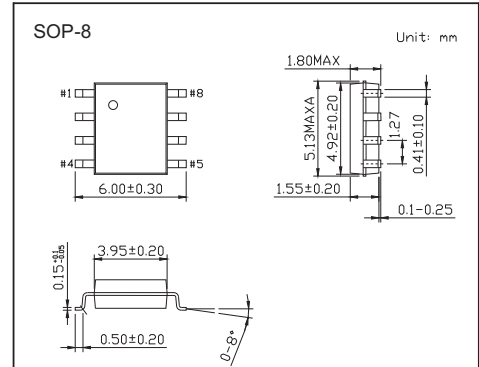


## 3A, 23V, 340KHz Synchronous Rectified Step-Down Converter

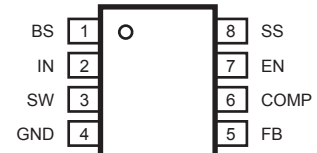
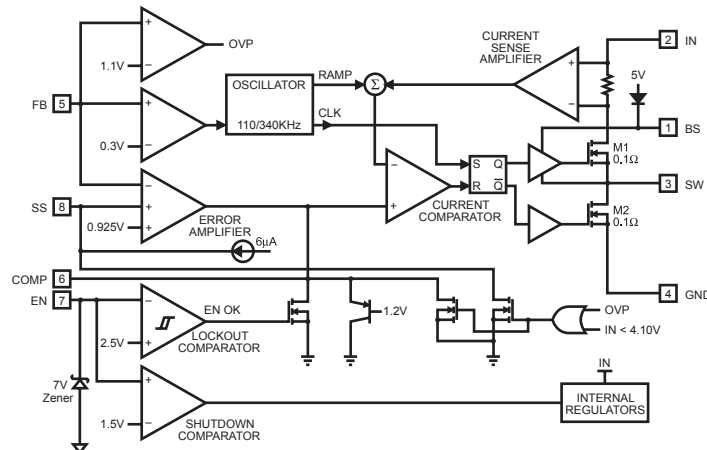
### MP2307

#### Features

- 3A Continuous Output Current, 4A Peak Output Current
- Wide 4.75V to 23V Operating Input Range
- Integrated 100mΩ Power MOSFET Switches
- Output Adjustable from 0.925V to 20V
- Up to 95% Efficiency
- Programmable Soft-Start
- Stable with Low ESR Ceramic Output Capacitors
- Fixed 340KHz Frequency
- Cycle-by-Cycle Over Current Protection
- Input Under Voltage Lockout



#### Functional Block Diagram



#### Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Input Voltage	$V_{in}$	-0.3 to 26	V
Switch Voltage	$V_{sw}$	-1 to $V_{in} + 0.3$	V
Boot Strap Voltage	$V_{bs}$	$V_{sw} - 0.3$ to $V_{sw} + 6$	V
All Other Pins		-0.3 to 6V	V
Power Dissipation	$P_D$	2.5	mW
Thermal Resistance	$R_{\theta JA}$	50	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to 150	$^\circ\text{C}$
Lead Temperature	$T_L$	260	$^\circ\text{C}$

#### Recommended Operating Conditions

Input Voltage	$V_{in}$	4.75 to 23	V
Output Voltage	$V_{out}$	0.925 to 20	V
Operating Temperature	$T_A$	-40 to 85	$^\circ\text{C}$

