

## High Temperature / Multi-color QCW Stacked Array

QD-Q1yzz-B(n) / QD-Q1yzz-BS(n) / QD-Q1yzz-G(n) / QD-Q1yzz-J(n)

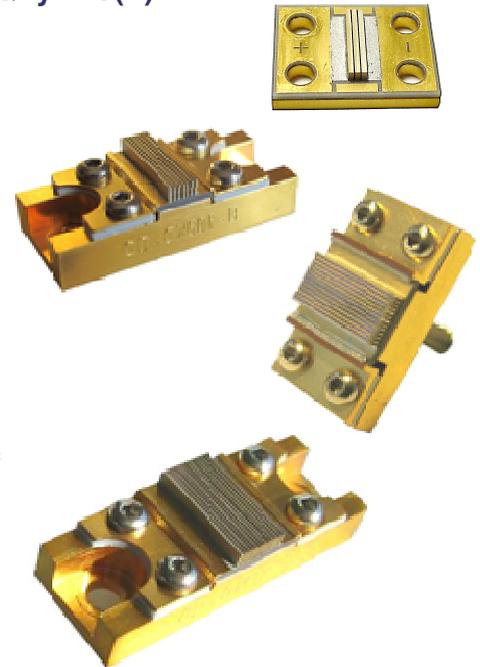
### DESCRIPTION

QD-Q1yzz-B(n), QD-Q1yzz-BS(n), and QD-Q1yzz-G(n) are a variety of conductively cooled laser diode stacked arrays with a design adapted for a reliable operation over extremely severe temperature range. These Stacks can be built from 1 to 19 diode bars of 60W QCW to 400W QCW.

The laser diode bar arrays benefit from a fully mastered technology, with the appropriate design for improved efficiency and performing reliable at high temperature of operation.

The possibility for mixing diode bars of different wavelength gives a broad optical spectrum of emission. This performance is well suited for building efficient pumping skim in a non stabilized environment in temperature.

Assembly, using AuSn hard solder technology, in a compact and rugged package allows easy and efficient connection which is ideal for a large range of defence, aerospace, industrial applications: pumping rods or slabs solid state lasers, illuminators...



### MAIN FEATURES

- QCW operation up to 400W QCW per diode bar
- Hard solder technology
- High efficiency over a very large operating temperature range
- Possibility of Multi-color emission and collimation
- Low thermal resistance assembly
- Mechanically robust, shock and vibration resistant

x =	1	2	3	4	5	6	
$\lambda$	808	790	830	915	940	980	nm
y =	2	3	4	5	6	7	8
P/bar	60	80	100	125	150	200	300
							400
							W

### SPECIFICATIONS

Case temperature: + 25° C

Quasi-continuous mode: pulse width = 200 $\mu$ s  
repetition rate = 100Hz

PARAMETERS	QD-Q1yzz-B(n) or J(n)	QD-Q1yzz-BS(n)	QD-Q1yzz-G(n)	Units
Number of Diode bars (pitch = 400 $\mu$ m) <b>zz</b> =	1 to 12	1 to 19	1 to 16	
Pitch between diode bars	From 330 to few 1000s			$\mu$ m
Emitting area	10 X (zz – 1)* pitch			mm <sup>2</sup>
QCW Optical Power per Diode Bar	up to 400			W
QCW Optical Power	up to 4800	up to 7000	up to 6800	W
Operating current @ 100W / bar	95A @ +25°C .....110A @ +75°C			A
Operating current @ 200W/bar	185A @ +25°C .....205A @ +75°C			A
Operating current @ 300W/bar	275A @ +25°C .....300A @ +75°C			A
Operating voltage	2V / bar			V
Total efficiency @ +25°C	58 Typ. @ 25°C and 50% @ 75°C			%
Wavelength ('n' = number of different $\lambda$ )	790 to 820			nm
Wavelength variation with Temperature	0.26/°C			nm / °C
Beam divergence (FWHM)	8 X 36			deg.

#### Note :

- Standard Polarisation: TM or TE mode
- Tolerance on wavelength is +/- 3nm, +/- 1,5 nm on demand
- Other wavelength selections are available (9xx nm)
- Specifications are for nominal lifetime > 1. 10<sup>9</sup> pulses @ 25°C and > 0.3 10<sup>9</sup> pulses @ +75°C (for 200 $\mu$ s pulse width)

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## ABSOLUTE MAXIMUM RATINGS

PARAMETERS	QD-Q1yzz-B(n)	QD-Q1yzz-BS(n)	QD-Q1yzz-G(n)	Units
Pulse width		500		μs
Maximum duty cycle		4		%
Reverse voltage		3		V
Operating temperature		-40 to +75		°C
Storage temperature		-55 to +85		°C

