

TEST REPORT

Reference No...... : WTF18S09122915-1W
FCC ID : 2AAGEAV5AV72
Applicant..... : Chengdu Vantron Technology, Ltd.
Address..... : No.5 Gaopeng Road, Hi-Tech Zone, Chengdu, Sichuan, P.R. China
610045
Manufacturer : The same as above
Address..... : The same as above
Product..... : M2M Gateway
Model(s) : AV5, AV7
Brand Name..... : NA
Standards..... : FCC CFR47 Part 22 Subpart H: 2016
FCC CFR47 Part 24 Subpart E: 2016
FCC CFR47 Part 27: 2016
Date of Receipt sample : 2018-09-04
Date of Test : 2018-09-05 to 2018-09-28
Date of Issue..... : 2018-09-29
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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2 Laboratories Introduction

Waltek Services Test Group Ltd. is one of the largest and the most comprehensive third party testing organizations in China, our headquarter located in Shenzhen (CNAS Registration No. L3110, A2LA Certificate Number: 4243.01) and have branches in Foshan (CNAS Registration No. L6478), Dongguan (CNAS Registration No. L9950), Zhongshan, Suzhou (CNAS Registration No. L7754), Ningbo and Hong Kong, Our test capability covered four large fields: safety test. Electronic Magnetic Compatibility(EMC), reliability and energy performance, Chemical test. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CPSC(Consumer Product Safety Commission), CEC(California energy efficiency), IC(Industry Canada) and ELI(Efficient Lighting Initiative). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as UL, Intertek(ETL-SEMKO), CSA, TÜV Rheinland, TÜV SÜD, etc. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

Waltek Services (Shenzhen) Co., Ltd.

A. Accreditations for Conformity Assessment (International)

Country/Region	Accreditation Body	Scope	Note
USA	CNAS (Registration No.: L3110) A2LA (Certificate No.: 4243.01)	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India	International Services	WPC	-
Thailand		NTC	-
Singapore		IDA	-
Note:			
1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.			
2. IC Canada Registration No.: 7760A			

B. TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of ...	Notify body number
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TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

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4 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTF18S09122 915-1W	2018-09-04	2018-09-04 to 2019-09- 28	2018-09-29	original	-	Vaild

5 General Information

5.1 General Description of E.U.T.

Product:	M2M Gateway
Model(s):	AV5, AV7
Model Description:	The models are different in size and appearance. Two models were tested. The worst data of AV 5 is recorded in the report.
WCDMA Band(s)	Band2/5
LTE Band(s):	FDD Band 2/4/5/12/13/17
Wi-Fi Specification:	2.4G-802.11b/g/n HT20 802.11n HT40
NFC:	Support
Highest frequency (Exclude Radio):	1.0GHz
Note:	NA.

5.2 Details of E.U.T.

Operation Frequency:	LTE Band 2: 1850~1910MHz LTE Band 4: 1710~1755MHz LTE Band 5: 824~849MHz LTE Band 12: 699~716MHz LTE Band 13: 777~787MHz LTE Band 17: 704~716MHz
Max. RF output power:	LTE Band 2: 0.220W LTE Band 4: 0.205W LTE Band 5: 0.195W LTE Band 12: 0.193W LTE Band 13: 0.194W LTE Band 17: 0.197W
Type of Modulation:	LTE: QPSK, 16QAM
Antenna installation:	LTE: internal permanent antenna
Antenna Gain:	LTE Band 2: 1.79dBi LTE Band 4: -0.12dBi LTE Band 5: -1.56dBi LTE Band 12: -2.76dBi LTE Band 13: -1.28dBi LTE Band 17: -2.76dBi
Ratings:	DC 12-34V by DC Power DC 5V 1A by PC

5.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Support Band	Test Mode BW(MHz)	Channel Frequency	Channel Number
LTE Band 2	1.4	1850.7 MHz	18607
		1880.0 MHz	18900
		1909.3 MHz	19193
	3	1851.5 MHz	18615
		1880.0 MHz	18900
		1908.5 MHz	19185
	5	1852.5 MHz	18625
		1880.0 MHz	18900
		1907.5 MHz	19175
	10	1855.0 MHz	18650
		1880.0 MHz	18900
		1905.0 MHz	19150
	15	1857.5 MHz	18675
		1880.0 MHz	18900
		1902.5 MHz	19125
20	1860.0 MHz	18700	
	1880.0 MHz	18900	
	1900.0 MHz	19100	
LTE Band 4	1.4	1710.7 MHz	19957
		1732.5 MHz	20175
		1754.3 MHz	20393
	3	1711.5 MHz	19965
		1732.5 MHz	20175
		1753.5 MHz	20385
	5	1712.5 MHz	19975
		1732.5 MHz	20175
		1752.5 MHz	20375
	10	1715.0 MHz	20000
		1732.5 MHz	20175
		1750.0 MHz	20350
	15	1717.5 MHz	20025
		1732.5 MHz	20175
		1747.5 MHz	20325
20	1720.0 MHz	20050	
	1732.5 MHz	20175	
	1745.0 MHz	20300	
LTE Band 5	1.4	824.7 MHz	20407
		836.5 MHz	20525
		848.3 MHz	20643

	3	825.5 MHz	20415
		836.5 MHz	20525
		847.5 MHz	20635
	5	826.5 MHz	20425
		836.5 MHz	20525
		846.5 MHz	20625
	10	829.0 MHz	20450
		836.5 MHz	20525
		844.0 MHz	20600
LTE Band 12	1.4	699.7 MHz	23017
		707.5 MHz	23095
		715.3 MHz	23173
	3	700.5 MHz	23025
		707.5 MHz	23095
		714.5 MHz	23165
	5	701.5 MHz	23035
		707.5 MHz	23095
		713.5 MHz	23155
	10	704.0 MHz	23060
		707.5 MHz	23095
		711.0 MHz	23130
LTE Band 13	5	779.5 MHz	23205
		782.0 MHz	23230
		784.5 MHz	23255
	10	782.0 MHz	23230
LTE Band 17	5	706.5 MHz	23755
		710.0 MHz	23790
		713.5 MHz	23825
	10	709.0 MHz	23780
		710.0 MHz	23790
		711.0 MHz	23800
Remark: All mode(s) were tested and the worst data was recorded.			

6 Test Summary

Test Items	Test Requirement	Result
(a)RF Output Power	2.1046 22.913 (a) 24.232 (c) 27.50(h.2) 27.50(d.4)	PASS
(b)Peak-to-Average Ratio	24.232 (d) 27.50(d)	PASS
(c)Bandwidth	2.1049 22.905 22.917 24.238 27.53(a)	PASS
(d)Spurious Emissions at Antenna Terminal	2.1051 22.917 (a) 24.238 (a) 27.53(h) 27.53(m)(4)	PASS
(e)Field Strength of Spurious Radiation	2.1053 22.917 (a) 24.238 (a) 27.53(h) 27.53(m)(4)	PASS
(f)Out of band emission	22.917 (a) 24.238 (a) 27.53(h) 27.53(m)(4)	PASS
(g)Frequency Stability	2.1055 22.355 24.235 27.5(h) 27.54	PASS
Remark: test items for(a,b,c,f,g), which can cite data from the original module(FCC ID:R17LE910NAV2) report.		

7 Equipment Used during Test

7.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	2018-09-12	2019-09-11
2.	LISN	R&S	ENV216	101215	2018-09-12	2019-09-11
3.	Cable	Top	TYPE16(3.5M)	-	2018-09-12	2019-09-11
Conducted Emissions Test Site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	2018-09-12	2019-09-11
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	2018-09-12	2019-09-11
3.	Limiter	York	MTS-IMP-136	261115-001-0024	2018-09-12	2019-09-11
4.	Cable	LARGE	RF300	-	2018-09-12	2019-09-11
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	100091	2018-04-29	2019-04-28
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2018-04-09	2019-04-08
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2018-04-09	2019-04-08
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2018-09-12	2019-09-11
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2018-04-09	2019-04-08
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2018-04-09	2019-04-08
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2018-04-13	2019-04-12
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	2018-04-13	2019-04-12
9	Signal Generator	R&S	SMR20	100046	2018-09-12	2019-09-11
10	Smart Antenna	SCHWARZBECK	HA08	-	2018-04-09	2019-04-08
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2018-04-13	2019-04-12
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2018-04-09	2019-04-08

3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	2018-04-13	2019-04-12
4	Cable	HUBER+SUHNER	CBL2	525178	2018-04-13	2019-04-12
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2018-09-12	2019-09-11
2.	Spectrum Analyzer	Agilent	N9020A	MY49100060	2018-09-12	2019-09-11
3.	Universal Radio Communication Tester	R&S	CMW 500	127818	2018-04-13	2019-04-12
4	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2018-09-12	2019-09-11

