

1.0A 100KHz 100V Buck DC to DC Converter

XL7046

Features

- Maximum Input Voltage 100V
- Maximum Duty Cycle up to 85%
- Minimum Drop Out 2.0V
- Adjust VOUT from 1.25V to 20V
- Max. IOU=1.0A at VOUT=5V
- Max. IOU=0.5A at VOUT=15V
- Fixed 100KHz Switching Frequency
- Max. Output power less than 8W
- EN PIN TTL shutdown capability
- Internal Optimize HV Power MOSFET
- High efficiency up to 91%
- Excellent line and load regulation
- Built in current limit function
- Built in output short Protection Function
- SOP8-EP (Exposed PAD) package

General Description

The XL7046 is a 100KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 1.0A load with high efficiency, low ripple and excellent line and load regulation. Requiring a minimum number of external components, the regulator is simple to use and include internal frequency compensation and a fixed-frequency oscillator.

The PWM control circuit is able to adjust the duty ratio linearly from 0 to 85%.

Applications

- Ebike Controller Power Supply
- Telecom / Networking Equipment

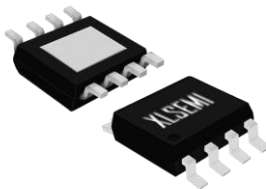


Figure1. Package Type of XL7046

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Pin Configurations

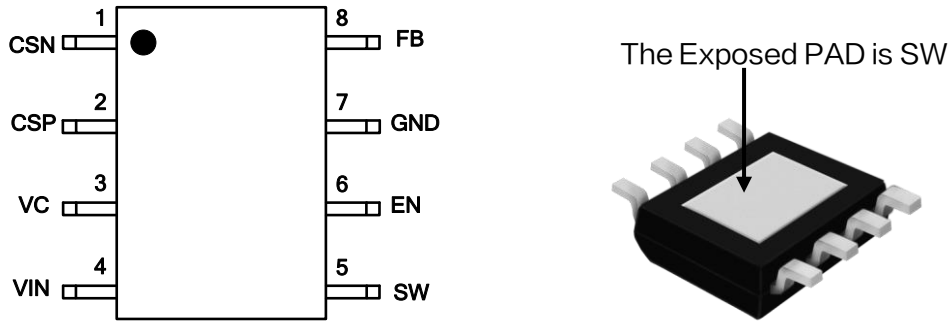


Figure2. Pin Configuration of XL7046 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	CSN	Current Sense Negative Terminal Pin.
2	CSP	Current Sense Positive Terminal Pin.
3	VC	Internal Voltage Regulator Bypass Capacitor Pin (VC). The VC pin connect a 1uf capacitor to VIN.
4	VIN	Supply Voltage Input Pin. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
5	SW	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output. The exposed PAD is SW.
6	EN	Enable Pin. Drive EN pin high to turn off the device, drive it low to turn it on. Floating is default low. Connect to GND to enable the voltage regulator.
7	GND	Ground Pin. Care must be taken in layout. This pin should be placed outside of the Schottky Diode to output capacitor ground path to prevent switching current spikes from inducing voltage noise into XL7046.
8	FB	Feedback Pin (FB). Through an external resistor divider network, Feedback senses the output voltage and regulates it. The feedback threshold voltage is 1.25V.

