

芯伯乐®
X I N B O L E

Product Specification

XBLW XBL4001

5A 150KHz 40V PWM
Buck Constant Current DC/DC Converter

WEB | www.xinboleic.com



Description

The XBL4001 is a monolithic IC designed for a step-down DC/DC converter, and owe the ability of driving a 5A load without additional transistor, It saves board space. The external shutdown function can be controlled by logic level and then come into standby mode. The internal compensation makes feedback control having good line and load regulation without external design. Regarding protected function, thermal shutdown is to prevent over temperature operating from damage, and current limit is against overcurrent operating of the output switch. If current limit function occurs and VFB is down below 0.5V, the switching frequency will be reduced.

The XBL4001 operates at a switching frequency of 150KHz thus allow smaller sized filter. Components than what would be needed with lower frequency switching regulators. Other features include a guaranteed $\pm 4\%$ tolerance on output voltage under specified input voltage and output load conditions, and $\pm 10\%$ on the oscillator frequency.

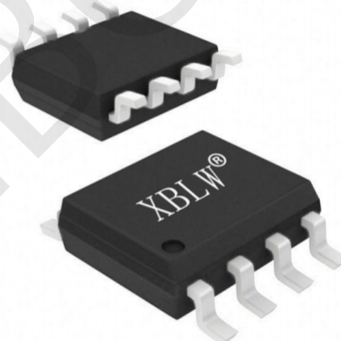
The chips are available in SOP8 package and ESOP8L.

Features

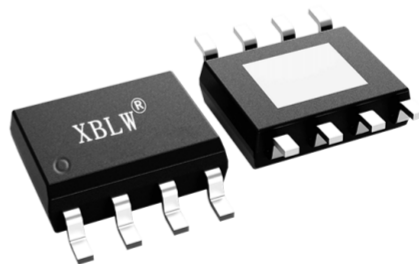
- Wide 4.5V to 40V Input Voltage Range
- Fixed 150KHz Switching Frequency
- Voltage Mode Non-synchronous PWM Control
- ON/OFF Shutdown Control Input
- Output Adjustable Voltage From 1.235V to 37V
- Output Load Current: SOP-8=2A, ESOP-8=5A
- Low Power Standby Mode
- Built-in Switching MOSFET on Chip

Applications

- Portable DVD
- LCD Monitor / TV
- Battery Charger
- ADSL Modem
- Telecom / Networking Equipment



SOP-8



ESOP-8

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW XBL4001DTR	SOP-8	XBL4001	Tape	2500Pcs/Reel
XBLW XBL4001E1DTR	ESOP-8	XBL4001E1	Tape	2500Pcs/Reel

