

500mA 1.2MHz 36V Built-in SBD Boost DC/DC Converter

Features

- Operating Voltage: 2.5V to 20V
- Output Voltage: 3V to 32V
- Shutdown Current: 3 μ A
- Fixed 1.2MHz Switching Frequency
- 500mA Constant Output Current Capability
- Built-in High-Frequency Power Transistor
- Built-in Schottky Diode
- High Efficiency up to 87%
- Excellent Line and Load Regulation
- EN Pin TTL ON/OFF Capability
- Built-in Output Overvoltage Protection
- Built-in Thermal Shutdown
- Device HBM ESD Classification: Class 3A
- Available in SOT23-6 Package

Applications

- Panel Power Supply
- GPS Receiver
- DSL Modem
- Wearable Portable Electronic Devices

General Description

The HCR66107 is a boost DC/DC converter with a built-in high-frequency power transistor and Schottky diode. It operates with fixed 1.2MHz PWM and supports an input operating voltage range of 2.5V to 20V.

Built-in frequency compensation allows small external components, reducing the cost of the power supply system and printed circuit board space.

The output voltage is adjustable by external divider resistors. The low feedback voltage of 410mV reduces power consumption in the external sampling resistors.

The EN pin supports TTL ON/OFF control. Built-in output overvoltage protection and thermal shutdown protection make the device suitable for very low quiescent current and ultra-small applications.



