



ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



Applicant: Quanta Computer Inc.
NO.188, Wenhua 2nd Rd., Guishan Dist., Taoyuan City
33377, Taiwan (R.O.C.)

Manufacturer: Quanta Computer Inc.
NO.188, Wenhua 2nd Rd., Guishan Dist., Taoyuan City
33377, Taiwan (R.O.C.)

Product Name: Smart Watch

Brand Name: Verizon Wireless

Model No.: QTAX59

Report Number: TERF2402000334ER

FCC ID HFS-QTAX59

Date of EUT Received: January 2, 2024

Date of Test: February 6, 2024 ~ March 12, 2024

Issue Date: April 10, 2024

Approved By

CHUN, CHIEH, CHEN

Chun Chieh, Chen

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.26-2015 and the energy emitted by the sample EUT comply with FCC rule part 2, 27 C.

The results of this report relate only to the sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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SGS Taiwan Ltd.

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2402000334ER	00	Original	Apr. 10 2024	Candice Li	

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.
- 2、Variant information of main and 2nd / 3rd source is provided by the applicant, test results of this report are applicable to the sample EUT(s) received. 3rd source only changes the memory and does not need to be verified after judgment. The TX Emissions was added to measure the above differences. The rest of the internal circuit board wiring technology and radio frequency functions of the main components are the same. Please refer to the attached file (Product information) for details.

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1 GENERAL PRODUCT INFORMATION

1.1 Product Description

Product Name:	Smart Watch
Brand Name:	Verizon Wireless
Model No.:	QTAX59
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.(IMEI):	353862890000590 (Conducted) 353862890002245 (Radiated) 353862890001593 (Radiated_2nd Source)
Power Supply:	3.87Vdc from Rechargeable Li-polymer Battery
Test Software (Name/Version)	N/A

1.2 Operation Frequency Range

LTE Band 4		
BW (MHz)	Operation Frequency (MHz)	
1.4	1710.7	1754.3
3	1711.5	1753.5
5	1712.5	1752.5
10	1715.0	1750.0
15	1717.5	1747.5
20	1720.0	1745.0

LTE Band 13		
BW (MHz)	Operation Frequency (MHz)	
5	779.5	784.5
10	782.0	

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1.3 Antenna Designation

Antenna Type	Antenna Part No.	Antenna No.
PIFA	DQ623113700	Ant0
Note: Transmission frequencies in this test report are only available by the above antenna(s).		

Modulation	Frequency (MHz)		Peak Antenna Gain (dBi)
			Ant0
LTE-Band 4	1710	~ 1755	-4.36
LTE-Band 13	777	~ 787	-9.35

Note: Antenna information is provided by the applicant.

1.4 Type of Emission & Max ERP/EIRP Power Measurement Result:

LTE Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
					ERP	EIRP			
4	1.4	1710.7	1754.3	QPSK	18.73	EIRP	0.075	1.0899	1M09G7D
				16QAM	17.47	EIRP	0.056	1.0914	1M09D7W
4	3	1711.5	1753.5	QPSK	18.72	EIRP	0.074	2.6872	2M69G7D
				16QAM	17.43	EIRP	0.055	2.6920	2M69D7W
4	5	1712.5	1752.5	QPSK	18.74	EIRP	0.075	4.4814	4M48G7D
				16QAM	17.41	EIRP	0.055	4.4829	4M48D7W
4	10	1715.0	1750.0	QPSK	18.77	EIRP	0.075	8.9718	8M97G7D
				16QAM	17.43	EIRP	0.055	8.9368	8M94D7W
4	15	1717.5	1747.5	QPSK	18.88	EIRP	0.077	13.4360	13M4G7D
				16QAM	17.46	EIRP	0.056	13.4140	13M4D7W
4	20	1720.0	1745.0	QPSK	18.64	EIRP	0.073	17.8560	17M9G7D
				16QAM	17.42	EIRP	0.055	17.8790	17M9D7W
LTE Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
13	5	779.5	784.5	QPSK	12.28	ERP	0.017	4.4848	4M48G7D
				16QAM	11.30	ERP	0.013	4.4871	4M49D7W
13	10	782.0	782.0	QPSK	12.43	ERP	0.017	8.9595	8M96G7D
				16QAM	11.23	ERP	0.013	8.9336	8M93D7W

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1.5 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 27C

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03r01

KDB412172 D01 Determining ERP and EIRP v01r01

1.6 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
	Conducted 6			
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
Conducted F				
Conducted G				

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

1.7 Special Accessories

No special accessories were used during testing.

