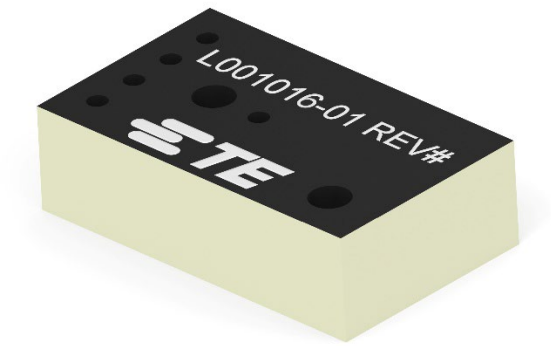


Ultra-Wide Band (UWB) Directional Antenna CH 9-10

UWB SMD Antenna (L001016-XX)

The patent-pending L001016 novel UWB antenna offers a wideband and wide beamwidth solution that covers channel 9 and channel 10 UWB frequency ranges 7737.6-8736.0 MHz

The antenna design is optimized for high efficiency, wide beamwidth, and a high front-to-back ratio. The superior high-performance fidelity factor, pulse delay and antenna characteristics enable secure and precise localization with radar capabilities.

When the antenna is placed in array with optimum spacing, the antenna can measure a wide Angle of Arrival (AoA) range of over 120° with a high-fidelity factor of greater than 0.95. The small pulse delay variation of less than 0.17ns corresponds to a measurement accuracy of 5 cm.

FEATURES

- Channel 9 & channel 10 UWB Antenna
- SMD capable
- High front-to-back ratio: >15dB in free space and F/B > 20dB on metal backing resulting in more energy in the required direction and increased accuracy
- Wide Angle of Arrival (AOA) range >120° for increased detection and accuracy
- High fidelity factor >0.95
- Low pulse delay variation <0.17ns resulting in accuracy measurements of 5cm

APPLICATIONS

- UWB radar for motion and presence detection
- Obstacle detection and collision avoidance
- Real-time location system (RTLS)
- Indoor and outdoor navigation
- Secure access and data transfer
- In-cabin radar, Angle of Arrival (AOA)
- Angle of Arrival (AOA) car access entry
- Time of Flight (TOF) car access entry

ORDERING INFORMATION

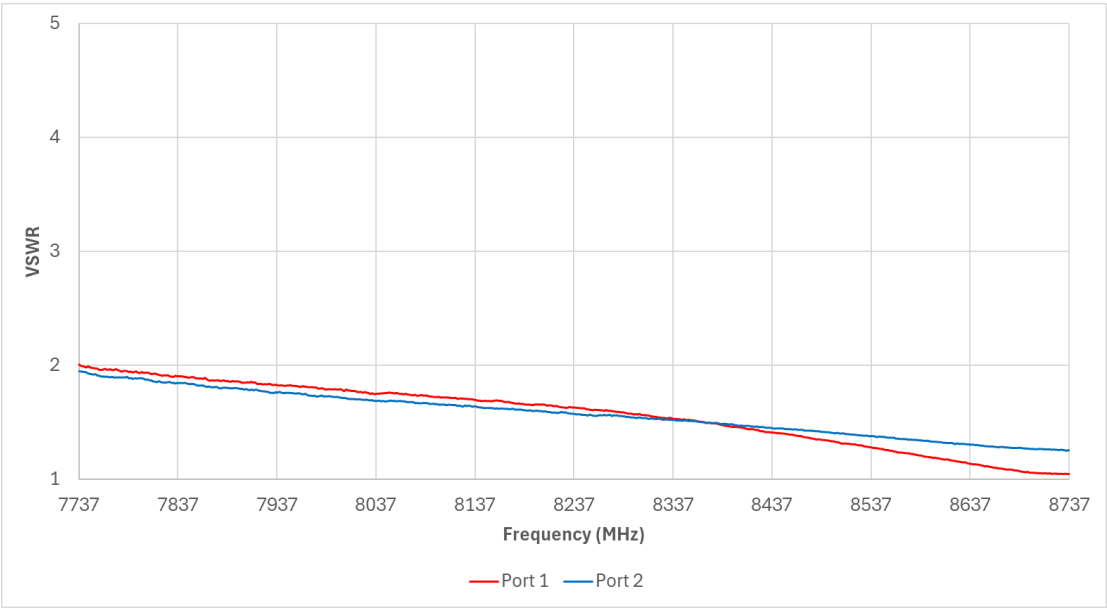
Part Number	Description	Mount
L001016-01	Surface Mount UWB Antenna	Surface Mount
L001016-02	Surface Mount UWB Dual Antenna Kit	SMA Male Connector

SPECIFICATIONS

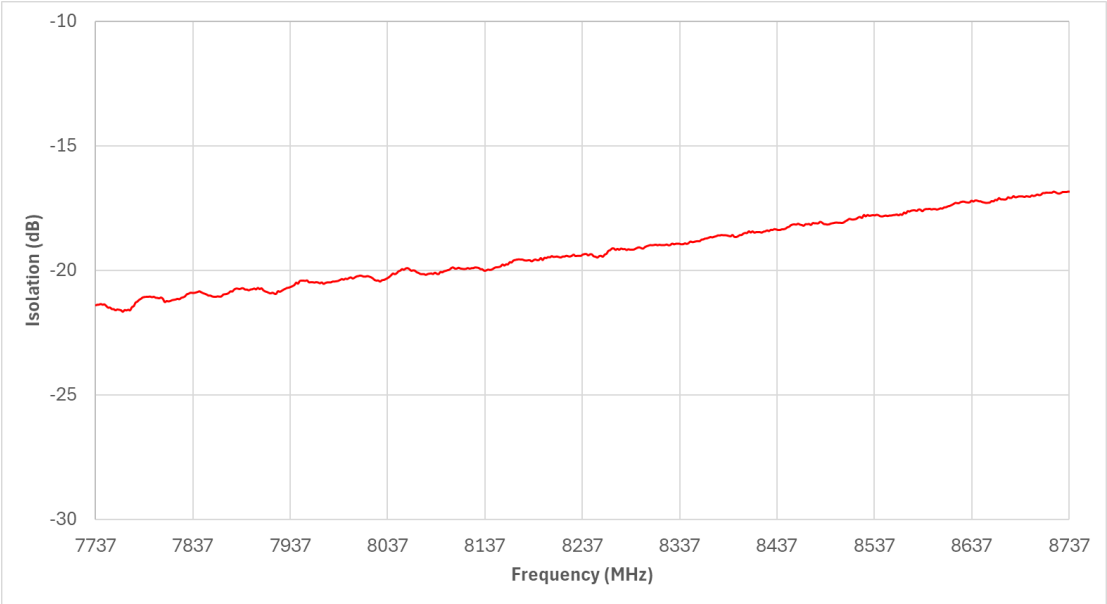
ELECTRICAL		
Frequency range (MHz)	UWB Channel 9 (7737.6-8236.8)	UWB Channel 10 (8236.8-8736.0)
VSWR (Max)	<2:1	
Isolation (dB)	>16	
Efficiency (Average)	>60%	
Peak Gain (dBi)	3.4	
3dB Beamwidth – Azimuth (Average)	149°	170°
3dB Beamwidth – Elevation (Average)	129°	123°
Front-to-Back Ratio (dB)	>11	
Impedance (Ω)	50	
Polarization	Linear	
Fidelity Factor	>0.95	
Pulse Delay Variation (ns)	<0.17	
Weight	< 1g	
Dimension mm (in.)	11 x 6.6 x 3.2 (0.43 x 0.26 x 0.13) – L001016-01 40 x 30 x 0.78 mm (1.58 x 1.18 x 0.03) – L001016-02	
Mounting	Surface-Mount Technology	
Operating Temperature	-40 to +85°C	
Reflow Temperature	240°C	

