SY8303A

High Efficiency Fast Response, 3A, 40V Input Synchronous Step Down Regulator

General Description

The SY8303A develops a high efficiency synchronous step-down DC/DC converter capable of delivering 3A load current. The SY8303A operates over a wide input voltage range from 4.5V to 40V and integrates main switch and synchronous switch with very low $R_{DS(ON)}$ to minimize the conduction loss.

The SY8303A adopts peak current control scheme. The switching frequency is adjustable from 500 kHz to 2.5MHz using an external resistor. The device also features ultra low quiescent operating to achieve high efficiency under light load. And the internal soft-start limits inrush current during power on.

SY8303A is available in TSOT23-8 package.

Ordering Information

SY8303 □(□□)□
- Temperature Code
- Package Code
- Optional Spec Code

Ordering Number	Package type	Note
SY8303AAIC	TSOT23-8	--

Features

- Low $R_{DS(ON)}$ for Internal Switches (Top/Bottom): 110/70 mΩ
- 4.5-40V Input Voltage Range
- Internal Compensation
- Internal 1ms Soft-start Limits the Inrush Current
- Adjustable Switching Frequency Range: 500kHz to 2.5MHz
- 3A Output Current Capability
- 1.5% 0.6V Reference
- Low Quiescent Current
- Cycle-by-cycle Peak Current Limitation
- Short Circuit Protection
- Thermal Shutdown and Auto Recovery
- RoHS Compliant and Halogen Free
- Compact Package: TSOT23-8

Applications

- LCD-TV
- SetTop Box
- Notebook
- Storage
- High Power AP Router
- Networking

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Typical Applications

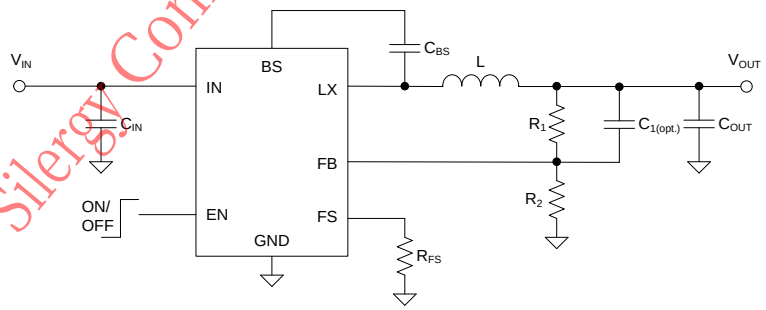


Figure 1. Schematic Diagram

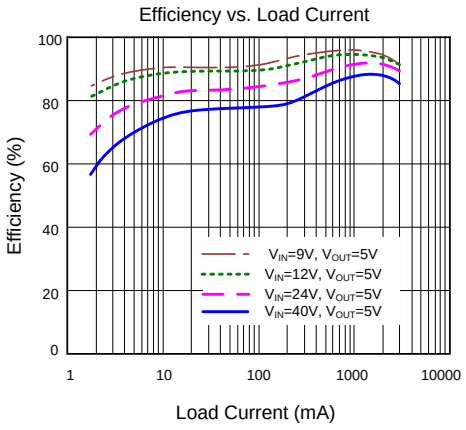
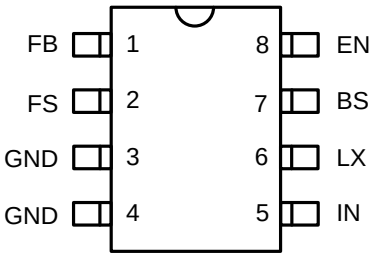


Figure 2. Efficiency vs. Load Current

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Pinout (top view)

