

Low Voltage (12V_{AC}) Dual-Mode Digital Control Dimmable LED Driver

1 Description

The iW3662 advanced digital LED driver, designed for low voltage AC and DC input voltages, combines support for both low voltage LEDs and high voltage Chip-On-Board (COB) LED modules at power levels up to 8W.

The iW3662 features two selectable operating modes to accommodate both low voltage LEDs and high voltage COB LEDs in one part. The Boost-Buck mode provides a boost converter to step-up the input voltage to an intermediate voltage, which a second buck regulator stage steps down to create a highly efficient, constant current LED controller. The Boost-Linear mode, designed to work with high voltage COB LEDs, steps up the input voltage to a higher voltage than in the Boost-Buck mode, then, with the buck converter now disabled and reconfigured into a linear current regulator, provides a highly accurate constant current sink to drive the LEDs.

The highly configurable digital control circuitry allows the end user to specify one part for multiple applications, covering the bulk of low voltage LED replacement bulb applications. Using Dialog's Flickerless™ technology allows the iW3662 to operate without visible flicker and operate with a broad range of input dimmer types (leading edge, trailing edge and digital) while effectively detecting and managing both electronic and magnetic transformers automatically. When the iW3662 detects a magnetic transformer, an additional output drives an external switch that can add extra input capacitance needed to ensure proper operation, easing the design of replacement bulbs compatible with both transformer types.

The iW3662 also integrates an internal bleeder FET to add a dynamic load to the input to optimize electronic transformer performance during low dimming ranges. Also, full protection features include over-temperature protection derating, which lowers the output current drive to the LEDs when an over-temperature event occurs to maintain light output even during a fault condition. These protection features provide robust and functional solutions for low voltage LED replacement lighting.

2 Features

- 10 to 24V_{DC} input voltage or 12V_{AC} input voltage
- Output power up to 8W
- Supports magnetic or electronic transformers
- Two operational modes
 - » Boost-Buck - low voltage LED arrays
 - » Boost-Linear - high voltage COB LEDs
- Integrated boost controller and buck/linear current regulator controller
- **Flickerless™** technology for flicker-free LED dimming
- Wide dimmer compatibility (leading edge, trailing edge, and digital)
- Deep dimming to 5% (depends on dimmers)
- Power factor > 0.7
- Tight LED current regulation (±5%) in both modes
- Optimized dimming curve for maximizing dimmer and electronic transformer compatibility
- Over-temperature protection derating
- OVP, OCP, and open load protection
- 16-lead QFN (4x4mm) or 16-lead TSSOP

3 Applications

- V_{AC} or V_{DC} input dimmable LED lighting
- Optimized for use with all transformers, including electronic and magnetic
- MR16 bulbs, AR111 fixtures/bulbs



