

**HL1561A/AC/BF****InGaAsP LD**

T-41-07

**Description**

The HL1561A/AC/BF are 1.55  $\mu\text{m}$  band InGaAsP  $\lambda/4$  phase-shifted distributed-feedback (DFB) laser diodes with a buried heterostructure.

**Fiber Specifications (HL1561BF only)**

Mode field diameter : 10.0  $\pm$ 1.0  $\mu\text{m}$   
 Cutoff wavelength : 1.10 to 1.20  $\mu\text{m}$   
 Core diameter : 10  $\mu\text{m}$   
 Outer diameter : 125  $\mu\text{m}$   
 Jacket diameter : 900  $\mu\text{m}$   
 Fiber length : More than 500 mm

**Features**

- Long-wavelength light output: 1530 to 1570 nm
- 5 mW (CW) operation at room temperature (HL1561A/AC)
- High output power:  $P_f = 1.0$  mW (CW or pulsed) (HL1561BF) operation
- Dynamic single longitudinal mode: side-mode suppression  $S_r = 38$  dB Typ. (HL1561A/AC/BF)
- Fast pulse response:  $t_r = 0.15$  ns;  $t_f = 0.2$  ns Typ.

**Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ )**

Item		Symbol	Rated Value	Units
Optical output power	HL1561A/AC	$P_O$	5	mW
Fiber optical output power	HL1561BF	$P_f$	1.0	mW
Reverse voltage	HL1561A/AC	$V_R$	2	V
LD reverse voltage	HL1561BF	$V_{R(LD)}$	2	V
PD reverse voltage		$V_{R(PD)}$	15	V
PD forward voltage		$I_P(PD)$	1	mA
Cooler current		$I_C$	1.4	A
Operating temperature		$T_{opr}$	0 to +60	$^\circ\text{C}$
Storage temperature	HL1561A/AC	$T_{stg}$	0 to +80	$^\circ\text{C}$
	HL1561BF		-40 to +70	

# HL1561A/AC/BF

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

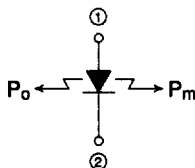
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Item	Symbol	Min	Typ	Max	Units	Test Conditions
Optical output power	HL1561A/AC P <sub>O</sub>	5	—	—	mW	Kink free
		1.5	—	—		I <sub>F</sub> = I <sub>th</sub> + 20 mA
Fiber optical output power	HL1561BF P <sub>f</sub>	1.0	—	—	mW	Kink free
		0.3	—	—		I <sub>F</sub> = I <sub>th</sub> + 20 mA
Threshold current	I <sub>th</sub>	—	25	50	mA	
Monitor optical output power	HL1561A/AC P <sub>m</sub>	0.6	—	—	mW	I <sub>F</sub> = I <sub>th</sub> + 20 mA
Lasing wavelength	HL1561A/AC λ <sub>p</sub>	1530	1550	1570	nm	P <sub>O</sub> = 3 mW
	HL1561BF	1530	1550	1570		P <sub>f</sub> = 0.5 mW
Side-mode suppression ratio	HL1561A/AC S <sub>r</sub>	30	38	—	dB	P <sub>O</sub> = 3 mW
	HL1561BF	30	35	—		P <sub>f</sub> = 0.5 mW
Beam divergence (parallel)	HL1561A/AC θ <sub>∥</sub>	—	30	—	deg.	P <sub>O</sub> = 3 mW, FWHM
Beam divergence (perpendicular)	θ <sub>⊥</sub>	—	40	—		P <sub>O</sub> = 3 mW, FWHM
Rise time	HL1561A/AC t <sub>r</sub>	—	0.15	—	ns	I <sub>bias</sub> = I <sub>th</sub> , 10 to 90%
	HL1561BF	—	0.2	—		I <sub>bias</sub> = I <sub>th</sub> , 10 to 90%
Fall time	HL1561A/AC t <sub>f</sub>	—	0.2	—	ns	I <sub>bias</sub> = I <sub>th</sub> , 90 to 10%
	HL1561BF	—	0.3	—		I <sub>bias</sub> = I <sub>th</sub> , 90 to 10%
PD dark current	HL1561BF I <sub>DARK</sub>	—	—	350	nA	V <sub>R (PD)</sub> = 5 V
Monitor current	I <sub>S</sub>	100	—	—	μA	V <sub>R (PD)</sub> = 5 V, P <sub>f</sub> = 0.5 mW
PD capacitance	C <sub>t</sub>	—	10	20	pF	V <sub>R (PD)</sub> = 5 V, f = 1 MHz
Photosensitivity saturation voltage	V <sub>R (S)</sub>	—	—	2	V	
Cooling capacity	ΔT	40	—	—	°C	P <sub>f</sub> = 0.5 mW, T <sub>C</sub> = 60°C
Cooler current	I <sub>O</sub>	—	—	1.4	A	ΔT = 40°C
Cooler voltage	V <sub>C</sub>	—	—	1.8	V	ΔT = 40°C
Thermistor resistance	R <sub>TM</sub>	—	10	—	KΩ	