7.2 Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission	± 3.64 dB(AC mains 150KHz~30MHz)
Radiated Spurious Emissions	± 5.08 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Radio Frequency	± 1 x 10 ⁻⁷ Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7dB
Conducted Spurious Emissions	± 2.76 dB (9kHz~26500MHz)
Confidence interval: 95%. Confidence factor:k=2	

7.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

ERP and EIRP

LTE Band 2

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	RX Antenna		Substituted			Absolute Level (dBm)	Part 24E	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
LTE Band 2 Channel 18607 – 1.4MHz – QPSK										
1850.70	76.36	10	1.3	H	2.39	0.31	10.40	12.48	33	-20.52
1850.70	84.03	352	1.1	V	10.75	0.31	10.40	20.84	33	-12.16
LTE Band 2 Channel 18900 – 1.4MHz – QPSK										
1880.00	77.00	99	2.5	H	3.15	0.31	10.40	13.24	33	-19.76
1880.00	84.20	236	1.1	V	11.08	0.31	10.40	21.17	33	-11.83
LTE Band 2 Channel 19193 – 1.4MHz – QPSK										
1909.30	78.27	192	2.0	H	4.54	0.32	10.40	14.62	33	-18.38
1909.30	84.63	40	2.1	V	11.67	0.32	10.40	21.75	33	-11.25
LTE Band 2 Channel 18607 – 1.4MHz – 16QAM										
1850.70	78.05	77	2.1	H	4.08	0.31	10.40	14.17	33	-18.83
1850.70	84.85	1	1.6	V	11.57	0.31	10.40	21.66	33	-11.34
LTE Band 2 Channel 18900 – 1.4MHz – 16QAM										
1880.00	79.22	52	1.6	H	5.37	0.31	10.40	15.46	33	-17.54
1880.00	84.36	163	1.3	V	11.24	0.31	10.40	21.33	33	-11.67
LTE Band 2 Channel 19193 – 1.4MHz – 16QAM										
1909.30	77.77	51	1.9	H	4.04	0.32	10.40	14.12	33	-18.88
1909.30	84.75	266	2.1	V	11.79	0.32	10.40	20.87	33	-12.13
LTE Band 2 Channel 18615 – 3MHz – QPSK										
1851.50	76.72	237	2.1	H	2.75	0.31	10.40	12.84	33	-20.16
1851.50	84.98	9	2.1	V	11.70	0.31	10.40	21.79	33	-11.21
LTE Band 2 Channel 18900 – 3MHz – QPSK										
1880.00	79.57	111	1.4	H	5.72	0.31	10.40	15.81	33	-17.19
1880.00	84.42	55	1.0	V	11.30	0.31	10.40	21.39	33	-11.61
LTE Band 2 Channel 19185 – 3MHz – QPSK										
1908.50	79.31	64	2.1	H	5.58	0.32	10.40	15.66	33	-17.34
1908.50	84.46	201	1.9	V	11.50	0.32	10.40	21.58	33	-11.42
LTE Band 2 Channel 18615 – 3MHz – 16QAM										
1851.50	76.42	336	2.3	H	2.45	0.31	10.40	12.54	33	-20.46
1851.50	84.17	52	2.2	V	10.89	0.31	10.40	20.98	33	-12.02
LTE Band 2 Channel 18900 – 3MHz – 16QAM										
1880.00	77.10	116	2.5	H	3.25	0.31	10.40	13.34	33	-19.66
1880.00	84.97	15	1.1	V	11.85	0.31	10.40	21.64	33	-11.36
LTE Band 2 Channel 19185 – 3MHz – 16QAM										
1908.50	78.16	193	2.4	H	4.43	0.32	10.40	14.51	33	-18.49
1908.50	84.57	285	1.9	V	11.61	0.32	10.40	21.69	33	-11.31
LTE Band 2 Channel 18625 – 5MHz – QPSK										
1852.50	76.69	132	2.0	H	2.72	0.31	10.40	12.81	33	-20.19
1852.50	84.55	86	1.1	V	11.27	0.31	10.40	21.36	33	-11.64
LTE Band 2 Channel 18900 – 5MHz – QPSK										
1880.00	78.73	283	1.5	H	4.88	0.31	10.40	14.97	33	-18.03

1880.00	84.29	73	1.8	V	11.17	0.31	10.40	21.26	33	-11.74
LTE Band 2 Channel 19175 – 5MHz – QPSK										
1907.50	76.28	222	1.9	H	2.55	0.32	10.40	12.63	33	-20.37
1907.50	84.14	2	1.3	V	11.18	0.32	10.40	21.26	33	-11.74
LTE Band 2 Channel 18625 – 5MHz – 16QAM										
1852.50	78.59	266	2.2	H	4.62	0.31	10.40	14.71	33	-18.29
1852.50	84.40	97	1.2	V	11.12	0.31	10.40	21.21	33	-11.79
LTE Band 2 Channel 18900 – 5MHz – 16QAM										
1880.00	76.86	281	2.0	H	3.01	0.31	10.40	13.10	33	-19.90
1880.00	84.12	33	1.2	V	11.00	0.31	10.40	21.09	33	-11.91
LTE Band 2 Channel 19175 – 5MHz – 16QAM										
1907.50	77.01	52	1.1	H	3.28	0.32	10.40	13.36	33	-19.64
1907.50	84.55	200	2.1	V	11.59	0.32	10.40	21.67	33	-11.33
LTE Band 2 Channel 18650 – 10MHz – QPSK										
1855.00	77.25	72	1.1	H	3.28	0.31	10.40	13.37	33	-19.63
1855.00	84.88	330	2.3	V	11.60	0.31	10.40	21.69	33	-11.31
LTE Band 2 Channel 18900 – 10MHz – QPSK										
1880.00	77.48	89	2.2	H	3.63	0.31	10.40	13.72	33	-19.28
1880.00	84.15	269	1.9	V	11.03	0.31	10.40	21.12	33	-11.88
LTE Band 2 Channel 19150 – 10MHz – QPSK										
1905.00	77.84	258	1.9	H	4.11	0.32	10.40	14.19	33	-18.81
1905.00	84.34	27	1.9	V	11.38	0.32	10.40	21.46	33	-11.54
LTE Band 2 Channel 18650 – 10MHz – 16QAM										
1855.00	76.70	303	1.5	H	2.73	0.31	10.40	12.82	33	-20.18
1855.00	84.50	211	1.7	V	11.22	0.31	10.40	21.31	33	-11.69
LTE Band 2 Channel 18900 – 10MHz – 16QAM										
1880.00	78.30	8	1.3	H	4.45	0.31	10.40	14.54	33	-18.46
1880.00	84.06	49	2.4	V	10.94	0.31	10.40	21.03	33	-11.97
LTE Band 2 Channel 19150 – 10MHz – 16QAM										
1905.00	79.19	156	2.3	H	5.46	0.32	10.40	15.54	33	-17.46
1905.00	84.44	234	1.7	V	11.48	0.32	10.40	21.56	33	-11.44
LTE Band 2 Channel 18675 – 15MHz – QPSK										
1857.50	77.76	213	1.5	H	3.79	0.31	10.40	13.88	33	-19.12
1857.50	84.29	42	1.2	V	11.01	0.31	10.40	21.10	33	-11.90
LTE Band 2 Channel 18900 – 15MHz – QPSK										
1880.00	76.46	228	1.3	H	2.61	0.31	10.40	12.70	33	-20.30
1880.00	84.14	266	1.6	V	11.02	0.31	10.40	21.11	33	-11.89
LTE Band 2 Channel 19125 – 15MHz – QPSK										
1902.50	78.85	278	1.7	H	5.12	0.32	10.40	15.20	33	-17.80
1902.50	84.51	314	2.4	V	11.55	0.32	10.40	21.63	33	-11.37
LTE Band 2 Channel 18675 – 15MHz – 16QAM										
1857.50	76.19	278	2.1	H	2.22	0.31	10.40	12.31	33	-20.69
1857.50	84.11	289	1.3	V	10.83	0.31	10.40	20.92	33	-12.08
LTE Band 2 Channel 18900 – 15MHz – 16QAM										
1880.00	78.58	218	1.0	H	4.73	0.31	10.40	14.82	33	-18.18
1880.00	84.32	100	2.4	V	11.20	0.31	10.40	21.29	33	-11.71
LTE Band 2 Channel 19125 – 15MHz – 16QAM										

