

**Shenzhen Global Test Service Co.,Ltd.**

1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

TEST REPORT**FCC Part 22 /Part 24****Report Reference No.**..... : **GTSR16120089-01****FCC ID.**..... : **2AKO3-HTPW300****Compiled by**
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Manager Sam Wang**Date of issue**..... : Dec. 27, 2016**Representative Laboratory Name** .. : **Shenzhen Global Test Service Co.,Ltd.****Address**..... : 1F, Building No. 13A, Zhonghaixin Science and Technology City,
No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District,
Shenzhen, Guangdong**Applicant's name** : **Dogness Smart Technology(Dongguan)Co.,LTD****Address**..... : Third floor, building1, Tongsha new industrial zone, Tongsha comm
unity of Dongcheng street, Dongguan city**Test specification****FCC Part 22: PUBLIC MOBILE SERVICES****Standard****FCC Part 24: PERSONAL COMMUNICATIONS SERVICES****TRF Originator** : Shenzhen Global Test Service Co.,Ltd.**Master TRF**..... : Dated 2014-12**Shenzhen Global Test Service Co.,Ltd. All rights reserved.**

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Test item description : DOGNESS smart pet's collar**Trade Mark** : /**Manufacturer**..... : **Dogness Smart Technology(Dongguan)Co.,LTD****Model/Type reference**..... : HT-PW300-S**List Model** : See 2.2**Ratings**..... : DC 3.8V**Modulation** : GMSK**GPRS**..... : Supported**Hardware version** : CWOIS_V2**Software version** : DS-T-1.0V**Frequency**..... : GSM 850MHz; PCS 1900MHz;**Result**..... : **PASS**

TEST REPORT

Test Report No. :	GTSR16120089-01	Dec. 27, 2016
		Date of issue

Equipment under Test : DOGNESS smart pet's collar

Model /Type : HT-PW300-S

Listed Models : See 2.2

Applicant : **Dogness Smart Technology(Dongguan)Co.,LTD**

Address : Third floor, building1, Tongsha new industrial zone, Tongsha community of Dongcheng street, Dongguan city

Manufacturer : **Dogness Smart Technology(Dongguan)Co.,LTD**

Address : Third floor, building1, Tongsha new industrial zone, Tongsha community of Dongcheng street, Dongguan city

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 22 \(10-1-12 Edition\)](#): PRIVATE LAND MOBILE RADIO SERVICES.

[FCC Part 24\(10-1-12 Edition\)](#): PUBLIC MOBILE SERVICES

[TIA/EIA 603 D June 2010](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Dec. 12, 2016
Testing commenced on	:	Dec. 12, 2016
Testing concluded on	:	Dec. 27, 2016

2.2 Product Description

Product Name:	DOGNESS smart pet's collar
Trade Mark:	/
Model/Type reference:	HT-PW300-S
List Model:	C2,JD01,HT-PW300-ST,HT-PW300-SC,HT-PW300-SD,HT-PW300-SE,HT-PW300-SF,HT-PW300-SG,HT-PW300-SH,HT-PW300-SI,HT-PW300-SJ,HT-PW300-SK,HT-PW300-SL,HT-PW300-SN,HT-PW300-SO,HT-PW300-SP,HT-PW300-SQ,HT-PW300-SR,HT-PW300-SS
Power supply:	DC 3.8V
Modulation Type	GMSK
Antenna Type	Internal antenna
GPS function	Supported
GPRS	Supported
GPRS Power Class	GPRS 850:Power Class 4/ GPRS 1900:Power Class 1
GPRS Operation Frequency	GPRS 850 :824.2MHz-848.8MHz/ GPRS 1900:1850.2MHz-1909.8MHz
GPRS Operation Frequency Band	GPRS850/GPRS1900
GPRS Multislot Class	Multi-slot Class 12
Extreme temp. Tolerance	-30°C to +50°C
GPRS operation mode	Class B
Antenna gain:	GPRS 850: -0.92dbi, GPRS 1900: -1.13dbi
Remark: The products are identical in interior structure, electrical circuits and components, just model names and color are different.	

2.3 Equipment under Test

Power supply system utilised

Power supply voltage	:	☐ 120V / 60 Hz	☐ 230V / 50Hz
		☐ 12 V DC	☐ 24 V DC
		☒ Other (specified in blank below)	

DC 3.8V

Test frequency list

Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
GPRS 850	TX	Channel 128	Channel 190	Channel 251
		824.2 MHz	836.6 MHz	848.8 MHz
	RX	Channel 128	Channel 190	Channel 251
		869.2 MHz	881.6 MHz	893.8 MHz
Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
GPRS 1900	TX	Channel 512	Channel 661	Channel 810
		1850.2 MHz	1880.0 MHz	1909.8 MHz
	RX	Channel 512	Channel 661	Channel 810
		1930.2 MHz	1960.0 MHz	1989.8 MHz

2.4 Short description of the Equipment under Test (EUT)

This is a DOGNESS smart pet's collar.

For more details, refer to the user's manual of the EUT.

2.5 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○ /	M/N : /
	Manufacturer: /

2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AKO3-HTPW300** filing to comply with FCC Part 22 and Part 24 Rules.

2.7 Modifications

No modifications were implemented to meet testing criteria.

2.8 General Test Conditions/Configurations**2.8.1 Test Modes**

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

Test Mode	GPRS
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2.8.2 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	3.4V
	VN	3.8V
	VH	4.2V

NOTE: VL=lower extreme test voltage VN=nominal voltage
VH=upper extreme test voltage TN=normal temperature

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.
1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park,
Buji Street, Longgang District, Shenzhen, Guangdong

Shenzhen CTL Testing Technology Co., Ltd
1/F.-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, Guangdong,
China

3.2 Test Facility

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

FCC-Registration No.: 964637

Shenzhen Global Test Service Co.,Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 964637, Jul 24, 2015.

CNAS-Lab Code: L8169

Shenzhen Global Test Service Co.,Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories. Date of Registration: Dec. 11, 2015. Valid time is until Dec. 10, 2018.

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December 19, 2013.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4 Test Description

3.4.1 Cellular Band (824-849MHz paired with 869-894MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §22.913	FCC: ERP $\leq$ 7W.	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §22.917	$\leq$ -13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917	FCC: $\leq$ -13dBm/100kHz, from 9kHz to 10th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	FCC: $\leq$ -13dBm/100kHz.	Pass
Frequency Stability	§2.1055, §22.355	$\leq \pm 2.5$ ppm.	Pass

NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" de notes "not tested".

3.4.2 PCS Band (1850-1915MHz paired with 1930-1995MHz)

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §24.232	EIRP $\leq$ 2W	Pass
Peak-Average Ratio	§2.1046, §24.232	FCC: Limits $\leq$ 13dB	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §24.238	$\leq$ -13dBm/1%*EBW, In 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238	$\leq$ -13dBm/1MHz, from 9kHz to 10th harmonics but outside authorized Operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238	$\leq$ -13dBm/1MHz.	Pass
Frequency Stability	§2.1055, §24.235	FCC: within authorized frequency block.	Pass

NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" de notes "not tested".

Remark: The measurement uncertainty is not included in the test result.

3.5 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.12	2016/06/02	2017/06/01
LISN	R&S	ESH2-Z5	860014/010	2016/06/02	2017/06/01
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2016/06/02	2017/06/01
Bilog Antenna	Sunol Sciences Corp.	JB1	A061719	2016/06/02	2017/06/01
EMI Test Receiver	R&S	ESCI	103710	2016/06/02	2017/06/01
Spectrum Analyzer	Agilent	N9030A	MY49430428	2016/05/21	2017/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2016/05/21	2017/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2016/05/19	2017/05/18
Horn Antenna	Sunol Sciences Corp.	DRH-118	A052014	2016/05/19	2017/05/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2016/05/19	2017/05/18
Amplifier	Agilent	8349B	3008A02306	2016/05/19	2017/05/18
Amplifier	Agilent	8447D	2944A10176	2016/05/19	2017/05/18
Temperature/Humidity Meter	Gangxing	CTH-608	02	2016/05/20	2017/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2016/05/20	2017/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2016/05/20	2017/05/19
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	2016/06/02	2017/06/01
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2016/06/02	2017/06/01
Coaxial Cables	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	2016/06/02	2017/06/01
RF Cable	Megalon	RF-A303	N/A	2016/06/02	2017/06/01
Power Sensor	R&S	NRP-Z4	823.3618.03	2016/06/02	2017/06/01
Power Meter	R&S	NRVS	1020.1809.02	2016/06/02	2017/06/01

4 TEST CONDITIONS AND RESULTS

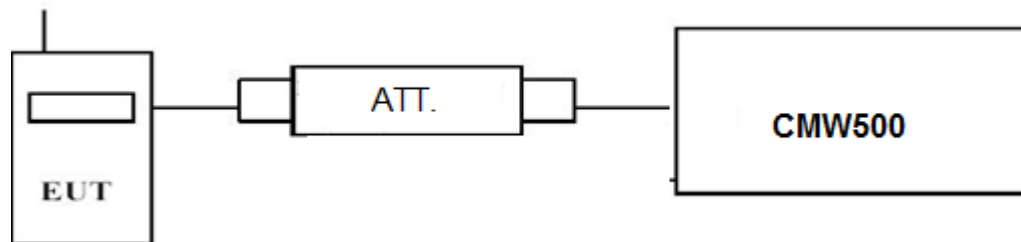
4.1 Output Power

TEST APPLICABLE

During the process of testing, the EUT was controlled via R&S Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

4.1.1 Conducted Output Power

TEST CONFIGURATION



TEST PROCEDURE

Conducted Power Measurement:

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a CMW500 by an Att.
- EUT Communicate with CMW500 then selects a channel for testing.
- Add a correction factor to the display CMW500, and then test.