1.8 Equipment Modifications

There was no modifications incorporated into the EUT.

1.9 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Measurement at Antenna Port

The EUT is placed on a table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

2.3.2 Radiated Emissions (ERP/EIRP)

The EUT is placed on a turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

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2.5 Final Amplifier Voltage and Current Information:

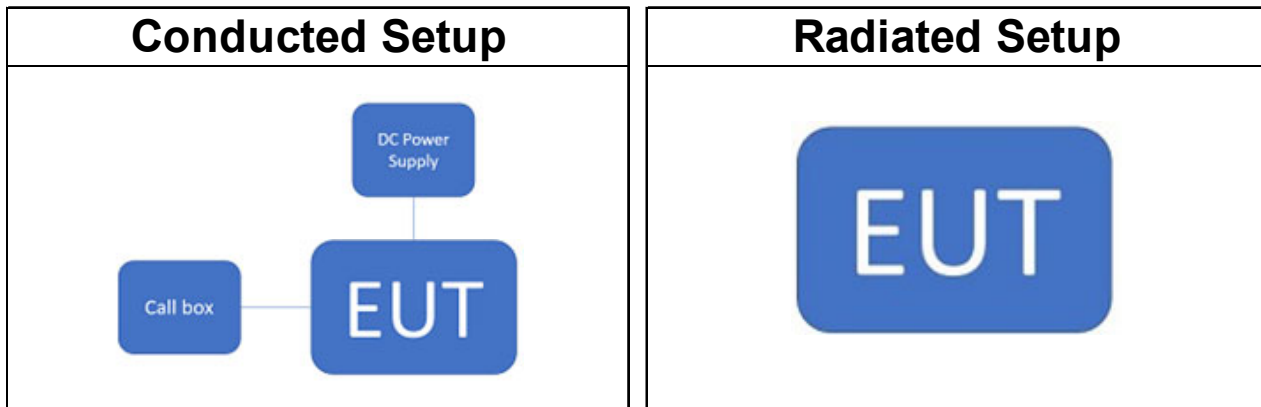
LTE Band 4

Test mode	DC voltage (V)	DC current (mA)
LTE Band 4_20M QPSK	3.87	406

LTE Band 13

Test mode	DC voltage (V)	DC current (mA)
LTE Band 13_10M QPSK	3.87	405

2.6 Test Configuration



Note: Radio Communication Analyzer is placed in remote side for radiated test.

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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046(a)	RF Power Output	Compliant
§27.50(b)(10) §27.50(d)(4)	ERP/ EIRP measurement	Compliant
§2.1049(h)	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §27.53(c)(2), (4) §27.53(h)	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §2.1057(a)(1) §27.53(c)(2), (4) §27.53(f) §27.53(h)	Field Strength of Spurious Radiation	Compliant
§27.50(d)(5)	Peak to Average Ratio	Compliant
§2.1055(a)(1) §27.54	Frequency Stability	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case scenario from all possible combinations among available modulations, data rates and antenna ports, the worst case configurations listed below for the final test.
3. The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

E-UTRA Band	Test Channel	Channel Bandwidth (MHz)	Modulation	Resource Block Allocation	
				RBs allocated	RB Offset
4	20025	15	QPSK	1	0
4	20175	15	QPSK	1	0
4	20325	15	QPSK	1	0
13	23230	10	QPSK	1	0

