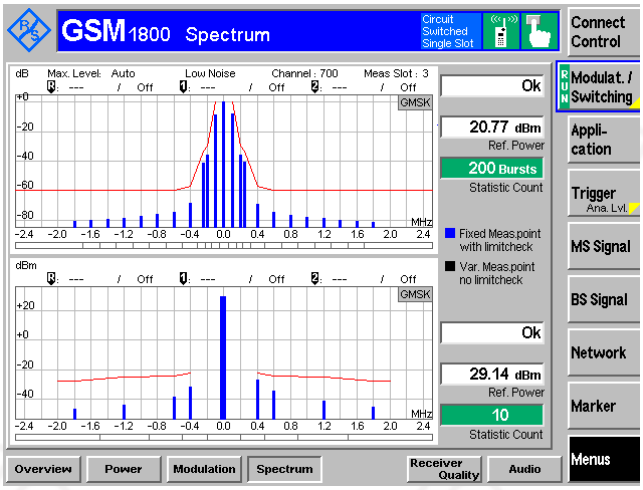
Normal Condition Power Control Level 0, High Channel



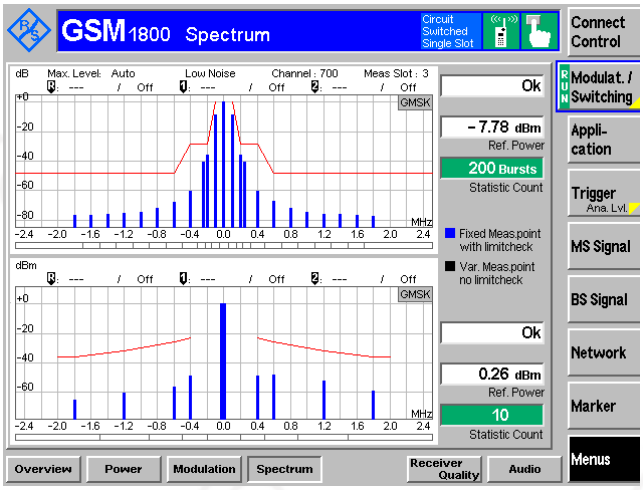
Normal Condition Power Control Level 15, High Channel



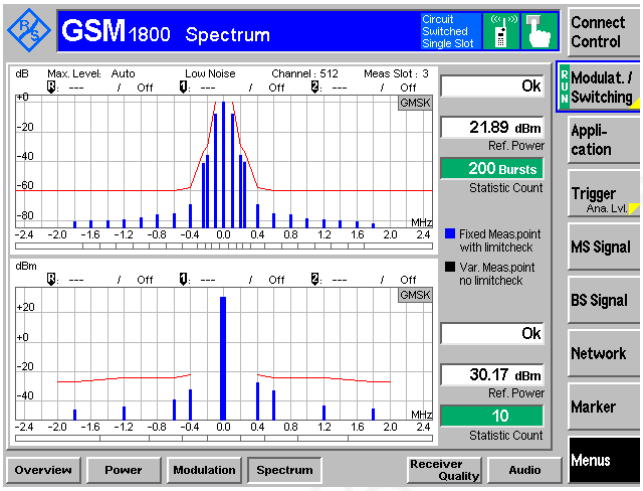
Normal Condition Power Control Level 0, Middle Channel



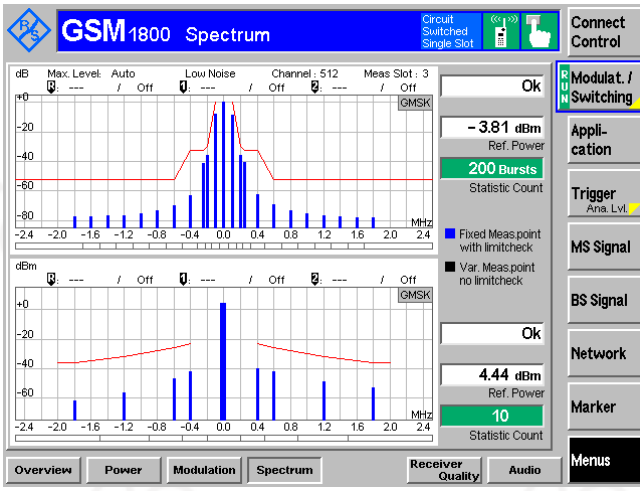
Normal Condition Power Control Level 15, Middle Channel



Normal Condition Power Control Level 0, Low Channel

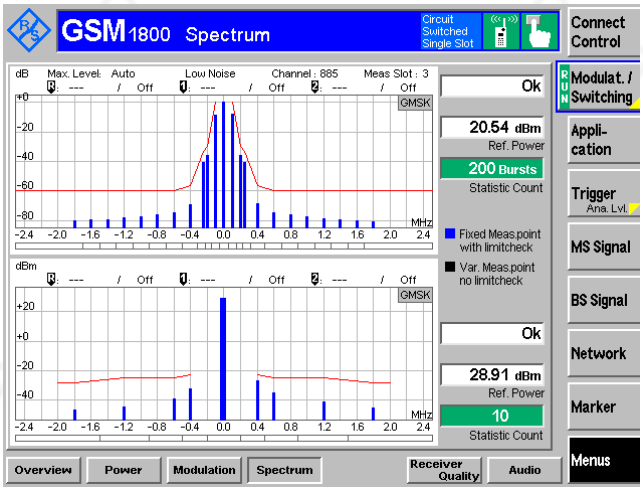


Normal Condition Power Control Level 15, Low Channel

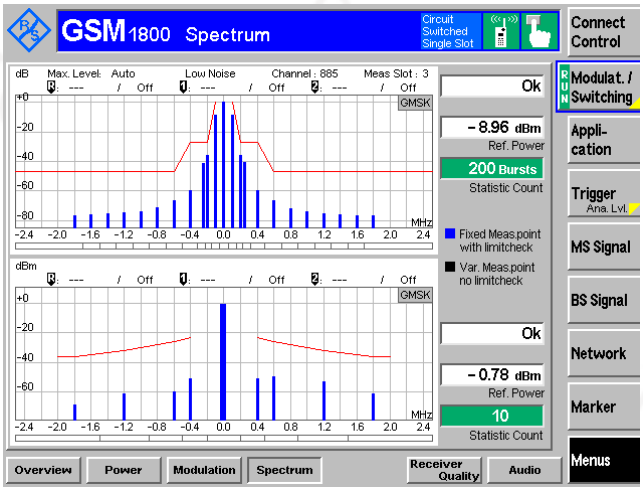


Extreme Condition

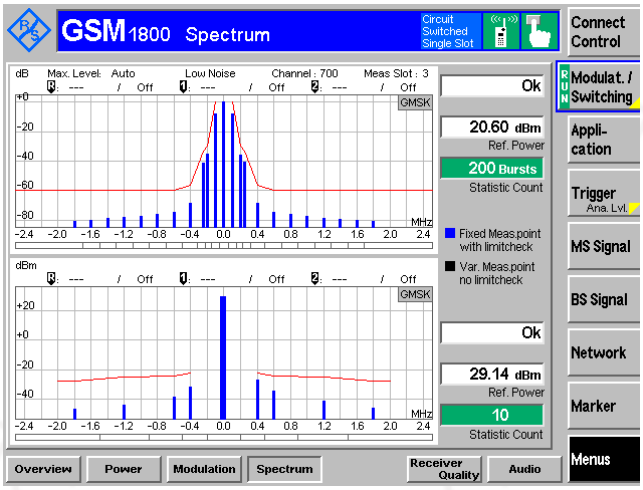
LV,LT Condition Power Control Level 0, High Channel



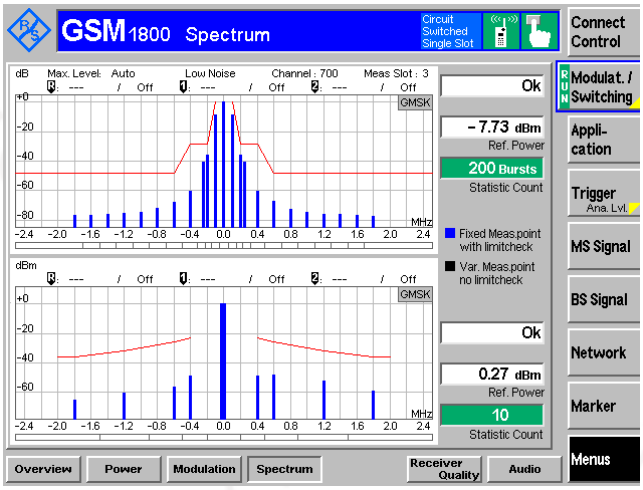
LV,LT Condition Power Control Level 15, High Channel



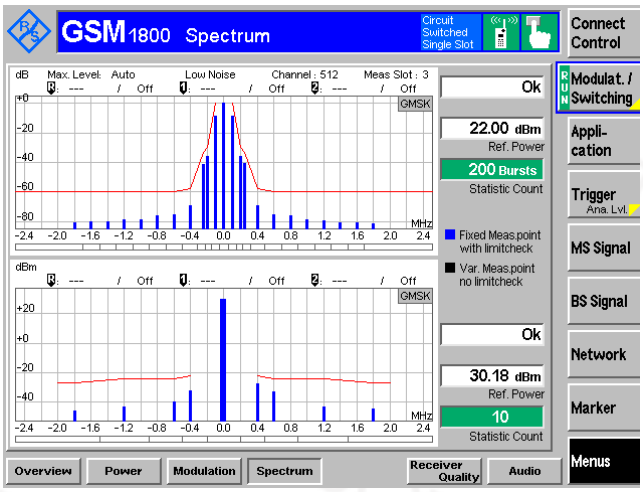
LV,LT Condition Power Control Level 0, Middle Channel



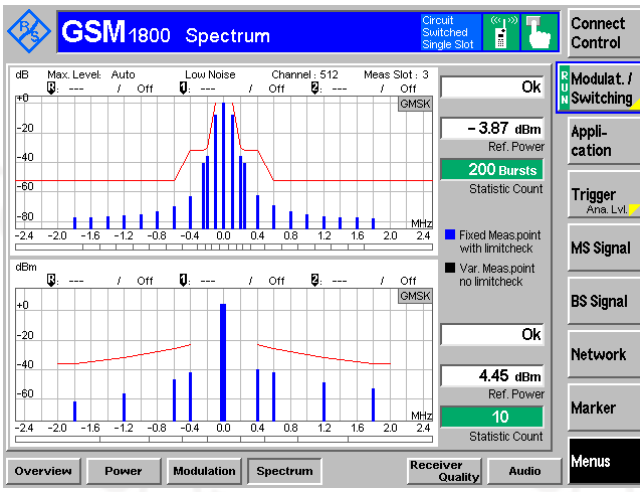
LV,LT Condition Power Control Level 15, Middle Channel



LV,LT Condition Power Control Level 0, Low Channel

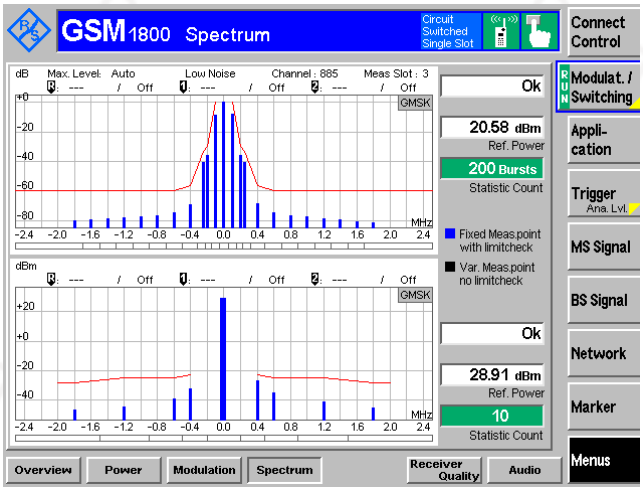


LV,LT Condition Power Control Level 15, Low Channel

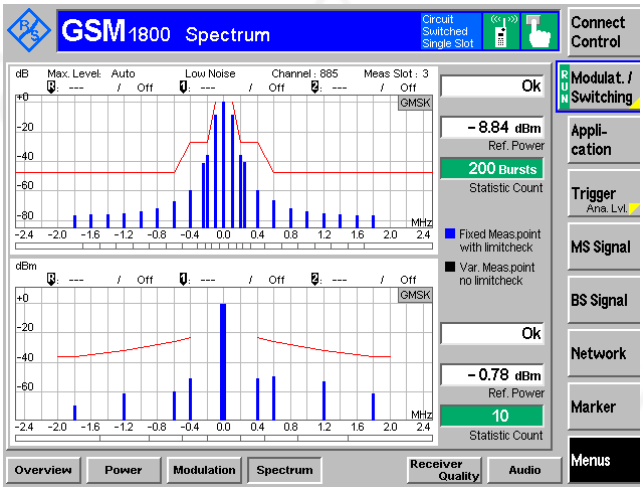


Extreme Condition

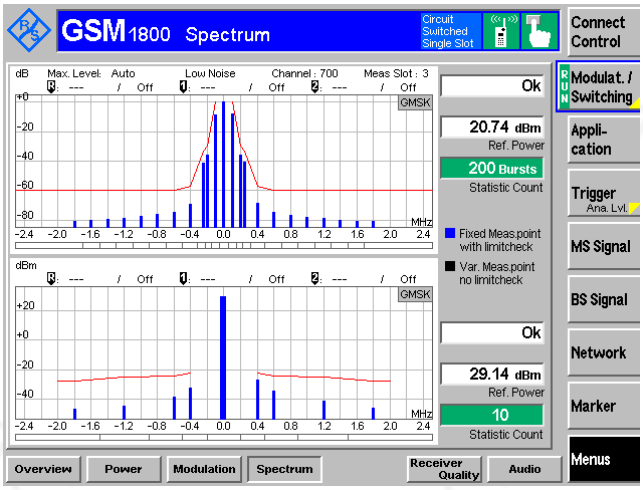
LV,HT Condition Power Control Level 0, High Channel



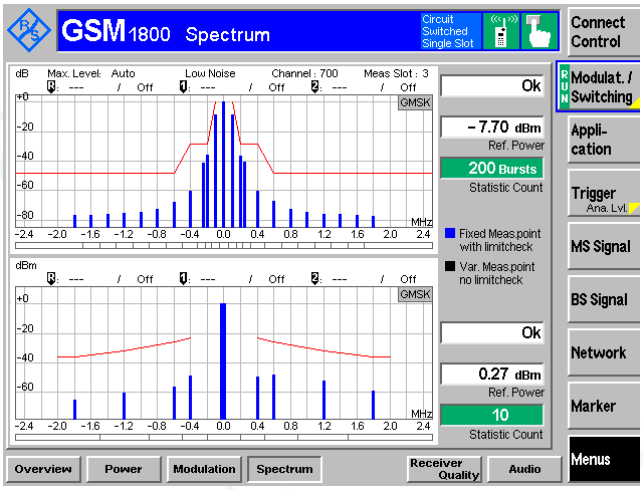
LV,HT Condition Power Control Level 15, High Channel



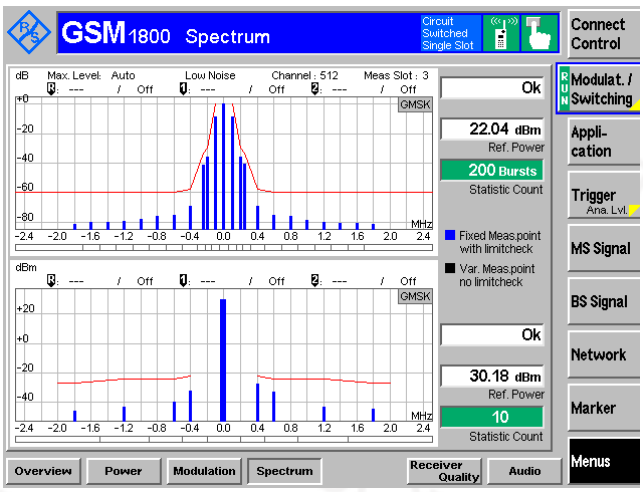
LV,HT Condition Power Control Level 0, Middle Channel



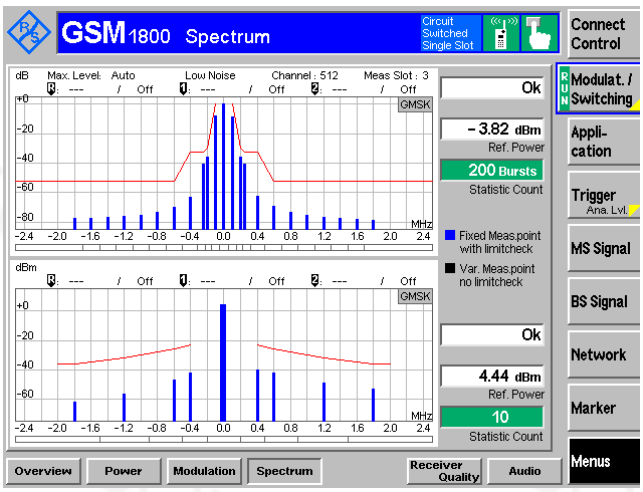
LV,HT Condition Power Control Level 15, Middle Channel



LV,HT Condition Power Control Level 0, Low Channel

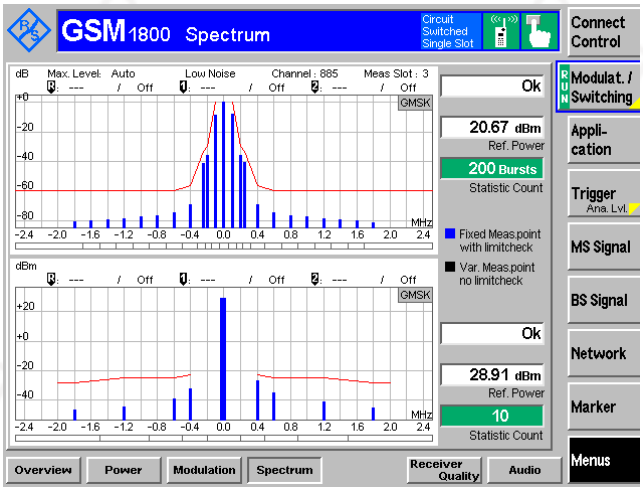


LV,HT Condition Power Control Level 15, Low Channel

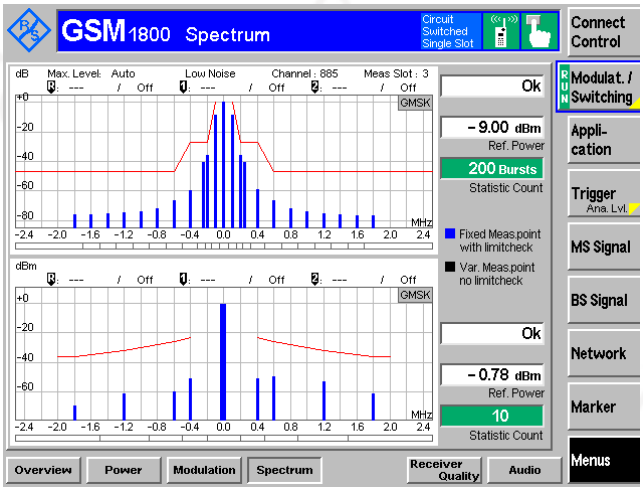


Extreme Condition

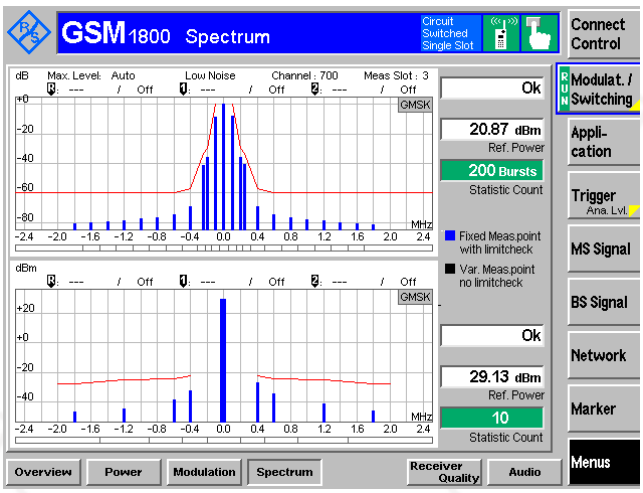
HV,HT Condition Power Control Level 0, High Channel



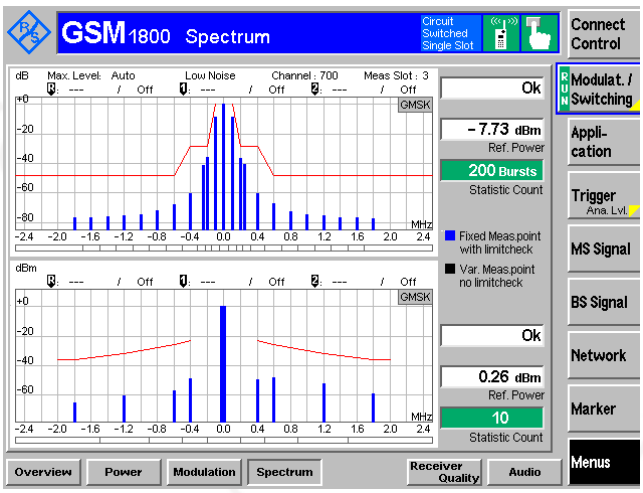
HV,HT Condition Power Control Level 15, High Channel



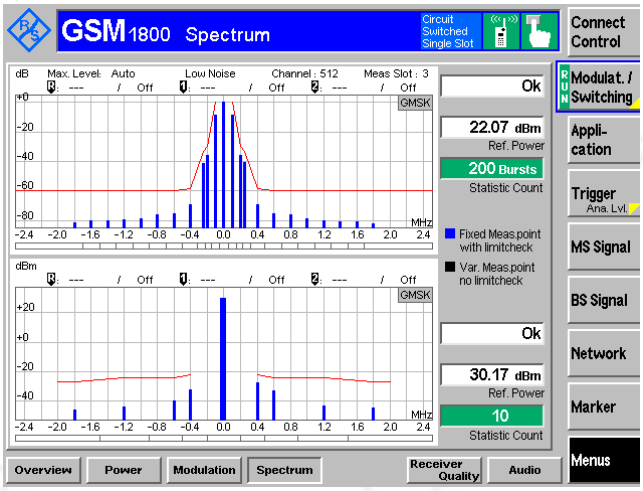
HV,HT Condition Power Control Level 0, Middle Channel



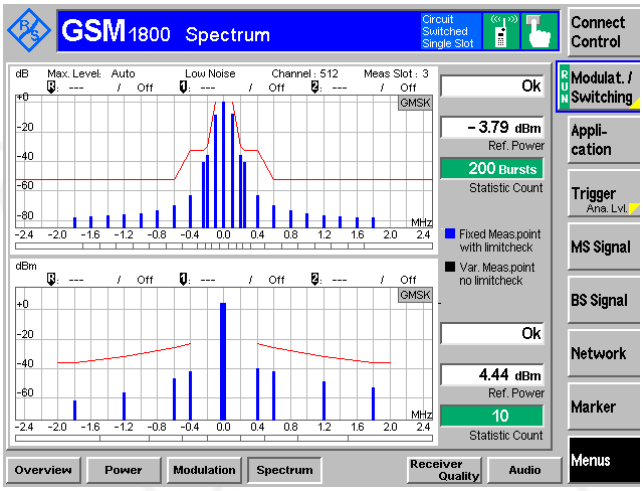
HV,HT Condition Power Control Level 15, Middle Channel



HV,HT Condition Power Control Level 0, Low Channel

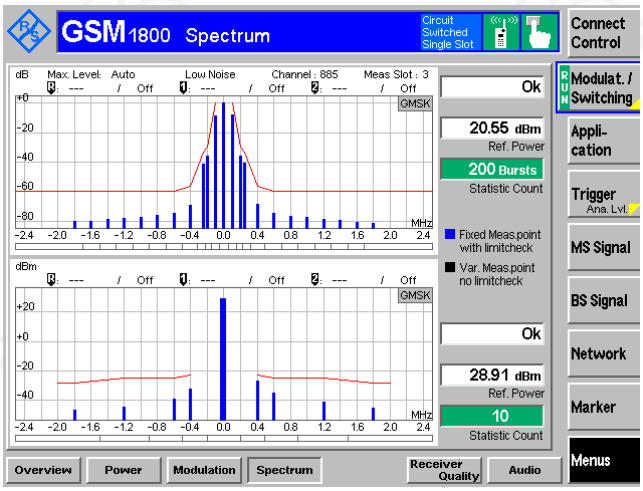


HV,HT Condition Power Control Level 15, Low Channel

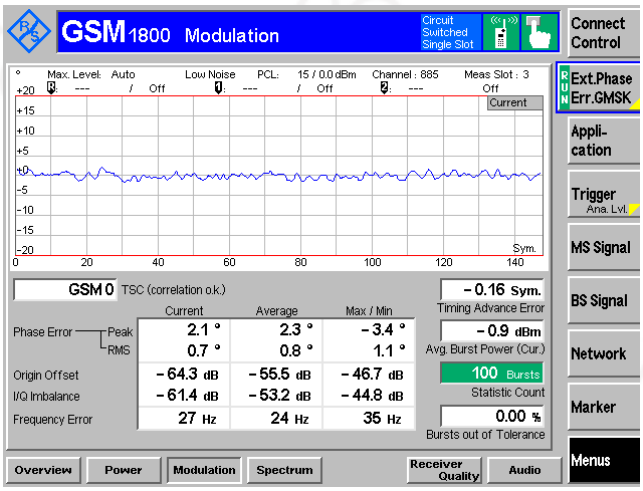


Extreme Condition

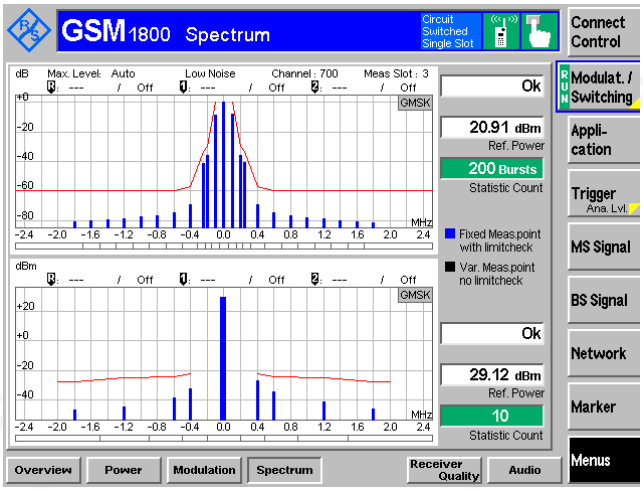
HV,LT Condition Power Control Level 0, High Channel



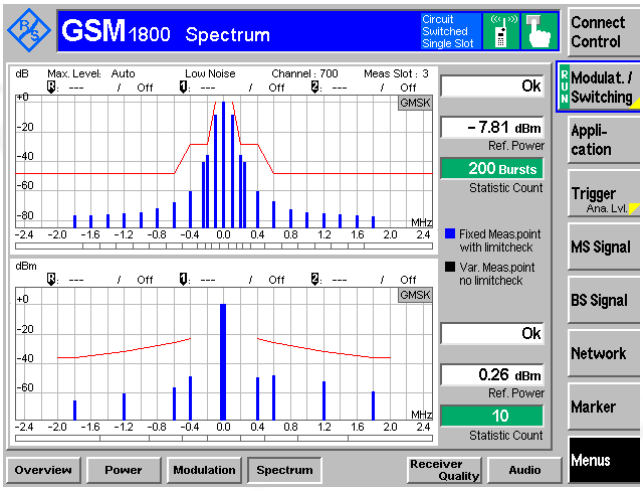
HV,LT Condition Power Control Level 15, High Channel



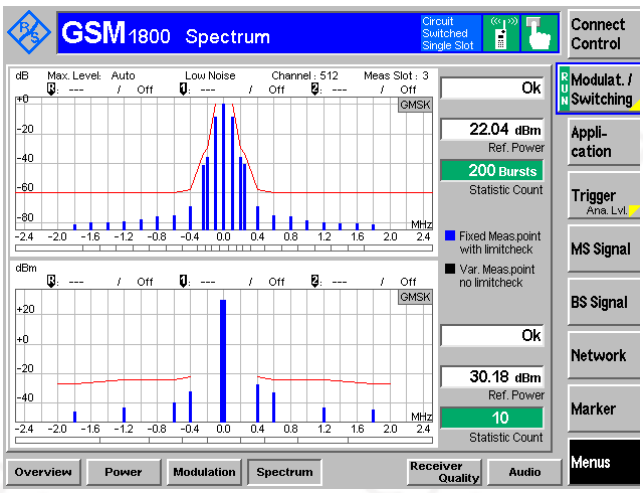
HV,LT Condition Power Control Level 0, Middle Channel



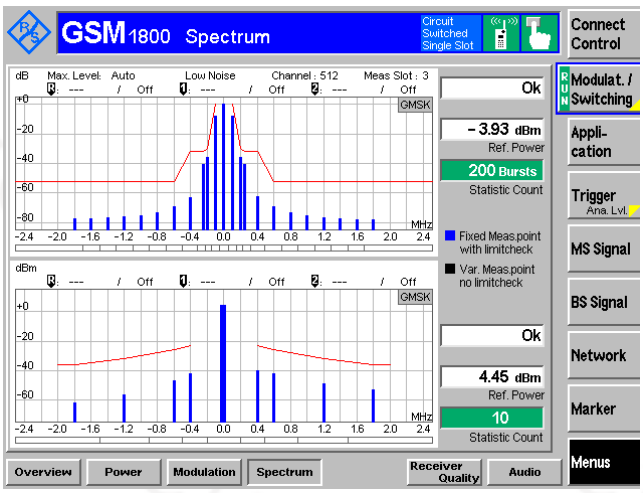
HV,LT Condition Power Control Level 15, Middle Channel



HV,LT Condition Power Control Level 0, Low Channel



HV,LT Condition Power Control Level 15, Low Channel



SPURIOUS EMISSIONS IN THE MS RECEIVE BANDS DATA

For GSM900 Band (925-935)MHz Limited:-67 dBm

(935-960)MHz Limited:-79 dBm

Middle channel

Frequency range (MHz)	Frequency (MHz)	Level (dBm)				
		Normal	L T L V	H T L V	L T H V	H T H V
925-935	930.82	-72.43	-72.76	-73.34	-71.54	-74.45
935-960	938.39	-85.54	-83.53	-81.78	-82.64	-82.76
	948.86	-82.65	-84.45	-82.76	-83.53	-82.32

Result: PASS

For DCS1800 Band_(Limit:-71dBm)

Middle channel

Frequency range (MHz)	Frequency (MHz)	Level (dBm)				
		Normal	L T L V	H T L V	L T H V	H T H V
1805-1880	1808.67	-75.75	-74.78	-73.87	-75.35	-74.35
	1823.32	-75.24	-75.85	-72.78	-74.75	-75.75
	1857.54	-74.52	-74.63	-74.76	-73.35	-75.67
	1876.42	-76.00	-73.64	-73.86	-75.34	-73.22

3.6 TRANSMITTER OUTPUT POWER IN GPRS MULTISLOT CONFIGURATION

Applicable Standard

According to EN 301 511, section 4.2.10,

Test Procedure

1. 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 dB under normal conditions; 3GPP TS 05.05, subclause 4.1.1, first table.
2. 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.
3. 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 GSM 400, GSM 700, GSM 850 and GSM 900), fourth table (for DCS 1 800) or fifth table (for PCS 1 900), from the lowest power control level up to the maximum output power corresponding to the class of the MS (for tolerance on maximum output power see conformance requirements 1), with a tolerance of ±3 dB, ±4 dB or ±5 dB under normal conditions; 3GPP TS 05.05, subclause 4.1.1, third, fourth or fifth table.
4. The power control levels shall have the nominal output power levels as defined in 3GPP TS 05.05, Subclause 4.1.1, third table (for GSM 400, GSM 700, GSM 850 and GSM 900), fourth table (for DCS 1 800) or fifth table (for PCS 1 900), from the lowest power control level up to the maximum output power corresponding to the class of the MS (for tolerance on maximum output power see conformance requirements 2), with a tolerance of ±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.
5. The output power actually transmitted by the MS at consecutive power control levels shall form a monotonic sequence and the interval between power control levels shall be 2 ± 1,5 dB (1 ± 1dB between power control level 30 and 31 for PCS 1 900); 3GPP TS 05.05, subclause 4.1.1.
6. The transmitted power level relative to time for a normal burst shall be within the power/time template given in 3GPP TS 05.05, annex B 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.

7. 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 DCS 1 800 and PCS 1 900 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 DCS 1800 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.

8. 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.

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).

c) 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.

d) 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.

e) 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 a) to b) and corresponding measurements on each timeslot within the multislot configuration are repeated. 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 cell re-selection or a new request for radio resource. In the case of a cell reselection 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 DCS 1 800 Class 3 and the Power Level is indicated by the MS_TXPWR_MAX_CCH parameter, 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 0 dB reference for the power/time template.

g) 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).

h) 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 DCS 1 800 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 (+23 dBm for GSM 400, GSM 700, GSM 850 and GSM 900 or +10 dBm for DCS 1 800 and PCS 1 900) and then steps f) to g) are repeated.

i) 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.

Environmental Conditions

Temperature	25° C
Relative Humidity	56%
ATM Pressure	100.2kPa

Test Results: Pass.

For more details,please see the next page.

