

# NEC

## HIGH ISOLATION VOLTAGE AC INPUT RESPONSE TYPE MULTI OPTOCOUPLER SERIES

PS2505-1, -2, -4  
PS2505L-1, -2, -4

### FEATURES

- **HIGH ISOLATION VOLTAGE**  
BV: 5 kVr.m.s. MIN
- **HIGH COLLECTOR TO EMITTER VOLTAGE**  
V<sub>CEO</sub>: 80 V MIN
- **HIGH CURRENT TRANSFER RATIO**  
CTR: 300% TYP
- **HIGH SPEED SWITCHING**  
tr = 3 μs, tf = 5 μs TYP
- **LOW COST**
- **ISOLATED CHANNELS PER EACH PACKAGE**
- **AC INPUT RESPONSE**

### DESCRIPTION

PS2505-1, -2, and -4 and PS2505L-1, -2, and -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor. PS2505-1, -2, and -4 are in a plastic DIP (Dual In-line Package) and PS2505-1, -2, and -4 are in a lead bending type (Gull-wing) for surface mount.

### APPLICATIONS

Interface circuit for various instrumentations and control equipments.

- **AC LINE / DIGITAL LOGIC**
- **DIGITAL LOGIC / DIGITAL LOGIC**
- **TWISTED PAIR LINE RECEIVER**
- **TELEPHONE / TELEGRAPH LINE RECEIVER**
- **SEQUENCE CONTROLLERS**
- **SYSTEMS APPLICATIONS, MEASURING INSTRUMENTS**

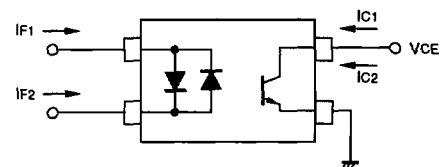
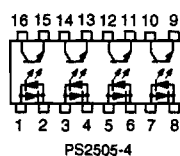
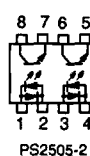
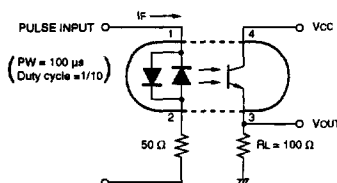
### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

| PART NUMBER |                                    |                                                                                                |       | PS2505-1, -2, -4<br>PS2505L-1, -2, -4 |      |     |
|-------------|------------------------------------|------------------------------------------------------------------------------------------------|-------|---------------------------------------|------|-----|
|             | SYMBOLS                            | PARAMETERS                                                                                     | UNITS | MIN                                   | TYP  | MAX |
| Diode       | V <sub>F</sub>                     | Forward Voltage, I <sub>F</sub> = ±10 mA                                                       | V     |                                       | 1.17 | 1.4 |
|             | C                                  | Junction Capacitance, V = 0, f = 1.0 MHz                                                       | pF    |                                       | 100  |     |
| Transistor  | I <sub>CEO</sub>                   | Collector to Emitter Dark Current, V <sub>ce</sub> = 80 V, I <sub>F</sub> = 0                  | nA    |                                       |      | 100 |
|             | BV <sub>CEO</sub>                  | Collector to Emitter Breakdown Voltage, I <sub>c</sub> = 1 mA, I <sub>B</sub> = 0              | V     |                                       | 40   | 60  |
|             | BV <sub>ECO</sub>                  | Emitter to Collector Breakdown Voltage, I <sub>E</sub> = 100 μA, I <sub>B</sub> = 0            | V     |                                       | 7    | 9   |
| Coupled     | CTR                                | Current Transfer Ratio, I <sub>F</sub> = ±5 mA, V <sub>CE</sub> = 5 V                          | %     | 80                                    | 300  | 600 |
|             | V <sub>CE (sat)</sub>              | Collector Saturation Voltage, I <sub>F</sub> = ±10 mA, I <sub>c</sub> = 2 mA                   | V     |                                       |      | 0.3 |
|             | R 1-2                              | Isolation Resistance, V <sub>in-out</sub> = 1.0 kV                                             | Ω     | 10 <sup>11</sup>                      |      |     |
|             | C 1-2                              | Isolation Capacitance, V = 0, f = 1.0 MHz                                                      | pF    |                                       | 0.5  |     |
|             | tr                                 | Rise Time <sup>1</sup> , V <sub>CC</sub> = 10 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω | μs    |                                       | 3    |     |
|             | tf                                 | Fall Time <sup>1</sup> , V <sub>CC</sub> = 10 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω | μs    |                                       | 5    |     |
|             | CTR <sub>1</sub> /CTR <sub>2</sub> | CTR <sup>2</sup> Ratio, I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V                           |       | 0.3                                   | 0.1  | 3.0 |

