TT Electronics

Sensors and Specialist Components

Product Selection Guide

OPTEK Technology BI Technologies Roxspur Measurement & Control

TT Electronics

About TT Electronics

TT Electronics is a global provider of engineered electronics for performance critical applications.

We harness our leading expertise to engineer electronics that put our customers ahead.

TT Electronics has years of experience and expertise in engineering and delivering electronics for applications in the harshest environments across industrial, transportation, aerospace, defence and medical markets.

We work hard to develop strong long-term relationships with our customers, many of which are global leaders, working on cutting-edge innovation in some of the fastest growing markets in the global economy. We are proud to be able to say that our customers regularly seek us out as technology partners because they value us most for our:

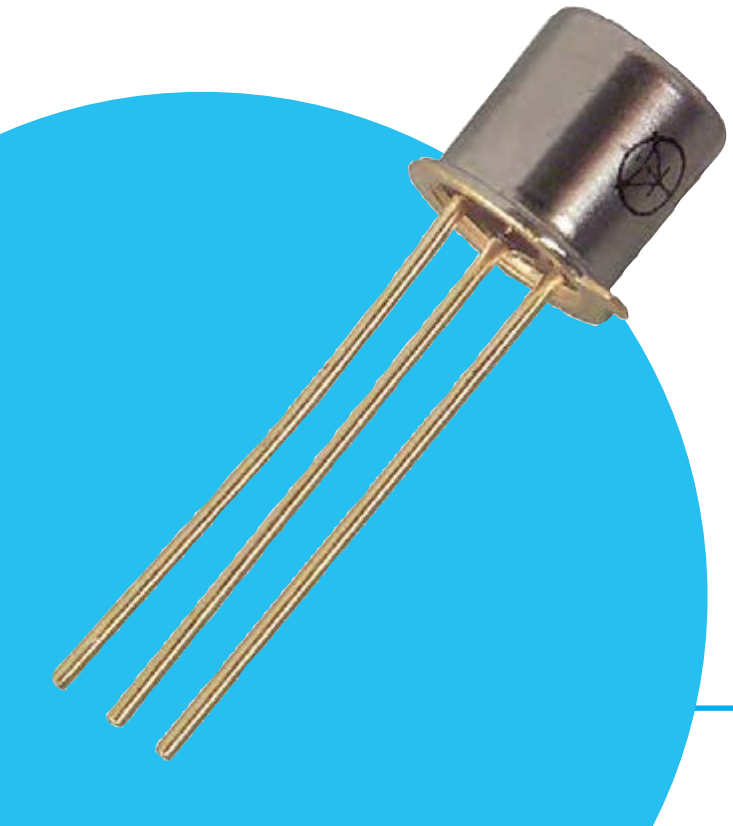
- Expertise to provide electronics products and solutions that perform to the highest standards
- Personalised and responsive service, which because of our global presence we can deliver wherever they are in the world.

We love the challenges that our customers bring us and we work hard to develop solutions that work best for them.

Sensors and Specialist Components

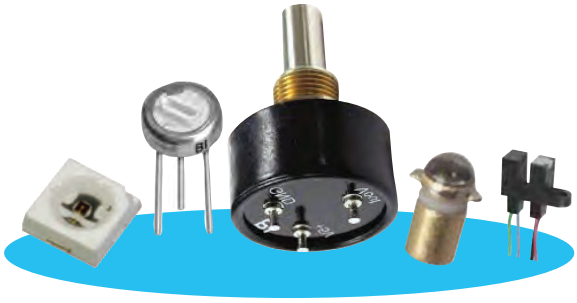
About

- The Sensors and Specialist Components division consists of optoelectronics, torque and positioning sensors, temperature, flow, and pressure sensors, magnetics, and resistors. This catalog showcases our optoelectronics, torque and position sensors, temperature, flow and pressure sensors manufactured by Optek, BI Technologies, and Roxspur Measurement and Control.
- We provide reliable standard and custom sensing solutions for industrial, aerospace and defence, oil and gas, process manufacturing, medical equipment, and off-road transportation sectors.
- We offer a diverse product portfolio, comprised of multiple core sensing technologies which address a broad range of measurement requirements, including position, temperature, pressure, flow, level and fluid quality, as well as calibration services.
- We have the full in-house capabilities to offer custom solutions with competitive lead times.
- We have earned a strong industry reputation as a trusted partner for industry leading OEMs, often times providing complex custom solutions for the most challenging applications.
- We have a dedicated global sales and engineering team that is entirely focused on delivering sustainable growth for TT Electronics and its customers.
- We seek to become a valued strategic partner to our end customers, helping them to anticipate present and future market needs.
- We offer field-proven, high-reliability designs that are rarely made obsolete, allowing our customers to warranty and service their own finished product designs with confidence.



Measurement Solutions

Position and Torque

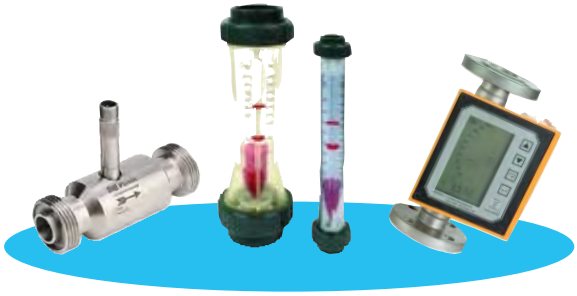


- Contact and non-contacting position and torque sensors; fibre optics; magnetics; optocouplers, rotary encoders
- Optical encoder switches; infrared emitting diodes; photodiodes; LED/sensor pairs; transmissive switches

Pressure

- Ceramic sensors and submersible transducers; pressure transmitters; flush mount pressure transducers; abrasive media sensors

Flow



- Glass and plastic VA; metal VA and ultrasonic flowmeters; control valves; sensor transmitters; dataloggers and controllers

Temperature

- Thermocouples, refractory sheaths and cables, transmitters; thermal imaging; infrared thermometers; multi-spot thermometers; averaging thermometers

Calibration Services

- Onsite or in-house UKAS accredited calibration and certification under BS/EN ISO17025 accredited procedures

Markets we serve

Continuous investments in R&D and the very latest in manufacturing equipment ensure that TT Electronics' industrial sensing and control products keep pace with evolving customer needs.

Oil and Gas

- Exploration
- Distribution
- Refining

Continuous Process

- Continuous flow manufacturing of chemicals, synthetic fibres, papers, metals and glass

Utilities

- Power generation, transmission and distribution
- Water and wastewater treatment
- Irrigation systems

Aerospace and Defence

- Aircraft and satellite
- Defence electronics
- Unmanned aerial vehicles
- Cockpit controls

Discrete Manufacturing

- Production of factory automation machinery and supporting equipment for pumping, heating, fluid handling, and refrigeration

Medical Equipment

- Medical diagnostics
- Portable patient care equipment
- Drug therapy dispensers
- Blood analysers

Offroad Vehicles

- Materials handling
- Agricultural
- Construction
- Recreational (ATVs)

Industrial Printing

- High-end industrial printing on paper and plastic
- 3D printing

Banking and Security

- Automated teller machines
- Safety equipment
- Identification equipment

Discretes

The vast portfolio of discrete components offered by TT Electronics includes a full line of infrared emitting diodes, in a choice of either hermetic or plastic, reflective object sensors, silicon phototransistors and Photodarlingtons, optically coupled isolators, high-voltage isolators, slotted optical switches, and hallogic hall effect sensors.

Hermetic Infrared Emitting Diodes

Model Number	OP132	OP133W	OP232	OP232W	OP233	OP233W	OP234W
Package	TO-46 Dome Lens	TO-46 Flat Window	TO-46 Dome Lens	TO-46 Flat Window	TO-46 Dome Lens	TO-46 Flat Window	TO-46 Flat Window
LED Wavelength (nm)	935	935	890	890	890	890	890
Output Power (mW/cm^2) Min/Max	4.0/N/A	5.0/N/A	2.0/6.0	3.5/7.0	3.0/N/A	5.0/N/A	5.0/N/A
I_F (mA) Typ/Max	50/100	20/100	50/100	20/100	50/100	20/100	20/100
Beam Angle (Degrees)	18	50	18	50	18	50	50
Lead Length	0.5"	0.5"	0.50"	0.50"	0.50"	0.50"	0.50"

Hermetic Infrared Emitting Diodes

Model Number	OP224
Package	Dome Lens
LED Wavelength (nm)	890
Input Radiance E_E (mW/cm^2)	3.5
I_F (mA) Typ/Max	50/100
Viewing Angle (Degrees)	24

Plastic Infrared Emitting Diodes

Model Number	OP140A	OP166A	OP240A	OP240B	OP245A	OP245B
Package	Sidelooker 0.060" Base	T-1 0.100" Lead Spacing	Sidelooker 0.060" Base	Sidelooker 0.060" Base	Sidelooker 0.100" Base	Sidelooker 0.100" Base
LED Wavelength (nm)	935	935	890	890	890	890
Output Power (mW/cm^2) Min/Max	0.40/N/A	1.95/N/A	0.60/N/A	0.40/1.20	0.60/N/A	0.40/1.20
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50
Beam Angle (Degrees)	40	18	40	40	40	40
Lead Length	0.50"	0.50"	0.50"	0.50"	0.50"	0.50"

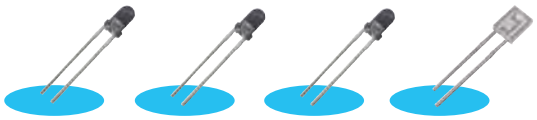
Plastic Infrared Emitting Diodes

Model Number	OP265FAB	OP266W	OP291A	OP295A	OP298A
Package	T-1	T-1 Flat 0.100" Lead Spacing	T-1 3/4	T-1 3/4	Plastic TO-18
LED Wavelength (nm)	850	890	890	890	890
Output Power (mW/cm^2) Min/Max	7.5/12.5	1.00/N/A	16.0/N/A	44.0/N/A	3.0/N/A
I_F (mA) Typ/Max	20/50	20/50	50/100	100/1,500 Pulsed	50/100
Beam Angle (Degrees)	18	90	50	50	60
Lead Length	0.50"	0.50"	0.69"	0.69"	0.50"

Reflective Object Sensors

Model Number	OPB608A	OPB608B	OPB608V	OPB710F	OPB730	OPB730F
Package	Mini-Cube Reflective	Mini-Cube Reflective	Mini-Cube Reflective	O-46 Reflective	TO-46 Reflective	TO-46 Reflective
Wavelength (nm) (Typ)	890	890	850	935	935	935
Sensor Type	Rbe Transistor	Rbe Transistor	Rbe Transistor	Transistor	Darlington	Darlington
Reflection Distance Inch (mm)	0.050" (1.27 mm)	0.050" (1.27 mm)	0.050" (1.27 mm)	0.250" (6.35 mm)	0.250" (6.35 mm)	0.250" (6.35 mm)
$I_{C(ON)}$ (mA) Min	2	1	5	0.15	1.00	1
I_F (mA) Typ/Max	20/50	20/50	7/12	20/50	20/50	20/50
V_{CE} (V) Typ/Max	30	30	30	30	15	15
Lead Length/Spacing	0.18"/0.24"	0.18"/0.24"	0.18"/0.24"	0.50"	0.50" DIA	0.50" DIA

Infrared Selected NPN Silicon Phototransistors

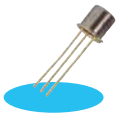


Model Number	OP505A	OP506A	OP506B	OP550A
Package	T-1	T-1	T-1	Sidelooker
Light Current $I_{C(ON)}$ (mA) Min/Max	4.30/N/A	4.30/N/A	2.15/5.95	2.55/N/A
V_{CE} (V) Max	30	30	30	30
Input Power E_E (mW/cm^2)	1.00	1.00	1.00	1.00
Viewing Angle (Degrees)	25	25	25	60
Lead Length/Spacing	0.5"/0.050"	0.5"/0.100"	0.5"/0.100"	0.5"/0.100"

NPN Plastic Silicon Phototransistors

Model Number	OP593A
Package	Plastic TO-18
Light Current $I_{C(ON)}$ (mA) Min/Max	3.00/N/A
V_{CE} (V) Max	30
Input Power E_E (mW/cm^2)	1.70
Viewing Angle (Degrees)	130
Lead Length	0.75"

NPN Silicon Phototransistors

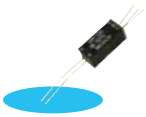



Model Number	OP800A	OP802WSL	OP803SL	OP805SL
Package	TO-18/46 Dome Lens	TO-46 Flat Window	TO-18/46 Dome Lens	TO-18/46 Dome Lens
Light Current $I_{C(ON)}$ (mA) Min/Max	3.60/N/A	2.5/N/A	4.00/8.00	15.00/N/A
V_{CE} (V) Max	30	30	30	30
Input Power E_E (mW/cm^2)	0.5	5.00	5.00	5.00
Viewing Angle (Degrees)	25	75	25	25
Lead Length	0.5"	0.5"	0.50"	0.50"

NPN Silicon Photodarlington

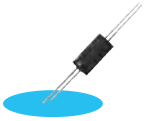
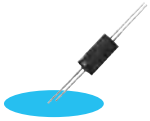
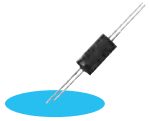
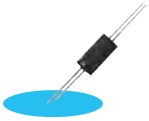
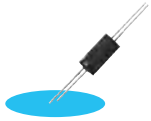
Model Number	OP535B
Package	T-1 0.050" Lead Spacing
Light Current $I_{C(ON)}$ (mA) Min/Max	3.5/32.0
V_{CE} (V) (Max)	2.0/15.0
Input Power E_E (mW/cm^2)	0.13
Viewing Angle (Degrees)	25
Lead Length	0.5"

