# CA-iTLA8600 C Band 89 CH Integrable Tunable Laser Assembly With Dither Function

**Technical Specifications Ver 1.01**
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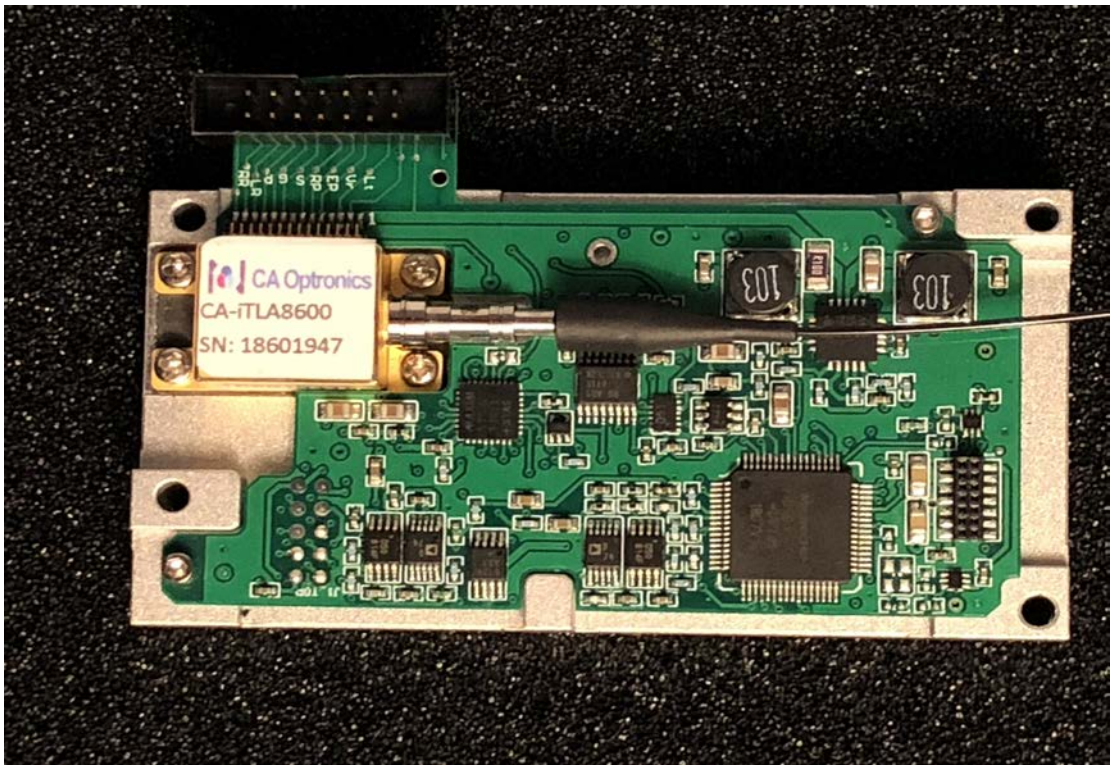


CA Optronics Group INC.

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# CA-iTLA8600 C Band 89 CH Integrable Tunable Laser Assembly

## Description

The CA OPTRONICS GROUP CA-iTLA8600 is a tunable laser assembly compatible with the OIF “Integrable Tunable Laser Assembly” MSA, based on a novel monolithic InP chip that integrates a tunable MG-Y laser with a semiconductor optical amplifier (SOA). The MG-Y (Modulated Grating Y-branch) laser is an electronically tuned device that can address any wavelength in the C-band. Since no mechanical or thermal adjustments are necessary, channel switching is fast with straightforward control circuitry. The SOA facilitates flexible control of the output power and acts as a shutter when reverse biased, enabling dark tuning between channels. The integrated chip has been optimized to improve the power efficiency. The chip is based on advanced InP technology platform, with proven reliability. The devices are packaged into a compact, low-profile hermetically sealed package, with an internal optical isolator and a wavelength locker. The locker monitors both output power and frequency of the light emitted from the front facet of the chip, enabling a closed loop control that guarantees stability of the frequency and output power over life, to within the requirements of 50 GHz ITU grid spacing applications. The assembly contains all electronics necessary to control the laser, offering users a simple and well-defined digital command interface. The CA-iTLA8600 is provided with polarization maintaining fiber for use with an external modulator.

