

NCL CALIBRATION LABORATORIES

Calibration File No: DC-739
Project Number: QTKB-ALS-D-5200-5277

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.

QuieTek Validation Dipole

Manufacturer: APREL Laboratories

Part number: ALS-D-5200-S-2

Frequency: 5200 MHz

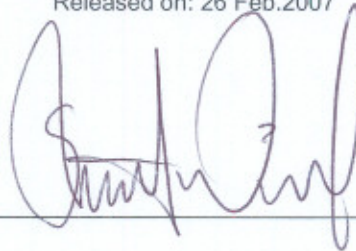
Serial No: 5200-230-00802

Customer: QuieTek Corporation

Calibrated: 23 Feb. 2007

Released on: 26 Feb. 2007

Released By: _____



NCL CALIBRATION LABORATORIES

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NEPEAN, ONTARIO
CANADA K2E 6T7

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4162

Conditions

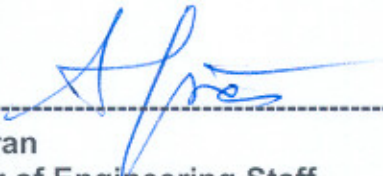
Ambient Temperature of the Laboratory: 22 °C +/- 0.5°C

Temperature of the Tissue: 21 °C +/- 0.5°C

We the undersigned attest that to the best of our knowledge the calibration of this device has been accurately conducted and that all information contained within this report has been reviewed for accuracy.



Stuart Nicol
Director Product Development



Alain Tran
Member of Engineering Staff
(Calibration Engineer)

Calibration Results Summary

The following results relate the Calibrated Dipole and should be used as a quick reference for the user.

Mechanical Dimensions

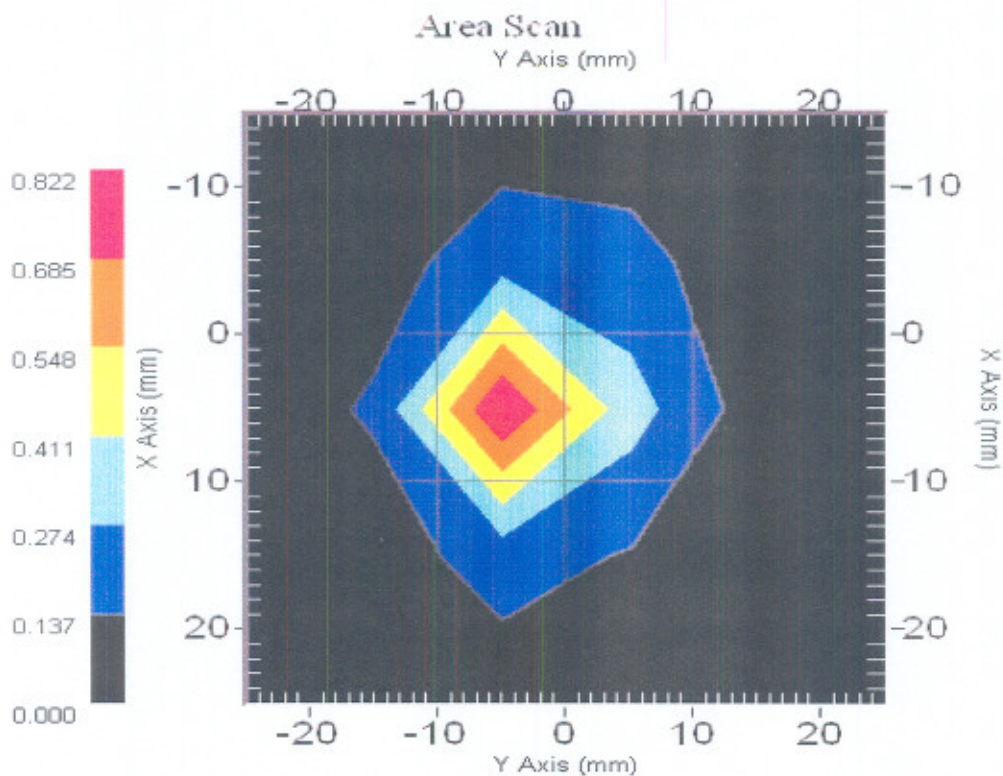
Length: 23.6 mm
Height: 14.0 mm

Electrical Specification

SWR: 1.004U
Return Loss: -53.3 dB
Impedance: 50.16 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
5200 MHz	62.9	17.9	223.1



Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 5200-230-00802. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 212.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure

SSI-TP-016 Tissue Calibration Procedure

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

Conditions

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

Temperature of the Tissue: 20 °C +/- 0.5°C

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
23.6 mm	14.0 mm	23.4 mm	15.4 mm

