RF Exposure

FCC ID: NCI-M360-D700

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/cm2)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	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：3.5dBi

Worst-Case mode Conducted Output Power Results for2.4G WIFI

802.11b mode

Channel	Frequency (MHz)	Output Power(dBm)	Tune Up tolerance(dBm)
1	2412	16.65	16±1
6	2437	16.92	16±1
11	2462	16.62	16±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	3.22	3±1
	GFSK	2441	3.00	3±1
	GFSK	2480	2.46	3±1
	pi/4DQPSK	2402	2.41	2±1
	pi/4DQPSK	2441	2.22	2±1
	pi/4DQPSK	2480	1.52	2±1
	8DPSK	2402	2.85	2±1
	8DPSK	2441	2.56	2±1
	8DPSK	2480	1.93	2±1
BLE	GFSK	2402	5.54	5±1
	GFSK	2440	5.41	5±1
	GFSK	2480	4.94	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	10.38	9.5±1
5220	10.09	9.5±1
5240	10.29	9.5±1
5745	12.31	11.5±1
5785	11.71	11.5±1
5825	11.42	11.5±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	21.00	0.126	100	0.126
	Mid	1880	21.00	0.126	100	0.126
	High	1900	21.00	0.126	100	0.126
LTE Band 4	Low	1720	20.00	0.100	100	0.100
	Mid	1732.5	20.00	0.100	100	0.100
	High	1745	20.00	0.100	100	0.100
LTE Band 5	Low	829	22.50	0.178	100	0.178
	Mid	836.5	22.50	0.178	100	0.178
	High	844	22.50	0.178	100	0.178
LTE Band 12	Low	704	22.50	0.178	100	0.178
	Mid	707.5	22.50	0.178	100	0.178
	High	711	22.50	0.178	100	0.178
LTE Band 13	Low	779.5	22.50	0.178	100	0.178
	Mid	782	22.50	0.178	100	0.178
	High	784.5	22.50	0.178	100	0.178
LTE Band 14	Low	790.5	22.50	0.178	100	0.178
	Mid	793	22.50	0.178	100	0.178
	High	795.5	22.50	0.178	100	0.178
LTE Band 66	Low	1720	21.00	0.126	100	0.126
	Mid	1745	21.00	0.126	100	0.126
	High	1770	21.00	0.126	100	0.126

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/cm2)	Limit (mW/cm2)
2412	17	20	0.019	1.0
2437	17	20	0.019	
2462	17	20	0.019	

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

Frequency (MHz)	Maximum tune up power(dBm)	RF distance(cm)	Result (mW/cm2)	Limit (mW/cm2)
5180	10.5	20	0.0039	1.0
5220	10.5	20	0.0039	
5240	10.5	20	0.0039	
5745	12.5	20	0.0063	
5785	12.5	20	0.0063	
5825	12.5	20	0.0063	

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

Bluetooth					
Band	Mode	Test Frequency	Power(dBm)	Result (mW/cm2)	Limit (mW/cm2)
BT EDR	GFSK	2402	4	0.001	1.0
	GFSK	2441	4	0.001	
	GFSK	2480	4	0.001	
	pi/4DQPSK	2402	3	0.001	
	pi/4DQPSK	2441	3	0.001	
	pi/4DQPSK	2480	3	0.001	
	8DPSK	2402	3	0.001	
	8DPSK	2441	3	0.001	
	8DPSK	2480	3	0.001	
BLE	GFSK	2402	6	0.0015	
	GFSK	2440	6	0.0015	
	GFSK	2480	6	0.0015	

Calculation results (for WWAN): Worst-Case mode

Band	Channel	Frequency (MHz)	Result(mW/cm2)	Limit(mW/cm2)	Ratio
WCDMA850	Low	826.4	0.089	0.55	0.160
	Mid	836.6	0.089	0.56	0.160
	High	846.4	0.089	0.57	0.160
WCDMA1900	Low	1852.4	0.112	1.0	0.112
	Mid	1880	0.112	1.0	0.112
	High	1907.6	0.112	1.0	0.112
LTE Band 2	Low	1860	0.056	1.0	0.056
	Mid	1880	0.056	1.0	0.056
	High	1900	0.056	1.0	0.056
LTE Band 4	Low	1720	0.045	1.0	0.045
	Mid	1732.5	0.045	1.0	0.045
	High	1745	0.045	1.0	0.045
LTE Band 5	Low	829	0.079	0.55	0.143
	Mid	836.5	0.079	0.56	0.142
	High	844	0.079	0.56	0.140
LTE Band 12	Low	704	0.079	0.47	0.168
	Mid	707.5	0.079	0.47	0.167
	High	711	0.079	0.47	0.167
LTE Band 13	Low	779.5	0.079	0.52	0.152
	Mid	782	0.079	0.52	0.152
	High	784.5	0.079	0.52	0.151
LTE Band 14	Low	790.5	0.079	0.53	0.150
	Mid	793	0.079	0.53	0.149
	High	795.5	0.079	0.53	0.149
LTE Band 66	Low	1720	0.056	1.0	0.056
	Mid	1745	0.056	1.0	0.056
	High	1770	0.056	1.0	0.056

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

Antenna	Mode/Channel	Calculation results(mW/cm2)	Limit (mW/cm2)	Ratio
WWAN	LTE Band12	0.079	0.47	0.168
WLAN	2.4G WIFI	0.019	1.0	0.019
WLAN	5G WIFI	0.0063	1.0	0.0063
BT	BLE	0.0015	1.0	0.0015

Max Simultaneous Transmission Calculation (Worst-case mode)

No.	Worst Mode	MPE Ratio	Results
1	LTE Band12 +2.4G WIFI+BLE	0.168+0.019+0.0015	0.1885<1.0(pass)