



## HIGH DENSITY MOUNTING PHOTOTRANSISTOR OPTICALLY COUPLED ISOLATORS

### DESCRIPTION

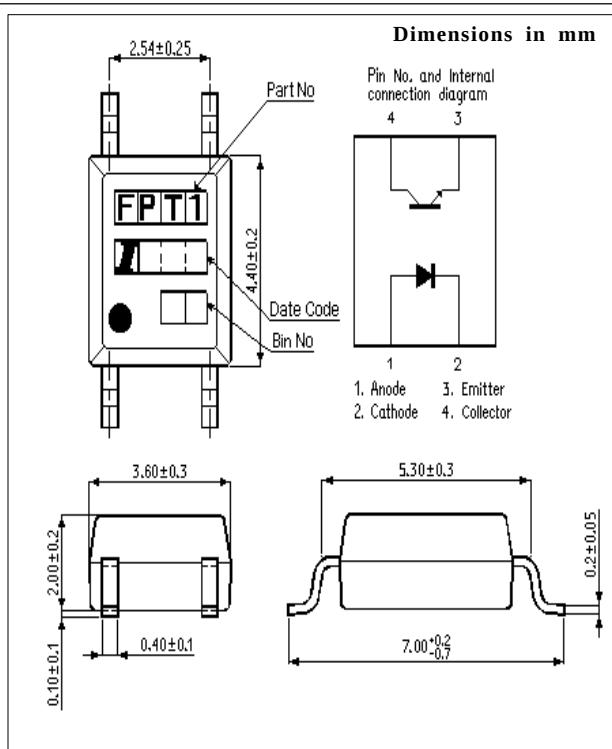
The IS357 is an optically coupled isolator consisting of an infrared light emitting diode and NPN silicon photo transistor in a space efficient dual in line plastic package.

### FEATURES

- Marked as FPT1.
- Current Transfer Ratio MIN. 50%
- Isolation Voltage (3.75kV<sub>RMS</sub>, 5.3kV<sub>PK</sub>)
- All electrical parameters 100% tested
- Drop in replacement for Sharp PC357

### APPLICATIONS

- Computer terminals
- Industrial systems controllers
- Measuring instruments
- Signal transmission between systems of different potentials and impedances



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**ABSOLUTE MAXIMUM RATINGS**  
(25°C unless otherwise specified)

Storage Temperature \_\_\_\_\_ -40°C to + 125°C  
Operating Temperature \_\_\_\_\_ -30°C to + 100°C  
Lead Soldering Temperature  
(1/16 inch (1.6mm) from case for 10 secs) 260°C

**INPUT DIODE**

Forward Current \_\_\_\_\_ 50mA  
Reverse Voltage \_\_\_\_\_ 6V  
Power Dissipation \_\_\_\_\_ 70mW

**OUTPUT TRANSISTOR**

Collector-emitter Voltage  $BV_{CEO}$  \_\_\_\_\_ 35V  
Emitter-collector Voltage  $BV_{ECO}$  \_\_\_\_\_ 6V  
Power Dissipation \_\_\_\_\_ 150mW