SOT23-6

Figure 1. Package Type of HCR66107

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Pin Configuration

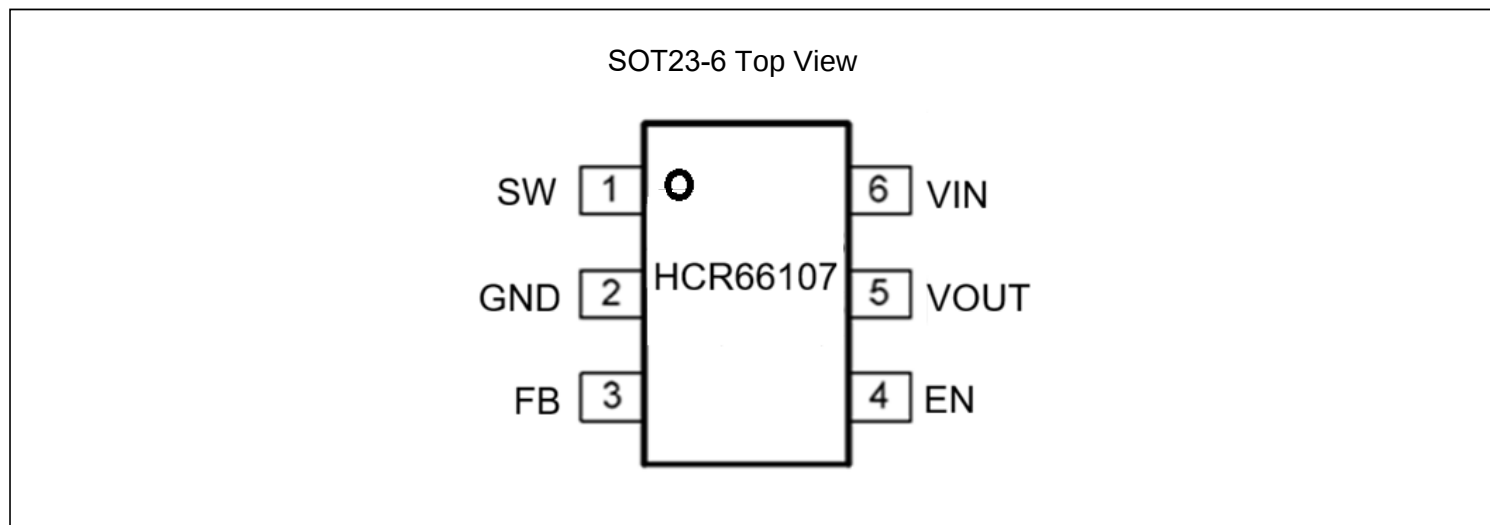


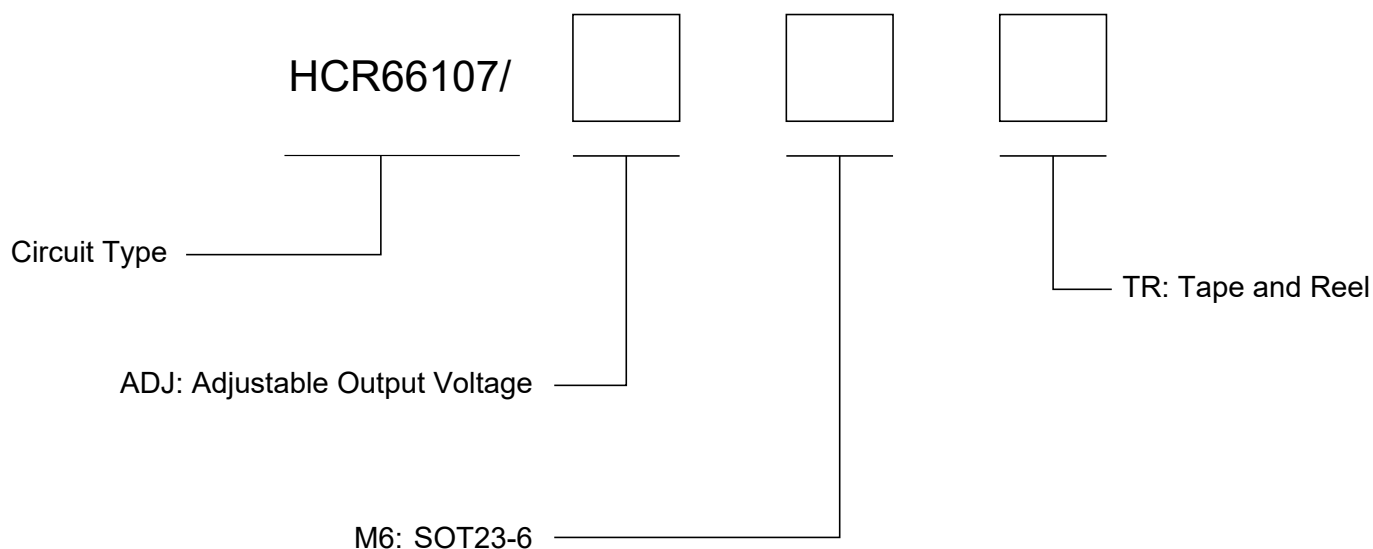
Figure 2. Pin Configuration of HCR66107

Pin Descriptions

Pin Number	Pin Name	Description
1	SW	Power Switch Pin.
2	GND	Ground Pin.
3	FB	Feedback Pin. Through an external resistor divider network, FB senses the output voltage and regulates it. The feedback threshold voltage is 410mV.
4	EN	Enable Pin. Drive EN high to turn on the device and low to turn it off. Floating is default high.
5	V _{OUT}	Output Pin.
6	V _{IN}	Supply Voltage Input Pin. HCR66107 operates from 2.5V to 20V DC. Bypass V _{IN} to GND with a suitable capacitor to eliminate noise on the input.

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Ordering Information



Ordering Code

Part Number	Marking ID ^(Note 2)	Junction Temperature Range	Package	Quantity per Reel
HCR66107/ADJM6TR	HCR66107xx	-40 to +125°C	SOT23-6	3000, Tape&Reel

Note 2. HCR66107 is the product type and xx is the date code.

Eco Plan: RoHS & HF

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Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Input Voltage	V_{IN}	-0.3 to 25	V
EN Pin Voltage	V_{EN}	-0.3 to V_{IN}	V
Feedback Pin Voltage	V_{FB}	-0.3 to V_{IN}	V
Switch Pin Voltage	V_{SW}	-0.3 to 40	V
V_{OUT} Pin Voltage	V_{OUT}	-0.3 to 40	V
Power Dissipation	P_D	250	mW
Thermal Resistance (SOT23-6) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	260	°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)	-	>4000	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

$T_A = 25^\circ\text{C}$; system parameters test circuit in Figure 8, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Feedback Voltage	V_{FB}	$V_{IN} = 5V$, $V_{OUT} = 12V$ $I_{OUT} = 30mA$	401.8	410	418.2	mV
Efficiency	η	$V_{IN} = 5V$, $V_{OUT} = 12V$ $I_{OUT} = 50mA$	-	83.2	-	%
Efficiency	η	$V_{IN} = 12V$, $V_{OUT} = 24V$ $I_{OUT} = 0.1A$	-	87.3	-	%

Electrical Characteristics (DC Parameters)

$T_A = 25^\circ\text{C}$, $V_{IN} = 3V$; system parameters test circuit in Figure 6, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input Operating Voltage	V_{IN}	-	2.5	-	20	V
Shutdown Supply Current	I_S	$V_{EN} = 0V$ V_{OUT} flowing	-	3	-	μA
Quiescent Supply Current	I_Q	$V_{FB} = 2V$	-	2.3	-	mA
Oscillator Frequency	F_{OSC}	-	0.96	1.20	1.44	MHz
Switch Current Limit	I_L	$V_{FB} = 0V$	-	500	-	mA
Switch V_{CE} Saturation Voltage	V_{SAT}	$I_{SW} = 300mA$	-	0.3	-	V
Schottky Forward Drop	V_F	$I_F = 300mA$	-	0.8	-	V
EN Pin Threshold	V_{EN_H}	High (ON)	2.0	-	-	V
	V_{EN_L}	Low (OFF)	-	-	0.5	
Max. Duty Cycle	D_{MAX}	$V_{FB} = 0V$	-	90	-	%
Overvoltage Protection	V_{OUT}	$V_{FB} = 0V$	-	36	-	V
Thermal Shutdown Temperature	T_{SD}	-	-	150	-	$^\circ\text{C}$

