



OPTICAL SWITCHES

HEI has been designing and building optical switches and assemblies to the strictest industrial and military standards for 20 years. Today HEI produces standard optical switches in twelve basic configurations with over 100 variations, including direct replacement parts for most industry standard switches.

The company is also a leader in designing and building custom optical switches for special application requirements. Compact, accurate and dependable HEI optical switches are suitable for any optical switching application.

OPTICAL SWITCH APPLICATIONS

- Optical Encoding
- Limit Switching
- Timing Transducer
- Fault Detection
- Rotational Speed Monitoring
- Counter Circuits
- Flow Metering
- Linear Measurement
- Precision Position Detection
- Level Indication

OPTICAL SWITCH FEATURES

- Over 100 packaging and electrical variations
- TTL, DTL, CMOS and Analog Outputs
- Pin or Wire Leads (12-in. standard)
- Variety of Gap Sizes
- Special Aperture Designs

CUSTOM OPTICAL SWITCHES

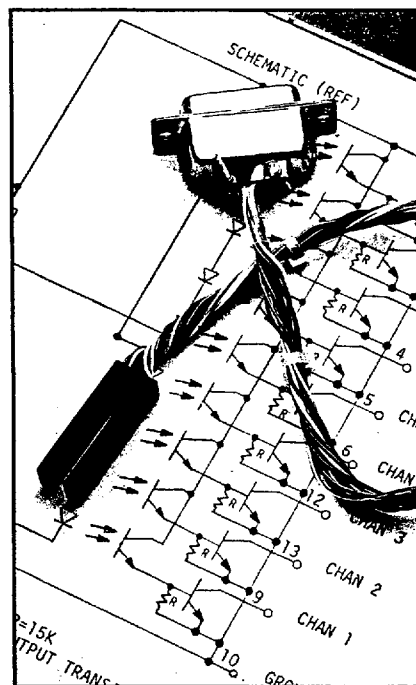
HEI also offers complete custom design and build services. From prototype to final production, HEI engineers assist customers in development of reliable and economical designs. The HEI custom optical switch process offers design options to customers in four categories. HEI engineers assist in setting specifications, and then develop prototypes for application testing.

Mechanical—selection of housing size and format, mounting detail

Electrical—signal characteristics, input/output requirements

Optical—number of channels, light frequency, aperture size, sensor distance

Interface—lead length-pin, wire or connector



HEI CUSTOM APPLICATION EXPERIENCE

- Photo Arrays
- Vertical Format Readers
- Optical Encoders
- End-of-Tape Sensors
- Ribbon Edge Sensors
- Bar Code reading
- Drop Sensors
- Printers/Plotters
- Centrifuges
- Blood Oxygen Monitoring

THE HEI QUALITY COMMITMENT

HEI has instituted a **Statistical Process Manufacturing Control** system to insure that each component meets performance specifications dependably and consistently. The company performs 100-percent electrical inspection of every device before shipment. As a result of these quality assurance processes HEI has been qualified as a **Dock-to-Stock** and **JIT** supplier by a number of original equipment manufacturers.



Custom or standard switches are used for reliable print head positioning and paper alignment.



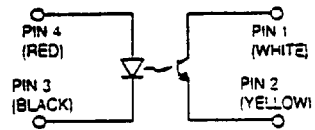
Optical switches perform encoding and head control monitoring functions for disk drive memories.



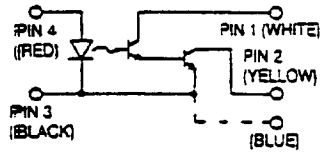
Mark sensing and motor speed monitoring are easily accomplished with packaged optoelectronic technology.



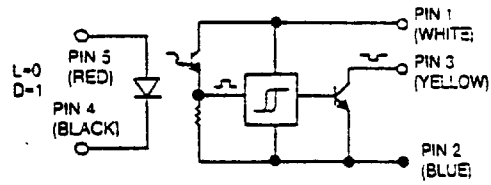
Solid-state optoelectronic devices handle contactless interruptor switching function reliably, over millions of actuations.



