

RADIO TEST REPORT

(EN 301 908-1)



Applicant:	Particle Industries, Inc
Address:	126 Post St, 4th floor, San Francisco, CA 94108 USA

Manufacturer or Supplier	Particle Industries, Inc
Address	126 Post St, 4th floor, San Francisco, CA 94108 USA
Product	Tracker One LTE CAT1/3G/2G
Brand Name	Particle
Model Name	ONE523M, ONE524M, ONE523M-NB, ONE524M-NB
Date of tests	Oct. 10, 2020 ~ Oct. 28, 2020

The tests have been carried out according to the requirements of the following standard:

☒ ETSI EN 301 908-1 V13.1.1(2019-11)

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Alex Chen Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
 Date: Oct. 28, 2020	 Date: Oct. 28, 2020

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BUREAU
VERITAS

Test Report No.: RE201009W001-2

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RE201009W001-2	Original release	Oct. 28, 2020

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: EN 301 908-1 V13.1.1			
STANDARD SUBCLAUSE	TEST TYPE AND LIMIT	REMARKS	PASS/FAIL
CROSS REFERENCES FOR USER EQUIPMENT (UE)			
4.2.2	Radiated emissions	Applicable	Pass
4.2.4	Control and monitoring functions	Applicable	Pass
CROSS REFERENCES FOR BASE STATIONS (BS) AND REPEATERS			
4.2.3	Radiated emissions	Not Applicable	NA
APPLIED STANDARD: EN 301 908-2 V11.1.2			
The detail information of the data please refer to report : R1906A0310-R2			
APPLIED STANDARD: EN 301 908-13 V11.1.2			
The detail information of the data please refer to report : R1906A0310-R3			



1.1 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Pre-Amplifier	EMSI	EMC 02325	980224	Jun. 02,20	Jun. 01,21
Signal Pre-Amplifier	EMSI	EMC 012645B	980258	Jun. 02,20	Jun. 01,21
3m Fully-anechoic Chamber	ETS-LINDGREN	10m*5m*5m	Euroshieldpn-CT0001143-1217	May. 19,20	May. 18,23
RS Antenna_LF	Rohde&Schwarz	R&S® HL046E	HL064E	NA	NA
Horn Antenna	ETS-LINDGREN	3117	00168692	Nov. 24,19	Nov. 23,20
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	Jun. 03,20	Jun. 02,21
Radio Communication Analyzer	ANRITSU	MT8820C	6201465425	Mar. 10,20	Mar. 09,21

NOTE:

1. The calibration interval of the above test instruments is 12 months or 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 3m Fully-anechoic Chamber.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.

1.2 MEASUREMENT UNCERTAINTY

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated and shall correspond to an expansion factor (coverage factor) $k = 1,96$ (which provides a confidence level of 95 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Principles for the calculation of measurement uncertainty are contained in ETSI TR 100 028 [i.3], in particular in annex D of the ETSI TR 100 028-2 [i.3].

Tables 5.2-1 and 5.2-2 are based on such expansion factors.

Table 5.2-1: Maximum measurement uncertainty (UE)

Parameter	Uncertainty
Effective radiated RF power between 30 MHz and 180 MHz	± 6 dB
Effective radiated RF power between 180 MHz and 12,75 GHz	± 3 dB
Conducted RF power	± 1 dB



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Tracker One LTE CAT1/3G/2G
BRAND NAME	Particle
MODEL NAME	ONE523M, ONE524M, ONE523M-NB, ONE524M-NB
NOMINAL VOLTAGE	LI+ pin: DC+3.6v--4.2V or Vusb PIN: DC+4.5V--5.5V or Vin PIN: DC 6V--30V
MODULATION TYPE	BPSK,QPSK,16QAM
RADIO TECHNOLOGY	WCDMA / HSDPA / HSUPA/ DC-HSDPA / LTE FDD/ LTE TDD
OPERATING FREQUENCY	WCDMA Band I Tx: 1922.6 ~ 1977.4MHz Rx: 2112.6 ~ 2167.4MHz WCDMA Band VIII Tx: 882.4 ~ 912.6MHz Rx: 927.4MHz ~ 957.6MHz LTE Band 1 Tx: 1922.5 ~ 1977.5MHz Rx: 2112.5 ~ 2167.5MHz LTE Band 3 Tx: 1710.7 ~ 1784.3MHz Rx: 1805.7 ~ 1879.3MHz LTE Band 7 Tx: 2502.5 ~ 2567.5MHz Rx: 2622.5 ~ 2687.5MHz LTE Band 8 Tx: 880.7 ~ 914.3MHz Rx: 925.7 ~ 959.3MHz LTE Band 20 Tx : 834.5 ~ 859.5MHz Rx : 793.5 ~ 818.5MHz LTE Band 28 : Tx: 704.5 ~ 746.5MHz Rx : 759.5~801.5MHz
ANTENNA TYPE	External Antenna
MAX. ANTENNA GAIN	WCDMA Band I : 2.27dBi WCDMA Band VIII : 1.98dBi LTE Band 1 : 2.27dBi LTE Band 3 : 1.94dBi LTE Band 7 : 2.14dBi LTE Band 8 : 1.98dBi LTE Band 20 : 1.98dBi LTE Band 28: 1.98dBi

HW VERSION	V1.0 Product HW Version: V1.0 V1.1 Product HW Version: V1.1
SW VERSION	V1.5.4
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB cable: non-shielded, detachable, 2.0meter

NOTE:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- The difference of V1.0 and V1.1 is V1.1 update PCBA and add some components, which not affect RF function. At the same time, we add three product models on v1.1, ONE524M, ONE523M-NB, ONE524M-NB, please see the table below for the differences of different model.

Product name	e-SIM company	Built-in LiPo battery
ONE523M	Kore	Yes
ONE524M	Twilio	Yes
ONE523M-NB	Kore	No
ONE524M-NB	Twilio	No

- The EUT was powered by the following Battery:

BATTERY	
BRAND:	Zhaoneng
MODEL:	113450
MANUFACTURER	Zhaoneng Battery Industrial Co., Ltd
POWER RATING:	3.7V, 2000mAh

- The EUT matched the following USB cable:

USB CABLE	
BRAND:	KAWEEI
MODEL:	CBUSB31-AM-CM-2000
SIGNAL LINE:	2.0 METER

- For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.



