

Quick Response, 2A, 18V Input, 500kHz Synchronous Step-Down DC/DC Converter

Features

- 4.5V to 18V Input Voltage Operation.
- 2A Output Current Capability
- Constant-on-Time Architecture to Achieve Fast Transient Response
- 500kHz Switching Frequency
- 0.6V 2% Feedback Reference Voltage
- 0.6V to 5.5V Adjustable Output Voltage
- Input Under-Voltage Lockout
- Cycle-by-Cycle Valley Current Limit
- Thermal Shutdown
- SOT-23-6 Package

General Description

The G2832 provides a high efficiency synchronous buck converter. The device supports a wide range input voltage from 4.5V to 18V. G2832 adopts quick response COT architecture to achieve fast transient response.

G2832 features enable control, cycle-by-cycle valley current limit, and thermal shutdown. It is available in a SOT-23-6 package.

Applications

- Set Top Box
- Laptop
- Access Point Router
- DSL Modem
- LCD Monitors and TVs

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G2832TB1U	2832x	-40°C to 85°C	SOT-23-6

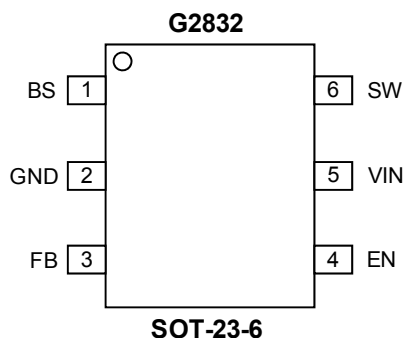
Note: TB: SOT-23-6

1: Bonding code

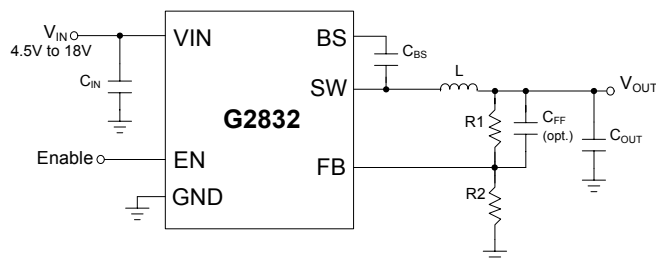
U: Tape & Reel

Green: Lead Free / Halogen Free

Pin Configuration



Application Circuit



Absolute Maximum Ratings

VIN, SW, EN	-.0.3V to +20V
BOOT-SW	-.0.3V to +5.5V
FB	-.0.3V to +5.5V
Thermal Resistance Junction to Ambient, (θ_{JA})	
SOT-23-6	240°C/W
Continuous Power Dissipation ($T_A=+25^\circ\text{C}$)	
SOT-23-6	0.5W
Thermal Resistance Junction to Case, (θ_{JC})	
SOT-23-6	80°C/W

Operating Ambient Temperature	-.40°C to +85°C
Storage Temperature range	-.60°C to +150°C
Reflow Temperature (Soldering, 10sec)	260°C
ESD Susceptibility (HBM)	2kV
ESD Susceptibility (MM)	200V

Recommended Operation Conditions

VIN	4.5V to +18V
Operating Ambient Temperature	-.40°C to 85°C
Operating Junction Temperature	-.40°C to 125°C

*Please refer to Minimum Footprint PCB Layout Section

- Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
- Device is ESD sensitive. Handling precaution recommended. The Human Body model is a 100pF capacitor discharged through a 1.5k Ω resistor into each pin.

