

High-Frequency PWM White LED Drivers with Internal Schottky Diode and OVP

Features

- 2.5V to 10V Input Voltage Range
- Output Voltage up to 34V
- Internal Schottky Diode
- 1.6 MHz PWM Operation (MIC2292)
- 2.0 MHz PWM Operation (MIC2293)
- Stable with Ceramic Capacitors
- 15V, and 34V Output OVP Options
- 1.2 MHz PWM Operation
- 500 mA Switch Current Rating
- 95 mV Feedback Voltage
- <1% Line and Load Regulation
- <1 μ A Shutdown Current
- Overtemperature Protection
- UVLO
- 2 mm x 2 mm DFN-8 Package
- -40°C to $+125^{\circ}\text{C}$ Junction Temperature Range

Applications

- White LED Driver for Backlighting:
 - Cell Phones
 - PDAs
 - GPS Systems
 - Digital Cameras
 - MP3 Players
 - IP Phones
- LED Flashlights
- Constant Current Power Supplies

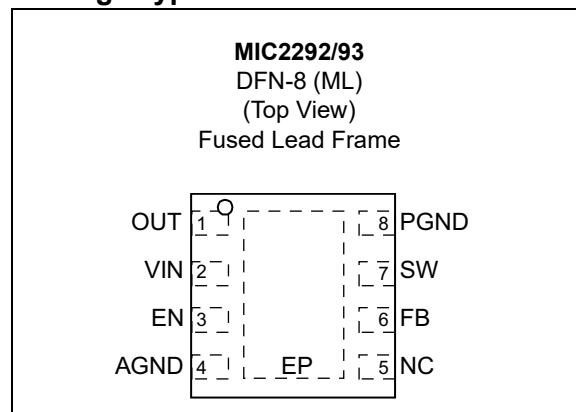
General Description

The MIC2292 and MIC2293 are high frequency, Pulse Width Modulator (PWM) boost regulators optimized for constant-current, white LED driver applications. Because of their constant PWM switching frequencies of 1.6 MHz and 2 MHz, respectively, the MIC2292/93 can use the smallest external components, allowing designers to avoid sensitive IF bands in their RF applications.

The products feature an internal Schottky diode and two levels of output overvoltage protection allowing a small size and efficient DC/DC solution that requires only four external components.

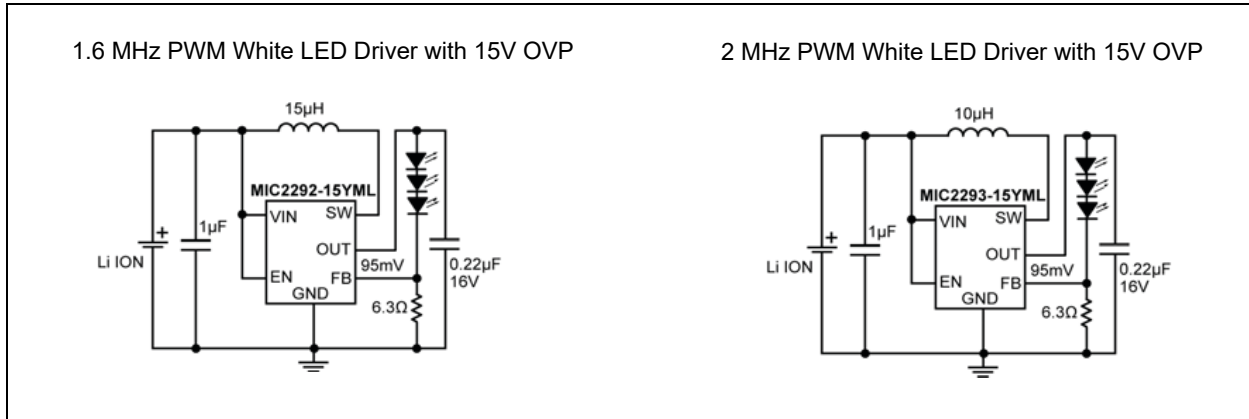
The 2.5V to 10V input voltage range of MIC2292/3 allows direct operation from 1- and 2-cell Li Ion as well as 3- to 4-cell NiCad/NiMH/Alkaline batteries. The MIC2292/3 products are available in a small size 2 mm x 2 mm 8-pin DFN package and have a junction temperature range of -40°C to $+125^{\circ}\text{C}$.

