

Optocouplers and Solid State Relays

April 2002

Datasheet.Company

- Schematics and Specifications
- Package Specifications
- PCB Layouts
- Carrier Tape Specifications
- Safety Agency Certifications
- Glossary of Terms

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Fairchild Semiconductor is a leader in the design and production of optocouplers and our newly released Solid State Relays (SSRs). Optocouplers incorporate two electronic components in a single device — an input infrared (IR) light emitting diode (LED) and an output photodetector. Solid State Relays, on the other hand, consist of an infrared LED optically coupled to a photovoltaic generator which drives a power MOSFET detector.

Two characteristics are critical to optocoupler performance — Voltage Isolation and Current Transfer Ratio. Voltage isolation (V_{ISO}), between the IR LED and the photodetector, is controlled by materials in the light path and by the physical separation between the two components. Current transfer ratio (CTR), is defined as the ratio of detector current to emitter current. Fairchild Semiconductor's product offering allows customers the broadest choice of Voltage Isolation and CTR options.

For the latest information and datasheets on our optocoupler and SSR families, please visit our website at: www.fairchildsemi.com/products/opto.

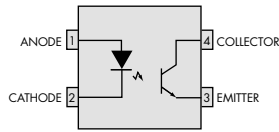
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	Package Type and Color (see pages 23 to 28)										Safety Agency Certifications (see pages 35 and 36)								Schematic and Specifications Page Number	
	White Packages					Black Packages					BABT	BSI	CSA	DEMKO	FIMKO	NEMKO	SEMKO	UL		VDE
	TO-18 Style Hermetic	4-Pin Plastic Housing	4-Pin Half-Pitch Mini Flat	4-Pin Full-Pitch Mini Flat	6-Pin Surface Mount Dual In-line	6-Pin Through Hole Dual In-line	6-Pin 0.4 Inch Dual In-line	8-Pin Small Outline	4-Pin Surface Mount Dual In-line	4-Pin Through Hole Dual In-line										
Photodarlington Output																				
DC Sensing Input																				
4N29											■	■	■				■	■	■	15
4N30											■	■	■				■	■	■	15
4N31											■	■	■				■	■	■	15
4N32											■	■	■				■	■	■	15
4N33											■	■	■				■	■	■	15
CNX48U											■	■	■				■	■	■	15
H11B1											■	■	■				■	■	■	15
H11B2											■	■	■				■	■	■	15
H11B255											■	■	■				■	■	■	15
H11B3											■	■	■				■	■	■	15
H11B815								■	■	■							■	■	■	15
H24B1		■																		15
H24B2		■																		15
MOC119 (No Base Connection)											■	■	■				■	■	■	16
MOC223-M							■										■		■	16
MOC8020 (No Base Connection)											■	■	■				■	■	■	16
MOC8021 (No Base Connection)											■	■	■				■	■	■	16
MOC8030 (No Base Connection)											■	■	■				■	■	■	16
MOC8050 (No Base Connection)											■	■	■				■	■	■	16
MOC8080											■	■	■				■	■	■	15
MOCD223-M (Dual Channel)							■										■		■	16
TIL113											■	■	■				■	■	■	15
High Voltage Photodarlington Output																				
(with integral base-emitter resistor)																				
DC Sensing Input																				
H11G1											■	■	■				■	■	■	16
H11G2											■	■	■				■	■	■	16
H11G3											■	■	■				■	■	■	16
High-Gain Split Photodarlington Output																				
Low Current DC Sensing Input																				
6N138														■	■	■			■	17
6N139														■	■	■			■	17
HCPL-0700							■										■	■		17
HCPL-0701							■										■	■		17
HCPL-2730 (Dual Channel)											■	■	■						■	17
HCPL-2731 (Dual Channel)											■	■	■				■		■	17

	Package Type and Color (see pages 23 to 28)										Safety Agency Certifications (see pages 35 and 36)							Schematic and Specifications Page Number							
	White Packages					Black Packages					BABT	BSI	CSA	DEMKO	FIMKO	NEMKO	SEMKO		UL	VDE					
	TO-18 Style Hermetic	4-Pin Plastic Housing	4-Pin Half-Pitch Mini Flat	4-Pin Full-Pitch Mini Flat	6-Pin Surface Mount Dual In-line	6-Pin Through Hole Dual In-line	6-Pin 0.4 Inch Dual In-line	8-Pin Small Outline	4-Pin Surface Mount Dual In-line	4-Pin Through Hole Dual In-line	4-Pin 0.4 Inch Dual In-line	6-Pin Surface Mount Dual In-line	6-Pin Through Hole Dual In-line	6-Pin 0.4 Inch Dual In-line	8-Pin Surface Mount Dual In-line	8-Pin Through Hole Dual In-line	8-Pin 0.4 Inch Dual In-line								
Bilateral Analog FET Output																									
DC Sensing Input																									
H11F1												■	■	■				■	■	■	■	■	■	■	21
H11F2												■	■	■				■	■	■	■	■	■	■	21
H11F3												■	■	■				■	■	■	■	■	■	■	21
Schmitt Trigger Output																									
DC Threshold Sensing Input																									
H11L1-M				■	■	■												■	■	■	■	■	■	■	21
H11L2-M				■	■	■												■	■	■	■	■	■	■	21
H11L3-M				■	■	■												■	■	■	■	■	■	■	21
Schmitt Trigger Output																									
DC Threshold Sensing Input																									
H11N1-M				■	■	■												■	■	■	■	■	■	■	22
H11N2-M				■	■	■												■	■	■	■	■	■	■	22
H11N3-M				■	■	■												■	■	■	■	■	■	■	22
Optically Isolated Error Amplifier																									
DC Sensing Input with Voltage Reference																									
FOD2712							■											■	■				■	■	22
Optically Coupled Solid State Relay																									
DC Threshold Sensing Input																									
HSR312				■	■													■	■				■	■	22
HSR312L				■	■													■	■				■	■	22
HSR412				■	■													■	■				■	■	22
HSR412L				■	■													■	■				■	■	22

Schematics and Specifications

4-Pin Package



Phototransistor Output; DC Sensing Input

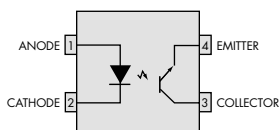
Part Number	CTR @ $\leq 10 \text{ mA } I_f$ (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_R/t_F (μs)	V_{ISO} AC _{RMS} (kV)
	min	max	min	min	min	typ	1 minute
H11A817	50	600	35	NA	6	2.4/2.4	5.3
H11A817A	80	160	35	NA	6	2.4/2.4	5.3
H11A817B	130	260	35	NA	6	2.4/2.4	5.3
H11A817C	200	400	35	NA	6	2.4/2.4	5.3
H11A817D	300	600	35	NA	6	2.4/2.4	5.3
HMA121	50	600	80	NA	7	3/3	3.75
HMA124	100	1200	80	NA	7	3/3	3.75
HMA2701	50	300	40	NA	7	3/3	3.75
HMHA2801	80	600	80	NA	7	3/3	2.5
HMHA281	50	600	80	NA	7	3/3	2.5

Hermetic Phototransistor Output; DC Sensing Input

Part Number	CTR @ $10 \text{ mA } I_f$ (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	$V_{CE(SAT)}$ (V)	V_{ISO} DC (kV)
	min	max	min	min	min	max	1 second
MCT4	15	—	30	NA	7	0.5	1
MCT4R*	15	—	30	NA	7	0.5	1

*Screened to MIL-STD -883C Class B

4-Pin Package

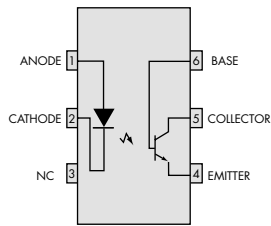


Phototransistor Output; DC Sensing Input

Part Number	CTR @ $\leq 10 \text{ mA } I_f$ (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μs)	V_{ISO} AC _{RMS} (kV)
	min	max	min	min	min	max	1 minute
H24A1	100	—	30	NA	7	—	5.3
H24A2	20	—	30	NA	7	—	5.3

Schematics and Specifications

6-Pin Package

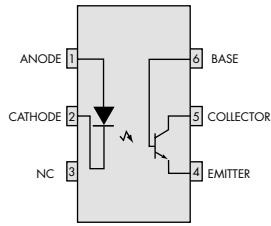


Phototransistor Output; DC Sensing Input

Part Number	CTR @ 10 mA I_f (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μ s)	V_{ISO} AC _{RMS} (kV) 1 minute
	min	max	min	min	min	max	
4N25							5.3
4N25-M	20	—	30	70	7	—	4.2
4N26							5.3
4N26-M	20	—	30	70	7	—	4.2
4N27							5.3
4N27-M	10	—	30	70	7	—	4.2
4N28							5.3
4N28-M	10	—	30	70	7	—	4.2
4N35							5.3
4N35-M	100	—	30	70	7	10/10	4.2
4N36							5.3
4N36-M	100	—	30	70	7	10/10	4.2
4N37							5.3
4N37-M	100	—	30	70	7	10/10	4.2
CNX35U	40	160	30	70	7	20/20	5.3
CNX36U	80	200	30	70	7	20/20	5.3
CNX38U	70	210	80	120	7	20/20	5.3
CNX39U	60	100	30	70	7	20/20	5.3
CNX83A.W	40	250	50	70	7	—	5.3
CNY17-1							5.3
CNY17-1-M	40	80	70	70	7	10/10	4.2
CNY17-2							5.3
CNY17-2-M	63	125	70	70	7	10/10	4.2
CNY17-3							5.3
CNY17-3-M	100	200	70	70	7	10/10	4.2
CNY17-4	160	320	70	70	7	10/10	5.3
H11A1							5.3
H11A1-M	50	—	30	70	7	—	4.2
H11A2							5.3
H11A2-M	20	—	30	70	7	—	4.2
H11A3							5.3
H11A3-M	20	—	30	70	7	—	4.2
H11A4							5.3
H11A4-M	10	—	30	70	7	—	4.2
H11A5							5.3
H11A5-M	30	—	30	70	7	—	4.2

Schematics and Specifications

6-Pin Package



Phototransistor Output; DC Sensing Input (cont.)

