D38 and D39 for DB9 Loopback

TP1
GND
R8 1R0
D38
To Flow Metter(s)
C2 39PF
J1 DB9_Female_MountingHoles
C1 39PF
D39
I2C_LevelShift
+12forSPIPeripherial
+5LevelShift
+3V3LevelShift
SDA_5V
SCL_5V
SDA_3.3V
SCL_3.3V
File: I2C_Level_Shifter.kicad_sch
SPI_ControllerLevel_Shifter
SCK_3V3
COPI_3V3
CIPO_3V3
COPI_nCS
File: SPI_ControllerLevel_Shifter.kicad_sch
R77 4K7
R78 4K7
SDA1
SCL1
S1 SWITCH_TACTILE_SPST-NO_0.05A_24V
SPI_nRST
CIPO1
SPI_SCK1
COPI1
J2 Conn_01x08
D_PSU_TX1
D_PSU_RX1
D_PSU_RX
D_PSU_TX
MISO
MOSI
SCK
RST2
5V2
GND4
SPI_MISO
SPI_MOSI
SPI_SCK
SPI_RESET
SPI_5V
SPI_GND
SPI
A1 Arduino_Due_Shield
Serial
I2C
CAN
Analog
Misc.
Power
GPIO
PWM
J6 Conn_01x08
ONE_WIRE_TC
nFAN1_PWM
J7 Conn_01x10
BLOWER_ENABLE
nCS_GPAD
TC_nCS2
J8 Conn_02x18_Odd_Even
5VHead
TC_nCS1
TC_nCS3
LOOPBACK25
LOOPBACK13
SSR_PWM
D52
D53
J5 Conn_01x08
BLOWER_TACH
J4 Conn_01x08
R76 1R0
VIN1
PWR_FLAG
J3 Conn_01x08
R79 1R0
R80 1R0
J25 Screw_Terminal_01x02
Remote Sense
Power supply control
J9
J10 Conn_02x12_Odd_Even
J14
Conn_01x10
R13 1R0
R14 1R0
R15 1R0
R16 1R0
SDA
SCL
D_PSU_RX
D_PSU_TX
PS_SDA
PS_SCL
NULL MODEM here.
Power supply header Pins and Signals
Pin #	**Function**	**Description**	**Pin #**	**Function**	**Description**
1	VS+	Remote Sense (+)	13	ACI	I Program
2	VO+	Positive Output Voltage	14	GND	Ground
3	VS-	Remote Sense (-)	15	VCI	V Program
4	VO-	Negative Output Voltage	16	GND	Ground
5	POK	Power OK	17	AUX	+5V/0.5A or +9V/0.3A Auxiliary Power
6	GND	Ground	18	GND	Ground
7	PAR	Parallel operation current share	19	SCL	Serial Clock I2C
8	VSET	Aux output setting	20	SDA	Serial Data I2C
9	EN-	Inhibit ON/OFF(-)	21	GND	Ground
10	GND	Ground	22	GND	Ground
11	EN+	Inhibit ON/OFF (+)	23	RX	For RS232 Receiver function
12	AUX	+V/0.5A or +9V/0.3A Auxiliary Power	24	TX	For RS232 Transmitaion function

