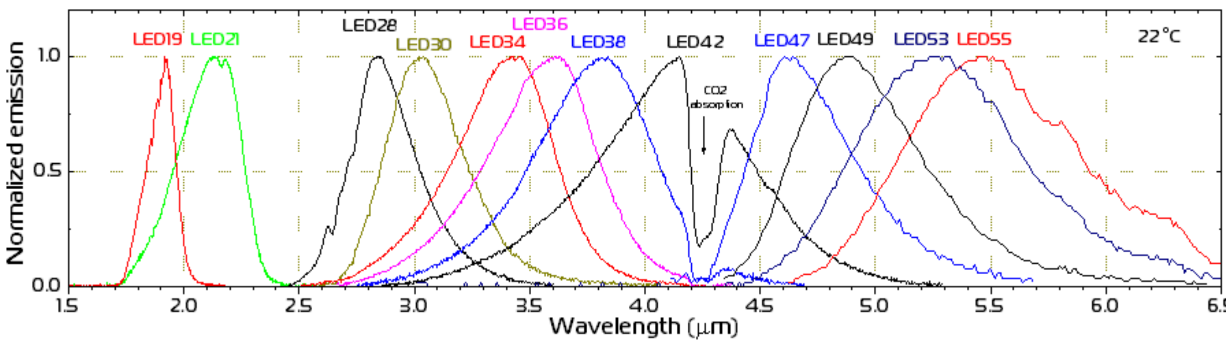
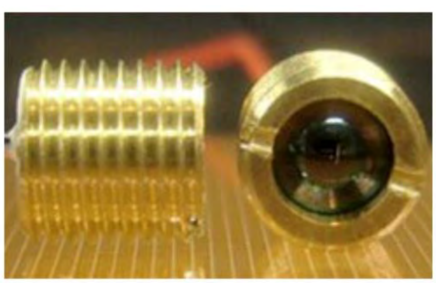
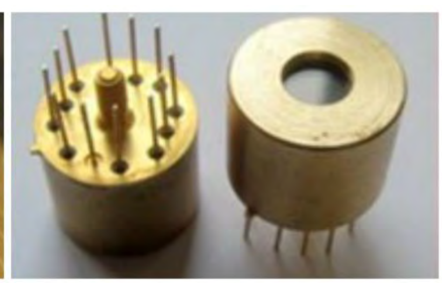
Boston Electronics

Infrared LEDs



Centered at 2.1 to 7 μm





Boston Electronics Corporation

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www.boselec.com **boselec@boselec.com**

Some notes about our IR LEDs

- We generally have in stock for immediate delivery a few of these devices in the LED*nn*Sr package.
- We have a convenient low cost programmable electronic drive circuit board available. The Universal Photon Source (UPS) Driver data sheet is included in this catalog.
- We do not generally recommend using the TE-cooled versions of these devices for the following reasons:
  1. Using TWO room temp devices gives more optical power than using ONE TE-cooled device
  2. Buying TWO room temp devices costs less than buying ONE TE-cooled device
  3. Electronics to drive a TE-cooler and heat sinking a TE cooler add significant cost and complication

Features

- Easy to use
- Low cost
- Simple, flexible control using dedicated software
- Adjustable voltage driving the source
- CW or pulsed operation—MHz to DC
- Nanosecond to seconds repetition rate
- Current and voltage monitor
- powered from USB (<0.5A) or DC supply

UPS Driver™

Universal Photon Source (UPS) Driver Board

The Boston Electronics Universal Photon Source (UPS) Driver delivers! It is a flexible, compact, low cost, configurable board, including power supply, that drives a wide range of light sources. The driver can control pulsed and CW sources, which makes it suitable for driving **ultraviolet (UV), visible and infrared (IR) sources, light emitting diodes (LEDs) and lasers over a frequency range of MHz to DC.**

Control is provided by easy to use PC software. The last used drive parameters are stored in the non-volatile EEPROM memory; thus, the configuration is remembered. The UPS Driver is equipped with voltage and current monitors, trigger output, power and communication inputs and anode/cathode connections for the sources.

The UPS Driver is compatible with UV, visible and IR sources, LEDs and lasers.

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UPS Driver Specifications

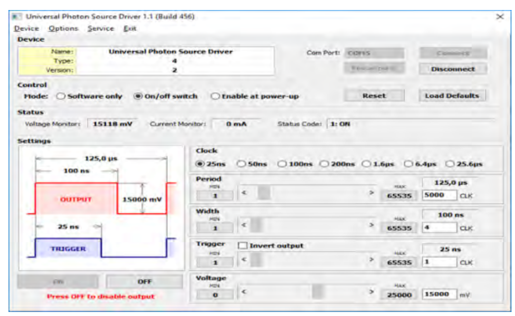
Developed with, and manufactered by:

Electrical parameters:

- Power supply: - USB from computer or +5 ... +6 V, connected to the DC Jack connector
- Average power sources
  - max. 1.5W, for the power supply from USB
  - max. 10W, for the power supply connected to the DC Jack connector
- Adjustable voltage supply, in the range 0.5 – 25V, 4095 steps
- Maximum current: 10 A (tested with QCL at 20 V and 100 ns pulse width)
- Monitor for the supply voltage source (ADC)
- Master clock period / frequency:

main clock period / frequency	output signal max. period / min. frequency
25 ns / 40 MHz	1.638 ms / 610 Hz
50 ns / 20 MHz	3.27 ms / 305 Hz
100 ns / 10 MHz	6.55 ms / 152 Hz
200 ns / 5 MHz	13.1 ms / 76.3 Hz
1600 ns / 0,625 MHz	104 ms / 9.54 Hz
6.4 µs / 156,25 kHz	420 ms / 2.38 Hz
25.6 µs / 39,0625 kHz	1.677 s / 0.594 Hz

- Pulse repetition period - adjustable in the range 1 ... 65535 times the period of the master clock
- Pulse duration - adjustable in the range 1 ... 65535 times the period of the master clock
  - if pulse duration is higher than the period, source stays on – CW operation
- Driving signal rise / fall times < 3 ns.
- Pulse jitter : 6 ns pp
- Trigger output starts 50 ns before the IR pulse
  - adjustable duration time in the range 1 ... 65535 times the period of the master clock
- Power supply monitor
- Source average current monitor - time constant 100 ms
- All parameters have their equivalent – minimum/maximum to provide for safe operation
- Anode of the source is connected to ground, cathode below ground potential

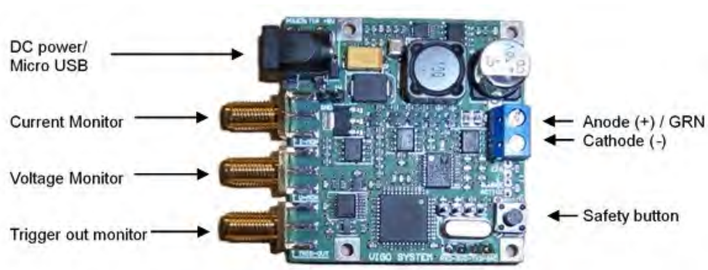


Software

- The UPS Driver is configured using PC software, or text protocols.

Connections:

- trigger output—SMA connector
  - output impedance 50 Ω
  - standard LVTTL: logic 0 - 0 V, logic 1 – 3,3 V @ Hi-imp, 1.65 V @ 50 Ω
- output current monitor—SMA connector
  - DC offset ~ 100 mV @ 50 Ω
  - current sensitivity 0.1 V/A @ 50 Ω / can be modified
  - 100 MHz BW
- output voltage monitor—SMA connector
  - DC offset ~ 100 mV @ 50 Ω
  - voltage sensitivity 50mV/V @ 50 Ω / can be modified
  - 100 MHz bandwidth
- micro-USB connector
  - communication with PC, virtual COM port
  - power supply, if current consumption of the driver does not exceed 0.5 A (USB 2.0 standard)
- DC power jack 2.5/5.5
  - power supply, if driver requires more than 0.5A (USB 2.0 standard), or If the PC is not used (configuration is restored from the memory)



Size:

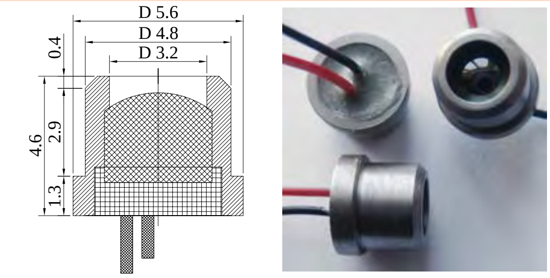
- PCB dimensions 60x50x15mm (width×height×depth), including connectors

Optically Immersed 2.15 µm LED in heat-sink optimized housing — LED21Su, LED21Sr

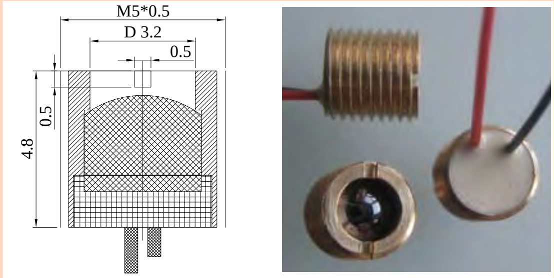
Peak wavelength λ_{max}	µm		2.15
Pulse power P_{pulsed}	mW	Drive current 1 A, 2 % duty cycle	10
Quasi-CW power P_{QCW}	mW	Drive current 0.4 A, 50% duty cycle	3
CW power P_{CW}	mW	Drive current 0.2 A	1.2

Code	Emission size, mm	Lens material	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation, %	Operation conditions, ⁰C	Lifetime, hrs	Polarity
LED21Su/Sr	∅ 3.2	Si	~15	≤5	±25	-25÷+60	>80 000	Red wire – positive, Black wire – negative

Product view



LED21Su



LED21Sr

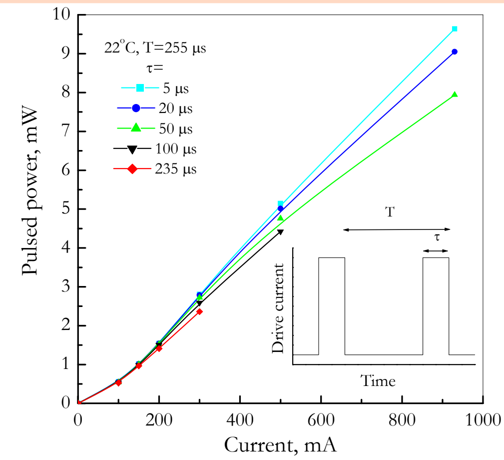
Features

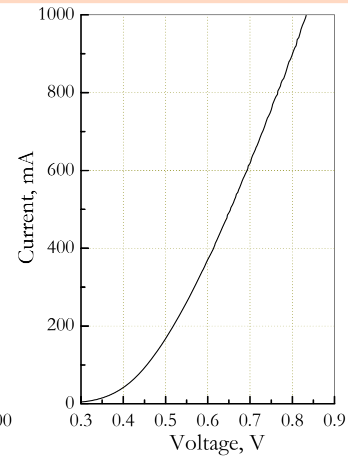
Growth of narrow gap semiconductor alloys onto n⁺-GaSb substrate; Flip-chip design of LEDs; Optical coupling through the use of chalcogenide glasses and Si lenses with antireflection coating

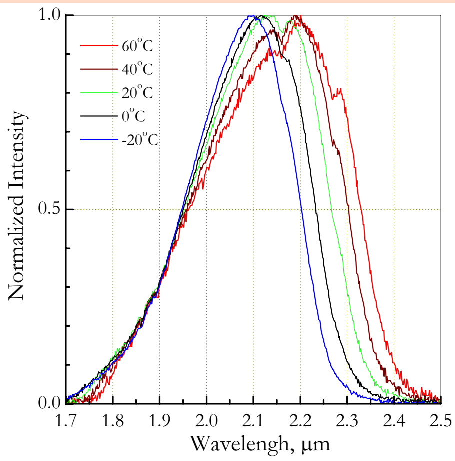
3-fold increased LED output power; Beam collimation within ~15 deg; Low serial resistance; Small on-off time (tenths of ns); Low power consumption (≤0.1 W)

Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. **Data are valid for 22°C and LED attached to a heatsink**. Heatsink is important for LED operation especially in the CW mode.

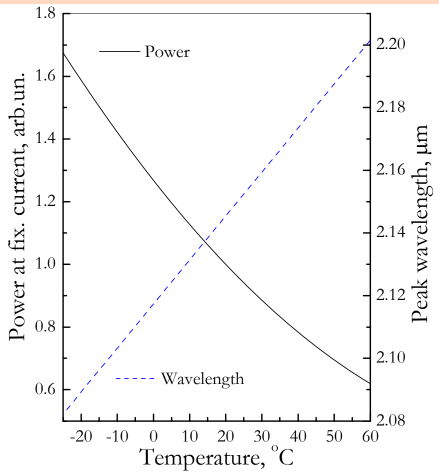
L-I and I-V characteristics and emission spectra

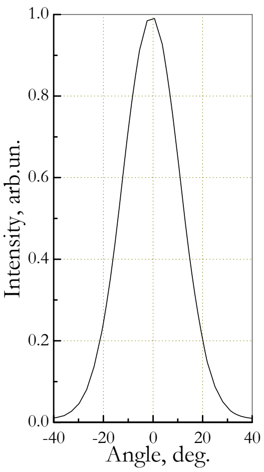


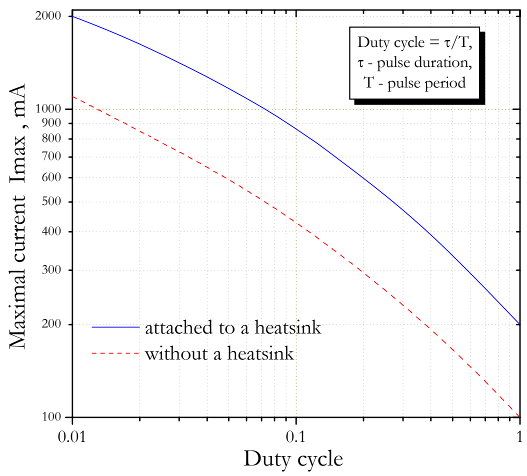




Output power and peak wavelength vs temperature, far-field pattern and maximal current vs operation conditions







Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 14.10.11

Optically Immersed 3.0 µm LED in heatsink optimized housing — LED30Su, LED30Sr

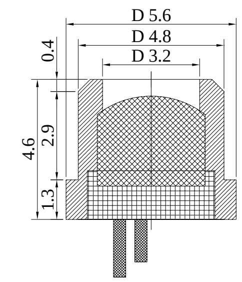
TE cooled Optically Immersed 3.0 µm LED — LED30TO8TEC

Peak wavelength	µm		2.97±0.05 [1]
Pulse power	mW	Drive current 1 A, 0.02 duty cycle	0.15÷0.18
Quasi-CW power	mW	Drive current 0.3 A, 0.5 duty cycle	0.05÷0.06
CW power	mW	Drive current 0.2 A	0.03÷0.04
Cut-off frequency	MHz		20 [2]

Code	Emission size, mm	Weight, g	Optical components	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation in lot, %	Operation conditions, °C	Lifetime, hrs
LED30Su LED30Sr	∅ 3.2	~0.4	Si lens	~15	≤5	±25	-60÷+120 [3]	>80 000 [5]
LED30 TO8TEC	∅ 3.2	~10	Si lens and output sapphire window D=6mm	~15	≤5	±25	-60÷+85 [4]	>80 000 [5]

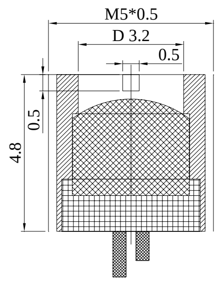
Product view

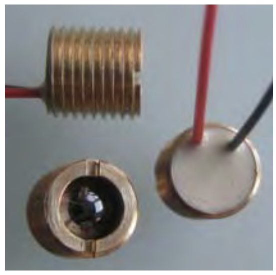
LED30Su



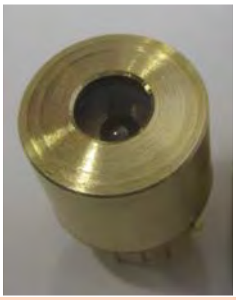
Pin assignment: red wire or long wire and red point on house - positive

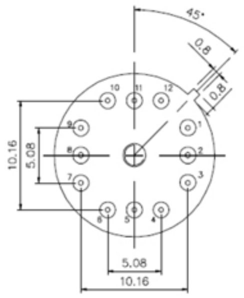
LED30Sr

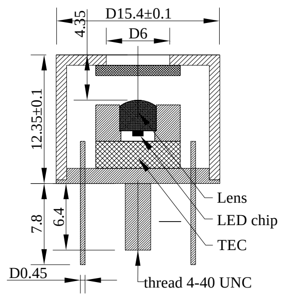




Pin assignment: red wire or long wire and red point on house - positive







Pin assignment LED30TO8TEC12

1 TEC negative;
3 TEC positive;
4 LED negative;
6 LED pozitive;
7, 9 thermosensor;
11 ⊥ (House)

Features

- Original growth of narrow gap semiconductor alloys onto n^+-InAs substrate;
- Flip-chip design of LEDs;
- Optical coupling through the use of chalcogenide glasses and Si lenses with antireflection coating
- 3-fold increased LED output power;
- Beam collimation;
- Small on-off time (tenths of ns);
- Low power consumption (≤0.1 W)

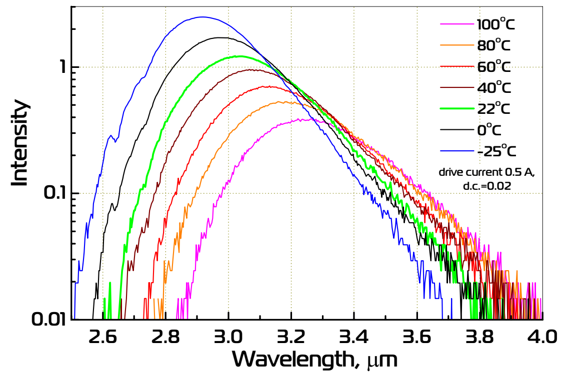
Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. Data are valid for LED attached to a heatsink and thermostabilized at 22°C. Heatsink is essential for TEC operation!

