



# TE Connectivity

## Sensor Solutions Guide



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# Pressure Sensors

## MS5525DSO Pressure Sensor

### Specifications

- Integrated Digital Pressure Sensor (24-bit  $\Delta\Sigma$  ADC)
- Fast Conversion Down to 1 ms
- Low Power,  $\mu\text{A}$  (Standby  $\leq 0.15 \mu\text{A}$ )
- Supply Voltage: 1.8 to 3.6V
- Range: 1-30 psi
- I<sup>2</sup>C and Spi Interface



### Medical Ventilator

Feature	Function	Benefit
Wide Pressure Range	Addresses a Large Array of Applications	One Product can be Used for Many Applications
Differential Pressure Measurements	Facilitates Flow Rate Measurements	Accurate Monitoring of Critical Medical Equipment



### UAV Airspeed Measurement

Feature	Function	Benefit
Small Footprint and Weight	Fits into Compact Assemblies	Reduces Total Aircraft Weight
Very Low Power Requirements	Enough Energy to Operate the Sensor Efficiently	Helps Extend Flight Times and Battery Life



### HVAC Control

Feature	Function	Benefit
Low Pressure Capability	Able to Monitor Small Pressure Changes	Compatible with Air Pressures Typically Found in Ductwork
Differential Pressure Sensing Capability	Measures the Difference Between Two Applied Pressures	Adapts to Air Flow Measurement Equipment



### Blood Pressure Monitor

Feature	Function	Benefit
Sleep Mode Available	Puts Sensor into Very Low Power Mode	Ideal for Battery Powered Products
High-Accuracy Measurements	Provide Reliable Data to the System	Numbers Provided to the Patient are Correct



# Pressure Sensors

## MS5837-02BA Pressure Sensor



### Specifications

- Small Metal Package – 3.3 x 3.3 x 2.75mm
- 24-bit, Digital Output. I<sup>2</sup>C Interface
- Low Power, 6µA (Stand by ≤0.10 µA @ 25° C)
- Operating Range: 300 to 1,200 mbar, -20° C to 85° C
- Watertight Sealing with 1.8 x 0.8m O-ring



### Fitness and Swim Watch

Feature	Function	Benefit
Designed for Harsh Environments	Able to Withstand Abuse	Ideal for Products Used by Active People
Very Small Footprint	Fit into Compact Assemblies	Adapts Easily to High-Density Packaging
Gel Seal Over Pressure Port	Allows Sensor to be Submerged	Adapts to Water and Underwater Activities
I <sup>2</sup> C Interface	Data Communication	Easy Interface to a Microcontroller. Adapts Easily to Digital Electronics
Sleep Mode	Puts Sensor into Very Low Power Configuration	Extends Device Battery Life



### e-Cigarettes

Feature	Function	Benefit
Very Small Footprint	Fits into Compact Assemblies	Adapts Easily to High-Density Packaging
Gel Seal Over Pressure Port	Protects from Moisture and Debris	Reliable Operation in Harsh Environments



### Mobile Altimeters/Barometers

Feature	Function	Benefit
Very High Resolution	Able to Detect Very Small Changes in Pressure	Accurate Altitude Data for the System
Sleep Mode	Puts Sensor into Very Low Power Configuration	Extends Device Battery Life

# Pressure Sensors

## M5600/U5600 Digital Wireless Transducer



### Specifications

- Digital 24-bit ADC Output, I<sup>2</sup>C Protocol
- Wireless Bluetooth 4.0 Connection
- Battery Powered (CR 2050)
- Weatherproof
- Gage, Sealed, Absolute Compound
- 20° C to 85° C Operating Temperature
- Down to  $\pm 0.1\%$  Pressure Accuracy



### HVACR Systems

Feature	Function	Benefit
Wireless Communications	Send Sensor Data to a Remote System Control	Eliminates Installation Cost of Signal Wiring
Microfused Front End Design	Provides a Ruggedized Sensing Element	Withstands Compressor Pressure Spikes
Available with Integral Valve Depressor	Compatible with Standard Schrader Valves	Easy Attachment to Typical HVAC systems