E/E1: Exclusive logo with radiator on the back

Pin Configurations

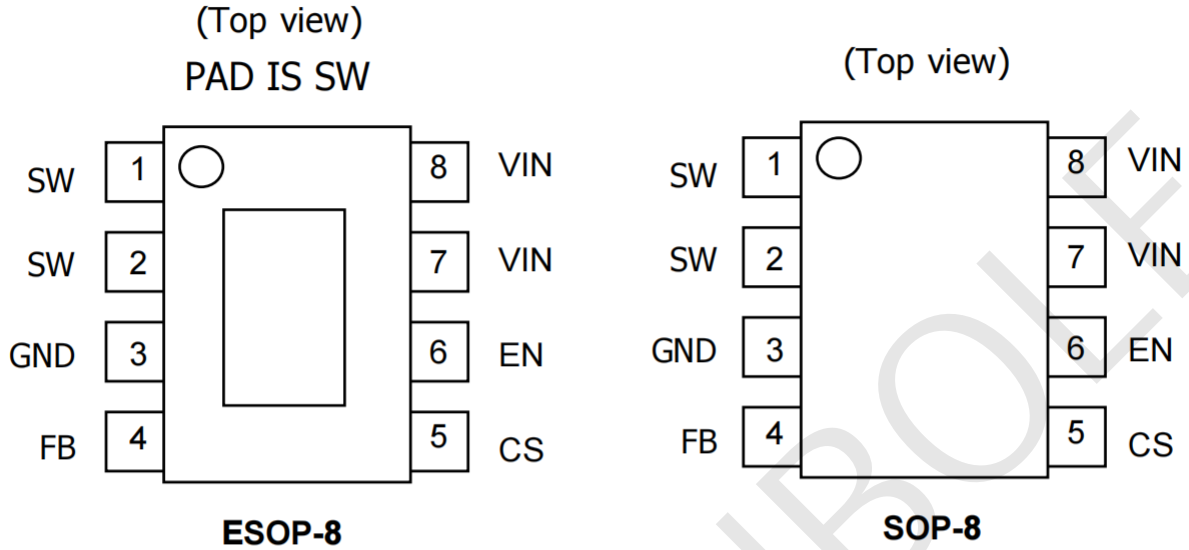


Figure1. Pin Configuration of XBL4001(TopView)

Pin Description

Pin Number	Pin Name	Description
1/2	SW	Power Switch Output Pin (SW). SW is the switch node that supplies power to the output.
3	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 XBL4001.
4	FB	Feedback Pin (FB). Through an external resistor divider network, FB senses the output voltage and regulates it. The feedback threshold voltage is 1.235V.
5	CS	Output Current Sense Pin($I_{LOAD}=0.155V/R_{cs}$).
6	EN	Enable Pin. Drive EN pin high or float to turn on the device, drive it low to turn it off.
7/8	VIN	Supply Voltage Input Pin. XBL4001 operates from a 4.5V to 40V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
Metal Tab	SW	Metal Tab is SW of ESOP8L package

