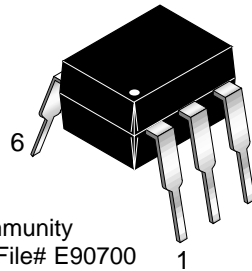


### DESCRIPTION

The MOC8020 and MOC8021 are photodarlington-type optically coupled optocouplers. The devices have a gallium arsenide infrared emitting diode coupled with a silicon darlington phototransistor.

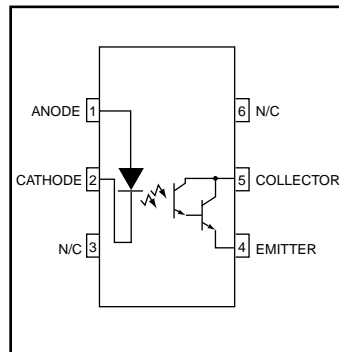
### FEATURES

- High current transfer ratio  
-500% (MOC8020)  
-1000% (MOC8021)
- No base connection for improved noise immunity
- Underwriters Laboratory (UL) recognized File# E90700

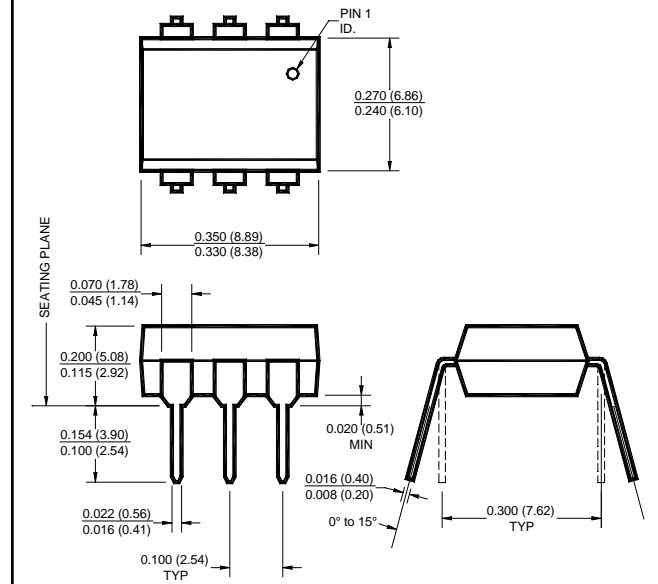


### APPLICATIONS

- Appliances, measuring instruments
- I/O interface for computers
- Programmable controllers
- Portable electronics
- Interfacing and coupling systems of different potentials and impedance
- Solid state relays



### PACKAGE DIMENSIONS



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

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless otherwise specified.)

Parameter	Symbol	Value	Units
<b>TOTAL DEVICE</b>			
Storage Temperature	$T_{STG}$	-55 to +150	$^\circ\text{C}$
Operating Temperature	$T_{OPR}$	-55 to +100	$^\circ\text{C}$
Lead Solder Temperature	$T_{SOL}$	260 for 10 sec	$^\circ\text{C}$
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	250	mW
Derate above $25^\circ\text{C}$		2.94	mW/ $^\circ\text{C}$
Input-Output Isolation Voltage	$V_{ISO}$	5300	Vac(rms)
<b>EMITTER</b>			
DC/Average Forward Input Current	$I_F$	60	mA
Reverse Input Voltage	$V_R$	3	V
LED Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	120	mW
Derate above $25^\circ\text{C}$		1.41	mW/ $^\circ\text{C}$
<b>DETECTOR</b>			
Collector-Emitter Voltage	$V_{CEO}$	50	V
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	150	mW
Derate above $25^\circ\text{C}$		1.76	mW/ $^\circ\text{C}$
Continuous Collector Current	$I_C$	150	mA

# PHOTODARLINGTON OPTOCOUPERS (NO BASE CONNECTION)

**MOC8020**

**MOC8021**

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

**INDIVIDUAL COMPONENT CHARACTERISTICS**

Parameter	Test Conditions	Symbol	Min	Typ**	Max	Unit
<b>EMITTER</b>						
Input Forward Voltage	( $I_F = 10\text{ mA}$ )	$V_F$		1.15	2	V
Input Capacitance	( $V_F = 0, f = 1\text{ MHz}$ )	$C_{IN}$		18		pF
Reverse Leakage Current	( $V_R = 3.0\text{ V}$ )	$I_R$		0.05	10	$\mu\text{A}$
<b>DETECTOR</b>						
Collector-Emitter Breakdown Voltage	( $I_C = 1.0\text{ mA}$ )	$BV_{CEO}$	50			V
Emitter-Collector Breakdown Voltage	( $I_E = 100\text{ }\mu\text{A}$ )	$BV_{ECO}$	5			V
Collector-Emitter Dark Current	( $V_{CE} = 10\text{ V}$ )	$I_{CEO}$			100	nA

