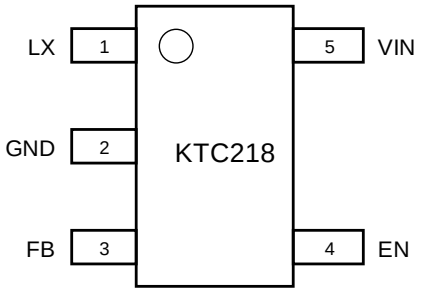
Pin Descriptions

SOT23-5 and TSOT23-5

Pin #	Name	Function
1	LX	Converter switching node
2	GND	Converter/IC ground
3	FB	Output feedback pin regulated at 1.2V
4	EN	Logic High enables converter/IC
5	VIN	IC supply voltage

SOT23-5 and TSOT23-5
(Top View)



Absolute Maximum Ratings [1]

(T_A = 25°C unless otherwise noted)

Symbol	Description	Value	Units
VIN	Input voltage	-0.3 to 6.0	V
LX	High voltage switching node	-0.3 to 44	V
FB, EN, GND	Other pins	-0.3 to VIN+0.3	V
T_J	Operating Temperature Range	-40 to 150	°C
T_s	Storage Temperature Range	-65 to 150	°C
T_{LEAD}	Maximum Soldering Temperature (at leads, 10 sec)	300	°C
ESD	HBM electrical static discharge	2.0	kV

1. Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. Functional operation at conditions other than the operating conditions specified is not implied. Only one Absolute Maximum rating should be applied at any one time.

Thermal Capabilities

Symbol	Description	Value	Units
SOT23-5			
θ_{JA}	Thermal Resistance – Junction to Ambient[2]	190	°C/W
P_D	Maximum Power Dissipation at $T_A \leq 25°C$	0.526	W
$\Delta P_D/°C$	Derating Factor Above T_A = 25°C	-5.26	mW/°C
TSOT23-5			
θ_{JA}	Thermal Resistance – Junction to Ambient[2]	190	°C/W
P_D	Maximum Power Dissipation at $T_A \leq 25°C$	0.526	W
$\Delta P_D/°C$	Derating Factor Above T_A = 25°C	-5.26	mW/°C

2. Junction to Ambient thermal resistance is highly dependent on PCB layout. Values are based on thermal properties of the device when soldered to an EV board.

Ordering Information

Part Number	Marking	Operating Temperature	Package
KTC218EAC-TR	BLYYZ3	-40˚C to +85°C	SOT23-5
KTC218EHC-TR	BLYYZ3	-40˚C to +85°C	TSOT23-5

3. “YYZ” is the date code and assembly code.

Electrical Characteristics [4]

Unless otherwise noted, the *Min* and *Max* specs are applied over the full operation temperature range of -40˚C to +85°C, while *Typ* values are specified at room temperature (25°C)**.** VIN = 3.6V, VOUT = 12V, L = 10μH, Cout = 4.7μF.

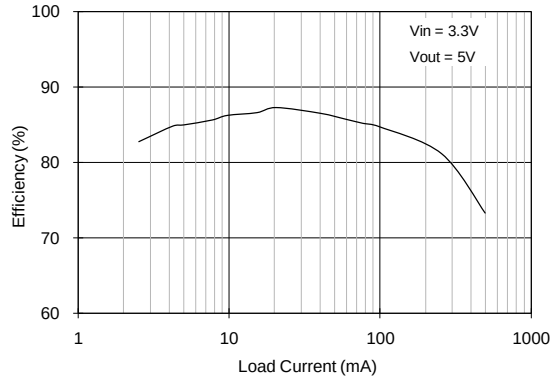
Symbol	Description	Conditions	Min	Typ	Max	Units
IC Supply						
V_{IN}	Input operating range		2.7		5.5	V
UVLO	Input under voltage lockout	Rising edge		2.5	2.65	V
$UVLO_{HYST}$	UVLO hysteresis			0.15		V
I_Q	IC quiescent current (non switching)	FB = 1.3V		0.25	0.4	mA
	IC operating current (switching)	FB = 0V		0.73	1.65	mA
I_{SHDN}	VIN pin shutdown current	EN = GND		0.1	1.0	μA
Step-Up Converter						
FB	FB pin accuracy	TA = 25°C	1.18	1.2	1.22	V
I_{FB}	FB pin bias current			0.02	0.1	μA
$R_{DS(ON)}$	NMOS on-resistance	TA = 25°C		0.65	1.1	Ω
I_{LIM}	Peak NMOS current limit			1.5		A
F_{SW}	Oscillator frequency			0.8		MHz
D_{max}	Maximum duty cycle		92	95		%
T_S	Start-up time			300		μs
Control						
V_{TH-L}	Logic low threshold				0.4	V
V_{TH-H}	Logic high threshold		1.4			V
T_{J-TH}	IC junction thermal shutdown threshold			150		°C
	IC junction thermal shutdown hysteresis			15		°C