Function Block

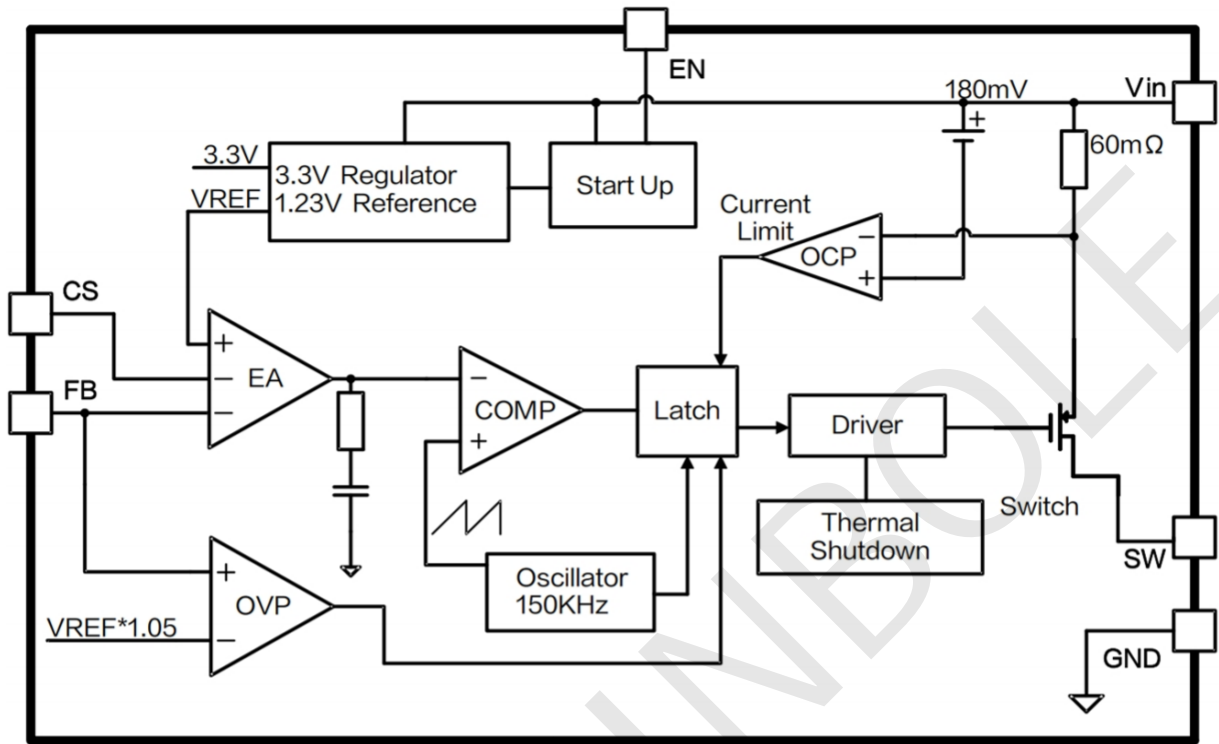


Figure 2. Function Block Diagram of XBL4001

Absolute Maximum Ratings

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.

Parameter	Symbol	Value	Unit
Input Voltage	V_{IN}	-0.3 to 45	V
Feedback Pin Voltage	V_{FB}	-0.3 to V_{IN}	V
Enable Pin Voltage	V_{EN}	-0.3 to V_{IN}	V
Switch Pin Voltage	V_{SW}	-0.3 to V_{IN}	V
CS Pin Voltage	V_{CS}	-0.3 to V_{IN}	V
Operating Junction Temperature	T_J	-40~125	°C
Storage Temperature	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	°C
ESD (HBM)		2000	V
MSL		Level 3	
Thermal Resistance-Junction to Ambient	$R_{\theta JA}$	85	°C / W
Thermal Resistance-Junction to Case	$R_{\theta JC}$	45	°C / W

Typical Application Circuit

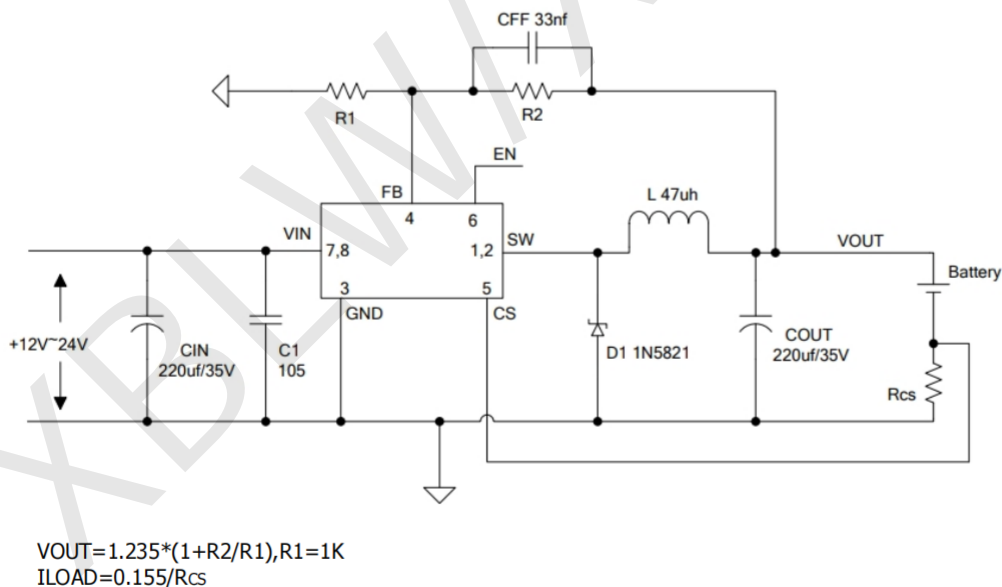


Figure 3. XBL4001 Typical Application Circuit

Electrical Characteristics

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
System parameters test circuit figure 3						
VFB	Feedback Voltage	$V_{in} = 8\text{V to } 40\text{V}, V_{out}=5\text{V}$ $I_{load}=0.5\text{A to } 5\text{A}$	1.21	1.235	1.26	V
Efficiency	η	$V_{in}=12\text{V}, V_{out}=5\text{V } I_{out}=5\text{A}$	-	87	-	%
Efficiency	η	$V_{in}=24\text{V}, V_{out}=12\text{V } I_{out}=4\text{A}$	-	93	-	%

Electrical Characteristics (DC Parameters)

