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QCW-diode stacks with improved efficiency for space applications

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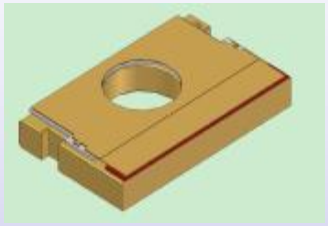
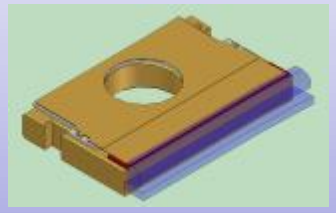
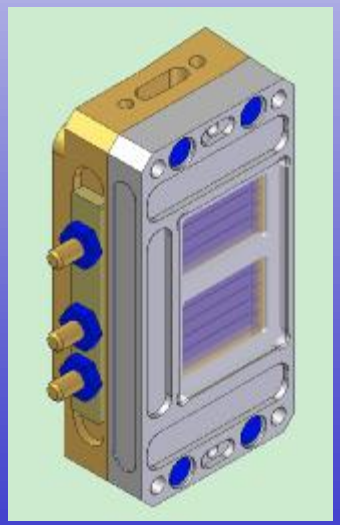
BELA diode stack



Diode



Diode + FAC



Stack

Focus on

- High Efficiency => >50%
- High Reliability => Long lifetime requirements
- In-Free mounting => Better long-term stability

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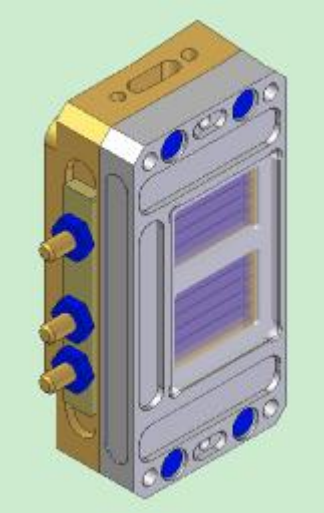
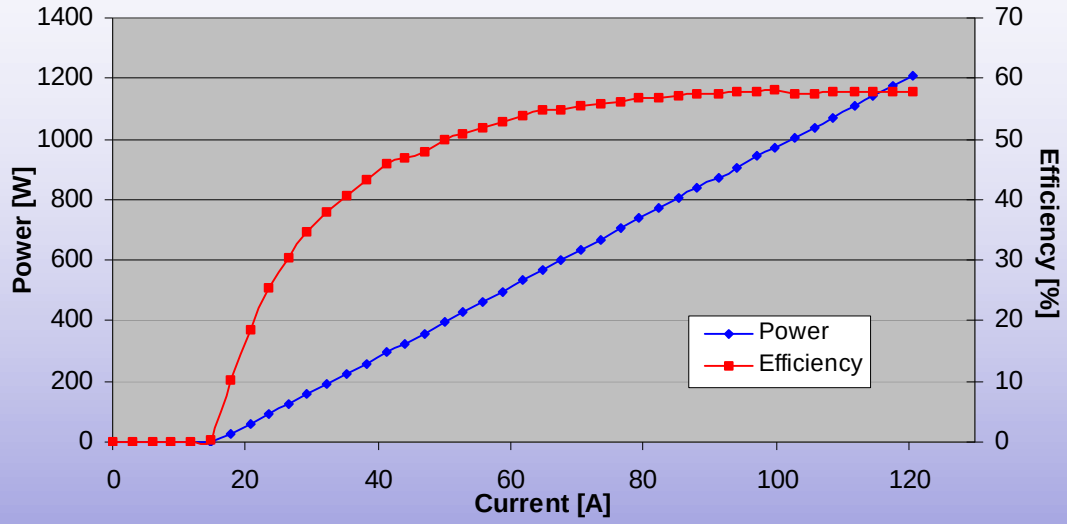
BELA diode stack



Stack



Test Results

- Efficiency: 58%
- Output Power: 900W (100W/bar) @ 95A
- Pulse Width: 250µs
- Chip Type: 50%FF