Package Type

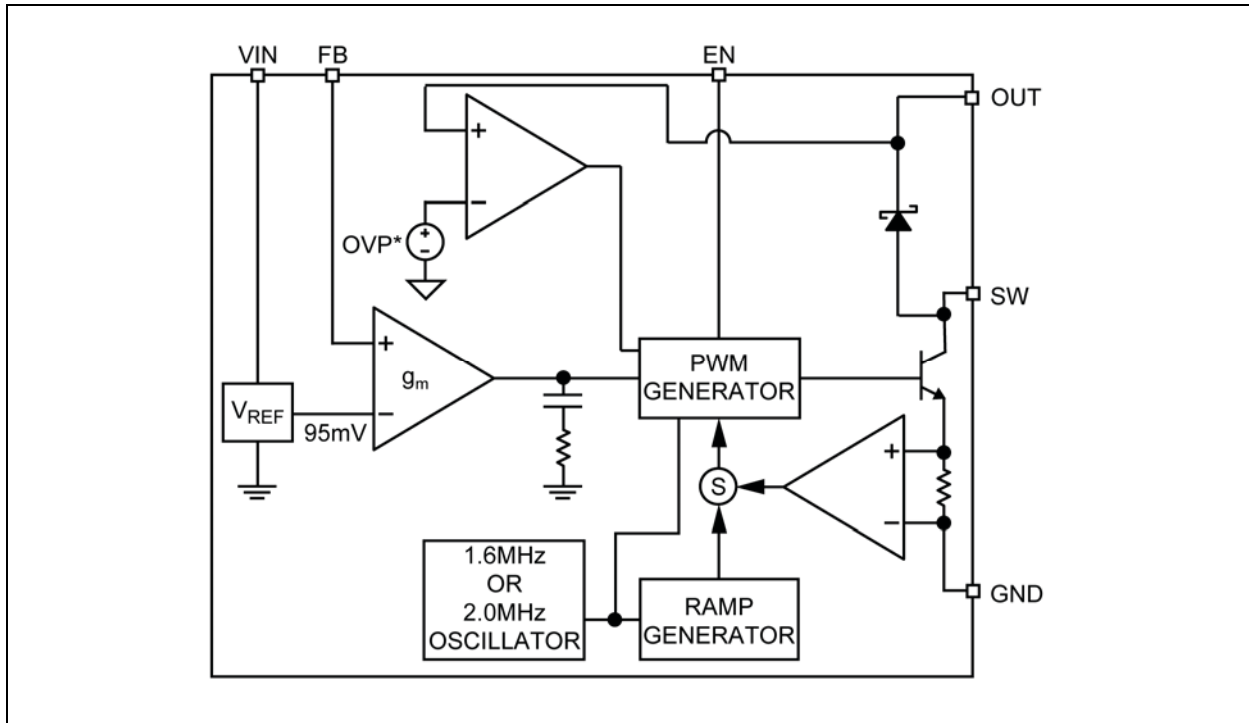


MIC2292/93

Typical Application Circuits



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

| | |
|---|-------------------|
| Supply Voltage (V_{IN}) | +12V |
| Switch Voltage (V_{SW}) | -0.3V to +34V |
| Enable Pin Voltage (V_{EN}) | -0.3V to V_{IN} |
| FB Voltage (V_{FB}) | +6.0V |
| Switch Current (I_{SW}) | 2A |
| Schottky Reverse Voltage (V_{DR}) | 34V |
| Ambient Storage Temperature Range (T_S) | -65°C to +150°C |
| ESD Rating (Note 1) | 2 kV |

Operating Ratings ††

| | |
|------------------------------------|-----------------------|
| Supply Voltage (V_{IN}) | +2.5V to +10V |
| Output Voltage (V_{OUT}) | V_{IN} to V_{OVP} |

† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

†† **Notice:** The device is not guaranteed to function outside its operating ratings.

Note 1: Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 k Ω in series with 100 pF.

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ELECTRICAL CHARACTERISTICS

Electrical Characteristics: $T_A = +25^\circ\text{C}$, $V_{IN} = V_{EN} = 3.6\text{V}$, $V_{OUT} = 15\text{V}$, $I_{OUT} = 20\text{ mA}$, unless otherwise noted. **Bold** values indicate $-40^\circ\text{C} \leq T_J \leq \pm 125^\circ\text{C}$. [Note 1](#)

| Parameter | Symbol | Min. | Typ. | Max. | Units | Conditions |
|---------------------------|---------------|------------|------|------------|------------------|---|
| Supply Voltage Range | V_{IN} | 2.5 | — | 10 | V | — |
| Undervoltage Lockout | V_{UVLO} | 1.8 | 2.1 | 2.4 | V | — |
| Quiescent Current | I_{VIN} | — | 2.5 | 5 | mA | $V_{FB} > 200\text{ mV}$, not switching |
| Shutdown Current | I_{SD} | — | 0.1 | 1 | μA | $V_{EN} = 0\text{V}$, Note 2 |
| Feedback Voltage | V_{FB} | 90 | 95 | 100 | mV | $\pm 5\%$ |
| Feedback Input Current | I_{FB} | — | -450 | — | nA | $V_{FB} = 95\text{ mV}$ |
| Line Regulation | — | — | 0.5 | 1 | % | $3\text{V} \leq V_{IN} \leq 5\text{V}$, Note 3 |
| Load Regulation | — | — | 0.5 | 2 | % | $5\text{ mA} \leq I_{OUT} \leq 20\text{ mA}$, Note 3 |
| Maximum Duty Cycle | D_{MAX} | 85 | 90 | — | % | — |
| Switch Current Limit | $I_{SW(LIM)}$ | — | 750 | — | mA | — |
| Switch Saturation Voltage | $V_{SW(SAT)}$ | — | 450 | — | mV | $I_{SW} = 0.5\text{A}$ |
| Switch Leakage Current | $I_{SW(LK)}$ | — | 0.01 | 5 | μA | $V_{EN} = 0\text{V}$, $V_{SW} = 10\text{V}$ |
| Enable Threshold | V_{EN} | 1.5 | — | — | V | Turn on |
| | | — | — | 0.4 | | Turn off |
| Enable Pin Current | I_{EN} | — | 20 | 40 | μA | $V_{EN} = 10\text{V}$ |
| Oscillator Frequency | f_{SW} | 1.4 | 1.6 | 1.8 | MHz | MIC2292 |
| | | 1.75 | 2.0 | 2.25 | | MIC2293 |
| Schottky Forward Drop | V_D | — | 0.8 | 1 | V | $I_D = 150\text{ mA}$ |
| Schottky Leakage Current | I_{RD} | — | — | 4 | μA | $V_R = 30$ |
| Overvoltage Protection | V_{OVP} | 13 | 14 | 16 | V | MIC2292/93-15 |
| | | 30 | 32 | 34 | | MIC2292/93-34 |
| Turn-On Time | t_{ON} | — | — | 50 | μs | $V_{IN} = 2.5\text{V}$, V_{EN} ramped 0V to V_{IN} |
| | | — | — | 50 | | $V_{IN} = 5\text{V}$, V_{EN} ramped 0V to V_{IN} |
| | | — | — | 50 | | $V_{IN} = 5\text{V}$, V_{EN} ramped 0V to V_{IN} |
| Overtemperature Shutdown | t_{SD} | — | 150 | — | $^\circ\text{C}$ | Threshold |
| | | — | 10 | — | | Hysteresis |

Note 1: Specification for packaged product only.