Note: The antenna specification is based on L001016-02

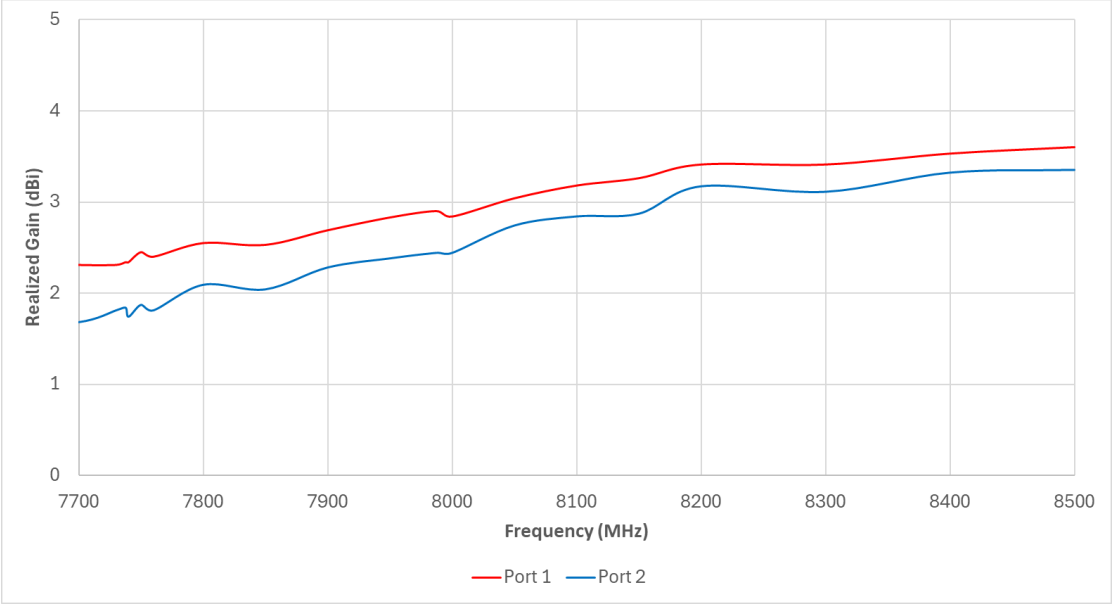
VSWR (L001016-02)



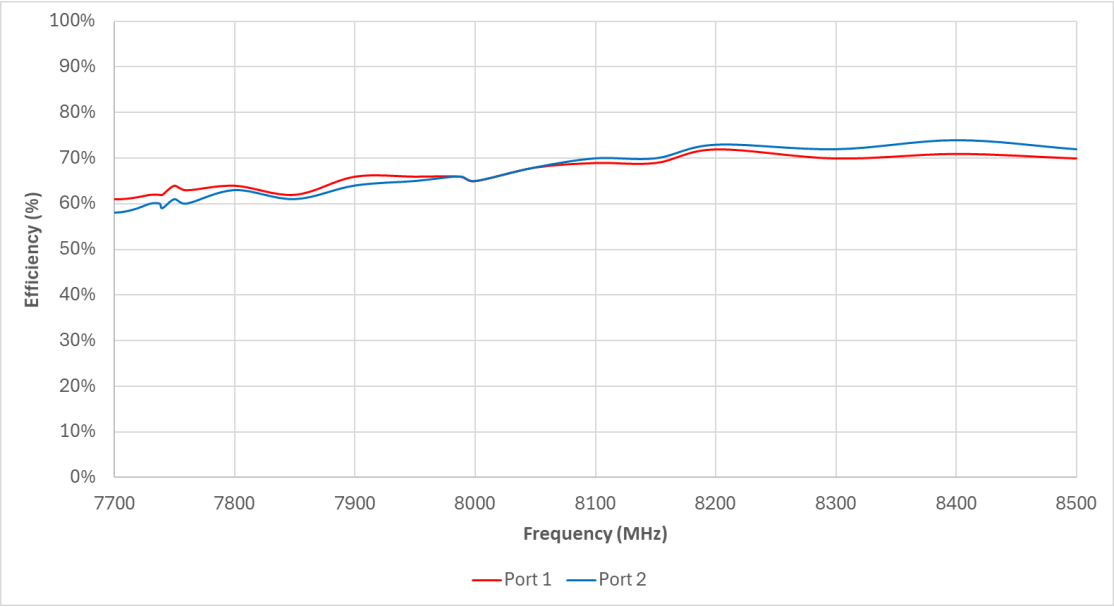
ISOLATION (L001016-02)