GSM900 Output Power in GPRS

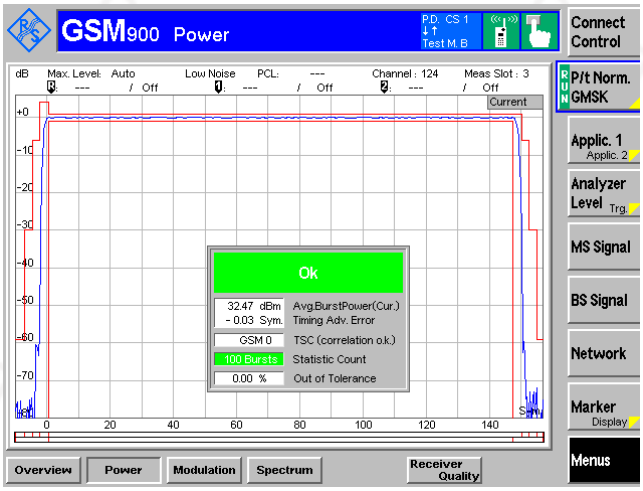
High Channel F = 914.8 MHz						
γ=	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
3	32.47	32.53	32.45	32.55	32.43	Pass
4	30.29	30.36	30.27	30.37	30.26	Pass
5	28.27	28.33	28.25	28.35	28.23	Pass
6	26.32	26.39	26.35	26.42	26.28	Pass
7	24.37	24.43	24.35	24.45	24.33	Pass
8	22.38	22.44	22.25	22.46	22.34	Pass
9	20.41	20.47	20.39	20.49	20.37	Pass
10	18.40	18.51	18.42	18.52	18.43	Pass
11	16.43	16.49	16.41	16.51	16.39	Pass
12	14.39	14.45	14.37	14.47	14.35	Pass
13	12.41	12.46	12.38	12.48	12.37	Pass
14	10.46	10.52	10.44	10.54	10.42	Pass
15	8.41	8.46	8.39	8.49	8.36	Pass
16	6.45	6.51	6.40	6.53	6.41	Pass
17	4.78	4.84	4.76	4.86	4.77	Pass

Middle Channel F = 902.00 MHz						
γ=	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
3	32.36	32.42	32.34	32.44	32.32	Pass
4	30.26	30.35	30.24	30.34	30.22	Pass
5	28.25	28.31	28.23	28.33	28.21	Pass
6	26.31	26.37	26.29	26.39	26.28	Pass
7	24.34	24.4	24.32	24.42	24.3	Pass
8	22.37	22.43	22.33	22.45	22.33	Pass
9	20.43	20.47	20.41	20.51	20.39	Pass
10	18.47	18.53	18.45	18.55	18.42	Pass
11	16.46	16.52	16.44	16.54	16.42	Pass
12	14.49	14.55	14.46	14.57	14.45	Pass
13	12.48	12.54	12.46	12.56	12.44	Pass
14	10.53	10.59	10.51	10.67	10.49	Pass
15	8.49	8.55	8.47	8.57	8.45	Pass
16	6.55	6.61	6.53	6.63	6.51	Pass
17	4.92	4.98	4.90	5.01	4.92	Pass

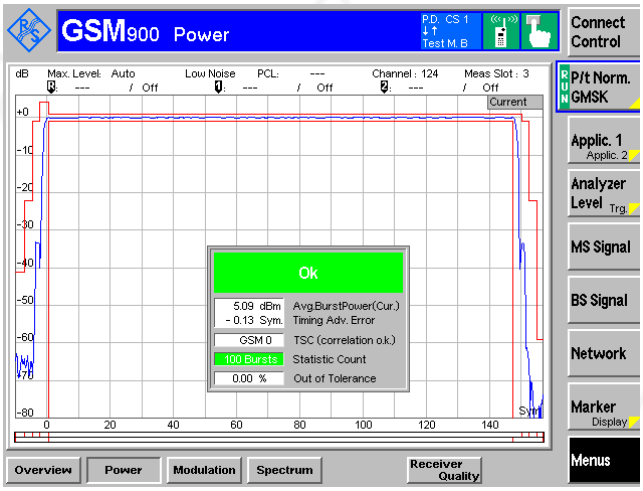
Low Channel F = 880.2 MHz						
γ=	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
3	32.46	32.52	32.44	32.54	32.42	Pass
4	30.27	30.33	30.25	30.35	30.22	Pass
5	28.28	28.35	28.26	28.36	28.24	Pass
6	26.30	26.36	26.28	26.31	26.26	Pass
7	24.35	24.41	24.32	24.43	24.31	Pass
8	22.39	22.45	22.37	22.47	22.35	Pass
9	20.43	20.42	20.41	20.51	20.39	Pass
10	18.38	18.44	18.36	18.46	18.34	Pass
11	16.42	16.48	16.4	16.5	16.38	Pass
12	14.43	14.49	14.41	14.51	14.39	Pass
13	12.51	12.57	12.49	12.59	12.47	Pass
14	10.52	10.58	10.5	10.6	10.49	Pass
15	8.47	8.53	8.45	8.55	8.43	Pass
16	6.62	6.68	6.61	6.75	6.58	Pass
17	4.78	4.84	4.76	4.86	4.74	Pass

Normal Condition:

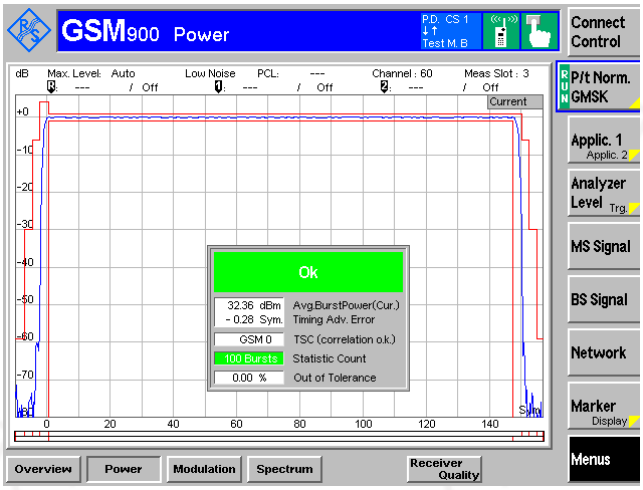
Normal Condition (γ=3), High Channel



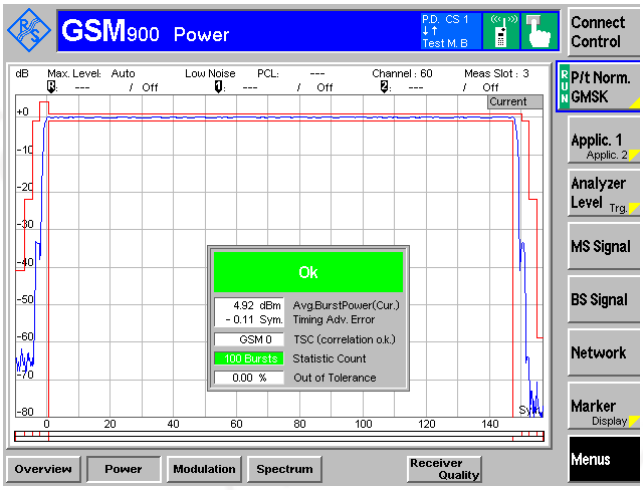
Normal Condition (γ=17), High Channel



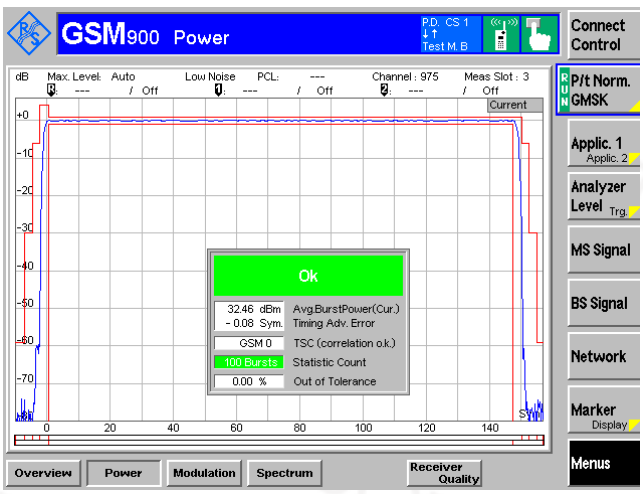
Normal Condition (γ=3), Middle Channel



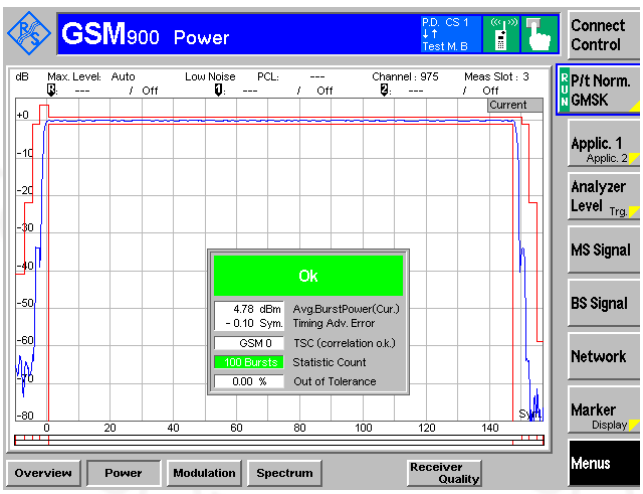
Normal Condition (γ=17), Middle Channel



Normal Condition (γ=3), Low Channel



Normal Condition (γ=17), Low Channel



GSM1800 Output Power in GPRS

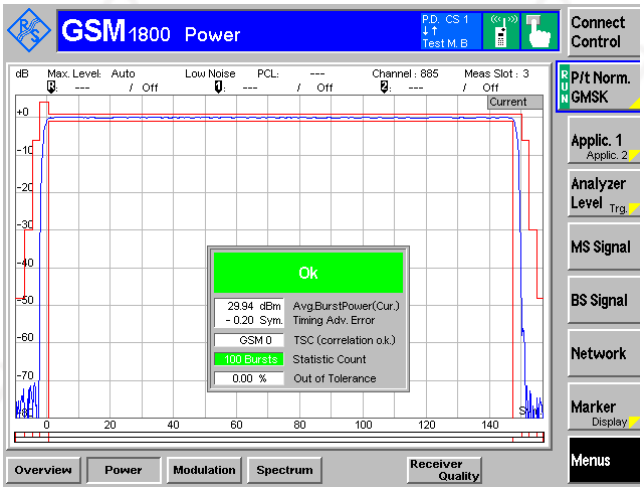
High Channel F = 1784.8 MHz						
γ=	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
3	29.94	30	29.92	30.02	29.9	Pass
4	27.83	27.89	27.81	27.91	27.79	Pass
5	25.89	25.96	25.87	25.92	25.85	Pass
6	23.83	23.85	23.81	23.91	23.79	Pass
7	21.86	21.91	21.82	21.96	21.84	Pass
8	19.97	20.03	19.95	20.05	19.93	Pass
9	17.95	18.01	17.93	18.01	17.90	Pass
10	15.98	16.04	15.96	16.06	15.94	Pass
11	14.02	14.08	14.01	14.11	13.98	Pass
12	14.03	14.09	14.01	14.11	13.99	Pass
13	12.05	12.11	12.03	12.13	12.01	Pass
14	10.04	10.12	10.02	10.12	10.02	Pass
15	7.99	8.05	7.97	8.07	7.95	Pass
16	6.06	6.11	6.04	6.14	6.02	Pass
17	2.06	2.12	2.04	2.14	2.02	Pass
18	1.23	1.29	1.21	1.30	1.18	Pass

Middle Channel F = 1747.8 MHz						
γ=	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
3	29.65	29.71	29.63	29.73	29.61	Pass
4	27.22	27.28	27.25	27.30	27.18	Pass
5	25.27	25.33	25.26	25.31	25.23	Pass
6	23.26	23.32	23.24	23.34	23.22	Pass
7	21.33	21.35	21.31	21.41	21.29	Pass
8	19.30	19.36	19.25	19.38	19.26	Pass
9	17.25	17.31	17.23	17.33	17.21	Pass
10	15.23	15.29	15.21	15.31	15.15	Pass
11	13.26	13.32	13.24	13.34	13.22	Pass
12	11.25	11.32	11.23	11.33	11.21	Pass
13	9.15	9.21	9.11	9.23	9.13	Pass
14	7.15	7.21	7.14	7.21	7.11	Pass
15	5.15	5.20	5.15	5.23	5.15	Pass
16	3.19	3.25	3.17	3.26	3.15	Pass
17	1.15	1.21	1.13	1.23	1.11	Pass
18	1.05	1.11	1.03	1.13	1.01	Pass

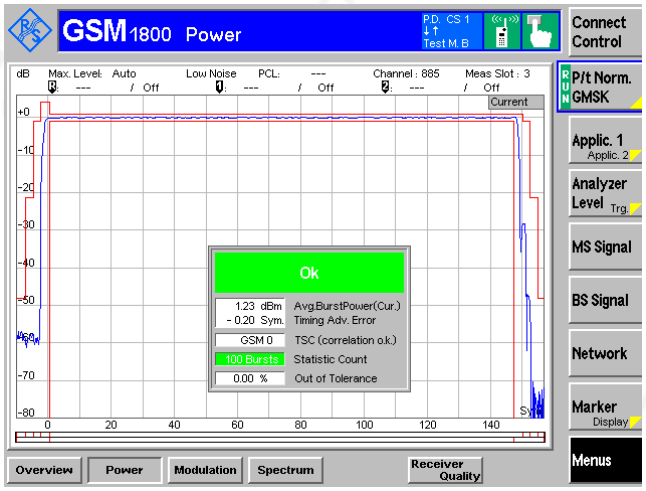
Low Channel F = 1710.2 MHz						
γ=	Output Power(dBm)					Result
	Normal	L.T.L.V	H.T.L.V	L.T.H.V.	H.T.H.V	
3	29.45	29.51	29.43	29.53	29.41	Pass
4	27.02	27.08	27.01	27.12	26.98	Pass
5	25.00	25.06	24.98	25.08	24.96	Pass
6	22.95	23.01	22.93	23.03	22.91	Pass
7	20.93	20.99	20.91	21.01	20.89	Pass
8	18.92	18.98	18.91	19.25	18.88	Pass
9	16.87	16.93	16.85	16.95	16.83	Pass
10	14.85	14.91	14.83	14.93	14.81	Pass
11	12.76	12.82	12.74	12.84	12.72	Pass
12	10.71	10.77	10.69	10.79	10.67	Pass
13	8.72	8.71	8.70	8.68	8.68	Pass
14	6.70	6.76	6.51	6.75	6.67	Pass
15	4.72	4.78	4.72	4.81	4.65	Pass
16	2.65	2.74	2.64	2.76	2.64	Pass
17	0.65	0.71	0.63	0.72	0.60	Pass
18	0.08	0.14	0.06	0.16	0.04	Pass

Normal Condition:

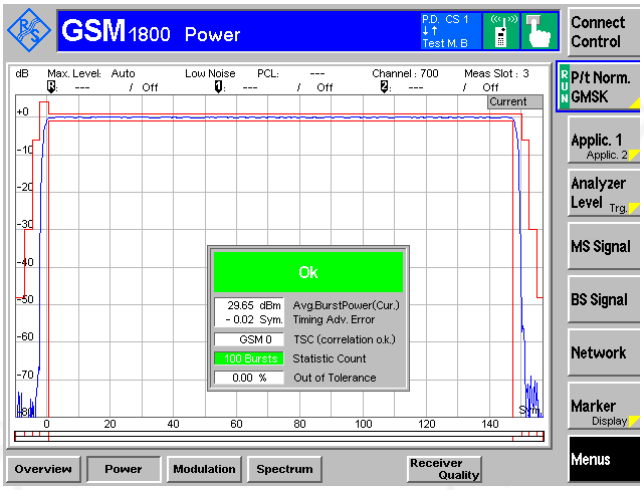
Normal Condition (γ=3), High Channel



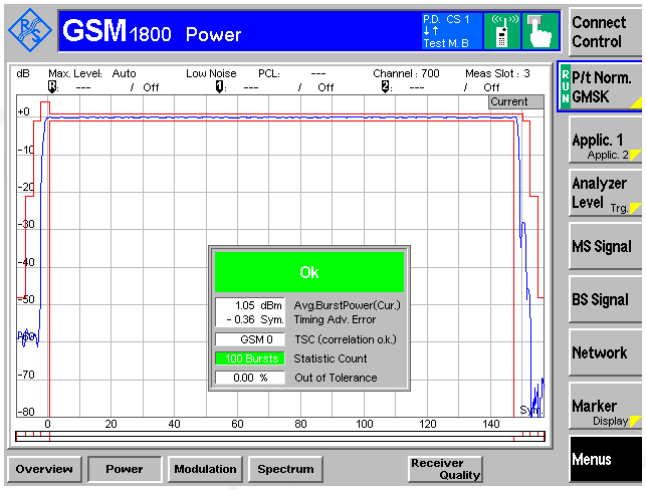
Normal Condition (γ=18), High Channel



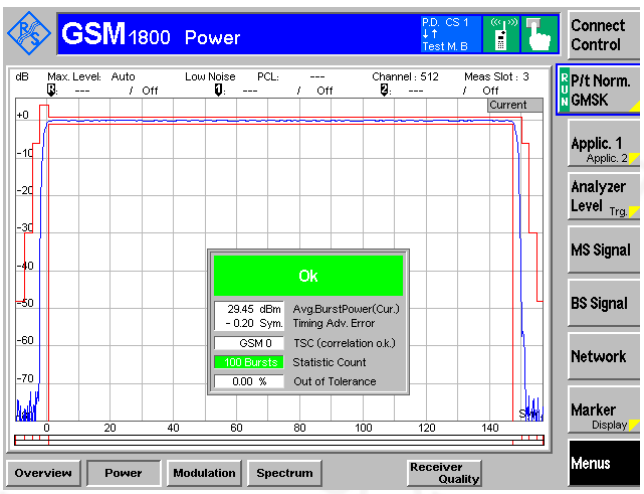
Normal Condition (γ=3), Middle Channel



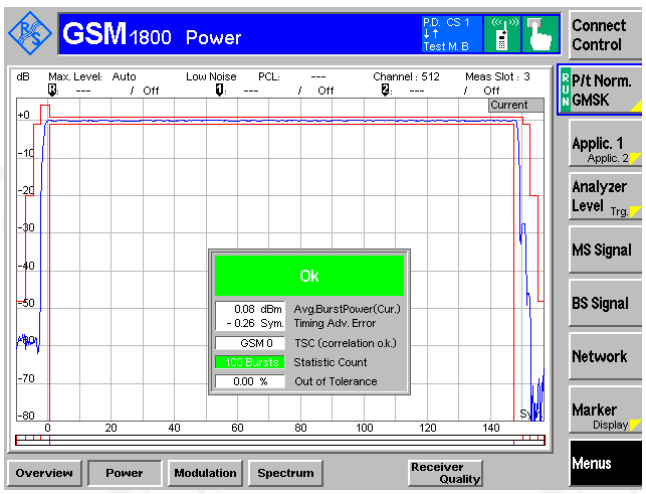
Normal Condition (γ=18), Middle Channel



Normal Condition (γ=3), Low Channel



Normal Condition (γ=18), Low Channel



3.7 OUTPUT RF SPECTRUM IN GPRS MULTISLOT CONFIGURATION

Applicable Standard

According to EN 301 511, section 4.2.11,

1. The level of the output RF spectrum due to modulation shall be no more than that given in 3GPP TS 05.05, subclause 4.2.1, table a) for GSM 400, GSM 700, GSM 850 and GSM 900, table b) for DCS 1800 or table c) for PCS 1900, with the following lowest measurement limits:
   - 36 dBm below 600 kHz offset from the carrier;
   - -51 dBm for GSM 400, GSM 700, GSM 850 and GSM 900 or -56 dBm for DCS 1 800 and PCS 1 900 from 600 kHz out to less than 1 800 kHz offset from the carrier;
   - -46 dBm for GSM 400, GSM 700, GSM 850 and GSM 900 or -51 dBm for DCS 1 800 and PCS 1 900 at and beyond 1 800 kHz offset from the carrier; but with the following exceptions at up to -36 dBm:
   - up to three bands of 200 kHz width centred on a frequency which is an integer multiple of 200 kHz in the combined range 600 kHz to 6 000 kHz above and below the carrier;
   - up to 12 bands of 200 kHz width centred on a frequency which is an integer multiple of 200 kHz at more than 6 000 kHz offset from the carrier.

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

   1.2 Under extreme conditions; 3GPP TS 05.05, subclause 4.2.1; 3GPP TS 05.05, annex D subclauses D.2.1 and D.2.2.
2. The level of the output RF spectrum due to switching transients shall be no more than given in 3GPP TS 05.05, subclause 4.2.2, table "a) Mobile Station".

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

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

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.

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

b) The other settings of the spectrum analyzer are set as follows:
   - Zero frequency scan;
   - Resolution bandwidth: 30 kHz;
   - Video bandwidth: 30 kHz;
- Video averaging: may be used, depending on the implementation of the test.

   The MS is commanded to its maximum power control level in every transmitted time slot.

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

d) The resolution and video bandwidth on the spectrum analyzer are adjusted to 100 kHz and the measurements are made at the following frequencies:
on every ARFCN from 1 800 kHz offset from the carrier to the edge of the relevant transmit band for each measurement over 50 bursts.
at 200 kHz intervals over the 2 MHz either side of the relevant transmit band for each measurement over 50 bursts.
For GSM 400, GSM 900 and DCS 1800:
at 200 kHz intervals over the band 925 MHz to 960 MHz for each measurement over 50 bursts.
at 200 kHz intervals over the band 1 805 MHz to 1 880 MHz for each measurement over 50 bursts.

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

g) 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.

Environmental Conditions

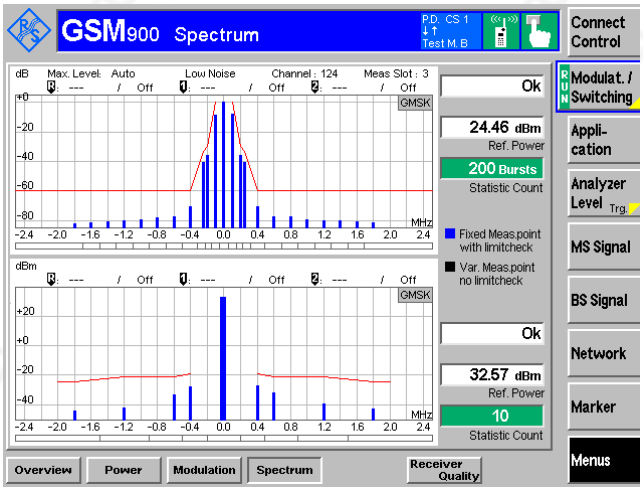
Temperature	25° C
Relative Humidity	56%
ATM Pressure	100.2kPa

TEST RESULT: Pass

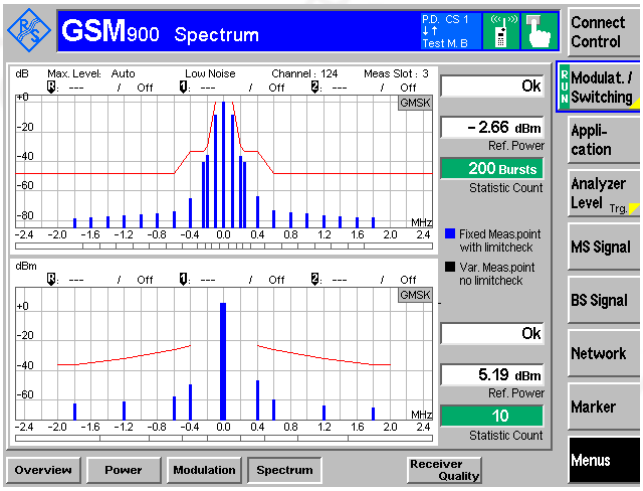
Please see the following plots.