2nd Source

E-UTRA Band	Test Channel	Channel Bandwidth (MHz)	Modulation	Resource Block Allocation	
				RBs allocated	RB Offset
4	20025	15	QPSK	1	0
13	23230	10	QPSK	1	0

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4.2 Measurement Configuration

Test Items				Max. Output Power												
Band	Test Channel			Bandwidth (MHz)						Modulation				RB #		
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full
4	v	v	v	v	v	v	v	v	v	v	v	-	-	v	v	v
13	v	v	v	-	-	v	v	-	-	v	v	-	-	v	v	v
Test Items				Frequency Stability												
4	-	v	-	-	-	-	v	-	-	v	-	-	-	-	-	v
13	-	v	-	-	-	-	v	-	-	v	-	-	-	-	-	v
Test Items				26dB and 99% Bandwidth												
Band	Test Channel			Bandwidth (MHz)						Modulation				RB #		
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	64QAM	1	Half	Full
4	v	v	v	v	v	v	v	v	v	v	v	-	-	-	-	v
13	v	v	v	-	-	v	v	-	-	v	v	-	-	-	-	v
Test Items				Peak-to-Average Ratio												
4	v	v	v	v	v	v	v	v	v	-	v	-	-	-	-	v
13	v	v	v	-	-	v	v	-	-	-	v	-	-	-	-	v
Test Items				Band Edge												
Band	Test Channel			Bandwidth (MHz)						Modulation				RB #		
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	64QAM	1	Half	Full
4	v	-	v	v	v	v	v	v	v	v	-	-	-	v	v	v
13	v	-	v	-	-	v	v	-	-	v	-	-	-	v	v	v
Test Items				Conducted Emission												
4	v	v	v	-	-	-	-	v	-	v	-	-	-	v	-	-
13	v	v	v	-	-	-	v	-	-	v	-	-	-	v	-	-
Test Items				Radiated Emission												
Band	Test Channel			Bandwidth (MHz)						Modulation				RB #		
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full
4	v	v	v	-	-	-	-	v	-	v	-	-	-	v	-	-
13	v	v	v	-	-	-	v	-	-	v	-	-	-	v	-	-

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
Power Density	+/- 0.61 dB
RF Power Output	+/- 0.97 dB
ERP/ EIRP measurement	+/- 2.15 dB
	+/- 2.15 dB
Emission Bandwidth	+/- 1.38 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 0.77 dB
Peak to Average Ratio	+/- 0.97 dB
Frequency Stability vs. Temperature	+/- 1.48 Hz
Frequency Stability vs. Voltage	+/- 1.48 Hz
Temperature	+/- 0.6 °C
Humidity	+/- 3 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty				
Polarization: Vertical	+/-	1.89	dB	9kHz~30MHz
	+/-	4.15	dB	30MHz - 1000MHz
	+/-	3.43	dB	1GHz - 18GHz
	+/-	3.86	dB	18GHz - 40GHz
Polarization: Horizontal	+/-	1.89	dB	9kHz~30MHz
	+/-	4.02	dB	30MHz - 1000MHz
	+/-	3.43	dB	1GHz - 18GHz
	+/-	3.86	dB	18GHz - 40GHz
Radiated Spurious Emission	+/-	2	dB	33GHz-50GHz
	+/-	1.59	dB	50GHz-60GHz
	+/-	1.7	dB	60GHz-90GHz
	+/-	1.64	dB	90GHz-140GHz
	+/-	3.83	dB	140GHz-220GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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6 MEASUREMENT EQUIPMENT USED

6.1 Conducted Measurement

Conducted Emission Test Site: Conducted 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Power Supply	Gwinstek	SPS-3610	GEW902152	01/18/2024	01/17/2025
DC Power Supply	Agilent	E3460A	MY40005907	10/23/2023	10/22/2024
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	05/03/2023	05/02/2024
Radio Communication Analyzer	Anritsu	MT8820C	6201465317	03/22/2023	03/21/2024
Temperature Chamber	Giant Force	GTH-150-40-CP-AR	MAA0512-018	05/24/2023	05/23/2024
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R
Attenuator	Mini-Circuits	BW-S10W2+	12	12/12/2023	12/11/2024
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-017	12/12/2023	12/11/2024

