T-41-83

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

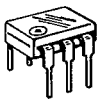
CNY17-1
CNY17-2
CNY17-3

6-Pin DIP Optoisolators
Transistor Output

6-PIN DIP
OPTOISOLATORS
TRANSISTOR OUTPUT

These devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector.

- Convenient Plastic Dual-in-Line Package
- Guaranteed 70 Volt $V_{(BR)CEO}$ Minimum
- High Input-Output Isolation Guaranteed — 7500 Volts Peak
- UL Recognized. File Number E54915
- VDE approved per standard 0883/6.80 (Certificate number 41853), with additional approval to DIN IEC380/VDE0806, IEC435/VDE0805, IEC65/VDE0860, VDE0110b, covering all other standards with equal or less stringent requirements, including IEC204/VDE0113, VDE0160, VDE0832, VDE0833, etc. 883
- Special lead form available (add suffix "T" to part number) which satisfies VDE0883/6.80 requirement for 8 mm minimum creepage distance between input and output solder pads.
- Various lead form options available. Consult "Optoisolator Lead Form Options" data sheet for details.



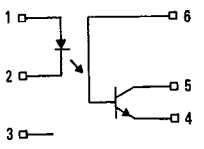
CASE 730A-02
PLASTIC

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
INPUT LED			
Reverse Voltage	V_R	6	Volts
Forward Current — Continuous	I_F	60	mA
Forward Current — Pk (PW = 1 μs, 330 pps)	$I_F(pk)$	1.5	A
LED Power Dissipation @ T_A = 25°C with Negligible Power in Output Detector Derate above 25°C	P_D	120 1.41	mW mW/°C
OUTPUT TRANSISTOR			
Collector-Emitter Voltage	V_{CEO}	70	Volts
Emitter-Base Voltage	V_{EBO}	7	Volts
Collector-Base Voltage	V_{CBO}	70	Volts
Collector Current — Continuous	I_C	100	mA
Detector Power Dissipation @ T_A = 25°C with Negligible Power in Input LED Derate above 25°C	P_D	150 1.76	mW mW/°C
TOTAL DEVICE			
Isolation Surge Voltage (1) (Peak ac Voltage, 60 Hz, 1 sec Duration)	V_{ISO}	7500	Vac
Total Device Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	250 2.94	mW mW/°C
Ambient Operating Temperature Range	T_A	−55 to +100	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C
Soldering Temperature (10 sec, 1/16" from case)	T_{sol}	260	°C

(1) Isolation surge voltage is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

