# IL388

## High Performance Linear Optocoupler for Optical DAA in Telecommunications



### FEATURES

- **2.3 mm High SMT Package**
- **High Sensitivity (K1) at Low Operating LED Current**
- **Couples AC and DC Signals**
- **Low Input-Output Capacitance**
- **Isolation Voltage, 2500 VDC, 1 second**
- **Low Distortion, below –80 db**
- **0.4 mm Internal Insulation Thickness**

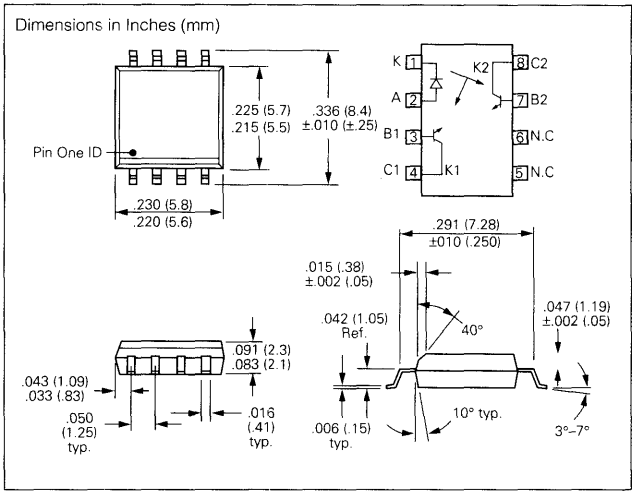
### APPLICATIONS

- **Optical DAA for V.34 FAX/Modem PCMCIA Cards**
- **Digital Telephone Line Isolation**

### DESCRIPTION

The IL388 family of Linear Optocoupler consist of an IRLED optically coupled to two photodiodes. The emitter is located such that both photodiodes receive approximately an equal amount of infrared light. The diodes produce a proportional amount of photocurrents. The ratio of the photocurrents stays constant with high accuracy when either the LED current changes or the ambient temperature changes. Thus one can control the output diode current optically by controlling the input photodiode current.

The IL388 optocouplers can be used with the aid of operational amplifiers in closed loop conditions to achieve highly linear and electrically isolated AC and or DC signal amplifiers.




**Absolute Maximum Ratings**

| **Emitter** | **Sym** | **Min.** | **Max.** | **Units** |
|---|---|---|---|---|
| Reverse Voltage | $V_R$ | — | 3.0 | V |
| Forward Current | $I_F$ | — | 30 | mA |
| Surge Current<br>Pulse Width <10 µs | $I_{PK}$ | — | 150 | mA |
| Power Dissipation, $T_A$=25°C | $P_{LED}$ | — | 150 | mW |
| Derate Linearly from 25°C | — | — | 2.0 | mW/°C |
| Junction Temperature | $T_J$ | — | 100 | °C |
| **Detector (each)** | | | | |
| Reverse Voltage | $V_R$ | — | 15 | V |
| Power Dissipation | P | — | 50 | mW |
| Derate Linearly from 25°C | — | — | 0.65 | mW/°C |
| Junction Temperature | $T_J$ | — | 100 | °C |
| **Coupler** | | | | |
| Isolation Test Voltage | $V_{ISOL}$ | 2500 | — | $V_{DC}$ |
| Total Package Power Dissipation | $P_t$ | — | 250 | mW |
| Derate Linearly from 25°C | — | — | 2.8 | mW/°C |
| Storage Temperature | $T_S$ | -40 | 150 | °C |
| Operating Temperature | $T_{op}$ | 0 | 75 | °C |
| Lead Soldering Time at 260°C | — | — | 10 | sec. |
| Isolation Resistance<br>$V_{IO}$=500 V, $T_A$=25°C<br>$V_{IO}$=500 V, $T_A$=100°C | — | <br>$10^{12}$ Ω<br>$10^{11}$ Ω | — | — |

**Electrical Characteristics,** $T_A$=25°C

| **LED Emitter** | **Symbol** | **Min.** | **Typ.** | **Max.** | **Units** | **Test Conditions** |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | — | 1.8 | 2.1 | V | $I_F$=10 mA |
| Reverse Current | $I_R$ | — | .01 | 10 | µA | $V_R$=3.0 V |
| $V_F$ Temperature Coefficient | $\Delta V_F/\Delta$°C | — | –2.2 | — | mV/°C | — |
| Junction Capacitance | $C_J$ | — | 15 | — | pF | $V_F$=0 V, f=1.0 MHz |
| Dynamic Resistance | $\Delta V_F/\Delta I_F$ | — | 6.0 | — | Ω | $I_F$=10 mA |
| **Detector** | | | | | | |
| Junction Capacitance | $C_J$ | — | 12 | — | pF | $V_F$=0 V, f=1.0 MHz |
| **AC Characteristics Photovoltaic Mode** | | | | | | |
| Frequency Response | BW(–3dB) | — | 1.0 | — | MHz | $I_{P1}$=25 µA Modulation current ΔIP1=±6.0 µA |
| Phase Response | — | — | 45 | — | Deg. | |
| Rise Time | — | — | 350 | — | ns | |
| **Package** | | | | | | |
| Input-Output Capacitance | $C_{IO}$ | — | 1.0 | — | pF | $V_F$=0 V, f=1.0 MHz |
| Common Mode Capacitance | $C_{cm}$ | — | 0.5 | — | pF | $V_F$=0 V, f=1.0 MHz |
| **Coupled Characteristics** | | | **Min.** | **Typ.** | **Max.** | **Units** |
| $K_1$ at $I_F$=2.0 mA, $V_D$=0 V | | | 0.007 | — | — | — |
| THD at $f_0$=316, $I_{PI}$=35 µA, $V_D$=0 V | | | –83 | — | — | db |
| $K_3$=$K_2$/$K_1$, $I_F$=2.0 mA, $V_D$=0 V | | | 0.690 | — | 1.311 | — |

**Bin table for $K_3$**

| **Bin** | **Min.** | **Max.** |
|---|---|---|
| C | 0.690 | 0.773 |
| D | 0.765 | 0.859 |
| E | 0.851 | 0.955 |
| F | 0.945 | 1.061 |
| G | 1.051 | 1.181 |
| H | 1.169 | 1.311 |