FCC
RF Test Report

Product Name: HSPA USB Stick

Model Number: E173u-63

Report No: SYBH(Z-RF)001112010-1
FCC ID: QISE173U-63

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Notice

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Notice 2

Modification Information:

Modification Information

Modification Information	1	
	2	
	3	Not Applicable!
	4	
	5	
	6	
	7	

REGULATION	FCC CFR47 Part 2: Subpart J;
	FCC CFR47 Part 24: Subpart E;
START OF TEST	Nov.25,2010
END OF TEST	Nov.29,2010
Final Judgement:	Pass

Approved By Nov.29, 2010 Liuchunlin
Date Name Signature

Reviewed By Nov.29, 2010 Chenxiaohong
Date Name Signature

Operator Nov.29, 2010 Zhangting
Date Name Signature

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1 Summary

The table below summarizes the measurements and results for the HUAWEI E173u-63 USB Stick. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
2.1046	24.232	Effective Isotropic radiated power of Transmitter	PASS
2.1046	24.232	Conducted Power of Transmitter	PASS
2.1047		Modulation Characteristics	PASS
2.1049		Occupied Bandwidth	PASS
2.1051	24.238	Band Edges Compliance	PASS
2.1051	24.238	Spurious Emission at Antenna Terminal	PASS
2.1055	24.235	Frequency Stability	PASS
2.1053	24.238	Radiated Spurious Emissions	See Note

Note: The Radiated Spurious Emissions' test results are shown in the EMC report.

2 Product Description

2.1 Production Information

2.1.1 General Description

E173u-63 USB Stick is subscriber equipment in the GSM/UMTS system. The frequency band of this report is 1900M of this report. The E173u-63 implements such functions as RF signal receiving / Transmitting, HSUPA/HSDPA/WCDMA/EDGE/GPRS protocol processing and data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface. It has an internal antenna. E173u-63 uses Qualcomm MSM6290 chipset and Zero-IF technologies.

2.1.2 Support function and Service

The HUAWEI E173u-63 USB Stick support the function and service as follows:

Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
Data	Modulation: GMSK	TM1	GPRS/GSM
Data	Modulation: 8PSK	TM2	EDGE
Data	Modulation: QPSK	TM3	WCDMA
Data	Modulation: QPSK	TM4	HSDPA
Data	Modulation: QPSK	TM5	HSUPA

Note: * The specified GPRS test conditions & settings are defined in 3GPP TS51.010 V5.4.0 and the EDGE test conditions & settings are defined in 3GPP TS51.010 V5.4.0. The WCDMA test condition & settings are defined in 3GPP TS 34.121 V8.7.0:2009.

2.2 Modification Information

For original equipment, following table is not application.

Modification Information

Model Number	Board/Module	Original Version	New Version	Modify Information

Not applicable

3 Test Site Description

The test site of:

Huawei Technologies Co. Ltd.
P.O. Box 518129
Huawei base, bantian,
Longgang District, Shenzhen, China

3.1 Testing Period

The test have been performed during the period of

Nov.25, 2010 – Nov.29, 2010

3.2 General Set up Description

HUAWEI E173u-63USB Stick can support GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA mode and PCS Band in this report. During this measurement, the HUAWEI E173u-63 USB Stick just works in GPRS/EDGE/WCDMA/HSDPA/HSUPA mode and PCS Band.

TM1: GSM/GPRS Mode with GMSK Modulation
TM2: EDGE Mode with 8PSK Modulation
TM3: WCDMA Mode with QPSK Modulation
TM4: HSDPA Mode with QPSK Modulation
TM5: HSUPA Mode with QPSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Frequency Range

Uplink band:	1850 to 1910 MHz
Downlink band:	1930 to 1990 MHz

4.1.2 Channel Spacing / Separation

Channel Spacing / Separation

	EDGE/GPRS/GSM	WCDMA/HSDPA/HSUPA
Channel raster	200k Hz	200k Hz
Channel spacing:	200k Hz	5MHz

4.1.3 Type of Emission

Type of Emission

	EDGE/GPRS/GSM	WCDMA/HSDPA/HSUPA
Emission Designation:	300KG7W / 300KGXW	5M00F9W

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

4.1.4 Environmental Requirements

Environmental Requirements

Minimum temperature:	- 10 °C
Maximum temperature:	+ 55 °C
Relative Humidity:	5％-95％RH

4.1.5 Power Source

Power Source

DC voltage nominal:	⎓ 5.0 V; Supplied by USB port of notebook
DC voltage range	⎓ 4.75 - 5.25 V
DC current maximal:	500mA

4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (9).

Please reference the document Tune-up Procedure in TCF.