### Internal Circuit

**Package Type**

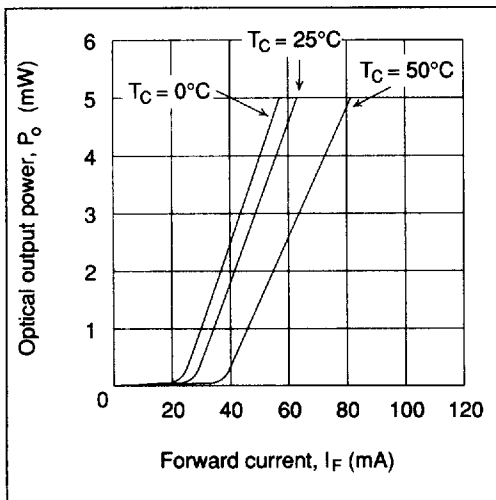
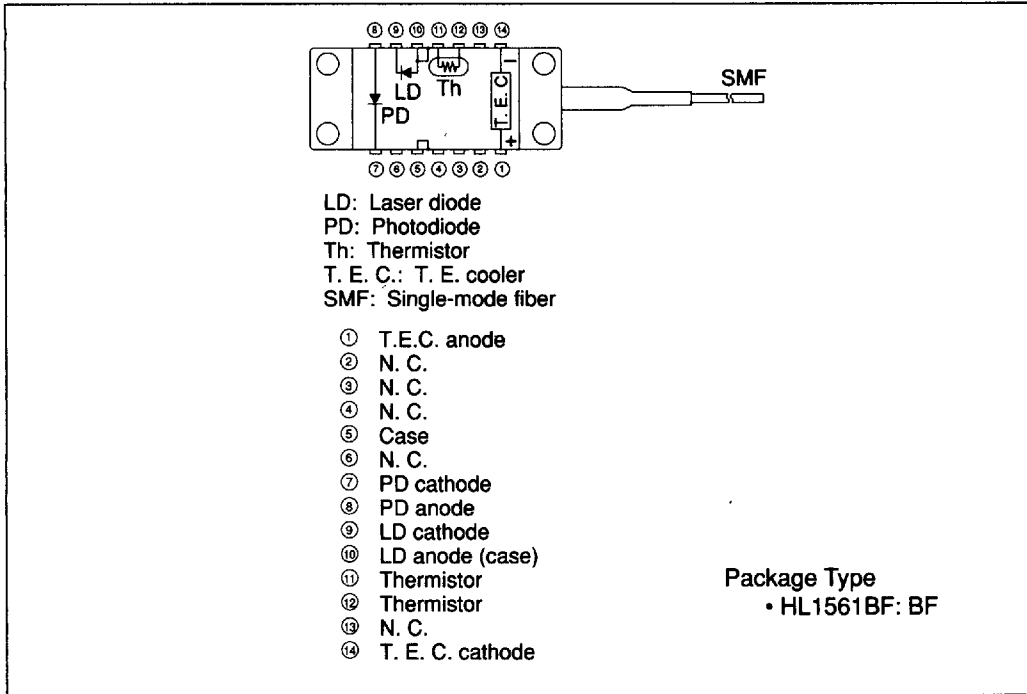
- HL1561A: A1
- HL1561AC: AC



