HAC TEST REPORT

for T-Coil measurement

Applicant Name	ZTE Corporation
Address of Applicant	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R. China 518057
EUT Type	Mobile phone
Model Number	ZTE C88
Date of receive	2007.05.30
Date of Test(s)	2007.07.10~2007.07.10
Date of Issue	2007.07.26

Standards:

ANSI PC63.19-2006 v3.12

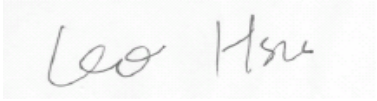
FCC RULE PART(S): 47 CFR PART 20.19(B)

HAC RATE CATEGORY: T4 (T Category)

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan EC Services or testing done by SGS Taiwan EC Services in connection with distribution or use of the product described in this report must be approved by SGS Taiwan EC Services in writing.

Tested by : 

Approved by: 

Leo Hsu
Testing Engineer Date: 2007.07.18

Dikin Yang
Asst. Supervisor Date: 2007.07.26

Table of Contents

1. Introduction

The purpose of the Hearing Aid Compatibility extension is to enable measurements of the near electric and magnetic fields generated by wireless communication devices in the region controlled for use by a hearing aid in accordance with ANSI-C63.19-2006
FCC has granted a request for waiver of the HAC rules in section 20.19 for dual band GSM handsets. The waiver has specific conditions, as stated in the order (FCC 05-166) and expires 1 August 2006.

The purpose of this standard is to establish categories for hearing aids and for WD (wireless communications devices) that can indicate to health care practitioners and hearing aid users which hearing aids are compatible with which WD, and to provide tests that can be used to assess the electromagnetic characteristics of hearing aids and WD and assign them to these categories. The various parameters required, in order to demonstrate compatibility and accessibility are measured. The design of the standard is such that when a hearing aid and WD achieve one of the categories specified, as measured by the methodology of this standard, the indicated performance is realized.
In order to provide for the usability of a hearing aid with a WD, several factors must be coordinated:

a) Radio frequency (RF) measurements of the near-field electric and magnetic fields emitted by a WD to categorize these emissions for correlation with the RF immunity of a hearing aid.
b) Magnetic field measurements of a WD emitted via the audio transducer associated with the T-coil mode of the hearing aid, for assessment of hearing aid performance.
c) Measurements with the hearing aid and a simulation of the categorized WD T-coil emissions to assess the hearing aid RF immunity in the T-coil mode.
The WD radio frequency (RF) and audio band emissions are measured.
Hence, the following are measurements made for the WD:
a) RF E-Field emissions
b) RF H-Field emissions
c) T-coil mode, magnetic signal strength in the audio band
d) T-coil mode, magnetic signal and noise articulation index
e) T-coil mode, magnetic signal frequency response through the audio band
Corresponding to the WD measurements, the hearing aid is measured for:
a) RF immunity in microphone mode
b) RF immunity in T-coil mode

2. Testing Laboratory

Company Name	SGS Taiwan Ltd. Electronics & Communication Laboratory
Company address	134, Wu Kung Road, Wuku Industrial Zone Taipei county,

	Taiwan, R.O.C.
Telephone	+886-2-2299-3279
Fax	+886-2-2298-0488
Website	http://www.tw.sgs.com

3. Details of Applicant

Name	ZTE Corporation
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R. China 518057
Country	China
Telephone	+86-021-68895196
Fax	N/A
Contact Person	li.dz
E-mail	li.dz@zte.com.cn

4. Description Of EUT

ESN	0D5A5E88	
Mode(s) of Operation	CDMA Cellular/US PCS	
TX Frequency range (MHz)	Cellular	US PCS
	824.25-848.3	1851.25-1908.75
Channel Number (ARFCN)	1013-777	25-1175
Maximum Output Power Setting(dBm)	24.13	23.95
Duty Cycle	1	1
Battery Type	Li-ion 3.7Vdc 800mAh	
EUT Type	Mobile phone	

