

400kHz 60V 3A Switching Current Boost DC/DC Converter

Features

- Wide 3.6V to 32V Input Voltage Range
- Positive or Negative Output Voltage Programming with a Single Feedback Pin
- Current Mode Control Provides Excellent Transient Response
- 1.25V Reference Adjustable Version
- Fixed 400kHz Switching Frequency
- Maximum 3A Switching Current
- SW Pin Built-in Overvoltage Protection
- Excellent Line and Load Regulation
- EN Pin TTL Shutdown Capability
- Internal Optimized Power MOSFET
- High Efficiency up to 92%
- Built-in Frequency Compensation
- Built-in Soft-Start Function
- Built-in Thermal Shutdown Function
- Built-in Current Limit Function
- Available in TO252-5L Package

General Description

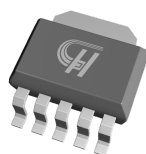
The HCR6636 regulator is a wide input range, current mode DC/DC converter capable of generating either positive or negative output voltages. It can be configured as a boost, flyback, SEPIC or inverting converter.

The HCR6636 integrates an N-channel power MOSFET and a fixed-frequency oscillator. Its current-mode architecture provides stable operation over a wide range of supply and output voltages.

The HCR6636 regulator is specially designed for portable electronic equipment.

Applications

- Automotive and Industrial Boost / Buck-Boost / Inverting Converters
- Portable Electronic Equipment



