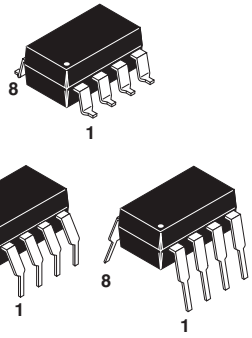
FAIRCHILD
SEMICONDUCTOR®

DUAL PHOTOTRANSISTOR OPTOCOUPLERS

MCT9001

DESCRIPTION

The MCT9001 Optocoupler has two channels for 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.



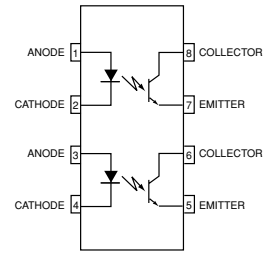
FEATURES

- Two isolated channels per package
- Two packages fit into a 16 lead DIP socket
- Underwriters Laboratory (U.L.) recognized File E90700

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 grounds and transients
- Relay contact monitor - isolate floating grounds and transients
- Power supply monitor - Isolate transients

SCHEMATIC



Equivalent Circuit

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
EMITTER (Each channel)			
Forward Current - Continuous	I_F	60	mA
Forward Current - Peak (PW = 1µs, 300pps)	I_F(pk)	3	A
Reverse Voltage	V_R	5.0	V
LED Power Dissipation @ T_A = 25°C Derate above 25°C (Total Input)	P_D	100 1.1	mW mW/°C
DETECTOR (Each channel)			
Collector Current - Continuous	I_C	30	mA
Detector Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	150 1.67	mW mW/°C
TOTAL DEVICE			
Storage Temperature	T_{STG}	-55 to +150	°C
Operating Temperature	T_{OPR}	-55 to +100	°C
Lead Solder Temperature	T_{SOL}	250 for 10 sec	°C
Total Device Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	400 4.83	mW mW/°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Min	Typ**	Max	Unit
EMITTER						
Input Forward Voltage	(I_F = 10 mA)	V_F		1.0	1.3	V
Reverse Current	(V_R = 5 V)	I_R			10	µA
Junction Capacitance	(V_F = 0 V, f = 1 MHz)	C_J		50		pF
DETECTOR						
Collector-Emitter Breakdown Voltage	(I_C = 0.5 mA, I_F = 0)	BV_{CEO}	55			V
Emitter-Collector Breakdown Voltage	(I_E = 100 µA, I_F = 0)	BV_{ECO}	7			V
Collector-Emitter Dark Current	(V_{CE} = 24 V, I_F = 0)	I_{CEO}		5	100	nA
	(V_{CE} = 24 V, T_A = 85°C)				50	µA
Capacitance	(V_{CE} = 0 V, f = 1 MHz)	C_{CE}		8		pF

TRANSFER CHARACTERISTICS

AC Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
SWITCHING TIMES						
Non-Saturated						
Turn-on Time	(R_L = 100 Ω, I_C = 2 mA, V_{CC} = 10 V)	t_{on}		3		µs
Turn-off Time		t_{off}		3		
Rise Time		t_r		2.4		
Fall Time		t_f		2.4		
Saturated						
Turn-on Time	(I_F = 16 mA, R_L = 1.9 kΩ, V_{CE} = 5 V)	t_{on}		2.4		
Turn-off Time		t_{off}		25.0		

