Timothy R Johnson
Examining Engineer
American Telecommunications Certification Body
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McLean, VA 22101 USA
tjohnson@American TCB.com

Re : Palmone Inc.
FCC ID : O8FMADECA

Dear Timothy

This is in response to your request for additional information for FCC ID: O8FMADECA. Following are the responses.

2) The test report cover and other portions of the report mentions C63.19-2005 but the engineering summary suggests this was tested under C63.19 – 2001 (page 4) instead. Please note that TCB's must carefully consult with the FCC for any reports granted using the C63.19-2001 version which would delay evaluation of this application. Please explain which version was used for testing. If relevant, please correct.

Response: Please note that the summary page has been modified to reflect C63.19-2005, which has been used for testing. Please see the modified report, page 4.

4) Test report should cite compliance to 20.19 according to 2.1033(d) of the rules: 2.1033(d) Applications for certification of equipment operating under part 20, that a manufacturer is seeking to certify as hearing aid compatible, as set forth in §20.19 of that part, shall include a statement indicating compliance with the test requirements of § 20.19 and indicating the appropriate U-rating for the equipment. The manufacturer of the equipment shall be responsible for maintaining the test results.

Response: A compliance statement according to 2.1033(d) has been incorporated in the summary page in bold letters. Please see the modified report, page4.

7) Please provide system verification targets/discussions for all three signal types recommended by C63.19. For the WD signal please detail the source for the WD signal for system verification and how it compares to the actual signal from the WD.

Response: System validation data for all three signal types (CW, WD & 805 AM) are provided in the modified report, pp.14. The target values for CW signal had been derived by APREL using FDTD numerical method which is now part of the C63.19. The CW validation data are within 10% of the target value. Please see the modified report for the data. The measured values for the WD and 80% modulation could not be compared against any theoretical target values as there are none defined. The source for the WD signal was the WD itself. The substitution signal for probe modulation response measurement was generated by a WD with the real time power loop activated and controlled by the Mobile Service Tester.

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8) Validation at system reconfiguration should be preformed with at least the type of modulation being tested (C63.19 4.2.2.1.2 and May 2005 FCC training). Please explain if this was performed as the validation in the report appears to be only for CW signals.

Response: Validation measurement have been performed for two modulated signals as well: 80% AM modulated with 1 kHz tone and CDMA signal. Only measurement results are presented as no target values exist for modulated signals, page 14.

9) The report should provide an appropriate grid or overlay of the device for reference purposes.

Response: The modified report does provide overlay of the device for reference. Please see the modified report.
The sample is provided:

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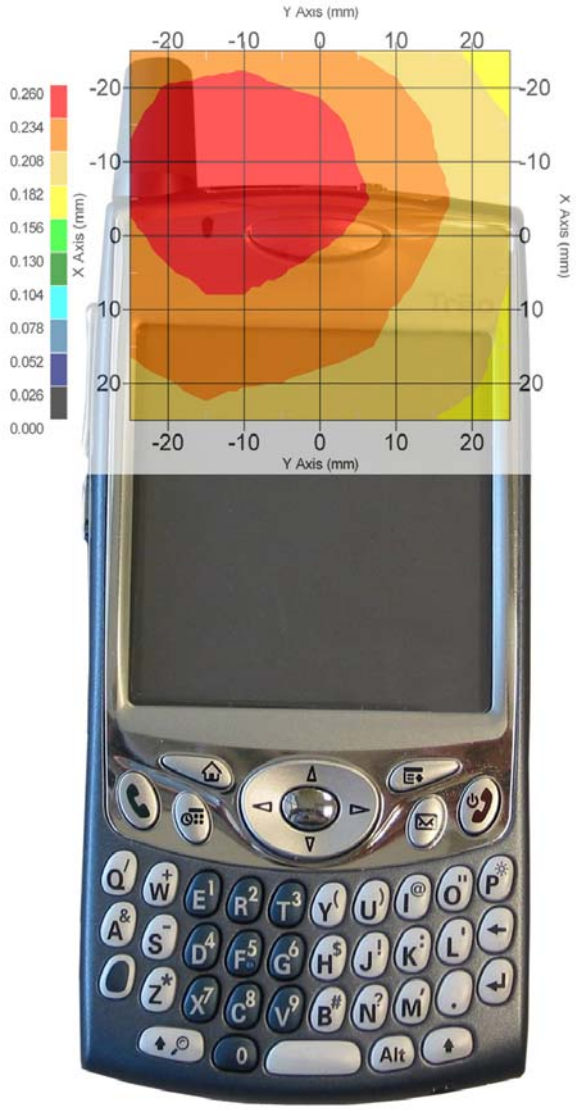

10) Please provide details of the WD's signal. Include wideband and 0 span spectrum analyzer plots. How was the signal set up and controlled (i.e. Please explain procedures used to establish test signals)? What settings were used, i.e. power control modes, and radio service mode. How was power loop controlled during the test? Also, please include details of what exact standard the CDMA radio is capable of using i.e. IS-95.

