

## FEATURES

- Wide Input Voltage Range: 3.5V to 30V
- Low Quiescent Current: 7mA
- Internal 7.5A Switch
- Very Few External Parts Required
- Self-Protected Against Overloads
- Available in Standard and Surface Mount 5-Pin Packages
- Can Be Externally Synchronized (See LT1072 Data Sheet)

## APPLICATIONS

- High Efficiency Boost Converter
- PC Power Supply with Multiple Outputs
- Battery Upconverter
- Negative-to-Positive Converter

### USER NOTE:

This data sheet is only intended to provide specifications, graphs, and a general functional description of the LT1268B/LT1268. Application circuits are included to show the capability of the LT1268B/LT1268. A complete design manual (AN19) should be obtained to assist in developing new designs. This manual contains a comprehensive discussion of both the LT1070 and the external components used with it, as well as complete formulas for calculating the values of these components. The manual can also be used for the LT1268B/LT1268 factoring in the higher switch current rating and higher operating frequency.

## DESCRIPTION

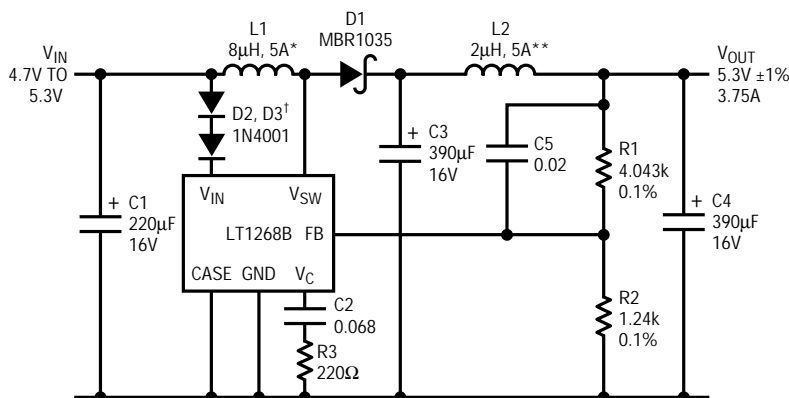
The LT1268B and LT1268 are monolithic high power switching regulators. Identical to the popular LT1070, except for switching frequency (150kHz) and higher switch current, they can be operated in all standard switching configurations including buck, boost, flyback, and inverting. A high current, high efficiency switch is included on the die along with all oscillator, control, and protection circuitry. Integration of all functions allows the LT1268 to be built in standard 5-pin power packages. This makes it extremely easy to use and provides "bust proof" operations similar to that obtained with 3-pin linear regulators.

The LT1268 operate with supply voltages from 3.5V to 30V and draw only 7mA quiescent current. By utilizing current mode switching techniques, it provides excellent AC and DC load and line regulation.

The LT1268 use an adaptive anti-sat switch drive to allow very wide ranging load currents with no loss in efficiency. An externally activated shutdown mode reduces total supply current to 100 $\mu$ A typical for standby operation.

## TYPICAL APPLICATION

Boost Regulator with 5.3V  $\pm$ 1% Output

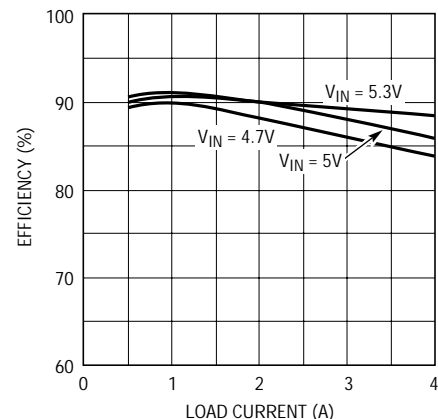


\*COILTRONICS CTX8-5-52

\*\*COILTRONICS CTX2-5-52

†OPTIONAL. D2 AND D3 ARE USED TO INCREASE UNDERVOLTAGE LOCKOUT FROM 2.7V TO  $\approx$ 4V.

