

## PVdF research kit



The PVdF research kit comprises 4 pieces (2 pieces of 80  $\mu\text{m}$  and 2 pieces of 40  $\mu\text{m}$  thick) of uniaxially oriented and poled PVdF homopolymer. Each piece has dimensions 5 cm by 5 cm and is supplied with electrodes of 250 nm Gold on top of 40 nm Chrome on each surface.

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.

## PACK CONTENTS

- Two pieces of 80  $\mu\text{m}$  thick PVdF with dimensions 5 cm x 5 cm
- Two pieces of 40  $\mu\text{m}$  thick PVdF with dimensions 5 cm x 5 cm

All pieces of film are provided with metallised electrodes comprising 250 nm Gold (Au) electrodes on top of 50 nm Chrome (Cr) keying layer.

## BASIC INFORMATION

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

### Acoustical properties

Longitudinal wave speed	$c_L$	2250 m/s
Shear wave speed	$c_S$	1085 m/s
Density	$\rho$	1780 kg/m <sup>3</sup>

### 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 <sup>3</sup> °C)
Thermal conductivity	$K$	1.3 mW/(cm <sup>3</sup> °C)
Thermal diffusivity	$\alpha$	0.053 mm <sup>2</sup> /s

### Electrical properties

Coercive field strength	$E_c$	110 MV/m
Breakdown field strength	$E_B$	150–200 MV/m
Volume resistivity		>10 <sup>14</sup> $\Omega$ m
Relative di-electric constant	$\epsilon_r$	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

