

HIGH COLLECTOR TO EMITTER VOLTAGE
SOP MULTI PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS2732-1 and PS2733-1 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington-connected phototransistor.

This package is SOP (Small Outline Package) type and has shield effect to cut off ambient light.

It is designed for high density mounting applications.

FEATURES

- High isolation voltage ($BV = 2\,500\text{ V r.m.s.}$)
- High collector to emitter voltage ($V_{CEO} = 300\text{ V}$: PS2732-1)
($V_{CEO} = 350\text{ V}$: PS2733-1)
- SOP (Small Outline Package) type
- High current transfer ratio ($CTR = 4\,000\%$ TYP.)
- Ordering number of taping product : PS2732-1-F3, F4, PS2733-1-F3, F4
- UL approved: File No. E72422 (S)
- VDE0884 approved (Option)

APPLICATIONS

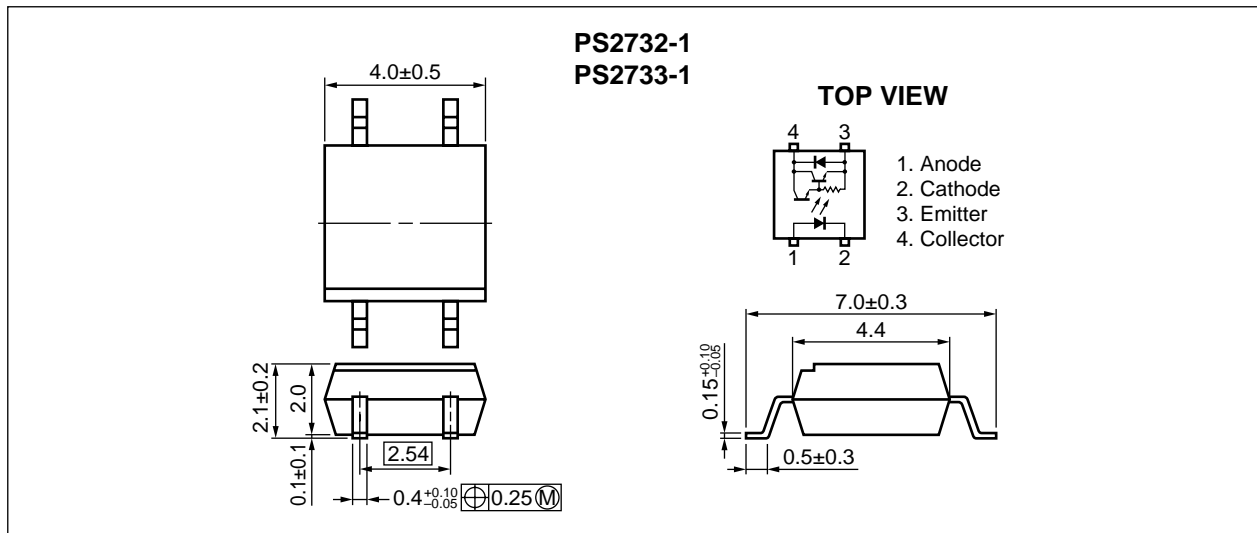
- Hybrid IC
- Telephone/Telegraph Receiver
- FAX

ORDERING INFORMATION

| Part Number | Package | Safety Standard Approval |
|------------------------|-----------|------------------------------------|
| PS2732-1, PS2733-1 | 4-pin SOP | Standard products • UL approved |
| PS2732-1-V, PS2733-1-V | 4-pin SOP | VDE0884 approved products (Option) |

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

★ PACKAGE DIMENSIONS (in millimeters)



ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

| Parameter | | Symbol | Ratings | | Unit |
|---------------------------------|------------------------------------|-------------------------------|-------------|----------|------------------------|
| | | | PS2732-1 | PS2733-1 | |
| Diode | Forward Current (DC) | I_F | 50 | | mA |
| | Reverse Voltage | V_R | 6 | | V |
| | Power Dissipation Derating | $\Delta P_D/^{\circ}\text{C}$ | 0.8 | | mW/ $^{\circ}\text{C}$ |
| | Power Dissipation | P_D | 80 | | mW |
| | Peak Forward Current ^{*1} | I_{FP} | 1 | | A |
| Transistor | Collector to Emitter Voltage | V_{CEO} | 300 | 350 | V |
| | Emitter to Collector Voltage | V_{ECO} | 0.3 | | V |
| | Collector Current | I_C | 150 | | mA |
| | Power Dissipation Derating | $\Delta P_C/^{\circ}\text{C}$ | 1.5 | | mW/ $^{\circ}\text{C}$ |
| | Power Dissipation | P_C | 150 | | mW |
| Isolation Voltage ^{*2} | | BV | 2 500 | | Vr.m.s. |
| Operating Ambient Temperature | | T_A | -55 to +100 | | $^{\circ}\text{C}$ |
| Storage Temperature | | T_{stg} | -55 to +150 | | $^{\circ}\text{C}$ |

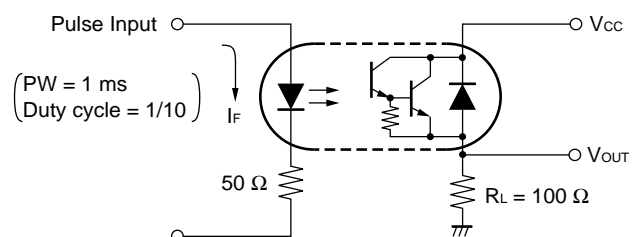
*1 $PW = 100\text{ }\mu\text{s}$, Duty Cycle = 1 %

*2 AC voltage for 1 minute at $T_A = 25\text{ }^{\circ}\text{C}$, RH = 60 % between input and output

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

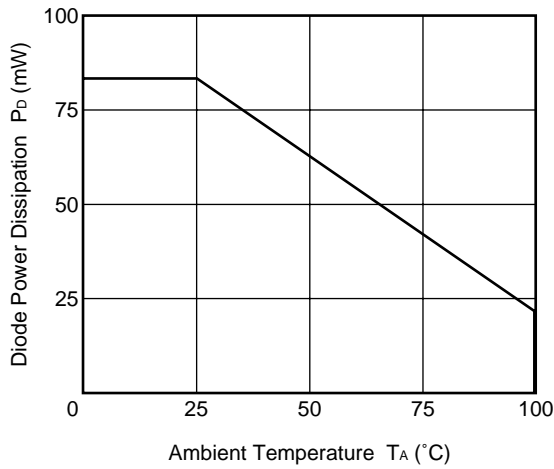
| Parameter | | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|------------|--|----------------------|---|------------------|-------|------|------|
| Diode | Forward Voltage | V _F | I _F = 10 mA | | 1.15 | 1.4 | V |
| | Reverse Current | I _R | V _R = 5 V | | | 5 | μA |
| | Terminal Capacitance | C _t | V = 0 V, f = 1 MHz | | 30 | | pF |
| Transistor | Collector to Emitter Dark Current | I _{CEO} | I _F = 0 mA, V _{CE} = 300 V | | | 400 | nA |
| Coupled | Current Transfer Ratio (I _c /I _F) | CTR | I _F = 1 mA, V _{CE} = 2 V | 1 500 | 4 000 | | % |
| | Collector Saturation Voltage | V _{CE(sat)} | I _F = 1 mA, I _c = 2 mA | | | 1.0 | V |
| | Isolation Resistance | R _{I-O} | V _{I-O} = 1 kV _{DC} | 10 ¹¹ | | | Ω |
| | Isolation Capacitance | C _{I-O} | V = 0 V, f = 1 MHz | | 0.4 | | pF |
| | Rise Time *1 | t _r | V _{CC} = 5 V, I _c = 10 mA, R _L = 100 Ω | | 100 | | μs |
| | Fall Time *1 | t _f | | | 100 | | |