## Features

- OIF “Integrable Tunable Laser Assembly” MSA compatible laser and control electronics assembly
- Full C-band tuning (89 channels at 50 GHz spacing)
- High, flexibly adjustable output power, from 9 to 13 dBm
- Low power dissipation, typically < 3.7 W at 75°C
- High side-mode suppression ratio > 40 dB
- Integral wavelength locker, allowing stabilization to within ±2.5 GHz over life, compatible with 50 GHz ITU grid spacing
- Up to ±5 GHz detuning from ITU grid
- Channel to channel tuning time < 0.1 s
- Dark tuning by reverse biasing the integrated amplifier (> 40 dB suppression)
- FM dither for SBS suppression
- Transmitter trace tone (TxTRACE)
- Polarization maintaining fiber pigtail

## Applications

- Tunable DWDM transponders and transceivers
- Dynamic provisioning and wavelength routing in metro DWDM systems Reconfigurable optical add/drop multiplexers (ROADM)
- Optical packet or burst-mode switching Test and measurement
- DWDM Transmission system

# Specifications

## Optical Performance

| *Parameter* | *Sym* | *Conditions* | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|
| Output power | $P_{max}$ | All channels, $T_C$ = -5°C ... 75°C, BOL | 13 | | | dBm |
| Output power variation over life | AP | Locked operation | -0.5 | | 0.5 | dB |
| Output power adjustment range [1] | | | 4 | | | dB |
| Output power when disabled [2] | | | | | -35 | dBm |
| Lowest emission frequency | $\nu_{min}$ | | 191.15 | 191.70 | | THz |
| Highest emission frequency | $\nu_{max}$ | | | 196.10 | 196.25 | THz |
| Lowest emission wavelength | $\lambda_{min}$ | | 1527.6 | 1528.8 | | nm |
| Highest emission wavelength | $\lambda_{max}$ | | | 1563.9 | 1568.4 | nm |
| Channel spacing | | ITU grid | | 50 | | GHz |
| Number of channels [3] | | Consecutive channels at 50 GHz spacing within the [$\nu_{min}$ ... $\nu_{max}$] range | 89 | | | |
| Frequency accuracy | Av | Locked operation, EOL | -2.5 | | 2.5 | GHz |
| Frequency detuning | | Relative to 50 GHz ITU grid | -5 | | 5 | GHz |
| Frequency tuning time | $t_T$ | | | 0.03 | 0.10 | s |
| Side-mode suppression ratio | SMSR | | 40 | | | dB |
| Optical signal-to-noise ratio | OSNR | 0.1 nm bandwidth | 50 | 55 | | dB |
| Linewidth | LW | Phase noise density meas. | | | 5 | MHz |
| Relative intensity noise | RIN | Average over 0.1 – 10 GHz | | | -140 | dB/Hz |
| Back reflection tolerance | | | | | -14 | dB |
| Optical isolation | | | 40 | | | dB |
| Polarization extinction ratio | PER | | 20 | | | dB |

1. Range over which the output power can be adjusted down from the output power Pmax, while maintaining all other optical specifications.
2. Output power when the optical output is disabled, e.g. while tuning to another channel.
3. Start frequency of the 89 channel range to be specified when ordering.

# Electrical and Thermal Performance

| *Parameter* | *Sym* | *Conditions* | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|
| Operating case temperature | $T_C$ | | -5 | | 75 | °C |
| Positive supply voltage | $V_{CC}$ | | 3.15 | 3.30 | 3.45 | V |
| Positive supply current | $I_{CC}$ | Steady state, $T_C$ = 25°C | | 0.3 | 0.4 | A |
| | $I_{CC}$ | Steady state, $T_C$ = 75°C | | | 1.2 | A |
| Negative supply voltage | $V_{EE}$ | | -5.45 | -5.20 | -4.95 | V |
| Negative supply current | $I_{EE}$ | | | <0.01 | | A |
| Total power consumption | $P_{tot}$ | Steady state, $T_C$ = 75°C | | 3.7 | 4.2 | W |
| Input signal pin voltage, low | $V_{IL}$ | | 0.0 | | 0.8 | V |
| Input signal pin voltage, high | $V_{IH}$ | | 2.0 | | 3.45 | V |
| Output signal pin voltage, low | $V_{OL}$ | $I_{OL}$ = 4 mA | 0.0 | | 0.6 | V |
| Output signal pin voltage, high | $V_{OH}$ | $I_{OH}$ = -4 mA | 2.4 | | $V_{CC}$ | V |
| Power supply noise | | 100 Hz to 20 MHz | | | 1.0 | % rms |

