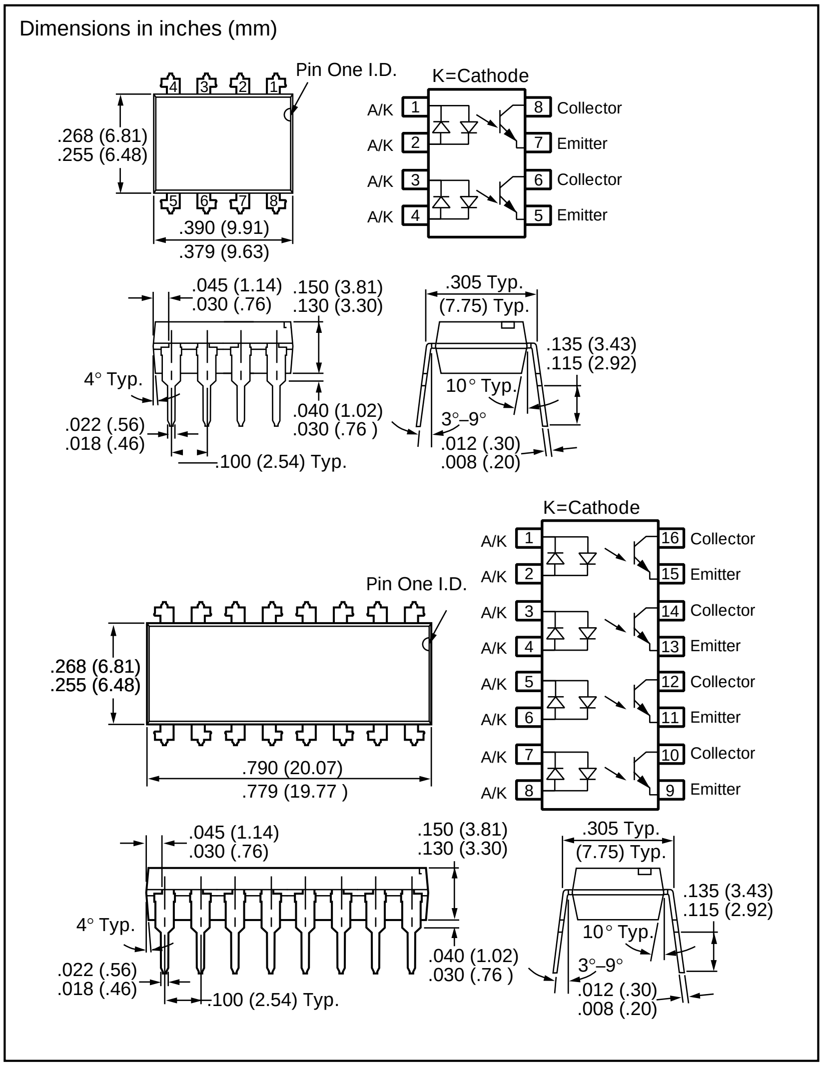
SIEMENS

# DUAL CHANNEL ILD620/620GB
# QUAD CHANNEL ILQ620/620GB
# AC INPUT PHOTOTRANSISTOR OPTOCOUPLER




## FEATURES

- **Identical Channel to Channel Footprint**
  **ILD620 Crosses to TLP620-2**
  **ILQ620 Crosses to TLP620-4**
- **Current Transfer Ratio (CTR) at $I_F$= ±5 mA**
  **ILD/Q620: 50% Min.**
  **ILD/Q620GB: 100% Min.**
- **Saturated Current Transfer Ratio ($CTR_{SAT}$) at $I_F$= ±1 mA**
  **ILD/Q620: 60% Typ.**
  **ILD/Q620GB: 30% Min.**
- **High Collector-Emitter Voltage, $BV_{CEO}$=70 V**
- **Dual and Quad Packages Feature:**
  - **Reduced Board Space**
  - **Lower Pin and Parts Count**
  - **Better Channel to Channel CTR Match**
  - **Improved Common Mode Rejection**
- **Field-Effect Stable by TRIOS (TR**ansparent **IO**n **S**hield**)**
- **Isolation Test Voltage from Double Molded Package**
- **Underwriters Lab File #E52744**
- **VDE 0884 Available with Option 1**