**POWER DISSIPATION**

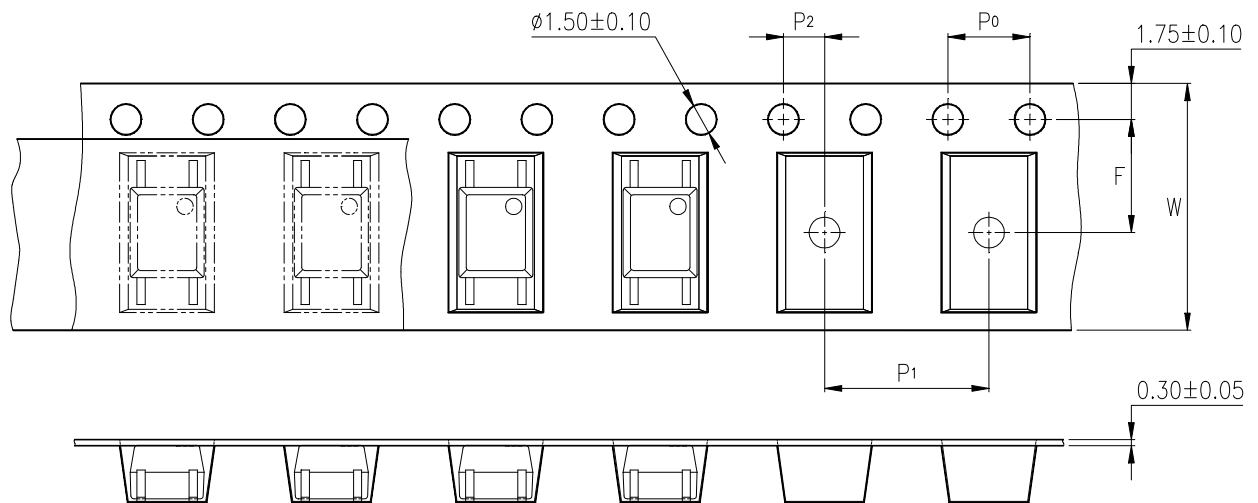
Total Power Dissipation \_\_\_\_\_ 170mW  
(derate linearly 2.26mW/°C above 25°C)

**ELECTRICAL CHARACTERISTICS (  $T_A = 25^\circ\text{C}$  Unless otherwise noted )**

| PARAMETER |                                                    | MIN                | TYP | MAX | UNITS                 | TEST CONDITION                        |
|-----------|----------------------------------------------------|--------------------|-----|-----|-----------------------|---------------------------------------|
| Input     | Forward Voltage ( $V_F$ )                          |                    | 1.2 | 1.4 | V                     | $I_F = 20\text{mA}$                   |
|           | Reverse Voltage ( $V_R$ )                          | 5                  |     |     | V                     | $I_R = 10\mu\text{A}$                 |
|           | Reverse Current ( $I_R$ )                          |                    |     | 10  | $\mu\text{A}$         | $V_R = 4\text{V}$                     |
| Output    | Collector-emitter Breakdown ( $BV_{CEO}$ )         | 35                 |     |     | V                     | $I_C = 0.5\text{mA}$                  |
|           | Emitter-collector Breakdown ( $BV_{ECO}$ )         | 6                  |     |     | V                     | $I_E = 0.1\text{mA}$                  |
|           | Collector-emitter Dark Current ( $I_{CEO}$ )       |                    |     | 100 | nA                    | $V_{CE} = 20\text{V}$                 |
| Coupled   | Current Transfer Ratio (CTR)                       | 50                 |     | 600 | %                     | $5\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | Optional CTR Grades: IS357A                        | 80                 |     | 160 | %                     | $5\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | IS357B                                             | 130                |     | 260 | %                     | $5\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | IS357C                                             | 200                |     | 400 | %                     | $5\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | IS357D                                             | 300                |     | 600 | %                     | $5\text{mA } I_F, 5\text{V } V_{CE}$  |
|           | Collector-emitter Saturation Voltage $V_{CE(SAT)}$ |                    |     | 0.2 | V                     | $20\text{mA } I_F, 1.0\text{mA } I_C$ |
|           | Input to Output Isolation Voltage $V_{ISO}$        | 3750<br>5300       |     |     | $V_{RMS}$<br>$V_{PK}$ | See note 1<br>See note 1              |
|           | Input-output Isolation Resistance $R_{ISO}$        | $5 \times 10^{10}$ |     |     | $\Omega$              | $V_{IO} = 500\text{V}$ (note 1)       |
|           | Output Rise Time $t_r$                             |                    | 4   | 18  | $\mu\text{s}$         | $V_{CE} = 2\text{V}$ ,                |
|           | Output Fall Time $t_f$                             |                    | 3   | 18  | $\mu\text{s}$         | $I_C = 2\text{mA}, R_L = 100\Omega$   |

Note 1 Measured with input leads shorted together and output leads shorted together.