1902.50	77.40	162	1.3	H	3.67	0.32	10.40	13.75	33	-19.25
1902.50	84.30	141	1.9	V	11.34	0.32	10.40	21.42	33	-11.58
LTE Band 2 Channel 18700 – 20MHz – QPSK										
1860.00	78.14	330	1.1	H	4.17	0.31	10.40	14.26	33	-18.74
1860.00	84.36	185	2.3	V	11.08	0.31	10.40	21.17	33	-11.83
LTE Band 2 Channel 18900 – 20MHz – QPSK										
1880.00	76.33	261	1.3	H	2.48	0.31	10.40	12.57	33	-20.43
1880.00	84.84	118	1.0	V	11.72	0.31	10.40	21.81	33	-11.19
LTE Band 2 Channel 19100 – 20MHz – QPSK										
1900.00	77.87	215	1.8	H	4.14	0.32	10.40	14.22	33	-18.78
1900.00	84.95	279	2.4	V	11.99	0.32	10.40	22.07	33	-10.93
LTE Band 2 Channel 18670 – 20MHz – 16QAM										
1860.00	78.50	80	1.6	H	4.53	0.31	10.40	14.62	33	-18.38
1860.00	84.05	341	1.8	V	10.77	0.31	10.40	20.86	33	-12.14
LTE Band 2 Channel 18900 – 20MHz – 16QAM										
1880.00	78.65	260	1.7	H	4.80	0.31	10.40	14.89	33	-18.11
1880.00	84.39	168	1.1	V	11.27	0.31	10.40	21.36	33	-11.64
LTE Band 2 Channel 19100 – 20MHz – 16QAM										
1900.00	78.63	72	1.4	H	4.90	0.32	10.40	14.98	33	-18.02
1900.00	84.58	89	2.1	V	11.62	0.32	10.40	21.70	33	-11.30

LTE Band 4

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	RX Antenna		Substituted			Absolute Level (dBm)	Part 27	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
LTE Band 4 Channel 19957 – 1.4MHz – QPSK										
1710.70	78.97	323	1.3	H	4.86	0.30	9.40	13.96	30	-16.04
1710.70	84.08	76	1.4	V	10.55	0.30	9.40	19.65	30	-10.35
LTE Band 4 Channel 20175 – 1.4MHz – QPSK										
1732.50	78.92	209	1.4	H	4.81	0.30	9.40	13.91	30	-16.09
1732.50	84.89	244	2.0	V	11.36	0.30	9.40	20.16	30	-9.84
LTE Band 4 Channel 20393 – 1.4MHz – QPSK										
1754.30	76.58	150	2.1	H	2.47	0.30	9.40	11.57	30	-18.43
1754.30	84.99	359	1.6	V	11.46	0.30	9.40	20.06	30	-9.94
LTE Band 4 Channel 19957 – 1.4MHz – 16QAM										
1710.70	79.03	328	2.1	H	4.92	0.30	9.40	14.02	30	-15.98
1710.70	84.99	158	1.4	V	11.46	0.30	9.40	20.26	30	-9.74
LTE Band 4 Channel 20175 – 1.4MHz – 16QAM										
1732.50	79.37	316	1.6	H	5.26	0.30	9.40	14.36	30	-15.64
1732.50	84.05	338	1.6	V	10.52	0.30	9.40	19.62	30	-10.38
LTE Band 4 Channel 20393 – 1.4MHz – 16QAM										
1754.30	78.40	292	1.6	H	4.29	0.30	9.40	13.39	30	-16.61
1754.30	84.53	277	1.7	V	11.00	0.30	9.40	20.10	30	-9.90
LTE Band 4 Channel 19965 – 3MHz – QPSK										
1711.50	78.96	32	1.4	H	4.85	0.30	9.40	13.95	30	-16.05
1711.50	84.70	186	1.6	V	11.17	0.30	9.40	20.17	30	-9.83
LTE Band 4 Channel 20175 – 3MHz – QPSK										
1732.50	78.61	155	2.1	H	4.50	0.30	9.40	13.60	30	-16.40
1732.50	84.96	343	1.1	V	11.43	0.30	9.40	20.13	30	-9.87
LTE Band 4 Channel 20385 – 3MHz – QPSK										
1753.50	78.69	155	1.4	H	4.58	0.30	9.40	13.68	30	-16.32
1753.50	84.87	142	1.1	V	11.34	0.30	9.40	20.14	30	-9.86
LTE Band 4 Channel 19965 – 3MHz – 16QAM										
1711.50	79.59	82	1.2	H	5.48	0.30	9.40	14.58	30	-15.42
1711.50	84.87	254	1.7	V	11.34	0.30	9.40	20.44	30	-9.56
LTE Band 4 Channel 20175 – 3MHz – 16QAM										
1732.50	79.17	335	1.2	H	5.06	0.30	9.40	14.16	30	-15.84
1732.50	84.63	181	1.4	V	11.10	0.30	9.40	20.20	30	-9.80
LTE Band 4 Channel 20385 – 3MHz – 16QAM										
1753.50	79.44	51	1.9	H	5.33	0.30	9.40	14.43	30	-15.57
1753.50	84.49	137	1.7	V	10.96	0.30	9.40	20.06	30	-9.94
LTE Band 4 Channel 19975 – 5MHz – QPSK										
1712.50	76.63	104	2.2	H	2.52	0.30	9.40	11.62	30	-18.38
1712.50	84.39	92	1.5	V	10.86	0.30	9.40	19.96	30	-10.04
LTE Band 4 Channel 20175 – 5MHz – QPSK										
1732.50	76.29	82	2.4	H	2.18	0.30	9.40	11.28	30	-18.72

1732.50	84.50	324	1.9	V	10.97	0.30	9.40	20.07	30	-9.93
LTE Band 4 Channel 20375 – 5MHz – QPSK										
1752.50	77.82	143	1.5	H	3.71	0.30	9.40	12.81	30	-17.19
1752.50	84.66	41	2.2	V	11.13	0.30	9.40	20.23	30	-9.77
LTE Band 4 Channel 19975 – 5MHz – 16QAM										
1712.50	77.15	112	2.1	H	3.04	0.30	9.40	12.14	30	-17.86
1712.50	84.33	257	1.4	V	10.80	0.30	9.40	19.90	30	-10.10
LTE Band 4 Channel 20175 – 5MHz – 16QAM										
1732.50	77.65	78	1.6	H	3.54	0.30	9.40	12.64	30	-17.36
1732.50	84.69	45	2.0	V	11.16	0.30	9.40	20.26	30	-9.74
LTE Band 4 Channel 20375 – 5MHz – 16QAM										
1752.50	79.91	234	1.5	H	5.80	0.30	9.40	14.90	30	-15.10
1752.50	84.16	38	1.4	V	10.63	0.30	9.40	19.73	30	-10.27
LTE Band 4 Channel 20000 – 10MHz – QPSK										
1715.00	77.84	167	1.0	H	3.73	0.30	9.40	12.83	30	-17.17
1715.00	84.41	120	1.3	V	10.88	0.30	9.40	19.98	30	-10.02
LTE Band 4 Channel 20175 – 10MHz – QPSK										
1732.50	76.32	141	1.9	H	2.21	0.30	9.40	11.31	30	-18.69
1732.50	84.99	126	1.2	V	11.46	0.30	9.40	20.56	30	-9.44
LTE Band 4 Channel 20350 – 10MHz – QPSK										
1750.00	78.76	318	2.3	H	4.65	0.30	9.40	13.75	30	-16.25
1750.00	84.80	350	1.5	V	11.27	0.30	9.40	20.37	30	-9.63
LTE Band 4 Channel 20000 – 10MHz – 16QAM										
1715.00	77.80	110	2.4	H	3.69	0.30	9.40	12.79	30	-17.21
1715.00	84.28	322	2.3	V	10.75	0.30	9.40	19.85	30	-10.15
LTE Band 4 Channel 20175 – 10MHz – 16QAM										
1732.50	78.82	159	1.2	H	4.71	0.30	9.40	13.81	30	-16.19
1732.50	84.09	65	2.1	V	10.56	0.30	9.40	19.66	30	-10.34
LTE Band 4 Channel 20350 – 10MHz – 16QAM										
1750.00	79.24	110	1.8	H	5.13	0.30	9.40	14.23	30	-15.77
1750.00	84.07	197	2.3	V	10.54	0.30	9.40	19.64	30	-10.36
LTE Band 4 Channel 20025 – 15MHz – QPSK										
1717.50	79.53	305	1.8	H	5.42	0.30	9.40	14.52	30	-15.48
1717.50	84.75	213	1.4	V	11.22	0.30	9.40	20.32	30	-9.68
LTE Band 4 Channel 20175 – 15MHz – QPSK										
1732.50	77.58	255	2.3	H	3.47	0.30	9.40	12.57	30	-17.43
1732.50	84.88	337	1.8	V	11.35	0.30	9.40	20.45	30	-9.55
LTE Band 4 Channel 20325 – 15MHz – QPSK										
1747.50	79.54	3	1.1	H	5.43	0.30	9.40	14.53	30	-15.47
1747.50	84.79	217	2.1	V	11.26	0.30	9.40	20.36	30	-9.64
LTE Band 4 Channel 20025 – 15MHz – 16QAM										
1717.50	78.26	348	1.4	H	4.15	0.30	9.40	13.25	30	-16.75
1717.50	84.86	3	1.0	V	11.33	0.30	9.40	20.43	30	-9.57
LTE Band 4 Channel 20175 – 15MHz – 16QAM										
1732.50	79.77	209	1.2	H	5.66	0.30	9.40	14.76	30	-15.24
1732.50	84.77	173	2.2	V	11.24	0.30	9.40	20.34	30	-9.66
LTE Band 4 Channel 20325 – 15MHz – 16QAM										

