Manuals+ — User Manuals Simplified.

RICHTEK RT4823 Wide Input and Ultra Low Quiescent Current Boost Converter with High Efficiency User Manual
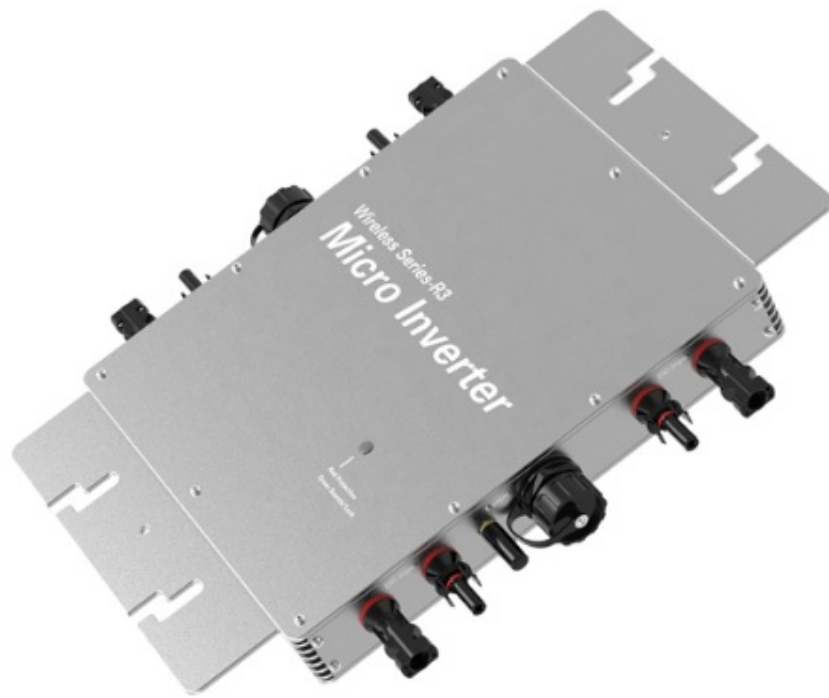
Contents

RICHTEK RT4823 Wide Input and Ultra Low Quiescent Current Boost Converter with High Efficiency

General Description

The RT4823 allows systems to take advantage of new battery chemistries that can supply significant energy when the battery voltage is lower than the required voltage for system power ICs. By combining built-in power transistors, synchronous rectification, and low supply current; this IC provides a compact solution for systems using advanced Li-Ion battery chemistries. The RT4823 is a boost regulator designed to provide a minimum output voltage from a single-cell Li-Ion battery, even when the battery voltage is below system minimum. In boost mode, output voltage regulation is guaranteed to a maximum load current of 1500mA. Quiescent current in shutdown mode is less than 1 A, which maximizes battery life. The regulator transitions smoothly between bypass and normal boost mode. The device can be forced into bypass mode to reduce quiescent current. The RT4823 is available in the WL-CSP-9B 1.3×1.2 (BSC) package.

Applications

- NFC Device Power Supply
- USB Charging Ports
- PC Accessory Application (Keyboard, Mouse…etc.)
- TWS (True Wireless Stereo) Hall Sensor
- Gaming Device Sensor

Features

- Ultra-Low Operating Quiescent Current
- Quickly Start-Up Time (< 400sec)
- 3 Few External Components : 1H Inductor, 0402 Case Size Input and 0603 Case Size Output Case Size Capacitors
- Input Voltage Range : 1.8V to 5.5V
- Support VIN > VOUT Operation
- Default Boost Output Voltage Setting :

  VOUT = 5V
- Maximum Continuous Load Current : 1.3A at VIN > 3.6V Boosting VOUT to 5V

- Up to 93% Efficiency
- EN(H) : Boost Mode
- EN(L), BP(H) : Bypass Mode
- EN(L), BP(L) : Shutdown Mode
- Internal Synchronous Rectifier
- Over-Current Protection
- Cycle-by-Cycle Current Limit
- Over-Voltage Protection
- Short-Circuit Protection
- Over-Temperature Protection
- Small WL-CSP-9B 1.3×1.2 (BSC) Package

Simplified Application Circuit
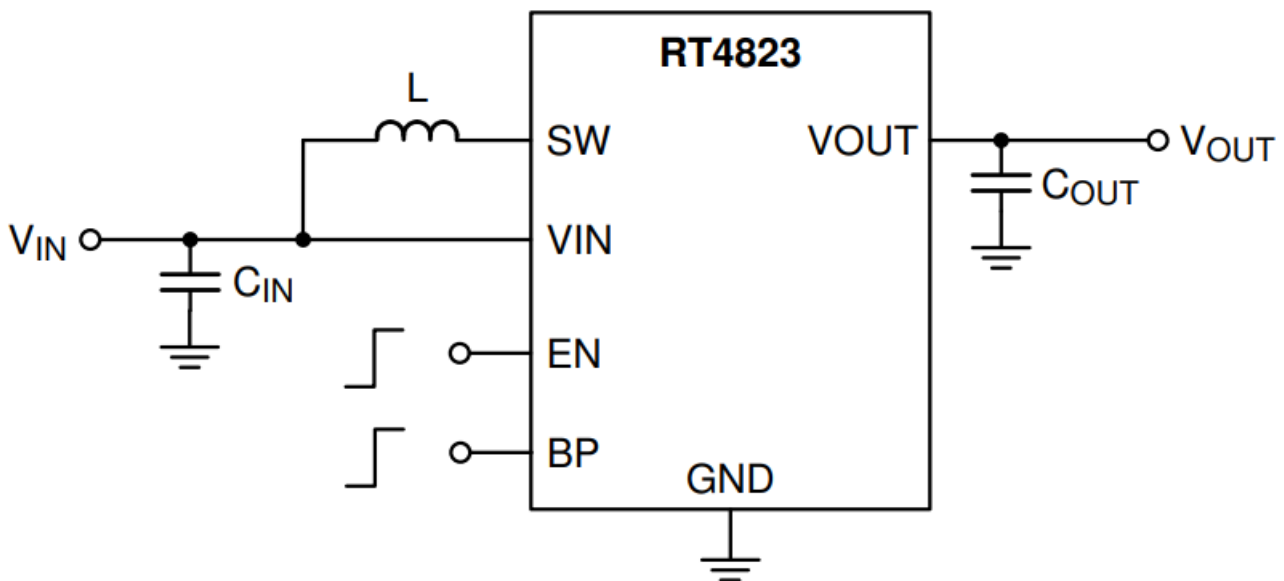
Ordering Information
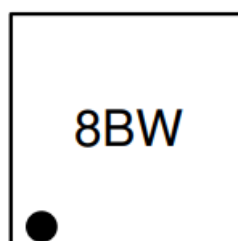
RT4823 □

Package Type
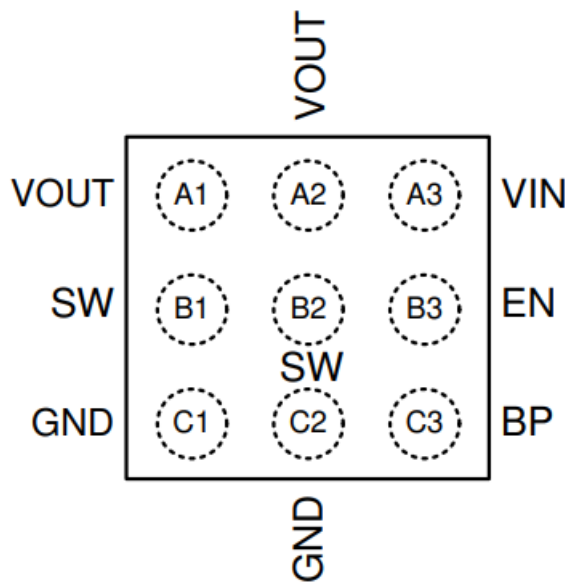WSC : WL-CSP-9B 1.3x1.2 (BSC)

Note :
Richtek products are :

- RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.
- Suitable for use in SnPb or Pb-free soldering processes.

Marking Information

8BW

Pin Configuration

WL-CSP-9B 1.3×1.2 (BSC)

Functional Pin Description

Pin No.	Pin Name	Pin Function
A1, A2	VOUT	Output voltage. Place COUT as close as possible to device.
A3	VIN	Input voltage. This pin has to connect to input power, it's used to supply chip internal power.
B1, B2	SW	Switching node. The power inductor should be connected between SW and power input.
B3	EN	Enable. When this pin is set to HIGH, the circuit is enabled. Do not let this pin floating.
C1, C2	GND	Ground. This is power and signal ground reference for the chip. The COUT bypass capacitor should be returned with the shortest path possible to these pins.
C3	BP	Bypass mode. This pin is used to control converter into bypass mode. (Detail configuration shows in Table 1.)

