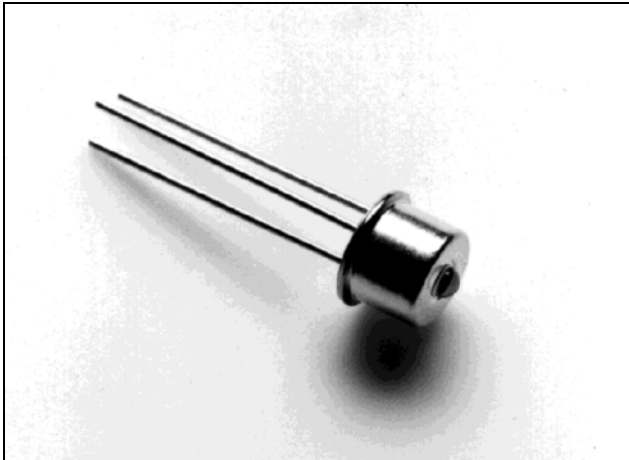


May 2004


**Ordering Information**

 ZL60212TBD TO-46 Package with lens  
 ZL60212TDD ST Housing  
 ZL60212TGD SMA Housing

**-55°C to +125°C**
**Description**

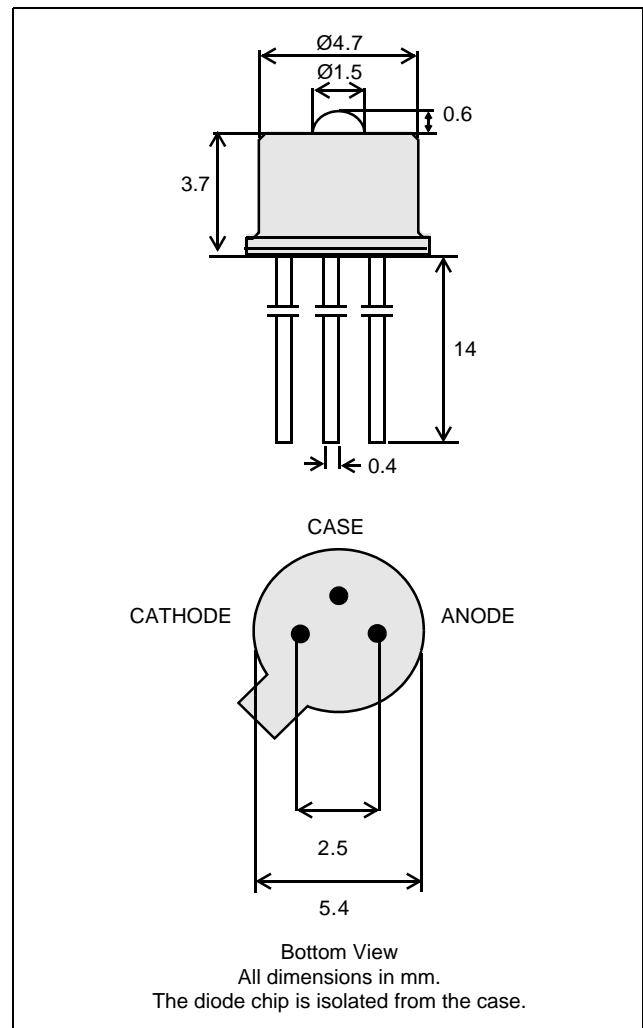
This single-chip device operates as both an Emitter and Detector, and transmits data over a single fiber in half-duplex mode; therefore, reducing both fiber and component costs when compared with traditional approaches.

