



6-Pin DIP Optoisolators Transistor Output

The 4N25/A, 4N26, 4N27 and 4N28 devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector.

- Most Economical Optoisolator Choice for Medium Speed, Switching Applications
- Meets or Exceeds All JEDEC Registered Specifications
- **To order devices that are tested and marked per VDE 0884 requirements, the suffix "V" must be included at end of part number. VDE 0884 is a test option.**

Applications

- General Purpose Switching Circuits
- Interfacing and coupling systems of different potentials and impedances
- I/O Interfacing
- Solid State Relays

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

| Rating | Symbol | Value | Unit |
|--------|--------|-------|------|
|--------|--------|-------|------|

INPUT LED

| | | | |
|---|-------|------|----------------------|
| Reverse Voltage | V_R | 3 | Volts |
| Forward Current — Continuous | I_F | 60 | mA |
| LED Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Output Detector Derate above 25°C | P_D | 120 | mW |
| | | 1.41 | mW/ $^\circ\text{C}$ |

OUTPUT TRANSISTOR

| | | | |
|--|-----------|------|----------------------|
| Collector–Emitter Voltage | V_{CEO} | 30 | Volts |
| Emitter–Collector Voltage | V_{ECO} | 7 | Volts |
| Collector–Base Voltage | V_{CBO} | 70 | Volts |
| Collector Current — Continuous | I_C | 150 | mA |
| Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Input LED Derate above 25°C | P_D | 150 | mW |
| | | 1.76 | mW/ $^\circ\text{C}$ |

TOTAL DEVICE

| | | | |
|--|-----------|-------------|----------------------|
| Isolation Surge Voltage(1) (Peak ac Voltage, 60 Hz, 1 sec Duration) | V_{ISO} | 7500 | Vac(pk) |
| Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 250 | mW |
| | | 2.94 | mW/ $^\circ\text{C}$ |
| Ambient Operating Temperature Range(2) | T_A | -55 to +100 | $^\circ\text{C}$ |
| Storage Temperature Range(2) | T_{stg} | -55 to +150 | $^\circ\text{C}$ |
| Soldering Temperature (10 sec, 1/16" from case) | T_L | 260 | $^\circ\text{C}$ |

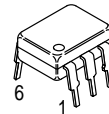
1. Isolation surge voltage is an internal device dielectric breakdown rating.
For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.
2. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.

Preferred devices are Motorola recommended choices for future use and best overall value.
GlobalOptoisolator is a trademark of Motorola, Inc.

4N25*
4N25A*
4N26*
[CTR = 20% Min]
4N27
4N28
[CTR = 10% Min]

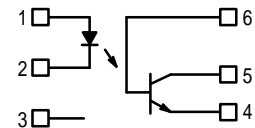
*Motorola Preferred Devices

STYLE 1 PLASTIC



STANDARD THRU HOLE
CASE 730A-04

SCHEMATIC



- PIN 1. LED ANODE
2. LED CATHODE
3. N.C.
4. EMITTER
5. COLLECTOR
6. BASE

4N25 4N25A 4N26 4N27 4N28

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)⁽¹⁾

| Characteristic | Symbol | Min | Typ ⁽¹⁾ | Max | Unit | |
|--|----------------|------------------------|--------------------|------|------|-------|
| INPUT LED | | | | | | |
| Forward Voltage (I _F = 10 mA) | V _F | T _A = 25°C | — | 1.15 | 1.5 | Volts |
| | | T _A = -55°C | — | 1.3 | — | |
| | | T _A = 100°C | — | 1.05 | — | |
| Reverse Leakage Current (V _R = 3 V) | I _R | — | — | 100 | μA | |
| Capacitance (V = 0 V, f = 1 MHz) | C _J | — | 18 | — | pF | |

OUTPUT TRANSISTOR

| | | | | | | |
|---|----------------|----------------------|----|-----|-----|-------|
| Collector–Emitter Dark Current (V _{CE} = 10 V, T _A = 25°C) | 4N25,25A,26,27 | I _{CEO} | — | 1 | 50 | nA |
| | 4N28 | | — | 1 | 100 | |
| (V _{CE} = 10 V, T _A = 100°C) | All Devices | I _{CEO} | — | 1 | — | μA |
| Collector–Base Dark Current (V _{CB} = 10 V) | | I _{CBO} | — | 0.2 | — | nA |
| Collector–Emitter Breakdown Voltage (I _C = 1 mA) | | V _{(BR)CEO} | 30 | 45 | — | Volts |
| Collector–Base Breakdown Voltage (I _C = 100 μA) | | V _{(BR)CBO} | 70 | 100 | — | Volts |
| Emitter–Collector Breakdown Voltage (I _E = 100 μA) | | V _{(BR)ECO} | 7 | 7.8 | — | Volts |
| DC Current Gain (I _C = 2 mA, V _{CE} = 5 V) | | h _{FE} | — | 500 | — | — |
| Collector–Emitter Capacitance (f = 1 MHz, V _{CE} = 0) | | C _{CE} | — | 7 | — | pF |
| Collector–Base Capacitance (f = 1 MHz, V _{CB} = 0) | | C _{CB} | — | 19 | — | pF |
| Emitter–Base Capacitance (f = 1 MHz, V _{EB} = 0) | | C _{EB} | — | 9 | — | pF |

COUPLED

| | | | | | |
|---|-------------------------------------|------------------|------------------|--------|---------|
| Output Collector Current (I _F = 10 mA, V _{CE} = 10 V) | I _C (CTR) ⁽²⁾ | 2 (20) 1 (10) | 7 (70) 5 (50) | — — | mA (%) |
| 4N25,25A,26 4N27,28 | | | | | |
| Collector–Emitter Saturation Voltage (I _C = 2 mA, I _F = 50 mA) | V _{CE(sat)} | — | 0.15 | 0.5 | Volts |
| Turn–On Time (I _F = 10 mA, V _{CC} = 10 V, R _L = 100 Ω) ⁽³⁾ | t _{on} | — | 2.8 | — | μs |
| Turn–Off Time (I _F = 10 mA, V _{CC} = 10 V, R _L = 100 Ω) ⁽³⁾ | t _{off} | — | 4.5 | — | μs |
| Rise Time (I _F = 10 mA, V _{CC} = 10 V, R _L = 100 Ω) ⁽³⁾ | t _r | — | 1.2 | — | μs |
| Fall Time (I _F = 10 mA, V _{CC} = 10 V, R _L = 100 Ω) ⁽³⁾ | t _f | — | 1.3 | — | μs |
| Isolation Voltage (f = 60 Hz, t = 1 sec) ⁽⁴⁾ | V _{ISO} | 7500 | — | — | Vac(pk) |
| Isolation Resistance (V = 500 V) ⁽⁴⁾ | R _{ISO} | 10 ¹¹ | — | — | Ω |
| Isolation Capacitance (V = 0 V, f = 1 MHz) ⁽⁴⁾ | C _{ISO} | — | 0.2 | — | pF |

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) = I_C/I_F × 100%.
3. For test circuit setup and waveforms, refer to Figure 11.
4. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.