



Reflection-less Full Spherical Antenna Mount FSM-5

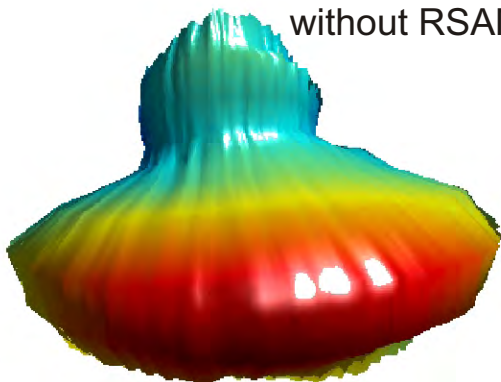
The new Diamond Engineering Full Spherical Mount is now a DAMs platform option that may be added to any DAMs platform. The mount utilizes delrin for ball bearings & structure and enables full spherical measurements to resolutions of .1 degrees. The mount is ideal for unobstructed gain data and efficiency. The belt driven system is plug and play substitution to the DAMs elevation motor.

Features

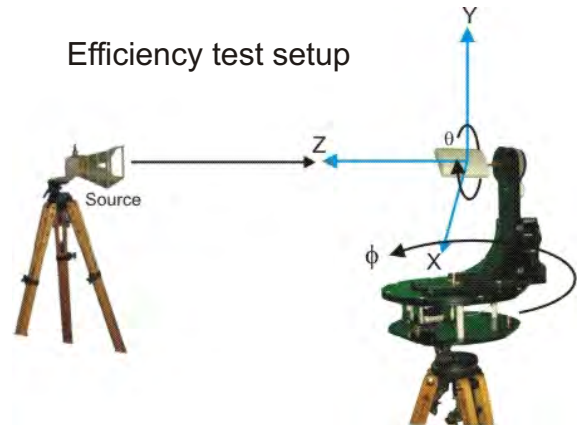
- Low reflection - 90% delrin construction
- DC- 18GHz
- 6" horizontal adjustment for centering
- 12" Vertical Height
- .1 degree movement resolution
- 5 lb load (option 5) 10lb load(option 10)
- CTIA and general efficiency software
- Runs from existing platform elevation plug

Freq = 5GHz Az= -10 EL= 25

Patch antenna measured without RSAM

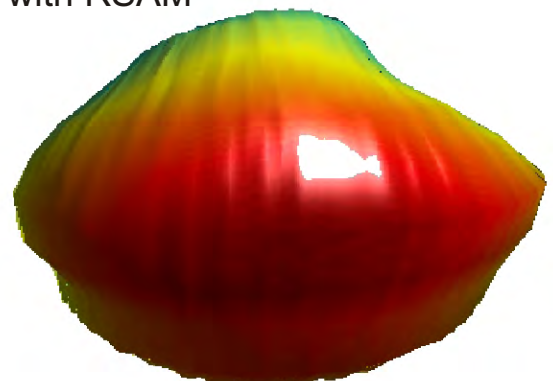


Efficiency test setup



Freq = 5GHz Az= -10 EL= 25

Same patch antenna measured with RSAM





Efficiency with AUT S22 removed

Efficiency

$$\epsilon = \frac{\pi}{2NM} \sum_N \sum_M \frac{S_{21}^2(\theta_M, \phi_N)}{P_L G_T} \cos(\phi_N)$$