1747.50	79.00	67	1.1	H	4.89	0.30	9.40	13.99	30	-16.01
1747.50	84.58	5	1.4	V	11.05	0.30	9.40	20.15	30	-9.85
LTE Band 4 Channel 20050 – 20MHz – QPSK										
1720.00	78.07	130	1.1	H	3.96	0.30	9.40	13.06	30	-16.94
1720.00	84.23	277	1.5	V	10.70	0.30	9.40	19.80	30	-10.20
LTE Band 4 Channel 20175 – 20MHz – QPSK										
1732.50	77.93	195	1.3	H	3.82	0.30	9.40	12.92	30	-17.08
1732.50	84.67	41	1.7	V	11.14	0.30	9.40	21.24	30	-8.76
LTE Band 4 Channel 20300 – 20MHz – QPSK										
1745.00	79.38	55	2.2	H	5.27	0.30	9.40	14.37	30	-15.63
1745.00	84.43	236	1.1	V	10.90	0.30	9.40	20.00	30	-10.00
LTE Band 4 Channel 20050 – 20MHz – 16QAM										
1720.00	77.44	10	1.1	H	3.33	0.30	9.40	12.43	30	-17.57
1720.00	84.55	67	1.3	V	11.02	0.30	9.40	20.12	30	-9.88
LTE Band 4 Channel 20175 – 20MHz – 16QAM										
1732.50	77.96	244	2.3	H	3.85	0.30	9.40	12.95	30	-17.05
1732.50	84.56	196	1.6	V	11.03	0.30	9.40	20.13	30	-9.87
LTE Band 4 Channel 20300 – 20MHz – 16QAM										
1745.00	77.66	109	2.3	H	3.55	0.30	9.40	12.65	30	-17.35
1745.00	84.74	280	2.4	V	11.21	0.30	9.40	21.31	30	-8.69

LTE Band 5

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	RX Antenna		Substituted			Absolute Level (dBm)	Part 22H	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
LTE Band 5 Channel 20407 – 1.4MHz – QPSK										
824.70	75.15	78	2.1	H	8.04	0.30	9.40	17.14	38.45	-21.31
824.70	79.17	170	2.0	V	11.64	0.30	9.40	20.74	38.45	-17.71
LTE Band 5 Channel 20525 – 1.4MHz – QPSK										
836.50	74.84	166	2.3	H	7.73	0.30	9.40	16.83	38.45	-21.62
836.50	79.48	6	1.3	V	11.95	0.30	9.40	21.05	38.45	-17.40
LTE Band 5 Channel 20643 – 1.4MHz – QPSK										
848.30	76.79	195	2.3	H	9.68	0.30	9.40	18.78	38.45	-19.67
848.30	79.96	320	1.9	V	12.43	0.30	9.40	21.53	38.45	-16.92
LTE Band 5 Channel 20407 – 1.4MHz – 16QAM										
824.70	75.83	72	1.8	H	8.72	0.30	9.40	17.82	38.45	-20.63
824.70	79.09	350	1.9	V	11.56	0.30	9.40	20.66	38.45	-17.79
LTE Band 5 Channel 20525 – 1.4MHz – 16QAM										
836.50	74.61	288	1.5	H	7.50	0.30	9.40	16.60	38.45	-21.85
836.50	79.38	291	2.5	V	11.85	0.30	9.40	20.95	38.45	-17.50
LTE Band 5 Channel 20643 – 1.4MHz – 16QAM										
848.30	72.42	119	1.5	H	5.31	0.30	9.40	14.41	38.45	-24.04
848.30	79.77	203	1.3	V	12.24	0.30	9.40	21.34	38.45	-17.11
LTE Band 5 Channel 20415 – 3MHz – QPSK										
825.50	75.95	230	1.4	H	8.84	0.30	9.40	17.94	38.45	-20.51
825.50	79.65	260	1.9	V	12.12	0.30	9.40	21.22	38.45	-17.23
LTE Band 5 Channel 20525 – 3MHz – QPSK										
836.50	74.73	327	2.5	H	7.62	0.30	9.40	16.72	38.45	-21.73
836.50	79.42	349	2.4	V	11.89	0.30	9.40	20.99	38.45	-17.46
LTE Band 5 Channel 20635 – 3MHz – QPSK										
847.50	72.84	338	1.4	H	5.73	0.30	9.40	14.83	38.45	-23.62
847.50	79.04	299	2.0	V	11.51	0.30	9.40	20.61	38.45	-17.84
LTE Band 5 Channel 20415 – 3MHz – 16QAM										
825.50	72.80	63	1.4	H	5.69	0.30	9.40	14.79	38.45	-23.66
825.50	79.35	53	1.5	V	11.82	0.30	9.40	20.92	38.45	-17.53
LTE Band 5 Channel 20525 – 3MHz – 16QAM										
836.50	75.34	217	1.9	H	8.23	0.30	9.40	17.33	38.45	-21.12
836.50	79.66	110	1.3	V	12.13	0.30	9.40	21.23	38.45	-17.22
LTE Band 5 Channel 20635 – 3MHz – 16QAM										
847.50	72.07	266	1.7	H	4.96	0.30	9.40	14.06	38.45	-24.39
847.50	79.62	327	1.8	V	12.09	0.30	9.40	21.19	38.45	-17.26
LTE Band 5 Channel 20425 – 5MHz – QPSK										
826.50	75.95	79	1.5	H	8.84	0.30	9.40	17.94	38.45	-20.51
826.50	79.18	197	1.5	V	11.65	0.30	9.40	20.75	38.45	-17.70
LTE Band 5 Channel 20525 – 5MHz – QPSK										
836.50	74.92	95	2.1	H	7.81	0.30	9.40	16.91	38.45	-21.54

836.50	79.18	0	2.5	V	11.65	0.30	9.40	20.75	38.45	-17.70
LTE Band 5 Channel 20625 – 5MHz – QPSK										
846.50	74.02	274	1.3	H	6.91	0.30	9.40	16.01	38.45	-22.44
846.50	79.64	98	2.4	V	12.11	0.30	9.40	21.21	38.45	-17.24
LTE Band 5 Channel 20425 – 5MHz – 16QAM										
826.50	73.15	152	1.1	H	6.04	0.30	9.40	15.14	38.45	-23.31
826.50	79.18	320	1.7	V	11.65	0.30	9.40	20.75	38.45	-17.70
LTE Band 5 Channel 20525 – 5MHz – 16QAM										
836.50	75.41	331	2.3	H	8.30	0.30	9.40	17.40	38.45	-21.05
836.50	79.70	329	1.6	V	12.17	0.30	9.40	21.27	38.45	-17.18
LTE Band 5 Channel 20625 – 5MHz – 16QAM										
846.50	74.18	173	1.9	H	7.07	0.30	9.40	16.17	38.45	-22.28
846.50	79.84	46	2.3	V	12.31	0.30	9.40	21.41	38.45	-17.04
LTE Band 5 Channel 20450 – 10MHz – QPSK										
829.00	75.11	129	2.1	H	8.00	0.30	9.40	17.10	38.45	-21.35
829.00	79.27	140	1.3	V	11.74	0.30	9.40	22.84	38.45	-15.61
LTE Band 5 Channel 20525 – 10MHz – QPSK										
836.50	75.10	195	1.1	H	7.99	0.30	9.40	17.09	38.45	-21.36
836.50	79.18	107	2.3	V	11.65	0.30	9.40	20.75	38.45	-17.70
LTE Band 5 Channel 20600 – 10MHz – QPSK										
844.00	73.27	331	2.1	H	6.16	0.30	9.40	15.26	38.45	-23.19
844.00	79.51	166	1.1	V	11.98	0.30	9.40	21.08	38.45	-17.37
LTE Band 5 Channel 20450 – 10MHz – 16QAM										
829.00	72.71	138	1.2	H	5.60	0.30	9.40	14.70	38.45	-23.75
829.00	79.61	91	1.0	V	12.08	0.30	9.40	21.18	38.45	-17.27
LTE Band 5 Channel 20525 – 10MHz – 16QAM										
836.50	74.10	312	2.1	H	6.99	0.30	9.40	16.09	38.45	-22.36
836.50	79.70	337	1.6	V	12.17	0.30	9.40	21.27	38.45	-17.18
LTE Band 5 Channel 20600 – 10MHz – 16QAM										
844.00	74.76	50	1.1	H	7.65	0.30	9.40	16.75	38.45	-21.70
844.00	79.51	92	1.1	V	11.98	0.30	9.40	22.08	38.45	-16.37