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Functional Block and Typical Application

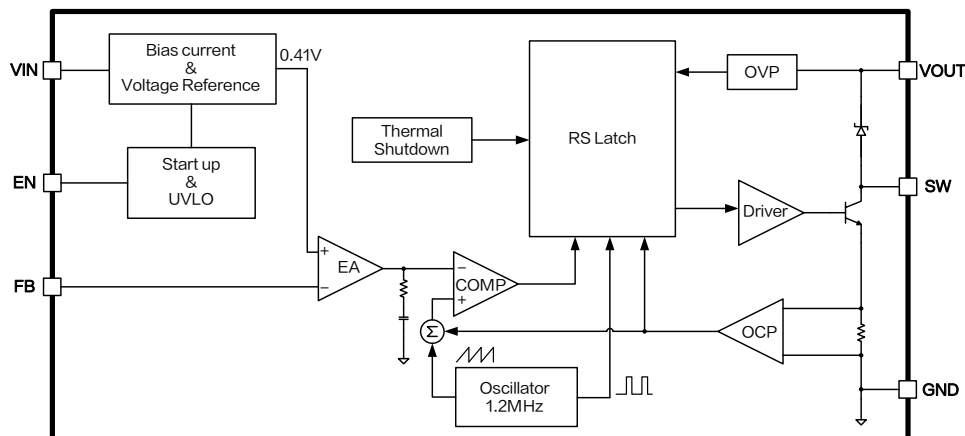


Figure 3. Functional Block Diagram

Typical Application Schematic

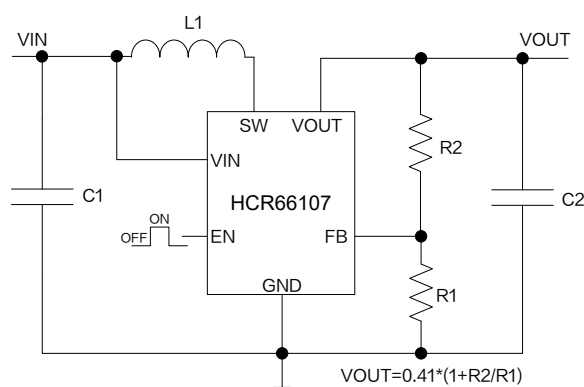


Figure 4. Typical Application Schematic

Typical Application Efficiency Curves

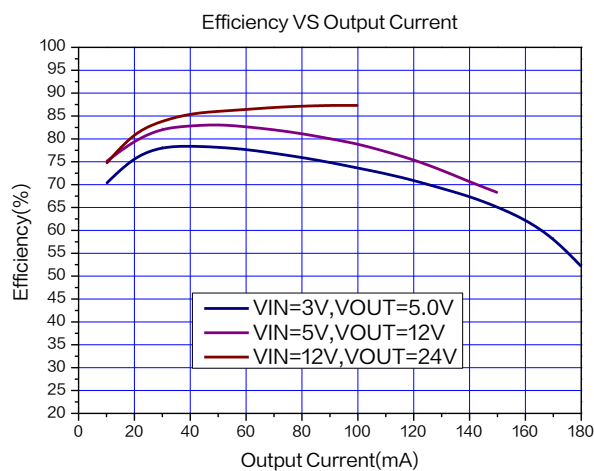
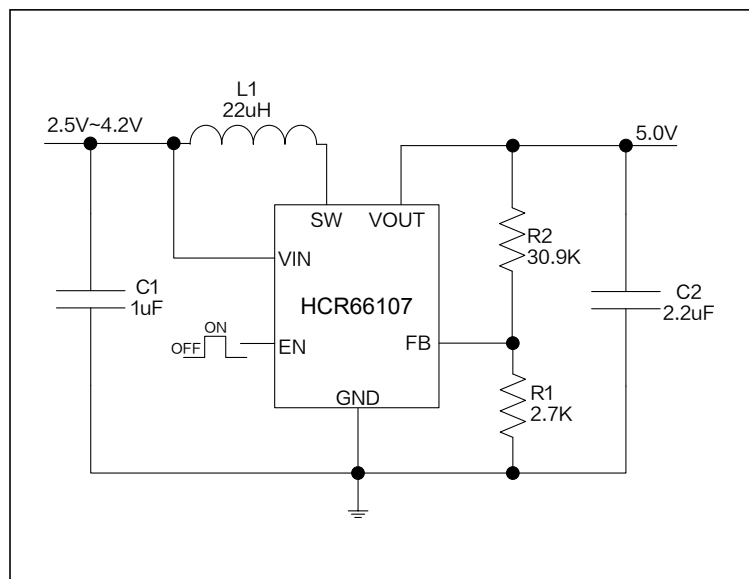
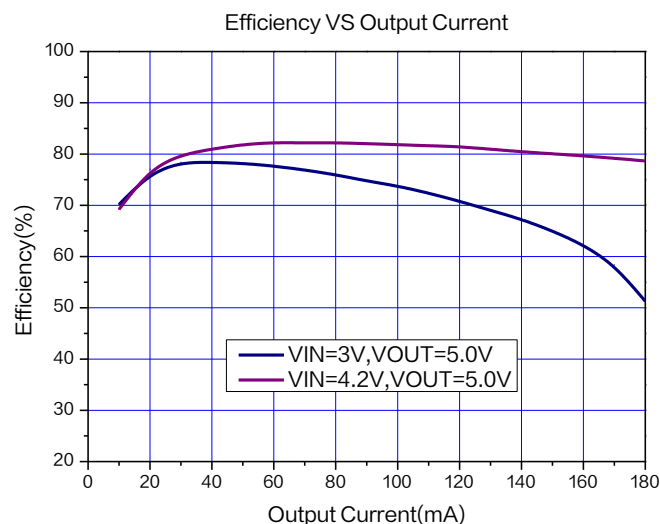
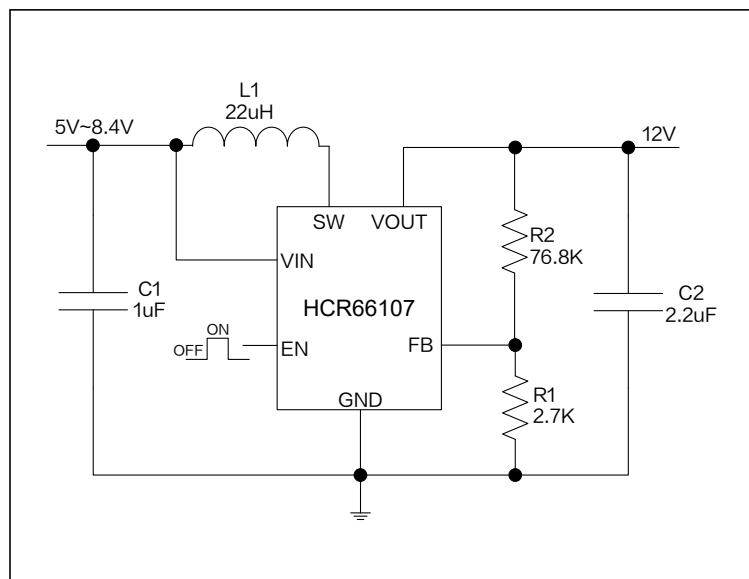
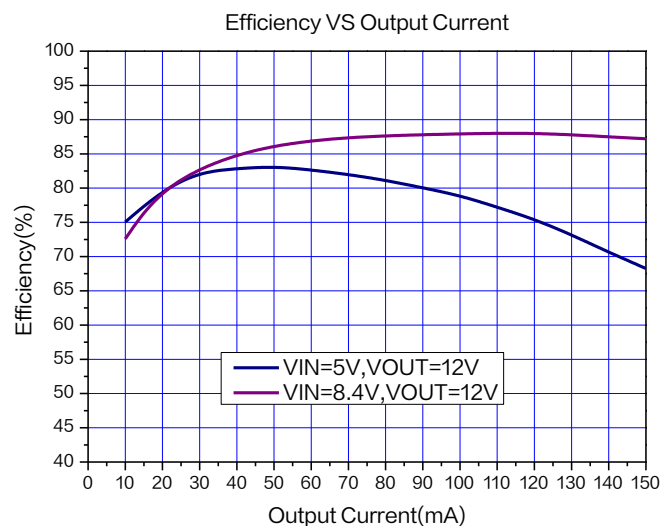


Figure 5. Typical Application Efficiency Curves

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Typical System Application - Single Li Battery
Boost Driver Circuit ($V_{OUT} = 5.0V$)

Figure 6. 5V Boost Driver Circuit

Figure 7. 5V Output Efficiency Curves
Typical Application Bill of Materials

Qty	Ref Des	Description	Mfg Part Number	Mfg
1	L1	22μH, 0.53A, Inductor, 3 × 3	ANR3015T220M	APV
1	C1	1μF, 25V, Ceramic, X7R, 0603	0603B105K250NT	Fenghua
1	C2	2.2μF, 50V, Ceramic, X7R, 0805	0805X225K500NT	Fenghua
1	R1	2.7kΩ, 1%, 1/16W, Thick Film, 0603	RS-03K2701FT	Fenghua
1	R2	30.9kΩ, 1%, 1/16W, Thick Film, 0603	RS-03K3092FT	Fenghua

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Typical System Application - Two Li Batteries
Boost Driver Circuit ($V_{OUT} = 12V$)