**Features**

- Half Duplex over single fiber
- Single chip solution
- High speed
- Industrial temperature range
- Typical Rated Fiber couple power of 120  $\mu$ W

**Applications**

- Industrial control systems
- Long reach RS232
- Security systems
- Single fiber Datacom


**TO-46 Package with Lens**

**Optical and Electrical Characteristics - Case Temperature 25°C**

Parameter		Symbol	Min	Typ	Max	Unit	Test Condition	
Emitting Mode	Fiber-coupled Power (Figures 1, 2, and 3) (Table 1)	$P_{\text{fiber}}$	80	120		$\mu\text{W}$	$I_F = 60 \text{ mA}$ (See notes 1 and 2)	Fiber 62.5/125 $\mu\text{m}$
	Rise and Fall Time (10-90%)	$t_r, t_f$		7	10	ns	$I_F = 60 \text{ mA}$ (no bias)	Graded Index
	Bandwidth (3 dB)	$f_c$		50		MHz	$I_F = 60 \text{ mA}$	NA = 0.275
	Peak Wavelength	$\lambda_p$	860	880	890	nm	$I_F = 60 \text{ mA}$	
	Spectral Width (FWHM)	$\Delta\lambda$		50		nm	$I_F = 60 \text{ mA}$	
	Forward Voltage (Figure 5)	$V_F$		1.9	2.1	V	$I_F = 60 \text{ mA}$	
Receiving Mode	Responsivity (Figures 6, 7, and 8) (Table 2)	R	0.10	0.15		A/W	$V_R = 1 \text{ V}$ $\lambda = 880 \text{ nm}$	Fiber 62.5/125 $\mu\text{m}$
	Rise and Fall Time (10-90%)	$t_r, t_f$		7	10	ns	$V_R = 1 \text{ V}$ $R_L = 50 \Omega$ (no bias)	Graded Index
	Bandwidth	$f_c$		50		MHz	$V_R = 1 \text{ V}$ $R_L = 50 \Omega$	NA = 0.275
	Capacitance	C		30		pF	$V_R = 1 \text{ V}, f = 1 \text{ MHz}$	
	Dark Current	$I_d$		10	50	nA	$V_R = 1 \text{ V}$	

Note 1: Measured at the exit of 100 meters of fiber.

Note 2: Rated Fiber coupled power apply only on the TO-46 package, for housing options fiber coupled power is typically 10% less.

**Absolute Maximum Ratings**

Parameter	Symbol	Limit
Storage Temperature	$T_{\text{stg}}$	-55 to +125°C
Operating Temperature (derating: Figure 4)	$T_{\text{op}}$	-55 to +125°C
Electrical Power Dissipation (derating: Figure 4)	$P_{\text{tot}}$	160 mW
Continuous Forward Current ( $f < 10 \text{ kHz}$ )	$I_F$	80 mA
Peak Forward Current (duty Cycle < 50%, $f > 1 \text{ MHz}$ )	$I_{\text{FRM}}$	130 mA
Reverse Voltage	$V_R$	2.0 V
Soldering Temperature (2 mm from the case for 10 sec.)	$T_{\text{sld}}$	260°C

**Thermal characteristics**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance - Infinite Heat Sing	$R_{thjc}$			200	$^{\circ}\text{C}/\text{W}$
Thermal Resistance - No Heat Sink	$R_{thja}$			500	$^{\circ}\text{C}/\text{W}$
Temperature Coefficient - Optical Power	$dP/dT_j$		-0.4		$\%/^{\circ}\text{C}$
Temperature Coefficient - Wavelength	$dI/dT_j$		0.3		$\text{nm}/^{\circ}\text{C}$
Temperature Coefficient - Responsivity	$dR/dT_j$		0.2		$\%/^{\circ}\text{C}$
Temperature Coefficient - Dark Current	$dL_d/dT_j$		2.5		$\%/^{\circ}\text{C}$

Typical Fiber-Coupled Power	
Core Diameter/Cladding Diameter Numerical Aperture	
50/125 $\mu\text{m}$ 0.20	62.5/125 $\mu\text{m}$ 0.275
55 $\mu\text{W}$	120 $\mu\text{W}$

**Table 1 - Typical Fiber-Coupled Power**

Typical Responsivity	
Core Diameter/Cladding Diameter Numerical Aperture	
50/125 $\mu\text{m}$ 0.20	62.5/125 $\mu\text{m}$ 0.275
0.15 A/W	0.15 A/W

