



**THE DATASHEET OF  
MCT271M**



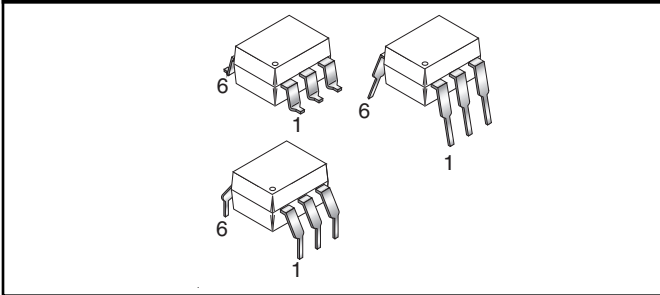
**MCT2  
MCT2200**

**MCT2E  
MCT2201**

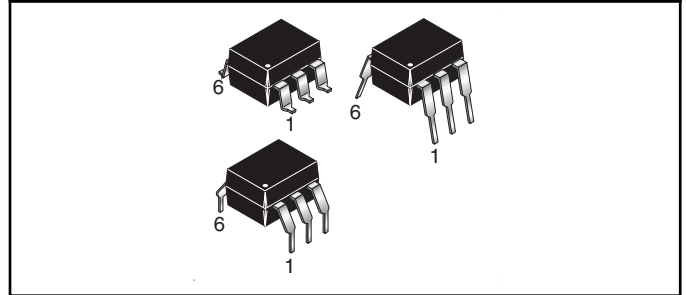
**MCT210  
MCT2202**

**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.

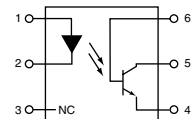
**FEATURES**

- 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**  
**MCT2200**

**MCT2E**  
**MCT2201**

**MCT210**  
**MCT2202**

**MCT271**

<b>ABSOLUTE MAXIMUM RATINGS</b>				
<b>Parameter</b>	<b>Symbol</b>	<b>Device</b>	<b>Value</b>	<b>Units</b>
<b>TOTAL DEVICE</b> 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	
<b>EMITTER</b> 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	
<b>DETECTOR</b> 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	

**MCT2**  
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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
<b>EMITTER</b>							
Input Forward Voltage	$(I_F = 20 \text{ mA})$	$V_F$	MCT2/-M MCT2E/-M MCT271 MCT2200 MCT2201 MCT2202		1.25	1.50	V
	$(T_A = 0-70^\circ\text{C}, I_F = 40 \text{ mA})$		MCT210		1.33		
Reverse Leakage Current	$(V_R = 3.0 \text{ V})$	$I_R$	MCT2/-M MCT2E/-M MCT271 MCT2200 MCT2201 MCT2202		0.001	10	$\mu\text{A}$
	$(T_A = 0-70^\circ\text{C}, V_R = 6.0 \text{ V})$		MCT210				
<b>DETECTOR</b>							
Collector-Emitter Breakdown Voltage	$(I_C = 1.0 \text{ mA}, I_F = 0)$	$BV_{CEO}$	ALL	30	100		V
	$(T_A = 0-70^\circ\text{C})$		MCT210				
Collector-Base Breakdown Voltage	$(I_C = 10 \mu\text{A}, I_F = 0)$	$BV_{CBO}$	MCT2/-M MCT2E/-M MCT271 MCT2200 MCT2201 MCT2202	70	120		V
	$(T_A = 0-70^\circ\text{C})$		MCT210	30			
Emitter-Collector Breakdown Voltage	$(I_E = 100 \mu\text{A}, I_F = 0)$	$BV_{ECO}$	MCT2/-M MCT2E/-M MCT271 MCT2200 MCT2201 MCT2202	7	10		V
	$(T_A = 0-70^\circ\text{C})$		MCT210	6	10		
Collector-Emitter Dark Current	$(V_{CE} = 10 \text{ V}, I_F = 0)$	$I_{CEO}$	ALL		1	50	nA
	$(V_{CE} = 5 \text{ V}, T_A = 0-70^\circ\text{C})$					30	$\mu\text{A}$
Collector-Base Dark Current	$(V_{CB} = 10 \text{ V}, I_F = 0)$	$I_{CBO}$	ALL			20	nA
Capacitance	$(V_{CE} = 0 \text{ V}, f = 1 \text{ MHz})$	$C_{CE}$	ALL		8		pF

