clearWave™ S140 is a low-loss thermoplastic material that provides excellent performance over a wide range of mmW frequencies. Properties below are for reference only. Please consult ConcealFab's Infrastructure Products Guide for 5G concealment solutions that are fabricated using this material.

KEY CHARACTERISTICS

- **Low transmission loss over a wide range of frequencies**
- **Low variation in near field loss vs. distance over a wide range of frequencies**
- **Low flammability**
- **Matte finish readily accepts paints and 3M vinyl film**
- **Note – Material must be painted or covered with vinyl film for long term UV protection**

SPECIFICATIONS

Property	Method	Units	Value
Thickness		mm (in)	3.3 (0.13)
Density		g/cm3	0.6
Modulus of elasticity	DIN 53 457	N/mm	975
Flexural strength	DIN 53 455	N/mm2	25
Shore hardness	DIN 53 453	Shore D	50
Heat deflection temperature	DIN 53 461	°C	60
Coefficient of linear thermal expansion	DIN 53 752	1/°C	8.0 x 10-5
Water absorption	DIN 53 495	%	<0.3
Flammability	UL 94		VO
Flame spread / smoke developed	ASTM E84-03		45 / 850
Dielectric constant	ASTM D2520, Method A		24 GHz = 1.76 28 GHz = 1.75 39 GHz = 1.64
Loss tangent	ASTM D2520, Method A		24 GHz = 0.0054 28 GHz = 0.0055 39 GHz = 0.0055

Values shown are standard values that apply to an average density. Small variations will occur depending on the sheet thickness. Technical specifications are subject to change.

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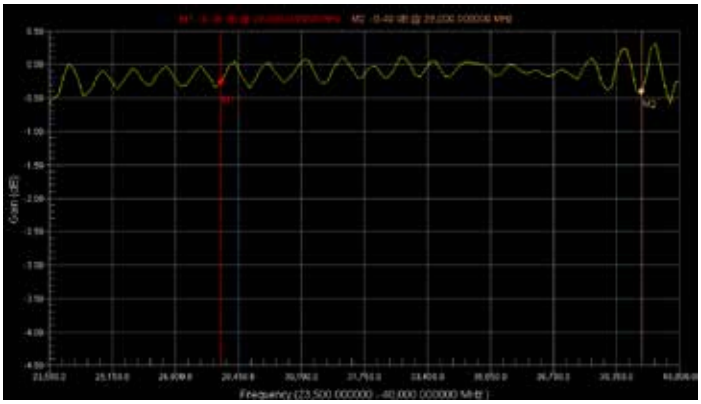
mmW PERFORMANCE

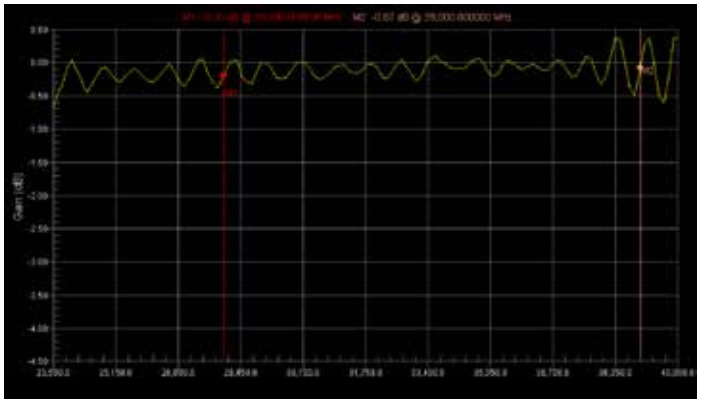
The following data is provided to show typical performance of clearWave™ S140 over mmW frequencies. Screening materials are electrically thick in this frequency range and can have a significant impact on system performance.

FAR FIELD TRANSMISSION LOSS

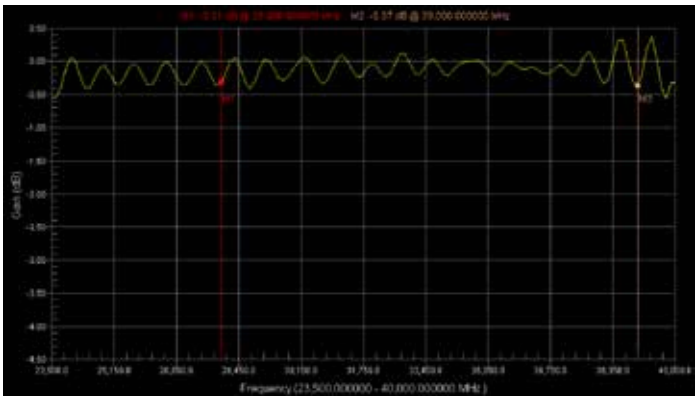
Traditional far field transmission loss data is provided from 23.5 GHz to 40 GHz, at 0, 30, 60 angles of incidence for both parallel and perpendicular polarizations. This test shows the energy that is lost due to reflection and absorption as the wave passes through the screen material at different angles of incidence. Reflection is minimized when the path through the material is multiples of ½ wavelength and when the electric field is parallel to the plane of incidence.



