FCC RF Exposure Evaluation

1. Product Information

FCC ID:	TV7R11ELTE6	
Product name	LTE Mini PCIe card R11e-LTE6	
Model number	R11e-LTE6	
Power supply	DC 3.8V	
Modulation Type	GMSK for GPRS GMSK&8PSK for EGPRS BPSK for WCDMA QPSK,16QAM for LTE	
Antenna Type	Omni Antenna	
Antenna Gain	7.26 dBi (maximum)	
Hardware version	M26H_1_10	
Software version	R11e_LTE6	
FCC Operation frequency	**GSM**	824.2 MHz ~ 848.8 MHz (FOR GSM 850) 1850.2 MHz ~ 1909.8MHz (FOR DCS 1900)
	WCDMA	826.4 MHz ~ 846.6 MHz (FOR WCDMA 850) 1852.4 MHz ~ 1907.6 MHz (FOR WCDMA 1900)
	LTE	LTE Band 2: 1805.7 MHz ~ 1909.3MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 25: 1850.7MHz ~ 1914.3 MHz LTE Band 26: 824.7MHz ~ 848.3 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz LTE Band 39: 1882.5 MHz ~ 1907.5 MHz LTE Band 40: 2307.5 MHz ~ 2312.5 MHz & 2352.5MHz~2357.5MHz LTE Band 41: 2498.5 MHz ~ 2687.5 MHz
Exposure category	General population/uncontrolled environment	
EUT Type	Production Unit	
Device Type	Portable Device	

2. Evaluation method and Limit

According to ANSI/IEEE C95.1-1992, the Criteria Listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

The MPE was calculated at **20 cm** to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

Where:
S = Power Density
P = Output Power at Antenna Terminals
G = Gain of Transmit Antenna (linear gain)
R = Distance from Transmitting Antenna

3. Antenna Information

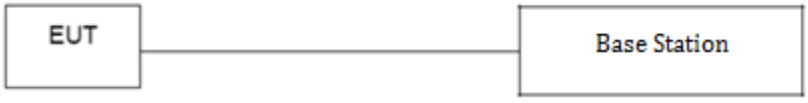
Product can only use antennas certificated as follows provided by manufacturer;

Antenna Type:	Main	Omni Antenna
	AUX(Only for RX)	Omni Antenna
Antenna gain:	Main	**GSM/GPRS:** 850: 4.83 dBi 1900: -0.21 dBi **WCDMA:** Band V: 4.83 dBi Band II: -0.21 dBi **LTE** LTE Band 2: -0.21 dBi LTE Band 5: 4.83 dBi LTE Band 7: -0.52 dBi LTE Band 12: 5.0 dBi LTE Band 17: 5.0 dBi LTE Band 25: -0.21 dBi LTE Band 26: 4.83 dBi LTE Band 38: -0.55 dBi LTE Band 39: -0.21 dBi LTE Band 41: -0.52 dBi
	AUX(Only for RX)	**GSM/GPRS:** 850: 4.83 dBi 1900: -0.21 dBi **WCDMA:** Band V: 4.83 dBi Band II: -0.21 dBi **LTE** LTE Band 2: -0.21 dBi LTE Band 5: 4.83 dBi LTE Band 7: -0.52 dBi LTE Band 12: 5.0 dBi LTE Band 17: 5.0 dBi LTE Band 25: -0.21 dBi LTE Band 26: 4.83 dBi LTE Band 38: -0.55 dBi LTE Band 39: -0.21 dBi LTE Band 40: -0.38 dBi LTE Band 41: -0.52 dBi

Note: The product has two antenna ports, Not support MIMO, the antennas used for antenna ports are the same.

4. Conducted Power

4.1 Test Setup Block Diagram



4.2 Test Procedure

1) The EUT was directly connected to the Base Station and antenna output port as show in the Block

diagram;

2) Reading average power in RMS detector.

