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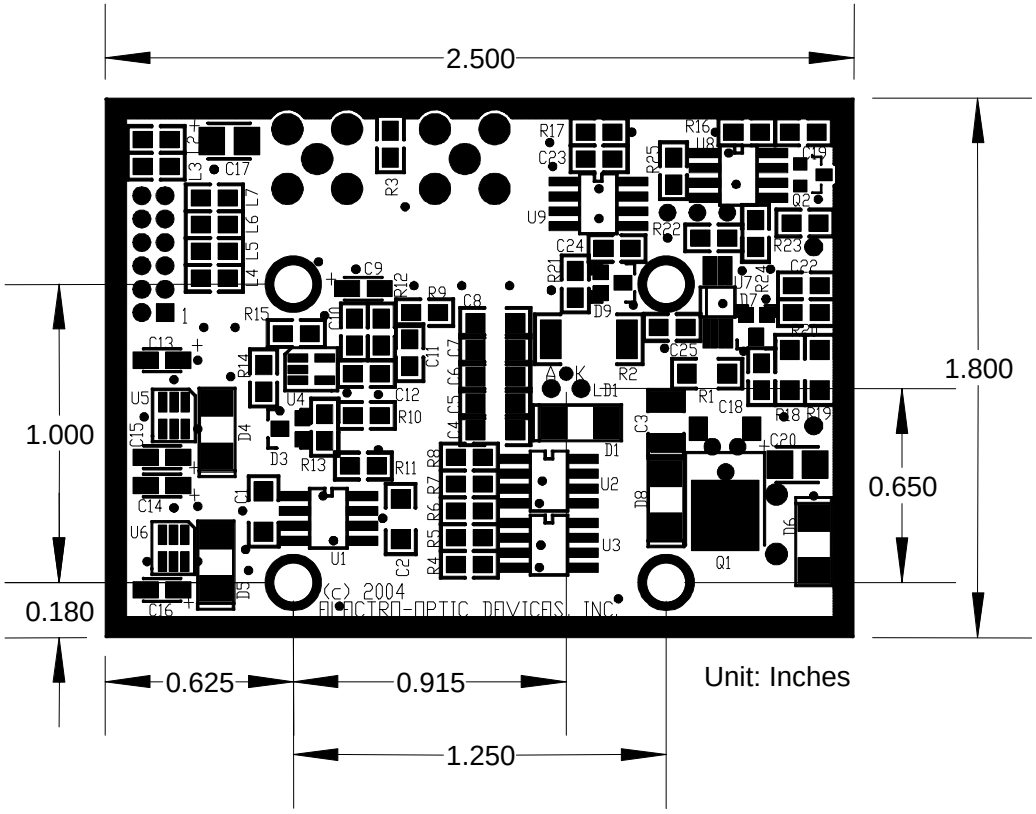
ETX-12 Hi-PRF Laser Driver with Power Supply

Preliminary Information



Operational Features:

Pulse Repetition Frequency: up to 40 kHz (standard), up to 100 kHz (custom)
Vsupply = 5.0Vdc @ 15mA (max. quiescent, no load), < 600mA @ full load/max voltage
SPI-bus compatible discharge voltage control.
TTL/CMOS compatible trigger input
TTL/CMOS compatible discharge detection output

Connections and Signal Descriptions:

Interface Connector P1, 2mm 12 position header

Pin #	Signal
1	Discharge Detection Output (alternate to J2)
2	GROUND
3	Trigger Input (alternate to J1)
4	GROUND
5	SI, Serial Data Input
6	GROUND
7	SCK, Serial Data Clock Input
8	GROUND
9	$\overline{\text{CS/SHDN}}$, combined SPI Chip Select and Power Supply Shutdown input
10	+5Vdc Power Input
11	VLFB, Laser Voltage Feedback Output
12	+5Vdc Power Input

P1 Signal Descriptions:

Serial Data, SI (Input, Pin #5) – Serial data input for SPI control over laser discharge voltage.

Serial Data Clock, SCK (Input, Pin #7) – Serial clock input for SPI data transfer.

Chip Select / Shutdown, $\overline{\text{CS/SHDN}}$ (Input, Pin #9) – Dual function input. To shutdown the laser discharge power supply (supply will output < 5Vdc), this input should be asserted to logic LO. During SPI control of the power supply, this input is used as Chip Select when asserted logic LO to demark the beginning and end of the serial transfer. During this brief period, the power supply will be in shutdown.

Laser Voltage FeedBack, VLFB (Output, Pin #11) – This analog output reflects the laser discharge voltage as present at the power supply storage capacitor, C21. The division ratio is 21:1 (Vdischarge : VLFB).

Trigger Input, TRIG (Input, Pin #3) TTL/CMOS Compatible, positive pulse with pulse width from 30 – 100 ns. For repetition rates > 50kHz, use of 30 – 60 ns width is preferred. Input impedance is 10K Ohms.

Discharge Detection Output, DDO (Output, Pin #1) TTL/CMOS Positive pulse coincident with laser discharge.

