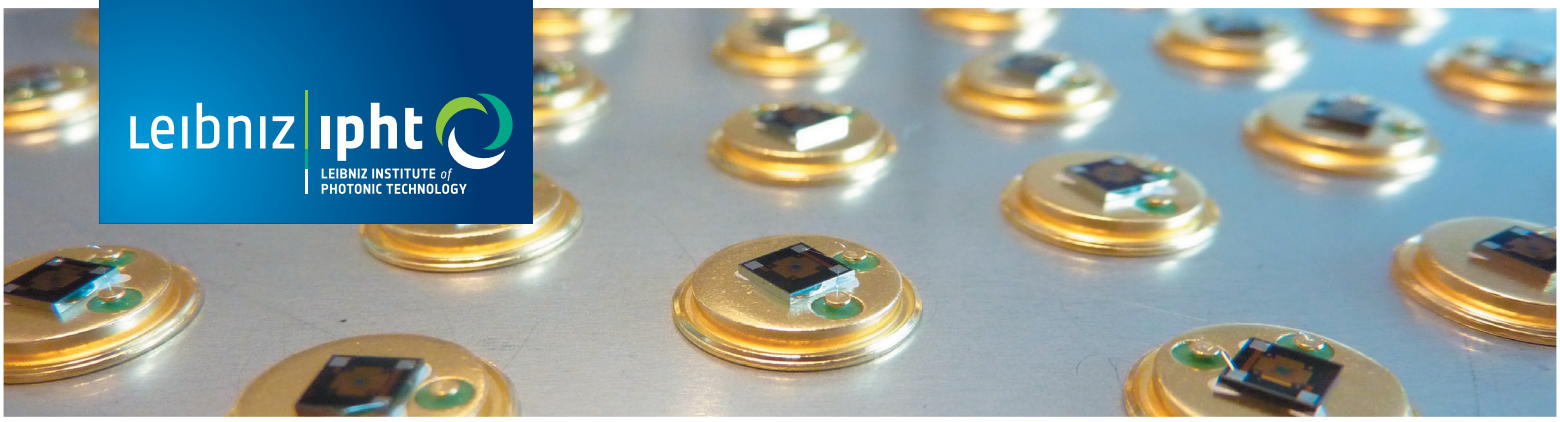

PLANAR MULITJUNCTION THERMAL CONVERTER PMJTC

The AC/DC converter is a miniaturized device made by modern thin-film technology on Si wafers. It consists of a planar arrangement of a heating layer and a thermopile made of thermoelectrically effective materials based on bismuth and antimony.

This arrangement is optimized to operate in a wide frequency range for the true rms measurement of any signal shape of ac power and is minimized with respect to the reversal difference of the ac-dc voltage transfer.

The chip is mounted on an especially designed aluminium oxide carrier and optional mounted in a special metal housing.

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PHYSIKALISCH-TECHNISCHE BUNDESANSTALT

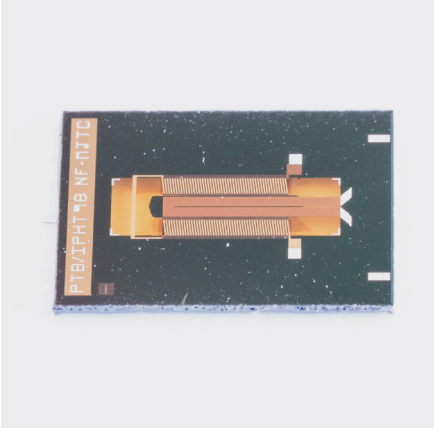
Laboratory 2.32 "AC-DC-Transfer"