5. Test Environment

Ambient Temperature	22.1° C
Relative Humidity	62 %

6. System Specifications of DASY4

6.1 Measurement system Diagram for SPEAG Robotic

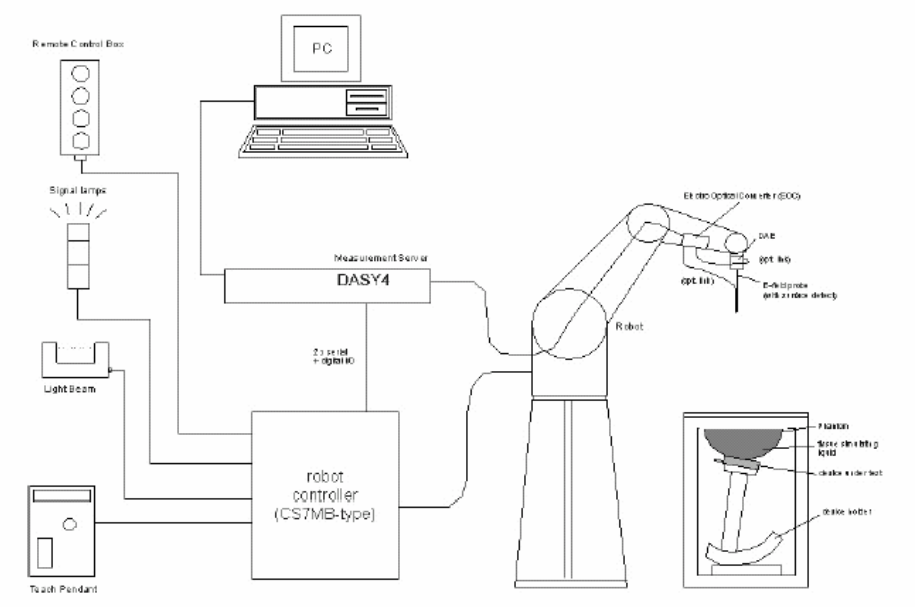


Fig 1. The SPEAG Robotic Diagram

The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A Auto Magnetic probe.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal

filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The Test Arch SAM phantom
- The device holder for handheld mobile phones.
- Validation dipole kits allowing to validate the proper functioning of the system.

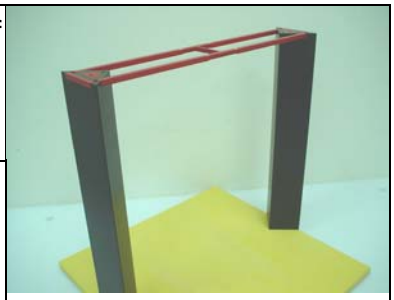
6.2 Audio Magnetic Probe AM1DV2

Description	- Active single sensor probe for both axial and radial measurement scans - Fully RF shielded, compatible with DAE, with adapted probe cup
Dynamic Range	0.1 KHz to 20 KHz
Sensitivity	<-50dB A/m @ 1KHz
Pre-Amp	40dB
Dimensions	300X18mm

AM1DV2 Audio Probe

6.3 Test Arch

Description	Enables easy and well defined positioning of the phone and validation dipoles as well as simple teaching of the robot.
Dimensions	length: 370 mm width: 370 mm height: 370 mm



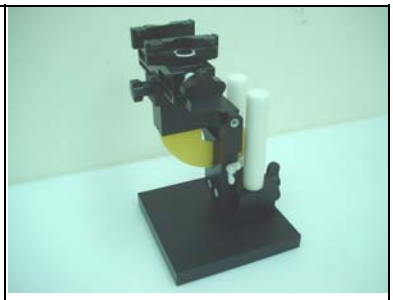
Test Arch

6.4 AMCC- Audio Magnetic Calibration Coil

Description	Allows calibration of the complete measurement setup, The two horizontal coils create a homogeneous magnetic field in the z direction. Refer to Appendix 5 for more detail on AMCC coil

AMCC

6.5 Phone Holder

Description	Supports accurate and reliable positioning of any phone Effect on near field <+/- 0.5 dB	 Phone Holder

6.6 AMMI - Audio Magnetic Measurement Instrument

Description	-USB interface to PC - Probe signal digitization and power supply - Test signal generation for wireless device (via base station simulator) - Auto-calibration and interfaces to AMCC for complete setup-calibration	 AMMI
Data Rate	48 KHz / 24bit	
Dynamic Range	85 dB	
Dimensions:	19” X 65 X 270mm	

7. Measurement Procedure

The sequence of the measurement is T-Coil testing procedure over a wireless communication device:

1) Confirm Geometry & signal check. Probe phantom alignment and check of accuracy.
2) Background noise measurement in the area of the WD.
3) Perform coarse resolution axial scan with narrow band signal. For the three orientation positions, using the optimal ABM1 point from the coarse resolution axial scan, perform fine resolution scans in the area of interest with narrow band signal.
4) For the three orientation positions, using the optimal SNR point from corresponding fine resolution area scans, perform point measurement with a narrowband signal – determine ABM1 and SNR. For Axial position, perform point measurement with a broadband signal – determine Frequency Response.

8. System Verification

An Input Level is measured to verify that it is within +/-0.1dB from the Reference Input Level in section 6.3.2.1 of ANSI PC63.19-2006 rd 3.12.

