REPORT ON

Specific Absorption Rate Co-Location Assessment of the Intermec Technologies Corporation CN3 Mobile Computer

Report No WS615435/02 Issue 1 **September 2006**

Product Service

Choose Certainty. Add Value

TUV Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk; www.babt.com

REPORT ON Specific Absorption Rate Co-location Assessment of the Intermec Technologies Corporation CN3 Mobile Computer

Report No: WS615435/02 Issue 1

September 2006

PREPARED FOR

Intermec Technologies Corporation
550 Second Street. SE
CEDAR RAPIDS
IA 52401-2023
USA

ATTESTATION

The wireless portable device described within this report has been shown to be capable of compliance for localised specific absorption rate (SAR) for General Population/Uncontrolled Exposure Limits as defined in the FCC standard Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01) and RSS-102 Issue 1 (Provisional) September 25, 1999 of 1.6 W/kg.

The measurements shown in this report were made in accordance with the procedures specified in Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), RSS-102 Issue 1 (Provisional) September 25 and IEEE 1528-2003

All reported testing was carried out on a sample of equipment to demonstrate compliance with the above standards. The sample tested was found to comply with the requirements in the applied rules.

A Miller
SAR Test Engineer

APPROVED BY

M J Hardy
Authorised Signatory

DATED 14th September 2006

Note: The test results reported herein relate only to the item tested as identified above and on the Status Page.

CONTENTS

SECTION 1

REPORT SUMMARY

Specific Absorption Rate Co-location Assessment of the
Intermec Technologies Corporation CN3 Mobile Computer

1.1 STATUS

MANUFACTURING DESCRIPTION	Mobile Computer
STATUS OF TEST	Specific Absorption Rate Testing
APPLICANT	Intermec Technologies Corporation
POWER CLASS	GSM 850 Class 4 (+33dBm) PCS 1900 Class 1 (+30dBm) EGPRS GSM 850 (+27dBm) PCS1900 Class E2 (+26dBm
GPRS CLASS	Class B
GPRS MULTI-SLOT CLASS	12 (4Dn;4Up;Sum5)
EGPRS CLASS	Class B
EGPRS MULTI-SLOT CLASS	10 (4Dn;2Up;Sum5)
MANUFACTURER	Intermec Technologies Corporation
TYPE OR MODEL NUMBER	Intermec CN3
CN3 HARDWARE VERSION	004
CN3 SOFTWARE VERSION	15096
CN3 SERIAL NUMBER	21590600241
MC75 HARDWARE VERSION	B2.5
MC75 SOFTWARE VERSION	02.002 (SV12)
MC75 IMEI NUMBER	IMEI 355634001531257
BATTERY MODEL	P/N: 318-016-002 (Li-ion 3.7V / 4000mHA)
BATTERY MANUFACTURER	Intermec Technologies Corporation

TEST SPECIFICATIONS:

1. Federal Communications Commission (FCC) OET Bulletin 65c, Edition 01-01, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields – Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions.
2. RSS-102 Issue 1 (Provisional) September 25, 1999: Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to radio Frequency Fields.

REFERENCES:

3. US Federal Government, Code of Federal Regulations, Title 47 Telecommunication, Chapter I Federal Communications Commission, part 2, section 1093.
4. IEEE 1528 – 2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.

BABT REGISTRATION NUMBER:	WS615435
RECEIPT OF TEST SAMPLES:	14th August 2006
START OF TEST:	14th August 2006
FINISH OF TEST:	12th September 2006

1.2 SUMMARY

This report must be read in conjunction with the following TUV Product Service Limited Report WS615435/01 Issue 1.

The unit supplied for testing is an Intermec CN3 Mobile Computer, which offers Dual-Band (GSM/GPRS/EGPRS 850/1900); WLAN 2450MHz and Bluetooth connectivity.

The unit allows simultaneous multi-band transmission; for the purpose of this report the following radio combinations were assessed for co-located head and body SAR.

- GSM 850; WLAN and Bluetooth.
- GSM 1900; WLAN and Bluetooth.

Prior to co-located assessment each of the radios were individually assessed to the requirements of the applied standards for full details see TUV Product Service Limited Reports WS615435/01 Issue 1'. From the individually assessed radios it was determined which combination of position and frequency provided the worst-case SAR. These positions were then used for the simultaneous transmission assessment.

The Bluetooth radio, when measured individually either against the head or body phantoms, produced an RF signal which was located within the noise floor. Therefore for the purpose of this report the Bluetooth radio was considered, but not used in the contribution in the evaluation of co-location SAR.

The procedure for the assessment of this wireless device with simultaneous multi-band transmission was selected from the draft document entitled PT_62209_2004_040_Siegbahn_Douglas_Section_6_3_measurement_procedure:-

Alternative 1: Assessment by summation of separately assessed maximum SAR values.

This procedure gives a fast method to determine the upper limit of the multi-band SAR

1. Assess the maximum mass-averaged SAR at frequency 1 and separately according to IEC62209 part 1.
2. Add the two maximum mass-averaged SAR values to obtain the multi-band SAR

In addition to the assessment by summation of separately assessed maximum SAR values the following method was used to show how much the secondary transmitters contributed to the maximum SAR of dominant transmitter. The Eeff V/m of each point of each of the area scans was squared then multiplied by the appropriate conductivity value then added together and finally a square root value obtained for each point. The resultant was recompiled into a combined data file normalised to a conductivity value of 1.00 and then loaded into SARA2. A new data visualisation file was then created. See section 2 of this report for full details.

1.3 CO-LOCATED ASSESSMENT SUMMARY

ASSESSMENT BY SUMMATION OF SEPARATELY ASSESSED MAXIMUM SAR VALUES

WLAN and GSM 850 Head SAR Co-located Assessment

Dominant Transmitter	:	2450 MHz
Dominant Transmitter Mode	:	WLAN VOiP
Modulation	:	DSSS (100%)
Bit rate	:	1mb/s
Phantom	:	SAM
EUT Position	:	LH Cheek
Maximum mass-averaged SAR (1g)	:	1.031 W/kg

Non-Dominant Transmitter	:	850 MHz
Non-Dominant Transmitter Mode	:	GSM Class 4
Modulation	:	GMSK (12.5%)
Phantom	:	SAM
EUT Position	:	LH Cheek
Maximum mass-averaged SAR (1g)	:	0.318 W/kg

Upper limit estimation of the multi-band SAR is 1.349W/kg

WLAN and GSM 850 (GPRS Mode) Body SAR Co-located Assessment

Dominant Transmitter	:	850 MHz
Dominant Transmitter Mode	:	GPRS Class 12
Modulation	:	GMSK (50%)
Phantom	:	Flat Phantom
EUT Position	:	Rear Facing
EUT Separation Distance	:	15.0mm
Maximum mass-averaged SAR (1g)	:	0.798W/kg

Non-Dominant Transmitter	:	2450 MHz
Non-Dominant Transmitter Mode	:	WLAN
Modulation	:	DSSS (100%)
Bit rate	:	1mb/s
Phantom	:	Flat Phantom
EUT Position	:	Rear facing
EUT Separation Distance	:	15.0mm
Maximum mass-averaged SAR (1g)	:	0.020W/kg

Upper limit estimation of the multi-band SAR is 0.818W/kg.

1.3 CO-LOCATED ASSESSMENT SUMMARY

ASSESSMENT BY SUMMATION OF SEPARATELY ASSESSED MAXIMUM SAR VALUES

WLAN and GSM 1900 Head SAR Co-located Assessment

Dominant Transmitter	:	2450 MHz
Dominant Transmitter Mode	:	WLAN VOiP
Modulation	:	DSSS (100%)
Bit rate	:	1mb/s
Phantom	:	SAM
EUT Position	:	LH Cheek
Maximum mass-averaged SAR (1g)	:	1.031 W/kg

Non-Dominant Transmitter	:	1900 MHz
Non-Dominant Transmitter Mode	:	GSM Class 1
Modulation	:	GMSK (12.5%)
Phantom	:	SAM
EUT Position	:	LH Cheek
Maximum mass-averaged SAR (1g)	:	0.038 W/kg

Upper limit estimation of the multi-band SAR is 1.069W/kg

WLAN and GSM 1900 (GPRS Mode) Body SAR Co-located Assessment

Dominant Transmitter	:	1900 MHz
Dominant Transmitter Mode	:	GPRS Class 12
Modulation	:	GMSK (50%)
Phantom	:	Flat Phantom
EUT Position	:	Rear facing
EUT Separation Distance	:	15.0mm
Maximum mass-averaged SAR (1g)	:	0.543W/kg

Non-Dominant Transmitter	:	2450 MHz
Non-Dominant Transmitter Mode	:	WLAN
Modulation	:	DSSS (100%)
Bit rate	:	1mb/s
Phantom	:	Flat Phantom
EUT Position	:	Rear facing
Separation Distance	:	0.0mm
Maximum mass-averaged SAR (1g)	:	0.020W/kg

Upper limit estimation of the multi-band SAR is 0.563W/kg

SECTION 2

ASSESSMENT DETAILS

Specific Absorption Rate Co-location Assessment of the
Intermec Technologies Corporation CN3 Mobile Computer

