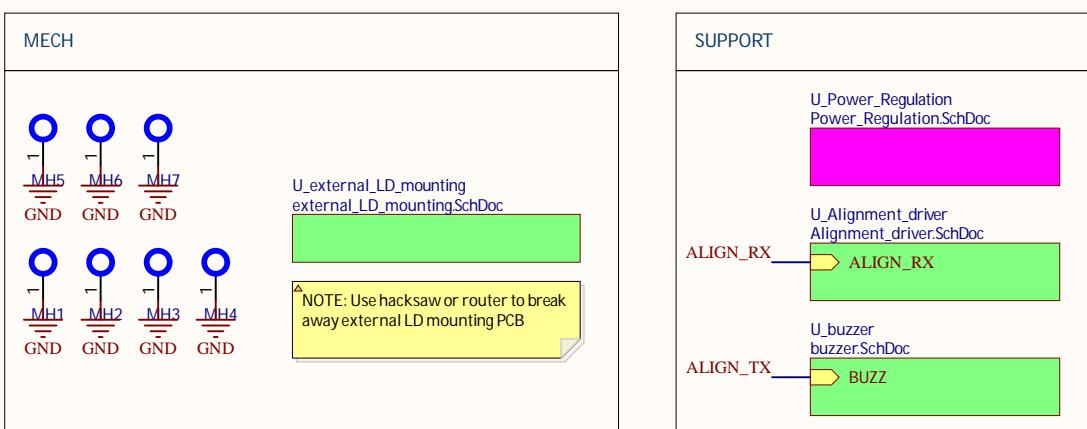


THE TREX SYSTEM

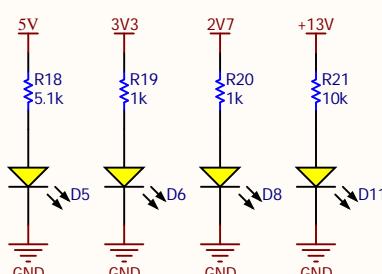
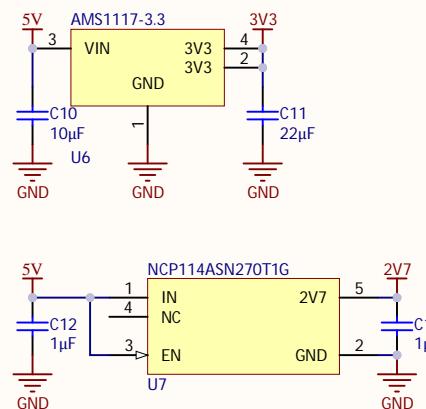
IS LICENSED UNDER CERN-OHL-S (strongly reciprocal)
THE FULL LICENSE TEXT IS AVAILABLE AT:
https://ohwr.org/cern_ohl_s_v2.txt
YOU MUST COMPLY WITH THE TERMS, INCLUDING
PROVIDING COMPLETE SOURCE IN DERIVATIVE WORKS

AUTHORS:
PETER
WON CHEN
AGNI

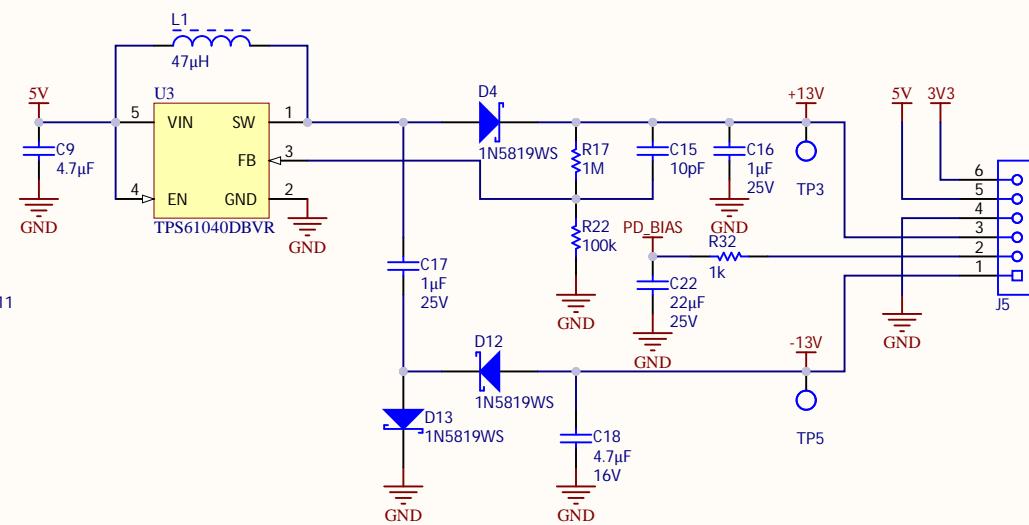
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Title: ROOT			
Designer:	Peter Tanner	Revision:	ce427f90 [No modification]
Date:	12/10/2025	Size:	A4
35 Stirling Hwy, Perth WA 6009, Australia		Sheet:	1 / 9



[Link to Circuit for Inverting Boost Converter. \(Pg.17 Fig.8-7\)](#)



Title:
Power

Designer: Agni,Peter

Revision: ce427f90 [No modification]

