# PHOTO COUPLERS

# PS2403-1,PS2403-2,PS2403-3,PS2403-4

## MULTI PHOTO COUPLER
## HIGH ISOLATION VOLTAGE
## SINGLE TRANSISTOR TYPE

### DESCRIPTION

The PS2403-1, -2, -3 and -4 series are optically coupled isolator containing a GaAs light emitting diode and an NPN silicon photo transistor. Each is mounted in a dual in-line package.

### FEATURES

- Small package size
- Each isolated channels per package
- High isolation voltage 5 000 $V_{ac}$ Rating
- Low input current
- Low cost
- UL recognized

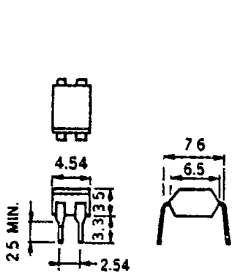
### APPLICATIONS

Interface circuit for various instrumentations, control equipments.

- AC Line/Digital Logic . . . . . .Isolate high voltage transients
- Digital Logic/Digital Logic. . . . . .Eliminate spurious ground loops
- Twisted pair line receiver. . . . . .Eliminate ground loop pick-up
- Telephone/Telegraph line receiver . . .Isolate high voltage transients
- High Frequency Power Supply Feedback Control . . . . . .Maintain floating ground
- Relay contact monitor . . . . . .Isolate floating grounds and transients
- Power Supply Monitor . . . . . .Isolate transients and ground systems

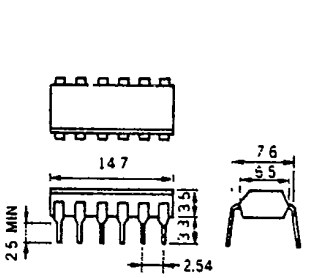
### PACKAGE DIMENSIONS (Unit : mm)

PS2403-1



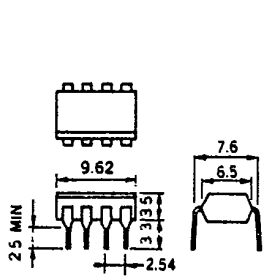

1. Anode
2. Cathode
3. Emitter
4. Collector

PS2403-3



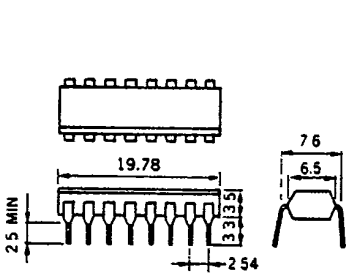

1. 3. 5. Anode
2. 4. 6. Cathode
7. 9. 11. Emitter
8. 10. 12. Collector

PS2403-2




1. 3. Anode
2. 4. Cathode
5. 7. Emitter
6. 8. Collector

PS2403-4




1. 3. 5. 7. Anode
2. 4. 6. 8. Cathode
9. 11. 13. 15. Emitter
10. 12. 14. 16. Collector

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T-41-83

## ABSOLUTE MAXIMUM RATINGS ($T_a$ = 25 °C)

| | | | | |
|---|---|---|---|---|
| Diode | | (PS2403-1) | (PS2403-2, PS2403-3, PS2403-4) | |
| Reverse Voltage | $V_R$ | 6.0 | 6.0 | V |
| Forward Current (DC) | $I_F$ | 50 | 50 | mA |
| Power Dissipation | $P_D$ | 150 | 120 | mW/Unit |
| Peak Forward Current (300 μs, 2 % duty cycle) | $I_{F(peak)}$ | 3 | 3 | A |
| Transistor | | | | |
| Collector to Emitter Voltage | $V_{CEO}$ | 40 | 40 | V |
| Emitter to Collector Voltage | $V_{ECO}$ | 7 | 7 | V |
| Collector Current | $I_C$ | 30 | 30 | mA |
| Power Dissipation | $P_C$ | 150 | 120 | mW/Unit |
| Isolation Voltage *1 | BV | 5000 | 5000 | $V_{ac}$ |
| Storage Temperature | $T_{stg}$ | −55 to +150 | −55 to +150 | °C |
| Operating Temperature | $T_{opt}$ | −55 to +100 | −55 to +100 | °C |
| Lead Temperature (Soldering 10 s) | $T_{sol}$ | 260 | 260 | °C |
| Total Power Dissipation | $P_T$ | 250 | 200 | mW/Unit |