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Function Block

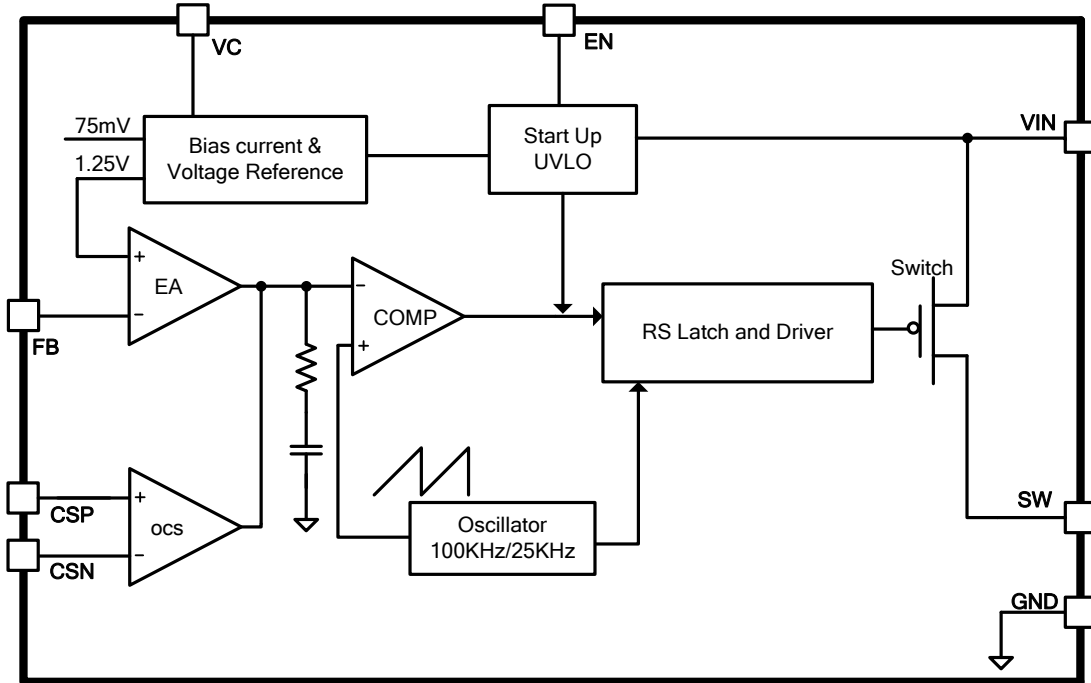
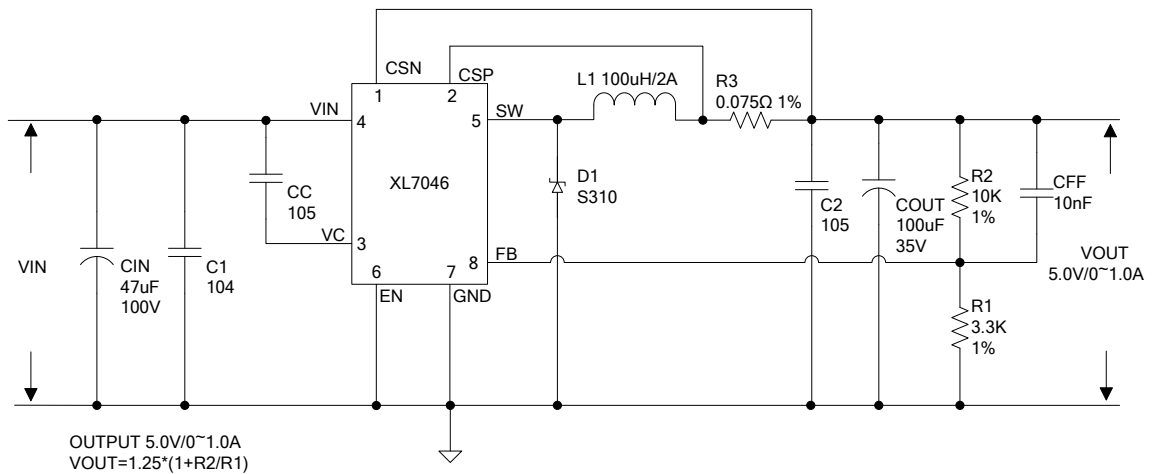


Figure3. Function Block Diagram of XL7046

Typical Application Circuit



R3 for limit maximum output current, R3 choose 0.075ohm in $V_{OUT} \leq 5V$ application; R3 choose 0.082ohm in $V_{OUT} > 5V$ application.

Figure4. XL7046 Typical Application Circuit

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Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL7046E1	XL7046E1	SOP8-EP	2500/4000 Units on Tape & Reel

XLSEMI Pb-free products, as designated with “E1” suffix in the par number, are RoHS compliant.