Figure 8. 12V Boost Driver Circuit

Figure 9. 12V Output Efficiency Curves
Typical Application Bill of Materials

Qty	Ref Des	Description	Mfg Part Number	Mfg
1	L1	22μH, 0.53A, Inductor, 3 × 3	ANR3015T220M	APV
1	C1	1μF, 25V, Ceramic, X7R, 0603	0603B105K250NT	Fenghua
1	C2	2.2μF, 50V, Ceramic, X7R, 0805	0805X225K500NT	Fenghua
1	R1	2.7kΩ, 1%, 1/16W, Thick Film, 0603	RS-03K2701FT	Fenghua
1	R2	76.8kΩ, 1%, 1/16W, Thick Film, 0603	RS-03K7682FT	Fenghua

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Typical Characteristics

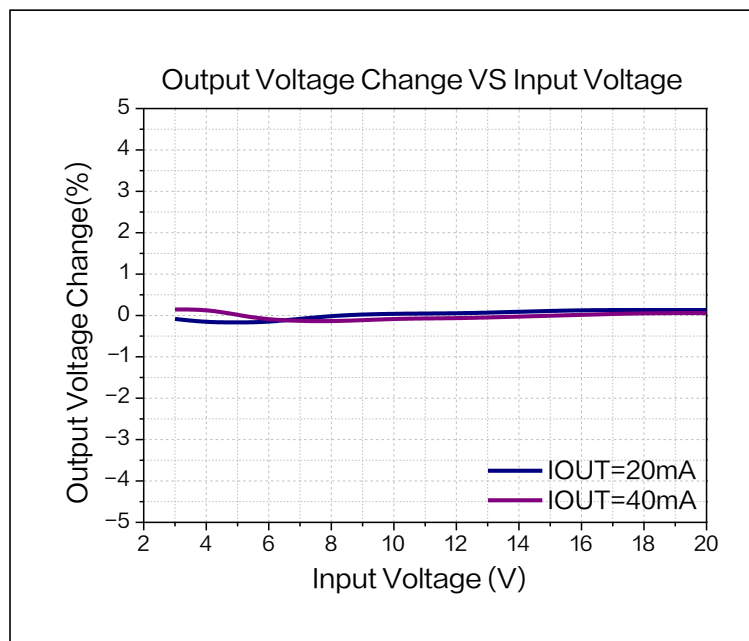