### Pool/Spa Pumps

Feature	Function	Benefit
316L Stainless Front End	Process Fitting with Integrated Sense Elements	Resists Corrosion from Pool/Spa Water
Sensor is Battery Powered	Self-Contained Power for all Sensor Operations	Eliminates Wiring Costs and Cable Failure Points
Weatherproof IP67 Rated Housing	Protects Sensor Interior from Moisture and Debris	Survives Outdoors without any Special Enclosures



### Engine Test Stands

Feature	Function	Benefit
Wireless Communications and Battery Powered	Makes Sensor Completely Self-Contained	Easy Install and Removal During Test Cycles
Rugged Enclosure with IP67 Rating	Protects Sensor Interior from Abuse	Able to Survive Rough Handling in Use
Many Standard Process Fitting Configurations	Mates with the Device Under Test	Eliminates Fitting Adaptors or Special Connections



### Storage Tank Liquid Level

Feature	Function	Benefit
Accurate Measure at Very Low Pressures	Able to Monitor Small Pressure Fluctuations	Accurate Indication of Liquid Level in the Tank
316L Stainless Front End	Corrosion Resistant Process Fitting	Sensor is Compatible with Different Types of Liquids
Weatherproof IP67 Rated Housing	Protects Sensor Interior from Moisture and Debris	Survives Outdoors without any Special Enclosures

# Humidity Sensors

## HTU2XY Relative Humidity and Temperature Sensor



### Specifications

- Digital Output, I<sup>2</sup>C Interface
- Small 3 x 3 x 0.9mm Footprint
- Each Port Individually Calibrated and Tested
- Adjustable Resolution (8 to 12-bit and up to 12 to 14-bit for RH/T)
- Optional Membrane (for Dust Particles and Water Immersion to allow for IP67)



### Refrigerators

Feature	Function	Benefit
1.5 to 3.6 Operating Voltage	Power for the Sensor	Compatible with any Fridge Power Source
Small size 3.0 x 3.0 x 0.9 mm	Saves Material Costs	Fits Well on High-Density PC Boards



### Medical CPAP

Feature	Function	Benefit
PTFE Filter Over Sensor Active Area	Prevents Accumulation of Debris and Water	Reliability in Hostile Environments
Humidity and Temperature Outputs Available	Act as a Multi-Sensor Module	Able to Calculate Dew Point Providing Three Data Points



### Home Comfort and Security

Feature	Function	Benefit
Small Size SMD Mountable Package	Standard Package for PC Board Assemblies	Fits into Very Dense Electronic Packaging
Accurate Measurement Over Full Range	Measures 0 to 100% RH within Spec	Ensures Proper Operation of System Under any Conditions



# Humidity Sensors

## HM15x0LF Humidity Probe



### Specifications

- Humidity Calibrated within  $\pm 2\%$  @ 55% RH
- Typical 1 to 3.6 VDC Output for 0-100% RH @ 5 VDC Supply
- Ratiometric to Voltage Supply from 4.75 VDC to 5 VDC
- Patented Polymer Structure
- Not Affected by Water Immersion



### HVACR Systems

Feature	Function	Benefit
3 to 10 VDC Power Required	Makes the Sensor Operational	Adapts Easily to Systems that Use Different Voltages
Able to Withstand Contact with Water	Operation is Normal after Drying from Water Contact	No Maintenance after Severe Condensation
Only 2 mA of Current Required	Power for the Sensor	Energy Efficient and Only Low-Voltage Wiring Needed



### Lab Test Chambers

Feature	Function	Benefit
0 to 100% Humidity Measurement	Provide Full Range Output	Covers Every Possible Condition in the Chamber
Analog Output	Provides Sensor Reading to Control System	Analog Signals are Easy to Interface
60mm x 15mm Package Size	Compact Size to be Unobtrusive	Saves Space and Reduces Temperature and Humidity Loading



