



# IL221AT/IL222AT/IL223AT

## Photodarlington Small Outline Surface Mount Optocoupler

### FEATURES

- High Current Transfer Ratio,  $I_F=1.0$  mA, IL221AT, 100% Minimum  
IL222AT, 200% Minimum  
IL223AT, 500% Minimum
- Withstand Test Voltage, 2500 V<sub>RMS</sub>
- Electrical Specifications Similar to Standard 6 Pin Coupler
- Industry Standard SOIC-8 Surface Mountable Package
- Standard Lead Spacing, .05"
- Available only on Tape and Reel Option (Conforms to EIA Standard RS481A)
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- Underwriters Lab File #E52744 (Code Letter P)

### DESCRIPTION

The IL221AT/IL222AT/IL223AT is a high current transfer ratio (CTR) optocoupler with a Gallium Arsenide infrared LED emitter and a silicon NPN photodarlington transistor detector.

This device has a CTR tested at an 1.0 mA LED current. This low drive current permits easy interfacing from CMOS to LSTTL or TTL.

This optocoupler is constructed in a standard SOIC-8 foot print which makes it ideally suited for high density applications. In addition to eliminating through-holes requirements, this package conforms to standards for surface mounted devices.

### Maximum Ratings

#### Emitter

Peak Reverse Voltage ..... 6.0 V  
Continuous Forward Current ..... 60 mA  
Power Dissipation at 25°C ..... 90 mW  
Derate Linearly from 25°C ..... 1.2mW/°C

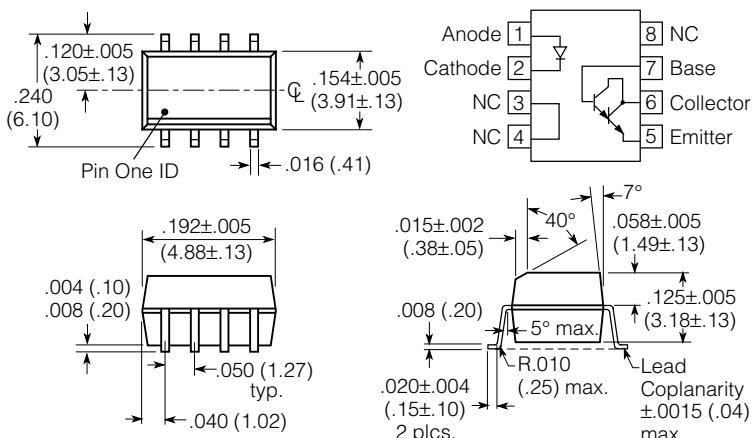
#### Detector

Collector-Emitter Breakdown Voltage ..... 30 V  
Emitter-Collector Breakdown Voltage ..... 5.0 V  
Collector-Base Breakdown Voltage ..... 70 V  
 $I_{CMAX}$  DC ..... 50 mA  
 $I_{CMAX}$  ( $t < 1.0$  ms) ..... 100 mA  
Power Dissipation ..... 150 mW  
Derate Linearly from 25°C ..... 2.0mW/°C

#### Package

Total Package Dissipation at 25°C Ambient (LED + Detector) ..... 240 mW  
Derate Linearly from 25°C ..... 3.3mW/°C  
Storage Temperature ..... -55°C to +150°C  
Operating Temperature ..... -55°C to +100°C  
Soldering Time at 260°C ..... 10 sec.

Dimensions in inches (mm)



