

# NEC HIGH ISOLATION VOLTAGE AC INPUT DARLINGTON TRANSISTOR TYPE SOP OPTOCOUPLER

PS2806-1  
PS2806-4

## FEATURES

- **HIGH ISOLATION VOLTAGE**  
BV: 2500 kVr.m.s.
- **SMALL THIN PACKAGE**  
4, 16 pin SOP, pin pitch 1.27 mm
- **AC INPUT RESPONSE**
- **HIGH CURRENT TRANSFER RATIO**  
CTR = 2000% TYP @  $I_F = \pm 1$  mA,  $V_{CE} = 2$  V
- **AVAILABLE IN TAPE AND REEL**  
PS2806-1-F3, PS2806-4-F3

## DESCRIPTION

PS2806-1 and PS2806-4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon Darlington-connected phototransistor in a plastic SOP (Small Out-Line Package) for high density applications. This device has a shield effect to cut off ambient light.

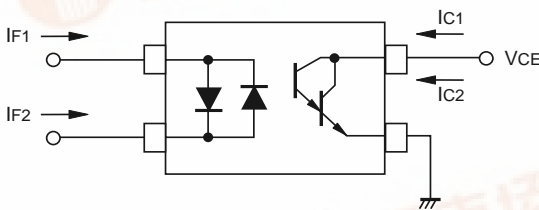
## APPLICATIONS

- PROGRAMMABLE LOGIC CONTROLLERS
- MEASURING INSTRUMENTS
- HYBRID IC

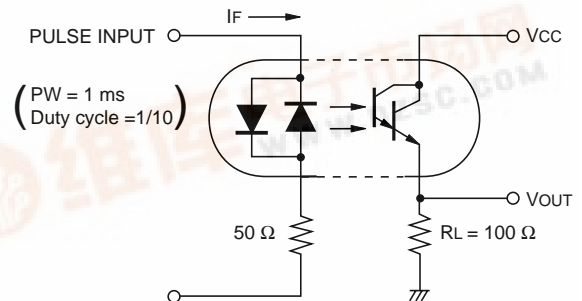
## ELECTRICAL CHARACTERISTICS (TA = 25°C)

| PART NUMBER    |   |  | PS2806-1, PS2806-4 |                  |      |
|----------------|---|--|--------------------|------------------|------|
| SYMBOLS        | PARAMETERS  | UNITS  | MIN                | TYP              | MAX  |
| Diode          | V <sub>F</sub>  | Forward Voltage, I <sub>F</sub> = ± 5 mA   | V                  | 1.1              | 1.4  |
|                | C <sub>t</sub>  | Terminal Capacitance, V = 0, f = 1 MHz   | pF                 | 30               |      |
| Transistor     | I <sub>CEO</sub>  | Collector to Emitter Dark Current<br>V <sub>CE</sub> = 40 V, I <sub>F</sub> = 0                          | nA                 |                  | 400  |
| Coupled        | CTR   | Current Transfer Ratio, (I <sub>c</sub> /I <sub>F</sub> ) I <sub>F</sub> = ± 1 mA, V <sub>CE</sub> = 2 V | %                  | 200              | 2000 |
|                | CTR <sub>1</sub> /CTR <sub>2</sub>  | CTR Ratio <sup>1</sup> , I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 2 V                                    | %                  | 0.3              | 1.0  |
|                | V <sub>CE(sat)</sub>  | Collector Saturation Voltage, I <sub>F</sub> = ± 1 mA, I <sub>c</sub> = 2 mA                             | V                  |                  | 1.0  |
|                | R <sub>I-O</sub>  | Isolation Resistance, V <sub>in-out</sub> = 1.0 k Vdc  | Ω                  | 10 <sup>11</sup> |      |
|                | C <sub>i-O</sub>  | Isolation Capacitance, V = 0, f = 1 MHz  | pF                 |                  | 0.4  |
|                | t <sub>r</sub>  | Rise Time <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω            | μs                 |                  | 200  |
| t <sub>f</sub> | Fall Time <sup>2</sup> , V <sub>CC</sub> = 5 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω | μs   |                    | 200              |      |

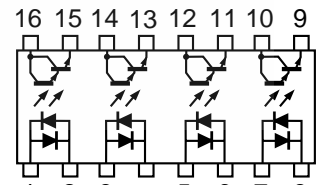
1.  $CTR_1 = \frac{I_{C1}}{I_{F1}}$ ,  $CTR_2 = \frac{I_{C2}}{I_{F2}}$