GSM900

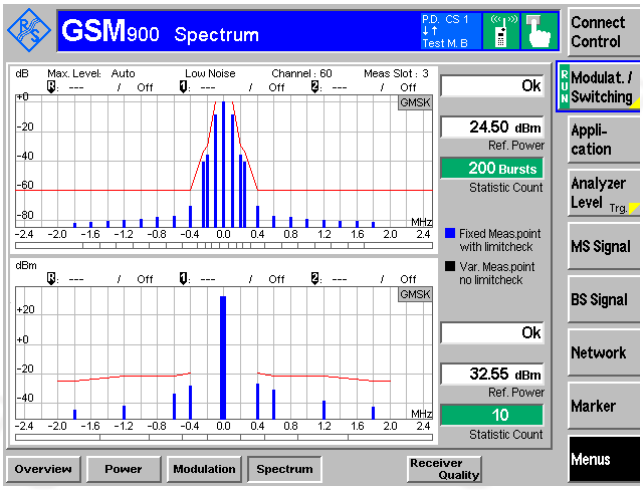
Normal Condition (γ=3), High Channel



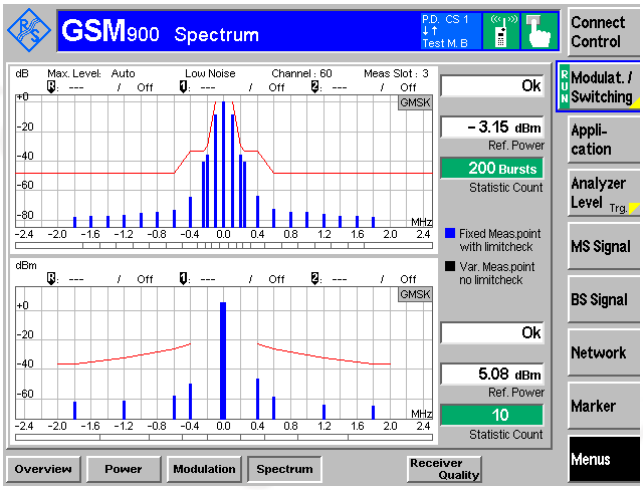
Normal Condition (γ=17), High Channel



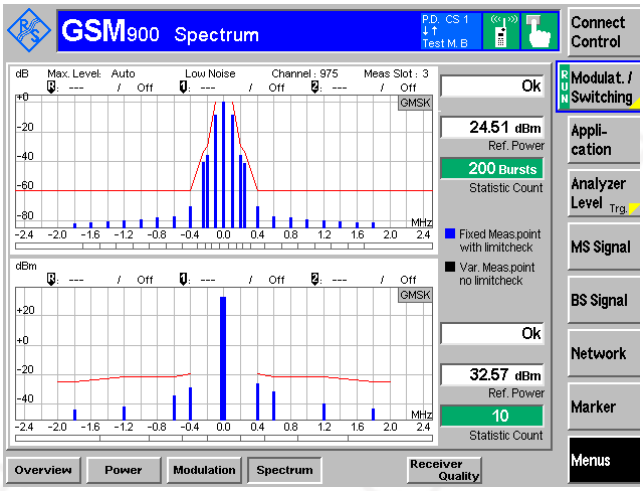
Normal Condition (γ=3),Middle Channel



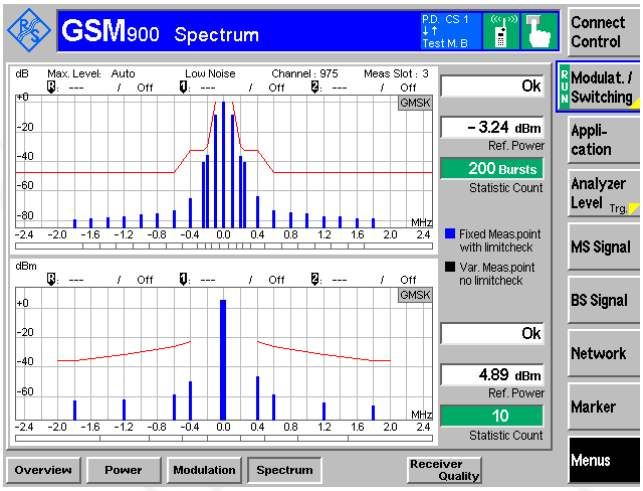
Normal Condition (γ=17), Middle Channel



Normal Condition (γ=3), Low Channel

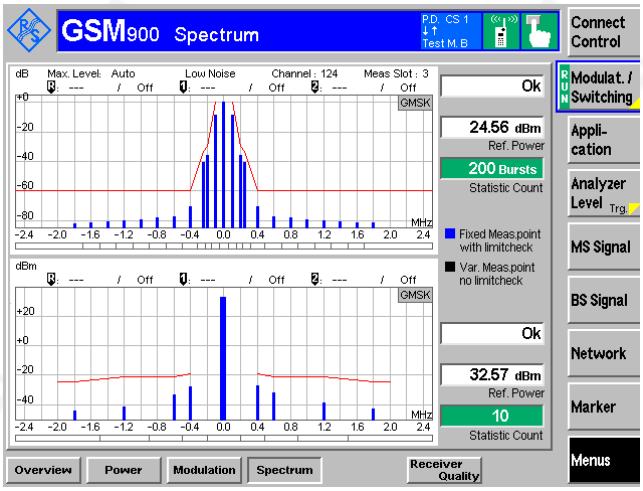


Normal Condition (γ=17), Low Channel

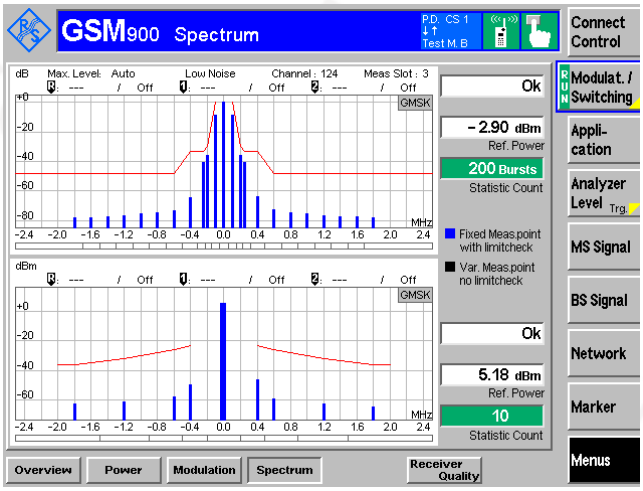


Extreme Condition

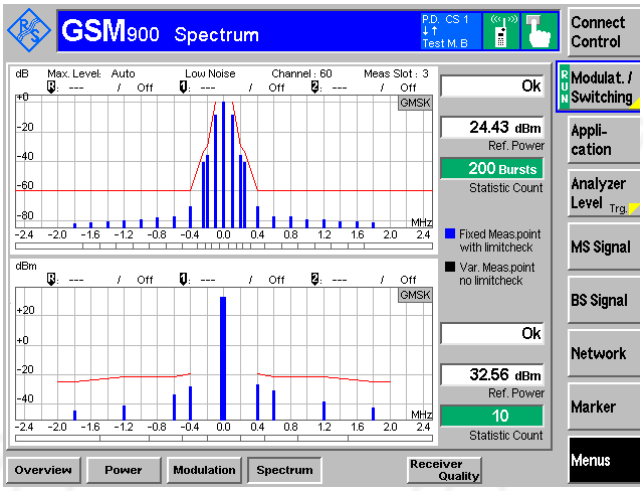
HT,HV Condition (γ=3), High Channel



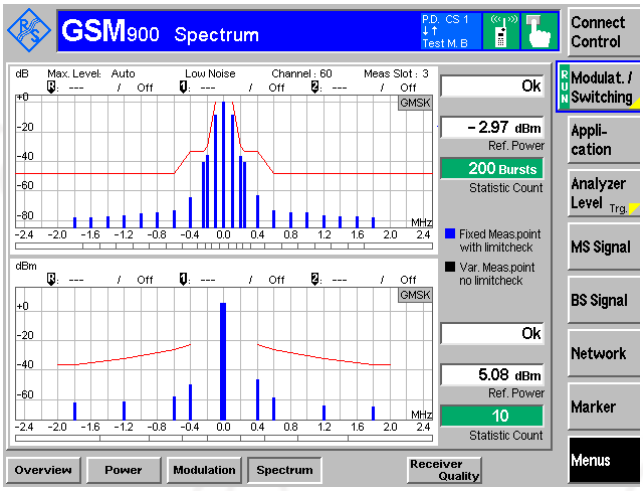
HT,HV Condition (γ=17), High Channel



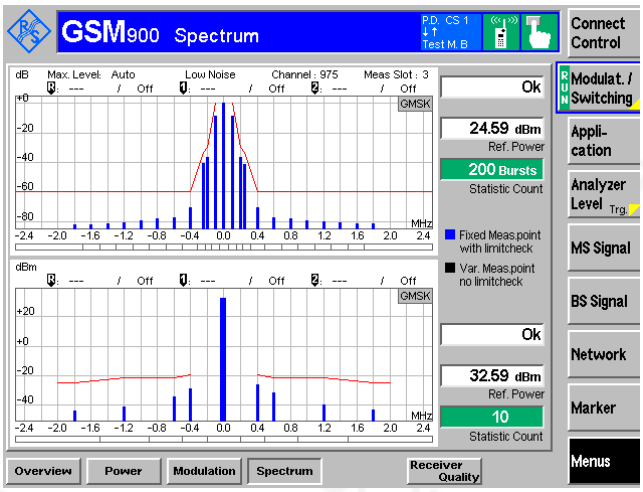
HT,HV Condition (γ=3), Middle Channel



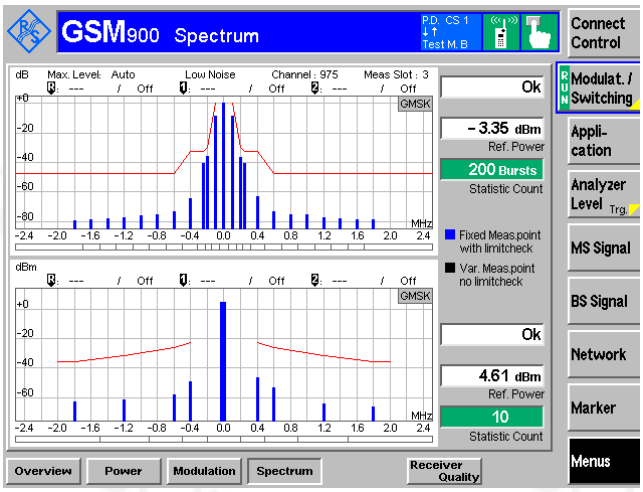
HT,HV Condition (γ=17), Middle Channel



HT,HV Condition (γ=3), Low Channel

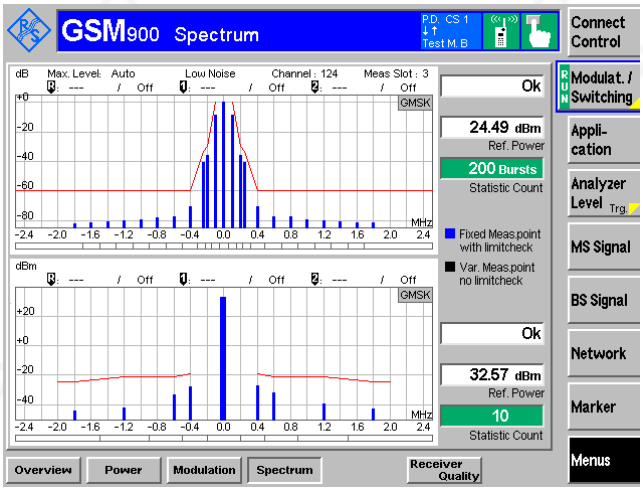


HT,HV Condition (γ=17), Low Channel

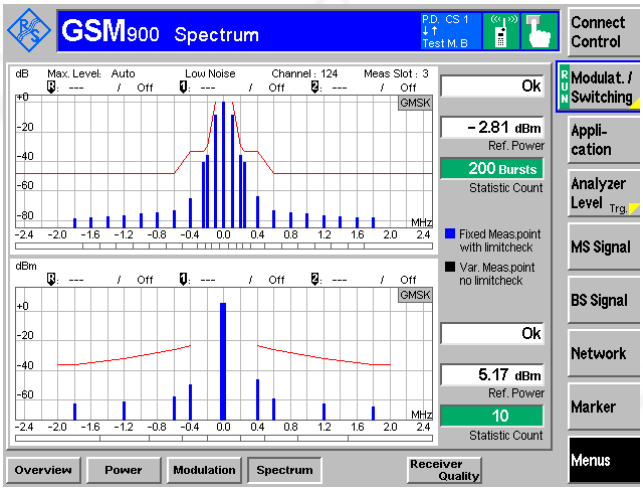


Extreme Condition

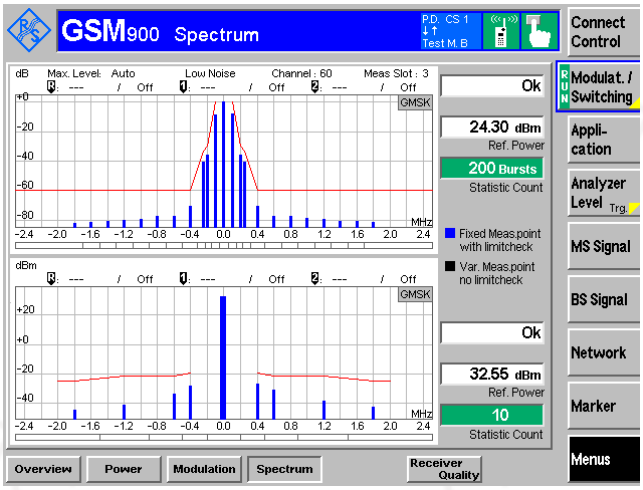
LT,HV Condition (γ=3), High Channel



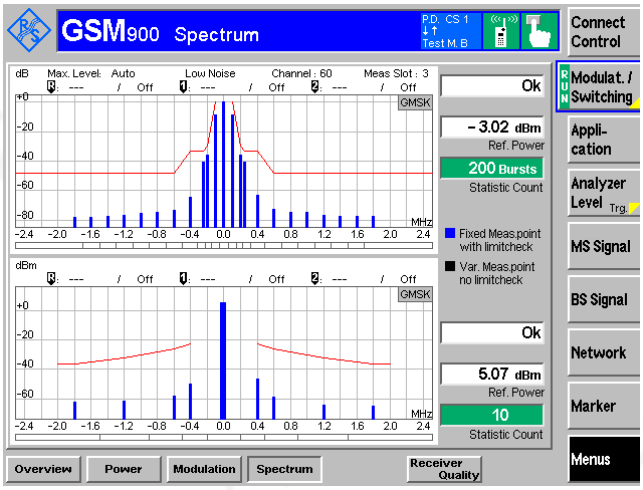
LT,HV Condition (γ=17), High Channel



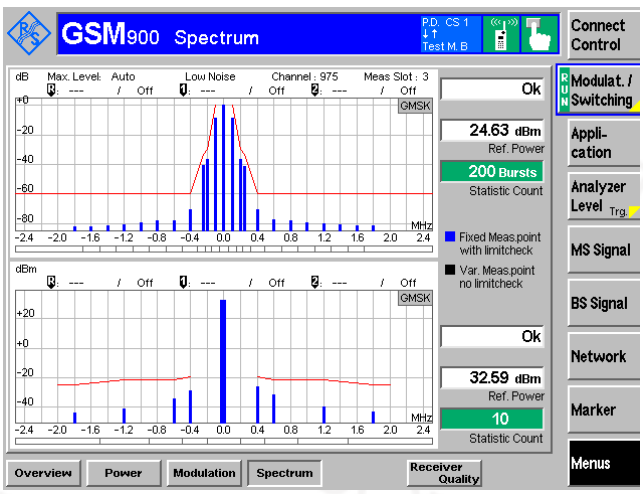
LT,HV Condition (γ=3), Middle Channel



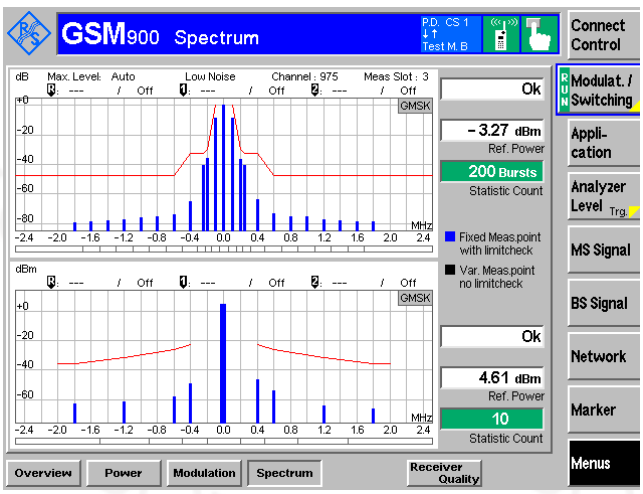
LT,HV Condition (γ=17), Middle Channel



LT,HV Condition (γ=3), Low Channel

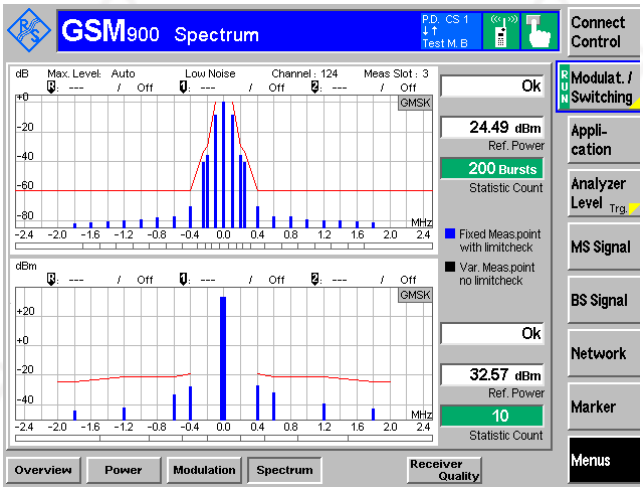


LT,HV Condition (γ=17), Low Channel

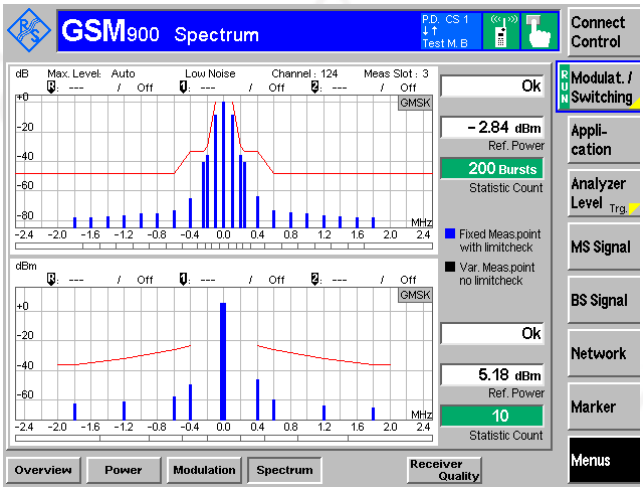


Extreme Condition

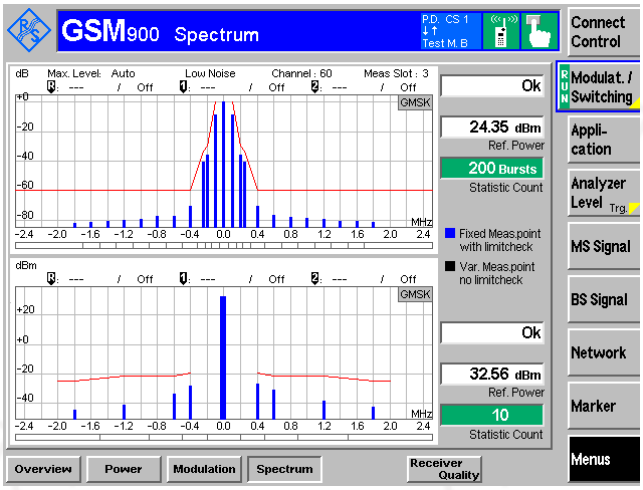
LT,LV Condition (γ=3), High Channel



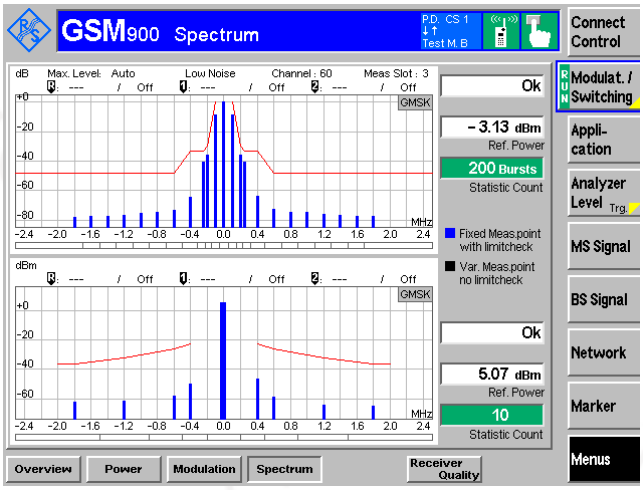
LT,LV Condition (γ=17), High Channel



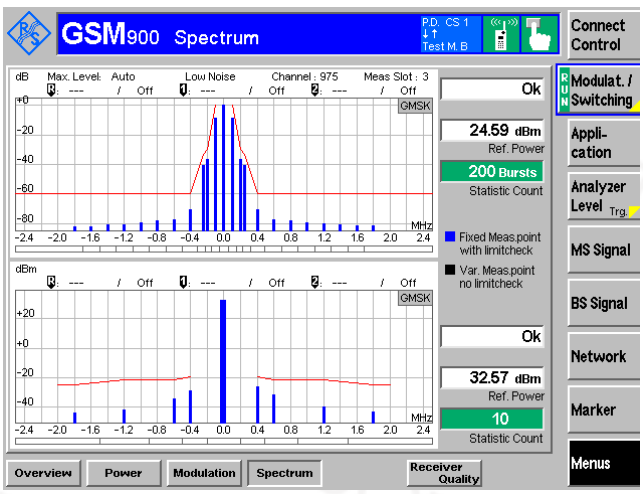
LT,LV Condition (γ=3), Middle Channel



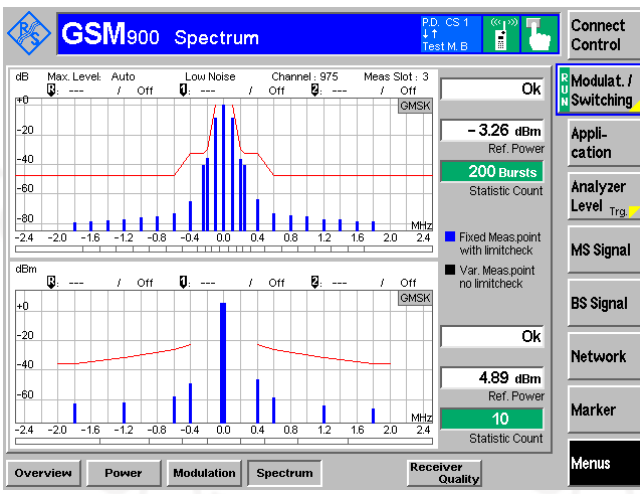
LT,LV Condition (γ=17), Middle Channel



LT,LV Condition (γ=3), Low Channel

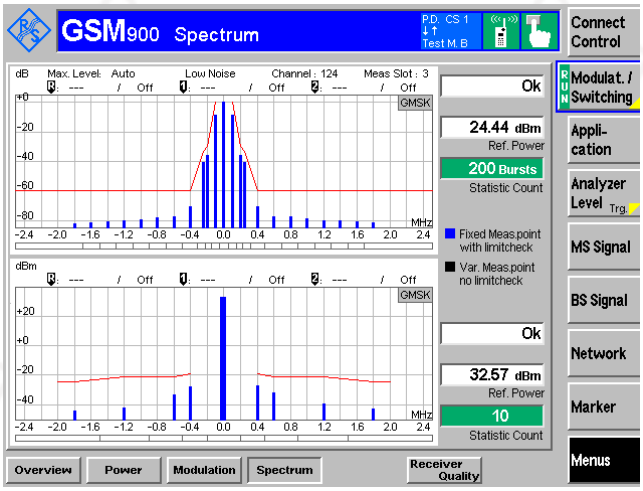


LT,LV Condition (γ=17), Low Channel

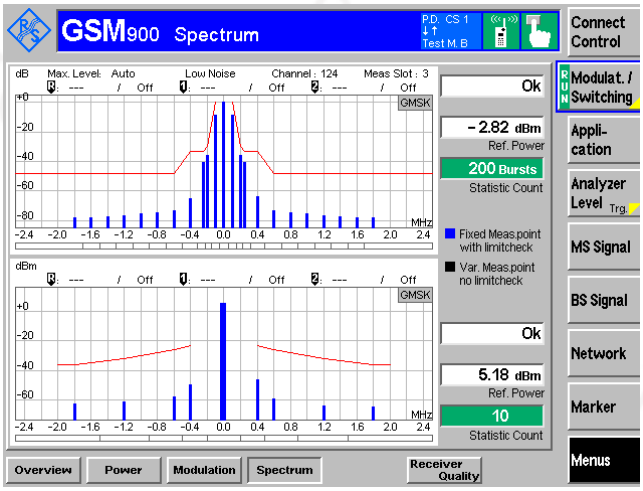


Extreme Condition

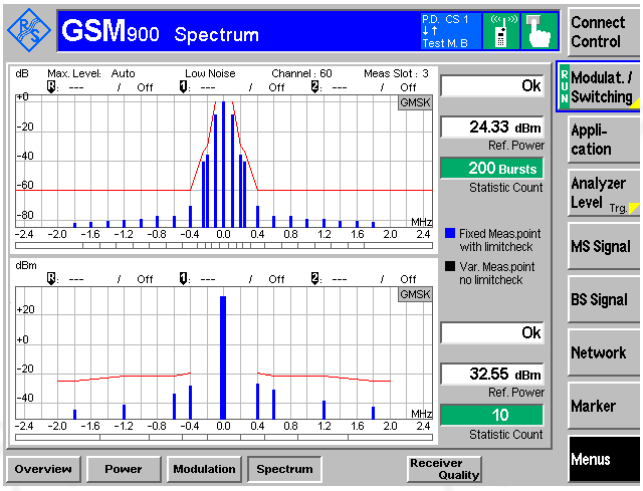
HT,LV Condition (γ=3), High Channel



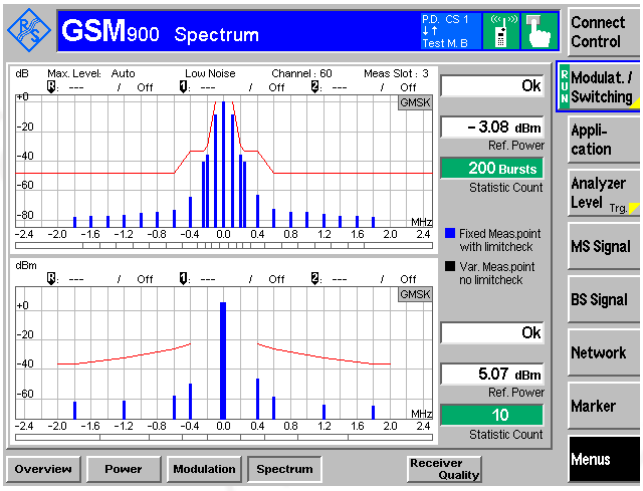
HT,LV Condition (γ=17), High Channel



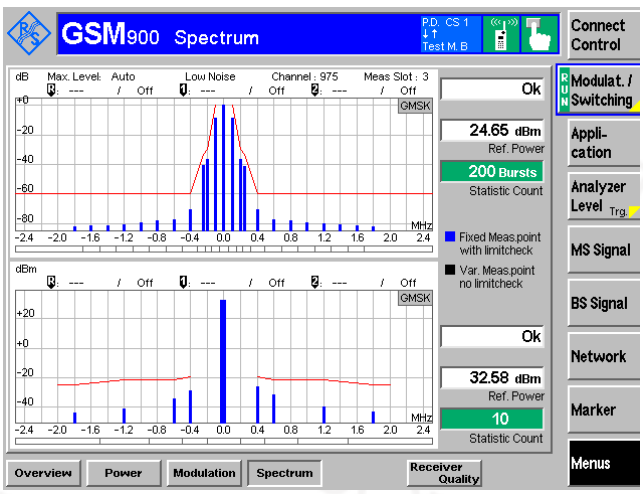
HT,LV Condition (γ=3), Middle Channel



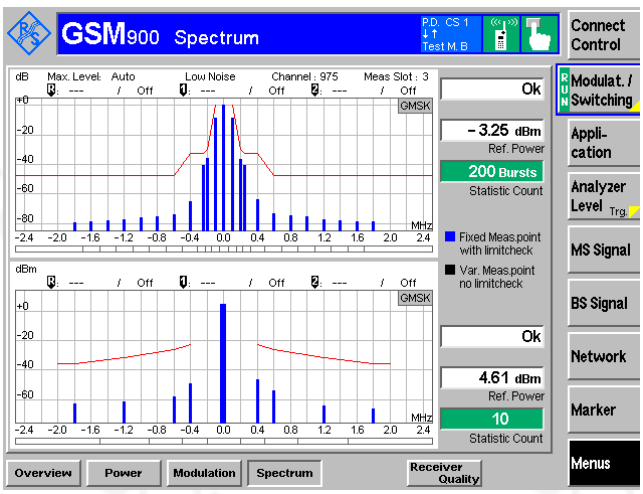
HT,LV Condition (γ=17), Middle Channel



HT,LV Condition (γ=3), Low Channel

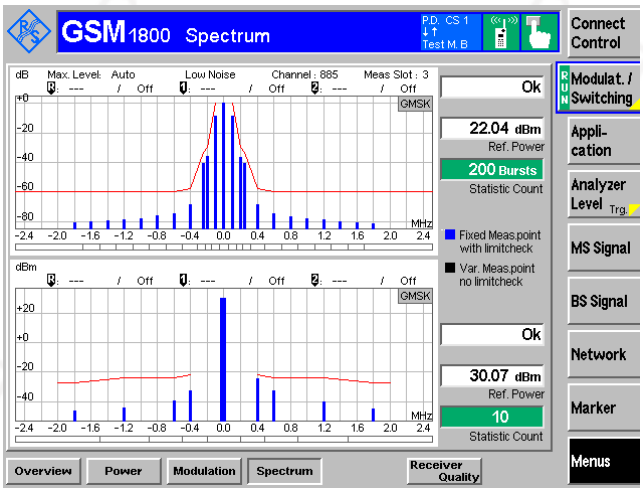


HT,LV Condition (γ=17), Low Channel

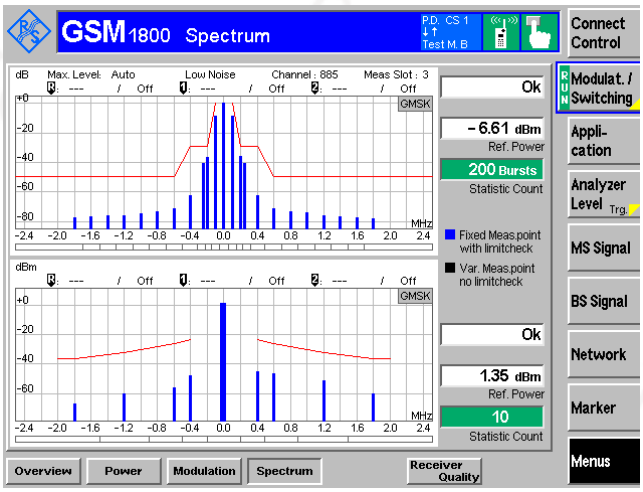


DSC1800

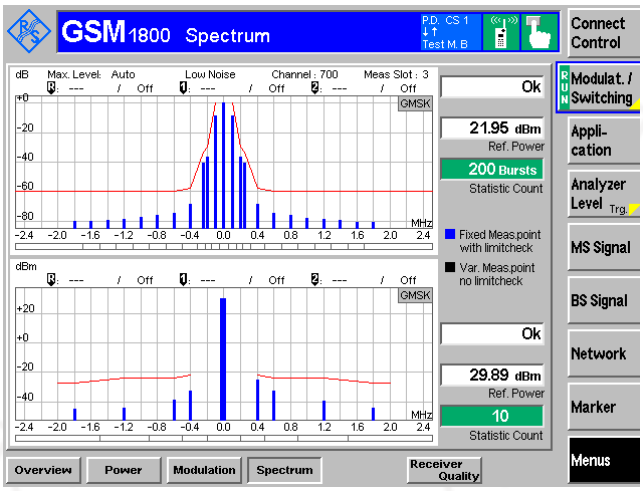
Normal Condition (γ=3), High Channel



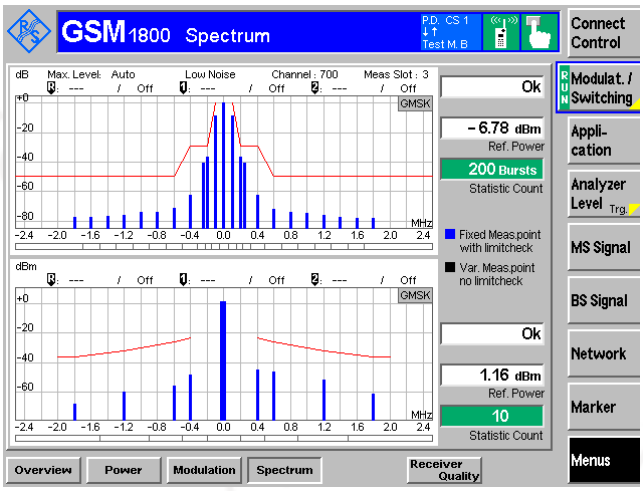
Normal Condition (γ=18), High Channel



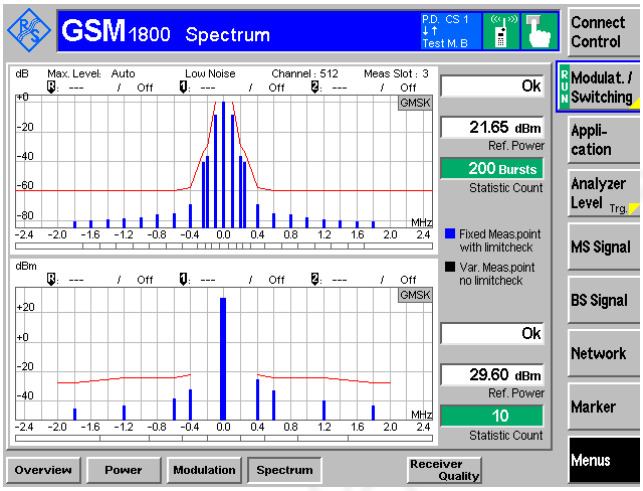
Normal Condition (γ=3), Middle Channel



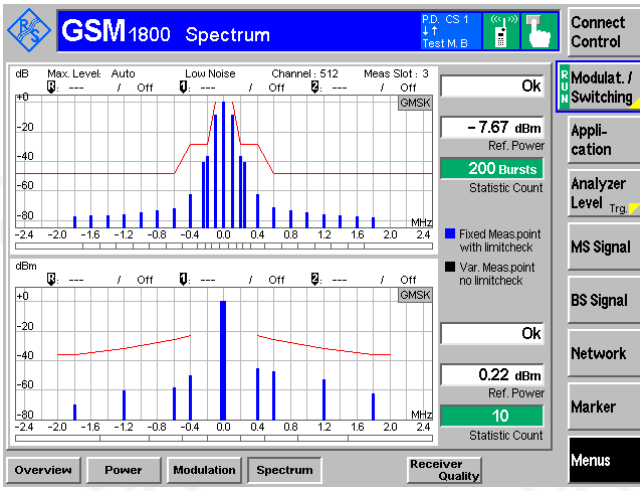
Normal Condition (γ=18), Middle Channel



Normal Condition (γ=3), Low Channel

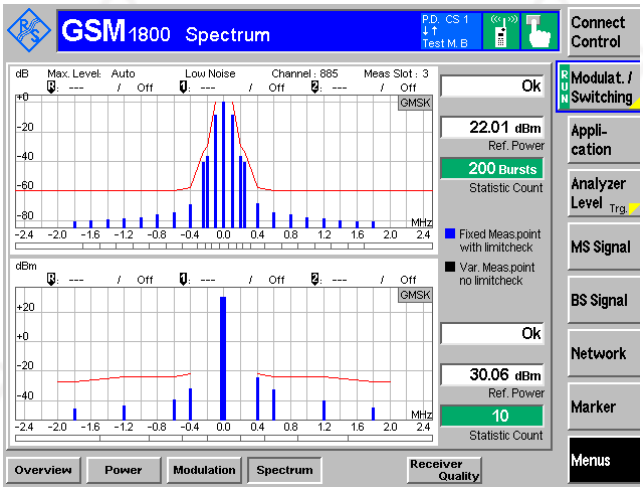


Normal Condition (γ=18), Low Channel

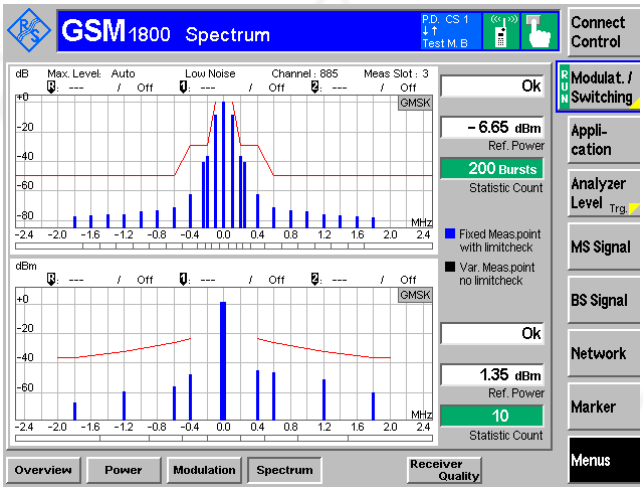


Extreme Condition

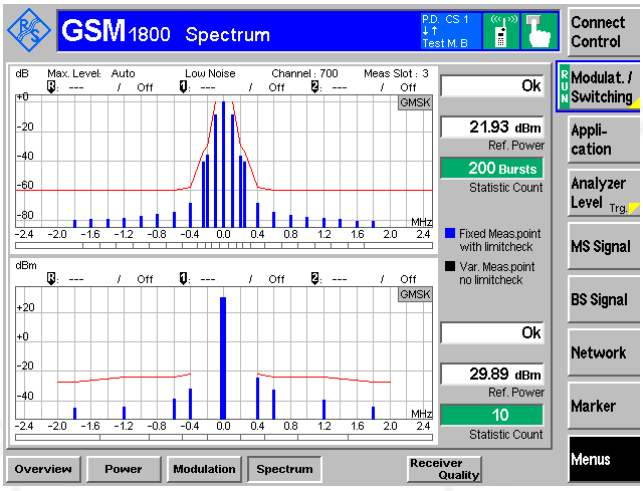
LV,LT Condition (γ=3), High Channel



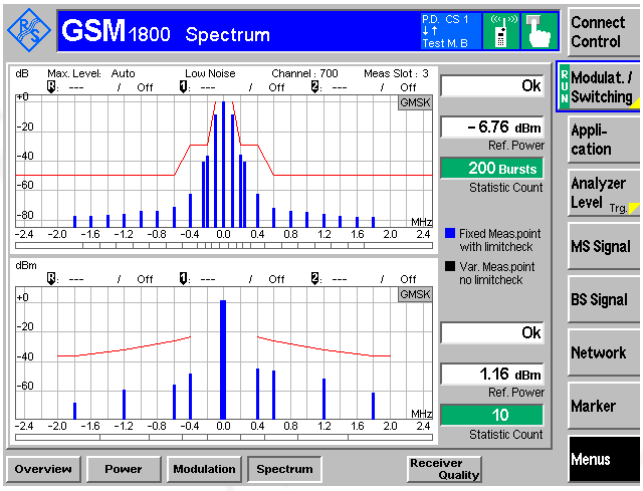
LV,LT Condition (γ=18), High Channel



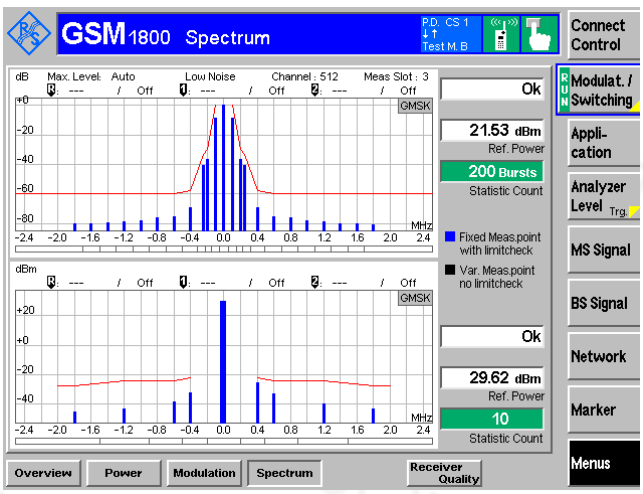
LV,LT Condition (γ=3), Middle Channel



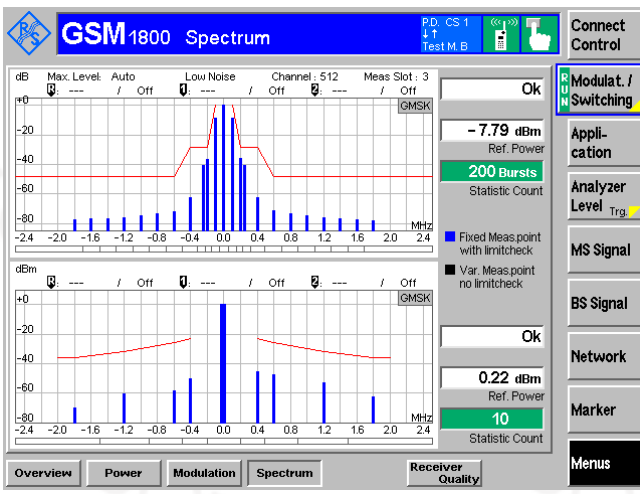
LV,LT Condition (γ=18), Middle Channel



LV,LT Condition (γ=3), Low Channel

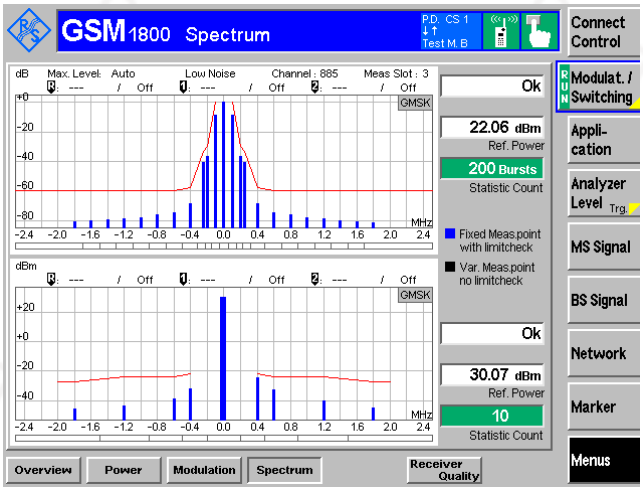


LV,LT Condition (γ=18), Low Channel

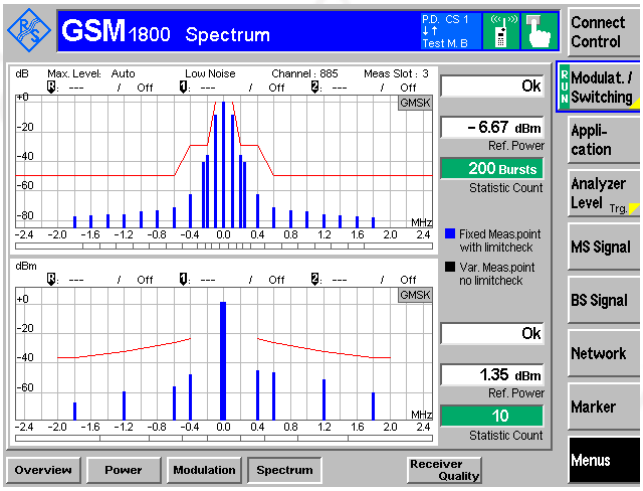


Extreme Condition

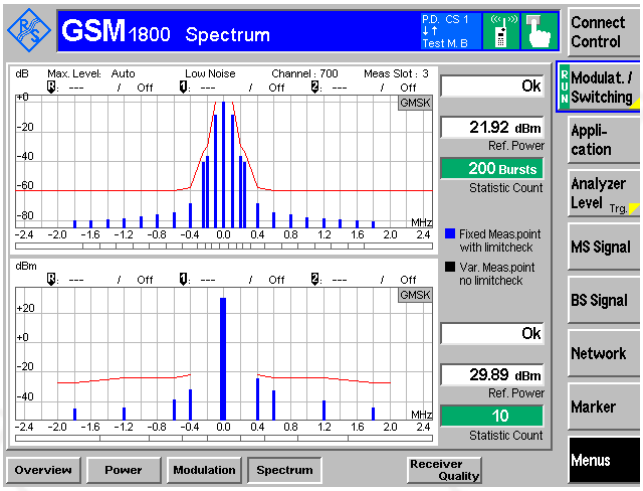
LV,HT Condition (γ=3), High Channel



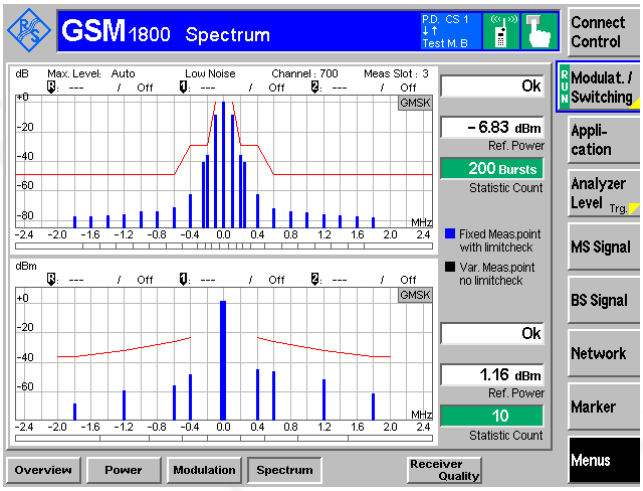
LV,HT Condition (γ=18), High Channel



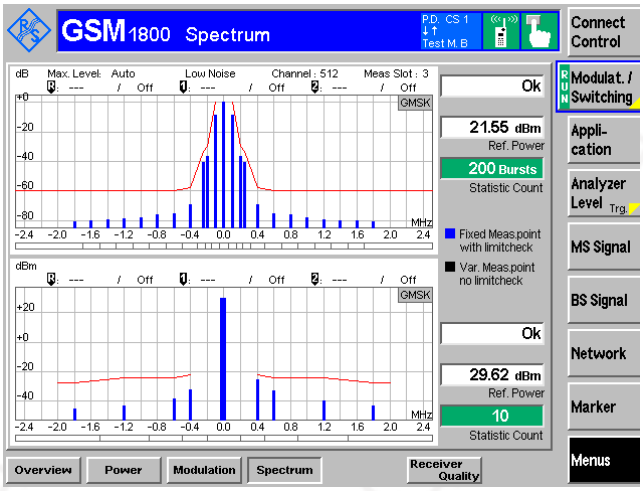
LV,HT Condition (γ=3), Middle Channel



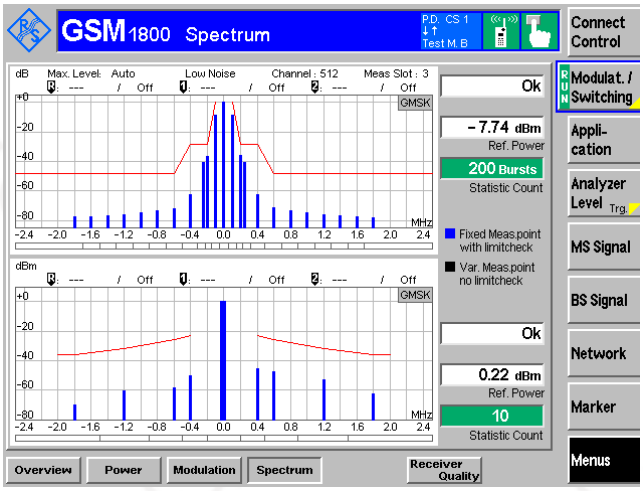
LV,HT Condition (γ=18), Middle Channel



LV,HT Condition (γ=3), Low Channel

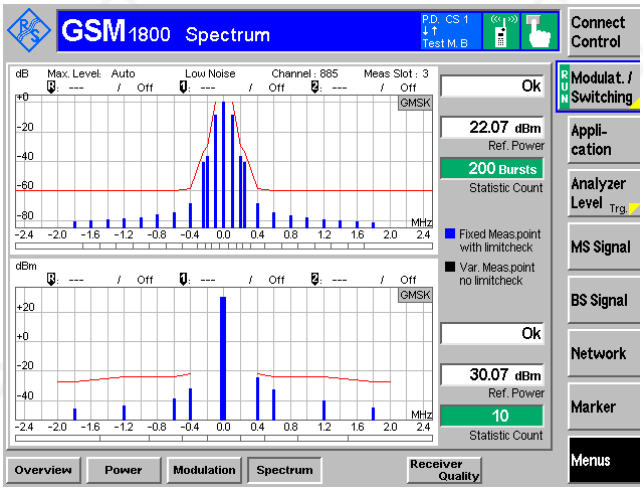


LV,HT Condition (γ=18), Low Channel

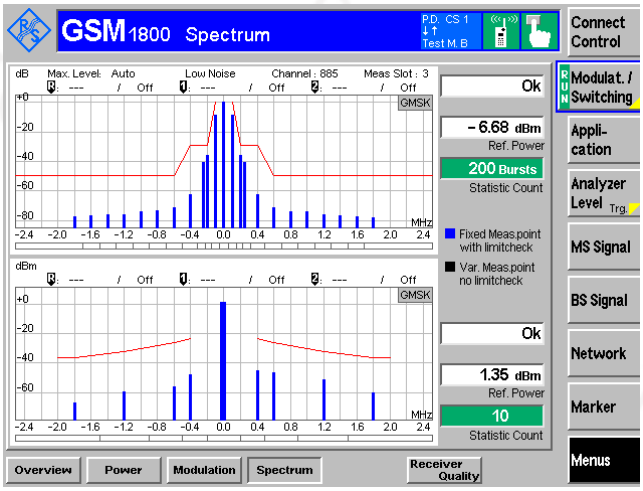


Extreme Condition

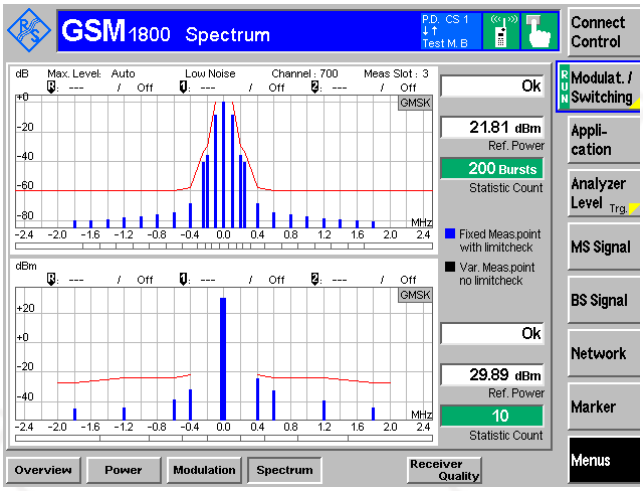
HV,HT Condition (γ=3), High Channel



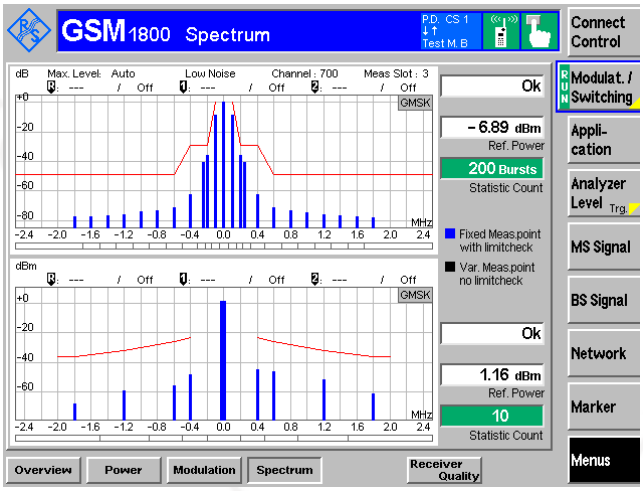
HV,HT Condition (γ=18), High Channel



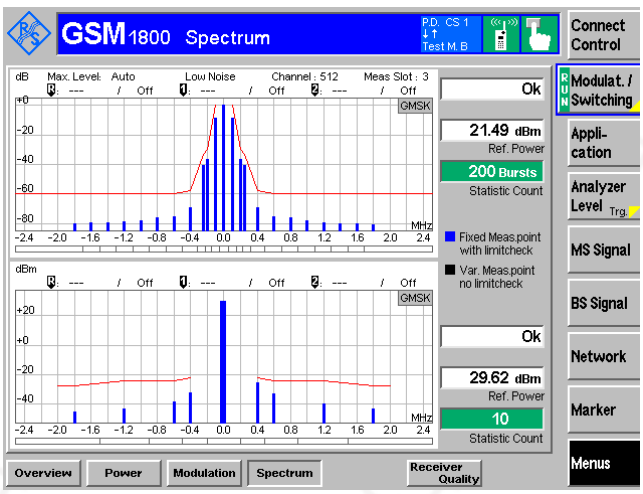
HV,HT Condition (γ=3), Middle Channel



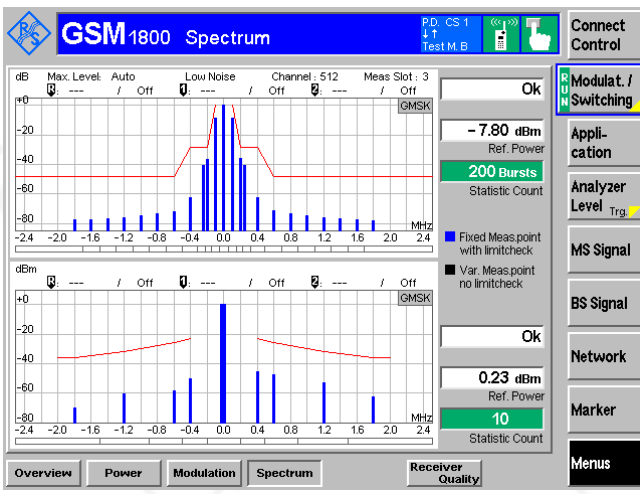
HV,HT Condition (γ=18), Middle Channel



HV,HT Condition (γ=3), Low Channel

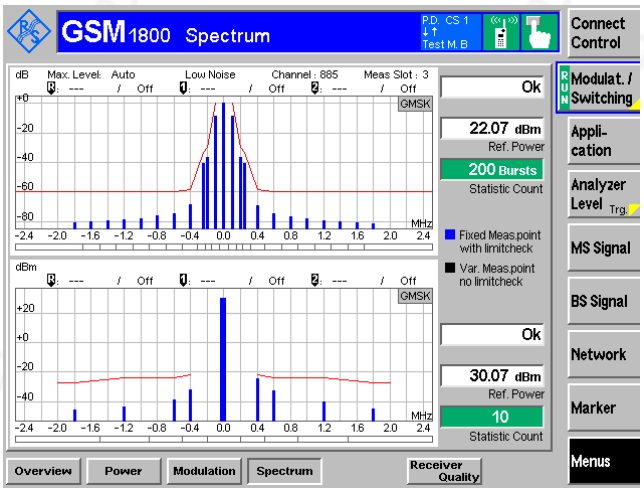


HV,HT Condition (γ=18), Low Channel

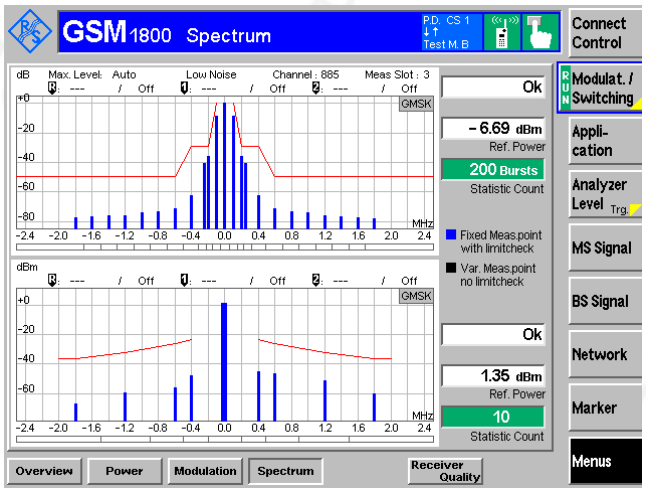


Extreme Condition

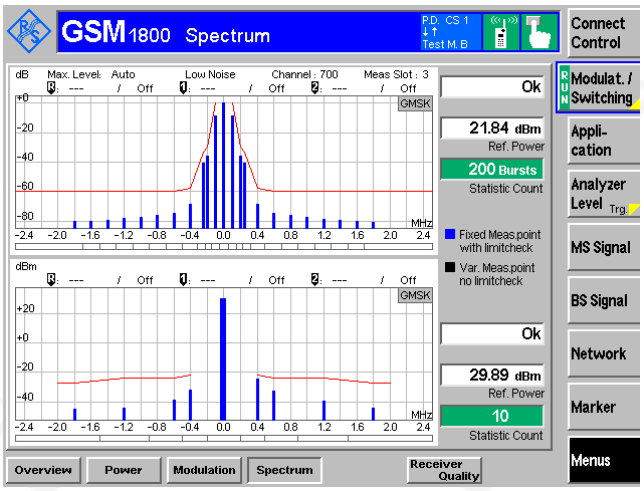
HV,LT Condition (γ=3), High Channel



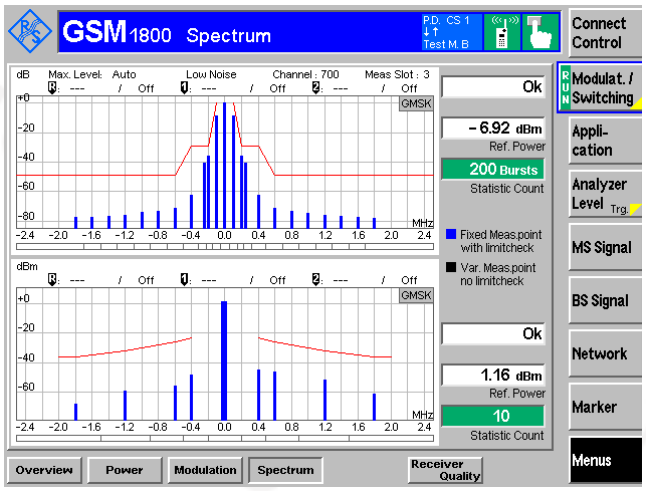
HV,LT Condition (γ=18), High Channel



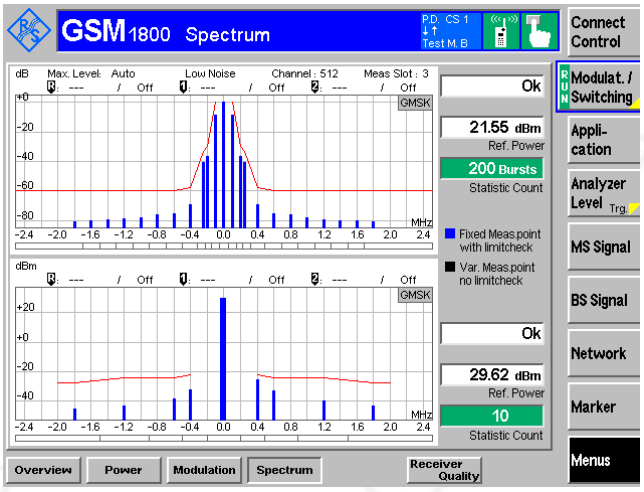
HV,LT Condition (γ=3), Middle Channel



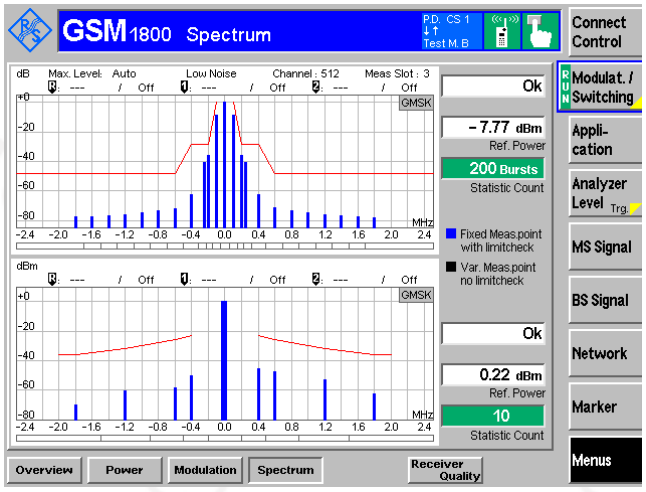
HV,LT Condition (γ=18), Middle Channel



HV,LT Condition (γ=3), Low Channel



HV,LT Condition (γ=18), Low Channel



3.8 CONDUCTED SPURIOUS EMISSIONS – MS ALLOCATED A CHANNEL

Applicable Standard

Clause 12.1.1 of TS 151 010-1 V9.5.0 (2011-08)applies.