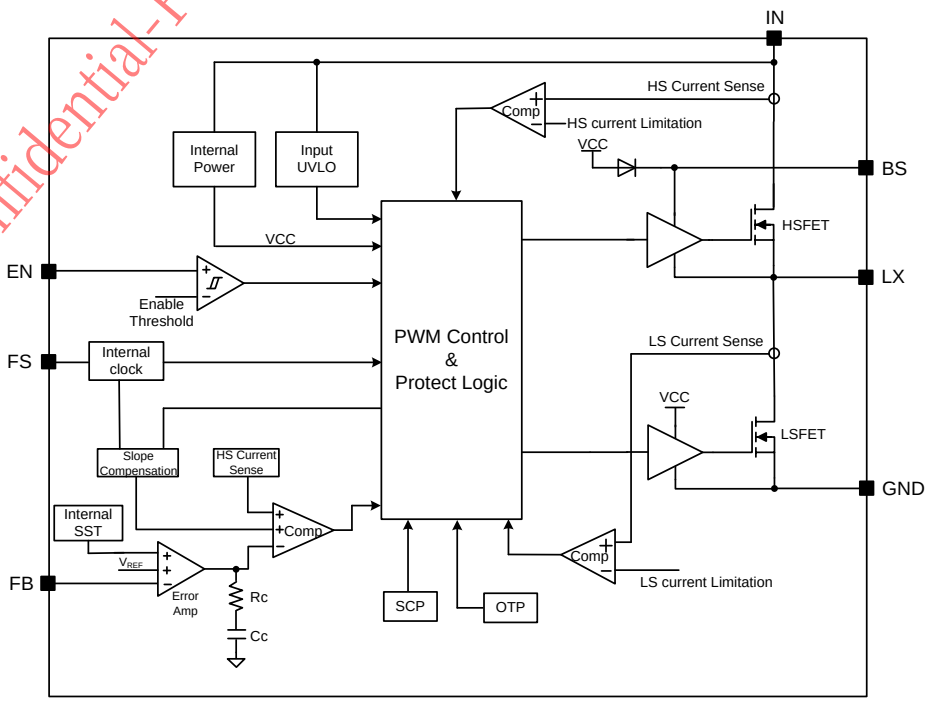


Top Mark: **bQ*xyz*** (Device code: bQ, ***x=year code, y=week code, z= lot number code***)

Pin Name	Pin Number	Pin Description
FB	1	Output feedback pin. Connect this pin to the center point of the output resistor divider (as shown in Figure 1) to program the output voltage: V_{OUT}=0.6*(1+R1/R2)
FS	2	Frequency programming pin. Connect a resistor to ground to program a switching frequency between 500kHz to 2.5MHz. The switching frequency equals to: Fsw(kHz) =$10^5/R_{FS}(k\Omega)$.
EN	8	Enable control. Pull high to turn on. Do not float.
GND	3,4	Ground pin.
IN	5	Input pin. Decouple this pin to GND pin with at least 4.7uF ceramic cap.
LX	6	Inductor pin. Connect this pin to the switching node of inductor.
BS	7	Boot-strap pin. Supply high side gate driver. Decouple this pin to LX pin with 100nF ceramic cap.

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Block Diagram



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Absolute Maximum Ratings (Note 1)

IN to GND ---------- -0.3V to 40V
LX, FB, EN, FS to GND---------- -0.3V to 40V
BS-LX ---------- 4V
Power Dissipation, PD @ T_A = 25℃ TSOT23-8 ---------- 2W
Package Thermal Resistance (Note 2)
θ_{JA} ---------- 60.2℃/W
θ_{JC} ---------- 11.2℃/W
Junction Temperature Range ---------- 150℃
Ambient Temperature Range ---------- -40℃ to 105℃
Lead Temperature (Soldering, 10 sec.) ---------- 260℃
Storage Temperature Range ---------- -65℃ to 150℃

Recommended Operating Conditions (Note 3)

Supply Input Voltage ---------- 4.5V to 40V

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Electrical Characteristics

(V_{IN} = 12V, V_{OUT} = 5V, C_{OUT} = 47uF, T_A = 25℃, I_{OUT} = 1A unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		4.5		40	V
Quiescent Current	I_Q	I_{OUT}=0, V_{FB}=V_{REF}×105%			19	μA
Shutdown Current	I_{SHDN}	EN=0		1	2	μA
Feedback Reference Voltage	V_{REF}		0.591	0.6	0.609	V
FB Input Current	I_{FB}	V_{FB}=V_{CC}	-50		50	nA
Top FET RON	$R_{DS(ON)1}$			110		mΩ
Bottom FET RON	$R_{DS(ON)2}$			70		mΩ
Top FET Current Limit	$I_{LIM,TOP}$		4		6.8	A
EN Low Threshold	V_{ENL}		0.5			V
EN High Threshold	V_{ENH}				1.5	V
Input UVLO Threshold	V_{UVLO}				4.35	V
UVLO Hysteresis	V_{HYS}			0.3		V
Oscillator Frequency Program Range	F_{OSC}	R_{FS}=40k~200k	0.5		2.5	MHz
Oscillator Frequency Accuracy		R_{FS}=200k	425	500	575	kHz
Soft-start Time	t_{SS}			1		ms
Min ON Time				80		ns
Min OFF Time				120		ns
Thermal Shutdown Temperature	T_{SD}			150		℃
Thermal Shutdown Hysteresis	$T_{SD,HYS}$			15		℃

Note 1: Stresses beyond the "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

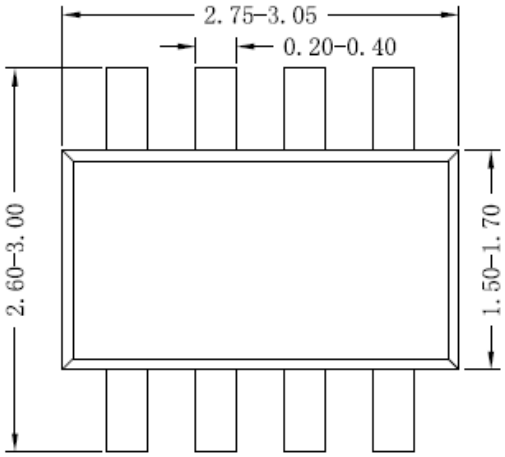
Note 2: θ_{JA} is measured in the natural convection at T_A = 25℃ on a low effective 4-layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Pin 2 of TSOT-23-8 packages is the case position for θ_{JC} measurement.