2. Test Circuit for Switching Time



PS2806-1



PS2806-4

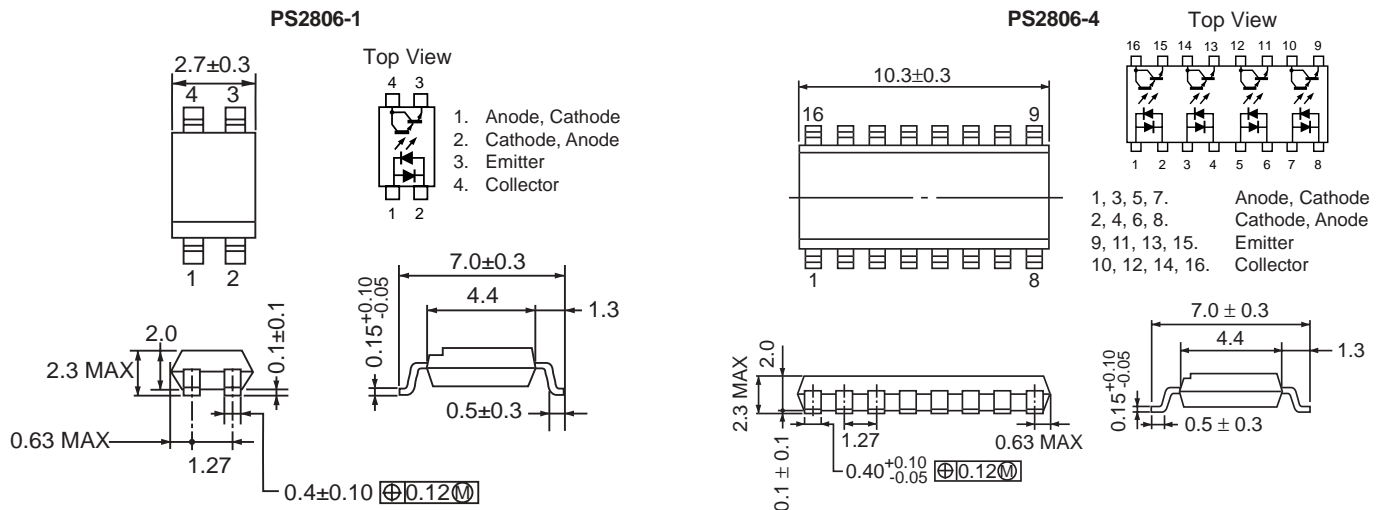
**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (T<sub>A</sub> = 25°C)

| SYMBOLS              | PARAMETERS                                    | UNITS               | RATINGS     |          |
|----------------------|---|---------------------|-------------|----------|
|                      |   |                     | PS2806-1    | PS2806-4 |
| Diode                |   |                     |             |          |
| I <sub>F</sub>       | Forward Current                               | mA                  | ±50         | ±50      |
| ΔP <sub>D</sub> /°C  | Power Dissipation Derating                    | mW/°C               | 0.6         | 0.8      |
| P <sub>D</sub>       | Power Dissipation                             | mW/Ch               | 60          | 80       |
| I <sub>F(Peak)</sub> | Forward Current<br>PW = 100 μs, Duty Cycle 1% | A                   | ±1          | ±1       |
| Transistor           |   |                     |             |          |
| V <sub>CEO</sub>     | Collector to Emitter Voltage                  | V                   | 40          | 40       |
| V <sub>ECO</sub>     | Emitter to Collector Voltage                  | V                   | 6           | 6        |
| I <sub>c</sub>       | Collector Current                             | mA/Ch               | 90          | 100      |
| ΔP <sub>c</sub> /°C  | Power Dissipation Derating                    | mW/°C               | 1.2         | 1.2      |
| P <sub>c</sub>       | Power Dissipation                             | mW/Ch               | 120         | 120      |
| Coupled              |   |                     |             |          |
| BV                   | Isolation Voltage <sup>2</sup>                | V <sub>r.m.s.</sub> | 2500        |          |
| T <sub>OP</sub>      | Operating Temperature                         | °C                  | -55 to +100 |          |
| T <sub>STG</sub>     | Storage Temperature                           | °C                  | -55 to +150 |          |