2.1 850MHz GSM HEAD SAR TEST RESULT INCLUDING COARSE AREA SCAN – 2D

SYSTEM / SOFTWARE:	SARA2 / 2.39 VPM	INPUT POWER DRIFT:	0.0 dB
DATE / TIME:	15/08/2006 09:20:46	DUT BATTERY MODEL/NO:	318-016-002
FILENAME:	WS615435_F_01.txt	PROBE SERIAL NUMBER:	187
AMBIENT TEMPERATURE:	22.9°C	LIQUID SIMULANT:	835 Head
DEVICE UNDER TEST:	Intermec CN3	RELATIVE PERMITTIVITY:	56.86
RELATIVE HUMIDITY:	46.2%	CONDUCTIVITY:	0.919
PHANTOM S/NO:	Head_04_35.csv	LIQUID TEMPERATURE:	21.8°C
PHANTOM ROTATION:	0°	MAX SAR Y-AXIS LOCATION:	-22.80 mm
DUT POSITION:	LH-Cheek	MAX SAR Z-AXIS LOCATION:	-142.50 mm
ANTENNA CONFIGURATION:	Fixed Internal	MAX E FIELD:	19.19 V/m
TEST FREQUENCY:	836.4MHz	SAR 1g:	0.318 W/kg
AIR FACTORS:	345 / 442 / 414	SAR 10g:	0.225 W/kg
CONVERSION FACTORS:	0.312 / 0.312 / 0.312	SAR START:	0.168 W/kg
TYPE OF MODULATION:	GMSK (GSM mode)	SAR END:	0.165 W/kg
MODN. DUTY CYCLE:	12.5%	SAR DRIFT DURING SCAN:	-1.62 %
DIODE COMPRESSION FACTORS (V*200):	20 / 20 / 20	PROBE BATTERY LAST CHANGED:	14/08/2006
INPUT POWER LEVEL:	5	EXTRAPOLATION:	poly4

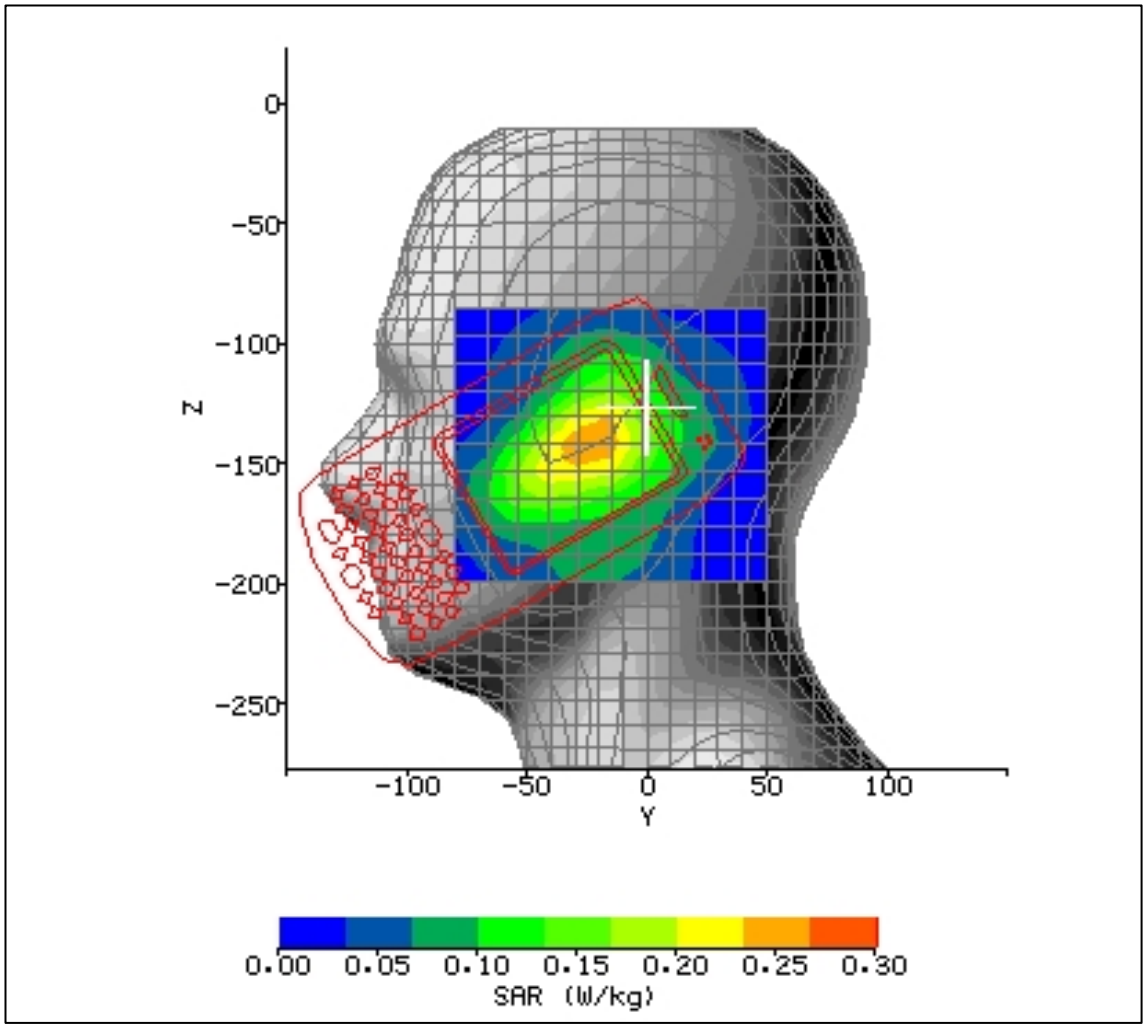

Figure 1: SAR Head Testing Results for the Intermec CN3 Mobile Computer in Left Hand Cheek Position; Tested at 836.4MHz (850MHz GSM Middle Channel).

2.1.1 2450MHz WLAN HEAD SAR TEST RESULT INCLUDING COARSE AREA SCAN – 2D

SYSTEM / SOFTWARE:	SARA2 / 2.39 VPM	INPUT POWER DRIFT:	0.0 dB
DATE / TIME:	18/08/2006 11:45:43	DUT BATTERY MODEL/NO:	318-016-002
FILENAME:	WS615435_F_17.txt	PROBE SERIAL NUMBER:	0187
AMBIENT TEMPERATURE:	22.8°C	LIQUID SIMULANT:	2450 Head
DEVICE UNDER TEST:	Intermec CN3	RELATIVE PERMITTIVITY:	38.81
RELATIVE HUMIDITY:	59.6%	CONDUCTIVITY:	1.834
PHANTOM S/NO:	HeadFT04.csv	LIQUID TEMPERATURE:	22.2°C
PHANTOM ROTATION:	0°	MAX SAR Y-AXIS LOCATION:	-18.90 mm
DUT POSITION:	LH-Cheek	MAX SAR Z-AXIS LOCATION:	-109.15 mm
ANTENNA CONFIGURATION:	Fixed Internal	MAX E FIELD:	26.72 V/m
TEST FREQUENCY:	2412MHz	SAR 1g:	1.031 W/kg
AIR FACTORS:	345 / 442 / 414	SAR 10g:	0.508 W/kg
CONVERSION FACTORS:	0.397 / 0.397 / 0.397	SAR START:	0.181 W/kg
TYPE OF MODULATION:	DSSS	SAR END:	0.181 W/kg
MODN. DUTY CYCLE:	100%	SAR DRIFT DURING SCAN:	-0.16 %
DIODE COMPRESSION FACTORS (V*200):	20 / 20 / 20	PROBE BATTERY LAST CHANGED:	18/08/06
INPUT POWER LEVEL:	19.24	EXTRAPOLATION:	poly4