Electrical characteristics

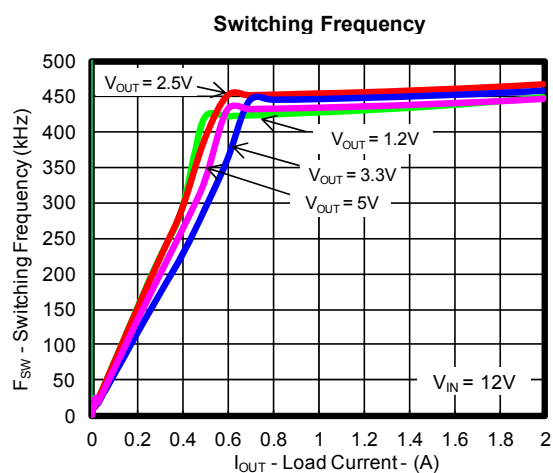
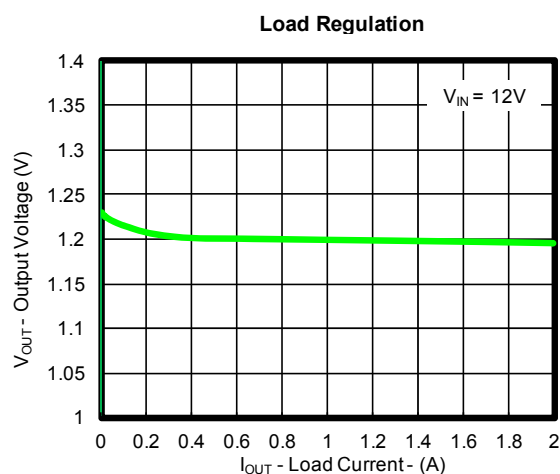
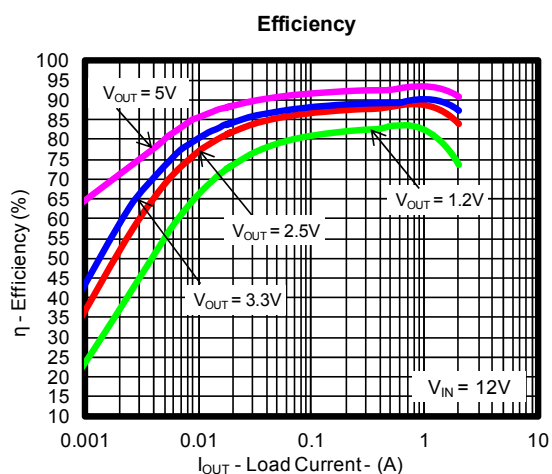
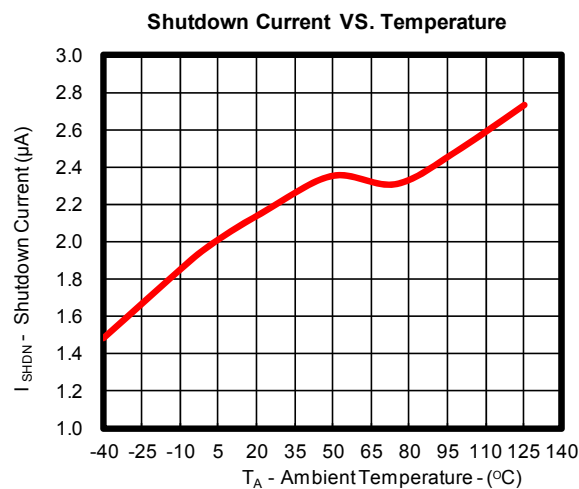
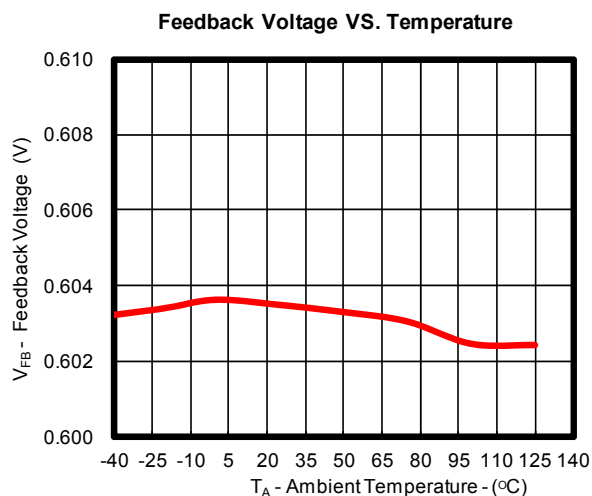
(VIN=12V, $T_A=25^\circ\text{C}$.)

