High Efficiency, Step-up DC/DC Converter

Features

- Output up to 20V
- Internal MOSFET with high switch current up to 2A
- 5μA Quiescent (Switch-off) Supply Current
- Zero Shutdown Mode Supply Current
- 90% Efficiency
- Up to 450KHz Switching Frequency
- Using Internal Power Switches
- SOP-8L Package

Applications

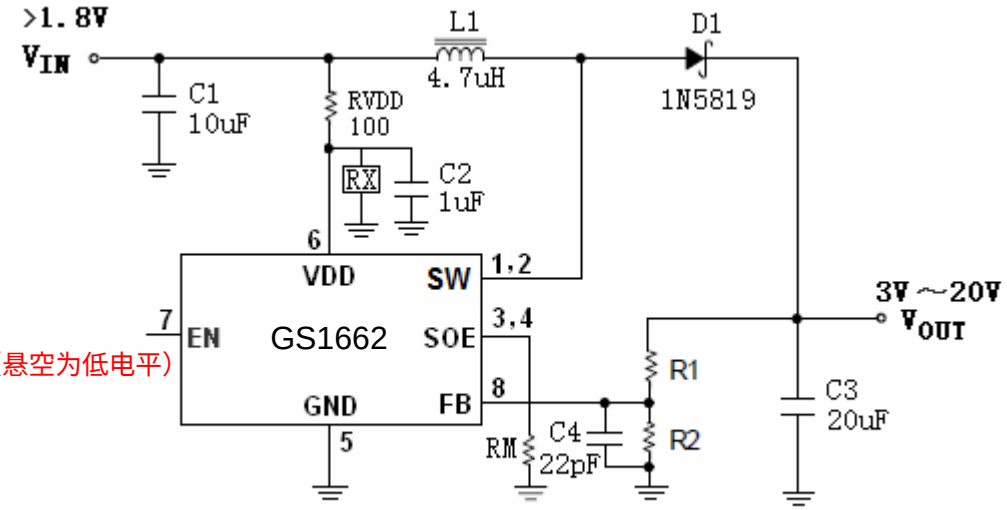
- PDA
- DSC
- LCD Panel
- RF-Tags
- MP3
- Portable Instrument
- Wireless Equipment

Description

The GS1662 is a compact, high efficiency, and low voltage step-up DC/DC converter including an error amplifier, ramp generator, comparator, switch pass element and driver in which providing a stable and high efficient operation over a wide range of load currents. It operates in stable waveforms without external compensation.

The low start-up input voltage below 1.6V. The high switching rate minimized the size of external components. Besides, the 5μA low quiescent current together with high efficiency maintains long battery lifetime.

The output voltage is set with two external resistors.



高开 / 低关（悬空为低电平）

TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

Typical Application

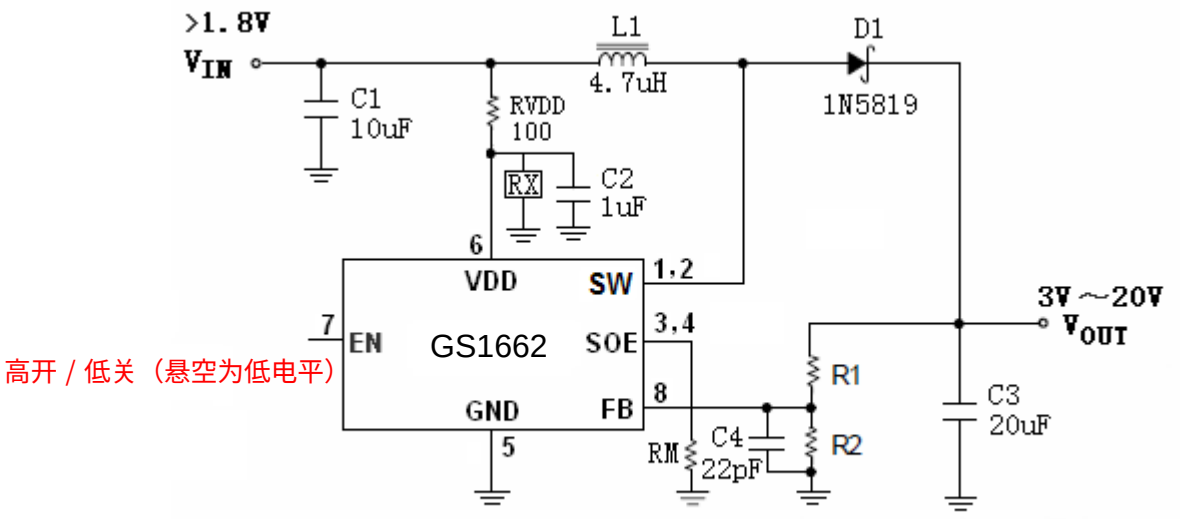


Figure 1 (1.8V Stat-up input Voltage)

RX can be a Zener Diodes or Resistor: The Ratio of RX/RVDD must to keep VDD voltage less than 5.5V. ＊ The resistor RM can be set to 50mΩ usually.