### Clean Room

Feature	Function	Benefit
Small Size	Convenient Packaging	Unobtrusive and Able to Fit into Tight Spaces
Full Range Sensitivity of 0 to 100% RH	Output Data from the Sensor	Able to Monitor any Condition that Occurs
Low-Voltage and Low-Current Requirements	Provides Device Power	Easy to Power from Convenient Sources



### Environmental Monitoring

Feature	Function	Benefit
Rugged but Simple Enclosure	Protects Internal Components	Able to Survive Outdoor Environments
Low-Voltage and Low-Current Requirements	Provides Device Power	Easy to Power from Energy Harvested Sources
No Damage from Exposure to Water	Sensor Recovers Fully when Dried Out	Withstands Precipitation and Condensation

# Temperature Sensors

## TSYS01/TSYS02 Digital Temperature Sensors



### Specifications

- High-Accuracy (0.1% Depending on Product and Temperature Range [-40° C to 125° C])
- I<sup>2</sup>C Interface
- Small TDFN8 Package
- Low Power Consumption <420µA (Standby < 0.14 µA)



### HVACR Systems

Feature	Function	Benefit
Factory Calibrated	True Plug and Play Operation	Accurate Inputs to the Central Control System; No Calibration
High-Accuracy	Measure Ambient Air Temperature or System Temperatures	Provides Accurate Reading for Personal Comfort or for Efficient Machine Operation



### Home Healthcare

Feature	Function	Benefit
Fast Conversion Time	Provides Fast and Accurate Temperature Readings	Allows Accurate Readings and Continuous Monitoring of Critical Information
Complete Solution – System in a Package	Combines Temperature Sensor, ADC Converter and Digital Output Circuitry	Saves Design Time, Lower Overall Cost, Higher Accuracy



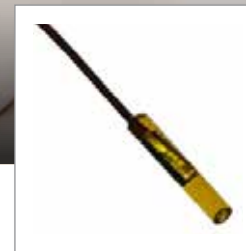
### Wireless Systems



Feature	Function	Benefit
Very Low Power	Only Active when Data is Needed; Operates with Only µA of Power	Excellent for Battery Powered Systems; Minimizes Power Drain
Digital Interface	Utilize Industry Standard I <sup>2</sup> C or Spi Interfaces	Easy to Interface to; Minimizes Programming

# Temperature Sensors

## MBD and MCD Series Thermistor Probes



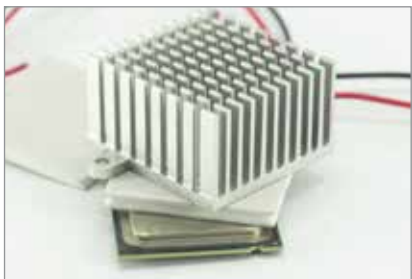
### Specifications

- Fast Time Response (400 ms in Water)
- Small Tip Diameter (1.1mm Max)
- Various Lead Lengths Available
- -40° C to 125° C Operating Temperature



### Medical Catheters

Feature	Function	Benefit
Small Size	Designed for Range of Intrusive Catheter Based Products	More Comfortable to Patient, Less Post Operative Issues
Very Fast Time Response	Fast Response to Changes in Temperature	Allows Doctors to See Activity in Real Time
Standard Polyimide Housing	Provides Consistent Size and Protects Sensing Element and Insulates Sensor Electrically	Allows for Easy, Cost Effective Installation and Rugged Design



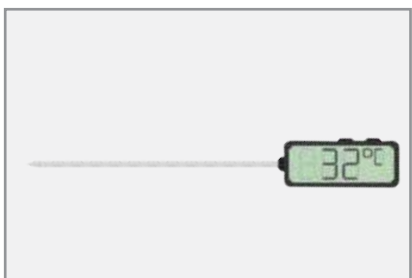
### Peltier Coolers

Feature	Function	Benefit
Rugged Design	Suitable for a Range of Industrial and Medical Applications	Provides Excellent Reliability
Accurate Thermistor Sensor	Provides Accurate Feedback Information to Controller	Allows for Easy Installation on a Variety of Tube Sizes
Customizable Tolerances and Lengths	Usable in a Variety of Locations in the System	Provides Good Cost/ Performance Ratio