GSM850				
Function	Power step	Nominal output power (dBm)	Power & Multislot class	Operation class
GSM	5	33dBm(2W)	4	/
GPRS	3	33dBm(2W)	12	B

PCS1900				
Function	Power step	Nominal output power (dBm)	Power & Multislot class	Operation class
GSM	0	30dBm(1W)	1	/
GPRS	3	30dBm(1W)	12	B

TEST RESULTS

GSM 850		Burst Average Conducted power (dBm)		
		Channel/Frequency(MHz)		
		128/824.2	190/836.6	251/848.8
GPRS (GMSK)	1TX slot	32.44	32.25	32.30
	2TX slot	30.54	30.67	30.41
	3TX slot	30.44	30.22	30.35
	4TX slot	29.73	29.56	29.41
PCS 1900		Burst Average Conducted power (dBm)		
		Channel/Frequency(MHz)		
		512/1850.2	661/1880	810/1909.8
GPRS (GMSK)	1TX slot	30.55	30.69	30.87
	2TX slot	28.67	28.72	28.99
	3TX slot	27.47	27.58	27.66
	4TX slot	27.04	27.31	27.48

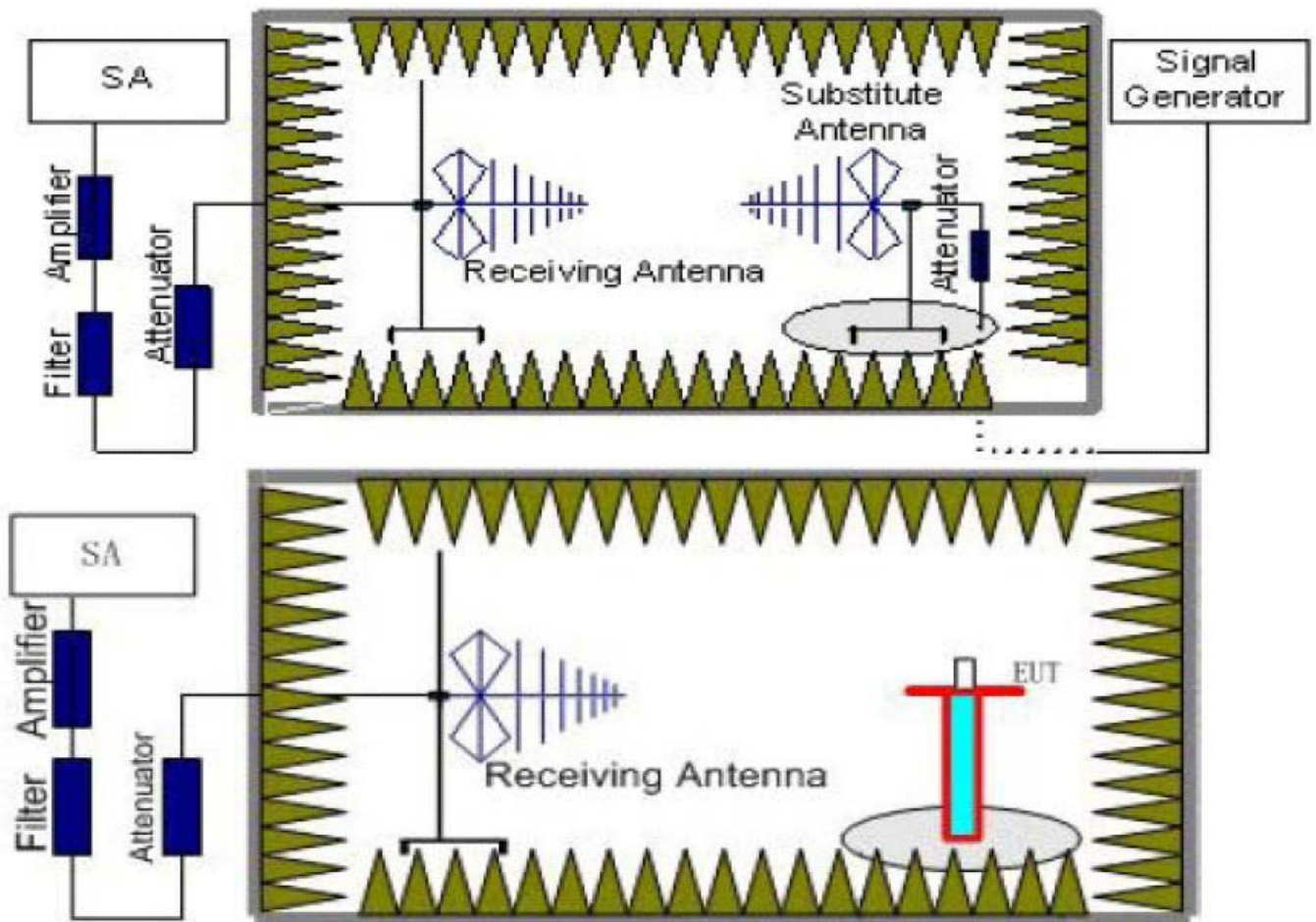
4.1.2 Radiated Output Power

TEST DESCRIPTION

This is the test for the maximum radiated power from the EUT.

Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(e) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage." Rule Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

TEST CONFIGURATION



TEST PROCEDURE

1. EUT was placed on a 0.80 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 0.80m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the

substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} - P_{Ag} - P_{cl} + G_a$$

We used SMF100A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:

$$\text{Power(EIRP)} = P_{Mea} - P_{cl} + G_a$$

6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

TEST LIMIT

Note: We test the H direction and V direction, V direction is worse.

According to 22.913(a) and 24.232(c), the ERP should be not exceed following table limits:

GSM850(GPRS850,EDGE850)		
Function	Power Step	Burst Peak ERP (dBm)
GSM	5	$\leq 38.45\text{dBm}$ (7W)
GPRS	3	$\leq 38.45\text{dBm}$ (7W)

PCS1900(GPRS1900,EDGE1900)		
Function	Power Step	Burst Peak EIRP (dBm)
GSM	0	$\leq 33\text{dBm}$ (2W)
GPRS	3	$\leq 33\text{dBm}$ (2W)

TEST RESULTS

Remark:

1. We were tested all Configuration refer 3GPP TS151 010.
2. $EIRP = P_{Mea}(\text{dBm}) - P_{cl}(\text{dB}) + P_{Ag}(\text{dB}) + G_a(\text{dBi})$
3. $ERP = EIRP - 2.15\text{dBi}$ as EIRP by subtracting the gain of the dipole.

Test site: Shenzhen CTL Testing Technology Co., Ltd

Note: We tesed Horizontal and Vertical, and Recorded the worst data at the Vertical

GPRS 850

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.20	-14.28	2.42	8.45	2.15	36.82	26.42	38.45	12.03	V
836.60	-14.54	2.46	8.45	2.15	36.82	26.12	38.45	12.33	V
848.80	-14.62	2.53	8.36	2.15	36.82	25.88	38.45	12.57	V

GPRS 1900

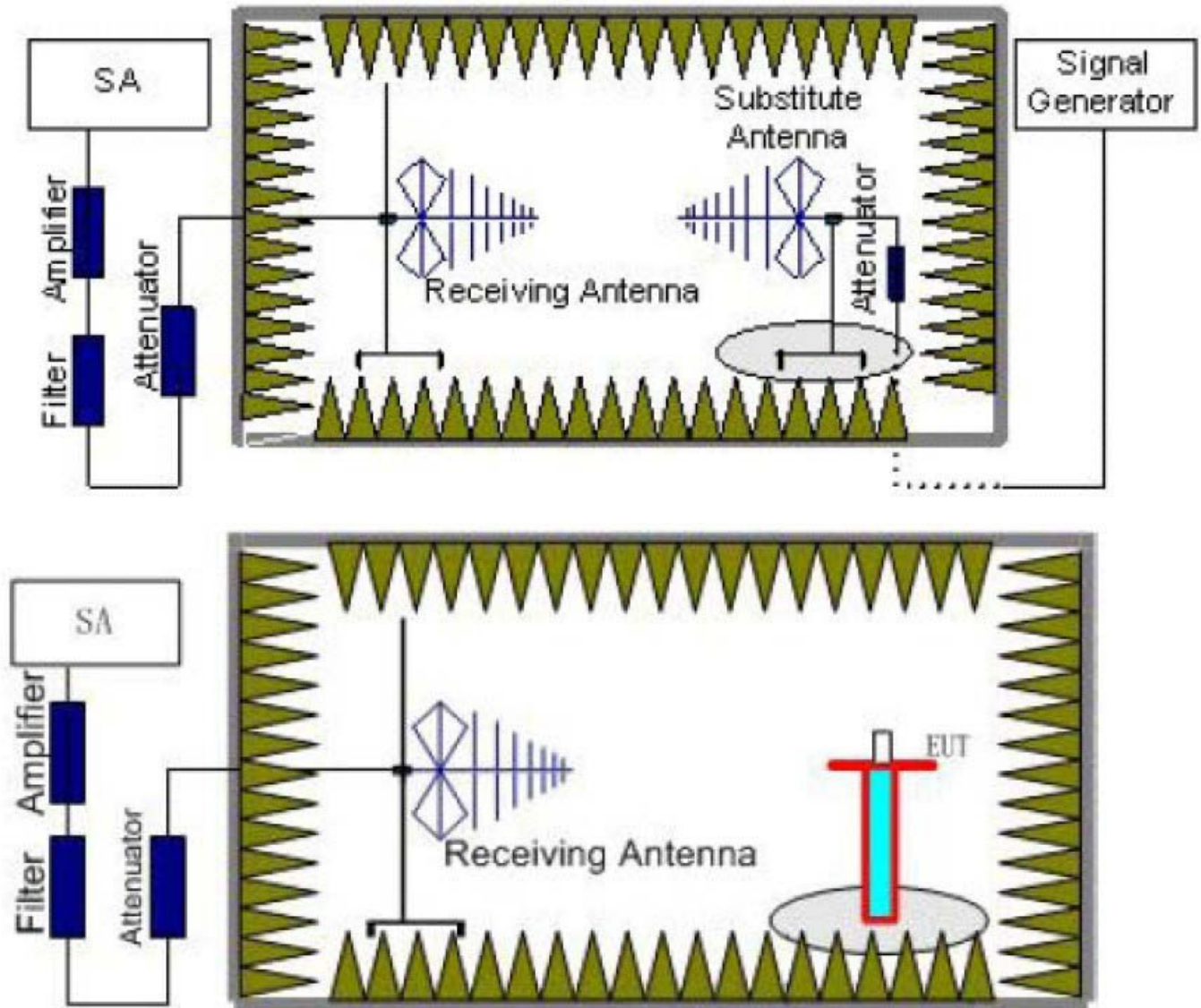
Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.20	-16.44	3.41	10.24	33.60	23.99	33.01	9.02	V
1880.00	-16.25	3.49	10.24	33.60	24.10	33.01	8.91	V
1909.80	-16.66	3.55	10.23	33.60	23.62	33.01	9.39	V

4.2 Radiated Spurious Emission

TEST APPLICABLE

According to the TIA/EIA 603D:2010 test method, The Receiver or Spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of PCS1900 and GSM850.