TRANSFER CHARACTERISTICS

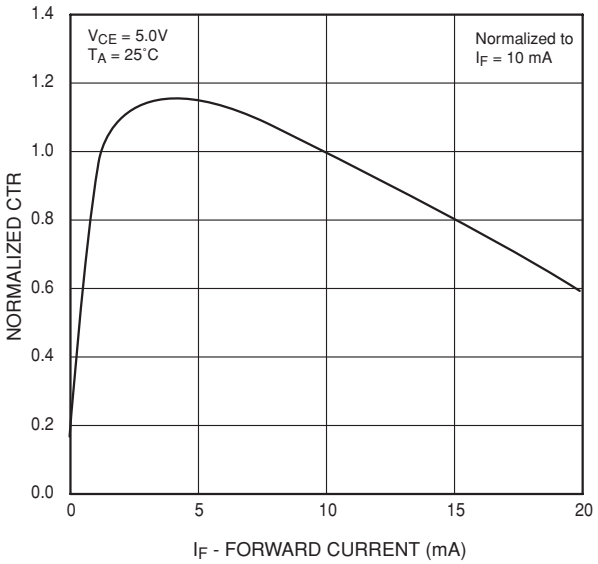
DC Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
Current Transfer Ratio, Collector-Emitter	(I_F = 5 mA, V_{CE} = 5 V)	CTR	50		600	%
	(I_F = 8 mA, V_{CE} = 0.4 V)	$CTR_{(sat)}$	30			
Saturation Voltage	(I_F = 8 mA, I_C = 2.4 mA)	$V_{CE(sat)}$			0.40	V

ISOLATION CHARACTERISTICS

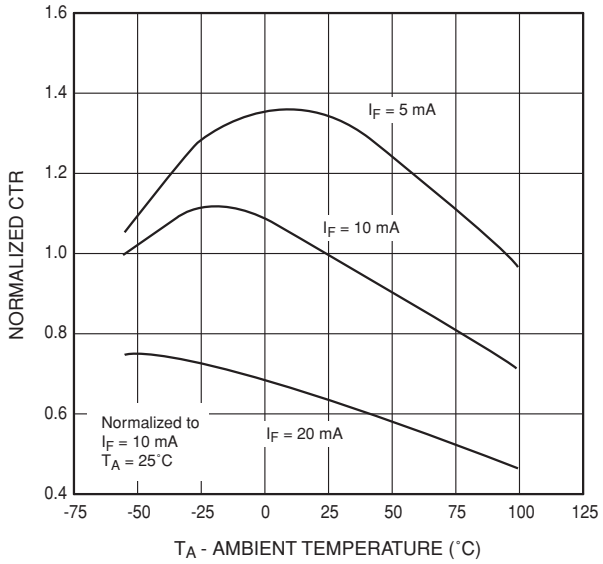
Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
Input-Output Isolation Voltage	($I_{I-O} \leq$ 1 µA, t = 1 min.)	V_{ISO}	5300			Vac(rms)
Isolation Resistance	(V_{I-O} = 500 VDC)	R_{ISO}	10^{11}			Ω
Isolation Capacitance	(f = 1 MHz)	C_{ISO}		0.5		pf