### Flow Sensors

Feature	Function	Benefit
Small Size	Provides Fast Response to Changes in Flow	Allows for Easy Analysis of Flow Rates and Changes
Compatible Materials	Probe Materials Compatible with a Wide Range of Applications	Allow Easier Approval for New Products
Available in a Range of Sizes and Other Options	Compatible with Most Control Systems	Allows Faster Time to Market and More Choices For Designers



### Miniature Probe Assemblies

Feature	Function	Benefit
Custom Lengths and Other Options Available	Allows Use in Wide Range of Systems	Eliminates Splices and Minimizes Overall Cost
Small, Consistent Head Size	Provides Rugged and Reliable Design	Provides Cost Efficient Assembly and Reliable Designs
Simple, Elegant Design	Allows Range of Options and Efficient Assembly	Maximizes Flexibility and Minimizes Cost



# Temperature Sensors

## TSD Series Digital Thermopile Sensors



### Specifications

- 0 - 100° C Measurement Range
- -10° C to +85° Operating Temperature
- Up to  $\pm 1^\circ$  C Accuracy
- I<sup>2</sup>C Interface
- Low Current Consumption ( 100 mA)



### Temperature Scanning

Feature	Function	Benefit
Non-Contact Measurement	Sensor Element Does Not Have to Contact Skin	Prevents Contamination and Debris Collection
Digital Output Signal	Basic Sensor Information for the Electronics	Digital Output is Easy Interface with a Microprocessor
Small Size	Ability to Fit Limited Spaces	Easy to Apply to Handheld Devices and Products



### Microwave Oven

Feature	Function	Benefit
Thermopile Field of View	Accommodates Various Microwave Cooking Areas	Insensitive to the Size of Food Item
Non-Contact Measurement	Can Measure Temperature Accurately from a Distance	Measure Food Temperature While it is Rotating
Sensor Housing is Sealed	Eliminates Problems from Dust, Dirt, Debris	Food Spatter and Spills Do Not Damage the Sensor



### Roll/Drum Printer, Copiers and Laminators

Feature	Function	Benefit
Non-Contact Measurements	Measures Temperature without Physical Contact	Easy to Measure the Temperature of Rotating Surfaces
Narrow Field of View	Measures a Small Surface Area Accurately	Is not Affected by Background Temperatures
Digital Signal Output	Sends Digital Temperature Info to System Controller	Simple Interface, No A/D Conversion Required

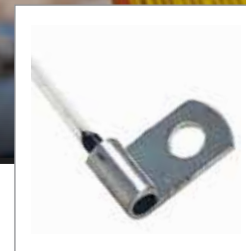


### Presence/Occupancy Detection

Feature	Function	Benefit
Continuous Detection of Thermal Sources in a Space	Sensitive to Single or Multiple Heat Sources	Excellent for Occupancy Sensing of Rooms
Signal Path from Heat Source is DC Steady State	Continuous Output Signal when Heat Source Present	Monitor a Space when Occupants are Stationary
Narrow Field of View Versions are Available	Allows Sensor to Focus on a Small Area of Interest	Area Discrimination when Optic Elements (Lens) Used

# Temperature Sensors

## Surface Mount Flag Terminal Temperature Probe



### Specifications

- Various Lead Lengths and Mounting Holes Available
- Available with Connector Attachment
- -40° C to 125° C Operating Temperature
- Available in a Range of R/T Curves