Definition and applicability

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

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

Conformance requirements

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

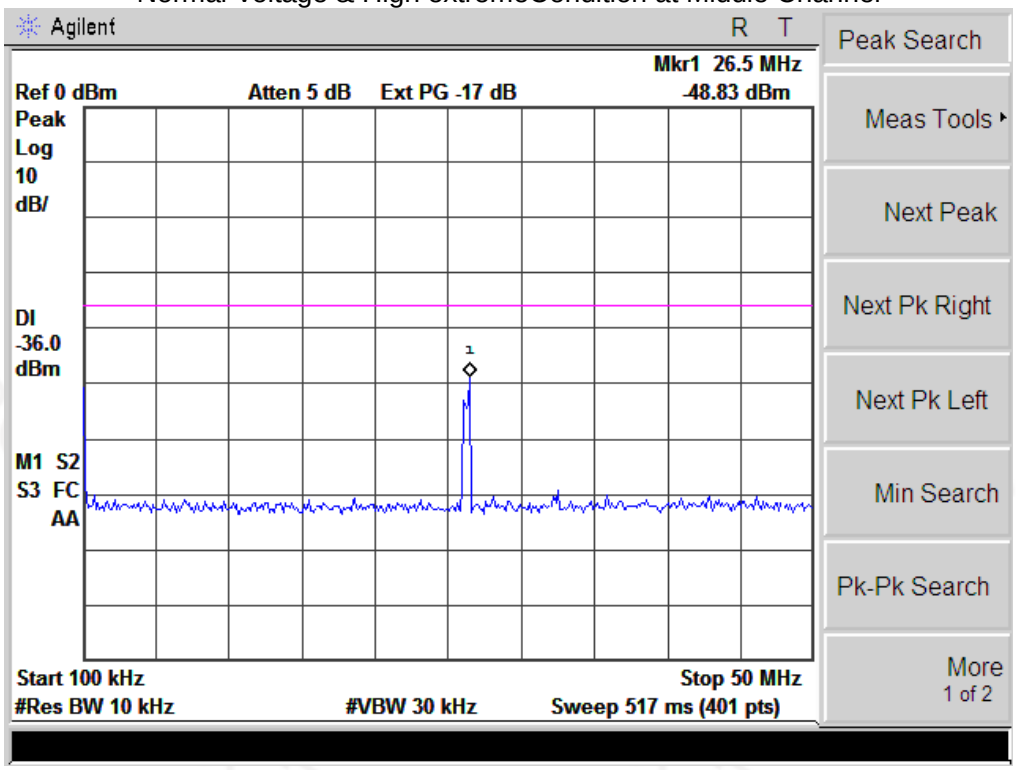
Set up for testing

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

TEST RESULT

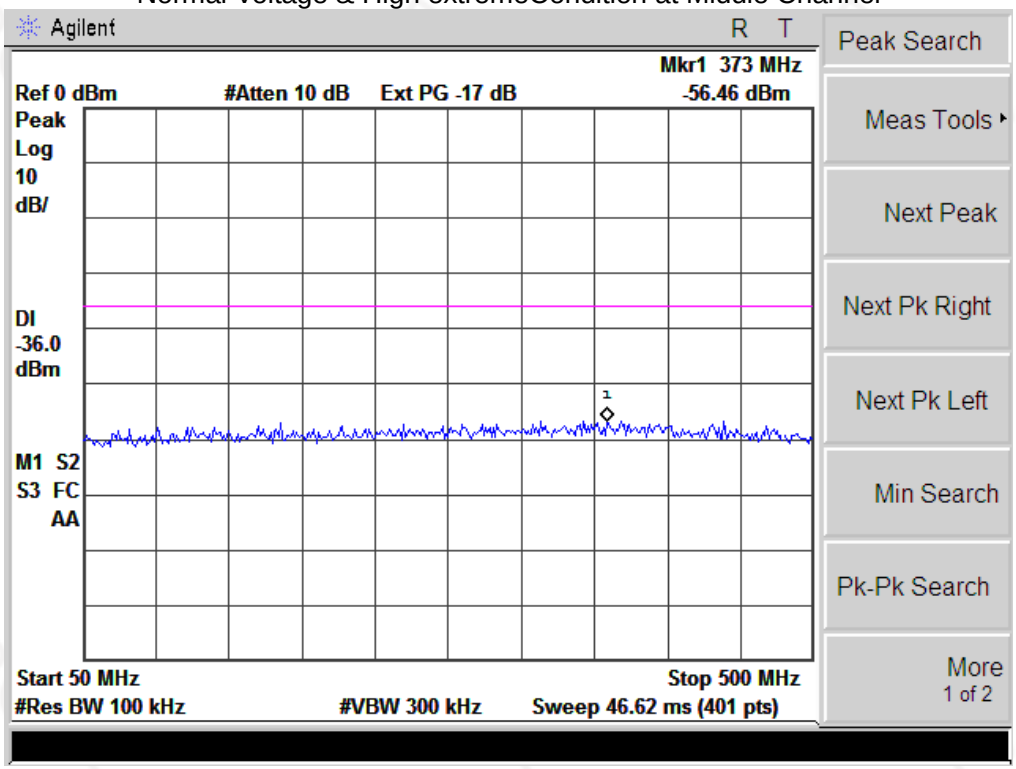
GSM900

Normal Voltage & High extremeCondition at Middle Channel



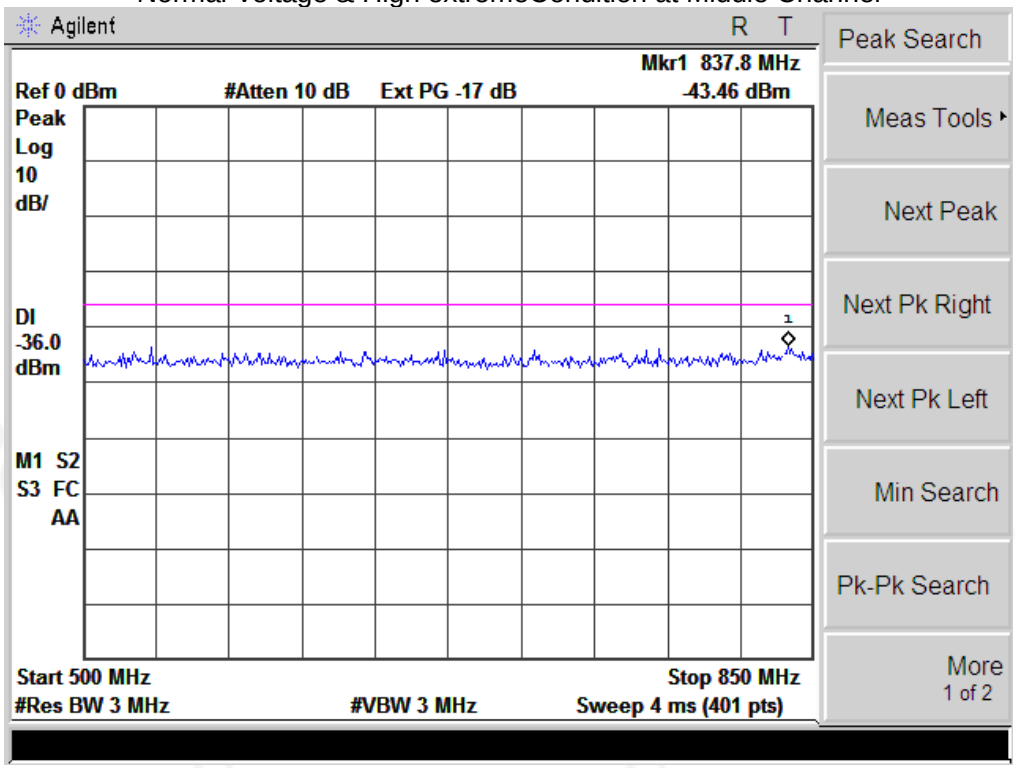
GSM900

Normal Voltage & High extremeCondition at Middle Channel



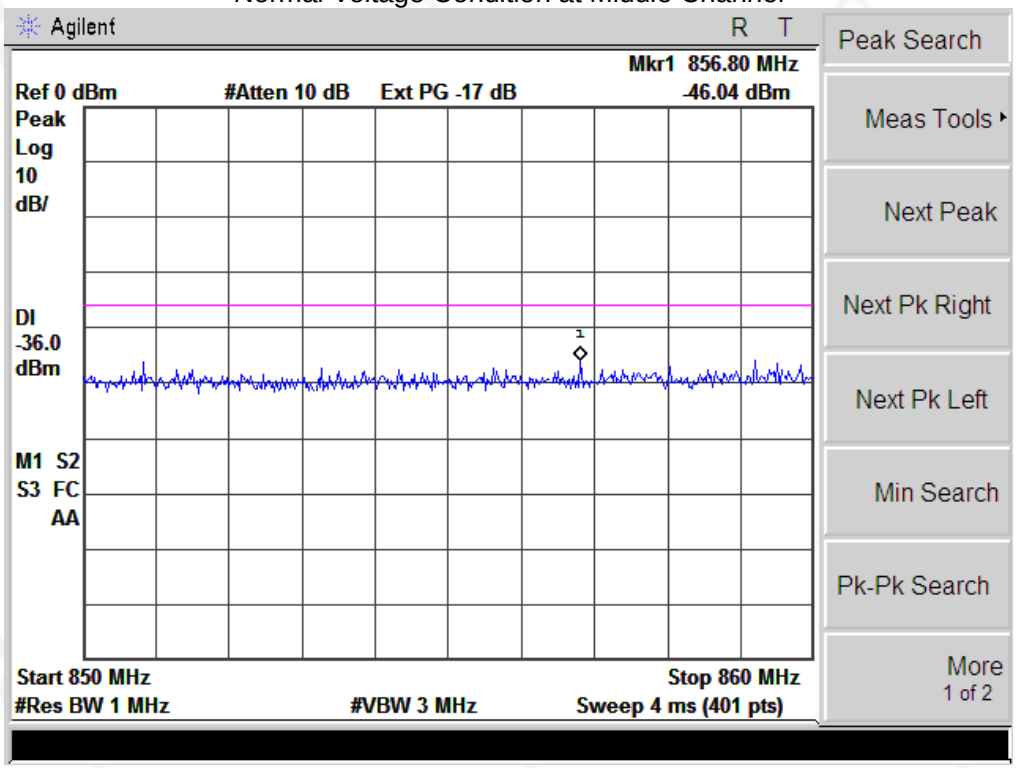
GSM900

Normal Voltage & High extremeCondition at Middle Channel



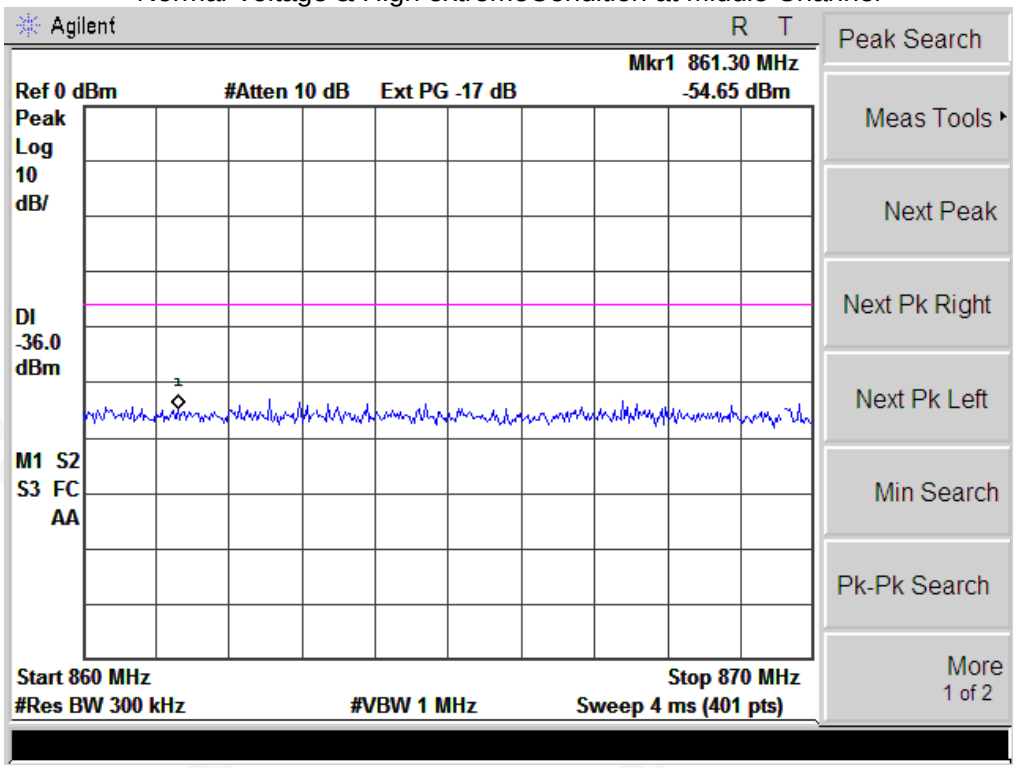
GSM900

Normal Voltage Condition at Middle Channel



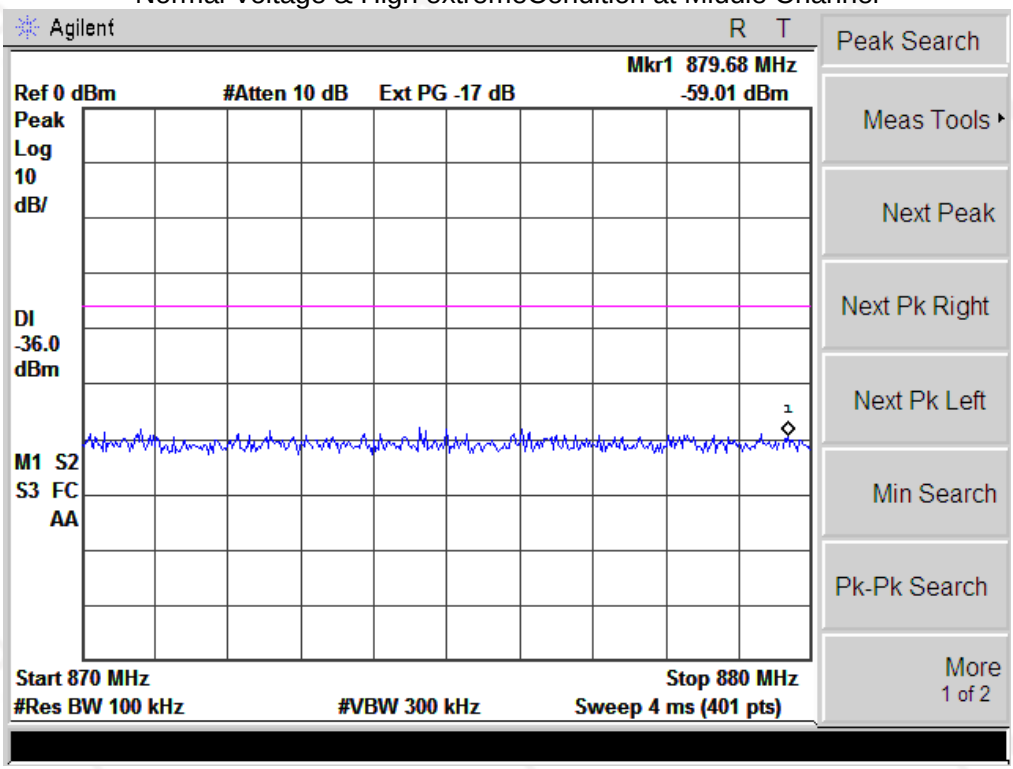
GSM900

Normal Voltage & High extremeCondition at Middle Channel



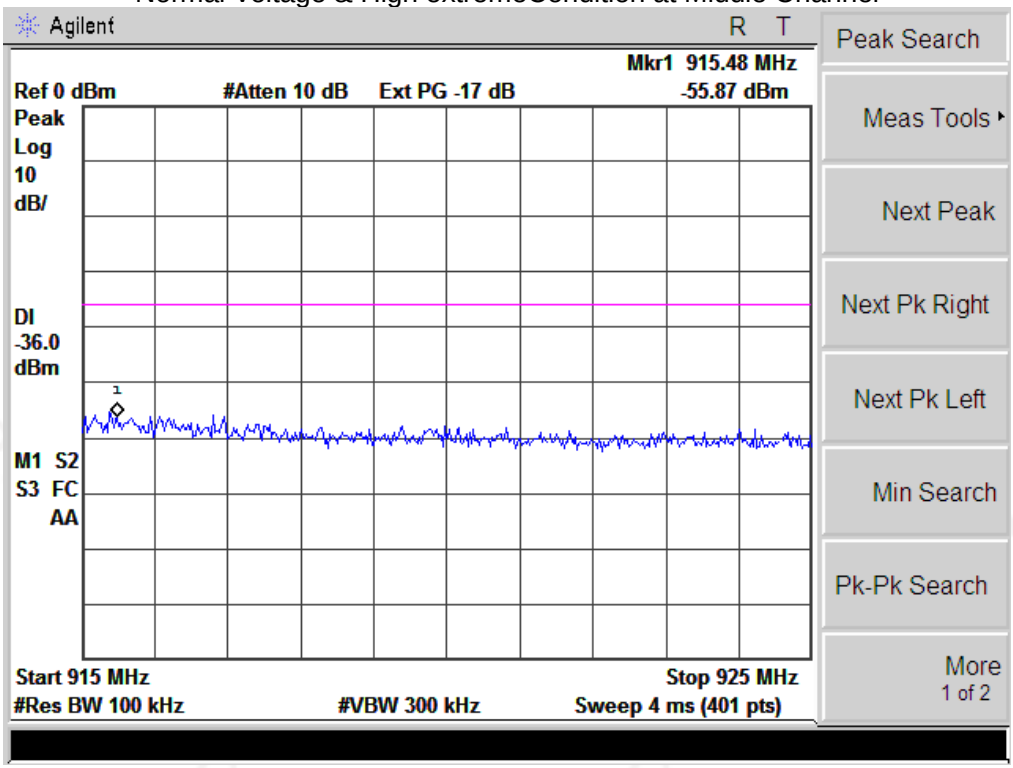
GSM900

Normal Voltage & High extremeCondition at Middle Channel



GSM900

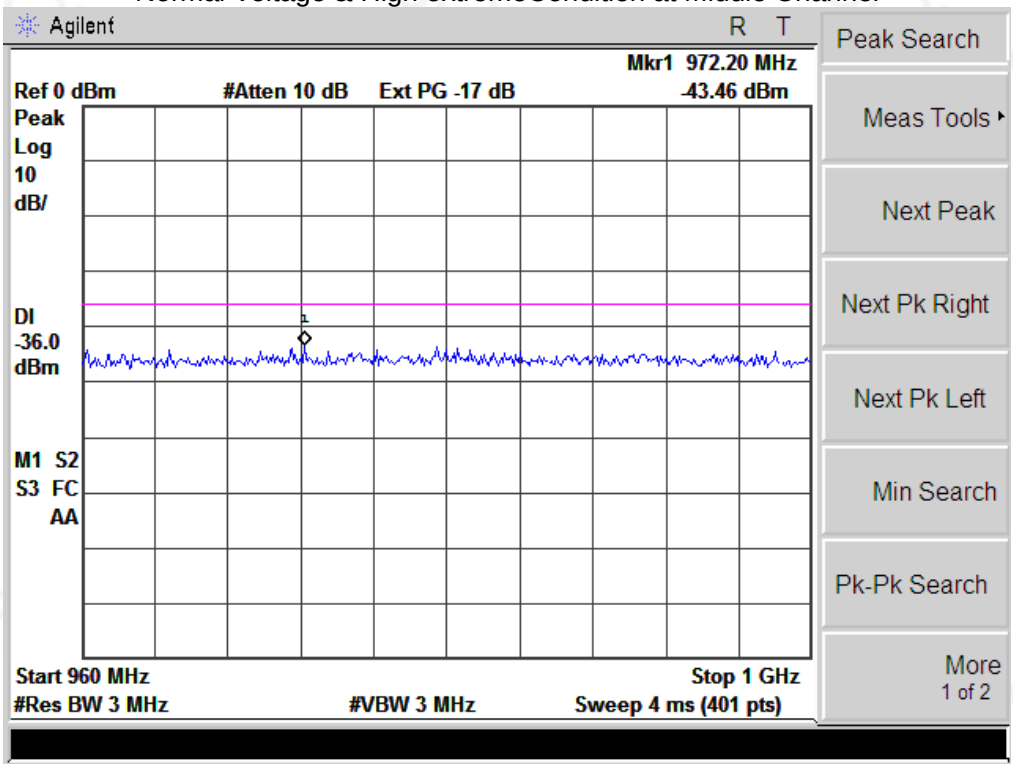
Normal Voltage & High extremeCondition at Middle Channel



Note: 925-960MHz is RX bands, please refer to sub clause §4.2.6.

