



IL201/IL202/IL203

Phototransistor Optocoupler

FEATURES

- High Current Transfer Ratio, 75% to 450%
- Minimum Current Transfer Ratio, 10%
- Guaranteed at $I_F=1.0\text{mA}$
- High Collector-Emitter Voltage, $BV_{CEO}=70\text{V}$
- Long Term Stability
- Industry Standard DIP Package
- Underwriters Lab File #E52744
- VDE 0884 Available with Option 1

DESCRIPTION

The IL201/202/203 are optically coupled pairs employing a Gallium Arsenide infrared LED and a Silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output. The IL201/202/203 can be used to replace relays and transformers in many digital interface applications, as well as analog applications such as CRT modulation.

Maximum Ratings

Emitter

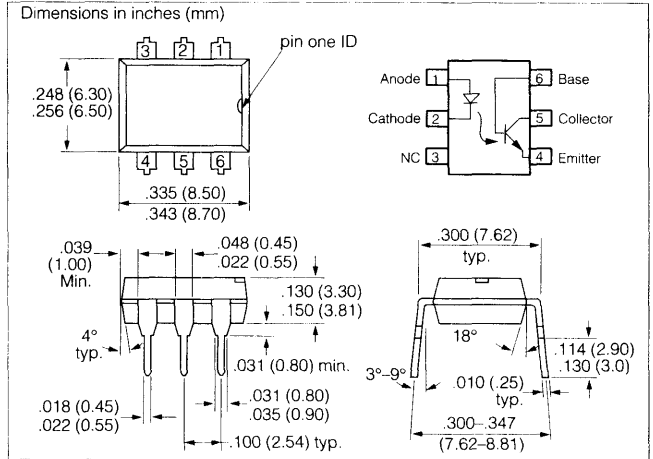
Peak Reverse Voltage 6.0 V
 Continuous Forward Current 60 mA
 Power Dissipation at 25°C 100 mW
 Derate Linearly from 25°C 1.33 mW/°C

Detector

Collector-Emitter Breakdown Voltage,
 BV_{CEO} 70 V
 Emitter-Collector Breakdown Voltage,
 BV_{ECO} 7.0 V
 Collector-Base Breakdown Voltage,
 BV_{CBO} 70 V
 Power Dissipation 200 mW
 Derate Linearly from 25°C 2.6 mW/°C

Package

Isolation Test Voltage ($t=1.0$ sec.) 5300 V_{RMS}
 Total Package Dissipation at 25°C A
 (LED + Detector) 250 mW
 Derate Linearly from 25°C 3.3 mW/°C
 Creepage ≥ 7.0 min
 Clearance ≥ 7.0 min
 Storage Temperature -55°C to +150°C
 Operating Temperature -55°C to +100°C
 Lead Soldering Time at 260°C 10 sec.