### Power Supplies/Heatsinks

Feature	Function	Benefit
Rugged Construction	Designed for Long Life	Minimizes Field Failures and Need for Replacement
Copper Housing	Fast Thermal Transfer	Overheat and Failure Conditions are Sensed Quickly
Available with Wide Range of R25 Values and Curves	Compatible with Most Standard Controls	Can be Used with Most Temperature Control Systems Worldwide



### Servo Motors

Feature	Function	Benefit
Operating Temp Range from -40° C To +125° C	Covers Most Industrial Application Temperature Ranges	One Design Fits Many Applications
Range of Ring Terminal Sizes Available	Suitable for a Wide Range of Motor Sizes	Design Can be Used on a Range of Products
Customizable Tolerances and Accuracies	Usable in a Variety of Locations in the System	Provides Good Cost/Performance Ratio



### Appliances

Feature	Function	Benefit
NTC Thermistor Element	Provides for a Cost Effective Design	Can be Used in Cost Critical Applications
Available in a Range of Wire Lengths and Connectors	Flexible Design, Compatible with many Systems	Eliminates Fitting Adaptors or Special Connections



### Alternative Energy

Feature	Function	Benefit
Small Footprint and Weight	Fits into Compact Assemblies	Reduces Total Weight and Cost
Can Accommodate Thermistors, RTDs and other Sensing Elements	Compatible with Standard Solar Controls	Can be Used with most Systems Worldwide

# Temperature Sensors

## TPE Overmold Probe (With and Without SS Housing)



### Specifications

- Available Stainless Steel Probe Head
- 24 AWG Double Insulated Cable
- IP68 Rated
- -40° C to 125° C Operating Temperature
- Variety of Connector Types Available



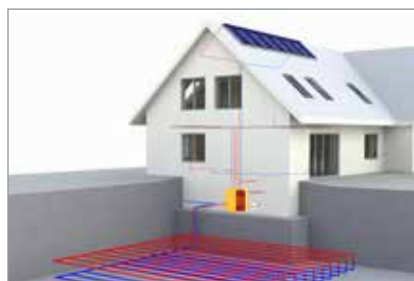
### Residential HVAC and Commercial Chiller Systems

Feature	Function	Benefit
Rugged Construction	Designed for Long Life	Minimizes Field Failures and Need for Replacement
Standard Housing Design	Can be Used With Or Without Clip	Allows for Easy Installation in Chiller Systems
Available with Wide Range of R25 Values and Curves	Compatible with Most Standard HVAC Controls	Can be Used with Most HVAC Systems Worldwide



### Commercial Refrigeration

Feature	Function	Benefit
IP68 Rated	Great for High Moisture and Freeze/Thaw Applications	Provides Excellent Reliability
Available with a Range Of Clip Sizes	Can be Mounted Directly to Refrigerant Tubes	Allows for Easy Installation on a Variety of Tube Sizes
Customizable Tolerances and Accuracies	Usable in a Variety of Locations in the System	Provides Good Cost/Performance Ratio



### Heat Pumps

Feature	Function	Benefit
Double Insulated Design	Provides Good Electrical/Mechanical Specifications	Allows for Easy Approval for Regulatory Controlled Systems
Rugged Design with IP68 Rating	Highly Moisture Resistant and Good for Freeze/Thaw	Provides Years of Reliable Operation in Critical Systems
Available in a Range of Connector Options	Compatible with Most Control Systems	Eliminates Fitting Adaptors or Special Connections



### Container Storage

Feature	Function	Benefit
Custom Lengths and Other Options Available	Allows Use in Wide Range of Systems	Eliminates Splices and Minimizes Overall Cost
Overmolded TPE Subassembly	Provides Rugged and Reliable Design	Prevents Field Failures
Simple, Elegant Design	Allows Range of Options and Efficient Assembly	Maximizes Flexibility and Minimizes Cost



# Ultrasonic and Optical Sensors

## AD-101 Air Bubble Detector



### Specifications

- 0° C to 40° C Temperature Range
- Response Time – 0.2 ms
- Input – 5 VDC – 24 VDC
- Output – 3.3 V ITL Logic
- Tubing Size – 3-10 mm
- Detects Bubble Size as Small as 70% of Tube Inner Diameter



