

MPE CALCULATION

FCC ID: I28-ZBRZQ3BT

I28-RFIDM6EM

I28MD-FXLAN11AC

RF Exposure Requirements:
RF Radiation Exposure Limits:
RF Radiation Exposure Guidelines:

47 CFR §1.1307(b)
47 CFR §1.1310
FCC OST/OET Bulletin Number 65

EUT Frequency Band:

902.75-927.25 MHz; 2402-2480 MHz,
2412-2462 MHz; 5180-5825 MHz

Limits for General Population/Uncontrolled Exposure in the band of:

300-1500MHz: Limit = $f/1500 \text{ mW/cm}^2$

Power Density Limit:

1500-100,000MHz: Limit = 1 mW/cm^2

Equation: $S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

Where, S = Power Density

P = Power Input to Antenna

G = Antenna Gain

R = distance to the center of radiated antenna

EUT: Thermal Printer, Model No.: ZC150, ZC300, and ZC350

Prediction distance 20cm

ZQ3BT Radio:

(Bluetooth BDR/EDR): Power = 7.42 dBm, Antenna Gain = 1.69 dBi, Power density = 0.00109 mW/cm^2

(Bluetooth LE): Power = 4.72 dBm, Antenna Gain = 1.69 dBi, Power density = 0.00203 mW/cm^2

Type	CH Freq (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Directional Gain (dBi)	Tune-Up Tolerance	Tolerance Max Power (dBm)	Measurement Distance (cm)	Calculated MPE (mW/cm ²)	MPE Limit (mW/cm ²)	Pass/Fail
BLE	2402	4.72	1.69	1.69	±1dB	5.72	20	0.00109	1	Pass
BT-EDR	2402	7.40	1.69	1.69	±1dB	8.40	20	0.00203	1	Pass

M6e-MicroTT:

UHF RFID: Power = 28.11 dBm, Antenna Gain = 3 dBi, Power density = 0.323 mW/cm^2

Type	CH Freq (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Directional Gain (dBi)	Tune-Up Tolerance	Tolerance Max Power (dBm)	Measurement Distance (cm)	Calculated MPE (mW/cm ²)	MPE Limit (mW/cm ²)	Pass/Fail
RFID	902.75	28.11	3	3	±1dB	29.11	20	0.323	0.602	Pass

AC Radio:

(Bluetooth BDR/EDR): Power = 10.27 dBm, Antenna Gain = 3.66 dBi, Power density = 0.00619 mW/cm²

(Bluetooth LE): Power = 8.43 dBm, Antenna Gain = 3.66 dBi, Power density = 0.00405 mW/cm²

(WLAN-2.4GHz): Power=16.77 dBm, Antenna Gain =3.66 dBi, Power density = 0.02766 mW/cm²

(WLAN-5GHz): Power=14.76 dBm, Antenna Gain =3.19 dBi, Power density = 0.01562 mW/cm²

Type	CH Freq (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Directional Gain (dBi)	Tune-Up Tolerance	Tolerance Max Power (dBm)	Measurement Distance (cm)	Calculated MPE (mW/cm ²)	MPE Limit (mW/cm ²)	Pass/Fail
BLE	2402	8.43	3.66	3.66	±1dB	9.43	20	0.00405	1	Pass
BT-BDR	2402	10.27	3.66	3.66	±1dB	11.27	20	0.00619	1	Pass
WLAN-2.4GHz	2412	16.77	3.66	3.66	±1dB	17.77	20	0.02766	1	Pass
WLAN-5GHz	5550	14.76	3.19	3.19	±1dB	15.76	20	0.01562	1	Pass

UHF Co-location with ZQ3BT: PASS

BT-EDR = (0.00203/1) x 100 = 0.203%

RFID = (0.323/0.601) x 100 = 53.74%

Total MPE Percentage = (0.203+53.74) % = **53.943% < 100%**

ZQ3BT Co-location with AC WLAN Radio: PASS

WLAN-2.4GHz = (0.02766/1) x 100% = 2.766%

BT-EDR = (0.00203/1) x 100% = 0.203%

Total MPE Percentage = (2.766+0.203) % = **2.969% < 100%**

ZQ3BT Co-location with AC WLAN Radio: PASS

WLAN-2.4GHz = (0.02766/1) x 100 = 2.766%

RFID = (0.323/0.601) x 100 = 53.74%

Total MPE Percentage = (2.766+53.74) % = **56.506% < 100%**

***Note: 2.4GHz and 5GHz do not transmit simultaneously**

The Above Result had shown that the Device complied with MPE requirement.

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