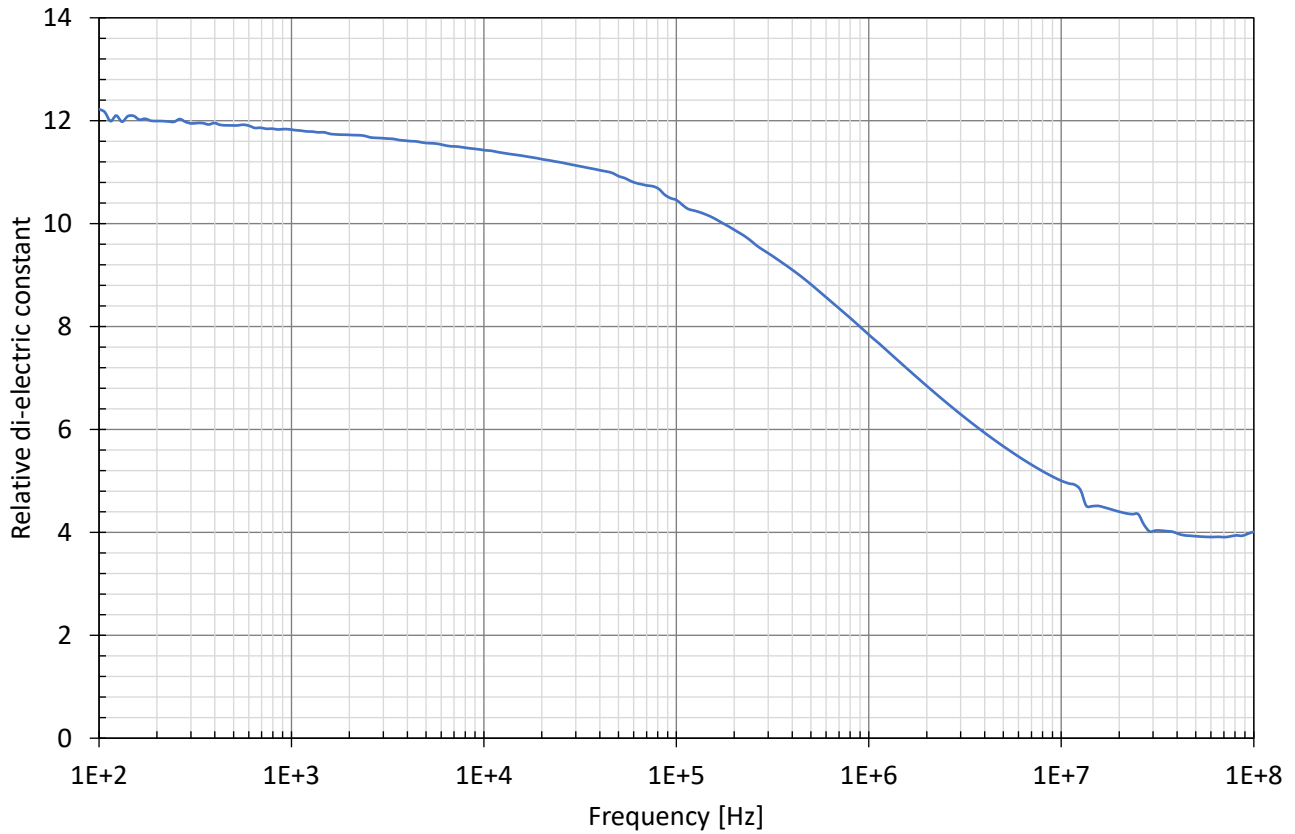


Figure 1 – Average dielectric constant of PVDF as a function of frequency

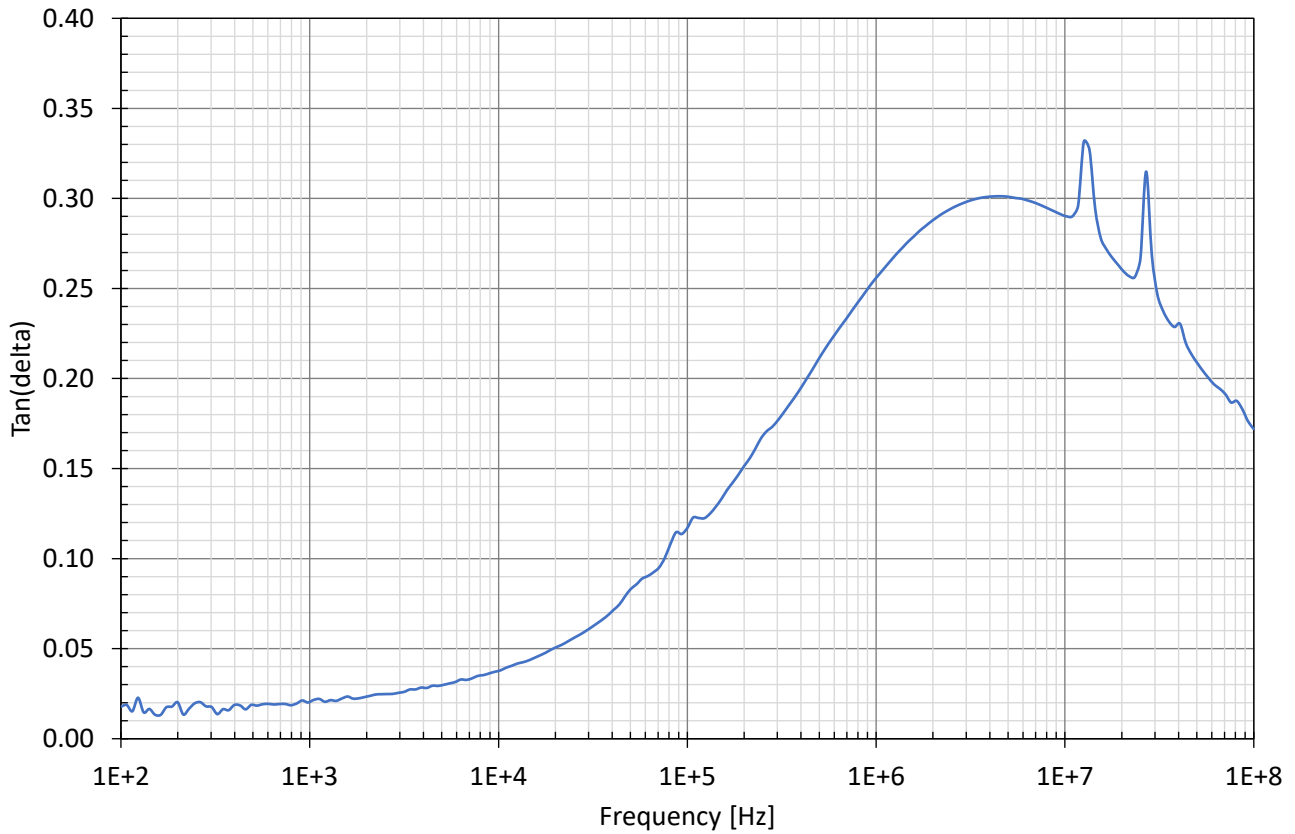


Figure 2 – Average dielectric loss tangent of PVDF as a function of frequency

## 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

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