Slotted Optical Switches
Darlington Output

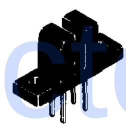
MOC71 Series

SLOTTED OPTICAL SWITCHES DARLINGTON OUTPUT

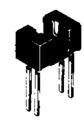
Each device consists of a gallium arsenide infrared emitting diode facing a silicon NPN photodarlington in a molded plastic housing. A slot in the housing between the emitter and the detector provides the means for mechanically interrupting the infrared beam. These devices are widely used as position sensors in a variety of applications.

- Single Unit for Easy PCB Mounting
- Non-Contact Electrical Switching
- Long-Life Liquid Phase Epi Emitter
- Several Convenient Package Styles

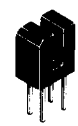
CASE 374-01
H



CASE 354A-01
T



CASE 354E-01
P



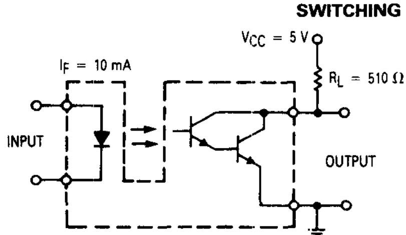
CASE 354-02
U

CASE 354G-01
V

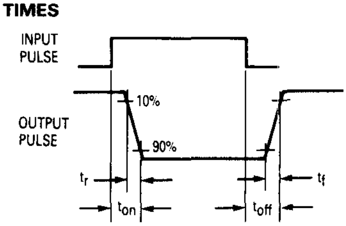
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
INPUT LED			
Reverse Voltage	V_R	6	Volts
Forward Current — Continuous	I_F	60	mA
Input LED Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	150 2	mW mW/°C
OUTPUT DARLINGTON			
Collector-Emitter Voltage	V_{CEO}	30	Volts
Output Current — Continuous	I_C	100	mA
Output Darlington Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	150 2	mW mW/°C
TOTAL DEVICE			
Ambient Operating Temperature Range	T_A	−40 to +100	°C
Storage Temperature	T_{stg}	−40 to +100	°C
Lead Soldering Temperature (5 seconds max)	—	260	°C
Total Device Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	300 4	mW mW/°C

SWITCHING TIMES

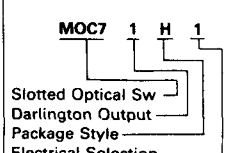


TEST CIRCUIT



WAVEFORMS

PART NUMBER DERIVATION



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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted. Note 1.)

Characteristic		Symbol	Min	Typ	Max	Unit
INPUT LED						
Forward Voltage (I_F = 50 mA)		V_F	0.9	1.3	1.8	Volts
Reverse Leakage (V_R = 6 V)		I_R	—	0.05	100	μA
Capacitance (V = 0 V, f = 1 MHz)		C_J	—	18	—	pF
OUTPUT DARLINGTON						
Dark Current (V_{CE} = 10 V)		I_{CEO}	—	10	100	nA
Collector-Emitter Breakdown Voltage (I_C = 1 mA)		$V_{(BR)CEO}$	30	90	—	Volts
Emitter-Collector Breakdown Voltage (I_E = 100 μA)		$V_{(BR)ECO}$	7	—	—	Volts
Capacitance (V = 0 V, f = 1 MHz)		C_{CE}	—	5.5	—	pF
DC Current Gain (V_{CE} = 10 V, I_C = 2 mA)		h_{FE}	—	10,000	—	—
COUPLED (Note 2)						
Output Collector Current	MOC71_1	I_C	2.5	5	—	mA
(I_F = 5 mA, V_{CE} = 5 V)	MOC71_3		8	14	—	
Output Collector Current	MOC71_1	I_C	7.5	15	—	mA
(I_F = 10 mA, V_{CE} = 5 V)	MOC71_3		20	35	—	
Collector-Emitter Saturation Voltage (I_C = 1.8 mA, I_F = 10 mA)		$V_{CE(sat)}$	—	—	1	Volts
Turn-On Time (I_F = 10 mA, V_{CC} = 5 V, R_L = 510 Ω)		t_{on}	—	120	—	μs
Turn-Off Time (I_F = 10 mA, V_{CC} = 5 V, R_L = 510 Ω)		t_{off}	—	500	—	μs

Notes: 1. Stray radiation can alter values of characteristics. Adequate light shielding should be provided.
2. No actuator in sensing gap.

