



Product Specification

XBLW XBL4005

5A 300KHz 40V PWM Buck DC/DC Converter

WEB | www.xinboleic.com



Descriptions

The XBL4005 is a 300KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 5A 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 100%. An over current protection function is built inside. When short protection function happens, the operation frequency will be reduced from 300KHz to 100KHz. An internal compensation block is built in to minimize external component count.

Features

- Wide 4.5V to 40V Input Voltage Range
- Output Adjustable from 0.8V to 37V
- Maximum Duty Cycle 100%
- Minimum Drop Out 0.3V
- Fixed 300KHz Switching Frequency
- 5A Constant Output Current Capability
- Internal Optimize Power MOSFET
- High efficiency up to 93%
- Excellent line and load regulation
- Built in thermal shutdown function
- Built in current limit function
- Built in output short protection function
- Available in TO263-5L package

Applications

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



Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBL4005E1TB	TO-263-5L	XBL4005E1	Tube	1000Pcs/Box
XBL4005E1DTR	TO-263-5L	XBL4005E1	Tape	800Pcs/Reel

E1: Equipped with heat sink.

Pin Configurations

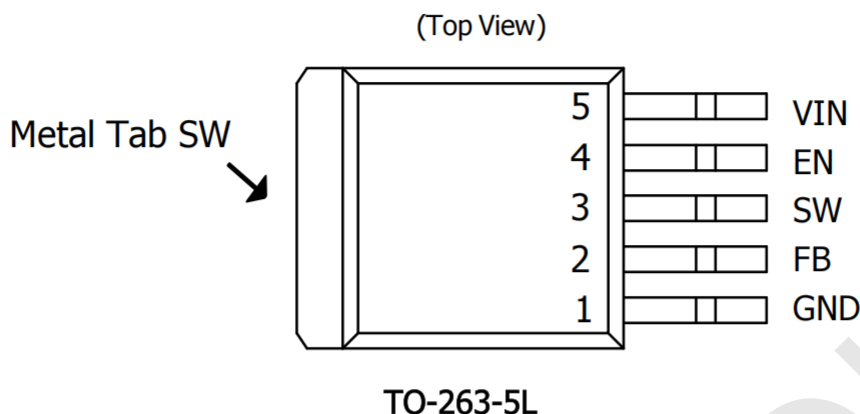


Figure 1. Pin Configuration of XBL4005 (Top View)

Pin Description

Pin Number	Pin Name	Description
1	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 XBL4005.
2	FB	Feedback Pin (FB). Through an external resistor divider network, FB senses the output voltage and regulates it. The feedback threshold voltage is 0.8V.
3	SW	Power Switch Output Pin (SW). SW is the switch node that supplies power to the output.
4	EN	Enable Pin. Drive EN pin high to turn on the device, drive it low to turn it off.
5	VIN	Supply Voltage Input Pin. XBL4005 operates from a 4.5V to 40V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
Tab	SW	Power Switch Output Pin (SW). SW is the switch node that supplies power to the output.