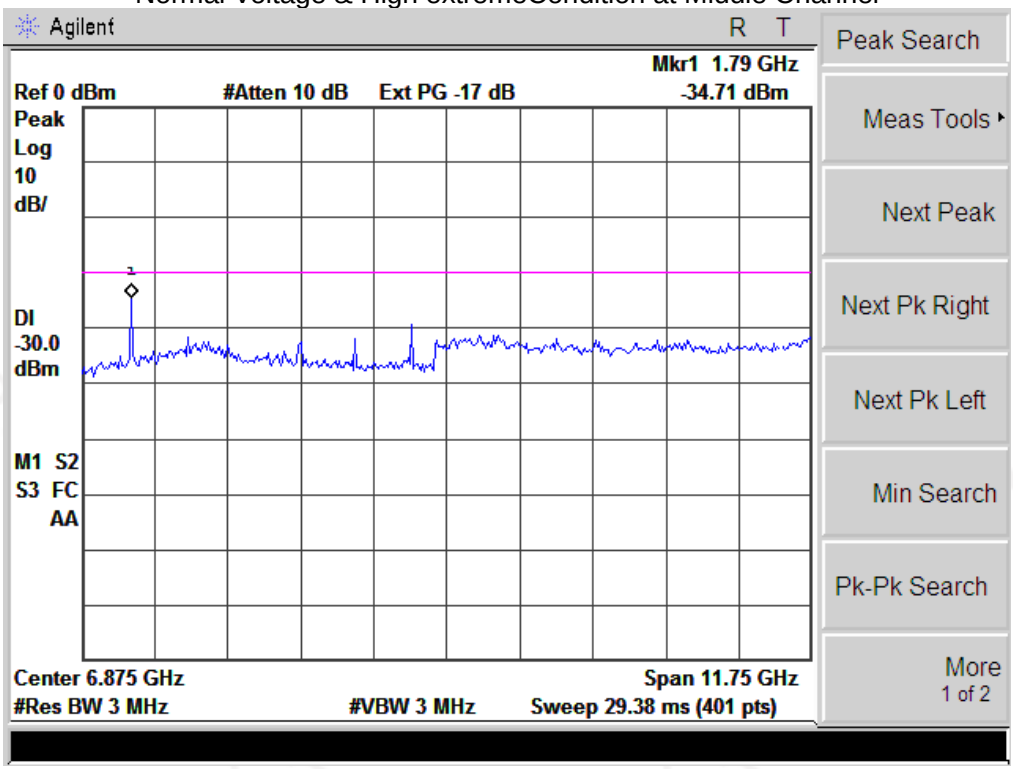
GSM900

Normal Voltage & High extremeCondition at Middle Channel



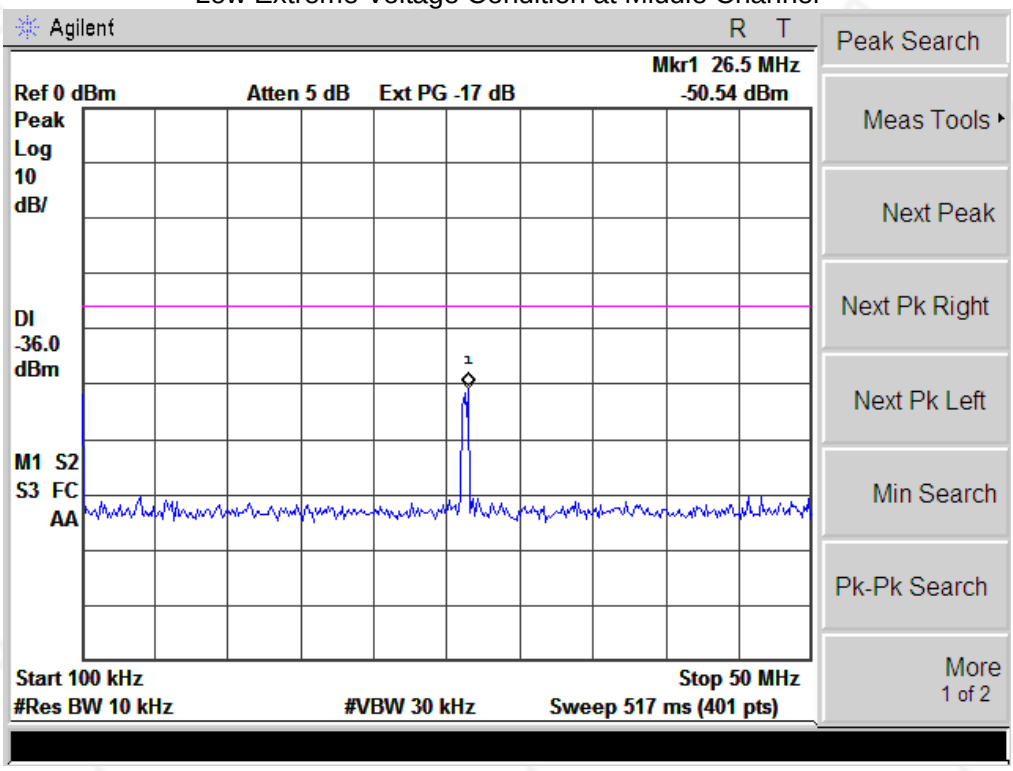
GSM900

Normal Voltage & High extremeCondition at Middle Channel



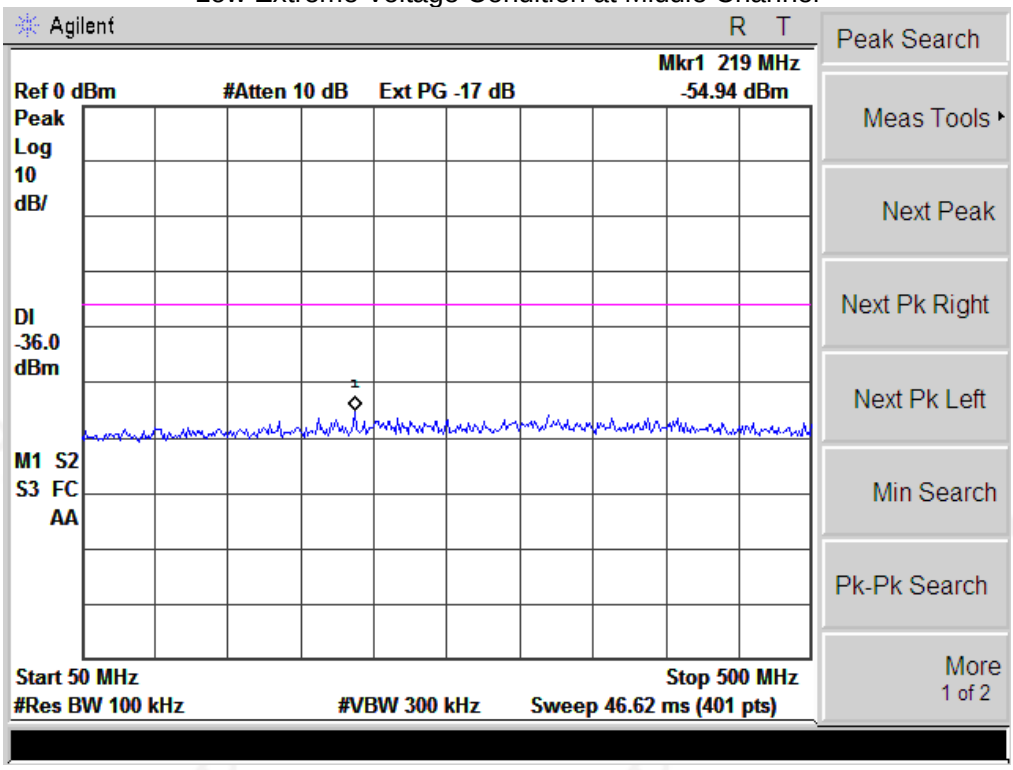
GSM900

Low Extreme Voltage Condition at Middle Channel



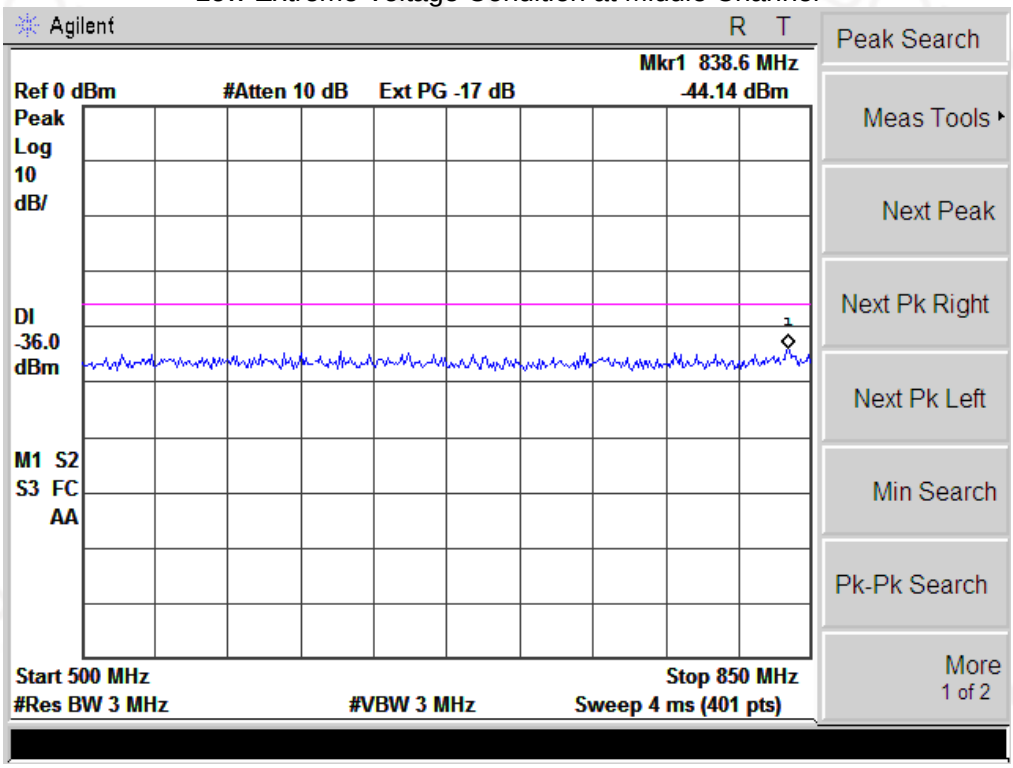
GSM900

Low Extreme Voltage Condition at Middle Channel



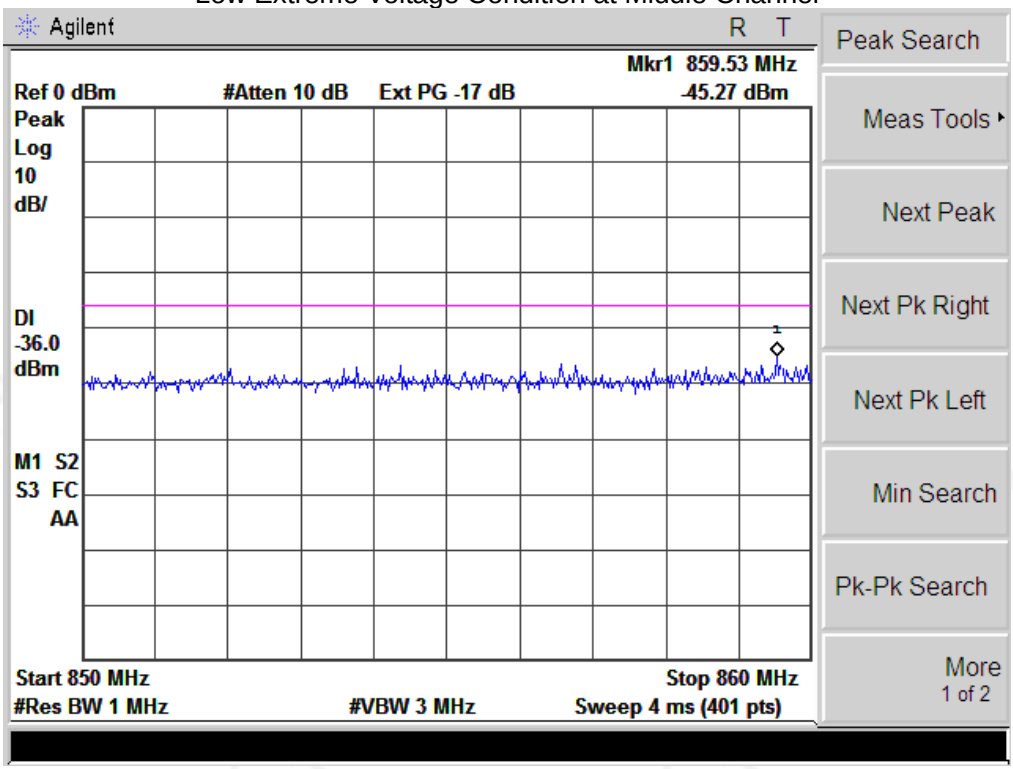
GSM900

Low Extreme Voltage Condition at Middle Channel



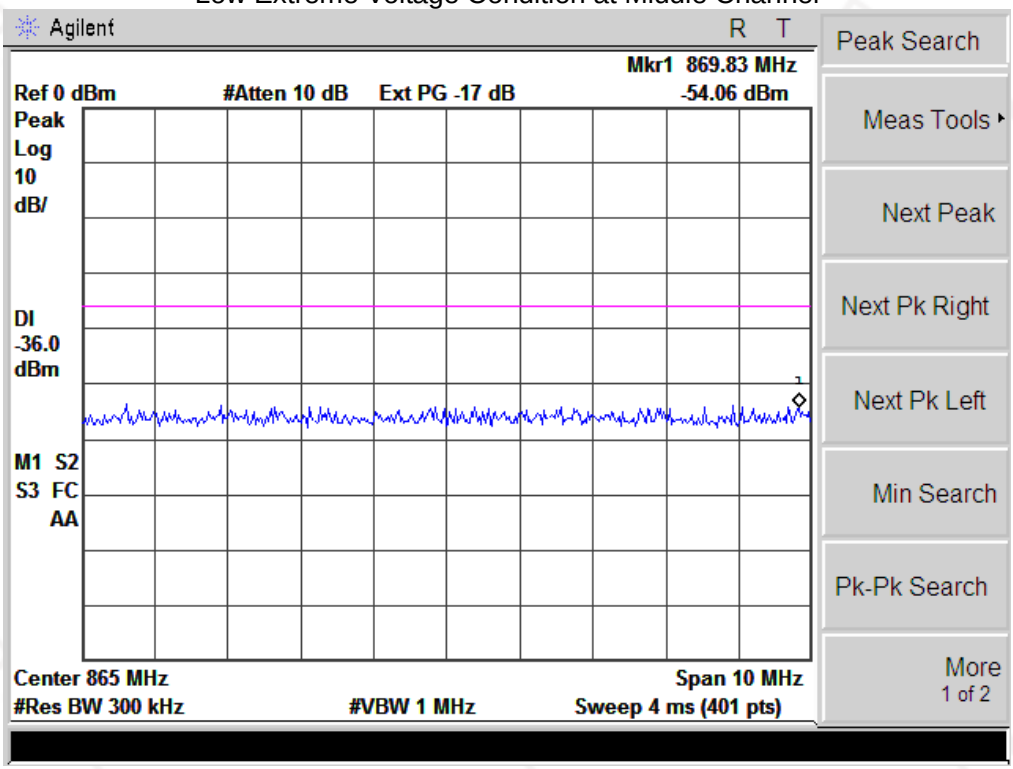
GSM900

Low Extreme Voltage Condition at Middle Channel



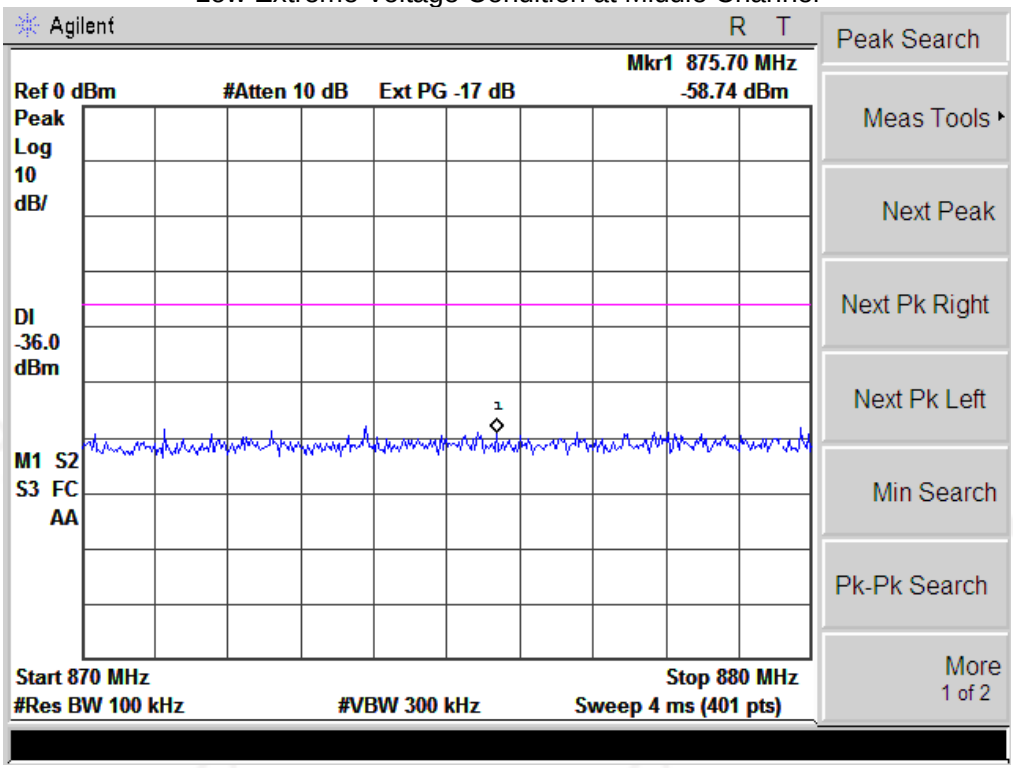
GSM900

Low Extreme Voltage Condition at Middle Channel



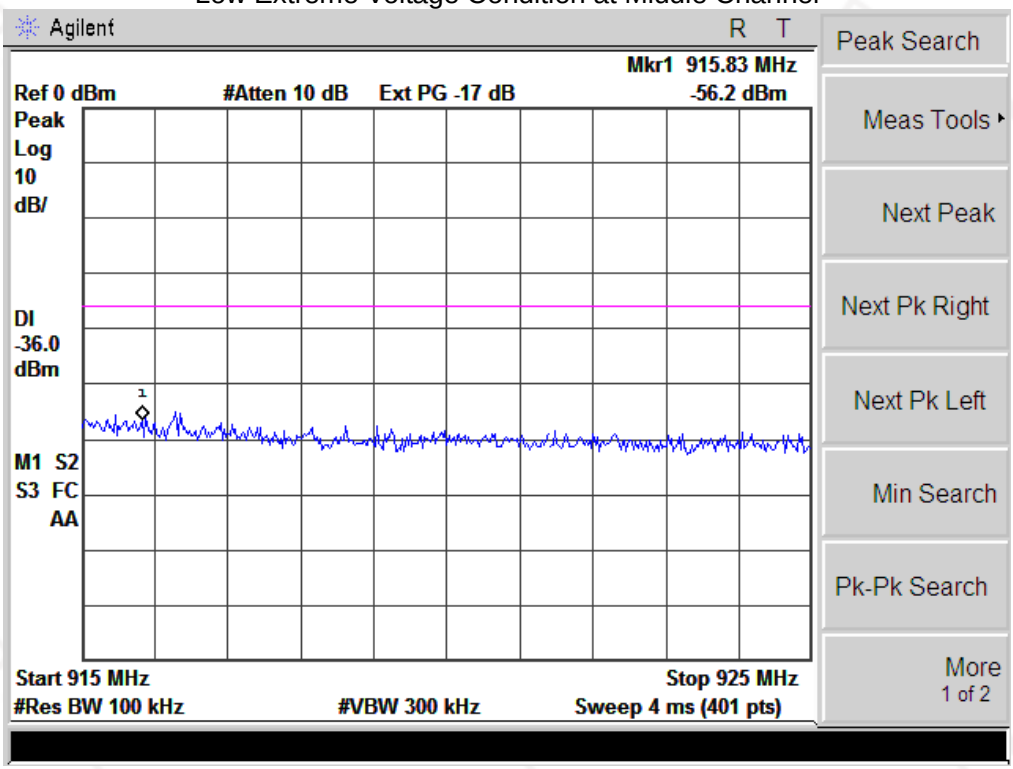
GSM900

Low Extreme Voltage Condition at Middle Channel



GSM900

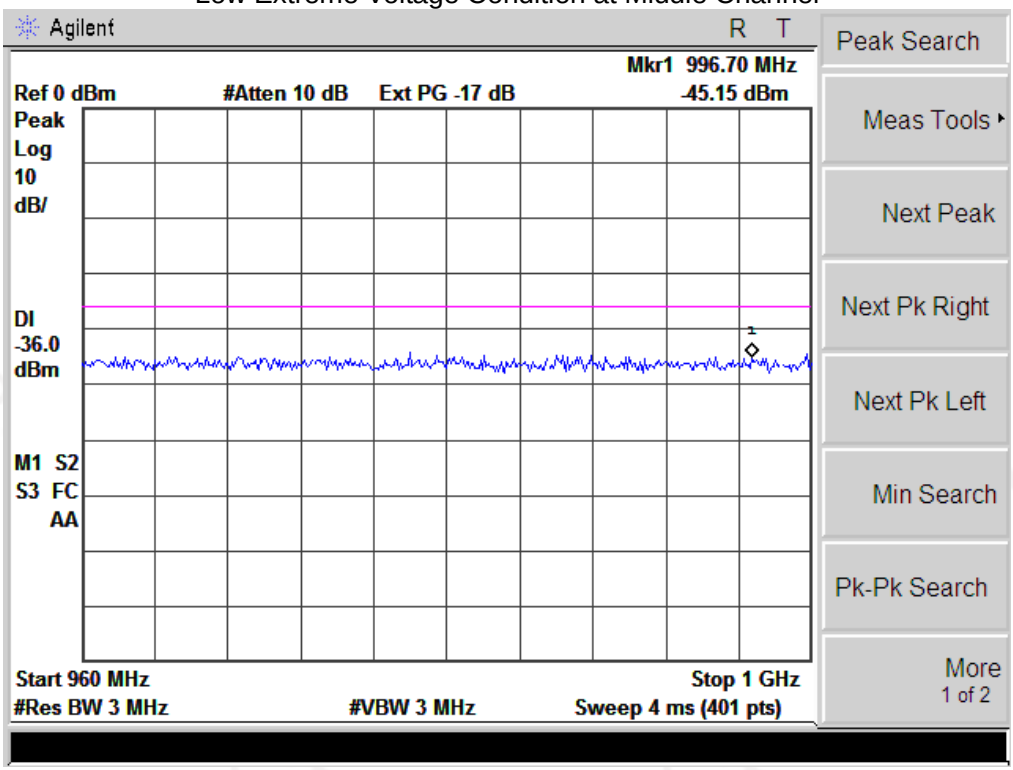
Low Extreme Voltage Condition at Middle Channel



Note: 925-960MHz is RX bands, please refer to sub clause §4.2.6.

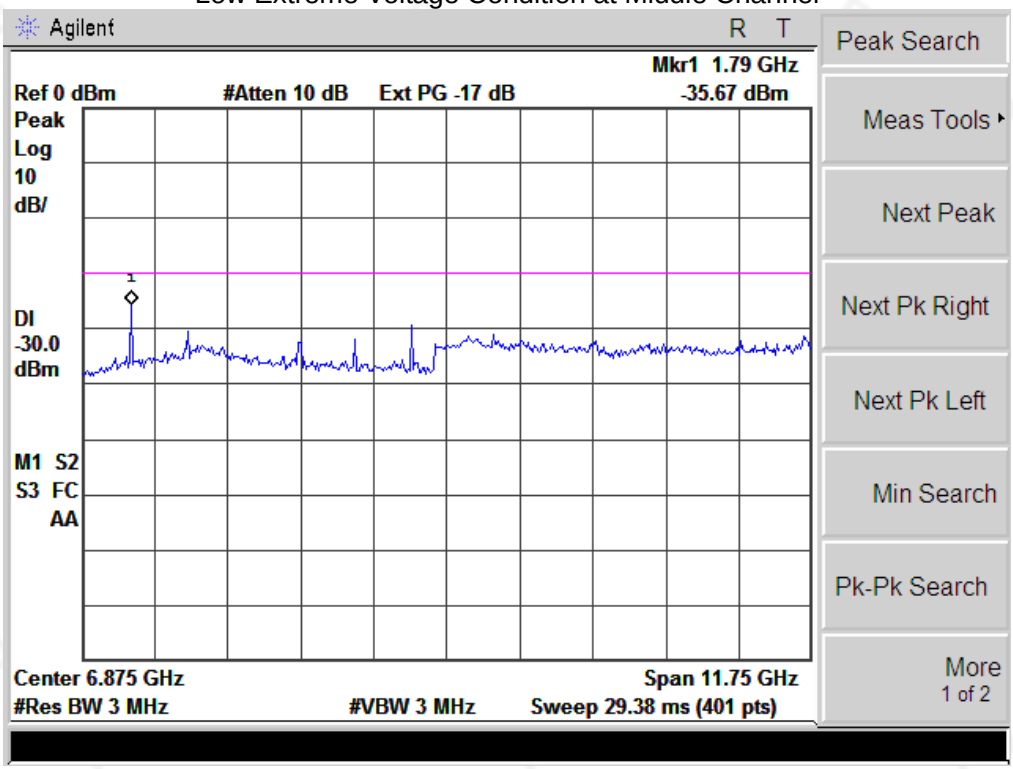
GSM900

Low Extreme Voltage Condition at Middle Channel



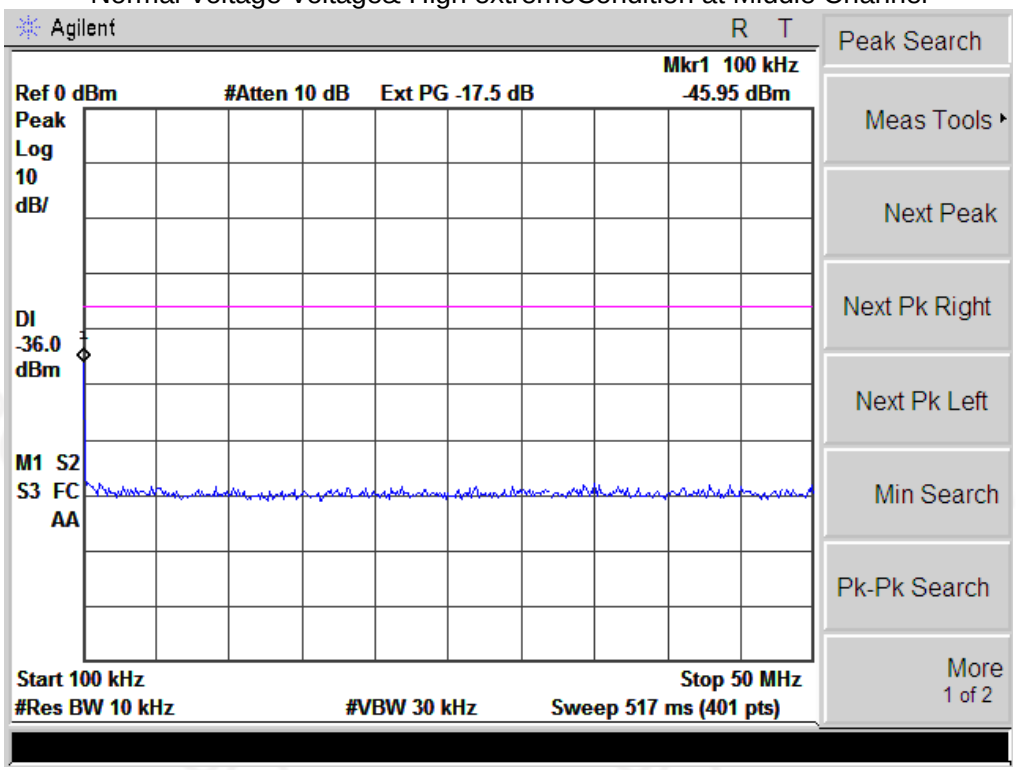
GSM900

Low Extreme Voltage Condition at Middle Channel



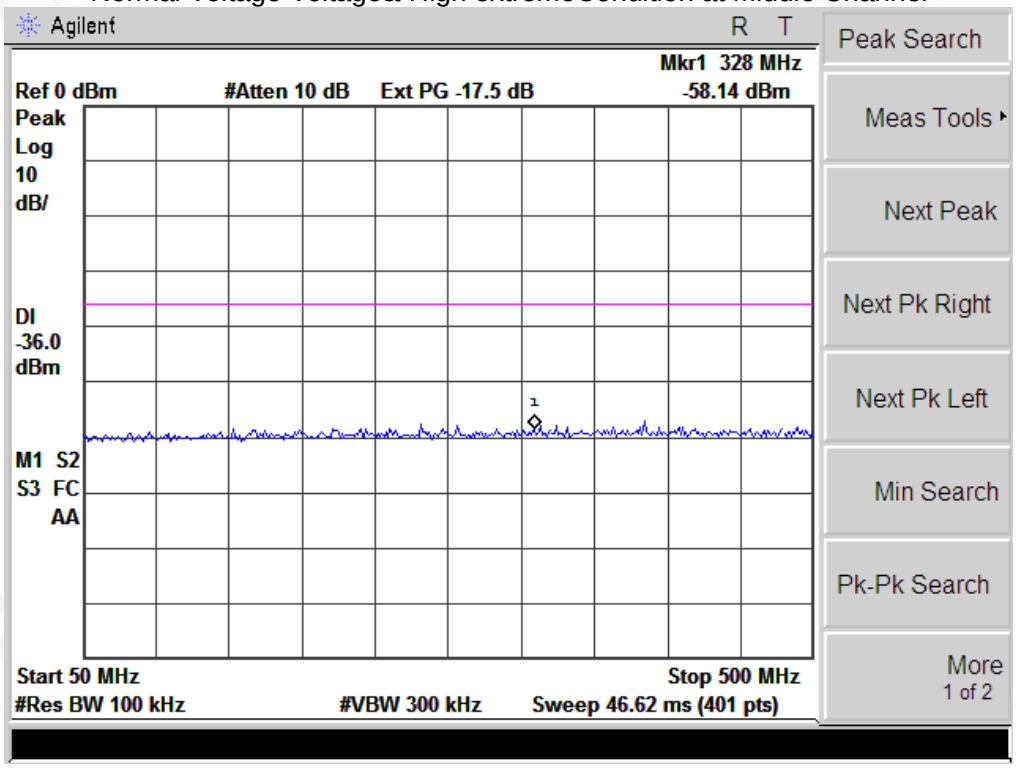
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



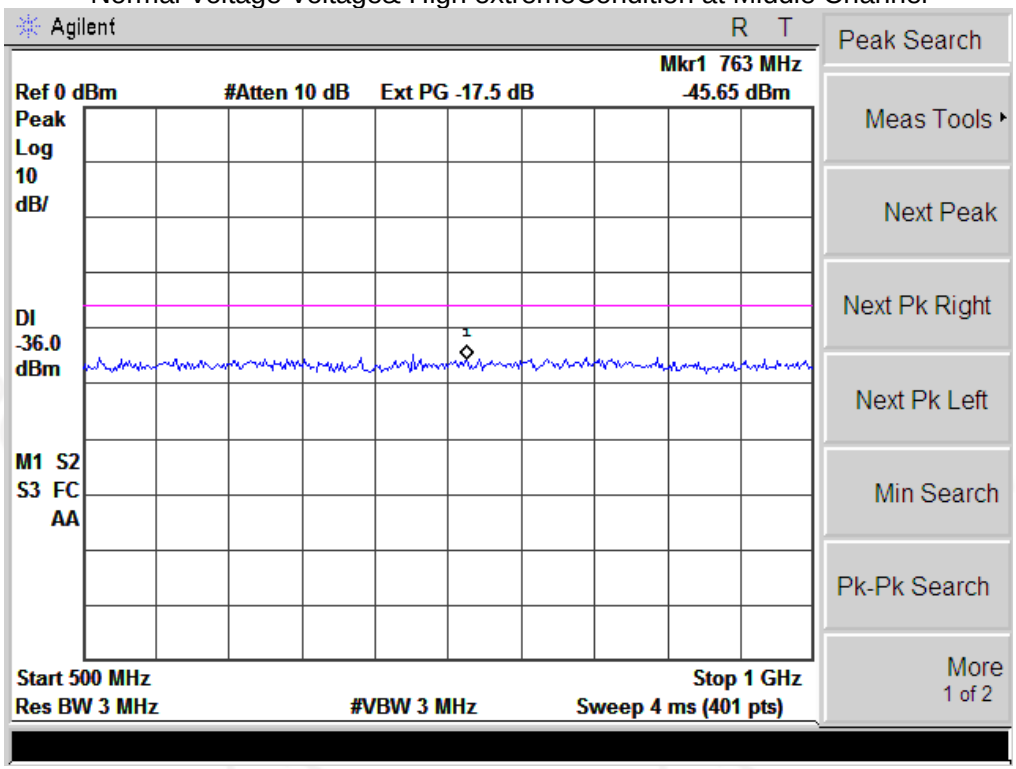
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



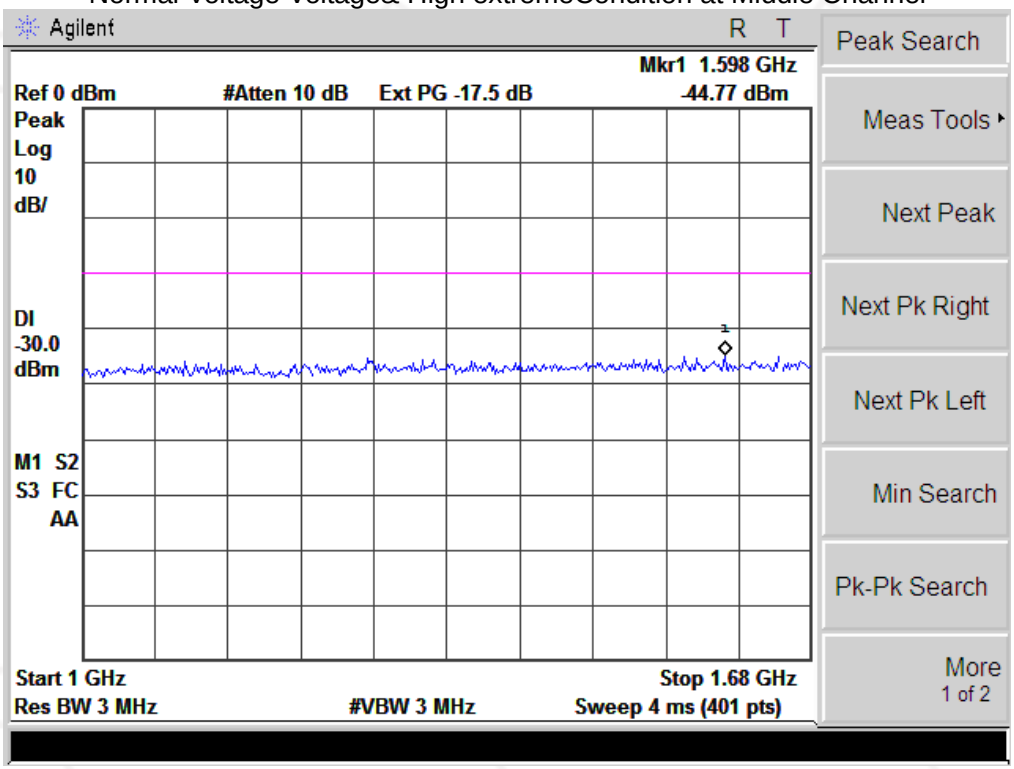
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



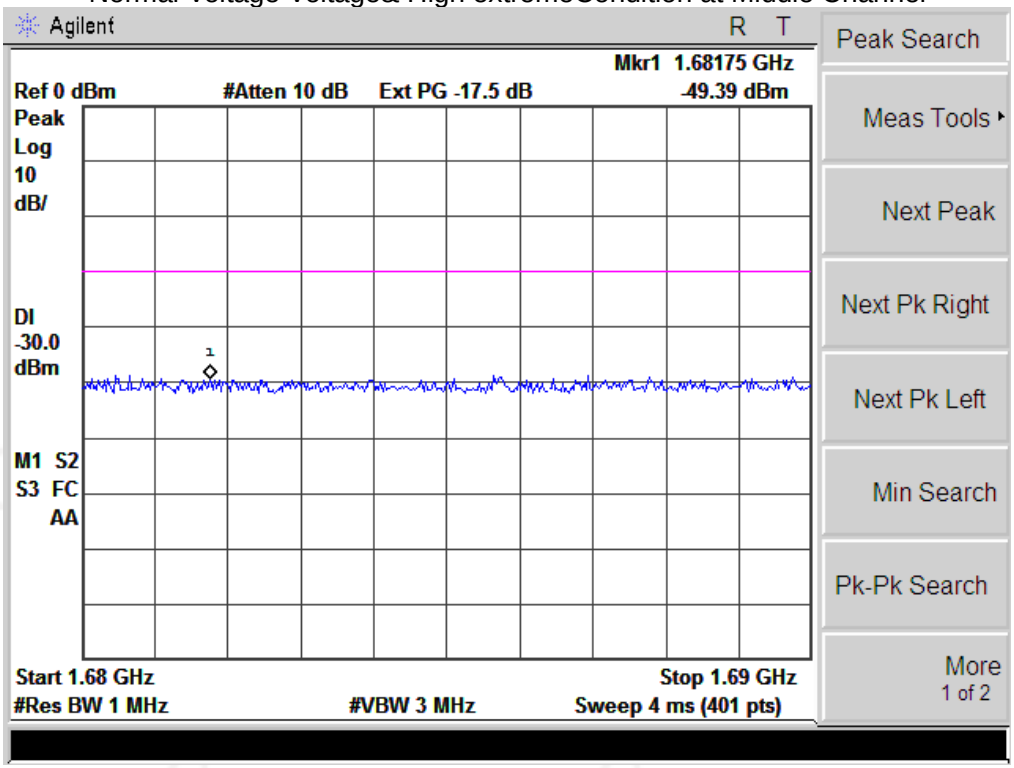
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



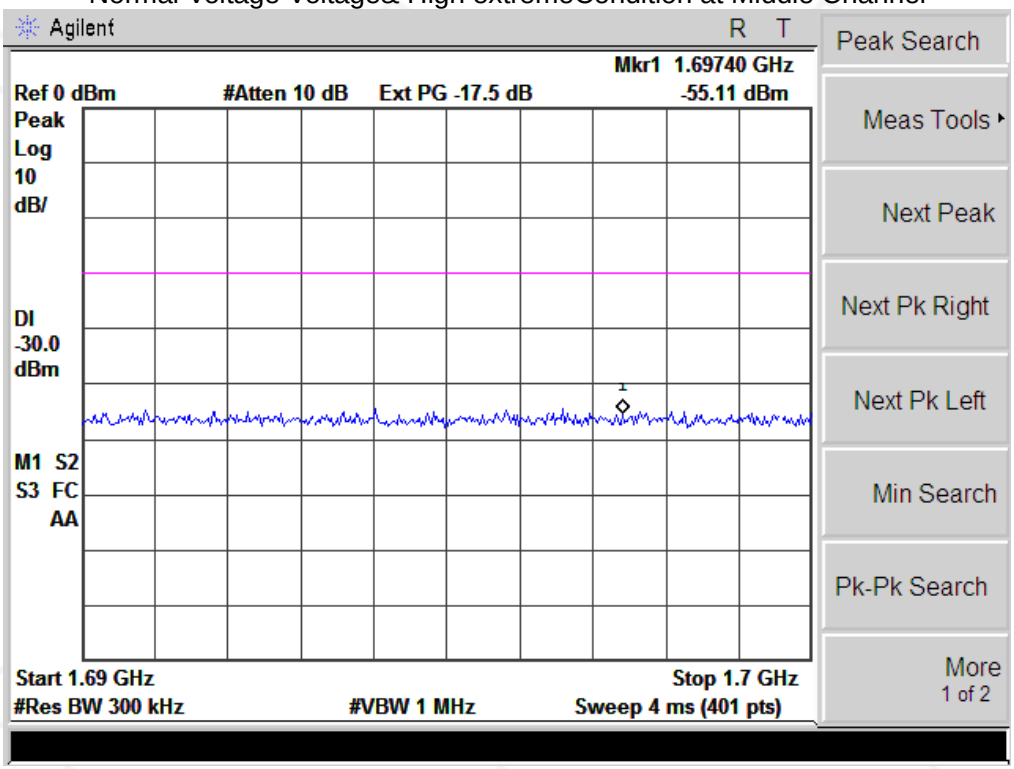
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



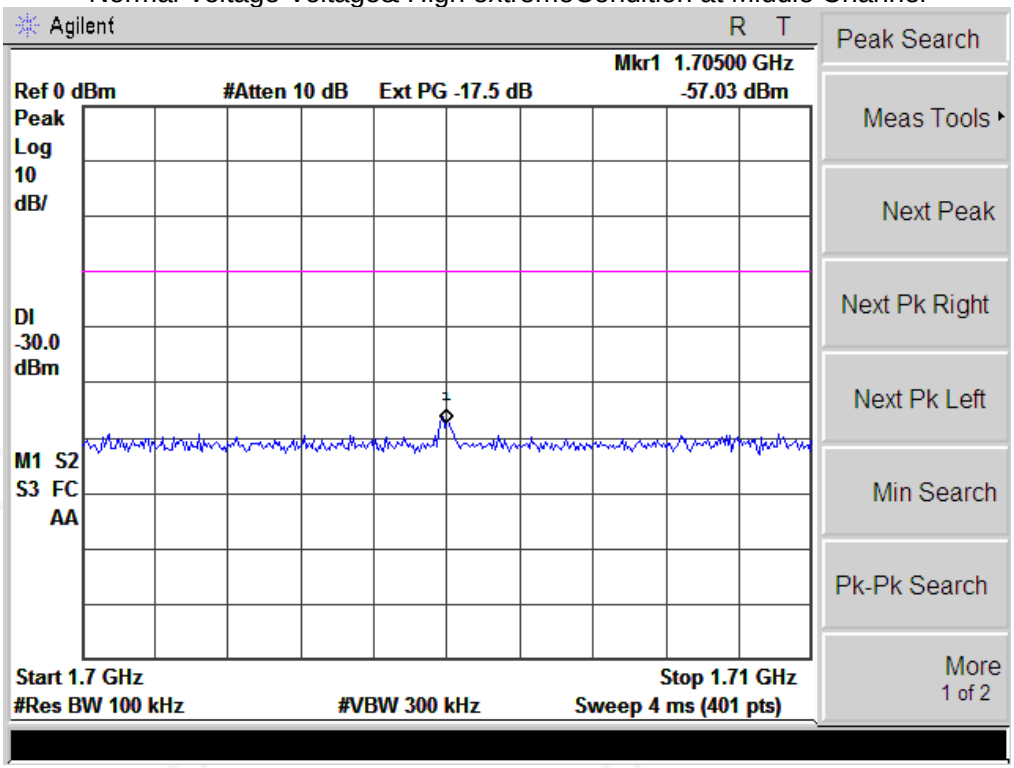
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



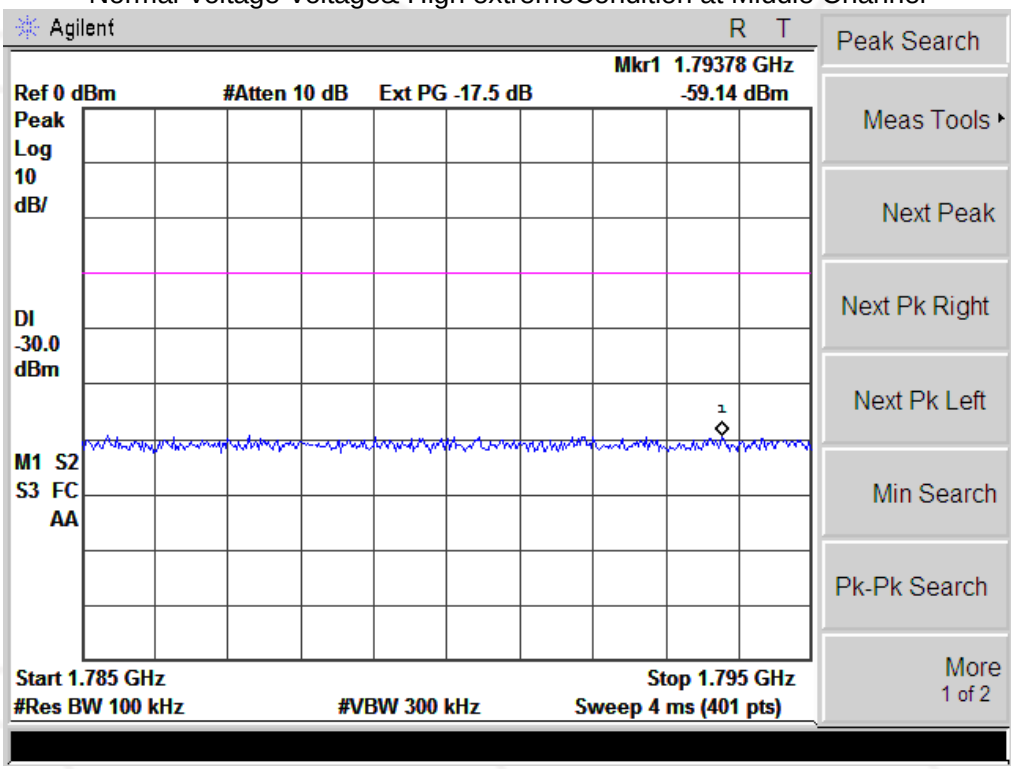
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



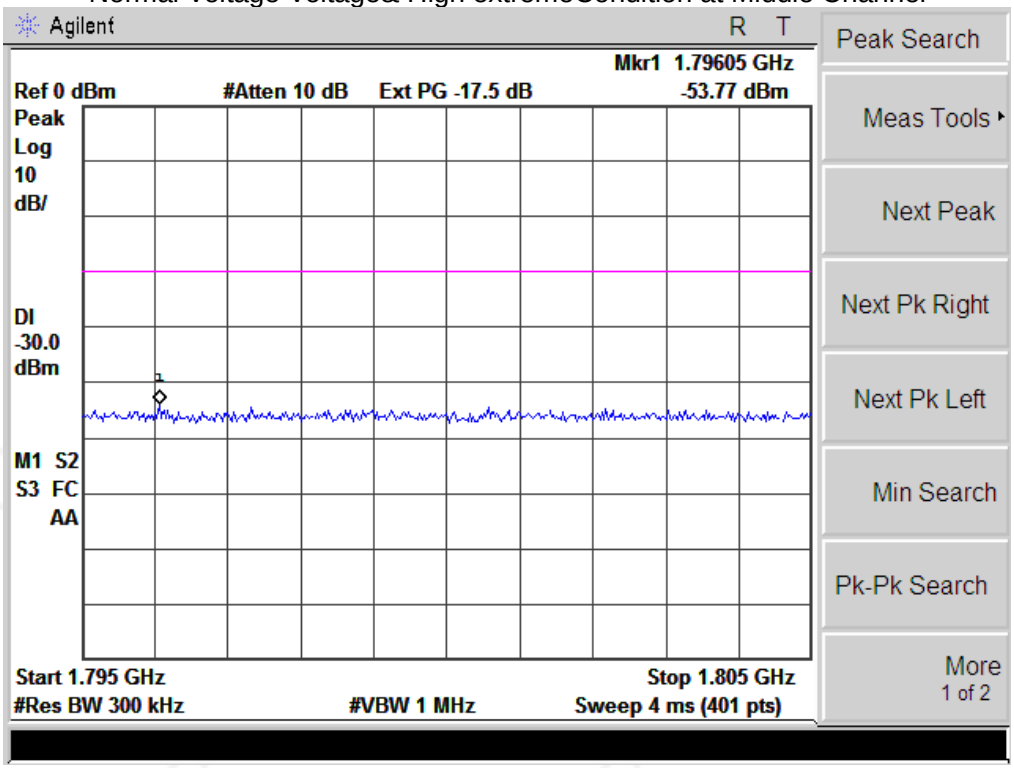
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



DCS 1800

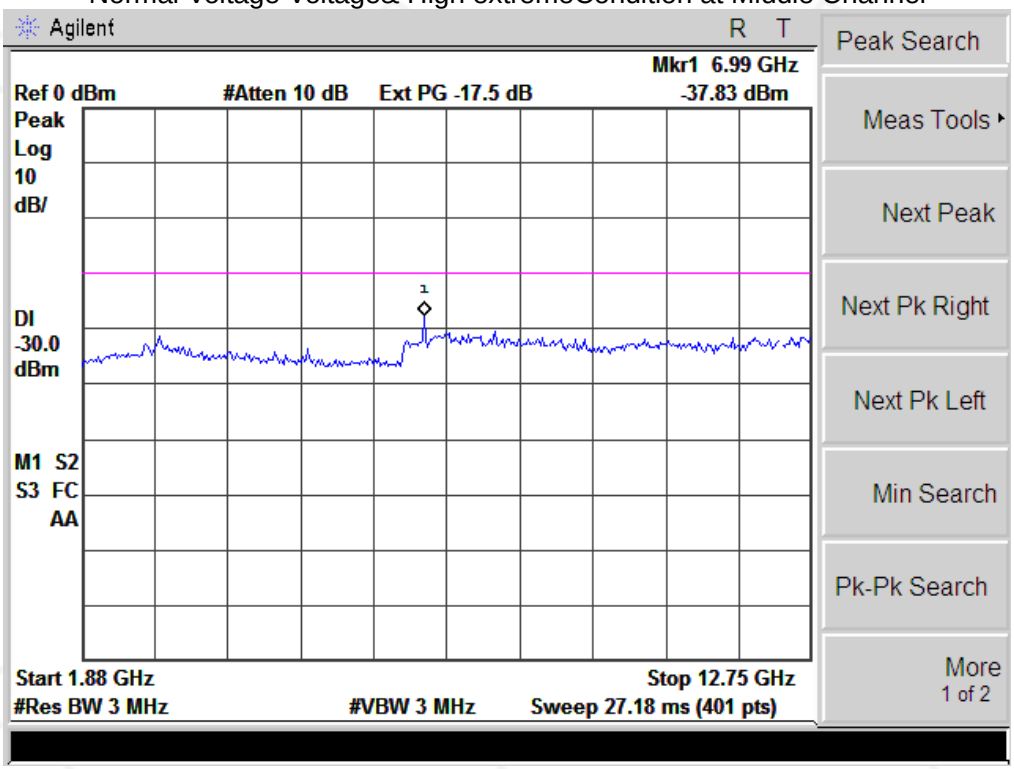
Normal Voltage Voltage& High extremeCondition at Middle Channel



Note: 1805-1880MHz is RX bands, please refer to sub clause §4.2.6.

