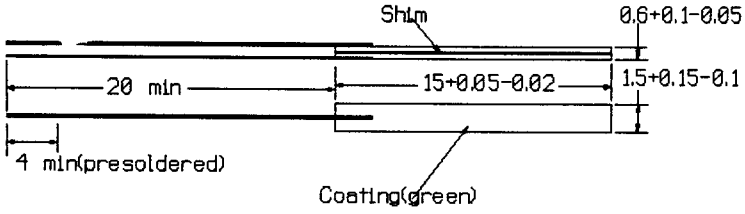
285-784 M641

PIEZOELECTRIC CERAMIC BIMORPH ELEMENT



This piezoceramic bi-morph element is a versatile low power electromechanical transducer capable of converting mechanical or acoustic energy to electrical energy. When the element is stressed or subjected to vibration, the minute movement causes one layer to be under tension while the other is under compression, since the two layers are polarised in opposite directions the opposite stresses in each layer will produce an electrical output or charge.

FEATURES:

- High compliance
- Low mass
- High efficiency
- Non-magnetic
- High Capacitance - low impedance
- Moisture proof

APPLICATIONS:

- Vibration/stress sensors
- Phonograph cartridges
- Micro-positioners

TECHNICAL SPECIFICATION:

Dimensions:	15mm x 1.5mm x 0.6mm
Capacitance:	750pF ± 170
Dielectric Constant :	ε2000
Piezo constant -	9_{31} ($x10^{-3}$ V-m/N): 12.1
Electromechanical Coupling Factor:	60
Compliance ($x10^{-4}$ m^2/N):	6.6
Max stress:	50-100μm
Output:	@ 5mm clamp from lead-end (cantilever action) vibration @ 10μm P-P = 4V P-P
Impedance:	Z = 1 M OHM

TABLE 1

Typical Symbols Employed in Describing Properties of Piezoelectric Materials
Strictly speaking these symbols are used to identify properties of MATERIALS only, and should not be used to describe characteristics of actual physical elements made of these materials. However, for convenience, some liberties have been taken in the explanations - electric boundary conditions are identified by indicating locations and connections of electrodes.

S^D_{11}

- D — Indicates that compliance is measured with electric circuit open
- 11 — Indicates that STRESS or strain is in 1 direction
- Indicates that STRAIN or stress is in 1 direction
- Compliance $= \frac{\text{strain}}{\text{stress}}$

(All stresses, other than the stress involved in one subscript, are constant).

S^E_{36}

- E — Indicates that compliance is measured with electrodes connected together.
- 36 — Indicates that STRESS or strain is in shear form around 3 axis.
- Indicates that STRAIN or stress is in 3 direction
- Compliance $= \frac{\text{strain}}{\text{stress}}$

(All stresses, other than the stress involved in one subscript, are constant).

K^T_1

- T — Indicates that all stresses on material are constant - forexample: zero external forces.
- 1 — Indicates that electrodes are perpendicular to 1 axis
- Relative dielectric constant $= \frac{\varepsilon_1^T}{\varepsilon^0}$

K^S_3

- S — Indicates that all strains in the material are constant- for example: material completely blocked preventing deformation in any direction.
- 3 — Indicates that electrodes are perpendicular to 3 axis
- relative dielectric constant $= \frac{\varepsilon_3^S}{\varepsilon^0}$

k_{15}

- 15 — Indicates that stress or strain is in shear form around 2 axis.
- Indicates that electrodes are perpendicular to 1 axis.
- Electromechanical coupling

k_p

- This subscript used only for ceramics. Indicates electrodes perpendicular to 3 axis, and stress or strain equal in all directions perpendicular to 3 axis.
- Electromechanical coupling.

d_{33}

- 33 — Indicates that the piezoelectrically induced strain, or the applied stress, is in 3 direction.
- Indicates that electrodes are perpendicular to 3 axis
- $\frac{\text{strain}}{\text{applied field}} = \frac{\text{short circuit charge/electrode area}}{\text{applied stress}}$

(All stresses, other than the stress involved in second subscript, are constant).

d_h

- Indicates that stress is applied equally in 1,2, and 3 directions (hydrostatic stress): and that electrodes are perpendicular to 3 axis for ceramics or 2 axis for Lithium sulphate.
- $\frac{\text{Short circuit charge/electrode area}}{\text{applied stress}}$

g_{31}

- 31 — Indicates that applied stress, or piezoelectrically induced strain is in 1 direction.
- Indicates that electrodes are perpendicular to 3 axis
- $\frac{\text{field}}{\text{applied stress}} = \frac{\text{strain}}{\text{applied charge/electrode area}}$

(All stresses, other than the stress involved in second subscript, are constant).

g_{15}

- 15 — Indicates that applied stress, or piezoelectrically induced strain is in shear form around 2 axis.
- Indicates that electrodes are perpendicularto 1 axis
- $\frac{\text{field}}{\text{applied stress}} = \frac{\text{strain}}{\text{applied charge/electrode area}}$

(All stresses, other than the stress involved in second subscript, are constant).

To :

SP. No. ACS - 023

CERAMIC BIMORPH SPECIFICATION

1. Scope

This specification covers ceramic bimorph
: EB - T - 320 , MADE IN JAPAN

2. Code

EB - T - 320

3. Shape and dimension

This is shown in external drawing : Fig.1

DRAWING
FOR REFERENCE

4. Ratings

Measuring requirement : temp.=23±5°C humi.=75 % RH max.