**Dither**

AM dither for transmitter trace tone purposes can be generated by applying an analog signal to pin 14 of the ITLA module, within the limits defined below. A triangular FM dither, typically used to suppress stimulated Brillouin scattering (SBS), is generated internally within the ITLA module when the Dither register is set to 0x0012.

| *Parameter* | *Sym* | *Conditions* | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|---|
| AM dither input impedance | | | | | 10 | pF |
| | | | 10 | | | kΩ |
| AM dither amplitude | A | Sinusoidal, peak to peak, relative to average output power | | | 10 | % |
| AM dither input voltage | $V_{AM}$ | Sinusoidal, peak to peak | | | 2.5 | V |
| AM dither gain | | | | 4 | | %/V |
| AM dither frequency range | $f_{AM}$ | | 10 | | 3000 | kHz |
| FM dither amplitude | F | Triangular, peak to peak | 0.1 | | 1.0 | GHz |
| FM dither frequency range | $f_{FM}$ | | 10 | | 50 | kHz |

# Fiber Connection

| *Parameter* | *Comments* | *Min* | *Typ* | *Max* | *Unit* |
|---|---|---|---|---|---|
| Fiber type | Polarization maintaining single-mode fiber [1] | | | | |
| Fiber length | | 0.9 | 1.0 | 1.1 | m |
| Mode field diameter | | 9.5 | 10.5 | 11.5 | µm |
| Fiber cladding diameter | | 122 | 125 | 128 | µm |
| Fiber polymer coating diameter | | 380 | 400 | 420 | µm |
| Fiber outer jacket diameter | Loose tube | | 900 | | µm |
| Polarization orientation | Parallel to slow axis of PM fiber | | | | |
| Fiber bend radius | | 20 | | | mm |
| Fiber proof strength | | 200 | | | kpsi |
| | | 1.38 | | | GPa |

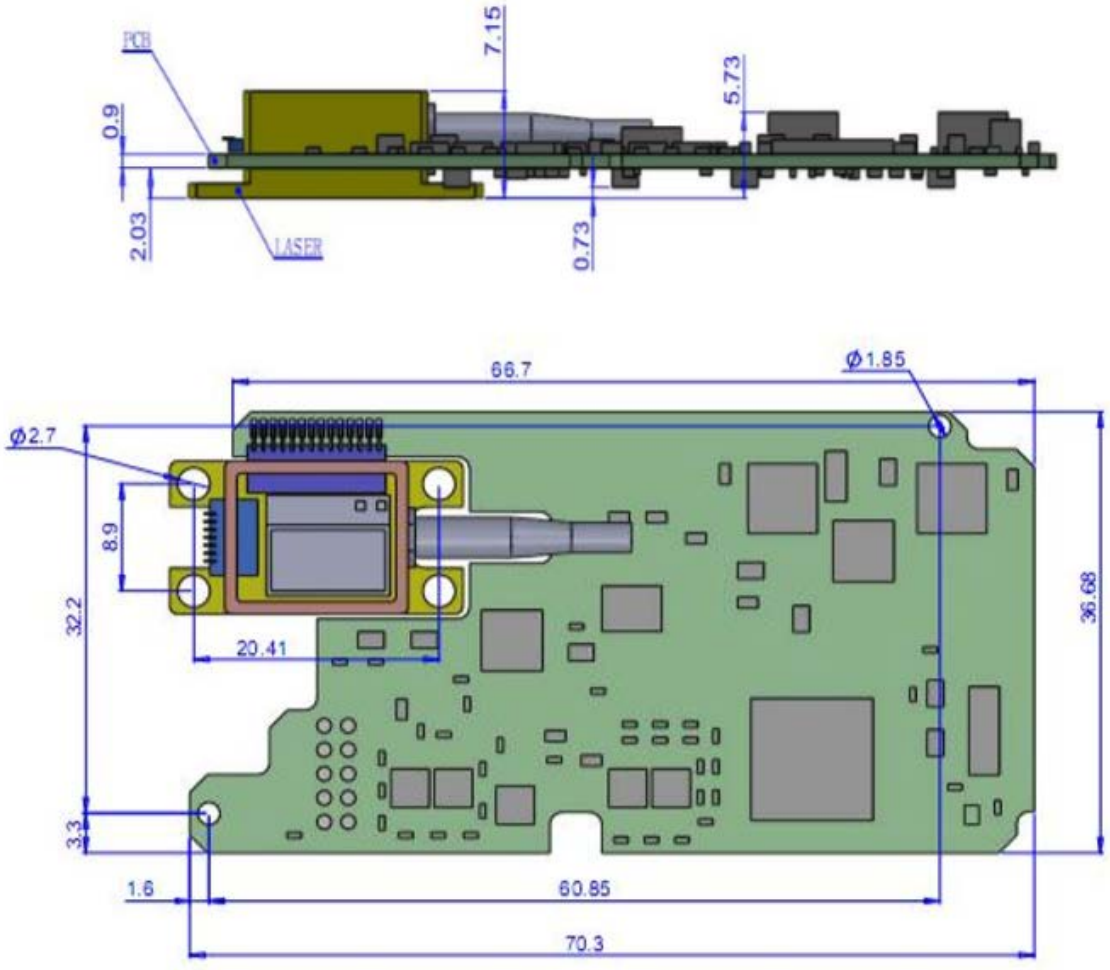
1. Fujikura SM15-PS-U40A-H PANDA or equivalent.