N = number of EL cuts

M = number of Az cuts

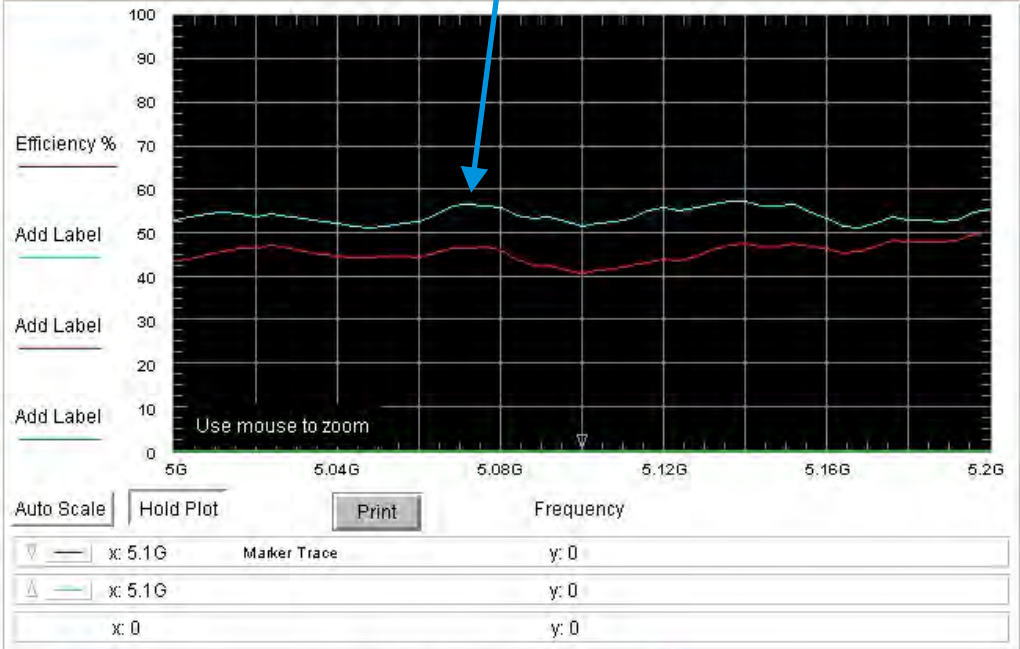
$S_{21}^2(\theta_M, \phi_N) = \text{Measured REG1}$