2.1 CONDUCTED POWER

WCDMA Band I & WCDMA Band VIII

Band	WCDMA I			WCDMA VIII		
Channel	9612	9750	9888	2712	2788	2863
Rx Channel	10562	10700	10838	2937	3013	3088
Frequency	1922.4	1950	1977.6	882.4	897.6	912.6
RMC 12.2K	23.28	23.22	23.33	23.08	23.26	23.39
HSDPA Subtest-1	22.26	22.21	22.32	22.10	22.24	22.40
HSDPA Subtest-2	22.30	22.19	22.30	22.09	22.20	22.45
HSDPA Subtest-3	21.75	21.68	21.78	21.56	21.76	21.91
HSDPA Subtest-4	21.72	21.70	21.79	21.58	21.74	21.94
DC-HSDPA Subtest-1	22.24	22.22	22.35	22.07	22.28	22.46
DC-HSDPA Subtest-2	22.21	22.20	22.31	22.11	22.22	22.42
DC-HSDPA Subtest-3	21.69	21.62	22.73	21.60	21.72	21.89
DC-HSDPA Subtest-4	21.67	21.63	22.76	21.57	21.69	21.90
HSUPA Subtest-1	22.25	22.17	22.27	22.05	22.22	22.37
HSUPA Subtest-2	20.29	20.25	20.29	20.02	20.25	20.39
HSUPA Subtest-3	21.22	21.21	21.30	21.08	21.23	21.45
HSUPA Subtest-4	20.23	20.16	20.26	20.11	20.21	20.38
HSUPA Subtest-5	22.21	20.18	22.34	22.12	22.29	22.46
HSPA+ Subtest-1	19.77	19.70	19.81	19.55	19.74	19.92



LTE Band 1

Band/BW	Modulation	RB Size	RB Offset	Low CH 18025	Mid CH 18300	High CH 18575	Tune Up
				Frequency 1922.5 MHz	Frequency 1950 MHz	Frequency 1977.5 MHz	
1/ 5	QPSK	1	0	23.59	23.28	23.45	24.0
		1	24	23.37	23.02	23.23	
		8	0	23.53	23.21	23.43	
		8	17	23.58	23.28	23.43	24.0
	16QAM	1	0	22.52	22.25	22.43	23.0
		1	24	22.24	22.01	22.13	
		8	0	22.58	22.23	22.44	
		8	17	22.01	22.13	21.98	23.0
Band/BW	Modulation	RB Size	RB Offset	Low CH 18050	Mid CH 18300	High CH 18550	Tune Up
				Frequency 1925 MHz	Frequency 1950 MHz	Frequency 1975 MHz	
1/ 10	QPSK	1	0	23.56	23.31	23.45	24.0
		1	49	23.37	23.02	23.24	
		12	0	23.50	23.25	23.39	
		12	38	23.59	23.27	23.46	24.0
	16QAM	1	0	22.52	22.22	22.39	23.0
		1	49	22.29	21.97	22.16	
		12	0	22.58	22.24	22.41	
		12	38	22.00	22.14	21.94	23.0

Band/BW	Modulation	RB Size	RB Offset	Low CH 18075	Mid CH 18300	High CH 18525	Tune Up
				Frequency 1927.5 MHz	Frequency 1950 MHz	Frequency 1972.5 MHz	
1/ 15	QPSK	1	0	23.63	23.31	23.42	24.0
		1	74	23.35	23.07	23.19	
		16	0	23.56	23.28	23.40	
		16	59	23.56	23.28	23.47	24.0
	16QAM	1	0	22.56	22.29	22.39	23.0
		1	74	22.28	21.98	22.16	
		16	0	22.54	22.29	22.43	
		16	59	22.01	22.17	21.96	23.0
Band/BW	Modulation	RB Size	RB Offset	Low CH 18100	Mid CH 18300	High CH 18500	Tune Up
				Frequency 1930 MHz	Frequency 1950 MHz	Frequency 1970 MHz	
1/ 20	QPSK	1	0	23.64	23.35	23.50	24.0
		1	99	23.39	23.10	23.25	
		18	0	23.58	23.29	23.44	
		18	82	23.62	23.33	23.48	24.0
	16QAM	1	0	22.59	22.30	22.45	23.0
		1	99	22.32	22.03	22.18	
		18	0	22.60	22.31	22.46	
		18	82	22.41	22.12	22.27	23.0



LTE Band 3

Band/BW	Modulation	RB Size	RB Offset	Low CH 19207	Mid CH 19575	High CH 19943	Tune Up
				Frequency 1710.7 MHz	Frequency 1747.5 MHz	Frequency 1784.3 MHz	
3/ 1.4	QPSK	1	0	22.82	23.13	22.99	23.5
		1	5	23.02	23.26	23.17	
		5	0	23.07	23.29	23.18	
		5	1	22.97	23.22	23.15	23.5
	16QAM	1	0	21.70	21.95	21.84	22.5
		1	5	21.81	22.02	21.95	
		5	0	21.95	22.19	22.13	
		5	1	21.91	22.19	22.08	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 19215	Mid CH 19575	High CH 19935	Tune Up
				Frequency 1711.5 MHz	Frequency 1747.5 MHz	Frequency 1783.5 MHz	
3/ 3	QPSK	1	0	22.84	23.15	22.98	23.5
		1	14	22.98	23.27	23.17	
		4	0	23.03	23.29	23.18	
		4	11	22.96	23.25	23.15	23.5
	16QAM	1	0	21.67	22.01	21.87	22.5
		1	14	21.78	22.05	21.93	
		4	0	21.98	22.19	22.13	
		4	11	21.87	22.17	22.05	22.5