The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified.

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range	V _{IN}		4.5	---	18	V
Shutdown Current	I _{SHDN}	EN = 0	---	5	10	μA
Quiescent Current	I _Q	I _{OUT} = 0, V _{FB} = 1V	---	500	---	μA
Feedback Voltage	V _{FB}		588	600	612	mV
FB Input Current	I _{FB}	V _{FB} = 1V	-50	---	50	nA
High-Side Switch On Resistance	R _{DS(ON) HS}	V _{BST-SW} = 5V	---	120	---	m Ω
Low-Side Switch On Resistance	R _{DS(ON) LS}	V _{IN} = 5V	---	120	---	m Ω
Low-Side Current Limit	I _{LIM}	Valley Current	2	---	---	A
Switching Frequency	f _{SW}		---	500	---	kHz
Min On Time	t _{ON}		---	70	---	ns
Min Off Time	t _{OFF}		---	160	---	ns
Input Under-Voltage Lockout Threshold	V _{UVLO}	Falling	3.55	3.9	4.25	V
	V _{UVLO HYS}	Hysteresis	---	300	---	mV
Soft-Start Time	t _{SS}		---	800	---	μs
EN Input Threshold	V _{IH}	Rising	1.5	---	---	V
	V _{IL}	Falling	---	---	0.4	V
EN Input Current	I _{IH}	V _{EN} = 2V	-50	---	50	nA
	I _{IL}	V _{EN} = 0V	-50	---	0	nA
Thermal Shutdown Temperature	T _{SD}		---	150	---	°C
	T _{SD HYS}		---	20	---	°C

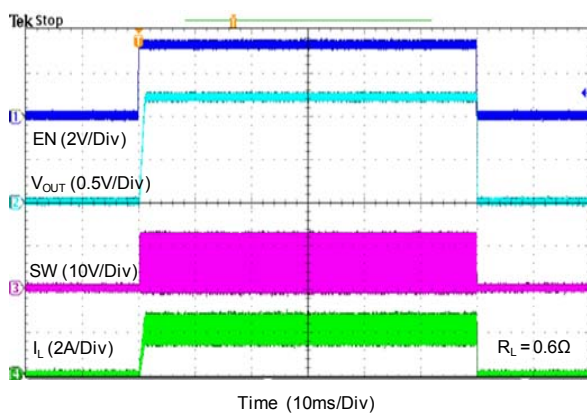
Typical Performance Characteristics

($V_{IN} = 12V$, $V_{OUT} = 1.2V$, $T_A = 25^\circ C$, unless otherwise noted.)

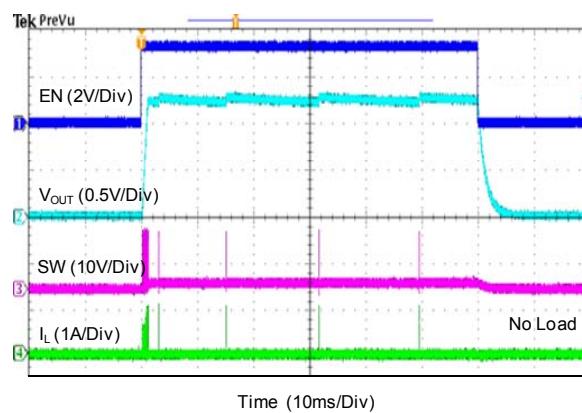


Typical Performance Characteristics (continued)