**Table 2 - Typical Responsivity**

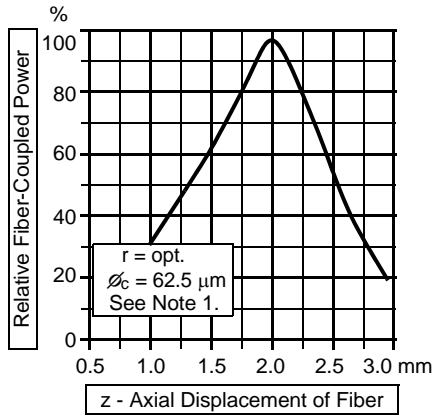


Figure 1 - z - Axial Displacement of Fiber

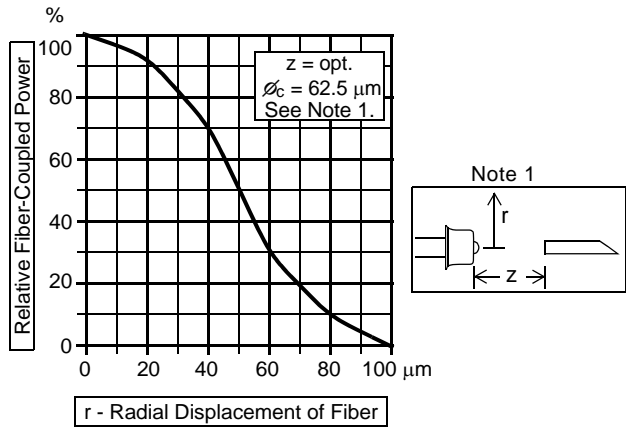


Figure 2 - r - Radial Displacement of Fiber

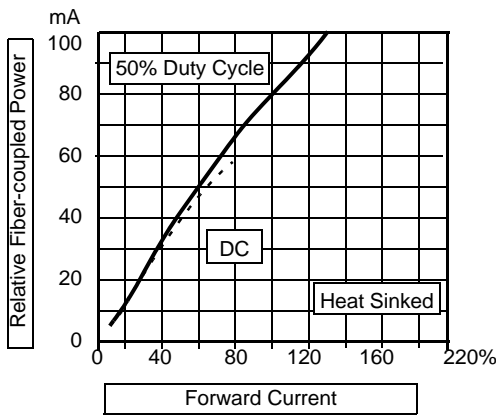
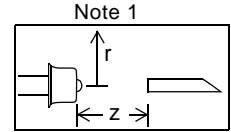