Functional Block Diagram
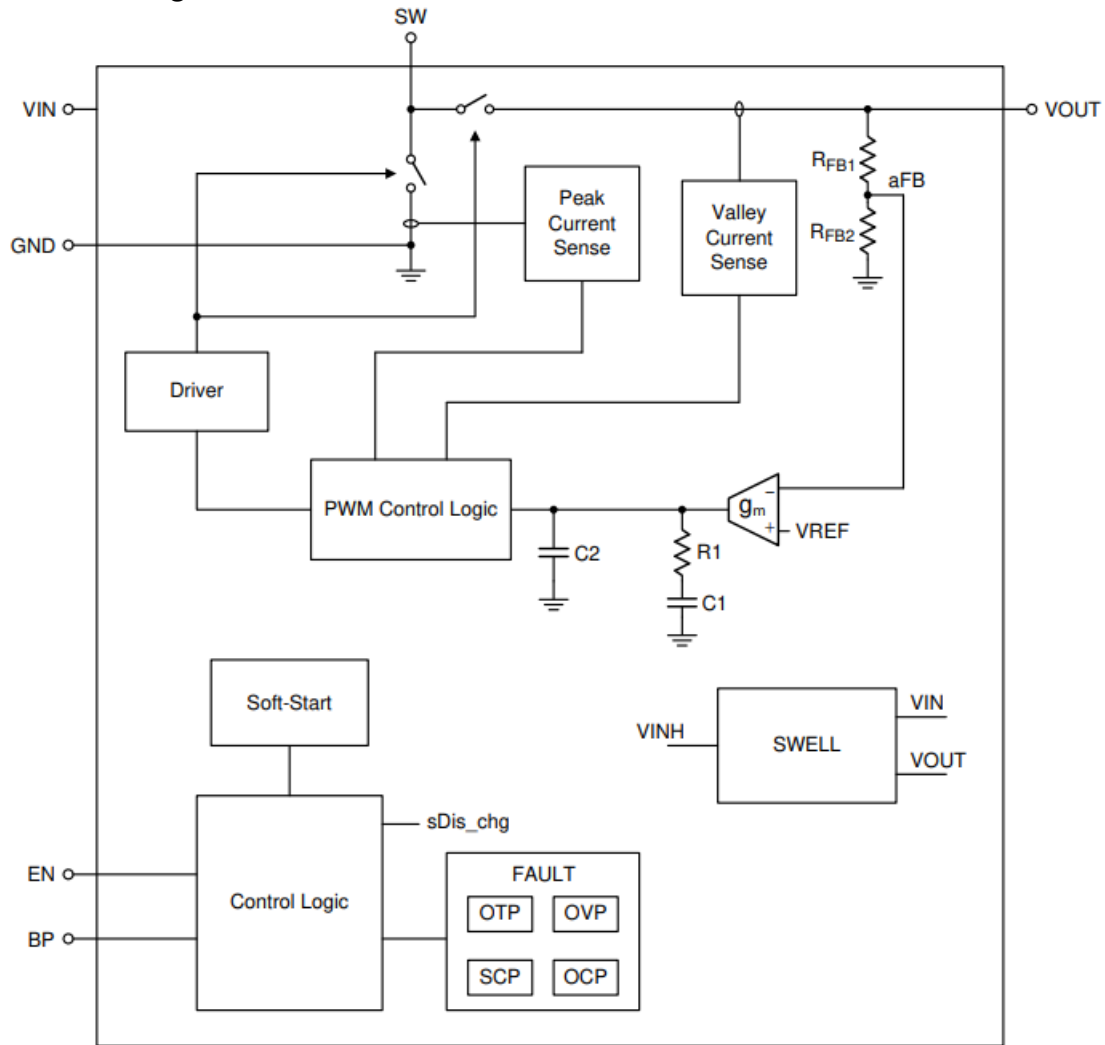
Operation

The RT4823 combined built-in power transistors, synchronous rectification, and low supply current, it provides a compact solution for system using advanced Li-Ion battery chemistries.

In boost mode, output voltage regulation is guaranteed to maximum load current of 1.5A. Quiescent current in Shutdown mode is less than 1 A, which maximizes battery life.

Power-On Reset

If input voltage is lower than POR, the internal digital and analog circuit is disable. If input voltage is higher than POR the Boost converter behavior is shown as follow :

1. IC Digital circuit will be activated.

2. Internal register will be load in default value.

3. Boost converter will into run free-running mode (detail in free-running mode section).

4. If VOUT > 2.2V (or VIN > 2.2V), Boost converter will into close loop control and load in E-fuse value to internal register.

Free-Running Mode

If both voltage of VIN and VOUT are lower than 2.2V, the Boost converter will into free-running mode. In this mode, switching frequency operation is 1.5MHz and duty cycle of Boost converter is 25%. It is translation of power-on stage, and there is implemented current limit function for converter soft-start. The current limit level should be lower than 900mA.

EN and BP

In the Table 1 shown, there are three device states in the RT4823. When EN and BP pull low, it is into shutdown mode and quiescent current is less than 1 A. If EN pull high (BP don't care), the RT4823 is into boost mode and it is with low quiescent operation. If BP pull high and EN pull low, the RT4823 is into bypass mode. There should be a delay time (< 250s) from EN pull high to power ready to guarantee normal operation.

EN Input	BP Input	Mode Define	Device State
0	0	Shutdown Mode	The device is shutdown. The device shutdown current is approximately about 1mA (max).
1	Don't care	Boost Mode	The device is active in Boost PFM low quiescent mode. The supply current is approximately about 4mA (typ.).
0	1	Bypass Mode	The device is into forced bypass mode.

Table 1. Pin Configuration for Converter

Enable

The boost can be enabled or disabled by the EN pin. When the EN pin is higher than the threshold of logic-high, the device starts operating follow Figure 1 operation diagram. In shutdown mode, the converter stops switching, internal control circuit is turned off. The output voltage is discharging by component consumption (Cap ESR…) that state have not discharge function.

Soft-Start State

During soft-start state, if VOUT reach to 99% VOUT_Target. The RT4823 will into boost operation. When system power-on with heavy loading (higher than pre-charge current), the RT4823 is in pre-charge state until loading release.

Boost/Auto Bypass Mode

EN = H There are two normal operation modes, one is the boost mode, and the other one is auto bypass mode. In the boost mode (VIN – 0.3V < VOUT_Target), the converter boost output voltage to VOUT_Target, it delivers power to loading by internal synchronous switches after the soft-start state. In the auto bypass mode (VIN – 0.3V ≥ VOUT_Target), input voltage will deliver and through to the output terminal loading directly. That can provide max current capacity with the RT4823. Detail information is shown as below.

Boost Mode (Auto PFM/PWM Control Method)

In order to save power and improve efficiency at low loads, the Boost operate in PFM (Pulse Frequency Modulation) as the inductor drops into DCM (Discontinuous Current Mode). The switching frequency is proportional to loading to reach output voltage regulation. When loading is increase and inductor current is into continuous current mode, the Boost automatically gets in PWM mode.

Mode	Description	Condition
LIN	Linear startup	VIN – 200mV ≥ VOUT
Soft-Start	Boost soft-start	0.99 x VOUT_Target > VOUT ≥ VIN – 200 mV
Boost	Boost mode	VOUT_Target ≥ 0.99 x VOUT_Target
If VIN increase higher than VOUT		
Auto Bypass	Auto bypass mode	VIN ≥ VOUT Control loop auto transfer between auto by pass mode and boost mode.

