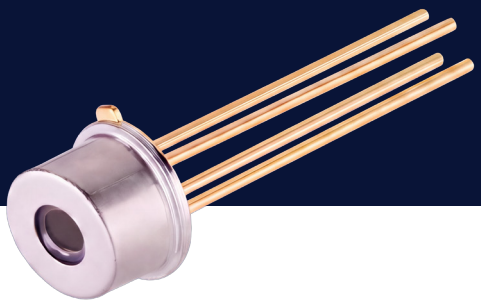
IMM photonics

Single Mode VCSEL 850 nm
Integrated TEC + NTC



IMV-2-850-PL-TO46-TEC

850 nm polarization-locked single-mode VCSEL with integrated TEC and NTC in compact TO46 package

APPLICATIONS

- Absorption spectroscopy & wavelength-selective sensing
- Particle sizing & concentration by optical scattering
- Interferometric displacement / thickness sensing
- Reference-light sources in analytical instruments
- FTIR (Fourier Transform Infrared Spectroscopy)
- Polarimetry & birefringence measurement

FEATURES

- Single-mode, polarization-locked 850 nm emission
- TEC-stabilized wavelength and optical power
- VCSEL Chip by COHERENT
- High SMSR
- Hermetically sealed compact TO46 package
- Low electrical power consumption
- Integrated miniature TEC + NTC
- Up to ~3 nm combined wavelength tuning
- AR-coated window
- RoHS compliant / Made in Europe

ABSOLUTE MAXIMUM RATINGS

PARAMETER	MAX RATINGS	UNIT	CONDITIONS
Continuous operating current	6	mA	VCSEL
Continuous reverse voltage	6	V	VCSEL
Maximum TEC current	600	mA	TEC component limit
Maximum TEC voltage	1.9	V	at hot-side temperature 85°C
PCB solder or reflow temperature	+260	°C	max. 10 seconds

Storage temperature: -20°C to +105°C **Operating temperature: -20°C to +85°C**

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PRELIMINARY ELECTRO-OPTICAL CHARACTERISTICS (MEASURED IN TO46)

PARAMETER	RATINGS MIN	TYP	MAX	UNIT	CONDITIONS
Emission wavelength (λ_R)	840	850	860	nm	I = 3 mA, TEC/device T = 25°C
Threshold current (I_{th})		1	2	mA	TEC/device T = 25°C
Optical output power (P_{opt})		1.5	2	mW	I = 3 mA, TEC/device T = 25°C
Operating laser current (I_{op})		3.0	4	mA	Nominal operating point
Laser Voltage (U_{op})	1.7	1.9	2.3	V	I = 3 mA
Wall-plug efficiency (WPE)	23	26	27	%	I = 3 mA; VCSEL electrical power only
Slope efficiency (nS)	0.67	0.70	0.72	W/A	T= 25°C, Ith1.2–3.0 mA
Differential series resistance (RS)	100	101	102	Ω	Around 3 mA operating point
3 dB modulation bandwidth (3dB)	8		GHz		
Wavelength tuning over current	0.25	0.29	0.32	nm/mA	1–4 mA, TEC / NTC setpoint 25°C
Wavelength tuning over over temperature	0.06	0.065	0.07	nm/K	Controlled device temperature, 20–40°C
Combined wavelength tuning capability	-	~2.1	~3.0	nm	Combined thermal + current tuning; engineering range
Side-mode suppression ratio (SMSR)	37	39	41	dB	I = 3 mA, TEC/device T = 25°C
Polarization extinction ratio (PER)	14	16	19	dB	TEC/Device T = 25°C, Opertaing Temp. range -20°C to +85°C
Polarization direction stability			0	flips	
Accuracy of polarization direction*1 (δpol)	-15		+15	deg	T = +25°C, Pop= 0.7 to 2 mW
Beam divergence (θ)	11	13	17	deg	T = +25°C, Pop= 1.5 mW
Spectral FWHM*2	0.12	0.18	0.25	nm	
TEC current (I_{TEC})	-		600	mA	Maximum TEC current
TEC voltage (U_{TEC})	-		1.9	V	Maximum at hot-side T = 85°C
TEC (ΔTmax)	-	69	82	K	69 K @ 27°C; 82 K @ 85°C hot-side
TEC cooling capacity (Qmax)	-	0.56	0.67	W	0.56 W @ 27°C; 0.67 W @ 85°C hot-side
NTC thermistor resistance @25°C (RNTC,25)	9.7	10.0	10.3	kΩ	Installed thermistor: 10 kΩ ±3%
NTC Beta value (B25/85)	3851	3930	4009	K	Installed thermistor: 3930 K ±2%

