

CNX35U CNX36U CNX38U CNX39U

DESCRIPTION

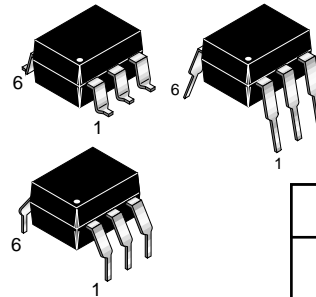
The CNX35U, CNX36U, CNX38U and CNX39U are optically coupled isolators consisting of an infrared emitting GaAs diode and a silicon NPN phototransistor with accessible base. These devices are housed in 6-pin dual-in-line packages (DIP).

FEATURES

- High output/input DC current transfer ratio
- Low saturation voltage
- UL recognized (File # E90700)
- VDE recognized (File # 94766)
- Ordering option '300' (e.g. CNX35U.300)

APPLICATIONS

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls



| Parameters | Symbol | Device | Value | Units |
|--|-----------|------------------------|----------------|-------|
| TOTAL DEVICE | | | | |
| Storage Temperature | T_{STG} | All | -55 to +150 | °C |
| Operating Temperature | T_{OPR} | All | -40 to +100 | °C |
| Lead Solder Temperature | T_{SOL} | All | 260 for 10 sec | °C |
| EMITTER | | | | |
| Continuous Reverse Voltage | V_R | All | 5 | V |
| Continuous Forward Current | I_F | All | 100 | mA |
| Forward Current - Peak (10 μ s pulse, $\delta = 0.01$) | $I_F(pk)$ | All | 3.0 | A |
| Total Power Dissipation up to 25°C Ambient Derate Linearly from 25°C | P_D | All | 200 | mW |
| | | All | 2.0 | mW/°C |
| DETECTOR | | | | |
| Collector to Emitter Voltage (open base) | V_{CEO} | CNX38U | 80 | V |
| | | CNX35U, CNX36U, CNX39U | 30 | |
| Collector to Base Voltage (open emitter) | V_{CBO} | CNX38U | 120 | V |
| | | CNX35U, CNX36U, CNX39U | 70 | |
| Emitter to Collector Voltage (open base) | V_{ECO} | All | 7 | V |
| DC Collector Current | I_C | All | 100 | mA |
| Detector Power Dissipation up to 25°C Ambient Derate Linearly from 25°C | P_D | All | 200 | mW |
| | | All | 2.0 | mW/°C |

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

| Parameters | Test Conditions | Symbol | Device | Min | Typ | Max | Units | |
|--------------------------------------|--|------------------------|------------------------|-----|------|-----|---------------|---------------|
| EMITTER | | | | | | | | |
| Input Forward Voltage | $I_F = 10\text{ mA}$ | V_F | All | | 1.15 | 1.5 | V | |
| Reverse Current | $V_R = 5\text{ V}$ | I_R | All | | | 10 | μA | |
| DETECTOR | | | | | | | | |
| Leakage Current Collector to Emitter | $V_{CE} = 10\text{ V}$ | I_{CEO} | CNX35U, CNX36U, CNX39U | | 2 | 50 | nA | |
| | $V_{CE} = 50\text{ V}$ | | CNX38U | | 2 | 50 | nA | |
| | $V_{CE} = 10\text{ V}, T_A = 70^\circ\text{C}$ | | CNX35U, CNX36U, CNX39U | | | | 10 | μA |
| | $V_{CE} = 50\text{ V}, T_A = 70^\circ\text{C}$ | | CNX38U | | | | 10 | μA |
| | | $V_{CE} = 10\text{ V}$ | I_{CBO} | All | | | 20 | nA |
| Breakdown Voltage | | | | | | | | |
| Collector to Emitter | $I_C = 1\text{ mA}, I_F = 0$ | BV_{CEO} | CNX35U, CNX36U, CNX39U | 30 | | | V | |
| | | | CNX38U | 80 | | | | |
| Collector to Base | $I_C = 0.1\text{ mA}, I_F = 0$ | BV_{CBO} | CNX35U, CNX36U, CNX39U | 70 | | | V | |
| | | | CNX38U | 120 | | | | |
| Emitter to Collector | $I_E = 0.1\text{ mA}, I_F = 0$ | BV_{ECO} | All | 7 | | | V | |

ISOLATION CHARACTERISTICS

| Characteristic | Test Conditions | Symbol | Min | Typ | Max | Units |
|--------------------------------|-------------------------------------|-----------|-------|-----|-----|-----------|
| Input-Output Isolation Voltage | $t = 1\text{ min.}$ | V_{ISO} | 5,300 | | | V_{RMS} |
| Isolation Resistance | $V_{I-O} = 500\text{ VDC}$ | R_{ISO} | 1 | 10 | | $T\Omega$ |
| Isolation Capacitance | $I_F = 0, V = 0V, f = 1\text{ MHz}$ | C_{ISO} | | 0.6 | 1.3 | pF |