Response: Mobile Service Tester Willtek 4300 was used to register the WD, make a call and then to control the WD, i.e. the WD was not used in the test mode.
In order to establish the call it was set to the appropriate SIN (System ID) and NID (Network ID) numbers. The instrument was equipped with the appropriate antenna to communicate with the WD over the air.
The instrument was used to set both, the uplink channels and output power level of the WD

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The channels used for testing (as set with Willtek 4300) were:
CDMA 991 (824MHz)
CDMA 384 (836.5MHz)
CDMA 799 (849MHz)
PCS 001 (1850MHz)
PCS 600 (1880MHz)
PCS 1199 (1910MHz)
For all channels tested Willtek 4300 was set to "ALL UPS" what automatically sets the maximum output power on the WD.
The WD was capable of using the standard IS-95.

Both, zero-span and wideband plots are attached.

11) During measurement of probe modulation response with a modulation equal to the device being tested, please explain if the substitution signal did or did not have real time power loop control activated which can affect the output signal and correction factors used during the test. Please explain how this was accounted for.

Response: The substitution signal for probe modulation response measurement was generated by a WD with the real time power loop activated and controlled by the Mobile Service Tester. The peak level at the dipole antenna feed point was adjusted to match the CW signal level and then in was monitored continuously with a spectrum analyzer. No drift was detected.

12) Please provide additional details justifying the conversion to peak; particularly the procedure used to measure power. Note that originally the VBW was required to be > than the 20 dB bandwidth of the signal. However recently the FCC released information stating that a 20 kHz VBW was allowed in liu of the full VBW. Please explain as necessary.

Response: Modulation factor was derived as ratio of scan result of reference CW signal to scan result of CDMA signal.
Both, reference CW and CDMA (IS-95) signals were fed to a dipole antenna with its feed point monitored with a directional coupler and a spectrum analyzer.
Both, RBW and VBW of the spectrum analyzer were set to full 3MHz as needed to cover the 20dB bandwidth of the IS-95 signal.
Zero-span peak amplitude CDMA signal was adjusted to match the reference CW signal level and it was monitored during measurement.

13) Please explain the test dates on the plots of May 21, 2005 and October 2, 2004. This appears odd. Additionally, only one validation appears to have been done.

Response: These dates are the probe calibration dates. The reports are generated by a computer running the test but the calibration dates are typed-in manually. The questioned dates were at an error. These were replaced with correct calibration dates (taken from the comprehensive calibration certificates - see the response to the question #19).
Validations – see responses to the questions 7 & 8.

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14) 1850 and 1880 MHz do not appear to meet the requirement that 4 sub-grids be common to the E-field and H field scans for a given grid. These 2 frequencies only appear to show 3 common grids. Please review and correct results as necessary.

Response: The 1850 and 1880 MHz scans were carefully reviewed. As a result it has been concluded that the appearance of only 3 common sub-grids as oppose to 4 required sub-grids had no effect on the reported HAC category of the WD.

15) How was drift measured? The FCC asks for demonstration that device power is steady through test. (i.e., Before/after power or field drift (<5%)).

Response: The drift was monitored using two methods:
- one via air-interface using a combination of horn antenna and a spectrum analyzer. Drift was measured before the start of the test, when the WD started transmitting (for reference purpose), during the test and after the test. There was no drift observed on the spectrum analyzer. The horn antenna was used as a receiver permanently placed aiming towards the WD under test at a safe distance of 3 feet where no reflection is created. The antenna was placed in such a manner such that no obstruction was present in its receiving path. The spectrum analyzer was situated outside the test chamber. It was ensured that during the drift measurement there was no moving object as well as the test engineer was absent inside the test chamber. No object inside the chamber was moved from their original position during the complete test process of the WD.
- and the second method: Immediately before the scan the sensor is positioned 10mm above the ERP. E-field level is recorded as "BEFORE". When the sensor is stopped at the same spot after completing the scan E-field level is again recorded as "AFTER". The difference is then calculated in terms of radiated power drift.
Please see page 21 of the modified report.

16) RF test procedures appear to be for clause 4, but the flow chart appears to be for Clause 6 data. Please review/explain/correct as necessary.

Response: Appropriate flow chart for clause 4 (WD Near Field Emission Automated Test Flow Chart) has replaced the existing flow chart. Please see the modified report.