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6.2 Radiated Measurement

Radiated Emission Test Site: SAC 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWARZBECK	VULB9168	1208	07/21/2023	07/20/2024
Horn Antenna	SCHWARZBECK	BBHA9120D	603	05/11/2023	05/10/2024
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/28/2023	12/27/2024
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/03/2023	07/02/2024
Horn Antenna	SCHWARZBECK	BBHA9120D	D803	01/12/2024	01/11/2025
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	12/18/2023	12/17/2024
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY60242081	10/17/2023	10/16/2024
Network Analyzer	Anritsu	MS4644A	1216312	12/07/2023	12/06/2024
Radio Communication Analyer	Anritsu	MT8821C	6261786084	01/16/2024	01/15/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R
Site Cal	SGS	SAC 1	N/A	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC184045B	980135	08/31/2023	08/30/2024
Pre-Amplifier	HP	8447D	2944A09469	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC118A45SEE	980933	07/31/2023	07/30/2024
3.1G High Pass Filter	Woken	WFIL-H3100-18000F-01	WRGBAFWC2B6	12/12/2023	12/11/2024
1.3G High Pass Filter	Woken	WHKX10-1066	19	12/12/2023	12/11/2024
Band Reject Filter 635-920	WI	WRCGV695/920-635/980-40/12SS	1	12/12/2023	12/11/2024
Band Reject Filter 1700-2000	EWT	EWT-54-0038	M1	12/12/2023	12/11/2024
Coaxial Cables	Huber Suhner	SUCOFLEX 102	RX Cable 18G-40G MY2630/2+805062/2	08/31/2023	08/30/2024
Coaxial Cables	Huber Suhner	SUCOFLEX 102+SUCOFLEX 106	TX Cable 30M-40G 23051/2+76096/6+2 2962/2	08/31/2023	08/30/2024
Coaxial Cable	EMCI	EMC104-SM-SM-8000+EMC106-SM-SM-7600	RX Cable 9K-18G(160125+150817)	09/12/2023	09/11/2024

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2nd Source

Radiated Emission Test Site: SAC 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	SCHWARZBECK	BBHA9120D	603	05/11/2023	05/10/2024
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/28/2023	12/27/2024
Horn Antenna	RF SPIN	DRH0844	LE2D05A0844	07/03/2023	07/02/2024
Horn Antenna	SCHWARZBECK	BBHA9120D	D803	01/12/2024	01/11/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY60242081	10/17/2023	10/16/2024
Network Analyzer	Anritsu	MS4644A	1216312	12/07/2023	12/06/2024
Radio Communication Analyer	Anritsu	MT8821C	6261786084	01/16/2024	01/15/2025
Test Software	Audix	e3	Ver. 9.210616	N.C.R	N.C.R
Site Cal	SGS	SAC 1	N/A	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC184045B	980135	08/31/2023	08/30/2024
Pre-Amplifier	EMCI	EMC118A45SEE	980933	07/31/2023	07/30/2024
3.1G High Pass Filter	Woken	WFIL-H3100-18000F-01	WRGBAFWC2B6	12/12/2023	12/11/2024
1.3G High Pass Filter	Woken	WHKX10-1066	19	12/12/2023	12/11/2024
Band Reject Filter 635-920	WI	WRCGV695/920-635/980-40/12SS	1	12/12/2023	12/11/2024
Band Reject Filter 1700-2000	EWT	EWT-54-0038	M1	12/12/2023	12/11/2024
Coaxial Cables	Huber Suhner	SUCOFLEX 102	RX Cable 18G-40G MY2630/2+805062/2	08/31/2023	08/30/2024
Coaxial Cables	Huber Suhner	SUCOFLEX 102+SUCOFLEX 106	TX Cable 30M-40G 23051/2+76096/6+2 2962/2	08/31/2023	08/30/2024
Coaxial Cable	EMCI	EMC104-SM-SM-8000+EMC106-SM-SM-7600	RX Cable 9K-18G(160125+150817)	09/12/2023	09/11/2024

NOTE: N.C.R refers to Not Calibrated Required.