PL = Path loss (REG2)

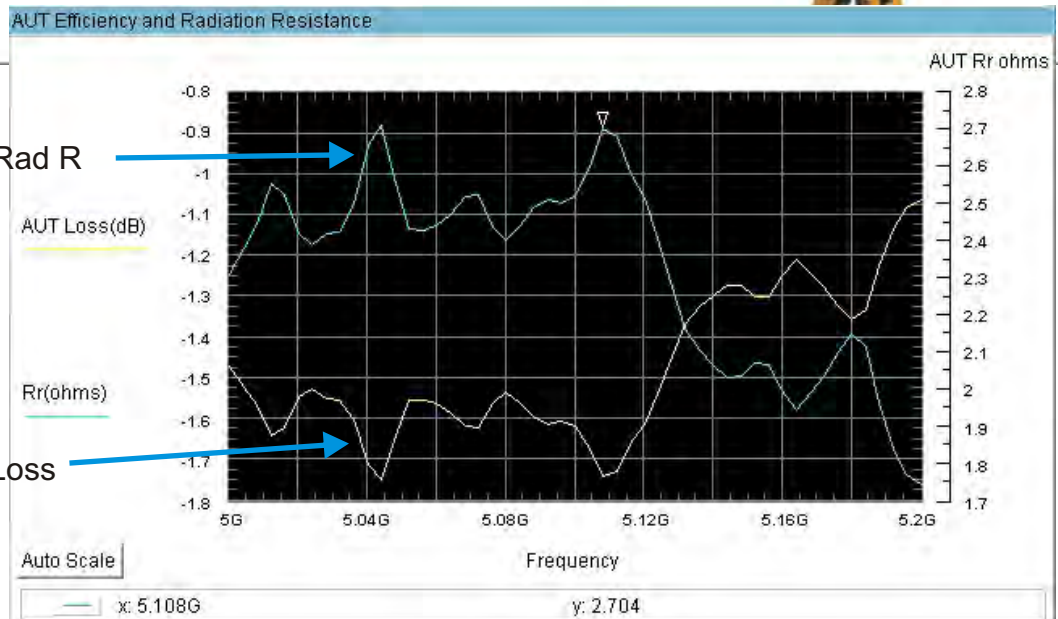
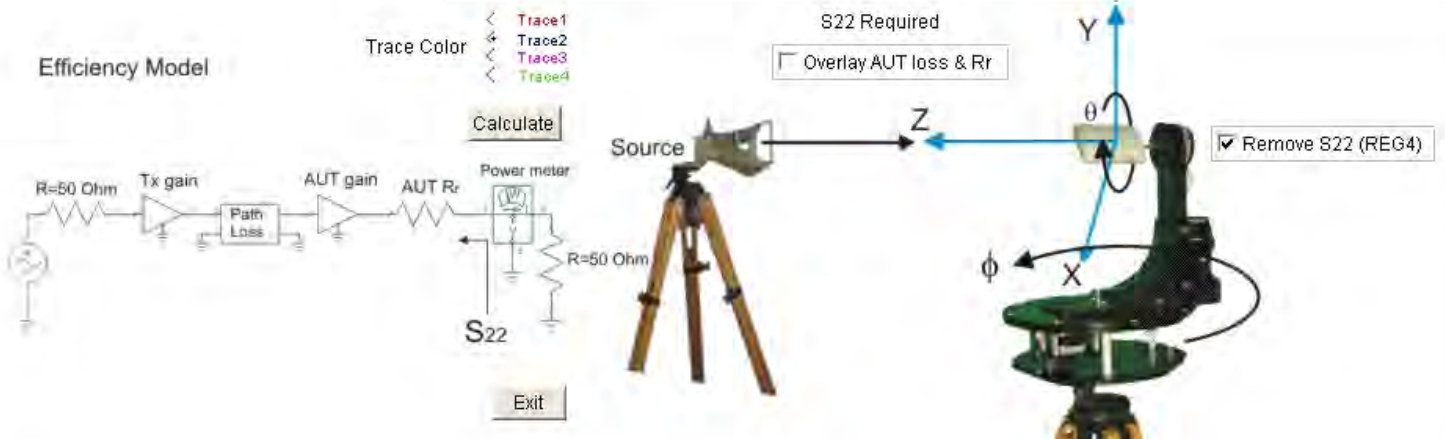
GT = Ref antenna gain (REG3)

