

# **RADIANCE™**

## SUNLIGHT READABLE LED DISPLAYS

**RAD-104NCSV1**

PRODUCT DATA SHEET – PAGE 1 OF 7

03/18/10

## 10.4" SVGA LED BACKLIT TFT DISPLAY SOLUTION

### SOLUTION OVERVIEW:

The **RAD-104NCSV1 Display** consists of the 10.4" NEC NL8060BC26-30C SVGA TFT display complete with a high performance LED backlight.

#### Display Features:

- Sunlight readable LCD panel with high efficiency solid state LED backlight
- **1000 cd/m<sup>2</sup> with 4.5W**, 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 2.2 to 1
- RoHS Compliant

### Sunlight Readability/Cool Operation



### SOLUTION INCLUDES:

<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	ACD-NC104-1861	10.4" SVGA TFT Display with High-Performance LED Backlight
1	ACI-1903	LED Driver
1	27-R0065	Input Cable Assembly

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

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## DISPLAY SPECIFICATIONS

Panel Manufacturer	NEC
Manufacturer's Part Number	NL8060BC26-30C
Size	10.4"
Resolution	SVGA 800 (H) X 600 (V)
Contrast Ratio	900:1 (typical)
Pixel Pitch	0.264 (H) x 0.264 (V) mm
Operating Temperature Range	-20 to +70° C (front surface) -20 to +70° C (back surface)
Response Time	18ms (typical)
Viewing Angle	160° (Horizontal), 160° (Vertical)
Panel Power (not including backlight)	1.32 W
Interface	LVDS 1port
Display Colors	16,777,216 colors max at 8-bit input
Surface Treatment, Polarizer surface	Antiglare + Antireflection (AR)
Surface Treatment, Polarizer pencil-hardness	2H (min.)
Display Mode	Positive

For complete LCD specifications (standard panel), refer to NEC datasheet NL8060BC26-30C (Document Number DOD-PP-0642, 1<sup>st</sup> edition, Published October 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 to the driver may occur.

**PANEL/BACKLIGHT OPTICAL CHARACTERISTICS**

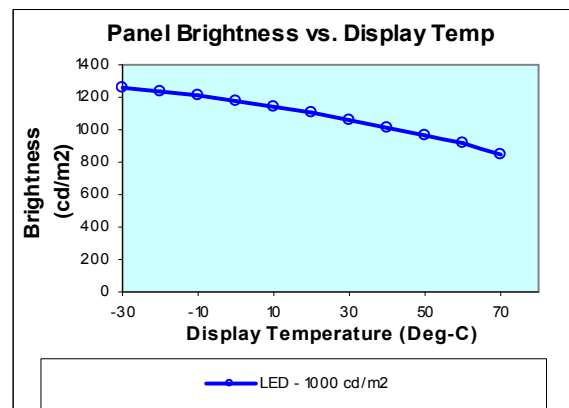
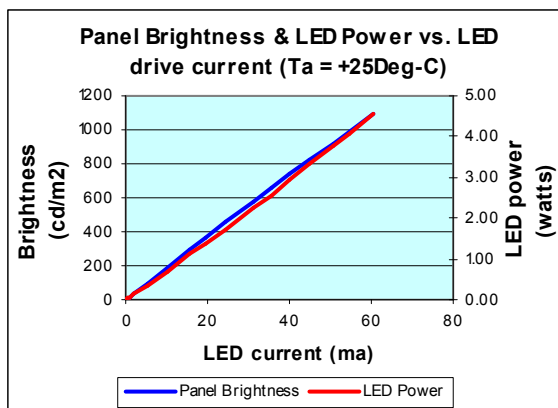
Ifwd = 61mA (LED rail ACR-0801-1714), Ta = +25Deg-C, LCD un-powered

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Bp	Panel Brightness		900	1000	1100	cd/m <sup>2</sup>
X	White X coordinate			0.332		-
Y	White Y coordinate			0.377		-

**LED EDGE-LIGHT ELECTRICAL CHARACTERISTICS**

Ifwd = 61mA, Top = +25Deg-C

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Vfwd	LED rail forward voltage drop		66	74	81	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 3<sup>rd</sup> 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.