**Maximum Ratings** (Each Channel)

### Emitter

Forward Current ........................................±60 mA
Surge Current............................................... ±1.5 A
Power Dissipation ..................................... 100 mW
Derate from 25°C .................................. 1.3 mW/°C

### Detector

Collector-Emitter Breakdown Voltage ............. 70 V
Collector Current.......................................... 50 mA
Collector Current (t <1 ms) ......................... 100 mA
Power Dissipation ..................................... 150 mW
Derate from 25°C .................................... 2 mW/°C

### Package

Isolation Test Voltage(t=1 sec.)......... 5300 $VAC_{RMS}$
Package Dissipation, ILD620/GB ............. 400 mW
Derate from 25°C ............................... 5.33 mW/°C
Package Dissipation, ILQ620/GB ............. 500 mW
Derate from 25°C ............................... 6.67 mW/°C
Creepage ................................................7 mm min.
Clearance ...............................................7 mm min.
Isolation Resistance
$V_{IO}$=500 V, $T_A$=25°C ...............................≥$10^{12}$ Ω
$V_{IO}$=500 V, $T_A$=100°C ............................≥$10^{11}$ Ω
Storage Temperature .................. –55°C to +150°C
Operating Temperature............... –55°C to +100°C
Junction Temperature .................................. 100°C
Soldering Temperature
(2 mm from case bottom).......................... 260°C

## DESCRIPTION

The ILD/Q620 and ILD/Q620GB are multi-channel input phototran-sistor optocouplers that use inverse parallel GaAs IRLED emitters and high gain NPN silicon phototransistors per channel. These devices are constructed using over/under leadframe optical coupling and double molded insulation resulting in a Withstand Test Voltage of 7500 $VAC_{PEAK}$.

The LED parameters and the linear CTR characteristics combined with the TRIOS field-effect process make these devices well suited for AC voltage detection. The ILD/Q620GB with its low IF guaranteed $CTR_{CEsat}$ minimizes power dissipation of the AC voltage detection network that is placed in series with the LEDs. Eliminating the phototransistor base connection provides added electrical noise immunity from the transients found in many industrial control environments.



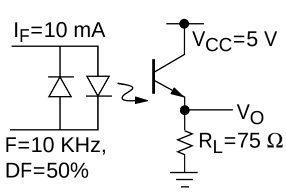
Downloaded from Elcodis.com electronic components distributor

## Characteristics

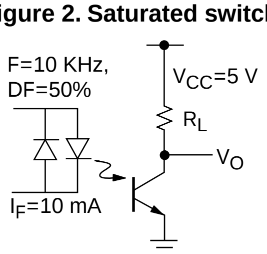
| | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| **Emitter** | | | | | | |
| Forward Voltage | $V_F$ | 1 | 1.15 | 1.3 | V | $I_F$=±10 mA |
| Forward Current | $I_F$ | | 2.5 | 20 | µA | $V_R$=±0.7 V |
| Capacitance | $C_O$ | | 25 | | pF | $V_F$=0 V, f=1 MHz |
| Thermal Resistance, Junction to Lead | $R_{THJL}$ | | 750 | | °C/W | |
| **Detector** | | | | | | |
| Capacitance | $C_{CE}$ | | 6.8 | | pF | $V_{CE}$=5 V, f=1 MHz |
| Collector-Emitter Leakage Current | $I_{CEO}$ | | 10 | 100 | nA | $V_{CE}$=24 V |
| Collector-Emitter Leakage Current | $I_{CEO}$ | | 2 | 50 | µA | $T_A$=85°C, $V_{CE}$=24 V |
| Thermal Resistance, Junction to Lead | $R_{THJL}$ | | 500 | | °C/W | |
| **Package Transfer Characteristics** | | | | | | |
| Channel/Channel CTR Match | CTRX/CTRY | 1 to 1 | | 3 to 1 | | $I_F$=±5 mA, $V_{CE}$=5 V |
| CTR Symmetry | $I_{CE(RATIO)}$ | 0.5 | | 2 | | $I_{CE}$($I_F$=–5 mA)/$I_F$(=+5 mA) |
| Off-State Collector Current | $I_{CE(OFF)}$ | | 1 | 10 | µA | $V_F$=±0.7 V, $V_{CE}$=24 V |
| **ILD/Q620** | | | | | | |
| Saturated Current Transfer Ratio | $CTR_{CEsat}$ | | 60 | | % | $I_F$=±1 mA, $V_{CE}$=0.4 V |
| Current Transfer Ratio | $CTR_{CE}$ | 50 | 80 | 600 | % | $I_F$=±5 mA, $V_{CE}$=5 V |
| Collector-Emitter Saturation Voltage | $V_{CEsat}$ | | | 0.4 | V | $I_F$=±8 mA, $I_{CE}$=2.4 mA |
| **ILD/Q620GB** | | | | | | |
| Saturated Current Transfer Ratio | $CTR_{CEsat}$ | 30 | | | % | $I_F$=±1 mA, $V_{CE}$=0.4 V |
| Current Transfer Ratio (Collector-Emitter) | $CTR_{CE}$ | 100 | 200 | 600 | % | $I_F$=±5 mA, $V_{CE}$=5 V |
| Collector-Emitter Saturation Voltage | $V_{CEsat}$ | | | 0.4 | V | $I_F$=±1 mA, $I_{CE}$=0.2 mA |
| **Isolation and Insulation** | | | | | | |
| Common Mode Rejection, Output High | CMH | | 5000 | | V/µs | $V_{CM}$=50 $V_{P-P}$, $R_L$=1 kΩ, $I_F$=0 mA |
| Common Mode Rejection, Output Low | CML | | 5000 | | V/µs | $V_{CM}$=50 $V_{P-P}$, $R_L$=1 kΩ, $I_F$=10 mA |
| Common Mode Coupling Capacitance | $C_{CM}$ | | 0.01 | | pF | |
| Package Capacitance | CI-O | 0.8 | | | pF | $V_{I-O}$=0 V, f=1 MHz |
| Insulation Resistance | $R_S$ | | $10^{12}$ | | Ω | $V_{I-O}$=500 V |
| Channel to Channel Insulation | | 500 | | | VAC | |