2: $I_{SD} = I_{VIN}$.

3: Guaranteed by design.

TEMPERATURE SPECIFICATIONS

| Parameters | Symbol | Min. | Typ. | Max. | Units | Conditions |
|------------------------------------|---------------|------|------|------|-------|------------|
| Temperature Ranges | | | | | | |
| Junction Operating Temperature | T_J | -40 | — | +125 | °C | — |
| Storage Temperature Range | T_S | -65 | — | +150 | °C | — |
| Package Thermal Resistance | | | | | | |
| Thermal Resistance, 2x2 DFN 8-Lead | θ_{JA} | — | 93 | — | °C/W | — |

Note 1: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A , T_J , θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +125°C rating. Sustained junction temperatures above +125°C can impact the device reliability.

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2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

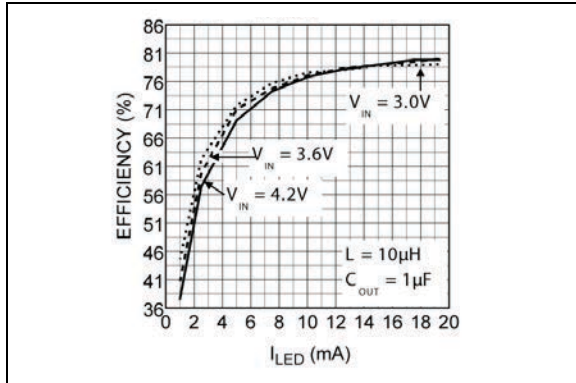


FIGURE 2-1: MIC2292 3 Series LED Efficiency.

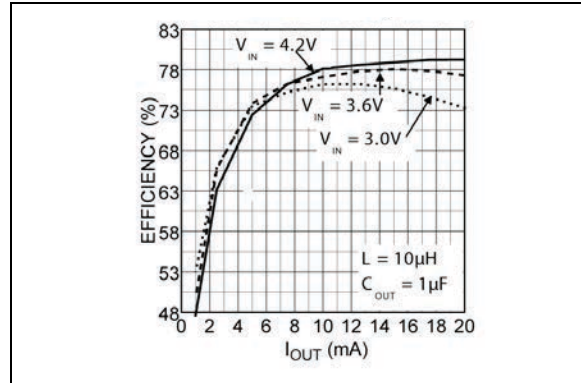


FIGURE 2-4: MIC2293 6 Series LED Efficiency.

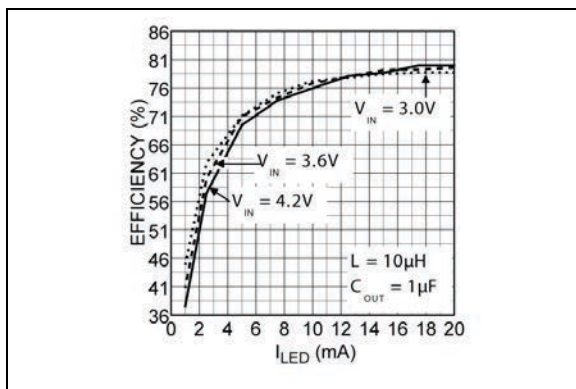


FIGURE 2-2: MIC2293 3 Series LED Efficiency.

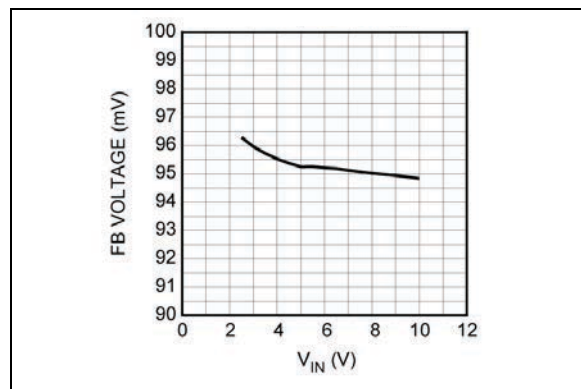


FIGURE 2-5: Feedback Voltage vs. Input Voltage.

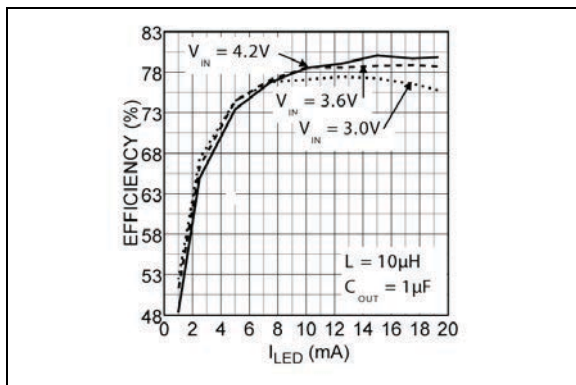


FIGURE 2-3: MIC2292 6 Series LED Efficiency.

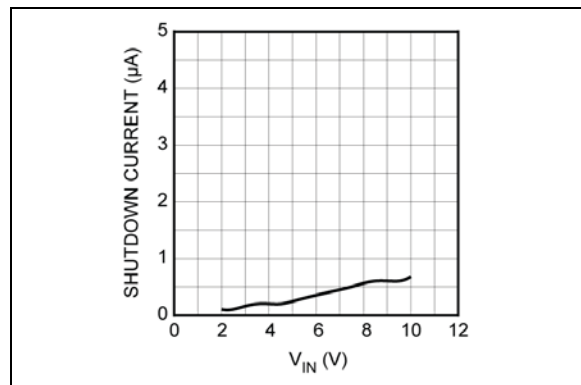


FIGURE 2-6: Shutdown Current vs. Input Voltage.