Function Block

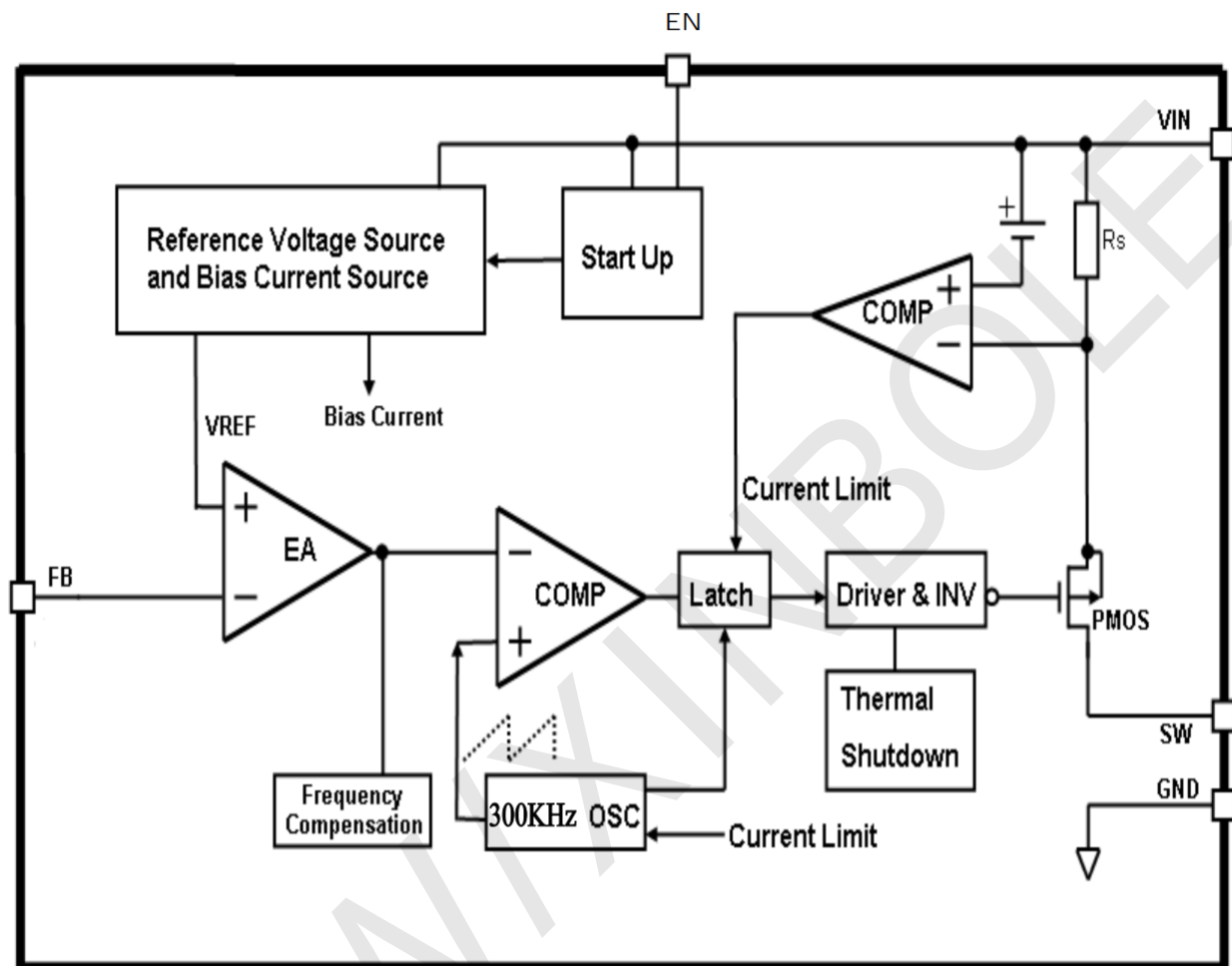


Figure 2. Function Block Diagram of XBL4005

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 40	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
Power Dissipation	P_D	Internally limited	mW
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		Level3	
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