Low Voltage (12V_{AC}) Dual-Mode Digital Control Dimmable LED Driver

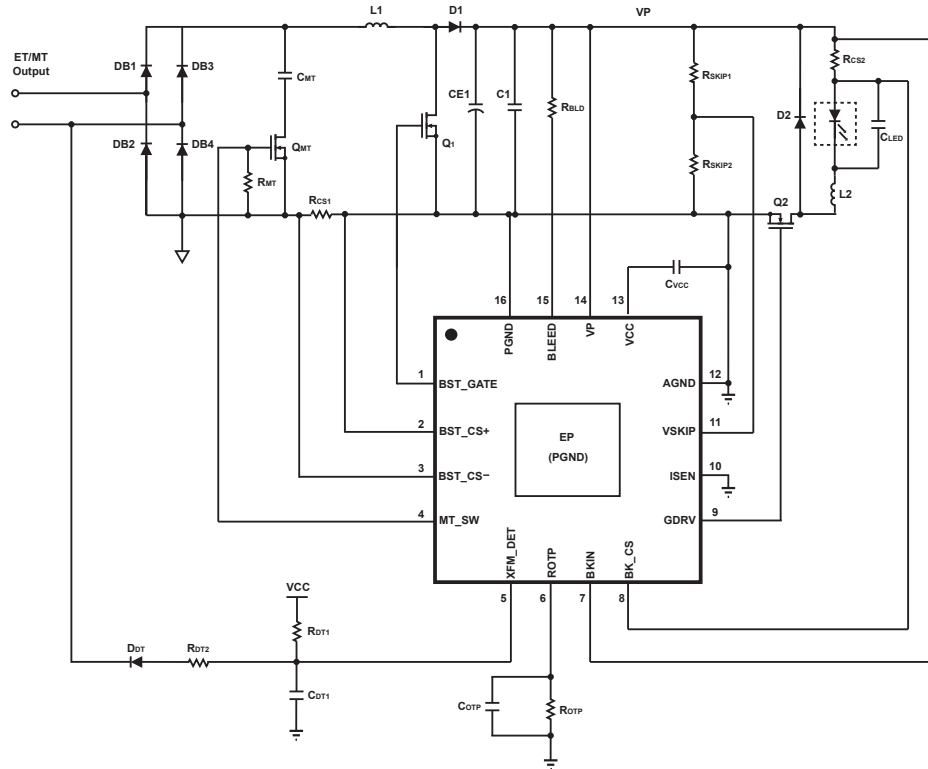


Figure 3.1 : Typical Schematic for 12V/350mA (4W) Boost-Buck Configuration

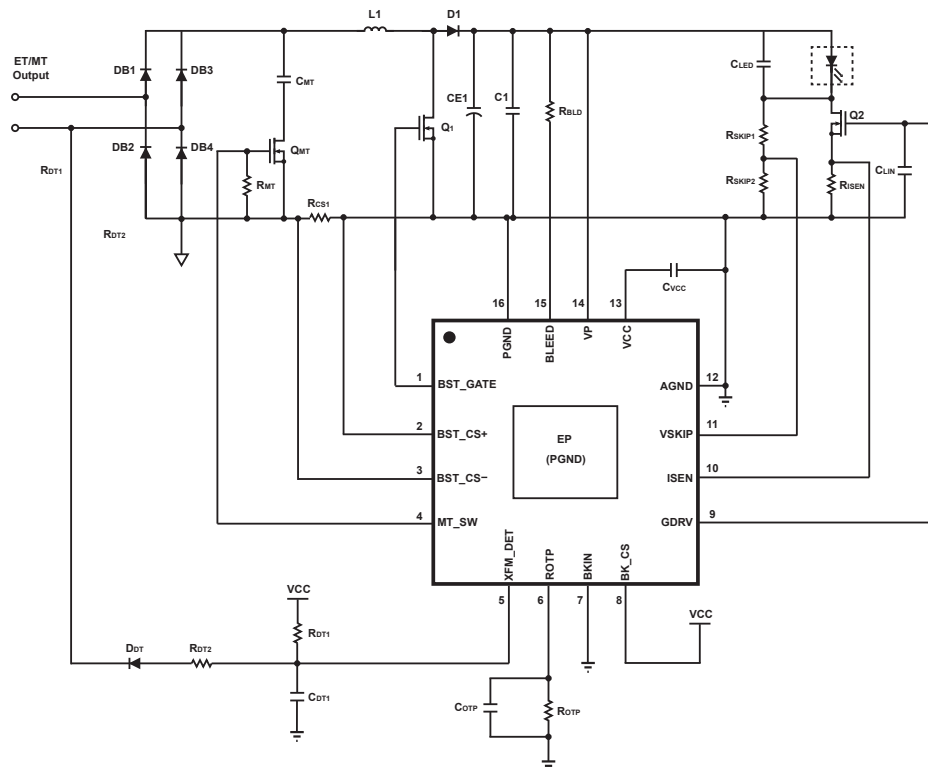


Figure 3.2 : Typical Schematic for 38V/105mA (4W) Boost-Linear Configuration

Low Voltage (12V_{AC}) Dual-Mode Digital Control Dimmable LED Driver

4 Pinout Description

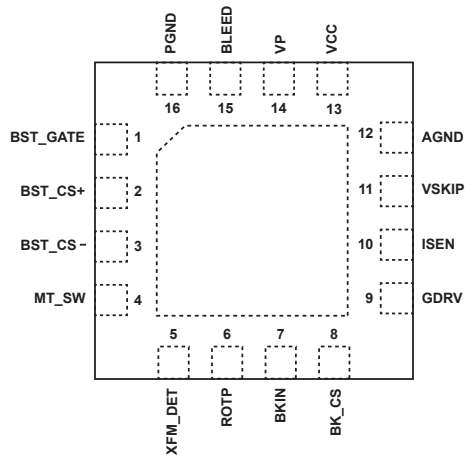


Figure 4.1 : 16-Lead QFN Package

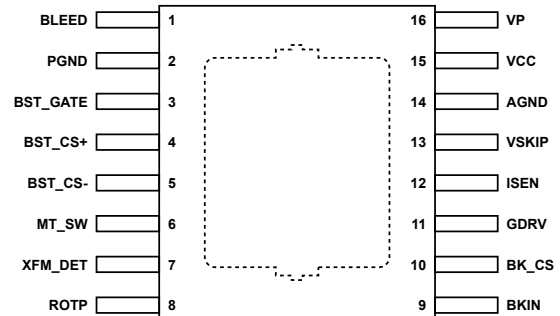


Figure 4.2 : 16-Lead TSSOP Package

Pin Number		Pin Name	Type	Pin Description
QFN	TSSOP			
1	3	BST_GATE	Output	Gate driver for boost converter.
2	4	BST_CS+	Input	Boost current sense positive input.
3	5	BST_CS-	Input	Boost current sense negative input.
4	6	MT_SW	Output	Indicator of MT/ET detection with PMOS open drain output. MT: MT_SW = V _{CC} ; ET: MT_SW = open drain, connect pull-down resistor to Ground.
5	7	XFM_DET	Input	MT/ET detection input. Internal 1MΩ pull-down to AGND
6	8	ROTP	Input	OTP threshold program pin. Used to set the power derating temperature that is determined by an external resistor tied to AGND.
7	9	BKIN	Input	Buck power supply input. It is also used to configure the operation mode. V _{BKIN} > 2V: Boost-Buck mode; V _{BKIN} < 2V: Boost-Linear mode
