



**SKYWORKS®**

## Applications

- Battery-powered devices
- USB-powered peripherals
- Consumer, industrial, medical, automotive: battery-powered or wireline

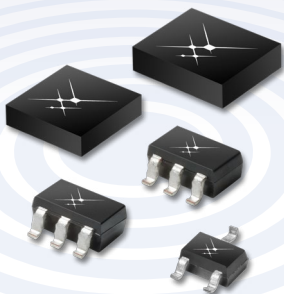
## Features

- High efficiency at light and maximum loads
- Small form factor devices
- Ease of design
- Cost-effective solutions

## **DC/DC Converters (Switching Regulators)**

Skyworks' broad product portfolio includes high-efficiency, pulse width modulation (PWM) switch-mode voltage regulators ideal for a wide variety of applications such as smartphones, portable navigation devices (PNDs), notebook computers, set-top boxes, digital still cameras, and other portable electronic devices. Step-up and step-down converter solutions are available for a range of output power, optimized in both size and performance for specific power levels. The switch-mode products utilize high switching frequencies to minimize output inductor and capacitor size. Internal compensation eliminates the need for additional external components. These products provide optimal light load efficiency and minimum light load ripple. In addition to excellent efficiency, many SwitchReg™ products offer fast turn-on time and fast transient response capabilities. Taking advantage of advanced modular bipolar CMOS DMOS (BCD) processes allows very low resistance switches, and eliminates the need for special packages that require additional thermal relief.

An application engineering team is available to assist you and with your design efforts. Application notes and block diagrams are accessible on Skyworks' Web site: [www.skyworksinc.com](http://www.skyworksinc.com).



## High Efficiency Performance

Figures 1 and 2 compare the efficiency performance of a switching regulator with light load mode (LLM), and and with pulse width modulation (PWM) mode only. Figure 1 displays the regulator efficiency with a PWM only mode. Figure 2 displays the regulator efficiency with a LLM. This mode extends the efficiency of the regulator under standby power (light load) conditions, addressing customer demands for longer battery life required in mobile applications.

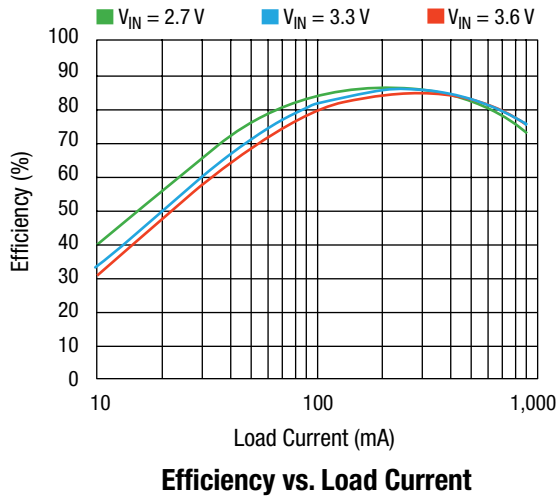


Figure 1. Pulse Width Modulation Mode

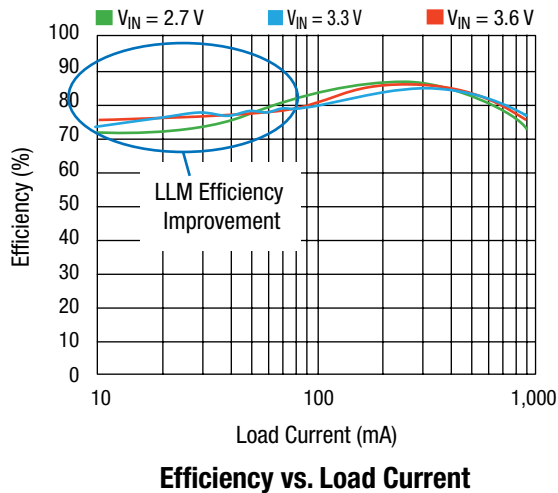


Figure 2. Light Load Mode

## Application Diagrams

Figures 3 and 4 show step-up (boost) converter and step-down (buck) converter application diagrams.

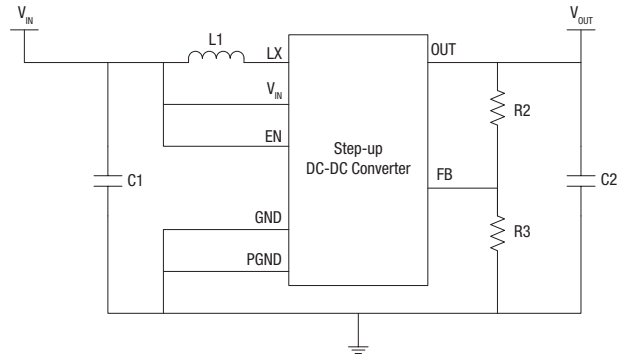


Figure 3. Step-up (Boost) Converter Application Diagram

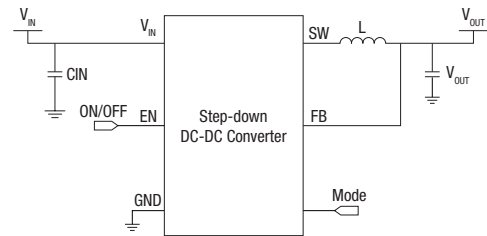














Figure 4. Step-down (Buck) Converter Application Diagram

















## Product Specifications


Electrical specifications for our step-up and step-down converter products are provided in Tables 1 and 2 below.

