

Drivers operate in

60+

countries worldwide

35+

years of experience

10000+

drivers manufactured

99%+

of drivers error-free
for **10+** years

Unlimited **in-house**
R&D solutions for
electronics hardware
and software



EKSPLA
ELECTRONICS

Advanced electronics
technologies

uniLDD

Laser Diode
Drivers'
Family

Drivers that can
supply almost any
medium / high
power laser diode
in continuous or
pulsed operation
mode

- + For high current / high power applications
- + Firmwares / hardwares for CW, QCW,..., TEC control, forced-air and conductive cooling
- + At factory optimization for stable performance with particular diode & cables

Pockels Cell Drivers

& HV Power
Supplies

Fast HV switches
designed to
load & unload
Pockels cell
capacitance with
several nanosecond
edges

- + Low / high repetition rate models ranging from single pulse to 6 MHz
- + Up to 5 MHz in burst
- + Square pulse shape
- + Controlled by an external trigger pulse

Laser Diode Drivers' Family



Driver that can supply almost any middle- and high-power laser diode in continuous or pulsed operation mode.

uniLDD is a DC input power converter designed to supply CW or pulsed (QCW) current for the single emitter, bar, stacked laser diode or high power VCSEL in constant current mode. Using different software versions together with specific hardware sets, the uniLDD driver is adapted for different types of laser diodes and modes of operation. The driver is based on DSP technology assuring high specifications. Typical performance is presented in below illustrations.

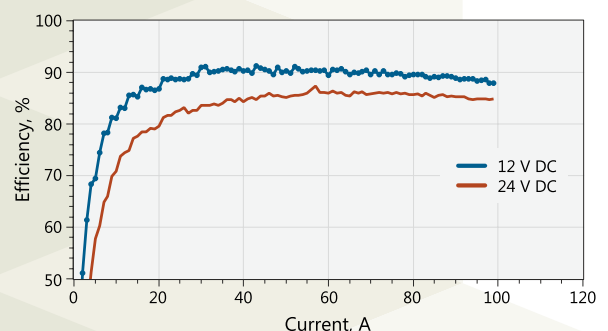
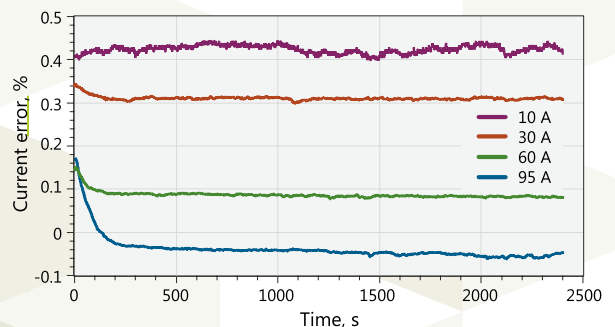
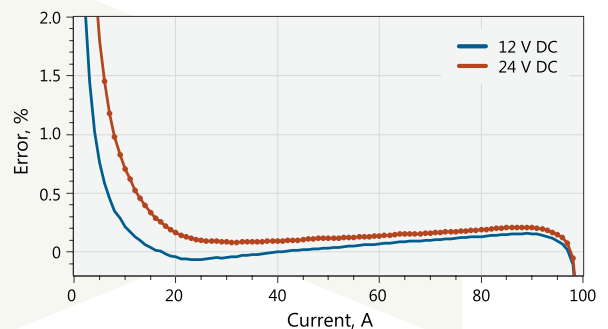
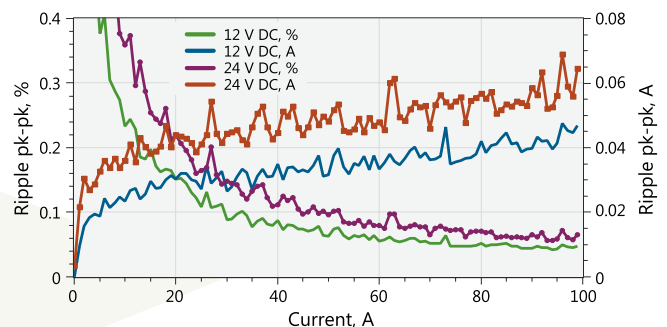
Next optimizations are done while adapting according to customer requirements (current, voltage, cables...):