**TRANSFER CHARACTERISTICS**

DC Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
Current Transfer Ratio, Collector-Emitter	MOC8020 ( $I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$ ) MOC8021 ( $I_F = 10\text{ mA}, V_{CE} = 5\text{ V}$ )	CTR	500			%
Collector-Emitter Saturation Voltage	( $I_F = 10\text{ mA}, I_C = 25\text{ mA}$ )		$V_{CE(SAT)}$		2	

**TRANSFER CHARACTERISTICS**

Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
<b>SWITCHING TIMES</b>						
Turn-on Time	( $V_{CC} = 10\text{ V}, R_L = 100\Omega, I_F = 5\text{ mA}$ )	$t_{on}$		3.5		$\mu\text{s}$
Turn-off Time		$t_{off}$		95		$\mu\text{s}$

**ISOLATION CHARACTERISTICS**

Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
Input-Output Isolation Voltage	( $I_{I-O} \leq 1\text{ }\mu\text{A}, 1\text{ min.}$ )	$V_{ISO}$	7500			Vac(pk)
	( $I_{I-O} \leq 1\text{ }\mu\text{A}, 1\text{ min.}$ )		5300			Vac(rms)
Isolation Resistance	( $V_{I-O} = 500\text{ VDC}$ )	$R_{ISO}$	$10^{11}$			$\Omega$
Isolation Capacitance	( $f = 1\text{ MHz}$ )	$C_{ISO}$		0.5		pf