TEST CONFIGURATION



TEST PROCEDURE

1. EUT was placed on a 0.80 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 0.80m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
The measurement results are obtained as described below:
 $Power(EIRP) = P_{Mea} - P_{Ag} - P_{cl} + G_a$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15dBi$.
8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
GSM 850	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~10	1 MHz	3 MHz	3
PCS 1900	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2

TEST LIMITS

According to 24.238 and 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Frequency	Channel	Frequency Range	Verdict
GSM 850	Low	9KHz-10GHz	PASS
	Middle	9KHz -10GHz	PASS
	High	9KHz -10GHz	PASS
PCS 1900	Low	9KHz -20GHz	PASS
	Middle	9KHz -20GHz	PASS
	High	9KHz -20GHz	PASS

TEST RESULTS

Remark:

1. We were tested all refer 3GPP TS151 010.
2. $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + G_a(dBi)$
3. We were not recorded other points as values lower than limits.
4. Margin = Limit - EIRP

Test site: Shenzhen CTL Testing Technology Co., Ltd

GPRS 850 Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1648.4	-32.51	3.00	3.00	9.58	-25.93	-13.00	12.93	H
2472.6	-38.17	3.03	3.00	10.72	-30.48	-13.00	17.48	H
1648.4	-31.39	3.00	3.00	9.68	-24.71	-13.00	11.71	V
2472.6	-37.28	3.03	3.00	10.72	-29.59	-13.00	16.59	V

GPRS 850 Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.2	-31.27	3.00	3.00	9.58	-24.69	-13.00	11.69	H
2509.8	-38.65	3.03	3.00	10.72	-30.90	-13.00	17.90	H
1673.2	-32.34	3.00	3.00	9.68	-25.66	-13.00	12.66	V
2509.8	-39.08	3.03	3.00	10.72	-29.59	-13.00	16.59	V

GPRS 850 High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.6	-31.21	3.00	3.00	9.58	-24.63	-13.00	11.63	H
2546.4	-38.69	3.03	3.00	10.72	-31.00	-13.00	18.00	H
1697.6	-32.42	3.00	3.00	9.68	-25.74	-13.00	12.74	V
2546.4	-39.32	3.03	3.00	10.72	-31.63	-13.00	18.63	V

GPRS 1900 Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3700.4	-31.57	4.39	3.00	12.34	-23.62	-13.00	10.62	H
5550.6	-37.61	5.31	3.00	13.52	-29.40	-13.00	16.40	H
3700.4	-32.55	4.39	3.00	12.34	-24.60	-13.00	11.60	V
5550.6	-39.88	5.31	3.00	13.52	-31.67	-13.00	18.67	V

GPRS 1900 Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.0	-38.22	4.41	3.00	12.34	-30.29	-13.00	17.29	H
5640.0	-40.41	5.38	3.00	13.58	-32.21	-13.00	19.21	H
3760.0	-36.58	4.41	3.00	12.34	-28.65	-13.00	15.65	V
5640.0	-38.86	5.38	3.00	13.58	-30.66	-13.00	17.66	V

GPRS 1900 High Channel

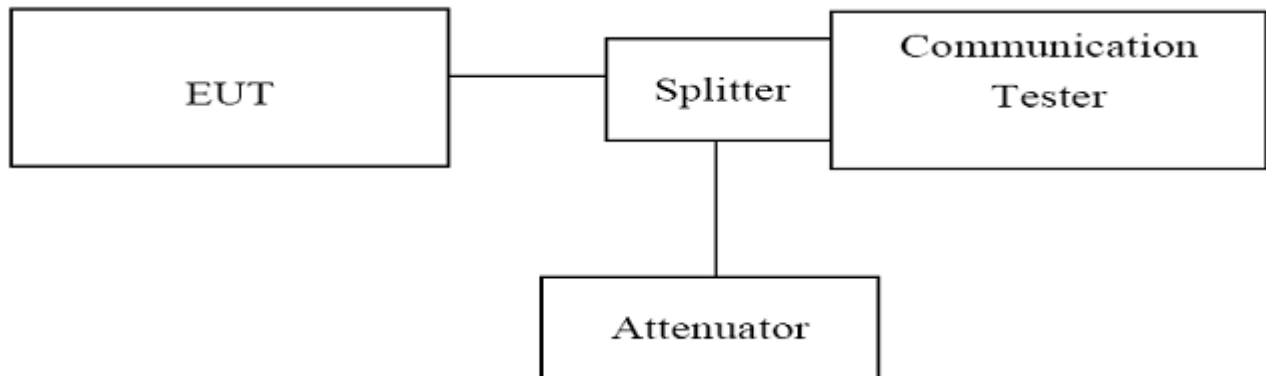
Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.6	-38.49	4.45	3.00	12.45	-30.49	-13.00	17.49	H
5729.4	-40.33	5.47	3.00	13.66	-32.14	-13.00	19.14	H
3819.6	-38.18	4.45	3.00	12.45	-30.18	-13.00	17.18	V
5729.4	-41.64	5.48	3.00	13.66	-33.46	-13.00	20.46	V

4.3 Occupied Bandwidth and Emission Bandwidth

TEST APPLICABLE

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band and GSM850 band. The table below lists the measured 99% Bandwidth and -26dBc Bandwidth.

TEST CONFIGURATION



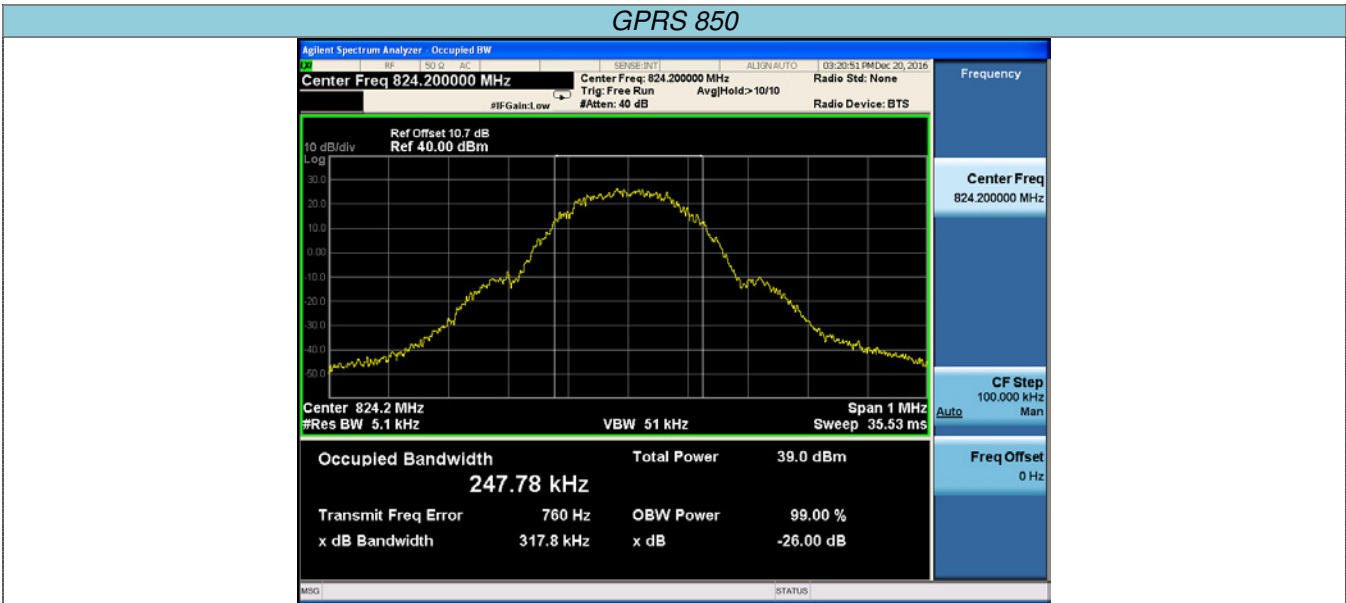
TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The Occupied bandwidth and Emission Bandwidth were measured with Agilent Spectrum Analyzer N9030A (peak);
3. Set RBW=5.1KHz, VBW=51KHz, Span=1MHz, SWT=500ms;
4. Set SPA Max hold and View, Set 99% Occupied Bandwidth/ Set -26dBc Occupied Bandwidth
5. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

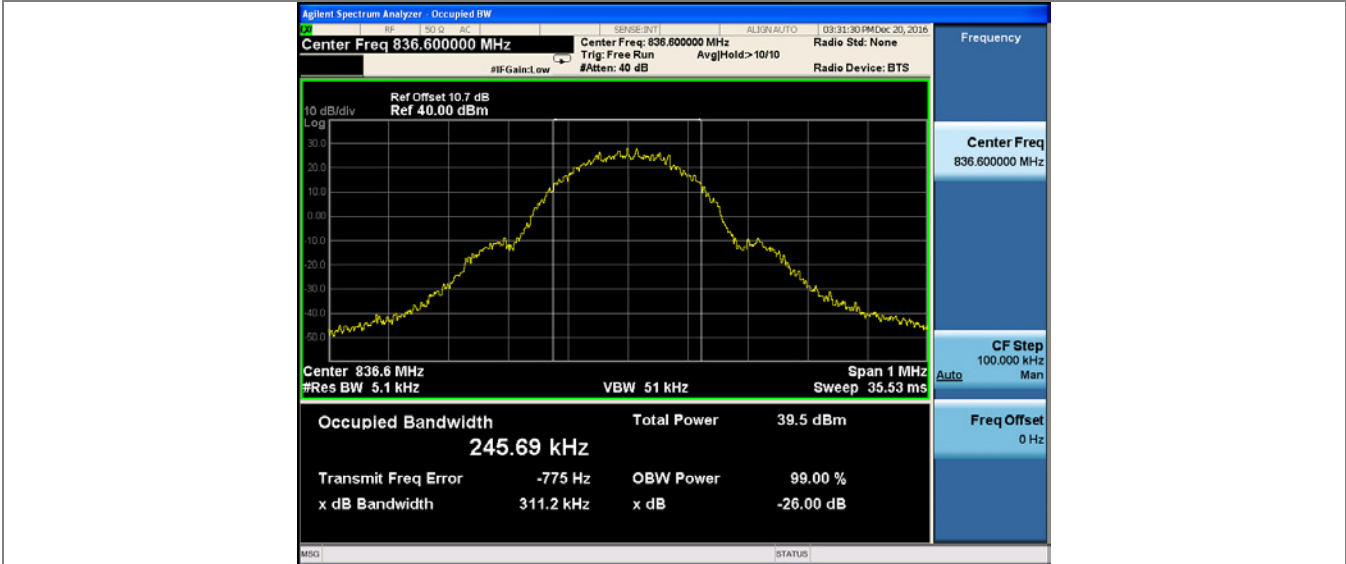
TEST RESULTS

GPRS 850				
Channel Number	Frequency (MHz)	Occupied Bandwidth (99% BW) (kHz)	Emission Bandwidth (26 dBc BW) (kHz)	Verdict
128	824.20	247.78	317.8	PASS
190	836.60	245.69	311.2	PASS
251	848.80	247.09	313.5	PASS

