GENERAL DESCRIPTION

OB3622M is a high current precision, non-isolated power switch for LED lighting. It works under transition mode.

It significantly simplifies the LED lighting system design by eliminating the auxiliary winding inductance and works under low current. A 650V power switch is also integrated into the device. The LED current can be adjusted externally by the sense resistor Rs at CS pin and high precision constant current regulation is realized.

OB3622M offers comprehensive protection coverage with auto-recovery features including LED string open protection, LED string short circuit protection, cycle-by-cycle current limiting, built-in leading edge blanking, VDD under voltage lockout (UVLO), over temperature protection (OTP), etc.

OB3622M is offered in SOP8 package.

FEATURES

- High precision Constant Current Regulation at Universal AC input
- Sense and supply without auxiliary winding inductance
- Low System Cost and High Efficiency
- Low operation current
- Programmable CC Regulation
- Transition Mode operation
- Built-in Primary winding inductance compensation
- LED string short circuit protection
- LED string open protection
- Cycle-by-Cycle Current Limiting
- Built-in Leading Edge Blanking (LEB)
- VDD Under Voltage Lockout with Hysteresis
- Over temperature protection (OTP)

APPLICATIONS

- LED lighting

TYPICAL APPLICATION

OB3622M

Output Power Table

Product	Condition	90Vac~264Vac Input	220Vac±20% Input
OB3622M	I_{OUT}≤0.2A	6.6W	11.3W

Note: Maximum practical continuous power in an open frame design with sufficient drain pattern as a heat sink, at 50℃ ambient and 60℃ temperature rise. Higher output power is possible with extra added heat sink or air circulation to reduce thermal resistance.

GENERAL INFORMATION

Pin Configuration

The pin map is shown as below for SOP8.

CS	1		8	GND
NC	2		7	GND
VDD	3		6	Drain
SW	4		5	Drain
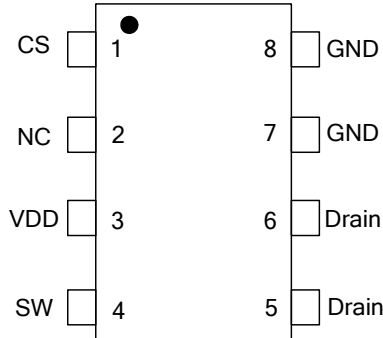
Ordering Information

Part Number	Description
OB3622MCP-H	8 Pin SOP, Pb free in Tube
OB3622MCPA-H	8 Pin SOP, Pb free in T&R

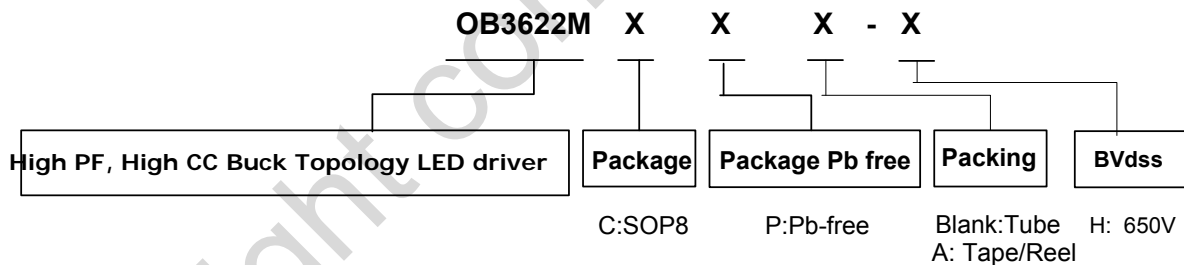**Note:** All Devices are offered in Pb-free Package if not otherwise noted.
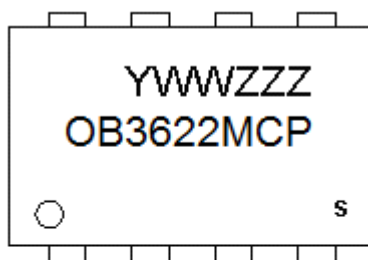
Package Dissipation Rating

Package	RθJA (℃/W)
SOP8	90

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Absolute Maximum Ratings

Parameter	Value
VDD Voltage	-0.3 to 20V
DRAIN Voltage	-0.3 to 650V
CS Input Voltage	-0.3 to 7V
SW Input Voltage	-0.3 to 20V
Min/Max Operating Junction Temperature T_J	-40 to 150 ℃
Min/Max Storage Temperature T_{stg}	-55 to 150 ℃
Lead Temperature (Soldering, 10secs)	260 ℃