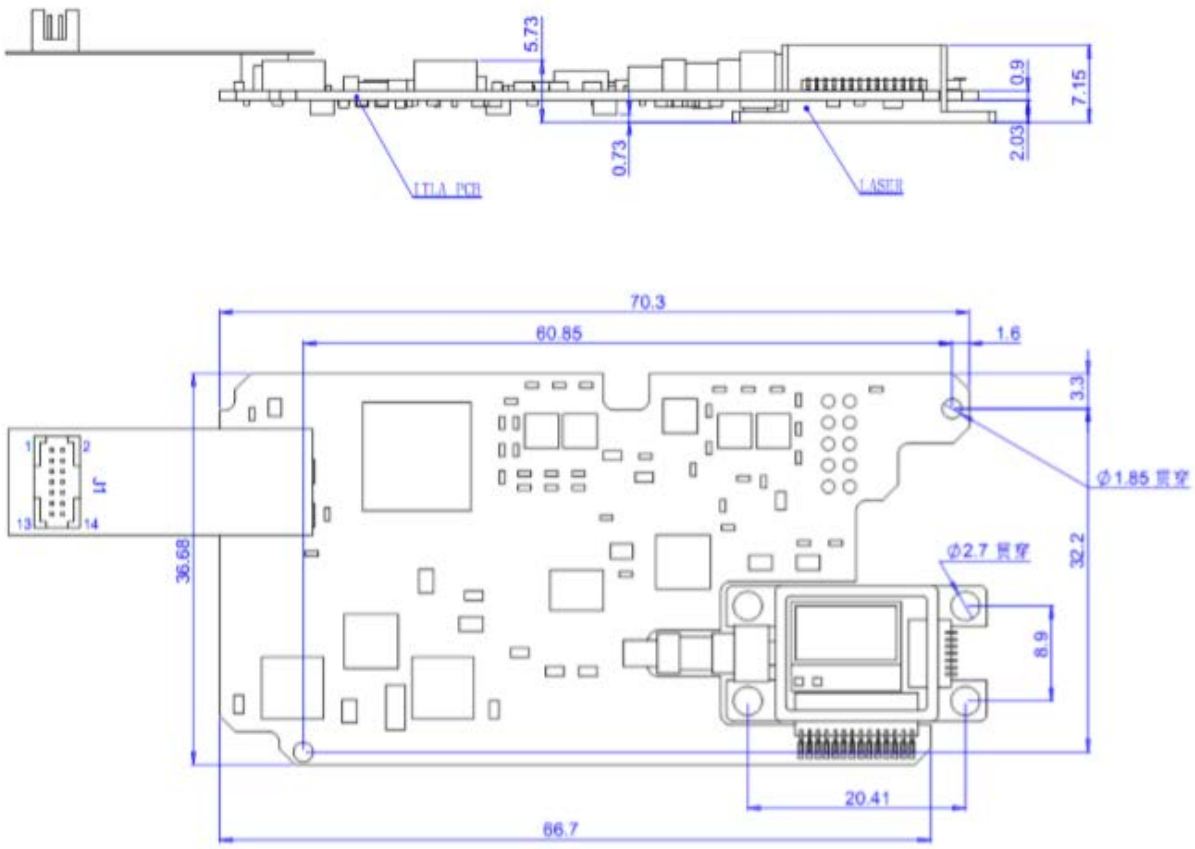
# Absolute Maximum Rating

| *Parameter* | *Sym* | *Conditions* | *Min* | *Max* | *Unit* |
|---|---|---|---|---|---|
| Storage temperature range | | | -40 | 85 | °C |
| Signal pin voltage | | | -0.3 | 3.6 | V |
| +3.3 V supply pin voltage | $V_{CC}$ | | -0.3 | 3.6 | V |
| -5.2 V supply pin voltage | $V_{EE}$ | | -5.7 | 0.5 | V |

