



# RF EXPOSURE EVALUATION REPORT

**APPLICANT** : Shenzhen Chainway Information  
Technology Co.,Ltd.  
**PRODUCT NAME** : Fixed Android UHF Reader  
**MODEL NAME** : URA8  
**BRAND NAME** : CHAINWAY  
**FCC ID** : 2AC6AURA8  
**STANDARD(S)** : 47CFR 2.1091  
KDB 447498  
**RECEIPT DATE** : 2019-12-11  
**TEST DATE** : 2019-12-30  
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Change history		
Version	Date	Reason of changed
1.0	2020-01-14	Original



# 1. Technical Information

**Note:** Provide by applicant.

## 1.1 Applicant and Manufacturer Information

<b>Applicant:</b>	Shenzhen Chainway Information Technology Co.,Ltd.
<b>Applicant Address:</b>	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen
<b>Manufacturer:</b>	Shenzhen Chainway Information Technology Co.,Ltd.
<b>Manufacturer Address:</b>	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen

## 1.2 Equipment under Test (EUT) Description

<b>EUT Name:</b>	Fixed Android UHF Reader
<b>Hardware Version:</b>	V12
<b>Software Version:</b>	A8_20191010
<b>Frequency Bands:</b>	GSM 850: 824 MHz ~ 849 MHz GSM 1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 17: 704 MHz ~ 716 MHz WLAN 2.4GHz: 2412 MHz ~ 2472 MHz RFID: 902 MHz ~ 928 MHz
<b>Modulation Mode:</b>	GPRS: GMSK WCDMA: QPSK LTE: QPSK/16QAM/64QAM 802.11b: DSSS 802.11g/n-HT20/HT40: OFDM
<b>Antenna Type:</b>	WWAN: Fixed External Antenna WLAN: Fixed External Antenna RFID: Circular polarized directional Antenna
<b>Antenna Gain:</b>	GSM850, WCDMA Band V, LTE Band 5: 0.73dBi; GSM1900, WCDMA Band II, LTE Band 2/4: 1.20dBi; LTE Band 7: 1.90dBi; LTE Band 17: 0.32dBi;



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	WLAN 2.4GHz: 1.90dBi RFID ANT1: 6dBi RFID ANT2: 9dBi RFID ANT3: 12dBi
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## 1.3 Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title	Method determination /Remark
1	47 CFR§2.1091	Radio Frequency Radiation Exposure Evaluation: mobile devices	No deviation
2	KDB 447498 D01v06	General RF Exposure Guidance	No deviation



## 2. Device Category and RF Exposure Limit

Per user manual, Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

### Mobile Devices:

47CFR 2.1091(b)

For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

### General Population/Uncontrolled Exposure:

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

**Table 1—Limits for Maximum Permissible Exposure (MPE)**

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

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

### 3. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
R&S	Network Emulator	CMW500	124534	2019.04.17	2020.04.16
Anritsu	Network Emulator	MT8820C	6200985414	2019.01.24	2020.01.23

**Note:**

The EUT was connected to Base Station Anritsu MT8820C referred to the Setup Configuration. For the maximum power, it was established between EUT and Base Station with following setting:

1. For GPRS testing, the MS TX Level was set 5 for low frequency bands and 0 for high frequency bands. For EDGE testing, the MS TX Level was set 8 for low frequency bands and 2 for high frequency bands.
2. For WCDMA testing, Power Ctrl Mode = All Up bits, and the transmitted maximum output power was recorded.
3. For LTE testing, the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and different configurations which are requested to be reported to FCC.



## 4. RF Output Power

### <GSM850>

GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	128	189	251		128	189	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GPRS 1 Tx slot	32.99	33.13	33.02	33.50	23.99	24.13	24.02	24.50
GPRS 2 Tx slots	32.74	32.90	32.78	33.50	26.74	26.90	26.78	27.50
GPRS 3 Tx slots	32.46	32.53	32.37	33.00	28.20	28.27	28.11	28.74
GPRS 4 Tx slots	32.07	32.20	32.11	33.00	29.07	29.20	29.11	30.00

### <GSM1900>

GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GPRS 1 Tx slot	31.18	31.03	30.88	31.50	22.18	22.03	21.88	22.50
GPRS 2 Tx slots	31.08	30.91	30.77	31.50	25.08	24.91	24.77	25.50
GPRS 3 Tx slots	30.98	30.79	30.63	31.50	26.72	26.53	26.37	27.24
GPRS 4 Tx slots	30.74	30.69	30.48	31.50	27.74	27.69	27.48	28.50

### <WCDMA Band II>

Band		WCDMA Band II			Tune-up Limit (dBm)
TX Channel		9262	9400	9538	
Rx Channel		9662	9800	9938	
Frequency (MHz)		1852.4	1880	1907.6	
3GPP Rel 99	RMC 12.2Kbps	21.16	21.23	21.21	22.00

