NTE7208
Integrated Circuit
Constant Current Single Output LED Driver

Description:
The NTE7208 is a step-down constant current source designed for driving high power white LEDs. A standard output current of 350mA makes this driver compatible with a wide range of LEDs from many different manufacturers without the need for any external components. Despite its compact size, the NTE7208 is fully featured with very high efficiency, wide input voltage range, high ambient operating temperature and two means of LED dimming: PWM/digital control and analog voltage dimming. Both dimming controls are independent and can be combined. The driver is also designed to be as reliable as the LEDs it is driving, even at the full operating temperature of +85°C.

Features:
- Constant Current Output
- Power LED Driver
- Wide Input Voltage Range
- PWM/Digital Dimming and Analog Voltage Dimming
- Short Circuit Protected
- 96% Efficiency

Electrical Specifications: (Typical at $T_A = +25°C$, nominal input voltage, rated output current unless otherwise specified.)
Input Voltage (Absolute Maximum) .......................................................... 36V
Recommended Input Voltage
Minimum .......................................................... 5V
Typical .......................................................... 24V
Maximum .......................................................... 36V
Input Filter .......................................................... Capacitor
Output Voltage Range ($V_{in} = 36V$) .......................................................... 2V to 32V
Output Current Range ($V_{in} - V_{out} > 1.5V$ to 4V) .......................................................... 350mA
Typical Output Current Accuracy ($I_O = 350mA$) .......................................................... ±2%
Internal Power Dissipation, (Load of 5 LEDs) .......................................................... 700mW
Maximum Output Current Stability ($V_{in} = 36V$, $V_{out} = 2V$ to 32V) .......................................................... ±1%
Maximum Output Ripple and Noise, (20MHz limited, $V_{in} = 36V$, $V_{out} = 2V$ to 32V) .......................................................... 120mV$_{p-p}$
Maximum Temperature Coefficient ($T_A = -40°$ to $+85°C$) .......................................................... ±0.015%/°C
Maximum Capacitive Load, .......................................................... 100μF
Operating Frequency
Minimum .......................................................... 210kHz
Typical .......................................................... 260kHz
Maximum .......................................................... 300kHz
Maximum Efficiency at Full Load .......................................................... 96%
Short Circuit Protection .......................................................... Regulated at Rated Output Current
Operating Temperature Range, $T_A$ .......................................................... $-40°$ to $+85°C$
Storage Temperature Range, $T_{stg}$ .......................................................... $-55°$ to $+125°C$
**Electrical Specifications (Cont’d):** (Typical at $T_A = +25^\circ C$, nominal input voltage, rated output current unless otherwise specified.

- Maximum Case Temperature, $T_C$ ................................................. +100°C
- Thermal Impedance (Nature Convection) ........................................... +55°C/W
- Case Material .......................................................... Non Conductive Black Plastic
- Potting Material ........................................................ Epoxy (UL94-V0)
- Maximum Wave Soldering Profile (10 seconds) .................................. +235°C

**PWM Dimming and ON/OFF Control** (Leave Open if Not Used):
- Remote ON/OFF
  - DC/DC ON, .......................................................... Open or $0V < V_r < 0.6V$
  - DC/DC OFF (Standby) ........................................... $0.6 < V_r < 2.9V$
  - DC/DC OFF (Shutdown) ........................................ 2.9 < $V_r < 6V$
- Maximum Remote Pin Drive Current ($V_r = 5V$) ................................ 1mA
- Maximum Quiescent Input Current in Shutdown Mode ($V_{in} = 36V$, $V_r > 2.9V$) 200μA
- Maximum PWM Frequency for Linear Operation (measured 10% to 90% Dimming) 200Hz

**Analog Dimming Control** (Leave Open if Not Used):
- Input Voltage Range .......................................................... 0 to 15V
- Control Voltage Range Limits
  - Full On .......................................................... $0.13V \pm 50mV$
  - Full Off ....................................................... $4.5V \pm 50mV$
- Maximum Analog Pin Drive Current ($V_c = 5V$) ................................ 0.2mA

**Environmental:**
- Relative Humidity (See Note) ........................................... 5% to 95% RH, non-condensing
- Conducted Emissions .................................................. EN55022, Class B
- Radiated Emissions ................................................... EN55022, Class B
- ESD .......................................................... EN61000-4-2, Class A
- Radiated Immunity ...................................................... EN61000-4-3, Class A
- Fast Transient .......................................................... EN61000-4-4, Class A
- Conducted Immunity ................................................... EN61000-4-6, Class A
- MTBF (RCD-24-0.70, Nominal $V_{in}$, Full Load)
  - +25°C .......................................................... $605 \times 10^3$ hours
  - Using MIL-HDBK 217F, +71°C .................................. $516 \times 10^3$ hours

Note: Requires an input filter to meet EN55022 Class B conducted emissions, see below.

**Class B Filter Suggestion**

![Class B Filter Suggestion Diagram](image-url)
Analog Dimming Control and Application Circuit Examples

LED Driver with 0–10V Interface

LED DIMMER for up to 7 white LEDs

Voltage Control (0–15V max)

Digital Dimming Control

*Max output current can also be set using Analog input
Package Style and Pinning

Pin Connections

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Out</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Vin</td>
<td>DC Supply</td>
</tr>
<tr>
<td>2</td>
<td>Analog Dimming</td>
<td>Leave open if not used</td>
</tr>
<tr>
<td>3</td>
<td>PWM/ON/OFF</td>
<td>Leave open if not used</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Do not connect to -Vout</td>
</tr>
<tr>
<td>5</td>
<td>-Vout</td>
<td>LED Cathode Connection</td>
</tr>
<tr>
<td>6</td>
<td>+Vout</td>
<td>LED Anode Connection</td>
</tr>
</tbody>
</table>

Pin Tolerance

- xx.x ±0.5mm
- xx.xx ±0.25mm
- Pin Tolerance 0.1mm

Leave 1mm space around case pcb

Recommended Footprint Details

- 1.00ø+0.15/-0
- 0.100 (2.54)

Analog Dimming Control and Application Circuit Examples

LED Driver

NTE7208

1st LED

Last LED