Efficiency is calculated using data in REG1-3.

AUT S22 may be removed. Measured S22 data must be present in REG4. S22 data may be of any size or shape as long as the frequency extents are identical to REG1 S21 data. Integration is performed over the measurement



Efficiency Model





Reflection-less Full Spherical Antenna Mount

Patch spherical scan at high and low resolution

Az: 0 360 step 15 EL: -90 90 step 15

Az: 0 360 step 5 EL: -90 90 step 5

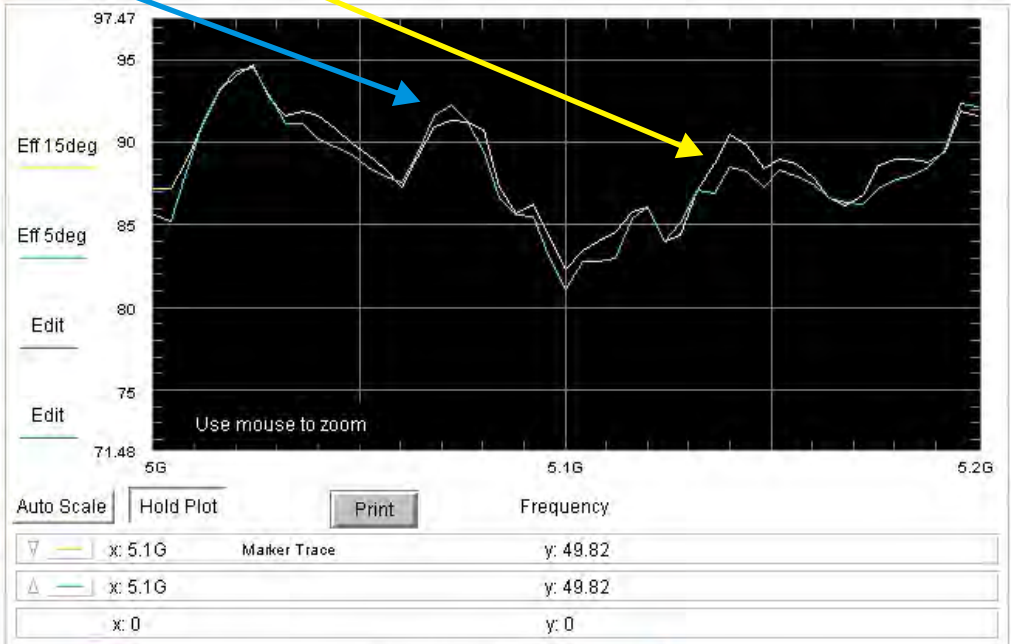
Efficiency

$$\epsilon = \frac{\pi}{2NM} \sum_N \sum_M \frac{S_{21}^2(\theta_M, \phi_N)}{P_I G_T} \cos(\phi_N)$$

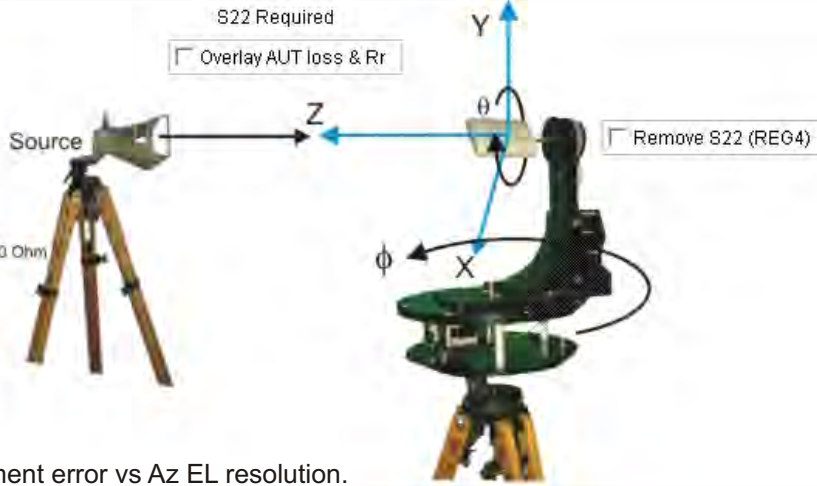
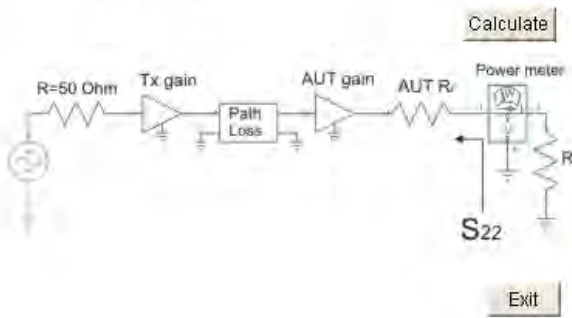
N = number of EL cuts
M = number of Az cuts
 $S_{21}^2(\theta_M, \phi_N) = \text{Measured REG1}$
PL = Path loss (REG2)
GT = Ref antenna gain (REG3)

Efficiency is calculated using data in REG1-3.

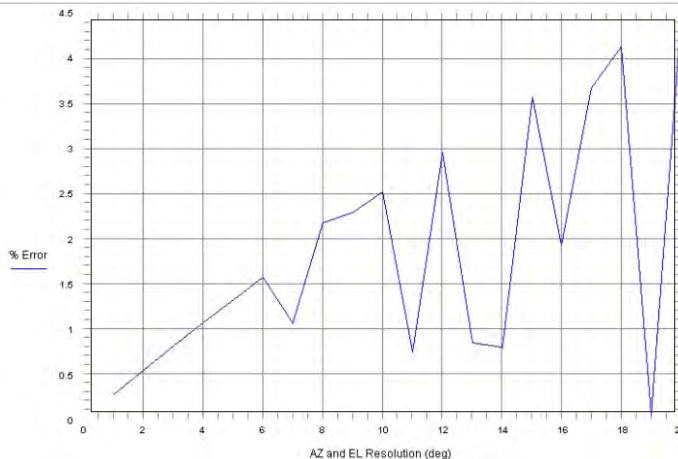
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Efficiency Model

