

## **RF Exposure Evaluation for FCC ID: 2AMLF-JC400**

Refer user manual this device is a EdgeCam 2, and this device was designed used in Mobile devices that the minimum distance between human's body is **20cm**. Based on the 47CFR 2.1091, this device belongs to Mobile device. The definition of the category as following:

### **Mobile Derives:**

CFR Title 47 §2.1091(b)

(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.

### **FCC KDB 447498 D01 General RF Exposure Guidance v06 Limit**

Devices operating in standalone mobile exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously. A minimum test separation distance  $\geq 20$  cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated. The minimum test separation distance required for a device to comply with mobile exposure conditions must be clearly identified in the installation and operating instructions, for all installation and exposure conditions, to enable users and installers to comply with RF exposure requirements. For mobile devices that have the potential to operate in portable device exposure conditions, similar to the configurations described in § 2.1091(d)(4), a KDB inquiry is required to determine the SAR test requirements for demonstrating compliance.

When the categorical exclusion provision of § 2.1091(c) applies, the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to FCC Part 1.1307, 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 level in excess of the commission's guidelines.

<b>Limits for General Population/ Uncontrolled Exposure</b>			
Frequency Range (MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength (H)(A/m)	Power Density (S)(mW/cm <sup>2</sup> )
0.3-1.34	614	1.63	(100)*
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*
30-300	27.5	0.073	0.2
300-1500			f/1500
1500-100,000			1.0

**MPE calculation formula**

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

Where:

S = power density

P = output power (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Separation distance between radiator and human body (cm)

## Test data

GSM 850								
GSM850 Band	Burst Average Power(dBm)			Tune-up Limit (dBm)	Frame-Averaged power (dBm)			Tune-up Limit (dBm)
Channel	128	190	251		128	190	251	
GSM (GMSK, 1-Slot)	33.28	33.39	33.50	34.00	24.09	24.20	24.31	24.50
GPRS (GMSK, 1-Slot)	33.28	33.44	33.49	33.50	24.09	24.25	24.30	24.50
GPRS (GMSK, 2-Slots)	31.29	31.33	31.30	31.50	25.16	<b>25.20</b>	25.17	25.50
GPRS (GMSK, 3-Slots)	29.39	29.45	29.40	29.50	24.97	25.03	24.98	25.50
GPRS (GMSK, 4-Slots)	27.27	27.30	27.30	27.50	24.09	24.12	24.12	24.50
EGPRS (8PSK, 1-Slot)	28.35	28.64	28.33	29.00	19.16	19.45	19.14	19.50
EGPRS (8PSK, 2-Slots)	28.35	28.59	28.33	29.00	22.22	22.46	22.20	22.50
EGPRS (8PSK, 3-Slots)	27.35	27.81	27.38	28.00	22.93	23.39	22.96	23.50
EGPRS (8PSK, 4-Slots)	24.83	25.53	25.09	26.00	21.65	22.35	21.91	22.50

  

GSM 1900								
GSM1900 Band	Burst Average Power(dBm)			Tune-up Limit (dBm)	Frame-Averaged power(dBm)			Tune-up Limit (dBm)
Channel	512	661	810		512	661	810	
GSM (GMSK, 1-Slot)	29.57	29.49	29.38	30.00	20.38	20.30	20.19	20.50
GPRS (GMSK, 1-Slot)	29.40	29.35	29.25	29.50	20.21	20.16	20.06	20.50
GPRS (GMSK, 2-Slots)	27.30	26.92	26.50	27.50	21.17	20.79	20.37	21.50
GPRS (GMSK, 3-Slots)	25.68	25.31	24.92	26.00	<b>21.26</b>	20.89	20.50	21.50
GPRS (GMSK, 4-Slots)	23.55	23.20	22.75	24.00	20.37	20.02	19.57	20.50
EGPRS (8PSK, 1-Slot)	29.55	29.45	29.35	30.00	20.36	20.26	20.16	20.50
EGPRS (8PSK, 2-Slots)	29.09	29.33	28.99	29.50	22.96	23.20	22.86	23.50
EGPRS (8PSK, 3-Slots)	27.44	27.75	27.53	28.00	23.02	23.33	23.11	23.50
EGPRS (8PSK, 4-Slots)	25.22	25.50	25.28	26.00	22.04	22.32	22.10	22.50

Note 1: SAR testing was performed on the maximum frame-averaged power mode.