*1 Test circuit for switching time

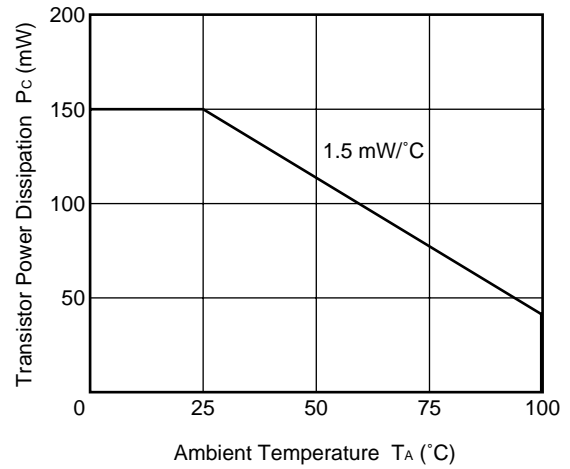


★ TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

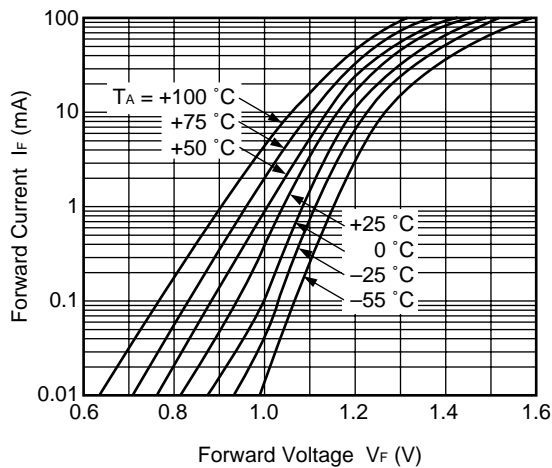
DIODE POWER DISSIPATION vs.
AMBIENT TEMPERATURE



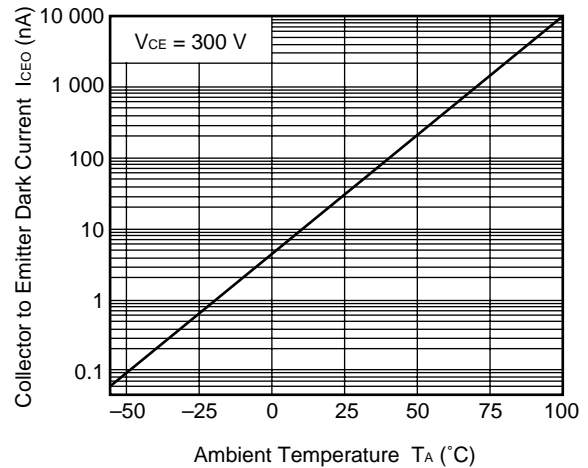
TRANSISTOR POWER DISSIPATION vs.
AMBIENT TEMPERATURE



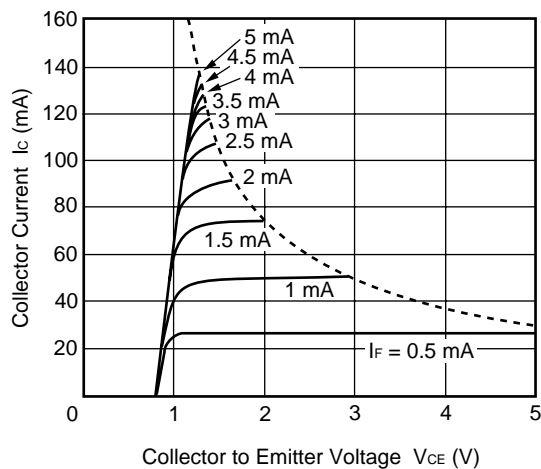
FORWARD CURRENT vs.
FORWARD VOLTAGE



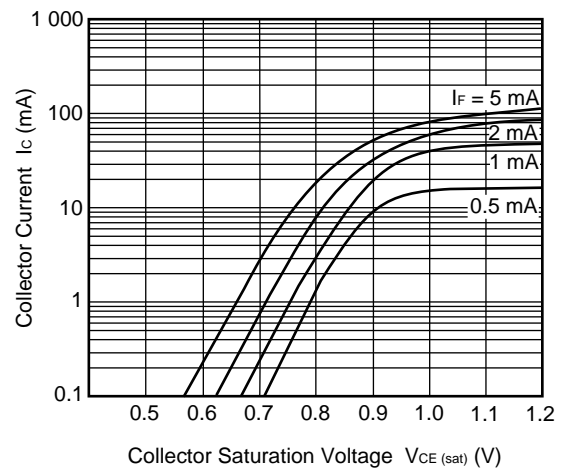
COLLECTOR TO EMITTER DARK
CURRENT vs. AMBIENT TEMPERATURE