TYPICAL CHARACTERISTICS

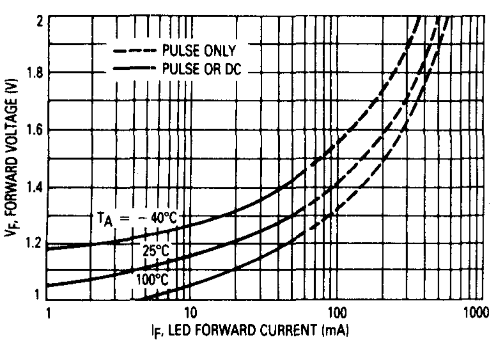

Figure 1. LED Forward Voltage versus Forward Current

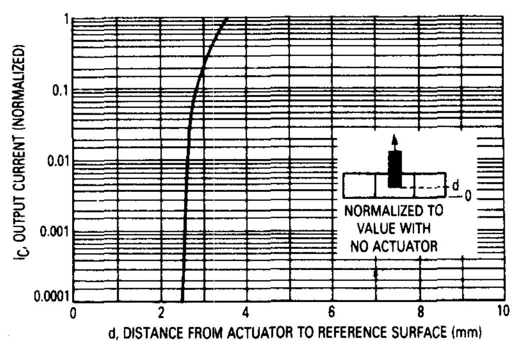

Figure 2. Output Current versus Actuator Position

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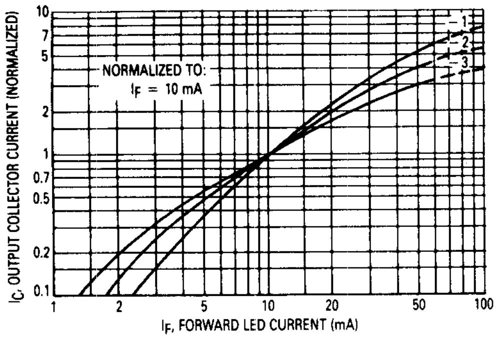

