

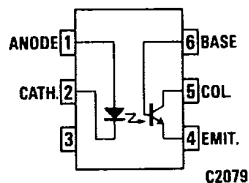
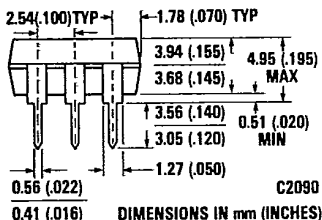
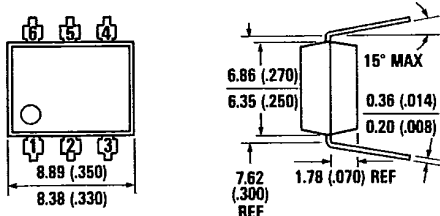
GENERAL INSTRUMENT

PHOTOTRANSISTOR OPTOCOUPLER

Optocouplers

MCT274

PACKAGE DIMENSIONS



Equivalent Circuit

DESCRIPTION

The MCT274 is a phototransistor-type optically coupled isolator. A gallium arsenide infrared emitting diode is selectively coupled with an NPN high-gain silicon phototransistor.

FEATURES

- Controlled Current Transfer Ratio – 225% to 400% (specified conditions)
- Maximum Turn-on time – 25 μ seconds (specified condition)
- Maximum Turn-off time – 25 μ seconds (specified condition)
- Surge Isolation Rating –
4000 volts DC 3000 volts AC, rms
- Steady-state Isolation Rating –
3500 volts DC 2500 volts AC, rms
- Underwriters Laboratory (U.L.) recognized – File E50151

APPLICATIONS

- Control Relays
- Digital controls
- Microprocessor controls
- Replace slow photodarlington types with better switching speeds and equivalent gain devices
- Multiple gate interface

ABSOLUTE MAXIMUM RATINGS

TOTAL PACKAGE

Storage temperature -55°C to 150°C
 Operating temperature -55°C to 100°C
 Lead temperature
 (Soldering, 10 sec) 260°C
 Total package power dissipation @ 25°C
 (LED plus detector) 260 mW
 Derate linearly from 25°C $3.5\text{ mW}/^{\circ}\text{C}$

INPUT DIODE

Forward DC current 60 mA
 Reverse voltage 3 V
 Peak forward current
 (1 μ s pulse, 300 pps) 3.0 A
 Power dissipation 25°C ambient 90 mW
 Derate linearly from 25°C $1.2\text{ mW}/^{\circ}\text{C}$

OUTPUT TRANSISTOR

Power dissipation @ 25°C 200 mW
 Derate linearly from 25°C $2.67\text{ mW}/^{\circ}\text{C}$

MCT274

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88D 02988

DT-41-83

ELECTRO-OPTICAL CHARACTERISTICS (25°C Temperature Unless Otherwise Specified)

TRANSFER CHARACTERISTICS							
	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS TEST CONDITIONS	
DC	Current Transfer Ratio, collector to emitter (a)	CTR _{CE}	225 12.5	305	400	% %	I _F = 10 mA; V _{CE} = 10 V I _F = 16 mA; V _{CE} = 0.4 V
	Current Transfer Ratio, collector to base	CTR _{CB}		0.15		%	I _F = 10 mA; V _{CB} = 10 V
	Saturation voltage	V _{CE(SAT)}		0.16	.40	V	I _F = 16 mA; I _C = 2 mA
SWITCHING TIMES	Non-saturated Turn-on time	t _{on}		9.1	25	μs	R _L = 100 Ω; I _C = 2 mA; V _{CC} = 5 V
	Turn-off time	t _{off}		7.9	25	μs	See figures 11, 13
	Saturated Turn-on time	t _{on}		3.0		μs	I _F = 16 mA; R _L = 1.9 KΩ
	Turn-off time (Approximates a typical TTL interface)	t _{off}		95		μs	See figures 12, 14
	Turn-on time	t _{on}		3.0		μs	I _F = 16 mA; R _L = 4.7 KΩ
	Turn-off time (Approximates a typical low power TTL interface)	t _{off}		185		μs	See figures 12, 14
ISOLATION	Surge isolation	V _{iso}	4000			VDC	Relative humidity < 50%, I _{I-O} < 10 μA
	Steady state isolation	V _{iso}	3000 3500			VAC-rms VDC	t = 1 second Relative humidity < 50%, I _{I-O} < 10 μA
	Isolation resistance	R _{iso}	2500 10 ¹¹			VAC-rms ohms	t = 1 minute V _{I-O} = 500 VDC
	Isolation capacitance	C _{iso}		0.5		pF	f = 1 MHz

INDIVIDUAL COMPONENT CHARACTERISTICS							
	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS TEST CONDITIONS	
INPUT DIODE	Forward voltage	V _F		1.20	1.50	V	I _F = 20 mA
	Forward voltage temp. coefficient			-1.8		mV/°C	
	Reverse voltage	V _R	3.0	25		V	I _R = 10 μA
	Junction capacitance	C _J		50		pF	V _F = 0 V, f = 1 MHz
	Reverse leakage current	I _R		65	10	μA	V _F = 1 V, f = 1 MHz V _R = 3.0 V
OUTPUT TRANSISTOR	DC forward current gain	h _{FE}		360			V _{CE} = 5 V, I _C = 100 μA
	Breakdown voltage						
	Collector to emitter	BV _{CEO}	30	45		V	I _C = 1.0 mA, I _F = 0
	Collector to base	BV _{CBO}	70	130		V	I _C = 10 μA
	Emitter to base	BV _{EBO}	5	7		V	I _E = 100 μA, I _F = 0
	Leakage current						
	Collector to emitter	I _{CEO}		5	50	nA	V _{CE} = 10 V, I _F = 0
Capacitance	Collector to emitter			8		pF	V _{CE} = 0, f = 1 MHz
	Collector to base			20		pF	V _{CB} = 5, f = 1 MHz
	Emitter to base			10		pF	V _{EB} = 0, f = 1 MHz

