



FCC

RF Test Report

Product Name: WCDMA Mobile Phone

Model Number: SKY 5.0Q

Report No: 1407FR31

FCCID: 2ABOSGC140603

A Test Lab Techno Corp.

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Notice

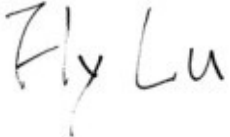
1. The laboratory has Passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 3464.01.
2. The laboratory has been accredited by the US Federal Communications Commission.
3. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test sites are 7381A.
4. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
5. The test report is invalid if there is any evidence of erasure and/or falsification.
6. The test report is only valid for the test samples.
7. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.



Applicant: Sky Phone LLC
Address: 1348 Washington Av., Miami Beach

Date of Receipt Sample: 2014-06-20
StartDate of Test: 2014-06-23
End Date of Test: 2014-07-23
Issue Date: 2014-08-01

Test Result: Pass

Approved By : 
(Manager) _____ (Murphy Wang)
Reviewed By : 
(Testing Engineer) _____ (FlyLv)



Revision History

Rev.	Issue Date	Revisions	Revised By
00	31 July, 2014	Initial Issue	
01	14 Aug, 2014	Test report number corrected	



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1 General Information

1.1 Applied Standard

AppliedRules: 47CFRFCC
Part02:201347CFRFCC
Part22:2013
47CFRFCC Part24:2013
47CFRFCC Part27:2013

Test Method: FCCKDB971168D01 Power MeasLicense Digital Systems

1.2 Test Location

TestLocation1: A Test Lab Techno Corp.
Address: No. 140-1, Changan Street, Bade City, Taoyuan County 334, Taiwan
R.O.C.

1.3 Test Environment Condition

Ambient Temperature: 19.5to25°C
Ambient Relative Humidity: 40to55%
Atmospheric Pressure: Not applicable



2 Test Summary

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

Test Item	FCC Rule No.	Requirements	Test Result	Verdict
Effective(Isotropic) Radiated Power Output Data	§2.1046, §22.913	FCC: ERP $\leq$ 7W.	Appendix A	Pass
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Appendix D	Pass
Band Edges Compliance	§2.1051, §22.917	$\leq$ - 13dBm/1%*EBW,in1MHzbandsimmetri- callyoutsideandadjacentto	Appendix E	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917	FCC: $\leq$ -13dBm/100kHz, from 9kHz to 10 th harmonics but outside authorized operating frequency ranges.	Appendix F	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	FCC: $\leq$ -13dBm/100kHz.	Appendix G	Pass
Frequency Stability	§2.1055, §22.355	$\leq \pm 2.5$ ppm.	Appendix H	Pass
NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".				



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

Test Item	FCC Rule No.	Requirements	Test Result	Verdict (NOTE 1)
Effective (Isotropic) Radiated Power Output Data	§2.1046, §24.232	EIRP $\leq$ 2W	Appendix A	Pass
Peak-Average Ratio	§2.1046, §24.232	FCC: Limit $\leq$ 13dB	Appendix B	Pass
Modulation Characteristics	§2.1047	Digital modulation	Appendix C	Pass
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Appendix D	Pass
Band Edges Compliance	§2.1051, §24.238	$\leq$ -13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to	Appendix E	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238	$\leq$ -13dBm/1MHz, from 9kHz to 10 th harmonics but outside authorized Operating frequency ranges.	Appendix F	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238	$\leq$ -13dBm/1MHz.	Appendix G	Pass
Frequency Stability	§2.1055, §24.235	FCC: within authorized frequency block.	Appendix H	Pass
NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".				



2.3 AWS Band (1710-1755MHz paired with 2110-2155MHz)

Test Item	FCC RuleNo.	Requirements	Test Result	Verdict
Effective(Isotropic)RadiatedPowerOutputData	§2.1046, §27.50(d)	EIRP $\leq$ 1W;	Appendix A	Pass
Peak-AverageRatio	§2.1046, §27.50(d)	Limit $\leq$ 13dB	Appendix B	Pass
ModulationCharacteristics	§2.1047	Digitalmodulation	Appendix C	Pass
Bandwidth	§2.1049	OBW: Nolimit. EBW: Nolimit.	Appendix D	Pass
BandEdgesCompliance	§2.1051, §27.53(h)	$\leq$ -13dBm/1%*EBW,in 1 MHzbandsimmediately outsideandadjacent to	Appendix E	Pass
SpuriousEmissionatAntennaTerminals	§2.1051, §27.53(h)	$\leq$ -13dBm/1MHz, from9kHzto10 th harmonicsbutoutside authorized	Appendix F	Pass
Frequency Stability	§2.1055, §27.54	Withinauthorizedbands of operation/frequency block.	Appendix G	Pass
Radiatedspurious emission	§2.1053, §27.53(h)	$\leq$ -13dBm/1MHz.	Appendix H	Pass



3 Description of the Equipment under Test (EUT)

3.1 General Description

SKY 4.5 is subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band II, Band IV, and Band V. The GSM/GPRS/EDGE (EDGE downlink only) frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band IV and Band II and Band V and GSM850 and PCS1900 band test data is included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS and WIFI etc. Externally it provides microSD 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.

