

AptFlex F3S



AptFlex F3S, from Acoustic Polymers Ltd is a two-component, flexible, high performance encapsulation material, exhibiting toughness, excellent hydrolytic stability and an acoustic wave speed similar to that of seawater.

AptFlex F3S, has excellent electrical insulation properties and can tolerate temperatures from $-50\text{ }^{\circ}\text{C}$ to $+100\text{ }^{\circ}\text{C}$. It is particularly useful where small, delicate components are being potted since the material exhibits low shrinkage and hence stress during the cure phase.

THIS COMBINATION OF PROPERTIES PRODUCES A MATERIAL THAT CAN BE USED IN AREAS SUCH AS:

- Hydrophone potting
- Marine encapsulation
- Acoustic windows
- Cable gland strain relief

material in the range with excellent abrasion resistance. However, it has slightly higher absorption coefficient and lower flexibility than other encapsulants provided by Precision Acoustics Ltd.

AptFlex F3S is part of a range of encapsulants and provides is the toughest

TYPICAL PROPERTIES

Appearance	Natural (Straw coloured)
Mix ratio (by mass)	7.3:1 (A:B)
Shore A hardness	78 ± 3
Density	1040 ± 20 kg / m ³
Density Part A	1050 ± 20 kg / m ³
Density Part B	1010 ± 20 kg / m ³
Viscosity (Initial @ 25 °C)	70 Poise
Average wave speed (1 MHz to 10 MHz)	1450 ± 30 m / s
Acoustic impedance	1.48 MRayls
Elongation at break	1000%
Tensile strength	8.6 MPa

CURING TIMES

Pot life	20-30 minutes	
Gel time	50 minutes	
Cure time	@ 30 °C	24 hours
	@ 50 °C	6 hours
	@ 80 °C	4 hours

INSERTION LOSS

Insertion loss (IL) is defined as

$$IL = -20 \log_{10} \left(\frac{P_t}{P_i} \right)$$

where P_t is the amplitude of the acoustic pressure transmitted through a sample and P_i is the amplitude of the acoustic pressure incident upon it.

This has been experimentally determined for two samples of AptFlex F3S, and this is shown in Figure 1 and in Figure 2 for frequencies below 1 MHz.

The dynamic range of IL measurement is approximately 40 dB and insertion loss values higher than this value cannot be guaranteed.