P. O. Box 3345

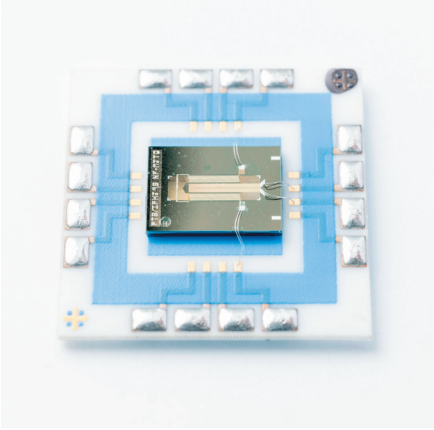
38023 Braunschweig, Germany

Tel.: +49 (0) 531 592 2320

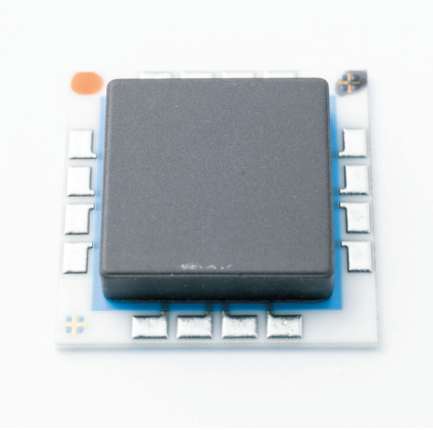
www.ptb.de



Chip



Mounted chip



Packaged chip

PHOTONICS FOR LIFE
from Ideas to Instruments

TECHNICAL DATA PMJTC

Sizes	Values	Units
Chip	6 x 8	mm
Membrane	1.3 x 5.2 x 0.001	mm
Al_2O_3-Carrier	18 x 18	mm
Membrane material	Si_xN_y	

Input characteristics	Values	Units
Heating layer (NiCrSi) resistance	90, 180, 400	Ω
TC of resistivity	$< \pm 5 \times 10^{-6}$	K^{-1}
Rated input voltage	1 (@ 90 Ω) 1.5 (@ 180 Ω) 2-3 (@ 400 Ω)	V V V
Maximum input voltage	twice of the rated input voltage	

Output characteristics	Values	Units
Number of junctions (Bi-Sb)	100	
Thermocouple resistance	< 10	kΩ
Output voltage	100	mV
Responsivity of the thermopile	15@20 °C	V / W
TC of responsivity	-2.2×10^{-3}	K^{-1}

Transfer characteristics	Values	Units
AC / DC transfer frequency range	10 ... 10^6	Hz
Thermal time constant	1800	ms
AC / DC voltage transfer difference $(U_{ac}-U_{dc})/U_{dc}$	$< 1 \times 10^{-6}$ (@ 1 kHz) $< 1 \times 10^{-5}$ (@ 100 kHz)	
Reversal difference	$<< 5 \times 10^{-6}$	

Precautions:
Since the thin-film PMJTC contains a very delicate thin film membrane with a silicon obelisk, it is necessary to avoid mechanical shocks not to break the membrane. To avoid excessive voltages between heater and thermocouples, which are likely to occur during switching between ac and dc and will probably damage the insulation, it is recommended to connect heater and thermocouples to the same or if not possible near the same potential.

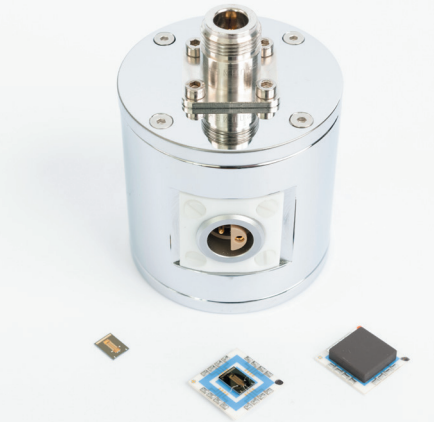
Connections:
N-Connector at the input (25 N-50-3-4/133NE)
UHF-Twin-connector at the output (ERN.2S.302.CLL)

FEATURES

- High Sensitivity
- Rugged Construction
- True AC / DC Conversion of any Signal Shape
- Broad Frequency Ranges
- Ambient Temperature Operation
- High Reliability
- Hermetically Sealed
- Excellent Long-Term Stability
- Traceability to National Standards by Calibration Certificates of the PTB
- ISO9001:2015 Quality Management System

APPLICATIONS

- AC / DC Transfer Instruments
- AC Voltmeters



Completed PMJTC

07.11.2023_1.0