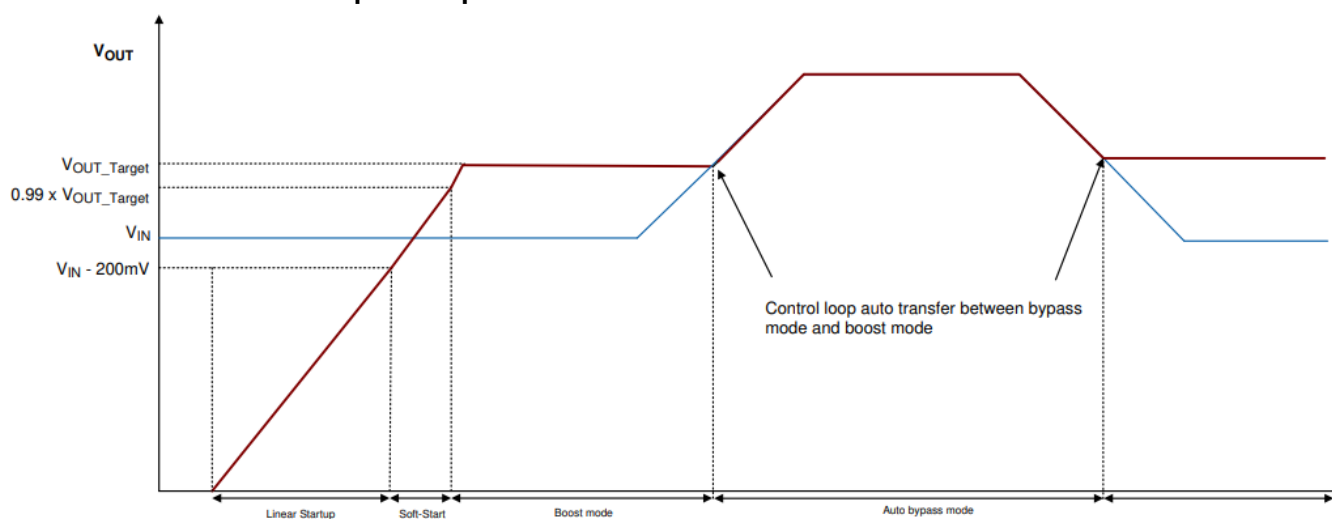**Table 2. The RT4823 Start-Up Description**

Figure 1. VOUT Mode Transition Diagram with EN L to H and VIN Variation (IOUT = 0A)

Protection
The RT4823 features some protections are listed in below table. It is described the protection behavior.

Protection Type	Fault Event Trigger	Fault Deglitch Time	Protection Method	Fault Protection Latch Time	Reset Method
OCP_IL5A	IL_peak > 5A	No delay	Turn off UG, LG	20ms, Auto-recovery	IL_peak < 5A
OCP	IL_peak > 3.6A	No delay	Stop LG switching	N/A	IL_valley < 3.3A
OVP	VOUT > 6V	100ns	Turn off UG, LG	N/A	VOUT < 6V
SCP	VOUT < 0.7V	No delay	Turn off UG, LG	20ms, Auto-recovery	VOUT > 0.7V
OTP	TEMP > 150°C	170ms	Turn off UG, LG	Turn off UG, LG	TEMP < 130°C
SCP_SS	VIN – VOUT > 0.2V	2ms	UG OCP = 0.3A	N/A	VIN – VOUT < 0.2V
OCP_BYP	IL > 0.3A	2ms	Turn off UG	20ms, Auto-recovery	IL < 0.3A
SCP_BYP	VIN – VOUT > 0.7V	No delay	Turn off UG, LG	20ms, Auto-recovery	VIN – VOUT < 0.7V

Absolute Maximum Ratings (Note 1)

- VIN, VOUT, SW, EN, BP ———————————————————————— –0.3V to 6.5V
- Power Dissipation, PD @ TA = 25°C
- WL-CSP-9B 1.3×1.2 (BSC) ———————————————————— 1.54W
- Package Thermal Resistance (Note 2)
- WL-CSP-9B 1.3×1.2 (BSC) ———————————————————— 64.9 C/W
- Lead Temperature (Soldering, 10 sec.) ——————————————— 260 C
- Junction Temperature ————————————————————————— 150 C
- Storage Temperature Range ——————————————————— 65 C to 150 C
  ESD Susceptibility (Note 3)
- HBM (Human Body Model) ——————————————————————— 2kV

Recommended Operating Conditions (Note 4)

- Input Voltage Range (Boost Mode) ——————————————————- 1.8V to 5.5V
- Input Voltage Range (Bypass Mode) ————————————————— 2.2V to 5.5V
- Output Voltage Range ————————————————————————— 5V
- Input Capacitor, CIN ————————————————————————-4.7F
- Output Capacitor, COUT ——————————————————————-3.5F to 50F
- Inductance, L ———————————————————————————— 0.7H to 2.2H
- Input Current (Average current into SW) ————————————————— 1.8A
- Input Current (Peak current into SW) ———————————————————— 4A
- Ambient Temperature Range ———————————————————— 40 C to 85 C
- Junction Temperature Range ———————————————————— 40 C to 125 C

Electrical Characteristics

(VIN = 3.6V, CIN = 4.7 F, COUT = 10 F, L1 = 1 H. All typical (TYP) limits apply for TA = 25 C, unless otherwise specified. All minimum (MIN) and maximum (MAX) apply over the full operating ambient temperature range (40 C ≤ TA ≤ 85 C).

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Supply						
VIN Operation Range	VIN		1.8	—	5.5	V
Into VIN Operating Quiescent Current	IQ(non-switching)	IOUT = 0mA, VIN = 3.6V, EN = BP = GND	—	0.1	0.5	mA
Into VOUT Standby Mode Quiescent Current	IQ(non-switching)	VOUT = 5V BP = GND, EN = 5V	—	4	6	mA
VIN Quiescent Current (Device Normal Switching)	IQ(switching)	VIN = 3.6V, VOUT = 5V, BP = EN = GND	—	—	1	mA
		VIN = 3.6V, VOUT = 5V, BP = GND, EN = VIN	—	4	6	
		VIN = 3.6V, VOUT = 5V, BP = VIN, EN = GND	—	16	25	
		VIN = 3.6V, VOUT = 5V, BP = EN = VIN	—	4	6	

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Power-On Reset	VPOR		1.2	1.5	—	V
Enable, FPWM						
Low-Level Input Voltage	VIL		—	—	0.4	V
High-Level Input Voltage	VIH		1.2	—	—	V
Input Leakage Current	Ilkg	Input connected to GND or VIN	—	—	0.5	mA
OUTPUT						
Regulated DC Output Voltage	VOUT	1.8V ≤ VIN ≤ 4.8V, IOUT = 0 mA, PFM operation	5.04	5.06	5.08	V
		VIN = 3.6V, IOUT = 1A, PWM operation	4.95	5	5.05	V
Output Ripple Performance	VOUT_Ripple	VIN = 3.6V, VOUT = 5V, COUT = 10mF, IOUT = 0A to 1A	—	60	120	mV

Power Switch						
High-Side MOSFET	rDS_H		—	80	—	mW
Low-Side MOSFET	rDS_L		—	80	—	mW
Minimum On-Time	tON_MIN	VIN = 1.8V to 4.8V, VOUT = 5 V	20	—	60	ns
Maximum Duty Cycle	DMAX	VIN = 1.8V, VOUT = 5V, IL = 400mA	68.8	—	—	%
Switch Peak Current Limit (VIN or VOUT > 2.2V)	ILIM(Peak)	VIN = 3.6V, VOUT = 5V	—	2450	—	mA
Switch Valley Current Limit (VIN or VOUT > 2.2V)	ILIM(Valley)	VIN = 3.6V, VOUT = 5V	—	2150	—	mA
Pass-Through Current Limit	ILIM(Pass)	VIN = 3.6V	250	300	350	mA
Negative OCP	ILIM(Neg)		-3000	-2000	-1000	mA
Oscilator						
Oscillator Frequency	fOSC	VIN = 3.6V	3	3.5	4	MHz
		VIN < 2.5V à start to reduce frequency	2	—	—	
Soft-Start						
Start-Up Time	tSTART_BST	VIN = 3.6V, BP = GND, IOUT = 0mA. Time from active EN to VOUT	100	400	500	ms
Pre-Charge Current Limit	ILIM(Start)	VIN = 3.6V, EN = 0 à 1.8V	250	300	350	mA
Protection						
Short-Circuit Protection	VSCP		0.3	0.5	0.7	V
Over-Temperature Protection	TOTP		140	150	160	°C
Over-Temperature Protection Hysteresis	TOTP_HYS		—	20	—	°C
Over-Current Protection	ILIM(5A)	VIN = 5V	4	5	5.5	A
Over-Voltage Protection	VOVP	VIN = 3.6V	—	6	—	V

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Efficiency						
Efficiency	Eff	VOUT = 5V, VIN = 3.6V, Load = 10mA	—	72	—	%
		VOUT = 5V, VIN = 3.6V, Load = 10mA	—	90	—	
		VOUT = 5V, VIN = 3.6V, Load = 600mA	—	93	—	
		VOUT = 5V, VIN = 3.6V, Load = 1000mA	—	91	—	

- Note 1. Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and 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. θJA is measured under natural convection (still air) at TA = 25°C with the component mounted on a high effective-thermal-conductivity four-layer test board on a JEDEC 51-7 thermal measurement standard. JC is measured at the exposed pad of the package.
- Note 3. Devices are ESD sensitive. Handling precautions are recommended. Note 4. The device is not guaranteed to function outside its operating conditions.

