

# EXASENSE LABS

EXACTING  
TEMPERATURE SENSING



LIFE SCIENCES • HVAC • AUTOMOTIVE • ELECTRO DOMESTICS • AEROSPACE

## Global leader in temperature sensing

ExaSense Labs leads the way in the design and manufacture of high quality thermistors for advanced temperature sensing. Starting from ultra high purity transition metal-oxides, further refined to nano-particle levels, ExaSense has pioneered the development of a vast range of material systems, meeting all global RT curve requirements. This state-of-the-art polycrystalline semi-conductor fab facility manufactures NTC thermistor chips, discs and ring/polos, a variety of glass encapsulated chips, lead frame coated devices, and microchip based catheter thermistor probes.

Our ISO 9001-2008 certified manufacturing plant with Class-100K clean-room facilities is based in Bangalore, India. Innovative application engineering capabilities with prototyping facilities results in highly reliable temperature sensors developed in partnership with our customers.

ExaSense Labs provides NTC thermistor based sensing solutions for HVAC, automotive, electro-domestics, life-sciences, aerospace and newly emerging applications in the fields of biotechnology, defence, and medical diagnostics.



Exacting Sensing solutions driving energy efficiency, safety, healthcare and emerging technologies for

## a world of applications



### HUMAN BODY

- Oral temperature
- Esophageal catheter
- Thermodilution heart catheter
- Kidney dialysis
- Urinary catheter
- Rectal temperature
- Skin temperature

### AUTOMOTIVE and LOGISTICS

- Coolant temperature
- Engine management
- Climate control
- Anti-lock braking system
- HID lamps
- Air bag controls
- Fuel filter sensors
- CRDi sensors
- Motor circuit protection



### HEALTH and LEISURE

- Pools and Spas
- Jacuzzis
- Sauna baths
- Steam rooms
- Power showers

### BABY INCUBATOR

- Ambient temperature
- Fan temperature
- Skin temperature
- Heater control
- Damper control



### UPS and POWERTOOLS

- Battery temperature
- Power packs
- Ambient temperature
- Heatsink temperature
- Charge circuit control
- Temperature compensation



### HVAC

- Home heaters
- Evaporator temperature
- Heat pumps
- Condensation systems
- Boilers and chillers
- Ducts and vents
- Electronic thermostats



### ELECTRO-DOMESTICS

- Frost free fridges
- Washing machines
- Dishwashers
- Ovens
- Microwave ovens
- Dryers

### DEFENCE and AVIONICS

- Windscreen de-icing
- Temperature compensation
- Smart systems
- Smart thermostats



### BIOTECH

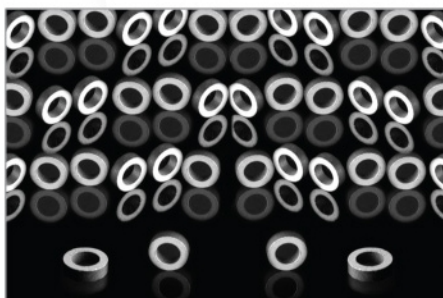
- Near cryogenic monitoring
- Vaccine logistics monitoring
- Validation systems
- Forensic analysis
- Cryogenic preservation





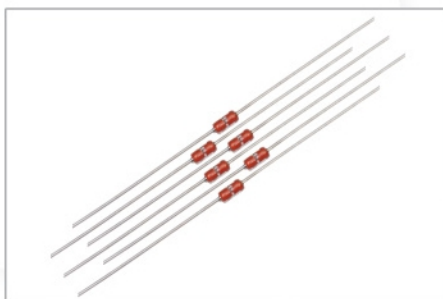
### NTC Disc Thermistors

Engineering Applications	Key Features	Specification Summary	Options
Automotive Engine Temperature Coolant Temp. monitoring Engine Management Systems Washing Machine Sensors	High Stability High Power Applications Rugged Construction	Operating Temperature -55 to +155°C Dissipation Constant 2 mW/°K to 8 mW/°K Diameter 2mm to 10mm typical	Custom R-T characteristics Broad Range of R-T curves Leadwires



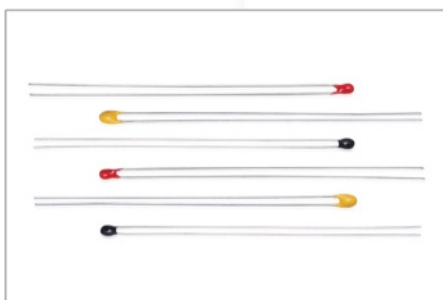
### NTC Ring Thermistors

Engineering Applications	Key Features	Specification Summary	Options
Automotive Engine Temperature Coolant Temp. monitoring Engine Management Systems Composite Sensors	High Power Applications Rugged Construction High Stability	Operating Temperature -55 to +155°C Diameter 4mm to 7mm typical Dissipation Constant 4 mW/°K to 8 mW/°K	Custom R-T characteristics Broad Range of R-T curves



