



# ***Gobi2000™ Module Dell Latitude™ E4200 (PP15S) Collocated RF Analysis***

**80-VR673-8 Rev. C**

**October 29, 2009**

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## Revision history

Revision	Date	Description
A	September 2009	Initial release
B	October 21, 2009	Minor error corrections
C	October 29, 2009	Update for corrected WWAN SAR values

# 1 Overview

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This document provides collocated SAR analysis of the Dell® notebook model Latitude™ E4200 (PP15S) in reference to KDB 616217.

The change filed under this application is adding notebook model PP15S collocated with WLAN modules QDS-BRCM1030, QDS-BRCM1031, E2K512ANHMW, E2K533ANH, WLAN/WiMAX combo module PD9512ANXHD and Bluetooth module QDS-BRCM1033. Because power levels for the Bluetooth module is <60/f, it is not included as part of this analysis.

The analysis shows that notebook model PP15S is compliant for all combinations of WWAN and WLAN modules based on the SAR summation of individual SAR measurement results.

## 1.1 Definitions

$$n_x = \frac{P_x}{60/f} - 1$$

$n_x$  = number of times by which an antenna's output power exceeds 60/f, calculated to determine an antenna's user separation threshold for test reduction procedures.

$P_x$  = antenna average output power

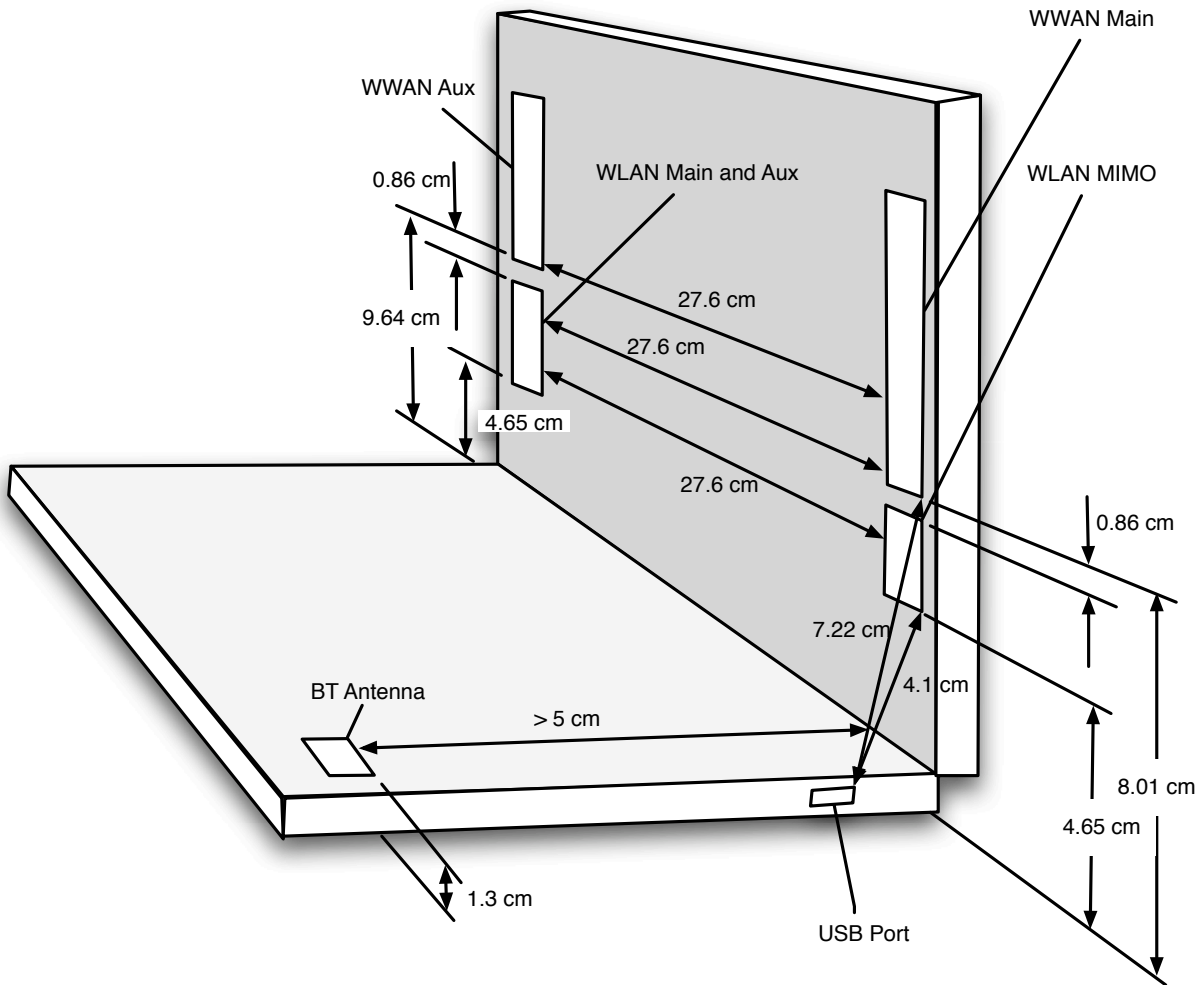
$f$  = frequency in MHz

## 1.2 Antenna Locations and Separation Distances

Table 1-1 Antenna Separation Distances

Antenna	Distance (cm)
WLAN Main-to-user	4.7
WLAN Aux-to-user	4.7
WWAN main-to-user	8.01
WLAN Aux-to-WWAN main	0.86
WLAN main-to-WWAN main	0.86

Figure 1-1 Antenna Locations