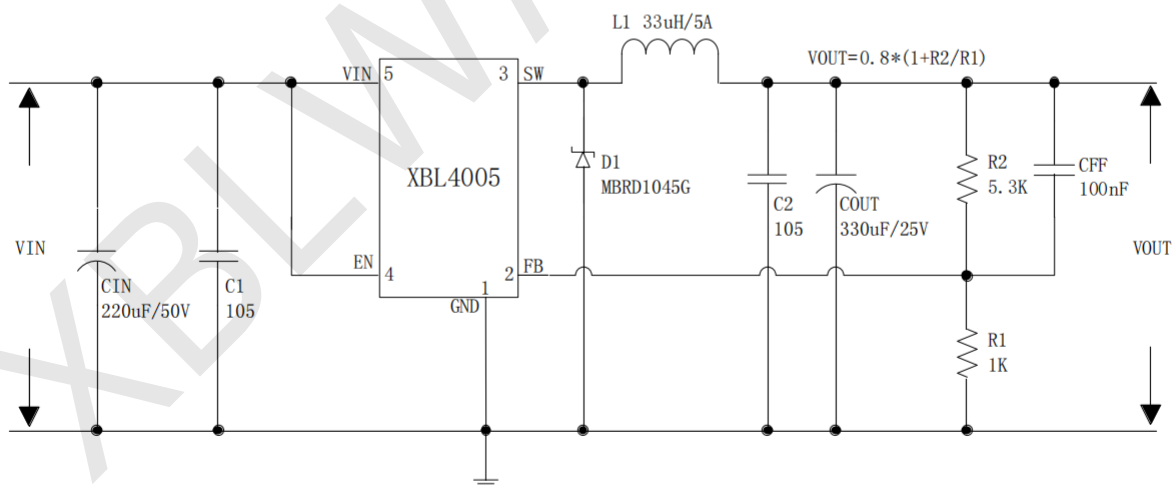


Figure 3. XBL4005 Typical Application Circuit ($V_{IN}=4.5V\sim 40V$, $V_{OUT}=5V/5A$)

Electrical Characteristics

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
VFB	Feedback Voltage	$V_{in} = 4.5\text{V to } 40\text{V}, V_{out}=5\text{V } I_{load}=0.5\text{A to } 5\text{A}$	0.785	0.80	0.815	V
Efficiency	η	$V_{in}=12\text{V}, V_{out}=5\text{V } I_{out}=5\text{A}$	-	90	-	%
Efficiency	η	$V_{in}=24\text{V}, V_{out}=12\text{V } I_{out}=4\text{A}$	-	93	-	%

Electrical Characteristics (DC Parameters)

$V_{in} = 12\text{V}$, $\text{GND}=0\text{V}$, 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	$V_{FB}=1\text{V}$		2.8	5	mA
Oscillator Frequency	F_{osc}		240	300	340	KHz
Output Short Frequency	F_{osp}			100		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

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

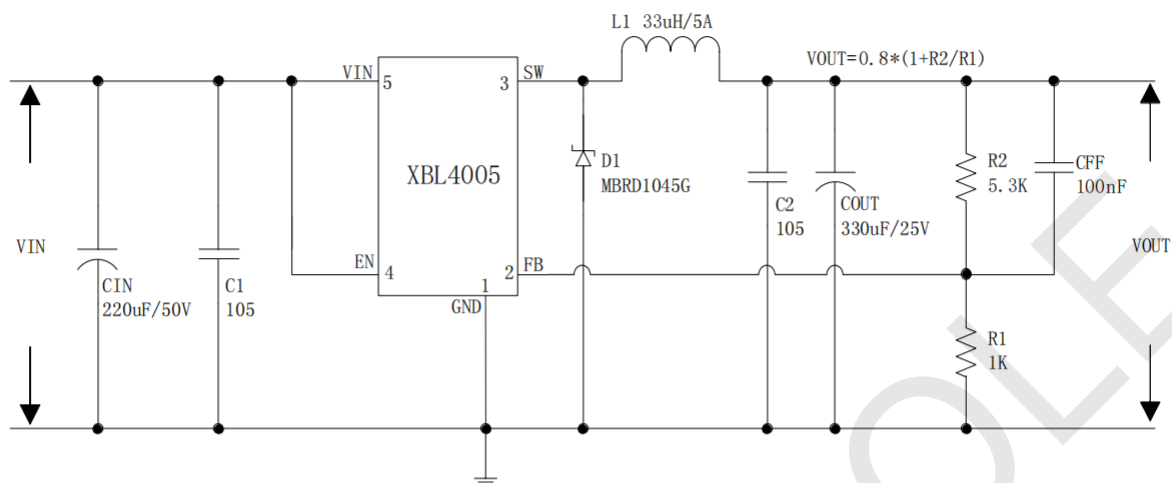


Figure 4. XBL4005 System Parameters Test Circuit ($V_{IN}=8V\sim 40V$, $V_{OUT}=5V/5A$)