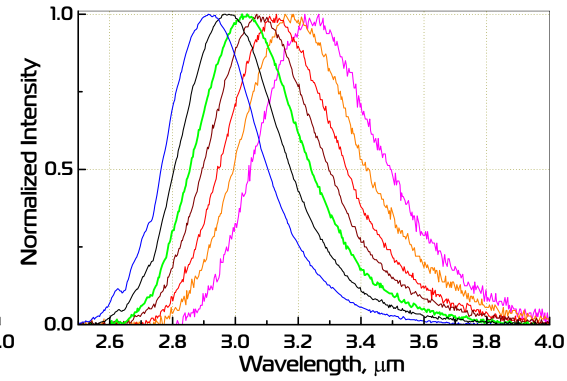
Notes

[1] - process 6189
[2] - according to estimation
[3] - devices have passed through 15 thermo cycles : (20°C, 8 hrs) -transition period of 30 min – (+125°C, 8 hrs) without changes in specifications. Valid for devices produced since 01.2013
[4] - devices have passed through 15 thermo cycles : (-60°C, 30 min) - transition period of 30 min -(+85°C, 30 min) without changes in specifications. Valid for devices produced since 01.2013
[5] – according to accelerated degradation stress at CW drive current 0.2 A

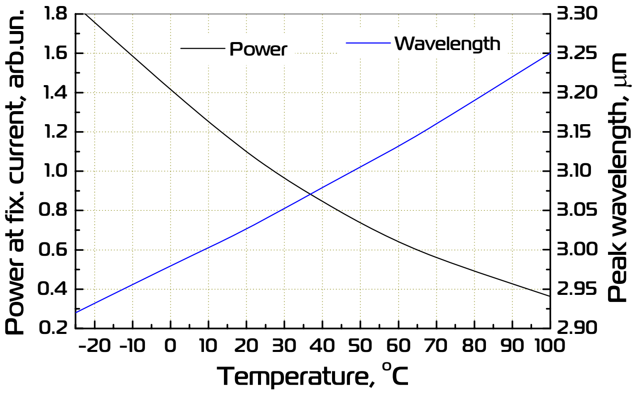
Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 15.01.13

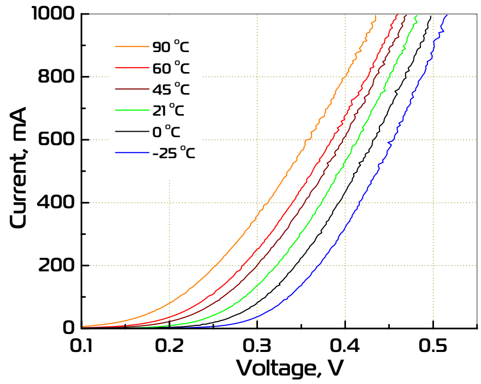
Emission spectra



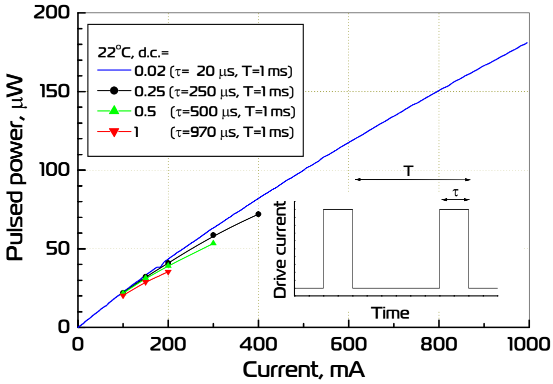


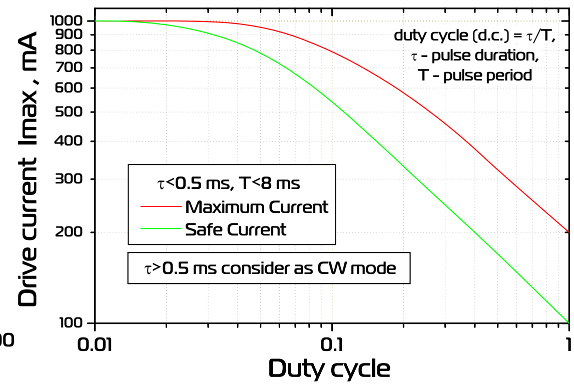
Power and peak wavelength vs. temperature; I – V curve





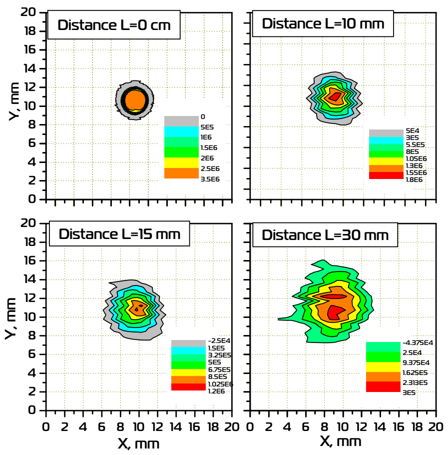
Output power and drive current vs operation conditions



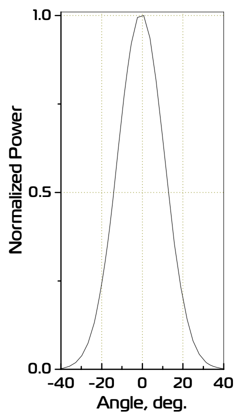


Far-field characterization

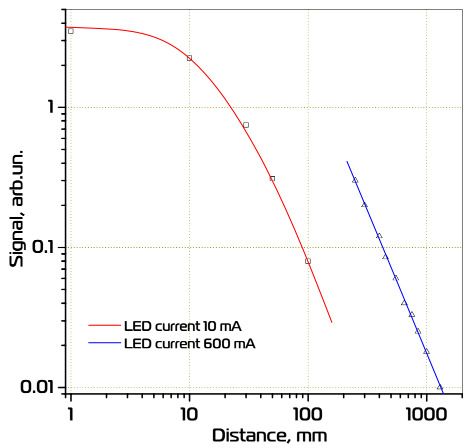
Radiation beam pattern in plane orthogonal to beam axis at several distances from LED



Angle distribution of output power



PD signal (PDxxSr/Su) vs. distance from activated LED

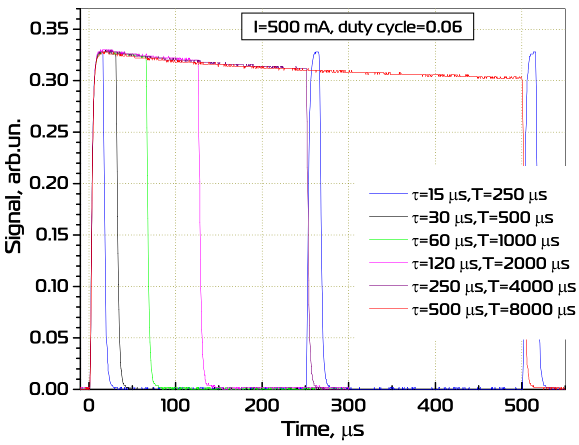


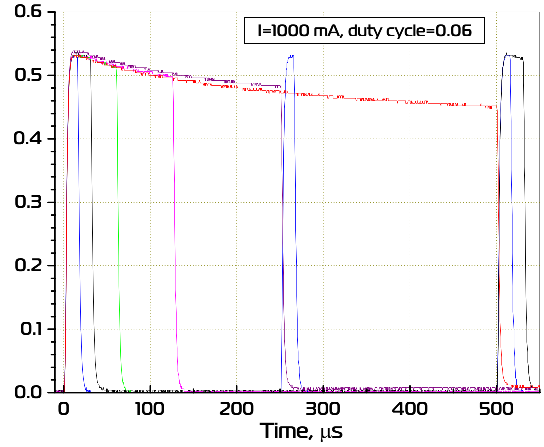
Time dependence of the output power for several values of d.c. and currents

(LED attached to a heatsink at room temperature).

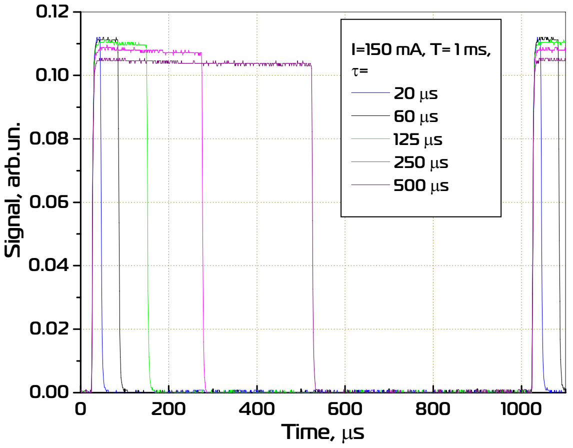
"Safe" operation mode | "Maximum current" operation mode

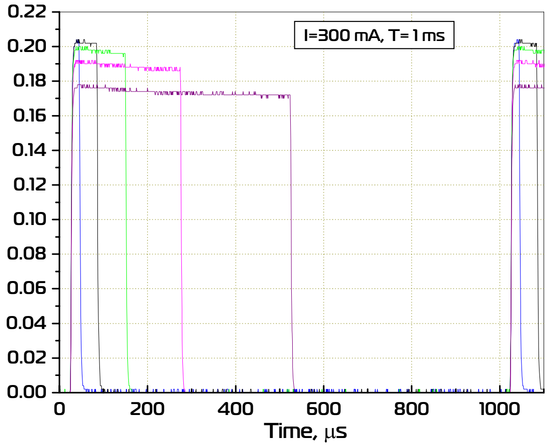
Pulse operation (d.c.=0.06)



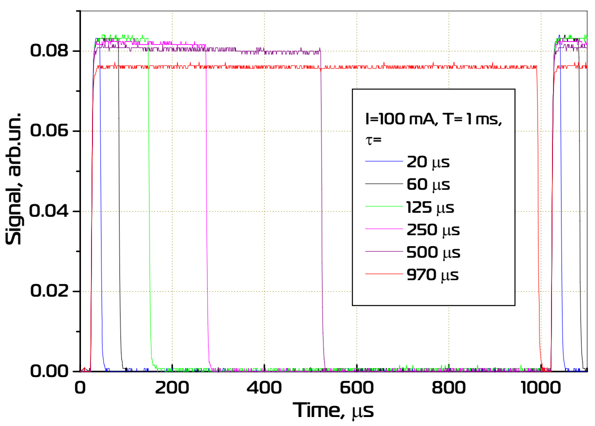


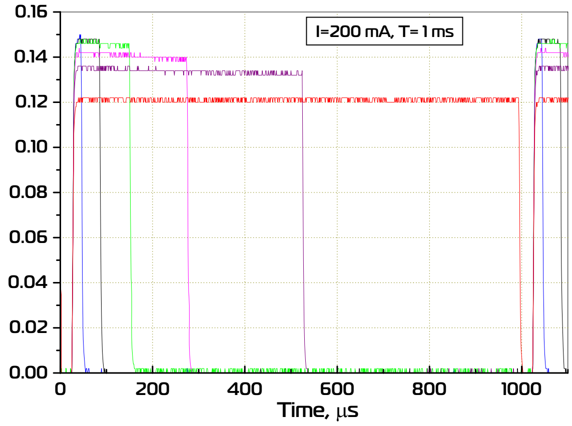
Quasi CW mode (d.c.=0.5)





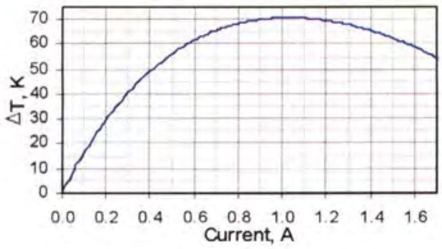
CW mode (d.c.=1)

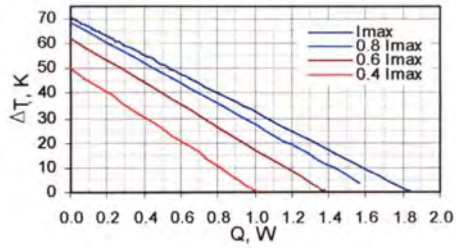


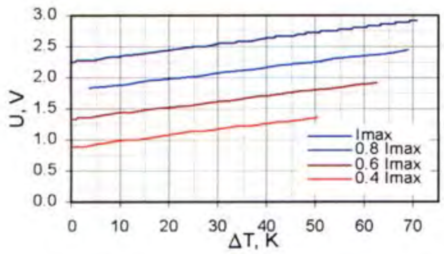


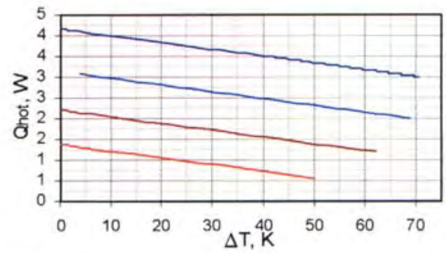
Thermoelectric cooling module datasheet

Mounted TEC	H, mm	ΔT_{max}, K	Q_{max}, W	I_{max}, A	U_{max}, V	R_t, K/W
1MC06-024/1-15	2.6	70	1.86	1.0	2.78	1.07







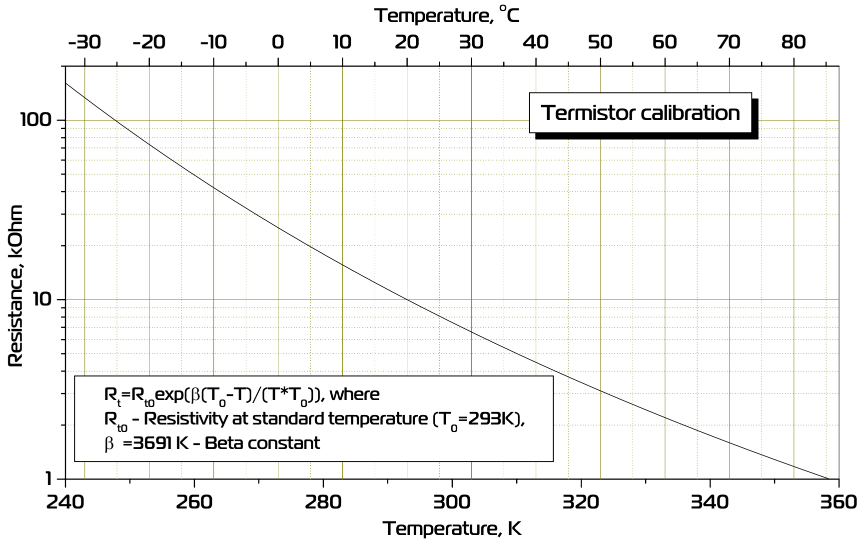


Data for T_{hot}=300 K, from www.tec-microsystems.com; www.rmtltd.ru

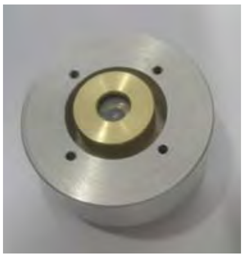
Thermistor specification

Type TB04-103

T, °C	R, kΩ	T, °C	R, kΩ
-60	1134.5	15	12.44
-55	762.4	20	10.00
-50	521.6	25	8.09
-45	362.8	25	8.09
-40	256.3	30	6.60
-35	183.8	35	5.41
-30	133.6	40	4.47
-25	98.3	45	3.71
-20	73.3	50	3.10
-15	55.2	55	2.61
-10	42.1	60	2.20
-5	32.4	65	1.87
0	25.2	70	1.59
5	19.7	75	1.37
10	15.6	80	1.18



Possible TEC heatsink view



Optically Immersed 3.4 μm LED in heatsink optimized housing — LED34Su, LED34Sr

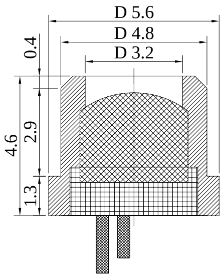
TE cooled Optically Immersed 3.4 μm LED — LED34TO8TEC

Peak wavelength	μm		3.4±0.05 @22 °C
Pulse power	mW	Drive current 1 A, 0.02 duty cycle	0.4÷0.5
Quasi-CW power	mW	Drive current 0.3 A, 0.5 duty cycle	0.20÷0.25
CW power	mW	Drive current 0.2 A	0.15÷0.20
Cut-off frequency	MHz		50 [1]

Code	Emission size, mm	Weight, g	Optical components	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation in lot, %	Operation conditions, °C	Lifetime, hrs
LED34Su LED34Sr	∅ 3.2	~0.4	Si lens	~15	≤5	±25	-60÷+120 [2]	>80 000 [4]
LED34 TO8TEC		~10	Si lens and output sapphire window D=6mm				-60÷+85 [3]	

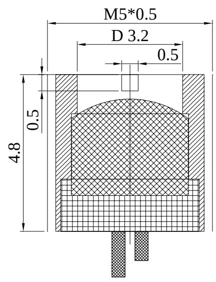
Product view

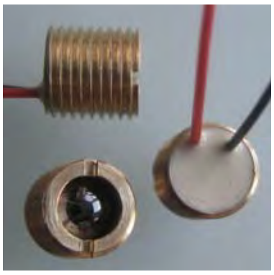
LED34Su



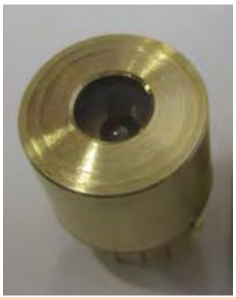
Pin assignment: red wire or long wire and red point on house - positive

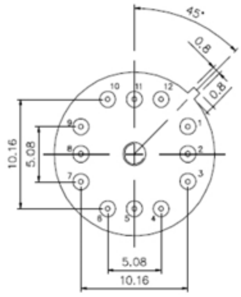
LED34Sr

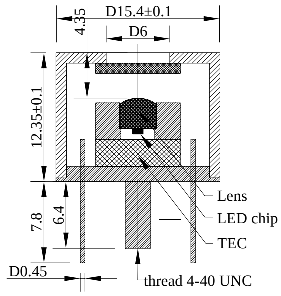




Pin assignment: red wire or long wire and red point on house - positive







Pin assignment LED34TO8TEC12

1 TEC negative;
3 TEC positive;
4 LED negative;
6 LED pozitive;
7, 9 thermosensor;
11 ⊥ (House)

Features

- Original growth of narrow gap semiconductor alloys onto n$^+$-InAs substrate;
- Flip-chip design of LEDs;
- Optical coupling through the use of chalcogenide glasses and Si lenses with antireflection coating
- 3-fold increased LED output power;
- Beam collimation;
- Small on-off time (tenths of ns);
- Low power consumption (≤0.1 W)

Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. Data are valid for LED attached to a heatsink and thermostabilized at 22°C. Heatsink is essential for TEC operation!

Notes

[1] - according to estimation

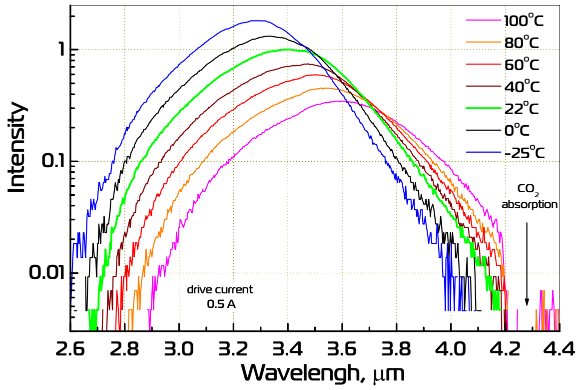
[2] - devices have passed through 15 thermo cycles : (20°C, 8 hrs) -transition period of 30 min – (+125°C, 8 hrs) without changes in specifications. Valid for devices produced since 01.2013. Operation conditions: -25÷+60 °C for old version LEDs.

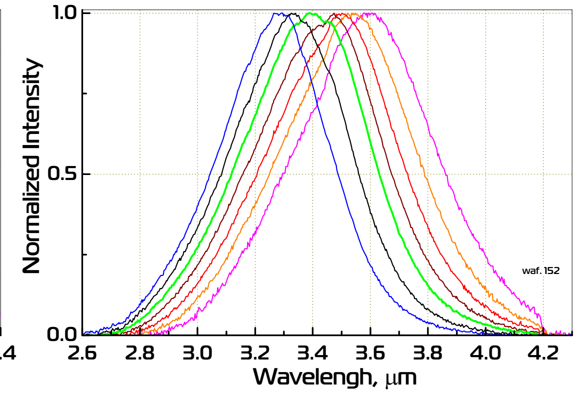
[3] - devices have passed through 15 thermo cycles : (-60°C, 30 min) - transition period of 30 min -(+85°C, 30 min) without changes in specifications. Valid for devices produced since 01.2013. Operation conditions: -25÷+60 °C for old version LEDs.

[4] – according to accelerated degradation stress at CW drive current 0.2 A

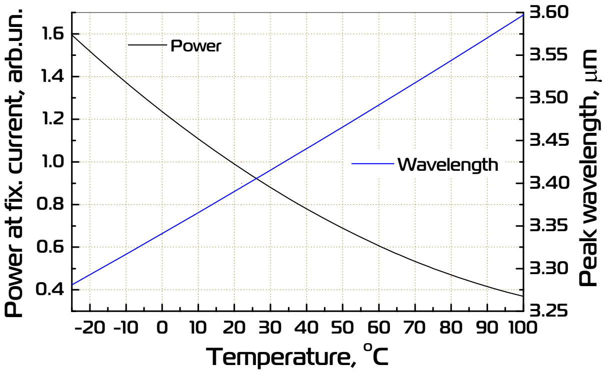
Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 16.05.13

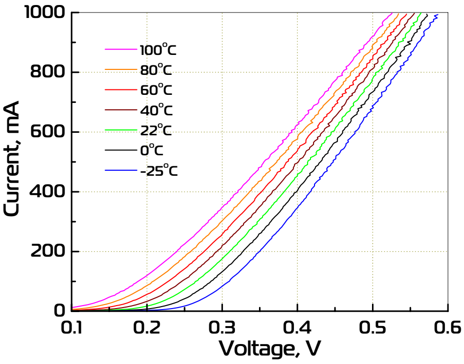
Emission spectra



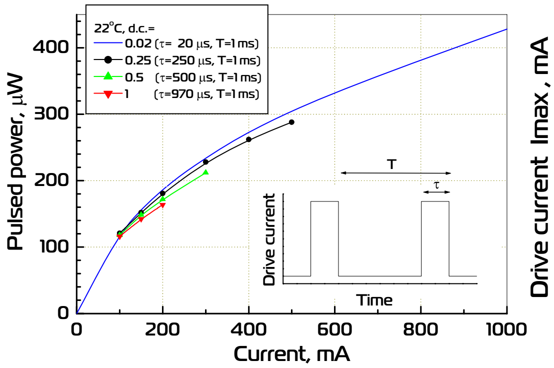


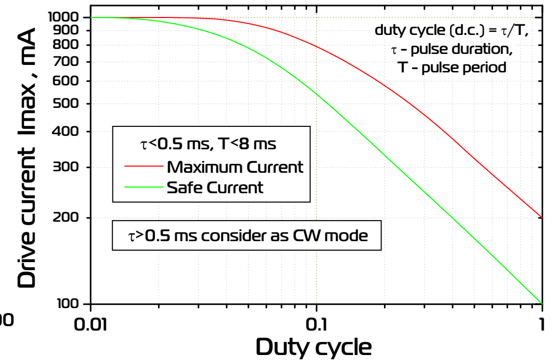
Power and peak wavelength vs. temperature; I – V curve





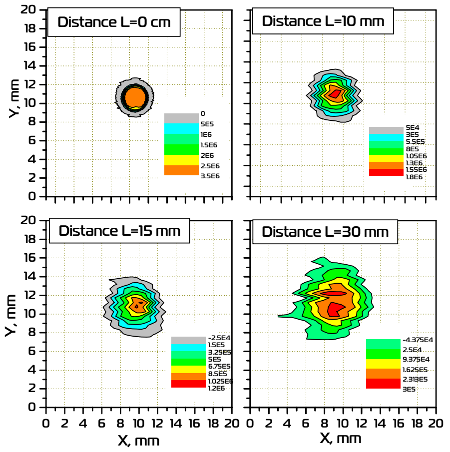
Output power and drive current vs operation conditions



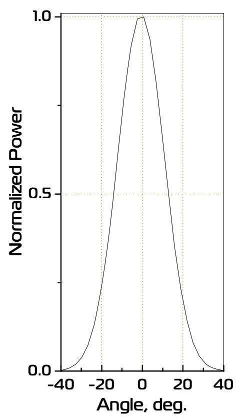


Far-field characterization

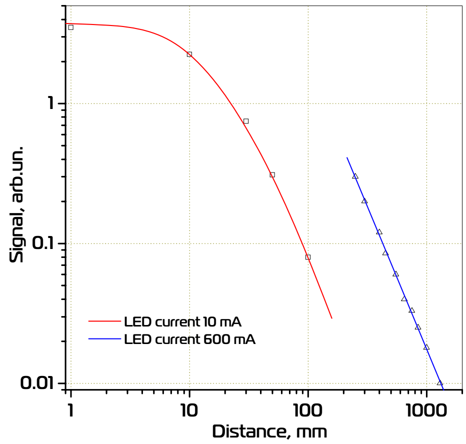
Radiation beam pattern in plane orthogonal to beam axis at several distances from LED



Angle distribution of output power



PD signal (PDxxSr/Su) vs. distance from activated LED

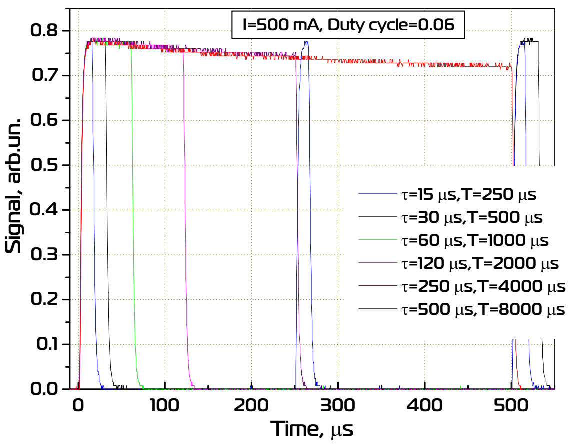


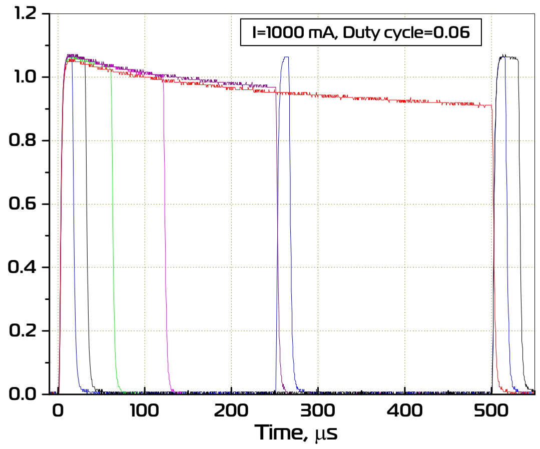
Time dependence of the output power for several values of d.c. and currents

(LED attached to a heatsink at room temperature).