LTE Band 12

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	RX Antenna		Substituted			Absolute Level (dBm)	Part 27	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
LTE Band 12 Channel 23017 – 1.4MHz – QPSK										
699.70	84.39	238	1.4	H	13.39	0.20	0.00	13.19	34.77	-21.58
699.70	92.30	52	2.1	V	20.02	0.20	0.00	19.82	34.77	-14.95
LTE Band 12 Channel 23095 – 1.4MHz – QPSK										
707.50	84.63	65	1.7	H	13.63	0.20	0.00	13.43	34.77	-21.34
707.50	92.02	81	2.5	V	19.74	0.20	0.00	19.54	34.77	-15.23
LTE Band 12 Channel 23173 – 1.4MHz – QPSK										
715.30	86.29	7	2.3	H	15.29	0.20	0.00	15.09	34.77	-19.68
715.30	92.29	59	1.8	V	20.01	0.20	0.00	19.81	34.77	-14.96
LTE Band 12 Channel 23017 – 1.4MHz – 16QAM										
699.70	84.92	104	2.4	H	13.92	0.20	0.00	13.72	34.77	-21.05
699.70	92.46	331	2.3	V	20.18	0.20	0.00	19.98	34.77	-14.79
LTE Band 12 Channel 23095 – 1.4MHz – 16QAM										
707.50	84.87	33	1.8	H	13.87	0.20	0.00	13.67	34.77	-21.10
707.50	92.47	162	1.5	V	20.19	0.20	0.00	19.99	34.77	-14.78
LTE Band 12 Channel 23173 – 1.4MHz – 16QAM										
715.30	87.68	308	2.3	H	16.68	0.20	0.00	16.48	34.77	-18.29
715.30	92.99	293	2.1	V	20.71	0.20	0.00	20.51	34.77	-14.26
LTE Band 12 Channel 23025 – 3MHz – QPSK										
700.50	87.07	41	2.4	H	16.07	0.20	0.00	15.87	34.77	-18.90
700.50	92.56	146	1.6	V	20.28	0.20	0.00	20.08	34.77	-14.69
LTE Band 12 Channel 23095 – 3MHz – QPSK										
707.50	86.90	58	2.2	H	15.90	0.20	0.00	15.70	34.77	-19.07
707.50	92.44	291	1.4	V	20.16	0.20	0.00	19.96	34.77	-14.81
LTE Band 12 Channel 23165 – 3MHz – QPSK										
714.50	86.59	53	2.5	H	15.59	0.20	0.00	15.39	34.77	-19.38
714.50	92.70	281	1.8	V	20.42	0.20	0.00	20.22	34.77	-14.55
LTE Band 12 Channel 23025 – 3MHz – 16QAM										
700.50	85.98	87	1.1	H	14.98	0.20	0.00	14.78	34.77	-19.99
700.50	92.76	283	1.1	V	20.48	0.20	0.00	20.28	34.77	-14.49
LTE Band 12 Channel 23095 – 3MHz – 16QAM										
707.50	87.67	151	1.1	H	16.67	0.20	0.00	16.47	34.77	-18.30
707.50	93.99	65	1.1	V	21.71	0.20	0.00	21.51	34.77	-13.26
LTE Band 12 Channel 23165 – 3MHz – 16QAM										
714.50	85.30	131	1.0	H	14.30	0.20	0.00	14.10	34.77	-20.67
714.50	93.36	167	1.2	V	21.08	0.20	0.00	20.88	34.77	-13.89
LTE Band 12 Channel 23035 – 5MHz – QPSK										
701.50	86.30	63	1.7	H	15.30	0.20	0.00	15.10	34.77	-19.67
701.50	92.19	332	1.0	V	19.91	0.20	0.00	19.71	34.77	-15.06
LTE Band 12 Channel 23095 – 5MHz – QPSK										
707.50	87.49	51	2.2	H	16.49	0.20	0.00	16.29	34.77	-18.48

707.50	92.36	333	1.4	V	20.08	0.20	0.00	19.88	34.77	-14.89
LTE Band 12 Channel 23155 – 5MHz – QPSK										
713.50	84.17	12	1.7	H	13.17	0.20	0.00	12.97	34.77	-21.80
713.50	92.51	199	1.3	V	20.23	0.20	0.00	20.03	34.77	-14.74
LTE Band 12 Channel 23035 – 5MHz – 16QAM										
701.50	84.39	215	1.8	H	13.39	0.20	0.00	13.19	34.77	-21.58
701.50	92.76	148	1.2	V	20.48	0.20	0.00	20.28	34.77	-14.49
LTE Band 12 Channel 23095 – 5MHz – 16QAM										
707.50	87.83	189	1.3	H	16.83	0.20	0.00	16.63	34.77	-18.14
707.50	92.54	139	1.1	V	20.26	0.20	0.00	20.06	34.77	-14.71
LTE Band 12 Channel 23155 – 5MHz – 16QAM										
713.50	84.10	256	2.3	H	13.10	0.20	0.00	12.90	34.77	-21.87
713.50	92.26	48	1.6	V	19.98	0.20	0.00	19.78	34.77	-14.99
LTE Band 12 Channel 23060 – 10MHz – QPSK										
704.00	86.39	87	1.6	H	15.39	0.20	0.00	15.19	34.77	-19.58
704.00	92.27	316	2.3	V	19.99	0.20	0.00	19.79	34.77	-14.98
LTE Band 12 Channel 23095 – 10MHz – QPSK										
707.50	86.30	50	1.4	H	15.30	0.20	0.00	15.10	34.77	-19.67
707.50	92.49	86	1.8	V	20.21	0.20	0.00	21.56	34.77	-13.21
LTE Band 12 Channel 23130 – 10MHz – QPSK										
711.00	85.10	56	1.7	H	14.10	0.20	0.00	13.90	34.77	-20.87
711.00	92.17	165	1.8	V	19.89	0.20	0.00	19.69	34.77	-15.08
LTE Band 12 Channel 23060 – 10MHz – 16QAM										
704.00	86.58	322	1.8	H	15.58	0.20	0.00	15.38	34.77	-19.39
704.00	92.57	235	1.6	V	20.29	0.20	0.00	20.09	34.77	-14.68
LTE Band 12 Channel 23095 – 10MHz – 16QAM										
707.50	84.81	239	1.5	H	13.81	0.20	0.00	13.61	34.77	-21.16
707.50	93.41	312	2.5	V	21.13	0.20	0.00	20.93	34.77	-13.84
LTE Band 12 Channel 23130 – 10MHz – 16QAM										
711.00	85.87	135	2.2	H	14.87	0.20	0.00	14.67	34.77	-20.10
711.00	93.35	246	2.3	V	21.07	0.20	0.00	21.87	34.77	-12.90

LTE Band 13

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	RX Antenna		Substituted			Absolute Level (dBm)	Part 27	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
LTE Band 13 Channel 23205 – 5MHz – QPSK										
779.50	87.09	302	2.4	H	16.09	0.20	0.00	15.89	34.77	-18.88
779.50	92.20	54	1.9	V	19.92	0.20	0.00	19.72	34.77	-15.05
LTE Band 13 Channel 23230 – 5MHz – QPSK										
782.00	85.10	110	1.2	H	14.10	0.20	0.00	13.90	34.77	-20.87
782.00	92.41	187	1.6	V	20.13	0.20	0.00	19.93	34.77	-14.84
LTE Band 13 Channel 23255 – 5MHz – QPSK										
784.50	84.37	190	2.5	H	13.37	0.20	0.00	13.17	34.77	-21.60
784.50	92.51	112	1.7	V	20.23	0.20	0.00	20.03	34.77	-14.74
LTE Band 13 Channel 23205 – 5MHz – 16QAM										
779.50	84.12	250	2.4	H	13.12	0.20	0.00	12.92	34.77	-21.85
779.50	92.80	265	1.6	V	20.52	0.20	0.00	20.32	34.77	-14.45
LTE Band 13 Channel 23230 – 5MHz – 16QAM										
782.00	87.13	305	1.8	H	16.13	0.20	0.00	15.93	34.77	-18.84
782.00	92.78	198	1.2	V	20.50	0.20	0.00	20.30	34.77	-14.47
LTE Band 13 Channel 23255 – 5MHz – 16QAM										
784.50	87.73	287	1.4	H	16.73	0.20	0.00	16.53	34.77	-18.24
784.50	92.93	270	1.2	V	20.65	0.20	0.00	20.45	34.77	-14.32
LTE Band 13 Channel 23230 – 10MHz – QPSK										
782.00	86.58	116	1.2	H	15.58	0.20	0.00	15.38	34.77	-19.39
782.00	92.63	28	1.4	V	20.35	0.20	0.00	21.15	34.77	-13.62
LTE Band 13 Channel 23230 – 10MHz – 16QAM										
782.00	86.61	124	2.3	H	15.61	0.20	0.00	15.41	34.77	-19.36
782.00	92.94	240	2.2	V	20.66	0.20	0.00	21.46	34.77	-13.31