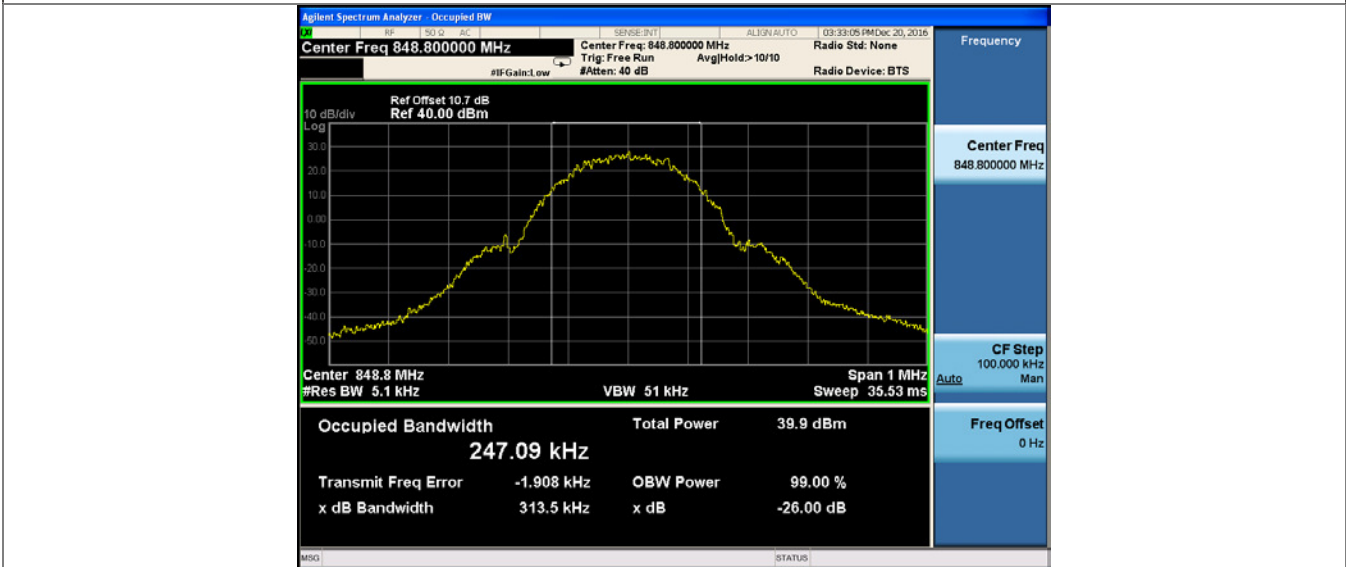
GPRS 1900				
Channel Number	Frequency (MHz)	Occupied Bandwidth (99% BW) (kHz)	Emission Bandwidth (26 dBc BW) (kHz)	Verdict
512	1850.20	244.39	317.2	PASS
661	1880.00	245.15	314.8	PASS
810	1909.80	245.04	318.5	PASS



