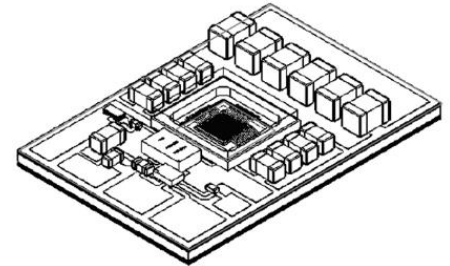


V00159

**Assy; 2222; 940; M; 3M; Z10x44-4; 10W;
1.99x1.99; VCSEL EVAL MODULE**



Applications

- LiDAR
- Time of Flight
- 3D Scanning
- Gesture Recognition
- Augmented Reality, Mixed Reality

Features:

- Package Description: VCSEL Driver Module
- Chip Technology: GaAs VCSEL
- Laser Wavelength: 940 nm
- Optical Power Class: 10 W
- Protective A/R Coated Optical Window
- Radiation Profile: 16 deg FWHM
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)

Ordering Information

Description	Operating Mode:	Ordering Code
Assy; 2222; 940; M; 3M; Z10x44-4; 10W; 1.99x1.99; VCSEL EVAL MODULE	T _a = 25°C; t _p = 50 ns; DC = 1%	V00159



COMPLIES WITH IEC 60825-1, 3rd EDITION MAY 2014.
COMPLIES WITH 21 CFR 1040.10 AND 1040-10.11 EXCEPT FOR DEVIATIONS PURSUANT TO LASER
NOTICE NO.50 DATED 27 MAY 2001.

Maximum Ratings ¹⁾ $T_a = 25^\circ\text{C}$

Parameter	Symbol		Values
Operation/Solder Temperature DC = 100%	T_S	min.	-40 °C
		max.	105 °C
Storage Temperature	T_{stg}	min.	-40 °C
		max.	120 °C
Forward Current Pulsed Operation; $t_p = 50$ ns; DC = 1%; $T_S = 25^\circ\text{C}$	I_f	max.	130 A
Supply Voltage	V_{dd}	max.	10 V
5V Supply Voltage	V_{cc}	max.	5.75 V
LVDS Input Pulse Voltage	V_{in}	max.	$V_{cc} + 0.3$ V

Note: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device.

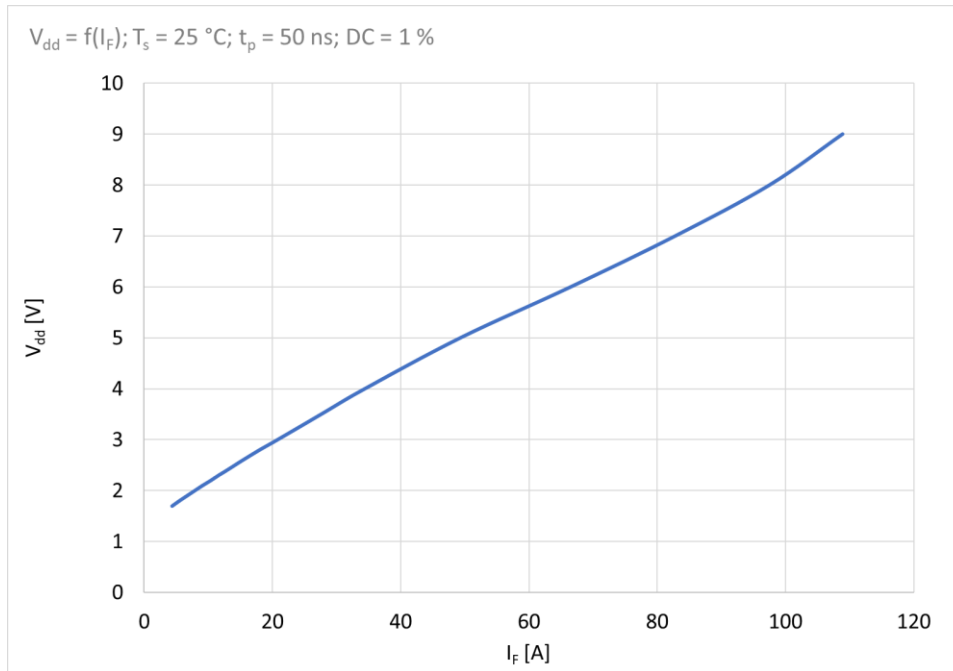
Characteristics (VCSEL and FET) ³⁾ $T_a = 25^\circ\text{C}$, $t_p = 50$ ns; DC = 1%; $V_{cc} = 5$ V; $V_{dd} = 9$ V