Typical Application Circuit
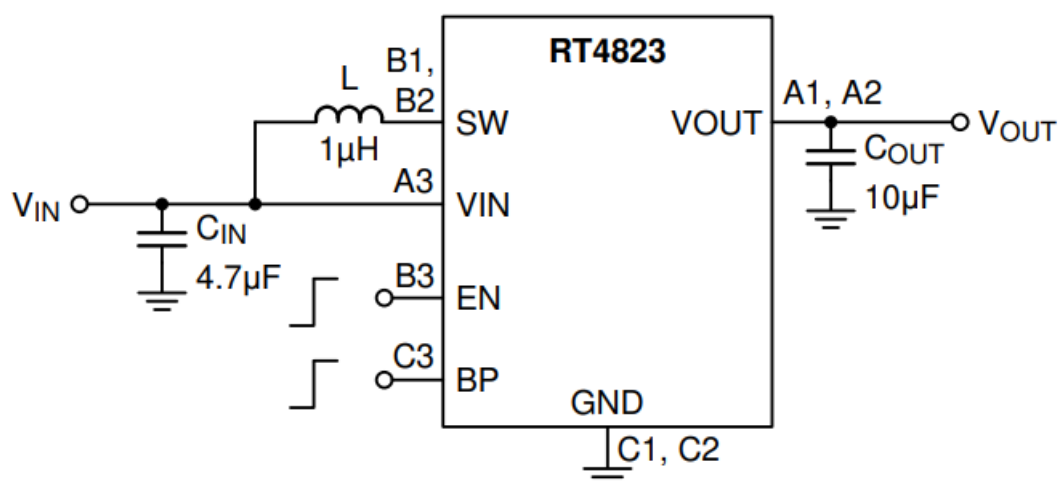
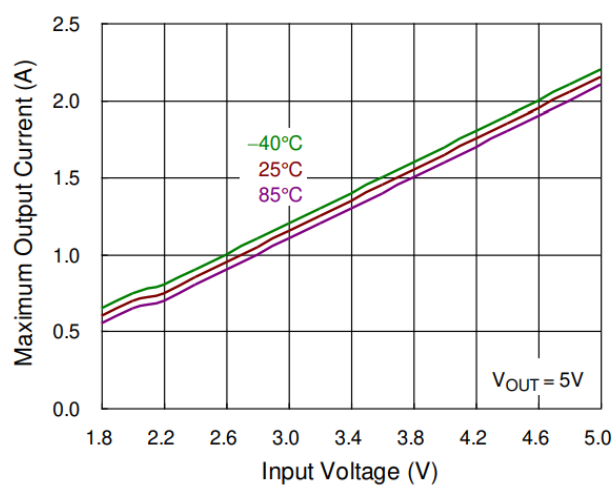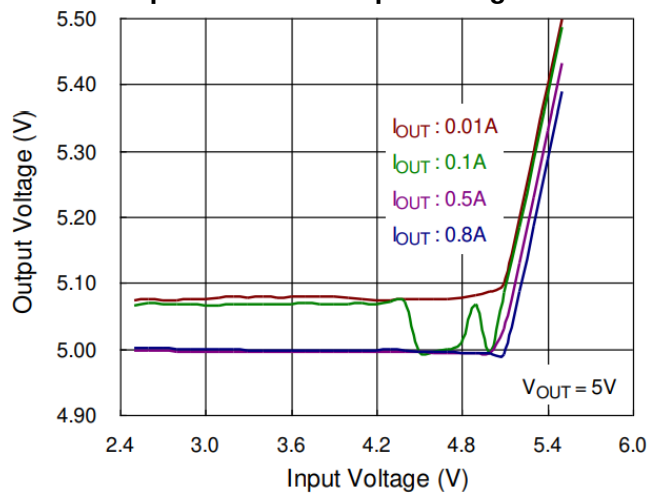| Reference	Part Number	Description	Package	Manufacturer
CIN	GRM155R60J475ME47D	4.7mF/6.3V/X5R	0402	Murata
COUT	GRM188R60J106ME47D	10mF/6.3V/X5R	0603	Murata
L	DFE252012F-1R0M=P2	1.0mH/3.3A	2.5×2.0x1.2mm	Murata

Typical Operating Characteristics

Efficiency vs. Output Current
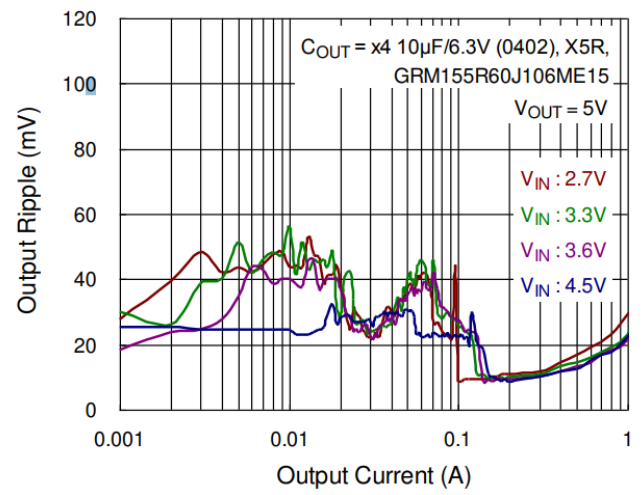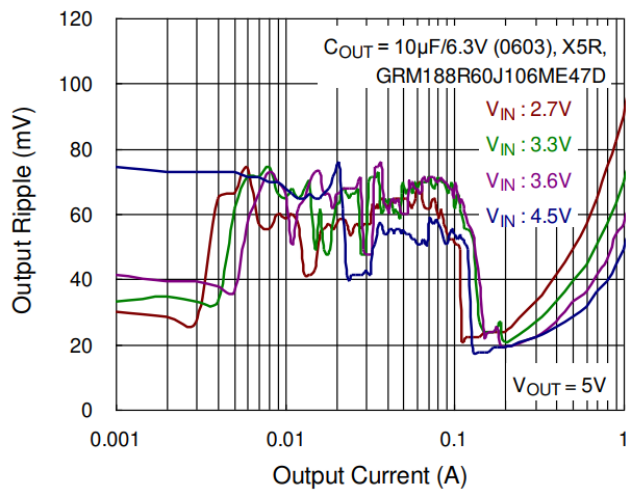**Boost Load Regulation**
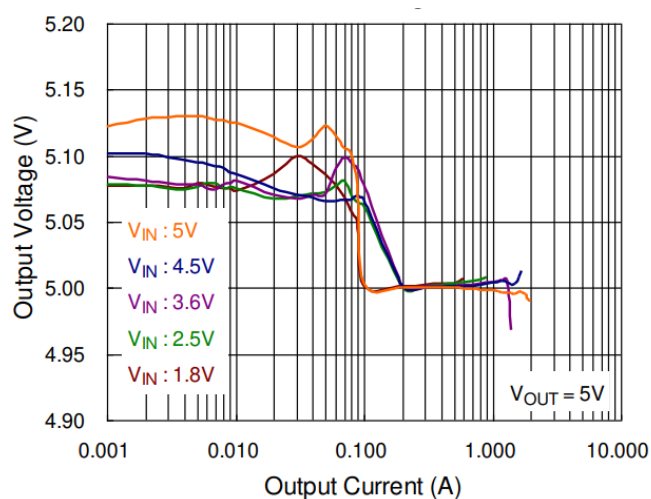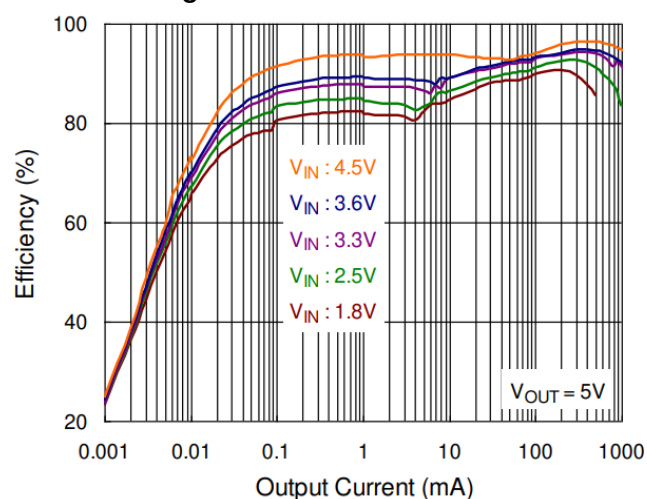
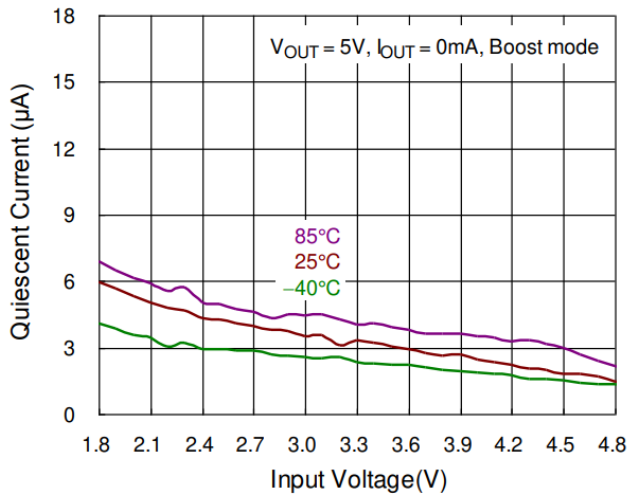**Boost Line Regulation**
Maximum Output Current vs. Input Voltage

