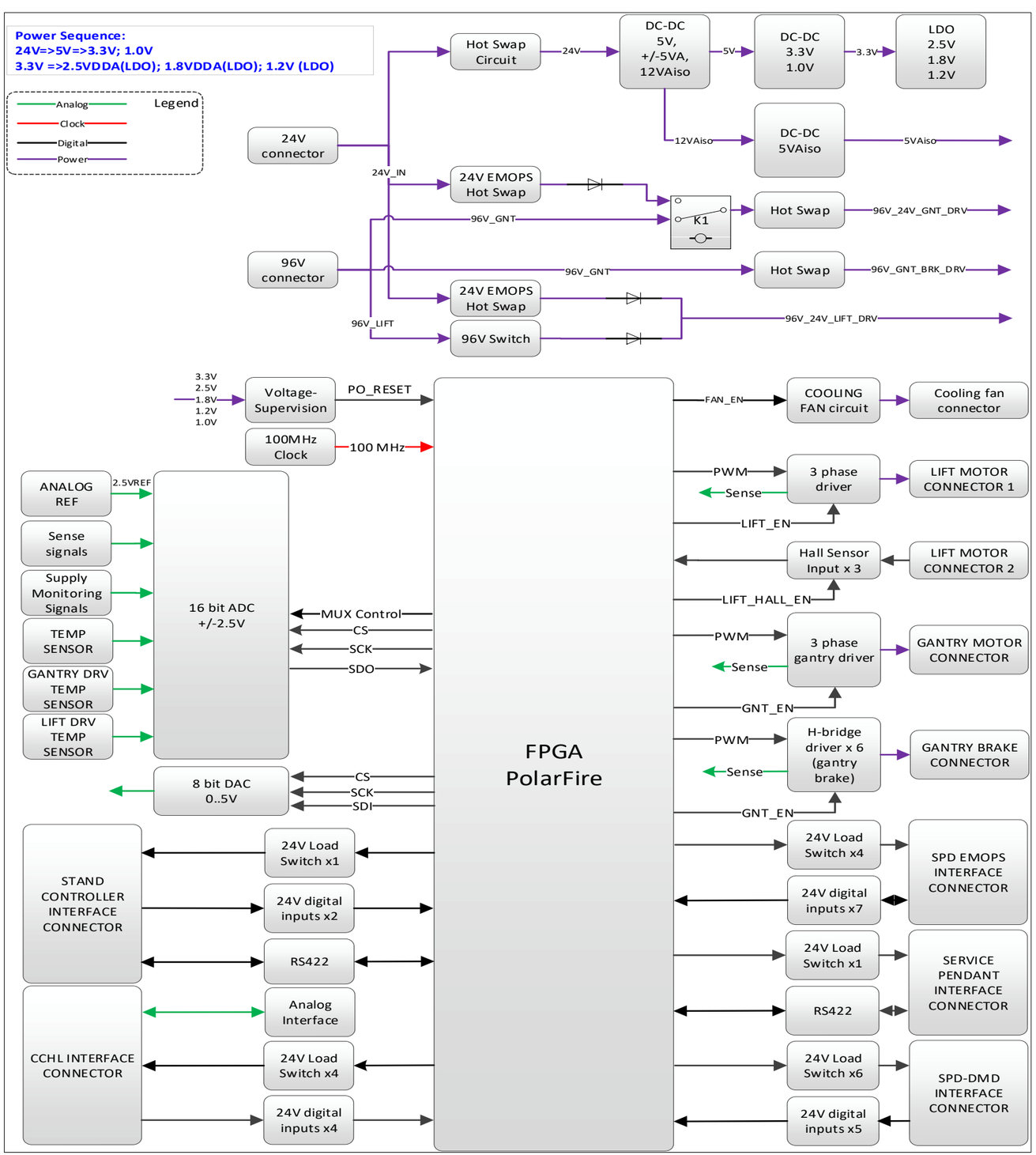
DASH NO.	TYPE OR MODEL	NEXT ASSEMBLY
–	SAPPHIRE	P1060972

DUAL MOTOR DRIVER



NOTES:

1. RESISTANCE VALUES ARE IN OHMS
2. CAPACITANCE VALUES ARE IN MICROFARADS

REFERENCE INFORMATION

TABLE OF CONTENTS

CONNECTOR KEYING TABLE

Jx	TYPE	FUNCTION	KEY
J1	HEADER 13x2 RIBBON	STAND CONTROLLER	8
J6	HEADER 4x2	LIFT HALL SENSOR	NA
J7	HEADER 2x1	COOLING FAN	NA
J8	DSUB 15-R	STAND CONTROL PANEL	2
J9	HEADER 10x2	DMD_24V, SPD DMD IF	18
J10	HEADER 13x2 RIBBON	STAND POWER DISTRIBUTION	11
J11	FTSH-105-01-L-D-K	FPGA JTAG	NA
J12	DSUB 26 HD RECEPTACLE	COUCH CONTROLLER	NA
J17	HEADER 2X3	GANTRY/LIFT 96V INPUT POWER	NA
J18	HEADER 4X1	EMOPS 24V	NA
J19	HEADER 5x2	TEST POINT HEADER	NA
J20	HEADER 5x2	TEST POINT HEADER	NA
J21	HEADER 10x2	TEST POINT / SWITCH HEADER	NA
J22	HEADER 4X1	GANTRY DRIVER OUTPUT	TBD
J23	HEADER 4X1	LIFT DRIVER OUTPUT	3
J24	DSUB 26 HD RECEPTACLE	GANTRY BRAKE	NA

VARIANT01

THE ELECTRONIC SIGNATURE RECORD WILL BE APPENDED TO THE LAST PAGE OF THE SECURED DOCUMENT

DESCRIPTION OF CHANGE

RENUMBERED REFDES
CHANGED CURRENT SENSE ICS FOR GANTRY BRAKE, MOTOR
ADDED IDEAL DIODE CIRCUIT
CHANGED RED LEDS
CHANGED PROGRAMMING HEADER TO SMT
CHANGED 12V DC/DC MODULE

varian

TITLE:

PCB, DUAL MOTOR DRIVER

/

DRAWN: Rami A.	SHEET 1 OF 21	D	P1060973	C
DATE: 06/22/2023				
ECO					
REV	C	ORCAD CAPTURE	SIZE	DWG NO	REV

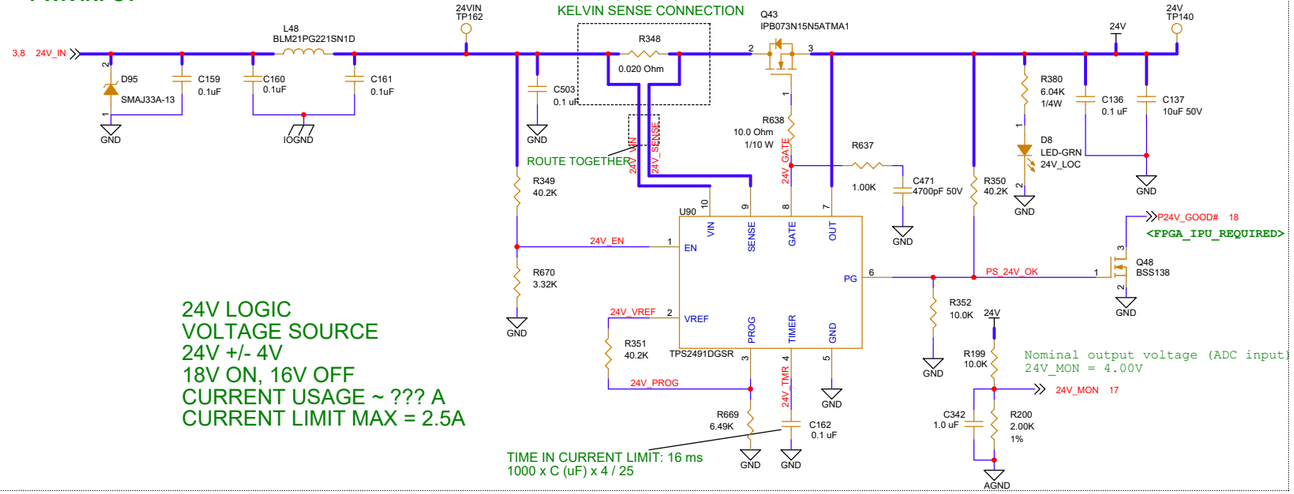
CM# 000060021264 Rev: C Ver: 02 Released 16. October 2024

Power Sequence: 24V=>5V; 5V=>3.3V, 1.0V; 3.3V =>2.5VDDA(LDO)=>1.8VDDA(LDO), 1.2V

PWR INPUT

CURR LIMIT = 2.5A
I (lim) = (50mV)/Rs
KELVIN SENSE CONNECTION

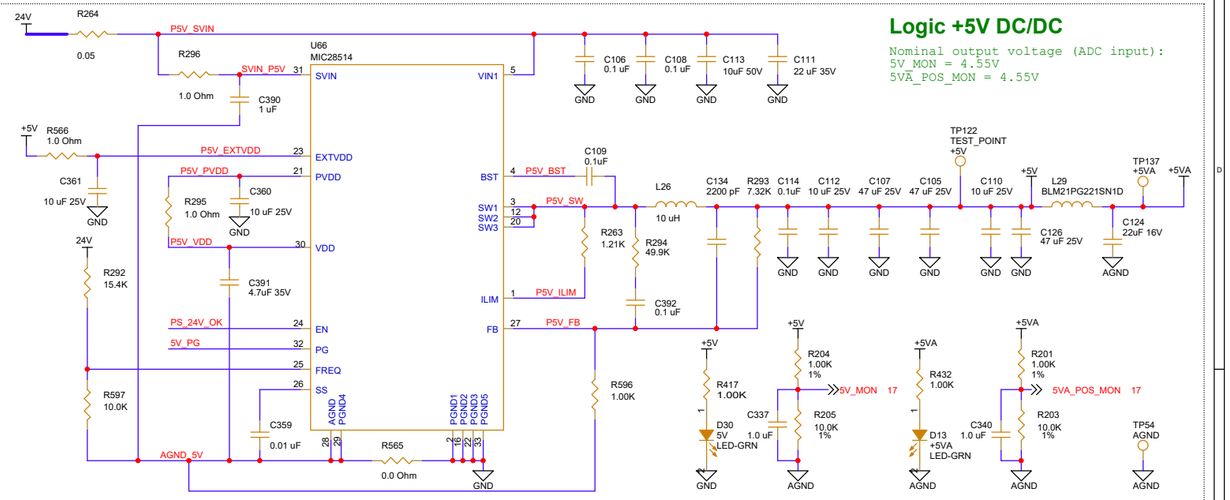
TOTAL BUS CAPACITANCE 50UF



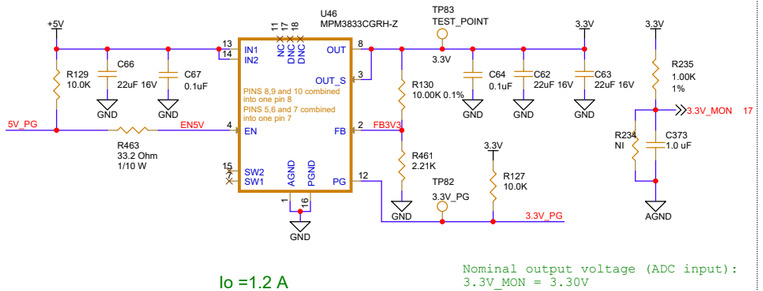
24V LOGIC
VOLTAGE SOURCE
24V +/- 4V
18V ON, 16V OFF
CURRENT USAGE ~ ??? A
CURRENT LIMIT MAX = 2.5A

Logic +5V DC/DC

Nominal output voltage (ADC input):
5V_MON = 4.55V
5VA_POS_MON = 4.55V



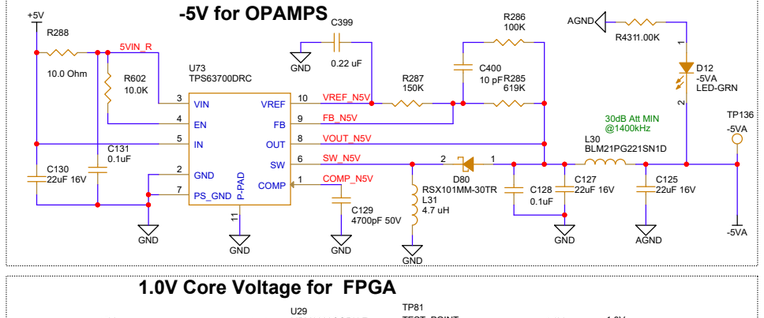
Logic +3.3V DC/DC



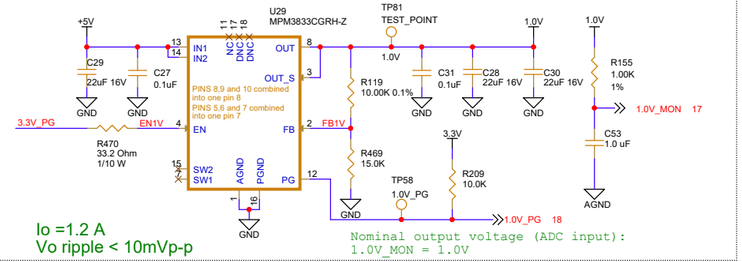
Io =1.2 A
Vo ripple < 10mVp-p

Nominal output voltage (ADC input):
3.3V_MON = 3.30V

-5V for OPAMPS



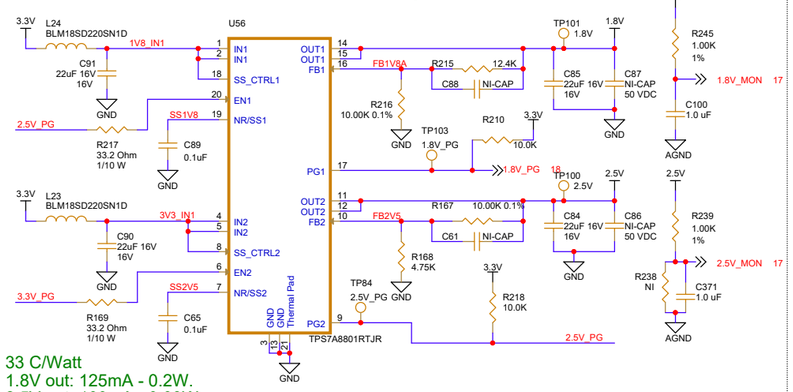
1.0V Core Voltage for FPGA



Io =1.2 A
Vo ripple < 10mVp-p

Nominal output voltage (ADC input):
1.0V_MON = 1.0V

1.8V FPGA Power



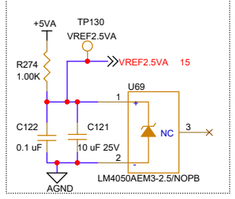
33 C/Watt
1.8V out: 125mA - 0.2W.
2.5V out: 100mA - 0.08W
Temp increase 10C

