

FEATURES

- **2 CHANNEL TYPE:**
OCMOS FET + PHOTOCOUPLER
- **DESIGNED FOR AC/DC SWITCHING LINE CHANGER**
- **SMALL PACKAGE:**
8-PIN SOP
- **ISOLATION VOLTAGE:**
BV: 1500 Vr.m.s. MIN
- **LOW OFFSET VOLTAGE**
- **LOW LED OPERATING CURRENT:**
IF = 2 mA
- **AVAILABLE IN TAPE AND REEL**

DESCRIPTION

PS7241-AT1 and PS7241-AT5 are solid state relays containing a GaAs LED on the emitting side (input side) and MOSFETs (+ Phototransistor) on the output side. They are suitable for analog signal control because of their low offset and high linearity.

APPLICATIONS

- EXCHANGE EQUIPMENT
- MEASUREMENT EQUIPMENT
- FA/OA EQUIPMENT

ELECTRICAL CHARACTERISTICS (TA = 25°C)

| | | PART NUMBER | | | | PS7241-AT1, PS7241-AT5 | | |
|----------------|------------------|------------------------|--|---|-------|------------------------|------|-----|
| | | SYMBOLS | PARAMETERS | CONDITIONS | UNITS | MIN | TYP | MAX |
| OCMOS FET | Diode | V _F | Forward Voltage | I _F = 5 mA | V | | 1.2 | 1.4 |
| | | I _R | Reverse Current | V _R = 5 V | μA | | | 5.0 |
| | MOSFET | I _{LOFF} | Off-state Leakage Current | V _D = 400 V | μA | | 0.03 | 1.0 |
| | | C _{out} | Output Capacitance | V _D = 0 V, f = 1 MHz | pF | | 65 | |
| | Coupler | I _{Fon} | LED On-state Current | I _L = 120 mA | mA | | | 2.0 |
| | | R _{ON1} | On-state Resistance | I _F = 10 mA, I _L = 10 mA | Ω | | 20 | 30 |
| | | | | I _F = 10 mA, I _L = 120 mA, t _≤ 10 ms | Ω | | | 25 |
| | | t _{ON} | Turn-on Time | I _F = 10 mA, V _O = 5 V, PW ≥10 ms | ms | | 0.3 | 1.0 |
| | | t _{OFF} | Turn-off Time | | ms | | 0.04 | 0.2 |
| | | R _{I-O} | Isolation Resistance | V _{I-O} = 1.0 kV | Ω | 10 ⁹ | | |
| | C _{I-O} | Isolation Capacitance | V = 0 V, f = 1 MHz | pF | | 1.1 | | |
| Photocoupler | Diode | V _F | Forward Voltage | I _F = 10 mA | V | | 1.2 | 1.4 |
| | | I _R | Reverse Current ¹ | V _R = 5 V | μA | | | 5.0 |
| | Transistor | I _{CEO} | Collector to Emitter Dark Current | V _{CE} = 40 V, I _F = 0 mA | nA | | | 100 |
| | | BV _{CEO} | Collector to Emitter Breakdown Voltage | I _C = 1 mA | V | 40 | | |
| | Coupler | BV _{ECO} | Emitter to Collector Breakdown Voltage | I _E = 100 μA | V | 6 | | |
| | | CTR | Current Transfer Ratio | I _F = 5 mA, V _{CE} = 5 V | % | 50 | | 400 |
| | | V _{CE(sat)} | Collector Saturation Voltage | I _F = 10 mA, I _C = 2 mA | V | | | 0.3 |
| | | R _{I-O} | Isolation Resistance | V _{in-out} = 1.0 kVcc | Ω | 10 ¹¹ | | |
| | | C _{I-O} | Isolation Capacitance | V = 0 V, f = 1 MHz | pF | | 0.4 | |
| | | t _R | Rise Time | V _{CC} = 5 V, I _C = 2 mA | μs | | 3.0 | |
| t _F | Fall Time | R _L = 100 Ω | μs | | 5.0 | | | |

Note:

1. PS7241-AT1 only.

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

| | SYMBOLS | PARAMETERS | UNITS | RATINGS |
|--------------|------------------|---|---------------------|------------|
| OCMOS | Diode | | | |
| | I _F | Forward Current (DC) | mA | 50 |
| | V _R | Reverse Voltage | V | 5.0 |
| | P _D | Power Dissipation | mW/ch | 50 |
| | I _{FP} | Peak Forward Current ² | A | 1.0 |
| | MOSFET | | | |
| | V _L | Break Down Voltage | V | 400 |
| | I _L | Continuous Load Current | mA | 120 |
| | I _{LP} | Pulse Load Current ³ (AC/DC Connection) | mA | 250 |
| | P _D | Power Dissipation | mW | 430 |
| Photocoupler | Diode | | | |
| | I _F | Forward Current | mA | 50 |
| | V _R | Reverse Voltage ⁴ | V | 5.0 |
| | P _D | Power Dissipation | mW/ch | 50 |
| | I _{FP} | Peak Forward Current ² | A | 1.0 |
| | Transistor | | | |
| | V _{CEO} | Collector to Emitter Voltage | V | 40 |
| | V _{ECO} | Emitter to Collector Voltage | V | 6.0 |
| | I _C | Collector Current | mA | 80 |
| | P _C | Power Dissipation | mW | 100 |
| | BV | Isolation Voltage ⁵ | V _{r.m.s.} | 1500 |
| | P _T | Total Power Dissipation | mW | 630 |
| | T _A | Operating Ambient Temp. | °C | -40 to 80 |
| | T _{STG} | Storage Temperature | °C | -40 to 100 |

RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

| SYMBOLS | PARAMETERS | UNITS | MIN | TYP | MAX |
|----------------|-----------------------|-------|-----|-----|-----|
| OCMOS FET | | | | | |
| I _F | LED Operating Current | mA | 2 | 10 | 20 |
| V _F | LED Off Voltage | V | 0 | | 0.5 |

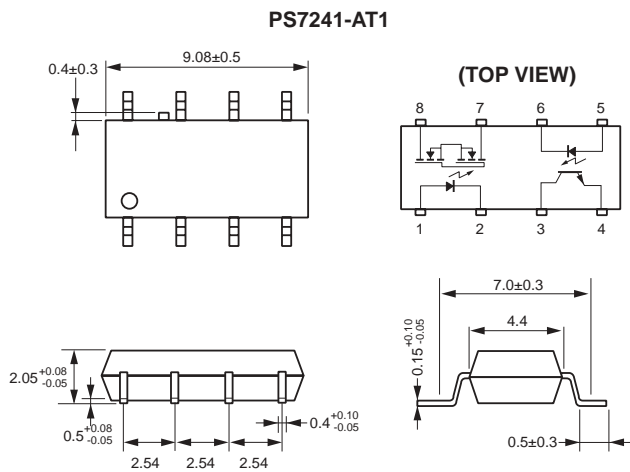
ORDERING INFORMATION

| PART NUMBER | PACKAGE | PACKING STYLE |
|---------------|-----------|-----------------------------|
| PS7241-AT1 | 8-pin SOP | Magazine case 45 pcs |
| PS7241-AT1-F3 | | Embossed Tape 1500 pcs/reel |
| PS7241-AT1-F4 | | |
| PS7241-AT5 | 8-pin SOP | Magazine case 45 pcs |
| PS7241-AT5-F3 | | Embossed Tape 1500 pcs/reel |
| PS7241-AT5-F4 | | |

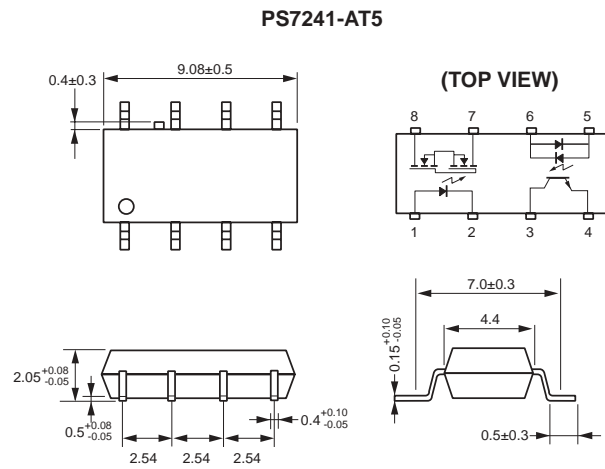
Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. PW = 100 μs, Duty Cycle = 1%.
3. PW = 100 ms, 1 shot.
4. PS7241-AT1 only.
5. AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output.