Notes:

1. Test Circuit for Switching Time

$$2. CTR_1 = \frac{I_{C1}}{I_{F1}}, CTR_2 = \frac{I_{C2}}{I_{F2}}$$



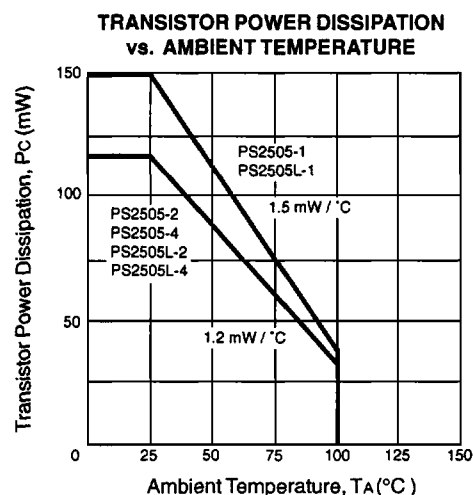
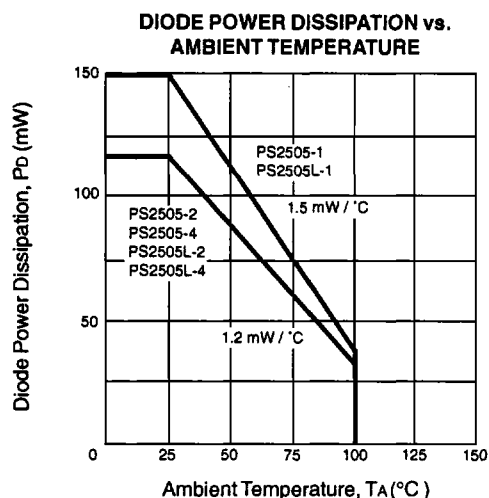
# ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

| SYMBOLS               | PARAMETERS                                                          | UNITS               | RATINGS               |                            |
|-----------------------|---------------------------------------------------------------------|---------------------|-----------------------|----------------------------|
|                       |                                                                     |                     | PS2505-1<br>PS2505L-1 | PS2505-2,4<br>PS2505L-2, 4 |
| Diode                 |                                                                     |                     |                       |                            |
| I <sub>F</sub>        | Forward Current                                                     | mA                  | 80                    | 80                         |
| P <sub>D</sub>        | Power Dissipation                                                   | mW/Ch               | 150                   | 120                        |
| I <sub>F</sub> (PEAK) | Peak Forward Current<br>(P <sub>W</sub> = 100 μs,<br>Duty Cycle 1%) | A                   | 1                     | 1                          |
| Transistor            |                                                                     |                     |                       |                            |
| V <sub>CEO</sub>      | Collector to Emitter Voltage                                        | V                   | 80                    | 80                         |
| V <sub>ECO</sub>      | Emitter to Collector Voltage                                        | V                   | 7                     | 7                          |
| I <sub>C</sub>        | Collector Current                                                   | mA                  | 50                    | 50                         |
| P <sub>C</sub>        | Power Dissipation                                                   | mW/Ch               | 150                   | 120                        |
| Coupled               |                                                                     |                     |                       |                            |
| BV                    | Isolation Voltage <sup>2</sup>                                      | V <sub>r.m.s.</sub> | 5000                  | 5000                       |
| T <sub>STG</sub>      | Storage Temperature                                                 | °C                  | -55 to +150           | -55 to +150                |
| T <sub>OPT</sub>      | Operating Temperature                                               | °C                  | -55 to +100           | -55 to +100                |
| T <sub>SOL</sub>      | Lead Temperature<br>(Soldering 10 s)                                | °C                  | 260                   | 260                        |
| P <sub>T</sub>        | Total Power Dissipation                                             | mW/Ch               | 250                   | 200                        |