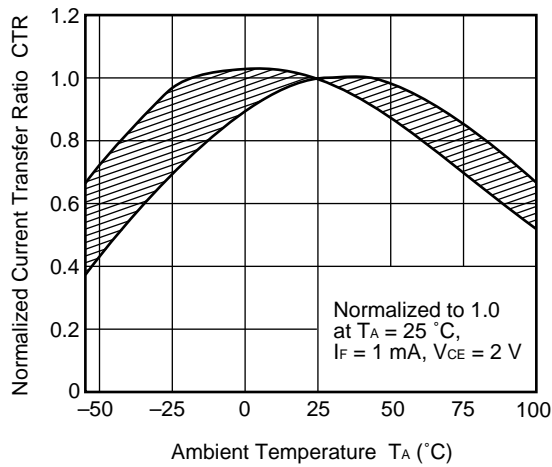
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



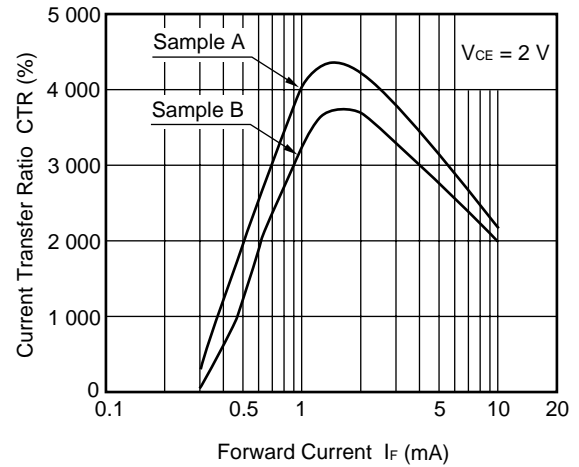
COLLECTOR CURRENT vs.
COLLECTOR SATURATION VOLTAGE



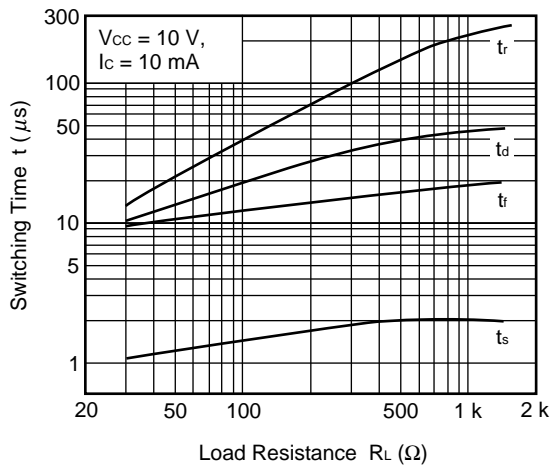
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



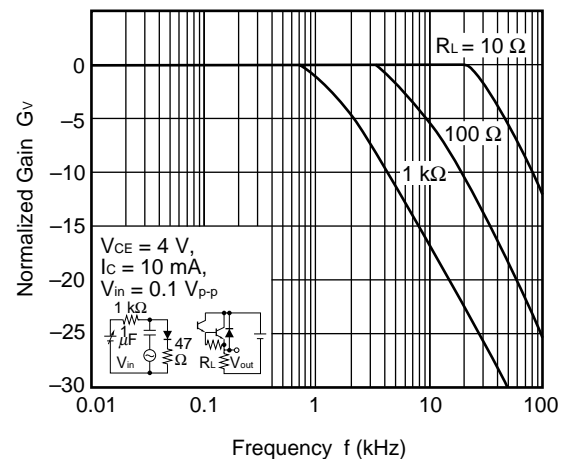
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