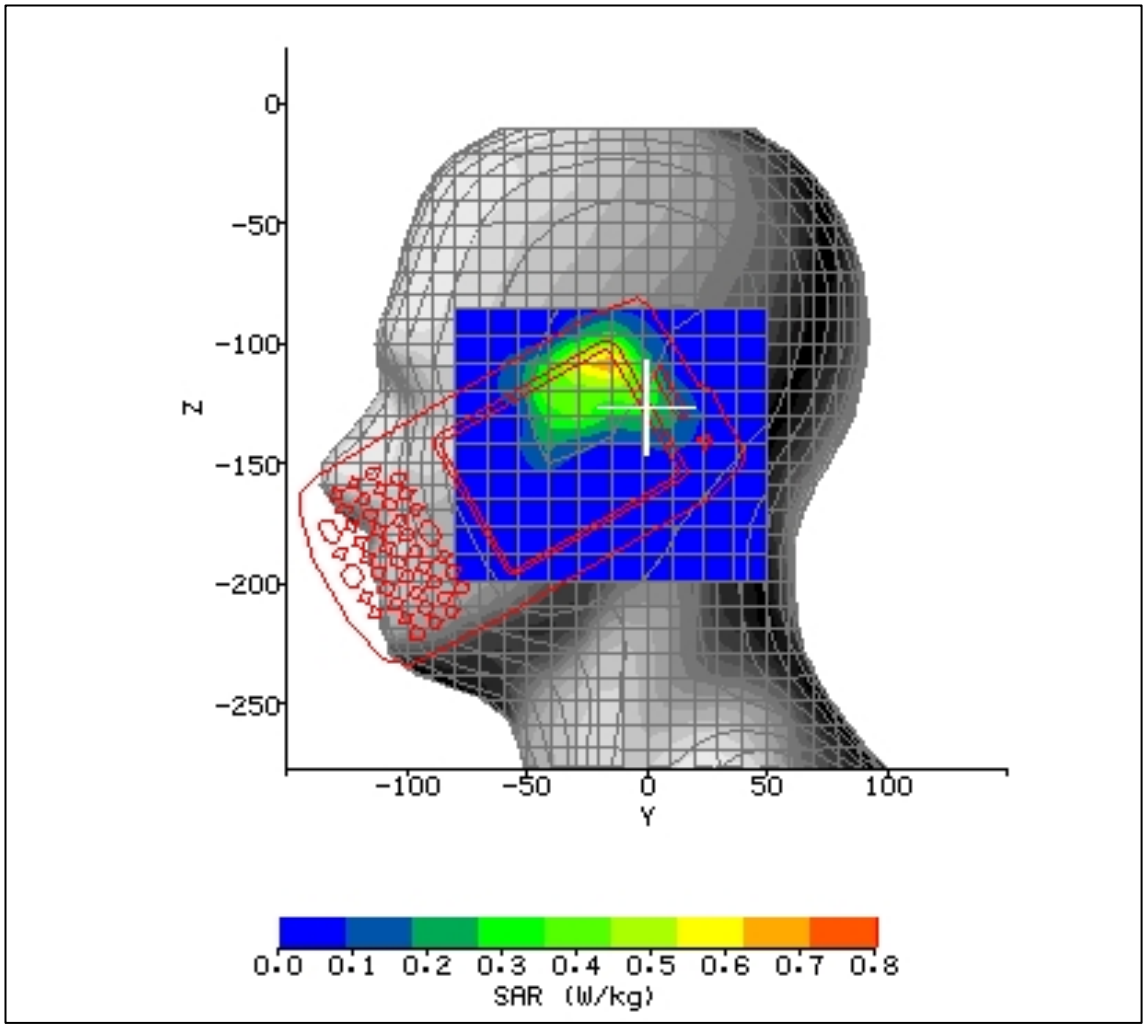

Figure 2: SAR Head Testing Results for the Intermec CN3 Mobile Computer in Left Hand Cheek Position; Tested at 2412MHz (WLAN Bottom Channel).

2.1.2 GSM850 AND WLAN CO-LOCATED HEAD SAR COARSE AREA SCAN – 2D

In addition to the assessment by summation of separately assessed maximum SAR values the following was used to show how much the secondary transmitters contributed to the maximum SAR of dominant transmitter. The Eeff V/m of each point of each of the area scans was squared then multiplied by the appropriate conductivity value then added together and finally a square root value obtained for each point. The resultant was recompiled into a combined data file normalised to a conductivity value of 1.00 and then loaded into SARA2. A new data visualisation file was then created.

The maximum spot SAR from the WLAN and 850MHz radios were added together; WLAN maxima spot SAR 0.731 W/kg and GSM 850 maxima spot SAR 0.262 W/kg giving a maximum spot SAR of 0.993W/kg. This was then compared to a point-by-point summation of the maxima spot SAR of which a maxima obtained was 0.850 W/kg.

In summary, adding the maxima of the separate scans would show about a 35.84% increase, but the point-by-point addition shows that this is pessimistic by a factor of 2.2 as the actual increase in the maximum would only be 16.28% when compared to the maxima spot SAR of the dominant transmitter. Also, the change in distribution is slight when a combined data file is recompiled by SARA2.

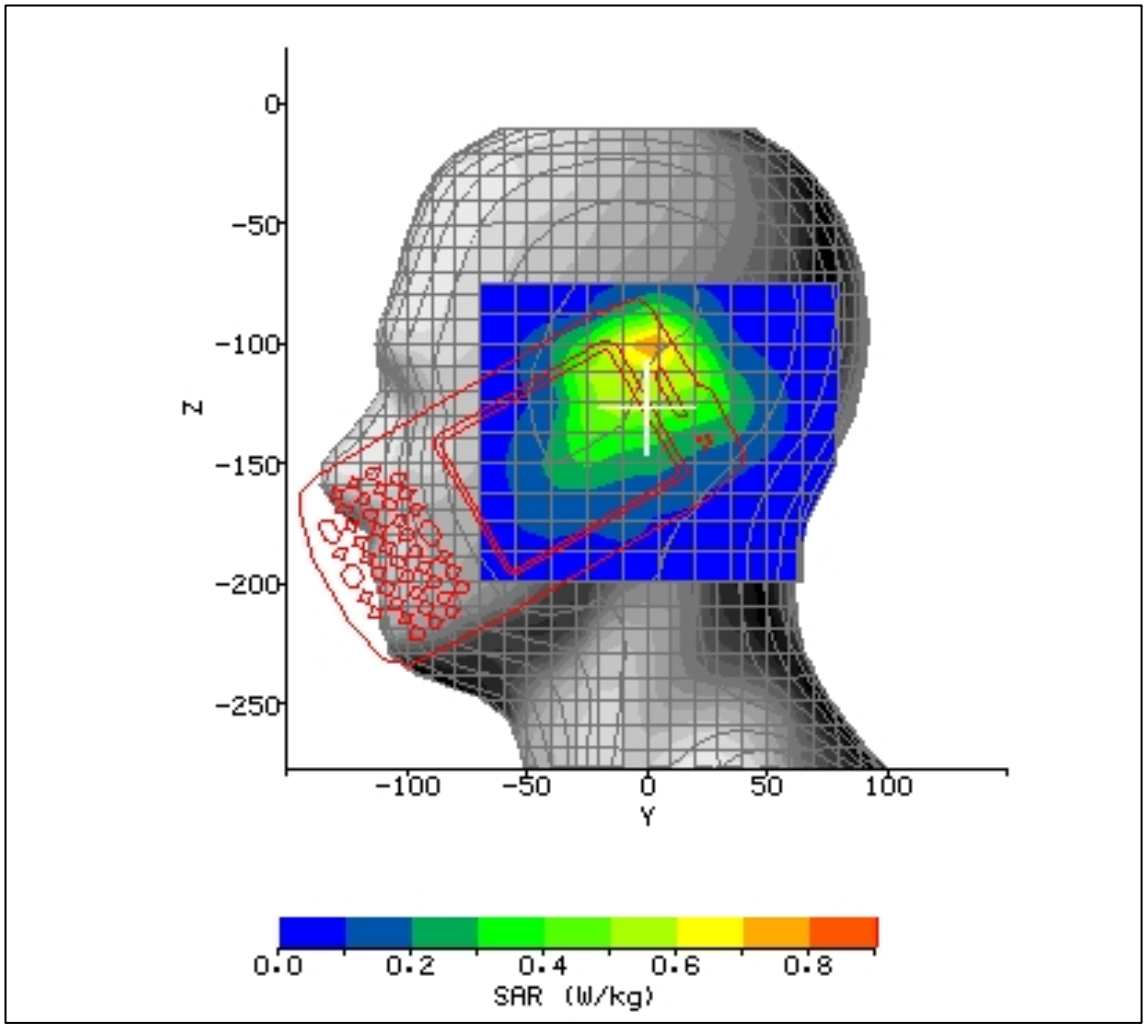

Figure 3: Co-located Assessment Results for the Intermec CN3 Mobile Computer in Left Hand Cheek Position; 836.4 (850MHz GSM High Channel) and 2412MHz (WLAN Middle Channel) Recompiled data file.

2.2 850MHz GPRS BODY SAR TEST RESULT INCLUDING COARSE AREA SCAN – 2D

SYSTEM / SOFTWARE:	SARA2 / 2.39 VPM	INPUT POWER DRIFT:	0.0 dB
DATE / TIME:	16/08/2006 11:58:43	DUT BATTERY MODEL/NO:	318-016-002
FILENAME:	WS615435_F_28.txt	PROBE SERIAL NUMBER:	187
AMBIENT TEMPERATURE:	22.6°C	LIQUID SIMULANT:	835 Body
DEVICE UNDER TEST:	Intermec CN3	RELATIVE PERMITTIVITY:	56.86
RELATIVE HUMIDITY:	53.1%	CONDUCTIVITY:	0.967
PHANTOM S/NO:	HeadBox02.csv	LIQUID TEMPERATURE:	20.7°C
PHANTOM ROTATION:	0°	MAX SAR X-AXIS LOCATION:	-9.00 mm
DUT POSITION:	Rear facing 15mm spacing	MAX SAR Y-AXIS LOCATION:	-25.00 mm
ANTENNA CONFIGURATION:	Fixed Internal	MAX E FIELD:	13.58 V/m
TEST FREQUENCY:	848.8MHz	SAR 1g:	0.203 W/kg
AIR FACTORS:	345 / 442 / 414	SAR 10g:	0.145 W/kg
CONVERSION FACTORS:	0.307 / 0.307 / 0.307	SAR START:	0.064 W/kg
TYPE OF MODULATION:	GMSK (GPRS mode)	SAR END:	0.064 W/kg
MODN. DUTY CYCLE:	50%	SAR DRIFT DURING SCAN:	0.47 %
DIODE COMPRESSION FACTORS (V*200):	20 / 20 / 20	PROBE BATTERY LAST CHANGED:	16/08/2006
INPUT POWER LEVEL:	4x 33dBm	EXTRAPOLATION:	poly4