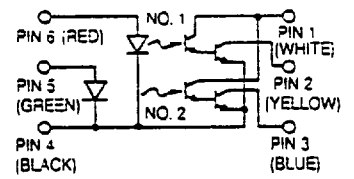
Schematic 12



Schematic 14



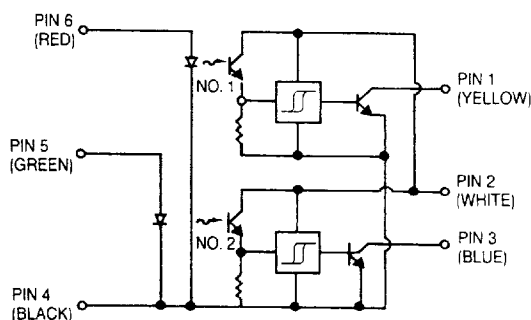
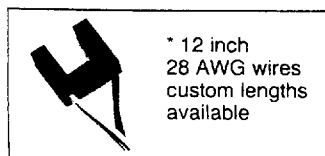
Schematic 15



Schematic 16

Characteristic		I _C ON				I _C OFF		t ON	t OFF	V _{CE} (SAT)		V _F (LED)		BV _{CEO}	BV _{ECO}	I _C	I _F (LED)		Output
Test Conditions		V _{CE} } I _F } R _L = 0 As Shown				V _{CE} } As Shown I _F = 0		I _F = 20mA R _L = 1k Ω		I _C } As Shown I _F = 35mA		I _F } As Shown		I _C = 1mA I _F = 0 H = 0	I _C = 100μA I _F = 0 H = 0				
Units		mA			V	nA	V	μS		V (SAT)	mA	V	mA	V		mA	mA		
	HEI	MIN	TYP	I _F	V _{CE}	MAX	V _{CE}	(t _d +t _r) TYP	(t _{st} +t _f) TYP	MAX	I _C	MAX	I _F	MIN	MIN	MAX	MAX		
PKG12 	10501	.5	1.0	30	5	100	5	200	300	.4	.5	1.5	40	20	5	15	50	12	Tran.
	*10503	.5	1.0	30	5	100	5	200	300	.4	.5	1.5	40	20	5	15	50	12	Tran.
	10509	1.5	2.0	30	5	100	5	350	350	1.0	.5	1.5	40	20	5	30	50	13	Darl.
	*10511	1.0	2.0	30	5	100	5	350	350	1.0	.5	1.5	40	20	5	30	50	13	Darl.
	10513	3.0	4.5	30	5	100	5	20	120	.1	.5	1.5	40	25	5	100	50	14	Amp.
SLOT.060	*10515	3.0	4.5	30	5	100	5	20	120	.1	.5	1.5	40	25	5	100	50	14	Amp.
PKG13 	10502	.5	1.0	30	5	100	5	200	300	.4	.5	1.5	40	20	5	15	50	12	Tran.
	*10504	.5	1.0	30	5	100	5	200	300	.4	.5	1.5	40	20	5	15	50	12	Tran.
	10510	1.0	2.0	30	5	100	5	100	250	1.0	.5	1.5	40	20	5	30	50	13	Darl.
	*10512	1.0	2.0	30	5	100	5	100	250	1.0	.5	1.5	40	20	5	30	50	13	Darl.
	10514	3.0	4.5	30	5	100	5	15	150	.1	.5	1.5	40	25	5	100	50	14	Amp.
SLOT.200	*10516	3.0	4.5	30	5	100	5	15	150	.1	.5	1.5	40	25	5	100	50	14	Amp.
PKG14 	10517		N1	2.0	5	N2	5	10	50	.1	.5	1.5	40	30	5	50	50	15	Schmitt Trigger
	*10519		N1	2.0	5	N2	5	10	50	.1	.5	1.5	40	30	5	50	50	15	Schmitt Trigger
	10529			3.0	5	100	5	20	120	.1	.5	1.5	40	25	5	50	50	16	Dual Amp.
	*10531			3.0	5	100	5	20	120	.1	.5	1.5	40	25	5	50	50	16	Dual Amp.
	*10535		N1	2.0	5	N2	5	10	50	.1	.5	1.5	40	30	5	50	50	17	Dual Schmitt
PKG15 	10518		N1	3.0	5	N2	5	15	40	.1	.5	1.5	40	30	5	50	50	15	Schmitt Trigger
	*10520		N1	3.0	5	N2	5	15	40	.1	.5	1.5	40	30	5	50	50	15	Schmitt Trigger
	10530			3.0	5	100	5	15	150	.1	.5	1.5	40	25	5	50	50	16	Dual Amp.
	*10532			3.0	5	100	5	15	150	.1	.5	1.5	40	25	5	50	50	16	Dual Amp.
	*10536		N1	3.0	5	N2	5	15	40	.1	.5	1.5	40	30	5	50	50	17	Dual Schmitt
SLOT.200 	10701	1.0 .5	2.5 1.0	30	5	100	5	20 150	250 250	.5	.5	1.5	40	25	5	15	50	12	Tran. N3
	10702	2 2	4.5 3.0	30	5	100	5	25 250	350 300	1.0	.5	1.5	40	20	5	30	50	13	Darl. N3
	10703	4.5 2	4.5 4.5	30	5	100	5	10 40	80 80	.1	.5	1.5	40	25	5	100	50	14	Amp. N3
	10704	N1	2.0 3.0		5	N2	5	50 50	25 35	.1	.5	1.5	40	30	5	50	50	15	Schmitt Trigger N3
	10710											1.55	50						LED