Absolute Maximum Ratings (Note1)

Parameter	Symbol	Value	Unit
VIN Pin Voltage	V_{IN}	-0.3 to 100	V
EN Pin Voltage	V_{EN}	-0.3 to 20	V
FB Pin Voltage	V_{FB}	-0.3 to 5	V
SW Pin Voltage	V_{SW}	-0.3 to V_{in}	V
Power Dissipation	P_D	Internally limited	mW
Thermal Resistance (SOP8-EP) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	60	°C/W
Maximum Junction Temperature	T_J	-40 to 150	°C
Operating Junction Temperature	T_J	-40 to 125	°C
Storage Temperature	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	°C
ESD (HBM)		>2000	V

Note1: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

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XL7046 Electrical Characteristics

$T_a = 25^{\circ}\text{C}$; unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
System parameters test circuit figure4						
VFB	FB Voltage	Vin =20V to 80V, Vout=15V Iload=0.2A	1.225	1.25	1.275	V
η	Efficiency	Vin=24V, Vout=15V Iout=0.5A	-	95	-	%
η	Efficiency	Vin=36V, Vout=15V Iout=0.5A	-	92	-	%
η	Efficiency	Vin=48V, Vout=15V Iout=0.5A	-	89	-	%
η	Efficiency	Vin=60V, Vout=15V Iout=0.5A	-	87	-	%
η	Efficiency	Vin=72V, Vout=15V Iout=0.5A	-	86	-	%

Electrical Characteristics (DC Parameters)

Vin = 48V, GND=0V, Vin & GND parallel connect a 47uf/100V capacitor; Iout=0.2A, $T_a = 25^{\circ}\text{C}$; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	Vin				80	V
VIN UVLO	Vin_uvlo			6		V
Shutdown Supply Current	I _s	V _{EN} =2V		160	400	uA
Quiescent Supply Current	I _q	V _{EN} =0V V _{FB} =2V		2.1	5	mA
Oscillator Frequency	Fosc		75	100	135	KHz
Switch Current Limit	I _L	V _{FB} =0V R3=0.075Ω		1.1		A
EN Pin Threshold	V _{EN}	High(RegulatorOFF)		2		V
		Low(Regulator ON)		1		V
Output Power PMOS	Rdson	V _{IN} =48V I _{SW} =1.0A			270	mohm

