

Product Brief — FP4209-O2 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 Interconnects

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 | 1310 | nm |
| Tuning Range ¹ | 35 | nm |
| Absolute Wavelength Accuracy | ±15 | pm |
| Wavelength Stability(24hr) ² | ±5 | pm |
| Output Power | ≥5 | mW |
| Output Power Flatness ³ | ±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) ⁴ | 655.35 | us |
| Wavelength Settling Time ⁵ | <200 | ns |
| SweepSync Timing | Active-low pulse generated at the beginning of the specified wavelength sequence | |
| StepSync Timing ⁶ | 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 ⁷ | 1500 | mA |
| Communication | | |
| Host USB Command ⁸ | ≤1 | ms |
| Host SPI Command ⁹ | <4 | us |
| DAC SPI Command ¹⁰ | <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 |