Figure 1 0. Line Regulation

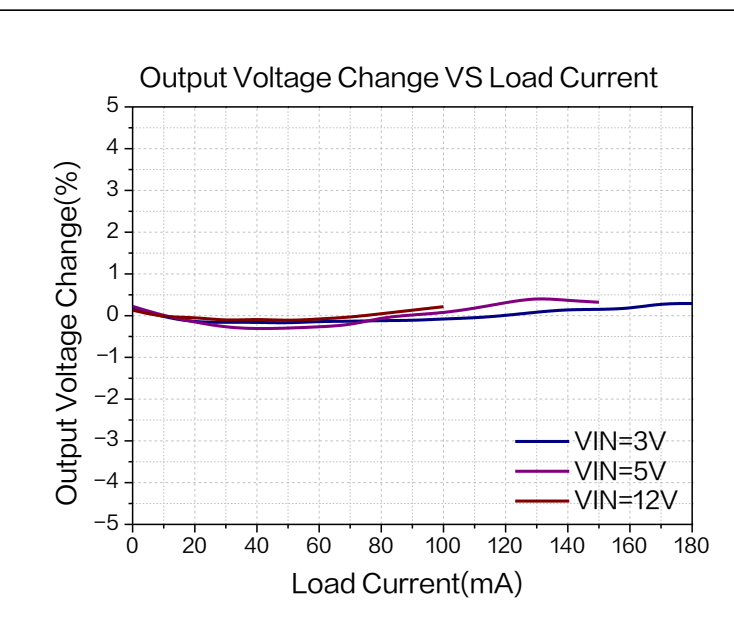


Figure 1 1. Load Regulation

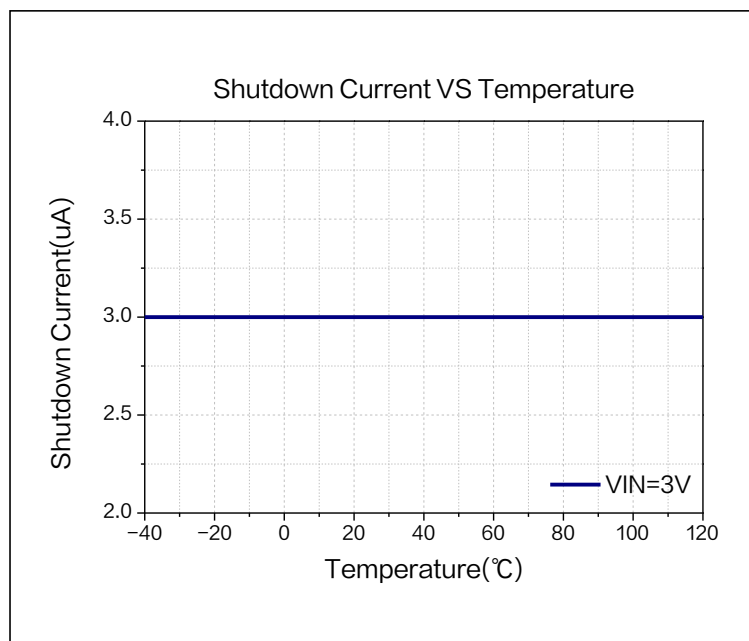


Figure 1 2. Shutdown Current

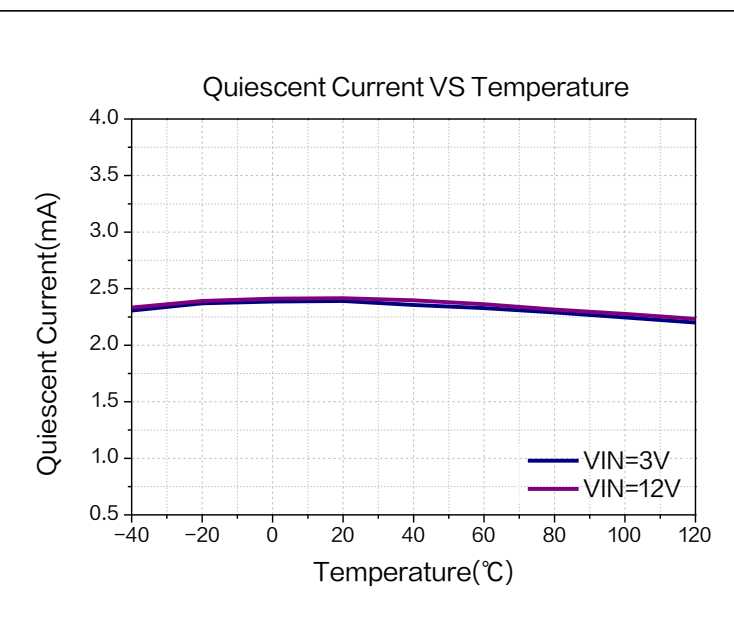


Figure 1 3. Quiescent Current

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Recommended Output Current

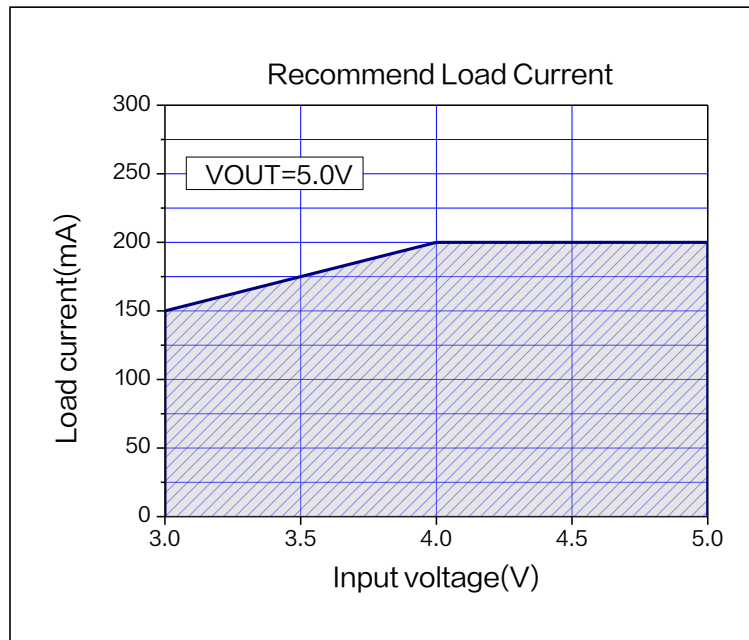


Figure 1 4. Max. Output Current
(VOUT = 5.0V, TA = 25°C)

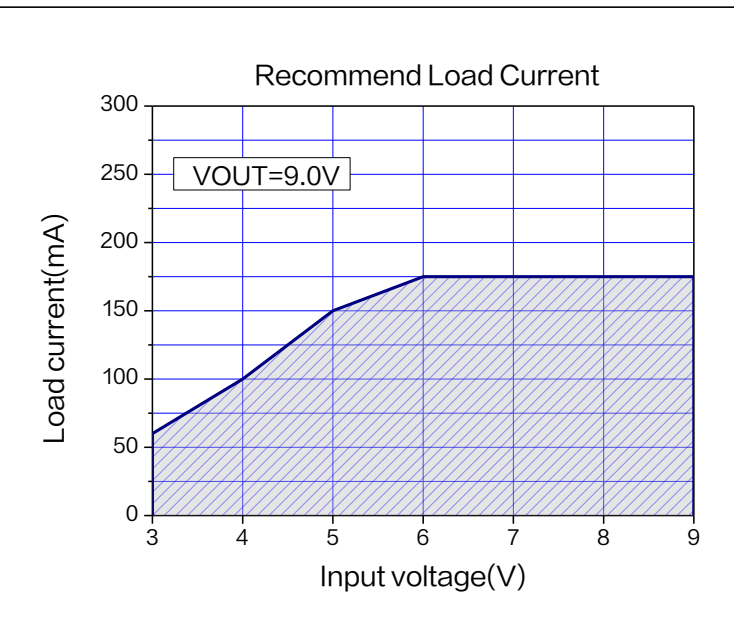


Figure 1 5. Max. Output Current
(VOUT = 9.0V, TA = 25°C)