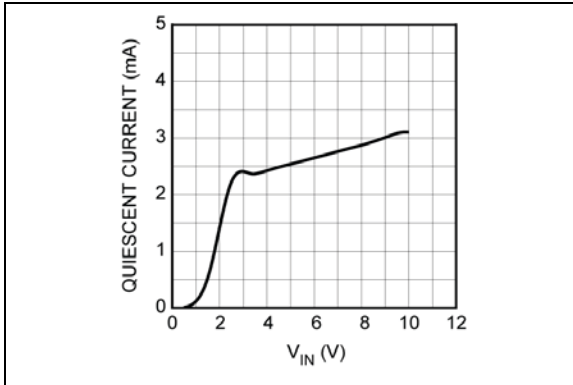


FIGURE 2-7: Quiescent Current vs. Input Voltage.

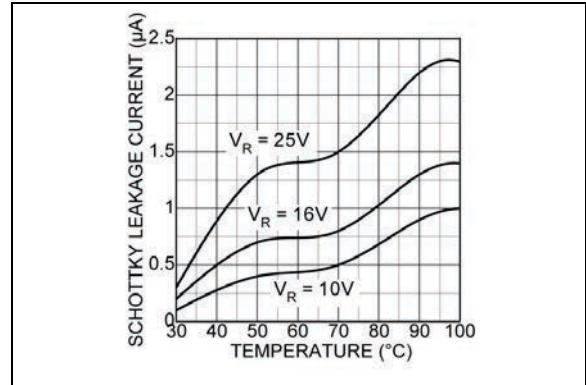


FIGURE 2-10: Schottky Reverse Leakage Current.

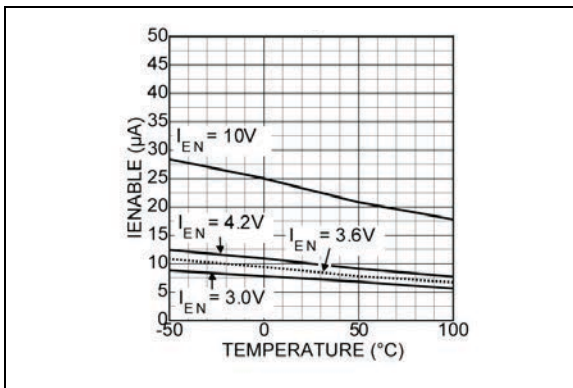


FIGURE 2-8: EN Pin Bias Current vs. Temperature.

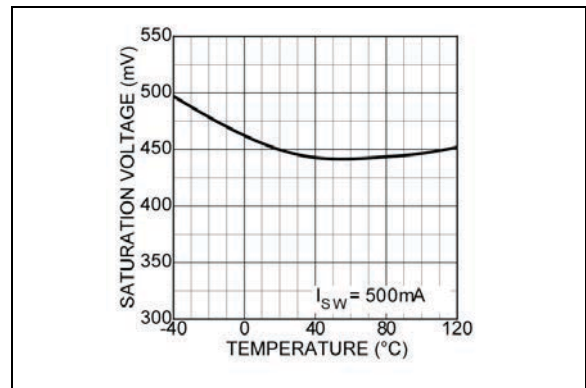


FIGURE 2-11: Saturation Voltage vs. Temperature.

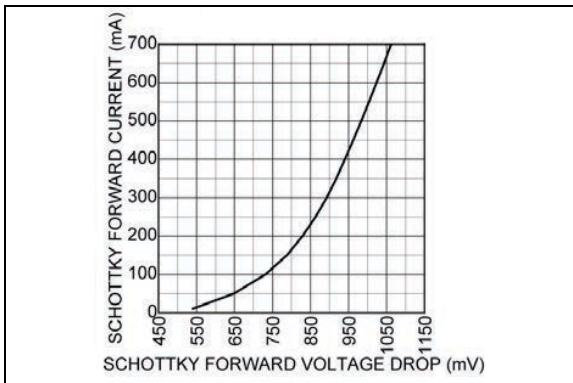


FIGURE 2-9: Schottky Forward Voltage Drop.

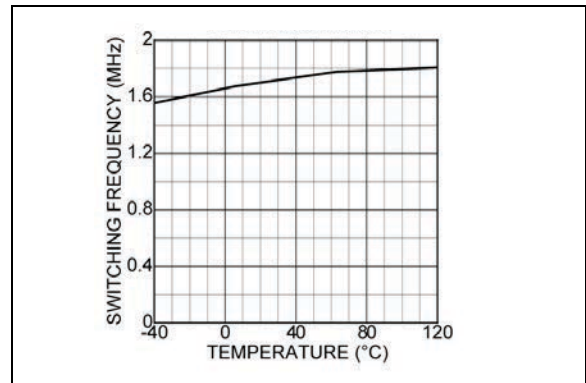


FIGURE 2-12: MIC2292 Switch Frequency vs. Temperature.

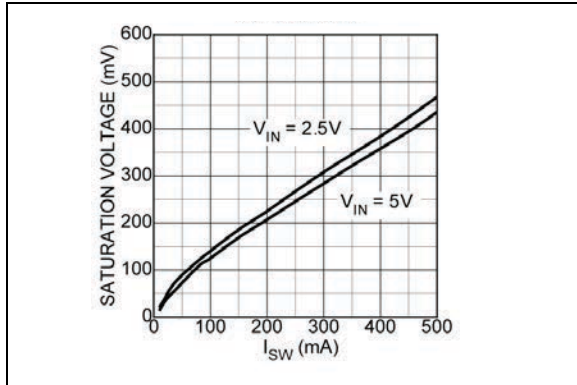


FIGURE 2-13: Switch Saturation Voltage vs. Current.

