PowerBoost VCSELs

Spring 2020
Light is OSRAM
**PowerBoost spotlight**

### Features

- Compact footprint with leading-edge VCSEL multi-junction technology.

### Applications

- AR/VR
- Face recognition
- Home Automation
- Industrial Automation
- 3D Sensing
- LiDAR

### Benefits

**Exceptional Efficiency**
- Power conversion >50%
- Slope efficiency of 2 W/A for dual junction
- Slope efficiency of 3 W/A for triple junction

**High Optical Power**
- Less current required to achieve the same optical performance as a single junction VCSEL.
- Faster switching speed of the driver possible due to greatly reducing required current.
**PowerBoost – 2J - Dual Junction VCSEL**

### Characteristics

- $T_a = 20^\circ C$, $I_f = 2$ A; $t_p = 100 \mu s$; DC = 1%
- Forward Voltage: 3.6 V
- Output Power: 3.6 W
- Threshold Current: 0.2 A
- Slope Efficiency: 2.0 W/A
- Power Conversion Efficiency: 50%
- Peak Wavelength: 940nm
- Field of View at 50% FWHM: 23°

### Die Specifications

- Dimensions: 0.87mm x 0.87mm x 0.10mm
- Apertures: 361
- Aperture Size: 10µm
- Emission Area: 0.768mm x 0.680mm
- Chip Technology: GaAs VCSEL

### LIV Performance

- Optical Power vs. Current (mA)
- Voltage (V) vs. Current (mA)

### Efficiency

- Efficiency vs. Current (mA)

### Beam Profile

- Beam profile for X and Y axes
**PowerBoost – 3J - Triple Junction VCSEL**

### Characteristics

- $T_a = 20^\circ C$, $I_f = 2$ A; $t_p = 100$ µs; DC = 1%

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Forward Voltage</td>
<td>4.9 V</td>
</tr>
<tr>
<td>Output Power</td>
<td>5.2 W</td>
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<tr>
<td>Threshold Current</td>
<td>0.25 A</td>
</tr>
<tr>
<td>Slope Efficiency</td>
<td>3.0 W/A</td>
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<td>Power Conversion Efficiency</td>
<td>53%</td>
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<tr>
<td>Peak Wavelength</td>
<td>940nm</td>
</tr>
<tr>
<td>Field of View at 50% FWHM</td>
<td>26°</td>
</tr>
</tbody>
</table>

### Die Specifications

- **Dimensions**: 0.87mm x 0.87mm x 0.10mm
- **Apertures**: 361
- **Aperture Size**: 10µm
- **Emission Area**: 0.768mm x 0.680mm
- **Chip Technology**: GaAs VCSEL

### LIV Performance

<table>
<thead>
<tr>
<th>Current (mA)</th>
<th>Optical Power (mW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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</tr>
<tr>
<td>1000</td>
<td>1000</td>
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<tr>
<td>2000</td>
<td>2000</td>
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<tr>
<td>4000</td>
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<td>5000</td>
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</table>

### Efficiency

<table>
<thead>
<tr>
<th>Current (mA)</th>
<th>Efficiency (%)</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1000</td>
<td>10</td>
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<td>4000</td>
<td>40</td>
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<tr>
<td>5000</td>
<td>50</td>
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</tbody>
</table>

### Beam Profile

- X Axis
- Y Axis

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Multijunction VCSELs | Vixar Sales Team  
Spring 2020
**PowerBoost – 5J - Five Junction VCSEL**

**Characteristics**

- $T_a = 20^\circ$C, $I_f = 2$ A; $t_p = 100$ µs; DC = 1%
- Forward Voltage: 7.8 V
- Output Power: 7.4 W
- Threshold Current: 0.28 A
- Slope Efficiency: 3.8* W/A
- Slope Efficiency (Single Aperture, $I_f = 5$ mA): 4.6 W/A
- Power Conversion Efficiency: 48%
- Peak Wavelength: 940nm
- Field of View at 50% FWHM: 27°

*Slope Efficiency up to 5 W/A for shorter pulses

**Die Specifications**

- Dimensions: 0.87mm x 0.87mm x 0.10mm
- Apertures: 361
- Aperture Size: 10µm
- Emission Area: 0.768mm x 0.680mm
- Chip Technology: GaAs VCSEL

**LIV Performance**

Input versus Voltage for a range of Currents

**Efficiency**

Efficiency versus Current

**Beam Profile**

$I = 1.8$ A

*Graphs and diagrams showing the performance characteristics of the PowerBoost 5J Five Junction VCSEL*
PowerBoost – 5J - Five Junction VCSEL Slope Efficiency

\[ T_a = 20^\circ \text{C}, \ t_p = 100 \ \mu\text{s}; \ \text{DC} = 1\% \]

**Single Aperture**

**Power Array**

Note: With shorter pulses the chip will be close to a SLE of 5W/A.