

TESTING CERT #2174.01

FCC RF Test Report

Product Name: LTE USB Stick

Product Model: K5150

Report Number: SYBH(Z-RF)019012013

FCC ID: QISK5150

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C

Tel: +86 755 28780808

Fax: +86 755 89652518

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3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 97456.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-2.
5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers of test site No.1 are R-2364, G-415, C-2583, and T-256, and the accreditation numbers of test site No.2 are R-3760, G-485, C-4210 and T-1237.
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Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt Sample: 2013-02-17
Start Date of Test: 2013-02-18
End Date of Test: 2013-03-01

Test Result: Pass

Approved by Senior	2013-03-04	Dai Linjun	
Engineer:	Date	Name	Signature

Prepared by:	2013-03-04	Feng Nianwei	
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1		First report.

CONTENT

1	General Information	6
1.1	Applied Standard	6
1.2	Test Location	6
1.3	Test Environment Condition	6
2	Test Summary	7
2.1	Cellular Band (824-849 MHz paired with 869-894 MHz)	7
2.2	PCS Band (1850-1915 MHz paired with 1930-1995 MHz)	8
2.3	BRS&EBS Band (2496-2690 MHz)	9
3	Description of the Equipment under Test (EUT)	11
3.1	General Description	11
3.2	EUT Identity	11
3.3	Technical Specification	12
4	General Test Conditions / Configurations	13
4.1	Test Modes	13
4.2	Test Environment	13
4.3	Test Frequency	14
4.4	DESCRIPTION OF TESTS	16
4.5	Test Setups	19
4.6	Test Conditions	21
5	Main Test Instruments	23
6	Measurement Uncertainty	24

1 General Information

1.1 Applied Standard

Applied Rules:

- 47 CFR FCC Part 02:2012
- 47 CFR FCC Part 22: 2012
- 47 CFR FCC Part 24: 2012
- 47 CFR FCC Part 27: 2012

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v02
FCC KDB 662911 D01 Multiple Transmitter Output v01r02

1.2 Test Location

Test Location 1: Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Test Environment Condition

Ambient Temperature:	19.5 to 25 °C
Ambient Relative Humidity:	40 to 55 %
Atmospheric Pressure:	Not applicable

2 Test Summary

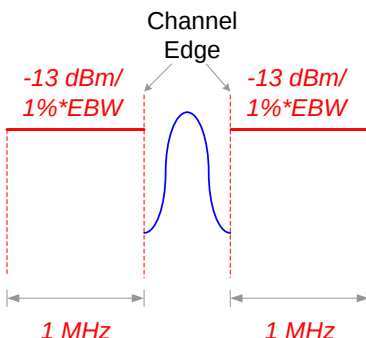
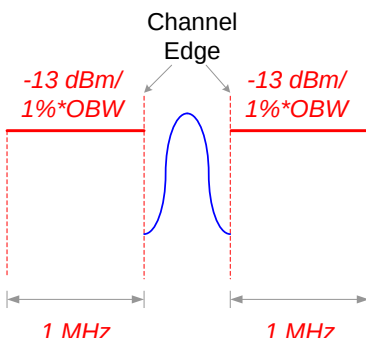
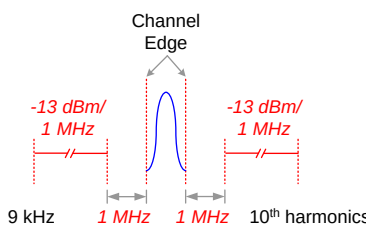
2.1 Cellular Band (824-849 MHz paired with 869-894 MHz)