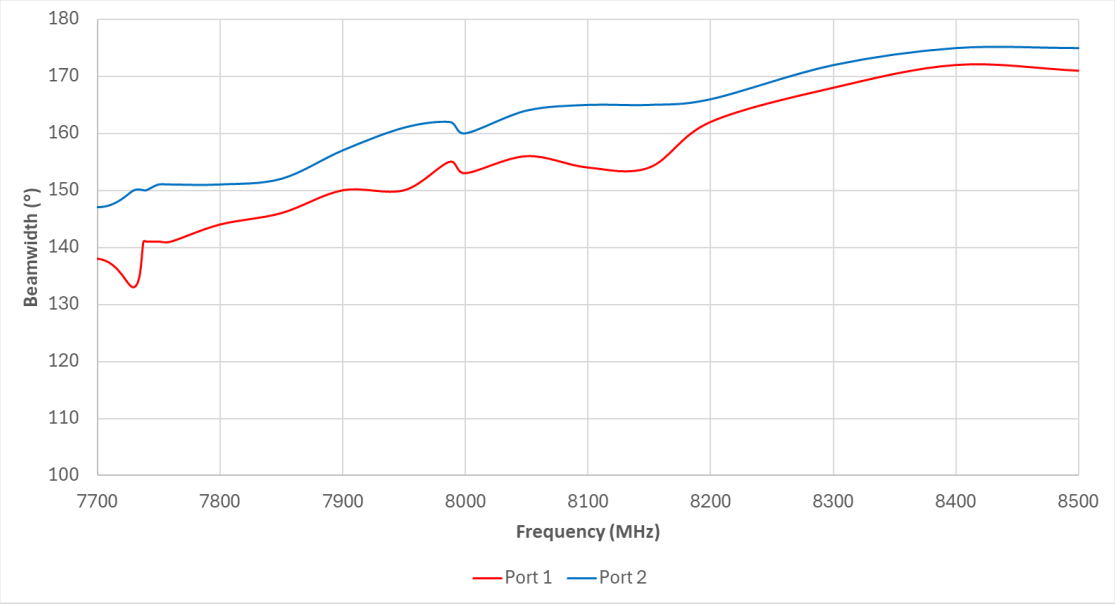
3D PEAK REALIZED GAIN (L001016-02)



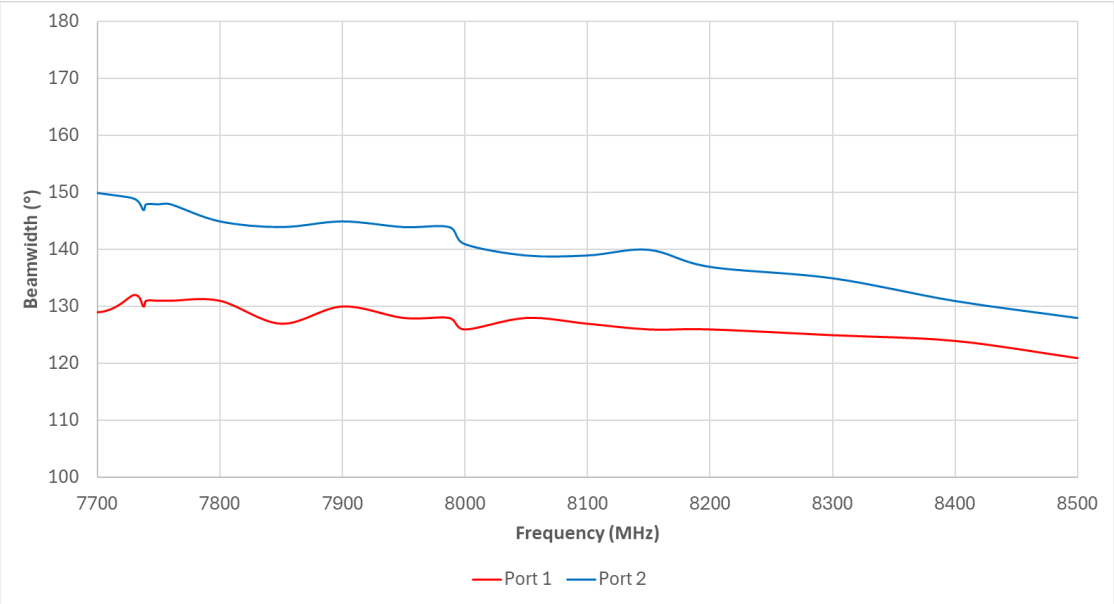
TOTAL EFFICIENCY (L001016-02)



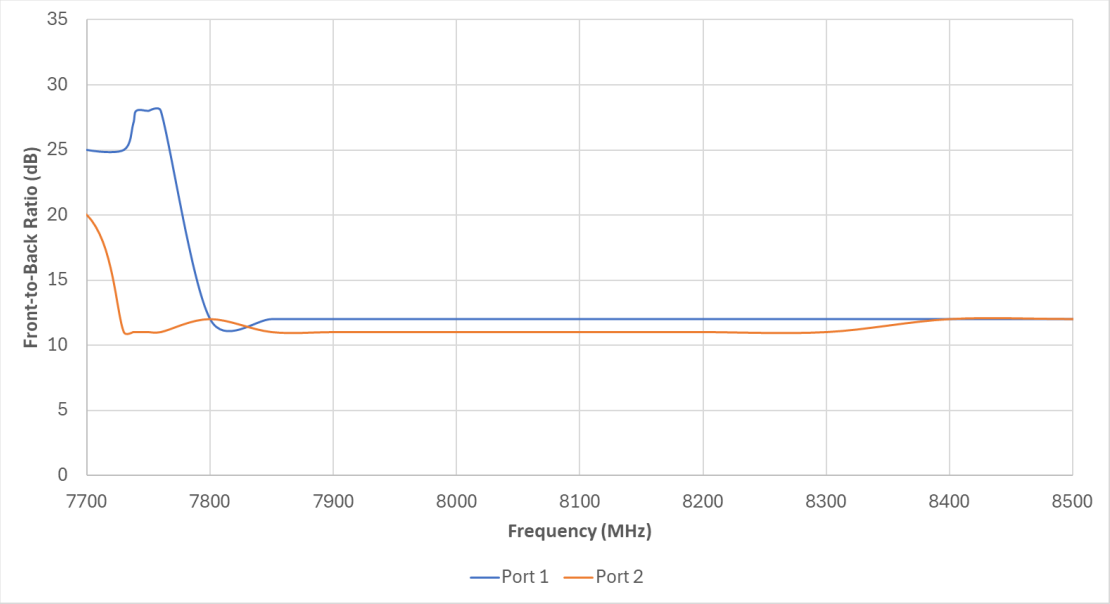
3DB BEAMWIDTH (AZIMUTH) (L001016-02)



3DB BEAMWIDTH (ELEVATION) (L001016-02)



