

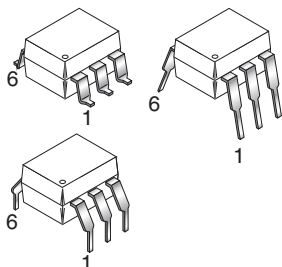
MCT2
MCT2200

MCT2E
MCT2201

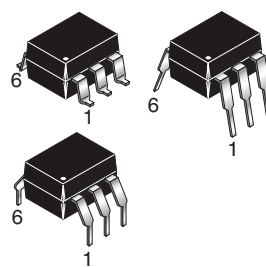
MCT210
MCT2202

MCT271

WHITE PACKAGE (-M SUFFIX)



BLACK PACKAGE (NO -M SUFFIX)



DESCRIPTION

The MCT2XXX series optoisolators consist of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a 6-pin dual in-line package.

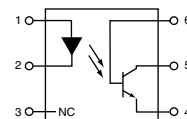
FEATURES

- UL recognized (File # E90700)
- VDE recognized (File # 94766)
 - Add option V for white package (e.g., MCT2V-M)
 - Add option 300 for black package (e.g., MCT2.300)
- MCT2 and MCT2E are also available in white package by specifying -M suffix, eg. MCT2-M

APPLICATIONS

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

SCHEMATIC



PIN 1. ANODE
2. CATHODE
3. NO CONNECTION
4. EMITTER
5. COLLECTOR
6. BASE

MCT2
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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Device	Value	Units
TOTAL DEVICE Storage Temperature	T_{STG}	ALL	-55 to +150	°C
Operating Temperature	T_{OPR}	ALL	-55 to +100	°C
Lead Solder Temperature	T_{SOL}	ALL	260 for 10 sec	°C
Total Device Power Dissipation @ $T_A = 25^{\circ}\text{C}$	P_D	-M	250	mW
		Non-M	260	
Derate above 25°C		-M	2.94	mW/°C
		Non-M	3.3	
EMITTER DC/Average Forward Input Current	I_F	-M	60	mA
		Non-M	100	
Reverse Input Voltage	V_R	ALL	3	V
Forward Current - Peak (300µs, 2% Duty Cycle)	$I_F(pk)$	ALL	3	A
LED Power Dissipation @ $T_A = 25^{\circ}\text{C}$	P_D	-M	120	mW
		Non-M	150	
Derate above 25°C		-M	1.41	mW/°C
		Non-M	2.0	
DETECTOR Collector Current	I_C	ALL	50	mA
Collector-Emitter Voltage	V_{CEO}	ALL	30	V
Detector Power Dissipation @ $T_A = 25^{\circ}\text{C}$	P_D	ALL	150	mW
Derate above 25°C		-M	1.76	mW/°C
		Non-M	2.0	

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

Individual Component Characteristics

Parameter	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
EMITTER							
Input Forward Voltage	(I _F = 20 mA)	V _F	MCT2/-M MCT2E/-M MCT271 MCT2200 MCT2201 MCT2202		1.25	1.50	V
	(T _A = 0-70°C, I _F = 40 mA)		MCT210		1.33		
Reverse Leakage Current	(V _R = 3.0 V)	I _R	MCT2/-M MCT2E/-M MCT271 MCT2200 MCT2201 MCT2202		0.001	10	μA
	(T _A = 0-70°C, V _R = 6.0 V)		MCT210				
DETECTOR	(I _C = 1.0 mA, I _F = 0)	BV _{CEO}	ALL	30	100		V
Collector-Emitter Breakdown Voltage	(T _A = 0-70°C)		MCT210				
Collector-Base Breakdown Voltage	(I _C = 10 μA, I _F = 0)	BV _{CBO}	MCT2/-M MCT2E/-M MCT271 MCT2200 MCT2201 MCT2202	70	120		V
	(T _A = 0-70°C)		MCT210	30			
Emitter-Collector Breakdown Voltage	(I _E = 100 μA, I _F = 0)	BV _{ECO}	MCT2/-M MCT2E/-M MCT271 MCT2200 MCT2201 MCT2202	7	10		V
	(T _A = 0-70°C)		MCT210	6	10		
Collector-Emitter Dark Current	(V _{CE} = 10 V, I _F = 0)	I _{CEO}	ALL		1	50	nA
	(V _{CE} = 5 V, T _A = 0-70°C)					30	μA
Collector-Base Dark Current	(V _{CB} = 10 V, I _F = 0)	I _{CBO}	ALL			20	nA
Capacitance	(V _{CE} = 0 V, f = 1 MHz)	C _{CE}	ALL		8		pF

** Typical values at $T_A = 25^\circ\text{C}$

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TRANSFER CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