17) Scan procedures do not support enough detail. For instance the procedures should clarify the information shown in the slide below from FCC training. Additionally, the contours on many plots suggest that maybe a smaller step size should have been used. Please adjust the test report or comment on the items given in the follow slide:

Response:The scan step size actually used is indicated in modified report (in the header of every individual scan).

18) Please justify probe measurement at the center of the sensor. C63.19 recommends measurement at the nearest element point. Please include additional illustrations of the probe/elements showing more detail of the probe tip area. This is for compliance of information shown in the following slide:

Response:
Each probe is comprised of 3 electric (E-field probe) or magnetic (H-field probe) dipoles used as field sensors and positioned at 90 degree to each other in XYZ arrangement. Their electric center makes the calibrated center of the probe. The center is aligned with the main axis of the probe. For constructional reasons it is located small distance, specified as the vertical offset, above the tip of the probe. The actual

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offset is specified in the probe's calibration certificate to allow for proper referencing to the probe's calibrated center when the probe's position is set be touching an object with the probe's tip.

19) Probe calibration information does not appear to contain enough details for FCC filings. Please reference the TCB training, Slide 41, Review Guidance for ANSI C63.19 Testing, May 12, 2005.

Response: Two calibration reports for E-field and H-field are attached with this response following the TCB guidance as of May 12, 2005

20) Please describe how probe rotation was accounted for in the filing. If applied, please show the grid location where the probe rotation was made. Note the FCC requests that probe rotation should take place at the peak after exclusion for at least the worst case configuration. Reported result should account for this rotation.

Response:
The highest reading reported includes the probe rotation performed at the peak after exclusion.

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Attachments

1. Calibration Certificate for the E-field probe
2. Modified pages of the Report

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NCL CALIBRATION LABORATORIES

Calibration File No.: CP-422

Client.: APREL

CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Equipment: Miniature Isotropic RF Probe

Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 269

IN AIR Calibration

Calibration Procedure: SSI/DRB-TP-DRB-TP-D01-038
Project No: Internal

Calibrated: 21nd May 2005
Released on: 21nd May 2005

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary

Released By: _____

***NCL* CALIBRATION LABORATORIES**
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NCL Calibration Laboratories
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Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-038 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 269.

References

SSI/DRB-TP-D01-038 E-Field Probe Calibration Procedure
IEEE Std 1309-2005 "Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 kHz to 40GHz".

Conditions

Probe 269 was a new probe taken from stock prior to calibration.

Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

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Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	269
Frequency:	1880 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte
Tip Diameter:	5 mm
Tip Length:	60 mm
Total Length:	290 mm

Sensitivity in Air

Channel X:	1.2 $\mu V/(V/m)^2$
Channel Y:	1.2 $\mu V/(V/m)^2$
Channel Z:	1.2 $\mu V/(V/m)^2$

Diode Compression Point:	95 mV

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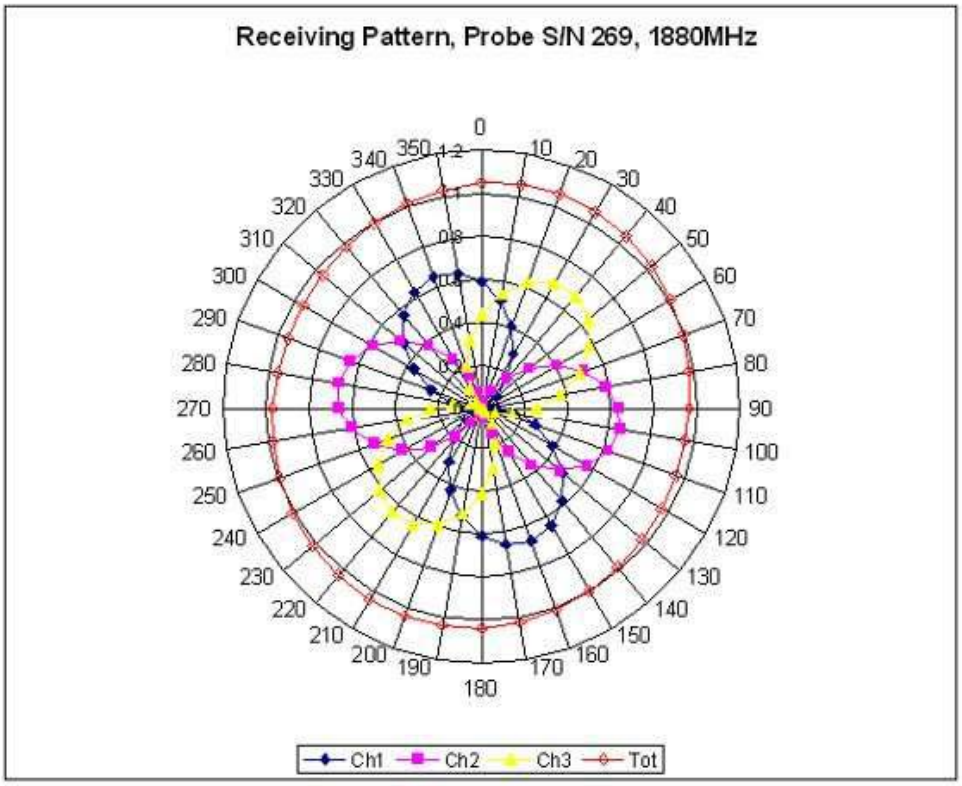
Spatial Resolution:

The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-038 for spatial resolution.

Receiving Pattern at 1880 MHz



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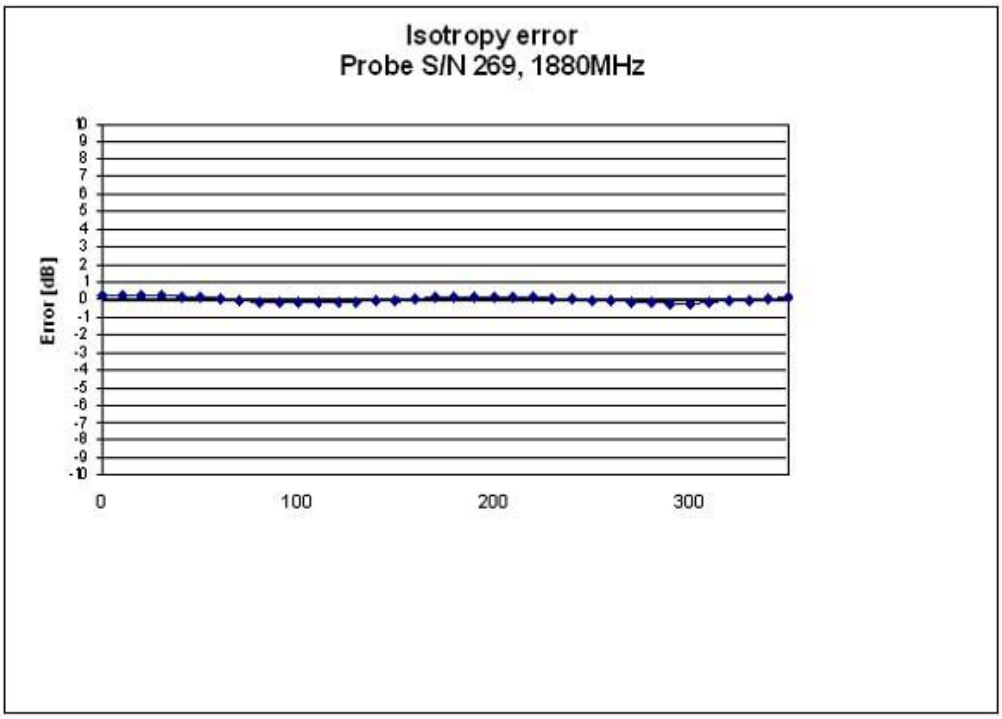
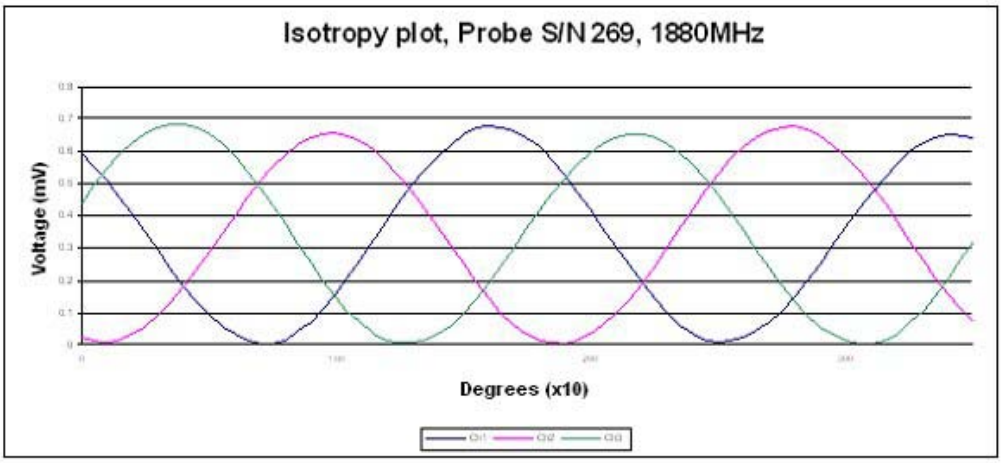
Isotropy Error 1880 MHz