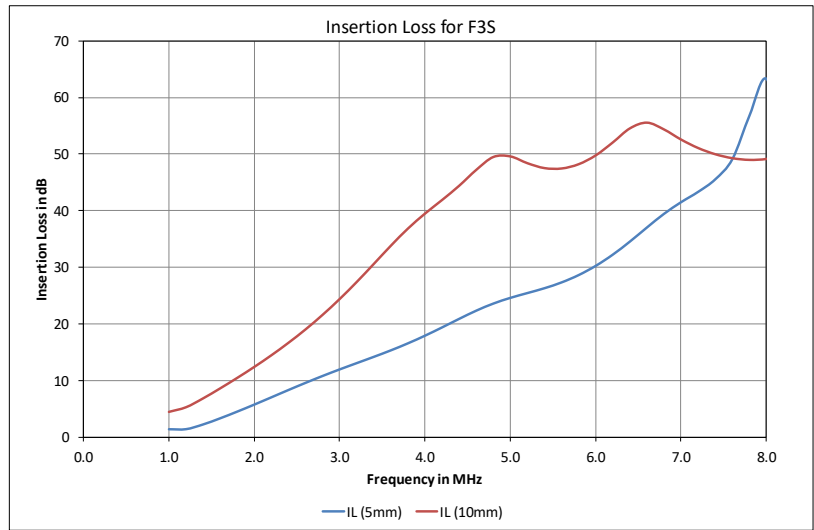


Figure 1 – Insertion loss vs Frequency for AptFlex F3S

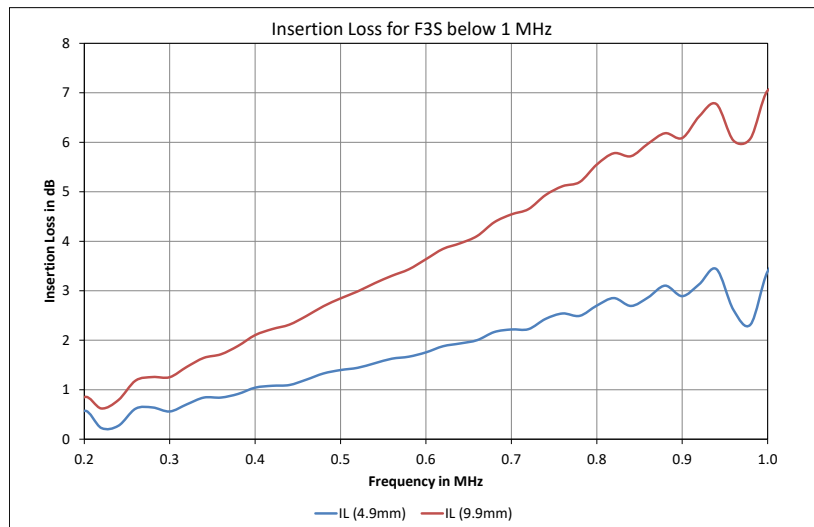


Figure 2 – Insertion loss vs Frequency for AptFlex F3S below 1 MHz

ATTENUATION

Attenuation (α) is evaluated from the measurement of Insertion Loss for 2 samples of the same material, but of different thicknesses. It is calculated as

$$\alpha = \frac{IL_1 - IL_2}{\Delta z}$$

where IL_1 is Insertion loss of sample 1, IL_2 is Insertion loss of sample 2 and Δz is the difference of between the thickness of the two samples. This has been experimentally determined for AptFlex F3S, and this is shown in Figure 3 and below 1 MHz in Figure 4. The data is fitted over the entire frequency range 0.2 MHz to 3 MHz and displayed on an enlarged scale below 1 MHz.

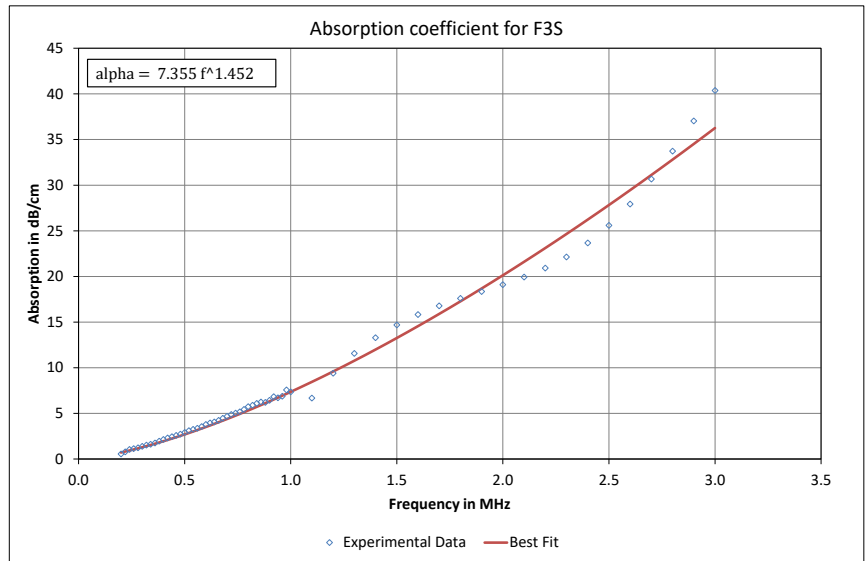


Figure 3 – Attenuation vs Frequency for AptFlex F3S

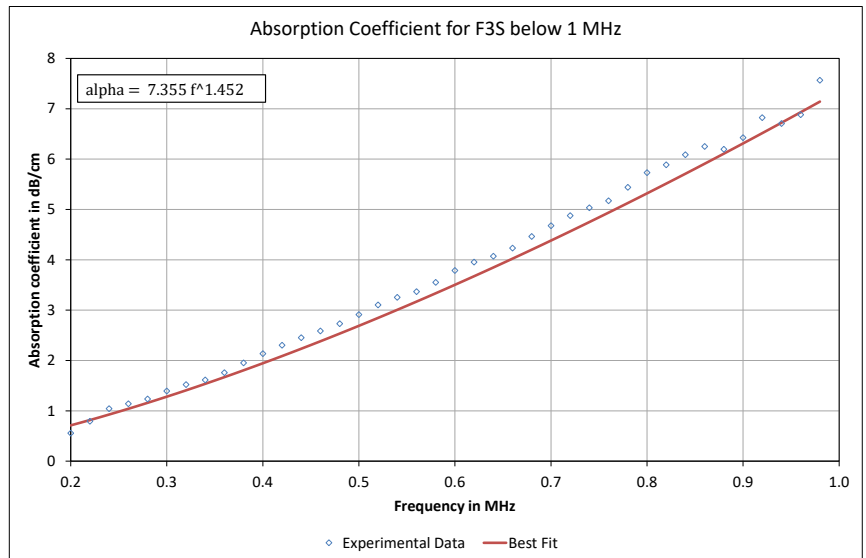


Figure 4 – Attenuation vs Frequency for AptFlex F3S below 1 MHz

ECHO REDUCTION

Echo Reduction (ER) is defined as

$$ER = -20 \log_{10} \left(\frac{P_r}{P_i} \right)$$

where P_r is the amplitude of the acoustic pressure reflected from a sample and P_i is the amplitude of the acoustic pressure incident upon it.

