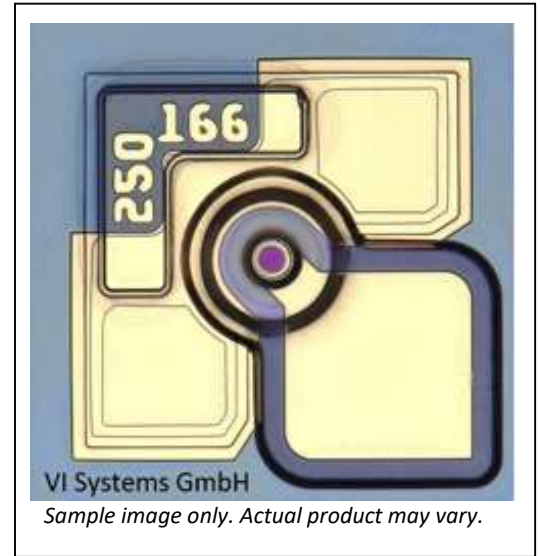


### 56 Gbit/s VCSEL (850 nm)

### Contact type: GS/SG

#### Product Code:

VM50-850-C1	1x1
VM50-850-C4	4x1
VM50-850-C12	12x1



### Product Description

These compact and very high modulation rate top-emitting GaAs-based vertical cavity surface emitting laser (VCSEL) chips and 1xN (N=4,12) arrays are available as engineering samples for use in the development and evaluation of optical interconnections, optical backplanes and integrated waveguides, and next-generation optical data communications systems. The VCSELs are contacted on the top-surface individually using ground-source (GS) microprobes, wire bonds, or flip-chip bonds.

Optical aperture: ~5-7 $\mu$ m

#### Features

- 4-ch or 12 chip arrays
- Up to 56 Gbit/s per channel
- Device-to-device pitch of 250  $\mu$ m
- Suitable for wire or flip-chip bonding

#### Applications

- Ethernet
- Proprietary optical interconnects
- Active Optical Cables (AOC)
- Short-reach 25G and 100G Ethernet

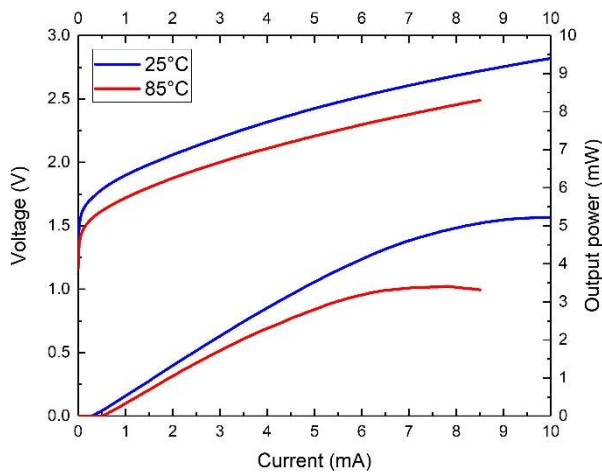
Parameter	Typical	Notes
Emission wavelength	850 nm	
Data rate	~56 Gbit/s	PAM-4
Threshold current	~ 0.5 mA	
Peak output power	~3 mW @85°C	

### Electro-Optical Specifications (T = 0 to 85°C)

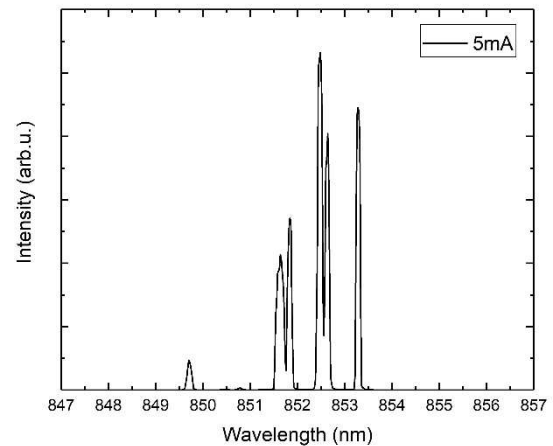
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Emission wavelength	$\lambda$		840		860	nm
Maximum data rate	BR			25	28	GBaud/s
Optical bandwidth	BW (f3dB0)			18	20	GHz
Slope efficiency	$\eta$	5 mA	0.3		0.5	W/A
Threshold current	I <sub>th</sub>	25-85°C			0.8	mA
Differential resistance	R <sub>d</sub>	5 mA		80	100	$\Omega$
Beam divergence	$\Theta$	FWHM		20		°
Peak output power	P <sub>max</sub>			3	5	mW
Spectral bandwidth (RMS)	$\Delta\lambda_{RMS}$	5 mA		0.6	0.8	nm