Parameter	Symbol		Values
Peak Pulsed Current	I_p	typ.	110 A
Optical Operating Power	L_{op}	typ.	80 W
Operating Peak Wavelength	WL_{peak}	min.	930 nm
		typ.	940 nm
		max.	950 nm
RMS Spectral Width	WL_{width}	typ.	3 nm
Optical Rise Time ⁰		typ.	12 ns
Optical Fall Time ⁰		typ.	2 ns
Beam Divergence	FWHM	typ.	18 deg
Beam Divergence	$1/e^2$	typ.	22 deg
ESD Rating (HBM) <small>Error! Reference source not found.</small>		typ.	2 kV

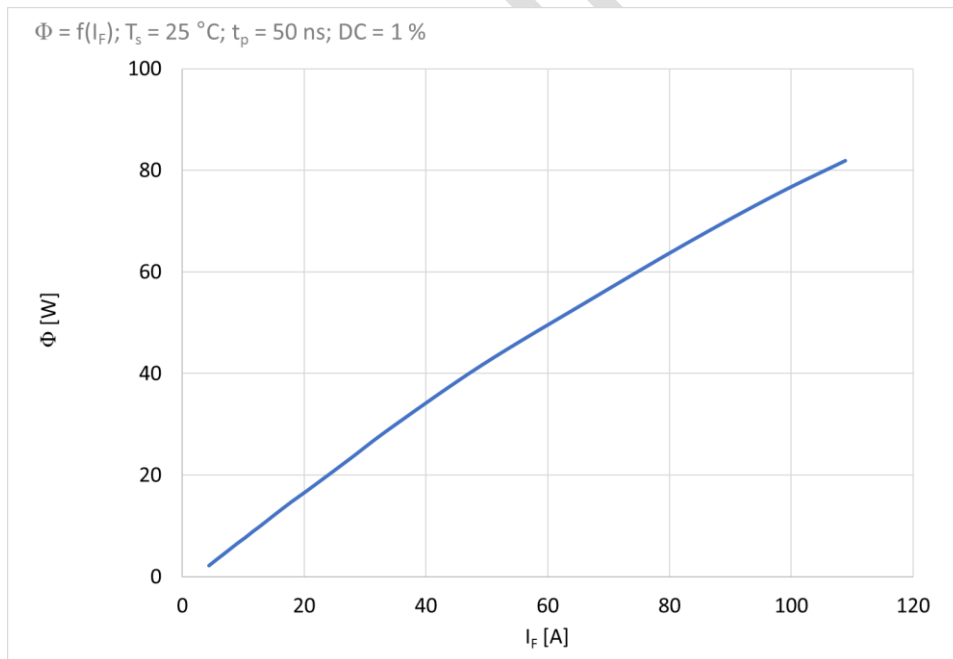
Characteristics (LVDS Input and Gate Driver) $T_a = 25^\circ\text{C}$

Parameter	Symbol		Values
V _{CC} Operating Voltage	V _{CC}	min.	4.75 V
		typ.	5.0 V
		max.	5.4 V
LVDS Input Operating Voltage	V _{in}	min.	0 V
		max.	V _{CC} V
Propagation Delay	t _d	typ.	TBD
Over Temperature Shutdown	T _{OTP}	typ.	170 °C
Over Temperature Hysteresis	T _{OTP}	typ.	18 °C
LVDS Input High Threshold	V _{IH}	min.	1.7 V
		max.	2.6 V
LVDS Input Low Threshold	V _{IL}	min.	1.1 V
		max.	1.8 V
LVDS Input Pull Down Resistance	R _{IN}	min.	100 kΩ
		typ.	150 kΩ
		max.	250 kΩ
Startup Time	t _{start}	typ.	50 μs
		max.	80 μs
Shutdown Time	t _{shutdown}	min.	1 μs
		typ.	5 μs
		max.	7 μs