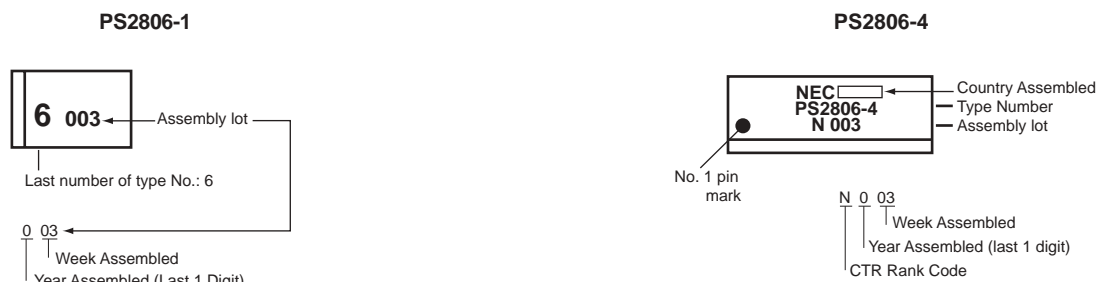
Notes:

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.

**OUTLINE DIMENSIONS** (Units in mm)



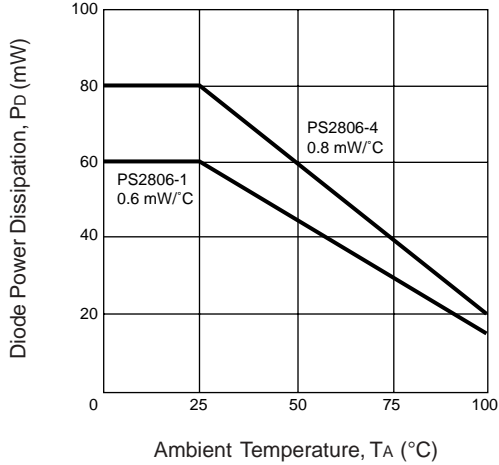
**MARKINGS**



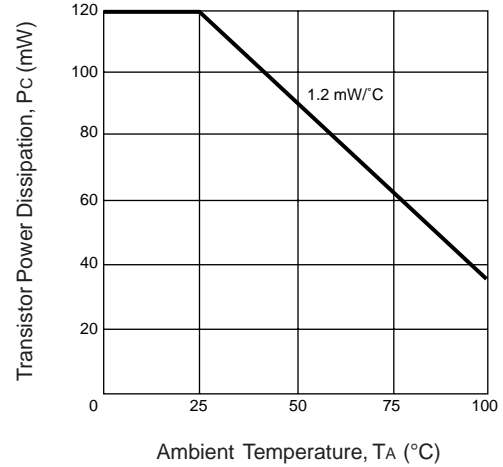
# PS2806-1, PS2806-4

## TYPICAL PERFORMANCE CURVES (TA = 25 °C)

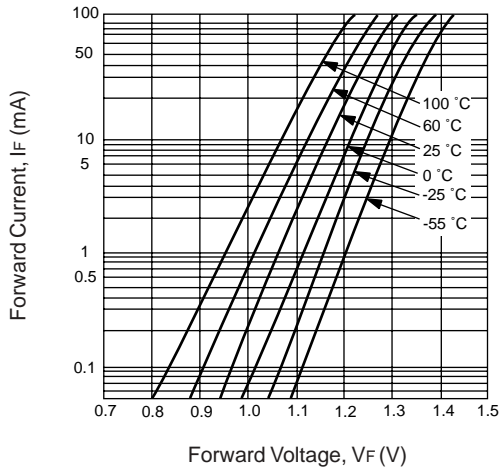
**DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE**



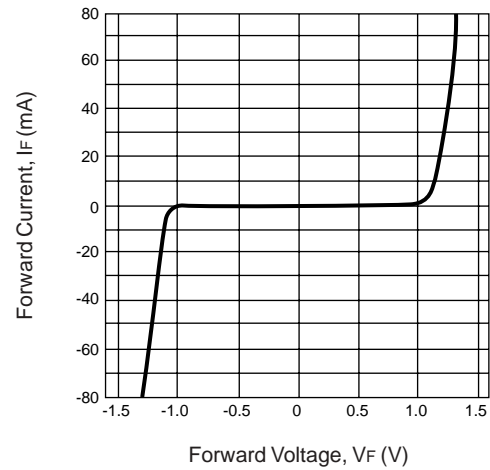
**TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE**



