SY8843/SY8843L

High Efficiency 1.5MHz, 3A Ultra Fast Dynamic Response Synchronous Step Down Regulator

General Description

The SY8843 and SY8843L are high efficiency 1.5MHz synchronous step down DC/DC regulators capable of delivering up to 3A output current. The SY8843 and SY8843L can operate over a wide input voltage range from 2.7V to 5.5V and integrate main switch and synchronous switch with very low $R_{DS(ON)}$ to minimize the conduction loss.

Low output voltage ripple, small external inductor and capacitor sizes are achieved with 1.5MHz switching frequency.

Ordering Information

SY8843 □(□□)□
- Temperature Code
- Package Code
- Optional Spec Code

Ordering Number	Package type	Note
SY8843QWC	QFN1.5×1.5-7	--
SY8843LQWC	QFN1.5×1.5-7	--

Features

- 2.7~5.5V Input Voltage Range
- 65μA Low Quiescent Current
- Ultra Fast Load Transient Speed
- Low $R_{DS(ON)}$ for Internal Switches (Top/Bottom) 85mΩ /50mΩ
- High Switching Frequency 1.5MHz Minimizes the External Components
- Internal Soft-start Limits the Inrush Current
- Reliable Short Circuit Protection
  - SY8843: Hic-cup Mode Protection
  - SY8843L: Latch Off Protection
- Reliable OVP and OTP Protection
  - SY8843: No Latch Off Protection
  - SY8843L: Latch Off Protection
- Output Auto Discharge Function
- RoHS Compliant and Halogen Free
- Compact Package: QFN1.5×1.5-7

Applications

- Smart Phone
- LCD TV
- Set Top Box
- Mini-notebook PC
- Access Point Router

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Typical Applications

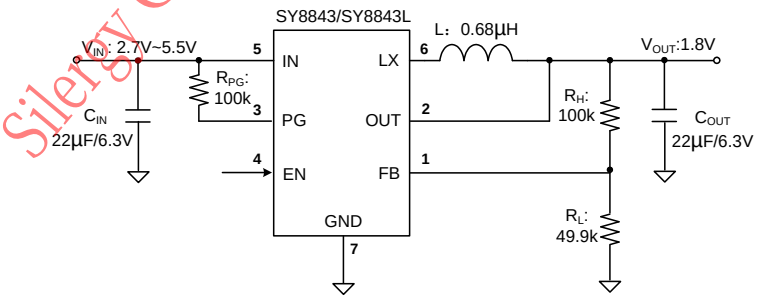


Figure1. Schematic Diagram

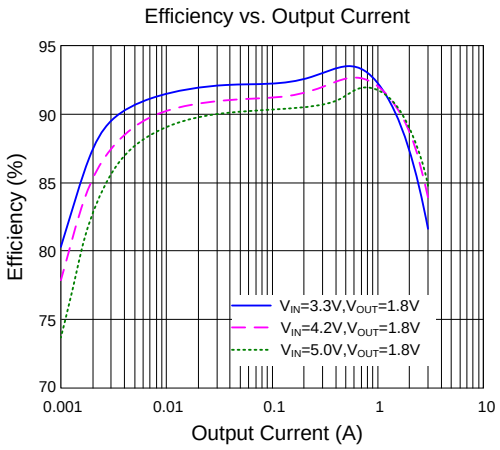
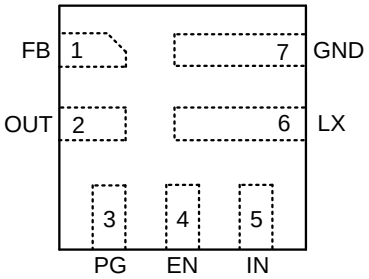


Figure2. Efficiency vs. Load Current

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Pinout (Top View)



(QFN1.5×1.5-7)

Top Mark: Vt*xyz* for SY8843QWC **(**device code: Vt, ***x=year code, y=week code, z= lot number code)***
dH*xyz* for SY8843LQWC **(**device code: dH, ***x=year code, y=week code, z= lot number code)***

Pin Name	Pin Number	Pin Description
FB	1	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}=0.6V× (1+R_H/R_L)
OUT	2	Output feedback pin, connect to the output capacitor side.
PG	3	Power good indicator (open drain output). Low if the output < 90% or the output >120% of regulation voltage; High otherwise. Connect a pull-up resistor to the input.
EN	4	Enable control. Pull high to turn on. Do not leave it floating
IN	5	Input pin. Decouple this pin to GND pin with at least a 22μF ceramic cap.
LX	6	Inductor pin. Connect this pin to the switching node of inductor.
GND	7	Ground pin.