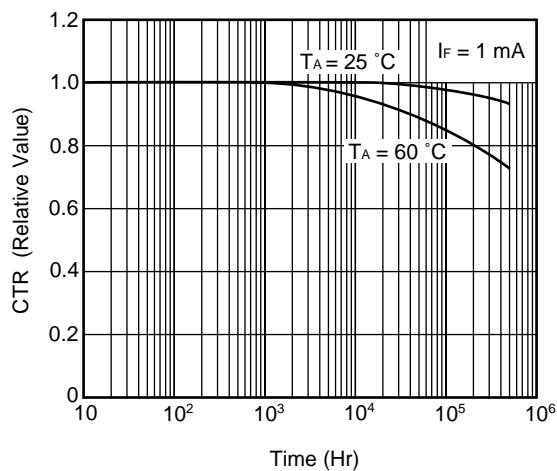
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



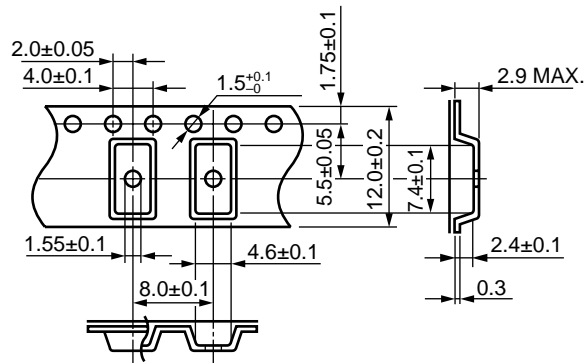
LONG TERM CTR DEGRADATION



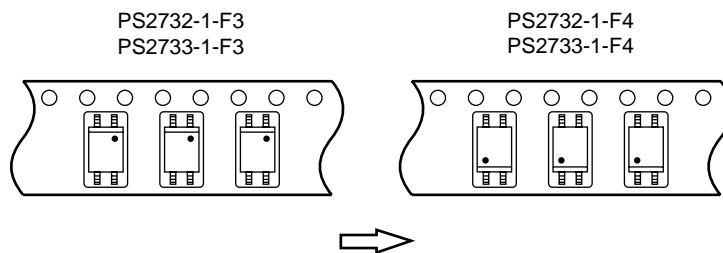
Remark The measurement of TYPICAL CHARACTERISTICS are only for reference, not guaranteed.

★ TAPING SPECIFICATIONS (in millimeters)

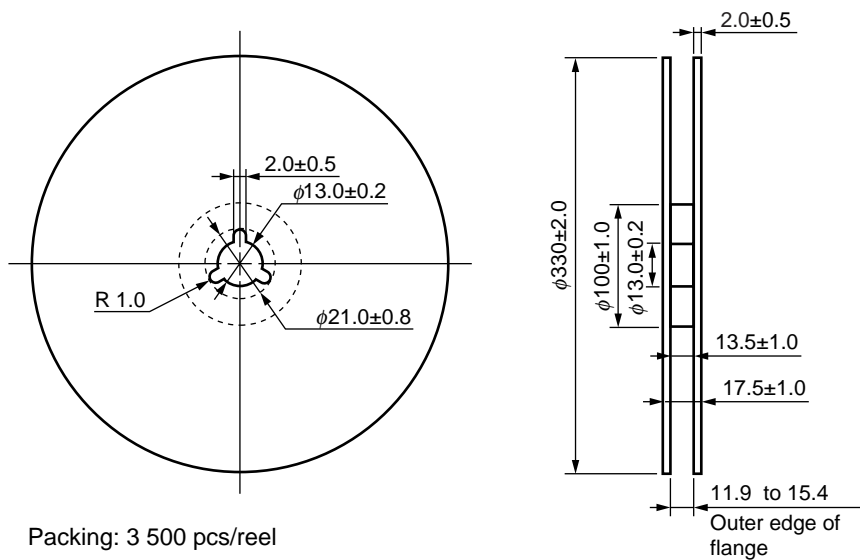
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