Figure 3. Output Current versus Input Current

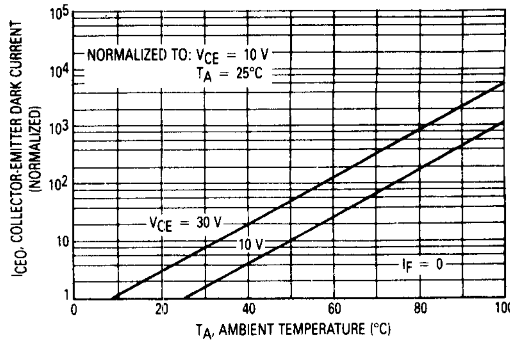

Figure 4. Collector-Emitter Dark Current versus Ambient Temperature

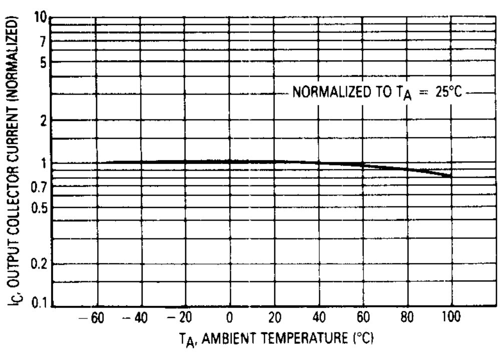

Figure 5. Output Current versus Ambient Temperature

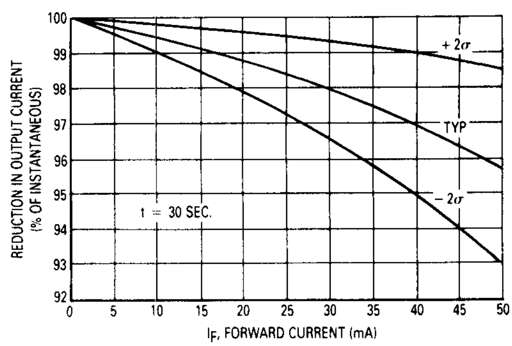

Figure 6. Reduction in Output Current Due to LED Heating versus Forward Current

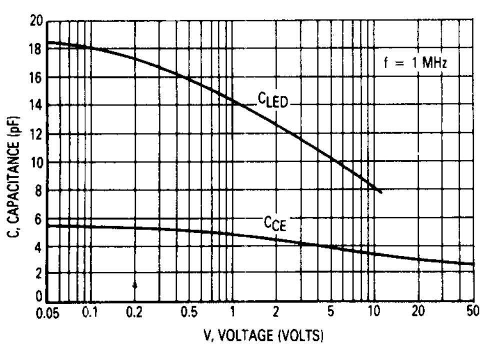

Figure 7. Capacitances versus Voltage

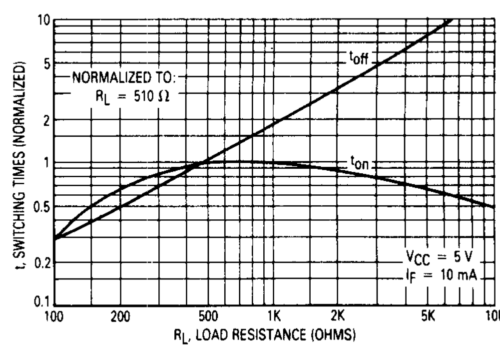

Figure 8. Switching Times versus Load Resistance

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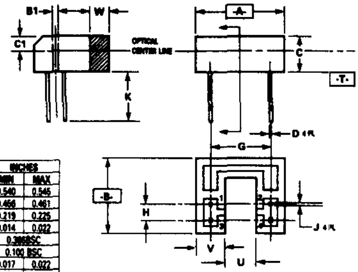
OUTLINE DIMENSIONS

STYLE 1:
PIN 1. CATHODE
2. COLLECTOR
3. ANODE
4. EMITTER

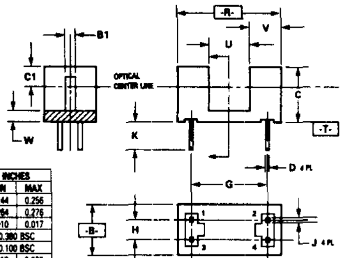


DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	13.72	13.84	0.540	0.545
B	11.58	11.70	0.456	0.461
C	5.57	5.71	0.219	0.225
D	0.35	0.56	0.014	0.022
G	9.30 BSC		0.366BSC	
H	2.54 BSC		0.100 BSC	
J	0.43	0.56	0.017	0.022
K	7.37	7.87	0.290	0.310
U	4.80	4.92	0.189	0.194
V	4.42	4.57	0.174	0.180
W	3.00	3.14	0.118	0.124
B1	0.84	1.01	0.033	0.040
C1	2.42 NOM		0.095 NOM	

NOTES:
1. POSITIONAL TOLERANCE FOR D DIMENSION (4 PL):
   ⌖ | 0.51 (0.020) Ⓜ | T | A Ⓜ | B Ⓜ
2. POSITIONAL TOLERANCE FOR J DIMENSION (4 PL):
   ⌖ | 0.51 (0.020) Ⓜ | T | B Ⓜ
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
4. CONTROLLING DIMENSION: INCH.

CASE 374-01
H

STYLE 1:
PIN 1. CATHODE
2. COLLECTOR
3. ANODE
4. EMITTER



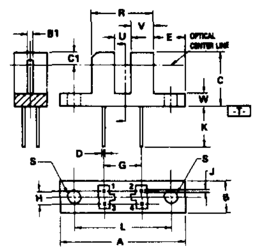
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
B	6.20	6.50	0.244	0.256
C	6.71	7.01	0.264	0.276
D	0.26	0.43	0.010	0.017
G	9.66 BSC		0.380 BSC	
H	2.54 BSC		0.100 BSC	
J	0.43	0.56	0.017	0.022
K	2.54	3.56	0.100	0.140
R	12.83	13.08	0.505	0.515
U	5.06	5.35	0.199	0.211
V	3.89	4.03	0.153	0.159
W	1.25	1.37	0.049	0.054
B1	0.38	0.63	0.015	0.025
C1	2.54 NOM		0.100 NOM	

NOTES:
1. POSITIONAL TOLERANCE FOR D DIMENSION (4 PL):
   ⌖ | 0.51 (0.020) Ⓜ | T | R Ⓜ | B Ⓜ
2. POSITIONAL TOLERANCE FOR J DIMENSION (4 PL):
   ⌖ | 0.51 (0.020) Ⓜ | T | B Ⓜ
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
4. CONTROLLING DIMENSION: INCH.

