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THORLABS

SAF1171S - May 6, 2019

Item # SAF1171S was discontinued on May 6, 2019. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

TUNABLE LASER GAIN CHIPS WITH THERMOELECTRIC COOLERS

- **Wavelength Ranges Centered at 1050, 1220, 1320, 1450, 1550, or 1900 nm**
- **Broadband Tunability**
- **Thermoelectrically Cooled Half-Butterfly Assembly**

SAF1174S
CWL = 1320 nm,
SM Fiber

SAF1550P2
CWL = 1550 nm,
PM Fiber

Hide Overview

OVERVIEW

Features

- Gain Chips Mounted for Easy Integration into External Cavity Lasers
- Half-Butterfly Assembly with Thermoelectric Cooler
- AR Coating Eliminates Unwanted Reflections, Increasing Laser Stability, Output Power, and Spectral Quality
- 1.0 m Long (Min), SM or PM Tight Jacket Pigtail with FC/APC Connector

Thorlabs' family of Single-Angled-Facet (SAF) Gain Chips provides a gain medium for light in wavelength ranges centered at 1050, 1220, 1320, 1450, 1550, or 1900 nm. These gain chips feature AR coatings, an angled waveguide, and a proven SOA structure, which gives designers of external cavity lasers (ECLs) the highest power and widest tuning range available on the market. The gain chip is mounted in a half-butterfly package that collimates the output of the normal facet and couples it into an FC/APC connectorized fiber. A thermoelectric cooler (TEC) and thermistor, incorporated into the package and controlled with the easily accessible supplied pins (see the *Graphs* tab), enable tuning and optimization of the operating temperature.

Item #	ASE Center Wavelength	ASE 3 dB Bandwidth	Peak Gain	Gain Ripple
SAF1171S	1050 nm	60 nm	30 dB	2.5 dB (Max)
SAF1175S	1220 nm	80 nm	17 dB	0.5 dB
SAF1174S	1320 nm	80 nm	35 dB	0.35 dB
SAF1450S2	1450 nm	100 nm	20 dB	0.4 dB (Max)
SAF1550S2	1550 nm	80 nm	17 dB	0.6 dB (Max)
SAF1550P2	1550 nm	80 nm	17 dB	0.6 dB (Max)
SAF1900S	1900 nm	150 nm	18 dB	1.5 dB

All values are typical, unless otherwise indicated. Please refer to the *Specs* tab for more information. The *Graphs* tab describes the typical performance obtained in an external cavity laser configuration.

Webpage Features
Clicking this info icon below will open a window that contains item specifications and graphs.

On certain models, we can optionally provide a PM fiber or an optical isolator for the free-space input. Please contact Tech Support for a quote.

Other SAF Gain Chips: Chip on Submount or Heatsink				
1220 nm	1320 nm	1450 nm	1550 / 1590 nm	1650 nm

Hide Specs

SPECS

All quoted values are typical, unless otherwise indicated. Please see the gain chip's Spec Sheet (linked below) for the most detailed information on performance. The *Graphs* tab describes the typical performace obtained in an external cavity laser configuration.

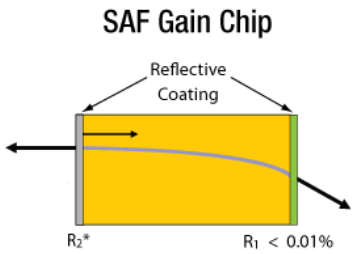
This link opens a document that contains a comprehensive list of performance specifications and performance plots.

General Specifications										
Item #	Spec Sheet	Reference Cavity	CWL[a]	Tuning Range[a, b]	Peak Power[a]	Chip Gain[c]	Gain Ripple	R_1	R_2	Chip Length
SAF1174S		TLK-L1300R[d]	1310 nm	100 nm	50 mW	35 dB	0.35 dB	0.005%	10%[e]	2 mm
SAF1550S2		TLK-L1550R[d]	1550 nm	120 nm	40 mW	17 dB	0.6 dB (Max)	0.005%	10%[e]	1 mm
SAF1550P2		TLK-L1550R[d]	1550 nm	120 nm	40 mW	17 dB	0.6 dB (Max)	0.005%	10%[e]	1 mm

- The values given in the highlighted columns were measured in the specified reference cavity. Different external cavities will produce different performance specifications.
- 10 dB point.
- Single-pass optical gain at center of gain curve.
- This item is no longer available for individual purchase.
- Refer to the SAF chip reflectivity diagram below.