Isotropicity: 0.10 dB

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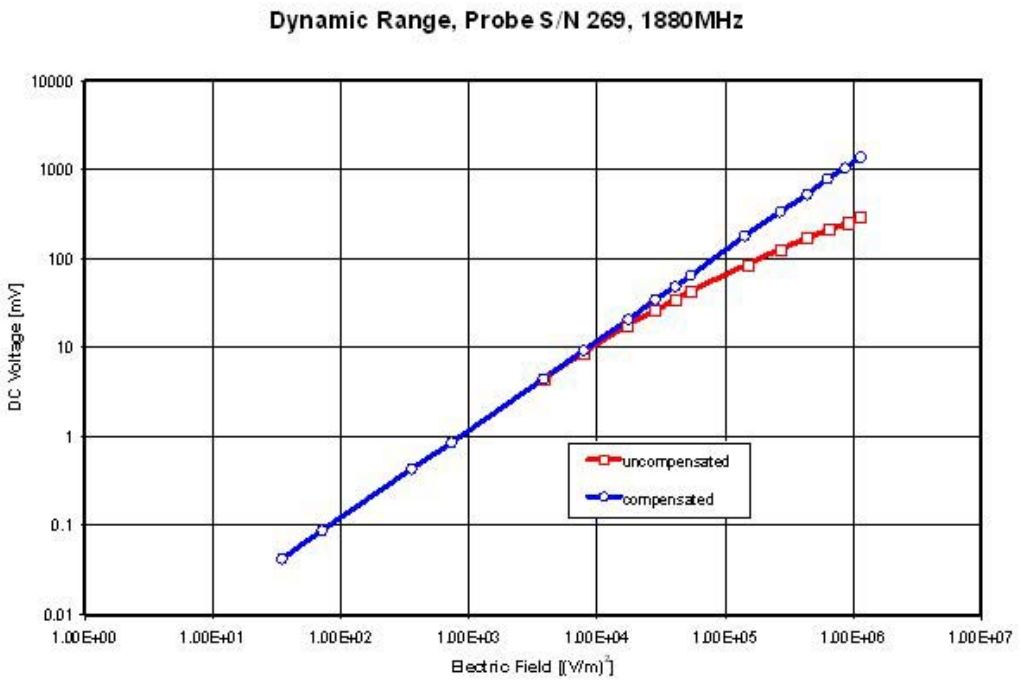
Dynamic Range



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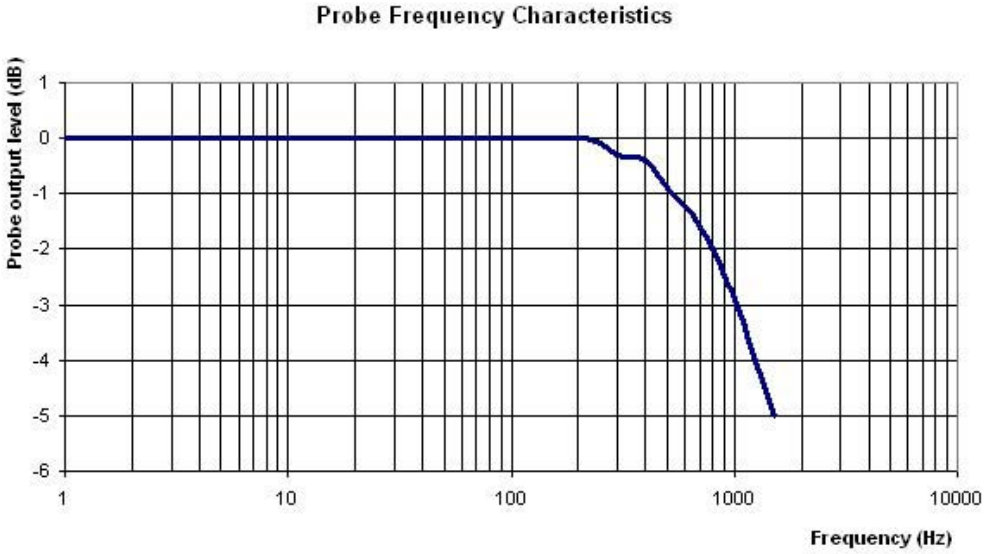
Video Bandwidth



Video Bandwidth at 500 Hz 1 dB
Video Bandwidth at 1.02 KHz: 3 dB

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Test Equipment

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed and located on the main APREL server R:\NCL\Calibration Equipment\Instrument List May 2005.