SCHEMATIC



1. LED ANODE
2. LED CATHODE
3. N.C.
4. EMITTER
5. COLLECTOR
6. BASE

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

Characteristic		Symbol	Min	Typ	Max	Unit
INPUT LED						
Forward Voltage (I_F = 60 mA)	T_A = 25°C	V_F	—	1.35	1.65	Volts
	T_A = −55°C		—	1.5	—	
	T_A = 100°C		—	1.25	—	
Reverse Leakage Current (V_R = 6 V)		I_R	—	—	10	μA
Capacitance (V = 0, f = 1 MHz)		C_J	—	18	—	pF
OUTPUT TRANSISTOR						
Collector-Emitter Dark Current (V_{CE} = 10 V, T_A = 25°C)	CNY17-1,2	I_{CEO}	—	5	50	nA
	CNY17-3		—	5	100	
(V_{CE} = 10 V, T_A = 100°C)	All devices	I_{CEO}	—	1.6	—	μA
Collector-Base Dark Current (V_{CB} = 10 V)		I_{CBO}	—	0.5	—	nA
Collector-Emitter Breakdown Voltage (I_C = 1 mA)		$V_{(BR)CEO}$	70	120	—	Volts
Collector-Base Breakdown Voltage (I_C = 100 μA)		$V_{(BR)CBO}$	70	120	—	Volts
Emitter-Base Breakdown Voltage (I_E = 100 μA)		$V_{(BR)EBO}$	7	7.8	—	Volts
DC Current Gain (I_C = 2 mA, V_{CE} = 5 V)		h_{FE}	—	400	—	—
Collector-Emitter Capacitance (f = 1 MHz, V_{CE} = 0)		C_{CE}	—	8	—	pF
Collector-Base Capacitance (f = 1 MHz, V_{CB} = 0)		C_{CB}	—	21	—	pF
Emitter-Base Capacitance (f = 1 MHz, V_{EB} = 0)		C_{EB}	—	8	—	pF
COUPLED						
Output Collector Current (I_F = 10 mA, V_{CE} = 5 V)	CNY17-1	I_C	4	6	8	mA
	CNY17-2		6.3	10	12.5	
	CNY17-3		10	15	20	
Collector-Emitter Saturation Voltage (I_C = 2.5 mA, I_F = 10 mA)		$V_{CE(sat)}$	—	0.18	0.4	Volts
Delay Time (I_F = 10 mA, V_{CC} = 5 V, R_L = 75 Ω, Figure 11)		t_d	—	1.6	5.6	μs
Rise Time (I_F = 10 mA, V_{CC} = 5 V, R_L = 75 Ω, Figure 11)		t_r	—	1.6	4	μs
Storage Time (I_F = 10 mA, V_{CC} = 5 V, R_L = 75 Ω, Figure 11)		t_s	—	0.7	4.1	μs
Fall Time (I_F = 10 mA, V_{CC} = 5 V, R_L = 75 Ω, Figure 11)		t_f	—	2.3	3.5	μs
Delay Time (I_F = 20 mA, V_{CC} = 5 V, R_L = 1 kΩ, Figure 11)	CNY17-1	t_d	—	1.2	5.5	μs
(I_F = 10 mA, V_{CC} = 5 V, R_L = 1 kΩ, Figure 11)	CNY17-2,3		—	1.8	8	
Rise Time (I_F = 20 mA, V_{CC} = 5 V, R_L = 1 kΩ, Figure 11)	CNY17-1	t_r	—	3.3	4	μs
(I_F = 10 mA, V_{CC} = 5 V, R_L = 1 kΩ, Figure 11)	CNY17-2,3		—	5	6	
Storage Time (I_F = 20 mA, V_{CC} = 5 V, R_L = 1 kΩ, Figure 11)	CNY17-1	t_s	—	4.4	34	μs
(I_F = 10 mA, V_{CC} = 5 V, R_L = 1 kΩ, Figure 11)	CNY17-2,3		—	2	39	
Fall Time (I_F = 20 mA, V_{CC} = 5 V, R_L = 1 kΩ, Figure 11)	CNY17-1	t_f	—	9.7	20	μs
(I_F = 10 mA, V_{CC} = 5 V, R_L = 1 kΩ, Figure 11)	CNY17-2,3		—	9.4	24	
Isolation Voltage (f = 60 Hz, t = 1 sec)		V_{ISO}	7500	—	—	Vac(pk)
Isolation Resistance (V = 500 V)		R_{ISO}	10^{11}	—	—	Ω
Isolation Capacitance (V = 0, f = 1 MHz)		C_{ISO}	—	0.2	0.5	pF