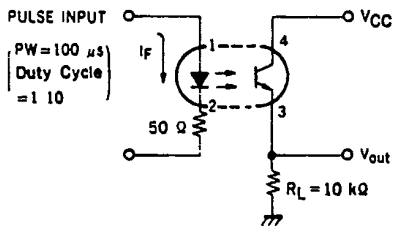
## ELECTRICAL CHARACTERISTICS ($T_a$ = 25 °C)

| | CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| Diode | Forward Voltage | $V_F$ | | 1.1 | 1.3 | V | $I_F$ = 1 mA |
| | Reverse Current | $I_R$ | | | 5 | μA | $V_R$ = 5 V |
| | Junction Capacitance | C | | 50 | | pF | V = 0, f = 1.0 MHz |
| Transistor | Collector to Emitter Dark Current | $I_{CEO}$ | | | 100 | nA | $V_{CE}$ = 40 V, $I_F$ = 0 |
| | Collector to Emitter Breakdown Voltage | $BV_{CEO}$ | 40 | 60 | | V | $I_C$ = 1 mA, $I_B$ = 0 |
| | Emitter to Collector Breakdown Voltage | $BV_{ECO}$ | 7 | 9 | | V | $I_E$ = 100 μA, $I_B$ = 0 |
| Coupled | Current Transfer Ratio *2 | CTR($I_C/I_F$) | 100 | 200 | 400 | % | $I_F$ = 1 mA, $V_{CE}$ = 5.0 V |
| | Collector Saturation Voltage | $V_{CE(sat)}$ | | | 0.25 | V | $I_F$ = 1 mA, $I_C$ = 0.2 mA |
| | Isolation Resistance | $R_{I-2}$ | $10^{11}$ | | | Ω | $V_{in-out}$ = 1.0 kV |
| | Isolation Capacitance | $C_{I-2}$ | | 0.5 | | pF | V = 0, f = 1.0 MHz |
| | Rise Time *3 | $t_r$ | | 8 | | μs | $V_{CC}$ = 5 V, $I_F$ = 1 mA, $R_L$ = 10 kΩ |
| | Fall Time *3 | $t_f$ | | 60 | | μs | $V_{CC}$ = 5 V, $I_F$ = 1 mA, $R_L$ = 10 kΩ |

*1 AC voltage for 1 minute at $T_a$ = 25 °C
RH = 60 %

*2 CTR rank (Only PS2403-1)
KY: 200 % to 400 %
LY: 150 % to 300 %
MY: 100 % to 200 %

* 3 Test Circuit for Switching Time



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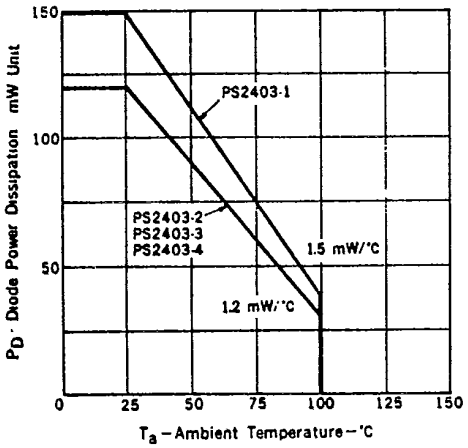
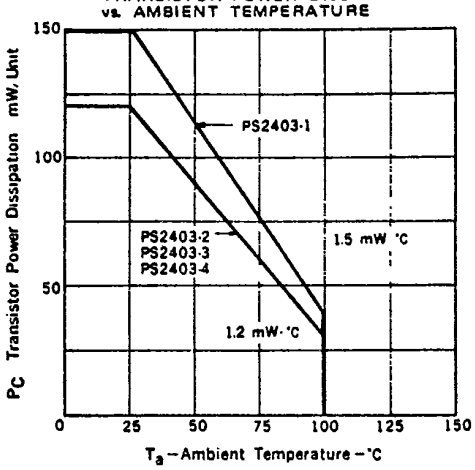
## TYPICAL CHARACTERISTICS ($T_a$ = 25 °C)

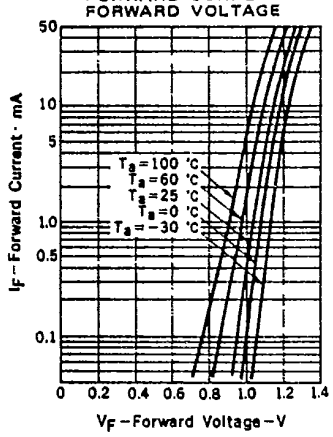
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