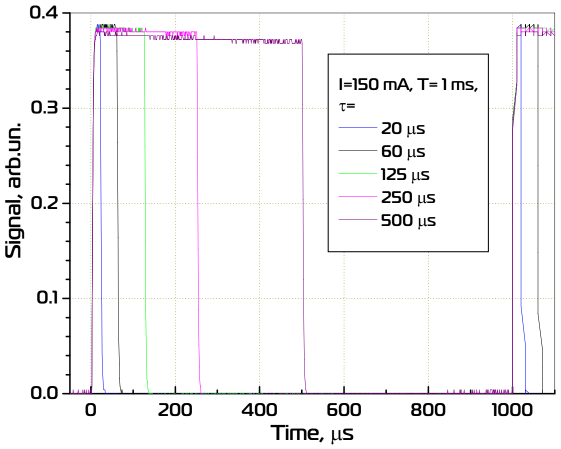
"Safe" operation mode | "Maximum current" operation mode

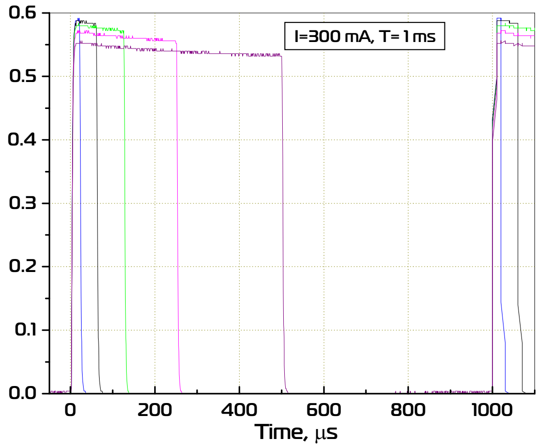
Pulse operation (d.c.=0.06)



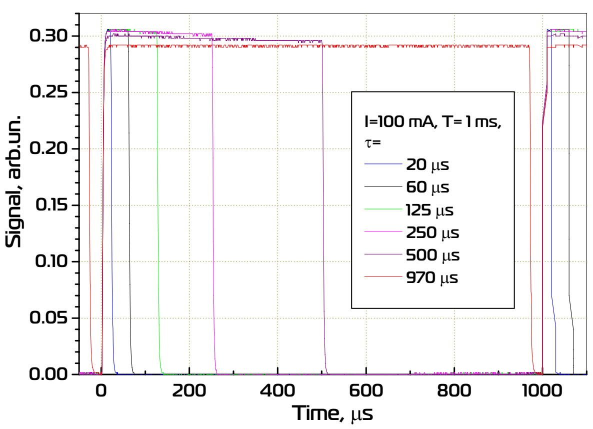


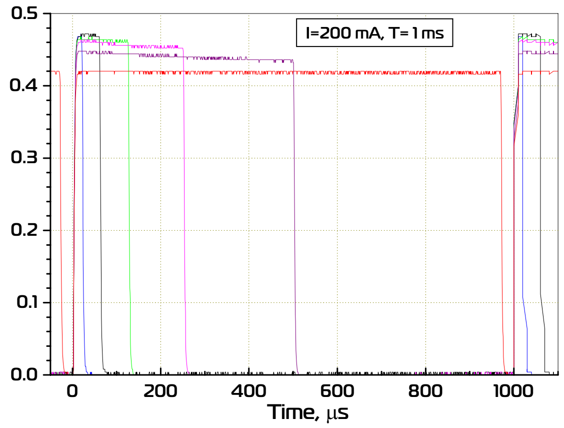
Quasi CW mode (d.c.=0.5)





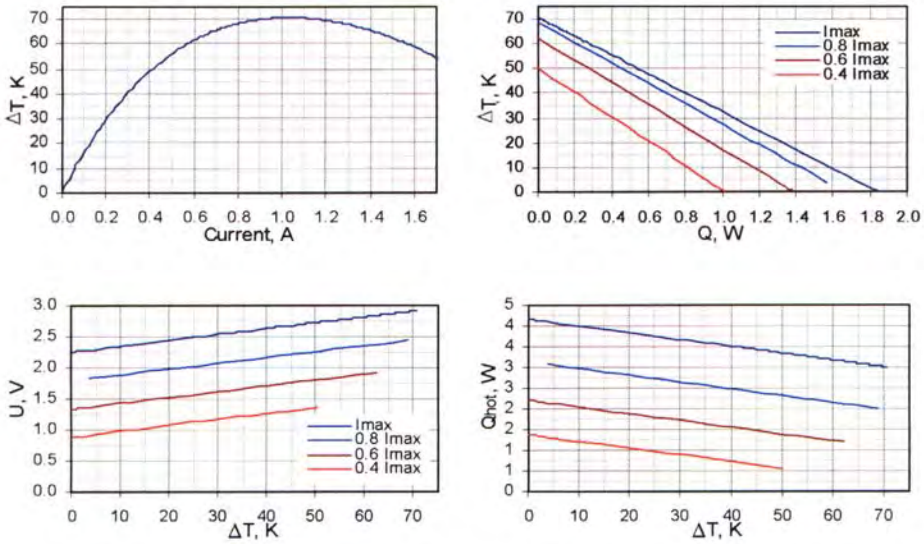
CW mode (d.c.=1)





Thermoelectric cooling module datasheet

Mounted TEC	H, mm	ΔT_{max}, K	Q_{max}, W	I_{max}, A	U_{max}, V	R_t, K/W
1MC06-024/1-15	2.6	70	1.86	1.0	2.78	1.07

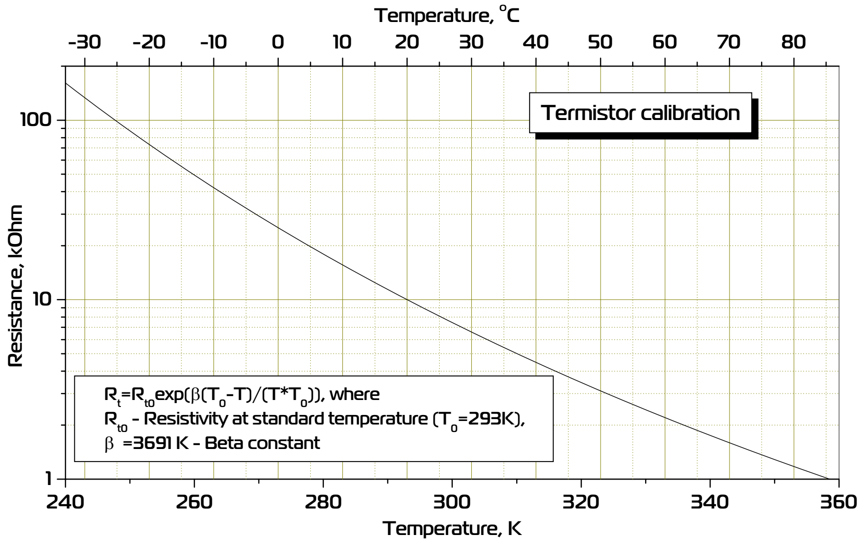


Data for T_{hot}=300 K, from www.tec-microsystems.com; www.rmtltd.ru

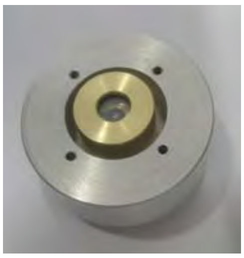
Thermistor specification

Type TB04-103

T, °C	R, kΩ	T, °C	R, kΩ
-60	1134.5	15	12.44
-55	762.4	20	10.00
-50	521.6	25	8.09
-45	362.8	25	8.09
-40	256.3	30	6.60
-35	183.8	35	5.41
-30	133.6	40	4.47
-25	98.3	45	3.71
-20	73.3	50	3.10
-15	55.2	55	2.61
-10	42.1	60	2.20
-5	32.4	65	1.87
0	25.2	70	1.59
5	19.7	75	1.37
10	15.6	80	1.18



Possible TEC heatsink view




Optically Immersed 3.6 µm LED in heatsink optimized housing — LED36Su, LED36Sr

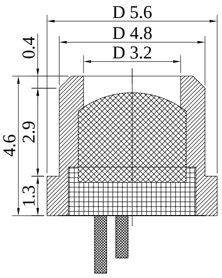
TE cooled Optically Immersed 3.6 µm LED — LED36TO8TEC

Peak wavelength	µm	3.6±0.05	@22 °C
Pulse power	mW	Drive current 1 A, 0.02 duty cycle	0.25÷0.35
Quasi-CW power	mW	Drive current 0.3 A, 0.5 duty cycle	0.15÷0.18
CW power	mW	Drive current 0.2 A	0.11÷0.15
Cut-off frequency	MHz		50 [1]

Code	Emission size, mm	Weight, g	Optical components	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation in lot, %	Operation conditions, °C	Lifetime, hrs
LED36Su LED36Sr	∅3.2	~0.4	Si lens	~15	≤5	±25	-60÷+120 [2]	>80 000 [4]
LED36 TO8TEC		~10	Si lens and output sapphire window D=6mm				-60÷+85 [3]	

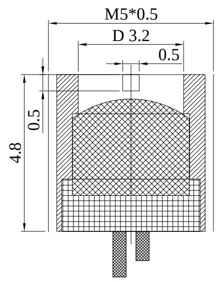
Product view

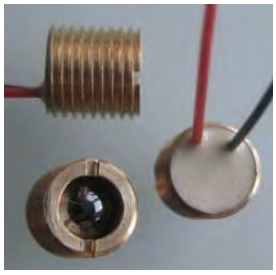
LED36Su



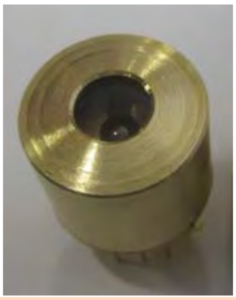
Pin assignment: red wire or long wire and red point on house - positive

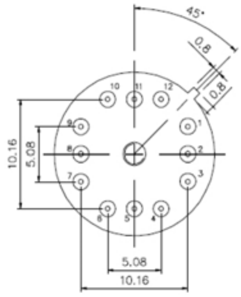
LED36Sr

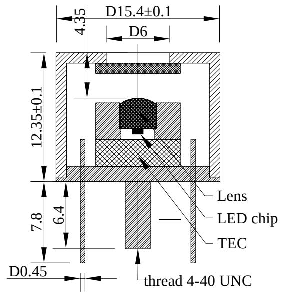




Pin assignment: red wire or long wire and red point on house - positive







Pin assignment LED36TO8TEC12

1 TEC negative;
3 TEC positive;
4 LED negative;
6 LED pozitive;
7, 9 thermosensor;
11 ⊥ (House)

Features

- Original growth of narrow gap semiconductor alloys onto n+-InAs substrate;
- Flip-chip design of LEDs;
- Optical coupling through the use of chalcogenide glasses and Si lenses with antireflection coating
- 3-fold increased LED output power;
- Beam collimation;
- Small on-off time (tenths of ns);
- Low power consumption (≤0.1 W)

Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. Data are valid for LED attached to a heatsink and thermostabilized at 22°C. Heatsink is essential for TEC operation!

Notes

[1] - according to estimation

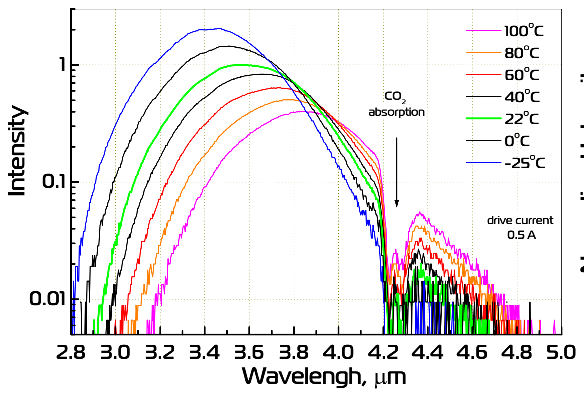
[2] - devices have passed through 15 thermo cycles : (20°C, 8 hrs) -transition period of 30 min – (+125°C, 8 hrs) without changes in specifications. Valid for devices produced since 01.2013. Operation conditions: -25÷+60 °C for old version LEDs.

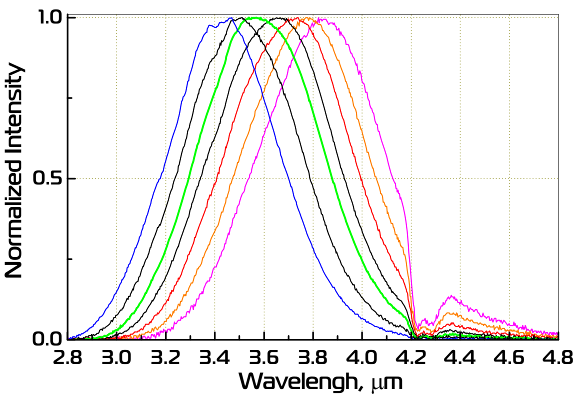
[3] - devices have passed through 15 thermo cycles : (-60°C, 30 min) - transition period of 30 min -(+85°C, 30 min) without changes in specifications. Valid for devices produced since 01.2013. Operation conditions: -25÷+60 °C for old version LEDs.

[4] – according to accelerated degradation stress at CW drive current 0.2 A

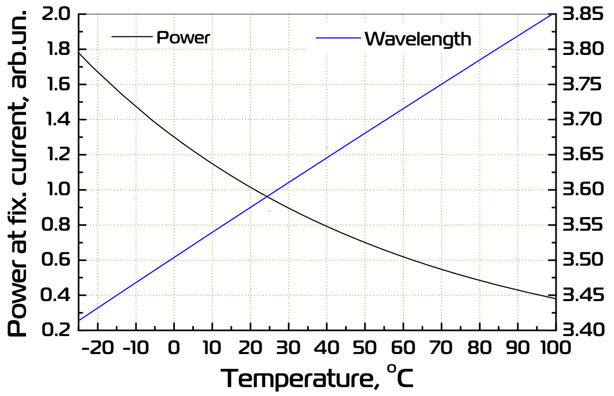
Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 31.07.13

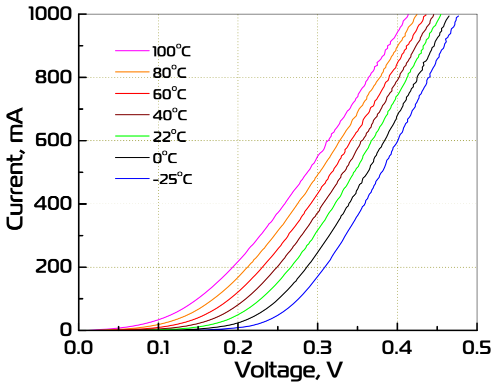
Emission spectra



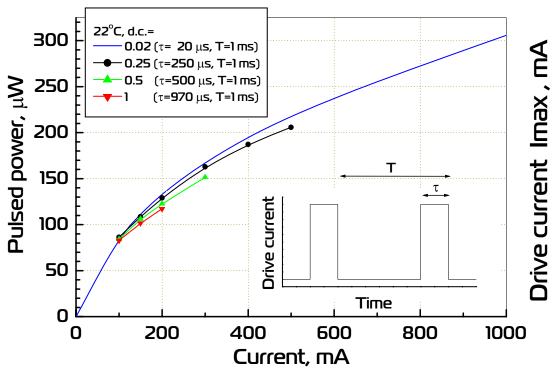


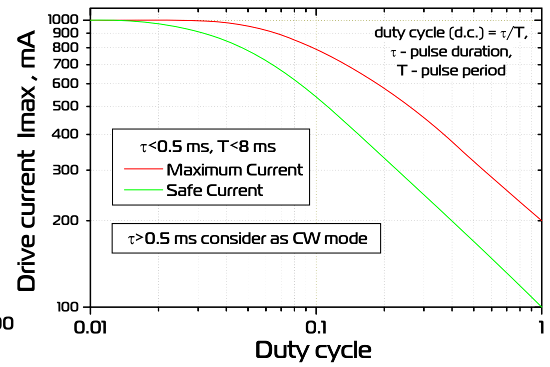
Power and peak wavelength vs. temperature; I – V curve





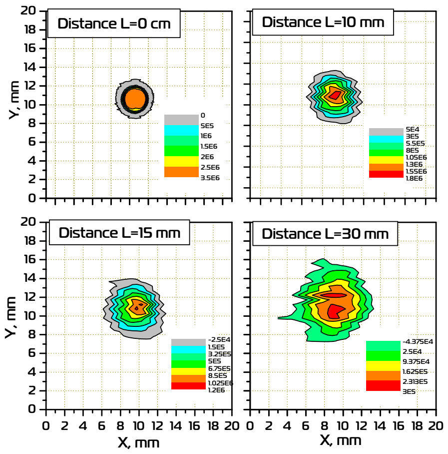
Output power and drive current vs operation conditions



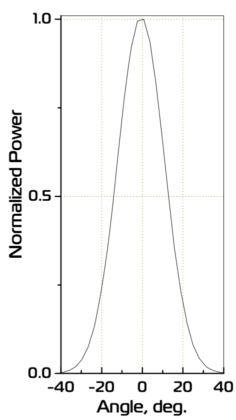


Far-field characterization

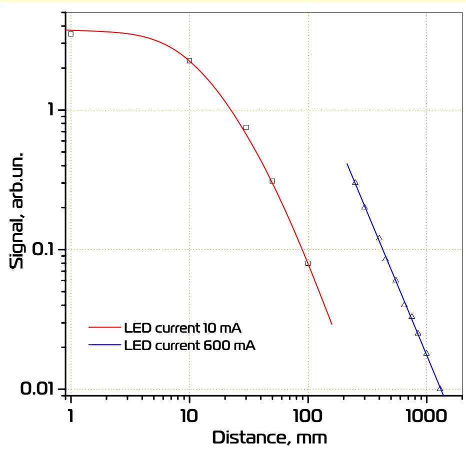
Radiation beam pattern in plane orthogonal to beam axis at several distances from LED



Angle distribution of output power



PD signal (PDxxSr/Su) vs. distance from activated LED

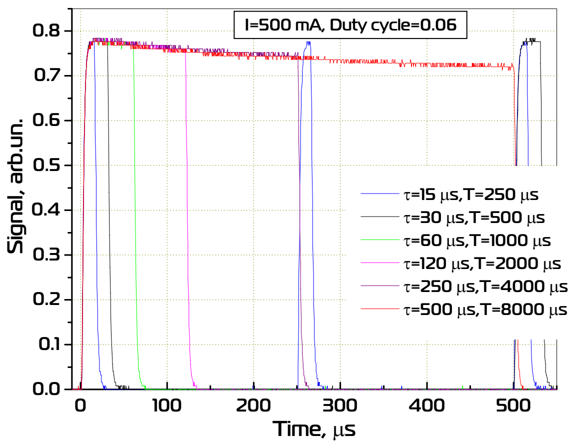


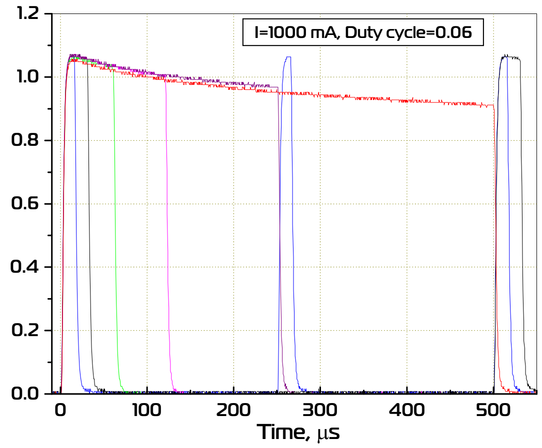
Time dependence of the output power for several values of d.c. and currents

(LED attached to a heatsink at room temperature).