Optically Coupled Isolators



Model Number	OPI120
Package	Axial Channel
LED Wavelength (nm)	890
Sensor Type	Transistor
CTR (Min/Max)	20
Isolation Voltage	15 kV
I_F (mA) Typ/Max	10/50
V_{CE} (V) (Max)	25
Lead Length/Spacing	0.40"/0.75"

Optically Coupled Isolators

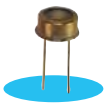






Model Number	OPI110C	OPI150	OPI1264A	OPI1264B	OPI1264C
Package	Axial-Cylindrical	Axial-Cylindrical	Axial-Cylindrical	Axial-Cylindrical	Axial-Cylindrical
Wavelength (nm) (Typ)	890	890	890	890	890
Sensor Type	Transistor	Transistor	Transistor	Transistor	Transistor
CTR (Min/Max)	100/N/A	10	25/N/A	50/125	100/N/A
Isolation Voltage	10 kV	50 kV	10 kV	10 kV	10 kV
I_F (mA) Typ/Max	10/40	16/50	10/40	10/40	10/40
V_{CE} (V) (Max)	30	5/30	30	30	30
Lead Length/Spacing	0.50"/0.55"	0.40"/3.16"	0.50"/0.55"	0.50"/0.55"	0.50"/0.55"

Photologic® Sensor


Model Number	OPL530	OPL550
Package	Sidelooker 0.060" Base	Sidelooker 0.060" Base
Photologic	10K Pull-Up	Totem-Pole
Input Power E_E (mW/cm^2) Min/Max	0.12/0.38	0.25/2.4
V_{CC} (V) (Min/Max)	4.5/16.0	4.5/5.5
Lead Length/Spacing	0.50"/0.075"	0.50"/0.075"

Photodiode Sensor

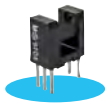




Model Number	OP906	OP913WSL	OP950
Package	T-1	TO-5	Sidelooker 0.060" Base
Light Current I_C Min/Max (µA)	16.0/35.0	40.0/N/A	8.0/18.0
V_R (V) (Max)	60	32	60
Input Power E_E (mW/cm^2)	0.5	5.0	1.00
Viewing Angle (Degrees)	95	80	95
Lead Length/Spacing	0.50"/0.100"	0.50"/0.200"	0.50"/0.100"

Slotted Optical Switch

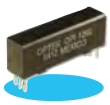

Model Number	OPB610	OPB620
Package	Slotted N	Slotted N
Wavelength (nm) (Typ)	890	890
Slot Width/Depth	0.150"/0.240"	0.190"/0.285"
Aperture Emitter/Sensor	0.06"/0.06"	0.06"/0.06"
I_F (mA) Typ/Max	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	1.0 /N/A	1.0 /N/A
V_{CE} (V) (Max)	24	24
Lead Length/Spacing	0.100"/0.275"	0.100"/0.320"

Photologic® Slotted Optical Switch



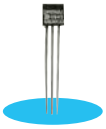

Model Number	OPB625	OPB627
Package	Slotted N	Slotted N
Sensor Type	10K Pull-up	Inv-10K
Gap Width/Depth	0.190"/0.285"	0.190"/0.285"
Aperture Emitter/Sensor	0.06"/0.06"	0.06"/0.06"
Wavelength (nm) (Typ)	890	890
I_F (mA) Typ/Max	20/50	20/50
I_{CCL}/I_{CCH} (mA) Max	12/12	12/12
V_{CC} (V) (Max)	4.5/16.0	4.5/16.0
Lead Length/Spacing	0.100"/0.320"	0.100"/0.320"

High-Voltage Isolators




Model Number	OPI1266	OPI1268
Package	Side Channel	Side Channel
LED Wavelength (nm)	890	890
Sensor Type	Open Collector	Open Collector
Isolation Voltage	16 kV	16 kV
CTR (Min/Max)	Logic 15 mA	Logic 15 mA
tPLH/tPHL Typ (ns)	800/800	100/200
I_F (mA) Typ/Max	13.5/50	10/50
V_{CE} (V) (Max)	7	18
Lead Length/Spacing	0.12"/0.98"	0.40"/0.75"

Hallogic Hall Effect Sensors

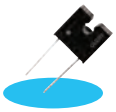
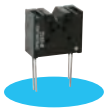


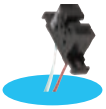
Model Number	OH090U
Package	Side Sensing TO-92
Output Type	Uni-Polar Non-Latching
Operating Point Gauss (Min/Typ/Max)	0/90/180
Release Point Gauss (Min/Typ/Max)	-100/65/100
Hysteresis Gauss (Min/Typ/Max)	10/25/100
V_{CC} (Volts) Min/Max	4.5/24.0

Assemblies

TT Electronics' standard assemblies provide space saving solutions of up to 80 %, as compared to discrete packaged parts. A full range of available products includes tube liquid sensors, optical slotted switches, reflective object sensors, optical emitters and sensor pairs, dual encoders, and long distance reflective and optical switches. TT Electronics can provide complete design and manufacturing services of all assemblies. This includes final assembly and 100 % testing, as well as standard chip carrier and custom packaging options. Product ranges include an extensive range of unique shapes, mounting configurations and material combinations.

Tube Liquid Sensor




Model Number	OPB350	OPB350L062	OPB350W062Z	OPB350W125Z	OPB350W250Z
Package	Slotted N	Slotted N	Slotted T	Slotted T	Slotted T
LED Peak Wavelength (nm)	890	890	890	890	890
Tube Size	0.125"	0.062" [1.57 mm]	0.062" [1.57 mm]	0.125" [3.18 mm]	0.250"
$I_{C(ON)}$ Ratio Typ	01:03.0	01:03.0	01:03.0	2.5	01:02.3
I_F (mA) Typ/Max	5/50	5/50	5/50	5/50	5/50
V_{CE} (V) (Max)	30	30	30	24	30
Lead Length/Spacing	0.33"/0.32"	0.33"/0.32"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

Slotted Optical Switches

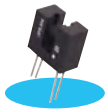




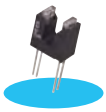


Model Number	OPB200	OPB365T55	OPB380P55Z	OPB380T51Z	OPB390L11Z	OPB390P11Z	OPB390T51Z
Package	Slotted L	Slotted T	Slotted P	Slotted T	Slotted L	Slotted P	Slotted T
Wavelength (nm) (Typ)	890	890	890	890	890	890	890
Slot Width/Depth	0.200"/0.320"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Aperture Emitter/Sensor	0.06"/0.06"	0.05"/0.05"	0.05"/0.05"	0.05"/0.01"	0.01"/0.01"	0.01"/0.01"	0.05"/0.01"
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	1.0/6.0	3.5/14.0	1.0/5.0	2.5/10.0	1.0/5.0	1.0/5.0	2.5/10.0
V_{CE} (V) (Max)	30	30	30	30	30	30	30
Lead Length/Spacing	0.425"/0.400"	0.425"/0.320"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

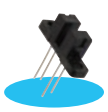
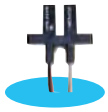
Slotted Optical Switches (Continued)



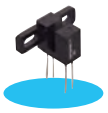



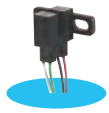
Model Number	OPB390T55Z	OPB804	OPB816Z	OPB818	OPB820S10	OPB821S5Z	OPB825
Package	Slotted T	Slotted N	Slotted T	Slotted N	Slotted P	Slotted P	Slotted N
Wavelength (nm) (Typ)	890	935	890	890	890	890	890
Slot Width/Depth	0.125"/0.345"	0.150"/0.330"	0.200" / 0.635"	0.200"/0.250"	0.125"/0.345"	0.080"/0.255"	0.160"/0.285"
Aperture Emitter/Sensor	0.05"/0.05"	0.06"/0.06"	0.05"/0.01"	0.06"/0.06"	0.04"/0.01"	0.04"/0.005"	0.06"/0.06"
I_F (mA) Typ/Max	20/50	20/30	20/50	20/30	20/50	20/50	20/30
Light Current $I_{C(ON)}$ (mA) Min/Max	3.5/14.0	0.5/N/A	N/A/30	0.1/N/A	0.50/N/A	0.30 /N/A	0.5/N/A
V_{CE} (V) (Max)	30	30	30	30	30	30	30
Lead Length/Spacing	24"/26 AWG Wire	0.425"/0.300"	24"/26 AWG Wire	0.425"/0.400"	0.425"/0.275"	24"/26 AWG Wire	0.200"/0.300"

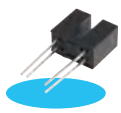



Model Number	OPB828D	OPB829CZ	OPB829DZ	OPB830W11Z	OPB830W55Z	OPB831W55Z	OPB832W55Z
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T
Wavelength (nm) (Typ)	890	890	890	880	880	890	880
Slot Width/Depth	0.120"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"
Aperture Emitter/Sensor	0.06"/0.01"	0.06"/0.06"	0.06"/0.01"	0.01"/0.01"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	1.8/N/A	1.8/N/A	1.8/N/A	0.625/N/A	0.625/N/A	1.25/N/A	2.25/N/A
V_{CE} (V) (Max)	30	30	30	30	30	30	30
Lead Length/Spacing	0.425"/0.220"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire



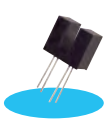






Model Number	OPB840L11	OPB840W11Z	OPB840W51Z	OPB840W55Z	OPB842W51Z	OPB857Z	OPB870N11
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted Channel	Slotted N
Wavelength (nm) (Typ)	890	880	880	880	880	890	890
Slot Width/Depth	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.150"/0.355"	0.125"/0.345"
Aperture Emitter/Sensor	0.05"/0.01"	0.01"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.06"/0.06"	0.01"/0.01"
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	0.625/N/A	0.625/N/A	0.625/N/A	0.625/N/A	2.25/N/A	1.5/N/A	0.5/N/A
V_{CE} (V) (Max)	30	30	30	30	30	30	30
Lead Length/Spacing	0.425"/0.320"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	11.5"/26 AWG Wire	0.425"/0.320"

Slotted Optical Switches (Continued)






Model Number	OPB871N51	OPB880P51Z	OPB880T51Z	OPB885Z	OPB890P51Z	OPB891T51Z
Package	Slotted N	Slotted P	Slotted T	Slotted P	Slotted P	Slotted T
Wavelength (nm) (Typ)	890	890	890	890	890	890
Slot Width/Depth	0.125"/0.345"	0.125"/0.345"	0.125"/0.315"	0.375"/0.595"	0.125"/0.345"	0.125"/0.315"
Aperture Emitter/Sensor	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	1.0/N/A	0.5/N/A	0.5/N/A	1.3/8.0	0.5/N/A	1.0/N/A
V_{CE} (V) (Max)	30	30	30	30	30	50
Lead Length/Spacing	0.425"/0.320"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

Wide Gap Slotted Optical Switches





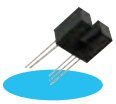

Model Number	OPB800L55	OPB800W51Z	OPB810L51	OPB810W51Z	OPB811L55	OPB811W55Z
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T
Wavelength (nm) (Typ)	890	890	890	890	890	890
Slot Width/Depth	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"
Aperture Emitter/Sensor	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.05"
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	0.05/N/A	0.05/N/A	0.05/N/A	0.05/N/A	1.0/N/A	1.0/N/A
V_{CE} (V) (Max)	30	30	30	30	30	30
Lead Length/Spacing	0.425"/0.570"	24"/26 AWG Wire	0.425"/0.570"	24"/26 AWG Wire	0.425"/0.570"	24"/26 AWG Wire

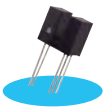
Photologic® Slotted Optical Switches











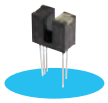
Model Number	OPB930W51Z	OPB930W55Z	OPB933W51Z	OPB940W51Z	OPB941W51Z	OPB943W51Z	OPB961N51	OPB961T51	OPB970N11
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted N	Slotted T	Slotted N
Sensor Type	Totem-Pole	Totem-Pole	Inv-Open-Collector	Totem-Pole	Open-Collector	Inv-Open-Collector	Open-Collector	Open-Collector	Totem-Pole
Wavelength (nm) (Typ)	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Slot Width/Depth	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.01"/0.01"
Aperture Emitter/Sensor	880	880	880	880	880	880	890	890	890
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50
I_{CCL}/I_{CCH} (mA) Max	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15
V_{CC} (V) Min/Max	4.75/5.25	4.75/5.25	4.75/5.25	4.75/5.25	4.75/5.25	4.75/5.25	4.5/16.0	4.5/16.0	4.5/16.0
Lead Length/Spacing	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"

Photologic® Slotted Optical Switches

Model Number	OPB970N51	OPB971N51	OPB973N51	OPB980L51Z	OPB980L55Z	OPB980T55Z	OPB982P51Z	OPB983P51Z	OPB983T51Z
Package	Slotted N	Slotted N	Slotted N	Slotted L	Slotted L	Slotted T	Slotted P	Slotted P	Slotted T
Sensor Type	Totem-Pole	Open-Collector	Inv-Open-Collector	Totem-Pole	Totem-Pole	Totem-Pole	Inv-Totem-Pole	Inv-Open-Collector	Inv-Open-Collector
Wavelength (nm) (Typ)	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Slot Width/Depth	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"
Aperture Emitter/Sensor	890	890	890	890	890	890	890	890	890
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50
I_{CCL}/I_{CCH} (mA) Max	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15
V_{CC} (V) Min/Max	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0
Lead Length/Spacing	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