## Switching Times

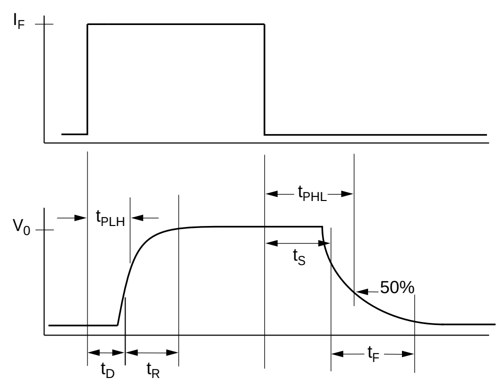
### Figure 1. Non-saturated switching timing




### Figure 2. Saturated switching timing



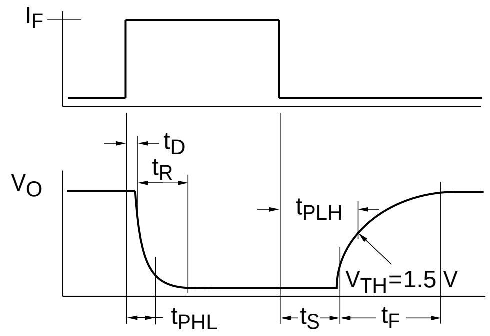

### Figure 3. Non-saturated switching timing






Downloaded from Elcodis.com electronic components distributor

**Figure 4. Saturated switching timing**




| Characteristic | Symbol | Typ. | Unit | Test Condition |
|---|---|---|---|---|
| On Time | $T_{ON}$ | 3.0 | µs | $I_F$=±10 mA |
| Rise Time | $t_R$ | 20 | µs | $V_{CC}$=5 V |
| Off Time | $t_{OFF}$ | 2.3 | µs | $R_L$=75 Ω |
| Fall Time | $t_F$ | 2.0 | µs | 50% of $V_{PP}$ |
| Propagation H-L | $t_{PHL}$ | 1.1 | µs | |
| Propagation L-H | $t_{PLH}$ | 2.5 | µs | |

| Characteristic | Symbol | Typ. | Unit | Test Condition |
|---|---|---|---|---|
| On Time | $T_{ON}$ | 4.3 | µs | $I_F$=±10 mA |
| Rise Time | $t_R$ | 2.8 | µs | $V_{CC}$=5 V |
| Off Time | $t_{OFF}$ | 2.5 | µs | $R_L$=1 Ω |
| Fall Time | $t_F$ | 11 | µs | $V_{TH}$=1.5 V |
| Propagation H-L | $t_{PHL}$ | 2.6 | µs | |
| Propagation L-H | $t_{PLH}$ | 7.2 | µs | |