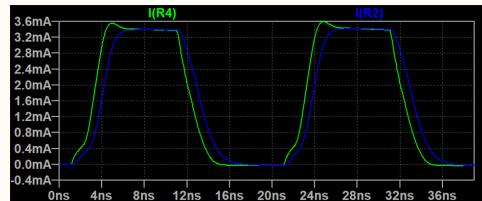
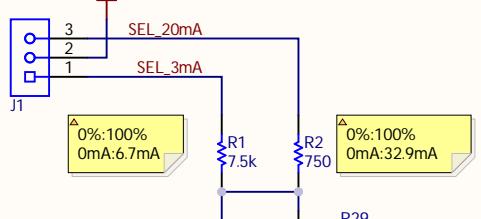
Date: 12/10/2025

Size: A4

35 Stirling Hwy, Perth WA 6009, Australia

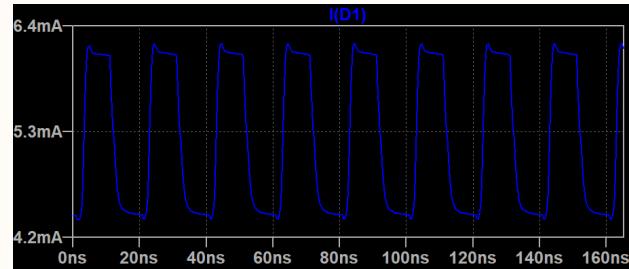
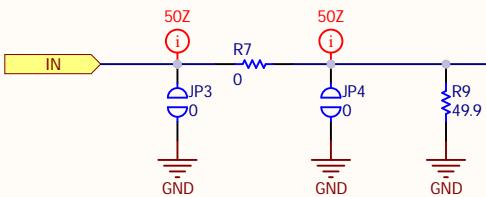
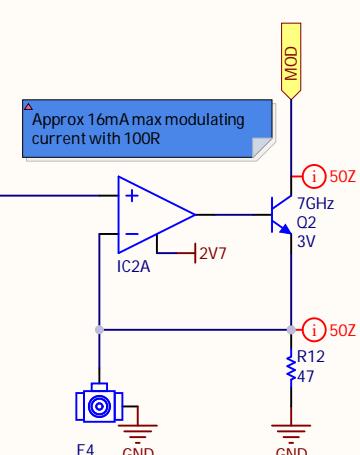
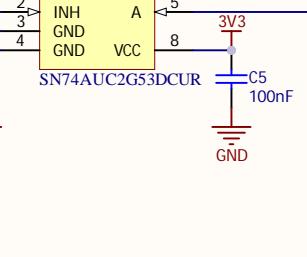
Sheet: 2 / 9

A

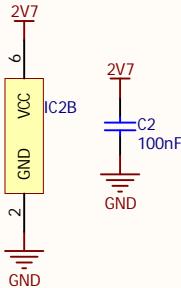


HF SPDT switch
Td=1.6ns

RC slew rate limiter
Try $R=470\Omega$, $C=1\text{pF}$ ($\tau=0.47\text{ns}$, $f_c=2.13\text{GHz}$)
Results in response I(R2). I(R4) is without RC limit
Initially unpopulated, bridge JP2 and replace R5



4.5mA bias
1.7mA modulation
I(D1) on plot is total current through laser diode
 $t_r=1\text{ns}$, $T=20\text{ns}$



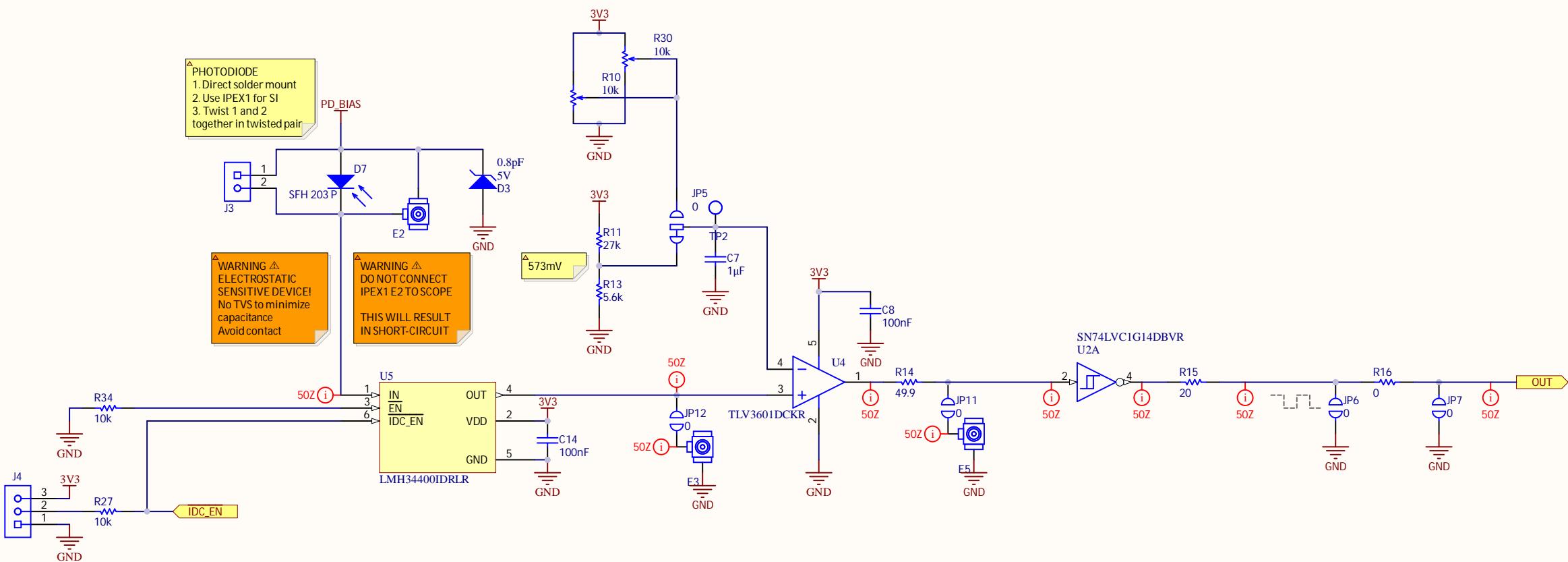
Title: Modulation Driver	
Designer: Peter Tanner	Revision: ce427f90 [No modification]
Date: 12/10/2025	Size: A4
35 Stirling Hwy, Perth WA 6009, Australia	Sheet: 3 / 9