This has been experimentally determined for two samples of AptFlex F3S, and this is shown in Figure 5.

The dynamic range of the ER measurement procedure is approximately 40 dB and values higher than this cannot be guaranteed.

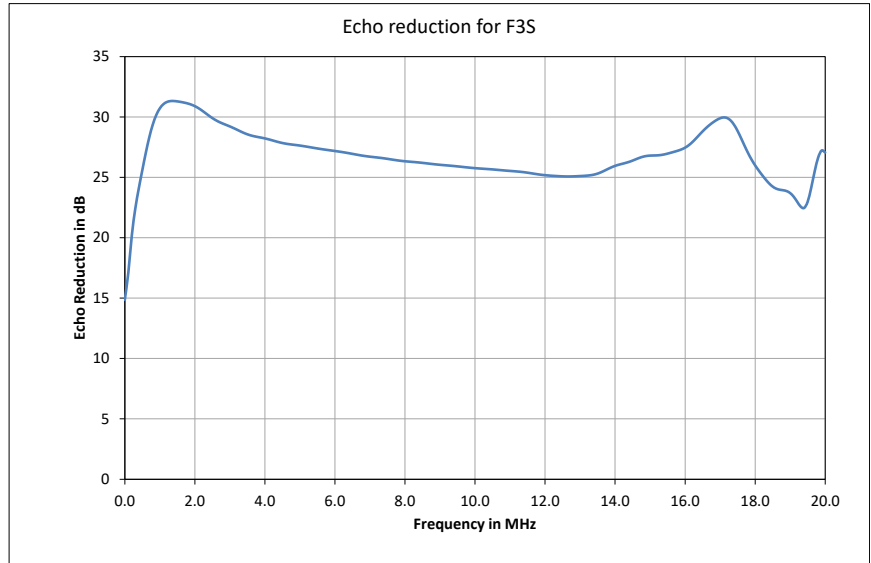


Figure 5 – Echo Reduction vs Frequency for AptFlex F3S

PHASE VELOCITY

Phase velocity is evaluated from the measurement of transit time across 2 samples of the same material.

This has been experimentally determined for AptFlex F3S, and this is shown in Figure 6.

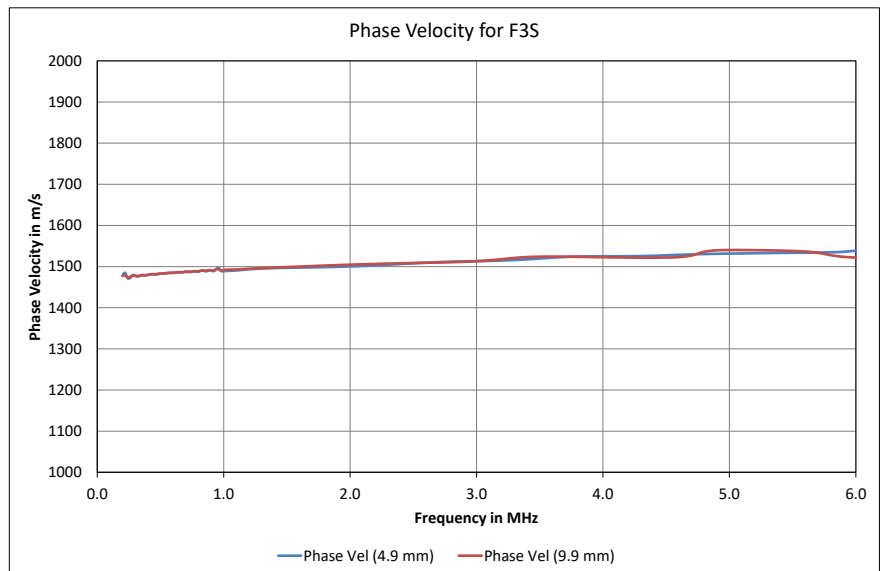


Figure 6 – Phase velocity vs Frequency for AptFlex F3S

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