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## NTE3091 Optocoupler Photo SCR Output

**Description:**

The NTE3091 is an optically coupled SCR with a gallium arsenide infrared emitter and a silicon photo SCR sensor in a 6-Lead DIP type package. Switching can be achieved while maintaining a high degree of isolation between triggering and load circuits. This device can be used in SCR TRIAC and solid state relay applications where high blocking voltages and low input current sensitivity is required.

**Features:**

- Turn On Current ( $I_{FT}$ ), 5mA Typical
- Gate Trigger Current ( $I_{GT}$ ), 20mA Typical
- Surge Anode Current, 5A
- Blocking Voltage, 400V Gate Trigger Voltage ( $V_{GT}$ ), 0.6V Typical
- Isolation est Voltage 5300V<sub>RMS</sub>
- Solid State Reliability

**Absolute Maximum Rating:** ( $T_A = +25\mu C$ , Note 1, unless otherwise specified)

**Input**

|                                      |                 |
|--------------------------------------|-----------------|
| Peak Reverse Voltage, $V_{RM}$ ..... | 6V              |
| Forward Current, $I_F$               |                 |
| Continuous .....                     | 60mA            |
| Peak (1.0ms, 1% Duty Cycle) .....    | 3A              |
| Power Dissipation .....              | 100mW           |
| Derate Above $25\mu C$ .....         | 1.33mW/ $\mu C$ |

**Output**

|  |                 |
|--|-----------------|
| Reverse Gate Voltage, $V_{RG}$ .....   | 6V              |
| Anode Voltage (DC or AC Peak), $V_A$ .....   | 400V            |
| RMS Forward Current, $I_{FRMS}$ .....  | 300mA           |
| Surge Anode Current (10ms Duration), $I_{AS}$ .....                                | 5A              |
| Peak Forward Current (Pulse Width = 100 $\mu s$ , Duty Cycle = 1%), $I_{FM}$ ..... | 10A             |
| Surge Gate Current (5ms Duration), $I_{GS}$ .....                                  | 200mA           |
| Power Dissipation ( $T_C = +25\mu C$ ) .....                                       | 1000mW          |
| Derate Linearly From $25\mu C$ .....   | 13.3mW/ $\mu C$ |

Note 1. Stresses in excess of the Absolute Maximum Ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to Absolute Maximum Ratings for extended periods of time can adversely affect reliability.

**Absolute Maximum Rating (Cont'd):** ( $T_A = +25\mu\text{C}$ , Note 1, unless otherwise specified)

**Coupler**

|  |                               |
|--|-------------------------------|
| Isolation Test Voltage, $V_{ISO}$<br>(Between Emitter and Detector Referred to<br>Standard Climate $23\mu\text{C}/50\% \text{RH}$ , DIN 50014) ..... | 5300V                         |
| Creepage .....   | 7.0mm                         |
| Clearance .....  | 7.0mm                         |
| Comparative Tracking Index (Per DIN IEC 112/VDE 0303, Part 1) .....  | 175                           |
| Isolation Resistance ( $V_{IO} = 500\text{V}$ ), $R_{IO}$  |                               |
| $T_A = +25\mu\text{C}$ .....   | $10^{12}\Omega$               |
| $T_A = +100\mu\text{C}$ .....  | $10^{11}\Omega$               |
| Total Package Dissipation, $P_{tot}$ .....   | 400mW                         |
| Derate Linearly From $25\mu\text{C}$ .....   | 5.5mW/ $\mu\text{C}$          |
| Operating Temperature Range, $T_{opr}$ .....   | $-55\mu$ to $+100\mu\text{C}$ |
| Storage Temperature Range, $T_{stg}$ .....   | $-55\mu$ to $+150\mu\text{C}$ |
| Lead Temperature (During Soldering, 10sec), $T_L$ .....  | $+260\mu\text{C}$             |

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**Electrical Characteristics:** ( $T_A = +25\mu\text{C}$ , Note 2 unless otherwise specified)

| Parameter                  | Symbol   | Test Conditions   | Min | Typ | Max | Unit          |
|----------------------------|----------|---|-----|-----|-----|---------------|
| <b>Input</b>               |          |   |     |     |     |               |
| Forward Voltage            | $V_F$    | $I_F = 10\text{mA}$   | -   | 1.2 | 1.5 | V             |
| Reverse Leakage Current    | $I_R$    | $V_R = 3\text{V}$   | -   | -   | 10  | $\mu\text{A}$ |
| Capacitance                | $C_J$    | $V = 0, f = 1\text{MHz}$  | -   | 50  | -   | pF            |
| <b>Output</b>              |          |   |     |     |     |               |
| Forward Blocking Voltage   | $V_{DM}$ | $I_D = 150\mu\text{A}, R_{GK} = 10\text{k}\Omega, T_A = +100\mu\text{C}$          | 400 | -   | -   | V             |
| Reverse Blocking Voltage   | $V_{RM}$ |   | 400 | -   | -   | V             |
| On-State Voltage           | $V_T$    | $I_T = 300\text{mA}$  | -   | 1.1 | 1.3 | V             |
| Holding Current            | $I_H$    | $R_{GK} = 27\text{k}\Omega, V_{FX} = 50\text{V}$                                  | -   | -   | 500 | $\mu\text{A}$ |
| Gate Trigger Voltage       | $V_{GT}$ | $V_{FX} = 100\text{V}, R_{GK} = 27\text{k}\Omega, R_L = 10\text{k}\Omega$         | -   | 0.6 | 1.0 | V             |
| Forward Leakage Current    | $I_R$    | $V_{RX} = 400\text{V}, R_{GK} = 10\text{k}\Omega, I_F = 0, T_A = +100\mu\text{C}$ | -   | 150 | -   | $\mu\text{A}$ |
| Reverse Leakage Current    |          |   | -   | 150 | -   | $\mu\text{A}$ |
| Capacitance (Anode-Gate)   |          | $V = 0, f = 1\text{MHz}$  | -   | 20  | -   | pF            |
| Capacitance (Gate-Cathode) |          | $V = 0, f = 1\text{MHz}$  | -   | 350 | -   | pF            |
| <b>Coupled</b>             |          |   |     |     |     |               |
| Turn-On Current            | $I_{FT}$ | $V_{DM} = 50\text{V}, R_{GK} = 10\text{k}\Omega$                                  | -   | -   | 20  | mA            |
|                            |          | $V_{DM} = 100\text{V}, R_{GK} = 27\text{k}\Omega$                                 | -   | 5   | 11  | mA            |

Note 2. Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

### Pin Connection Diagram

