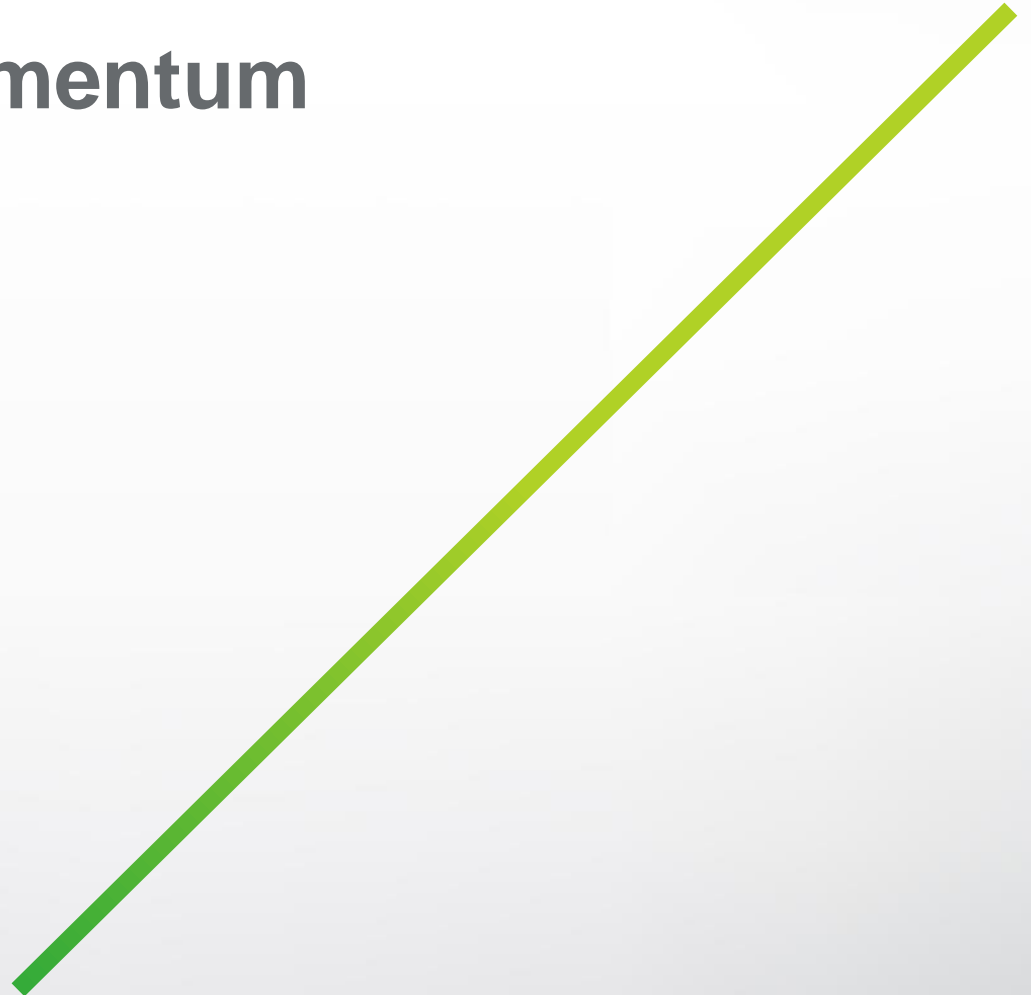


3D Sensing at Lumentum

Sept.2015



Lumentum Spun out from JDSU

Date: Monday, August 3, 2015

- An industry leader in optical communications and commercial lasers, Lumentum will commence trading on the NASDAQ Stock Market on August 4, 2015

MILPITAS, Calif., Aug. 3, 2015 (GLOBE NEWSWIRE) -- Lumentum Holdings Inc. ("Lumentum") today announced that it completed the spinoff from JDSU and initiated operations as an independent, publicly-traded company on August 1, 2015. Formerly JDSU's Communications and Commercial Optical Product ("CCOP") business segment, Lumentum will commence "regular-way" trading on NASDAQ under the ticker symbol LITE on August 4, 2015.