### <WCDMA Band V>

Band		WCDMA Band V			Tune-up Limit (dBm)
TX Channel		4132	4183	4233	
Rx Channel		4357	4408	4458	
Frequency (MHz)		826.4	836.6	846.6	
3GPP Rel 99	RMC 12.2Kbps	22.02	21.97	21.98	22.50



## &lt;LTE Band 2&gt;

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				18700	18900	19100	
Frequency (MHz)				1860	1880	1900	
20	QPSK	1	0	20.83	20.77	20.95	22.00
20	QPSK	1	49	20.81	21.21	20.85	
20	QPSK	1	99	20.71	21.12	20.75	
20	QPSK	50	0	19.95	19.91	19.96	21.00
20	QPSK	50	24	19.84	20.06	19.82	
20	QPSK	50	50	19.77	19.96	19.81	
20	QPSK	100	0	19.92	20.13	19.87	
20	16QAM	1	0	20.34	19.84	20.13	21.00
20	16QAM	1	49	20.23	20.12	20.07	
20	16QAM	1	99	19.94	20.22	20.29	
20	16QAM	50	0	18.96	18.91	18.85	19.50
20	16QAM	50	24	18.96	19.09	18.74	
20	16QAM	50	50	18.67	19.01	18.86	
20	16QAM	100	0	18.74	19.08	18.90	
20	64QAM	1	0	20.13	20.01	20.09	20.50
20	64QAM	1	49	20.14	20.27	19.94	
20	64QAM	1	99	19.87	20.37	19.94	
20	64QAM	50	0	18.96	18.98	18.84	19.50
20	64QAM	50	24	18.83	19.12	18.73	
20	64QAM	50	50	18.70	19.01	18.94	
20	64QAM	100	0	18.94	19.16	18.86	
Channel				18675	18900	19125	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	21.01	20.95	21.13	22.00
15	QPSK	1	37	20.77	21.19	20.71	
15	QPSK	1	74	20.78	20.84	20.95	
15	QPSK	36	0	19.97	19.93	19.96	20.50
15	QPSK	36	20	19.86	19.99	19.74	
15	QPSK	36	39	19.85	19.83	19.74	
15	QPSK	75	0	19.90	19.89	19.82	
15	16QAM	1	0	20.09	19.94	20.44	21.00



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15	16QAM	1	37	20.30	20.43	20.09	19.50
15	16QAM	1	74	19.96	20.37	20.05	
15	16QAM	36	0	18.89	19.11	18.95	
15	16QAM	36	20	18.86	19.06	18.76	
15	16QAM	36	39	18.84	18.91	18.61	
15	16QAM	75	0	18.94	18.94	18.85	21.00
15	64QAM	1	0	20.22	19.88	20.37	
15	64QAM	1	37	20.18	20.21	19.91	
15	64QAM	36	0	18.93	19.07	18.98	
15	64QAM	36	20	19.05	19.03	18.78	
15	64QAM	36	39	18.84	18.99	18.73	19.50
15	64QAM	75	0	18.97	19.09	18.85	
Channel				18650	18900	19150	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	QPSK	1	0	20.84	20.77	21.04	22.00
10	QPSK	1	25	20.99	21.12	20.68	
10	QPSK	1	49	20.77	20.97	21.02	
10	QPSK	25	0	19.94	20.05	19.82	21.00
10	QPSK	25	12	19.97	20.03	19.94	
10	QPSK	25	25	19.80	20.03	19.91	
10	QPSK	50	0	19.97	19.98	19.87	
10	16QAM	1	0	20.00	19.83	20.14	21.00
10	16QAM	1	25	19.89	20.24	19.97	
10	16QAM	1	49	19.85	20.18	19.91	
10	16QAM	25	0	19.10	19.29	18.80	20.00
10	16QAM	25	12	19.06	19.12	19.07	
10	16QAM	25	25	18.95	19.03	18.81	
10	16QAM	50	0	18.97	19.09	18.74	
10	64QAM	1	0	19.72	19.78	20.08	21.00
10	64QAM	1	25	19.94	20.11	20.21	
10	64QAM	1	49	19.87	20.16	19.77	
10	64QAM	25	0	18.98	19.15	18.72	20.00
10	64QAM	25	12	18.76	19.17	18.97	
10	64QAM	25	25	18.94	19.11	18.78	
10	64QAM	50	0	19.01	19.03	18.86	
Channel				18625	18900	19175	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	