Characteristics 0°C to 70°C unless otherwise specified

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition | |
|--|-------------|-------|------|------|---------|--|--------------------------------|
| Emitter | | | | | | | |
| Forward Voltage | V_F | — | 1.2 | 1.5 | V | $I_F=20$ mA | |
| Forward Voltage | | — | 1.0 | 1.2 | | $I_F=1.0$ mA | |
| Breakdown Voltage | | 6.0 | 20 | — | | $I_R=10$ μ A | |
| Reverse Current | I_R | — | 0.1 | 10 | μ A | $V_R=6.0$ V $T_A=25^\circ\text{C}$ | |
| Detector | | | | | | | |
| Transistor Gain | HFE | 100 | 200 | — | — | $V_{CE}=5.0$ V $I_C=100$ μ A | |
| Breakdown Voltage Collector-Emitter | BV_{CEO} | 70 | — | — | V | $I_C=100$ μ A | |
| Breakdown Voltage Emitter-Collector | BV_{ECO} | 7.0 | 10 | — | | $I_E=100$ μ A | |
| Breakdown Voltage Collector-Base | BV_{CBO} | 70 | 90 | — | | $I_C=10$ μ A | |
| Leakage Current Collector-Emitter | I_{CEO} | — | 5.0 | 50 | nA | $V_{CE}=10$ V, $T_A=25^\circ\text{C}$ | |
| Package | | | | | | | |
| Base Current Transfer Ratio | CTRCB | 0.15 | — | — | % | $I_F=10$ mA $V_{CB}=10$ V | |
| | V_{CEsat} | — | — | 0.4 | V | $I_F=10$ mA $I_C=2.0$ mA | |
| DC Current Transfer Ratio | CTR | IL201 | 75 | 100 | 150 | % | $I_F=10$ mA, $V_{CE}=10$ V |
| | | IL202 | 125 | 200 | 250 | | |
| | | IL203 | 225 | 300 | 450 | | |
| DC Current Transfer Ratio | CTR | IL201 | 10 | — | — | % | $I_F=1.0$ mA, $V_{CE}=10$ V |
| | | IL202 | 30 | | | | |
| | | IL203 | 50 | | | | |
| | | | | | | | |

Figure 1. Forward voltage versus forward current

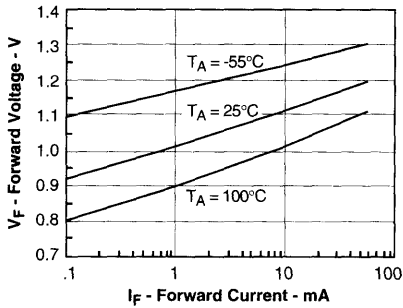


Figure 2. Normalized non-saturated and saturated CTR at $T_A=25^\circ\text{C}$ versus LED current

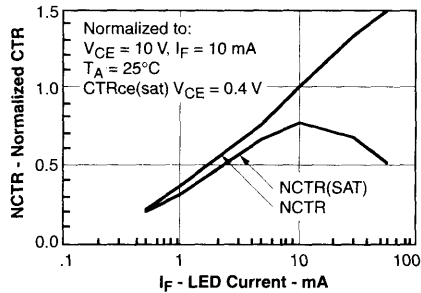


Figure 3. Normalized non-saturated and saturated CTR at $T_A=50^\circ\text{C}$ versus LED current

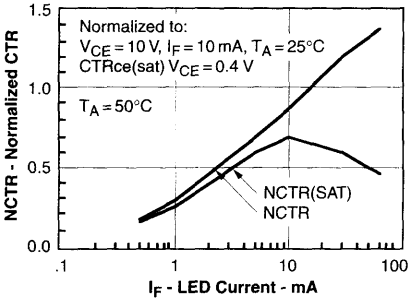


Figure 4. Normalized non-saturated and saturated CTR at $T_A=70^\circ\text{C}$ versus LED current

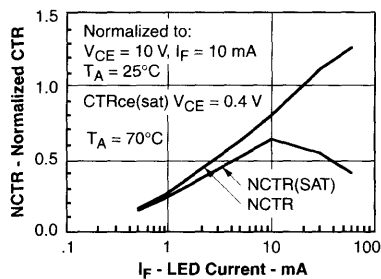


Figure 5. Normalized non-saturated and saturated CTR at $T_A=85^\circ\text{C}$ versus LED current