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

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<b>TRANSFER CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified.)							
DC Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Output Collector Current	( $T_A = 0\text{-}70^\circ\text{C}$ )	CTR	MCT210	150			%
	(I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5 V)		MCT2200	20			
			MCT2201	100			
			MCT2202	63		125	
	(I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 10 V)		MCT2 MCT2-M MCT2E MCT2E-M	20			
	(I <sub>F</sub> = 3.2 mA to 32 mA, V <sub>CE</sub> = 0.4 V) ( $T_A = 0\text{-}70^\circ\text{C}$ )		MCT210	50			
Collector-Emitter Saturation Voltage	(I <sub>C</sub> = 2 mA, I <sub>F</sub> = 16 mA)	V <sub>CE (SAT)</sub>	MCT2 MCT2-M MCT2E MCT2E-M MCT271			0.4	V
	(I <sub>C</sub> = 16 mA, I <sub>F</sub> = 32 mA, $T_A = 0\text{-}70^\circ\text{C}$ )		MCT210				
	(I <sub>C</sub> = 2.5 mA, I <sub>F</sub> = 10 mA)		MCT2200 MCT2201 MCT2202				
AC Characteristic Saturated Turn-on Time from 5 V to 0.8 V	(I <sub>F</sub> = 15 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 2 kΩ) (R <sub>B</sub> = Open) (Fig. 20)	t <sub>on</sub>	MCT2		1.1		μs
	(I <sub>F</sub> = 20 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 2 kΩ) (R <sub>B</sub> = 100 kΩ) (Fig. 20)		MCT2E		1.1		
Saturated Turn-off Time from SAT to 2.0 V	(I <sub>F</sub> = 15 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 2 kΩ) (R <sub>B</sub> = Open) (Fig. 20)	t <sub>off</sub>	MCT2		50		
	(I <sub>F</sub> = 20 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 2 kΩ) (R <sub>B</sub> = 100 kΩ) (Fig. 20)		MCT2E		50		
Turn-on Time	(I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω)	t <sub>on</sub>	MCT2-M MCT2E-M		2		
Turn-off Time	(I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω)	t <sub>off</sub>	MCT2-M MCT2E-M		2		
Rise Time	(I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω)	t <sub>r</sub>	MCT2-M MCT2E-M		2		
Fall Time	(I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100 Ω)	t <sub>f</sub>	MCT2-M MCT2E-M		1.5		

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

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<b>TRANSFER CHARACTERISTICS (Cont.)</b>							
AC Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Saturated turn-on time	(I <sub>F</sub> = 16 mA, R <sub>L</sub> = 1.9kΩ, V <sub>CC</sub> = 5 V) (Fig. 20)	t <sub>on</sub>	MCT271		1.0		μs
Saturated turn-off time (Approximates a typical TTL interface)		t <sub>off</sub>			48		
Saturated turn-on time	(I <sub>F</sub> = 16 mA, R <sub>L</sub> = 4.7kΩ, V <sub>CC</sub> = 5 V) (Fig. 20)	t <sub>on</sub>			1.0		
Saturated turn-off time (Approximates a typical low power TTL interface)		t <sub>off</sub>			98		
Saturated rise time	(I <sub>F</sub> = 16 mA, R <sub>L</sub> = 560Ω, V <sub>CC</sub> = 5 V) (Fig. 20, 21)	t <sub>r</sub>	MCT210		1.0		
Saturated fall time		t <sub>f</sub>			11		
Saturated propagation delay - high to low	(I <sub>F</sub> = 16 mA, R <sub>L</sub> = 2.7kΩ) (Fig. 20, 21)	T <sub>PD (HL)</sub>			1.0		
Saturated propagation delay - low to high		T <sub>PD (LH)</sub>			50		
Non-saturated turn on time	(I <sub>C</sub> = 2 mA, V <sub>CC</sub> = 10 V, R <sub>L</sub> = 100Ω) (Fig. 20)	T <sub>ON</sub>	MCT2200		2	10	
Non-saturated turn off time		T <sub>OFF</sub>	MCT2201 MCT2202		2	10	
Non-saturated rise time	(I <sub>C</sub> = 2 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 100Ω) (Fig. 20)	t <sub>r</sub>	MCT210		2		
Non-saturated fall time		t <sub>f</sub>			2		
Non-saturated turn-on time	(I <sub>C</sub> = 2 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 100Ω) (Fig. 20)	t <sub>on</sub>	MCT271		2	7	
Non-saturated turn-off time		t <sub>off</sub>			2	7	

\*\* Typical values at T<sub>A</sub> = 25°C

<b>ISOLATION CHARACTERISTICS</b>							
Characteristic	Test Conditions	Symbol	Min	Typ*	Max	Units	
Input-Output Isolation Voltage	(Non '-M', Black Package) (f = 60 Hz, t = 1 min)	V <sub>ISO</sub>	5300			Vac(rms)	
	('M', White Package) (f = 60 Hz, t = 1 sec)		7500			Vac(pk)	
Isolation Resistance	(V <sub>I-O</sub> = 500 VDC)	R <sub>ISO</sub>	10 <sup>11</sup>			Ω	
Isolation Capacitance	(V <sub>I-O</sub> = &, f = 1 MHz)	C <sub>ISO</sub>		0.5		pF	
	('M' White Package)			0.2	2	pF	

