OR1601SBC

High Efficiency, 1.2MHz, 55V Input, 0.8A Asynchronous Step Down Regulator

General Description

The OR1601SBC develops a high efficiency asynchronous step down DC/DC regulator capable of delivering 0.8A output current. The IC adopts current mode adaptive constant off time control . The OR1601SBC perates over a wide input voltage range from 4.5V to 55V and integrates main switch with very low $R_{DS(ON)}$ to minimize the conduction loss. Low output voltage ripple and small external inductor and capacitor sizes are achieved with 1.2MHz switching frequency.

Features

- Low $R_{DS(ON)}$ for Internal N-channel Power FET: 700mΩ
- 4.5-55V Input Voltage Range
- 0.8A Output Current Capability
- 1.2MHz Pseudo Constant Switching Frequency
- Internal Soft-start Limits the Inrush Current
- Hic-cup Mode Output Short Circuit Protection
- EN ON/OFF Control with Accurate Threshold
- Cycle by Cycle Peak Current Limit
- 0.6V ±1 % Reference Voltage
- SOT23-6 Package

Ordering Information

OR1601□ □ □
- □ Temperature Code
- □ Package Code
- □ Optional Spec Code

Ordering Number	Package type	Note
OR1601SBC	SOT23-6	--

Applications

- Non-Isolated Telecommunication Buck Regulator
- Secondary High Voltage Post Regulator
- Automotive Systems

Typical Applications

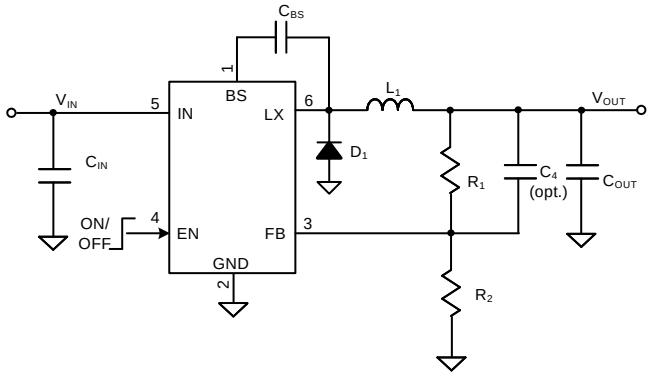


Figure 1. Schematic Diagram

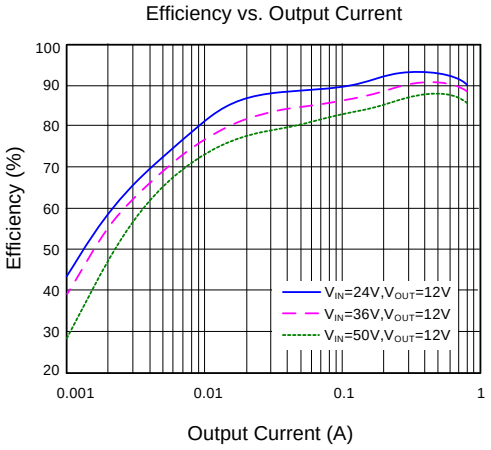
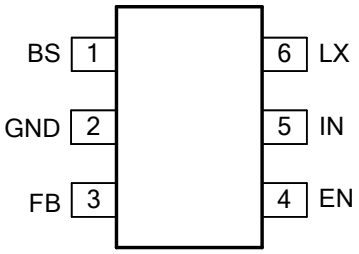


Figure 2. Efficiency

Pinout (top view)



(SOT23-6)

Top Mark: My ***xyz***(Device code: My, ***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. Decouple this pin to the LX pin with a 0.1μF ceramic capacitor.
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}=0.6×(1+R1/R2).
EN	4	Enable control. Pull high to turn on. Do not leave it 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.