Model Number	OPB990L51Z	OPB990P51Z	OPB990T51Z	OPB990T55Z	OPB991L51Z	OPB992T51Z	OPB993L11Z
Package	Slotted L	Slotted P	Slotted T	Slotted T	Slotted L	Slotted T	Slotted L
Sensor Type	Totem-Pole	Totem-Pole	Totem-Pole	Totem-Pole	Open-Collector	Inv-Totem-Pole	Inv-Open-Collector
Wavelength (nm) (Typ)	0.125"/0.345"	0.125"/0.315"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Slot Width/Depth	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"	0.01"/0.01"
Aperture Emitter/Sensor	890	890	890	890	890	890	890
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
I_{CCL}/I_{CCH} (mA) Max	15/15	15/15	15/15	15/15	15/15	15/15	15/15
V_{CC} (V) Min/Max	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0
Lead Length/Spacing	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

Photologic® Slotted Optical Switches



Model Number	OPB460N11
Package	Slotted N
Sensor Type	10K Pull-up
Gap Width/Depth	0.125"/0.345"
Aperture Emitter/Sensor	0.01"/0.01"
Wavelength (nm) (Typ)	890
I_F (mA) Typ/Max	20/50
I_{CCL}/I_{CCH} (mA) Max	7.5/7.5
V_{CC} (Volts) Min/Max	4.5/16.0
Lead Length/ Spacing	0.425"/0.320"

Deep Gap Slotted Switch Wire and Connector Options

Model Number	OPB815L	OPB815WZ
Package	Slotted T	Slotted T
Wavelength (nm) (Typ)	890	890
Slot Width/Depth	0.375"/0.350"	0.375"/0.430"
Aperture Emitter/Sensor	0.06"/0.06"	0.06"/0.06"
I_F (mA) Typ/Max	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	0.05/N/A	1.0/N/A
V_{CE} (V) (Max)	30	30
Lead Length/Spacing	0.100"/0.530"	24"/26 AWG Wire

Optical Emitter and Sensor Pair



Model Number	OPB100Z	OPB100-EZ	OPB100-SZ
Package	Module Pair	1/2 Module Pair	1/2 Module Pair
LED Wavelength (nm)	880	880	-
Sensor Type	Phototransistor	-	Phototransistor
$I_{C(ON)}$ (mA) Min/Max	5.0	N/A	N/A
I_F (mA) Typ/Max	20/100	20/100	N/A
V_{CE} (V) (Max)	30	N/A	30
Lead Length/Spacing	24"/26 AWG Wire	-	24"/26 AWG Wire

Slotted Optical Flag Switch

Model Number	OPB680-20
Package	Flag Switch
Wavelength (nm) (Typ)	890
Sensor Type	Rbe Transistor
Flag Travel Degrees Max	51°
$I_{C(ON)}$ (mA) Min/Max	0.6
I_F (mA) Typ/Max	10/50
V_{CE} (V) (Max)	30
Lead Length/Spacing	0.100"/0.275"

Photologic® Slotted Optical Switch "Wide Gap" Series

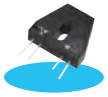


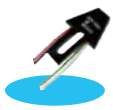


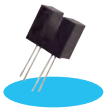


Model Number	OPB900W55Z	OPB901W55Z	OPB903W55Z	OPB910W55Z	OPB911W55Z	OPB912W55Z	OPB913W55Z
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T
Sensor Type	Totem-Pole	Open-Collector	Inv-Open-Collector	Totem-Pole	Open-Collector	Inv-Totem-Pole	Inv-Open-Collector
Gap Width/Depth	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"
Aperture Emitter/Sensor	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"
Wavelength (nm) (Typ)	890	890	890	890	890	890	890
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
I_{CCL}/I_{CCH} (mA) Max	15/15	15/15	15/15	15/15	15/15	15/15	15/15
V_{CC} (Volts) Min/Max	4.75/5.25	4.75/5.25	4.75/ 5.25	4.75/ 5.25	4.75/5.25	4.75/ 5.25	4.75/ 5.25
Lead Length/Spacing	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

Reflective Object Sensors

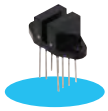
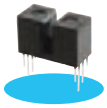






Model Number	OPB733TR	OPB745	OPB700ALZ	OPB701ALZ	OPB704	OPB704WZ	OPB706A	OPB711
Package	SMD Reflective Object	Reflective Switch	Reflective Switch	Reflective Switch	Reflective Switch	Reflective Switch	Cube Reflective	Flat Reflective
Sensor Type	Transistor	Darlington	Transistor	Darlington	Transistor	Transistor	Transistor	Transistor
Wavelength (nm) (Typ)	890	890	890	890	890	890	935	890
Reflection Distance Inch (mm)	0.4 (10.16 mm) to 1 (25.4 mm)	0.150" (3.81 mm)	0.200" (5.08 mm)	0.200" (5.08 mm)	0.150" (3.81 mm)	0.150" (3.81 mm)	0.050" (1.27 mm)	0.080" (2.03 mm)"
$I_{C(ON)}$ (mA) Min	0.1	0.1	0.1	2.5	0.2	0.2	0.5	0.35
I_F (mA) Typ/Max	20/50	40/40	40/100	40/50	40/40	40/40	20/50	20/50
V_{CE} (V) (Max)	30	15	24	15	30	30	24	24
Lead Length/Spacing	-	0.150"/N/A	18"/26 AWG Wire	18"/26 AWG Wire	0.160"/N/A	24"/26 AWG Wire	0.45"/0.087", 0.100"	0.30"/0.095", 0.100"

Dual Channel Encoder

Model Number	OPB822S	OPB822SD	OPB826SD
Package	Dual Slotted	Dual Slotted	Dual Slotted
Wavelength (nm) (Typ)	935	935	890
Gap Width/Depth	0.090"/0.300"	0.090"/0.300"	0.100"/0.420"
$I_{C(ON)}$ (mA) Min	0.25	0.1	0.1
I_F (mA) Typ/Max	20/50	20/50	20/50
V_{CE} (V) Typ/Max	30	30	30
Aperture Emitter/Sensor	N/A/0.01"	0.01"/0.01"	0.04"/ 0.04"
Lead Length/Spacing	0.425"/0.300"	0.425"/0.300"	0.200"/0.740"

Photologic® Reflective Object Sensors


Model Number	OPB716Z	OPB718Z
Package	Object Reflective	Object Reflective
Sensor Type	Open-Collector	Inv-Open-Collector
Wavelength (nm) (Typ)	890	890
Reflection Distance Inch (mm)	0.50"	0.50"
I_{CCL}/I_{CCH} (mA) Max	0.1/.01	0.1/.01
I_F (mA) Typ/Max	30/30	30/30
V_{CC} (V) (Min/Max)	4.75/5.25	4.75/5.25
Lead Length/Spacing	18"/26 AWG Wire	18"/26 AWG Wire

Long Distance Optical Switch

Model Number	OPB732WZ
Package	Object Reflective
Sensor Type	Transistor
Wavelength (nm) (Typ)	850
Reflection Distance Inch (mm)	3.0" (76.2 mm)
$I_{C(ON)}$ (mA) Min	0.25
V_{CE} (V) (Max)	30
Lead Length/Spacing	24"/26 AWG Wire

Long Distance Reflective Switch



Model Number	OPB720B-12Z	OPB720B-30VZ	OPB755TZ
Package	Objective Reflective	Objective Reflective	Reflective Switch
Sensor Type	Open-Collector	Open-Collector	Transistor & Rbe
Wavelength (nm) (Typ)	890	890	890
Reflection Distance Inch (mm)	12" [30.5 cm]	30" [76.2 cm]	0.08"/0.15"/0.22"
I_F (mA) Typ/Max	N/A	N/A	30/50
V_{CC} (V) or V_{CE} (V) (Min/Max)	4/7 V_{CC}	4/7 V_{CC}	N/A/24 V_{CE}
$I_{C(ON)}$ (mA) Min	N/A	N/A	0.500/0.375/0.250
V_{CE} (V) (Max)	30	30	30
Lead Length/Spacing	39" [99 cm]	39" [99 cm]	12"/26 AWG Wire

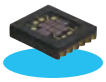
Hybrids

The hybrid components portfolio of TT Electronics can help to reduce costs, enhance reliability, and increase circuit performance. Our optoelectronic hybrid product designs combine opto sensors and LEDs with chip level components, to create systems that simplify motion and surface detection functions. Hybrid product technologies include visible and infrared LEDs, VCSELs, photodiode arrays, phototransistor arrays, reflective assemblies, and custom control components.

Miniature SMD Reflective Sensor

Model Number	OPR5005
Package	SMD Chip Carrier
Sensor Type	Transistor
Wavelength (nm) (Typ)	890
Reflection Distance Inch (mm)	0.05 to 0.20
$I_{C(ON)}$ (mA) Min	0.1
I_F (mA) Typ/Max	20/50
V_{CE} (V) (Max)	30
Lead Length/Spacing	SMD

Six-Element SMD Photodiode Array

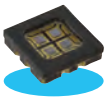


Model Number	OPR2101
Package	Surface Mount
Receiver Type	Diode Array
# of Elements	6
Responsivity (mA/mW) Min	0.45
Reverse Voltage Min	50
Active Area mm^2	0.84

Miniature Surface Mount

Model Number	OPR5200
Package	1208 Flat Lens
LED Wavelength (nm)	890
Output Power Min (mW/cm^2)	0.35
V_F (V) Max	1.8
I_F (mA) Typ/Max	20/50
Beam Angle (Degrees)	90

Surface Mount Quad Photodiode



Model Number	OPR5925
Package	Quad
Receiver Type	Photodiode Array
# of Elements	4
Responsivity (mA/mW) Min	0.45
Reverse Voltage Min	35
Active Area mm^2	0.64 X 4

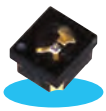
Infrared Light Emitting VCSEL

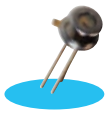
Model Number	OPR2800V
Package	Flat Lens Window
LED Wavelength (nm)	850
Output Power (mW/cm^2) Min/Max	1.5
I_F (mA) Typ/Max	7.0/12
Beam Angle (Degrees)	24
Lead Length	leadless

Surface Mount and Chip Carrier

The TT Electronics surface mount and chip carrier portfolio includes SMD emitter components, infrared LEDs, vertical cavity surface emitting diodes, photodiodes, phototransistors, optical comparators, and optoisolators.

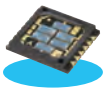
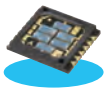
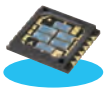
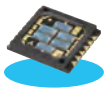
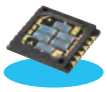
LEDs



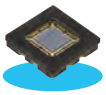
Model Number	OP181	OPR2800T	OPR5200	OPV310Y	OPV314	OPV314Y
Package	SMD	SMD	1208 Flat Lens	TO-46 Flat Window	TO-46 Bead Lens	TO-46 Bead Lens
LED Wavelength (nm)	940	880	890	850	850	850
Output Power Min (mW/cm^2)	0.26	0.2	0.35	1.5	1.4	1.4
V_F (V) Max	1.65	1.5	1.8	2.2	2.2	2.2
I_F (mA) Typ/Max	20/50	20/50	20/50	7.0/12	7.0/12	7.0/12
Beam Angle (Degrees)	10˚	100˚	90˚	24˚	-	-

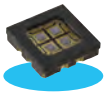
Photodiodes

Model Number	OP980	OPR2100	OPR2100HS	OPR2100HST	OPR2100T	OPR2101
Package	PLCC-2	Surface Mount	Surface Mount	Surface Mount	Surface Mount	Surface Mount
Receiver Type	Photodiode	Diode Array	Diode Array	Diode Array	Diode Array	Diode Array
# of Elements	1	6	6	6	6	6
Responsivity (mA/mW) Min	0.45	0.45	0.45	0.45	0.45	0.45
Reverse Voltage Min	60	50	50	50	50	50
Active Area mm^2	.175	3.45	3.45	3.45	3.45	0.84





Model Number	OPR5910	OPR5910T	OPR5911	OPR5913	OPR5915	OPR5925
Package	Single	Single	Quad	Single	Single	Quad
Receiver Type	Photodiode	Photodiode	Photodiode Array	Photodiode	Photodiode	Photodiode Array
# of Elements	1	1	4	1	1	4
Responsivity (mA/mW) Min	0.45	0.45	0.45	0.4	0.45	0.45
Reverse Voltage Min	35	35	14	10	35	35
Active Area mm^2	.316	.316	1.00 X 4	25	7.8	0.64 X 4

Phototransistors

Model Number	OP580DA	OPR5500
Package	PLCC-2	1208 Flat Lens
Light Current $I_{C(ON)}$ (mA) Min	10	0.036
V_{CE} (V) Max	35	30
Input Power EE (mW/cm^2)	0.15	0.15
Viewing Angle	100°	120°
Active Area mm^2	0.73	0.73

Optical Comparators

Model Number	OPR5011	OPR5011T
Package	Three Differential Comparators	Three Differential Comparators
Sensor Type	Differential Optical Comparator	Differential Optical Comparator
# of Elements	3	3
I_{CC} (mA) Typ/Max	9/20	9/20
Optical Hysteresis (%) Typ	40	40
Optical Offset (%) Min/Max	-40/+40	-40/+40

Optoisolator/Optocoupler

Model Number	4N22U 4N22UTX 4N22UTXV	4N23UTX 4N23UTXV	4N24U 4N24UTX 4N24UTXV	4N47U 4N47UTX 4N47UTXV	4N48U 4N48UTX 4N48UTXV	4N49U 4N49UTX 4N49UTXV	HCC240 HCC240TX HCC240TXV	HCC242 HCC242TX HCC242TXV
Package	6-Pin Ceramic	6-Pin Ceramic	6-Pin Ceramic	6-Pin Ceramic	6-Pin Ceramic	6-Pin Ceramic	4-Pin Ceramic	4-Pin Ceramic
Sensor Type	Transistor	Transistor	Transistor	Transistor	Transistor	Transistor	Transistor	Transistor
Isolation Voltage (Min ,000)	1	1	1	1	1	1	1	1
CTR (Min/Max)	25/N/A	60/N/A	100/500	50/NA	100/500	200/1,000	25/60	100/150
I_F (mA) Typ/Max	1/40	1/40	1/40	1/40	1/40	1/40	10/40	10/40
V_{CE} (V) Max	40	40	40	40	40	40	30	30
Rise/Fall Times (Max. µs)	15/15	15/15	20/20	20/20	20/20	20/20	15/15	20/20

High-Reliability JAN Isolators

High-reliability JAN isolators from TT Electronics feature a choice of either hermetically sealed TO-78 package or surface mountable SM/LCC package. Each isolator in this series consists of an infrared emitting diode and a NPN silicon phototransistor, which are mounted in a hermetically sealed TO-78/SMD package. Devices are designed for military and/or harsh environments. They feature a high current transfer ratio and 1 kV electrical isolation as standard.