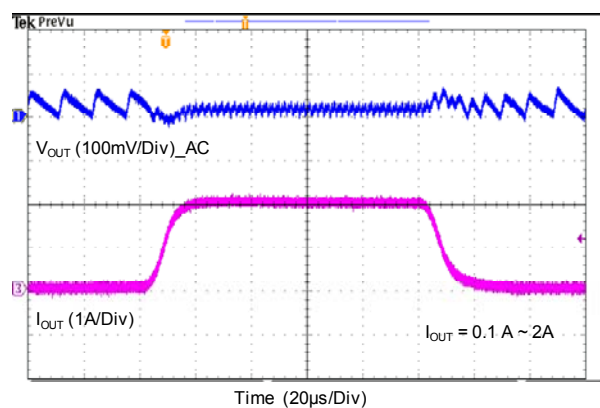
Start-Up and Shut-Down



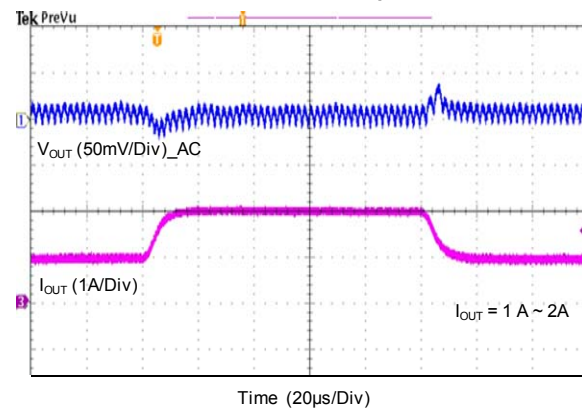
Start-Up and Shut-Down



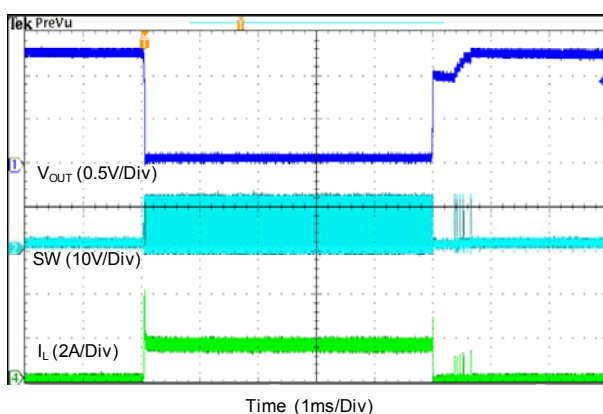
Load Transient Response



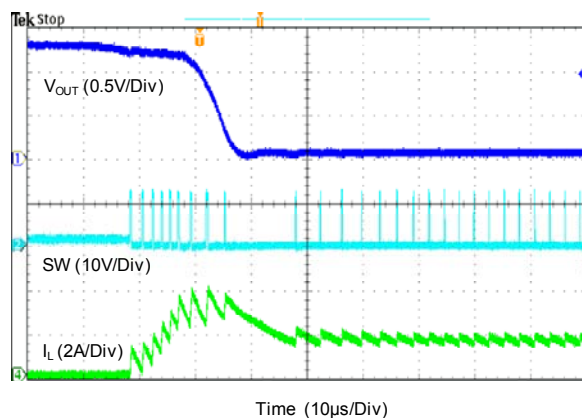
Load Transient Response



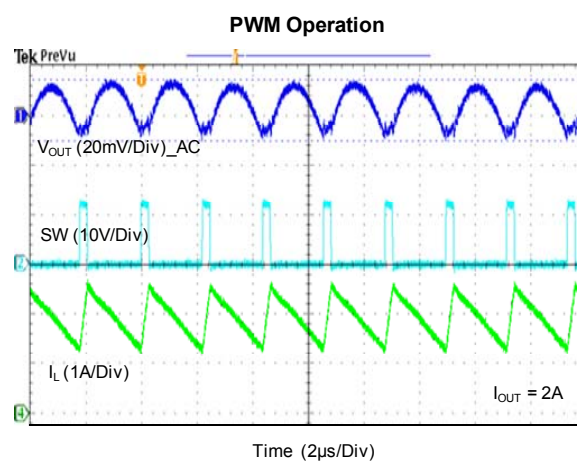
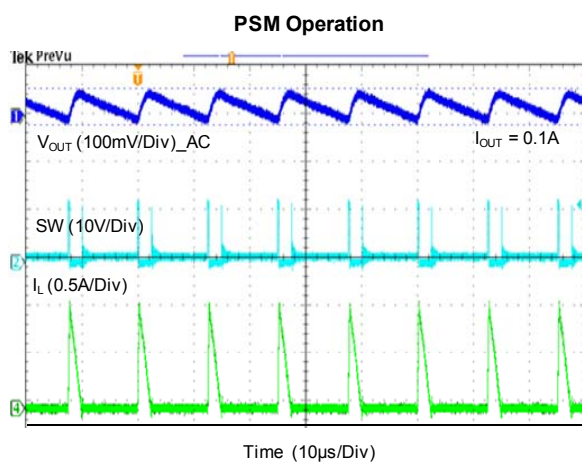
Output Short Circuit Protection