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5	QPSK	1	0	20.80	21.05	20.93	22.00
5	QPSK	1	12	21.13	21.09	20.90	
5	QPSK	1	24	20.95	20.98	20.92	
5	QPSK	12	0	19.94	20.01	19.78	20.50
5	QPSK	12	7	19.87	20.02	19.90	
5	QPSK	12	13	19.89	20.01	19.88	
5	QPSK	25	0	19.91	19.94	19.84	
5	16QAM	1	0	20.14	20.03	19.88	21.00
5	16QAM	1	12	20.25	19.83	20.11	
5	16QAM	1	24	20.13	19.88	20.33	
5	16QAM	12	0	18.91	19.23	18.89	20.00
5	16QAM	12	7	18.87	19.29	18.89	
5	16QAM	12	13	18.82	19.28	18.92	
5	16QAM	25	0	19.09	19.23	18.98	
5	64QAM	1	0	20.06	20.08	20.04	20.50
5	64QAM	1	12	20.01	20.07	19.99	
5	64QAM	1	24	20.27	19.82	20.01	
5	64QAM	12	0	18.89	18.99	18.77	19.50
5	64QAM	12	7	18.83	19.05	18.93	
5	64QAM	12	13	18.88	19.06	18.79	
5	64QAM	25	0	19.00	18.94	18.82	
Channel				18615	18900	19185	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	20.84	21.04	20.91	21.50
3	QPSK	1	8	20.68	21.03	21.00	
3	QPSK	1	14	20.89	21.08	20.91	
3	QPSK	8	0	19.91	20.06	19.81	20.50
3	QPSK	8	4	19.88	20.08	19.83	
3	QPSK	8	7	19.86	20.00	19.78	
3	QPSK	15	0	19.87	19.99	19.76	
3	16QAM	1	0	20.09	20.32	20.47	21.00
3	16QAM	1	8	20.10	20.31	20.14	
3	16QAM	1	14	19.98	20.36	20.20	
3	16QAM	8	0	19.00	18.91	18.84	19.50
3	16QAM	8	4	18.96	19.10	18.65	
3	16QAM	8	7	19.12	19.10	19.05	
3	16QAM	15	0	18.95	19.14	18.71	
3	64QAM	1	0	20.10	20.00	20.36	19.50



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3	64QAM	1	8	19.96	19.95	19.88	
3	64QAM	1	14	20.05	20.37	20.06	
3	64QAM	8	0	19.04	18.87	18.78	18.50
3	64QAM	8	4	19.10	18.91	18.66	
3	64QAM	8	7	18.85	18.95	18.82	
3	64QAM	15	0	19.15	19.08	18.75	
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	
1.4	QPSK	1	0	20.91	20.91	20.90	22.00
1.4	QPSK	1	3	20.91	21.13	20.83	
1.4	QPSK	1	5	20.82	21.03	20.73	
1.4	QPSK	3	0	20.94	21.05	20.92	
1.4	QPSK	3	1	20.90	21.06	20.95	
1.4	QPSK	3	3	20.99	21.14	20.94	
1.4	QPSK	6	0	19.99	20.06	19.88	20.50
1.4	16QAM	1	0	20.09	19.88	20.06	21.00
1.4	16QAM	1	3	20.34	20.25	20.08	
1.4	16QAM	1	5	20.34	20.34	19.86	
1.4	16QAM	3	0	20.11	20.18	20.00	
1.4	16QAM	3	1	20.14	20.35	20.08	
1.4	16QAM	3	3	20.01	20.22	19.89	
1.4	16QAM	6	0	18.65	18.90	18.45	19.50
1.4	64QAM	1	0	20.33	20.29	19.95	20.00
1.4	64QAM	1	3	20.05	20.27	20.23	
1.4	64QAM	1	5	20.00	20.21	20.33	
1.4	64QAM	3	0	20.21	20.47	20.11	
1.4	64QAM	3	1	20.07	20.25	20.21	
1.4	64QAM	3	3	20.04	20.29	20.00	
1.4	64QAM	6	0	18.98	19.18	18.86	19.00



## &lt;LTE Band 4&gt;

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20050	20175	20300	
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	20.85	20.84	21.22	22.00
20	QPSK	1	49	20.74	21.20	20.81	
20	QPSK	1	99	20.81	20.72	20.77	
20	QPSK	50	0	19.73	19.96	20.00	20.50
20	QPSK	50	24	19.73	19.84	19.74	
20	QPSK	50	50	19.77	19.90	19.73	
20	QPSK	100	0	19.80	19.89	19.75	
20	16QAM	1	0	19.90	19.96	20.28	21.00
20	16QAM	1	49	20.12	20.22	19.82	
20	16QAM	1	99	20.08	19.98	19.91	
20	16QAM	50	0	18.76	19.04	19.15	19.50
20	16QAM	50	24	18.91	19.00	18.66	
20	16QAM	50	50	18.85	18.87	18.67	
20	16QAM	100	0	18.77	18.92	18.82	
20	64QAM	1	0	19.84	19.96	20.12	21.00
20	64QAM	1	49	20.01	20.04	20.07	
20	64QAM	1	99	20.20	20.09	19.87	
20	64QAM	50	0	18.66	19.07	19.00	19.50
20	64QAM	50	24	18.91	18.96	18.73	
20	64QAM	50	50	18.80	18.92	18.74	
20	64QAM	100	0	18.92	18.92	18.78	
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	20.88	20.86	20.93	21.50
15	QPSK	1	37	20.60	21.06	20.66	
15	QPSK	1	74	20.73	20.84	20.81	
15	QPSK	36	0	19.67	19.88	19.85	20.50
15	QPSK	36	20	19.65	19.88	19.80	
15	QPSK	36	39	19.69	19.94	19.67	
15	QPSK	75	0	19.67	19.92	19.82	
15	16QAM	1	0	20.08	19.78	20.18	20.50



