LCD Backlight Driver

Model
LS460-RH

RoHS
COMPLIANT

12 Volt Input
Dual Tube CCFT Inverter
Brightness Control

Physical Specifications*

Dimensions:	20mm x 120mm x 9.5mm (0.787" x 4.72" x 0.374")
Weight:	20g (0.704 oz)
Operating Temp:	0 to 55°C, convection cooling
Relative Humidity:	20% to 90%, non-condensing
Storage:	-20 to 85°C/5-95% RH
Impact Resistance:	50G half wave per 2 msec
Vibration Resistance:	10-55-10 Hz/min @ 1.5mm

Input Specifications

Item	Condition	Standard

Input Voltage
  Rated
  Tolerance
	—
	Continuous Operation
	Starting Condition (Discharge Starting Voltage)
		12 Vdc
		10.8 Vdc - 13.2 Vdc
		10.8 Vdc - 13.2 Vdc

Max. Input Current	V_{IN} = 10.8 Vdc Luminance @ Max.	0.65A
Input Current	Control Terminal H = V_{IN} V_{IN} = 13.2 Vdc	3.0 μA (Lamp Off)
Max. Rush Current	V_{IN} = 13.2 Vdc Luminance @ Max.	3.0 Azero-p/0.3 ms
Max. Input Power	V_{IN} = 12 Vdc Luminance @ Max.	7.0W
Control Terminal Input Current	Control Terminal L = 0.0 - 0.4 Vdc V_{IN} = 13.2 Vdc Control Terminal H = Open	I_{LOW} = -0.4mA over (Lamp Lighting) — (Lamp Off)

*Above specifications occur @ 25 ± 5°C.

Output Specifications*

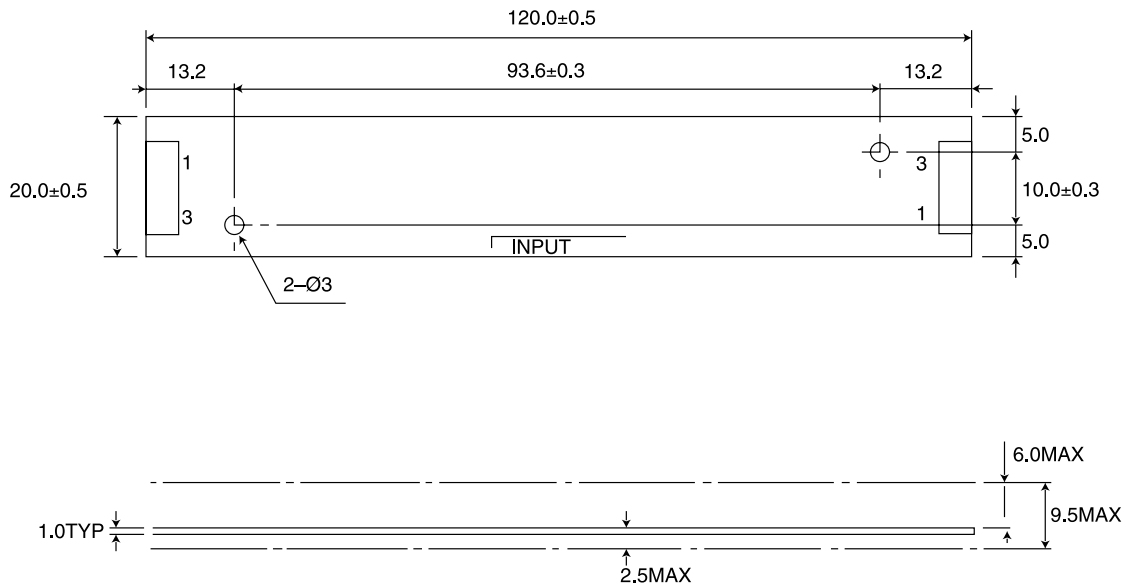| Item	Condition	Standard		
		MIN	**TYP**	**MAX**
Output Voltage (Vrms)	V_{IN} = 12.0 Vdc	—	1300	—
Tube Current (mArms)	Vcont = 0.0 V Vcont = 2.5 V	4.2 —	4.7 2.4	5.2 —
Max. Power Output (W)	V_{IN} = 12 Vdc/Luminance @ Max.	—	—	5.5
Ignition Frequency (kHz)	Luminance @ Max.	—	47	—
DC/DC Converter Frequency (kHz)	Luminance @ Max.	—	90	—