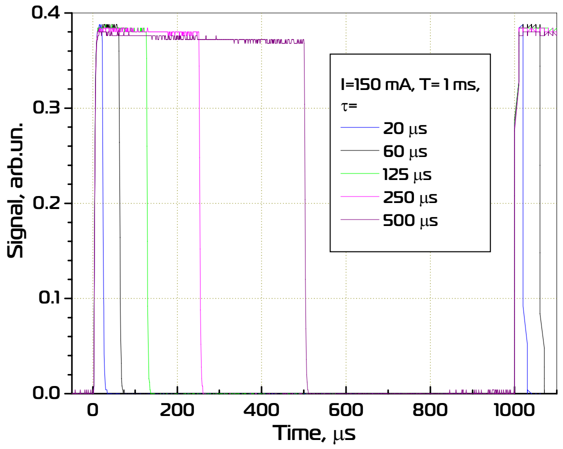
	"Safe" operation mode	"Maximum current" operation mode

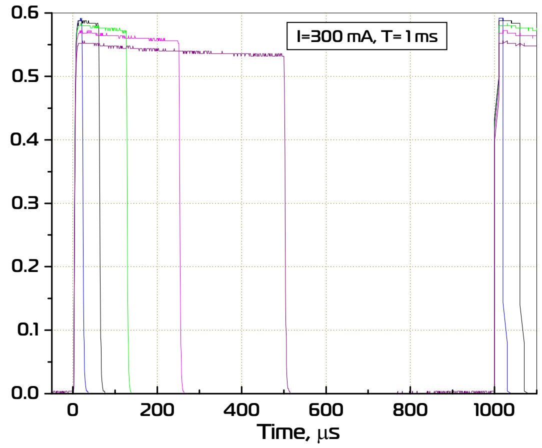
Pulse operation (d.c.=0.06)



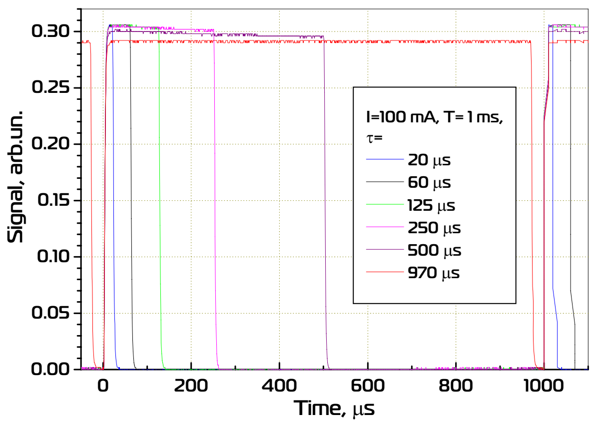


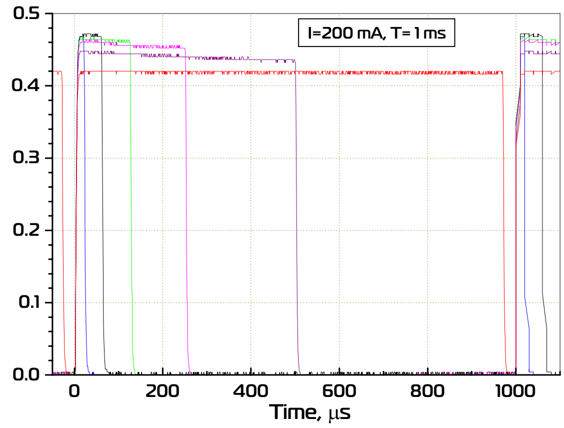
Quasi CW mode (d.c.=0.5)





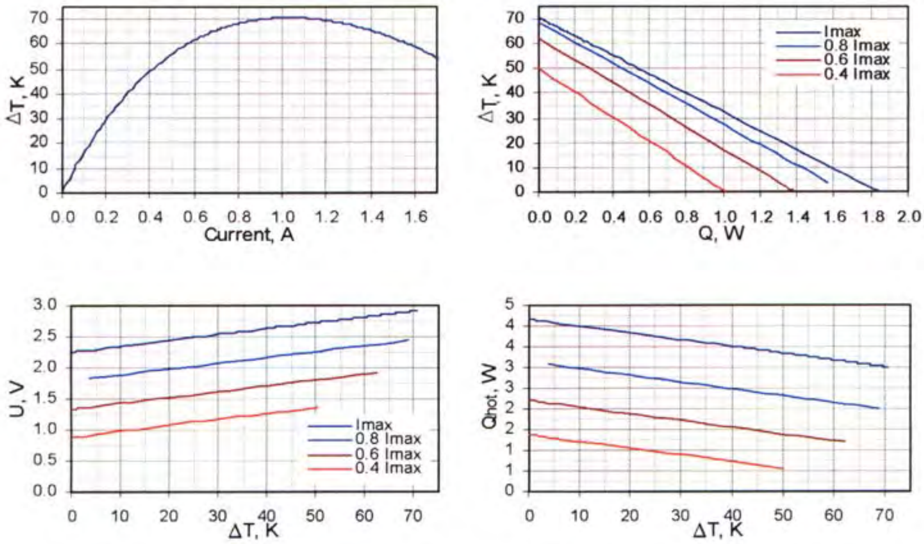
CW mode (d.c.=1)





Thermoelectric cooling module datasheet

Mounted TEC	H, mm	ΔT_{max}, K	Q_{max}, W	I_{max}, A	U_{max}, V	R_t, K/W
1MC06-024/1-15	2.6	70	1.86	1.0	2.78	1.07



Data for T_{hot}=300 K, from www.tec-microsystems.com; www.rmtltd.ru

Thermistor specification

Type TB04-103

T, °C	R, kΩ	T, °C	R, kΩ
-60	1134.5	15	12.44
-55	762.4	20	10.00
-50	521.6	25	8.09
-45	362.8	25	8.09
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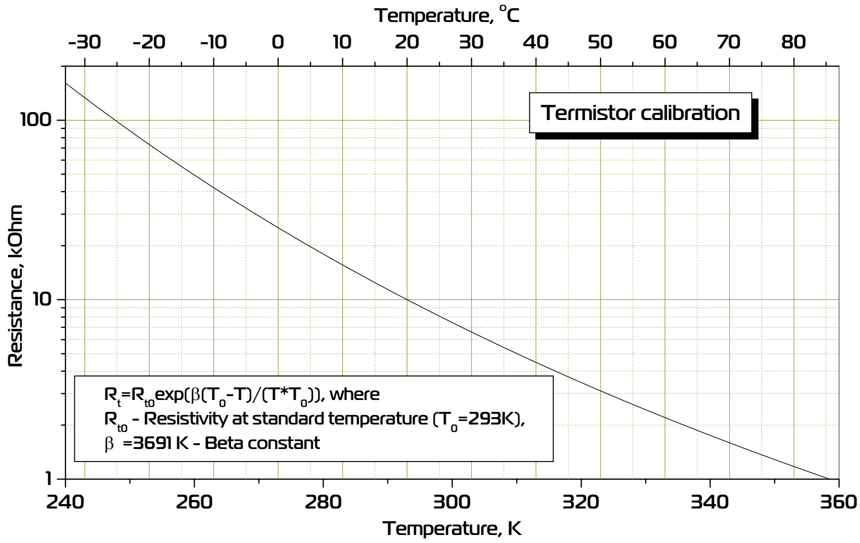
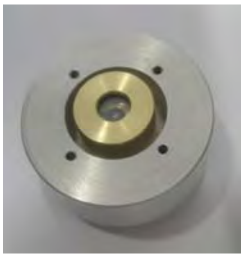
-10	42.1	60	2.20
-5	32.4	65	1.87
0	25.2	70	1.59
5	19.7	75	1.37
10	15.6	80	1.18



Possible TEC heatsink view



Optically Immersed 3.8 μm LED in heatsink optimized housing — LED38Su, LED38Sr

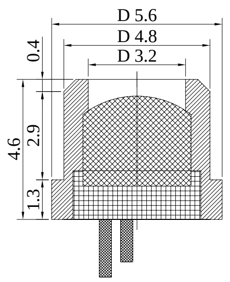
TE cooled Optically Immersed 3.8 μm LED — LED38TO8TEC

Peak wavelength	μm		3.8±0.05 @22 °C
Pulse power	mW	Drive current 1 A, 0.02 duty cycle	0.15÷0.2
Quasi-CW power	mW	Drive current 0.3 A, 0.5 duty cycle	0.08÷0.1
CW power	mW	Drive current 0.2 A	0.06÷0.08
Cut-off frequency	MHz		50 [1]

Code	Emission size, mm	Weight, g	Optical components	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation in lot, %	Operation conditions, °C	Lifetime, hrs
LED38Su LED38Sr	∅ 3.2	~0.4	Si lens	~15	≤5	±25	-60÷+120 [2]	>100 000[4]
LED38 TO8TEC	∅ 3.2	~10	Si lens and output sapphire window D=6mm	~15	≤5	±25	-60÷+85 [3]	>100 000[4]

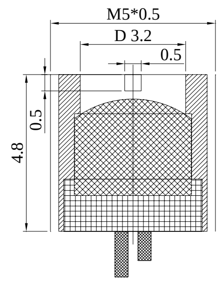
Product view

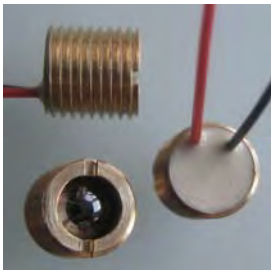
LED38Su



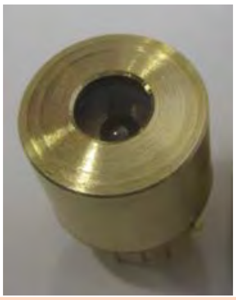
Pin assignment: red wire or long wire and red point on house - positive

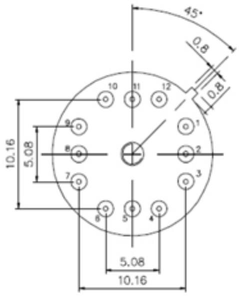
LED38Sr

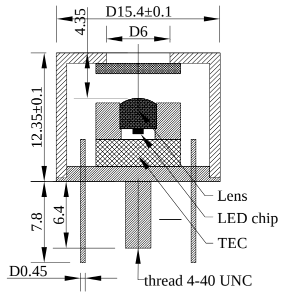




Pin assignment: red wire or long wire and red point on house - positive







Pin assignment LED38TO8TEC12

1 TEC negative;
3 TEC positive;
4 LED negative;
6 LED pozitive;
7, 9 thermosensor;
11 ⊥ (House)

Features

- Original growth of narrow gap semiconductor alloys onto n⁺-InAs substrate;
- Flip-chip design of LEDs;
- Optical coupling through the use of chalcogenide glasses and Si lenses with antireflection coating
- 3-fold increased LED output power;
- Beam collimation;
- Small on-off time (tenths of ns);
- Low power consumption (≤0.1 W)

Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. Data are valid for LED attached to a heatsink and thermostabilized at 22°C. Heatsink is essential for TEC operation!

Notes

[1] - according to estimation

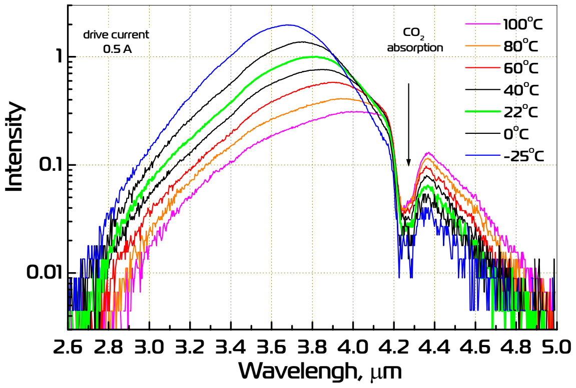
[2] - devices have passed through 15 thermo cycles : (20°C, 8 hrs) -transition period of 30 min – (+125°C, 8 hrs) without changes in specifications. Valid for devices produced since 01.2013. Operation conditions: -25÷+60 °C for old version LEDs.

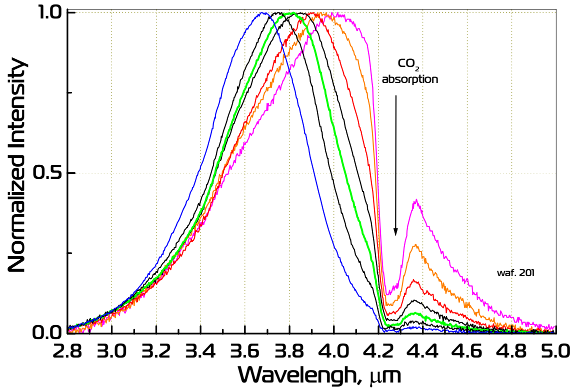
[3] - devices have passed through 15 thermo cycles : (-60°C, 30 min) - transition period of 30 min -(+85°C, 30 min) without changes in specifications. Valid for devices produced since 01.2013. Operation conditions: -25÷+60 °C for old version LEDs.

[4] – according to accelerated degradation stress at CW drive current 0.2 A

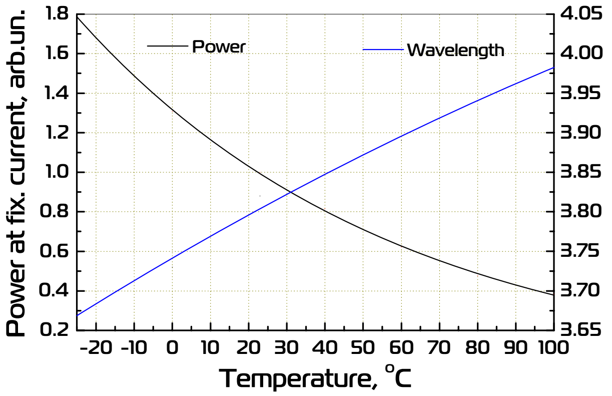
Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 05.09.13

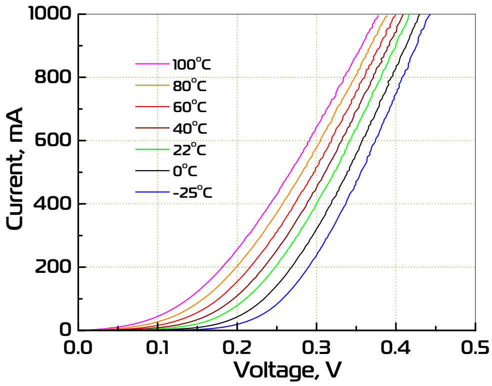
Emission spectra



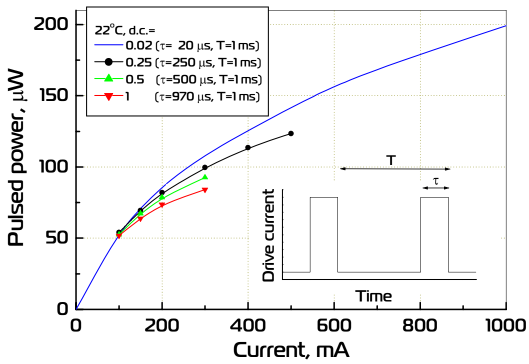


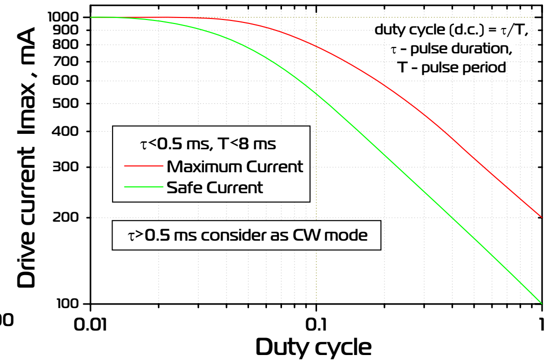
Power and peak wavelength vs. temperature; I – V curve





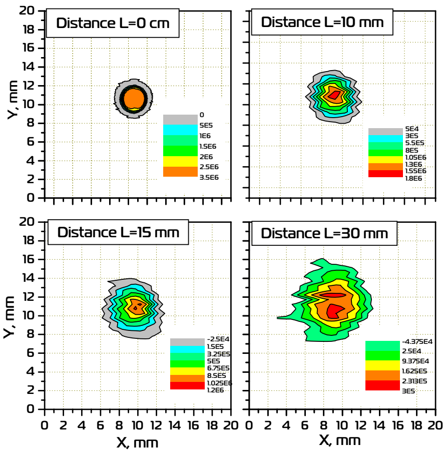
Output power and drive current vs operation conditions



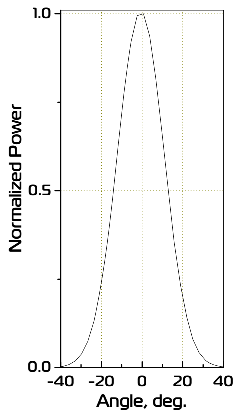


Far-field characterization

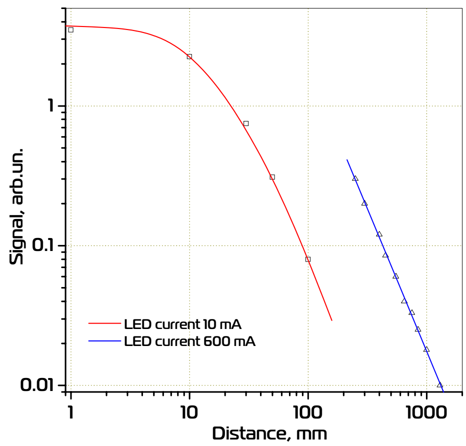
Radiation beam pattern in plane orthogonal to beam axis at several distances from LED