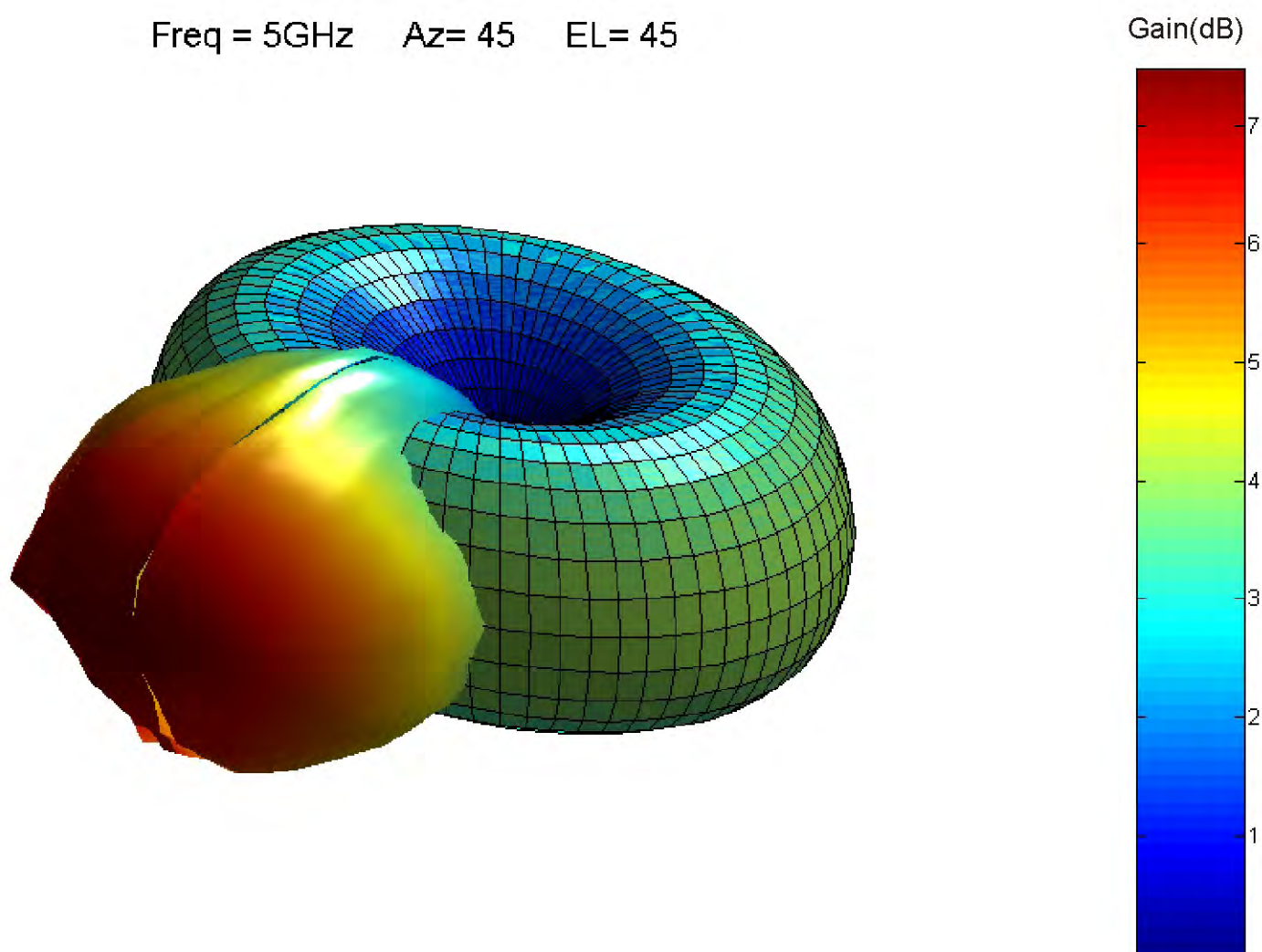


Efficiency measurement error vs Az EL resolution.



