XLSEMI®

Datasheet

180KHz 80V 0.5A Switching Current Buck DC/DC Converter XL7002

Features

- Wide 28 to 80V Input Voltage Range.
- 1.25V reference adjustable version.
- Recommend Output Voltage 5V to 20V.
- Current Mode Control Provides Excellent Transient Response.
- Fixed 180KHz Switching Frequency.
- Maximum 0.5A Switching Current.
- Excellent line and load regulation.
- EN PIN TTL shutdown capability.
- Internal optimize power HV-MOSFET.
- Built in Frequency Compensation.
- Built in Soft-Start Function.
- Built in Thermal Shutdown Function.
- Built in Current Limit Function.
- Available in SOIC-8 package.

General Description

The XL7002 regulator is a wide input range, current mode, DC/DC converter which is capable of operation high input voltage up to 80V. The XL7002 built in N-channel power MOSFET and fixed frequency oscillator, current-mode architecture results in stable operation over a wide range of supply and output voltages.

The XL7002 regulator is special design for portable electronic equipment.

Applications

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

SOIC-8

Figure1. Package Type of XL7002

Pin Configurations

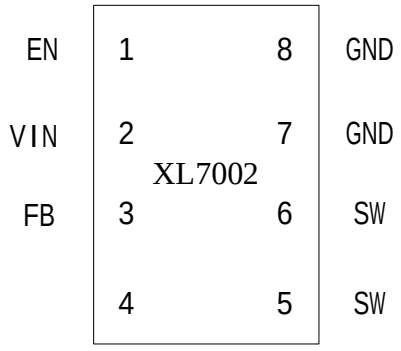

Figure2. Pin Configuration of XL7002 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	EN	Enable Pin. Drive EN pin low to turn off the device, drive it high to turn it on. Floating is default high.
2	VIN	Supply Voltage Input Pin. XL7002 operates from a 28V to 80V DC voltage. Bypass Vin to GND with a suitably large capacitor to eliminate noise on the input.
3	FB	Feedback Pin (FB). The feedback threshold voltage is 1.25V.
4	NC	No Connected.
5,6	SW	Power Switch Output Pin (SW). Output is the switch node that supplies power to the output.
7,8	GND	Ground Pin.