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7 STANDARD APPLICABLE

7.1 Maximum Output Power

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

7.1.1 ERP/EIRP LIMIT

According to FCC §2.1046

FCC 27.50 (b)

(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

FCC 27.50(d)

(4) Mobile, and portable (hand-held) stations operating in the 1710-1755 MHz, 1695-1710 MHz and 1755-1780 MHz bands are limited to 1W EIRP.

7.2 Occupied Bandwidth Measurement

The occupied bandwidth 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.

7.3 Out Of Band Emission At Antenna Terminals

FCC §27.53(h)

Out of band emissions. 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.

FCC §27.53(c)

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776– 788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB (-13dBm)

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

FCC §27.53(h)(1)

(h) *AWS emission limits*—(1) *General protection levels*. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

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7.4 Field Strength Of Spurious Radiation Measurement

According to FCC §2.1053,

FCC§27.53(h)

Out of band emissions. 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.

FCC §27.53(h)(1)

(h) *AWS emission limits*—(1) *General protection levels*. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

7.5 Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

7.6 Peak to Average Ratio

The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

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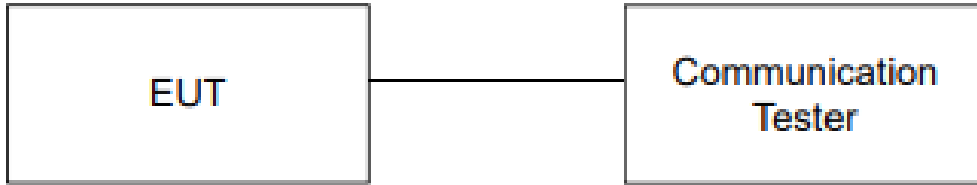
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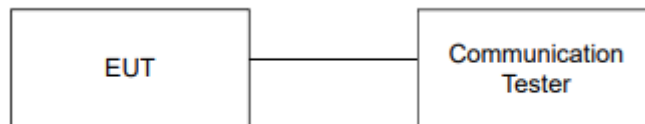
8 TEST SETUP

8.1 Maximum Output Power



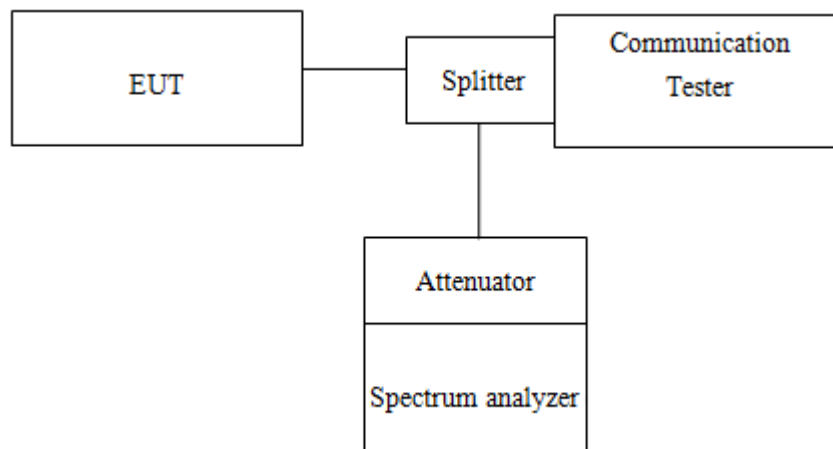
Note: Measurement setup for testing on Antenna connector