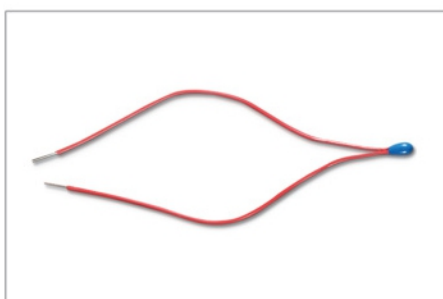
### Axial Glass Encapsulated NTC Thermistors

Engineering Applications	Key Features	Specification Summary	Options
Engine Management Systems Battery Packs Washing Machine Sensors Pressure Cookers Fuel Level Sensor	DO-35 Diode Glass Packaging DUMET header lead wires Hermetically sealed High-Temp. Applications High Voltage Insulation	-40°C to T-Max 250°C Diameter 1.8mm, Length 3.8mm typical Dissipation Constant 3 mW/°K	Tape-on-Reel for Auto-Insertion Broad Range of R-T curves



### Epoxy Coated NTC Chip Thermistors

Engineering Applications	Key Features	Specification Summary	Options
Overmoulded Automotive Sensors Air-Conditioning Probes Refrigeration Probes Engine Management Systems Medical Sensors Thermometers	Interchangeable upto +/- 0.1°C Accuracy Miniature Head Size Fast Response	T-Max 150°C Diameter 1mm to 3mm typical Steel/Alloy 52/Alloy 42 /Nickel/Copper Lead Wires	Long lead length option for Overmoulding applications Broad Range of R-T curves High Temperature Resins

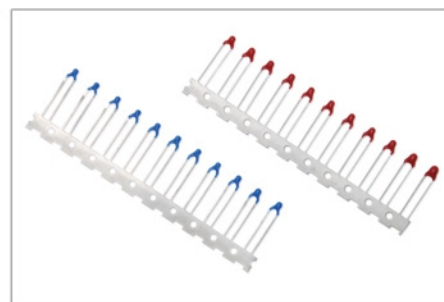


### Epoxy Coated NTC Chip Thermistors with Insulated Lead Wires

Engineering Applications	Key Features	Specification Summary	Options
Heater Control Systems Engine Management Systems Battery Packs Uninterruptible Power Sytems Heatsink Temperature Ambient Temperature Circuit Protection	Interchangeable to +/- 0.1°C Accuracy Miniature Head Size Fast Response	PTFE/PVC/KYNAR Insulation T-Max 150°C Diameter 1mm to 3mm typical Nickel/Copper lead wires	Matched Pair Broad Range of R-T curves High Temperature Resins

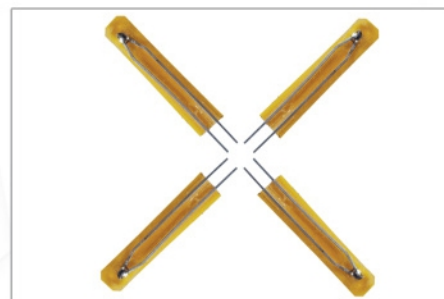
## Lead Frame NTC Thermistors

Engineering Applications	Key Features	Specification Summary	Options
Designed for Automated Assembly Engine Management Systems Ambient Temperature Monitoring Temperature Compensation	Optimum for overmoulding applications	Operating Temperature -55 to +155°C Diameter 2mm to 5mm typical Dissipation Constant 2 mW/°K to 5 mW/°K	X or Y lead form Broad Range of R-T curves



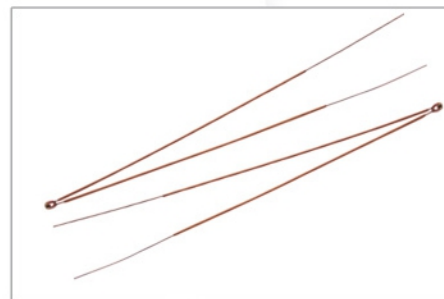
## Ultra-Thin NTC Thermistor Sensors in Flexible Tape/PCB

Engineering Applications	Key Features	Specification Summary	Options
Multi-layer Gaskets Heat Pumps Cell-Phone Battery Sensor Laptop Battery Sensor Boiler Temperature Sensors Automotive Seat Heaters	Kapton Tape Protected Nickel Bifilar Lead Wires Gold Electroded	Operating Temperature -55 to +155°C 250 Micron sensor thickness 150 Micron NTC Microchip	Variety of Adhesive Tapes Adhesive Foam Base PTFE connector harness Broad Range of R-T curves



## Chip in Glass NTC Thermistors

Engineering Applications	Key Features	Specification Summary	Options
IT Peripherals Optical Scanners Engine Management Systems Electronic Thermostats Medical Sensors Medical Catheters High-End HVAC Systems	High Stability Thermistor Fast Response Ultra Miniature Gold Electroded Hermetically sealed	T-Max 250°C Diameter 0.5mm to 3mm typical DUMET Leaded Wire	Ultra Fast response Broad Range of R-T curves



