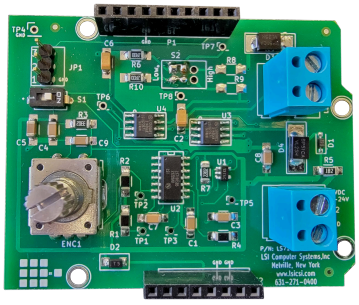
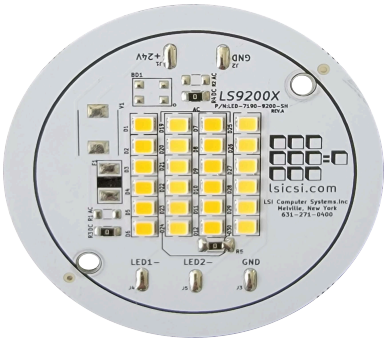




LS7190-9200-SH

LS7190 and LS9200 development kit for Arduino

LS7190-9200-SH is a circuit board designed to facilitate the evaluation and application of LS9200, a CMOS LED engine in conjunction with LS7190, a CMOS digital potentiometer with SPI interface. The circuit can be operated in stand alone mode with an on-board mechanical quadrature encoder or remotely with an Arduino board. The combination of LS7190 and LS9200 in a single design highlights each device's application potential although each device can be designed into applications without the other.

LS7190-LS9200-SH contains two LS9200 devices to drive two separate banks of LEDs, available separately in part number LS9200X, a rectangular array of two independent banks of LEDs. The LED banks can be dimmed together synchronously in the same direction wherein both LED banks brightens or dims in lockstep. The two LED banks can also change brightness in reverse directions with respect to each other wherein the brightness' are complements of each other. The reverse dimming facilitates changing of color of total light output when different color LEDs are used in the two LED banks such as in LS9200X.

Arduino mode.
Jumper JP1: 3-2 closed, 1-2 open
Switch S1: closed.
Software is provided for Arduino Uno for the following functions:

1. Set LED brightness levels to any of 64 discrete levels.
2. Synchronous dim. Sweep the brightness of two banks of LEDs up and down in lock step between a minimum and maximum.
3. Reverse dim. Sweep the brightness of two banks of LEDs as complements of each other with constant total lumen output but with varying color.

Standalone mode.
Jumper JP1: 1-2 closed, 3-2 open
In standalone mode the encoder ENC1 controls the brightness of the two banks of LEDs in the following configurations.

1. Switch S1 closed: Synchronous dim. Turning ENC1 in CW or CCW causes the brightness of the two banks of LEDs step up or step down synchronously.
2. Switch S1 open: Reverse dim. Turning ENC1 in CW or CCW causes the brightness of the two banks of LEDs step up or step down as complements of each other.

In both modes switch S2 selects between 70mA and 150mA of load current. When designing a LED string the dissipation, Pl per LED driver must be limited to a maximum of 1.5W.
Example. (See fig 2 for reference)
Iled = 70mA, LED string supply voltage = 120V, Each LED forward drop = 6V
Voltage at U4-6 = Vr = 20Ω x 70mA = 1.4V
Maximum voltage at U4-7 = Vl = Vr + 1.5W/70mA = 1.4V + 21.4V = 22.8V
Number of LEDs in string = (120V – 22.8V)/6V = 16