- Firmware version (chosen from different 5 ready versions)
- Hardware components set
- Regulation loop frequency response analysis and PID constants defining
- Hardware and software settings

One or two TEC control channels can be added as option. However, the price for the feature is reduction of maximal possible output current to laser diode since 2 or 3 output stages of total 5 are utilized for TEC supply.

uniLDD Main Features

- Best suitable for high-current and high-power applications
- Different firmware versions featuring CW, QCW, ..., TEC control operation
- Hardware versions for CW, QCW, TEC control, Conductive cooling options
- At factory frequency response analysis is used to optimize performance to achieve stable operation with particular laser diode and connection cables combination
- High efficiency switching mode converter
- Multi-phase power stage for low current ripple
- Low current drift
- Parallel operation of two drivers to double output current
- "Voltage booster" layout option to extend output voltage to 200V and more
- External storage capacitor option for long-pulse QCW operation
- Analog and digital (CAN, RS232) control interfaces



uniLDD General Specifications

INPUT

Supply voltage, power stage
12...90 VDC

Supply voltage, control stage
12...30 VDC

PHYSICAL CHARACTERISTICS

Assembly dimensions
(L x W x H)

190 x 68 x 55 mm

PROTECTIONS

Current transient protection and shut-down

Open circuit shut-down

Over temperature shut-down

Power **voltage brownout** shut-down

Interlock shut-down

AUXILIARY OUTPUTS

+5V @ 200mA

+15V @ 100mA

-15V @ 100mA

OUTPUT, CW mode

Diode compliance voltage	1...28V	Up to 95% of power stage supply voltage. Can be extended using voltage booster layout
Max current	50A – 100A	Can be extended above 100A using parallel connection of several drivers
Current ripple	0.1% pk-pk	DC...100kHz bandwidth, in x0.5...x1 of max current range
Current drift	<0.2%	Cold start, 8h period, after 5min. warm up
Bandwidth of $I_{programm}$ control input frequency	>10kHz	At minimal connection cable inductance

OUTPUT, OCW (Pulse mode)

Diode compliance voltage	1...80 V	Can be extended using voltage booster layout
Max pulse current	160A-360A	Can be extended above 360A using parallel connection of the drivers
Duty cycle	≤20%	
Current pulse raise, typical range	10μs...50 μs	@ minimal connection cable inductance and sufficient power stage voltage
Max RMS current	100A	80A for diode compliance voltage >28V
Current pulse amplitude stability	0.1% pk-pk	In x0.5...x1 of max current range
Current drift	<0.2%	Cold start, 8h period, after 5min. warm up

OUTPUT, TEC control (if equipped)

Quantity of output channels	1 or 2	
Maximal output current	25A	
Maximal output voltage	28V	

ENVIRONMENT

Operating temperature	0 to 40°C	De-rate current at higher temperature
Cooling	Forced air	Installed or external shared fan. Conductive cooling version available as option

NOTES:

Specifications are subject to change without prior notice.

Not all combinations of parameters are possible at the same time.

