0.8A 150KHz 80V Buck DC to DC Converter XL7015

Features

- Wide 5V to 80V Operation Voltage
- Output Adjustable from 1.25V to 20V
- Maximum Duty Cycle 90%
- Minimum Drop Out 2V
- Fixed 150KHz Switching Frequency
- Maximum 0.8A Output Current
- Recommend Maximum 0.6A Output Current At 5V Output,48V Input
- Recommend Maximum 0.4A Output Current At 15V Output,48V Input
- Internal Optimize HV Power Transistor
- High efficiency up to 85%
- Excellent line and load regulation
- TTL shutdown capability
- Built in thermal shutdown function
- Built in output short Protection Function
- Built in current limit function
- TO252-5L package

Applications

- Ebike Controller Power Supply
- Telecom / Networking Equipment

General Description

The XL7015 is a 150KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 0.8A 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 90%. An enable function, an over current protection function is built inside. When output short protection function happens, the operation frequency will be reduced from 150KHz to 45KHz. An internal compensation block is built in to minimize external component count.

Figure1. Package Type of XL7015

Pin Configurations

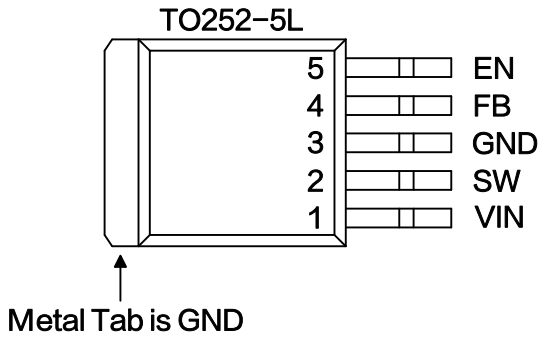


Figure2. Pin Configuration of XL7015 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	VIN	Supply Voltage Input Pin. XL7015 operates from a 5V to 80V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
2	SW	Power Switch Output Pin (SW). Output 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 XL7015. The exposed PAD is GND.
4	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.
5	EN	Enable Pin. Drive EN pin low to turn on the device, drive it high to turn it off. Floating is default low.

