Datasheet of 25Gb/s 850nm VCSEL chip

Part Number: 1104-0501XX
Doc Number: 1102-220101-01
Ownership: Components Department

Rev	Date	Description	Originator
1	2020-02-22	Initial Release	Patrick Chen

Product Description:

The chip is an 850nm top-contact, high-speed, GaAs-based Vertical Cavity Surface Emitting Laser (VCSEL), which is designed for uncooled digital applications, including 25G and 100G Ethernet, Fiber Channel and Datacenter applications.

Absolute Maximum Ratings:

Parameter	Symbol	Value	Unit	Condition
Storage Temperature	T_{st}	-40 to 90	°C	
Case Operation Temperature	T_{op}	0 to 85	°C	
Lead Solder Temperature	T_{solder}	260 °C for 10sec	°C	
Continuous Optical Power	P_{max}	8	mW	Estimated
Laser Diode Reverse Voltage	V_r	-5	V	
Laser Diode Continuous Bias Current	I_{max}	12	mA	Estimated
ESD Susceptibility (HBM)	ESD_{HBM}	100	V	Estimated

Electrical and Optical Characterizations: (T=25C unless otherwise noted)

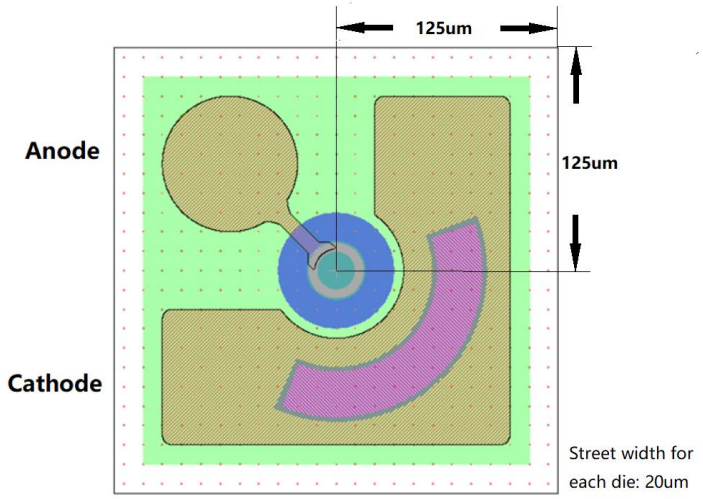
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Operation Temperature	T_{op}	0		85	°C	
Wavelength	λ	840	850	860	nm	CW, I_{op}=6mA, 0 to 85 °C
Output Power	P_{out}	1.5	2	4.0	mW	I_{op}=6mA, 0 to 85 °C
Threshold Current	I_{th}		0.7	1.6	mA	0 to 85 °C
Slope Efficiency	SE	0.25		0.45	mW/mA	I=I_{th}+1mA, 0 to 85 °C
Series Resistance	R_s	50		85	Ω	I_{op}=6mA, 0 to 85 °C

Spectral Width	Δλ			0.65	nm	I_{op}=6mA, 0 to 85 °C
Temperature Dependence	Δλ/ΔT		0.06		nm/ °C	
Beam Divergence	θ		28	33	Degree	I_{op}=6mA, 0 to 85 °C, full width 1/e^2
Relative Intensity Noise	RIN		-130	-125	dB/Hz	I_{op}=6mA, 0 to 85 °C
Resonance Frequency	f_r	18			GHz	I_{op}=6mA, 0 to 85 °C
S21 3dB Bandwidth	BW	12.5	15		GHz	I_{op}=6mA, 0 to 85 °C

Reliability Specification (Preliminary):

- End of Life Criteria: ΔP > 10% @ Iop=6mA, 85C
- Reliability Requirement: >20 years lifetime at 55C operation
- Reliability Test Form Factor: TO-Can
- Product Qualification (post Burn-in):
  - 3 wafers from 3 different process runs, SS=50/wafer for each step of HTOL/THB/THS
  - HTOL Condition: 85C/12mA for 5000 hours
  - THB: 85C/85%RH, 0.2A bias, 500 hours
  - THS: 85C/85%RH, no bias, 500 hours
- Wafer Qual Condition (post Burn-in):
  - Wearout: 85C/12mA for 500 hours, SS=30/wafer
  - THS Condition: 85C/85%RH, unbiased, 24 hours
- Burn-in Condition: 100C/10mA for 24 hours
- ORT (Ongoing Reliability Test): To be determined
- ESD Threshold: HBM, CDM, MM (to be measured)

Geometric Dimensions:



Parameter	Dimensions

Die Length	250 µm+/-20um
Die Width	250 µm+/-20um
Die Thickness	150 µm+/-10um
Aperture Diameter	7 µm+/- 0.5 µm
Anode Bond Pad Diameter	70 µm
Street width	40 µm, die to die

Related Documentations:

Documentation	**Doc Number**
Epi Structure	1102-210001-01
Process Flow	
Test Specification	
Visual Inspection Specification	