Single-Stage SSL LED Driver with Integrated High Voltage MOSFET for Dimmable Retrofit Lamps up to 15W

1 Description

The iW3658 is a highly integrated, high-performance off-line power supply controller for phase-cut dimmable LED luminaires. It uses patented ***PrimAccurate™*** primary-side sensing technology to regulate output current accurately without the need for a feedback circuit. The iW3658 operates at boundary conduction mode to achieve high efficiency and low EMI.

With advanced dimming control technology, the iW3658 can operate with most wall dimmers including leading-edge dimmers (R-type or R-L type) and trailing-edge dimmers (R-C type). The iW3658 operates in buck-boost mode to regulate current to the output LEDs.

Dialog's innovative technology maximizes the iW3658 performance with an integrated high-voltage MOSFET in an SO-7 package, which provides an extra pin spacing between the high voltage MOSFET's drain and low voltage pins. With Dialog's proprietary V_{CC} regulation circuit, the iW3658's V_{CC} level is well maintained regardless of the LED voltage and dimmer phase angle, which eliminates the possibility of low end flickering.

2 Features

- Isolated/non-isolated off-line $120V_{AC}$/$230V_{AC}$ LED driver up to 15W (Note 1)
- Wide line frequency range (45Hz – 66Hz)
- Excellent dimmer compatibility
  - » Leading-edge dimmer
  - » Trailing-edge dimmer
- Low BOM cost
- Integrated high-voltage MOSFET
- Single-winding inductor
- Internal start-up without the need for high voltage circuit
- Closed-loop constant current regulation
- Built-in LED current derating at high temperature
- Built-in over-temperature shut-down
- LED open and short protection
- Fast start-up (< 0.5s without dimmer)
- Resonant control to achieve high efficiency (typical > 85%)
- Supports Buck-Boost topology

3 Applications

- Dimmable LED retrofit lamps up to 15W (Note 1)
  - » A-style, BR, GU and PAR
- Fits in E26/27 Socket for All-Glass Lamps

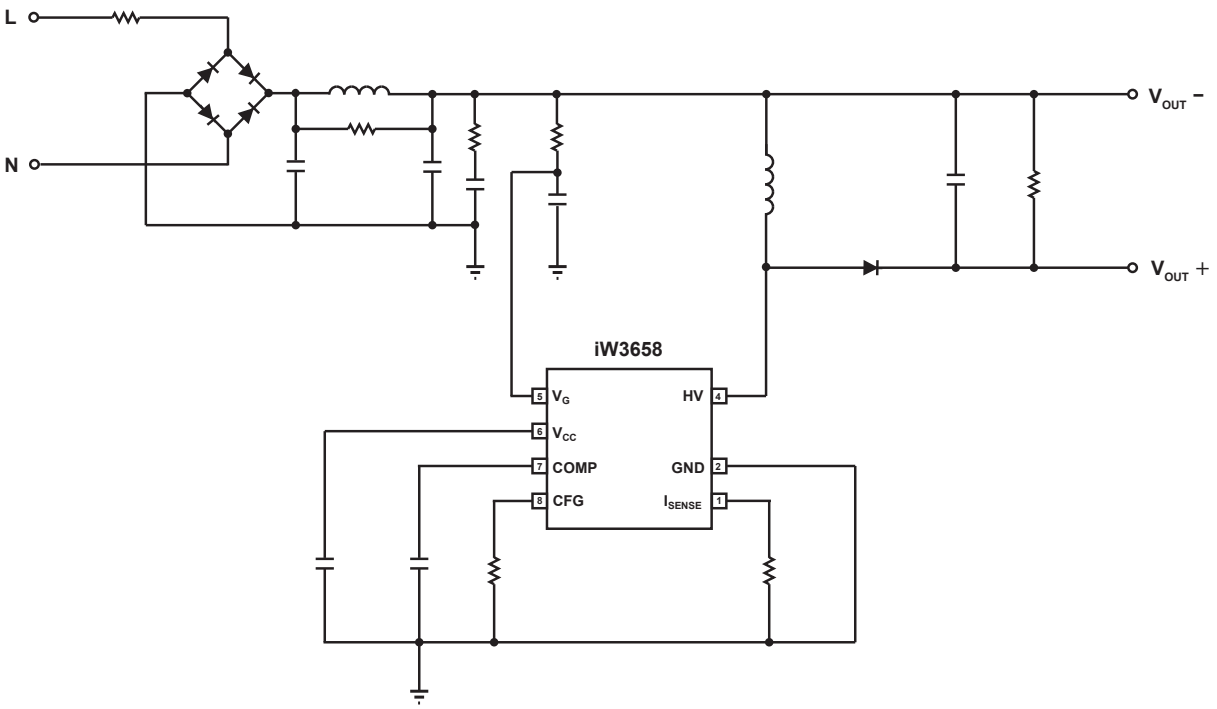


Figure 3.1 : iW3658 Typical Application Circuit

Note 1 : For output power above 12W designs, care should be taken to verify the thermal and reliability constraints on the IC. An IC temperature below 120°C is recommended for proper IC operation.