LTE Band 17

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	RX Antenna		Substituted			Absolute Level (dBm)	Part 27	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
LTE Band 17 Channel 23755 – 5MHz – QPSK										
706.50	87.77	332	2.2	H	16.77	0.20	0.00	16.57	34.77	-18.20
706.50	92.94	98	1.6	V	20.66	0.20	0.00	20.36	34.77	-15.31
LTE Band 17 Channel 23790 – 5MHz – QPSK										
710.00	86.86	305	2.1	H	15.86	0.20	0.00	15.66	34.77	-19.11
710.00	92.24	187	1.7	V	19.96	0.20	0.00	19.76	34.77	-15.01
LTE Band 17 Channel 23825 – 5MHz – QPSK										
713.50	87.01	114	2.0	H	16.01	0.20	0.00	15.81	34.77	-18.96
713.50	92.34	164	2.1	V	20.06	0.20	0.00	19.86	34.77	-14.91
LTE Band 17 Channel 23755 – 5MHz – 16QAM										
706.50	86.90	67	1.6	H	15.90	0.20	0.00	15.70	34.77	-19.07
706.50	92.50	355	2.4	V	20.22	0.20	0.00	20.02	34.77	-14.75
LTE Band 17 Channel 23790 – 5MHz – 16QAM										
710.00	86.74	319	2.2	H	15.74	0.20	0.00	15.54	34.77	-19.23
710.00	92.33	343	1.4	V	20.05	0.20	0.00	19.85	34.77	-14.92
LTE Band 17 Channel 23825 – 5MHz – 16QAM										
713.50	86.52	228	2.3	H	15.52	0.20	0.00	15.32	34.77	-19.45
713.50	92.61	339	2.1	V	20.33	0.20	0.00	20.13	34.77	-14.64
LTE Band 17 Channel 23780 – 10MHz – QPSK										
709.00	87.56	196	2.3	H	16.56	0.20	0.00	16.36	34.77	-18.41
709.00	92.04	170	1.2	V	19.76	0.20	0.00	19.56	34.77	-15.21
LTE Band 17 Channel 23790 – 10MHz – QPSK										
710.00	85.73	69	1.8	H	14.73	0.20	0.00	14.53	34.77	-20.24
710.00	92.16	139	2.2	V	19.88	0.20	0.00	19.68	34.77	-15.09
LTE Band 17 Channel 23800 – 10MHz – QPSK										
711.00	87.71	280	2.0	H	16.71	0.20	0.00	16.51	34.77	-18.26
711.00	92.94	261	1.9	V	20.66	0.20	0.00	20.46	34.77	-14.31
LTE Band 17 Channel 23780 – 10MHz – 16QAM										
709.00	84.83	336	1.8	H	13.83	0.20	0.00	13.63	34.77	-21.14
709.00	92.52	124	1.1	V	20.24	0.20	0.00	20.04	34.77	-14.73
LTE Band 17 Channel 23790 – 10MHz – 16QAM										
710.00	86.30	109	2.0	H	15.30	0.20	0.00	15.10	34.77	-19.67
710.00	93.33	295	1.7	V	21.05	0.20	0.00	20.85	34.77	-13.92
LTE Band 17 Channel 23800 – 10MHz – 16QAM										
711.00	87.81	11	1.1	H	16.81	0.20	0.00	16.61	34.77	-18.16
711.00	93.82	191	1.4	V	21.54	0.20	0.00	21.34	34.77	-13.43

8 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement:	FCC Part 2.1051, 22.917(a), 24.238(a), 27.53(h), 27.53(m)(4); 90.691
Test Method:	TIA/EIA-603-D:2010 KDB 971168 D01 Power Meas License Digital Systems v03
Test Mode:	TX transmitting

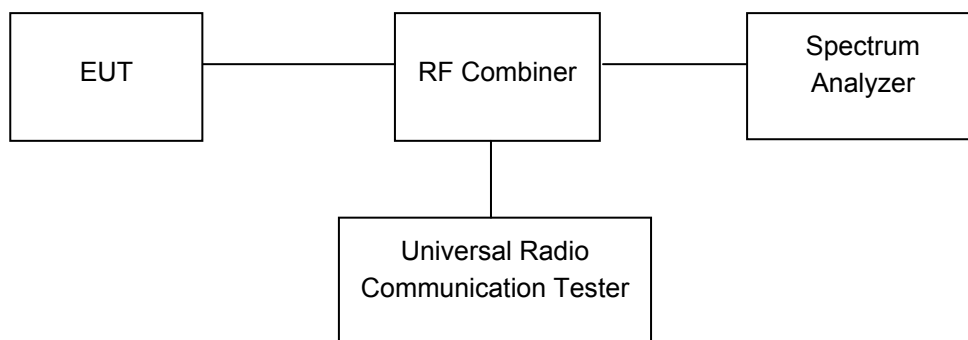
8.1 EUT Operation

Operating Environment :

Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.3kPa

8.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.



8.3 Test Result

PASS

LTE Band

Please refer to the Appendix Band 2/4/5/12/13/17 LTE Transmitter Spurious Emissions.

9 SPURIOUS RADIATED EMISSIONS

Test Requirement:	FCC Part 2.1053, 22.917, 24.238, 27.53(h), 27.53(m)(4); 90.691
Test Method:	TIA/EIA-603-D:2010 KDB 971168 D01 Power Meas License Digital Systems v03
Test Mode:	TX transmitting

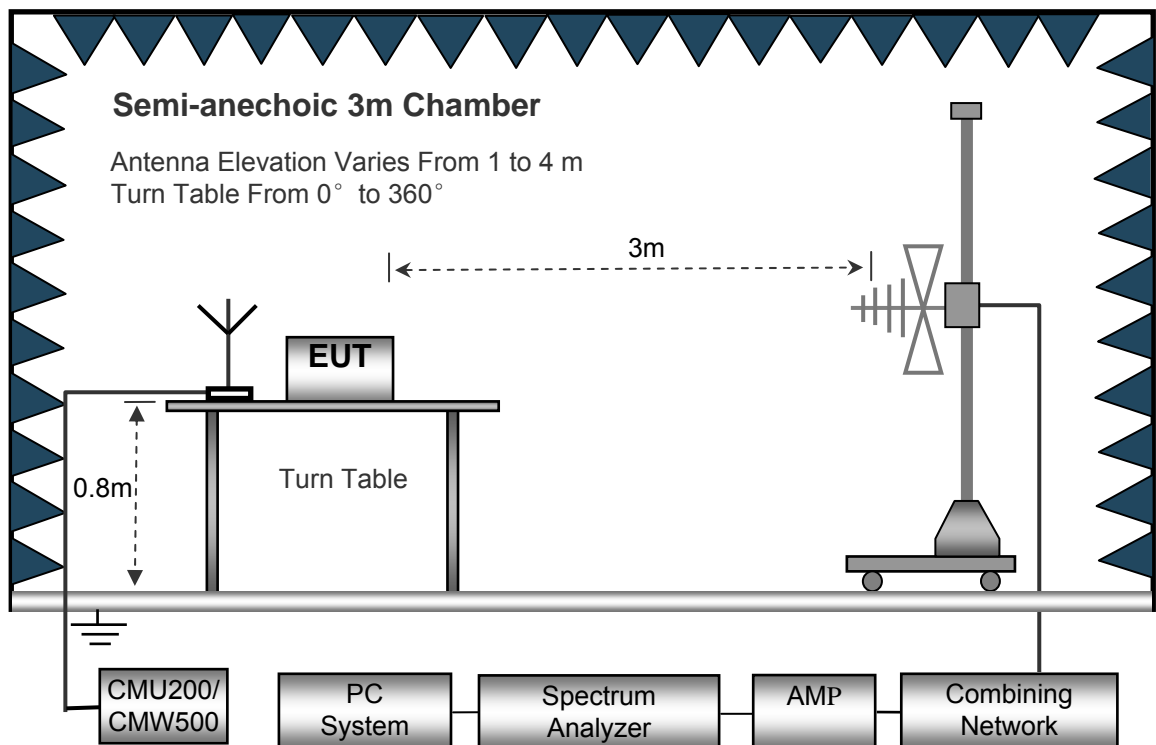
9.1 EUT Operation

Operating Environment :