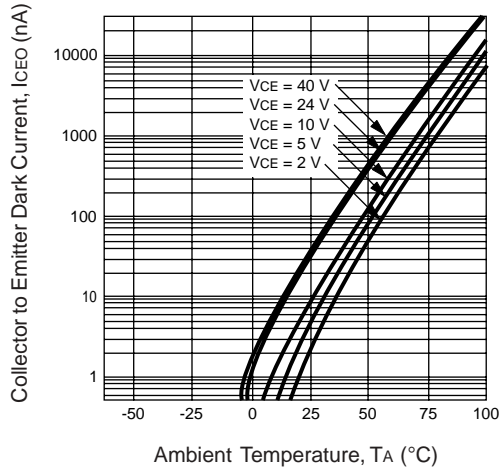
**FORWARD CURRENT vs. FORWARD VOLTAGE**



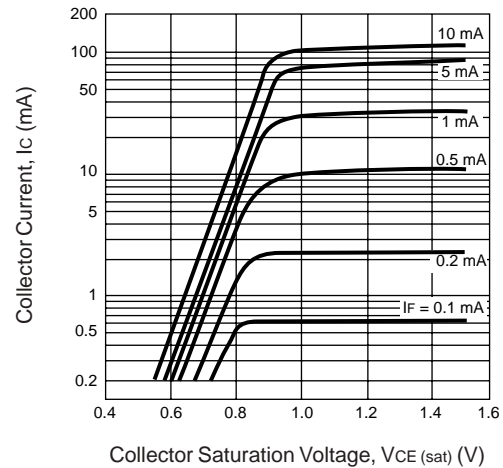
**FORWARD CURRENT vs. FORWARD VOLTAGE**



**COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE**

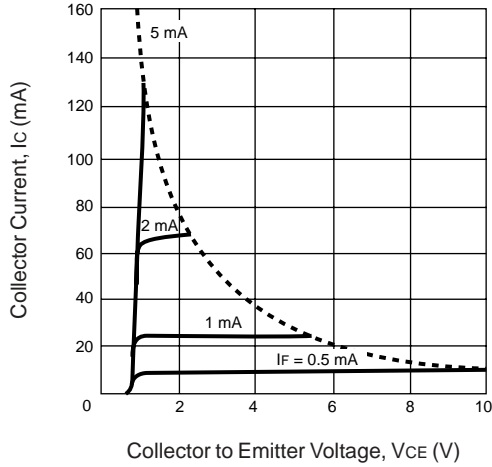


**COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE**

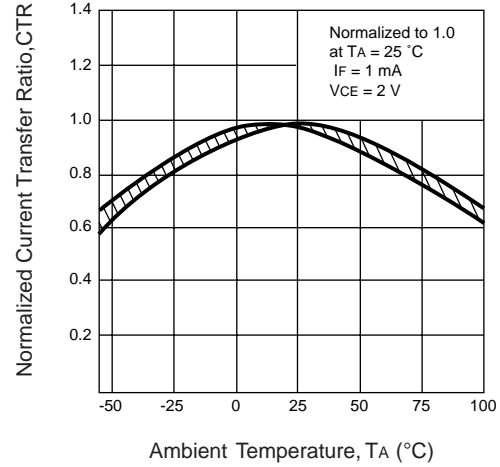


TYPICAL PERFORMANCE CURVES (TA = 25 °C)

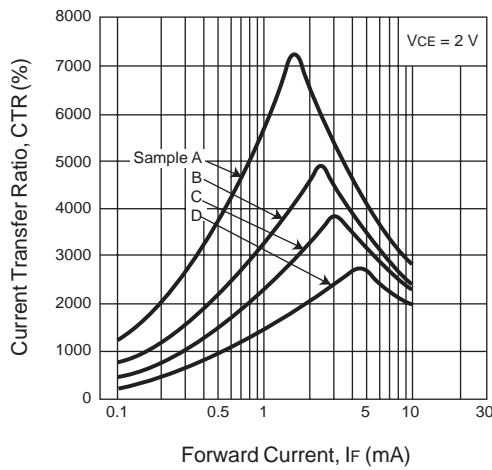
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