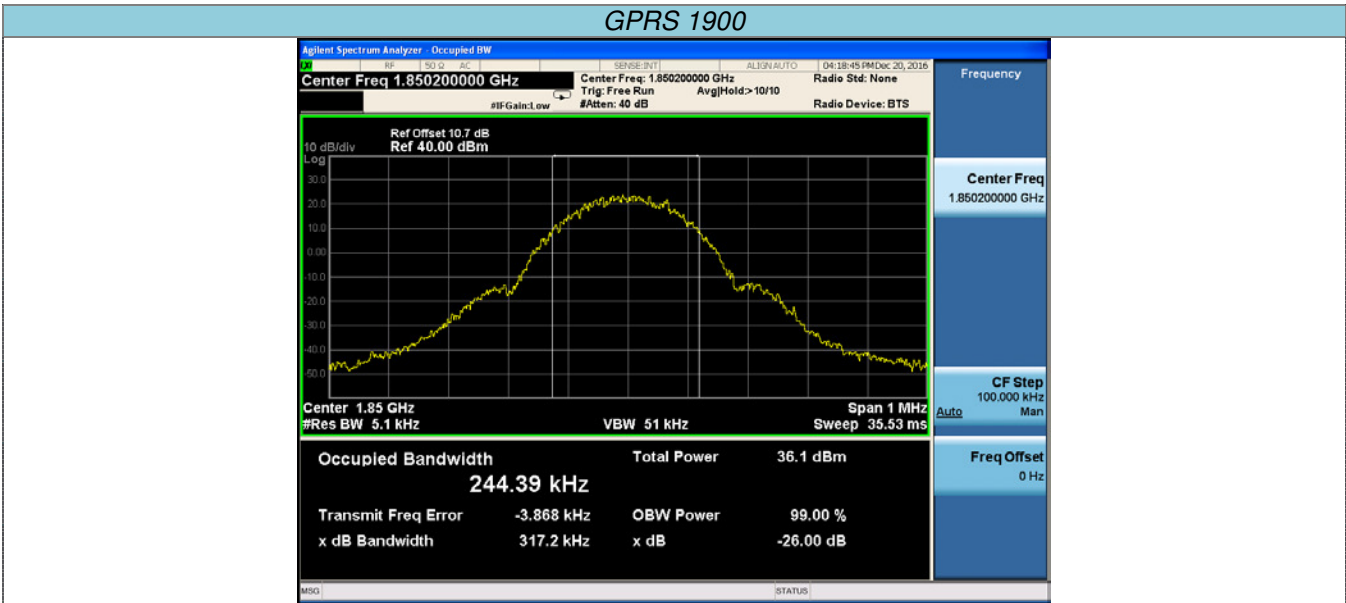
Channel 128



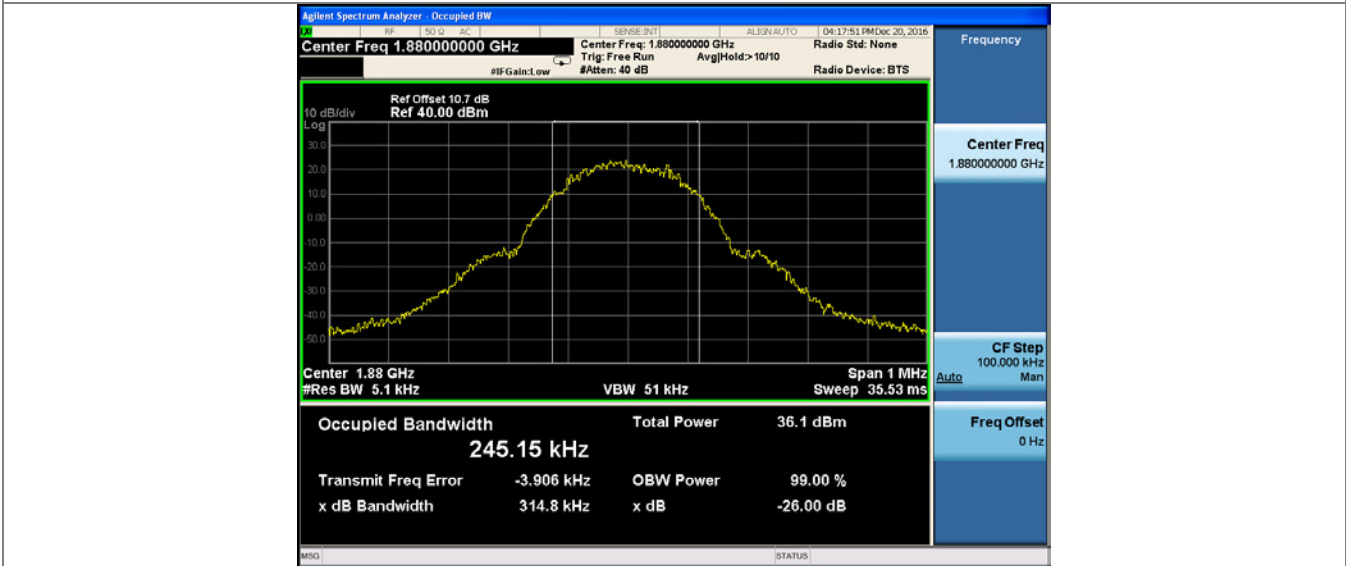
Channel 190



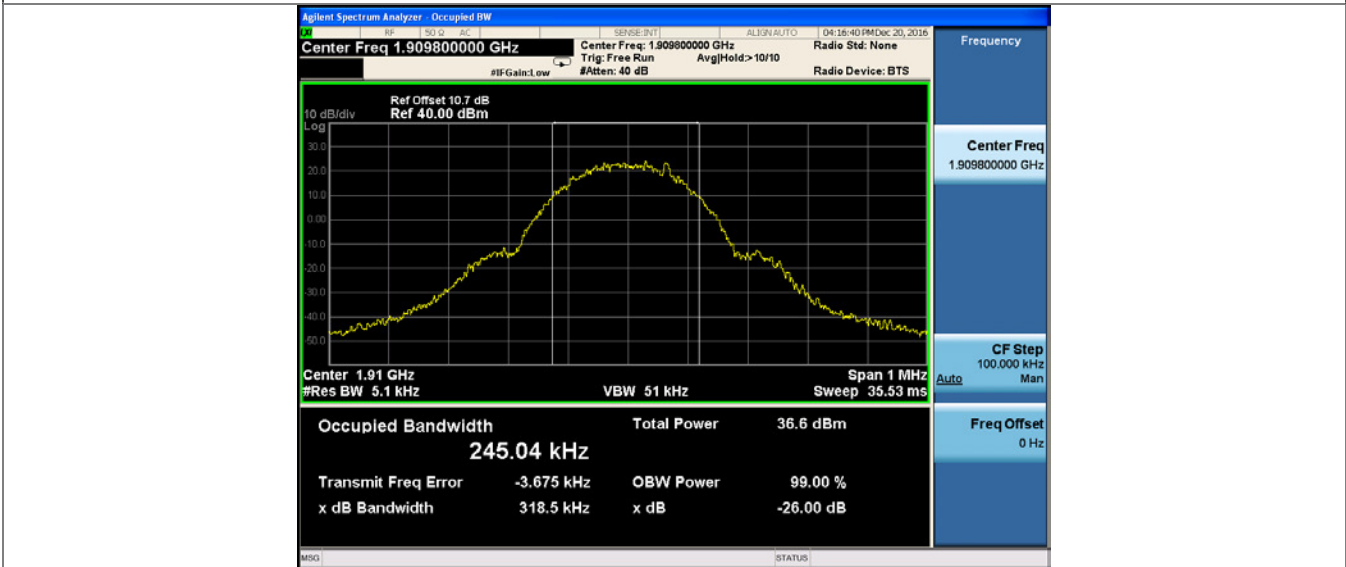
Channel 251



Channel 512



Channel 661



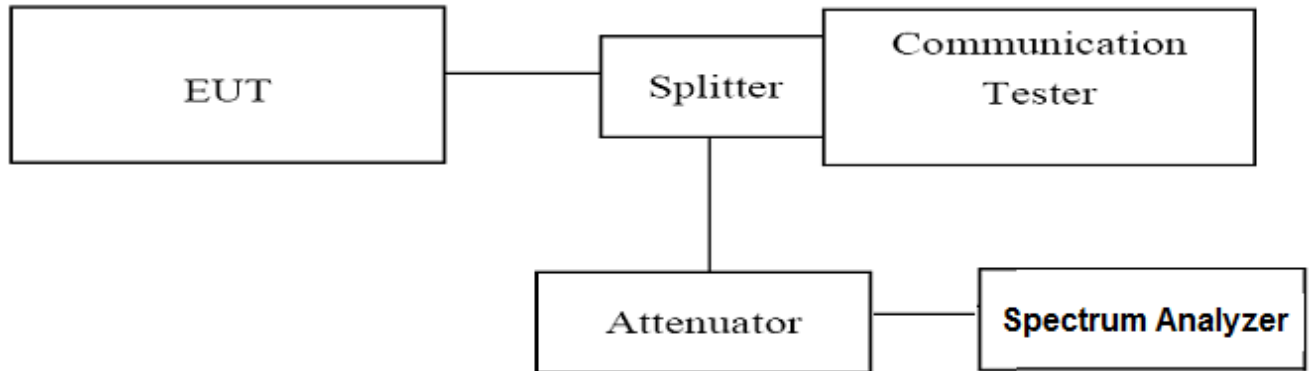
Channel 810

4.4 Band Edge Compliance

TEST APPLICABLE

During the process of testing, the EUT was controlled via Aglient Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

TEST CONFIGURATION



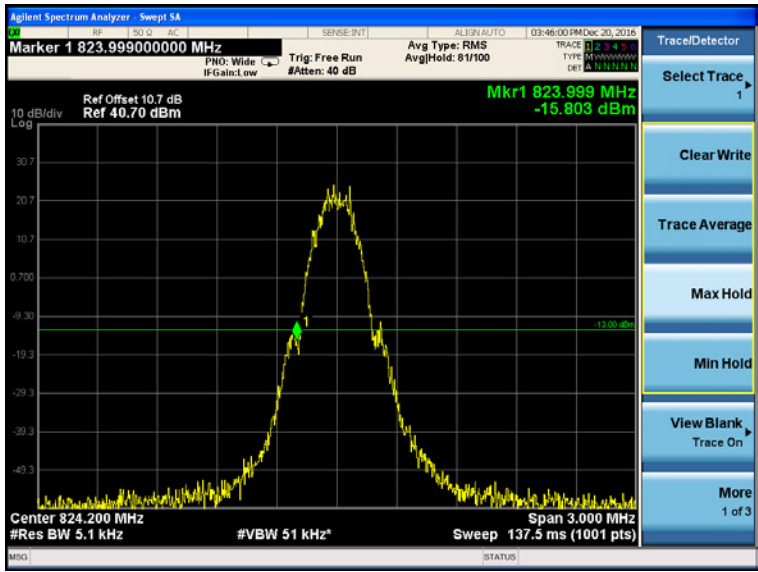
TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Aglient Spectrum Analyzer N9030A;
3. Set RBW=5.1KHz, VBW=51KHz, Span=2MHz, SWT=300ms, Dector: RMS;
4. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (bottom, middle and top of operational frequency range).

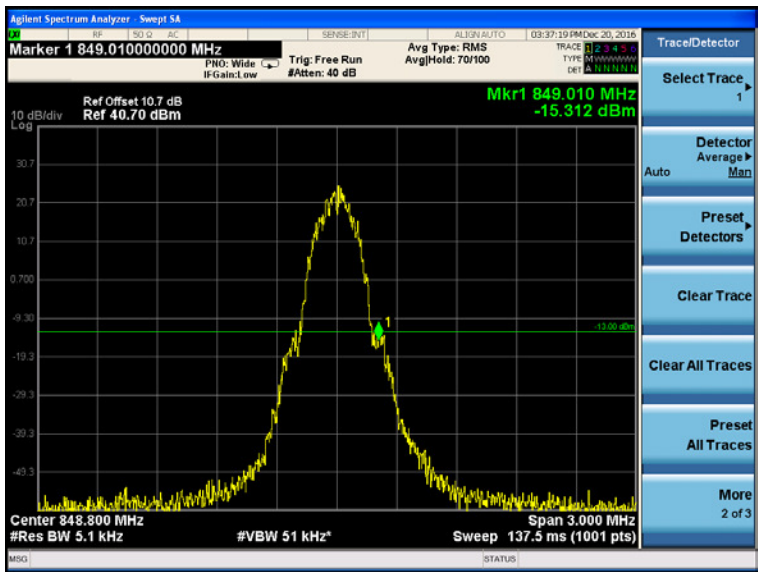
TEST RESULTS

GPRS 850					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
128	824.20	823.99	-15.803	-13.00	PASS
251	848.80	849.01	-15.312	-13.00	PASS

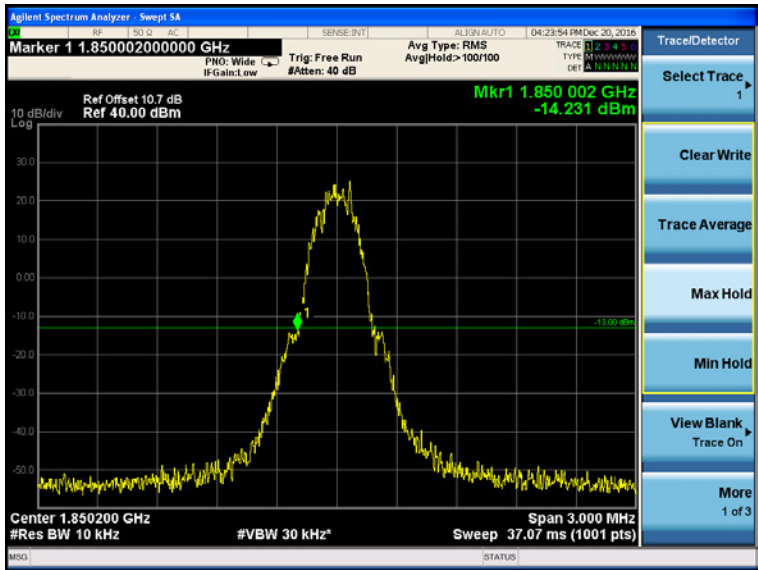
GPRS 1900					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
512	1850.20	1850.00	-14.231	-13.00	PASS
810	1909.80	1910.00	-14.473	-13.00	PASS



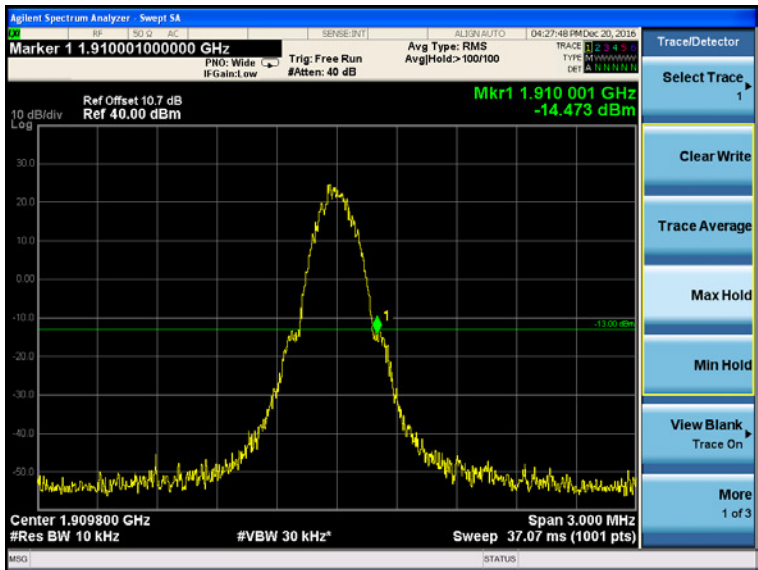
(Channel 128: 824.20MHz @ GPRS 850)



(Channel 251: 848.80MHz @ GPRS 850)



(Channel 512: 1850.20MHz @ GPRS 1900)



(Channel 810: 1909.80MHz @ GPRS 1900)