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15	16QAM	1	37	19.75	20.15	19.82	19.50
15	16QAM	1	74	20.12	19.99	19.72	
15	16QAM	36	0	18.77	19.08	18.87	
15	16QAM	36	20	18.58	19.04	18.82	
15	16QAM	36	39	18.64	18.89	18.84	
15	16QAM	75	0	18.70	18.95	18.77	
15	64QAM	1	0	20.23	20.24	20.22	20.50
15	64QAM	1	37	19.88	20.24	19.95	
15	64QAM	36	0	18.72	19.08	19.02	19.50
15	64QAM	36	20	18.70	19.05	18.95	
15	64QAM	36	39	18.89	19.01	18.82	
15	64QAM	75	0	18.76	18.96	18.84	
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	20.74	20.73	20.79	21.50
10	QPSK	1	25	20.67	21.06	20.95	
10	QPSK	1	49	20.64	20.63	20.86	
10	QPSK	25	0	19.71	19.87	19.90	20.50
10	QPSK	25	12	19.72	19.95	19.86	
10	QPSK	25	25	19.69	19.91	19.79	
10	QPSK	50	0	19.69	19.91	19.88	
10	16QAM	1	0	20.14	20.24	19.84	21.00
10	16QAM	1	25	19.84	20.22	20.31	
10	16QAM	1	49	19.84	20.26	20.17	
10	16QAM	25	0	18.81	19.21	19.10	20.00
10	16QAM	25	12	18.71	19.12	18.96	
10	16QAM	25	25	18.74	18.81	18.99	
10	16QAM	50	0	18.74	18.99	19.05	
10	64QAM	1	0	20.03	20.13	19.88	20.50
10	64QAM	1	25	19.81	20.19	19.80	
10	64QAM	1	49	19.71	19.94	20.04	
10	64QAM	25	0	18.73	19.11	18.89	19.50
10	64QAM	25	12	18.66	18.90	18.98	
10	64QAM	25	25	18.69	18.88	18.98	
10	64QAM	50	0	18.83	18.92	18.86	
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	



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5	QPSK	1	0	20.65	20.78	20.63	21.50
5	QPSK	1	12	20.78	20.98	20.84	
5	QPSK	1	24	20.62	20.60	20.93	
5	QPSK	12	0	19.62	19.85	19.70	20.50
5	QPSK	12	7	19.66	19.78	19.71	
5	QPSK	12	13	19.66	19.87	19.87	
5	QPSK	25	0	19.66	19.77	19.79	
5	16QAM	1	0	20.05	20.11	19.89	21.00
5	16QAM	1	12	19.97	20.13	20.09	
5	16QAM	1	24	19.88	20.38	20.27	
5	16QAM	12	0	18.82	18.89	18.62	19.50
5	16QAM	12	7	18.52	18.82	18.80	
5	16QAM	12	13	18.48	18.98	18.91	
5	16QAM	25	0	18.60	18.82	18.75	
5	64QAM	1	0	19.85	20.24	19.93	20.50
5	64QAM	1	12	19.79	20.19	20.17	
5	64QAM	1	24	19.75	19.83	20.12	
5	64QAM	12	0	18.50	18.81	18.71	19.50
5	64QAM	12	7	18.59	18.71	18.80	
5	64QAM	12	13	18.50	18.73	18.91	
5	64QAM	25	0	18.56	18.81	18.74	
Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	20.61	20.86	20.66	21.50
3	QPSK	1	8	20.55	20.84	20.61	
3	QPSK	1	14	20.61	20.78	20.89	
3	QPSK	8	0	19.67	19.85	19.85	20.50
3	QPSK	8	4	19.66	19.79	19.89	
3	QPSK	8	7	19.63	19.85	19.84	
3	QPSK	15	0	19.66	19.77	19.79	
3	16QAM	1	0	19.73	19.85	19.82	20.50
3	16QAM	1	8	19.65	20.03	19.86	
3	16QAM	1	14	20.03	20.1	20.07	
3	16QAM	8	0	18.71	18.8	18.83	19.50
3	16QAM	8	4	18.94	18.88	18.88	
3	16QAM	8	7	18.84	19.17	18.71	
3	16QAM	15	0	18.64	18.96	18.85	
3	64QAM	1	0	19.46	19.87	19.77	19.50





