

DATA SHEET

MCT4/4R: Photo-Transistor Hermetic Optocouplers

Features

- 1000 V_{DC} electrical isolation
- Small size
- Standard TO-72 hermetic package
- Screened version is available on MCT4R

Description

The MCT4 and MCT4R products are designed especially for high-reliability applications that require optical isolation with high Current Transfer Ratio (CTR) and low saturation V_{CE}.

Each optocoupler consists of an LED and N-P-N silicon photo-transistor that is mounted and optically coupled in a four-leaded hermetic TO-18 package.

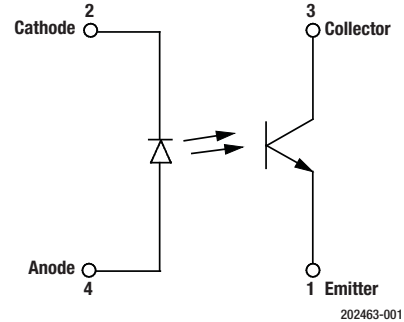


Figure 1. MCT4/4R Block Diagram

A functional block diagram of the MCT4/4R is shown in Figure 1. The absolute maximum ratings of the MCT4/4R are provided in Table 1. Electrical specifications are provided in Table 2.

Typical performance characteristics of the MCT4/4R are illustrated in Figures 2 through 4. A typical switching test circuit is shown in Figure 5 and package dimensions for the MCT4/4R are provided in Figure 6.

Table 1. MCT4/4R Absolute Maximum Ratings ¹

Parameter	Symbol	Minimum	Maximum	Units
<i>Coupled</i>				
Input to output isolation voltage ²	V _{DC}	-1000	+1000	V
Storage temperature range	T _{STG}	-65	+150	°C
Operating temperature range	T _A	-55	+125	°C
Lead soldering temperature range (1.6 mm from case for 10 sec.)	T _{MTG}		+260	°C
Total power dissipation	P _D		250	mW
Derate linearly from 25 °C			3.3	mW/25 °C
<i>Input Diode</i>				
Average input current	I _{DD}		40	mA
Peak forward current ³	I _F		3	A
Reverse voltage	V _R		3	V
Power dissipation at 25 °C	P _D		90	mW
Derate linearly from 25 °C			1.2	mW/25 °C
<i>Output Detector</i>				
Collector to emitter voltage	V _{CE}		30	V
Emitter to collector voltage	V _{EC}		7	V
Power dissipation at 25 °C	P _D		200	mW
Derate linearly from 25 °C			2.67	mW/25 °C

¹ Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to the device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed in the above table may result in permanent damage to the device.

² Measured between pins 1 and 3 shorted together, and pins 2 and 4 shorted together. T_A = 25 °C and duration = 1 s.

³ Value applies for PW ≤ 1 μs, PRR ≤ 300 pps.

CAUTION: Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

Table 2. MCT4/4R Electrical Specifications ¹
(TA = 25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Current transfer ratio	CTR	$I_F = 10 \text{ mA}, V_{CE} = 10 \text{ V}$	15	100		%
Saturation voltage	V_{CE_SAT}	$I_F = 10.0 \text{ mA}, I_C = 500.0 \text{ }\mu\text{A}$		0.1		V
		$I_F = 50.0 \text{ mA}, I_C = 2.0 \text{ mA}$		0.2	0.5	V
Breakdown voltage:						
Collector to emitter	BV_{CEO}	$I_{CE} = 1 \text{ mA}$	30			V
Emitter to collector	BV_{ECO}	$I_{EC} = 100 \text{ }\mu\text{A}$	7			V
Collector to emitter dark current	I_{CEO}	$V_{CE} = 10 \text{ V}$			50	nA
Capacitance collector to emitter		$V_{CE} = 0 \text{ V}$		2		pF
Input:						
Forward voltage	V_F	$I_F = 40.0 \text{ mA}$		1.3	1.5	V
Reverse current	I_R	$V_R = 3 \text{ V}$			10	μA
Output leakage current ²	I_{L_O}	$R_H \leq 50\%, V_{L_O} = 1000 \text{ V}_{DC}$			1	μA
Rise and Fall time	t_r/t_f	$V_{CC} = 10 \text{ V}, R_L = 100 \text{ }\Omega, I_C = 2 \text{ mA}$		2		μs

¹ Performance is guaranteed only under the conditions listed in the above table.

² Measured between pins 1 and 3 shorted together, and pins 2 and 4 shorted together. TA = 25 °C and duration = 1 s.

Typical Performance Characteristics
 ($T_A = -55\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$, Unless Otherwise Noted)