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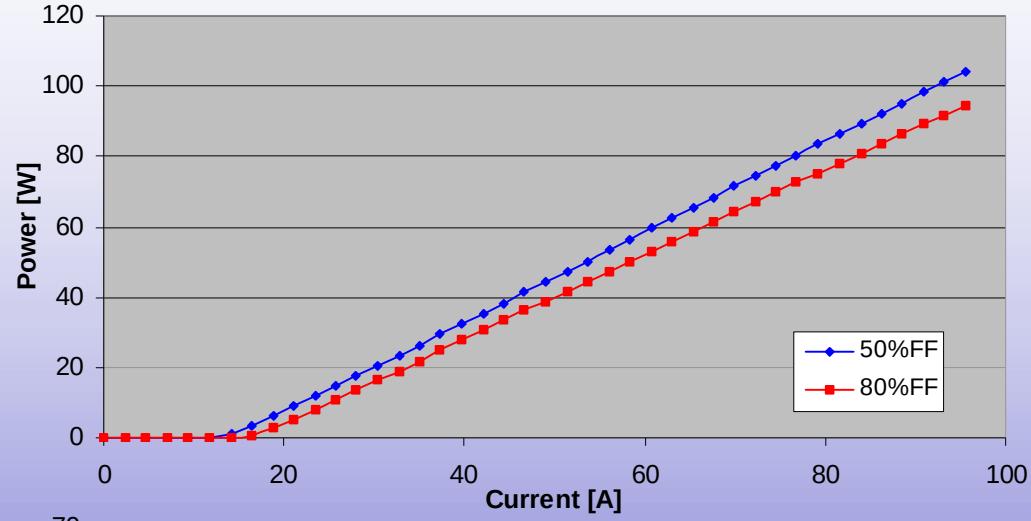
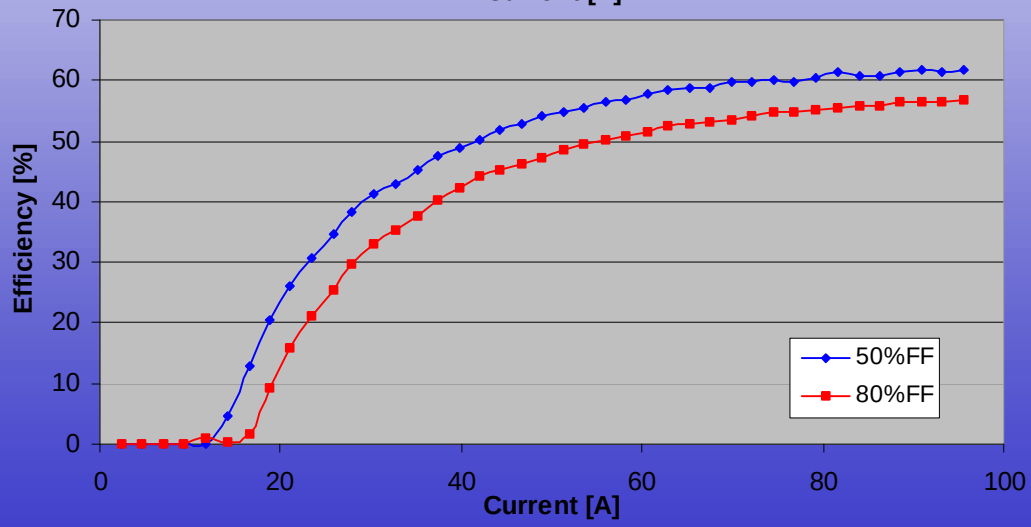
50%FF bar vs. 80%FF bar

Comparison

- Lower Threshold for 50%FF
- 5% higher efficiency compared to 80%FF bar
- Better performance of 50%FF bar at nominal and derated operating points