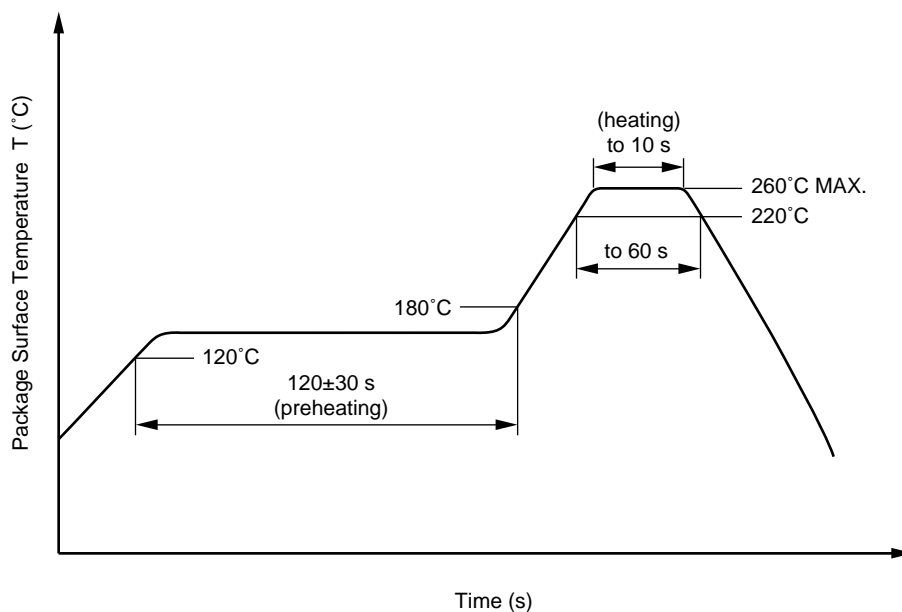
★ NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

- Peak reflow temperature 260°C or below (package surface temperature)
- Time of peak reflow temperature 10 seconds or less
- Time of temperature higher than 220°C 60 seconds or less
- Time to preheat temperature from 120 to 180°C 120±30 s
- 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.)

Recommended Temperature Profile of Infrared Reflow



(2) Wave soldering

- Temperature 260°C or below (molten solder temperature)
- Time 10 seconds or less
- Preheating conditions 120°C or below (package surface temperature)
- Number of times One (Allowed to be dipped in solder including plastic mold portion.)
- 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 and chlorine-based cleaning solvent.

2. Cautions regarding noise

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

★ USAGE CAUTIONS

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

| Parameter | Symbol | Spec | Unit |
|---|--|-----------------------------|----------------------------|
| Application classification (DIN VDE 0109) for rated line voltages ≤ 150 Vr.m.s. for rated line voltages ≤ 300 Vr.m.s. | | IV III | |
| Climatic test class (DIN IEC 68 Teil 1/09.80) | | 55/100/21 | |
| Dielectric strength Maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.2 \times U_{IORM}$, $P_d < 5$ pC | U_{IORM} U_{pr} | 710 850 | V_{peak} V_{peak} |
| ★ Test voltage (partial discharge test, procedure b for all devices test) $U_{pr} = 1.6 \times U_{IORM}$, $P_d < 5$ pC | U_{pr} | 1 140 | V_{peak} |
| Highest permissible overvoltage | U_{TR} | 4 000 | V_{peak} |
| Degree of pollution (DIN VDE 0109) | | 2 | |
| Clearance distance | | > 5 | mm |
| Creepage distance | | > 5 | mm |
| Comparative tracking index (DIN IEC 112/VDE 0303 part 1) | CTI | 175 | |
| Material group (DIN VDE 0109) | | III a | |
| Storage temperature range | T_{stg} | -55 to +150 | °C |
| Operating temperature range | T_A | -55 to +100 | °C |
| Isolation resistance, minimum value $V_{IO} = 500$ V dc at $T_A = 25$ °C $V_{IO} = 500$ V dc at T_A MAX. at least 100 °C | Ris MIN. Ris MIN. | 10^{12} 10^{11} | Ω Ω |
| Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I_F , $P_{si} = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500$ V dc at $T_A = 175$ °C (T_{si}) | T_{si} I_{si} P_{si} Ris MIN. | 150 300 500 10^9 | °C mA mW Ω |

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M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT

| | | |
|----------------|---------------|---|
| Caution | GaAs Products | <p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p> |
|----------------|---------------|---|

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