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TYPICAL CHARACTERISTICS

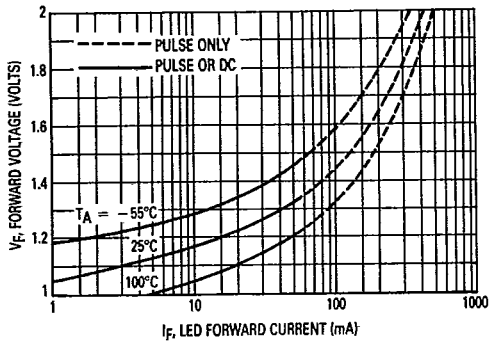

Figure 1. LED Forward Voltage versus Forward Current

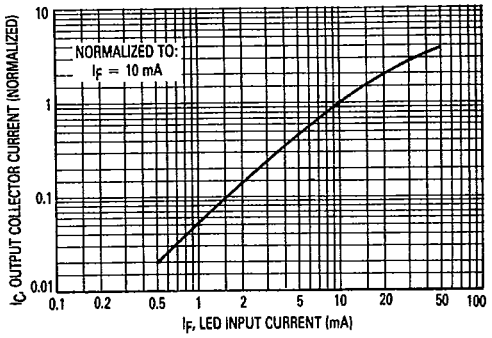

Figure 2. Output Current versus Input Current

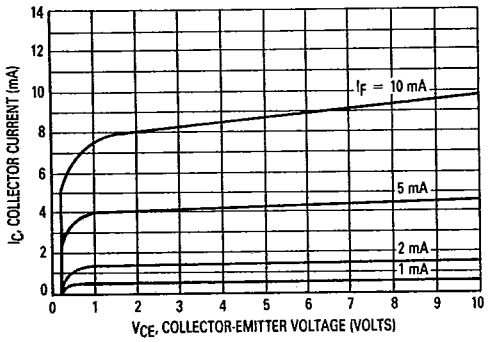

Figure 3. Collector Current versus Collector-Emitter Voltage

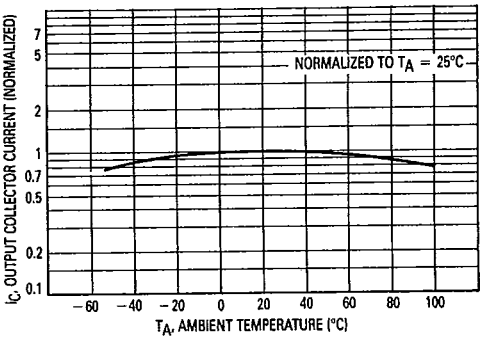

Figure 4. Output Current versus Ambient Temperature

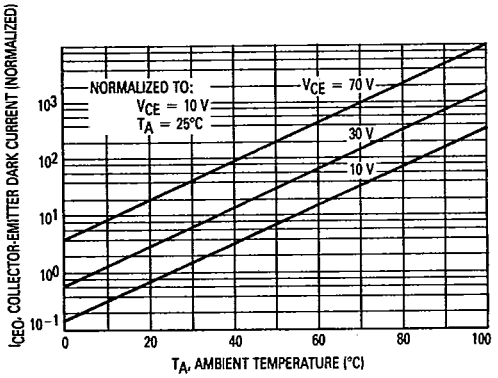

Figure 5. Dark Current versus Ambient Temperature

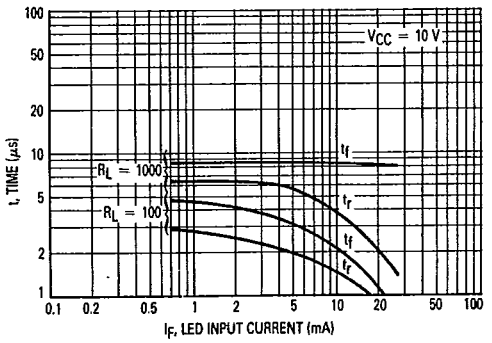

Figure 6. Rise and Fall Times

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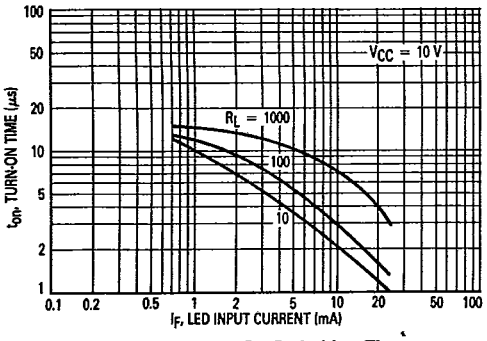

Figure 7. Turn-On Switching Times

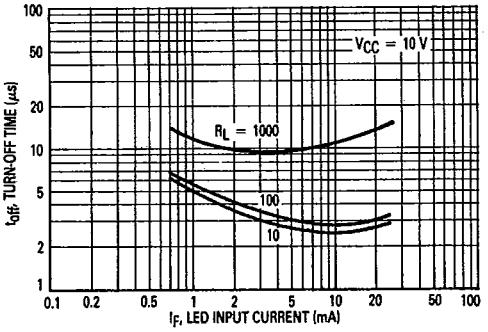

Figure 8. Turn-Off Switching Times

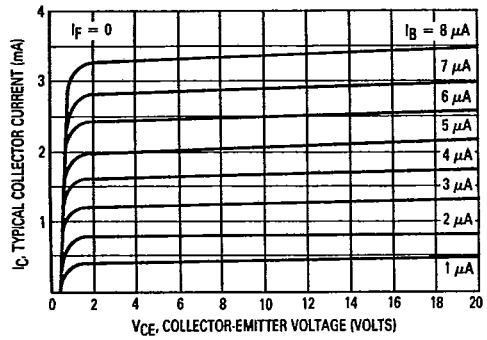

Figure 9. DC Current Gain (Detector Only)