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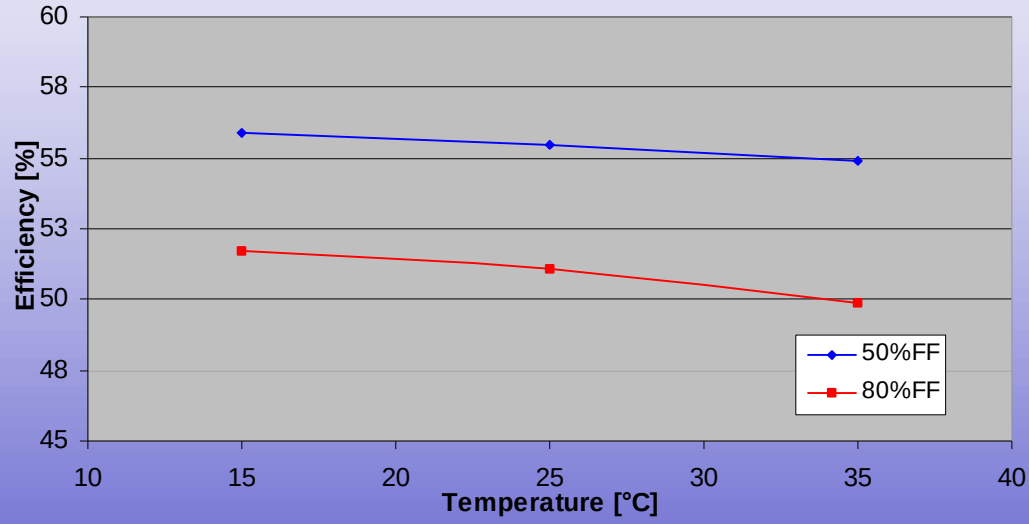
50%FF bar vs. 80%FF bar

Comparison

- Better efficiency even at elevated temperature



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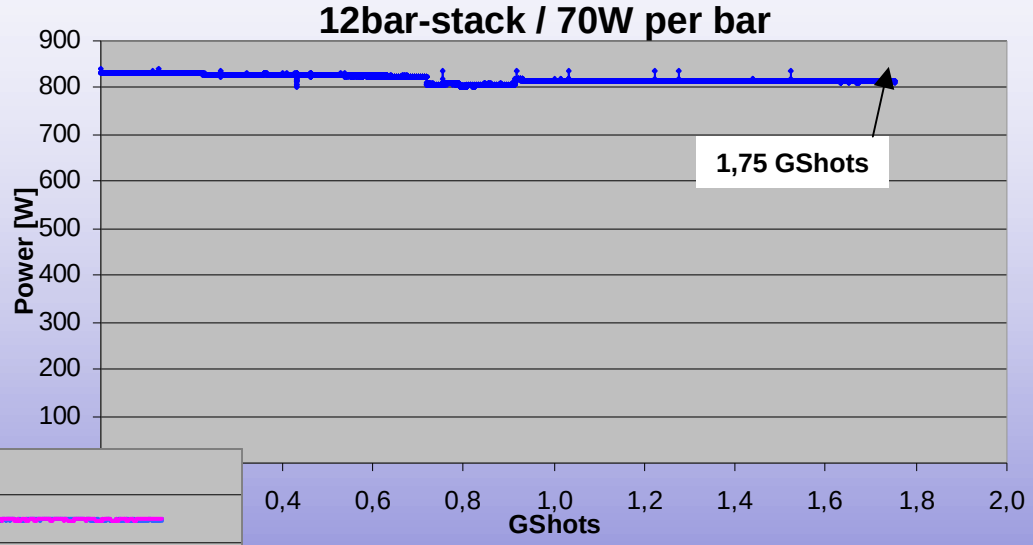
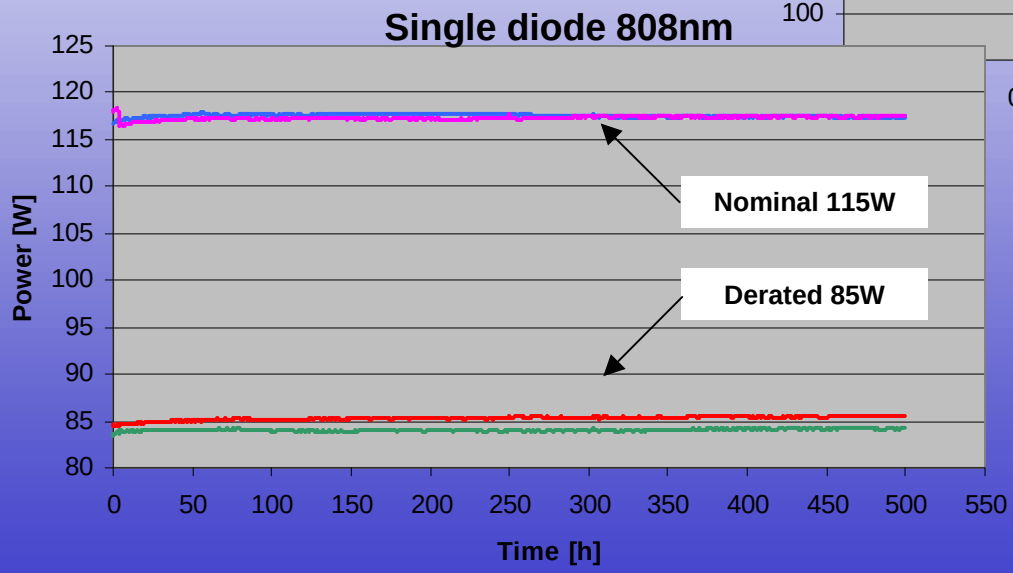
Lifetime tests