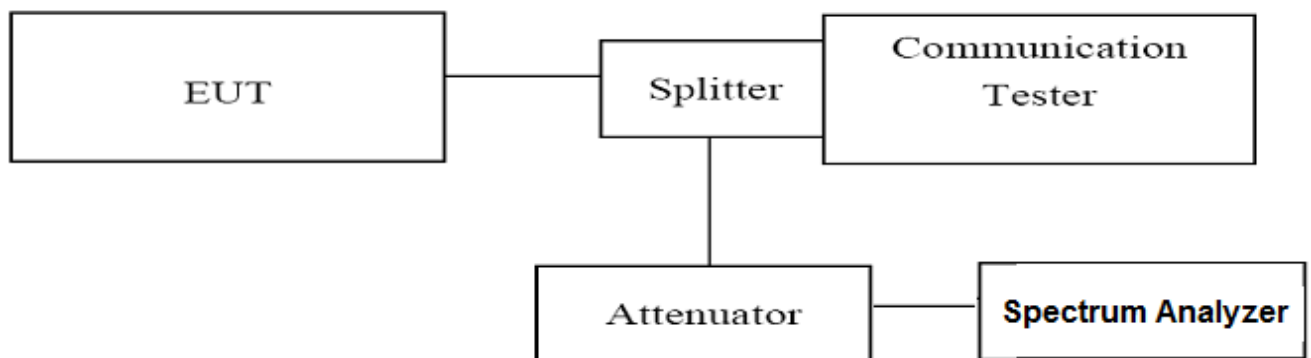
4.5 Spurious Emssion on Antenna Port

TEST APPLICABLE

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 9 KHz to 19.1 GHz, data taken from 9 KHz to 25 GHz. For GSM850, data taken from 9 KHz to 9 GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; if the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give an optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
The trace mode is set to MaxHold to get the highest signal at each frequency;
Wait 25 seconds;
Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Agilent Spectrum Analyzer N9030A (peak);
3. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

TEST LIMIT

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST RESULTS

4.5.1 For GPRS 850 Test Results

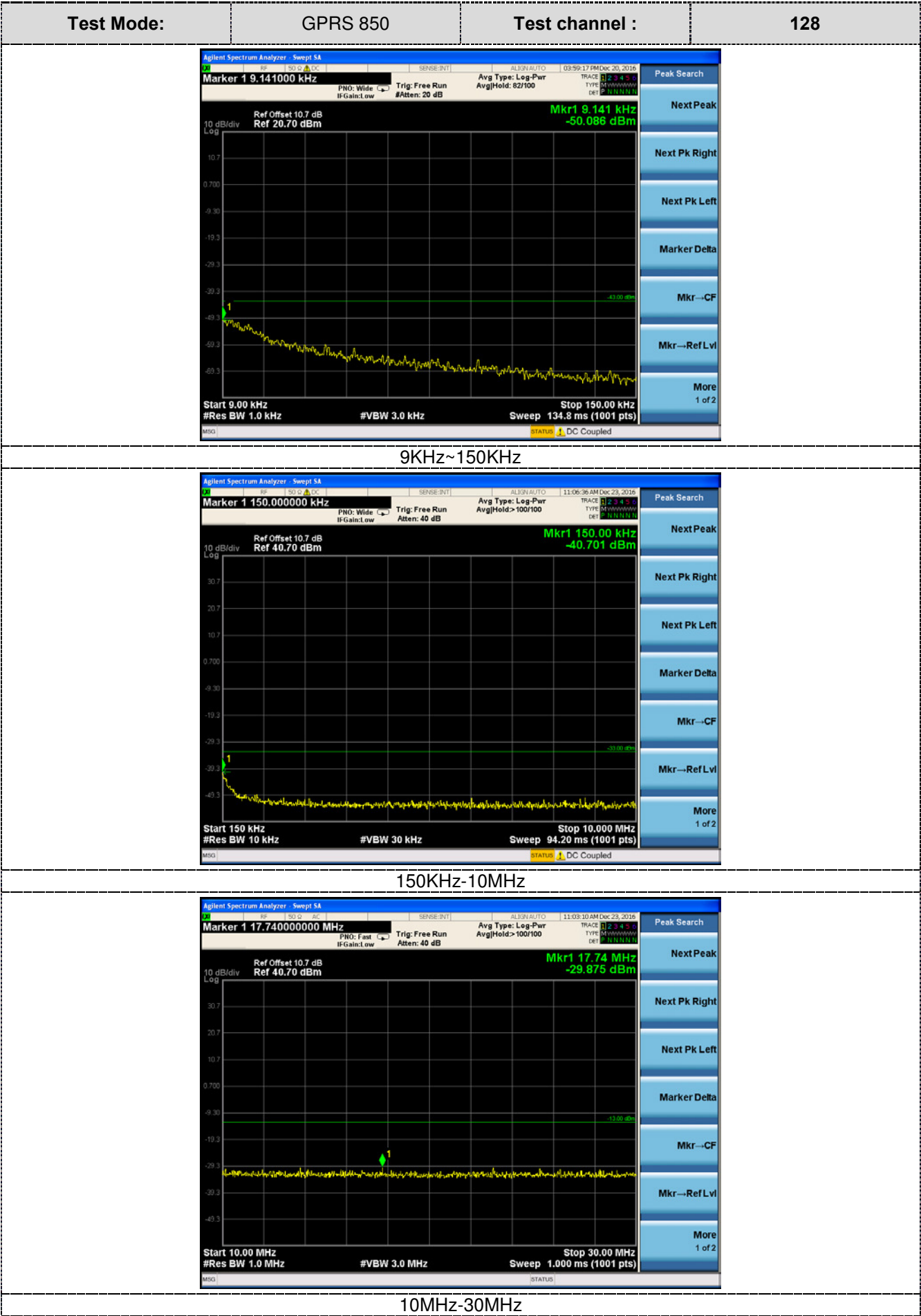
A. Test Verdict

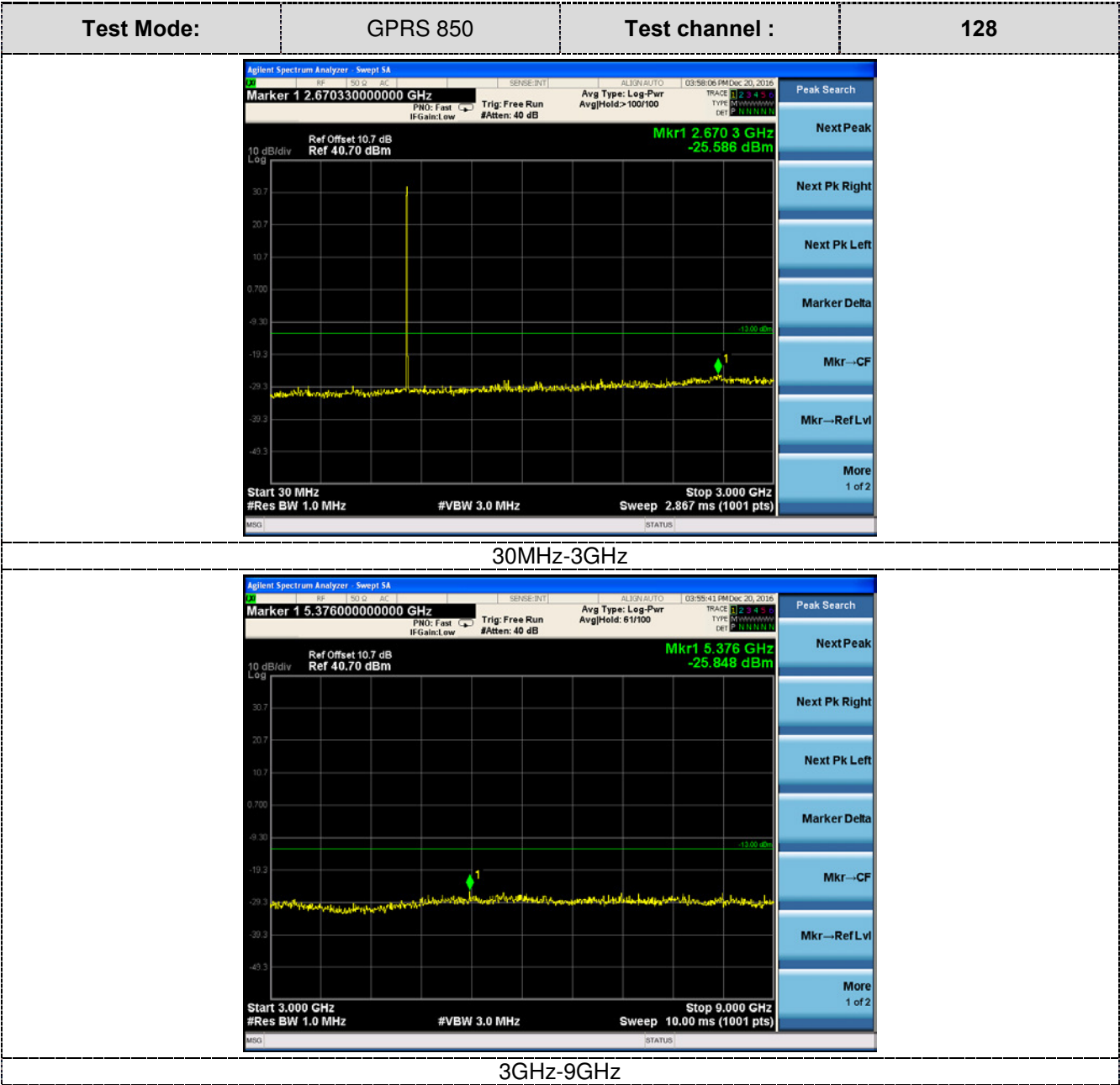
Test Mode/ Channel	Frequency (MHz)	Frequency Range	Limit (dBm)	Verdict
GPRS 850 /128	824.20	9KHz-150KHz	-43.00	PASS
		150KHz-10MHz	-33.00	PASS
		10MHz-30MHz	-13.00	PASS
		30MHz-3GHz	-13.00	PASS
		3GHz-9GHz	-13.00	PASS
GPRS 850 /190	836.60	9KHz-150KHz	-43.00	PASS
		150KHz-10MHz	-33.00	PASS
		10MHz-30MHz	-13.00	PASS
		30MHz-3GHz	-13.00	PASS
		3GHz-9GHz	-13.00	PASS
GPRS 850 /251	848.80	9KHz-150KHz	-43.00	PASS
		150KHz-10MHz	-33.00	PASS
		10MHz-30MHz	-13.00	PASS
		30MHz-3GHz	-13.00	PASS
		3GHz-9GHz	-13.00	PASS