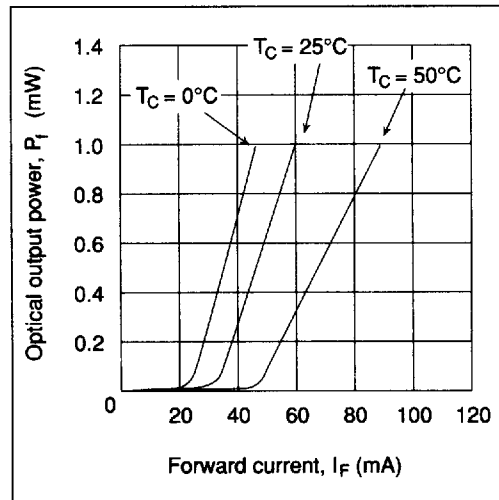
**HL1561A/AC/BF**

**Pin Connection (Bottom View) (HL1561BF)**

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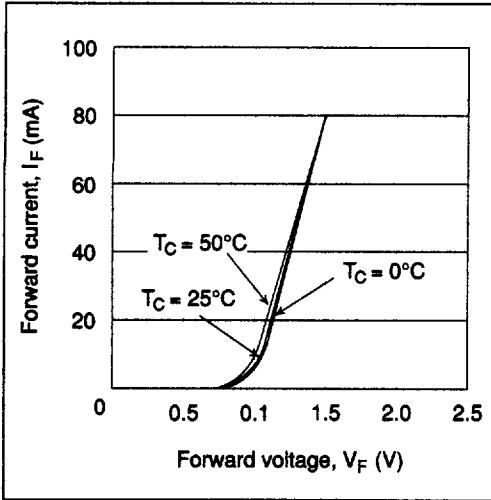


**Figure 1 Optical Output Power vs. Forward Current (HL1561A/AC)**

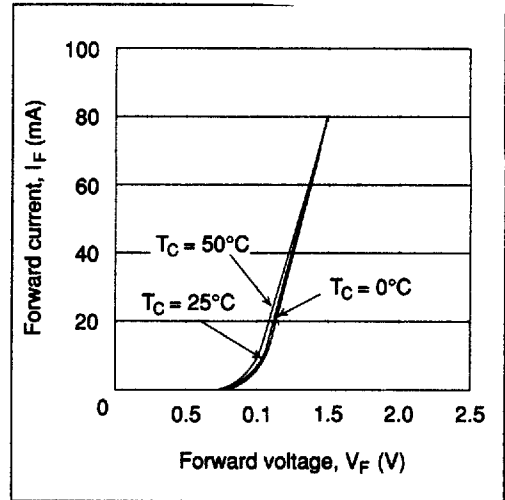


**Figure 2 Optical Output Power vs. Forward Current (HL1561BF)**

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**Figure 3 Forward Current vs. Forward Voltage (HL1561A/AC)**