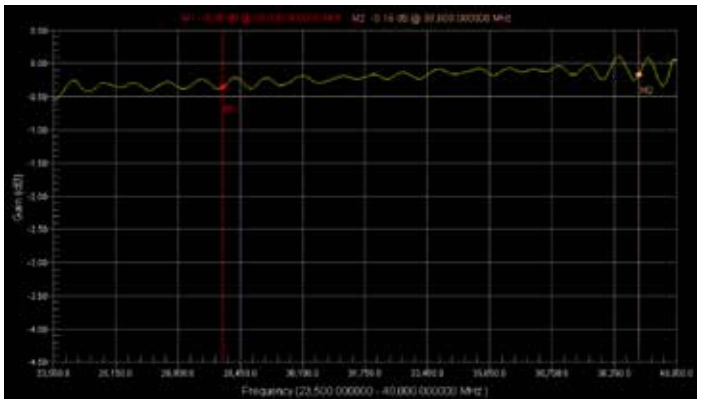
0° orientation – parallel polarization



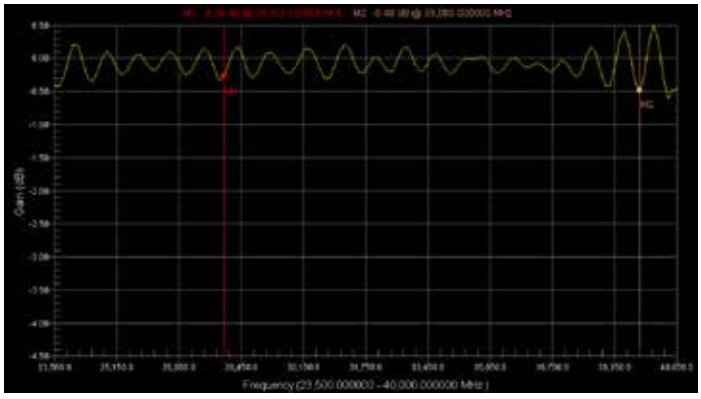
0° orientation – perpendicular polarization