** All typicals at TA = 25°C

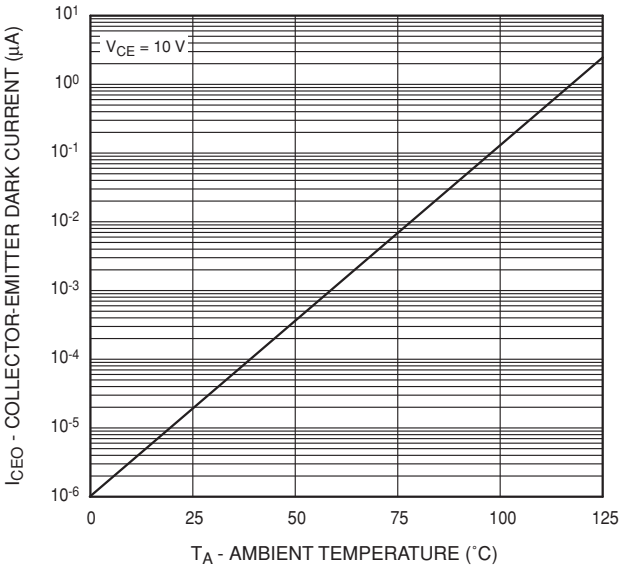
Normalized CTR vs. Forward Current



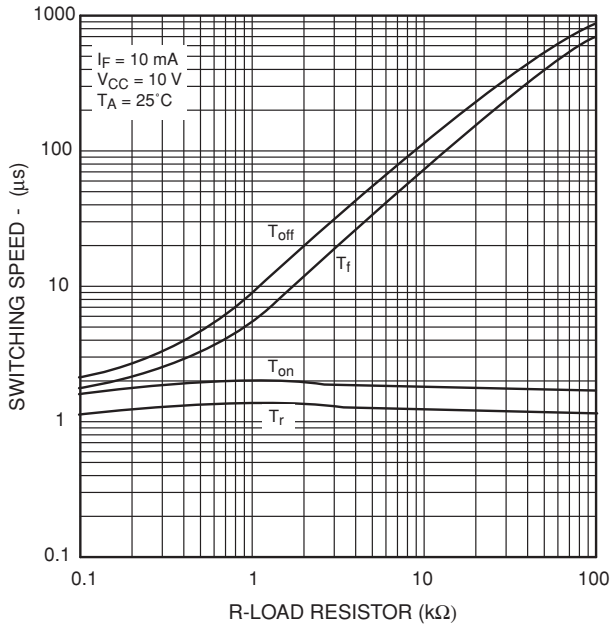
Normalized CTR vs. Ambient Temperature



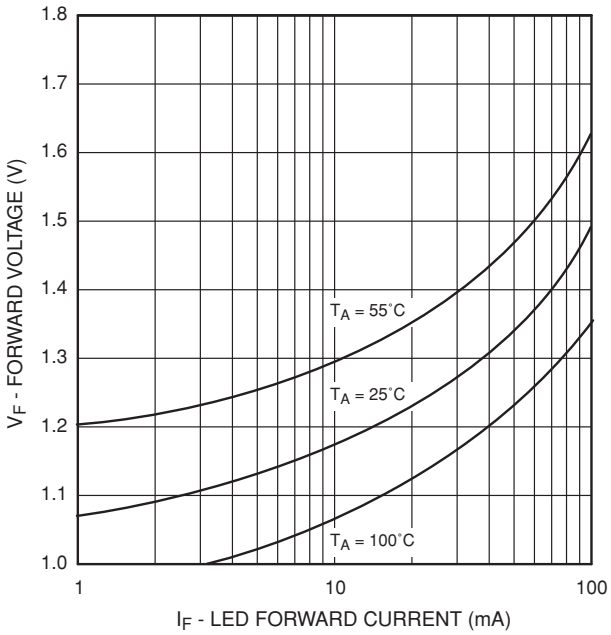
Dark Current vs. Ambient Temperature



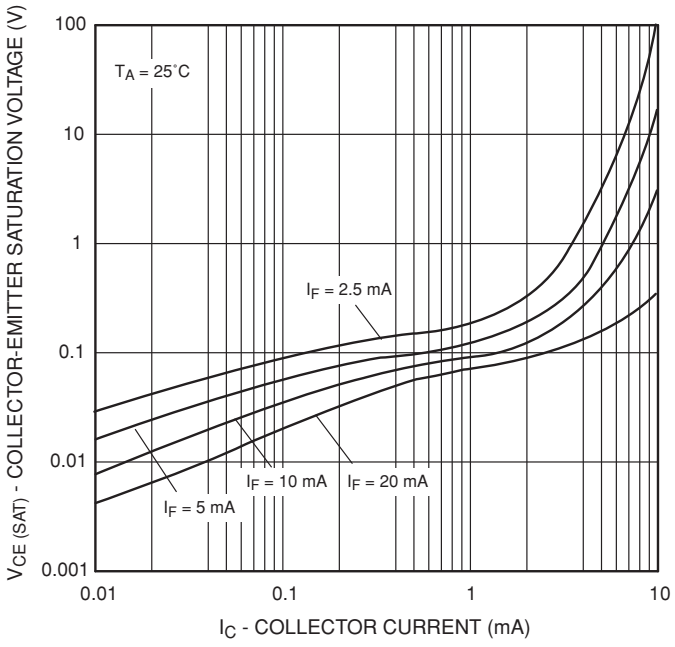
Switching Speed vs. Load Resistor



