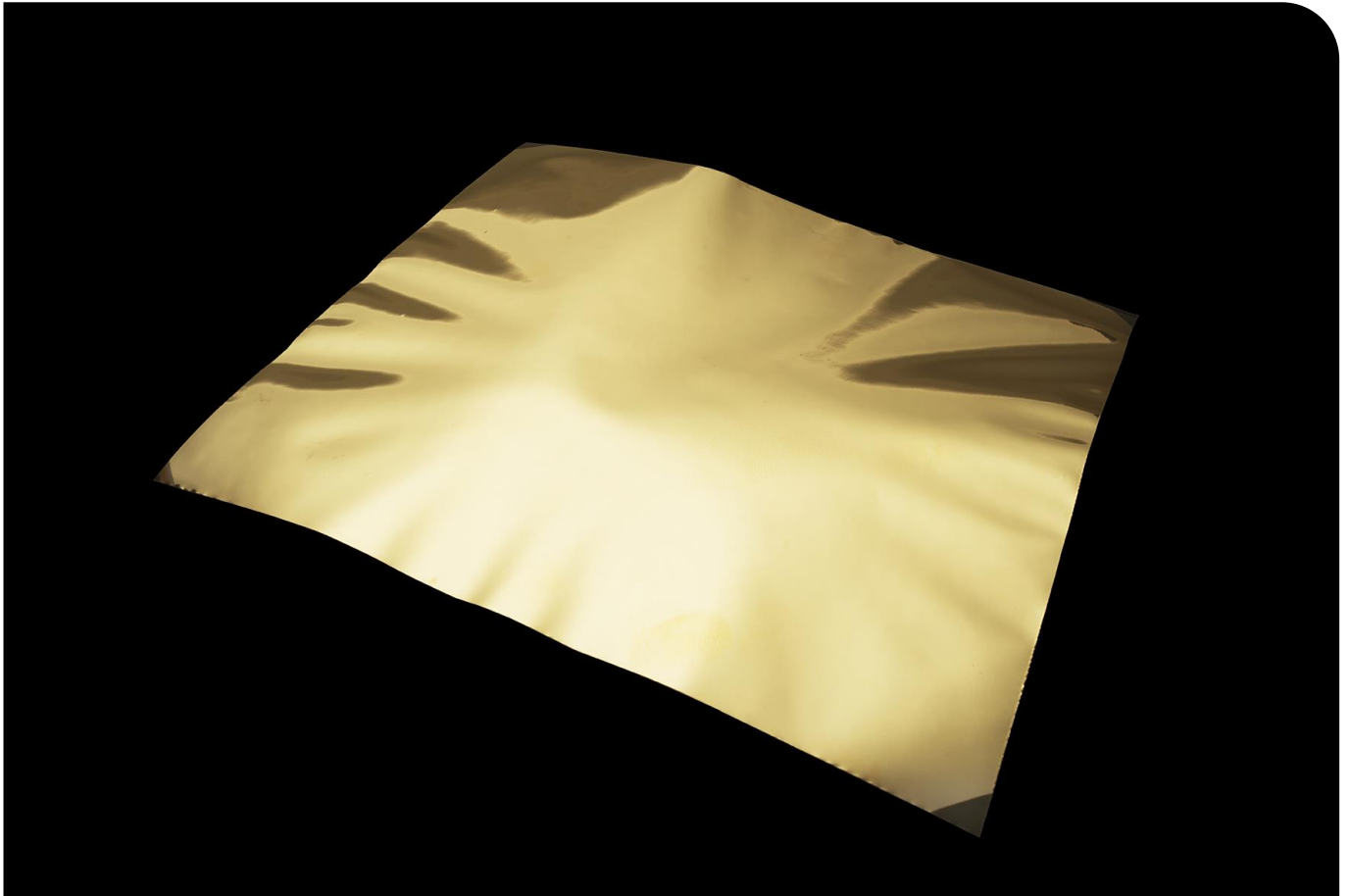


PVdF piezo-electric film



Precision Acoustics Ltd are pleased to announce the re-introduction of their range of PVdF piezo-electric film. This PVDF homopolymer is available in two different thicknesses and can be supplied with or without metallised electrodes.

Quarter and half wave thickness resonance frequencies for PVdF film can be deduced from the acoustic velocity and the thickness of the film.

There may be some localised variation in properties and therefore all data within this document are provided as indicative values and cannot be guaranteed.

AVAILABLE FILM CONFIGURATIONS

| Nominal thickness [μm] | Orientation |
|-------------------------------------|-----------------------|
| 40 | Uni-axially stretched |
| 80 | Uni-axially stretched |

EVAPORATED ELECTRODE OPTIONS

Film is usually coated with 250 nm Gold (Au) electrodes on top of 50 nm Chrome (Cr) keying layer but can be supplied without evaporated electrodes (on request).