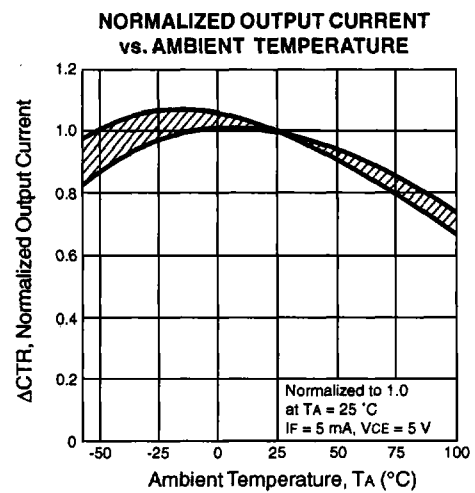
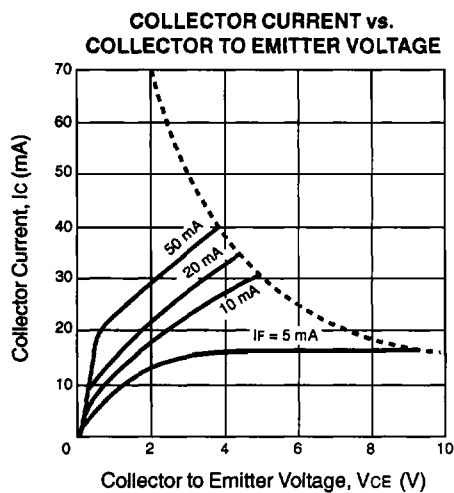
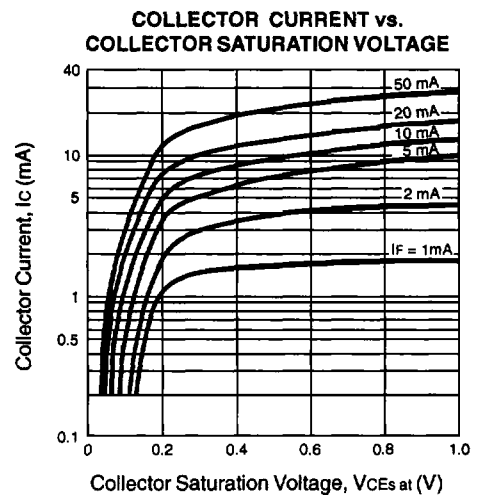
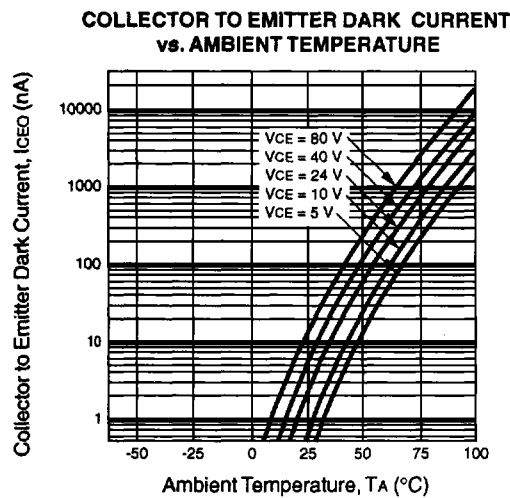
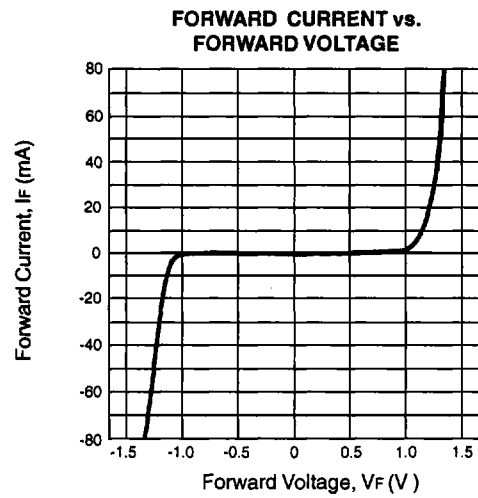
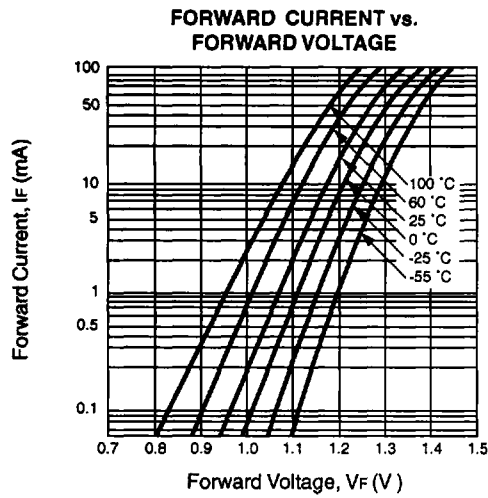
## Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input and output.

