High-Performance T-1¾ (5 mm) TS AlGaAs Infrared (875 nm) Lamp

Technical Data

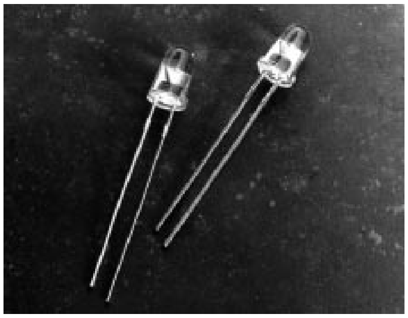
HSDL-4200 Series
HSDL-4220 30°
HSDL-4230 17°

Features

- **Very High Power TS AlGaAs Technology**
- **875 nm Wavelength**
- **T-1¾ Package**
- **Low Cost**
- **Very High Intensity:**
  HSDL-4220 - 38 mW/sr
  HSDL-4230 - 75 mW/sr
- **Choice of Viewing Angle:**
  HSDL-4220 - 30°
  HSDL-4230 - 17°
- **Low Forward Voltage for Series Operation**
- **High Speed: 40 ns Rise Times**
- **Copper Leadframe for Improved Thermal and Optical Characteristics**

Applications

- **IR Audio**
- **IR Telephones**
- **High Speed IR Communications**
  IR LANs
  IR Modems
  IR Dongles
- **Industrial IR Equipment**
- **IR Portable Instruments**

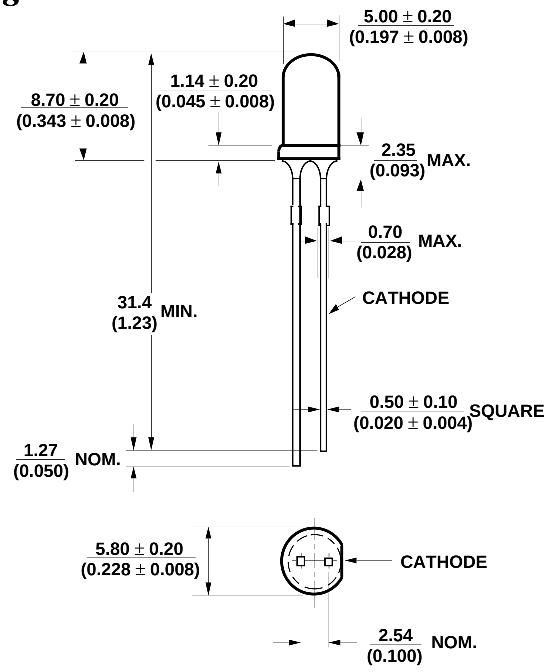


- **Interfaces with Crystal Semiconductor CS8130 Infrared Transceiver**

Description

The HSDL-4200 series of emitters are the first in a sequence of emitters that are aimed at high power, low forward voltage, and high speed. These emitters utilize the *T*ransparent *S*ubstrate, double heterojunction, *Al*uminum *Ga*llium *Ar*senide (TS AlGaAs) LED technology. These devices are optimized for speed and efficiency at emission wavelengths of 875 nm. This material produces high radiant efficiency over a wide range of currents up to 500 mA peak current. The HSDL-4200 series of emitters are available in a choice of viewing angles, the HSDL-4230 at 17° and the HSDL-4220 at 30°. Both lamps are packaged in clear T-1¾ (5 mm) packages.

Package Dimensions



The package design of these emitters is optimized for efficient power dissipation. Copper leadframes are used to obtain better thermal performance than the traditional steel leadframes.