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Modified pages of the Report

ENGINEERING SUMMARY

This report contains the results of the engineering evaluation performed on the PALM CDMA mobile phone model TREO 650. The analysis was carried out in accordance with the requirements of ANSI/IEEE C63.19-2005, Rev 3.6, "American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids"

PALM provided APREL laboratories with one prototype model of the Mobile Phone. The TREO 650 Mobile Phone is hereby referred to as the DUT (Device Under Test).

The TREO 650 Mobile Phone was evaluated for RF emissions and in both CDMA and PCS bands. Three channels for each band, CDMA and PCS, were tested. See the summary of the results.

In the **CDMA band**, the category for RF E-field emissions is M3 and for H-field Emissions is M3. The overall M category for the audio coupling is **M3**.

In the **PCS band**, the category for RF E-field emissions is M4 and for H-field Emissions is M3. The overall M category for the audio coupling mode is **M3**.

As such, the overall M category for the TREO 650 is **M3**.

Evaluation data and graphs are presented in this report.

This wireless portable device has been shown to be compatible with hearing aids under the category shown below. In accordance with FCC rule 47 CFR 2.033(d) these test results demonstrate compliance with FCC 47CFR section 20.19 and with PC63.19 – 2005 rd3.6.

ANSI/IEEE C63.19 – 2005 HAC Rated Category: M 3 (RF Emission)

The results presented in this report relate only to the sample evaluated.

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System Validation Results

Dipole target Values

Frequency (MHz)	E-Field Calculated (Target)Values Peak v/m	H-Field Calculated (Target) Values Peak A/m
835	265	0.673
1880	211	0.645

Dipole FDTD Simulated values
Thick Dipoles

Dipole Validation Results

Signal Type	Frequency (MHz)	Input Power	Measured E-Field Peak (v/m)	E-Field Target Value Peak (v/m)	Deviation
CW	835	100 mW	244	265	-7.9%
CW	1880	100 mW	196	211	-7.1%
80%AM	835	31mW	148	-	-
80%AM	1880	31mW	119	-	-
CDMA	835	31mW	246	-	-
CDMA	1880	31mW	194	-	-

Signal Type	Frequency (MHz)	Input Power	Measured H-Field Peak (A/m)	H-Field Target Value Peak (A/m)	Deviation
CW	835	100 mW	0.707	0.673	5.1%
CW	1880	100 mW	0.687	0.645	6.5%
80%AM	835	31mW	0.430	-	-
80%AM	1880	31mW	0.418	-	-
CDMA	835	31mW	0.672	-	-
CDMA	1880	31mW	0.642	-	-

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Modulation Factors

Frequency (MHz)	Protocol	E-Field Modulation Factor	H-Field Modulation Factor
835	CDMA	5.1	5.1
835	CW		
1880	CDMA	5.1	5.1
1880	CW		