Note 2: The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:

Frame-averaged power = Burst averaged power (1 Tx Slot) – 9.19 dB

Frame-averaged power = Burst averaged power (2 Tx Slots) – 6.13 dB

Frame-averaged power = Burst averaged power (3 Tx Slots) - 4.42dB

Frame-averaged power = Burst averaged power (4 Tx Slots) – 3.18 dB

WCDMA			
Mode	Band 2	Band 4	Band 5
Output Power (dBm)	23.40	23.26	23.36

Note: This report listed the worst case power value, please refer to RF test report for more details.

LTE								
Mode	Band 2	Band 4	Band 5	Band 7	Band 12	Band 17	Band 38	Band 41
Output Power (dBm)	23.45	23.43	22.99	24.10	23.07	24.04	24.10	24.99

Note: This report listed the worst case power value, please refer to RF test report for more details.

Bluetooth				
Mode	BR/EDR			BLE
	GFSK	π/4-DQPSK	8-DPSK	GFSK
Output Power (dBm)	8.93	10.11	10.19	5.73

Note: This report listed the worst case EIRP power value, please refer to RF test report for more details.

WIFI			
Mode	802.11b	802.11g	802.11n20
Average Power (dBm)	17.40	15.42	15.84

Note: This report listed the worst case EIRP power value, please refer to RF test report for more details.

### Test result

Evolution mode	Maximum output power (dBm)	Antenna Gain (typical) (dBi):	Total Power (mw)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )	Power Density/ Limit	Verdict
GSM 850	25.20	3	660.69	20	0.1314	0.5493	<b>0.2392</b>	Pass
GSM 1900	21.26	3	266.69	20	0.0531	1.2333	0.0431	Pass
WCDMA Band 2	23.40	3	436.52	20	0.0868	1.2333	0.0704	Pass
WCDMA Band 4	23.26	3	422.67	20	0.0841	1.1400	0.0738	Pass
WCDMA Band 5	23.36	3	432.51	20	0.0860	0.5493	0.1566	Pass
LTE Band 2	23.45	3	441.57	20	0.0878	1.2333	0.0712	Pass
LTE Band 4	23.43	3	439.54	20	0.0874	1.1400	0.0767	Pass
LTE Band 5	22.99	3	397.19	20	0.0790	0.5493	0.1438	Pass
LTE Band 7	24.10	3	512.86	20	0.1020	1.6667	0.0612	Pass
LTE Band 12	23.07	3	404.58	20	0.0805	0.4660	0.1727	Pass
LTE Band 17	24.04	3	505.82	20	0.1006	0.4693	0.2144	Pass
LTE Band 38	24.10	3	512.86	20	0.1020	1.7133	0.0595	Pass
LTE Band 41	24.99	3	629.51	20	0.1252	1.7033	0.0735	Pass
Bluetooth	10.11	0	10.26	20	0.0020	1.0000	0.0020	Pass
WIFI	17.40	0	54.95	20	0.0109	1.0000	0.0109	Pass

### Collocated Power Density Calculation

Evolution mode	Frequency(MHz)	Power Density/Limit	$\Sigma$ (Power Density / Limit) of WWAN + Bluetooth	Verdict
GSM 850	824 MHz ~ 849 MHz	0.2392	0.2412	Pass
Bluetooth	2400 MHz ~ 2483.5 MHz	0.0020		Pass
Evolution mode	Frequency(MHz)	Power Density/Limit	$\Sigma$ (Power Density / Limit) of WWAN + WLAN	Verdict
GSM 850	824 MHz ~ 849 MHz	0.2392	<b>0.2501</b>	Pass
WIFI	2400 MHz ~ 2483.5 MHz	0.0109		Pass

**Note:**

1.  $\Sigma$  (Power Density / Limit): This is a summation of [(power density for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + Bluetooth and WWAN + WLAN.
2. Both of the WWAN/WLAN can transmit simultaneously, the formula of calculated the MPE is  
 $CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$   
 CPD = Calculation power density  
 LPD = Limit of power density
3. The worst-case situation is 0.2501, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.
4. More power list please refer to RF test report.

**Conclusion:**

RF exposure Evaluation Results: **Compliance**