

KDB 447498
General SAR test reduction and exclusion guidance
Customer declared Output powers

Channel	Power Output (dBm)	Power Output (W)
WCDMA bandII	24	0.25
WCDMA bandV	24	0.25
GSM850	33	2
PCS1900	30	1
Bluetooth	9	0.008
BLE	1	0.001

Section 4.3 General SAR test reduction and exclusion guidance

For Standalone SAR exclusion consideration, when SAR Exclusion Threshold requirement in KDB 447498 is satisfied, standalone SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

In the frequency range below 100 MHz to 6 GHz and test separation distance of 50mm, the SAR Test Exclusion Threshold will be determined as follows

SAR Exclusion Threshold (SARET)

SAR Exclusion Threshold = Step 1 + Step 2

Step 1

$$NT = [(MP/TSD^A) * \sqrt{f_{GHz}}]$$

NT = Numeric Threshold (3.0 for 1-g SAR and 7.5 for 10-g SAR)
 MP = Max Power of channel (mW) (inc tune up)
 TSD^A = Min Test separation Distance or 50mm (whichever is lower) = 50

We can transpose this formula to allow us to find the maximum power of a channel allowed and compare this to the measured maximum power.

$$= [(NT \times TSD^A) / \sqrt{f_{GHz}}]$$

For Distances Greater than 50 mm Step 2 applies

Step 2

For Frequencies from 100 MHz to < 1500 MHz

$$(TSD^B - 50mm) * (f_{MHz} / 150)\}$$

For Frequencies > 1500 MHz and ≤ 6 GHz

$$(TSD^B - 50mm) * 10\}$$

Where:

TSD^B = Min Test separation Distance (mm) = 200

WCDMA band V Operating Frequency 826.4MHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{0.8264}] + \{ (200 - 50) * (826.4/150) \}$$

$$\text{SARET} = [150 / 0.91] + \{150 * 5.51\}$$

$$\text{SARET} = 164.84 + 826.4$$

$$\text{SARET} = 0.991\text{W}$$

WCDMA band V Operating Frequency 846.6MHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{0.8466}] + \{ (200 - 50) * (846.6/150) \}$$

$$\text{SARET} = [150 / 0.92] + \{150 * 5.51\}$$

$$\text{SARET} = 163.04 + 846.6$$

$$\text{SARET} = 1.01\text{W}$$

WCDMA band II Operating Frequency 1852.4MHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{1.8524}] + \{ (200 - 50) * 10 \}$$

$$\text{SARET} = [150 / 1.36] + \{150 * 10\}$$

$$\text{SARET} = 110.29 + 1500$$

$$\text{SARET} = 1.61 \text{ W}$$

WCDMA band II Operating Frequency 1907.6MHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{1.9076}] + \{ (200 - 50) * 10 \}$$

$$\text{SARET} = [150 / 1.38] + \{150 * 10\}$$

$$\text{SARET} = 108.7 + 1500$$

$$\text{SARET} = 1.609\text{W}$$

GSM 850 Operating Frequency 824.2 MHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{0.8242}] + \{ (200 - 50) * (824.2/150) \}$$

$$\text{SARET} = [150 / 0.91] + \{150 * 5.49\}$$

$$\text{SARET} = 164.84 + 824.2$$

$$\text{SARET} = 0.989 \text{ W}$$

GSM 850 Operating Frequency 848.8MHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{0.8488}] + \{ (200 - 50) * (848.8/150) \}$$

$$\text{SARET} = [150 / 0.92] + \{150 * 5.66\}$$

$$\text{SARET} = 163.04 + 848.8$$

$$\text{SARET} = 1.012 \text{ W}$$

PCS1900 Operating Frequency 1850.2 MHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{1.8502}] + \{ (200 - 50) * 10 \}$$

$$\text{SARET} = [150 / 1.36] + \{150 * 10\}$$

$$\text{SARET} = 110.29 + 1500$$

$$\text{SARET} = 1.61 \text{ W}$$

PCS1900 Operating Frequency 1909.8MHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{1.9098}] + \{ (200 - 50) * 10 \}$$

$$\text{SARET} = [150 / 1.38] + \{150 * 10\}$$

$$\text{SARET} = 108.7 + 1500$$

$$\text{SARET} = 1.609 \text{ W}$$

Bluetooth (Classic and LE) Operating Frequency 2.402 GHz

$$\text{SARET} = [(3.0 \times 50) / \sqrt{2.402}] + \{ (200 - 50) * 10 \}$$

$$\text{SARET} = [150 / 1.55] + \{150 * 10\}$$

$$\text{SARET} = 96.77 + 1500$$

$$\text{SARET} = 1.597 \text{ W}$$

Section 7.2 Transmitters used in mobile device exposure conditions for simultaneous transmission operations

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modelled, or measured field strengths or power density. The MPE ratio of each antenna is determined at the minimum *test separation distance* required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to the MPE limit at the test frequency.

Band	EIRP (W)	Duty Cycle %	Time Averaged EIRP (W)	SAR Exclusion Threshold (W)	Ratio
WCDMA band II	0.250	12.5	0.03125	1.609	0.019
WCDMA band V	0.250	12.5	0.03125	0.991	0.03
GSM850	2	12.5	0.250	0.989	0.253
PCS1900	1	12.5	0.125	1.609	0.078
BTC	0.008	100	0.008	1.597	0.005
BTLE	0.001	100	0.001	1.597	0.0006
*Sum of Ratios		0.253 + 0.005 + 0.0006 =		0.259	
Ratio Limit		< 1.0			

*Maximum ratio for radio capable of simultaneous operation