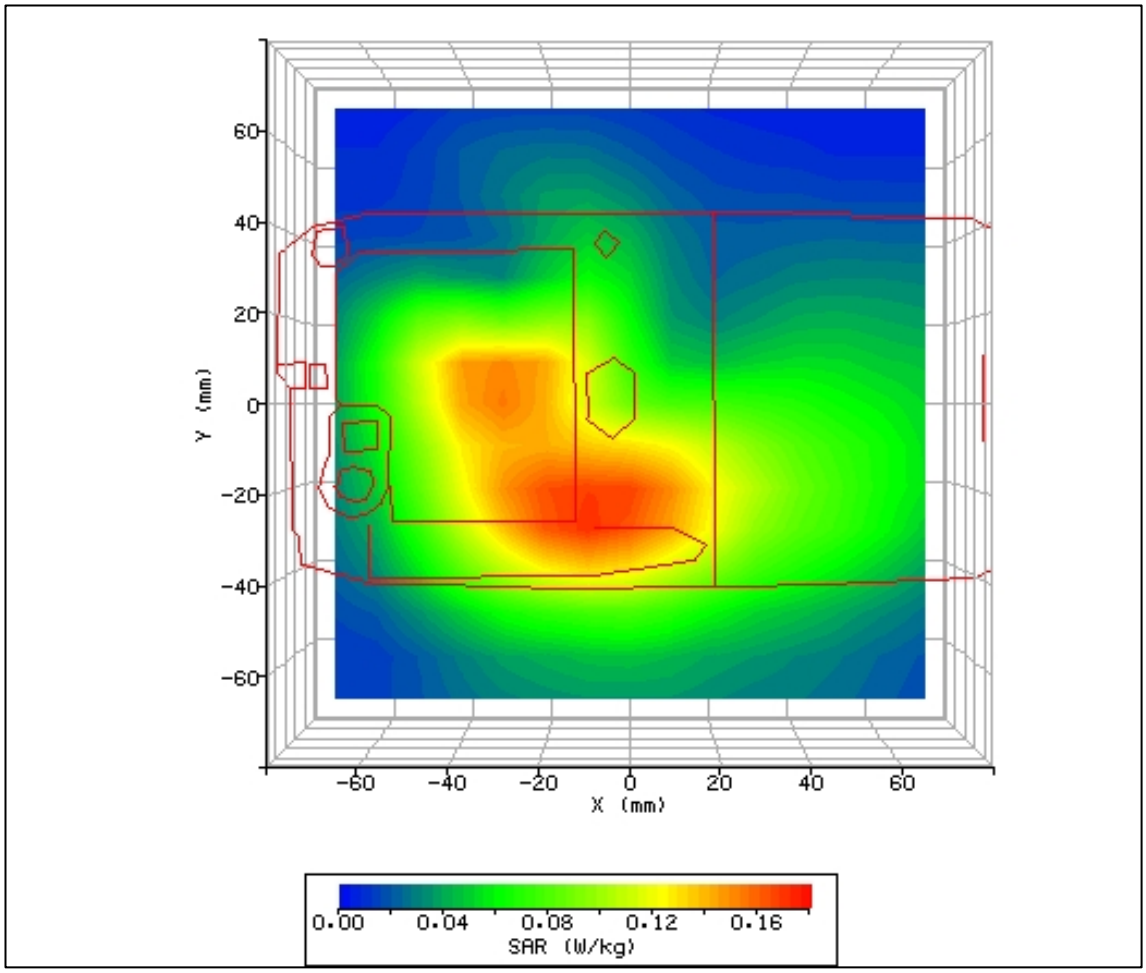

Figure 4: SAR Body Testing Results for the Intermec CN3 Mobile Computer in Rear Facing Phantom Position; Tested at 848.8MHz (850MHz GPRS High Channel) with 15.0mm Separation.

2.2.1 2450MHz WLAN BODY SAR TEST RESULT INCLUDING COARSE AREA SCAN – 2D

SYSTEM / SOFTWARE:	SARA2 / 2.39 VPM	INPUT POWER DRIFT:	0.0 dB
DATE / TIME:	18/08/2006 14:36:56	DUT BATTERY MODEL/NO:	318-016-002
FILENAME:	WS615435_F_40.txt	PROBE SERIAL NUMBER:	187
AMBIENT TEMPERATURE:	22.1°C	LIQUID SIMULANT:	2450 Body
DEVICE UNDER TEST:	Intermec CN3	RELATIVE PERMITTIVITY:	53.04
RELATIVE HUMIDITY:	57.2%	CONDUCTIVITY:	0.967
PHANTOM S/NO:	HeadBox02.csv	LIQUID TEMPERATURE:	20.3°C
PHANTOM ROTATION:	0°	MAX SAR X-AXIS LOCATION:	-12.00 mm
DUT POSITION:	Rear facing 15.0mm spacing	MAX SAR Y-AXIS LOCATION:	-34.00 mm
ANTENNA CONFIGURATION:	Fixed Internal	MAX E FIELD:	2.82 V/m
TEST FREQUENCY:	2437.0MHz	SAR 1g:	0.020 W/kg
AIR FACTORS:	345 / 442 / 414	SAR 10g:	0.012 W/kg
CONVERSION FACTORS:	0.457 / 0.457 / 0.457	SAR START:	0.003 W/kg
TYPE OF MODULATION:	DSSS	SAR END:	0.003 W/kg
MODN. DUTY CYCLE:	100%	SAR DRIFT DURING SCAN:	0.00 %
DIODE COMPRESSION FACTORS (V*200):	20 / 20 / 20	PROBE BATTERY LAST CHANGED:	18/08/2006
INPUT POWER LEVEL:	19.24	EXTRAPOLATION:	poly4

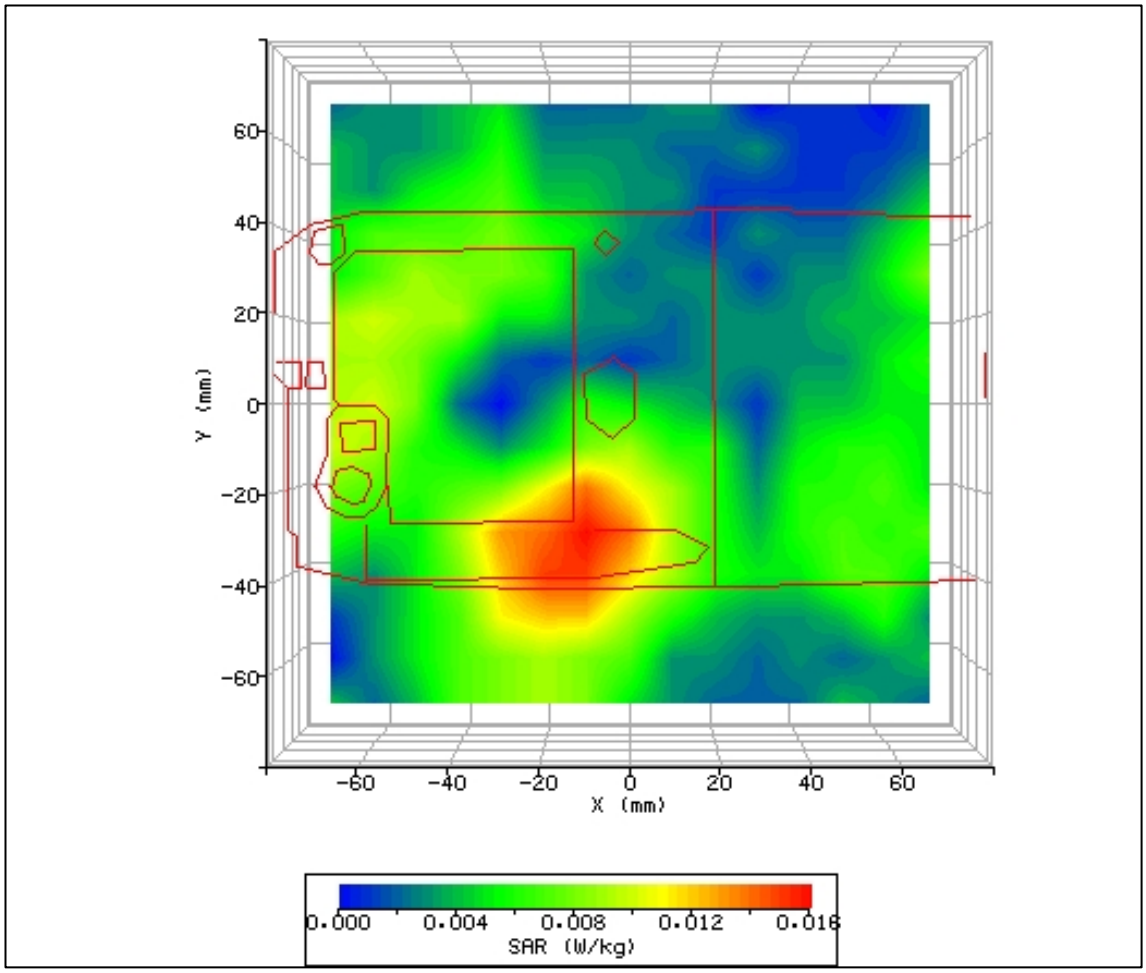

Figure 5: SAR Body Testing Results for the Intermec CN3 Mobile Computer in Rear Facing Phantom Position; Tested at 2437MHz (WLAN Middle Channel) with 15.0mm Separation.

2.2.2 GPRS850MHz AND WLAN COLLOCATED BODY SAR COARSE AREA SCAN – 2D

In addition to the assessment by summation of separately assessed maximum SAR values the following was used to show how much the secondary transmitters contributed to the maximum SAR of dominant transmitter. The Eeff V/m of each point of each of the area scans was squared then multiplied by the appropriate conductivity value then added together and finally a square root value obtained for each point. The resultant was recompiled into a combined data file normalised to a conductivity value of 1.00 and then loaded into SARA2. A new data visualisation file was then created.

