

FCC PART 22/24 TEST REPORT FCC Part 22 /Part 24 Report Reference No.....: MWR150900601 FCC ID...... **RQQHLT-L40SCL** Compiled by yuchao.wang File administrators Martin Ao (position+printed name+signature) ..: Supervised by (position+printed name+signature) ...: Test Engineer Yuchao Wang Approved by Manager Dixon Hao (position+printed name+signature) ..: Date of issue..... Sep 22, 2015 Representative Laboratory Name .: Maxwell International Co., Ltd. Room 509, Hongfa center building, Baoan District, Shenzhen, Address..... Guangdong, China **CCIC Southern Electronic Product Testing (Shenzhen) Co.,** Testing Laboratory Name Ltd. Electronic Testing Building, Shahe Road, Xili, Nanshan Address..... District, Shenzhen, 518055, P. R. China Applicant's name..... **HYUNDAI CORPORATION** Address..... 140-2, Kye-dong, Chongro-ku, Seoul, South Korea Test specification: FCC Part 22: PUBLIC MOBILE SERVICES Standard FCC Part 24: PERSONAL COMMUNICATIONS SERVICES Maxwell International Co., Ltd. TRF Originator Maxwell International Co., Ltd. All rights reserved. This publication may be reproduced in whole or in part for non-commercial purposes as long as the Maxwell International Co., Ltd. as copyright owner and source of the material. Maxwell International Co., Ltd. takess no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context. Test item description Mobile Phone Trade Mark HYUNDAI Manufacturer..... **Skycom Telecommunications Co., Limited** Model/Type reference.....: L445 Listed Models N/A Ratings..... DC 3.70V Modulation GMSK, 8-PSK GPRS..... Supported EGPRS Supported Hardware version 5096SF_MM1_V01 Software version HYUNDAI L445 V5.0.2 20150907 GSM 850MHz; PCS 1900MHz; Frequency..... Result.....

PASS

TEST REPORT

Test Report No. :	MWR150900601		Nov 19, 2014 Date of issue	
Equipment under Test	:	Mobile Phone		
Model /Type	:	L445		
Listed Models	:	N/A		
Applicant	:	HYUNDAI CORPORAT	ION	
Address	:	140-2, Kye-dong, Chong	gro-ku, Seoul, South Korea	
Manufacturer	:	Skycom Telecommuni	cations Co., Limited	
Address	:		engtang Bldg., No.1, Tairan 9 Rd., istrict, Shenzhen, China	

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. <u>TEST STANDARDS</u>

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

<u>TIA/EIA 603 D June 2010:</u> Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

47 CFR FCC Part 15 Subpart B: - Unintentional Radiators

FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

ANSI C63.4:2009: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

2. <u>SUMMARY</u>

2.1. General Remarks

Date of receipt of test sample	:	Aug 20, 2015
Testing commenced on	:	Aug 21, 2015
Testing concluded on	:	Sep 22, 2015

2.2. Product Description

The **HYUNDAI CORPORATION**'s Model: L445 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Mobile Phone	
Model Number	L445	
Mediletian Turce	GMSK for GSM/GPRS, 8-PSK for EDGE, QPSK for UMTS,	
Modilation Type	QPSK, 16QAM for LTE	
Antenna Type	Internal	
UMTS Operation Frequency Band	Device supported UMTS FDD Band II/IV/V	
	IEEE 802.11b:2412-2462MHz	
MILAN FCC Operation frequency	IEEE 802.11g:2412-2462MHz	
WLAN FCC Operation frequency	IEEE 802.11n HT20:2412-2462MHz	
	IEEE 802.11n HT40:2422-2452MHz	
BT FCC Operation frequency	2402MHz-2480MHz	
HSDPA Release Version	Release 10	
HSUPA Release Version	Release 6	
DC-HSUPA Release Version	Not Supported	
WCDMA Release Version	R99	
LTE Release Version	R8	
LTE Operation Frequency Band	Device supported FDD band 2, FDD band 4, FDD band 5,	
LTE Operation Frequency Band	FDD band 7, FDD band 17	
	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)	
WLAN FCC Modulation Type	IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)	
WLAN FCC Wodulation Type	IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK, BPSK)	
	IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK, BPSK)	
BT Modulation Type	GFSK (BT 4.0)/GFSK,8DPSK,π/4DQPSK(BT 3.0+EDR)	
Hardware version	5096SF_MM1_V01	
Software version	HYUNDAI_L445_V5.0.2_20150907	
Android version	Android 4.4.2	
GPS function	Supported	
WLAN	Supported 802.11b/802.11g/802.11n	
Bluetooth	Supported BT 4.0/BT 3.0+EDR	
GSM/EDGE/GPRS	Supported GSM/GPRS/EDGE	
GSM/EDGE/GPRS Power Class	GSM900:Power Class 4/DCS1800:Power Class 1	
GSM/EDGE/GPRS Operation Frequency	GSM900 :880MHz-915MHz/DCS1800:1710MHz-1785MHz	
GSM/EDGE/GPRS Operation Frequency	GSM900/DCS1800/GPRS900/ GPRS	
Band	1800/EDGE900/EDGE1800	
GSM Release Version	R99	
GPRS/EDGE Multislot Class	GPRS/EDGE: Multi-slot Class 12	
Extreme temp. Tolerance	-30°C to +50°C	
Extreme vol. Limits	3.40VDC to 4.20VDC (nominal: 3.70VDC)	
GPRS operation mode	Class B	

2.3. Equipment under Test

Power supply system utilised

Power supply voltage	:	0	120V / 60 Hz	0	115V / 60Hz
		0	12 V DC	0	24 V DC
			Other (specified in blank below	ow)

DC 3.70V

Test frequency list

Tost Modo	Test Mode TX/RX		RF Channel			
Test Mode		Low(L)	Middle (M)	High (H)		
	ТХ	Channel 128	Channel 190	Channel 251		
GSM850		824.2 MHz	836.6 MHz	848.8 MHz		
GSIMOSU	RX	Channel 128	Channel 190	Channel 251		
	ΓΛ	869.2 MHz	881.6 MHz	893.8 MHz		
Test Mode	TX/RX	RF Channel				
		Low(L)	Middle (M)	High (H)		
	ТХ	Channel 512	Channel 661	Channel 810		
GSM1900		1850.2 MHz	1880.0 MHz	1909.8 MHz		
631011900	RX	Channel 512	Channel 661	Channel 810		
	ľΛ	1930.2 MHz	1960.0 MHz	1989.8 MHz		

2.4. Short description of the Equipment under Test (EUT)

2.4.1 General Description

L445 is subscriber equipment in the WCDMA/GSM /LTE system. The HSPA/UMTS frequency band is Band II, Band IV and Band V, LTE frequency band is band 2.band 4,band 5,band 7,band 17; The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band II and Band V and GSM850 and PCS1900 bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS ,LTE and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and SIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

2.5. Internal Identification of AE used during the test

AE ID*	Description
AE1	Charger

AE1 Model: TPA-5950100UU INPUT: 100-240V 50/60Hz 0.2A OUTPUT: DC 5.0V,1000mAh

*AE ID: is used to identify the test sample in the lab internally.

2.6. Normal Accessory setting

Fully charged battery was used during the test.

2.7. EUT configuration

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

• - supplied by the manufacturer

 \bigcirc - supplied by the lab

0	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
0	Multimeter	Manufacturer :	/
		Model No. :	/

2.8. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: RQQHLT-L40SCL filing to comply with FCC Part 22 and Part 24 Rules

2.9. Modifications

No modifications were implemented to meet testing criteria.

2.10. General Test Conditions/Configurations

2.10.1 Test Modes

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

Test Mode	Test Modes Description	
GSM/TM1	GSM system, GSM, GMSK modulation	
GSM/TM2	GSM system, GPRS, GMSK modulation	
GSM/TM3	GSM system, EDGE, 8PSK modulation	

Note:

 EDGE and GPRS use same modulation type (GMSK) in GSM/TM2 mode, we test only GPRS according to 3GPP TS 151 010 requirement.

2.10.2 Test Environment

Environment Parameter	Selected Values During Tests			
Relative Humidity	Ambient			
Temperature	TN	Ambient		
	VL	3.4V		
Voltage	VN	3.7V		
	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

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

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

FCC-Registration information:

FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter fr om the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

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 ≤ 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	≤-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: ≤ -13dBm/100kHz, from 9kHz to 10th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	FCC: ≤ -13dBm/100kHz.	Pass
Frequency Stability	§2.1055, §22.355	≤ ±2.5ppm.	Pass
NOTE 1: For the verdict, t	he "N/A" denotes	s "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 ≤ 2W	Pass
Peak-Average Ratio	§2.1046, §24.232	FCC:Limit≤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	 ≤ -13dBm/1%*EBW, In 1MHz bands immediately outside and adjacent to The frequency block. 	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238	≤-13dBm/1MHz, from 9kHz to10th harmonics but outside authorized Operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238	≤ -13dBm/1MHz.	Pass
Frequency Stability	§2.1055, §24.235	FCC: within authorized frequency block.	Pass
NOTE 1: For the verdict, t	he "N/A" denotes	s "not applicable", the "N/T" de notes "not tested".	

Remark:

1. The measurement uncertainty is not included in the test result.

3.5. Equipments Used during the Test

Description	Manufacturer	Model	Serial No.	Test Date	Due Date
EMI Test Receiver	R&S	ESIB26	A0304218	2015.06.02	2016.06.01
Full-Anechoic Chamber	Albatross	12.8m*6.8m *6.4m	A0412372	2015.01.05	2016.01.04
Loop Antenna	Schwarz beck	HFH2-Z2	100047	2015.06.02	2016.06.01
Bilog Antenna	Schwarzbeck	VULB 9163	9163-274	2015.06.02	2016.06.01
Bilog Antenna	Schwarzbeck	VULB 9163	9163-276	2015.06.02	2016.06.01
Double ridge horn antenna	R&S	HF960	100150	2015.06.02	2016.06.01
Double ridge horn antenna	R&S	HF960	100155	2015.06.02	2016.06.01
Ultra-wideband antenna	R&S	HL562	100089	2015.06.02	2016.06.01
Ultra-wideband antenna	R&S	HL562	100090	2015.06.02	2016.06.01
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902607	2015.06.02	2016.06.01
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902611	2015.06.02	2016.06.01
Amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.02	2016.06.01
Ampilier 1G~18GHz	R&S	MITEQ AFS42- 00101800	25-S-42	2015.06.02	2016.06.01
Ampilier 18G~40GHz	R&S	JS42- 18002600- 28-5A	12111.0980. 00	2015.06.02	2016.06.01
System Simulator	R&S	CMW500	A130101034	2015.06.010	2016.06.09
Signal Generator	R&S	SMF100A	A0304267	2015.06.010	2016.06.09
Signal Analyzer	Agilent	N9030A	MY49430428	2015.06.010	2016.06.09

The calibration interval was one year.