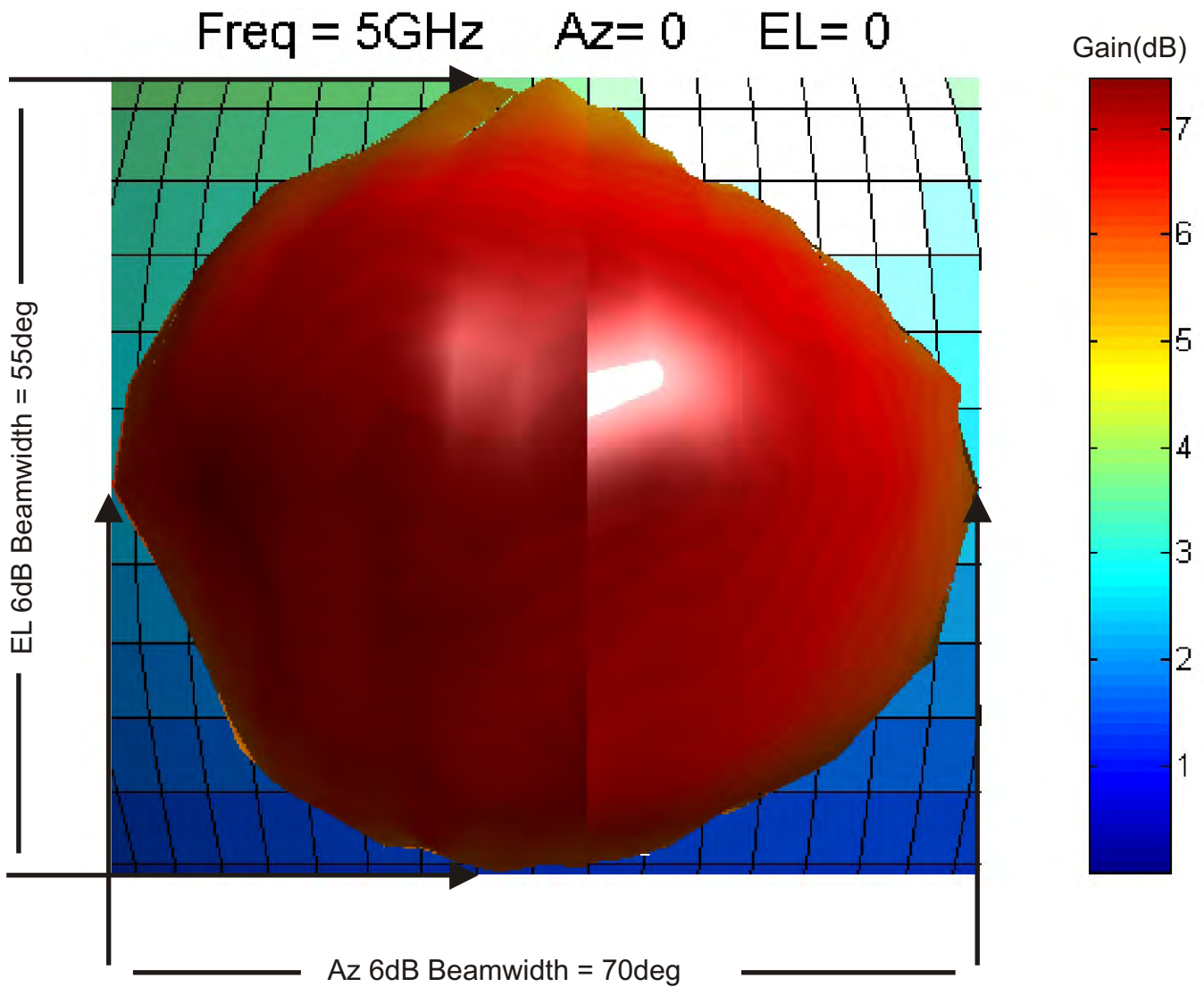
Spherical Plot of AUT (Patch) Gain With ideal 3dBd Dipole