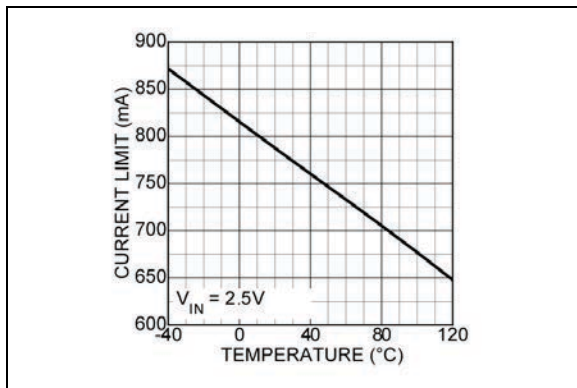


FIGURE 2-14: Current Limit vs. Temperature.

FUNCTIONAL CHARACTERISTICS

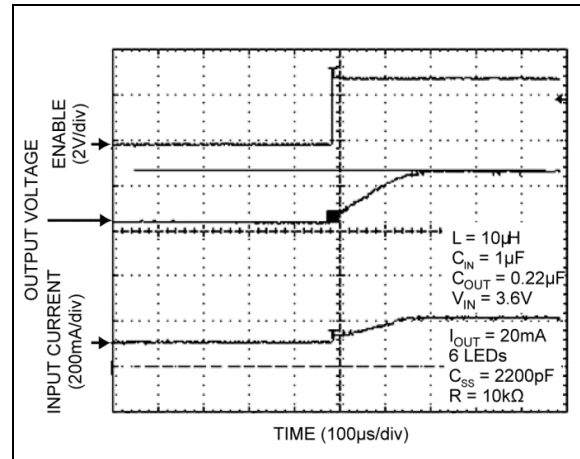


FIGURE 2-15: 6-Series LED Circuit with External Soft-Start.

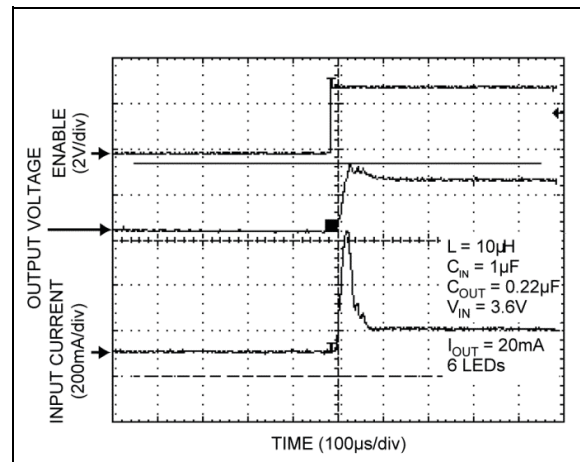


FIGURE 2-16: 6-Series LED Circuit without External Soft-Start.

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 3-1](#).

TABLE 3-1: PIN FUNCTION TABLE

| Pin Number DFN-8 | Pin Name | Description |
|---------------------|----------|---|
| 1 | OUT | Output Pin and Overvoltage Protection (Output). Connect to the output capacitor and LEDs. |
| 2 | VIN | Supply (Input). Input voltage. |
| 3 | EN | Enable (Input). Logic HIGH enables regulator and logic LOW shuts down regulator. |
| 5 | NC | No Connect. No internal connection to die. |
| 6 | FB | Feedback (Input). Output voltage sense node. Connect the cathode of the LED to this pin. A resistor from this pin to Ground (GND) sets the LED current. |
| 7 | SW | Switch Node (Input). Internal power transistor collector. |
| 4, 8 | GND | Ground (Return). Ground. |
| EP | GND | Ground (Return). Exposed backside pad (ePad). |

MIC2292/93

4.0 FUNCTIONAL DESCRIPTION

The MIC2292/93 are constant frequency, PWM current-mode boost regulators. The [Functional Block Diagram](#) is on page two. The MIC2292/93 are composed of an oscillator, slope compensation ramp generator, current amplifier, gm error amplifier, PWM generator, 500 mA bipolar output transistor, and Schottky rectifier diode. The oscillator generates a 1.6 MHz clock for the MIC2292 and a 2.0 MHz clock for the MIC2293. The clocks' two functions are to trigger the PWM generator that turns on the output transistor and to reset the slope compensation ramp generator. The current amplifier is used to measure the switch current by amplifying the voltage signal from the internal sense resistor. The output of the current amplifier is summed with the output of the slope compensation ramp generator. This summed current-loop signal is fed to one of the inputs of the PWM generator.

The g_m error amplifier measures the LED current through the external sense resistor and amplifies the error between the detected signal and the 95 mV reference voltage. The output of the g_m error amplifier provides the voltage loop signal that is fed to the other input of the PWM generator. When the current-loop signal exceeds the voltage loop signal, the PWM generator turns off the bipolar output transistor. The next clock period initiates the next switching cycle, maintaining the constant frequency current mode PWM control. The LED current is set by the feedback resistor:

EQUATION 4-1:

$$I_{LED} = \frac{95mV}{R_{FB}}$$

The Enable pin shuts down the output switching and disables control circuitry to reduce VIN pin input current to leakage current level. Enable pin input current is zero at zero volt.

4.1 Dimming Control

There are two techniques for dimming control. One is PWM dimming, and the other is continuous dimming.