The wide angle emitter, HSDL-4220, is compatible with the IrDA SIR standard and can be used with the HSDL-1000 integrated SIR transceiver.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Reference
Peak Forward Current	I_{FPK}		500	mA	[2], Fig. 2b Duty Factor = 20% Pulse Width = 100 µs
Average Forward Current	I_{FAVG}		100	mA	[2]
DC Forward Current	I_{FDC}		100	mA	[1], Fig. 2a
Power Dissipation	P_{DISS}		260	mW	
Reverse Voltage (I_R = 100 µA)	V_R	5		V	
Transient Forward Current (10 µs Pulse)	I_{FTR}		1.0	A	[3]
Operating Temperature	T_O	0	70	°C	
Storage Temperature	T_S	-20	85	°C	
LED Junction Temperature	T_J		110	°C	
Lead Soldering Temperature [1.6 mm (0.063 in.) from body]			260 for 5 seconds	°C	

Notes:
1. Derate linearly as shown in Figure 4.
2. Any pulsed operation cannot exceed the Absolute Max Peak Forward Current as specified in Figure 5.
3. The transient peak current is the maximum non-recurring peak current the device can withstand without damaging the LED die and the wire bonds.

Electrical Characteristics at 25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	Reference
Forward Voltage	V_F	1.30	1.50 2.15	1.70	V	I_{FDC} = 50 mA I_{FPK} = 250 mA	Fig. 2a Fig. 2b
Forward Voltage Temperature Coefficient	$\Delta V/\Delta T$		-2.1 -2.1		mV/°C	I_{FDC} = 50 mA I_{FDC} = 100 mA	Fig. 2c
Series Resistance	R_S		2.8		ohms	I_{FDC} = 100 mA	
Diode Capacitance	C_O		40		pF	0 V, 1 MHz	
Reverse Voltage	V_R	2	20		V	I_R = 100 µA	
Thermal Resistance, Junction to Pin	$R\theta_{jp}$		110		°C/W		

Optical Characteristics at 25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	Reference
Radiant Optical Power HSDL-4220	P_O		19 38		mW	I_{FDC} = 50 mA I_{FDC} = 100 mA	
HSDL-4230	P_O		16 32		mW	I_{FDC} = 50 mA I_{FDC} = 100 mA	
Radiant On-Axis Intensity HSDL-4220	I_E	22	38 76 190	60	mW/sr	I_{FDC} = 50 mA I_{FDC} = 100 mA I_{FPK} = 250 mA	Fig. 3a Fig. 3b
HSDL-4230	I_E	39	75 150 375	131	mW/sr	I_{FDC} = 50 mA I_{FDC} = 100 mA I_{FPK} = 250 mA	Fig. 3a Fig. 3b
Radiant On-Axis Intensity Temperature Coefficient	$\Delta I_E/\Delta T$		-0.35 -0.35		%/°C	I_{FDC} = 50 mA I_{FDC} = 100 mA	
Viewing Angle HSDL-4220	$2\theta_{1/2}$		30		deg	I_{FDC} = 50 mA	Fig. 6
HSDL-4230	$2\theta_{1/2}$		17		deg	I_{FDC} = 50 mA	Fig. 7
Peak Wavelength	λ_{PK}	860	875	895	nm	I_{FDC} = 50 mA	Fig. 1
Peak Wavelength Temperature Coefficient	$\Delta\lambda/\Delta T$		0.25		nm/°C	I_{FDC} = 50 mA	
Spectral Width–at FWHM	$\Delta\lambda$		37		nm	I_{FDC} = 50 mA	Fig. 1
Optical Rise and Fall Times, 10%-90%	t_r/t_f		40		ns	I_{FDC} = 50 mA	
Bandwidth	f_c		9		MHz	I_F = 50 mA ± 10 mA	Fig. 8

Ordering Information

Part Number	Lead Form	Shipping Option
HSDL-4220	Straight	Bulk
HSDL-4230	Straight	Bulk

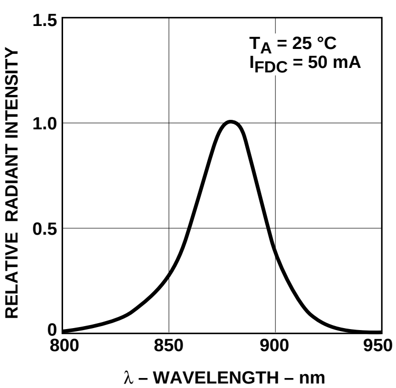


Figure 1. Relative Radiant Intensity vs. Wavelength.

