

LM2853

3A 550 kHz Synchronous SIMPLE SWITCHER® Buck Regulator

General Description

The LM2853 synchronous SIMPLE SWITCHER® buck regulator is a 550 kHz step-down switching voltage regulator capable of driving up to a 3A load with excellent line and load regulation. The LM2853 accepts an input voltage between 3.0V and 5.5V and delivers a customizable output voltage that is factory programmable from 0.8V to 3.3V in 100mV increments. Internal type-three compensation enables a low component count solution and greatly simplifies external component selection. The exposed-pad TSSOP-14 package enhances the thermal performance of the LM2853.

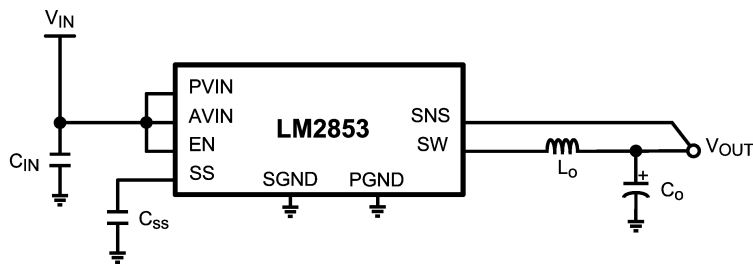
Features

- Input voltage range of 3.0V to 5.5V
- Factory EEPROM set output voltages from 0.8V to 3.3V in 100 mV increments
- Maximum load current of 3A
- Voltage Mode Control
- Internal type-three compensation
- Switching frequency of 550 kHz
- Low standby current of 12 μ A
- Internal 40 m Ω MOSFET switches
- Standard voltage options
0.8/1.0/1.2/1.5/1.8/2.5/3.0/3.3 volts
- Exposed pad TSSOP-14 package

Applications

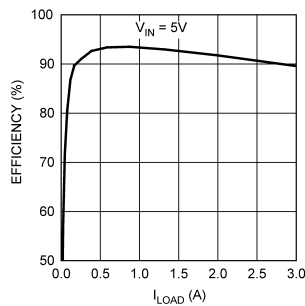
- Low voltage point of load regulation
- Local solution for FPGA/DSP/ASIC core power
- Broadband networking and communications infrastructure

Typical Application Circuit



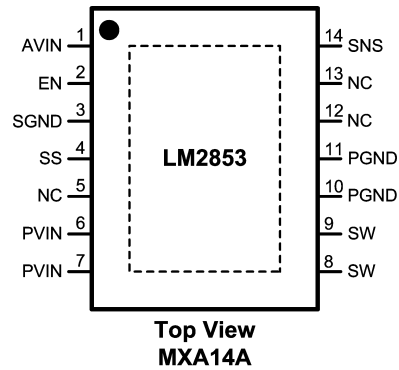
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Efficiency vs Load Current ($V_{OUT} = 3.3V$)



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Connection Diagram



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Ordering Information

Order Number	Voltage Option	Package Marking	Package Type	Package Drawing	Supplied As
LM2853MH-0.8	0.8	LM2853-0.8	TSSOP-14 exposed pad	MXA14A	94 Units, Rail
LM2853MHX-0.8					2500 Units, Tape and Reel
LM2853MH-1.0	1.0	LM2853-1.0			94 Units, Rail
LM2853MHX-1.0					2500 Units, Tape and Reel
LM2853MH-1.2	1.2	LM2853-1.2			94 Units, Rail
LM2853MHX-1.2					2500 Units, Tape and Reel
LM2853MH-1.5	1.5	LM2853-1.5			94 Units, Rail
LM2853MHX-1.5					2500 Units, Tape and Reel
LM2853MH-1.8	1.8	LM2853-1.8			94 Units, Rail
LM2853MHX-1.8					2500 Units, Tape and Reel
LM2853MH-2.5	2.5	LM2853-2.5			94 Units, Rail
LM2853MHX-2.5					2500 Units, Tape and Reel
LM2853MH-3.0	3.0	LM2853-3.0			94 Units, Rail
LM2853MHX-3.0					2500 Units, Tape and Reel
LM2853MH-3.3	3.3	LM2853-3.3	94 Units, Rail		
LM2853MHX-3.3			2500 Units, Tape and Reel		

Note: Contact factory for other voltage options.