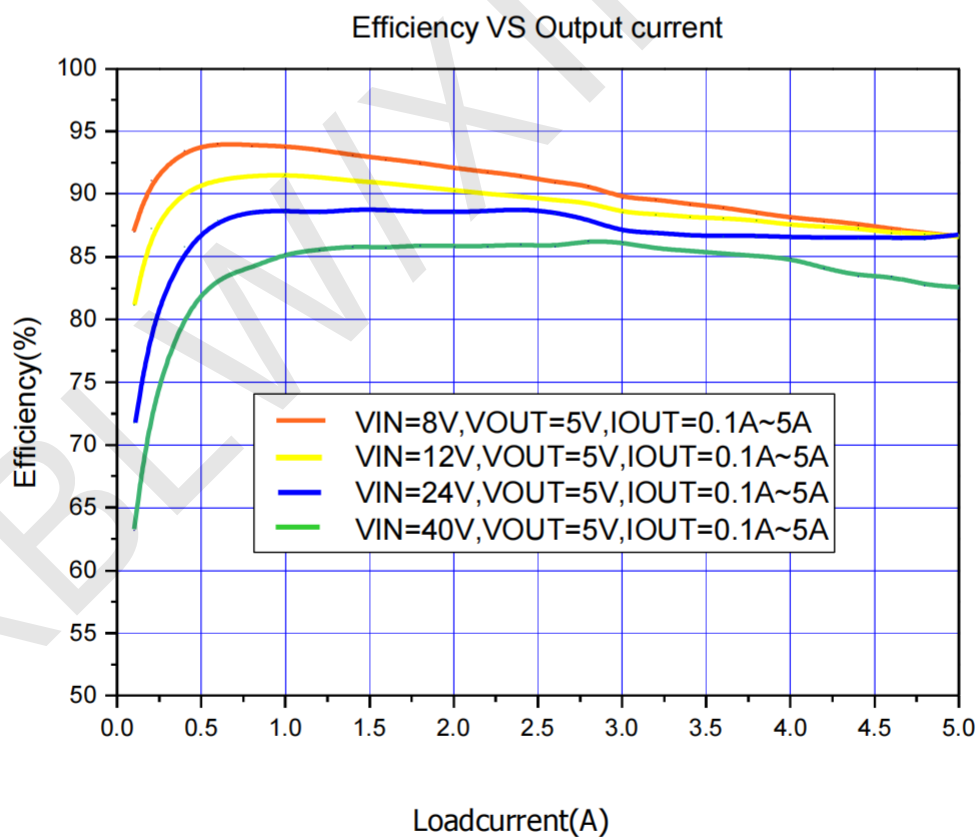


Figure 5. XBL4005 System Efficiency Curve

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

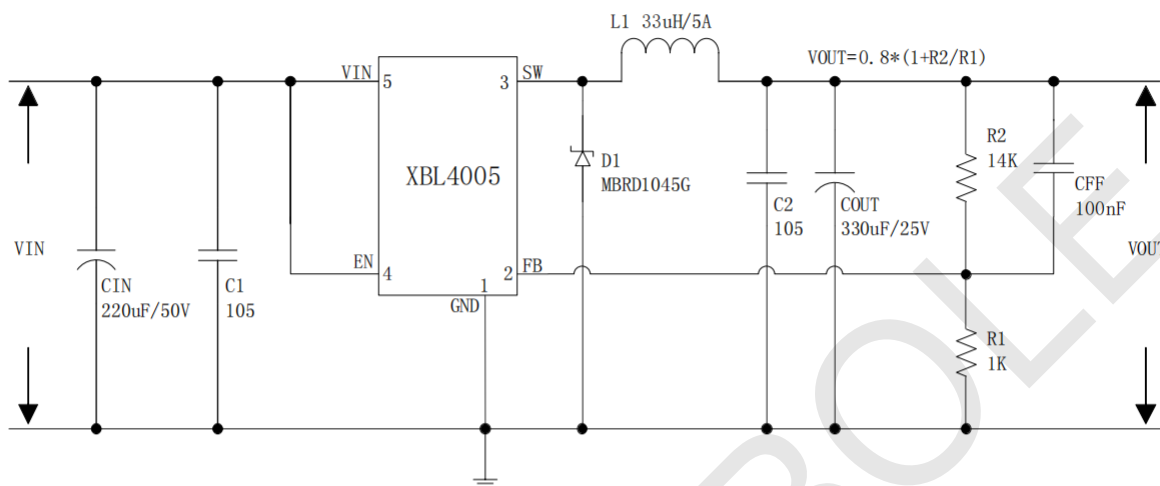


