SIEMENS

DUAL CHANNEL ILD621/621GB
QUAD CHANNEL ILQ621/621GB
MULTI-CHANNEL PHOTOTRANSISTOR OPTOCOUPLER

FEATURES

- **Alternate Source to TLP621-2/-4 and TLP621GB-2/-4**
- **Current Transfer Ratio (CTR) at I_F= 5 mA**
  ILD/Q621: 50% Min.
  ILD/Q621GB: 100% Min.
- **Saturated Current Transfer Ratio (CTR_{SAT}) at I_F=1 mA**
  ILD/Q621: 60% Typ.
  ILD/Q621GB: 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, 5300 VAC_{RMS}**
- **Underwriters Lab File #E52744**
- **VDE 0884 Available with Option 1**

Maximum Ratings (Each Channel)

Emitter

Reverse Voltage	6 V
Forward Current	60 mA
Surge Current	1.5 A
Power Dissipation	100 mW
Derate from 25°C	1.33 mW/°C

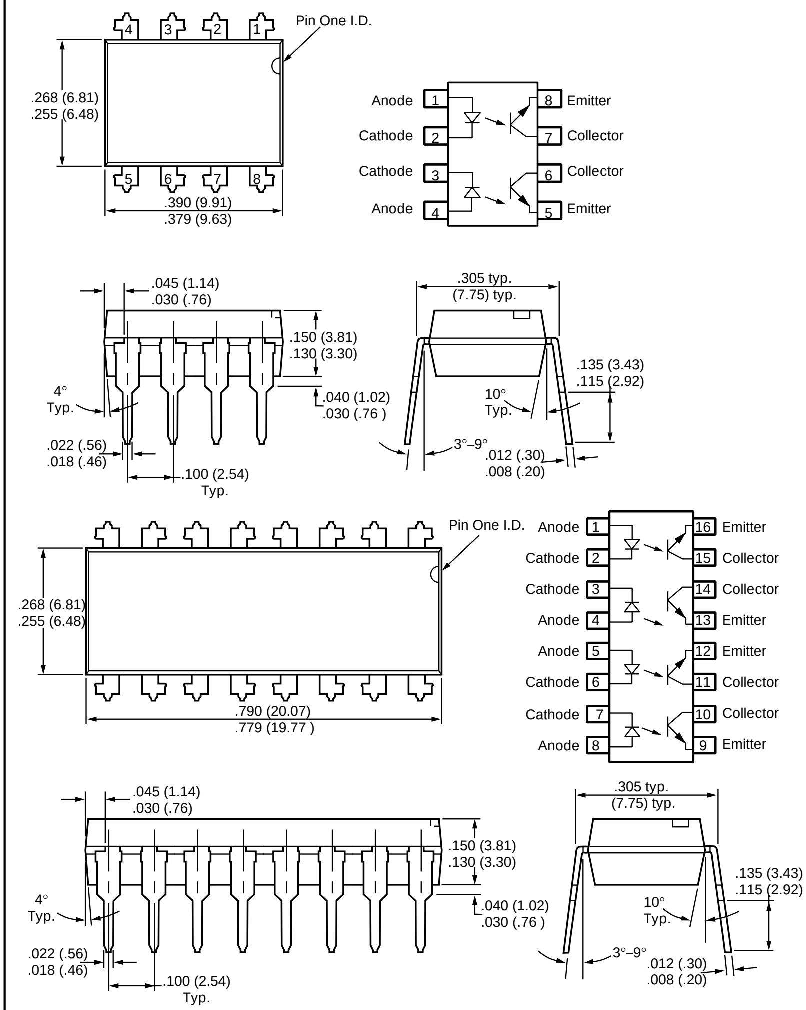
Detector

Collector-Emitter Reverse 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.)	7500 VAC_{PK}
(t=1 min.)	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 min 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

Dimensions in inches (mm)



DESCRIPTION

The ILD/Q621 and ILD/Q621GB are multi-channel phototransistor optocouplers that use GaAs IRLED emitters and high gain NPN silicon phototransistors. These devices are constructed using over/under leadframe optical coupling and double molded insulation technology. This assembly process offers a withstand test voltage of 7500 VDC.