Band/BW	Modulation	RB Size	RB Offset	Low CH 19225	Mid CH 19575	High CH 19925	Tune Up
				Frequency 1712.5 MHz	Frequency 1747.5 MHz	Frequency 1782.5 MHz	
3/ 5	QPSK	1	0	22.85	23.10	22.99	23.5
		1	24	23.03	23.24	23.17	
		8	0	23.04	23.28	23.22	
		8	17	22.99	23.25	23.12	23.5
	16QAM	1	0	21.68	21.97	21.87	22.5
		1	24	21.75	22.08	21.92	
		8	0	21.98	22.19	22.12	
		8	17	21.92	22.18	22.02	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 19250	Mid CH 19575	High CH 19900	Tune Up
				Frequency 1715 MHz	Frequency 1747.5 MHz	Frequency 1780 MHz	
3/ 10	QPSK	1	0	22.82	23.13	22.99	23.5
		1	49	23.03	23.24	23.18	
		12	0	23.01	23.32	23.18	
		12	38	23.00	23.24	23.15	23.5
	16QAM	1	0	21.68	21.94	21.83	22.5
		1	49	21.80	22.04	21.95	
		12	0	21.98	22.20	22.09	
		12	38	21.90	22.19	22.01	22.5

Band/BW	Modulation	RB Size	RB Offset	Low CH 19275	Mid CH 19575	High CH 19875	Tune Up
				Frequency 1717.5 MHz	Frequency 1747.5 MHz	Frequency 1777.5 MHz	
3/ 15	QPSK	1	0	22.89	23.13	22.96	23.5
		1	74	23.01	23.29	23.13	
		16	0	23.07	23.35	23.19	
		16	59	22.97	23.25	23.16	23.5
	16QAM	1	0	21.72	22.01	21.83	22.5
		1	74	21.79	22.05	21.95	
		16	0	21.94	22.25	22.11	
		16	59	21.94	22.24	22.07	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 19300	Mid CH 19575	High CH 19850	Tune Up
				Frequency 1720 MHz	Frequency 1747.5 MHz	Frequency 1775 MHz	
3/ 20	QPSK	1	0	22.90	23.17	23.04	23.5
		1	99	23.05	23.32	23.19	
		18	0	23.09	23.36	23.23	
		18	82	23.03	23.30	23.17	23.5
	16QAM	1	0	21.75	22.02	21.89	22.5
		1	99	21.83	22.10	21.97	
		18	0	22.00	22.27	22.14	
		18	82	22.02	22.29	22.16	22.5

LTE band 7

Band/BW	Modulation	RB Size	RB Offset	Low CH 20775	Mid CH 21100	High CH 21425	Tune Up
				Frequency 2502.5 MHz	Frequency 2535 MHz	Frequency 2567.5 MHz	
7/ 5	QPSK	1	0	23.00	23.18	23.10	23.5
		1	24	22.79	22.93	22.89	
		8	0	22.81	22.98	22.95	
		8	17	22.85	23.04	22.94	23.5
	16QAM	1	0	21.67	21.89	21.82	22.5
		1	24	21.51	21.77	21.64	
		8	0	21.90	22.04	22.00	
		8	17	21.57	21.77	21.56	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 20800	Mid CH 21100	High CH 21400	Tune Up
				Frequency 2505 MHz	Frequency 2535 MHz	Frequency 2565 MHz	
7/ 10	QPSK	1	0	22.97	23.21	23.10	23.5
		1	49	22.79	22.93	22.90	
		12	0	22.78	23.02	22.91	
		12	38	22.86	23.03	22.97	23.5
	16QAM	1	0	21.67	21.86	21.78	22.5
		1	49	21.56	21.73	21.67	
		12	0	21.90	22.05	21.97	
		12	38	21.62	21.84	21.48	22.5

Band/BW	Modulation	RB Size	RB Offset	Low CH 20825	Mid CH 21100	High CH 21375	Tune Up
				Frequency 2507.5 MHz	Frequency 2535 MHz	Frequency 2562.5 MHz	
7/ 15	QPSK	1	0	23.04	23.21	23.07	23.5
		1	74	22.77	22.98	22.85	
		16	0	22.84	23.05	22.92	
		16	59	22.83	23.04	22.98	23.5
	16QAM	1	0	21.71	21.93	21.78	22.5
		1	74	21.55	21.74	21.67	
		16	0	21.86	22.10	21.99	
		16	59	21.64	21.91	21.64	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 20850	Mid CH 21100	High CH 21350	Tune Up
				Frequency 2510 MHz	Frequency 2535 MHz	Frequency 2560 MHz	
7/ 20	QPSK	1	0	23.05	23.25	23.15	23.5
		1	99	22.81	23.01	22.91	
		18	0	22.86	23.06	22.96	
		18	82	22.89	23.09	22.99	23.5
	16QAM	1	0	21.74	21.94	21.84	22.5
		1	99	21.59	21.79	21.69	
		18	0	21.92	22.12	22.02	
		18	82	21.75	21.95	21.85	22.5

LTE band 8

Band/BW	Modulation	RB Size	RB Offset	Low CH 21457	Mid CH 21625	High CH 21793	Tune Up
				Frequency 880.7 MHz	Frequency 897.5 MHz	Frequency 914.3 MHz	
8/ 1.4	QPSK	1	0	23.29	23.23	23.34	24.0
		1	5	23.50	23.37	23.53	
		5	0	23.44	23.29	23.43	
		5	1	23.42	23.30	23.48	24.0
	16QAM	1	0	22.06	21.94	22.08	22.5
		1	5	22.05	21.89	22.07	
		5	0	22.22	22.09	22.28	
		5	1	23.20	23.09	23.21	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 21465	Mid CH 21625	High CH 21785	Tune Up
				Frequency 881.5 MHz	Frequency 897.5 MHz	Frequency 913.5 MHz	
8/ 3	QPSK	1	0	23.31	23.25	23.33	24.0
		1	14	23.46	23.38	23.53	
		4	0	23.40	23.29	23.43	
		4	11	23.41	23.33	23.48	24.0
	16QAM	1	0	22.03	22.00	22.11	22.5
		1	14	22.02	21.92	22.05	
		4	0	22.25	22.09	22.28	
		4	11	22.16	22.10	22.21	22.5