Angle distribution of output power

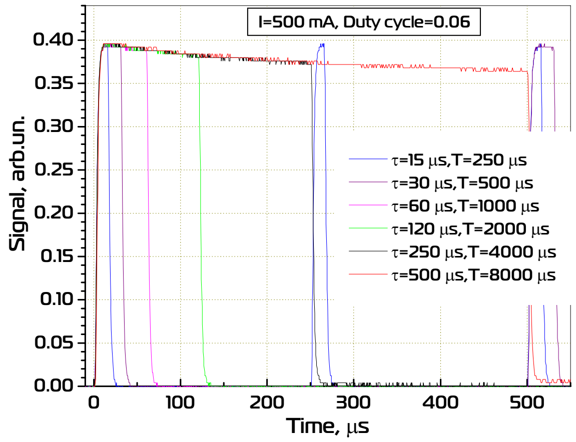
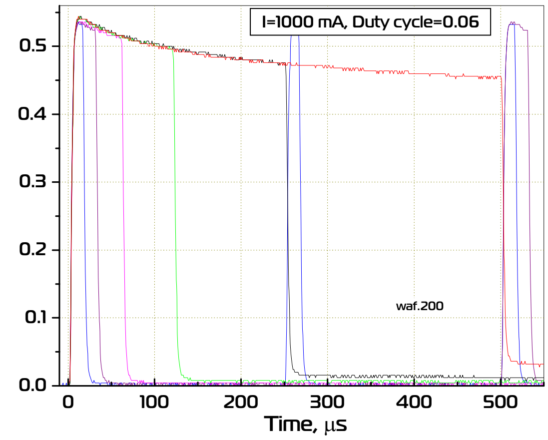
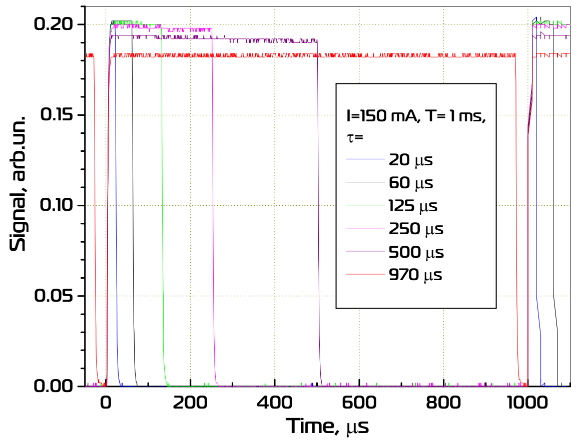
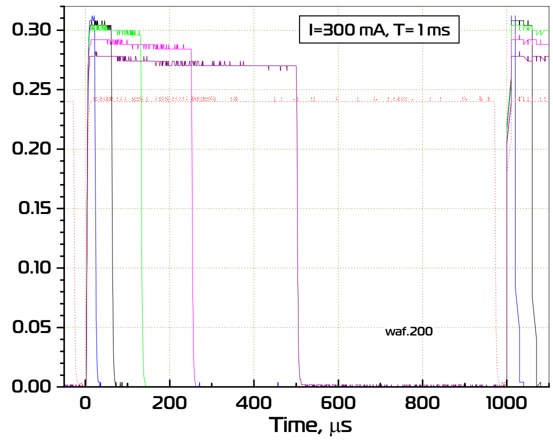
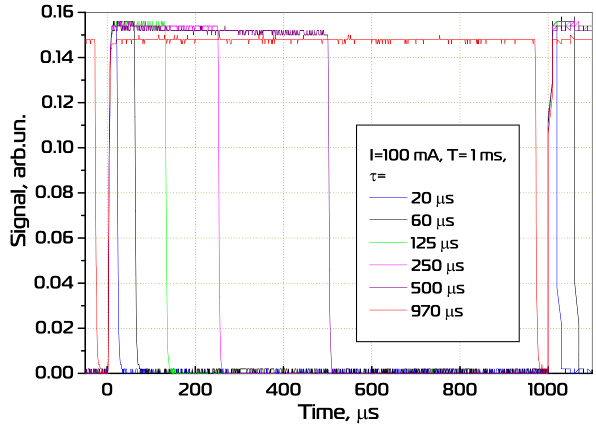
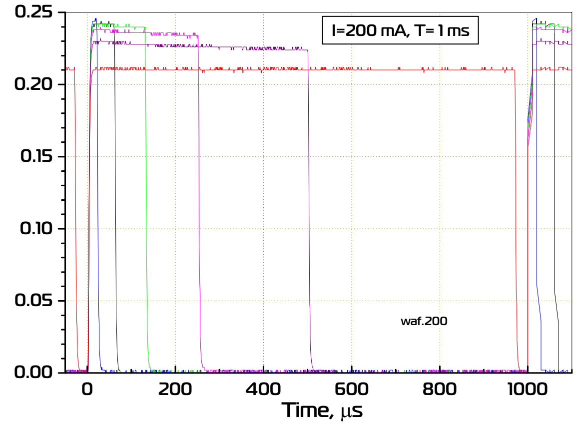


PD signal (PDxxSr/Su) vs. distance from activated LED



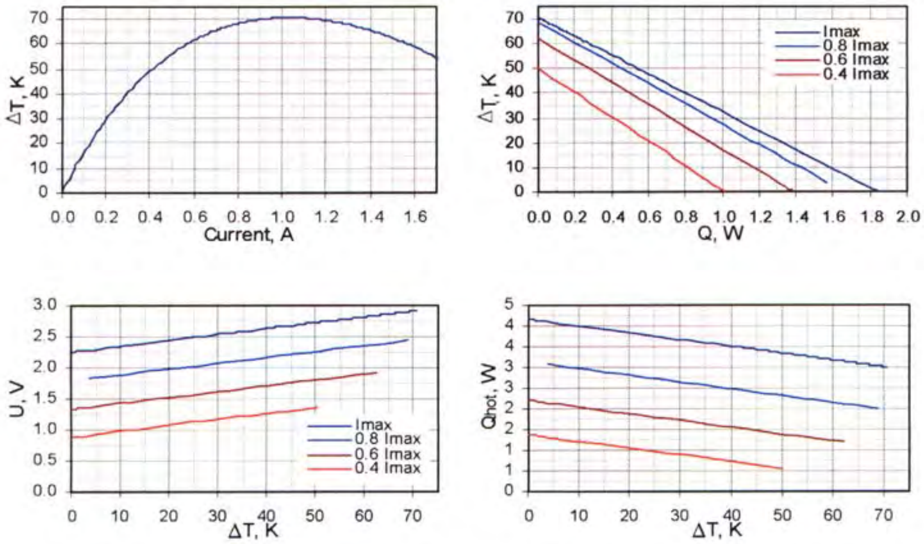
Time dependence of the output power for several values of d.c. and currents

(LED attached to a heatsink at room temperature).

	"Safe" operation mode	"Maximum current" operation mode
Pulse operation (d.c.=0.06)		
Quasi CW mode (d.c.=0.5)		
CW mode (d.c.=1)		

Thermoelectric cooling module datasheet

Mounted TEC	H, mm	ΔT_{max}, K	Q_{max}, W	I_{max}, A	U_{max}, V	R_t, K/W
1MC06-024/1-15	2.6	70	1.86	1.0	2.78	1.07

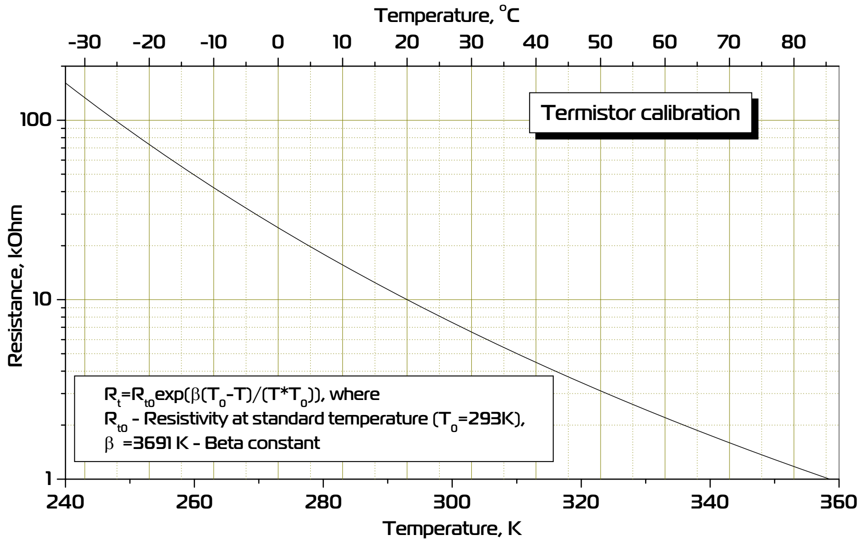


Data for T_{hot}=300 K, from www.tec-microsystems.com; www.rmtltd.ru

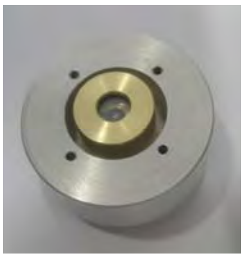
Thermistor specification

Type TB04-103

T, °C	R, kΩ	T, °C	R, kΩ
-60	1134.5	15	12.44
-55	762.4	20	10.00
-50	521.6	25	8.09
-45	362.8	25	8.09
-40	256.3	30	6.60
-35	183.8	35	5.41
-30	133.6	40	4.47
-25	98.3	45	3.71
-20	73.3	50	3.10
-15	55.2	55	2.61
-10	42.1	60	2.20
-5	32.4	65	1.87
0	25.2	70	1.59
5	19.7	75	1.37
10	15.6	80	1.18



Possible TEC heatsink view



Optically Immersed 4.2 μm LED in heatsink optimized housing — LED42Su, LED42Sr

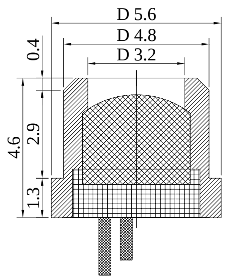
TE cooled Optically Immersed 4.2 μm LED — LED42TO8TEC

Peak wavelength	μm		4.15÷4.2 @22 °C
Pulse power	mW	Drive current 1 A, 0.02 duty cycle	0.08÷0.10
Quasi-CW power	mW	Drive current 0.3 A, 0.5 duty cycle	0.04÷0.05
CW power	mW	Drive current 0.2 A	0.03÷0.04
Cut-off frequency	MHz		50 [1]

Code	Emission size, mm	Weight, g	Optical components	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation in lot, %	Operation conditions, °C	Lifetime, hrs
LED42Su LED42Sr	∅ 3.2	~0.4	Si lens	~15	≤5	±25	-60÷+120 [2]	>100 000[4]
LED42 TO8TEC		~10	Si lens and output sapphire window D=6mm				-60÷+85 [3]	

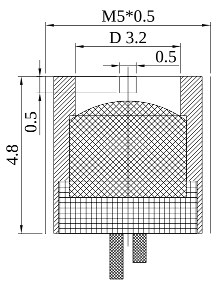
Product view

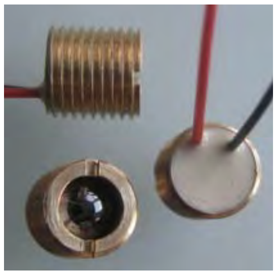
LED42Su



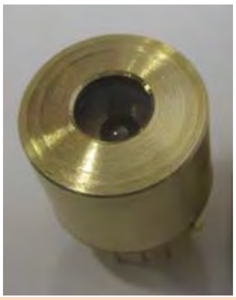
Pin assignment: red wire or long wire and red point on house - positive

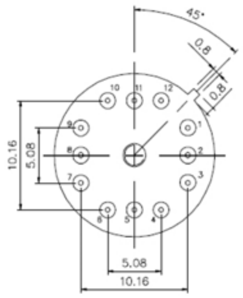
LED42Sr

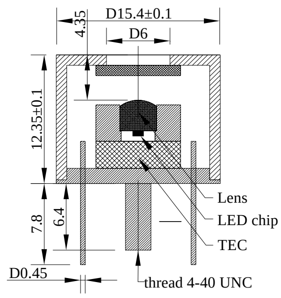




Pin assignment: red wire or long wire and red point on house - positive







Pin assignment LED42TO8TEC12

1 TEC negative;
3 TEC positive;
4 LED negative;
6 LED pozitive;
7, 9 thermosensor;
11 ⊥ (House)

Features

- Original growth of narrow gap semiconductor alloys onto n⁺-InAs substrate;
- Flip-chip design of LEDs;
- Optical coupling through the use of chalcogenide glasses and Si lenses with antireflection coating
- 3-fold increased LED output power;
- Beam collimation;
- Small on-off time (tenths of ns);
- Low power consumption (≤0.1 W)

Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. Data are valid for LED attached to a heatsink and thermostabilized at 22°C. Heatsink is essential for TEC operation!

Notes

[1] - according to estimation

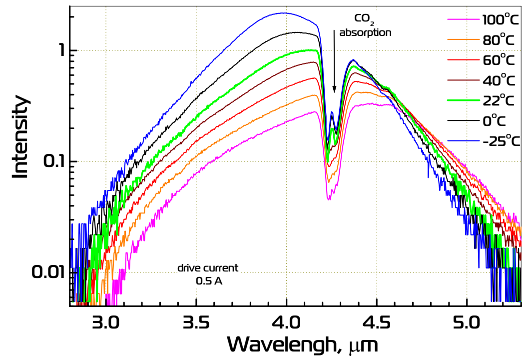
[2] - devices have passed through 15 thermo cycles : (20°C, 8 hrs) -transition period of 30 min – (+125°C, 8 hrs) without changes in specifications. Valid for devices produced since 01.2013. Operation conditions: -25÷+60 °C for old version LEDs.

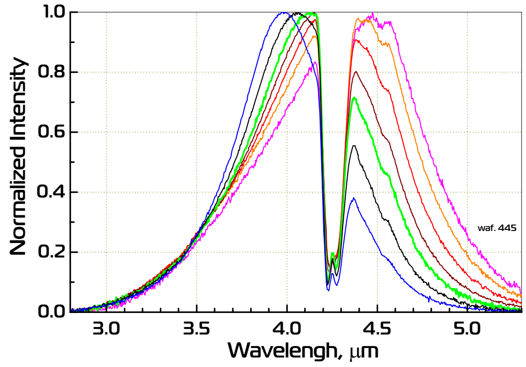
[3] - devices have passed through 15 thermo cycles : (-60°C, 30 min) - transition period of 30 min -(+85°C, 30 min) without changes in specifications. Valid for devices produced since 01.2013. Operation conditions: -25÷+60 °C for old version LEDs.

[4] – according to accelerated degradation stress at CW drive current 0.2 A

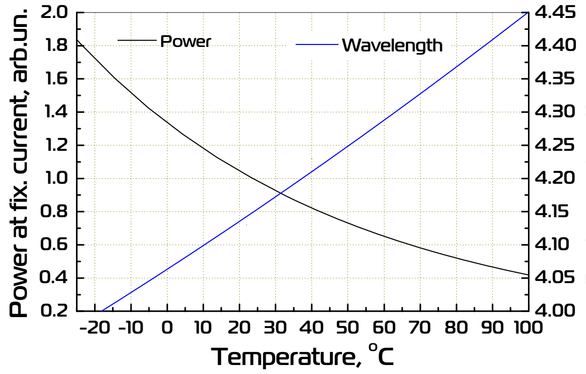
Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 04.09.13

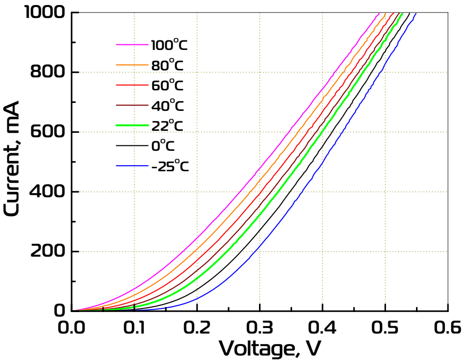
Emission spectra



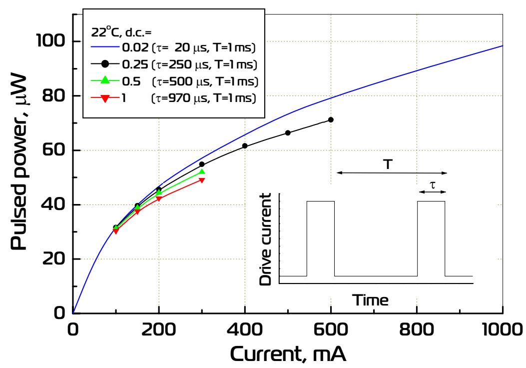


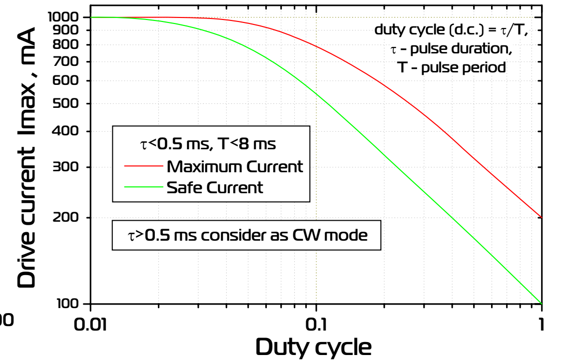
Power and peak wavelength vs. temperature; I – V curve





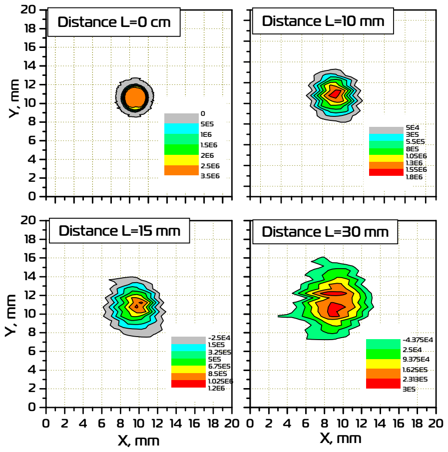
Output power and drive current vs operation conditions



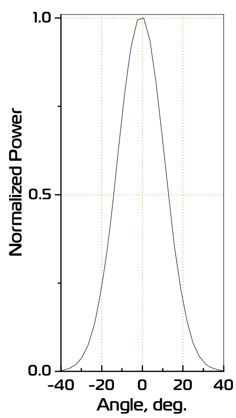


Far-field characterization

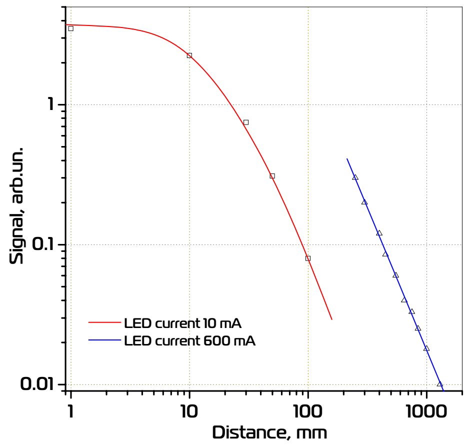
Radiation beam pattern in plane orthogonal to beam axis at several distances from LED



Angle distribution of output power



PD signal (PDxxSr/Su) vs. distance from activated LED

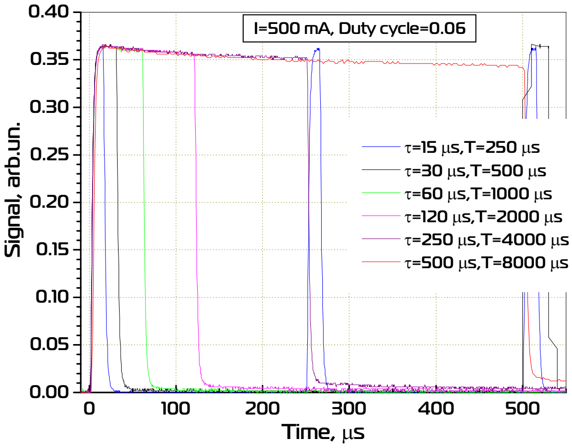


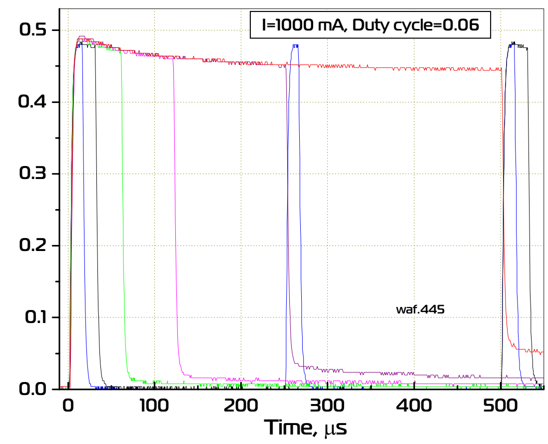
Time dependence of the output power for several values of d.c. and currents

(LED attached to a heatsink at room temperature).