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| TRANSFER CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.) | | | | | | | |
|---|--|---------------|----------------|------------|------------|------------|---------------|
| DC Characteristics | Test Conditions | Symbol | Device | Min | Typ | Max | Units |
| Output/Input Current Transfer Ratio | $I_F = 10\text{ mA}, V_{CE} = 0.4\text{ V}$ | CTR | CNX35U | 40 | | 160 | % |
| | | | CNX39U | 60 | | 100 | |
| | CNX36U | | 80 | | 200 | | |
| | CNX38U | | 70 | | 210 | | |
| | | | 50 | | | | |
| $I_F = 2\text{ mA}, V_{CE} = 5\text{ V}$ | All | 15 | | | | | |
| Collector-Emitter Saturation Voltage | $I_F = 10\text{ mA}, I_C = 2\text{ mA}$ | $V_{CE(SAT)}$ | CNX35U, CNX39U | | 0.15 | 0.4 | V |
| | $I_F = 10\text{ mA}, I_C = 4\text{ mA}$ | | CNX36U | | 0.19 | 0.4 | |
| | $I_F = 16\text{ mA}, I_C = 2\text{ mA}$ | | CNX38U | | 0.2 | 0.4 | |
| AC Characteristics | Test Conditions | Symbol | Device | Min | Typ | Max | Units |
| Non-Saturated Switching Times Turn-On Time See Fig. 1 and Fig. 2 | $R_L = 100\ \Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$ | t_{on} | CNX35U | | | 20 | μs |
| | $R_L = 100\ \Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$ | | CNX39U | | | 20 | |
| CNX36U | | | | 20 | | | |
| CNX38U | | 20 | | | | | |
| Turn-Off Time See Fig. 1 and Fig. 2 | $R_L = 100\ \Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$ | t_{off} | CNX35U | | | 20 | μs |
| | | | CNX39U | | | 20 | |
| CNX36U | | | 20 | | | | |
| CNX38U | | | 20 | | | | |
| Saturated Switching Times Turn-On Time See Fig. 1 and Fig. 2 | $R_L = 1\text{ k}\Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$ | t_{on} | CNX35U | | | 50 | μs |
| | $R_L = 1\text{ k}\Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$ | | CNX39U | | | 50 | |
| CNX36U | | | 50 | | | | |
| CNX38U | | 50 | | | | | |
| Turn-Off Time See Fig. 1 and Fig. 2 | $R_L = 1\text{ k}\Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$ | t_{off} | CNX35U | | | 50 | μs |
| | | | CNX39U | | | 50 | |
| CNX36U | | | 50 | | | | |
| CNX38U | | | 50 | | | | |

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Fig. 1 Switching Test Circuit

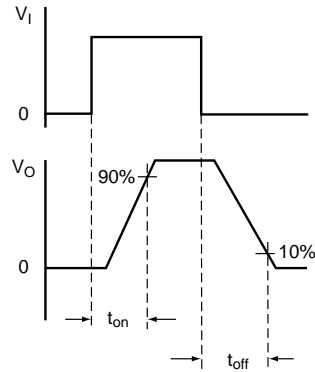


Fig. 2 Switching Test Waveforms

Fig. 3 LED Forward Voltage vs. Forward Current



Fig. 4 Normalized CTR vs. Forward Current

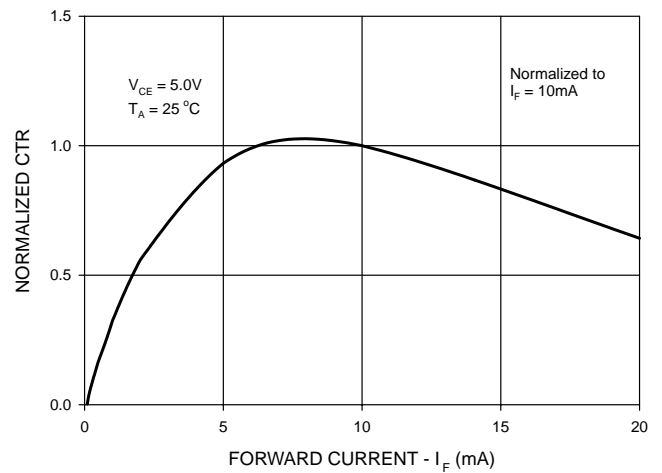


Fig. 5 Normalized CTR vs. Temperature



Fig. 6 CTR vs. R_BE (Unsaturated)



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Fig. 7 CTR vs. R_{BE} (Saturated)



Fig. 8 Normalized t_{on} vs. R_{BE}



Fig. 9 Normalized t_{off} vs. R_{BE}



Fig. 10 Switching Speed vs. Load Resistor



Fig. 11 Collector-Emitter Saturation Voltage as a Function of Collector Current



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ORDERING INFORMATION

| Option | Order Entry Identifier | Description |
|--------|------------------------|--------------------------------------|
| S | .S | Surface Mount Lead Bend |
| SD | .SD | Surface Mount; Tape and reel |
| W | .W | 0.4" Lead Spacing |
| 300 | .300 | VDE 0884 |
| 300W | .300W | VDE 0884, 0.4" Lead Spacing |
| 3S | .3S | VDE 0884, Surface Mount |
| 3SD | .3SD | VDE 0884, Surface Mount, Tape & Reel |

Carrier Tape Specifications ("D" Taping Orientation)



NOTE

All dimensions are in inches (millimeters)

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