$V_{in} = 12\text{V}, GND=0\text{V}$, V_{in} & GND parallel connect a $220\mu\text{F}/50\text{V}$ capacitor; $I_{out}=500\text{mA}$,
 $T_a = 25^{\circ}\text{C}$; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	V_{in}		4.5		40	V
Quiescent Supply Current	I_q	$V_{FB}=5\text{V}$		3.5	5	mA
Oscillator Frequency	F_{osc}		127	150	173	KHz
Output Short Frequency	F_{osp}			48		KHz
Switch Current Limit	I_L	$V_{FB}=0$		8		A
Max. Duty Cycle	D _{MAX}	$V_{FB}=0\text{V}$		100		%
Output Power PMOS	R_{dson}	$V_{FB}=0\text{V}, V_{in}=12\text{V},$ $I_{SW}=5\text{A}$		60	80	mohm
CS voltage	V_{CS}	Constant Current Voltage		155		mV

Typical System Application (VOUT=5V/5A)

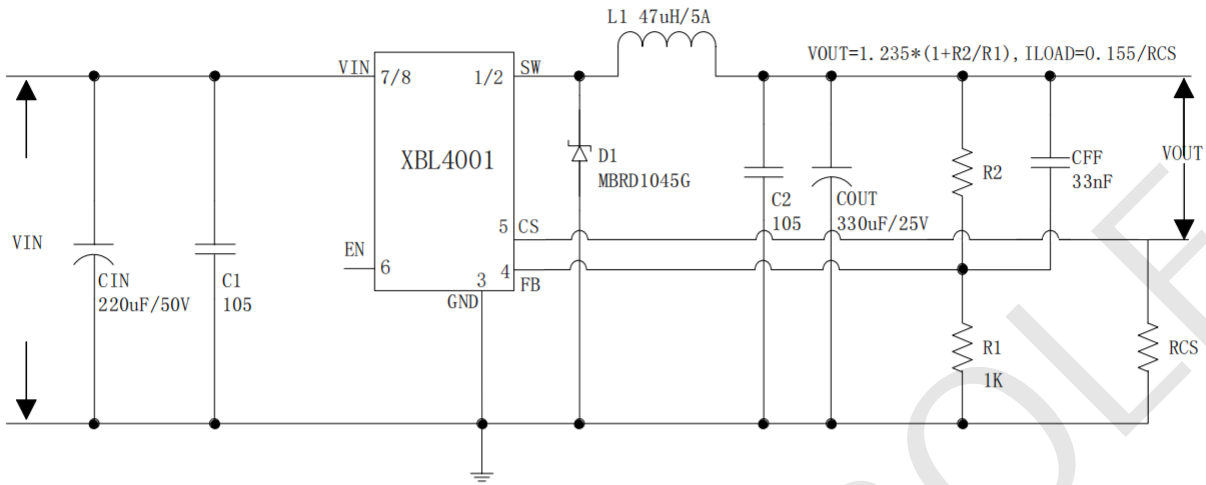


Figure 4. XBL4001 System Parameters Test Circuit (VIN=8V~40V, VOUT=5V/5A)