## 1.3 Collocation Calculations

**Table 1-2 Individual Transmitter SAR Evaluation (Worst Case)**

Technology	Freq (MHz)	Measured Burst Avg Pwr (GPRS only) (dBm)	Average Power (dBm)	Measured Average Power (mW)	60/F <sub>(GHz)</sub> (mW)	n = (P / (60/f) - 1) cm	1/2*n (cm) per FCC Procedure	Minimum Antenna-User Separation Requirement (cm)	Actual Antenna-User Distance (cm)	Highest Measured SAR (mW/g 1g)
GPRS 850 MHz	824.2	31.4	25.70	371.5	72.8	4.1	2	7.0	17	0.054
EVDO R0	1908.75		24.05	254.1	31.4	7.1	4	9	17	0.117
WLAN (QDS-BRCM1031)	5150		20.29	107.0	11.7	8.2	4	9	4.65	0.178
WLAN (QDS-BRCM1030)	2480		23.05	202.0	24.2	7	4	9	4.65	0.056
WLAN (E2K512ANHMW)	2462		18.57	72.0	24.4	2	1	6	4.65	1.457
WLAN (E2K512ANHMW)	5700		18.51	71.0	10.5	6	3	8	4.65	1.457
WLAN (E2K512ANHMW)	5795		17.92	62.0	10.4	5	2	7	4.65	1.457
WLAN (E2K533ANH)	2462		26.41	438.0	24.4	17	8	13	4.65	1.462
WLAN (E2K533ANH)	5795		26.44	441.0	10.4	42	21	26	4.65	1.462
WLAN/WiMAX (PD9512ANXHD)	2462		27.67	585	24.4	23	12	17	4.65	0.096
WLAN/WiMAX (PD9512ANXHD)	2690		24.05	254	22.3	10	5	10	4.65	0.096
WLAN/WiMAX (PD9512ANXHD)	5700		16.81	48	10.5	4	2	7	4.65	0.096
WLAN/WiMAX (PD9512ANXHD)	5825		25.16	328	10.3	31	15	20	4.65	0.096

**Table 1-3 Simultaneous Transmitter SAR Requirements**

Mode	Simultaneous Transmitting Antenna Distance Calculation Requirement (5 + 1/2 Nx + 1/2 Ny) cm	Actual Separation (cm)	Result
GPRS 850 MHz + WLAN Aux	11.0	0.86	Sum Individual SAR
UMTS 1900 MHz + WLAN Main	13.0	0.86	Sum Individual SAR

## 1.4 Summation of WWAN and WLAN SAR values

### 1.4.1 QDS-BRCM1030

Table 1-4 Simultaneous SAR Summation QDS-BRCM1030

Mode	Highest Measured SAR (mW/g (1g))
WWAN (GPRS 850 MHz)	0.054
WWAN (EVDO R0)	0.117
WLAN QDS-BRCM1030	0.056