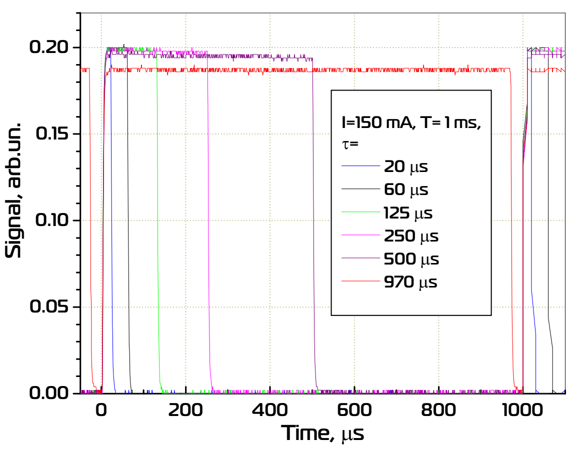
	"Safe" operation mode	"Maximum current" operation mode

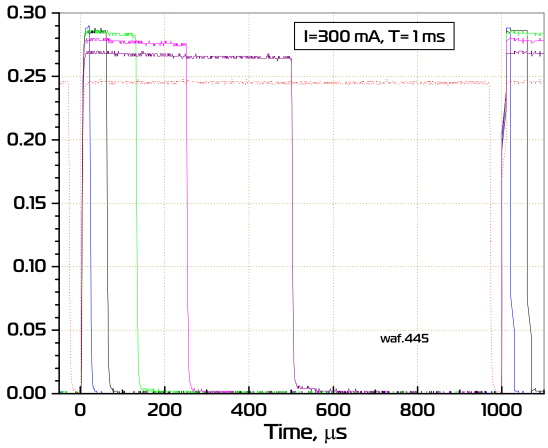
Pulse operation (d.c.=0.06)



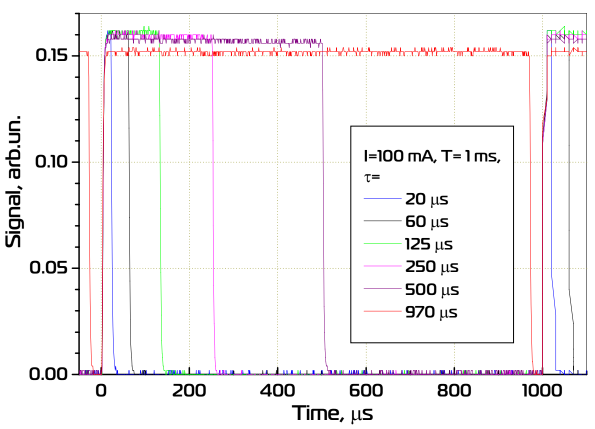


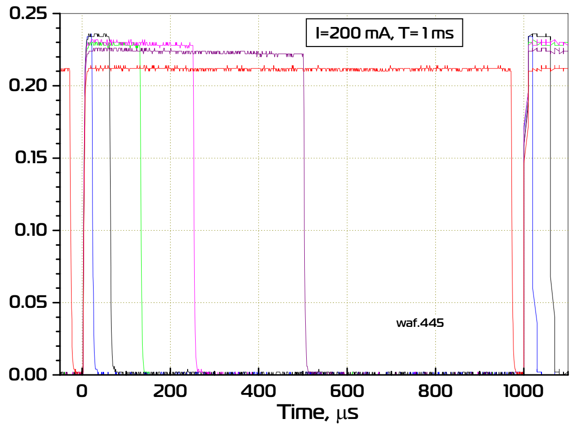
Quasi CW mode (d.c.=0.5)





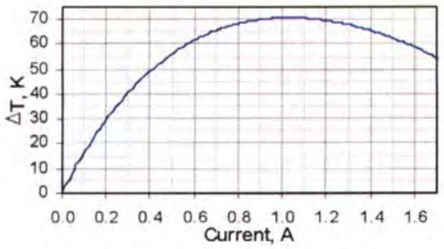
CW mode (d.c.=1)

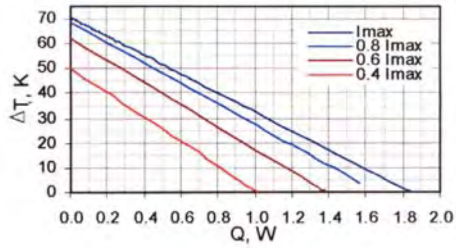


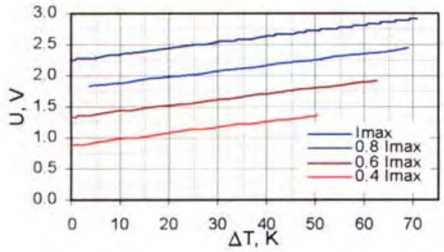


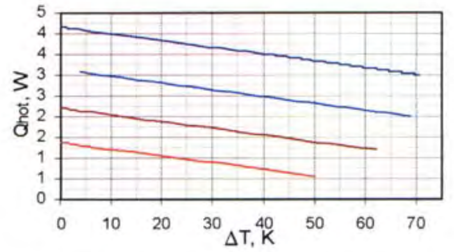
Thermoelectric cooling module datasheet

Mounted TEC	H, mm	ΔT_{max}, K	Q_{max}, W	I_{max}, A	U_{max}, V	R_t, K/W
1MC06-024/1-15	2.6	70	1.86	1.0	2.78	1.07







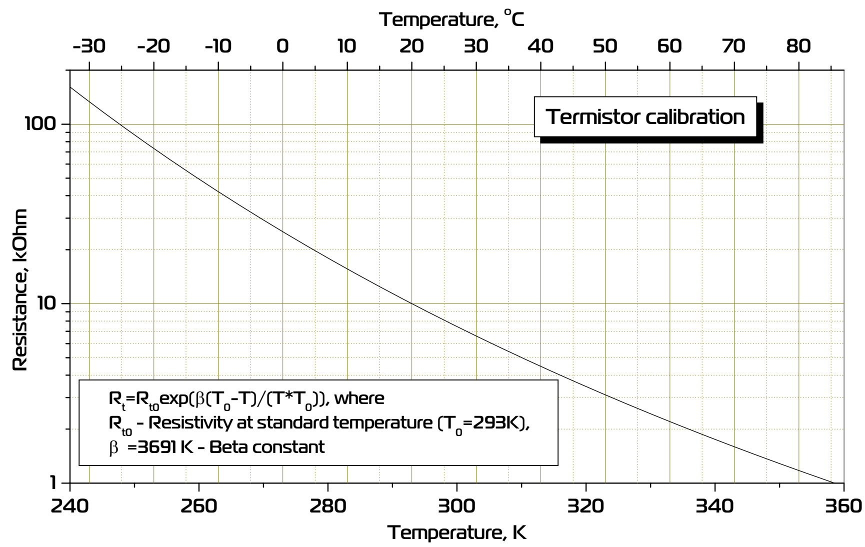


Data for T_{hot}=300 K, from www.tec-microsystems.com; www.rmtltd.ru

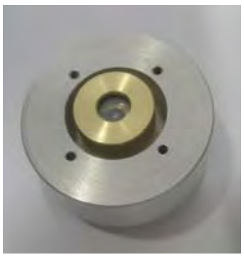
Thermistor specification

Type TB04-103

T, °C	R, kΩ	T, °C	R, kΩ
-60	1134.5	15	12.44
-55	762.4	20	10.00
-50	521.6	25	8.09
-45	362.8	25	8.09
-40	256.3	30	6.60
-35	183.8	35	5.41
-30	133.6	40	4.47
-25	98.3	45	3.71
-20	73.3	50	3.10
-15	55.2	55	2.61
-10	42.1	60	2.20
-5	32.4	65	1.87
0	25.2	70	1.59
5	19.7	75	1.37
10	15.6	80	1.18



Possible TEC heatsink view



Optically Immersed 4.7 μm LED in heatsink optimized housing — LED47 Sr/Su/Cy

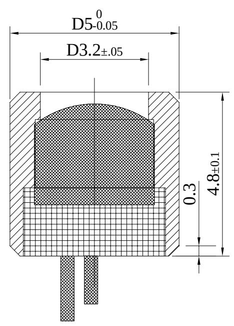
TE cooled Optically Immersed 4.7 μm LED — LED47TO8TEC

Parameter	Unit	Conditions	LED47Sr/Su/Cy	LED47TO8TEC
Peak wavelength	μm		4.7±0.1 @22 °C	
Pulse power	μW	Drive current 1 A, 0.02 duty cycle	15÷18	13÷15
Quasi-CW power	μW	Drive current 0.3 A, 0.5 duty cycle	6.5÷8	5.5÷7
CW power	μW	Drive current 0.2 A	4.5÷5.5	3.8÷4.7
Cut-off frequency	MHz		50 [1]	

Code	Emission size, mm	Weight, g	Optical components	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation in lot, %	Operation conditions, °C	Lifetime, hrs
LED47 Sr/Su/Cy	∅ 3.2	~0.4	Si lens	~15	≤5	±25	-60÷+85	>100 000
LED47 TO8TEC	∅ 3.2	~10	Si lens and output sapphire window D=6mm	~15	≤5	±25	-60÷+85	>100 000

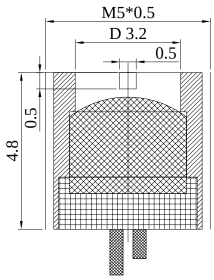
Product view

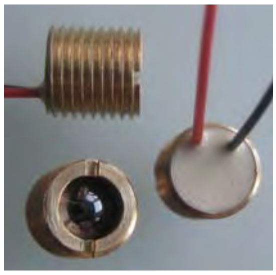
LED47Cy



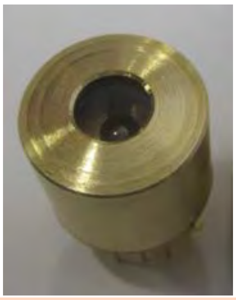
Pin assignment: red wire or long wire and red point on house - positive

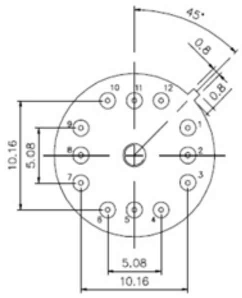
LED47Sr

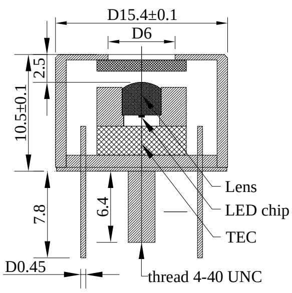




Pin assignment: red wire or long wire and red point on house - positive







Pin assignment LED47TO8TEC12

1 TEC negative;
3 TEC positive;
4 LED negative;
6 LED pozitive;
7, 9 thermosensor;
11 ⊥ (House)

Features

- Original growth of narrow gap semiconductor alloys onto n^+-InAs substrate;
- Flip-chip design of LEDs;
- Optical coupling through the use of chalcogenide glasses and Si lenses with antireflection coating
- 3-fold increased LED output power;
- Beam collimation;
- Small on-off time (tenths of ns);
- Low power consumption (≤0.1 W)

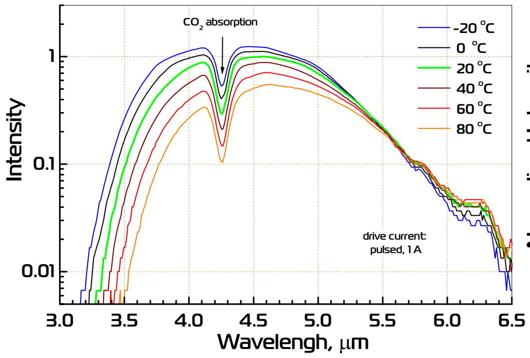
Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. Data are valid for LED attached to a heatsink and thermostabilized at 22°C. Heatsink is essential for TEC operation!

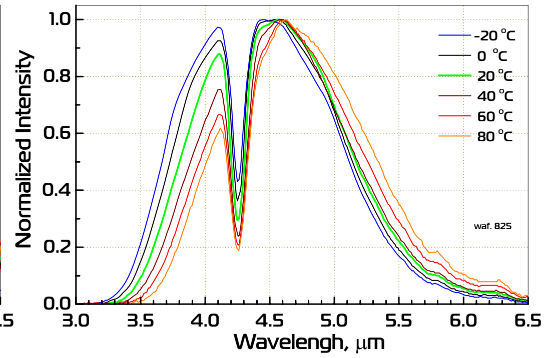
Notes

[1] - according to estimation

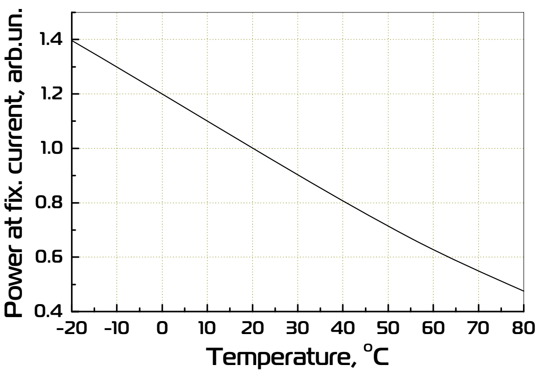
Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 07.12.14

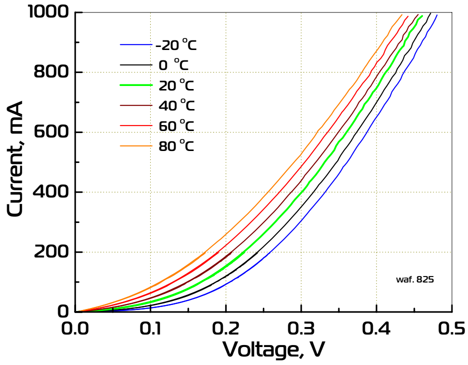
Emission spectra



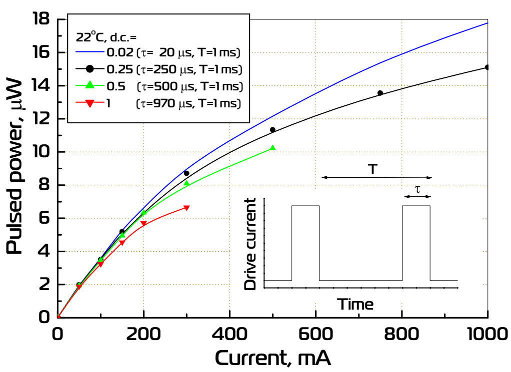


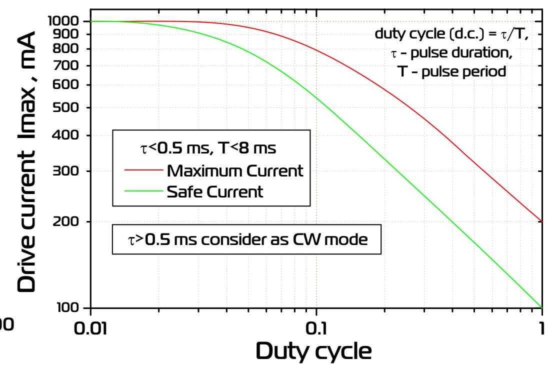
Power vs. temperature; I – V curve





Output power and drive current vs operation conditions



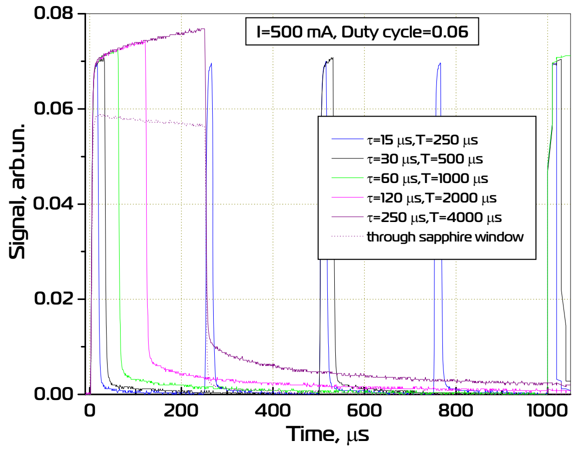


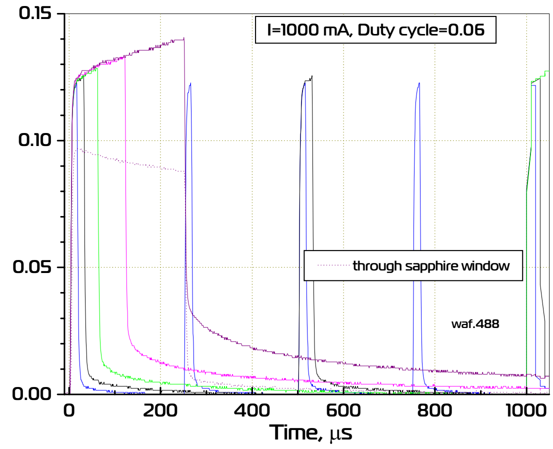
Time dependence of the output power for several values of d.c. and currents

(LED attached to a heatsink at room temperature).

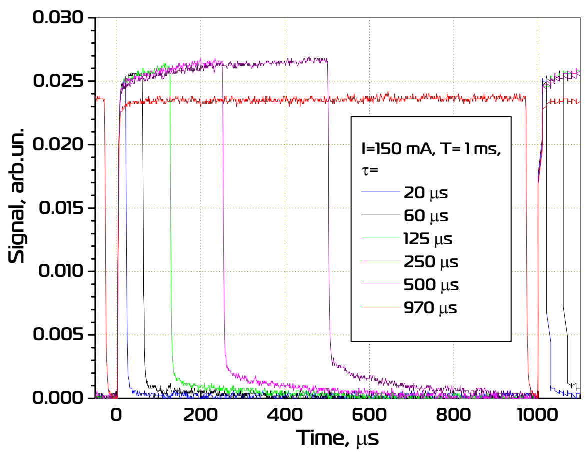
	"Safe" operation mode	"Maximum current" operation mode

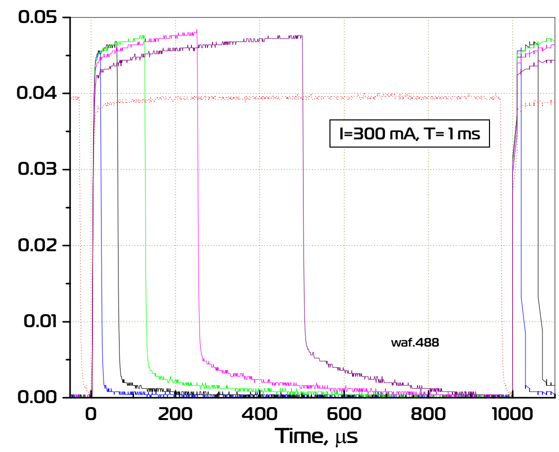
Pulse operation (d.c.=0.06)



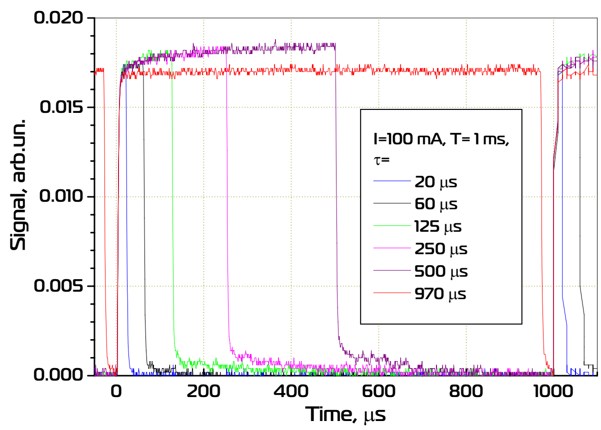


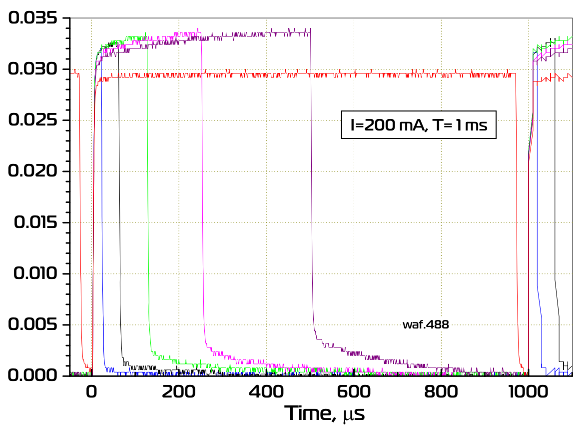
Quasi CW mode (d.c.=0.5)





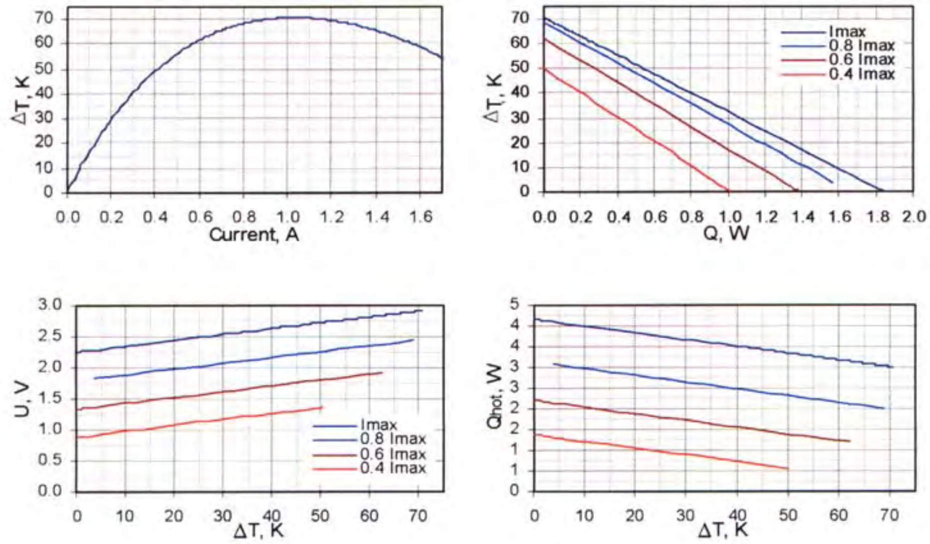
CW mode (d.c.=1)





Thermoelectric cooling module datasheet

Mounted TEC	H, mm	ΔT_{max}, K	Q_{max}, W	I_{max}, A	U_{max}, V	R_t, K/W
1MC06-024/1-15	2.6	70	1.86	1.0	2.78	1.07