ASE Specifications					
Item #	Center Wavelength (Typ.)	3 dB Bandwidth (Typ.)	ASE Current	Operating Current (Typ.)	Operating Current (Max)
SAF1174S	1320 nm	80 nm	600 mA (Typ.)	500 mA	800 mA
SAF1550S2	1550 nm	80 nm	300 mA (Typ.)	300 mA	600 mA
SAF1550P2	1550 nm	80 nm	300 mA (Typ.)	300 mA	600 mA

Note: The light polarization is horizontal inside the SAF Gain Chips.



*R_2 = 10% for all models in the SAF series except the SAF1900S, for which R_2 = 20%.

Hide Graphs

GRAPHS

SAF Gain Chip Lasing Performance Using Littrow Tunable Laser Kit*

The innovative design of an SAF gain chip is ideal for use in external cavity lasers because it virtually eliminates unwanted feedback from the intracavity facet of the gain chip. These devices offer superior performance in a wide variety of external cavity configurations. Given below are typical spectra and details on the packaged devices.

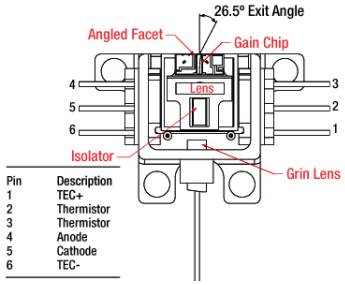
*Our Littrow Tunable Laser Kit has been discontinued.

Item #	Center Wavelength	Power vs. Current	Power Spectrum
SAF1171S	1050 nm		
SAF1175S	1220 nm		
a			

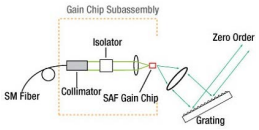
SAF1174S	1320 nm		
SAF1450S2	1450 nm		
SAF1550S2	1550 nm		
SAF1550P2	1550 nm		
SAF1900S	1900 nm		

- Please note that the fluctuations in the power spectrum between 1350 and 1380 nm are associated with water vapor absorption.

Fiber-Coupled SAF Gain Chip Drawing



Basic Littrow Configuration



Hide SAF Gain Chips

SAF Gain Chips

- Designed for Use in a Littrow Cavity
- 1.0 m Long (Min), SM or PM Tight Jacket Pigtail with FC/APC Connector

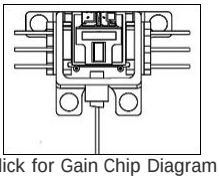
The SAF1171S, SAF1175S, SAF1450S2, and SAF1900S will be retired without replacement when stock is depleted. If you require this part for line production, please contact our OEM Team.

Thorlabs' SAF Gain Chips are designed for use in wavelength ranges centered at 1050, 1220, 1320, 1450, 1550, or 1900 nm. The models designed for 1220, 1320, 1450, or 1550 nm (SAF1175S, SAF1174S, SAF1450S2, SAF1550S2, and SAF1550P2) feature an optical isolator on the fiber output, protecting the chip against back reflections and increasing laser stability.

Each SAF Gain Chip is individually burned in and rigorously tested to ensure long-term stability and compliance with our specifications. For typical performance characteristics, please see the *Specs* tab. A complete test report will come with each serialized gain chip package.

Click the icon below for more detailed performance specifications.

ASE Specifications					
Item #	**Info**	**Center Wavelength (Typ.)**	**3 dB Bandwidth (Typ.)**	**ASE Current**	**Operating Current (Typ./Max)**
SAF1171S		1050 nm	60 nm	150 mA (Max)	- /150 mA
SAF1175S		1220 nm	80 nm	200 mA (Typ.)	200 mA/ -
SAF1174S		1320 nm	80 nm	600 mA (Typ.)	500 mA/800 mA
SAF1450S2		1450 nm	100 nm	500 mA (Max)	-/500 mA
SAF1550S2		1550 nm	80 nm	300 mA (Typ.)	300 mA/600 mA
SAF1550P2		1550 nm	80 nm	300 mA (Typ.)	300 mA/600 mA
SAF1900S		1930 nm	150 nm	400 mA (Typ.)	500 mA/800 mA