Efficiency of 5.3V Boost Converter



LT1268 • TA02

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage .....	30V
Switch Output Voltage .....	60V
Feedback Pin Voltage (Transient, 1ms) .....	±15V
Operating Junction Temperature Range	
Operating .....	0°C to 125°C
Short-Circuit .....	0°C to 140°C
Storage Temperature Range .....	-65°C to 150°C
Lead Temperature (Soldering, 10 sec) .....	300°C

**PACKAGE/ORDER INFORMATION**

<p>Q PACKAGE 5-LEAD DD</p> <p><math>T_{JMAX} = 125^{\circ}C, \theta_{JC} = 2^{\circ}C/W, \theta_{JA} = \text{See Notes 5 and 6}</math></p>	<p>ORDER PART NUMBER</p> <p>LT1268CQ LT1268BCQ</p>
<p>T PACKAGE 5-LEAD TO-220</p> <p><math>T_{JMAX} = 125^{\circ}C, \theta_{JC} = 2^{\circ}C/W, \theta_{JA} = 50^{\circ}C/W</math></p>	<p>ORDER PART NUMBER</p> <p>LT1268CT LT1268BCT</p>

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**ELECTRICAL CHARACTERISTICS**

$V_{IN} = 15V, V_C = 0.5V, V_{FB} = V_{REF}$ , switch pin open, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$V_{REF}$	Reference Voltage Measured at Feedback Pin (Note 4)	LT1268B	1.235	1.244	1.253	V
			1.224	1.244	1.264	V
	Reference Voltage	LT1268	1.224	1.244	1.264	V
			1.214	1.244	1.274	V
$I_B$	Feedback Input Current	$V_{FB} = V_{REF}$		350	750	nA
					1100	nA
$g_m$	Error Amplifier Transconductance	$\Delta I_C = \pm 25\mu A$	3000	4400	6000	$\mu mho$
			2400		7000	$\mu mho$
	Error Amplifier Source or Sink Current	$V_C = 1.5V$	150	200	350	$\mu A$
			120		400	$\mu A$
	Error Amplifier Clamp Voltage	Hi Clamp, $V_{FB} = 1V$	1.80		2.30	V
		Lo Clamp, $V_{FB} = 1.5V$	0.25	0.38	0.52	V
	Reference Voltage Line Regulation	$3V \leq V_{IN} \leq V_{MAX}, V_C = 0.8V$			0.03	%/V
$A_V$	Error Amplifier Voltage Gain	$0.9V \leq V_C \leq 1.4V$	500	800		V/V
				2.8	3.0	V
$I_Q$	Supply Current	$3V \leq V_{IN} \leq V_{MAX}, V_C = 0.6V$		7	10	mA
				0.7	0.9	1.08
	Control Pin Threshold	Duty Cycle = 0	0.5		1.25	V
				60	75	V
$B_V$	Output Switch Breakdown Voltage	$3V \leq V_{IN} \leq V_{MAX}, I_{SW} = 1.5mA$	60	75		V
$V_{SAT}$	Output Switch-ON Resistance (Note 1, 3)	$T_J \leq 100^{\circ}C$ $T_J \leq 125^{\circ}C$		0.12	0.18	$\Omega$
					0.22	$\Omega$
	Control Voltage to Switch Current Transconductance			12		A/V
$I_{LIM}$	Switch Current Limit (Note 3, 6)	Duty Cycle = 50%, $T_J \leq 100^{\circ}C$	7.50		15	A
		Duty Cycle = 65%, $T_J \leq 100^{\circ}C$	6.50		14	A

# ELECTRICAL CHARACTERISTICS

$V_{IN} = 15V$ ,  $V_C = 0.5V$ ,  $V_{FB} = V_{REF}$ , switch pin open, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$\frac{\Delta I_{IN}}{\Delta I_{SW}}$	Supply Current Increase During Switch-ON Time			25	45	mA/A
f	Switching Frequency		120	150	180	kHz
			120		180	kHz
DC <sub>MAX</sub>	Maximum Switch Duty Cycle		65	85	92	%
	Shutdown Mode Supply Current	$3V \leq V_{IN} \leq V_{MAX}$ , $V_C = 0.05V$		100	500	$\mu A$
	Shutdown Mode Threshold Voltage	$3V \leq V_{IN} \leq V_{MAX}$	100	150	250	mV
			50		300	mV

The ● denotes specifications which apply over the full operating temperature range.