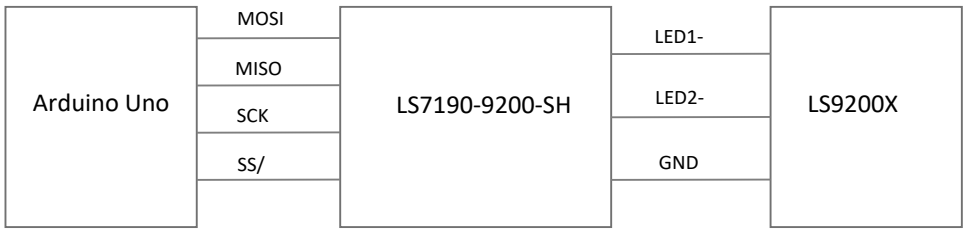
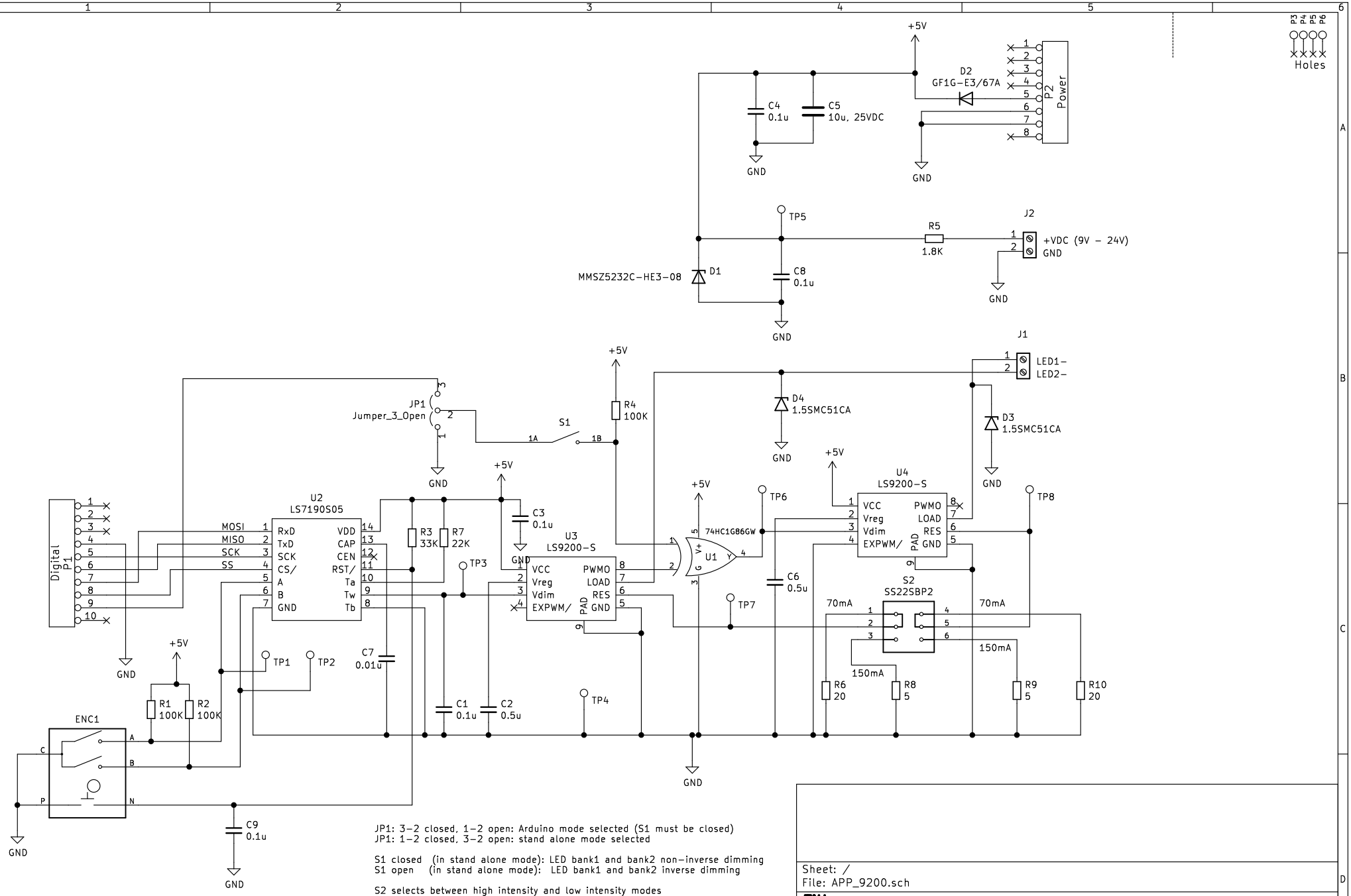
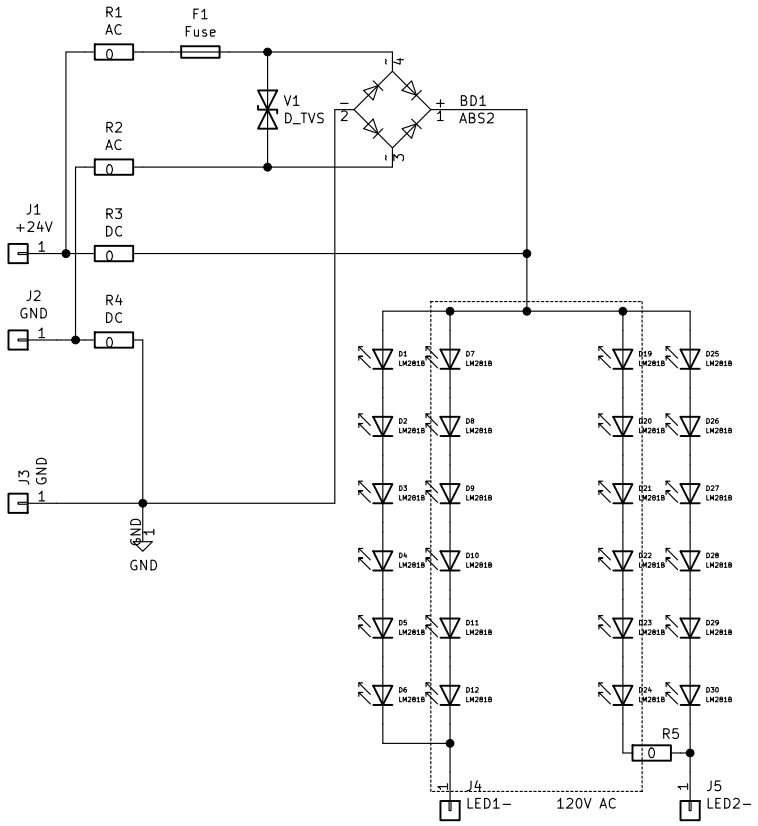