**Note :** Operation at temperature below dew point requests to use dry N2 environment

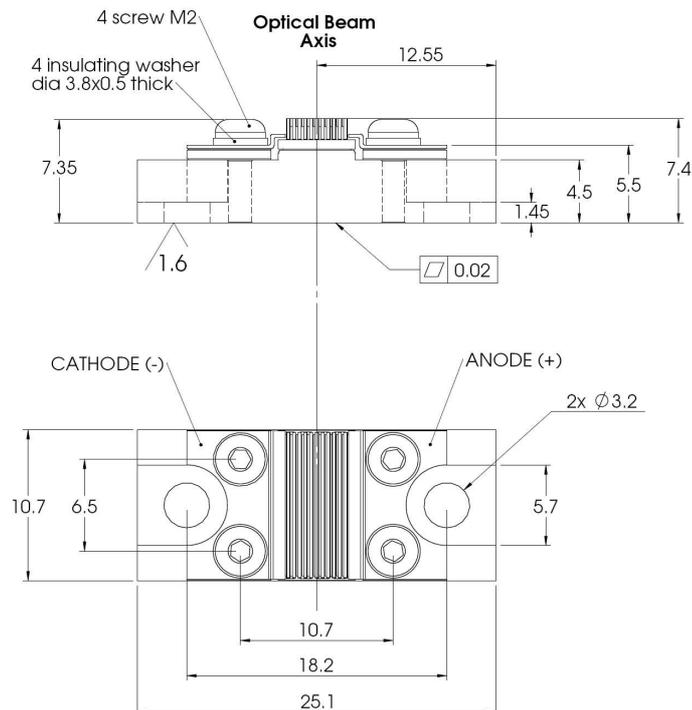
## PACKAGE SPECIFICATIONS

- dimensions are in mm
- standard tolerances are  $\pm 0.2$  mm

### QD-Q1yzz-B



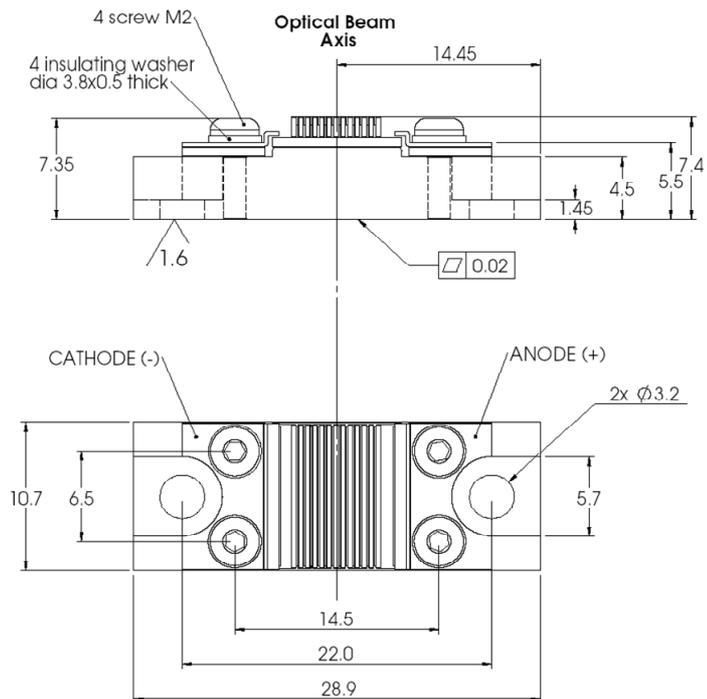
This stack "B" type can be proposed with a variable number ('zz') of diode bars:  
 'zz' = 1 to 12 bars at a pitch of 330μm,  
 'zz' = 1 to 11 bars at a pitch of 400μm,  
 'zz' = 1 to 8 bars at a pitch of 500μm



### QD-Q1yzz-BS



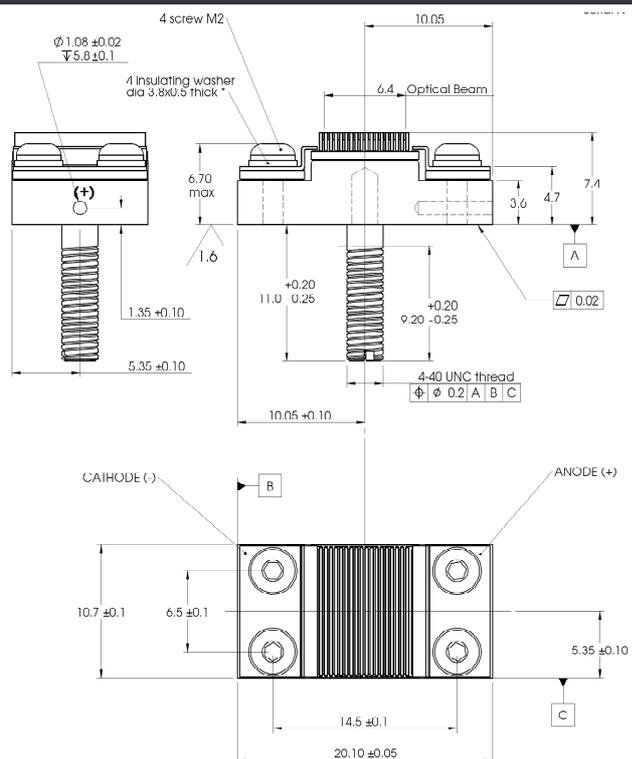
This stack "BS" type can be proposed with a variable number ('zz') of diode bars:  
 'zz' = 1 to 19 bars at a pitch of 400µm,  
 'zz' = 1 to 15 bars at a pitch of 500µm  
 'zz' = 1 to 6 bars at a pitch of 1000µm



### QD-Q1yzz-G



This stack "BS" type can be proposed with a variable number ('zz') of diode bars.  
 'zz' = 1 to 19 bars at a pitch of 400µm,  
 'zz' = 1 to 15 bars at a pitch of 500µm  
 'zz' = 1 to 6 bars at a pitch of 1000µm



## QCW Stacked Array with 'Fast Axis Collimation'

**QD-Q1yzz-BO / QD-Q1yzz-BSO / QD-Q1yzz-BSSO**

### DESCRIPTION

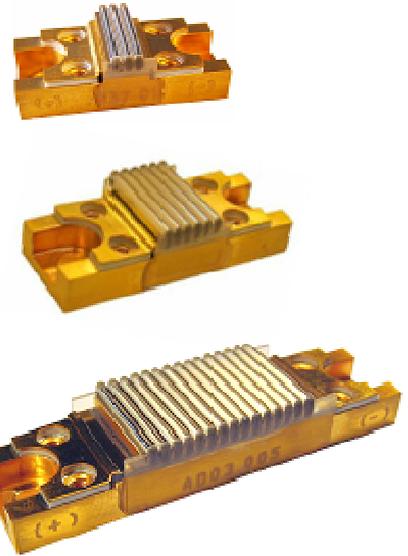
QD-Q1yzz-BO, QD-Q1yzz-BSO, and QD-Q1yzz-BSSO are a variety of conductively cooled laser diode stacked arrays designed with a 'Fast Axis Collimation' (FAC) lens accurately fixed on each diode bar. The fast axis divergence is reduced to a very low value (8mrad @ 1/e<sup>2</sup>).

These Stacks can be built from 1 to 17 diode bars with up to 400W QCW per bar. Minimum bar pitch is 400 µm.

The quality of the collimated beam is convenient for association with appropriate optical systems for application which request very high optical beam density.

