General Description

The MAX25024 is a 4-channel backlight driver IC with boost controller for automotive displays. The integrated current outputs can sink up to 150mA LED current each. The device accepts a wide 2.5V to 36V input voltage range and withstands automotive load-dump events.

The internal current-mode switching DC-DC controller supports boost or SEPIC topologies and operates in the 400kHz to 2.2MHz frequency range. Integrated spread spectrum helps reduce EMI. An adaptive output-voltage-control scheme minimizes power dissipation in the LED current-sink paths.

Control is included for an external nMOSFET series switch to reduce quiescent current when the backlight is off and to disconnect the boost converter in the case of a fault.

The device features I²C-controlled pulse-width-modulation (PWM) dimming and hybrid dimming. In either case, the minimum pulse width is 500ns. Phase-shifted dimming of the strings is incorporated for lower EMI.

Comprehensive diagnostic information is available through the I²C interface to ease integration in systems requiring ASIL B compliance.

The MAX25024 is available in a 24-pin TQFN or 24-pin side-wettable TQFN (SWTQFN) package and operates over the -40°C to +125°C temperature range.

Applications

- Instrument Clusters
- Central Information Displays
- Infotainment Displays

Benefits and Features

- **Wide Voltage-Range Operation**
  - Operates Down to 2.5V Supply After Startup
  - Survives Load Dumps Up to 40V

- **High Integration**
  - Complete 4-Channel Solution Including Boost Controller
  - I²C Control for Minimum Parts Count

- **Robust and Low EMI**
  - Spread-Spectrum Oscillator
  - Phase Shifting
  - 400kHz to 2.2MHz Switching-Frequency Range
  - nMOS Input Protection Switch

- **Multiple Features for ASIL B Systems**
  - LED-Current Measurement
  - Boost Input Current Measurement
  - Boost Output Voltage Measurement
  - LED Open/Short Detection and Protection
  - Boost Output Undervoltage and Overvoltage

- **Versatile Dimming Scheme Allows Hybrid or PWM-Only Dimming Using DIM Input or I²C**
  - Dimming Ratio > 10,000:1 Using Hybrid Dimming
  - 10,000:1 Dimming Ratio at 200Hz Using PWM Dimming

- **Compact (4mm x 4mm) 24-Pin TQFN and SWTQFN Packages**

*Ordering Information appears at end of data sheet.*
MAX25024

Automotive Low Input Voltage I²C 4-Channel
150mA Backlight Driver supporting ASIL B

Typical Application Circuits

MAX25024 Applications Circuit

Ordering Information

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>TEMPERATURE RANGE</th>
<th>PIN-PACKAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX25024ATG/V+</td>
<td>-40°C to +125°C</td>
<td>24 TQFN-EP*</td>
</tr>
<tr>
<td>MAX25024ATG/VY+</td>
<td>-40°C to +125°C</td>
<td>24 SWTQFN-EP*</td>
</tr>
</tbody>
</table>

+Denotes a lead(Pb)-free/RoHS-compliant package.

T = Tape and reel.

/V denotes an automotive qualified part.

Y = Side-wettable package.

EP* = Exposed Pad

*Future product—contact factory for availability.