Vo = 1.8V
Max. Io = 0.12A

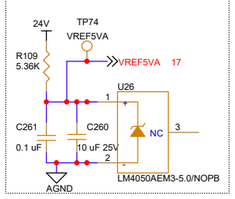
Vo = 2.5V
Max. Io = 0.1A

Nominal output voltages (ADC input):
1.8V_MON = 1.8V
2.5V_MON = 1.67V

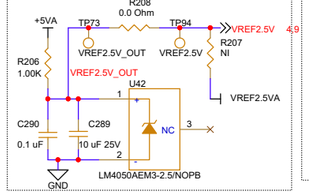
2.5V ANALOG REF (Level Shifter)



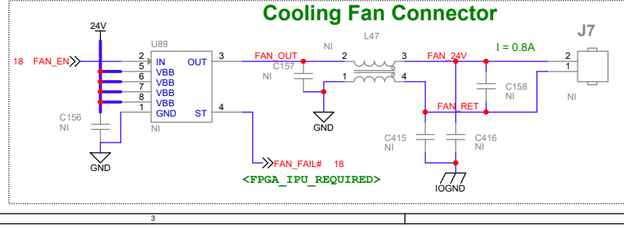
5V ANALOG REF (ADC)



2.5V DIGITAL REF (Comparators)

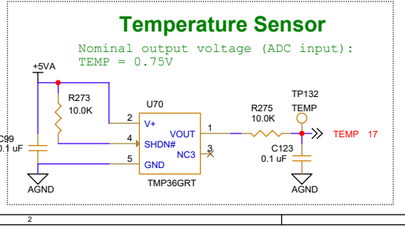


Cooling Fan Connector

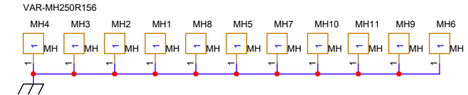


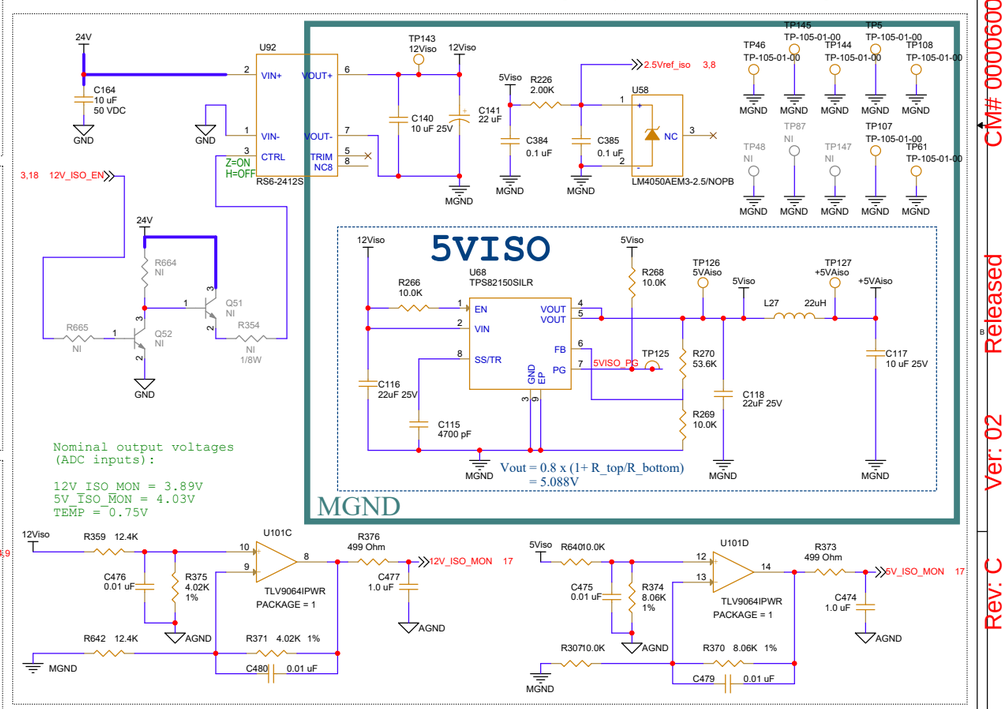
Temperature Sensor

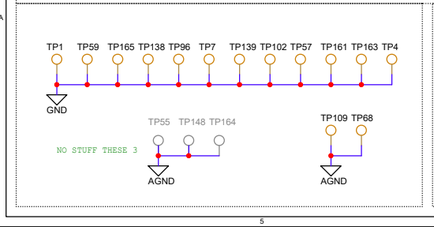
Nominal output voltage (ADC input):
TEMP = 0.75V

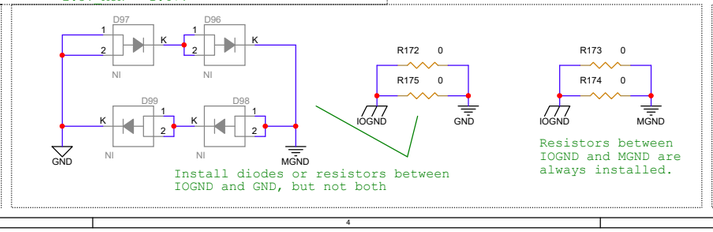


Mounting Holes (connected to Chassis GND through standoffs)









Install diodes or resistors between IOGND and GND, but not both

Resistors between IOGND and MGND are always installed.

POWER - DIGITAL

VARIANT01	
varian	SCALE: NONE
	SHEET: 2 OF 21
DUAL MOTOR DRIVER	
DWG NO: P1060973	REV: C

CM# 0000600021264
Released
Rev. C
Ver: 02
16. October 2024

GANTRY EMOPS

HIGH CURRENT 15A

CURRENT LIMIT = 16.7A
I (lim) = (50mV)/Rs = 16.666A

J18
350989-4
24V_IN 2,3,8
GND

2,3,8 24V_IN
R297 0.003 Ohm 3W
24V_GNT_EMOPS_D
Q38 STH180N10F3-2
24V_GNT_EMOPS_S
C135 0.1 uF
D87 MURS120T3
C472 0.1 uF
Route together
R299 10.0 Ohm
R298
24V_GNT_EMOPS_GATE
1.00K
C473 4700 pF

R171 NI
R219 NI
D63
D62
MBRB20200CTT4G
MBRB20200CTT4G
TP86 24V_GNT_EMOPS
24V_GNT_EMOPS

U67 TPS2491DGSR
18 24V_GNT_EMOPS_EN
R611 2.00K
24V_GNT_EMOPS_VREF
R612 40.2K
24V_GNT_EMOPS_VPROG
R613 6.65K
VIN SENSE GATE OUT
EN VREF PROG TIMER GND PG
C414 0.1 uF
6 24V_GNT_EMOPS_PG 18
<FPGA_IPU_REQUIRED>

V(prog) = 0.568V
P(lim) = 28.4W
Time in Current Limit: 16 ms
1000 x C (uF) x 4 / 25

HIGH CURRENT 40A

RLY2 HAT901CSDC24-1
24V
TP106 96V_24V_GNT
96V_24V_GNT 3,4
D162 S1B
D163 SMAJ33A-13
K1_COIL_GNT
Q57 BSS123
TP123
18 GNT_EMOPS_EN
R610 2.00K

2,8 2.5Vref_iso
R225 11.8K
R584 10.0K
R586 1.0M
5Viso
C386 0.1 uF
U57 LMV331
R224 200K
R223 10.0K
C387 1000 pF
ISO_GNT_EMOPS_OV_L 4
Set level (high output) at 23.9V
Reset level (low output) at 24.5V

HIGH CURRENT 20A

J17
1720420602
1720420602
96V_LFT 8
96V_GNT
MGND

Reverse Voltage Protection

IPTG111N20NM3FD Q55
IPTG111N20NM3FD Q14
D158 MMSZ5246B-7-F
D158 MMSZ5246B-7-F
DIODE_FET_A_GATE_96V
DIODE_FET_B_GATE_96V
R589 10.0 Ohm
R587 10.0 Ohm
DIODE_GATE_96V
TP104
DIODE_96V_GNT
DIODE_96V_GNT 4
To brakes

U106 ZXGD3111N7TC
GATE DRAIN VCC GND GND PGND PGND
TP105
C388 0.1 uF 50V
C389 10 uF 25V
12V IS REFERENCED TO 96V_GNT

U91 RS6-2412S
24V
C163 10 uF 50 VDC
VIN+ VOUT+ VIN- VOUT- CTRL TRIM NC8
Z=ON H=OFF
TP141 VP_ACT_DIODE
VP_ACT_DIODE
C138 10 uF 25V
C139 22 uF
TP142 VP_ACT_DIODE_RET
R588 0.0 Ohm
12V_ACT_DIODE
R300 12.4K

2,18 12V_ISO_EN
R666 NI
R667 NI
R668 NI
Q49 NI
Q50 NI
R353 NI 1/8W

TP124
U78 140106146000
R265 10.0K 3.3V
12V_ACT_DIODE_ON# 18

+5VA
C484 0.1 uF
AGND
U101A
3 96V_GNT
R358 200K 1/4W
C487 0.01 uF
R364 8.06K 1%
TLV9064IPWR PACKAGE = 1
R363 499 Ohm
96V_GNT_MON 17
C486 1.0 uF
R632 200K 1/4W
R368 8.06K 1%
C482 0.01 uF

U101B
3,4 96V_24V_GNT
R639 200K 1/4W
C488 0.01 uF
R365 8.06K 1%
TLV9064IPWR PACKAGE = 1
R366 499 Ohm
96V_24V_GNT_MON 17
C489 1.0 uF
R361 200K 1/4W
R369 8.06K 1%
C483 0.01 uF

Nominal output voltages (ADC inputs):

24V_IN_MON = 4.00V
24V_GNT_EMOPS_S_MON = 4.00V
24V_GNT_EMOPS_MON = 4.00V
96V_GNT_MON = 3.86V
96V_24V_GNT_MON = 3.86V

2,3,8 24V_IN
R243 10.0K
R244 2.00K 1%
C368 1.0 uF
24V_IN_MON 17

24V_GNT_EMOPS_S
R240 10.0K
R241 2.00K 1%
C370 1.0 uF
24V_GNT_EMOPS_S_MON 17

24V_GNT_EMOPS
R236 10.0K
R237 2.00K 1%
C372 1.0 uF
24V_GNT_EMOPS_MON 17

TP45
Finger safe test point
24V_GNT_EMOPS
3 96V_GNT
R495 6.04K 1/4W
R220 6.04K 1/4W
R221 6.04K 1/4W
R222 6.04K 1/4W
R267 6.04K 1/4W
D52 EMOPS_24V LED-GRN
D73 96V_GNT LED-GRN
GND
MGND

GANTRY 96V EMOPS

VARIANT01

varian	SCALE NONE
	SHEET 3 OF 21
DUAL MOTOR DRIVER	
DWG NO P1060973	REV C

CM# 0000600021264
Rev: C Released Ver: 02 16. October 2024

HIGH CURRENT 40A FROM RLY1

3 96V_24V_GNT

D64 SMAJ130A-13-F

MGND

R183 0.002 Ohm 5W

Kelvin Sense

96V_24V_GNT_D

Q23 IPB110N20N3LFATMA1

96V_24V_GNT_S

D149

Q24 MMSZ5246B-7-F IPB110N20N3LFATMA1

R176 100 Ohm

R558 499 Ohm

C68 0.01 uF

R554 10.0 Ohm

D150

MMSZ5246B-7-F

R585 10.0 Ohm

R555 10.0 Ohm

C76 1000uF

C92 1000uF

R553 1.8K

R552 1.8K

MGND

Bleeder resistors to drop 96V to ~48V in 5 sec

Vout = 500mV + 40mV/A

U109 IP+ IP- ACS780L_100U

VCC GND VOUT

+5V C413 0.1 uF GND

96V_24V_GNT_I

96V_24V_GNT_DRV 4,5,9

TP95 NI-22-03-2021

R246 1.00K

R567 499K

R568 5.49K

R251 4.99K

3.3V

TP118 OC_V_GNT_MOT_DRV

OC_V_GNT_MOT_DRV 18

U63 LMV331

Set level (high output) at 62,9A
Reset level (low output) at 59,9A

2,4,9 VREF2.5V

R247 1.00K

R249 NI

C366 0.1 uF

C364 0.1 uF

GNDGND

UVLO set to ~ 18V
OVLO disabled

C70 0.1 uF 250V

96V_24V_GNT_RUN

R177 187K

R559 14.3K

dV/dt ~ 0.3V/ms

R180 200K

C71 2.2uF

C358 0.15uF

U48 LTC7000EMSE

Vin Run OVLO INP VCC VCCUV

SNS+ SNS- ISET GND TIMER

TGUP TGDN BST TS IMON FAULT

96V_24V_GNT_TGU 96V_24V_GNT_TGD 96V_24V_GNT_BST 96V_24V_GNT_IMON 96V_24V_GNT_FLT#

4,18 GNT_MOT_PWR_EN R405 NI 96V_24V_GNT_EN 4

4,18 GNT_BRK_PWR_EN R407 NI 96V_GNT_BRK_EN 4

4,9 WDOK R408 NI GNT_PWM_EN 4,5,6,7

4,18 GNT_SHUNT_EN R409 NI GNT_SHUNT_EN_OUT 4

4 96V_24V_GNT_EN

R556 2.00K

C73 1 uF 35V

R179 113K

VCCUV set to ~ 8V
Iset = 150k * 0.5uA ~ 75mV

R557 150K

C75 2.2uF

R182 100K

Fault Timer set to ~ 30ms
Retry Disabled

Ilimit = Vsense/R*(599 Ohm/499 Ohm)
Vsense(min) = 90% * Vsense(nom) = 67.5mV, Ilimit = 40.5A
Vsense(nom) = 75mV, Ilimit = 45A
Vsense(max) = 106.7% * Vsense(nom) = 80mV, Ilimit = 48A