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Block Diagram

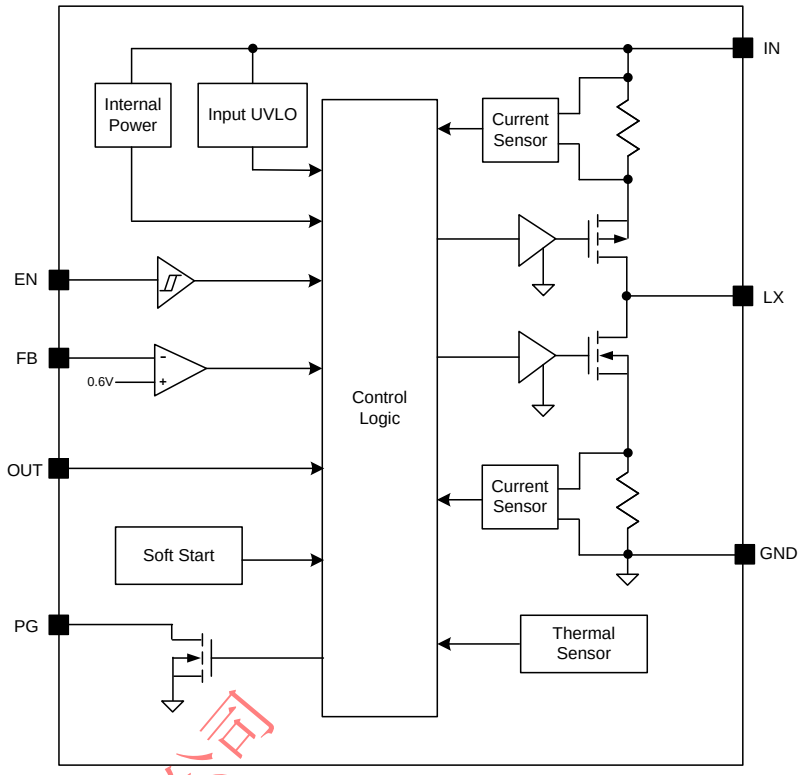


Figure3. SY8843 and SY8843L Block Diagram

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Absolute Maximum Ratings (Note 1)

Supply Input Voltage ---------- -0.3V to 6.0V
EN, FB, PG, OUT Voltage ---------- -0.3V to VIN + 0.6V
LX Voltage ---------- -0.3V (*1) to 6V (*2)
Power Dissipation, P_D @ T_A = 25℃,
QFN1.5×1.5-7 ---------- 1.5W
Package Thermal Resistance (Note 2)
θ_{JA} ---------- 66℃/W
θ_{JC} ---------- 5℃/W
Junction Temperature Range ----------150℃
Lead Temperature (Soldering, 10 sec.) ---------- 260℃
Storage Temperature Range ---------- -65℃ to 150℃
(*1) LX Voltage Tested Down to -3V <20ns
(*2) LX Voltage Tested Up to +7V <20ns

Recommended Operating Conditions (Note 3)

Supply Input Voltage ---------- 2.7V to 5.5V
Junction Temperature Range ---------- -40℃ to 125℃
Ambient Temperature Range ---------- -40℃ to 85℃

