RADIANCE™
SUNLIGHT READABLE LED DISPLAYS

RAD-121NCSV1

03/18/10

12.1" SVGA LED BACKLIT TFT DISPLAY SOLUTION

SOLUTION OVERVIEW:

The **RAD-121NCSV1 Display** consists of the 12.1" NEC NL8060BC31-41C SVGA TFT display complete with a high performance LED backlight.

Display Features:

- Sunlight readable LCD panel with high efficiency solid state LED backlight
- **1050 cd/m^2 with 6.0W**, Sunlight Readable
- Ideal for demanding Industrial, Military and Marine applications, as well as Outdoor Kiosks, POS, and Gas Pumps
- Highly reliable LED backlight configuration provides light-source redundancy
- Includes LED driver with ultra-wide dimming range
- Exceeds performance of comparable CCFL backlight by 2.8 to 1
- RoHS Compliant

Sunlight Readability/Cool Operation

SOLUTION INCLUDES:

QTY	P/N	DESCRIPTION
1	ACD-NC121-1862	12.1" SVGA TFT Display with High-Performance LED Backlight
1	ACI-1903	LED Driver
1	27-R0066	Input Cable Assembly

Also available: LCD Controller, LVDS Cable, OSD and Cable.

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Applied Concepts
INNOVATION IN POWER CONVERSION TECHNOLOGY
ISO 9001:2000
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DISPLAY SPECIFICATIONS

Panel Manufacturer	NEC
Manufacturer's Part Number	NL8060BC31-41C
Size	12.1"
Resolution	SVGA 800 (H) X 600 (V)
Contrast Ratio	600:1 (typical)
Pixel Pitch	0.3075 (H) x 0.3075 (V) mm
Operating Temperature Range	-20 to +70° C (front surface) -20 to +70° C (back surface)
Response Time	25ms (typical)
Viewing Angle	160° (Horizontal), 140° (Vertical)
Panel Power (not including backlight)	1.16 W
Interface	LVDS 1port
Display Colors	16,777,216 colors max at 8-bit input
Surface Treatment, Polarizer surface	Clear + Antireflection (AR)
Surface Treatment, Polarizer pencil-hardness	2H (min.)
Display Mode	Positive

For complete LCD specifications (standard panel), refer to NEC datasheet NL8060BC31-41C (Document Number DOD-PP-0507, 1st edition, Published April 2008).

BACKLIGHT SPECIFICATIONS

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
Top	Operating temperature of display (center of panel surface)	-20 to +70	Deg-C
Tled	Operating temperature of LED edge light (light rail contact)	-20 to +75	Deg-C
Tstg	Display storage temperature	-30 to +80	Deg-C
Ifwd	LED forward current	125	mADC

*Maximum Ratings are those values beyond which damage may occur.

PANEL/BACKLIGHT OPTICAL CHARACTERISTICS

Ifwd = 41mA x 2 Banks (LED rail ACR-0702-1871), Ta = +25Deg-C, LCD un-powered

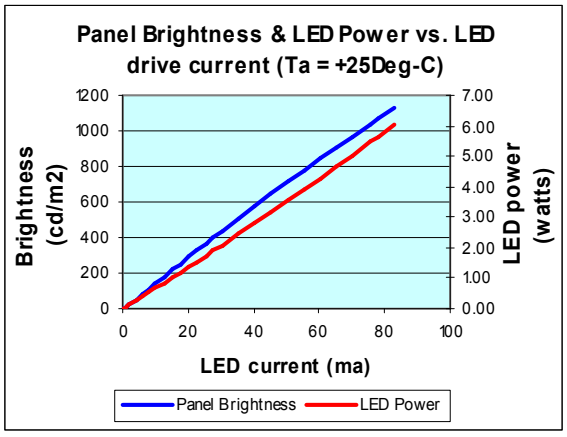
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Bp	Panel Brightness		945	1050	1155	cd/m^2
X	White X coordinate			0.321		-
Y	White Y coordinate			0.398		-