4.1.7 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8).

The voltage and current in the final RF stage is:

Applied RF Module Voltages and Currents

Voltage:	⎓ 2.85V (for the RF IC)
Current:	150mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)
Voltage:	⎓ 3.6V (for the PA module)
Current:	350mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)

4.2 EUT Identification List

4.2.1 Board Information

Board Information

HSPA USB Stick		
E173u-63		
Board and Module		
Model name	Serial Number	Remarks
E173u-63	T5Z4CA10B1600067	CD1E153M

4.2.2 Adapter Technical Data

Not Applicable.

4.2.3 Battery Technical Data

Not Applicable.

4.2.4 FCC Identification

FCC Identification: QISE173U-63

5 Main Test Instruments

Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Power supply	KEITHLEY	2303	1288003	Sep.27,2011
Universal Radio Communication Tester	R&S	CMU200	105822	Oct.24.2011
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug.04,2011
Spectrum Analyzer	Agilent	E4440A	MY49420179	Apr.24,2011
Signal Analyzer	R&S	FSQ40	100025	Oct.09,2011
Signal Analyzer	R&S	FSQ31	200021	Sep.27,2011
Temperature Chamber	ESPEC	MW3030	611403	May.12,2011
Signal Generator	R&S	SMR40	100325	May.12,2011
Vector Signal Generator	R&S	SMU200A	104162	Sep.07,2011
Spectrum Analyzer	R&S	FSU26	EG26725	Mar.07,2011
Test receiver	R&S	ESIB26	100318	May.04.2011
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	919/1009	Dec.13.2010
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Dec.13.2010
Horn Antenna	R & S	HF906	359287/005	May.07, 2011
Horn Antenna	R & S	HF906	359287/006	April.27, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2536	Sep.21, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2941	Jun.11, 2011
Horn Antenna	ETS-LINDGREN	3160	60008	Sep.20.2011
Horn Antenna	ETS-LINDGREN	3160	60006	Oct.27.2011

6 Transmitter Measurements

6.1 Effective Isotropic radiated power of Transmitter (EIRP)

6.1.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25℃
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3/TM4/TM5 at frequency Bottom, Middle, Top

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24 subpart E

6.1.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.1.2.3 Limits

Compliance with part 24.232, mobile/portable stations are limited to 2 watts EIRP peak power.
W(dBm)= 10*log ($W_{In\ mW}$).

Limits

Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

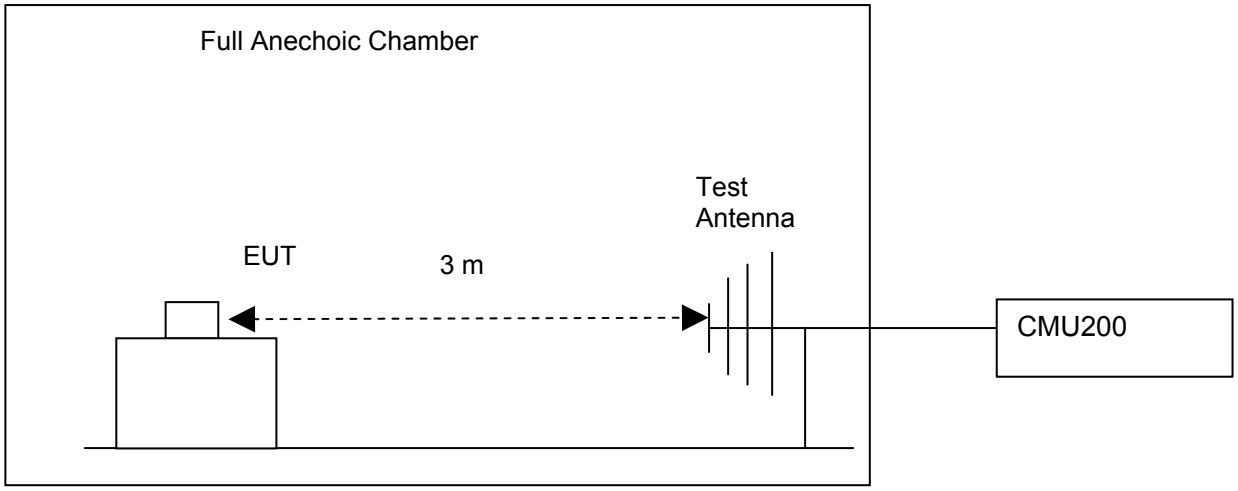
6.1.3 Test Method and Setup

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the HUAWEI E173u-63 USB Stick to the wireless communication tester CMU200 via the air interface. The band is set as PCS.
(b) Test the Radiated maximum output power by the CMU200 received from test antenna.