TO252-5L

Figure 1. Package Type of HCR6636

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Pin Configuration

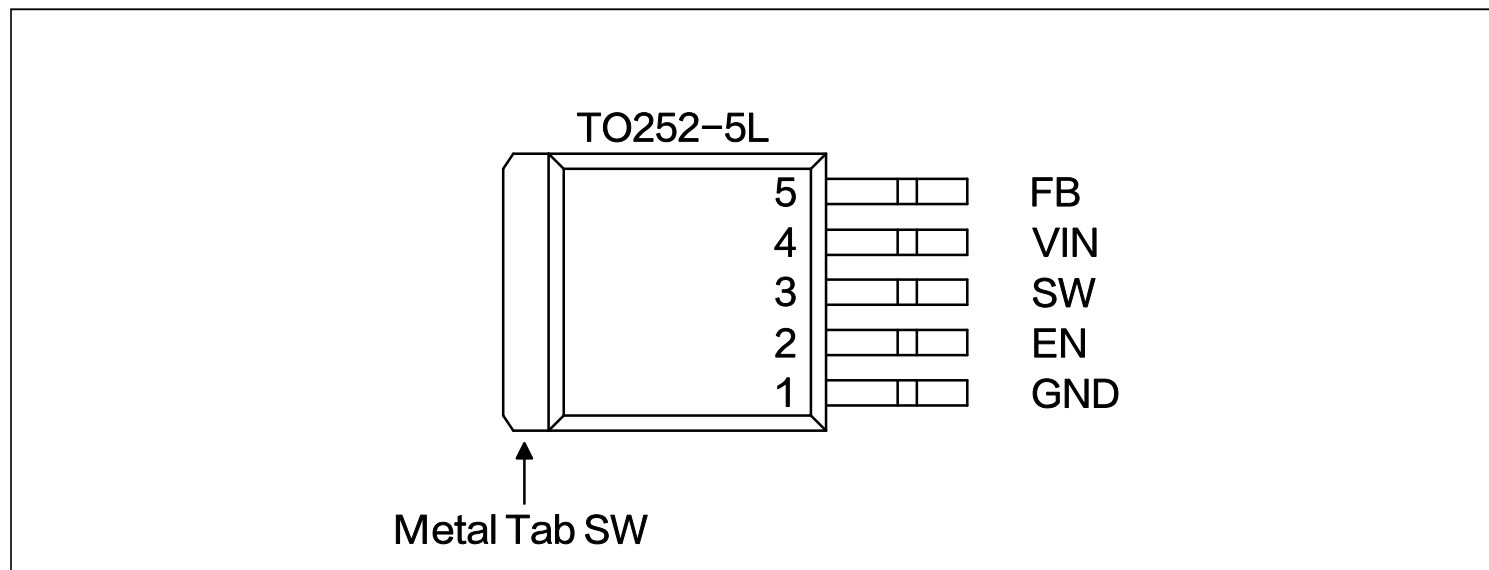


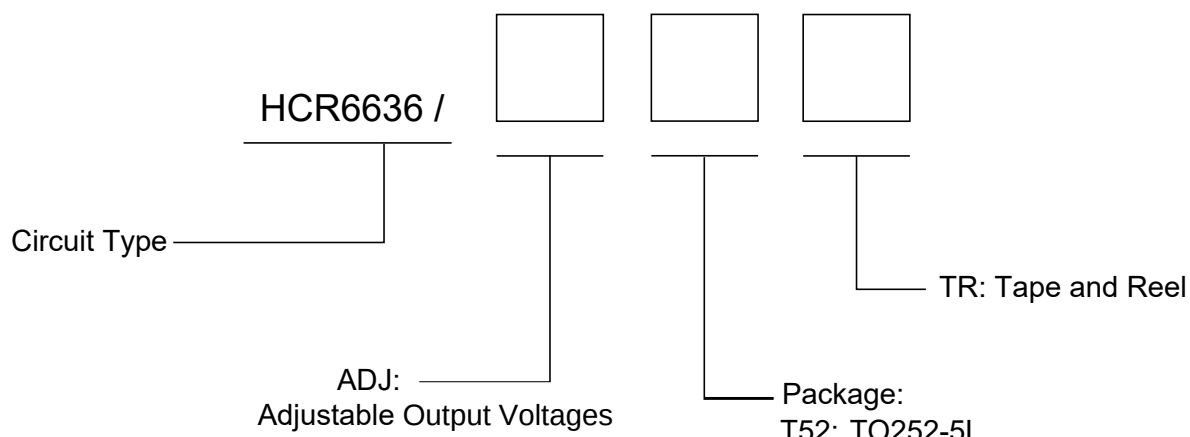
Figure 2. Pin Configuration of HCR6636 (Top View)

Pin Descriptions

Pin Number	Pin Name	Description
1	GND	Ground Pin.
2	EN	Enable Pin. Drive EN pin low to turn off the device, drive it high to turn it on. Floating is default high.
3	SW	Power Switch Output Pin (SW).
4	VIN	Supply Voltage Input Pin. HCR6636 operates from a 3.6V to 32V DC voltage. Bypass V_{in} to GND with a suitably large capacitor to eliminate noise on the input.
5	FB	Feedback Pin (FB). The feedback threshold voltage is 1.25V.

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Ordering Information



Ordering Code

Part Number	Marking ID ^[2]	Junction Temperature Range	Package	Quantity per Reel
HCR6636/ADJT52TR	HCR6636xx	-40 to +125°C	TO252-5L	2500,Tape&Reel

Note 2. HCR6636 is the product type and xx is the date code.

Packing Type: Tape and Reel

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Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Input Voltage	V_{in}	-0.3 to 36	V
Feedback Pin Voltage	V_{FB}	-0.3 to V_{in}	V
EN Pin Voltage	V_{EN}	-0.3 to V_{in}	V
Output Switch Pin Voltage	V_{SW}	-0.3 to 60	V
Power Dissipation	P_D	Internally limited	mW
Thermal Resistance (TO252-5L) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	50	°C/W