A

B

C

D

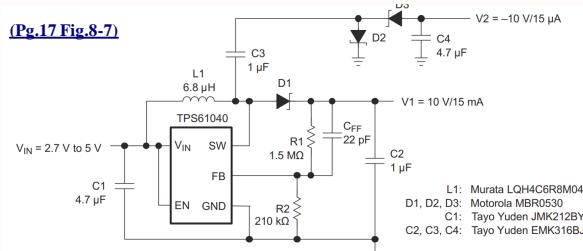


$V_{OUT} = 1.233V * (1 + (R3/R5))$
Value of R5 has to be $\leq 200k$, and maximum value of R3 is 2.2M. Used JLCBasic parts. So, with R5 = 200k, and R3 = 2.2M, $V_{OUT} = 13.56V$.

$f_s = 74.1\text{kHz}$
Found by rearranging Eqn(2) on Pg.12, Inductor value that was used 10uH.

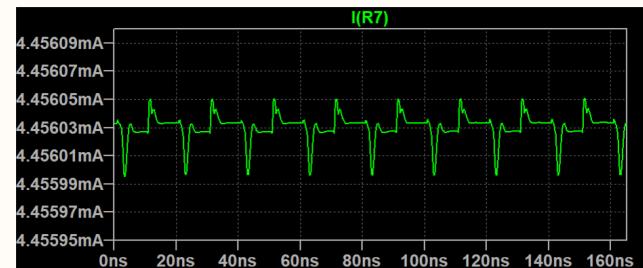
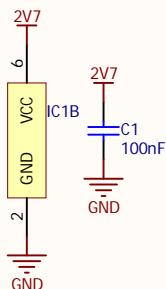
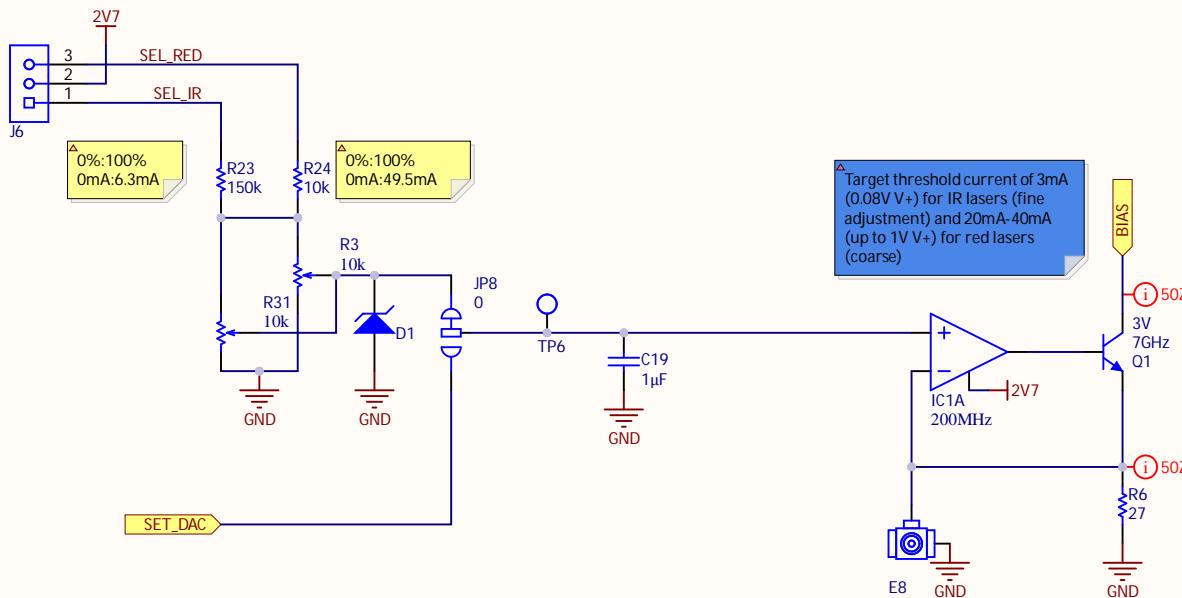
I_P value for TPS61040 from Eqn(1) on Pg.9.
V_{IN} value used: 5V.