Pin Descriptions

Pin #	Name	Function
1	AVIN	Input Voltage for Control Circuitry.
2	EN	Enable.
3	SGND	Low noise ground.
4	SS	Soft-Start Pin.
5	NC	No Connect. This pin must be tied to ground.
6,7	PVIN	Input Voltage for Power Circuitry.
8,9	SW	Switch Pin.
10,11	PGND	Power Ground.
12,13	NC	No-Connect. These pins must be tied to ground.
14	SNS	Output Voltage Sense Pin.
Exposed Pad	EP	The exposed pad is internally connected to GND, but it cannot be used as the primary GND connection. The exposed pad should be soldered to an external GND plane.

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

AVIN, PVIN, EN, SNS, SW, SS	-0.3V to 6.0V
ESD Susceptibility (Note 2)	2kV
Power Dissipation	Internally Limited
Storage Temperature Range	-65°C to +150°C
Maximum Junction Temp.	150°C

14-Pin Exposed Pad TSSOP Package

Infrared (15 sec)	220°C
Vapor Phase (60 sec)	215°C
Soldering (10 sec)	260°C

Operating Ratings (Note 1)

PVIN to GND	1.5V to 5.5V
AVIN to GND	3.0V to 5.5V
Junction Temperature	-40°C to +125°C

Electrical Characteristics

Specifications with standard typeface are for $T_J = 25^\circ\text{C}$, and those in bold face type apply over the full Junction Temperature Range (-40°C to 125°C). Minimum and Maximum limits are guaranteed through test, design or statistical correlation. Typical values represent the most likely parametric norm at $T_J = 25^\circ\text{C}$ and are provided for reference purposes only. Unless otherwise specified AVIN = PVIN = 5V.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
SYSTEM PARAMETERS						
V_{OUT}	Voltage Tolerance (Note 3)	$V_{OUT} = 0.8\text{V}$ option	0.782	0.8	0.818	V
		$V_{OUT} = 1.0\text{V}$ option	0.9775	1.0	1.0225	
		$V_{OUT} = 1.2\text{V}$ option	1.1730	1.2	1.227	
		$V_{OUT} = 1.5\text{V}$ option	1.4663	1.5	1.5337	
		$V_{OUT} = 1.8\text{V}$ option	1.7595	1.8	1.8405	
		$V_{OUT} = 2.5\text{V}$ option	2.4437	2.5	2.5563	
		$V_{OUT} = 3.0\text{V}$ option	2.9325	3.0	3.0675	
$\Delta V_{OUT}/\Delta AVIN$	Line Regulation (Note 3)	$V_{OUT} = 0.8\text{V}, 1.0\text{V}, 1.2\text{V}, 1.5\text{V}, 1.8\text{V}$ or 2.5V $3.0\text{V} \leq AVIN \leq 5.5\text{V}$		0.2	1.1	%
		$V_{OUT} = 3.0\text{V}$ or 3.3V $3.5\text{V} \leq AVIN \leq 5.5\text{V}$		0.2	1.1	%
$\Delta V_{OUT}/\Delta I_O$	Load Regulation	Normal operation		2		mV/A
V_{ON}	UVLO Threshold (AVIN)	Rising		2.47	3.0	V
		Falling Hysteresis	50	155	260	mV
$R_{DS(ON)-P}$	PFET On Resistance	$I_{sw} = 3\text{A}$		40	120	m Ω
$R_{DS(ON)-N}$	NFET On Resistance	$I_{sw} = 3\text{A}$		32	100	m Ω
R_{SS}	Soft-Start Resistance			450		k Ω
I_{CL}	Peak Current Limit Threshold		3.6	5		A
I_Q	Operating Current	Non-switching		0.85	2	mA
I_{SD}	Shutdown Quiescent Current	EN = 0V		12	50	μA
R_{SNS}	Sense Pin Resistance			432		k Ω
PWM						
f_{osc}	Switching Frequency	.	325	550	725	kHz
D_{range}	Duty Cycle Range		0		100	%
ENABLE CONTROL (Note 4)						
V_{IH}	EN Pin Minimum High Input		75			% of AVIN
V_{IL}	EN Pin Maximum Low Input				25	% of AVIN
I_{EN}	EN Pin Pullup Current	EN = 0V		1.5		μA

