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NEC Electronics Inc.

# 6N136
# HIGH SPEED PHOTO COUPLER
*NEPOC SERIES*

## Description

The 6N136 is a high speed photo coupler containing GaAsP light emitting diode and a PN photo diode connected to a high speed transistor. The CTR is 15% min.

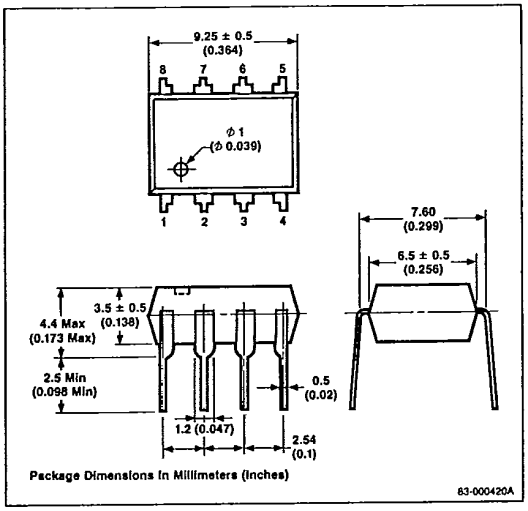
## Features

- ☐ High isolation voltage: $3000V_{DC}$ min
- ☐ High speed response: $t_{PHL}$, $t_{PLH}$ = 300ns typ
- ☐ Compact, dual in-line plastic package

## Applications

- ☐ Interface circuit for various instruments and control equipment
- ☐ Floating power supply feedback networks
- ☐ Computer and peripheral manufacture
- ☐ Pulse transformers
- ☐ High speed digital and analog line receivers

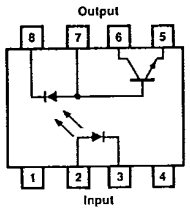
## Package Dimensions




Package Dimensions in Millimeters (Inches)

83-000420A

## Pin Connection




| PIN | | Function |
|---|---|---|
| Input | 1. | NC |
| | 2. | Anode |
| | 3. | Cathode |
| | 4. | NC |
| Output | 5. | Emitter |
| | 6. | $V_O$ |
| | 7. | Base |
| | 8. | $V_{CC}$ |

83-000410A

## Absolute Maximum Ratings

$T_A$ = +25°C

| | |
|---|---|
| **Diode** | |
| Reverse Voltage, $V_R$ | 5V |
| Forward Current, $I_F$ | 25mA |
| Power Dissipation, $P_D$ | 45mW |
| **Detector** | |
| Supply Voltage, $V_{CC}$ | −0.5V to +15V |
| Output Voltage, $V_O$ | −0.5V to +15V |
| Output Current, $I_O$ | 8mA |
| Emitter to Base Voltage, $V_{EBO}$ | 5V |
| Power Dissipation, $P_D$ | 100mW |
| Isolation Voltage[1], BV | $3000V_{DC}$ |
| Storage Temperature, $T_{STG}$ | −55°C to +125°C |
| Operating Temperature, $T_{OPT}$ | −55°C to +100°C |

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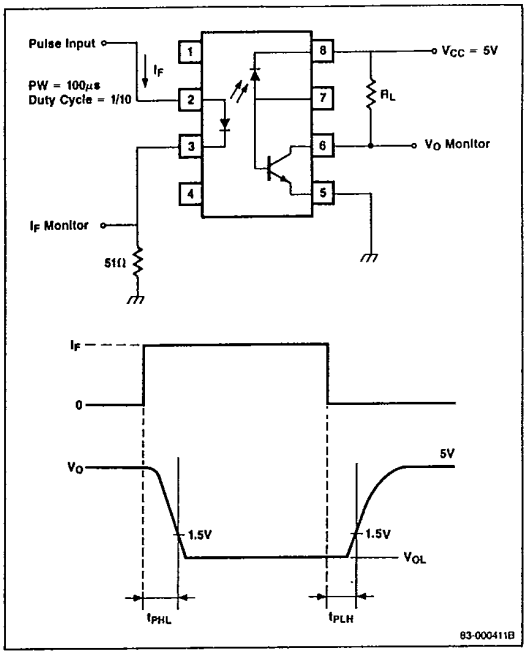
## Electrical Characteristics
$T_A$ = +25°C