Output Ripple vs. Output Current
Output Ripple vs. Output Current

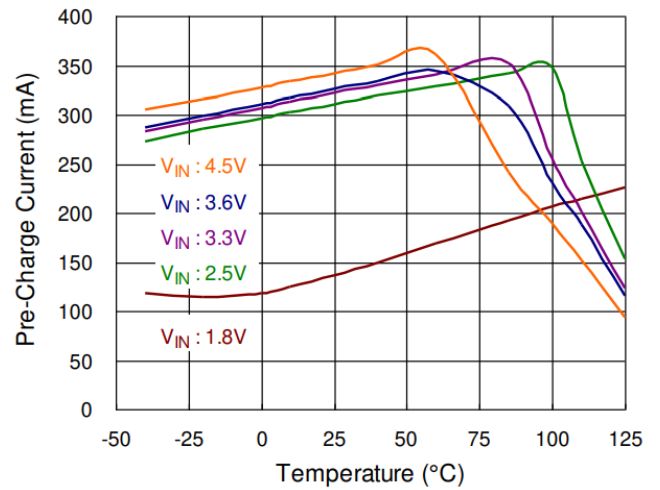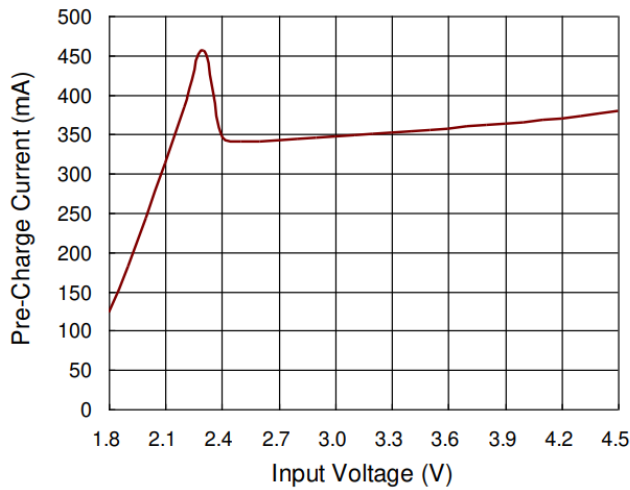Output Ripple (mV) vs Output Current (A)

$C_{OUT} = 10\mu F/6.3V$ (0603), X5R, GRM188R60J106ME47D
V_{IN} : 2.7V
V_{IN} : 3.3V
V_{IN} : 3.6V
V_{IN} : 4.5V
$V_{OUT} = 5V$

$C_{OUT} = x4\ 10\mu F/6.3V$ (0402), X5R, GRM155R60J106ME15
$V_{OUT} = 5V$
V_{IN} : 2.7V
V_{IN} : 3.3V
V_{IN} : 3.6V
V_{IN} : 4.5V

Quiescent Current vs. Input Voltage
Quiescent Current vs. Input Voltage

Quiescent Current (μA) vs Input Voltage (V)

$V_{OUT} = 5V$, $I_{OUT} = 0mA$, Boost mode
85°C
25°C
−40°C

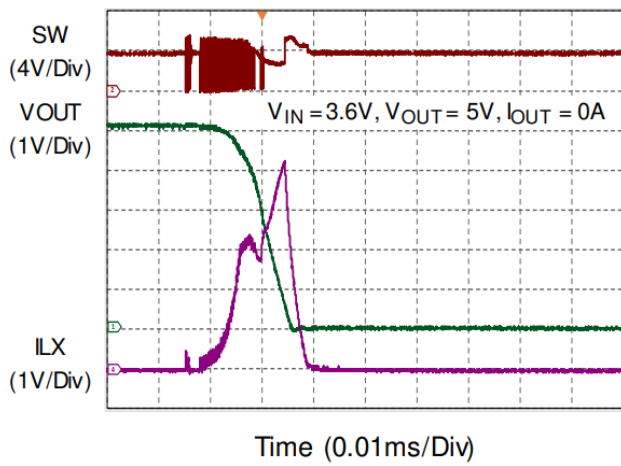$V_{OUT} = V_{IN}$, $I_{OUT} = 0mA$, Bypass mode
85°C
25°C
−40°C
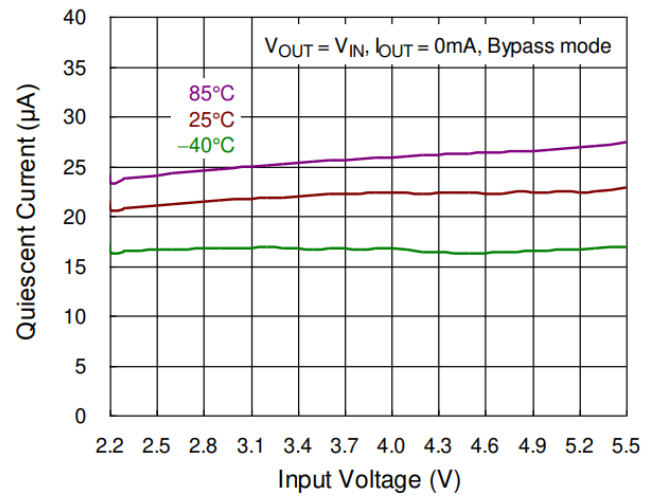
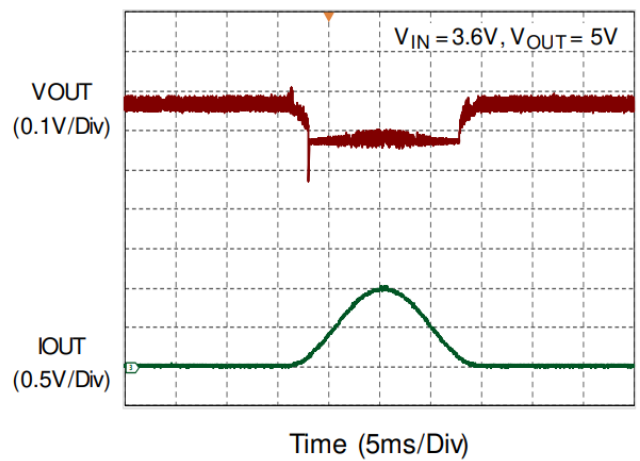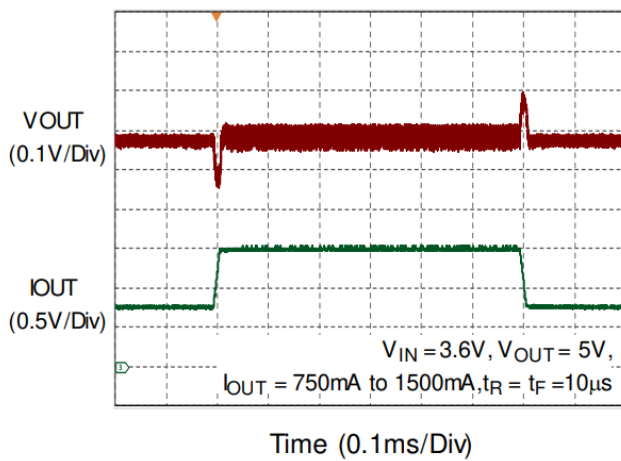## Pre-Charge Current vs. Input Voltage
Pre-Charge Current vs. Temperature

Pre-Charge Current (mA) vs Input Voltage (V)

Pre-Charge Current (mA) vs Temperature (°C)
V_{IN} : 4.5V
V_{IN} : 3.6V
V_{IN} : 3.3V
V_{IN} : 2.5V
V_{IN} : 1.8V

Boost Short Circuit
Power-On

SW (4V/Div)

VOUT (1V/Div)

ILX (1V/Div)

$V_{IN} = 3.6V$, $V_{OUT} = 5V$, $I_{OUT} = 0A$

Time (0.01ms/Div)

$V_{IN} = 3.6V$, $V_{OUT} = 5V$, $I_{OUT} = 0A$

EN (2V/Div)

VOUT (1V/Div)

ILX (0.2V/Div)