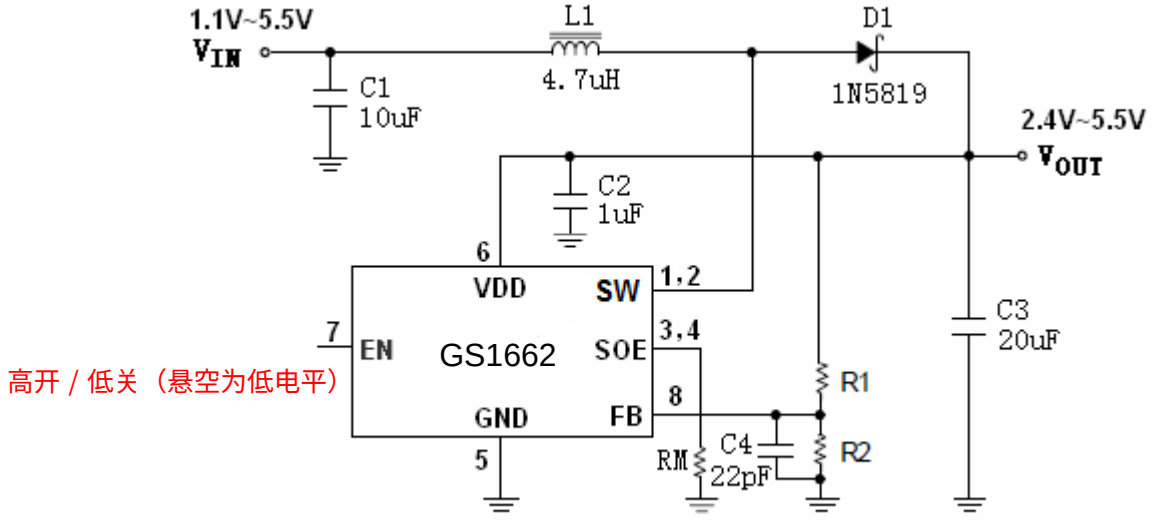
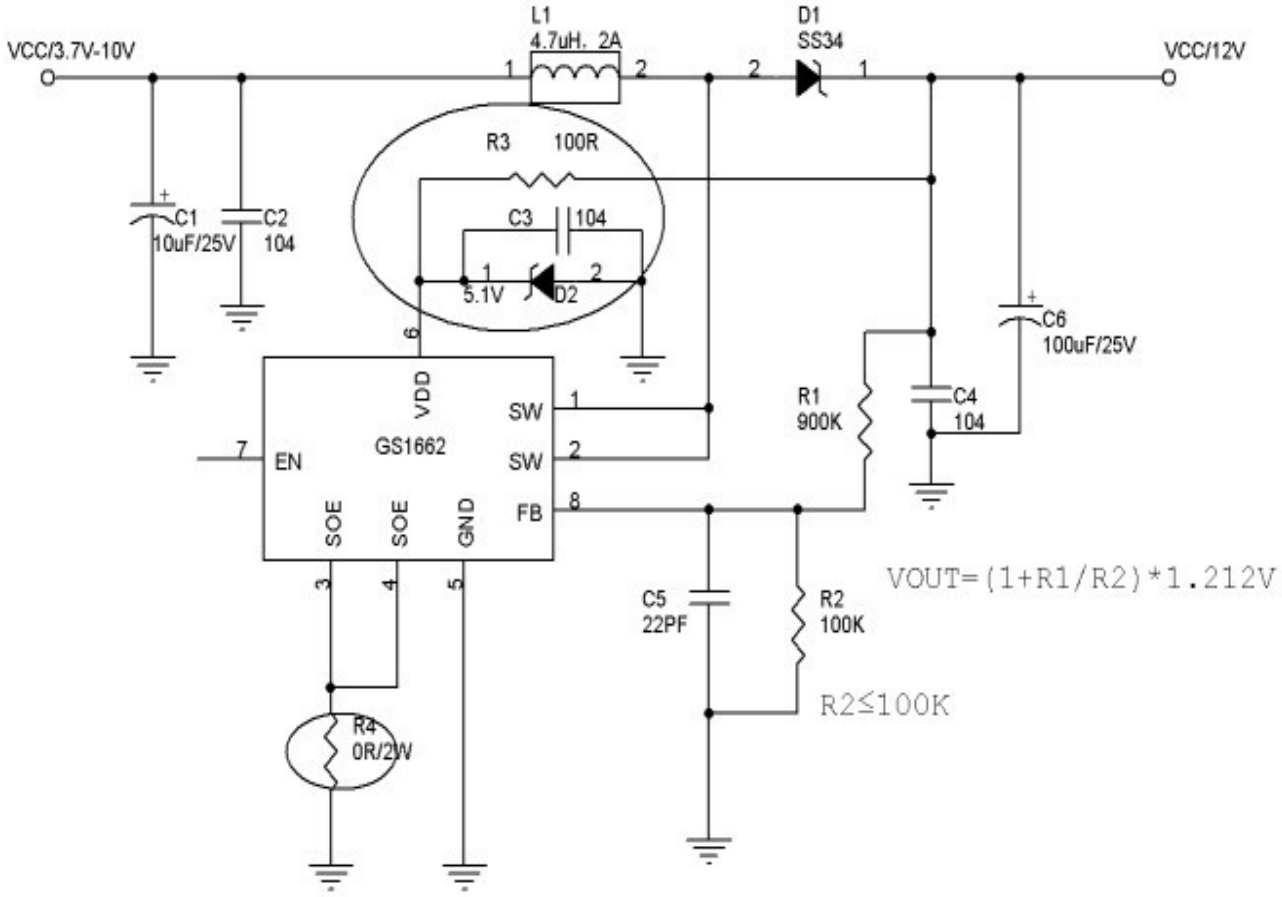


Figure.2 （1.1V Stat-up input Voltage）

＊ The resistor RM can be set to 50mΩ usually.

TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

Test Circuit

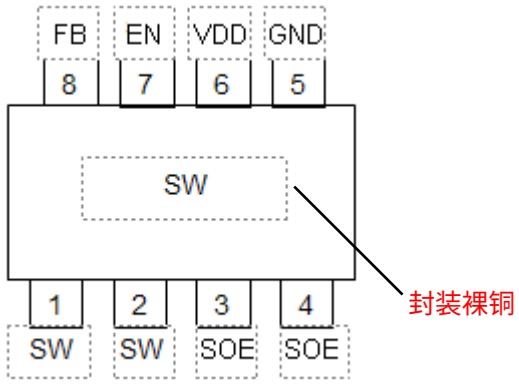


Absolute Maximum Ratings

- Supply Voltage……..−0.3V to 6V
- SW Pin Switch Voltage……−0.3V to 24V
- Other I/O Pin Voltages……−0.3V to 6V
- SW Pin Switch Current ……..3A
- Operating Junction Temperature……..125℃
- Storage Temperature Range ……..−65℃ ~ +150℃

TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

Pin Assignment



SOP- 8L

PIN NUMBER	PIN NAME	FUNCTION
1	SW	Switch Output
2	SW	Switch Output
3	SOE	Source of the MOSFET
4	SOE	Source of the MOSFET
5	GND	Ground
6	VDD	Input
7	EN	ON/OFF Control(High Enable)
8	FB	Feedback