+5VAiso

C249 0.1 uF

U11A LMV324IPT PACKAGE = 1

R48 1.00K

R50 1.00K

IMON = 66.6mV/A
IMON MAX (45A) = 0.002*45*(499/599)*20*2 = 3V

U4 ISO7740FDBQR

3.3V C205 10 uF C7 0.1 uF GND

5Viso C14 0.1 uF C248 10 uF MGND

VCC1 GND1 INA INB INC IND NC GND1

VCC2 GND2 OUTA OUTB OUTC OUTD EN2 GND2

4,18 GNT_MOT_PWR_EN

4,18 GNT_BRK_PWR_EN

4,9 WDOK

4,18 GNT_SHUNT_EN

96V_24V_GNT_EN 4

96V_GNT_BRK_EN 4

GNT_PWM_EN 4,5,6,7

GNT_SHUNT_EN_OUT 4

R406 2.00K R14 2.00K R13 2.00K

R442 10.0K 5Viso

U11D LMV324IPT PACKAGE = 1

R633 200K 1/4W

C465 1000 pF

R310 8.06K

U80A TLV9064IPWR PACKAGE = 2

R630 200K 1/4W

R312 8.06K

C143 1000 pF

R309 499 Ohm

C142 1.0 uF

96V_24V_GNT_VMON_V 17

Nominal output voltage:
Vin = 96V -> Vout = 3.86V
Vin = 24V -> Vout = 0.96V

R641 10.0K

C466 1000 pF

R311 10.0K

U80B TLV9064IPWR PACKAGE = 2

R629 10.0K

R367 10.0K

C481 1000 pF

R362 499 Ohm

C485 1.0 uF

96V_24V_GNT_IMON_V 17

96V_24V_GNT_FLT# R404 NI GNT_MOT_PWR_FLT# 4,18

96V_GNT_BRK_FLT# R403 NI GNT_BRK_PWR_FLT# 4,18

3,4 ISO_GNT_EMOPS_OV_L R402 NI GNT_EMOPS_OV_L 4,18

5Viso R401 NI 5V_ISO_MON_GNT 4,18

5Viso C247 10 uF C15 0.1 uF MGND

U5 ISO7740FDBQR

VCC1 GND1 INA INB INC IND NC GND1

VCC2 GND2 OUTA OUTB OUTC OUTD EN2 GND2

3.3V C8 0.1 uF C204 10 uF GND

96V_24V_GNT_FLT#

96V_GNT_BRK_FLT#

3,4 ISO_GNT_EMOPS_OV_L

GNT_MOT_PWR_FLT# 4,18

GNT_BRK_PWR_FLT# 4,18

GNT_EMOPS_OV_L 4,18

5V_ISO_MON_GNT 4,18

R441 2.00K R56 2.00K R440 2.00K R57 2.00K

R15 10.0K 3.3V GND

TP35 NI-22-03-2021

R428 499K

R70 4.99K

TP39 OC_V_GNT_BRK_DRV

OC_V_GNT_BRK_DRV 18

U17 LMV331

Set level (high output) at 30.26A
Reset level (low output) at 29.84A

U34 ACS723LLCTR-40AU-T

IP+_2 IP+_2 IP-_2 IP-_2

VCC VOUT BW_SEL GND

96V_GNT_BRK_I

C38 0.1 uF C39 1000 pF

R63 4.02K R430 10.0K R67 NI R64 2.00K

C226 0.1 uF C224 0.1 uF

96V_GNT_BRK_DRV 6,7

2,4,9 VREF2.5V

R308 200K 1/4W

C463 1000 pF

R316 8.06K

U80C TLV9064IPWR PACKAGE = 2

R631 200K 1/4W

R372 8.06K

C478 1000 pF

R627 499 Ohm

C146 1.0 uF

96V_GNT_BRK_VMON_V 17

Nominal output voltage:
Vin = 96V -> Vout = 3.86V

R360 10.0K

C462 1000 pF

R315 10.0K

U80D TLV9064IPWR PACKAGE = 2

R628 10.0K

R313 10.0K

C144 1000 pF

R314 499 Ohm

C145 1.0 uF

96V_GNT_BRK_IMON_V 17

3.3V D58 LED-GRN GNT_MOT_PWR_EN R531 392 Ohm

Q32 BSS123

4,18 GNT_MOT_PWR_EN

3.3V D57 LED-GRN GNT_BRK_PWR_EN R532 392 Ohm

Q30 BSS123

4,18 GNT_BRK_PWR_EN

GND

OC Threshold ~ 27.5A
27.5A * 0.003Ohm * (1000/1100) = 75mV

Ilimit = Vsense/R * 1.1
Vsense(min) = 67.5 mV, Ilimit = 24.75 A
Vsense(nom) = 75 mV, Ilimit = 27.5 A
Vsense(max) = 80 mV, Ilimit = 29.3 A

Bleeder resistors to drop 96V to ~48V in 5 sec

HIGH CURRENT 22A FROM J17

3 DIODE_96V_GNT

D136 SMAJ130A-13-F

MGND

R140 0.003 Ohm 3W

Kelvin Sense

96V_GNT_BRK_D

Q16 IPB110N20N3LFATMA1

96V_GNT_BRK_S

D135 MMSZ5246B-7-F

R131 100 Ohm

R523 100K

C32 0.01 uF

R520 10.0 Ohm

C37 1000uF

R518 1.8K

R491 1.8K

MGND

UVLO set to ~ 18V
OVLO disabled

C69 0.1 uF 250V

96V_GNT_BRK_RUN

R133 187K

R524 14.3K

dV/dt ~ 0.3V/ms

R135 200K

C34 2.2uF

R521 10.0 Ohm

C299 0.15uF

U33 LTC7000EMSE

Vin Run OVLO INP VCC VCCUV

SNS+ SNS- ISET GND TIMER

TGUP TGDN BST TS IMON FAULT

96V_GNT_BRK_TGU 96V_GNT_BRK_TGD 96V_GNT_BRK_BST 96V_GNT_BRK_IMON 96V_GNT_BRK_FLT#

4 96V_GNT_BRK_EN

R139 2.00K

C72 1 uF 35V

R178 113K

VCCUV set to ~ 8V
Iset = 121k * 0.5uA ~ 60mV

R138 121K

C74 2.2uF

R181 100K

Fault Timer set to ~ 30ms
Retry Disabled

U11B LMV324IPT PACKAGE = 1

R49 1.00K

R51 2.00K

IMON = 163.6mV/A
IMON MAX = (0.003*(1000/1100)*20*3)*27.5 = 4.5V

3.3V C286 0.1 uF GND

U45 SN74LVC1G123DCUR

A B CLR GND VCC Rext/Cext Cext Q

R161 10.0K C285 0.01 uF

18 WD_TRIG TP79 TP80 WDOK 4,9

R162 392 Ohm

D51 LED-GRN WDOK

WDOK is enable signal for GANTRY, GANTRY BRAKE and LIFT MOTOR drivers

+96V PROTECTION SHUNT FOR GANTRY

HIGH CURRENT 5A

4,5,9 96V_24V_GNT_DRV

D110 MURS120T3

9 GNT_96VSHUNT-

Q5 FQD12N20LTM

4 GNT_SHUNT_EN_OUT

R88 2.00K

96V_GNT_SH_R1 96V_GNT_SH_R2 96V_GNT_SH_R3 96V_GNT_SH_R4

R19 12.4K R20 12.4K R22 12.4K R23 12.4K

Q3 ZVNL120GTA

R18 53.6K R17 4.99K

TP6 GNT_SHUNT_ON 18

U7 140106146000

R21 10.0K 3.3V

GANTRY 96V INTERFACE

VARIANT01

varian

SCALE	NONE
SHEET	4 OF 21

DUAL MOTOR DRIVER

DWG NO	REV
P1060973	C

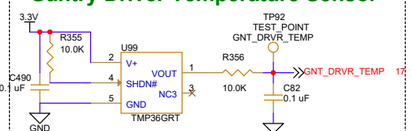
CM# 0000021264

Released Ver: 02 Rev: C 16 October 2024

GND MGND MGND MGND GND

HIGH POWER DRIVER WITH HEATSINKS

Gantry Driver Temperature Sensor



Nominal output voltage (ADC input):
GNT_DRVR_TEMP = 0.75V at 25°C

Total gate charge (max) : 61nC
Max duty cycle 96%
Typical frequency 20kHz

HIGH CURRENT 40A

HIGH CURRENT 40A

HIGH CURRENT 40A

VOUT = 2.5V +/- 20mV/A

VOUT = 2.5V +/- 20mV/A

TO GANTRY MOTOR
J22

GND MGND

GANTRY DRIVER

VARIANT01	
varian	SCALE NONE
	SHEET 5 OF 21
DUAL MOTOR DRIVER	
DWG NO P1060973	REV C

CM# 0000600021264 Released Ver: 02 Rev: C 16. October 2024

POWER DRIVER WITHOUT HEATSINKS

HIGH CURRENT 4A

VOUT = 0.5V + 400mV/A

GANTRY BRAKE DRIVER 1 and 2

VARIANT01

varian	SCALE: NONE
	SHEET: 6 OF 21
DUAL MOTOR DRIVER	
DWG NO: P1060973	REV: C

GND MGND

CM# 0000600021264 Released Ver: 02 Rev: C 16. October 2024

POWER DRIVER WITHOUT HEATSINKS

GND MGND

7,18 GNT_BRK3_PWM_HI
7,18 GNT_BRK3_PWM_LO
7,18 GNT_BRK3_RET_PWM_HI
7,18 GNT_BRK3_RET_PWM_LO

R659 NI ISO_GNT_BRK3_H
R658 NI ISO_GNT_BRK3_L
R657 NI ISO_GNT_BRK3_RET_H
R656 NI ISO_GNT_BRK3_RET_L

3.3V C498 10 uF C170 0.1 uF GND
5Viso C169 0.1 uF C497 10 uF MGND

U95 ISO7740FDBQR
VCC1 GND1 INA INB INC IND NC GND1
VCC2 GND2 OUTA OUTB OUTC OUTD EN2 GND2
GNT_PWM_EN 4,5,6

RN4A 2.0K RN4B 2.0K RN4C 2.0K RN4D 2.0K GND
RN12A 2.0K RN12B 2.0K RN12C 2.0K RN12D 2.0K MGND

ISO_GNT_BRK3_H
ISO_GNT_BRK3_L
ISO_GNT_BRK3_RET_L
ISO_GNT_BRK3_RET_H

GNT_BRK3_RG_H

12Viso R509 3.3 Ohm R508 3.3 Ohm C296 10 uF 25V MGND
D49 MURS120T3 2 GNT_BRK3_VB_DIODE
U37 UCC27712DR VDD HB HO HI LI HS COM LO
C25 0.33 uF
R146 33.2 Ohm R145 33.2 Ohm C46 47 pF C47 47 pF MGND
GNT_BRK3_RG_H GNT_BRK3_RG_L
4,6,7 96V_GNT_BRK_DRV
D125 RSX101MM-30TR R506 3.3 Ohm GNT_BRK3_G_H
Q21 IRFR4615TRLPBF
D124 MMSZ5246B-7-F
GNT_BRK3_VS
D113 RSX101MM-30TR R507 3.3 Ohm GNT_BRK3_G_L
Q22 IRFR4615TRLPBF
D126 MMSZ5246B-7-F MGND

GNT_BRK3_RET_RG_H

12Viso R513 3.3 Ohm R512 3.3 Ohm C297 10 uF 25V MGND
D48 MURS120T3 2 GNT_BRK3_RET_VB_DIODE
U36 UCC27712DR VDD HB HO HI LI HS COM LO
C23 0.33 uF
R144 33.2 Ohm R143 33.2 Ohm C44 47 pF C45 47 pF MGND
GNT_BRK3_RET_RG_H GNT_BRK3_RET_RG_L
4,6,7 96V_GNT_BRK_DRV
D128 NI R510 NI Q19 NI D127 NI
GNT_BRK3_RET_G_H
GNT_BRK3_RET_VS
D115 RSX101MM-30TR R511 3.3 Ohm GNT_BRK3_RET_G_L
Q20 IRFR4615TRLPBF
D129 MMSZ5246B-7-F MGND

HIGH CURRENT 4A

+5VA R147 1.00K R501 NI AGND
C48 0.1 uF AGND
U38 ACS723LLCTR-10AU-T VCC VOUT BW_SEL GND IP+ IP+_2 IP-_2 IP-
GNT_BRK3_I
R100 499 Ohm
TP51 NI-22-03-2021 AGND
C268 1000 pF AGND
VOUT = 0.5V + 400mV/A
GNT_BRK3_CUR 17

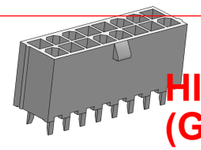
TP62 TEST_POINT
GNT_BRK3 7
GNT_BRK3_IND
R503 100 Ohm
C294 1000 pF 250V
D121 SMBJ17A
D122 MURS120T3
L19 CM2021Y330R-10
TP63 TEST_POINT
GNT_BRK3_RET 7
R504 100 Ohm
C295 1000 pF 250V

7 GNT_BRK1_SW_FB
TP67 R151 200K R154 35.7K C52 1.0 uF GND
D120 BAT54C,215
U64A SN74LVC14A PACKAGE = 2
D84 GNT_BRK1_FB LED-GRN 3.3V
R593 392 Ohm
GNT_BRK1_FB# 18

7 GNT_BRK2_SW_FB
TP66 R150 200K R153 35.7K C51 1.0 uF GND
D119 BAT54C,215
U64B SN74LVC14A PACKAGE = 2
D85 GNT_BRK2_FB LED-GRN 3.3V
R594 392 Ohm
GNT_BRK2_FB# 18

7 GNT_BRK3_SW_FB
TP65 R149 200K R152 35.7K C50 1.0 uF GND
U64C SN74LVC14A PACKAGE = 2
D86 GNT_BRK3_FB LED-GRN 3.3V
R595 392 Ohm
GNT_BRK3_FB# 18

U64D SN74LVC14A PACKAGE = 2
U64E SN74LVC14A PACKAGE = 2



HIGH CURRENT 4A (GNT_BRK1-3, GNT_BRK1-3_RET)

12 GNT_BRK_SW_24V
J13 39-29-6168
6 GNT_BRK1
6 GNT_BRK2
7 GNT_BRK3
GNT_BRK1_RET 6
GNT_BRK2_RET 6
GNT_BRK3_RET 7
GNT_BRK1_SW_FB 7
GNT_BRK2_SW_FB 7
GNT_BRK3_SW_FB 7
IOGND IOGND

