

PCB Trace Antenna Specification

Field Theory

1029 Butterfield Rd,
Vernon Hills, IL 60061
Email: info@fieldtheoryinc.com



TEST METHOD

Passive antenna measurement within a 5-meter anechoic antenna chamber equipped with a quad-ridged horn receiver antenna and an EL-AZ positioner with laser positioner

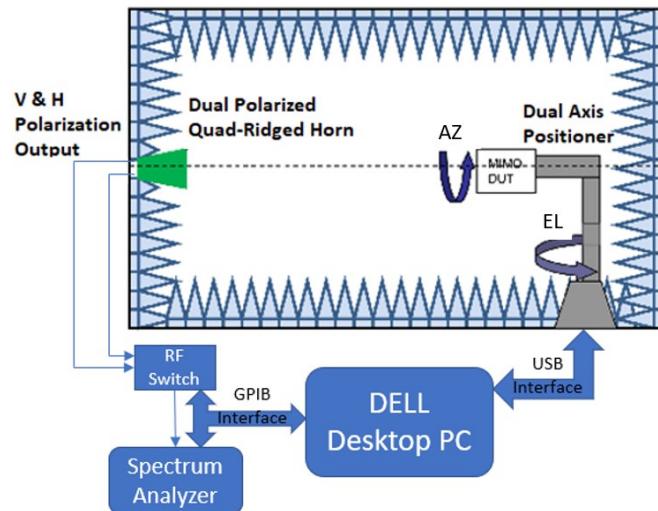
SITE / EQUIPMENT INFORMATION

Lab Name: Field Theory Consulting

Lab Address: 1029 Butterfield Rd, Vernon Hills, IL 60061

Size: 5-meter

Frequency Measurement Range: LTE Bands 1,2,3,4,5,8,12,13,20,28,66



Equipment	Manufacturer	Model No.	Serial No.	last Cal.	Due Date
Network Analyzer	Anritsu	MS46122B	2135304	8/25/2023	8/24/2024
Quad-Ridge Horn Antenna	ETS-Lindgren	3164-10	217936	8/25/2023	8/24/2024
5 Meter Anechoic Chamber	Braden Shielding Systems	NA	F70331	NA	NA
RF Cable	ENS Microwave	S160-160-MKS-MKS	3042020	8/25/2023	8/24/2024
RF Cable	ENS Microwave	S160-120-MKS-MKS	12042018	8/25/2023	8/24/2024
RF Cable	ENS Microwave	EMC1-K1K1-72	1GVT4 19002201	8/25/2023	8/24/2024
RF Cable	ENS Microwave	EMC1-K1K1-72	1GVT4 19002202	8/25/2023	8/24/2024
RF Cable	ENS Microwave	EMC1-K1K1-216	1GVT4 19002202 001	8/25/2023	8/24/2024
RF Cable	ENS Microwave	EMC1-K1K1-216	1GVT4 19002202 002	8/25/2023	8/24/2024
DUT Positioner	DE LCC	D6025	NA	NA	NA
RF Switch	Mini-Circuits	RC-1SPDT-A18	1810010005	8/25/2023	8/24/2024

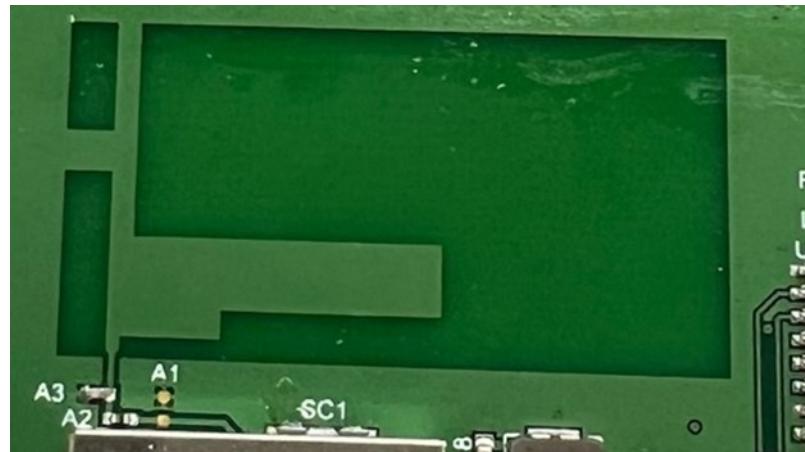
Bluetooth Antenna

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FIELD THEORY
CUSTOM ANTENNA DESIGN & RF SOLUTIONS

PHOTO



FORMULA AND CALCULATIONS

Gain:

$$G_{AUT} = \frac{[S_{21}^2]}{[G_{REF}]} \left(\frac{\lambda}{4\pi d} \right)^{-2}$$

Efficiency:

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

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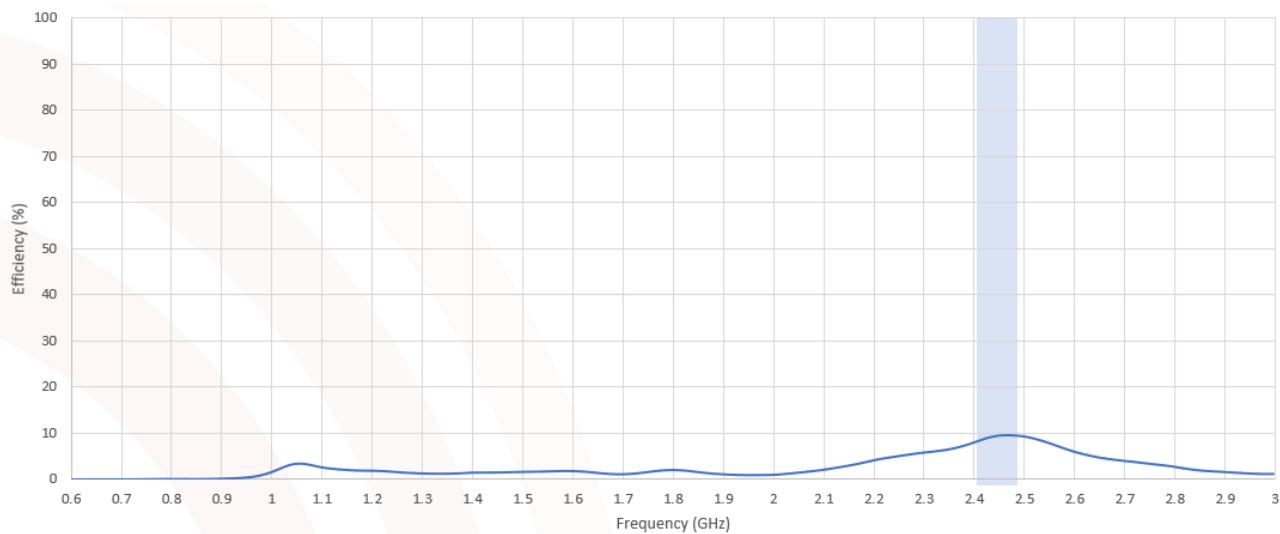
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PCB Trace Antenna: Bluetooth

Performance (Typical as measured in Device)			
Frequency (MHz)	2404	2440	2480
Efficiency (%)	8.2	9.3	9.6
Peak Gain (dBi)	-3.5	-2.9	-2.8
Impedance (ohms)	50	50	50
VSWR	≤ 2.5	≤ 2.5	≤ 2.5
Polarization	Linear		
Maximum Input Power (W)	5		

Efficiency



Bluetooth Antenna

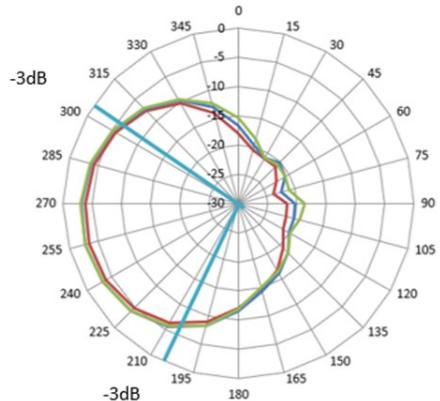
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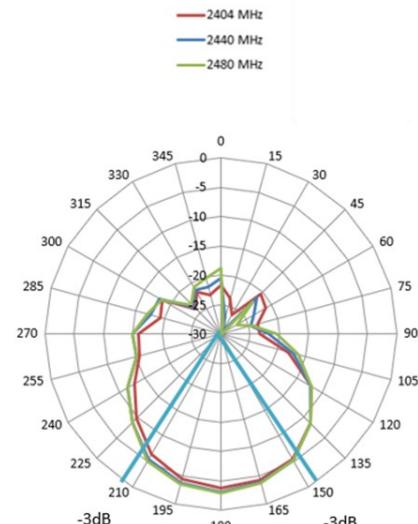
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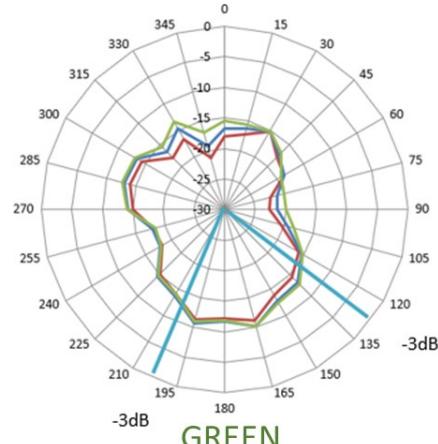
1D Radiation Patterns