8.2 Occupied Bandwidth Measurement



Note: Measurement setup for testing on Antenna connector

8.3 Out of Band Emission At Antenna Terminals

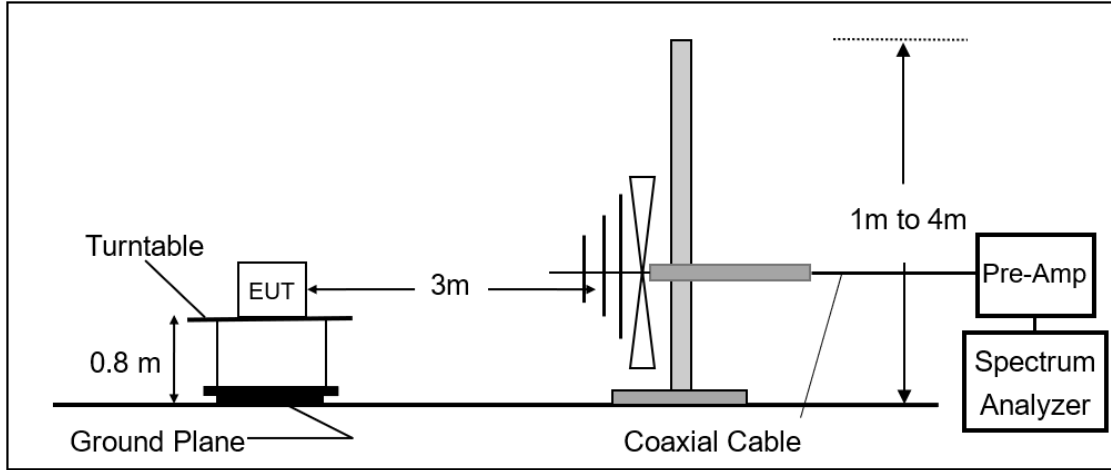


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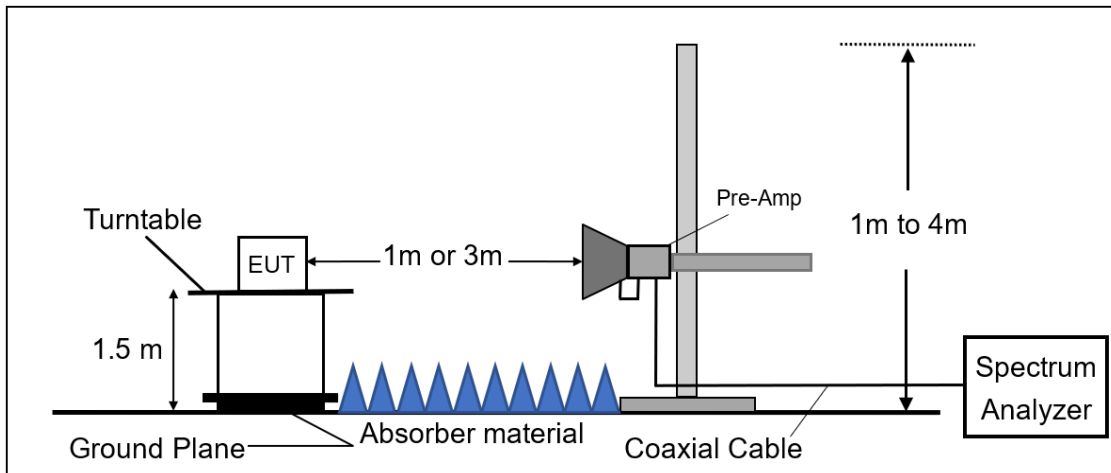
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8.4 Field Strength of Spurious Radiation Measurement

Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



Radiated Emission Test Set-Up, Frequency Above 1GHz.