4.3 Measurement Equipment

Item	Equipment	Manufacturer	Model No.	Inventory No.	Last Cal.	Next Cal.
1	Base Station	R&S	CMW500	164998	2018/3/17	2019/3/16

Conducted Power (*Unit: dBm)						
Band	**GSM850**			**GSM1900**		
Channel	**128**	**189**	**251**	**512**	**661**	**810**
Frequency	**824.2**	**836.4**	**848.8**	**1850.2**	**1880.0**	**1909.8**
GPRS class 8	32.50	32.50	32.58	32.71	32.66	32.01
GPRS class 10	32.44	32.49	32.58	32.67	32.62	31.97
GPRS class 11	31.36	31.43	31.54	31.70	31.78	31.28
GPRS class 12	29.79	29.84	29.90	30.74	30.87	30.48
EGPRS class 8	27.24	27.37	27.31	24.81	24.66	24.35
EGPRS class 10	26.01	25.85	25.43	22.63	22.75	21.78
EGPRS class 11	23.75	24.17	23.77	20.78	20.96	19.47
EGPRS class 12	21.68	21.83	21.62	18.58	17.99	17.64

Conducted Power (*Unit: dBm)						
Band	**WCDMA Band V**			**WCDMA Band II**		
Channel	**4132**	**4182**	**4233**	**9262**	**9400**	**9538**
Frequency	**826.4**	**836.4**	**846.6**	**1852.4**	**1880**	**1907.6**
RMC 12.2Kbps	22.37	22.14	22.88	25.24	25.06	24.84
HSDPA Subtest-1	21.38	21.69	21.54	22.68	22.79	22.91
HSDPA Subtest-2	21.22	21.82	21.36	21.92	22.05	21.86
HSDPA Subtest-3	20.61	20.50	20.68	20.76	20.81	20.49
HSDPA Subtest-4	21.72	21.66	21.53	22.89	22.60	22.53
HSUPA Subtest-1	22.41	22.40	22.29	22.81	23.01	22.86
HSUPA Subtest-2	22.39	21.52	21.54	22.01	22.12	21.98
HSUPA Subtest-3	21.98	22.13	22.11	22.58	22.77	22.49
HSUPA Subtest-4	20.65	20.74	20.72	20.50	20.68	20.41
HSUPA Subtest-5	22.78	22.56	22.62	23.60	23.43	23.14

Band	Bandwidth	Modulation	Channel	RB Configuration	Result(dBm)
Band2	1.4MHz	QPSK	18900	3RB#1	24.21
Band2	3MHz	QPSK	18900	1RB#14	23.54
Band2	5MHz	QPSK	18900	1RB#24	23.76
Band2	10MHz	QPSK	18900	1RB#0	23.52
Band2	15MHz	QPSK	18900	38RB#37	23.53
Band2	20MHz	QPSK	18900	1RB#99	23.68
Band5	1.4MHz	QPSK	20643	3RB#0	23.58
Band5	3MHz	QPSK	20635	1RB#0	22.64