Band/BW	Modulation	RB Size	RB Offset	Low CH 21475	Mid CH 21625	High CH 21775	Tune Up
				Frequency 882.5 MHz	Frequency 897.5 MHz	Frequency 912.5 MHz	
8/ 5	QPSK	1	0	23.32	23.20	23.34	24.0
		1	24	23.51	23.35	23.53	
		8	0	23.41	23.28	23.47	
		8	17	23.44	23.33	23.45	24.0
	16QAM	1	0	22.04	21.96	22.11	22.5
		1	24	21.99	21.95	22.04	
		8	0	22.25	22.09	22.27	
		8	17	22.16	22.08	22.18	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 21500	Mid CH 21625	High CH 21750	Tune Up
				Frequency 885 MHz	Frequency 897.5 MHz	Frequency 910 MHz	
8/ 10	QPSK	1	0	23.37	23.27	23.39	24.0
		1	49	23.53	23.43	23.55	
		12	0	23.46	23.36	23.48	
		12	38	23.48	23.38	23.50	24.0
	16QAM	1	0	22.11	22.01	22.13	22.5
		1	49	22.07	21.97	22.09	
		12	0	22.27	22.17	22.29	
		12	38	22.24	22.14	22.26	22.5



LTE band 20

Band/BW	Modulation	RB Size	RB Offset	Low CH 24175	Mid CH 24300	High CH 24425	Tune Up
				Frequency 834.5 MHz	Frequency 847 MHz	Frequency 859.5 MHz	
20/ 5	QPSK	1	0	23.05	23.19	23.19	23.5
		1	24	22.91	23.01	23.05	
		8	0	22.90	23.03	23.08	
		8	17	22.82	22.97	22.95	23.5
	16QAM	1	0	21.67	21.85	21.86	22.5
		1	24	21.61	21.83	21.78	
		8	0	22.03	22.13	22.17	
		8	17	21.75	21.83	21.78	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 24200	Mid CH 24300	High CH 24400	Tune Up
				Frequency 837 MHz	Frequency 847 MHz	Frequency 857 MHz	
20/ 10	QPSK	1	0	23.02	23.22	23.19	23.5
		1	49	22.91	23.01	23.06	
		12	0	22.87	23.07	23.04	
		12	38	22.83	22.96	22.98	23.5
	16QAM	1	0	21.67	21.82	21.82	22.5
		1	49	21.66	21.79	21.81	
		12	0	22.03	22.14	22.14	
		12	38	21.76	21.81	21.75	22.5

Band/BW	Modulation	RB Size	RB Offset	Low CH 24225	Mid CH 24300	High CH 24375	Tune Up
				Frequency 839.5 MHz	Frequency 847 MHz	Frequency 854.5 MHz	
20/ 15	QPSK	1	0	23.09	23.22	23.16	23.5
		1	74	22.89	23.06	23.01	
		16	0	22.93	23.10	23.05	
		16	59	22.80	22.97	22.99	23.5
	16QAM	1	0	21.71	21.89	21.82	22.5
		1	74	21.65	21.80	21.81	
		16	0	21.99	22.19	22.16	
		16	59	21.74	21.83	21.77	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 24250	Mid CH 24300	High CH 24350	Tune Up
				Frequency 842 MHz	Frequency 847 MHz	Frequency 852 MHz	
20/ 20	QPSK	1	0	23.10	23.26	23.24	23.5
		1	99	22.93	23.09	23.07	
		18	0	22.95	23.11	23.09	
		18	82	22.86	23.02	23.00	23.5
	16QAM	1	0	21.74	21.90	21.88	22.5
		1	99	21.69	21.85	21.83	
		18	0	22.05	22.21	22.19	
		18	82	21.97	22.13	22.11	22.5



LTE band 28

Band/BW	Modulation	RB Size	RB Offset	Low CH (27225)	Mid CH (27375)	High CH (27645)	Tune Up
				Frequency (704.5)MHz	Frequency (719.5)MHz	Frequency (746.5)MHz	
28/ 3	QPSK	1	0	23.21	23.03	23.05	23.5
		1	14	23.19	22.99	23.08	
		4	0	23.27	23.04	23.12	
		4	11	23.16	22.96	23.05	23.5
	16QAM	1	0	21.93	21.78	21.83	22.5
		1	14	21.90	21.68	21.75	
		4	0	22.36	22.08	22.21	
		4	11	22.07	21.94	21.97	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH (27235)	Mid CH (27385)	High CH (27635)	Tune Up
				Frequency (705.5)MHz	Frequency (720.5)MHz	Frequency (745.5)MHz	
28/ 5	QPSK	1	0	23.22	22.98	23.06	23.5
		1	24	23.24	22.96	23.08	
		8	0	23.28	23.03	23.16	
		8	17	23.19	22.96	23.02	23.5
	16QAM	1	0	21.94	21.74	21.83	22.5
		1	24	21.87	21.71	21.74	
		8	0	22.36	22.08	22.20	
		8	17	22.05	21.98	21.93	22.5