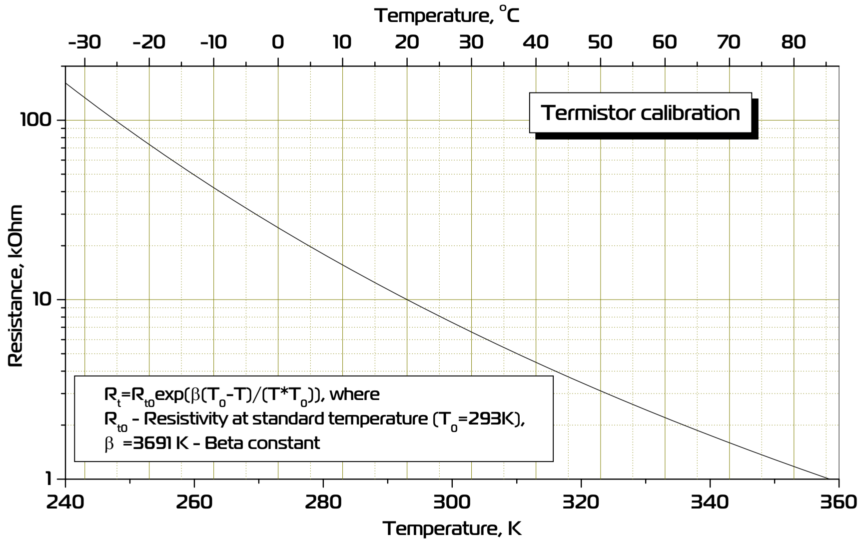


Data for T_{hot}=300 K, from www.tec-microsystems.com; www.rmtltd.ru

Thermistor specification

Type TB04-103

T, °C	R, kΩ	T, °C	R, kΩ
-60	1134.5	15	12.44
-55	762.4	20	10.00
-50	521.6	25	8.09
-45	362.8	25	8.09
-40	256.3	30	6.60
-35	183.8	35	5.41
-30	133.6	40	4.47
-25	98.3	45	3.71
-20	73.3	50	3.10
-15	55.2	55	2.61
-10	42.1	60	2.20
-5	32.4	65	1.87
0	25.2	70	1.59
5	19.7	75	1.37
10	15.6	80	1.18



Possible TEC heatsink view

Optically Immersed 5.5 μm LED in heatsink optimized housing — LED55 Sr/Su/Cy

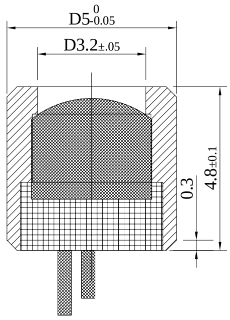
TE cooled Optically Immersed 5.5 μm LED — LED55TO8TEC

Peak wavelength	μm		5.5÷5.6	@22 °C
			LED55Sr/Su/Cy	LED55TO8TEC
Pulse power	μW	Drive current 1 A, 0.02 duty cycle	5÷7	4÷5.6
Quasi-CW power	μW	Drive current 0.3 A, 0.5 duty cycle	2.2÷2.7	1.8÷2.2
CW power	μW	Drive current 0.2 A	1.5÷1.8	1.2÷1.4
Cut-off frequency	MHz		50 [1]	

Code	Emission size, mm	Weight, g	Optical components	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation in lot, %	Operation conditions, °C	Lifetime, hrs
LED55 Sr/Su/Cy	∅ 3.2	~0.4	Si lens	~15	≤5	±25	-60÷+85	>100 000
LED55 TO8TEC		~10	Si lens and output sapphire window D=6mm					

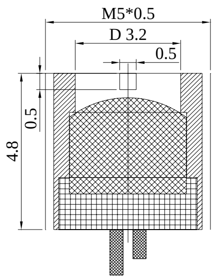
Product view

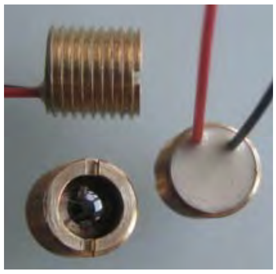
LED55Cy



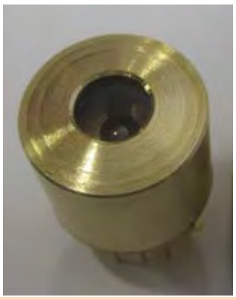
Pin assignment: red wire or long wire and red point on house - positive

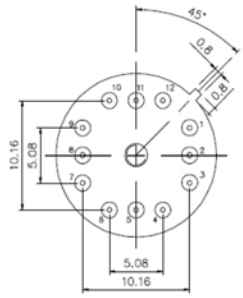
LED55Sr

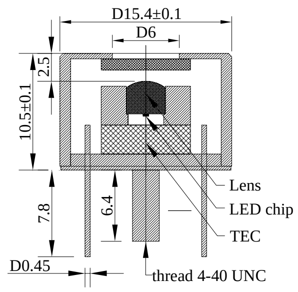




Pin assignment: red wire or long wire and red point on house - positive







Pin assignment LED55TO8TEC12

1 TEC negative;
3 TEC positive;
4 LED negative;
6 LED pozitive;
7, 9 thermosensor;
11 ⊥ (House)

Features

- Original growth of narrow gap semiconductor alloys onto n^+-InAs substrate;
- Flip-chip design of LEDs;
- Optical coupling through the use of chalcogenide glasses and Si lenses with antireflection coating
- 3-fold increased LED output power;
- Beam collimation;
- Small on-off time (tenths of ns);
- Low power consumption (≤0.1 W)

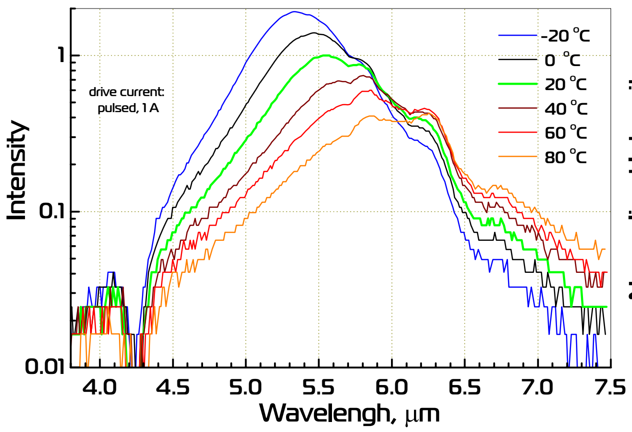
Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. Data are valid for LED attached to a heatsink and thermostabilized at 22°C. Heatsink is essential for TEC operation!

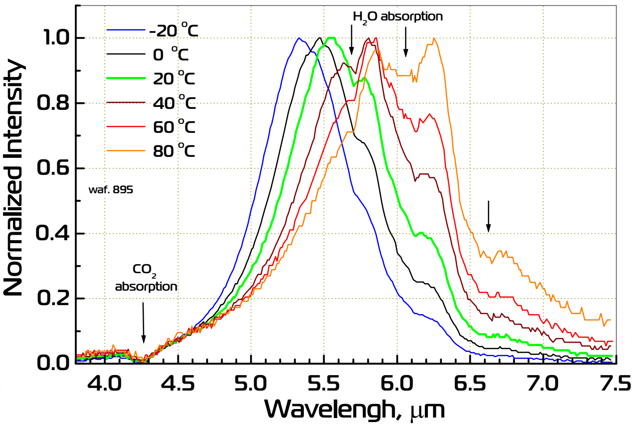
Notes

[1] - according to estimation

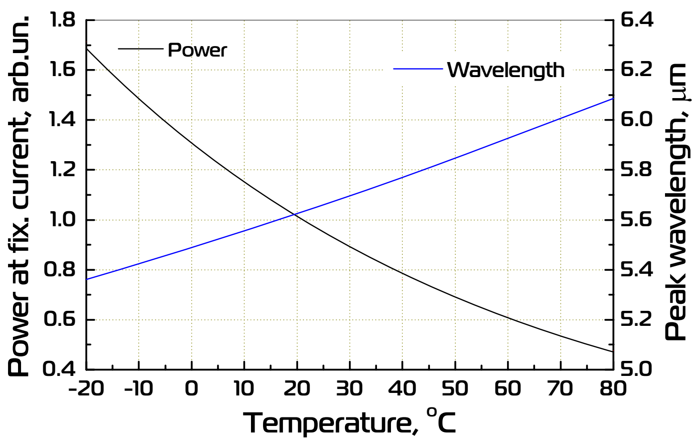
Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 20.01.15

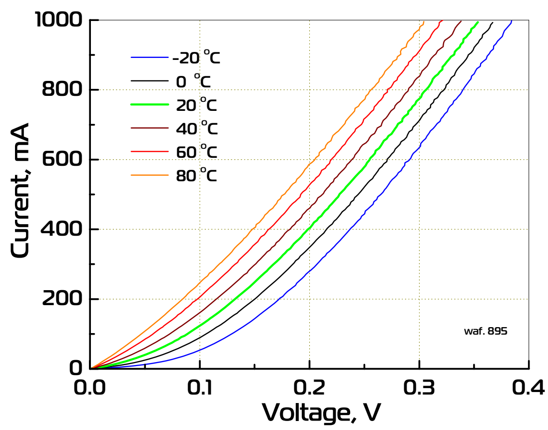
Emission spectra



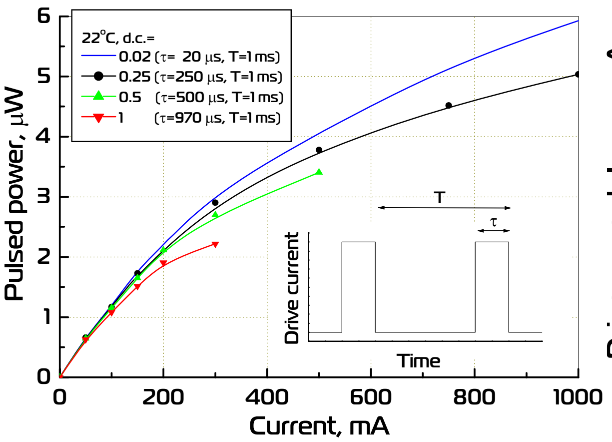


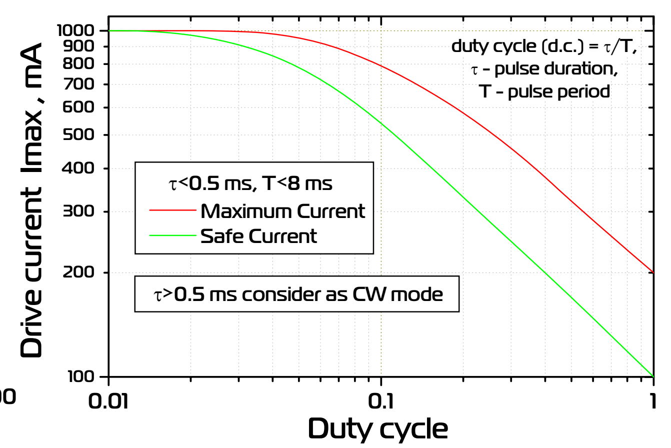
Power and peak wavelength vs. temperature; I – V curves





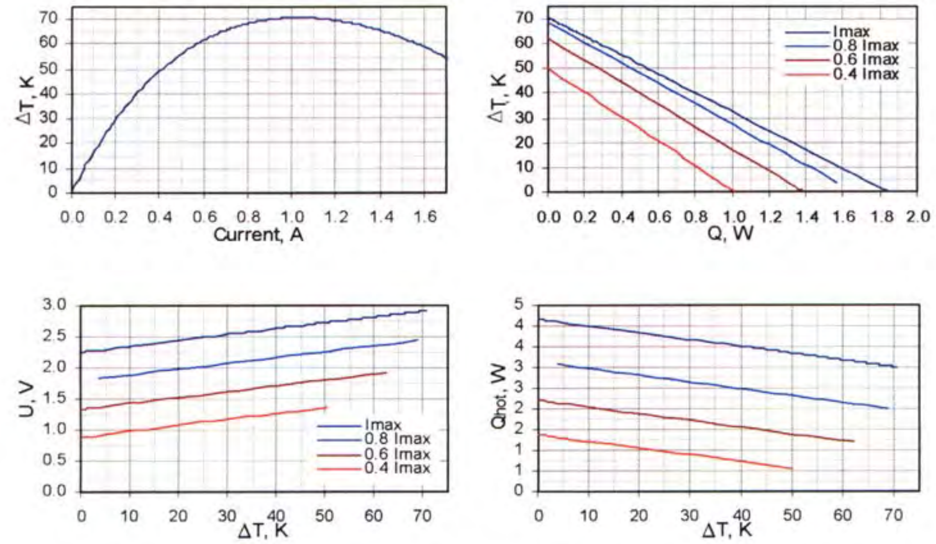
Output power and drive current vs operation conditions





Thermoelectric cooling module datasheet

Mounted TEC	H, mm	ΔT_{max}, K	Q_{max}, W	I_{max}, A	U_{max}, V	R_t, K/W
1MC06-024/1-15	2.6	70	1.86	1.0	2.78	1.07

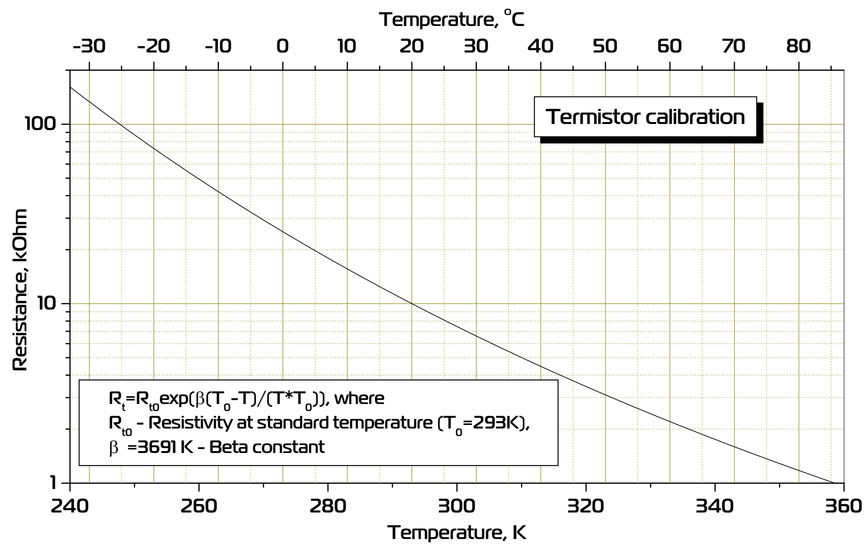


Data for T_{hot}=300 K, from www.tec-microsystems.com; www.rmtltd.ru

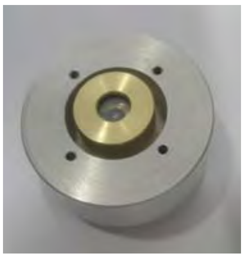
Thermistor specification

Type TB04-103

T, °C	R, kΩ	T, °C	R, kΩ
-60	1134.5	15	12.44
-55	762.4	20	10.00
-50	521.6	25	8.09
-45	362.8	25	8.09
-40	256.3	30	6.60
-35	183.8	35	5.41
-30	133.6	40	4.47
-25	98.3	45	3.71
-20	73.3	50	3.10
-15	55.2	55	2.61
-10	42.1	60	2.20
-5	32.4	65	1.87
0	25.2	70	1.59
5	19.7	75	1.37
10	15.6	80	1.18



Possible TEC heatsink view



Optically Immersed 7.0 μm LED in heatsink optimized housing

Photoluminescent LED70Sr

TE cooled Optically Immersed 7.0 μm LED

LED70TO8TEC

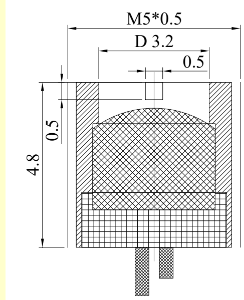
Peak wavelength	μm		7.0 ± 0.2 @22 ⁰C
Pulse power	μW	Drive current 1 A, 0.02 duty cycle	3÷3.5
Quasi-CW power	μW	Drive current 0.15 A, 0.5 duty cycle	0.5÷0.6
CW power	μW	Drive current 0.1 A	0.3÷0.4
Cut-off frequency	MHz		50 [1]

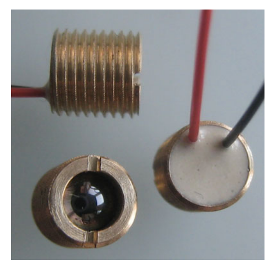
Code	Emission size, mm	Weight, g	Optical components	Far-field pattern FWHM, deg.	Optical axis deviation, deg.	Optical power deviation in lot, %	Operation conditions, ⁰C	Lifetime, hrs
LED70Sr/Cy	∅ 3.2	~0.4	Ge lens	~15	≤5	±25	-60÷+60	>100 000
LED70 TO8TEC		~10	Ge lens and output CaF2 window D=6mm					

Product view

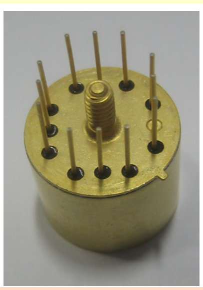
(We note that 2 room temp devices produce more power than 1 TE-Cooled device at lower cost)

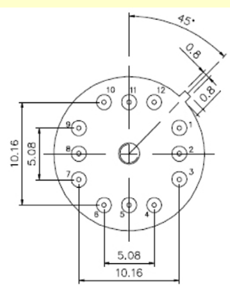
LED70Sr

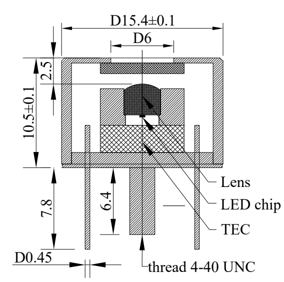




Pin assignment: red wire or long wire and red point on house - positive







Pin assignment LED70TO8TEC12

1 TEC negative;
3 TEC positive;
4 LED negative;
6 LED –pozitive;
7, 9 thermosensor;
11 ⊥ (House)

Features

- Optical coupling through the use of chalcogenide glasses and Ge lenses with antireflection coating
- 3-fold increased LED output power;
- Beam collimation;
- Small on-off time (tenths of ns);
- Low power consumption (≤0.1 W)

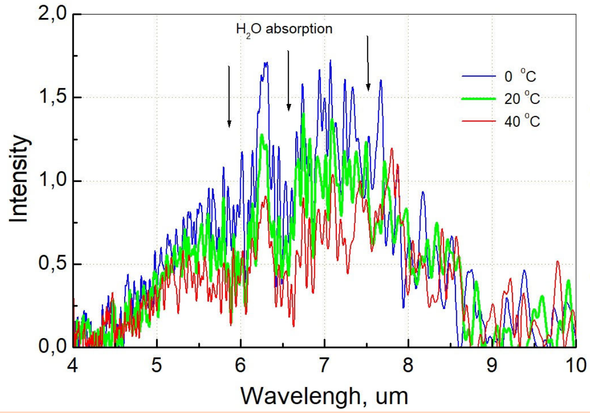
Emission beam divergence is small and thus we recommend adjusting LED position regarding to the detector system before final evaluation/use of the devices. We recommend if possible using low duty cycle mode of operation with I<0.5×Imax so that higher efficiency and long term stability of a LED are achieved. Data are valid for LED **attached to a heatsink** and thermostabilized at 22⁰C. **Heatsink is essential for TEC operation!**

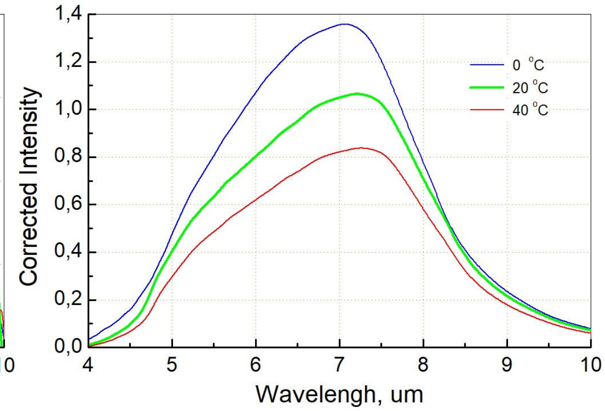
Notes

[1] - according to estimation
[2] - Customized headers and caps can be fabricated

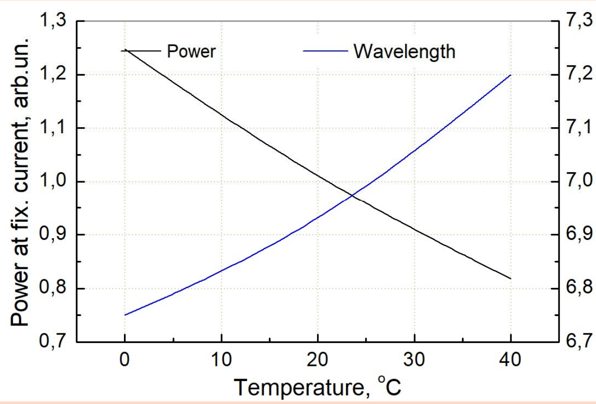
Product specifications are subject to change without prior notice due to improvements or other reasons. Updated 29.06.20

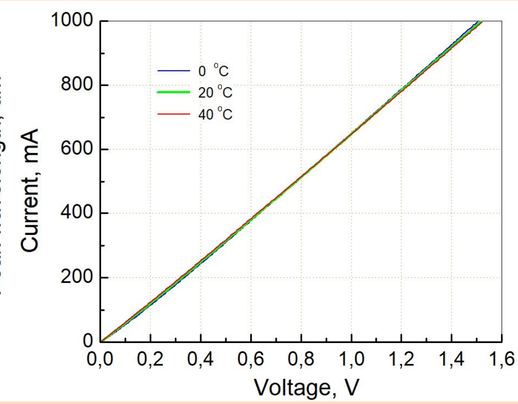
Measured and Corrected for H2O absorption emission spectra