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

| Parameter                             | Symbol        | Min.              | Typ. | Max. | Unit             | Condition                                          |
|---------------------------------------|---------------|-------------------|------|------|------------------|----------------------------------------------------|
| <b>Emitter</b>                        |               |                   |      |      |                  |                                                    |
| Forward Voltage                       | $V_F$         | —                 | 1.0  | 1.5  | V                | $I_F=1.0$ mA                                       |
| Reverse Current                       | $I_R$         | —                 | 0.1  | 100  | $\mu\text{A}$    | $V_R=6.0$ V                                        |
| Capacitance                           | $C_O$         | —                 | 25   | —    | pF               | $V_R=0$ V,<br>$F=1.0$ MHz                          |
| <b>Detector</b>                       |               |                   |      |      |                  |                                                    |
| Breakdown Voltage                     | $B_{V_{CEO}}$ | 30                | —    | —    | V                | $I_C=100$ $\mu\text{A}$<br>$I_E=100$ $\mu\text{A}$ |
|                                       | $B_{V_{ECO}}$ | 5.0               | —    | —    | V                |                                                    |
| Voltage, Collector-Base               | $B_{V_{CBO}}$ | 70                | —    | —    | V                | $I_C=10$ $\mu\text{A}$                             |
| Capacitance, Collector-Emitter        | $C_{CE}$      | —                 | 3.4  | —    | pF               | $V_{CE}=10$ V                                      |
| <b>Package</b>                        |               |                   |      |      |                  |                                                    |
| DC Current Transfer Ratio             | IL221A        | CTR <sub>DC</sub> | 100  | —    | —                | $I_F=1.0$ mA,<br>$V_{CE}=5.0$ V                    |
|                                       | IL222A        |                   | 200  | —    | —                |                                                    |
|                                       | IL223A        |                   | 500  | —    | —                |                                                    |
| Saturation Voltage, Collector-Emitter | $V_{CEsat}$   | —                 | —    | 1.0  | V                | $I_{CE}=0.5$ mA,<br>$I_F=1.0$ mA                   |
| Isolation Test Voltage                | $V_{IO}$      | 2500              | —    | —    | V <sub>RMS</sub> | $t=1.0$ sec.                                       |
| Capacitance, Input to Output          | $C_{IO}$      | —                 | 0.5  | —    | pF               | —                                                  |
| Resistance, Input to Output           | $R_{IO}$      | —                 | 100  | —    | G $\Omega$       | —                                                  |

