



# SINGLE CHANNEL IL30/31/55 DUAL CHANNEL ILD30/31/55 QUAD CHANNEL ILQ30/31/55 Photodarlington Optocoupler

## FEATURES

- **Current Transfer Ratio**  
IL/ILD/ILQ30/55, 100% min.  
IL/ILD/ILQ31, 200% min.
- **125 mA Load Current Rating**
- **Fast Rise Time, 10  $\mu$ S**
- **Fast Fall Time, 35  $\mu$ S**
- **Single, Dual and Quad Channel**
- **Solid State Reliability**
- **Standard DIP Packages**
- **Underwriters Lab File #E52744**
- **VDE 0884 Available with Option 1**

## DESCRIPTION

The IL30/31/55, ILD30/31/55, and ILQ30/31/55 are optically coupled isolators with Gallium Arsenide infrared emitters and silicon photodarlington sensors. Switching can be achieved while maintaining a high degree of isolation between driving and load circuits, with no crosstalk between channels. These optocouplers can be used to replace reed and mercury relays with advantages of long life, high speed switching and elimination of magnetic fields.

The IL30/31/55 are equivalent to MCA230/MCA231/MCA255. The ILD30/31/55 re designed to reduce board space requirements in high density applications.

## Maximum Ratings

### Emitter (each channel)

Peak Reverse Voltage.....3.0 V  
Continuous Forward Current..... 60 mA  
Power Dissipation at 25°C ..... 100 mW  
Derate Linearly from 25°C ..... 1.33 mW/°C

### Detector (each channel)

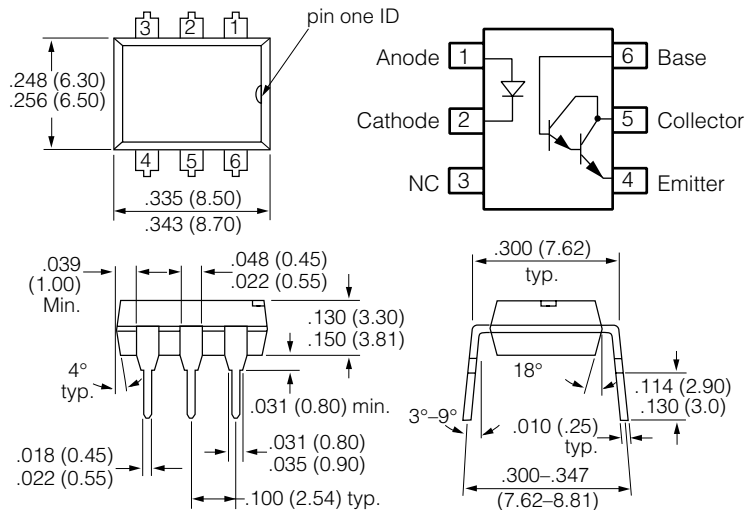
Collector-Emitter Breakdown Voltage  
IL/D/Q30 .....30 V  
IL/D/Q55 .....55 V  
Collector (Load) Current ..... 125 mA  
Power Dissipation at 25°C Ambient..... 150 mW  
Derate Linearly from 25°C ..... 2.0 mW/°C

## Package

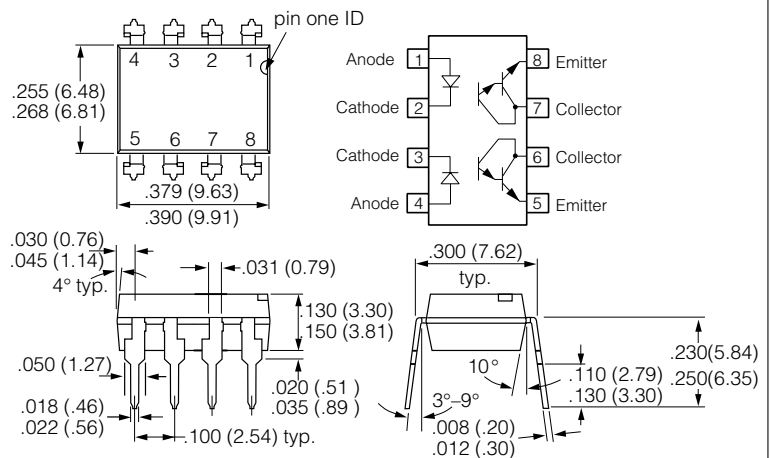
Total Package Power Dissipation at 25°C  
IL30/31/55 .....250 mW  
ILD30/31/55 .....400 mW  
ILQ30/31/55 .....500 mW  
Derate Linearly from 25°C  
IL30/31/55 ..... 3.3 mW/°C  
ILD30/31/55 ..... 5.33 mW/°C  
ILQ30/31/55 ..... 6.67 mW/°C  
Isolation Test Voltage ..... 5300 V<sub>RMS</sub>  
Creepage .....  $\geq 7.0$  mm  
Clearance .....  $\geq 7.0$  mm  
Comparative Tracking Index..... 175  
Storage Temperature ..... -55°C to +125°C  
Operating Temperature..... -55°C to +100°C  
Lead Soldering Time at 260°C ..... 10 sec.

