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= ±5.0 mA**
  ILD/Q620: 50% Min.
  ILD/Q620GB: 100% Min.
- **Saturated Current Transfer Ratio (CTR_{SAT}) at I_F= ±1.0 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 (TRansparent IOn Shield)**
- **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

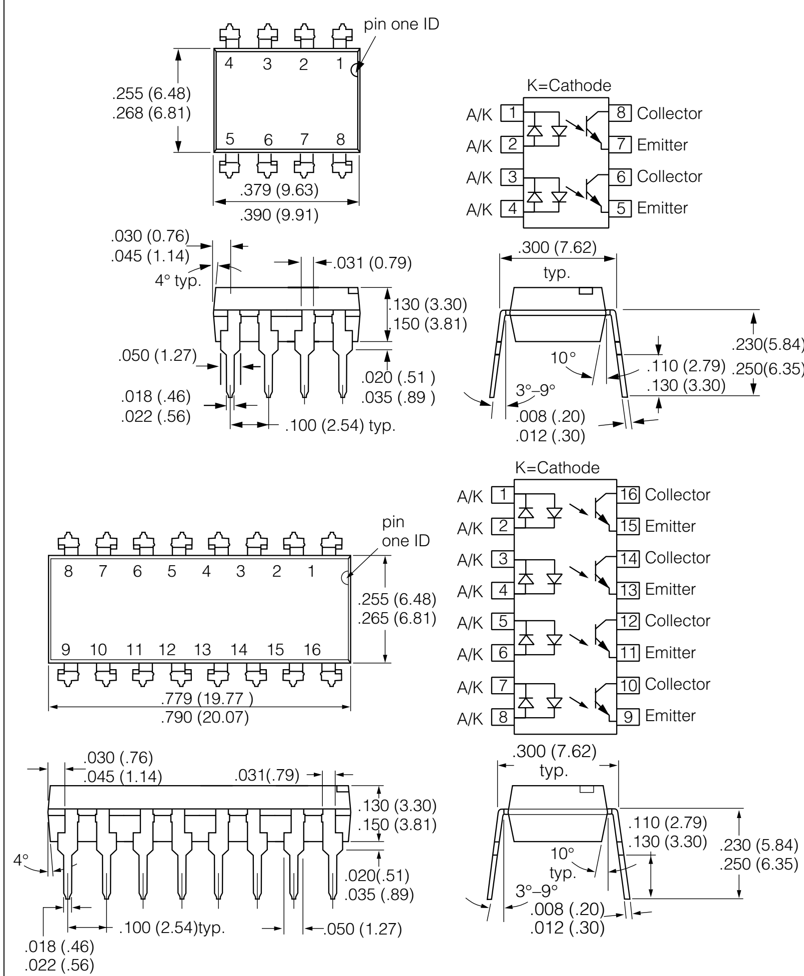
Detector

Collector-Emitter Breakdown Voltage	70 V
Collector Current	50 mA
Collector Current (t <1.0 ms)	100 mA
Power Dissipation	150 mW
Derate from 25°C	2.0 mW/°C

Package

Isolation Test Voltage (t=1.0 sec.)	5300 V_{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	≥7.0 mm
Clearance	≥7.0 mm
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 (2.0 mm from case bottom)	260°C

Dimensions in inches (mm)



DESCRIPTION

The ILD/Q620 and ILD/Q620GB are multi-channel input phototransistor 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 5300 V_{RMS}.

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 I_F 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.

