220KHz 90V 1A Switching Current SEPIC DC/DC Converter XL7003

Features

- VIN operation voltage 10V to 90V.
- 1.25V reference adjustable version.
- VIN UVLO is about 7V.
- Recommend output 1.25V to 20V.
- Fixed 220KHz switching frequency.
- Maximum 1A switching current.
- Recommend output power less than 8W.
- Excellent line and load regulation.
- Internal optimize 100V HV-NMOS.
- Built in frequency compensation.
- Built in output Short Protection function.
- Built in Soft-Start function.
- Built in Current Limit function.
- Available in TO252-5L package.

General Description

The XL7003 regulator is a wide input range, DC/DC converter which is capable of operation high input voltage up to 90V. The XL7003 built in N-channel power MOSFET and fixed frequency oscillator results in stable operation over a wide range of supply and output voltages.

The XL7003 regulator is special design for portable electronic equipment.

Applications

- EBIKE Controller Power Supply.
- High Voltage Buck Converter.
- Portable Electronic Equipment.

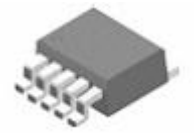


Figure1. Package Type of XL7003

Pin Configurations

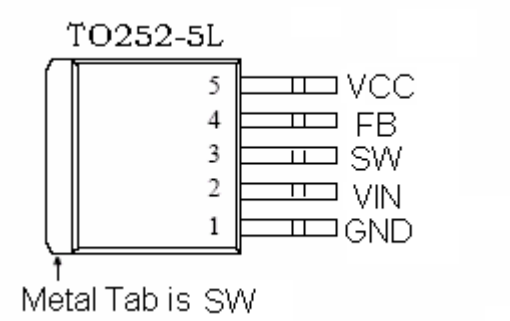


Figure2. Pin Configuration of XL7003 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	GND	Ground Pin.
2	VIN	Supply Voltage Input Pin. XL7003 VIN operates from a 10V to 90V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
3	SW	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output. The metal tab is SW.
4	FB	Feedback Pin (FB). The feedback threshold voltage is 1.25V.
5	VCC	Supply Voltage Input Pin. A 10 µF ceramic decoupling capacitor is required. An external voltage between 7V and 9V can be applied to this pin to reduce internal power dissipation.