1. PWM dimming control is implemented by applying a PWM signal on EN pin as shown in [Figure 4-1](#). The MIC2292/93 is turned on and off by the PWM signal. With this method, the LEDs operate with either zero or full current. The average LED current is increased proportionally to the duty-cycle of the PWM signal. This technique has high efficiency because the IC and the LEDs consume no current during the off-cycle of the PWM signal. Typical frequency should be between 100 Hz and 10 kHz.
2. Continuous dimming control is implemented by applying a DC control voltage to the FB pin of the MIC2289 through a series resistor as shown in [Figure 4-2](#). The LED current is decreased proportionally with the amplitude of the control voltage. The LED intensity (current) can be dynamically varied applying a DC voltage to the FB pin. The DC voltage can come from a DAC signal, or a filtered PWM signal. The advantage of this approach is that a high frequency PWM signal (>10 kHz) can be used to control LED intensity.

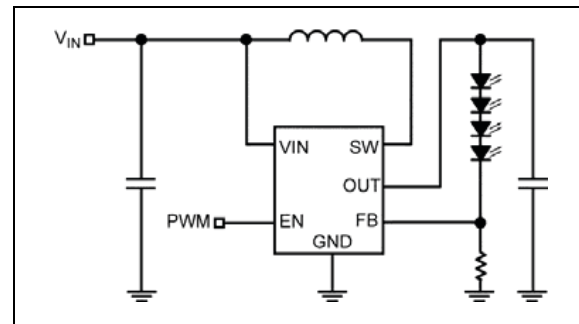


FIGURE 4-1: PWM Dimming Method.

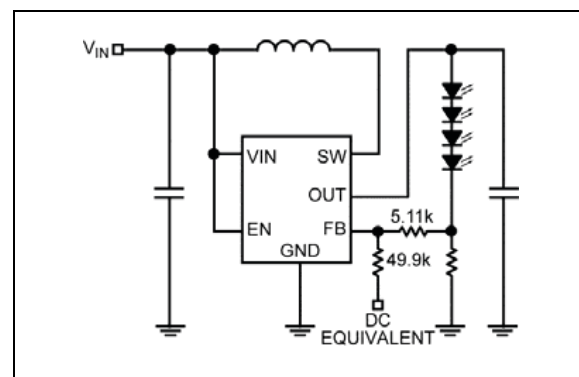


FIGURE 4-2: Continuous Dimming.

4.2 Open Circuit Protection

If the LEDs are disconnected from the circuit, or in case an LED fails open, the sense resistor will pull the FB pin to ground. This will cause the MIC2292/93 to switch with a high duty cycle, resulting in output overvoltage. This may cause the SW pin voltage to exceed its maximum voltage rating, possibly damaging the IC and the external components. To ensure the highest level of protection, the MIC2292/93 has two product options in the 2 mm × 2 mm DFN-8 with overvoltage protection, OVP. The extra pins of the 8-pin DFN package allow the use of a dedicated OVP monitor with options for 15V or 34V (see Figure 4-3). The reason for the two OVP levels is to let users choose the suitable level of OVP for their application. For example, a 4-LED application would typically see an output voltage of no more than 12V, so a 15V OVP option would offer a suitable level of protection. This allows the user to select the output diode and capacitor with the lowest voltage ratings, therefore smallest size and lowest cost. The OVP will clamp the output voltage to within the specified limits.

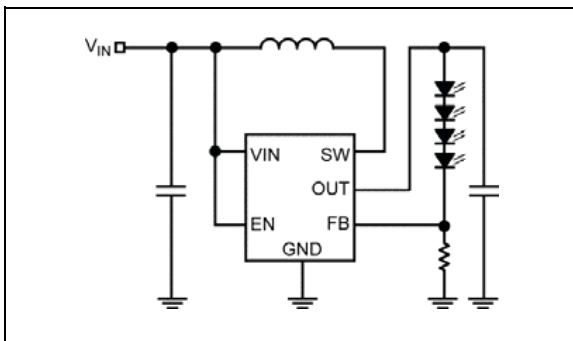


FIGURE 4-3: DFN Package OVP Circuit.

4.3 Start-Up and Inrush Current

During start-up, inrush current of approximately double the nominal current flows to set up the inductor current and the voltage on the output capacitor. If the inrush current needs to be limited, a soft-start circuit similar to Figure 4-4 could be implemented. The soft-start capacitor, C_{SS} , provides over drive voltage to the FB pin at start-up, resulting in gradual increase of switch duty cycle and limited inrush current.

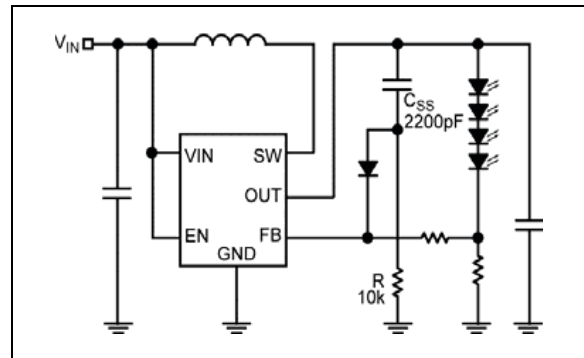


FIGURE 4-4: Soft-Start Circuit.

MIC2292/93

5.0 EXTERNAL COMPONENT SELECTION

The MIC2292/93 can be used across a wide range of applications. The table below shows recommended inductor and output capacitor values for various series-LED applications.