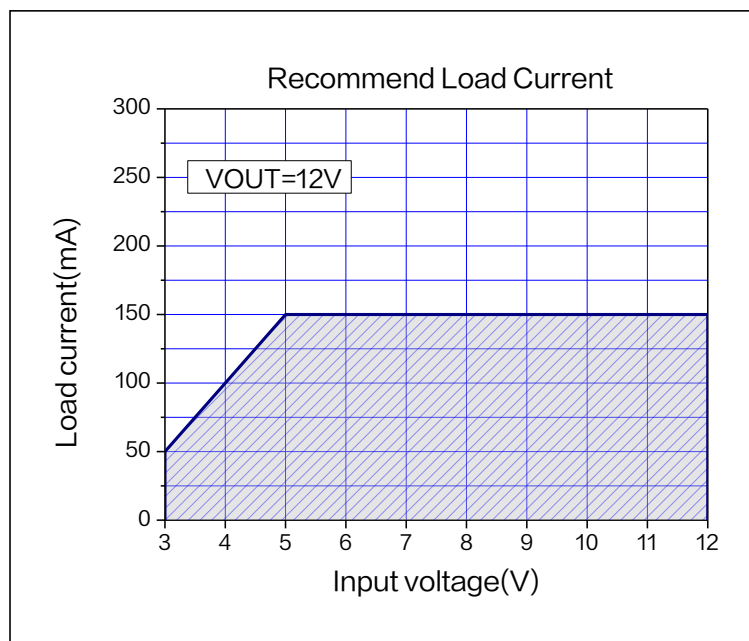


Figure 1 6. Max. Output Current
(VOUT = 12V, TA = 25°C)

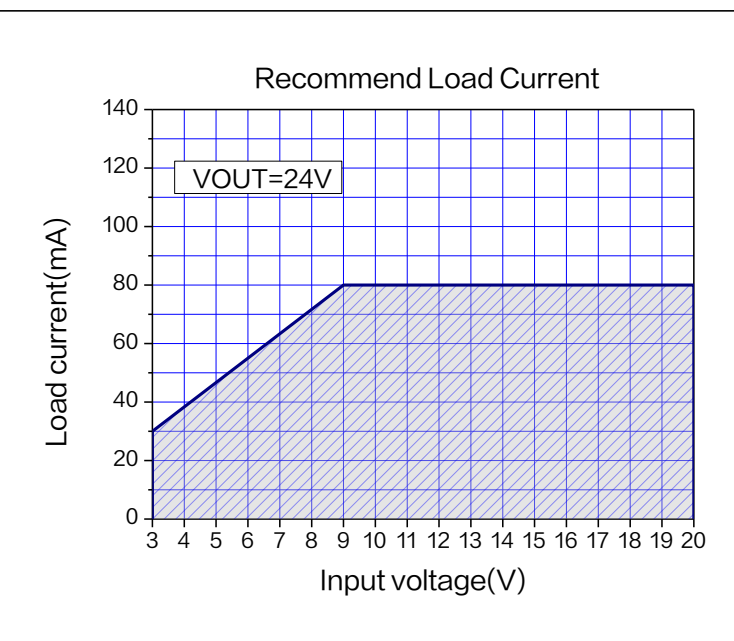


Figure 1 7. Max. Output Current
(VOUT = 24V, TA = 25°C)

Package Dimensions

PKG:SOT23-6 (M6)