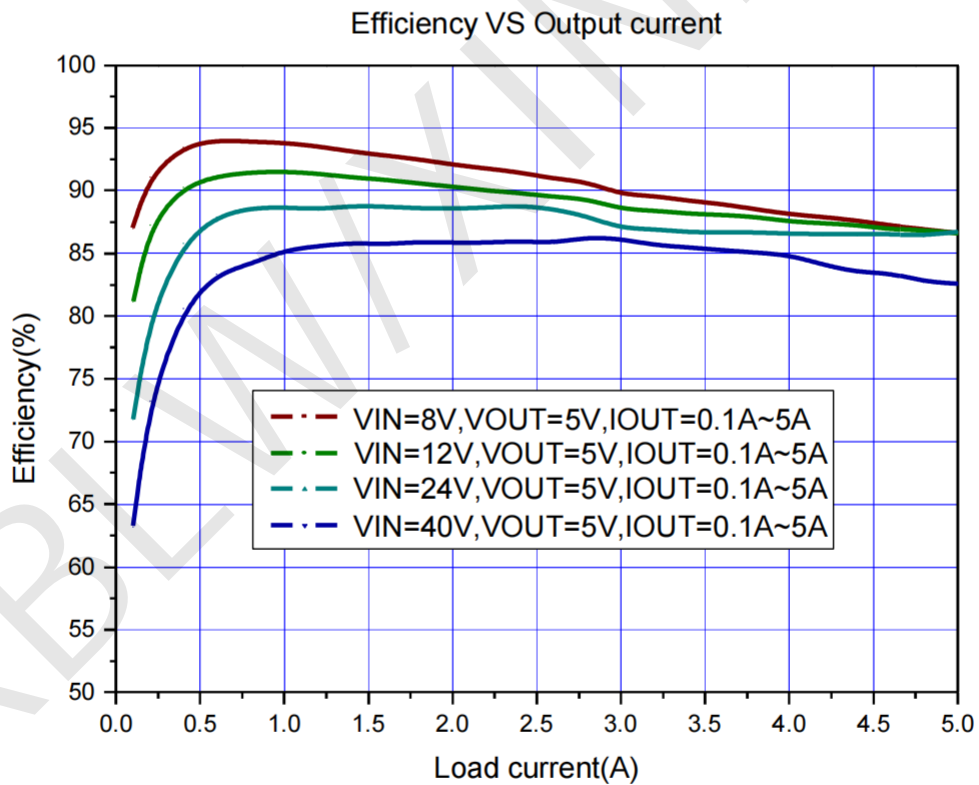


Figure 5. XBL4001 System Efficiency Curve

Typical System Application (VOUT=12V/4A)

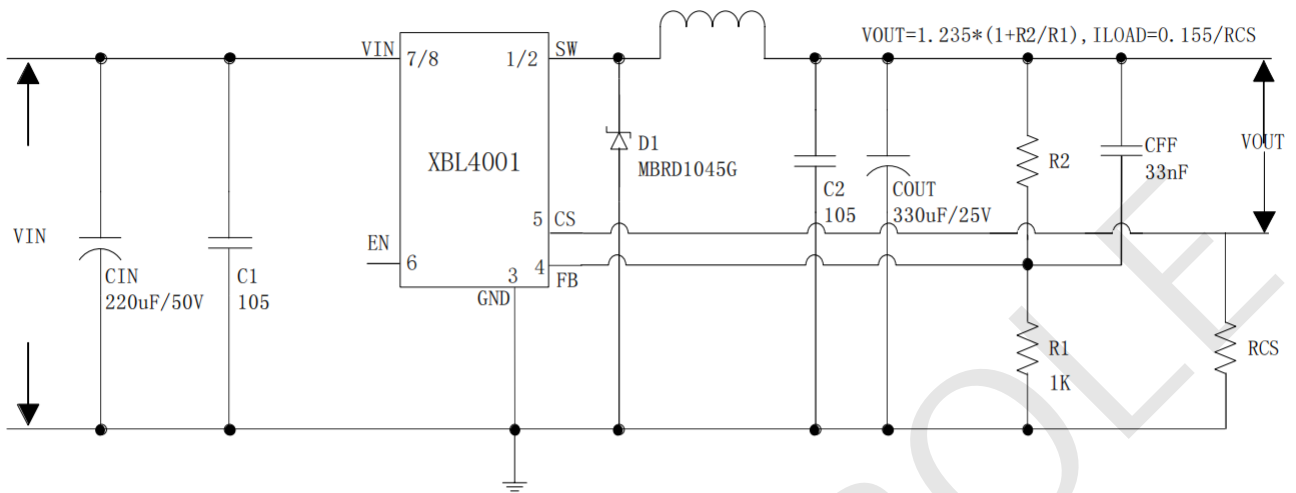


Figure 6. XBL4001 System Parameters Test Circuit (VIN=15V~40V, VOUT=12V/4A)