Figure 6. XBL4005 System Parameters Test Circuit (VIN=15V~40V, VOUT=12V/4A)

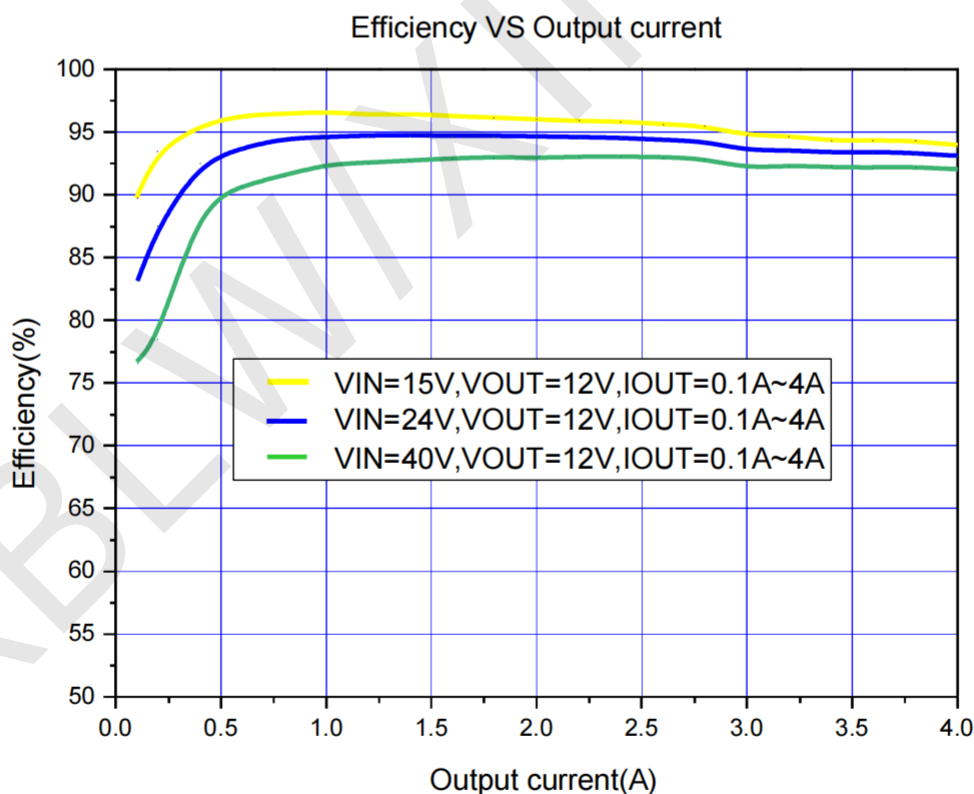


Figure 7. XBL4005 System Efficiency Curve

Typical System Application (EN shutdown function)