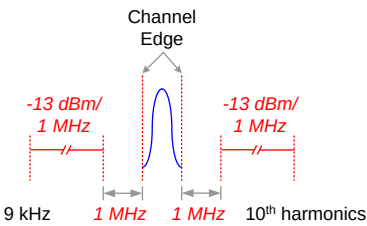
Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
RF Power Output	§2.1046, §22.913	RSS-Gen, §4.8; RSS-132, §4.4	FCC: ERP $\leq$ 7 W. IC: EIRP $\leq$ 11.5 W.	Appendix A	Pass
Modulation Characteristics	§2.1047	RSS-132, §4.2	Digital modulation	Appendix C	Pass
Bandwidth	§2.1049, §22.917	RSS-Gen, §4.6	OBW: No limit. EBW: No limit.	Appendix D	Pass
Band Edges Compliance	§2.1051, §22.917	RSS-Gen, §4.9; RSS-132, §4.5	$\leq$ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix E	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917	RSS-Gen, §4.9; RSS-132, §4.5	FCC: $\leq$ -13 dBm/100 kHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges. IC: $\leq$ -13 dBm/100 kHz (for EBW $\leq$ 4 MHz) or $\leq$ -13 dBm/1 MHz (for EBW > 4 MHz), from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Appendix F	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	RSS-Gen, §4.9; RSS-132, §4.5	FCC: $\leq$ -13 dBm/100 kHz. IC: $\leq$ -13 dBm/100 kHz (for EBW $\leq$ 4 MHz) or $\leq$ -13 dBm/1 MHz (for EBW > 4 MHz).	Appendix G	Pass
Frequency Stability	§2.1055, §22.355	RSS-Gen, §4.7; RSS-132, §4.3	$\leq \pm 2.5$ ppm.	Appendix H	Pass
Receiver Spurious Emissions (NOTE 1)	---	RSS-Gen, §4.10; RSS-Gen, §6; RSS-132, §4.6	Radiated limit: RSS-Gen, §6.1 field strength limit. Conducted limit: $\leq$ -57 dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and $\leq$ -53 dBm/1 MHz (AV), from 1 GHz to 3 rd harmonics.	---	N/T
Photos of Test Setups	---	---	---	Appendix J	---
NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna. NOTE 2: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".					

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

Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
RF Power Output	§2.1046, §24.232	RSS-Gen, §4.8; RSS-133, §6.4	EIRP ≤ 2 W; PAR ≤ 13 dB.	Appendix A	Pass
Peak-Average Ratio	§2.1046, §24.232	RSS-Gen, §4.8; RSS-133, §6.4	FCC: Limit ≤ 13 dB	Appendix B	Pass
Modulation Characteristics	§2.1047	RSS-133, §6.2	Digital modulation	Appendix C	Pass
Bandwidth	§2.1049, §22.917	RSS-Gen, §4.6	OBW: No limit. EBW: No limit.	Appendix D	Pass
Band Edges Compliance	§2.1051, §24.238	RSS-Gen, §4.9; RSS-133, §6.5	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix E	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238	RSS-Gen, §4.9; RSS-133, §6.5	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Appendix F	Pass
Field Strength of Spurious Radiation	§2.1053, §24.238	RSS-Gen, §4.9; RSS-133, §6.5	≤ -13 dBm/1 MHz.	Appendix G	Pass
Frequency Stability	§2.1055, §24.235	RSS-Gen, §4.7; RSS-133, §6.3	FCC: within authorized frequency block. IC: $\leq \pm 2.5$ ppm.	Appendix H	Pass
Receiver Spurious Emissions (NOTE 1)	---	RSS-Gen, §4.10; RSS-Gen, §6; RSS-133, §6.6	Radiated limit: RSS-Gen, §6.1 field strength limit. Conducted limit: ≤ -57 dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and ≤ -53 dBm/1 MHz (AV), from 1 GHz to 3 rd harmonics.	---	N/T
Photos of Test Setups	---	---	---	Appendix J	---
NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna. NOTE 2: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".					

2.3 BRS&EBS Band (2496-2690 MHz)

Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
RF Power Output	§2.1046, §27.50(h)	RSS-Gen, §4.8; RSS-199, §4.4	FCC: EIRP $\leq 33 \text{ dBW} + 10 \lg(X/Y)$ dBW + 10 lg(360/beamwidth) dBW. IC: EIRP $\leq 33.3 \text{ W/100 kHz}$.	Appendix A	Pass
Peak-Average Ratio	§2.1046, §27.50(h)	RSS-Gen, §4.8; RSS-199, §4.4	FCC: Limit $\leq 13 \text{ dB}$	Appendix B	Pass
Modulation Characteristics	§2.1047	RSS-199, §4.2	Digital modulation	Appendix C	Pass
Bandwidth	§2.1049, §22.917	RSS-Gen, §4.6	OBW: No limit. EBW: No limit.	Appendix D	Pass
Band Edges Compliance	§2.1051, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.5; RSS-199, §4.2	FCC:  IC: 	Appendix E	Pass
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.5; RSS-199, §4.2		Appendix F	Pass

Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
Field Strength of Spurious Radiation	§2.1053, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.5	 Channel Edge -13 dBm/1 MHz 9 kHz 1 MHz 1 MHz 10th harmonics	Appendix G	Pass
Frequency Stability	§2.1055, §27.54	RSS-Gen, §4.7; RSS-199, §4.3	Within authorized bands of operation/frequency block.	Appendix H	Pass
Receiver Spurious Emissions (NOTE 1)	---	RSS-Gen, §4.10; RSS-Gen, §6; RSS-199, §4.6	Radiated limit: RSS-Gen, §6.1 field strength limit. Conducted limit: ≤ -57 dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and ≤ -53 dBm/1 MHz (AV), from 1 GHz to 3 rd harmonics.	---	N/T
Photos of Test Setups	---	---	---	Appendix J	---
NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna. NOTE 2: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.					

