KDB 447498 D01 General RF Exposure Guidance v06

4.3.1. Standalone SAR test exclusion considerations

100 MHz to 6 GHz at separation distance less than or equal to 50 mm

SAR Test Exclusion Calculator

Insert values in yellow highlighted boxes to determine SAR Exclusion

Max Power	8	mW
Min Separation	5	mm
Frequency	2.4	GHz

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Answer **2.5** **Must be less than or equal to 3.0 for SAR Exclusion**

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TCBs are excluded from granting if:

General Population: The Answer is equal to or greater than 24 (8x threshold)

Controlled Use: The Answer is equal to or greater than 60 (20x threshold)

and, when published RF exposure KDB procedures are not established for SAR testing or when SAR data is not provided to support compliance.

Please also note the following: *[FCC KDB quote]* 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. *[End quote]*

	Model:	A03817	Test Number:	190930		
MPE Calculator	RF Exposure uses EIRP for calculation. EIRP is based on TX power added to the antenna gain in dBi.					
	dBi = dB gain compared to an isotropic radiator.					
	S = power density in mW/cm^2					
	Transmitter maximum Output power operating at 100% (Watts)		0.0080			
	Percent Duty Cycle operation (%)		100.0		Antenna Gain (dBi)	2.5
	Output Power for 100% duty Cycle operation (Watts)		0.0080		Antenna Gain (Numeric)	1.78
Tx Frequency (MHz)	2437	Calcualtion power (Watts)	0.0080	dBd + 2.17 = dBi	dBi to dBd	2.2
					Antenna Gain (dBd)	0.33
Cable Loss (dB)	0.0	Adjusted Power (dBm)	9.03		Antenna minus cable (dBi)	2.50
	Calculated ERP (mw)	8.632			EIRP = Po(dBM) + Gain (dB)	
	Calculated EIRP (mw)	14.226			Radiated (EIRP) dBm	11.531
					ERP = EIRP - 2.17 dB	
					Radiated (ERP) dBm	9.361

Power density (S) mW/cm² = EIRP / 4 p r^2

r (cm) EIRP (mW)

	Occupational Limit	FCC radio frequency radiation exposure limits per 1.1310		
5	mW/cm^2	Frequency (MHz)	Occupational Limit (mW/cm^2)	Public Limit (mW/cm^2)
50	W/m^2	30-300	1	0.2
	General Public Limit	300-1,500	f/300	f/1500
1	mW/cm^2	1,500-10,000	5	1
10	W/m^2			

	Occupational Limit			
$0.6455f^{0.5}$	W/m^2	IC radio frequency radiation exposure limits per RSS-102		
39.7	W/m^2	Frequency (MHz)	Occupational Limit (W/m^2)	Public Limit (W/m^2)
	General Public Limit	100-6,000	$0.6455f^{0.5}$	
$0.02619f^{0.6834}$	W/m^2	6,000-15,000	50	
5.4	W/m^2	48-300		1.291
		300-6,000		$0.02619f^{0.6834}$
		6,000-15,000	50	10

f = Transmit Frequecny (MHz)			f (MHz) =	2437
P_T = Power Input to Antenna (mW)			P_T (mW) =	8.0000
Duty cycle (percentage of operation)			% =	100.0
P_A = Adjusted Power due to Duty cycle or Cable Loss (mW)			P_A (mW) =	8.00
G_N = Numeric Gain of the Antenna			GN (numeric) =	1.78
S_{20} = Power Density of device at 20cm (W/m^2)		$S_{20}=(P_AG_N)/(4\pi R_{20})^2$	S_{20} (W/m^2) =	0.03
S_L = Power Density Limit (W/m^2)			S_L (W/m^2)=	5.404
R_C = Minimum distance to the Radiating Element for Compliance (cm)		$R_C=\sqrt{(P_AG_N/4\pi S_L)}$	R_C (cm) =	1.4
R_C = Minimum distance to the Radiating Element for Compliance (m)		$R_C=\sqrt{(P_AG_N/4\pi S_L)}$	R_C (cm) =	0.01
S_C = Power Density of the device at the Compliance Distance R_C (W/m^2)		$S_C=(P_AG_N)/(4\pi R_C)^2$	S_C (W/m^2) =	5.40
R_{20} = 20cm			R20=	20

	For Complaince with Canada General Population Limits, User Manual must indicate a minimum seperation distance of	1.4	cm
	For Complaince with Canada General Population Limits, User Manual may indicate a minimum seperation distance of	0.014	m