Unit:mm

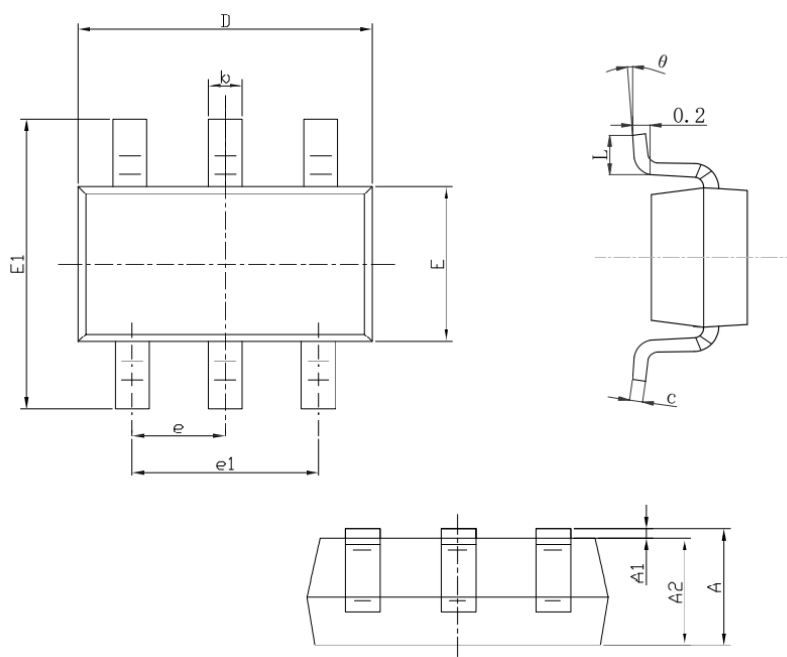


Figure 1 8. Package Dimensions (SOT23-6)

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	1.000	1.350	0.039	0.053
A1	0.000	0.150	0.000	0.006
A2	1.000	1.200	0.039	0.047
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.050	0.111	0.120
E	1.500	1.726	0.059	0.068
E1	2.600	3.000	0.102	0.118
e	0.900	1.000	0.035	0.039
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

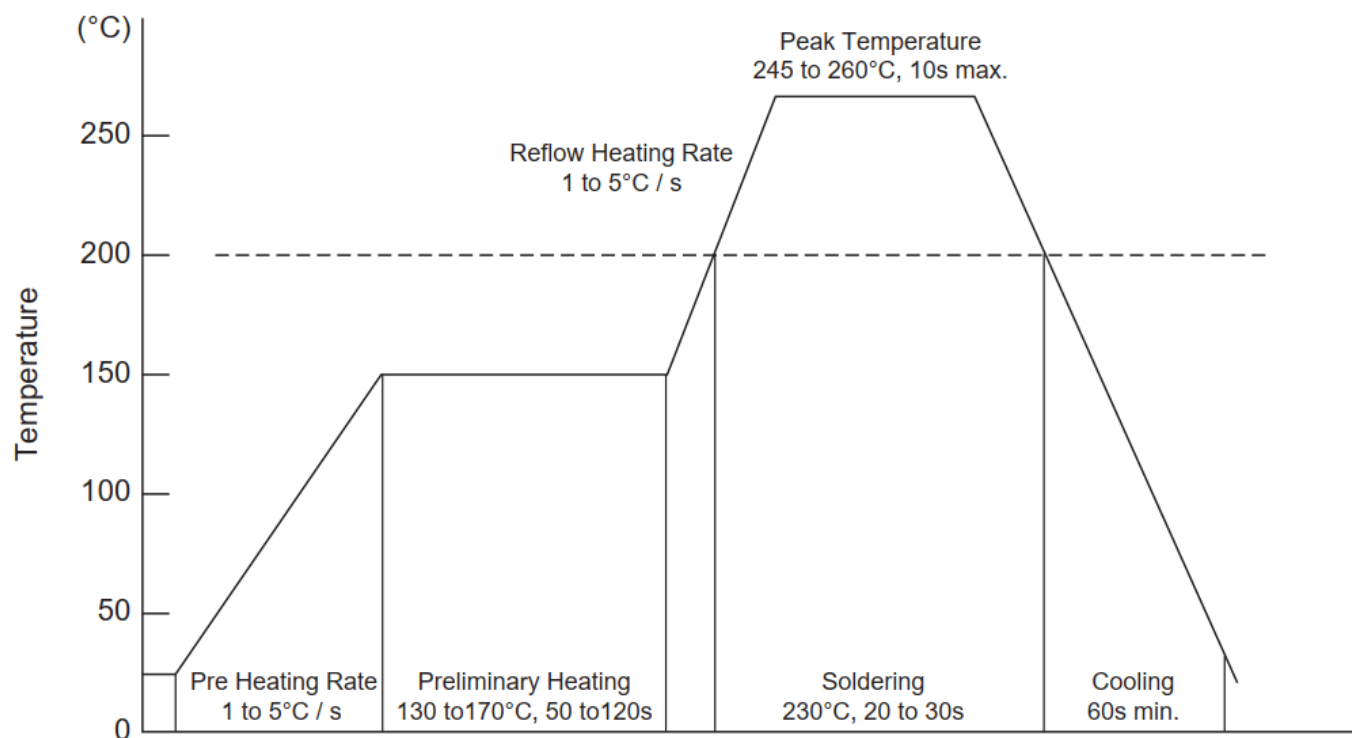
500mA 1.2MHz 36V Built-in SBD Boost DC/DC Converter**Conditions of Soldering and Storage****Recommended Condition of Reflow Soldering**

Figure 20. 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