WWAN 850 MHz +WLAN (QDS-BRCM1030)

$$\text{WWAN 850 + WLAN SAR} = 0.054 \text{ mW/g} + 0.056 \text{ mW/g} = \mathbf{0.110 \text{ mW/g (1g)}}$$

WWAN 1900 MHz +WLAN (QDS-BRCM1030)

$$\text{WWAN 1900 + WLAN SAR} = 0.117 \text{ mW/g} + 0.116 \text{ mW/g} = \mathbf{0.173 \text{ mW/g (1g)}}$$

### 1.4.2 QDS-BRCM1031

Table 1-5 Simultaneous SAR Summation QDS-BRCM1031

Mode	Highest Measured SAR (mW/g (1g))
WWAN (GPRS 850 MHz)	0.054
WWAN (EVDO R0)	0.117
WLAN QDS-BRCM1031	0.178

WWAN 850 MHz +WLAN (QDS-BRCM1031)

$$\text{WWAN 850 + WLAN SAR} = 0.054 \text{ mW/g} + 0.178 \text{ mW/g} = \mathbf{0.232 \text{ mW/g (1g)}}$$

WWAN 1900 MHz +WLAN (QDS-BRCM1031)

$$\text{WWAN 1900 + WLAN SAR} = 0.117 \text{ mW/g} + 0.178 \text{ mW/g} = \mathbf{0.295 \text{ mW/g (1g)}}$$

### 1.4.3 E2K512ANHMW

**Table 1-6 Simultaneous SAR Summation E2K512ANHMW**

Mode	Highest Measured SAR (mW/g (1g))
WWAN (GPRS 850 MHz)	0.054
WWAN (EVDO R0)	0.117
E2K512ANHMW	1.457

WWAN 850 MHz +WLAN (E2K512ANHMW)

WWAN 850 + WLAN SAR = 0.054 mW/g +1.457 mW/g = **1.511 mW/g (1g)**

WWAN 1900 MHz +WLAN (E2K512ANHMW)

WWAN 1900 + WLAN SAR = 0.117 mW/g +1.457 mW/g = **1.574 mW/g (1g)**

### 1.4.4 E2K533ANH

**Table 1-7 Simultaneous SAR Summation E2K533ANH**

Mode	Highest Measured SAR (mW/g (1g))
WWAN (GPRS 850 MHz)	0.054
WWAN (EVDO R0)	0.117
WLAN E2K533ANH	1.41

WWAN 850 MHz +WLAN (E2K533ANH)

WWAN 850 + WLAN SAR = 0.054 mW/g +1.41 mW/g = **1.464 mW/g (1g)**

WWAN 1900 MHz +WLAN (E2K533ANH)

WWAN 1900 + WLAN SAR = 0.117 mW/g +1.41mW/g = **1.527 mW/g (1g)**

### 1.4.5 PD9512ANXHD

**Table 1-8 Simultaneous SAR Summation PD9512ANXHD**

Mode	Highest Measured SAR (mW/g (1g))
WWAN (GPRS 850 MHz)	0.054
WWAN (EVDO R0)	0.117
WLAN QDS-BRCM1031	0.096

WWAN 850 MHz +WLAN (PD9512ANXHD)

WWAN 850 + WLAN SAR = 0.054 mW/g +0.096 mW/g = **0.150 mW/g (1g)**

WWAN 1900 MHz +WLAN (PD9512ANXHD)

WWAN 1900 + WLAN SAR = 0.117 mW/g +0.096 mW/g = **0.213 mW/g (1g)**



## 2 Permissive Change History

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Table 2-1 summarizes the FCC permissive change history for FCC ID J9CGOBI2000-D.

**Table 2-1 FCC Permissive Change history, J9CGOBI2000-D**

Grant Date	Change Description	Hosts	WWAN FCC Category	WLAN FCC IDs
9/8/2009	Add Portable Host + collocation	Inspiron 1011 (PP19S)	Portable	QDS-BRCM1030 QDS-BRCM1031
Pending	Add Portable Host + collocation	Latitude E4200 (PP15S)	Portable	QDS-BRCM1030 QDS-BRCM1031 E2K512ANHMW E2K533ANH PD9512ANXHD