Freq = 5GHz Az= 45 EL= 45





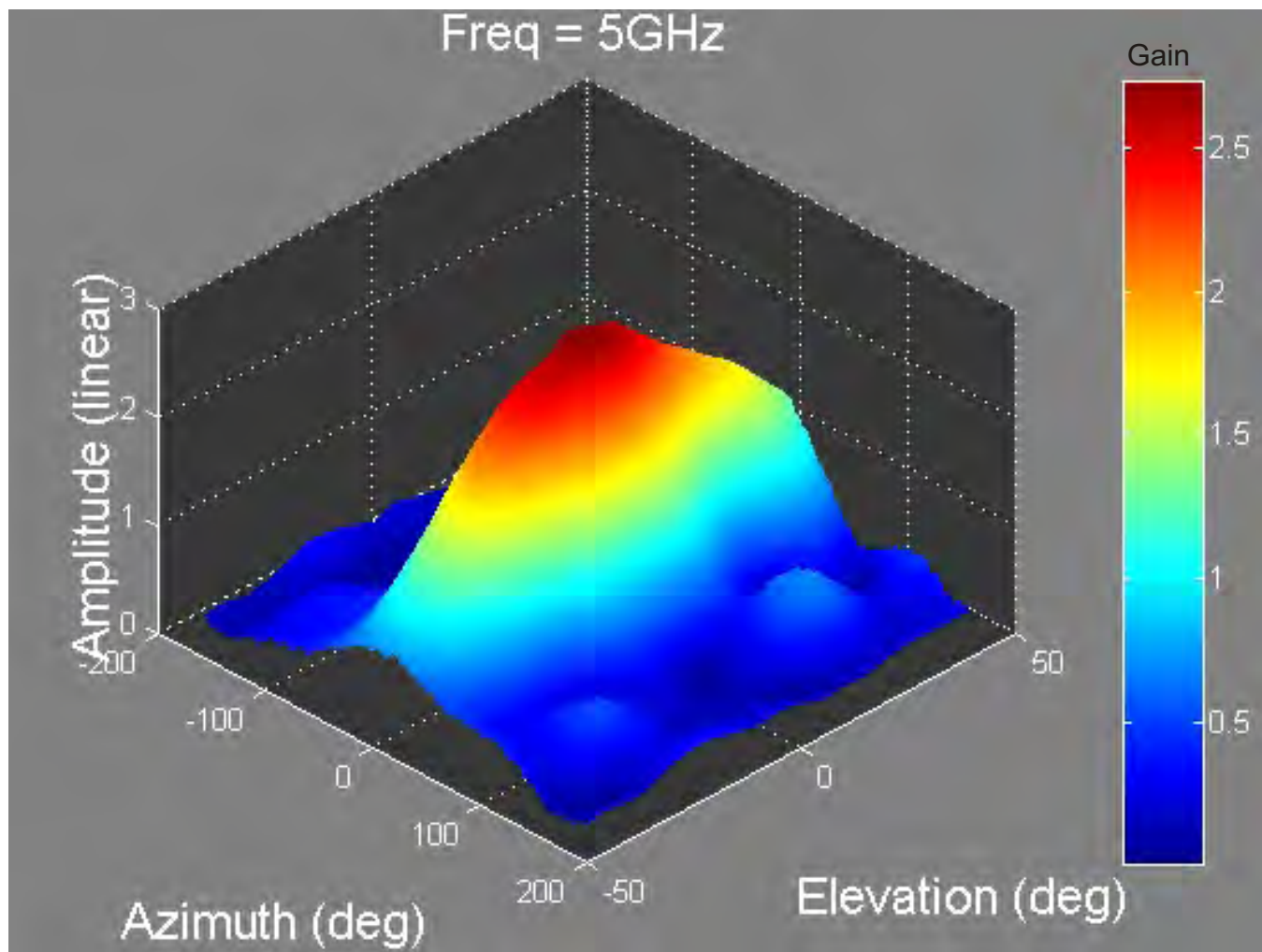
Spherical Plot of AUT 6dB beamwidth using 6dB gain Iso-sphere



