

Optically-Coupled Isolator

Optoelectronic Products

FCD830/A/B/C/D

General Description

The FCD830 series of optoisolators have a npn silicon Planar phototransistor in close proximity with a GaAs diode. Optical coupling 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.

Glassolated™

High Current Transfer Ratio—Typically 50%
1500 V To 6000 V Minimum Isolation

Input-to-Output

10^{11} Isolation Resistance
Low Coupling Capacitance—Typically 1.0 pF
High Speed

Absolute Maximum Ratings

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

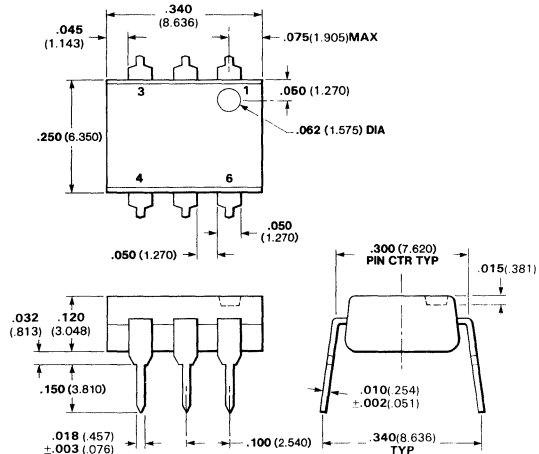
Input Diode

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 $T_A = 25^\circ\text{C}$ Derate Linearly from 25°C	100 mW 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	20 mA
P_D Power Dissipation at $T_A = 25^\circ\text{C}$ Derate Linearly from 25°C	150 mW 2.6 mW/°C

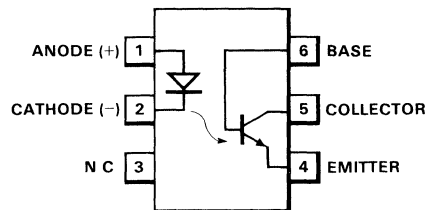
Package Outline



Notes

All dimensions in inches **bold** and millimeters (parentheses).
 Tolerance unless specified = $\pm .015$ (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

FCD830/A/B/C/D

Electrical Characteristics—Input Diode $T_A = 25^\circ\text{C}$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
V_F	Forward Voltage		1.3	1.5	V	$I_F = 60\text{ mA}$
BV_R	Reverse Breakdown Voltage	3.0	8.0		V	$I_R = 10\text{ }\mu\text{A}$

Electrical Characteristics—Output Transistor $T_A = 25^\circ\text{C}$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
V_{CEO}	Collector-to-Emitter Voltage	30	65		V	$I_C = 1.0\text{ mA}$, $I_F = 0$
V_{CBO}	Collector-to-Base Voltage	70	165		V	$I_C = 10\text{ }\mu\text{A}$, $I_F = 0$
I_{CEO}	Collector-to-Emitter Leakage Current		2.0	50	nA	$V_{CE} = 10\text{ V}$, $I_F = 0$
I_{CBO}	Collector-to-Base Leakage Current		0.1	20	nA	$V_{CB} = 10\text{ V}$, $I_F = 0$
h_{FE}	Forward Current Gain	100				$V_{CE} = 5.0\text{ V}$, $I_C = 100\text{ }\mu\text{A}$
C_{cb}	Collector-to-Base Capacitance		7.5		pF	$V_{CB} = 10\text{ V}$
C_{eb}	Emitter-to-Base Capacitance		10		pF	$V_{EB} = 0$

Electrical Characteristics—Coupled $T_A = 25^\circ\text{C}$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
V_{IO}	Input-to-Output Voltage FCD830 FCD830A FCD830B FCD830C FCD830D	1500 1500 2500 5000 6000			V_{rms} V_{pk} V_{pk} V_{pk} V_{pk}	
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage		0.24	0.40	V_{pk}	$I_C = 2.2\text{ mA}$, $I_F = 15\text{ mA}$ (FCD830, $I_C = 2.0\text{ mA}$, $I_F = 10\text{ mA}$) $V_{CE} = 10\text{ V}$, $I_F = 10\text{ mA}$ (FCD830, $V_{CE} = 0.4\text{ V}$)
I_C/I_F (CTR)	Collector Current Transfer Ratio (Note 1)	20	50		%	$V_{IO} = 500\text{ V}$ $f = 1.0\text{ MHz}$ $I_C = 2.0\text{ mA}$, $V_{CC} = 10\text{ V}$, $R_L = 100\text{ }\Omega$
R_{IO}	Input-to-Output Resistance	10^{11}			Ω	
C_{IO}	Input-to-Output Capacitance		1.0		pF	
t_r, t_f	Collector Rise and Fall Times (Note 2)		1.6	2.0	μs	

Notes

- Collector current transfer ratio is defined as the ratio of the collector current to the forward bias input current.
- 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.