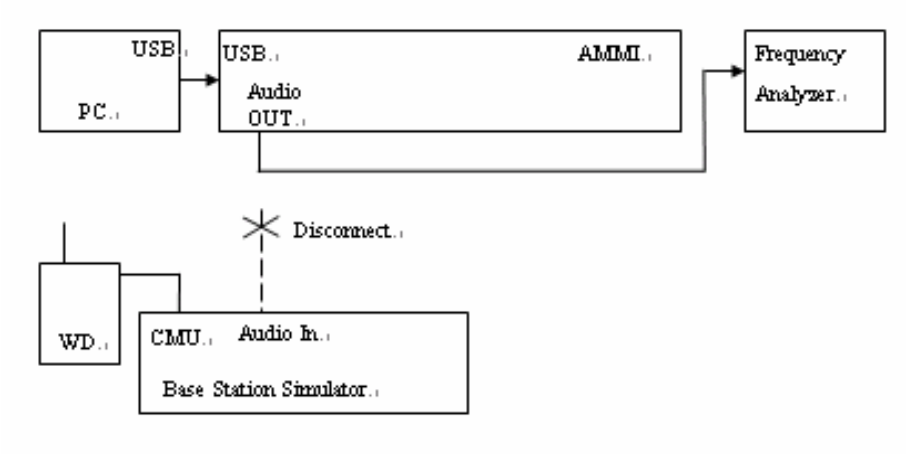


Figure 2: Signal Verification Setup

“Audio Out” of the AMMI is connected to the Bruel & Kjaar 3560C analyzer. On the analyzer, the “Input User ref” is set to the “0dBm0 Input reference” value to account for CMU’s inherent offset values (refer to Note 1 at the bottom of this page0. A signal from AMMI is initiated by running the appropriate DASY template. The template includes both broadband and narrowband signals. The signal is captured on the analyzer. The value from the analyzer is compared to the target given in 6.3.2.1 of ANSI PC63.19-2006 rd 3.12. If it is not within +/-0.1dB, the gains setting in the DASY template are adjusted.
Signal Verification has been conducted on the same days as DUT measurements.

9. Test Standards and Limits

The measurements were performed to ensure compliance to the ANSI PC63.19-2006 rd 3.12 standard, which is the same as the ANSI C63.19-2006 per the FCC public notice DA 06-1215. The limit values please follow in Table2

Table 2: Signal Quality Range

Category	Telephone parameters WD Signal Quality ((Signal + Noise) to noise ratio in dB)	
Mode	AWF=0(CDMA&UMTS)	AWF=-5(GSM)

Category T1	-20 to -10 dB	-15 to -5 dB
Category T2	-10 to 0 dB	-5 to 5 dB
Category T3	0 to 10 dB	5 to 15 dB
Category T4	>10dB	>15dB

10. Instruments List

Manufacturer	Device	Type	Serial Number	Date Of Last Calibration
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Mar.21.2007
Schmid & Partner Engineering AG	Software	DASY 4 V4.7 Build 53	N/A	Calibration isn't necessary
Schmid & Partner Engineering AG	Audio Magnetic 1D Field Probe	AM1DV2	1030	Feb.16.2007
Schmid & Partner Engineering AG	AMMI SE UMS	010 AB	1028	Calibration isn't necessary
Schmid & Partner Engineering AG	AMCC SD HAC	P01 BA	1026	N/A
Schmid & Partner Engineering AG	Test Arch SD HAC	P01	1047	N/A
R&S	Communication Simulator	CMU200	109326	Mar.08.2007
B&K	Frequency Analyzer	3560C	2430788	Mar.20.2007

11. Summary of Results

Probe Position	Frequency Band (MHz)	Channel	Conducted Output Power (dBm)	Location of the Measured Point (x,y)	Ambient Noise (dB A/m)	ABM1 (dB A/m)	SNR (dB)	T-coil SNR Rating
Axial	Cellular	384	24.13	(-6.3,-4.3)	-53.97	-0.87	49.33	T4
	US PCS	600	23.95	9-4,-6.3)	-53.97	3.76	48.35	T4
Radial 1	Cellular	384	24.13	(5.7,-6.3)	-40.3	-3.10	37.19	T4
	US PCS	600	23.95	(2,-8.3)	-40.3	-1.95	38.59	T4
Radial 2	Cellular	384	24.13	(0,0)	-47.45	-3.39	44.06	T4
	US PCS	600	23.95	(0,0)	-47.45	-1.36	43.55	T4

Note:

The ABM1, SNR and T-coil Rating results are shown in Section 11. Also shown are the location of the measured point, noise and ABM2. The delta between Ambient Noise measurement and ABM2 measurement should be greater than 10dB. However, in cases where ABM2 is very low, it is suitable for the delta to be less than 10 dB. For the three probe positions, noise spectrum plots for the highest ambient noise, indicated with bold numbers.