Dimensions in inches (mm)

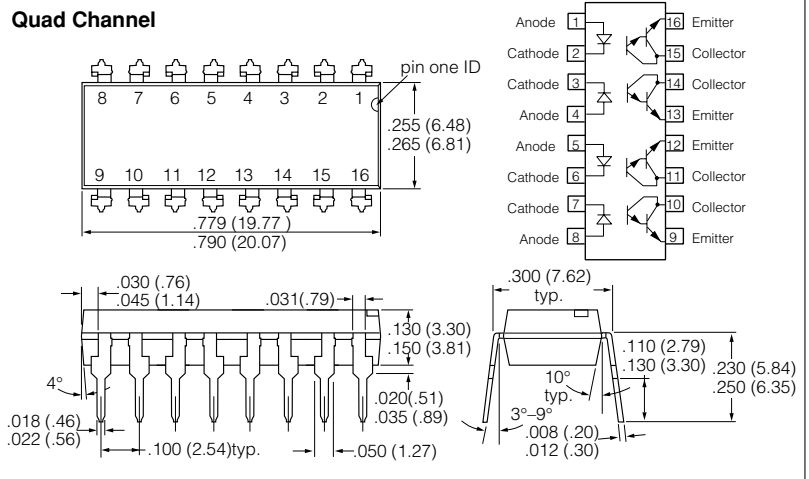
### Single Channel



### Dual Channel



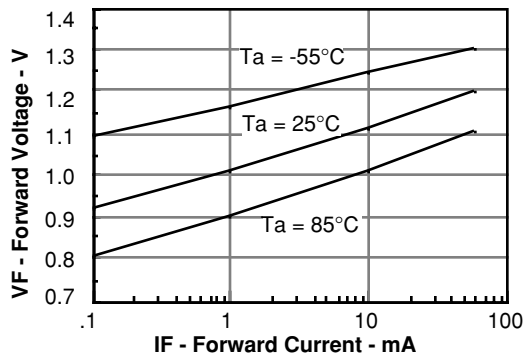
### Quad Channel



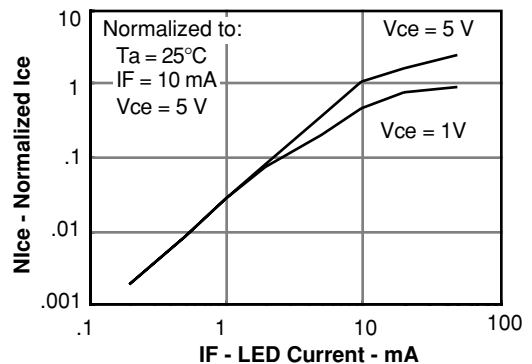
**Electrical Characteristics**  $T_A=25^\circ\text{C}$

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	
<b>GaAs Emitter (per channel)</b>							
Forward Voltage	$V_F$	—	1.25	1.5	V	$I_F=20\text{ mA}$	
Reverse Current	$I_R$	—	0.1	10	$\mu\text{A}$	$V_R=3.0\text{ V}$	
Capacitance	$C_O$	—	25	—	pF	$V_R=0\text{ V}$	
<b>Detector (per channel)</b>							
Collector-Emitter Breakdown Voltage	$BV_{CEO}$	30/55	—	—	V	$I_C=100\ \mu\text{A}$	
Collector-Emitter Leakage Current	$I_{CEO}$	—	1.0	100	nA	$V_{CE}=10\text{ V}, I_F=0$	
Collector-Emitter Capacitance	$C_{CE}$	—	3.4	—	pF	$V_{CE}=10\text{ V}, f=1.0\text{ MHz}$	
<b>Package</b>							
Current Transfer Ratio	IL/D/Q30/55	CTR	100	400	—	%	$I_F=10\text{ mA}, V_{CE}=5.0\text{ V}$
	IL/D/Q31		200	400	—		
Collector-Emitter Saturation Voltage	$V_{CEsat}$	—	0.9	1.0	V	$I_C=50\text{ mA}, I_F=50\text{ mA}$	
Isolation Test Voltage	—	5300	—	—	$V_{RMS}$	—	
Isolation Resistance	$R_{ISOL}$	—	$10^{12}$	—	$\Omega$	—	
Coupling Capacitance	$C_{ISOL}$	—	0.5	—	pF	—	
Rise Time	$t_r$	—	10	—	$\mu\text{s}$	$V_{CC}=13.5\text{ V}, I_F=50\text{ mA}, R_L=100\ \Omega$	
Fall Time	$t_f$	—	35	—	$\mu\text{s}$		