The laser diode arrays benefit from a fully mastered technology, with appropriate design for improved efficiency and reliability, operating from -40°C up to 75 °C.

Assembly in a compact and rugged package allows easy connection which is ideal for different applications: pumping rods or slabs solid state lasers, illuminators...



### MAIN FEATURES

- QCW operation
- Low divergence 'Fast Axis Collimation'
- Up to 400W QCW per diode bar (500W with short pulse width)
- Wavelengths: 808nm, 9xxnm
- High efficiency, low thermal resistance assembly
- Mechanically robust, shock and vibration qualified

<b>x =</b>	1	2	3	4	5	6	
<b>λ</b>	808	790	830	915	940	980	nm
<b>y =</b>	2	3	4	5	6	7	8
<b>P/bar</b>	60	80	100	125	150	200	300
							400
							W

### SPECIFICATIONS

PARAMETERS @ 25°C		QD-Qxyzz-BO	QD-Qxyzz-BSO	QD-Qxyzz-BSSO	Units
Number of Diode bars	<b>zz =</b>	Up to 11	Up to 19	Up to 25	
Pitch between diode bars		400 to 2000			µm
Emitting area		10 x (zz – 1)* pitch			mm <sup>2</sup>
QCW Optical Power per Diode Bar		up to 400			W
QCW Optical Power		up to 4 400	up to 7 000	up to 10 000	W
Operating current	@ 100W / bar	95 A Typical - 115A Max			A
Operating current	@ 200W / bar	185 A Typical - 215A Max			A
Operating current	@ 400W / bar	370 A Typical - 390A Max			A
Operating voltage		<2V / bar			V
Total efficiency		58% @ 808 nm, 65% @ 940/980 nm			%
Wavelength ( 'n' = number of different λ )		790 to 980			nm
Beam divergence per bar (@ 1/e <sup>2</sup> )	Slow axis	0 Typ. ( ≤ 10)			deg.
	Fast axis	8 Typ. ( ≤ 10) upon the pitch			mrad
Beam pointing (bar to bar)		± 3 Typ. ( ≤ ± 4)			mrad

#### **Note :**

- Standard Polarisation: TM or TE mode @ 808 nm, TE @ 9xx nm
- Tolerance on wavelength is +/- 3nm, +/- 1,5 nm on demand
- Variation of wavelength with temperature ~0.26/nm/°C
- Specifications are for nominal lifetime > 1. 10<sup>9</sup> pulses @ 25°C (for 200µs pulse width)

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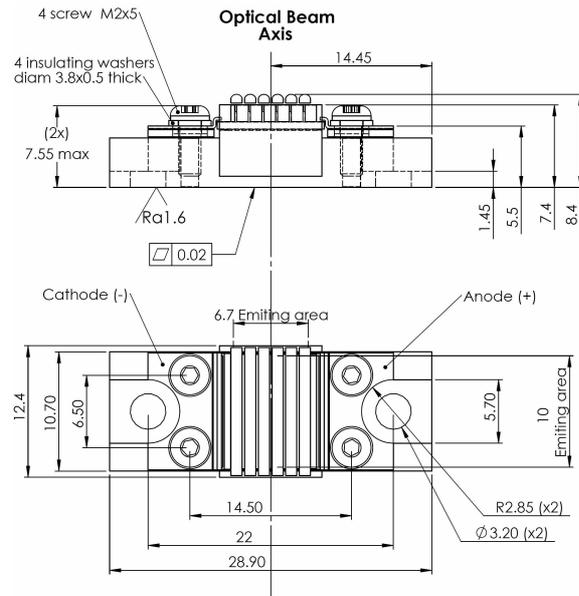


## QD-Q1yzz-BSO

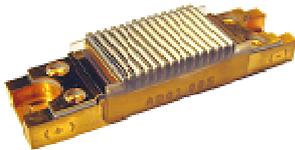


This stack "BSO" type can be proposed with a total number 'zz' of diode bars:

Up to 19 at a pitch of 400  $\mu\text{m}$   
Up to 6 at a pitch of 1200  $\mu\text{m}$

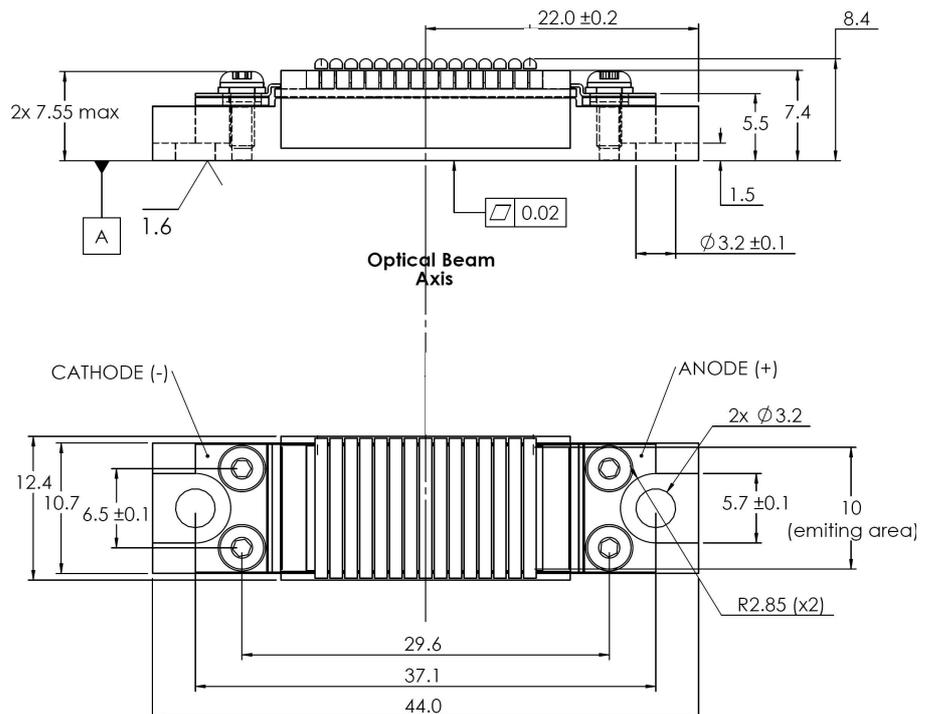


## QD-Q1yzz-BSSO



This stack "BSSO" type can be proposed with a total number 'zz' of diode bars:

Up to 25 at a pitch of 400  $\mu\text{m}$   
Up to 17 at a pitch of 1200  $\mu\text{m}$



## QCW Linear Bar Array

QD-Qxy01-A1 / QD-Qxy01-T / QD-Qxy01-H

### DESCRIPTION

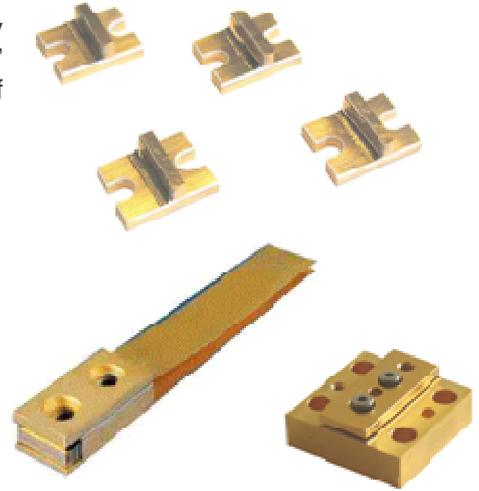
QD-Qxy01-A1, QD-Qxy01-T, QD-Qxy01-J, QD-Qxy01-H are conductively cooled laser single diode bars operating at high QCW optical power. The 'x' designs the wavelength window and 'y' characterizes the optical power of diode bar proposed up to 400W QCW (cf Table below).

These products are based on an efficient and reliable 1cm linear bar arrays. Design is optimized to very high repetition rate (up to 50 kHz).

Operation at high Duty Cycle and high average optical power is addressed with "H" package offering a low thermal resistance.

An additional FAC lens is an option appropriate for application requesting well collimated beam (~8 mrad @ 1/e<sup>2</sup>).

Assembly in a compact and rugged package (A1 or T) using AuSn hard solder allows building association of bars for dense pumping arrays for a wide range of applications.



### MAIN FEATURES

- QCW operation
- Highly compact design
- Conductively cooled package
- High conversion efficiency
- Wavelengths: from 790 up to 980 nm
- Option with FAC lens (0,5°)
- Option for operation at high Duty Cycle
- Mechanically robust, shock and vibration resistant



x =	1	2	3	4	5	6	
λ	808	790	830	915	940	980	nm
y =	2	3	4	5	6	7	8
P/bar	60	80	100	125	150	200	300
							400
							W

### SPECIFICATIONS

Case temperature: + 25 °C

Quasi-continuous mode: pulse width = 200µs  
repetition rate = 100Hz

PARAMETERS	QD-Q1401-A1 or other packaging	QD-Q1701-A1 other packaging	QD-Q1901-A1 other packaging	Units
QCW Optical Power	100	200	400	W
Operating current	Typ. 95 Max. < 115	185 < 200	370 < 390	A A
Threshold current (Typ.)	18			A
Operating voltage (Typ.)	1.8 / Bar			V
Total efficiency (Typ.)	58% @ 808 nm, 65% @ 940/980 nm			%
Wavelength	790 to 980			nm
Wavelength variation with Temperature	0.26			nm / °C
Beam divergence (FWHM)	8 X 36			deg.

#### Note :

- Standard Polarisation is TM or TE mode @ 808 nm, TE @ 9xx nm
- Spectral width is ≤ 3 nm FWHM
- Double or Triple Quantum Well bars available on demand
- Standard tolerance on wavelength is +/- 3nm, +/- 1,5 nm on demand
- Specifications are for nominal lifetime > 1. 10<sup>9</sup> pulses @ +25°C and > 0.3 10<sup>9</sup> pulses @ +75°C (for 200µs pulse width)

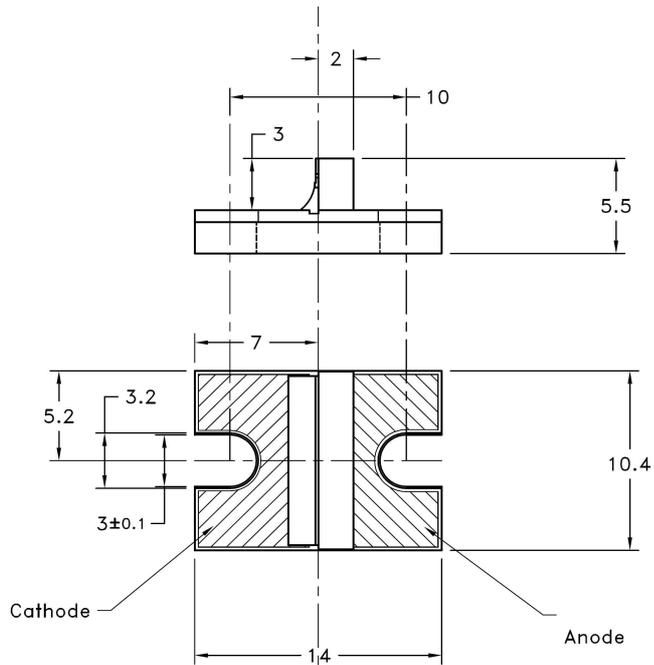
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### QD-Qxy01-T



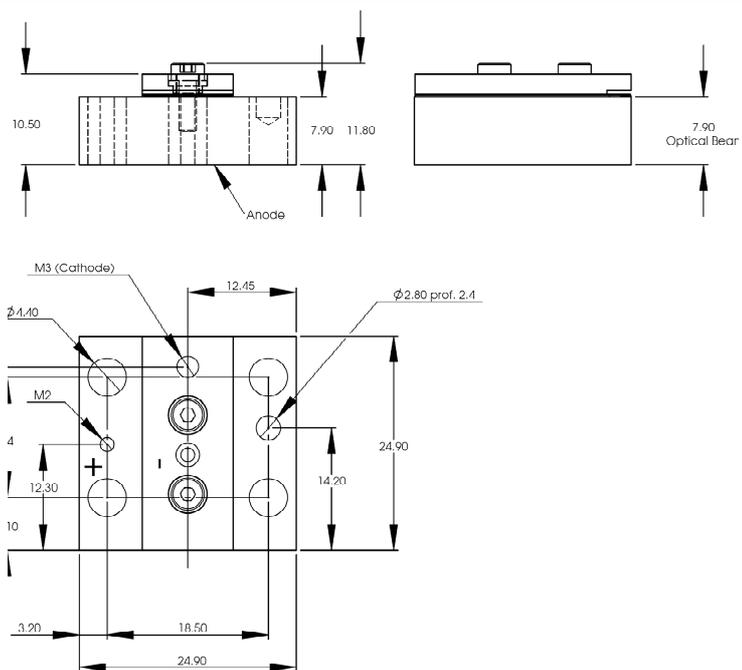
This "T" package has been design for high compactness. It is also well appropriate for building a multi-bars compact emission line.



