



Improved Ruggedized SOI Transducers Operational Above 600°C

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Kulite Semiconductor Products, Inc.
Presented at the 21st Transducer Workshop
Lexington Park, MD June 22-23, 2004



Industry Requirements

- Temperatures Up To and Above 600°C
- Harsh Environments
 - Acceleration Greater Than 200g
 - Corrosive/Oxidizing
- Static and Dynamic Measurement
- High Frequency Response
- Vibration Insensitivity

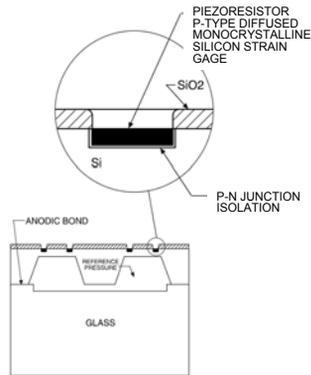
“Silicon Is The Ideal Choice”

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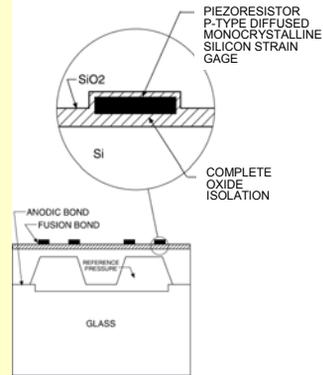


Silicon Integrated Sensors

CONVENTIONAL P-N JUNCTION TECHNOLOGY



CURRENT SOI TECHNOLOGY

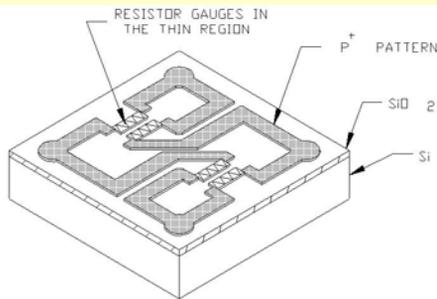


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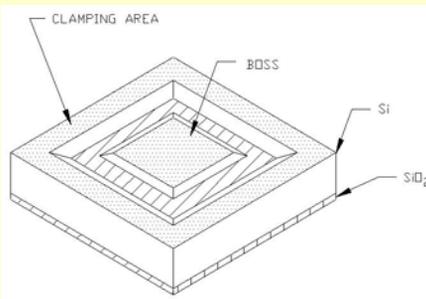


Silicon Integrated Sensors

Isometric Views of the Sensor



GAUGE SIDE ISOMETRIC OF SENSOR CHIP

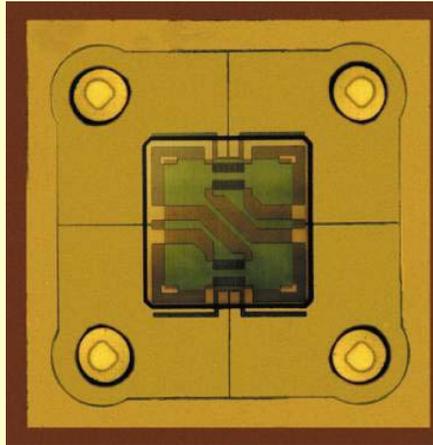


DIAPHRAGM SIDE ISOMETRIC OF SENSOR CHIP

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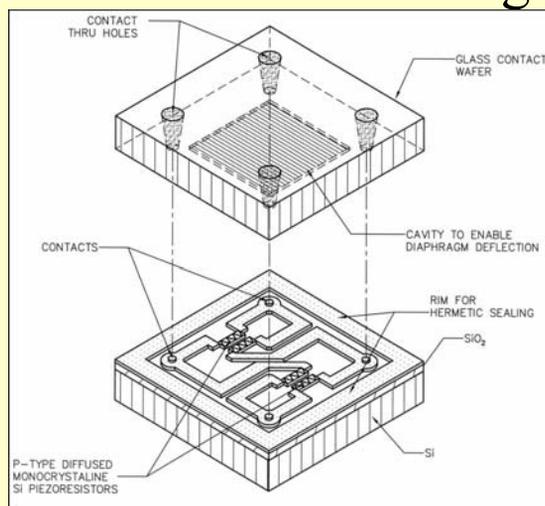
Leadless (SOI) Sensor with Cover Attached