Function Block

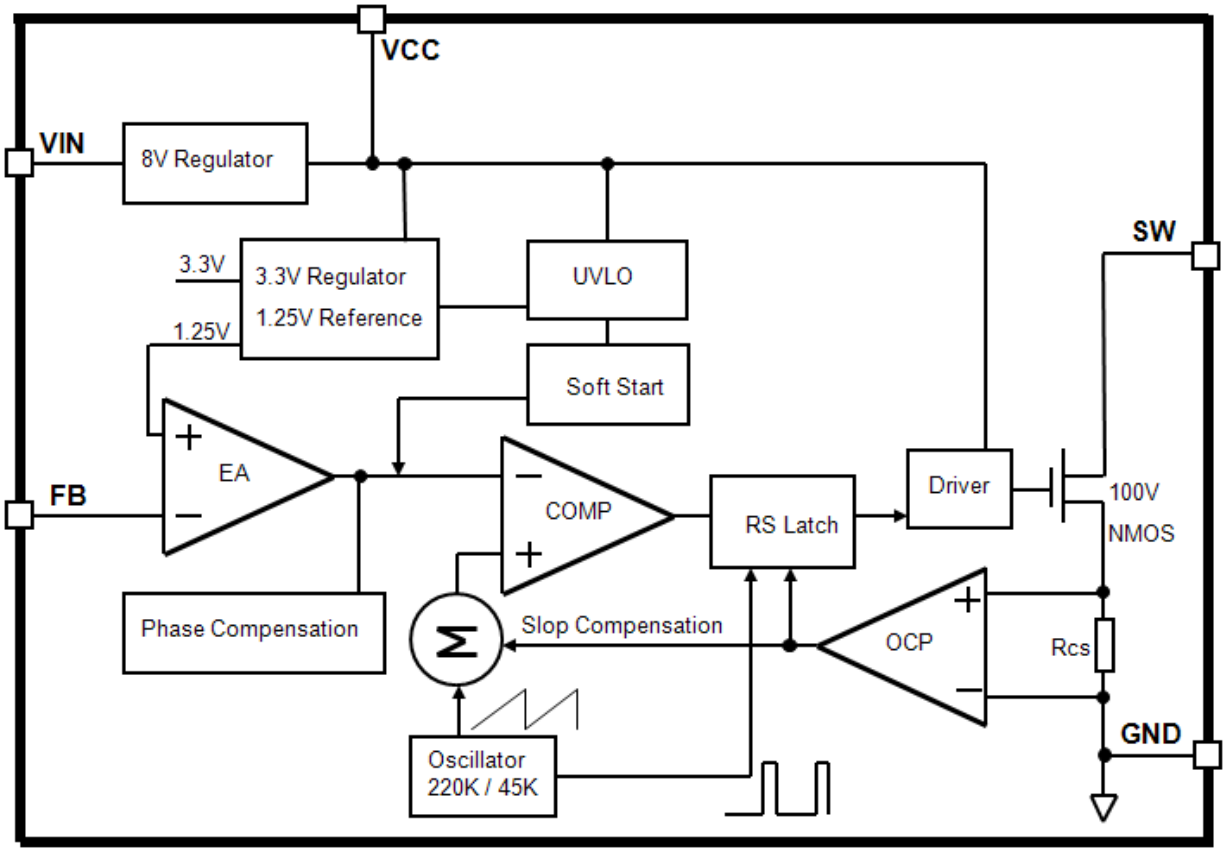


Figure3. Function Block Diagram of XL7003

Typical Application Circuit

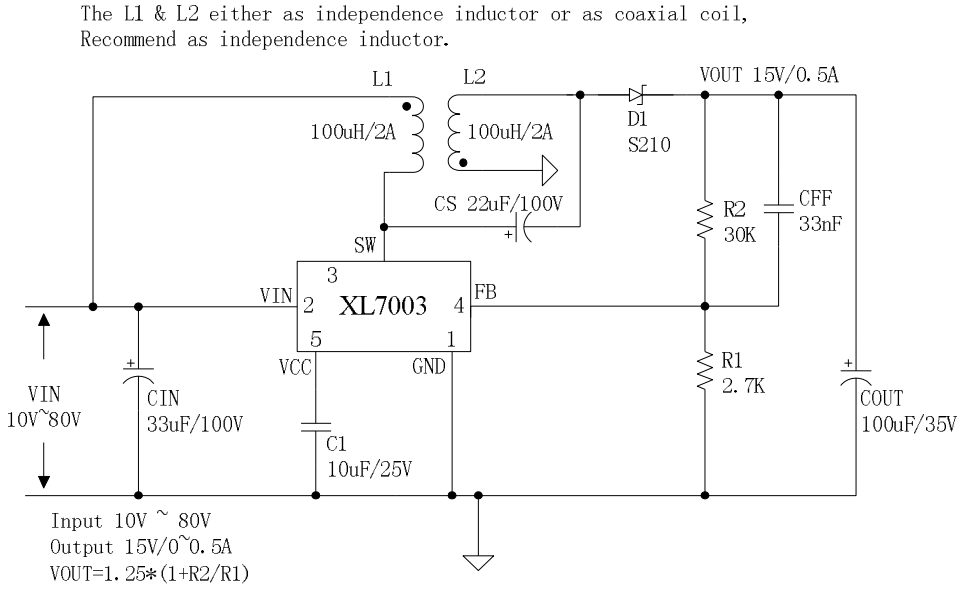


Figure4. XL7003 Typical Application Circuit

Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL7003E1	XL7003E1	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 95	V
SW Pin Voltage	V_{SW}	-0.3 to 100	V
Feedback Pin Voltage	V_{FB}	-0.3 to 25	V
VCC Pin Voltage	VCC	-0.3 to 9	V
Power Dissipation	P_D	1000	mW
Thermal Resistance (TO252-5L) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	50	ºC/W
Maximum Junction Temperature	T_J	-40 to 150	ºC
Operating Junction Temperature	T_J	-40 to 125	ºC
Storage Temperature	T_{STG}	-65 to 150	ºC
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	ºC
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.