Note

\* Typical values at T<sub>A</sub> = 25°C

**MCT2  
MCT2200**

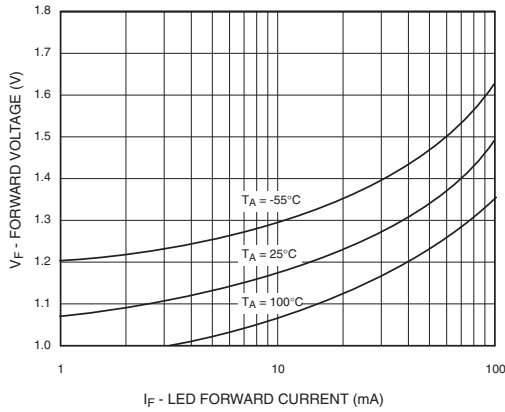
**MCT2E  
MCT2201**

**MCT210  
MCT2202**

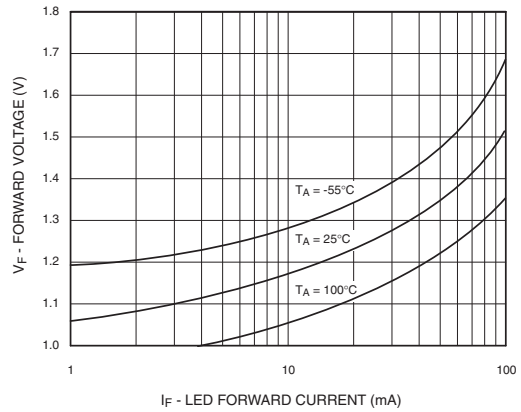
**MCT271**

**TYPICAL PERFORMANCE CURVES**

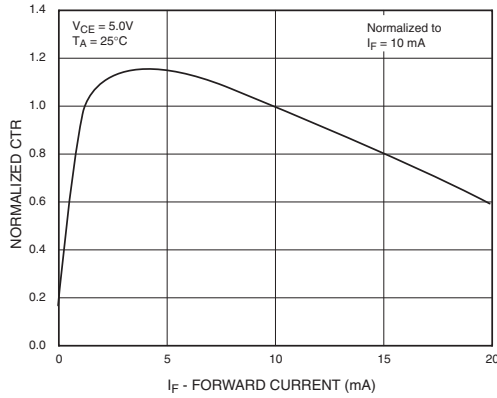
**Fig. 1 LED Forward Voltage vs. Forward Current (Black Package)**



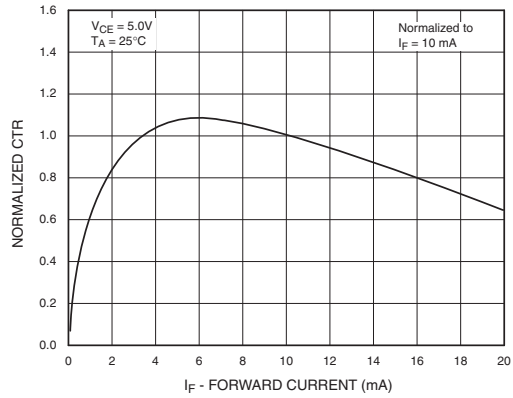
**Fig. 2 LED Forward Voltage vs. Forward Current (White Package)**



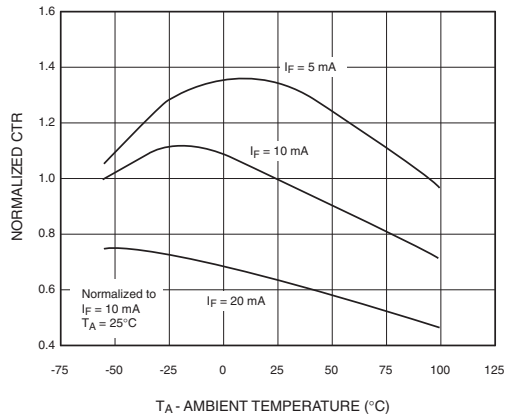
**Fig.3 Normalized CTR vs. Forward Current (Black Package)**



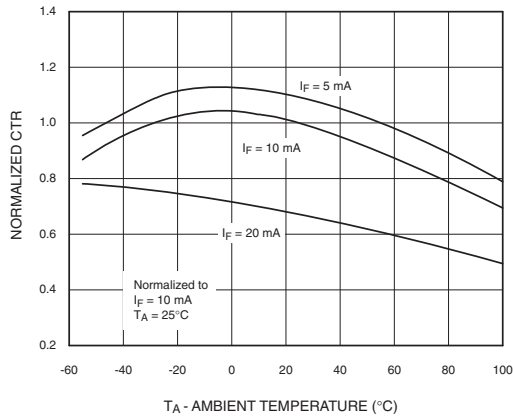
**Fig.4 Normalized CTR vs. Forward Current (White Package)**