4 Pinout Description

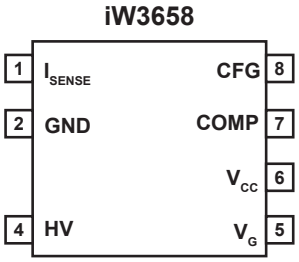


Figure 4.1 : 7-Lead SO Package

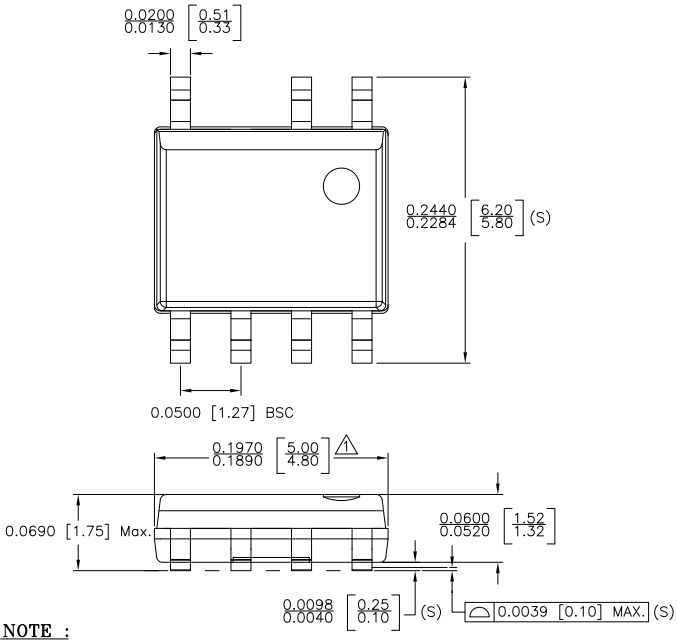
Pin Number	Pin Name	Type	Pin Description
1	I_{SENSE}	Analog	Current sense
2	GND	Ground	Ground reference
4	HV	Analog	Internal high voltage MOSFET drain
5	V_G	Analog	Internal high voltage MOSFET gate
6	V_{CC}	Power Input	Power supply to control logic and MOSFET drive
7	COMP	Analog	Constant current regulation loop compensation
8	CFG	Analog	OVP level configuration

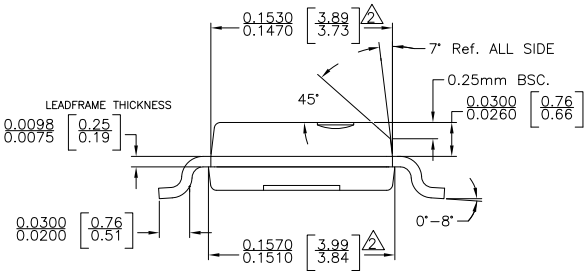
5 Absolute Maximum Ratings

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

Parameter	Symbol	Value	Units
DC supply voltage range (pin 6)	V_{CC}	-0.3 to 6.0	V
V_G (pin 5)		-0.3 to 18.0	V
COMP (pin 7)		-0.3 to 6.0	V
HV (pin 4)		500 or 650	V
I_{SENSE} (pin 1)		-0.3 to 6.0	V
CFG (pin 8)		-0.3 to 6.0	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}	170	°C/W
ESD rating per JEDEC JESD22-A114		± 2000	V
Latch-up test per JESD78D		± 100	mA

6 Physical Dimensions





NOTE :

1. DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .006 INCH PER SIDE.
2. 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
4. LEAD SPAN/STAND OFF HEIGHT/COPLANARITY ARE CONSIDERED AS SPECIAL CHARACTERISTIC.(S)
5. CONTROLLING DIMENSIONS IN INCHES.[mm]

STATUS: RELEASED	SCALE: DO NOT SCALE
TERMINAL FINISH: 100% Sn or NiPdAu (PPF)	
TITLE: 7 SOIC (NO PIN 3) PACKAGE OUTLINE	
REV: C	REVISION NOTE: ADD PACKAGE CHAMFER — DATE: 01–JUNE–2015

7 Ordering Information

Part no.	Options	Package	Description
iW3658-00C[1] iW3658-00D	120V_{AC} Input, 500V/3A MOSFET	SO-7	Tape & Reel[2]
iW3658-06D	120V_{AC} Input, 500V/2A MOSFET	SO-7	Tape & Reel[2]
iW3658-20[1] iW3658-20D	120V_{AC} Input, 500V/3A MOSFET, optimized for high power factor	SO-7	Tape & Reel[2]
iW3658-21[1] iW3658-21D	230V_{AC} Input, 650V/2A MOSFET, optimized for high power factor	SO-7	Tape & Reel[2]
iW3658-26D	120V_{AC} Input, 500V/2A MOSFET, optimized for high power factor	SO-7	Tape & Reel[2]
iW3658-30[1] iW3658-30D	120V_{AC} Input, 500V/3A MOSFET, optimized for filament load	SO-7	Tape & Reel[2]
iW3658-31[1] iW3658-31D	230V_{AC} Input, 650V/2A MOSFET, optimized for filament load	SO-7	Tape & Reel[2]
iW3658-36D	120V_{AC} Input, 500V/2A MOSFET, optimized for filament load	SO-7	Tape & Reel[2]

Note 1: Not recommended for new designs; use the -xxD version.

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

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