12. Measurement Data

CDMA Cellular _CH384

Date/Time: 2007/7/10 19:38:52

DUT: C88; Type: CDMA;

Communication System: CDMA_850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: σ = 0 mho/m, ε_r = 1; ρ = 1 kg/m^3
Phantom section: AMB with Coil Section

DASY4 Configuration:

- Probe: AM1DV2 - 1030; ; Calibrated: 2007/2/16
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2007/3/5
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Scans/z (axial) rough 50 x 50/ABM Signal(x,y,z) (7x7x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 2.96069 dB A/m
BWC Factor = 0.161011 dB
Location: 0, -8.3, 363.7 mm

Scans/z (axial) 16 x 16/ABM Signal(x,y,z) (9x9x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 3.19371 dB A/m
BWC Factor = 0.161011 dB
Location: -2.3, -8.3, 363.7 mm

Point measurement/z (axial) at max z/ABM Signal(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -0.876411 dB A/m
BWC Factor = 0.161011 dB
Location: -6.3, -4.3, 363.7 mm

Point measurement/z (axial) at max z/ABM SNR(x,y,z) (1x1x1):

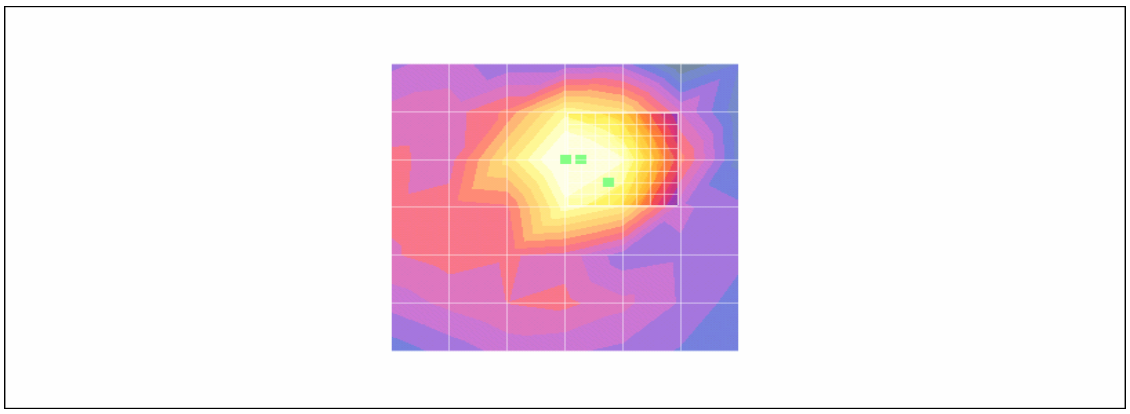
Measurement grid: dx=10mm, dy=10mm

Cursor:
ABM1/ABM2 = 49.337 dB
BWC Factor = 0.161011 dB
Location: -6.3, -4.3, 363.7 mm

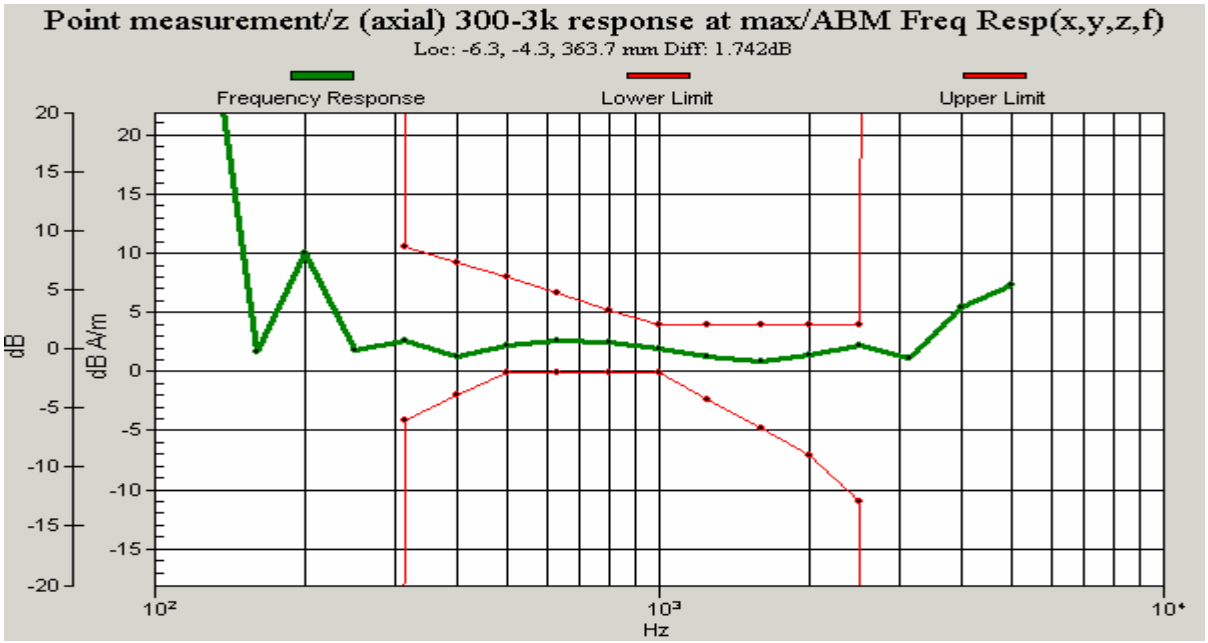
Point measurement/z (axial) 300-3k response at max/ABM Freq Resp(x,y,z,f) (1x1x1):