Function Block

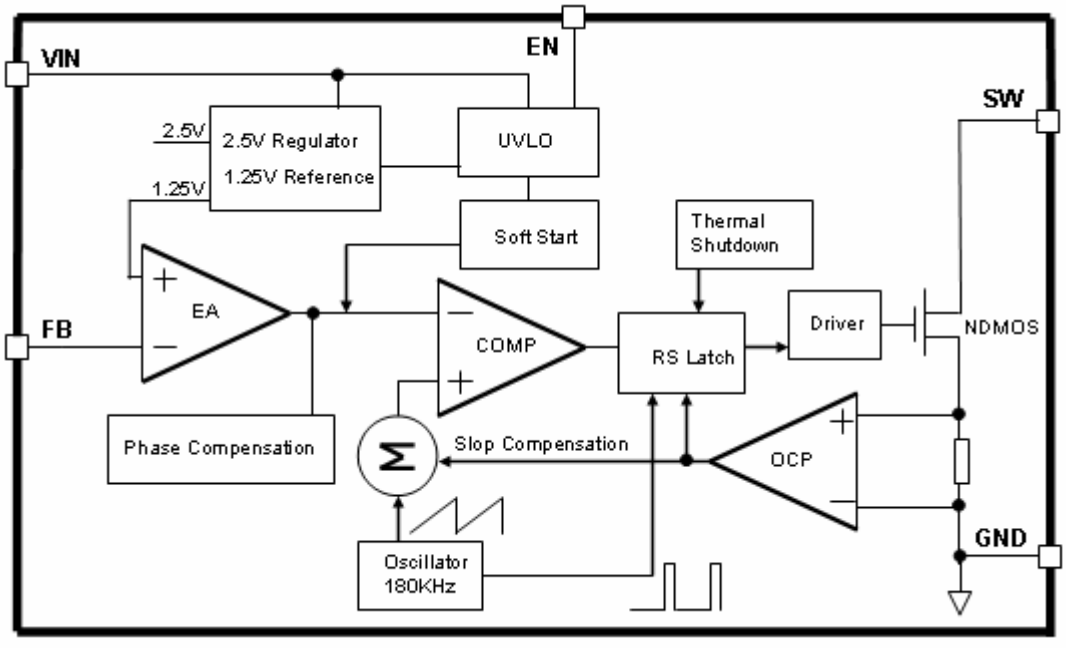

Figure3. Function Block Diagram of XL7002

Typical Application Circuit

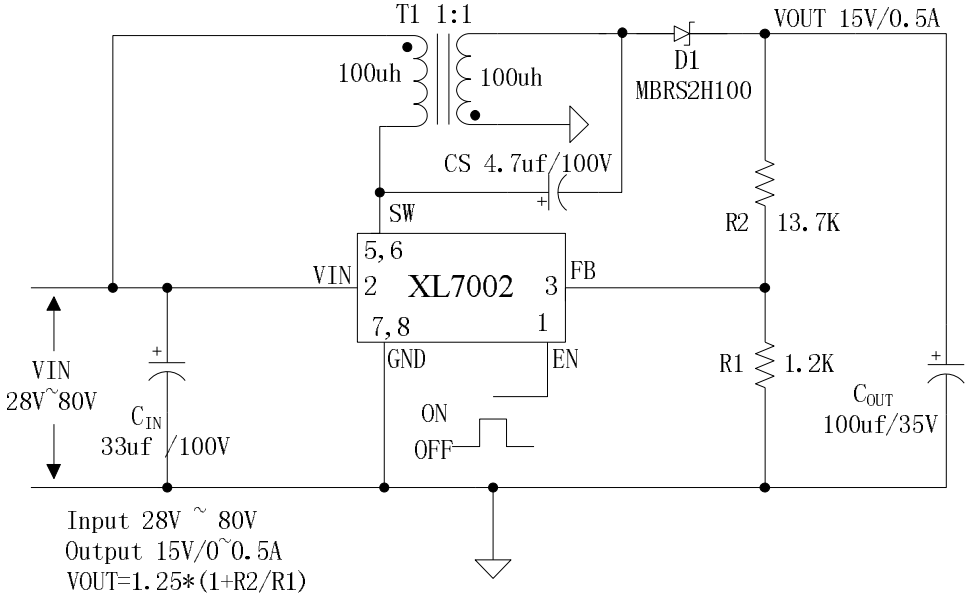

Figure4. XL7002 Typical Application Circuit

180KHz 80V 0.5A Switching Current Buck DC/DC Converter XL7002

Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL7002E1	XL7002E1	SOIC-8	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 90	V
Feedback Pin Voltage	V_{FB}	-0.3 to Vin	V
EN Pin Voltage	V_{EN}	-0.3 to Vin	V
Power Dissipation	P_D	Internally limited	mW
Thermal Resistance (SOP-8L) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	100	ºC/W
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.

XL7002 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 = 36V to 80V, Vout=15V Iload=0.1A to 0.5A	1.213	1.25	1.287	V
Efficiency	ŋ	Vin=48V ,Vout=15V Iout=0.5A	-	85.1	-	%

Electrical Characteristics (DC Parameters)

Vin = 48V, GND=0V, Vin & GND parallel connect a 33uf/100V capacitor; Iout=0.1A, T_a = 25℃; the others floating unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	Vin		28		80	V
Shutdown Supply Current	I_{STBY}	V_{EN}=0V		70	100	uA
Quiescent Supply Current	I_q	V_{EN} =2V, V_{FB} =Vin		2.5	5	mA
Oscillator Frequency	Fosc		144	180	216	Khz
Switch Current Limit	I_L	V_{FB} =0		0.8		A
Output Power NMOS	Rdson	Vin=48V, I_{SW}=0.5A		100	150	mohm
EN Pin Threshold	V_{EN}	High (Regulator ON) Low (Regulator OFF)		1.4 0.8		V
EN Pin Input Leakage Current	I_H	V_{EN} =2V (ON)		3	10	uA
	I_L	V_{EN} =0V (OFF)		3	10	uA
Max. Duty Cycle	D_{MAX}	V_{FB}=0V		85		%