4. The KTC218 is guaranteed to meet performance specifications over the –40˚C to +85°C operating temperature range by design, characterization and correlation with statistical process controls.

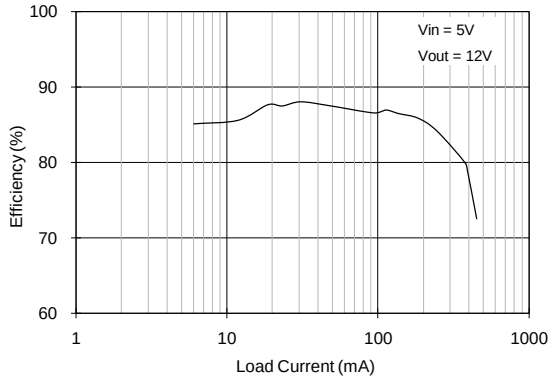
Typical Characteristics

Temp = 25°C unless otherwise specified.

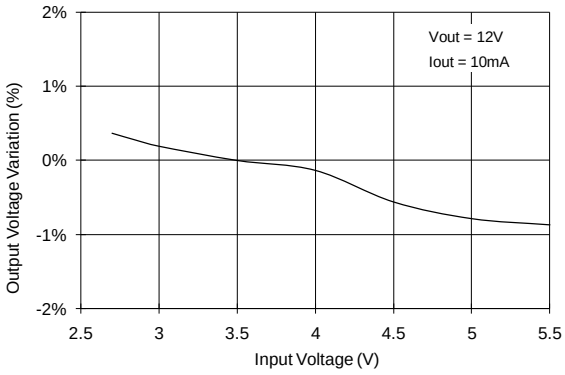
Efficiency (Vout = 5V)



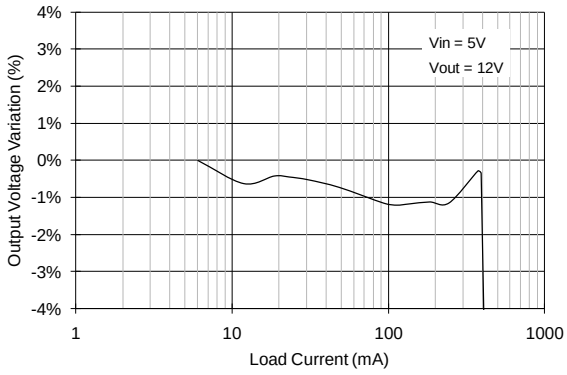
Efficiency (Vout = 12V)