THERMOCOUPLE BLOCK
One Wire Thermocouple amplifiter and Interface
DATA is bidorectional on the Due GPIO
Thermocouple Amplifier with 1-Wire Breakout Board - MAX31850K
DATA
+5V_MAX31850K
+3V3_MAX31850K
File: Adafruit-MAX31850-thermocouple-breakout-board.kicad_sch
Thermocouple Amplifier SPI Interface breakout board - MAX31855
R5 1R0
R6 1R0
R7 1R0
R3 1R0
R1 1R0
SCK
DO
+5V_MAX31855
+3V3_MAX31855
nCS_1
nCS_2
nCS_3
File: Adafruit-MAX31855-breakout-board.kicad_sch
Thermocouple Amplifier I2C breakout board - MCP9600
+3.3V_MCP9600
R4 1R0
R2 1R0
SDA
SCL
File: Adafruit-MAX31856-PCB-master.kicad_sch
H1 MountingHole_Pad_3.5mm
H2 MountingHole_Pad_3.5mm
H3 MountingHole_Pad_3.5mm
H4 MountingHole_Pad_3.5mm
H5 MountingHole_Pad_3.5mm
ISO1 MountingHole_Pad_3.5mm
ISO2 MountingHole_Pad_3.5mm
ISO3 MountingHole_Pad_3.5mm
ISO4 MountingHole_Pad_3.5mm
ISO5 MountingHole_Pad_3.5mm
R32 4M7
C22 10nF
SSR Interface (Solid State Relay)
HEATER the Due output sets high to switch AC power to enable preheaters
Heater_SSR_High passes +5V through to the SSR.
Heater_SSR_High goes low, conducts, to turn on SSR when HEATER is asserted high.
Blower Controller Signals
FAN_POWER the Due output sets high to enable power to the blower.
FAN1_FG is the Due input gets tachometer signal. Two low going edeges per revoluion.
nFan1_PWM is negative aserted PWM to control blower speed.
Due pin 22
Blower controller
R10 1R
R11 1R
R12 1R
R91 1R
R92 1R
BLOWER_ENABLE
BLOWER_TACH
nFAN1_PWM
LOOPBACK25
LOOPBACK13
FAN_POWER
FAN1_FG
nFAN1_PWM
LOOPBACK25
LOOPBACK13
+24VFan
+5VFan
+3.3VFan
File: Fan controller.kicad_sch
SSR Interface
+24V_SSR
+12V_SSR
Heater
Heater_SSR_High
Heater_SSR_Low
R9 1R
File: SSR Interface.kicad_sch
J11 To chassis mounted +12V.
Screw_Terminal_01x02
J12 To chassis mounted +24V.
J13 To SSR control.
MF1 PCB RAW
MF2 PCB RAW
MF3 PCB RAW
MF4 PCB RAW
PCB_BKT_OEDCS_01
PCB_BKT_OEDCS_01
Stacking Headers Pins Kit
PCB_OEDCS_Control_Ver_0.1

Each board will be addressed by parts on our main board.
The daughter boards will need the addressing traces CUT.

UNIT 1 will have all three amplifiter boards as subaddress 0x00
UNITs beyound will have subaddress as 0x01, 0x02 and 0x04.

Three Adafruit-MAX31850-thermocouple
Thermocouple Amplifier with 1-Wire Breakout Board - MAX31850K

TP5 +VccMAX31850

R82
1R0
+3V3_MAX31850K

R17
DNI
+5V_MAX31850K

+VccMAX31850

Subaddress: 0x01
A0 Hi
A1 Low
A2 Low
A3 Low

JP1 SolderJumper-3_Bridged12
JP2 SolderJumper-3_Bridged12
JP3 SolderJumper-3_Bridged12
JP4 SolderJumper-3_Bridged12

R18 1K
R19 1K
R20 1K
R22 1K

TP6 +VccMAX31850_1

JP9 MAX31850K
DATA

GND

Subaddress: 0x02
A0 Low
A1 Hi
A2 Low
A3 Low

JP5 SolderJumper-3_Bridged12
JP6 SolderJumper-3_Bridged12
JP7 SolderJumper-3_Bridged12
JP8 SolderJumper-3_Bridged12