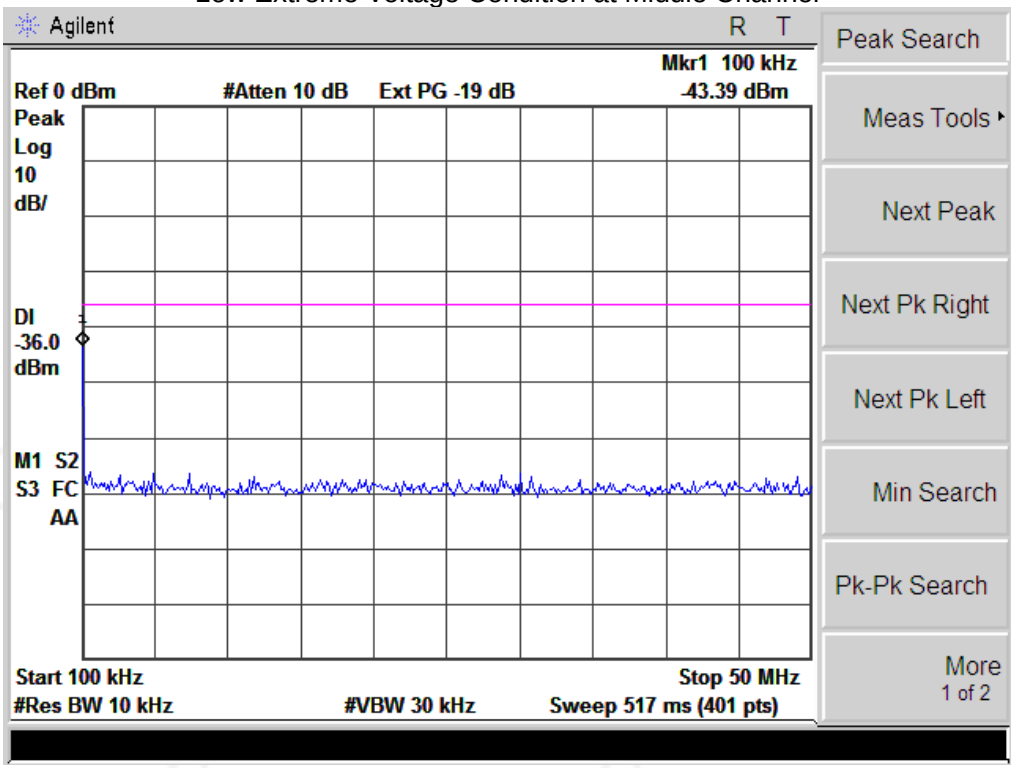
DCS 1800

Normal Voltage Voltage& High extremeCondition at Middle Channel



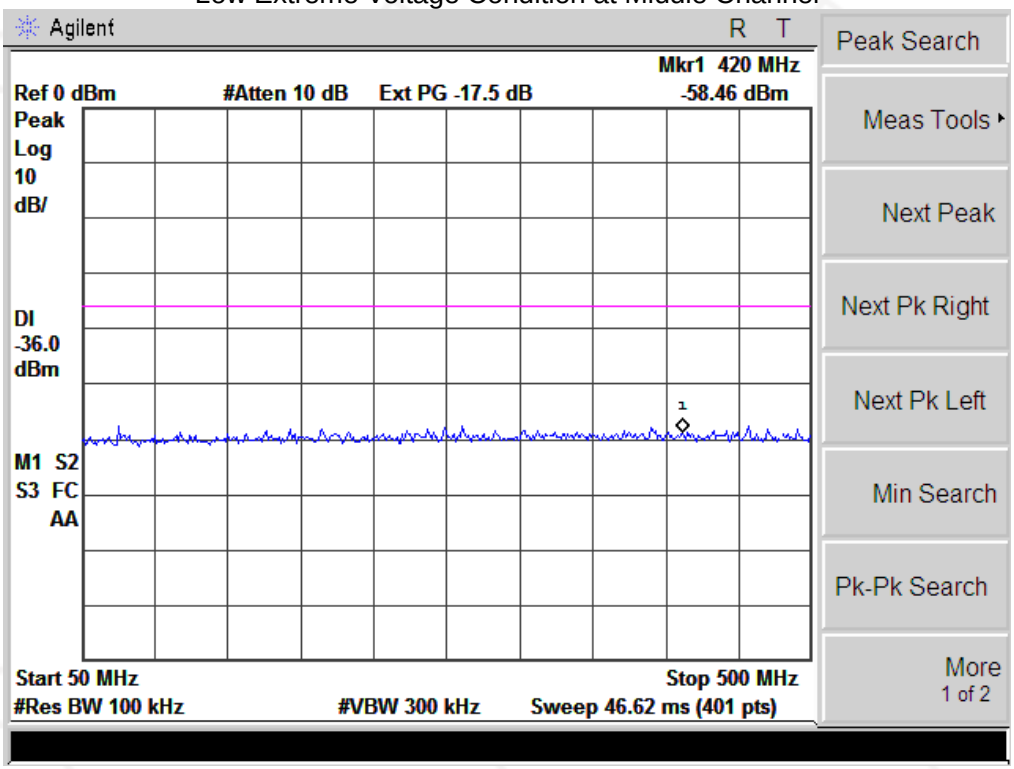
DCS 1800

Low Extreme Voltage Condition at Middle Channel



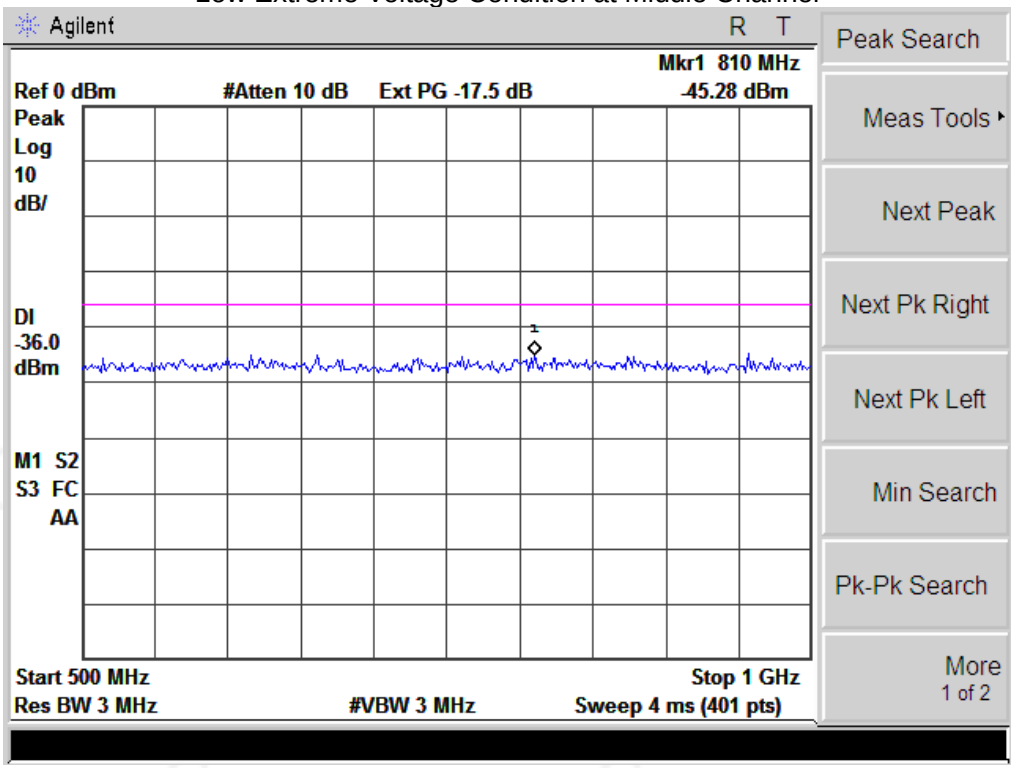
DCS 1800

Low Extreme Voltage Condition at Middle Channel



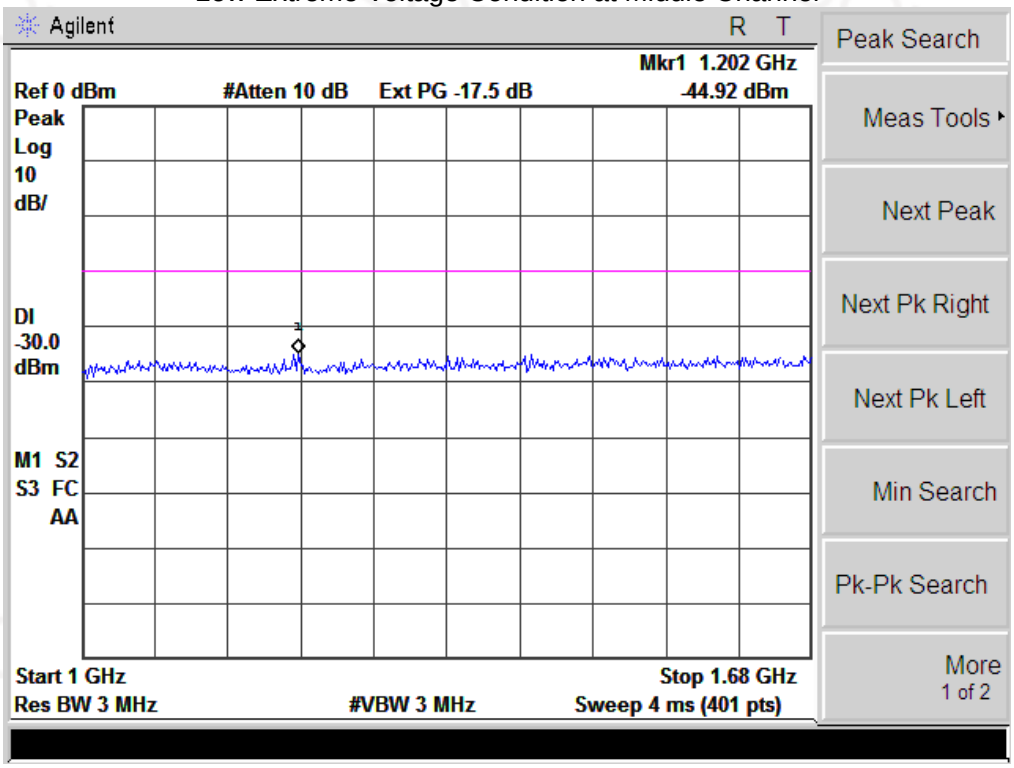
DCS 1800

Low Extreme Voltage Condition at Middle Channel



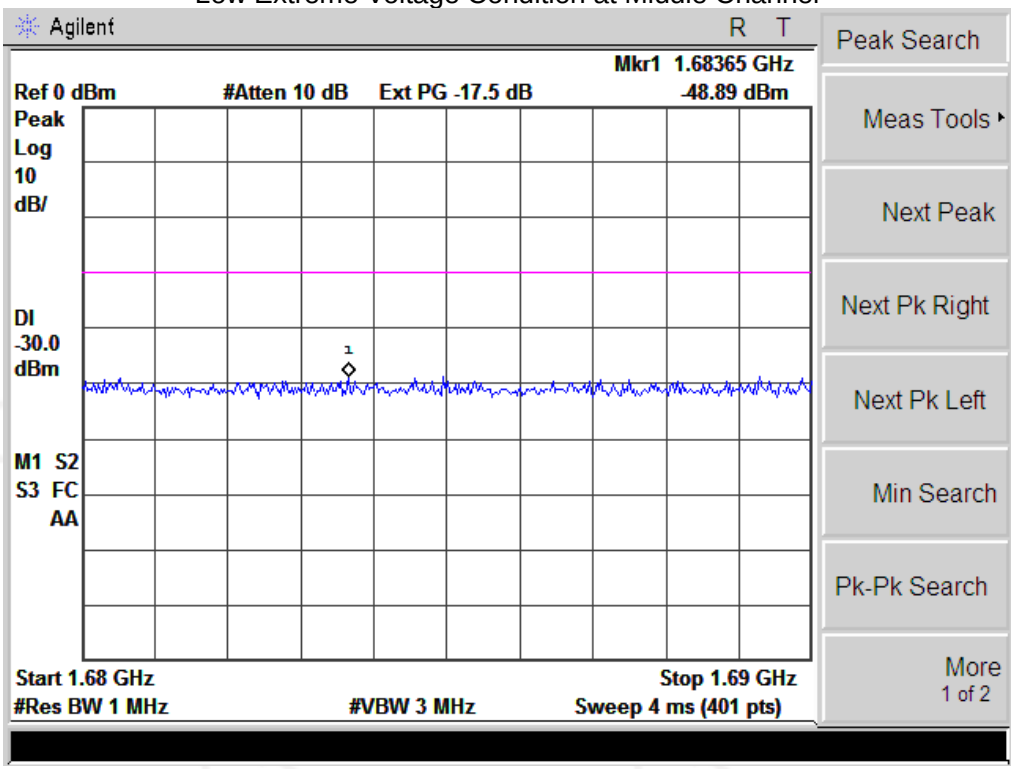
DCS 1800

Low Extreme Voltage Condition at Middle Channel



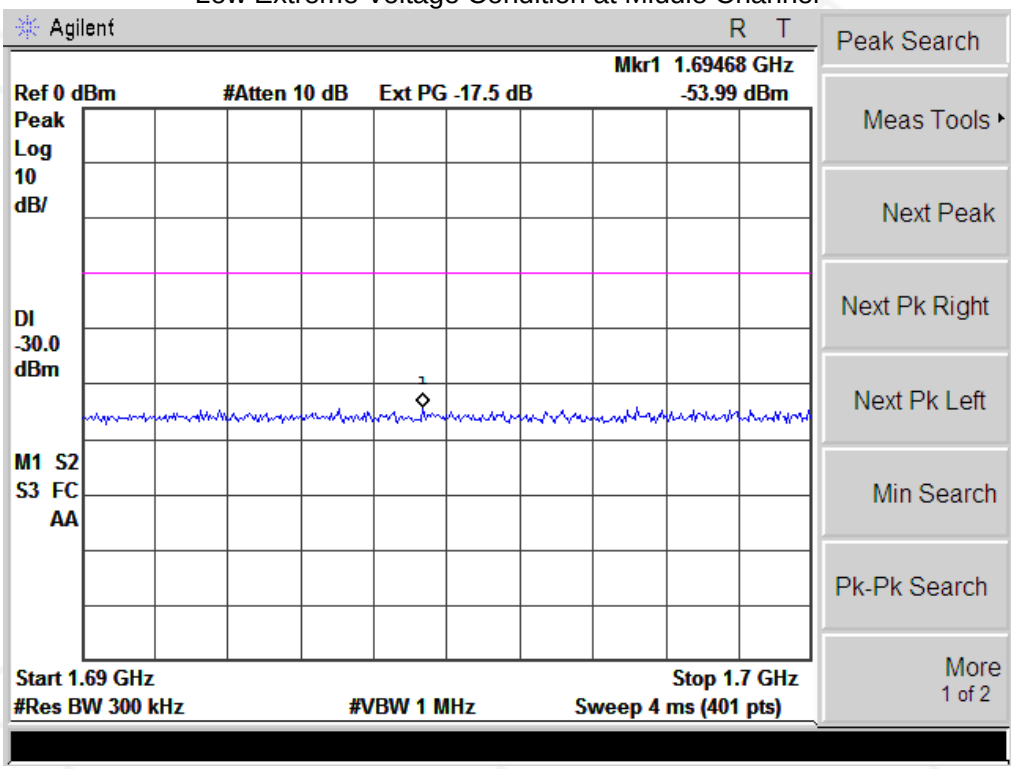
DCS 1800

Low Extreme Voltage Condition at Middle Channel



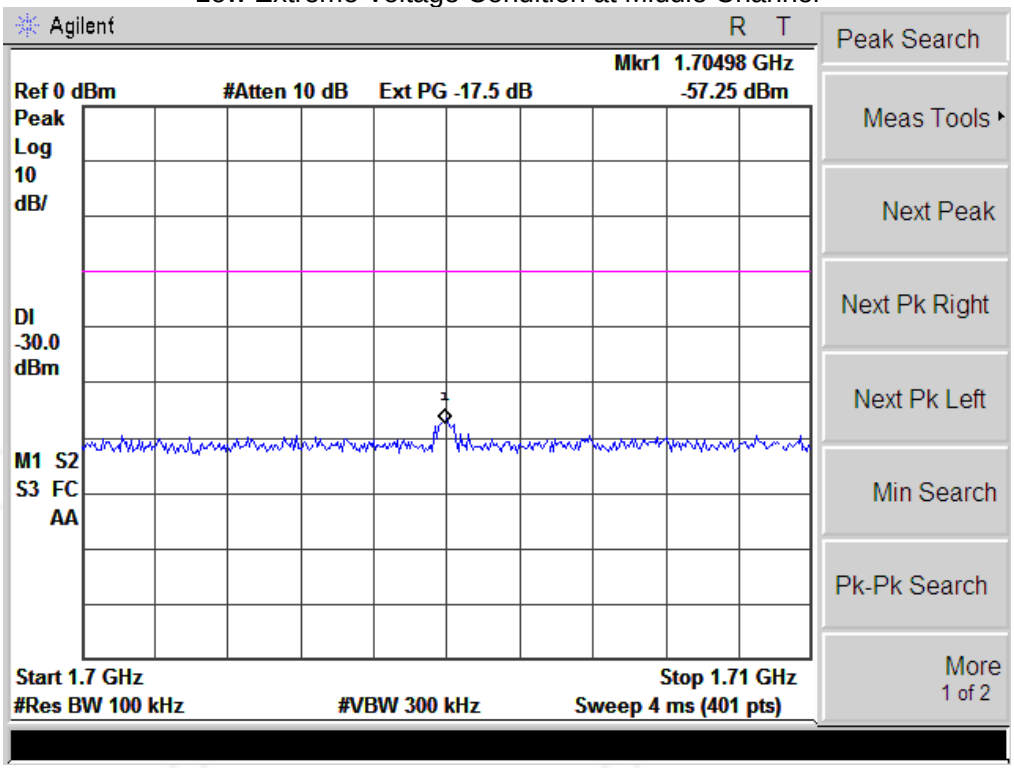
DCS 1800

Low Extreme Voltage Condition at Middle Channel



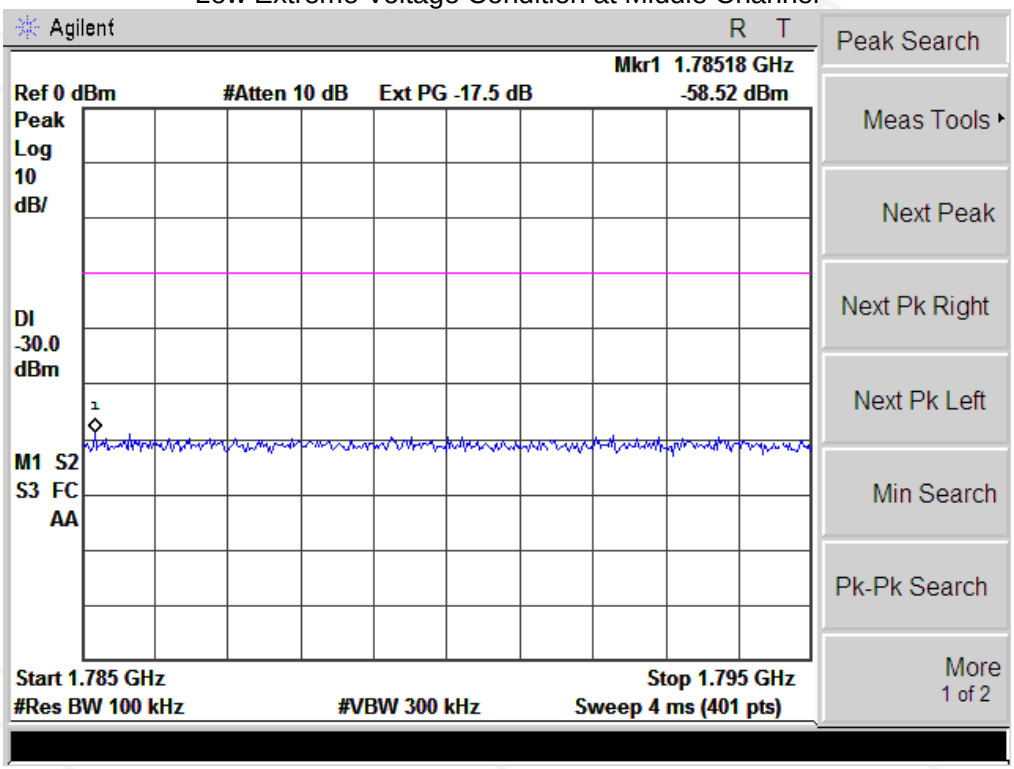
DCS 1800

Low Extreme Voltage Condition at Middle Channel



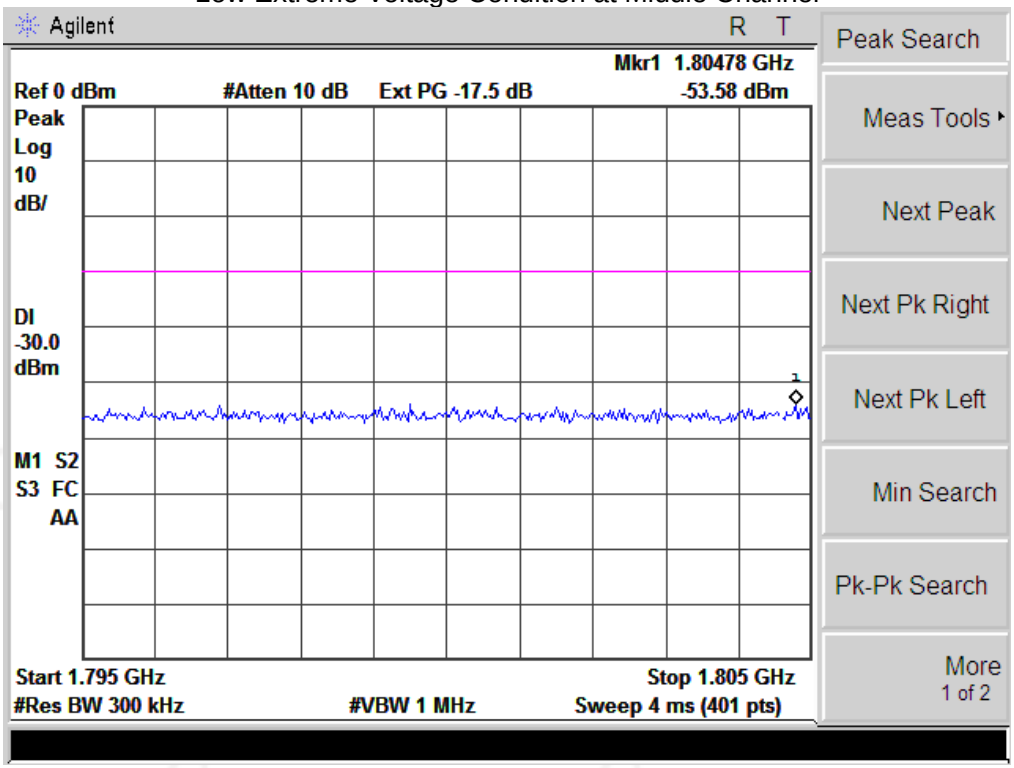
DCS 1800

Low Extreme Voltage Condition at Middle Channel



DCS 1800

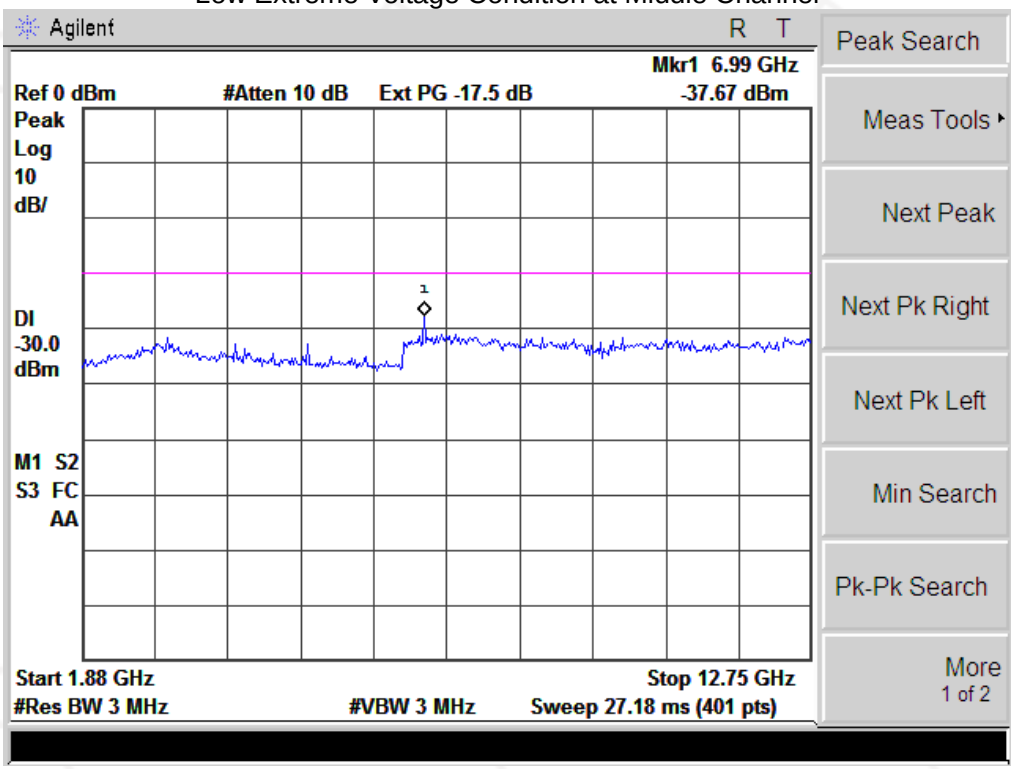
Low Extreme Voltage Condition at Middle Channel



Note: 1805-1880MHz is RX bands, please refer to sub clause §4.2.6.

DCS 1800

Low Extreme Voltage Condition at Middle Channel



3.9 CONDUCTED SPURIOUS EMISSIONS – MS IN IDLE MODE

Applicable Standard

Clause 12.1.2 of TS 151 010-1 V9.5.0 (2011-08)applies.

Frequency range		Power level in dBm	
		GSM 400, T-GSM 810 GSM 900, DCS 1 800	GSM 700, GSM 850, PCS 1 900
100 kHz to	880 MHz	-57	-57
880 MHz to	915 MHz	-59	-57
915 MHz to	1 000 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

