

IS452

# HIGH DENSITY MOUNTING HIGH VOLTAGE DARLINGTON OPTICALLY COUPLED ISOLATORS



## DESCRIPTION

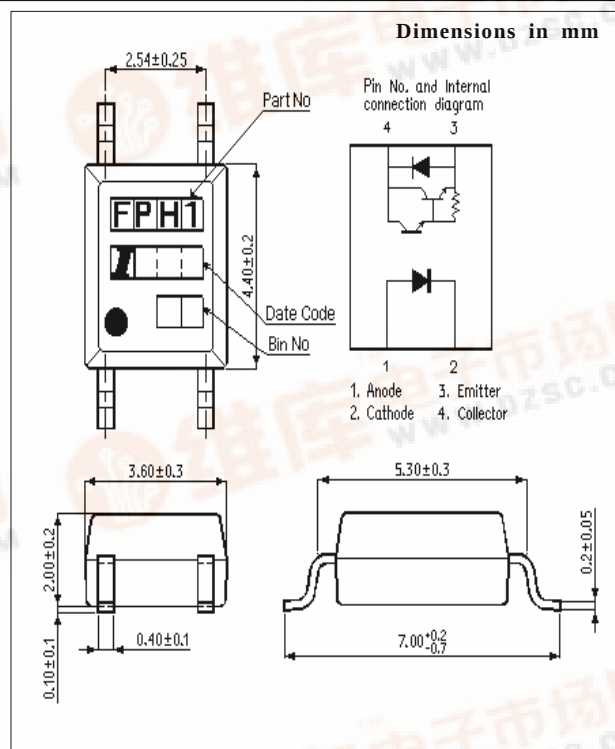
The IS452 is an optically coupled isolator consisting of an infrared light emitting diode and a high voltage NPN silicon photo darlington which has an integral base-emitter resistor to optimise switching speed and elevated temperature characteristics in a space efficient dual in line plastic package.

## FEATURES

- Marked as FPH1.
- Current Transfer Ratio MIN. 1000%
- High collector-emitter voltage,  $V_{ce}=300V$
- Isolation Voltage ( $3.75kV_{RMS}, 5.3kV_{PK}$ )
- All electrical parameters 100% tested
- Drop in replacement for Sharp PC452

## 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                       | _____ | -55°C to + 150°C |
| Operating Temperature                     | _____ | -55°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 $BV_{CEO}$ | _____ | 300V  |
| Emitter-collector Voltage $BV_{ECO}$ | _____ | 0.1V  |
| Power Dissipation                    | _____ | 150mW |

**POWER DISSIPATION**

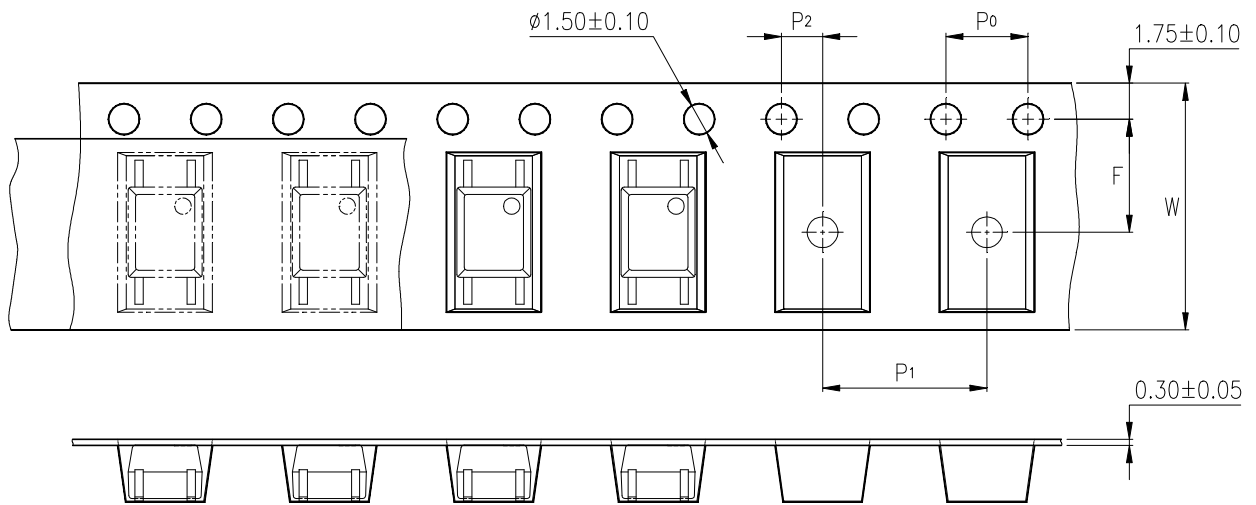
|                                        |       |       |
|----------------------------------------|-------|-------|
| Total Power Dissipation                | _____ | 170mW |
| (derate linearly 2.26mW/°C above 25°C) |       |       |

