



DATASHEET

UWB/BLE COMBO ANTENNA PART NUMBER 2389101-1

UWB/BLE COMBO ANTENNA

FEATURES

- UWB (Ultra Wide Band) Antenna
- BLE (Bluetooth Low Energy) Antenna
- Omnidirectional Radiation Pattern
- UWB: 6.0–8.5 GHz (Channels 5,6,8,9)
- Channels: 5, 6, 8, 9
- BLE: 2.4–2.5 GHz
- Application: UWB Ranging, UWB Angle of Arrival, BLE
- SMT Compatible

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TECHNICAL DATA

Dimensions	9.35 x 16.10 x 10.00 mm ³
Pad Configuration	Pad 1 = Feed UWB; Pad 2 = Feed BLE; Pad 3 / 4 = GND
Material	Brass (metal), LCP (resin)
Temperature range	-40 to + 105 °C
Manufacturing Process	SMT Placeable (Tape & Reel)

ELECTRICAL	BLE	CHANNEL 5	CHANNEL 9
Frequency range	2.40 to 2.50 GHz	6.24 to 6.74 GHz	7.73 to 8.24 GHz
Return Loss S11	< -7 dB	< -10 dB	< -10 dB
Efficiency	> -2.5 dB	> -2.0 dB	> -2.0 dB
Peak Gain	2 dBi	5 dBi	5.5 dBi
Radiation Properties	Omnidirectional		
Polarization	Linear Vertical		
Impedance	50 Ohm		
Max. Input Power	10 W		

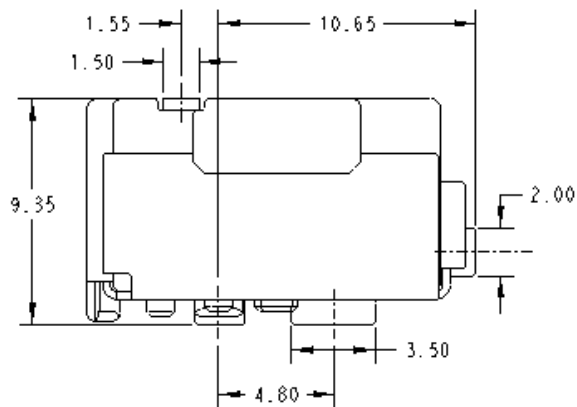
Notes:

1. Performance data on 60x85 mm² eval ground plane.
2. Reference plane for measurement is the connector.

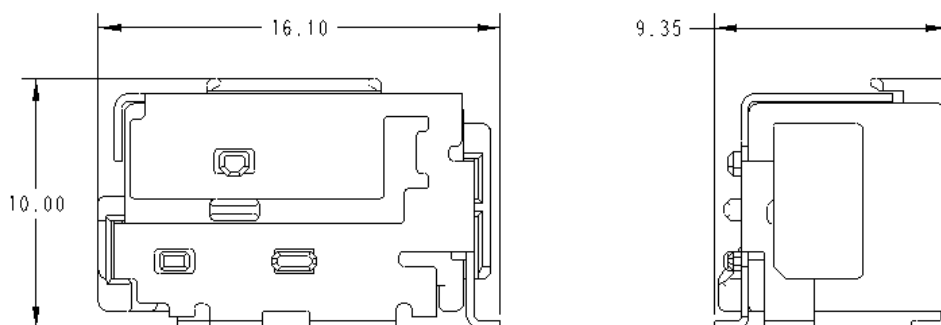
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ANTENNA DIMENSIONS

Pad Position






Outline

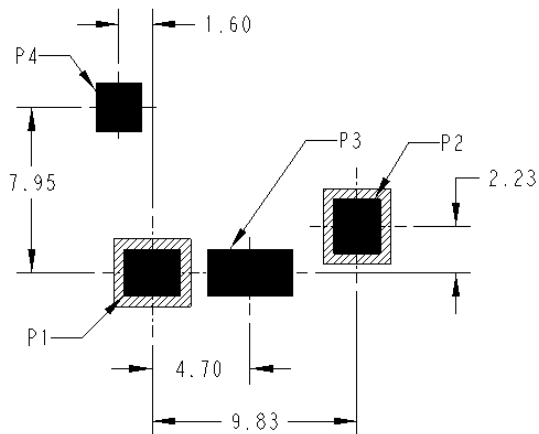


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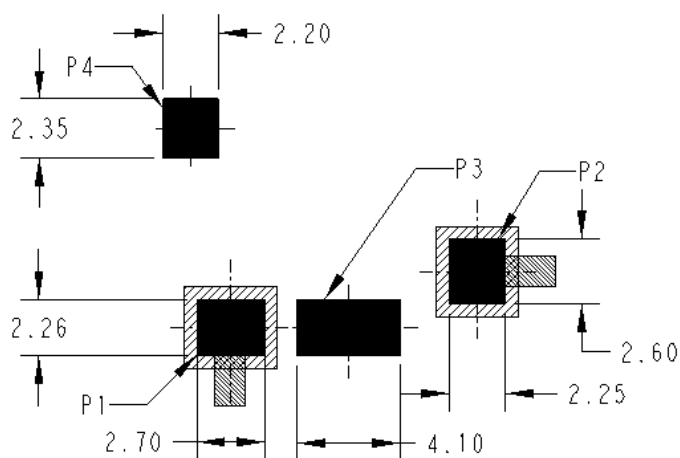
ANTENNA LAND PATTERN

PAD	DESCRIPTION
P1	UWB Feed Pad
P2	BLE Feed Pad
P3	Ground Pad
P4	Ground Pad

	Copper Keep-out Area
	Antenna Copper Area
	50 Ohm Transmission Line All other areas to be GND



Dimensions referenced to P1 center.