Electrical Characteristics

(V_{IN} = 1.5V, VDD set to 3.3V, Load Current = 0A, TA = 25℃, unless otherwise specified)

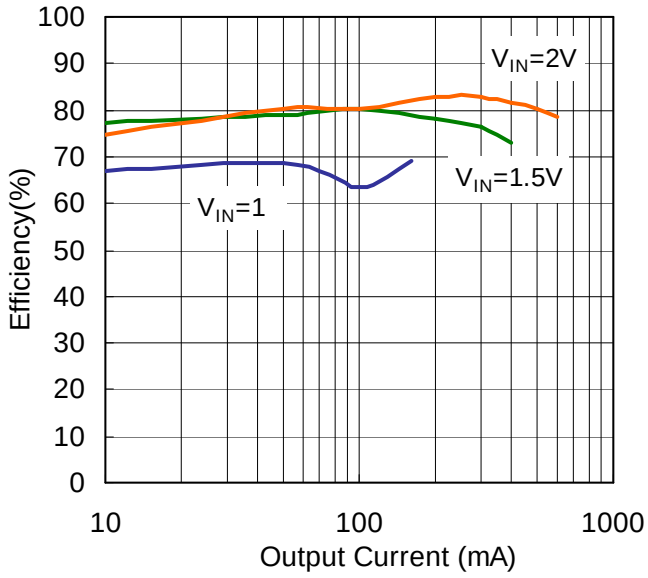
Parameter	Test Conditions	Min	Typ	Max	Units
Start-UP Voltage	IL = 1mA	1.00			V
Operating VDD Range	VDD pin voltage	2		5.5	V
No Load Current I (V_{IN})	V_{IN} = 1.5V, V_{OUT} = 3.3V		40		μA
Feedback Reference Voltage	Close Loop, VDD = 3.3V	1.182	1.212	1.242	V
Switching Frequency	VDD = 3.3V			450	KHz
Maximum Duty	VDD = 3.3V		80		%
SW ON Resistance	VDD = 3.3V		0.07		Ω
Current Limit Setting	VDD = 3.3V		2		A
Line Regulation	V_{IN} = 1.5 ~ 2.5V, IL = 100mA		55		mV/V
Load Regulation	V_{IN} = 2.5V, IL = 1 ~ 300mA		0.1		mV/mA
En Input High		1			V
En Input Low				0.6	V
Temperature Stability for V_{OUT}			50		ppm/℃
Thermal Shutdown			165		℃
Thermal Shutdown Hysterics			10		℃
Maximum V_{RM}			145		mV

TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

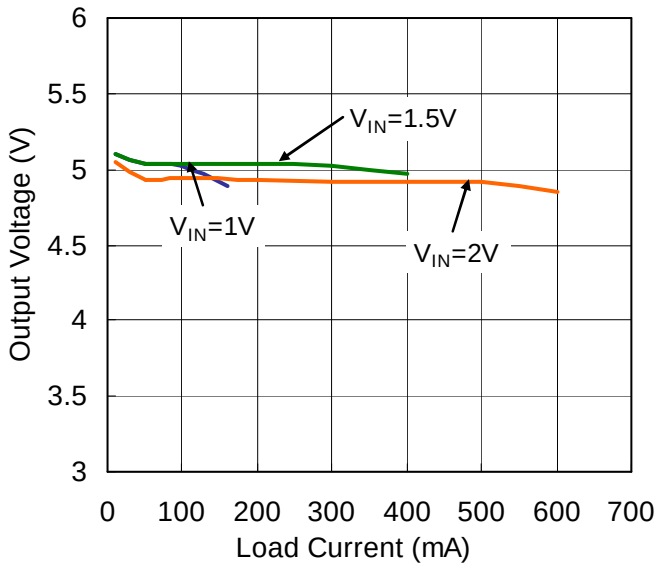
Typical Performance Characteristics

TA=25℃, C_{IN} =10 μF, C_{OUT} =20 μF, L=4.7 μH, unless otherwise noted.
Refer to Test Circuit Figure. 1

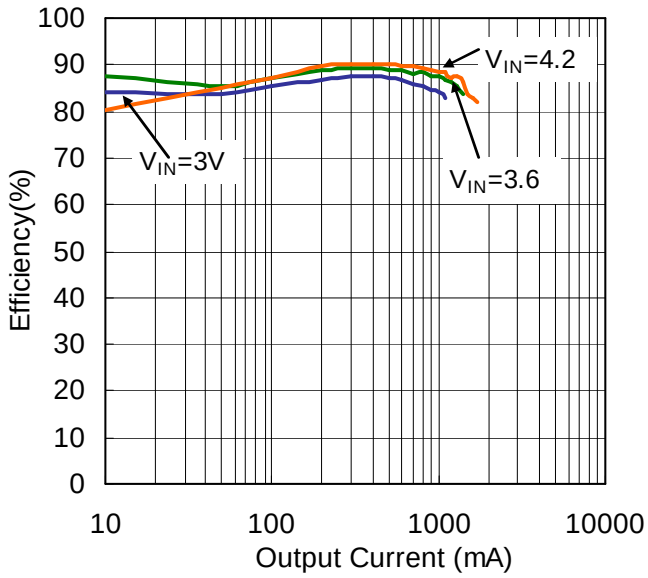
Efficiency vs. Output Current (Vout=5V)



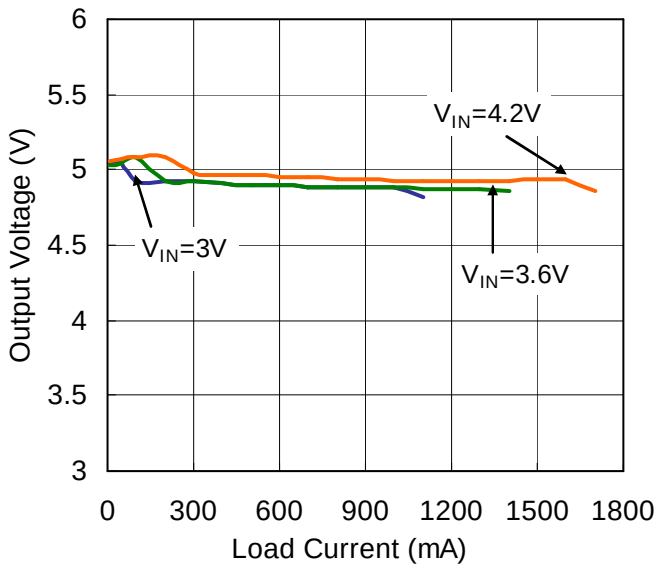
Output Voltage vs. Load Current (Vout=5V)



