OR1501SBC

High Efficiency, 1A 40V Input Synchronous Step Down Regulator

General Description

The OR1501SBC develops a high efficiency synchronous step-down DC/DC converter capable of delivering 1A load current. The SY8301 operates over a wide input voltage range from 4.5V to 40V and integrates main switch and synchronous switch with low $R_{DS(ON)}$ to minimize the conduction loss. The OR1501SBC adopts peak current control scheme. The switching frequency is 2MHz. Low output voltage

ripple and small external inductor and capacitor sizes are achieved with 2MHz switching frequency.

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.

Ordering Information

OR1501□ □ □)
- Temperature Code
- Package Code
- Optional Spec Code

Ordering Number	Package type	Note
OR1501SBC	SOT23-6	--

Features

- Low $R_{DS(ON)}$ for Internal Switches (Top/Bottom):380mΩ/180mΩ
- 4.5-40V Input Voltage Range
- 1A Output Current Capability
- 2MHz Fixed Switching Frequency
- 0.8V±1.0% Reference Voltage
- Low Quiescent Current
- Internal Soft-start Limits the Inrush Current
- Hic-cup Mode Output Short Circuit Protection
- Thermal Shutdown and Auto Recovery
- Compact Package: SOT23-6

Applications

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

Typical Applications

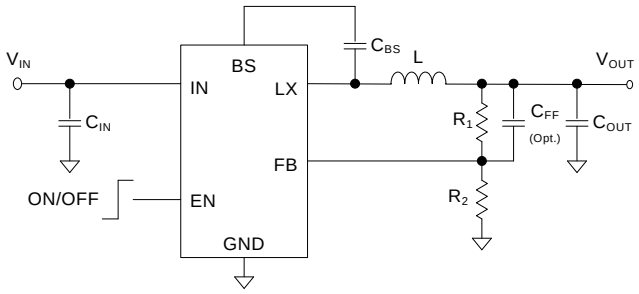


Figure1. Schematic Diagram

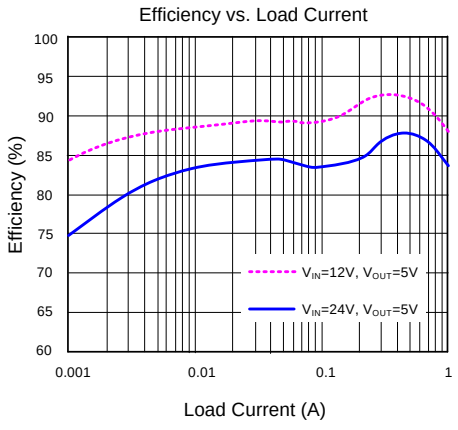
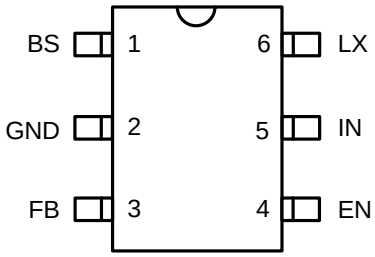


Figure2. Efficiency

Pinout (top view)



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

Pin Name	Pin Number	Pin Description
BS	1	Boot-strap pin. Supply high side gate driver. Connect a 0.1μF ceramic capacitor between the BS and the LX pin .
GND	2	Ground pin.
FB	3	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}=0.8× (1+R1/R2)
EN	4	Enable control pin. Pulling this pin high to turn on the IC. Do not leave this pin floating.
IN	5	Input pin. Decouple this pin to the GND pin with at least a 1μF ceramic capacitor.
LX	6	Inductor pin. Connect this pin to the switching node of the inductor.