Note: Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

OB3622M   X   X   X - X

High PF, High CC Buck Topology LED driver	Package	Package Pb free	Packing	BVdss

C:SOP8   P:Pb-free   Blank:Tube   H: 650V
                                     A: Tape/Reel

Marking Information

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YWWZZZ
OB3622MCP
```

Y:Year Code
WW:Week Code(01-52)
ZZZ:Lot Code
C:SOP8 Package
P:Pb-free Package
S:Internal Code(Optional)

TERMINAL ASSIGNMENTS

| Pin Num	Pin Name	I/O	Description
1	CS	I	Current sensing terminal
2	NC		No Connection
3	VDD	P	Power supply Input
4	SW	I	MOSFET Source Terminal
5,6	DRAIN	I	MOSFET Drain Terminal
7	GND	P	Power Ground, suggest to be left floating with no pad in PCB layout.
8	GND	P	Power Ground

BLOCK DIAGRAM
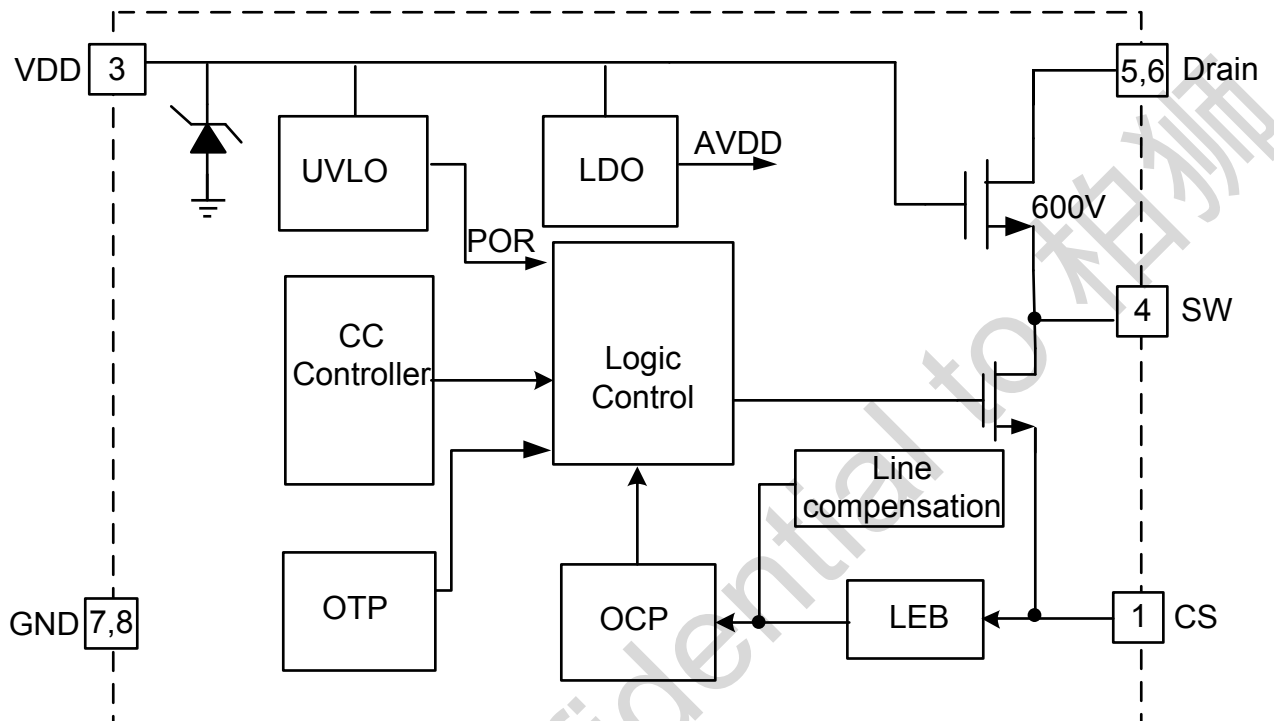
ELECTRICAL CHARACTERISTICS

(TA = 25℃, VDD=7.5V, if not otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Supply Voltage (VDD) Section						
I start-up	Start up current	VDD=UVLO(OFF)-1V		120	150	uA
I oper	operation current	VDD=7.5V, no loading		280	320	uA
UVLO(OFF)	VDD under voltage lockout exit			9		V
UVLO(ON)	VDD under voltage lockout enter			6.5		V
VDD_CLAMP	VDD CLAMP	VDD current 1mA		10.5		V
Current Sense Input Section						
TLEB	LEB time			0.3		us
Vth_ocp	Over current threshold		485	500	515	mV
Td_oc	OCP propagation delay	From OCP comparator to gate drive		100		ns
Toff_max	Maximum off time			600		us
Toff_min	Minimum off time			5		us
Ton_max	Maximum on time			305		us
Source Drive Section						