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Electrical Characteristics

(V_{IN} = 5.0V, V_{OUT} = 1.8V, L = 0.68μH, C_{OUT} = 22μF, T_A = 25℃, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		2.7		5.5	V
Input UVLO Threshold	V_{UVLO}				2.7	V
Input UVLO Hysteresis	V_{HYS}			0.18		V
Quiescent Current	I_Q	V_{FB}=V_{REF}×105%		65		μA
Shutdown Current	I_{SHDN}	V_{EN}=0V		0.1	1	μA
Feedback Reference Voltage	V_{REF}	I_{OUT}=1.0A	594	600	606	mV
Output Discharge Resistance	R_{DIS}			75		Ω
Top FET R_{ON}	$R_{DS(ON)1}$			85		mΩ
Bottom FET R_{ON}	$R_{DS(ON)2}$			50		mΩ
EN Input Voltage High	$V_{EN,H}$		1.1			V
EN Input Voltage Low	$V_{EN,L}$				0.4	V
PG Threshold for Under Voltage Detection	$V_{PG,UV}$	V_{FB} falling, PG from high to low		90		%V_{REF}
PG Low Delay Time for Under Voltage Detection	$t_{PG,UV}$			15		μs
PG Threshold for Over Voltage Detection	$V_{PG,OV}$	V_{FB} rising, PG from high to low		120		%V_{REF}
PG Low Delay Time for Over Voltage Detection	$t_{PG,OV}$			10		μs
Min ON Time	$t_{ON,MIN}$			100		ns
Maximum Duty Cycle	D_{MAX}		100			%
Turn On Delay	$t_{ON,DLY}$	from EN high to LX start switching		90		μs
Soft-start Time	t_{SS}			0.35		ms
Switching Frequency	F_{SW}	I_{OUT}=1.0A		1.5		MHz
Top FET Current Limit	$I_{LMT,TOP}$		4			A
Bottom FET Current Limit	$I_{LMT,BOT}$		3			A
Output Under Voltage Protection Threshold	V_{UVP}			40		%V_{REF}
Output UVP Delay	$t_{UVP,DLY}$			15		μs
Output Over Voltage Protection Threshold	V_{OVP}	SY8843L		120		%V_{REF}
Output OVP Delay	$V_{OVP,DLY}$	SY8843L		10		μs
Thermal Shutdown Temperature	T_{SD}			150		℃
Thermal Shutdown Hysteresis	T_{HYS}	SY8843		15		℃

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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.

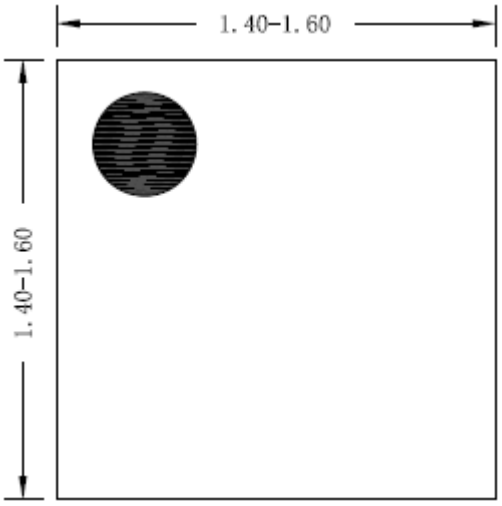
Note2: θ_{JA} of SY8843 and SY8843L are measured in the natural convection at T_A = 25℃ on 2OZ two-layer Silergy evaluation board. Pin 6 is the case position for SY8843 and SY8843L θ_{JC} measurement.

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

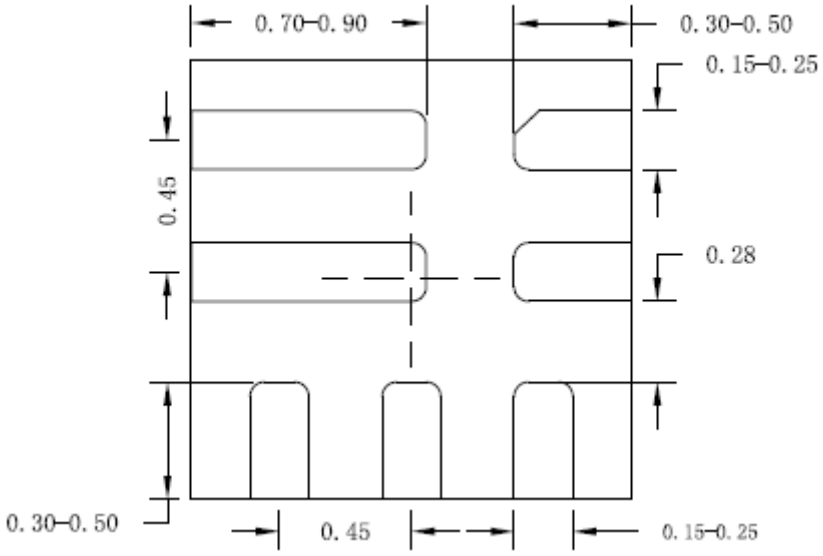
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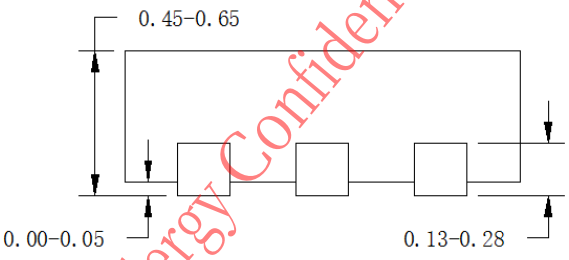
QFN1.5×1.5-7 Package Outline Drawing