Figure 1. Forward voltage versus forward current

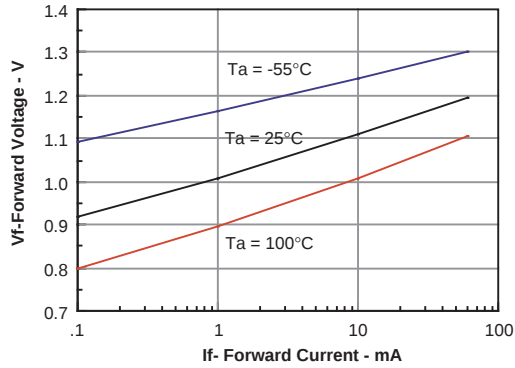


Figure 2. Peak LED current versus duty factor, Tau

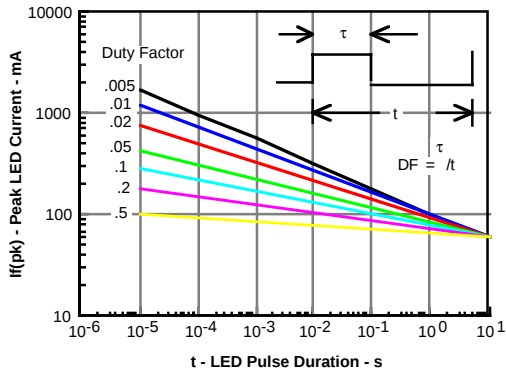


Figure 3. Normalized  $CTR_{CB}$  versus  $I_f$

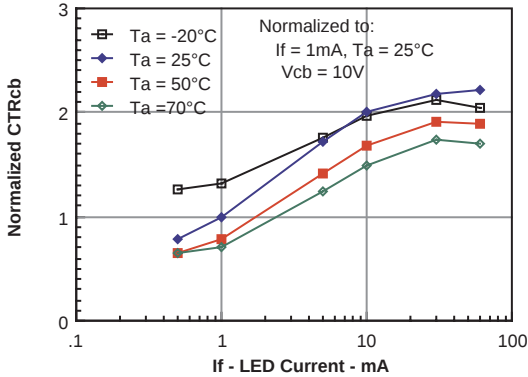


Figure 4. Normalized  $CTR_{CE}$  versus LED current

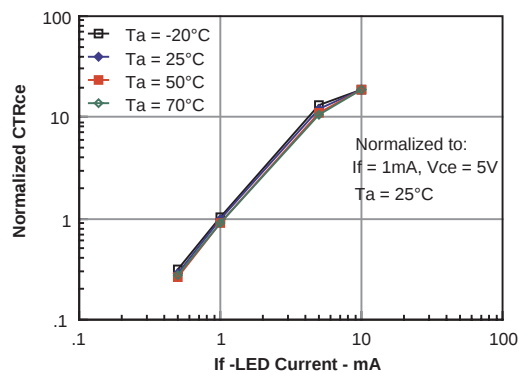


Figure 5.  $CTR_{CB}$  versus LED current

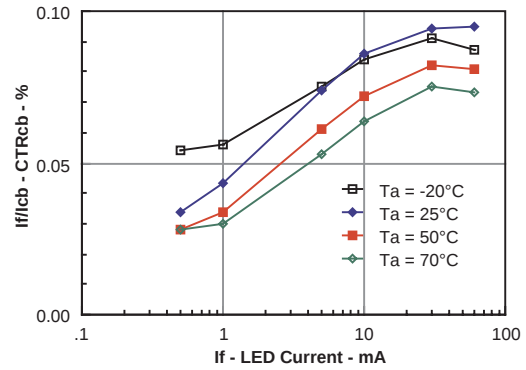


Figure 6. CTR versus LED current

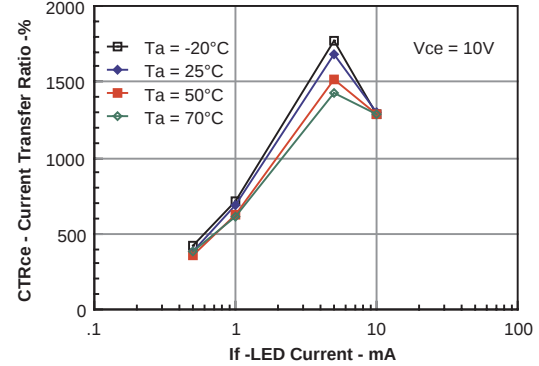


Figure 7. Collector current versus LED current

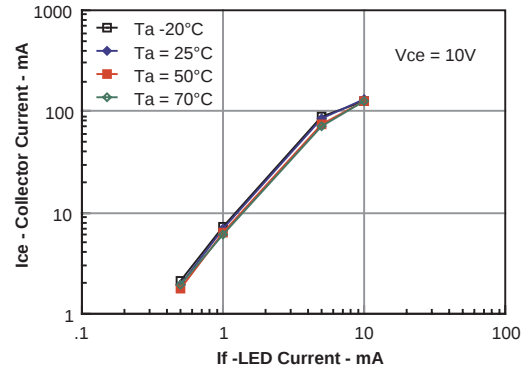


Figure 8. Photocurrent versus LED current

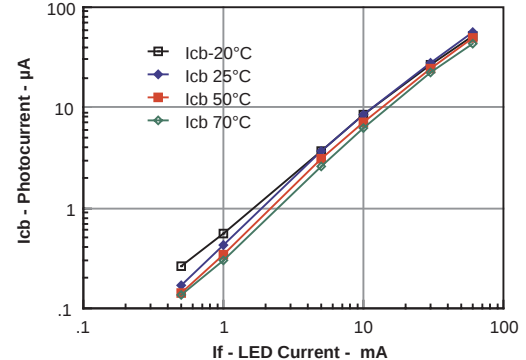


Figure 9. Normalized  $I_{CB}$  versus  $I_F$

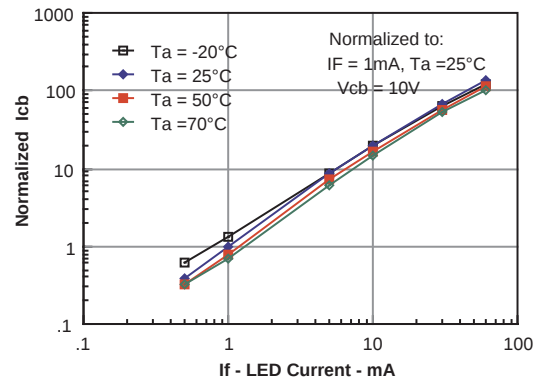


Figure 10. Switching timing

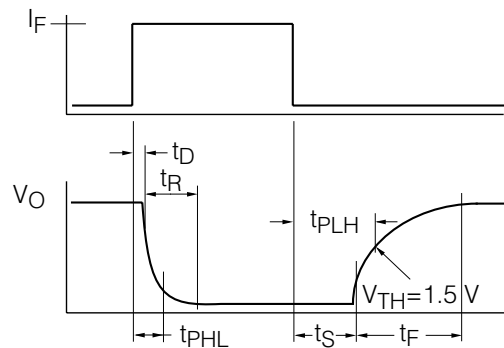


Figure 11. Switching schematic