Band/BW	Modulation	RB Size	RB Offset	Low CH (27260)	Mid CH (27410)	High CH (27610)	Tune Up
				Frequency (708)MHz	Frequency (723)MHz	Frequency (743)MHz	
28/ 10	QPSK	1	0	23.19	23.01	23.06	23.5
		1	49	23.24	22.96	23.09	
		12	0	23.25	23.07	23.12	
		12	38	23.20	22.95	23.05	23.5
	16QAM	1	0	21.94	21.71	21.79	22.5
		1	49	21.92	21.67	21.77	
		12	0	22.36	22.09	22.17	
		12	38	22.08	21.94	21.95	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH (27285)	Mid CH (27435)	High CH (27585)	Tune Up
				Frequency (710.5)MHz	Frequency (725.5)MHz	Frequency (740.5)MHz	
28/ 15	QPSK	1	0	23.26	23.01	23.03	23.5
		1	74	23.22	23.01	23.04	
		16	0	23.31	23.10	23.13	
		16	59	23.17	22.96	23.06	23.5
	16QAM	1	0	21.98	21.78	21.79	22.5
		1	74	21.91	21.68	21.77	
		16	0	22.32	22.14	22.19	
		16	59	22.05	21.97	21.96	22.5
Band/BW	Modulation	RB Size	RB Offset	Low CH 27310	Mid CH 27460	High CH (27560)	Tune Up
				Frequency (713)MHz	Frequency (728)MHz	Frequency (738)MHz	
28/ 20	QPSK	1	0	23.27	23.05	23.11	23.5
		1	99	23.26	23.04	23.10	
		18	0	23.33	23.11	23.17	
		18	82	23.23	23.01	23.07	23.5
	16QAM	1	0	22.01	21.79	21.85	22.5
		1	99	21.95	21.73	21.79	
		18	0	22.38	22.16	22.22	
		18	82	22.29	22.07	22.13	22.5

2.2 DESCRIPTION OF TEST MODES

✧ The EUT was tested under following conditions:

BAND	OPERATING CONDITIONS	AXIS
WCDMA Band I	Linking / Idle mode at middle channel (CH 9750)	X-Plane
WCDMA Band VIII	Linking / Idle mode at middle channel (CH 2788)	Y-Plane
LTE Band 1	Linking / Idle mode at middle channel (CH 18300)	Z-Plane
LTE Band 3	Linking / Idle mode at middle channel (CH 19575)	Y-Plane
LTE Band 7	Linking / Idle mode at middle channel (CH 21100)	Y-Plane
LTE Band 8	Linking / Idle mode at middle channel (CH 21625)	Y-Plane
LTE Band 20	Linking / Idle mode at middle channel (CH 24300)	X-Plane
LTE Band 28	Linking / Idle mode at middle channel (CH 27435)	Z-Plane

NOTE:

1. Since the EUT is considered a portable unit, it was pre-tested on the positioned of each 3 axis. Only the worst case was present in this report positioned. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture), although the BT&WIFI can simultaneously transmit, but has no effect on the RF signal level in spurious emissions test.
2. The RSE Measurement for LTE was based on the worst BW conducted power for each LTE Band.

2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

EN 301 908-1 V13.1.1(2019-11)

All tests have been performed and recorded as per the above standard.

2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any other necessary accessories or support units.

For test

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	N/A	N/A	N/A	N/A	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

2.5 CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photograph of the test configuration for reference.



3 TEST TYPES AND RESULTS

3.1 RADIATED SPURIOUS EMISSIONS – IN LINK MODE

3.1.1 LIMIT OF RADIATED SPURIOUS EMISSIONS – IN LINK MODE

FREQUENCY RANGE	FREQUENCIES BELOW 1GHz	FREQUENCIES ABOVE 1GHz
Limit value	250nW (–36dBm/100KHz)	1μW (–30dBm/1MHz)

3.1.2 TEST PROCEDURES

Whenever possible the test site should be a fully anechoic chamber simulating the free-space conditions. EUT shall be placed on a non-conducting support. Mean power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser).

Measurements are made with a tuned dipole antenna or a reference antenna with a known gain referenced to an isotropic antenna. Unless otherwise stated, all measurements are done as mean power (RMS).

3.1.3 TEST SETUP

For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).

3.1.4 DEVIATION FROM TEST STANDARD

No deviation



3.1.5 TEST RESULTS

Note: For higher frequency, the emission is too low to be detected.

LINKING MODE AT MIDDLE CHANNEL WCDMA B1

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C, 59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Linking mode at middle channel (CH 9750)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-78.06	-36.00	-42.06
244.37	H	-90.46	-36.00	-54.46
512.09	H	-85.66	-36.00	-49.66
624.61	H	-85.44	-36.00	-49.44
812.79	H	-84.25	-36.00	-48.25
892.33	H	-83.62	-36.00	-47.62
3902.20	H	-49.94	-30.00	-19.94
5853.10	H	-52.90	-30.00	-22.90
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-74.58	-36.00	-38.58
45.52	V	-76.06	-36.00	-40.06
244.37	V	-91.42	-36.00	-55.42
508.21	V	-86.80	-36.00	-50.80
657.59	V	-86.45	-36.00	-50.45
845.77	V	-83.72	-36.00	-47.72
3901.76	V	-44.79	-30.00	-14.79
5847.08	V	-47.30	-30.00	-17.30



LINKING MODE AT MIDDLE CHANNEL WCDMA B8

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Linking mode at middle channel (CH 2788)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
35.82	H	-76.90	-36.00	-40.90
244.37	H	-89.63	-36.00	-53.63
413.15	H	-87.07	-36.00	-51.07
512.09	H	-85.75	-36.00	-49.75
616.85	H	-84.71	-36.00	-48.71
776.90	H	-79.27	-36.00	-43.27
1796.60	H	-49.48	-30.00	-19.48
2696.40	H	-44.02	-30.00	-14.02
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-75.93	-36.00	-39.93
46.49	V	-75.22	-36.00	-39.22
244.37	V	-91.00	-36.00	-55.00
560.59	V	-86.38	-36.00	-50.38
724.52	V	-86.48	-36.00	-50.48
777.87	V	-80.66	-36.00	-44.66
1797.86	V	-50.32	-30.00	-20.32
2696.34	V	-46.00	-30.00	-16.00

LINKING MODE AT MIDDLE CHANNEL (LTE B1)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Linking mode at middle channel (CH18300 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.97	H	-77.35	-36.00	-41.35
249.22	H	-91.21	-36.00	-55.21
422.85	H	-87.53	-36.00	-51.53
571.26	H	-86.12	-36.00	-50.12
662.44	H	-86.29	-36.00	-50.29
821.52	H	-83.26	-36.00	-47.26
3891.17	H	-36.78	-30.00	-6.78
5837.03	H	-45.11	-30.00	-15.11
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
50.37	V	-74.48	-36.00	-38.48
249.22	V	-90.64	-36.00	-54.64
385.02	V	-89.41	-36.00	-53.41
522.76	V	-86.30	-36.00	-50.30
748.77	V	-85.03	-36.00	-49.03
877.78	V	-83.26	-36.00	-47.26
3891.28	V	-36.86	-30.00	-6.86
5836.68	V	-43.36	-30.00	-13.36

