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# NTE3087
# Optoisolator
# High Speed, Open Collector, NAND Gate Output

**Description:**

The NTE3087 is an optoisolator which combines a GaAsP LED as the emitter and an integrated high gain multi–stage high speed photodetector. The output of the detector circuit is an open collector, Schottky clamped transistor capable of sinking 50mA. The open collector output provides capability for bussing, ORing and strobing. The NTE3087 is packaged in a plastic 8–pin mini–DIP.

**Features:**

- LSTTL/TTL Compatible: 5V Supply
- Ultra High Speed
- Guaranteed Performance Over Temperature
- High Isolation Voltage: $2500V_{rms}$

**Absolute Maximum Ratings:** ($T_A$ = 0°C to +70°C unless otherwise specified)

Input Forward Current (Note 2), $I_F$ . . . . . 20mA
Pulse Forward Current (Note 3), $I_{FP}$ . . . . . 40mA
Reverse Voltage, $V_R$ . . . . . 5V
Output Current, $I_O$ . . . . . 50mA
Output Voltage, $V_O$ . . . . . 7V
Supply Voltage (1 minute max), $V_{CC}$ . . . . . 7V
Enable Input Voltage (Not to Exceed $V_{CC}$ by More than 500mV) , $V_{EH}$ . . . . . 5.5V
Output Collector Power Dissipation, $P_O$ . . . . . 85mW
Operating Temperature Range, $T_{opr}$ . . . . . 0° to +70°C
Storage Temperature Range, $T_{stg}$ . . . . . –55° to +125°C
Isolation Voltage (Note 3), $BV_S$ . . . . . $2500V_{rms}$

Note 1. Device considered a two–terminal device: Pin1, 2, 3, and 4 are shorted together, and Pin5, 6, 7, and 8 are shorted together.

Note 2. 50% Duty Cycle, 1ms Pulse Width.

Note 3. R.H. = 40 to 60%, AC/1min.

**Recommended Operating Conditions:**

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Input Current, Low Level (Each Channel) | $I_{FL}$ | | 0 | – | 250 | µA |
| Input Current, High Level (Each Channel) | $I_{FH}$ | | 6.3 | – | 15.0 | mA |
| Enable Voltage, Low Level (Output High) | $V_{EL}$ | | 0 | – | 0.8 | V |
| Enable Voltage, High Level | $V_{EH}$ | | 2.0 | – | $V_{CC}$ | V |
| Operating Temperature | $T_A$ | | 0 | – | 70 | °C |
| Fan Out (TTL Load) | N | | – | – | 8 | |

**Electrical Characteristics:** ($T_A$ = 0°C to +70°C, Note 4 unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| High Level Output Current | $I_{OH}$ | $V_{CC}$ = 5.5V, $V_O$ = 5.5V, $I_F$ = 250μA, $V_E$ = 2V | – | 1 | 250 | μA |
| Low Level Output Voltage | $V_{OL}$ | $V_{CC}$ = 5.5V, $I_F$ = 5mA, $V_{EH}$ = 2V, $I_{OL}$ = 13mA | – | 0.4 | 0.6 | V |
| High Level Enable Current | $I_{EH}$ | $V_{CC}$ = 5.5V, $V_E$ = 2.0V | – | –1.0 | – | mA |
| Low Level Enable Current | $I_{EL}$ | $V_{CC}$ = 5.5V, $V_E$ = 0.5V | – | –1.6 | –2.0 | mA |
| High Level Supply Current | $I_{CCH}$ | $V_{CC}$ = 5.5V, $I_F$ = 0, $V_E$ = 0.5V | – | 7 | 14 | mA |
| Low Level Supply Current | $I_{CCL}$ | $V_{CC}$ = 5.5V, $I_F$ = 10mA, $V_E$ = 0.5V | – | 12 | 18 | mA |
| Resistance (Input–to–Output) | $R_{I–O}$ | $V_{I–O}$ = 500V, $T_A$ = +25°C | – | $10^{12}$ | – | Ω |
| Capacitance (Input–to–Output) | $C_{I–O}$ | f = 1MHz, $T_A$ = +25°C | – | 0.6 | – | pF |
| Input Forward Voltage | $V_F$ | $I_F$ = 10mA, $T_A$ = +25°C | – | 1.65 | 1.9 | V |
| Input Reverse Breakdown Voltage | $V_{(BR)R}$ | $I_R$ = 10μA, $T_A$ = +25°C | 5.0 | – | – | V |
| Input Capacitance | $C_{IN}$ | $V_F$ = 0, f = 1MHz | – | 30 | – | pF |
| Current Transfer Ratio | CTR | $I_F$ = 5mA, $R_L$ = 10Ω | – | 1000 | – | % |

Note 4. All typical values at $V_{CC}$ = 5V, $T_A$ = +25°C.

**Switching Characteristics:** ($T_A$ = +25°C, $V_{CC}$ = 5V unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Propagation Delay Time to High level Output | $t_{PLH}$ | $R_L$ = 350Ω, $C_L$ = 15pF, $I_F$ = 7.5mA | – | 60 | 120 | ns |
| Propagation Delay Time to Low level Output | $t_{PLH}$ | | – | 60 | 120 | ns |
| Output Rise–Fall Time (10% to 90%) | $t_r$, $t_f$ | $R_L$ = 350Ω, $C_L$ = 15pF, $I_F$ = 7.5mA | – | 30 | – | ns |
| Propagation Delay Time of Enable from $V_{EH}$ to $V_{EL}$ | $t_{ELH}$ | $R_L$ = 350Ω, $C_L$ = 15pF, $I_F$ = 7.5mA, $V_{EH}$ = 3V, $V_{EL}$ = 0.5V | – | 25 | – | ns |
| Propagation Delay Time of Enable from $V_{EL}$ to $V_{EH}$ | $t_{EHL}$ | | – | 25 | – | ns |
| Common Mode Transient Immunity at Logic High Outut Level | $CM_H$ | $V_{CM}$ = 10V, $R_L$ = 350Ω, $V_{O(min)}$ = 2V, $I_F$ = 0mA | – | 150 | – | V/μs |
| Common Mode Transient Immunity at Logic Low Outut Level | $CM_L$ | $V_{CM}$ = 10V, $R_L$ = 350Ω, $V_{O(max)}$ = 0.8V, $I_F$ = 5mA | – | –150 | – | V/μs |

**Truth Table:** (0.1μF bypass capacitor must be connected between Pin8 and Pin5)

| Input | Enable | Output |
|---|---|---|
| H | H | L |
| L | H | H |
| H | L | H |
| L | L | H |

**Pin Connection Diagram**