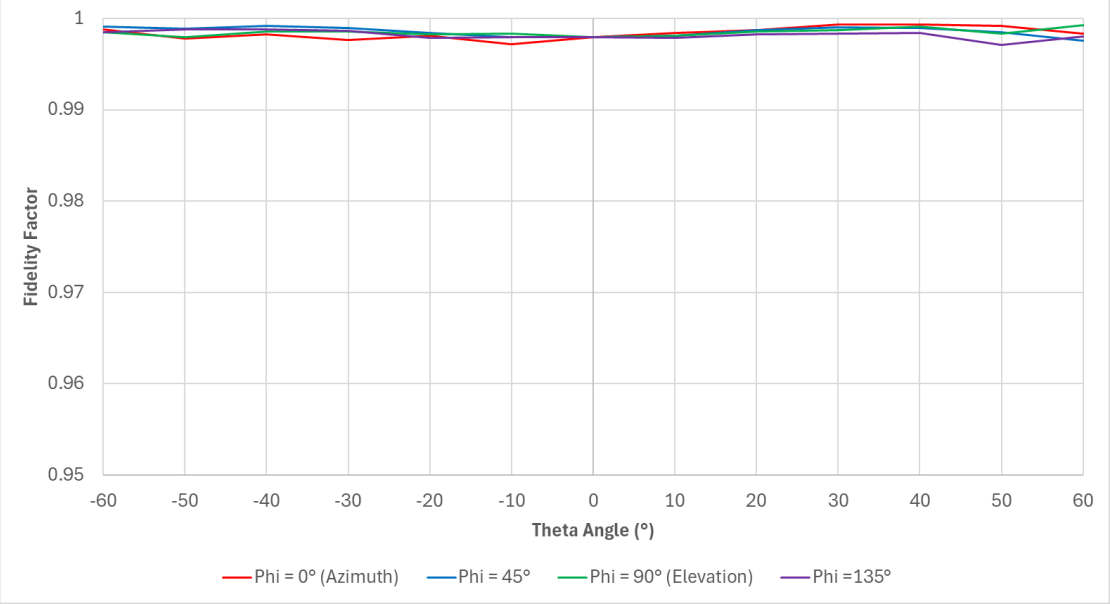
FRONT-TO-BACK RATIO (L001016-02)



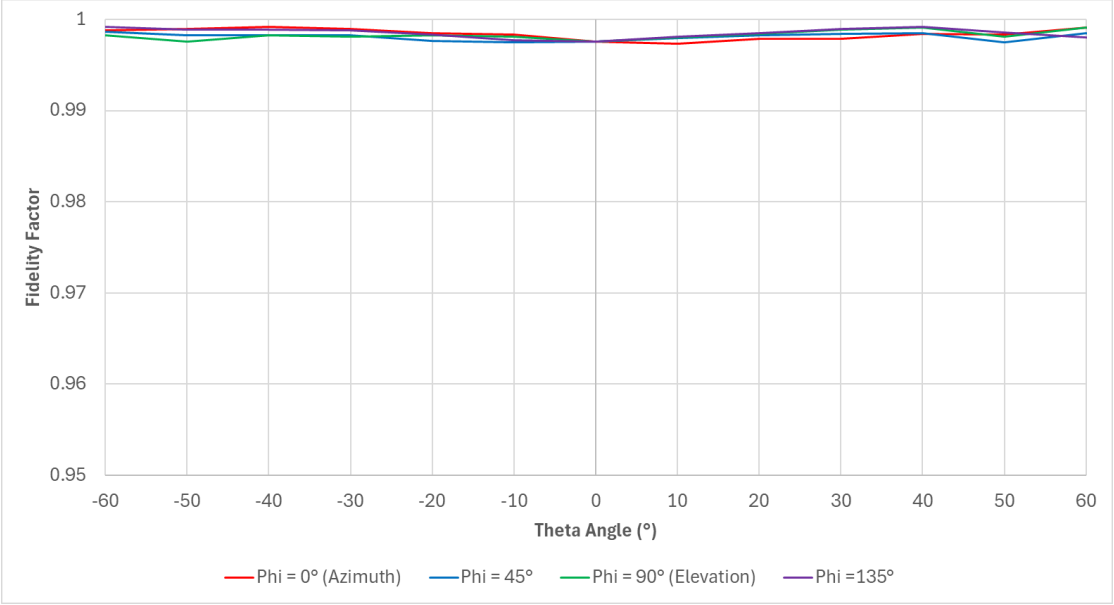
FIDELITY FACTOR (L001016-02)

A UWB antenna's fidelity factor measures how well it maintains the original pulse shape. It is defined as the highest value of the cross correlation between the pulse shape supplied to the antenna (x) and the pulse shape emitted in a particular direction (y) after the signal power is normalized.

Fidelity Factor vs. Theta Angle (Port 1)



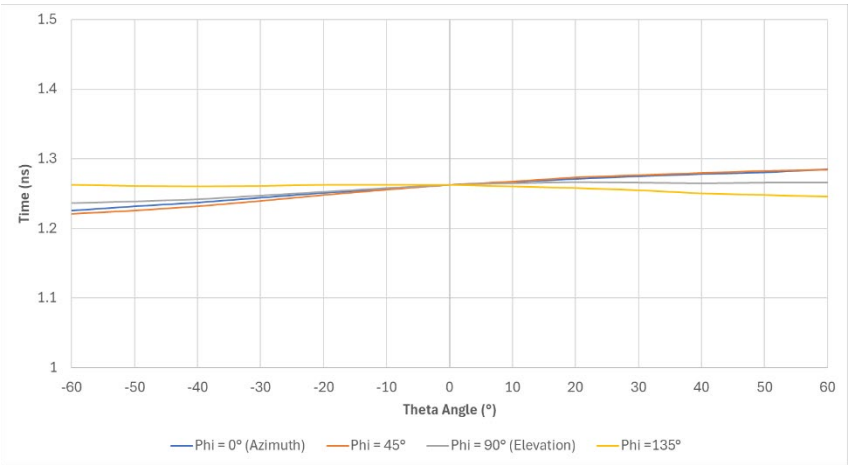
Fidelity Factor vs. Theta Angle (Port 2)



PULSE DELAY (L001016-02)

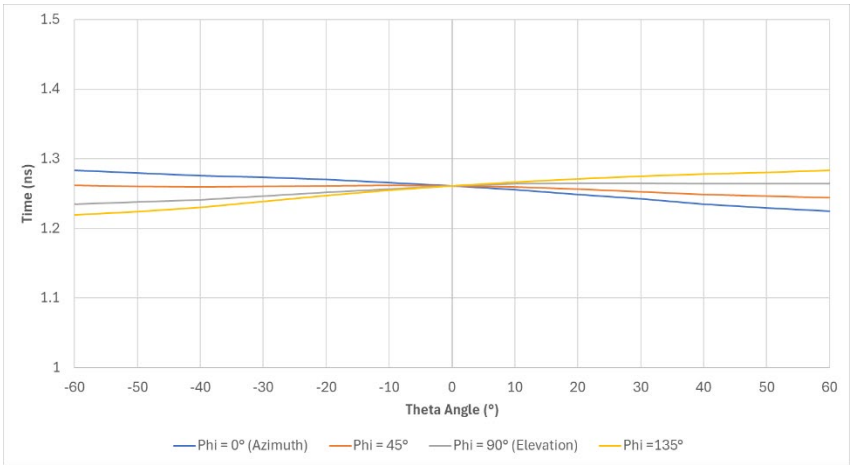
When a given direction is considered, the reference pulse delay becomes the pulse delay of the antenna. The direction of the main lobe is taken as a reference to make comparisons to spatial angles close to the main radiation direction.