(c) Use substitution method to verify the maximum output power. The EUT is substituted by a horn antenna. The horn is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on CMU200, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum EIRP

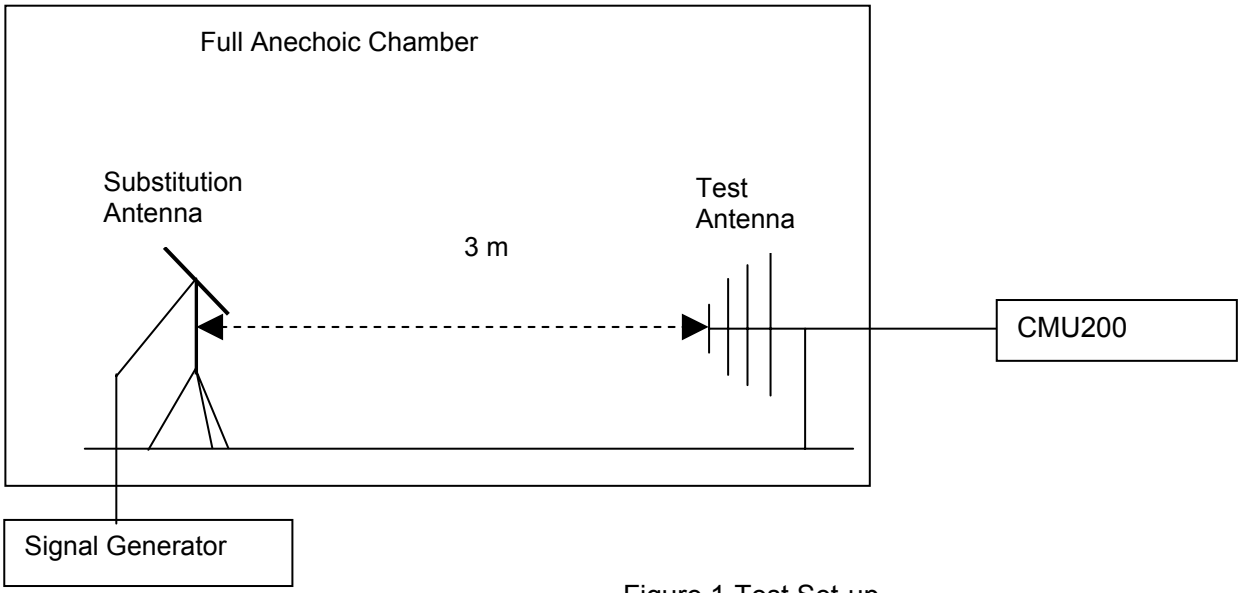


Figure 1.Test Set-up

NOTE: Effective Isotropic radiated power (EIRP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave horn antennas.
There is a constant difference of 2.15 dB between EIRP and ERP.
EIRP (dBm)= ERP (dBm) + 2.15 (ITU-R Recommendation SM.329-10).
EIRP was measured using 1 host.
BenQ Joy book S72

6.1.4 Measurement Results

6.1.4.1 Pre-test Results

For HSDPA test mode, there are 4 sub-tests for different configuration. For the sub-test 1, the max power of E173u-63 is the maximum as followed table.
The channel is mid range.

HSDPA conducted max power pre-scan

Sub-test	c	d	d (SF)	c/d	HS (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0	0
2	12/15	15/15	64	12/15	24/15	1	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

For HSUPA test mode, there are 5 sub-tests for different configuration. For the sub-test 1, the max power of E173u-6 is the maximum as followed table.
The channel is mid range

HSUPA conducted max power pre-scan

Sub-test	β_c	β_d	β_d ***(SF)***	β_c/β_d	β_{HS} *(Note1)*	β_{ec}	β_{ed} *(Note 5)* *(Note 6)*	β_{ed} ***(SF)***	β_{ed} ***(Codes)***	**CM** ***(dB)*** *(Note 2)*	**MPR** ***(dB)*** *(Note 2)*	***AG Index*** *(Note 6)*	***E-TFCI***
1	11/15 *(Note 3)*	15/15 *(Note 3)*	64	11/15 *(Note 3)*	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 *(Note 4)*	15/15 *(Note 4)*	64	15/15 *(Note 4)*	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .
Note 2: CM = 1 for β_c/β_d =12/15, $_{hs}/_{c}$=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the $_c/_d$ ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $_c$ = 10/15 and $_d$ = 15/15.
Note 4: For subtest 5 the $_c/_d$ ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $_c$ = 14/15 and $_d$ = 15/15.
Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Measurement Results