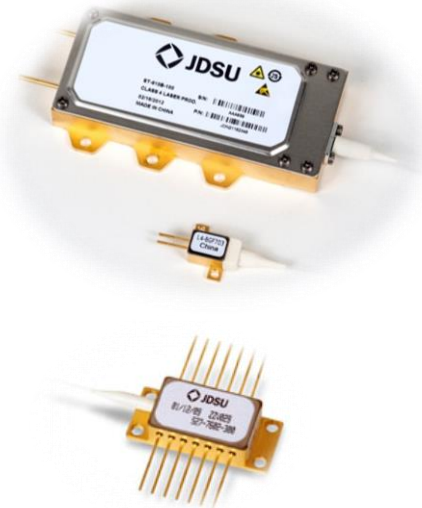
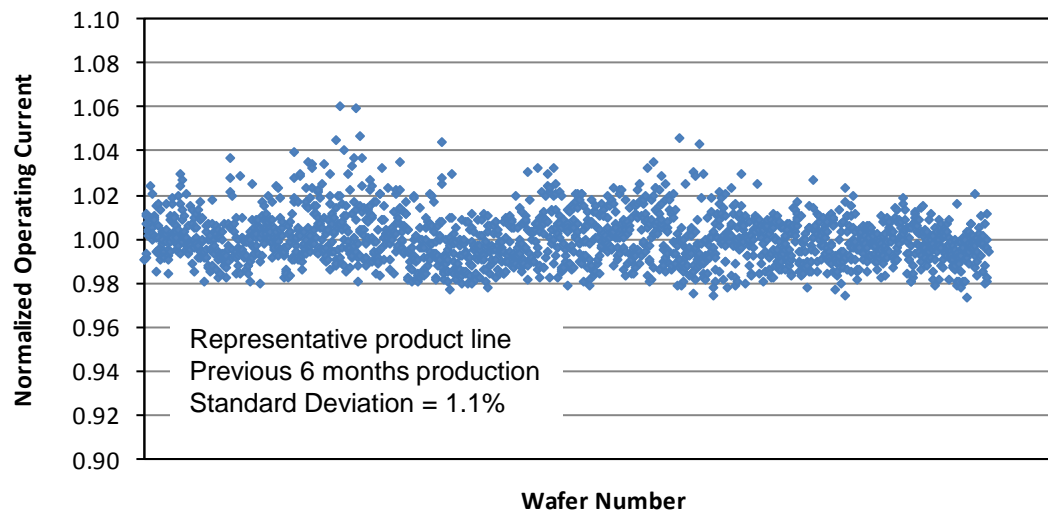
"We are excited to begin our journey as an independent, publicly-traded company," said Alar Lowe, Lumentum's president and chief executive officer. "With a more focused and agile structure, we believe that we are well positioned to capitalize on the growth opportunities in both the communications and commercial lasers markets. As an established technology and industry leader, we look forward to delivering value to our customers and shareholders."

About Lumentum

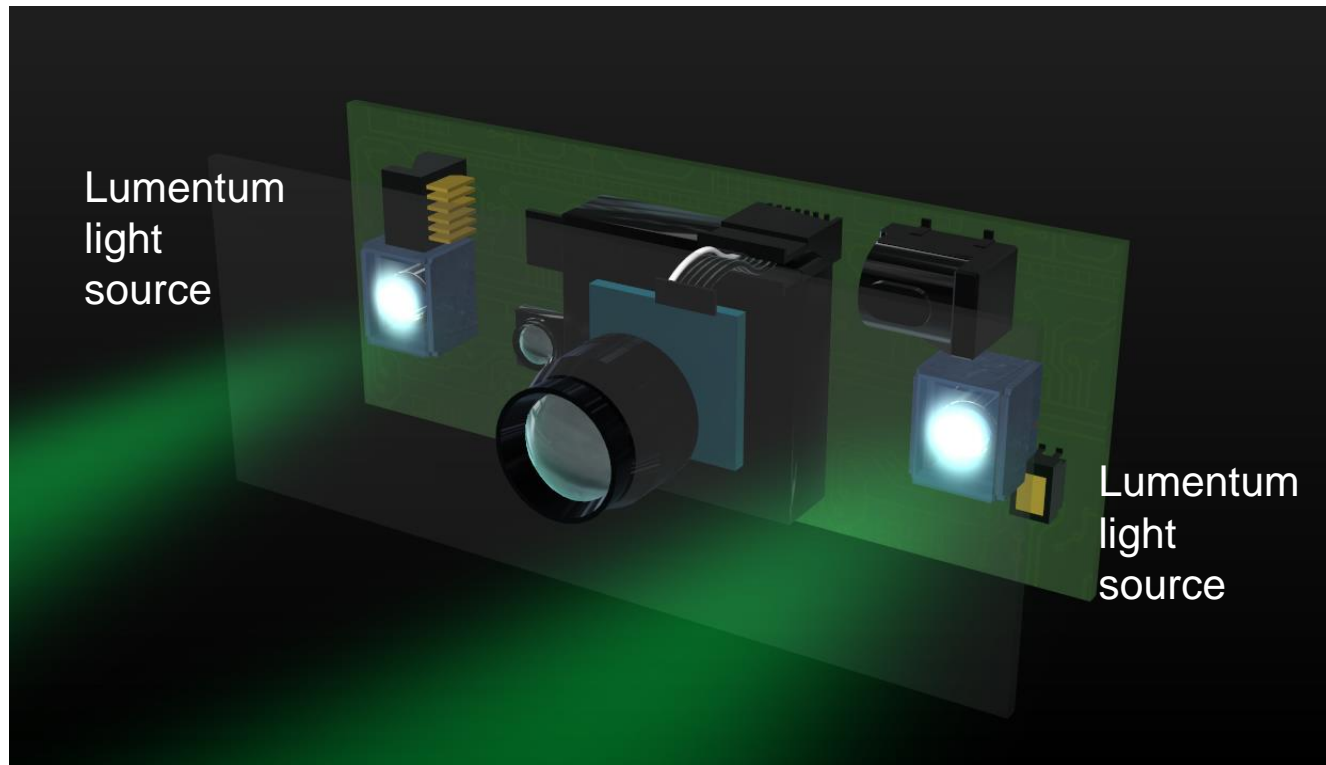
Lumentum (NASDAQ:LITE) is a market-leading manufacturer of innovative optical and photonic products enabling optical networking and commercial laser customers worldwide. Lumentum's optical components and subsystems are part of virtually every type of telecom, enterprise, and data center network. Lumentum's commercial lasers enable advanced manufacturing techniques and diverse applications including next-generation 3D sensing capabilities. Lumentum is headquartered in Milpitas, California with R&D, manufacturing, and sales offices worldwide. For more information, visit www.lumentum.com (www.lumentum.com).