DC Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Output Collector Current	(T _A = 0-70°C)	CTR	MCT210	150			%
	(I _F = 10 mA, V _{CE} = 5 V)		MCT2200	20			
			MCT2201	100			
			MCT2202	63		125	
	(I _F = 10 mA, V _{CE} = 10 V)		MCT2 MCT2-M MCT2E MCT2E-M	20			
			MCT271	45		90	
(I _F = 3.2 mA to 32 mA, V _{CE} = 0.4 V) (T _A = 0-70°C)	MCT210	50					
Collector-Emitter Saturation Voltage	(I _C = 2 mA, I _F = 16 mA)	V _{CE (SAT)}	MCT2 MCT2-M MCT2E MCT2E-M MCT271			0.4	V
	MCT210						
	MCT2200 MCT2201 MCT2202						
AC Characteristic Saturated Turn-on Time from 5 V to 0.8 V	(I _F = 15 mA, V _{CC} = 5 V, R _L = 2 kΩ) (R _B = Open) (Fig. 20)	t _{on}	MCT2		1.1		μs
	(I _F = 20 mA, V _{CC} = 5 V, R _L = 2 kΩ) (R _B = 100 kΩ) (Fig. 20)		MCT2E		1.1		
			MCT2		1.3		
			MCT2E		1.3		
Saturated Turn-off Time from SAT to 2.0 V	(I _F = 15 mA, V _{CC} = 5 V, R _L = 2 kΩ) (R _B = Open) (Fig. 20)	t _{off}	MCT2		50		
	MCT2E			50			
	(I _F = 20 mA, V _{CC} = 5 V, R _L = 2 kΩ) (R _B = 100 kΩ) (Fig. 20)		MCT2		20		
			MCT2E		20		
Turn-on Time	(I _F = 10 mA, V _{CC} = 10 V, R _L = 100 Ω)	t _{on}	MCT2-M MCT2E-M		2		
Turn-off Time	(I _F = 10 mA, V _{CC} = 10 V, R _L = 100 Ω)	t _{off}	MCT2-M MCT2E-M		2		
Rise Time	(I _F = 10 mA, V _{CC} = 10 V, R _L = 100 Ω)	t _r	MCT2-M MCT2E-M		2		
Fall Time	(I _F = 10 mA, V _{CC} = 10 V, R _L = 100 Ω)	t _f	MCT2-M MCT2E-M		1.5		

** Typical values at $T_A = 25^\circ\text{C}$

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TRANSFER CHARACTERISTICS (Cont.)

AC Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Saturated turn-on time	$(I_F = 16 \text{ mA}, R_L = 1.9\text{k}\Omega, V_{CC} = 5 \text{ V})$ (Fig. 20)	t_{on}	MCT271		1.0		μs
Saturated turn-off time (Approximates a typical TTL interface)		t_{off}			48		
Saturated turn-on time	$(I_F = 16 \text{ mA}, R_L = 4.7\text{k}\Omega, V_{CC} = 5 \text{ V})$ (Fig. 20)	t_{on}			1.0		
Saturated turn-off time (Approximates a typical low power TTL interface)		t_{off}			98		
Saturated rise time	$(I_F = 16 \text{ mA}, R_L = 560\Omega, V_{CC} = 5 \text{ V})$ (Fig. 20, 21)	t_r	MCT210		1.0		
Saturated fall time		t_f			11		
Saturated propagation delay - high to low	$(I_F = 16 \text{ mA}, R_L = 2.7\text{k}\Omega)$ (Fig. 20, 21)	$T_{PD} \text{ (HL)}$			1.0		
Saturated propagation delay - low to high		$T_{PD} \text{ (LH)}$			50		
Non-saturated turn on time	$(I_C = 2 \text{ mA}, V_{CC} = 10 \text{ V}, R_L = 100\Omega)$ (Fig. 20)	T_{ON}	MCT2200 MCT2201 MCT2202		2	10	
Non-saturated turn off time		T_{OFF}			2	10	
Non-saturated rise time	$(I_C = 2 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 100\Omega)$ (Fig. 20)	t_r	MCT210		2		
Non-saturated fall time		t_f			2		
Non-saturated turn-on time	$(I_C = 2 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 100\Omega)$ (Fig. 20)	t_{on}	MCT271		2	7	
Non-saturated turn-off time		t_{off}			2	7	

** Typical values at $T_A = 25^\circ\text{C}$

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ*	Max	Units
Input-Output Isolation Voltage	(Non '-M', Black Package) ($f = 60 \text{ Hz}, t = 1 \text{ min}$)	V_{ISO}	5300			Vac(rms)
	('M', White Package) ($f = 60 \text{ Hz}, t = 1 \text{ sec}$)		7500			Vac(pk)
Isolation Resistance	$(V_{I-O} = 500 \text{ VDC})$	R_{ISO}	10^{11}			Ω
Isolation Capacitance	$(V_{I-O} = \&, f = 1 \text{ MHz})$	C_{ISO}		0.5		pF
	('M' White Package)			0.2	2	pF

Note

* Typical values at $T_A = 25^\circ\text{C}$

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TYPICAL PERFORMANCE CURVES

Fig. 1 LED Forward Voltage vs. Forward Current (Black Package)

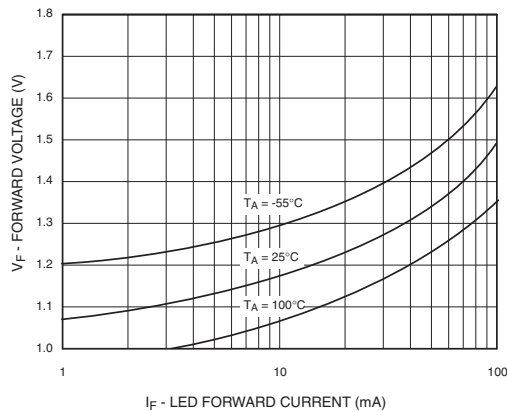


Fig. 2 LED Forward Voltage vs. Forward Current (White Package)

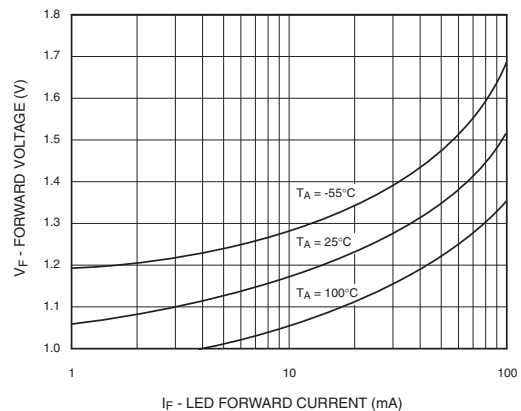


Fig.3 Normalized CTR vs. Forward Current (Black Package)

