Data Sheet

PS9031
2.5 A OUTPUT CURRENT, HIGH CMR, IGBT GATE DRIVE,
5-PIN SOP (LSO5 With 8mm CREEPAGE DISTANCE) PHOTOCOUPLER

DESCRIPTION

The PS9031 is an optically coupled isolator containing a GaAlAs LED on the input side and a photodiode, a signal processing circuit and power MOSFETs on the output side on one chip.

FEATURES

- Long creepage distance (8 mm MIN.)
- Large peak output current (2.5 A MAX., 2.0 A MIN.)
- High speed switching (tPLH, tPHL = 175 ns MAX.)
- UVLO (Under Voltage Lock Out) protection with hysteresis
- High common mode transient immunity (CMH, CML = ±50 kV/µs MIN.)
- Operating Ambient Temperature (125 °C MAX.)
- Embossed tape product : PS9031-F3 : 3000 pcs/reel
- Pb-Free product
- Safety standards
  - UL approved: UL1577, Double protection
  - CSA approved: CA5A, CAN/CSA-C22.2 No.60065, CAN/CSA-C22.2 No.60950-1, Reinforced insulation
  - VDE approved: DIN EN 60747-5-5 (Option)

APPLICATIONS

- IGBT, Power MOS FET Gate Driver
- Industrial inverter
- AC Servo
Weight: 0.119g (typ.)

**PHOTOCOUPLER CONSTRUCTION**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>MIN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Distance</td>
<td>8.0 mm</td>
</tr>
<tr>
<td>Outer Creepage Distance</td>
<td>8.0 mm</td>
</tr>
<tr>
<td>Isolation Distance</td>
<td>0.15 mm</td>
</tr>
</tbody>
</table>
BLOCK DIAGRAM

<table>
<thead>
<tr>
<th>Input</th>
<th>LED</th>
<th>Tr. 1</th>
<th>Tr. 2</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>H</td>
</tr>
<tr>
<td>L</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>L</td>
</tr>
</tbody>
</table>

MARKING EXAMPLE

- **R**
  - An initial of “Renesas”
- **9031**
  - Product Part Number
- ○
  - No.1 pin Mark, Anode Mark
- **N340**
  - Rank Code
- **340**
  - Assembly Lot
- 3
  - Last one-digit of Assembly Year
- 40
  - Weekly Serial Code
### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Order Number</th>
<th>Solder Plating Specification</th>
<th>Packing Style</th>
<th>Safety Standard Approval</th>
<th>Application Part Number*1</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS9031</td>
<td>PS9031-Y-AX</td>
<td>Pb-Free and Halogen Free (Ni/Pd/Au)</td>
<td>20 pcs (Tape 20 pcs cut)</td>
<td>Standard products (UL,CSA approved)</td>
<td>PS9031</td>
</tr>
<tr>
<td>PS9031-F3</td>
<td>PS9031-Y-F3-AX</td>
<td></td>
<td>Embossed Tape 3 000 pcs/reel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS9031-V</td>
<td>PS9031-Y-V-AX</td>
<td></td>
<td>20 pcs (Tape 20 pcs cut)</td>
<td>UL,CSA approved DIN EN 60747-5-5 (VDE 0884-5): 2011-11 approved (Option)</td>
<td></td>
</tr>
<tr>
<td>PS9031-V-F3</td>
<td>PS9031-Y-V-F3-AX</td>
<td></td>
<td>Embossed Tape 3 000 pcs/reel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *1. For the application of the Safety Standard, following part number should be used.