**Note 1:** Measured with  $V_C$  in hi clamp,  $V_{FB} = 0.8V$ .

**Note 2:** For duty cycles (DC) between 50% and 65%, minimum guaranteed switch current is given by  $I_{LIM} = 6.25 (1.7 - DC)$ .

**Note 3:** Minimum current limit is reduced by 0.5A at 125°C. 100°C test limits are guaranteed by correlation to 125°C tests.

**Note 4:** LT1268B reference voltage is specified at  $\pm 9mV$  to guarantee  $\pm 1\%$  output voltage accuracy when 0.1% external resistors are used to set output voltage. To maintain output accuracy under load, load current should be taken from the case and the ground pin should be connected separately to output ground. See AN19 for details.

**Note 5:** The Q package is intended for surface mount without a separate heat sink. See graph for thermal resistance as a function of the mounting area. This curve assumes no other heat dissipators adjacent to package.

**Note 6:** Maximum switch current may be limited by package power dissipation, especially for the surface mount (Q) package. This package

has a thermal resistance of 20°C/W to 50°C/W (see graph). The following formula will allow an estimate of maximum continuous switch current as a function of power loss and duty cycle. See AN19 for more details.

$$I_{MAX} = \sqrt{\frac{P}{R_{SW} \times DC}}$$

P = Power dissipation due to switch current

$R_{SW}$  = Switch-ON resistance  $\approx 0.15\Omega$

DC = Switch duty cycle

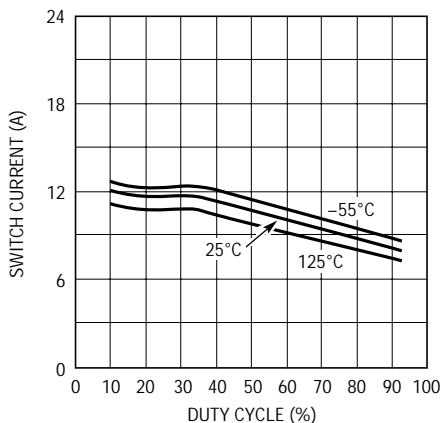
In a typical application where thermal resistance is 30°C/W, maximum power might be limited to 2W and power allocated to switch loss is 1.5W. For a duty cycle of 40%, this yields

$$I_{MAX} = \sqrt{\frac{1.5}{0.15 \times 0.4}} = 5A$$

Obviously, a combination of high thermal resistance and high duty cycle may restrict switch current to a value well below the 7.5A electrical limit.