XL7003 Electrical Characteristics

T_a = 25℃;unless otherwise specified.

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
System parameters test circuit figure4						
VFB	Feedback Voltage	Vin = 10V to 80V, Vout=15V Iload=0.1A to 0.5A	1.213	1.25	1.287	V
ŋ	Efficiency	Vin=36V ,Vout=15V Iout=0.5A	-	85	-	%
ŋ	Efficiency	Vin=48V ,Vout=15V Iout=0.5A	-	83	-	%
ŋ	Efficiency	Vin=60V ,Vout=15V Iout=0.5A	-	80	-	%
ŋ	Efficiency	Vin=72V ,Vout=15V Iout=0.4A	-	78	-	%

Electrical Characteristics (DC Parameters test circuit figure4)

Vin = 48V, GND=0V, Vout=15V,Iout=0.1A;T_a = 25℃; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
VIN operation voltage	Vin		10		80	V
VIN UVLO voltage	Vin_uvlo			7		V
VCC voltage	Vcc		7	8	9	V
Quiescent Supply Current	I_q	V_{FB}=2V		4.5	6	mA
Oscillator Frequency	Fosc		176	220	264	KHz
Short Frequency	Fshort	V_{FB}<0.6V	36	45	54	KHz
Switch Current Limit	I_L	V_{FB}=0		1		A
Output Power NMOS	Rdson	Vin=48V, I_{SW}=1A		150	200	mohm
Max. Duty Cycle	D_{MAX}	V_{FB}=0V		90		%

Typical System Application (Recommend output current safe work range)

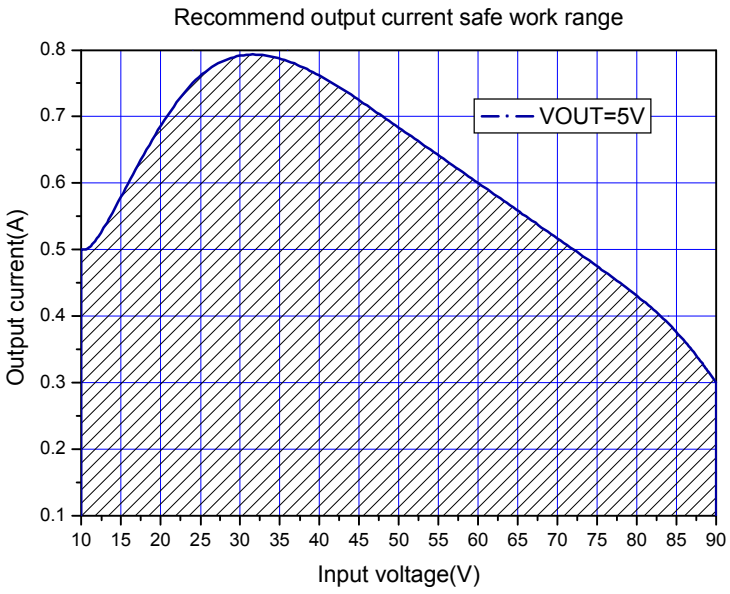


Figure5.Max output current(VOUT=5V)