# Mechanical Package

For ITLA with PN: CA-iTLA8600 Dimensions are in millimeters. General tolerances are ±0.13 mm. Mounting holes are M2 tapped holes






# Pin Assignment

| *Pin #* | *Function* | *Pin #* | *Function* |
|---|---|---|---|
| 1 | $V_{CC}$ = +3.3 V | 2 | DIS* |
| 3 | $V_{CC}$ = +3.3 V | 4 | SRQ* |
| 5 | GND | 6 | MS* |
| 7 | GND | 8 | TxD |
| 9 | $V_{EE}$ = -5.2 V | 10 | RxD |
| 11 | $V_{EE}$ = -5.2 V | 12 | RST* |
| 13 | OIF reserved | 14 | AM dither (TxTRACE) |

**Pin Functions**

| Pin Functions<br>Pin Numbers | Symbol | Type | Name | Description |
|---|---|---|---|---|
| 5,7 | GND | Power | Ground | Ground<br>**Note**: Ground pins are tied together internally to the module. |
| 1,3 | PS+3.3V | Power | +3.3V Supply | 3.3V Power Supply<br>**Note**: Pins are tied together internally to the module. |
| 9,11 | PS-5.2V | Power | -5.2V Supply | -5.2V Power Supply<br>**Note**: Pins are tied together internally to the module. |

| | | | | |
|---|---|---|---|---|
| 12 | RST* | LVTTL input, active low | Reset | Purpose: Disables laser output and holds the module in RESET Initial State: Any – user application specific Action: Laser OFF, TEC OFF, Module CPU held in RESET, Communication protocol is OFF Resultant State: High, Must remain high for laser to operate Attributes: When active, lowest current draw from the module |
| 2 | DIS* | LVTTL input, active low | Disable module's optical output | Purpose: Provide hardware control to kill laser output. Initial State: Any – user application specific Action: High = laser output controlled by protocol; Low = laser output OFF Resultant State: When DIS* asserted, communication protocol is ON, software enable (SENA) reset. Attributes: Bypasses communication protocol to turn laser OFF. Re-enabling of the laser requires setting SENA. Otherwise does not interfere with module settings |
| 4 | SRQ* | LVTTL output, active low | Programmable module service request | Purpose: General purpose service request. Initial State: High (No service requested) Action: Generates request for service as required to report a variety of conditions by setting line low. SRQ* is asserted when the result of the status (0x20,0x21) OR'd with SRQT trigger (0x28) is non-zero. Resultant State: ·Communication protocol is ON ·SRQ* conditions can be read and cleared through interface Attributes: SRQ conditions (and limits) are software configurable and can be re-configured by the user through the interface. Status bits must be cleared to de-assert SRQ*. |
| 6 | MS* | LVTTL input, active low-high transition | Module IO Select (Reset communicatio ns interface) | Purpose: Provide hardware control to reset physical interface Initial State: Any – user application specific Action:High or LOW = No effect; Low to High transition – Reset communications interface, clear input buffers, terminate current packet Resultant State: Communication can be commenced upon deassertion with a new packet. Attributes: Provides ability to reset communications interface |
| 8 | TxD | LVTTL output | Module's Transmit Data | Purpose: Transmit outbound packets from module |
| 10 | RxD | LVTTL input | Module's Receive Data | Purpose: Receive inbound packets from host |
| 13 | OIF Reserved | LVTTL input | OIF Reserved | No user connection Purpose: Provide for possible future expansion of communications interfaces |
| 14 | AM dither | 2.5V p-p sinusoidal, analog inpu | Dither amplitude analog signal | Purpose: Provide trace tone capability. AC coupled inside ITLA. Pull down to ground if not used. |

# Operate:

1. According to the above pin definition to connect the hardware，which includes VCC, GND, TXD (TTL), RXD (TTL), and other signals.
2. According to OIF-ITLA-MSA-01.2 Standard protocols and validation method, Through the UART to control the ITLA module, the details please reference OIF-ITLA-MSA-01.2standard protocols

# Order Information

PN: CA-iTLA8600 Description: Tunable laser assembly, 89 channels at 50 GHz spacing from 191.70 THz to 196.10 THz, 13 dBm output power, 900um loose tube single mode fiber pigtail with FC test plug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Product specifications and descriptions in this documentation subject to change without notice.