Click for Gain Chip Diagram

Part Number	Description	Price	Availability
SAF1171S	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1050 nm, SM Fiber**	**$3,330.40**	**Lead Time**
SAF1175S	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1220 nm, SM Fiber**	**$2,783.04**	**Today**
SAF1174S	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1320 nm, SM Fiber**	**$2,783.04**	**Today**
SAF1450S2	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1450 nm, SM Fiber**	**$2,783.04**	**5-8 Days**

SAF1550S2	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1550 nm, SM Fiber**	**$2,783.04**	**Today**
SAF1550P2	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1550 nm, PM Fiber**	**$2,943.78**	**Today**
SAF1900S	**Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1900 nm, SM Fiber**	**$2,783.04**	**5-8 Days**

SAF1171S - Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1050 nm, SM Fiber

Performance Specs | Chip Specs | Power Spectrum | P-I Curve | ASE Spectrum

Laser Cavity Performance				
Characteristic	**MIN**	**TYP**	**MAX**	**UNIT**
Reference Laser Cavity[a]	Littman Cavity:TLK-L1050M			
Center Wavelength	1040	1050	1060	nm
Tuning Range[b]	45	60	-	nm
Peak Power	5	8	-	mW
Wavelength Tuning Resolution	2	-	-	pm
Tuning Speed	-	-	30	nm/s
Linewidth	-	100	130	kHz
Side Mode Suppression Ratio	45	-	-	dB
Polarization Extinction Ratio	-	-	-	dB
Power Stability (30 s/24 hr)[c]	1/10	-	-	%
Wavelength Stability (30 s/24 hr)[c]	-	-	1/50	pm

a. Different external laser cavities will produce different performance specifications. The data given here is only valid for the specified reference cavity.
b. 10 dB
c. Running open loop, measured using ITC4020 current controller.

ASE Performance (T_C = 25 °C)				
Characteristic	**MIN**	**TYP**	**MAX**	**UNIT**
Center Wavelength	1030	1060	1090	nm
3 dB Bandwidth	30	60	-	nm
Operating Current	-	-	150	mA
Chip Forward Voltage	-	-	2.5	V
Gain Ripple, RMS[a]	-	-	2.5	dB
Power, Front Facet[b]	3	6	-	mW

a. Measured using OSA with 0.1 nm resolution bandwidth
b. Free-space output power

Auto CAD PDF | Auto CAD DXF | Solidworks | eDrawing | Step | Spec Sheet

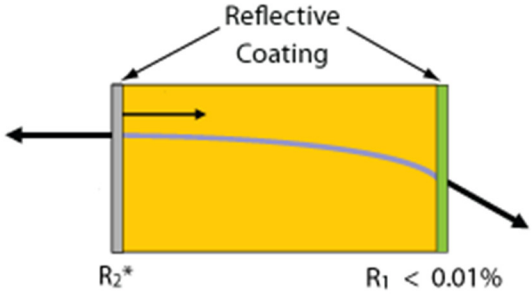
SAF1171S - Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1050 nm, SM Fiber

Performance Specs | **Chip Specs** | Power Spectrum | P-I Curve | ASE Spectrum

Gain Chip Specs (T_{CHIP} = 25 °C)				
Characteristic	**MIN**	**TYP**	**MAX**	**UNIT**
Chip Gain[a]	-	30	-	dB
Angled Facet Reflectivity[b] (R_1)	-	0.005	0.01	%
Normal Facet Reflectivity (R_2)	-	10	-	%
Lateral Beam Exit Angle	-	26.5	-	deg
Transverse Beam Divergence (FWHM)	25	40	55	deg
Lateral Beam Divergence (FWHM)	10	20	35	deg
Operating Current (@ T_{CHIP})	-	-	150	mA
Operating Temperature (Non-Condensing)	-	25	-	°C
TEC Forward Voltage	-	-	3.6	V
TEC Current	-	-	2.1	A
Chip Length	-	1	-	mm
Waveguide Refractive Index	-	3.2	-	-
Astigmatism	-	1	3	µm
Fiber Type	HI1060, 1.5 m Long			
Fiber Connector	FC/APC			
Peak Optical Isolation	-	-	-	dB
Fiber Coupling Efficiency	-	50	-	%

a. Single pass optical gain at center of gain curve.
b. SAF chip reflectivity diagram (see below).