Pulse Delay vs. Theta Angle (Port 1)



Phi Cut-Plane (°)	Pulse Delay Variation (ns)
0	0.12
45	0.07
90	0.11
135	0.13

Pulse Delay vs. Theta Angle (Port 2)

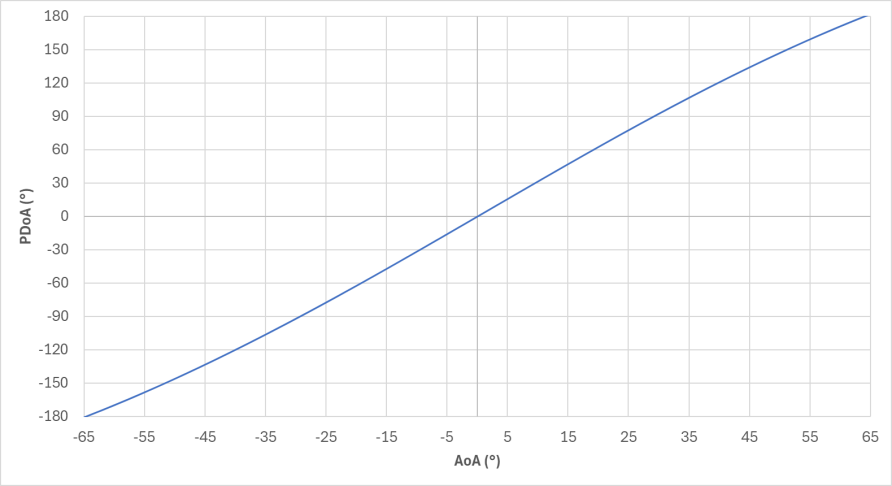


Phi Cut-Plane (°)	Pulse Delay Variation (ns)
0	0.12
45	0.13
90	0.16
135	0.07

PDOA VS AOA (L001016-02)

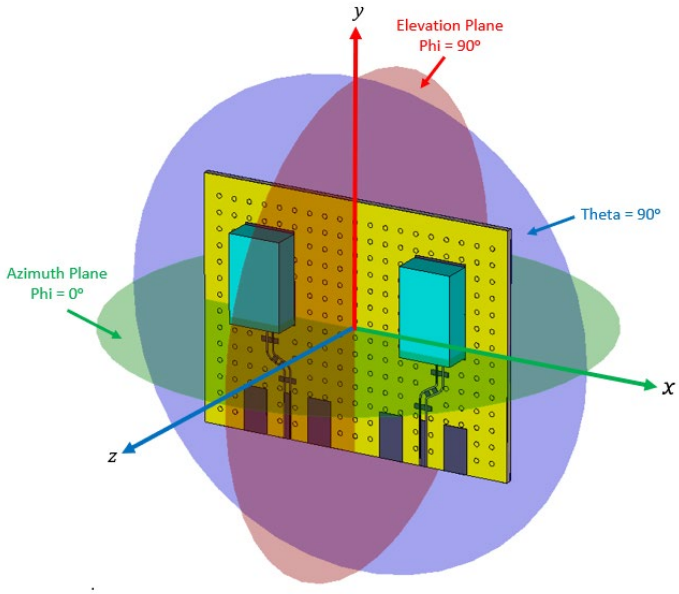
To accurately estimate the Angle of Arrival (AoA), the Phase Difference of Arrival (PDoA) between two antenna elements should lie in the range from -180° to 180°. This is because an out-of-range PDoA will produce ambiguity issues for the AoA calculation.

PDoA vs AoA at 8 GHz



AOA measurable angle range is from -64° to 63°

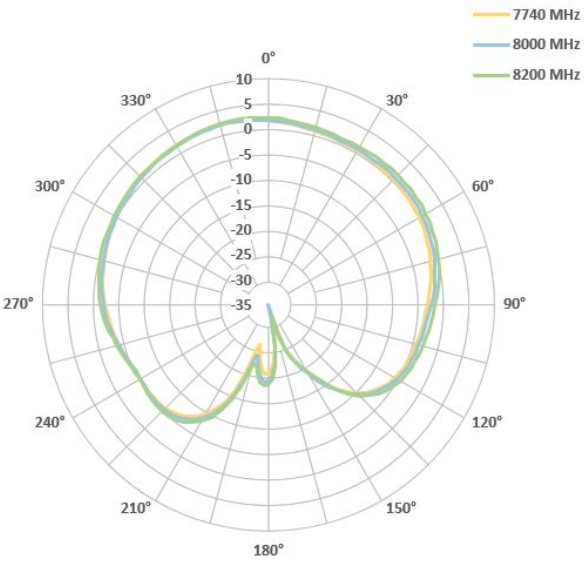
COORDINATE SYSTEM (L001016-02)



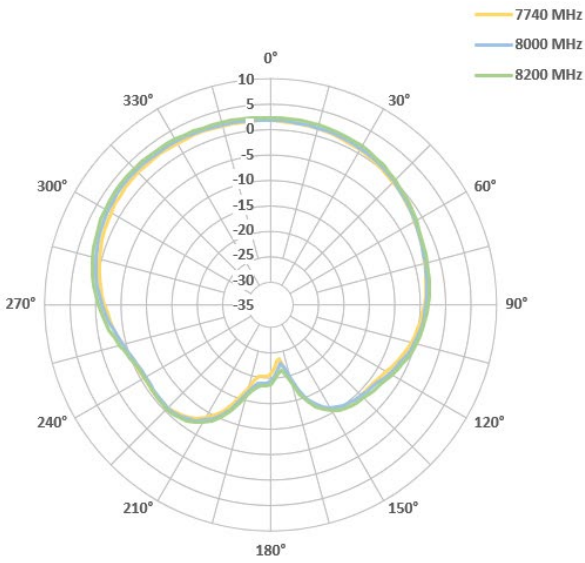
RADIATION PATTERNS – PORT 1 (L001016-02)