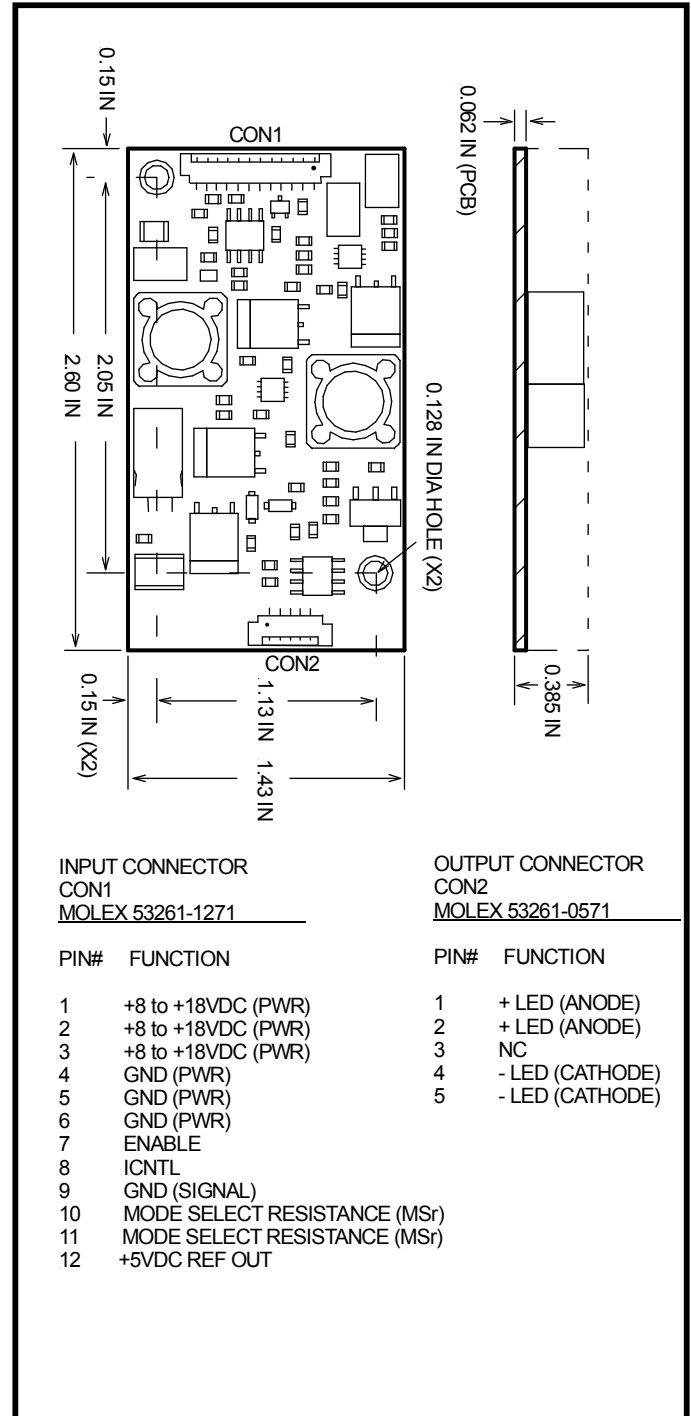
Operating as a true constant current source and capable of driving up to 40 LEDs in series, this driver provides a complete integrated solution that is regulated over an input range of +8V to +18V.