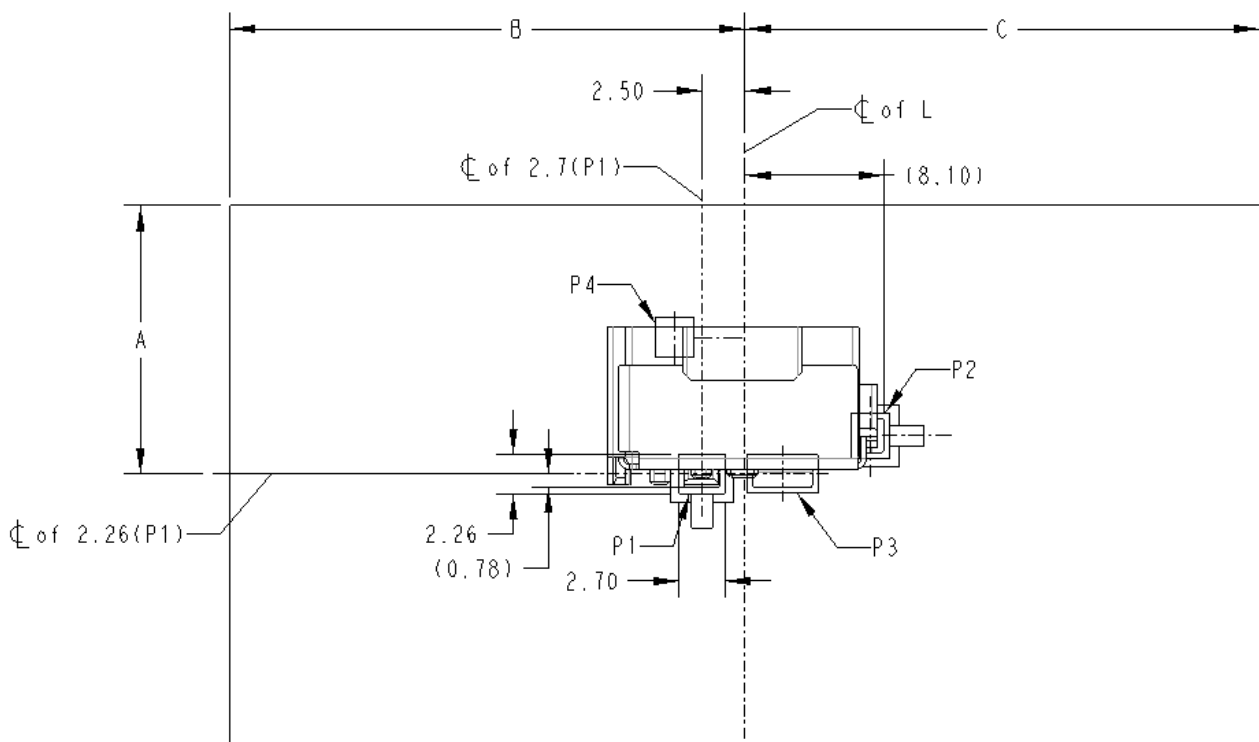


Copper keep-out area width around P1 and P2 is 0.5mm.

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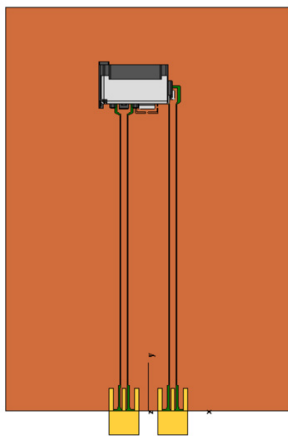
ANTENNA LAND PATTERN

LOCATION	DIMENSION FROM PCB OUTLINE [MM]
A	16 mm min.
B	16 mm min.
C	21 mm min.



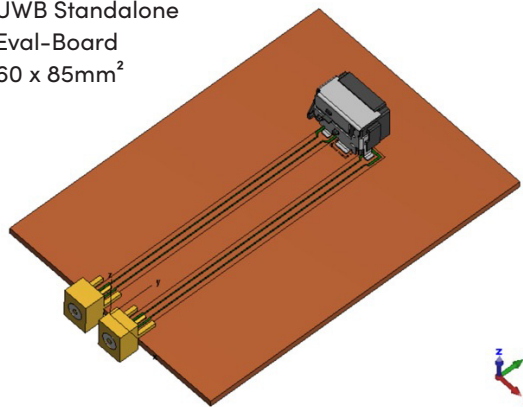
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EVAL-BOARD