Function Block

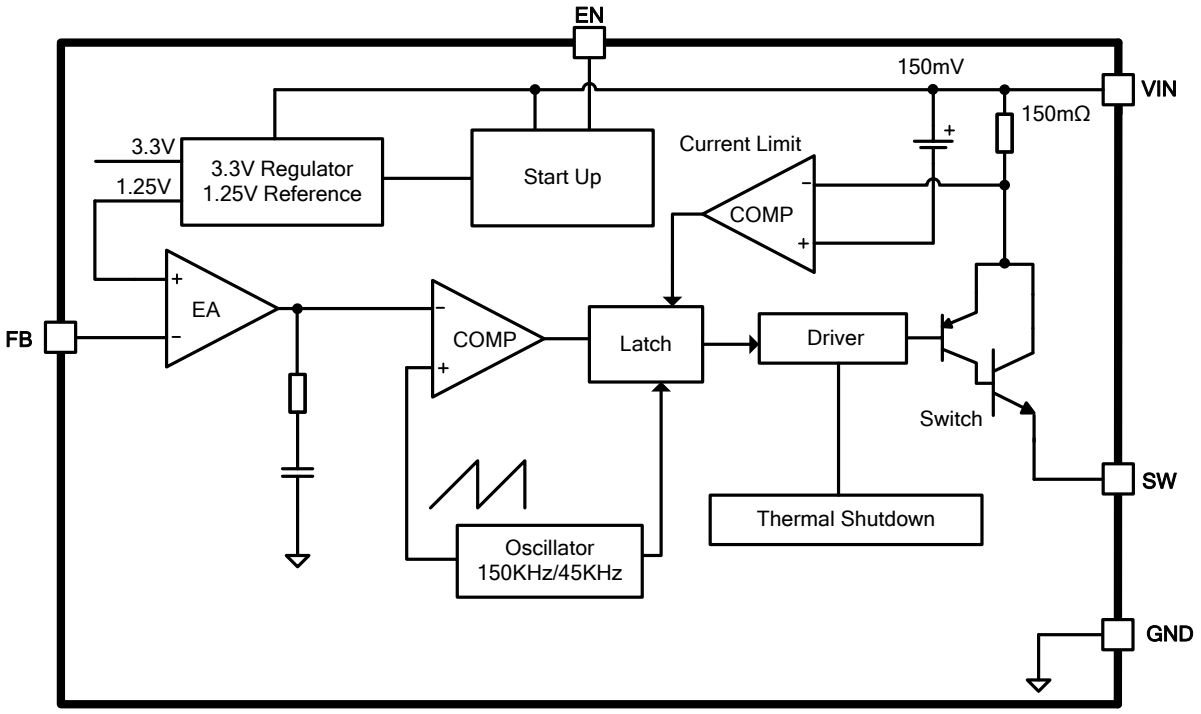


Figure3. Function Block Diagram of XL7015

Typical Application Circuit

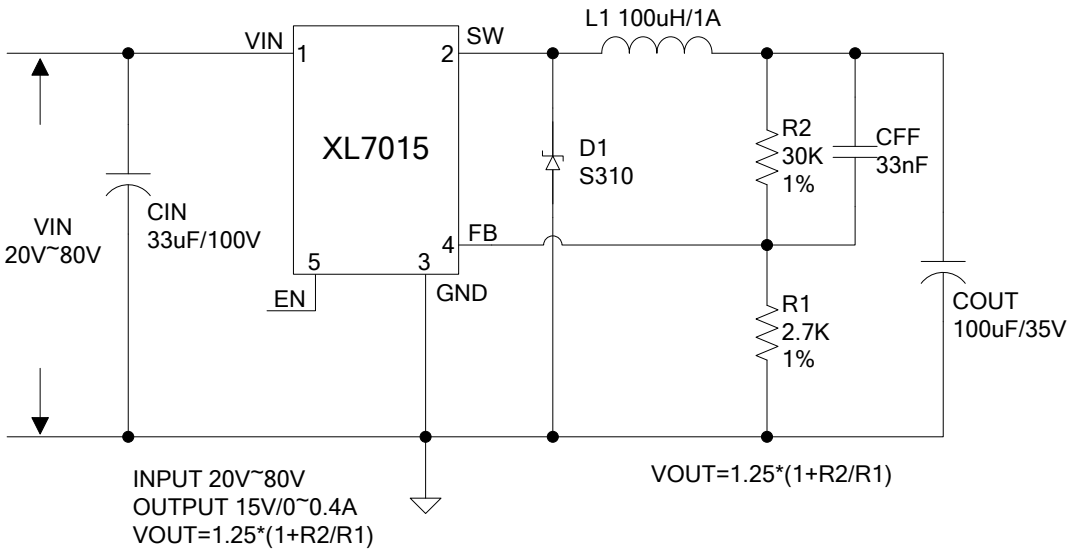


Figure4. XL7015 Typical Application Circuit

Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL7015E1	XL7015E1	TO252-5L	2500 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
Input Voltage	Vin	-0.3 to 85	V
Feedback Pin Voltage	V_{FB}	-0.3 to 7	V
EN Pin Voltage	V_{EN}	-0.3 to 7	V
Output Switch Pin Voltage	V_{SW}	-0.3 to Vin	V
Power Dissipation	P_D	Internally limited	mW
Thermal Resistance (TO252-5L) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	50	°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)		>3000	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.

XL7015 Electrical Characteristics

T_a = 25℃;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=0.1A to 0.4A	1.225	1.25	1.275	V
η	Efficiency	Vin=36V ,Vout=15V Iout=0.4A	–	86	–	%
η	Efficiency	Vin=48V ,Vout=15V Iout=0.4A	–	83	–	%
η	Efficiency	Vin=60V ,Vout=15V Iout=0.4A	–	81	–	%

Electrical Characteristics (DC Parameters)