4. TEST CONDITIONS AND RESULTS

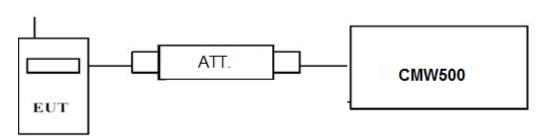
4.1. Output Power

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:

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a CMW500 by an Att.
- c) EUT Communicate with CMW500 then selects a channel for testing.
- d) 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	В			
EDGE	8	27dBm(0.5W)	12	В			

PCS1900							
Function	Power step	Nominal output power (dBm)	Power &Multislot class	Operation class			
GSM	0	30dBm(1W)	1	/			
GPRS	3	30dBm(1W)	12	В			
EDGE	2	27dBm(0.5W)	12	В			

TEST RESULTS

		Burst A	verage Conducted pow	ver (dBm)			
GSM	/ 850	Channel/Frequency(MHz)					
		128/824.2 190/836.6 251/848.8					
G	SM	32.84	32.83	32.96			
	1TX slot	32.95	32.96	33.03			
GPRS	2TX slot	30.35	30.66	30.74			
(GMSK)	3TX slot	28.21	28.46	28.62			
	4TX slot	27.35	27.57	27.81			
	1TX slot	27.31	27.22	26.99			
EGPRS	2TX slot	25.43	25.62	25.77			
(8PSK)	3TX slot	23.05	23.22	23.36			
	4TX slot	22.24	22.52	22.63			

		Burst Av	verage Conducted pow	ver (dBm)			
GSN	1 1900	Channel/Frequency(MHz)					
		512/1850.2 661/1880 810/1909.8					
G	SM	29.15	29.74	30.32			
	1TX slot	29.27	29.88	30.45			
GPRS	2TX slot	27.63	27.52	27.89			
(GMSK)	3TX slot	26.34	26.47	26.62			
	4TX slot	25.22	25.36	25.64			
	1TX slot	26.55	26.13	26.38			
EGPRS	2TX slot	24.35	24.52	24.62			
(8PSK)	3TX slot	23.00	23.12	23.35			
	4TX slot	22.34	22.49	22.52			

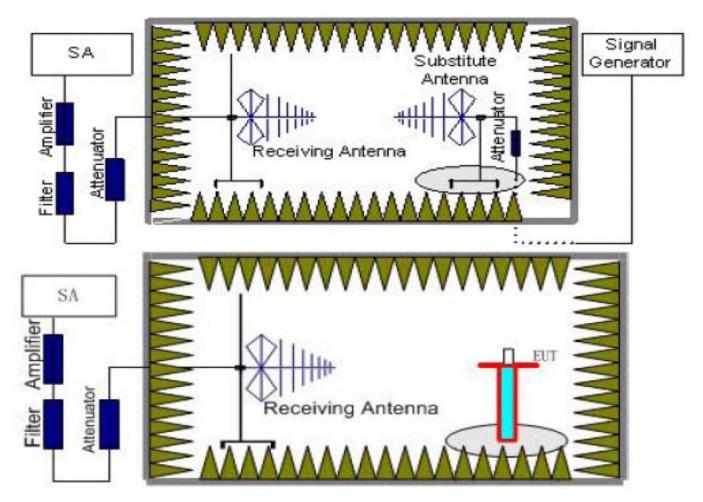
4.1.2. Radiated Output Power

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

- 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 We used SMF100A micowave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substituation test; The measurement results are amend as described below: 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-2.15dBi.

TEST LIMIT

Note: We test the H direction and V direction and 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	≤38.45dBm (7W)					
GPRS	3	≤38.45dBm (7W)					
EDGE	8	≤38.45dBm (7W)					

PCS1900(GPRS1900,EDGE1900)							
Function Power Step Burst Peak EIRP (dBm)							
GSM	0	≤33dBm (2W)					
GPRS	3	≤33dBm (2W)					
EDGE	2	≤33dBm (2W)					

TEST RESULTS

Remark:

1. We were tested all Configuration refer 3GPP TS151 010.

2. $EIRP=P_{Mea}(dBm)-P_{cl}(dB)+P_{Aq}(dB)+G_{a}(dBi)$

3. ERP = EIRP – 2.15dBi as EIRP by subtracting the gain of the dipole.

GSM/TM1/GSM850

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	-14.01	2.42	8.45	2.15	36.82	26.69	38.45	11.76	V
836.60	-13.25	2.46	8.45	2.15	36.82	27.41	38.45	11.04	V
848.80	-13.38	2.53	8.36	2.15	36.82	27.12	38.45	11.33	V

GSM/TM3/EDGE850

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	-18.09	2.42	8.45	2.15	36.82	22.61	38.45	15.84	V
836.60	-18.23	2.46	8.45	2.15	36.82	22.43	38.45	16.02	V
848.80	-18.33	2.53	8.36	2.15	36.82	22.17	38.45	16.28	V

GSM/TM1/GSM1900

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	-15.92	3.41	10.24	33.60	24.51	33.01	8.50	Н
1880.00	-15.93	3.49	10.24	33.60	24.42	33.01	8.59	Н
1909.80	-15.92	3.55	10.23	33.60	24.36	33.01	8.65	Н

GSM/TM3/EDGE1900

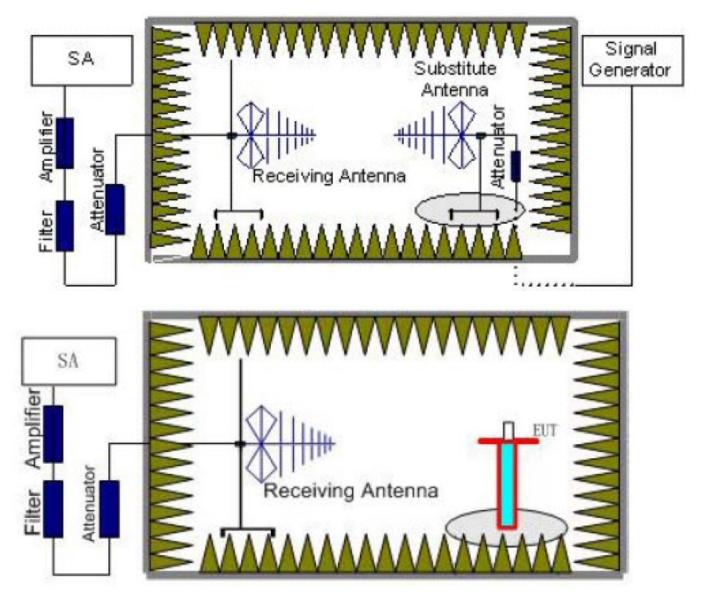
Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.20	-20.02	3.41	10.24	33.60	20.41	33.01	12.60	Н
1880.00	-19.73	3.49	10.24	33.60	20.62	33.01	12.39	Н
1909.80	-19.85	3.55	10.23	33.60	20.43	33.01	12.58	Н

4.2. Radiated Spurious Emssion

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

- 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.
- 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)
	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
TM1/GSM 850	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
	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
TM1/GSM 1900	2~5	1 MHz	3 MHz	3
1101/03101 1900	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
	Low	9KHz-10GHz	PASS
TM1/GSM 850	Middle	9KHz -10GHz	PASS
	High	9KHz -10GHz	PASS
	Low	9KHz -20GHz	PASS
TM1/GSM 1900	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

GSM/TM1/GSM850_ Low Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1648.4	-38.11	3.00	3.00	9.58	-31.53	-13.00	18.53	Н
2472.6	-44.40	3.03	3.00	10.72	-36.71	-13.00	23.71	Н
1648.4	-41.92	3.00	3.00	9.68	-35.24	-13.00	22.24	V
2472.6	-47.67	3.03	3.00	10.72	-39.98	-13.00	26.98	V

GSM/TM1/GSM850_ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.2	-35.02	3.00	3.00	9.58	-28.44	-13.00	15.44	Н
2509.8	-43.88	3.03	3.00	10.72	-36.19	-13.00	23.19	Н
1673.2	-40.46	3.00	3.00	9.68	-33.78	-13.00	20.78	V
2509.8	-47.96	3.03	3.00	10.72	-40.27	-13.00	27.27	V

GSM/TM1/GSM850_ High Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.6	-37.47	3.00	3.00	9.58	-30.89	-13.00	17.89	Н
2546.4	-44.21	3.03	3.00	10.72	-36.52	-13.00	23.52	Н
1697.6	-42.35	3.00	3.00	9.68	-35.67	-13.00	22.67	V
2546.4	-49.16	3.03	3.00	10.72	-41.47	-13.00	28.47	V

GSM/TM3/GSM850_ Low Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1648.4	-41.82	3.00	3.00	9.58	-35.24	-13.00	22.24	Н
2472.6	-48.14	3.03	3.00	10.72	-40.45	-13.00	27.45	Н
1648.4	-45.75	3.00	3.00	9.68	-39.07	-13.00	26.07	V
2472.6	-54.29	3.03	3.00	10.72	-46.60	-13.00	33.60	V

GSM/TM3/GSM850_ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.2	-38.94	3.00	3.00	9.58	-32.36	-13.00	19.36	Н
2509.8	-46.47	3.03	3.00	10.72	-38.78	-13.00	25.78	Н
1673.2	-42.84	3.00	3.00	9.68	-36.16	-13.00	23.16	V
2509.8	-49.62	3.03	3.00	10.72	-41.93	-13.00	28.93	V

GSM/TM3/GSM850_ High Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.6	-40.02	3.00	3.00	9.58	-33.44	-13.00	20.44	Н
2546.4	-46.60	3.03	3.00	10.72	-38.91	-13.00	25.91	Н
1697.6	-44.46	3.00	3.00	9.68	-37.78	-13.00	24.78	V
2546.4	-51.01	3.03	3.00	10.72	-43.32	-13.00	30.32	V

<u>G31/11/17</u>	<u>221011900 L</u>							
Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3700.4	-39.02	4.39	3.00	12.34	-31.07	-13.00	18.07	Н
5550.6	-44.73	5.31	3.00	13.52	-36.52	-13.00	23.52	Н
3700.4	-45.17	4.39	3.00	12.34	-37.22	-13.00	24.22	V
5550.6	-52.40	5.31	3.00	13.52	-44.19	-13.00	31.19	V

GSM/TM1/GSM1900 Low Channel

GSM/TM1/GSM1900_ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.0	-43.20	4.41	3.00	12.34	-35.27	-13.00	22.27	Н
5640.0	-48.34	5.38	3.00	13.58	-40.14	-13.00	27.14	Н
3760.0	-47.01	4.41	3.00	12.34	-39.08	-13.00	26.08	V
5640.0	-54.82	5.38	3.00	13.58	-46.62	-13.00	33.62	V