3.2 EUT Identity

IMEI No.	
SIM 1	868817019960176
SIM 2	868817019960034

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



3.3 Technical Specification

Characteristics	Description	
Radio System Type	☒ GSM ☒ UMTS	
Supported Frequency Range	GSM850/WCDMA850	Transmission(TX): 824 to 849MHz
		Receiving(RX): 869 to 894MHz
	GSM1900/WCDMA1900	Transmission(TX): 1850 to 1910MHz
		Receiving(RX): 193 to 1990MHz
	WCDMA1700	Transmission(TX): 1710to1755MHz
		Receiving(RX): 2110to2155MHz
TX and RX Antenna Ports	TX& RX port:	1
	TX-only port:	0
	RX-only port:	1
Supported Channel Bandwidth	GSM system:	200 kHz
	UMTS system:	5 MHz
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	GSM850:	247KGXW
	GSM1900:	248KGXW
	UMTS 850:	4M17F9W
	UMTS 1900:	4M18F9W
	UMTS1700:	4M19F9W



4 General Test Conditions/Configurations

4.2 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/GPRS,GMSK modulation
UMTS/TM1	WCDMA system, QPSK modulation
UMTS/TM2	HSDPA system, QPSK modulation
UMTS/TM3	HSUPA system, QPSK modulation

Note: This EUT owns two SIM cards, after we perform the pretest for these two SIM cards, we found the SIM 1 is the worst case, so its result is recorded in this report.

4.3 TestEnvironment

EnvironmentParameter	SelectedValuesDuringTests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	3.5V
	VN	3.7V
	VH	4.2V

NOTE: VL=lower extreme
testvoltageVN=nominalvoltage
VH=upperextreme
testvoltageTN=normaltemperature



4.4 Test Frequency

TestMode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
GSM850	TX	Channel128	Channel190	Channel251
		824.2MHz	836.6MHz	848.8MHz
	RX	Channel128	Channel190	Channel251
		869.2MHz	881.6MHz	893.8MHz
TestMode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
GSM1900	TX	Channel512	Channel661	Channel810
		1850.2MHz	1880.0MHz	1909.8MHz
	RX	Channel512	Channel661	Channel810
		1930.2 MHz	1960.0 MHz	1989.8 MHz
TestMode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA850	TX	Channel4132	Channel4182	Channel4233
		826.4MHz	836.4MHz	846.6MHz
	RX	Channel4357	Channel4407	Channel4458
		871.4MHz	881.4MHz	891.6MHz
TestMode	TX/RX			



TestMode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA1700	TX	Channel1312	Channel1413	Channel1513
		1712.4MHz	1732.6MHz	1752.6MHz
	RX	Channel1537	Channel1638	Channel1738
		2112.4MHz	2132.6MHz	2152.6MHz



4.5 DESCRIPTION OF TESTS

4.5.1 Radiated Power and Radiated Spurious Emissions

Radiated spurious emissions are investigated indoors in a semi-anechoic chamber to determine the frequencies producing the worst case emissions. Final measurements for radiated power and radiated spurious emissions are performed on the 3meter OATS per the guidelines of ANSI/TIA-603-C-2004. The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3meters from the receive antenna. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Emissions are also investigated with the receive antenna horizontally and vertically polarized.

A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized. Measure the EUT maximum RF power and record the result.

A half-wavedipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d[\text{dBm}] = P_g[\text{dBm}] - \text{cable loss}[\text{dB}] + \text{antenna gain}[\text{dBd/dBi}]$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-

wavedipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g[\text{dBm}] - \text{cable loss}[\text{dB}]$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -

13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power}[\text{Watts}])$.

Note: Reference test setup 3



4.5.2 Occupied Bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The span of the analyzers shall be set to capture all products of the modulation process, including the emissions skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or peak hold, may produce a wider bandwidth than actual. The traced data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

Note: Reference test setup 1.