Part Number	CTR @ 10 mA I_F (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μ s)	V_{ISO} AC_{RMS} (kV) 1 minute
	min	max	min	min	min	max	
H11AV1-M	100	300	70	70	7	15/15	4.2
H11AV1A-M	100	300	70	70	7	15/15	4.2
H11AV2-M	50	—	70	70	7	15/15	4.2
H11AV2A-M	50	—	70	70	7	15/15	4.2
MCT2	20	—	30	70	7	—	5.3
MCT2-M							4.2
MCT210	150	—	30	30	6	—	5.3
MCT2200	20	—	30	70	7	10/10	5.3
MCT2201	100	—	30	70	7	10/10	5.3
MCT2202	63	125	30	70	7	10/10	5.3
MCT271	45	90	30	70	7	7/7	5.3
MCT2E	20	—	30	70	7	—	5.3
MCT2E-M							4.2
MOC8100-M	50*	—	30	70	NA	20/20	4.2
SL5500	50	300	30	30	7	20/50	5.3
SL5501	25	400	30	30	7	20/50	5.3
SL5504	25	400	80	120	7	50/150	5.3
SL5511	25**	—	30	30	7	20/50	5.3
SL5583.W	40	320	50	70	7	20/50	5.3
TIL111	12.5***	—	30	70	NA	10/10	5.3
TIL111-M							4.2
TIL117-M							4.2

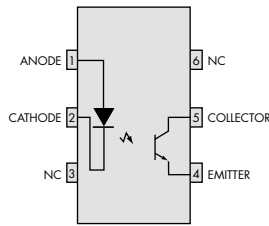
*CTR measured at $I_F = 1$ mA

**CTR measured at $I_F = 2$ mA

***CTR measured at $I_F = 16$ mA

Schematics and Specifications

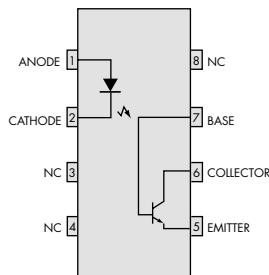
6-Pin Package (No Base Connection)



Phototransistor Output; DC Sensing Input

Part Number	CTR @ 10 mA I_f (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μ s)	V_{ISO} AC _{RMS} (kV) 1 minute
	min	max	min	min	min	max	
CNX82A.W	40	250	50	NA	7	—	5.3
CNY17F-1	40	80	70	NA	7	10/10	5.3
CNY17F-2	63	125	70	NA	7	10/10	5.3
CNY17F-3	100	200	70	NA	7	10/10	5.3
CNY17F-4	160	320	70	NA	7	10/10	5.3
MOC8101	50	80	30	NA	7	—	5.3
MOC8102	73	117	30	NA	7	—	5.3
MOC8103	108	173	30	NA	7	—	5.3
MOC8104	160	256	30	NA	7	—	5.3
MOC8105	65	133	30	NA	7	—	5.3
MOC8106	50	150	70	NA	7	—	5.3
MOC8107	100	300	70	NA	7	—	5.3
MOC8108	250	600	70	NA	7	—	5.3
MOC8111	20	—	30	NA	7	20/20	5.3
MOC8112	50	—	30	NA	7	20/20	5.3
MOC8113	100	—	30	NA	7	20/20	5.3
SL5582.W	40	320	50	NA	7	20/50	5.3

8-Pin Package



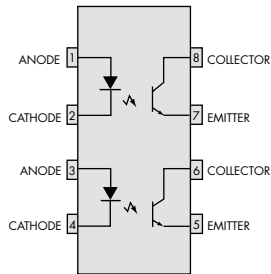
Phototransistor Output; DC Sensing Input

Part Number	CTR @ 10 mA I_f (%)		BV_{CEO} (V)	$V_{CE(SAT)}$ (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μ s)	V_{ISO} AC _{RMS} (kV) 1 minute
	min	max	min	max	min	max	
MOC205-M	40	80	70	0.4	7	—	2.5
MOC206-M	63	125	70	0.4	7	—	2.5
MOC207-M	100	200	70	0.4	7	—	2.5
MOC208-M	40	125	70	0.4	7	—	2.5
MOC211-M	20	—	30	0.4	7	—	2.5
MOC212-M	50	—	30	0.4	7	—	2.5
MOC213-M	100	—	30	0.4	7	—	2.5
MOC215-M	20*	—	30	0.4	7	—	2.5
MOC216-M	50*	—	30	0.4	7	—	2.5
MOC217-M	100*	—	30	0.4	7	—	2.5

*CTR measured at $I_f = 1$ mA

Schematics and Specifications

8-Pin Package (Dual Channel)



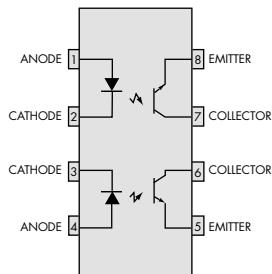
Phototransistor Output; DC Sensing Input

Part Number	CTR @ 10 mA I_F (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μ s)	V_{ISO} AC_{RMS} (kV) 1 minute
	min	max	min	min	min	max	
MCT9001	50*	600*	55	NA	7	—	5.3
MOCD207-M	100	200	70	NA	7	—	2.5
MOCD208-M	40	125	70	NA	7	—	2.5
MOCD211-M	20	—	30	NA	7	—	2.5
MOCD213-M	100	—	70	NA	7	—	2.5
MOCD217-M	100**	—	30	NA	7	—	2.5

*CTR measured at $I_F = 5$ mA

**CTR measured at $I_F = 1$ mA

8-Pin Package (Dual Channel)

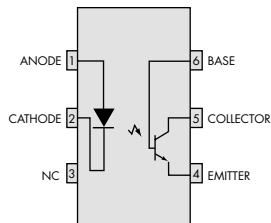


Phototransistor Output; DC Sensing Input

Part Number	CTR @ 5 mA I_F (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μ s)	V_{ISO} AC_{RMS} (kV) 1 minute
	min	max	min	min	min	max	
MCT6	20*	—	30	NA	6	—	5.3
MCT61	50	—	30	NA	6	—	5.3
MCT62	100	—	30	NA	6	—	5.3

*CTR measured at $I_F = 10$ mA

6-Pin Package

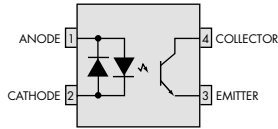


Phototransistor Output; Low Current DC Sensing Input

Part Number	CTR @ ≤ 10 mA I_F (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μ s)	V_{ISO} AC_{RMS} (kV) 1 minute
	min	max	min	min	min	max	
H11AG1	300	—	30	70	7	—	5.3
H11AG2	200	—	30	70	7	—	5.3
H11AG3	100	—	30	70	7	—	5.3
MCT5200	75	—	30	30	NA	—	5.3
MCT5201	120	—	30	30	NA	—	5.3
MCT5210	70	—	30	30	NA	—	5.3
MCT5211	150	—	30	30	NA	—	5.3

Schematics and Specifications

4-Pin Package

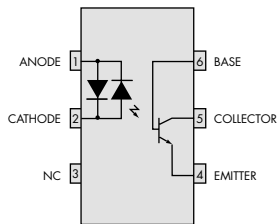


Phototransistor Output; AC Sensing Input

Part Number	CTR @ $\pm 1 \text{ mA } I_F$ (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_R/t_F (μs)	V_{ISO} AC _{RMS} (kV) 1 minute
	min	max	min	min	min	typ	
H11AA814	20	300	35	NA	6	2.4/2.4	5.3
H11AA814A	50	150	35	NA	6	2.4/2.4	5.3
HMAA2705	50*	300*	40	NA	7	3/3	3.75
HMHAA280	50*	600*	80	NA	7	3/3	2.5

*CTR measured at $I_F = \pm 5 \text{ mA}$

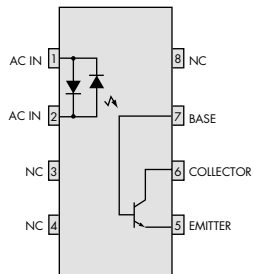
6-Pin Package



Phototransistor Output; AC Sensing Input

Part Number	CTR @ $\leq 10 \text{ mA } I_F$ (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μs)	V_{ISO} AC _{RMS} (kV) 1 minute
	min	max	min	min	min	max	
H11AA1	20	—	30	70	7	—	5.3
H11AA2	10	—	30	70	7	—	5.3
H11AA3	50	—	30	70	7	—	5.3
H11AA4	100	—	30	70	7	—	5.3

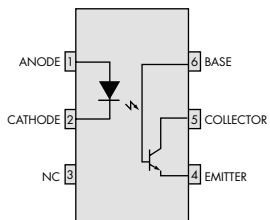
8-Pin Package



Phototransistor Output; AC Sensing Input

Part Number	CTR @ $\pm 10 \text{ mA } I_F$ (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μs)	V_{ISO} AC _{RMS} (kV) 1 minute
	min	max	min	min	min	max	
MOC256-M	20	—	30	70	5	—	2.5

6-Pin Package



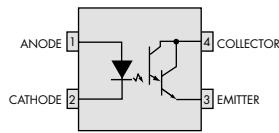
High Voltage Phototransistor Output; DC Sensing Input

Part Number	CTR @ $10 \text{ mA } I_F$ (%)		BV_{CEO} (V)	BV_{CBO} (V)	BV_{ECO} (V)	t_{ON}/t_{OFF} (μs)	V_{ISO} AC _{RMS} (kV) 1 minute
	min	max	min	min	min	max	
4N38	20	—	80	80	7	—	5.3
H11D1	20	—	300*	300	7	—	5.3
H11D2	20	—	300*	300	7	—	5.3
H11D3	20	—	200*	200	7	—	5.3
H11D4	10	—	200*	200	7	—	5.3
MOC8204	20	—	400*	400	NA	—	5.3

* BV_{CEO} : $R_{BE} = 1 \text{ M}\Omega$

Schematics and Specifications

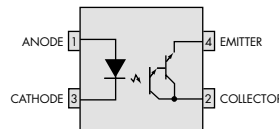
4-Pin Package



Photodarlington Output; DC Sensing Input

Part Number	CTR @ 1 mA I _F (%)		BV _{CEO} (V)	BV _{CBO} (V)	BV _{ECO} (V)	t _R /t _F (μs)	V _{ISO} AC _{RMS} (kV)
	min	max	min	min	min	max	1 minute
H11B815	600	7500	35	NA	6	300/250	5.3

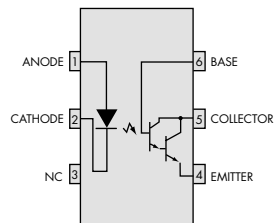
4-Pin Package



Photodarlington Output; DC Sensing Input

Part Number	CTR @ 5 mA I _F (%)		BV _{CEO} (V)	BV _{CBO} (V)	BV _{ECO} (V)	V _{CEO} (SAT) (μs)	V _{ISO} AC _{RMS} (kV)
	min	max	min	min	min	max	1 minute
H24B1	1000	—	30	NA	7	1.0	3.75
H24B2	400	—	30	NA	7	1.0	3.75