Characteristics

	Symbol	Min.	Typ.	Max.	Unit	Condition
Emitter						
Forward Voltage	V_F	1.0	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=1.0 MHz
Thermal Resistance, Junction to Lead	R_{THJL}	—	750	—	K/W	—
Detector						
Capacitance	C_{CE}	—	6.8	—	pF	V_{CE}=5.0 V, f=1.0 MHz
Collector-Emitter Leakage Current	I_{CEO}	—	10	100	nA	V_{CE}=24 V
Collector-Emitter Leakage Current	I_{CEO}	—	2.0	50	µA	T_A=85°C, V_{CE}=24 V
Thermal Resistance, Junction to Lead	R_{THJL}	—	500	—	K/W	—
Package Transfer Characteristics						
Channel/Channel CTR Match	CTRX/CTRY	1 to 1	—	3 to 1	—	I_F=±5.0 mA, V_{CE}=5.0 V
CTR Symmetry	$I_{CE(RATIO)}$	0.5	—	2.0	—	$I_{CE}(I_F$=–5.0 mA$)/I_{CE}(I_F$=+5.0 mA$)$
Off-State Collector Current	$I_{CE(OFF)}$	—	1.0	10	µA	V_F=±0.7 V, V_{CE}=24 V
ILD/Q620						
Saturated Current Transfer Ratio	CTR_{CEsat}	—	60	—	%	I_F=±1.0 mA, V_{CE}=0.4 V
Current Transfer Ratio	CTR_{CE}	50	80	600	%	I_F=±5.0 mA, V_{CE}=5.0 V
Collector-Emitter Saturation Voltage	V_{CEsat}	—	—	0.4	V	I_F=±8.0 mA, I_{CE}=2.4 mA
ILD/Q620GB						
Saturated Current Transfer Ratio	CTR_{CEsat}	30	—	—	%	I_F=±1.0 mA, V_{CE}=0.4 V
Current Transfer Ratio (Collector-Emitter)	CTR_{CE}	100	200	600	%	I_F=±5.0 mA, V_{CE}=5.0 V
Collector-Emitter Saturation Voltage	V_{CEsat}	—	—	0.4	V	I_F=±1.0 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=1.0 kΩ, I_F=0 mA
Common Mode Rejection, Output Low	CML	—	5000	—	V/µs	V_{CM}=50 V_{P-P}, R_L=1.0 kΩ, I_F=10 mA
Common Mode Coupling Capacitance	C_{CM}	—	0.01	—	pF	—
Package Capacitance	C_{I-O}	—	0.8	—	pF	V_{I-O}=0 V, f=1.0 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

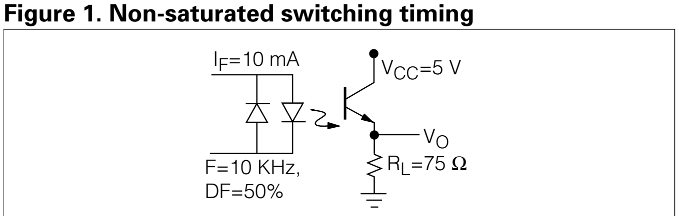


Figure 2. Saturated switching timing

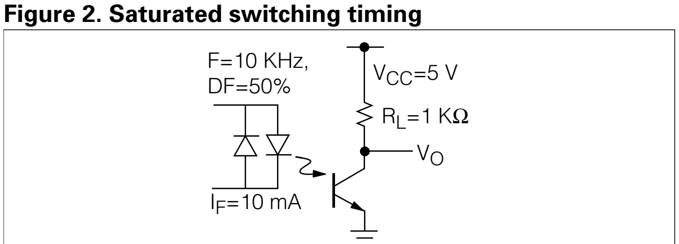


Figure 3. Non-saturated switching timing

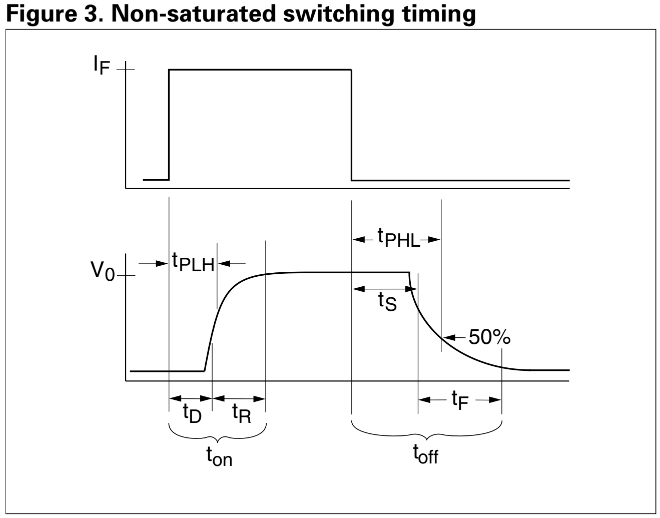
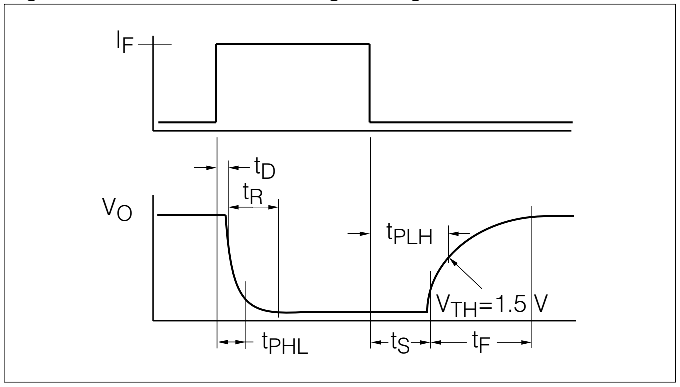


