

2.8A, 20V Boost Converter in SOT23-6 Package

DESCRIPTION

The ETA1625 is a high efficiency step-up converter with an internally integrated 20V/2.8A low side power MOSEFT. It runs with an optimal 0.55MHz frequency, providing the best efficiency. Given the 2.8A power FET, ETA1625 is suitable for delivering 0.15-2A output current depending on the Vout/Vin ratio. For maximum protection, the ETA1625 has an OVP protection feature that prevents the output voltage exceeding the maximum rating of the ETA1625 and the output cap during open conditions.

ETA1625 is available in a space-saving SOT23-6 package.

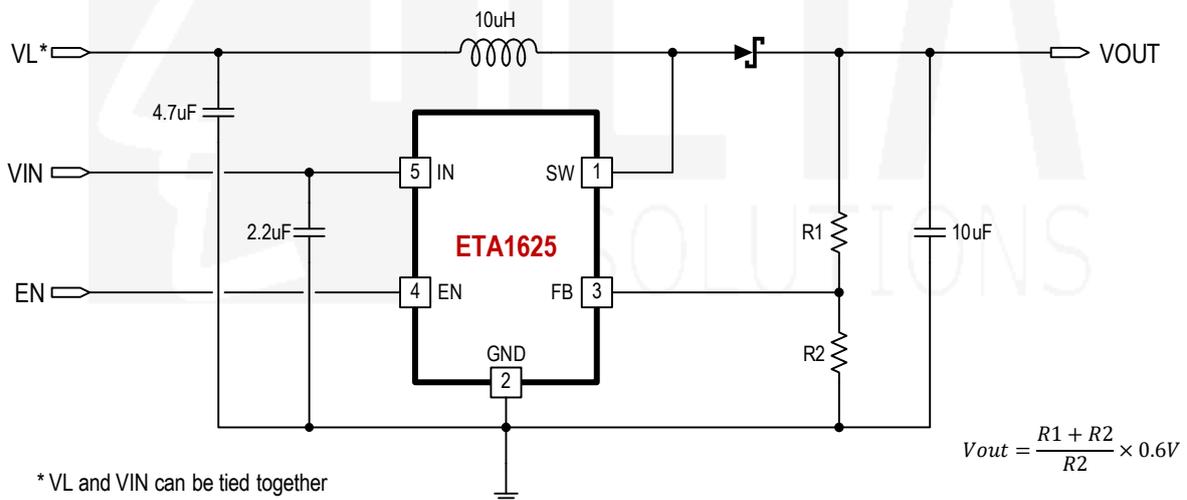
FEATURES

- ◆ Up to 95% Efficiency
- ◆ 22V OVP protection
- ◆ 600mV Feedback Voltage
- ◆ 2.8A current limit
- ◆ SOT23-6 Package

APPLICATIONS

- ◆ PLC module
- ◆ Power Bank
- ◆ Bluetooth Speaker

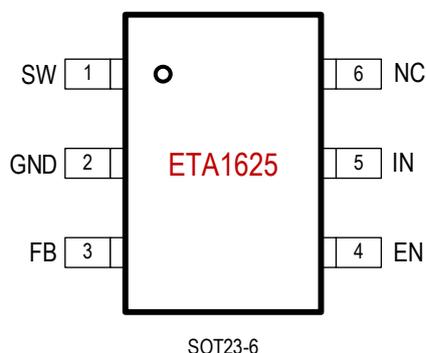
TYPICAL APPLICATION CIRCUIT



ORDERING INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
ETA1625S2G	SOT23-6	GxYW	3000

PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

SW Voltage.....	-0.3V to 22V
All Other Pin Voltage.....	-0.3V to 6V
SW to PGND current.....	Internally limited
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-55°C to 150°C
Thermal Resistance θ_{JA} θ_{JC}	
SOT23-6.....	134.....50.....°C/W
Lead Temperature (Soldering, 10sec)	260°C
ESD HBM (Human Body Mode)	2KV
ESD MM (Machine Mode)	200V