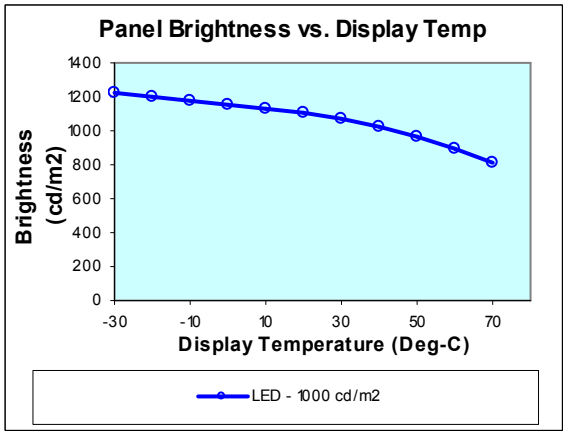
LED EDGE-LIGHT ELECTRICAL CHARACTERISTICS

Ifwd = 41mA x 2 Banks, Top = +25Deg-C

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Vfwd	LED rail forward voltage drop		63	70	77	Vdc

TYPICAL LCD/LED BACKLIGHT PERFORMANCE GRAPHS





LED DRIVER SPECIFICATIONS

I-DRIVE, 14.4 WATT LED DRIVER

(Single Channel 120V, 0-120mA)

GENERAL DESCRIPTION

The ACI-1903 is a universal driver utilizing the 3rd generation of I-Drive technology used for powering LED backlights.

This driver includes a Mode Select feature, enabling the user to select one of four maximum current settings by the user providing a Mode Select Resistance (MSr) between Pins 10 and 11 of CON1, enabling the driver to support a wide range of LED Rails.

Operating as a true constant current source and capable of driving up to 40 LEDs in series, this driver provides a complete integrated solution that is regulated over an input range of +8V to +18V.

Simple to connect and operate, this driver solution is capable of providing precise control to supporting dimming applications with a minimum of 3000:1.

This unit also features an enable control input.

MECHANICAL/ENVIRONMENTAL

Weight = 21.2 grams

Altitude = 35,000 ft max.

Humidity < 95% non-condensing

Size (L x W x H) = 2.60 IN x 1.43 IN x 0.385 IN

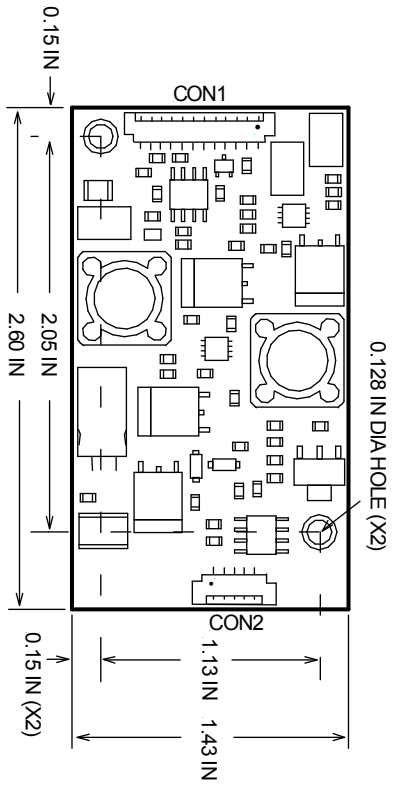
PCB thickness = 0.062 IN

Mounting Holes = 0.128 IN diameter (X2)

Input Power & Control Connector = CON1

LED Output Connector = CON2

This unit is RoHS Compliant



INPUT CONNECTOR
CON1
MOLEX 53261-1271

PIN#	FUNCTION
1	+8 to +18VDC (PWR)
2	+8 to +18VDC (PWR)
3	+8 to +18VDC (PWR)
4	GND (PWR)
5	GND (PWR)
6	GND (PWR)
7	ENABLE
8	ICNTL
9	GND (SIGNAL)
10	MODE SELECT RESISTANCE (MSr)
11	MODE SELECT RESISTANCE (MSr)
12	+5VDC REF OUT

OUTPUT CONNECTOR
CON2
MOLEX 53261-0571

PIN#	FUNCTION
1	+ LED (ANODE)
2	+ LED (ANODE)
3	NC
4	- LED (CATHODE)
5	- LED (CATHODE)