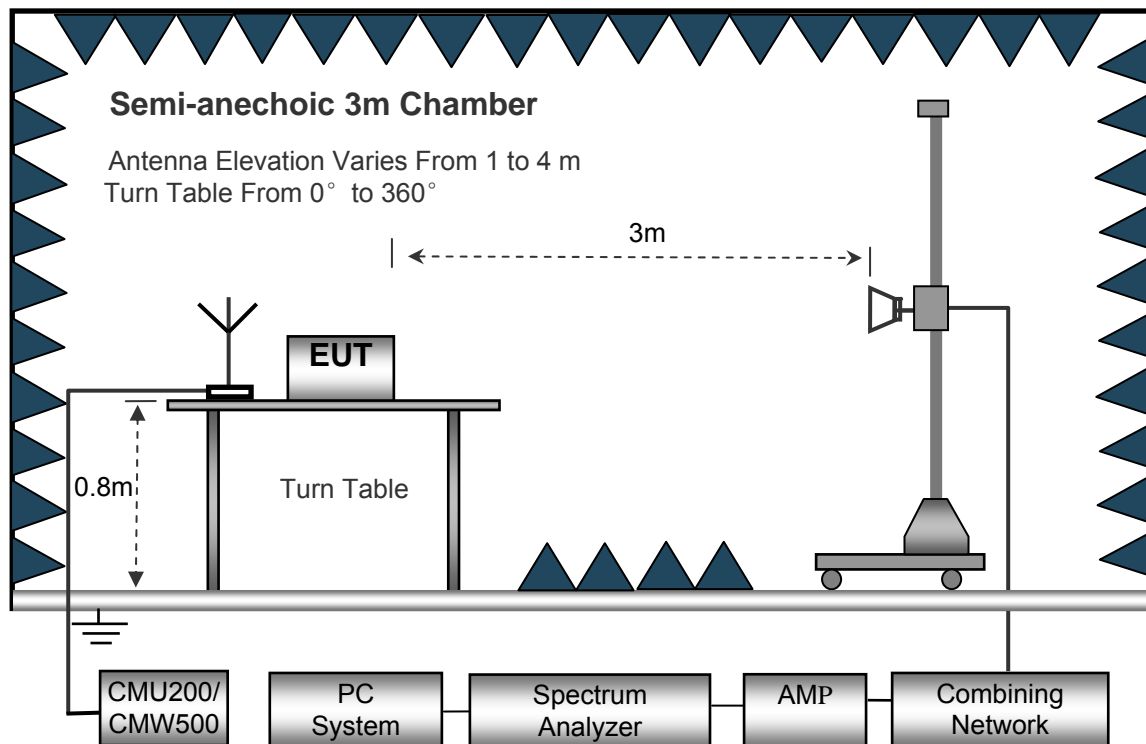
Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.2kPa

9.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site. The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

30MHz ~ 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 100kHz
 Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 3MHz
 Detector Ave.
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 10Hz

9.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from 30MHz up to the tenth harmonic of the highest fundamental frequency.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown was the Z position only.
7. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

8. Repeat above procedures until the measurements for all frequencies are completed.

9.5 Summary of Test Results

Remark: Test performed from 30MHz to 10th harmonics with low/middle/high channels, only the worst data were recorded.

LTE Band 2

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
LTE BAND 2 Channel 18607										
216.37	46.97	177	1.7	H	-63.54	0.15	0.00	-63.69	-13.00	-50.69
216.37	37.84	296	1.1	V	-69.75	0.15	0.00	-69.90	-13.00	-56.90
3701.40	65.95	58	1.7	H	-45.59	2.37	12.50	-35.46	-13.00	-22.46
3701.40	59.98	144	1.5	V	-49.83	2.37	12.50	-39.70	-13.00	-26.70
5552.10	53.58	172	1.1	H	-56.03	2.86	12.90	-45.99	-13.00	-32.99
5552.10	44.73	360	1.5	V	-64.15	2.86	12.90	-54.11	-13.00	-41.11
LTE BAND 2 Channel 18900										
216.37	47.10	105	1.9	H	-63.41	0.15	0.00	-63.56	-13.00	-50.56
216.37	38.55	344	1.8	V	-69.04	0.15	0.00	-69.19	-13.00	-56.19
3760.00	58.53	182	1.3	H	-53.01	2.37	12.50	-42.88	-13.00	-29.88
3760.00	53.43	300	1.2	V	-56.38	2.37	12.50	-46.25	-13.00	-33.25
5640.00	46.10	7	2.0	H	-63.51	2.86	12.90	-53.47	-13.00	-40.47
5640.00	37.40	33	1.6	V	-71.48	2.86	12.90	-61.44	-13.00	-48.44
LTE BAND 2 Channel 19193										
216.37	46.55	115	1.4	H	-63.96	0.15	0.00	-64.11	-13.00	-51.11
216.37	37.74	247	1.8	V	-69.85	0.15	0.00	-70.00	-13.00	-57.00
3818.60	51.58	141	1.8	H	-59.27	2.37	12.60	-49.04	-13.00	-36.04
3818.60	47.15	28	2.0	V	-62.16	2.37	12.60	-51.93	-13.00	-38.93
5727.90	38.80	343	1.9	H	-70.55	2.86	12.90	-60.51	-13.00	-47.51
5727.90	29.87	87	1.6	V	-78.63	2.86	12.90	-68.59	-13.00	-55.59

LTE Band 4

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
LTE BAND 4 Channel 19957										
216.37	38.35	284	1.0	H	-72.16	0.15	0.00	-72.31	-13.00	-59.31
216.37	29.33	344	1.8	V	-78.26	0.15	0.00	-78.41	-13.00	-65.41
3421.40	65.95	106	1.6	H	-47.10	2.34	12.40	-37.04	-13.00	-24.04
3421.40	59.98	2	1.7	V	-51.17	2.34	12.40	-41.11	-13.00	-28.11
5132.10	53.58	317	1.2	H	-55.83	2.79	12.70	-45.92	-13.00	-32.92
5132.10	44.73	132	1.7	V	-64.04	2.79	12.70	-54.13	-13.00	-41.13
LTE BAND 4 Channel 20175										
216.37	39.16	237	2.2	H	-71.35	0.15	0.00	-71.50	-13.00	-58.50
216.37	29.93	159	1.2	V	-77.66	0.15	0.00	-77.81	-13.00	-64.81
3465.00	59.85	248	1.6	H	-53.20	2.37	12.50	-43.07	-13.00	-30.07
3465.00	52.36	287	1.0	V	-58.79	2.37	12.50	-48.66	-13.00	-35.66
5197.50	46.96	21	1.6	H	-62.45	2.79	12.70	-52.54	-13.00	-39.54
5197.50	36.74	295	1.2	V	-72.03	2.79	12.70	-62.12	-13.00	-49.12
LTE BAND 4 Channel 20393										
216.37	38.39	178	1.6	H	-72.12	0.15	0.00	-72.27	-13.00	-59.27
216.37	29.64	294	1.9	V	-77.95	0.15	0.00	-78.10	-13.00	-65.10
3508.60	52.86	314	2.0	H	-59.78	2.37	12.50	-49.65	-13.00	-36.65
3508.60	45.01	334	1.7	V	-65.72	2.37	12.50	-55.59	-13.00	-42.59
5262.90	40.30	65	2.0	H	-69.28	2.81	12.80	-59.29	-13.00	-46.29
5262.90	29.98	336	1.8	V	-78.82	2.81	12.80	-68.83	-13.00	-55.83