.dxf files available

UWB Standalone
Eval-Board
60 x 85mm²

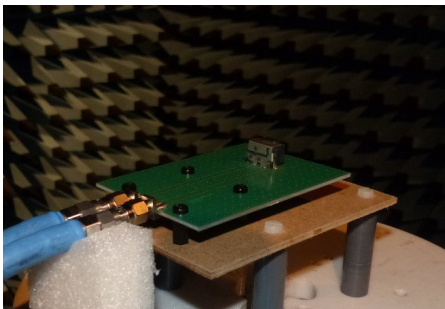


Recommended Connector: Linx CONSMA013.062

Simulation Model



Measurement Setup

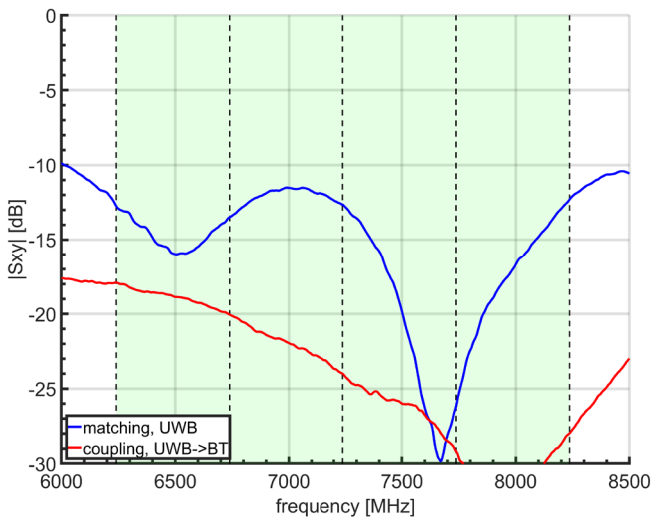
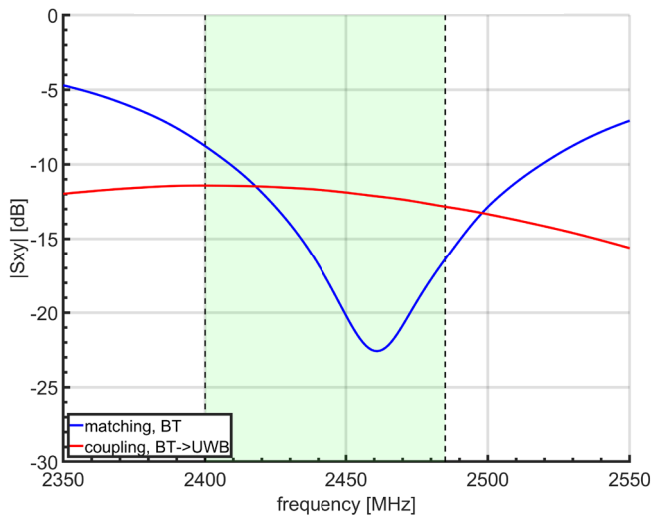


Reference Plane for Simulation and Measurement is the Connector.

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RETURN LOSS S11 AND COUPLING S21 (MEASURED)

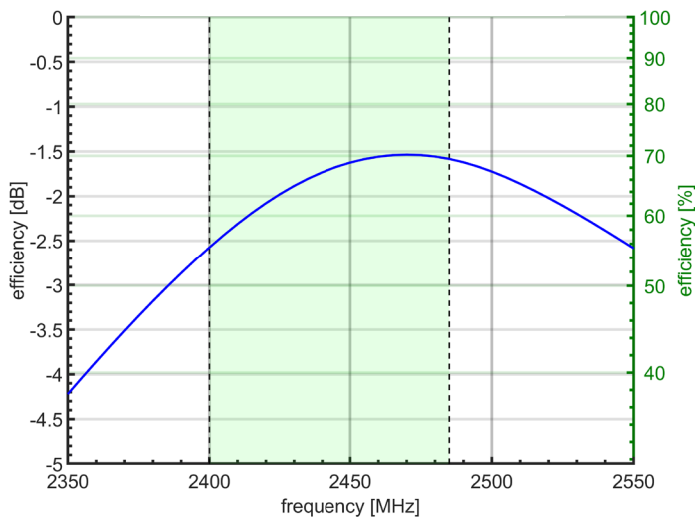
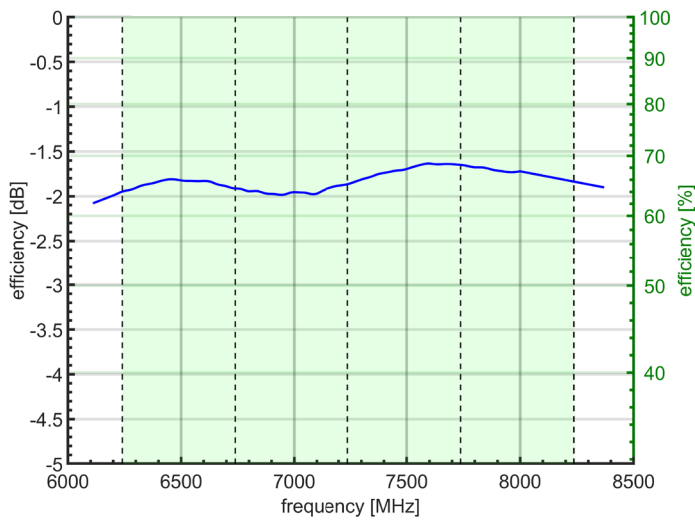
UWB/BLE Combo Antenna @ Eval-Board



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EFFICIENCY (MEASURED)

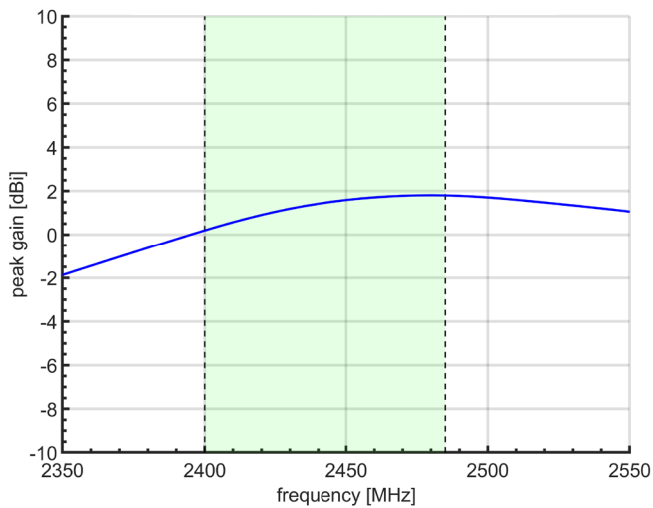
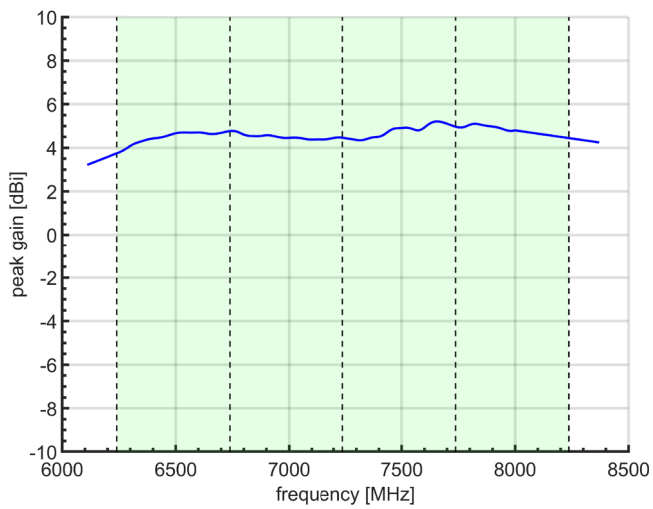
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PEAK GAIN (MEASURED)