Typical Performance Characteristics

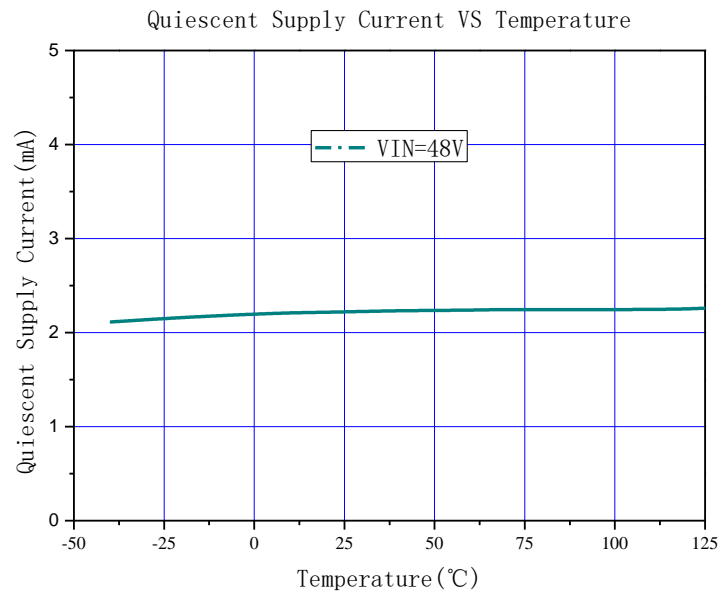


Figure5. Quiescent Current Curve

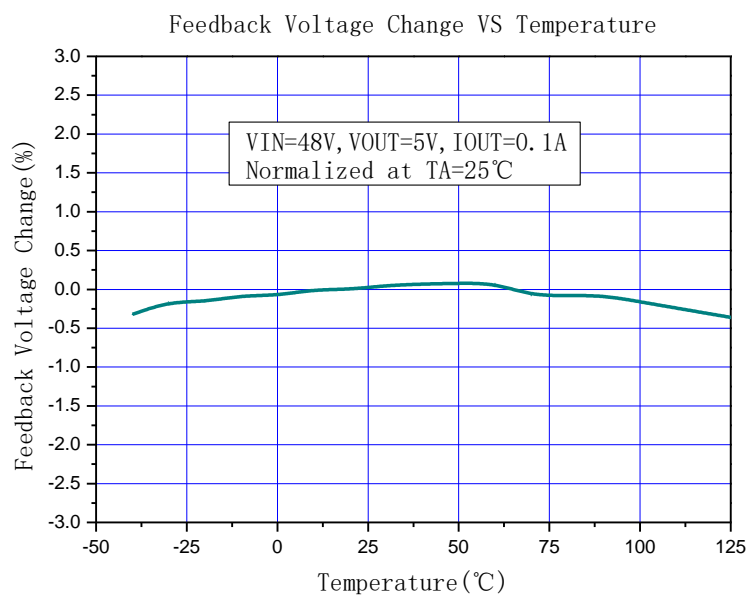


Figure6. Feedback Voltage Curve

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Typical System Application (VOUT=15V, IOU=0~0.5A)

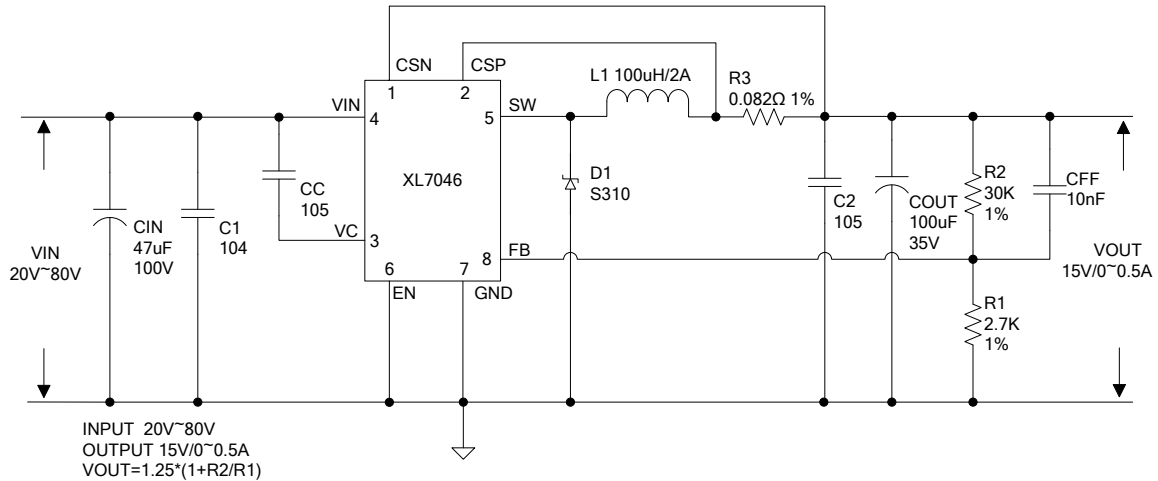


Figure7. XL7046 System Application (VIN=20V~80V, VOUT=15V, IOU=0~0.5A)

ON/OFF Mode Application (VEN=0/2V)