No.	Items	Specifications	Remarks
1.	Capacitance	750±175 pF	Measuring frequency : 1kHz Measuring voltage : 1Vrms
2.	Insulating resistance	30 MΩ min.	Measuring voltage : DC 50 V Measuring time : 1min.
3.	Operational temperature range	-20 ~ +60 °C	… … … … …
4.	Storage temperature range	-30 ~ +70 °C	… … … … …
5.	Storage humidity range	80 % RH max.	… … … … …

				APPROVED	CHECKED	DESIGNED	DRAWN
	株式会社村田製作所 技術部 5.5.10 電子デバイス事業部			H. Yamamori	T. Ito	M. Aoki	M. Aoki
REVISIONS		DATE	DRAWN				

7. External drawing

1) Shape and dimension

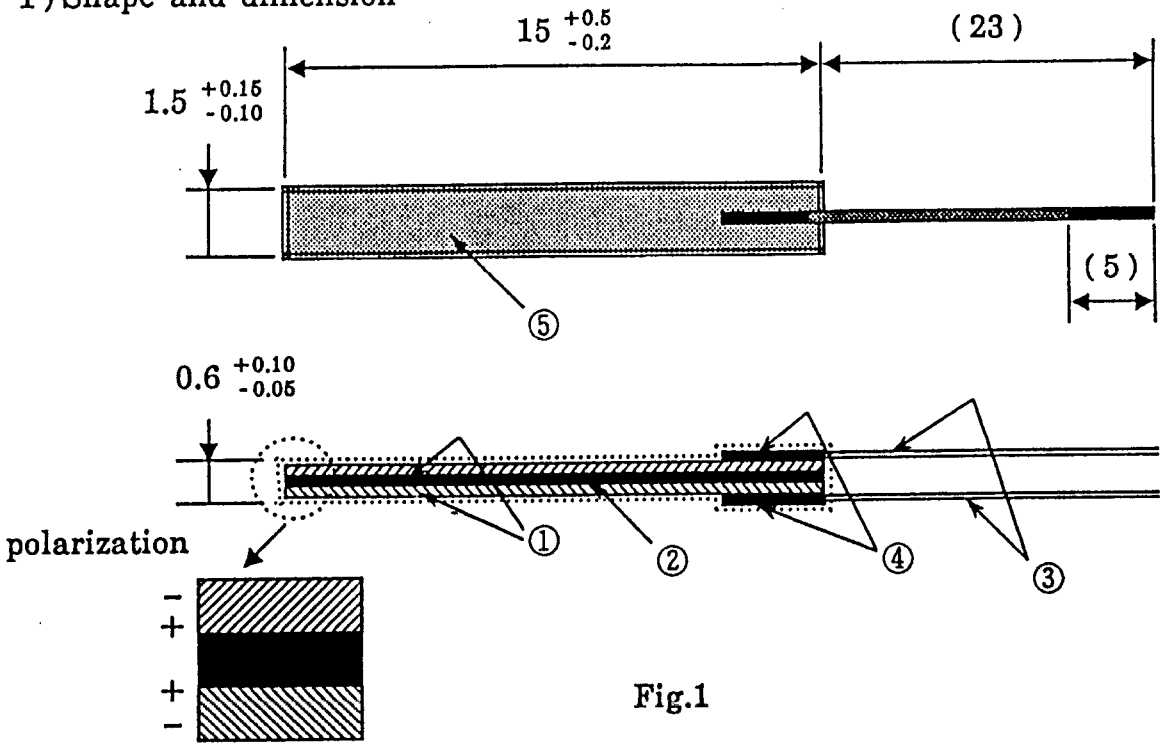


Fig.1

2) Parts list

No.	Names	Remarks
①	Piezoelectric ceramic	NTK code MT-11
②	Shim	Titanium 0.03t
③	Lead wire	polyurethane coverd copper wire 10×φ0.04
④	Solder	Low temperature solder 143 °C
⑤	Coating	Resin Green

5. Environmental characteristics

No.	Items	Test method	Requirement
1.	High temperature storage	Specimen shall be stored at +70 °C for 500 hours and then kept at normal temperature and humidity for 24 hours before measurement.	Capacitance changing rate ± 20% max. Insulating resistance 10 MΩ min.
2.	Low temperature storage	Specimen shall be stored at -30 °C for 500 hours and then kept at normal temperature and humidity for 24 hours before measurement.	
3.	Humidity	Specimen shall be stored at +60 °C · 80% RH for 500 hours and then kept at normal temperature and humidity for 24 hours before measurement.	
4.	Temperature cycle	Specimen shall be stored at -20 °C and +60 °C for 0.5 hour. (temperature gradient 50 °C/hour) After 25 cycles of this operation, and then kept at normal temperature and humidity for 24 hours before measurement.	

6. Others

1) Caution

This bimorph (EB-T-320) electrode is silver. You shall be stored or operated this bimorph at bad conditions, high temperature and high humidity and input DC voltage, which insulating resistance is lower, affected silver migration.
Please use care storage and operation conditions.

2) Changes in specification

In the case of changes in specification, propose beforehand and discuss separately.