## TAPING DIMENSIONS



| Description                            | Symbol | Dimensions in mm ( inches ) |
|----------------------------------------|--------|-----------------------------|
| Tape wide                              | W      | $12 \pm 0.3$ ( .47 )        |
| Pitch of sprocket holes                | $P_0$  | $4 \pm 0.1$ ( .15 )         |
| Distance of compartment                | F      | $5.5 \pm 0.1$ ( .217 )      |
| Distance of compartment to compartment | $P_1$  | $2 \pm 0.1$ ( .079 )        |
|                                        |        | $8 \pm 0.1$ ( .315 )        |

## CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Ambient Temperature

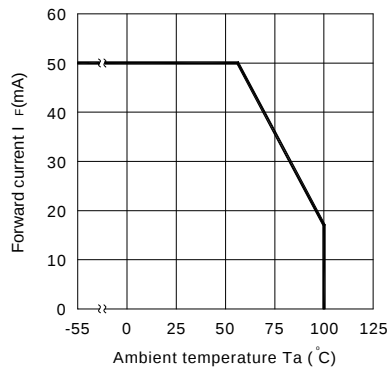


Fig.2 Collector Power Dissipation vs. Ambient Temperature

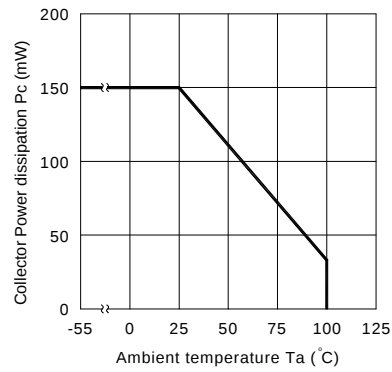


Fig.3 Collector-emitter Saturation Voltage vs. Forward Current

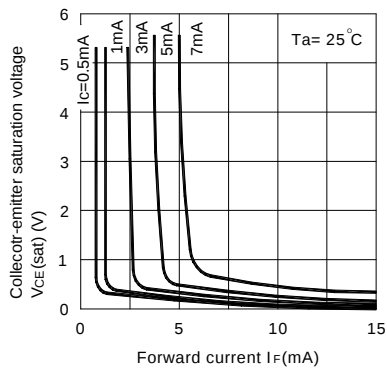


Fig.4 Forward Current vs. Forward Voltage

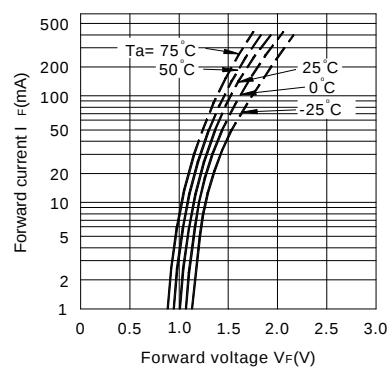


Fig.5 Current Transfer Ratio vs. Forward Current

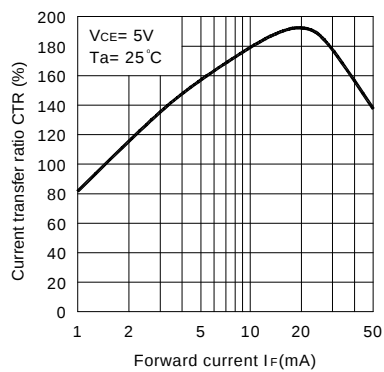
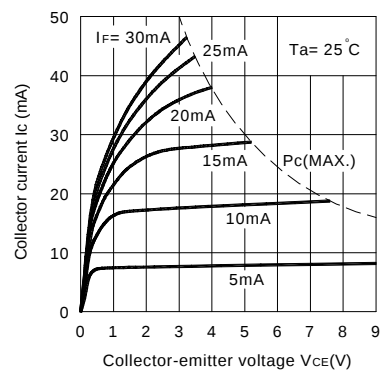