OUTLINE DIMENSIONS (Units in mm)



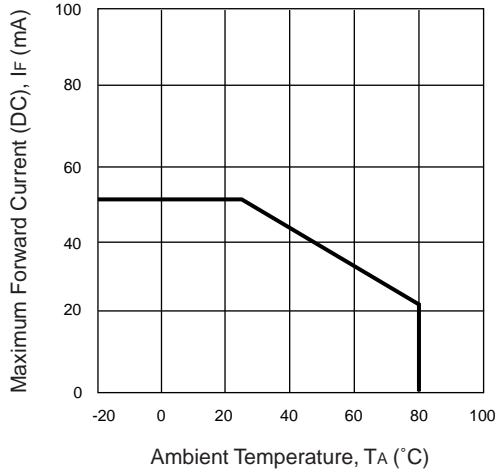
- 1 LED Anode
- 2 LED Cathode
- 3 Tr Collector
- 4 Tr Emitter
- 5 LED Anode
- 6 LED Cathode
- 7 MOSFET
- 8 MOSFET



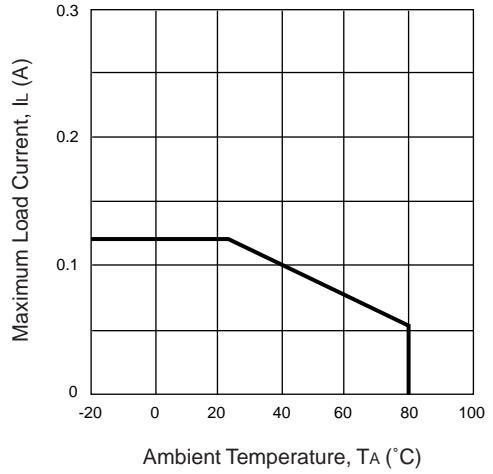
- 1 LED Anode
- 2 LED Cathode
- 3 Tr Collector
- 4 Tr Emitter
- 5 LED Anode/Cathode
- 6 LED Cathode/Anode
- 7 MOSFET
- 8 MOSFET

OCMOS TYPICAL PERFORMANCE CURVES (TA = 25°C)

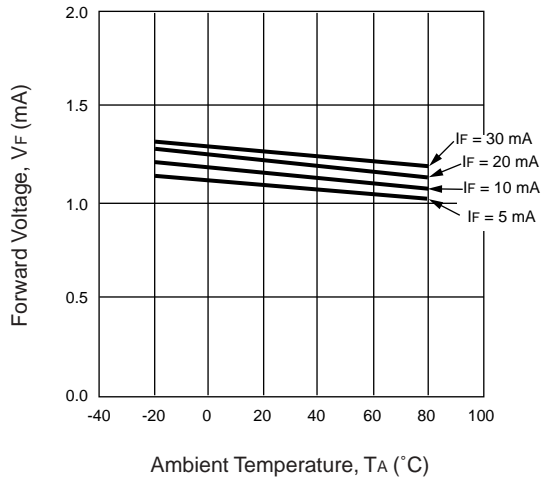
MAXIMUM FORWARD CURRENT (DC)
vs. AMBIENT TEMPERATURE



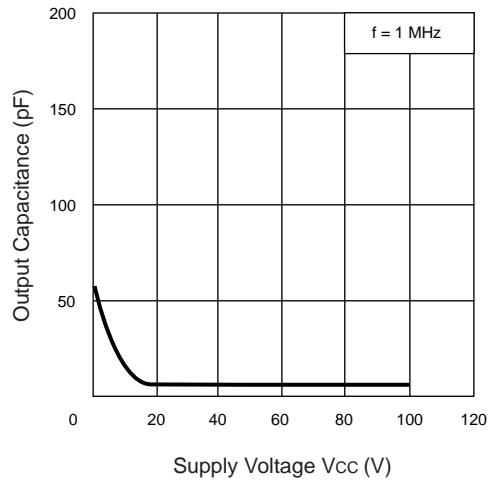
MAXIMUM LOAD CURRENT
vs. AMBIENT TEMPERATURE