3 Description of the Equipment under Test (EUT)

3.1 General Description

K5150 LTE USB Stick is subscriber equipment in the LTE/ DC-HSPA+/ HSUPA/ HSDPA/ WCDMA/ EDGE/ GPRS/ GSM system. LTE supports Band I, III, VII, VIII, XX, but only Band VII test date included in this report, DC-HSPA+/HSUPA/HSDPA/WCDMA supports Band I, II, V, VIII, but only Band II and V test date included in this report, EDGE/GPRS/GSM Supports GSM 850, 900, 1800, 1900, but only GSM 850 and 1900 test date included in this report. K5150 implement such functions as RF signal receiving/transmitting, LTE/DC-HSPA+/WCDMA and EDGE/GPRS/GSM protocol processing, data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and Micro SD card interface. K5150 has an internal antenna as default.

3.2 EUT Identity

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.

3.2.1 Board

Board		
Serial Number	Hardware Version	Description
860112020000982	CH1K5150M	Main Board

3.3 Technical Specification

Characteristics	Description	
Radio System Type	☒ GSM ☒ UMTS ☒ LTE	
Supported Frequency Range	GSM850/ WCDMA850	Transmission (TX): 824 to 849 MHz
		Receiving (RX): 869 to 894 MHz
	GSM1900/ WCDMA1900	Transmission (TX): 1850 to 1910 MHz
		Receiving (RX): 1930 to 1990 MHz
	LTE BAND7	Transmission (TX): 2500 to 2570 MHz
		Receiving (RX): 2620 to 2690 MHz
TX and RX Antenna Ports	TX & RX port:	1
	TX-only port:	0
	RX-only port:	1
TX Output Power	GSM850: 32.7dBm GSM1900 29.7dBm UMTS850 26.2dBm UMTS1900: 25.2dBm LTE system: 22.7dBm	
Supported Channel Bandwidth	GSM system:	☒ 200 kHz
	UMTS system:	☒ 5 MHz
	LTE band 7	☒ 5 MHz, ☒ 10 MHz, ☒ 15 MHz, ☒ 20 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:	250KGXW, 254KG7W
	GSM1900:	246KGXW, 249KG7W
	UMTS850:	4M16F9W
	UMTS1900:	4M15F9W
	LTE BAND7:	4M50G7D (5 MHz QPSK modulation), 4M50W7D (5 MHz 16QAM modulation) 8M98G7D (10 MHz QPSK modulation), 8M98W7D (10 MHz 16QAM modulation) 13M49G7D (15 MHz QPSK modulation), 13M49W7D (15 MHz 16QAM modulation) 17M96G7D (20 MHz QPSK modulation), 17M97W7D (20 MHz 16QAM modulation)

4 General Test Conditions / Configurations

4.1 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/GPRS, GMSK modulation
GSM/TM2	GSM system, EDGE, 8PSK modulation
UMTS/TM1	WCDMA system, QPSK modulation
UMTS/TM2	HSDPA system, QPSK modulation
UMTS/TM3	HSUPA system, QPSK modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation

NOTE: HSPA+ implementation of this device, 16QAM is not used for uplink. The uplink Category and release number is same as HSUPA, RF test is not required.

DC-HSDPA implementation of this device, the uplink parameters are the same as HSDPA. No additional channels and modulations (16QAM and 64QAM) are supported in uplink. The difference is only down link parameters. HSDPA setting were used on uplink.