Efficiency vs. Output Current (Vout=5V)

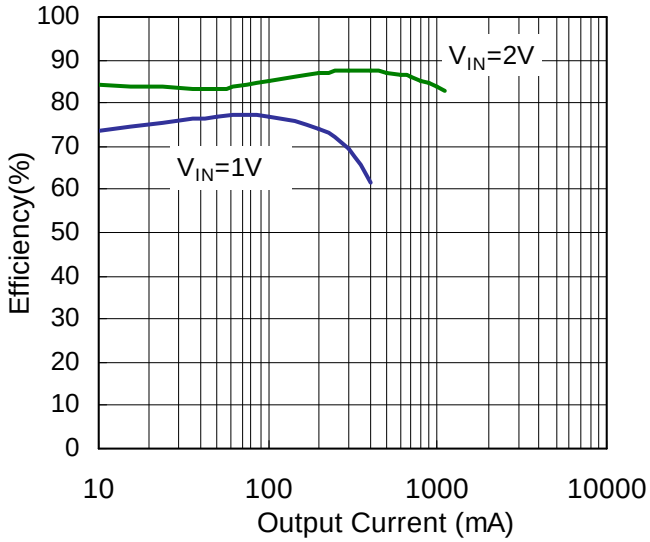


Output Voltage vs. Load Current (Vout=5V)

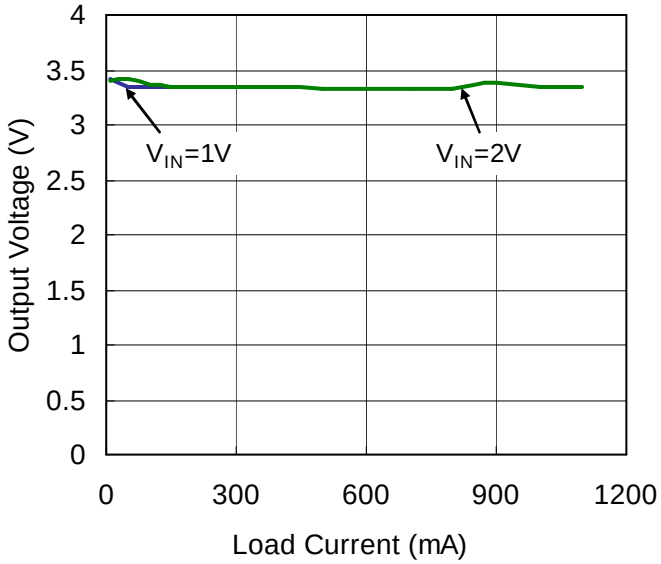


TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

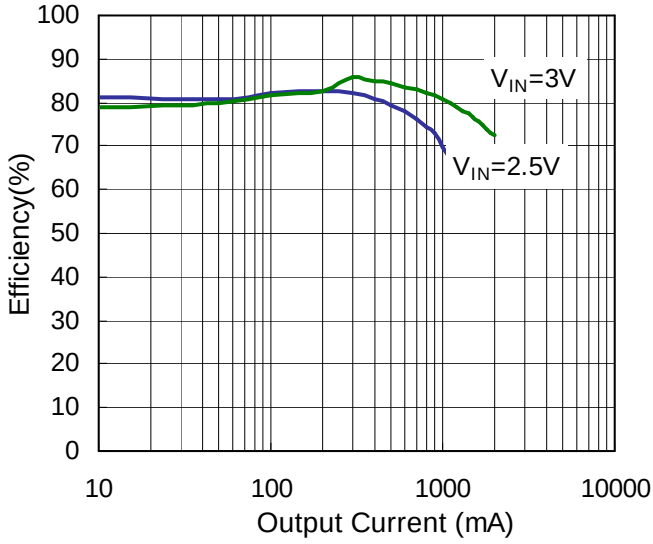
Efficiency vs. Output Current
(Vout=3.3V)



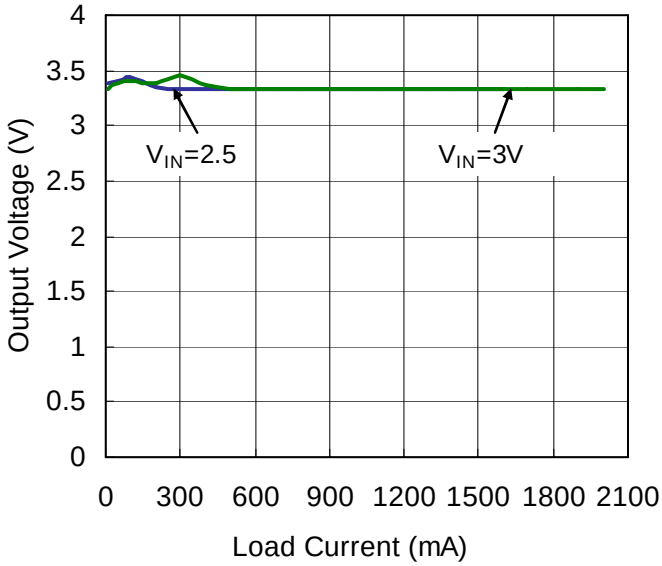
Output Voltage vs. Load Current
(Vout=3.3V)



Efficiency vs. Output Current
(Vout=3.3V)

