

SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens

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Antenna-to-user separation distance calculations for independent SAR requirements:

Output > 60/f: SAR evaluation is required when antenna-to-user distance is $<(5 + \frac{1}{2}n)$ cm

- EVDO 850: $(5 + \frac{1}{2}n) = 5 + \frac{1}{2}[251/(60/0.85)-1] = 5 + 1 = 6$ cm
- EVDO 1900: $(5 + \frac{1}{2}n) = 5 + \frac{1}{2}[251/(60/1.9)-1] = 5 + 3 = 8$ cm
- 802.11 at 2.45 GHz: $(5 + \frac{1}{2}n) = 5 + \frac{1}{2}[100/(60/2.45)-1] = 5 + 2 = 7$ cm
- 802.11 at 5.24 GHz: $(5 + \frac{1}{2}n) = 5 + \frac{1}{2}[100/(60/2.45)-1] = 5 + 4 = 9$ cm
- 802.11 at 5.8 GHz: $(5 + \frac{1}{2}n) = 5 + \frac{1}{2}[100/(60/2.45)-1] = 5 + 4 = 9$ cm

EVDO test reduction applies since antenna to user separation distance is greater than 8 cm.

802.11 test reduction applies since antenna to user separation distance is greater than 9 cm.

Antenna-to-antenna separation distance calculations for simultaneous SAR requirements:

Output > 60/f: SAR evaluation is required when antenna-to-antenna distance is $<(5 + \frac{1}{2}n_x + \frac{1}{2}n_y)$ cm

- EVDO & 802.11 (worst case): $(5 + \frac{1}{2}n_x + \frac{1}{2}n_y) = (5 + 3 + 4) = 12$ cm
- EVDO & Bluetooth (worst case): $(5 + \frac{1}{2}n_x + \frac{1}{2}n_y) = (5 + 3 + 0) = 8$ cm
- 802.11 & Bluetooth (worst case): $(5 + \frac{1}{2}n_x + \frac{1}{2}n_y) = (5 + 4 + 0) = 9$ cm

Bluetooth evaluation is required only if both antenna-to-antenna and antenna-to-user separation distances are < 5cm. Both separation distances are > 5cm so SAR for simultaneous transmission is not required.