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

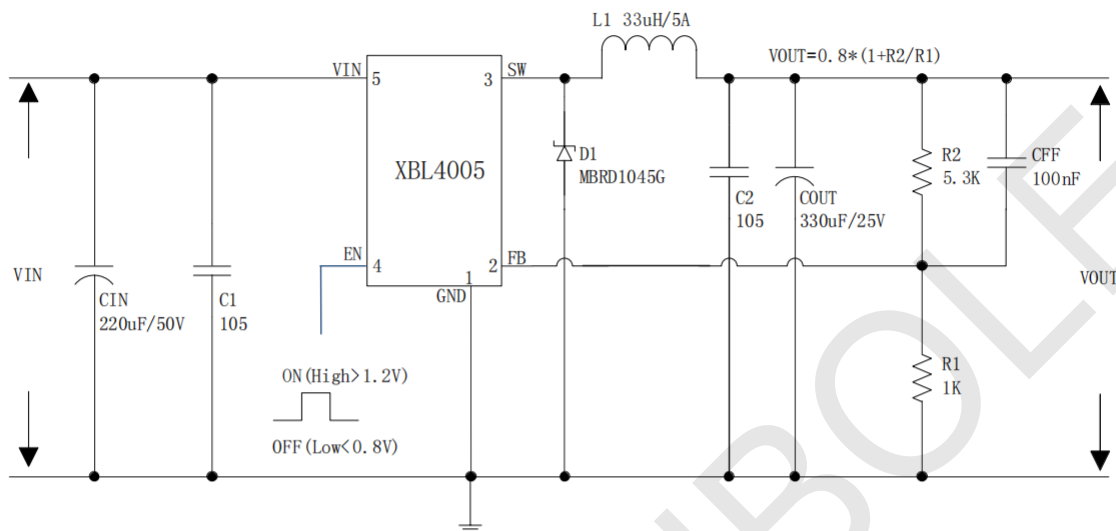
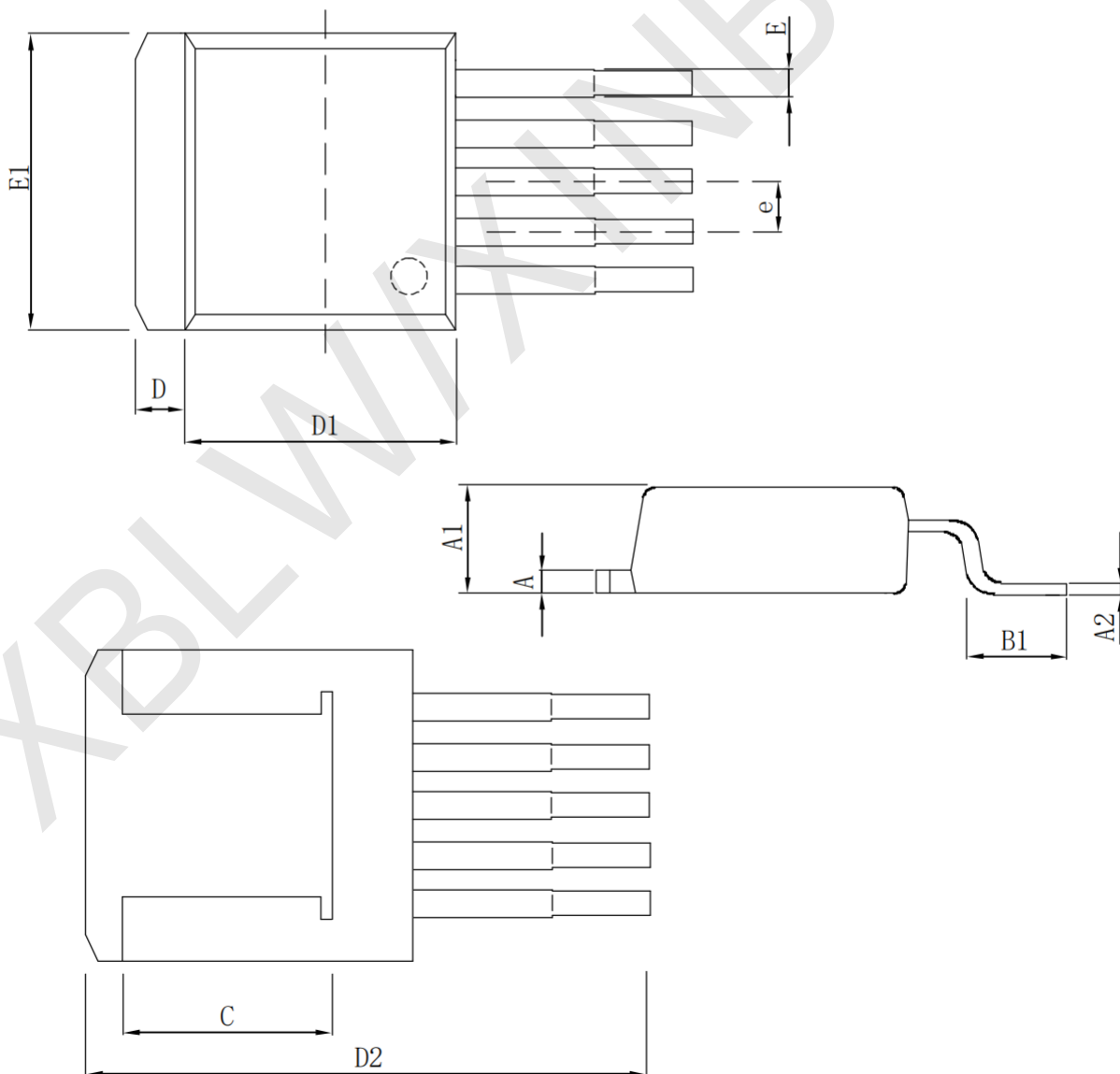