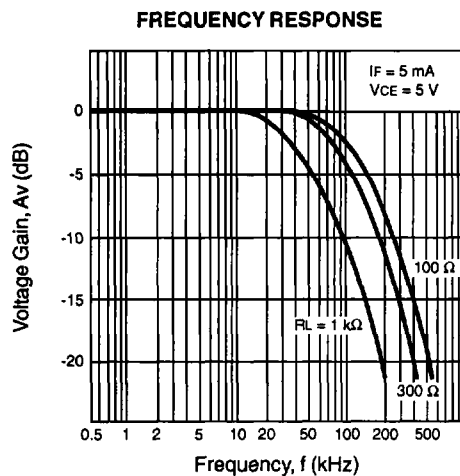
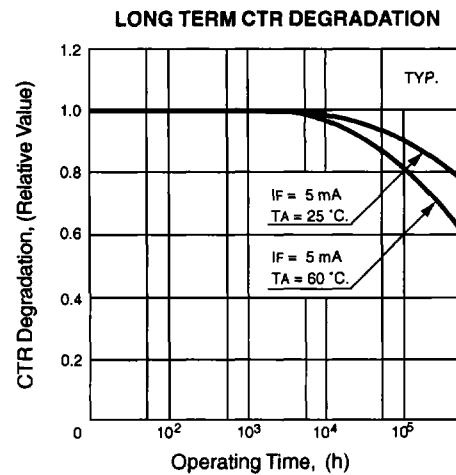
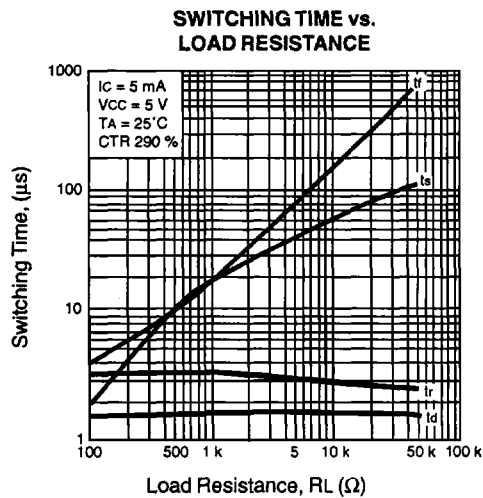
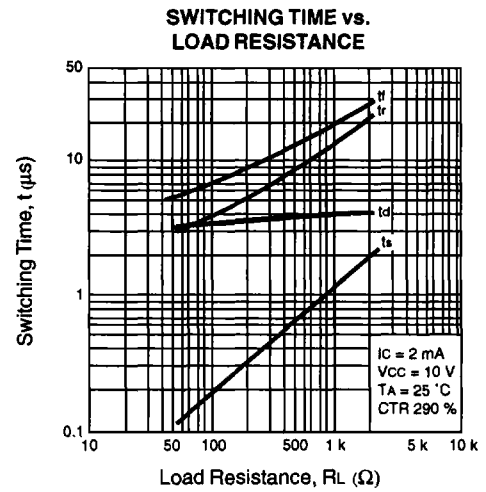
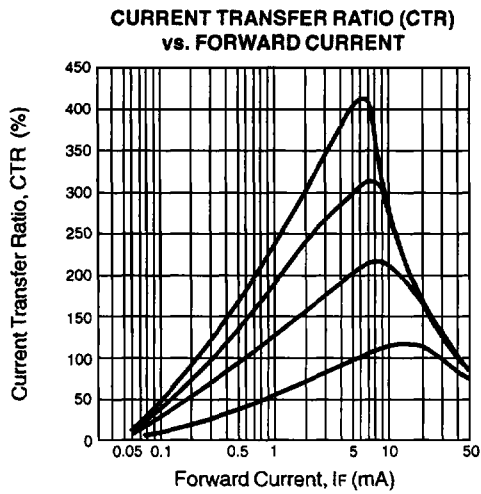
# TYPICAL PERFORMANCE CURVES (T<sub>A</sub> = 25° C)