Block Diagram

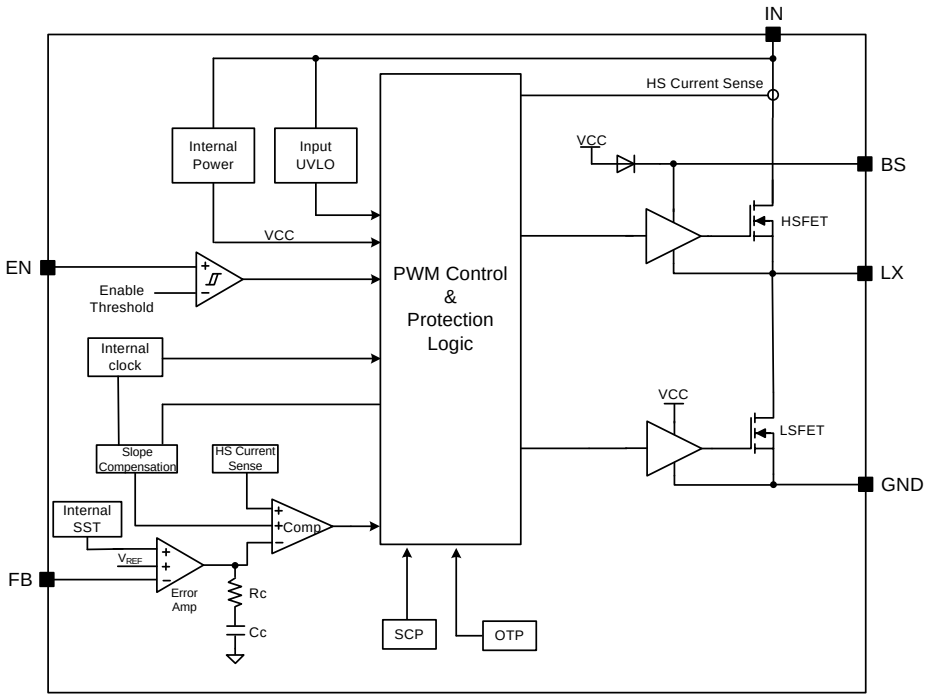


Figure3. Block Diagram

Absolute Maximum Ratings (Note 1)

Supply Input Voltage ---------- -0.3 to 40V
LX, FB, EN Voltage ---------- -0.3 to 40V
BS-LX Voltage---------- -0.3 to 4V
Power Dissipation, P_D @ T_A = 25℃ SOT23-6---------- 0.4W
Package Thermal Resistance (Note 2)
θ_{JA} ----------100℃/W
θ_{JC} ---------- 30℃/W
Junction Temperature Range ---------- -40℃ to 150℃
Lead Temperature (Soldering, 10 sec.) ---------- 260℃
Storage Temperature Range ---------- -65℃ to 150℃
Dynamic LX Voltage in 10ns Duration ---------- IN+3V to GND -5V

Recommended Operating Conditions (Note 3)

Supply Input Voltage ---------- 4.5V to 40V
Junction Temperature Range ---------- -40℃ to 125℃
Ambient Temperature Range ---------- -40℃ to 85℃

Electrical Characteristics

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

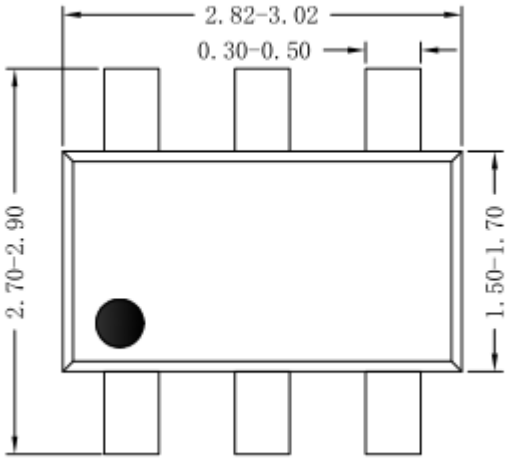
Parameter	symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		4.5		40	V
Input UVLO Threshold	V_{UVLO_R}		3.6	4	4.4	V
Input UVLO Hysteresis	V_{HYS}			0.6		V
Quiescent Current	I_Q	I_{OUT}=0,V_{FB}=V_{REF}×105%	12	22	28	μA
Shutdown Current	I_{SHDN}	EN=0		1	2	μA
Feedback Reference Voltage	V_{REF}		0.792	0.8	0.808	V
FB Input Current	I_{FB}	V_{FB}=3.3V	-50		50	nA
Top FET RON	$R_{DS(ON),TOP}$			380		mΩ
Top FET Peak Current Limit	$I_{LIM,TOP}$		1.6		2.5	A
Bottom FET RON	$R_{DS(ON),BOT}$			180		mΩ
EN Rising Threshold	V_{ENH}		1.4			V
EN Falling Threshold	V_{ENL}				1	V
Soft-start Time	t_{SS}			1		ms
Switching Frequency	f_{SW}		1.6	2	2.4	MHz
Output UVP Threshold	V_{UVP}			50		%V_{REF}
Output UVP Wait Time	t_{WAIT}			60		μs
Min ON Time	t_{ON}			80		ns
Min OFF Time	t_{OFF}			100		ns
Thermal Shutdown Temperature	T_{SD}			150		℃
Thermal Shutdown Hysteresis	T_{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.