		RF Output Power (EIRP)					
TEST CONDITIONS		Channel512(B) 1850.2MHz		Channel661(M) 1880.0MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (5.0V)		Measured	Limit	Measured	Limit	Measured	Limit
TM1		31.35	33	31.11	33	31.03	33
TM2		27.73	33	27.65	33	27.52	33
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880.0MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (5.0V)		Measured	Limit	Measured	Limit	Measured	Limit
TM3		22.97	33	23.07	33	22.86	33
TM4	Case1	22.68	33	22.62	33	22.59	33
	Case2	22.12	33	22.34	33	22.06	33
	Case3	22.14	33	22.35	33	22.00	33
	Case4	22.11	33	22.30	33	21.99	33
TM5	Case1	21.67	33	22.44	33	21.06	33
	Case2	21.67	33	20.82	33	20.53	33
	Case3	21.61	33	21.42	33	22.10	33
	Case4	21.00	33	21.14	33	20.30	33
	Case5	21.73	33	21.57	33	21.34	33

6.1.4.2 Substitution Results

Substitution Results

Test Mode		Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	FCC limit [dBm]	Result
TM1		1850.2	29.58	Horn Ant.	27.85	4.5	1.0	31.35	33	Pass
TM1		1880.0	29.34	Horn Ant.	27.61	4.5	1.0	31.11	33	Pass
TM1		1909.8	29.26	Horn Ant.	27.23	4.8	1.0	31.03	33	Pass
TM2		1850.2	25.96	Horn Ant.	24.23	4.5	1.0	27.73	33	Pass
TM2		1880.0	25.88	Horn Ant.	24.15	4.5	1.0	27.65	33	Pass
TM2		1909.8	25.75	Horn Ant.	23.72	4.8	1.0	27.52	33	Pass
TM3		1852.4	21.20	Horn Ant.	19.47	4.5	1.0	22.97	33	Pass
TM3		1880.0	21.30	Horn Ant.	19.57	4.5	1.0	23.07	33	Pass
TM3		1907.6	21.09	Horn Ant.	19.06	4.8	1.0	22.86	33	Pass
TM4	Case1	1852.4	20.91	Horn Ant.	19.18	4.5	1.0	22.68	33	Pass
	Case2	1852.4	20.35	Horn Ant.	18.62	4.5	1.0	22.12	33	Pass
	Case3	1852.4	20.37	Horn Ant.	18.34	4.8	1.0	22.14	33	Pass
	Case4	1852.4	20.34	Horn Ant.	18.61	4.5	1.0	22.11	33	Pass
TM4	Case1	1880.0	20.85	Horn Ant.	19.12	4.5	1.0	22.62	33	Pass
	Case2	1880.0	20.57	Horn Ant.	18.54	4.8	1.0	22.34	33	Pass
	Case3	1880.0	20.58	Horn Ant.	18.85	4.5	1.0	22.35	33	Pass
	Case4	1880.0	20.53	Horn Ant.	18.80	4.5	1.0	22.30	33	Pass
TM4	Case1	1907.6	20.82	Horn Ant.	18.79	4.8	1.0	22.59	33	Pass
	Case2	1907.6	20.29	Horn Ant.	18.56	4.5	1.0	22.06	33	Pass
	Case3	1907.6	20.23	Horn Ant.	18.50	4.5	1.0	22.00	33	Pass
	Case4	1907.6	20.22	Horn Ant.	18.19	4.8	1.0	21.99	33	Pass
TM5	Case1	1852.4	19.90	Horn Ant.	18.17	4.5	1.0	21.67	33	Pass
	Case2	1852.4	18.93	Horn Ant.	17.20	4.5	1.0	20.70	33	Pass
	Case3	1852.4	19.84	Horn Ant.	17.81	4.8	1.0	21.61	33	Pass
	Case4	1852.4	19.23	Horn Ant.	17.50	4.5	1.0	21.00	33	Pass
	Case5	1852.4	19.96	Horn Ant.	18.23	4.5	1.0	21.73	33	Pass
TM5	Case1	1880.0	20.67	Horn Ant.	18.64	4.8	1.0	22.44	33	Pass