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)	-	>2000	V

Note 1. 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.

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Electrical Characteristics

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

System parameters: test circuit in Figure 4.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Feedback Voltage	V_{FB}	$V_{in} = 12\text{V to } 16\text{V}$, $V_{out}=18\text{V}$; $I_{load}=0.1\text{A to } 1\text{A}$	1.213	1.25	1.287	V
Efficiency	η	$V_{in}=12\text{V}$, $V_{out}=18.5\text{V}$; $I_{out}=1\text{A}$	-	92	-	%

Electrical Characteristics (DC Parameters)

$V_{in} = 12\text{V}$, $\text{GND} = 0\text{V}$, with a $220\mu\text{F}/50\text{V}$ capacitor connected between V_{in} and GND ; $I_{out} = 0.5\text{A}$, $T_a = 25^\circ\text{C}$. All other pins floating unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input operation voltage	V_{in}	-	3.6	-	32	V
Shutdown Supply Current	I_S	$V_{EN}=0\text{V}$	-	70	100	μA
Quiescent Supply Current	I_q	$V_{EN}=2\text{V}$, $V_{FB}=V_{in}$	-	2.5	5	mA
Oscillator Frequency	F_{osc}	-	320	400	480	kHz
Switch Current Limit	I_L	$V_{FB}=0\text{V}$	-	3	-	A
Output Power NMOS	R_{dson}	$V_{in}=12\text{V}$, $I_{SW}=3\text{A}$	-	110	120	m Ω
EN Pin Threshold	V_{EN}	High (Regulator ON) Low (Regulator OFF)	-	1.4 0.8	-	V
EN Pin Input Leakage Current	I_H	$V_{EN}=2\text{V}$ (ON)	-	3	10	μA
	I_L	$V_{EN}=0\text{V}$ (OFF)	-	3	10	μA
Max. Duty Cycle	D_{MAX}	$V_{FB}=0\text{V}$	-	90	-	%