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

Fig. 1 Output Current vs. Input Current

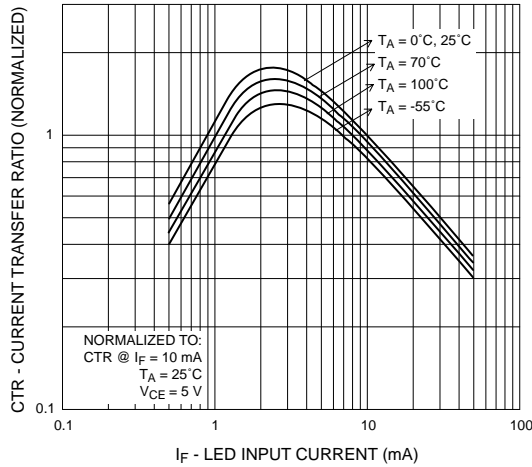


Fig. 2 Current Transfer Ratio vs. Ambient Temperature

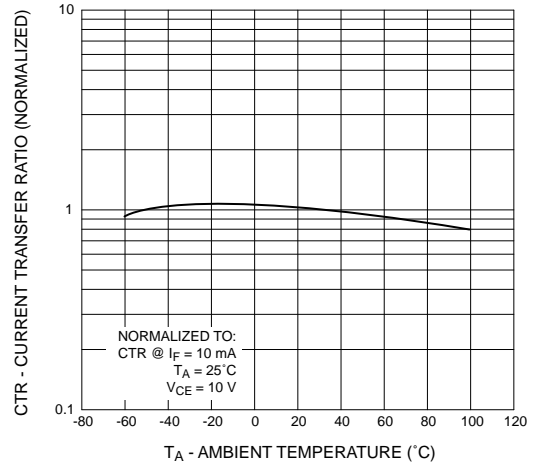


Fig. 3 Collector Current vs. Collector-Emitter Voltage

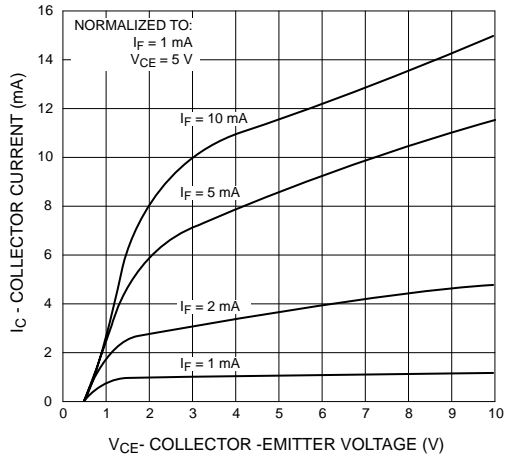


Fig. 4 Dark Current vs. Ambient Temperature

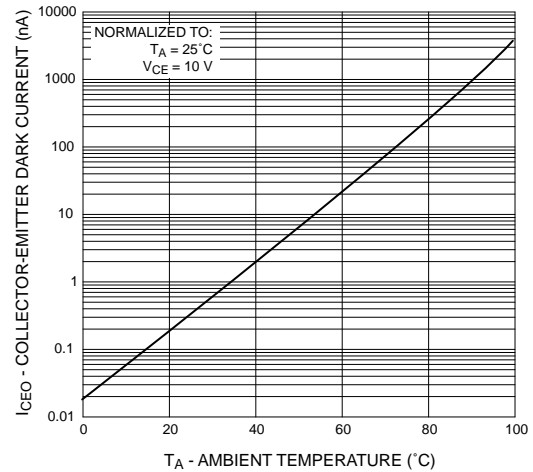


Fig. 5 Turn-On Time vs. Input Current

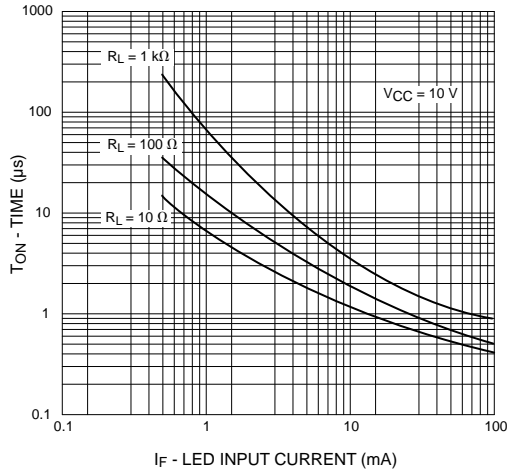
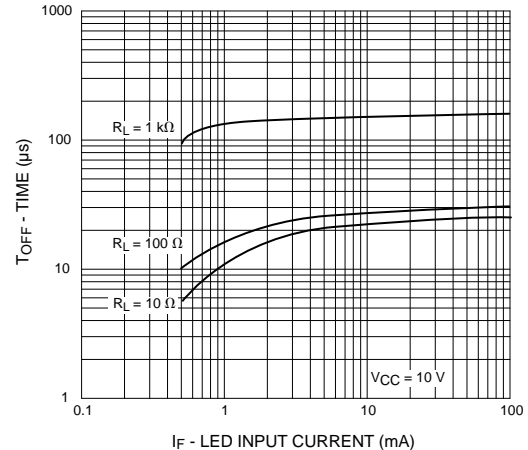