Vin = 48V, GND=0V, Vin & GND parallel connect a 33uf/100V capacitor; Iout=0.2A, T_a = 25℃; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	Vin		5		80	V
Shutdown Supply Current	I_{STBY}	V_{EN}=2V		85	200	uA
Quiescent Supply Current	I_q	V_{EN}=0V, V_{FB}=2V		2.5	5	mA
Oscillator Frequency	Fosc		120	150	180	KHz
Switch Current Limit	I_L	V_{FB}=0V		1		A
EN Pin Threshold	V_{EN}	High (Regulator OFF)		1.6		V
		Low (Regulator ON)		0.8		
EN Pin Input Leakage Current	I_H	V_{EN}=2.5V (OFF)		6	20	uA
	I_L	V_{EN}=0.5V (ON)		1	10	uA
Output Saturation Voltage	V_{CE}	V_{FB}=0V I_{out}=0.5A		0.87		V
Max. Duty Cycle	D_{MAX}	V_{FB}=0V		90		%

Typical System Application (Recommend output current safe work range)

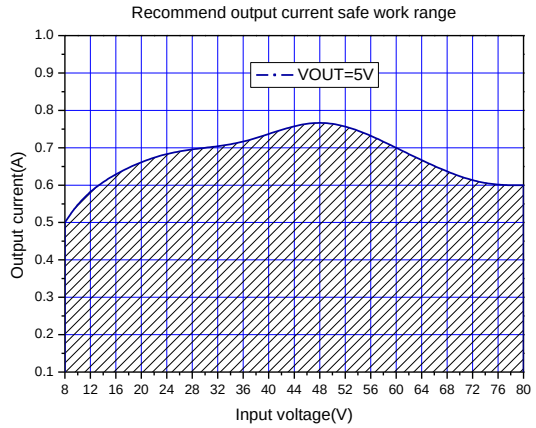


Figure5.Max output current(VOUT=5V)

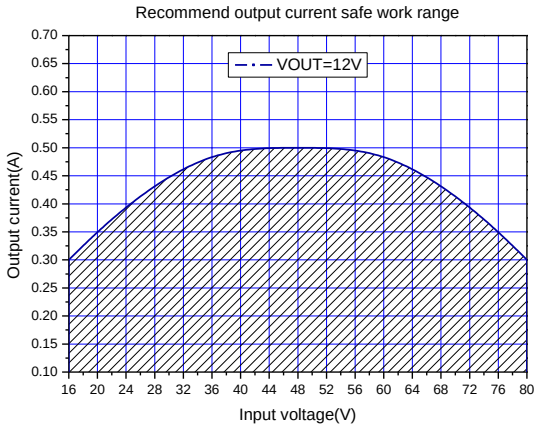


Figure6.Max output current(VOUT=12V)

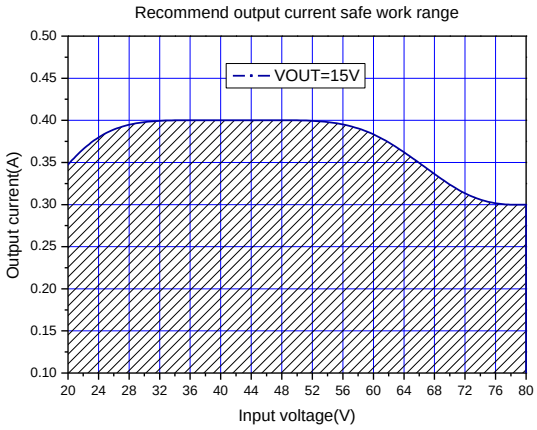


Figure7.Max output current(VOUT=15V)

Typical System Application(VOUT=15V/0.4A)