- 50%FF bars
- 808nm
- In-soldered





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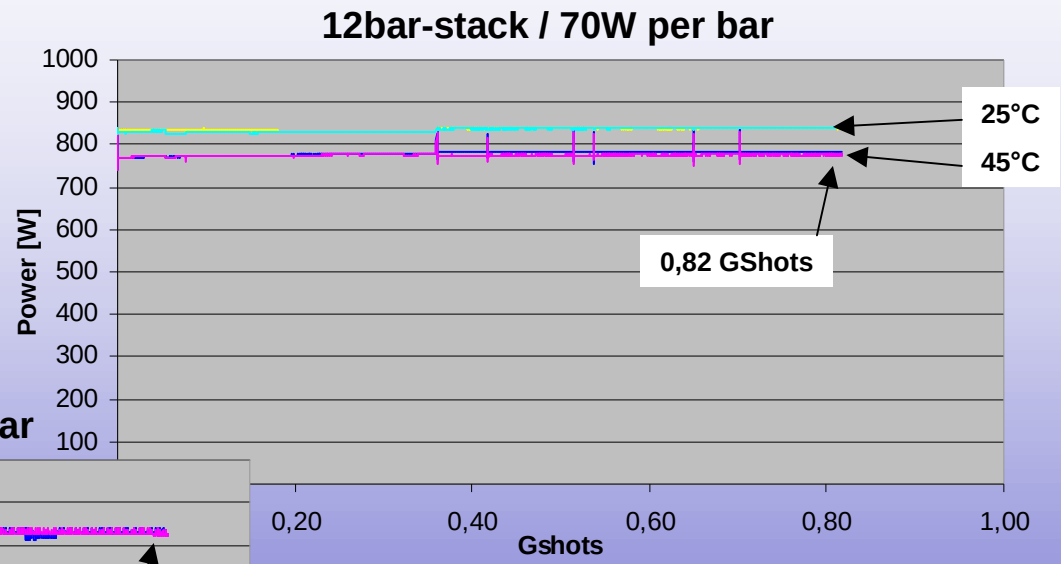
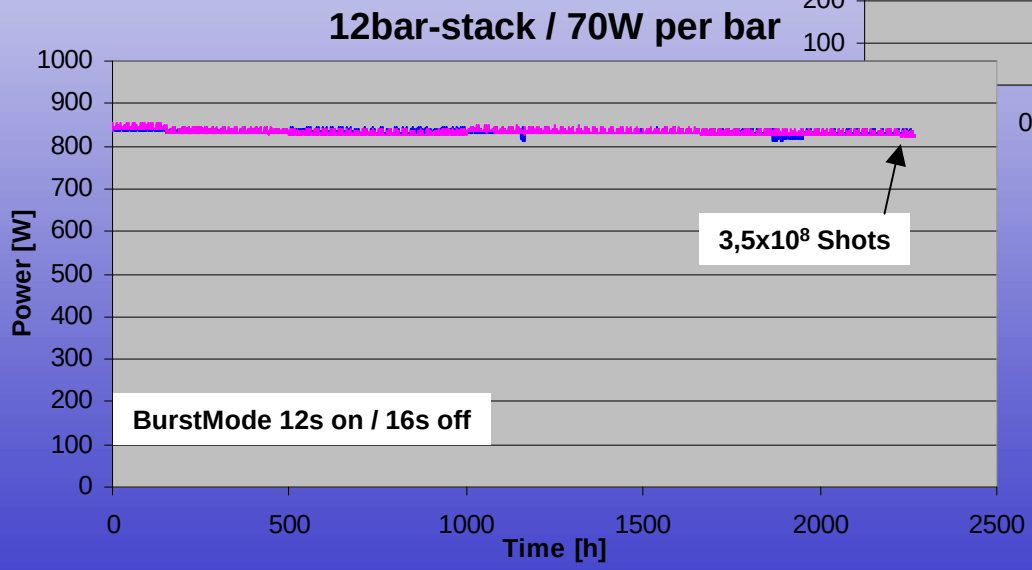
Results from Assessment Test for AEOLUS

