

FCD820 • FCD820C

OPTICALLY-COUPLED ISOLATOR

OPTOELECTRONICS PRODUCT GROUP

GENERAL DESCRIPTION – The FCD820 series of optoisolators combines a gallium arsenide 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 U.L. component recognition program, reference file E55299.

- GLASSOLATED™
- HIGH CURRENT TRANSFER RATIO – TYPICALLY 50%
- 1500 V TO 6000 V MINIMUM ISOLATION INPUT-TO-OUTPUT
- $10^{11} \Omega$ ISOLATION RESISTANCE
- LOW COUPLING CAPACITANCE – TYPICALLY 1.0 pF

ABSOLUTE MAXIMUM RATINGS

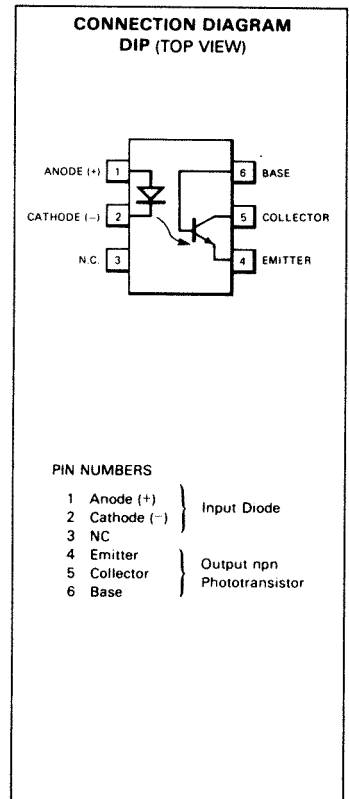
Storage Temperature	–55°C to +150°C
Operating Temperature	–55°C to +100°C
Pin Temperature (Soldering, 5 s)	260°C
Total Package Power Dissipation at $T_A = 25^\circ\text{C}$ (LED plus Detector)	250 mW
Derate Linearly from 25°C	3.3 mW/°C

INPUT DIODE

V_R	Reverse Voltage	3.0 V
I_F	Forward Current	60 mA
I_{fP}	Peak Forward Current (1 μs pulse width, 300 pps)	3.0 A
P_D	Power Dissipation at $T_A = 25^\circ\text{C}$	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 $T_A = 25^\circ\text{C}$	150 mW
	Derate Linearly from 25°C	2.0 mW/°C



ELECTRICAL CHARACTERISTICS – INPUT DIODE: $T_A = 25^\circ\text{C}$

SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_F	Forward Voltage		1.2	1.5	V	$I_F = 60 \text{ mA}$
BV_R	Reverse Breakdown Voltage	3.0	8.0		V	$I_R = 10 \mu\text{A}$

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ELECTRICAL CHARACTERISTICS – OUTPUT TRANSISTOR: $T_A = 25^\circ\text{C}$

SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_{CE0}	Collector-Emitter Voltage	30	65		V	$I_C = 1.0\text{ mA}$, $I_F = 0$
V_{CBO}	Collector-Base Voltage	70	165		V	$I_C = 100\ \mu\text{A}$, $I_F = 0$
I_{CE0}	Collector-Emitter Leakage Current			50	nA	$V_{CE} = 10\text{ V}$, $I_F = 0$
I_{CBO}	Collector-Base Leakage Current			20	nA	$V_{CB} = 10\text{ V}$, $I_F = 0$
h_{FE}	Forward Current Gain	100	250			$V_{CE} = 5.0\text{ V}$, $I_C = 100\ \mu\text{A}$
C_{cb}	Collector-Base Capacitance		20		pF	$V_{CB} = 10\text{ V}$
C_{eb}	Emitter-Base Capacitance		10		pF	$V_{EB} = 0$

ELECTRICAL CHARACTERISTICS – COUPLED: $T_A = 25^\circ\text{C}$

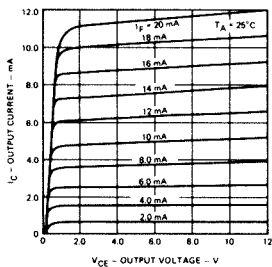
SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_{IO}	Input-to-Output Voltage FCD820 FCD820C	1500 5000			V_{rms} V_{pk}	
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage		0.24	0.40	V	$I_C = 2.2\text{ mA}$, $I_F = 15\text{ mA}$ (FCD820, $I_C = 2.0\text{ mA}$, $I_F = 10\text{ mA}$)
$I_C/I_F(CTR)$	Collector Current Transfer Ratio (Note 1)	20	50		%	$V_{CE} = 10\text{ V}$, $I_F = 10\text{ mA}$ (FCD820, $V_{CE} = 0.4\text{ V}$)
R_{IO}	Input-to-Output Resistance	10^{11}			Ω	$V_{IO} = 500\text{ V}$
C_{IO}	Input-to-Output Capacitance		1.0		pF	$f = 1.0\text{ MHz}$
t_r, t_f	Collector Rise and Fall Times (Note 2)		2.5		μs	$I_C = 2.0\text{ mA}$, $V_{CE} = 10\text{ V}$, $R_L = 100\ \Omega$

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.

TYPICAL ELECTRICAL CHARACTERISTIC CURVES

LOW LEVEL TRANSFER CHARACTERISTICS



MAXIMUM POWER DISSIPATION RATING VERSUS AMBIENT TEMPERATURE