### QD-Qxy01-H



This "H" package allows a very low thermal resistance (~0.4°/W) and is specifically adapted for operation at high Duty Cycle and high average optical power.



## QCW Mini-Stacked Array QD-Q1S09-D(n) / QD-Q1R12-D(n)

### DESCRIPTION

QD-Q1S09-D(n) or QD-Q1R12-D(n) are conductively cooled laser diode stacked arrays with a specific design adapted for the realization of highly compact laser diode source.

These Stacks are designed to integrate reduced size diode bars allowing an emission of square shape with high optical power density:

- with 9 mini-bars 3mm → ~3 X 3 mm<sup>2</sup> emission
- with 12 mini-bars 5 mm → 5 X 5 mm<sup>2</sup> emission

Heat-sink has been adapted for such mini-bars with a small foot-print and qualified for stable operation over large temperature range.

Option is proposed with mini-bars of different wavelengths (to broaden the optical spectrum) which is well appropriate for operation under environment with non stabilized temperature.

This compact stack is well adapted to be tightly packed in customer-designed manifolds for optimized small size and efficient diode pumped solid state lasers.



### MAIN FEATURES

- QCW operation
- Highly compact design
- Square emission area
- Possibility of Multi-color emission and collimation
- High operating Temperature range
- Mechanically robust, shock and vibration qualified
- Also available with A, B, G, K or any other QLD packaging

### SPECIFICATIONS

PARAMETERS @ 25 °C	QD-Q1S09-D(n)	QD-Q1R12-D(n)	Units
Number of Mini-Diode bars	9	12	
Pitch between diode bars	330, 400 and 500		µm
Mini-bar width	3	5	mm
Emitting area	3.2 X 3	4.4 X 5	mm <sup>2</sup>
<b>QCW Optical Power</b>	<b>900</b>	<b>2000</b>	<b>W</b>
Operating current	110 Typ. (< 120)	170 Typ. (< 190)	A
Operating voltage	<18	<24	V
Total efficiency	56% @ 808 nm, 62% @ 940/980 nm		%
Wavelength's (n = number of different wavelengths)	790 to 980 (n = 1 to 4)		nm
Wavelength variation with Temperature	0.26		nm / °C
Beam divergence (FWHM)	8 X 36		deg.

#### **Note :**

- Standard Polarisation: TM or TE mode @ 808 nm, TE @ 9xx nm
- Spectral width (for single wavelength) is ≤ 3 nm FWHM
- Standard tolerance on wavelength is +/- 3nm
- Possibility of pitch between diode bars of 500µm
- Specifications are for nominal lifetime > 1. 10<sup>8</sup> pulses @ +25°C and > 0.5 10<sup>8</sup> pulses @ +75°C (for 200µs pulse width)

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## ABSOLUTE MAXIMUM RATINGS

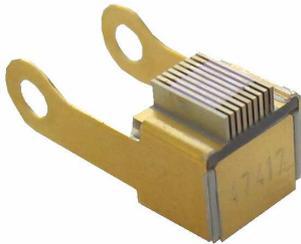
PARAMETERS	QD-Q1S09-D(n)	QD-Q1R12-D(n)	Units
Pulse width	500		µs
Maximum duty cycle	1	0.5	%
Reverse voltage	3		Volt
Operating temperature	-40 to +75		°C
Storage temperature	-55 to +85		°C

**Note :** Operation at temperature below dew point requests to use dry N2 environment

## PACKAGE SPECIFICATIONS

- dimensions are in mm
- standard tolerances are  $\pm 0.2$  mm

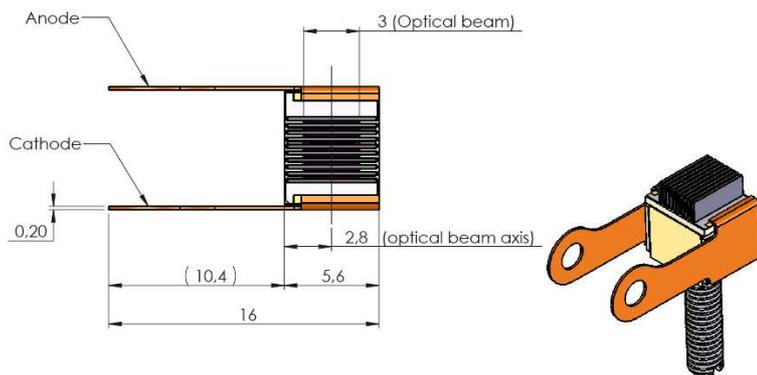
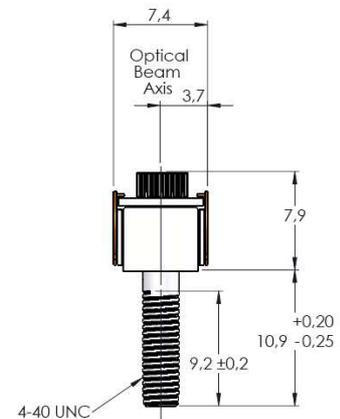
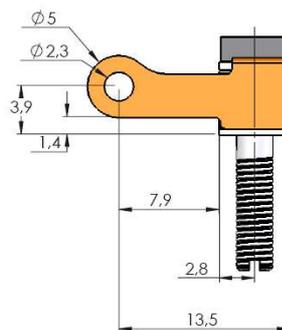
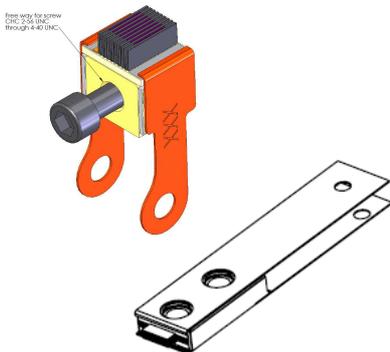
### QD-Q1yzz-D