Time (0.1ms/Div)
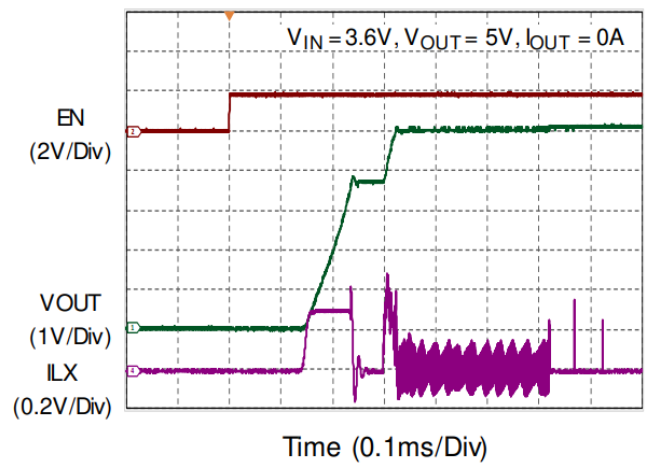
Load Transient
Load Transient

$V_{IN} = 3.6V$, $V_{OUT} = 5V$, $I_{OUT} = 50mA$ to $500mA$, $t_R = t_F = 10\mu s$

VOUT (0.1V/Div)

IOUT (0.2V/Div)

Time (0.1ms/Div)

$V_{IN} = 3.6V$, $V_{OUT} = 5V$, $I_{OUT} = 0mA$ to $750mA$, $t_R = t_F = 10\mu s$

VOUT (0.1V/Div)

IOUT (0.2V/Div)

Time (0.1ms/Div)

Load Transient
Sine Waveform Stability

VOUT (0.1V/Div)

IOUT (0.5V/Div)

$V_{IN} = 3.6V$, $V_{OUT} = 5V$, $I_{OUT} = 750mA$ to $1500mA$, $t_R = t_F = 10\mu s$

Time (0.1ms/Div)

$V_{IN} = 3.6V$, $V_{OUT} = 5V$

VOUT (0.1V/Div)

IOUT (0.5V/Div)

Time (5ms/Div)

PFM Output Ripple
PFM Output Ripple

VIN = 3.6V, VOUT = 5V, IOUT = 0A

VOUT (0.1V/Div)
SW (4A/Div)
ILX (0.4A/Div)

Time (20ms/Div)

VIN = 4.5V, VOUT = 5V, IOUT = 0A

VOUT (0.1V/Div)
SW (4A/Div)
ILX (0.4A/Div)

Time (20ms/Div)

PWM Output Ripple
PWM Output Ripple

VOUT (0.02V/Div)
SW (4V/Div)
ILX (0.4V/Div)

VIN = 3.6V, VOUT = 5V, IOUT = 0.5A

Time (0.0002ms/Div)

VOUT (0.02V/Div)
SW (4V/Div)
ILX (0.4V/Div)

VIN = 4.5V, VOUT = 5V, IOUT = 0.5A

Time (0.0002ms/Div)
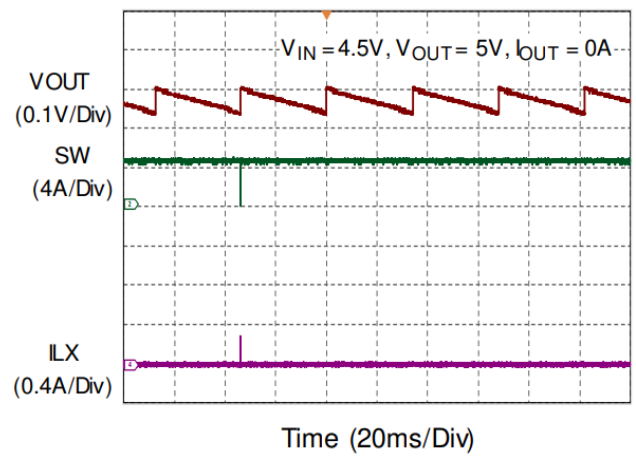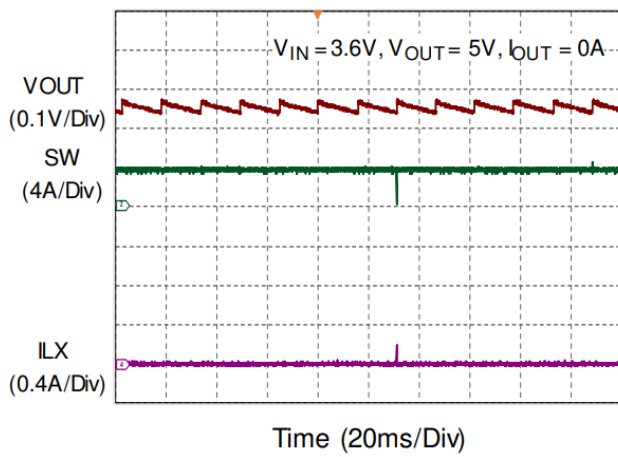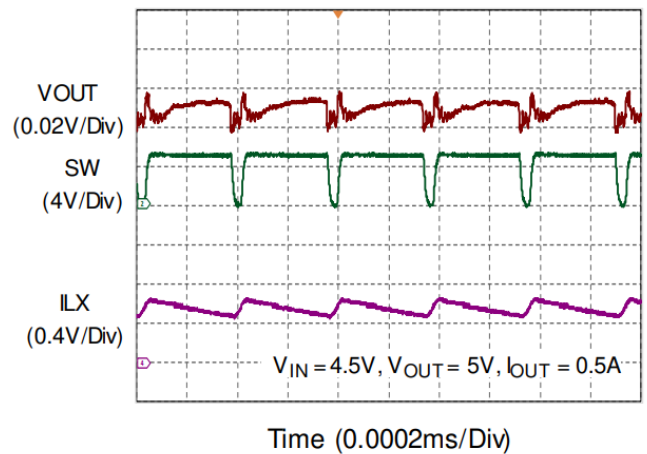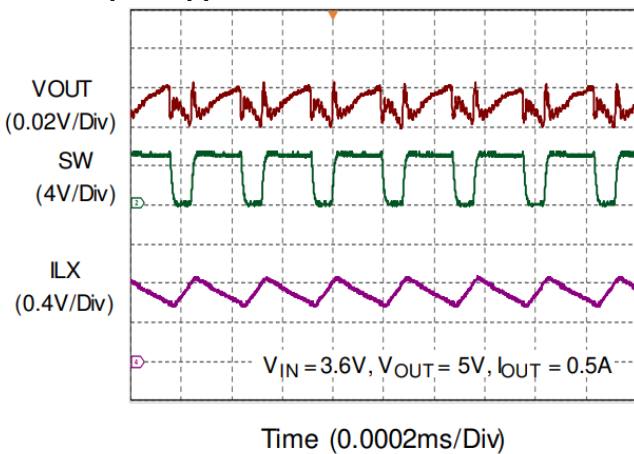
Bypass Mode into Boost Mode
Boost Mode into Bypass Mode

EN (1V/Div)
VOUT (1V/Div)
SW (2V/Div)

VIN = 4.5V, VOUT = 5V, IOUT = 0A

Time (1ms/Div)

EN (1V/Div)
VOUT (1V/Div)
SW (2V/Div)

VIN = 4.5V, VOUT = 5V, IOUT = 0A

Time (1ms/Div)
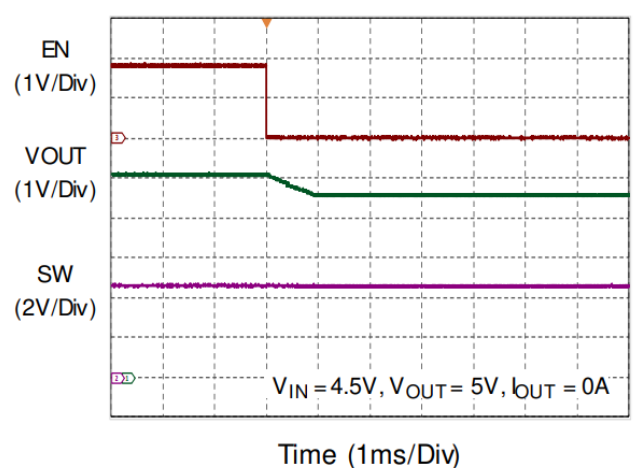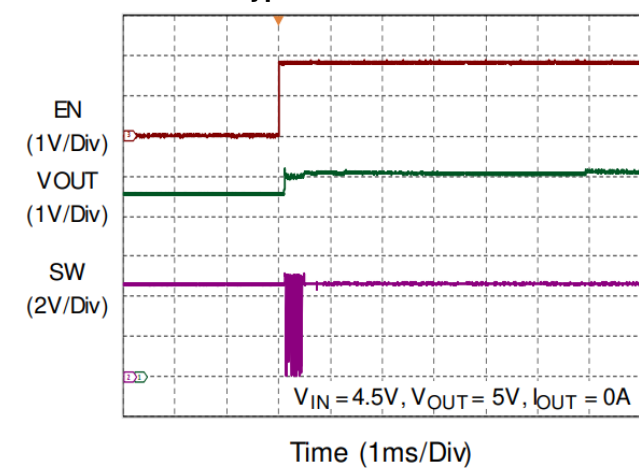
Application Information

Enable

The device can be enabled or disabled by the EN pin. When the EN pin is higher than the threshold of logic-high, the device starts operating with soft-start. Once the EN pin is set at low, the device will be shut down. In shutdown mode, the converter stops switching, internal control circuitry is turned off, and the load is disconnected from the input. This also means that the output voltage can drop below the input voltage during shutdown. Power Frequency Modulation (PFM) PFM is used to improve efficiency at light load. When the output voltage is lower than a set threshold voltage, the converter will operate in PFM. It raises the output voltage with several pulses until the loop exits PFM.