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Functional Block Diagram

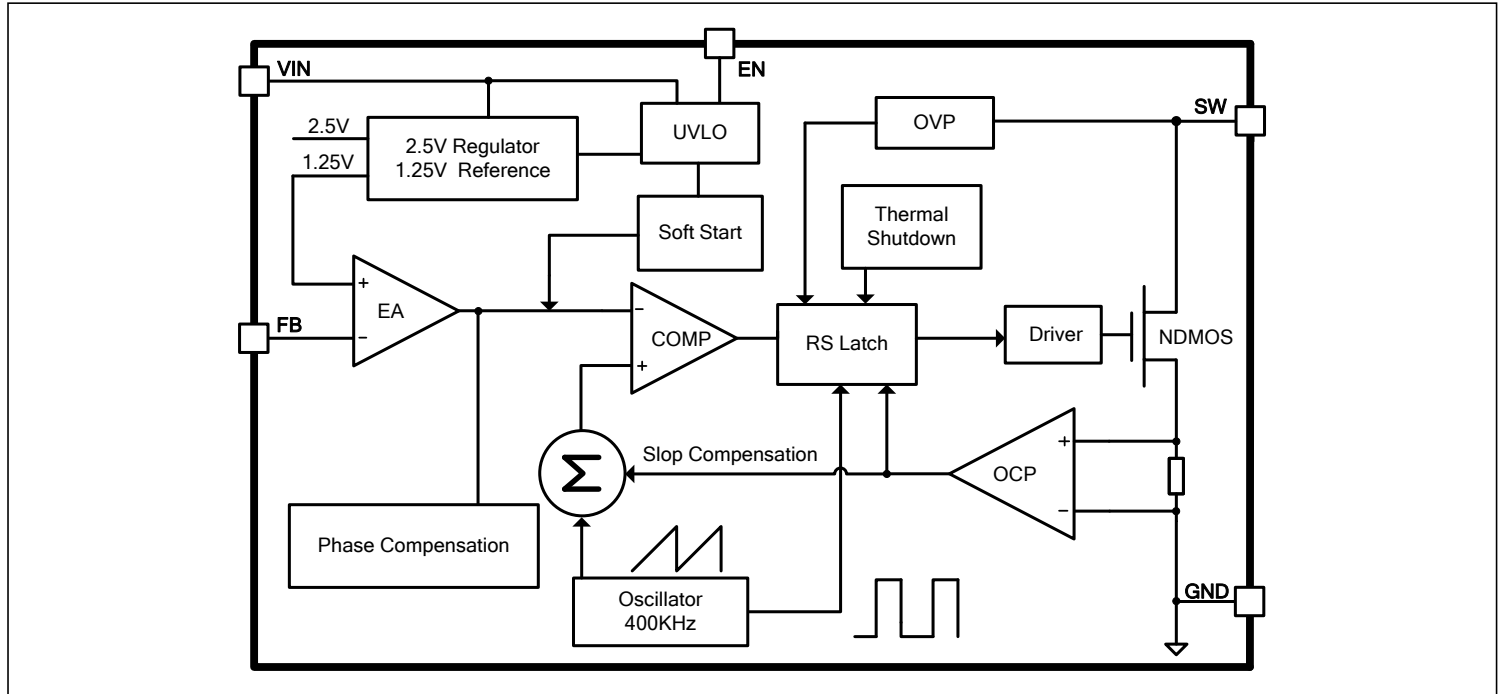