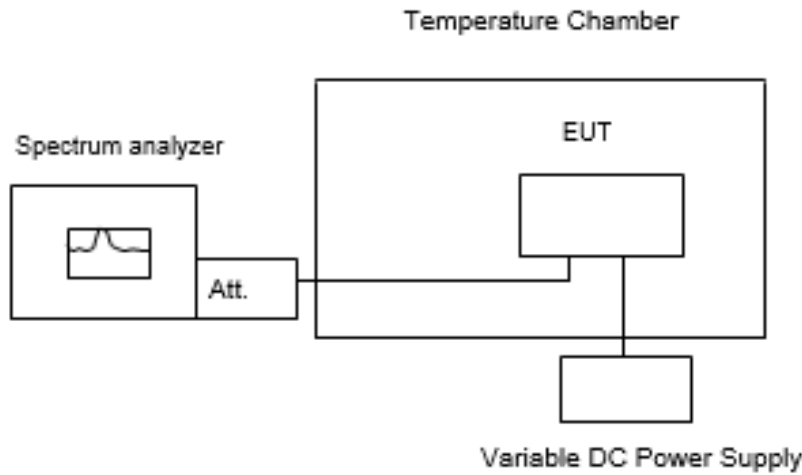


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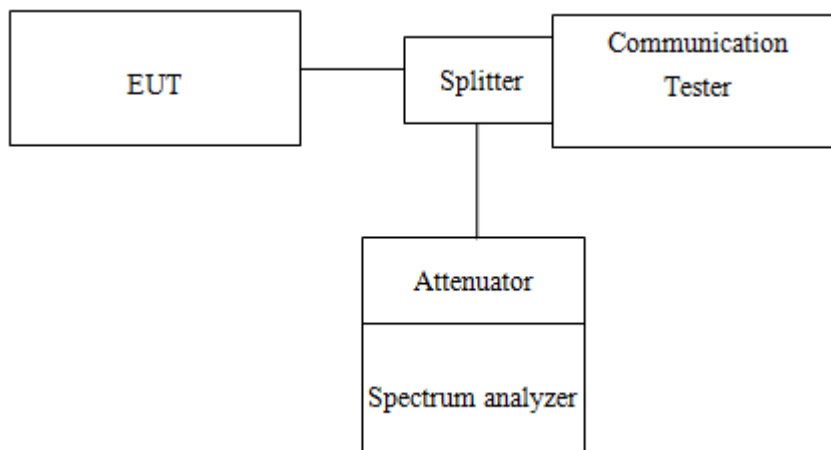
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8.5 Frequency Stability Measurement



Note: Measurement setup for testing on Antenna connector

8.6 Peak To Average Ratio



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9 TEST PROCEDURE

9.1 Maximum Output Power

9.1.1 Output Power Measurement Applicable Guidance

The transmitter output was connected to a communication tester. Transmitter output was read off the communication tester in dBm. The power output at the transmitter antenna port was determined by the communication tester reading.

KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results.

All LTE bands conducted average power is obtained from the simulator telecommunication test set.

9.1.2 Determining ERP and/or EIRP from conducted RF output power measurements

According to KDB 412172 D01 Power Approach,

$$EIRP = P_T + G_T - L_C,$$

$$ERP = EIRP - 2.15,$$

Where:

- ERP or EIRP = effective radiated power or equivalent isotropically radiated power (expressed in the same units as P_T , typically dBW, dBm, or power spectral density (PSD)²), relative to either a dipole antenna (ERP) or an isotropic antenna (EIRP);
- P_T = transmitter output power, expressed in dBW, dBm, or PSD;
- G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
- L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

9.2 Occupied Bandwidth Measurement

99% & 26dB Bandwidth with detector peak

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 * RBW, with span > 2 * Signal BW, set % Power = 99%.

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9.3 Out of Band Emission at Antenna Terminals

9.3.1 Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

9.3.2 Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting RBW \geq 1% EBW.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

9.4 Field Strength of Spurious Radiation Measurement

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBd)} + \text{Cable Loss(dB)}$$

$$\text{EIRP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBi)} + \text{Cable Loss(dB)}$$

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9.5 Frequency Stability Measurement

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change.

9.6 Peak to Average Ratio

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth \geq signal's occupied bandwidth; & internal =1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

10 MEASUREMENT RESULTS

Please refer to the Annex A-Measurement Results.

~ End of Report ~

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