R21 1K
R23 1K
R24 1K
R25 1K

TP7 +VccMAX31850_2

JP10 MAX31850K

R83
4K7

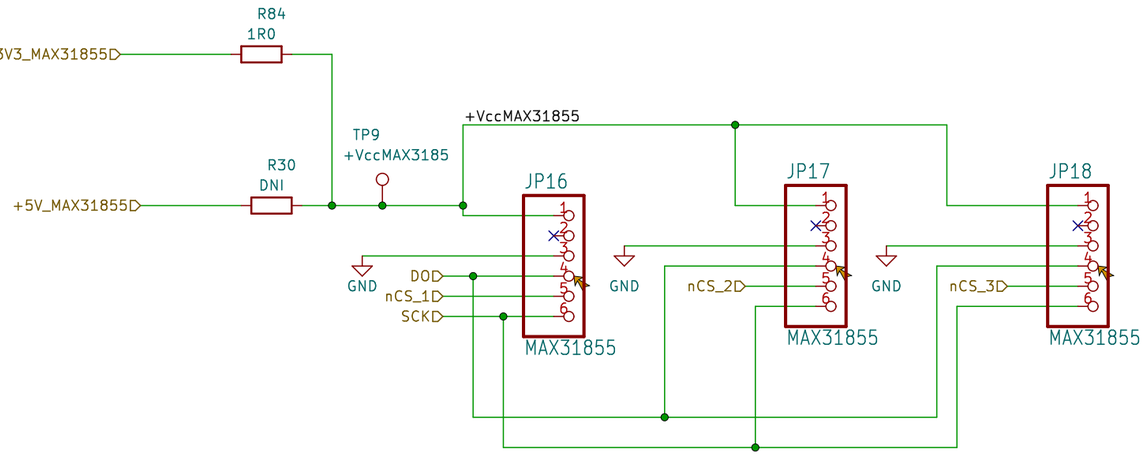
Subaddress: 0x04
A0 Low
A1 Low
A2 Hi
A3 Low

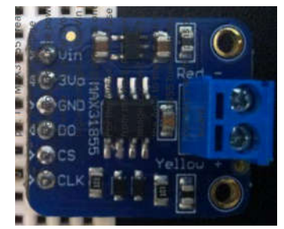
JP11 SolderJumper-3_Bridged12
JP12 SolderJumper-3_Bridged12
JP13 SolderJumper-3_Bridged12
JP14 SolderJumper-3_Bridged12

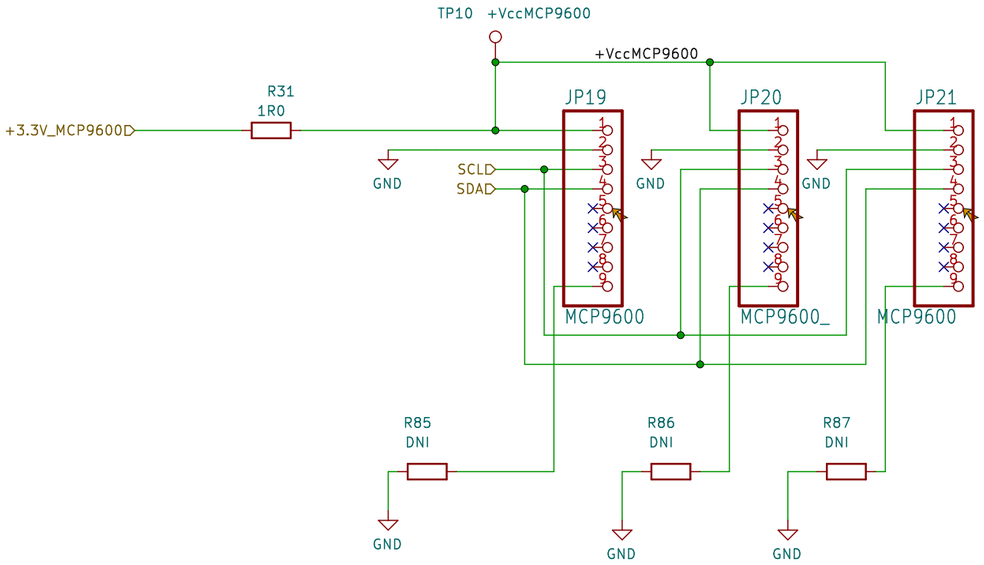
R26 1K
R27 1K
R28 1K
R29 1K

TP8 +VccMAX31850_3

JP15 MAX31850K

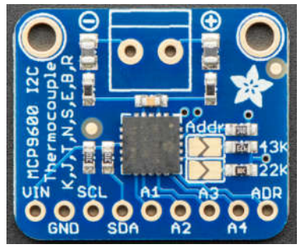

R84
1R0
+3V3_MAX31855
TP9
+VccMAX3185
+VccMAX31855
R30
DNI
+5V_MAX31855
JP16
JP17
JP18
GND
DOD
nCS_1D
SCKD
GND
nCS_2D
GND
nCS_3D
MAX31855
MAX31855
MAX31855