Figure 3. Functional Block Diagram

Typical Application Circuit

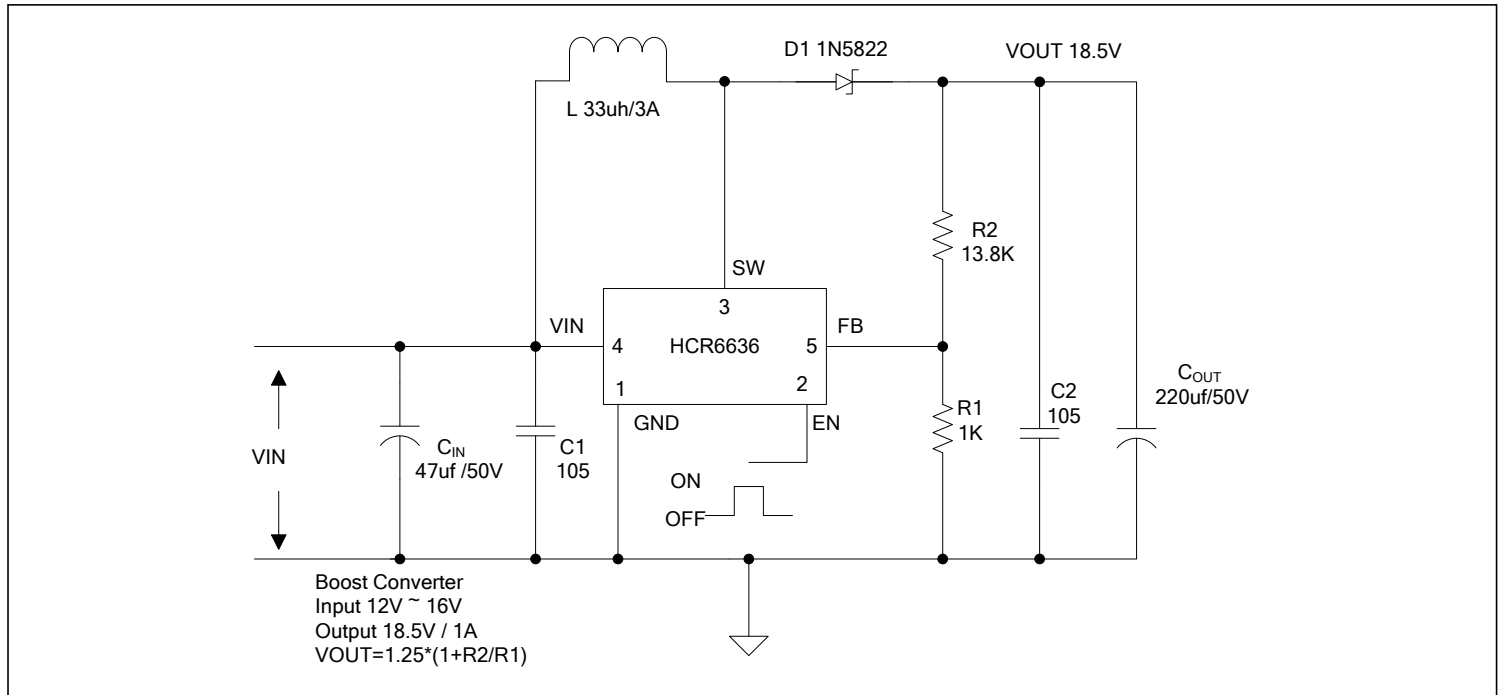
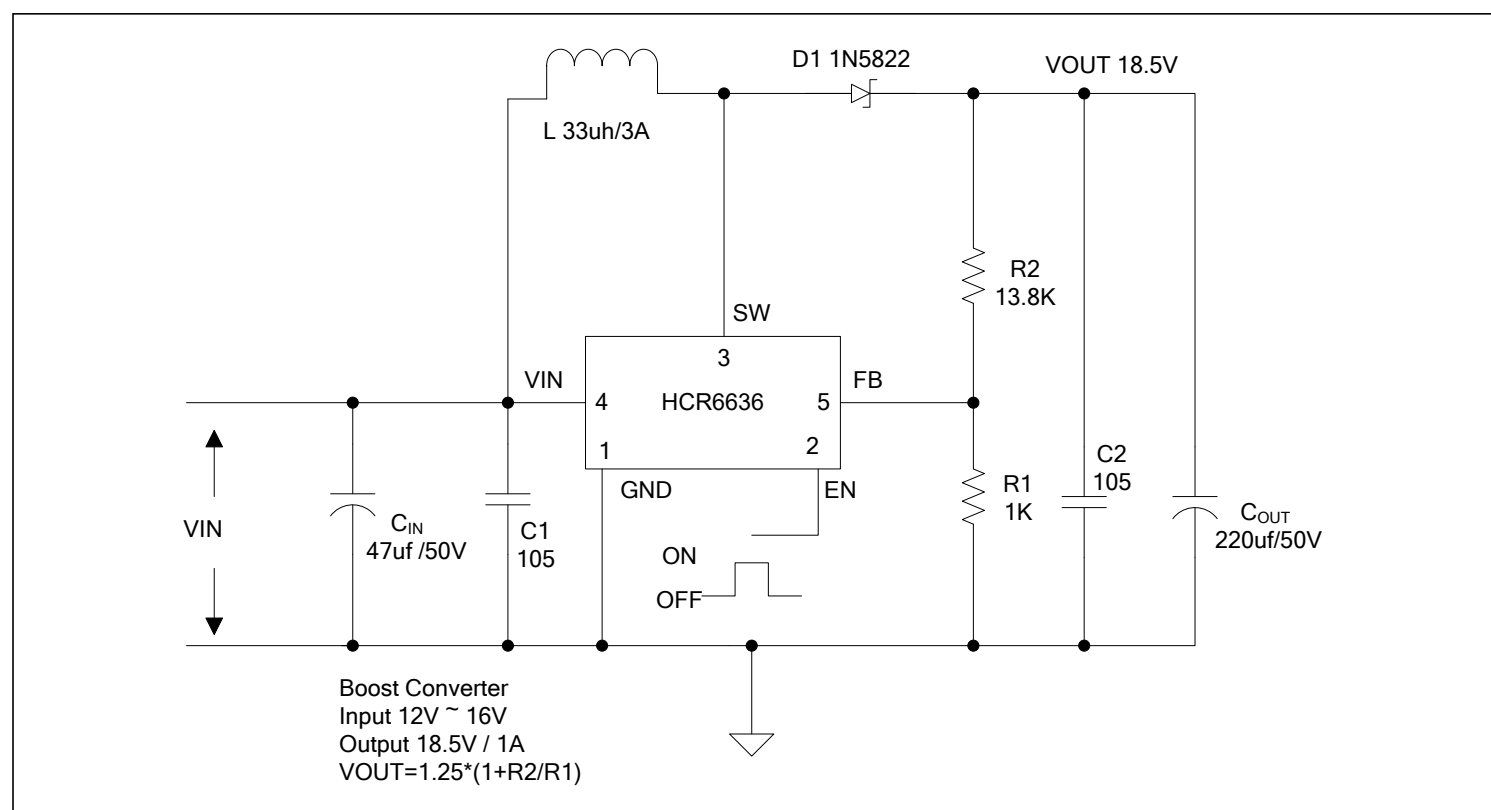