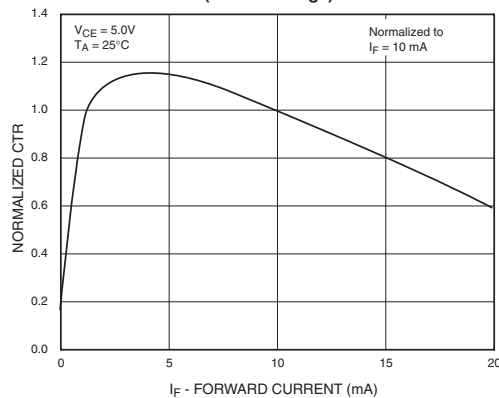


Fig.4 Normalized CTR vs. Forward Current (White Package)

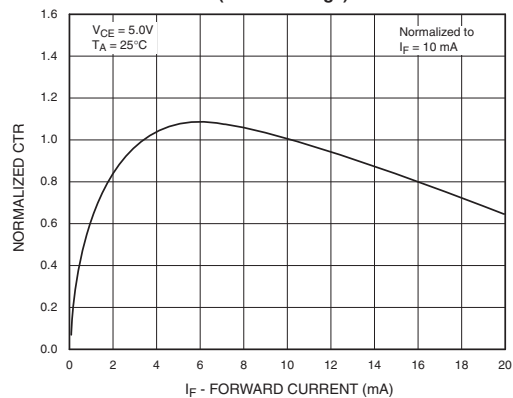


Fig. 5 Normalized CTR vs. Ambient Temperature (Black Package)

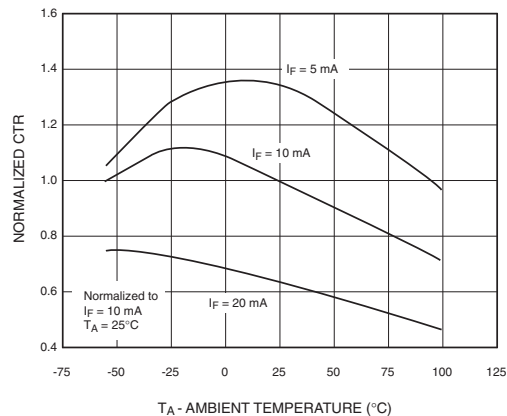
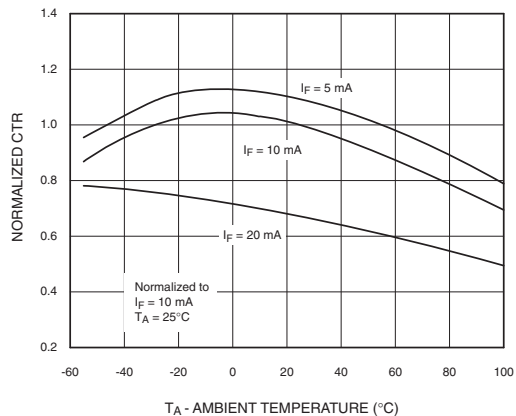


Fig. 6 Normalized CTR vs. Ambient Temperature (White Package)



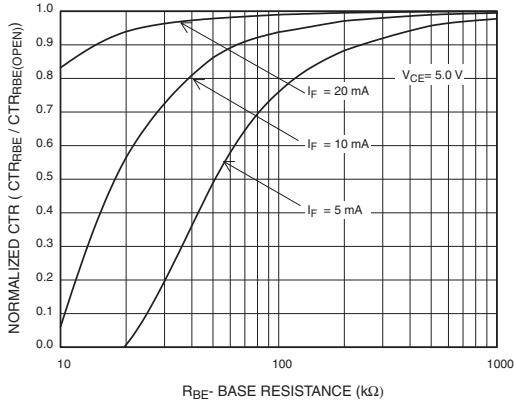
**MCT2
MCT2200**

**MCT2E
MCT2201**

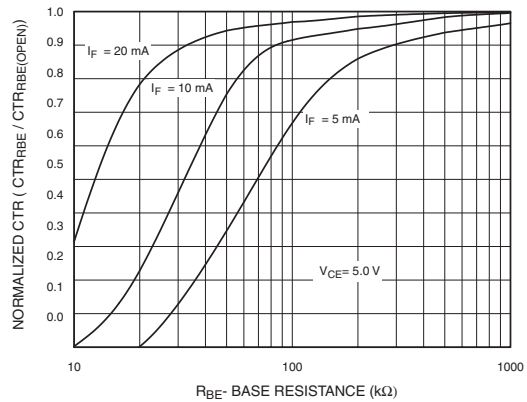
**MCT210
MCT2202**

MCT271

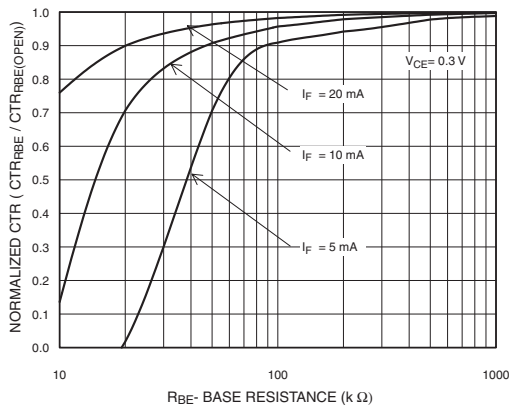
**Fig. 7 CTR vs. RBE (Unsaturated)
(Black Package)**



