Device No.	Output	Max Ratings @ T_A = 25°C					Coupled Characteristics			
			Transistor		Diode			Min Current Transfer Ratio		
		P_D mW	I_C mA	V_{CEO} V	V_R V	I_F mA	V_{ISO} kV	I_C/I_F %	@I_F mA	@V_{CE} V
4N25[4]	Trans	250	—	30	3.0	80	2.5	20	10	10
4N26[4]	Trans	250	—	30	3.0	80	1.5	20	10	10
4N27[4]	Trans	250	—	30	3.0	80	1.5	10	10	10
4N28[4]	Trans	250	—	30	3.0	80	0.5	10	10	10
4N29[4]	Darlg	250	125	30	3.0	80	2.5	100	10	10
4N30[4]	Darlg	250	125	30	3.0	80	1.5	100	10	10
4N31[4]	Darlg	250	125	30	3.0	80	1.5	50	10	10
4N32[4]	Darlg	250	125	30	3.0	80	2.5	500	10	10
4N33[4]	Darlg	250	125	30	3.0	80	1.5	500	10	10
4N35[4]	Trans	300	—	30	6.0	60	3.5	100	10	10
4N36[4]	Trans	300	—	30	6.0	60	2.5	100	10	10
4N37[4]	Trans	300	—	30	6.0	60	1.5	100	10	10

Notes
1. Standard Transistor output
2. High-speed transistor output
   guaranteed 2.0 μs max t_r and t_f with 100 Ω R_L
   8.0 μs typ at 1 kΩ R_L
3. CTR guaranteed with transistor in saturation
4. JEDEC registered data and conditions
5. CTR typ at 1.0 mA = 40%

Couplers (Cont'd)

Coupled Characteristics		Input Diode Characteristics		Output Transistor Characteristics			Output Darlington Characteristics		Data Sheet Page No.	Device No.
T_r μs Typ	t_f μs Typ	V_F V Max	@ I_F mA	$V_{CE(sat)}$ V Max	@ I_C mA	@ I_F mA	I_{CEO} μA Max	@ V_{CE} V		
2.5	2.5	1.5	50	0.5	2.0	50			5-47	4N25(4)
2.5	2.5	1.5	50	0.5	2.0	50			5-47	4N26(4)
2.5	2.5	1.5	50	0.5	2.0	50			5-47	4N27(4)
2.5	2.5	1.5	50	0.5	2.0	50			5-47	4N28(4)
10	45	1.5	50	1.0	2.0	8.0	0.1	10	5-49	4N29(4)
10	45	1.5	50	1.0	2.0	8.0	0.1	10	5-49	4N30(4)
10	45	1.5	50	1.2	2.0	8.0	0.1	10	5-49	4N31(4)
10	120	1.5	50	1.0	2.0	8.0	0.1	10	5-49	4N32(4)
10	120	1.5	50	1.0	2.0	8.0	0.1	10	5-49	4N33(4)
8.0	8.0	1.5	10	0.3	0.5	10			5-51	4N35(4)
8.0	8.0	1.5	10	0.3	0.5	10			5-51	4N36(4)
8.0	8.0	1.5	10	0.3	0.5	10			5-51	4N37(4)

Optically-Coupled Darlington Isolator

Optoelectronics Products

4N29, 4N30 4N31, 4N32 4N33

General Description

The 4N29, 4N30, 4N31, 4N32 and 4N33 series of optoisolators has a silicon npn Planar photo-Darlington transistor coupled to a GaAs diode. Each is mounted in a 6-pin plastic DIP package.

High Current Transfer Ratio
1500 V or 2500 V Minimum Isolation Input-To-Output
10^{11} Ω Isolation Resistance
Low Coupling Capacitance

Absolute Maximum Ratings

Maximum Temperature and Humidity

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)*	250 mW
Derate Linearly from 25°C*	3.3 mW/°C