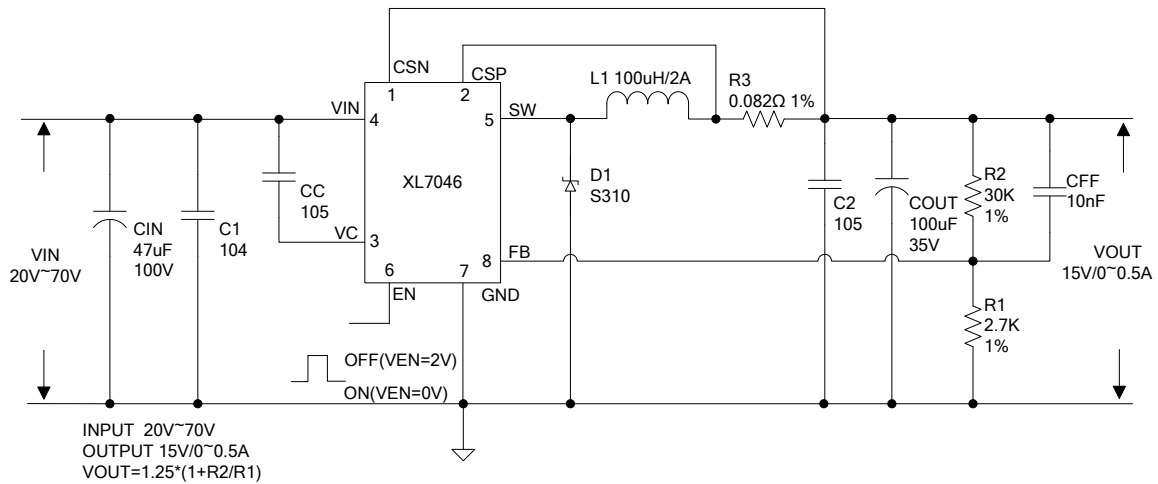


Figure8. XL7046 ON/OFF Mode Application (VIN=20V~70V, VOUT=15V, IOU=0~0.5A)

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Typical System Application (VOUT=5V, IOU=0~1.0A)

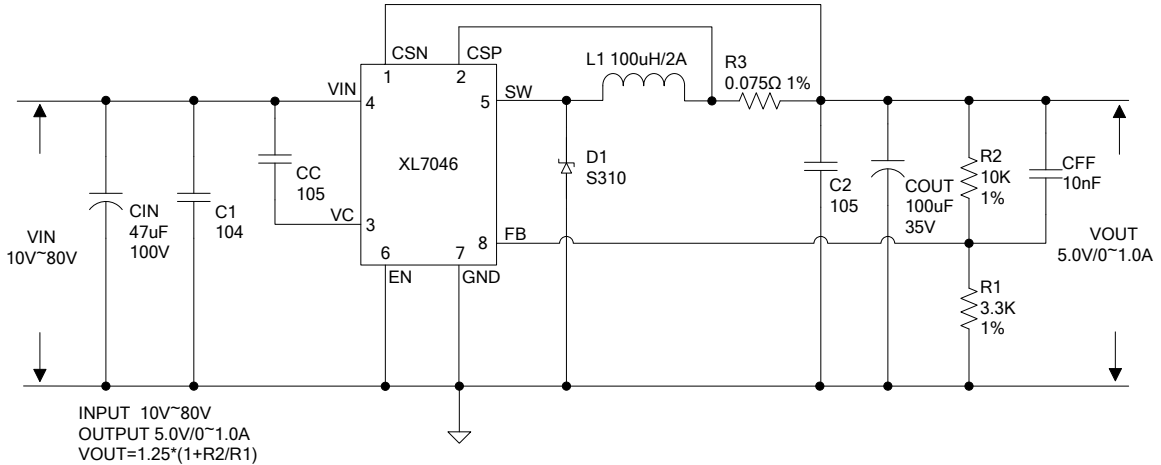


Figure9. XL7046 System Application (VIN=10V~80V, VOUT=5V, IOU=0~1.0A)

ON/OFF Mode Application (VEN=0/2V)