Rdson_l	Source drive low side on resistor			1.3		ohm
OTP Section						
OTP	Over temperature protection			150		℃
Power MOSFET Section						
BVdss	MOSFET Drain-Source Breakdown Voltage		650			V
Rds,on	On resistance			18		ohm

OB3622M
High Precision Non-isolated Power Switch

CHARACTERIZATION PLOTS
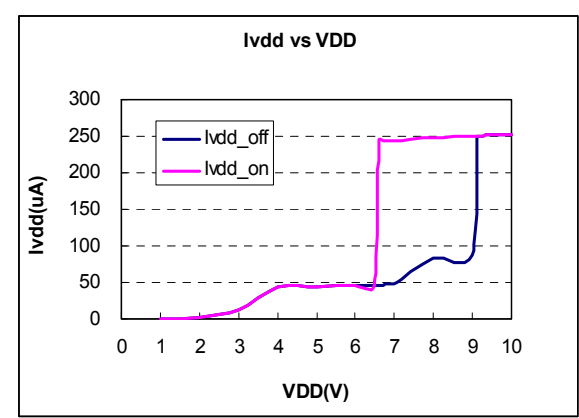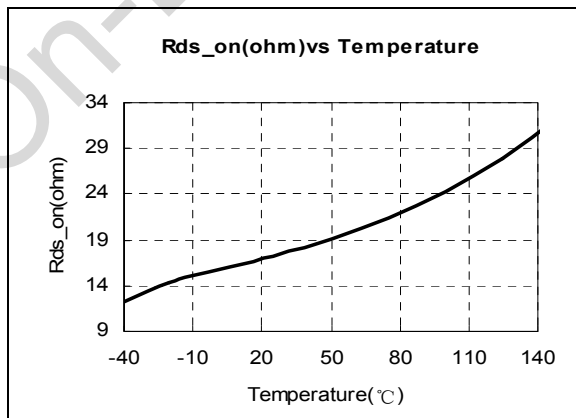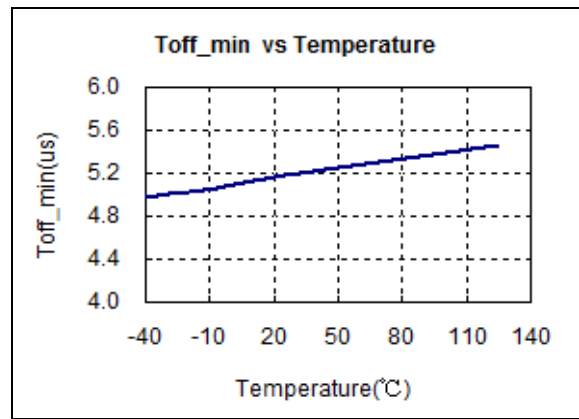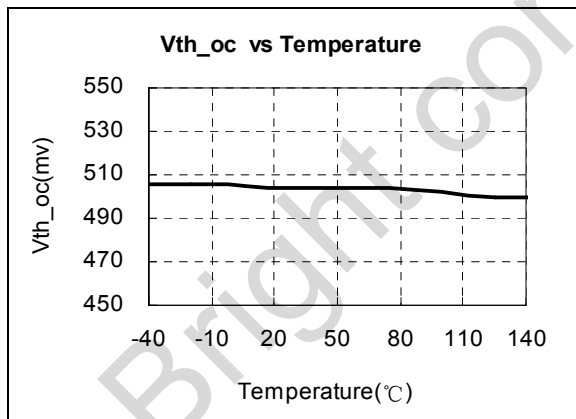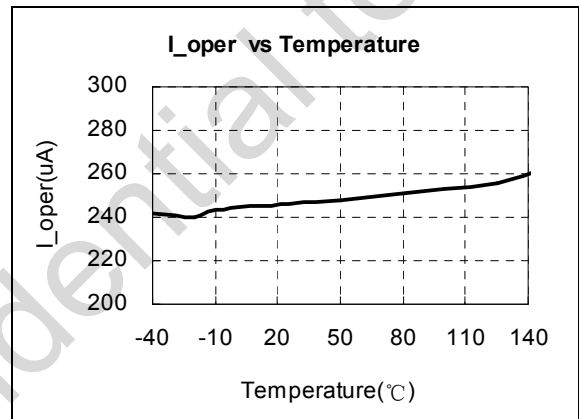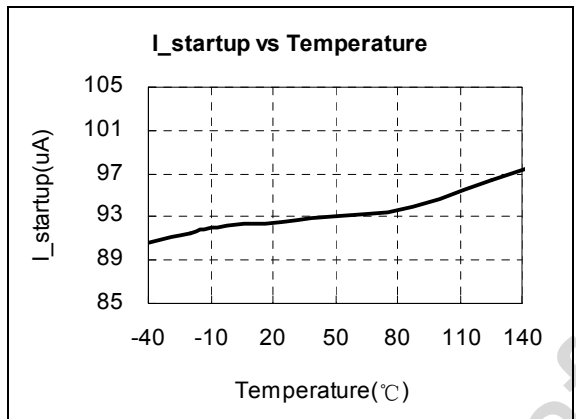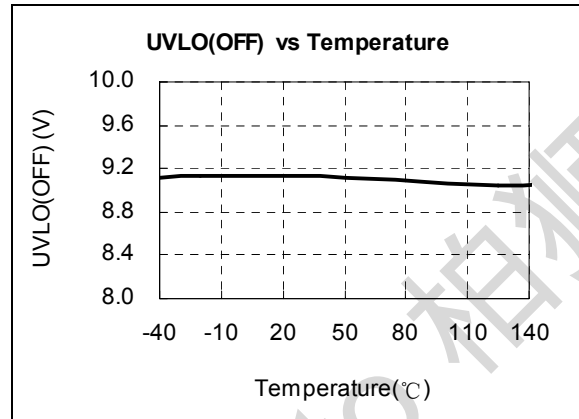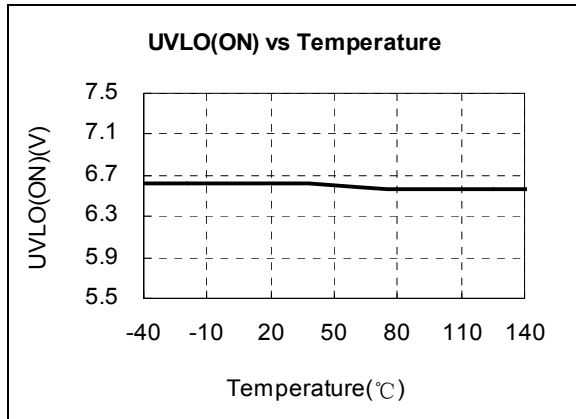
OPERATION DESCRIPTION

OB3622M is a high current precision, non-isolated power switch for LED lighting working under transition mode. It significantly simplifies the LED lighting system design by eliminating the auxiliary winding inductance and works under low current. A 650V power switch is also integrated into the device.

● **Start up Control**
Startup process is realized by charging VDD capacitor. When VDD voltage reaches up to UVLO(OFF), the inner circuit works. A 10.5V (typical) clamp circuit is applied to clamp VDD voltage. At work state, no auxiliary winding inductance is necessary.

● **Principle of CC Operation**
For buck type operating in transition mode, the peak voltage of CS is detected cycle-by-cycle, and compared with internal reference voltage, Vth_ocp (typical value 500mV).. When the voltage at CS pin is up to the threshold voltage, the power switch will be turned off.

$$I_{pk} = \frac{V_{th\_ocp}}{R_{CS}} \qquad (1)$$