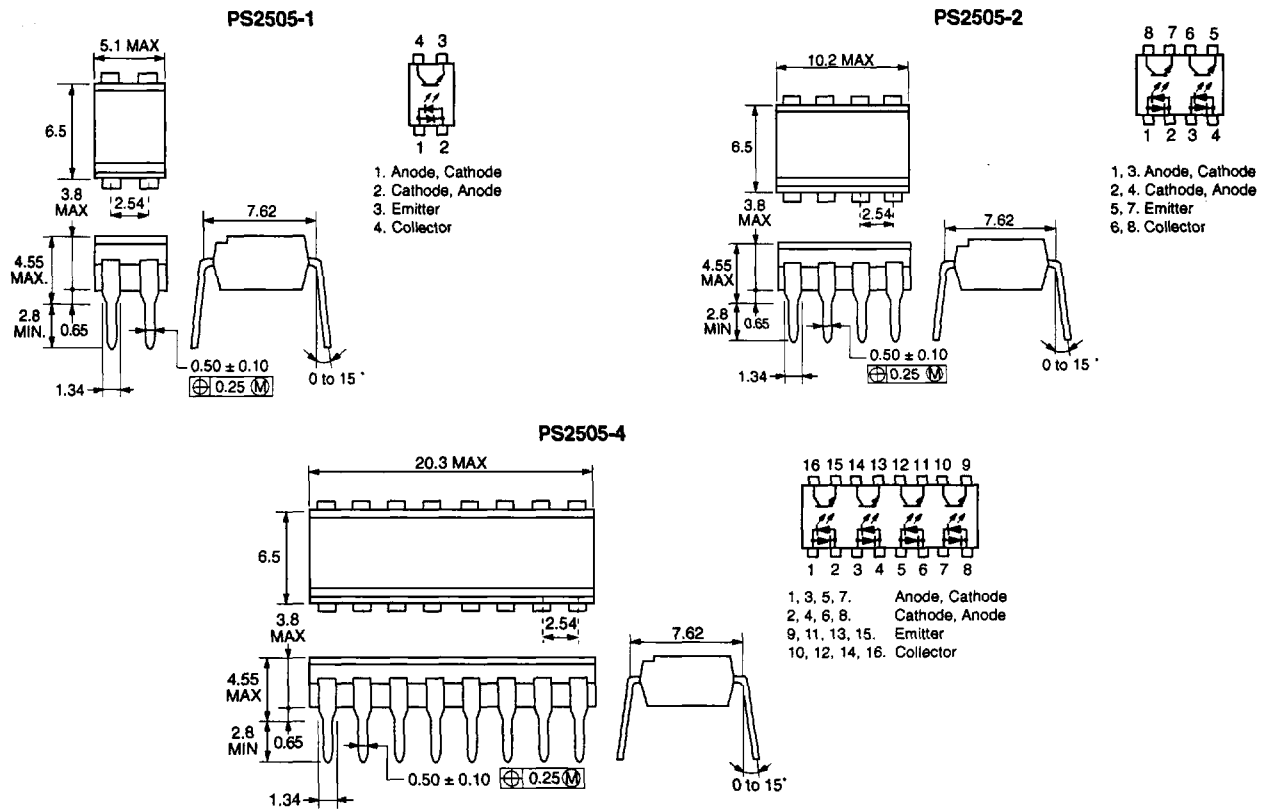
# TYPICAL PERFORMANCE CURVES ( $T_A = 25^\circ\text{C}$ )



**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )



# OUTLINE DIMENSIONS (Units in mm)



# OUTLINE DIMENSIONS (Units in mm)