This Mini-stack "D" type can be proposed with a total number of diode bars:

- ❖ 9 mini-bars of 3mm
- ❖ 12 mini-bars of 5mm

Other mechanical designs are available



## Conduction-cooled QCW Stacked Array

QD-Q1yzz-A / QD-Q1yzz-B / QD-Q1yzz-BS / QD-Q1yzz-G / QD-Q1yzz-K

### DESCRIPTION

QD-Q1yzz-A, QD-Q1yzz-B, QD-Q1yzz-BS, QD-Q1yzz-G and QD-Q1yzz-K are a variety of conductively cooled laser diode stacked arrays. These Stacks can be built from 1 to 19 diode bars of 60W QCW to 400W QCW. The laser diode bar arrays benefit from a fully mastered technology, with the appropriate design for improved efficiency and reliable operation. Packaging and heat-sink have been optimized to reduce the overall thermal resistance. Assembly in a compact and rugged package, using AuSn hard solder, allows easy connection to a heat exchanger to get good thermal control.

This technology of stacks has been successfully submitted to specific environmental tests requested for Space missions (long life-tests, endurance under vacuum, irradiations...) with NASA or ESA.

These stacks are ideal for different applications under severe conditions: pumping rods or slabs solid state lasers, illuminators...for aerospace, industrial, space applications.



### MAIN FEATURES

- QCW operation
- 60W to 400W QCW per diode bar
- Standard wavelength: from 790 to 980 nm
- Vacuum qualified technology
- Low thermal resistance assembly
- Mechanically robust, shock and vibration resistant

x =	1	2	3	4	5	6	
λ	808	790	830	915	940	980	nm
y =	2	3	4	5	6	7	8
P/bar	60	80	100	125	150	200	300
							400
							W

### SPECIFICATIONS

PARAMETERS @ 25°C	QD-Qxyzz-A	QD-Qxyzz-B	QD-Qxyzz-BS	QD-Qxyzz-G	QD-Qxyzz-K	Units
Number of Diode bars <b>zz =</b>	2 to 06	1 to 12	1 to 19	1 to 16	1 to 08	
Pitch between diode bars	330 to few 1000s					μm
Emitting area	10 x (zz - 1)* pitch					mm <sup>2</sup>
QCW Optical Power per Diode Bar	up to 400					W
QCW Optical Power	up to 2 400	up to 4 400	up to 7 000	up to 6 000	up to 1 600	W
Operating current @ 100W / bar	95 A Typical - 115A Max					A
Operating current @ 200W / bar	185 A Typical - 215A Max					A
Operating current @ 400W / bar	370 A Typical - 390A Max					A
Operating voltage	<2 V /bar					V
Total efficiency	58% @ 808 nm, 65% @ 940/980 nm					%
Wavelength	790 to 980					nm
Spectral width (FWHM)	3					nm
Beam divergence (FWHM)	9 X 36					deg.

#### Note :

- Standard Polarisation: TM or TE mode @ 808 nm, TE @ 9xx nm
- Variation of wavelength with temperature is approximately 0.26 nm/°C
- Tolerance on wavelength is +/- 3nm, +/- 1.5 nm on demand
- Double or Triple Quantum Well bars available (ex: 400W @ 200A & 4V)
- Specifications are for nominal lifetime > 1. 10<sup>9</sup> pulses (for 200μs pulse width)

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## ABSOLUTE MAXIMUM RATINGS

PARAMETERS	QD-Qxyzz-A	QD-Qxyzz-B	QD-Qxyzz-BS	QD-Qxyzz-G	QD-Qxyzz-K
Pulse width	500				μs
Maximum duty cycle	3	4			%
Reverse voltage	3				Volt
Storage temperature	-55 to +85				°C