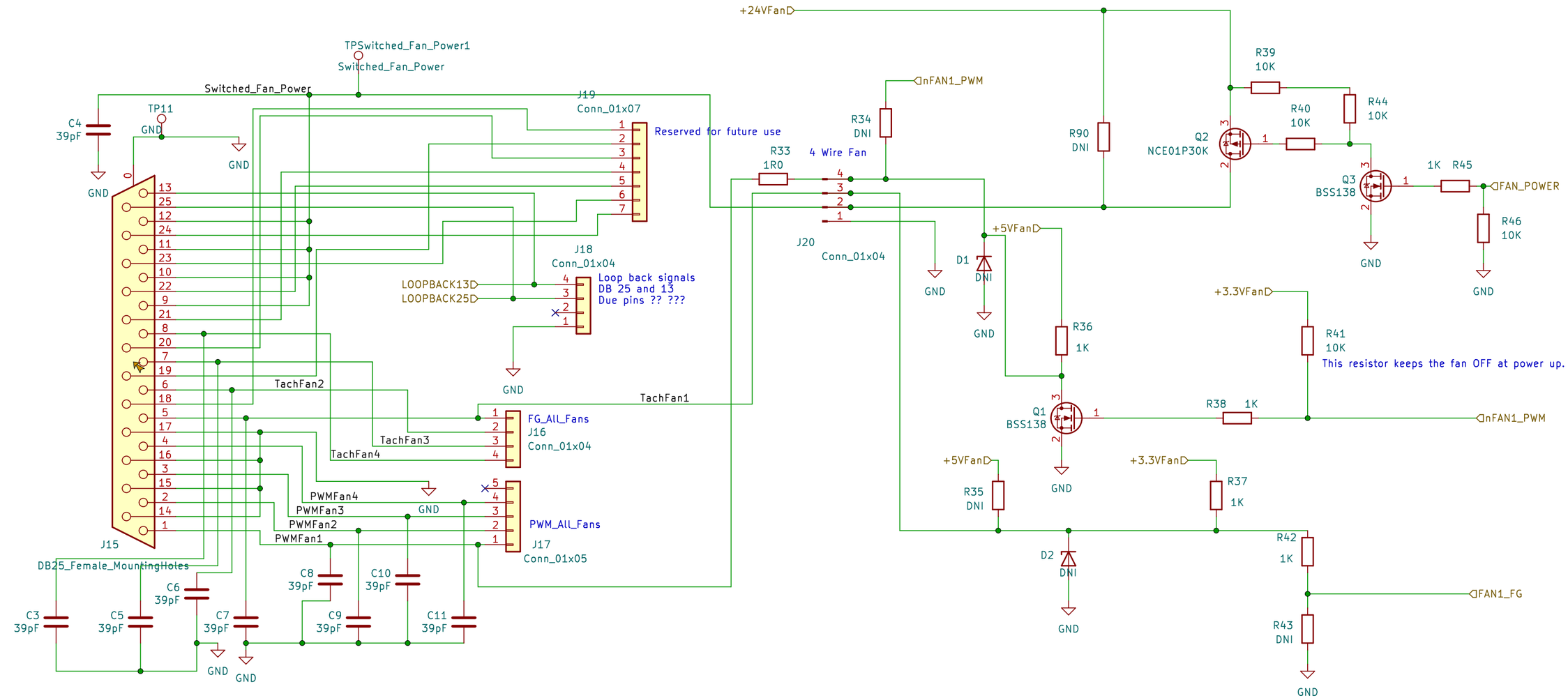

Vin
3Vo
GND
DO
CS
CLK
MAX31855
Red +
Yellow -



TO DO:
Solder on the modules directly to set subaddress.
Default is 0x67.