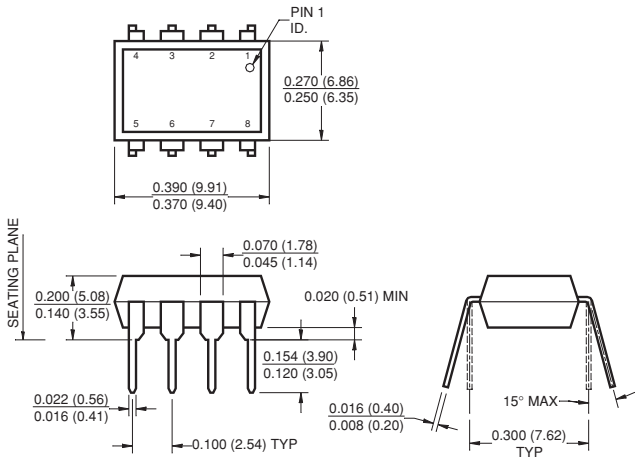
LED Forward Voltage vs. Forward Current



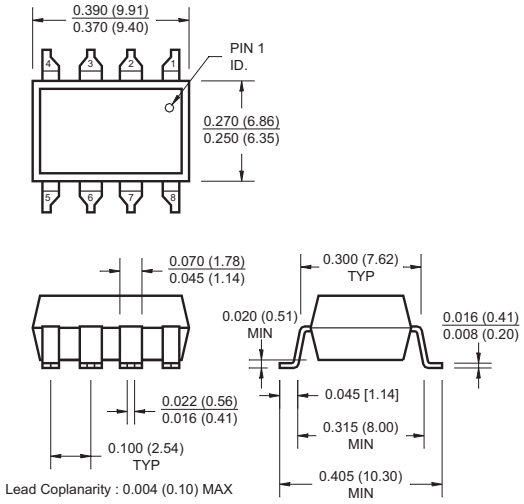
Collector-Emitter Saturation Voltage vs Collector Current



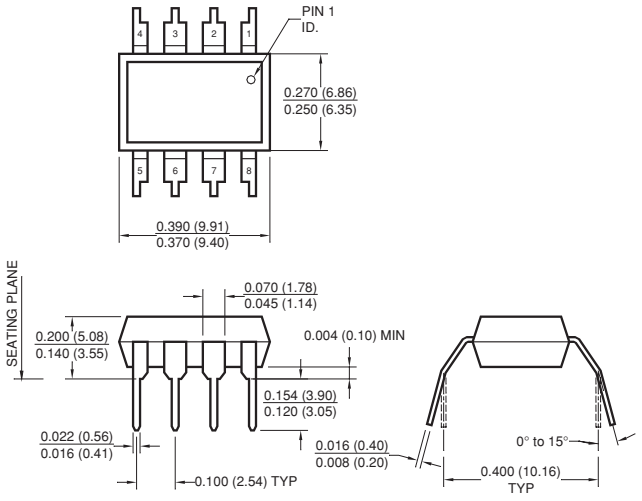
Package Dimensions (Through Hole)



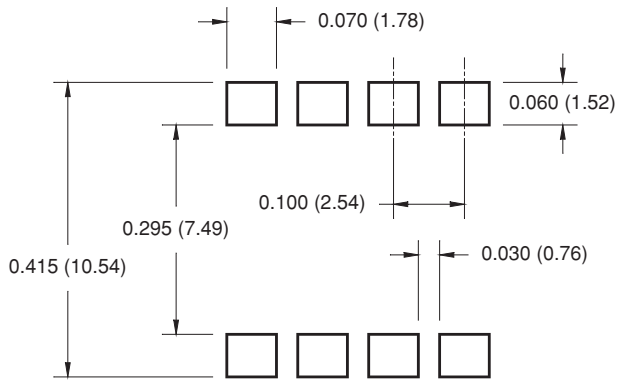
Package Dimensions (Surface Mount)