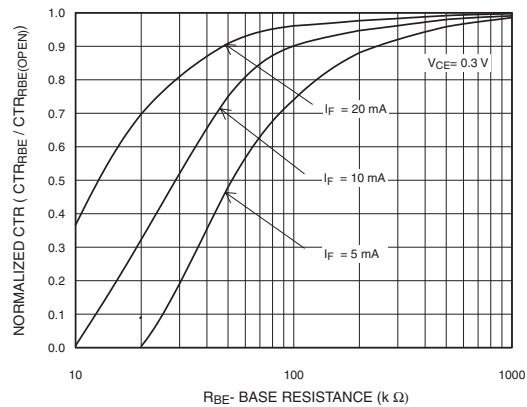
**Fig. 8 CTR vs. RBE (Unsaturated)
(White Package)**



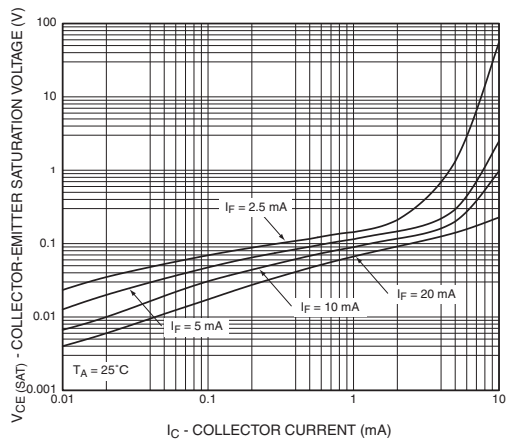
**Fig. 9 CTR vs. RBE (Saturated)
(Black Package)**



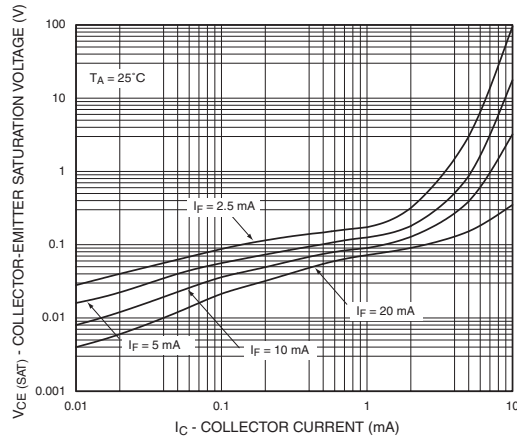
**Fig. 10 CTR vs. RBE (Saturated)
(White Package)**



**Fig. 11 Collector-Emitter Saturation Voltage vs. Collector Current
(Black Package)**



**Fig. 12 Collector-Emitter Saturation Voltage vs. Collector Current
(White Package)**



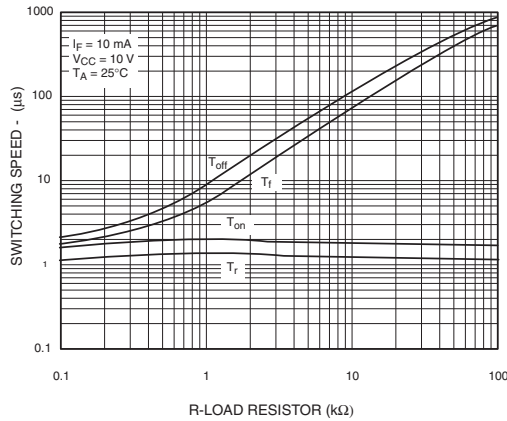
**MCT2
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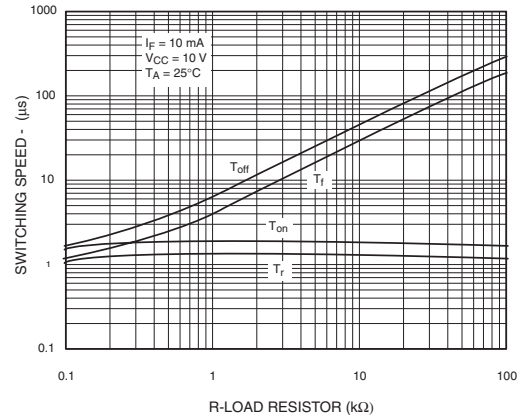
**MCT210
MCT2202**

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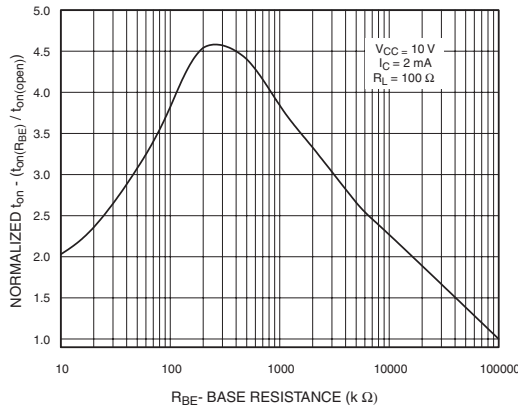
**Fig. 13 Switching Speed vs. Load Resistor
(Black Package)**



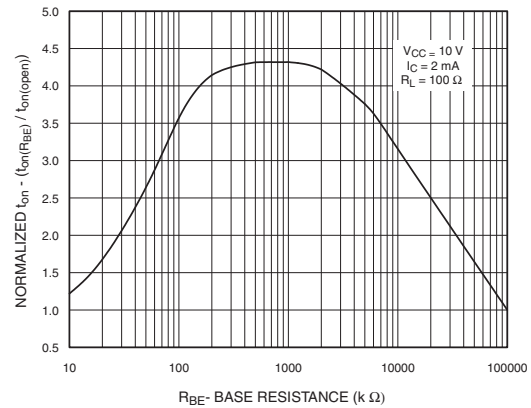
**Fig. 14 Switching Speed vs. Load Resistor
(White Package)**