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



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



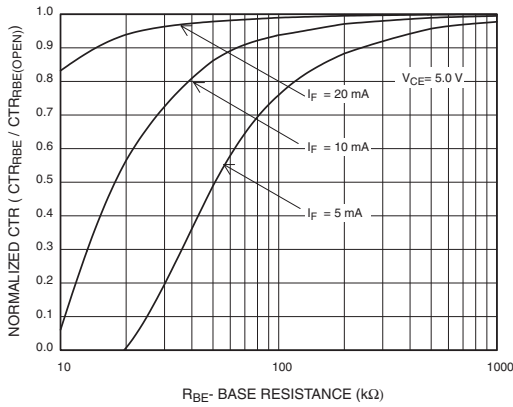
**MCT2**  
**MCT2200**

**MCT2E**  
**MCT2201**

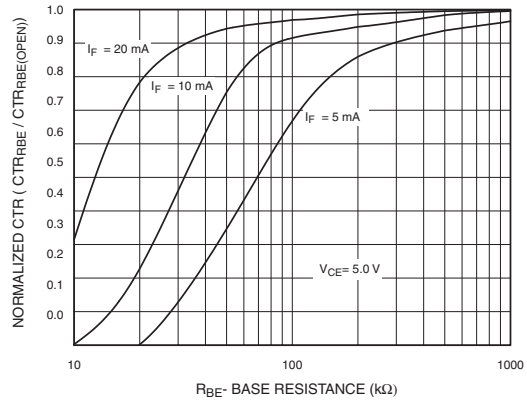
**MCT210**  
**MCT2202**

**MCT271**

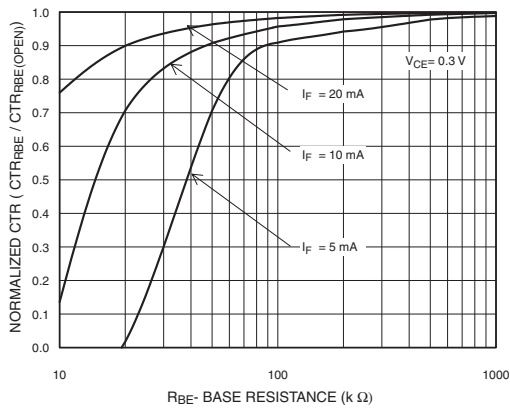
**Fig. 7 CTR vs. RBE (Unsaturated)**  
**(Black Package)**



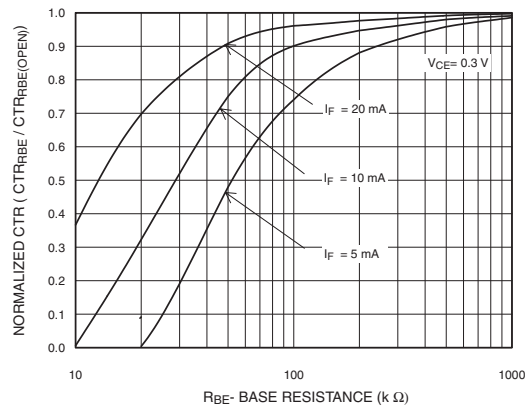
**Fig. 8 CTR vs. RBE (Unsaturated)**  
**(White Package)**



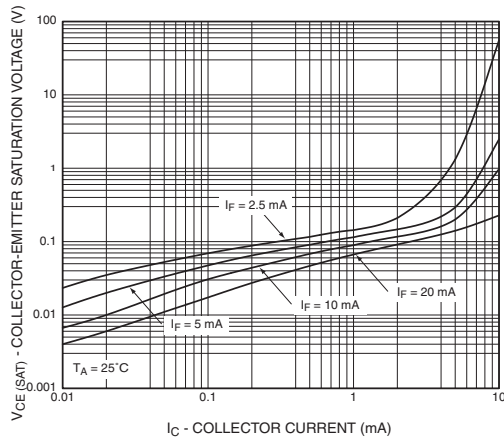
**Fig. 9 CTR vs. RBE (Saturated)**  
**(Black Package)**



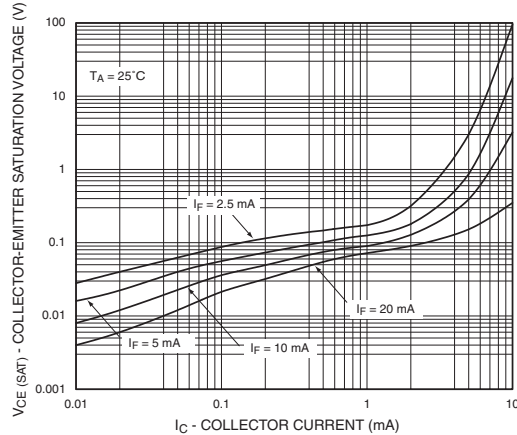
**Fig. 10 CTR vs. RBE (Saturated)**  
**(White Package)**



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



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



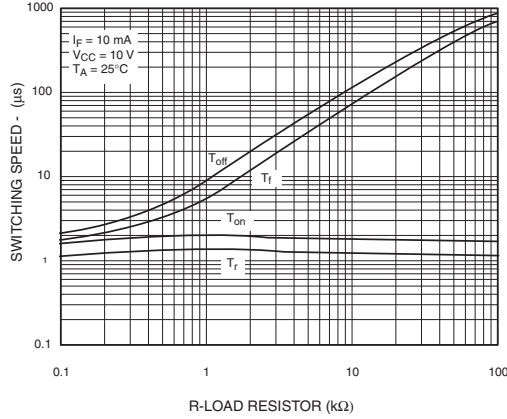
**MCT2**  
**MCT2200**

**MCT2E**  
**MCT2201**

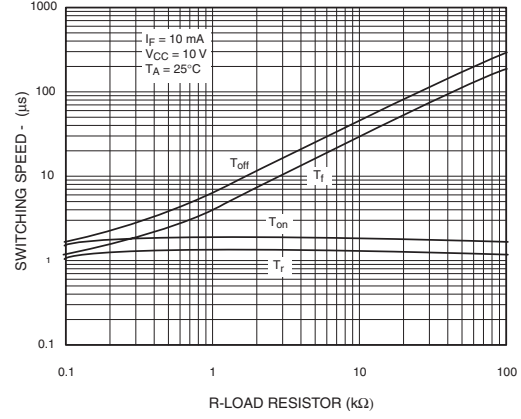
**MCT210**  
**MCT2202**

**MCT271**

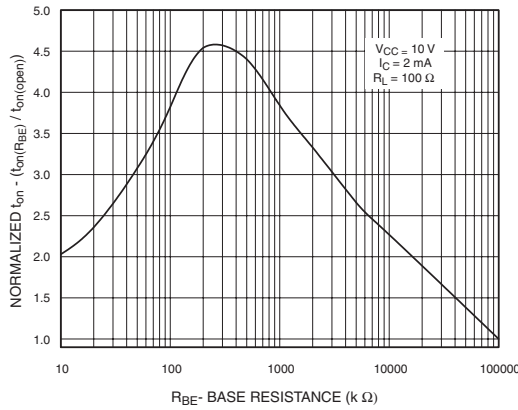
**Fig. 13 Switching Speed vs. Load Resistor (Black Package)**