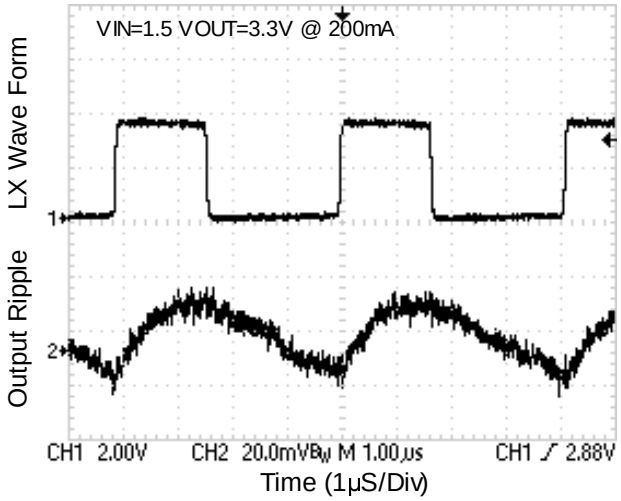


Output Voltage vs. Load Current
(Vout=3.3V)

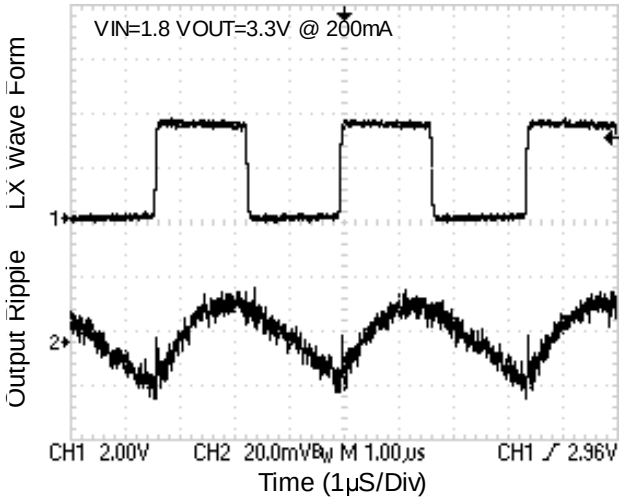


TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

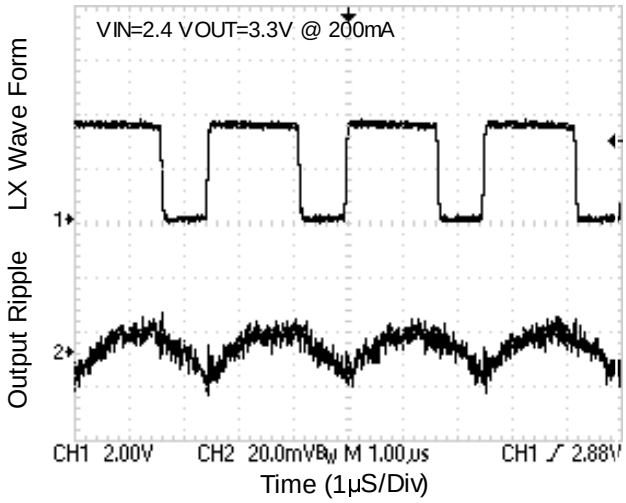
LX Pin Wave Form & Output Ripple



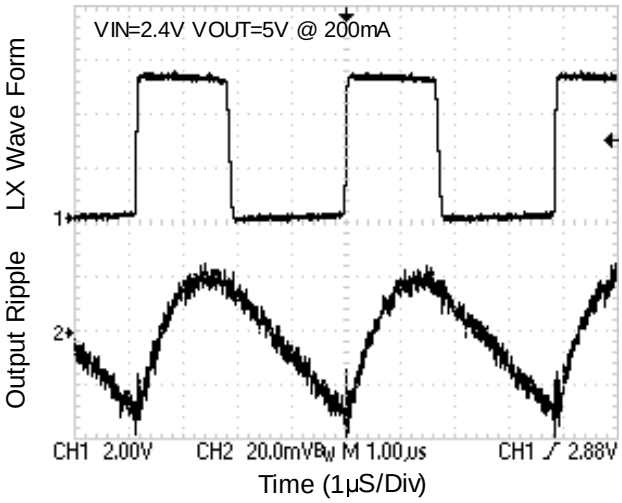
LX Pin Wave Form & Output Ripple



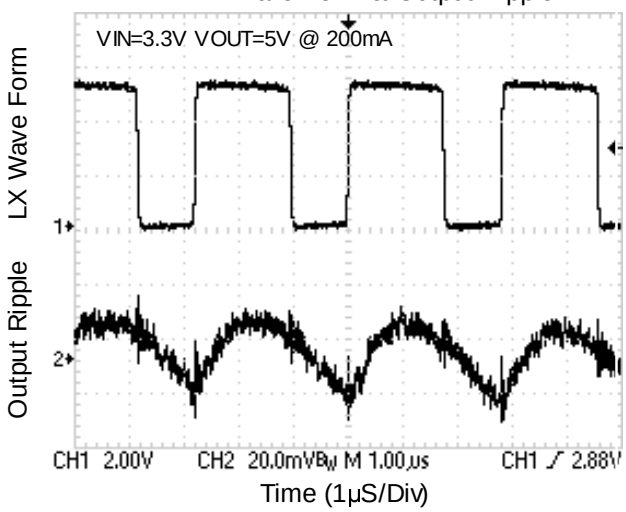
LX Pin Wave Form & Output Ripple



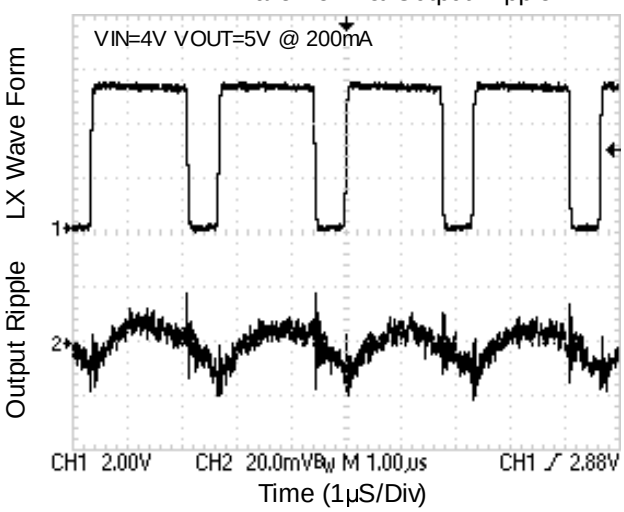