UWB/BLE Combo Antenna @ Eval-Board

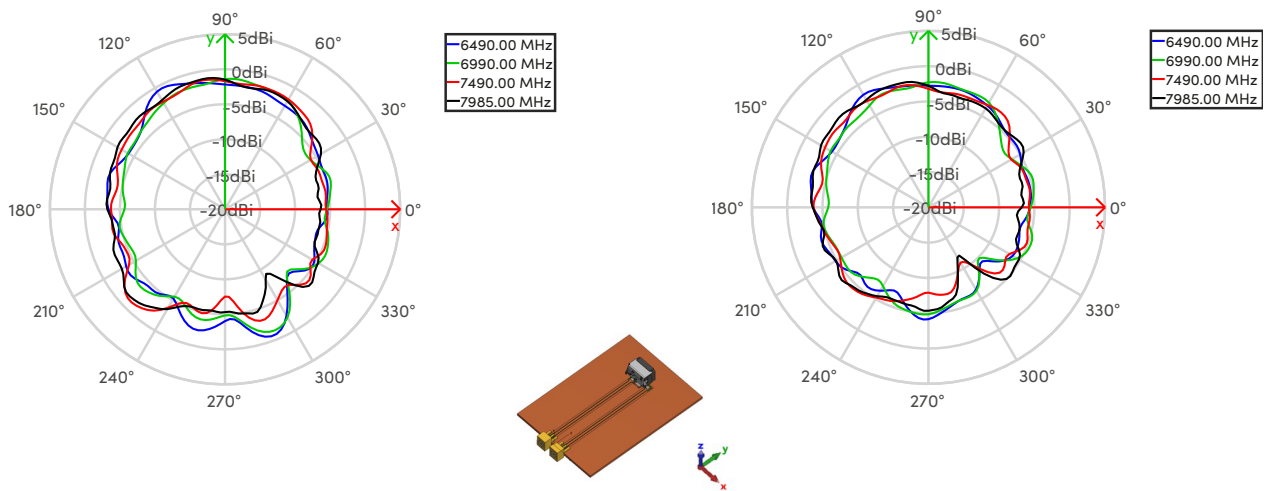


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RADIATION PATTERN XY-PLANE - TOTAL & THETA POLARISATION (SIMULATED)

UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Total) @ XY-Plane

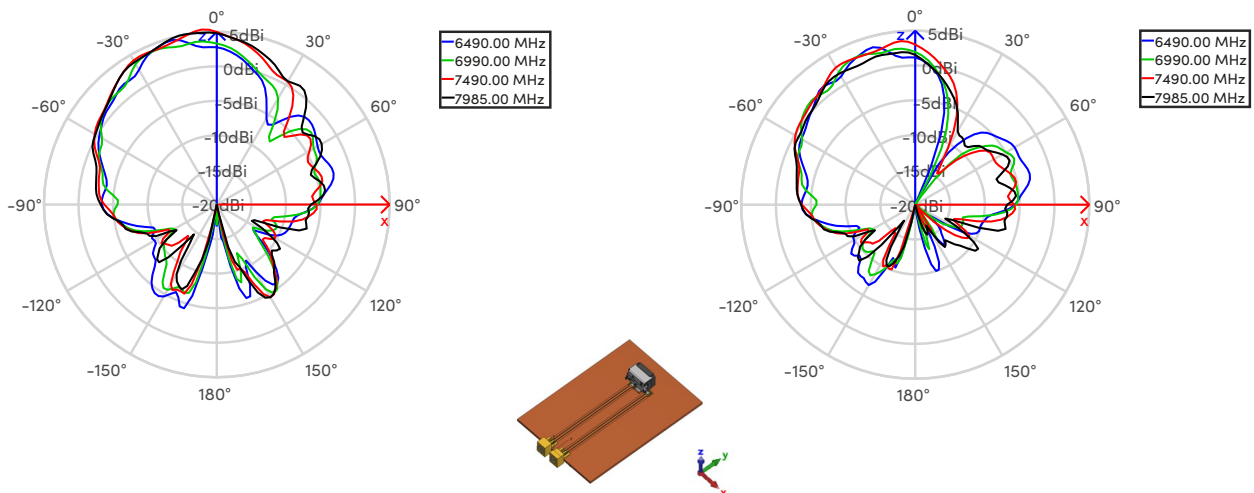
UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Theta) @ XY-Plane



RADIATION PATTERN XZ-PLANE - TOTAL & THETA POLARISATION (SIMULATED)

UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Total) @ XZ-Plane

UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Theta) @ XZ-Plane

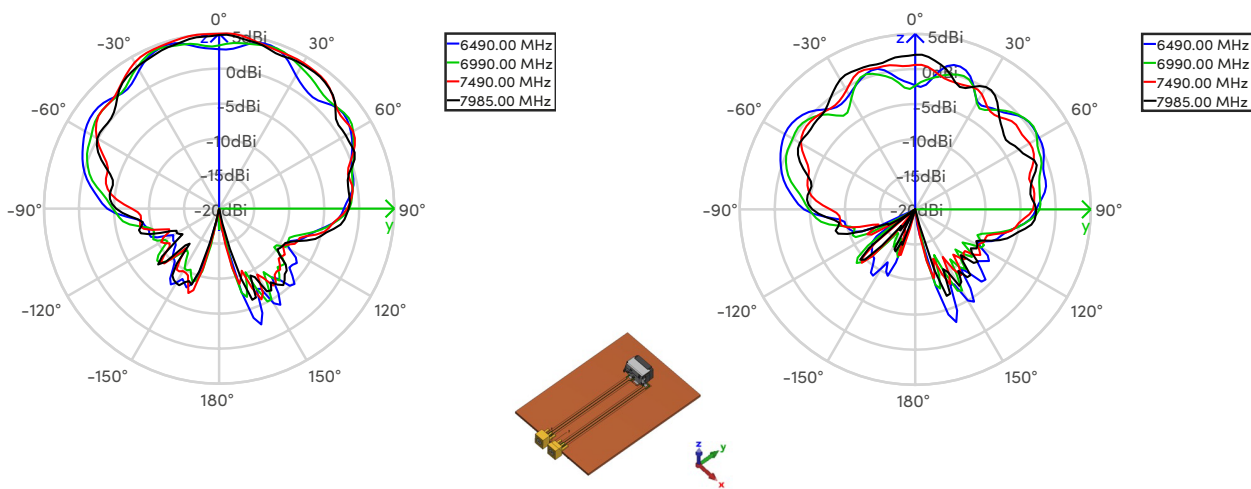


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RADIATION PATTERN YZ-PLANE - TOTAL & THETA POLARISATION (SIMULATED)

UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Total) @ YZ-Plane

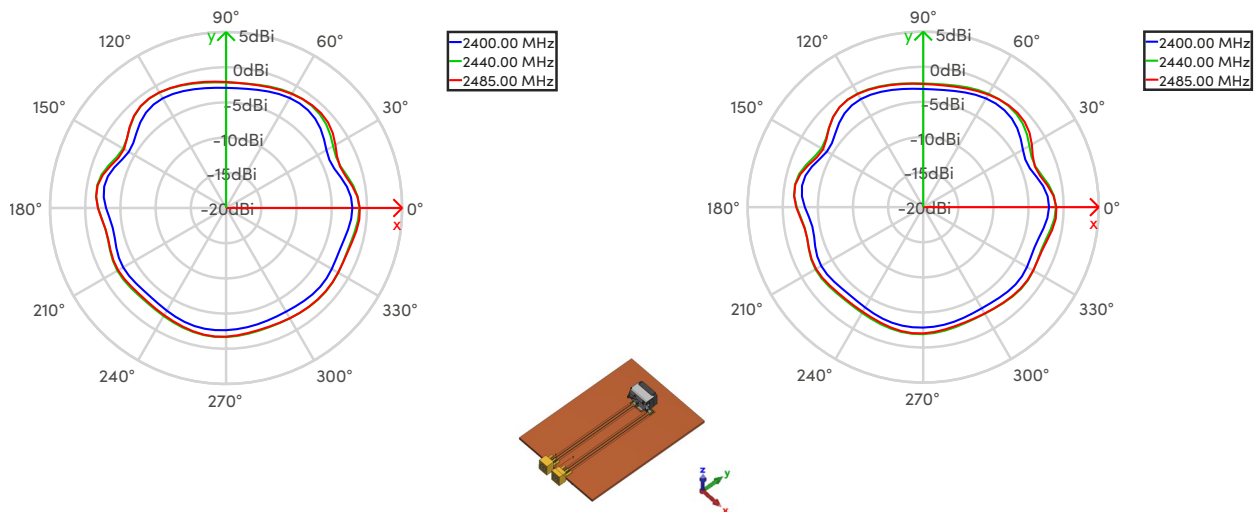
UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Theta) @ YZ-Plane



RADIATION PATTERN XY-PLANE - TOTAL & THETA POLARISATION (SIMULATED)

UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Total) @ XY-Plane

UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Theta) @ XY-Plane

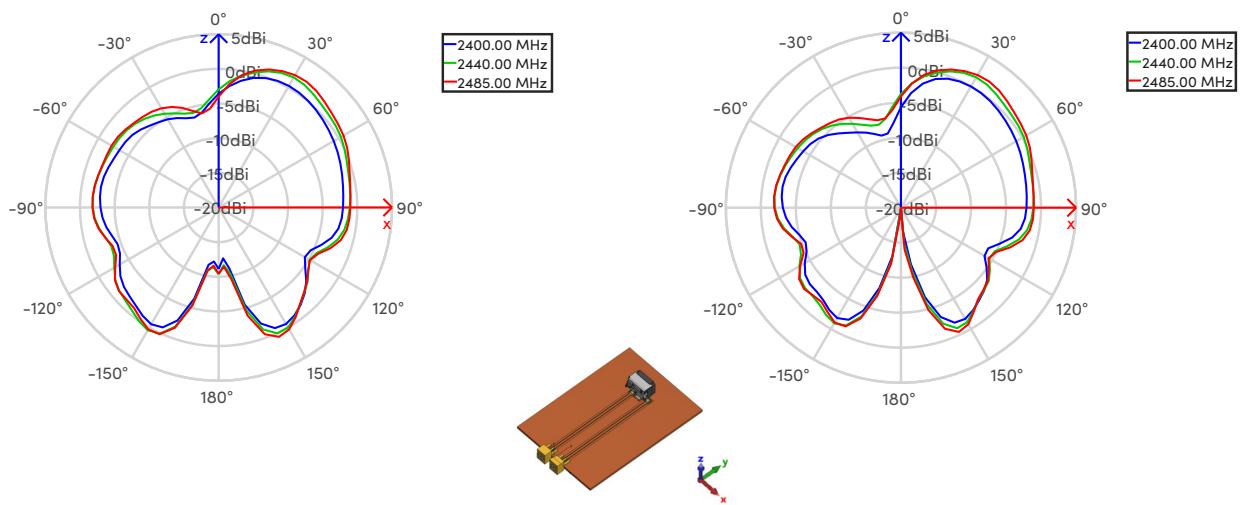


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RADIATION PATTERN XZ-PLANE - TOTAL & THETA POLARISATION (SIMULATED)

UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Total) @ XZ-Plane

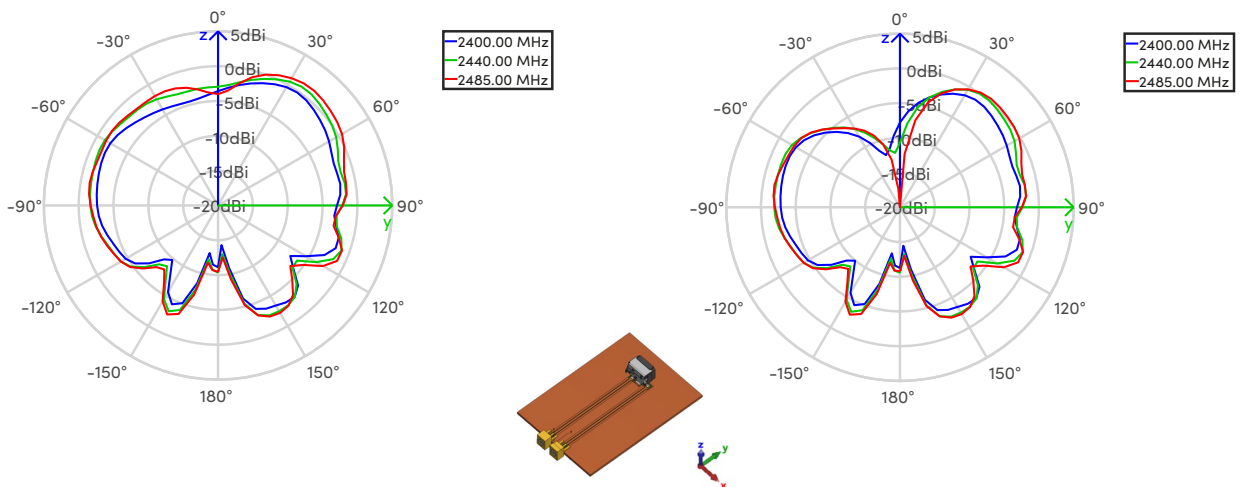
UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Theta) @ XZ-Plane



RADIATION PATTERN YZ-PLANE - TOTAL & THETA POLARISATION (SIMULATED)

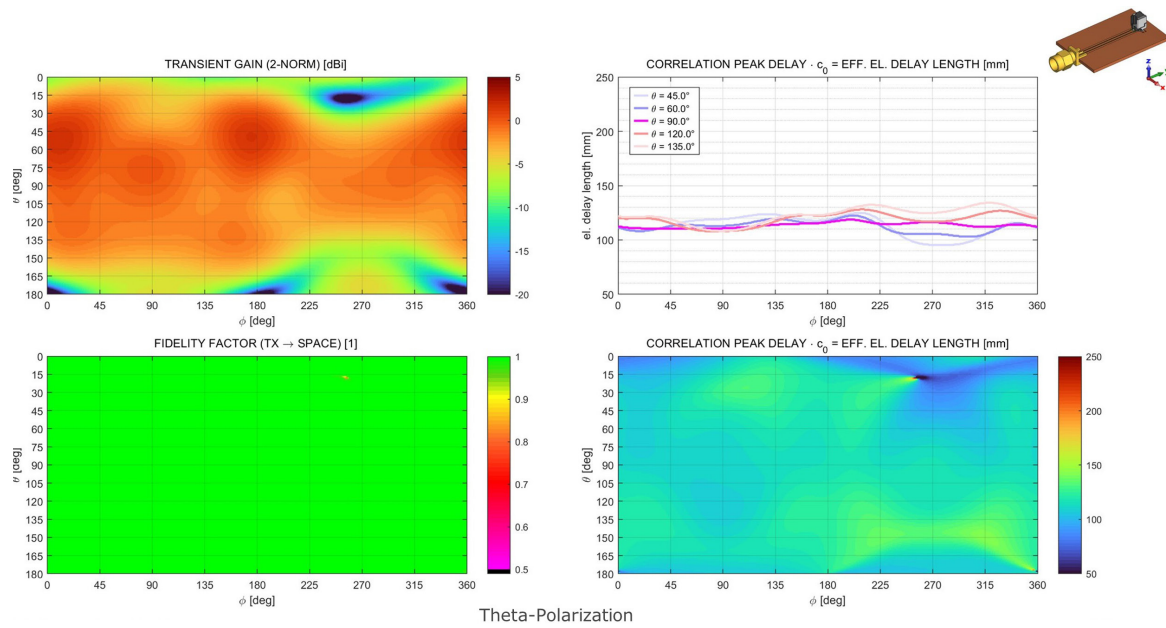
UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Total) @ YZ-Plane