Figure 8. XBL4005 Typical Application Circuit

Package Information

· T0-263-5L

Symbol	Size		Dimensions In Millimeters		Symbol	Size		Dimensions In Inches	
			Min (mm)	Max (mm)				Min (in)	Max (in)
A			1.170	1.370	A			0.046	0.054
A1			4.470	4.670	A1			0.176	0.184
A2			0.310	0.530	A2			0.012	0.021
B1			2.340	2.740	B1			0.092	0.108
C			5.080 (REF)		C			0.200 (REF)	
D			1.170	1.370	D			0.046	0.054
D1			8.500	8.900	D1			0.335	0.350
D2			14.55	15.55	D2			0.572	0.612
E			0.660	0.860	E			0.025	0.034
E1			10.01	10.31	E1			0.394	0.406
e			1.700 (BSC)		e			0.067 (BSC)	



Statement:

- XBLW reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.
- Any semiconductor product may malfunction under specified conditions. When using XBLW products for system design and overall manufacturing, the buyer is responsible for complying with safety standards and taking appropriate safety measures to avoid risks that may cause personal injury or property damage.
- XBLW products have not been licensed for life support, military, and aerospace applications, and therefore XBLW is not responsible for any consequences arising from the use of this product in these areas.
- If any or all XBLW products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.
- The specifications of any and all XBLW products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.
- XBLW documentation is only allowed to be copied without any alteration of the content and with the relevant authorization. XBLW assumes no responsibility or liability for altered documents.
- XBLW is committed to becoming the preferred semiconductor brand for customers, and XBLW will strive to provide customers with better performance and better quality products.

Specification Revision History:

Version	Date	Description
2023-06-V1.0	2023-06	New
2024-09-V2.0	2024-09	Replace template
2025-07-V2.1	2025-07	Modify switch pin (EN), apply typical diagram, R1 and R2 values