Electrical Characteristics Specifications with standard typeface are for $T_J = 25^\circ\text{C}$, and those in bold face type apply over the full Junction Temperature Range (-40°C to 125°C). Minimum and Maximum limits are guaranteed through test, design or statistical correlation. Typical values represent the most likely parametric norm at $T_J = 25^\circ\text{C}$ and are provided for reference purposes only. Unless otherwise specified $AVIN = PVIN = 5V$. (Continued)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
THERMAL CONTROLS						
T_{SD}	Thermal Shutdown Threshold			165		$^\circ\text{C}$
T_{SD-HYS}	Hysteresis for Thermal Shutdown			10		$^\circ\text{C}$
THERMAL RESISTANCE						
θ_{JA}	Junction to Ambient	MXA14A		38		$^\circ\text{C/W}$

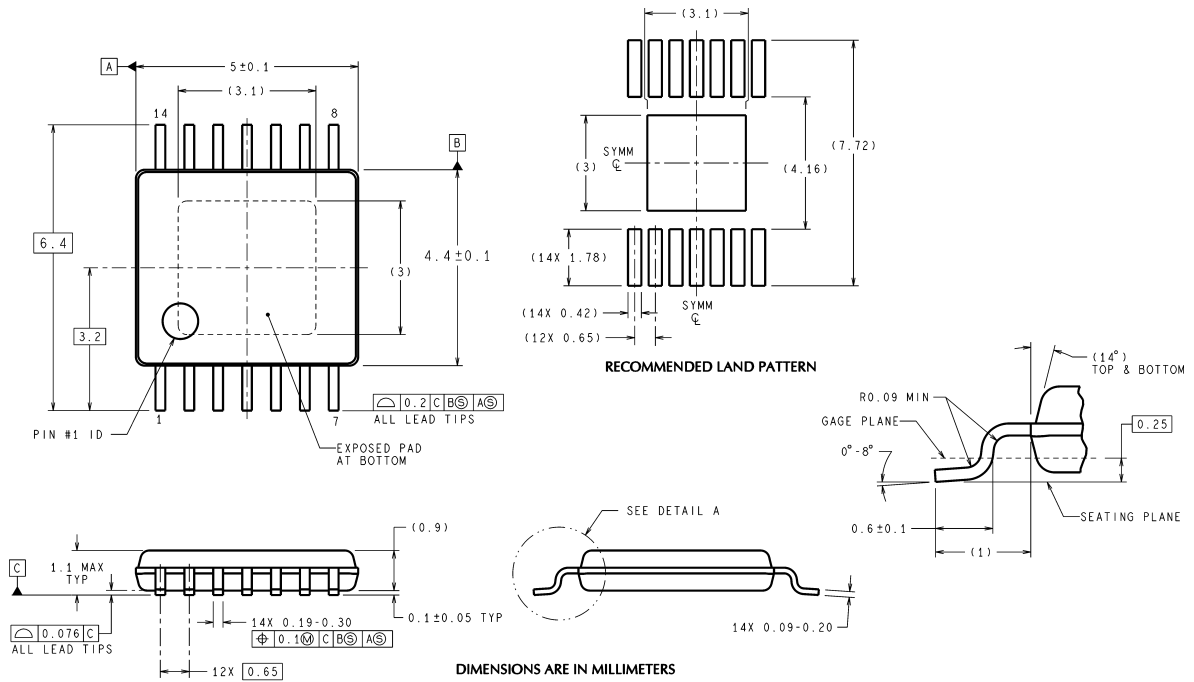
Note 1: Absolute maximum ratings indicate limits beyond which damage to the device may occur. Operating Range indicates conditions for which the device is intended to be functional, but does not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics.

Note 2: The human body model is a 100 pF capacitor discharged through a 1.5 k Ω resistor into each pin. Test Method is per JESD22-A114.

Note 3: V_{OUT} measured in a non-switching, closed-loop configuration at the SNS pin.

Note 4: The enable pin is internally pulled up, so the LM2853 is automatically enabled unless an external enable voltage is applied.

Physical Dimensions inches (millimeters) unless otherwise noted



MXA14A (Rev A)

14-Lead ETSSOP Package NS Package Number MXA14A

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