8	10	BK_CS	Input	Buck current sense input. Connect resistor RCS2 from this pin to BKIN to define nominal average output current. It is also used to configure the skip function when in Boost-Linear mode. V _{BK_CS} < 2V: Disable skip function in Boost-Linear mode. V _{BK_CS} > 2V: Enable skip function in Boost-Linear mode.
9	11	GDRV	Output	Dual function: Boost-Buck mode: Gate driver for Buck FET. Boost-Linear mode: Gate driver for linear current regulator.

Low Voltage (12V_{AC}) Dual-Mode Digital Control Dimmable LED Driver

Pin Number		Pin Name	Type	Pin Description
QFN	TSSOP			
10	12	ISEN	Input	Current sense input for the linear current regulator in Boost-Linear mode. In Boost-Buck mode, used to enable/disable DCM operation. VISEN > 2V: Disable DCM function in Boost-Buck mode. VISEN < 2V: Enable DCM function in Boost-Buck mode.
11	13	VSKIP	Input	Skip voltage threshold set pin.
12	14	AGND	Ground	Chip ground.
13	15	VCC	Output	LDO 5V output. Connect a 4.7μF capacitor typically to AGND.
14	16	VP	Power	Chip power supply input.
15	1	BLEED	Output	Input for the internal bleeder FET. Internal 1MΩ resistor to VP. See Section 9.5 for more details.
16	2	PGND	Ground	Power ground for bleeder FET.
		EP	Ground	Exposed PAD. It is internally tied to PGND.