4.5.3 Spurious and Harmonic Emissions at Antenna Terminal

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Note: Reference test setup 1.

4.5.4 Peak-Average Ratio

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

Note: Reference test setup 1.



4.5.5 Frequency Stability/Temperature Variation

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-C-2004. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from-

30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from

85% to 115% of the nominal value for non-hand-carried battery and AC powered equipment. For hand-carried, battery-

powered equipment, primary supply voltage is reduced to the battery operating endpoint which shall be specified by the manufacturer.

Specification—

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitters shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

Time Period and Procedure:

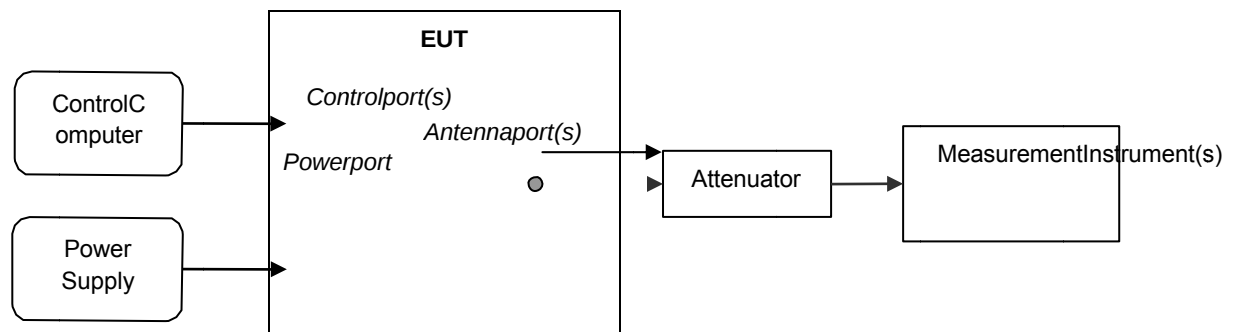
1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one-half-hour is provided to allow stabilization of the equipment at each temperature level.

Note: Reference test setup 2.