C_{FF} = C₅ = 10pF



A

A



bias stability w/ 20ns modulating square wave
 I(R7) on plot is current through current sense resistor R6 in schematic
 4.5mA bias
 1.7mA modulation
 tr=1ns, T=20ns

Title: Bias Driver

Designer: Peter Tanner

Revision: ce427f90 [No modification]

Date: 12/10/2025

Size: A4 Sheet: 5 / 9

35 Stirling Hwy, Perth WA 6009, Australia

A

A

B

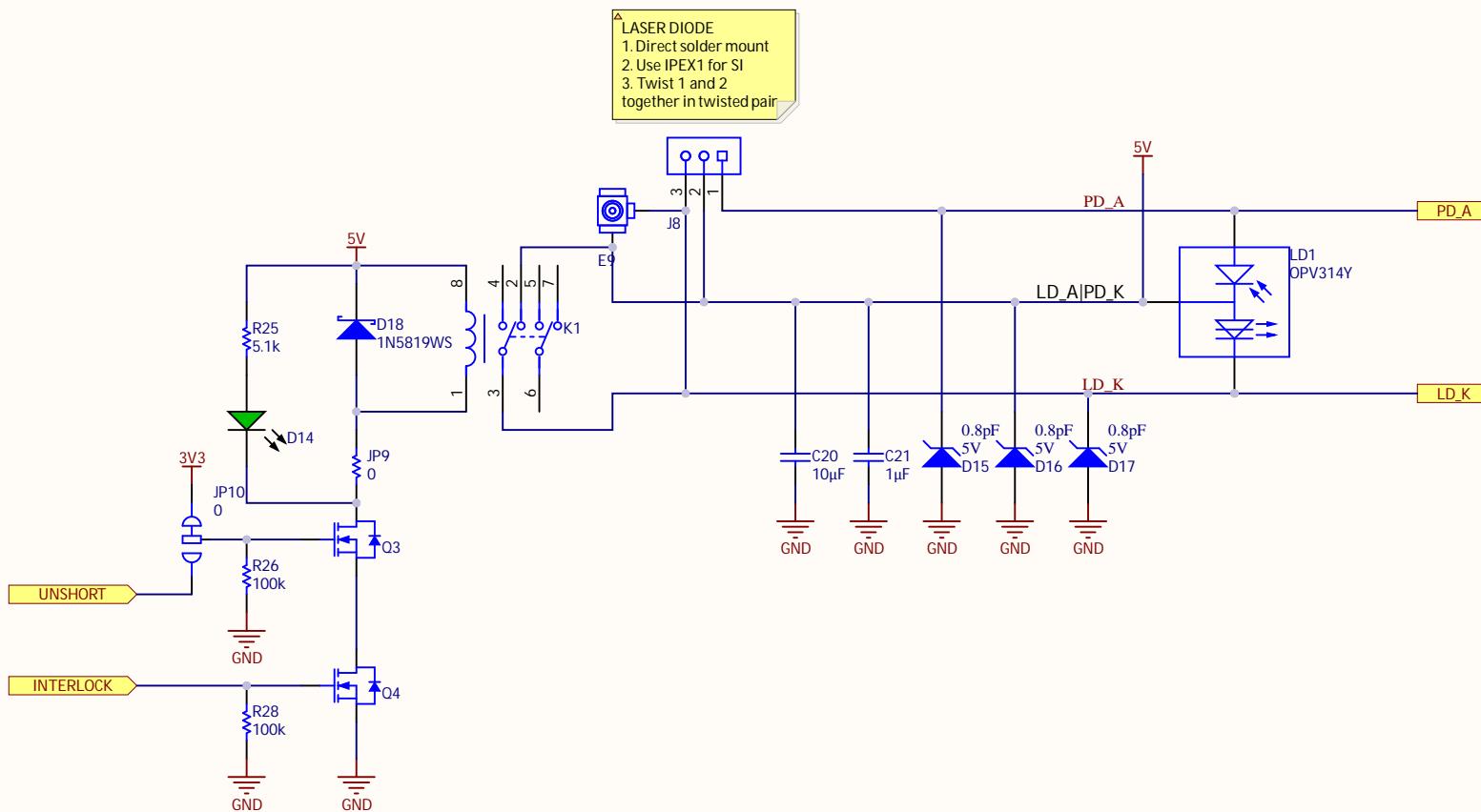
B

C

C

D

D



Title: Laser			
Designer: Peter Tanner	Revision: ce427f90 [No modification]		
Date: 12/10/2025		Size: A4	Sheet: 6 / 9
35 Stirling Hwy, Perth WA 6009, Australia			

