

1.0 General Description

1.1 Description

The G7616 is a two-stage, high-performance AC/DC offline power supply controller for dimmable LED luminaires. It applies advanced digital control technology to detect the dimmer type and phase, which provides dynamic impedance to interface the dimmer and control the LED brightness at the same time. The G7616 eliminates visible flicker in the entire dimming range and minimizes low frequency output ripple current.

With advanced dimmer detection technology, the G7616 can operate with most wall dimmers including leading-edge dimmers (R-type or R-L type) and trailing-edge dimmers (R-C type). In addition, the G7616's cycle-by-cycle waveform analysis technology allows fast dimmer setting response. When no dimmer is on the line, the G7616 optimizes the power factor and minimizes the current harmonic distortion to the AC line. The G7616 operates the main power converter that delivers constant current to the LED load in quasi-resonant mode to provide high power efficiency and minimize electro-magnetic interference (EMI). It uses primary-side sensing technology to achieve excellent LED current regulation under different AC line and LED load voltages, without using a secondary-side feedback circuit and eliminating the need for an opto-coupler.

The G7616 minimizes the external components count by simplifying the EMI filter with Global-Semi's EZSwitch technology. The intelligent dimmer detection technology eliminates the need for a high-power bleeder. Additionally, the digital control loop of the G7616 maintains stable overall operating conditions without the need for loop compensation components.

1.2 Applications

- ◆ Dimmable LED retrofit lamps up to 12W
- ◆ Dimmable LED ballast and luminaires up to 12W

1.3 Features

- ◆ Isolated/non-isolated offline 120V_{AC}/230V_{AC} LED driver up to 12W output power
- ◆ Wide line frequency ranges (from 45Hz to 66Hz)
- ◆ Meets IEC61000-3-2 requirement
- ◆ Total harmonic distortion < 15% with PF > 0.95
- ◆ Wide dimmer compatibility
 - Leading-edge dimmer
 - Trailing-edge dimmer
 - Digital dimmer
- ◆ Occupancy sensors and timers
- ◆ Under 20% output ripple current
- ◆ Wide dimming range from 1% to 100%
- ◆ Flickerless LED dimming
- ◆ Resonant control to achieve high efficiency (typical > 85% without dimmer)
- ◆ Over-temperature LED current foldback
- ◆ Small solution size
- ◆ Two-stage topology enables small-size input and output filter capacitors
- ◆ maximum switching frequency enables small transformer
- ◆ Intelligent dimmer interface eliminates dedicated high-power bleeder
- ◆ Primary-side sensing eliminates the need for opto-isolator feedback
- ◆ Tight LED current regulation ($\pm 5\%$)
- ◆ Fast start-up (< 0.5s without dimmer)
- ◆ Supports hot-plug LED module (Zhaga)
- ◆ Compatible with NEMA SSL6 dimming curve standard
- ◆ Supports wide LED output voltage range
- ◆ Multiple protection features:
 - LED open-circuit and short-circuit protection
 - Over-current and over-temperature protection
 - Current sense resistor short-circuit protection
 - AC line over-voltage/-frequency protection

G7616

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

2.0 Products Information

2.1 Pin configuration

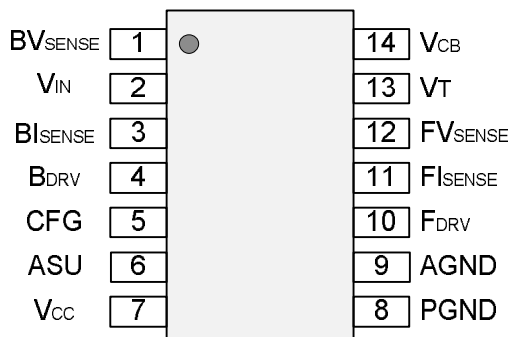


Figure 2.1 Top view (SOP14 package)