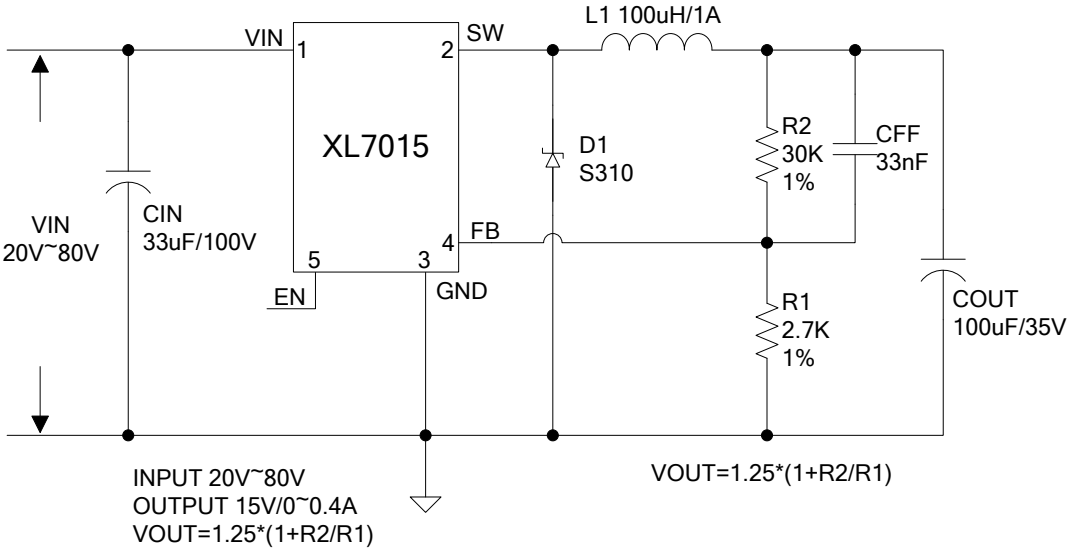


Figure8. XL7015 System Application (VIN=20V~80V, VOUT=15V/0.4A)

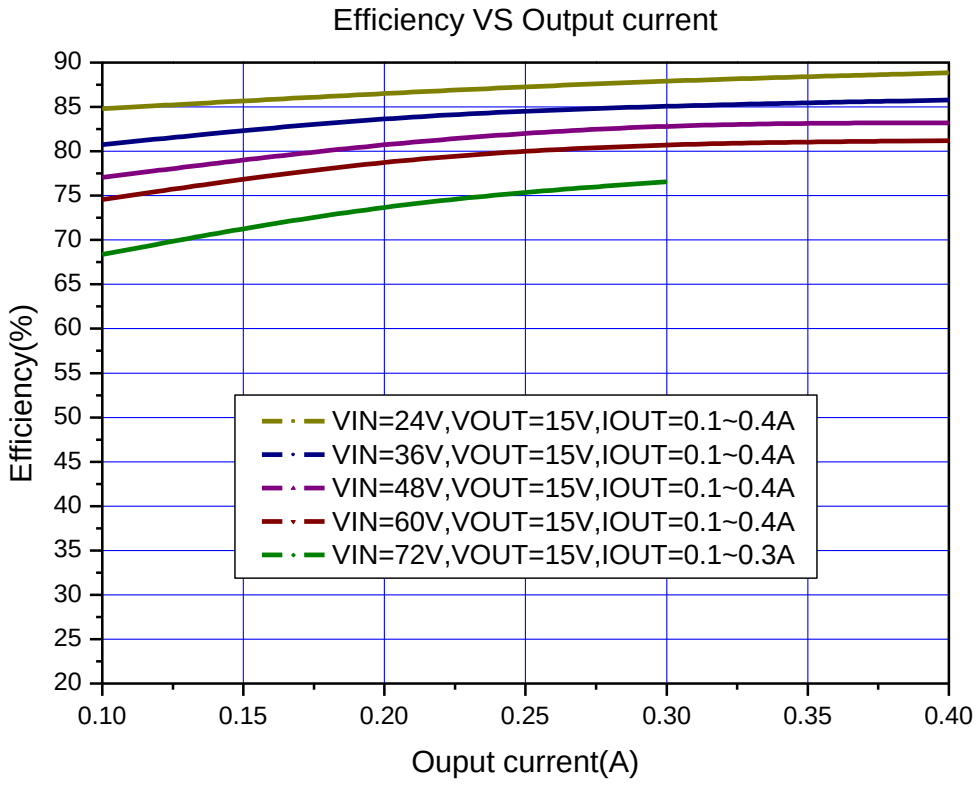


Figure9. XL7015 System Application (Efficiency VS Output Current)

Typical System Application(VOUT=5V/0.8A)