Measurement grid: dx=10mm, dy=10mm

Cursor:
Diff = 1.74172 dB
BWC Factor = 10.8 dB
Location: -6.3, -4.3, 363.7 mm



0 dB = 1.00A/m



CDMA Cellular _CH384

Date/Time: 2007/7/10 19:46:07

DUT: C88; Type: CDMA;

Communication System: CDMA_850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: σ = 0 mho/m, ε_r = 1; ρ = 1 kg/m^3
Phantom section: AMB with Coil Section

DASY4 Configuration:

- Probe: AM1DV2 - 1030; ; Calibrated: 2007/2/16
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2007/3/5
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Scans/x (longitudinal) 24 x 16/ABM Signal(x,y,z) (13x9x1):

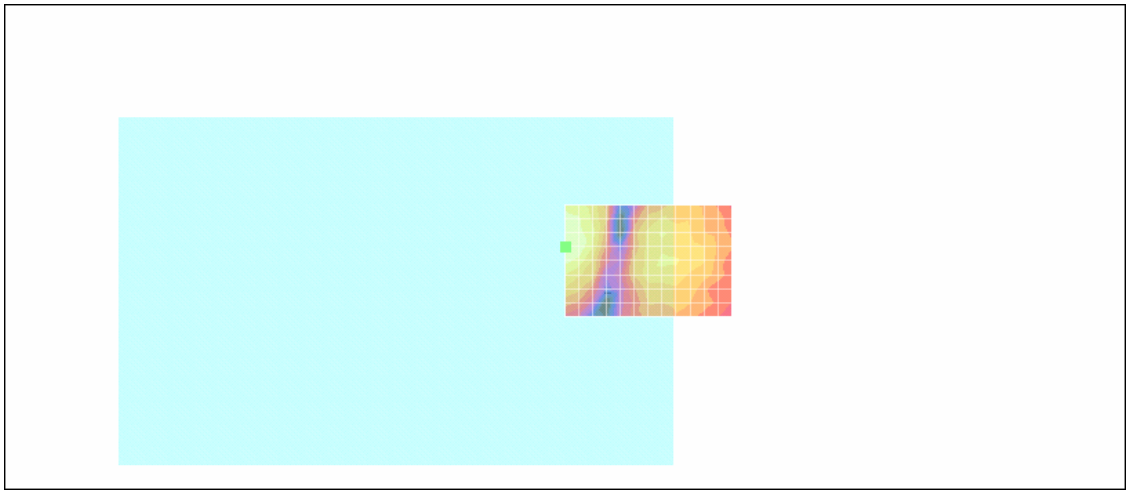
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -1.95062 dB A/m
BWC Factor = 0.161011 dB
Location: 5.7, -6.3, 363.7 mm

Point measurement/x (longitudinal) at max x/ABM Signal(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -3.10254 dB A/m
BWC Factor = 0.161011 dB
Location: 5.7, -6.3, 363.7 mm

Point measurement/x (longitudinal) at max x/ABM SNR(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 37.1957 dB
BWC Factor = 0.161011 dB
Location: 5.7, -6.3, 363.7 mm



0 dB = 1.00A/m

CDMA Cellular _CH384

Date/Time: 2007/7/10 19:55:57

DUT: C88; Type: CDMA;

Communication System: CDMA_850; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: σ = 0 mho/m, ε_r = 1; ρ = 1 kg/m^3
Phantom section: AMB with Coil Section

DASY4 Configuration:

- Probe: AM1DV2 - 1030; ; Calibrated: 2007/2/16
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2007/3/5
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Scans/y (transversal) 16 x 24/ABM Signal(x,y,z) (9x13x1):