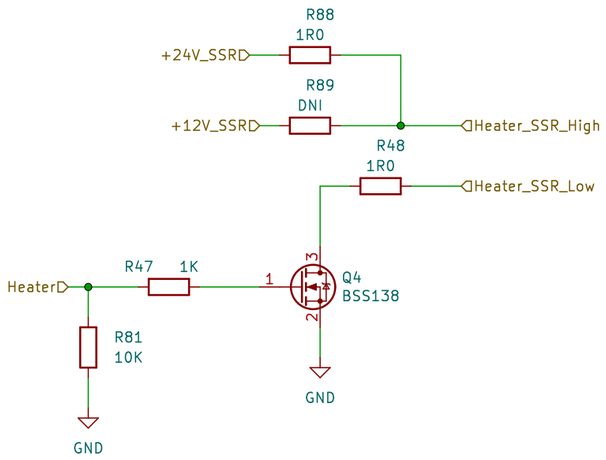
MCP9600 Pin Descriptions
1 Vin
2 GND
3 SCL
4 SDA
5 Alert 1
6 Alert 2
7 Alert 3
8 Alert 4
9 ADR





Unit 1 Wring Notes:

Fan Breakout	Signal-Function	DB25 MALE Pin #	DB25 FEMALE Pin #	Other	Due Pin	Due Signal
1	+24V Switched (fans)	2-5	9-12		???	FAN_POWER
2	GND for all fans	22-25	14-17		GND	NA
3	#1 PWM	13	1	J10-1	D9	nFAN1_PWM
4	#1 Tach	9	5	J9-1	A0	FAN1_FG
5	#2 PWM	12	2	J10-2		nFAN2_PWM
6	#2 Tach	8	6	J9-2		FAN2_FG
7	#3 Tach	11	3	J10-3		nFAN3_PWM
8	#3 PWM	7	7	J9-3		FAN3_FG
9	#4 Tach	10	4	J10-4		nFAN4_PWM
10	#4 PWM	6	8	J9-4		FAN4_FG
			25	J11-3		
			13	J11-4		
			18	J12-1		
			19	J12-2		
			20	J12-3		
			21	J12-4		
			22	J12-5		
			23	J12-6		
			24	J12-7		


R88
1R0
+24V_SSR
R89
DNI
+12V_SSR
Heater_SSR_High
R48
1R0
Heater_SSR_Low
R47
1K
Heater
1
3
2
Q4
BSS138
R81
10K
GND
GND