6-Pin Package



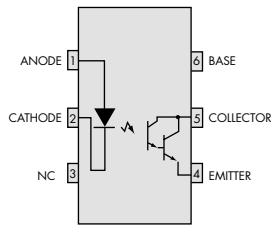
Photodarlington Output; DC Sensing Input

Part Number	CTR @ 10 mA I _F (%)		BV _{CEO} (V)	BV _{CBO} (V)	BV _{ECO} (V)	t _{ON} /t _{OFF} (μs)	V _{ISO} AC _{RMS} (kV)
	min	max	min	min	min	max	1 minute
4N29	100	—	30	30	5	5/40	5.3
4N30	100	—	30	30	5	5/40	5.3
4N31	50	—	30	30	5	5/40	5.3
4N32	500	—	30	30	5	5/100	5.3
4N33	500	—	30	30	5	5/100	5.3
CNX48U	600	—	30	30	7	—	5.3
H11B1	500*	—	25	30	7	—	5.3
H11B2	200*	—	25	30	7	—	5.3
H11B255	100	—	55	55	7	—	5.3
H11B3	100*	—	25	30	7	—	5.3
MOC8080	500	—	55	55	7	—	5.3
TIL113	300	—	30	30	5	5/100	5.3

*CTR measured at I_F = 1 mA

Schematics and Specifications

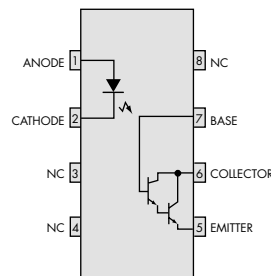
6-Pin Package (No Base Connection)



Photodarlington Output; DC Sensing Input

Part Number	CTR @ 10 mA I _F (%)		BV _{CEO} (V)	BV _{ECO} (V)	V _{CE(SAT)} (V)	t _{ON} /t _{OFF} (μs)	V _{ISO} AC _{RMS} (kV)
	min	max	min	min	max	max	1 minute
MOC119	300	—	30	7	1	—	5.3
MOC8020	500	—	50	5	2	—	5.3
MOC8021	1000	—	50	5	2	—	5.3
MOC8030	300	—	80	5	—	—	5.3
MOC8050	500	—	80	5	—	—	5.3

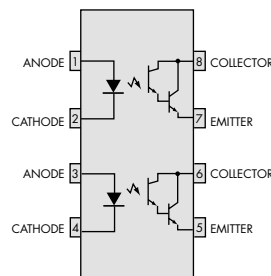
8-Pin Package



Photodarlington Output; DC Sensing Input

Part Number	CTR @ 1 mA I _F (%)		BV _{CEO} (V)	V _{CE(SAT)} (V)	BV _{ECO} (V)	t _{ON} /t _{OFF} (μs)	V _{ISO} AC _{RMS} (kV)
	min	max	min	max	min	max	1 minute
MOC223-M	500	—	30	1	7	—	2.5

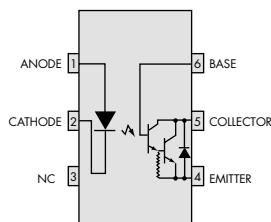
8-Pin Package (Dual Channel)



Photodarlington Output; DC Sensing Input

Part Number	CTR @ 1 mA I _F (%)		BV _{CEO} (V)	BV _{CBO} (V)	BV _{ECO} (V)	t _{ON} /t _{OFF} (μs)	V _{ISO} AC _{RMS} (kV)
	min	max	min	min	min	max	1 minute
MOC223-M	500	—	30	NA	7	—	2.5

6 Pin Package



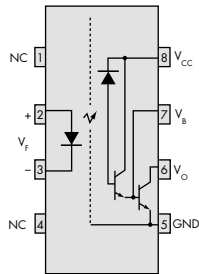
High Voltage Photodarlington Output (with integral base-emitter resistor); DC Sensing Input

Part Number	CTR @ 10 mA I _F (%)		BV _{CEO} (V)	BV _{CBO} (V)	BV _{EBO} (V)	t _{ON} /t _{OFF} (μs)	V _{ISO} AC _{RMS} (kV)
	min	max	min	min	min	max	1 minute
H11G1	1000	—	100	100	7	—	5.3
H11G2	1000	—	80	80	7	—	5.3
H11G3	200*	—	55	55	7	—	5.3

*CTR measured at I_F = 1 mA

Schematics and Specifications

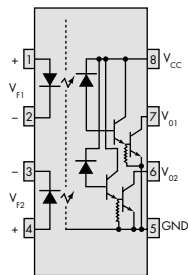
8-Pin Package



High-Gain Split Photodarlington Output; Low Current DC Sensing Input

Part Number	CTR @ 1.6 mA I _F (%)		V _{OL} (V) max	I _{OH} (μA) max	t _{PHL} /t _{PLH} (μs) max	V _{ISO} AC _{RMS} (kV) 1 minute
	min	max				
6N138	300	—	0.4	250	10/35	2.5
6N139	500	—	0.4	100	25/60	2.5
HCPL-0700	300	2600	0.4	250	10/35	2.5
HCPL-0701	500	2600	0.4	100	25/60	2.5

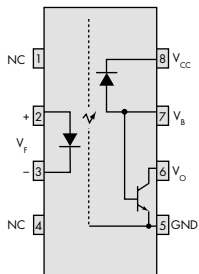
8-Pin Package (Dual Channel)



High-Gain Split Darlington Output; Low Current DC Sensing Input

Part Number	CTR @ 1.6 mA I _F (%)		V _{OL} (V) max	I _{CLL} (mA) max	t _{PHL} /t _{PLH} (μs) max	V _{ISO} AC _{RMS} (kV) 1 minute
	min	max				
HCPL-2730	300	—	0.4	3	20/35	2.5
HCPL-2731	500	—	0.4	3	20/35	2.5

8-Pin Package

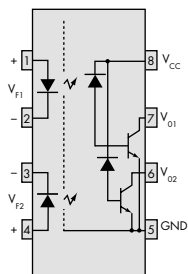


1 Mbit/s High-Speed Transistor Output; DC Sensing Input

Part Number	CTR @ 16 mA I _F (%)		V _{OL} (V) max	I _{CLL} (μA) max	t _{PHL} /t _{PLH} (μs) max	V _{ISO} AC _{RMS} (kV) 1 minute
	min	max				
6N135	7	50	0.4	200	1.5/1.5	2.5
6N136	19	50	0.4	200	0.8/0.8	2.5
HCPL-0452	19	50	0.4	200	0.8/0.8	2.5
HCPL-0500	7	50	0.4	200	1.5/1.5	2.5
HCPL-0501	19	50	0.4	200	0.8/0.8	2.5
HCPL-2503	12	—	0.4	200	0.8/0.8	2.5
HCPL-4502	19	50	0.4	200	0.8/0.8	2.5

Pin 7 is not connected in Part Numbers HCPL-0452 and HCPL-4502

8-Pin Package (Dual Channel)

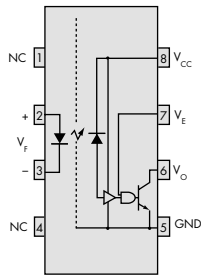


1 Mbit/s High-Speed Transistor Output; DC Sensing Input

Part Number	CTR @ 16 mA I _F (%)		V _{OL} (V) max	I _{CLL} (μA) max	t _{PHL} /t _{PLH} (μs) max	V _{ISO} AC _{RMS} (kV) 1 minute
	min	max				
HCPL-2530	7	50	0.5	400	1.5/1.5	2.5
HCPL-2531	19	50	0.5	400	0.8/0.8	2.5

Schematics and Specifications

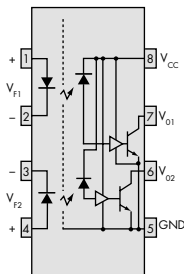
8-Pin Package



10 Mbit/s High-Speed Logic Gate Output; DC Threshold Sensing Input

Part Number	I_{FT} (mA) max	V_{OL} (V) max	I_{CCH} (μ s) max	I_{CCL} (mA) max	t_{PHL}/t_{PLH} (μ s) max	V_{ISO} AC _{RMS} (kV) 1 minute
6N137	5	0.6	10	13	0.075/0.075	2.5
HCPL-0600	5	0.6	10	13	0.075/0.075	2.5
HCPL-0601	5	0.6	10	13	0.075/0.075	2.5
HCPL-2601	5	0.6	10	13	0.075/0.075	2.5
HCPL-2611	5	0.6	10	13	0.075/0.075	2.5

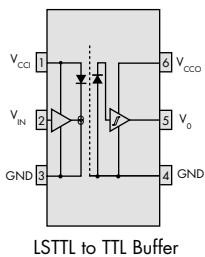
8-Pin Package (Dual Channel)



10 Mbit/s High-Speed Logic Gate Output; DC Threshold Sensing Input

Part Number	I_{FT} (mA) max	V_{OL} (V) max	I_{CCH} (μ s) max	I_{CCL} (mA) max	t_{PHL}/t_{PLH} (μ s) max	V_{ISO} AC _{RMS} (kV) 1 minute
HCPL-2630	5	0.6	15	21	0.075/0.075	2.5
HCPL-2631	5	0.6	15	21	0.075/0.075	2.5

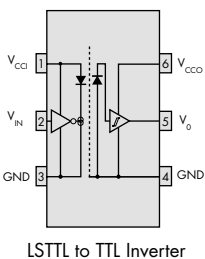
6-Pin Package



10 Mbit/s High-Speed Logic-to-Logic (OPTOLOGIC®); DC Sensing Input

Part Number	V_{IH} (mA) min	V_{IL} (V) max	V_{OL} (V) max	I_{OL} (mA) min	t_{PHL}/t_{PLH} (μ s) max	V_{ISO} AC _{RMS} (kV) 1 minute
74OL6000	2	0.8	0.6	16	0.1/0.1	5.3

6-Pin Package

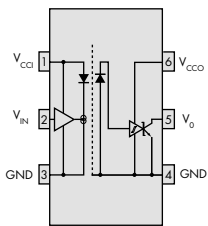


10 Mbit/s High-Speed Logic-to-Logic (OPTOLOGIC®); DC Sensing Input

Part Number	V_{IH} (mA) min	V_{IL} (V) max	V_{OL} (V) max	I_{OL} (mA) min	t_{PHL}/t_{PLH} (μ s) max	V_{ISO} AC _{RMS} (kV) 1 minute
74OL6001	2	0.8	0.6	16	0.1/0.1	5.3