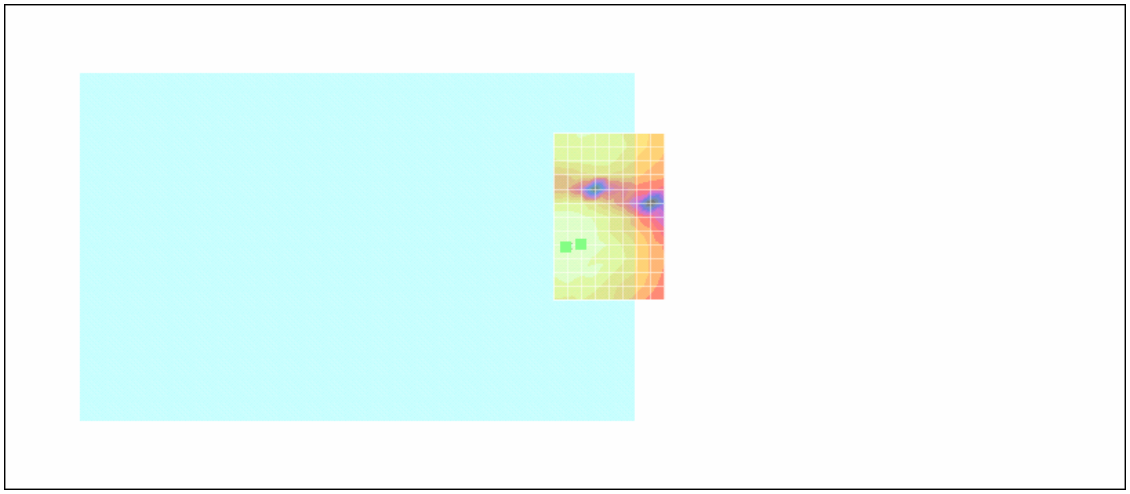
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -3.2563 dB A/m
BWC Factor = 0.161011 dB
Location: -2.3, -0.3, 363.7 mm

Point measurement/y (transversal) at max y/ABM Signal(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -3.39096 dB A/m
BWC Factor = 0.161011 dB
Location: 0, 0, 363.7 mm

Point measurement/y (transversal) at max y/ABM SNR(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 44.0668 dB
BWC Factor = 0.161011 dB
Location: 0, 0, 363.7 mm



0 dB = 1.00A/m

CDMA US PCS _CH600

Date/Time: 2007/7/10 00:10:29

DUT: C88; Type: CDMA;

Communication System: CDMA2000; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: σ = 0 mho/m, ε_r = 1; ρ = 1 kg/m^3
Phantom section: AMB with Coil Section

DASY4 Configuration:

- Probe: AM1DV2 - 1030; ; Calibrated: 2007/2/16
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2007/3/5
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Scans/z (axial) rough 50 x 50/ABM Signal(x,y,z) (7x7x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 4.08572 dB A/m
BWC Factor = 0.158027 dB
Location: 0, -8.3, 363.7 mm

Scans/z (axial) 16 x 16/ABM Signal(x,y,z) (9x9x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 5.31101 dB A/m
BWC Factor = 0.158027 dB
Location: 0, -6.3, 363.7 mm

Point measurement/z (axial) at max z/ABM Signal(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 3.76209 dB A/m
BWC Factor = 0.158027 dB
Location: -4, -6.3, 363.7 mm

Point measurement/z (axial) at max z/ABM SNR(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 48.354 dB

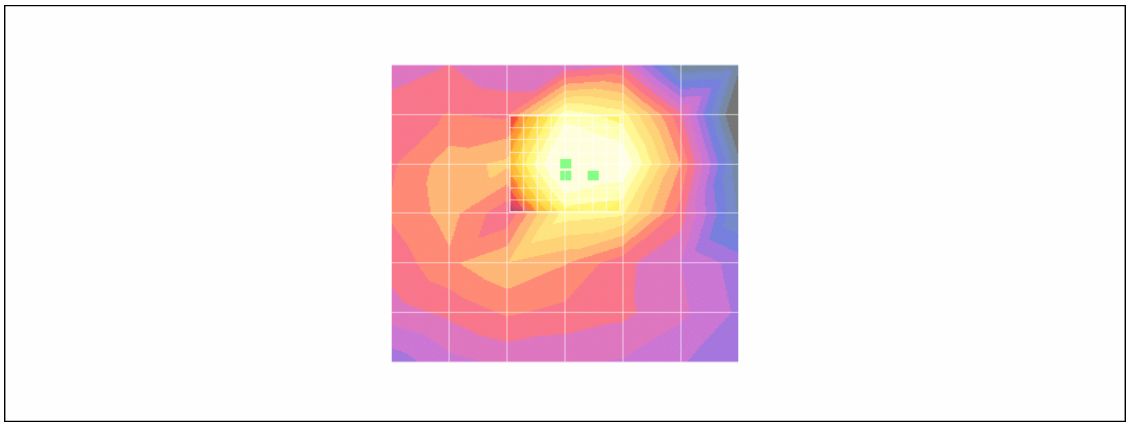
BWC Factor = 0.158027 dB
Location: -4, -6.3, 363.7 mm