Fig.6 Collector Current vs. Collector-emitter Voltage



## CHARACTERISTIC CURVES

Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

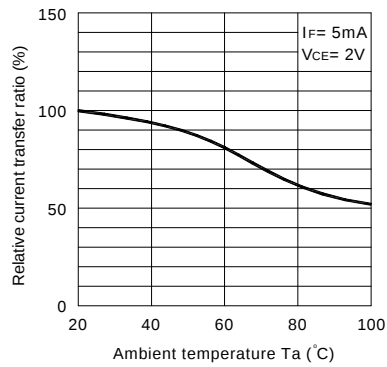


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

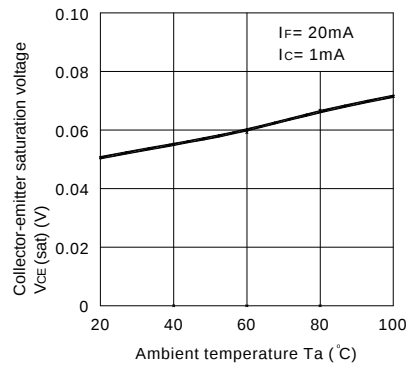


Fig.9 Collector Dark Current vs. Ambient Temperature

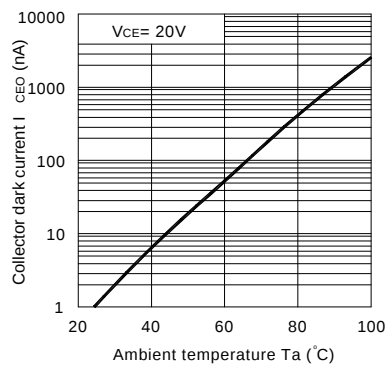


Fig.10 Response Time vs. Load Resistance

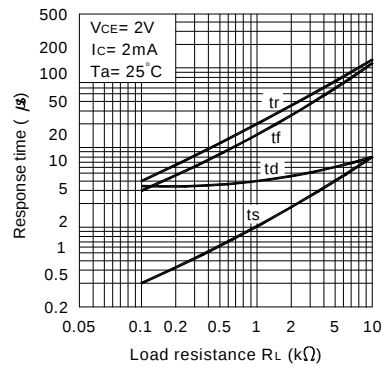
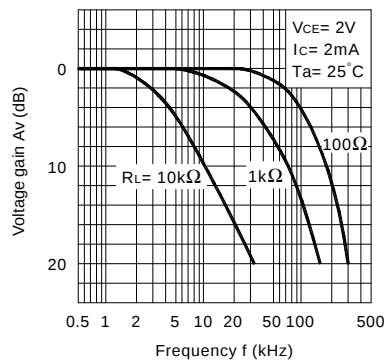
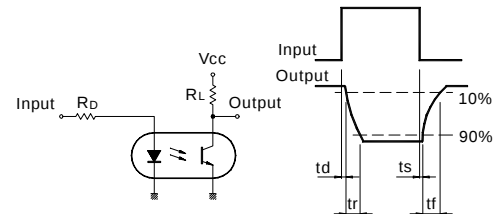


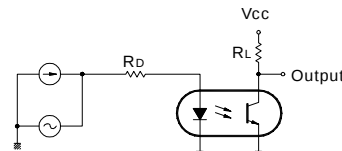
Fig.11 Frequency Response



Test Circuit for Response Time

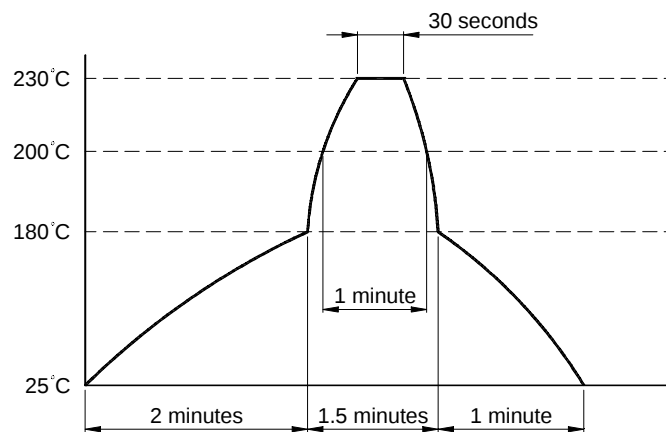


Test Circuit for Frequency Response



## TEMPERATURE PROFILE OF SOLDERING REFLOW

- (1) One time soldering reflow is recommended within the condition of temperature and time profile shown below.



- (2) When using another soldering method such as infrared ray lamp, the temperature may rise partially in the mold of the device.  
Keep the temperature on the package of the device within the condition of above (1).