Table 3

Definition and applicability

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

Conformance requirements

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

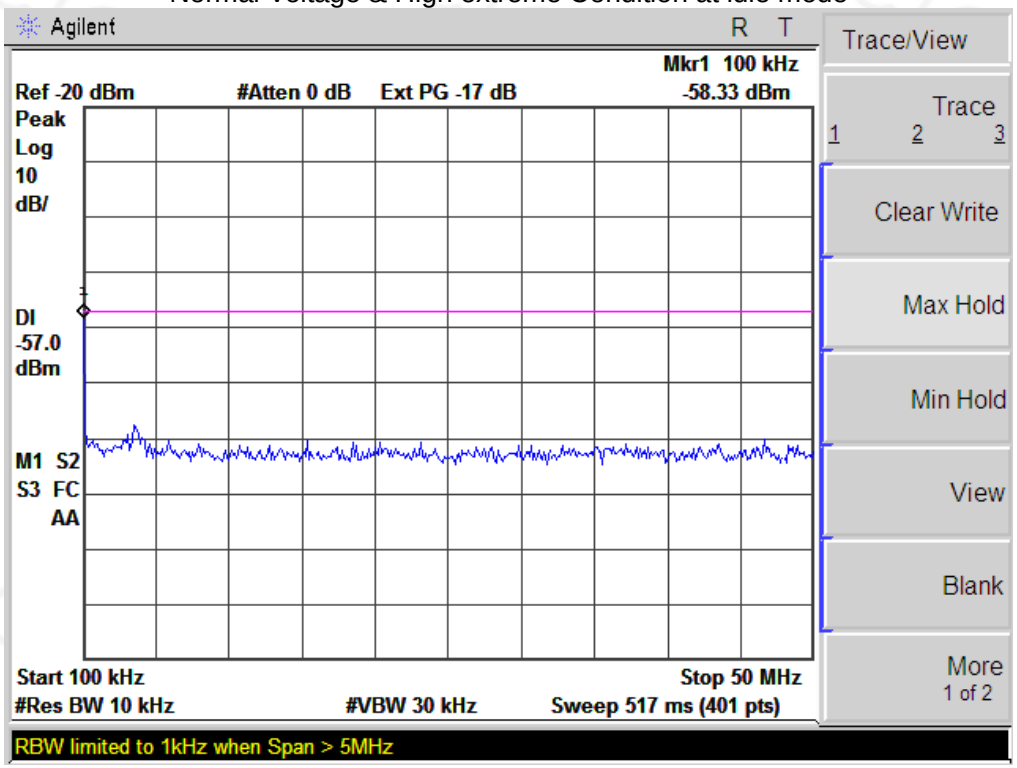
Set up for testing

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

TEST RESULT

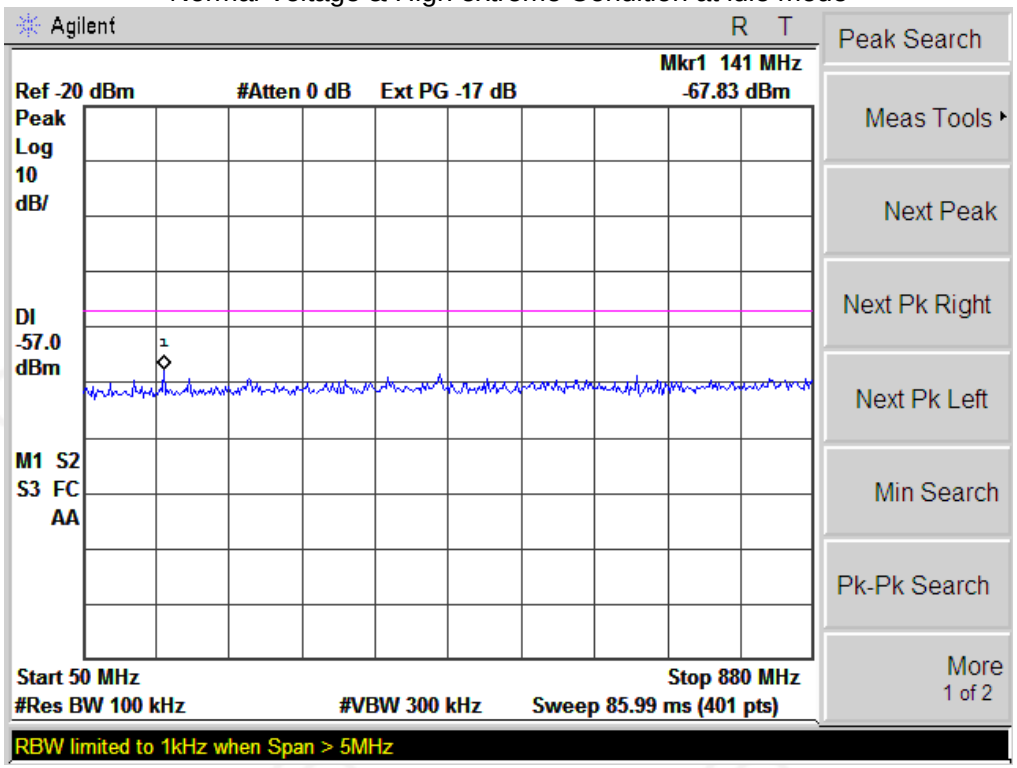
GSM900

Normal Voltage & High extreme Condition at idle mode



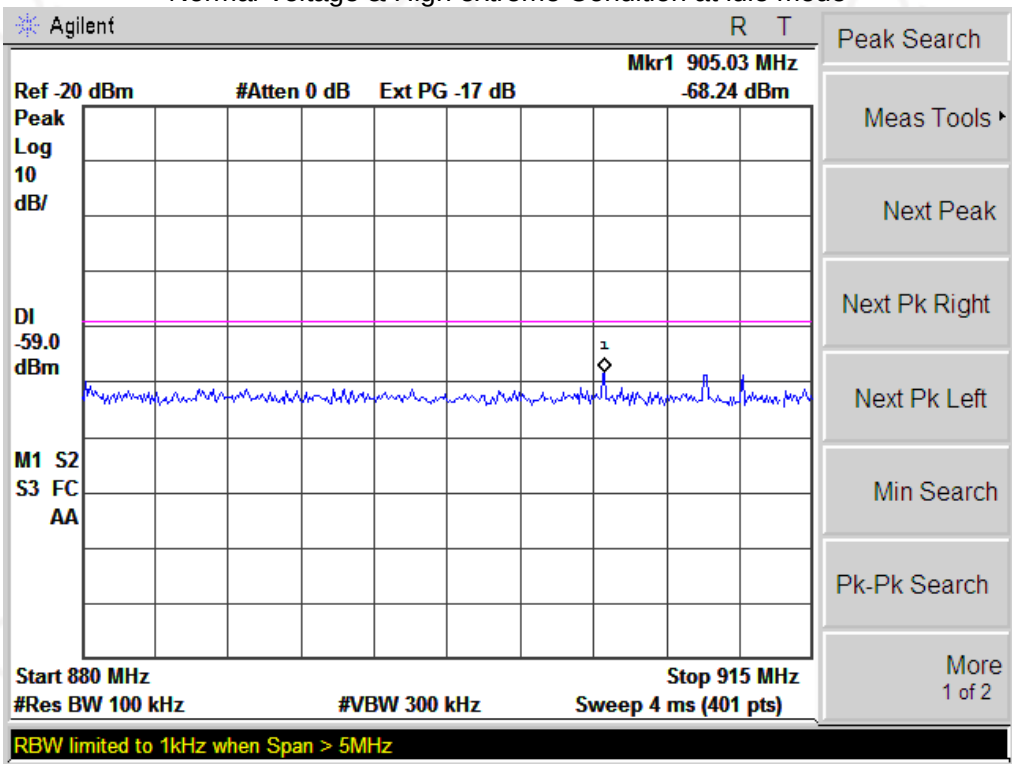
GSM900

Normal Voltage & High extreme Condition at idle mode



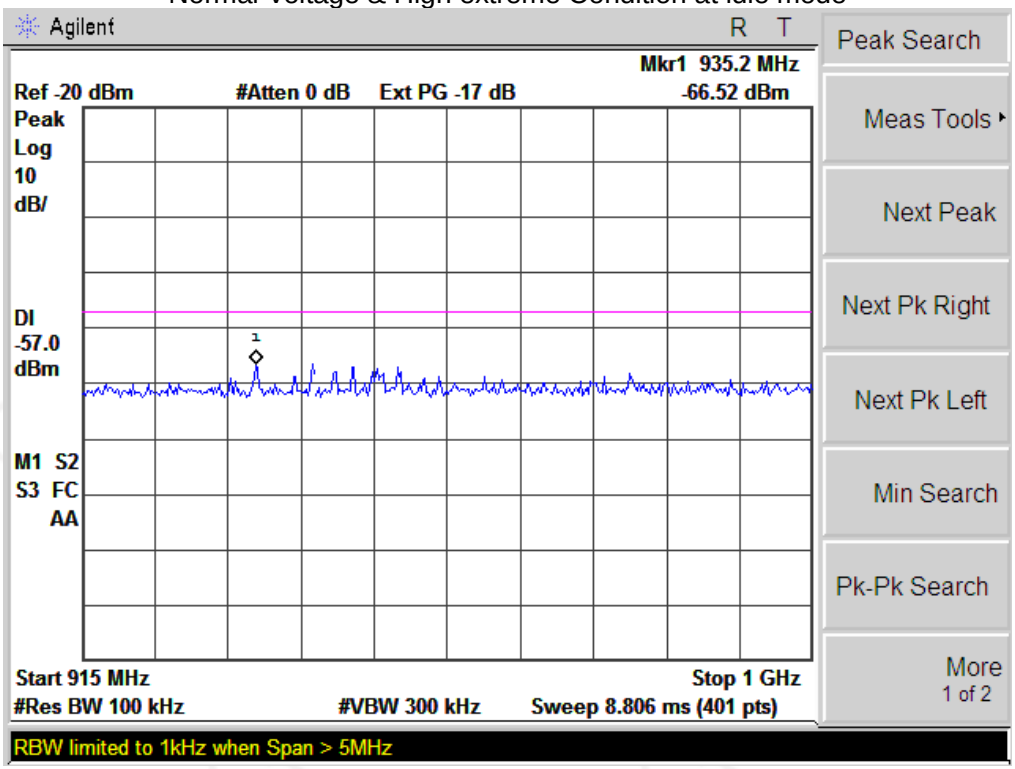
GSM900

Normal Voltage & High extreme Condition at idle mode



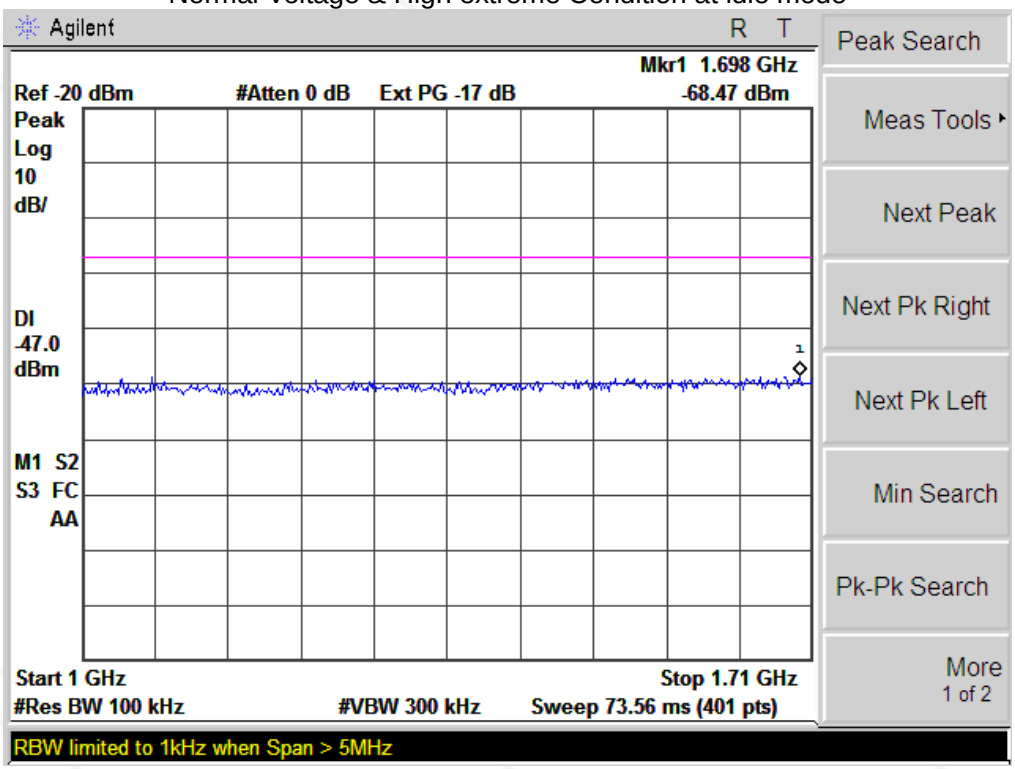
GSM900

Normal Voltage & High extreme Condition at idle mode



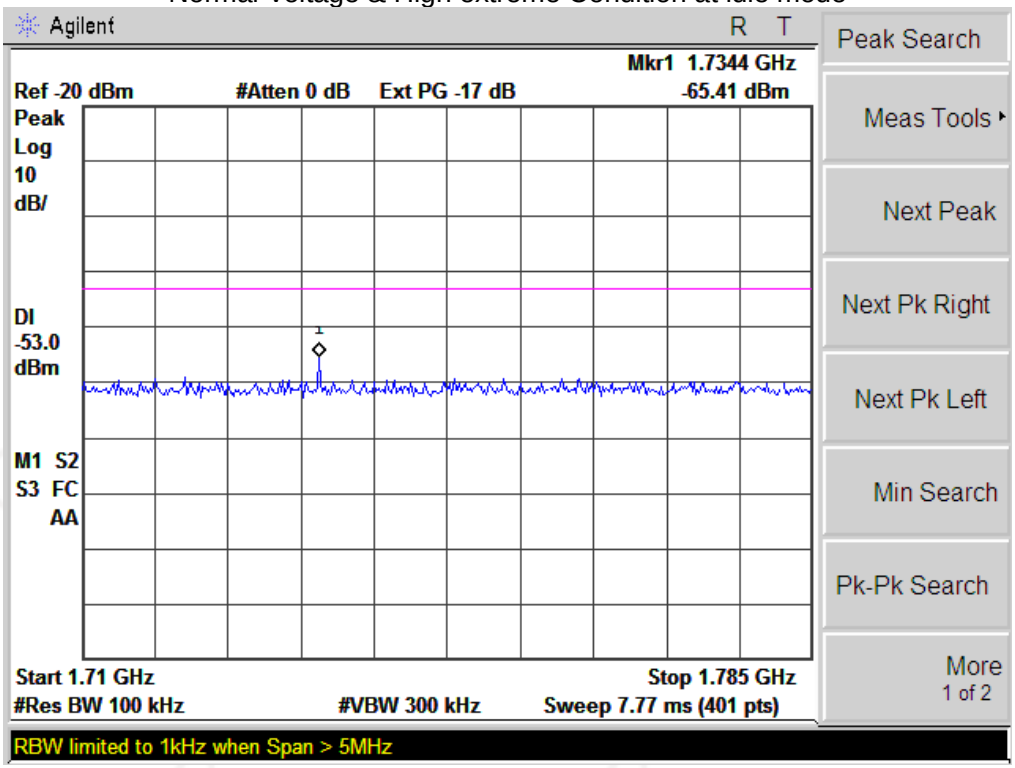
GSM900

Normal Voltage & High extreme Condition at idle mode



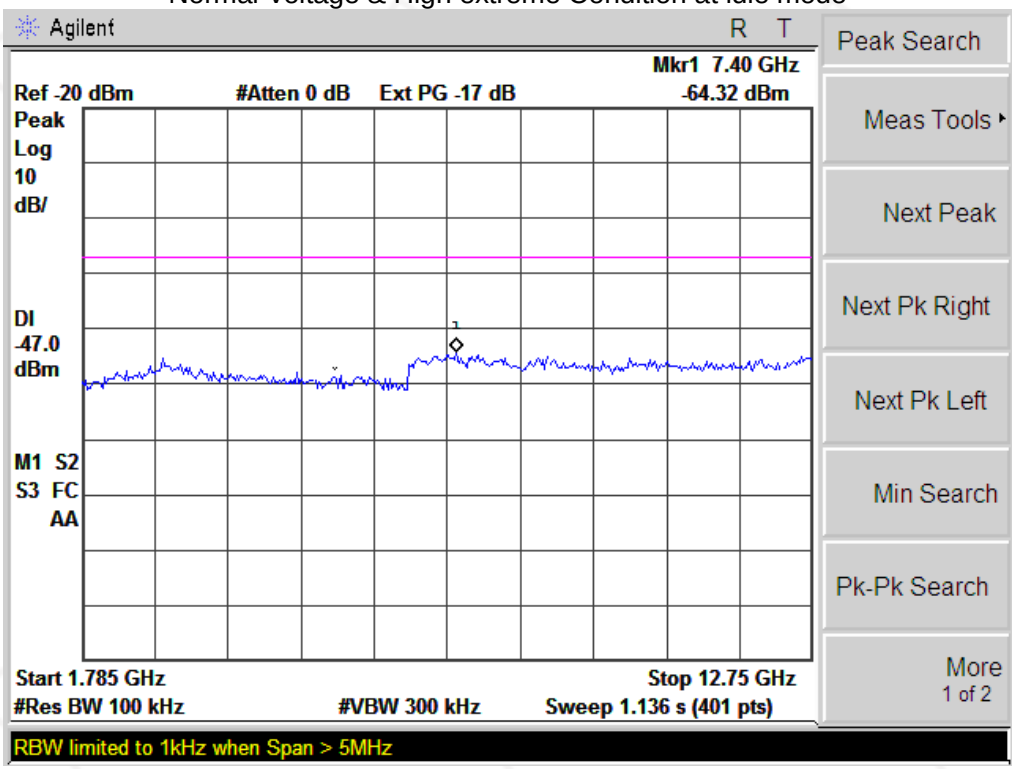
GSM900

Normal Voltage & High extreme Condition at idle mode



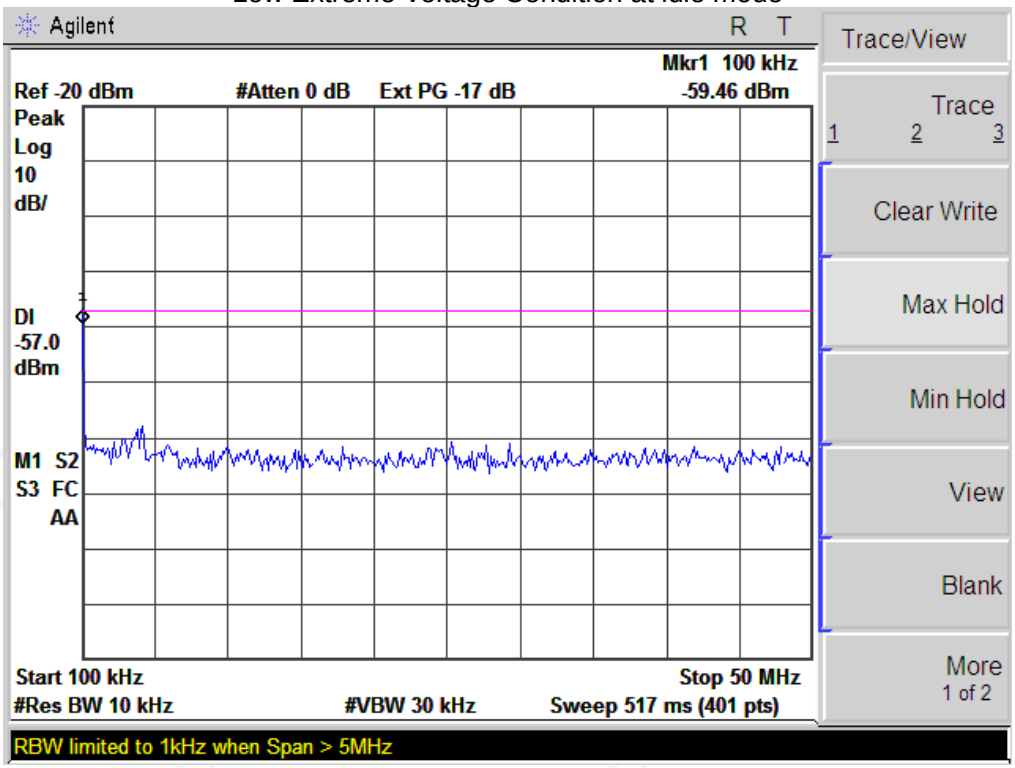
GSM900

Normal Voltage & High extreme Condition at idle mode



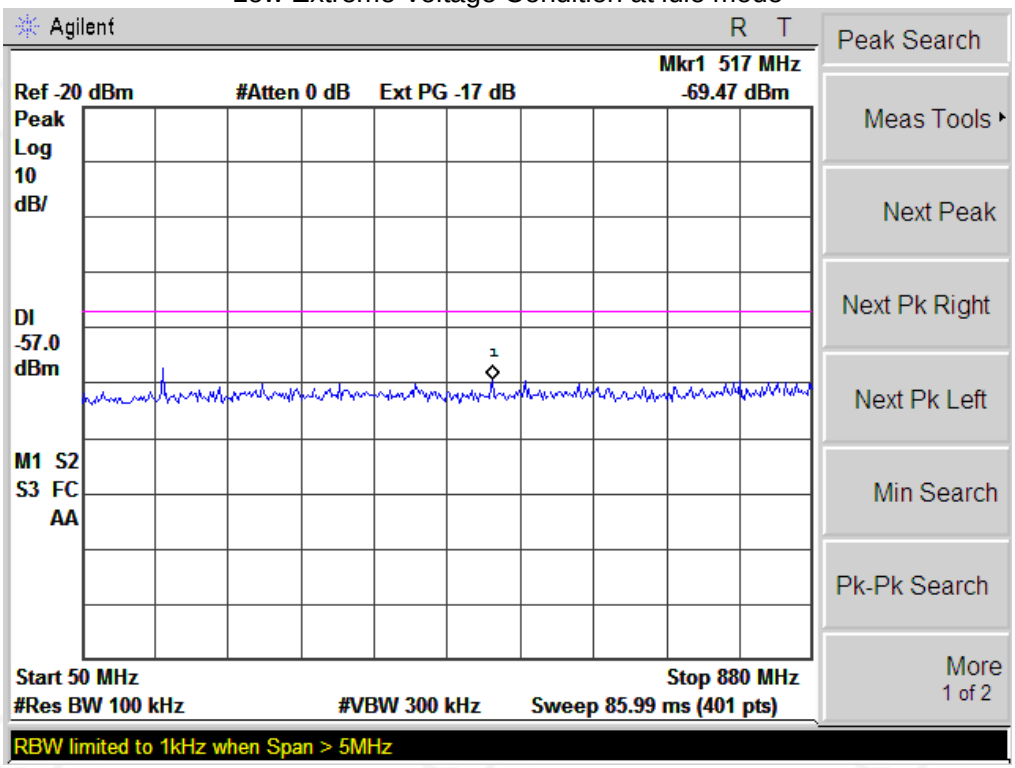
GSM900

Low Extreme Voltage Condition at idle mode



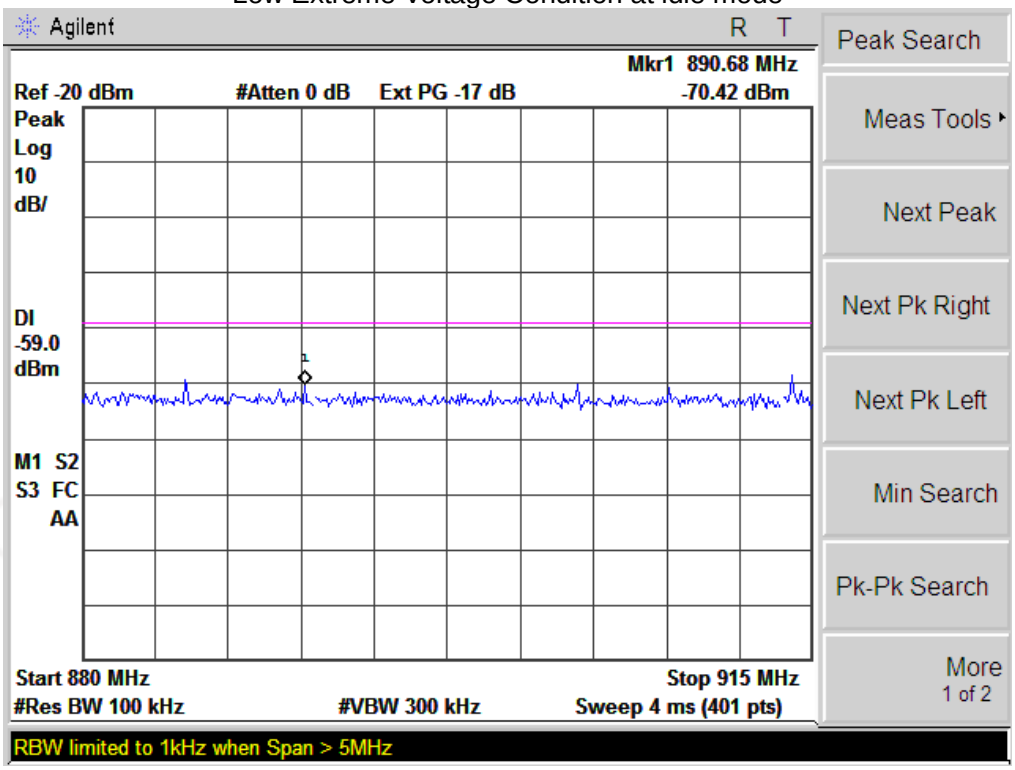
GSM900

Low Extreme Voltage Condition at idle mode



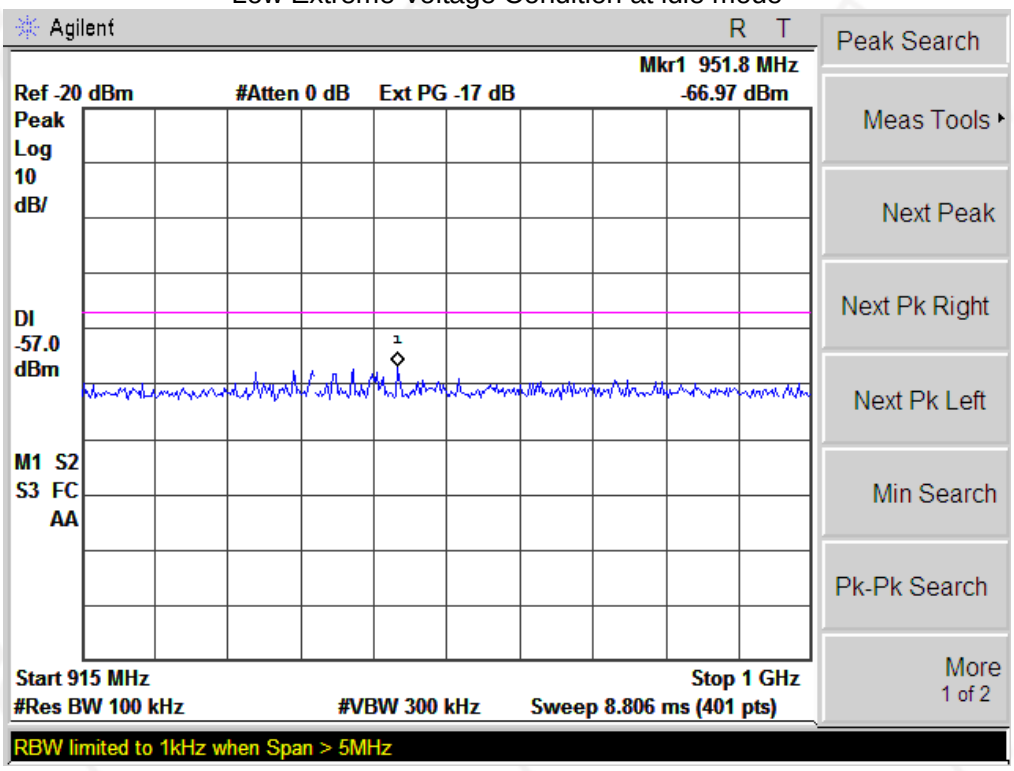
GSM900

Low Extreme Voltage Condition at idle mode



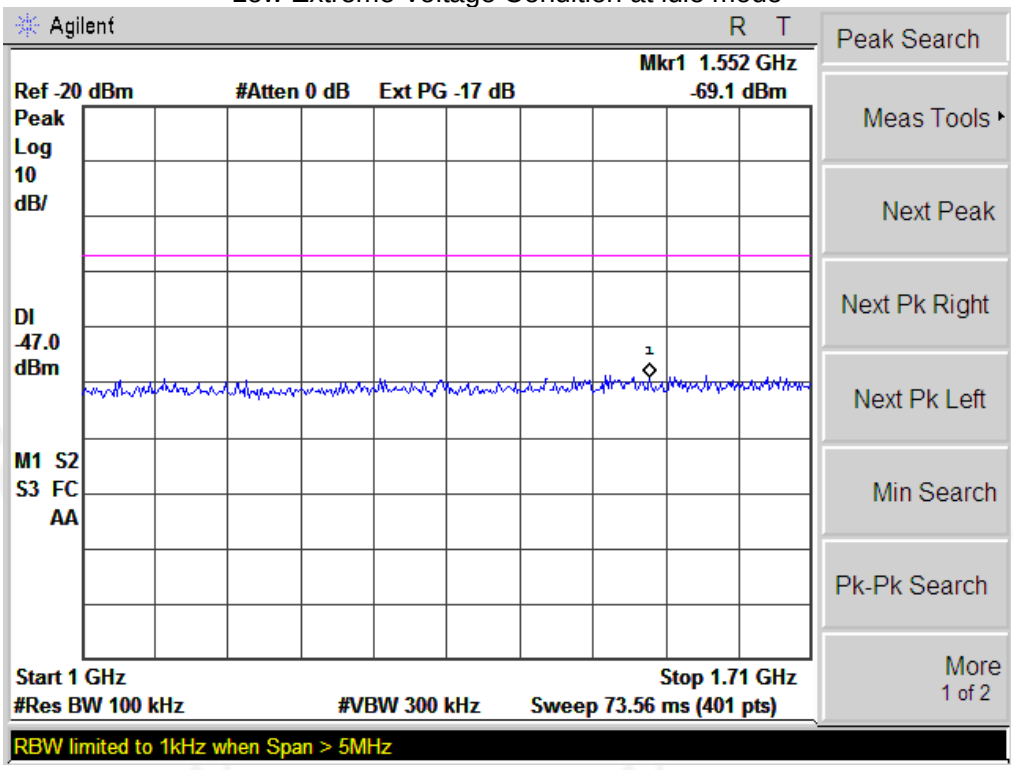
GSM900

Low Extreme Voltage Condition at idle mode



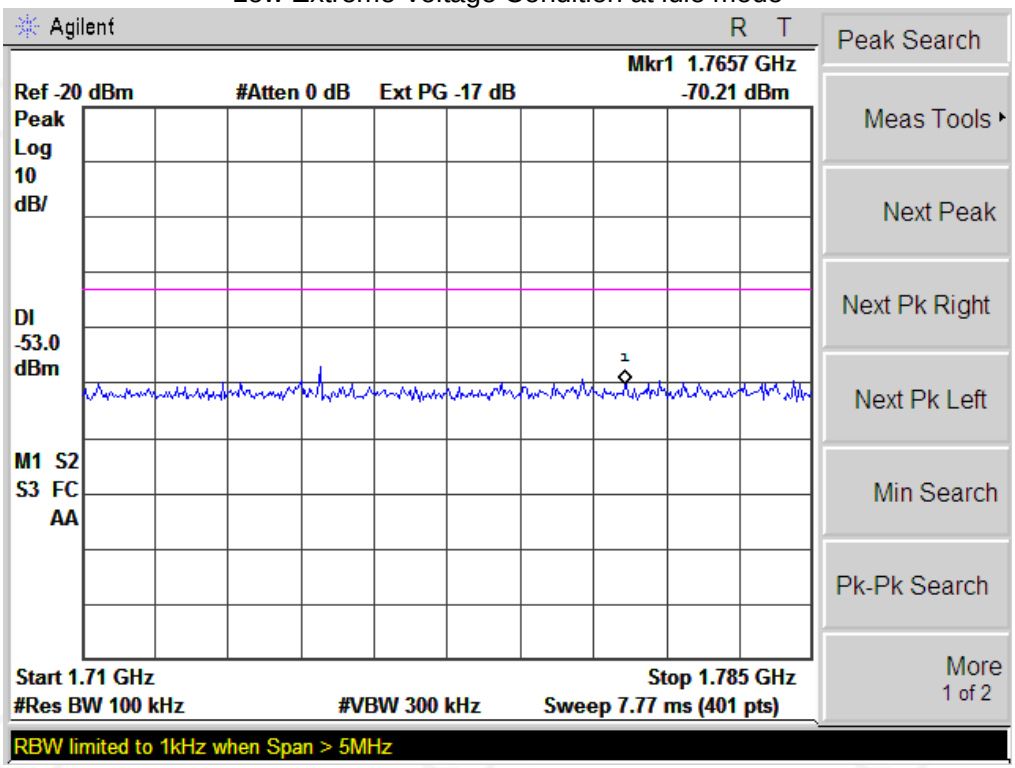
GSM900

Low Extreme Voltage Condition at idle mode



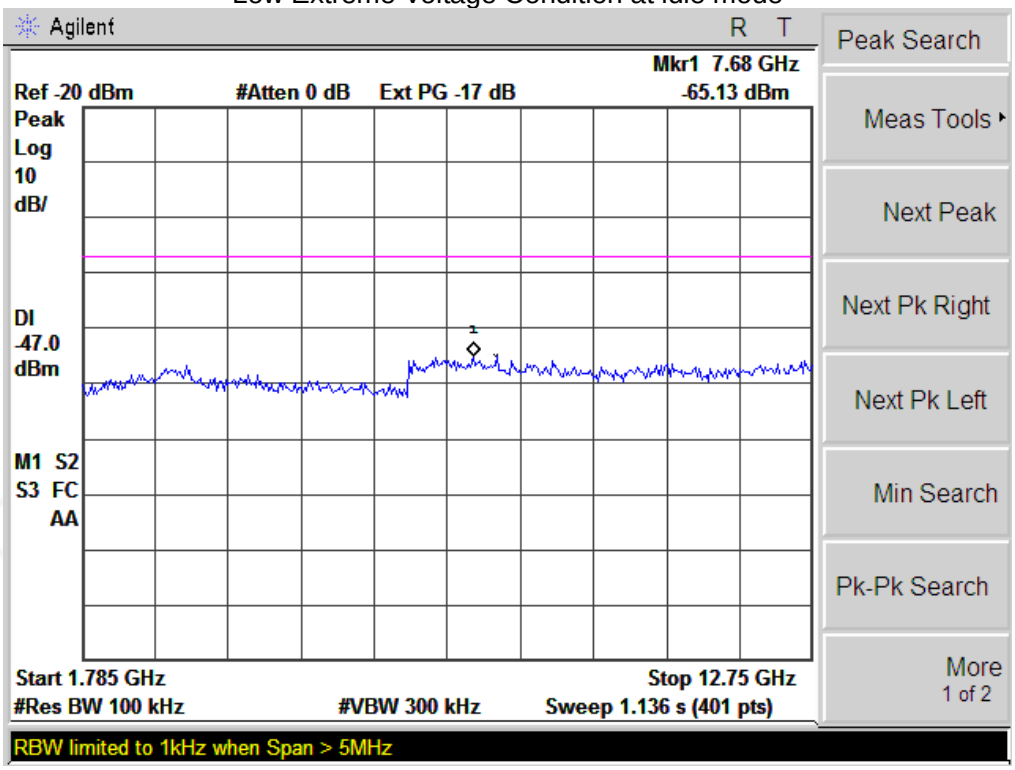
GSM900

Low Extreme Voltage Condition at idle mode



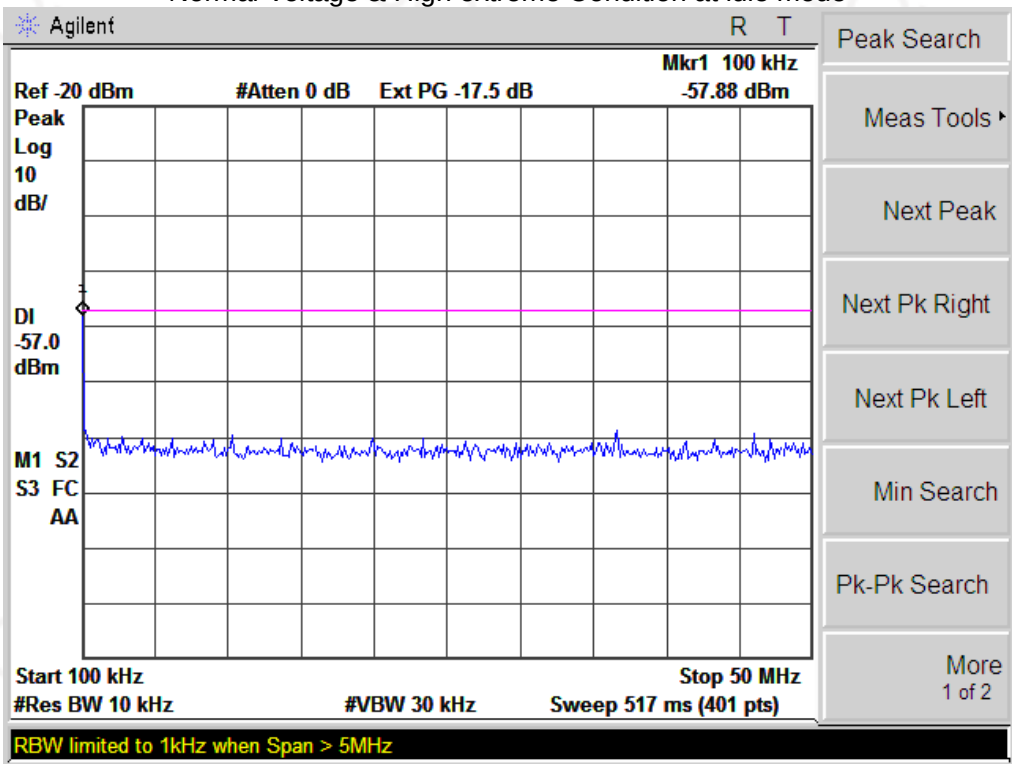
GSM900

Low Extreme Voltage Condition at idle mode



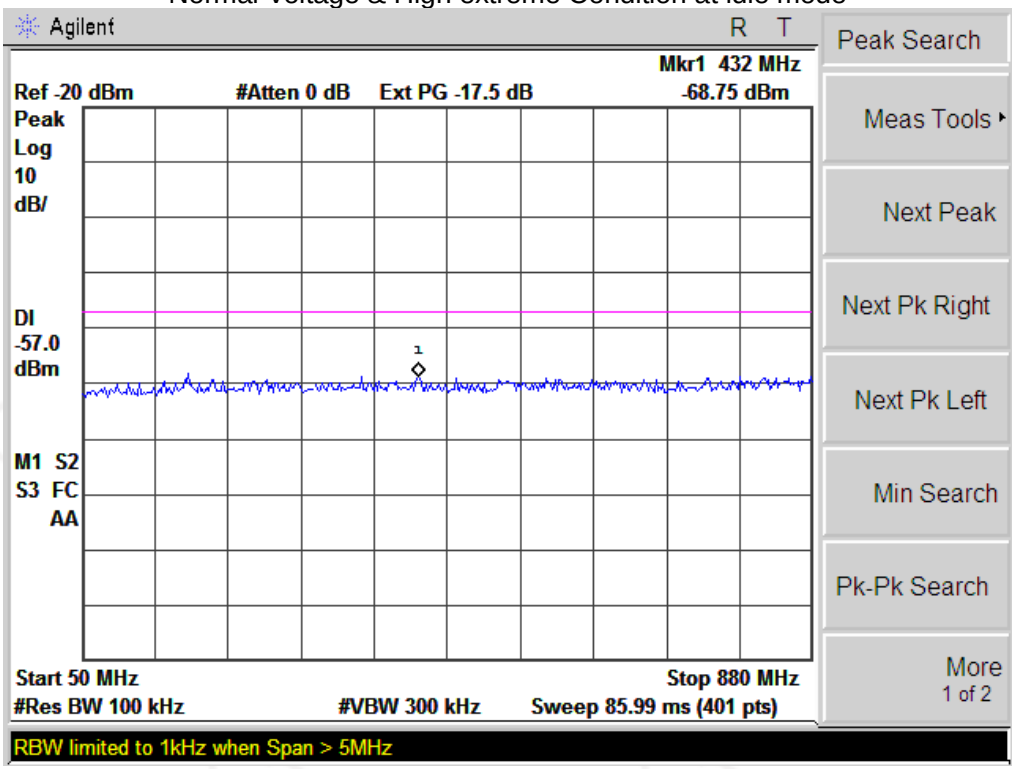
GSM1800

Normal Voltage & High extreme Condition at idle mode



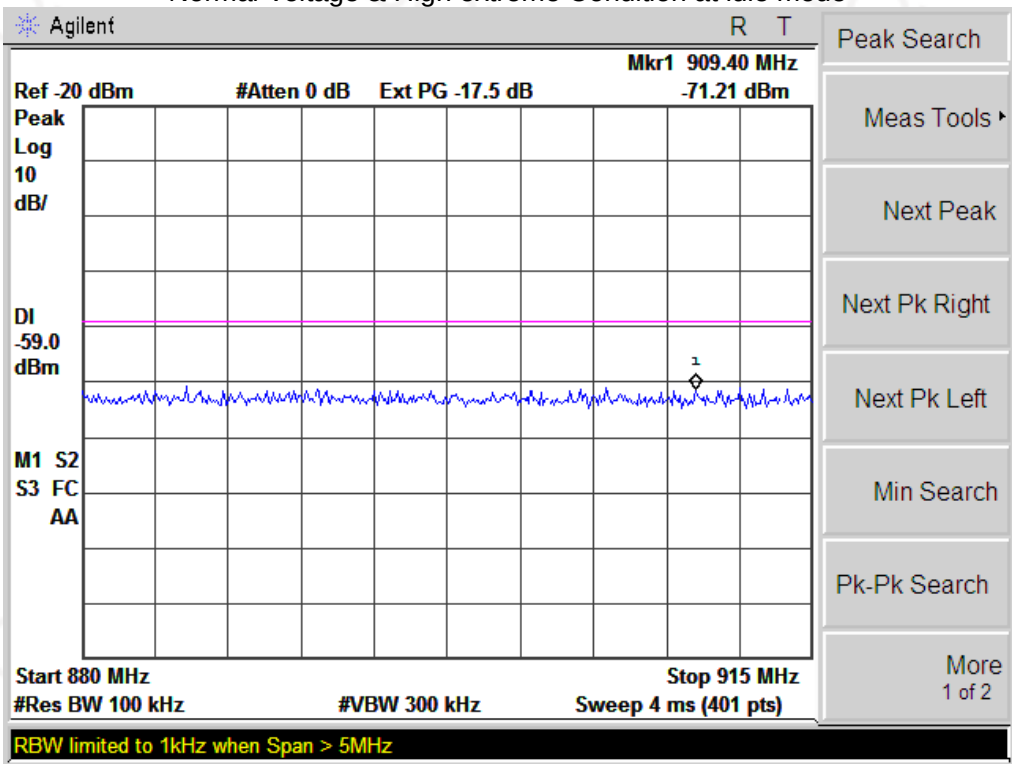
GSM1800

Normal Voltage & High extreme Condition at idle mode



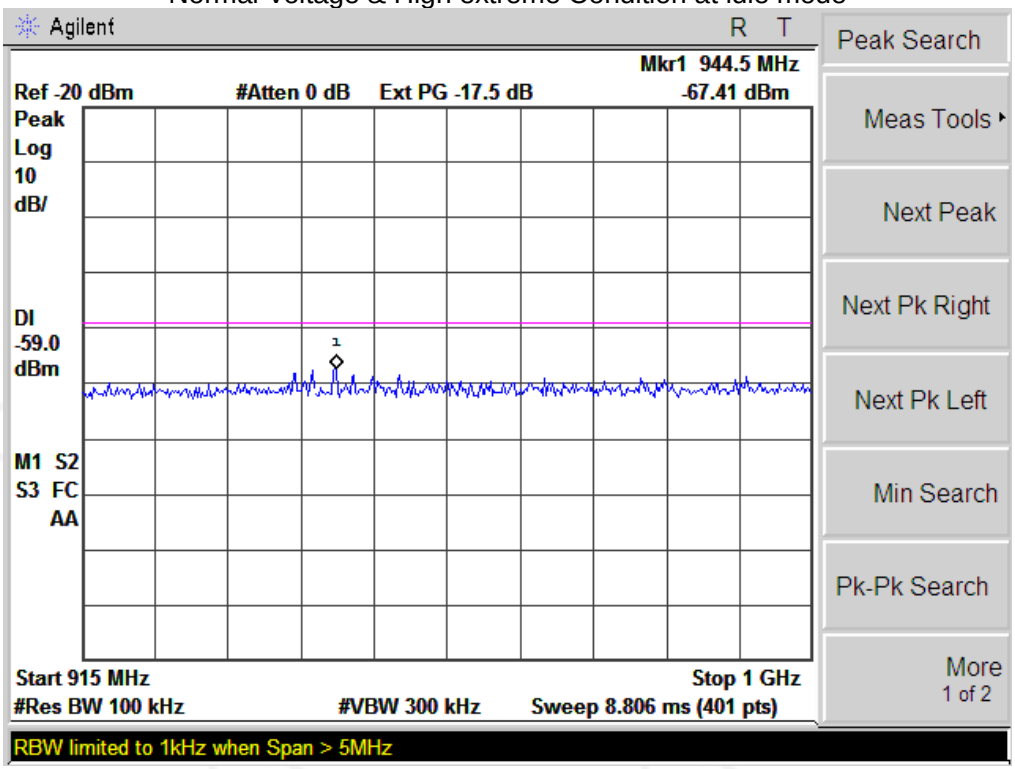
GSM1800

Normal Voltage & High extreme Condition at idle mode



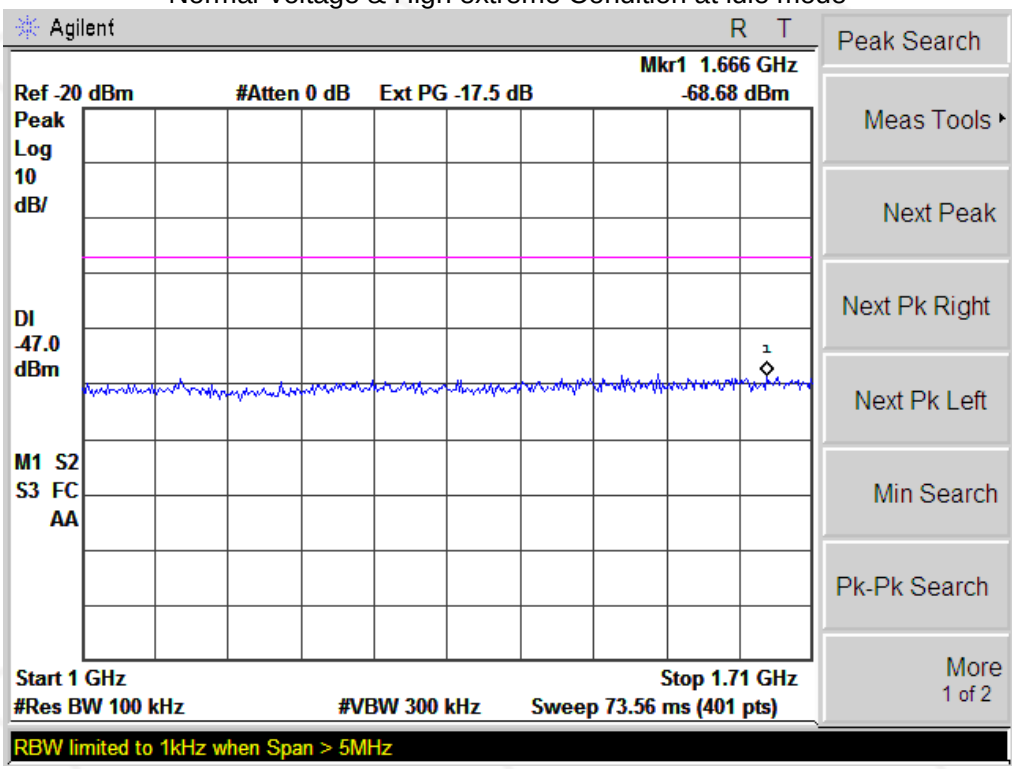
GSM1800

Normal Voltage & High extreme Condition at idle mode



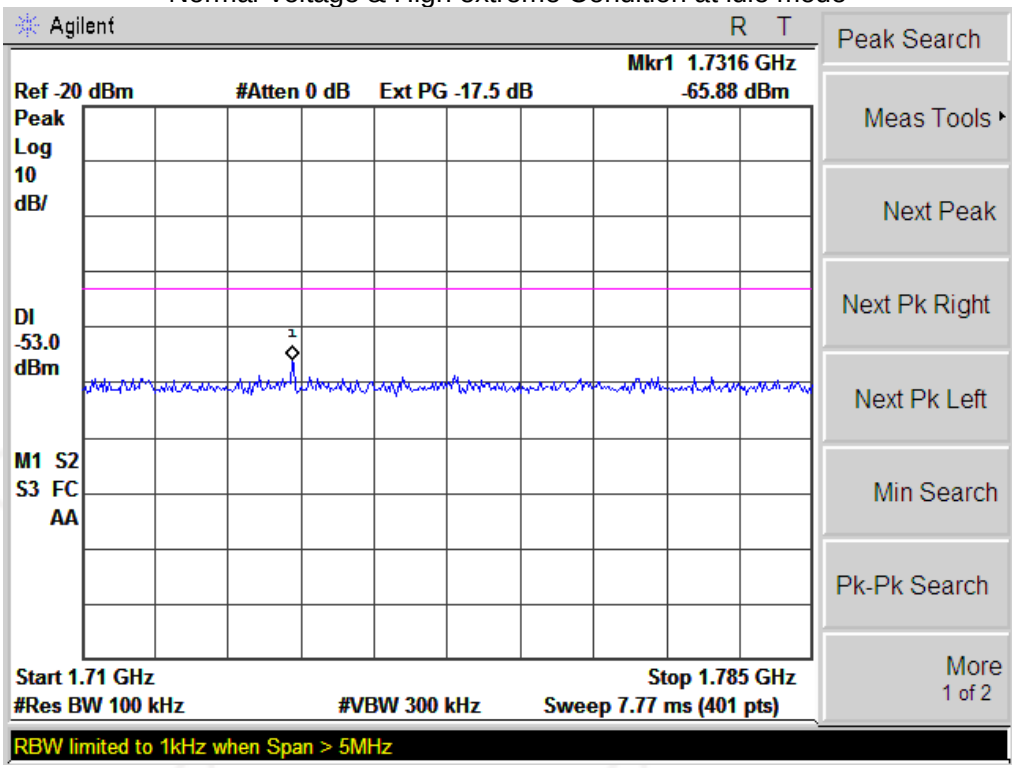
GSM1800

Normal Voltage & High extreme Condition at idle mode



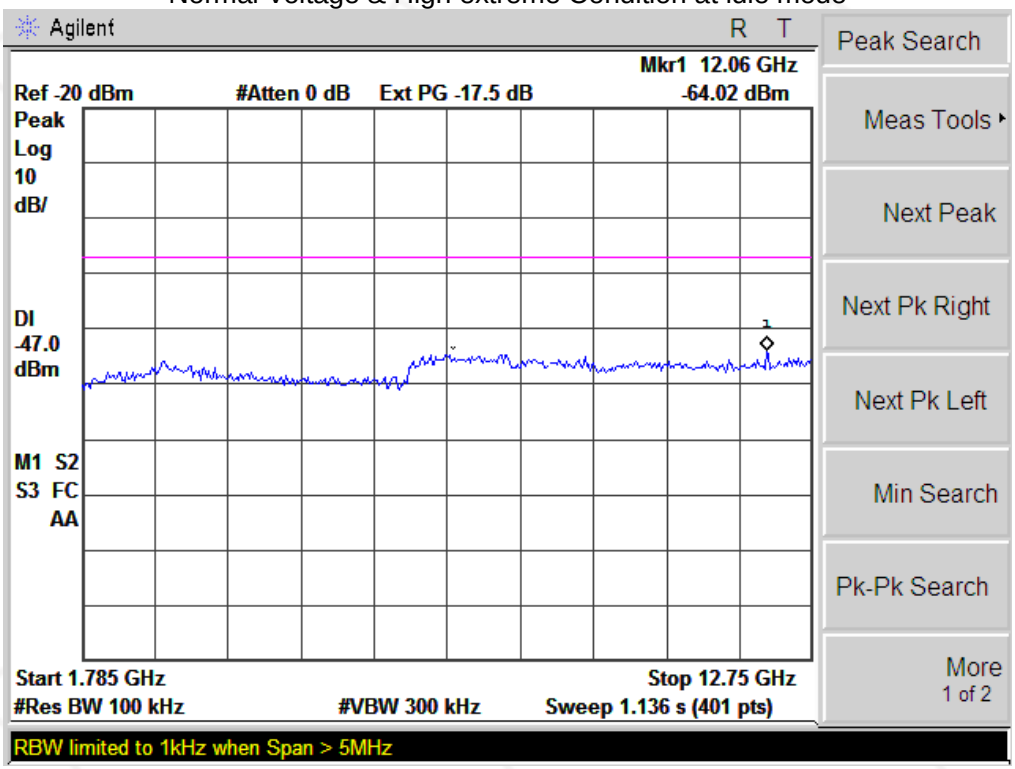
GSM1800

Normal Voltage & High extreme Condition at idle mode



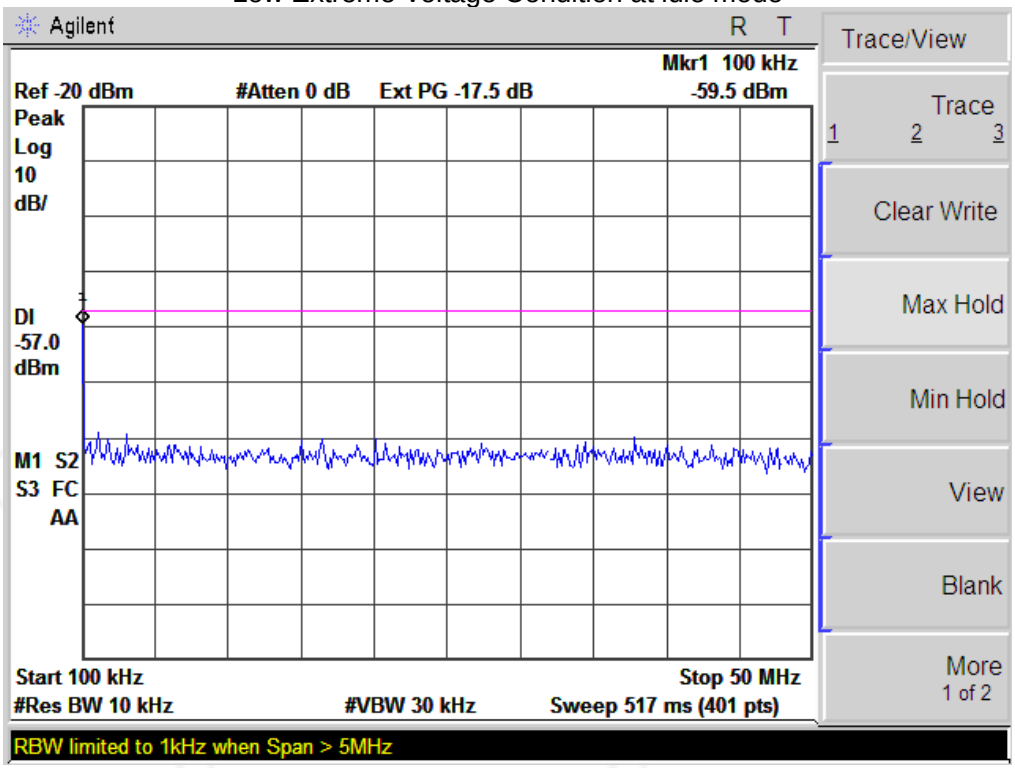
GSM1800

Normal Voltage & High extreme Condition at idle mode



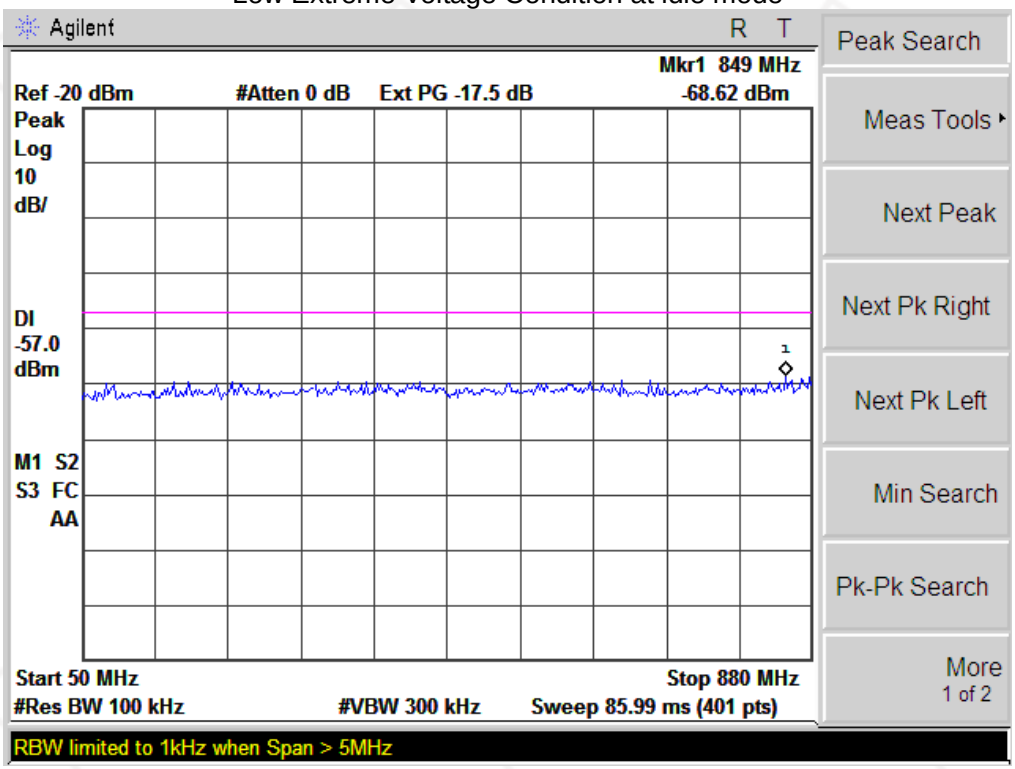
GSM1800

Low Extreme Voltage Condition at idle mode



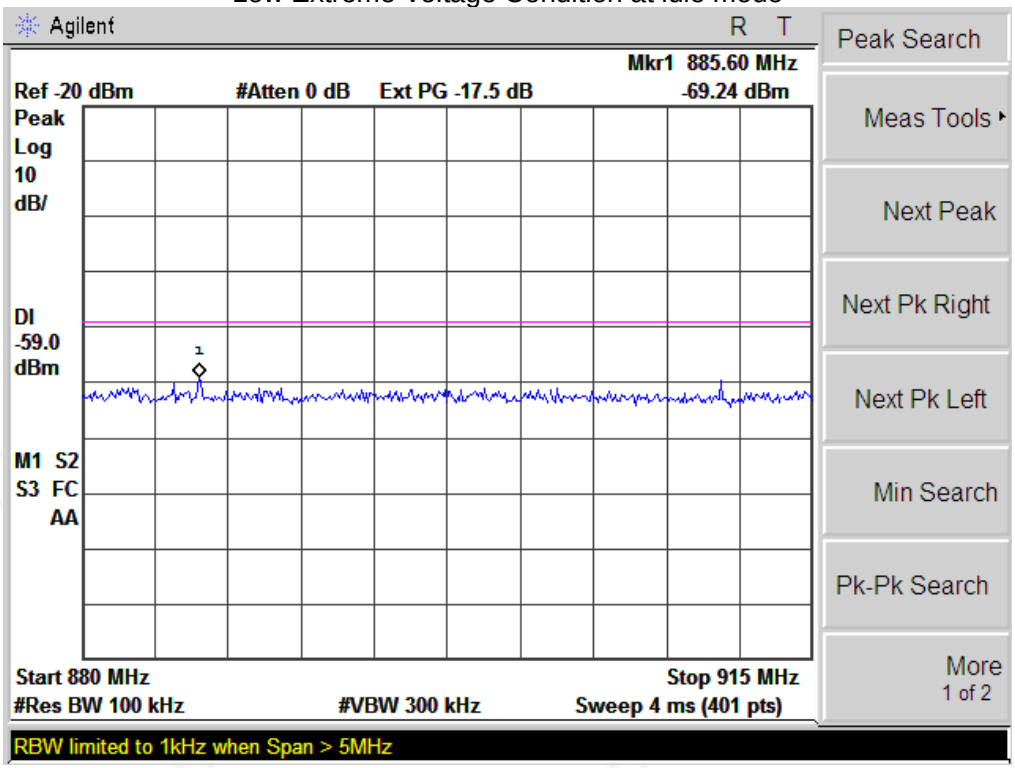
GSM1800

Low Extreme Voltage Condition at idle mode



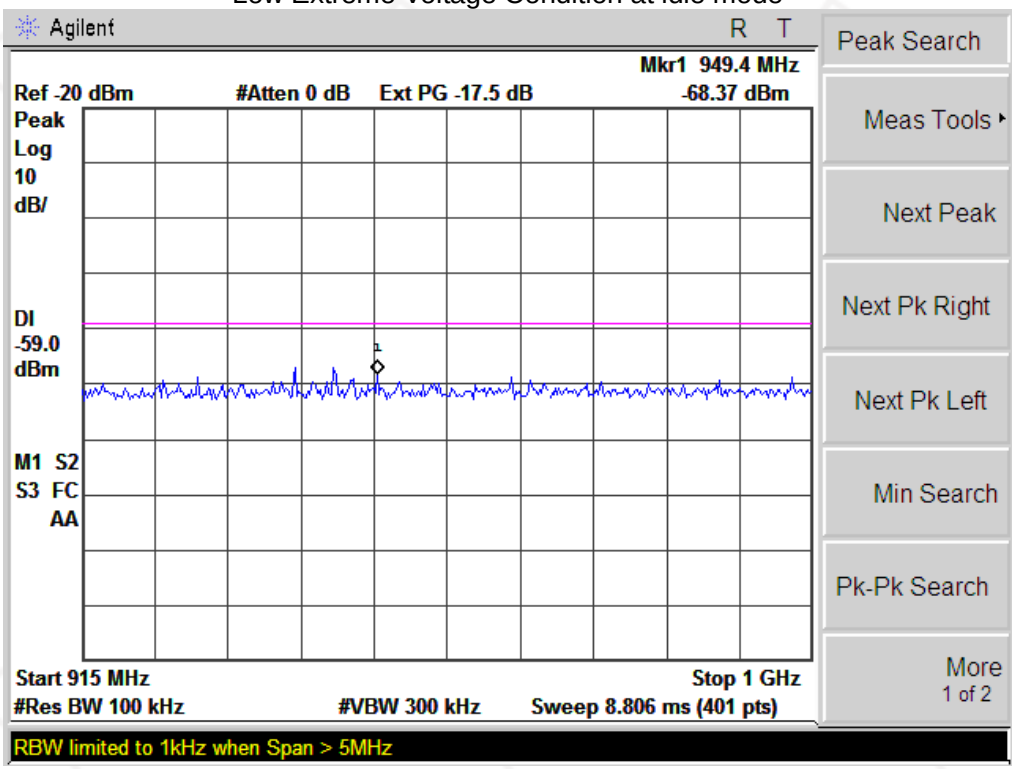
GSM1800

Low Extreme Voltage Condition at idle mode



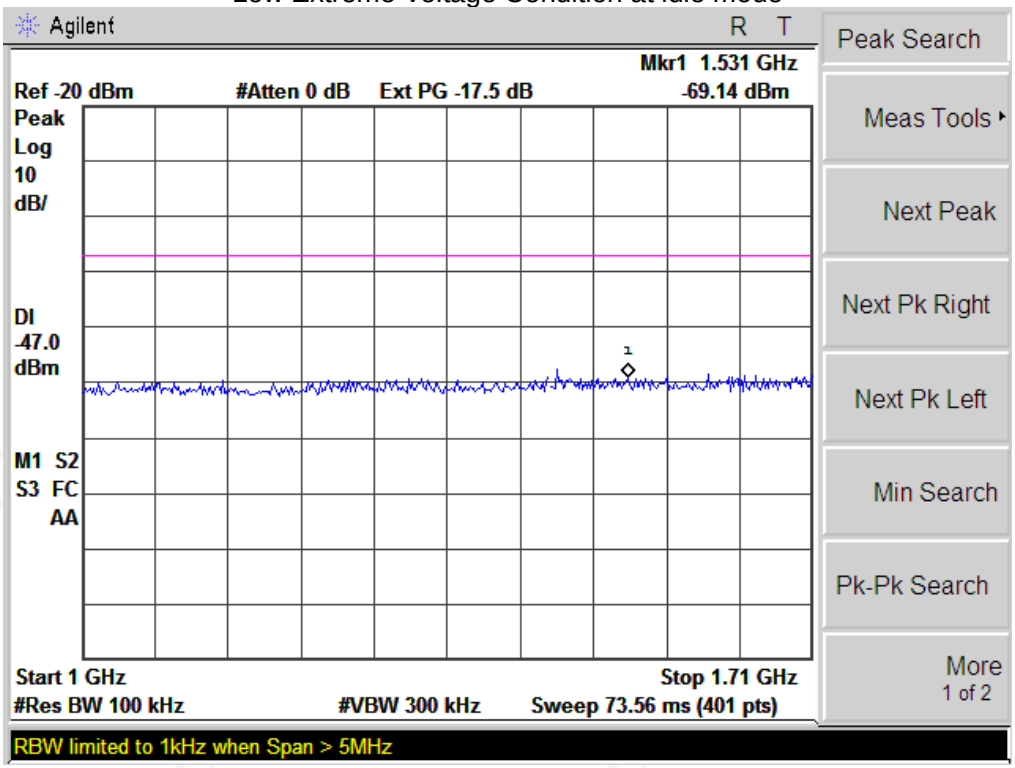
GSM1800

Low Extreme Voltage Condition at idle mode



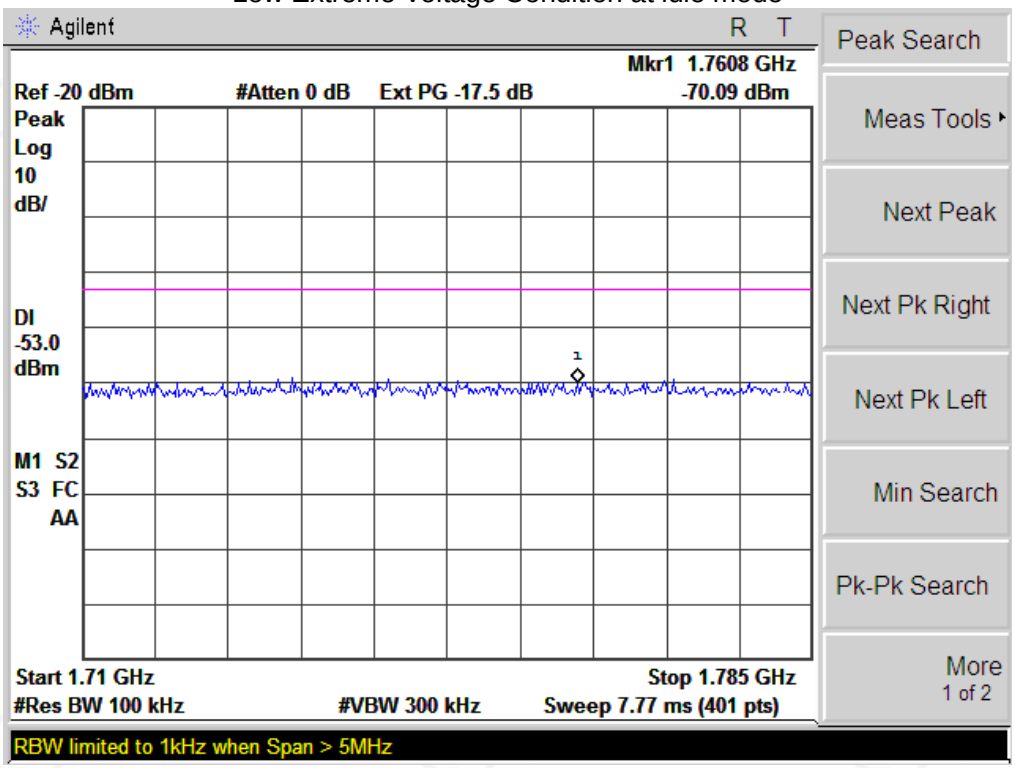
GSM1800

Low Extreme Voltage Condition at idle mode



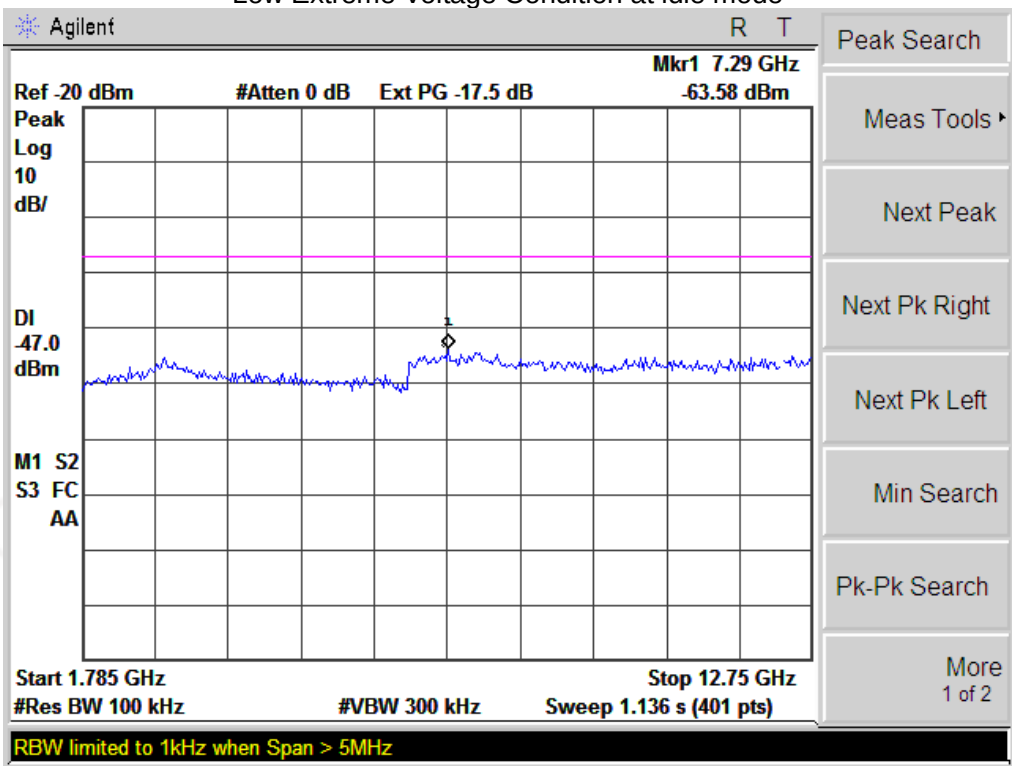
GSM1800

Low Extreme Voltage Condition at idle mode



GSM1800

Low Extreme Voltage Condition at idle mode



3.10 RADIATED SPURIOUS EMISSIONS – MS ALLOCATED A CHANNEL

Requirements: According to EN 301 511, section 4.2.16, the radiated spurious power emitted by the MS,when allocated channel, shall be no more than the levels in table 5 under normal and extreme voltage conditions.

Table 5

Frequency range		Power level in dBm		
		GSM 400, GSM 700, T-GSM 810, GSM 850, GSM 900	DCS 1 800	PCS 1 900
30 MHz to	1 GHz	-36	-36	-36
1 GHz to	4 GHz	-30		-30
1 GHz to	1 710 MHz		-30	
1 710 MHz to	1 785 MHz		-36	
1 785 MHz to	4 GHz		-30	

Test Procedure

a) Initially the test antenna is closely coupled to the MS and any spurious emission radiated by the MS is detected by the test antenna and receiver in the range 30 MHz to 4 GHz.

NOTE 1: This is a qualitative step to identify the frequency and presence of spurious emissions which are to be measured in subsequent steps.

b) The test antenna separation is set to the appropriate measurement distance and at each frequency at which 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 900 MHz, the test antenna separation from the MS may be reduced to 1 meter.

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

Table 6

Frequency range	Frequency offset	Filter bandwidth	Approx video bandwidth
30 MHz to 50 MHz	-	10 kHz	30 kHz
50 MHz to 500 MHz	-	100 kHz	300 kHz
excl. relevant TX band:			
GSM 450: 450,4 MHz to 457,6 MHz;			
GSM 480: 478,8 MHz to 486 MHz			
500 MHz to 4 GHz,	0 to 10 MHz	100 kHz	300 kHz
	>= 10 MHz	300 kHz	1 MHz
Excl. relevant TX band:	>= 20 MHz	1 MHz	3 MHz
GSM 710: 698 MHz to 716 MHz	>= 30 MHz	3 MHz	3 MHz
GSM 750: 777 MHz to 793 MHz			
T-GSM 810: 806MHz to 821 MHz			
GSM 850: 824 MHz to 849 MHz			
P-GSM: 890 MHz to 915 MHz;	(offset from edge of		
E-GSM: 880 MHz to 915 MHz;	relevant TX band)		
DCS: 1 710 MHz to 1 785 MHz.			
PCS 1 900: 1 850 MHz to 1 910 MHz			
Relevant TX band:			
GSM 450: 450,4 MHz to 457,6 MHz	1,8 MHz to 6,0 MHz	30 kHz	100 kHz
GSM 480: 478,8 MHz to 486 MHz	> 6,0 MHz	100 kHz	300 kHz
GSM 710: 698 MHz to 716 MHz			
GSM 750: 777 MHz to 793 MHz			
T-GSM 810: 806MHz to 821 MHz			
GSM 850: 824 MHz to 849 MHz	(offset from carrier)		
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			
NOTE 1: 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 2: Due to practical implementation of a SS, the video bandwidth is restricted to a maximum of 3 MHz.			

Environmental Conditions

Temperature	18~22° C
Relative Humidity	45~66%
ATM Pressure	101.1~101.7kPa

TEST RESULT

GSM 900

Normal Voltage,Middle Channel

Frequency (MHz)	Polar (H/V)	ReadingLevel (dBm)	Factor	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
operation frequency:Middle channel						
143.3261	V	-99.93	24.19	-75.74	-36.00	-39.74
139.3613	H	-100.02	24.30	-75.72	-36.00	-39.72
1805.125	V	-44.69	-3.08	-47.77	-30.00	-17.77
1805.002	H	-39.23	-3.07	-42.30	-30.00	-12.30
2708.250	V	-39.93	-0.30	-40.23	-30.00	-10.23
2705.697	H	-35.62	-0.30	-35.92	-30.00	-5.92
3610.003	V	-52.53	2.96	-49.57	-30.00	-19.57
3610.003	H	-51.46	2.96	-48.50	-30.00	-18.50

GSM 1800

Normal Voltage,Middle Channel