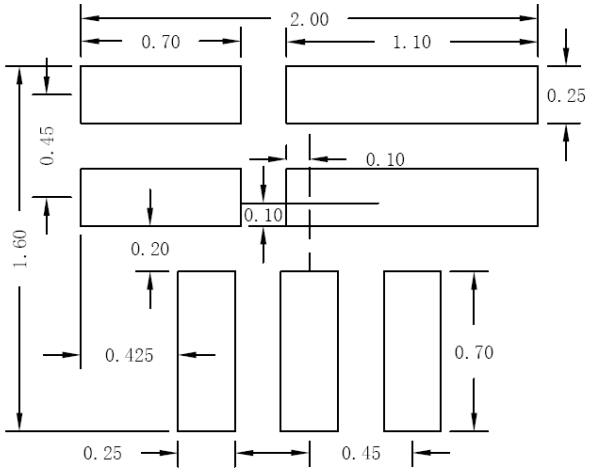
Top View



Bottom View



Side View



Recommended PCB layout
(Reference only)

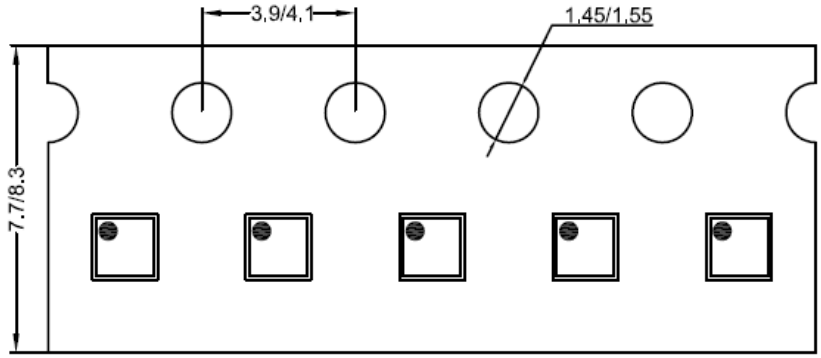
Notes: **All dimension in millimeter and exclude mold flash & metal burr.**

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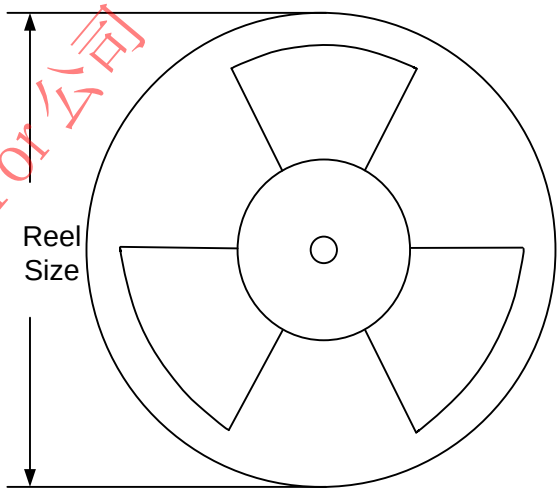
Taping & Reel Specification

1. QFN1.5×1.5 taping orientation



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
QFN1.5×1.5	8	4	7"	400	160	3000

3. Others: NA

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