UWB/BLE Combo Antenna @ Eval-Board
Realized Gain (E_Theta) @ YZ-Plane

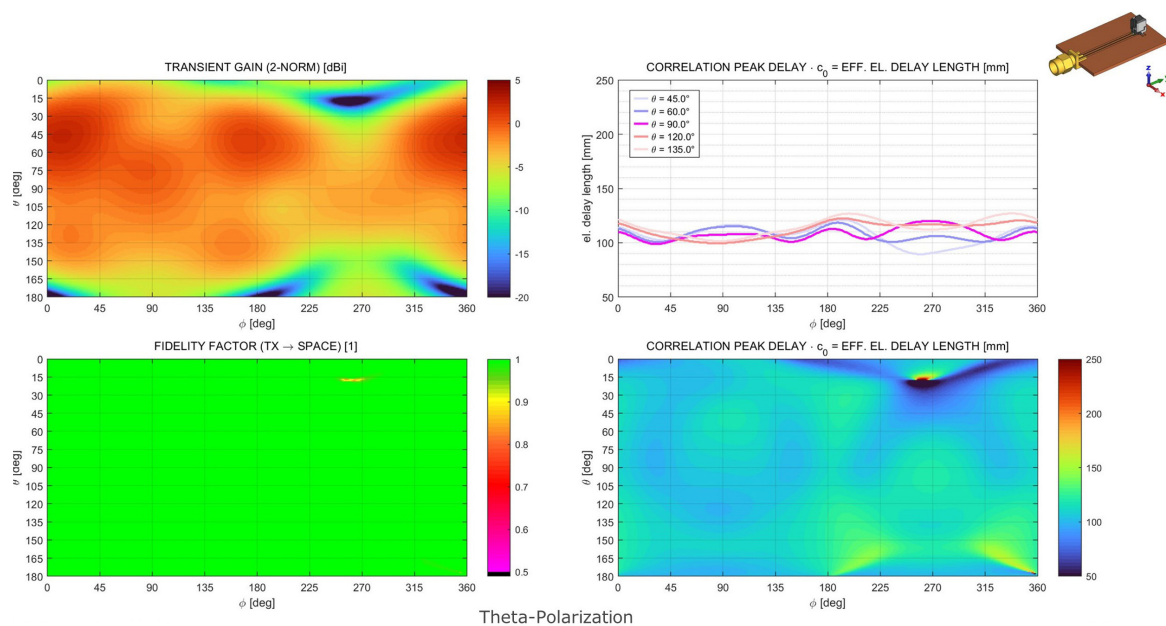


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TRANSIENT GAIN, FIDELITY FACTOR AND CORRELATION PEAK DELAY - CHANNEL 5 (SIMULATED)

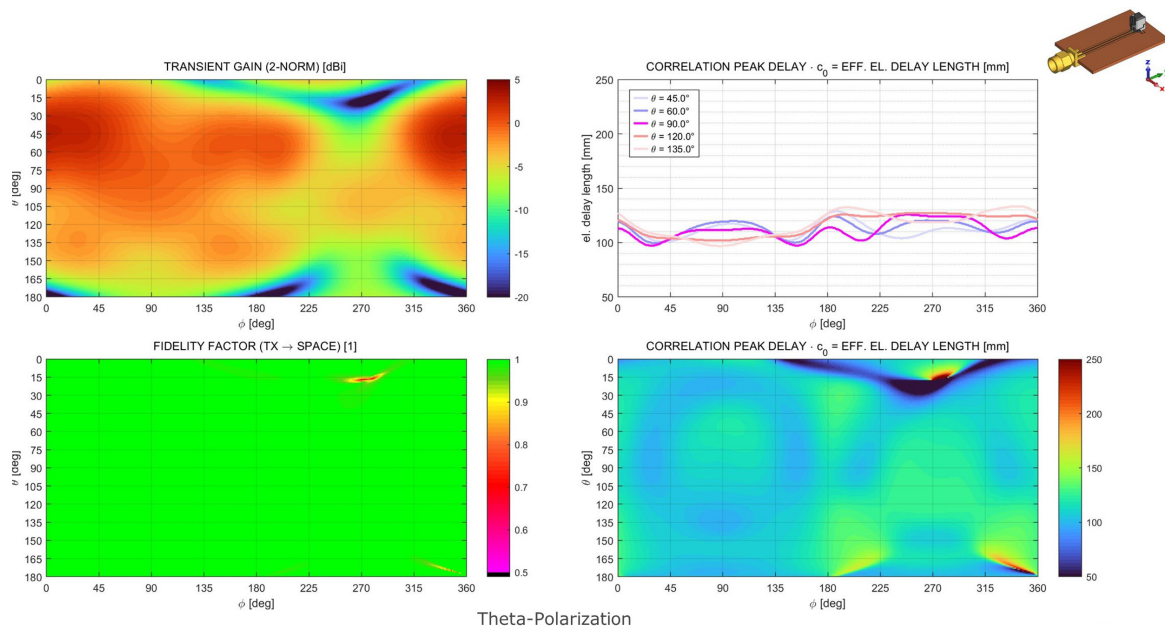


TRANSIENT GAIN, FIDELITY FACTOR AND CORRELATION PEAK DELAY - CHANNEL 6 (SIMULATED)

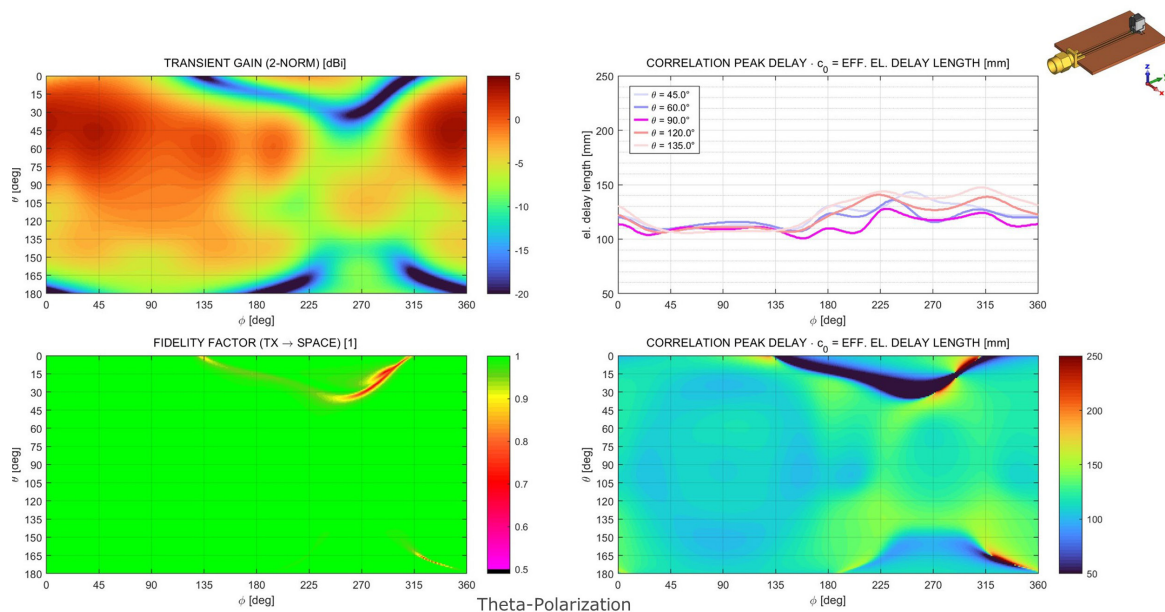


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TRANSIENT GAIN, FIDELITY FACTOR AND CORRELATION PEAK DELAY - CHANNEL 8 (SIMULATED)