The maximum spot SAR from the 850MHz and WLAN radios were added together; GPRS 850 maxima spot SAR 0.171 W/kg and WLAN maxima spot SAR 0.016 W/kg giving a maximum spot SAR of 0.187W/kg. This was then compared to a point-by-point summation of the maxima spot SAR of which a maxima obtained was 0.187 W/kg.

In summary, adding the maxima of the separate scans would show about a 9.36% increase, the point-by-point addition shows also the actual increase in the maximum would only be 9.36% when compared to the maxima spot SAR of the dominant transmitter. Also, the change in distribution is almost imperceptible when a combined data file is recompiled by SARA2.

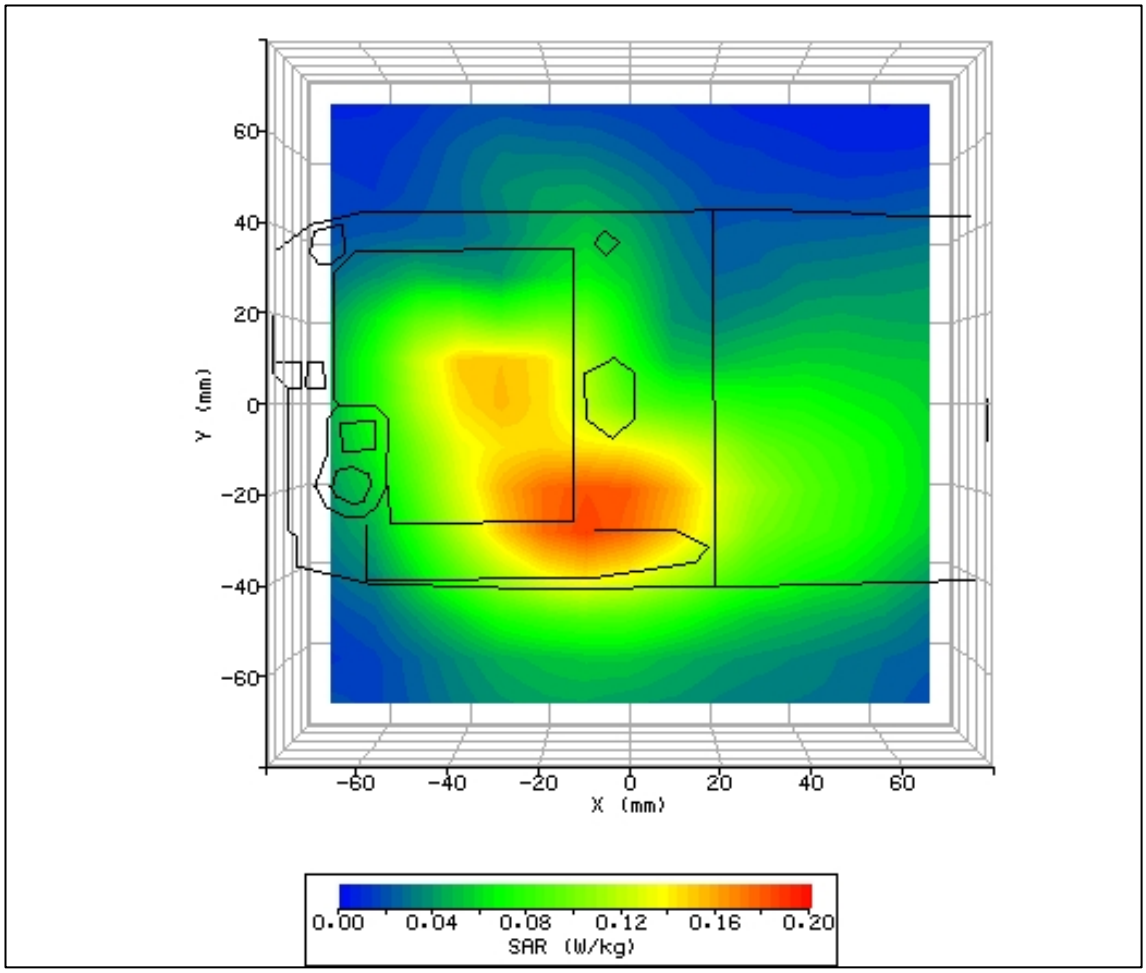

Figure 6: Co-located Assessment Results for the Intermec CN3 Mobile Computer Rear Facing Phantom Position; 848.8 (850MHz GPRS High Channel) and 2437MHz (WLAN Middle Channel) Recompiled data file.

2.3 1900MHz GSM HEAD SAR TEST RESULT INCLUDING COARSE AREA SCAN – 2D

SYSTEM / SOFTWARE:	SARA2 / 2.39 VPM	INPUT POWER DRIFT:	0.0 dB
DATE / TIME:	16/08/2006 16:41:25	DUT BATTERY MODEL/NO:	318-016-002
FILENAME:	WS615435_F_07.txt	PROBE SERIAL NUMBER:	0187
AMBIENT TEMPERATURE:	22.9°C	LIQUID SIMULANT:	1900 Head
DEVICE UNDER TEST:	Intermec CN3	RELATIVE PERMITTIVITY:	39.83
RELATIVE HUMIDITY:	46.2%	CONDUCTIVITY:	1.431
PHANTOM S/NO:	HeadFT04.csv	LIQUID TEMPERATURE:	21.8°C
PHANTOM ROTATION:	0°	MAX SAR Y-AXIS LOCATION:	-8.50 mm
DUT POSITION:	LH-Cheek	MAX SAR Z-AXIS LOCATION:	-122.95 mm
ANTENNA CONFIGURATION:	Fixed Internal	MAX E FIELD:	5.32 V/m
TEST FREQUENCY:	1880.0MHz	SAR 1g:	0.038 W/kg
AIR FACTORS:	345 / 442 / 414	SAR 10g:	0.023 W/kg
CONVERSION FACTORS:	0.382 / 0.382 / 0.382	SAR START:	0.015 W/kg
TYPE OF MODULATION:	GMSK (GSM mode)	SAR END:	0.014 W/kg
MODN. DUTY CYCLE:	12.5%	SAR DRIFT DURING SCAN:	-7.84 %
DIODE COMPRESSION FACTORS (V*200):	20 / 20 / 20	PROBE BATTERY LAST CHANGED:	16/08/06
INPUT POWER LEVEL:	5	EXTRAPOLATION:	poly4

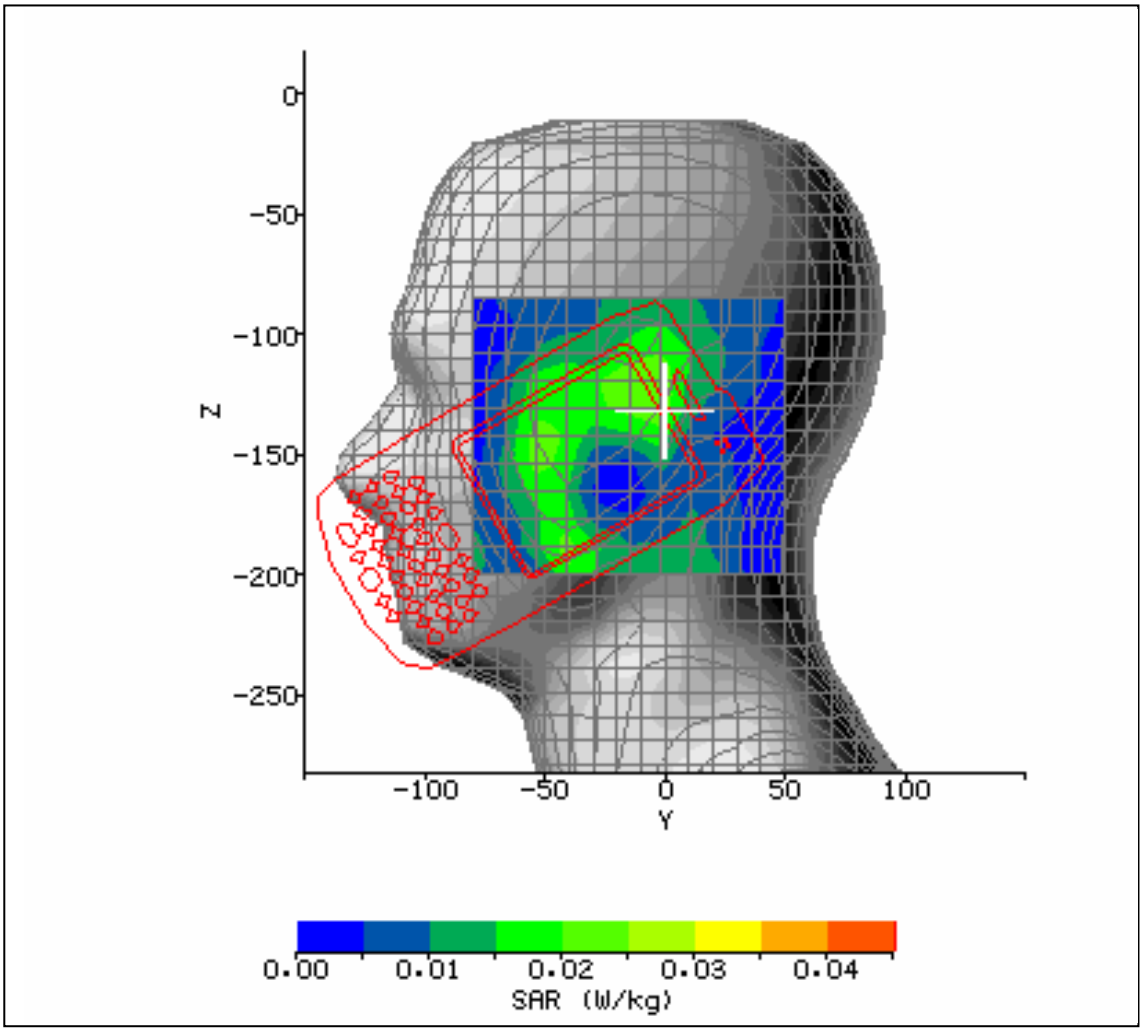

Figure 7: SAR Head Testing Results for the Intermec CN3 Mobile Computer in Left Hand Cheek Position; Tested at 1880MHz (1900MHz GSM Middle Channel).