Schematics and Specifications

6-Pin Package

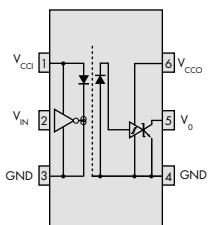


LSTTL to CMOS Buffer

10 Mbit/s High-Speed Logic-to-Logic (OPTOLOGIC®); DC Sensing Input

Part Number	V_{IH} (mA) min	V_{IL} (V) max	V_{OL} (V) max	I_{OL} (mA) min	t_{PHL}/t_{PLH} (μs) max	V_{ISO} AC_{RMS} (kV) 1 minute
74OL6010	2	0.8	0.6	16	0.12/0.18	5.3

6-Pin Package

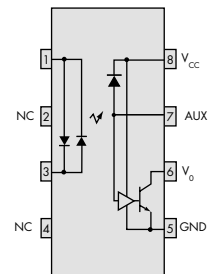


LSTTL to CMOS Inverter

10 Mbit/s High-Speed Logic-to-Logic (OPTOLOGIC®); DC Sensing Input

Part Number	V_{IH} (mA) min	V_{IL} (V) max	V_{OL} (V) max	I_{OL} (mA) min	t_{PHL}/t_{PLH} (μs) max	V_{ISO} AC_{RMS} (kV) 1 minute
74OL6011	2	0.8	0.6	16	0.12/0.18	5.3

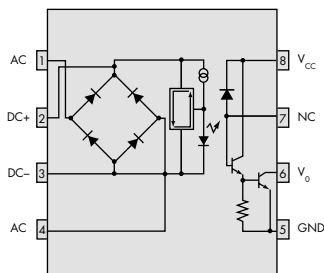
8-Pin Package



Logic Output; AC Threshold Sensing Input

Part Number	$I_{(ON)}$ RMS (mA) min	$I_{(OFF)}$ RMS (mA) max	V_{CC} (V) max	$V_{I(ON)}$ RMS (V) min	$V_{I(OFF)}$ RMS (V) max	I_{OH} (μA) max	V_{ISO} AC_{RMS} (kV) 1 minute
MID400	4	0.15	7	90	5.5	100	2.5

8-Pin Package

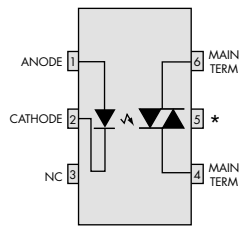


AC/DC to Logic Interface; AC Threshold Sensing Input

Part Number	I_{TH+} (mA)		I_{TH-} (mA)		V_{TH+} (DC) (mA)		V_{TH-} (DC) (V)		V_{TH+} (AC) (V)		V_{TH-} (AC) (V)		V_{ISO} AC_{RMS} (kV) 1 minute
	min	max	min	max	min	max	min	max	min	max	min	max	
HCPL-3700	1.96	3.11	1.00	1.62	3.35	4.05	2.01	2.86	4.23	5.50	2.87	4.20	2.5

Schematics and Specifications

6-Pin Package

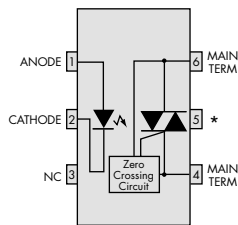


* Do not connect

Random Phase Triac Driver Output; DC Threshold Sensing Input

Part Number	I_{FT} (mA) max	V_{TM} (V) max	V_{DRM} (V) min	I_H (μ A) typ	I_{DRM} (nA) max	V_{ISO} AC _{RMS} (kV) 1 minute
MOC3010-M	15	3	250	100	100	4.2
MOC3011-M	10	3	250	100	100	4.2
MOC3012-M	5	3	250	100	100	4.2
MOC3020-M	30	3	400	100	100	4.2
MOC3021-M	15	3	400	100	100	4.2
MOC3022-M	10	3	400	100	100	4.2
MOC3023-M	5	3	400	100	100	4.2
MOC3051-M	15	2.5	600	280	100	4.2
MOC3052-M	10	2.5	600	280	100	4.2

6-Pin Package



* Do not connect

Zero Crossing Triac Driver Output; DC Threshold Sensing Input

Part Number	I_{FT} (mA) max	V_{TM} (V) max	V_{DRM} (V) max	dv/dt (V/ μ s) min	I_{DRM1} (nA) max	V_{ISO} AC _{RMS} (kV) 1 minute
MOC3031-M	15	3	250	1000	100	4.2
MOC3032-M	10	3	250	1000	100	4.2
MOC3033-M	5	3	250	1000	100	4.2
MOC3041-M	15	3	400	1000	100	4.2
MOC3042-M	10	3	400	1000	100	4.2
MOC3043-M	5	3	400	1000	100	4.2
MOC3061-M	15	3	600	600	500	4.2
MOC3062-M	10	3	600	600	500	4.2
MOC3063-M	5	3	600	600	500	4.2
MOC3081-M	15	3	800	600	500	4.2
MOC3082-M	10	3	800	600	500	4.2
MOC3083-M	5	3	800	600	500	4.2
MOC3162-M	10	3	600	1000	100	4.2
MOC3163-M	5	3	600	1000	100	4.2

Schematics and Specifications

6-Pin Package

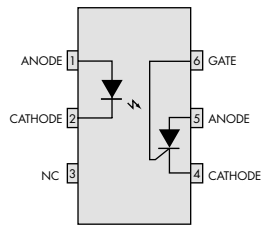
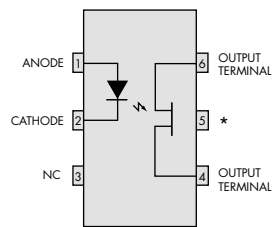


Photo SCR Output; DC Threshold Sensing Input

Part Number	I_{FT}^* (mA) max	V_{TM} (V) max	V_{DRM} (V) min	I_{DM} (μ A) max	I_H (mA) max	V_{ISO} AC _{RMS} (kV) 1 minute
4N39	14	1.3	200	50	1.0	5.3
4N40	14	1.3	400	150	1.0	5.3
H11C1	11	1.3	200	50	—	5.3
H11C2	11	1.3	200	50	—	5.3
H11C3	14	1.3	200	50	—	5.3
H11C4	11	1.3	400	150	—	5.3
H11C5	11	1.3	400	150	—	5.3
H11C6	14	1.3	400	150	—	5.3

* I_{FT} @ $V_{AK} = 100$ V

6-Pin Package

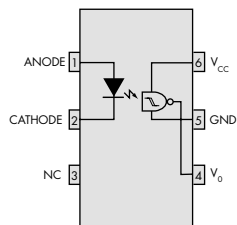


* Do not connect

Bilateral Analog FET Output; DC Sensing Input

Part Number	R_{DS} (Ω)		V_{BR} (V) min	I_{46} (nA) max	t_{ON}/t_{OFF} (μ s) max	V_{ISO} AC _{RMS} (kV) 1 minute
	ON max	OFF min				
H11F1	200	300M	30	50	25/25	5.3
H11F2	330	300M	30	50	25/25	5.3
H11F3	470	300M	15	50	25/25	5.3

6-Pin Package



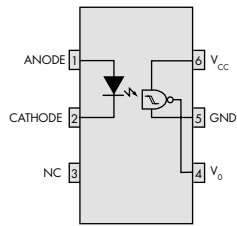
Open collector/inverted output

Schmitt Trigger Output; DC Threshold Sensing Input

Part Number	$I_{FT(ON)}$ (mA) max	$I_{FT(OFF)}$ (mA) min	V_{CC} (V) max	V_{OL} (V) max	$I_{CC(ON)}$ (mA) max	V_{ISO} AC _{RMS} (kV) 1 minute
H11L1-M	1.6	0.3	15	0.4	5	4.2
H11L2-M	10.0	0.3	15	0.4	5	4.2
H11L3-M	5.0	0.3	15	0.4	5	4.2

Schematics and Specifications

6-Pin Package

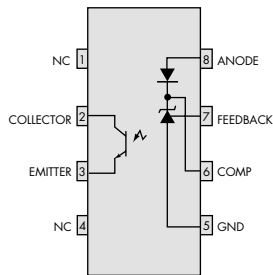


Open collector/inverted output

Schmitt Trigger Output; DC Threshold Sensing Input

Part Number	$I_{FT(ON)}$ (mA) max	$I_{FT(OFF)}$ (mA) min	$I_{CC(ON)}$ (mA) max	V_{OL} (V) max	t_{PHL}/t_{PLH} (μ s) max	V_{ISO} AC _{RMS} (kV) 1 minute
H11N1-M	3.2	0.3	10	0.5	.330/.330	4.2
H11N2-M	5.0	0.3	10	0.5	.330/.330	4.2
H11N3-M	10.0	0.3	10	0.5	.330/.330	4.2

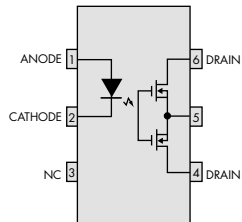
8-Pin Package



Optically Isolated Error Amplifier; DC Sensing Input with Voltage Reference

Part Number	V_{REF} (V) min	V_{REF} (V) max	CTR @ 10 mA I_F (%)		BV_{CEO} (V) min	V_{ISO} AC _{RMS} (kV) 1 minute
FOD2712	1.221	1.259	100	200	70	2.5

6-Pin Package



*MOSFETs (pins 4, 5 and 6) connected in parallel

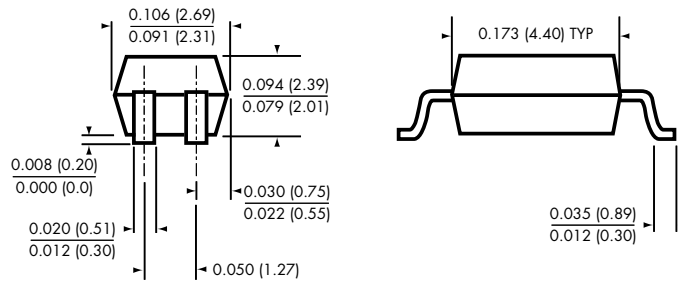
MOSFETs (pins 4 and 6) connected in series