[1] Typical application circuit (VIN=28V~80V, VOUT=15V, IOUT=0~0.5A)

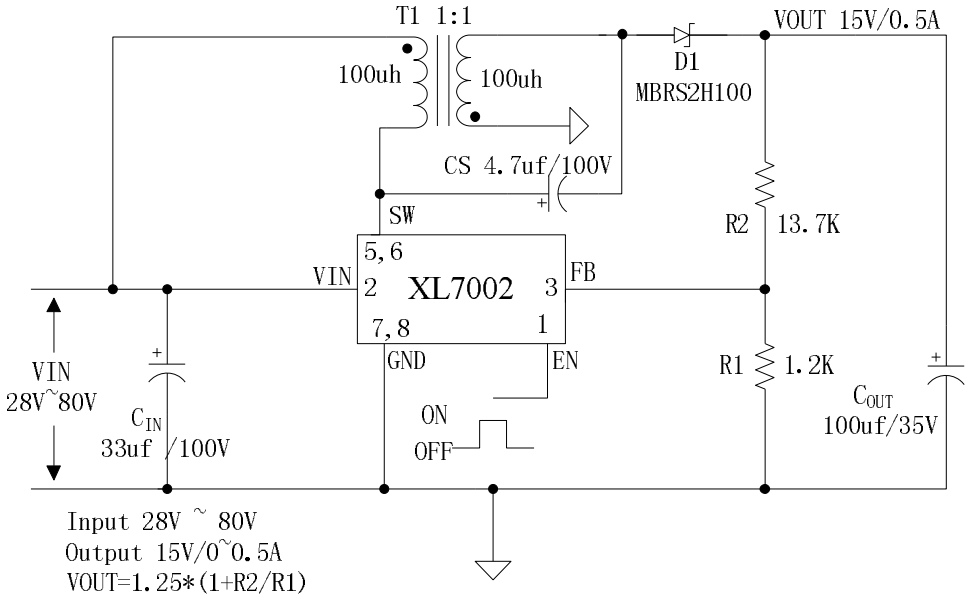

Figure5. XL7002 Typical System Application

The figure5 system parameters as following:

VIN=36V					
Output Current(A)	Vin(V)	Iin(A)	Vout(V)	Iout(A)	Effiency(%)
0.1	36.06	0.054	15.47	0.101	80.24
0.2	36.06	0.103	15.47	0.201	83.72
0.3	36.05	0.151	15.49	0.301	85.65
0.4	36.04	0.201	15.50	0.401	85.80
0.5	36.04	0.251	15.52	0.501	85.95
VIN=48V					
Output Current(A)	Vin(V)	Iin(A)	Vout(V)	Iout(A)	Effiency(%)
0.1	48.09	0.043	15.48	0.101	75.61
0.2	48.08	0.080	15.49	0.201	80.95
0.3	48.08	0.116	15.49	0.301	83.60
0.4	48.07	0.153	15.50	0.401	84.51
0.5	48.07	0.190	15.51	0.501	85.08
VIN=60V					
Output Current(A)	Vin(V)	Iin(A)	Vout(V)	Iout(A)	Effiency(%)
0.1	60.05	0.035	15.38	0.101	73.91
0.2	60.08	0.064	15.00	0.201	78.41
0.3	60.07	0.091	14.57	0.301	80.23
0.4	60.07	0.118	14.48	0.401	81.92
0.5	60.07	0.144	14.37	0.501	83.23

