Optically-Coupled Isolator

Optoelectronic Products

FCD820/A/B/C/D

General Description

The FCD820 series of optoisolators combines a GaAs infrared-emitting diode and a silicon npn phototransistor in close proximity. Optical intercoupling provides a high degree of ac and dc isolation. A capability for continuous operation of the input diode results in a frequency response extending to dc. Connection to the transistor base is also provided for design flexibility. The FCD820 is covered under UL component recognition program, reference file E55299.

Glassolated™
High Current Transfer Ratio—Typically 50%
1500 V To 6000 V Minimum Isolation Input-To-Output
10^{11} Ω Isolation Resistance
Low Coupling Capacitance—Typically 1.0 pF

Absolute Maximum Ratings

Maximum Temperature and Humidity

Storage Temperature	−55°C to +150°C
Operating Temperature	−55°C to +100°C
Pin Temperature (Soldering, 5s)	260°C
Total Package Power Dissipation at T_A = 25°C (LED plus Detector)	250 mW
Derate Linearly from 25°C	3.3 mW/°C

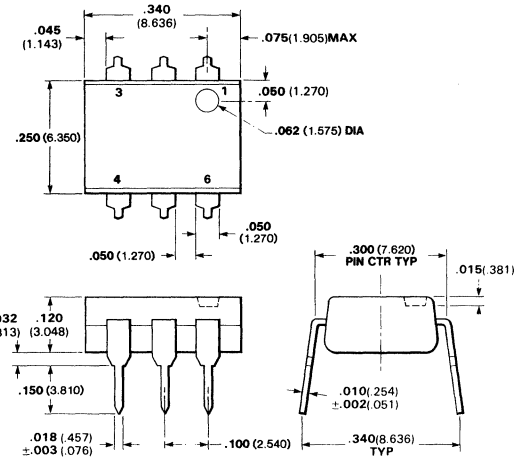
Input Diode

V_R	Reverse Voltage	3.0 V
I_F	Forward dc Current	60 mA
I_{pk}	Peak Forward Current (1 μs pulse width, 300 pps)	3.0 A
P_D	Power Dissipation at T_A = 25°C	100 mW
	Derate Linearly from 25°C	1.33 mW/°C

Output Transistor

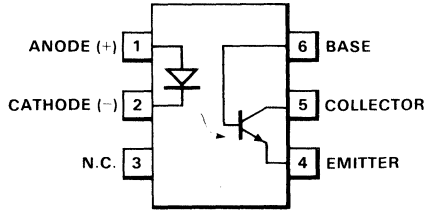
V_{CE}	Collector to Emitter Voltage	30 V
V_{CB}	Collector to Base Voltage	70 V
I_C	Collector Current	25 mA
P_D	Power Dissipation at T_A = 25°C	150 mW
	Derate Linearly from 25°C	2.0 mW/°C

Package Outline



Notes
All dimensions in inches **bold** and millimeters (parentheses).
Tolerance unless specified = ±**.015** (0.381)

Connection Diagram
DIP (Top View)



Pin		
1	Anode (+)	Input Diode
2	Cathode (−)	
3	NC	
4	Emitter	Output npn Phototransistor
5	Collector	
6	Base	

Typical Electrical Characteristics

FCD820/A/B/C/D

Electrical Characteristics—Input Diode $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
V_F	Forward Voltage		1.2	1.5	V	$I_F = 60$ mA
BV_R	Reverse Breakdown Voltage	3.0	8.0		V	$I_R = 10\ \mu A$

Electrical Characteristics—Output Transistor $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
V_{CEO}	Collector-to-Emitter Voltage	30	65		V	$I_C = 1.0$ mA, $I_F = 0$
V_{CBO}	Collector-to-Base Voltage	70	165		V	$I_C = 100\ \mu A$, $I_F = 0$
I_{CEO}	Collector-to-Emitter Leakage Current			50	nA	$V_{CE} = 10$ V, $I_F = 0$
I_{CBO}	Collector-to-Base Leakage Current			20	nA	$V_{CB} = 10$ V, $I_F = 0$
h_{FE}	Forward Current Gain	100	250			$V_{CE} = 5.0$ V, $I_C = 100\ \mu A$
C_{cb}	Collector-to-Base Capacitance		20		pF	$V_{CB} = 10$ V
C_{eb}	Emitter-to-Base Capacitance		10		pF	$V_{EB} = 0$

Electrical Characteristics—Coupled $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
V_{IO}	Input-to-Output Voltage					
	FCD820	1500			V_{rms}	
	FCD820A	1500			V_{pk}	
	FCD820B	2500			V_{pk}	
	FCD820C	5000			V_{pk}	
	FCD820D	6000			V_{pk}	
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage		0.24	0.40	V	$I_C = 2.2$ mA, $I_F = 15$ mA (FCD820, $I_C = 2.0$ mA, $I_F = 10$ mA)
$I_C/I_F(CTR)$	Collector Current Transfer Ratio (Note 1)	20	50		%	$V_{CE} = 10$ V, $I_F = 10$ mA (FCD820, $V_{CE} = 0.4$ V)
R_{IO}	Input-to-Output Resistance	10^{11}			Ω	$V_{IO} = 500$ V
C_{IO}	Input-to-Output Capacitance		1.0		pF	f = 1.0 MHz
t_r, t_f	Collector Rise and Fall Times (Note 2)		2.5		μs	$I_C = 2.0$ mA, $V_{CE} = 10$ V, $R_L = 100\ \Omega$

Notes

1. Collector current transfer ratio is defined as the ratio of the collector current to the forward bias input current.
2. Rise time is defined as the time for the collector current to rise from 10% to 90% of peak value. Fall time is defined as the time required for the current to decrease from 90% to 10% of peak value.

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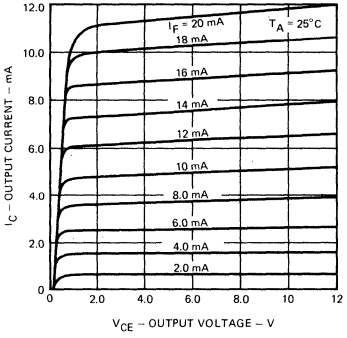
Typical Electrical Characteristic Curves

Low Level Transfer Characteristics



Maximum Power Dissipation Rating vs Ambient Temperature