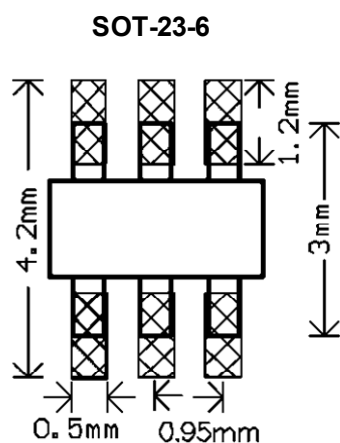
Output Short Circuit Protection - Zoom in



Typical Performance Characteristics (continued)



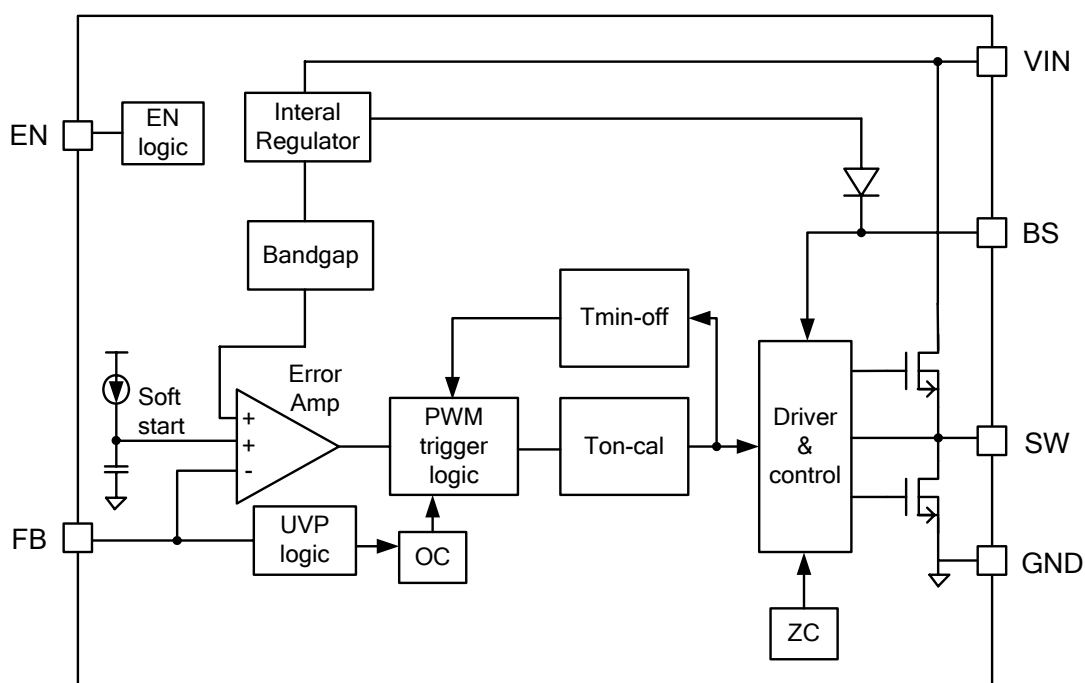
Minimum Footprint PCB Layout Section



Pin Description

PIN	NAME	FUNCTION
1	BS	Boot-strap pin. Decouple this pin to SW with a 100nF capacitor
2	GND	Ground pin.
3	FB	Output voltage setting pin. Connect this pin to the resistor divider of the output. V_{FB} is regulated to 0.6V.
4	EN	Enable control. Pulled high to turn on. Do not leave EN to be floating.
5	VIN	Power supply input. Decouple this pin to GND with at least 10 μ F.
6	SW	Inductor pin. Connect this pin to the switching node of inductor.