**Figure 5. LED forward current versus forward voltage**

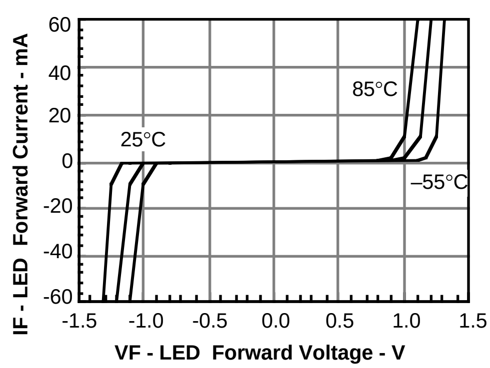



**Figure 6. Collector-emitter leakage versus temperature**

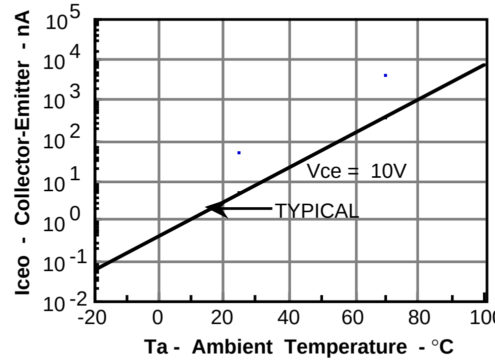



**Figure 7. Maximum LED current versus ambient temperature**

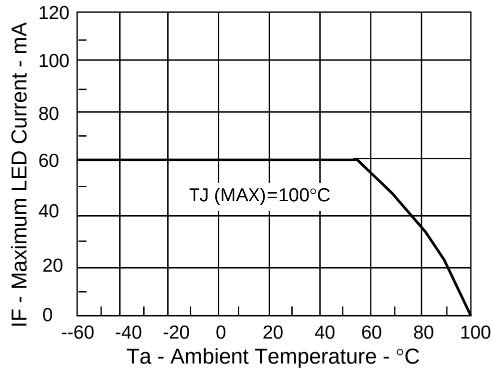



**Figure 8. Maximum LED power dissipation**

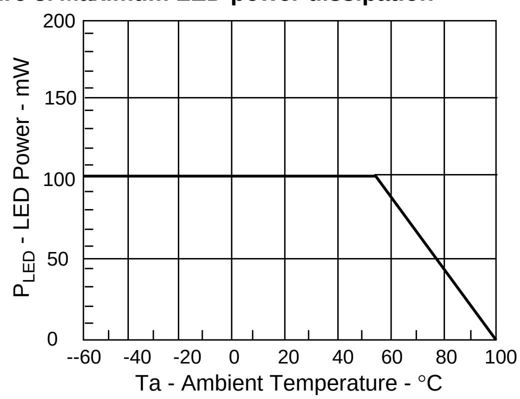
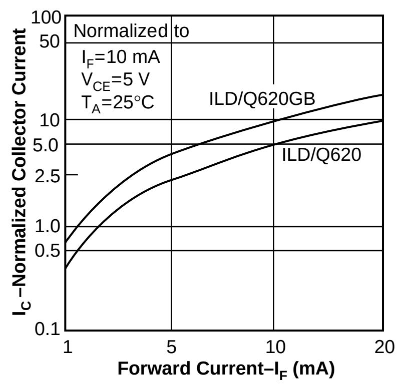



**Figure 9. Collector current versus diode forward current**







Downloaded from Elcodis.com electronic components distributor

Figure 10. Normalization factor for non-saturated and saturated CTR $T_A$=50°C versus if

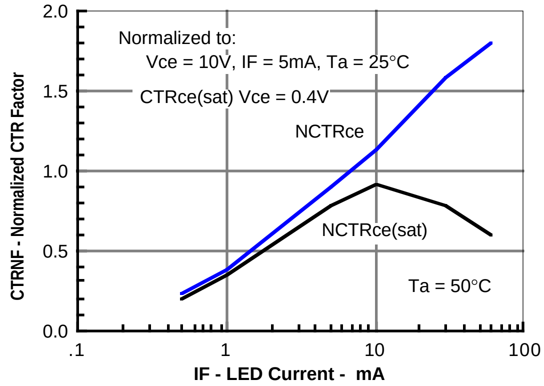



Figure 11. Normalization factor for non-saturated and saturated CTR $T_A$=70°C versus if