*Above specifications occur @ 25 ± 5°C & V_{IN} = 10.8 - 13.2 Vdc.

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Insulating Withstand Voltage

Item	Rating Description	
Insulating Withstand Voltage	Primary - Secondary	1.5 KVa Impulse
Insulating Resistance	Primary - Secondary	500 Vdc
	Winding - Core	More than 100MΩ

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Connection Diagram

LS460-RH

CN1
Molex 53261-0771

CN2, CN3
JST SM02(8.0)B-BHS-1-TB(LF)

1	V(in)	
2	V(in)	
3	GND	
4	GND	
5	On/Off	
6	Brightness	
7	SG	

High-1	1	
NC	2	CFL 1
Low-1	3	

CN3

High-2	1	
NC	2	CFL 2
Low-2	3	

10.8-13.2 Vdc

INVERTER

SW

DC
0–2.5V

Corresponding Housing:
Molex 51021-0700

Corresponding Housing:
JST BHR-03VS-1
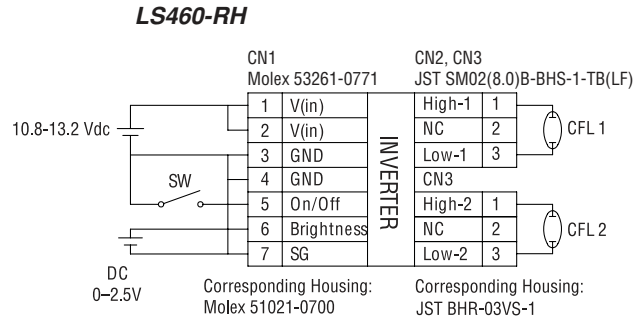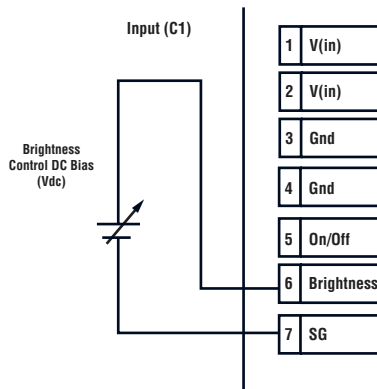
Output Current Optimization Method

Maximum output current can be adjusted by applying bias
voltage between brightness control pins as shown below.

Input (C1)

1	V(in)
2	V(in)
3	Gnd
4	Gnd
5	On/Off
6	Brightness
7	SG

Brightness
Control DC Bias
(Vdc)

DC Bias	Typical Output Current	Maximum Output Current
0.00 V	4.8 mA	5.2 mA
0.80 V	4.5 mA	5.0 mA
1.20 V	4.0 mA	4.5 mA
1.60 V	3.5 mA	4.0 mA
2.00 V	3.0 mA	3.5 mA
2.40 V	2.5 mA	3.0 mA

On/Off Control

The on/off control is achieved by using the on/off pin on the input
side of LS460. The circuit for the remote on/off circuitry consists
of an active low TTL switch. When the circuit is open, the V(in)
is cut off. When the circuit is closed, V(in) is activated. A mechani-
cal switch or a TTL/CMOS gate needs to be placed between the
remote on/off pin and ground creating a condition where the cir-
cuit is closed to activate the inverter. Either one of the following will
be required for the inverter to operate:

One recommended use of logic switch for remote on/off is shown
in the diagram below. Electrical specification for on/off terminal is
Low 0 to 0.4V, -0.4 mA or higher when switch is closed.