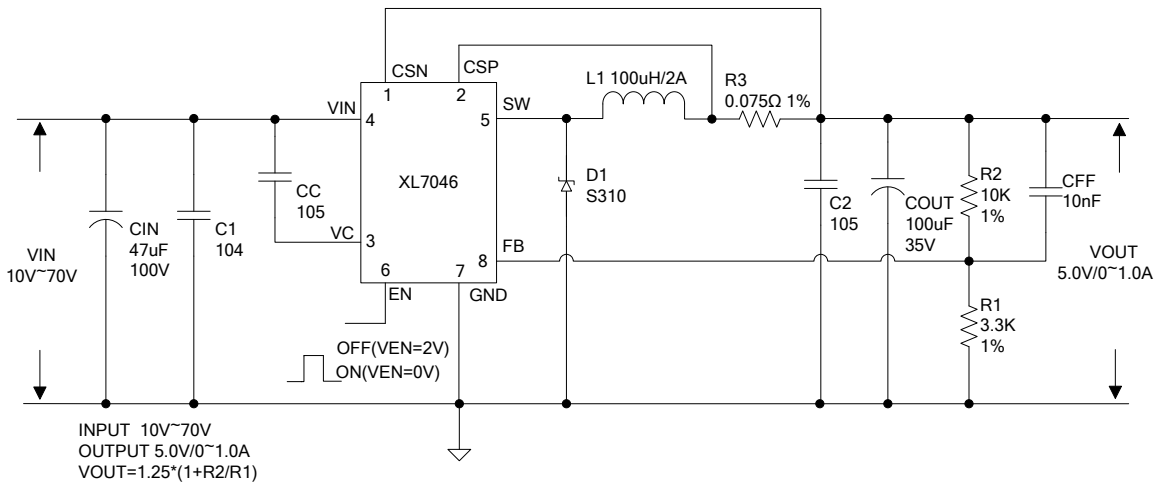


Figure10. XL7046 ON/OFF Mode Application (VIN=10V~70V, VOUT=5V, IOU=0~1.0A)

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Typical System Application (VOUT=3.3V, IOU=0~1.0A)

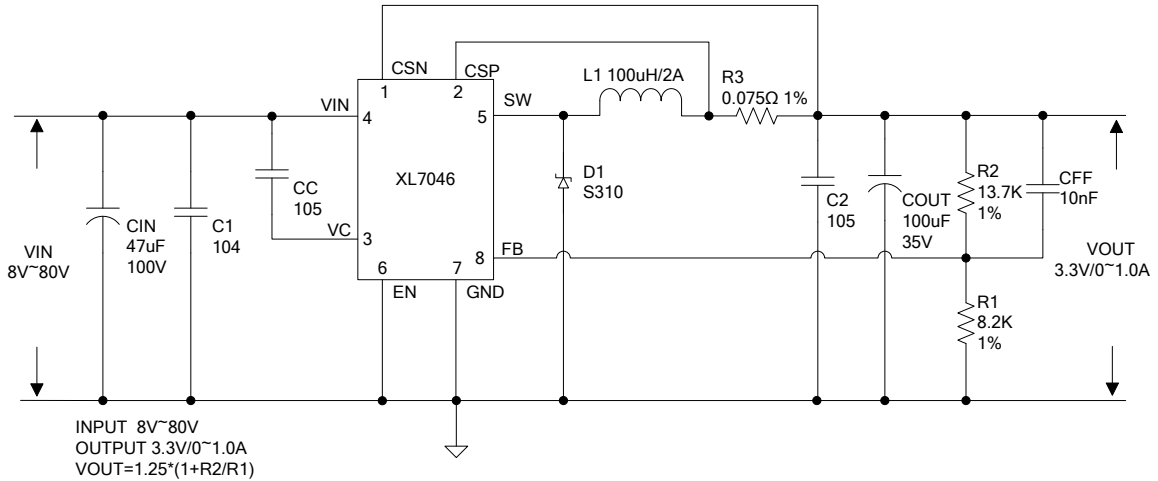


Figure11. XL7046 System Application (VIN=8V~80V, VOUT=3.3V, IOU=0~1.0A)

ON/OFF Mode Application (VEN=0/2V)

