

High Efficiency, 2MHz, 40V Input, 300mA Asynchronous Step Down Regulator

General Description

The SY8290 is a high efficiency 2MHz, adaptive constant OFF time controlled asynchronous step-down DC-DC regulator capable of delivering 300mA output current. The SY8290 operates over a wide input voltage range from 5V to 40V.

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

Ordering Information

SY8290 □(□□)□
 □ Temperature Code
 □ Package Code
 □ Optional Spec Code

Ordering Number	Package type	Note
SY8290ABC	SOT23-6	--

Features

- 5-40V Input Voltage Range
- 2MHz Switching Frequency
- Adaptive Constant OFF Time Control
- Internal Soft-start Limits the Inrush Current
- 2% 0.6V Reference
- RoHS Compliant and Halogen Free
- Compact Package: SOT23-6

Applications

- Smart Meter
- Set Top Box
- Portable TV
- Access Point Router
- DSL Modem
- LCD TV

Typical Applications

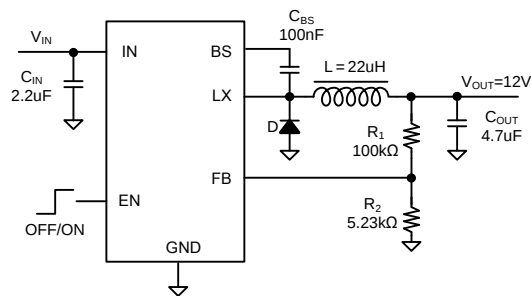


Figure 1. Schematic Diagram

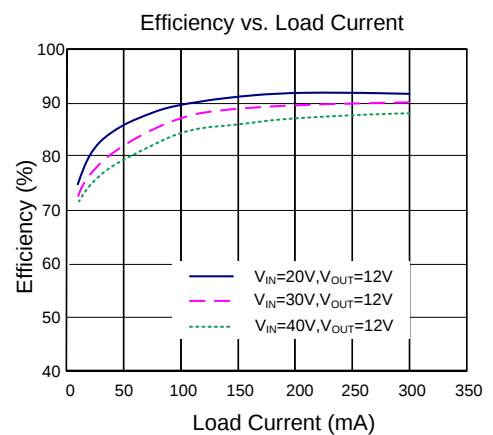
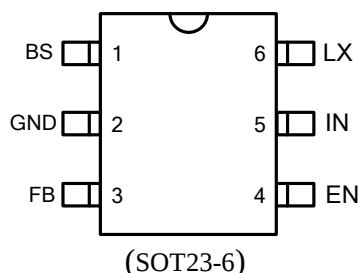


Figure2. Efficiency Figure

Pinout (top view)


Top Mark: TE_{xyz} (Device code: TE, 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 LX pin with 0.1uF ceramic cap.
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: $V_{OUT}=0.6 \times (1+R1/R2)$.
EN	4	Enable control. Pull high to turn on. Do not float.
IN	5	Input pin. Decouple this pin to GND pin with at least 1 μ F ceramic cap.
LX	6	Inductor pin. Connect this pin to the switching node of inductor.

Absolute Maximum Ratings (Note 1)

Supply Input Voltage	-0.3V to 42V
Enable Voltage	-0.3V to $V_{IN} + 0.6V$
FB Voltage	-0.3V to 3.6V
BS to LX Voltage	-0.3V to 3.6V
LX voltage	-0.7V to $V_{IN}+0.6V$
Power Dissipation, P_D @ $T_A = 25^\circ C$, SOT23-6	0.6W
Package Thermal Resistance (Note 2)	
θ_{JA}	170 $^\circ C/W$
θ_{JC}	130 $^\circ C/W$
Junction Temperature Range	-40 $^\circ C$ to 150 $^\circ C$
Lead Temperature (Soldering, 10 sec.)	260 $^\circ C$
Storage Temperature Range	-65 $^\circ C$ to 150 $^\circ C$
Dynamic LX voltage in 10ns duration	$IN+3V$ to $GND-5V$

Recommended Operating Conditions (Note 3)

Supply Input Voltage	5V to 40V
BS to LX Voltage	3.3V
Junction Temperature Range	-40 $^\circ C$ to 125 $^\circ C$
Ambient Temperature Range	-40 $^\circ C$ to 85 $^\circ C$

Electrical Characteristics

($V_{IN} = 20V$, $V_{OUT} = 12V$, $L=22\mu H$, $C_{OUT}=4.7\mu F$, $T_A = 25\text{ }^{\circ}C$, $I_{OUT} = 100mA$ unless otherwise specified)

