

## 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 QTK-319. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the IEEE/APREL 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 QTK 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

Dipole QTK-319 was new taken from stock.

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

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



## Dipole Calibration Results

### Mechanical Verification

IEEE Length	IEEE Height	Measured Length	Measured Height
51.5 mm	30.4 mm	53.5 mm	30.4 mm

### Tissue Validation

Body Tissue 2450 MHz	Measured
Dielectric constant, $\epsilon_r$	52.5
Conductivity, $\sigma$ [S/m]	1.78



Electrical Calibration

Test	Result
S11 R/L	-20.8 dB
SWR	1.2 U
Impedance	49.4 $\Omega$

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

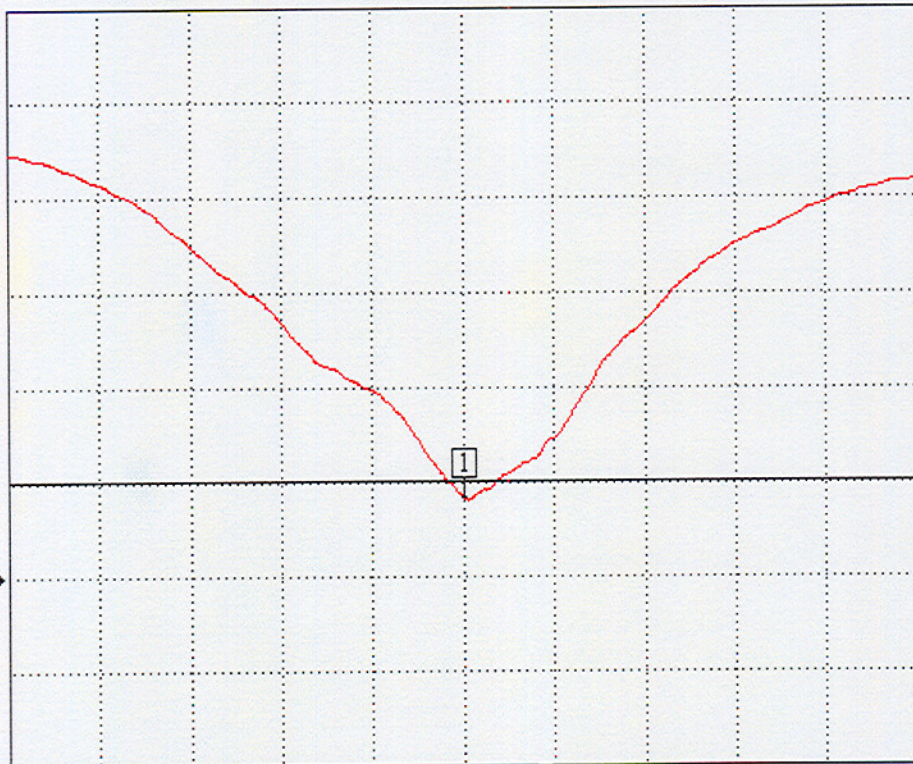
S11 Parameter Return Loss

S11 FORWARD REFLECTION

LOG MAGNITUDE

REF = -25.000 dB

5.000 dB/DIV



CH 1 - S11  
REFERENCE PLANE  
0.0000 mm

MARKER 1  
2.450046 GHz  
-20.796 dB

MARKER TO MAX  
▶ MARKER TO MIN

MARKER READOUT  
FUNCTIONS

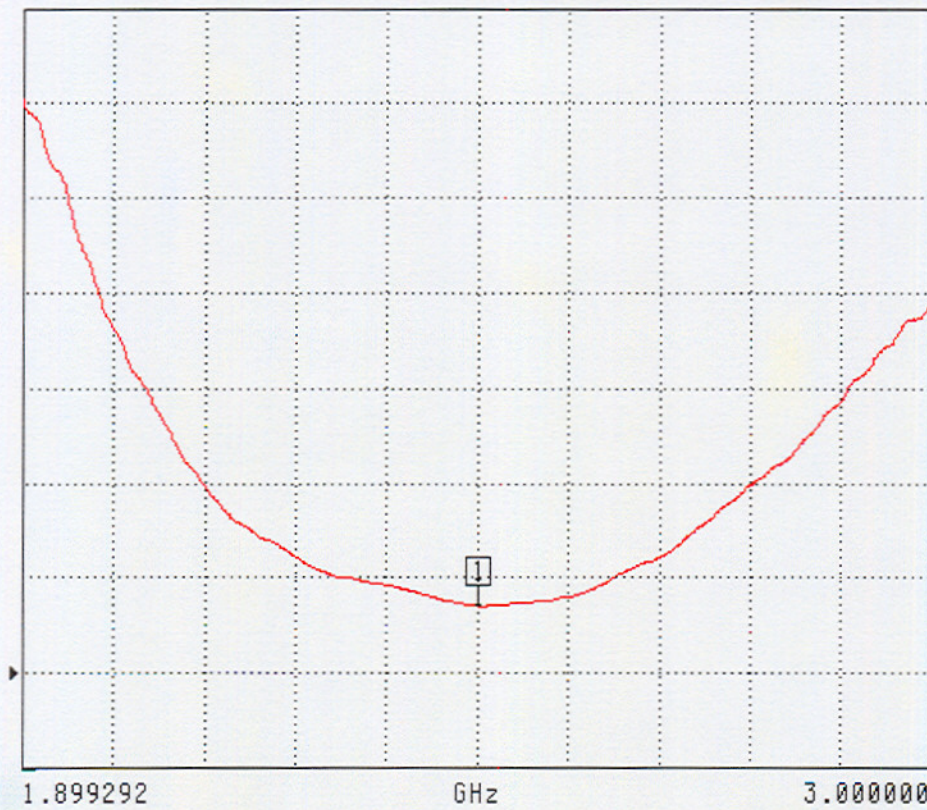
*[Handwritten signatures]*



SWR

S11 FORWARD REFLECTION

SWR REF=500.000 mU 1.000 U/DIV



CH 1 - S11  
REFERENCE PLANE  
0.0000 mm

MARKER 1  
2.450046 GHz  
1.199 U

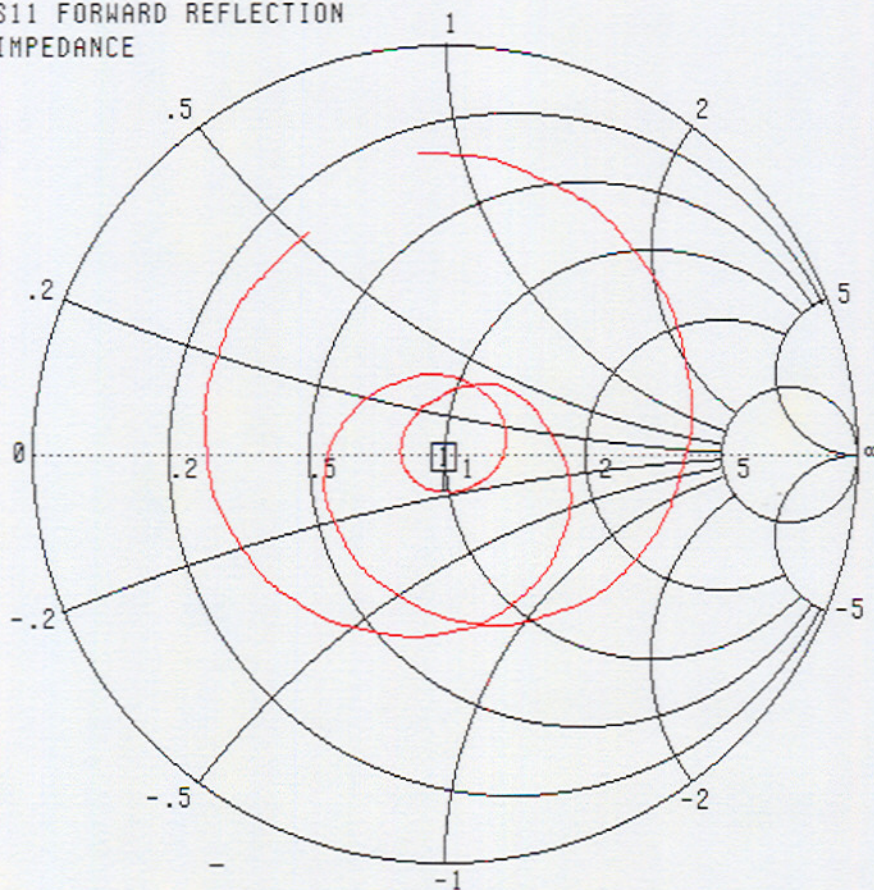
