AC/DC Digital Power Controller for High Power Factor Dimmable LED Drivers

1 Description

The iW3623 is a high-performance AC/DC off-line power supply controller for LED luminaires. The iW3623 combines power factor correction and LED current regulation into one controller. It achieves PF > 0.95 and THD < 10% for 100–277V_{AC} input voltage range.

The iW3623 operates in quasi-resonant mode to provide high efficiency. The device uses Dialog's advanced ***PrimAccurate***™ primary-side sensing technology to achieve excellent line and load regulation without a secondary-feedback circuit. In addition, the iW3623's pulse-by-pulse waveform analysis technology allows accurate LED current regulation. The iW3623 maintains stability over all operating conditions without the need for loop compensation components.

2 Features

- Isolated AC/DC off-line LED driver
- Power factor > 0.95 for wide input voltage range 100 – 277V_{AC}
- Total harmonic distortion (THD) < 10%
- Under 5% 100Hz/120Hz output current ripple
- Resonant control to achieve high efficiency
- LED current foldback with external NTC
- Small size design
  - » Small size input bulk capacitor
  - » Small size output capacitor
  - » Small transformer
- ***PrimAccurate***™ primary-side sensing eliminates the need for optocoupler feedback and simplifies design
- Tight LED current regulation ± 5%
- Under 0.5 second start-up time
- Hot-plug LED module support
- Multiple protection features:
  - » LED open circuit protection
  - » Single-fault protection
  - » Over-current protection
  - » LED short-circuit protection
  - » Current sense-resistor-short-circuit protection
  - » Input over-voltage and brown-out protection