GSM/TM1/GSM1900_ High Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.6	-44.55	4.45	3.00	12.45	-36.55	-13.00	23.55	Н
5729.4	-51.62	5.47	3.00	13.66	-43.43	-13.00	30.43	Н
3819.6	-47.97	4.45	3.00	12.45	-39.97	-13.00	26.97	V
5729.4	-56.78	5.48	3.00	13.66	-48.60	-13.00	35.60	V

GSM/TM3/GSM1900_ Low Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3700.4	-42.39	4.39	3.00	12.34	-34.44	-13.00	21.44	Н
5550.6	-47.13	5.31	3.00	13.52	-38.92	-13.00	25.92	Н
3700.4	-48.09	4.39	3.00	12.34	-40.14	-13.00	27.14	V
5550.6	-54.87	5.31	3.00	13.52	-46.66	-13.00	33.66	V

GSM/TM3/GSM1900_ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.0	-44.32	4.41	3.00	12.34	-36.39	-13.00	23.39	Н
5640.0	-50.44	5.38	3.00	13.58	-42.24	-13.00	29.24	Н
3760.0	-49.70	4.41	3.00	12.34	-41.77	-13.00	28.77	V
5640.0	-57.32	5.38	3.00	13.58	-49.12	-13.00	36.12	V

GSM/TM3/GSM1900_ High Channel

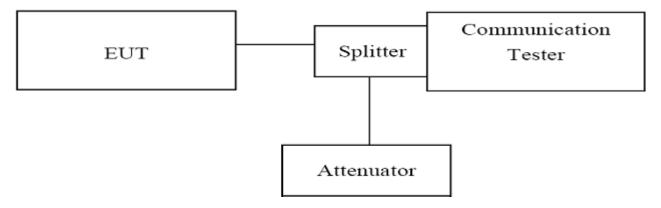
Frequency (MHz)	P _{Mea} (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.6	-46.19	4.45	3.00	12.45	-38.19	-13.00	25.19	Н
5729.4	-53.24	5.47	3.00	13.66	-45.05	-13.00	32.05	Н
3819.6	-52.74	4.45	3.00	12.45	-44.74	-13.00	31.74	V
5729.4	-58.15	5.48	3.00	13.66	-49.97	-13.00	36.97	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 Aglient 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

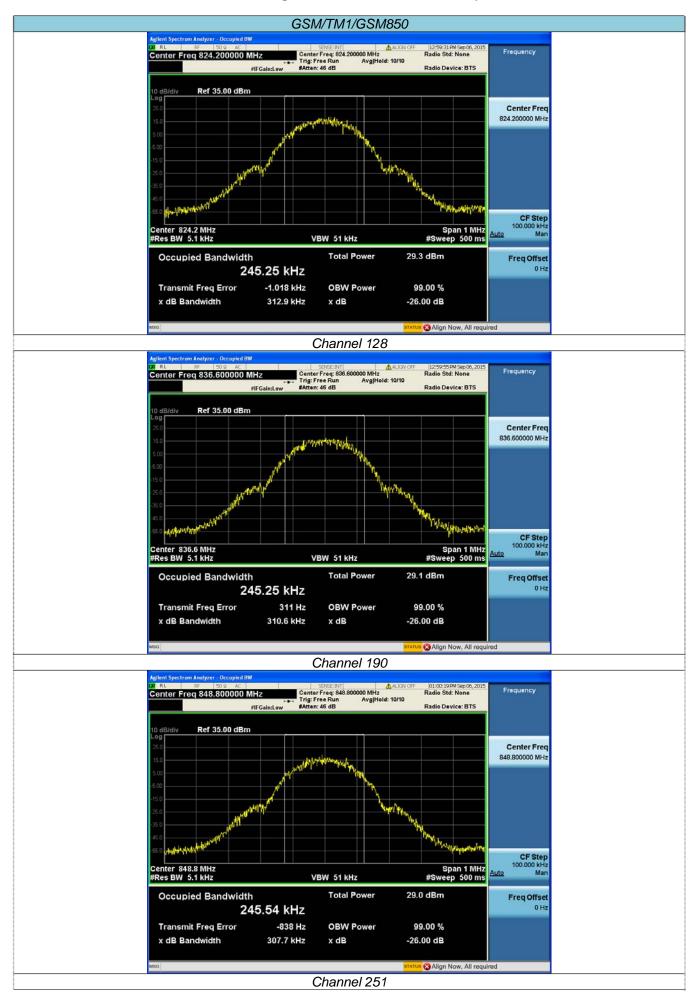
	GSM/TM1/GSM850							
Channel Number	Frequency (MHz)	Occupied Bandwidth (99% BW) (kHz)	Emission Bandwidth (26 dBc BW) (kHz)	Verdict				
128	824.20	245.25	312.92	PASS				
190	836.60	245.25	310.62	PASS				
251	848.80	245.54	307.68	PASS				

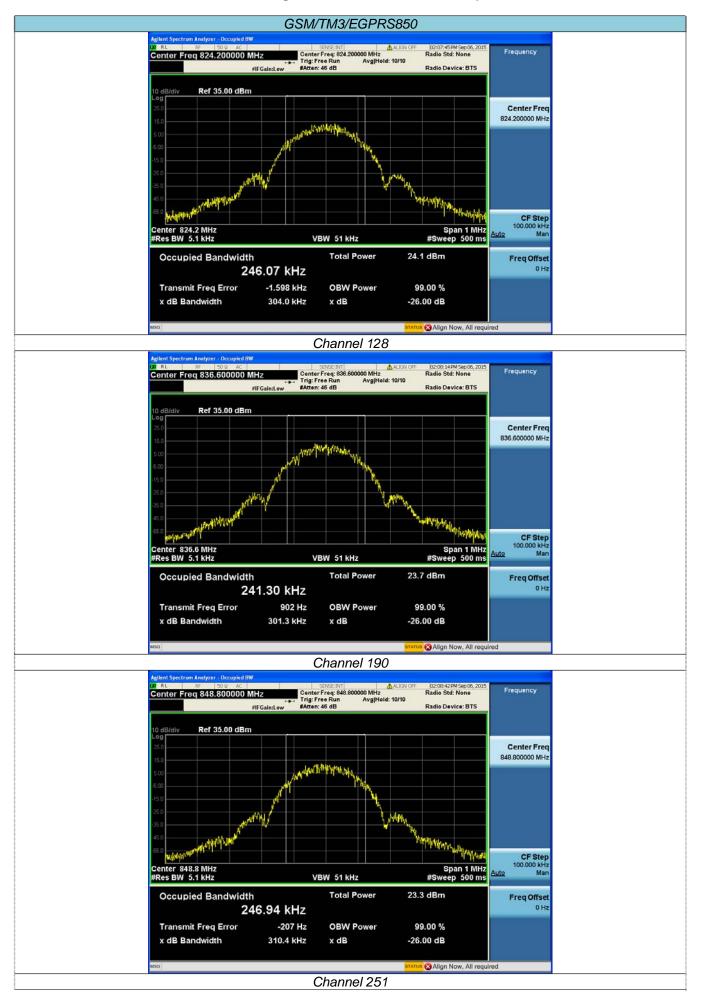
	GSM/TM3/GPRS850							
Channel Number	Frequency (MHz)	Occupied Bandwidth (99% BW) (kHz)	Emission Bandwidth (26 dBc BW) (kHz)	Verdict				
128	824.20	246.07	304.00	PASS				
190	836.60	241.30	301.32	PASS				
251	848.80	246.94	310.43	PASS				

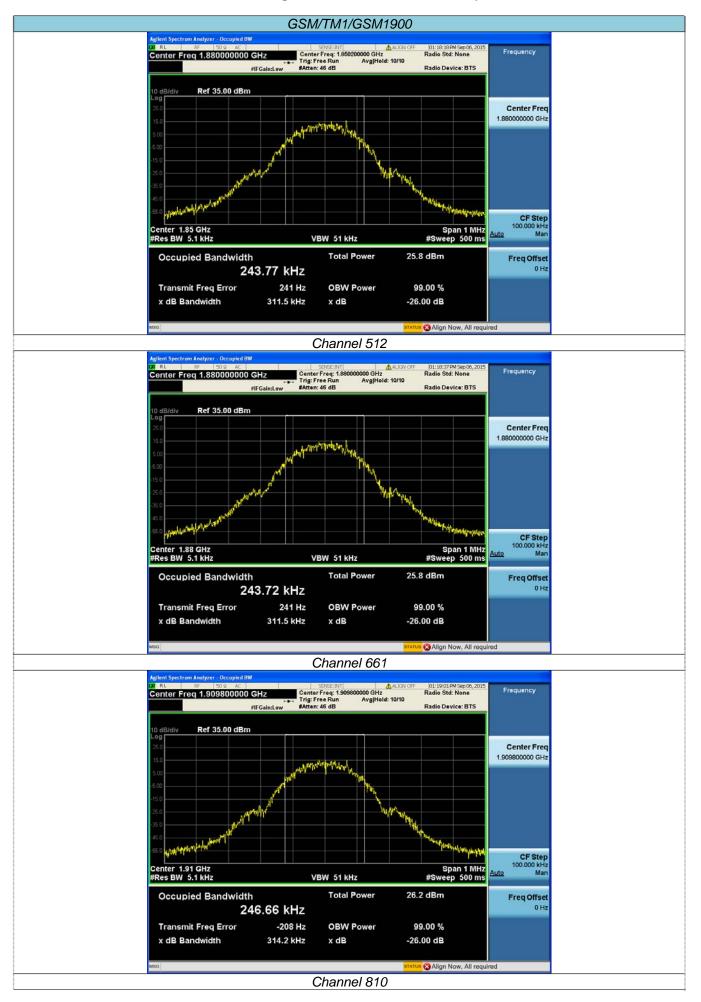
	GSM/TM1/GSM1900							
Channel Number	Frequency (MHz)	Occupied Bandwidth (99% BW) (kHz)	Emission Bandwidth (26 dBc BW) (kHz)	Verdict				
512	1850.20	243.77	311.53	PASS				
661	1880.00	243.72	311.53	PASS				
810	1909.80	246.66	314.19	PASS				