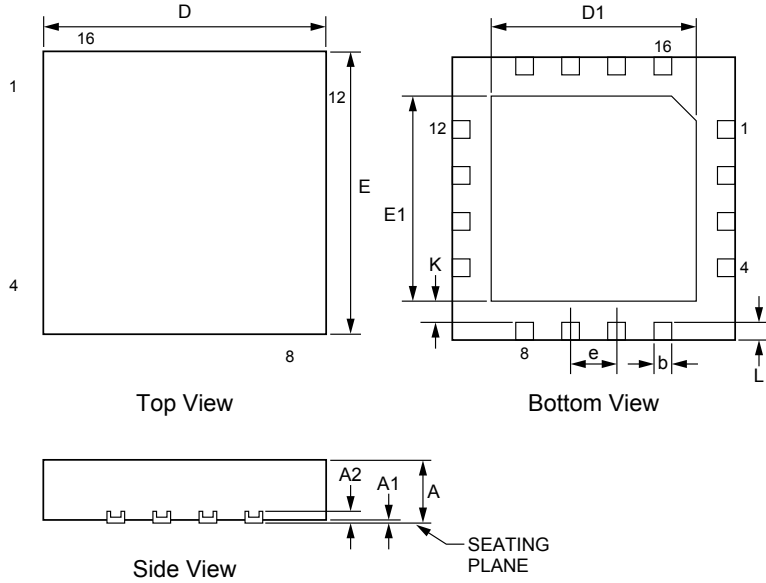
5 Absolute Maximum Ratings

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

Parameter	Symbol	Value	Units	
VP to AGND		-0.3 to 60	V	
BLEED, VSKIP to AGND		-0.3 to V _P	V	
BKIN, BK_CS to AGND		-0.3 to V _P	V	
BST_CS- to AGND		-5 to 0.3	V	
XFM_DET, MT_SW to AGND		-0.3 to 6.5	V	
Other pins to AGND		-0.3 to 6.5	V	
Voltage difference between BKIN and BK_CS		-6.5 to 6.5	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 [Still Air]	θ _{JA}	QFN4x4	98	°C/W
		TSSOP16	148	
ESD rating per JEDEC JESD22-A114		±2,000	V	

Low Voltage (12V_{AC}) Dual-Mode Digital Control Dimmable LED Driver

6 Physical Dimensions



	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.031	0.035	0.80	0.90
A1	0.0	0.002	0.00	0.05
A2	0.008 REF		0.20 REF	
b	0.010	0.014	0.25	0.35
D	0.157 BSC		4.00 BSC	
D1	0.110	0.118	2.80	3.00
E	0.157 BSC		4.00 BSC	
E1	0.110	0.118	2.80	3.00
e	0.026 BSC		0.65 BSC	
K	0.0098 REF		0.25 REF	
L	0.008	0.016	0.20	0.40

Compliant to JEDEC Standard MS12F

Controlling dimensions are in millimeters; inch dimensions are for reference only

This product is RoHS compliant and Halide free.

Soldering Temperature Resistance:

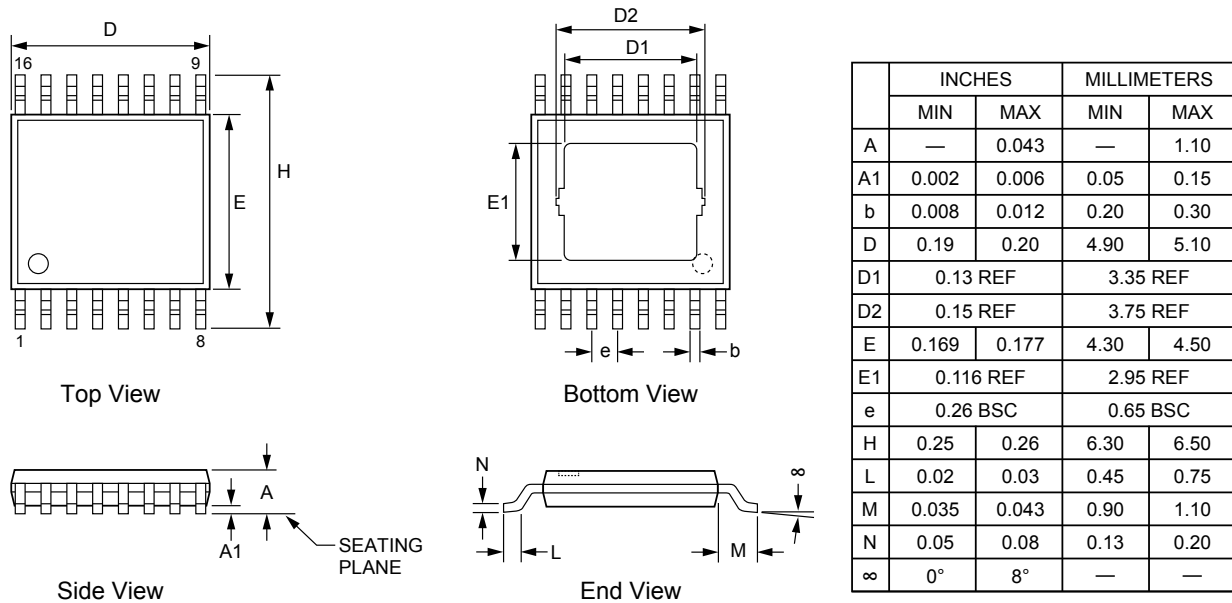
[a] Package is IPC/JEDEC Std 020D Moisture Sensitivity Level 1

[b] Package exceeds JEDEC Std No. 22-A111 for Solder Immersion Resistance; package can withstand 10 s immersion < 260 °C

Figure 6.1 : 16-Lead QFN 4x4mm Package

Low Voltage (12V_{AC}) Dual-Mode Digital Control Dimmable LED Driver

Physical Dimensions (continued)



Compliant to JEDEC Standard MS12F

Controlling dimensions are in inches; millimeter dimensions are for reference only

This product is RoHS compliant and Halide free.

Soldering Temperature Resistance:

[a] Package is IPC/JEDEC Std 020D Moisture Sensitivity Level 1

[b] Package exceeds JEDEC Std No. 22-A111 for Solder Immersion Resistance; package can withstand immersion < 260°C

The package top may be smaller than the package bottom. Dimensions D and E are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.

Figure 6.2 : 16-Lead TSSOP Package

7 Ordering Information

Part no.	Options	Package	Description
iW3662-00-QFN5	Low voltage SSL controller (12V _{AC} or 10-24V _{DC}) in QFN 16-lead, 4x4mm package optimized for boost buck	QFN16, 4x4	Tape & Reel ¹
iW3662-01-QFN5	Low voltage SSL controller (12V _{AC} or 10-24V _{DC}) in QFN 16-lead, 4x4mm package optimized for boost linear	QFN16, 4x4	Tape & Reel ¹
iW3662-00-TSE16	Low voltage SSL controller (12V _{AC} or 10-24V _{DC}) in TSSOP 16-lead package. See Note 2.	TSSOP16	Tape & Reel ¹

Note 1: 7-inch Tape & Reel packing quantity is 1,500/reel. Minimum ordering quantity is 1,500.

Note 2: Please call Dialog for availability.

Low Voltage (12V_{AC}) Dual-Mode Digital Control Dimmable LED Driver

Disclaimer

Information in this document is believed to be accurate and reliable. However, Dialog Semiconductor does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information. Dialog Semiconductor furthermore takes no responsibility whatsoever for the content in this document if provided by any information source outside of Dialog Semiconductor.