LINKING MODE AT MIDDLE CHANNEL (LTE B3)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Linking mode at middle channel (CH19575 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
35.82	H	-77.54	-36.00	-41.54
243.40	H	-90.86	-36.00	-54.86
487.84	H	-87.34	-36.00	-51.34
624.61	H	-86.05	-36.00	-50.05
751.68	H	-85.36	-36.00	-49.36
833.16	H	-83.46	-36.00	-47.46
3486.11	H	-34.49	-30.00	-4.49
5229.15	H	-47.33	-30.00	-17.33
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-75.22	-36.00	-39.22
49.40	V	-75.61	-36.00	-39.61
246.31	V	-90.87	-36.00	-54.87
594.54	V	-84.50	-36.00	-48.50
688.63	V	-86.16	-36.00	-50.16
829.28	V	-83.41	-36.00	-47.41
3486.09	V	-40.67	-30.00	-10.67
5229.11	V	-49.99	-30.00	-19.99

LINKING MODE AT MIDDLE CHANNEL (LTE B7)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Linking mode at middle channel (CH21100 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-77.00	-36.00	-41.00
74.62	H	-89.56	-36.00	-53.56
253.10	H	-90.13	-36.00	-54.13
594.54	H	-84.92	-36.00	-48.92
751.68	H	-83.38	-36.00	-47.38
827.34	H	-82.80	-36.00	-46.80
5061.11	H	-48.07	-30.00	-18.07
7591.66	H	-37.50	-30.00	-7.50
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-75.39	-36.00	-39.39
45.52	V	-75.99	-36.00	-39.99
243.40	V	-90.33	-36.00	-54.33
428.67	V	-87.42	-36.00	-51.42
547.01	V	-86.16	-36.00	-50.16
741.01	V	-84.21	-36.00	-48.21
5061.30	V	-47.39	-30.00	-17.39
7591.75	V	-40.94	-30.00	-10.94



LINKING MODE AT MIDDLE CHANNEL (LTE B8)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Linking mode at middle channel (CH21625 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
31.94	H	-77.37	-36.00	-41.37
260.86	H	-90.65	-36.00	-54.65
486.87	H	-86.62	-36.00	-50.62
614.91	H	-85.60	-36.00	-49.60
749.74	H	-84.71	-36.00	-48.71
852.56	H	-82.67	-36.00	-46.67
1786.32	H	-45.40	-30.00	-15.40
2679.24	H	-35.32	-30.00	-5.32
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-75.68	-36.00	-39.68
46.49	V	-75.39	-36.00	-39.39
252.13	V	-90.80	-36.00	-54.80
414.12	V	-87.79	-36.00	-51.79
567.38	V	-86.31	-36.00	-50.31
693.48	V	-85.74	-36.00	-49.74
1786.16	V	-44.26	-30.00	-14.26
2679.34	V	-39.32	-30.00	-9.32



LINKING MODE AT MIDDLE CHANNEL (LTE B20)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Linking mode at middle channel (CH24300 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
35.82	H	-76.16	-36.00	-40.16
243.40	H	-90.57	-36.00	-54.57
431.58	H	-86.30	-36.00	-50.30
600.36	H	-84.85	-36.00	-48.85
781.75	H	-84.44	-36.00	-48.44
918.52	H	-83.71	-36.00	-47.71
1442.46	H	-40.03	-30.00	-10.03
2163.36	H	-50.71	-30.00	-20.71
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.97	V	-76.06	-36.00	-40.06
50.37	V	-74.82	-36.00	-38.82
260.86	V	-91.14	-36.00	-55.14
446.13	V	-87.64	-36.00	-51.64
572.23	V	-86.00	-36.00	-50.00
750.71	V	-85.35	-36.00	-49.35
1442.34	V	-46.49	-30.00	-16.49
2163.44	V	-50.46	-30.00	-20.46

LINKING MODE AT MIDDLE CHANNEL (LTE B28)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Linking mode at middle channel (CH 27435 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-77.38	-36.00	-41.38
275.41	H	-91.80	-36.00	-55.80
589.69	H	-86.48	-36.00	-50.48
683.78	H	-86.52	-36.00	-50.52
818.61	H	-83.61	-36.00	-47.61
885.54	H	-83.80	-36.00	-47.80
1442.06	H	-41.73	-30.00	-11.73
2163.20	H	-53.90	-30.00	-23.90
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-75.34	-36.00	-39.34
46.49	V	-74.78	-36.00	-38.78
244.37	V	-91.42	-36.00	-55.42
430.61	V	-87.51	-36.00	-51.51
522.76	V	-86.65	-36.00	-50.65
868.08	V	-83.46	-36.00	-47.46
1442.12	V	-48.28	-30.00	-18.28
2163.32	V	-54.27	-30.00	-24.27

3.2 CONTROL AND MONITORING FUNCTIONS (UE)

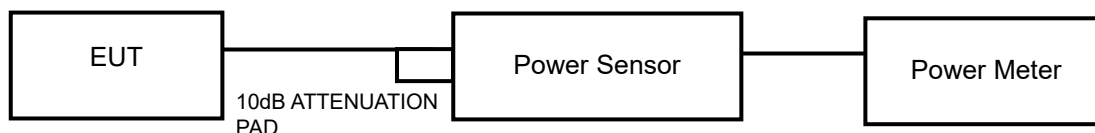
3.2.1 LIMIT OF CONTROL AND MONITORING FUNCTIONS (UE)

The maximum measured power during the duration of the test shall not exceed -30 dBm.

3.2.2 TEST PROCEDURES

At the start of the test, the UE shall be switched off. The UE antenna connector shall be connected to a power. The UE shall be switched on for a period of approximately fifteen minutes, and then switched off. The EUT shall remain switched off for a period of at least thirty seconds, and shall then be switched on for a period of approximately one minute. The maximum power emitted from the UE throughout the duration of the test shall be recorded.