V(in)

On/Off Pin

SW (External)

To IC Vcc

V(in)

On/Off Pin

0V Inverter Off
5V Inverter On

To IC Vcc
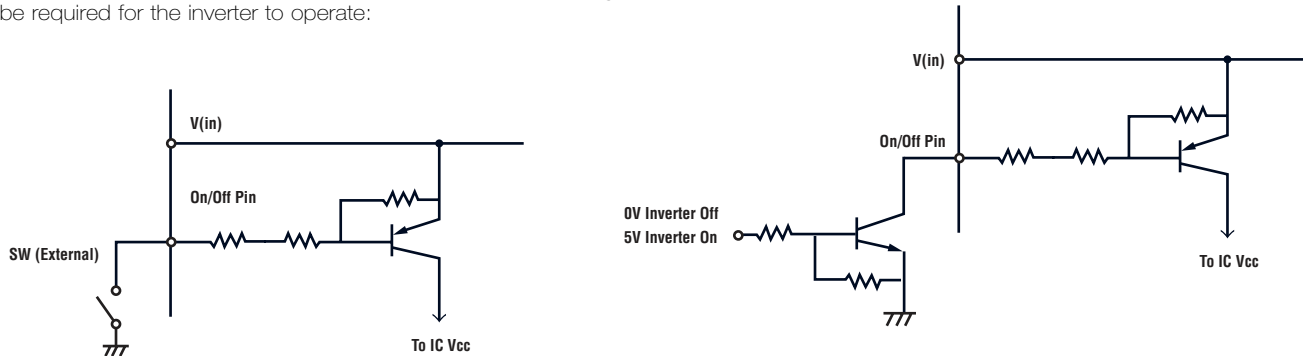
1. Tie on/off pin to ground.

2. Add mechanical switch between on/off pin and ground, close switch.

3. Add TTL/CMOS switch between on/off and ground. Circuit must be closed for
   unit to operate (as shown above right).

Brightness Control Using a Potentiometer

The LS460 brightness control is done by applying a DC bias of 0 to 2.5V to the brightness control pins. Unlike the single tube inverters like the LS380s, brightness control for dual tube inverters cannot be accomplished with a potentiometer. The reason for this is that the LS460 has a voltage follower, or a sub-regulator built into the unit to synchronize both outputs. This voltage follower compensates for resistive load to the brightness control circuitry.
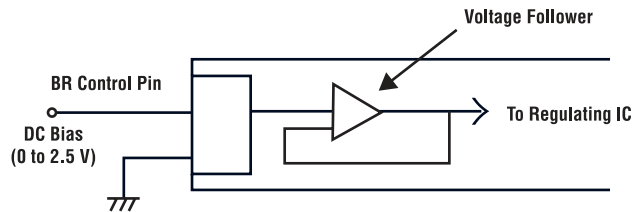
However, by using a voltage separator circuit consisting of a potentiometer, a virtual brightness control by potentiometer can be achieved.
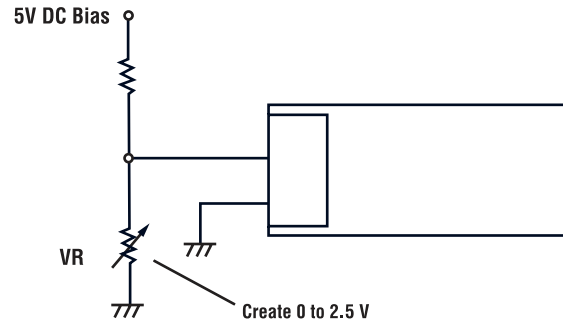
Note that current which will run between the brightness control pin will be in a trivial 3.0µA range.

Mean Time Between Failures (MTBF)

By using the MIL-HDBK 217E Condition Ground Benign method, the MTBF for the LS460 is calculated at 787,407 hours.

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