Other Connections:

J1 – SMA/SMB Trigger Input (coaxial connection option)
J2 – SMA/SMB Discharge Detection Output (coaxial connection option)

TP1,TP2 & TP3, External Control Voltage Inputs –
TP1,TP2 & TP3, External Control Voltage Inputs –
TP1 – Ground
TP2 – External Control Voltage
TP3 – Voltage Reference

Connecting an external control voltage of 0 – 4.1 Vdc to TP2, the laser voltage can be controlled over the full range of approximately 5 to 100Vdc, respectively. Caution should be observed. Exceeding 4.1Vdc on TP2 can place the power supply in an overvoltage condition, potentially damaging the laser driver.

Optionally, a potentiometer may be attached for on-board manual control of the discharge voltage. TP1, TP2 & TP3 are arranged linearly with 0.1" centers to accommodate a similarly leaded 10K potentiometer. Removal of R25 is necessary for this configuration.

SPI Control over Laser Discharge Power Supply:

The Laser Power Supply voltage is controlled by a digital potentiometer (Microchip P/N MCP41xxx series). Please see the appropriate datasheet for detailed communication specifications.

Generally, the data sent to the laser driver is 16 bits, MSB first. The first byte is a command byte: $11 (hex). The second byte contains the 8 bit voltage level desired for the power supply. A second byte of $FF is maximum voltage (near 100Vdc). A second byte of $00 will attain minimum laser voltage (near 4.5Vdc).

Example: To set the laser voltage supply at 30 Vdc:
Second byte = 30V / 100V * 255 = 76.5
Therefore using 76 or 77 ($4C or $4D) should place the power supply near 30Vdc. The full 16 bits of data would be: $114C

Shutdown of Laser Discharge Supply:

Holding a logic LO on the CS/SHDN input will disable the on-board switching power supply. Since the power supply is a Boost Regulator, the discharge voltage will rest at ~0.5V less than the input voltage, typically at 4.5 Vdc, while CS/SHDN is LO.

ETX-12 OPERATING SPECIFICATIONS:

(temp = 25 C, Vcc = 5.0Vdc, standard configuration)

PARAMETER	MIN.	TYP.	MAX.	UNIT
Supply Voltage (Vcc)	4.8	5.0	5.2	V dc
Supply Current – quiescent (Icc)[1]	5	10	20	mA dc
Supply Current – operating (Icc)[2]	5		600	mA dc
Supply Current during shutdown (Ishdn)		5		mA dc
Laser Discharge Voltage (Vdis)[3]	5		100	V dc
Laser Discharge Voltage (shutdown)		4.5		V dc
Pulse Repetition Rate (continuous, Vdis up to 60V)[4,5]			40	kHz
Pulse Repetition Rate (continuous, Vdis = 80V)[4]			28	kHz
Pulse Repetition Rate (continuous, Vdis = Max)[4]			17	kHz
Maximum Current Pulse Amplitude (peak)[4,6]		35		A
Current Pulse Width (Vdis = 50 Vdc)[4,6]		16		ns (fwhm)
Trigger Input Pulse Amplitude (Vih)	2.4	5	12	V dc
Trigger Input Pulse Width (at 50% amplitude)	25	50	100	ns
Discharge Detection Output Amplitude (Vol, Voh typ.)	0.3		4.8	V dc

NOTES:

1. Quiescent – dependent upon discharge voltage.
2. Operating – dependent upon repetition rate, discharge voltage and capacitance bank
3. Temperature dependent - actual minimum voltage ~ 4.5Vdc and maximum voltage ~ 98Vdc
4. Measured load: 1" length of 18Ga. wire with current probe attached.
5. PRF limited by current limiting resistor. Resistor may be modified for PRF > 100kHz, cooling may be necessary.
6. Dependent upon laser package inductance, discharge capacitance, series resistance and laser voltage.

ETX-12 ORDERING OPTIONS:

ORDERING CODES:

ETX-12	ETX-12 laser driver **without** 12 position header, no Laser
ETX-12-C	ETX-12 laser driver **with** 2 position 2mm header, no Laser
ETX-12-85	ETX-12 laser driver, no connector, SPL PL85 Laser Diode*
ETX-12-90	ETX-12 laser driver, no connector, SPL PL90 Laser Diode*
ETX-12-93	ETX-12 laser driver, no connector, SPL PL90_3 Laser Diode*
ETX-12-85-C	ETX-12 laser driver, 12 pos header, SPL PL85 Laser Diode*
ETX-12-90-C	ETX-12 laser driver, 12 pos header, SPL PL90 Laser Diode*
ETX-12-93-C	ETX-12 laser driver, 12 pos header, SPL PL90_3 Laser Diode*

* includes test data indicating measured peak laser power at Vdis = 50Vdc

Add –SMA suffix for SMA coaxial connections on J1 and J2

Add –SMB suffix for SMB coaxial connections on J1 and J2

Accessories:

ETX-12-ETD	Extended test data including Po vs. Vdis and laser spectral plots
ETX-12-NRE	Custom pulsewidth / power output Non-Recurring Engineering