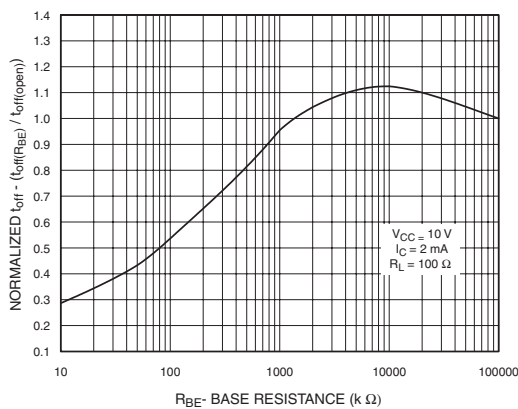
**Fig. 15 Normalized t_{on} vs. R_{BE}
(Black Package)**



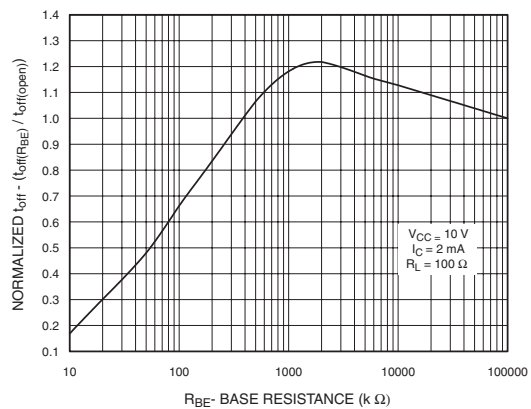
**Fig. 16 Normalized t_{on} vs. R_{BE}
(White Package)**



**Fig. 17 Normalized t_{off} vs. R_{BE}
(Black Package)**



**Fig. 18 Normalized t_{off} vs. R_{BE}
(White Package)**



**MCT2
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Fig. 19 Dark Current vs. Ambient Temperature

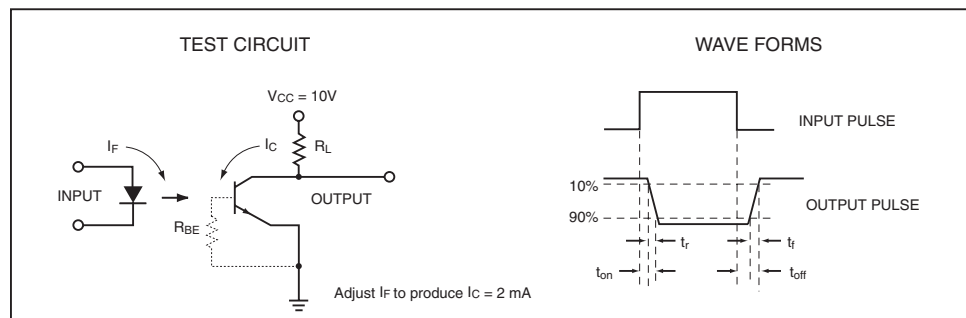
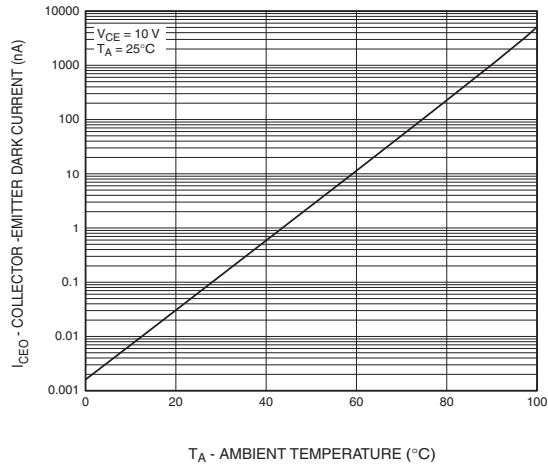


Figure 20. Switching Time Test Circuit and Waveforms

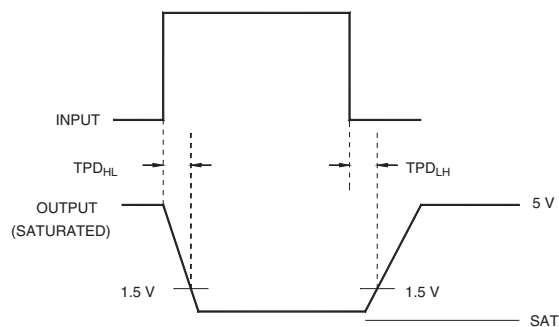


Figure 21. Switching Time Waveforms (MCT210)