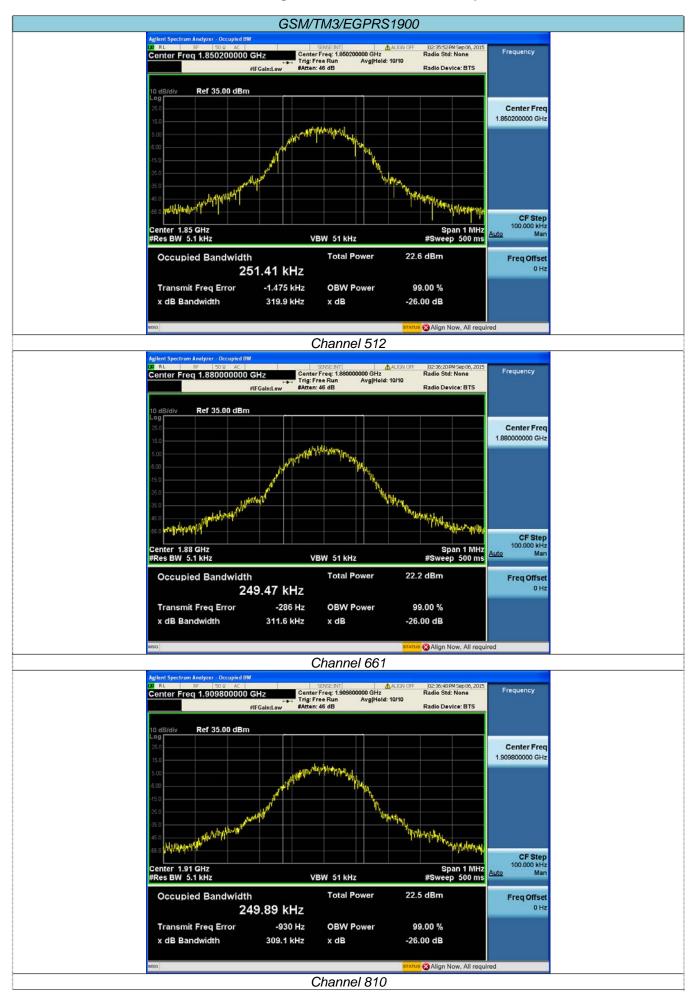
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	GSM/TM3/GPRS1900							
Channel Number	Frequency (MHz)	Occupied Bandwidth (99% BW) (kHz)	Emission Bandwidth (26 dBc BW) (kHz)	Verdict				
512	1850.20	251.41	319.91	PASS				
661	1880.00	249.47	311.56	PASS				
810	1909.80	249.89	309.12	PASS				







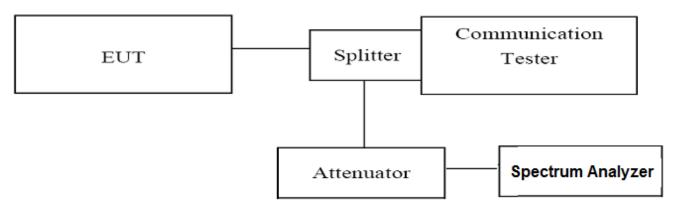


4.4. Band Edge Complicance

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;
- 1. 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

GSM/TM1/GSM850							
Channel	Frequency	Measurement Results		Limit			
Number	Frequency (MHz)	Frequency (MHz)	· · · (0Bm)		Refer to Plot	Verdict	
128	824.20	823.992	-24.766	-13.00	Plot 4.4.1 A	PASS	
251	848.80	849.008	-24.663	-13.00	Plot 4.4.1 B	PASS	

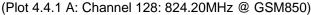
GSM/TM3/EGPRS850							
Channel	Fraguanay	Measurement Results		Limit			
Channel Number	Frequency (MHz)	Frequency (MHz)	Values (dBm)	(dBm)	Refer to Plot	Verdict	
128	824.20	823.976	-31.537	-13.00	Plot 4.4.2 A	PASS	
251	848.80	849.020	-34.587	-13.00	Plot 4.4.2 B	PASS	

GSM/TM1/GSM1900							
Channel	Fraguanay	Measureme	ent Results	Limit			
Number	Frequency (MHz)	Frequency (MHz)	Values (dBm)	(dBm)	Refer to Plot	Verdict	
512	1850.20	1849.976	-29.357	-13.00	Plot 4.4.3 A	PASS	
810	1909.80	1910.016	-27.965	-13.00	Plot 4.4.3 B	PASS	

GSM/TM3/EGPRS1900							
Channel	Frequency	Measureme	ent Results	Limit			
Number	Frequency (MHz)	Frequency (MHz)	Values (dBm)	(dBm)	Refer to Plot	Verdict	
512	1850.20	1849.962	-35.065	-13.00	Plot 4.4.4 A	PASS	
810	1909.80	1910.016	-32.936	-13.00	Plot 4.4.4 B	PASS	

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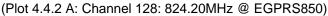




(Plot 4.4.1 B: Channel 251: 848.80MHz @ GSM850)

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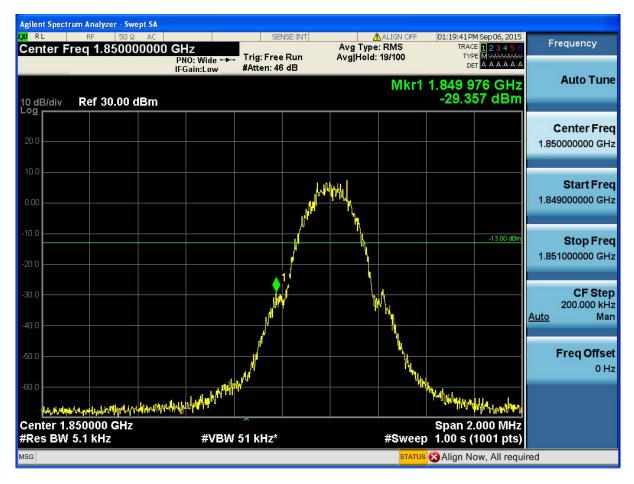


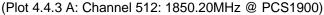




(Plot 4.4.2 B: Channel 251: 848.80MHz @ EGPRS850)

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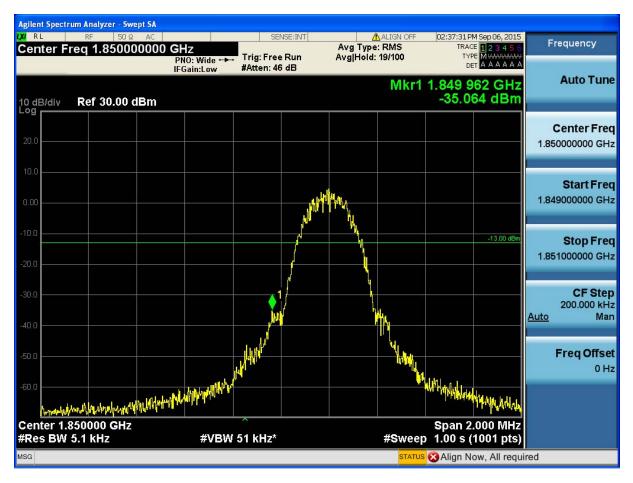


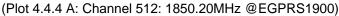




(Plot 4.4.3 B: Channel 810: 1909.80MHz @ PCS1900)

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(Plot 4.4.4 B: Channel 810: 1909.80MHz @ EGPRS1900)

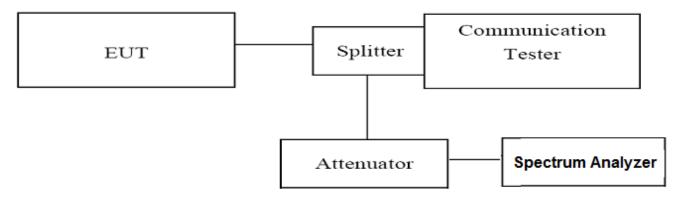
4.5. Spurious Emssion on Antenna Port

TEST APPLICABLE

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

- 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.
- 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).

<u>TEST LIMIT</u>

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

4.6.1 For GSM/TM1/GSM850Test Results

A. Test Verdict

Test Mode/ Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBm)	Verdict
		9KHz-150KHz	Plot 4.5.1 A1	-13.00	PASS
GSM/TM1/GSM850	824.20	150KHz-30MHz	Plot 4.5.1 A2	-13.00	PASS
/128	024.20	30MHz-1GHz	Plot 4.5.1 A3	-13.00	PASS
		1GHz-9GHz	Plot 4.5.1 A4	-13.00	PASS
		9KHz-150KHz	Plot 4.5.1 B1	-13.00	PASS
GSM/TM1/GSM850	836.60	150KHz-30MHz	Plot 4.5.1 B2	-13.00	PASS
/190	030.00	30MHz-1GHz	Plot 4.5.1 B3	-13.00	PASS
		1GHz-9GHz	Plot 4.5.1 B4	-13.00	PASS
		9KHz-150KHz	Plot 4.5.1 C1	-13.00	PASS
GSM/TM1/GSM850	040 00	150KHz-30MHz	Plot 4.5.1 C2	-13.00	PASS
/251	848.80	30MHz-1GHz	Plot 4.5.1 C3	-13.00	PASS
		1GHz-9GHz	Plot 4.5.1 C4	-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.

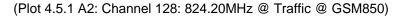
B. Test Plots

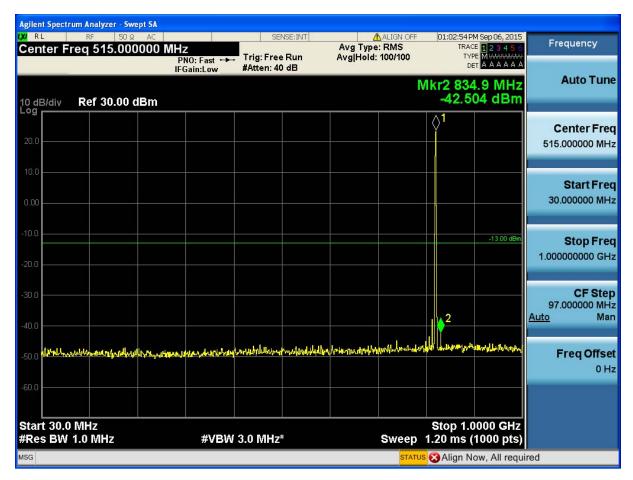
RL F	RF 50 Ω / DC		SENSE:INT		ALIGN OFF	01:02:18 P	4 Sep 06, 2015	- March March 1999	
enter Freq	79.500 kHz		Trig: Free Run #Atten: 46 dB	Avg Type Avg Hold	: RMS	TRAC TYP	E 1 2 3 4 5 6 E MWWWWW T A A A A A A A	Frequency	ÿ
0 dB/div Re	ef 20.00 dBm				ľ	Mkr1 26 -66.3	.36 kHz 25 dBm	Auto	Tune
10.0								Center 79.50	Frec
0.00								Start 9.00	Fred 0 kH
30.0							-33.00 dBm	Stop 150.00	
40.0 50.0							Δ	CF 14.10 <u>uto</u>	Ste 00 kH Ma
50.0		many monoral and the	allow Weinerga Landre	mantan	Wern Carlow	n hin huy	Murana	Freq C	Offse 0 H
tart 9.00 kH Res BW 1.0		#VBW	10 kHz*		Sweep	Stop 15 168 ms (0.00 kHz 1000 pts)		