Point measurement/z (axial) 300-3k response at max/ABM Freq Resp(x,y,z,f) (1x1x1):

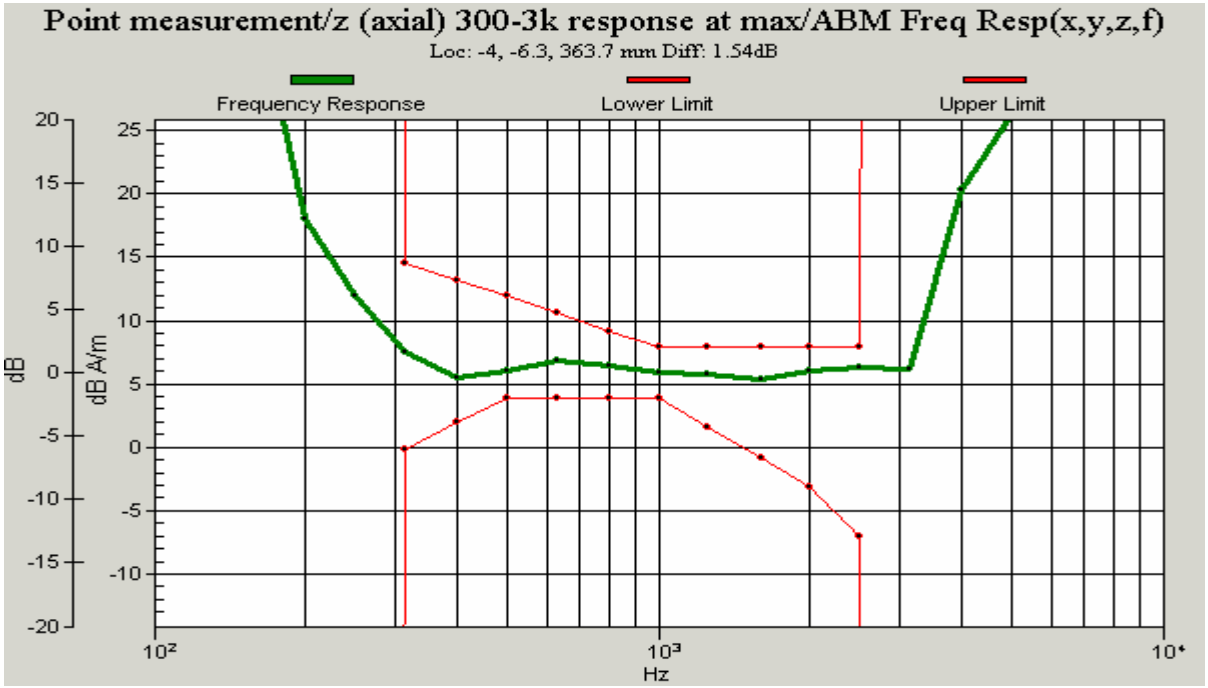
Measurement grid: dx=10mm, dy=10mm

Cursor:

Diff = 1.5402 dB
BWC Factor = 10.8 dB
Location: -4, -6.3, 363.7 mm



0 dB = 1.00A/m



CDMA US PCS _CH600

Date/Time: 2007/7/10 00:17:26

DUT: C88; Type: CDMA;

Communication System: CDMA2000; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: σ = 0 mho/m, ε_r = 1; ρ = 1 kg/m^3
Phantom section: AMB with Coil Section

DASY4 Configuration:

- Probe: AM1DV2 - 1030; ; Calibrated: 2007/2/16
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn547; Calibrated: 2007/3/5
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Scans/x (longitudinal) 24 x 16/ABM Signal(x,y,z) (13x9x1):