3.2.3 TEST SETUP



3.2.4 DEVIATION FROM TEST STANDARD

No deviation

3.2.5 TEST RESULTS

TEST VOLTAGE	230Vac, 50Hz	ENVIRONMENTAL CONDITIONS	23deg.C,59%RH
OPERATING CONDITIONS	Switch on/Switch off	TESTED BY	Ezreal Tan

THE MAXIMUM MEASURED POWER DURING THE DURATION OF THE TEST LEVEL			
TEST TIMES	MEASUREMENT POWER LEVEL (dBm)	LIMIT (dBm)	RESULT
1	-62.20	-30.0	PASS
2	-62.35	-30.0	PASS
3	-62.79	-30.0	PASS
4	-62.22	-30.0	PASS
5	-62.66	-30.0	PASS

3.3 RADIATED SPURIOUS EMISSIONS – IN IDLE MODE

3.3.1 LIMIT OF RADIATED SPURIOUS EMISSIONS – IN IDLE MODE

FREQUENCY RANGE	FREQUENCIES BELOW 1GHz	OTHER FREQUENCIES ABOVE 1GHz
Limit value	-57dBm/100KHz	-47dBm/1MHz

3.3.2 TEST PROCEDURES

Whenever possible the test site should be a fully anechoic chamber simulating the free-space conditions. EUT shall be placed on a non-conducting support. Mean power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser).

Measurements are made with a tuned dipole antenna or a reference antenna with a known gain referenced to an isotropic antenna. Unless otherwise stated, all measurements are done as mean power (RMS).

3.3.3 TEST SETUP

For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).

3.3.4 DEVIATION FROM TEST STANDARD

No deviation

3.3.5 TEST RESULTS

Note: For higher frequency, the emission is too low to be detected.

IDLE MODE AT MIDDLE CHANNEL WCDMA B1

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Idle mode at middle channel (CH 9750)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
31.94	H	-78.24	-57.00	-21.24
200.72	H	-94.71	-57.00	-37.71
288.02	H	-92.16	-57.00	-35.16
420.91	H	-88.18	-57.00	-31.18
556.71	H	-86.26	-57.00	-29.26
776.90	H	-79.53	-57.00	-22.53
3890.50	H	-60.54	-47.00	-13.54
5852.22	H	-58.13	-47.00	-11.13
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
44.55	V	-75.51	-57.00	-18.51
248.25	V	-90.58	-57.00	-33.58
430.61	V	-87.87	-57.00	-30.87
520.82	V	-86.55	-57.00	-29.55
683.78	V	-86.47	-57.00	-29.47
776.90	V	-80.27	-57.00	-23.27
3900.14	V	-61.45	-47.00	-14.45
5840.50	V	-58.50	-47.00	-11.50

IDLE MODE AT MIDDLE CHANNEL WCDMA B8

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Idle mode at middle channel (CH 2788)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
31.94	H	-76.72	-57.00	-19.72
261.83	H	-90.30	-57.00	-33.30
530.52	H	-86.03	-57.00	-29.03
624.61	H	-84.78	-57.00	-27.78
776.90	H	-79.08	-57.00	-22.08
901.06	H	-83.57	-57.00	-26.57
2698.82	H	-60.41	-47.00	-13.41
3581.72	H	-61.43	-47.00	-14.43
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
32.91	V	-73.41	-57.00	-16.41
51.34	V	-74.82	-57.00	-17.82
260.86	V	-91.11	-57.00	-34.11
522.76	V	-86.20	-57.00	-29.20
681.84	V	-85.68	-57.00	-28.68
776.90	V	-79.21	-57.00	-22.21
1799.78	V	-64.18	-47.00	-17.18
2684.66	V	-61.41	-47.00	-14.41

IDLE MODE AT MIDDLE CHANNEL (LTE B1)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Idle mode at middle channel (CH18300 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
31.94	H	-76.77	-57.00	-19.77
244.37	H	-90.09	-57.00	-33.09
413.15	H	-87.46	-57.00	-30.46
625.58	H	-84.78	-57.00	-27.78
777.87	H	-79.27	-57.00	-22.27
898.15	H	-83.42	-57.00	-26.42
3887.24	H	-60.49	-47.00	-13.49
5833.90	H	-58.65	-47.00	-11.65
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.97	V	-78.37	-57.00	-21.37
45.52	V	-80.72	-57.00	-23.72
377.26	V	-89.85	-57.00	-32.85
565.44	V	-86.88	-57.00	-29.88
776.90	V	-80.22	-57.00	-23.22
3880.18	V	-61.31	-47.00	-14.31
5839.28	V	-58.92	-47.00	-11.92

IDLE MODE AT MIDDLE CHANNEL (LTE B3)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Idle mode at middle channel (CH 19575 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
32.91	H	-77.76	-57.00	-20.76
244.37	H	-90.83	-57.00	-33.83
429.64	H	-87.37	-57.00	-30.37
624.61	H	-85.51	-57.00	-28.51
776.90	H	-80.34	-57.00	-23.34
918.52	H	-84.01	-57.00	-27.01
2943.40	H	-58.18	-47.00	-11.18
4411.72	H	-60.27	-47.00	-13.27
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.97	V	-75.29	-57.00	-18.29
49.40	V	-75.26	-57.00	-18.26
241.46	V	-90.62	-57.00	-33.62
594.54	V	-85.39	-57.00	-28.39
777.87	V	-78.86	-57.00	-21.86
900.09	V	-82.75	-57.00	-25.75
2953.84	V	-58.75	-47.00	-11.75
4407.60	V	-58.64	-47.00	-11.64