(Plot 4.5.1 A1: Channel 128: 824.20MHz @ Traffic @ GSM850)

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	Agilent Spectrum Analyzer - Swept SA												
		RF	50 Ω 5.0750		17	SE	NSE:INT	Avg Type	ALIGN OFF		M Sep 06, 2015	Frequency	y
Gen		eq	5.0750	JOO I MI	PNO: Wide ++- IFGain:Low	Trig: Free #Atten: 40		Avg Hold:		TYP			
10 dE Log i	3/div	Ref	20.00 (dBm					MI	kr1 14.9 -69.9	11 MHz 89 dBm	Auto T	une
												Center	Second and the second
10.0												15.075000	MHz
0.00												Start F	Freq
-10.0					<u>e</u>							150.000) kHz
-20.0											-23.00 dBm	Stop F	Freq
-30.0					9							30.000000	1.0
-40.0												CFS	Step
												2.985000 <u>Auto</u>	MHz Man
-50.0												-	
-60.0							1					Freq Of	fset 0 Hz
-70.0	hand	1 hhruby	et in the second	hill better	meron la thore	abriller manifiler	Wellinger and w	mahlulate	edhan tera a nd	hunderthousen	n-phonertage		
	t 150 k s BW 1		Iz		#VBW	30 kHz*			Sweep	Stop 3 368 ms (0.00 MHz 1000 pts)		
MSG									STATUS	🛛 🔁 Align N	ow, All requi	red	

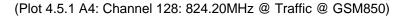


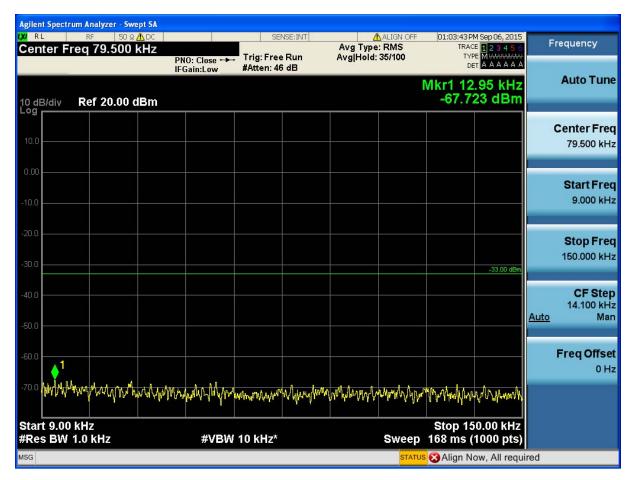


(Plot 4.5.1 A3: Channel 128: 824.20MHz @ Traffic @ GSM850)

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-		m Analyzer						į.				
Cen		_{RF} eq 5.00	50 Ω A		z		NSE:INT	Avg Type		TRAC	M Sep 06, 2015	Frequency
				PN	lO: Fast 🔸	Trig: Free #Atten: 40		Avg Hold:	83/100	D		
									M	(r1 1.64	87 GHz	Auto Tune
10 dE Log	3/div	Ref 30.	00 dBn	n						-36.9	57 dBm	
Ŭ												Center Freq
20.0	_		2									5.00000000 GHz
10.0												
10.0												Start Freq
0.00			2							5		1.000000000 GHz
-10.0											-13.00 dBm	Stop Freq
-20.0			5			c .				5	c	9.00000000 GHz
-30.0		<u> </u>	-									CF Step 800.000000 MHz
10.0		?]										Auto Man
-40.0		ويتدار التراريس المرار	وأبلغ برقيط واللاه	u likeleritetet		alandar or out shalls the	No. a Hold Development	ka ka ti like ka ka mara	والمعالية المراجع والمراط	and and the first of the state	u unu	
-50.0			-utra atas		and the second	A DESCRIPTION OF THE OWNER.	international design of the	l presidente de la companya de la co	and the second of the state of the second		Billion and Application	Freq Offset
												0 Hz
-60.0												
	t 1.000) GHz I.0 MHz			#\/D\A	3.0 MHz	*		Swoon	Stop 9	.000 GHz 8190 pts)	
#RC	5 DW				#VDVV	3.0 MHZ					ow, All requir	red
Mod	_	_	_	_					GIAIO		ow, An requi	Cu

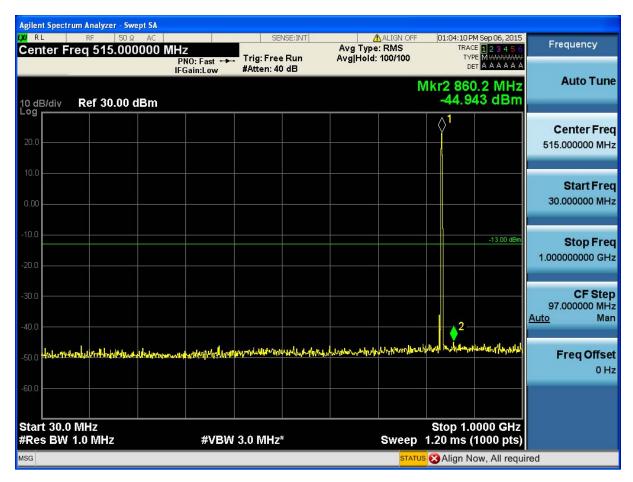




(Plot 4.5.1 B1: Channel 190: 836.60MHz @ Traffic @ GSM850)

			lyzer - Sw											
Con		RF	50 s				9	ENSE;INT	Ava T	ALIGN OFF		CE 1 2 3 4 5 6		Frequency
GGI		eq	5.075	000 1		Wide 🔶 n:Low	Trig: Fre #Atten:			old: 17/100	Τ'			
10 d Log	B/div	Ref	20.00	dBm							Mkr1 9.1 -73.8	44 MHz 84 dBm		Auto Tune
10.0				10			c				5			Center Freq 15.075000 MHz
0.00 -10.0				9 9										Start Freq 150.000 kHz
-20.0 -30.0				8								-23.00 dBm	;	Stop Freq 30.000000 MHz
-40.0 -50.0													<u>Auto</u>	CF Step 2.985000 MHz Man
-60.0					1								0	Freq Offset 0 Hz
	W <mark>wwww</mark> rt 150 s BW	kHz		anth days and	Adalahan	արերեր #VBW	Щил _{ли} син / 30 kHz*			ավոստակյ⊮ Sweep	Stop 3	<mark>փծախիկողը</mark> 0.00 MHz (1000 pts)		
MSG										STATU	J <mark>s</mark> 🐼 Align N	low, All requi	red	

(Plot 4.5.1 B2: Channel 190: 836.60MHz @ Traffic @ GSM850)

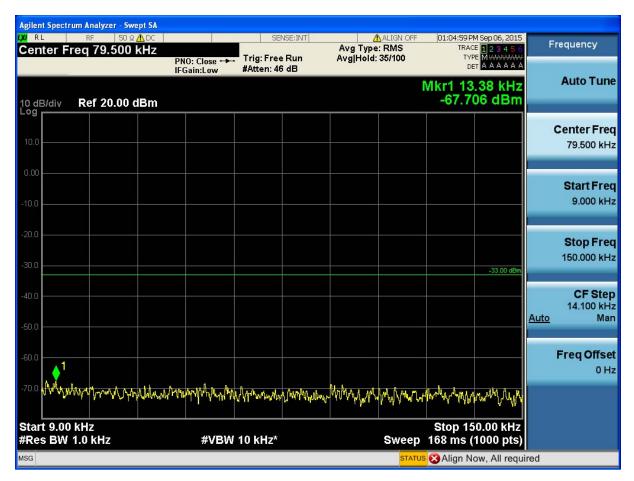


(Plot 4.5.1 B3: Channel 190: 836.60MHz @ Traffic @ GSM850)

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		ım Analyzer - !					1				
Cen	1.		Ω AC 000000 G	Hz		NSE:INT	Avg Type		TRAG	M Sep 06, 2015	Frequency
			F	NO: Fast 🔸	Trig: Free #Atten: 40		Avg Hold:	83/100			
								M	(r1 3.63	3 8 GHz	Auto Tune
10 dE	3/div	Ref 30.00) dBm						-40.4	61 dBm	
Log											Center Freq
20.0			4	e.						C	5.00000000 GHz
10.0											Start Freq
0.00			<i>u</i> .	e.					0	6	1.000000000 GHz
0.00											
-10.0									-	-13.00 dBm	Stop Freq
											9.000000000 GHz
-20.0									2		
-30.0									5		CF Step
				1							800.000000 MHz Auto Man
-40.0						11		a an trill as ast	hild the state of the		Auto Mari
-50.0		ماندان و مغربوا الماري مراجع مرجع الماري									Freq Offset
-50.0	Long & all her	ALL DE LE CONTRACTOR									0 Hz
-60.0											
	t 1.00								Stop 9	.000 GHz	
#Res	s BW	1.0 MHz		#VBW	3.0 MHz	*		Sweep	13.6 ms (8190 pts)	
MSG								STATU	s 🐼 Align N	ow, All requi	red

(Plot 4.5.1 B4: Channel 190: 836.60MHz @ Traffic @ GSM850)



(Plot 4.5.1 C1: Channel 251: 848.80MHz @ Traffic @ GSM850)

-			alyzer - Sv										
COD		RF	50 s 15.075		Ц ₇	SE	NSE:INT	Avg Type	ALIGN OFF		M Sep 06, 2015	F	requency
Gen		eq	15.075	000 1	PNO: Wide ++ IFGain:Low	Trig: Free #Atten: 30		Avg Hold:		TYI			
10 dE Log	3/div	Ref	20.00	dBm					M	kr1 19.6 -74.7	32 MHz 64 dBm		Auto Tune
10.0				8.	J								Center Freq 5.075000 MHz
0.00				9									Start Freq 150.000 kHz
-20.0 -30.0											-23.00 dBm	3(Stop Freq 0.000000 MHz
-40.0												Auto 2	CF Step 2.985000 MHz Man
-60.0													Freq Offset 0 Hz
	t 150	kHz	hhalpantan	ullyphosphorymle			waladgenerer	1 แกรงหมุงครไปหนุกป		Stop 3	0.00 MHz		
#Res	s BW	10 k	Hz		#VBW	30 kHz*				No.	1000 pts) ow, All requi	red	

(Plot 4.5.1 C2: Channel 251: 848.80MHz @ Traffic @ GSM850)