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LED DRIVER SPECIFICATIONS

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
Vin	Supply Voltage (Referenced to Ground)	-0.7 to 20	Vdc
Vip	Voltage applied to any Input Pin (Referenced to Ground)	-0.7 to 5.7	Vdc
Iop	Current sourced or sinked from any Output Control Pin	+/- 10	mAdc
Pin	Input Power (DC Input Voltage x DC Input Current)	18.5	W
Top	Operating Temperature (Still air ambient around Driver)	-30 to +85	°C
Tstg	Storage Temperature	-40 to +105	°C

*Maximum Ratings are those values beyond which damage to the LED driver may occur

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
Vin	Supply Voltage (Referenced to Ground)	8.0	18.0	Vdc
Vf	Series Connected Cumulative LED Forward-Drop Voltage	36	110	Vdc
Icntl	LED Intensity Control Voltage	0.5	4.5	Vdc

ELECTRICAL CHARACTERISTICS

Vin = +12V, Icntl = +4.5V, Enable = +5V, unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Nom	Max	Unit
OCV	Open Circuit Voltage	No Load	133	140	147	Vdc
Iadj	Nominal output current adjust range	Icntl (Pin8) = +0.5V to +4.5V	0		Note1	mAdc
ENoff	Enable Control, Unit Off	Enable (Pin 7)			0.5	Vdc
ENon	Enable Control, Unit ON	Enable (Pin 7)	2.0			Vdc
+5Vref	+5V Output Reference Voltage	1K Ohm Load to Ground (Pin 12)	4.75	5.0	5.25	Vdc
MSr	Mode Select Resistance, Mode = 1	Pins 10 and 11 electrically shorted together	0	0	15.5K	Ohms
MSr	Mode Select Resistance, Mode = 2	Resistance applied between Pins 10 and 11	31.4K	33K	34.7K	Ohms
MSr	Mode Select Resistance, Mode = 3	Resistance applied between Pins 10 and 11	64.6K	68K	71.4K	Ohms
MSr	Mode Select Resistance, Mode = 4	Pins 10 and 11 electrically open	141K	∞	∞	Ohms
Zms	Mode Select Input Impedance	MS (Pin 10)		47K		Ohms
Iind	Input Current Draw (Disabled)	Enable (Pin 7) = 0V			0.06	Adc
Eff	Electrical Efficiency			86		%

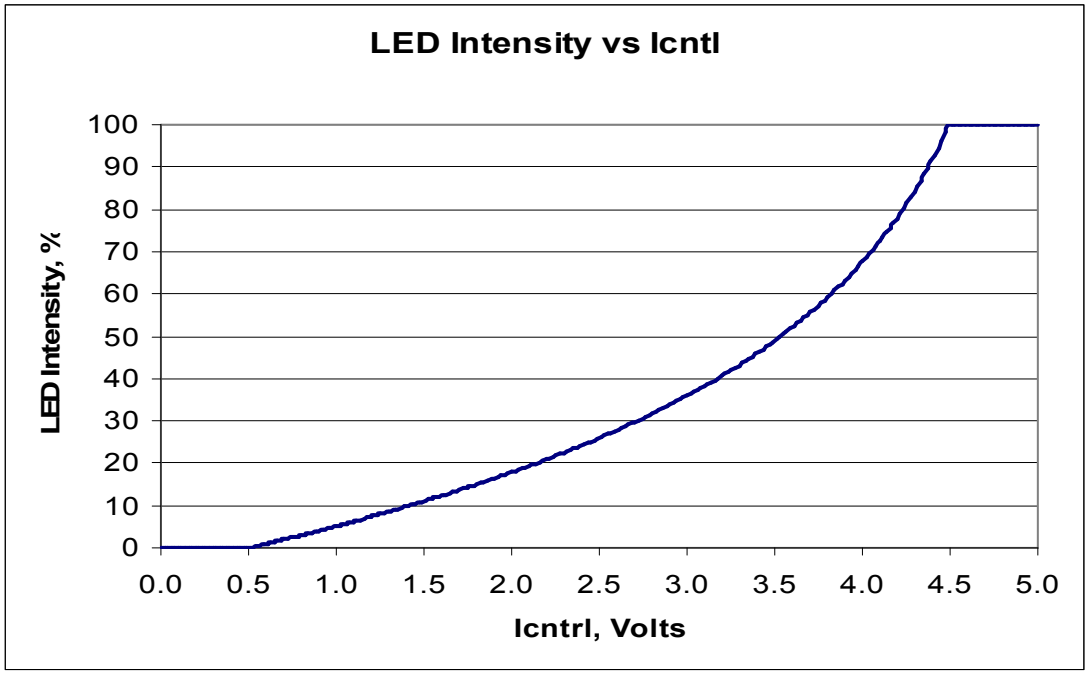
LED DRIVER SPECIFICATIONS

ELECTRICAL CHARACTERISTICS (Mode Dependent)