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diode Forward Current</td>
<td>(I_F)</td>
<td>25</td>
<td>mA</td>
</tr>
<tr>
<td>Diode Peak Transient Forward Current (Pulse Width (&lt; 1 \mu s))</td>
<td>(I_{F(TRAN)})</td>
<td>1.0</td>
<td>A</td>
</tr>
<tr>
<td>Diode Reverse Voltage</td>
<td>(V_R)</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Diode Power Dissipation*1</td>
<td>(P_D)</td>
<td>45</td>
<td>mW</td>
</tr>
<tr>
<td>Detector High Level Peak Output Current*2</td>
<td>(I_{OH(PEAK)})</td>
<td>2.5</td>
<td>A</td>
</tr>
<tr>
<td>Detector Low Level Peak Output Current*2</td>
<td>(I_{OL(PEAK)})</td>
<td>2.5</td>
<td>A</td>
</tr>
<tr>
<td>Supply Voltage ((V_{CC} - V_{EE}))</td>
<td>(V_O)</td>
<td>0 to 35</td>
<td>V</td>
</tr>
<tr>
<td>Isolation Voltage*4</td>
<td>(B_V)</td>
<td>5 000</td>
<td>Vr.m.s.</td>
</tr>
<tr>
<td>Operating Frequency</td>
<td>(f)</td>
<td>200</td>
<td>kHz</td>
</tr>
<tr>
<td>Operating Ambient Temperature</td>
<td>(T_A)</td>
<td>-40 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>(T_{stg})</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes: *1. Reduced to 1.2 mW/°C at \(T_A = 110^\circ C\) or more.
*2. Maximum pulse width = 10 \(\mu s\), Maximum duty cycle = 0.2%
*3. Reduced to 3.9 mW/°C at \(T_A = 90^\circ C\) or more.
*4. AC voltage for 1 minute at \(T_A = 25^\circ C\), RH = 60% between input and output.
   Pins 1-2 shorted together, 3-5 shorted together.

### RECOMMENDED OPERATING CONDITIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage ((V_{CC} - V_{EE}))</td>
<td>(I_{F(ON)})</td>
<td>15</td>
<td>30</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Forward Current (ON)</td>
<td>(V_{F(OFF)})</td>
<td>-2</td>
<td>0.8</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Forward Voltage (OFF)</td>
<td>(T_A)</td>
<td>-40</td>
<td>125</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

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**REPRESENTATIVE APPLICATION**

**Figure 2**

- Pin 1: Ground
- Pin 2: Output
- Pin 3: Input
- Pin 4: Power Supply (VCC)
- Pin 5: Power Supply (VEE)

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**Figure 3**

- Input: \(I_{in}\)
- Output: \(V_{out}\)
- Power Supply: \(V_{CC}\)
- Ground: \(GND\)

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**Figure 4**

- Circuit Diagram
- Schematic Diagram
- Connection Diagram

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**Figure 5**

- Battery Connection
- Transformer Connection
- DC Power Supply Connection

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**Figure 6**

- PCB Layout
- Component Placement
- Wire Routing

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**Figure 7**

- Test Setup
- Measurement Equipment
- Data Capturing System

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**Figure 8**

- Waveform Diagram
- Frequency Response
- Gain vs Frequency

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**Figure 9**

- Power Dissipation
- Efficiency
- Thermal Impedance

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**Figure 10**

- Reliability Test
- Accelerated Life Test
- Shock Test

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**Figure 11**

- Environmental Conditions
- Temperature Range
- Humidity Range
- Storage Conditions

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**Figure 12**

- Printed Circuit Board
- Component List
- Bill of Materials

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**Figure 13**

- Assembly Instructions
- Precautions
- Maintenance
- Disposal

---

**Figure 14**

- Regulatory Compliance
- Certification Marks
- CE Marking
- RoHS Compliance

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**Figure 15**

- Specification Sheet
- Data Sheet
- Data Book
- Handbook

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**Figure 16**

- Design Guide
- Development Tools
- Software Support
- Firmware Updates

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**Figure 17**

- Technical Support
- Customer Support
- Support Contact Information
- Technical Forums

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**Figure 18**

- Product Brochure
- Data Sheet
- Application Notes
- Case Study

---

**Figure 19**

- User Manual
- Installation Guide
- Operation Guide
- Troubleshooting Guide

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**Figure 20**

- Safety Instructions
- Warning Signs
- Precautions
- Emergency Procedures

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**Figure 21**

- Quality Assurance
- ISO Certification
- QS9000 Compliance
- JIS Certification

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**Figure 22**

- vendor's website
- suppliers' website
- distributors' website
- resellers' website