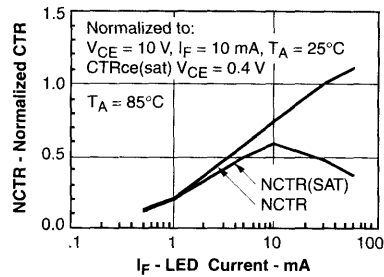


Figure 6. Collector-emitter current versus temperature and LED current

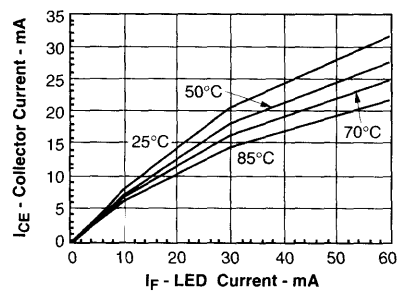


Figure 7. Collector-emitter leakage current versus temperature

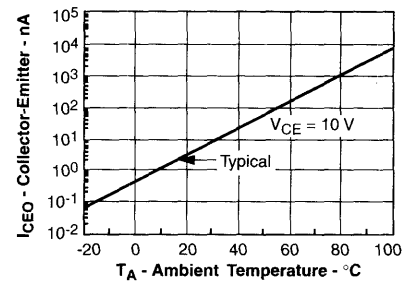


Figure 8. Normalized CTRcb versus LED current and temperature

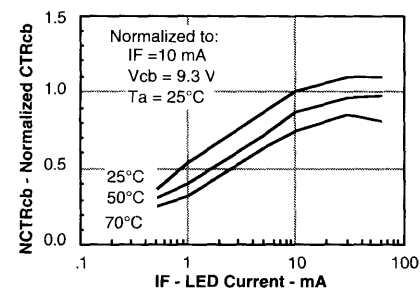


Figure 9. Collector base photocurrent versus LED current

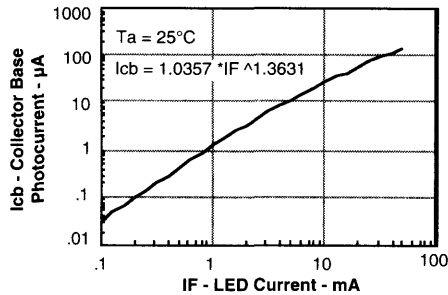


Figure 10. Normalized photocurrent versus I_F and temperature

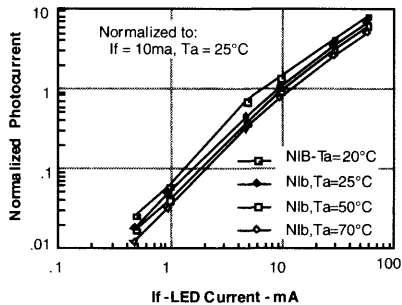


Figure 11. Normalized saturated HFE versus base current and temperature

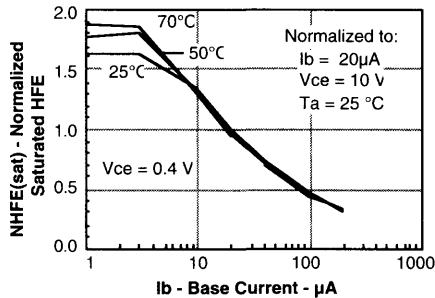


Figure 12. Propagation delay versus collector load resistor

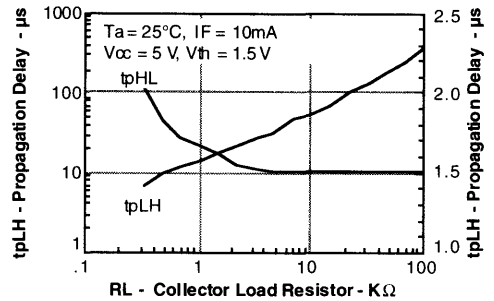


Figure 13. Normalized non-saturated and saturated CTR_{ce} versus LED current

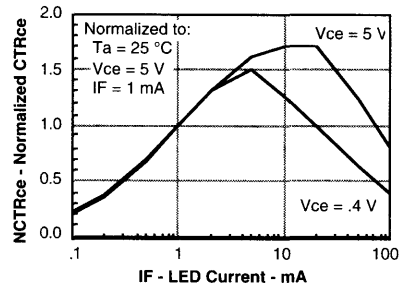


Figure 14. Normalized non-saturated HFE versus base current and temperature