	Case2	1880.0	19.05	Horn Ant.	17.32	4.5	1.0	20.82	33	Pass
	Case3	1880.0	19.65	Horn Ant.	17.92	4.5	1.0	21.42	33	Pass
	Case4	1880.0	19.37	Horn Ant.	17.34	4.8	1.0	21.14	33	Pass
	Case5	1880.0	19.80	Horn Ant.	18.07	4.5	1.0	21.57	33	Pass
TM5	Case1	1907.6	19.29	Horn Ant.	17.56	4.5	1.0	21.06	33	Pass
	Case2	1907.6	18.76	Horn Ant.	16.73	4.8	1.0	20.53	33	Pass
	Case3	1907.6	19.33	Horn Ant.	18.60	4.5	1.0	22.10	33	Pass
	Case4	1907.6	18.53	Horn Ant.	16.80	4.5	1.0	20.30	33	Pass
	Case5	1907.6	19.57	Horn Ant.	17.54	4.8	1.0	21.34	33	Pass

Note: a, For get the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should take to calculate it,

EIRP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBi]

NOTE: SGP- Signal Generator Level

b, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 200kHz for TM1 and TM2 and 5M for TM3.

6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3/TM4/TM5 at frequency Bottom, Middle, Top

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.2.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.2.2.3 Limits

Compliance with part 24.232, in no any case may the peak power of a mobile station transmitter exceed 2 W. The calculated longitude EIRP by following formula:

EIRP(dBm)= 10*log ($EIRP_{in\ mW}$).

And for conducted power, we can use Antenna Gain to calculate the limit. So the conducted power:

$P_{cod.}$(dBm)=EIRP(dBm)- Gain(dBi).
and Gain (dBi)= Gain(dBd)+ 2.15dB

Limits

Maximum Output Power (Watts)	< 2 Watts (33 dBm)
Antenna Gain(dBi):	1.77
Maximum Conducted Output Power (dBm)	< 32.68

6.2.3 Test Method and Setup

(a)For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, Conducted maximum power shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the HUAWEI E173u-63 USB Stick to the wireless communication tester CMU200 via the antenna connector. The band class is set as PCS.
(b)Test the Conducted maximum output power by the CMU200.

Test setup

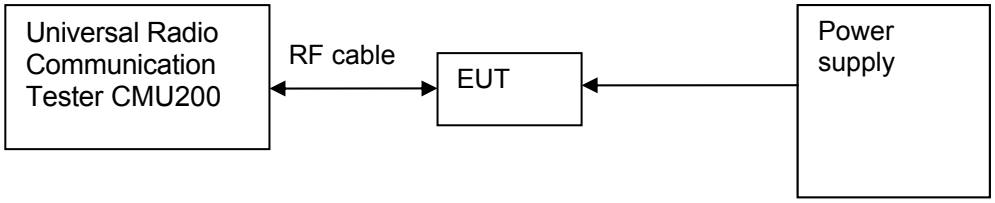


Figure 2. Test Set-up

6.2.4 Measurement Results

Measurement Results

		RF Output Power (Conducted)					
TEST CONDITIONS		Channel512(B) 1850.2MHz		Channel661(M) 1880.0MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (5.0V)		Measured	Limit	Measured	Limit	Measured	Limit
TM1		29.58	32.68	29.34	32.68	29.26	32.68
TM2		25.96	32.68	25.88	32.68	25.75	32.68
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880.0MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (5.0V)		Measured	Limit	Measured	Limit	Measured	Limit
TM3		21.20	32.68	21.30	32.68	21.09	32.68
TM4	Case1	20.91	32.68	20.85	32.68	20.82	32.68
	Case2	20.35	32.68	20.57	32.68	20.29	32.68
	Case3	20.37	32.68	20.58	32.68	20.23	32.68
	Case4	20.34	32.68	20.53	32.68	20.22	32.68
TM5	Case1	19.90	32.68	20.67	32.68	19.29	32.68
	Case2	18.93	32.68	19.05	32.68	18.76	32.68
	Case3	19.84	32.68	19.65	32.68	19.33	32.68
	Case4	19.23	32.68	19.37	32.68	18.53	32.68
	Case5	19.96	32.68	19.80	32.68	19.57	32.68

6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.

6.3 Modulation Characteristics

6.3.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3 at frequency Middle

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.3.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 24 subpart E.

Limits

Limits	Not applicable

6.3.3 Test Method and Setup

Connect the HUAWEI E173u-63 USB Stick to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as PCS; the HUAWEI E173u-63 USB Stick's output is matched with 50 Ω load, test method was according to 3GPP TS 51.010 and 3GPP TS 34.121. The waveform quality and constellation of the HUAWEI E173u-63 USB Stick was tested.