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Leadless Sensor Design



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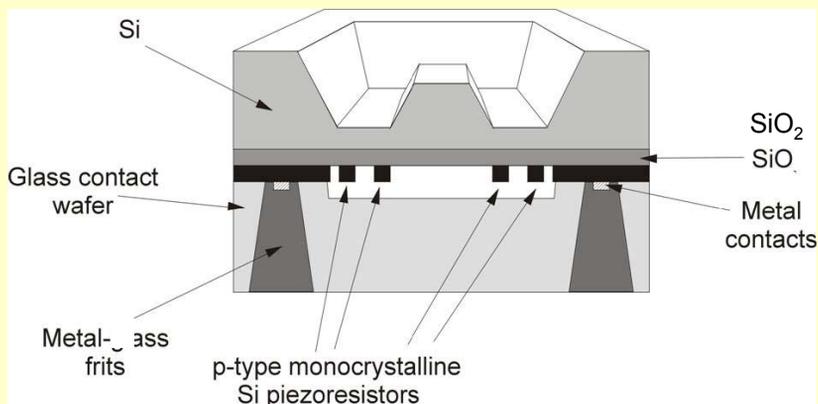
Sensor Optimization

- Performance Characteristics
- High Temperature Capability
 - ❖ Electrical Interface
 - ❖ Dielectric Isolation
 - ❖ Mechanical Assembly
- Harsh Environment Capability - Leadless

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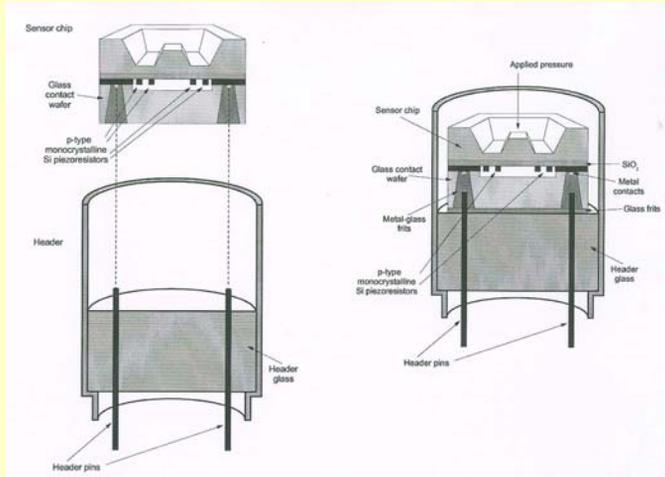
Side View of the “Leadless Chip Composite” after Filling with Glass-Metal Paste for Contacting



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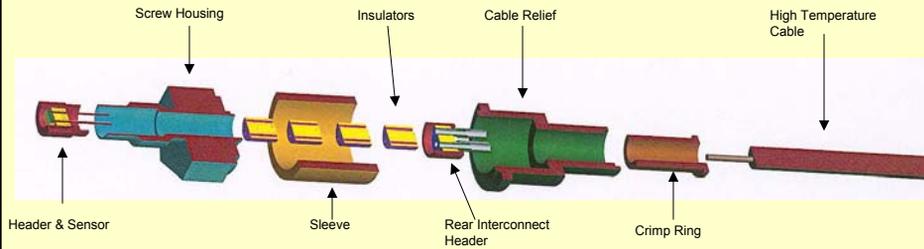
Leadless Packaging