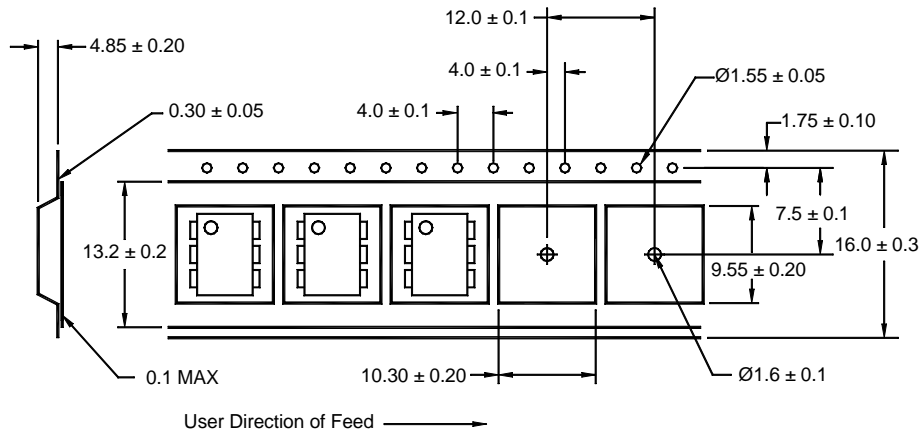
Fig. 6 Turn-Off Time vs. Input Current

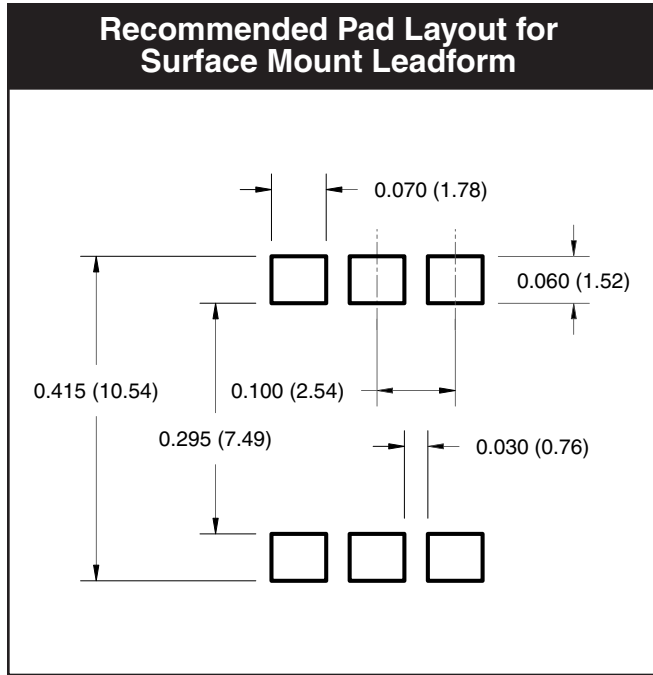


**ORDERING INFORMATION**

Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4" Lead Spacing
300	.300	VDE 0884
300W	.300W	VDE 0884, 0.4" Lead Spacing
3S	.3S	VDE 0884, Surface Mount
3SD	.3SD	VDE 0884, Surface Mount, Tape & Reel

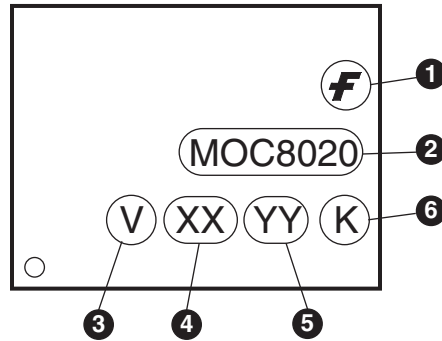
**QT Carrier Tape Specifications ("D" Taping Orientation)**





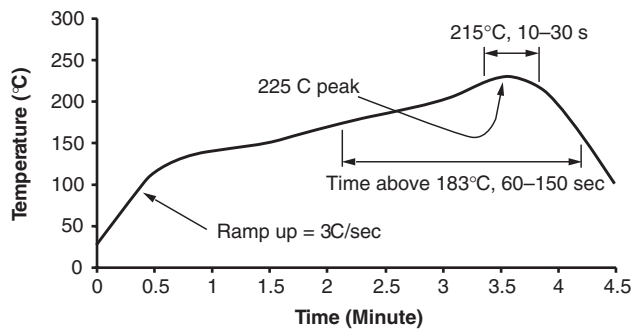
**Note**  
All dimensions are in inches (millimeters)

**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

**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

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CoolFET™	FRFET™	MicroFET™	PowerTrench®	SuperSOT™-6
CROSSVOLT™	GlobalOptoisolator™	MicroPak™	QFET®	SuperSOT™-8
DOMET™	GTO™	MICROWIRE™	QS™	SyncFET™
EcoSPARK™	HiSeC™	MSX™	QT Optoelectronics™	TinyLogic®
E <sup>2</sup> CMOS™	µC™	MSXPro™	Quiet Series™	TINYOPTO™
EnSigna™	i-Lo™	OCX™	RapidConfigure™	TruTranslation™
FACT™	ImpliedDisconnect™	OCXPro™	RapidConnect™	UHC™
FACT Quiet Series™		OPTOLOGIC®	µSerDes™	UltraFET®
Across the board. Around the world.™		OPTOPLANAR™	SILENT SWITCHER®	VCX™
The Power Franchise®		PACMAN™	SMART START™	
Programmable Active Droop™		POP™	SPM™	

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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.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.