Radiation Patterns at Channel 9

Azimuth Plane

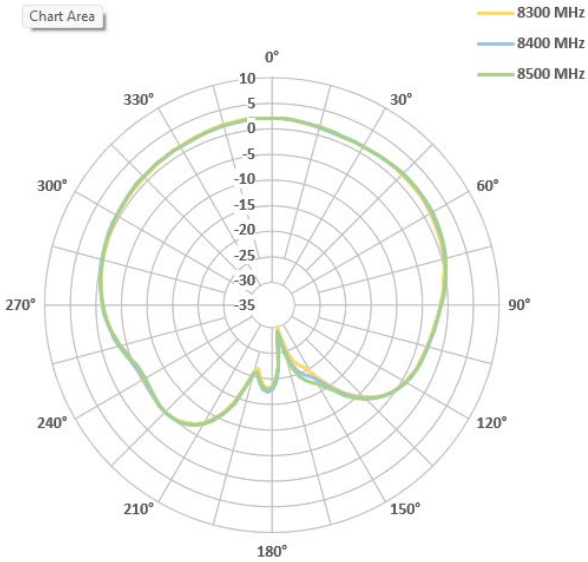


Elevation Plane

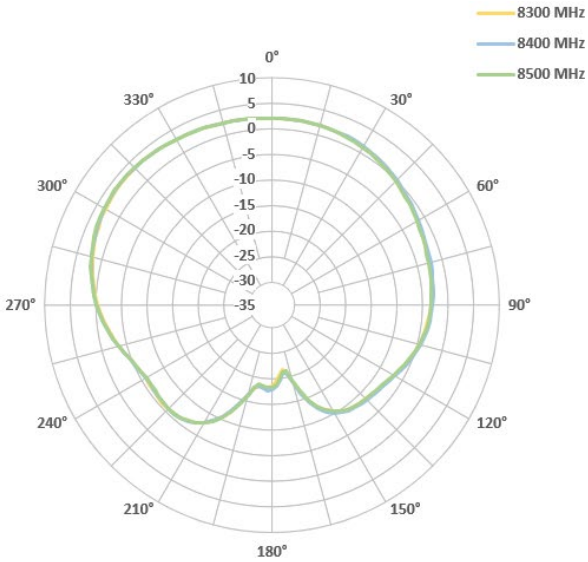


Radiation Patterns at Channel 10

Azimuth Plane



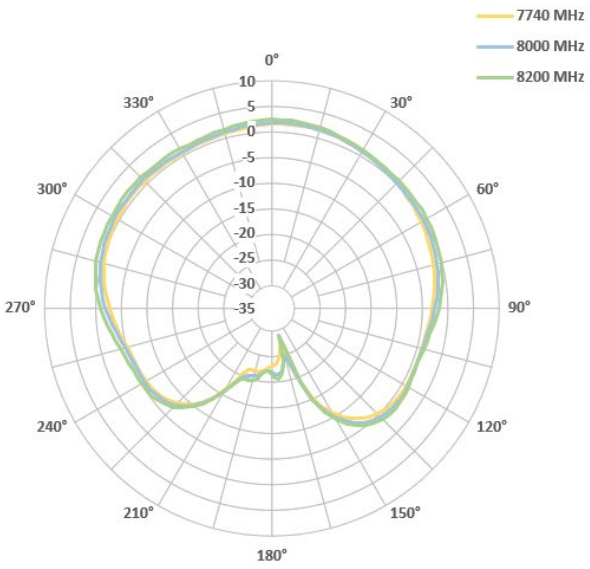
Elevation Plane



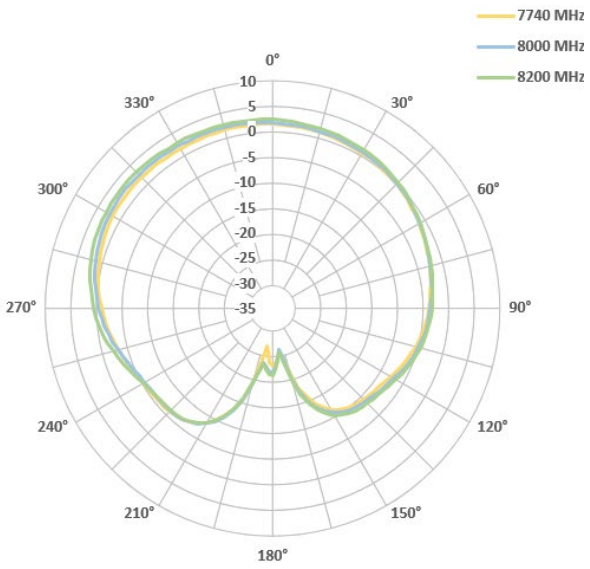
RADIATION PATTERNS – PORT 2 (L001016-02)