LX Pin Wave Form & Output Ripple



LX Pin Wave Form & Output Ripple



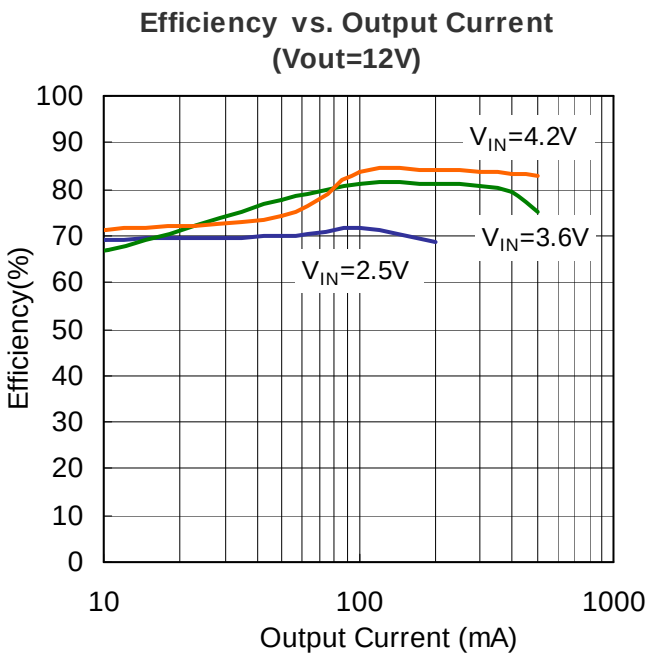
LX Pin Wave Form & Output Ripple

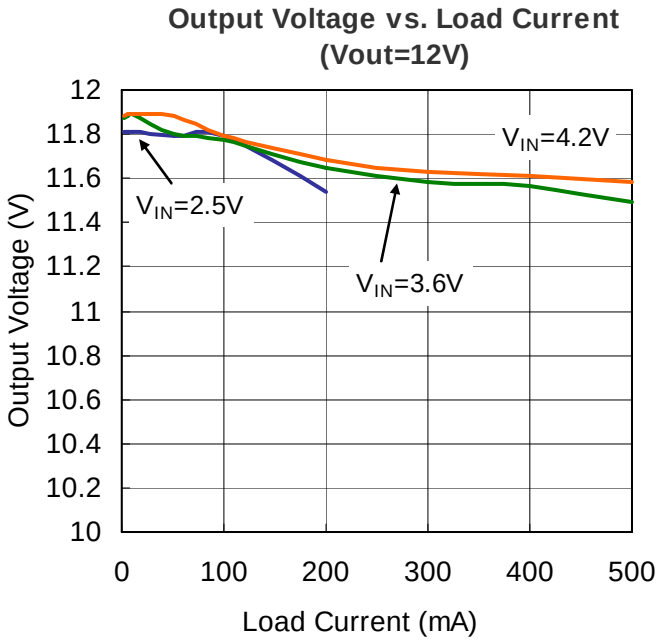


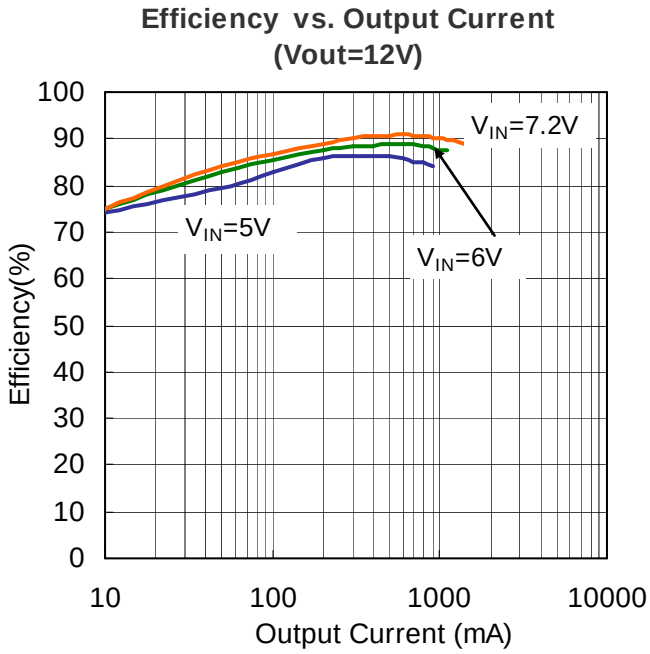
TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

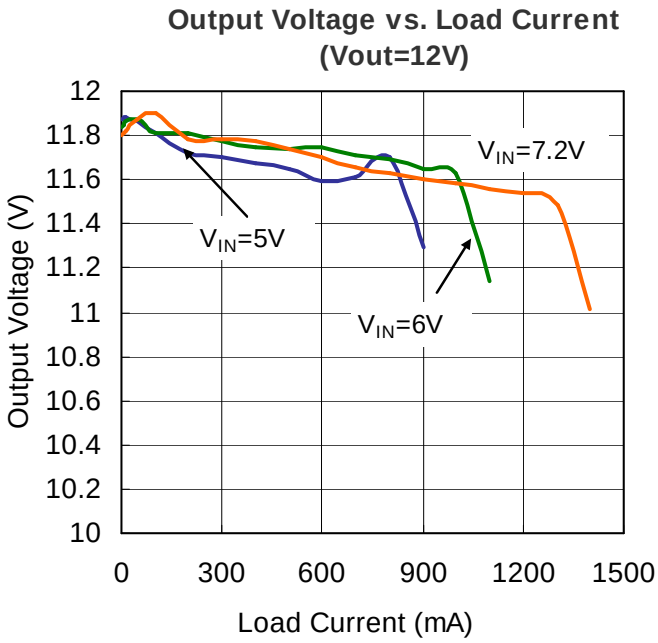
Typical Performance Characteristics

T_A=25℃, C_{IN} =10 μF, C_{OUT} =20 μF, L=10 μH (high saturated inductor current), unless otherwise noted.