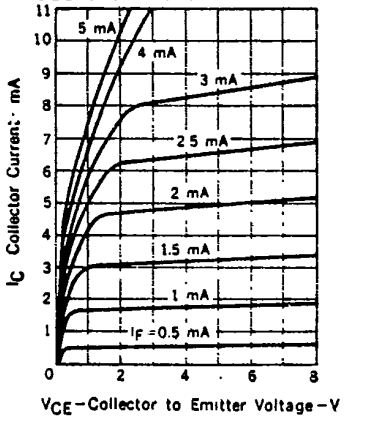

TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE




FORWARD CURRENT vs. FORWARD VOLTAGE




COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



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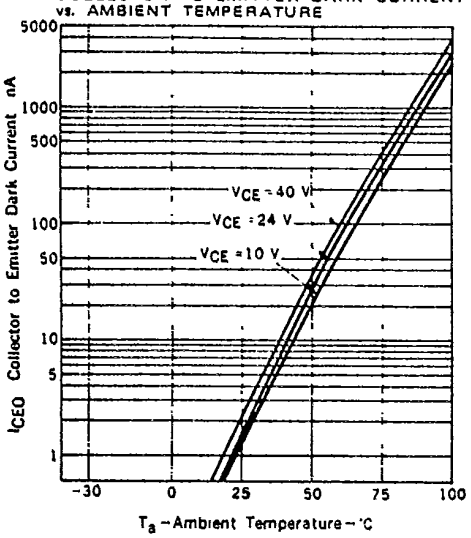
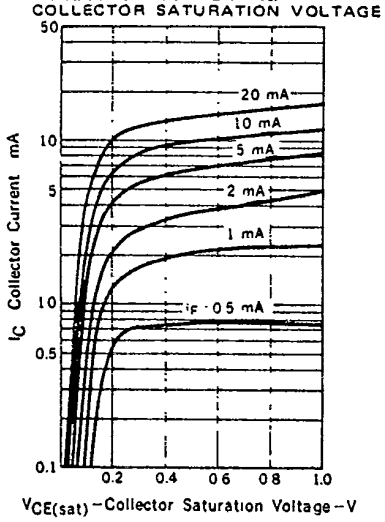
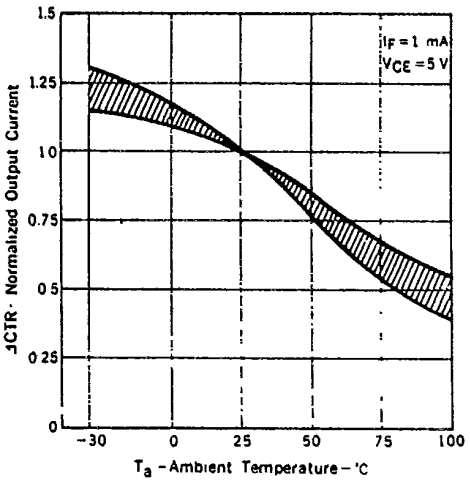
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



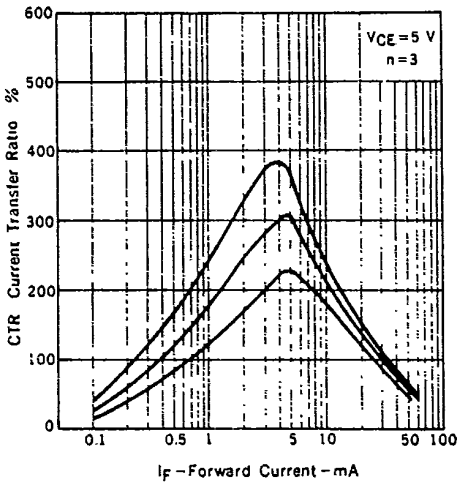

COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



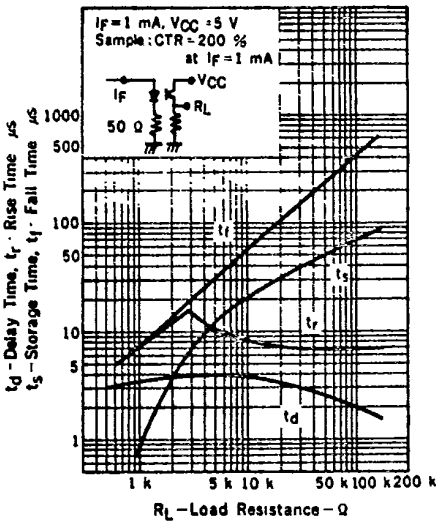

NORMALIZED OUTPUT CURRENT vs. AMBIENT TEMPERATURE




CURRENT TRANSFER RATIO (CTR) vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE




FREQUENCY RESPONSE