Figure 4. Saturated switching timing



Non-saturated

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}=5.0 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	

Saturated

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}=5.0 V
Off Time	t_{OFF}	2.5	µs	R_L=1.0 KΩ
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

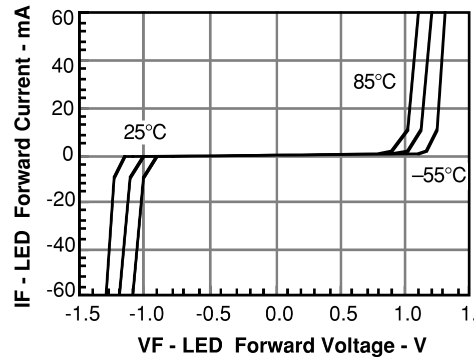


Figure 6. Collector-emitter leakage versus temperature

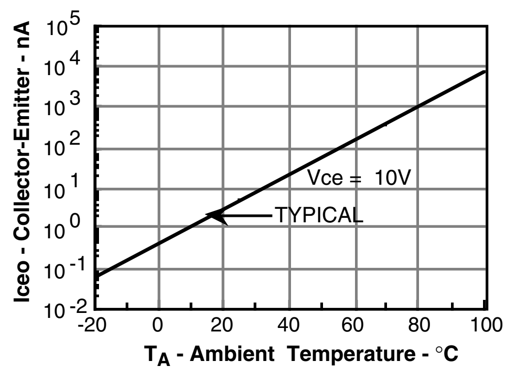


Figure 7. Maximum LED current versus ambient temperature

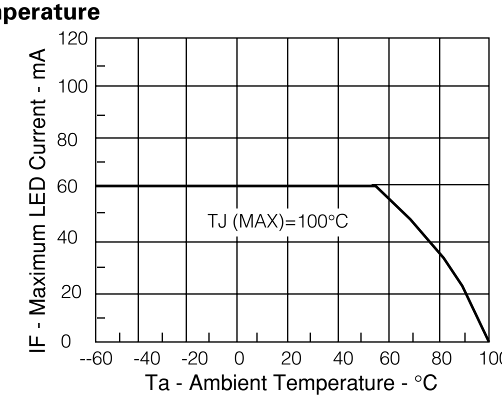


Figure 8. Maximum LED power dissipation

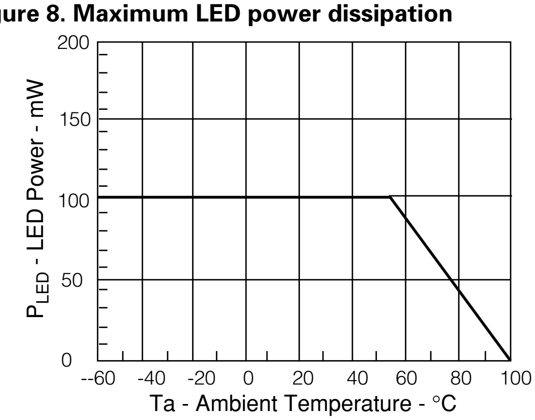


Figure 9. Collector current versus diode forward current

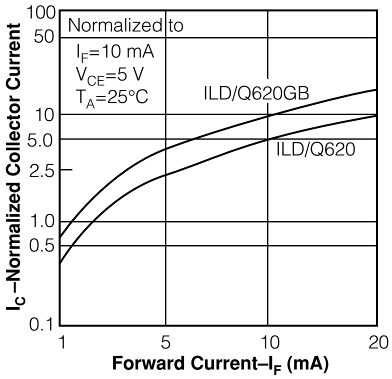


Figure 10. Normalization factor for non-saturated and saturated CTR T_A=50°C versus I_F