Test setup

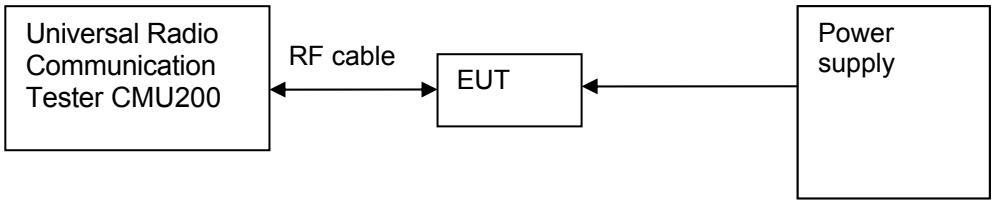


Figure 3.Test Set-up

6.3.4 Measurement Results

Measurement Results

		Modulation Characteristic	
TEST CONDITIONS		Channel661(M) 192MHz	
		Measured	
		TM1	TM2
T_{nom} (25 °C)	V_{nom} (5.0V)	Refer to Appendix A	Refer to Appendix A
TEST CONDITIONS		Channel9400(M) 192MHz	
		Measured	
		TM3	
T_{nom} (25 °C)	V_{nom} (5.0V)	Refer to Appendix A	

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.

For the measurement results refer to appendix A.

6.4 Occupied Bandwidth

6.4.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom, Middle, Top

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 24 subpart E

6.4.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.4.2.3 Limits

No specific occupied bandwidth requirement in part 24 subpart E, but the occupied bandwidth was defined in part 2.1049: 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.

Limits

Upper /lower frequency limits	0.5% of the mean power

6.4.3 Test Method and Setup

HUAWEI E173u-63 USB Stick was connected to the wireless signal analyzer R&S FSU26 via the one RF connector. The band class is set as PCS; HUAWEI E173u-63 USB Stick was controlled to transmit maximum power. Measure and record the occupied bandwidth of the HUAWEI E173u-63 USB Stick by the R&S FSU26.

The OBW, 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 under the following conditions as applicable:

Refer to 47CFR part2.1049 section (g)&(h).
(g) Transmitter in which the modulating base band comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.
(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudorandom generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

For TM1/TM2 following RBW and VBW are employed:
Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)
Video bandwidth (VBW): 10 kHz
For TM3 following RBW and VBW are employed:
Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)
Video bandwidth (VBW): 500 kHz

Test Set-up

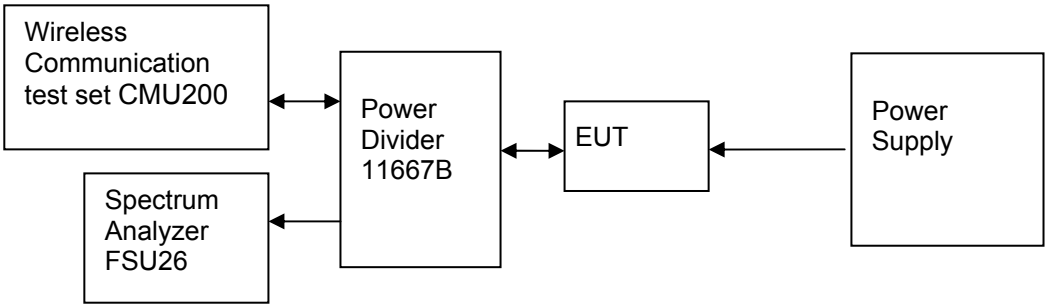


Figure 4.Test Set-up

6.4.4 Measurement Results

Measurement Results

TEST CONDITIONS		Occupied Bandwidth					
Center Frequency		Channel512(B) 1850.2MHz		Channel661(M) 1880.0MHz		Channel810(T) 1909.8MHz	
		Measured (kHz)		Measured (kHz)		Measured (kHz)	
		TM1	TM2	TM1	TM2	TM1	TM2
Tnom (25 °C) Vnom (5.0V)	99%	246.79	245.19	248.40	238.78	248.40	246.79
Center Frequency		Channel9262(B) 1852.4MHz		Channel661(M) 1880.0MHz		Channel9538(T) 1907.6MHz	
		Measured (MHz)		Measured (MHz)		Measured (MHz)	
		TM3		TM3		TM3	
Tnom (25 °C) Vnom (5.0V)	99%	4.17		4.20		4.18	

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B.

6.5 Band Edges Compliance

6.5.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom, Top

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part24 Subpart E

6.5.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.5.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P(W). (Whereas P is the rated power of the EUT).

Limits for GPRS

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	43+10log (1) = 43 , 30 dBm - 43 dB	43+10log (0.4) = 39 , 26 dBm - 39 dB	43+10log (0.25) = 37 , 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

6.5.3 Test Method and Setup

HUAWEI E173u-63 USB Stick was connected to the wireless signal analyzer R&S FSU26 via the one RF connector, the band class is set as PCS. HUAWEI E173u-63 USB Stickwas controlled to transmit maximum power. Measure and record band edges compliance of the HUAWEI E173u-63 USB Stick by the R&S FSU26.