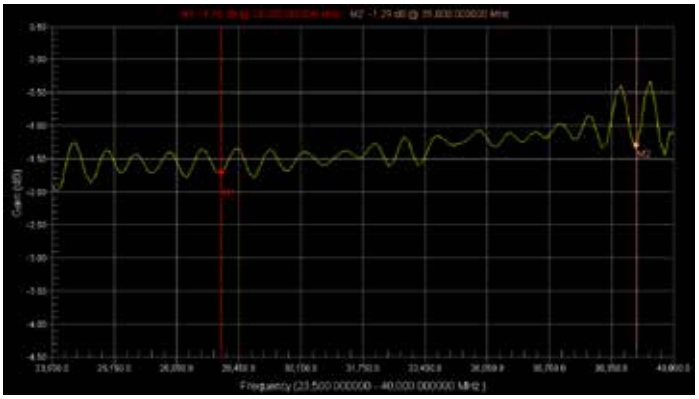
30° orientation – parallel polarization



30° orientation – perpendicular polarization



60° orientation – parallel polarization



60° orientation – perpendicular polarization

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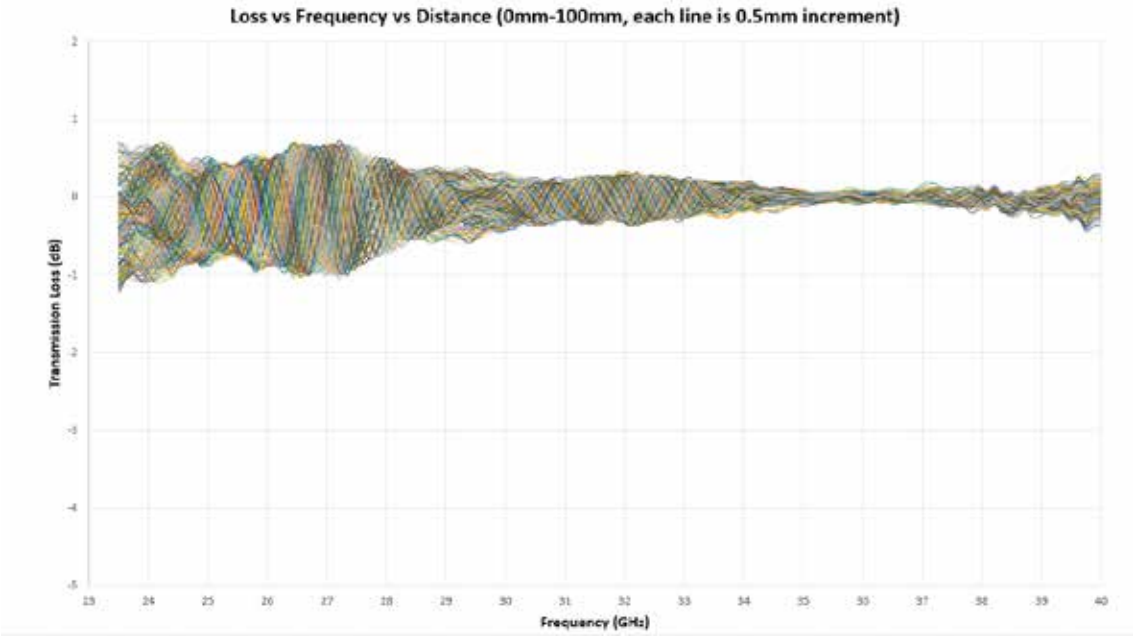
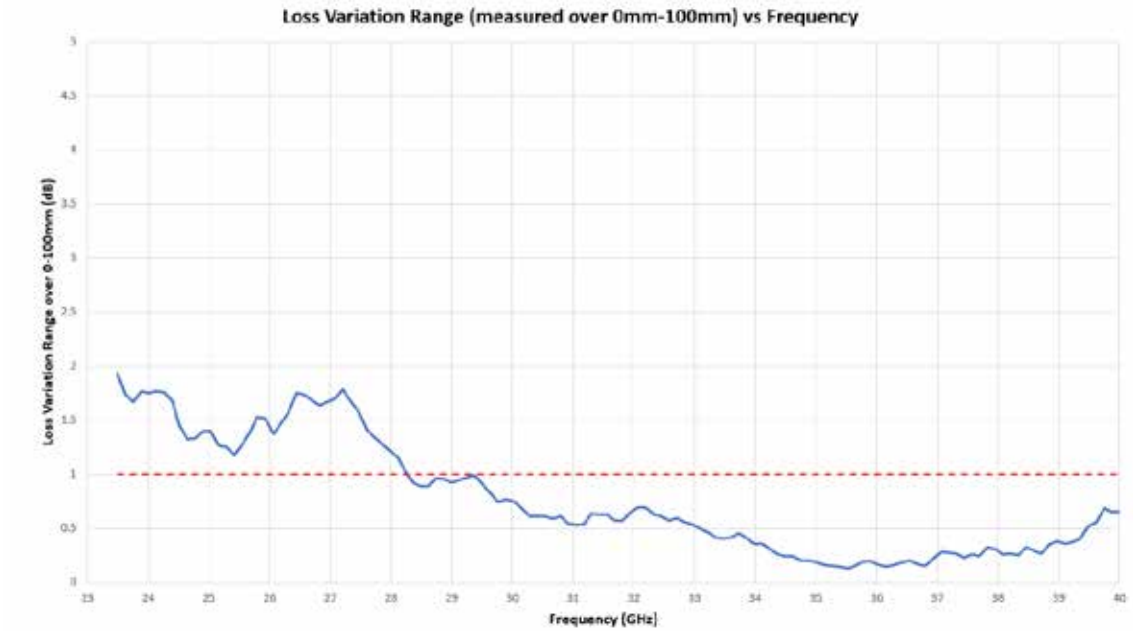
NEAR FIELD LOSS VS. DISTANCE

For typical mmW deployments the screening material is placed in the near field of the antenna, not the far field. This can cause a "lensing effect" that greatly impacts performance. The loss vs. distance test, or "Cyclone chart" shows how sensitive a material is to placement in front of the antenna. At frequencies with high variation in loss, more care must be taken to optimize screen location. At frequencies with low variation, screen placement will have less impact on over-all performance. Since ConcealFab often deploys concealments using ClearWave S140 with 3M film applied, the Cyclone chart for this configuration is provided for reference.