### Medical Infusion Pumps

Feature	Function	Benefit
Non-Invasive Measurements	Detect Bubbles without Making Contact to the Liquid	Eliminates the Chance of Contamination
Compatible with Different Tube Diameters	Provides Good Acoustic Contact with the Tubing	Able to Work with a Variety of Infusion Systems



### Food & Beverage Production

Feature	Function	Benefit
Detects Large Interruptions in Liquid Flow	Senses any Bubble Size Greater than 70% of Tube I.D.	Ensures Proper Filling of Package Containers
Non-Invasive Detection	Measures Bubble through Tubing Wall	Assures Food Safety by Eliminating Contamination



### Hydroponic Farming

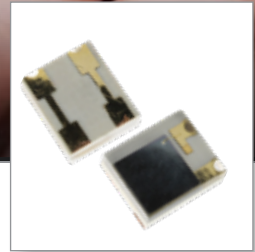
Feature	Function	Benefit
Able to Determine a No-Liquid Condition in the Tube	Response to Air in the Tubing	Quickly Detects Interruption of Irrigation Flow
Adapts to Various Size Tubing	Connection of the Sensors to the Liquid Flow	Eliminates Need for Special Adaptors



### Pharmaceutical Production

Feature	Function	Benefit
Detects Large Interruptions in Liquid Flow	Senses any Bubble Size Greater than 70% of Tube I.D.	Ensures each Package Contains Proper Medication Dose
Continuous Self Test Feature in the Sensor	Indication Provided if Sensor is Malfunctioning	Ensures Vial is Filled with Proper Dosage of Medication

# Ultrasonic and Optional SMT Photo Optic/SPO<sub>2</sub> Components



## Specifications

- Four Standard IR LED Wave Length Choices – 880 nm, 905 nm, 910 nm and 940 nm
- Fast Response, Highly Efficient
- Bio Compatible Packages Available



## Pulse Oximetry

Feature	Function	Benefit
Tight Tolerance on Red LED Wavelength	Precision is Driven by Proprietary Emitters Spectrally Matched to Function with a Detector	More Precision in Acute Medical Conditions Can Mean the Difference Between Life and Death
Reflow Solderable	Decreases Manual Soldering Processes	Enable Medical Device Designers to Design Products with Reduced Overall Cost Due to Reduced Labor as well as Increased Quality



## Finger Probes

Feature	Function	Benefit
High-Reliability	Proven Track Record in Quality and Reliability	Great Overall Value in Cost and Performance
Flexibility to Meet any Customer's Requirements	Dual Drive Emitters, both Red and IR	Able to Meet a Wide Range of Customer Specifications and Needs



## Ear Probes

Feature	Function	Benefit
Scalable, Value-added Manufacturing	Can Meet Large Component Volume Requirements	On-Time Delivery, even in Large Quantities Saves Time and Money
Gold Contacts	Make Electrical Connections	Compatible with Many Contact Surfaces (Plated Header, Solder, Wire Bond Wire)



## Disposable

Feature	Function	Benefit
Spectrally Paired Photo-Detector Components	Matches Wavelength of Emitter LEDs	Allow Easy and Reliable Matching of Emitter and Detector
Includes both Photo Optic Components and Complete Sensor Solutions	Wide Range of Products	Provides Greater Flexibility for OEM Manufacturers

# Position Sensors

## DOG2 MEMs Inclinometer



### Specifications

- Dual Axis
- Measurement Range  $\pm 25^\circ$ ,  $\pm 45^\circ$  and  $\pm 90^\circ$
- Voltage Output
- 8 to 30 VDC Supply Voltage
- Digital Signal Processing (DSP)
  - Filter
  - Temperature Compensation
- 12-bit Resolution