- 50%FF bars
- 808nm
- AuSn-soldered





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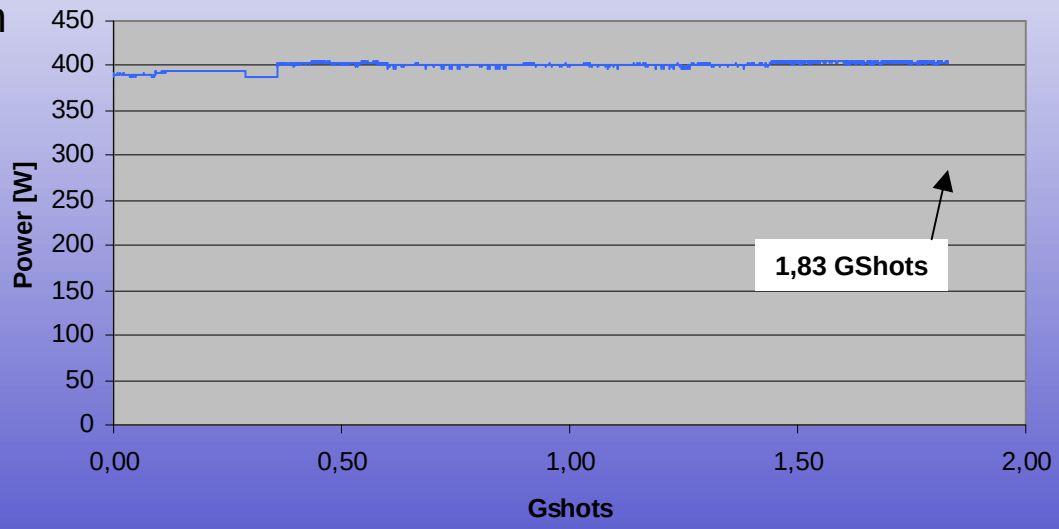
New stacking technique

- 50%FF bars
- 808nm
- AuSn-soldered
- New stack design



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Conclusion

- Use of 50%FF bar for use at power levels up to 100W
- Improved efficiency
- High Volume bar => Good process stability and control
- AuSn-soldering on α-matched heat sink
- Improved stacking technology

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Thank you for your attention

Timo Mattern **QCW Diode Lasers**

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