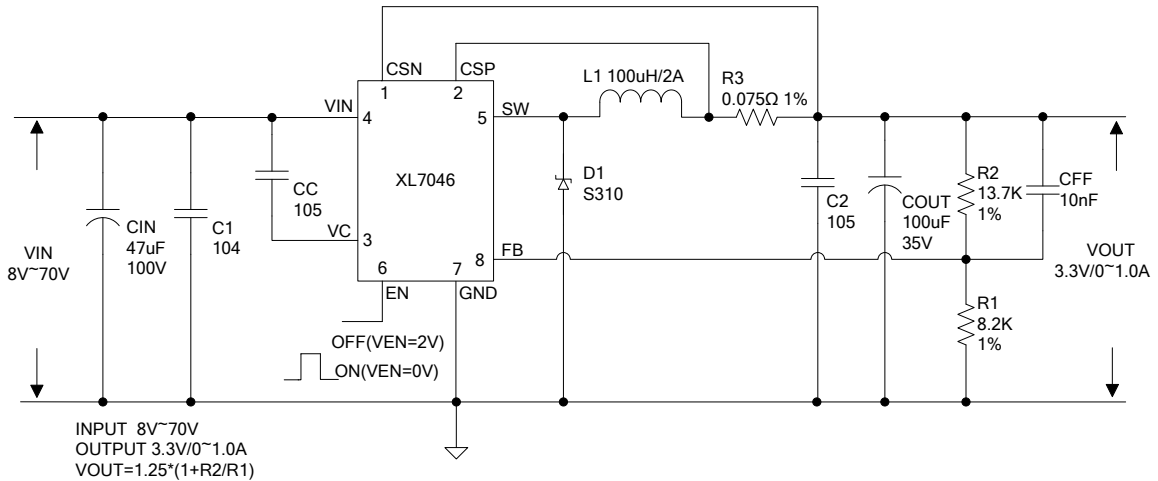


Figure12. XL7046 ON/OFF Mode Application (VIN=8V~70V, VOUT=3.3V, IOU=0~1.0A)

Typical System Application (Efficiency VS Output Current)