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3	64QAM	1	8	19.42	19.86	19.78	
3	64QAM	1	14	19.35	19.60	20.00	
3	64QAM	8	0	18.34	18.94	18.81	18.50
3	64QAM	8	4	18.30	18.74	18.77	
3	64QAM	8	7	18.52	18.97	18.82	
3	64QAM	15	0	18.76	18.78	19.00	
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	20.84	21.03	21.07	22.00
1.4	QPSK	1	3	20.72	21.06	21.07	
1.4	QPSK	1	5	20.95	21.02	20.99	
1.4	QPSK	3	0	20.84	21.18	21.05	
1.4	QPSK	3	1	20.89	21.21	21.25	
1.4	QPSK	3	3	20.91	21.22	21.21	
1.4	QPSK	6	0	19.83	20.19	20.19	21.00
1.4	16QAM	1	0	20.17	20.38	19.96	21.00
1.4	16QAM	1	3	19.95	20.40	19.91	
1.4	16QAM	1	5	20.05	20.36	20.16	
1.4	16QAM	3	0	19.91	20.29	20.16	
1.4	16QAM	3	1	19.94	20.23	20.20	
1.4	16QAM	3	3	19.85	20.31	20.14	
1.4	16QAM	6	0	18.68	19.05	18.95	19.50
1.4	64QAM	1	0	20.06	20.44	20.12	20.00
1.4	64QAM	1	3	20.01	20.23	20.28	
1.4	64QAM	1	5	20.02	20.14	20.16	
1.4	64QAM	3	0	20.00	19.97	19.92	
1.4	64QAM	3	1	20.02	20.23	20.11	
1.4	64QAM	3	3	20.16	20.30	20.13	
1.4	64QAM	6	0	19.52	19.13	19.25	19.00



## &lt;LTE Band 5&gt;

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	21.54	21.48	21.50	22.50
10	QPSK	1	25	21.50	21.69	21.47	
10	QPSK	1	49	21.40	21.45	21.25	
10	QPSK	25	0	20.66	20.67	20.68	21.50
10	QPSK	25	12	20.63	20.68	20.52	
10	QPSK	25	25	20.56	20.62	20.47	
10	QPSK	50	0	20.56	20.66	20.60	
10	16QAM	1	0	20.64	20.97	20.62	21.50
10	16QAM	1	25	20.77	20.75	20.66	
10	16QAM	1	49	20.57	20.61	20.54	
10	16QAM	25	0	19.74	19.84	19.73	20.50
10	16QAM	25	12	19.53	19.57	19.57	
10	16QAM	25	25	19.60	19.67	19.55	
10	16QAM	50	0	19.46	19.74	19.50	
10	64QAM	1	0	20.63	20.55	20.63	21.50
10	64QAM	1	25	20.62	20.53	20.77	
10	64QAM	1	49	20.84	20.56	20.43	
10	64QAM	25	0	19.70	19.74	19.69	20.50
10	64QAM	25	12	19.82	19.69	19.52	
10	64QAM	25	25	19.42	19.74	19.52	
10	64QAM	50	0	19.61	19.81	19.57	
Channel				20425	20525	20625	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	21.39	21.55	21.55	22.00
5	QPSK	1	12	21.54	21.54	21.54	
5	QPSK	1	24	21.32	21.41	21.39	
5	QPSK	12	0	20.68	20.54	20.61	21.00
5	QPSK	12	7	20.49	20.59	20.56	
5	QPSK	12	13	20.46	20.61	20.51	
5	QPSK	25	0	20.53	20.58	20.45	
5	16QAM	1	0	20.72	20.79	20.59	21.00



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5	16QAM	1	12	20.70	20.78	20.35	21.00
5	16QAM	1	24	20.29	20.35	20.48	
5	16QAM	12	0	19.57	19.63	19.56	
5	16QAM	12	7	19.58	19.62	19.52	
5	16QAM	12	13	19.62	19.71	19.73	
5	16QAM	25	0	20.54	20.77	20.67	21.50
5	64QAM	1	0	20.48	20.68	20.54	
5	64QAM	1	12	20.45	20.74	20.24	20.50
5	64QAM	12	0	19.51	19.39	19.65	
5	64QAM	12	7	19.57	19.63	19.75	
5	64QAM	12	13	19.50	19.54	19.66	
5	64QAM	25	0	19.58	19.71	19.63	Tune-up limit (dBm)
Channel				20415	20525	20635	
Frequency (MHz)				825.5	836.5	847.5	22.50
3	QPSK	1	0	21.30	21.57	21.67	
3	QPSK	1	8	21.47	21.34	21.35	
3	QPSK	1	14	21.19	21.68	21.29	21.50
3	QPSK	8	0	20.58	20.60	20.58	
3	QPSK	8	4	20.58	20.64	20.57	
3	QPSK	8	7	20.60	20.61	20.49	
3	QPSK	15	0	20.54	20.56	20.54	21.50
3	16QAM	1	0	20.76	20.62	20.66	
3	16QAM	1	8	20.82	20.92	20.62	
3	16QAM	1	14	20.54	20.94	20.62	20.50
3	16QAM	8	0	19.75	19.82	19.76	
3	16QAM	8	4	19.75	19.83	19.65	
3	16QAM	8	7	19.67	19.80	19.71	
3	16QAM	15	0	19.62	19.68	19.86	21.00
3	64QAM	1	0	20.57	20.67	20.62	
3	64QAM	1	8	20.50	20.36	20.46	
3	64QAM	1	14	20.57	20.66	20.48	20.50
3	64QAM	8	0	19.50	19.60	19.71	
3	64QAM	8	4	19.58	19.79	19.67	
3	64QAM	8	7	19.52	19.81	19.46	
3	64QAM	15	0	19.57	19.64	19.62	Tune-up limit (dBm)
Channel				20407	20525	20643	
Frequency (MHz)				824.7	836.5	848.3	