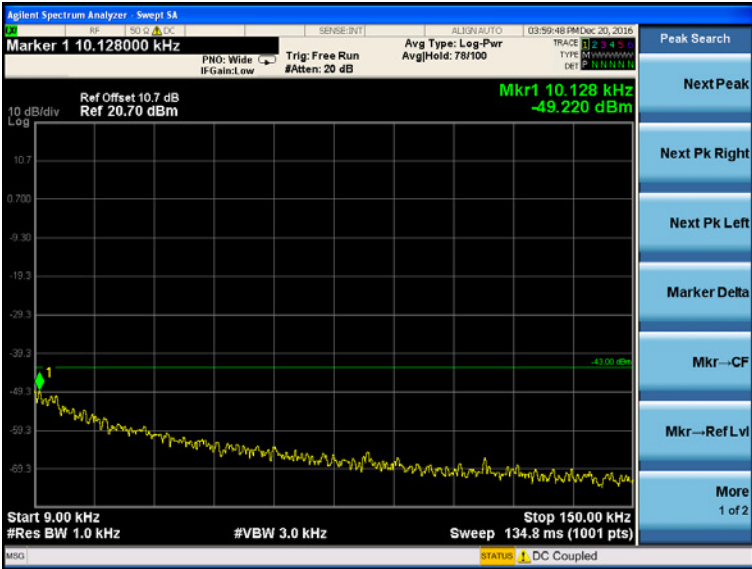
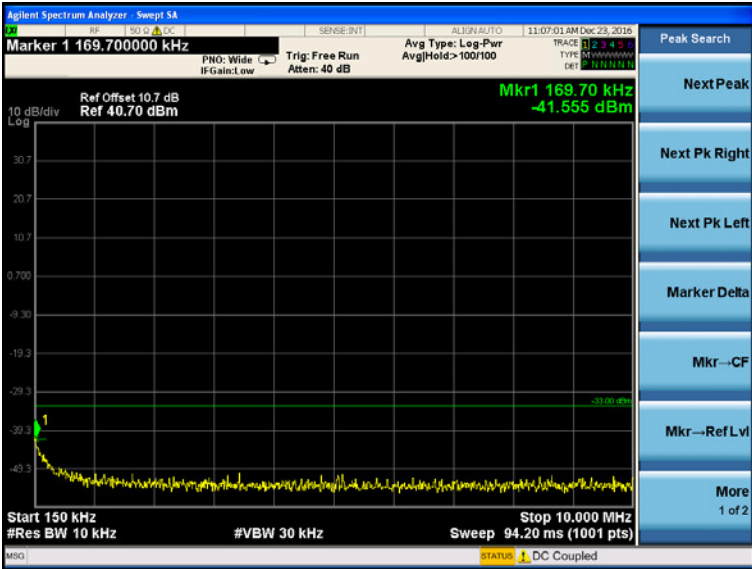
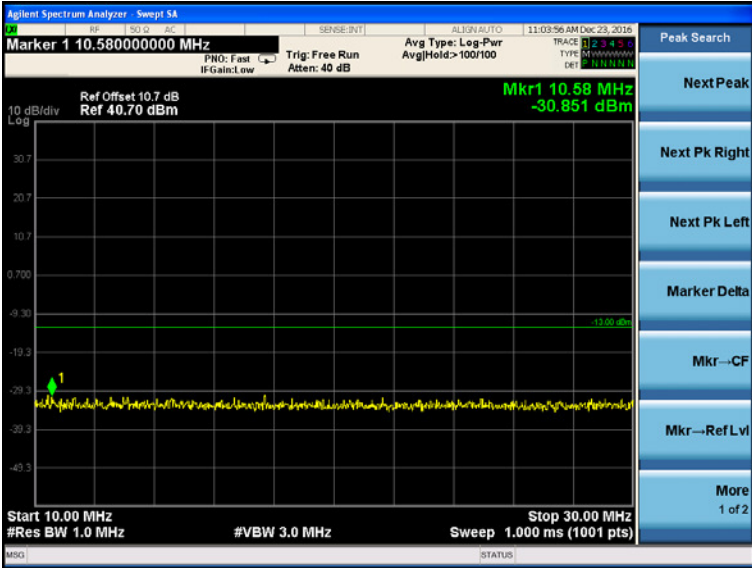
Note:

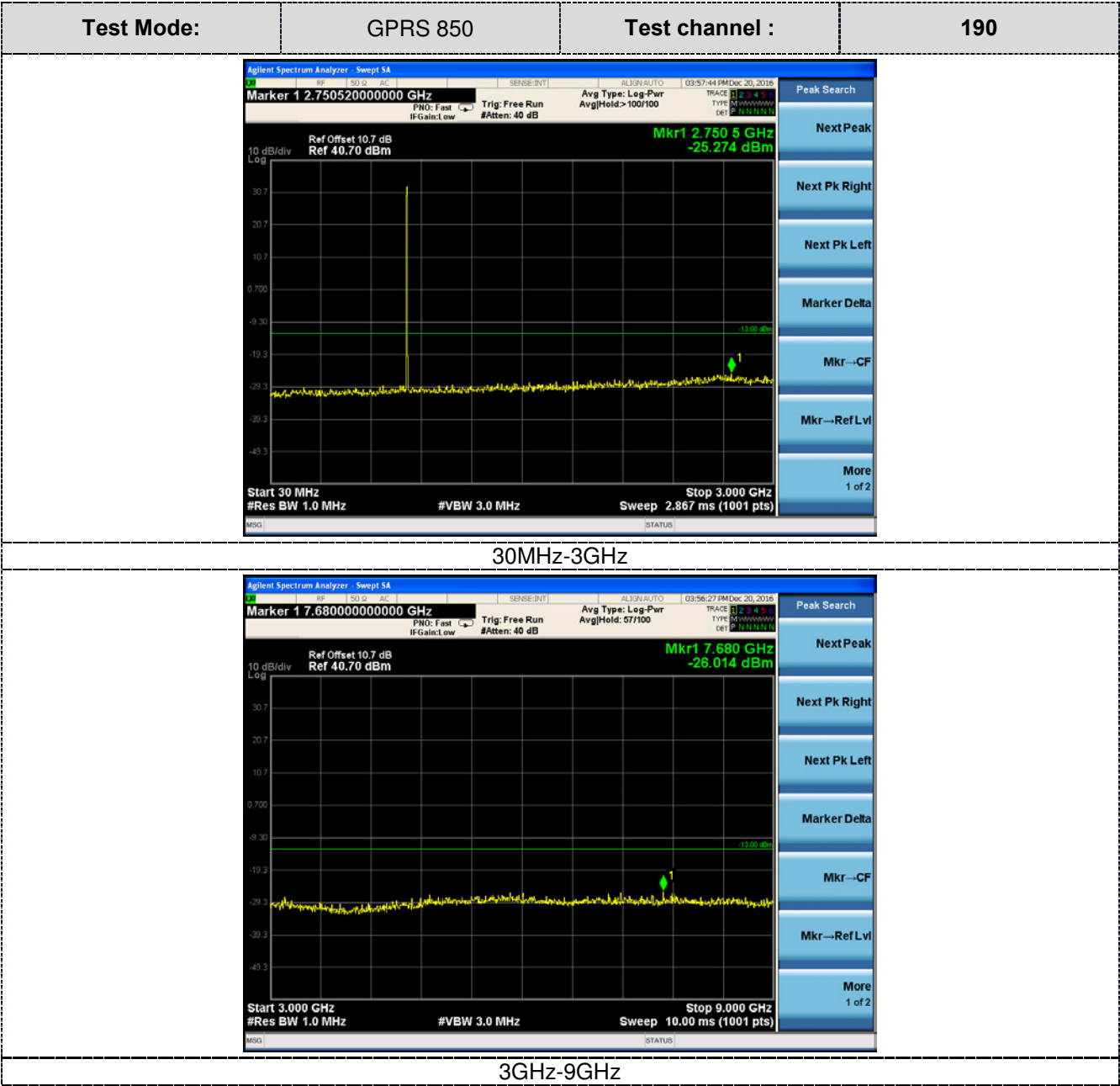
1. In general, the worse case attenuation requirement shown above was applied.
2. "----" means that the emission level is too low to be measured or at least 20 dB down than the limit.

