

# SIEMENS

# NEW

## IL356T HIGH VOLTAGE SOLID STATE RELAY OPTOCOUPLER

Preliminary Data Sheet

### FEATURES

- Normally Open, Single Pole Single Throw Operation
- Control 400 VAC or DC Voltage
- Switch 100 mA Loads
- Low ON-Resistance
- $dv/dt$ , > 500 V/ms
- Input and Output Isolation Voltage, 2500 V<sub>RMS</sub>
- Current Limiting
- Applications
  - Telephone Switch Hook
  - Industrial Control Systems
  - PCMCIA Card
- Available in Tape and Reel (suffix T)

### DESCRIPTION

The IL356T is a single pole single throw (SPST), normally open (NO), solid state relay. The relay can control AC or DC loads currents up to 100 mA, with a supply voltage up to 400 V. The device is packaged in a eight pin 2 mm surface mount package. This package offers an insulation dielectric withstand of 2500 V<sub>RMS</sub>.

The coupler consists of an AlGaAs LED that is optically coupled to a dielectrically isolated photodiode array which drives two series connected high voltage MOS transistors. The typical ON-Resistance is 25 Ω at 25 mA lead current and is linear up to 50 mA. The incremental resistance drops to less than 20 Ω beyond 50 mA while reducing internal power dissipation at high load currents. There is built-in current limiting circuitry in the detector chip.

### Absolute Maximum Ratings (T<sub>A</sub> = 25°C)

#### Emitter

Reverse Voltage ..... 5.0 V  
 Continuous Forward Current ..... 60 mA  
 Peak Forward Current, Non-repetitive (1 μs) ..... 0.25 A  
 Power Dissipation ..... 50 mW  
 Derate Linearly from 25°C ..... .66 mW/°C

#### Detector

Output Breakdown Voltage ..... ±400 V  
 Continuous Load Current ..... ±100 mA  
 Power Dissipation ..... 300 mW  
 Derate Linearly from 25°C ..... 5.8 mW/°C

#### Package

Input and Output Isolation Voltage ..... 2500 V<sub>RMS</sub>  
 Total Power Dissipation ..... 350 mW  
 Derate Linearly from 25°C ..... 5.3 mW/°C  
 Isolation Resistance

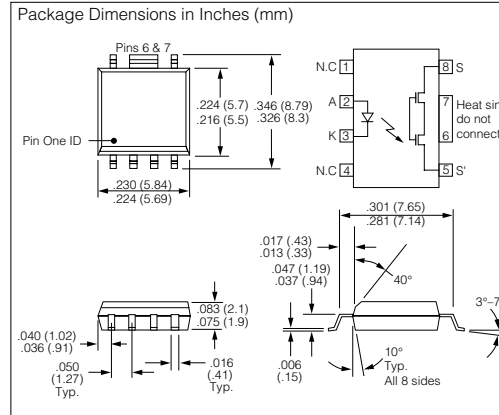
V<sub>IO</sub>=500 V, T<sub>A</sub>=25°C ..... ≥10<sup>12</sup> Ω  
 V<sub>IO</sub>=500 V, T<sub>A</sub>=100°C ..... ≥10<sup>11</sup> Ω