Fig 1. PCB connections


+5V
D2
GF1G-E3/67A
P2
Power
C4
0.1u
C5
10u, 25VDC
GND
TP5
R5
1.8K
J2
+VDC (9V - 24V)
GND
MMSZ5232C-HE3-08
D1
C8
0.1u
P3
P4
P5
P6
Holes
J1
LED1-
LED2-
D4
1.5SMC51CA
D3
1.5SMC51CA
JP1
Jumper_3_Open
S1
R4
100K
U4
LS9200-S
VCC
Vreg
Vdim
EXPWM/
PWMO
LOAD
RES
GND
PAD
TP8
TP6
74HC1G86GW
U1
U2
LS7190S05
RxD
TxD
SCK
CS/
A
B
GND
VDD
CAP
CEN
RST/
Ta
Tw
Tb
MOSI
MISO
SCK
SS
Digital
P1
R3
33K
R7
22K
C3
0.1u
U3
LS9200-S
TP3
C6
0.5u
TP7
S2
SS22SBP2
70mA
150mA
R6
20
R8
5
R9
5
R10
20
TP1
TP2
C7
0.01u
R1
100K
R2
100K
ENC1
C1
0.1u
C2
0.5u
TP4
C9
0.1u
JP1: 3-2 closed, 1-2 open: Arduino mode selected (S1 must be closed)
JP1: 1-2 closed, 3-2 open: stand alone mode selected
S1 closed (in stand alone mode): LED bank1 and bank2 non-inverse dimming
S1 open (in stand alone mode): LED bank1 and bank2 inverse dimming
S2 selects between high intensity and low intensity modes
For Iled = 70mA, maximum voltages at J1-1 and J1-2 must be limited to 22V.
For Iled = 150mA, maximum voltages at J1-1 and J1-2 must be limited to 10V
Sheet: /
File: APP_9200.sch
Title: Remote Dimmer
Size: A4
Date: lun. 30 mars 2015
Rev:
KiCad E.D.A. kicad (5.1.10)-1
Id: 1/1



LS9200X

LSI/CSI

Sheet: /
File: 24V/120V LED

Title:24V–120V LED

Size: A4	Date: 2022-2-2	**Rev: A**
LSI/CSI a Semiconductor Company		Id: 1/1