clearWave™ S140 Cyclone chart



clearWave™ S140 peak-to-peak variation summary



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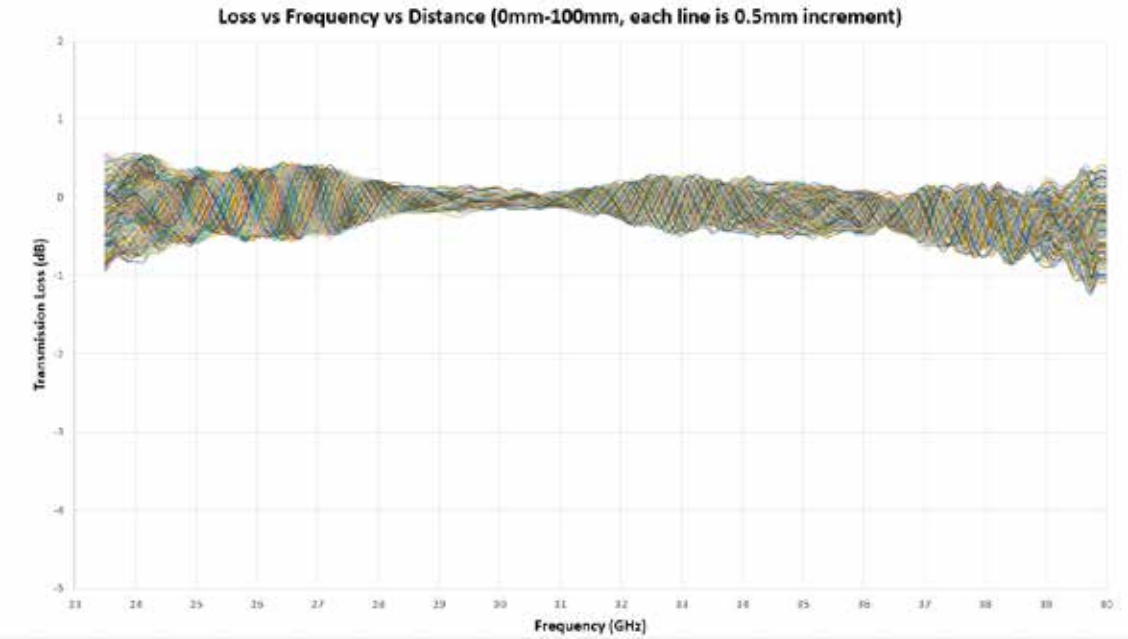
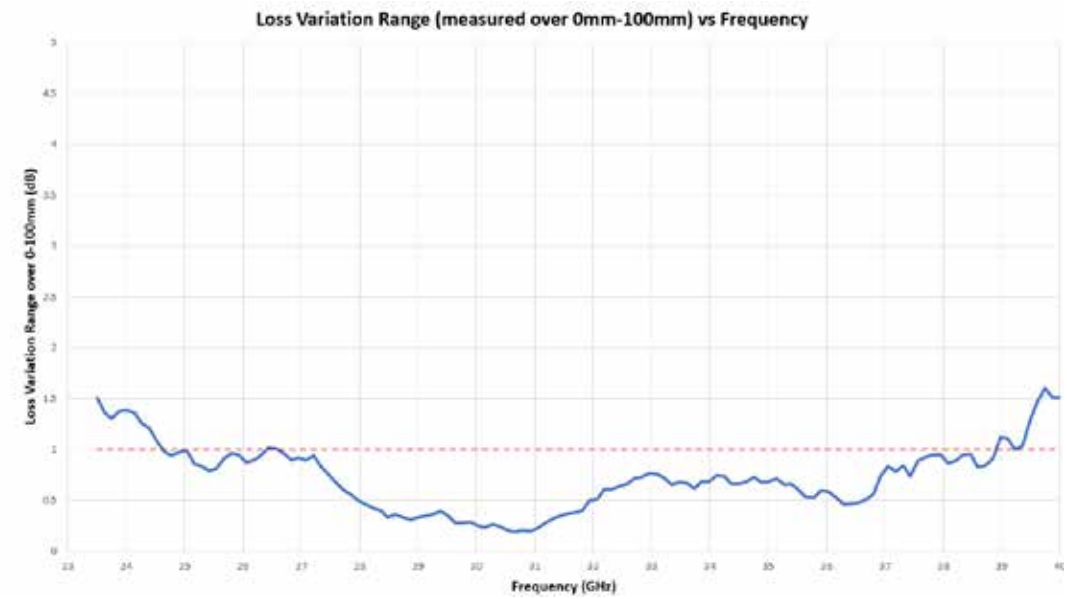
clearWave™ S140 w/3M film Cyclone chart



clearWave™ S140 w/3M film peak-to-peak variation summary



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