Iso-Sphere grid set to 5deg/div Az and EL

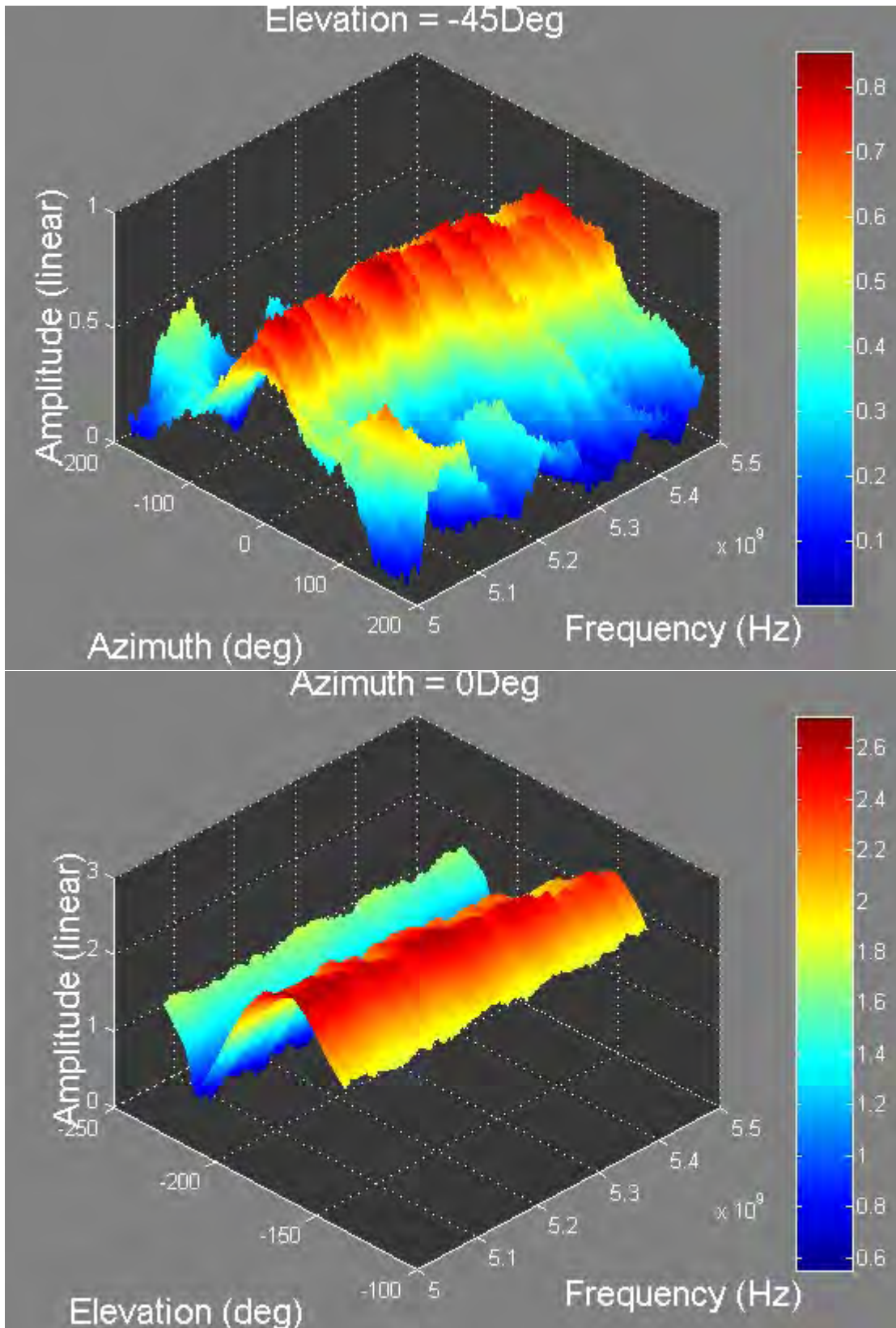


Linear Az-EL Plot of AUT





Az vs Frequency and EL vs Frequency





Polar Plot of Patch AUT showing all Az EL contours relative to Max Gain