Figure 3 - Forward Current

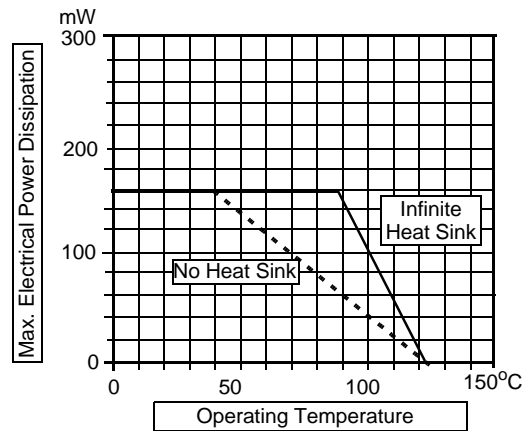


Figure 4 - Operating Temperature

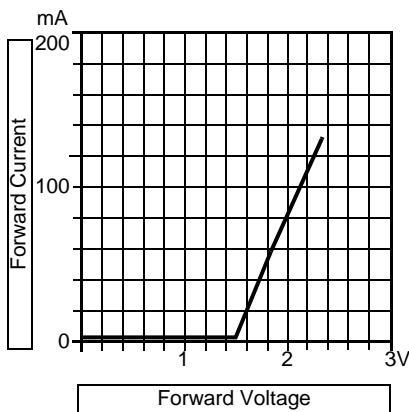


Figure 5 - Forward Voltage

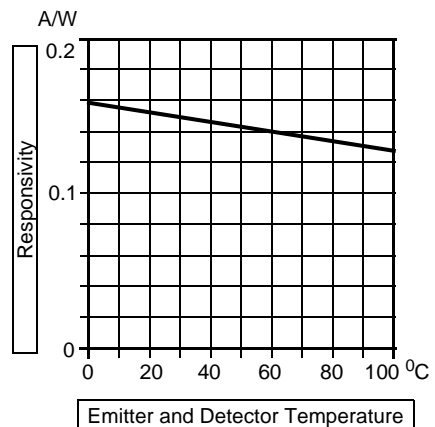
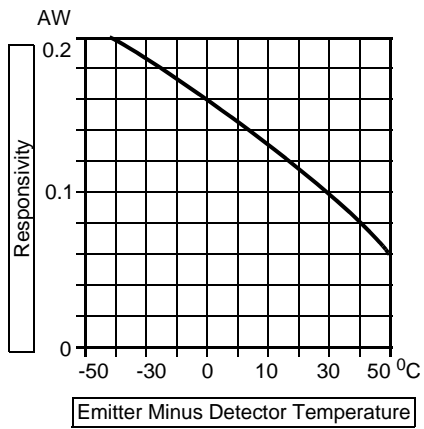
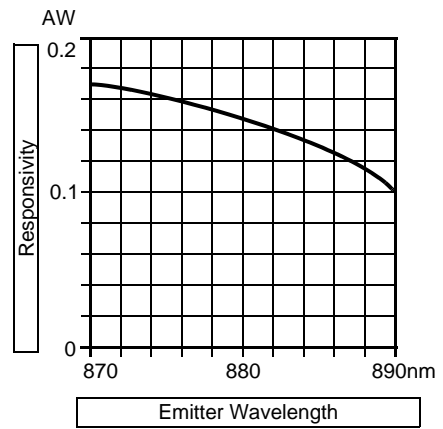