Optically Coupled Solid State Relay; DC Threshold Sensing Input

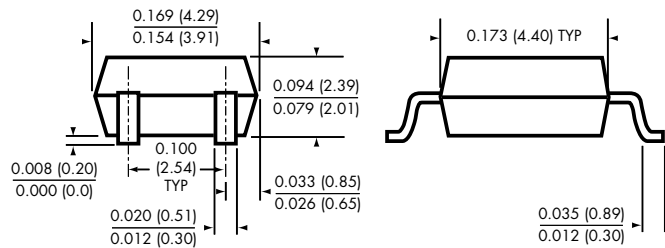
Part Number	$I_{F(ON)}$ (mA) max	$I_{F(OFF)}$ (mA) min	V_{OPR} (V _{DC} or V _{AC(PK)}) max	I_L (mA) max	R_{ON} (Ω) max	I_{LMT} (mA)		V_{ISO} AC _{RMS} (kV) 1 minute
						min	max	
HSR312	2.0	0.4	250	190	10	NA	NA	4.0
				320*	3*	NA*	NA*	
HSR312L	2.0	0.4	250	170	15	190	300	4.0
				300*	4.25*	330*	560*	
HSR412	3.0	0.4	400	140	27	NA	NA	4.0
				210*	7*	NA*	NA*	
HSR412L	3.0	0.4	400	120	35	130	220	4.0
				200*	9*	260*	440*	

Package Specifications

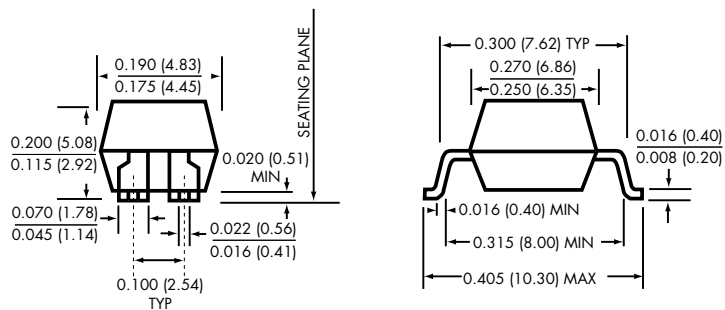
4-Pin Half-Pitch Mini-Flat Package (White)



4-Pin Full-Pitch Mini-Flat Package (White)



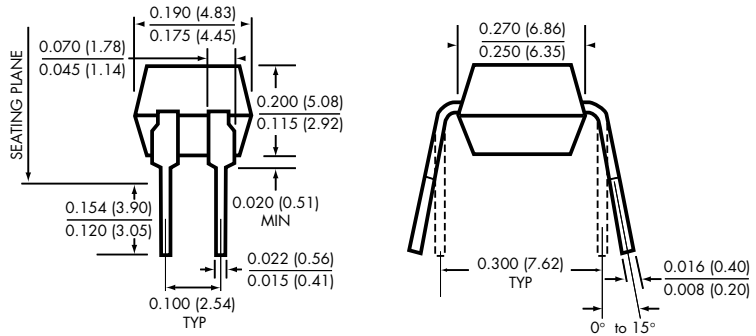
4-Pin Surface Mount Dual In-line Package (Black)



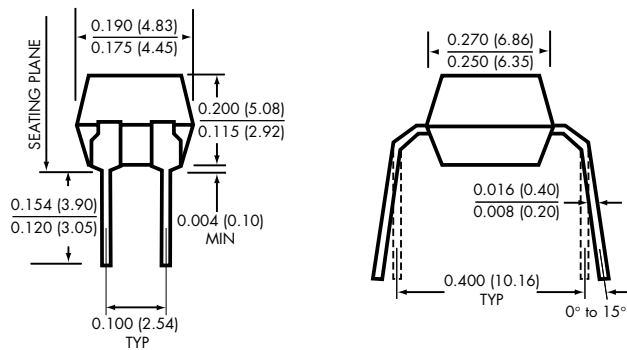
All dimensions are in inches (millimeters)

Package Specifications

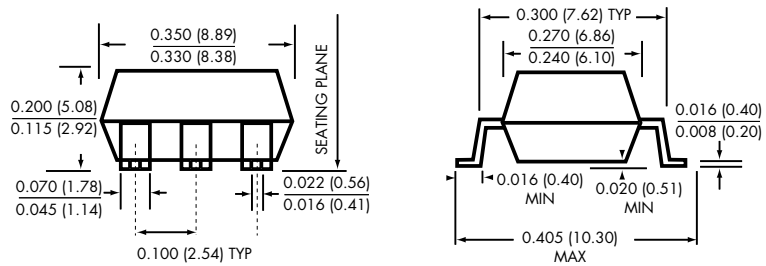
4-Pin Through Hole Dual In-line Package (Black)



4-Pin Through Hole (0.4" Lead Spacing) Dual In-line Package (Black)



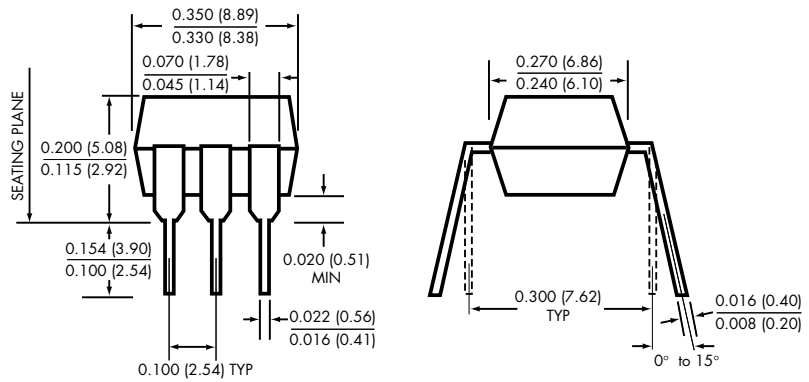
6-Pin Surface Mount Dual In-line Package (Black)



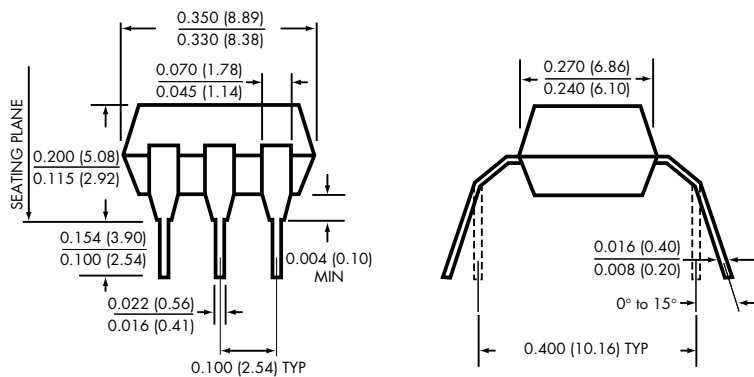
All dimensions are in inches (millimeters)

Package Specifications

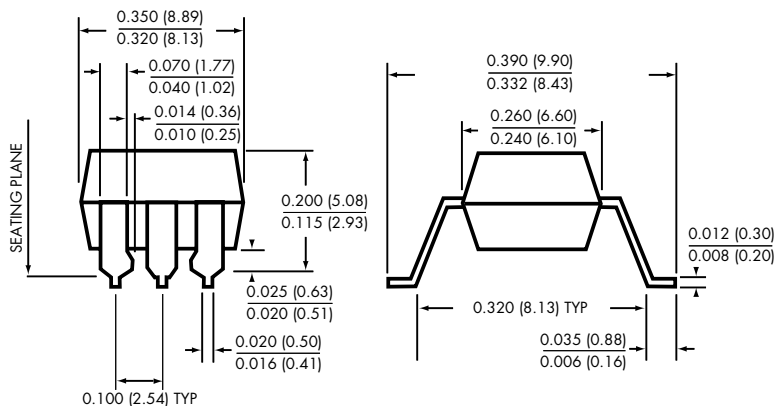
6-Pin Through Hole Dual In-line Package (Black)



6-Pin Through Hole (0.4" Lead Spacing) Dual In-line Package (Black)



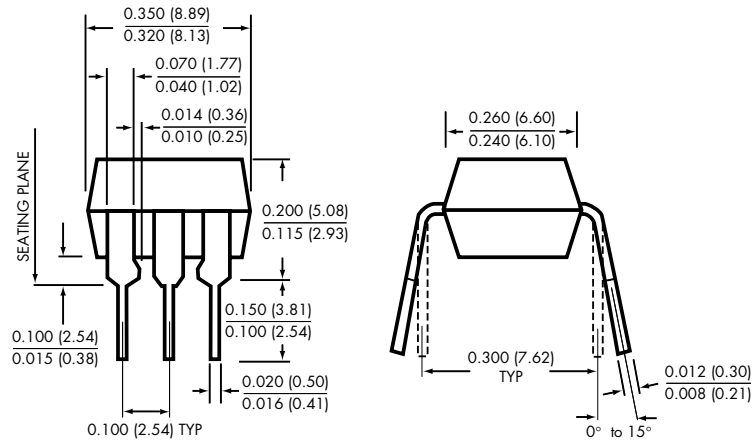
6-Pin Surface Mount Dual In-line Package (White)



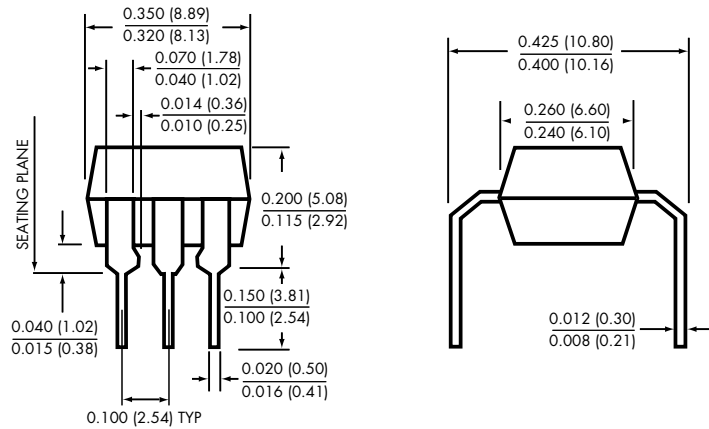
All dimensions are in inches (millimeters)

Package Specifications

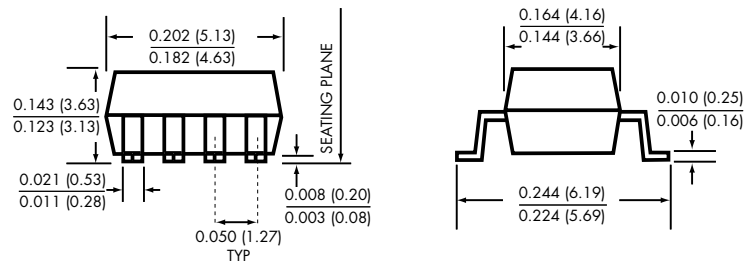
6-Pin Through Hole Dual In-line Package (White)