Frequency (MHz)	Polar (H/V)	ReadingLevel (dBm)	Factor	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
operation frequency:Middle channel						
260.1444	V	-94.67	27.05	-67.62	-36.00	-31.62
260.1444	H	-98.85	27.05	-71.80	-36.00	-35.80
3494.605	V	-52.97	2.70	-50.27	-30.00	-20.27
3494.605	H	-59.27	2.70	-56.57	-30.00	-26.57

Absolute Level= ReadingLevel+ Factor

Margin= Limit- Absolute Level

3.11 RADIATED SPURIOUS EMISSIONS – MS IN IDLE MODE

Applicable Standard

Requirements: According to EN 301 511, section 4.2.17, the radiated spurious power emitted by the MS,when in idle mode, shall be no more than the levels in table 7 under normal and extreme voltage conditions.

Table 7

Frequency range		Power level in dBm	
		GSM 400, T-GSM 810, GSM 900, DCS 1 800	GSM 700, GSM 850, PCS 1 900
30 MHz to	880 MHz	-57	-57
880 MHz to	915 MHz	-59	-57
915 MHz to	1 000 MHz	-57	-57
1 GHz to	1 710 MHz	-47	
1 710 MHz to	1 785 MHz	-53	
1 785 MHz to	4GHz	-47	
1 GHz to	1 850 MHz		-47
1 850 MHz to	1 910 MHz		-53
1 910 MHz to	4GHz		-47

Test Procedure

a) Initially the test antenna is closely coupled to the MS and any spurious emission radiated by the MS is detected by the test antenna and receiver in the range 30 MHz to 4 GHz.

NOTE 1: This is a qualitative step to identify the frequency and presence of spurious emissions which are to be measured in subsequent steps.

b) The test antenna separation is set to the appropriate measurement distance and at each frequency at which a spurious emission has been detected the MS is rotated to obtain a maximum response.

The effective radiated power of the emission is determined by a substitution measurement. In case of an anechoic shielded chamber pre-calibration may be used instead of a substitution measurement.

c) The measurement bandwidth based on a 5 pole synchronously tuned filter shall be according to table 8.The power indication is the peak power detected by the measuring system.

The measurement time on any frequency shall be such that it includes the time during which the MS receives a TDMA frame containing the paging channel.

NOTE 2: For these filter bandwidths some difficulties may be experienced with noise floor above required

measurement limit. This will depend on the gain of the test antenna, and adjustment of the measuring system bandwidth is permissible. Alternatively, for test frequencies above 900 MHz, the test antenna separation from the MS may be reduced to 1 meter.

Table 8

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

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

Environmental Conditions

Temperature	18~22° C
Relative Humidity	45~66%
ATM Pressure	101.1~101.7kPa

TEST RESULT

GSM 900

Frequency (MHz)	Polar (H/V)	ReadingLevel (dBm)	Factor	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
operation frequency:Middle channel						
35.3172	V	-93.36	28.42	-64.94	-57.00	-7.94
562.3549	V	-98.34	35.54	-62.80	-57.00	-5.80
2348.260	V	-59.61	-1.33	-60.94	-47.00	-13.94
3106.650	V	-61.64	0.35	-61.29	-47.00	-14.29
613.6642	H	-106.15	35.42	-70.73	-57.00	-13.73
2423.560	H	-63.45	-1.31	-64.76	-47.00	-17.76
2526.687	H	-61.89	-1.43	-63.32	-47.00	-16.32

GSM1800

Frequency (MHz)	Polar (H/V)	ReadingLevel (dBm)	Factor	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
operation frequency:Middle channel						
869.684	V	-95.43	26.53	-68.90	-57.00	-11.90
2132.425	V	-60.72	0.42	-60.30	-47.00	-13.30
2536.340	V	-57.82	-1.24	-59.06	-47.00	-12.06
33.6793	H	-102.45	29.73	-72.72	-57.00	-15.72
525.3667	H	-102.86	33.17	-69.69	-57.00	-12.69
1413.640	H	-60.42	-3.40	-63.82	-47.00	-16.82
2161.345	H	-60.35	0.35	-60.00	-47.00	-13.00

Note:

Absolute Level= ReadingLevel+ Factor

Margin= Limit- Absolute Level

3.12 RECEIVER BLOCKING AND SPURIOUS RESPONSE – SPEECH CHANNELS

Applicable Standard

Clause 14.7.1 of TS 151 010-1 V9.5.0 (2011-08)applies.

RESULT: Pass

Definition and applicability

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

The requirements and this test apply MS supporting speech.

Conformance requirements

The blocking characteristics of the receiver are specified separately for in-band and out-band performance as identified in GSM 05.05 clause 5.1.

The reference sensitivity performance as specified in table 1 of GSM 05.05 shall be met when the following signals are simultaneously input to the receiver:

- a useful signal at frequency f_o, 3dB above the reference sensitivity level as specified in GSM 05.05 clause 6.2;

- a continuous, static sine wave signal at a level as in the table of GSM 05.05 clause 5.1 and at a frequency (f) which is integer multiple of 200kHz.With the following exceptions, called spurious response frequencies:

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

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

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

Set up for testing

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

Testequipment: R&S CMU200, R&S SMR20

F_{lo} = 1320MHz – 1373MHz for E-GSM900

F_{lo} = 1282MHz – 1339MHz for DCS1800

The manufacturer declares the local oscillator frequency to 13.000 MHz and the first IF to 360.000 MHz. According to the requirements of TS 151 010, ARFCN 63 and ARFCN 700 was verified by tests.

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

Environmental Conditions

Temperature	25° C
Relative Humidity	66%
ATM Pressure	100.2kPa

Test result

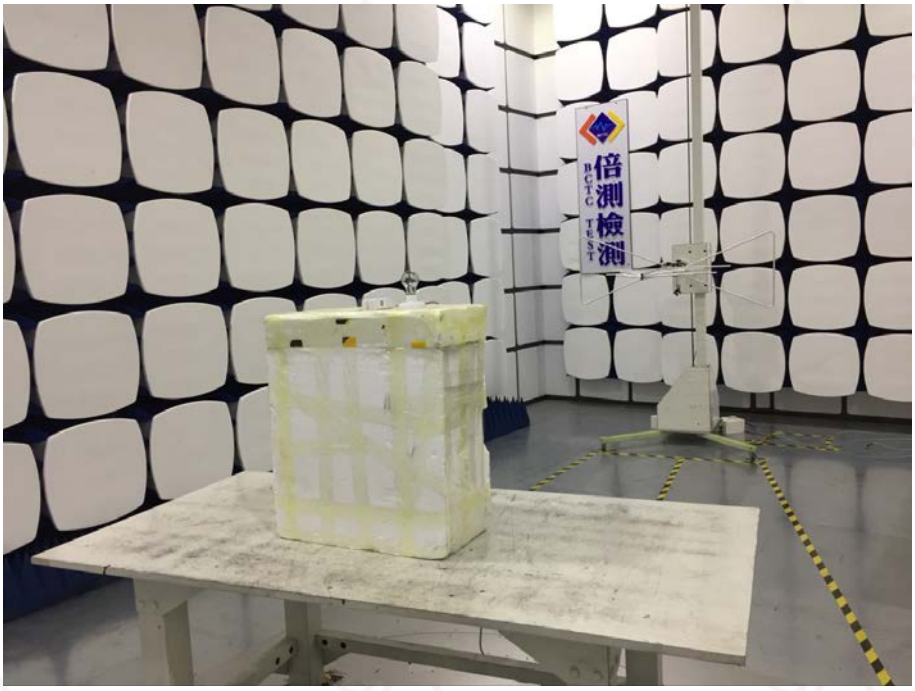
GSM900

Channel frequency (MHZ)	FBER (%)	Limit (%)	Result
880.2	0.003	2.439	Pass
898.4	0.006	2.439	Pass
914.8	0.000	2.439	Pass

GSM1800

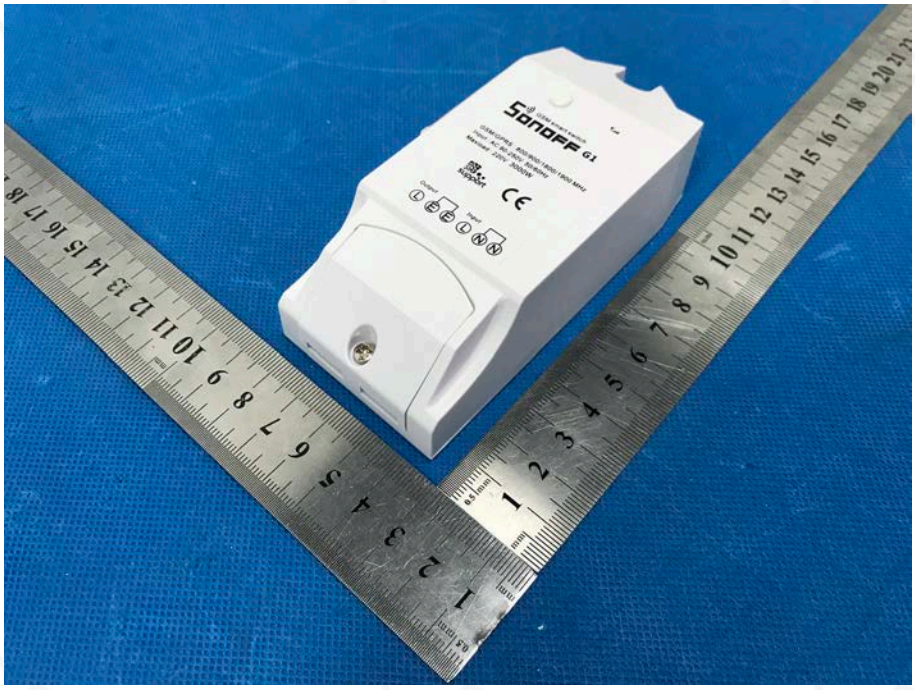
Channel frequency (MHZ)	FBER (%)	Limit (%)	Result
1710.2	0.006	2.439	Pass
1747.8	0.000	2.439	Pass
1784.8	0.000	2.439	Pass

PHOTOS OF TEST SETUP:



EUT PHOTO:

EUT Photo 1



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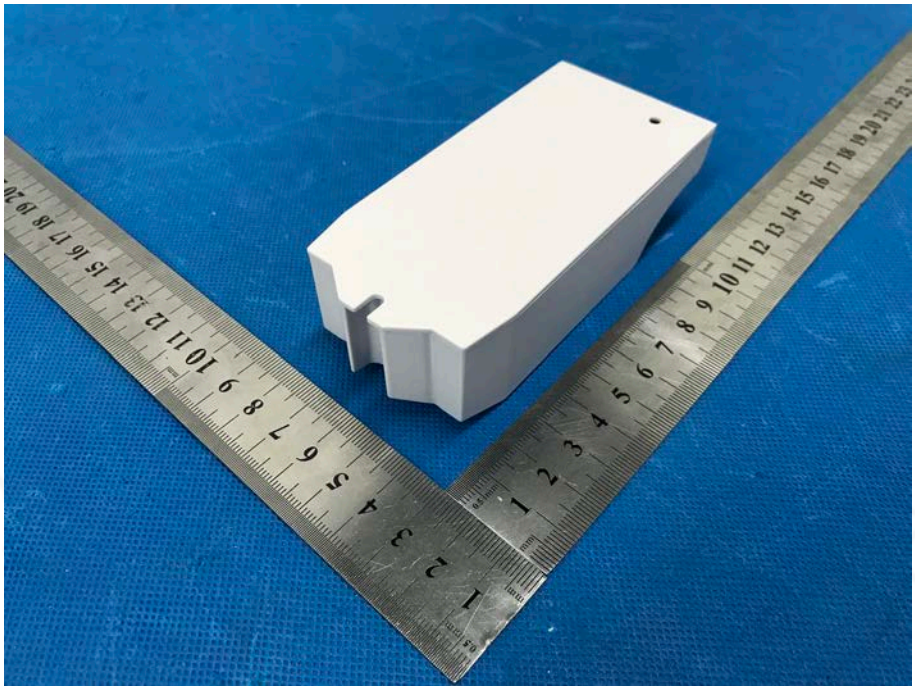
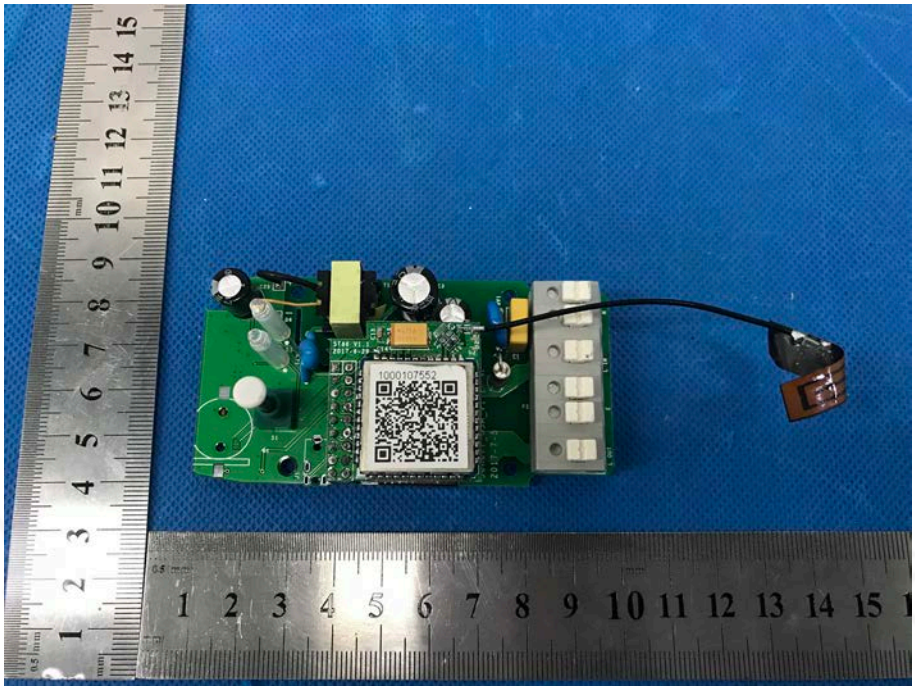


EUT Photo 3

EUT Photo 4

EUT Photo 5

EUT Photo 6



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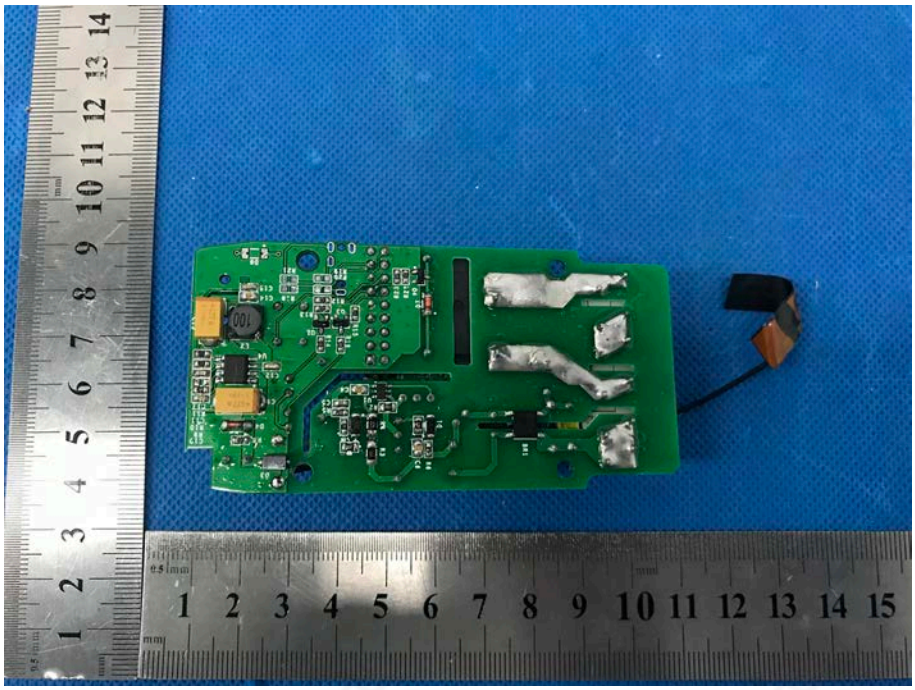

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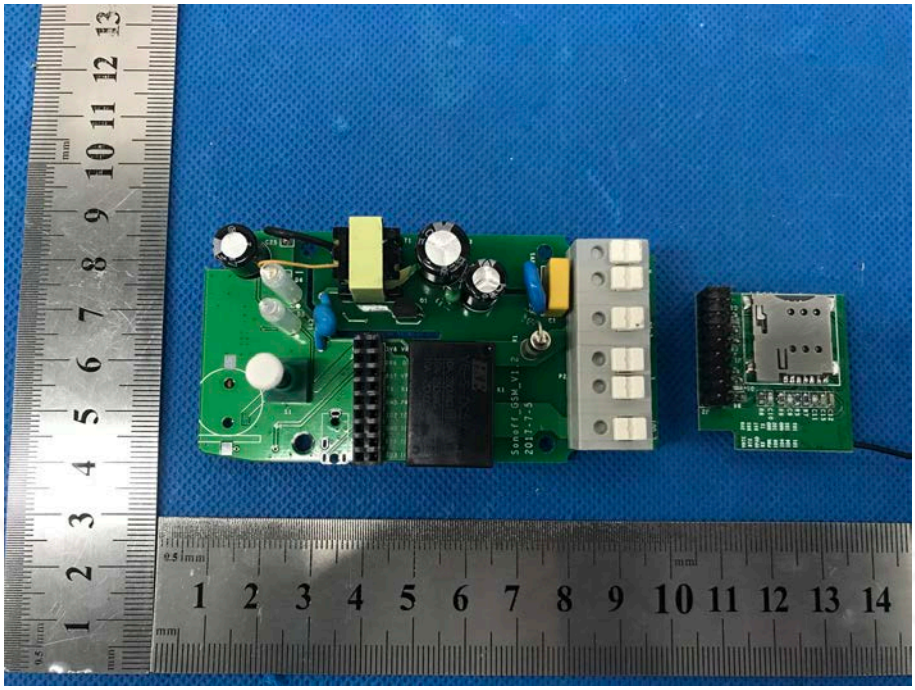

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