GANTRY BRAKE DRIVER 3 AND FEEDBACK

VARIAN101 varian	SCALE NONE	
	SHEET 7 OF 21	
DUAL MOTOR DRIVER		
DWG NO P1060973		REV C

CM# 0000600021264 Released Ver: 02 Rev: C 16. October 2024

HIGH CURRENT 20A FROM J17

3,8 96V_LFT

LIFT EMOPS

HIGH CURRENT 15A FROM J18

CURRENT LIMIT = 16.7A
I (lim) = (50mV)/Rs = 16.666A

2,3 24V_IN
R4 0.003 Ohm 3W
24V_LFT_EMOPS_D
Q1 STH180N10F3-2
24V_LFT_EMOPS_S
24V_LFT_EMOPS_HS
C2 0.1 uF
GND
Route together
R5 10.0 Ohm
C4 0.1 uF
D3 MURS120T3
R6
24V_LFT_EMOPS_GATE
1.00K
C3 4700 pF

R8 NI
R7 NI
D2
D1
MBRB20200CTT4G
MBRB20200CTT4G
TP2 24V_LFT_EMOPS

U1 TPS2491DGSR
VIN SENSE GATE OUT EN VREF PROG TIMER GND PG
18 24V_LFT_EMOPS_EN
R3 2.00K
24V_LFT_EMOPS_VREF
R1 40.2K
R2 6.65K
24V_LFT_EMOPS_VPROG
V(prog) = 0.568V
P(lim) = 28.4W
C1 0.1 uF
Time in Current Limit: 16 ms
1000 x C (uF) x 4 / 25
6 24V_LFT_EMOPS_PG 18
<FPGA_IPU_REQUIRED>

96V_LFT
24V_LFT_EMOPS
RLY1 HAT901CSDC24-1
24V
TP60 96V_24V_LIFT
96V_24V_LFT 8,9
D108 S1B
D101 SMAJ33A-13
K1_COIL_LFT
Q2 BSS123
TP3
18 LFT_EMOPS_EN
R416 2.00K

HIGH CURRENT 20A

2,3 2.5Vref_iso
R46 11.8K
R447 10.0K
R446 1.0M
5Viso
C253 0.1 uF
R47 200K
R445 10.0K
C252 1000 pF
U10 LMV331
ISO_LFT_EMOPS_OV_L 9
Set level (high output) at 23.9V
Reset level (low output) at 24.5V

TP44
Finger safe test point
24V_LFT_EMOPS
3,8 96V_LFT
R525 6.04K 1/4W
R94 6.04K 1/4W
R93 6.04K 1/4W
R91 6.04K 1/4W
R87 6.04K 1/4W
D59 EMOPS_24V LED-GRN
D36 96V_LFT LED-GRN

Nominal output voltages (ADC inputs):

24V_LFT_EMOPS_S_MON = 4.00V
24V_LFT_EMOPS_MON = 4.00V
96V_LFT_MON = 3.86V
96V_24V_LFT_MON = 3.86V

24V_LFT_EMOPS_S
R108 10.0K
C262 1.0 uF
R106 2.00K 1%
24V_LFT_EMOPS_S_MON 17
24V_LFT_EMOPS
R107 10.0K
C26 1.0 uF
R477 2.00K 1%
24V_LFT_EMOPS_MON 17

3,8 96V_LFT
R535 200K 1/4W
C374 0.01 uF
R571 8.06K 1%
U61C TLV9064IPWR PACKAGE = 3
R572 499 Ohm
C98 1.0 uF
96V_LFT_MON 17
R574 200K 1/4W
R233 8.06K 1%
C375 0.01 uF

8,9 96V_24V_LFT
R189 200K 1/4W
C346 0.01 uF
R196 8.06K 1%
U61D TLV9064IPWR PACKAGE = 3
R195 499 Ohm
C345 1.0 uF
96V_24V_LFT_MON 17
R536 200K 1/4W
R194 8.06K 1%
C347 0.01 uF

LIFT 96V EMOPS

VARIANT01

varian

SCALE	NONE
SHEET	8 OF 21

DUAL MOTOR DRIVER

DWG NO	REV
P1060973	C

CM# 0000600021264
Released
Ver: 02
Rev: C
16. October 2024

HIGH CURRENT 20A FROM RLY2

Bleeder resistors to drop 96V to ~48V in 5 sec

UVLO set to ~ 18V
OVLO disabled

dV/dt ~ 0.3V/ms

Vout = 500mV + 100mV/A

Set level (high output) at 24.608A
Reset level (low output) at 24.5A

Nominal output voltage:
Vin = 96V -> Vout = 3.86V
Vin = 24V -> Vout = 0.96V

VCCUV set to ~ 8V
Iset = 121k * 0.5uA ~ 60mV

Fault Timer set to ~ 30ms
Retry Disabled

IMON = 180mV/A
IMON MAX = 0.003*20*20*3 = 3.6V

```
Ilimit = Vsense/R
Vsense(min) = 54 mV, Ilimit = 18 A
Vsense(nom) = 60 mV, Ilimit = 20 A
Vsense(max) = 64 mV, Ilimit = 21.3 A
```

COMBINED CONNECTOR FOR LIFT AND GANTRY SHUNT

HIGH CURRENT 3A — **HIGH CURRENT 5A**

+96V PROTECTION SHUNT FOR LIFT

HIGH CURRENT 3A

GND MGND MGND GND

LIFT 96V INTERFACE

VARIANT01

varian

SCALE	NONE
SHEET	9 OF 21
DUAL MOTOR DRIVER	
DWG NO	REV
P1060973	C

CM# 0000600021264 Released Ver: 02 Rev: C 16. October 2024

HIGH POWER DRIVER WITH HEATSINKS

Lift Driver Temperature Sensor

3.3V
R25 10.0K
C202 0.1 uF
U8
TMP36GRT
R24 10.0K
TP31 TEST_POINT LIFT_DRVR_TEMP
C229 0.1 uF
LFT_DRVR_TEMP 17
GND
AGND

Nominal output voltage (ADC input):
LFT_DRVR_TEMP = 0.75V at 25°C

10,18 LFT_PWM_PHA_HI — R397 NI — ISO_LFT_DRV_A_H 10
10,18 LFT_PWM_PHA_LO — R398 NI — ISO_LFT_DRV_A_L 10
10,18 LFT_PWM_PHB_HI — R399 NI — ISO_LFT_DRV_B_H 10
10,18 LFT_PWM_PHB_LO — R400 NI — ISO_LFT_DRV_B_L 10

3.3V: C203 10 uF, C9 0.1 uF → GND
5Viso: C16 0.1 uF, C246 10 uF → MGND

U6 ISO7740FDBQR
VCC1, GND1, INA, INB, INC, IND, NC, GND1
VCC2, GND2, OUTA, OUTB, OUTC, OUTD, EN2, GND2

10,18 LFT_PWM_PHA_HI → INA
10,18 LFT_PWM_PHA_LO → INB
10,18 LFT_PWM_PHB_HI → INC
10,18 LFT_PWM_PHB_LO → IND
OUTA → ISO_LFT_DRV_A_H → ISO_LFT_DRV_A_H 10
OUTB → ISO_LFT_DRV_A_L → ISO_LFT_DRV_A_L 10
OUTC → ISO_LFT_DRV_B_H → ISO_LFT_DRV_B_H 10
OUTD → ISO_LFT_DRV_B_L → ISO_LFT_DRV_B_L 10
EN2 ← LFT_PWM_EN 9,10

RN1A 2.0K, RN1B 2.0K, RN1C 2.0K, RN1D 2.0K → GND
RN4A 2.0K, RN4B 2.0K, RN4C 2.0K, RN4D 2.0K → MGND

12Viso: R483 3.3 Ohm, R482 3.3 Ohm, D114 MURS120T3 → LFT_DRV_VB_DIODE_A
C24 10 uF 25V → MGND
U103 UCC27712DR
VDD, HB, HO, HI, LI, HS, COM, LO
C273 0.33 uF
LFT_DRV_RG_A_H, LFT_DRV_RG_A_L
R485 33.2 Ohm, R486 33.2 Ohm
C275 47 pF, C274 47 pF → MGND

9,10 96V_24V_LFT_DRV
D40 RSX101MM-30TR, R484 3.3 Ohm, LFT_DRV_G_A_H1
D39 MMSZ5246B-7-F
XQ12 7109DG, Q12 IPB117N20NFDATMA1
D112 RSX101MM-30TR, R481 3.3 Ohm, LFT_DRV_G_A_L1
D111 MMSZ5246B-7-F
XQ13 7109DG, Q13 IPB117N20NFDATMA1
MGND

Total gate charge (max) : 61nC
Max duty cycle 96%
Typical frequency 20kHz

LFT_MOT_A_I
C271 1000 pF, +5VA, AGND
C270 0.1 uF
U24 MCS1803GS-20
VCC, VOUT, FLT, GND, IP1+, IP2+, IP1-, IP2-
R99 499 Ohm
TP50 NI-22-03-2021
C266 1000 pF
LFT_DRV_CURA 17
VOUT = 2.5V +/- 100mV/A
TEST_POINT TP49
L18 SRP1270-1R0M
LFT_DRV_VS_A, LFT_DRV_PHASE_A_IND, LFT_DRV_PHASE_A
R480 100 Ohm
C272 1000 pF 250V

HIGH CURRENT 20A

12Viso: R59 3.3 Ohm, R58 3.3 Ohm, D107 MURS120T3 → LFT_DRV_VB_DIODE_B
C17 10 uF 25V → MGND
U102 UCC27712DR
C242 0.33 uF
LFT_DRV_RG_B_H, LFT_DRV_RG_B_L
R437 33.2 Ohm, R438 33.2 Ohm
C244 47 pF, C243 47 pF → MGND

9,10 96V_24V_LFT_DRV
D11 RSX101MM-30TR, R436 3.3 Ohm, LFT_DRV_G_B_H1
D10 MMSZ5246B-7-F
XQ8 7109DG, Q8 IPB117N20NFDATMA1
D106 RSX101MM-30TR, R435 3.3 Ohm, LFT_DRV_G_B_L1
D105 MMSZ5246B-7-F
XQ9 7109DG, Q9 IPB117N20NFDATMA1
MGND

LFT_MOT_B_I
C239 1000 pF, +5VA, AGND
C238 0.1 uF
U12 MCS1803GS-20
VCC, VOUT, FLT, GND, IP1+, IP2+, IP1-, IP2-
R60 499 Ohm
TP30 NI-22-03-2021
C237 1000 pF
LFT_DRV_CURB 17
VOUT = 2.5V +/- 100mV/A
TEST_POINT TP47
L17 SRP1270-1R0M
LFT_DRV_VS_B, LFT_DRV_PHASE_B_IND, LFT_DRV_PHASE_B
R433 100 Ohm
C241 1000 pF 250V

HIGH CURRENT 20A

J23
LFT_DRV_PHASE_A
LFT_DRV_PHASE_B
LFT_DRV_PHASE_C
IOGND
4S HEADER 4 350988-4

10,18 LFT_PWM_PHC_HI — R661 NI — ISO_LFT_DRV_C_H 10
10,18 LFT_PWM_PHC_LO — R660 NI — ISO_LFT_DRV_C_L 10

3.3V: C500 10 uF, C168 0.1 uF → GND
5Viso: C167 0.1 uF, C499 10 uF → MGND

U94 ISO7740FDBQR
VCC1, GND1, INA, INB, INC, IND, NC, GND1
VCC2, GND2, OUTA, OUTB, OUTC, OUTD, EN2, GND2

10,18 LFT_PWM_PHC_HI → INA
10,18 LFT_PWM_PHC_LO → INB
OUTA → ISO_LFT_DRV_C_H
OUTB → ISO_LFT_DRV_C_L
ISO_LFT_DRV_C_H 10
ISO_LFT_DRV_C_L 10
EN2 ← LFT_PWM_EN 9,10

RN3A 2.0K, RN3B 2.0K, RN3C 2.0K, RN3D 2.0K → GND
RN13A 2.0K, RN13B 2.0K, RN13C 2.0K, RN13D 2.0K → MGND

12Viso: R97 3.3 Ohm, R98 3.3 Ohm, D116 MURS120T3 → LFT_DRV_VB_DIODE_C
C22 10 uF 25V → MGND
U104 UCC27712DR
C245 0.33 uF
LFT_DRV_RG_C_H, LFT_DRV_RG_C_L
R488 33.2 Ohm, R487 33.2 Ohm
C276 47 pF, C277 47 pF → MGND

9,10 96V_24V_LFT_DRV
D38 RSX101MM-30TR, R489 3.3 Ohm, LFT_DRV_G_C_H1
D37 MMSZ5246B-7-F
XQ11 7109DG, Q11 IPB117N20NFDATMA1
D5 RSX101MM-30TR, R16 3.3 Ohm, LFT_DRV_G_C_L1
D4 MMSZ5246B-7-F
XQ7 7109DG, Q7 IPB117N20NFDATMA1
MGND