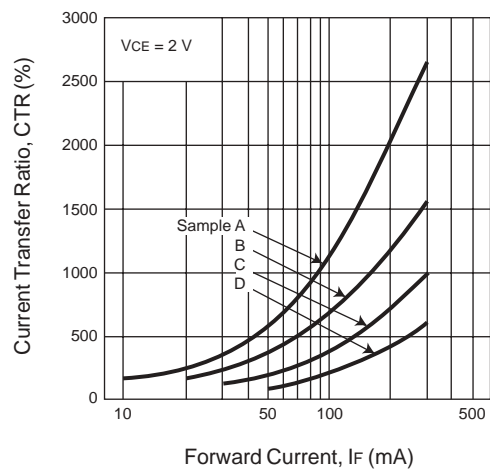
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



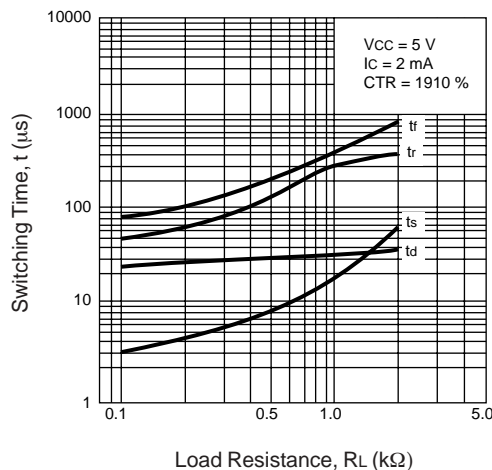
CURRENT TRANSFER RATIO (CTR) vs. FORWARD CURRENT



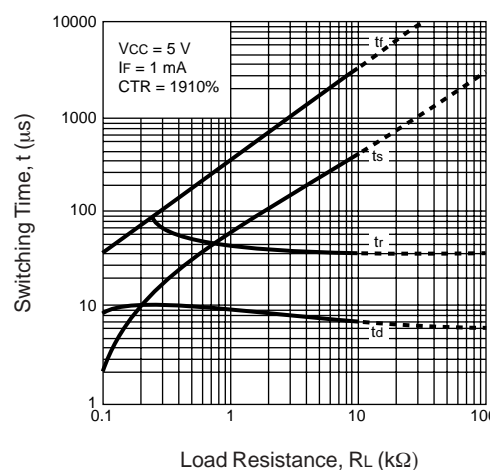
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE



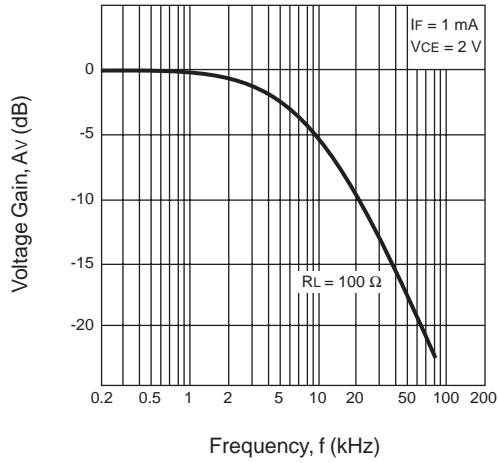
SWITCHING TIME vs. LOAD RESISTANCE



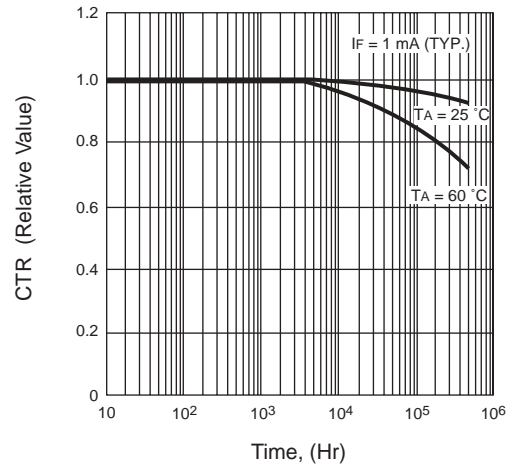
# PS2806-1, PS2806-4

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

### FREQUENCY RESPONSE

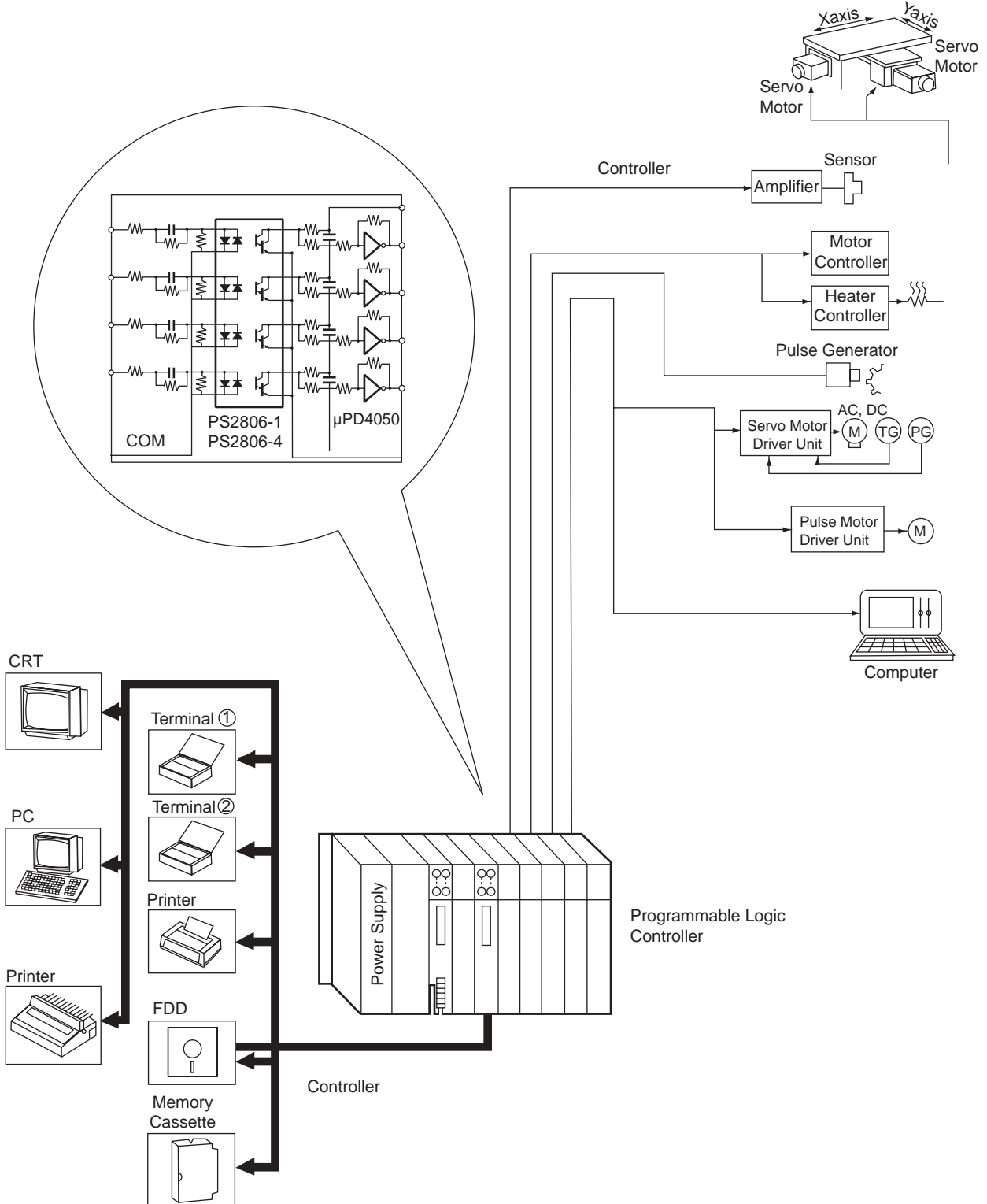


### LONG TERM CTR DEGRADATION



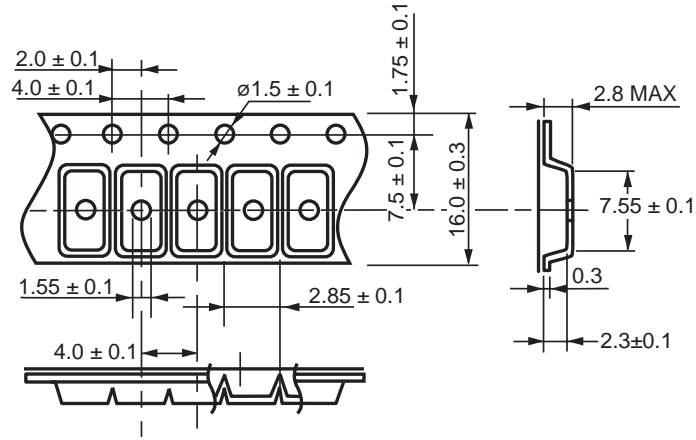
# PROGRAMMABLE LOGIC CONTROLLER EXAMPLE

Purpose: In-out interface

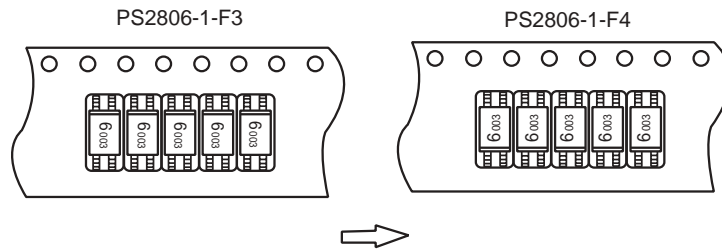


**TAPING SPECIFICATIONS** (Units in mm)

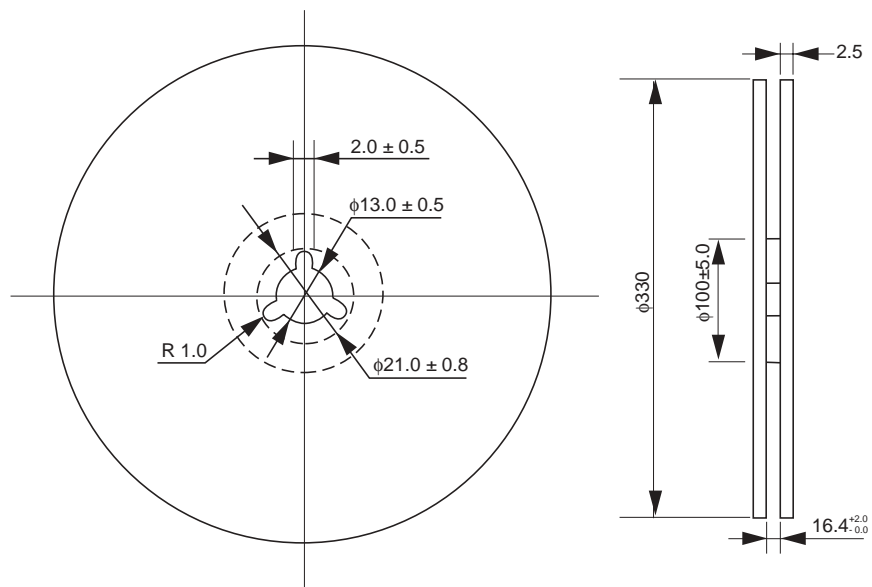
**TAPE OUTLINE AND DIMENSIONS**



**TAPE DIRECTION**



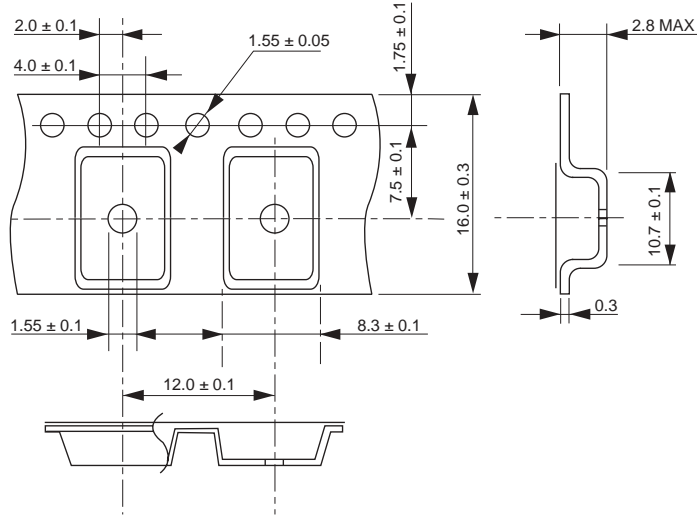