CASE 354E-01
P

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.13	25.01	0.950	0.985
B	6.19	6.50	0.244	0.256
C	10.64	10.94	0.419	0.431
D	0.35	0.55	0.014	0.022
E	6.24	6.55	0.246	0.258
G	7.36 BSC		0.290 BSC	
H	2.54 BSC		0.100 BSC	
J	0.43	0.55	0.017	0.022
K	7.36	—	0.290	—
L	19.05 BSC		0.750 BSC	
R	11.98	12.19	0.472	0.480
S	3.24	3.37	0.124	0.133
U	3.07	3.32	0.115	0.129
V	4.36	4.52	0.172	0.178
W	2.38	2.69	0.094	0.106
B1	0.88	1.14	0.035	0.045
C1	2.54 NOM		0.100 NOM	

NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
2. POSITIONAL TOLERANCE FOR MOUNTING HOLES:
   ⌖ | ϕ 0.36 (0.014) Ⓜ | T | A Ⓜ | B Ⓜ
3. POSITIONAL TOLERANCE FOR LEAD DIMENSION J:
   ⌖ | 0.13 (0.005) Ⓜ | T | B Ⓜ
4. POSITIONAL TOLERANCE FOR LEAD DIMENSION D:
   ⌖ | 0.13 (0.005) Ⓜ | T | A Ⓜ | B Ⓜ
5. DIMENSIONING AND TOLERANCING PER Y14.5, 1973

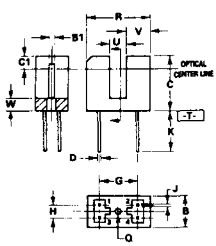


STYLE 1:
PIN 1. CATHODE
2. COLLECTOR
3. ANODE
4. EMITTER

CASE 354A-01
T

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
B	6.19	6.50	0.244	0.256
C	10.64	10.94	0.419	0.431
D	0.35	0.55	0.014	0.022
G	7.36 BSC		0.290 BSC	
H	2.54 BSC		0.100 BSC	
J	0.43	0.55	0.017	0.022
K	7.36	—	0.290	—
Q	1.45	1.70	0.057	0.067
R	11.98	12.19	0.472	0.480
U	3.07	3.32	0.115	0.129
V	4.36	4.52	0.172	0.178
W	2.38	2.69	0.094	0.106
B1	0.88	1.14	0.035	0.045
C1	2.54 NOM		0.100 NOM	

NOTES:
1. DIMENSIONS R & B ARE DATUMS & T IS A DATUM SURFACE.
2. POSITIONAL TOLERANCE FOR LEAD DIMENSION J:
   ⌖ | 0.51 (0.020) Ⓜ | T | B Ⓜ
3. POSITIONAL TOLERANCE FOR LEAD DIMENSION D:
   ⌖ | 0.51 (0.020) Ⓜ | T | R Ⓜ | B Ⓜ
4. POSITIONAL TOLERANCE FOR HOLE DIMENSION Q:
   ⌖ | 0.036 (0.014) Ⓜ | A | B Ⓜ | C Ⓜ
5. DIMENSIONING AND TOLERANCING PER Y14.5, 1982.

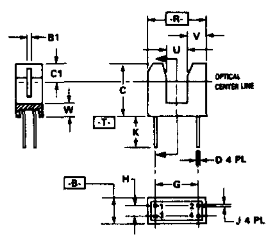


STYLE 1:
PIN 1. CATHODE
2. COLLECTOR
3. ANODE
4. EMITTER

CASE 354-02
U

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
B	6.18	6.32	0.243	0.249
C	12.58	12.82	0.495	0.505
D	0.36	0.55	0.014	0.022
G	10.16 BSC		0.400 BSC	
H	2.54 BSC		0.100 BSC	
J	0.43	0.55	0.017	0.022
K	7.37	—	0.290	—
R	13.69	13.94	0.539	0.549
U	4.83	5.08	0.190	0.200
V	8.77	9.01	0.345	0.356
W	3.05	3.30	0.120	0.130
B1	0.87	0.99	0.034	0.039
C1	4.32 NOM		0.170 NOM	

NOTES
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. POSITIONAL TOLERANCE FOR LEAD DIMENSION D:
   ⌖ | 0.51 (0.020) Ⓜ | T | R Ⓜ
3. POSITIONAL TOLERANCE FOR LEAD DIMENSION J:
   ⌖ | 0.51 (0.020) Ⓜ | T | B Ⓜ
4. CONTROLLING DIMENSION: INCH.



STYLE 1:
PIN 1. CATHODE
2. COLLECTOR
3. ANODE
4. EMITTER

CASE 354G-01
V