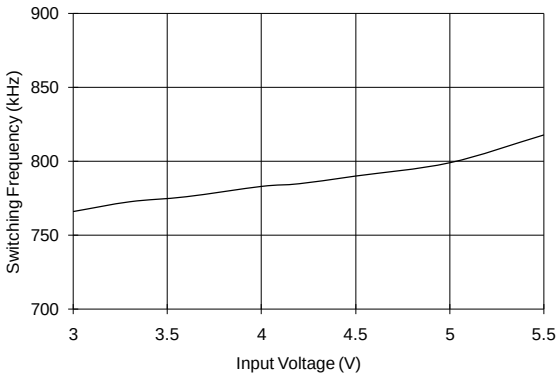
Line Regulation



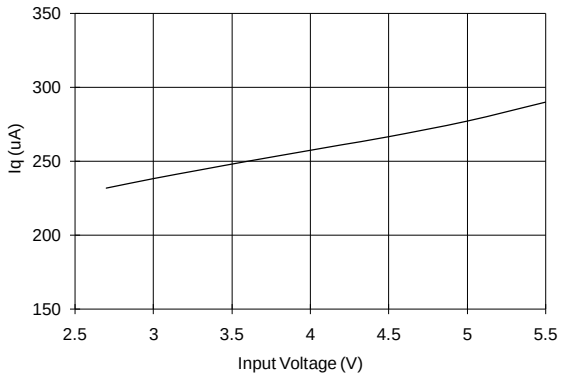
Load Regulation



Switching Frequency vs. Input Voltage



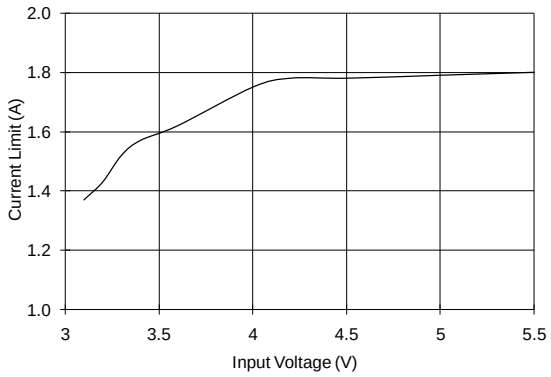
Operating Current (non-switching)



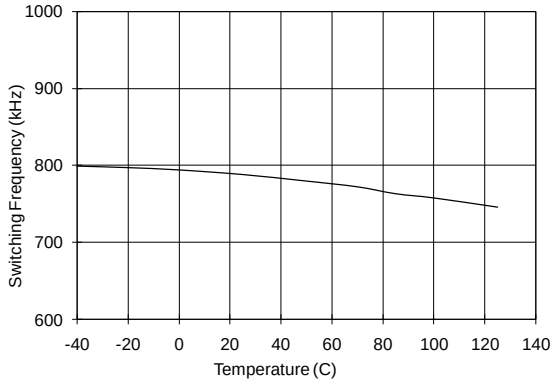
Typical Characteristics (continued)

Temp = 25°C unless otherwise specified.