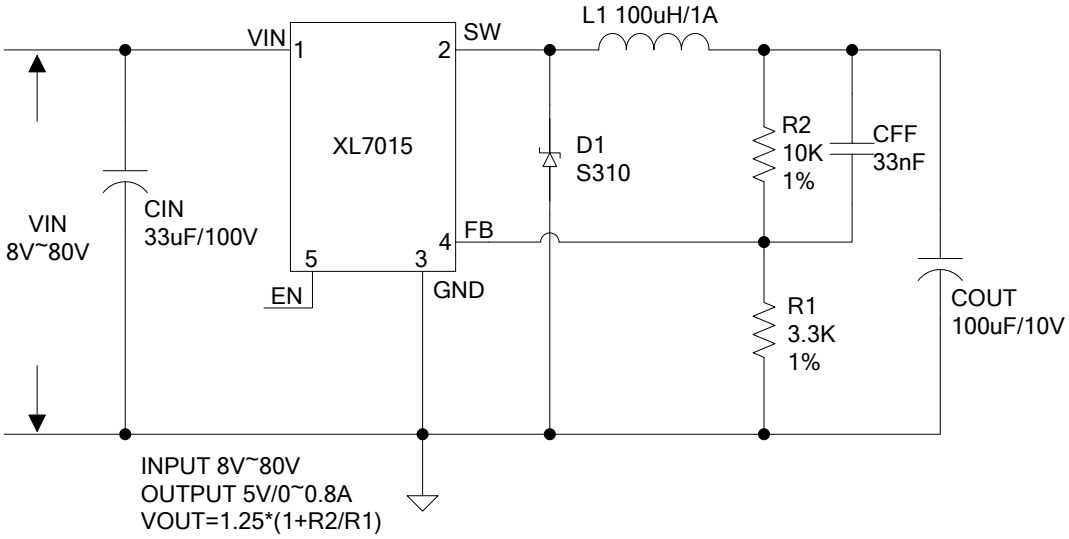


Figure10. XL7015 System Application (VIN=8V~80V, VOUT=5V/0.8A)