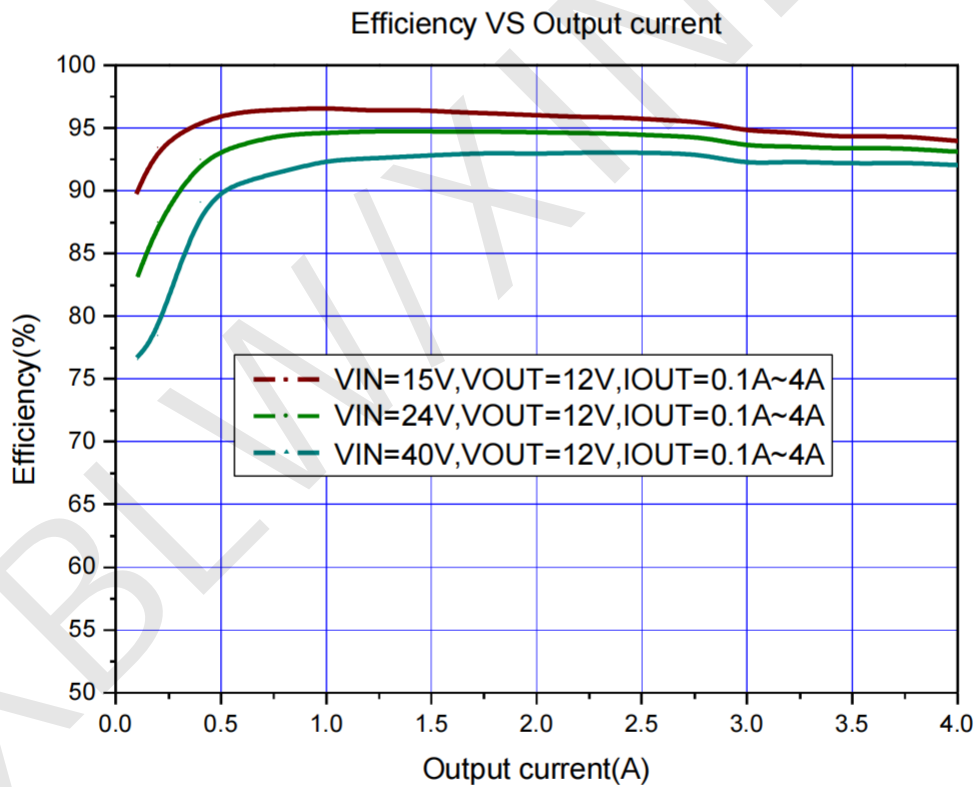


Figure 7. XBL4001 System Efficiency Curve

Typical System Application (EN shutdown function)

Logic level signals shutdown function can be used in typical system application without external components. When the EN voltage lower than 0.8V, the converter will shutdown; when the EN voltage above 1.2V or float, the converter will turn on.

