

# SIEMENS

## SINGLE CHANNEL IL30/31/55 DUAL CHANNEL ILD30/31/55 QUAD CHANNEL ILQ30/31/55 PHOTODARLINGTON OPTOCOUPLER

### FEATURES

- Current Transfer Ratio  
IL/D/Q30/55, 100% Min.  
IL/D/Q31, 200% Min.
- 125 mA Load Current Rating
- Fast Rise Time, 10  $\mu$ S
- Fast Fall Time, 35  $\mu$ S
- Single, Dual, & Quad Channel
- Solid State Reliability
- Standard DIP Package
- Underwriters Lab File #E52744
-  VDE 0884 Available with Option 1

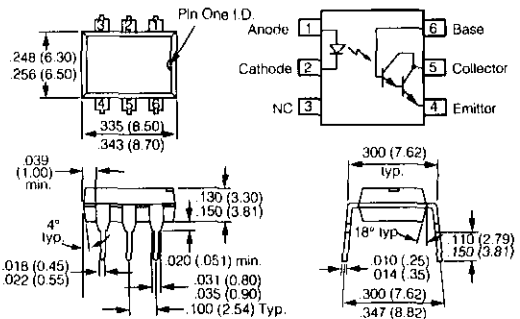
### DESCRIPTION

The IL30/31/55, ILD30/31/55 and ILQ30/31/55 are optically coupled isolators with a Gallium Arsenide infrared emitter and a silicon photodarlington sensor. Switching can be achieved while maintaining a high degree of isolation between driving and load circuits, with no cross talk 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.

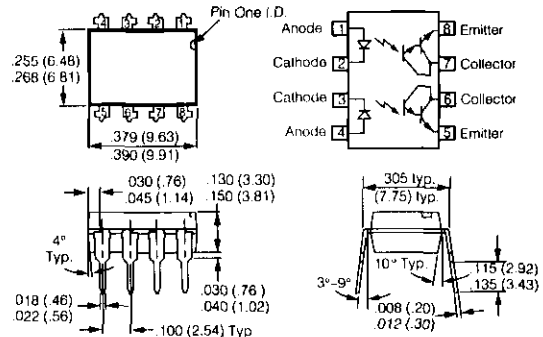
The IL30/31/55 are equivalent to MCA230/MCA231/MCA255. The ILD/Q30/31/55 are designed to reduce board space requirements in high density applications.

Package Dimensions in Inches (mm)

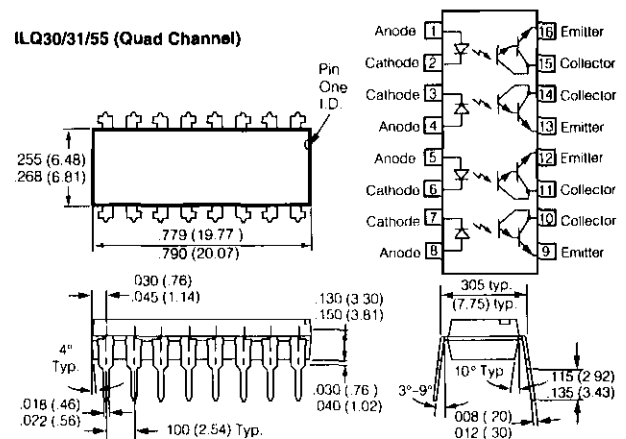
#### IL30/31/55 (Single Channel)



#### ILD30/31/55 (Dual Channel)



#### ILQ30/31/55 (Quad Channel)



## Maximum Ratings

### Emitter (each channel)

|                            |            |
|----------------------------|------------|
| Peak Reverse Voltage       | 3 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 | 30 V      |
| IL/D/Q30                            | 55 V      |
| Collector-Emitter Breakdown Voltage | 55 V      |
| IL/D/Q35                            | 125 mA    |
| Power Dissipation at 25°C Ambient   | 150 mW    |
| Derate Linearly from 25°C           | 2.0 mW/°C |

### Package

|                                   |                         |
|-----------------------------------|-------------------------|
| Total Package Dissipation at 25°C |                         |
| IL30/31/55                        | 250 mW                  |
| ILD30/31/55                       | 400 mW                  |
| IL7Q30/31/55                      | 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 VAC <sub>RMS</sub> |
| Creepage                          | 7 mm min.               |
| Clearance                         | 7 mm min.               |
| 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.                 |

## Electrical Characteristics (T<sub>A</sub>=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-----------|--------|------|------|------|------|-----------|
|-----------|--------|------|------|------|------|-----------|

### Emitter

|                 |                |      |     |    |                        |
|-----------------|----------------|------|-----|----|------------------------|
| Forward Voltage | V <sub>F</sub> | 1.25 | 1.5 | V  | I <sub>F</sub> = 20 mA |
| Reverse Current | I <sub>R</sub> | 0.1  | 10  | μA | V <sub>R</sub> = 3.0 V |
| Capacitance     | C <sub>O</sub> | 25   |     | pF | V <sub>R</sub> = 0     |

### Detector

|                                     |                   |       |     |    |                                            |
|-------------------------------------|-------------------|-------|-----|----|--------------------------------------------|
| Collector-Emitter Breakdown Voltage | BV <sub>CEO</sub> | 30/55 |     | V  | I <sub>C</sub> = 100 μA                    |
| Collector-Emitter Leakage Current   | I <sub>CEO</sub>  | 1.0   | 100 | nA | V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0 |
| Collector-Emitter Capacitance       | C <sub>CE</sub>   | 3.4   |     | pF | V <sub>CE</sub> = 10 V, f = 1 MHz          |