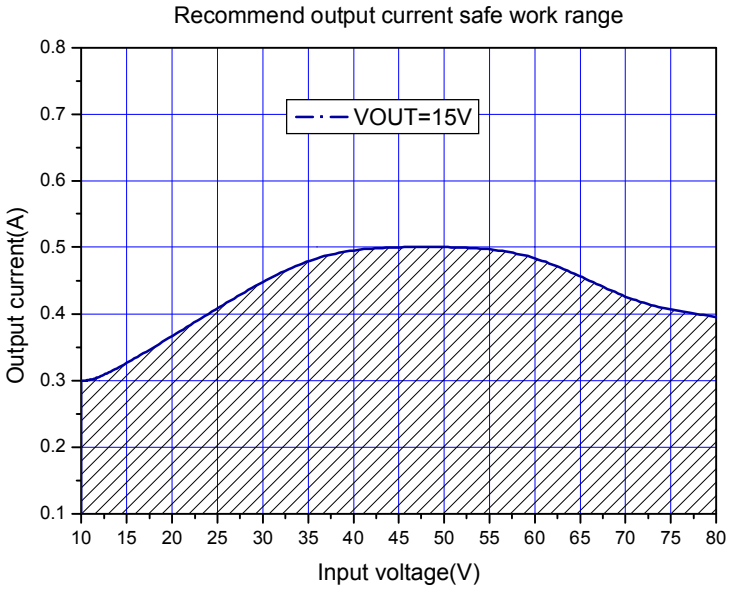
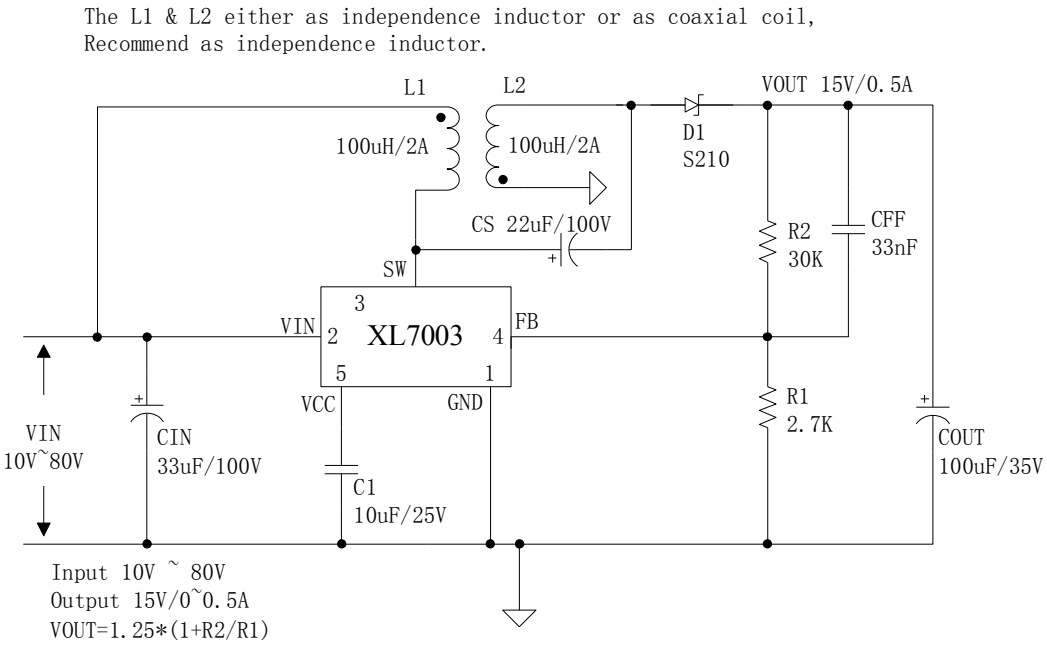


Figure6.Max output current(VOUT=15V)

Typical application circuit (VIN=10V~80V, VOUT=15V, IOUT=0~0.5A)