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**Figure 23**

- Supply Chain Management
- Inventory Management
- Ordering Information
- Logistic Support

---

**Figure 24**

- Safety Data Sheet
- Material Safety Data Sheet
- Environmental Information
- Recycling Information

---

**Figure 25**

- Environmental Impact
- Recycling Programs
- Disposal Methods
- Compliance Information

---

**Figure 26**

- ESD Protection
- Package Handling
- Assembly Guidelines
- Storage Conditions

---

**Figure 27**

- Regulatory Compliance
- FCC Rules
- CE Marking
- RoHS Compliance

---

**Figure 28**

- Supplier Information
- Distributor Information
- Reseller Information
- Benchmark Information

---

**Figure 29**

- Competitive Analysis
- Market Trends
- Industry News
- Technology Updates

---

**Figure 30**

- Patent Information
- Intellectual Property
- Trademark Information
- Copyright Information

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**Figure 31**

- Customer Testimonials
- Customer Reviews
- Customer Feedback
- Customer Satisfaction Survey
## ELECTRICAL CHARACTERISTICS

(at RECOMMENDED OPERATING CONDITIONS, VEE=GND, unless otherwise Specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>MIN.</th>
<th>TYP. *1</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>V_F</td>
<td>I_F = 10 mA, T_A = 25°C</td>
<td>1.35</td>
<td>1.56</td>
<td>1.75</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Current</td>
<td>I_R</td>
<td>V_R = 3 V, T_A = 25°C</td>
<td>10</td>
<td></td>
<td></td>
<td>µA</td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>C_IN</td>
<td>f = 1 MHz, V_F = 0 V</td>
<td>30</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Detector</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Level Output Current</td>
<td>I_OH</td>
<td>V_O = (V_CC – 4 V)^2</td>
<td>0.5</td>
<td>2.2</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_O = (V_CC – 15 V)^3</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Level Output Current</td>
<td>I_OL</td>
<td>V_O = (V_EE + 2.5 V)^2</td>
<td>0.5</td>
<td>2.4</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_O = (V_EE + 15 V)^3</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Level Output Voltage</td>
<td>V_OH</td>
<td>I_O = -100 mA ^4</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Low Level Output Voltage</td>
<td>V_OL</td>
<td>I_O = 100 mA</td>
<td>0.2</td>
<td>0.5</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>High Level Supply Current</td>
<td>I_CH</td>
<td>V_O = Open, I_F = 10 mA</td>
<td>1.7</td>
<td>2.2</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Low Level Supply Current</td>
<td>I_CL</td>
<td>V_O = Open, V_F = 0 to 0.8V</td>
<td>1.7</td>
<td>2.2</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>UVLO Threshold</td>
<td>V_UVLO+</td>
<td>V_O &gt; 5 V, I_O = 10 mA</td>
<td>10.8</td>
<td>12.3</td>
<td>13.4</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>V_UVLO-</td>
<td></td>
<td>9.5</td>
<td>11.0</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>UVLO Hysteresis</td>
<td>UVLO_HYS</td>
<td>V_O &gt; 5 V, I_O = 10 mA</td>
<td>0.4</td>
<td>1.3</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Coupled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold Input Current</td>
<td>I_FLH</td>
<td>I_O = 0 mA, V_O &gt; 5 V</td>
<td>1.7</td>
<td>4.0</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>(L → H)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold Input Voltage</td>
<td>V_FHL</td>
<td>I_O = 0 mA, V_O &lt; 5 V</td>
<td>0.8</td>
<td></td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>

Notes: *1. Typical values at T_A = 25°C, V_CC – V_EE = 30 V.
*2. Maximum pulse width = 50 µs, Maximum duty cycle = 0.5%.
*3. Maximum pulse width = 10 µs, Maximum duty cycle = 0.2%.
*4. V_OH is measured with the DC load current in this testing (Maximum pulse width = 2 ms, Maximum duty cycle = 20%).