		1 Analyzer - S		-							
Cen			i Ω AC 00000 MH	z		NSE:INT	Avg Type		TR	7 PM Sep 06, 2015 ACE 1 2 3 4 5 6	Frequency
			I	NO: Fast ++- Gain:Low	Trig: Free #Atten: 40		Avg Hold:	100/100			
									Vikr2 8	34.9 MHz	Auto Tune
10 dE Log	3/div	Ref 30.00) dBm					-	-42.	137 dBm	
3											Center Freq
20.0			2	<u>i</u>						<u></u>	515.000000 MHz
10.0											
10.0											Start Freq
0.00			a)	<u>j</u> é	- <u>-</u>				<u></u>	.e	30.000000 MHz
-10.0										-13.00 dBm	Stop Freq
-20.0			-	<u>.</u>							1.000000000 GHz
-30.0											CF Step 97.000000 MHz
-40.0											<u>Auto</u> Man
				as as	estature data a co	al la come a	e de l'estrate au	the second		w + the part of a farmer of	
-50.0	hand the second s	propole Dipolyphics	-happinet they apply	wy-flolwigtHospheticity/	UNIVILIAN AND AND AND AND AND AND AND AND AND A	₩Ĵ₿ <mark>₰₺₺₧₯₡₰_₩₼</mark>	PH PARA IN AN AN AN		An average to day	an en la	Freq Offset 0 Hz
-60.0											0 H2
-00.0											
Star	t 30.0 N	/H7							Stop 1	.0000 GHz	
	s BW 1.			#VBW	3.0 MHz	*		Sweep		(1000 pts)	
MSG								STATU	I <mark>s</mark> 🐼 Align	Now, All requi	ired

(Plot 4.5.1 C3: Channel 251: 848.80MHz @ Traffic @ GSM850)

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Agilent		m Analyzer - Sw RF 50 S	vept SA ≥ AC			NSE:INT	1	ALIGN OFF	01-05-07.0	4 Con 06 2015	
		eq 5.0000		lz			Avg Type	RMS	TRAC	M Sep 06, 2015 E 1 2 3 4 5 6 E M WAAAAAAA	Frequency
				NO: Fast 🔸	Trig: Free #Atten: 40		Avg Hold:	82/100	DE	TAAAAAA	
								M	(r1 3.66	2 GHz	Auto Tune
10 dB	/div	Ref 30.00	dBm						-39.8	13 dBm	
											Center Freq
20.0 -				<u>.</u>					0		5.00000000 GHz
10.0											
10.01											Start Freq
0.00			9	<u>.</u>					0	6	1.000000000 GHz
-10.0										-13.00 dBm	Stop Freq
-20.0			2	4					<u>а</u>		9.000000000 GHz
20.0											
-30.0									-		CF Step
				1							800.000000 MHz <u>Auto</u> Man
-40.0 -			la Lan Kabaladir.	و ملافقت خوال	an chaire	والملور والمعادية والرالية	د. مراجع من المراجع المراجع الم	Jamby & Mattala State	and the state of the second	a shara ka shi a	
-50.0 *		dun allandar bat		AL-AP		The second state of the second states	-losine and shirts from the second	<mark>harden an an</mark>	Tranhang It all a production		Freq Offset
											0 Hz
-60.0									-		
	1.000								Stop 9	.000 GHz	
	BW 1	.0 MHz		#VBW	3.0 MHz	•			13.6 ms (
MSG								STATU	Align N	ow, All requi	rea

(Plot 4.5.1 C4: Channel 251: 848.80MHz @ Traffic @ GSM850)

4.6.2 For GSM/TM1/GSM 1900 Test Results

A. Test Verdict

Test Mode/ Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBm)	Verdict
		9KHz-150KHz	Plot 4.5.2 A1	-13.00	PASS
		150KHz-30MHz	Plot 4.5.2 A2	-13.00	PASS
GSM/TM1/GSM1900	1850.20	30MHz-1GHz	Plot 4.5.2 A3	-13.00	PASS
/512	1000.20	1GHz-7GHz	Plot 4.5.2 A4	-13.00	PASS
		7 GHz-13.5 GHz	Plot 4.5.2 A5	-13.00	PASS
		13.5 GHz -20GHz	Plot 4.5.2 A6	-13.00	PASS
		9KHz-150KHz	Plot 4.5.2 A1	-13.00	PASS
		150KHz-30MHz	Plot 4.5.2 A2	-13.00	PASS
GSM/TM1/GSM1900	1880.00	30MHz-1GHz	Plot 4.5.2 A3	-13.00	PASS
/661	1000.00	1GHz-7GHz	Plot 4.5.2 A4	-13.00	PASS
		7 GHz-13.5 GHz	Plot 4.5.2 A5	-13.00	PASS
		13.5 GHz -20GHz	Plot 4.5.2 A6	-13.00	PASS
		9KHz-150KHz	Plot 4.5.2 A1	-13.00	PASS
		150KHz-30MHz	Plot 4.5.2 A2	-13.00	PASS
GSM/TM1/GSM1900	1000.80	30MHz-1GHz	Plot 4.5.2 A3	-13.00	PASS
/810	1909.80	1GHz-7GHz	Plot 4.5.2 A4	-13.00	PASS
		7 GHz-13.5 GHz	Plot 4.5.2 A5	-13.00	PASS
		13.5 GHz -20GHz	Plot 4.5.2 A6	-13.00	PASS

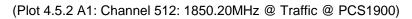
Note:

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

B. Test Plots

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		m Analyzer -										
Cen		RF 5 eq 79.50	οΩ <u>Λ</u> DC			NSE:INT	Avg Type		TRAC	M Sep 06, 2015 E 1 2 3 4 5 6	F	requency
				PNO: Close 🔸 IFGain:Low	Trig: Free #Atten: 4		Avg Hold:	35/100	DI			
									Mkr1 14	.93 kHz		Auto Tune
10 dE Log	3/div	Ref 20.0	0 dBm						-66.2	65 dBm		
											1	Center Freq
10.0				9	6					<u>.</u>		79.500 kHz
0.00												
0.00												Start Freq
-10.0			2		0			3				9.000 kHz
-20.0												
-20.0												Stop Freq
-30.0			2	3	¢.			-				150.000 kHz
												05.044
-40.0										-43.00 dBm		CF Step 14.100 kHz
-50.0											<u>Auto</u>	Man
											-	
-60.0	1											Freq Offset 0 Hz
1.70 O	atra la a										_	0 112
10.0	an Arde	hala haralara	Nor Multin	MingNumber	My young to	www.phulphu	material	/www.hulli	MANNA	MAY LIMAN PAN		
Star	t 9.00	kHz							Stop 15	0.00 kHz		
#Re	s BW 1	.0 kHz		#VBW	10 kHz*			Sweep		1000 pts)		
MSG								STATUS	🛛 🕄 Align N	ow, All requi	red	



orter Freq 15.075000 Center Freq 15.075000		SENSE:INT Trig: Free Run #Atten: 36 dB	ALIGN OFF Avg Type: RMS Avg Hold: 17/100	01:21:17 PM Sep 06, 2015 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET A A A A A A	Frequency
0 dB/div Ref 20.00 dBr	n		IV	lkr1 2.331 MHz -74.431 dBm	Auto Tune
10.0					Center Free 15.075000 MH
10.0					Start Free 150.000 kH
30.0				-33.00 dBm	Stop Fre 30.000000 MH
40.0					CF Stej 2.985000 MH <u>Auto</u> Ma
70.0					Freq Offse 0 H
	#uhuuufamanaa #VBW	հյերոկիսութերիութի	สามาร์สารรูปเหน่าไห้สุดสามาร์ Sweep	<mark>։ Տ</mark> եօր 30.00 MHz 368 ms (1000 pts)	

(Plot 4.5.2 A2: Channel 512: 1850.20MHz @ Traffic @ PCS1900)

-		m Analyzer -									
Con		RF 5		MHz	SE	NSE:INT	Avg Type	ALIGN OFF		M Sep 06, 2015 E 1 2 3 4 5 6	Frequency
Gen		eq 515.0	100000	PNO: Fast ++ IFGain:Low	Trig: Free #Atten: 40		Avg Hold:	100/100	TYI Di		Auto Tune
10 dE Log r	3/div	Ref 30.0	0 dBm					Λ	/kr1 803 -44.7	3.9 MHz 39 dBm	Auto Tune
											Center Freq
20.0											515.000000 MHz
10.0											Start Freq
0.00			9	e.					<u>9</u>	<u>.</u>	30.000000 MHz
-10.0									.	-13.00 dBm	Oton From
-20.0											Stop Freq 1.000000000 GHz
-30.0 -											CF Step 97.000000 MHz Auto Man
-40.0									• ¹		<u>Auto</u> Man
-50.0	p	him the cities	Merrythe-honder	log-weight-special-sulfreig	alugarilarondou.	der the second	and the states of the second second	NATURA STATE	aliyaya yada yada yada yada yada yada yada	14. April and a start of the second	Freq Offset
-60.0											0 Hz
	t 30.0 s BW 1	MHz .0 MHz		#VBW	3.0 MHz	*		Sweep	Stop 1.0 1.20 ms (0000 GHz 1000 pts)	
MSG									-	ow, All requi	red

(Plot 4.5.2 A3: Channel 512: 1850.20MHz @ Traffic @ PCS1900)

	um Analyzer - Swept SA								
	RF 50Ω AC req 4.00000000	0 GHz	SEI	NSE:INT	Avg Type	ALIGN OFF	TRA	M Sep 06, 2015 CE 1 2 3 4 5 6	Frequency
		PNO: Fast ↔→→ IFGain:Low	Trig: Free #Atten: 40		Avg Hold:	100/100	T١		
						M	kr2 3.71	5 9 GHz	Auto Tune
10 dB/div	Ref 30.00 dBm						-39.8	85 dBm	
									Center Freq
20.0							2		4.000000000 GHz
10.0								-	Otart Error
0.00									Start Freq 1.000000000 GHz
0.00									1.00000000000
-10.0							-	-13.00 dBm	04
								10.00 abii	Stop Freq 7.000000000 GHz
-20.0							9) 		7.00000000000
-30.0									CF Step
-30.0			<u>^</u> 2						600.000000 MHz
-40.0			<u>و</u>						<u>Auto</u> Man
nuar tied	المنابع والمراجع والمنابع والمراجع والمراجع والمراجع	al and the second second second	and the second	ik de se stikk se s			<mark>des seise bestimt</mark>		
-50.0									Freq Offset 0 Hz
-60.0									0112
-00.0									
Stort 4 00	0.04-						Oton 7		
Start 1.00 #Res BW		#VBW	3.0 MHz*	*		Sweep	10.3 ms	.000 GHz (6200 pts)	
MSG								low, All requi	red

(Plot 4.5.2 A4: Channel 512: 1850.20MHz @ Traffic @ PCS1900)