## MP2307

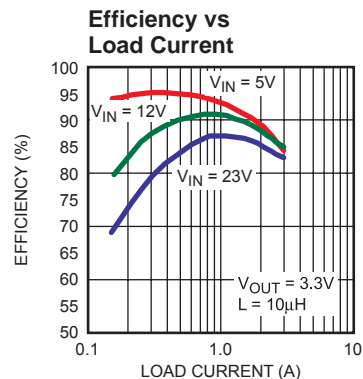
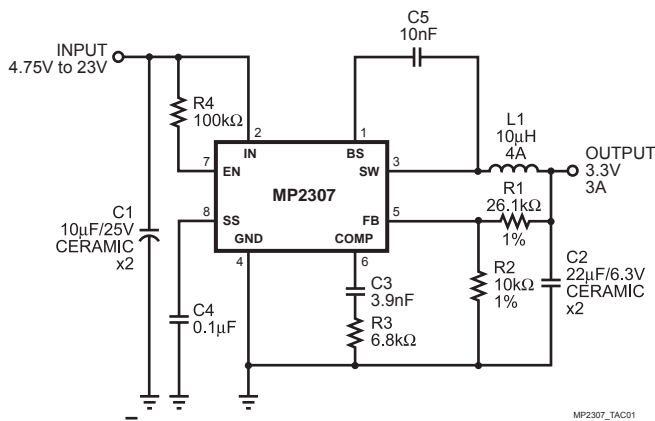
Electrical Characteristics (Ta = 25°C, VIN=12V, unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Units
Shutdown Supply Current		V <sub>EN</sub> = 0V		0.3	3.0	μA
Supply Current		V <sub>EN</sub> = 2.0V, V <sub>FB</sub> = 1.0V		1.3	1.5	mA
Feedback Voltage	V <sub>FB</sub>	4.75V ≤ V <sub>IN</sub> ≤ 23V	0.900	0.925	0.950	V
Feedback Overvoltage Threshold				1.1		V
Error Amplifier Voltage Gain <sup>(4)</sup>	A <sub>EA</sub>			400		V/V
Error Amplifier Transconductance	G <sub>EA</sub>	ΔI <sub>C</sub> = ±10μA		820		μA/V
High-Side Switch On-Resistance <sup>(4)</sup>	R <sub>DS(ON)1</sub>			100		mΩ
Low-Side Switch On-Resistance <sup>(4)</sup>	R <sub>DS(ON)2</sub>			100		mΩ
High-Side Switch Leakage Current		V <sub>EN</sub> = 0V, V <sub>SW</sub> = 0V		0	10	μA
Upper Switch Current Limit		Minimum Duty Cycle	4.0	5.8		A
Lower Switch Current Limit		From Drain to Source		0.9		A
COMP to Current Sense Transconductance	G <sub>CS</sub>			5.2		A/V
Oscillation Frequency	F <sub>osc1</sub>		300	340	380	KHz
Short Circuit Oscillation Frequency	F <sub>osc2</sub>	V <sub>FB</sub> = 0V		110		KHz
Maximum Duty Cycle	D <sub>MAX</sub>	V <sub>FB</sub> = 1.0V		90		%
Minimum On Time <sup>(4)</sup>	T <sub>ON</sub>			220		ns
EN Shutdown Threshold Voltage		V <sub>EN</sub> Rising	1.1	1.5	2.0	V
EN Shutdown Threshold Voltage Hysteresis				220		mV
EN Lockout Threshold Voltage			2.2	2.5	2.7	V
EN Lockout Hysteresis				210		mV
Input Under Voltage Lockout Threshold		V <sub>IN</sub> Rising	3.80	4.05	4.40	V
Input Under Voltage Lockout Threshold Hysteresis				210		mV
Soft-Start Current		V <sub>SS</sub> = 0V		6		μA
Soft-Start Period		C <sub>SS</sub> = 0.1μF		15		ms
Thermal Shutdown <sup>(1)</sup>				160		°C

**Note:**

1) Guaranteed by design, not tested.