High-Reliability JAN Isolators

						
Model Number*	4N22(A)(U)	4N23(A)(U)	4N24(A)(U)	4N47(A)(U)	4N48(A)(U)	4N49(A)(U)
Package	TO-78/SMD	TO-78/SMD	TO-78/SMD	TO-78/SMD	TO-78/SMD	TO-78/SMD
CTR (Min/Max)	40/N/A	60/N/A	100/N/A	50/N/A	100/500	200/1000
Isolation Voltage (Min. kV)	1	1	1	1	1	1
I_F (mA) Max	40	40	40	40	40	40
V_{CE} (V) (Max)	35	35	35	40	40	40
Rise/Fall Times (Max. µs)	15	15	20	20	20	25
Slash Sheet (MIL-PRF-19500)	486	486	486	548	548	548
RoHS	No	No	No	No	No	No

* Available in JAN, JANTX, JANTXV and non-JAN COTS versions.

"A" suffix denotes collector electrically isolated from case.

"U" suffix denotes SMD/LCC 6 6-pin version.

High-Reliability COTS Optoelectronics

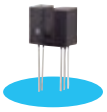
The TT Electronics components family consists of GaAIAs/GaAs LEDs, photodarlingtons, photodiodes, Photologic® detectors (integrated detector), phototransistors and VCSELs. Components are available in both metal packages (Pill, TO-5, TO-18, TO-46) and plastic packages (T-1, T-1 3/4, endlooker, sidelooker). In addition to these standard offerings, TT Electronics can provide custom designs at OEM volumes in shorter lead times than can often be found among other industry off-the-shelf-solutions.

High-Reliability Hallogic Hall-Effect Sensors



Model Number	OMH3040B	OMH3075B	OMH3075S
Package	Side Sensing Ceramic	Side Sensing Ceramic	Side Sensing Ceramic
Output Type	Uni-Polar Non-Latching	Bi-Polar Latching	Bi-Polar Latching
Operating Point Gauss (Min/Typ/Max)	70/150/200	50/150/250	50/150/250
Release Point Gauss (Min/Typ/Max)	50/115/180	-250/-150/-50	-250/-150/-50
Hysteresis Gauss (Min/Typ/Max)	110/35/60	100/300/500	100/300/500
V_{CC} (Volts) Min/Max	4.5/24.0	4.5/24.0	4.5/24.0
RoHS	No	No	No

Photologic® Slotted Optical Switches

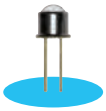



Model Number	OPB930W51Z	OPB973N51
Package	Slotted T	Slotted N
Sensor Type	Totem-Pole	Inv-Open-Collector
Gap Width/Depth	0.125"/0.315"	0.125"/0.345"
Aperture Emitter/Sensor	0.05"/0.01"	0.05"/0.01"
Wavelength (nm) (Typ)	880	890
I_F (mA) Typ/Max	20/50	20/50
I_{CCL}/I_{CCH} (mA) Max	15/15	15/15
V_{CC} (Volts) Min/Max	4.75/5.25	4.5/16.0
Lead Length/Spacing	24"/26 AWG Wire	0.425"/0.320"

High-Reliability GaAIAs Infrared Emitting Diode

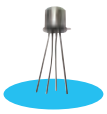
Model Number	OP224S
Package	Pill Dome Lens
LED Wavelength (nm) (Typ)	890
Output Power (µW) Min	1.5
I_F (mA) Typ/Max	50/100
Beam Angle (Degrees)	24
Lead Length	N/A

High-Reliability Hermetic Infrared Emitting Diode



Model Number	OP236TX
Package	TO-46 Dome Lens
LED Wavelength (nm) (Typ)	890
Output Power (µW) Min	3.5
I_F (mA) Typ/Max	50/100
Beam Angle (Degrees)	18
Lead Length	0.50"

High-Reliability Optically Coupled Isolator



Model Number	3C92CTX
Package	TO-72
LED Wavelength (nm) (Typ)	935
Sensor Type	Transistor
CTR (Min/Max)	0.3/2.0
Isolation Voltage (Min, 000)	1
I_F (mA) Typ/Max	10/50
V_{CE} (V) Typ/Max	10/50
Rise/Fall Times (Max. µs)	N/A

High-Reliability COTS Hall Effect

High-reliability COTS sensors from TT Electronics offer reliable performance, low form factor, and extended service life across a variety of applications. These standard offerings are available with short lead times, as well as in assorted styles and types.

Hallogic Hall Effect Sensors
Hall Ceramic

Model Number	OMH090 OMH090B OMH090S	OMH3019 OMH3019B OMH3019S	OMH3020 OMH3020B OMH3020S	OMH3040 OMH3040B OMH3040S	OMH3075 OMH3075B OMH3075S	OMH3131 OMH3131B OMH3131S	OMH3150 OMH3150B OMH3150S
Package	Side Sensing 3-Leaded Ceramic	Side Sensing 3-Leaded Ceramic	Side Sensing 3-Leaded Ceramic	Side Sensing 3-Leaded Ceramic	Side Sensing 3-Leaded Ceramic	Side Sensing 3-Leaded Ceramic	Side Sensing 3-Leaded Ceramic
Output Type	Uni-Polar Non-Latching	Uni-Polar Non-Latching	Uni-Polar Non-Latching	Uni-Polar Non-Latching	Bi-Polar Latching	Uni-Polar Non-Latching	Ratiometric
Operating Point Gauss (Min /Typ/Max)	70/90/220	175/300/500	70/220/350	70/150/200	50/150/250	20/60/95	2.5 mV/G
Release Point Gauss (Min /Typ/Max)	30/65/180	125/235/420	50/180/330	50/115/180	-250/-150/-50	10/45/85	N/A
Hysteresis Gauss (Min /Typ/Max)	10/30/60	30/100/155	15/55/200	10/35/60	100/250/500	5/15/40	2.5 mV/G
V_{CC} (Volts) (Min/Max)	4.5/24.0	4.5/24.0	4.5/24.0	4.5/24.0	4.5/24.0	4.5/24.0	4.5V/6.0V

Hallogic Hall Effect Sensor Assemblies

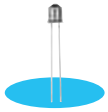
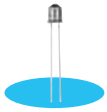
Model Number	OHB3040	OHB3040B	OHB3040S
Package	Slotted Switch	Slotted Switch	Slotted Switch
Output Type	Logic	Logic	Logic
Right Operate Point (Min)*	0.073" [1.85 mm]	0.073" [1.85 mm]	0.073" [1.85 mm]
Right Operate Point (Max)*	0.003" [0.08 mm]	0.003" [0.08 mm]	0.003" [0.08 mm]
Right Release Point (Min)*	0.045" [1.14 mm]	0.045" [1.14 mm]	0.045" [1.14 mm]
Right Release Point (Max)*	-0.005" [-0.127 mm]	-0.005" [-0.127 mm]	-0.005" [-0.127 mm]
Left Release Point (Min)*	-0.045" [-1.14 mm]	-0.045" [-1.14 mm]	-0.045" [-1.14 mm]
Left Release Point (Max)*	0.005" [0.127 mm]	0.005" [0.127 mm]	0.005" [0.127 mm]
Left Operate Point (Min)*	-0.073 [-1.85 mm]	-0.073 [-1.85 mm]	-0.073 [-1.85 mm]
Left Operate Point (Max)*	-0.003" [-0.08 mm]	-0.003" [-0.08 mm]	-0.003" [-0.08 mm]
V_{CC} (Volts) (Min/Max)	4.5/25	4.5/25	4.5/25

	Right Operate Point	Right Release Point	Left Release Point	Left Operate Point
Minimum	0.073" [1,85mm]	0.045" [1,14mm]	-0.045" [-1,14mm]	-0.073" [-1,85mm]
Maximum	0.003" [0,08mm]	-0.005" [-0.127mm]	0.005" [0.127mm]	-0.003" [-0,08mm]

Measurements are referenced to Center Line.

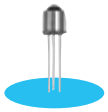
LEDs



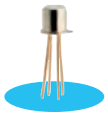
Model Number	OP223TX OP223TXV	OP224ESA-B1, -B2 and -B3; -C1, -C2 and -C3	OP224S OP224TX OP225TXV	OP235TX OP235TXV	OP236TX OP236TXV
Package	Pill Dome Lens	Pill Dome Lens	Pill Dome Lens	TO-46 Dome Lens	TO-46 Dome Lens
LED Wavelength (nm)	890	890	890	890	890
Output Power (mW) Min	1	1.5	1.5	1.5	3.5
I_F (mA) Typ/Max	50/100	50/100	50/100	50/100	50/100
Beam Angle (Degrees)	24	24	24	18	18
Lead Length	N/A	N/A	N/A	0.50"	0.50"

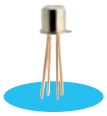
High-Reliability Photologic® Hermetic Sensors

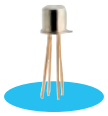
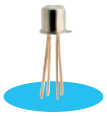


Model Number	OPL800TX OPL800TXV
Package	Hermetic, Lensed TO-18
Photologic	Totem-Pole
Irradience (mW/cm^2)	3
V_{CC} (V) Typ/Max	4.5 - 10.0
Lead Length	0.50"

Optically Coupled Isolators

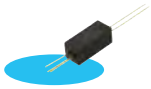
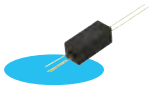
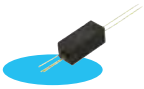
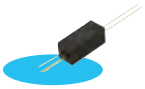
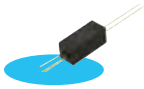




Model Number	3C91CTX 3C91CTXV	3C92CTX 3C92CTXV	3N243TX	3N244TX	3N245TX	3N261TX	3N262TX	3N263TX
Package	TO-72	TO-72	TO-72	TO-72	TO-72	TO-72	TO-72	TO-72
LED Wavelength (nm)	935	935	880	880	880	880	880	880
Sensor Type	Transistor	Transistor	Transistor	Transistor	Transistor	Transistor	Transistor	Transistor
CTR (Min/Max)	0.3/1.90	0.3/2.0	0.15/N/A	0.3/N/A	0.6/N/A	0.5/N/A	1/5	2/10
Isolation Voltage (Min ,000)	1	1	1	1	1	1	1	1
I_F (mA) Typ/Max	10/50	10/50	3/40	3/40	3/40	1/40	1/40	1/40
V_{CE} (V) Typ/Max	10/50	10/50	10/30	10/30	10/30	5/30	5/30	5/30
Rise/Fall Times (Max. µs)	N/A	N/A	10	10	10	20	20	25

High-Reliability Optically Coupled Isolators

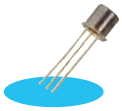
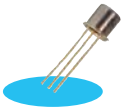
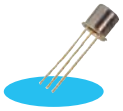







Model Number	OPI120 OPI120TX OPI120TXV	OPI123	OPI125 OPI125TX OPI125TXV	OPI126	OPI127	OPI150 OPI150TX OPI150TXV
Package	Axial Channel	Axial Channel	Axial Channel	Axial Channel	Axial Channel	Axial-Cylindrical
LED Wavelength (Nm)	890	890 or 935	890 or 935	935	890	890
Sensor Type	Transistor	Darlington	Totem Pole	Open Collector	Inv-Totem Pole	Transistor
CTR (Min/Max)	20	50	Logic 15 mA	Logic 15 mA	Logic 15 mA	10
t_{PLH}/t_{PHL} Typ (ns)	N/A	N/A	N/A	N/A	5/5	N/A
Isolation Voltage (Min ,000)	15	15	15	15	15	50
I_F (mA) Typ/Max	10/50	10/50	7.5/25	7.5/25	7.5/25	16/100
V_{CE} (V) Typ/Max	5/25	20	35	35	35	5/30
Lead Length/Spacing	0.44"/0.90"	0.40"/0.75"	0.44"/0.90"	0.40"/0.75"	0.40"/0.75"	0.40"/3.16"

High-Reliability NPN Silicon Phototransistors
Sensor Type: Transistor (ALL)

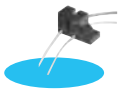




Model Number	OP602TX OP602TXV	OP603TX OP603TXV	OP604ESA-B1, -B2, -B3; -C2, -C2, -C3	OP604S OP604TX OP604TXV	OP803TX OP803TXV	OP804TX OP804TXV	OP805TX OP805TXV
Package	Low Lens	Low Lens	Low Lens	Low Lens	TO-18/46 Dome Lens	TO-18/46 Dome Lens	TO-18/46 Dome Lens
Light Current $I_{C(ON)}$(μA) Min/Max	2/5	4/8	7/N/A	7/N/A	4/8	7/22	15/N/A
V_{CE} (V) Typ/Max	5/50	5/50	5/50	5/50	5	5	5
Input Radiance EE (mW/cm^2)	20	20	20	20	5	5	5
Viewing Angle (Degrees)	35	35	35	35	25	25	25
Lead Length	N/A	N/A	N/A	N/A	0.5"	0.5"	0.5"

Slotted Switches - Transistor Type Sensor (ALL)