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Leadless Assembly

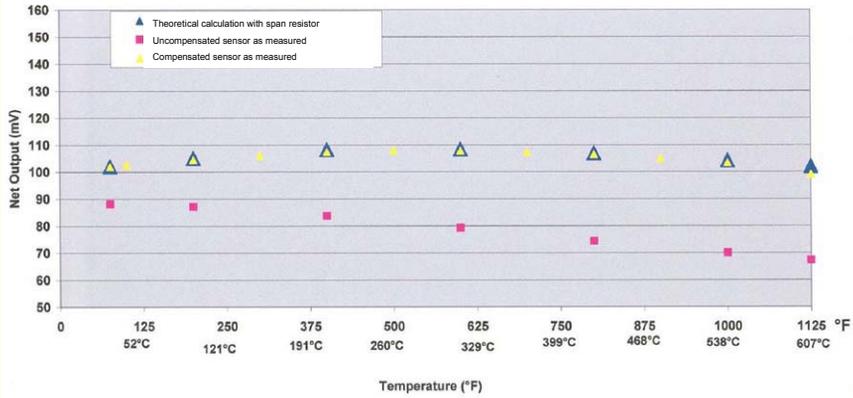


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Sensor Performance

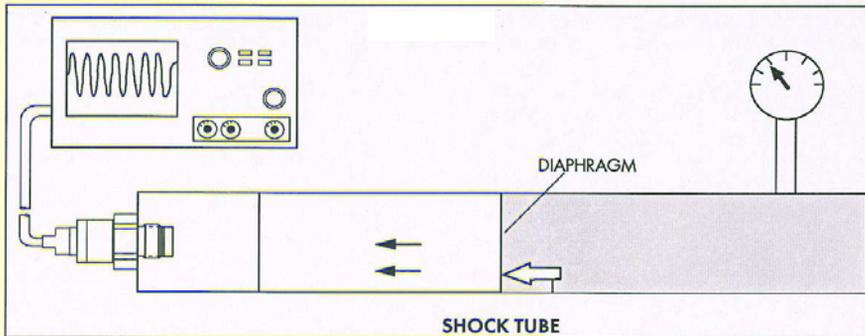
SOI SENSOR PERFORMANCE UP TO 1125°F(607°C) WITH AND WITHOUT SPAN TEMPERATURE COMPENSATION



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Shock Tube Set-Up



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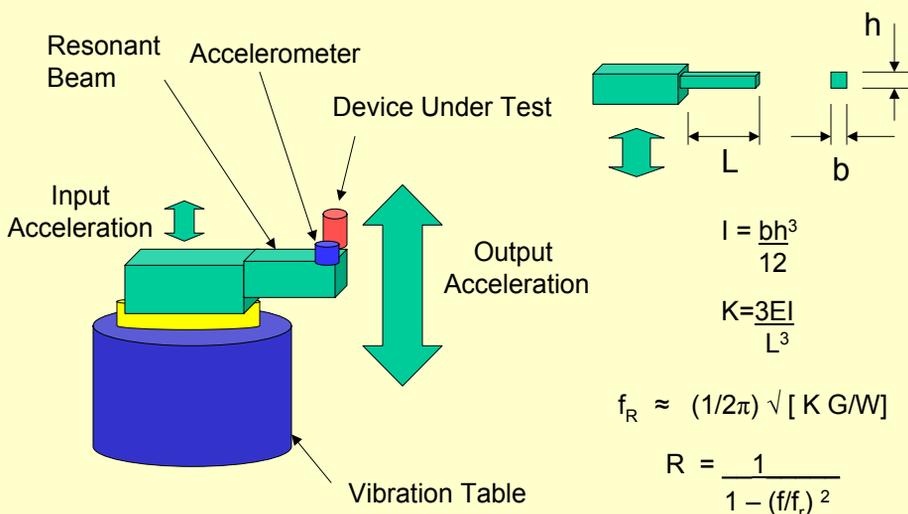
Dynamic Performance

- Evaluated Sensors Ranging From 5 psi to 1000 psi
- Excellent Dynamic Performance
- Dynamic Response Ranged From 150 KHz to 1MHz

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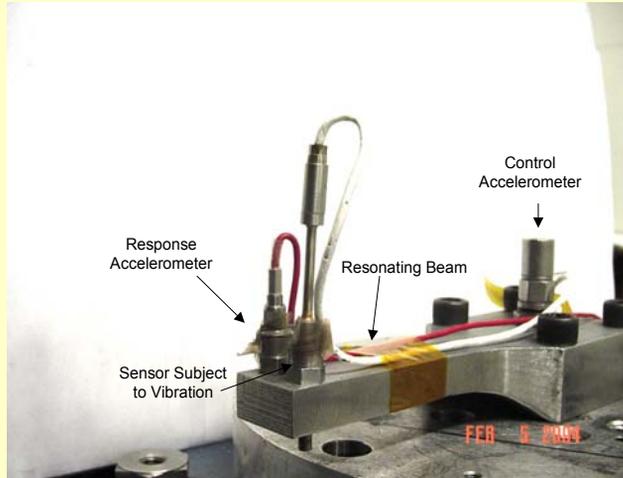
Resonant Beam Apparatus



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Resonant Beam Vibration Apparatus



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Mechanical Robustness Evaluation

- All Transducers Evaluated Up To 1000G For (2) Hours.
- No Signs of Degradation Were Visible.
- For Measurement In High Acceleration/Vibration Environments the Vibration Insensitive Sensor (VIS) Should Be Incorporated.

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Summary

- Latest Generation of High Temperature Transducers Designed, Fabricated and Evaluated
- Operability Up To 607° (1125°F) Demonstrated
- SOI Leadless Design – Harsh Environments
 - ❖ Excellent Static Performance
 - ❖ Excellent Dynamic Performance
 - ❖ Highly Robust Design
- Suitable To A Variety Of Transducer Applications.

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