RF Exposure Evaluation for FCC ID: XEK-MSCANCVG

Refer user manual this device is a MSCAN-CVG RFID READER, and this device was designed used in portable devices that the minimum distance between human's body is **60mm.** Based on the 47CFR 2.1093, this device belongs to portable device. The definition of the category as following:

Portable Derives:

CFR Title 47 § 2.1093(b)

(b) For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

FCC KDB 447498 D01 General RF Exposure Guidance v06 Limit

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√ f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

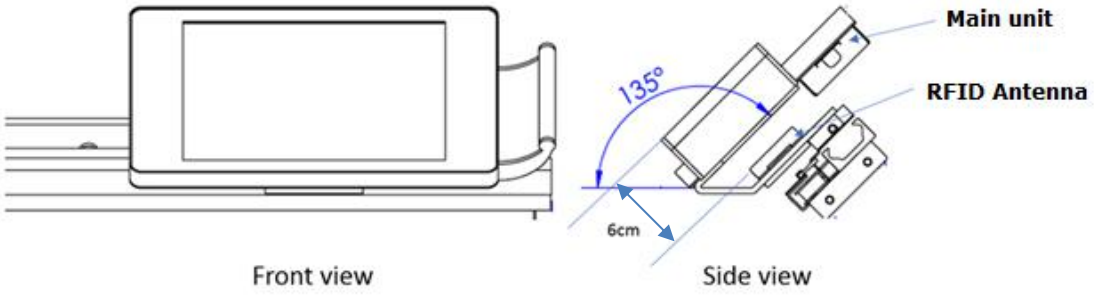
Where

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and

for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 60 mm, a distance of 60 mm is applied to determine SAR test exclusion.

Normal Working Scenario



Test data

RFID			
Mode	Low Channel	Middle Channel	High Channel
Peak Power (dBm)	15.96	16.30	**16.56**

Bluetooth				
Mode	BR+EDR			BLE
	GFSK	∏/4-DQPSK	8-DPSK	GFSK
Peak Power (dBm)	1.62	0.44	0.93	8.30
Note: This report listed the worst case peak power value, please refer to RF test report for more details.				

Tune-up power

Mode	Range (dBm)
RFID	15 +/- 2dBm

Mode	Range (dBm)			
Bluetooth	BR+EDR			BLE
	GFSK	∏/4-DQPSK	8-DPSK	GFSK
	0 +/- 2dBm	(-1.00) +/- 2dBm	(-1.00) +/- 2dBm	7.00 +/- 2dBm

RFID: FCC exclusion condition= [50.12 mW/60 mm] · [√ 0.9269 GHz] = 0.80 ＜ 3.0
Bluetooth: FCC exclusion condition= [7.94 mW/5 mm] · [√ 2.48 GHz] = 2.50 ＜ 3.0

Estimated SAR Calculation

According to KDB 447498 D01 when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR was estimated according to following formula to result in substantially conservative SAR values of <= 0.4 W/kg to determine simultaneous transmission SAR test exclusion.

$$\text{Estimated SAR} = \frac{Max.Tune\ Up\ Power(mw)}{Min\ Test\ Separation\ Distance} * \frac{\sqrt{f_{GHz}}}{x}$$ (where x = 7.5 for 1-g SAR)

If the minimum test separation distance is < 5 mm, a distance of 5 mm is used for estimated SAR calculation. When the test separation distance is > 50 mm, the 0.4 W/kg is used for SAR-1g.

Band	Mode	Position	Antenna To user (mm)	SAR Testing	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Frequency (GHz)	Calculation Distance/Gap (mm)	Estimated SAR (W/kg)
Bluetooth	GFSK	Body	5	NO	9.0	7.94	2480	5	0.333
RFID	RFID	Body	60	NO	17.0	50.12	0.9269	60	0.400

Simultaneous Transmission Mode Consider

NO.	Mode	Bluetooth
		Body
1	RFID	+ Bluetooth

Simultaneous Mode	Mode	Max. 1g SAR (W/kg)	1g Sum SAR (W/kg)
RFID+Bluetooth	RFID	0.400	0.733
	Bluetooth	0.333	

Sum SAR of Simultaneous Transmission

RF Exposure Evaluation Result: **Pass**

Note: More power data, Please refer to the RF report.