Function Block

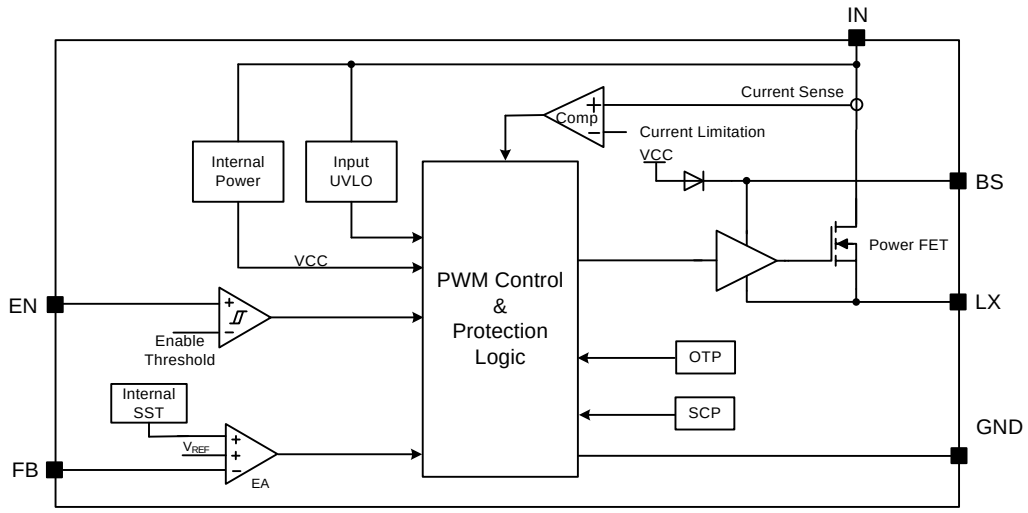


Figure3. Block Diagram

Absolute Maximum Ratings (Note 1)

Supply Input Voltage ---------- -0.3V to 60V
BS-LX Voltage ---------- -0.3V to 4V
FB, EN Voltage ---------- -0.3V to V_{IN} + 0.3V
Power Dissipation, P_D @ T_A = 25℃, SOT23-6 ---------- 1W
Package Thermal Resistance (Note 2)
θ_{JA} ---------- 100℃/W
θ_{JC} ---------- 25℃/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 55V
Junction Temperature Range ---------- -40℃ to 125℃
Ambient Temperature Range ---------- -40℃ to 85℃

Electrical Characteristics

(V_{IN} = 20V, V_{OUT} = 12V, L = 6.8μH, C_{OUT} = 10uF, T_A = 25℃, I_{OUT} =0.1A unless otherwise specified)

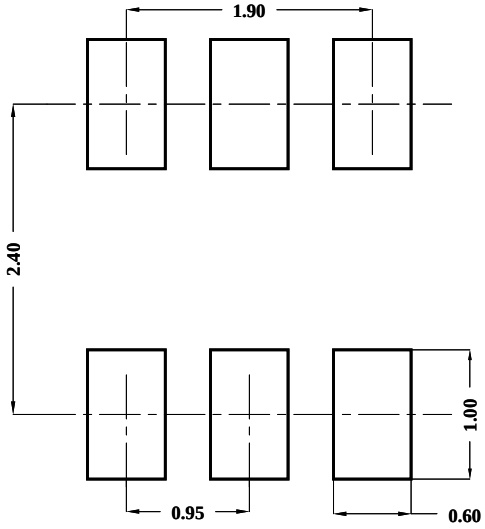
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		4.5		55	V
Quiescent Current	I_Q	LX not switching		150		μA
Shutdown Current	I_{SHDN}	EN=0		5	10	μA
Feedback Reference Voltage	V_{REF}		0.594	0.6	0.606	V
FB Input Current	I_{FB}	$V_{FB}=V_{IN}$	-50		50	nA
Power FET RON	$R_{DS(ON)}$			700		mΩ
Power FET Peak Current Limit	$I_{LIM,TOP}$		1.05		1.65	A
EN Rising Threshold	V_{ENH}		1.18	1.23	1.28	V
EN Falling Threshold	V_{ENL}		0.94	1	1.06	V
Input UVLO Threshold	V_{UVLO}				4.5	V
Switching Frequency	F_{SW}			1.2		MHz
Switching Frequency Accuracy			-20		20	$\%F_{SW}$
Min ON Time	t_{ON}			100		ns
Min Off Time	t_{OFF}			80		ns
Soft-start Time	t_{SS}			1.4		ms
Thermal Shutdown Temperature	T_{SD}			150		℃
Thermal Shutdown Hysteresis	T_{HYS}			15		℃

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

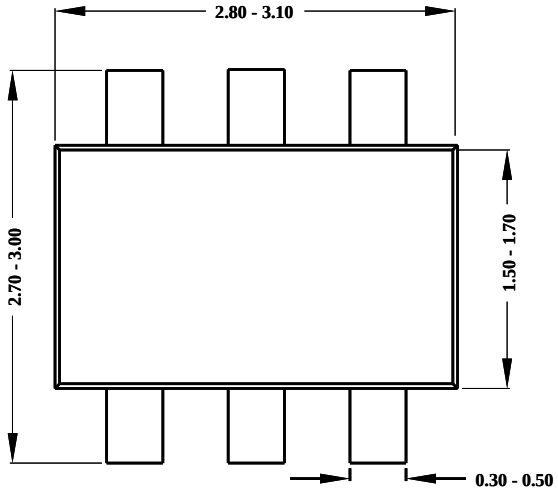
Note 2: θ_{JA} is measured in the natural convection at T_A = 25℃ on a high effective thermal conductivity four-layer test board per JESD51-7. Pin 2 of SOT23-6 package is the case position for θ_{JC} measurement.