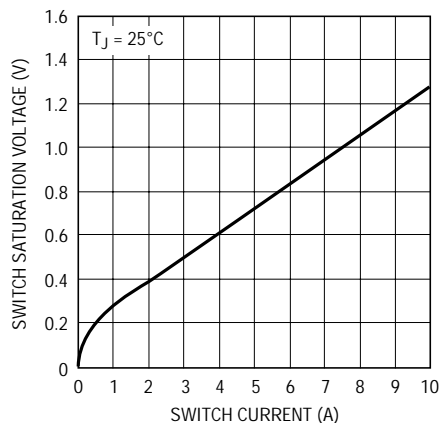
# TYPICAL PERFORMANCE CHARACTERISTICS

Switch Current Limit vs Duty Cycle



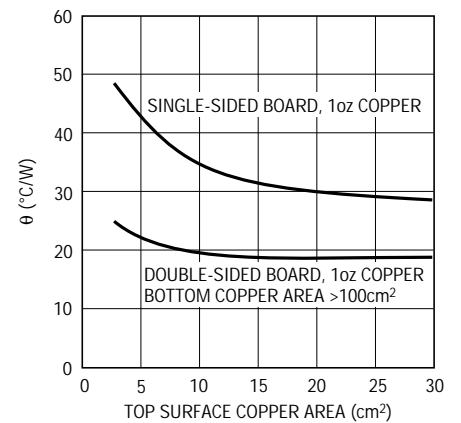
LT1268 - TPC01

Switch Saturation Voltage



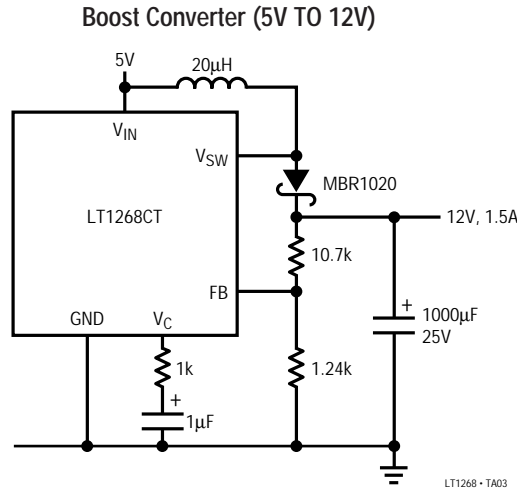
LT1268 - TPC02

Q Package Thermal Resistance



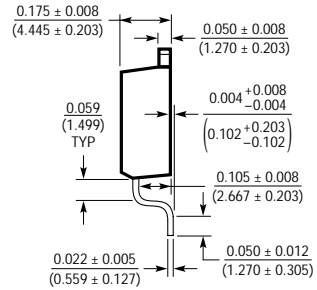
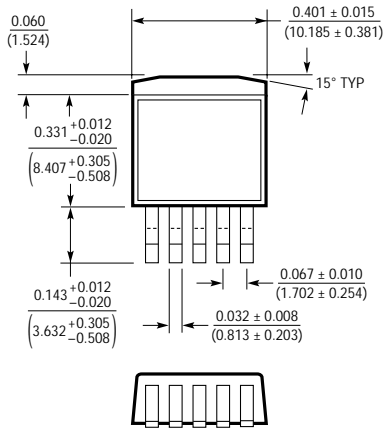
LT1268 - 603

TYPICAL APPLICATION

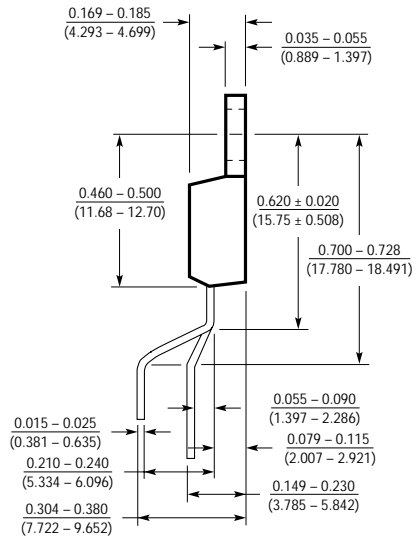
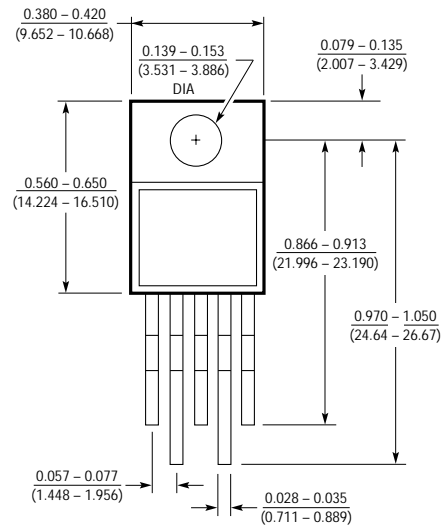


**PACKAGE DESCRIPTION** Dimensions in inches (millimeters) unless otherwise noted.

**Q Package  
5-Lead DD**



**T Package  
5-Lead TO-220**



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