Tissue Validation

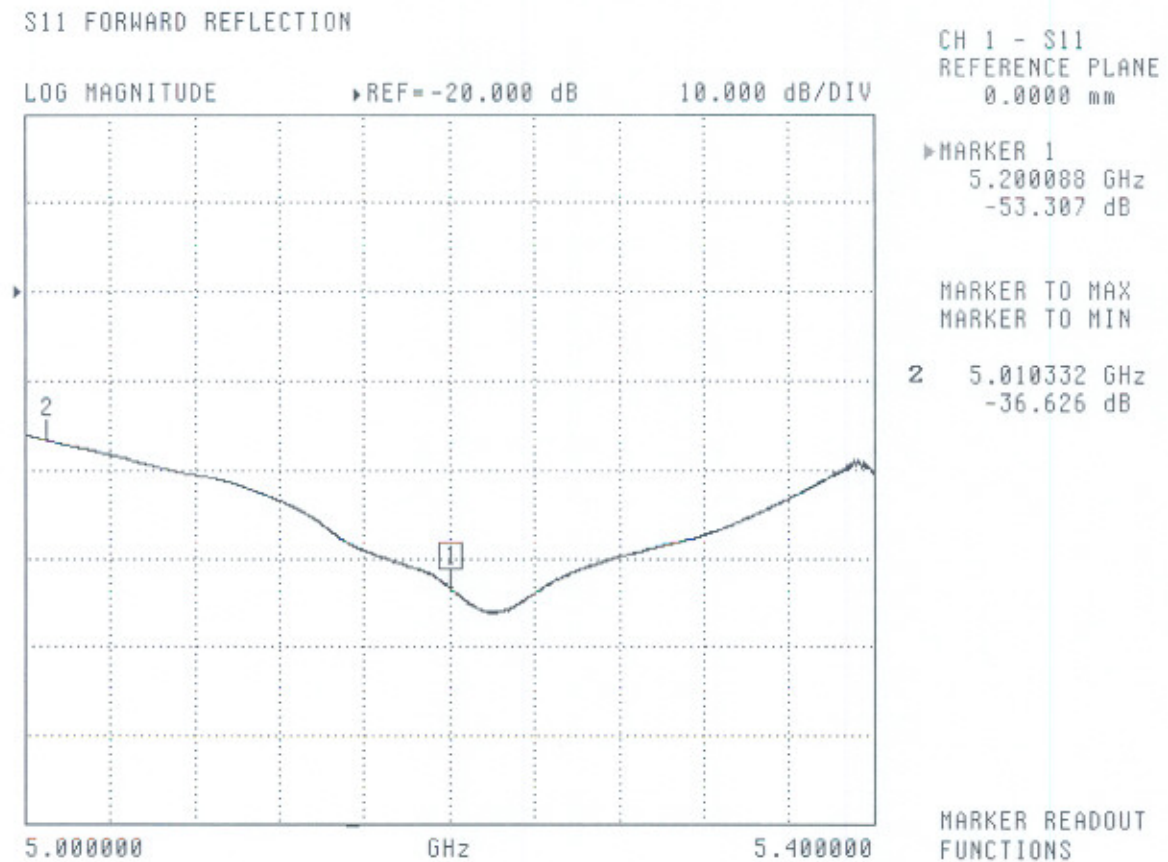
Head Tissue 5200 MHz	Measured
Dielectric constant, ϵ_r	35.3
Conductivity, σ [S/m]	5.30