ELECTRICAL CHARACTERISTICS

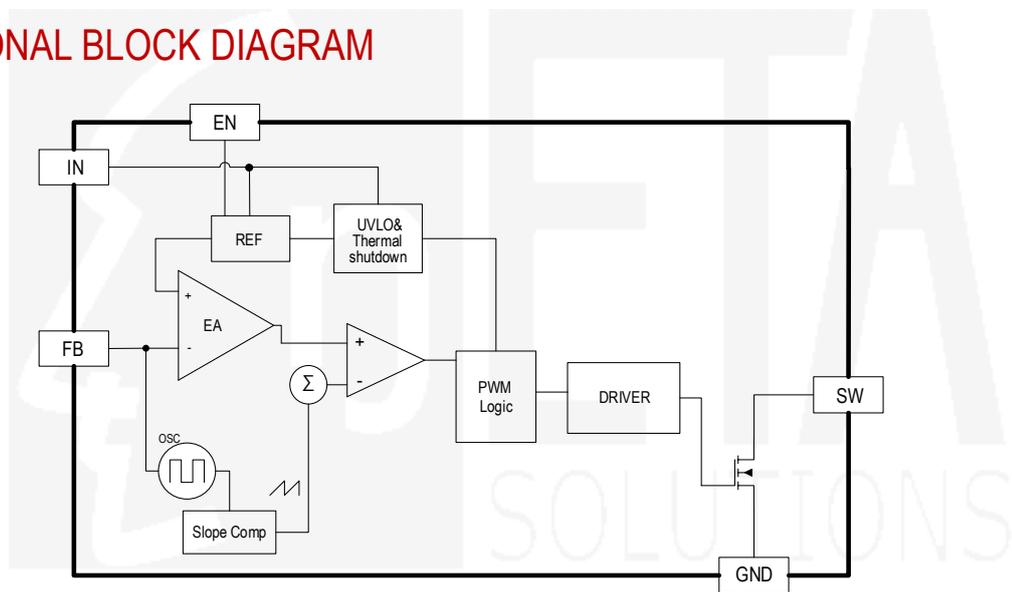
(V_{IN} = 3.6V, unless otherwise specified. Typical values are at T_A = 25°C.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range		2.5		6	V
Input UVLO	Rising	1.85	2.15	2.45	V
UVLO HYS			140		mV
FB Feedback Voltage	$V_{IN} = V_{EN} = 3.6V$	582	600	618	mV
FB Input Current				50	nA
Quiescent Current at IN	Switching at $I_{out}=0$		1.8		mA
	No Switching		0.25		mA
Shutdown Supply Current at IN	$V_{EN}=GND$		0	5	μA
Switching Frequency	$V_{IN}<4.3V$	470	550	630	KHz
Maximum Duty Cycle		90			%
NMOS Switch On Resistance	$I_{SW} = 100mA$		0.1		Ω
NMOS Switch Current Limit			2.8		A
SW Leakage Current	$V_{SW}=0$ or 20V, $V_{EN}=GND$			10	μA
EN Input Low Voltage				0.6	V
EN Input High Voltage		1.2			V
Thermal Shutdown	Rising, Hysteresis=10°C		150		°C

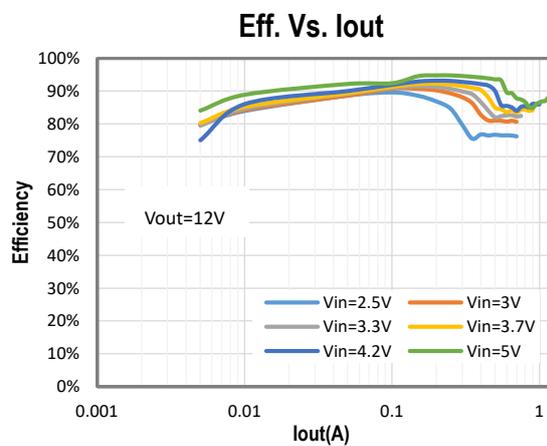
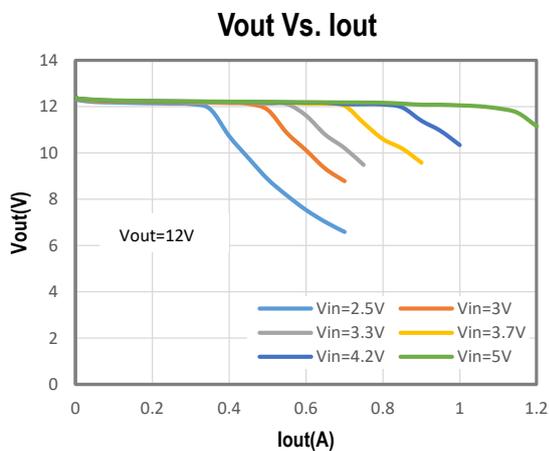
PIN DESCRIPTION

PIN #	PIN NAME	DESCRIPTION
1	SW	Inductor Connection. Connect an inductor between SW and IN.
2	GND	Ground Pin
3	FB	Feedback Input. Connect an external resistor divider from the output to FB and GND to set VOUT
4	EN	Control pin for the IC. Pull high to enable the IC, pull low to disable. If the pin is floating will disable the IC.
5	IN	Input Supply Pin. Bypass with a 4.7 μ F or larger ceramic capacitor to GND
6	NC	Not Connected, leave this Pin floating