**Figure 4 Forward Current vs. Forward Voltage (HL1561BF)**

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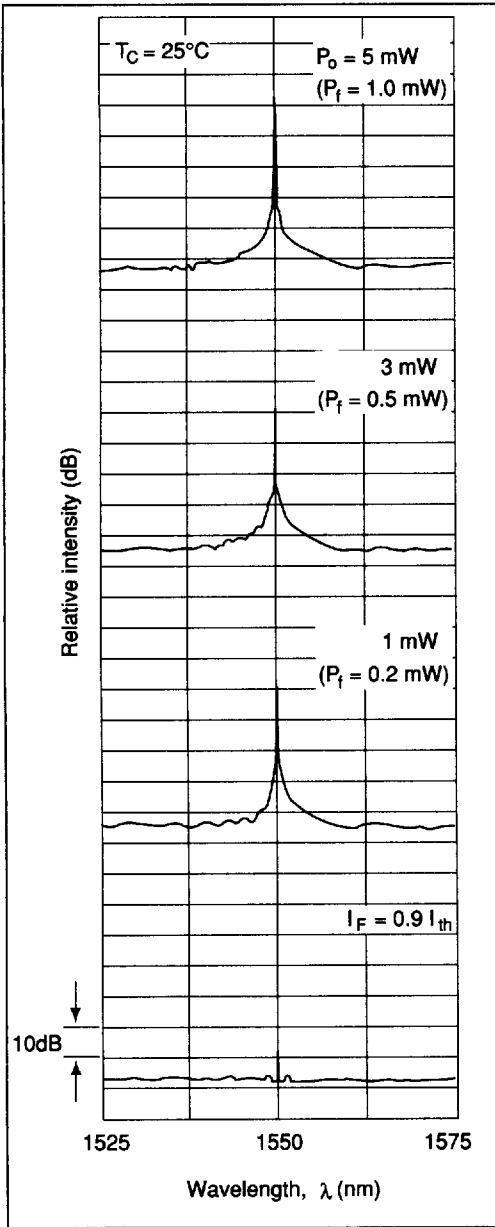


Figure 5 Optical Output Power Dependence of Lasing Spectrum (HL1561A/AC/BF) ( ): HL1561BF only