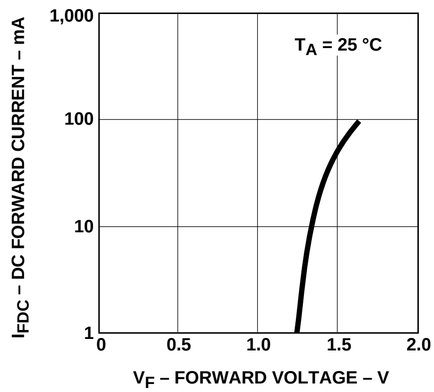


Figure 2a. DC Forward Current vs. Forward Voltage.

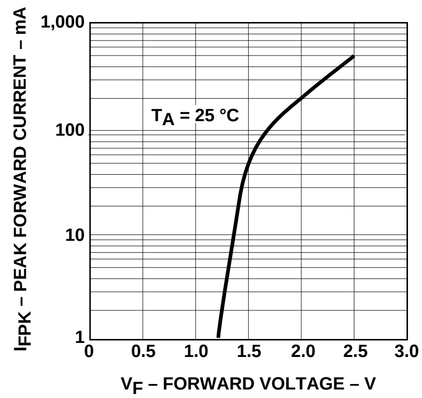


Figure 2b. Peak Forward Current vs. Forward Voltage.

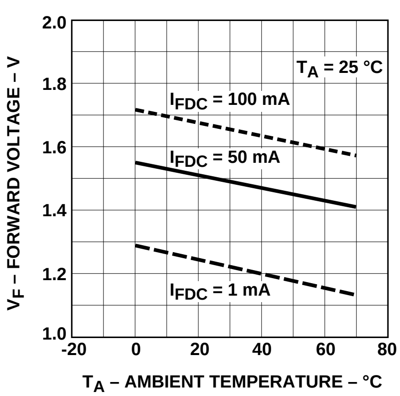


Figure 2c. Forward Voltage vs Ambient Temperature.

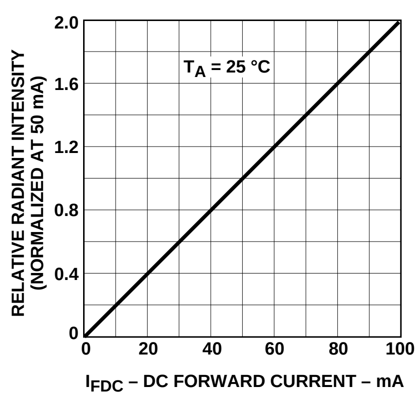


Figure 3a. Relative Radiant Intensity vs. DC Forward Current.

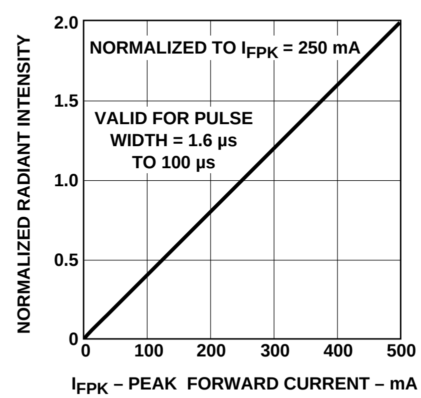


Figure 3b. Normalized Radiant Intensity vs. Peak Forward Current.