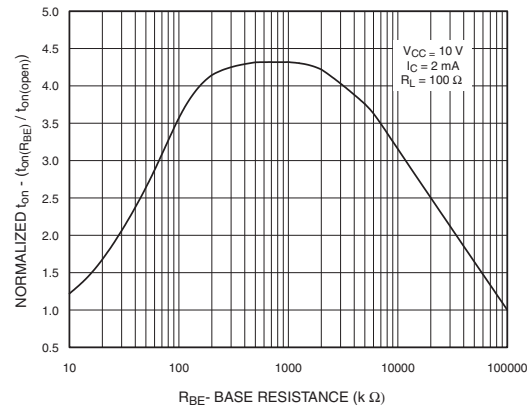
**Fig. 14 Switching Speed vs. Load Resistor (White Package)**



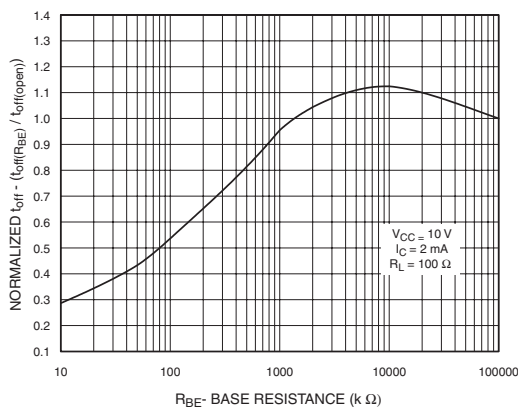
**Fig. 15 Normalized  $t_{on}$  vs.  $R_{BE}$  (Black Package)**



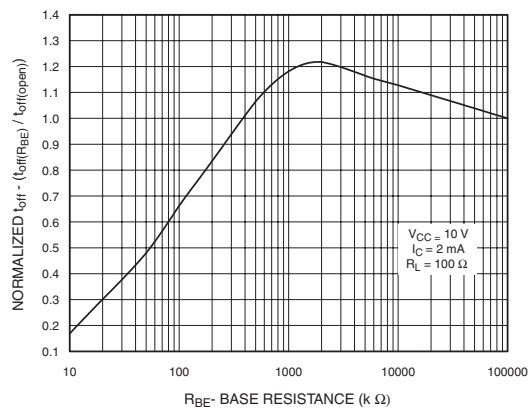
**Fig. 16 Normalized  $t_{on}$  vs.  $R_{BE}$  (White Package)**



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



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



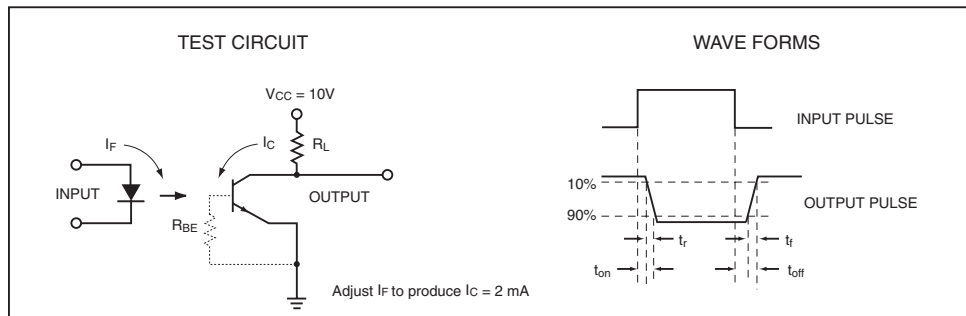
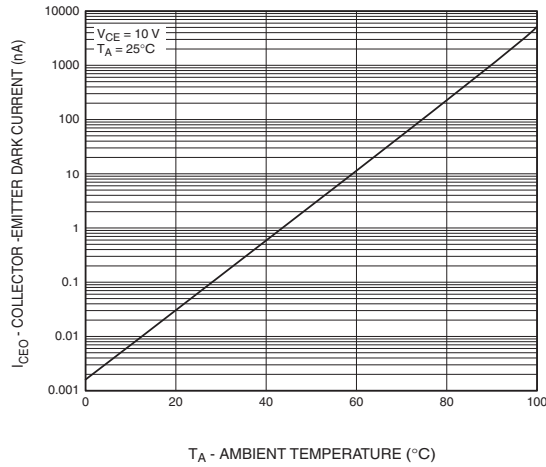
**MCT2  
MCT2200**

