

## Product Brief — FP4209-C1 InstaTune Fast Random-Access Tunable Laser

### FEATURES

- Rapid arbitrary wavelength switching as fast as 2us/step
- User configurable look-up table (10k points across full tuning range)
- Compact, fully self-contained module
- Interfaced via USB or fast (25MHz) SPI
- Logic output for synchronizing to sweep
- Programmable logic output for synchronizing to each wavelength step (sample window)

### APPLICATIONS

- Test and Measurement
- Fiber Sensing
- Optical Communications

### NOTES

1. Gap-free continuous wavelength tuning range centered about nominal wavelength
2. Case temperature kept at 25°C
3. Power variation across all wavelengths

### OVERVIEW

The FP4209 Fast Random-Access Tunable Laser (InstaTune) is a compact, self-contained tunable laser module capable of emitting any wavelength within the specified range and resolution available. Wavelength switching from any wavelength to any wavelength in as little as two microseconds while fully meeting specifications is supported. The module can be operated in scenarios where a host system is commanding wavelength changes as well as stand-alone where the module deterministically self-steps through a user defined sequence of wavelengths, thus generating an arbitrary waveform. Alternatively, the module can emit a programmable static wavelength. USB and SPI interfaces are provided for configuration and control. An evaluation board is also available.

### SPECIFICATIONS

General Parameter	Value	Unit
Center Wavelength	1547	nm
Tuning Range <sup>1</sup>	40	nm
Absolute Wavelength Accuracy	±15	pm
Wavelength Stability(24hr) <sup>2</sup>	±5	pm
Output Power	≥5	mW
Output Power Flatness <sup>3</sup>	±0.25	dB
Tuning Resolution	Tuning Range / 10k points	nm
SMSR	>30	dB
Wavelength Settling Time	<200	ns
Laser Linewidth	<50	MHz
Fiber Type	PM, Slow-axis aligned to key	
Fiber Connector	FC/ APC	
Case Temperature Operating Range	10°C - 55°C	Non-condensing
Case Temperature Storage Range	-10°C - 70°C	Non-condensing

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### NOTES CONTINUED:

4. Maximum step rate when auto stepping, can dwell on any wavelength indefinitely
5. Portion of step period required for wavelength settling
6. Can be programmed in 10ns steps with the maximum width equal to the step period
7. Varies with case temperature (<100mA at 25°C)
8. Time to set new wavelength when in direct wavelength access mode using USB interface
9. Time to set new wavelength when in direct wavelength access mode using Host SPI interface
10. Time to set new wavelength when in direct wavelength access mode using DAC SPI interface

Sweeping Parameter	Value	Unit
Number Wavelength Steps (min)	1	
Number Wavelength Steps (max)	10000	
Wavelength Step Period (min)	2	us
Wavelength Step Period (max) <sup>4</sup>	655.35	us
Wavelength Settling Time <sup>5</sup>	<200	ns
SweepSync Timing	Active-low pulse generated at the beginning of the specified wavelength sequence	
StepSync Timing <sup>6</sup>	Active-low pulse generated every laser wavelength step.	

Electrical Parameter	Value	Unit
Power		
3.3V Supply Current	200	mA
3.8V Supply Current	1000	mA
5.0V Supply Current <sup>7</sup>	1500	mA
Communication		
Host USB Command <sup>8</sup>	≤1	ms
Host SPI Command <sup>9</sup>	<4	us
DAC SPI Command <sup>10</sup>	<4	us



As part of our policy of continuous product improvement, we reserve the right to change specifications at any time.

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### NOTES CONTINUED:

11. Pin connections that have the same name are shorted inside the module
12. Direct SPI communication for quick wavelength index switching to any of the 10000 points in the LUT. SPI for DAC index communication. First bit is laser enable 1/ disable 0, followed by integer from 0 to 9999.
13. External digital signals SweepSync and StepSync may be used to monitor the sweep operations of the InstaTune using external hardware. The digital interface consists of two output signals whose function is configurable in the register settings.

### PIN ASSIGNMENTS

10 Pin Header			
Pin Name	Pin #	Pin #	Pin Name
VISRC	1	2	VISRC
ISRCGND	3	4	ISRCGND
NC	5	6	NC
PGND	7	8	PGND
VTEC	9	10	VTEC

30 Pin Header			
Pin Name	Pin #	Pin #	Pin Name
DAC FC1 SSELO	1	2	DAC FC1 MOSI
DAC DC1 SCLK	3	4	DAC FC1 MISO
DAC USB DP R	5	6	DAC USB DM R
DAC USB VBUS R	7	8	DAC Trig In
DAC Sweep Sync	9	10	DAC Step Sync
DGND	11	12	DGND
VD3R3	13	14	VD3R3
AGND	15	16	AGND
VA3R3	17	18	VA3R3
Host Alarm	19	20	Host Laser Enable
Host Laser Valid	21	22	Host Mod Valid
Host USB VBUS R	23	24	DGND
Host USB DP R	25	26	Host USB DM R
Host SCLK	27	28	Host MISO
Host SSELO	29	30	Host MOSI