\*anti-reflection coating is optimized for <1% reflectivity within the range 840 nm - 960 nm

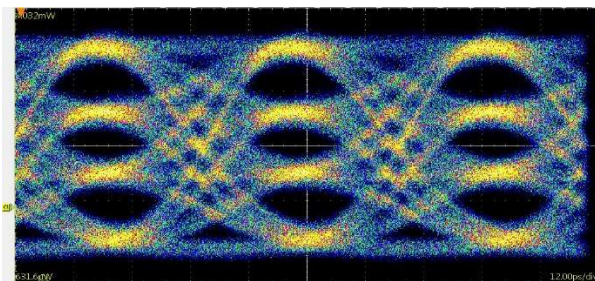
### LIV Characteristics



### Optical Spectrum

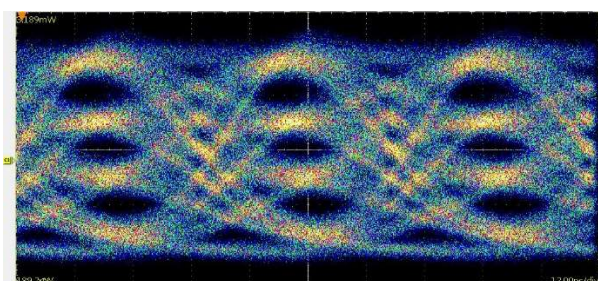


### 50 Gbit/s PAM4 25°C 6 mA 500 mVpp



OMA 1.63 mW

### 50 Gbit/s PAM4 85°C 6 mA 500 mVpp

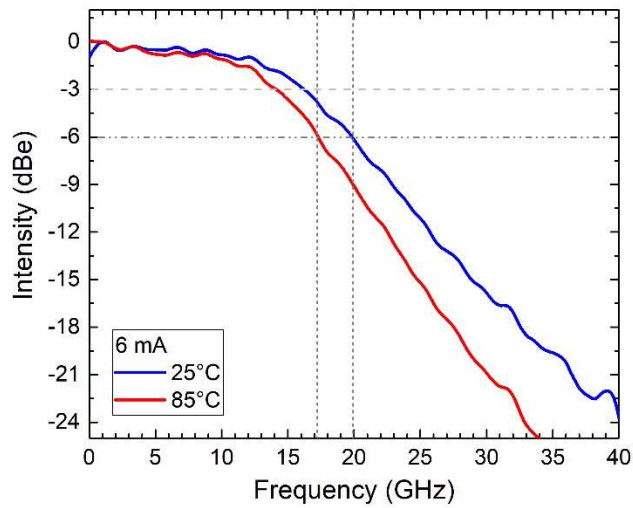


OMA 1.6 mW

Transmitter: SHF BPG 12104A. Receiver: Tektronix DSA8300 w. 80C15 Optical Sampling Module.

**Eye diagrams show intrinsic performance of the chip. No equalization or signal processing was applied.**

### Frequency response (electrical)



### Absolute Maximum Ratings

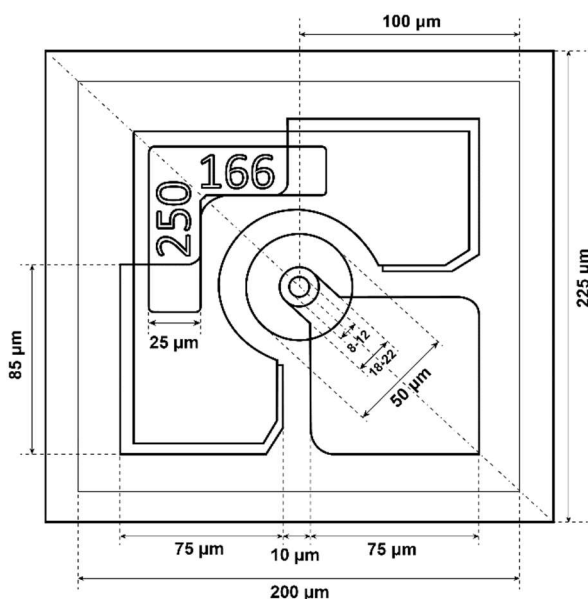
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Peak forward current	$I_f$				9	mA
Maximum reverse voltage	$V_{rv}$				5	V
Operating temperature	$T_{op}$				85	°C
Storage temperature	$T_{st}$		-40		100	°C
Soldering temperature	$T_{sl}$	max 260 sec			150	°C

Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate irreversible damage to the component even if all other parameters are within the electro-optical specifications. Exposure to any of the Absolute Maximum Ratings for extended periods can adversely affect the reliability of these chips.

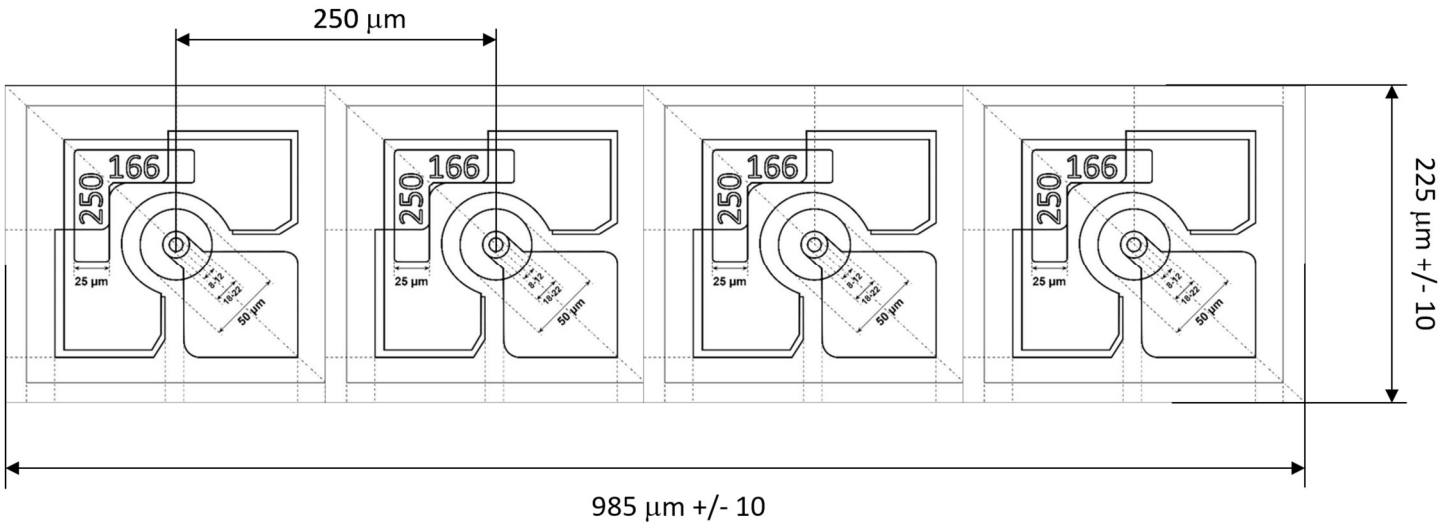
### Mechanical Dimensions

Parameter	Type	Min	Typ	Max	Unit
VCSEL pitch	All		250		$\mu\text{m}$
Length 1x1 VCSEL chip	VM50-850-C1		215	250	$\mu\text{m}$
Length 1x4 VCSEL array	VM50-850-C4		975	1000	$\mu\text{m}$
Length 1x12 VCSEL array	VM50-850-C12		2960	3000	$\mu\text{m}$
Height	All	140	150	160	$\mu\text{m}$
Width	All		210	250	$\mu\text{m}$

### Dimensions

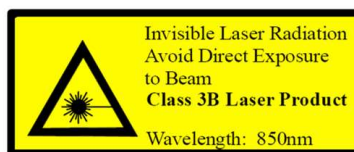


### VM50-850-C4 Array dimensions



### Qualification Notification

The VM50-850-Cxx has been qualified to meet the specifications outlined in this data. A reliability assessment report is available as a separate document. However, it has not undergone full qualification testing or characterization and therefore may not meet the performance specifications over all extremes. Preliminary reliability assessment can be provided upon request.



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