**MCT2E  
MCT2201**

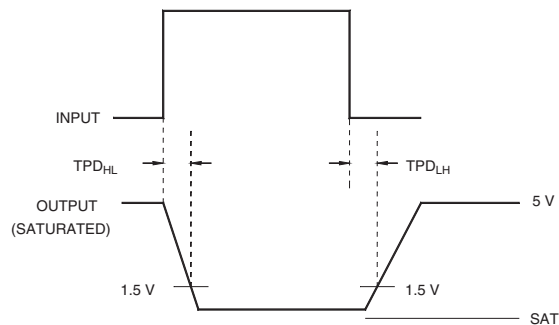
**MCT210  
MCT2202**

**MCT271**

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



**Figure 20. Switching Time Test Circuit and Waveforms**



**Figure 21. Switching Time Waveforms (MCT210)**

**MCT2  
MCT2200**

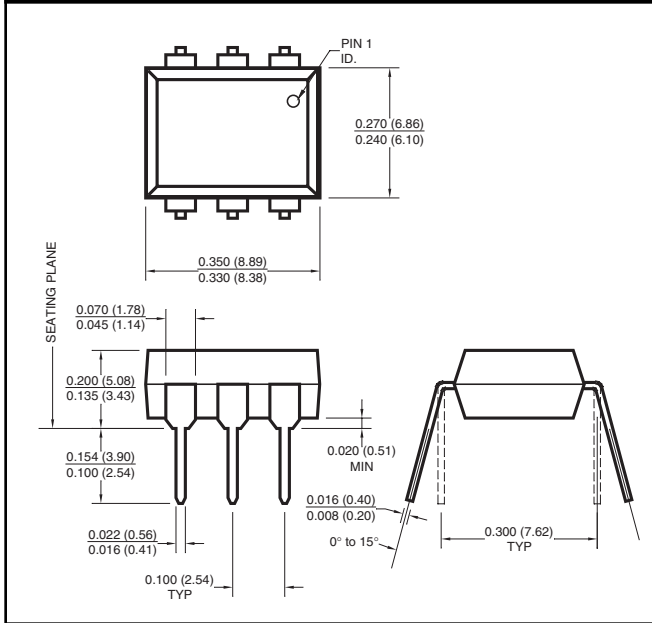
**MCT2E  
MCT2201**

**MCT210  
MCT2202**

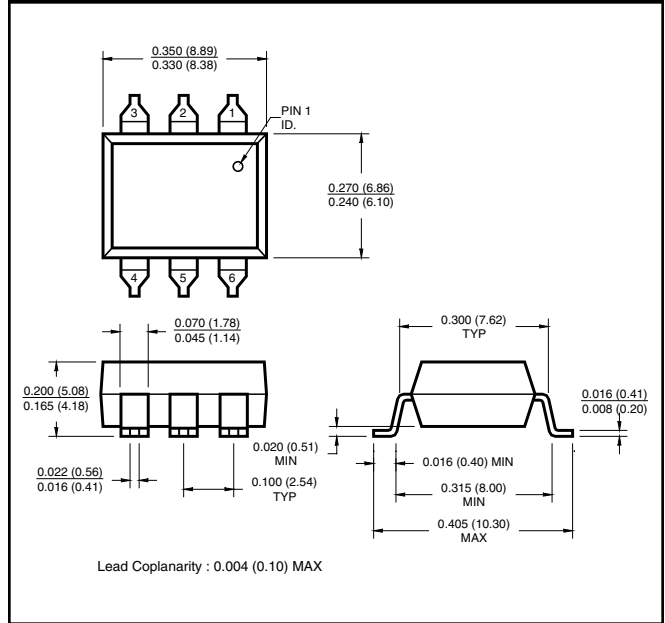
**MCT271**

**Black Package (No -M Suffix)**

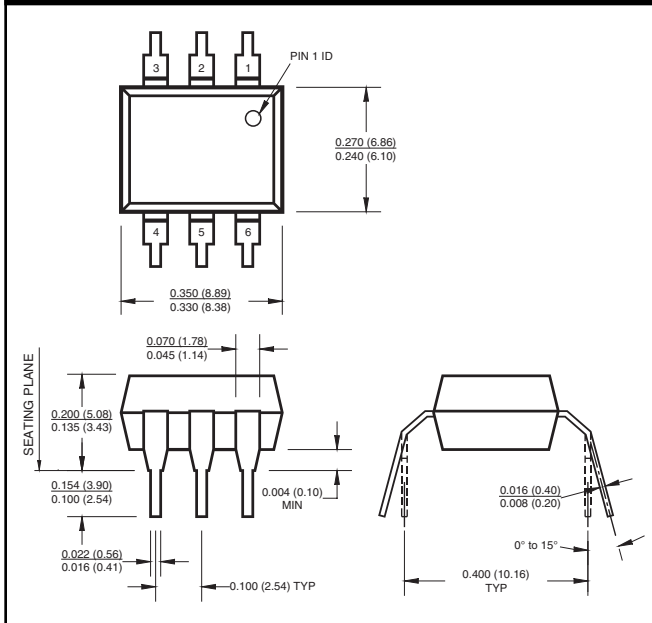
**Package Dimensions (Through Hole)**



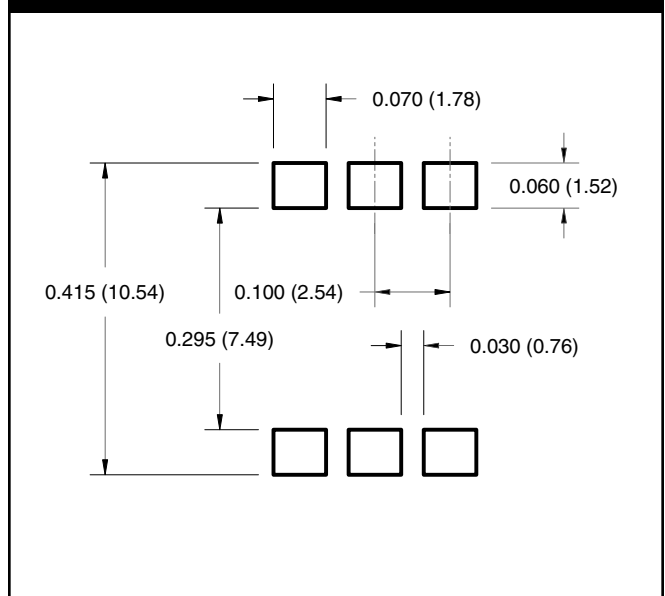
**Package Dimensions (Surface Mount)**



**Package Dimensions (0.4" Lead Spacing)**



**Recommended Pad Layout for Surface Mount Leadform**



**NOTE**  
All dimensions are in inches (millimeters)