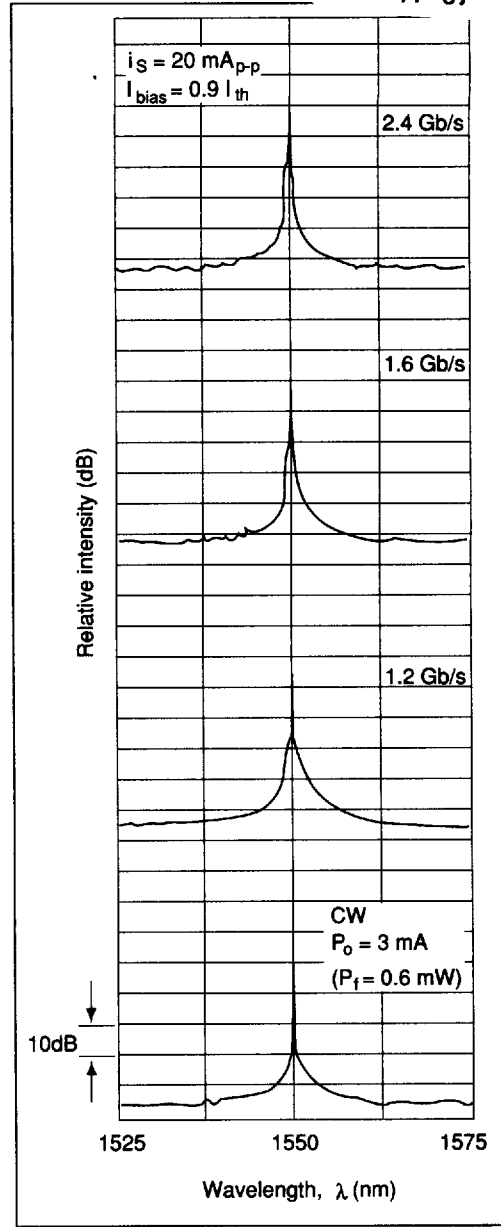
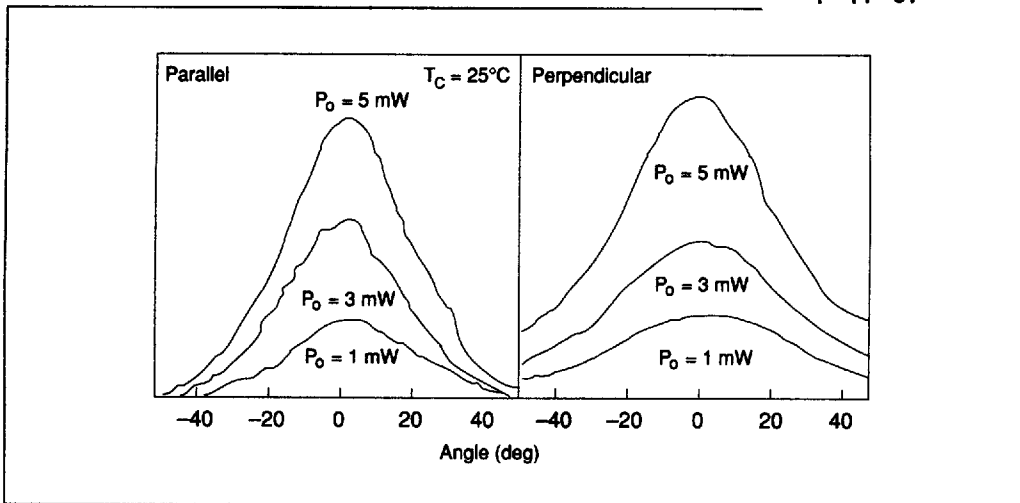
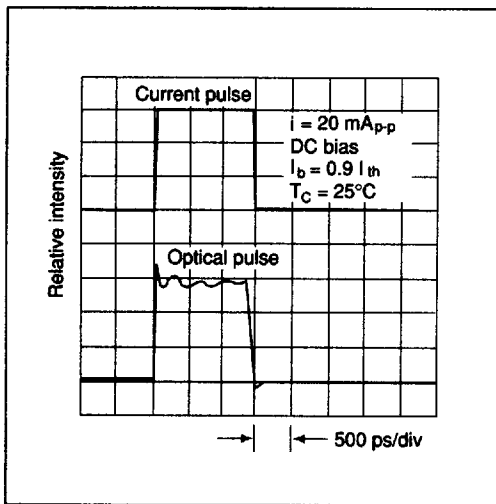


Figure 6 Frequency Dependence of Lasing Spectrum (HL1561A/AC/BF) ( ): HL1561BF only

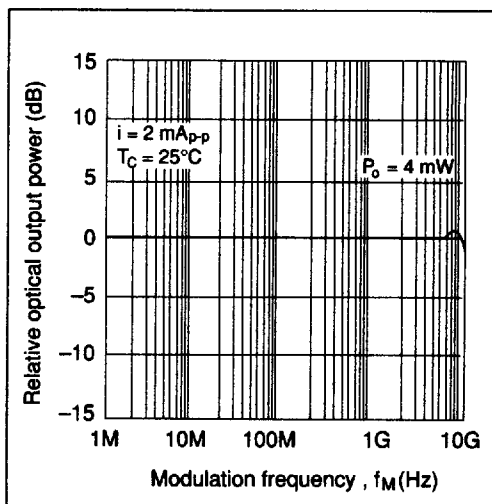
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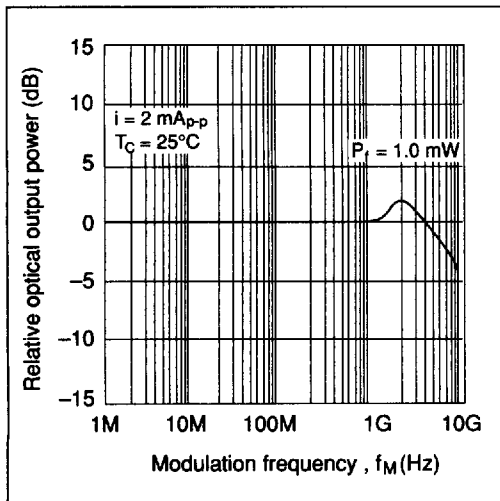
**Figure 7 Far Field Pattern (HL1561A/AC)**