Radiation Patterns at Channel 9

Azimuth Plane

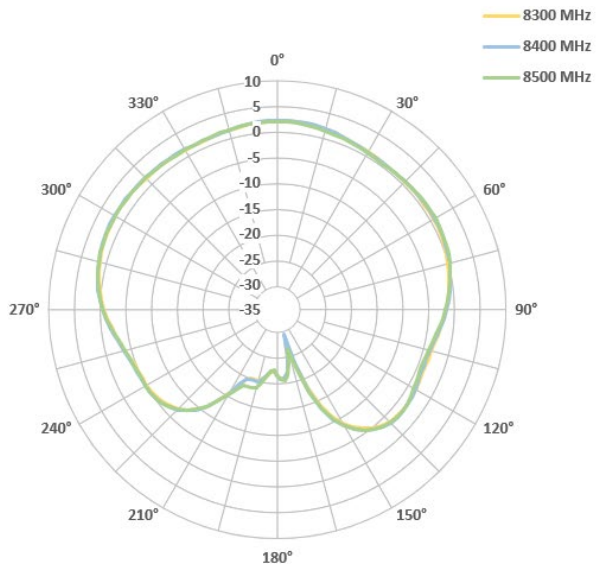


Elevation Plane

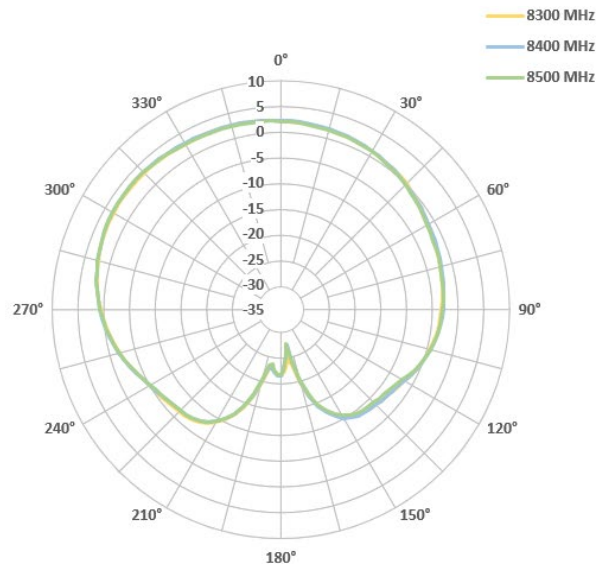


Radiation Patterns at Channel 10

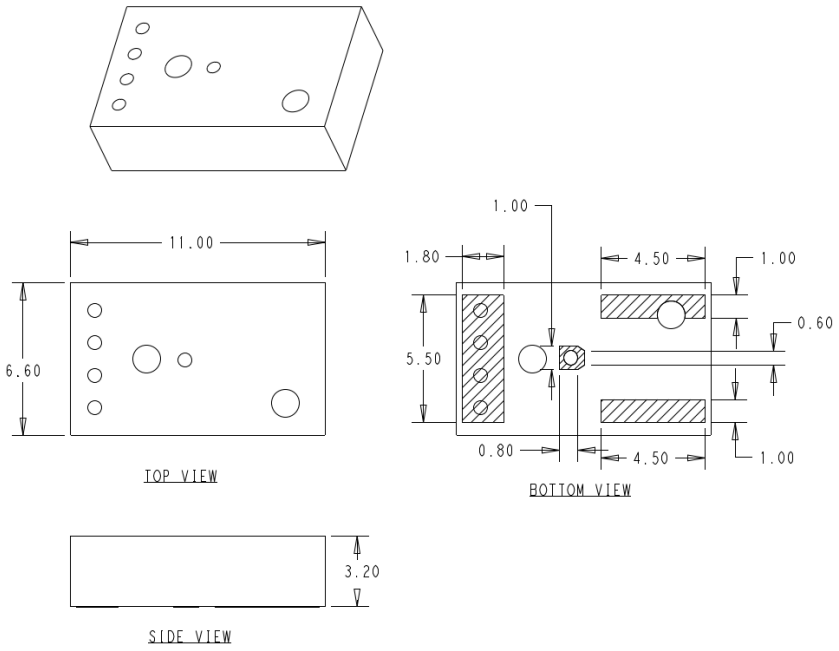
Azimuth Plane



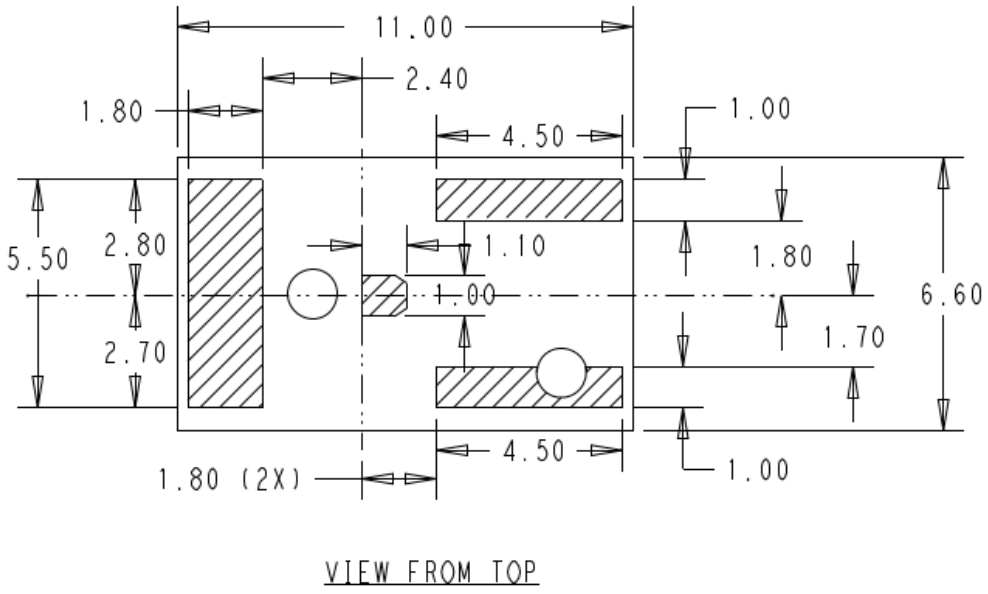
Elevation Plane



MECHANICAL DRAWINGS (L001016-01)



ANTENNA FOOTPRINT

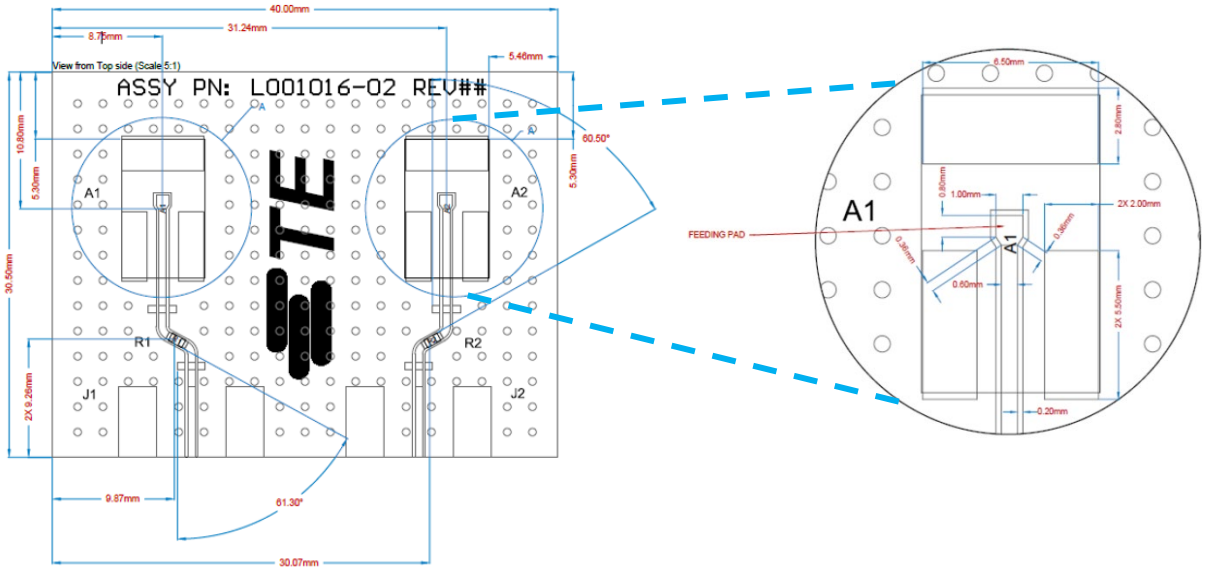


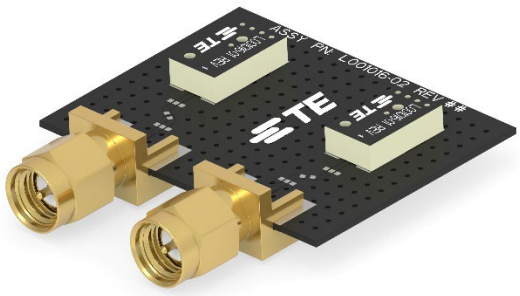
ANTENNA INTEGRATION

In any module, an antenna needs to be placed at a specific location to achieve the optimum performance. Hence an antenna kit is designed to demonstrate the integration of dual antenna (L001016-02) application.