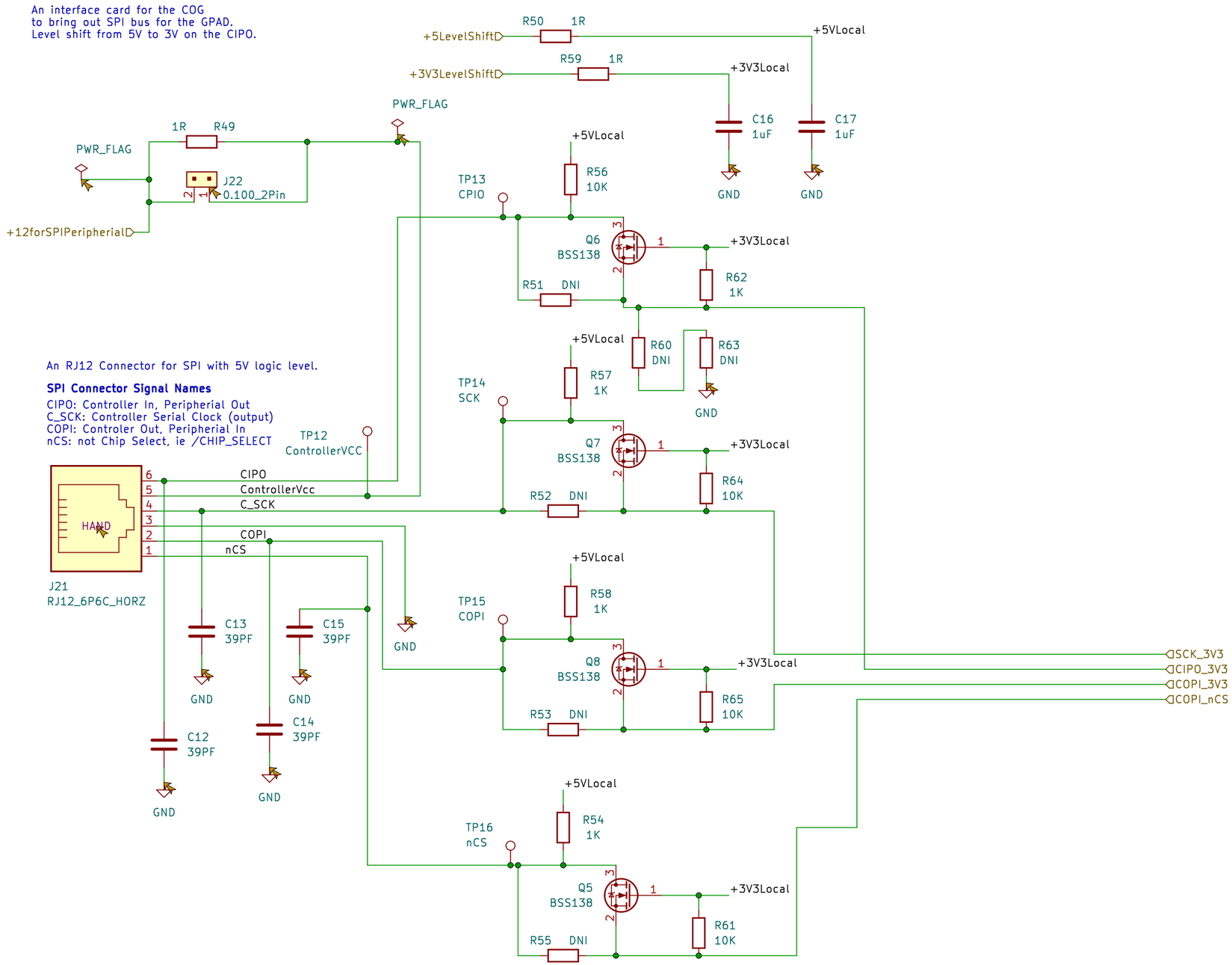
SPI 3V3 to 5V Controller Interface

An interface card for the COG
to bring out SPI bus for the GPAD.
Level shift from 5V to 3V on the CIPO.

An RJ12 Connector for SPI with 5V logic level.

SPI Connector Signal Names

CIPO: Controller In, Peripherial Out
C_SCK: Controller Serial Clock (output)
COPI: Controler Out, Peripherial In
nCS: not Chip Select, ie /CHIP_SELECT



Bring out I2C bus through bidirectional level shifters.

+3V3LevelShift
R66 1R
+3V3Local
C18 1uF
GND

+5VLocal
R69 10K
+3V3Local
R67 10K
Q9 BSS138

SCL_3.3V

SDA_3.3V

+5VLocal
R70 10K
+3V3Local
R68 10K
Q10 BSS138

+5VLocal
C19 1uF
GND
TP17 I2C_VCC
R73 1R
R74 DNI
R75 DNI
+5LevelShift
+12forSPIPeripherial
J23 0.100_2Pin

Power to I2C interface, 5V or 12V.

I2C Connector Signal Names
SCL_5V: Serial Clock at 5V
SDA_5V: Serial Data at 5V

TP18 SCL_5V
R71 39R
R72 39R
SDA_5V TP19
I2C_VCC
SCL_5V
SDA_5V
J24 Conn_01x04
GND
C20 39PF
C21 39PF
GND
GND

SCL_5V
SDA_5V