### Cranes and Hoists

Feature	Function	Benefit
Simple Two-Bolt Mounting Feature	Attach Sensor to Moving Equipment	Simple Attachment to Any Available Mounting Surface
Rugged Construction	Protect the Sensor Components and Corresponding Benefit	Sensors Can Be Used in Harsh Environments



### Dump Trucks

Feature	Function	Benefit
Senses in Both X and Y Axis	Determine Tilt in any Direction	Adapts Well to Mobile Applications
J1939 CAN Interface	Communicates Data to the System	Compatible with Industry Standard Systems



### Bucket Position

Feature	Function	Benefit
Angular Capability of $\pm 90^\circ$	Covers a Large Range of Motion	Adapts to Applications with Significant Movement
IP65 Enclosure	Protect Sensor Interior from Dust, Dirt and Debris	Reliable Operation in "Dirty" Environments



### Cabin/RV Leveling

Feature	Function	Benefit
$\pm 0.5^\circ$ Accuracy	Sends Precision Data to the Host System	Leveling Feature Provides Operator Comfort
Operating Temperature is -40 to $+85^\circ\text{C}$	Accurate Tilt Information in a Variety of Conditions	Reliable Operation in Environmental Extremes



# Product and Market Matrix



		Aerospace and Defence	Agriculture	Appliances	Automation and Control	Automotive	Data and Devices	Industrial	ICT	Intelligent Buildings	Medical	Oil and Gas	Test and Measurement
MS5525DSO Pressure Sensor				◆	●		●	●		●	●	●	
MS5837-02BA Pressure Sensor							●				◆		
M5600 Digital Wireless Transducer			●		◆			●		●			
U5600 Digital Wireless Transducer					◆					●	●	●	
HTU2XY Relative Humidity and Temperature Sensor			◆	●	●	◆				●	●		
HM1500LF Humidity Sensor			◆					●		●			◆
TSYS01/02 Digital Temperature Sensor				◆	●		●			●	●		
TSD Series Digital Thermopile Temperature Sensors					◆			●		●			
Surface Mount Flag Terminal Temperature Probe				◆	◆			◆		●			
TPE Overmold Temperature Probe				●	◆			◆		●			
TPE Overmold Temperature Probe with Stainless Steel Housing				◆	◆			◆		●			
Pipe Probe Temperature Sensor								◆		◆			
MBD and MCD Series Thermistor Probes					●			●			●		◆
10K3CG Leadless Chip Gold NTC Temperature Sensor		◆					●	●					
AD-101 Ultrasonic/Optic Sensor			●	●				●			●		
SMT Photo Optic/SP02 Components											●		
DOG2 MEMS Inclinometer		◆	◆		◆				●				

◆ Market application examples found in the guide

● Market served but not represented in guide

IoT Ready Sensor



# Why Buy from the Specialist in Electronic Component Distribution?

Founded in 1971, TTI has steadily grown to become the world's leading interconnect, passive, electromechanical and discrete component distributor in the industry. The company was founded on the premise that passive component purchasing could be made more efficient by offering product specialization, customer-driven service, and proprietary supply chain solutions.



## Knowledgeable Product Experts

Specialization allows TTI product managers to provide much better product insight to support your manufacturing from design through production. TTI Specialists' commitment to our customers is key to our continued success.



## Broader and Deeper Inventories

TTI maintains extensive component inventories, stocking more than 500,000 part numbers in North America and over 850,000 globally – that's more interconnect, passive, electromechanical and discrete inventory available than from any other source.



## AIM - Advanced Inventory Management Platform

TTI's proprietary supply chain system is specifically designed for managing IP&E products and partnerships with premier manufacturers. This allows us to provide the BOM coverage necessary to deploy comprehensive solutions that reduce total cost of ownership and mitigate line down risk.

## Quality and Reliability

TTI is the first distributor to have all global warehouse locations ISO registered and currently are certified to ISO 9001 with AS9100C and ISO 14001 in North America, ISO 9001, EN 9100, ISO 14001 and EN 9120 in TTI Europe and ISO 9001 in TTI Asia.

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