NTC measured reference points: 24.47 kΩ @ 5°C | 15.42 kΩ @ 15°C | 10.01 kΩ @ 25°C | 6.66 kΩ @ 35°C | 4.51 kΩ @ 45°C.
*1 Polarization direction relative to the chip
*2 Spectrometer resolution 0.06 nm

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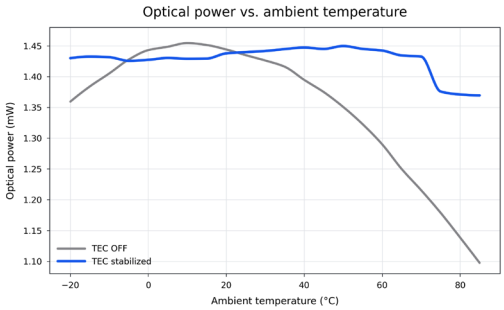
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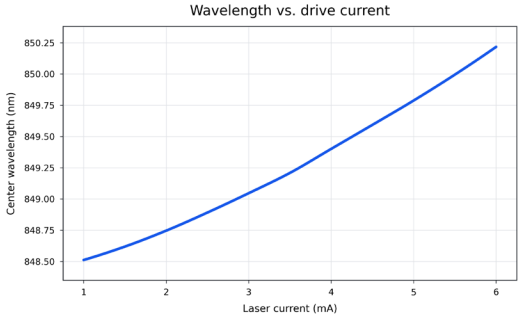
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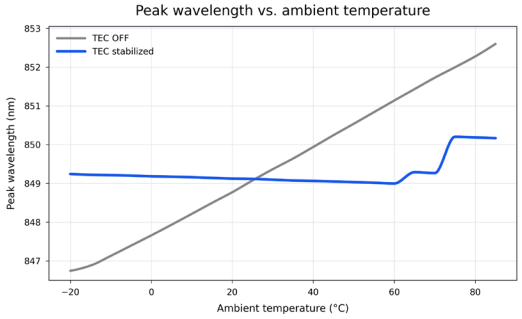
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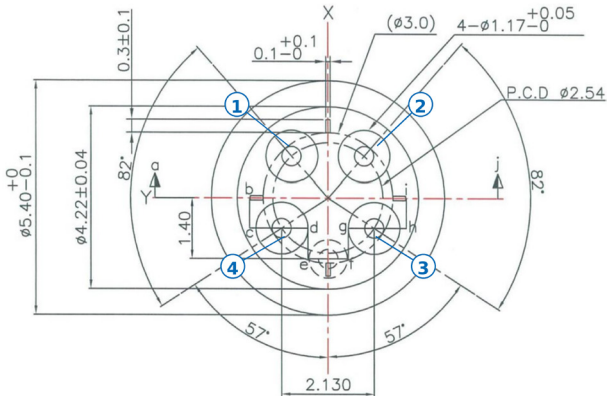
TYPICAL CHARACTERISTIC CURVES

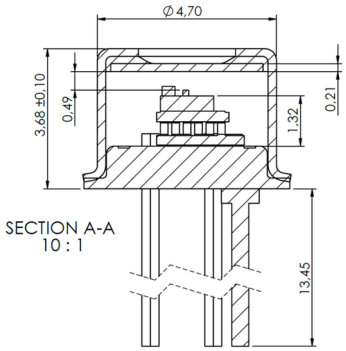






TO DIMENSIONS / PIN ASSIGNMENT





PIN ASSIGNMENT

1 NTC / Thermistor Lead 2
2 VCSEL Anode
3 TEC+
4 TEC−
Case VCSEL Cathode / NTC Lead 1 (common cathode)

Case = common VCSEL cathode / NTC Lead 1.

NOTES

Compliant with RoHS-requirements (2011/65/EU from June 8, 2011).

The above product specifications are preliminary and subject to change without notice. TEC stabilization strongly reduces wavelength and optical-power drift versus ambient temperature. Release 11/2026

WE LOOK FORWARD
to solving your challenge

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