B. Test Plots

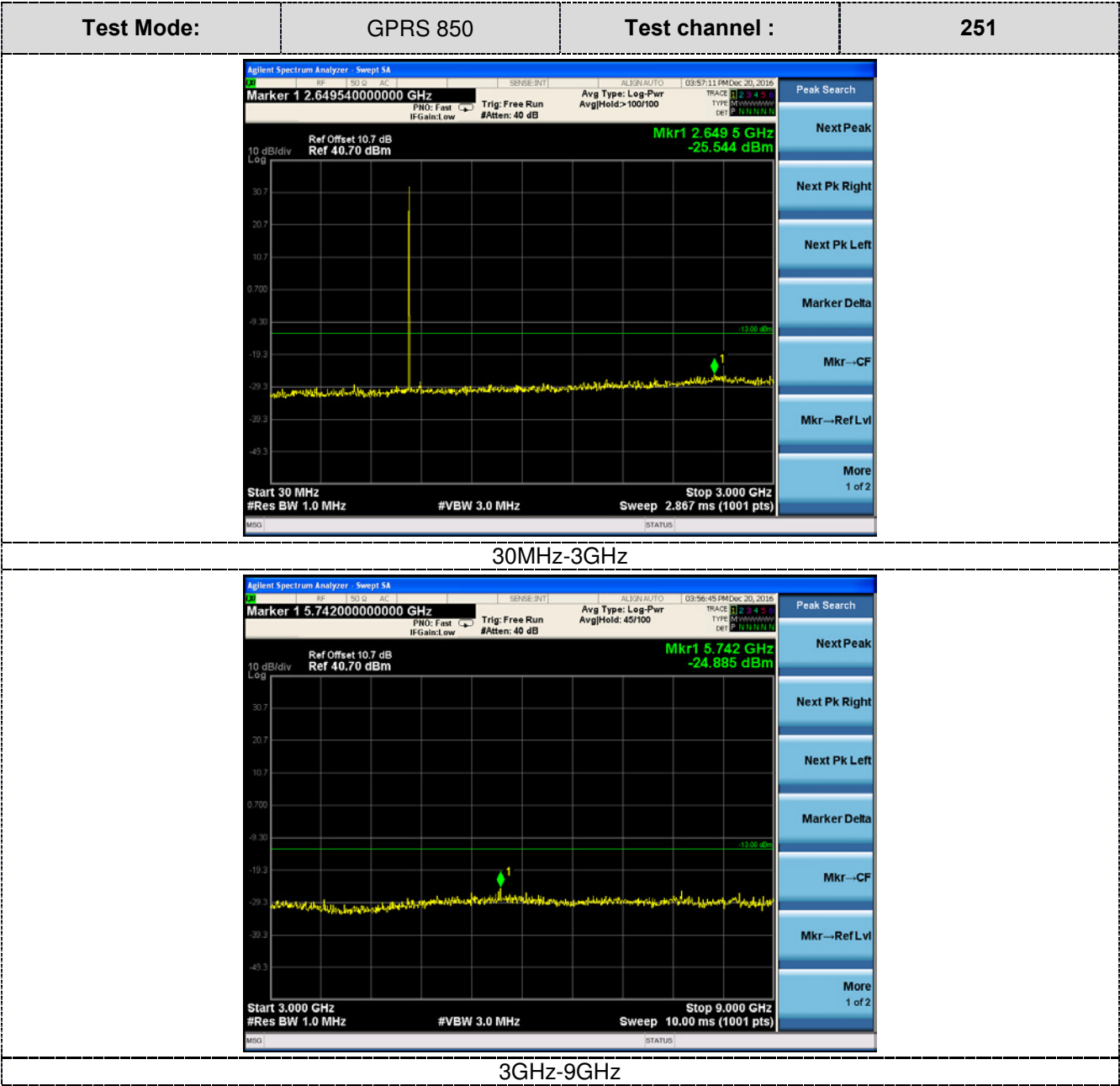




Test Mode:	GPRS 850	Test channel :	190
 Agilent Spectrum Analyzer - Swept SA Marker 1 10.128000 kHz Ref Offset 10.7 dB Ref 20.70 dBm Mkr1 10.128 kHz -49.220 dBm Start 9.00 kHz #Res BW 1.0 kHz #VBW 3.0 kHz Sweep 134.8 ms (1001 pts) STATUS DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl More 1 of 2			
9KHz~150KHz			
 Agilent Spectrum Analyzer - Swept SA Marker 1 169.700000 MHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 169.70 kHz -41.555 dBm Start 150 kHz #Res BW 10 kHz #VBW 30 kHz Sweep 94.20 ms (1001 pts) STATUS DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl More 1 of 2			
150KHz-10MHz			
 Agilent Spectrum Analyzer - Swept SA Marker 1 10.58000000 MHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 10.58 MHz -30.851 dBm Start 10.00 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts) STATUS Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl More 1 of 2			
10MHz-30MHz			



Test Mode:	GPRS 850	Test channel :	251
Agilent Spectrum Analyzer - Swept SA Marker 1 10.128000 kHz Ref Offset 10.7 dB Ref 20.70 dBm 10 dB/div Log Start 9.00 kHz #Res BW 1.0 kHz #VBW 3.0 kHz Sweep 134.8 ms (1001 pts) Stop 150.00 kHz Mkr1 10.128 kHz -48.287 dBm -43.00 dBm Trig: Free Run Avg Type: Log-Pwr AvgHold: 38/100 PN0: Wide IF Gain: Low #Atten: 20 dB DC DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2			
9KHz~150KHz			
Agilent Spectrum Analyzer - Swept SA Marker 1 150.000000 kHz Ref Offset 10.7 dB Ref 40.70 dBm 10 dB/div Log Start 150 kHz #Res BW 10 kHz #VBW 30 kHz Sweep 94.20 ms (1001 pts) Stop 10.000 MHz Mkr1 150.00 kHz -42.000 dBm -33.00 dBm Trig: Free Run Avg Type: Log-Pwr AvgHold: 26/100 PN0: Wide IF Gain: Low #Atten: 40 dB DC DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2			
150KHz-10MHz			
Agilent Spectrum Analyzer - Swept SA Marker 1 26.88000000 MHz Ref Offset 10.7 dB Ref 40.70 dBm 10 dB/div Log Start 10.00 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (1001 pts) Stop 30.00 MHz Mkr1 26.88 MHz -30.414 dBm -13.00 dBm Trig: Free Run Avg Type: Log-Pwr AvgHold: >100/100 PN0: Fast IF Gain: Low #Atten: 40 dB DC DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2			
10MHz-30MHz			



4.5.2 For GPRS 1900 Test Results

A. Test Verdict

Test Mode/ Channel	Frequency (MHz)	Frequency Range	Limit (dBm)	Verdict
GPRS 1900 /512	1850.20	9KHz-150KHz	-43.00	PASS
		150KHz-10MHz	-33.00	PASS
		10MHz-30MHz	-13.00	PASS
		30MHz-3GHz	-13.00	PASS
		3GHz-9GHz	-13.00	PASS
		9GHz-20GHz	-43.00	PASS
GPRS 1900 /661	1880.00	9KHz-150KHz	-43.00	PASS
		150KHz-10MHz	-33.00	PASS
		10MHz-30MHz	-13.00	PASS
		30MHz-3GHz	-13.00	PASS
		3GHz-9GHz	-13.00	PASS
		9GHz-20GHz	-43.00	PASS
GPRS 1900 /810	1909.80	9KHz-150KHz	-43.00	PASS
		150KHz-10MHz	-33.00	PASS
		10MHz-30MHz	-13.00	PASS
		30MHz-3GHz	-13.00	PASS
		3GHz-9GHz	-13.00	PASS
		9GHz-20GHz	-43.00	PASS

Note:

1. In general, the worse case attenuation requirement shown above was applied.
2. "----" means that the emission level is too low to be measured or at least 20 dB down than the limit.

B. Test Plots

Test Mode:	GPRS 1900	Test channel :	512								
Agilent Spectrum Analyzer - Swept SA Marker 1 9.846000 kHz Ref Offset 10.7 dB Ref 20.70 dBm Mkr1 9.846 kHz -48.807 dBm Start 9.00 kHz #Res BW 1.0 kHz #VBW 3.0 kHz Stop 150.00 kHz Sweep 134.8 ms (1001 pts) STATUS 1, DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 9KHz~150KHz <tr><td colspan="4"> Agilent Spectrum Analyzer - Swept SA Marker 1 169.700000 kHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 169.70 kHz -41.383 dBm Start 150 kHz #Res BW 10 kHz #VBW 30 kHz Stop 10.000 MHz Sweep 94.20 ms (1001 pts) STATUS 1, DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 150KHz-10MHz <tr><td colspan="4"> Agilent Spectrum Analyzer - Swept SA Marker 1 16.54000000 MHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 16.54 MHz -29.554 dBm Start 10.00 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 30.00 MHz Sweep 1.000 ms (1001 pts) STATUS Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 10MHz-30MHz </td></tr></td></tr>				Agilent Spectrum Analyzer - Swept SA Marker 1 169.700000 kHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 169.70 kHz -41.383 dBm Start 150 kHz #Res BW 10 kHz #VBW 30 kHz Stop 10.000 MHz Sweep 94.20 ms (1001 pts) STATUS 1, DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 150KHz-10MHz <tr><td colspan="4"> Agilent Spectrum Analyzer - Swept SA Marker 1 16.54000000 MHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 16.54 MHz -29.554 dBm Start 10.00 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 30.00 MHz Sweep 1.000 ms (1001 pts) STATUS Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 10MHz-30MHz </td></tr>				Agilent Spectrum Analyzer - Swept SA Marker 1 16.54000000 MHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 16.54 MHz -29.554 dBm Start 10.00 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 30.00 MHz Sweep 1.000 ms (1001 pts) STATUS Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 10MHz-30MHz			
Agilent Spectrum Analyzer - Swept SA Marker 1 169.700000 kHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 169.70 kHz -41.383 dBm Start 150 kHz #Res BW 10 kHz #VBW 30 kHz Stop 10.000 MHz Sweep 94.20 ms (1001 pts) STATUS 1, DC Coupled Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 150KHz-10MHz <tr><td colspan="4"> Agilent Spectrum Analyzer - Swept SA Marker 1 16.54000000 MHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 16.54 MHz -29.554 dBm Start 10.00 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 30.00 MHz Sweep 1.000 ms (1001 pts) STATUS Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 10MHz-30MHz </td></tr>				Agilent Spectrum Analyzer - Swept SA Marker 1 16.54000000 MHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 16.54 MHz -29.554 dBm Start 10.00 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 30.00 MHz Sweep 1.000 ms (1001 pts) STATUS Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 10MHz-30MHz							
Agilent Spectrum Analyzer - Swept SA Marker 1 16.54000000 MHz Ref Offset 10.7 dB Ref 40.70 dBm Mkr1 16.54 MHz -29.554 dBm Start 10.00 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 30.00 MHz Sweep 1.000 ms (1001 pts) STATUS Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 10MHz-30MHz											

Test Mode:	GPRS 1900	Test channel :	512
Agilent Spectrum Analyzer - Swept SA Marker 1 2.786160000000 GHz Ref Offset 10.7 dB Ref 40.00 dBm 10 dB/div Log 30.0 20.0 10.0 0.00 -10.0 -20.0 -30.0 -40.0 -50.0 Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 3.000 GHz Sweep 2.867 ms (1001 pts) Mkr1 2.786 2 GHz -24.717 dBm 1 Trig: Free Run Avg Type: Log-Pwr AvgHold: 100/100 Trig: Fast IF Gain: Low #Att: 40 dB 04:31:11 PM Dec 20, 2016 TRACE 1 2 3 4 5 6 TYPE: DEWRAWAY DET: NNNNN Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 30MHz-3GHz			
Agilent Spectrum Analyzer - Swept SA Marker 1 5.748000000000 GHz Ref Offset 10.7 dB Ref 40.00 dBm 10 dB/div Log 30.0 20.0 10.0 0.00 -10.0 -20.0 -30.0 -40.0 -50.0 Start 3.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 9.000 GHz Sweep 10.00 ms (1001 pts) Mkr1 5.748 GHz -27.039 dBm 1 Trig: Free Run Avg Type: Log-Pwr AvgHold: 29/100 Trig: Fast IF Gain: Low #Att: 40 dB 04:31:26 PM Dec 20, 2016 TRACE 1 2 3 4 5 6 TYPE: DEWRAWAY DET: NNNNN Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 3GHz-9GHz			
Agilent Spectrum Analyzer - Swept SA Marker 1 16.854000000000 GHz Ref Offset 10.7 dB Ref 40.00 dBm 10 dB/div Log 30.0 20.0 10.0 0.00 -10.0 -20.0 -30.0 -40.0 -50.0 Start 9.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Stop 20.000 GHz Sweep 27.53 ms (1001 pts) Mkr1 16.854 GHz -21.895 dBm 1 Trig: Free Run Avg Type: Log-Pwr AvgHold: 100/100 Trig: Fast IF Gain: Low #Att: 40 dB 11:23:17 AM Dec 23, 2016 TRACE 1 2 3 4 5 6 TYPE: DEWRAWAY DET: NNNNN Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr--CF Mkr--Ref Lvl More 1 of 2 9GHz-20GHz			