Model Numbers	OPB821TX OPB821TXV	OPB847TX OPB847TXV	OPB848TX OPB848TXV
Package Type	Slotted Wires	Slotted N	Slotted N
LED Wavelength (nm)	880	890	890
Slot Width/Depth	0.080"/0.255"	0.100"/0.250"	0.100"/0.250"
Light Current IC(ON) (mA) Min	0.8	4	1
I_F (mA) Typ/Max	20/50	20/30	20/30
V_{CE} (V) Typ/Max	30	30	30
Aperture Emitter/Sensor	0.04"/0.04"	0.025"/0.025"	0.06"/0.06"
Lead Length/Spacing	24"/26 AWG Wire	0.425"/0.300"	0.425"/0.300"

Slotted Switches - Transistor Type Sensor (ALL)
Package Type: Slotted L







Model Numbers	OPB870L11TX OPB870L11TXV	OPB870L51TX OPB870L51TXV	OPB870L55TX OPB870L55TXV	OPB871L51TX OPB871L51TXV	OPB871L55TX OPB871L55TXV	OPB872L51TX OPB872L51TXV	OPB872L55TX OPB872L55TXV
LED Wavelength (nm)	890	890	890	890	890	890	890
Slot Width/Depth	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Light Current IC(ON) (mA) Min	0.5	0.5	0.5	1.0	1.0	1.8	1.8
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
V_{CE} (V) Typ/Max	50	50	50	50	5/50	50	50
Aperture Emitter/Sensor	0.01"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.05"
Lead Length/Spacing	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"

Slotted Switches - Transistor Type Sensor (Continued)
Package Type: Slotted N

Model Numbers	OPB870N11TX OPB870N11TXV	OPB870N51TX OPB870N51TXV	OPB870N55TX OPB870N55TXV	OPB871N51TX OPB871N51TXV	OPB871N55TX OPB871N55TXV	OPB872N51TX OPB872N51TXV	OPB872N55TX OPB872N55TXV
LED Wavelength (nm)	890	890	890	890	890	890	890
Slot Width/Depth	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Light Current IC(ON) (mA) Min	0.5	0.5	0.5	1.0	1.0	1.8	1.8
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
V_{CE} (V) Typ/Max	50	50	50	5/50	5/50	50	50
Aperture Emitter/Sensor	0.01"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.05"
Lead Length/Spacing	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"

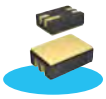
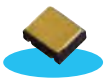
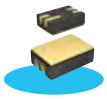
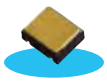
Slotted Switches - Transistor Type Sensor (Continued)
Package Type: Slotted P

Model Numbers	OPB870P11TX OPB870P11TXV	OPB870P51TX OPB870P51TXV	OPB870P55TX OPB870P55TXV	OPB871P51TX OPB871P51TXV	OPB871P55TX OPB871P55TXV	OPB872P51TX OPB872P51TXV	OPB872P55TX OPB872P55TXV
LED Wavelength (nm)	890	890	890	890	890	890	890
Slot Width/Depth	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Light Current IC(ON) (mA) Min	0.5	0.5	0.5	1.0	1.0	1.8	1.8
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
V_{CE} (V) Typ/Max	50	50	50	50	50	50	50
Aperture Emitter/Sensor	0.01"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.05"
Lead Length/Spacing	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"

Slotted Switches - Transistor Type Sensor (Continued)
Package Type: Slotted T

Model Numbers	OPB870T11TX OPB870T11TXV	OPB870T51TX OPB870T51TXV	OPB870T55TX OPB870T55TXV	OPB871T51TX OPB871T51TXV	OPB871T55TX OPB871T55TXV	OPB872T11TX OPB872T11TXV	OPB872T51TX OPB872T51TXV	OPB872T55TX OPB872T55TXV
LED Wavelength (nm)	890	890	890	890	890	890	890	890
Slot Width/Depth	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Light Current IC(ON) (mA) Min	0.5	0.5	0.5	1.0	1.0	1.8	1.8	1.8
I_F (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50
V_{CE} (V) Typ/Max	30	30	50	5/50	5/50	50	50	50
Aperture Emitter/Sensor	0.01"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.05"	0.01" / 0.01"	0.05"/0.01"	0.05"/0.05"
Lead Length/Spacing	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"

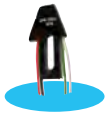
Transistors




Model Number	2N2222AUA 2N2222AUATX 2N2222AUATXV	2N2222AUB 2N2222AUBTX 2N2222AUBTXV	2N2907AUA 2N2907AUATX 2N2907AUATXV	2N2907AUB 2N2907AUBTX 2N2907AUBTXV	2N4854U 2N4854UTX 2N4854UTXV	2N5794U 2N5794UTX 2N5794UTXV	2N5796U 2N5796UTX 2N5796UTXV	2N6987U 2N6987UTX 2N6987URXV	2N6989U 2N6989UTX 2N6989UTXV
Package	4-Pin Ceramic	3-Pin Ceramic	4-Pin Ceramic	3-Pin Ceramic	6-Pin Ceramic	6-Pin Ceramic	6-Pin Ceramic	20-Pin Ceramic	20-Pin Ceramic
Sensor Type	NPN Transistor	NPN Transistor	PNP Transistor	PNP Transistor	NPN & PNP Transistor	Dual-NPN Transistor	Dual-PNP Transistor	Quad-PNP Transistor	Quad-NPN Transistor
H_{FE} Min/Max	50/325	50/325	75/450	75/450	50/300	35/300	75/300	75/450	50/325
V_{CEO} (Volts) Max	50	50	60	60	40	40	60	60	50
Rise/Fall Times Max (ns)	35/300	35/300	45/300	45/300	45/300	45/310	50/140	45/300	35/300

Reflective Switches
Sensor Type: Transistor



Model Number	OPB700TX OPB700TXV
Package	Reflective Switch
LED Wavelength (nm)	890
Reflection Distance in (mm)	0.200 (5.08)
$I_{C(ON)}$ (µA) Min	0.05
I_F (mA) Typ/Max	40/50
V_{CE} (V) Typ/Max	5/50
Wire Length	24"/26 AWG Wire

Surface Mount Optically Coupled Isolators




Model Number	HCC240TX HCC240TXV	HCC242TX HCC242TXV	HCC240TX HCC240TXV	HCC242TX HCC242TXV
Package	4-Pin Ceramic	4-Pin Ceramic	4-Pin Ceramic	4-Pin Ceramic
Sensor Type	Transistor	Transistor	1	1
CTR (Min/Max)	25/60	100/150	10/40	10/40
Isolation Voltage (Min, 000)	1	1	5.0/30	5.0/30
I_F (mA) Typ/Max	5.0/30	5.0/30	15/15	20/20
V_{CE} (V) Typ/Max	10/15	10/20	15/20	15/20
Rise/Fall Times Max (µs)	15/20	15/20		

Surface Mount
MOS and MOFSET Transistors


Model Number	HCT7000MTX HCT7000MTXV	HCT802TX HCT802TXV
Package	3-Pin Ceramic	6-Pin Ceramic
Sensor Type	N-Channel Enhanced MOSFET	N&P-Channel Enhanced MOSFET
V_{DSS} (Volts) Min	60	90
$V_{GS(TH)}$ (Volts) Min/Max	0.8/3.0	0.5/2.5 & -2.0/-4.5
I_D(ON) (mA) Min	75	1.5 & -1.1
G_{fs} (ms) Min	100	170 & 200
t(ON)/t(OFF) (ns) Max	10/10	15/17 & 50/50

Fiber Optics

Fiber optic detectors, receivers and transmitters from TT Electronics provide highly reliable electronic signal transmission over extended distances, as well as over their full signal capacity. Fiber optic detectors convert optical signals back into electrical impulses used at the receiving end of the fiber optic data links. The receivers are used to accept these signals. Fiber optic transmitters are then used to convert an electrical input into an optical output from a laser diode or LED. These products are also available with a full range of customisation options to support specific requirements.

Vertical Cavity Surface Emitting Laser in T-1 Package

Model Number	OPV332
Package	T-1 Dome Lens
Wavelength (nm)	850
Total Output Power (mW 50/125) Min	1.5
I_F (mA) Typ/Max	7.0/12
Rise/Fall Time (ps)(Typ)	110/110
Beam Angle (Degrees) (Typ)	4˚
Lead Length Min	0.55"
Laser Class	3B

Fiber Optic Detector

Model Number	OPF482
Package	ST-Tall
Responsivity (mA/mW) Typ	0.45
tr/tf (Typ)(ns)	2
Reverse Voltage (Max)	100

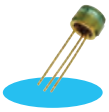
Fiber Optic Transmitters

Model Number	OPF370A
Package	TO-18 Clear Cap
LED Wavelength (nm)	850
Output Power (µW) Min	25
I_F (mA) Typ/Max	100
Rise/Fall Time (ns)	8.0/10.0
Fiber Size (µm)	50/125
Lead Length	0.50"

Fiber Optic Transmitters

Model Number	OPF372A
Package	ST-Tall
Wavelength (nm)	850
Coupled Power (dbm/µW) Min	-16/25
I_F (mA) Typ/Max	100
tr/tf (Typ)(ns)	6.0/10.0

Fiber Optic Receivers



Model Number	OPF520	OPF522	OPF2412
Package	TO-18 Green Cap	ST-Short	Cube/DIP ST-Panel
Data Rate (Max)	5 Mbps	5 MBd	5 Mbps
Receiver Type	Open Collector Schmitt	Open Collector Schmitt	Open Collector Schmitt
Input Sensitivity (dbm)/(µw)	-40/0.1	-40/0.1	-40/0.1
Responsivity (mV/µW) Min/Max	-	-	-
Peak Input Power (dBm/µw)	-9.2/120	-9.2/120	-9.2/120
Output Type	Digital	Digital	TTL or CMOS
Fiber Size (µm)	100/140	N/A	N/A

VLEDs

VLEDs from TT Electronics are designed to meet or exceed the light output of other industry models. A unique product design features the integrating sphere, which detects the exact color (dominant wavelength or color temperature for white light), the peak wavelength, brightness (total luminous flux), and other parameters at a specified current level (IF). The VLEDs range is available as assemblies, signage and channel lettering, designer kits, flexible strips, surface mount, and module strings. They are also offered with a choice of single color, white, and RGB, as well as in a variety of package types. High power and through-hole mounted versions are also available.

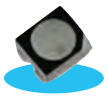
Mini Half-Watt SMD 3.5 mm (120° Viewing Angle)

Model Number	OVS5MRBCR4	OVS5MGBCR4	OVS5MBBCR4
Package	3.5 mm mini half-watt	3.5 mm mini half-watt	3.5 mm mini half-watt
Material	AlInGaP	InGaN	InGaN
Color	Red	Green	Blue
Dominant λD	625 nm	525 nm	465 nm
Lens Color	Clear	Clear	Clear
I_V at I_F=mA/Typ	140/7150 mcd	150/22 lm	150/6 lm
Viewing Angle (Degrees)	120°	120°	120°
V_F (Typ)	2.2	3.4	3.4

Full-Color 1204 SMD (150° Viewing Angle)

Model Number	OVSRRGBCC3	OVSRRGBCC3TM
Package	Side Mount	Top Mount
Material	R:AlInGaP G&B:InGaN	R:AlInGaP G&B:InGaN
Color	RGB	RGB
Dominant λD	R:625 G:530 B:475	R:625 G:530 B:475
Lens Color	Clear	Clear
I_V at I_F=mA/Typ	R:105 G:330 B:110	R:105 G:330 B:110
Viewing Angle (Degrees)	150°	150°
V_F (Typ)	R:2.0 G&B:3.3	R:2.0 G&B:3.3

Full Color PLCC4 LED



Model Number	OVSARGB4R8
Package	PLCC4
Material	AlInGaP, InGaN, InGaN
Color	RGB
Dominant λD	622nm, 530 nm, 470 nm
Lens Color	Diffused
I_V at I_F=mA/Typ	635 mcd, 1000 mcd, 335 mcd
Viewing Angle (Degrees)	120°
V_F (Typ)	R=2.3 G=3.6 B=3.6

Flexible LED Light Strip 30 LEDs per strip

Model Number	OVQ12S30W7
Package	Flexible LED Light Strip
Material	InGaN
Color	White
Dominant λD	5500°K
Lens Color	Clear
I_V at I_F=mA/Typ	68 lux@0.5m
Viewing Angle (Degrees)	120°
V_F (Typ)	12V

Steering Torque and Position Sensors

TT Electronics position and torque sensors are available in both single- and multi-turn versions, contacting or non-contacting, with a choice of either side or top adjustments, and plain, threaded or sleeve bushing types. Units offer rotational life ranging from single turn, to up to 1000K turns. In addition, TT Electronics offers a full line of rotary panel and slide potentiometers, linear motion sensors and actuators, multi-turn precision potentiometers, steering sensors, and cermet trimmers.