**MCT2  
MCT2200**

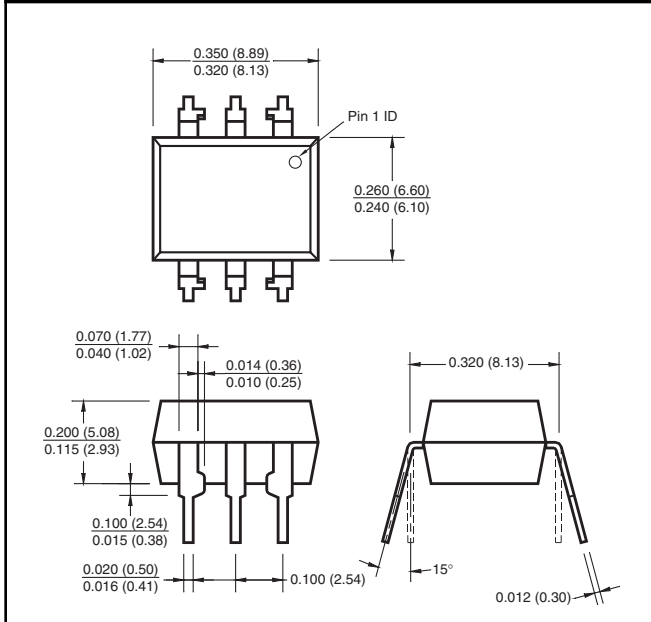
**MCT2E  
MCT2201**

**MCT210  
MCT2202**

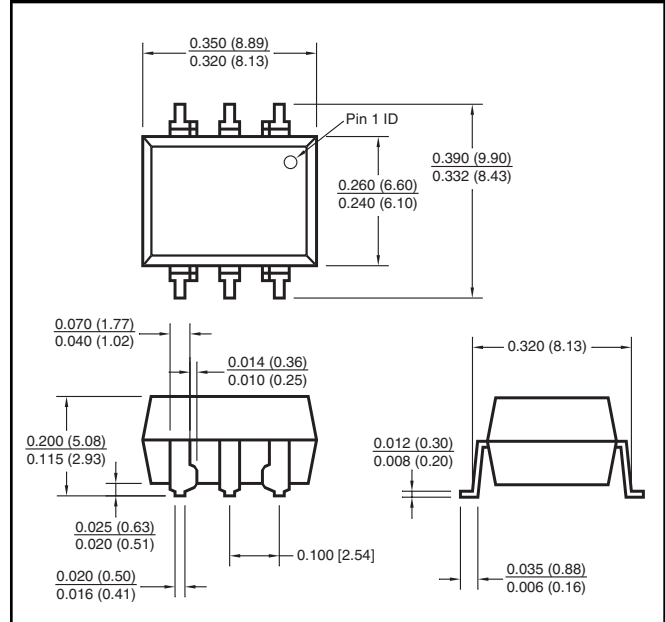
**MCT271**

**White Package (-M Suffix)**

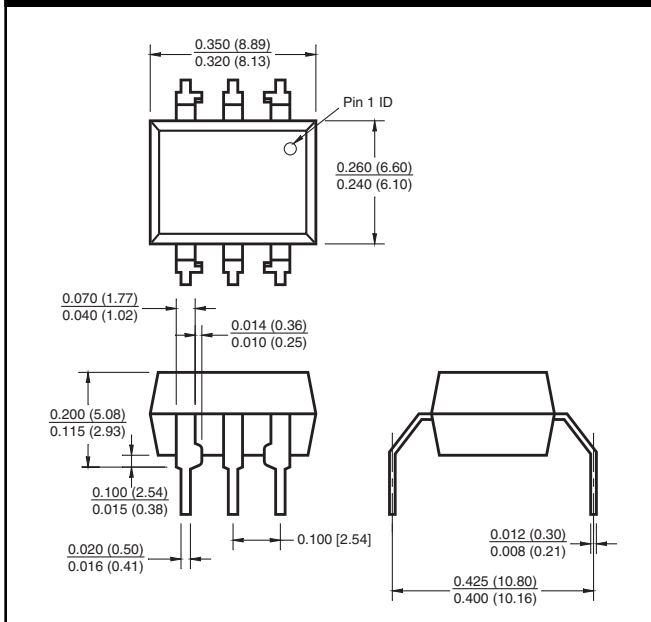
**Package Dimensions (Through Hole)**



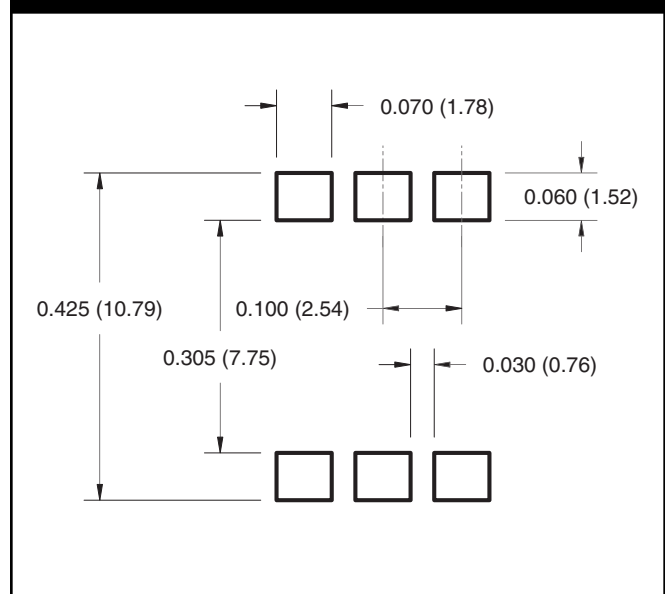
**Package Dimensions (Surface Mount)**



**Package Dimensions (0.4" Lead Spacing)**



**Recommended Pad Layout for Surface Mount Leadform**



**NOTE**

All dimensions are in inches (millimeters)

**MCT2**  
**MCT2200**

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**MCT2202**

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**ORDERING INFORMATION**

<b>Order Entry Identifier</b>		