2.3.1 2450MHz WLAN HEAD SAR TEST RESULT INCLUDING COARSE AREA SCAN – 2D

SYSTEM / SOFTWARE:	SARA2 / 2.39 VPM	INPUT POWER DRIFT:	0.0 dB
DATE / TIME:	18/08/2006 11:45:43	DUT BATTERY MODEL/NO:	318-016-002
FILENAME:	WS615435_F_17.txt	PROBE SERIAL NUMBER:	0187
AMBIENT TEMPERATURE:	22.8°C	LIQUID SIMULANT:	2450 Head
DEVICE UNDER TEST:	Intermec CN3	RELATIVE PERMITTIVITY:	38.81
RELATIVE HUMIDITY:	59.6%	CONDUCTIVITY:	1.834
PHANTOM S/NO:	HeadFT04.csv	LIQUID TEMPERATURE:	22.2°C
PHANTOM ROTATION:	0°	MAX SAR Y-AXIS LOCATION:	-18.90 mm
DUT POSITION:	LH-Cheek	MAX SAR Z-AXIS LOCATION:	-109.15 mm
ANTENNA CONFIGURATION:	Fixed Internal	MAX E FIELD:	26.72 V/m
TEST FREQUENCY:	2412MHz	SAR 1g:	1.031 W/kg
AIR FACTORS:	345 / 442 / 414	SAR 10g:	0.508 W/kg
CONVERSION FACTORS:	0.397 / 0.397 / 0.397	SAR START:	0.181 W/kg
TYPE OF MODULATION:	DSSS	SAR END:	0.181 W/kg
MODN. DUTY CYCLE:	100%	SAR DRIFT DURING SCAN:	-0.16 %
DIODE COMPRESSION FACTORS (V*200):	20 / 20 / 20	PROBE BATTERY LAST CHANGED:	18/08/06
INPUT POWER LEVEL:	19.24	EXTRAPOLATION:	poly4

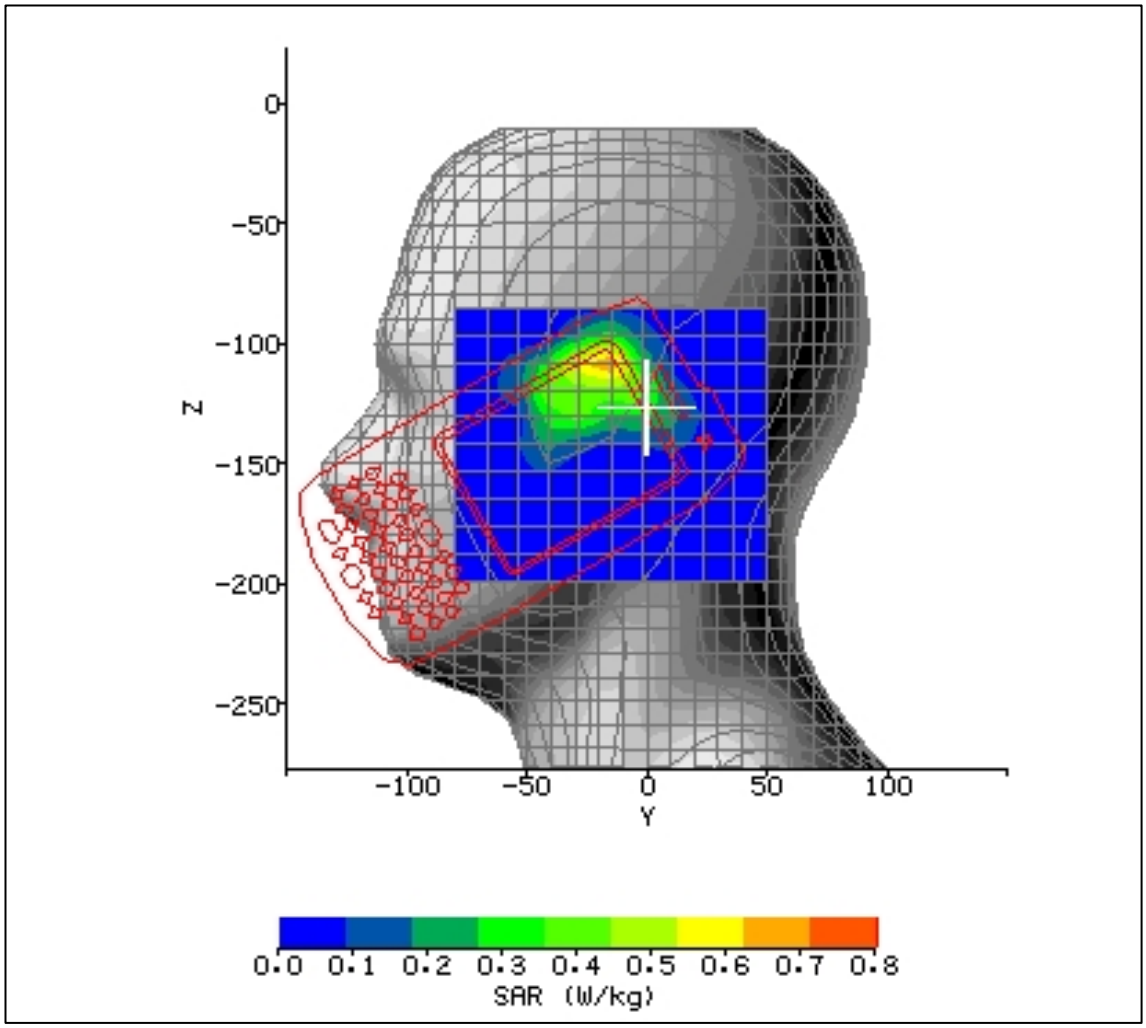

Figure 8: SAR Head Testing Results for the Intermec CN3 Mobile Computer in Left Hand Cheek Position; Tested at 2412MHz (WLAN Bottom Channel).

2.3.2 GSM1900 AND WLAN COLLOCATED HEAD SAR COARSE AREA SCAN – 2D

In addition to the assessment by summation of separately assessed maximum SAR values the following was used to show how much the secondary transmitters contributed to the maximum SAR of dominant transmitter. The Eeff V/m of each point of each of the area scans was squared then multiplied by the appropriate conductivity value then added together and finally a square root value obtained for each point. The resultant was recompiled into a combined data file normalised to a conductivity value of 1.00 and then loaded into SARA2. A new data visualisation file was then created.

The maximum spot SAR from the 1900MHz; WLAN and Bluetooth radios were added together; GSM 1900 maxima spot SAR 0.731 W/kg and WLAN maxima spot SAR 0.025 W/kg giving a maximum spot SAR of 0.756W/kg. This was then compared to a point-by-point summation of the maxima spot SAR of which a maxima obtained was 0.749 W/kg.

In summary, adding the maxima of the separate scans would show about a 3.42% increase, but the point-by-point addition shows that this is pessimistic by a factor of 1.39 as the actual increase in the maximum would only be 2.46% when compared to the maxima spot SAR of the dominant transmitter. Also, the change in distribution is slight when a combined data file is recompiled by SARA2.