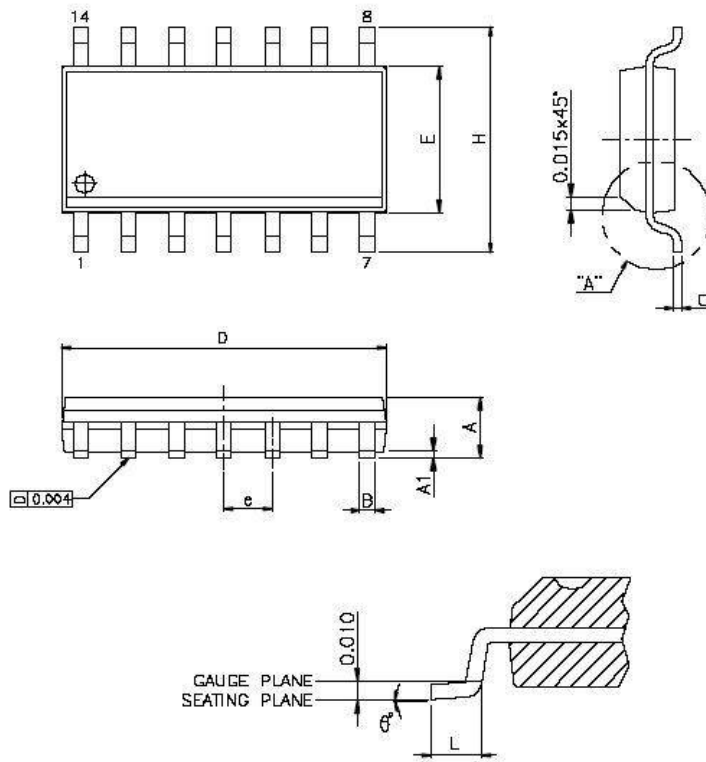
Order	Name	Type	Description
1	BV _{SENSE}	Analog Input	Boost inductor voltage feedback input
2	V _{IN}	Analog Input	Rectified AC line voltage input
3	BI _{SENSE}	Analog Input	Boost current sense input
4	B _{DRV}	Output	Base drive output for boost BJT
5	CFG	Analog In/Out	Driver parameter configuration pin and auxiliary driver
6	ASU	Output	Active start-up and bleeder control
7	V _{CC}	Power Supply	Power supply for control logic and voltage sense for power-on reset circuit
8	PGND	Ground	Power ground
9	AGND	Ground	Signal ground. It should be connected to the power ground on PCB
10	F _{DRV}	Output	Gate drive output for flyback MOSFET
11	FI _{SENSE}	Analog Input	Flyback current sense (used for cycle-by-cycle peak current control and limit)
12	FV _{SENSE}	Analog Input	Flyback voltage sense (used for primary-side regulation and ZVS)
13	V _T	Analog Input	External power limit shutdown control and external over-temperature power derating
14	V _{CB}	Analog Input	Boost output voltage feedback input

2.2 Series description

Part Number	Description	Marking information	
		Part Number	Marking
G7616-00	120V _{AC} input	G7616	
G7616-01	230V _{AC} input	G7616	

3.0 package and ordering information

SOP14 Package



SYMBOLS	MIN.	NOM.	MAX.
A	0.058	0.064	0.068
A1	0.004	—	0.010
B	0.013	0.016	0.020
C	0.0075	0.008	0.0098
D	0.336	0.341	0.344
E	0.150	0.154	0.157
e	—	0.050	—
H	0.228	0.236	0.244
L	0.015	0.025	0.050
θ	D°	—	B°

UNIT : INCH

NOTES:

1. JEDEC OUTLINE : MS-012 AB
2. DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .15mm (.006in) PER SIDE.
3. DIMENSIONS "E" DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .25mm (.010in) PER SIDE.

Figure 10.1 Physical dimensions, SOP14 package

Data and specifications subject to change without notice.

This product has been designed and qualified for Industrial Level and Lead-Free.

Qualification Standards can be found on GS's Web site.

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