Vin = +12V, Vf = 110Vdc, Icntl = +4.5V, Enable = +5V, unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Nom	Max	Unit
Iout	Output Current per channel	Mode = 1	57	**60**	63	mAdc
Iin	Input Current Draw	Input Cable = P/N 27-R0065	0.61	0.64	0.67	Adc
Iout	Output Current per channel	**Mode = 2**	76	**80**	84	mAdc
Iin	Input Current Draw	**Input Cable = P/N 27-R0066**	0.81	0.85	0.90	Adc
Iout	Output Current per channel	Mode = 3	95	**100**	105	mAdc
Iin	Input Current Draw	Input Cable = P/N 27-R0067	1.0	1.1	1.1	Adc
Iout	Output Current per channel	Mode = 4	114	**120**	126	mAdc
Iin	Input Current Draw	Input Cable = P/N 27-R0068	1.2	1.3	1.3	Adc

* Included and used with this Display Solution.



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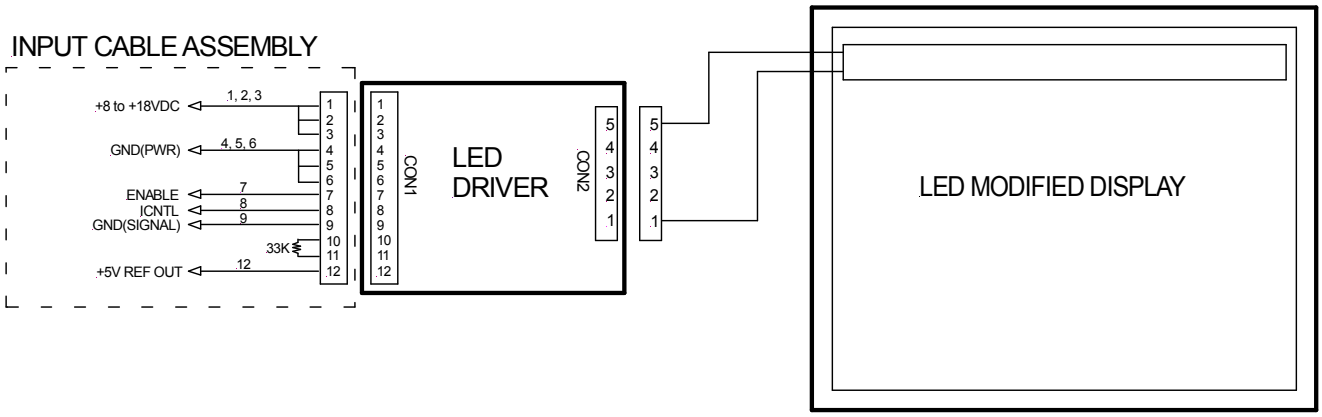
APPLICATION NOTES

Connection Diagram:



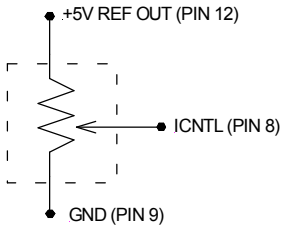
1. Input Cable Assembly sets the maximum output current level, by including the required resistance between pins 10 and 11 (refer to Mode Select section of LED Driver specification in this document).

2. If Enable (PIN 7) is not being used, it can be left electrically floating.

3. If no dimming is required, connect Icntl (PIN 8) to +5V REF OUT (PIN 12).

4. If dimming is required, the +5V REF OUT (PIN 12) may be used for high-side of Intensity Control Potentiometer. A 10K Ohm Potentiometer is recommended.

Connecting 10K Ohm Potentiometer used for Dimming



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