Figure 6 - Emitter and Detector Temperature

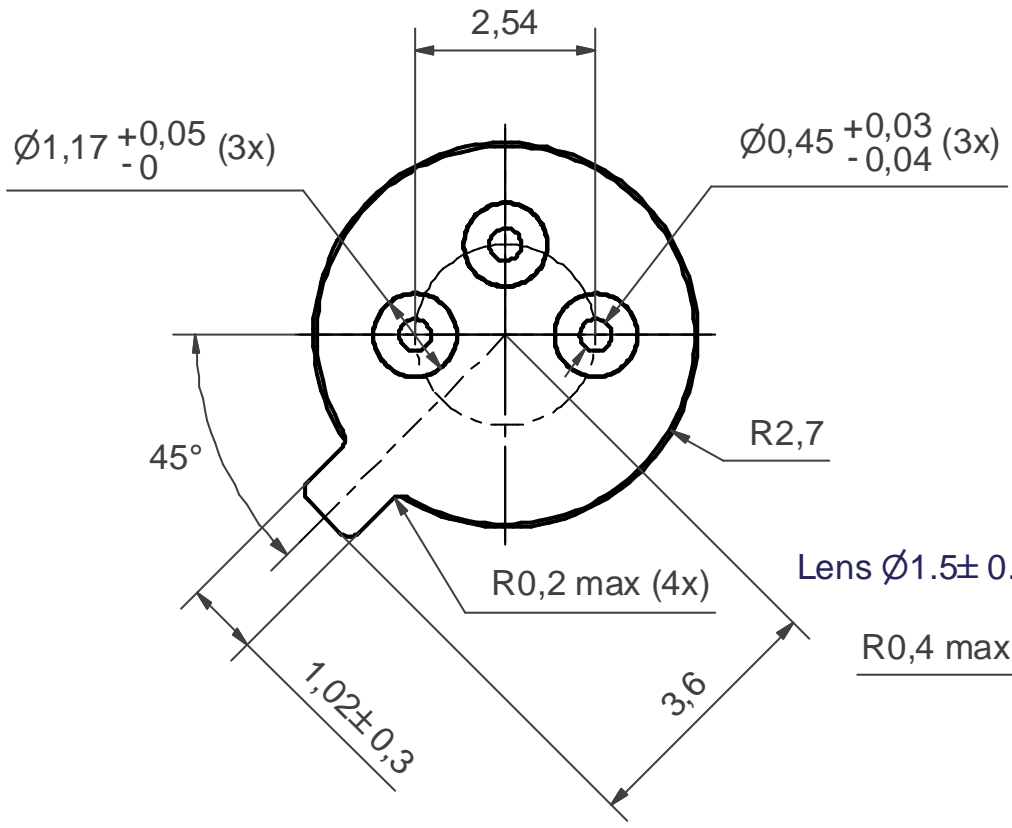


**Figure 7 - Emitter Minus Detector Temperature**

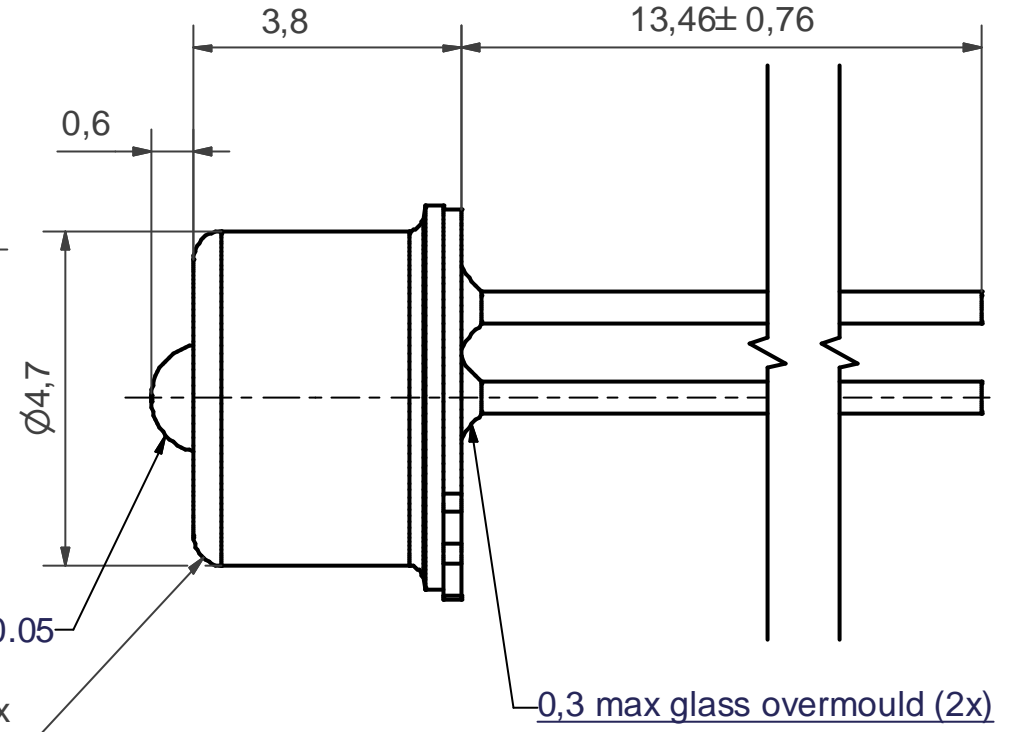


**Figure 8 - Emitter Wavelength**

# BOTTOM VIEW ( 10 : 1 )



# SIDE VIEW



### NOTES:-

1. All dimensions in mm.
2. General tol. ISO-2768-mK.
3. Coating: Case: Ni 1,5-2,5  $\mu\text{m}$ .  
Header: Ni 2-3  $\mu\text{m}$  / Au min 1,32  $\mu\text{m}$ .

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Package code **TB**

Previous package codes

Drawing type  
Package drawing, TO-46 with lens

Title **JS004076**



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