Thermal Shutdown

The device has a built-in temperature sensor which monitors the internal junction temperature. If the temperature exceeds the threshold, the device stops operating. As soon as the IC temperature has decreased below the threshold with a hysteresis, it starts operating again. The built-in hysteresis is designed to avoid unstable operation at IC temperatures near the over temperature threshold.

Inductor Selection

The point of inductor selection is the maximum loading of the application. The example is given by below application condition and equations.

Application condition:

VIN = 3.6V, VOUT = 5V, IOUT = 1.3A, converter efficiency = 90.2%, Frequency = 3.5MHz, L = 1 H.
Step 1 : To calculate input current (IIN).
The recommended nominal inductance value is 1 H. It is recommended to use inductor with dc saturation current ≥ 2200mA.

Input Capacitor Selection

At least a 4.7 F and the rate voltage is 6.3V for DC bias input capacitor is recommended to improve transient behavior of the regulator and EMI behavior of the total power supply circuit for SW. And input capacitor placed as close as possible to the VIN and GND pins of the IC is recommended.

Output Capacitor Selection

At least 10 F capacitors is recommended to improve VOUT ripple.
Output voltage ripple is inversely proportional to COUT.
Output capacitor is selected according to output ripple which is calculated as :
The maximum VRIPPLE occurs at minimum input voltage and maximum output load.

Boost Converter Sleeping Mode Operation

The PFM mode and PWM mode are implemented in the RT4823. PFM mode is design for power saving operation when system is operating in light load.
There is a mode transition between PFM and PWM mode. When system loading is increasing and operating modes transient from PFM mode to PWM mode, the mode changed causes output ripple increasing during the short loading current duration in boundary condition.

Current Limit

The RT4823 employs a valley-current limit detection scheme to sense inductor current during the off-time. When the loading current is increased such that the loading is above the valley current limit threshold, the off-time is increased until the current is decreased to valley-current threshold. Next on-time begins after current is decreased to valley-current threshold. On-time is decided by (VOUT VIN) / VOUT ratio. The output voltage decreases when further loading current increase. The current limit function is implemented by the scheme, refer to Figure 2.

OCP (ILIM(5A)) Shutdown Protection

The RT4823 is implemented OCP shutdown protection. When the converter is operation in boost mode, peak current limit and valley current limit function can not protect IC from short circuit or the huge loading. The RT4823 is implemented truth disconnection function, when peak current is > 5A (Typ.), boost converter will turn off high-side MOSFET (UG) and low-side MOSFET (LG).
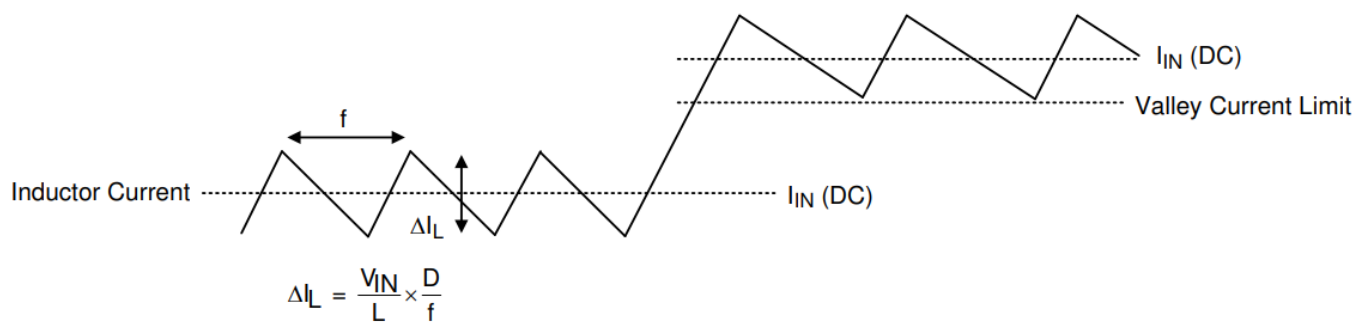
$$\Delta I_L = \frac{V_{IN}}{L} \times \frac{D}{f}$$

Figure 2. Inductor Currents in Current Limit Operation

Figure 2. Inductor Currents in Current Limit Operation

Thermal Considerations

The junction temperature should never exceed the absolute maximum junction temperature TJ(MAX), listed under Absolute Maximum Ratings, to avoid permanent damage to the device. The maximum allowable power dissipation depends on the thermal resistance of the IC package, the PCB layout, the rate of surrounding airflow, and the difference between the junction and ambient temperatures. The maximum power dissipation can be calculated using the following formula :

PD(MAX) = (TJ(MAX) – TA) / JA
where TJ(MAX) is the maximum junction temperature, TA is the ambient temperature, and JA is the junction-to-ambient thermal resistance.
For continuous operation, the maximum operating junction temperature indicated under Recommended Operating Conditions is 125°C. The junction-to- ambient thermal resistance, JA, is highly package dependent. For a WL-CSP-9B 1.3×1.2 (BSC) package, the thermal resistance, JA, is 64.9°C/W on a standard JEDEC 51-7 high effective-thermal-conductivity four-layer test board. The maximum power dissipation at TA = 25°C can be calculated as below :
PD(MAX) = (125°C – 25°C) / (64.9°C/W) = 1.54W for a WL-CSP-9B 1.3×1.2 (BSC) package.
The maximum power dissipation depends on the operating ambient temperature for the fixed TJ(MAX) and the thermal resistance, JA. The derating curves in Figure 3 allows the designer to see the effect of rising ambient temperature on the maximum power dissipation.
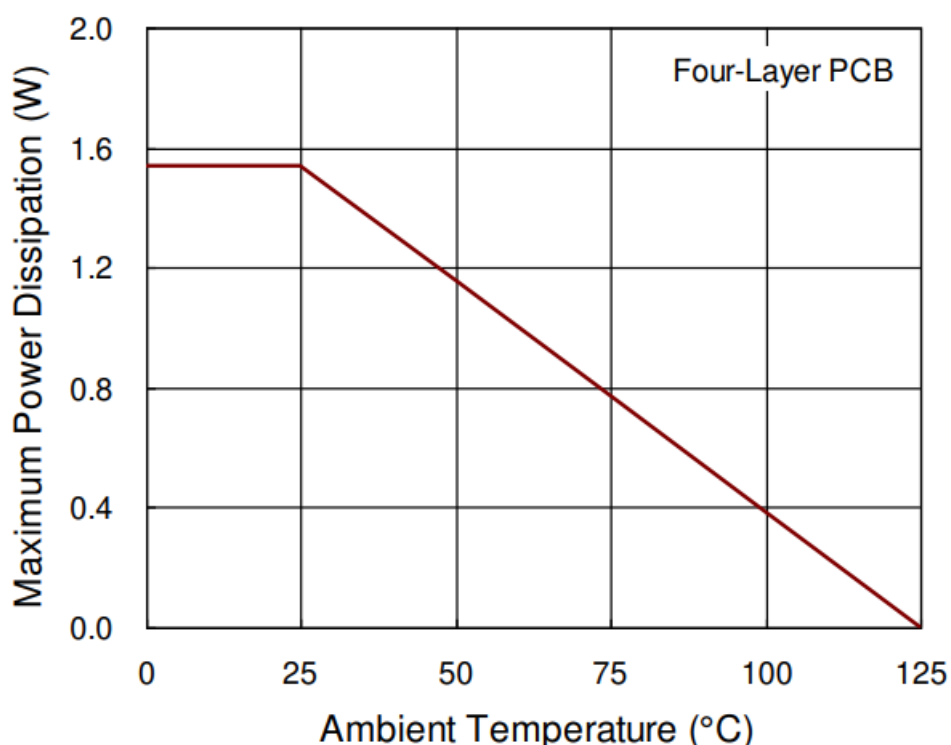
Figure 3. Derating Curve of Maximum Power Dissipation

Layout Considerations

The PCB layout is an important step to maintain the high performance of the RT4823.