A

A

B

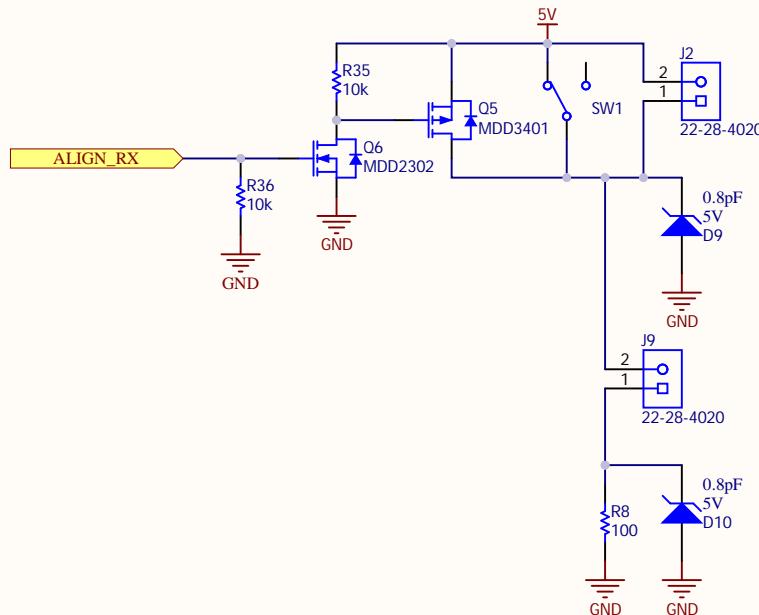
1

6

6

D

1



Title: Alignment Laser	
Designer: Won Chen	Revision: ce427f90 [No modification]
Date: 12/10/2025	Size: A4
35 Stirling Hwy, Perth WA 6009, Australia	Sheet: 7 / 9

A

A

B

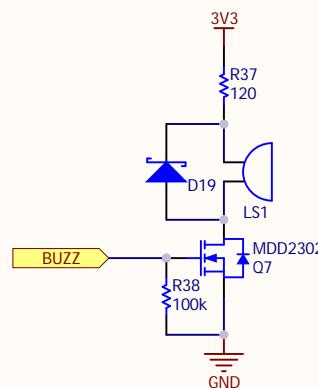
B

C

C

D

D



Title: Buzzer	
Designer: Peter Tanner	Revision: ce427f90 [No modification]
Date: 12/10/2025	Size: A4
35 Stirling Hwy, Perth WA 6009, Australia	Sheet: 8 / 9

A

A

B

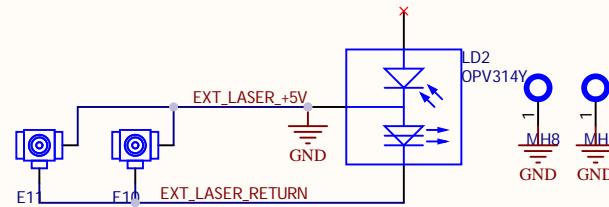
B

C

C

D

D



IMPORTANT:
IMPORTANT:
Cut off this ext laser board using a CNC router or hacksaw

NOTE: GND is not connected to circuit ground in reality
(only connected to main PCB for purpose of cheapening
order)

GND Acts as +5V since shield of cable is held positive (see
laserSchDoc)

Title: External Laser Mounting PCB	
Designer: Peter Tanner	Revision: ce427f90 [No modification]
Date: 12/10/2025	Size: A4
35 Stirling Hwy, Perth WA 6009, Australia	Sheet: 9 / 9

Bill of Materials

Project Title: Copy of Bill of Materials for Variant [PRODUCTION] of BOM Document [Driver_Modulation.BomDoc]