LTE Band 5

frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	RX Antenna		Substituted			Absolute Level (dBm)	Result	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
LTE BAND 5 Channel 20407										
199.38	40.22	89	1.7	H	-70.29	0.15	0.00	-70.44	-13.00	-57.44
199.38	31.36	342	1.7	V	-76.23	0.15	0.00	-76.38	-13.00	-63.38
1649.40	65.95	57	1.6	H	-47.10	2.34	12.40	-37.04	-13.00	-24.04
1649.40	59.98	157	2.2	V	-51.17	2.34	12.40	-41.11	-13.00	-28.11
2474.10	53.58	150	1.4	H	-55.83	2.79	12.70	-45.92	-13.00	-32.92
2474.10	44.73	126	1.1	V	-64.04	2.79	12.70	-54.13	-13.00	-41.13
LTE BAND 5 Channel 20525										
199.38	40.70	133	1.7	H	-69.81	0.15	0.00	-69.96	-13.00	-56.96
199.38	30.84	149	1.2	V	-76.75	0.15	0.00	-76.90	-13.00	-63.90
1673.00	59.53	180	1.9	H	-53.52	2.37	12.50	-43.39	-13.00	-30.39
1673.00	53.16	60	2.0	V	-57.99	2.37	12.50	-47.86	-13.00	-34.86
2509.50	46.43	25	1.9	H	-62.98	2.79	12.70	-53.07	-13.00	-40.07
2509.50	38.20	232	2.2	V	-70.57	2.79	12.70	-60.66	-13.00	-47.66
LTE BAND 5 Channel 20643										
199.38	41.52	288	1.5	H	-68.99	0.15	0.00	-69.14	-13.00	-56.14
199.38	31.44	89	1.2	V	-76.15	0.15	0.00	-76.30	-13.00	-63.30
1696.60	53.23	318	1.1	H	-59.41	2.37	12.50	-49.28	-13.00	-36.28
1696.60	45.30	14	1.9	V	-65.43	2.37	12.50	-55.30	-13.00	-42.30
2544.90	39.40	171	2.0	H	-70.18	2.81	12.80	-60.19	-13.00	-47.19
2544.90	32.20	309	1.4	V	-76.60	2.81	12.80	-66.61	-13.00	-53.61

LTE Band 12

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
LTE BAND 12 Channel 23017										
216.37	40.42	262	2.0	H	-70.09	0.15	0.00	-70.24	-13.00	-57.24
216.37	29.70	122	1.1	V	-77.89	0.15	0.00	-78.04	-13.00	-65.04
5597.60	65.95	160	1.2	H	-43.29	2.79	12.70	-33.38	-13.00	-20.38
5597.60	59.98	165	2.1	V	-48.79	2.79	12.70	-38.88	-13.00	-25.88
7696.70	53.58	194	1.1	H	-52.96	3.12	11.50	-44.58	-13.00	-31.58
7696.70	44.73	154	1.6	V	-60.70	3.12	11.50	-52.32	-13.00	-39.32
LTE BAND 12 Channel 23095										
216.37	40.31	100	1.7	H	-70.20	0.15	0.00	-70.35	-13.00	-57.35
216.37	30.36	168	1.2	V	-77.23	0.15	0.00	-77.38	-13.00	-64.38
5660.00	58.54	34	2.1	H	-50.70	2.37	12.50	-40.57	-13.00	-27.57
5660.00	53.53	4	2.0	V	-55.24	2.37	12.50	-45.11	-13.00	-32.11
7782.50	46.17	171	1.6	H	-60.37	3.12	11.50	-51.99	-13.00	-38.99
7782.50	37.55	148	1.1	V	-67.88	3.12	11.50	-59.50	-13.00	-46.50
LTE BAND 12 Channel 23173										
216.37	40.62	249	1.5	H	-69.89	0.15	0.00	-70.04	-13.00	-57.04
216.37	31.13	344	1.9	V	-76.46	0.15	0.00	-76.61	-13.00	-63.61
5722.40	50.59	88	1.1	H	-58.82	2.37	12.50	-48.69	-13.00	-35.69
5722.40	46.72	232	2.1	V	-62.05	2.37	12.50	-51.92	-13.00	-38.92
7868.30	38.26	257	1.1	H	-66.97	3.12	11.50	-58.59	-13.00	-45.59
7868.30	29.94	272	1.6	V	-74.95	3.12	11.50	-66.57	-13.00	-53.57

LTE Band 13

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
LTE BAND 13 Channel 23205										
219.42	39.67	241	2.1	H	-70.84	0.15	0.00	-70.99	-13.00	-57.99
219.42	30.25	83	1.2	V	-77.34	0.15	0.00	-77.49	-13.00	-64.49
5456.50	65.95	93	1.6	H	-43.29	2.79	12.70	-33.38	-13.00	-20.38
5456.50	59.98	235	1.4	V	-48.79	2.79	12.70	-38.88	-13.00	-25.88
7795.00	53.58	134	1.7	H	-52.96	3.12	11.50	-44.58	-13.00	-31.58
7795.00	44.73	291	1.8	V	-60.70	3.12	11.50	-52.32	-13.00	-39.32
LTE BAND 13 Channel 23230										
219.42	38.78	46	1.1	H	-71.73	0.15	0.00	-71.88	-13.00	-58.88
219.42	30.97	272	1.1	V	-76.62	0.15	0.00	-76.77	-13.00	-63.77
5474.00	59.94	321	1.1	H	-49.30	2.37	12.50	-39.17	-13.00	-26.17
5474.00	52.80	149	2.0	V	-55.97	2.37	12.50	-45.84	-13.00	-32.84
7820.00	47.33	159	1.6	H	-59.21	3.12	11.50	-50.83	-13.00	-37.83
7820.00	38.16	293	1.1	V	-67.27	3.12	11.50	-58.89	-13.00	-45.89
LTE BAND 13 Channel 23255										
219.42	38.33	185	1.5	H	-72.18	0.15	0.00	-72.33	-13.00	-59.33
219.42	29.99	201	1.8	V	-77.60	0.15	0.00	-77.75	-13.00	-64.75
5491.50	53.20	37	2.1	H	-56.21	2.37	12.50	-46.08	-13.00	-33.08
5491.50	45.02	167	1.4	V	-63.75	2.37	12.50	-53.62	-13.00	-40.62
7845.00	40.59	233	1.9	H	-64.64	3.12	11.50	-56.26	-13.00	-43.26
7845.00	31.71	344	1.8	V	-73.18	3.12	11.50	-64.80	-13.00	-51.80

LTE Band 17

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
LTE BAND 17 Channel 23755										
216.37	39.01	65	1.4	H	-71.50	0.15	0.00	-71.65	-13.00	-58.65
216.37	31.56	189	2.0	V	-76.03	0.15	0.00	-76.18	-13.00	-63.18
1413.00	65.95	153	1.4	H	-44.29	2.79	12.70	-34.38	-13.00	-21.38
1413.00	59.98	272	1.9	V	-51.79	2.79	12.70	-41.88	-13.00	-28.88
2119.50	53.58	52	2.0	H	-58.96	3.12	11.50	-50.58	-13.00	-37.58
2119.50	44.73	60	1.0	V	-68.70	3.12	11.50	-60.32	-13.00	-47.32
LTE BAND 17 Channel 23790										
216.37	39.21	298	1.8	H	-71.30	0.15	0.00	-71.45	-13.00	-58.45
216.37	31.72	135	1.3	V	-75.87	0.15	0.00	-76.02	-13.00	-63.02
1420.00	59.53	110	1.5	H	-50.71	2.37	12.50	-40.58	-13.00	-27.58
1420.00	53.89	112	1.5	V	-57.88	2.37	12.50	-47.75	-13.00	-34.75
2130.00	47.24	266	1.5	H	-65.30	3.12	11.50	-56.92	-13.00	-43.92
2130.00	38.62	54	2.2	V	-74.81	3.12	11.50	-66.43	-13.00	-53.43
LTE BAND 17 Channel 23825										
216.37	38.32	351	2.0	H	-72.19	0.15	0.00	-72.34	-13.00	-59.34
216.37	32.08	202	1.3	V	-75.51	0.15	0.00	-75.66	-13.00	-62.66
1427.00	52.24	353	1.5	H	-58.00	2.37	12.50	-47.87	-13.00	-34.87
1427.00	46.41	105	2.1	V	-65.36	2.37	12.50	-55.23	-13.00	-42.23
2140.50	39.48	52	1.7	H	-73.06	3.12	11.50	-64.68	-13.00	-51.68
2140.50	30.74	339	1.7	V	-82.69	3.12	11.50	-74.31	-13.00	-61.31

Note: 1) Absolute Level = SG Level - Cable loss + Antenna Gain

2) Margin = Absolute Level - Limit

10 RF Exposure

Test Requirement: FCC Part 1.1307

Test Mode: The EUT work in test mode(Tx).

10.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

10.2 The procedures / limit

FCC Part 1.1307:

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ;

*Plane-wave equivalent power density

10.3 MPE Calculation Method

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

FCC Part 1.1307:

Mode	Antenna Gain (dBi)	Antenna Gain (numeric)	Max.Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
LTE BAND2	1.79	1.510	23.43	220.29	0.066179	1
LTE BAND4	-0.12	0.973	23.12	205.12	0.039694	1
LTE BAND5	-1.56	0.698	22.90	194.98	0.027084	0.550
LTE BAND12	-2.76	0.530	22.86	193.20	0.020357	0.466
LTE BAND13	-1.28	0.745	22.88	194.09	0.028755	0.518
LTE BAND17	-2.76	0.530	22.95	197.24	0.020784	0.469