SHEET DIMENSIONS

- PVdF piezo-electric film with evaporated electrodes is available in sheets of 170 mm by 180 mm.
- PVdF piezo-electric film without electrodes is available in any length and width up to 350 mm.

BASIC INFORMATION

PVdF is a semi-crystalline polymer consisting of micro-crystallites within amorphous polymer chains.

Acoustical properties

| | | |
|-------------------------|--------|------------------------|
| Longitudinal wave speed | c_L | 2250 m/s |
| Shear wave speed | c_S | 1085 m/s |
| Density | ρ | 1780 kg/m ³ |

Thermal properties

| | | |
|------------------------------|-----------|-----------------------------|
| Melting temperature | T_m | 175 °C |
| Curie temperature | T_C | 205 °C |
| Maximum usable temperature | T_{max} | 70 °C |
| Glass transition temperature | T_g | -42 °C |
| Volume specific heat | | 2.5 J/(cm ³ °C) |
| Thermal conductivity | K | 1.3 mW/(cm ³ °C) |
| Thermal diffusivity | α | 0.053 mm ² /s |

Electrical properties

| | | |
|-------------------------------|----------------|-----------------------------|
| Coercive field strength | E_c | 110 MV/m |
| Breakdown field strength | E_B | 150–200 MV/m |
| Volume resistivity | | $>10^{14} \Omega \text{ m}$ |
| Relative di-electric constant | ϵ_r | See Figure 1 below |
| Di-electric loss tangent | $\tan(\delta)$ | See Figure 2 below |

Elastic constants

| | |
|------------|---------|
| C_{33}^D | 9.0 GPa |
| C_{33}^E | 8.6 GPa |

Piezoelectric constants

| | |
|----------|--|
| k_t | 0.145 |
| d_{31} | Quasi-static: 27 pC/N |
| d_{32} | Quasi-static: 5 pC/N |
| d_{33} | Quasi-static: 19.1 pC/N 10 MHz to 20 MHz: 25.5 pC/N |

Optical properties

| | | |
|--------------------------|-----|--------------------------|
| Refractive index | n | 1.42 |
| Beta : Alpha phase ratio | | 82% (determined by FTIR) |