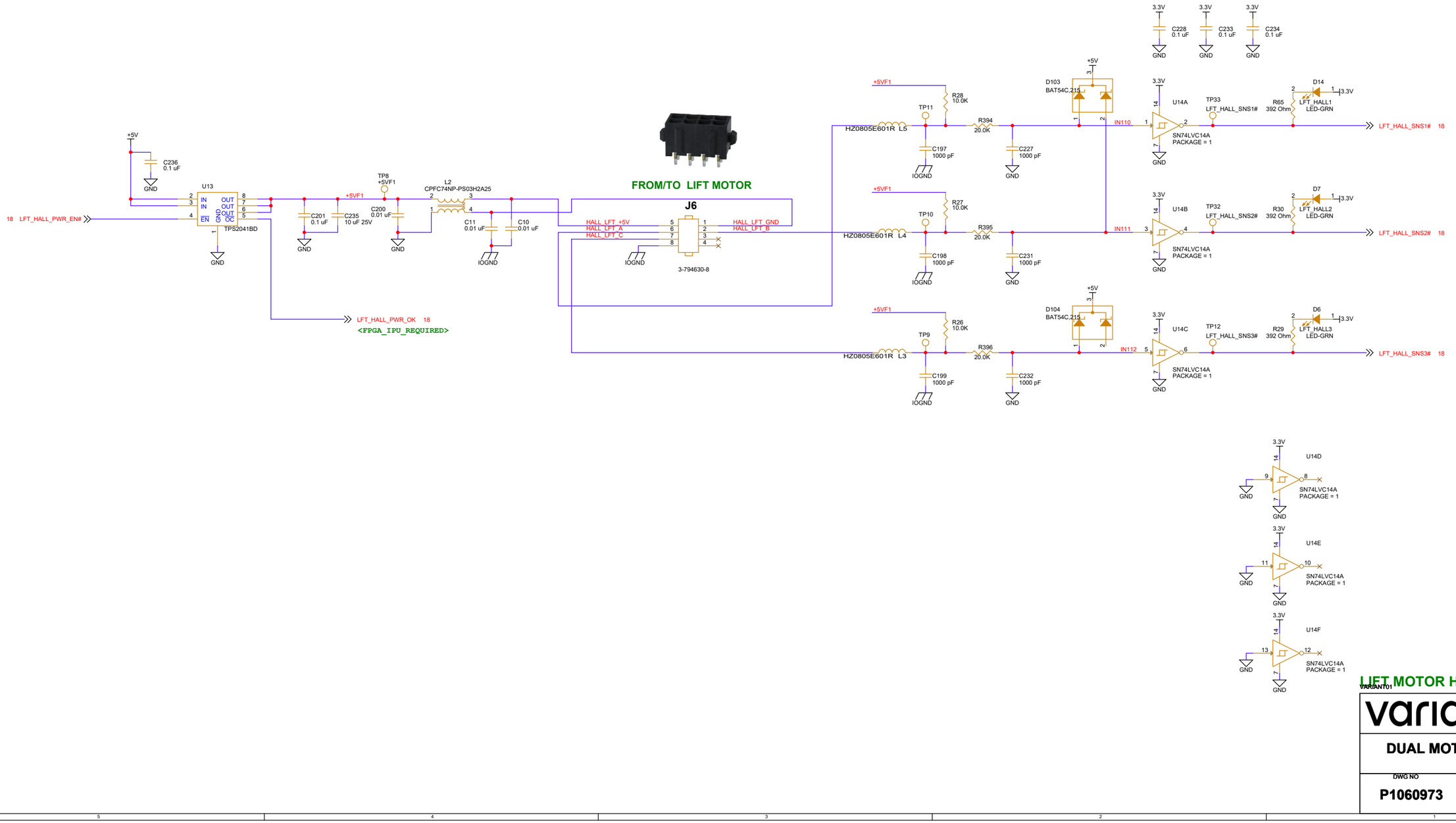
TEST_POINT TP29
L1 SRP1270-1R0M
LFT_DRV_VS_C, LFT_DRV_PHASE_C
R434 100 Ohm
C240 1000 pF 250V

HIGH CURRENT 20A

GND MGND

LFT DRIVER
VARIANT01
varian
SCALE NONE
SHEET 10 OF 21
DUAL MOTOR DRIVER
DWG NO P1060973
REV C

CM# 0000600021264
Released
Ver: 02
Rev: C
16. October 2024



LIFT MOTOR HALL SENSOR IF

VARIANT01

varian	SCALE NONE
	SHEET 11 OF 21
DUAL MOTOR DRIVER	
DWG NO P1060973	REV C

CM# 0000600021264 Released Rev: C Ver: 02 16. October 2024

Vertical Ribbon Connector
Connects to SPD2 J36

J9
N3428-6302RB

TP23 DMD_24V
R40 10.0K
R385 1.78K
C212 1000 pF
R81 100K
D26 BAT54C,215
U21A SN74LVC14A PACKAGE = 3
SPD2_24V_STATUS# 18

GND
IOGND
3.3V
<KEY>

GNT_HW_ENAB
GNT_HW_ENAB_OUT
GNT_ST_DISB#
GNT_ST_DISB_OUT
DMD_DIG_GND
LFT_HW_ENAB
LFT_HW_ENAB_OUT
LFT_ST_DISB#
LFT_ST_DISB_OUT
DMDPWR_STS

TP27
R44 10.0K
R381 1.78K
C208 1000 pF
R85 100K
D28 BAT54C,215
U21B SN74LVC14A PACKAGE = 3
IN26
LFT_ST_DISB 18
R564 392 Ohm
D70 LFT_ST_DISB LED-GRN

TP26
R43 10.0K
R382 1.78K
C209 1000 pF
R84 100K
U21C SN74LVC14A PACKAGE = 3
IN25
LFT_HW_EN# 18
R562 392 Ohm
D71 LFT_HW_EN LED-GRN

TP25
R42 10.0K
R383 1.78K
C210 1000 pF
R83 100K
D27 BAT54C,215
U21D SN74LVC14A PACKAGE = 3
IN23
GNT_ST_DISB 18
R563 392 Ohm GNT_ST_DISB LED-GRN

TP24
R41 10.0K
R384 1.78K
C211 1000 pF
R82 100K
C213 0.1 uF
U21E SN74LVC14A PACKAGE = 3
IN24
GNT_HW_EN# 18
R590 392 Ohm
D81 GNT_HW_EN LED-GRN

18 GNT_HW_EN_MON
18 GNT_ST_DISB_MON
18 LFT_HW_EN_MON
18 LFT_ST_DISB_MON
18 DMD_PWR_OK
18 SPARE_MON
18 GNT_BRK_SW_MON

U22
24V
C255 NI
VBB
IN1 IN2 IN3 IN4 IN5 IN6 IN7 IN8
LS DIAG
OUT1 OUT2 OUT3 OUT4 OUT5 OUT6 OUT7 OUT8
GND NC NC NC NC NC NC NC NC
R120 4.99K
R121 4.99K
R122 4.99K
R123 4.99K
R124 4.99K
R125 4.99K
R126 4.99K
R128 NI
IN8_1

GNT_HW_ENAB_MON_OUT
GNT_ST_DISB_MON_OUT
LFT_HW_ENAB_MON_OUT
LFT_ST_DISB_MON_OUT
DMDPWR_STS_OUT
SPAREMON_STS
GNT_BRK_SW_OUT

D29 MURS120T3
GNT_BRK_SW_24V 7
D102 SMAJ33A-13

L11 MH3261-601Y
L12 MH3261-601Y
L13 MH3261-601Y
L14 MH3261-601Y
L15 MH3261-601Y
L16 MH3261-601Y
C184 0.01 uF
C185 1000 pF
C186 1000 pF
C187 1000 pF
C188 1000 pF
C189 1000 pF
TP43 SPAREMON_STS
R424 10.0K

<FPGA_IPU_REQUIRED>
SPDIO_FLT# 18
Q53 NI
R423 NI

U30
24V
C256 0.1 uF
NC1 NC2 VSS1 VSS2
IN1 IN2 IN3 IN4
OUT1 OUT2 OUT3 OUT4
DIAG_EN THER CL
ST1 ST2 ST3 ST4 PAD GND
GNT_HW_EN_MON
GNT_ST_DISB_MON
LFT_HW_EN_MON
LFT_ST_DISB_MON
GNT_HW_ENAB_MON_OUT
GNT_ST_DISB_MON_OUT
LFT_HW_ENAB_MON_OUT
LFT_ST_DISB_MON_OUT
R466 1.00K
R468 NI
R467 383 Ohm
TPS4H000AQPWPRQ1

Current limit = 625mA
Rcl = 0.8*300/0.625

SPDIO_FLT#

U31
24V
C254 0.1 uF
DMD_PWR_OK
SPARE_MON
GNT_BRK_SW_MON
IN8_1
DMDPWR_STS_OUT
SPAREMON_STS
GNT_BRK_SW_OUT
R462 1.00K
R465 NI
R464 383 Ohm
TPS4H000AQPWPRQ1

Current limit = 625mA
Rcl = 0.8*300/0.625

SPD DMD INTERFACE
VARIANT01

varian	SCALE NONE
	SHEET 12 OF 21
DUAL MOTOR DRIVER	
DWG NO P1060973	REV C

CM# 0000600021264
Released
Ver: 02
Rev: C
16. October 2024

FROM/TO
STAND POWER DIST

J10

EM_LFT_UP and EM_LFT_DWN are active-low

N3429-6302RB

LAT-LNG BRAKE DRIVER

Current limit = 625mA
Rcl = 0.8*300/0.625

Current limit = 625mA
Rcl = 0.8*300/0.625

SN74LVC14A
PACKAGE = 4

TPS4H000AQPWPRQ1

BSP742T

SPD_EMOPS_INTERFACE

VARIANT01

varian	SCALE NONE
	SHEET 13 OF 21
DUAL MOTOR DRIVER	
DWG NO P1060973	REV C

CM# 0000600021264 Released Rev: C Ver: 02 16. October 2024

13 EXOPS_GNT_24V

J1

1 TP40
2
3
4
5
6
7
8 <KEY>
9
10
11 MSSB_TX_P 14
12 MSSB_TX_N 14
13
14
15 MSSB_RX_P 14
16 MSSB_RX_N 14
17
18
19
20
21
22 CCW_LIMIT_24V#
23
24 CW_LIMIT_24V#
25
26

GND
IOGND

N3429-6302RB

FROM/TO STAND CONT

TP159
R342 10.0K
R617 1.78K
C424 1000 pF
R341 100K
GND

TP158
R340 10.0K
R618 1.78K
C425 1000 pF
R339 100K
GND

3.3V
D164 BAT54C,215

U74A
SN74LVC14A PACKAGE = 5
IN62 1
2
R592 392 Ohm
D83 LED-GRN GNT_CCW_LIMIT
GNT_CCW_LIMIT 18

U74B
SN74LVC14A PACKAGE = 5
IN64 3
4
R591 392 Ohm
D82 LED-GRN GNT_CW_LIMIT
GNT_CW_LIMIT 18

3.3V
C152 0.1 uF
C153 1 uF
U86 SN65HVD1477DR
A B VCC R D GND Y Z
14 MSSB_RX_P
14 MSSB_RX_N
18 MSSB_TX
R378 100 Ohm 1/4W
ST_MSSB_RX
R343 33.2 Ohm
MSSB_RX 18
MSSB_TX_P 14
MSSB_TX_N 14

STAND CONTROLLER INTERFACE

VARIAN

varian

SCALE NONE

SHEET 14 OF 21

DUAL MOTOR DRIVER

DWG NO P1060973

REV C

CM# 0000600021264 Released Ver: 02 Rev: C 16. October 2024

ANALOG INTERFACE

DAC MONITOR

17 LFT_DAC >> R326 100 Ohm → TP152 LFT_DAC_VMON → LFT_DAC_VMON → U84 OPA743NA (+5VA, -5VA) → R327 22.1 Ohm → TP153 LFT_IMON+ → L37 DLW44SM851SK2L → C439 22 pF, C442 22 pF → IOGND

C441 0.1 uF (+5VA, AGND)

C440 0.1 uF (-5VA, AGND)

OPAMP OUT (0..+4.98V)
0V = -20A
2.5V = 0.0A
5.0V = +20A

IMON FEEDBACK DAC
0--> 5.0V

FROM/TO CCHL

J12

CONN DSUB HD26-S
C180 1000 pF
C181 0.01 uF100 VDC
R377 100K
IOGND

10	LIFT_GPO1	
1	LIFT_GPI1	
11	LIFT_GPO2	
2	LIFT_GPI2	
12		
19		
20		
21	LIFT_CURR_CMD_A	LIFT_GPI3
3		
22	LIFT_CURR_CMD_B	LIFT_GPI4
13		
4		LIFT_LIMIT1
23	LIFT_CURR_FB_A	
14		
5		
24	LIFT_CURR_FB_B	LIFT_LIMIT2
15		
6		
25		
16		
7		
26		
17		
8		
18		
9		

Comment:
LIFT_LIMIT1 and LIFT_LIMIT2 are active-low

DIGITAL OUTPUTS

24V, C396 NI, GND

U76 NI

18 LFT_SER_CLK	6 IN1	OUT1 36	LIFT_GPI1_Y
18 LFT_SER_SYNC	7 IN2	OUT1 35	
18 LFT_SER_DATA0	8 IN3	OUT2 34	LIFT_GPI2_Y
18 LFT_SER_DATA1	9 IN4	OUT2 33	
		OUT3 32	LIFT_GPI3_Y
18 EXT_BRK1_DRV_EN	10 IN5	OUT3 31	
18 EXT_BRK2_DRV_EN	11 IN6	OUT4 30	LIFT_GPI4_Y
18 EXT_BRK3_DRV_EN	12 IN7	OUT4 29	
		OUT4 28	
IN8_3	13 IN8	OUT5 27	EXT_BRK1_DRV_24V 15,2
		OUT5 26	EXT_BRK2_DRV_24V 15,2
		OUT6 25	EXT_BRK3_DRV_24V 15,2
		OUT6 24	
		OUT7 23	
		OUT7 22	
		OUT8 21	
	3 LS	DIAG 20	

VBB 37; GND 19; NC NC NC NC NC NC NC NC NC

R598 NI; GND GND GND

L41 MH3261-601Y
L40 MH3261-601Y
L39 MH3261-601Y
L38 MH3261-601Y

C428 1000 pF, C429 1000 pF, C430 1000 pF, C431 1000 pF

IOGND

Q56 NI, R616 NI, GND GND

LFT_SERIO_FLT# 18
<FPGA_IPU_REQUIRED>

Input Diff. Range: +/-10V
Scaling: 4A/1V

1:4 CONFIG

R330 4.99K 1%
R329 3.32K
R328 4.99K 1%
C437 1000 pF
C434 NI, C438 NI
R623 NI
LFT_CURR_CMD_B_IN
LFT_CURR_CMD_A_IN

U85 AD620BR (+5VA, -5VA, AGND)
C435 0.1 uF (+5VA, AGND)
C436 0.1 uF (-5VA, AGND)

R281 20.0K
2 VREF2.5V
C405 0.1 uF
R280 20.0K AGND

R276 20.0K
U72A TLV9064IPWR PACKAGE = 4
C403 0.1 uF (+5VA, AGND)
R278 100 Ohm
TP131 LFT_VIN
0...5V
4A/0.25V
LFT_CURR_CMD 17
C406 0.1 uF AGND
R277 20.0K
C407 0.01 uF

TP157 R338 10.0K, R619 1.78K, C426 1000 pF, R337 100K, D165 BAT54C,215 (3.3V), C398 0.1 uF, U74D SN74LVC14A PACKAGE = 5, IN90 9, R526 392 Ohm, D60 LFT_MTN_EN LED-GRN (3.3V), LFT_MTN_EN# 18

TP156 R336 10.0K, R620 1.78K, C427 1000 pF, R335 100K, U74E, IN91 11, R527 392 Ohm, D61 LFT_SER_PAGE_SEL LED-GRN (3.3V), LFT_SER_PAGE_SEL# 18