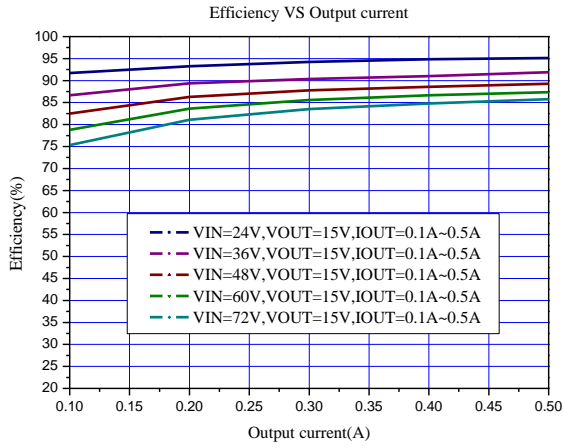


Figure13. VIN=20V~80V, VOUT=15V

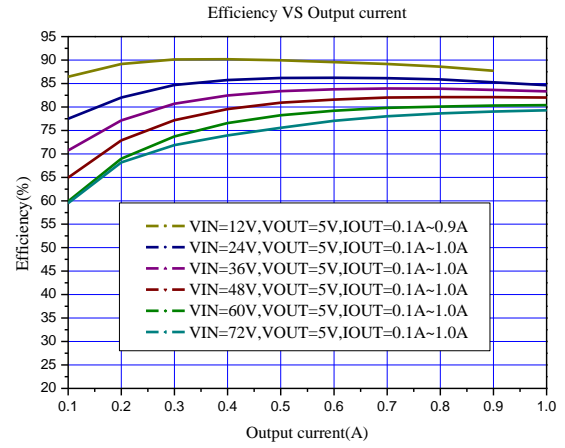


Figure14. VIN=10V~80V, VOUT=5V

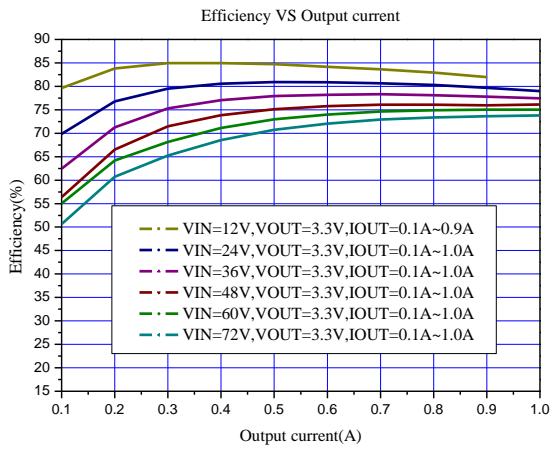


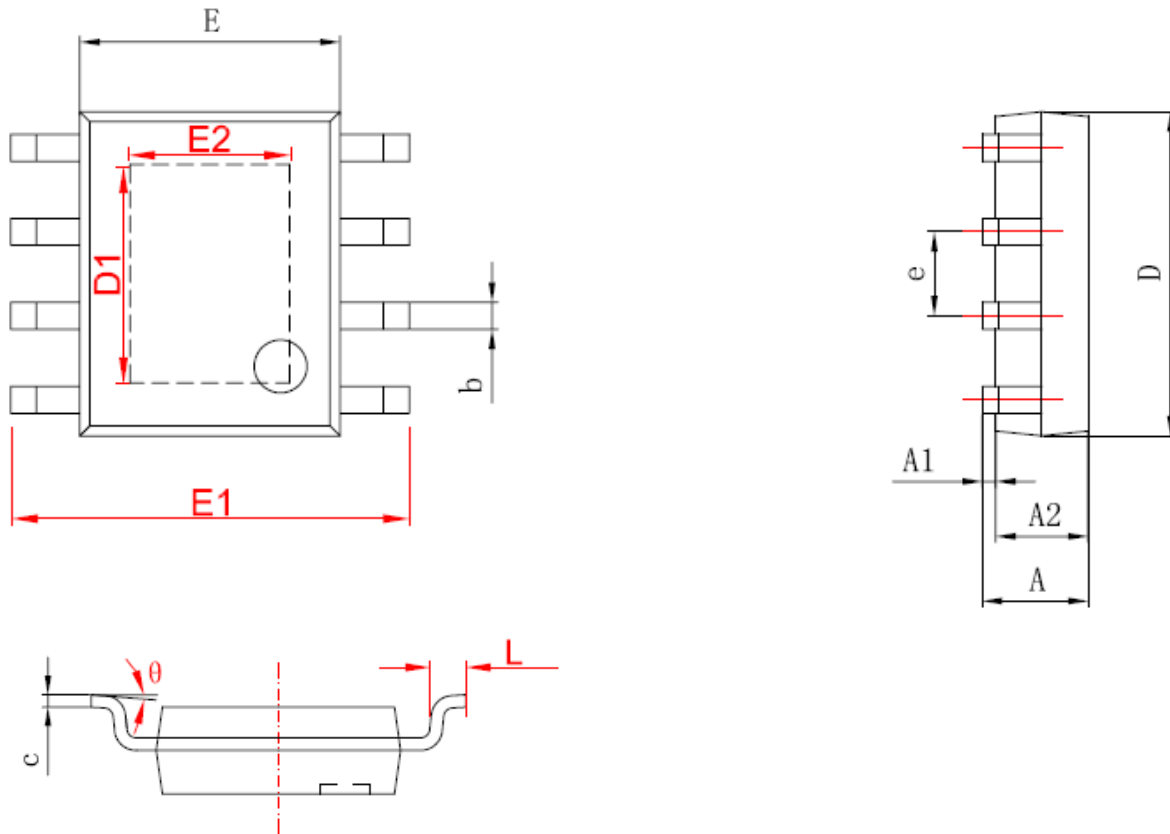
Figure15. VIN=8V~80V, VOUT=3.3V

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Package Information

SOP8-EP Mechanical Dimensions



字符	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.050	0.150	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
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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