Block Diagram



Typical Application Circuit

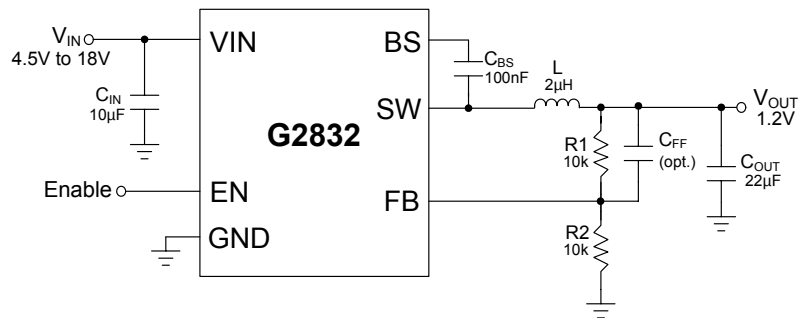


Table 1. Suggested Component Values

V_{OUT} (V)	R1 (k Ω)	R2 (k Ω)	L (μ H)	C _{FF} (pF)	C _{OUT} (μ F)
5	110	15	4.7	39	22
3.3	115	25.5	3.3	33	22
2.5	25.5	8.06	3.3	NC	22
1.2	10	10	2.2	NC	22

Function Descriptions

The G2832 is a high efficiency synchronous buck converter which supports a wide range input voltage from 4.5V to 18V. G2832 adopts quick response constant on-time (COT) architecture to achieve fast transient response. G2832 provides cycle by cycle current limiting and thermal shutdown protection.

Output Voltage Setting

The output voltage can be set by connecting FB to a resistive divider between the output and ground according to the following equation:

$$V_{OUT} = 0.6 \times (1 + R1/R2)$$

Place the two resistors as close as possible to the FB pin.

Soft-Start (SS)

The G2832 employs soft-start circuitry to reduce supply inrush current during startup conditions. When the device exits under-voltage lockout or shut-down mode, the soft-start circuitry will slowly ramp up the output voltage in about 800μs.

Cycle-By-Cycle Current Limit

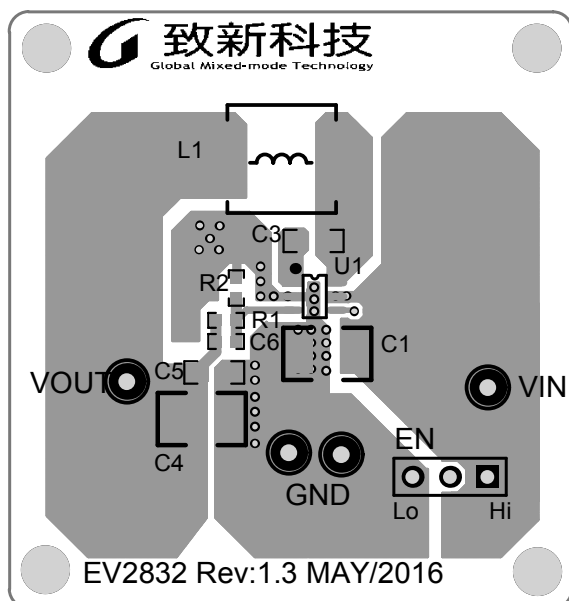
The inductor current is monitored via the low-side NMOS cycle-by-cycle. Once the inductor current is larger than the current limit, the switcher will not start the next switching cycle until the inductor current drop below the current limit threshold. The valley current will therefore be locked at the current limit threshold.