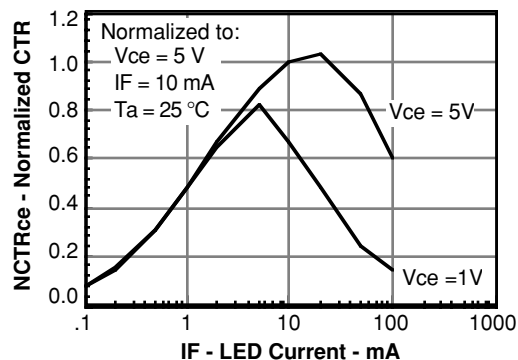
**Figure 1. Forward voltage versus forward current**



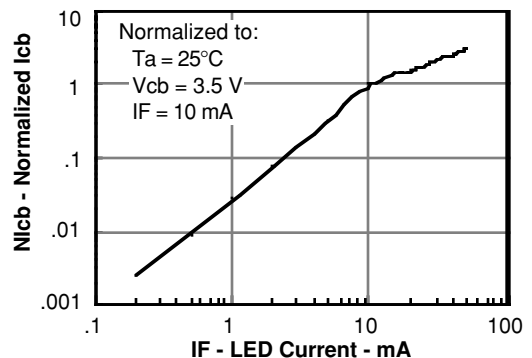
**Figure 3. Normalized non-saturated and saturated collector-emitter current versus LED current**



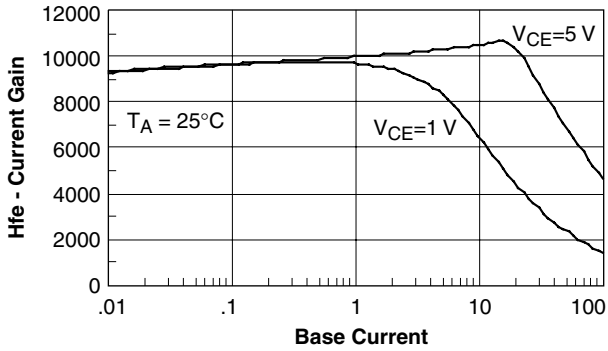
**Figure 2. Normalized non-saturated and saturated CTR<sub>ce</sub> at TA=25°C versus LED current**



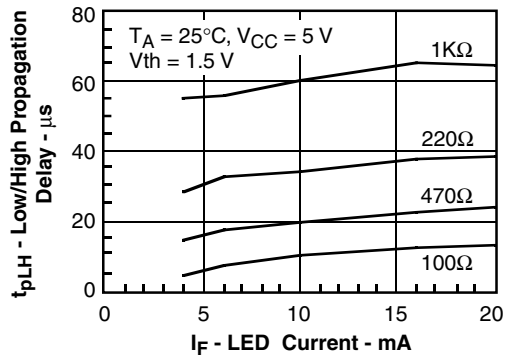
**Figure 4. Normalized collector-base photocurrent versus LED current**



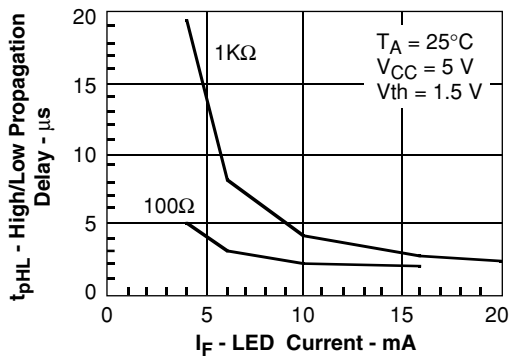
**Figure 5. Hfe current gain versus base current**



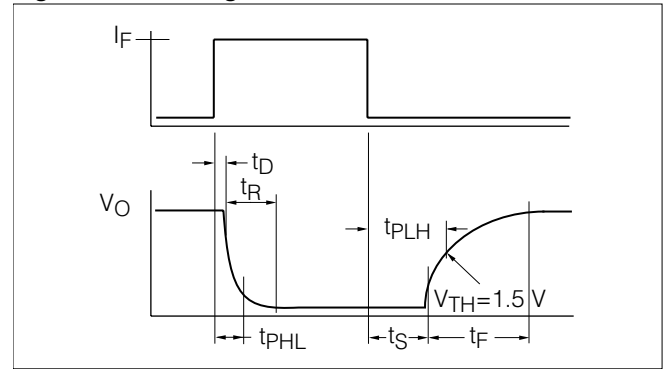
**Figure 6. Low to high propagation delay versus collector load resistance and LED current**



**Figure 7. High to low propagation delay versus collector load resistance and LED current**



**Figure 8. Switching waveforms**



**Figure 9. Switching schematic**