Lumentum High Power Diode Lasers – A World Leader in Quality and Scale

- MOCVD epitaxial growth and wafer processing
- AlGaAs-based High Power Lasers (HPL) for:
 - Industrial pump lasers (multi-mode)
 - Telecom pump lasers (single-mode)
 - Consumer electronics illumination lasers (e.g. 3D Sensing)
- Also building: VCSEL, InP tunable lasers, DFB, PD, PICs, etc.
- Several ~50MW of HPL lasers shipped in 2013



Lumentum 3D Sensing Capabilities



- Core Competence in lasers and optics design and manufacturing and THE leading supplier of laser and optics for 3D Sensing depth cameras
- Lumentum has shipped Consumer Electronics volumes of lasers with field proven reliability (< 2 dppm returns)

3D Sensing Products

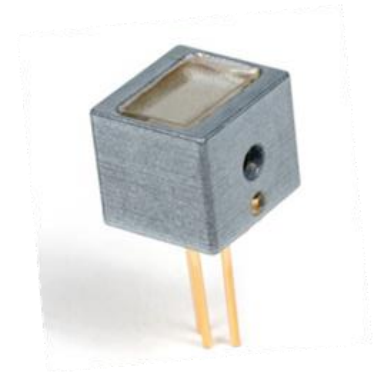
- Edge Emitting Lasers

- Lasers for various 3D Sensing Technologies
- Two packaging platforms: TO-can and Frame packages



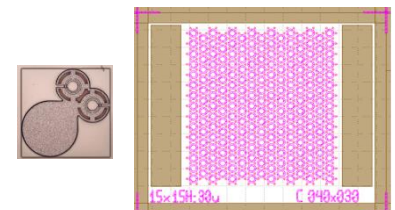
- Custom integrated illuminators

- Optical subassemblies for 3D Sensing
- Custom lasers+ optical + electronics
- Collaboration with customers



- VCSELs

- Die only or array product or standard SMT package
- Differentiated VCSELs (940nm, high efficiency)

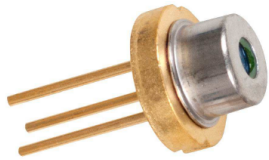


LED vs Lasers

- Lasers are more efficiency, spectrally precise and fast.