For TM1/TM2 following RBW and VBW are employed:
Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)
Video bandwidth (VBW): 10 kHz
For TM3 following RBW and VBW are employed:
Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)
Video bandwidth (VBW): 200 kHz

Test Set-up

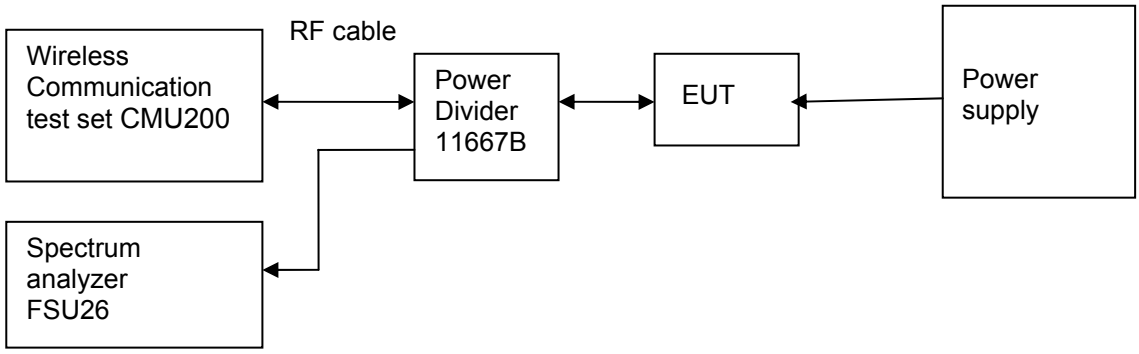


Figure 5. Test Set-up

6.5.4 Measurement Results

Measurement Results outside Band Edges-- Single Carrier

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode	Spurious Level measured [dBm]	FCC limit	Result
PCS	T_{nom} (25 °C), V_{nom} (5.0V)					
	128	512	TM1	<-13(See appendix C)	- 13 dBm	Pass
	251	810	TM1	<-13(See appendix C)	- 13 dBm	Pass
	128	512	TM2	<-13(See appendix C)	- 13 dBm	Pass
	251	810	TM2	<-13(See appendix C)	- 13 dBm	Pass
	4132	9262	TM3	<-13(See appendix C)	- 13 dBm	Pass
	4233	9538	TM3	<-13(See appendix C)	- 13 dBm	Pass

6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix C.

6.6 Spurious Emission at Antenna Terminal

6.6.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	50 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom, Middle ,Top

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part24 Subpart E

6.6.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.6.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P. (Whereas P is the rated power of the EUT).

Limits for GPRS Mode

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	43+10log (1) = 43 , 30 dBm - 43 dB	43+10log (0.4) = 39 , 26 dBm - 39 dB	43+10log (0.25) = 37 , 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

6.6.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSU26 via the one RF connector, the band class is set as PCS. The EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT by the R&S FSU26.

According to part 24.238, the defined measurement bandwidth as following:

24.238 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30MHz: 10 kHz;
Measurement bandwidth (RBW) for 30 MHz up to 20GHz: 1MHz;

Test Set-up

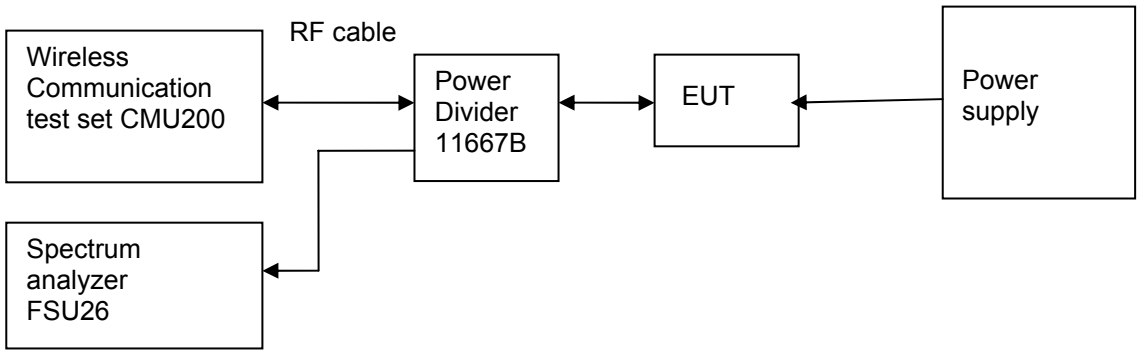


Figure 6. Test Set-up

6.6.4 Measurement Results

Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 512(B)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9262(B)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 661(M)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9400(M)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 810(T)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9538(T)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass

6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix D.