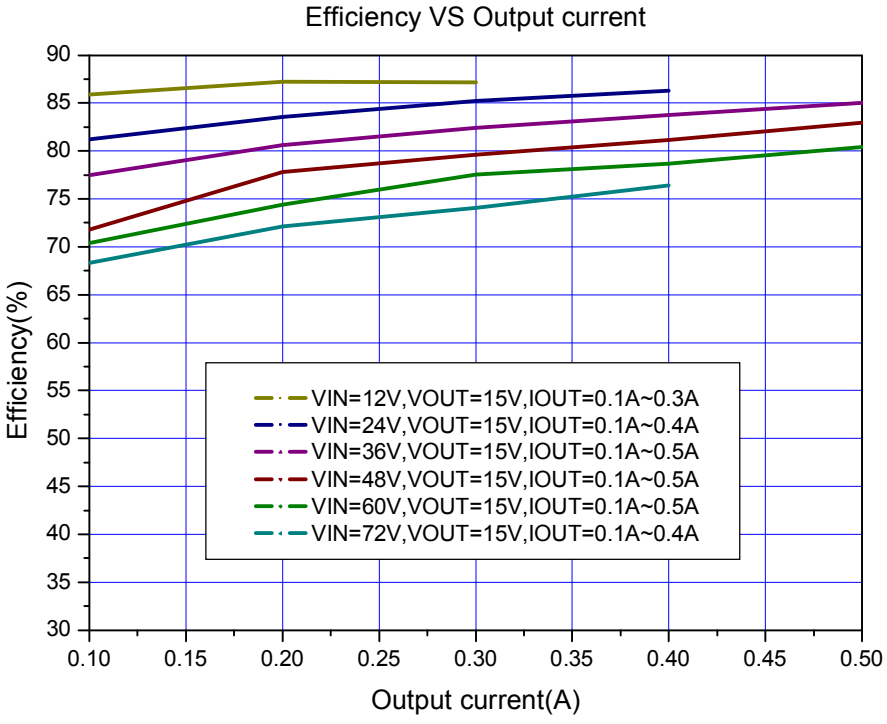
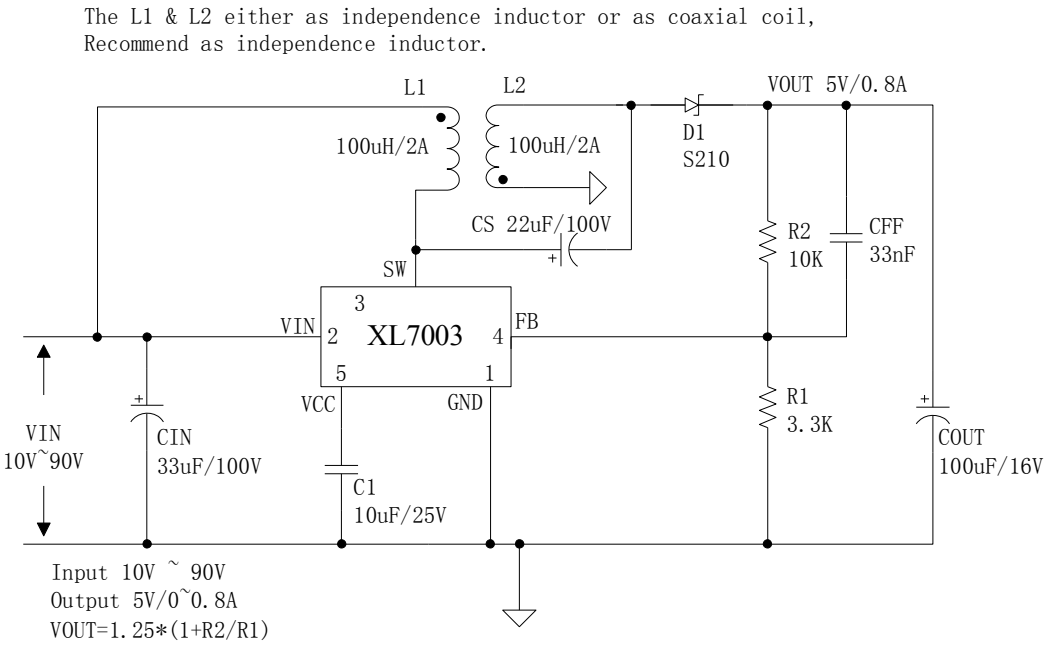


Figure7. XL7003 Typical System Application & efficiency curve

Typical application circuit (VIN=10V~90V, VOUT=5V, IOUT=0~0.8A)