Parameter	Lumentum Edge emitter	VCSEL Array	LED
Optical Power (mW)	1W	1W	1W
Wavelength (nm)	850nm, 940nm	850nm, 940nm	various
Spectral Width (nm)	1	<1	30
Efficiency (Electrical to Optical) Room Temp	55%	~ 35%	~30-35%
Rise Time (ns)	~ 1	~ 1	5-10
WL shift	0.3nm/C	0.08nm/C	NA

1W CW 85x nm Diode Laser: part number 22045498

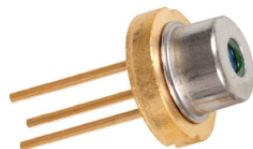


- Key Features**
- TO-56 package with double cathode, low inductance design
 - 845nm to 859nm CWL at 1W CW, 25C
 - 2.4W Peak Power with 50% d.c. 10MHz

Item	Parameter	Min	Typical	Max	Units	Notes
All values at 1W CW, 25C unless otherwise noted.						
1	Electrical					
	Laser Peak Optical Power			2.4	W	50% maximum duty cycle, ~10MHz
	Rise Time			1	ns	Met by design based on package inductance assuming 5V rail voltage. Not tested in production.
	Fall Time			2	ns	
	Operating Voltage		1.8	2.0	V	
	Operating Current	1	1.2	1.4	A	
	Threshold Current		0.2	0.5	A	
	Slope Efficiency		1.1		W/A	
	Package Inductance		0.9		nH	Met by design with JDSU modeling (0.3 mm anode pin length and 1.3 mm cathode pin length) and measurements (0.6 mm typical anode/cathode pin length). Not tested in production.
2	Mechanical/Thermal					
	Case Thermal Resistance		14		°C/W	Between pn-junction and bottom of TO-56 case (excluding interfacial mounting thermal resistance). Met by design with JDSU modeling. Not tested in production.
	Operating Temperature Range	-5		65	°C	
	Operating Altitude	-300		2000	m	
	Operating Relative Humidity			95%	% RH	Non-condensing.
	Non-Operating Storage Temperature	-40		60	°C	
Item	Parameter	Min	Typical	Max	Units	Notes
3	Optical Performance					
	Wavelength Shift over Temperature		0.3		nm/°C	BOL, CW operation, constant current at 20C, 1W. Not tested in production.
	Optical Power Temperature Coefficient		-0.4	-1.0	%/C	BOL from 20C to 60C at constant current defined at 20C, 2.4W peak, 10MHz, 50% duty cycle. Not tested in production.
	Beam Divergence - Fast Axis	14		21	deg	BOL @25C 1W CW, FWHM
	Beam Divergence - Slow Axis	6		9	deg	
	Polarization Ratio	90%				
	Wavelength at 5% integrated power (WL5%)		845		nm	
	Wavelength at 95% integrated power (W95%)			859	nm	
4	Absolute Maximum Ratings	Min	Typical	Max	Units	
	Operating Current			4.5	A	Absolute Maximum Ratings (AMR) are the maximum stresses that may be applied to the device for short periods of time without causing damage. Stresses in excess of the AMR may cause permanent damage. Exposure to AMR for extended periods of time or exposure to more than one AMR simultaneously may adversely affect device reliability. AMR apply for pulses longer than 100ps.
	Laser Peak Optical Power			3.7	W	

Call Lumentum Sales at 1-860-243-6714 for more information

350mW 854 nm Single Mode Laser: part number 22045504



- Key Features**
- 350mW CW Power
 - 854nm at 25C
 - TO-56 can with elongated cap

Electro-optical Performance (at 350mW CW, 25C. The specifications below are based on a sample)
and 0.6 NA collection optics)

Laser Characteristics	Symbol	Min.	Typ.	Max.	Unit
CW Output Power	P_O		350		mW
Center wavelength	λ_{25C}		854		nm
Spectrum width (90% intensity)				0.5	nm
Threshold current	I_{th}		34	50	mA
Slope efficiency	S_{eff}		1.1		W/A
Operating current	I_{op}		380	430	mA
Operating voltage	V_{op}		1.8		V
FWHM Beam Divergence	FWHM				
Parallel to junction	$\Theta_{ }$		8		deg
Perpendicular to Junction	Θ_{\perp}		17		deg
FWHM Beam Pointing	FWHM				
Parallel to junction	$d\Theta_{ }$	-2.5	–	2.5	degrees
Perpendicular to junction	$d\Theta_{\perp}$	-2.5	–	2.5	degrees

Summary

- Strategic investments over 6 years to become the market leader in optical component supply for 3D Sensing products
- Field proven reliability with negligible failure rates with our lasers
- Wide range of laser components for long range and short range applications
- Laser diodes designed into Texas Instruments 3D Depth camera reference designs
- Call us at 1-860-243-6714 or visit us at to learn more at <https://www.lumentum.com/en/3d-sensing-and-industrial-diode-lasers/products>

Thank you