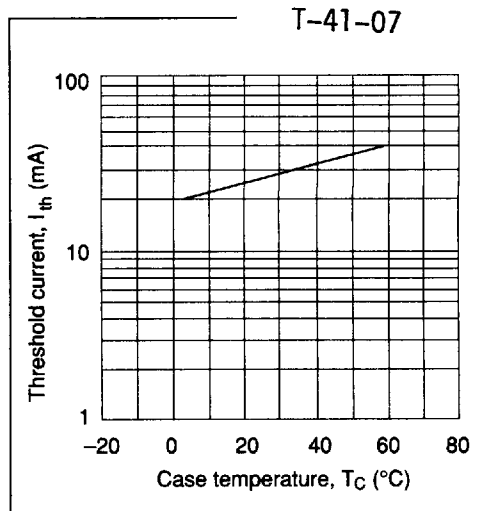
**Figure 8 Pulse Response of Laser Diode (HL1561A/AC/BF)**



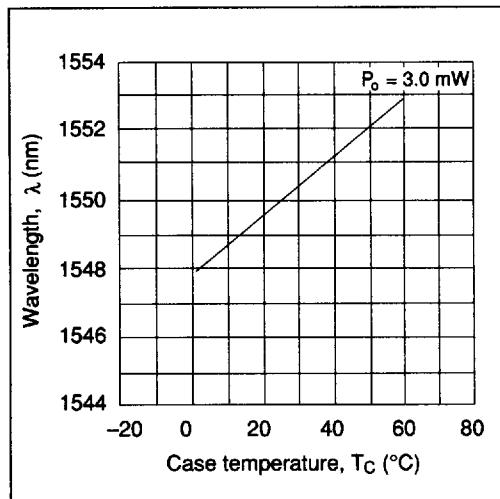
**Figure 9 Frequency Response of Laser Diode (HL1561A/AC)**



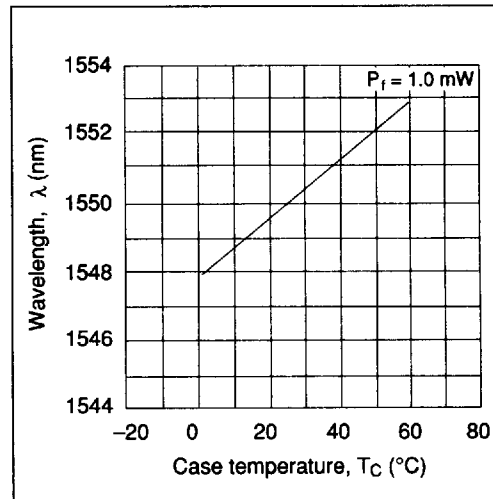
**Figure 10 Frequency Response of Laser Diode (HL1561BF)**