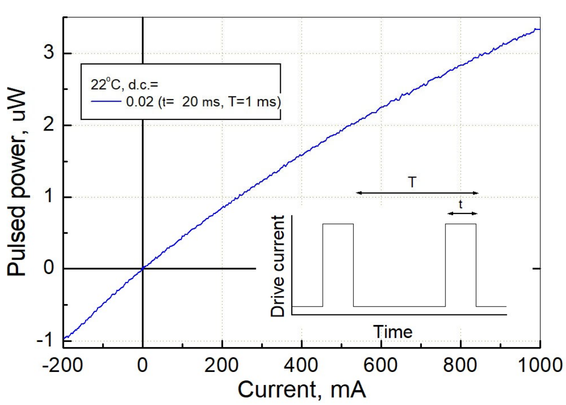


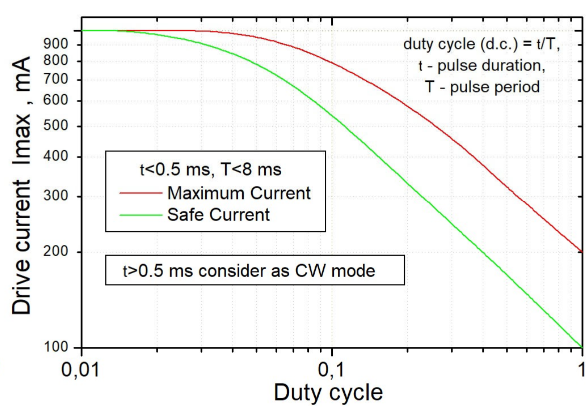
Power and peak wavelength vs. temperature; I – V curve





Output power and drive current vs operation conditions





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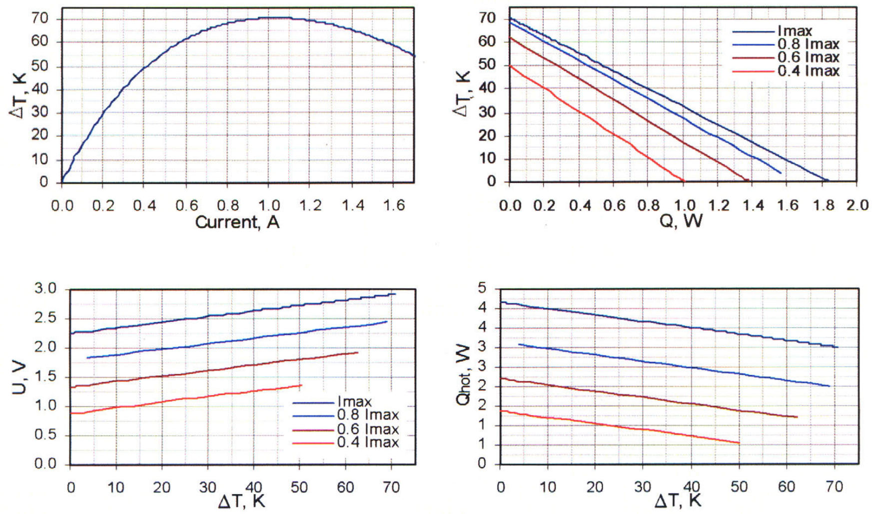
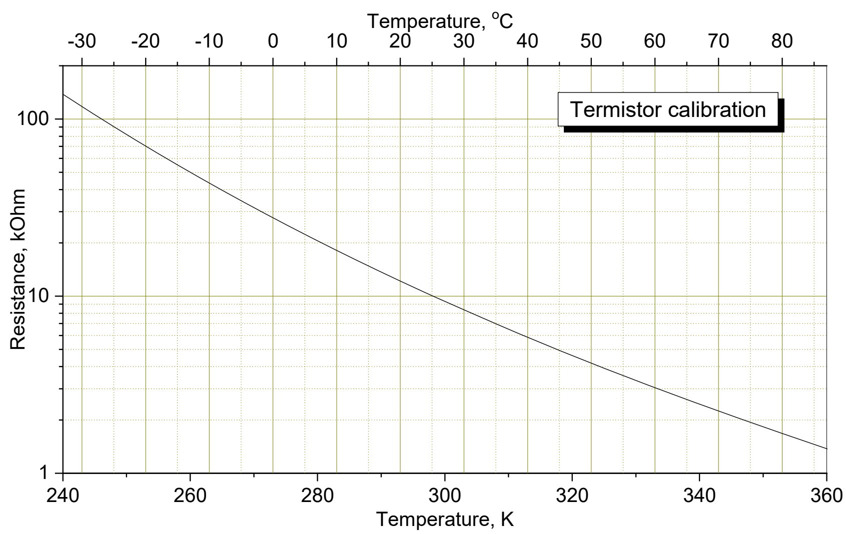


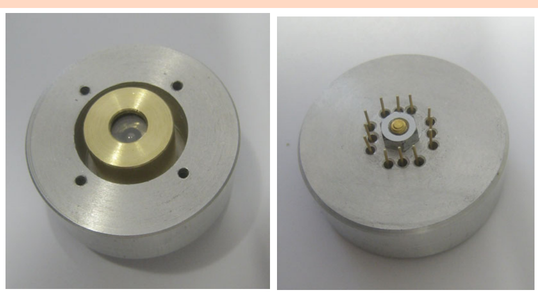
Data for T_{hot}=300 K, from www.tec-microsystems.com; www.rmtltd.ru

Thermistor specification

Type ERTJ0EG103FA (PANASONIC)

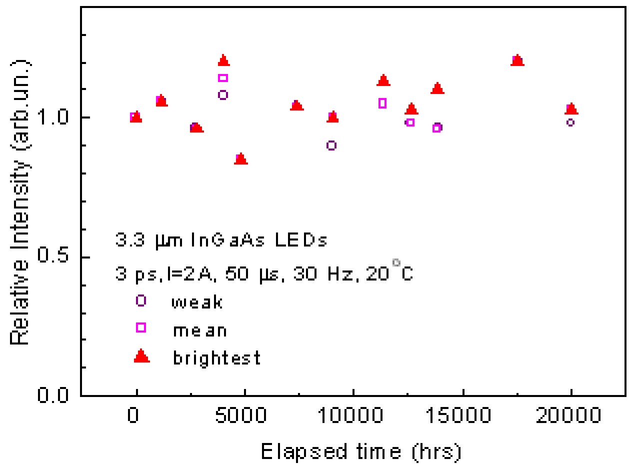


Possible TEC heatsink view

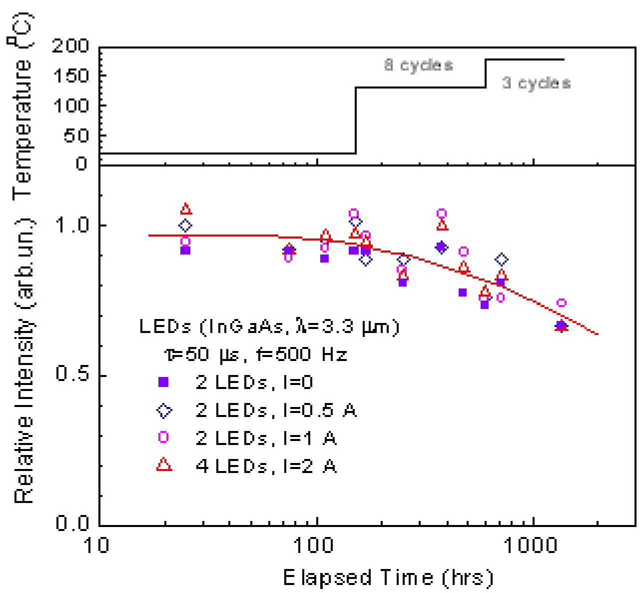


Lifetime Tests

Room temperature lifetime tests were performed with InGaAs homojunction diodes un-encapsulated and encapsulated at current pulses of 2A, duration 50 μs and repetition rate of 30 Hz.

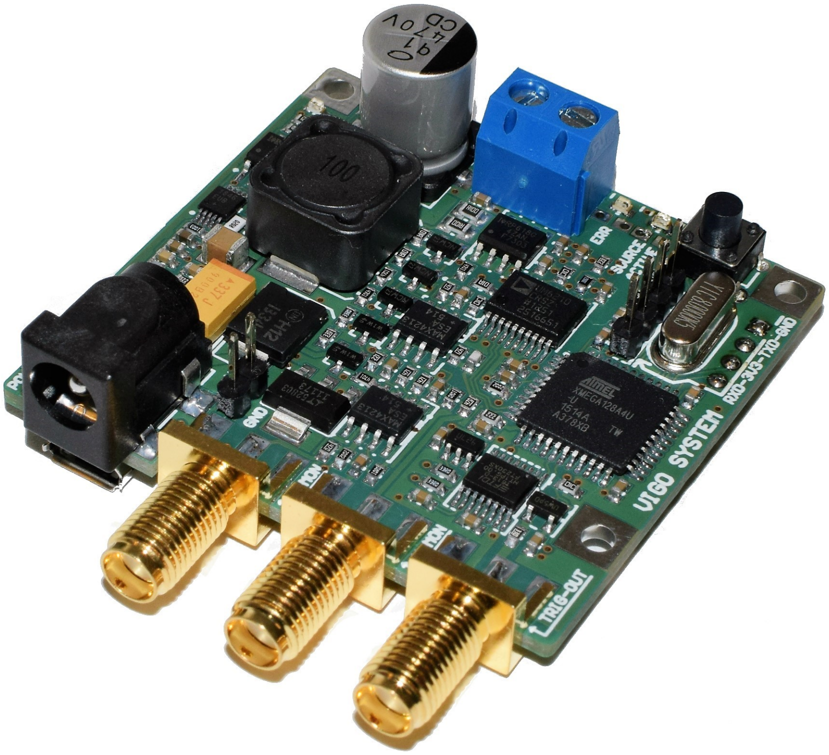


Lower figure presents data on the long-term variation of the properties of the uncoated InGaAs homojunction LED s at high temperatures. The upper graph shows the times for which the LEDs under study operated at several ambient temperatures. The samples operated at currents *I* = 0, 0.5, 1, 2 A for 150 h at room temperature, 450 h at *T* = 130°C, and 800 h at *T* =180°C. The LEDs were cooled to room temperature and heated again to *T* = 130°C eight times and to 180°C three times.



The lower graph shows the output power as a function of the working time. As can be seen, the output power decreased, on average, by 25% after 1400 h of operation. It is noteworthy that the operating current strength has no effect on the degradation of the LEDs. With increasing operating time, the reverse currents at a bias *U* = 1 V increased from 0.5–1 mA (0 h) to 3–4 mA (1400 h). On "cleaning" the sample surface by etching in CP-4, the reverse current returned to its initial values, and the output power tended to regain its initial value: P(1400 h) = (0.85–0.9)P(0 h).

This confirms that LED encapsulation or by protection with window should increase LED lifetime at elevated temperatures.



Features

- Easy to use
- Low cost
- Simple, flexible control using dedicated software
- Adjustable voltage to the light source
- CW or pulsed operation—MHz to DC
- Nanosecond to seconds repetition rate
- Current and voltage monitor
- powered from USB (<0.5A) or DC supply

UPS Driver™

Universal Photon Source (UPS) Driver Board

The Boston Electronics Universal Photon Source (UPS) Driver delivers! It is a flexible, compact, low cost, configurable board, including power supply, that drives a **WIDE** range of light sources. The driver can control pulsed and CW sources, which makes it suitable for driving **ultraviolet (UV), visible and infrared (IR) sources, light emitting diodes (LEDs) and lasers over a frequency range of MHz to DC.**

Control is provided by easy to use PC software. The last used drive parameters are stored in the non-volatile EEPROM memory; thus, the configuration is remembered. The UPS Driver is equipped with voltage and current monitors, trigger output, power and communication inputs and anode/cathode connections for the sources.

The UPS Driver is compatible with UV, visible and IR sources, LEDs and lasers.

BostonElectronics

boselec@boselec.com | www.boselec.com | 617-566-3821

UPS Driver Specifications

Developed with, and manufactered by:

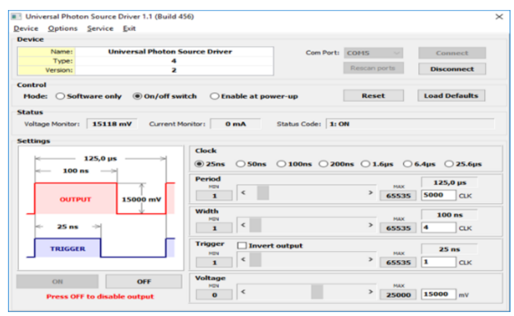
VIGO SYSTEM

Electrical parameters:

- Power supply: - USB from computer **or** +5 ... +6 V, connected to the DC Jack connector
- Average power deliveerd to connected source
  - max. 1.5W, for the power supply from USB
  - max. 10W, for the power supply connected to the DC Jack connector
- Adjustable ootput voltage supply, in the range 0.5 – 25V, 4095 steps
- Maximum current: 10 A (tested with QCL at 20 V and 100 ns pulse width)
- Monitor for the supply voltage source (ADC)
- Master clock period / frequency:

main clock period / frequency	output signal max. period / min. frequency
25 ns / 20 MHz	1.638 ms / 610 Hz
50 ns / 10 MHz	3.27 ms / 305 Hz
100 ns / 5 MHz	6.55 ms / 152 Hz
200 ns / 2.5 MHz	13.1 ms / 76.3 Hz
1600 ns / 0.312 MHz	104 ms / 9.54 Hz
6.4 µs / 78 kHz	420 ms / 2.38 Hz
25.6 µs / 19.5 kHz	1.677 s / 0.594 Hz

- Pulse repetition period - adjustable in the range 1 ... 65535 times the period of the master clock
- Pulse duration - adjustable in the range 1 ... 65535 times the period of the master clock
  - if pulse duration is higher than the period, source stays on – CW operation
- Driving signal rise / fall times < 3 ns.
- Pulse jitter : 6 ns pp
- Trigger output starts 50 ns before the IR pulse
  - adjustable duration time in the range 1 ... 65535 times the period of the master clock
- Power supply monitor
- Source average current monitor - time constant 100 ms
- All parameters have their equivalent – minimum/maximum to provide for safe operation
- Anode of the source is connected to ground, cathode below ground potential

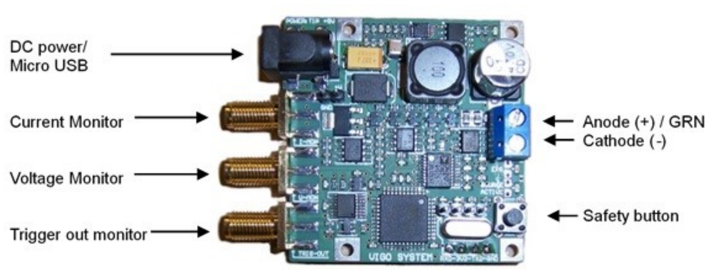


Software

- The UPS Driver is configured using PC software, or text protocols.

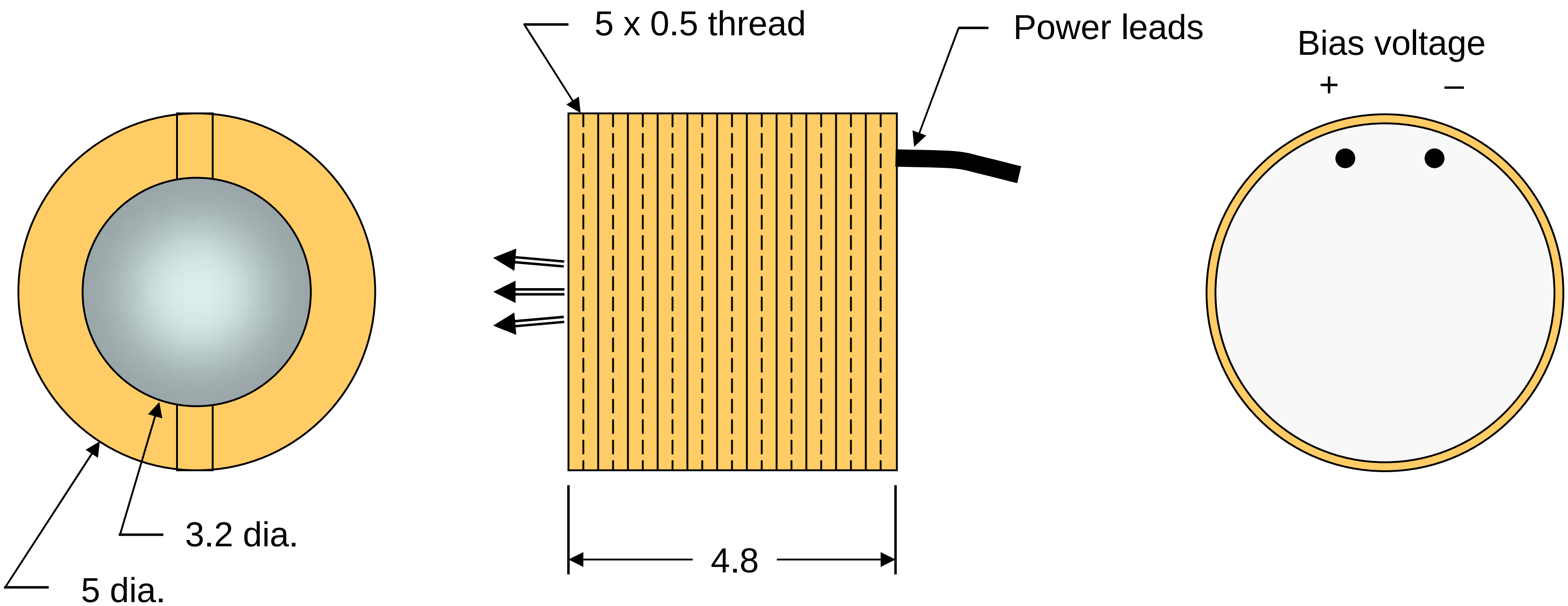
Connections:

- trigger output—SMA connector
  - output impedance 50 Ω
  - standard LVTTL: logic 0 - 0 V, logic 1 – 3,3 V @ Hi-imp, 1.65 V @ 50 Ω
- output current monitor—SMA connector
  - DC offset ~ 100 mV @ 50 Ω
  - current sensitivity 0.1 V/A @ 50 Ω / can be modified
  - 100 MHz BW
- output voltage monitor—SMA connector
  - DC offset ~ 100 mV @ 50 Ω
  - voltage sensitivity 50mV/V @ 50 Ω / can be modified
  - 100 MHz bandwidth
- micro-USB connector
  - communication with PC, virtual COM port
  - power supply, if current consumption of the driver does not exceed 0.5 A (USB 2.0 standard)
- DC power jack 2.5/5.5
  - power supply, if driver requires more than 0.5A (USB 2.0 standard), or If the PC is not used (configuration is restored from the memory)



Size:

- PCB dimensions 60x50x15mm (width×height×depth), including connectors



LEDxxSr package configuration	
Dimensions: mm Tolerances: N/A	Date: 29 July 2009

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1. An electroluminescent IR LED is a product which requires care in use. IR LEDs are fabricated from narrow band heterostructures with energy gap from 0.25 to 0.4 eV. That's why the bias used to initiate current flow is low compared to the well known visible or NIR LEDs. Typical forward bias is V~0.1- 1 V only for mid-IR LEDs!
2. Be sure not to exceed I*max which is given in each LED specification and do not use test instrument that contain sources/batteries with voltage greater that V_{cw} max given in specification. For LED current restriction and further LED current measurement we recommend to use resistor (1-5 Ohms) connected in serial to LED. This is important to note that un-grounded devices (e.g. computers) can give V=1-5 V that is enough to destroy the LED!
3. It is highly desirable that the user has I-V meter for small currents (10-100 $x10^{-6}$ A). We guarantee the existence of the LED output as long as V-I characteristic shows saturation in the reverse bias (10-100 $x10^{-6}$ A).
4. We recommend activating pulse generator prior connecting LED to generator. On switching off the procedure is reversed: disconnect LED, switch off pulse generator. Long wires connecting LED with pulse generator may be the reason for LED failure because of unexpected voltage surges when switching on and off the LED supply.
5. Please test all elements and circuits before applying voltage to LED. Remember that ground (T0-18 or another holder) should be biased positively (if not specially designed). Usually the negative electrode is made shorter than the positive one.
6. The expected signal is not very big and it is important to test and eliminate noise in the detector circuits.
7. In some cases it is possible to increase pulse duration. Imax in such cases can be estimated using the following equation: Imax=I* max /20*SQRT(f*t), where f-is the frequency (Hz), t-is the pulse duration (s), I* max-is the maximum current (A) for t=5 us and f=500 Hz. The equation gives an order of magnitude and may be used for t< 0.1 ms only. Pulses with t > 0.15 ms should be considered as adequate to CW operation and Imax and Vmax should be taken close to CW operation parameters. Please, note that long pulses can increase heat dissipation and the chip temperature. This effect decreases LED emission power and can be traced due to the LED resistance decrease during each pulse. CW power often decreases with time due to heatsink temperature increase.
8. Microimmersion LEDs are made with chalcogenide glass that have low melting temperature (50-70^{o}C). That’s why, please, avoid any heater source close to the LED. Even sunlight concentrated onto the lens can melt glass the lens. That’s why we recommend vertical position for the LEDs at the initial stage of the research work. We are working now to increase the glass melting temperature or/and to strengthen its position and shape.
9. Be patient in adjusting the optical system. It is only experience that allows fast work.