TRANSIENT GAIN, FIDELITY FACTOR AND CORRELATION PEAK DELAY - CHANNEL 9 (SIMULATED)



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TRANSIENT GAIN

Definition

Broad-band and energy-based pendant to classical power-based antenna gain

→ Mean gain weighted with power spectral density of UWB reference pulse (acc. to IEEE standard 802.4.15).

$$g_{\theta}(\theta, \phi) = \frac{\int_{-\infty}^{+\infty} G_{\theta}(\omega, \theta, \phi) \cdot |S_{\text{TX}}(\omega)|^2 d\omega}{\int_{-\infty}^{+\infty} |S_{\text{TX}}(\omega)|^2 d\omega}$$

W. Wiesbeck, et. al.: Basic properties and design principles of UWB antennas. Proc. IEEE, Vol. 97, No. 2, Feb. 2009.

FIDELITY FACTOR

Definition

Normalized cross-correlation of radiated pulse (electr. far-field of antenna) with transmit pulse in TD when antenna is stimulated with a UWB reference pulse (acc. to IEEE standard 802.4.15).

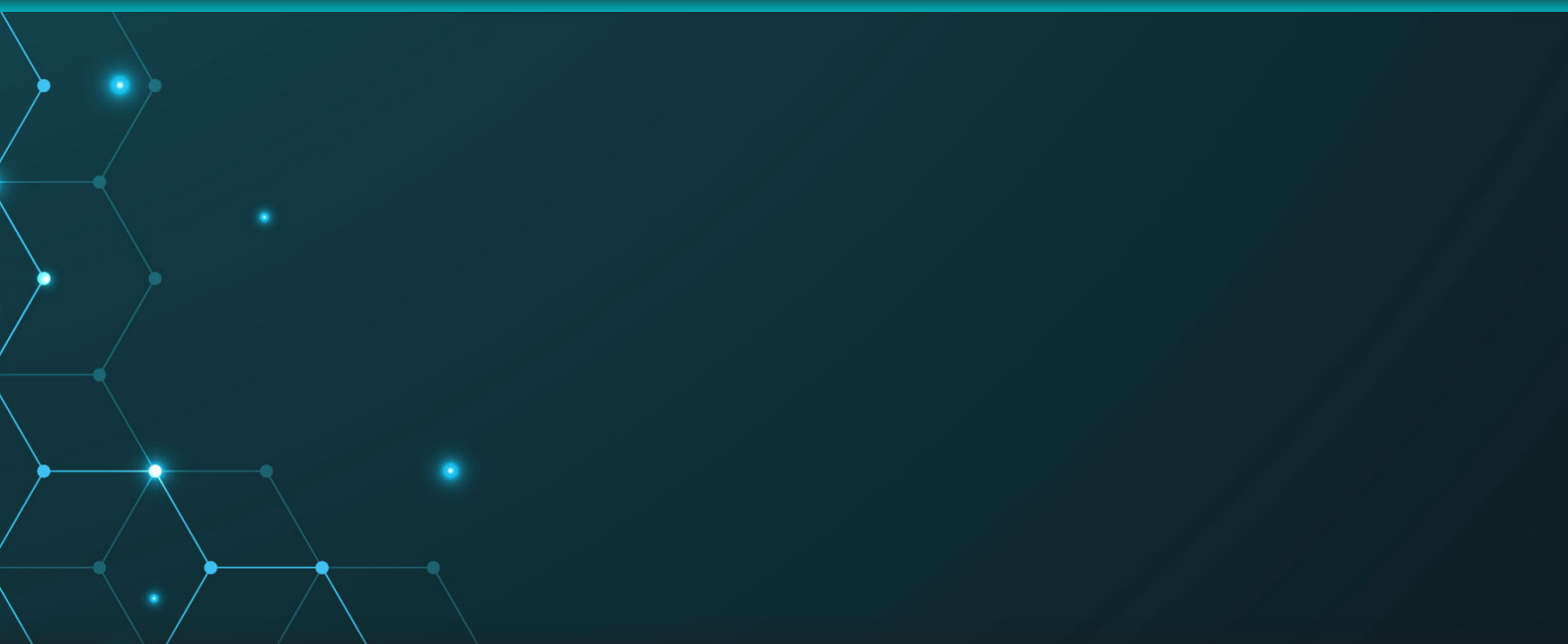
$$F_{\theta}(\theta, \phi) = \max_{\tau} \left\{ \frac{\left| \int_{-\infty}^{+\infty} e_{\theta}^{\text{FF}}(t + \tau, \theta, \phi) \cdot s_{\text{TX}}^*(t) dt \right|}{\sqrt{\int_{-\infty}^{+\infty} |e_{\theta}^{\text{FF}}(t, \theta, \phi)|^2 dt} \cdot \sqrt{\int_{-\infty}^{+\infty} |s_{\text{TX}}(t)|^2 dt}} \right\}$$

D.-H. Kwon: Effect of antenna gain and group delay variations on pulse-preserving capabilities of ultrawideband antennas. IEEE Trans. AP, Vol. 54., No. 8, Aug. 2006.

DELAY

Definition

Time-lag τ (available from above fidelity factor calculation) cross-correlation peak between radiated and stimulated pulse in TD. Electrical far-field of antenna can be referenced to any distance from phase-center. The delay is referenced to the antenna phase center (with zero radial distance).



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