## SWITCHING CHARACTERISTICS

(at RECOMMENDED OPERATING CONDITIONS, VEE=GND, unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>MIN.</th>
<th>TYP. *1</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propagation Delay Time (L → H)</td>
<td>t_PHL</td>
<td>R_D = 10 Ω, C_s = 10 nF,</td>
<td>80</td>
<td>175</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>f = 10 kHz,</td>
<td>105</td>
<td>175</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Pulse Width Distortion (PWD)</td>
<td>t_PHL–t_PHH</td>
<td>Duty Cycle = 50%,</td>
<td>25</td>
<td>75</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Propagation Delay Time (Difference Between Any Two Products)</td>
<td>t_PHL–t_PHH</td>
<td>I_F = 10 mA</td>
<td>-90</td>
<td>90</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Rise Time</td>
<td>t_r</td>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Fall Time</td>
<td>t_f</td>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Common Mode Transient Immunity at High Level Output</td>
<td>[CM_H]</td>
<td>T_A = 25°C, I_F = 10 mA,</td>
<td>50</td>
<td></td>
<td></td>
<td>kV/µs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_CC = 30 V, V_CM = 1.5 kV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Mode Transient Immunity at Low Level Output</td>
<td>[CM_L]</td>
<td>T_A = 25°C, I_F = 0 mA,</td>
<td>50</td>
<td></td>
<td></td>
<td>kV/µs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_CC = 30 V, V_CM = 1.5 kV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: *1. Typical values at T_A = 25°C, V_CC–V_EE = 30 V.
TEST CIRCUIT

Fig. 1  IOH Test Circuit

Fig. 2  IOL Test Circuit

Fig. 3  VOH Test Circuit

Fig. 4  VOL Test Circuit

Fig. 5  ICCH/ICCL Test Circuit

Fig. 6  UVLO Test Circuit
Fig. 7 IFLH Test Circuit

Fig. 8 tPLH, tPHL, tr, tf Test Circuit and Wave Forms

Fig. 9 CMR Test Circuit and Wave Forms
TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

**Remark**  The graphs indicate nominal characteristics.
Remark  The graphs indicate nominal characteristics.
Remark  The graphs indicate nominal characteristics.
Remark  The graphs indicate nominal characteristics.
TAPING SPECIFICATIONS (UNIT: mm)

Outline and Dimensions (Taps)

Outline and Dimensions (Reel)

Packing: 3000 pcs/reel
RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)

Remark  All dimensions in this figure must be evaluated before use.
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 refloows: Three
      • Flux: Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

   (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) Soldering by Soldering Iron
      • Peak Temperature (lead part temperature): 350°C or below
      • Time (each pins): 3 seconds or less
      • Flux: Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

         (a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead

   (4) 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 at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.
USAGE CAUTIONS

1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.

2. Board designing
   (1) By-pass capacitor of more than 1.0 \(\mu\)F is used between VCC and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.
   (2) When designing the printed wiring board, ensure that the pattern of the IGBT collectors/emitters is not too close to the input block pattern of the photocoupler.
      If the pattern is too close to the input block and coupling occurs, a sudden fluctuation in the voltage on the IGBT output side might affect the photocoupler’s LED input, leading to malfunction or degradation of characteristics.
      (If the pattern needs to be close to the input block, to prevent the LED from lighting during the off state due to the abovementioned coupling, design the input-side circuit so that the bias of the LED is reversed, within the range of the recommended operating conditions, and be sure to thoroughly evaluate operation.)