| Parameter | Symbol | Limits Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| **Diode** | | | | | | |
| Forward Voltage | $V_F$ | | 1.43 | 1.7 | V | $I_F$ = 16mA |
| Reverse Current | $I_R$ | | 0.01 | 10 | μA | $V_R$ = 5V |
| Forward Voltage Temperature Coefficient | $\Delta V_F/\Delta T$ | | −1.51 | | mV/°C | $I_F$ = 16mA |
| Capacitance | $C_T$ | | 60 | | pF | V = 0, f = 1MHz |
| **Detector** | | | | | | |
| High Level Output Current | $I_{OH1}$ | | 3 | 500 | nA | $I_F$ = 0mA, $V_{CC}$ = 5.5V $V_O$ = 5.5V |
| High Level Output Current | $I_{OH2}$ | | | 100 | μA | $I_F$ = 0ma, $V_{CC}$ = 15V $V_O$ = 15V |
| DC Current Gain | $h_{FE}$ | | 120 | | | $V_O$ = 5V, $I_O$ = 3mA |
| **Coupled** | | | | | | |
| Current Transfer Ratio | CTR | 15 | 22 | | % | $I_F$ = 16mA, $V_{CC}$ = 4.5V $V_O$ = 0.4V |
| Low Level Output Voltage | $V_{OL}$ | | 0.1 | 0.4 | V | $I_F$ = 16mA, $V_{CC}$ = 4.5V $I_O$ = 2.4mA |
| Low Level Supply Current | $I_{CCL}$ | | 50 | | μA | $I_F$ = 16mA, $V_O$ = Open, $V_{CC}$ = 15V |
| High Level Supply Current | $I_{CCH}$ | | 0.01 | 1 | μA | $I_F$ = 0mA, $V_O$ = Open, $V_{CC}$ = 15V |
| Isolation Resistance | $R_{I-2}$ | | $10^{12}$ | | Ω | $V_{IN-OUT}$ = 1kV |
| Isolation Capacitance | $C_{I-2}$ | | 0.7 | | pF | V = 0, f = 1MHz |
| Propagation Delay Time to Low Output Level | $t_{PHL}$2 | | 0.3/ .05 | 0.8/ 1.5 | μs | $I_F$ = 16mA, $V_{CC}$ = 5V $R_L$ = 1.9kΩ/ 4.1kΩ |
| Propagation Delay Time to High Output Level | $t_{PLH}$2 | | 0.3/ .05 | 0.8/ 1.5 | μs | $I_F$ = 16mA, $V_{CC}$ = 5V $R_L$ = 1.9kΩ/ 4.1kΩ |

Notes: 1. Measuring Conditions: DC voltage for 1 min at $T_A$ = +25°C, RH = 60% between input (pins 1, 2, 3, and 4 common) and output (pins 5, 6, 7, and 8 common).

2. Measuring circuit.

*Measuring circuit*



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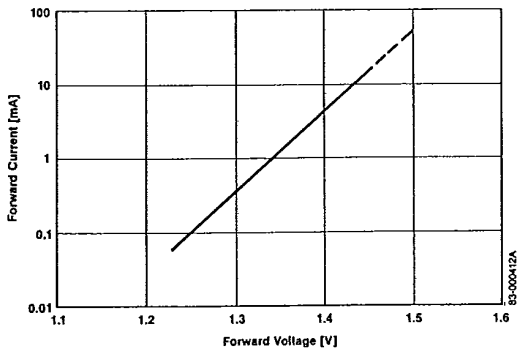
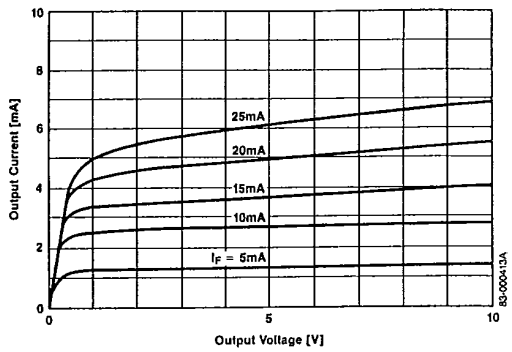
**6N136**