## Injectate/Hypodermic Needle Probes

Engineering Applications	Key Features	Specification Summary	Options
Thermolulution Catheterisation Cancer Research & Treatment Brain Tumor Treatment Tissue Temperature Measurement Open Heart Surgery	Interchangeable to +/- 0.1°C Accuracy Ultra Miniature Fast Response Gold Electroded High Stability Thermistor	T-Max 120°C Diameter 0.56mm upwards typical Injectate - SS Tubing (FED GGN-196) Hypodermic - ASTM SS Tubing	Ultra Fast Response Other Tubing - Copper/Inconel Other Tubing - Monel/Nickel/Titanium Broad Range of R-T curves

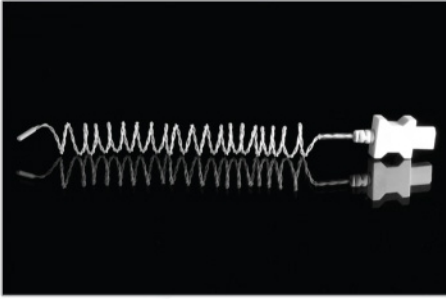


## Hospital Temperature Oral Probe

Engineering Applications	Key Features	Specification Summary	Options
Body Temperature Monitoring Critical Care Thermometry	Interchangeable to +/- 0.1°C Accuracy Ultra Miniature Fast Response Gold Electroded High Stability Thermistor	T-Max 120°C Diameter upto 3mm typical SS 304/316 Probe	Ultra Fast Response Welded Probe Tip Disposable Probe Covers Upto 5m Cable with Phono Jack Broad Range of R-T curves



### Esophageal Catheter Thermistor Probe



Engineering Applications	Key Features	Specification Summary	Options
Core Body Temperature Monitoring Critical Post-Operative care	Food Grade Contact Materials Interchangeable to +/- 0.1°C Accuracy Ultra Miniature Fast Response Gold Electroded High Stability Thermistor	T-Max 120°C Diameter upto 2mm typical ABS Probe Cover Monitor Interconnection R37 = 1355 Ohms +/- 0.3% typical	Gamma-Ray/EtO Sterilised and Packaged Broad Range of R-T curves

### Thermodilution Catheter Thermistor Probe



Engineering Applications	Key Features	Specification Summary	Options
Cardiac Diagnostics Cardiac Blood Flow Evaluation	Food Grade Contact Materials Interchangeable to +/- 0.1°C Accuracy Ultra Miniature Fast Response Gold Electroded High Stability Thermistor	T-Max 120°C Diameter 0.5mm typical R37 = 14004 Ohms +/- 0.5% typical Polyimide Tubing Isomide Coated Nickel Bifilar Wire	Gamma-Ray/EtO Sterilised and Packaged Broad Range of R-T curves

**Beta Value (25/85)°C range of 3000 to 4600 K with tolerances as tight as +/- 0.15%**  
**Our typical Beta Value curves and temperature multiples**

Temperature °C	Material Curve - 2 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3977\text{K}$	Material Curve - 4 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3690\text{K}$	Material Curve - 5 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3969\text{K}$	Material Curve - 6 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3960\text{K}$	Material Curve - 7 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3936\text{K}$
-40	33.36	24.25	34.23	33.00	29.98
-20	9.68	7.94	9.78	9.58	9.11
0	3.26	2.96	3.27	3.24	3.18
25	1.00	1.00	1.00	1.00	1.00
50	0.360	0.389	0.360	0.362	0.366
85	0.107	0.126	0.108	0.108	0.110
100	0.0678	0.0820	0.0683	0.0685	0.0694
120	0.0388	0.0485	0.0392	0.0392	0.0396
150	0.0184	0.0240	0.0187	0.0186	0.0187

Temperature °C	Material Curve - 8 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3435\text{K}$	Material Curve - 9 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3740\text{K}$	Material Curve - 10 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 4252\text{K}$	Material Curve - 12 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3540\text{K}$	Material Curve - 13 Rt / R25 nominal $\beta(25/85)^{\circ}\text{C} = 3627\text{K}$
-40	18.40	27.31	41.54	22.43	24.09
-20	6.72	11.20	11.18	7.49	7.86
0	2.72	3.05	3.52	2.86	2.93
25	1.00	1.00	1.00	1.00	1.00
50	0.416	0.383	0.336	0.403	0.394
85	0.145	0.122	0.092	0.137	0.130
100	0.0973	0.0796	0.0562	0.0910	0.0859
120	0.0596	0.0471	0.0308	0.0552	0.0515
150	0.0308	0.0234	0.0138	0.0283	0.0260



Our fundamental technology base enables virtually any NTC thermistor material system to be developed for our global OEM customers. Top of the range medical and avionics thermistors have been matched to accuracies of better than  $\pm 0.05\%$ ; best in its class globally. From nano-particles, to polycrystalline sintering, multiple electroding, dicing and calibration, our state-of-the-art facility provides comprehensive temperature sensing solutions with excellent quality and reliability performance.





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