

High Performance Step-Down DC/DC Controller with DC and PWM dimming up to 78V

1 Description

The iW380-4X is a DC/DC step-down controller with tight current regulation and exceptional dimming performance for LED lighting. It is designed to be used in the high-side switching buck topology up to 78V input voltage and up to 98% of output voltage/input voltage ratio.

The iW380-4X supports high resolution DC dimming and high resolution, high frequency PWM dimming. The PWM dimming is achieved by only turning on the buck converter during PWM dimming signal ON time. To support highest dimming resolution, the iW380 also embeds the shunt MOSFET driver to short LED string during PWM dimming signal OFF time. This provides in most accurate LED current control.

A dedicated light-off mode in the iW380-4X turns off the output current when the dimming signal input is less than the light-off threshold. In the light-off mode, the iW380-4X consumes minimum power while still monitoring the dimming inputs. If the dimming signal input becomes higher than the light-on threshold, the iW380-4X can immediately wake up and resume output current regulation.

2 Features

- Input DC voltage range: 22V ~ 78V
- Output/input voltage ratio: up to 98%
- Output power up to 150W
- Advanced dimming control
 - Supports DC dimming and PWM dimming
 - DC Dimming range: 12.5%-100%
 - PWM dimming range: 0% to 100%
 - PWM dimming mode supports high frequency PWM dimming
 - Embedded shunt MOSFET driver enables highest resolution in PWM dimming mode
- Constant-current (CC) line and load regulation <math>< \pm 3\%</math>
- Light-off current consumption <math>< 1\text{mA}</math>
- Auto dimming signal type detection on ADJ pin
- Rich protections:
 - V_{VIN} over/under voltage
 - Over current protection (OCP)
 - Over temperature protection (OTP)

3 Applications

- High performance DC/DC LED driver
- Stage Lighting

High Performance Step-Down DC/DC Controller with DC and PWM dimming up to 78V

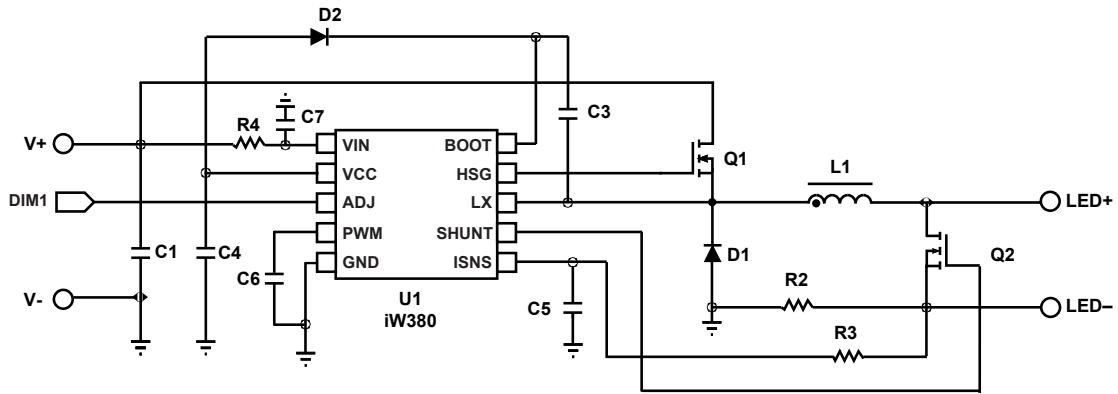


Figure 3.1 : iW380-4X Application Circuit with Shunt MOSFET for Highest Resolution Dimming

High Performance Step-Down DC/DC Controller with DC and PWM dimming up to 78V

4 Pinout Description

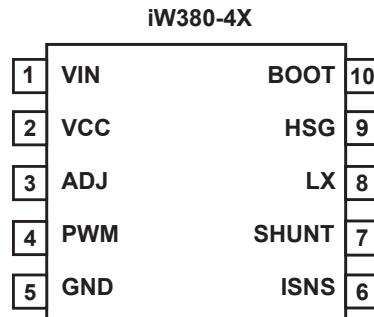


Figure 4.1 : 10-Lead SOIC Package

Pin Number	Pin Name	Type	Pin Description
1	VIN	Power	Power source and input voltage sensing
2	VCC	Power	IC power supply
3	ADJ	Analog Input	DC dimming signal input
4	PWM	Analog Input	PWM dimming signal input
5	GND	Ground	Ground reference
6	ISNS	Analog Input	Buck inductor current sensing
7	SHUNT	Analog Input	LED-short MOSFET driver
8	LX	Analog Input	Buck switching node, high-side power MOSFET source
9	HSG	Analog Output	High-side power MOSFET gate drive
10	BOOT	Power	Bootstrap high-side driver power supply