3. Make sure the rise/fall time of the forward current is 0.5 \(\mu\)s or less.
4. In order to avoid malfunctions, make sure the rise/fall slope of the supply voltage is 3 V/\(\mu\)s or less.
5. Avoid storage at a high temperature and high humidity.
### SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Spec.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatic test class (IEC 60068-1/DIN EN 60068-1)</td>
<td></td>
<td>40/125/21</td>
<td></td>
</tr>
<tr>
<td>Dielectric strength</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maximum operating isolation voltage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test voltage (partial discharge test, procedure a for type test and random test)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$U_{pr} = 1.6 \times U_{ORM}$, $P_d &lt; 5 \text{ pC}$</td>
<td>U_{ORM}</td>
<td>1 130</td>
<td>$V_{peak}$</td>
</tr>
<tr>
<td>$U_{pr} = 1.875 \times U_{ORM}$, $P_d &lt; 5 \text{ pC}$</td>
<td>U_{pr}</td>
<td>2 119</td>
<td>$V_{peak}$</td>
</tr>
<tr>
<td>Test voltage (partial discharge test, procedure b for all devices)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$U_{pr} = 1.875 \times U_{ORM}$, $P_d &lt; 5 \text{ pC}$</td>
<td>U_{pr}</td>
<td>1 130</td>
<td>$V_{peak}$</td>
</tr>
<tr>
<td>Highest permissible overvoltage</td>
<td>U_{OTM}</td>
<td>8 000</td>
<td>$V_{peak}$</td>
</tr>
<tr>
<td>Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303 Part 11))</td>
<td></td>
<td>CTI 400</td>
<td></td>
</tr>
<tr>
<td>Material group (DIN EN 60664-1 VDE0110 Part 1)</td>
<td></td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>T_{stg}</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>T_{A}</td>
<td>-40 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Isolation resistance, minimum value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{IO} = 500 \text{ V dc at } T_{A} = 25^\circ \text{C}$</td>
<td>R_{is MIN.}</td>
<td>10^{12}</td>
<td>Ω</td>
</tr>
<tr>
<td>$V_{IO} = 500 \text{ V dc at } T_{A \text{ MAX.}} \text{ at least } 100^\circ \text{C}$</td>
<td>R_{is MIN.}</td>
<td>10^{11}</td>
<td>Ω</td>
</tr>
<tr>
<td>Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package temperature</td>
<td>T_{si}</td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td>Current (input current $I_{K}$, $Psi = 0$)</td>
<td>Isi</td>
<td>400</td>
<td>mA</td>
</tr>
<tr>
<td>Power (output or total power dissipation)</td>
<td>Psi</td>
<td>700</td>
<td>mW</td>
</tr>
<tr>
<td>Isolation resistance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{IO} = 500 \text{ V dc at } T_{A} = T_{si}$</td>
<td>R_{is MIN.}</td>
<td>10^{9}</td>
<td>Ω</td>
</tr>
</tbody>
</table>

**Dependence of maximum safety ratings with package temperature**

![Graph showing the dependence of maximum safety ratings with package temperature]
Method A  Destructive Test, Type and Sample test

\[ V \]

\[ U_{\text{IOTM}} = 8000V \]
\[ U_{\text{PR}} = 1808V \]
\[ U_{\text{FORM}} = 1130V \]

\[ t_1, t_2 = 1 \text{ to } 10 \text{ sec} \]
\[ t_3, t_4 = 1 \text{ sec} \]
\[ t_{\text{m}} (\text{PARTIAL DISCHARGE}) = 10 \text{ sec} \]
\[ t_{\text{test}} = 12 \text{ sec} \]
\[ t_{\text{init}} = 60 \text{ sec} \]

Method b  Non-destructive Test, 100% Production Test

\[ V \]
\[ U_{\text{PR}} = 2119V \]
\[ U_{\text{FORM}} = 1130V \]

\[ t_3, t_4 = 0.1 \text{ sec} \]
\[ t_{\text{p}} (\text{PARTIAL DISCHARGE}) = 1.0 \text{ sec} \]
\[ t_{\text{test}} = 1.2 \text{ sec} \]
<table>
<thead>
<tr>
<th>Caution</th>
<th>GaAs Products</th>
</tr>
</thead>
</table>

This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.

- Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.
  1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.
  2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.
- Do not burn, destroy, cut, crush, or chemically dissolve the product.
- Do not lick the product or in any way allow it to enter the mouth.
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