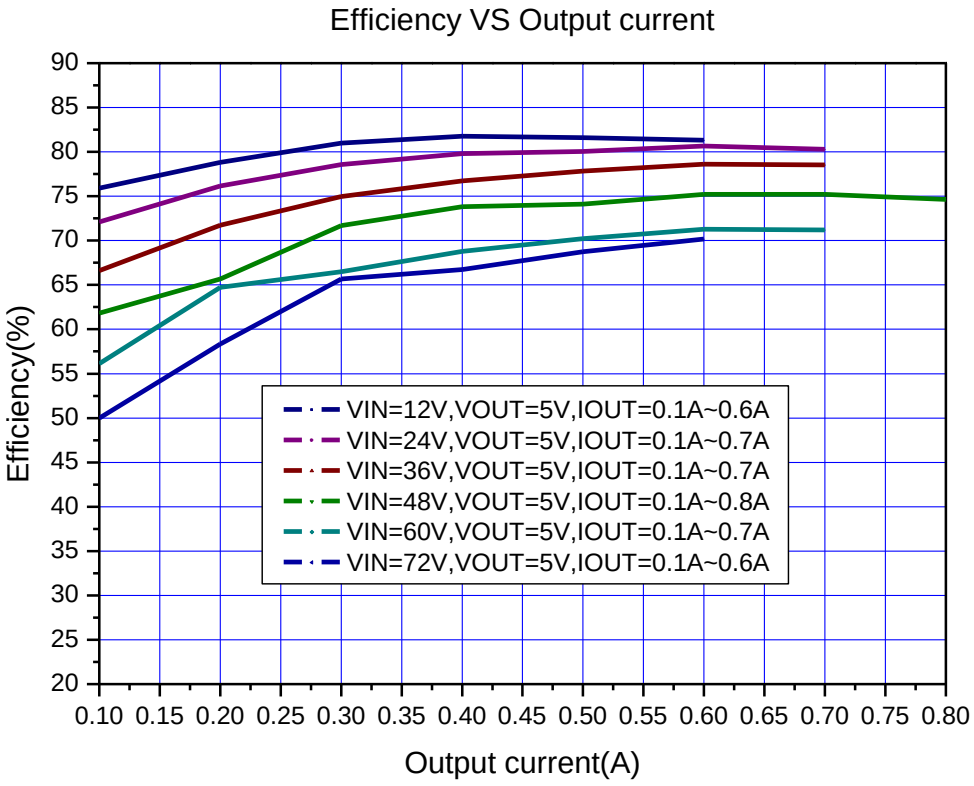
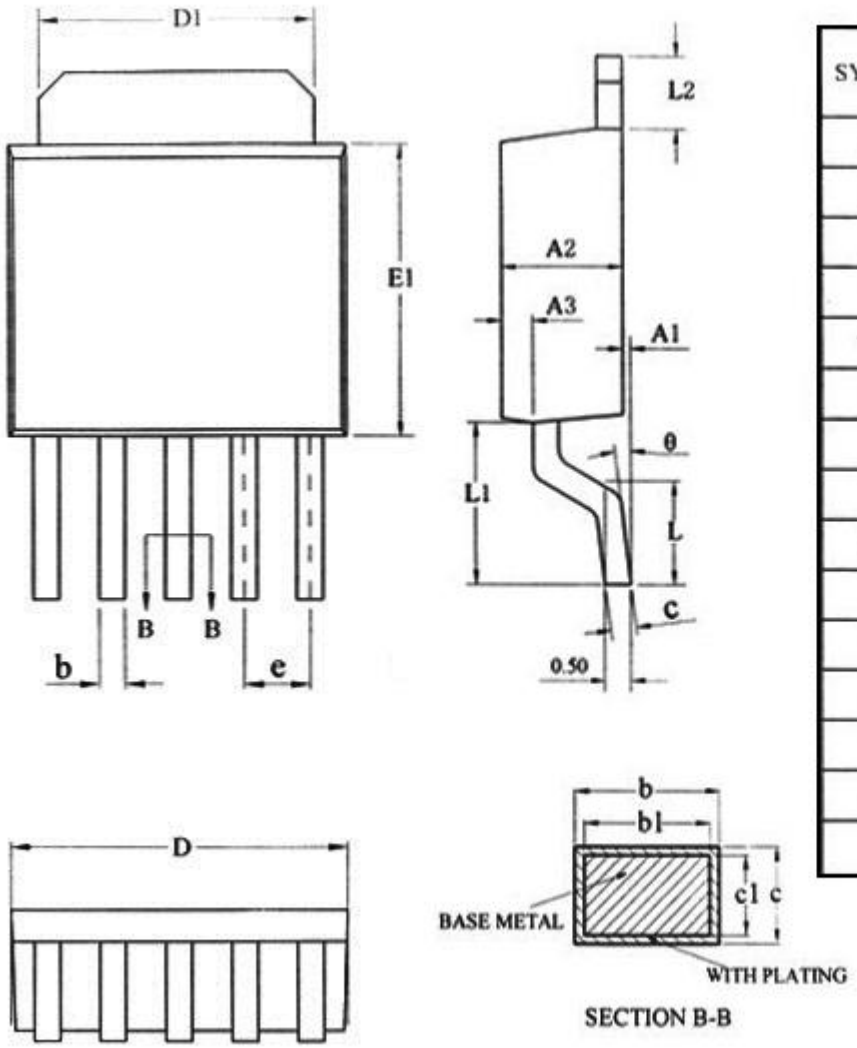


Figure11. XL7015 System Application (Efficiency VS Output Current)

Package Information

TO252-5L Mechanical Dimensions



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A1	0.05	0.15	0.25
A2	2.10	2.30	2.50
A3	0.50	0.60	0.70
b	0.46	—	0.60
b1	0.45	0.50	0.55
c	0.49	—	0.56
c1	0.48	0.50	0.52
D	6.30	6.50	6.70
D1	5.30REF		
E1	5.30	5.50	5.70
e	1.27BSC		
L	1.40	1.50	1.60
L1	3.00	3.10	3.30
L2	1.40BSC		
θ	0	—	8°

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