TABLE 5-1: RECOMMENDED INDUCTOR AND OUTPUT CAPACITOR VALUES

| Series LEDs | L | Part # | Manufacturer | Min. C _{OUT} | Part # | Manufacturer | |
|-------------|-------------|-----------------|-----------------|-----------------------|----------------|----------------|--------|
| 2 | 22 μ H | LQH32CN220K21 | Murata | 2.2 μ F | 0805ZD225KAT | AVX | |
| | | NLC453232T-220K | TDK | | GRM40X5R225K10 | Murata | |
| | 15 μ H | LQH32CN150K21 | Murata | 1 μ F | 0805ZD105KAT | AVX | |
| | | NLC453232T-150K | TDK | | GRM40X5R105K10 | Murata | |
| | 10 μ H | LQH32CN100K21 | Murata | 0.22 μ F | 0805ZD224KAT | AVX | |
| | | NLC453232T-100K | TDK | | GRM40X5R224K10 | Murata | |
| | 6.8 μ H | LQH32CN6R8K21 | Murata | 0.22 μ F | 0805ZD224KAT | AVX | |
| | | NLC453232T-6R8K | TDK | | GRM40X5R224K10 | Murata | |
| | 4.7 μ H | LQH32CN4R7K21 | Murata | 0.22 μ F | 0805ZD224KAT | AVX | |
| | | NLC453232T-4R7K | TDK | | GRM40X5R224K10 | Murata | |
| | 3 | 22 μ H | LQH43MN220K21 | Murata | 2.2 μ F | 0805YD225KAT | AVX |
| | | | NLC453232T-220K | TDK | | GRM40X5R225K16 | Murata |
| 15 μ H | | LQH43MN150K21 | Murata | 1 μ F | 0805YD105KAT | AVX | |
| | | NLC453232T-150K | TDK | | GRM40X5R105K16 | Murata | |
| 10 μ H | | LQH43MN100K21 | Murata | 0.22 μ F | 0805YC224KAT | AVX | |
| | | NLC453232T-100K | TDK | | GRM40X5R224K16 | Murata | |
| 6.8 μ H | | LQH43MN6R8K21 | Murata | 0.22 μ F | 0805YC224KAT | AVX | |
| | | NLC453232T-6R8K | TDK | | GRM40X5R224K16 | Murata | |
| 4.7 μ H | | LQH43MN4R7K21 | Murata | 0.27 μ F | 0805YC274KAT | AVX | |
| | | NLC453232T-4R7K | TDK | | GRM40X5R274K16 | Kemet | |
| 4 | | 22 μ H | LQH43MN220K21 | Murata | 1 μ F, 25V | 08053D105KAT | AVX |
| | | | NLC453232T-220K | TDK | | GRM40X5R105K25 | Kemet |
| | 15 μ H | LQH43MN150K21 | Murata | 1 μ F, 25V | 08053D105KAT | AVX | |
| | | NLC453232T-150K | TDK | | GRM40X5R105K25 | Kemet | |
| | 10 μ H | LQH43MN100K21 | Murata | 0.27 μ F | 08053C274KAT2A | AVX | |
| | | NLC453232T-100K | TDK | | GRM40X5R274K25 | Kemet | |
| | 6.8 μ H | LQH43MN6R8K21 | Murata | 0.27 μ F | 08053C274KAT | AVX | |
| | | NLC453232T-6R8K | TDK | | GRM40X5R274K25 | Kemet | |
| | 4.7 μ H | LQH43MN4R7K21 | Murata | 0.27 μ F | 08053C274KAT | AVX | |
| | | NLC453232T-4R7K | TDK | | GRM40X5R274K25 | Kemet | |

TABLE 5-1: RECOMMENDED INDUCTOR AND OUTPUT CAPACITOR VALUES (CONTINUED)

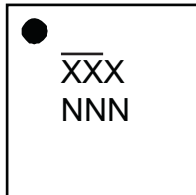
| Series LEDs | L | Part # | Manufacturer | Min. C _{OUT} | Part # | Manufacturer |
|-------------|-----------------|-----------------|--------------|-----------------------|----------------|--------------|
| 5, 6 | 22 μ H | LQH43MN220K21 | Murata | 0.22 μ F | 08053C224KAT | AVX |
| | | NLC453232T-220K | TDK | | GRM40X5R224K25 | Murata |
| | 15 μ H | LQH43MN150K21 | Murata | 0.22 μ F | 08053C224KAT | AVX |
| | | NLC453232T-150K | TDK | | GRM40X5R224K25 | Murata |
| | 10 μ H | LQH43MN100K21 | Murata | 0.27 μ F | 08053C274KAT | AVX |
| | | NLC453232T-100K | TDK | | GRM40X5R274K25 | Kemet |
| | 6.8 μ H | LQH43MN6R8K21 | Murata | 0.27 μ F | 08053C274KAT | AVX |
| | | NLC453232T-6R8K | TDK | | GRM40X5R274K25 | Kemet |
| 4.7 μ H | LQH43MN4R7K21 | Murata | 0.27 μ F | 08053C274KAT | AVX | |
| | NLC453232T-4R7K | TDK | | GRM40X5R274K25 | Kemet | |
| 7, 8 | 22 μ H | LQH43MN220K21 | Murata | 0.22 μ F | 0805DD224KAT | AVX |
| | | NLC453232T-220K | TDK | | GRM40X5R224K25 | Murata |
| | 15 μ H | LQH43MN150K21 | Murata | 0.22 μ F | 0805DD224KAT | AVX |
| | | NLC453232T-150K | TDK | | GRM40X5R224K25 | Murata |
| | 10 μ H | LQH43MN100K21 | Murata | 0.27 μ F | 08055C274KAT | AVX |
| | | NLC453232T-100K | TDK | | GRM40X5R274K25 | Kemet |
| | 6.8 μ H | LQH43MN6R8K21 | Murata | 0.27 μ F | 08055C274KAT | AVX |
| | | NLC453232T-6R8K | TDK | | GRM40X5R274K25 | Kemet |
| | 4.7 μ H | LQH43MN4R7K21 | Murata | 0.27 μ F | 08055C274KAT | AVX |
| | | NLC453232T-4R7K | TDK | | GRM40X5R274K25 | Kemet |