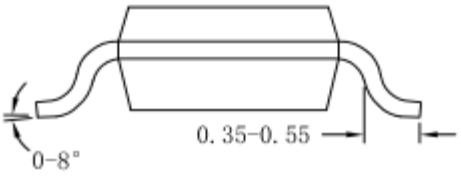
Note 2: Package thermal resistance is measured in the natural convection at T_A = 25℃ on a two-layer Orange Evaluation Board.

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

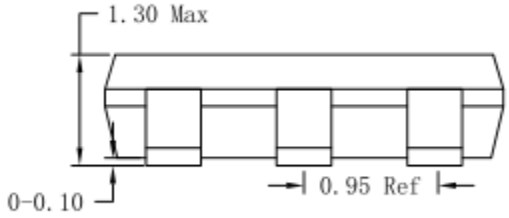
SOT23-6 Package Outline & PCB Layout



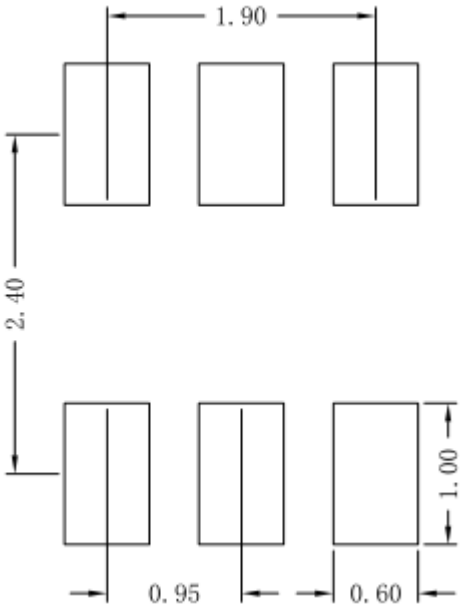
Top View



Side View



Side View



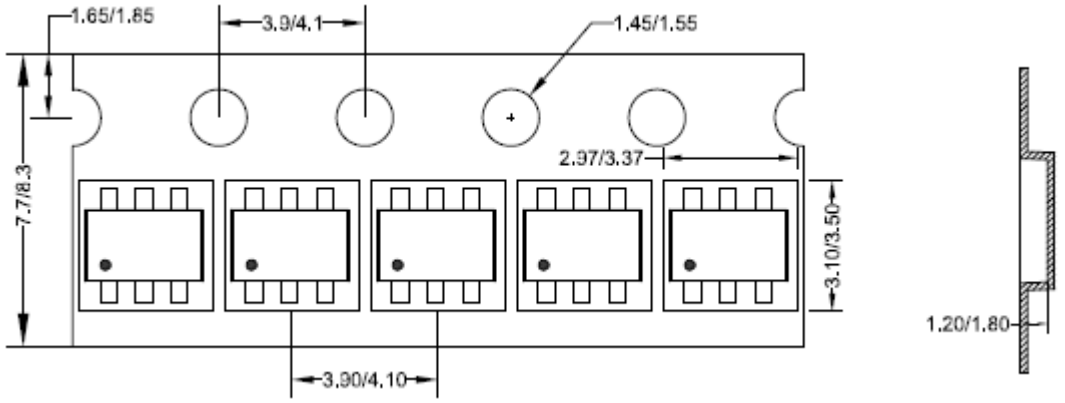
Recommended Pad Layout

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

Taping & Reel Specification

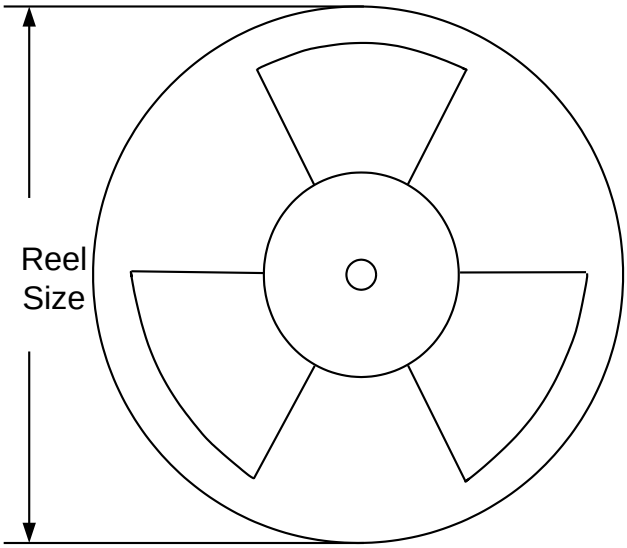
1. Taping orientation

SOT23-6



Feeding direction ⟶

2. Carrier Tape & Reel specification for packages



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Trailer length(mm)	Leader length (mm)	Qty per reel
SOT23-6	8	4	7"	280	160	3000

3. Others: NA