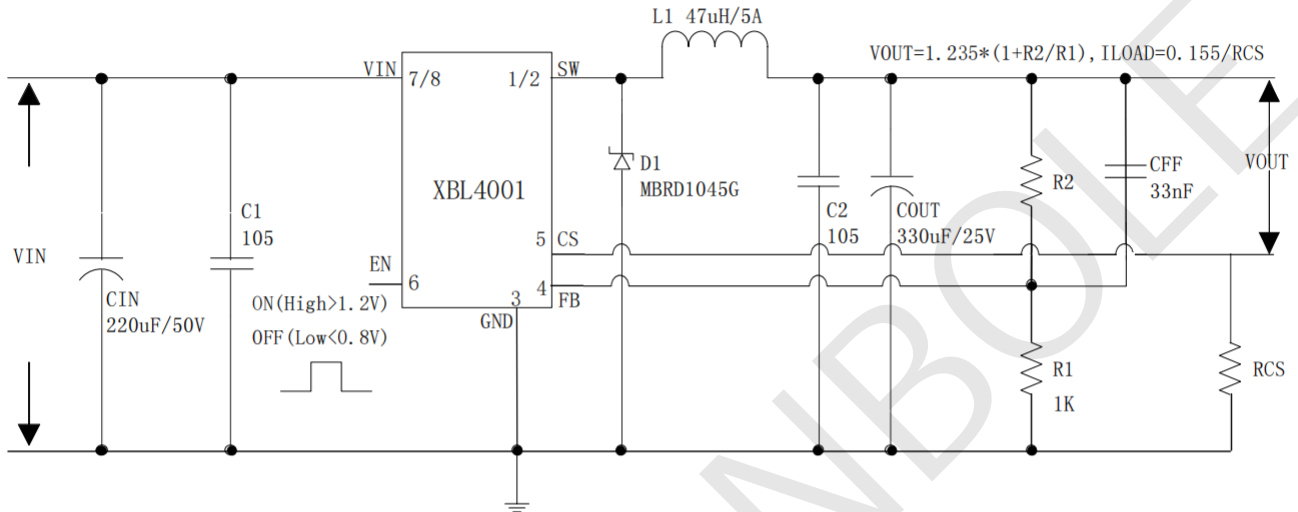
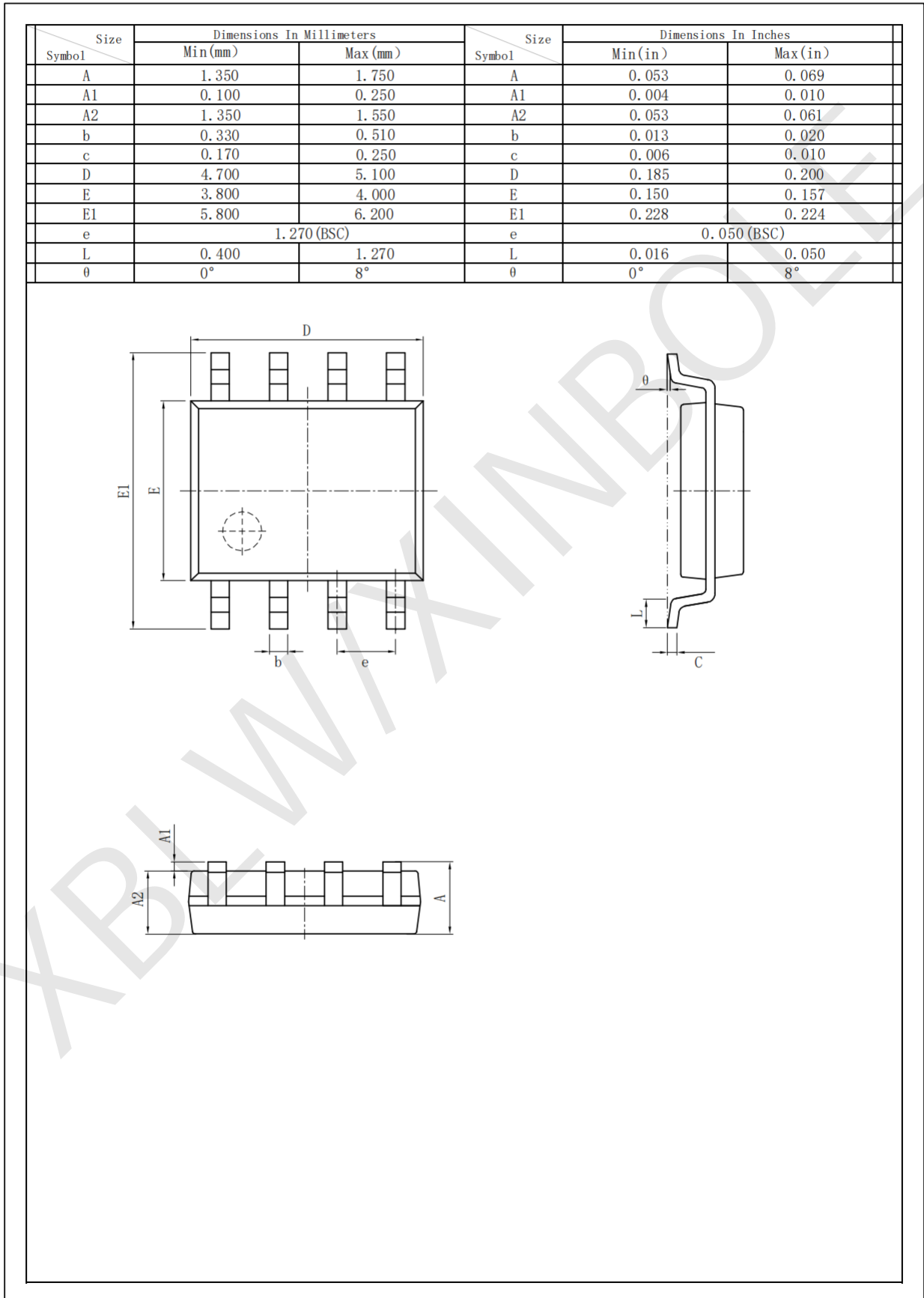