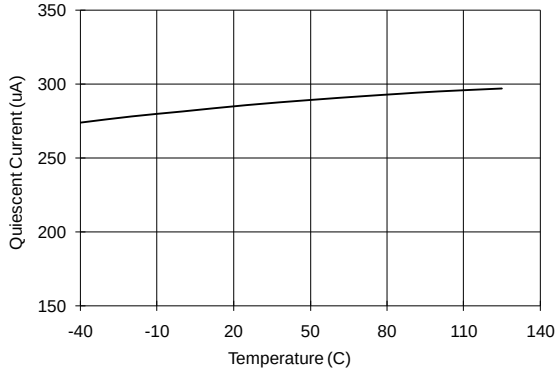
Current Limit vs. Input Voltage



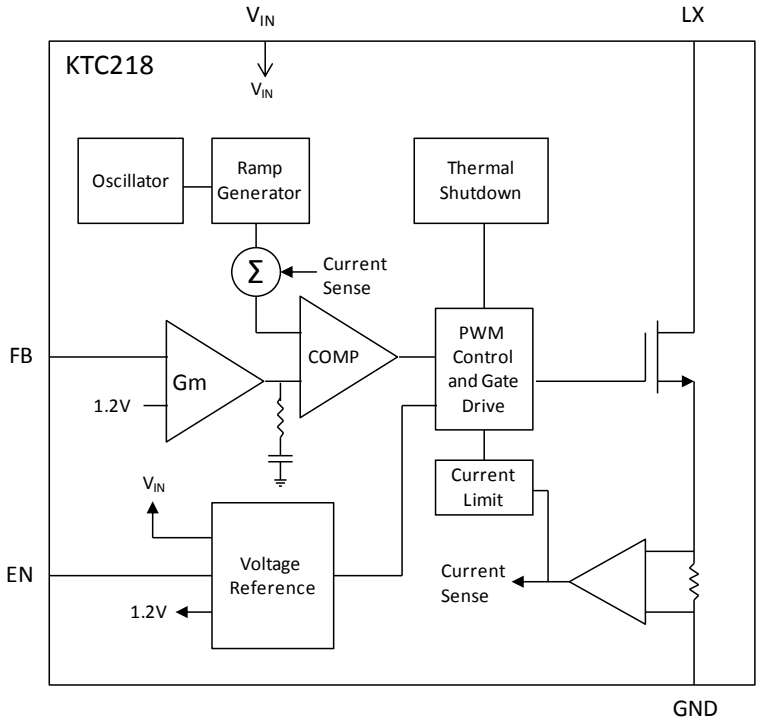
Switching Frequency vs. Temperature



Operating Current (non-switching) vs. Temperature



Functional Block Diagram



Functional Description

The KTC218 uses a constant-frequency current-mode boost converter architecture to control the output voltage. Please refer to the functional block diagram above for an explanation of KTC218 operation. The beginning of each cycle turns on the Power MOSFET. A slope compensation ramp is added to the output of the current sense amplifier and the result is fed into the positive input of the comparator (COMP). When this voltage goes above the output voltage of the error amplifier (Gm), the Power MOSFET is turned off. The voltage at the output of the Gm block amplifies the difference between the 1.2V reference voltage and the feedback voltage (FB), so that FB voltage can be regulated to 1.2V.

The KTC218 has built-in soft-start to limit the inrush current during startup and to limit the amount of overshoot on the output. Protection features in the KTC218 include cycle-by-cycle current limit protection and thermal shutdown.

Application Information

Inductor Selection

A 4.7µH~10µH inductor is recommended for all applications. If high efficiency is a critical requirement, a low DCR inductor should be selected. The inductor's saturation current rating should also exceed the peak input current, especially for high load current applications.

Capacitor Selection

Small size ceramic capacitors are ideal for KTC218 applications. A 10uF input capacitor and a 1µF~10µF output capacitor are suggested for all applications. The voltage rating of the output capacitor should exceed the output voltage.

Diode Selection

Using a schottky diode is recommended in KTC218 applications because of its low forward voltage drop and fast reverse recovery time. The current rating of the schottky diode should exceed the peak current of the boost converter. The voltage rating should also exceed the target output voltage.