**Figure 11 Threshold Current vs. Case Temperature (HL1561A/AC/BF)**

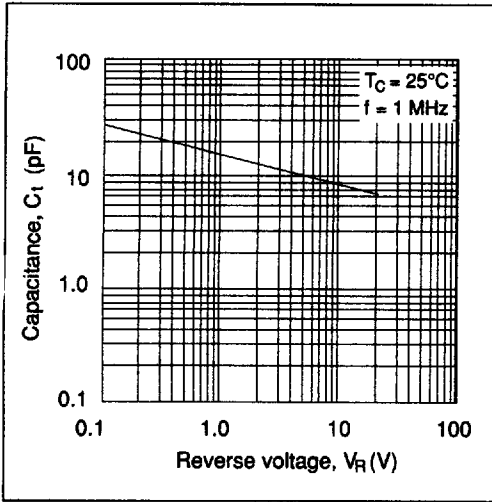


**Figure 12 Temperature Dependence of Lasing Wavelength (HL1561A/AC)**

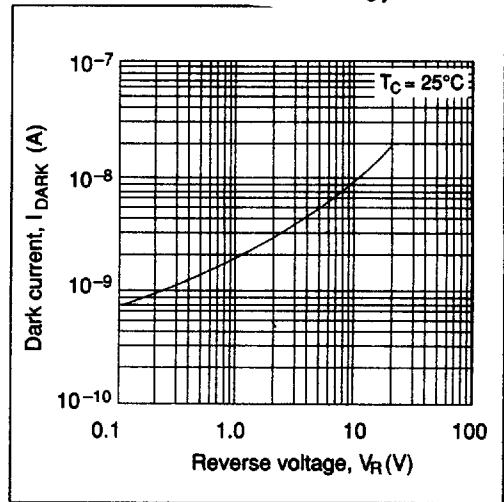


**Figure 13 Temperature Dependence of Lasing Wavelength (HL1561BF)**

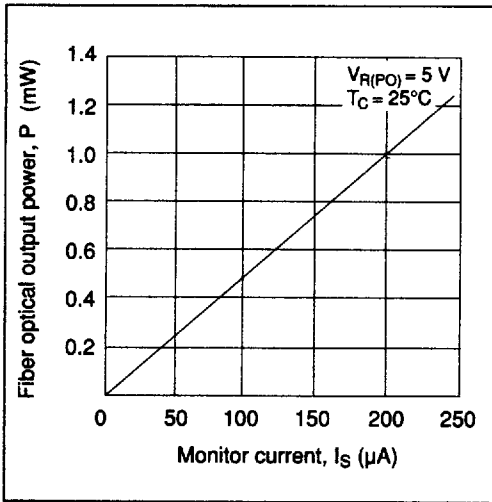
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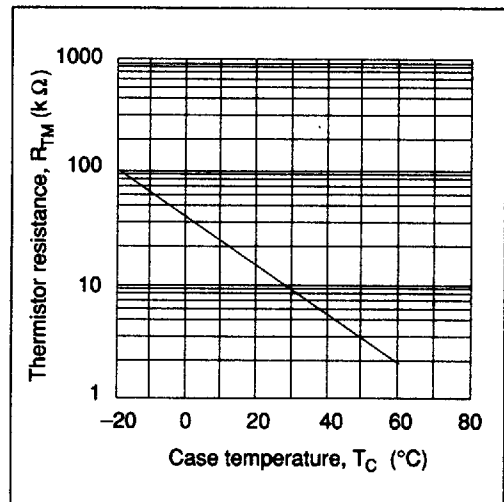
**Figure 14** Capacitance vs. Reverse Voltage of Photodiode (HL1561BF)



**Figure 15** Dark Current vs. Reverse Voltage of Photodiode (HL1561BF)



**Figure 16** Fiber Optical Output Power vs. Monitor Current (HL1561BF)



**Figure 17** Temperature Dependence of Thermistor Resistance (HL1561BF)

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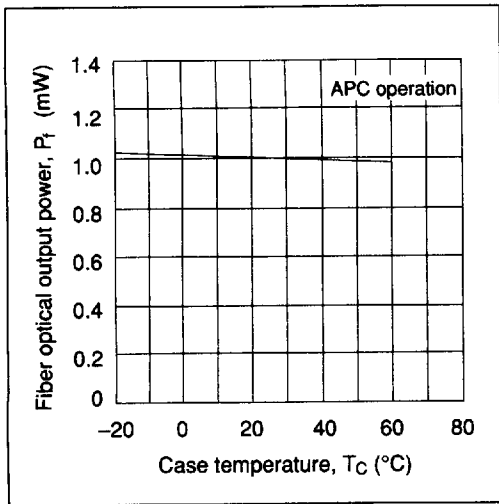


Figure 18 Tracking Characteristics  
(HL1561BF)