Figure 8. XBL4001 Typical Application Circuit

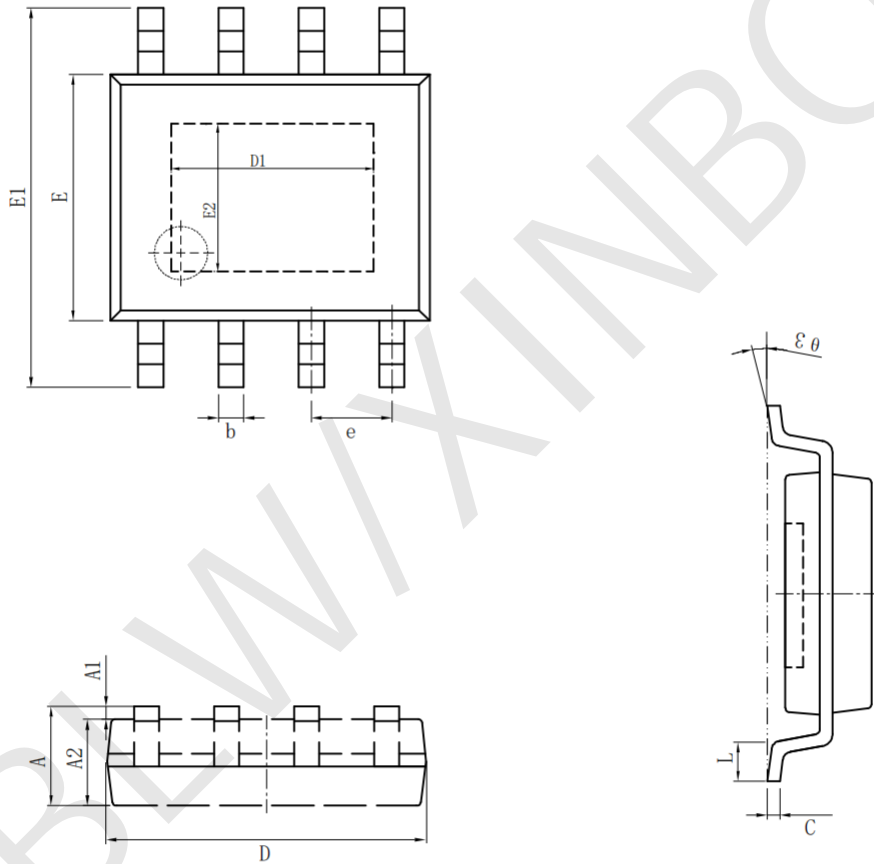
Package Information

- SOP-8



· ESOP-8

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
A	1.350	1.750	A	0.053	0.069
A1	0.050	0.150	A1	0.004	0.010
A2	1.350	1.550	A2	0.053	0.061
b	0.330	0.510	b	0.013	0.020
c	0.170	0.250	c	0.007	0.010
D	4.700	5.100	D	0.185	0.201
D1	3.202	3.402	D1	0.126	0.134
E	3.800	4.000	E	0.150	0.157
E1	5.800	6.200	E1	0.228	0.244
E2	2.313	2.513	E2	0.091	0.099
e	1.270 (BSC)		e	0.050 (BSC)	
L	0.400	1.270	L	0.016	0.050
θ	0°	8°	θ	0°	8°



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