

RF Exposure

FCC ID: NCI-M360-D700-1

Applicant: VIA Technologies, Inc

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Dash Cam

Refer Standard: FCC Part 2.1091: Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

FCC MPE Limited:

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
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
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Test Data

Predication of MPE limit at a given distance

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

Where: S = power density

P = power input to the antenna

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)

SRD Antenna Gain information

2.4G WLAN: 2.8dBi

5G WLAN: 2.5dBi

BT: 2.8 dBi

WWAN Antenna Gain information:

Max gain: 2.1dBi

Worst-Case mode Conducted Output Power Results for 2.4G WIFI

802.11b mode

Channel	Frequency (MHz)	Output Power(dBm)	Tune Up tolerance(dBm)
1	2412	17.22	17±1
6	2437	17.59	17±1
11	2462	17.51	17±1

Worst-Case mode Conducted Output Power Results for BT /BLE

Bluetooth				
Band	Mode	Test Frequency	Power(dBm)	Tune-up tolerance(dBm)
BT EDR	GFSK	2402	5.68	5±1
	GFSK	2441	5.89	5±1
	GFSK	2480	5.68	5±1
	pi/4DQPSK	2402	2.70	2±1
	pi/4DQPSK	2441	2.89	2±1
	pi/4DQPSK	2480	2.46	2±1
	8DPSK	2402	3.19	3±1
	8DPSK	2441	2.87	3±1
	8DPSK	2480	2.69	3±1
BLE	GFSK	2402	5.55	5±1
	GFSK	2440	5.94	5±1
	GFSK	2480	5.74	5±1

Worst-Case mode Conducted Power Test results of band U-NII-1/U-NII-3

802.11a mode		
Frequency (MHz)	Conducted Output Power (dBm)	Tune Up tolerance(dBm)
5180	12.69	12±1
5220	12.64	12±1
5240	12.61	12±1
5745	12.64	12±1
5785	12.03	12±1
5825	11.72	12±1

Worst-Case mode Conducted Output Power Results for WWAN

Band	Channel	Frequency (MHz)	Max Tune up power(dBm)	Max Tune up power(mW)	Duty cycle(%)	Average power(mW)
WCDMA850	Low	826.4	23.00	0.200	100	0.200
	Mid	836.6	23.00	0.200	100	0.200
	High	846.4	23.00	0.200	100	0.200
WCDMA1900	Low	1852.4	24.00	0.251	100	0.251
	Mid	1880	24.00	0.251	100	0.251
	High	1907.6	24.00	0.251	100	0.251
WCDMA1700	Low	1852.4	24.00	0.251	100	0.251
	Mid	1880	24.00	0.251	100	0.251
	High	1907.6	24.00	0.251	100	0.251
LTE Band 2	Low	1860	23.00	0.200	100	0.200
	Mid	1880	23.00	0.200	100	0.200
	High	1900	23.00	0.200	100	0.200
LTE Band 4	Low	1720	23.00	0.200	100	0.200
	Mid	1732.5	23.00	0.200	100	0.200
	High	1745	23.00	0.200	100	0.200
LTE Band 5	Low	829	24.00	0.251	100	0.251
	Mid	836.5	24.00	0.251	100	0.251
	High	844	24.00	0.251	100	0.251
LTE Band 12	Low	704	24.00	0.251	100	0.251
	Mid	707.5	24.00	0.251	100	0.251
	High	711	24.00	0.251	100	0.251
LTE Band 13	Low	779.5	24.00	0.251	100	0.251
	Mid	782	24.00	0.251	100	0.251
	High	784.5	24.00	0.251	100	0.251
LTE Band 14	Low	790.5	24.00	0.251	100	0.251
	Mid	793	24.00	0.251	100	0.251
	High	795.5	24.00	0.251	100	0.251
LTE Band 66	Low	1720	24.00	0.251	100	0.251
	Mid	1745	24.00	0.251	100	0.251
	High	1770	24.00	0.251	100	0.251

Note: for power tolerance please refer to tune up for detail.