The ILD/Q621GB is well suited for CMOS interfacing given the CTR_{CEsat} of 30% minimum at I_F of 1 mA. High gain linear operation is guaranteed by a minimum CTR_{CE} of 100% at 5 mA. The ILD/Q621 has a guaranteed CTR_{CE} of 50% minimum at 5 mA. The TRansparent IOn Shield insures stable DC gain in applications such as power supply feedback circuits, where constant DC V_{IO} voltages are present.

Characteristics

	Symbol	Min.	Typ.	Max.	Unit	Condition
Emitter						
Forward Voltage	V_F	1	1.15	1.3	V	I_F=10 mA
Reverse Current	I_R		0.01	10	µA	V_R=6 V
Capacitance	C_O		40		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
ILD/Q621						
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/Q621GB						
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=8 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_{IO}=0 V, f=1 MHz
Insulation Resistance	R_S	10^{12}			Ω	V_{IO}=500 V, T_A=25°C
Channel to Channel Insulation		500			VAC	

Switching Times

Figure 1. Non-saturated switching timing

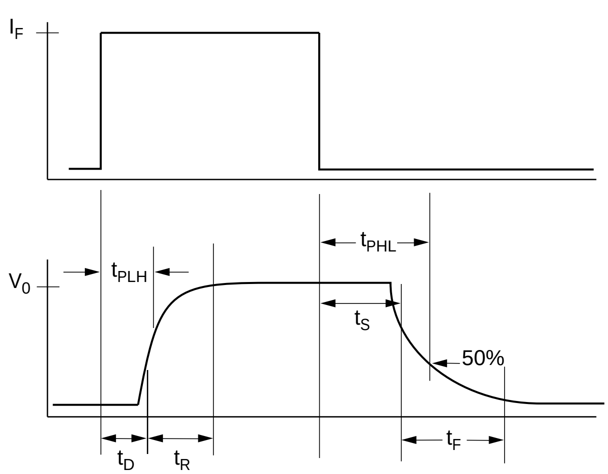
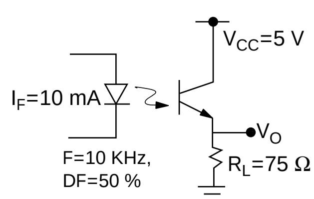


Figure 2. Non-saturated switching timing



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	

Figure 3. Saturated switching timing

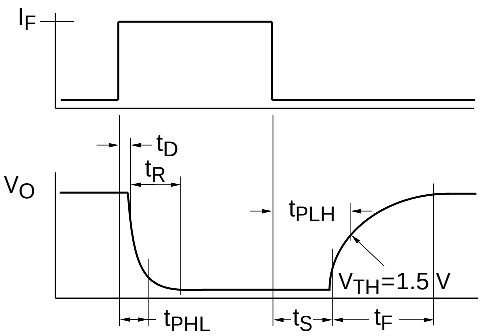
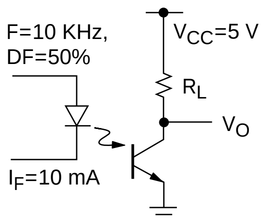


Figure 4. Saturated switching timing



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. Maximum LED current versus ambient temperature