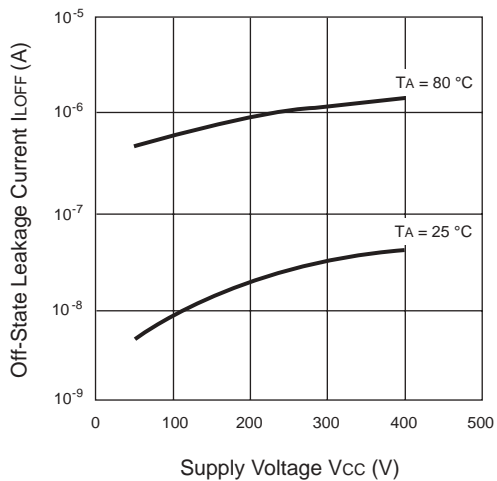
FORWARD VOLTAGE vs.
AMBIENT TEMPERATURE



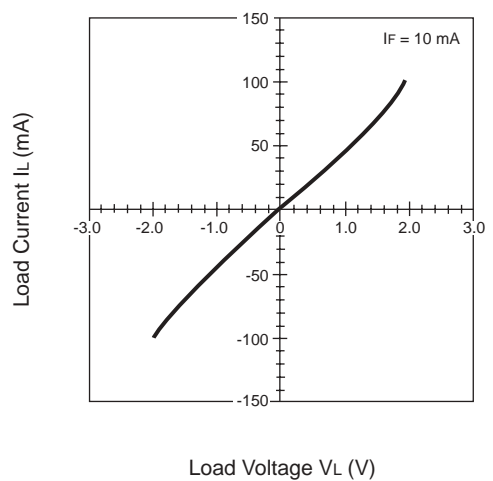
OUTPUT CAPACITANCE
vs. SUPPLY VOLTAGE



OFF-STATE LEAKAGE CURRENT
vs. SUPPLY VOLTAGE

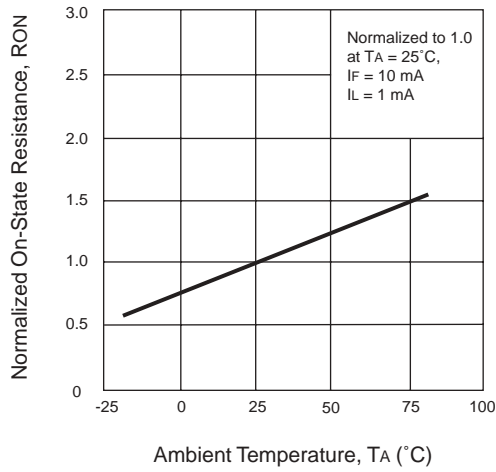


LOAD CURRENT vs.
LOAD VOLTAGE

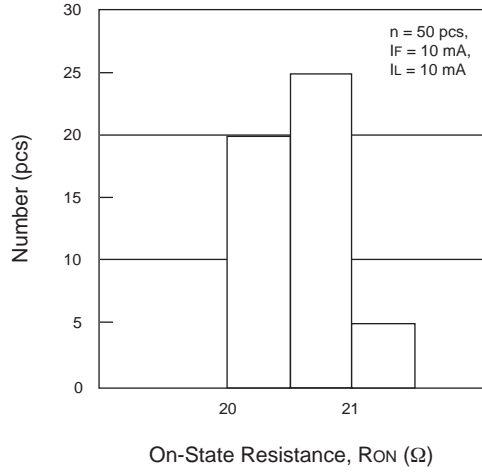


OCMOS TYPICAL PERFORMANCE CURVES (TA = 25°C)

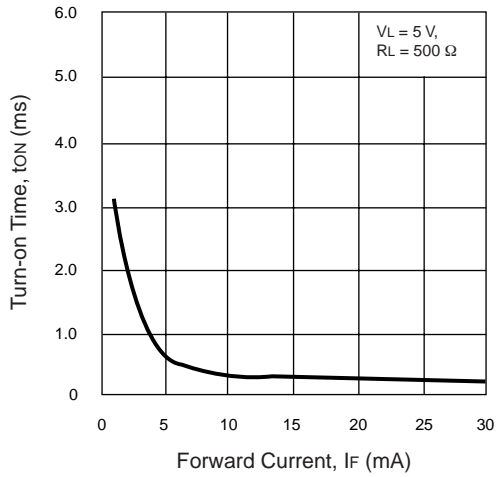
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