Calculation results (for 2.4G WIFI): Worst-case mode

Frequency (MHz)	Maximum tune up power(dBm)	RF distance(cm)	Result (mW/cm ²)	Limit (mW/cm ²)
2412	18	20	0.024	1.0
2437	18	20	0.024	
2462	18	20	0.024	

Calculation results (for 5G WIFI): Worst-Case mode

Frequency (MHz)	Maximum tune up power(dBm)	RF distance(cm)	Result (mW/cm ²)	Limit (mW/cm ²)
5180	13	20	0.007	1.0
5220	13	20	0.007	
5240	13	20	0.007	
5745	13	20	0.007	
5785	13	20	0.007	
5825	13	20	0.007	

Calculation results (for BT/BLE): Worst-case mode

Bluetooth					
Band	Mode	Test Frequency	Power(dBm)	Result (mW/cm ²)	Limit (mW/cm ²)
BT EDR	GFSK	2402	6	0.002	1.0
	GFSK	2441	6	0.002	
	GFSK	2480	6	0.002	
	pi/4DQPSK	2402	3	0.001	
	pi/4DQPSK	2441	3	0.001	
	pi/4DQPSK	2480	3	0.001	
	8DPSK	2402	4	0.001	
	8DPSK	2441	4	0.001	
	8DPSK	2480	4	0.001	
BLE	GFSK	2402	6	0.002	
	GFSK	2440	6	0.002	
	GFSK	2480	6	0.002	

Calculation results (for WWAN): Worst-Case mode

Band	Channel	Frequency (MHz)	Result(mW/cm2)	Limit(mW/cm2)	Ratio
WCDMA850	Low	826.4	0.064	0.55	0.116
	Mid	836.6	0.064	0.56	0.114
	High	846.4	0.064	0.57	0.112
WCDMA1900	Low	1852.4	0.081	1.0	0.081
	Mid	1880	0.081	1.0	0.081
	High	1907.6	0.081	1.0	0.081
WCDMA1700	Low	1852.4	0.081	1.0	0.112
	Mid	1880	0.081	1.0	0.112
	High	1907.6	0.081	1.0	0.112
LTE Band 2	Low	1860	0.064	1.0	0.064
	Mid	1880	0.064	1.0	0.064
	High	1900	0.064	1.0	0.064
LTE Band 4	Low	1720	0.064	1.0	0.064
	Mid	1732.5	0.064	1.0	0.064
	High	1745	0.064	1.0	0.064
LTE Band 5	Low	829	0.081	0.55	0.147
	Mid	836.5	0.081	0.56	0.145
	High	844	0.081	0.56	0.145
LTE Band 12	Low	704	0.081	0.47	0.172
	Mid	707.5	0.081	0.47	0.172
	High	711	0.081	0.47	0.172
LTE Band 13	Low	779.5	0.081	0.52	0.156
	Mid	782	0.081	0.52	0.156
	High	784.5	0.081	0.52	0.156
LTE Band 14	Low	790.5	0.081	0.53	0.153
	Mid	793	0.081	0.53	0.153
	High	795.5	0.081	0.53	0.153
LTE Band 66	Low	1720	0.081	1.0	0.081
	Mid	1745	0.081	1.0	0.081
	High	1770	0.081	1.0	0.081

Simultaneous Transmission Calculation (Worst-case mode)

No.	Transmitter Combinations	Scenario Supported or not
1	WWAN+2.4G WLAN+BT	Yes
2	WWAN +5G WLAN+BT	Yes

Max Simultaneous Transmission Calculation (Worst-case mode)

No.	Worst Mode	MPE Ratio	Results
1	LTE Band12 +2.4G WIFI+BLE	$0.172+0.024+0.002=0.198$	<1.0(pass)