**Note :** Operation at temperature below dew point requests to use dry N2 environment

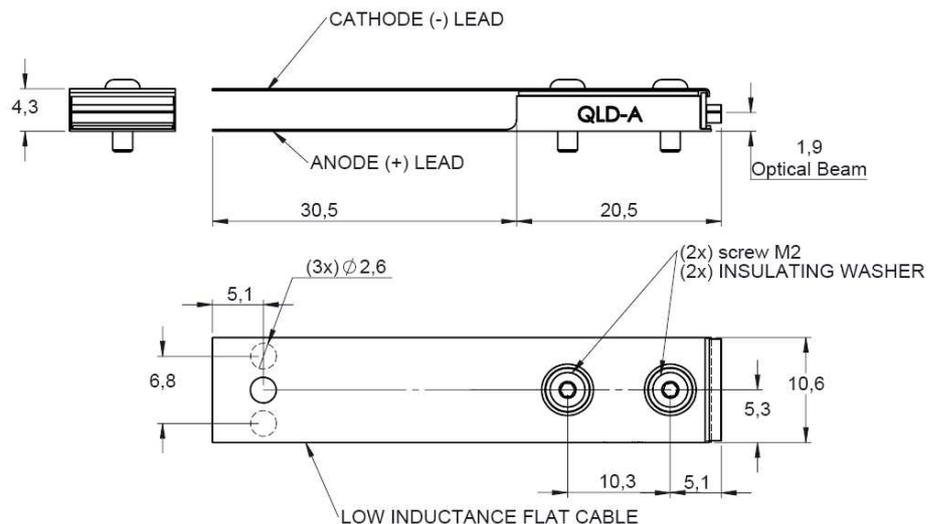
## PACKAGE SPECIFICATIONS

- dimensions are in mm
- standard tolerances are  $\pm 0.2$  mm

### QD-Q1yzz-A



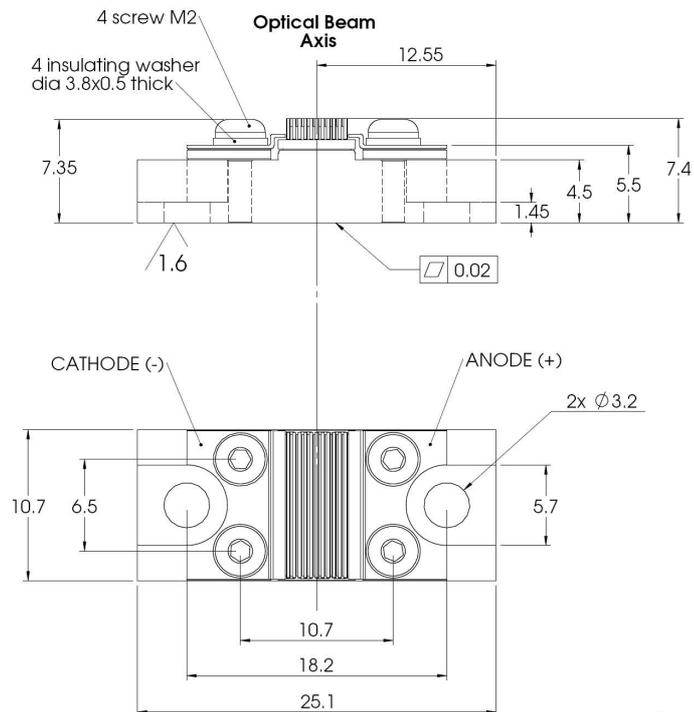
This stack "A" type with a very thin design can be proposed with a total number of 'zz' diode bars.  
 'zz' = 1 to 6 bars at a pitch of 400μm,  
 'zz' = 1 to 5 bars at a pitch of 500μm



## QD-Q1yzz-B



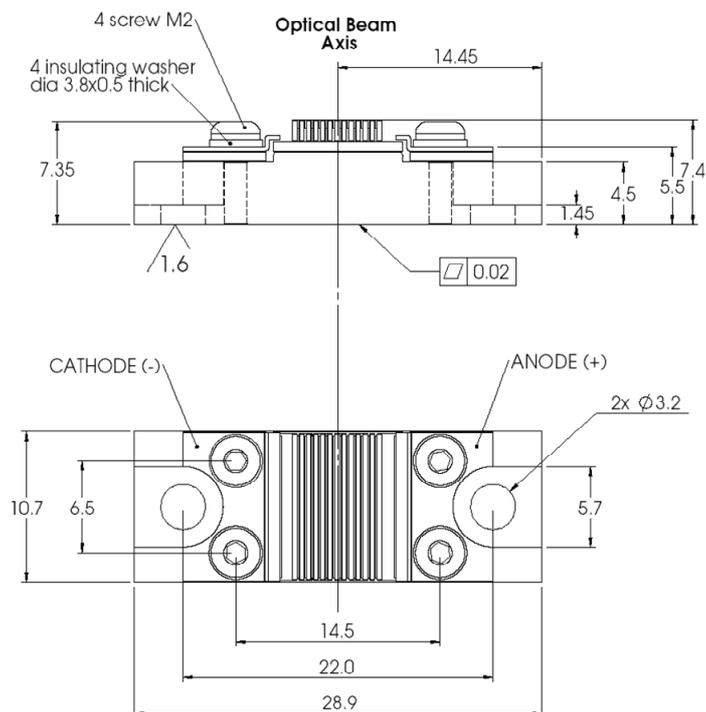
This stack “B” type can be proposed with a variable number (‘zz’) of diode bars:  
 ‘zz’ = 1 to 12 bars at a pitch of 330µm,  
 ‘zz’ = 1 to 11 bars at a pitch of 400µm,  
 ‘zz’ = 1 to 8 bars at a pitch of 500µm



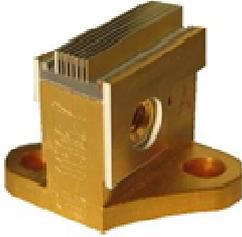
## QD-Q1yzz-BS



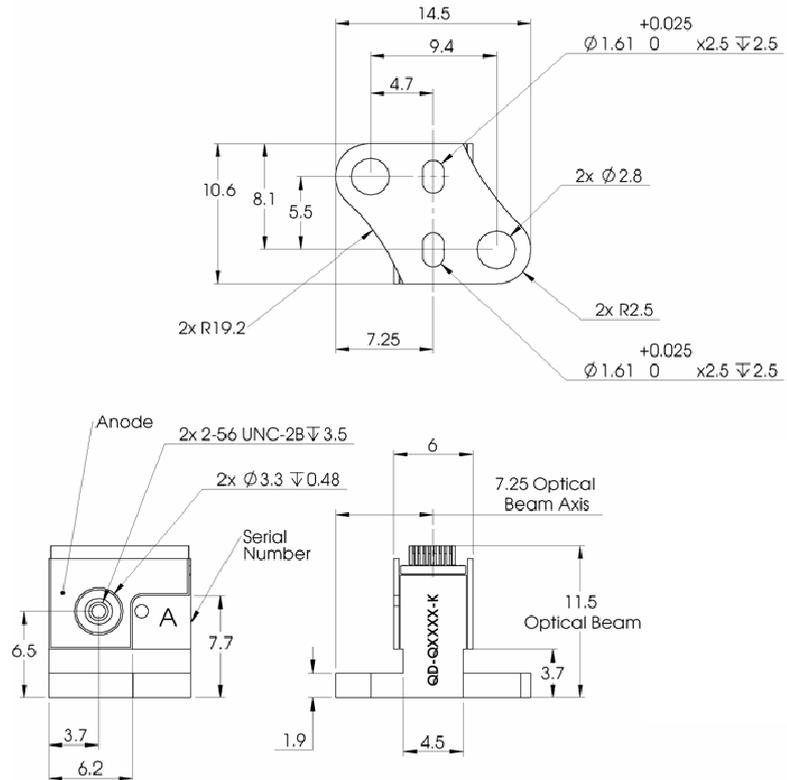
This stack “BS” type can be proposed with a variable number (‘zz’) of diode bars:  
 ‘zz’ = 1 to 19 bars at a pitch of 400µm,  
 ‘zz’ = 1 to 15 bars at a pitch of 500µm,  
 ‘zz’ = 1 to 6 bars at a pitch of 1000µm