FUNCTIONAL BLOCK DIAGRAM



TYPICAL PERFORMANCE CHARACTERISTICS



FUNCTION DESCRIPTION

The ETA1625 is a high efficiency, high output voltage boost converter in a small package size. The device is ideal for delivering 1-2A current when boosting up the output voltage. The device integrates 22V/2.8A switch FET and operates in pulse width modulation (PWM) with 550KHz fixed switching frequency. For operation details, please check the block diagram at the “Block Diagram” chapter. The duty cycle of the converter is set by the error amplifier output and the current signal applied to the PWM control comparator.

Output Open Circuit Protection

Output open circuit protection circuitry prevents IC damage as the result of output open circuit. The ETA1625 monitors the voltage at the SW pin and FB pin during each switching cycle. The circuitry turns off the switch FET and shuts down the IC when both of the following conditions persist for 8 switching clock cycles: (1) the SW voltage exceeds the VOVP threshold, which is 22V and (2) the FB voltage is less than half of regulation voltage. As a result, the output voltage falls to the level of the input supply. The device remains in shutdown mode until it is enabled by toggling the EN pin logic. The output voltage plus the 200mV reference voltage cannot exceed the minimum OVP threshold or $OUTPUT\ VOLTAGE + 200\ mV \leq VOVP(MIN)$.

Shutdown

The ETA1625 enters shutdown mode when the EN voltage is logic low for more than 2.5ms. During shutdown, the input supply current for the device is less than 1 μ A (max). Although the internal FET does not switch in shutdown, there is still a DC current path between the input and the output through the inductor and Schottky diode.

Output Voltage Setting

The FB voltage is regulated by a low 0.6V reference voltage. The output voltage is set externally by using a resistor divider. The value of the R1/R2 divider is calculated using Equation 1.1:

$$V_{out} = \frac{R_1 + R_2}{R_2} \times 0.6V \quad (1.1)$$

Where,

VOUT = output voltage, R2 = resistance between FB and GND, R1 = resistance between OUT and FB.

The output current tolerance depends on the FB accuracy and the current sensor resistor accuracy.

APPLICATION INFORMATION

Inductor Selection

Using an inductor with a smaller inductance value forces discontinuous PWM when the inductor current ramps down to zero before the end of each switching cycle. This reduces the boost converter's maximum output current, causes large input voltage ripple and reduces efficiency. Large inductance value provides much more output current and higher conversion efficiency. For these reasons, a 10 μ H inductor value range is recommended and optimized the efficiency for most application while maintaining low inductor peak to peak ripple. Below table lists the recommended inductor for the ETA1625.

Recommended Inductors for ETA1625

Part #	L(μ H)	Saturation Current (mA)	Vendor
SWPA8040S100MT	10	>3000	Sunlord

Schottky Diode Selection

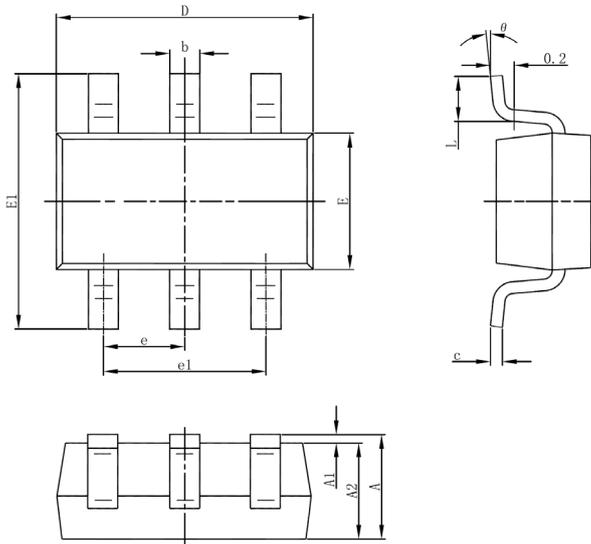
A high-speed rectifying Schottky is recommended for ETA1625 for maximum efficiency due to its high switching frequency. The diode average and peak current rating must be larger than the average output current and peak inductor current to ensure reliability. In addition, the diode's reverse breakdown voltage must exceed the OVP voltage.

Input and Output Capacitor Selection

The output capacitor is mainly selected to meet the requirements for the output ripple and loop stability. The output requires a capacitor of at least 10 μ F.

PACKAGE OUTLINE

Package: SOT23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°