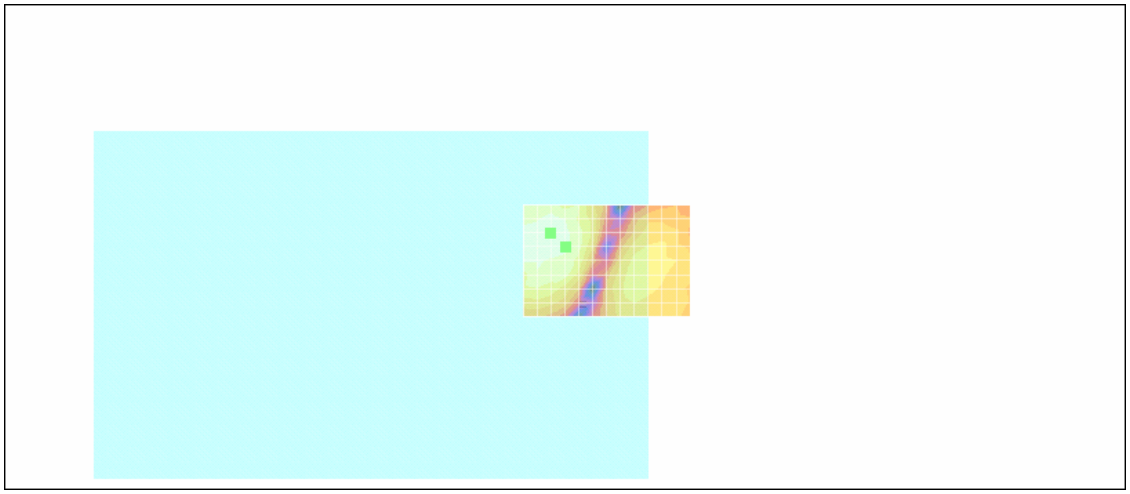
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -1.31271 dB A/m
BWC Factor = 0.158027 dB
Location: 4, -10.3, 363.7 mm

Point measurement/x (longitudinal) at max x/ABM Signal(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -1.95843 dB A/m
BWC Factor = 0.158027 dB
Location: 2, -8.3, 363.7 mm

Point measurement/x (longitudinal) at max x/ABM SNR(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 38.5937 dB
BWC Factor = 0.158027 dB
Location: 2, -8.3, 363.7 mm



0 dB = 1.00A/m

CDMA US PCS _CH600

Date/Time: 2007/7/10 00:26:45

DUT: C88; Type: CDMA;

Communication System: CDMA2000; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Air Medium parameters used: σ = 0 mho/m, ε_r = 1; ρ = 1 kg/m^3
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- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 100x
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Scans/y (transversal) 16 x 24/ABM Signal(x,y,z) (9x13x1):

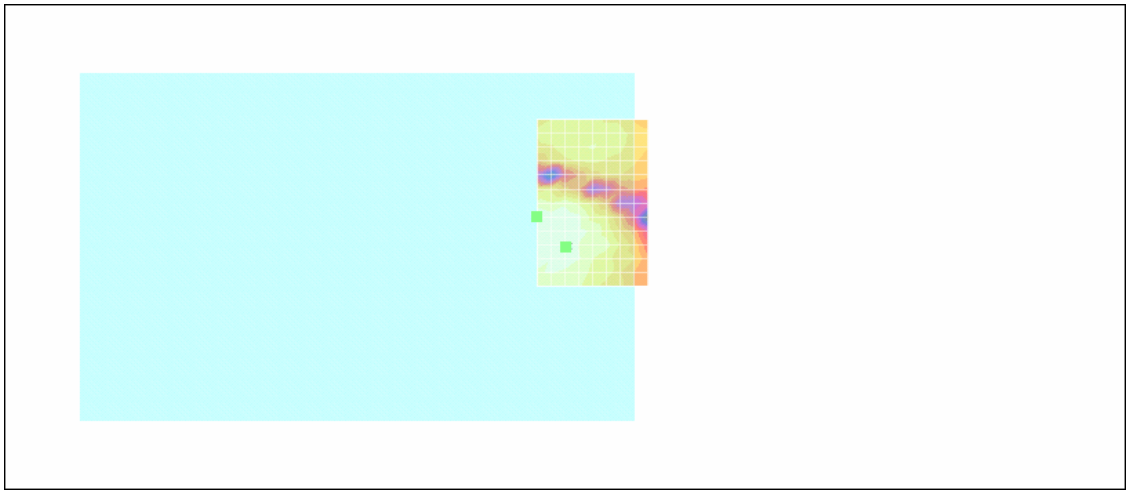
Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = 0.0380693 dB A/m
BWC Factor = 0.158027 dB
Location: 4, -4.3, 363.7 mm

Point measurement/y (transversal) at max y/ABM Signal(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1 comp = -1.36453 dB A/m
BWC Factor = 0.158027 dB
Location: 0, 0, 363.7 mm

Point measurement/y (transversal) at max y/ABM SNR(x,y,z) (1x1x1):

Measurement grid: dx=10mm, dy=10mm
Cursor:
ABM1/ABM2 = 43.5535 dB
BWC Factor = 0.158027 dB
Location: 0, 0, 363.7 mm



0 dB = 1.00A/m