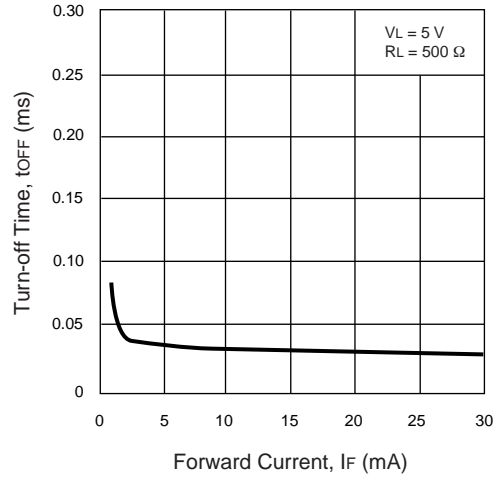
ON-STATE RESISTANCE DISTRIBUTION



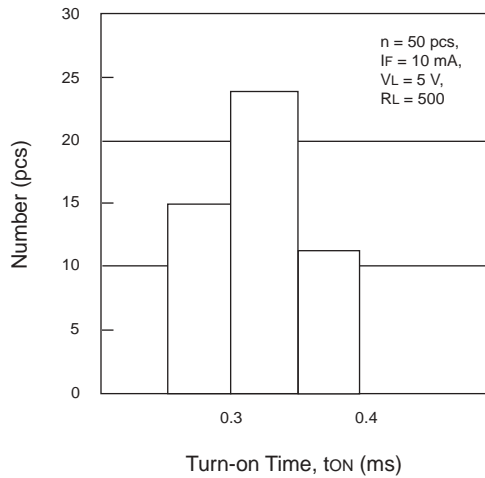
TURN-ON TIME vs. FORWARD CURRENT



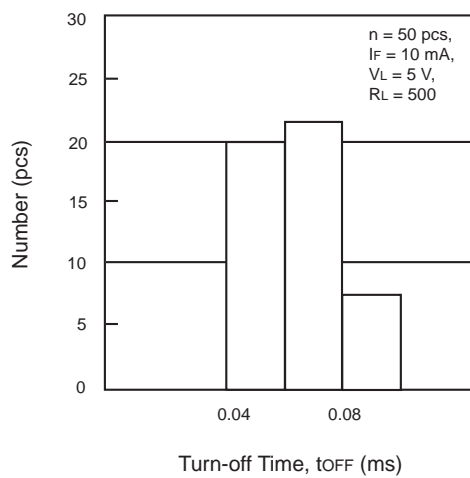
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION

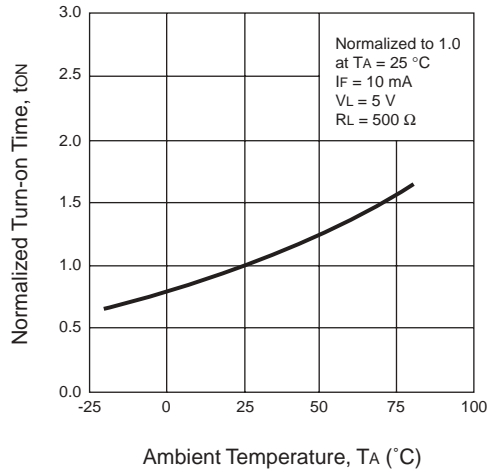


TURN-OFF TIME DISTRIBUTION

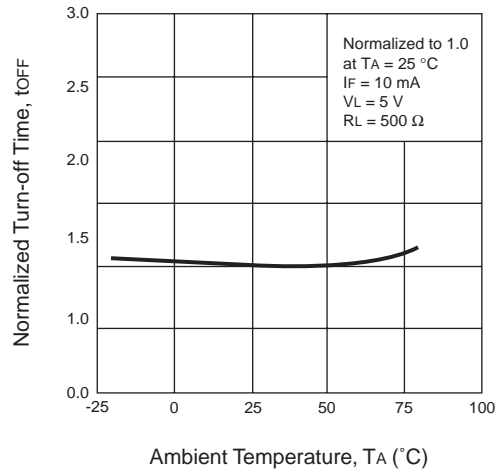


OCMOS TYPICAL PERFORMANCE CURVES (TA = 25°C)

NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE

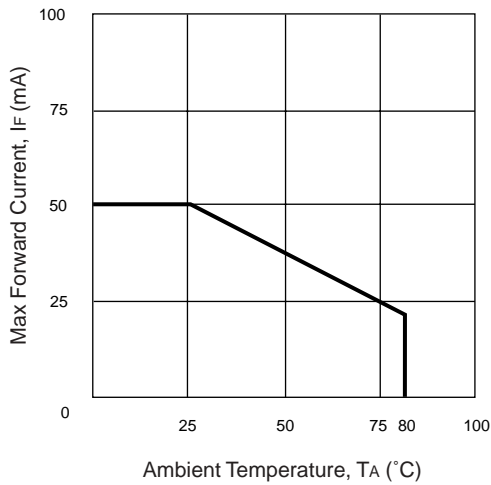


NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE

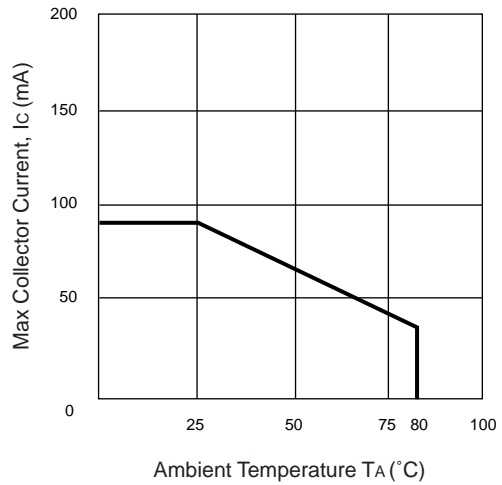


PHOTOCOUPLER TYPICAL PERFORMANCE CURVES (TA = 25°C)

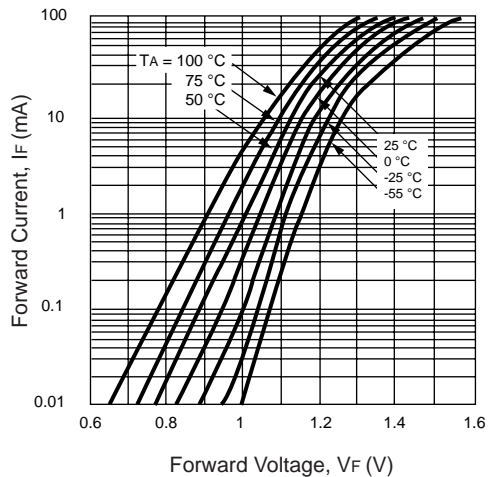
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



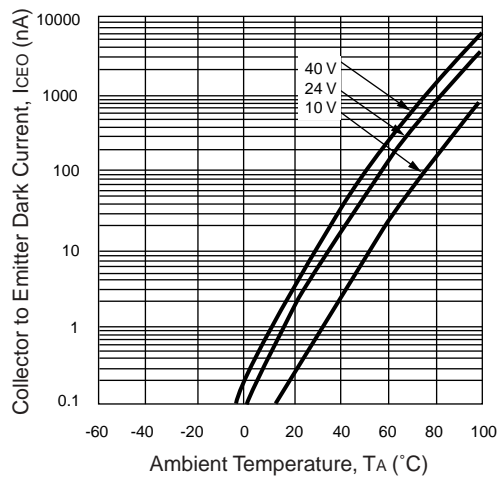
MAXIMUM COLLECTOR CURRENT vs. AMBIENT TEMPERATURE