High Performance Step-Down DC/DC Controller with DC and PWM dimming up to 78V

5 Absolute Maximum Ratings

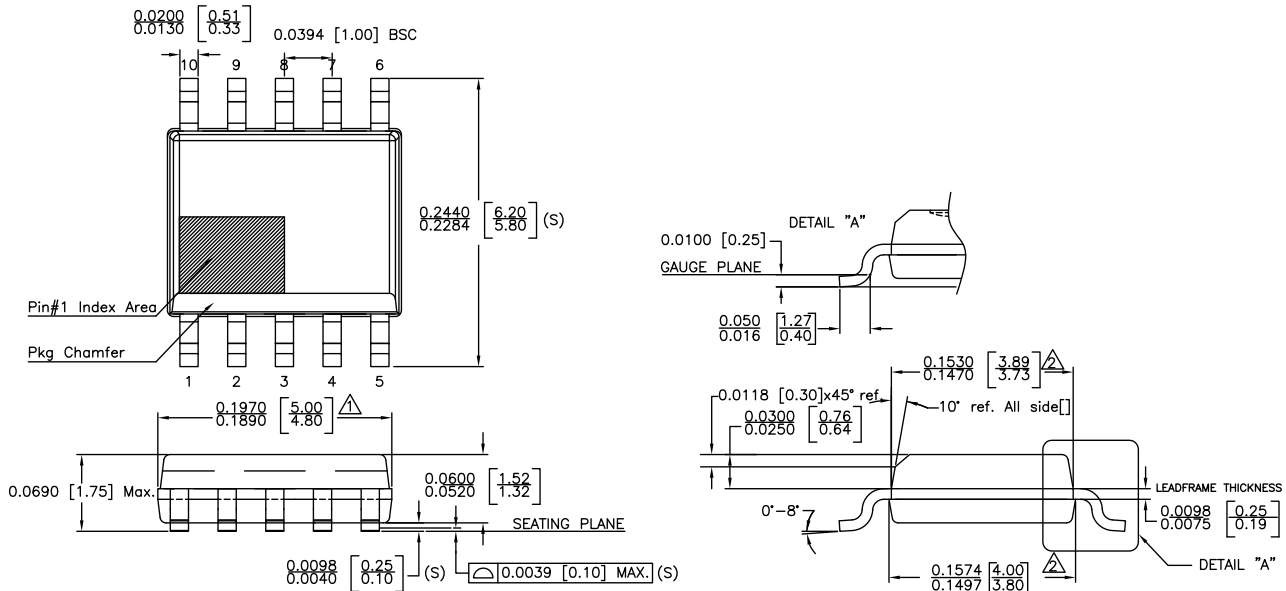
Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded.

Parameter	Symbol	Value	Units
DC supply voltage range	V_{VCC}	-0.3 to 6.5	V
Continuous DC supply at VCC pin	I_{VCC}	20	mA
VIN pin		-0.3 to 82	V
ADJ and PWM pin		-0.3 to 6.5	V
ISNS pin		-0.3 to 6.5	V
SHUNT pin		-0.3 to 6.5	V
LX pin		-0.7 to 82	V
HSG pin (Note 1)		-0.3 to 87	V
BOOT pin (Note 1)		-0.3 to 87	V
Maximum junction temperature	T_{JMAX}	150	°C
Operating junction temperature	T_{JOPT}	-40 to 150	°C
Storage temperature	T_{STG}	-65 to 150	°C
Thermal resistance junction to ambient	θ_{JA}	209	°C/W
ESD rating per JEDEC JS-001-2017		±2000	V
Latch-up test per JESD78E		±100	mA

Note 1. BOOT pin and HSG pin respect to LX pin < 5.5V.

High Performance Step-Down DC/DC Controller with DC and PWM dimming up to 78V

6 Physical Dimensions



NOTE :

- △ DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .006 INCH PER SIDE.
- △ DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .010 INCH PER SIDE.
- 3. PACKAGE DIMENSION CONFORM TO JEDEC SPECIFICATION MS-012 EXCEPT LEAD PITCH.
- 4. LEAD SPAN/STAND OFF HEIGHT/COPLANARITY ARE CONSIDERED AS SPECIAL CHARACTERISTIC.(S)
- 5. CONTROLLING DIMENSIONS IN INCHES.[mm]
- 6. PHYSICAL APPEARANCE OF PACKAGE (E-PIN, DIMPLE, CHAMFER) MAY VARY DUE TO ASSEMBLY TOOLINGS

STATUS:	
RELEASED	
TERMINAL FINISH:	
PPF or 100% Sn	
TITLE:	
SOP 10L 150MIL PACKAGE OUTLINE	
REV:	REVISION NOTE:
C	STANDARDIZED P0D

Figure 6.1 : 10-Lead SOIC Package Outline Drawing

7 Ordering Information

Part Number	Status	Options	Package	Description
iW380-40	Active	V_{VIN} startup = 43V, ADJ hysteresis = 0.05% for PWM signal, 0.5% for analog signal	SOIC-10	Tape & Reel ¹
iW380-40B	Recommended for New Designs	V_{VIN} startup = 43V, ADJ hysteresis = 0.05% for PWM signal, 0.5% for analog signal	SOIC-10	Tape & Reel ¹
iW380-41	Active	V_{VIN} startup = 49V, ADJ hysteresis = 0.05% for PWM signal, 0.5% for analog signal	SOIC-10	Tape & Reel ¹

Note 1. Tape and reel packing quantity is 2,500/reel. Minimum packing quantity is 2,500.

High Performance Step-Down DC/DC Controller with DC and PWM dimming up to 78V

IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers skilled in the art designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only for development of an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising out of your use of these resources. Renesas’ products are provided only subject to Renesas’ Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

© 2022 Renesas Electronics Corporation. All rights reserved.

RoHS Compliance

Dialog Semiconductor’s suppliers certify that its products are in compliance with the requirements of Directive 2011/65/EU of the European Parliament on the restriction of the use of certain hazardous substances in electrical and electronic equipment. RoHS certificates from our suppliers are available on request.

(Rev.1.0 Mar 2020)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.