VIN=72V					
Output Current(A)	Vin(V)	Iin(A)	Vout(V)	Iout(A)	Effiency(%)
0.1	72.03	0.030	15.47	0.100	71.59
0.2	72.03	0.057	15.50	0.201	75.88
0.3	72.03	0.083	15.48	0.301	77.94
0.4	72.02	0.108	15.47	0.401	79.75
0.5	72.02	0.132	15.47	0.501	81.53
VIN=80V					
Output Current(A)	Vin(V)	Iin(A)	Vout(V)	Iout(A)	Effiency(%)
0.1	80.06	0.028	15.46	0.100	68.97
0.2	80.05	0.051	15.46	0.201	76.12
0.3	80.05	0.076	15.47	0.301	76.54
0.4	80.05	0.099	15.47	0.401	78.28
0.5	80.05	0.122	15.45	0.501	79.26

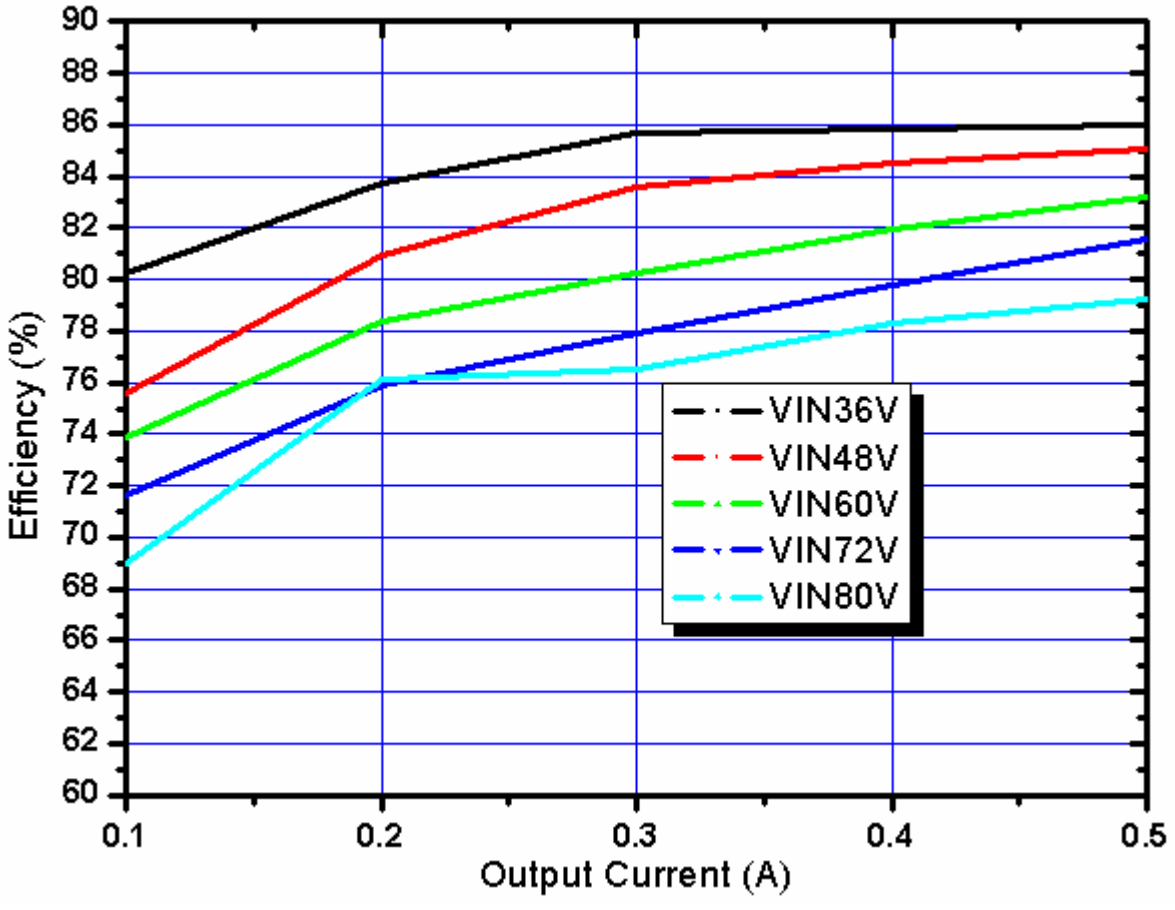

Figure6. XL7002 System efficiency curve

Package Information

SOP8 Package Mechanical Dimensions