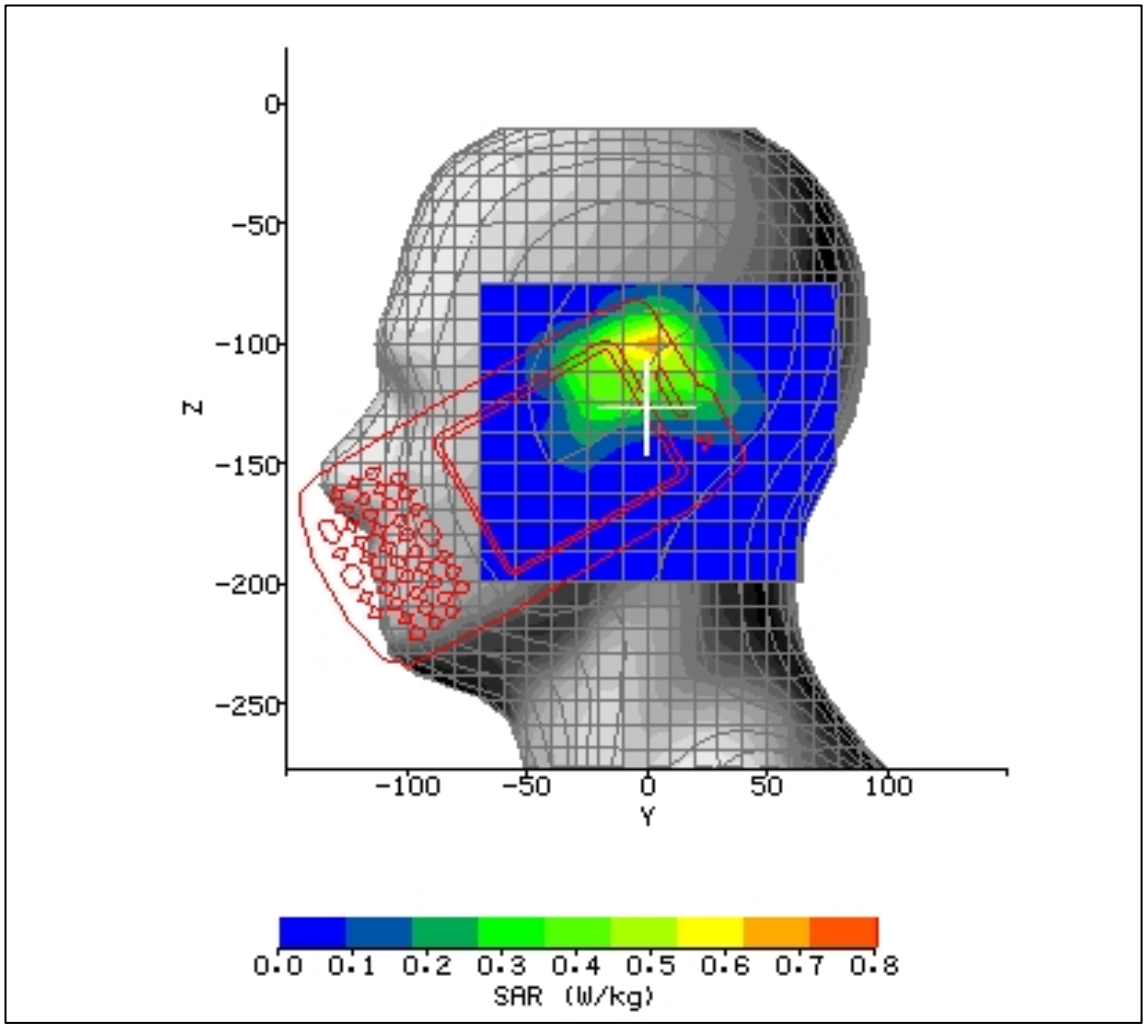

Figure 9: Co-located Assessment Results for the Intermec CN3 Mobile Computer in Left Hand Cheek Position; 1880MHz (1900MHz GSM Middle Channel); 2412MHz (WLAN Bottom Channel) Recompiled data file.

2.4 1900MHz GPRS BODY SAR TEST RESULT INCLUDING COARSE AREA SCAN – 2D

SYSTEM / SOFTWARE:	SARA2 / 2.39 VPM	INPUT POWER DRIFT:	0.0 dB
DATE / TIME:	17/08/2006 14:09:31	DUT BATTERY MODEL/NO:	318-016-002
FILENAME:	WS615435_F_38.txt	PROBE SERIAL NUMBER:	187
AMBIENT TEMPERATURE:	22.7°C	LIQUID SIMULANT:	1900 Body
DEVICE UNDER TEST:	Intermec CN3	RELATIVE PERMITTIVITY:	53.48
RELATIVE HUMIDITY:	59.80%	CONDUCTIVITY:	0.967
PHANTOM S/NO:	HeadBox02.csv	LIQUID TEMPERATURE:	21.4°C
PHANTOM ROTATION:	0°	MAX SAR X-AXIS LOCATION:	-44.00 mm
DUT POSITION:	Rear facing 15mm spacing	MAX SAR Y-AXIS LOCATION:	6.00 mm
ANTENNA CONFIGURATION:	Fixed Internal	MAX E FIELD:	17.16 V/m
TEST FREQUENCY:	1909.8MHz	SAR 1g:	0.543 W/kg
AIR FACTORS:	345 / 442 / 414	SAR 10g:	0.292 W/kg
CONVERSION FACTORS:	0.420 / 0.420 / 0.420	SAR START:	0.067 W/kg
TYPE OF MODULATION:	GMSK (GPRS mode)	SAR END:	0.066 W/kg
MODN. DUTY CYCLE:	50%	SAR DRIFT DURING SCAN:	-0.91 %
DIODE COMPRESSION FACTORS (V*200):	20 / 20 / 20	PROBE BATTERY LAST CHANGED:	16/08/2006
INPUT POWER LEVEL:	4x 30dBm	EXTRAPOLATION:	poly4

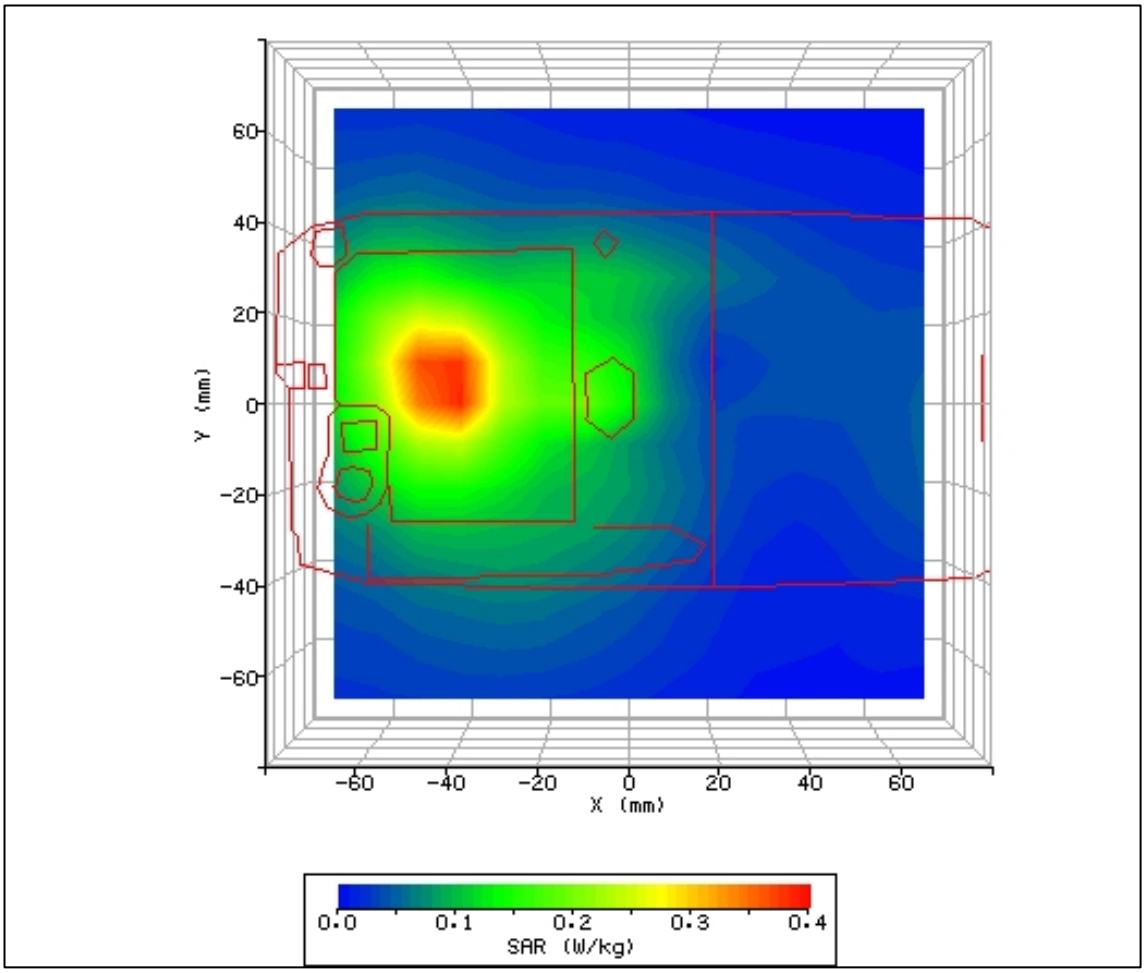

Figure 10: SAR Body Testing Results for the Intermec CN3 Mobile Computer in Rear Facing Phantom Position; Tested at 1909.8MHz (1900MHz GPRS Top Channel) with 15.0mm Separation.