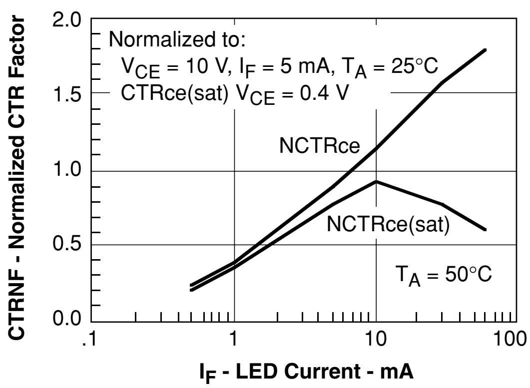


Figure 11. Normalization factor for non-saturated and saturated CTR T_A=70°C versus I_F

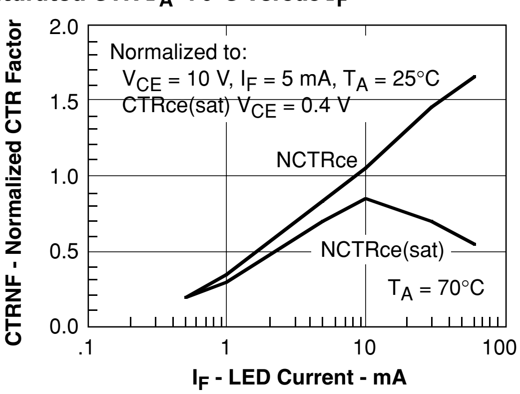


Figure 12. Normalization factor for non-saturated and saturated CTR T_A=100°C versus I_F

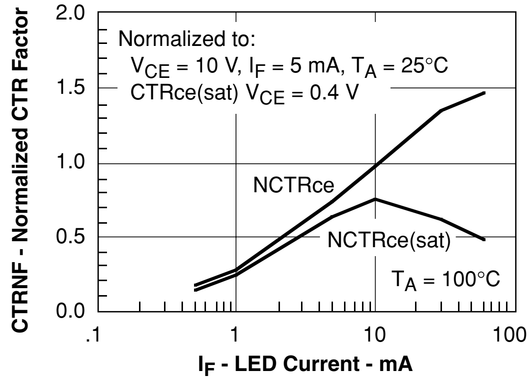


Figure 13. Peak LED current versus peak duration, Tau

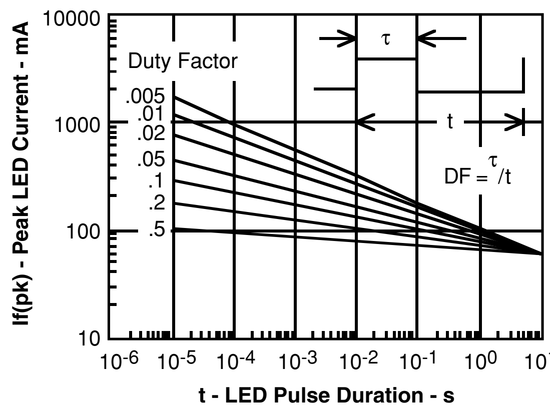


Figure 14. Maximum detector power dissipation

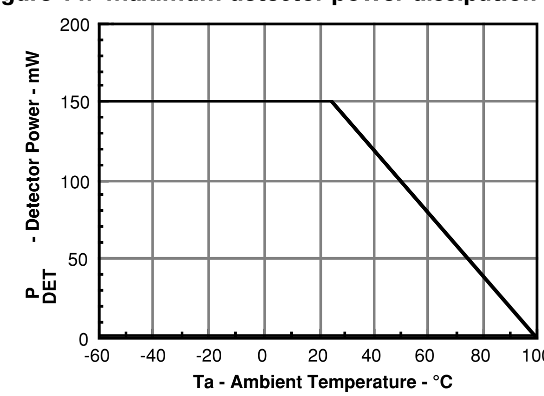


Figure 15. Maximum collector current versus collector voltage