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



## 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		%

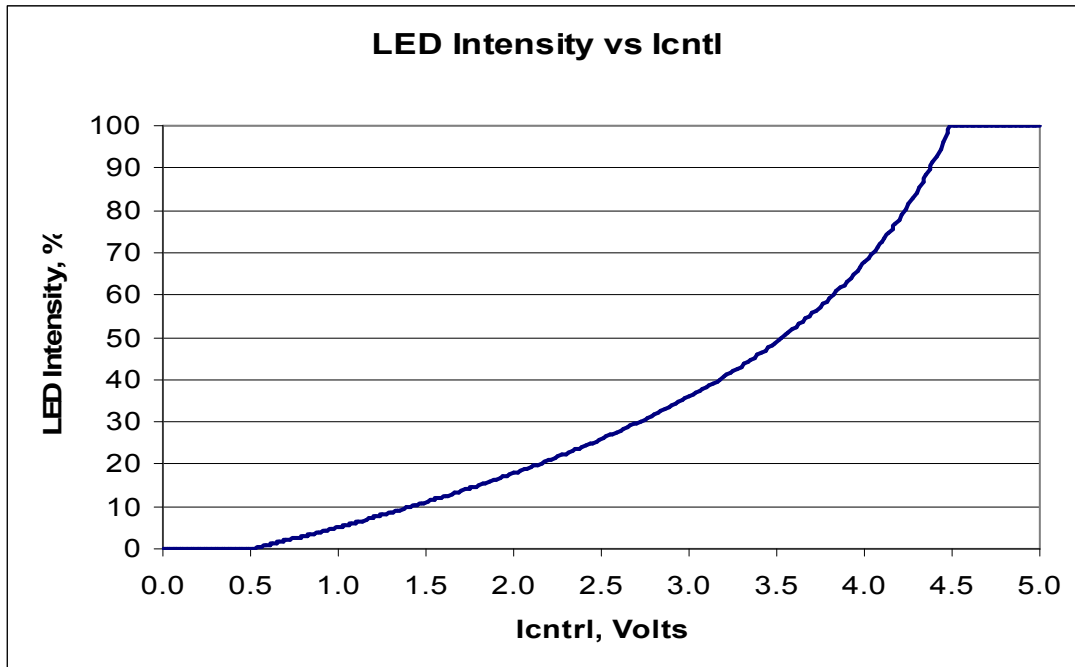
LED DRIVER SPECIFICATIONS

**ELECTRICAL CHARACTERISTICS (Mode Dependent)**

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

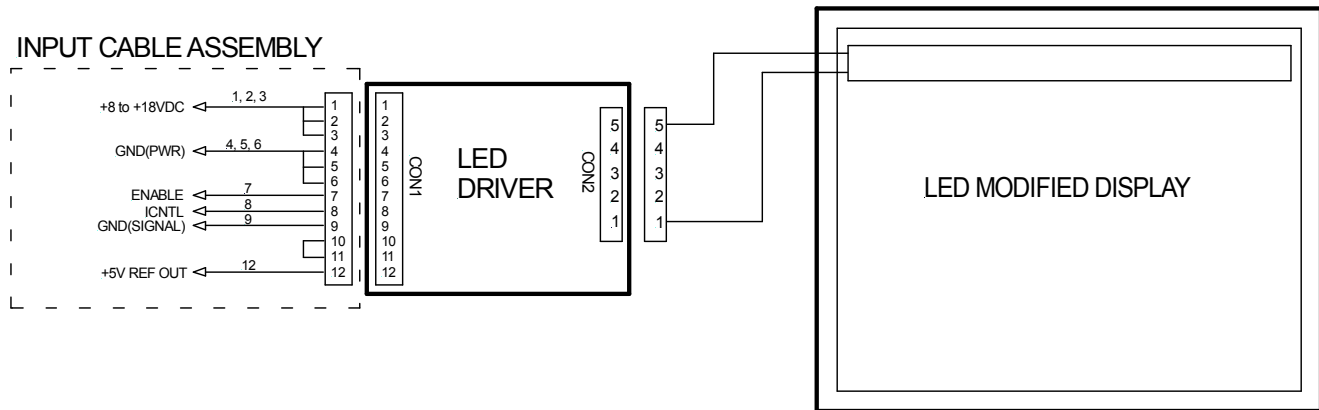
Symbol	Parameter	Test Conditions	Min	Nom	Max	Unit
Iout	Output Current per channel	<b>Mode = 1</b> <b>Input Cable = P/N 27-R0065*</b>	57	<b>60</b>	63	mAdc
Iin	Input Current Draw		0.61	0.64	0.67	Adc
Iout	Output Current per channel	Mode = 2 Input Cable = P/N 27-R0066	76	<b>80</b>	84	mAdc
Iin	Input Current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

\* Included and used with this Display Solution.



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