Note 3: The device is not guaranteed to function outside its operating conditions.

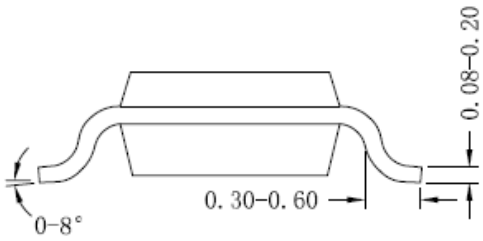
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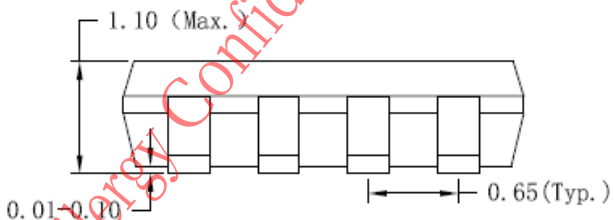
TSOT23-8 Package Outline Drawing



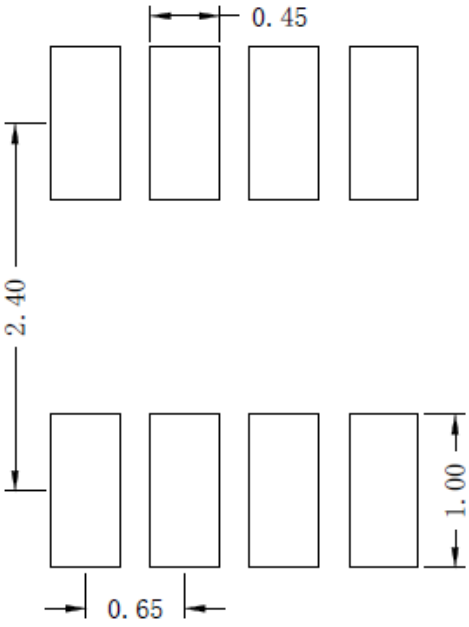
Top view



Side view A



Side view B



Recommended PCB layout
(Reference only)

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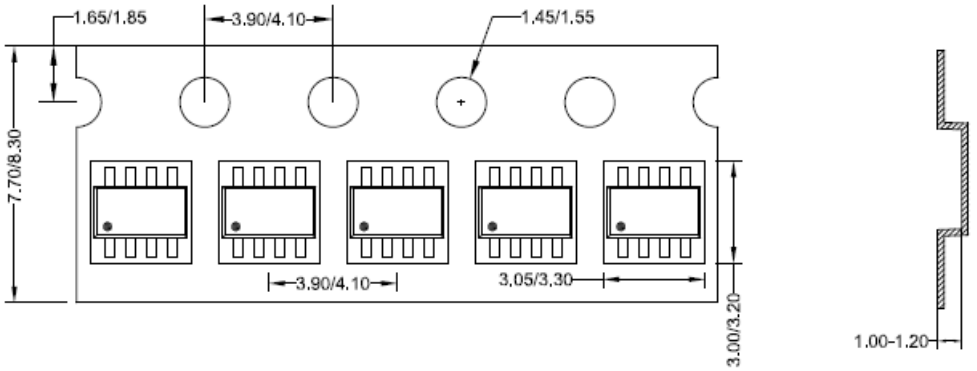
Notes: **All dimension in millimeter and exclude mold flash & metal burr**

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Taping & Reel Specification

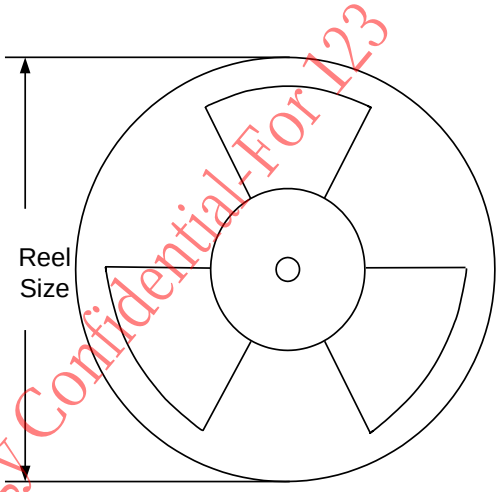
1. Taping orientation

TSOT23-8



Feeding direction ⟶

2. Carrier Tape & Reel specification for packages



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Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Trailer * length(mm)	Leader * length (mm)	Qty per reel (pcs)
TSOT23-8	8	4	7	400	160	3000

3. Others: NA

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