Thermal Shutdown

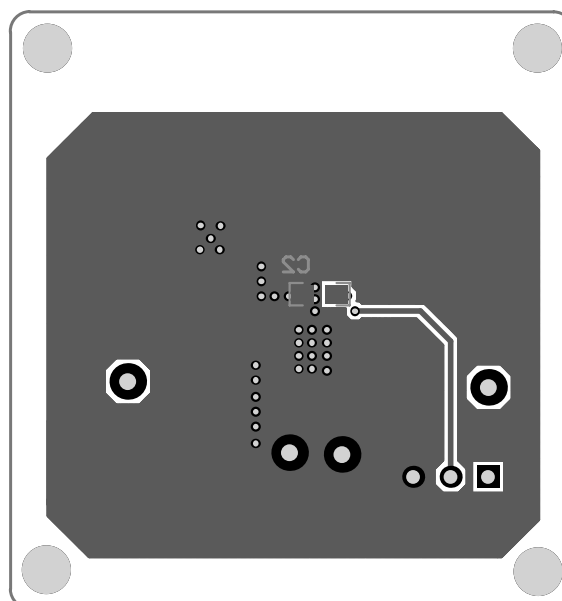
The G2832 will stop switching when the junction temperature exceeds the OTP threshold. Once the junction temperature cools down and is lower the OTP hysteresis threshold, the converter will resume switching.

Board Layout

Top Layer



Bottom Layer



EV2832 PCB	Information
Board Material	FR4
Size	38mm x 40mm
Board Thickness	1.6mm
Layers	2
Copper Thickness	2oz.

Layout Consideration

1. Component Placement

Place input capacitors as close as possible to VIN.
Place the feedback resistors and compensation components as close as possible to the IC.

2. Layout Recommendation

To prevent electromagnetic interference (EMI) problems and reduce voltage ripple of the device, any high current copper trace which see high frequency switching should be optimized.

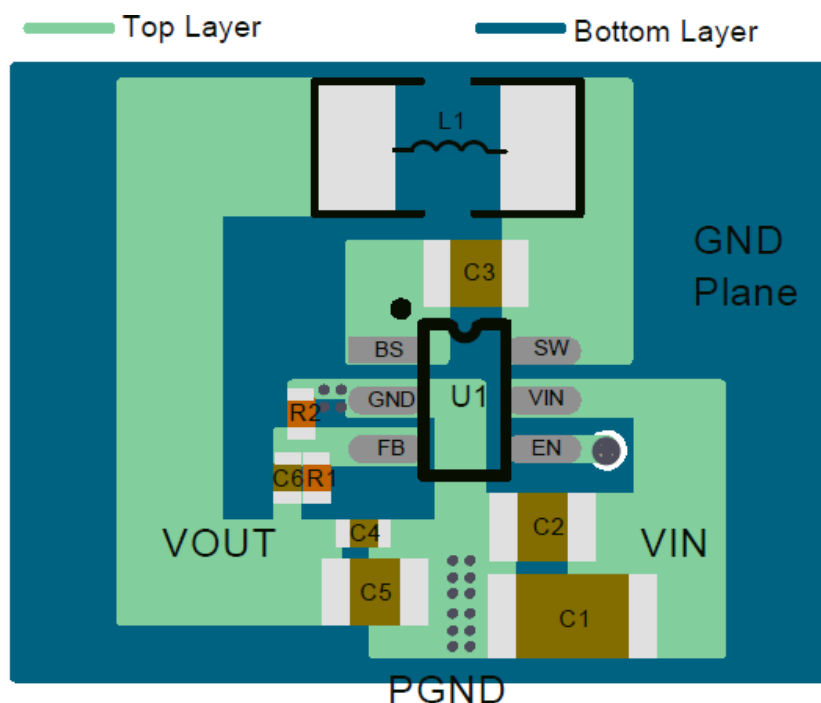
Therefore, use short and wide traces for power current paths and for power ground tracks, power plane and

ground plane are recommended if possible.