### Package

|                                      |                    |                  |     |                    |                                                |
|--------------------------------------|--------------------|------------------|-----|--------------------|------------------------------------------------|
| Current Transfer Ratio               | CTR                |                  |     |                    |                                                |
| IL/D/Q30/55                          |                    | 100              | 400 | %                  | I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5 V  |
| IL/D/Q31                             |                    | 200              | 400 | %                  | I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5 V  |
| Collector-Emitter Saturation Voltage | V <sub>CEsat</sub> | 0.9              | 1.0 | V                  | I <sub>C</sub> = 50 mA, I <sub>F</sub> = 50 mA |
| Isolation Test Voltage               |                    | 5300             |     | VAC <sub>RMS</sub> |                                                |
| Isolation Resistance                 | R <sub>ISOL</sub>  | 10 <sup>12</sup> |     | Ω                  |                                                |
| Coupling Capacitance                 | C <sub>ISOL</sub>  | 0.5              |     | pF                 |                                                |
| Rise Time                            | t <sub>r</sub>     | 10               |     | μs                 | V <sub>CC</sub> = 13.5 V                       |
| Fall Time                            | t <sub>f</sub>     | 35               |     | μs                 | I <sub>F</sub> = 50 mA, R <sub>C</sub> = 100 Ω |

Figure 1. Forward voltage versus forward current

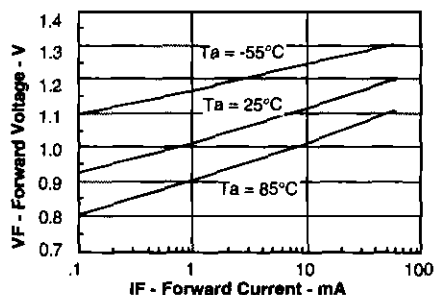


Figure 2. Normalized non-saturated and saturated CTR<sub>ce</sub> at T<sub>A</sub>=25°C versus LED current

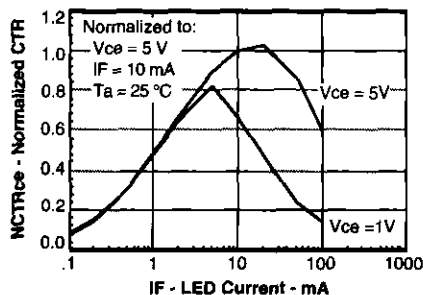


Figure 3. Normalized non-saturated and saturated collector-emitter current versus LED current

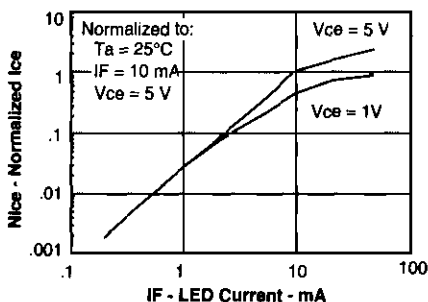


Figure 4. Normalized collector-base photocurrent versus LED current

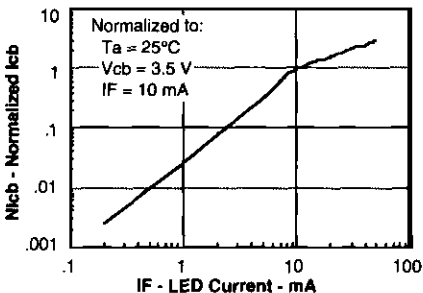


Figure 5. Hfe current gain vs. base current

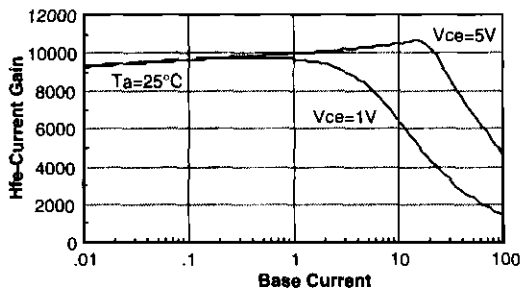


Figure 7. High to low propagation delay versus collector load resistance and LED current

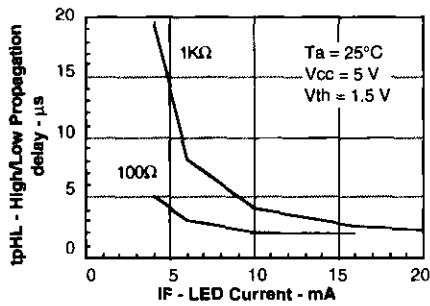


Figure 9. Switching schematic

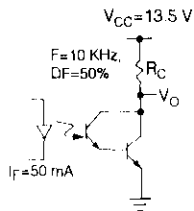


Figure 6. Low to high propagation delay versus collector load resistance and LED current

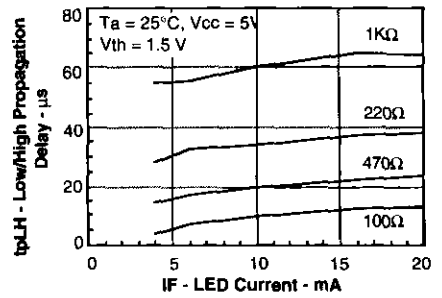


Figure 8. Switching waveforms