uniLDD Possible Configurations

CW



Fig.2
CW uniLDD
conductive cooled
driver version

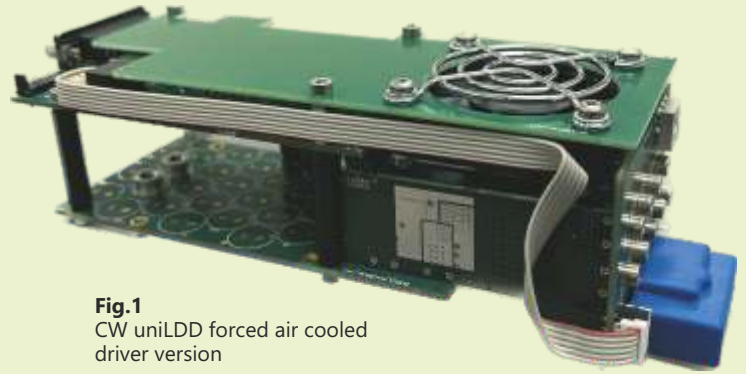


Fig.1
CW uniLDD forced air cooled
driver version

uniLDD-CW

Driver for CW mode operation

Firmware	CW
Maximum current to laser diode	100A
Maximum compliance voltage	27V

*Voltage extension possible by customization
and current reduction.*

uniLDD-CW+1TEC

Driver for CW mode operation and
one stage bidirectional TEC control

Firmware	CW-TEC
Maximum current to laser diode	75A
Maximum compliance voltage	27V
Maximum current to TEC	25A
Maximum TEC voltage	28V

QCW

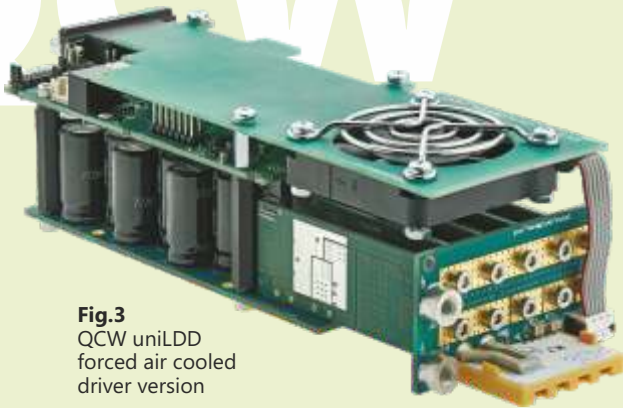


Fig.3
QCW uniLDD
forced air cooled
driver version

uniLDD-QCW

Driver for
QCW mode operation

Firmware	QCW
Maximum current to laser diode	360A
Maximum compliance voltage	80V

Hardware options rated 30, 60, 100 V

uniLDD-QCW-1TEC

Driver for QCW mode operation and
one channel bidirectional TEC control

Firmware	QCW-TEC
Maximum current to laser diode	270A
Maximum compliance voltage	80V

Hardware options rated 30, 60, 100 V

uniLDD-QCW-2TEC

Driver for QCW mode operation and
two channels bidirectional TEC control

Firmware	QCW-2TEC
Maximum current to laser diode	180A
Maximum compliance voltage	80V

Hardware options rated 30, 60, 100 V

Pockels Cell Drivers

& HV Power Supplies

Range of drivers for Pockels cells are fast HV switches designed to load and unload capacitance of Pockels cell with several nanosecond edges.

Amplitude of output pulses to Pockels cell is about equal to HV supply voltage. Only exception is DP-FAM series drivers that allow to control the amplitude of each pulse by analog voltage input.

Design adaptation for particular OEM customer is possible and can include optimizing of mechanical design, output switch for voltage, repetition rate, rise/fall time and pulse duration lengthening etc.

Almost all the drivers can work in up to 5 MHz bursts. Range of DC/DC type HV power supplies is manufactured to provide a complete Pockels driving solution.