Figure 4. Typical Application Circuit (Boost Converter)

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Schottky Diode Selection Table

Current	Surface Mount	Through Hole	VR (The same as system maximum input voltage)				
			20V	30V	40V	50V	60V
1A	-	√	1N5817	1N5818	1N5819	-	-
3A	-	√	1N5820	1N5821	1N5822	-	-
	-	√	MBR320	MBR330	MBR340	MBR350	MBR360
	√	-	SK32	SK33	SK34	SK35	SK36
	√	-	-	30WQ03	30WQ04	30WQ05	-
	-	√	-	31DQ03	31DQ04	31DQ05	-
	-	√	SR302	SR303	SR304	SR305	SR306

Typical System Application - Boost (Output 18.5V/1A)

Figure 5. Typical System Application (Boost Converter)

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Typical System Applications

SEPIC Buck-Boost (Input 10V to 30V, Output 12V/1A)

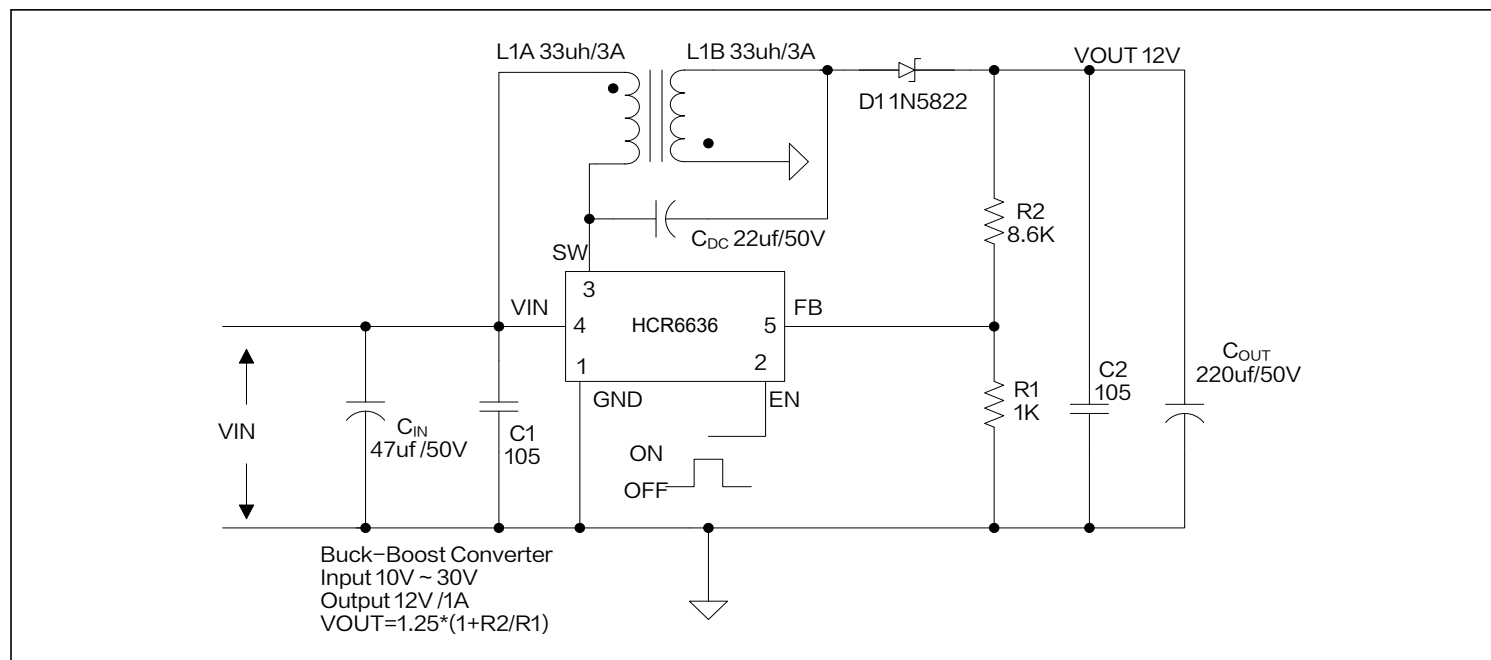


Figure 6. Typical System Application (SEPIC Buck-Boost Converter)

SEPIC Inverting Topology (Input 10V to 30V, Output $\pm$ 12V/0.6A)