Electrical Calibration

Test	Result
S11 R/L	-53.3 dB
SWR	1.004 U
Impedance	50.16 Ω

The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss



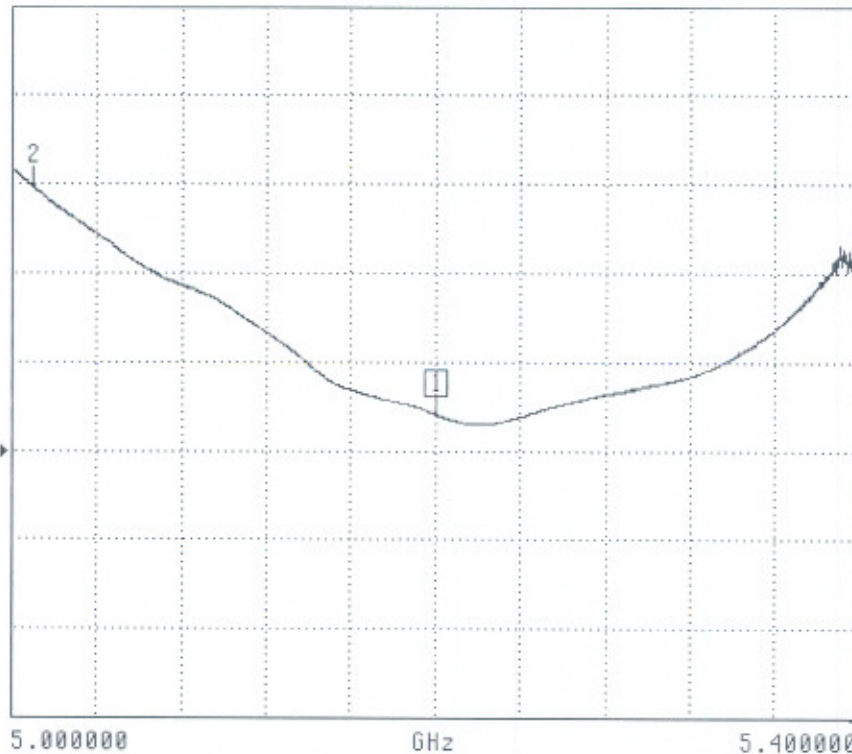
SWR

S11 FORWARD REFLECTION

SWR

REF=1.000 U

10.000 mU/DIV



CH 1 - S11
REFERENCE PLANE
0.0000 mm

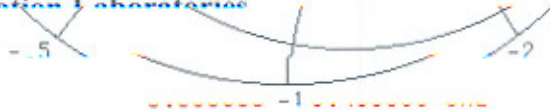
MARKER 1
5.200088 GHz
1.004 U

MARKER TO MAX
MARKER TO MIN

2 5.010332 GHz
1.030 U

MARKER READOUT
FUNCTIONS

NCT Calibration Laboratories

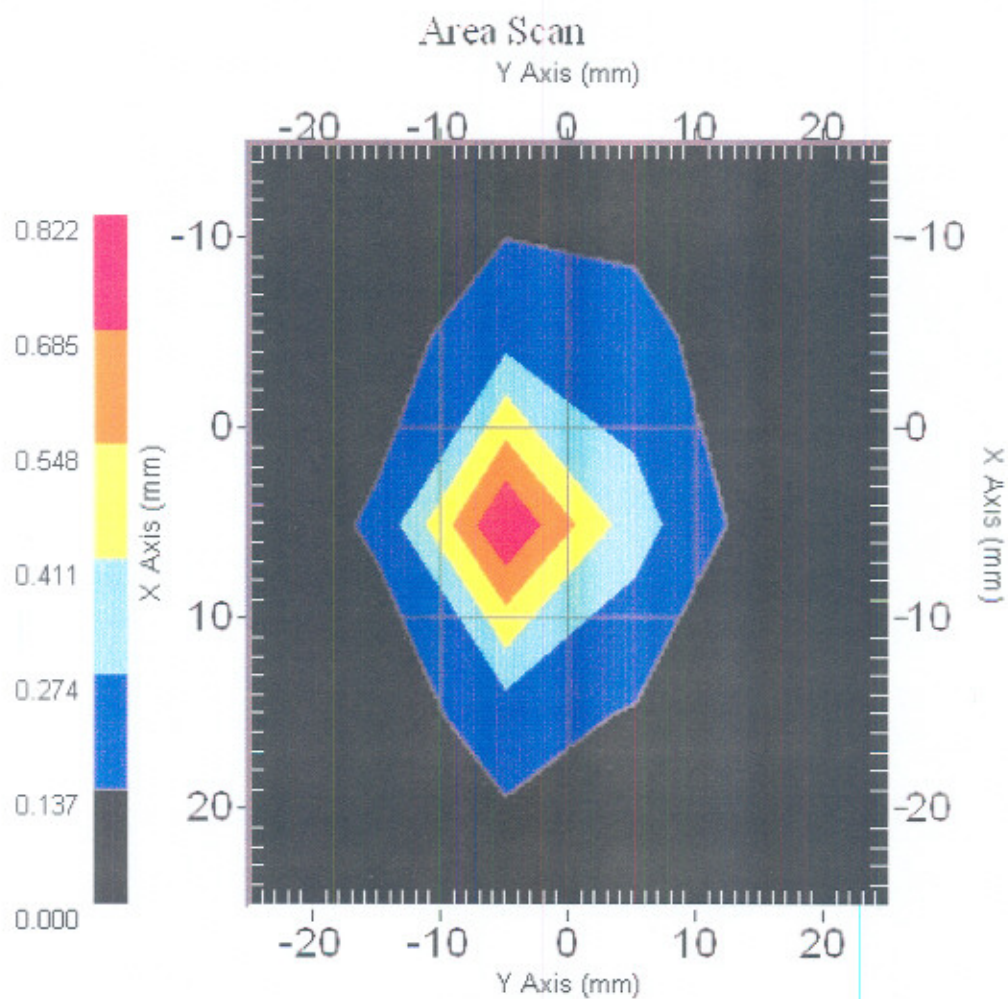


MARKER READOUT

This page has been reviewed for content and attested to by signature within this document.

System Validation Results Using the Electrically Calibrated Dipole

Head Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
5200 MHz	62.9	17.9	223.1



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 2006