Band5	5MHz	QPSK	20625	1RB#0	22.94
Band5	10MHz	QPSK	20600	1RB#0	22.32
Band7	5MHz	QPSK	20775	1RB#24	22.69
Band7	10MHz	QPSK	20800	1RB#24	22.40
Band7	20MHz	QPSK	20850	1RB#99	22.92
Band12	1.4MHz	QPSK	23017	3RB#3	23.57
Band12	3MHz	QPSK	23095	1RB#14	22.86
Band12	5MHz	QPSK	23155	1RB#12	22.87
Band12	10MHz	QPSK	23095	1RB#0	22.80
Band17	5MHz	QPSK	23825	1RB#0	22.90
Band17	10MHz	QPSK	23790	1RB#0	22.88
Band25	1.4MHz	QPSK	26683	3RB#3	24.30
Band25	3MHz	QPSK	26365	1RB#8	23.51
Band25	3MHz	QPSK	26675	1RB#0	23.51
Band25	5MHz	QPSK	26365	1RB#0	23.82
Band25	5MHz	QPSK	26665	1RB#0	23.82
Band25	10MHz	QPSK	26365	1RB#0	23.55
Band25	15MHz	QPSK	26365	1RB#0	23.49
Band25	20MHz	QPSK	26365	1RB#0	23.97
Band26	1.4MHz	QPSK	27033	3RB#0	23.69
Band26	1.4MHz	QPSK	27033	3RB#1	23.69
Band26	3MHz	QPSK	27025	1RB#0	23.03
Band26	5MHz	QPSK	27015	1RB#0	23.36
Band26	10MHz	QPSK	26990	1RB#24	22.90
Band26	15MHz	QPSK	26915	1RB#0	22.90
Band38	5MHz	QPSK	38000	1RB#0	23.07
Band38	10MHz	QPSK	38000	1RB#0	23.11
Band38	15MHz	QPSK	38000	1RB#0	23.28
Band38	20MHz	QPSK	37850	1RB#99	23.40
Band38	20MHz	QPSK	38000	1RB#0	23.40
Band39	5MHz	QPSK	38275	1RB#0	24.25
Band39	10MHz	QPSK	38300	1RB#0	24.31
Band39	15MHz	QPSK	38325	1RB#0	24.43
Band39	20MHz	QPSK	38350	1RB#0	24.27
Band41	5MHz	QPSK	40265	1RB#0	25.20
Band41	10MHz	QPSK	40290	1RB#0	24.86
Band41	15MHz	QPSK	40315	1RB#0	24.31
Band41	20MHz	QPSK	41140	1RB#0	24.33
Band40	5MHz	QPSK	39175	1RB#0	19.93
Band40	10MHz	QPSK	39200	1RB#0	19.79

5. Evaluation Results

Collocated WWAN and othe Wireless							For FCC	
Band	**Frequency (MHz)**	**Antenna Gain (dBi)**	**Maximum Power (dBm)**	**Maximum EIRP (dBm)**	**Maximum EIRP (W)**	**Average EIRP (mW)**	**Power Density at 20cm (mW/cm^2)**	**Limit (mW/cm^2)**
GPRS 850 (1 Tx slot)	824	4.8	33.0	37.8	6.07	763.84	0.152	0.549
EGPRS 850 (1 Tx slot)	824	4.8	33.0	37.8	6.07	763.84	0.152	0.549
GPRS 1900 (1 Tx slot)	1850	-0.2	33.0	32.8	1.90	239.33	0.048	1.000
EGPRS 1900 (1 Tx slot)	1850	-0.2	33.0	32.8	1.90	239.33	0.048	1.000
WCDMA Band 5	804	4.8	24.0	28.8	0.76	763.84	0.152	0.536
WCDMA Band 2	1850	-0.2	26.0	25.8	0.38	379.31	0.076	1.000
LTE Band 12	700	5.0	24.0	29.0	0.79	794.33	0.158	0.466
LTE Band 17	704	5.0	24.0	29.0	0.79	794.33	0.158	0.469
LTE Band 26 for Part22	825	4.8	24.0	28.8	0.76	763.84	0.152	0.550
LTE Band 26 for Part90	815	4.8	24.0	28.8	0.76	763.84	0.152	0.543
LTE Band 5	824	4.8	24.0	28.8	0.76	763.84	0.152	0.549
LTE Band 2	1850	-0.2	25.0	24.8	0.30	301.30	0.060	1.000
LTE Band 25	1850	-0.2	25.0	24.8	0.30	301.30	0.060	1.000
LTE Band 39	1882	-0.2	25.0	24.8	0.30	301.30	0.060	1.000
LTE Band 40	2307	-0.4	21.0	20.6	0.12	115.35	0.023	1.000
LTE Band 41	2498	-0.5	26.0	25.5	0.35	353.18	0.070	1.000
LTE Band 7	2502	-0.5	24.0	23.5	0.22	222.84	0.044	1.000
LTE Band 38	2572	-0.6	24.0	23.5	0.22	221.31	0.044	1.000

Remark:

1. Output power including tune up tolerance;

6. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure.

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