4.2 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	4.75V
	VN	5V
	VH	5.25V

NOTE: VL= lower extreme test voltage

VN= nominal voltage

VH= upper extreme test voltage

TN= normal temperature

4.3 Test Frequency

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM850	TX	Channel 128	Channel 190	Channel 251
		824.2MHz	836.6MHz	848.8MHz
	RX	Channel 128	Channel 190	Channel 251
		869.2MHz	881.6MHz	893.8MHz
WCDMA850	TX	Channel 4132	Channel 4182	Channel 4233
		826.4MHz	836.4MHz	846.6MHz
	RX	Channel 4357	Channel 4407	Channel 4458
		871.4MHz	881.4MHz	891.6MHz
Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
GSM1900	TX	Channel 512	Channel 661	Channel 810
		1850.2MHz	1880.0MHz	1909.8MHz
	RX	Channel 512	Channel 661	Channel 810
		1930.2 MHz	1960.0 MHz	1989.8 MHz
WCDMA1900	TX	Channel 9262	Channel9400	Channel9538
		1852.4MHz	1880.0MHz	1907.6MHz
	RX	Channel 9662	Channel 9800	Channel 9938
		1932.4 MHz	1960.0 MHz	1987.6 MHz

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 7	TX (5M)	Channel 20775	Channel 21100	Channel 21425
		2502.5 MHz	2535 MHz	2567.5 MHz
	TX (10M)	Channel 20800	Channel 21100	Channel 21400
		2505 MHz	2535 MHz	2565 MHz
	TX (15M)	Channel 20825	Channel 21100	Channel 21375
		2507.5 MHz	2535 MHz	2562.5 MHz
	TX (20M)	Channel 20850	Channel 21100	Channel 21350
		2510 MHz	2535 MHz	2560 MHz
	RX (5M)	Channel 2775	Channel 3100	Channel 3425
		2622.5 MHz	2655 MHz	2687.5 MHz
	RX (10M)	Channel 2800	Channel 3100	Channel 3400
		2625 MHz	2655 MHz	2685 MHz
	RX (15M)	Channel 2825	Channel 3100	Channel 3375
		2627.5 MHz	2655 MHz	2682.5 MHz
	RX (20M)	Channel 2850	Channel 3100	Channel 3350
		2630 MHz	2655 MHz	2680 MHz

4.4 DESCRIPTION OF TESTS

4.4.1 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 3 meter 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 3 meters 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-wave dipole 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:

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

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

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 $43 + 10\log_{10}(\text{Power [Watts]})$.

Note: Reference test setup 3

4.4.2 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 analyzer shall be set to capture all products of the modulation process, including the emission 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 trace 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.

4.4.3 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 emission 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 emission are attenuated at least 26 dB below the transmitter power.

Note: Reference test setup 1.

4.4.4 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.

4.4.5 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 end point 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 transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

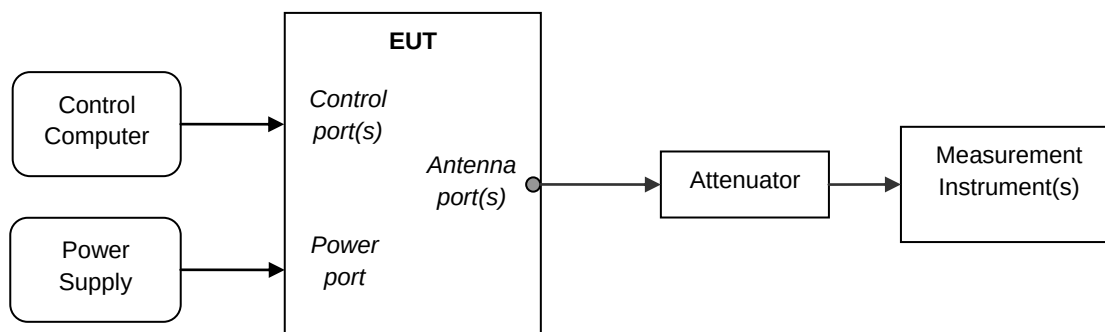
Time Period and Procedure:

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.

