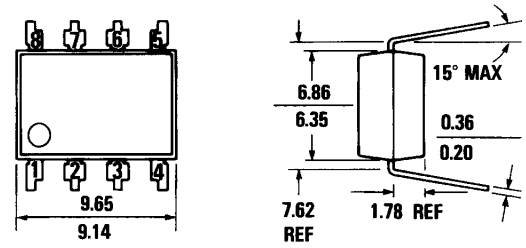
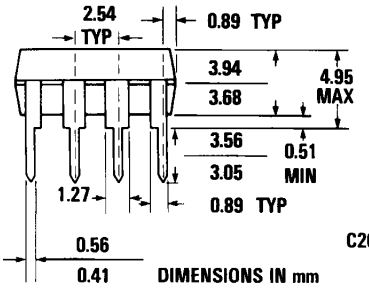
OPTOELECTRONICS

DUAL PHOTOTRANSISTOR OPTOCOUPLERS

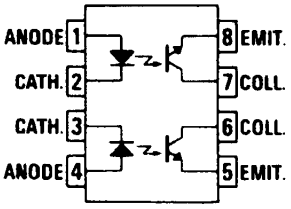
MCT6 MCT62 MCT61

PACKAGE DIMENSIONS





DIMENSIONS IN mm
PACKAGE CODE G



Equivalent Circuit

DESCRIPTION

The MCT6X optoisolators have two channels for high density applications. For four channel applications, two-packages fit into a standard 16-pin DIP socket. Each channel is an NPN silicon planar phototransistor optically coupled to a gallium arsenide infrared emitting diode.

FEATURES

- Two isolated channels per package
- Two packages fit into a 16 lead DIP socket
- Choice of 3 current transfer ratios
- Underwriters Laboratory (U.L.) recognized File E50151

APPLICATIONS

- AC Line/Digital Logic—Isolate high voltage transients
- Digital Logic/Digital Logic—Eliminate spurious grounds
- Digital Logic/AC Triac Control—Isolate high voltage transients
- Twisted pair line receiver—Eliminate ground loop feedthrough
- Telephone/Telegraph line receiver—Isolate high voltage transients
- High Frequency Power Supply Feedback Control—Maintain floating ground
- Relay contact monitor—Isolate floating grounds and transients
- Power Supply Monitor—Isolate transients

ABSOLUTE MAXIMUM RATINGS

Storage temperature ..... −55°C to 150°C
Operating temperature ..... −55°C to 100°C
Lead temperature ..... (soldering, 10 sec.) 250°C

TOTAL INPUT
Power dissipation at 25°C ambient ..... 100 mW
Derate linearly from 25°C ..... 1.3 mW/°C

COUPLED
Input to output breakdown voltage ... 2500 volts V_{RMS}
Total package power dissipation
@ 25°C ambient ..... 400 mW
Derate linearly from 25°C ..... 5.33 mW/°C

INPUT DIODE (each channel)
Forward current ..... 60 mA
Reverse voltage ..... 3.0 V
Peak forward current (1 μs pulse, 300 pps) ..... 3 A

OUTPUT TRANSISTOR (each channel)
Power dissipation @ 25°C ambient ..... 150 mW
Derate linearly from 25°C ..... 2 mW/°C
Collector current ..... 30 mA

QT OPTOELECTRONICS

DUAL PHOTOTRANSISTOR OPTOCOUPLERS

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

INDIVIDUAL COMPONENT CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITION
INPUT DIODE						
Rated forward voltage	V_F		1.25	1.50	V	I_F=20 mA
Reverse voltage	V_R	3.0	25		V	I_R=10 μA
Reverse current	I_R		.001	10	μA	V_R=3.0 V
Junction capacitance	C_J		50		pF	V_F=0 V
OUTPUT TRANSISTOR (I_F=0)						
Breakdown voltage, collector to emitter	BV_{CEO}	30	85		V	I_C=1.0 mA
Breakdown voltage, emitter to collector	BV_{ECO}	6	13		V	I_E=100 μA
Leakage current, collector to emitter	I_{CEO}		5	100	nA	V_{CE}=10 V
Capacitance collector to emitter	C_{CE}		8		pF	V_{CE}=0 V

TRANSFER CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITION
COUPLED						
DC current transfer ratio (I_C/I_F)=CTR MCT6		20			%	V_{CE}=10 V, I_F=10 mA
MCT61		50			%	V_{CE}=5 V, I_F=5 mA
MCT62		100			%	V_{CE}=5 V, I_F=5 mA
Saturation voltage— collector to emitter MCT6, 61, 62	$V_{CE\ (SAT)}$		0.2	0.4	V	I_C=2 mA, I_F=16 mA

TRANSFER CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITION
SWITCHING TIMES, OUTPUT TRANSISTOR						
Non-saturated rise time, fall time (Note 3)			2.4		μs	I_C=2 mA, V_{CE}=10 V, R_L=100Ω
Non-saturated rise time, fall time (Note 3)			15		μs	I_C=2 mA, V_{CE}=10 V, R_L=1KΩ
Saturated turn-on time (from 5.0V to 0.8V)			5		μs	R_L=2KΩ, I_F=40 mA
Saturated turn-off time (from saturation to 2.0V)			25		μs	R_L=2KΩ, I_F=40 mA
Bandwidth B_W			150		kHz	I_C=2 mA, V_{CE}=10 V, R_L=100Ω

