Optically-Coupled Isolator

Optoelectronic Products

TIL111, TIL114 TIL116, TIL117

General Description

The TIL111, TIL114, TIL116 and TIL117 series of optically-coupled isolators are electrical and mechanical replacements for the Texas Instruments 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
High-Speed Switching—Typically 2 μs
10^{11} Ω Isolation Resistance
Low Coupling Capacitance—Typically 1.0 pF

Absolute Maximum Ratings

Maximum Temperature

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°C,	
LED plus Detector	250 mW
Derate Linearly from 25°C	3.3 mW/°C

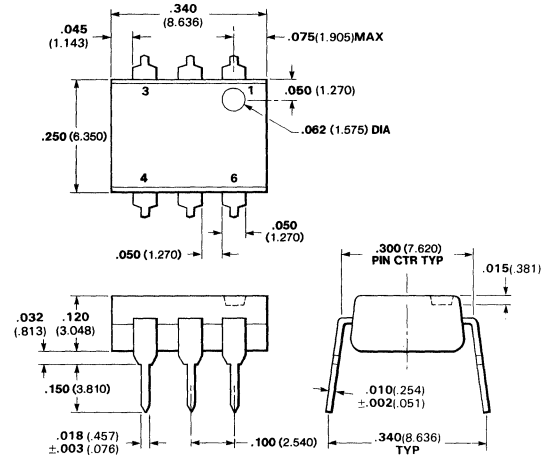
Input Diode

V_R	Reverse Voltage	3.0 V
I_F	Forward dc Current	100 mA
I_{pk}	Peak Forward Current at 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	2.6 mW/°C

Output Transistor

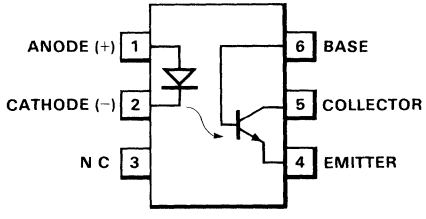
V_{CE}	Collector-to-Emitter Voltage	30 V
V_{CB}	Collector-to-Base Voltage	70 V
P_D	Power Dissipation at T_A = 25°C	150 mW
	Derate Linearly from 25°C	2.6 mW/°C

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 (−)	Input Diode
3	NC	
4	Emitter	Output npn Phototransistor
5	Collector	Output npn Phototransistor
6	Base	Output npn Phototransistor

Typical Electrical Characteristics

TIL111, TIL114 TIL116, TIL117

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

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
V_F	Forward Voltage					
	TIL111, TIL114, TIL117		1.2	1.4	V	$I_F = 16$ mA
	TIL116		1.2	1.5	V	$I_F = 60$ mA
BV_R	Reverse Breakdown Voltage	3.0	5.0		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			V	$I_C = 1.0$ mA, $I_F = 0$
V_{CBO}	Collector-to-Base Voltage	70			V	$I_C = 10\ \mu A$, $I_F = 0$
V_{EBO}	Emitter-to-Base Voltage	7.0			V	$I_E = 10\ \mu A$
I_{CEO}	Collector-to-Emitter Leakage Current		1.0	50	nA	$V_{CE} = 10$ V, $I_F = 0$
I_{CBO}	Collector-to-Base Leakage Current		0.1	20	nA	$V_{CB} = 10$ V, $I_F = 0$
h_{FE}	Forward Current Gain					
	TIL111, TIL114	100	300			$V_{CE} = 5$ V, $I_C = 10$ mA
	TIL116	100	300			$V_{CE} = 5$ V, $I_C = 100\ \mu A$
	TIL117	200	550			$V_{CE} = 5$ V, $I_C = 10$ mA

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Typical Electrical Characteristics (Cont'd)

Electrical Characteristics—Coupled $T_A = 25°C$

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_C	Collector Output Current					
	TIL111, TIL114	2.0	7.0		mA	$V_{CE} = 0.4$ V, $I_F = 16$ mA
	TIL116	2.0	5.0		mA	$V_{CE} = 10$ V, $I_F = 10$ mA
	TIL117	5.0	9.0		mA	$V_{CE} = 10$ V, $I_F = 10$ mA
I_B	Collector-to-Base Current	10	20		μA	$V_{CB} = 0.4$ V, $I_F = 16$ mA
V_{ISO}	Isolation Voltage					
	TIL111	1500			V	
	TIL114, TIL116, TIL117	2500			V	
R_{ISO}	Isolation Resistance	10^{11}			Ω	V = 500 V
$V_{CE(sat)}$	Collector-to-Emitter Saturation Voltage					
	TIL111, TIL114		0.25	0.4	V	$I_C = 2.0$ mA, $I_F = 16$ mA
	TIL116		0.25	0.4		$I_C = 2.2$ mA, $I_F = 15$ mA
	TIL117		0.25	0.4	V	$I_C = 0.5$ mA, $I_F = 10$ mA
C_{ISO}	Isolation Capacitance		1.0	1.3	pF	V = 0, f = 1.0 MHz
t_r, t_f	Rise Time, Fall time (See Note)					$I_C = 2.0$ mA, $V_{CC} = 10$ V, $R_L = 100$ Ω (See Note)
	TIL111, TIL114		5.0	10	μs	
	TIL116		5.0	10	μs	
	TIL117		5.0	10	μs	

Note
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.