OpenInverter_Mini_Mainboard—openinverter_mini_mainboard

U1

GND	CANH		CANH +
+12V	CANL		CANL −
+5V	URX		USART_RX
CRUISE*_(SJ3)_MOSI(3.3v)	UTX		USART_TX
SIG_START*	DESAT		DESAT
SIG_BRAKE*	PWM1P		PWM1P
SIG_FORWARD*	PWM1N		PWM1N
SIG_REVERSE*	PWM2P		PWM2P
SIG_EMCYSTOP*	PWM2N		PWM2N
SIG_BMS*	PWM3P		PWM3P
THROTTLE2*	PWM3N		PWM3N
THROTTLE1*	R2		R2
MTEMP−	R1		ENC_Z/R1
MTEMP+	A_S2		ENC_A/S2
OUT_PRE	B_S3		ENC_B/S3
OUT_DCSW	S1S4		SIN/S1&COS/S4
SCK/OUT_ERR	TMPHS/T_SINK		T_SINK
MISO/_Board_address_/_OUT_BRAKE	UDC		U_DC−LINK
CS_ADC/OUVTG	IL1		IL1
PWM_USER/OUT_TEMP	IL2		IL2

12v*   0−6.6V°   v2

PWR_FLAG

Board Address / Out_Brake

Nissan External Inverter Connection
J2 Conn_02x20_Top_Bottom_MountingPin

100nF C7
SMAJ15CA−TP D3
+12VSW
PRE
OUT_ERR
*SIG_START *
*SIG_FORWARD *
*SIG_REVERSE *
EXT_OUT_BRAKE
THROTTLE2 •
CANH +
CANL −
OUT_OUVTG
ENC_B/S3
ENC_A/S2
OUT_TEMP
ENC_Z/R1

DCSW
CRUISE* / MOSI
SIG_BRAKE *
MTEMP+
SIG_BMS *
MTEMP−
THROTTLE1 •
was SIG_EMCYSTOP (incorrect)
S1   S1   SIN/S1&COS/S4
S4   S4
R2   was R1 (incorrect)

C17 10uF

TMPHS AKA T_SINK
PWM_USER / was R2 (incorrect)

Nissan Internal Inverter Connection To Power Stages
J1 Conn_02x16_Top_Bottom_MountingPin

WAS I_PH1
I_PH2
R3 0R
R9 0R
IL1
IL2
R2 0R
C5 10uF
R4 0R
T_SINK
R13 3K3
U_DC−LINK
PWM2P
PWM2N
IGBTDRV_FAULT
IGBTDRV_UVLO

Was:
P1G PWM1P
N3G PWM3N
P3G PWM3P
N1G PWM1N

WAS:
P2G
N2G

C6 10uF
C8 100nF
SMAJ15CA−TP D10

Verify R13 with Nissan temp sensor range

SJ5 SolderJumper_2_Bridged
12v E−Stop can be bypassed by shorting this solder jumper (SJ5). Leave jumper open to use external e−stop with +12v as signal when in run mode.

SIG_EMCYSTOP *
C18 1uF

D7 D
D8 D
R5 3K3
R12 4k7
R10 470R
D9 LM3Z3V3T1G
IGBTDRV_FAULT
IGBTDRV_UVLO
DESAT

U6 ESP32−S2−WROOM

GND	IO35	
	IO34	
	IO33	
	IO32	
	IO27	
	IO26	
	IO25	
SCS/CMD	IO23	
SCK/CLK	IO22	
SWP/SD3	IO21	
SHD/SD2	IO20	
SDI/SD1	IO19	
SDO/SD0	IO18	
	IO17	
	IO16	
	IO15	
	IO13	
	IO12	
	IO5	
	IO4	
SENSOR_VN	RXD0/IO3	
SENSOR_VP	TXD0/IO1	
EN	IO0	
	VDD	

Board Address / Brake Output

Note 5.3V for voltage divider calcs
4K7 = GEN 3 LEAF BOARD

TP_A1 TestPoint MISO
R15 47K 1%
R18 4k7 1%
SJ4 SolderJumper_2_Bridged
D11 LM3Z3V3T1G
D12 D_Zener
R1
TP_GND1 TestPoint

Cut SJ4 jumper to disconnect brake output. Verify brake circuitry doesn't change board address voltage!

+ OUT BRAKE LIGHT SIGNAL
U3 TPS22810DBVR
VIN VOUT
GND QOD
EN/UVLO CT
C9 1uF
EXT_OUT_BRAKE
+12v ~1.5A ▲
R6 DNP
D13 SMAJ15CA−TP
C10 DNP

Q3, Q4, Q5 OUTPUTS, SWITCHED GROUNDS ~1A

OUT_OUVTG
Q5 IRLML0100TRPBF
R16 10K
CS_ADC
OUT_ERR
Q4 IRLML0100TRPBF
SCK
R14 10K
C11 100nF
EMI
C12 1uF
UV1 TestPoint
SJ6 Jumper_3_Open
R19 DNP
PWM_V
PWM_USER_OP
PWM_USER
Q3 IRLML0100TRPBF
R11 10K
OUT_TEMP
5.3V1 TestPoint

CAN ESD & Termination Resistors
D6 SP0502BAHT
R22 60R4 .1% .25W SJH1 SolderJumper_2_Open
R23 60R4 .1% .25W SJL1 SolderJumper_2_Open
CANH +
CANL −
C16 4.7nF
Solder both jumpers to enable a CAN 120 ohm resistor. Needs equal (accurate) resistors to keep from diminishing noise reduction.

DCSW
Q1 Q_NMOS_GDS
D1 D_Zener
OUT_DCSW
R7 10K
C3 100nF
D4 MM1Z3B3

PRE
Q2 Q_NMOS_GDS
D2 D_Zener
OUT_PRE
R8 10K
C4 100nF
D5 MM1Z3B3

Pre Charge and Main Contactor mosfets (switches on grounds for contactors.) No economizer circuitry built in here. Likely Nissan connector is the amperage limiting factor at 4.5A.

BOOT DELAY
C13 1uF
R25 10K
L2 10uH 1.15OHM
C14 1uF
C15 10uF T
PWR_FLAG
+3.3VP
J8 Conn_01x03_Male
JP8 Jumper_3_Open
+5V
+3.3VP
Conn_01x06_Male J4
USART_RX
USART_TX
ESP32 PROGRAMMING

U2 AP1117−33
VI VO
GND
C1 1uF
C2 1uF
TP_GND2 TestPoint
Conn_02x05_Odd_Even J3
USART_TX
USART_RX

R24 499R
to suppress 80 MHz harmonics

FID1 Fiducial
FID2 Fiducial
FID3 Fiducial
H5 MountingHole
H6 MountingHole
H1 MountingHole_Pad
H2 MountingHole_Pad
H3 MountingHole_Pad
H4 MountingHole_Pad

* = 12V Signal
° = 0−6.6V Signal
□ = Switched −
▲ = Switched +12v

Revisions
File: Revisions.kicad_sch

Sheet: /
File: Gen 3 Leaf Adapter.kicad_sch

Title: Gen 3 Nissan Leaf Mini Mainboard Adapter

Size: A4	Date: 2023−10−05	Rev: V0.0.2
KiCad E.D.A. kicad (6.0.5)		Id: 1/2

V0.0.1 — Removed 10k resistor between SJ5 and SIG_EMCYSTOP. Would have prevented ESTOP signal from going high with mini mainboard resistor divider circuit.
Corrected mini mainboard symbol voltage on throttle input to 0–6.6v (V2 bottom right corner,) also corrected in notes.