1.4	QPSK	1	0	21.59	21.40	21.45	22.50
1.4	QPSK	1	3	21.43	21.48	21.19	
1.4	QPSK	1	5	21.45	21.54	21.16	
1.4	QPSK	3	0	21.51	21.53	21.45	
1.4	QPSK	3	1	21.44	21.57	21.48	
1.4	QPSK	3	3	21.61	21.63	21.39	
1.4	QPSK	6	0	20.53	20.67	20.52	21.50
1.4	16QAM	1	0	20.92	20.87	20.46	21.50
1.4	16QAM	1	3	20.87	20.68	20.85	
1.4	16QAM	1	5	20.89	20.71	20.64	
1.4	16QAM	3	0	20.71	20.79	20.49	
1.4	16QAM	3	1	20.76	20.80	20.51	
1.4	16QAM	3	3	20.77	20.75	20.41	
1.4	16QAM	6	0	19.20	19.50	19.44	20.50
1.4	64QAM	1	0	20.48	20.45	20.63	21.50
1.4	64QAM	1	3	20.87	20.80	20.91	
1.4	64QAM	1	5	20.50	20.82	20.54	
1.4	64QAM	3	0	20.86	20.79	20.56	
1.4	64QAM	3	1	21.04	20.85	20.79	
1.4	64QAM	3	3	20.81	20.59	20.76	
1.4	64QAM	6	0	19.63	19.66	19.54	20.50

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20850	21100	21350	
Frequency (MHz)				2510	2535	2560	
20	QPSK	1	0	21.18	21.54	21.39	22.50
20	QPSK	1	49	21.66	21.36	21.61	
20	QPSK	1	99	21.23	21.24	21.16	
20	QPSK	50	0	20.19	20.39	20.42	21.00
20	QPSK	50	24	20.25	20.12	20.35	
20	QPSK	50	50	20.25	20.24	20.31	
20	QPSK	100	0	20.31	20.20	20.47	
20	16QAM	1	0	20.12	20.38	20.18	21.00
20	16QAM	1	49	20.33	20.27	20.42	
20	16QAM	1	99	20.58	20.39	20.48	



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20	16QAM	50	0	19.41	19.26	19.42	20.50
20	16QAM	50	24	19.32	19.07	19.45	
20	16QAM	50	50	19.22	19.20	19.35	
20	16QAM	100	0	19.28	19.21	19.51	
20	64QAM	1	0	20.23	20.49	20.30	21.00
20	64QAM	1	49	20.73	20.29	20.33	
20	64QAM	1	99	20.23	20.25	20.29	
20	64QAM	50	0	19.46	19.26	19.39	20.00
20	64QAM	50	24	19.32	19.11	19.47	
20	64QAM	50	50	19.32	19.22	19.34	
20	64QAM	100	0	19.28	19.29	19.48	
Channel				20825	21100	21375	Tune-up limit (dBm)
Frequency (MHz)				2507.5	2535	2562.5	
15	QPSK	1	0	21.02	21.45	21.31	22.50
15	QPSK	1	37	21.23	21.24	21.43	
15	QPSK	1	74	21.47	21.18	21.14	
15	QPSK	36	0	20.29	20.35	20.40	21.50
15	QPSK	36	20	20.08	20.20	20.35	
15	QPSK	36	39	20.23	20.18	20.23	
15	QPSK	75	0	20.31	20.23	20.31	
15	16QAM	1	0	20.45	20.89	20.72	21.50
15	16QAM	1	37	20.43	20.49	20.44	
15	16QAM	1	74	20.91	20.51	20.57	
15	16QAM	36	0	19.39	19.37	19.50	20.50
15	16QAM	36	20	19.16	19.22	19.43	
15	16QAM	36	39	19.22	19.27	19.33	
15	16QAM	75	0	19.25	19.22	19.32	
15	64QAM	1	0	20.46	20.74	20.42	21.50
15	64QAM	1	37	20.36	20.26	20.61	
15	64QAM	36	0	19.64	19.42	19.41	20.00
15	64QAM	36	20	19.35	19.25	19.30	
15	64QAM	36	39	19.28	19.28	19.36	
15	64QAM	75	0	19.32	19.24	19.32	
Channel				20800	21100	21400	Tune-up limit (dBm)
Frequency (MHz)				2505	2535	2565	
10	QPSK	1	0	20.97	21.43	21.32	22.00
10	QPSK	1	25	20.94	21.23	21.41	