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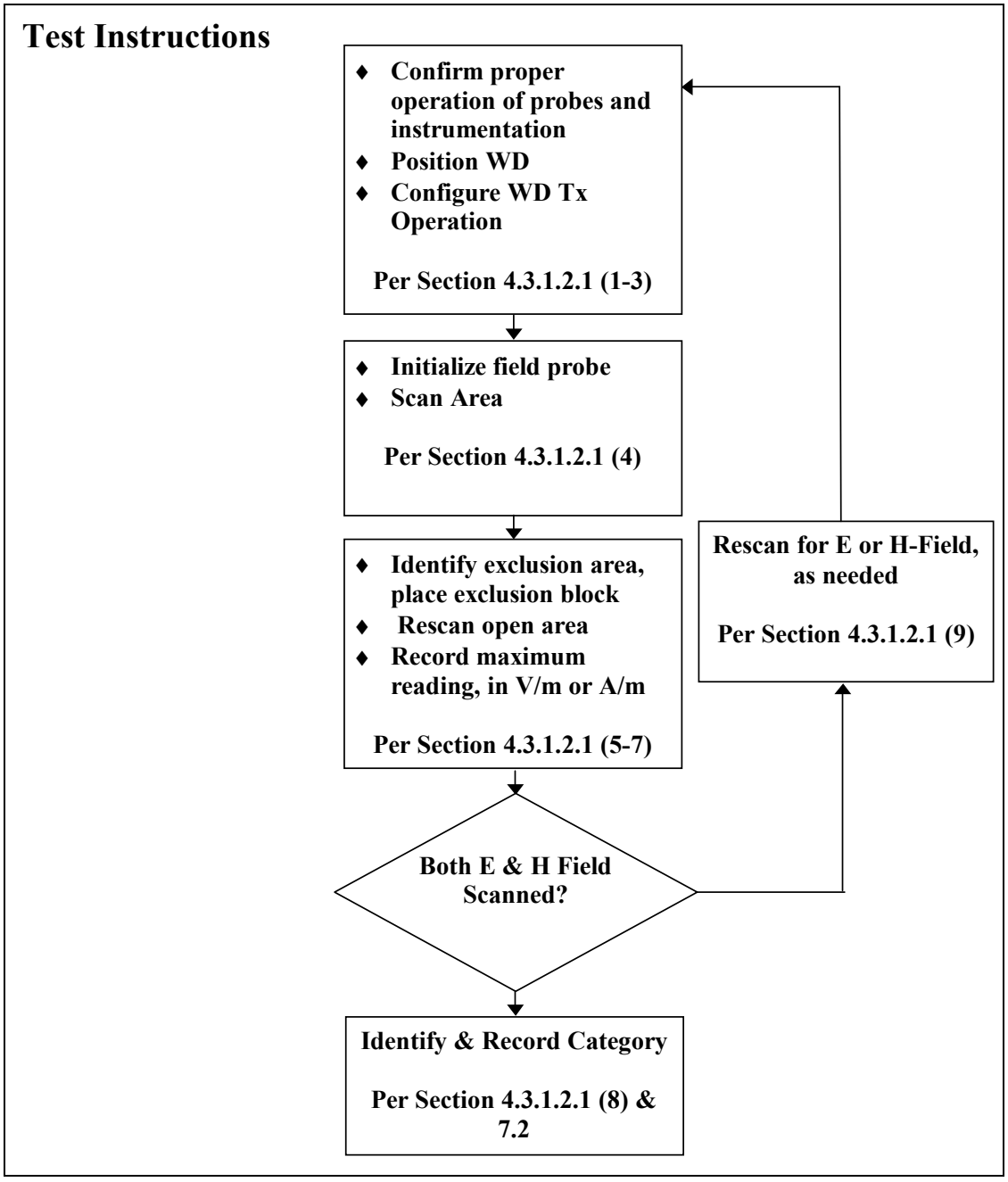

From Hearing Aid Compatibility Standard ANSI PC63.19 2005 D3.6

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Test Results – E-field

Mode	Channel	Freq.	Cond. Pwr	Peak E-field	Peak E-field	Reference position	Battery	Cat.
		[MHz]	[dBm]	[V/m]	[dB(V/m)]			
CDMA	991	824	24	77.4	37.7	speaker	1	M3
CDMA	384	836.5	24	82.9	38.3	speaker	1	M3
CDMA	799	849	24	83.3	38.4	speaker	1	M3
CDMA	001	1850	24	56.5	35.4	speaker	1	M4
CDMA	600	1880	24	58.9	35.4	speaker	1	M4
CDMA	1199	1910	24	49.7	33.9	speaker	1	M4

Test Results – H-field

Mode	Channel	Freq.	Cond. Pwr	Peak H-field	Peak H-field	Reference position	Battery	Cat.
		[MHz]	[dBm]	[A/m]	[dB(A/m)]			
CDMA	991	824	24	0.222	-13.1	speaker	1	M3
CDMA	384	836.5	24	0.251	-11.9	speaker	1	M3
CDMA	799	849	24	0.244	-12.3	speaker	1	M3
CDMA	001	1850	24	0.267	-11.5	speaker	1	M3
CDMA	600	1880	24	0.278	-11.11	speaker	1	M3
CDMA	1199	1910	24	0.252	-11.9	speaker	1	M3

Power Drift: The drift was monitored using two methods:

- via air-interface using a combination of horn antenna and a spectrum analyzer. Drift was measured before the start of the test, when the WD started transmitting (for reference purpose), during the test and after the test. There was no drift observed on the spectrum analyzer. The horn antenna was used as a receiver permanently placed aiming towards the WD under test at a safe distance of 3 feet where no reflection is created. The antenna was placed in such a manner such that no obstruction was present in its receiving path. The spectrum analyzer was situated outside the test chamber. It was ensured that during the drift measurement there was no moving object as well as the test engineer was absent inside the test chamber. No object inside the chamber was moved from their original position during the complete test process of the WD.

- and the second method: Immediately before the scan the sensor is positioned 10mm above the ERP. E-field level is recorded as "BEFORE". When the sensor is stopped at the same spot after completing the scan E-field level is again recorded as "AFTER". The difference is then calculated in terms of radiated power drift.