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Agilen		m Analyzer - Sw									
	1.	eq 10.2500	AC 000000	Hz		NSE:INT	Avg Type		TRAC	M Sep 06, 2015 E 1 2 3 4 5 6	Frequency
			Р	NO: Fast 🔸	Trig: Free #Atten: 40		Avg Hold:	100/100	TYF DE		
								Mkr	1 13.37	9 GHz	Auto Tune
10 dE	3/div	Ref 30.00	dBm						-40.6	57 dBm	
Log											Center Freq
20.0				e .						<u>.</u>	10.250000000 GHz
10.0										-	Start Freq
0.00				1					0	e.	7.000000000 GHz
0.00											
-10.0			_						÷	-13.00 dBm	Stop Freq
											13.50000000 GHz
-20.0			2	24 							
-30.0											CF Step
										4	650.000000 MHz
-40.0		and a				d s de nation	alarrat ba	n allonates di		والمتلك المتعاد	<u>Auto</u> Man
	al an								1	dag chailteat a stillig	Freq Offset
-50.0											0 Hz
-60.0											
Star	t 7.000	GHz							Stop 13	.500 GHz	
		.0 MHz		#VBW	3.0 MHz	*		Sweep	10.9 ms (6800 pts)	
MSG								STATU	s 🔀 Align N	ow, All requi	red

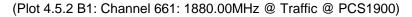
(Plot 4.5.2 A5: Channel 512: 1850.20MHz @ Traffic @ PCS1900)

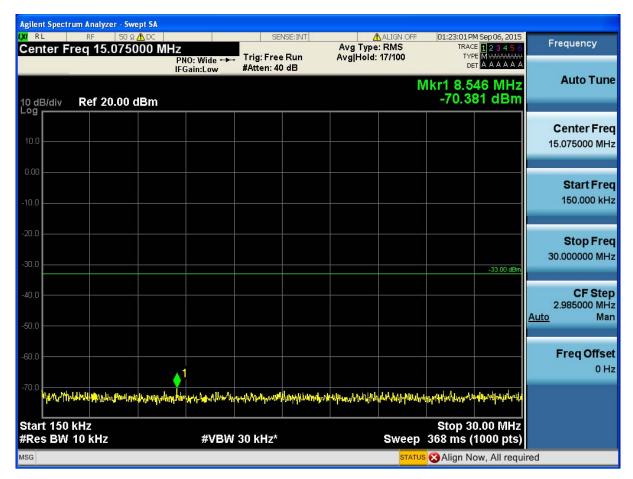


(Plot 4.56.2 A6: Channel 512: 1850.20MHz @ Traffic @ PCS1900)

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		n Analyzer - S					10					
Cent		RF 50 eq 79.50	IΩ <u>∧</u> DC 0 kHz			NSE:INT	Avg Type		TRAC	M Sep 06, 2015 E 1 2 3 4 5 6	F	requency
				PNO: Close ++- IFGain:Low	Trig: Free #Atten: 40		Avg Hold:	35/100	DE			
									Mkr1 11	.82 kHz		Auto Tune
10 dB Log	3/div	Ref 20.00) dBm						-65.9	42 dBm	4	
- vg												Center Freq
10.0				5								79.500 kHz
0.00												Start Freq
-10.0			3) 3)	3	0							9.000 kHz
-20.0				7	-							Stop Freq
												150.000 kHz
-30.0												
-40.0										-43.00 dBm		CF Step
										-43.00 dBm	Auto	14.100 kHz Man
-50.0											Auto	Width
												Freq Offset
-60.0	↓ ¹											0 Hz
-70.0	BAT MAL	Acho An Manh	Jo. Rue Asres	whither was	hit a da a	ALL B.	. Ash at a s	the set			-	
	κα πρίγ	u add aff i ddaa	I IIMI - M A A MA	Authling	ŴŴŴŴ	ANTIMA RAMA NA	rander of years	andar Rhammer	wan waa waa	WANNA WANNA		
Start	9.00 I	(Hz							Stop 15	0.00 kHz		
		.0 kHz		#VBW	10 kHz*			Sweep	168 ms (1000 pts)		
MSG								STATUS	🛛 Align N	ow, All requi	red	





(Plot 4.5.2 B2: Channel 661: 1880.00MHz @ Traffic @ PCS1900)

-	t Spectru											
IXI RI		RF		AC 000 N		SE	NSE:INT	Avg Type	ALIGN OFF		M Sep 06, 2015	Frequency
Gen		eq JT	51000		PNO: Fast ++ IFGain:Low	Trig: Free #Atten: 40		Avg Hold:	100/100	TYI Di		Auto Tune
10 dE Log i	3/div	Ref 3	0.00 c	IBm					Ν	44.9	7.7 MHz 73 dBm	Auto Tune
												Center Freq
20.0												515.000000 MHz
10.0						-						Start Freq
0.00					L					0		30.000000 MHz
-10.0											-13.00 dBm	Stop Freq
-20.0					e.	<i>.</i>						1.000000000 GHz
-30.0										-		CF Step
												97.000000 MHz <u>Auto</u> Man
-40.0					SATE ON THE AND WHE	a. 11 ha - 14 at 1. 1	i contro a la	al Juis and	under our the	SAME AN BANKAN	ak milin kilan	
-50.0	h lithe and lithe lithe	no ⁿ llhor	Munu and an	<i>╣╻╕</i> ┙┓┫ _╋ ╡	ᡪ ᢔᢔᠳᡘᡗᡗᢂᠯᢦᢘᡘ᠓ᢔᡘᡃᠰᡗ	in this have	ana kaka ka ka ka ka	₩ ₩				Freq Offset 0 Hz
-60.0		_										
Star	t 30.0	MHz								Stop 1.0	0000 GHz	
#Res	s BW ′	.0 MH	z		#VBW	3.0 MHz	*			1.20 ms (1000 pts)	
MSG									STATU	s 🐼 Align N	ow, All requi	red

(Plot 4.5.2 B3: Channel 661: 1880.00MHz @ Traffic @ PCS1900)



(Plot 4.5.2 B4: Channel 661: 1880.00MHz @ Traffic @ PCS1900)

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		n Analyzer - Sw					1				
Cen	1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	RF 50 ຊ ອ ຊ 10.250 1	AC 000000	SHz		NSE:INT	Avg Type		TRAC	M Sep 06, 2015 E 1 2 3 4 5 6	Frequency
			Р	NO: Fast 🔸	Trig: Free #Atten: 40		Avg Hold:	100/100	TYI		
								Mki	1 12.69	7 9 GHz	Auto Tune
10 dE Log	3/div	Ref 30.00	dBm						-40.9	97 dBm	
20g											Center Freq
20.0				<u>u</u> .					2	<u>c</u>	10.250000000 GHz
10.0				7.							Start Freq
0.00			2	3					3	8	7.00000000 GHz
-10.0										-13.00 dBm	Stop Freq
-20.0										e	13.500000000 GHz
-20.0											
-30.0		_	2	7.						~	CF Step
									<u> </u> 1		650.000000 MHz <u>Auto</u> Man
-40.0	Li com pala	an district and	a a a dan karakara man	Lallan a Jandasa	القراط ويعدل والمراجع	الفالغ فلفوه الم	A stable and participation of the stable s	and the best of the	v datela patrella et la tra	dia dala solo di	
-50.0	aking bergen and a second s	The second states		andalahan dalahan Propinsi dalahan Propinsi dalahan	vin site in the second		A hite a file of the bandle of				Freq Offset
											0 Hz
-60.0											
	t 7.000			41) (D14)	2 0 MILL-	*		Current	Stop 13	.500 GHz	
#RC	S BW 1	.0 MHz		#VBW	3.0 MHz				10.9 ms (ow, All requi	rad
MaG								STATU		ow, All requi	leu

(Plot 4.5.2 B5: Channel 661: 1880.00MHz @ Traffic @ PCS1900)



(Plot 4.5.2 B6: Channel 661: 1880.00MHz @ Traffic @ PCS1900)

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Agilen		<mark>m Analyzer</mark> RF	- Swept SA 50 Ω <u>Λ</u> DC		CE.	NSE:INT		ALIGN OFF	01/04/00 0	M Sep 06, 2015	_	
		eq 79.5			- · · -		Avg Type	RMS	TRAC	E 1 2 3 4 5 6	F	requency
				PNO: Close ++- IFGain:Low	Trig: Free #Atten: 46		Avg Hold:	35/100	DE			- 21-12-14
10 dE	3/div	Ref 20.0	00 dBm					ľ	Mkr1 38 -67.6	.92 kHz 27 dBm		Auto Tune
Log												Center Freq
10.0								<u></u>				79.500 kHz
0.00												
-10.0		5-	5	e.								Start Freq 9.000 kHz
10.0												
-20.0												Stop Freq
-30.0		<u></u>	2									150.000 kHz
-40.0										-43.00 dBm		CF Step
										-43.00 ubii	<u>Auto</u>	14.100 kHz Man
-50.0												
-60.0			<u>1</u>									Freq Offset 0 Hz
-70.0	wind the	Mu Marka Ma	MA Allaha salati	un proposition	have h rule . Ru		ullin Nun	الدرا مراجع مراره	All mill and	M. A. MALaur	ŕ	UTI2
		ין עייף י	a mathly of	and to be also	en alma all'hana	a waada fi fiya	an why w	หนาหาเจะๆเ	I W HP WAY	ana Manadala		
	t 9.00 s BW 1	kHz I.0 kHz		#VBW	10 kHz*			Sweep		0.00 kHz 1000 pts)		
MSG										ow, All requi	red	

(Plot 4.5.2 C1: Channel 810: 1909.80MHz @ Traffic @ PCS1900)

enter F	RF 50 Ω reg 515.000		z		NSE:INT	Avg Type		TRAC	M Sep 06, 2015 CE <mark>1 2 3 4 5 6</mark>	Frequency
			PNO: Fast 🔸 Gain:Low	Trig: Free #Atten: 40		Avg Hold:		DI	D.5 MHz	Auto Tur
0 dB/div	Ref 30.00 d	IBm							48 dBm	
										Center Fre
20.0										515.000000 MH
10.0			-							Otant Fre
0.00	ý 80		e.	U.				0		Start Fre 30.000000 MH
10.0									-13.00 dBm	Stop Fre
20.0				8						1.000000000 GI
30.0										CF Ste
										97.000000 MI Auto M
10.0								↓ 1−		
50.0 milye	v\$/11/h_1_ml.rhiv.jszagil-ad	whithours	nerrandition	entligetstranty	www.waythu	whyphydanth	nginghalite	and the second	bertody Wygoland	Freq Offs
30.0										01
tart 30.0								Stop 1.0	0000 GHz	
Res BW	1.0 MHz		#VBW	3.0 MHz	*		Sweep	1.20 ms (1000 pts)	