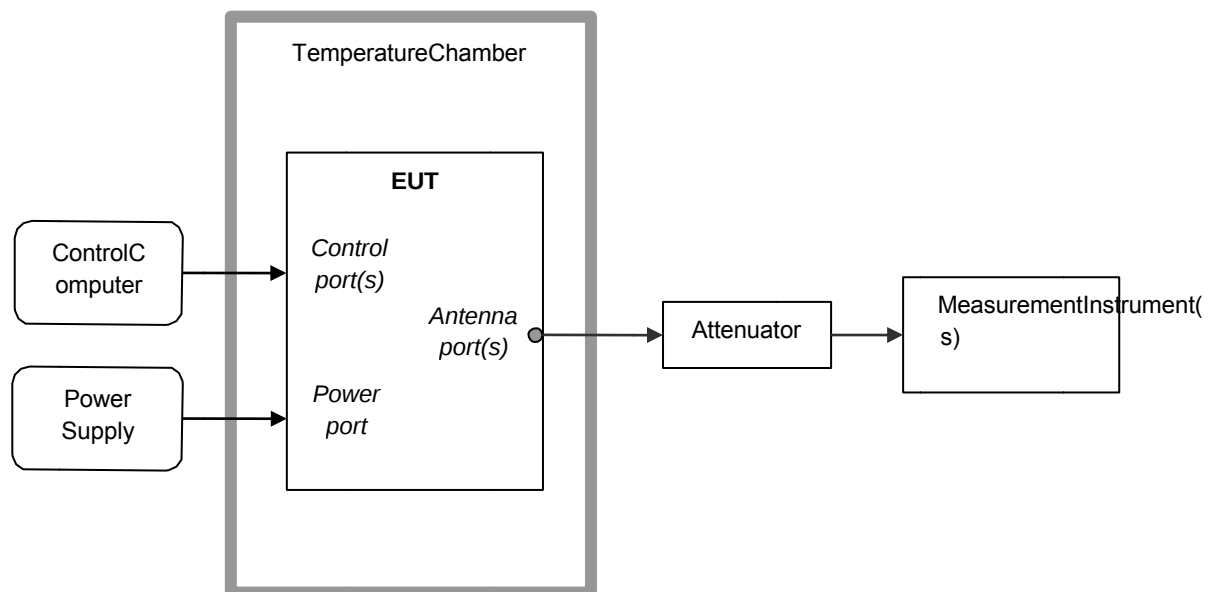


4.5 Test Setups

4.5.1 Test Setup 1



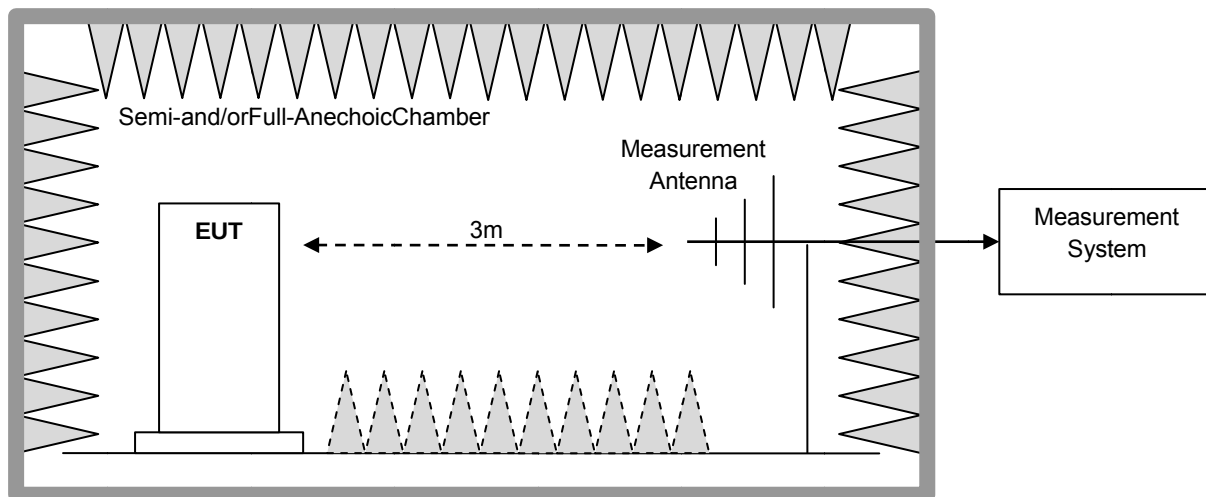
4.5.2 Test Setup 2



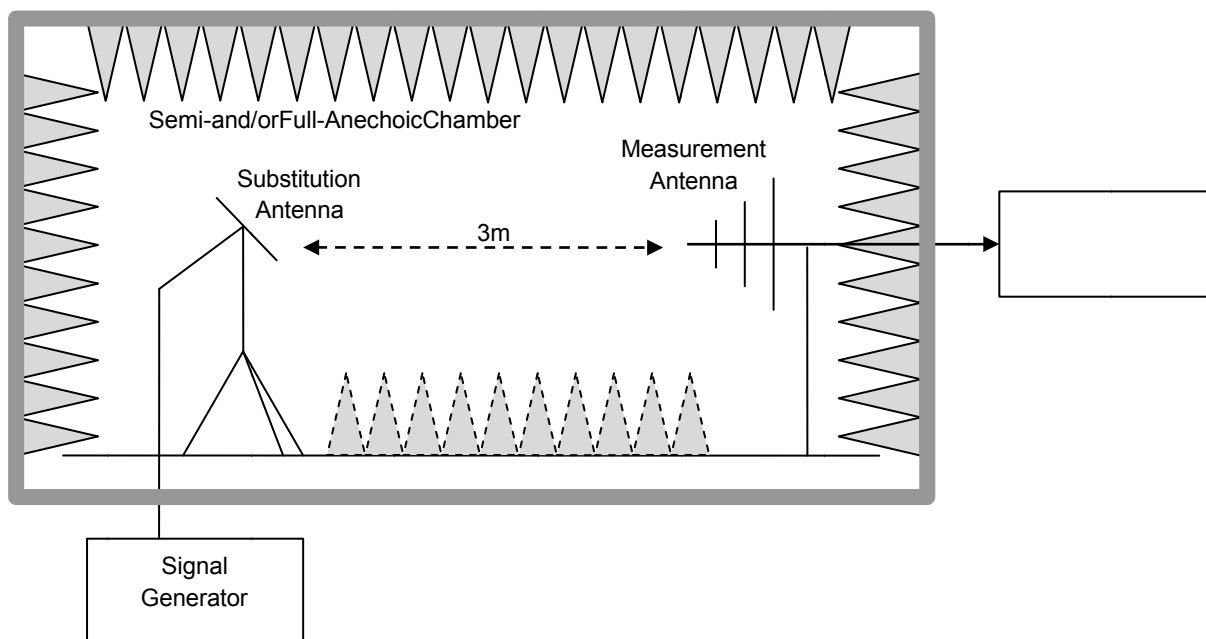
4.5.3 TestSetup 3

NOTE: Effectiveradiatedpower(ERP) referstotheradiationpower outputof theEUT,assumingallemissions areradiatedfrom half-wavedipoleantennas.