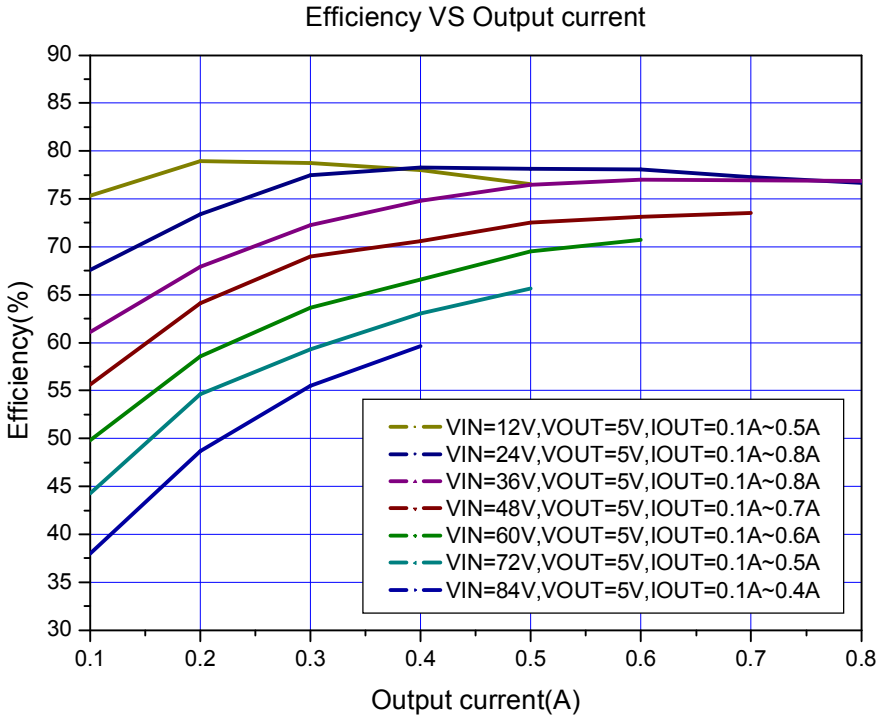
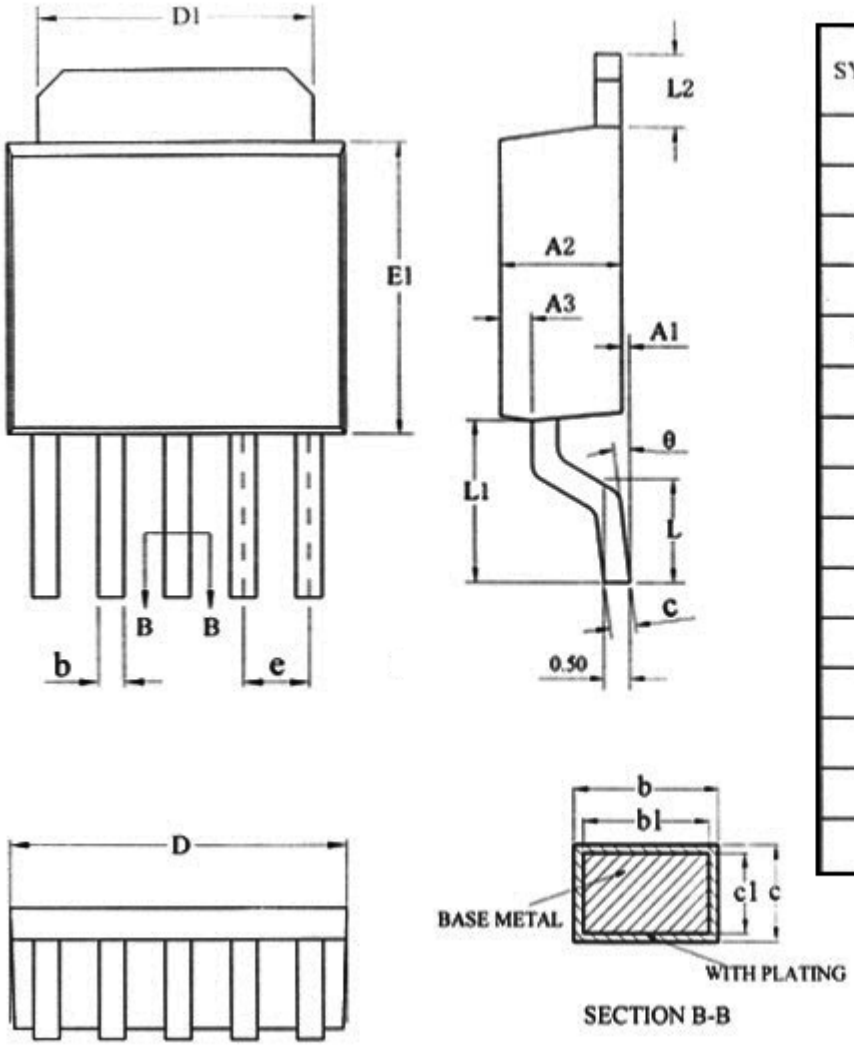


Figure8. XL7003 Typical System Application & efficiency curve

Package Information

TO252-5L



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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