Optically-Coupled Darlington Isolator

Optoelectronic Products

MCA230
MCA231
MCA255

General Description

The MCA230, MCA231 and MCA255 series of optically-coupled isolators are electrical and mechanical replacements for the Monsanto series. Optical intercoupling provides a high degree of ac and dc isolation. Connection to the base is also provided for design flexibility.

Glassolated™
High Current Transfer Ratio At Low Input Current
10^{11} Ω Isolation Resistance
Low Coupling Capacitance—Typically 1.5 pF

Absolute Maximum Ratings

Storage Temperature	−55°C to +150°C
Operating Temperature	−55°C to +100°C
Pin Temperature (Soldering, 10 s)	260°C
Total Package Power Dissipation at T_A = 25°C (LED plus Detector)	300 mW
Derate Linearly from 25°C	4.0 mW/°C

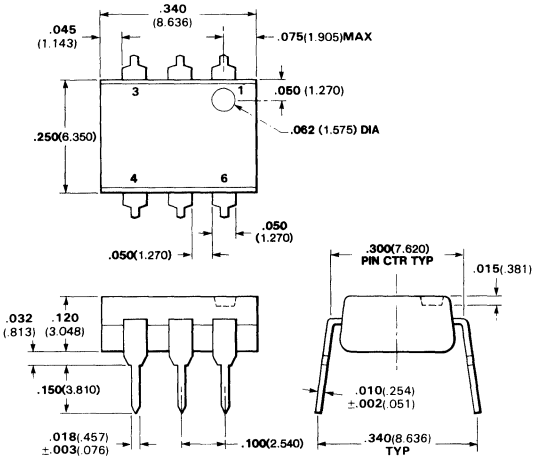
Input Diode

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	90 mW
	Derate Linearly from 55°C	2.0 mW/°C

Output Transistor (Darlington)

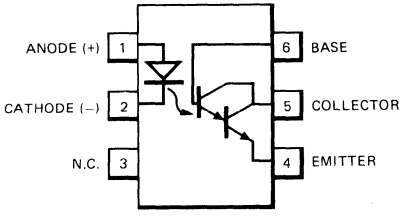
V_{CE}	Collector-to-Emitter Voltage	
	MCA230/231	30 V
	MCA255	55 V
V_{CB}	Collector-to-Base Voltage	
	MCA230/231	30 V
	MCA255	55 V
P_D	Power Dissipation at T_A = 25°C	210 mW
	Derate Linearly from 25°C	2.8 mW/°C

Package Outline



Notes
All dimensions in inches **bold** and millimeters (parentheses)
Tolerance unless specified = ±.015 (±.381)

Connection Diagram
DIP (Top View)



Pin

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

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 = 20 mA
BV_R	Reverse Breakdown Voltage	3.0	5.0		V	I_R = 10 μA

Typical Electrical Characteristics

MCA230 MCA231 MCA255

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

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
V_{CEO}	Collector-to-Emitter Voltage					
	MCA230/231	30			V	I_C = 1.0 mA, I_F = 0
	MCA255	55			V	I_C = 1.0 mA, I_F = 0
V_{CBO}	Collector-to-Base Voltage					
	MCA230/231	30			V	I_C = 10 μA, I_F = 0
	MCA255	55				
I_{CEO}	Collector-to-Emitter Leakage Current		1.0	100	nA	V_{CE} = 10 V, I_F = 0
h_{FE}	Forward Current Gain		25 k			V_{CE} = 5.0 V, I_C = 500 μA
V_{EBO}	Emitter-to-Base Voltage					I_E = 10 μA
	MCA230/255	8			V	
	MCA231	6			V	

Electrical Characteristics—Coupled $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_C	Collector Output Current					
	MCA230	10	40		mA	V_{CE} = 5.0 V, I_F = 10 mA
	MCA231	2.0	4.0		mA	V_{CE} = 1.0 V, I_F = 1.0 mA
	MCA255	10	40		mA	V_{CE} = 5.0 V, I_F = 10 mA
V_{ISO}	Isolation Voltage	1.5 k	2.0 k		V	
R_{ISO}	Isolation Resistance		10^{11}		Ω	V = 500 V
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage					
	MCA230, MCA255		0.8	1.0	V	I_C = 50 mA, I_F = 50 mA
	MCA231		0.8	1.0	V	I_C = 2.0 mA, I_F = 1.0 mA
	MCA231		0.8	1.0	V	I_C = 10 mA, I_F = 5 mA
	MCA231		0.9	1.2	V	I_C = 40 mA, I_F = 10 mA
t_{on}	Turn-on Time		40		μs	I_C = 1.0 mA, V_{CC} = 10 V, R_L = 100 Ω
t_{off}	Turn-off Time (See Note 1)		50		μs	

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.