## Typical Characteristics

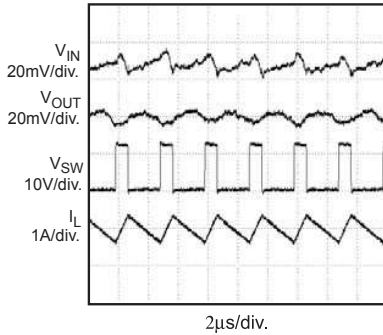


# MP2307

## Typical Characteristics

### Steady State Test Waveforms

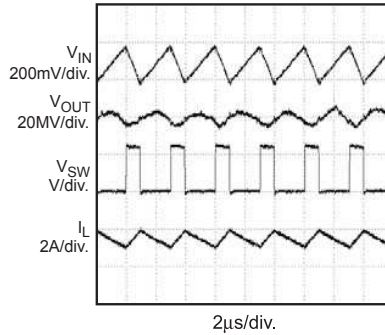
$V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 0A$



MP2307-TPC01

### Steady State Test Waveforms

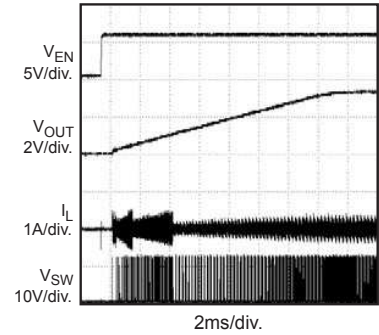
$V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 3A$



MP2307-TPC02

### Startup through Enable Waveforms

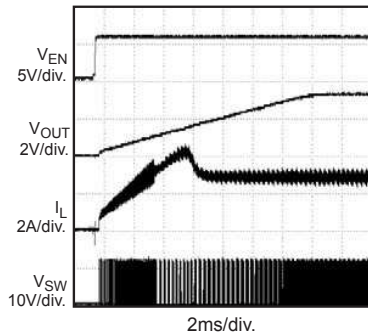
$V_{IN} = 12V, V_{OUT} = 3.3V, \text{No Load}$



MP2307-TPC03

### Startup Through Enable Waveforms

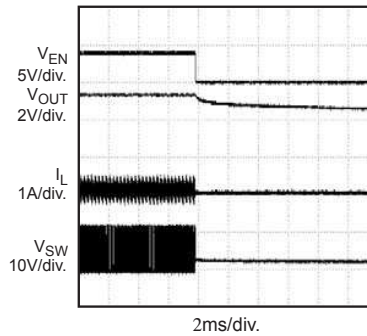
$V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 3A \text{ (Resistance Load)}$



MP2307-TPC04

### Shutdown Through Enable Waveforms

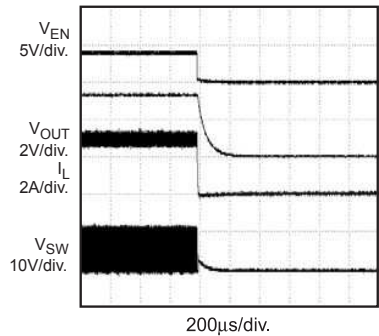
$V_{IN} = 12V, V_{OUT} = 3.3V, \text{No Load}$



MP2307-TPC05

### Shutdown Through Enable Waveforms

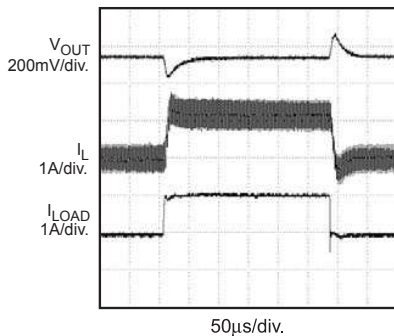
$V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 3A \text{ (Resistance Load)}$



MP2307-TPC06

### Load Transient Test Waveforms

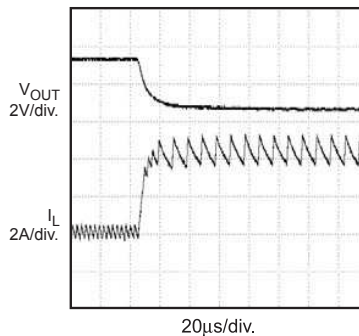
$V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 1A \text{ to } 2A \text{ step}$



MP2307-TPC07

### Short Circuit Test Waveforms

$V_{IN} = 12V, V_{OUT} = 3.3V$



MP2307-TPC08

### Short Circuit Recovery Waveforms

$V_{IN} = 12V, V_{OUT} = 3.3V$