**MCT2
MCT2200**

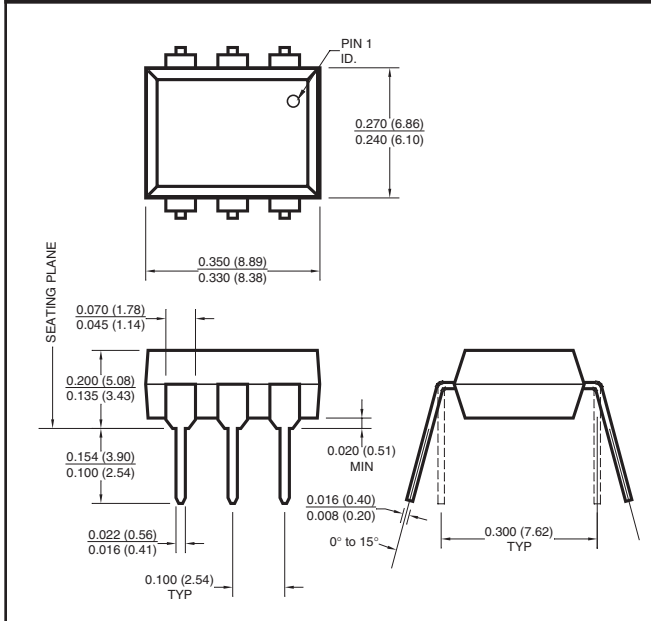
**MCT2E
MCT2201**

**MCT210
MCT2202**

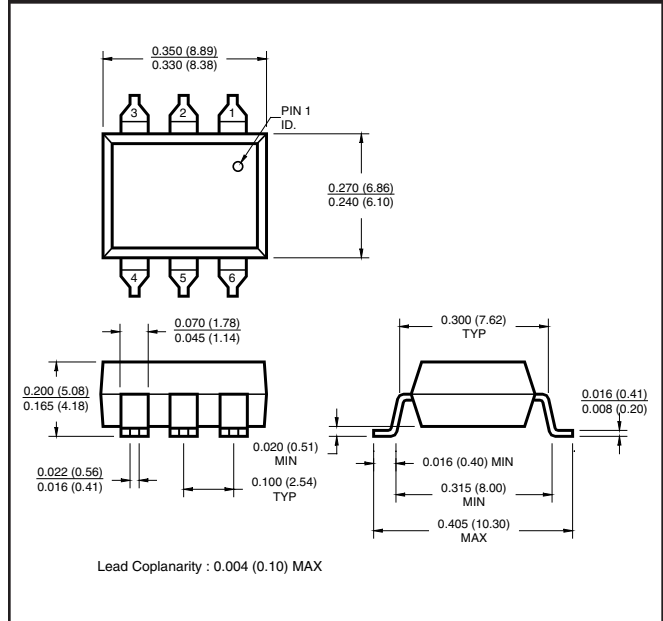
MCT271

Black Package (No -M Suffix)

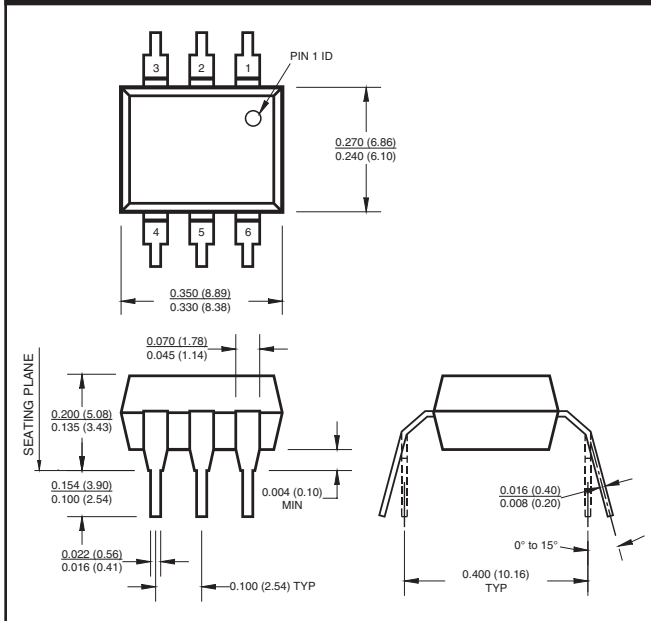
Package Dimensions (Through Hole)



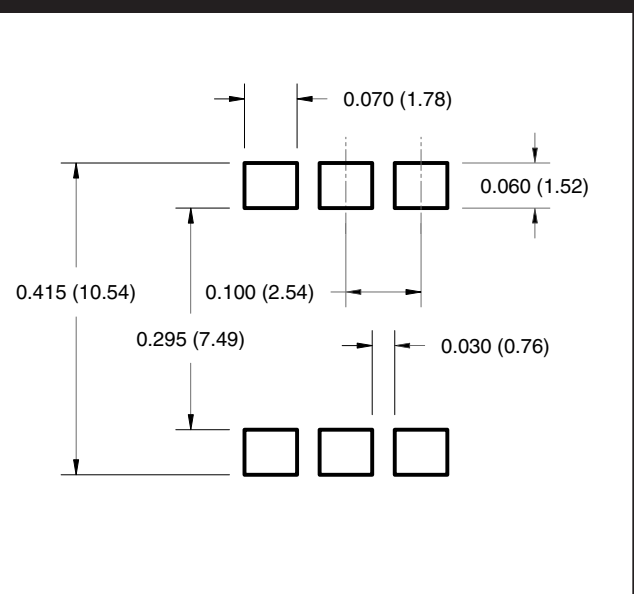
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

All dimensions are in inches (millimeters)