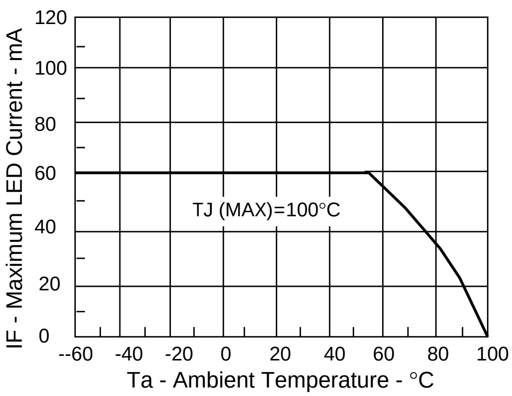


Figure 6. Maximum LED power dissipation

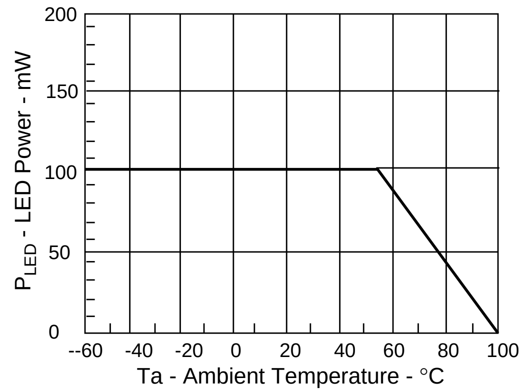


Figure 7. Forward voltage versus forward current

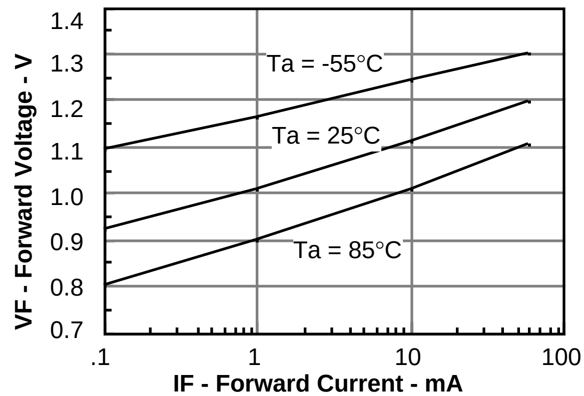


Figure 8. Collector-emitter current versus temperature and LED current

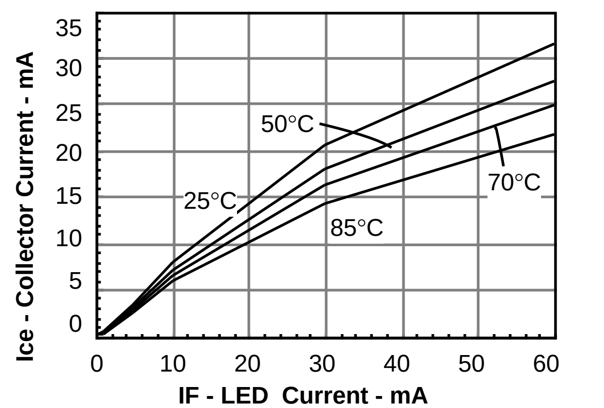


Figure 9. Collector-emitter leakage versus temperature

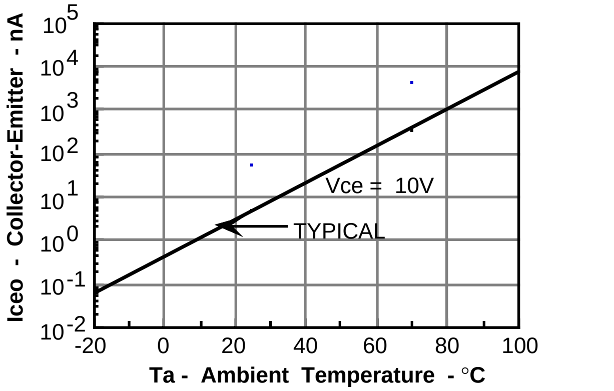


Figure 10. Propagation delay versus collector load resistor

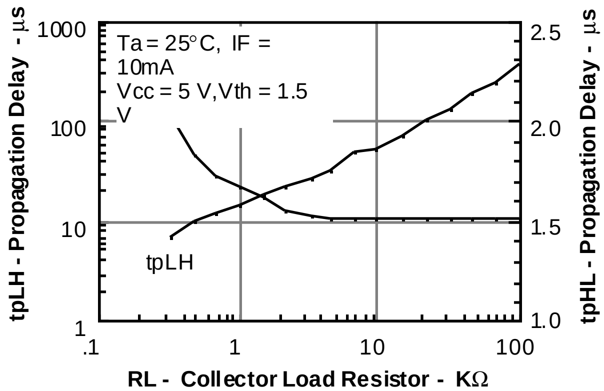


Figure 11. Maximum detector power dissipation