Steering Sensors

Model Number	SX-4289	SX-4300	SX-4388	SX-4400	SX-4404	SX-4413	SX-4414	SX-4417	SX-4428	SX-4429
Technology	contacting	contacting	contacting	magnetic	contacting	contacting	contacting	magnetic	magnetic	contacting
Torque Angle	± 8°	± 8°	± 8°	± 5°	± 5°	± 5°	± 5°	± 5°	± 5°	
Position Angle	360°	± 900°			± 900°		360°	± 900°		± 900°
# of Wires	6	7	4	4	7	4	6	8	4	5
Connector Model	Delphi 15336723	Delphi 15406142	Delphi 15336723	Yazaki 7122-8365	TE 1376352-1 connector	Yazaki 7122-8365	Yazaki 7122-8365	Delphi 15406142	Yazaki 7122-8365	Yazaki 7122-8365

Model Number	SX-4431	SX-4432	SX-4433	SX-4473	SX-4474	SX-4475	SX-4476	SX-4479	SX-4487	SX-4491
Technology	contacting	contacting	contacting	contacting	contacting	contacting	contacting	contacting	contacting	contacting
Torque Angle	± 8°	± 8°	± 8°	± 5°	± 5°	± 8°	± 8°	± 8°	± 8°	± 5°
Position Angle	± 900°		360°	360°	± 900°	360°	± 900°	360°	± 900°	360°
# of Wires	7	4	6	6	7	6	7	6	7	6
Connector Model	TE 1376352-1	TE 1376352-1	TE 1376352-1	Flex circuit	Delphi 15406142	Delphi 15406142	Delphi 15406142	Delphi 15406142	Delphi 15406142	Delphi 15406142

Rotary Encoders

Model Number	EN08-S	EN11-HSM	EN11-HSB	EN11-VSM	EN12-HS	EN12-VS	EN16-H	EN16-V
Size	8 mm	11 mm	11 mm	11 mm	12 mm	12 mm	16 mm	16 mm
Adjust	Side	Top	Top	Side	Top	Side	Top	Side
Pulses	10	15, 20	15, 20	15, 20	12, 24	12, 24	12, 24	12, 24
Detents	0, 20	0, 20, 30	0, 20, 30	0, 20, 30	0, 12, 24	0, 12, 24	0, 12, 24	0, 12, 24
Switch	Y	Y	Y	Y	Y	Y	N	N
Bushing Type	Threaded	Threaded	Plain	Threaded	Sleeve	Sleeve	Threaded	Threaded
Shaft	Metal	Metal	Metal	Metal	Plastic	Plastic	Plastic	Plastic
Life	50K	30K	30K	30K	30K	30K	30K	30K

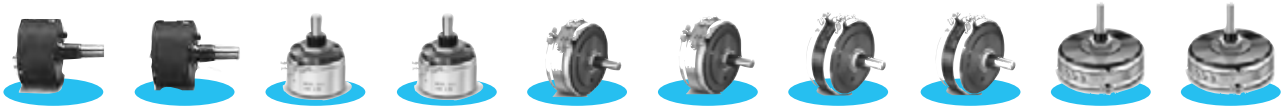
Rotary Panel Potentiometers

Model Number	P08xN	P08xS	P090L	P090S	P09xS/N	P09x5N	P110KV/KVI	P110KH/KH1
Style	Side adj	Side adj	Side adj	Top adj.	Side adj	Top adj.	Side adj	Top adj.
Package Size	8 mm	8 mm	9 mm	9 mm	9 mm	9 mm	11 mm	11 mm
Element	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.
Shaft	Metal	Metal	Plastic	Plastic	Metal	Metal	Plastic	Plastic
Bushing	Metal	Metal	N/A	N/A	Metal	Metal	Metal	Metal
Power Rating	0.05W	0.05W	0.03W	0.03W	0.05W	0.05W	0.05W	0.05W
Rotational Life	100K	100K	100K	100K	100K	100K	30K	30K
Switch	N/A	Y	N/A	N/A	Y	N/A	N/A	N/A
Multi-Ganged	4	4	N/A	N/A	8	2	N/A	N/A

Model Number	P120PK	P140KH/KH1	P160KN/KN2	P160KNPD	P160KNP	P170S/N	P170S2/N2	P170SP1/NP1
Style	Top adj.	Top adj.	Side adj. PC pin	Rear adj. PC pin	Solder lug	Solder lug	Side adj. PC pin	Top adj. PC pin
Package Size	12 mm	14 mm	16 mm	16 mm	16 mm	17 mm	17 mm	17 mm
Element	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.
Shaft	Plastic	Plastic	Metal	Metal	Metal	Metal	Metal	Metal
Bushing	N/A	Metal	Metal	Metal	Metal	Metal	Metal	Metal
Power Rating	0.05W	0.2W	0.2W	0.2W	0.2W	0.1W	0.1W	0.1W
Rotational Life	100K	30K	100K	100K	100K	100K	100K	100K
Switch	N/A	N/A	Y	Y	Y	Y	Y	Y
Multi-Ganged	2	2	6	6	6	N/A	N/A	N/A

Model Number	P170SPD/NPD	P230	P231	P232	P260P	P260S (Switch)	P260D (Detent)	P260T	P261P	P270
Style	Rear ad. PC pin	Solder lug	Solder lug	Solder lug	Side adj. PC pin	Side adj. PC pin	Side adj. PC pin	Top adj. PC pin	Solder Lug	Solder Lug
Package Size	17 mm	24 mm	24 mm	24 mm	12.7 mm	12.7 mm	12.7 mm	12.7 mm	12.7 mm	27 mm
Element	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.	Con. Plas.
Shaft	Metal	Metal	Metal	Metal	Metal	Metal	Metal	Metal	Metal	Metal
Bushing	Metal	Metal	Metal	Metal	Metal	Metal	Metal	Metal	Metal	Metal
Power Rating	0.1W	0.5W	0.5W	0.5W	0.5W	0.5W	0.5W	0.5W	0.5W	2.0W
Rotational Life	100K	500K	100K	2,000K	1,000K	100K	100K	1,000K	1,000K	1,000K
Switch	Y	N/A	N/A	N/A	N/A	Y	N/A	Y	N/A	N/A
Multi-Ganged	N/A	N/A	N/A	1	6	5	6	2	6	1

Rotary Single Turn Precision Potentiometers



Model Number	6371	6373	5401	5403	5611	5613	6671	6673	5711	5713
Housing (OD)	1-5/16"	1-5/16"	1-7/16"	1-7/16"	2"	2"	2"	2"	3"	3"
Element*	CP	CP	WW	WW	WW	WW	CP	CP	WW	WW
Resistor Range (Ohms)	1K to 300K	1K to 300K	25 to 50K	25 to 50K	15 to 80K	15 to 80K	1K to 300K	1K to 300K	25 to 145K	25 to 145K
Standard Resistance Tolerance	±10%	±10%	±5%	±5%	±5%	±5%	±10%	±10%	±5%	±5%
Standard Linearity	±0.5%	±0.5%	±0.5% (<100 Ohms±1.0%)	±0.5% (<100 Ohms±1.0%)	±0.5% (<50 Ohms±1.0%)	±0.5% (<50 Ohms±1.0%)	±0.25%	±0.25%	±0.5%	±0.5%
Mounting Style	Bushing	Servo	Bushing	Servo	Bushing	Servo	Bushing	Servo	Bushing	Servo

Model Number	5101	5103	6138	6143	6163	6173	6186	6273	3371	5311
Housing (OD)	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	1-1/16"	1-5/16"	1-5/16"
Element*	WW	WW	CP	CP	CP	CP	CP	CP	CP	WW
Resistor Range (Ohms)	200 to 15K	200 to 15K	1K to 60K	1K to 100K	1K to 100K	1K to 100K	1K to 100K	1K to 900K	1K to 900K	10 to 44.6K
Standard Resistance Tolerance	±5%	±5%	±20%	±10%	±10%	±10%	±10%	±10%	±10%	±3% (<40 Ohms±5%)
Standard Linearity	±0.5%	±0.5%	±1.0%	±1.0%	±1.0%	±0.5%	±1.0%	±0.5%	±0.5%	±0.5% (<250 Ohms±1.0%)
Mounting Style	Bushing	Servo	Bushing	Servo	Servo	Servo	Bushing	Servo	Bushing	Bushing

Rotary Multi-Turn Precision Potentiometers

Model Number	7383	7386	9301	9303	7481	7483	7486	7216
No of Turns	3	3	3	3	5	5	5	10
Housing (OD)	7/8"	7/8"	1-13/16"	1-13/16"	7/8"	7/8"	7/8"	7/8"
Element*	WW	WW	WW	WW	WW	WW	WW	WW, HYB
Resistor Range (Ohms)	100 to 30K	100 to 30K	30 to 90K	30 to 90K	100 to 50K	100 to 50K	100 to 50K	10 to 125K
Standard Resistance Tolerance	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±3%
Standard Linearity	±0.50%	±0.50%	±0.25%	±0.25%	±0.30%	±0.30%	±0.30%	±0.25%
Mounting Style	Servo	Bushing	Bushing	Servo	Bushing	Servo	Bushing	Bushing

Rotary Multi-Turn Precision Potentiometers

Model Number	7221	7223	7274	7276	7284	7286	7288	8146	8148	7601	7603
No of Turns	10	10	10	10	10	10	10	10	10	10	10
Housing (OD)	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	1-13/16"	1-13/16"
Element*	WW, HYB	WW, HYB	WW	WW	WW	WW	WW	HYB	HYB	WW	WW
Resistor Range (Ohms)	10 to 125K	10 to 125K	100 to 100K	100 to 100K	100 to 100K	100 to 100K	100 to 100K	1K to 100K	1K to 100K	1K to 650K	1K to 650K
Standard Resistance Tolerance	±3%	±3%	±5%	±5%	±5%	±5%	±5%	±10%	±10%	±5%	±5%
Standard Linearity	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%	±0.15%	±0.15%
Mounting Style	Bushing	Servo	Bushing	Bushing	Bushing	Bushing	Bushing	Bushing	Bushing	Bushing	Servo

Precision Potentiometers

Model Number	A	B	C	D	E
No of Turns	10	15	3	25	40
Housing (OD)	1-13/16"	3-5/16"	1-13/16"	3-5/16"	3-5/16"
Element*	WW	WW	WW, HYB	WW	WW
Resistor Range (Ohms)	10 to 500K	40 to 2Meg	5 to 194.7K	60 to 3.3Meg	125 to 5.3Meg
Standard Resistance Tolerance	±3% (<100 Ohms=±5%)	±5%	±3%	±5%	±5%
Standard Linearity	±0.25% <300 Ohms=±0.50%)	±0.50%	±0.50%	±0.50%	±0.50%
Mounting Style	Bushing	Bushing	Bushing	Bushing	Bushing

Slide Potentiometers

Model Number	PS45G	PS60G	PS100-1	PS100-2	PSxx-1	PSxx-2	PSxxL	PSxxM
Gang(s)	Dual	Dual	Single	Dual	Single	Dual	Single	Dual
Element	Con. Plas	Con. Plas	Con. Plas	Con. Plas	Con. Plas	Con. Plas	Con. Plas	Con. Plas
Power Ratio	0.25W	0.25W	0.25W	0.25W				
Cycle Life	200K	200K	100K	100K	100K	100K	100K	100K
Stroke Length	45 mm	60 mm	100 mm	100 mm	15 - 60 mm	16 - 60 mm	20 - 60 mm	20 - 60 mm
Dust Cover	Y	Y	N	N	N	N	Y	Y
Center Detent	N	N	N	N	Y	Y	Y	Y
LED	N	N	N	N	N	N	Y	N

Rotary Single Turn Non-Contacting Hall Effect Position Sensors

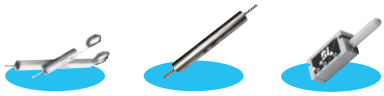
Model Number	6121	6124	6126	6127	6153
Housing	7/8"	7/8"	7/8"	7/8"	7/8"
Angle	35-360°	35-360°	35-360°	35-360°	35-360°
Standard Linearity	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
Mounting Style	1/8" Shaft 1/4" Bushing	6 mm Shaft 3/8" Bushing	1/8" Shaft 3/8" Bushing	1/4" Shaft 3/8" Bushing	Servo

Rotary Multi-Turn Non-Contacting Position Sensors

Model Number	8151	8152	8154	8156
Housing	7/8"	7/8"	7/8"	7/8"
Number of Turns	3, 5, 10	3, 5, 10	3, 5, 10	3, 5, 10
Standard Linearity	±0.5%	±0.5%	±0.5%	±0.5%
Mounting Style	1/8" Shaft, 1/4" Bushing	1/8" Shaft, 1/4" Servo Mount	6 mm Shaft, 3/8" Bushing	1/4" Shaft, 3/8" Bushing

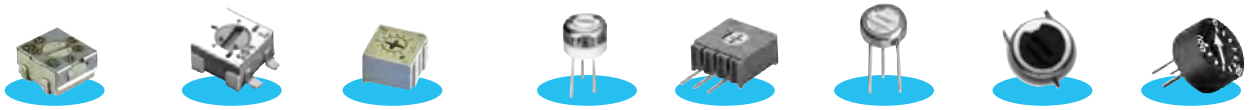
Linear Potentiometers

Model 400 Series Linear Actuation Position Sensors
Model 404 Series Spring Return, Linear Actuation Conductive Plastic Position Sensors
Model 405 Series Low Cost, Linear Actuation Conductive Plastic Position Sensors



400 404 405

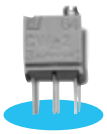
Single Turn Cermet Trimmers



Model Number	22	23	25	62	72	82	83	93
Housing Size	3 mm Sq.	4mm Dia.	1/4" Sq.	1/4" Dia.	3/8" Sq.	1/4" Dia.	1/4" Sq	1/2" Dia.
Adjustment Style	Top	Top	Top, Side	Top	Top, Side	Top, Side	Top, Side	Top
Mounting Style	Surface	Surface	Thru-Hole	Thru-Hole	Thru-Hole	Thru-Hole	Surface	Thru-Hole
Seal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard Resistance Range	100 to 2 Meg	10 to 2 Meg	10 to 2 Meg	10 to 1 Meg	10 to 2 Meg	10 to 1 Meg	10 to 1 Meg	20 to 2 Meg
Standard Resistance Tolerance	±20%	±20%	±10%	±10% (<100 Ohms=±20%)	±10% (<100 Ohms=±20%)	±10% (<100 Ohms=±20%)	±10% (<100 Ohms=±20%)	±10% (<100 Ohms=±20%)
Available Packaging	TR	TR, TB	AP (25U, 25V Only) TB (25U, 25V Only) TR		AP (72 RW Only) TB TR (72 RW Only)	AP (82W Only) TB TR (82W Only)	TB (83Y Only) TR (83Y Only)	