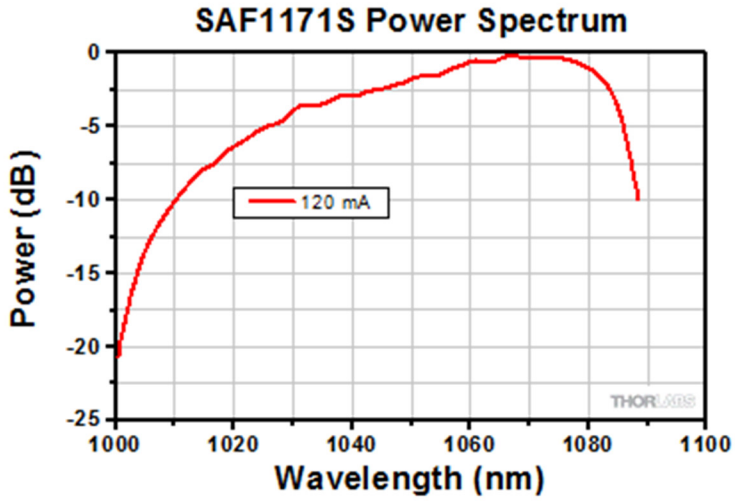
SAF Gain Chip



Auto CAD PDF | Auto CAD DXF | Solidworks | eDrawing | Step | Spec Sheet

SAF1171S - Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1050 nm, SM Fiber

Performance Specs | Chip Specs | **Power Spectrum** | P-I Curve | ASE Spectrum



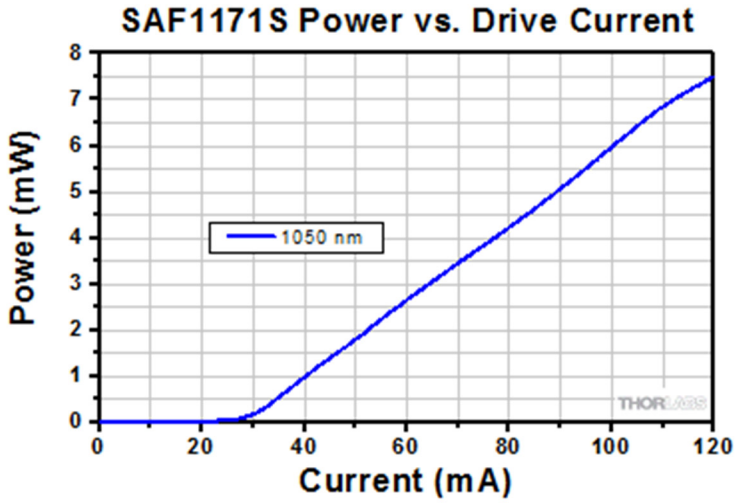
SAF1171S single-angled facet gain chip power spectrum using the Littman tunable laser kit.

To view an excel file that lists all of the measured spectral, P-I, and ASE characteristic values for this laser gain chip, please click here.

Auto CAD PDF | Auto CAD DXF | Solidworks | eDrawing | Step | Spec Sheet

SAF1171S - Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1050 nm, SM Fiber

Performance Specs | Chip Specs | Power Spectrum | **P-I Curve** | ASE Spectrum



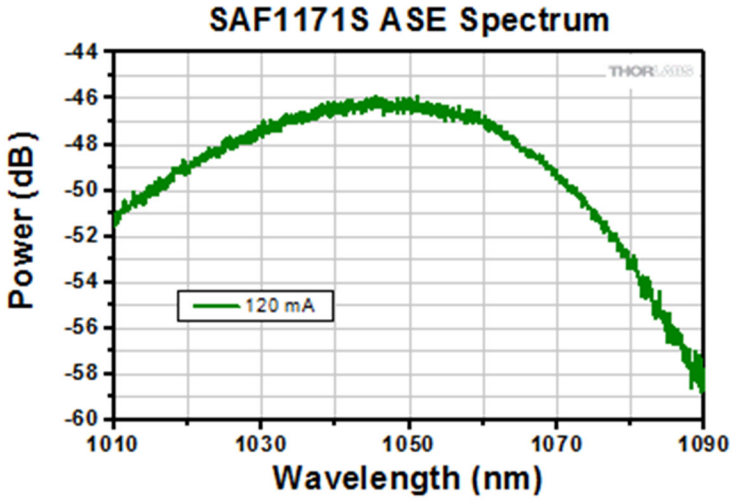
SAF1171S single-angled facet gain chip power vs. drive current using the Littman tunable laser kit.

To view an excel file that lists all of the measured spectral, P-I, and ASE characteristic values for this laser gain chip, please click here.