Where, Rcs indicates the resistor at CS pin for primary side current sensing.
Refer to the equation 1, LED output current is

$$I_{LED} = \frac{I_{pk}}{2} = \frac{V_{th\_ocp}}{2 \times R_{CS}} \qquad (2)$$

OB3622M works under transition mode and the on-time for power switch is

$$t_{on} = \frac{L \times I_{pk}}{V_{in} - V_{LED}} \qquad (3)$$

Where L is the inductor of transformer at primary-side winding, Vin is line voltage after rectifying and V$_{LED}$ is the voltage at LED.
When power switch turns off, the current flowing in the inductor will reduce to zero and the power switch will turn on after then. The off-time for power switch is

$$t_{off} = \frac{L \times I_{pk}}{V_{LED}} \qquad (4)$$

The inductor could also be calculated by

$$L = \frac{V_{LED} \times (V_{in} - V_{LED})}{f \times I_{pk} \times V_{in}} \qquad (5)$$

Where, f is the working frequency. The working frequency changes with input voltage. The lowest input voltage determines the lowest working frequency and the highest input voltage determines the highest working frequency.
The minimum and maximum off-time are set in OB3622N. Therefore, the value of inductor should be carefully designed to achieve good LED output current, according to equation 4.

● **Inner Line Compensation**
OB3622N provides internal line compensation, therefore no outside sensing devices are needed. The compensated voltage is added to CS voltage cycle-by-cycle and LED output current is kept constant under different line voltage.

● **Current Sensing and Leading Edge Blanking**