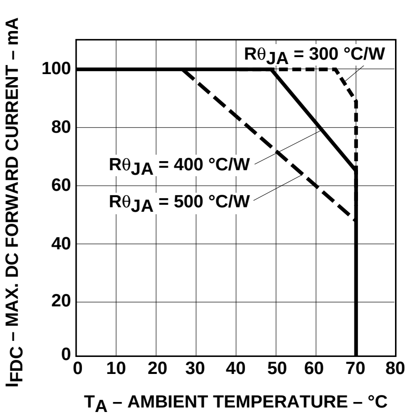


Figure 4. Maximum DC Forward Current vs. Ambient Temperature. Derated Based on T_{JMAX} = 110°C.

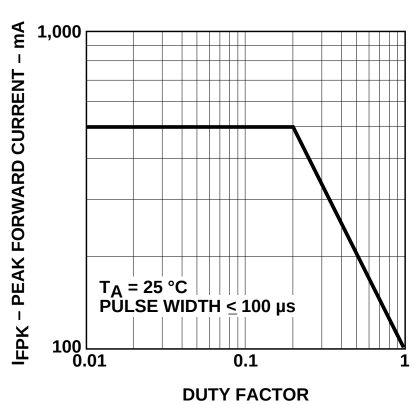


Figure 5. Maximum Peak Forward Current vs. Duty Factor.

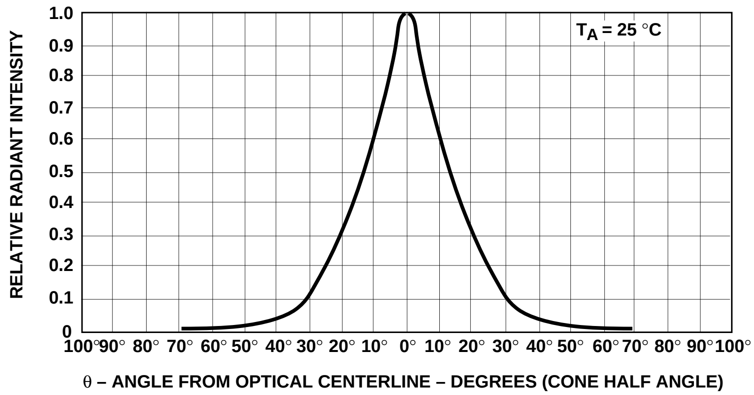


Figure 6. Relative Radiant Intensity vs. Angular Displacement HSDL-4220.

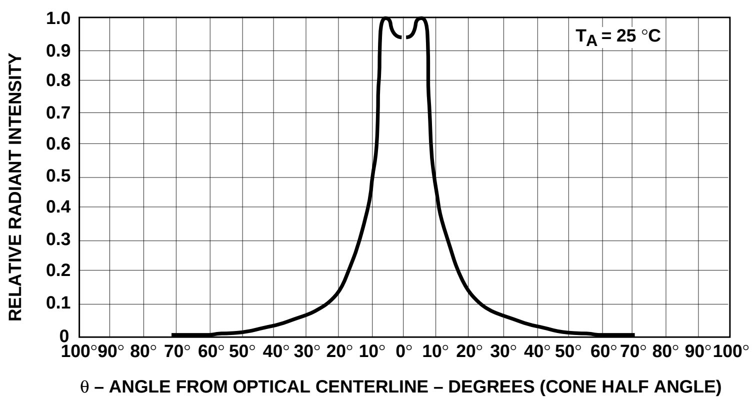


Figure 7. Relative Radiant Intensity vs. Angular Displacement HSDL-4230.

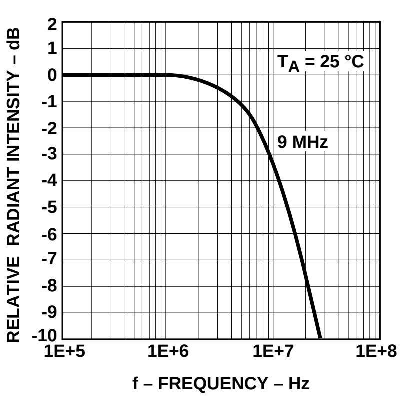


Figure 8. Relative Radiant Intensity vs. Frequency.

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