Both the high current and the fast switching nodes demand full attention to the PCB layout to save the robustness of the RT4823 through the PCB layout. Improper layout might show the symptoms of poor line or load regulation, ground and output voltage shifts, stability issues, unsatisfying EMI behavior or worsened efficiency. For the best performance of the RT4823, the following PCB layout guidelines must be strictly followed.

- Place the input and output capacitors as close as possible to the input and output pins respectively for good filtering.

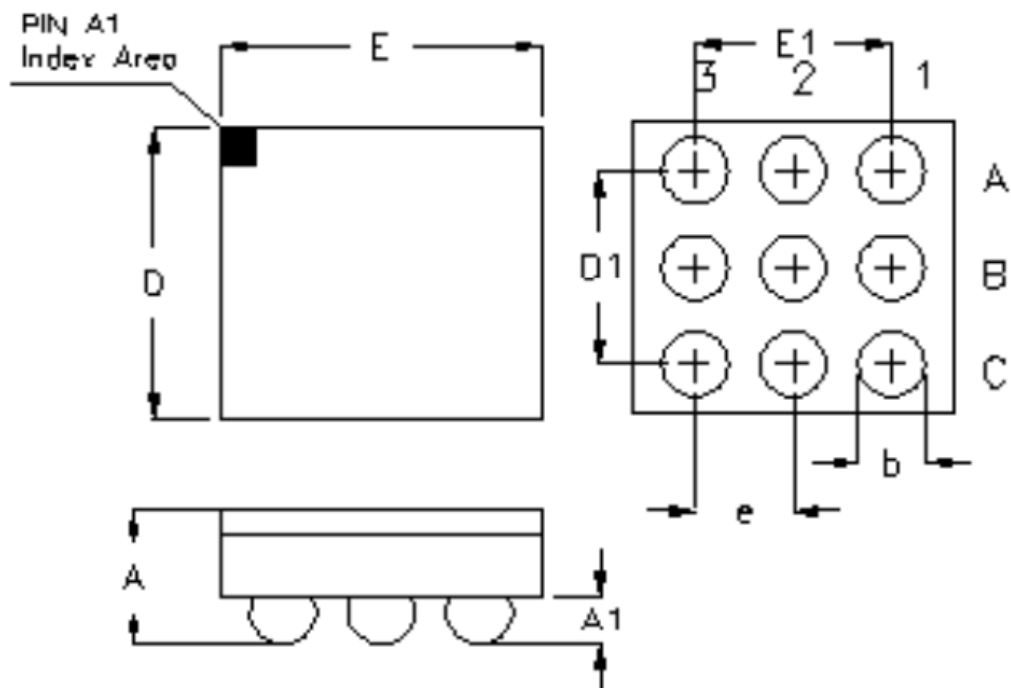- For thermal consider, it needed to maximize the pure area for power stage area besides the SW.
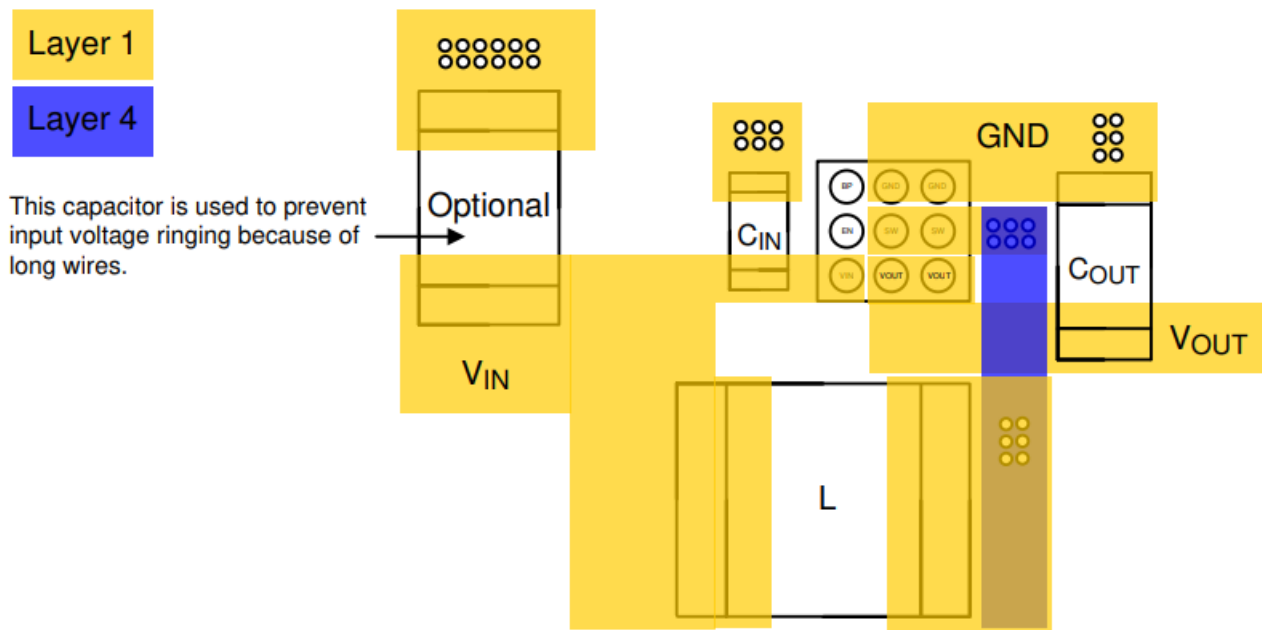
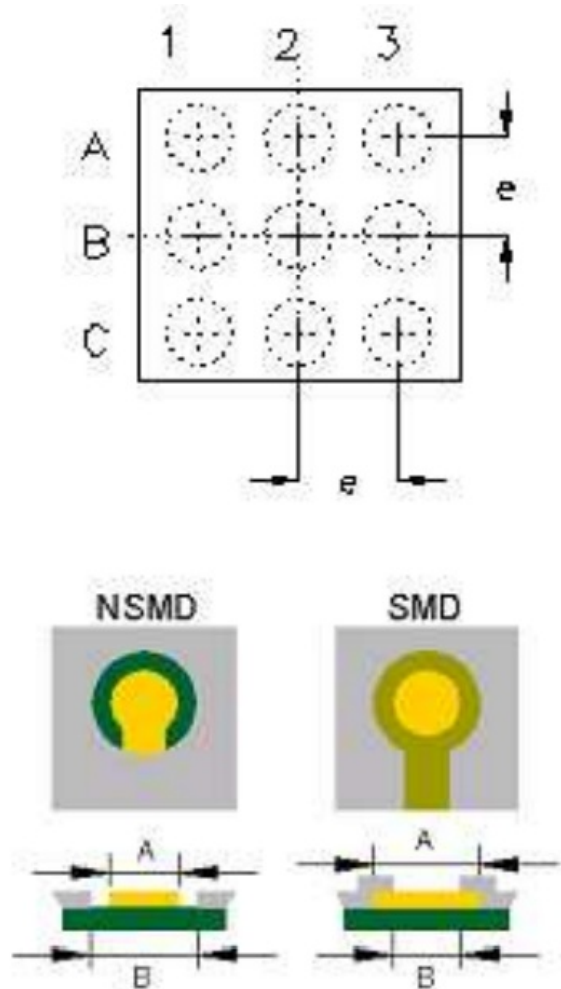Figure 4. PCB Layout Guide

Figure 4. PCB Layout Guide

Outline Dimension

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.500	0.600	0.020	0.024
A1	0.170	0.230	0.007	0.009
b	0.240	0.300	0.009	0.012
D	1.160	1.240	0.046	0.049
D1	0.800		0.031	
E	1.260	1.340	0.050	0.053
E1	0.800		0.031	
e	0.400		0.016	

9B WL-CSP 1.3×1.2 Package (BSC)

Footprint Information
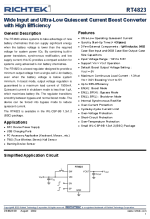
Package	Number of Pin	Type	Footprint Dimension (mm)			Tolerance
			e	A	B	
WL-CSP1.3×1.2-9(BSC)	9	NSMD	0.400	0.240	0.340	±0.025
		SMD		0.270	0.240	

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Documents / Resources

	RICHTEK RT4823 Wide Input and Ultra Low Quiescent Current Boost Converter with High Efficiency [pdf] User Manual RT4823 Wide Input and Ultra Low Quiescent Current Boost Converter with High Efficiency, RT4823, Wide Input and Ultra Low Quiescent Current Boost Converter with High Efficiency, RT4823 Wide Input and Ultra Low Quiescent Current Boost Converter, Wide Input and Ultra Low Quiescent Current Boost Converter, Ultra Low Quiescent Current Boost Converter, Quiescent Current Boost Converter, Current Boost Converter, Boost Converter, Converter

References

- **Richtek Technology**