Auto CAD PDF | Auto CAD DXF | Solidworks | eDrawing | Step | Spec Sheet

SAF1171S - Mounted SAF Gain Chip, Half Butterfly Pkg, CWL = 1050 nm, SM Fiber

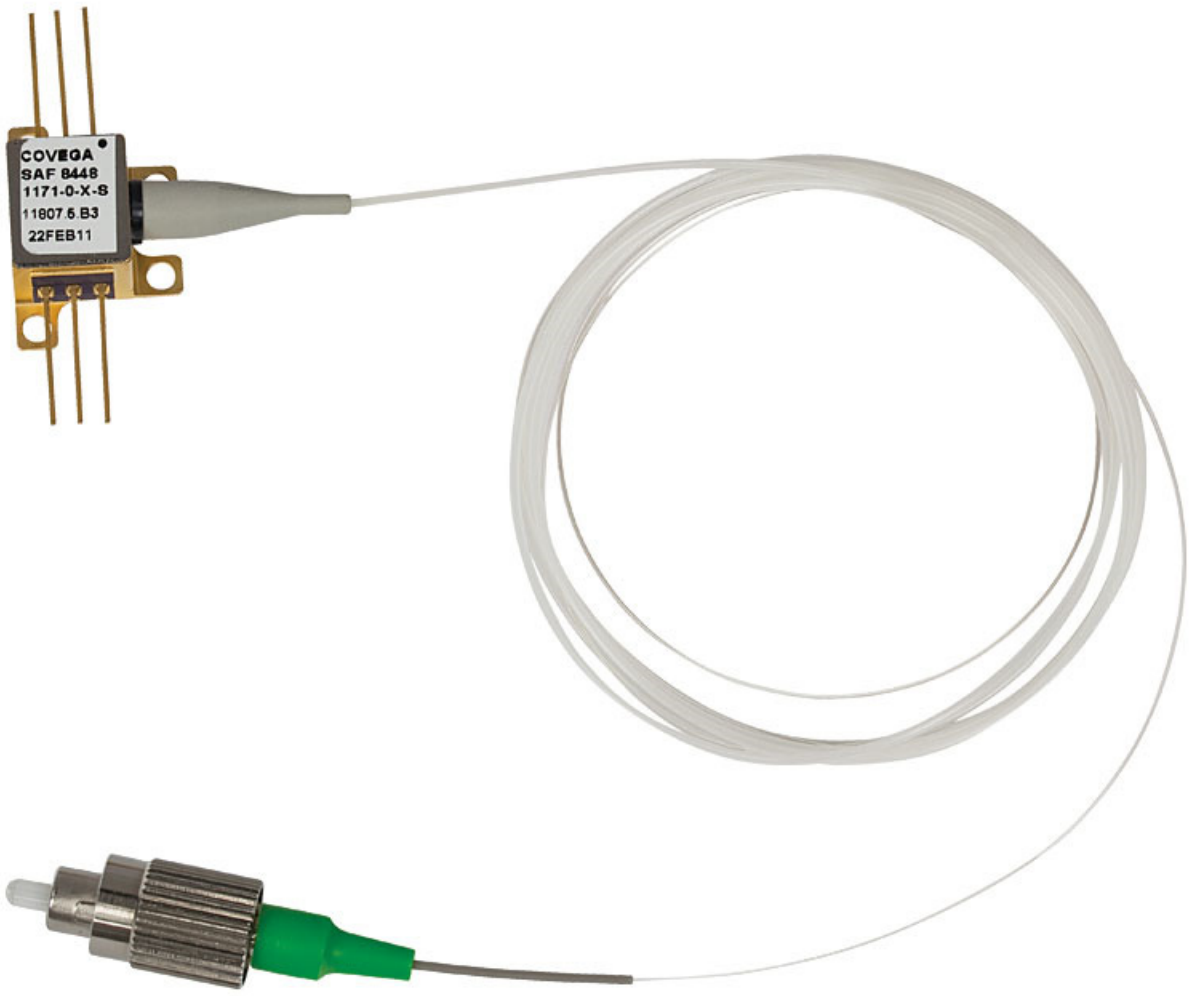
Performance Specs | Chip Specs | Power Spectrum | P-I Curve | ASE Spectrum



SAF1171S single-angled facet gain chip amplified spontaneous emission graph.

To view an excel file that lists all of the measured spectral, P-I, and ASE characteristic values for this laser gain chip, please click here.

Auto CAD PDF | Auto CAD DXF | Solidworks | eDrawing | Step | Spec Sheet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