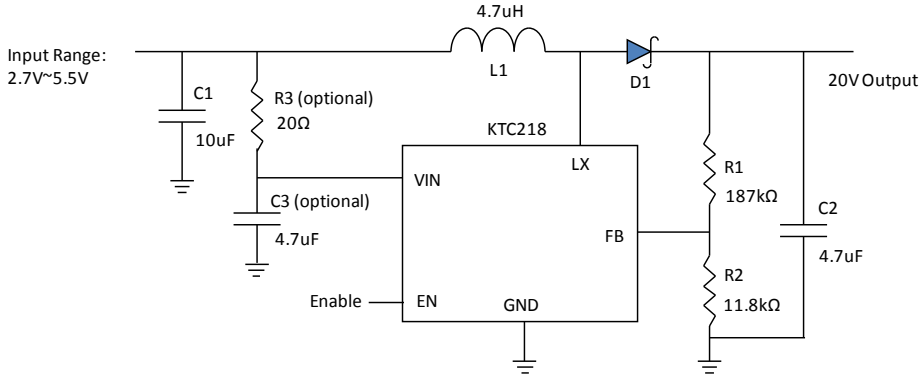


Figure 1. Application Circuit for 20V Output

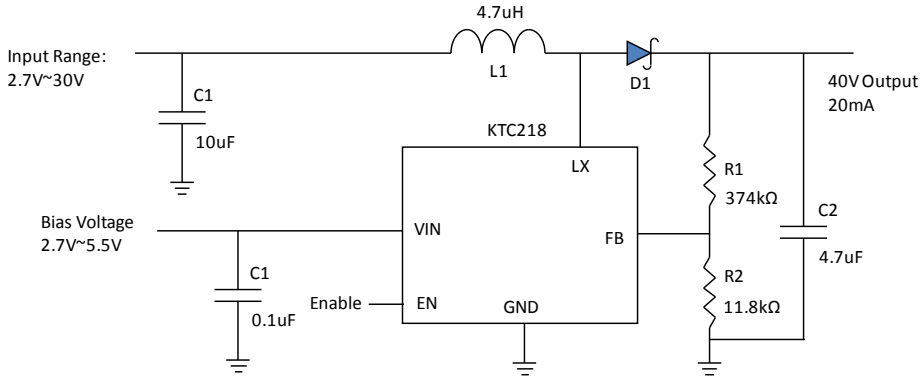


Figure 2. Application Circuit for 40V Output Using Separate Power Rail

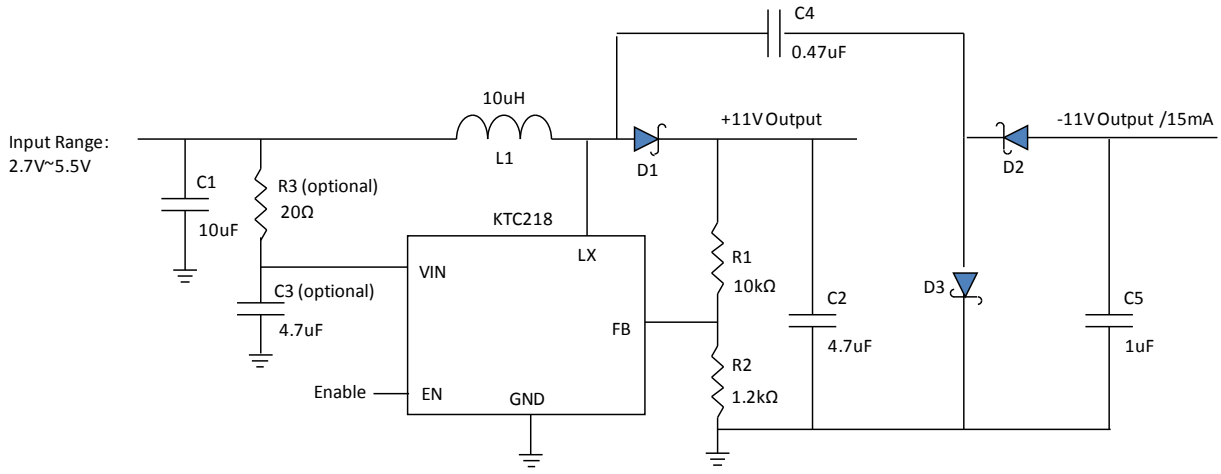


Figure 3. Application Circuit for +11V and low current -11V Output

Output Voltage Setting

The output voltage is programmable by selecting the resistive voltage divider ratio. Use a 11.8kΩ for resistor R2 of the voltage divider shown in Figure 1 above. High-side resistor R1 should be determined using the following equation:

$$R1 = \frac{R2 \cdot (V_{OUT} - V_{FB})}{V_{FB}}$$

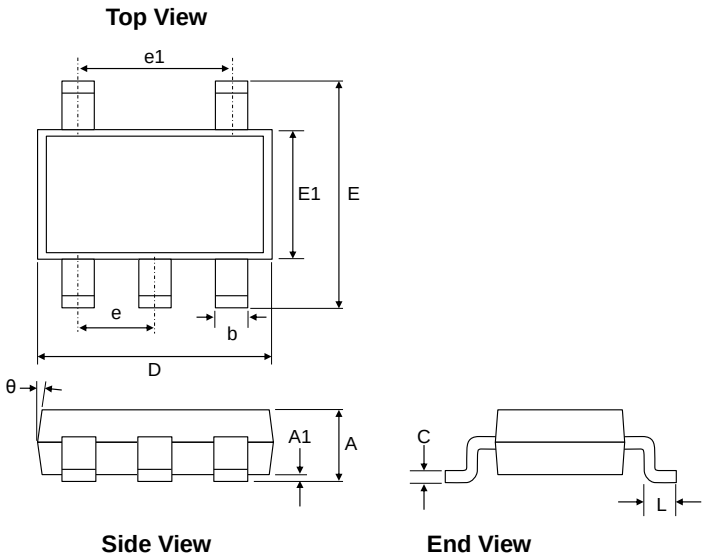
For example in the case where 20V output is desired, 11.8kΩ is selected for R2 and using the values VFB = 1.2V and VOUT = 20V, the closest 1% resistor choice for R1 is 187kΩ.