6.7 Frequency Stability

6.7.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	TM1/TM2/TM3 at frequency Middle

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and Part24 Subpart E

6.7.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.7.2.3 Limits

No specific frequency stability requirement in part 2.1055 and part 24.235.

6.7.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30 ° to +50 ° centigrade for all equipment except that specified in subparagraphs
(2) and (3) of paragraph 2.1055

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10^{o} centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(b) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 95 to 105 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment,

or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.
(c) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

The EUT can only work in such extreme voltage 4.75V and 5.25V, so here the EUT is tested in the 4.75V and 5.25V.

Test Set up

Connect the EUT to the Wireless Communication test set CMU200 via the connector. Then measure the frequency error by the Wireless Communication test set CMU200. The EUT's output is matched with a 50 Ω load.

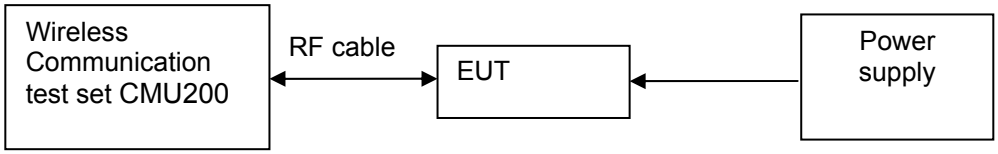


Figure 7. Test Set up

6.7.4 Measurement Results

6.7.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 5.0V DC Channel No.661(192.0MHz)**

Measurement Results vs. Variation of Temperature—TM1

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	1880.0	-34	Pass
-20 °C	1880.0	25	Pass
-10 °C	1880.0	-15	Pass
0 °C	1880.0	-12	Pass
+10 °C	1880.0	-6	Pass
+20 °C	1880.0	-9	Pass
+30 °C	1880.0	-6	Pass
+40 °C	1880.0	-12	Pass
+50 °C	1880.0	-18	Pass

- **TM2, 5.0V DC Channel No.661(192.0MHz)**

Measurement Results vs. Variation of Temperature—TM2

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	1880.0	32	Pass
-20 °C	1880.0	-26	Pass
-10 °C	1880.0	18	Pass
0 °C	1880.0	-12	Pass
+10 °C	1880.0	-11	Pass
+20 °C	1880.0	-6	Pass
+30 °C	1880.0	7	Pass
+40 °C	1880.0	-8	Pass
+50 °C	1880.0	-18	Pass

- **TM3, 5.0V DC Channel No.9400(192.0MHz)**

Measurement Results vs. Variation of Temperature—TM3

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	1880.0	-31	Pass
-20 °C	1880.0	-22	Pass
-10 °C	1880.0	-13	Pass
0 °C	1880.0	-10	Pass
+10 °C	1880.0	-11	Pass
+20 °C	1880.0	-9	Pass
+30 °C	1880.0	10	Pass
+40 °C	1880.0	-14	Pass
+50 °C	1880.0	19	Pass

6.7.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 661(192.0MHz)**

Measurement Results vs. Variation of Voltage—TM1

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25 V	1880.0	-26	Pass
5.0 V	1880.0	-44	Pass
4.75 V	1880.0	-31	Pass

- **TM2, 25 °C ,Channel No. 661(192.0MHz)**

Measurement Results vs. Variation of Voltage—TM2

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25 V	1880.0	-29	Pass
5.0 V	1880.0	-37	Pass
4.75 V	1880.0	-47	Pass

- **TM3, 25 °C ,Channel No. 9400(192.0MHz)**

Measurement Results vs. Variation of Voltage—TM3

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25 V	1880.0	-12	Pass
5.0 V	1880.0	3	Pass
4.75 V	1880.0	-17	Pass

6.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.

7 System Measurement Uncertainty

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

System Measurement Uncertainty

Items		Extended Uncertainty
Effective Isotropic radiated power of Transmitter	EIRP (dBm)	U=3dB; k=2
Band Width	Magnitude (%)	U＝0.2%; k=2
Band Edge Compliance	Disturbance Power(dBm)	U＝2.0dB; k=2
Conducted Spurious Emission at Antenna Terminal	Disturbance Power(dBm)	U＝2.0dB; k=2
Frequency Stability	Frequency Accuracy(ppm)	U＝0.21ppm; k=2

8 Appendices

Appendix A	Measurement Results Modulation Characteristics	4 Pages
Appendix B	Measurement Results Occupied Bandwidth	10 Pages
Appendix C	Measurement Results Band Edges	7 Pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	28 Pages