2.4.1 2450MHz WLAN BODY SAR TEST RESULT INCLUDING COARSE AREA SCAN – 2D

SYSTEM / SOFTWARE:	SARA2 / 2.39 VPM	INPUT POWER DRIFT:	0.0 dB
DATE / TIME:	18/08/2006 14:36:56	DUT BATTERY MODEL/NO:	318-016-002
FILENAME:	WS615435_F_40.txt	PROBE SERIAL NUMBER:	187
AMBIENT TEMPERATURE:	22.1°C	LIQUID SIMULANT:	2450 Body
DEVICE UNDER TEST:	Intermec CN3	RELATIVE PERMITTIVITY:	53.04
RELATIVE HUMIDITY:	57.2%	CONDUCTIVITY:	0.967
PHANTOM S/NO:	HeadBox02.csv	LIQUID TEMPERATURE:	20.3°C
PHANTOM ROTATION:	0°	MAX SAR X-AXIS LOCATION:	-12.00 mm
DUT POSITION:	Rear facing 15.0mm spacing	MAX SAR Y-AXIS LOCATION:	-34.00 mm
ANTENNA CONFIGURATION:	Fixed Internal	MAX E FIELD:	2.82 V/m
TEST FREQUENCY:	2437.0MHz	SAR 1g:	0.020 W/kg
AIR FACTORS:	345 / 442 / 414	SAR 10g:	0.012 W/kg
CONVERSION FACTORS:	0.457 / 0.457 / 0.457	SAR START:	0.003 W/kg
TYPE OF MODULATION:	DSSS	SAR END:	0.003 W/kg
MODN. DUTY CYCLE:	100%	SAR DRIFT DURING SCAN:	0.00 %
DIODE COMPRESSION FACTORS (V*200):	20 / 20 / 20	PROBE BATTERY LAST CHANGED:	18/08/2006
INPUT POWER LEVEL:	19.24	EXTRAPOLATION:	poly4

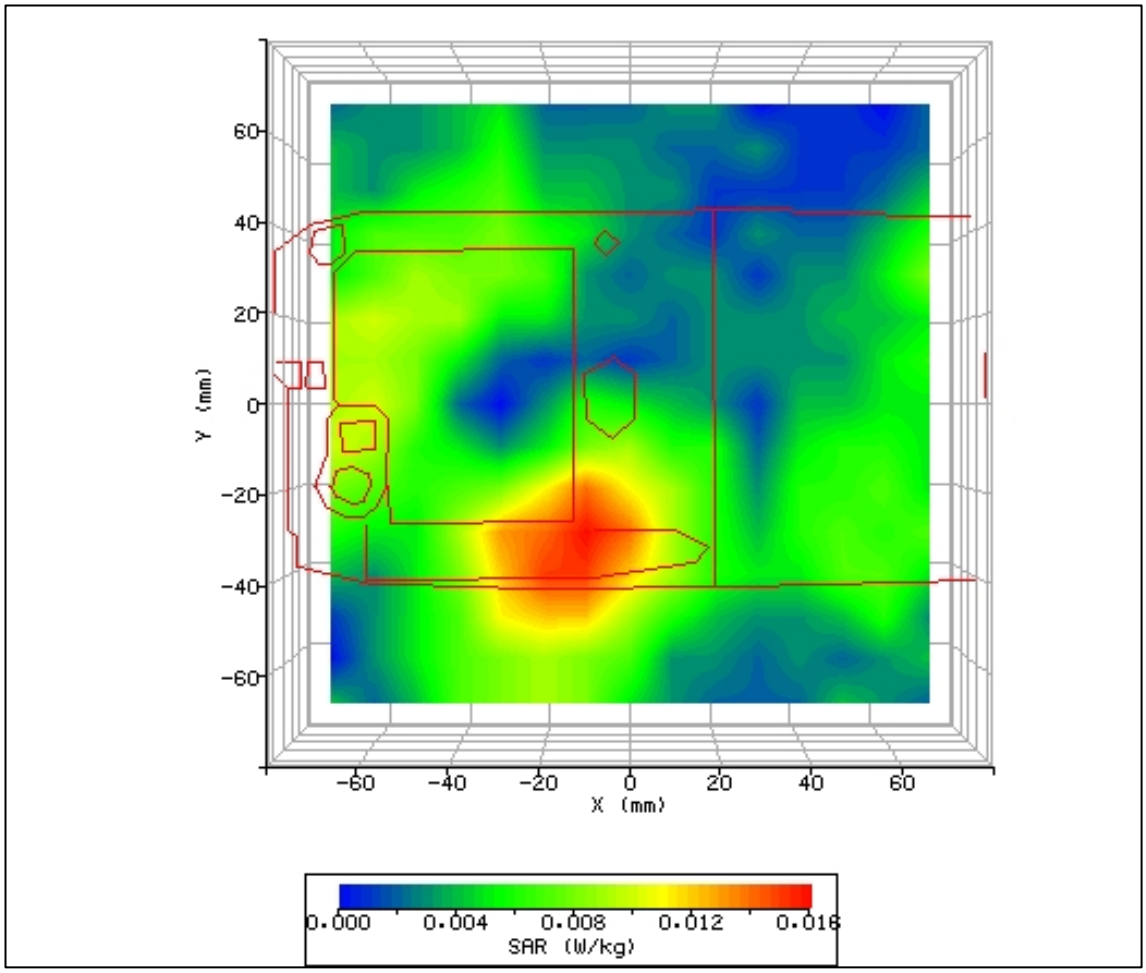

Figure 11: SAR Body Testing Results for the Intermec CN3 Mobile Computer in Rear Facing Phantom Position; Tested at 2437MHz (WLAN Middle Channel) with 15.0mm Separation.

2.4.2 GPRS1900MHz; WLAN AND BLUETOOTH COLLOCATED BODY SAR COARSE AREA SCAN – 2D

In addition to the assessment by summation of separately assessed maximum SAR values the following was used to show how much the secondary transmitters contributed to the maximum SAR of dominant transmitter. The Eeff V/m of each point of each of the area scans was squared then multiplied by the appropriate conductivity value then added together and finally a square root value obtained for each point. The resultant was recompiled into a combined data file normalised to a conductivity value of 1.00 and then loaded into SARA2. A new data visualisation file was then created.

The maximum spot SAR from the 1900MHz; WLAN and Bluetooth radios were added together; GPRS 1900 maxima spot SAR 0.302 W/kg; WLAN maxima spot SAR 0.012 W/kg and Bluetooth maxima spot SAR 0.000 W/kg giving a maximum spot SAR of 0.314W/kg. This was then compared to a point-by-point summation of the maxima spot SAR of which a maxima obtained was 0.306 W/kg.

In summary, adding the maxima of the separate scans would show about a 3.97% increase, but the point-by-point addition shows that this is pessimistic by a factor of 3 as the actual increase in the maximum would only be 1.32% when compared to the maxima spot SAR of the dominant transmitter. Also, the change in distribution is almost imperceptible when a combined data file is recompiled by SARA2.

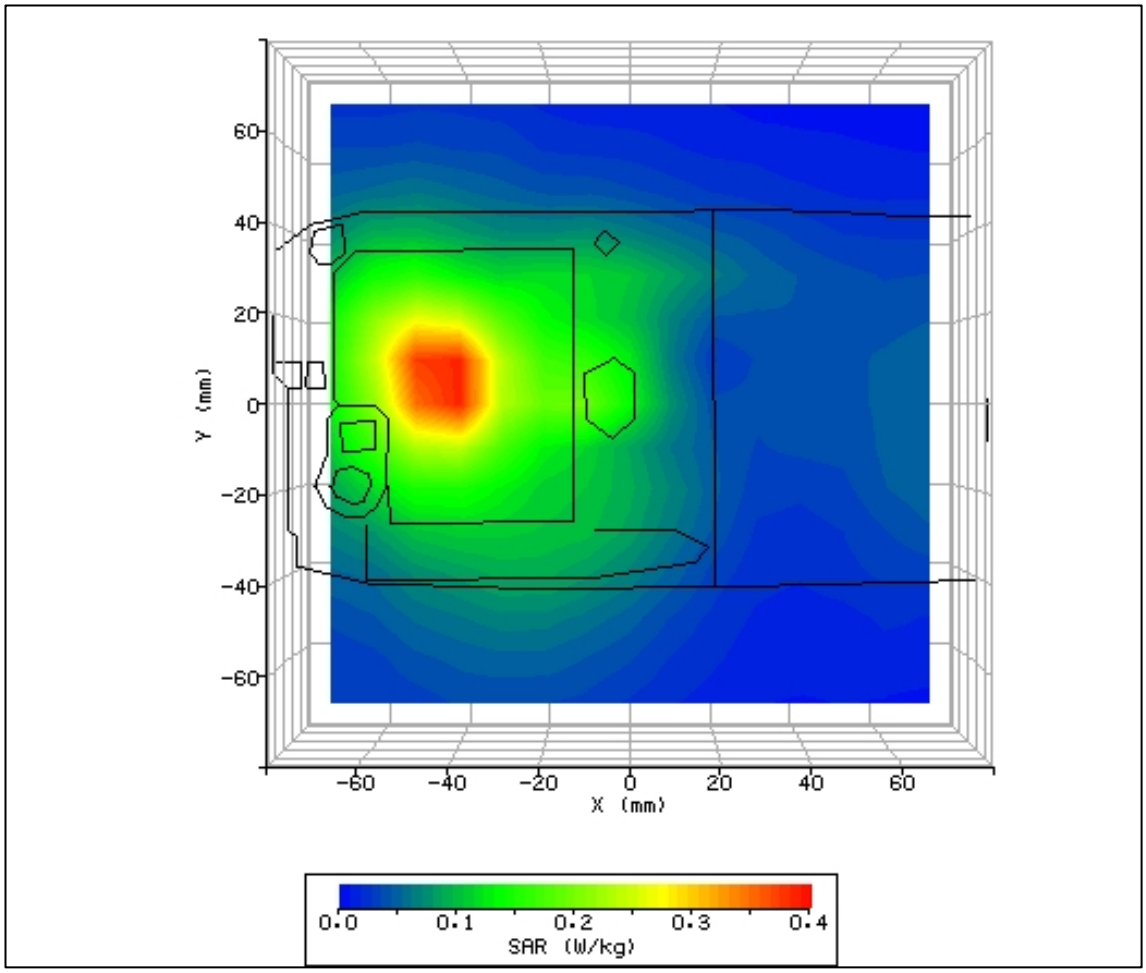

Figure 12: Co-located Assessment Results for the Intermec CN3 Mobile Computer in Front Facing Position; 1909.8MHz (1900MHz GSM High Channel) and 2437MHz (WLAN Middle Channel) Recompiled data file.

SECTION 3

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

3.1 DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.