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#7	#8	#9

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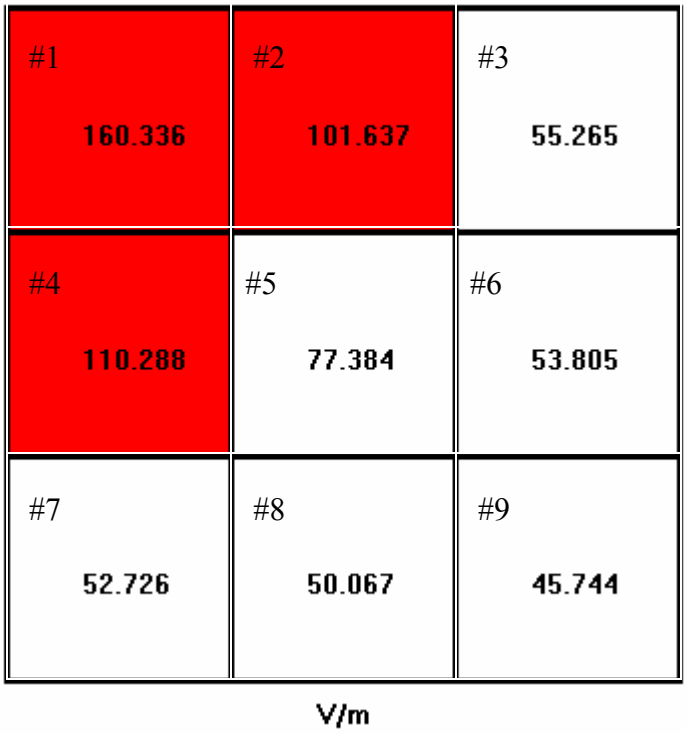
HAC Test Report

Device Type : CDMA
Device Name : TREO 650
Device S/N : PTVC0555H4MP
Probe Serial No. : 269
Probe Type : E-field probe
Probe Model : ALS-E020
Date Calibrated : 21-May-2005
Test Frequency : 824 MHz
Channel Number : CDMA 991
Probe Mod. Factor : 5.1 dB
Probe Sensitivity : 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point : 95 mV
Offset : 1.56 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
E-Field : 77.384 V/m (Peak)
dB : 37.773 db(V/m)(Peak)
Category : M3
Contiguous sub-grids shaded red are excluded.



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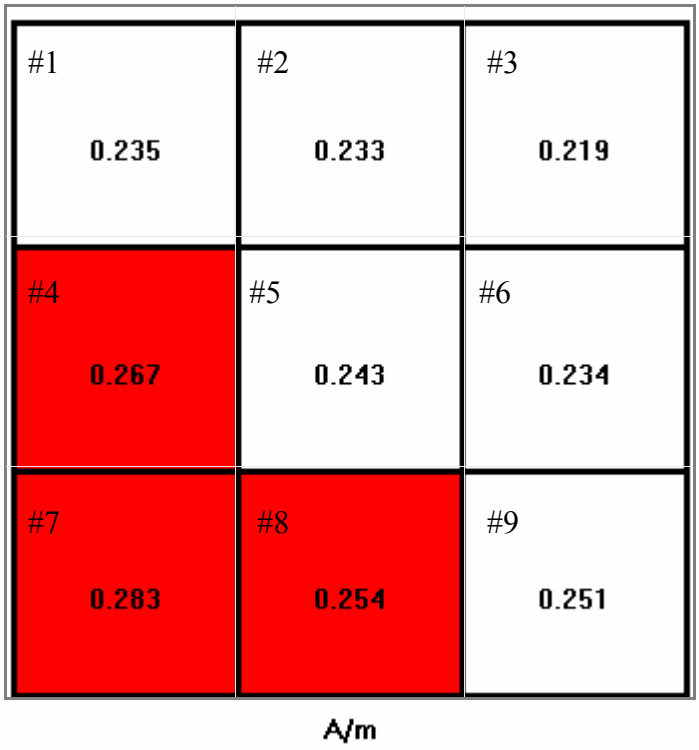
HAC Test Report

Device Type : CDMA
Device Name : TREO 650
Device S/N : PTVC0555H4MP
Probe Serial No. : 101
Probe Type : H-field probe
Probe Model : ALS-H020
Date Calibrated : 02-Oct-2004
Test Frequency : 836.5 MHz
Channel Number : CDMA 384
Probe Mod. Factor : 5.1 dB
Probe Sensitivity : 86.70 mV/(A/m)^2
Compression Point : 95 mV
Offset : 3 mm
HAC Test (26x26X1): Measurement grid dx=2, dy=2, dz=10
H-Field : 0.251 A/m (Peak)
dB : -11.998 db(A/m)(Peak)
Category : M3
Contiguous sub-grids shaded red are excluded.



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