Main Features

- Low and high repetition rate models covering range from single pulse to 6MHz
- Up to 5MHz in burst
- Square pulse shape
- Controlled by an external trigger pulse
- Fast HV switching for both rise and fall edges
- Wide range of pulse durations
- Low jitter
- For BBO, RTP, KD*P, CdTe Pockels cells
- Designed for capacitive load

General Specifications

DRIVER series	PCD-UHR series	PCD-UHRS series
Maximal operating voltage	≤ 9.8 kV	≤ 3.6 kV
Maximal repetition rate	6 MHz	1 MHz
Minimal HV pulse duration	100 ns	15 ns
HV pulse duration extension with no principal limit using pulse regeneration technique	YES	NO
Triggering pulse duration requirement (for two-pulses triggering mode only)	≥20 ns	
Triggering pulse amplitude requirement	3.5 – 5 V (50 Ohm input)	
Triggering pulse rise & fall time requirement	≤ 10 ns	≤ 5 ns
Maximal length of leads to Pockels cell	10 cm	
HV pulse delay	25 ns	30 ns
HV pulse jitter	<100 ps	

EXTERNAL POWER REQUIREMENTS

HV supply: each model has particular recommendation

Low voltage supply: 24 VDC ±1V

Product Range

Driver Selection Table ⁽¹⁾

High PRR unipolar output driver.

HV pulse duration
100-5000ns

Ekspla Electronics p/n	Rep-rate kHz	Voltage kV	Rise/fall < ns	Power ⁽²⁾ W
PCD-UHR-50-3.6	50	3.6	7	20
PCD-UHR-250-2.6-(C)	250	2.6	6	40
PCD-UHR-250-3.6-(C)	250	3.6	7	75
PCD-UHR-400-1.5-(C)	400	1.5	5.5	20
PCD-UHR-500-2.6-(C)	500	2.6	6.5	90
PCD-UHR-1000-1.8-(C)	1000	1.8	6	80
PCD-UHR-2000-1.5-(C)	2000	1.5	7	120

High PRR unipolar output short-pulse driver.

HV pulse duration
15-5000ns

	kHz	kV	< ns	W
PCD-UHRS-50-3.6	50	3.6	7	20
PCD-UHRS-250-3.6-(C)	250	3.6	7	75
PCD-UHRS-250-2.6-(C)	250	2.6	6	40
PCD-UHRS-500-2.6-(C)	500	2.6	6.5	90
PCD-UHRS-1000-1.8-(C)	1000	1.8	6	80
PCD-UHRS-400-1.5-(C)	400	1.5	5.5	20

-(C) – driver can be made in any configuration - with aluminum housing or open frame

-C – driver in aluminum housing

High PRR Cavity Dumping bipolar output driver.

HV pulse duration
100-5000ns

	kHz	kV	< ns	W
PCD-UHR-I-250-5.2-C	250	5.2	8.5	100
PCD-UHR-I-300-4.6-C	300	4.6	8	100
PCD-UHR-I-350-4-C	350	4	7.5	100
PCD-UHR-I-1000-3.0-C	1000	3	7.5	100

	kHz	kV	< ns	W
PCD-UHR-II-150-7.0	150	7	9.5	110
PCD-UHR-II-250-7.0-C	250	7	9.5	200
PCD-UHR-II-1000-4.0-C	1000	4	6	230
PCD-UHR-II-1000-3.8-C	1000	3.8	9.5	210

	kHz	kV	< ns	W
PCD-UHR-III-500-7.2-C	500	7.2	8.5	375
PCD-UHR-III-2000-3.4-C	2000	3.4	9.5	360
PCD-UHR-III-2500-3.1-C	2500	3.1	9.5	360
PCD-UHR-III-3000-2.6-C	3000	2.6	8.5	325

High PRR Cavity Dumping driver.

FULL BRIDGE configuration with output frequency doubling.

Encased version.

	kHz	kV	< ns	W
2PCD-UHR-III-4000-1.7-C	4000	1.7	10.5	360
2PCD-UHR-III-6000-1.3-C	6000	1.3	9	350
2PCD-UHR-500-3.4-C	500	3.4	7	150
2PCD-UHR-1000-2.4-C	1000	2.4	6.5	180
2PCD-UHR-2000-1.6-C	2000	1.6	6	130

High voltage Cavity Dumping driver.

