

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

RF Exposure
2BDVS-ZWBLE1US
31766-ZWBLE1US
23-0267
February 2, 2024
DEN Smart Home
DEN SmartStrike

Maximum Permissible Exposure to RF (MPE), CFR 1.1310 (e)

The maximum exposure level to the public from the RF power of the EUT shall not exceed a power density, **S** as per the respective limits in Table 1 below, at a distance, d, of 20 cm (Mobile condition) from the EUT.

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 ²)	Averaging time (minutes)
Limits for General Population/Uncontrolled Exposure				
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
300-1,500			f/1500	30
1,500-100,000			1.0	30

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

Therefore, for:

MPE for 912 MHz – 920 MHz for DEN SmartStrike:

Limit: $f/1500 = 0.61 \text{ mW/cm}^2$

Peak Power (dBm) = +11.76 dBm

Peak Power (Watts) = 0.015 W

Gain of Transmit Antenna = +3.0 dBi = 1.99 numeric

d = Distance = 20 cm = 0.2 m

$$\begin{aligned} \mathbf{S} &= (\mathbf{PG} / 4\pi d^2) = \text{EIRP} / 4\pi = 0.015 (1.99) / 4\pi * 0.2 * 0.2 \\ &= 0.0299 / 0.5030 = 0.05944 \text{ W/m}^2 \\ &= (0.05944 \text{ W/m}^2) (1\text{m}^2/\text{W}) (0.1 \text{ mW/cm}^2) \\ &= 0.005944 \text{ mW/cm}^2 \end{aligned}$$

which is << less than $S = 0.61 \text{ mW/cm}^2$

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MPE for 2400 MHz – 2483.5 MHz radio module:

See attached RF Exposure Report for the radio module bearing FCC ID: QOQ-BGM220S2 and IC: 5123A-BGM220S2.

Bureau Veritas, Test Report Number: SA200602C21, Issue Date: Aug 24, 2020.

Reported Maximum Power Density (mW/cm²) = 0.002 mW/cm²

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RSS-102, 2.5.2 compliance for 433.164 MHz – 435.324 MHz:

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

for 912 MHz – 920 MHz:

$$\text{Limit} = 1.31 \times 10^{-2} \times 916^{0.6834} = 1.38 \text{ Watts}$$

Max EIRP for DEN SmartStrike radio = 11.76 dBm + 3.0 dBi = 14.76 dBm = 30.0 mW << 1380 mW

All calculations performed by:
Date: February 2, 2024
Test Engineer: George Yang

Signature: 

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Simultaneous Transmission Collocation considerations:

Please either confirm that the transmitters operate standalone per KDB 447498 D01 v06 section 7.1 or, if the transmitters can transmit simultaneously, include the necessary calculations for simultaneous transmission per KDB 447498 D01 v06 section 7.2.

Please either confirm that the transmitters operate standalone or, if the transmitters can transmit simultaneously, include the necessary calculations for simultaneous transmission per ISED RSS-102 issue 5 section 3.1.2.

The device has two radios on board, a Z-wave and BLE. The radio can occasionally simultaneously broadcast however the fundamental signals are on different frequencies, 900 MHz ISM band and 2.4 GHz ISM band. The radios do not share a common antenna. Each radio has its own antenna. The BLE is pre-certified module bearing its own FCC and IC identification numbers and is being used with approved antennas.

Calculations for simultaneous transmission per KDB 447498 D01 v06 section 7.2 is provided here to show that Simultaneous transmission MPE test exclusion applies since the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 .

Per ISED RSS-102 (I5) section 3.1.2 other recognized methods can be used to show compliance; therefore, this method is used to show compliance to RSS-102.

Total Sum of MPE:

Sum of the total MPE for both frequency bands =
 $0.0002/1 \text{ mW/cm}^2 + 0.005944/1 \text{ mW/cm}^2 = 0.006$ which is $\ll$ less than 1.0

The EUT was tested with all radios ON and active during collocation testing. The emissions generated with a single radio ON and active versus all radios ON and active did not produce additional unwanted spurious emissions or intermodulation that would require additional testing. The radios can be collocated as designed.