TP155 R334 10.0K, R621 1.78K, C432 1000 pF, R333 100K, D166 BAT54C,215 (3.3V), U74F, IN92 13, R560 392 Ohm, D68 LFT_DOWN_LIMIT LED-GRN, LFT_DOWN_LIMIT 18

TP154 R332 10.0K, R622 1.78K, C433 1000 pF, R331 100K, U74C, IN93 5, R561 392 Ohm, D69 LFT_UP_LIMIT LED-GRN, LFT_UP_LIMIT 18

3.3V, GND, AGND

U77 TPS4H000AQPWPRQ1 (NI)

LFT_SER_CLK	1 IN1	OUT1 20	LIFT_GPI1_Y
LFT_SER_SYNC	2 IN2	OUT2 19	LIFT_GPI2_Y
LFT_SER_DATA0	3 IN3	OUT3 16	LIFT_GPI3_Y
LFT_SER_DATA1	4 IN4	OUT4 15	LIFT_GPI4_Y
3.3V	R289 1.00K 11 DIAG_EN	CL 9	R290 383 Ohm
	R291 NI 12 THER		
	5 ST1		
	6 ST2		
	7 ST3	PAD 21	
	8 ST4	GND 10	

NC1 13, NC2 14, VSS1 17, VSS2 18; C393 NI, 24V, GND

Current limit = 625mA
Rcl = 0.8*300/0.625

U75 TPS4H000AQPWPRQ1

EXT_BRK1_DRV_EN	1 IN1	OUT1 20	EXT_BRK1_DRV_24V 15,21
EXT_BRK2_DRV_EN	2 IN2	OUT2 19	EXT_BRK2_DRV_24V 15,21
EXT_BRK3_DRV_EN	3 IN3	OUT3 16	EXT_BRK3_DRV_24V 15,21
IN8_3	4 IN4	OUT4 15	
3.3V	R601 1.00K 11 DIAG_EN	CL 9	R600 383 Ohm
	R599 NI 12 THER		
	5 ST1		
	6 ST2		
	7 ST3	PAD 21	
	8 ST4	GND 10	

NC1 13, NC2 14, VSS1 17, VSS2 18; C397 0.1 uF, 24V, GND

Current limit = 625mA
Rcl = 0.8*300/0.625

LFT_SERIO_FLT#

U72B TLV9064IPWR PACKAGE = 4
R284 10.0K, -5VA, AGND
R283 8.06K, C401 0.1 uF
R282 100 Ohm, C402 0.1 uF, AGND
TP134 LFT_VIN
5VA_NEG_MON 17

U72D TLV9064IPWR PACKAGE = 4, AGND

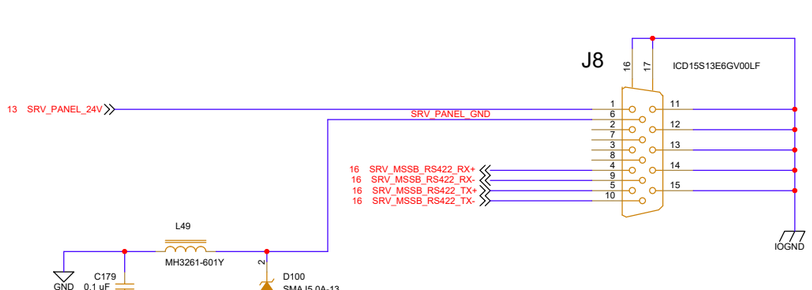
Nominal output voltages (ADC inp.):
5VA_NEG_MON = 4.03V

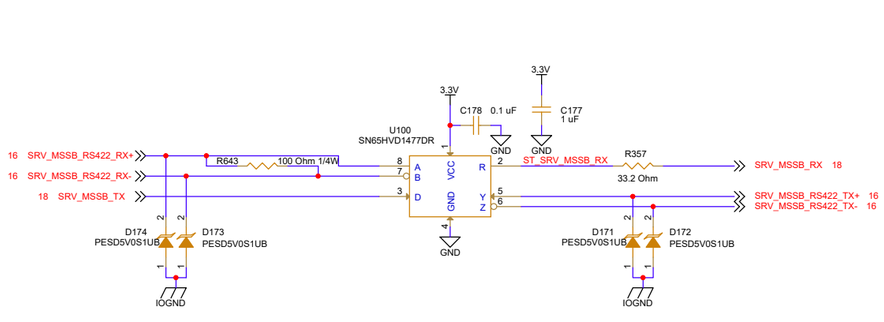
CCHL INTERFACE

VARIANT	/
SCALE	NONE
SHEET	15 OF 21
DWG NO	P1060973
REV	C

DUAL MOTOR DRIVER

CM# 0000600021264 Released Ver: 02 Rev: C 16 October 2024





SERVICE PENDANT

VARIANT01

varian

SCALE	NONE
SHEET	16 OF 21

DUAL MOTOR DRIVER

DWG NO	REV
P1060973	C

CM# 0000600021264 Released Ver: 02 Rev: C 16. October 2024

Nominal output voltages (ADC inputs):

24V_IN_MON = 4.00V
24V_GNT_EMOPS_S_MON = 4.00V
24V_GNT_EMOPS_MON = 4.00V
96V_GNT_MON = 3.86V
96V_24V_GNT_MON = 3.86V
12V_ISO_MON = 3.89V
5V_ISO_MON = 4.03V
TEMP = 0.75V

Nominal output voltage (ADC input):

5VA_POS_MON = 4.55V
5VA_NEG_MON = 4.03V
24V_MON = 4.00V
5V_MON = 4.55V
3.3V_MON = 3.30V
1.8V_MON = 1.80V
2.5V_MON = 2.50V

Nominal output voltage (ADC input):

1.0V_MON = 1.0V
96V_24V_GNT_VMON_V = 3.86V
96V_24V_GNT_IMON_V = 66.6mV/A
96V_GNT_BRK_VMON_V = 3.86V
96V_GNT_BRK_IMON_V = 180mV/A
GNT_DRV_CURA = 2.5V +/- 20mV/A
GNT_DRV_CURB = 2.5V +/- 20mV/A
GNT_DRVR_TEMP = 0.75V at 25°C

Nominal output voltage (ADC input):

GNT_BRK1_CUR = 0.5V + 400mV/A
GNT_BRK2_CUR = 0.5V + 400mV/A
GNT_BRK3_CUR = 0.5V + 400mV/A
24V_LFT_EMOPS_S_MON = 4.00V
24V_LFT_EMOPS_MON = 4.00V
96V_LFT_MON = 3.86V
96V_24V_LFT_MON = 3.86V

Nominal output voltage (ADC input):

96V_24V_LFT_IMON_V = 180mV/A
LFT_DRV_CURA = 2.5V +/- 100mV/A
LFT_DRV_CURB = 2.5V +/- 100mV/A
LFT_DRVR_TEMP = 0.75V at 25°C
LFT_CURR_CMD = 2.5V + 62.5mV/A
24V_LFT_EMOPS_MON = 4.0V

- Max. input voltage 5V
- Resolution (typ) = 16-bit
- Analog Input Ragne = 0..4.95V
- LSB = 76.3uV

Note: Keep digital AD-signals inside GND plane region. Do not route into AGND region

5V for compatibility with ADS8339

MOTOR PROGRAMMABLE CURRENT LIMITS

DAC

A/D AND D/A CONVERTERS

VARIANT01

DUAL MOTOR DRIVER

/

DWG NO P1060973

REV C

SCALE NONE

SHEET 17 OF 21

CM# 0000600021264 Released Rev. C Ver: 02 16. October 2024

Debug Header
J11

3.3V — R257 2.32K

18 DBUG_HEADER2 — 2
18 DBUG_HEADER4 — 4
18 DBUG_HEADER6 — 6
18 DBUG_HEADER8 — 8
18 DBUG_HEADER10 — 10
12 — 1
3 — 5
7 — 7
9 — 9
11 — 11

DBUG_SCLK 18
DBUG_MISO 18
DBUG_MOSI 18
DBUG_CS# 18
DBUG_ACTIVE 18

GND — 87832-1220 HEADER 6x2/SM — GND — R260 2.32K — GND

18 POWER_GOOD — R421 392 Ohm — D34 LED-GRN POWER_GOOD — GND

18 MSSB_COMM_FAULT — R419 392 Ohm — D32 LED-RED MSSB_COMM_FAULT — GND

18 HSWAP_FAULT — R420 392 Ohm — D33 LED-RED HSWAP_FAULT — GND

U54-9

BANK-2

POWER IF
2 P24V_GOOD# — F5 GPIO0PB2
2 FAN_FAIL# — E5 GPIO0NB2
2 FAN_EN — D4 GPIO1PB2
2,3 12V_ISO_EN — C4 GPIO1NB2

GANTRY 96V EMOPS
3 24V_GNT_EMOPS_PG — F3 GPIO2PB2/DQS
3 24V_GNT_EMOPS_EN — E4 GPIO2NB2/DQS
3 GNT_EMOPS_EN — B4 GPIO3PB2
A5 GPIO3NB2

GANTRY 96V INTERFACE
4 GNT_MOT_PWR_EN — E6 GPIO4PB2
4 GNT_BRK_PWR_EN — D6 GPIO4NB2
4 WD_TRIG
4 OC_V_GNT_MOT_DRV — C5 GPIO5PB2
4 OC_V_GNT_BRK_DRV — B5 GPIO5NB2
4 GNT_MOT_PWR_FLT# — D7 GPIO6PB2
4 GNT_BRK_PWR_FLT# — C7 GPIO6NB2
4 GNT_EMOPS_OV_L — C6 GPIO7PB2
4 5V_ISO_MON_GNT — B7 GPIO7NB2
4 GNT_SHUNT_EN — E8 GPIO8PB2/DQS
4 GNT_SHUNT_ON — D8 GPIO8NB2/DQS
9 5V_ISO_MON_LFT — A6 GPIO9PB2
A7 GPIO9NB2

GANTRY DRIVER
5 GNT_PWM_PHA_HI — E9 GPIO10PB2
5 GNT_PWM_PHA_LO — D9 GPIO10NB2
5 GNT_PWM_PHB_HI — B8 GPIO11PB2
5 GNT_PWM_PHB_LO — A8 GPIO11NB2
5 GNT_PWM_PHC_HI — B12 GPIO12PB2/CLKIN_S_4
5 GNT_PWM_PHC_LO — B13 GPIO12NB2

SPD-DMD IF
12 GNT_HW_EN_MON — C9 GPIO13PB2/CLKIN_S_5
12 LFT_ST_DISB_MON — C10 GPIO13NB2
12 LFT_HW_EN_MON — B9 GPIO14PB2/DQS
12 GNT_ST_DISB_MON — B10 GPIO14NB2/DQS
12 DMD_PWR_OK — C11 GPIO15PB2/CLKIN_S_6
12 SPARE_MON — C12 GPIO15NB2
12 SPDIO_FLT# — A10 GPIO16PB2/LPRB_A
12 SPD2_24V_STATUS# — A11 GPIO16NB2/LPRB_B
12 LFT_ST_DISB — A12 GPIO17PB2/CLKIN_S_7
12 LFT_HW_EN# — A13 GPIO17NB2
12 GNT_ST_DISB — G12 GPIO24PB2
12 GNT_HW_EN# — G13 GPIO24NB2

LIFT MOTOR HALL SENSOR IF
11 LFT_HALL_PWR_EN# — F10 GPIO25PB2
11 LFT_HALL_PWR_OK — E10 GPIO25NB2
11 LFT_HALL_SNS1# — D11 GPIO26PB2/DQS
11 LFT_HALL_SNS2# — D12 GPIO26NB2/DQS
11 LFT_HALL_SNS3# — C14 GPIO27PB2
GPIO27NB2 — F13 24V_LFT_EMOPS_EN 8
F12 OC_V_LFT_MOT_DRV 9

LIFT 96V INTERFACE
GPIO28PB2 — E11 LFT_SHUNT_EN 9
GPIO28NB2 — F11 LFT_SHUNT_ON 9
GPIO29NB2 — E13 LFT_EMOPS_EN 8
GPIO29PB2 — D13 LFT_EMOPS_OV_L 9
GPIO30NB2 — E14 LFT_MOT_PWR_FLT# 9
GPIO30PB2 — D14 LFT_MOT_PWR_EN 9
GPIO31PB2 — C14 EMOPS_STAT1 13
GPIO31NB2 — C15 EMOPS_STAT2 13
GPIO32PB2/DQS/CCC_SE_PLL0_OUT0 — A17 LFT_ROT_BRK_RLS 13
GPIO32NB2/DQS — B17 LAT_LNG_BRK_RLS 13
GPIO33PB2/CLKIN_S_8/CCC_SE_CLKIN_S_8/CCC_SE_PLL0_OUT0 — B14 EM_DOWN_LIMIT 13
GPIO33NB2 — B15 EM_UP_LIMIT 13
GPIO34PB2/CCC_SE_PLL0_OUT1 — C16 CCH_LFT_MOT_EN# 13
GPIO34NB2 — C17 CCH_LFT_DWN# 13
GPIO35PB2/CLKIN_S_9/CCC_SE_CLKIN_S_9 — A15 CCH_LAT_LNG_FLOAT# 13
GPIO35NB2 — A16 EMO_GOOD# 13
GPIO36PB2 — G14 SITE_24V_PWR_OK# 13
GPIO36NB2 — H13 SRVC_CCH_GNT# 13
GPIO37PB2 — H15 EM_CCH_24V_EN 13
GPIO37NB2 — G15 SPD_EMOPS_FLT# 13

SPD_EMOPS_INTERFACE

GPIO38PB2/DQS/CCC_SE_PLL1_OUT0 — D16 EXOPS_GNT_24V_EN 13
GPIO38NB2/DQS — D17 GNT_CCW_LIMIT 14
GPIO39PB2/CCC_SE_CLKIN_S_10/CCC_SE_PLL1_OUT0 — E15 GNT_CW_LIMIT 14
GPIO39NB2 — E16 ST_MSSB_TX
GPIO40PB2/CCC_SE_PLL1_OUT1 — G17 MSSB_RX 14
GPIO40NB2 — F17 ST_SRV_MSSB_TX