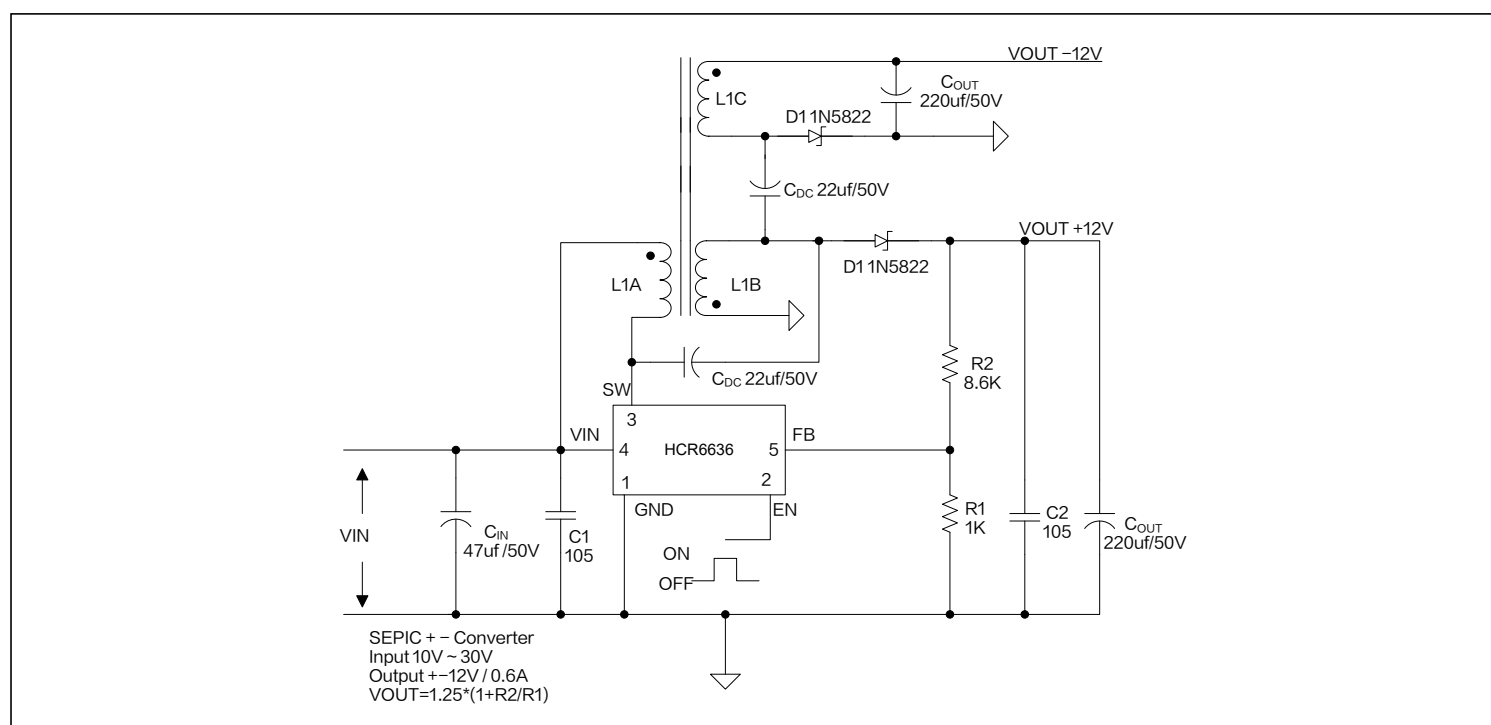
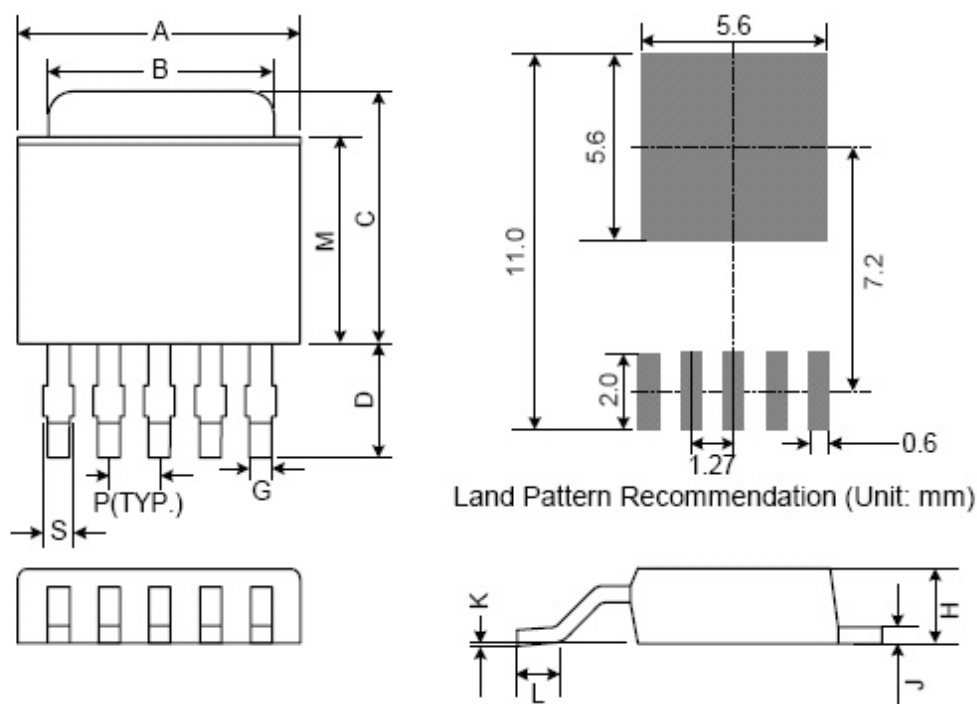


Figure 7. Typical System Application (SEPIC Inverting Converter)

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Package Dimensions

PKG : TO252-5L (T52)