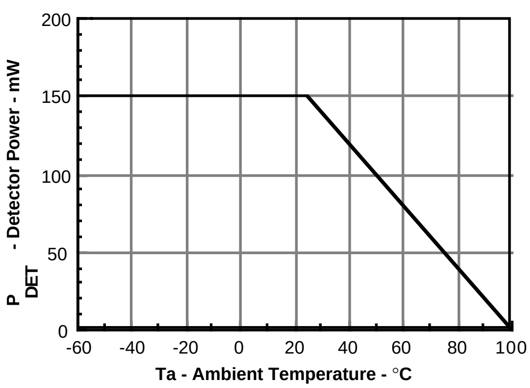


Figure 12. Maximum collector current versus collector voltage

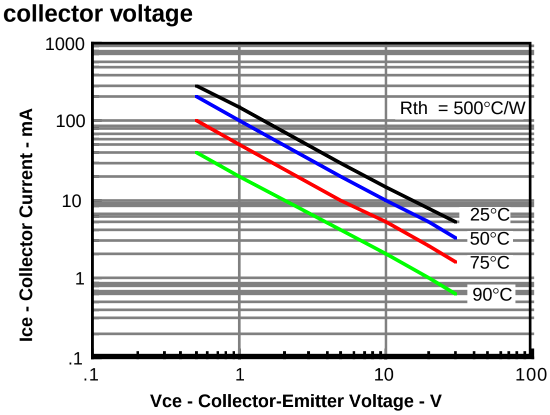


Figure 13. Normalization factor for non-saturated and saturated CTR T_A=50°C versus If

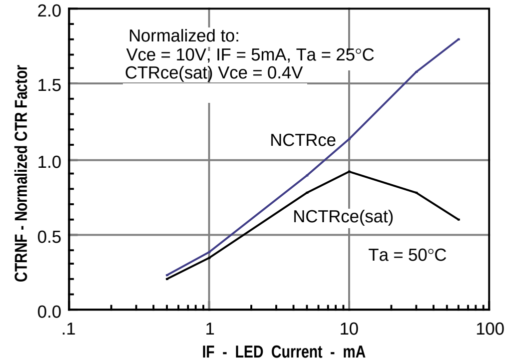


Figure 14. Normalization factor for non-saturated and saturated CTR T_A=70°C versus If

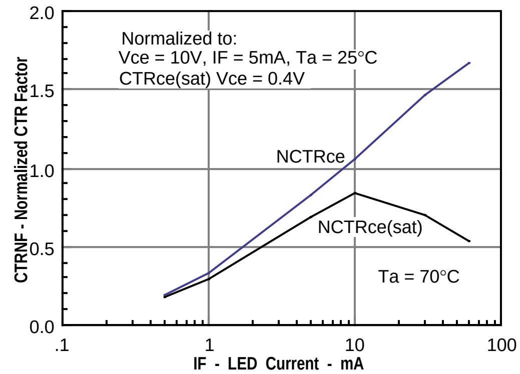


Figure 15. Normalization factor for non-saturated and saturated CTR T_A=100°C versus If

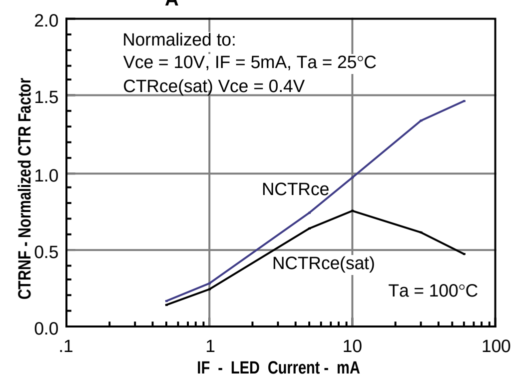


Figure 16. Peak LED current versus pulse duration, Tau