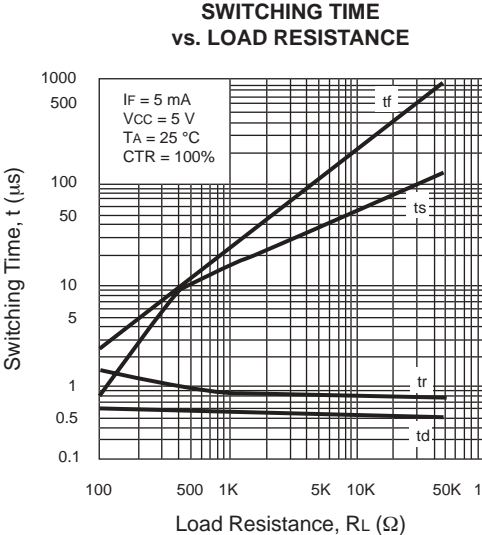
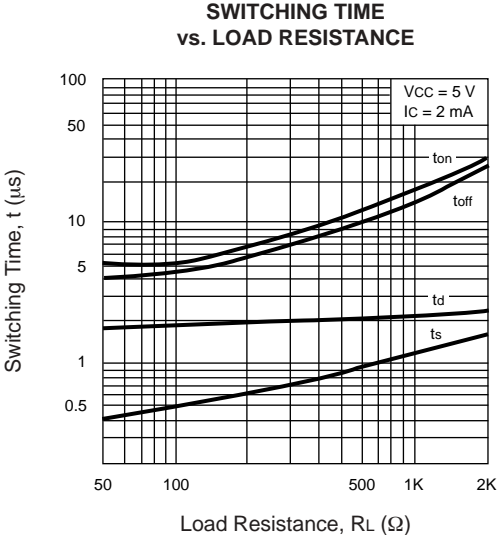
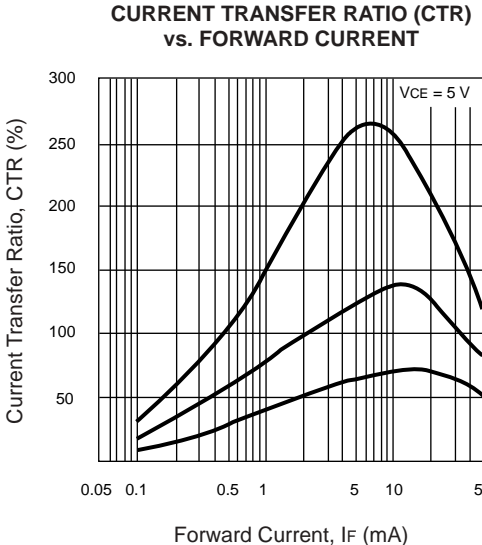
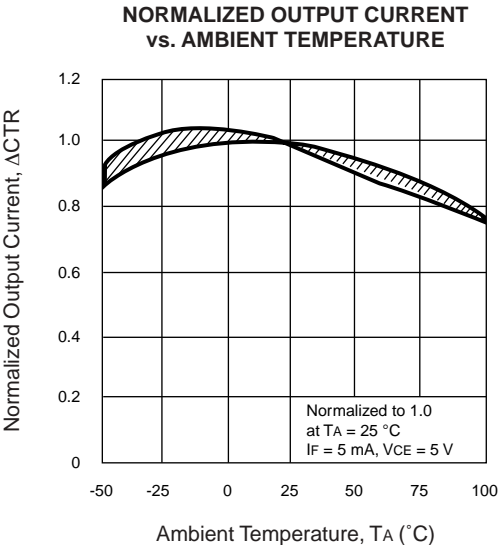
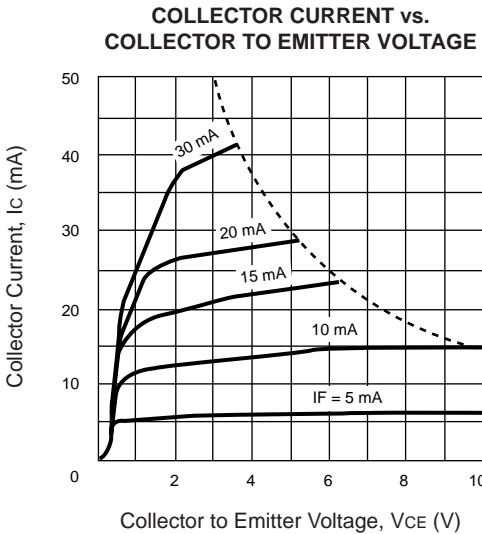
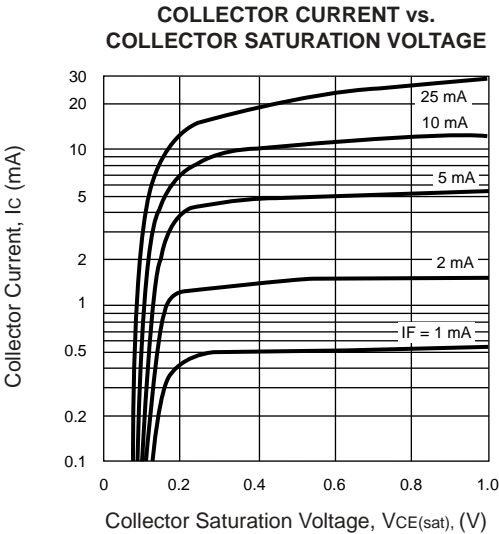
FORWARD CURRENT vs. FORWARD VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

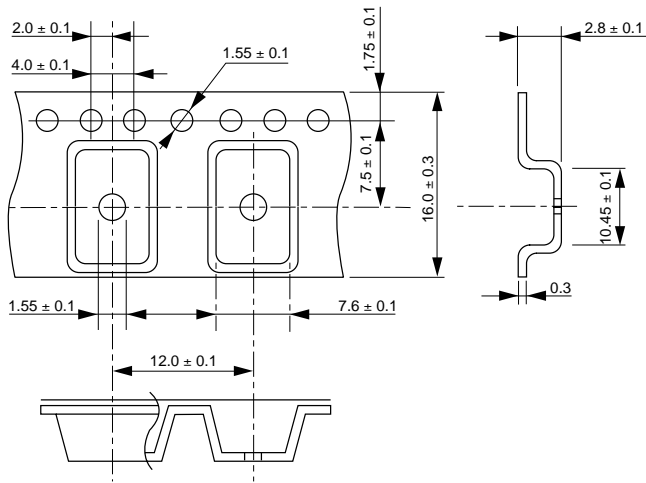


PHOTOCOUPLER TYPICAL PERFORMANCE CURVES (TA = 25°C)