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	6.35	6.60	6.85	0.250	0.260	0.270
B	5.20	5.35	5.50	0.205	0.211	0.217
C	6.80	7.00	7.30	0.268	0.276	0.287
D	2.40	2.80	3.20	0.094	0.110	0.126
P	1.27 REF.			0.05 REF.		
S	0.50	0.65	0.80	0.020	0.026	0.031
G	0.40	0.50	0.63	0.016	0.020	0.025
H	2.20	2.30	2.40	0.087	0.091	0.094
J	0.45	0.52	0.58	0.018	0.020	0.023
K	0.00	0.08	0.15	0.000	0.003	0.006
L	0.90	1.20	1.77	0.035	0.047	0.064
M	5.40	5.80	6.20	0.213	0.228	0.244

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Conditions of Soldering and Storage

Recommended Condition of Reflow Soldering

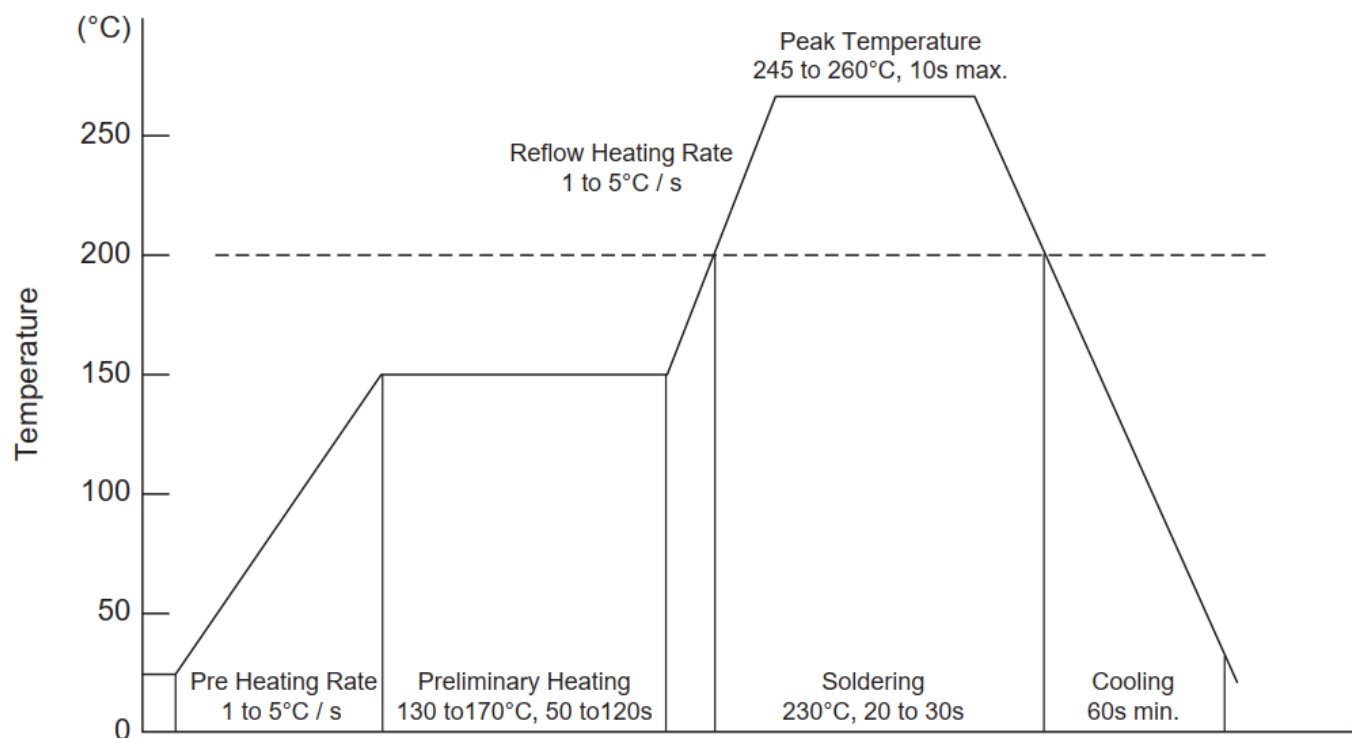


Figure 10. Recommended Reflow Soldering Profile

Recommended peak temperature is over 245°C. If peak temperature is below 245°C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

Conditions of Hand Soldering

- Temperature: 300°C
- Time: 3s max
- Times: one time

Storage Conditions

- Temperature: 5 to 40°C
- Humidity: 30 to 80% RH
- Recommended period: One year after manufacturing