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10	QPSK	1	49	21.35	21.08	20.94	21.00
10	QPSK	25	0	20.60	20.32	20.44	
10	QPSK	25	12	20.33	20.19	20.23	
10	QPSK	25	25	20.26	20.22	20.22	
10	QPSK	50	0	20.28	20.17	20.24	
10	16QAM	1	0	20.29	20.78	20.71	21.50
10	16QAM	1	25	20.31	20.34	20.42	
10	16QAM	1	49	20.68	20.60	20.32	
10	16QAM	25	0	19.57	19.37	19.48	20.00
10	16QAM	25	12	19.45	19.28	19.15	
10	16QAM	25	25	19.46	19.11	19.22	
10	16QAM	50	0	19.29	19.12	19.31	
10	64QAM	1	0	20.26	20.58	20.42	21.00
10	64QAM	1	25	20.16	20.36	20.25	
10	64QAM	1	49	20.47	20.11	20.39	
10	64QAM	25	0	19.68	19.37	19.57	20.50
10	64QAM	25	12	19.41	19.25	19.38	
10	64QAM	25	25	19.36	19.26	19.26	
10	64QAM	50	0	19.36	19.26	19.30	
Channel				20775	21100	21425	Tune-up limit (dBm)
Frequency (MHz)				2502.5	2535	2567.5	
5	QPSK	1	0	21.05	21.40	21.46	22.00
5	QPSK	1	12	20.97	21.42	21.45	
5	QPSK	1	24	20.96	21.08	21.16	
5	QPSK	12	0	20.64	20.24	20.33	21.00
5	QPSK	12	7	20.32	20.16	20.17	
5	QPSK	12	13	20.36	20.18	20.15	
5	QPSK	25	0	20.26	20.17	20.19	
5	16QAM	1	0	20.32	20.35	20.45	21.00
5	16QAM	1	12	19.97	19.96	20.22	
5	16QAM	1	24	20.25	20.21	20.25	
5	16QAM	12	0	19.41	19.33	19.29	20.00
5	16QAM	12	7	19.44	19.10	19.37	
5	16QAM	12	13	19.36	19.14	19.24	
5	16QAM	25	0	19.43	19.12	19.25	
5	64QAM	1	0	20.58	20.54	20.54	21.00
5	64QAM	1	12	20.45	20.29	20.27	
5	64QAM	1	24	20.24	20.12	20.09	



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5	64QAM	12	0	19.58	19.26	19.38	20.00
5	64QAM	12	7	19.29	19.16	19.21	
5	64QAM	12	13	19.34	19.15	19.11	
5	64QAM	25	0	19.44	19.19	19.28	

<LTE Band 17>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				23780	23790	23800	
Frequency (MHz)				709	710	711	
10	QPSK	1	0	21.69	21.49	21.41	22.50
10	QPSK	1	25	21.70	21.63	21.79	
10	QPSK	1	49	21.64	21.80	21.82	
10	QPSK	25	0	20.45	20.40	20.41	21.50
10	QPSK	25	12	20.52	20.52	20.58	
10	QPSK	25	25	20.53	20.71	20.65	
10	QPSK	50	0	20.58	20.58	20.47	
10	16QAM	1	0	20.65	20.77	20.92	21.50
10	16QAM	1	25	21.09	20.83	21.03	
10	16QAM	1	49	21.14	20.86	20.68	
10	16QAM	25	0	19.49	19.49	19.55	20.50
10	16QAM	25	12	19.59	19.54	19.71	
10	16QAM	25	25	19.39	19.81	19.79	
10	16QAM	50	0	19.57	19.64	19.51	
10	64QAM	1	0	20.81	20.69	20.75	21.50
10	64QAM	1	25	20.68	20.90	21.00	
10	64QAM	1	49	21.04	21.10	20.82	
10	64QAM	25	0	19.46	19.57	19.53	20.50
10	64QAM	25	12	19.57	19.63	19.51	
10	64QAM	25	25	19.49	19.71	19.76	
10	64QAM	50	0	19.58	19.60	19.63	
Channel				23755	23790	23825	Tune-up limit (dBm)
Frequency (MHz)				706.5	710	713.5	
5	QPSK	1	0	21.60	21.37	21.40	22.50
5	QPSK	1	12	21.54	21.53	21.74	
5	QPSK	1	24	21.38	21.64	21.71	