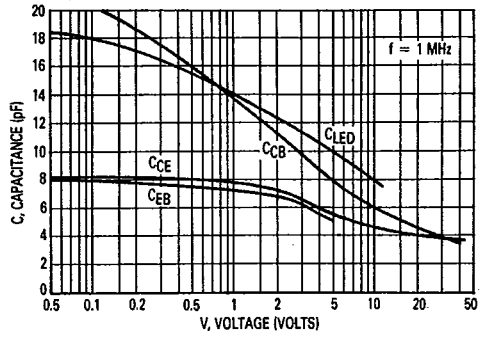

Figure 10. Capacitances versus Voltage

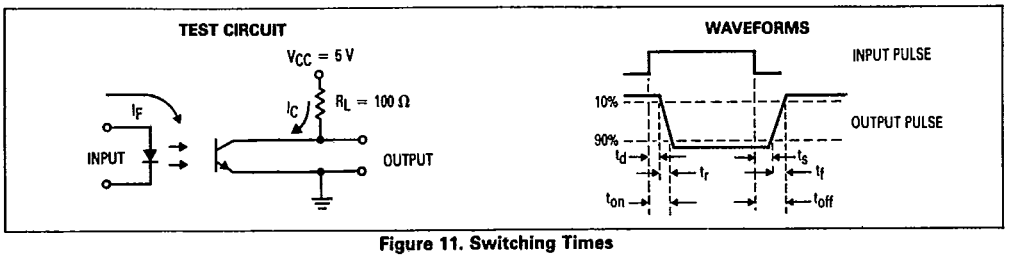

Figure 11. Switching Times

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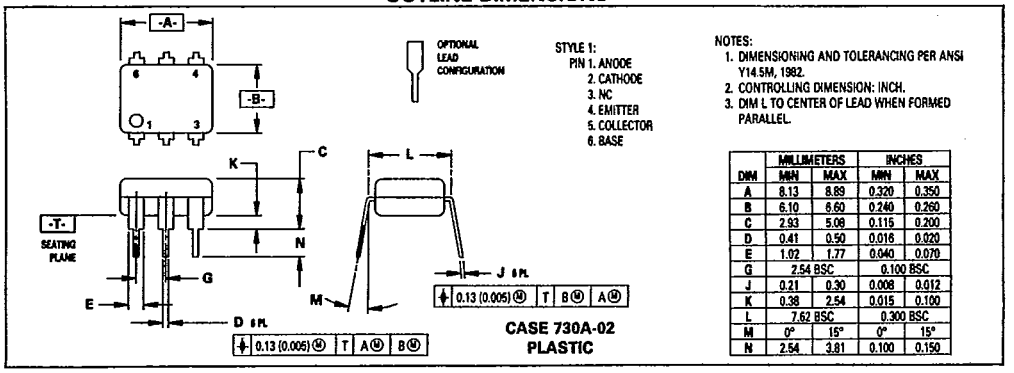
OUTLINE DIMENSIONS



STYLE 1:
PIN 1. ANODE
2. CATHODE
3. NC
4. EMITTER
5. COLLECTOR
6. BASE

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM L TO CENTER OF LEAD WHEN FORMED PARALLEL.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.93	5.08	0.115	0.200
D	0.41	0.50	0.016	0.020
E	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
J	0.21	0.30	0.008	0.012
K	0.38	2.54	0.015	0.100
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	2.54	3.81	0.100	0.150

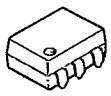
Optoisolator Lead Form Options

Suffix R
Suffix S
Suffix T

OPTOISOLATOR LEAD FORM OPTIONS

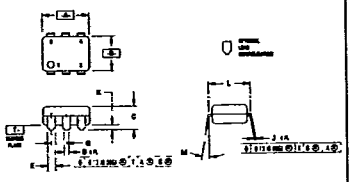
All Motorola 6-pin dual-in-line optoisolators are available in either a surface-mountable gull-wing lead form or a wide-spaced 0.400" lead form, which is used to satisfy 8 mm pc board spacing requirements.

- Attach "R" to any Motorola 6-pin dual-in-line part number for surface-mountable butt-lead option.
- Attach "S" to any Motorola 6-pin dual-in-line part number for surface-mountable gull-wing lead form.
- Attach "T" to any Motorola 6-pin dual-in-line part number for wide-spaced 0.400" lead form.



R

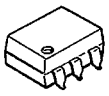
Surface-mountable butt-lead option



NOTES:
1. DIMENSIONS "A" AND "B" ARE DATUMS.
2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
4. CONTROLLING DIMENSION: INCH.

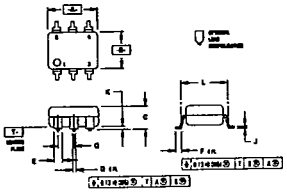
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.93	5.08	0.115	0.200
D	0.41	0.50	0.016	0.020
E	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	0.51	0.63	0.020	0.025
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°

730B-02



S

Surface-mountable gull-wing option



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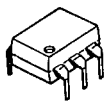
2. CONTROLLING DIMENSION: INCH.

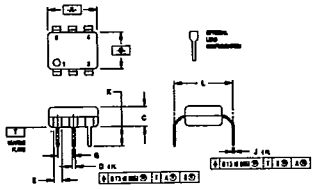
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.93	5.08	0.115	0.200
D	0.41	0.50	0.016	0.020
E	1.02	1.77	0.040	0.070
F	0.18	0.88	0.006	0.035
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	0.51	0.63	0.020	0.025
L	8.13 BSC		0.320 BSC	

730C-02



T

Wide-spaced (0.400") lead form option



NOTES
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2. CONTROLLING DIMENSION: INCH.
3. DIM L TO CENTER OF LEAD WHEN FORMED PARALLEL.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.42	4.44	0.095	0.175
D	0.41	0.50	0.016	0.020
E	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	3.38	—	0.133	—
L	10.16 BSC		0.400 BSC	

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