MIC2292/93

6.0 PACKAGING INFORMATION

6.1 Package Marking Information

8-Lead VDFN*



Example

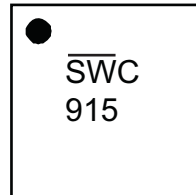


TABLE 6-1: MIC2292/93 PACKAGE MARKING CODES

| Part Number | Package | OVP | Product Code |
|---------------|---------|-----|--------------|
| MIC2292-15YML | DFN-8 | 15V | SWA |
| MIC2292-34YML | DFN-8 | 34V | SWC |
| MIC2293-15YML | DFN-8 | 15V | SZA |
| MIC2293-34YML | DFN-8 | 34V | SZC |

| | |
|---|---|
| <p>Legend:</p> <p>XX...X Product code or customer-specific information</p> <p>Y Year code (last digit of calendar year)</p> <p>YY Year code (last 2 digits of calendar year)</p> <p>WW Week code (week of January 1 is week '01')</p> <p>NNN Alphanumeric traceability code</p> <p>(e3) Pb-free JEDEC® designator for Matte Tin (Sn)</p> <p>* This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.</p> <p>•, ▲, ▼ Pin one index is identified by a dot, delta up, or delta down (triangle mark).</p> | <p>Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.</p> <p>Underbar (¯) and/or Overbar (˘) symbol may not be to scale.</p> |
|---|---|

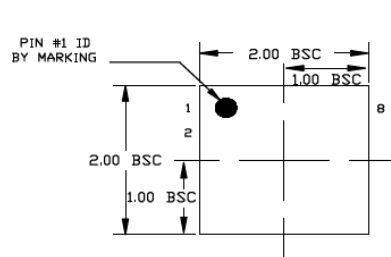
8-Lead 2 mm x 2 mm DFN Package Outline and Recommended Land Pattern

TITLE

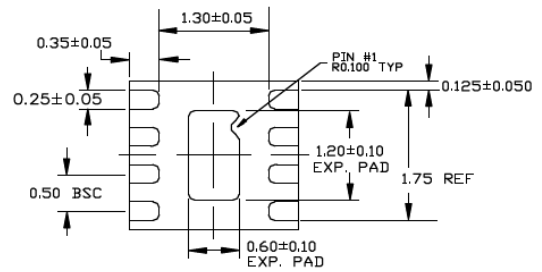
8 LEAD DFN 2x2mm PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING # DFN22-8LD-PL-1

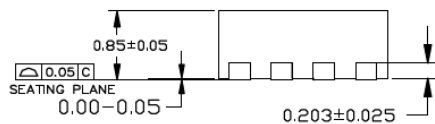
UNIT MM



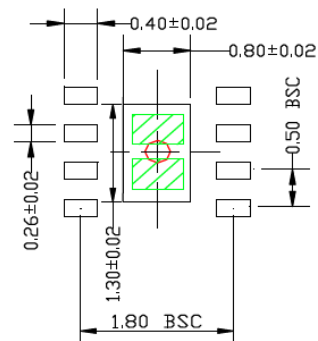
TOP VIEW
NOTE: 1, 2, 3



BOTTOM VIEW
NOTE: 1, 2, 3



END VIEW
NOTE: 1, 2, 3



RECOMMENDED LAND PATTERN
NOTE: 4, 5

NOTE:

1. MAX PACKAGE WARPAGE IS 0.05 MM
2. MAX ALLOWABLE BURR IS 0.076MM IN ALL DIRECTIONS
3. PIN #1 IS ON TOP WILL BE LASER MARKED
4. RED CIRCLE IN LAND PATTERN INDICATE THERMAL VIA, SIZE SHOULD BE 0.30-0.35MM IN DIAMETER AND SHOULD BE CONNECTED TO GND FOR MAX THERMAL PERFORMANCE
5. GREEN RECTANGLES (SHADED AREA) INDICATE SOLDER STENCIL OPENING ON EXPOSED PAD AREA. SIZE SHOULD BE 0.60x0.40 MM IN SIZE, 0.20 MM SPACING.

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>.

MIC2292/93

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (October 2021)

- Converted Micrel document MIC2292/93 to Microchip data sheet template DS20006598A.
- Minor grammatical corrections throughout.

MIC2292/93

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

| <u>PART NO.</u> | <u>-XX</u> | <u>X</u> | <u>XX</u> | <u>-XX</u> |
|--|--|----------------------------------|-----------|------------|
| Device | Feature | Junction Temperature Range | Package | Media Type |
| Device: | MIC2292: High-Frequency PWM White LED Driver with Internal Schottky Diode and OVP MIC2293: High-Frequency PWM White LED Driver with Internal Schottky Diode and OVP | | | |
| Feature: | 15 = 15V 34 = 34V | | | |
| Junction Temperature Range: | Y = -40°C to +125°C, RoHS Compliant | | | |
| Package: | ML = 8-Lead 2 mm x 2 mm x 0.9 mm DFN | | | |
| Media Type: | TR = 5,000/Reel | | | |

Examples:

a) MIC2292-15YML-TR: High-Frequency PWM White LED Driver with Internal Schottky Diode and OVP, 15V, -40°C to +125°C Junction Temperature Range, RoHS compliant, 8-Lead DFN 2 mm x 2 mm x 0.9 mm Package, 5,000/Reel

b) MIC2293-34YML-TR: High-Frequency PWM White LED Driver with Internal Schottky Diode and OVP, 15V, -40°C to +125°C Junction Temperature Range, RoHS compliant, 8-Lead DFN 2 mm x 2 mm x 0.9 mm Package, 5,000/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

MIC2292/93

NOTES:

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