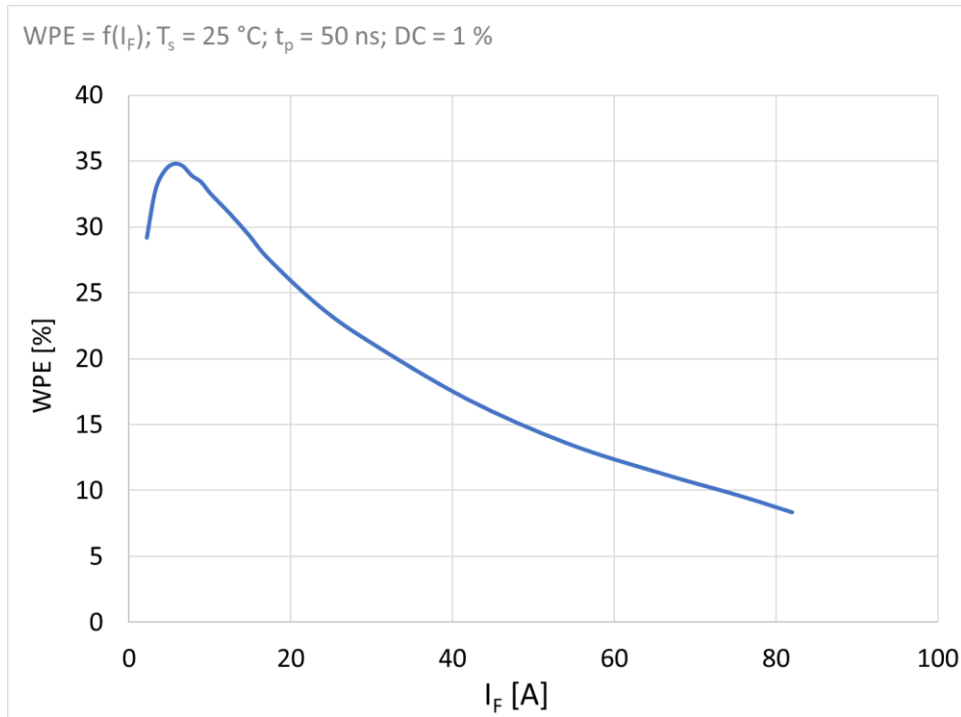
Operating Voltage ³⁾



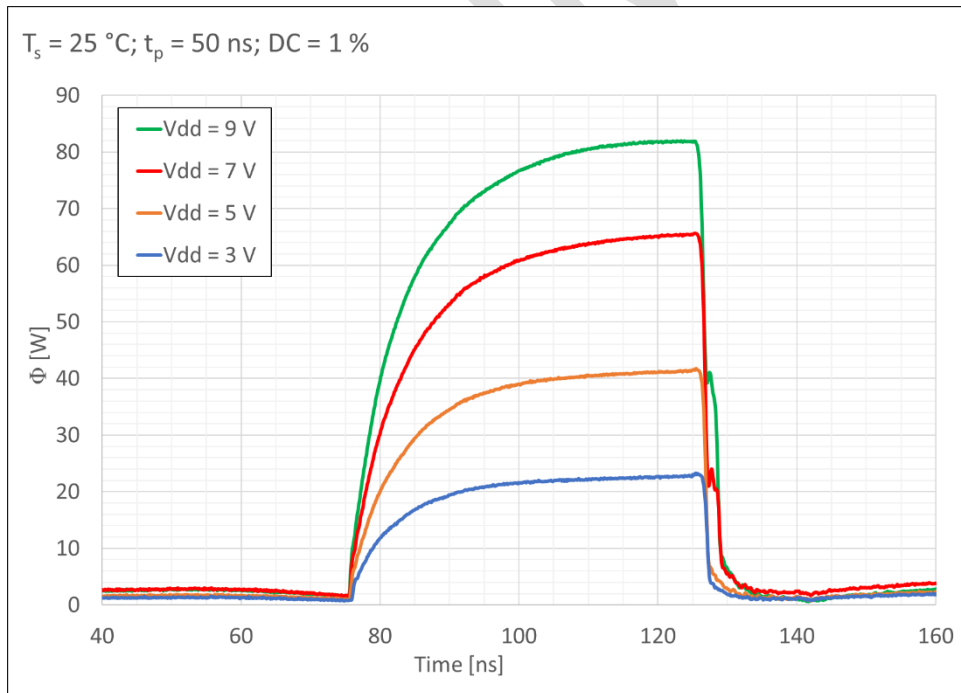
Optical Output Power ³⁾



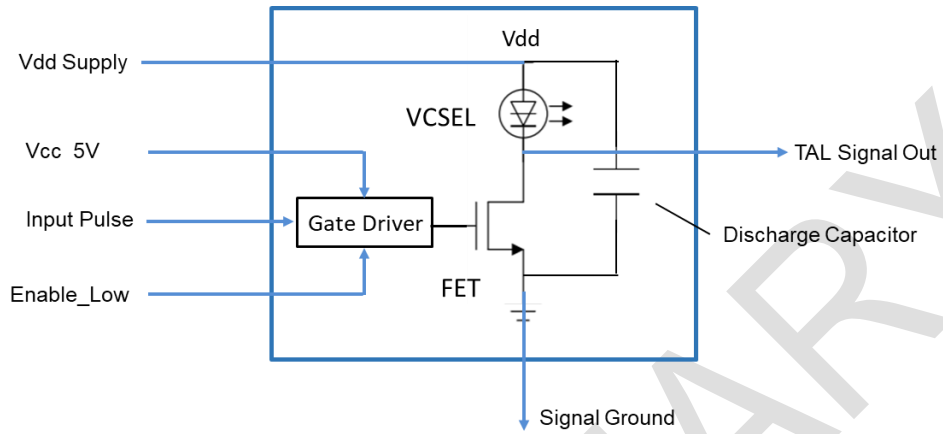
Module Wall Plug Efficiency ³⁾



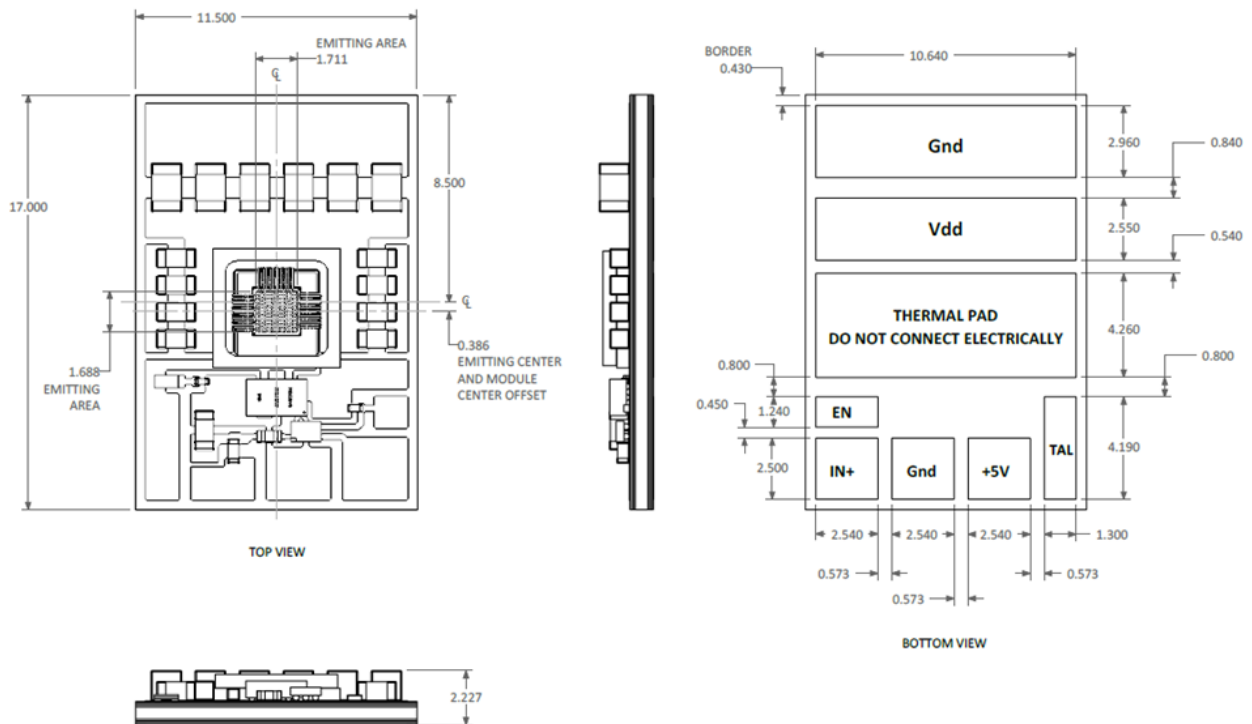
Pulse Characteristics ³⁾



Schematic Diagram



Dimension Drawings 4)



Disclaimer

Depending on the mode of operation, these devices emit highly concentrated visible and non-visible light which can be hazardous to the human eye. Products which incorporate these devices must follow the safety precautions given in IEC 60825-1.

Subcomponents of this device contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize device exposure to aggressive substances during storage, production, and use. Devices that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

For further application related information please visit www.vixarinc.com/applications/application-notes

PRELIMINARY

Notes

- 1) **Maximum Ratings** Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated for extended periods of time may affect device reliability.
- 2) **Characteristics**

Vdd operating voltage is limited by the voltage rating of the selected capacitors and maximum peak current through VCSEL die and GaN FET.

Demonstrated 80W pulsed power at 100 amps pulsed current from a single junction 940 nm VCSEL die designed for 10W QCW.

Rise time & Fall time is dependent on several factors, including parasitic inductance in the bond wires and PCB design. Individual lasers in Vixar's VCSEL array have Tr/Tf performance of < 800ps.
- 3) **Typical Values:** Due to the special conditions of the manufacturing processes of semiconductor devices, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.
- 4) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.

Revision History

Version	Date	Change
0.0	January 13, 2020	Initial Draft
0.1	May 5, 2020	Review and Update
0.2	December 8 th , 2020	Preliminary Datasheet for Customer
0.3	February 12 th , 2021	Update Specs and Laser Class
0.4	February 25 th , 2021	Added ordering code and description

PRELIMINARY



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