## Typical Characteristics
$T_A$ = +25°C

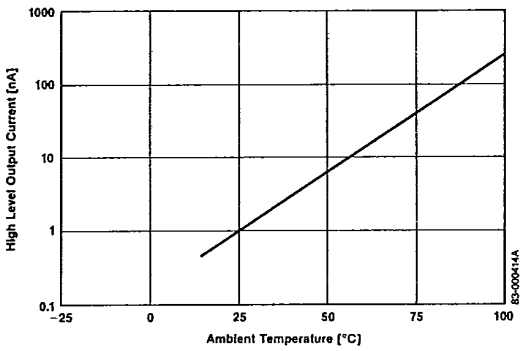
Forward Current vs Forward Voltage



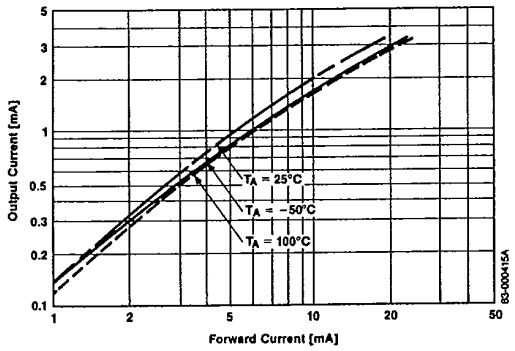

Output Current vs Output Voltage



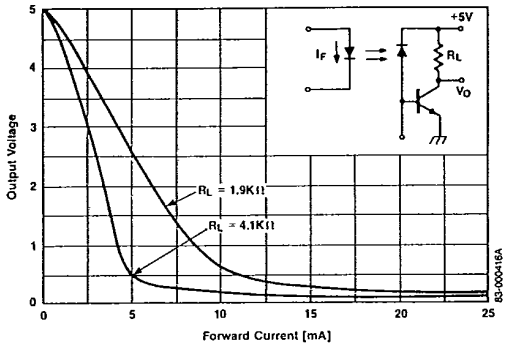

High Level Output Current vs Ambient Temperature



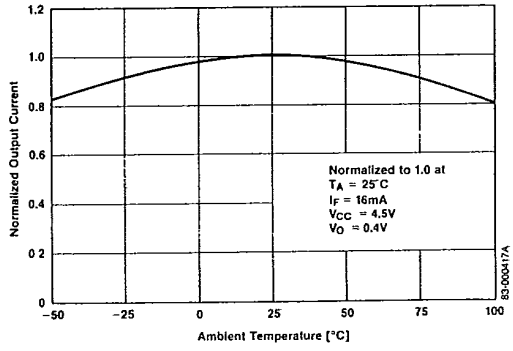

Output Current vs Forward Current




Output Voltage vs Forward Current




Normalized Output Current vs Ambient Temperature

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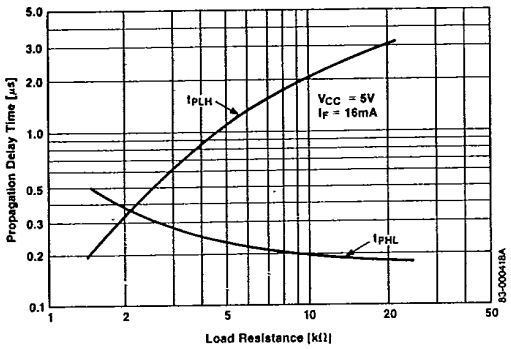
### Typical Characteristics (cont)

$T_A$ = +25°C

Propagation Delay Time vs Load Resistance




Propagation Delay Time vs Ambient Temperature