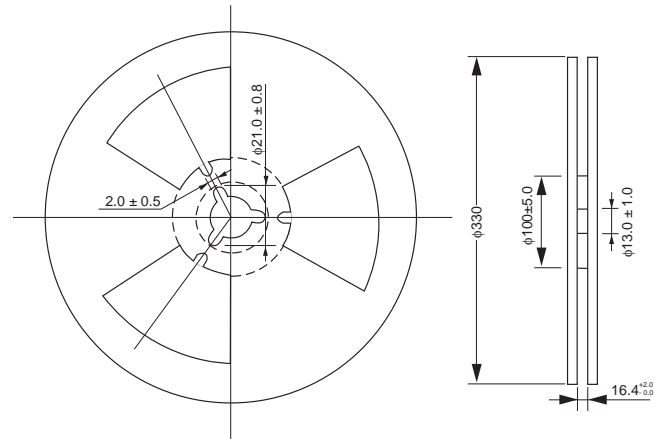


TAPING SPECIFICATIONS (Units in mm)

OUTLINE AND DIMENSIONS (TAPE)



OUTLINE AND DIMENSIONS (REEL)

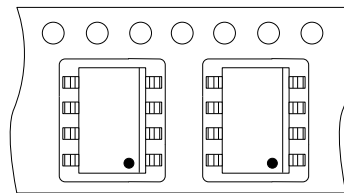
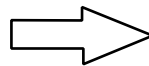
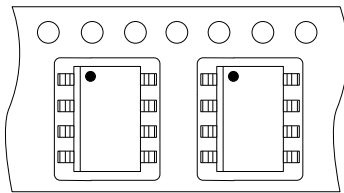


Notes:
1. Packaging : 1500 pcs/reel

TAPING DIRECTION

PS7241-AT1-F3
PS7241-AT5-F3

PS7241-AT1-F4
PS7241-AT5-F4

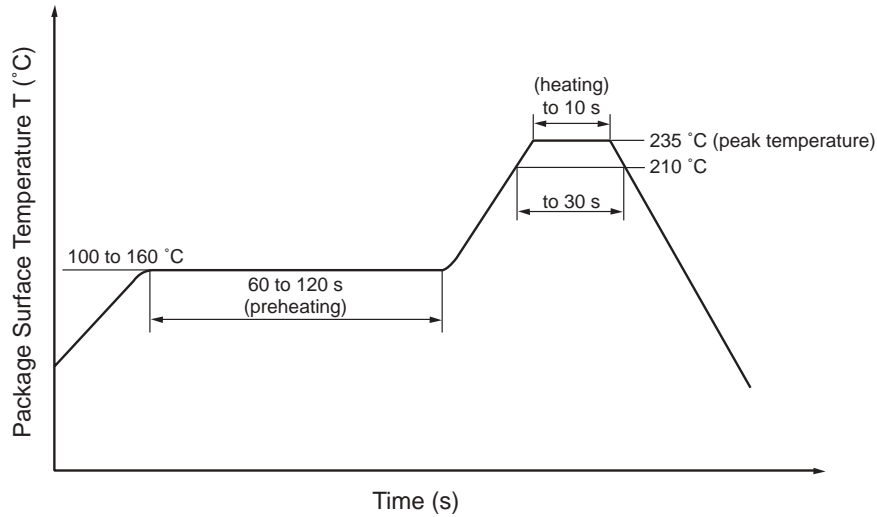


RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

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

Recommended Temperature Profile of Infrared Reflow

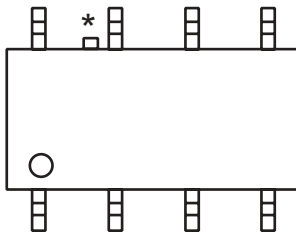


(2) Dip soldering

- 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 freon-based cleaning solvent.
- Avoid shorting between portion of frame and leads.



* Portion of frame

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