Project File Name: Driver_Modulation.PrjPcb
Date: 13/10/2025

Variant: PRODUCTION
Currency: AUD



UWA Aerospace,
35 Stirling Hwy,
Perth WA 6009,
Australia

Line #	Name	Description	Designator	UWAA ID	Source	JLC PN	Manufacturer	Manufacturer Part Number	Supplier	Supplier Part Number	Unit Price	QTY	Total Price
	AMS1117-3.3	Gull Wing EAR99 Fixed Positive Single Output Ldo Regulator Dual Voltage Regulator Linear 125C 1.2W 1A 1.8MM	U6	CMP-001-0007-3	JLCPBC(Basic)	C6186	Advanced Monolithic Systems	AMS1117-3.3	LCSC	C6186	\$0.26	1	\$1.32
	JUMPER-0402 TWO STATE	JUMPER-0402 TWO STATE Fixed Resistor, Metal Glaze/thick Film, 0.1W, 0ohm, Surface Mount, 0402	JP5, JP8, JP10	CMP-009-00003-3	JLCPBC(Basic)	C17168						3	
	68000-406HLF	CONN HEADER 6POS.100 STR TIN	J13	CMP-00021-3			Amphenol Communications Solutions	68000-406HLF				1	
	68000-406HLF	CONN HEADER 6POS.100 STR TIN	J5, J10	CMP-00021-4	Aliexpress							2	
	OPV314Y	VCSEL Emitter, 840nm Min, 860nm Max, 2500Mbps, TO-46, Through Hole Mount	LD2	CMP-00026-00000-5	Distributor		Optek	OPV314				1	
	CL10A475K08NNNC	16V 4.7uF X5R ±10% 0603 Multilayer Ceramic Capacitors MLCC - SMD/SMT ROHS	C9, C18	CMP-00044-4	JLCPBC(Basic)	C19666	Samsung Electro-Mechanics	CL10A475K08NNNC	ouser	187-CL10A475K08NNNC	\$0.02	2	\$0.25
	SN74LVC1G14DBVR	Single 1.65-V to 5.5-V inverter with Schmitt-Trigger inputs 5-SOT-23 -40 to 125	U2	CMP-071-000015-2	Distributor	C7835	Texas Instruments	SN74LVC1G14DBVR	ouser	595-SN74LVC1G14DBVR	\$0.45	1	\$0.90
	SN74AUC2G53DCUR	2.5-V, 2: 1 (SPDT), 1-channel general-purpose analog switch 8-VSSOP -40 to 85	U1	CMP-071-000018-2	Distributor		Texas Instruments	SN74AUC2G53DCUR	ouser	595-SN74AUC2G53DCUR	\$0.82	1	\$1.64
	CL05B104KB54PNC	Ceramic Capacitor, Multilayer, Ceramic, 50V, 10% +Tol, 10% -Tol, X7R, 15% TC, 0.1uF, Surface Mount, 0402	C1, C2, C5, C6, C8, C14	CMP-00074-10	JLCPBC(Basic)	C307331	Samsung	CL05B104KB54PNC				6	
	0402WGF499JTCE	62.5mW Thick Film Resistors 50V ±100ppm/°C ±1% 49.90 0402 Chip Resistor - Surface Mount ROHS	R9, R14	CMP-077-000018-1	JLCPBC(Basic)	C25120						2	
	NCP114ASN270T1G	LDO Voltage Regulator, Fixed, 1.7V to 5.5V, Single Output, 170mV, 2.7V, 300mA, 5 Pins, TSOP	U7	CMP-077-000020-1	Distributor		onsemi	NCP114ASN270T1G	ouser	863-NCP114ASN270T1G	\$0.26	1	\$0.53
	0805W8F1503T5E	Thick Film Resistors - SMD RMC 0805 1/8W 1% T/R-5000	R23	CMP-077-000023-1	JLCPBC(Basic)	C17470						1	
	0805W8F1002T5E	Res Thick Film 0805 10K Ohm 1% 0.125W(1/8W) ±100ppm/C Pad SMD T/R	R24	CMP-077-000024-1	JLCPBC(Basic)	C17414						1	
	0805W8F7501T5E	-55°C~+155°C 125mW 150V 7.5kΩ Thick Film Resistor ±1% ±100ppm/°C 0805 Chip Resistor - Surface Mount ROHS	R1	CMP-077-000027-1	JLCPBC(Basic)	C17807						1	
	0603WAF200JT5E	Res Thick Film 0603 20 Ohm 1% 0.1W(1/10W) ±200ppm/C Pad SMD T/R	R15	CMP-077-000029-1	JLCPBC(Basic)	C22950						1	
	0402WGF2702TCE	Res Thick Film 0402 27K Ohm 1% 0.063W(1/16W) ±100ppm/C Pad SMD T/R	R11	CMP-077-000030-1	JLCPBC(Basic)	C25771						1	