6-Pin Through Hole (0.4" Lead Spacing) Dual In-line Package (White)



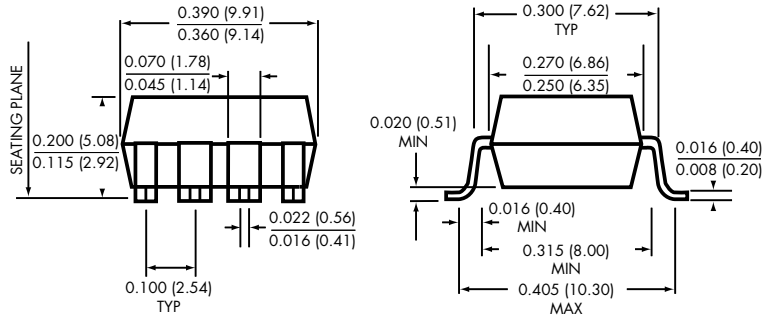
8-Pin Small Outline Package (White)



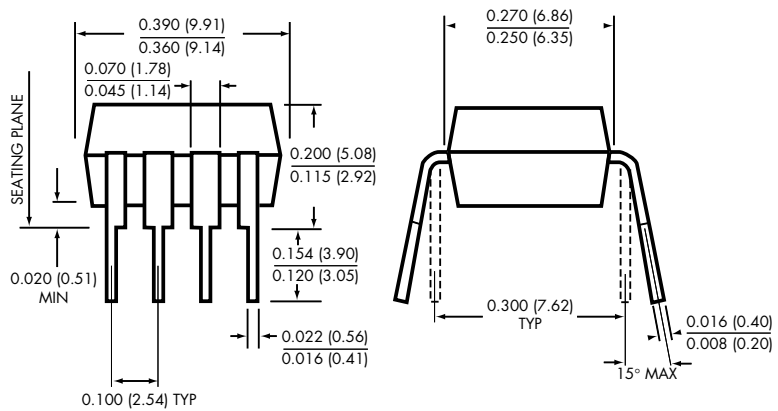
All dimensions are in inches (millimeters)

Package Specifications

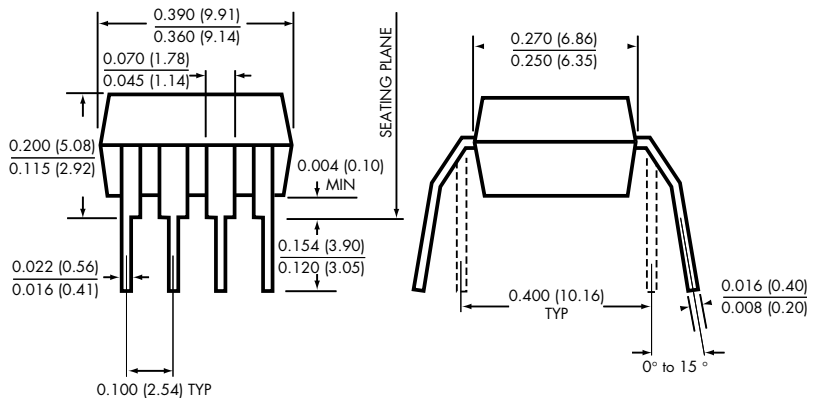
8-Pin Surface Mount Dual In-line Package (Black)



8-Pin Through Hole Dual In-line Package (Black)



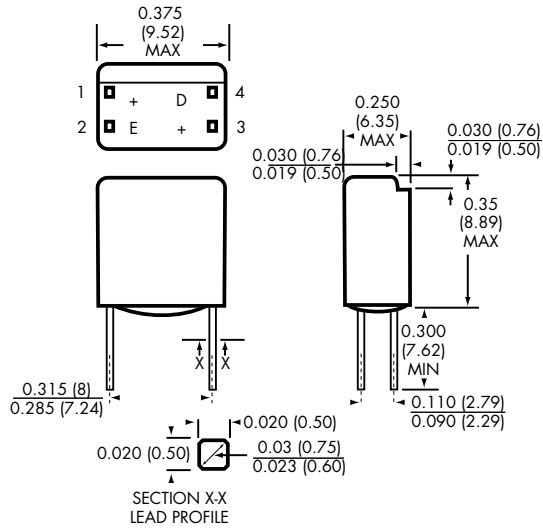
8-Pin Through Hole (0.4" Lead Spacing) Dual In-line Package (Black)



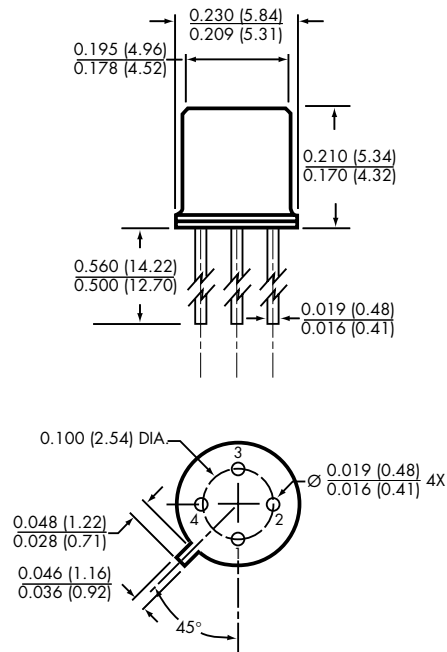
All dimensions are in inches (millimeters)

Package Specifications

4-Pin Plastic Housing Package



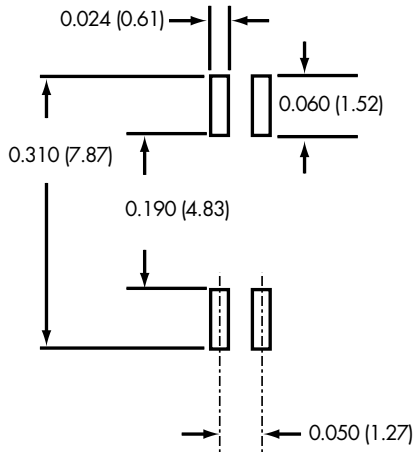
T0-18 Style Hermetic Package



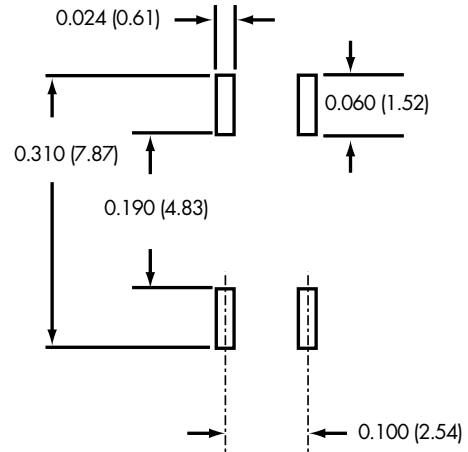
All dimensions are in inches (millimeters)

PCB Layouts

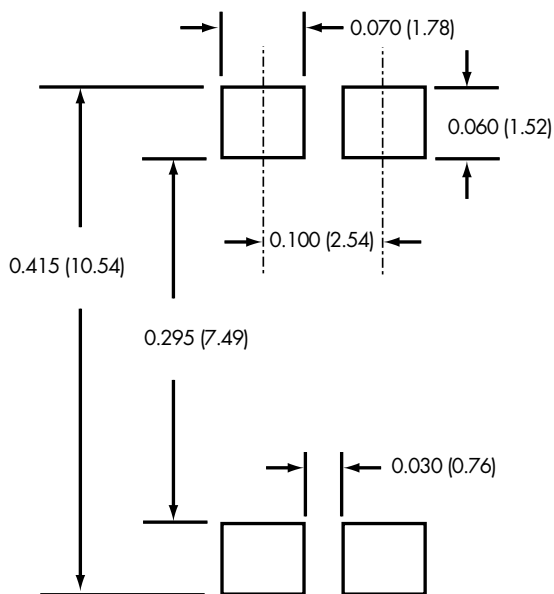
4-Pin Half-Pitch Mini-Flat Package (White)



4-Pin Full-Pitch Mini-Flat Package (White)



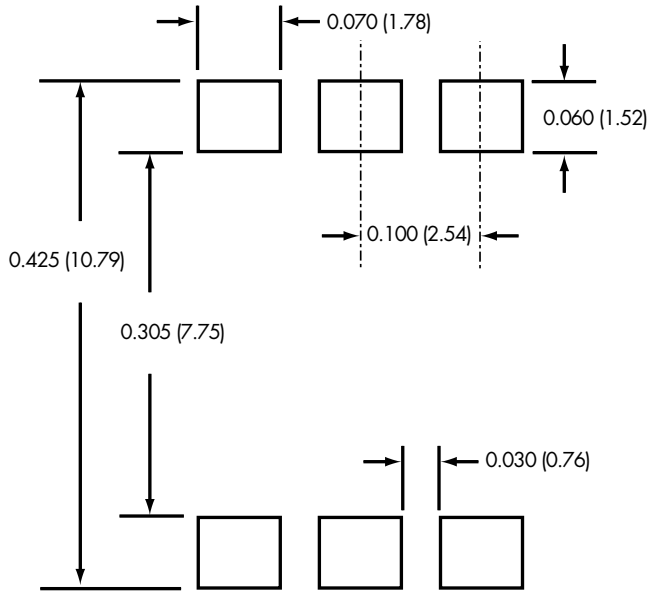
4-Pin Surface Mount Dual In-line Package (Black)



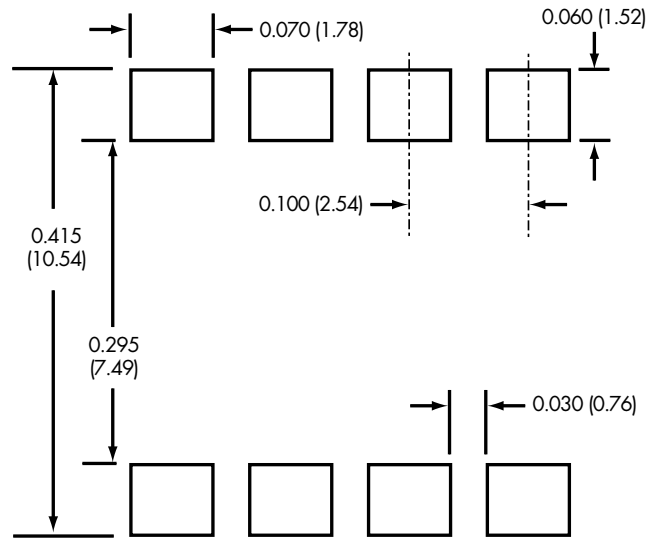
All dimensions are in inches (millimeters)