DI-ELECTRIC CONSTANT

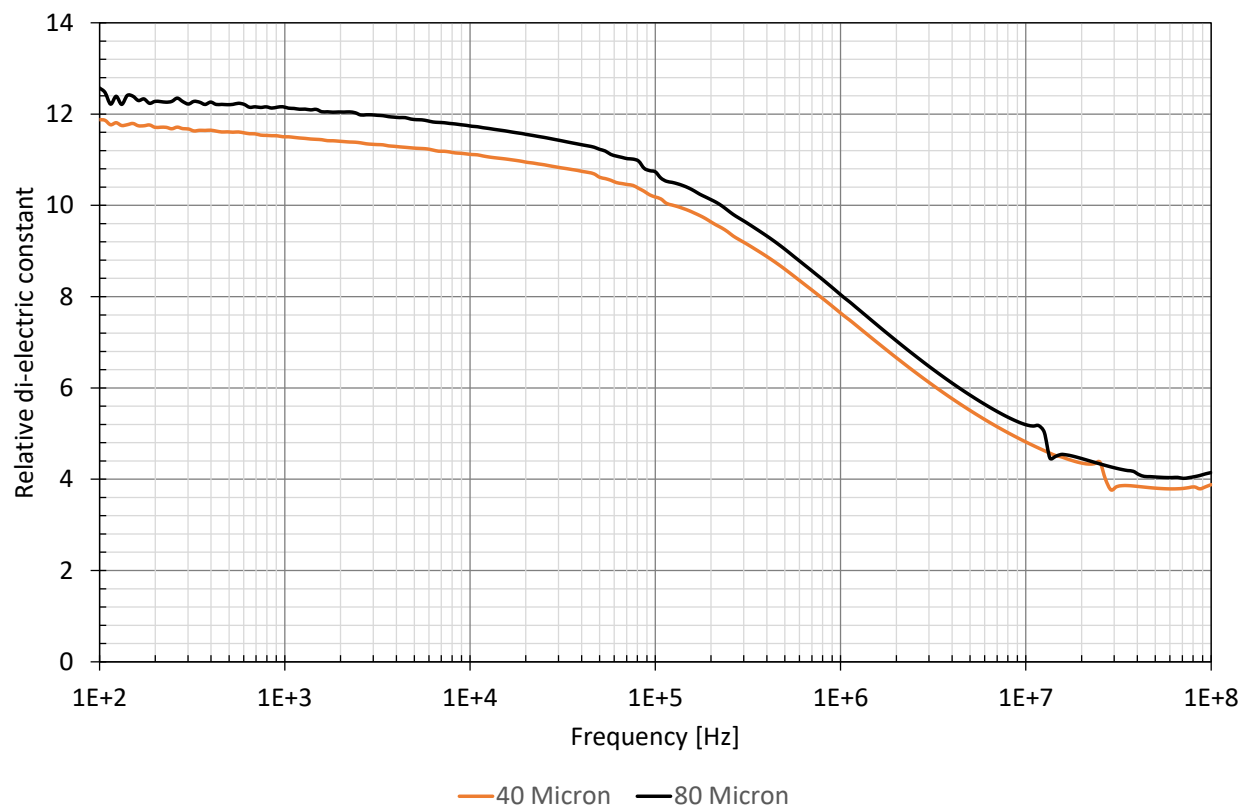


Figure 1 - Dielectric constant of PVDF as a function of frequency

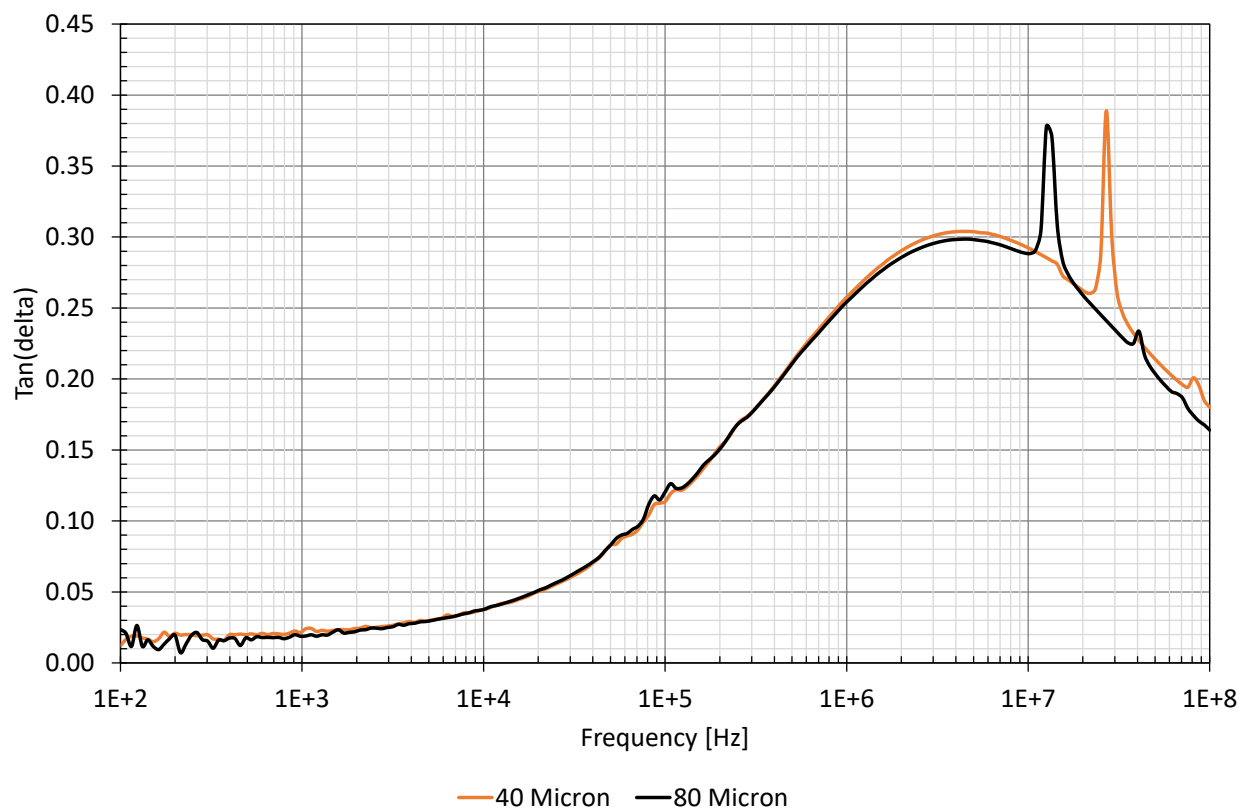


Figure 2 – Dielectric loss tangent of PVDF as a function of frequency

PRODUCT SUPPORT

Disclaimer

All information is based on results gained from experience and tests and is believed to be accurate but is given without acceptance of liability for loss or damage attributable to reliance thereon as conditions of use lie outside the control of Precision Acoustics Ltd.

Warranty

The warranty will be for 12 months against defect of hardware component or manufacture only.

CONTACT DETAILS

| | |
|---------------------------|---|
| <i>Address</i> | Precision Acoustics Ltd, Hampton Farm Business Park, Dorchester, Dorset, DT2 8QH |
| <i>Tel</i> | +44 (0)1305 264669 |
| <i>Commercial matters</i> | office@acoustics.co.uk |
| <i>Technical matters</i> | technical@acoustics.co.uk |

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