Cycle-by-Cycle current limiting is offered in OB3622M. The switch current is detected by a sense resistor into the CS pin. An internal leading edge blanking circuit chops off the sensed voltage spike at initial power MOSFET on state so that the external RC filtering on sense input is no longer needed.

● **Protection**
OB3622M offers comprehensive protection coverage with auto-recovery features including LED string open loop protection, LED string short circuit protection.

OB3622M detects the states of LED. When LED string short circuit occurs, the switching frequency is reduced to the minimum switching frequency with maximum Toff time. OB3362M resumes normal operation after the fault condition is removed. When LED string open circuit occurs, OB3622M stops switching and re-detect the LED string status after 160ms (typical). If the fault condition is removed, OB3362M resumes normal operation. Otherwise, the above operation is repeated.

Over temperature protection is offered in OB3622M. When temperature rises above 150℃ (typical), switching will be stopped. The normal operation is resumed until the temperature falls below 130℃ (typical).

PACKAGE MECHANICAL DATA

SOP8 PACKAGE OUTLINE DIMENSIONS
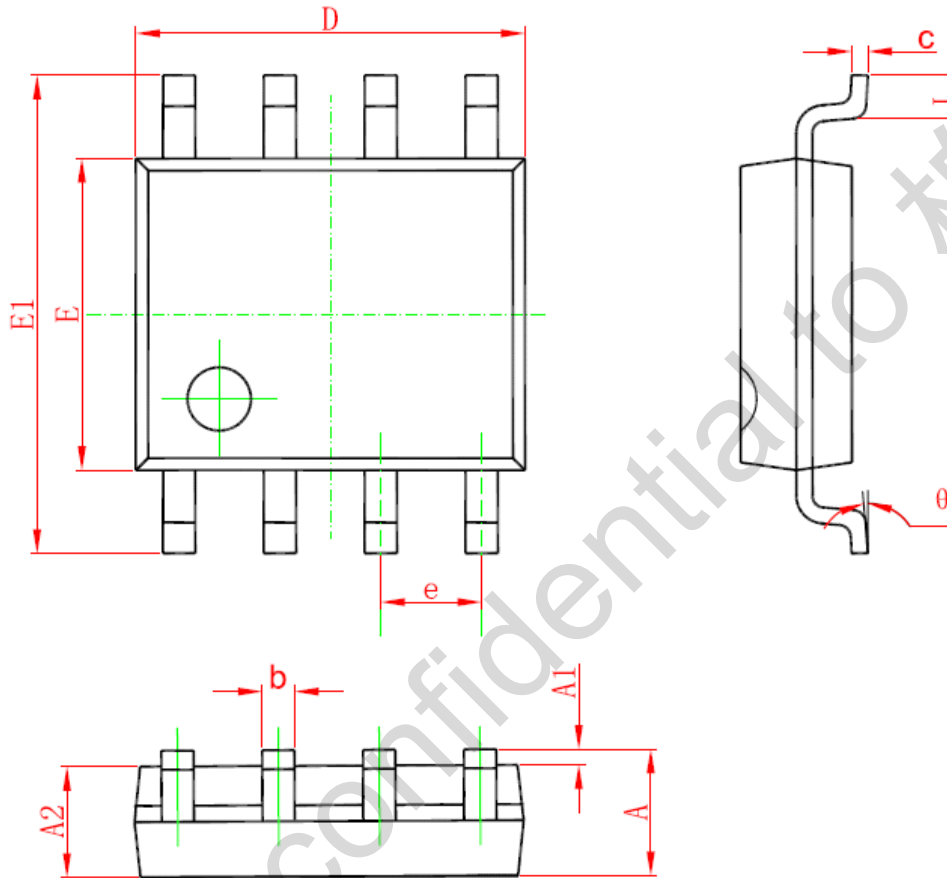
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.250	0.002	0.010
A2	1.250	1.650	0.049	0.065
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	4.700	5.150	0.185	0.203
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0º	8º	0º	8º

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