Multi-Turn Cermet Trimmers







Model Number	43LF	44	45	64	66	67	68	78	84	89/90
Adjustment Turns	11	9	15	12	20	20	20	22	12	20
Housing Size	3 mm Sq.	4 mm Sq.	4 mm Sq.	1/4" Sq.	3/8" Sq.	3/8" Sq.	3/8" Sq.	1-1/4" Sq.	1/4" Sq.	3/4" Sq.
Adjustment Style	Top	Top, Side	Top, Side	Top, Side	Top,Side	Top,Side	Top,Side	Side	Top,Side	Side
Mounting Style	Surface	Surface	Surface	Thru-Hole	Thru-Hole	Thru-Hole	Thru-Hole	Thru-Hole	Surface	Thru-Hole
Seal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard Resistance Range	10 to 2 Meg	10 to 2 Meg	10 to 2 Meg	10 to 1 Meg	10 to 2 Meg	10 to 2 Meg	10 to 2 Meg	10 to 2 Meg	10 to 1 Meg	10 to 2 Meg
Standard Resistance	±20%	±10% (<100 Ohms=±20%)	±10% (<100 Ohms=±20%)	±10%	±10% (<100 Ohms=±20%)	±10% (<100 Ohms=±20%)	±10% (<100 Ohms=±20%)	±10% (<100 Ohms=±20%)	±10%	±10% (<100 Ohms=±20%)
Available Packaging	TR	TR TB	TR TB	TR AP (66y, 64Z Only)	TB TR AP (66W,66X Only)	TB TR (67W,67X Only) AP (67W,67X Only)	TB TR (68W, 68X Only) AP (68W, 68X Only)	Boxes	TR	TB

Level Sensing Products

TT Electronics offers several key level sensing products for a wide range of test and measurement related applications. These include our intrinsically safe multi-spot thermometer, specified for high-accuracy spot-temperature measurements in a wide range of applications. It also includes the maintenance-free Latis, a combined temperature and water-interface sensor for use in tanks storing a wide range of liquids. Our innovative contactless autopad linear position sensor utilises inductive technology, offering zero mechanical wear and excellent EMI resistance, as well as good tolerance to geometric offsets in a robust, cost-competitive package.

Multi-Spot Thermometers
REF: DS2102

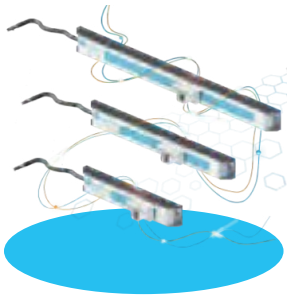
Accuracy	±0.15 + 0.002 x ltlC			
	Sheath Construction	Type	Wire insulation	Temperature range
	Thick-wall Nylon 12 (Rilsan) tube	Standard Nylon	PVC throughout	-20 to +90°C
	Thin-wall AISI 316 Convolute Tube	Standard Stainless	PVC throughout	-20 to +90°C
		Extended Temperature Stainless	PTFE internal PVC external	-50 to +120°C
		High Temperature Stainless	PTFE with high-temperature elements	-50 to +200°C
		Cryogenic	PTFE	-200 to +50°C
		Bitumen	Double glass on nickel/copper wire	-20 to +280°C
Other	Maximum pressure	6 bar		
	Termination	Top fitting with a 12" (305 mm) long stainless steel pipe with 10" (254 mm) length, 1/2" BSP thread, or to customer specification.		
	Fittings	1 locking ring and nut as standard.		
		Other fittings and flanges can be supplied.		
	Tank height	2 m to 40 m		
	Cabling	Colour-coded sleeved wires (max 10 m)		
		For high temps, (-20 to +280°C) wires are numbered		
	Active level-probe length	150 mm to 1.5 m (450 mm length is standard)		
Construction	Immersed parts: AISI 316 stainless steel, PTFE, FEP and VITON for maximum corrosion resistance			
Approvals	The stainless steel MST is certified to conform to the ATEX directive 94/9/EC.			
	The type of protection is EExia IIC T3 (Tamb = +160°C), certificate number BAS No. EX97D2042X.			

Latis
REF: DS2202

Accuracy	Water/Oil Level	Typically better than ±1 % of probe length
	Temperature	±0.15 + 0.002 x ItI°C
Repeatability	Water/Oil Level	Typically ±0.5 mm or ±0.1 % of active probe length, whichever is the greater
Output	Level Signal	4-20 mA (@ 10-30 Vdc)
Environmental	Operating Temperature	-20 to +80°C
	Maximum Pressure	6 bar
Construction	Immersed Parts: AISI 316 stainless steel, PTFE, FEP and VITON for maximum corrosion resistance	
Other	Active level-probe length	150 mm to 1.5 m (450 mm length is standard)
	Tank Height	2 m to 40 m
	Sleeved Wires Cabling	10 m maximum
Approvals	LATIS is certified to conform to the ATEX directive 94/9/EC. The type of protection is EExia IIC T4 (Tamb=80°C), certificate number BAS No.EX97D20242X.	

Autopad Linear Position Sensor

Interface	Analogue; 0-5 V ratiometric	Analogue; 0-5V	4-20 mA
Power Supply	4.5 – 5.5 Vdc	8-24V DC	8-24V DC
Current Consumption	20 mA	15 mA Max.	40 mA
Nominal Sensing Range (L) (mm)	75 mm/150 mm/250 mm		
Nominal Target - Sensor Separation	2 mm ± 1.5 mm		
Sense Through Non-Conductive Material (eg: plastic, water, oil)	Yes		
Linearity	1 % full scale output		
Hysteresis	None		
Magnetic field resistance	Complete Immunity		
Resolution	12 bit		
Update Rate	250µs		
Operating Temperature Range	-20 to 70°C		
Electrical Connections	Brown: V+, Black: Output, Blue: Gnd		
Output Load	>1kΩ		
Reverse Polarity	Yes		
Overvoltage Protection	Yes, to 40 V		
Cable Length	0.5 m		
Sealing	IP67		
Approvals	CE, ROHS & WEEE		



OEM Pressure Sensors

OEM pressure sensors from TT Electronics are available in standard ranges from 100mbar to 600bar. All ranges are available in gauge or absolute format. It is ideal for continuous use in applications where the pressure medium is wet and corrosive and long term stability is of prime importance.

Manufactured from high purity alumina ceramics, the OEM pressure sensor possesses superb chemical and abrasion resistance, making it unrivalled for use with virtually any pressure medium. The diaphragm of the sensing element has a four active-arm strain gauge bridge fused to its inner face. This direct fusion ensures excellent long term stability and repeatability, which, coupled with the matched bridge network, provides excellent linear thermal characteristics.

15 mm OEM Pressure Sensor
REF: DS2902

Sensor Range (bar)	0.4	1.0	2.0	3.0	4	5	10	20	50	150	200
Thickness (mm normal)	6.20	6.20	6.26	6.26	6.31	6.31	6.38	6.49	6.49	7.06	7.28
Sensitivity mV/V ±30%	1.3	3.7	2.8	4.3	3.4	4.2	4.5	4.8	6.4	5.4	5.4

Burst Pressure	3X sensor range minimum
Sensor Diameter (mm)	14.80 mm - 15.00 mm
Supply Voltage	1 - 30 Vdc
Operating Temperature	-25°C to +125°C
NL&H (%FRO.BSL)	<±0.25 (<±0.1 available)
TZS (%FRO/°C)	<±0.07
TSS (%FRO/°C)	<-0.04 typical
Zero Output Laser Trim	<±0.2mV/V
Bridge Resistance	10K ±30%
Long Term Stability	<±0.1%/y@25°C
Material	96% AL_2O_3 ceramic

19 mm OEM Pressure Sensor

Sensor Range (bar)	0.1	0.4	1.0	2.0	3	5	10	20	50	100	200	400	600
Thickness (mm normal)	6.2	6.2	6.2	6.3	6.4	6.4	6.5	6.6	6.8	7.3	7.8	8.6	9.5
Sensitivity mV/V ±30%	0.7	1.8	3.0	3.0	3.0	3.5	4.5	5.0	5.0	4.5	5.0	4.0	3.0

Burst Pressure	3X sensor range minimum	
Sensor Diameter (mm)	18.60 - 19.00	
Supply Voltage	1 - 30 Vdc	
Operating Temperature	-40°C to +120°C	
NL&H (%FRO.BSL)	<±0.25 (<±0.1 available)	
TZS (%FRO/°C)	<1 bar(g)	<0.2% span/°C
	1-3 bar(g)	<0.07% span/°C
	>5 bar(g)	<0.04% span/°C
	<3 bar(a)	<0.2% span/°C
	5-10 bar(a)	<0.07% span/°C
	>20 bar(a)	<0.04% span/°C
TSS (%FRO/°C)	<-0.04 typical	
Zero Output Laser Trim	<±0.2 mV/V	
Bridge Resistance	10K ±30%	
Long Term Stability	<±0.1%/y@25°C	
Material	96% AL_2O_3 ceramics	

Pressure Sensors and Transducers

Pressure transmitters and transducers from TT Electronics offer superb chemical and corrosion resistance. A choice of either gauge or absolute pressure is detected using a four active arm strain gauge bridge sensor, fused to a high-purity ceramic diaphragm. Models are available in several classes of accuracy and compensation specified below, with ranges from 100 mbar to 600 bar or scaled to customer requirements. Industry specific certifications may also be available. Please consult the factory for details.

TPL Series OEM Pressure Sensor

Gauge Pressure Range	0-4 to 0-10 bar
Output Type	Voltage (0.5 V to 4.5 V ratiometric)
Output Span	4.0 Vdc ±1 % of span
Output Zero	0.5 Vdc ± 1 %
Non Linearity, Hysteresis & Repeatability	±0.25 % of span (best fit straight line)
Compensated Temperature Range	0°C to +80°C
Operating Temperature Range	-20°C to 125°C
Thermal Zero Shift	±0.04 % of span /°C
Thermal Span Shift	±0.015 % reading /°C typical
Long Term Stability	±0.1 %/12 months typical
Power Supply	5 Vdc ±0.25 Vdc
Over Pressure	21 bar for 15 seconds @ +20°C
Burst Pressure	>35 bar
Pressure Connection Options	G 1/4" BSP male or female G 1/2" BSP male
	1/4" NPT male or female
	1/2" NPT male
	Vernon Morris QR
	Metric threads (M10, M14, M16, M18 & 20)
	Contact factory for additional pressure connections
Electrical Connection Options	IP65 mini-DIN (40050) plug & socket
	IP65 cable & ferrule
	IP65 large-DIN (43650) plug & socket
	IP68 glanded cable
	IP6K9K DIN Bayonet
	Contact factory for additional electrical connections
Housings	316L Stainless Steel (Brass upon request; contact factory for additional options)
Seals	Viton (Nitrile, EPDM, Chemraz upon request)

HPS-A Series Active Voltage Output Pressure Transducer
REF: DS2806

Output Span	4V ±0.5 %
Output Zero	1V ±0.5 % of span
Non Linearity, Hysteresis & Repeatability (NLH)	±0.1 % of span (best fit straight line)
Compensated Temp Range	-20°C to 125°C
Operating Temp Range	-20°C to 125°C
Thermal Zero Shift	0 to 100°C, ±0.01 % of span / °C
	< 0°C & >100°C, ±0.015 % span / °C
Thermal Span Shift	±0.015 % reading/°C typical
Long Term Stability	0.1 %/12 months typical
Power Supply	10 to 32 Vdc

HPS - C Series Rationalised mV Output Pressure Transducer

Output Span	Dependent on range. ±1 mV
Output Zero	0 mV ± 0.1 mV/V
Non Linearity, Hysteresis & Repeatability (NLH)	±0.2 % of span (best fit straight line)
Compensated Temp Range	-20°C to 125°C
Operating Temp Range	-20°C to 125°C
Thermal Zero Shift	<0 to 100°C, ±0.01 % span / °C
	< 0°C & >100°C, ±0.015 % span / °C
Thermal Span Shift	±0.015 % reading/°C typical
Long Term Stability	0.1 %/12 months typical
Power Supply	2-10 Vdc regulated

HPS - A Series 4-20 mA Pressure Transmitter
REF: DS2805

Output Span	16 mA ±0.5 %
Output Zero	4 mA ±0.5 % of span
Non Linearity, Hysteresis & Repeatability (NLH)	±0.1 % of span (best fit straight line)
Compensated Temp Range	-20°C to 125°C
Operating Temp Range	-20°C to 125°C
Thermal Zero Shift	0 to 100°C, ±0.01 % of span / °C
	< 0°C & >100°C, ±0.015 % span / °C
Thermal Span Shift	±0.015 % reading/°C typical
Long Term Stability	0.1 %/12 months typical
Power Supply	10 to 32Vdc
Loop Resistance	1.1k Ω max @32Vdc supply

HPS-A Series Active mV Output Pressure Transducers
REF: DS2807

	Class A	Class B	Class C
Output Span	200 mV ±0.5 % (others available)	200 mV ±1 % (others available)	200 mV ±1 % (others available)
Output Zero	0 mV ±0.5 % of span	0 mV ±1 % of span	0 mV ±1 % of span
Non Linearity, Hysteresis & Repeatability (NLH)	±0.1 % of span (best fit straight line)	±0.15 % of span (best fit straight line)	±0.25 % of span (best fit straight line)
Compensated Temp Range	-20°C to 125°C	0°C to 100°C	0°C to 80°C
Operating Temp Range	-20°C to 125°C	-20°C to 125°C	-20°C to 125°C
Thermal Zero Shift	0 to 100°C, ±0.01 % of span / °C	±0.015 % span / °C	±0.04 % span / °C
	<0°C & >100°C, ±0.015 % span / °C		
Thermal Span Shift	±0.015 % reading/°C typical	±0.015 % reading/ °C typical	±0.015 % reading/°C typical
Long Term Stability	0.1 %/12 months typical	0.1 %/12 months typical	0.1 %/12 months typical
Power Supply	10 to 32 Vdc	10 to 32 Vdc	10 to 32 Vdc

Flush Mounting and Abrasive Media

Flush mounting and abrasive media products from TT Electronics offer unrivaled abrasion resistance. They are both robust and high quality, and are available with a choice of either a cable or integrated connector configuration. Both types incorporate a four active arm strain gauge bridge fused to a high purity ceramic diaphragm. This offers high natural output coupled with superb chemical and corrosion resistance. The units have been designed primarily for use with slurry and other abrasive fluids. They feature a cavity free, flush sensing diaphragm covered by a flexible polypropylene shield.