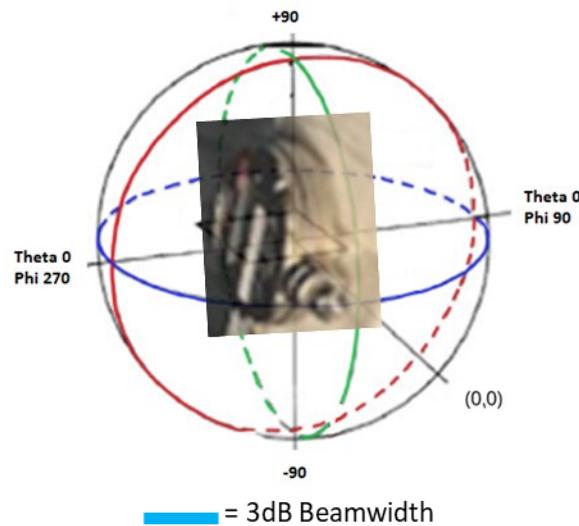
BLUE



RED



GREEN



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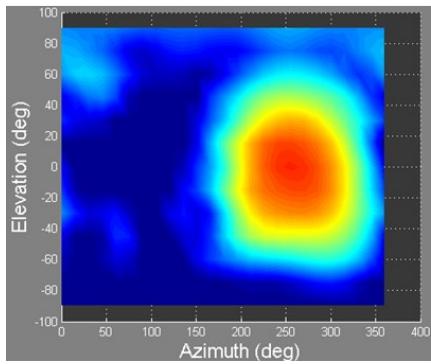
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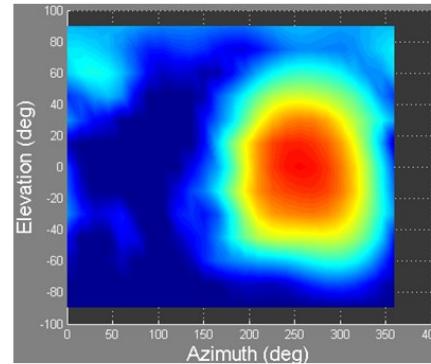


2D Heat Map & 3D Spherical

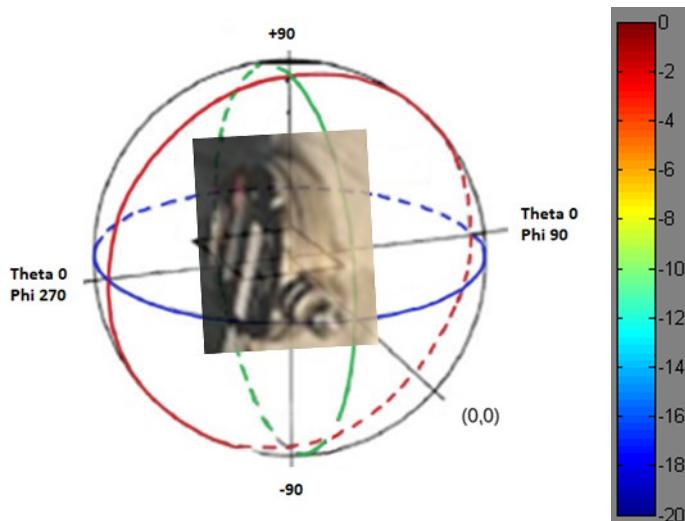
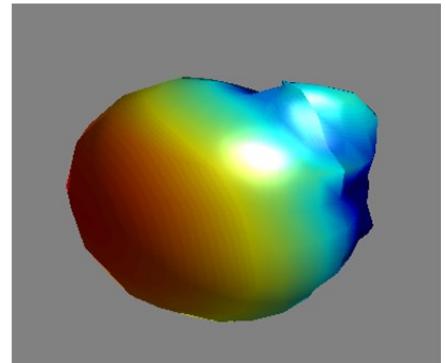
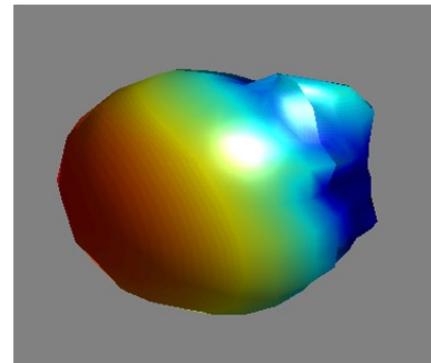
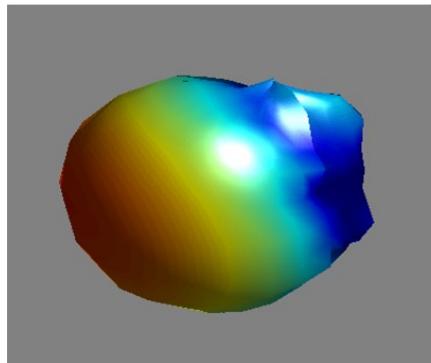
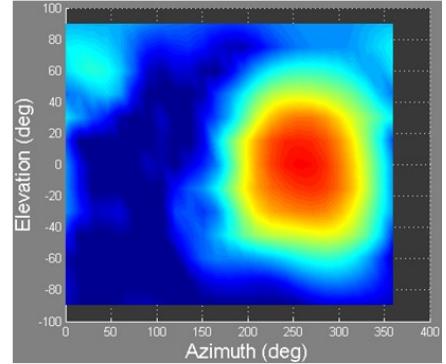
2404 MHz



2440 MHz



2480 MHz



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