3 Applications

- Non-dimmable LED lamps and luminaires
- Optimized for up to 45W output power

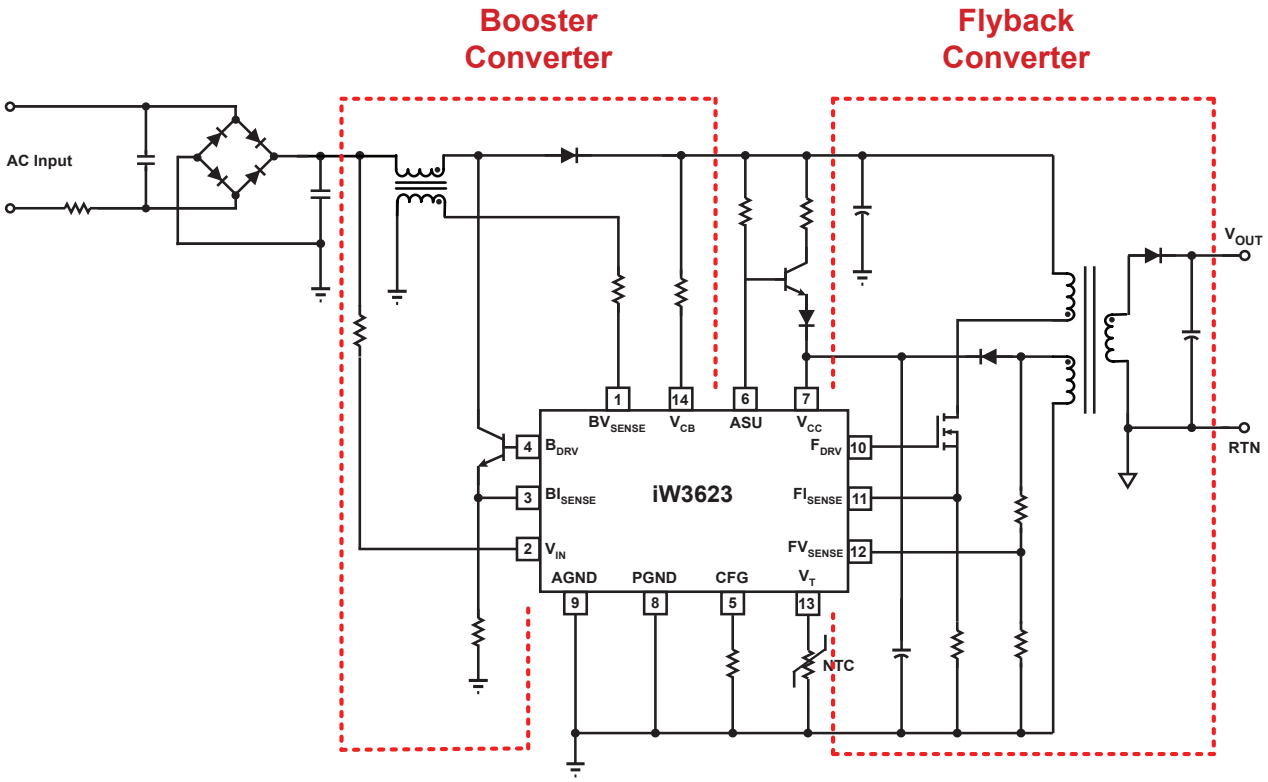


Figure 3.1 : iW3623 Typical Application Circuit

4 Pinout Description

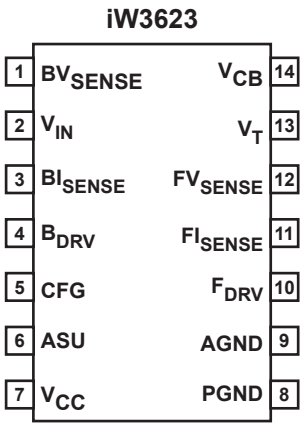


Figure 4.1 : 14-Lead SOIC Package

Pin Number	Pin Name	Type	Pin Description
1	BV_{SENSE}	Analog Input	Boost inductor voltage feedback
2	V_{IN}	Analog Input	Rectified AC line voltage feedback
3	BI_{SENSE}	Analog Input	Boost current sense (used for cycle-by-cycle peak current limit)
4	B_{DRV}	Output	Base drive for boost BJT
5	CFG	Analog In/Out	Chooses input start-up voltage and brown-out shutdown voltage
6	ASU	Output	Active start-up control
7	V_{CC}	Power	Power supply for control logic and voltage sense for power-on reset circuitry. A decoupling capacitor of 0.1µF or so should be connected between the V_{CC} pin and GND.
8	PGND	Ground	Power ground
9	AGND	Ground	Signal ground
10	F_{DRV}	Output	Gate drive for flyback MOSFET
11	FI_{SENSE}	Analog Input	Primary current sense (used for cycle-by-cycle peak current control and limit)
12	FV_{SENSE}	Analog Input	Auxiliary voltage sense (used for primary-side regulation and ZVS)
13	V_T	Analog Input	Output power limit and shutdown control
14	V_{CB}	Analog Input	Boost output voltage feedback

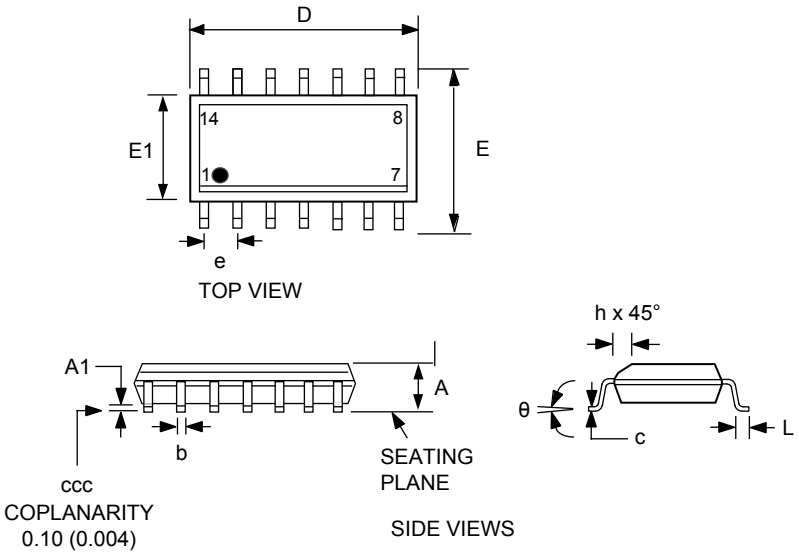
5 Absolute Maximum Ratings

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 7)	V_{CC}	-0.3 to 18	V
F_{DRV} output (pin 10)		-0.3 to 18	V
B_{DRV} output (pin 4)		-0.3 to 4.0	V
CFG input (pin 5)		-0.3 to 4.0	V
CFG output (pin 5)		-0.3 to 18	V
FV_{SENSE} input (pin 12, I ≤ 10mA)		-0.7 to 4.0	V
BV_{SENSE} input (pin 1, I ≤ 3mA)		-0.7 to 4.0	V
V_{IN} input (pin 2)		-0.3 to 18	V
V_{CB} input (pin 14)		-0.3 to 18	V
FI_{SENSE} input (pin 11)		-0.3 to 4.0	V
BI_{SENSE} input (pin 3)		-0.3 to 4.0	V
ASU output (pin 6)		-0.3 to 18	V
V_T input (pin 13)		-0.3 to 4.0	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-PCB Board Surface Temperature	ψ_{JB}	45	°C/W
ESD rating per JEDEC JESD22-A114		±2,000	V
Latch-up test per JESD78A		±100	mA

6 Physical Dimensions

14-Lead SOIC Package



Symbol	Inches		Millimeters	
	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
b	0.013	0.020	0.33	0.51
c	0.007	0.010	0.19	0.25
D	0.337	0.344	8.55	8.75
E1	0.150	0.157	3.80	4.00
E	0.228	0.244	5.80	6.20
e	0.050 BSC		1.27 BSC	
L	0.016	0.050	0.40	1.27
h	0.010	0.020	0.25	0.50
θ	0°	8°	0°	8°
ccc	0.004		0.10	

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 10 s immersion < 260˚C

Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15 mm per end. Dimension E does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25 mm per side.

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 6.1 : 14-Lead SOIC Package

7 Ordering Information

Part no.	Options	Package	Description
iW3623-00		SOIC-14	Tape & Reel[1]

Note 1: Tape & Reel packing quantity is 2,500/reel. Minimum ordering quantity is 2,500.

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