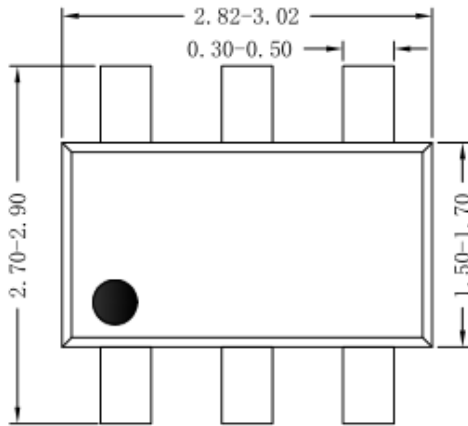
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		5		40	V
Input UVLO Threshold	V_{UVLO}	Rising		4.5		V
Input UVLO Hysteresis	V_{UVLO_HYS}			200		mV
Quiescent Current	I_Q	$I_{OUT}=0$, $V_{FB}=V_{REF}\times 105\%$		160		μA
Shutdown Current	I_{SHDN}	$EN=0$			10	μA
Feedback Reference Voltage	V_{REF}		0.588	0.6	0.612	V
FB Input Current	I_{FB}	$V_{FB}=V_{IN}$	-50	10	50	nA
Power FET RON	$R_{DS(ON)1}$			2		Ω
Power FET Current Limit	I_{LIM}		450			mA
EN Rising Threshold	V_{ENH}		1.5			V
EN Falling Threshold	V_{ENL}				0.4	V
Minimum OFF Time	t_{OFF}				100	ns
Minimum ON Time	t_{OFF}				100	ns
Soft Start Time	t_{SS}			400		us
Switching Frequency	F_{SW}		1.6	2	2.4	MHz
Thermal Shutdown Temperature	T_{SD}			150		$^{\circ}C$
Thermal Recovery Hysteresis	T_{HYS}			15		$^{\circ}C$

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.

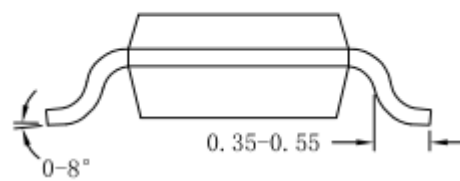
Note 2: θ_{JA} is measured in the natural convection at $T_A = 25\text{ }^{\circ}C$ on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

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

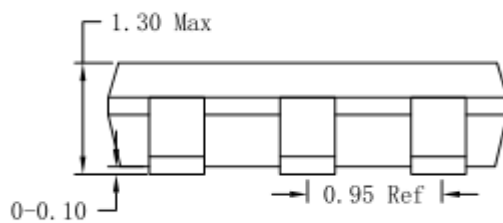
SOT23-6L Package Outline & PCB Layout



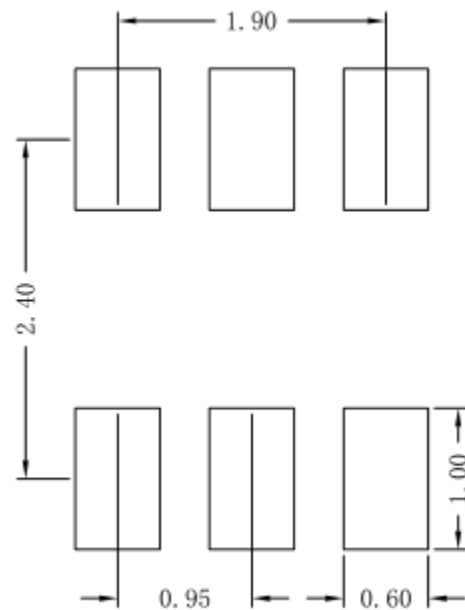
Top View



Side View



Side View

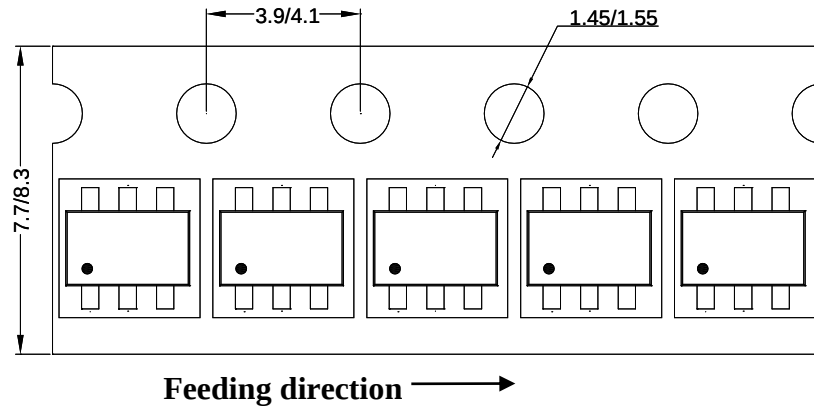


Recommended Pad Layout

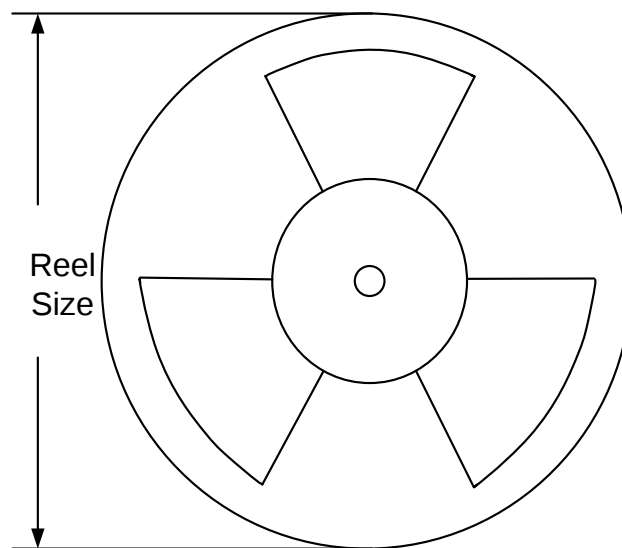
Notes: All dimension in millimeter and exclude mold flash & metal burr.

Taping & Reel Specification

1. Taping orientation



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