(Plot 4.5.2 C2: Channel 810: 1909.80MHz @ Traffic @ PCS1900)

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Agilent Spect	rum Analyzer - Swept SA RF 50 Ω AC		I	NT REF		ALIGN OFF	09:01:34 P	M May 06, 2015	
Center F	req 515.000000	MHz PNO: Fast	Trig: Free	Run		: Pwr(RMS)	TRAC	E 123456 E M WWWWW	Frequency
		IFGain:Low	#Atten: 30	dB	2005	N			Auto Tune
10 dB/div Log	Ref Offset 7.15 dB Ref 27.15 dBm					IV	-53.4	6.7 MHz 14 dBm	
									Center Freq
17.2									515.000000 MHz
7.15									
-2.85									Start Freq 30.000000 MHz
1.00									
-12.9								-13.00 dBm	Stop Freq
-22.9									1.000000000 GHz
-32.9									CF Step
									97.000000 MHz Auto Man
-42.9							24		
-52.9	and a start of the	AND THE ADDRESS OF ADDRES		-April and the state			wanter of sur	and a star Barran a Star Star and a star	Freq Offset
-62.9									0 Hz
Start 30.0		<i>"</i> "					Stop 1.0	000 GHz	
#Res BW	1.0 MHZ	#VBW	3.0 MHz*			#Sweep	100 ms (1000 pts)	

(Plot 4.5.2 C3: Channel 810: 1909.80MHz @ Traffic @ PCS1900)

-	it Spectrum Analyzer - Swept SA							
Cen	L RF 50 Ω AC Iter Freq 4.000000000) GHz	SENSE;INT	Avg Type	ALIGN OFF	TRACE	1 Sep 06, 2015	Frequency
		PNO: East +++ II	ig: Free Run tten: 40 dB	Avg Hold:	100/100	TYPI DE		
		in Gam.Low			M	kr2 3.624	9 GHz	Auto Tune
10 di	B/div Ref 30.00 dBm					-40.12	27 dBm	
Log								Center Freq
20.0	Ŷ	<u>e</u>						4.000000000 GHz
10.0						-		Start Freq
0.00						5	g.	1.000000000 GHz
0.00								
-10.0							-13.00 dBm	Stop Freq
								7.000000000 GHz
-20.0								
-30.0								CF Step
			2					600.000000 MHz
-40.0								<u>Auto</u> Man
	international second			and the property of the proper				Erog Offect
-50.0								Freq Offset 0 Hz
-60.0								
Star	t 1.000 GHz					Stop 7.	000 GHz	
	s BW 1.0 MHz	#VBW 3.0	MHz*		Sweep	10.3 ms (6	6200 pts)	
MSG					STATU	s 🐼 Align No	w, All requir	red

(Plot 4.5.2 C4: Channel 810: 1909.80MHz @ Traffic @ PCS1900)

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Agilen LXI RI		m Analyzer - So	wept SA Ω AC		05	NSE:INT		ALIGN OFF	01-05-07.0	M Sep 06, 2015	
		eq 10.250	000000	SHz			Avg Type Avg Hold:	RMS	TRAC	E 1 2 3 4 5 6 E MWWWW	Frequency
				NO: Fast 🔸 Gain:Low	#Atten: 40		Avginoid.	100/100	DE		
10 dE	3/div	Ref 30.00	dBm					Mkr	1 13.324	4 1 GHz 40 dBm	Auto Tune
Log											Center Freq
20.0			9.	14					0		10.250000000 GHz
10.0											
10.0											Start Freq
0.00			9.	<u>u</u>					<u>.</u>		7.000000000 GHz
-10.0			-	-					-		
										-13.00 dBm	Stop Freq 13.50000000 GHz
-20.0				<u>9</u>							
-30.0											CF Step
										1	650.000000 MHz <u>Auto</u> Man
-40.0	u hilingin di		لل مارير النافان مغر معام	أواع المالية إلا ورابات الم	and here a bit	da ole bu gladista da	la de la denir de		والمحو بالابتدائد واري		
-50.0				the section is a first in	Alexandra Marina Malandaria		e e p in ope				Freq Offset
-60.0											0 Hz
-00.0											
Star	t 7.000	GHz							Stop 13	.500 GHz	
	s BW 1	.0 MHz		#VBW	/ 3.0 MHz	*			10.9 ms (6800 pts)	
MSG								STATU	S 🐼 Align N	ow, All requi	red

(Plot 4.5.2 C5: Channel 810: 1909.80MHz @ Traffic @ PCS1900)



(Plot 4.5.2 C6: Channel 810: 1909.80MHz @ Traffic @ PCS1900)

4.6. Frequency Stability Test

TEST APPLICABLE

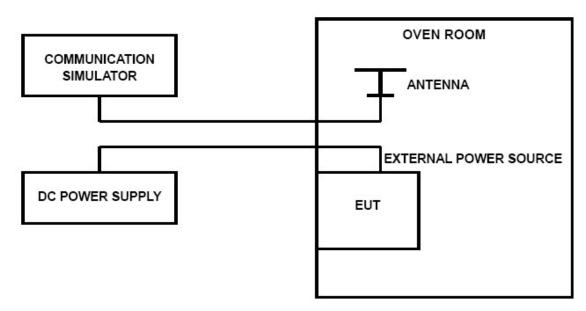
- 1. According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade.
- 2. According to FCC Part 2 Section 2.1055 (E) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
- 3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried voltage equipment and the end voltage point was 3.40V.

TEST PROCEDURE

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

- 1. Measure the carrier frequency at room temperature;
- 2. Subject the EUT to overnight soak at -30℃;
- 3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel of PCS 1900 and GSM850, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
- 4. Repeat the above measurements at 10 °C increments from -30 °C to +50 °C. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
- Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 0.5 hours unpowered, to allow any self-heating to stabilize, before continuing;
- 6. Subject the EUT to overnight soak at $+50^{\circ}$ C;
- 7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
- Repeat the above measurements at 10[°]C increments from +50[°]C to -30[°]C. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
- 9. At all temperature levels hold the temperature to +/- 0.5 °C during the measurement procedure;

TEST CONFIGURATION



TEST LIMITS

For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized

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frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.40VDC and 4.20VDC, with a nominal voltage of 3.70DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

TEST RESULTS

	GSM/TM1/GSM850						
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict		
3.40	25	-3.93	0.00	2.50	PASS		
3.70	25	-5.49	-0.01	2.50	PASS		
4.20	25	-4.44	-0.01	2.50	PASS		
3.70	-30	5.94	0.01	2.50	PASS		
3.70	-20	3.49	0.00	2.50	PASS		
3.70	-10	4.65	0.01	2.50	PASS		
3.70	0	4.52	0.01	2.50	PASS		
3.70	10	5.04	0.01	2.50	PASS		
3.70	20	3.16	0.00	2.50	PASS		
3.70	30	4.13	0.00	2.50	PASS		
3.70	40	4.33	0.01	2.50	PASS		
3.70	50	5.62	0.01	2.50	PASS		

GSM/TM3/GSM850						
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict	
3.40	25	-3.93	0.00	2.50	PASS	
3.70	25	-5.49	-0.01	2.50	PASS	
4.20	25	-4.44	-0.01	2.50	PASS	
3.70	-30	3.07	0.00	2.50	PASS	
3.70	-20	5.17	0.01	2.50	PASS	
3.70	-10	5.20	0.01	2.50	PASS	
3.70	0	3.07	0.00	2.50	PASS	
3.70	10	4.07	0.00	2.50	PASS	
3.70	20	5.59	0.01	2.50	PASS	
3.70	30	4.52	0.01	2.50	PASS	
3.70	40	7.30	0.01	2.50	PASS	
3.70	50	5.33	0.01	2.50	PASS	

GSM/TM1/PCS1900						
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict	
3.40	20	-20.15	-0.01	2.50	PASS	
3.70	20	-7.94	0.00	2.50	PASS	
4.20	20	-18.73	-0.01	2.50	PASS	
3.70	-30	0.26	0.00	2.50	PASS	
3.70	-20	-4.58	0.00	2.50	PASS	
3.70	-10	-0.26	0.00	2.50	PASS	
3.70	0	-4.00	0.00	2.50	PASS	
3.70	10	-5.81	0.00	2.50	PASS	
3.70	20	-2.45	0.00	2.50	PASS	
3.70	30	-2.84	0.00	2.50	PASS	
3.70	40	-1.16	0.00	2.50	PASS	
3.70	50	-3.87	0.00	2.50	PASS	

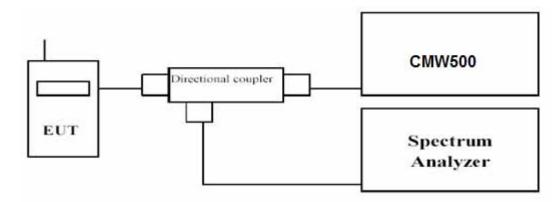
	GSM/TM3/PCS1900						
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict		
3.40	20	-20.15	-0.01	2.50	PASS		
3.70	20	-7.94	0.00	2.50	PASS		
4.20	20	-18.73	-0.01	2.50	PASS		
3.70	-30	9.40	0.01	2.50	PASS		
3.70	-20	8.72	0.00	2.50	PASS		
3.70	-10	13.53	0.01	2.50	PASS		
3.70	0	13.24	0.01	2.50	PASS		
3.70	10	8.85	0.00	2.50	PASS		
3.70	20	13.82	0.01	2.50	PASS		
3.70	30	13.14	0.01	2.50	PASS		
3.70	40	11.43	0.01	2.50	PASS		
3.70	50	10.43	0.01	2.50	PASS		

4.7. Peak-to-Average Ratio (PAR)

<u>LIMIT</u>

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

TEST CONFIGURATION



TEST PROCEDURE

Use spectrum to measure the total peak power and record as P_{Pk} . Use spectrum to measure the total average power and record as P_{Avg} . Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm).

Determine the PAPR from:

 $\mathsf{PAPR}\ (\mathsf{dB}) = \mathsf{P}_{\mathsf{Pk}}\ (\mathsf{dBm}) - \mathsf{P}_{\mathsf{Avg}}\ (\mathsf{dBm}).$

TEST RESULTS

G	SM/TM1/ PCS1900	GSM/TM3/ EDGE1900
Frequency	Measured	Measured
(MHz)	(dB)	(dbm)
1850.20	0.48	0.56
1880.00	0.47	0.47
1909.80	0.39	0.41

5. Test Setup Photos of the EUT

Please refer to separated files for Test Setup Photos of the EUT.

6. External Photos of the EUT

Please refer to separated files for External Photos of the EUT.

7. Internal Photos of the EUT

Please refer to separated files for Internal Photos of the EUT.

.....End of Report.....