<b>Black Package (No Suffix)</b>	<b>White Package (-M Suffix)</b>	<b>Description</b>
.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

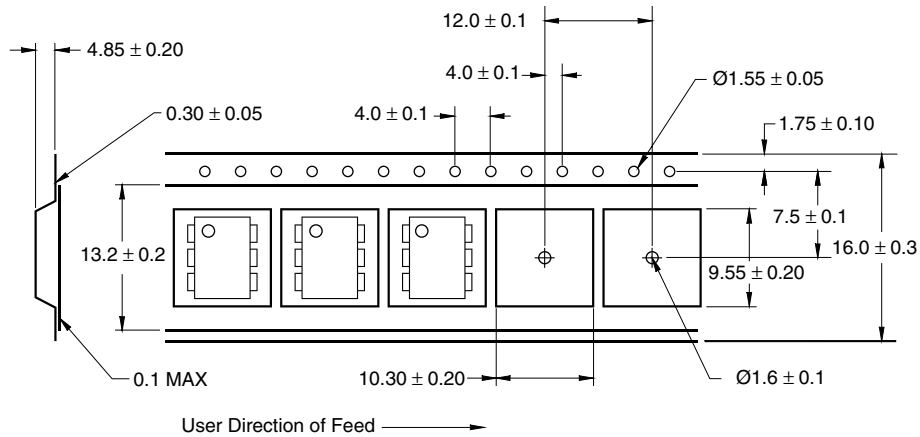
**MCT2  
MCT2200**

**MCT2E  
MCT2201**

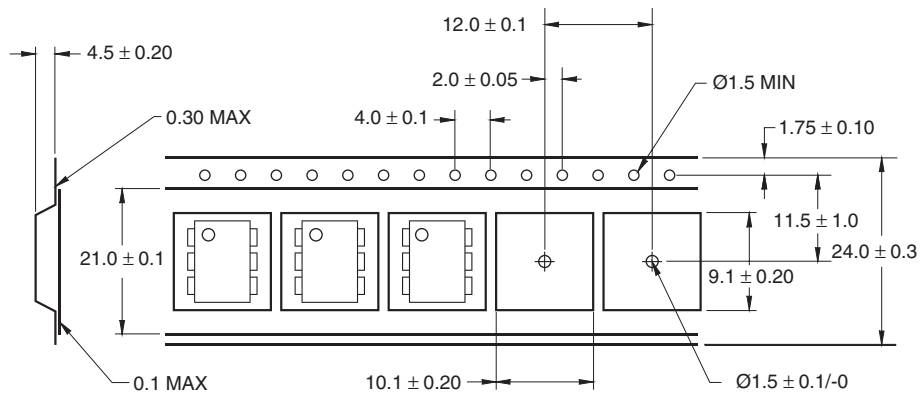
**MCT210  
MCT2202**

**MCT271**

**QT Carrier Tape Specifications ("D" Taping Orientation) (Black Package, No Suffix)**



**QT Carrier Tape Specifications ("D" Taping Orientation) (White Package, -M Suffix)**



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**MCT2**  
**MCT2200**

**MCT2E**  
**MCT2201**

**MCT210**  
**MCT2202**

**MCT271**

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**DISCLAIMER**

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