HV05Wm HV power supply is included.

	kHz	kV	< ns	W
PCD-UHV-4.2	10	4.2	6	5
PCD-UHV-5.5	5	5.5	7	5
PCD-UHV10-3	8.6	3	10.5/9.5	5
PCD-UHV10-2.5	9.8	2.5	12/10.5	5

High voltage Cavity Dumping driver with HV05Wm HV power supply included.

Encased version.

PCD-UHV-C	kHz	kV	< ns	W
	10	4.2	6	5
	5	5.5	7	5
PCD-UHV10-C	kHz	kV	< ns	W
	8.6	3	10.5/9.5	5
	9.8	2.5	12/10.5	5

Fast amplitude modulation driver.

Each pulse can have individual amplitude in full range 0.1 to 2.5kV according to analog input control signal.

	kHz	kV	< ns	W
DP-FAM-250-2.5	250	2.5	26/13	60
DP-FAM-500-2.5	500	2.5	26/13	120

1) All specifications correspond to Pockels cell capacitance 6pF 2) HV Power consumption, the same heat to be removed by cooling

Pockels Cell Drivers



PCD-UHR-III,
2PCD-UHR-III series driver



PCD-UHR, PCD-UHRS
series open frame OEM driver



PCD-UHR...C, PCD-UHRS...C
series OEM driver in aluminum housing

HV Power Supplies

	Ekspla Electronics p/n	Output Power W	Maximal Voltage – Standard Options kV
Encased HV Power Supply Powering 48V; Voltage range 0 – U _{max} ; Auxiliary output 24V. CAN, RS232, trimmer analog (option) control.	HV-200	200 W	1.8, 2.6, 3.6, 4 kV
	HV-400	400 W	
	HV-2x200	2 x 200 W	±1.5, ±2.0, ±2.6, ±3.6 kV
Encased HV Power Supply Powering 24V; Voltage range 0.4*U _{max} – U _{max} ; Trimmer and CAN control.	HV-170	170 W	1.8, 2.6, 3.6 kV
	HV-2x85	2 x 85 W	±1.5, ±1.8 kV
Open frame (PCB) HV Power Supply Powering 24V; Voltage range 0.4*U _{max} – U _{max} ; “-CAN” with CAN control, other trimmer control.	HV05Wm	5 W	1.8, 2.8, 4.0, 4.4, 5.0 kV
	HV05Wm-CAN		
	HV40Wm	40 W	1.3, 1.8, 2.5, 3.6, 4.0 kV
	HV40Wm-CAN		
	HV80Wm	80 W	1.8, 2.6, 3.1, 3.6, 4.0 kV
	HV80Wm-CAN		
	HV120Wm	120 W	1.8, 2.6, 3.1, 3.6, kV
	HV120Wm-CAN		
	HV2x60Wm	2 x 60 W	±1.4, ±2.0, ±2.6, ±3.6 kV
	HV2x60Wm-CAN		

**Contact Ekspla
for more details and
quotation**



EKSPLA ELECTRONICS

Advanced electronics
technologies

About Ekspla Electronics

Team of developers and manufacturers of specific electronic devices with cutting-edge parameters and bullet proof reliability continues operation under the new name – Ekspla Electronics.

Product's design embodies 35+ years of experience in manufacturing and R&D of serial and custom laser systems. Up to date, laser electronics created by our team of enthusiastic engineers, has been the heart and soul of 10 000+ laser systems.

99%+ of sold products perform fails-free throughout 10+ years' period under the most demanding conditions. Our exclusive area of expertise – devices for solid state pulsed lasers.

Ekspla Electronics experience includes custom adaptation and high volume manufacturing for laser developers and manufacturers.

Our clients – world-leading manufacturers of industrial, medical and scientific lasers whose systems are installed in 60+ countries and 80+ top universities worldwide.

Ekspla Electronics products are implemented in the world's most sophisticated laser systems developed for CERN, NASA, ELI, Max Planck Institutes, Cambridge University, Massachusetts Institute of Technology and other renowned scientific institutions.



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