Line #	Name	Description	Designator	UWAA ID	Source	JLC PN	Manufacturer	Manufacturer Part Number	Supplier	Supplier Part Number	Unit Price	QTY	Total Price
	0402WGF5601TCE	62.5mW Thick Film Resistors 50V ±100ppm/°C ±1% 5.6kΩ 0402 Chip Resistor - Surface Mount ROHS	R13	CMP-077-000031_1	JLCPBC(Basic)	C25908						1	
	RK0971114DOB	Potentiometer, 0.05W, 10000ohm, 10V, 20% +/-Tol, 1 Turn(s)	R30, R31	CMP-077-000032_3	Aliexpress		ALPS	RK097_10K	Aliexpress	RK097_10K	\$0.40	2	\$1.60
	0805W8F7500T5E	Thick Film Resistors - SMD RMC 0805 1/8W 1% T/R-5000	R2	CMP-077-000036_1	JLCPBC(Basic)	C17818	Royal Ohm	0805W8F7500T5E	Mouser	303-0805W8F7500T5E	\$0.00	1	\$30.89
	RK097_1K	Potentiometer, 0.05W, 1000ohm, 10V, 20% +/-Tol, 1 Turn(s)	R29	CMP-077-000037_1	Aliexpress		ALPS	RK097_1K	Aliexpress	RK097_1K	\$0.40	1	\$0.80
	GCM1555C1H1R0JA16D	Cap Ceramic 1pF 50V COG 5% Pad SMD 0402 125C Automotive T/R	C3	CMP-00086-4	JLCPBC(Basic)	C1550	Fenghua Electronics	0402CG1ROC500NT				1	
	CRCW0402100KFKECD	RES 100K OHM 1% 1/16W 0402	R22, R26, R28, R38	CMP-00094-5	JLCPBC(Basic)	C25741	Walsin Technologies	WR04X1003FTL	Mouser	791-WR04X1003FTL	\$0.01	4	\$0.11
	CRCW04021K00FKEDC	RES 1K OHM 1% 1/16W 0402	R19, R20, R32	CMP-00098-5	JLCPBC(Basic)	C11702	Vishay	CRCW04021K00FKEDC	Mouser	71-CRCW04021K00FKEDC	\$0.03	3	\$0.26
	SFH 203 P	Photodiode PIN Chip 850nm 0.62A/W Sensitivity 2-Pin T-1 3/4	D7	CMP-111-000002_3	Distributor		Osram	SFH 203 P	Mouser	720-SFH203P	\$1.48	1	\$2.97
	PCM12SMTR	C & K COMPONENTS - PCM12SMTR - SWITCH, SPDT, 0.3A, 6VDC, SMD	SW1	CMP-00120-3	Distributor		C&K Components	PCM12SMTR	LCSC	C221841	\$0.21	1	\$0.41
	CL21A226MAQNNNE	Ceramic Capacitor, Multilayer, Ceramic, 25V, 20% +Tol, 20% -Tol, X5R, 15% TC, 1uF, Surface Mount, 0805	C22	CMP-00128-5	JLCPBC(Basic)	C45783	Samsung Electro-Mechanics	CL21A226MAQNNNE	LCSC	C45783	\$0.04	1	\$0.39
	22-28-4020	KK 254 Breakaway Header, Vertical, 2 Circuits, Tin (Sn) Plating, Mating Pin Length 6.09mm 2 POS	J2, J9, J14	CMP-00157-5	Aliexpress							3	
	10129378-903001BLF	Conn Unshrouded Header HDR 3 POS 2.54mm Solder ST Thru-Hole Poly Bag	J1, J4, J6	CMP-00188-3	Aliexpress		AMPHENOL ICC (FCI)	10129378-903001BLF				3	
	CL05A105KA5NQNC	Ceramic Capacitor, Multilayer, Ceramic, 25V, 10% +Tol, 10% -Tol, X5R, 15% TC, 1uF, Surface Mount, 0402	C4, C7, C12, C13, C16, C17, C19, C21	CMP-00190-9	JLCPBC(Basic)	C52923	Samsung Electro-Mechanics	CL05A105KO5NNNC	Mouser	187-CL05A105KO5NNNC	\$0.01	8	\$0.20
	RB521S30T1G	SCHOTTKY BARRIER DIODE Rectifier Diode, Schottky, 1 Phase, 1 Element, 0.2A, 30V V(RRM), Silicon RB521S-30	D19	CMP-00227-5	JLCPBC(Basic)	C7502702						1	
	0402WGF1004TCE	Fixed Resistor, Metal Glaze/thick Film, 0.0625W, 1000000ohm, 50V, 1% +/-Tol, 100ppm/Cel, Surface Mount, 0402	R17	CMP-00319-8	JLCPBC(Basic)	C26083	Stackpole Electronics	RMCF0402FT1M00	Mouser	708-RMCF0402FT1M00	\$0.01	1	\$0.12
	UFL-R-SMT-1(01)	Rf Connectors / Coaxial Connectors SMT MI Rec Au 50 Ohm W/anti Sldr Wicking UFL	E6, E7, E9, E10, E11	CMP-00380-18	UWAA_Stock		BAT Wireless	BWU.FL-IPEX1	LCSC	C5137195	\$0.01	5	\$0.06
	22-28-4080	Conn Unshrouded Header HDR 8 POS 2.54mm Solder ST Thru-Hole Bag	J11, J12	CMP-00439-4	Aliexpress							2	
	ERJ-3GEYJ270V	Res Thick Film 0603 27 Ohm 5% 1/10W +/-200ppm/°C Molded SMD Punched Carrier T/R	R6	CMP-00490-4	JLCPBC(Basic)	C25190	Panasonic	ERJ-3GEYJ270V	Mouser	667-ERJ-3GEYJ270V	\$0.15	1	\$0.31
	CRCW0402-10K0FKED	Res Thick Film 0402 10K Ohm 1% 1/16W ±100ppm/°C Molded SMD Paper T/R	R21, R27, R34, R35, R36	CMP-00515-7	JLCPBC(Basic)	C25744	Vishay	CRCW040210K0FKEDC	Mouser	71-CRCW040210K0FKEDC	\$0.03	5	\$0.32
	RC0603FR-0747RL	Res Thick Film 0603 47 Ohm 1% 0.1W(1/10W) ±100ppm/C Pad SMD T/R	R12	CMP-00601-4	JLCPBC(Basic)	C23182	Yageo Group	RC0603FR-0747RL	Mouser	603-RC0603FR-0747RL	\$0.01	1	\$0.14
	CL05C100JB5NNNC	Multilayer Ceramic Capacitor, 10 pF, 50 V, ± 5%, COG (NPO), 0402 [1005 Metric]	C15	CMP-00653-3	JLCPBC(Basic)	C32949	Samsung Electro-Mechanics	CL05C100JB5NNNC	Mouser	187-CL05C100JB5NNNC	\$0.01	1	\$0.11