STAND CONTROLLER INTERFACE

GPIO41PB2/CCC_SE_CLKIN_S_11 — F15 SRV_MSSB_RX 16
GPIO41NB2 — F16 PAN_24V_SW 13

SERVICE PENDANT

GPIO142PB2/CCC_SW_CLKIN_S_0 — E1 MAINS_LEVEL_FB 21
GPIO142NB2 — D1 POWER_GOOD 18
GPIO143PB2/CCC_SW_CLKIN_S_1 — D2 MSSB_COMM_FAULT 18
GPIO143NB2 — C2 HSWAP_FAULT 18
GPIO144PB2/DQS/CCC_SW_PLL1_OUT0 — C1 EXT_BRK1_DRV_EN 15
GPIO144NB2/DQS — B1 EXT_BRK2_DRV_EN 15
GPIO145PB2/CLKIN_S_2/CCC_SW_CLKIN_S_2/CCC_SW_PLL1_OUT0 — A2 EXT_BRK3_DRV_EN 15
GPIO145NB2 — A3 DBUG_HEADER2 18
GPIO146PB2/CCC_SW_PLL1_OUT1 — E3 DBUG_HEADER4 18
GPIO146NB2 — D3 DBUG_HEADER6 18
GPIO147PB2/CLKIN_S_3/CCC_SW_CLKIN_S_3 — B2 DBUG_HEADER8 18
GPIO147NB2 — B3 DBUG_HEADER10 18

EXT BRAKE DRIVER

DEBUG Port

MPF100T-FCG484E

U54-10

BANK-4

18 FPGA_100M_CLK — R1 GPIO108PB4/CLKIN_W_7/CCC_NW_CLKIN_W_7/CCC_NW_PLL0_OUT0
T1 GPIO108NB4
21 PWM_BRK_EXT_FAUL — N1 GPIO109PB4/DQS
21 GNT_BRK_EXT_EN — P1 GPIO109NB4/DQS
12 GNT_BRK_SW_MON — N2 GPIO112PB4
7 GNT_BRK1_FB# — P2 GPIO112NB4
7 GNT_BRK2_FB# — T5 GPIO113PB4
7 GNT_BRK3_FB# — T6 GPIO113NB4
6,21 GNT_BRK1_PWM_HI — P4 GPIO114PB4/CLKIN_W_6/CCC_NW_CLKIN_W_6/CCC_NW_PLL0_OUT1
6,21 GNT_BRK1_PWM_LO — R3 GPIO114NB4

GANTRY BRAKE DRIVER
6,21 GNT_BRK1_RET_PWM_HI — T2 GPIO115PB4/DQS/CCC_NW_PLL0_OUT0
6,21 GNT_BRK1_RET_PWM_LO — T3 GPIO115NB4/DQS
6 GNT_BRK2_PWM_HI — N4 GPIO116PB4
6 GNT_BRK2_PWM_LO — P3 GPIO116NB4
6 GNT_BRK2_RET_PWM_HI — R5 GPIO117PB4
6 GNT_BRK2_RET_PWM_LO — R4 GPIO117NB4
7 GNT_BRK3_PWM_HI — P9 GPIO118PB4
7 GNT_BRK3_PWM_LO — R8 GPIO118NB4
7 GNT_BRK3_RET_PWM_HI — P6 GPIO119PB4
7 GNT_BRK3_RET_PWM_LO — R6 GPIO119NB4
8 24V_LFT_EMOPS_PG — P7 GPIO120PB4
10 LFT_PWM_PHA_HI — P8 GPIO120NB4
10 LFT_PWM_PHA_LO — N7 GPIO121PB4/DQS
10 LFT_PWM_PHB_HI — N8 GPIO121NB4/DQS
10 LFT_PWM_PHB_LO — N6 GPIO122PB4
10 LFT_PWM_PHC_HI — N5 GPIO122NB4
10 LFT_PWM_PHC_LO — M8 GPIO123PB4
TP99 GPIO2 — M9 GPIO123NB4
TP97 GPIO3 — M3 GPIO124PB4
18 EEP_CS# — M2 GPIO124NB4
18 EEP_SI — L7 GPIO125PB4
18 EEP_SCK — L8 GPIO125NB4
18 EEP_SO

LIFT MOTOR INTERFACE

EEPROM INTERFACE

GPIO126PB4 — L6 RESET# 18
GPIO126NB4 — M7 GPIO5 TP98
GPIO127PB4/DQS — K5 LFT_SER_CLK 15
GPIO127NB4/DQS — K4 LFT_SER_SYNC 15
GPIO128PB4 — L3 LFT_SER_DATA0 15
GPIO128NB4 — M4 LFT_SER_DATA1 15
GPIO129PB4 — L5 LFT_SERIO_FLT# 15
GPIO129NB4 — M5 LFT_MTN_EN# 15
GPIO130PB4 — K1 LFT_SER_PAGE_SEL# 15
GPIO130NB4 — L1 LFT_DOWN_LIMIT 15
GPIO131PB4/CLKIN_W_5/CCC_NW_CLKIN_W_5 — J3 LFT_UP_LIMIT 15
GPIO131NB4 — J2 AD_SEL0 17
GPIO132PB4/CLKIN_W_4/CCC_NW_CLKIN_W_4 — K3 AD_SEL1 17
GPIO132NB4 — L2 AD_SEL2 17
GPIO133PB4/DQS — H1 AD_MUX1# 17
GPIO133NB4/DQS — J1 AD_MUX2# 17
GPIO134PB4 — F2 AD_MUX3# 17
GPIO134NB4 — F1 AD_MUX4# 17
GPIO135PB4/CLKIN_W_3/CCC_SW_CLKIN_W_3 — G2 AD_MUX5# 17
GPIO135NB4 — H2 ST_DAC_CLK
GPIO136PB4/CCC_SW_PLL0_OUT1 — J6 DAC_SDI 17
GPIO136NB4 — K6 DAC_CS# 17
GPIO137PB4/CLKIN_W_2/CCC_SW_CLKIN_W_2/CCC_SW_PLL0_OUT0 — H7 DAC_SDO 17
GPIO137NB4 — J7 ADC_SDOUT 17
GPIO138PB4/CLKIN_W_1/CCC_SW_CLKIN_W_1 — J8 12V_ACT_DIODE_ON# 3
GPIO138NB4 — K8 ST_ADC_SCLK
GPIO139PB4/DQS/CCC_SW_PLL0_OUT0 — H4 ADC_CNVST 17
GPIO139NB4/DQS — J4 DBUG_MISO 18
GPIO140PB4 — H6 DBUG_MOSI 18
GPIO140NB4 — H5 DBUG_CS# 18
GPIO141PB4/CLKIN_W_0/CCC_SW_CLKIN_W_0 — J9 DBUG_SCLK 18
GPIO141NB4 — K9 DBUG_ACTIVE 18

CCHL INTERFACE

A/D CONVERTER

DEBUG Port

MPF100T-FCG484E

ST_SRV_MSSB_TX — R164 33.2 Ohm — SRV_MSSB_TX 16
ST_MSSB_TX — R163 33.2 Ohm — MSSB_TX 14
ST_DAC_CLK — R259 33.2 Ohm — DAC_CLK 17
ST_ADC_SCLK — R213 33.2 Ohm — ADC_SCLK 17

3.3V — U55 — VCC, OE, OUT, GND — C83 0.1uF — 100.000MHz ASDMB-100.000MHZ-LY-T — FPGA_100M_CLK 18 — GND

EEPROM
Serial EEPROM
(Board Configuration Parameter)

3.3V — C363 0.1uF — GND — R262 2.32K — R261 2.32K

18 EEP_CS# — CS
18 EEP_SI — SI
18 EEP_SCK — SCK
WP, HOLD, VCC, VSS, SO — EEP_SO 18

U65 25AA640A-I/SN — GND

Voltage Supervisor and Push-Button Reset

3.3V — C336 0.1uF — GND

2 1.0V_PG — A
2 1.8V_PG — B
VCC, GND, Y — R211 33.2 Ohm — U53 SN74LVC1G08DCK3 — GND

3.3V — R496 10.0K 1/10 W — SW1 B3SN-3012P — GND

M_RESET_L

2.5V, 3.3V — C281 0.1uF, C280 0.1uF, C279 0.1uF — GND

U47 STM6719SYWB6F
VCC1, VCC2, RSTIN, MR#, VSS, RST#

3.3V — R170 10.0K 1/10 W — TP85 TEST_POINT RESET# — RESET# 18

JTAG

3.3V

J5

18 RESET# — H9 DEVRST_N
JTAG_TDO2 — R253 22.1 Ohm — JTAG_TCK F8 — TCK
JTAG_TDI G8 — TDI
JTAG_TDO F6 — TDO
JTAG_TMS F7 — TMS
G7 — TRSTB

FTSH-105-01-L-DV-K-TR — GND — R252 1.00K — GND

3.3V — R255 NI — R254 1.00K — GND

JTAG_TRST

U54-6

BANK-3

RESERVED — H11
IO_CFG_INTF — G9
SPI_EN — H10
SCK — G3
SDI — G10
SDO — G5
SS — G4

3.3V — R530 10.0K
IO_CFG_INTF
SPI_EN
SCK
SDI
SS

R256 10.0K — R258 10.0K — R212 10.0K — R214 10.0K — GND

MPF100T-FCG484E

VARIANT01

FPGA FUNCTIONAL INTERFACE 1

varian

SCALE	NONE
SHEET	18 OF 21

DUAL MOTOR DRIVER

DWG NO	REV
P1060973	C

CM# 000060021264
Released
Ver: 02
Rev: C
16. October 2024

U54-7

BANK-0

W9	HSIO78PB0/CLKIN_N_5	HSIO96PB0	AB3
Y9	HSIO78NB0	HSIO96NB0	AB4
V9	HSIO79PB0	HSIO97PB0	V6
V10	HSIO79NB0	HSIO97NB0	W6
R9	HSIO80PB0/CLKIN_N_4	HSIO98PB0	AA2
R10	HSIO80NB0	HSIO98NB0	AB2
T10	HSIO81PB0/DQS	HSIO99PB0/DQS	Y4
U10	HSIO81NB0/DQS	HSIO99NB0/DQS	Y5
U8	HSIO82PB0	HSIO100PB0	Y3
U9	HSIO82NB0	HSIO100NB0	AA3
T7	HSIO83PB0	HSIO101PB0	V5
T8	HSIO83NB0	HSIO101NB0	W4
AA8	HSIO90PB0	HSIO102PB0/CLKIN_N_3/CCC_NW_CLKIN_N_3	Y1
Y8	HSIO90NB0	HSIO102NB0	AA1
AA7	HSIO91PB0	HSIO103PB0/CCC_NW_PLL1_OUT1	V4
AB7	HSIO91NB0	HSIO103NB0	W3
W7	HSIO92PB0	HSIO104PB0/CLKIN_N_2/CCC_NW_CLKIN_N_2/CCC_NW_PLL1_OUT0	V1
W8	HSIO92NB0	HSIO104NB0	W1
AA5	HSIO93PB0/DQS	HSIO105PB0/DQS/CCC_NW_PLL1_OUT0	V2
AB5	HSIO93NB0/DQS	HSIO105NB0/DQS	W2
Y6	HSIO94PB0	HSIO106PB0/CCC_NW_CLKIN_N_1	U3
AA6	HSIO94NB0	HSIO106NB0	U2
U7	HSIO95PB0	HSIO107PB0/CCC_NW_CLKIN_N_0	U5
V7	HSIO95NB0	HSIO107NB0	U4

MPF100T-FCG484E

U54-8

BANK-1

T17	HSIO42PB1/CCC_NE_CLKIN_N_11	HSIO54PB1	AA10
U17	HSIO42NB1	HSIO54NB1	AB10
V16	HSIO43PB1/CCC_NE_PLL0_OUT1	HSIO55PB1	Y11
W16	HSIO43NB1	HSIO55NB1	AA11
W17	HSIO44PB1/CCC_NE_CLKIN_N_10/CCC_NE_PLL0_OUT0	HSIO56PB1	V12
V17	HSIO44NB1	HSIO56NB1	W12
AB17	HSIO45PB1/DQS/CCC_NE_PLL0_OUT0	HSIO57PB1/DQS	AB8
AA17	HSIO45NB1/DQS	HSIO57NB1/DQS	AB9
AA16	HSIO46PB1	HSIO58PB1	W11
Y16	HSIO46NB1	HSIO58NB1	Y10
T16	HSIO47PB1	HSIO59PB1	U12
R16	HSIO47NB1	HSIO59NB1	V11
Y15	HSIO48PB1/CLKIN_N_9/CCC_NE_CLKIN_N_9	HSIO66PB1/CLKIN_N_7	T15
AA15	HSIO48NB1	HSIO66NB1	R15
W14	HSIO49PB1/CCC_NE_PLL1_OUT1	HSIO67PB1	T13
Y14	HSIO49NB1	HSIO67NB1	U13
AB14	HSIO50PB1/CLKIN_N_8/CCC_NE_CLKIN_N_8/CCC_NE_PLL1_OUT0	HSIO68PB1/CLKIN_N_6	V15
AB15	HSIO50NB1	HSIO68NB1	U15
AA12	HSIO51PB1/DQS/CCC_NE_PLL1_OUT0	HSIO69PB1/DQS	R13
AB12	HSIO51NB1/DQS	HSIO69NB1/DQS	T12
AA13	HSIO52PB1	HSIO70PB1	R12
AB13	HSIO52NB1	HSIO70NB1	T11
W13	HSIO53PB1	HSIO71PB1	V14
Y13	HSIO53NB1	HSIO71NB1	U14

MPF100T-FCG484E

U54-1

XCVR-0

M22	XCVR_0_RX0_P	XCVR_0_TX0_P	P22
M21	XCVR_0_RX0_N	XCVR_0_TX0_N	P21
T22	XCVR_0_RX1_P	XCVR_0_TX1_P	V22
T21	XCVR_0_RX1_N	XCVR_0_TX1_N	V21
W20	XCVR_0_RX2_P	XCVR_0_TX2_P	Y22
W19	XCVR_0_RX2_N	XCVR_0_TX2_N	Y21
AA20	XCVR_0_RX3_P	XCVR_0_TX3_P	AB22
AA19	XCVR_0_RX3_N	XCVR_0_TX3_N	AB21
R19	XCVR_0A_REFCLK_P		
R20	XCVR_0A_REFCLK_N		

MPF100T-FCG484E

U54-2

XCVR-1

A20	XCVR_1_RX0_P	XCVR_1_TX0_P	B22
A19	XCVR_1_RX0_N	XCVR_1_TX0_N	B21
C20	XCVR_1_RX1_P	XCVR_1_TX1_P	D22
C19	XCVR_1_RX1_N	XCVR_1_TX1_N	D21
F22	XCVR_1_RX2_P	XCVR_1_TX2_P	H22
F21	XCVR_1_RX2_N	XCVR_1_TX2_N	H21
L20	XCVR_1_RX3_P	XCVR_1_TX3_P	K22
L19	XCVR_1_RX3_N	XCVR_1_TX3_N	K21
G19	XCVR_1A_REFCLK_P		
G20	XCVR_1A_REFCLK_N		