Abrasive Material Pressure Transmitter P6420-57 (Cable) or P6420-67 (Niphan plug and socket)

Pressure Range		5, 10, 20, & 50 bar SG and G
Excitation		10-32 Vdc unregulated
Output	Span:	16 mA ±1 % of span at pressure
	Zero:	4 mA ±1 % of span at zero pressure
Output Type		4-20 mA
Non Linearity, Hysteresis & Repeatability (NLH)		<±1 % of span (best fit straight line)
Operating Temp Range		-25°C to +100°C
Safe Over-range		1.5 times rated range
Burst Pressure		3 times rated range minimum
Insulation Resistance		>500M Ω at 500 Vdc, over the full operating temperature range
Loading Driving		1k Ω @ 28 Vdc supply
Environmental Protection		IP68 (P6420-57-Cable) or IP66 (P6420-67 - Niphan plug and socket)
Electrical Connections		IP68 Cable PUR or Niphan plug and socket
Cable Length (m)		3

Model Number (Cable)	PP6420-010-57	PP6420-016-57	PP6420-020-57	PP6420-035-57
Pressure Range (bar)	0-10	0-16	0-20	0-35

Model Number (Plug & Socket)	PP6420-010-67	PP6420-016-67	PP6420-020-67	PP6420-035-67
Pressure Range (bar)	0-10	0-16	0-20	0-35

Model Number (Cable)	PP6420-050-57	PP6420-070-57	PP6420-100-57	PP6420-200-57
Pressure Range (bar)	0-50	0-70	0-100	0-200

Model Number (Plug & Socket)	PP6420-050-67	PP6420-070-67	PP6420-100-67	PP6420-200-67
Pressure Range (bar)	0-50	0-70	0-100	0-200

Submersible Transducers and Transmitters

The submersible transducer and transmitter portfolio of TT Electronics is comprised of two families: the Trident Series Submersible Level-Depth Transmitter; and the Trident Series Corrosion Resistant Submersible Level/Depth Transmitter. Each has been designed for exceptional accuracy and reliability.

Trident Series Level/Depth Transmitters are a family of temperature compensated pressure transmitters. Their all-welded construction makes them ideal for even the most onerous of applications, including pump testing, reservoir, borehole, river and tank liquid level measurements.

Trident Series Corrosion Resistant Submersible Level/Depth Transmitters have been specifically designed for harsh environment liquid level monitoring requirements, including those of land fill and effluent sites. Their materials of construction ensure protection from even the most aggressive leachates in these applications.

Lightning and surge protection are also standard features of both product families, making them suitable for outdoor installations. They are also fully compensated over wide operational and compensated temperature ranges.

Trident Series Corrosion Resistant Submersible Level/Depth Transmitters
REF: DS2801 & DS2802

Pressure Ranges		Available from 1 mWG to 500 mWG vented; Absolute available from 2.5 mWG
Power Supply		10 to 32 Vdc
Output Options		4-20 mA (two-wire)
Zero and Span Setting		±1 % of span
Non Linearity, Hysteresis & Repeatability (NLH)		<±0.25 % of span
Compensated Temp		0°C to 60°C
Operating Temp		-10°C to 60°C
Thermal Effects	Zero:	<±0.015 % span/°C
	Span:	<±0.015 % reading/°C typical
Safe Over-range		1.5 x rated range minimum
Burst Pressure		3 x rated range minimum
Long Term Stability		0.1 % span/12 months
EMC Protection		Meets EN2004/108/EC
Electrical Connection		PUR vented cable
Wetted Materials		DS2801: C316L stainless steel, alumina ceramic, polyurethane, acetal and Viton O-ring
		DS2802 (Enhanced Corrosion Resistance): DUPLEX stainless steel, alumina ceramic, polyurethane, acetal and chemraz O-ring

Trident Series Corrosion Resistant Submersible Level/Depth Transmitters

Model Number	PB-AIVAC-0001-A-G	PB-AIVAC-0001-B-G	PB-AIVAC-0001-C-G	PB-AIVAC-0001-D-G	PB-AIVAC-0001-E-G
Pressure Range (mbar)	0-100	0-100	0-100	0-100	0-100
Cable Length (m)	1	2	4	6	10

Model Number	PB-AIVAC-0004-A-G	PB-AIVAC-0004-B-G	PB-AIVAC-0004-C-G	PB-AIVAC-0004-D-G	PB-AIVAC-0004-E-G
Pressure Range (mbar)	0-400	0-400	0-400	0-400	0-400
Cable Length (m)	1	2	4	6	10

Model Number	PB-AIVAC-001-A-G	PB-AIVAC-001-B-G	PB-AIVAC-001-C-G	PB-AIVAC-001-D-G	PB-AIVAC-001-E-G
Pressure Range (bar)	0-1	0-1	0-1	0-1	0-1
Cable Length (m)	1	2	4	6	10

Model Number	PB-AIVAC-002-A-G	PB-AIVAC-002-B-G	PB-AIVAC-002-C-G	PB-AIVAC-002-D-G	PB-AIVAC-002-E-G
Pressure Range (bar)	0-2	0-2	0-2	0-2	0-2
Cable Length (m)	1	2	4	6	10

Model Number	PB-AIVAC-003-A-G	PB-AIVAC-003-B-G	PB-AIVAC-003-C-G	PB-AIVAC-003-D-G	PB-AIVAC-003-E-G
Pressure Range (bar)	0-3	0-3	0-3	0-3	0-3
Cable Length (m)	1	2	4	6	10

Model Number	PB-AIVAC-005-A-G	PB-AIVAC-005-B-G	PB-AIVAC-005-C-G	PB-AIVAC-005-D-G	PB-AIVAC-005-E-G
Pressure Range (bar)	0-5	0-5	0-5	0-5	0-5
Cable Length (m)	1	2	4	6	10

Model Number	PB-AIVAC-010-A-G	PB-AIVAC-010-B-G	PB-AIVAC-010-C-G	PB-AIVAC-010-D-G	PB-AIVAC-010-E-G
Pressure Range (bar)	0-10	0-10	0-10	0-10	0-10
Cable Length (m)	1	2	4	6	10

Flowmeters

The flowmeters portfolio of TT Electronics provides high-accuracy liquid flow measurements of up to 100 m^3/hr and gas flow up to 1000 m^3/hr. We manufacture glass, plastic and metal flowmeters that are simple to install, use and maintain. A selection of products are available with ATEX approval.

Anaesthetic Tubes

Glass & Plastic Tube Variable Aperture Flow Meters

Metal Tube Variable Aperture Flow Meters

	Anaesthetic GTF (Glass Tube & Float)	NGX, LGX, GU, PG/PGU	GMTB, GMT, GMTX
Gas Flow range	0.1 to 1.0L/min, 1.0 to 10L/min or 0.1 to 15L/min	5mL /min to 440L/min	0.5 - 1000m^3/hr
Liquid flow range		2mL /min to 2400L/hr	20L/hr to 100m^3/hr
Standard Gases	Oxygen, Air and Nitrous Oxide	Air	Air
Standard Fluids		Water	Water
Accuracy	±1.5% to ± 5% FSD	Up to ± 1.25% FSD to ± 5% FSD	± 2% FSD
Certification		ATE	IP65, CRN
Max Pressure	ATP, 1.013 Bar	10 to 25 bar	75 bar to 100 bar
Operating temperature	20°C	80 to 100 °C	-50 to 200°C
Materials of construction			
Float material	Duraluminium Red.	Duraluminium, Stainless Steel or PTFe	316 Stainless Steel or PVC
Tube Material	Borosilicate glass	Borosilicate glass, Polycarbonate and TPX plastic	Brass or 316 Stainless Steel
Tube Length	150 mm, 230 mm, 240 mm, 250 mm, & 260 mm	65 mm & 138 mm	15, 25, 50, 80 & 100 mm
Tube Diameter	Outside Diameter 12 mm or 15 mm nominal		
Scale Length		30-100 mm	100 mm
Frame Size		1 to 5	
Plate		Protective and non protective housing	Flanged or Screwed
Seals / O-ring		Brass , Stainless Steel, Viton or Nitrile	
Orifice Carrier			Polyester coated aluminium. Weatherproof coated to IP65
Power Supply / Relay Unit			4-20 mA output version
Transmitter			Mains or DC powered 4-20 mA transmitter
Alarm option		Available	Low & High, Single & Dual Channel
Process connection		Rear and inline versions	
Connection		G 1/4, G1, G 3/8 or G 1/2 female	DIN PN16+40, ANSI 150+300lb, BSPP female and NPT female
CUSTOMER OPTIONS	Individual flow calibration	Valve or non valved	ATEX approved, DC version only
			85-265 Vac and 12-24 Vdc

All devices are available as analog indicators with or without alarms, as well as electronic transmitters with 4-20 mA and NAMUR contact outputs. Easy-to-read graphical displays are optional. Depending upon specified model, flow products can be used in all hazardous areas in flameproof, intrinsic safety or non sparking design. Custom options, such as special scales, are available for most products.

Shunts Orifice Flowmeters

PITOT Tube

Flostats Automatic Flow Controllers

SGUV, SGUL, LPCB Mark 1, LPCB Mark 2	Flo-Bar	MN, FV, Type B, Type LB
	5 - 100 000 cm^3/min	
150 -1250 dm^3/min	2 - 3500 cm^3/min	
± 2.5 % to ± 5 % at varius test flows specified by LPCB	± 0.5 % to ± 1 %	
12 bar at 20°C, to 25 bar	5 bar	20 bar and 28 bar
80°C	90°C - 300°C	80°C to 100°C
Stainless Steel	Stainless Steel 316	
Borosilicate glass		Brass or 316 Stainless Steel
	13 mm, 25 mm and 60 mm	
Stainless Steel mounted		
Nitrile		Nitrile (Brass) or Viton (SS)
Polyester coated steel carrier ring		
Flanged or Vitaulic	Optional	
Approved and Listed by LPCB		

Temperature Instrumentation

TT Electronics manufactures a full range of thermocouples and temperature probes. They are available in both standard and custom designs, fully supported by our applications engineering team. We stock a full range of associated accessories and instrumentation and provide fast delivery for urgent requirements.

Thermocouples

- Ranges from +200°C to +1600°C
- All types and industries
- Materials & components held in stock
- In-house calibration and repair services
- Manufactured to the latest revision of AMS2750 for aerospace applications

Temperature Transmitters

- Head or DIN rail mounted
- Configurable input/output
- In-head display and alarm relay options
- Intrinsically safe options
- Open HART® protocol

Refractory Sheaths and Cables

- Sheaths/tubes up to +1800°C
- Excellent corrosion resistance
- Range of materials
- Cables to suit all thermocouples
- Colour coded to IEC 584-3

Infrared Thermometers

- 0°C to +3000°C range
- Adjustable emissivity
- Datalogging function
- Fixed or portable versions
- Optional UKAS calibration

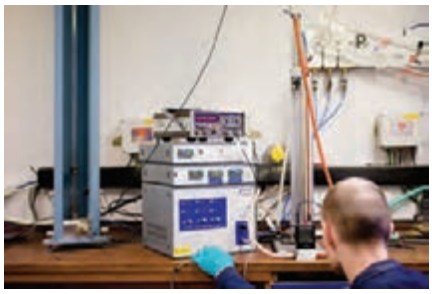
Controllers, Recorders and Dataloggers

- Process controllers and indicators
- Graphical recorders
- Stand alone or networked solutions
- SCADA & data acquisition packages
- Configuration and project management services

UKAS Calibration and Services

Located in Sheffield, United Kingdom, the accredited calibration laboratories of TT Electronics can provide either on-site or in-house calibration to either UKAS or traceable national standards under BS/EN/ISO17025 accredited procedures. Calibration services support temperature, pressure, flow and electrical measurement parameters. Certifications are issued using the latest technology. They support aerospace industry compliance to the latest revision of AMS2750. In addition, TT Electronics offers fast and efficient maintenance and repair services. Please consult the factory for details.

UKAS and Traceable Calibration



- Over 50 years of experience
- Flexibility to meet your requirements - on or off site
- Fast and efficient maintenance and repair services

Supported Measurement Parameters

- UKAS accredited for calibrations of Pressure, Temperature, Flow and Electrical instrumentation
- Temperature ranges from -196°C to +1600°C
- Gas flow ranges from 5 mL/min to 50 L/min
- Pressure ranges from 1 bar to 1200 bar
- Electrical – mV, mA, ohms and testing to the latest revision of AMS2750

Customer Care

- Fast delivery for urgent requirements
- Customer collections service
- Full technical and application support for all products
- Comprehensive repair facility

TT Electronics
Industrial Sensing and Control

1645 Wallace Drive, Suite 130
Dallas, TX 75006
USA

Toll Free: +1 800-341-4747
Tel: +1 972-323-220
Fax: +1 972 323 2396

Asia: asiasales@ttelectronics.com
Europe: emea@ttelectronics.com

www.ttelectronics.com

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