MARKER TO MAX  
▶ MARKER TO MIN

MARKER READOUT  
FUNCTIONS



### Smith Chart Dipole Impedance

S11 FORWARD REFLECTION  
IMPEDANCE



CH 1 - S11  
REFERENCE PLANE  
0.0000 mm

MARKER 1  
2.450046 GHz  
49.365  $\Omega$   
-9.232  $j\Omega$

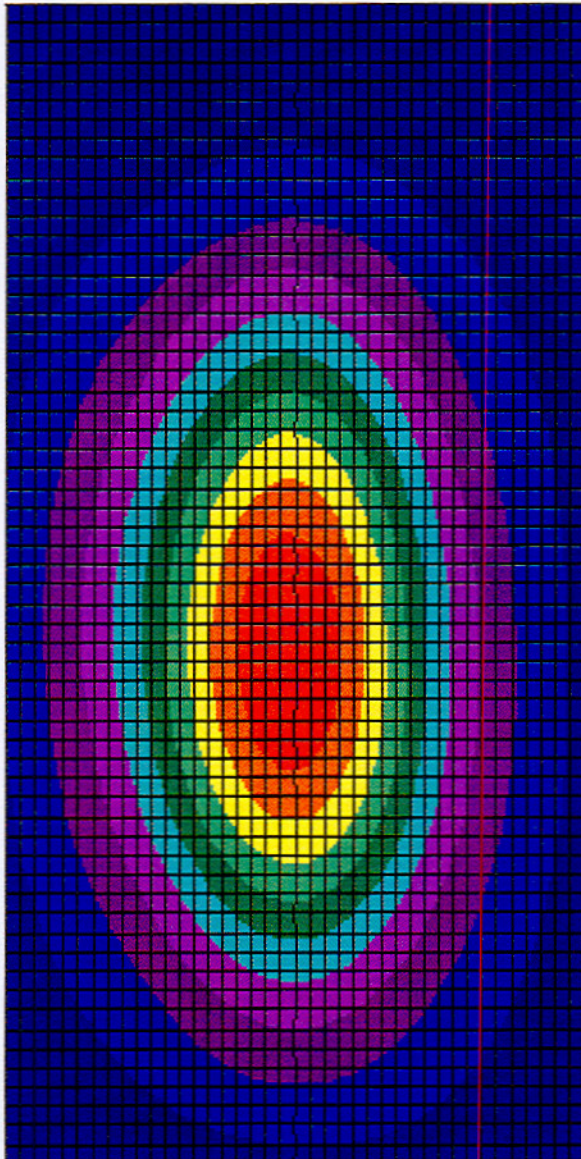
MARKER TO MAX  
▶ MARKER TO MIN

MARKER READOUT  
FUNCTIONS



System Validation Results Using the Electrically Calibrated Dipole

Frequency	1 Gram	10 Gram	Peak Above Feed Point
2.45 GHz	48.07	25.65	95.6





**NCL Calibration Laboratories**

Division of APREL Laboratories.

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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 2003