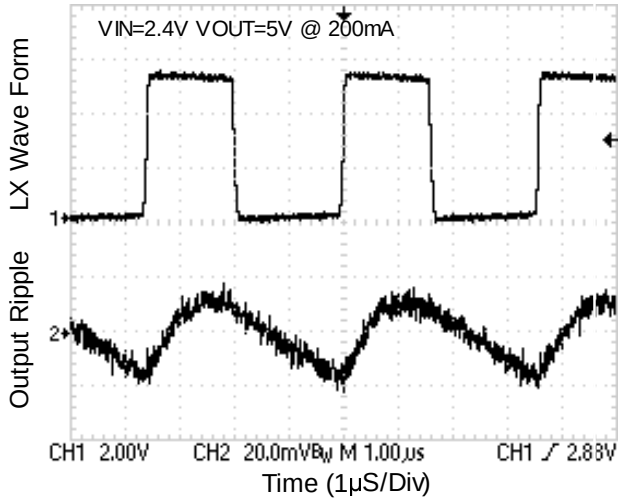




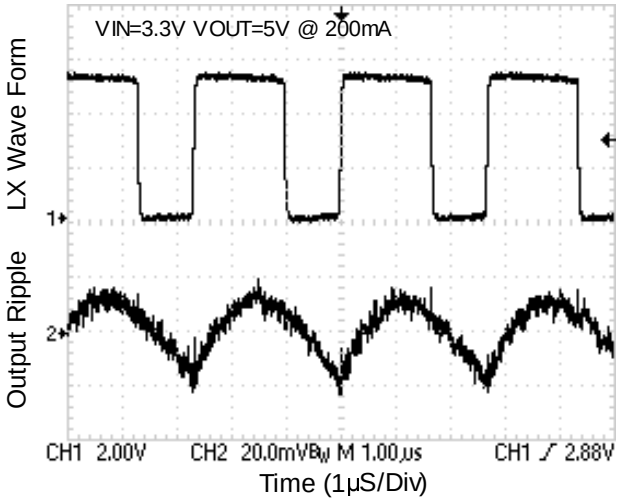


TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

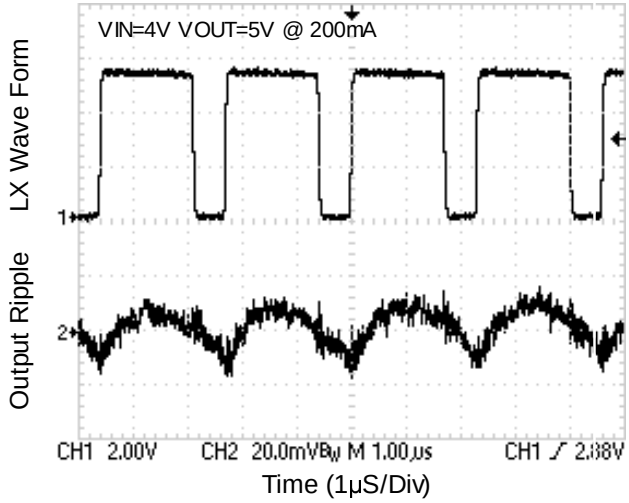
LX Pin Wave Form & Output Ripple



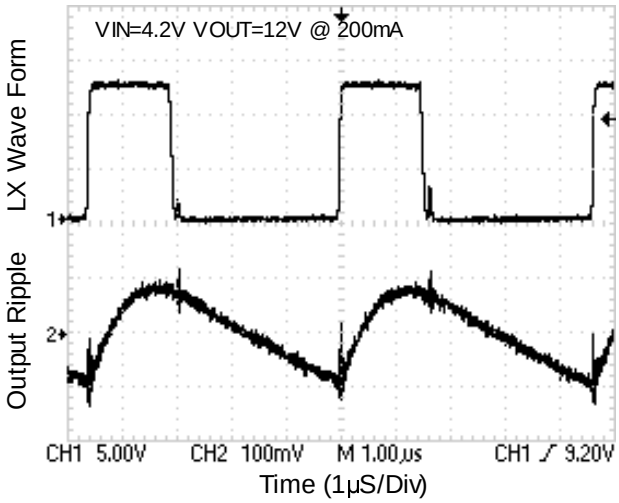
LX Pin Wave Form & Output Ripple



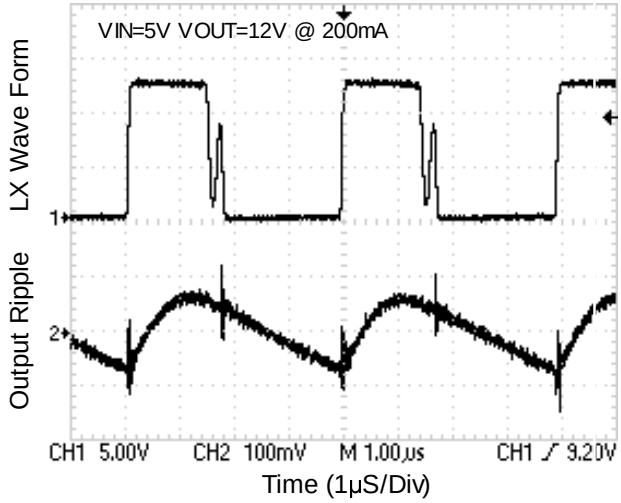
LX Pin Wave Form & Output Ripple



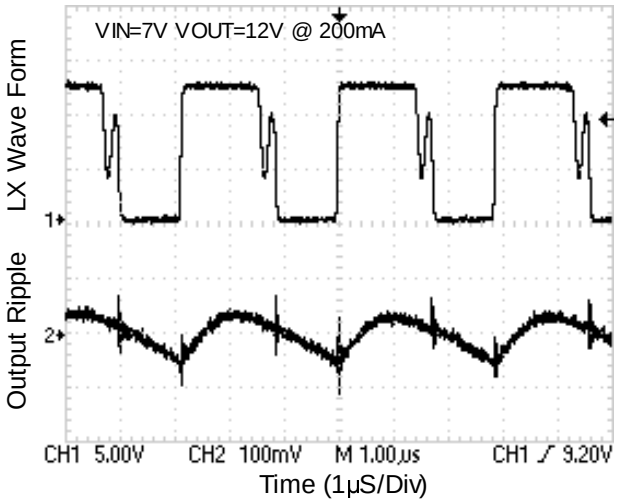
LX Pin Wave Form & Output Ripple



LX Pin Wave Form & Output Ripple



LX Pin Wave Form & Output Ripple



TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

Application Information

Output Voltage Setting

Referring to Typical Application Circuits, the output voltage of the switching regulator (V_{OUT}) can be set with Equation (1).