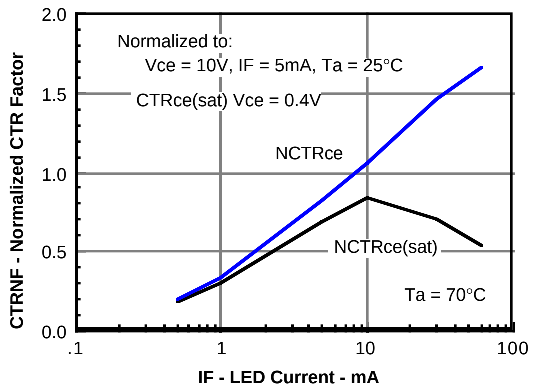



Figure 12. Normalization factor for non-saturated and saturated CTR $T_A$=100°C versus if

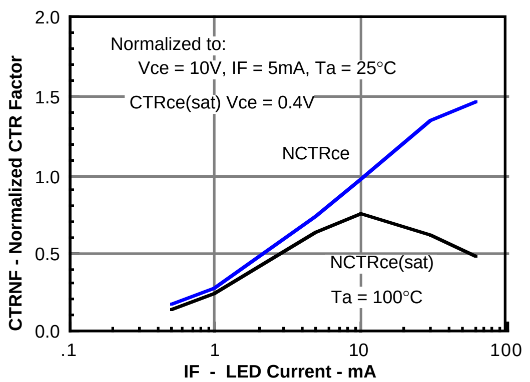



Figure 13. Peak LED current versus peak duration, Tau

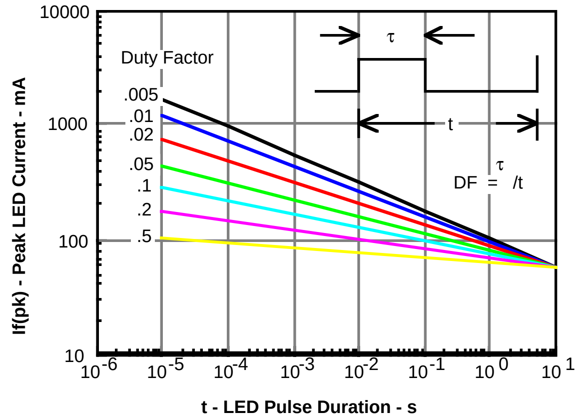



Figure 14. Maximum detector power dissipation

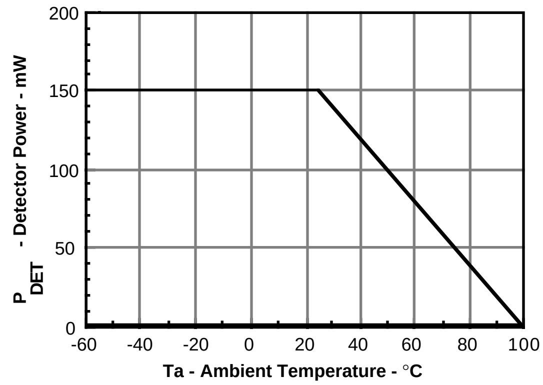
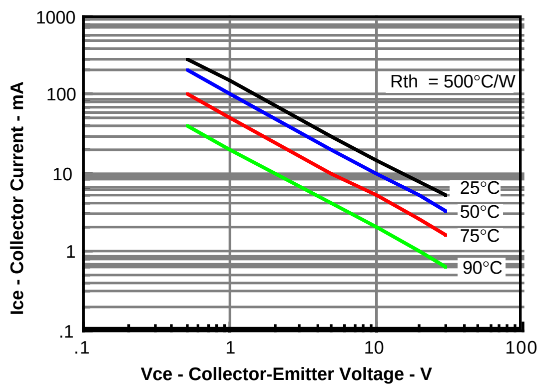



Figure 15. Maximum collector current versus collector voltage






Downloaded from Elcodis.com electronic components distributor