PCB Layouts

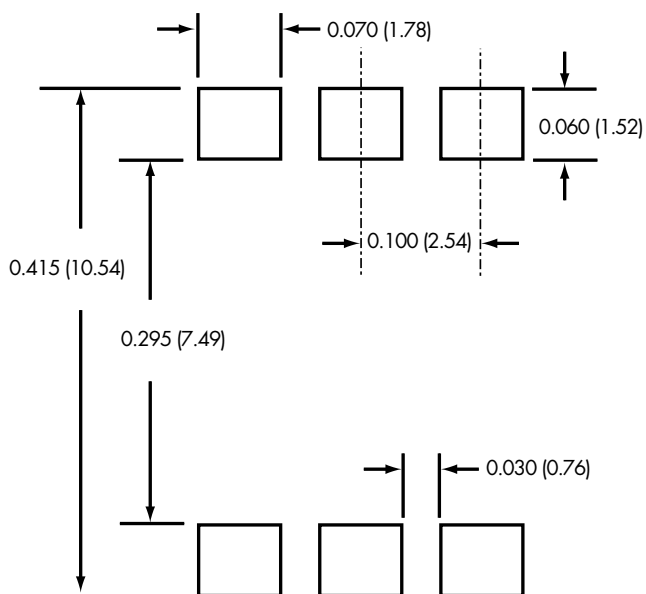
6-Pin Surface Mount Dual In-line Package (White)



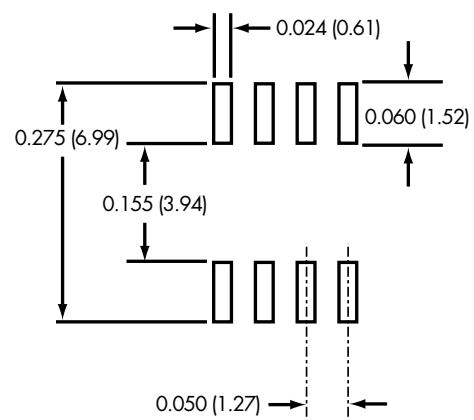
8-Pin Surface Mount Dual In-line Package (Black)



6-Pin Surface Mount Dual In-line Package (Black)



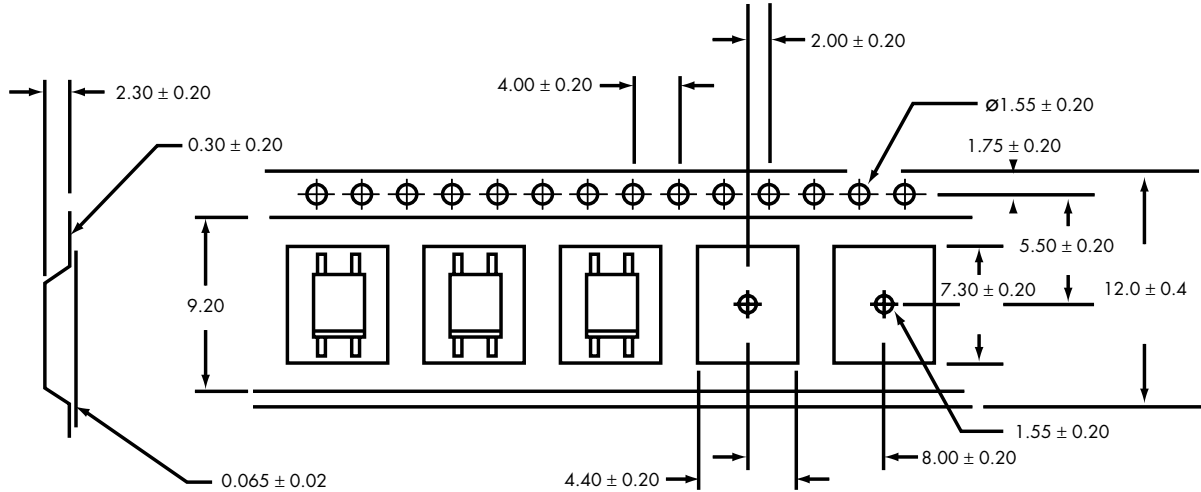
8-Pin Small Outline Package (White)



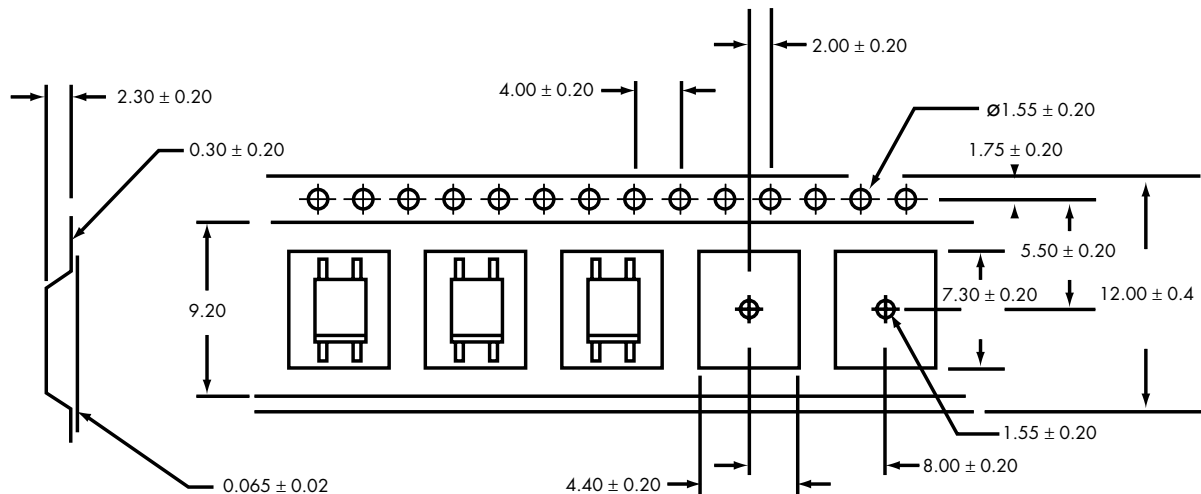
All dimensions are in inches (millimeters)

Carrier Tape Specifications

4-Pin Half-Pitch Mini-Flat Package (White)



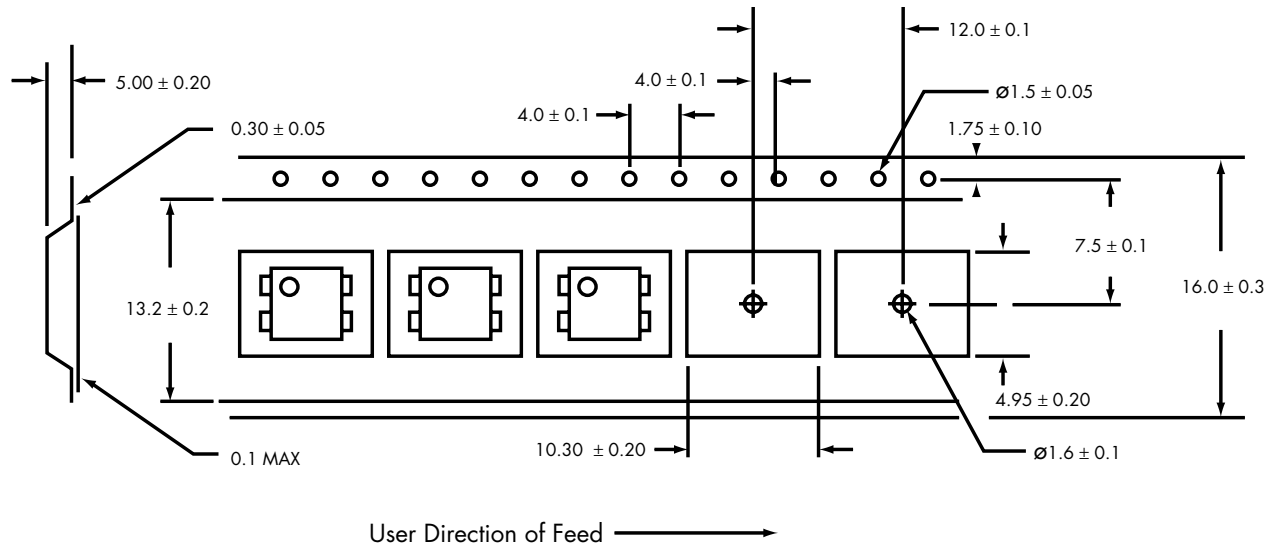
4-Pin Full-Pitch Mini-Flat Package (White)



All dimensions are in millimeters

Carrier Tape Specifications

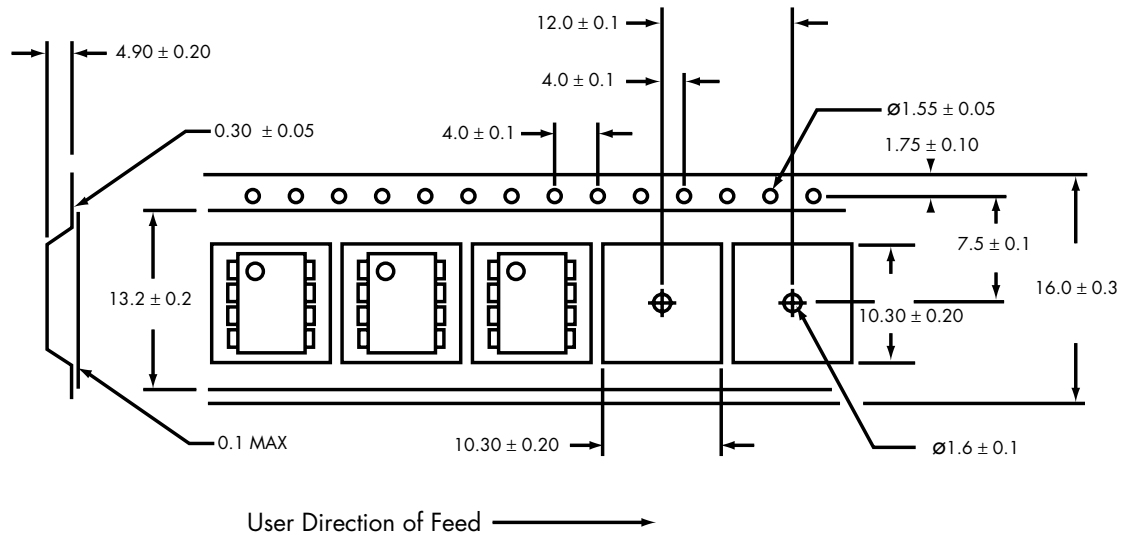
4-Pin Surface Mount Dual In-line Package (Black)