## QD-Q1yzz-K



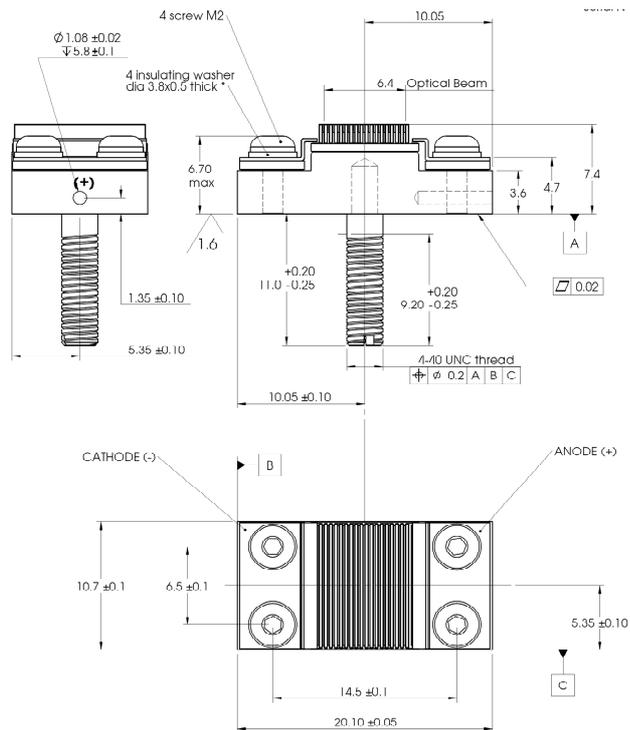
This stack “Z” type offers a very small foot-print.  
It can be proposed with a variable number of ‘zz’ diode bars:  
‘zz’ = 1 to 8 bars at a pitch of 400µm,  
‘zz’ = 1 to 6 bars at a pitch of 500µm



## QD-Q1yzz-G



This stack “BS” type can be proposed with a variable number (‘zz’) of diode bars:  
‘zz’ = 1 to 19 bars at a pitch of 400µm,  
‘zz’ = 1 to 15 bars at a pitch of 500µm  
‘zz’ = 1 to 6 bars at a pitch of 1000µm



## Dual QCW Linear Stacked Array

QD-Q1yzz-L2 QD-Q1yzz-Zn

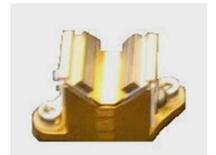
### DESCRIPTION

QD-Q1yzz-L2 is a conductively cooled dual laser diode stacked array designed for a very compact association of stacks with up to 12 diode bars each. These stacks are biased in series, with a reduced space between them. For specific design such as 3 or 4 even more stacks in //, use the letter Z (n been the number of stacks from 2 to 25).

The laser diode bar arrays benefit from a fully mastered technology, with appropriate design for improved efficiency and reliable operation. Assembly, using AuSn hard solder technology, has been optimized to reduce the overall thermal resistance.

Custom assembly is also proposed to package, with our 'full soldered' technology, different number of stacks on the same heat-sink of any proprietary design. This allows building compact and complex specific pumping heads such as V stack.

These stacks are ideal for pumping rods or slab solid state lasers for a broad range of aerospace, defence, industrial and space application.



### MAIN FEATURES

- QCW operation
- Highly compact design
- Possibility of custom multi-stacks design's
- Wavelengths: 808nm, 9xxnm
- Low thermal resistance assembly
- Mechanically robust, shock and vibration qualified

x =	1	2	3	4	5	6	
$\lambda$	808	790	830	915	940	980	nm
y =	2	3	4	5	6	7	8
P/bar	60	80	100	125	150	200	300
							400
							W

### SPECIFICATIONS (Example)

PARAMETERS @ 25 °C		QD-Qxyzz-L2	Units
Number of Diode bars	zz =	Up to 6 times 12 bars	
Pitch between diode bars		330 to few 1000s	$\mu\text{m}$
Emission area		Upon packaging	$\text{mm}^2$
QCW Optical Power per Diode Bar		Up to 400	W
QCW Optical Power		Up to 10 000	W
Operating current	@ 100 W / bar	95 Typ. - 115 Max	A
Operating current	@ 200 W / bar	185 Typ. - 215 Max.	A
	@ 400W / bar	370 Typ. - 390 Max	A
Operating voltage		<2V / bar	V
Total efficiency		58% @ 808 nm, 65% @ 940/980 nm	%
Wavelength		790 to 980	nm / °C
Spectral width (FWHM)		3	nm / °C
Beam divergence (FWHM)		8 X 36	deg.

#### Note :

- Standard Polarisation: TM or TE mode @ 808 nm, TE @ 9xx nm
- Standard tolerance on wavelength is +/- 3nm, +/- 1,5 nm on demand
- Possibility of "custom design's" with array with different number of stacks
- FAC collimation starting from 400  $\mu\text{m}$  pitch
- Specifications are for nominal lifetime > 1. 10<sup>9</sup> pulses @ +25°C (for 200 $\mu\text{s}$  pulse width)

Quantel Laser Diodes reserves the right to change specifications without prior notice

## ABSOLUTE MAXIMUM RATINGS

PARAMETERS	QD-Qxyzz-L2	Units
Pulse width	5000	μs
Maximum duty cycle	3	%
Reverse voltage	3	Volt
Operating temperature	- 40 to + 65	°C
Storage temperature	-55 to +85	°C

**Note :** Operation at temperature below dew point requests to use dry N2 environment

## PACKAGE SPECIFICATIONS

- dimensions are in mm
- standard tolerances are  $\pm 0.2$  mm

### QD-Q1yzz-L2



This Linear stacked Array "L2" type is an association of two stacks with 2 X 'zz' bars per stack. 'zz' can be 2 to 12 diode bars which gives stacks of 4 to 24 diode bars.

Other configuration are available on demand (4 times 4 bars, 3 times 16 bars,...)