**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                     | $I_F = 10\text{mA}$                   |
|           | 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 ( $BV_{CEO}$ )         | 300                |     |     | V                     | $I_C = 0.1\text{mA}$                  |
|           | Emitter-collector Breakdown ( $BV_{ECO}$ )         | 0.1                |     |     | V                     | $I_E = 10\mu\text{A}$                 |
|           | Collector-emitter Dark Current ( $I_{CEO}$ )       |                    |     | 200 | nA                    | $V_{CE} = 200\text{V}$                |
| Coupled   | Current Transfer Ratio (CTR)                       | 1000               |     |     | %                     | $1\text{mA } I_F, 2\text{V } V_{CE}$  |
|           | Collector-emitter Saturation Voltage $V_{CE(SAT)}$ |                    |     | 1.2 | V                     | $20\text{mA } I_F, 100\text{mA } I_C$ |
|           | 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 tr                                |                    | 4   | 18  | $\mu\text{s}$         | $V_{CE} = 2\text{V},$                 |
|           | Output Fall Time tf                                |                    | 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 ± 0.3 ( .47 )            |
| Pitch of sprocket holes                | P <sub>0</sub> | 4 ± 0.1 ( .15 )             |
| Distance of compartment                | F              | 5.5 ± 0.1 ( .217 )          |
|                                        | P <sub>2</sub> | 2 ± 0.1 ( .079 )            |
| Distance of compartment to compartment | P <sub>1</sub> | 8 ± 0.1 ( .315 )            |

## CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Ambient Temperature

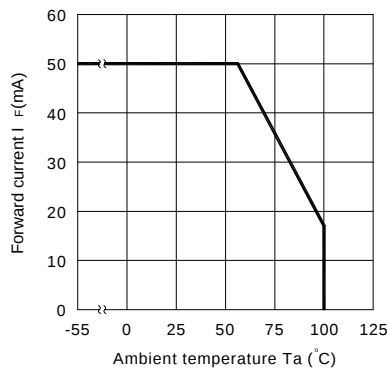


Fig.2 Collector Power Dissipation vs. Ambient Temperature

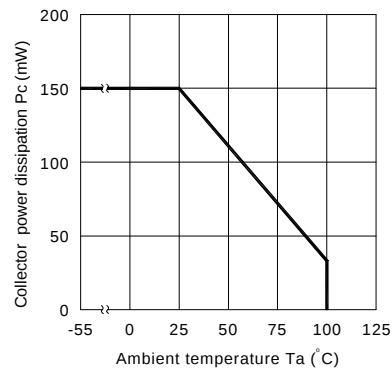


Fig.3 Collector-emitter saturation Voltage vs. Forward current

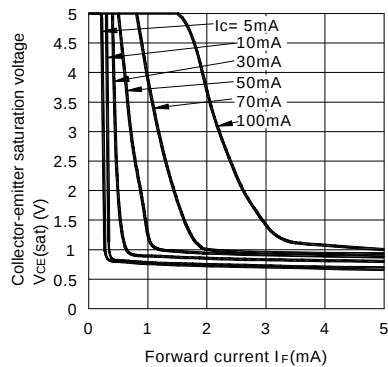


Fig.4 Forward Current vs. Forward Voltage

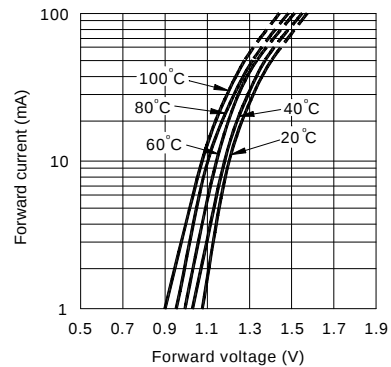


Fig.5 Current Transfer Ratio vs. Forward Current

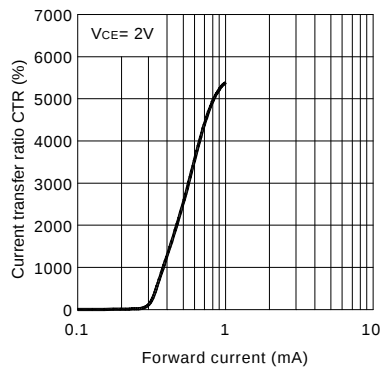
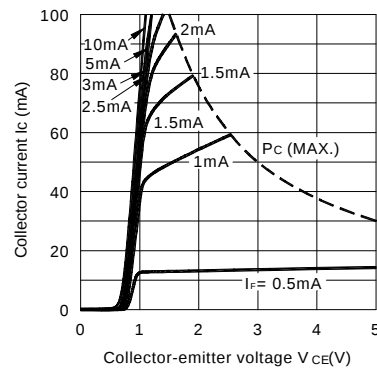