MPF100T-FCG484E

U54-11

XCVR EXTERNAL REF CLOCKS

U19	XCVR_0B_REFCLK_P	XCVR_1B_REFCLK_P	J19
U20	XCVR_0B_REFCLK_N	XCVR_1B_REFCLK_N	J20
N19	XCVR_0C_REFCLK_P	XCVR_1C_REFCLK_P	E19
N20	XCVR_0C_REFCLK_N	XCVR_1C_REFCLK_N	E20

MPF100T-FCG484E

CM# 0000600021264

Released

Ver: 02

Rev: C

16, October 2024

FPGA FUNCTIONAL INTERFACE 2

VARIANT01

varian

SCALE	NONE
SHEET	19 OF 21

DUAL MOTOR DRIVER

DWG NO	REV
P1060973	C

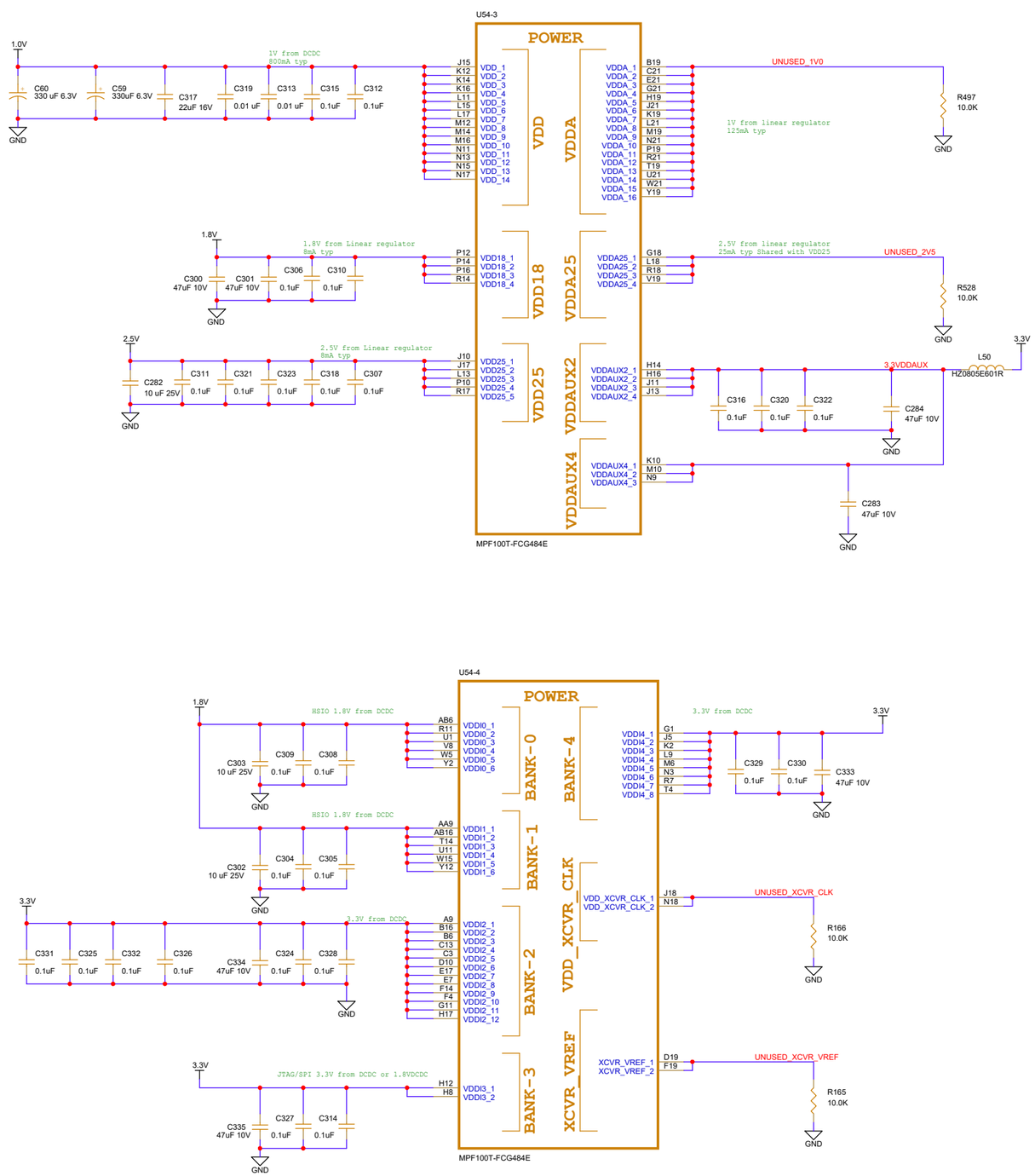
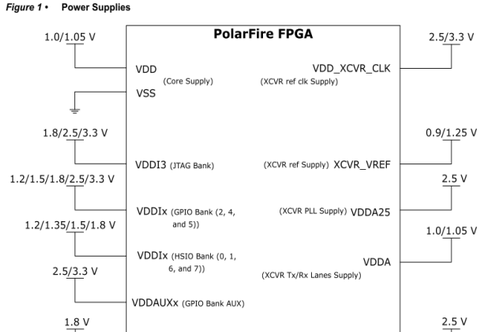


Figure 1 • **Power Supplies**



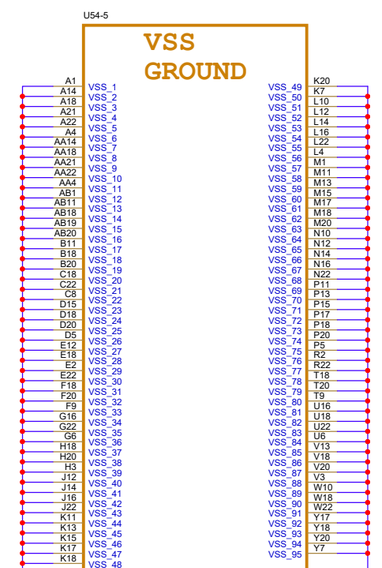


Table 12 • **Power-Supply Decoupling Capacitors—MPF100T - FCG484 (1 mm)**

	Ceramic							Tantalum
Pin Name	**4.7 nF**	**10 nF**	**0.1 µF**	**1 µF**	**4.7 µF**	**10 µF**	**47 µF**	**330 µF**
V_{DD}		2	2					1
V_{DD18}			2				2	
V_{DD25}			5			1		
V_{DDA}	3	1	6				1	
V_{DDA25}			4				1	
V_{DDIO3}			2			1		
V_{DDAUXx}[1]			2				1	
GPIO Bank[2]			2				1	
HSIO Bank[3]			2				1	
VDD_XCVR_CLK			2			1		
XCVR_VREF			2					

1. Required Decoupling Capacitor for each VDDAUXx.
2. Required Decoupling Capacitor for each GPIO bank.
3. Required Decoupling Capacitor for each HSIO bank.

FPGA POWER INTERFACE

VARIANT01

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SCALE	NONE
SHEET	20 OF 21

DUAL MOTOR DRIVER

DWG NO	REV
P1060973	C

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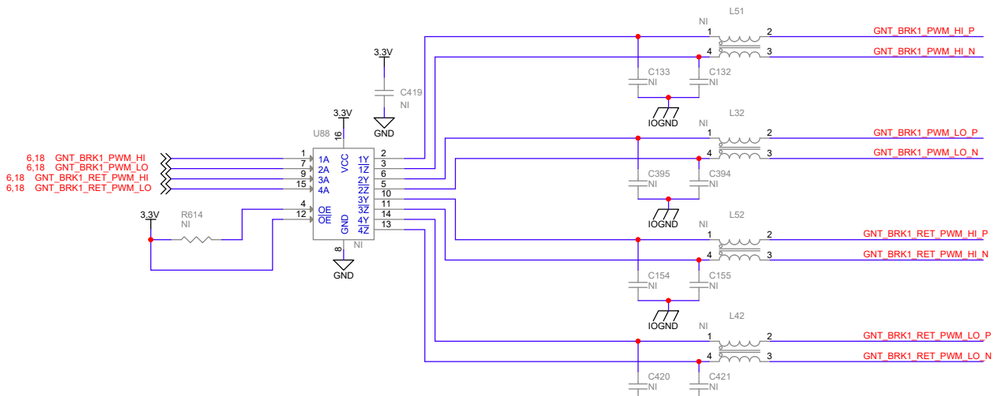
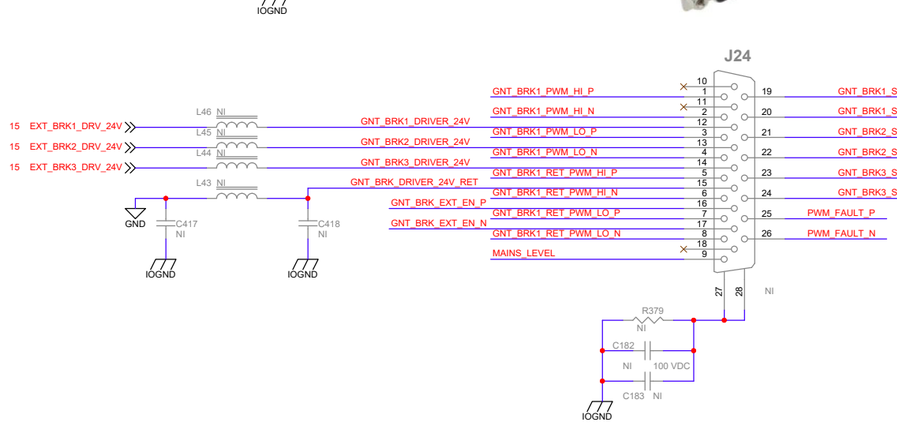
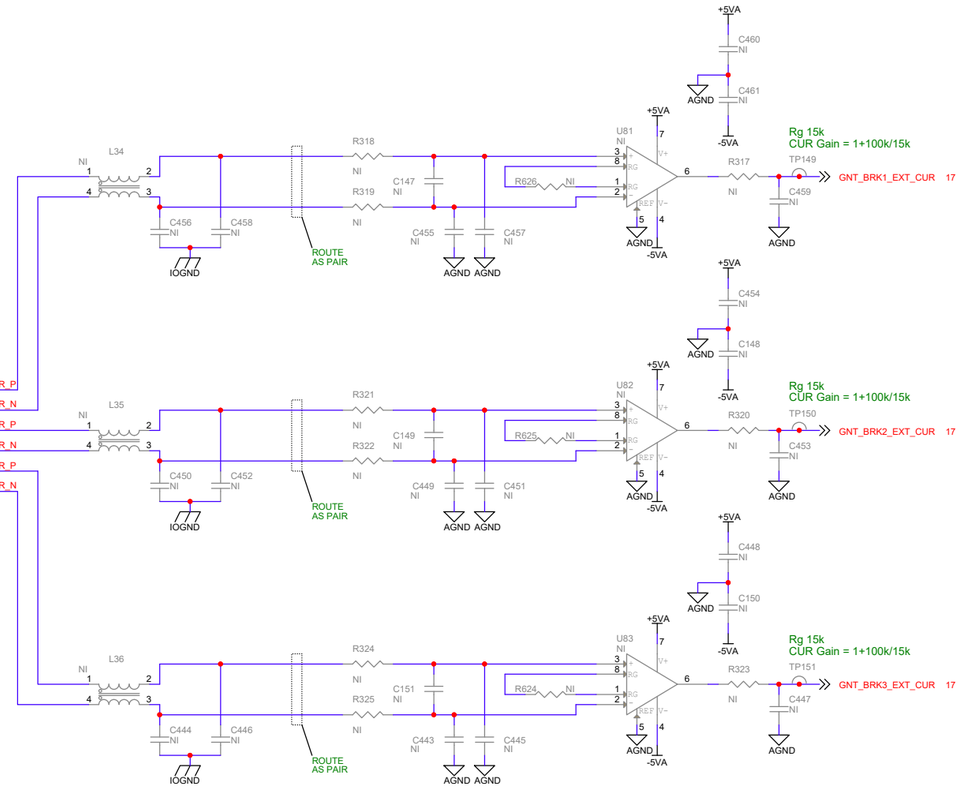
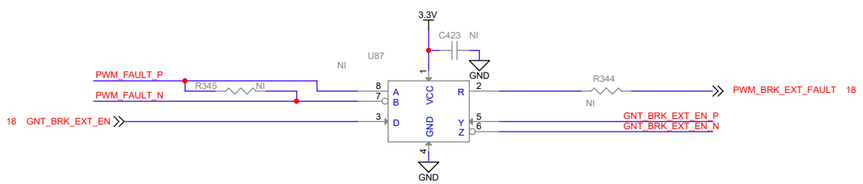
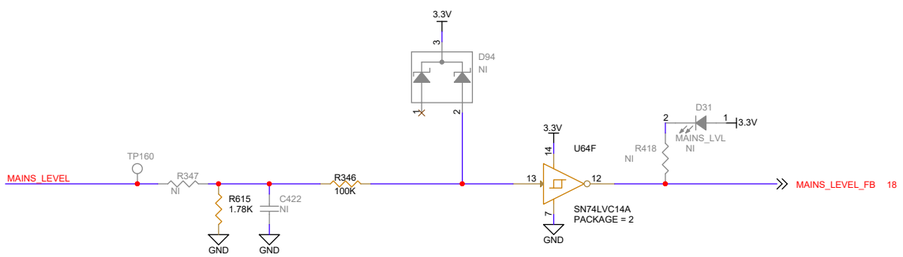
FOR POSSIBLE FUTURE USE.











EXTERNAL BRAKE DRIVER IF

VARIAN	SCALE NONE
	SHEET 21 OF 21
DUAL MOTOR DRIVER	
DWG NO P1060973	REV C

CM# 0000600021264
Released
Ver: 02
Rev: C
16. October 2024

Signature File

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A Siemens Healthineers Company

Document: P1060973/SCH/000/02
Description: SCH, DUAL MOTOR DRIVER

Change Master Number: 60021264
ECN Number: 200109890
ECN Description:

Signature list

Date	Time	User	Status
16, October 2024	18:26:12	Gary Yen	Released
11, October 2024	21:39:08	Rami Abdelmotalib	Approved
11, October 2024	16:39:32	Kevin Greenberg	In Eng Approval
10, October 2024	23:20:20	Gary Yen	In Checking
10, October 2024	23:20:02	Gary Yen	In Drafting
10, October 2024	23:07:38	Gary Yen	In Works