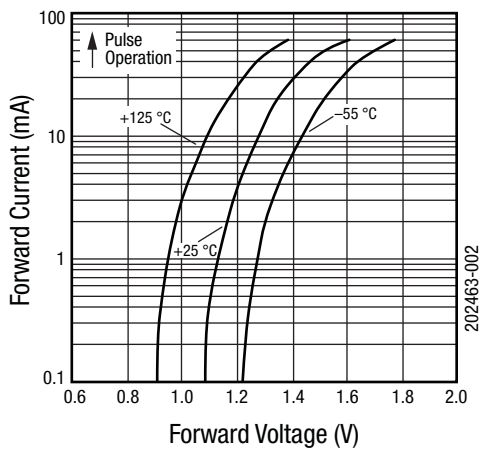


Figure 2. Forward Current vs Forward Voltage

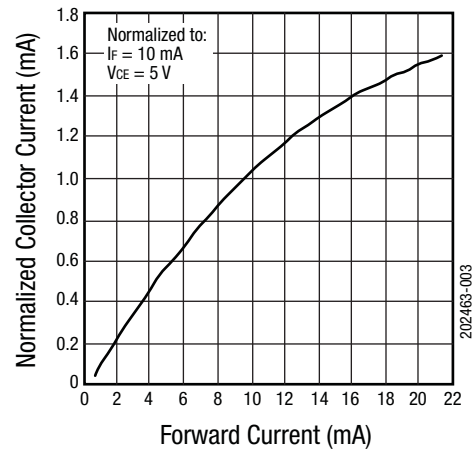


Figure 3. Normalized Collector Current vs Forward Current

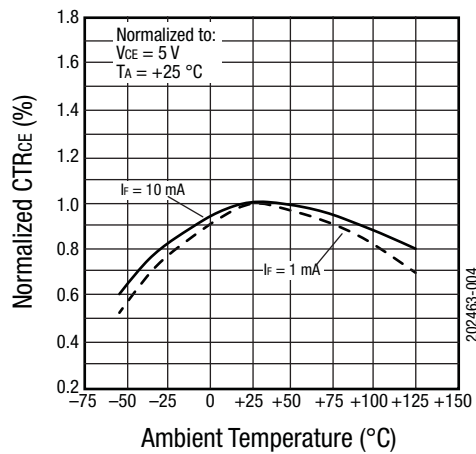


Figure 4. Normalized CTRce vs Temperature

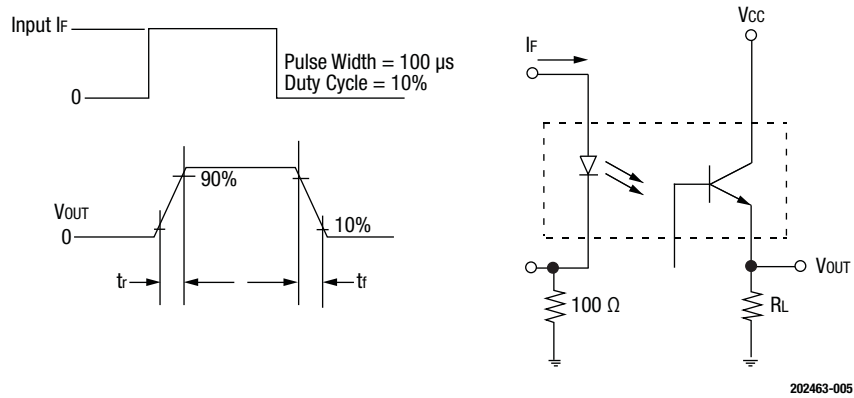
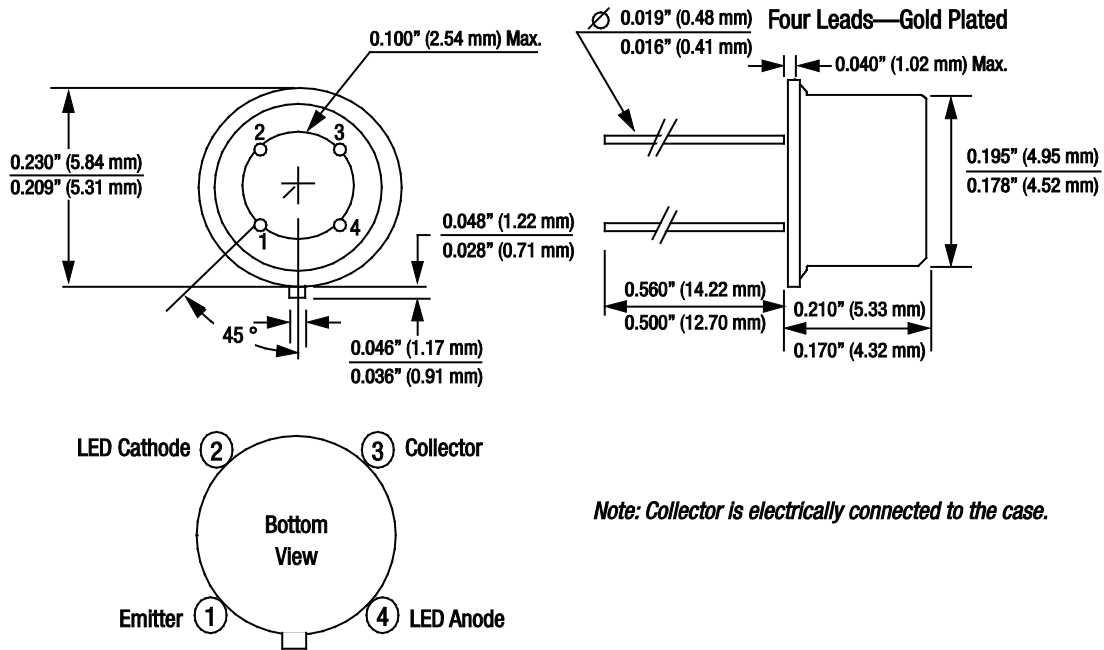


Figure 5. MCT4/4R Switching Test Circuit



Note: Collector is electrically connected to the case.

* LED Anode is Case.

Figure 6. MCT4/4R Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
MCT4/4R: Photo-Transistor Hermetic Optocouplers	MCT4/4R

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