Layout Considerations

PCB layout is very important for high frequency switching regulators in order to keep the loop stable and minimize noise. The input capacitor should be very close to the IC to get the best decoupling. For the best performance, an input RC (R = 20Ω, C = 4.7µF) filter is strongly recommended connected to the IC's VIN pin to prevent any interference between the boost converter input and the IC input. The path of the inductor, schottky diode and output capacitor should be kept as short as possible to minimize noise and ringing. Please see the KTC218 evaluation document for detailed PCB layout guidelines.

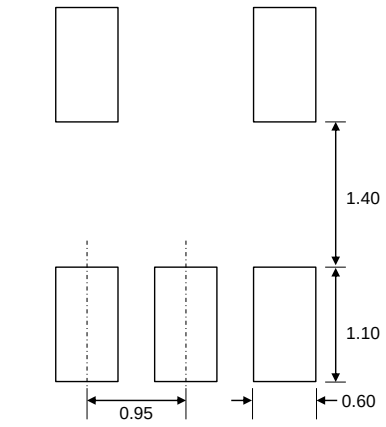
Packaging Information

SOT23-5



Dimension	mm		
	Min.	Typ.	Max.
A	0.90	1.30	1.40
A1	0.00	0.075	0.15
b	0.30	0.35	0.50
c	0.08	0.15	0.22
D	2.90 BSC		
E	2.80 BSC		
E1	1.60 BSC		
e	0.95 BSC		
e1	1.90 BSC		
L	0.30	0.45	0.60
Θ	0°	4°	8°

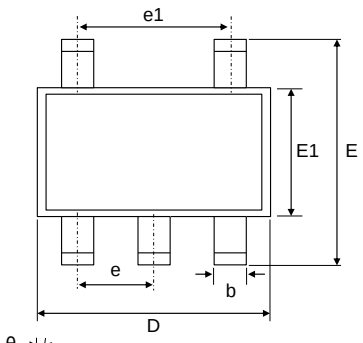
SOT23-5 Recommended Footprint



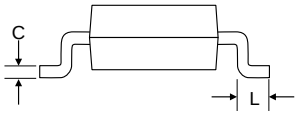
* Dimensions are in millimeters.

TSOT23-5

Top View



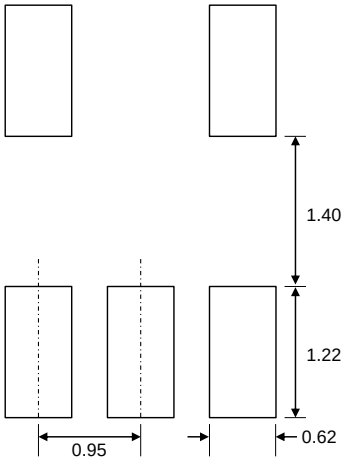
Side View



End View

Dimension	mm		
	Min.	Typ.	Max.
A	0.70	0.80	0.90
A1	0.00	0.05	0.10
b	0.30	0.40	0.50
c	0.10	0.15	0.20
D	2.80	2.90	3.00
E	2.65	2.80	2.95
E1	1.50	1.60	1.70
e		0.95 BSC	
e1		1.9 BSC	
L	0.30		0.60
Θ	4°		8°

TSOT23-5 Recommended Footprint



* Dimensions are in millimeters.

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