Input Diode*

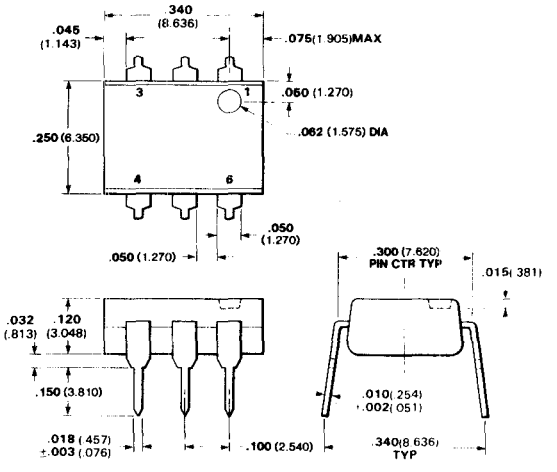
I_F	Forward dc Current Continuous *	80 mA
V_R	Reverse Voltage	3.0 V
I_{pk}	Peak Forward Current (1 μs pulse width, 300 pps)	3.0 A
P_D	Power Dissipation at T_A = 25°C	150 mW
	Derate Linearly from 25°C	2.0 mW/°C

Output Transistor (Darlington)*

V_{CE}	Collector-to-Emitter Voltage	30 V
V_{CB}	Collector-to-Base Voltage	50 V
V_{EB}	Emitter-to-Base Voltage	8.0 V
V_{EC}	Emitter-to-Collector Voltage	5.0 V
P_D	Power Dissipation at T_A = 25°C	150 mW
	Derate Linearly from 25°C	2.0 mW/°C

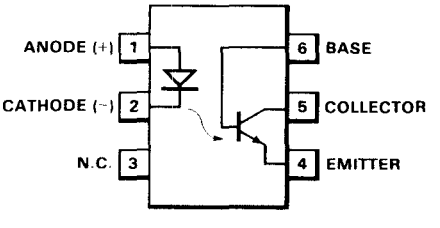
*Indicates JEDEC Registered Data

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 = 50 mA
I_R*	Reverse Leakage Current		0.05	100	μA	V_R = 3.0 V
C	Capacitance		150		pF	V_R = 0 V, f = 1 MHz

Typical Electrical Characteristics

4N29, 4N30 4N31, 4N32 4N33

Electrical Characteristics—Output Transistor (Darlington) $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{CEO}*	Collector-to-Emitter Breakdown Voltage	30	70		V	I_C = 100 μA, I_B = 0
BV_{CBO}*	Collector-to-Base Breakdown Voltage	30			V	I_C = 100 μA, I_E = 0
BV_{ECO}*	Emitter-to-Collector Breakdown Voltage	5.0			V	I_E = 100 μA, I_B = 0
I_{CEO}*	Collector-to-Emitter Dark Current			100	nA	V_{CE} = 10 V, Base Open
h_{FE}	Forward Current Gain		2000			V_{CE} = 5.0 V, I_C = 500 μA

Electrical Characteristics—Coupled $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_C*	Collector Output Current					
	4N32, 4N33	50			mA	V_{CE} = 10 V, I_F = 10 mA
	4N29, 4N30	10			mA	V_{CE} = 10 V, I_F = 10 mA
	4N31	5.0			mA	V_{CE} = 10 V, I_F = 10 mA
V_{ISO}*	Isolation Voltage					
	4N29, 4N32	2500			V	
	4N30, 4N31, 4N33	1500			V	
R_{ISO}*	Isolation Resistance		10^{11}		Ω	V = 500 V
$V_{CE(sat)}$*	Collector-to-Emitter Saturation Voltage					
	4N31			1.2	V	I_C = 2.0 mA, I_F = 8.0 mA
	4N29, 4N30, 4N32, 4N33			1.0	V	I_C = 2.0 mA, I_F = 8.0 mA
C_{ISO}	Isolation Capacitance		1.5		pF	V = 0, f = 1.0 MHz
t_{on}	Turn-on Time		10		μs	I_C = 50 mA, V_{CC} = 10 V, R_L = 180 Ω, I_F = 200 mA
t_{off}	Turn-off Time (See Note)					I_C = 50 mA,
	4N29, 4N30, 4N31		20	45	μs	V_{CC} = 10 V,
	4N32, 4N33		60	120	μs	R_L = 180 Ω, I_F = 200 mA

Note
Turn-on time is defined as the time for the (base collector) current to rise from 10% to 90% of peak value. Turn-off time is defined as the time required for the current to decrease from 90% to 10% of peak value.
*Indicates JEDEC Registered Data.