ANTENNA INTEGRATION (L001016-02)

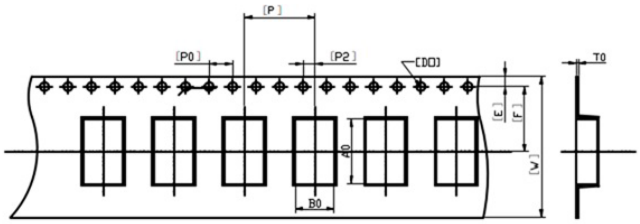
The figure below shows the multiple antenna integration on a 30x40mm board Surface mount UWB Kit L001016-02. Two antenna elements are placed on an evaluation board of size 30mm x 40mm x 0.78 mm. Surface mount UWB antenna Kit L001016-02 is designed without required any matching, hence, it has a serial 0 Ohm component. End-products with different design environments are recommended to have a Pi-matching network for antenna matching to match the antenna on the different design environment.





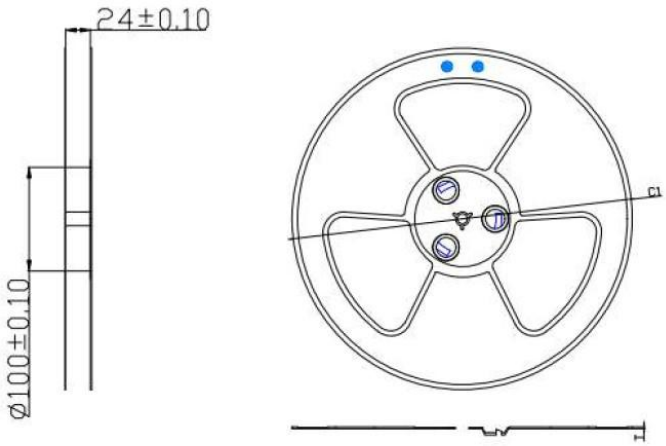
TAPE AND REEL PACKAGING

The dimensions of the tape in which L001016-01 is packaged. Reel dimensions are provided as the following.



Tape Dimension		
Symbol	Dimension (mm)	Tolerance (mm)
W	24.00	±0.30
E	1.75	±0.10
T0	0.35	±0.05
F	11.00	±0.10
P	12.00	±0.10
P0	4.00	±0.10
P2	2.00	±0.10
D0	Ø1.50	+0.10/-0
A0	11.20	±0.10
B0	6.80	±0.10
K0	3.20	±0.10

REEL INFORMATION



spec	13″
C1±1	ϕ330
A±0.2	2.6
B±0.2	10.8
T±0.2	1.8

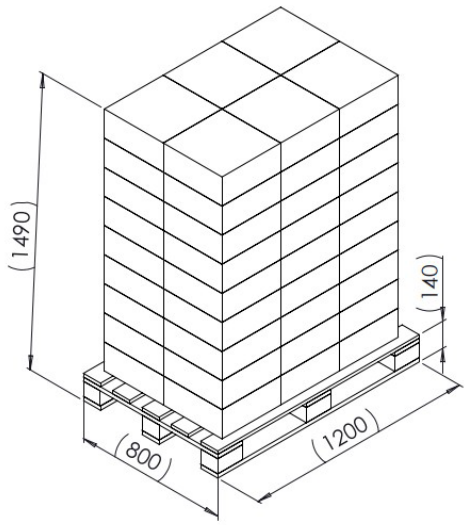
PACKAGE QUANTITIES

L001016-01	
QTY per Reel	1,500 pcs
QTY per Master Carton	6,000 pcs

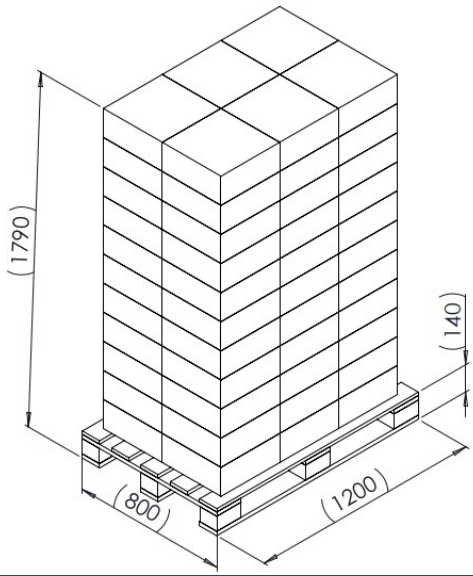
L001016-02	
QTY per Master Carton	168 pcs

PACKING INFORMATION - PALLET

AIR SHIPMENT

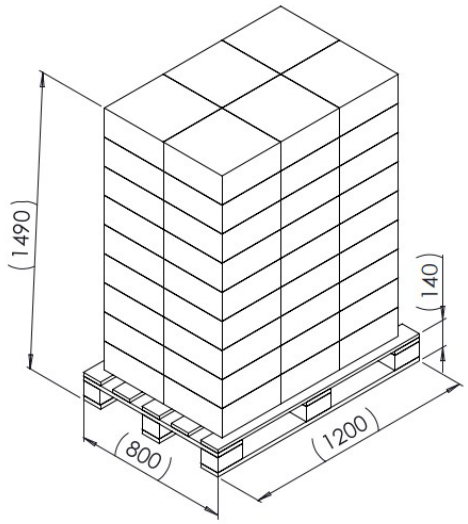


OCEAN SHIPMENT



PART NUMBER	Air Shipment Qty	Ocean Shipment Qty
L001016-01	324,000	396,000

AIR SHIPMENT



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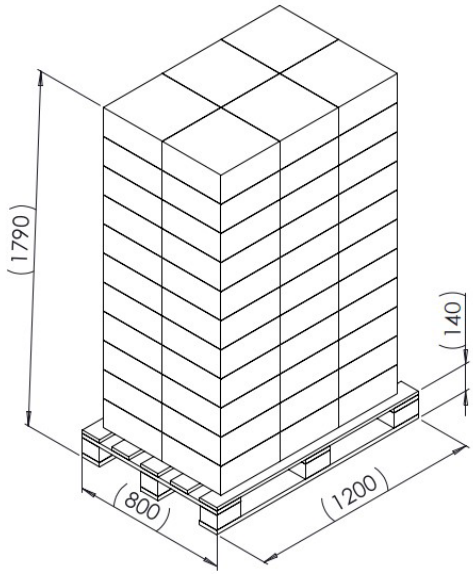

PART NUMBER	Air Shipment Qty	Ocean Shipment Qty
L001016-02	9,072	11,088

TE TECHNICAL SUPPORT CENTER

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