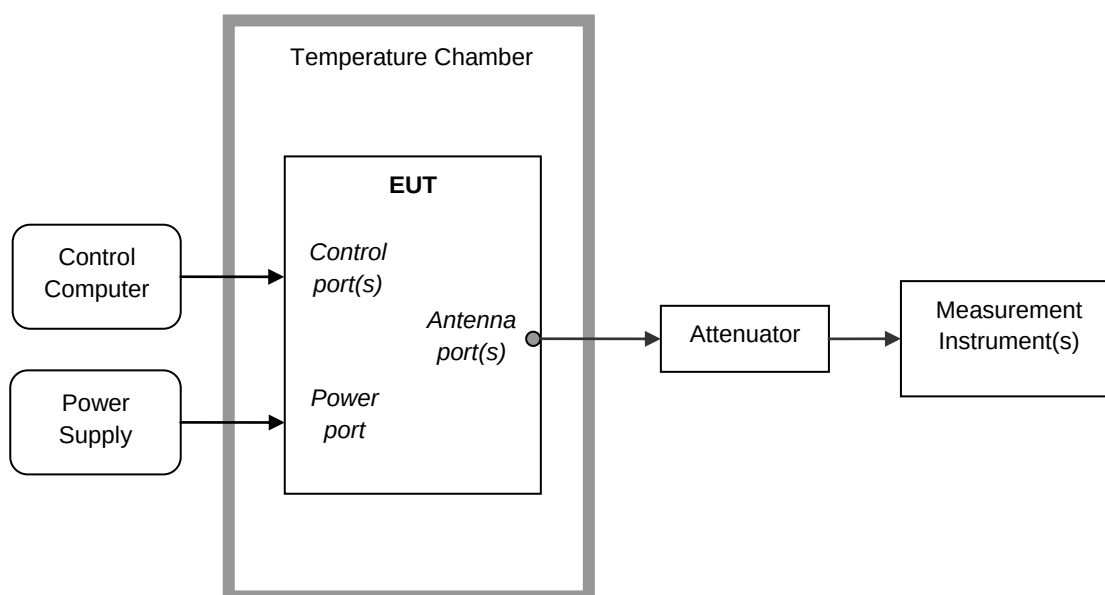
Note: Reference test setup 2.