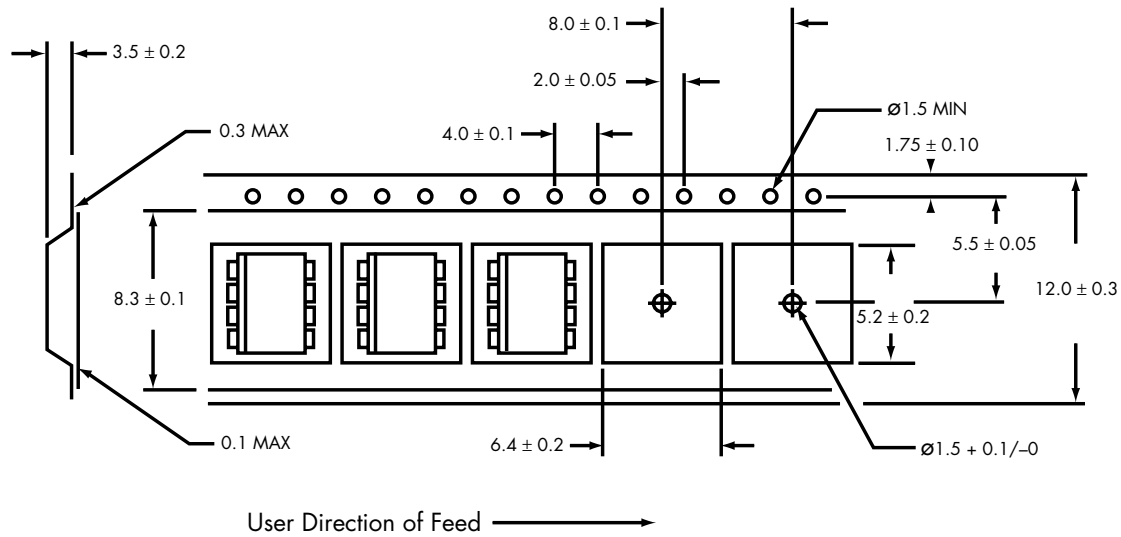
All dimensions are in millimeters

Carrier Tape Specifications

8-Pin Surface Mount Dual In-line Package (Black)



8-Pin Small Outline Package (White)



All dimensions are in millimeters

Safety Agency Certification/Reference Numbers

Agency Designation

Agency Name (Country)	Package Description (Designation)	Certificate/Reference Numbers
BABT British Approvals Board for Telecommunications (UK)	4-Pin (White) Half Pitch Mini-Flat Package	NA
	4-Pin (White) Full Pitch Mini-Flat Package	NA
	4-Pin (Black) Dual In-line Package	NA
	6-Pin (Black) Dual In-line Package	607992
	6-Pin (White) Dual In-line Package	CR/0117
	8-Pin (Black) Dual In-line Package	NA
	8-Pin (White) Small Outline Package	NA
BSI British Standards Institute (UK)	4-Pin (White) Half Pitch Mini-Flat Package	8611, 8612
	4-Pin (White) Full Pitch Mini-Flat Package	8611, 8612
	4-Pin (Black) Dual In-line Package	7676, 7677
	6-Pin (Black) Dual In-line Package	7676, 7677
	6-Pin (White) Dual In-line Package	NA
	8-Pin (Black) Dual In-line Package	NA
	8-Pin (White) Small Outline Package	8460, 8461; 8661, 8662
CSA Canadian Standards Association (Canada)	4-Pin (White) Half Pitch Mini-Flat Package	1201524
	4-Pin (White) Full Pitch Mini-Flat Package	1162301
	4-Pin (Black) Dual In-line Package	1027742
	6-Pin (Black) Dual In-line Package	1027742
	6-Pin (White) Dual In-line Package	1113639; 1213275 (for SSRs)
	8-Pin (Black) Dual In-line Package	1027742
	8-Pin (White) Small Outline Package	1113643
DEMKO Demko (Denmark)	4-Pin (White) Half Pitch Mini-Flat Package	NA
	4-Pin (White) Full Pitch Mini-Flat Package	NA
	4-Pin (Black) Dual In-line Package	130726-01
	6-Pin (Black) Dual In-line Package	310684-02
	6-Pin (White) Dual In-line Package	310983-01
	8-Pin (Black) Dual In-line Package	NA
	8-Pin (White) Small Outline Package	NA
FIMKO Fimko (Finland)	4-Pin (White) Half Pitch Mini-Flat Package	NA
	4-Pin (White) Full Pitch Mini-Flat Package	NA
	4-Pin (Black) Dual In-line Package	FI 12103
	6-Pin (Black) Dual In-line Package	FI 16812
	6-Pin (White) Dual In-line Package	FI 17434
	8-Pin (Black) Dual In-line Package	NA
	8-Pin (White) Small Outline Package	NA

Safety Agency Certification/Reference Numbers

Agency Designation

Agency Name (Country)

NEMKO

Nemko (Norway)

Package Description (Designation)

Certificate/Reference Numbers

4-Pin (White) Half Pitch Mini-Flat Package	NA
4-Pin (White) Full Pitch Mini-Flat Package	NA
4-Pin (Black) Dual In-line Package	P01101879
6-Pin (Black) Dual In-line Package	P01101067
6-Pin (White) Dual In-line Package	P01101866
8-Pin (Black) Dual In-line Package	NA
8-Pin (White) Small Outline Package	NA

SEMKO

Semko (Sweden)

4-Pin (White) Half Pitch Mini-Flat Package	NA
4-Pin (White) Full Pitch Mini-Flat Package	NA
4-Pin (Black) Dual In-line Package	0128053
6-Pin (Black) Dual In-line Package	0122085
6-Pin (White) Dual In-line Package	0134082
8-Pin (Black) Dual In-line Package	NA
8-Pin (White) Small Outline Package	NA

UL

Underwriters Laboratories (USA)

4-Pin (White) Half Pitch Mini-Flat Package	E90700, Volume 2
4-Pin (White) Full Pitch Mini-Flat Package	E90700, Volume 2
4-Pin (Black) Dual In-line Package	E90700, Volume 1
6-Pin (Black) Dual In-line Package	E90700, Volume 1
6-Pin (White) Dual In-line Package	E90700, Volume 2; E220443 (for SSRs)
8-Pin (Black) Dual In-line Package	E90700, Volume 1
8-Pin (White) Small Outline Package	E90700, Volume 2

VDE

VDE (Germany)

4-Pin (White) Half Pitch Mini-Flat Package	136480
4-Pin (White) Full Pitch Mini-Flat Package	136480
4-Pin (Black) Dual In-line Package	104801
6-Pin (Black) Dual In-line Package	94766
6-Pin (White) Dual In-line Package	102497
8-Pin (Black) Dual In-line Package	102915
8-Pin (White) Small Outline Package	136616

Glossary of Terms

Terms	Definitions	Symbol	Unit
Breakdown Voltage	Voltage at which junction may break down and device cease to operate as specified	V_{BR}	V
	Minimum collector to base breakdown voltage with the emitter open	$BV_{CBO(MIN)}$	V
	Minimum collector to emitter breakdown voltage with the base open	$BV_{CEO(MIN)}$	V
	Minimum emitter to collector breakdown voltage with the base open	$BV_{ECO(MIN)}$	V
Critical Voltage Rise Rate	Critical rate of rise of off-state voltage	dv/dt	V/ μ s
Current	Off-state current	I_{DM}	μ A
	Off-state/dark current	I_{46}	nA
	Peak blocking current, either direction.	I_{DRM}	μ A
	Holding current	I_H	mA
	Current limit	I_{LMT}	mA
	On-state RMS input current	$I_{ON(RMS)}$	mA
	Off-state RMS input current	$I_{OFF(RMS)}$	mA
Current Transfer Ratio	Ratio of the collector current to the diode forward current (I_C/I_F).	CTR	%
Forward Voltage	Maximum input forward voltage	$V_{F(MAX)}$	V
Input Current	The current flowing through a diode from anode to cathode	I_F	mA
	LED trigger current	I_{FT}	mA
	Turn-on threshold current	$I_{FT(ON)}$	mA
	Turn-off threshold current	$I_{FT(OFF)}$	mA
	Maximum input threshold current	I_{TH+}	mA
	Minimum input threshold current	I_{TH-}	mA
Input Voltage	High level input voltage	V_{IH}	V
	Low level input voltage	V_{IL}	V
Isolation Voltage	AC_{RMS} isolation voltage rating for one (1) minute duration	V_{ISO}	V
Operating Temperature Range	Temperature range for which operating specifications are valid	T_{OPR}	$^{\circ}$ C
Output Current	Logic high output current	I_{OH}	mA or μ A
	Logic low output current	I_{OL}	mA or μ A
Propagation Time	Propagation delay time to logic high output	t_{PHL}	μ s
	Propagation delay time to logic low output	t_{PLH}	μ s
Resistance	On-state output resistance	$R_{DS(ON)}$	Ω
	Off-state output resistance	$R_{DS(OFF)}$	Ω
Rise/Fall Time	Time delay between the 10% and 90% point on the rising and falling edges	t_R/t_F	μ s
Soldering Temperature	Temperature for lead soldering	T_{SOL}	$^{\circ}$ C
Storage Temperature Range	Temperature range for storage while not in operation	T_{STR}	$^{\circ}$ C
Supply Current	Operating supply current	$I_{CC(ON)}$	mA
	Logic high supply current	I_{CCH}	mA
	Logic low supply current	I_{CCL}	mA
Supply Voltage	Operating supply voltage	V_{CC}	V
Switching Time	Turn-on/turn-off switching time	t_{ON}/t_{OFF}	μ s
Voltage	Voltage between anode and cathode of SCR	V_{AK}	V
	Collector to emitter saturation voltage	$V_{CE(SAT)}$	V
	Off-state output terminal voltage	V_{DRM}	V
	Reference voltage	V_{REF}	V
	On-state RMS input voltage	$V_{I(ON)(RMS)}$	V
	Logic low output voltage	V_{OL}	V
	Maximum input threshold voltage	V_{TH+}	V
	Minimum input threshold voltage	V_{TH-}	V
	Operating voltage range	V_{OPR}	V
	On-state voltage	V_{TM}	V

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