Storage Temperature Range ..... -40 to +150°C

Operating Temperature Range ..... -40 to +85°C

Junction Temperature ..... 100°C

Soldering Temperature  
 2 mm from case, 10 sec. .... 260°C



### Electrical Specifications at 25°C unless otherwise specified

Input (Emitter)	Symbol	Min.	Typ.	Max.	Units	Condition
Forward Voltage	V <sub>F</sub>	1.15	1.26	1.45	V	I <sub>F</sub> =10 mA
Reverse Voltage	V <sub>R</sub>	5			V	I <sub>R</sub> =10 μA
Capacitance	C <sub>LED</sub>		25		pF	V <sub>R</sub> =0 f=1 MHz
<b>Output (S-S')</b>						
Output Off-state Leakage Current	I <sub>LKG</sub>		0.04	200	nA	I <sub>F</sub> =0 mA V <sub>L</sub> =±100 V
				1.0	μA	I <sub>F</sub> =0 mA V <sub>L</sub> =±400 V
OFF Resistance	R <sub>OFF</sub>		5000		GΩ	
ON-Resistance	R <sub>ON</sub>	17	25	33	Ω	I <sub>F</sub> =1.5 mA I <sub>L</sub> =±25 mA
Current Limit	I <sub>LMT</sub>	170	210	270	mA	I <sub>F</sub> =1.5 mA t=5 ms
Output Capacitance	C <sub>O</sub>		37		pF	I <sub>F</sub> =0 mA V <sub>L</sub> =1 V
				13	pF	I <sub>F</sub> =0 mA V <sub>L</sub> =50 V
Switch Offset			0.25		μV	I <sub>F</sub> =5 mA
<b>Transfer Characteristics</b>						
LED Forward Current, Switch Turn-on	I <sub>Fon</sub>		0.12	0.3	mA	I <sub>L</sub> =100 mA t=10 ms
LED Forward Current, Switch Turn-off	I <sub>Foff</sub>	0.001	0.1		mA	V <sub>L</sub> =±350 V t=100 ms

Electrical Specifications continued on next page.

Electrical Specifications (continued)

Transfer Characteristics (continued)	Symbol	Min.	Typ.	Max.	Units	Condition
Input/Output Capacitance	$C_{ISO}$		0.8		pF	$V_{ISO}=1\text{ V}$
Turn-on Time	$t_{on}$		1.00		ms	$I_F=1.5\text{ mA}$ $I_L=50\text{ mA}$
			0.3	1	ms	$I_F=5.0\text{ mA}$ $I_L=50\text{ mA}$
Turn-off Time	$t_{off}$		0.20		ms	$I_F=1.5\text{ mA}$ $I_L=50\text{ mA}$
			0.25	0.5	ms	$I_F=5.0\text{ mA}$ $I_L=50\text{ mA}$

Figure 1 Timing test circuit

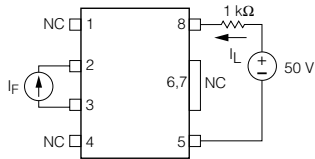


Figure 2 Timing waveform

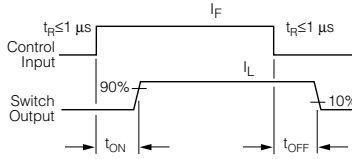


Figure 3. LED forward current vs. forward voltage

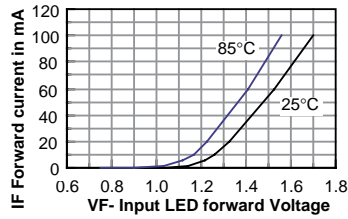


Figure 4. Recommended operating conditions

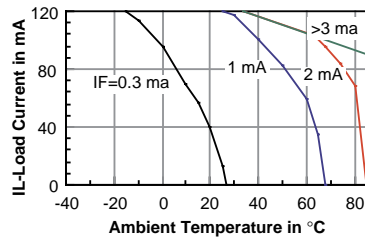


Figure 5. Change in current limit vs. temperature

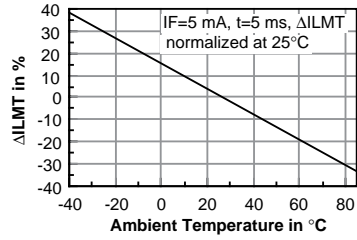


Figure 6. Min. LED current, switch turn-ON vs. temp.

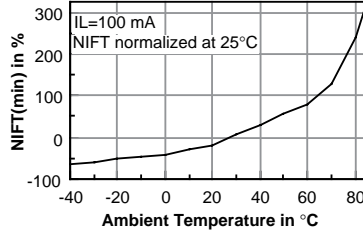


Figure 7. Change in ON resistance vs. temperature

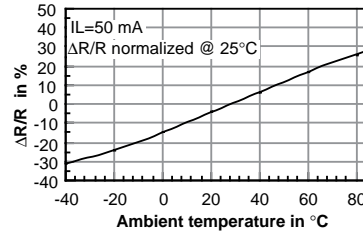


Figure 8. Switching speed vs. LED current