It is important to minimize the area of the switching nodes and use the ground plane under them to minimize crosstalk to sensitive signals and ICs.

It's suggested to keep as complete of a ground plane under G2832 if possible.

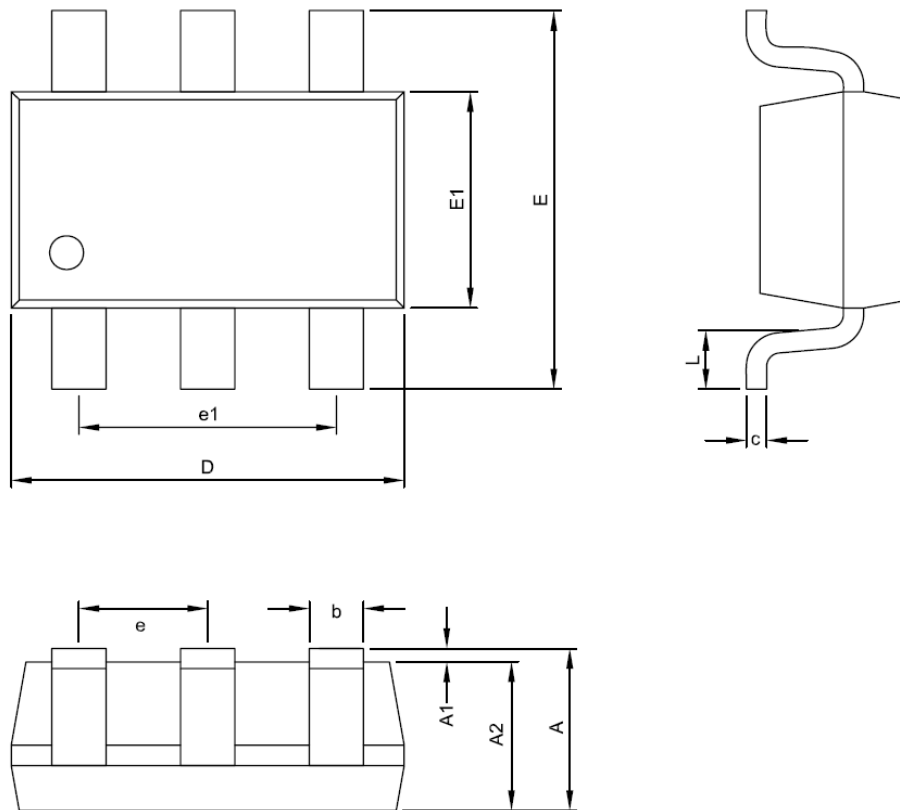
It is always good practice to keep the sensitive tracks such as feedback connection (FB) away from switching signal connections (SW).



Bill of Materials

Location	Quantity	Description	Value	Manufacturer
U1	1	SOT-23-6	G2832	Global Mixed-mode Technology
L1	1	SPM6530T-2R2M	2.2μH	TDK
R1,R2	1	1%, 0805	10kΩ	TA-I
C1	1	25V, X5R, 1210	10μF	TAIYO YUDEN
C2,C3	2	50V, X5R, 0805	0.1μF	TAIYO YUDEN
C4	1	25V, X5R, 1210	22μF	TAIYO YUDEN

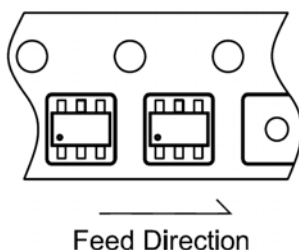
Package Information



SOT-23-6 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.95	1.10	1.45	0.037	0.043	0.057
A1	0.00	---	0.15	0.000	---	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
D	2.70	2.90	3.10	0.106	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
c	0.08	0.15	0.25	0.003	0.006	0.010
b	0.30	0.40	0.50	0.012	0.016	0.020
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024

Taping Specification



PACKAGE	Q'TY/REEL
SOT-23-6	3,000 ea

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