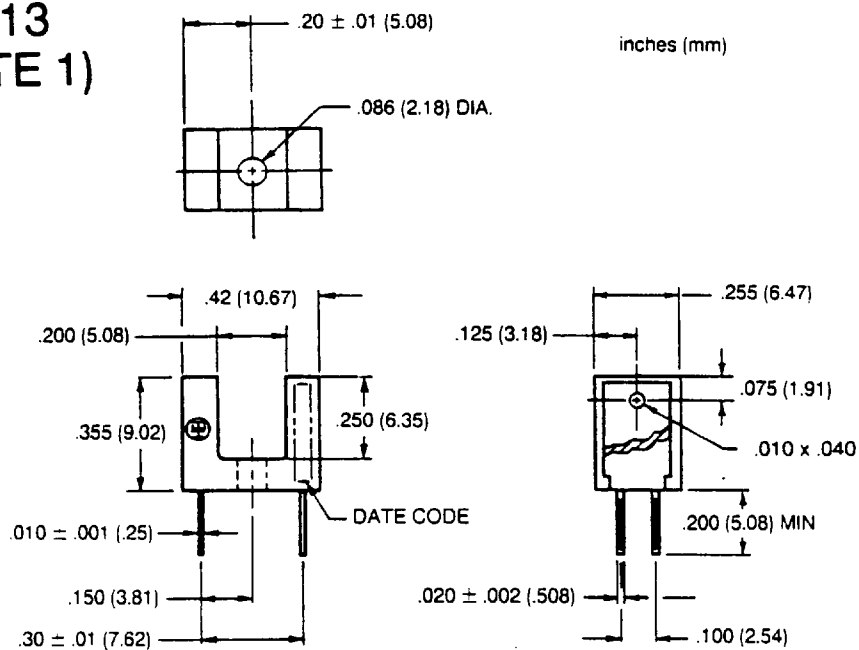
.060 Gap Switch, Led and Sensor Aperture = .010 x .040"
.200 Gap Switch, Led and Sensor Aperture = .020 x .040"



Schematic 17

NOTE—Current limiting and pull-up resistors may be added internally.
Faster switching speeds available
Devices can be supplied with tubing and connectors
N1 Schmitt trigger MAX switch threshold (I_F(LED)) mA
N2 Schmitt trigger quiescent current = 1.2mA TYP.
N3 10710 was used as the light source I_F = 30mA V_{CE} = 5V
ENVIRONMENTAL SPECIFICATIONS
Operating Temperature 0—70°C
Storage Temperature -40—+80°C
Consult factory for power dissipation specification

PKG13 (NOTE 1)



PKG14 (NOTE 1)