4.5 Test Setups

4.5.1 Test Setup 1



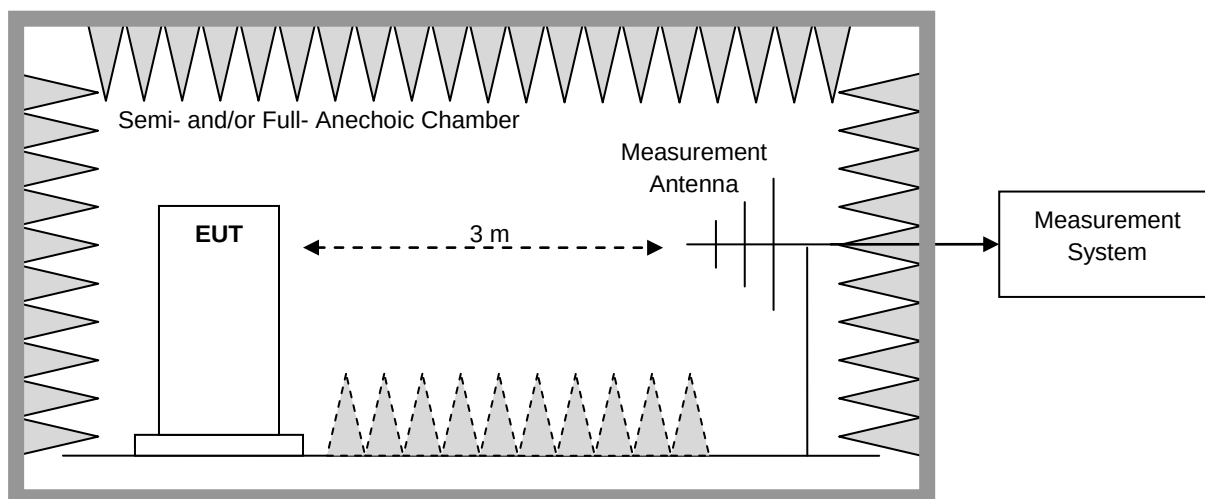
4.5.2 Test Setup 2



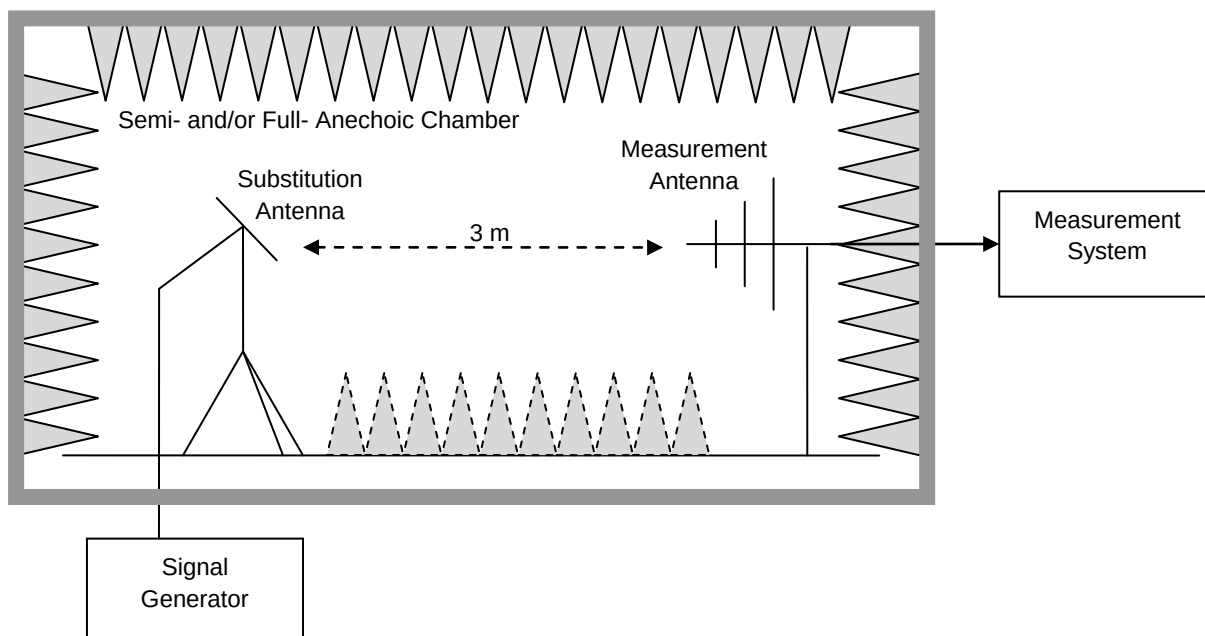
4.5.3 Test Setup 3

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

4.5.3.1 Step 1: Pre-test



4.5.3.2 Step 2: Substitution method to verify the maximum ERP



4.6 Test Conditions

Test Case		Test Conditions	
RF Power Output	Average Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
	Average Power, Spectral Density (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
	Peak-to-Average Ratio (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
	Emission Bandwidth (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Spurious Emission at Antenna Terminals		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2
Field Strength of Spurious Radiation		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 3
		Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1/TM2/TM3,LTE/TM1,LTE/TM2 NOTE: If applicable, the EUT conf. that has maximum power

Test Case	Test Conditions	
		density (based on the equivalent power level) is selected.
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
Frequency Stability	Test Env.	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) 85%, 100% and 115% of Rated Voltage at Ambient Climate.
	Test Setup	Test Seup 2
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	GSM/TM1,GSM/TM2,UMTS/TM1,LTE/TM1,LTE/TM2

5 Main Test Instruments

Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal. Due
Power supply	KEITHLEY	2303	1288003	2012.11.19	2014.11.18
Universal Radio Communication Tester	R&S	CMU200	123299	2012-09-20	2013.09.19
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	2012.11.09	2013.11.08
Spectrum Analyzer	Agilent	E4440A	MY49420179	2012.08.20	2013.08.19
Signal Analyzer	R&S	FSQ31	200021	2012.11.09	2013.11.08
Temperature Chamber	WEISS	WKL64	56246002940010	2013.1.29	2014.1.28
Signal generator	Agilent	E8257D	MY49281095	2012.09.14	2013.09.13
Spectrum analyzer	R&S	FSU3	200474	2013.01.29	2014.01.28
Spectrum analyzer	R&S	FSU43	100144	2013.01.29	2014.01.28
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100304	2013.02.02	2014.02.01
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100391	2011.10.12	2013.10.11
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBEC K	VULB 9163	9163-521	2011.12.09	2013.12.08
Pyramidal Horn Antenna(26GHz-40GHz)	ETS-Lindgren	3160-10	00123940	2011.02.28	2014.02.27
Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	3160-09	00125912	2011.02.28	2014.02.27
Universal Radio Communication Tester	R & S	CMW500	126855	2012.08.06	2013.08.05
Universal Radio Communication Tester	Anritsu	MT8820C	6200971028	2012.05.09	2013.05.08

6 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
RF Power Output	Power [dBm]	U = 0.39 dB
Bandwidth	Magnitude [%]	U = 0.2%
Band Edge Compliance	Disturbance Power [dBm]	U = 2.0 dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	U = 2.0 dB
Field Strength of Spurious Radiation	ERP [dBm]	For 3 m Chamber: U = 4.6 dB (30 MHz to 1GHz) U = 3.0 dB (above 1 GHz) For 10 m Chamber: U = 4.6 dB (30 MHz to 1GHz) U = 3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy [ppm]	U = 0.21 ppm

END