Dialog Semiconductor reserves the right to change without notice the information published in this document, including without limitation the specification and the design of the related semiconductor products, software and applications.

Applications, software, and semiconductor products described in this document are for illustrative purposes only. Dialog Semiconductor makes no representation or warranty that such applications, software and semiconductor products will be suitable for the specified use without further testing or modification. Unless otherwise agreed in writing, such testing or modification is the sole responsibility of the customer and Dialog Semiconductor excludes all liability in this respect.

Customer notes that nothing in this document may be construed as a license for customer to use the Dialog Semiconductor products, software and applications referred to in this document. Such license must be separately sought by customer with Dialog Semiconductor.

All use of Dialog Semiconductor products, software and applications referred to in this document are subject to [Dialog Semiconductor's Standard Terms and Conditions of Sale](#), available on the company website (www.dialog-semiconductor.com) unless otherwise stated.

Dialog and the Dialog logo are trademarks of Dialog Semiconductor plc or its subsidiaries. All other product or service names are the property of their respective owners.

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.

Contacting Dialog Semiconductor

United Kingdom (Headquarters)
Dialog Semiconductor (UK) LTD
Phone: +44 1793 757700

Germany
Dialog Semiconductor GmbH
Phone: +49 7021 805-0

The Netherlands
Dialog Semiconductor B.V.
Phone: +31 73 640 8822

Email
info_pcbg@diasemi.com

North America
Dialog Semiconductor Inc.
Phone: +1 408 845 8500

Japan
Dialog Semiconductor K. K.
Phone: +81 3 5425 4567

Taiwan
Dialog Semiconductor Taiwan
Phone: +886 281 786 222

Web site:
www.dialog-semiconductor.com

Singapore
Dialog Semiconductor Singapore
Phone: +65 64 8499 29

Hong Kong
Dialog Semiconductor Hong Kong
Phone: +852 3769 5200

Korea
Dialog Semiconductor Korea
Phone: +82 2 3469 8200

China (Shenzhen)
Dialog Semiconductor China
Phone: +86 755 2981 3669

China (Shanghai)
Dialog Semiconductor China
Phone: +86 21 5424 9058

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [LED Display Drivers](#) category:

Click to view products by [Dialog Semiconductor](#) manufacturer:

Other Similar products are found below :

[MAP9000QNRH](#) [AP5726WUG-7](#) [AL8806QMP-13](#) [AP5726FDCG-7](#) [AS3693B-ZTQT](#) [AP5725WUG-7](#) [MAX139EQH+D](#) [STP16DP05PTR](#)
[STP16CPP05PTR](#) [STP16CPP05XTTR](#) [LV5236VZ-TLM-H](#) [BP9911CC](#) [ZXLD1366QEN8TC](#) [MT7725D](#) [TX6143](#) [SY6813PEC](#) [SD1002L4](#)
[AW3643CSR](#) [MP3370GN-Z](#) [LA2284L-G09-T](#) [SEDA](#) [SCT2027CSSG](#) [LYT3315D](#) [LYT3324D](#) [LYT4211E2](#) [LYT4214E2](#) [LYT4215E2](#)
[LYT4217E2](#) [LYT4218E2](#) [LYT4222E](#) [LYT4317E2](#) [LYT4321E](#) [LYT4323E](#) [LYT4324E3](#) [LYT4326E3](#) [TPS92020DR](#) [TPS92691PWPR](#)
[BCR420U](#) [HV9801ALG-G](#) [IS31FL3199-QFLS2-TR](#) [IS31FL3731-QFLS2-TR](#) [CAT4238TD](#) [SCT2001ASIG](#) [SCT2024CSTG](#) [SCT2167CSOG](#)
[SCT2167CSSG](#) [STP16CPPS05XTTR](#) [TLE4241GMFUMA1](#) [ICM7212MIQH+D](#) [ICM7212AIQH+D](#)