ISOLATION CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITION
Isolation voltage	$BV_{(I-O)}$	2500			V_{RMS}	t=1 minute
Isolation resistance MCT6X—	$R_{(I-O)}$	10^{11}	10^{12}		Ω	V_{I-O}=500 VDC
Breakdown voltage—channel-to-channel MCT6X			500		VDC	Relative humidity=40% f=1 MHz
Capacitance between channels			0.4		pF	

TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified)

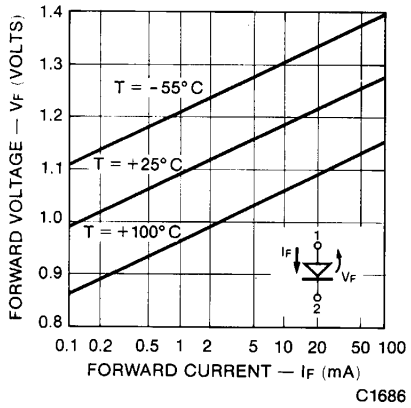


Fig. 1. Forward Voltage vs. Current

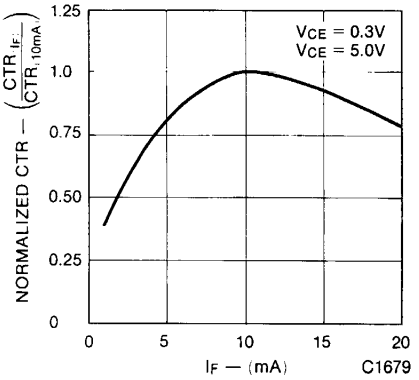


Fig. 2. Normalized CTR vs. Forward Current

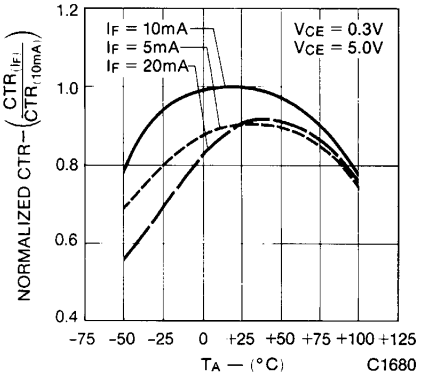


Fig. 3. Normalized CTR vs. Temperature

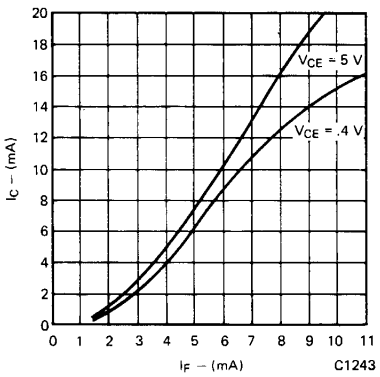


Fig. 4. Collector Current vs. Forward Current

TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

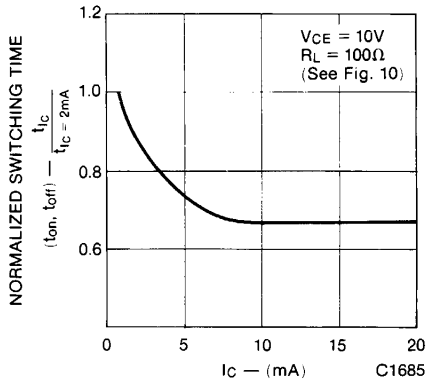


Fig. 5. Switching Time vs. IC

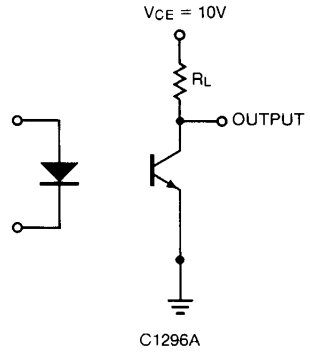


Fig. 6. Switching Time Test Circuit

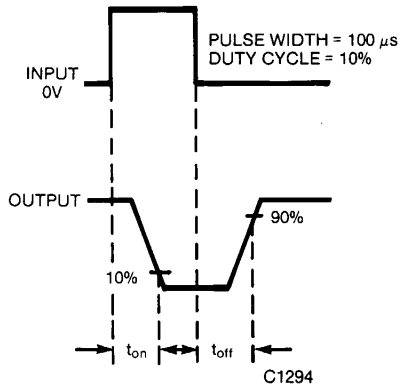


Fig. 7. Switching Time Waveforms

NOTES

1. *Normalized CTR degradation* $= \frac{CTR_o\text{-}CTR}{CTR_o}$
2. *The current transfer ratio (I_C/I_F) is the ratio of the detector collector current to the LED input current with V_{CE} at 10 volts.*
3. *The frequency at which i_c is 3 dB down from the 1 kHz value.*
4. *Rise time (t_r) is the time required for the collector current to increase from 10% of its final value to 90%.*
   Fall time (t_f) is the time required for the collector current to decrease from 90% of its initial value to 10%.