Fig.6 Collector Current vs. Collector-emitter Voltage



## CHARACTERISTIC CURVES

Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

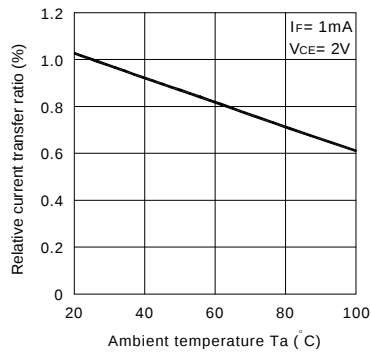


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

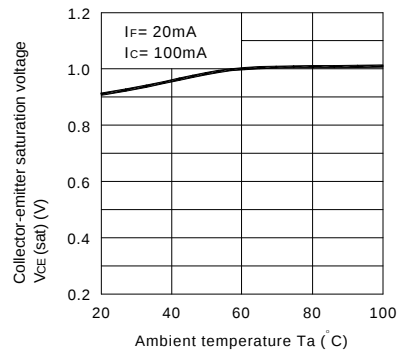


Fig.9 Collector Dark Current vs. Temperature

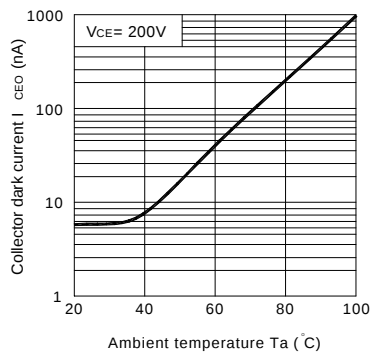


Fig.10 Response Time vs. Load Resistance

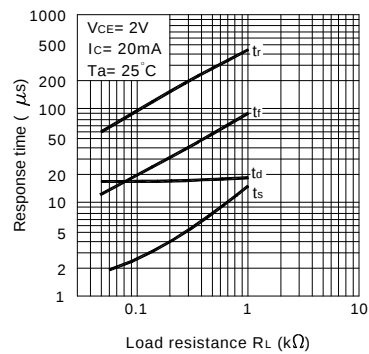
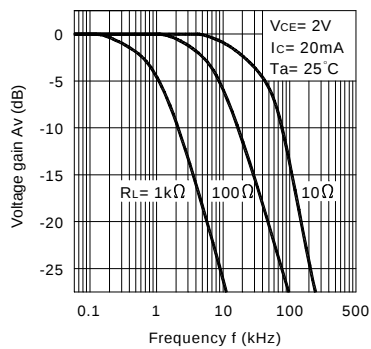
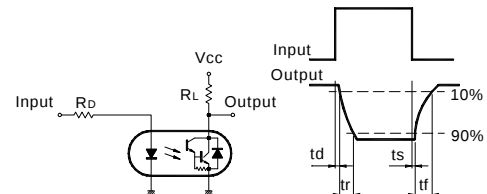


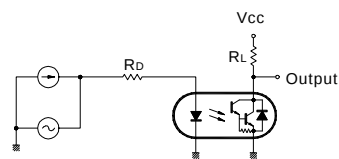
Fig.11 Frequency Response



Test Circuit for Response Time

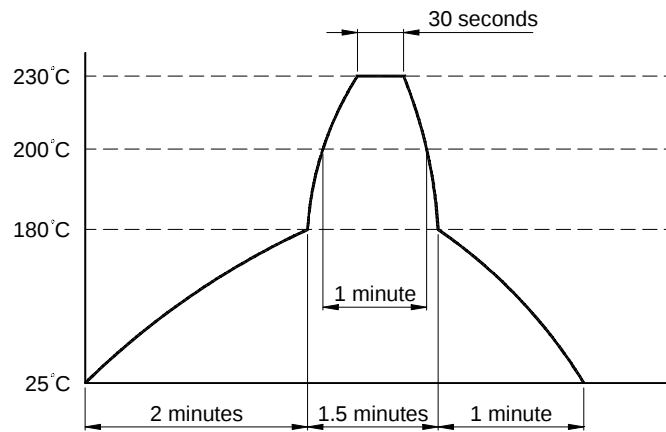


Test Circuit for Frequency Response



## 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).