Package Dimensions (0.4"Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform

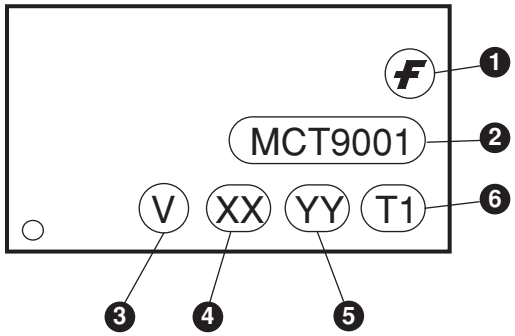


NOTE
All dimensions are in inches (millimeters)

ORDERING INFORMATION

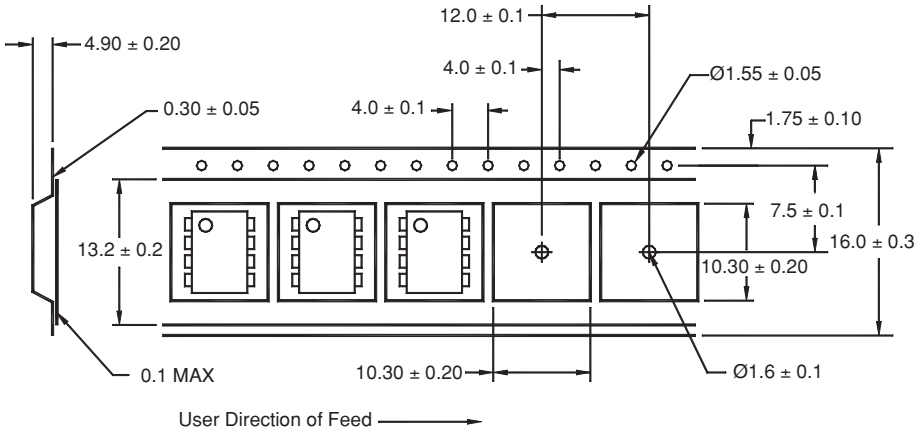
Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4” Lead Spacing

MARKING INFORMATION



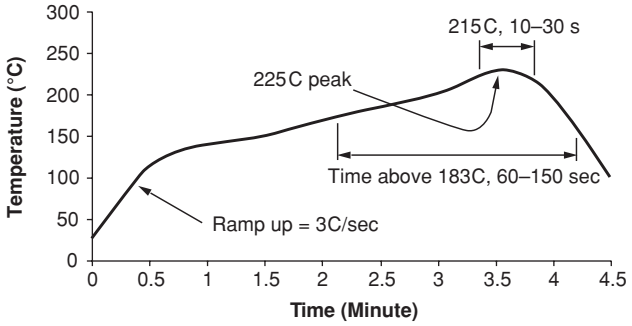
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	Two digit year code, e.g., ‘03’
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

Carrier Tape Specifications



NOTE
All dimensions are in inches (millimeters)

Reflow Profile



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

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CROSSVOLT™	GlobalOptoisolator™	MicroPak™	QFET®	SuperSOT™-8
DOME™	GTO™	MICROWIRE™	QS™	SyncFET™
EcoSPARK™	HiSeC™	MSX™	QT Optoelectronics™	TinyLogic®
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EnSigna™	*i-Lo*™	OCX™	RapidConfigure™	TruTranslation™
FACT™	ImpliedDisconnect™	OCXPro™	RapidConnect™	UHC™
FACT Quiet Series™		OPTOLOGIC®	µSerDes™	UltraFET®
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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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