**MCT2
MCT2200**

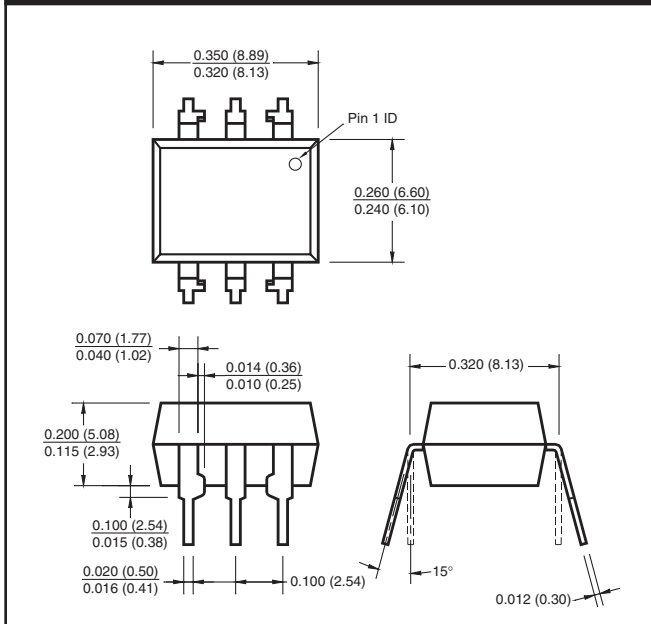
**MCT2E
MCT2201**

**MCT210
MCT2202**

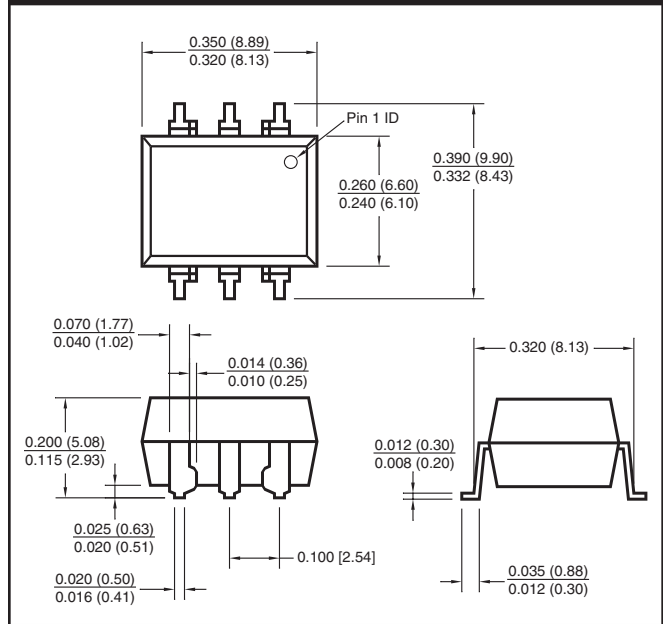
MCT271

White Package (-M Suffix)

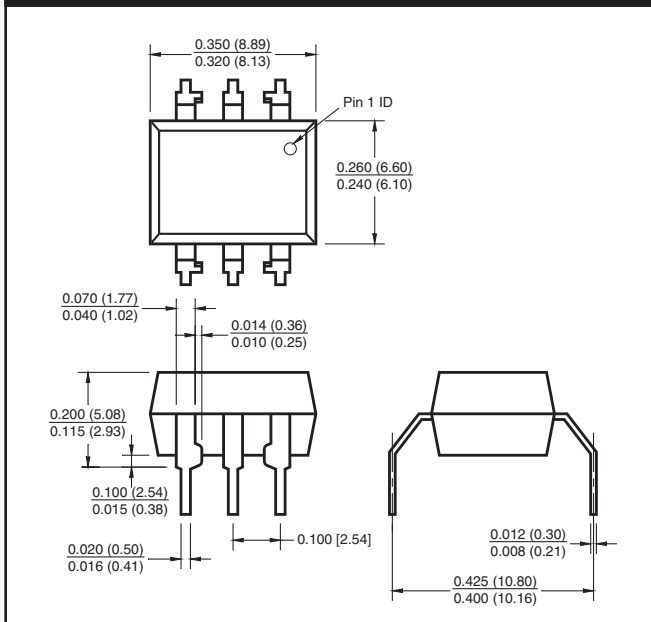
Package Dimensions (Through Hole)



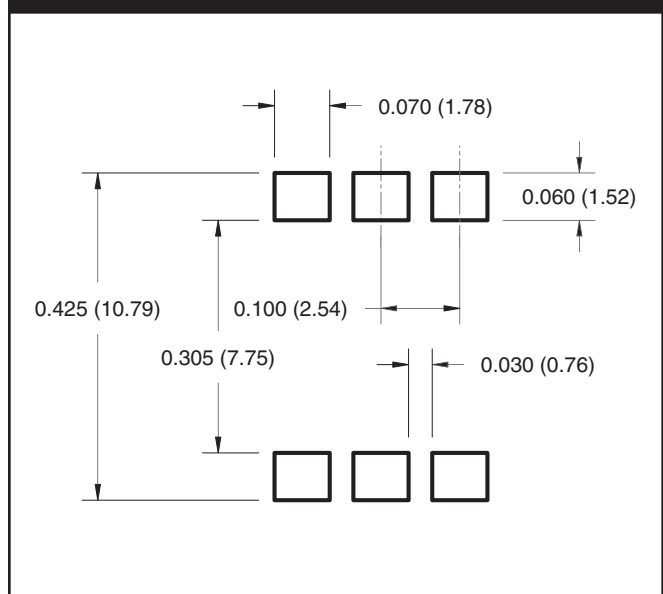
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

All dimensions are in inches (millimeters)

MCT2
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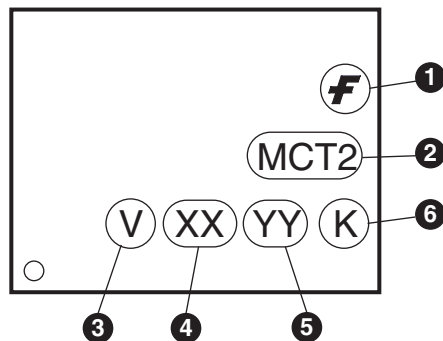
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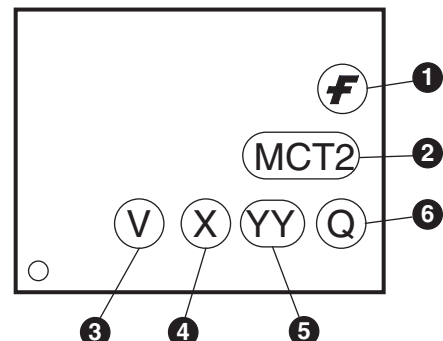
ORDERING INFORMATION