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5	QPSK	12	0	20.41	20.31	20.64	21.00
5	QPSK	12	7	20.29	20.49	20.54	
5	QPSK	12	13	20.28	20.42	20.55	
5	QPSK	25	0	20.31	20.54	20.63	
5	16QAM	1	0	20.84	20.62	20.80	21.50
5	16QAM	1	12	20.91	20.75	21.08	
5	16QAM	1	24	21.11	21.10	21.05	
5	16QAM	12	0	19.38	19.39	19.74	20.50
5	16QAM	12	7	19.46	19.55	19.57	
5	16QAM	12	13	19.29	19.65	19.62	
5	16QAM	25	0	19.34	19.68	19.57	
5	64QAM	1	0	20.77	20.78	20.61	21.00
5	64QAM	1	12	20.52	20.41	20.88	
5	64QAM	12	0	19.33	19.23	19.28	20.00
5	64QAM	12	7	19.16	19.42	19.41	
5	64QAM	12	13	19.20	19.30	19.46	
5	64QAM	25	0	19.26	19.71	19.64	

<WLAN 2.4GHz>

2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11b 1Mbps	CH 1	2412	17.04	17.50	97.51
		CH 7	2442	16.13	16.50	
		CH 13	2472	14.59	15.00	
	802.11g 6Mbps	CH 1	2412	11.01	11.50	97.22
		CH 7	2442	10.77	12.00	
		CH 13	2472	9.15	10.00	
	802.11n-HT20 MCS0	CH 1	2412	11.08	11.50	86.73
		CH 7	2442	10.83	11.00	
		CH 13	2472	9.89	10.00	
	802.11n-HT40 MCS0	CH 3	2422	11.40	11.50	75.99
		CH 7	2442	11.45	11.50	
		CH 11	2462	9.74	10.00	





## &lt;RFID&gt;

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
RFID	1	902.75	13.57
	25	914.75	14.80
	50	927.25	14.38
Tune-up Limit (dBm)			15.50

**Note:**

The output power of 2.4GHz WLAN & RFID is derived from the report SZ19100318W03/04.

## 5. RF Exposure Evaluation

### ➤ Standalone Transmission Evaluation:

Bands	Frequency (MHz)	Maximum Tune-up Power (dBm)	Antenna Gain (dBi)	EIRP (mW)	Power Density (mW/cm <sup>2</sup> )	Limit for MPE (mW/cm <sup>2</sup> )
GSM850	836.4	30.00	0.73	1183.042	0.235	0.558
GSM1900	1850.2	28.50	1.20	933.254	0.186	1.0
WCDMA Band II	1880	22.00	1.20	208.930	0.042	1.0
WCDMA Band V	826.4	22.50	0.73	210.378	0.042	0.551
LTE Band 2	1880	22.00	1.20	208.930	0.042	1.0
LTE Band 4	1745	22.00	1.20	208.930	0.042	1.0
LTE Band 5	836.5	22.50	0.73	210.378	0.042	0.558
LTE Band 7	2510	22.50	1.90	275.423	0.055	1.0
LTE Band 17	711	22.50	0.32	191.426	0.038	0.474
WLAN 2.4GHz	2412	17.50	1.90	87.096	0.017	1.0
RFID	914.75	15.50	12.00	562.341	0.112	0.610

#### Note:

1. According to KDB 447498, SAR test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.
2. MPE calculate method

$$\text{Power Density} = \text{EIRP} / 4\pi R^2$$

Where: EIRP = P+G

P = Output Power (dBm)

G = Antenna Gain (dBi)

R = Separation Distance (20cm)

### ➤ Simultaneous Transmission Evaluation:

#### Multi-Band Simultaneous Transmission Consideration

Simultaneous Transmission Consideration	Applicable Combination
	WWAN + WLAN 2.4GHz
	WWAN + RFID
	WLAN 2.4GHz + RFID
	WWAN + WLAN 2.4GHz + RFID



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1. This device contains transmitters that may be operated simultaneously, therefore simultaneous transmission analysis is required.
2. The worst condition for WWAN & WLAN & RFID will be calculated for transmitting simultaneously.

Formula:  $\text{Result} = \text{Power density}_1 / \text{limit}_1 + \text{Power density}_2 / \text{limit}_2 + \text{Power density}_3 / \text{limit}_3 \leq 1$ .

Transmission Bands	Power Density/ SAR	Limit	Simultaneous Transmission Result
WWAN	0.235	0.558	0.621
WLAN 2.4GHz	0.017	1	
RFID	0.112	0.610	

➤ **Conclusion:**

According to 47 CFR §2.1091, this device complies with human exposure basic restrictions.



## Annex A General Information

### 1. Identification of the Responsible Testing Laboratory

<b>Laboratory Name:</b>	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
<b>Laboratory Address:</b>	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
<b>Telephone:</b>	+86 755 36698555
<b>Facsimile:</b>	+86 755 36698525

### 2. Identification of the Responsible Testing Location

<b>Name:</b>	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
<b>Address:</b>	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

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