IDLE MODE AT MIDDLE CHANNEL (LTE B7)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Idle mode at middle channel (CH 21100 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
32.91	H	-75.73	-57.00	-18.73
259.89	H	-90.59	-57.00	-33.59
422.85	H	-87.56	-57.00	-30.56
565.44	H	-85.96	-57.00	-28.96
776.90	H	-79.47	-57.00	-22.47
850.62	H	-83.01	-57.00	-26.01
2532.00	H	-61.46	-47.00	-14.46
5056.82	H	-58.45	-47.00	-11.45
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-75.88	-57.00	-18.88
47.46	V	-76.46	-57.00	-19.46
258.92	V	-90.22	-57.00	-33.22
423.82	V	-87.91	-57.00	-30.91
625.58	V	-85.96	-57.00	-28.96
777.87	V	-79.47	-57.00	-22.47
2529.66	V	-60.60	-47.00	-13.60
5066.44	V	-58.99	-47.00	-11.99



IDLE MODE AT MIDDLE CHANNEL (LTE B8)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Idle mode at middle channel (CH 21625 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-78.58	-57.00	-21.58
46.49	H	-80.58	-57.00	-23.58
244.37	H	-91.09	-57.00	-34.09
448.07	H	-88.26	-57.00	-31.26
658.56	H	-86.55	-57.00	-29.55
776.90	H	-78.72	-57.00	-21.72
1786.89	H	-60.12	-47.00	-13.12
2679.89	H	-57.16	-47.00	-10.16
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-74.72	-57.00	-17.72
49.40	V	-75.59	-57.00	-18.59
243.40	V	-90.82	-57.00	-33.82
564.47	V	-86.37	-57.00	-29.37
775.93	V	-79.59	-57.00	-22.59
849.65	V	-83.17	-57.00	-26.17
1786.66	V	-59.46	-47.00	-12.46
2679.21	V	-58.69	-47.00	-11.69

IDLE MODE AT MIDDLE CHANNEL (LTE B20)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Idle mode at middle channel (CH 24300 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-76.37	-57.00	-19.37
246.31	H	-91.02	-57.00	-34.02
426.73	H	-87.81	-57.00	-30.81
547.98	H	-86.26	-57.00	-29.26
776.90	H	-80.27	-57.00	-23.27
831.22	H	-83.07	-57.00	-26.07
1682.74	H	-63.97	-47.00	-16.97
2523.02	H	-61.13	-47.00	-14.13
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.97	V	-76.22	-57.00	-19.22
45.52	V	-76.22	-57.00	-19.22
251.16	V	-91.58	-57.00	-34.58
512.09	V	-87.02	-57.00	-30.02
663.41	V	-85.93	-57.00	-28.93
776.90	V	-80.93	-57.00	-23.93
1688.74	V	-63.55	-47.00	-16.55
2517.16	V	-59.71	-47.00	-12.71

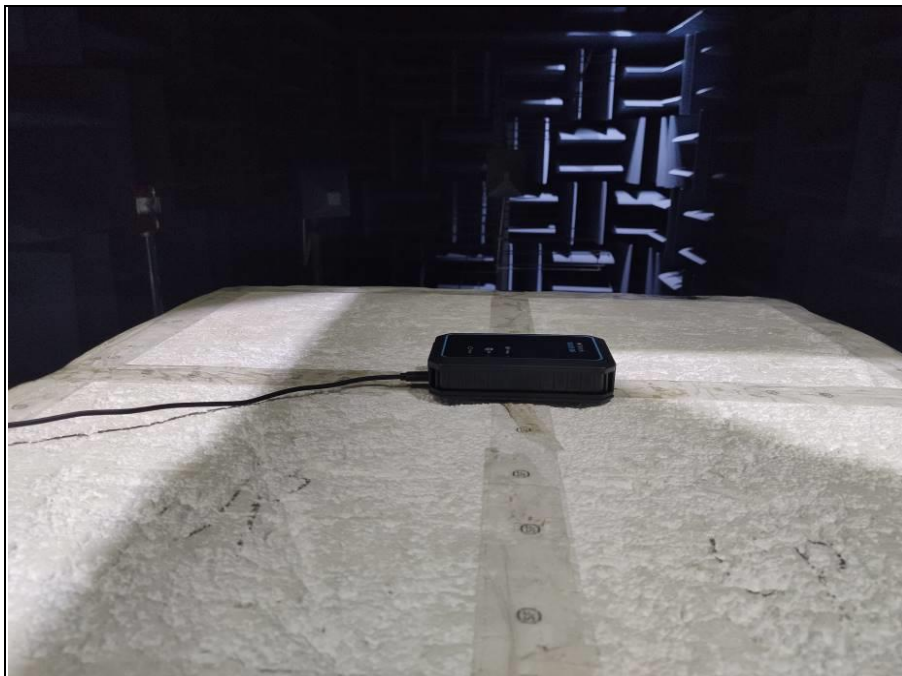
IDLE MODE AT MIDDLE CHANNEL (LTE B28)

FREQUENCY RANGE	30 ~ 12750 MHz	TEST VOLTAGE	230Vac, 50Hz
ENVIRONMENTAL CONDITIONS	23deg.C,59%RH	TESTED BY	Ezreal Tan
OPERATING CONDITIONS	Idle mode at middle channel (CH 27435 RB=1 Offset=0)		

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	H	-78.25	-57.00	-21.25
244.37	H	-90.38	-57.00	-33.38
428.67	H	-87.86	-57.00	-30.86
548.95	H	-86.57	-57.00	-29.57
617.82	H	-85.79	-57.00	-28.79
777.87	H	-78.76	-57.00	-21.76
1439.82	H	-64.90	-47.00	-17.90
2153.38	H	-61.47	-47.00	-14.47
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
30.00	V	-74.80	-57.00	-17.80
45.52	V	-75.51	-57.00	-18.51
251.16	V	-90.81	-57.00	-33.81
444.19	V	-87.41	-57.00	-30.41
613.94	V	-85.32	-57.00	-28.32
776.90	V	-79.40	-57.00	-22.40
1439.82	V	-64.90	-47.00	-17.90
2153.38	V	-61.47	-47.00	-14.47

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

LINK AND IDLE SPURIOUS EMISSION (BELOW 1GHz)



LINK AND IDLE SPURIOUS EMISSION (ABOVE 1GHz)





5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

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