Order Entry Identifier		
Black Package (No Suffix)	White Package (-M Suffix)	Description
.S	S	Surface Mount Lead Bend
.SD	SR2	Surface Mount; Tape and reel
.W	T	0.4" Lead Spacing
.300	V	VDE 0884
.300W	TV	VDE 0884, 0.4" Lead Spacing
.3S	SV	VDE 0884, Surface Mount
.3SD	SR2V	VDE 0884, Surface Mount, Tape & Reel

MARKING INFORMATION



Black Package, No Suffix



White Package, -M Suffix

Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One or two digit year code • Two digits for black package parts, e.g., '03' • One digit for white package parts, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

*Note – Parts built in the white package (M suffix) that do not have the 'V' option (see definition 3 above) that are marked with date code '325' or earlier are marked in the portrait format.

MCT271

Technical drawing of a 5-axis lathe tool holder. The drawing shows a side view of the tool holder with various dimensions and callouts. The dimensions are as follows:

- Overall length: 10.30 ± 0.20
- Overall width: 16.0 ± 0.3
- Distance from left face to first hole center: 4.85 ± 0.20
- Distance between hole centers: 4.0 ± 0.1
- Distance from last hole center to right face: 4.0 ± 0.1
- Distance from left face to first hole center (alternative): 0.30 ± 0.05
- Distance from left face to first hole center (alternative): 13.2 ± 0.2
- Distance from left face to first hole center (alternative): 0.1 MAX
- Distance from left face to first hole center (alternative): 12.0 ± 0.1
- Distance from left face to first hole center (alternative): 4.0 ± 0.1
- Distance from left face to first hole center (alternative): 1.75 ± 0.10
- Distance from left face to first hole center (alternative): 7.5 ± 0.1
- Distance from left face to first hole center (alternative): 9.55 ± 0.20
- Distance from left face to first hole center (alternative): 0.155 ± 0.05
- Distance from left face to first hole center (alternative): 0.16 ± 0.1

The drawing also includes a "User Direction of Feed" arrow pointing to the right.

Technical drawing of the front view of a 5-bay rack assembly. The drawing shows a rectangular assembly with five bays. The overall width is 12.0 ± 0.1 . The overall height is 24.0 ± 0.3 . The top edge has a 0.30 MAX chamfer. The bottom edge has a 0.1 MAX chamfer. The top edge has a 4.5 ± 0.20 dimension. The top edge has a 2.0 ± 0.05 dimension. The top edge has a 4.0 ± 0.1 dimension. The top edge has a 1.75 ± 0.10 dimension. The top edge has a 11.5 ± 1.0 dimension. The top edge has a 9.1 ± 0.20 dimension. The top edge has a 10.1 ± 0.20 dimension. The top edge has a 21.0 ± 0.1 dimension. The top edge has a $\text{Ø}1.5 \text{ MIN}$ dimension. The top edge has a $\text{Ø}1.5 \pm 0.1/-0$ dimension.

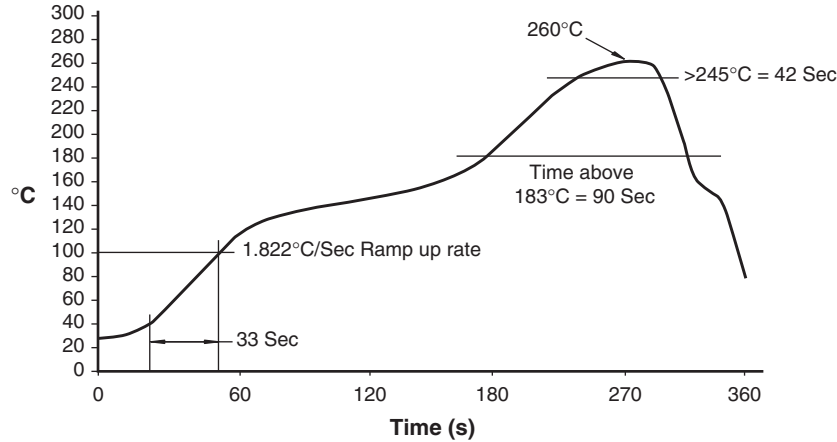
**MCT2
MCT2200**

**MCT2E
MCT2201**

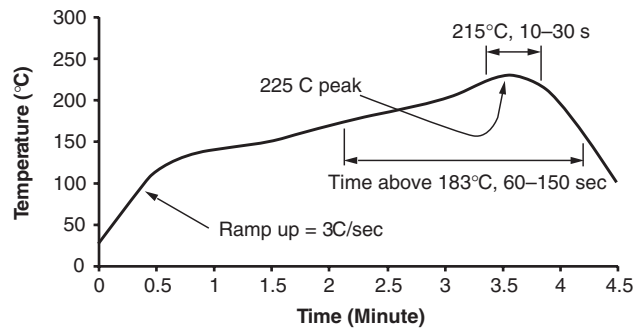
**MCT210
MCT2202**

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Reflow Profile (White Package, -M Suffix)



Reflow Profile (Black Package, No Suffix)



- Peak reflow temperature: 225°C (package surface temperature)
- Time of temperature higher than 183°C for 60-150 seconds
- One time soldering reflow is recommended

MCT2
MCT2200

MCT2E
MCT2201

MCT210
MCT2202

MCT271

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