**REEL OUTLINE DIMENSIONS**



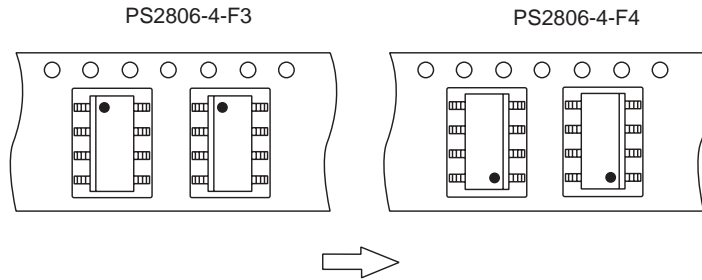
# PS2806-1, PS2806-4

## TAPING SPECIFICATIONS (Units in mm)

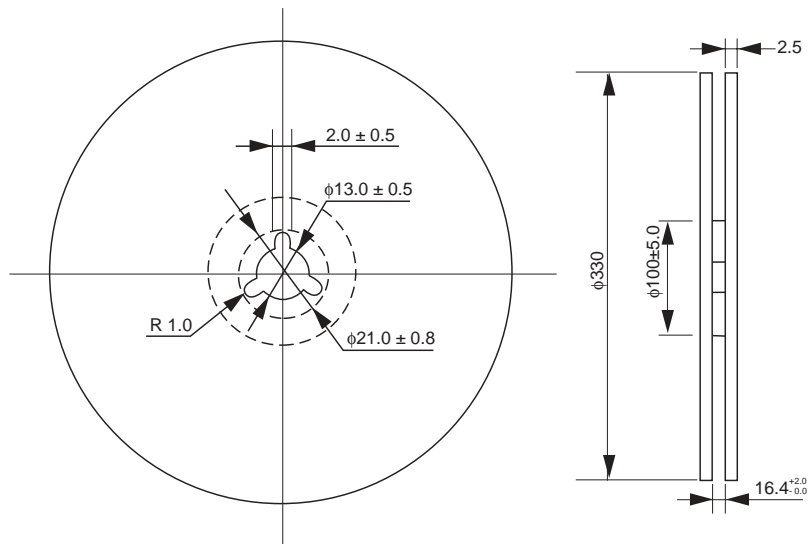
### TAPE OUTLINE AND DIMENSIONS



### TAPE DIRECTION



### REEL OUTLINE DIMENSIONS



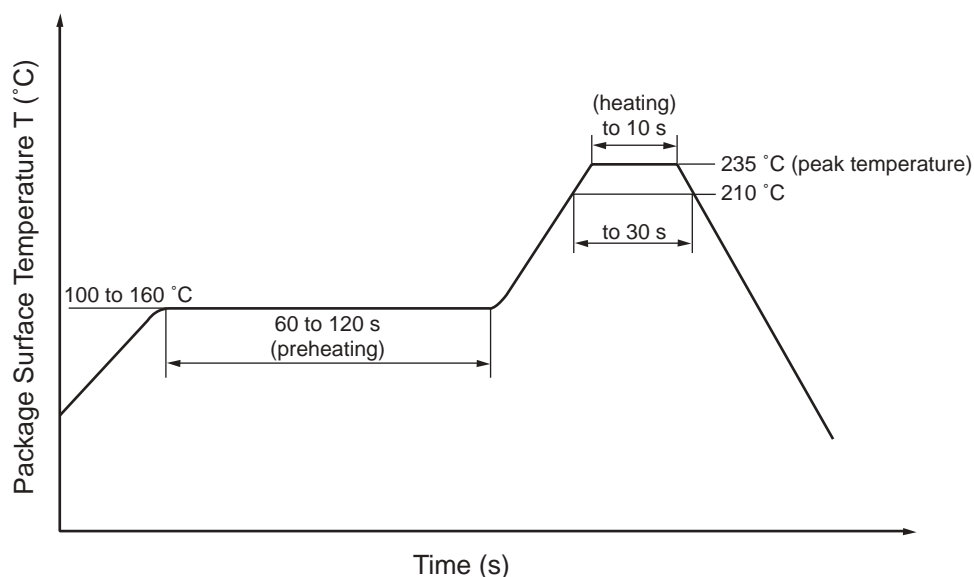
Packing: 2500 ppcs/reel



## RECOMMENDED SOLDERING CONDITIONS

### (1) Infrared reflow soldering

- Peak reflow temperature 235 °C (package surface temperature)
- Time of temperature higher than 210 °C 30 seconds or less
- Number of reflows Three
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended).



### (2) Dip soldering

- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- Number of times One
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended).

### (3) Cautions

- Fluxes Avoid removing the residual flux with chlorine-based cleaning solvent after a reflow process.

### CAUTIONS REGARDING NOISE

Be aware that when voltage is applied suddenly between the photocoupler's input and output or between corrector-emitters at start-up, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

#### Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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