Line #	Name	Description	Designator	UWAA ID	Source	JLC PN	Manufacturer	Manufacturer Part Number	Supplier	Supplier Part Number	Unit Price	QTY	Total Price
	0402WGF1000TCE	Fixed Resistor, Metal Glaze/thick Film, 0.0625W, 100ohm, 50V, 1% +/- Tol, 100ppm/Cel, Surface Mount, 0402	R8	CMP-00655-3	JLCPCB(Basic)	C25076						1	
	0402WGF5101TCE	RESISTOR, 0402 1% 5K1; Power Rating: 0.0625W; Resistance: 5.1kohm; Tolerance, Resistance: ± 1%; Series: MC...	R18, R25	CMP-00657-3	JLCPCB(Basic)	C25905						2	
	CL05A106MQ5NUNC	Cap Ceramic 10uF 6.3V X5R 20% SMD 0402 85°C Paper T/R	C10, C20	CMP-00663-2	JLCPCB(Basic)	C15525	Samsung	CL05A106MQ5NUNC				2	
	TPS61040DBVR	Conv DC-DC 1.8V to 6V Step Up Single-Out 1.8V to 28V 0.4A 5-Pin SOT-23 T/R	U3	CMP-00672-2	JLCPCB(Basic)	C7722	Texas Instruments	TPS61040DBVR	JLCPCB	C7722	\$0.35	1	\$1.77
	1N5819WS	VR=40V IF=1A 120pF P=250mW	D4, D12, D13, D18	CMP-00680-5	JLCPCB(Basic)	C191023						4	
	MDD3401	30V 4.2A 45mΩ@10V P Channel SOT-23 MOSFETs ROHS	Q5	CMP-00682-5	JLCPCB(Extended,Economic _PCBA)	C427383	MDD	MDD3401A				1	
	0402WGF1200TCE	Fixed Resistor, Metal Glaze/thick Film, 0.0625W, 1200hm, 50V, 1% +/- Tol, 100ppm/Cel, Surface Mount, 0402	R37	CMP-00689-3	JLCPCB(Basic)	C25079	Royal Ohm	0402WGF1200TCE	ouser	303-0402WGF1200TCE	\$0.01	1	\$61.78
	TMB12A03	Active (driven circuit included) 85dB@3V,10cm Magnetic 2300Hz Plugin,D-12mm Buzzers ROHS	LS1	CMP-00694-4	Aliexpress		YUEXIN	TMB12D03 3V	LCSC	C781856	\$0.36	1	\$1.79
	CL10A226MQ8NRNC	Multilayer Ceramic Capacitor, 22 uF, 6.3 V, ± 20%, X5R, 0603 [1608 Metric]	C11	CMP-00700-2	JLCPCB(Basic)	C59461	Samsung Electro-Mechanics	CL10A226MQ8NRNC	ouser	187-CL10A226MQ8NRNC	\$0.32	1	\$0.65
	MDD2302	4A 25mΩ@4.5V null SOT-23 MOSFETs ROHS N CHANNEL	Q3, Q4, Q6, Q7	CMP-00703-4	JLCPCB(Basic)	C427390	MDD	MDD2302				4	
	KT-0805G	Emerald 0805 Light Emitting Diodes (LED) ROHS green	D14	CMP-00712-3	JLCPCB(Basic)	C2297						1	
	0402WGF0000TCE	Metal Glaze/thick Film, 0.0625W, 0ohm, 0402	JP9, R5, R7, R16, R33	CMP-00817-3	JLCPCB(Basic)	C17168						5	
	H5VU10U	5A 55W 16V 9V Unidirectional 5V DFN1006-2L ESD and Surge Protection (TVS/ESD) ROHS	D1, D2, D3, D9, D10, D15, D16, D17	CMP-00841-4	JLCPCB(Basic)	C22395519	Hongjiacheng	H5VU10U				8	
	KT-0805Y	Yellow 0805 LED Indication - Discrete ROHS	D5, D6, D8, D11	CMP-00852-3	JLCPCB(Basic)	C2296	KENTO	KT-0805Y				4	
	2SC3356	RF Small Signal Bipolar Transistor, 0.1A I(C), 1-Element, Ultra High Frequency Band, Silicon, NPN	Q1, Q2	CMP-00894-2	JLCPCB(Basic)	C28646266	Renesas	2SC3356-T1B-A				2	
	OPA355NA/3K	Operational Amplifier, 1 Func, 9000uV Offset-Max, 100MHz Band Width, CMOS, PDS06	IC1, IC2	CMP-00897-1	JLCPCB(Extended,Economic _PCBA)	C2058090	Texas Instruments	OPA355NA/3K	ouser	595-OPA355NA/3K	\$2.89	2	\$11.55
	LMH34400IDRLR	"240-MHZ, Single-ended, Transimpedance" Transimpedance Amplifier IC SOT-563	U5	CMP-00906-2	JLCPCB(Extended,Economic _PCBA)	C19723951	Texas Instruments	LMH34400IDRLR	ouser	595-LMH34400IDRLR	\$4.59	1	\$9.17
	TLV3601DCKR	2.5-ns high-speed rail-to-rail comparator with push-pull outputs 5-SCT70 -40 to 125	U4	CMP-00909-3	JLCPCB(Extended,Economic _PCBA)	C2974371	Texas Instruments	TLV3601DCKR	ouser	595-TLV3601DCKR	\$7.01	1	\$14.02
	PCD0504MT470	General Purpose Inductor, 47uH, 20%, 1 Element, SMD, 2320	L1	CMP-00916-1	UWAA_Stock		Tai Tech	HPC5040NF-470M				1	
												116	\$144.05

Approved:	Notes:
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