$$V_{OUT} = \left(1 + \frac{R1}{R2}\right) \times 1.212\ V \quad (1)$$

Current-limiting Resistance Setting

$$RM = \frac{0.145}{I_{MAX\_switch}}$$

Feedback Loop Design

Referring to the Typical Application Circuits. The selection of R1 and R2 based on the trade-off between quiescent current consumption and interference immunity is stated below:

- l Follow Equation (1)
- l Higher R reduces the quiescent current (Path current = 1.18V/R2), however resistors beyond 5MW are not Recommended.

For applications without standby or suspend modes, lower values of R1 and R2 are preferred. For applications concerning the current consumption in standby or suspend modes, the higher values of R1 and R2 are needed. Such high impedance feedback loop is sensitive to any interference, which requires careful PCB layout and avoid any interference, especially to FB pin. To improve the system stability, a proper value capacitor between FB pin and GND pin is suggested. An empirical suggestion is around 20pF.

PCB Layout Guide

PCB Layout shall follow these guidelines for better system stability:

- A full GND plane without any gap break.
- VDD to GND bypass Cap – The 1μF MLCC noise bypass Cap pin 4 shall have short and wide connections.
- V_{IN} to GND bypass Cap – Add a Cap close to the inductor when V_{IN} is not an idea voltage source.
- Minimize the FB node copper area and keep it far away from noise sources.

TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

Pin Information

SW (Pin 1/ Pin 2): Switch Pin. Connect inductor between SW and VIN. Keep these PCB trace lengths as short and wide as possible to reduce EMI and voltage overshoot.

SOE (Pin 3/ Pin 4): Source of the MOSFET. Connect resistor to GND.

GND (Pin 5): Signal and Power Ground. Provide a short direct PCB path between GND and the (–) side of the output capacitor(s).

VDD (Pin 6): Input positive power pin.

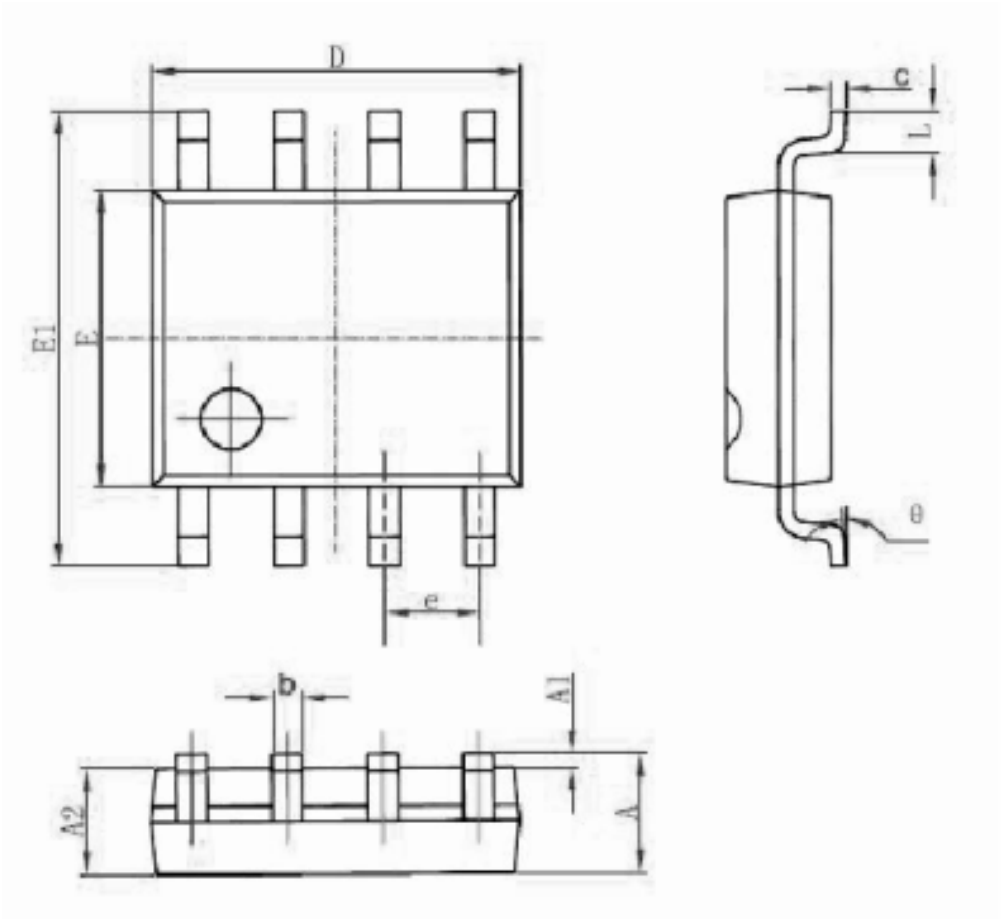
EN (Pin 7): En Control Input. Forcing this pin above 1V enables the part. Forcing this pin below 0.6V shuts down the device. In shutdown, all functions are disabled, drawing <1μA supply current. Do not leave EN floating.

FB (Pin 8): Feedback Input to the g_m Error Amplifier. Connect resistor divider tap to this pin. The output voltage can be adjusted from 3.3V to 20V by: V_{OUT} = 1.212V • [1 + (R1/R2)]

TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn

Packaging Information

SOP-8 Package Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
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	0°	8°	0°	8°

TEL:0755-27668758/29469758 web:http://www.zgsemi.com www.086ic.cn