4.5.3.1 Step 1: Pre-test



4.5.3.2 Step 2: Substitution method to verify the maximum ERP





4.6 TestConditions

Test Case		TestConditions		
Transmit OutputPowerData	AveragePower, Total	Test Env.	Ambient Climate & Rated Voltage	
		Test Setup	Test Seup1	
		RFChannels (TX)	L, M, H (L= lowchannel,M=middlechannel,H=highchannel)	
		TestMode	GSM/TM1,UMTS/TM1	
	AveragePower, SpectralDensity(if required)	Test Env.	AmbientClimate&RatedVoltage	
		Test Setup	TestSeup1	
		RFChannels (TX)	L, M, H (L= lowchannel,M=middlechannel,H=highchannel)	
		TestMode	GSM/TM1,UMTS/TM1	
Peak-to- AverageRatio(if required)		Test Env.	AmbientClimate&RatedVoltage	
		Test Setup	TestSeup1	
		RFChannels (TX)	L, M, H (L= lowchannel,M=middlechannel,H=highchannel)	
		TestMode	GSM/TM1,UMTS/TM1	
ModulationCharacteristics		TestEnv.	AmbientClimate&RatedVoltage	
		Test Setup	TestSeup1	
		RFChannels (TX)	M (L= lowchannel,M=middlechannel,H=highchannel)	
		TestMode	GSM/TM1,UMTS/TM1	
Bandwidth	Occupied Bandwidth	Test Env.	AmbientClimate&RatedVoltage	
		Test Setup	TestSeup1	
		RFChannels (TX)	L, M, H (L= lowchannel,M=middlechannel,H=highchannel)	
		TestMode	GSM/TM1,UMTS/TM1	



Test Case	TestConditions	
	TestMode	GSM/TM1,UMTS/TM1
FieldStrengthofSpuriousRadiation	TestEnv.	AmbientClimate&RatedVoltage
	Test Setup	TestSeup3
	TestMode	GSM/TM1,UMTS/TM1/TM2/TM3
	RFChannels (TX)	L, M, H (L= lowchannel,M=middlechannel,H=highchannel)
Frequency Stability	TestEnv.	(1) -30°C to+50°C withstep10°C atRatedVoltage; (2) VL, VN andVH ofRatedVoltageat AmbientClimate.
	Test Setup	TestSeup2
	RFChannels (TX)	L, M, H (L= lowchannel,M=middlechannel,H=highchannel)
	TestMode	GSM/TM1,UMTS/TM1



5 Main Test Instruments

EquipmentName	Manufacturer	Model	SerialNumber	CalDate	Cal Period
Universal Radio Communication Tester	R & S	CMU200	109369	08/07/2013	1 year
Wideband Radio Communication Test	R & S	CMW500	103168	11/05/2013	1 year
Single Channel PK Power Sensor	Agilent	N1911A	MY45101619	12/21/2013	1 year
Wideband Power Meter	Agilent	N1921A	MY45241957	12/21/2013	1 year
MXA Signal Analyzer	Agilent	N9020A	MY53420615	05/12/2014	1 year
RF Pre-selector	Agilent	N9039A	MY46520256	01/10/2014	1 year
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/10/2014	1 year
Pre Amplifier	Agilent	8449B	3008A02237	02/21/2014	1 year
Pre Amplifier	Agilent	8447D	2944A10961	02/21/2014	1 year
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	07/16/2014	1 year
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/10/2014	1 year
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	06/13/2014	1 year
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/16/2014	1 year
Amplifier	Mini-Circuits	ZKL-1R5+	N/A	05/29/2014	1 year
Amplifier	Mini-Circuits	ZVA-213-S+	N/A	05/29/2014	1 year
RF Pre-selector	Agilent	N9039A	MY465		



Measurement Uncertainty

For a 95% confidence level ($k = 2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
Transmit Output Power Data	Power [dBm]	U = 1.2dB
Bandwidth	Magnitude[%]	U = 0.2%
Band Edge Compliance	Disturbance Power [dBm]	U = 1.2dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	U = 1.2dB
Field Strength of Spurious Radiation	ERP [dBm]	For 3m Chamber: U = 4.6dB (30MHz to 1GHz) U = 3.0dB (above 1GHz) For 10m Chamber: U = 4.6dB (30MHz to 1GHz)
Frequency Stability	Frequency Accuracy [ppm]	U = 0.21ppm

END