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

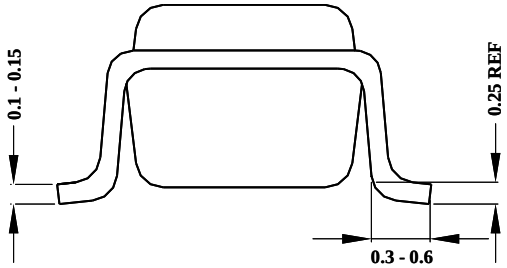
SOT23-6 Package Outline & PCB layout

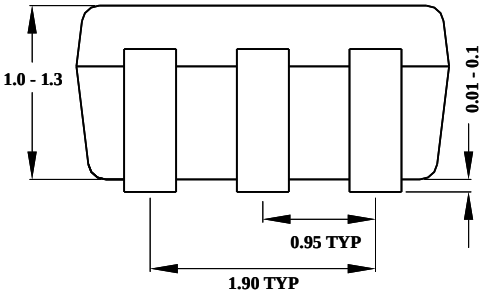


Recommended Pad Layout



Top View



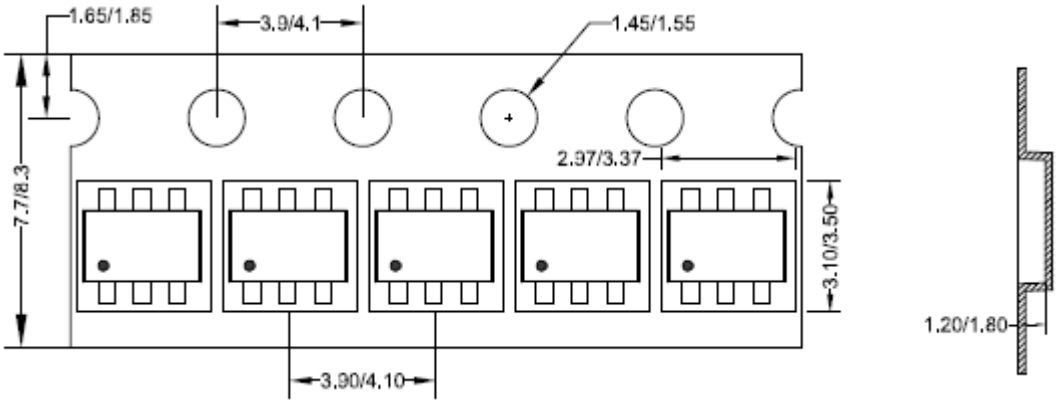


Notes: **All dimension in millimeter and exclude mold flash & metal burr.**

Taping & Reel Specification

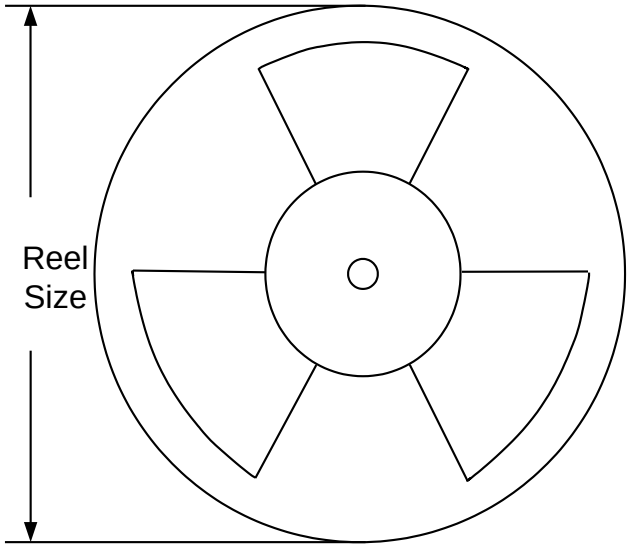
1. Taping orientation

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