3890128 GENL INSTR, OPTOELEK 88D 02989 TYPICAL ELECTRICAL CHARACTERISTIC CURVES (25°C Free Air Temperature Unless Otherwise Specified)

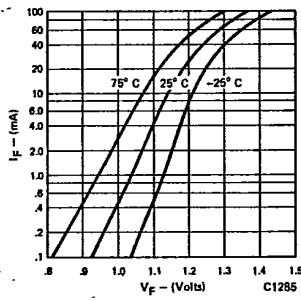


Fig. 1. Forward Voltage vs. Forward Current

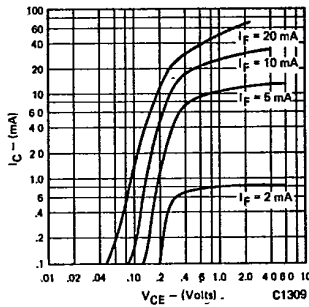


Fig. 2. Collector Current vs. Collector to Emitter Voltage

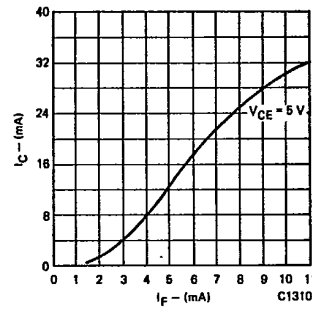


Fig. 3. Collector Current vs. Forward Current

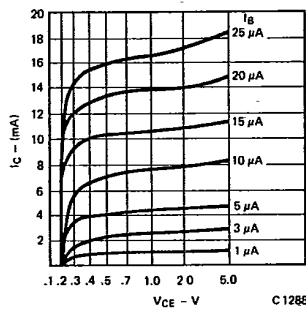


Fig. 4. Collector Current vs. Collector to Emitter Voltage

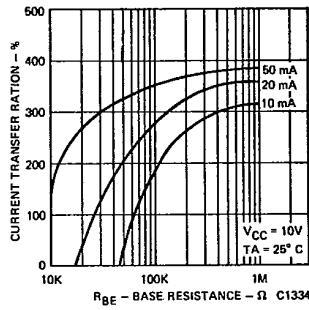


Fig. 5. Sensitivity vs. Base Resistance

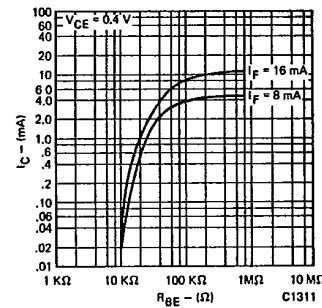


Fig. 6. Saturated CTR vs. Base to Emitter Resistance

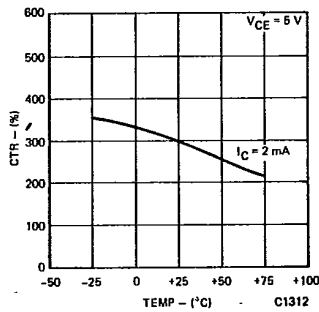


Fig. 7. Current Transfer Ratio (unsaturated) vs. Temperature

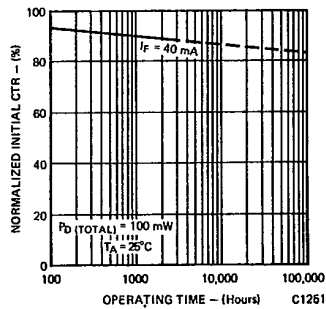


Fig. 8. Current Transfer Ratio vs. Operating Time

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TYPICAL SWITCHING CHARACTERISTICS

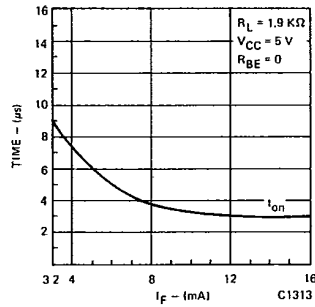


Fig. 9. Switch-on Time vs. I_F Drive (saturated)

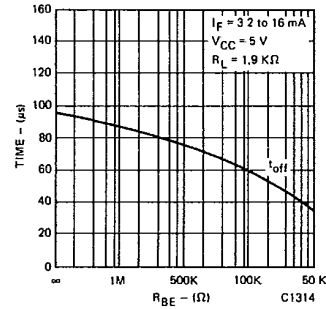


Fig. 10. Switch-off Time vs. Base to Emitter Resistance (saturated)

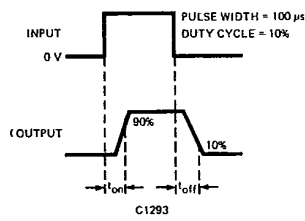


Fig. 11.

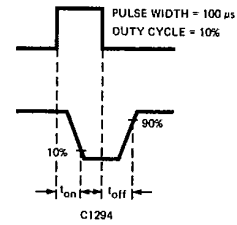


Fig. 12.

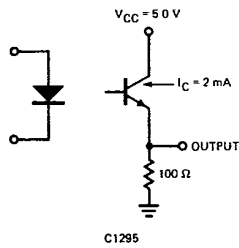


Fig. 13.

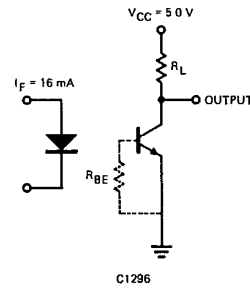


Fig. 14.

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Datasheets for electronic components.