### Table 1. Step-up Converters





































Part Number	Min. $V_{IN}$ (V)	Max. $V_{IN}$ (V)	Min. $V_{OUT}$ (V)	Max. $V_{OUT}$ (V)	$I_{OUT}$ (mA)	$f_{OSC}$ (kHz)	Typ. $I_Q$ ( $\mu$ A)	Package (mm)
 AAT1210	2.7	5.50	$V_{IN}$	18.0	900	2000	250	TDFN34 16L 3 x 4 x 0.75
 <b>AAT1217</b>	0.5	$V_{OUT}$	2.5	5.5	600	1200	300	TSOT-23 6L 2.9 x 2.8 x 1 SOT23 6L 2.85 x 2.8 x 1.2
 AAT1218	0.5	6.00	2.5	5.5	1000	1200	300	TDFN33 12L 3 x 3 x 0.75
 AAT1219	2.4	$V_{OUT} + 0.25$	3.0	5.0	2000 1200	1200	58	TDFN33 12L 3 x 3 x 0.75
 AAT1230	2.7	5.50	18	18.0	100	2000	40	TSOPJW 12L 3 x 2.85 x 1.02 TDFN34 16L 4 x 3 x 0.75
 AAT1232	2.7	5.50	N/A	24.0	100	2000	40	TSOPJW 12L 3 x 2.85 x 1.02 TDFN34 16L 4 x 3 x 0.75
 AAT1275	2.7	5.00	$V_{IN}$	5.5	500	2000	100	TSOPJW 12L 3 x 2.85 x 1.02 TDFN34 16L 4 x 3 x 0.75
 AAT1275A	2.7	$V_{OUT}$	$V_{IN}$	5.5	500	2000	100	TSOPJW 12L 3 x 2.85 x 1.02 TDFN34 16L 4 x 3 x 0.75
 AAT1276	2.7	5.00	$V_{IN}$	5.5	500	2000	100	TSOPJW 12L 3 x 2.85 x 1.02 TDFN34 16L 4 x 3 x 0.75
 AAT2215	2.4	5.25	3.0	5.5	3000	600	55	TDFN33 12L 3 x 3 x 0.75
 AAT2404	10.8	24.00	$V_{IN} + 3$	100	5000	400	1000	TQFN34-24L 3 x 4 x 0.75
 AAT3125	2.7	5.50	4.6	5.25	100	750	60	QFN44 16L 4 x 4 x 0.93


### Table 2. Step-down Converters

Part Number	Min. $V_{IN}$ (V)	Max. $V_{IN}$ (V)	Min. $V_{OUT}$ (V)	Max. $V_{OUT}$ (V)	$I_{OUT}$ (mA)	$f_{OSC}$ (kHz)	Typ. $I_Q$ ( $\mu$ A)	Package (mm)
 AAT1106	2.5	5.5	0.6	$V_{IN}$	600	1500	270	TSOT23 5L 2.8 x 2.9 x 0.95
 AAT1110	2.7	5.5	0.6	$V_{IN}$	800	1400	27	SC70JW-8 2 x 2.1 x 1.1
 AAT1112	2.7	5.5	0.6	$V_{IN}$	1500	1400	42	TDFN33 12L 3 x 3 x 0.75 TSOPJW 12L 3 x 2.85 x 1
 AAT1120	2.7	5.5	0.6	$V_{IN}$	500	1500	30	STDFN 8L 2 x 2 x 0.55
 AAT1121	2.7	5.5	0.6	$V_{IN}$	250	1500	30	TDFN 8L 2 x 2 x 0.85 STDFN22 8L 2 x 2 x 0.55
 AAT1123	2.7	5.5	0.6	0.6	600	1000	25	SC70JW 8L 2 x 2.1 x 1.1
 AAT1126	2.7	5.5	0.6	0.6	600	1000	25	SOT-23 5L 2.85 x 2.8 x 1.2
 AAT1130	2.7	5.5	0.6	1.8	400	2500	60	SC70JW 10L 2 x 2.2 x 1.1
 AAT1138	2.5	5.5	0.6	$V_{IN}$	2000	1200	300	TDFN 16L 3 x 4 x 0.75
 AAT1141	2.7	5.5	0.6	$V_{IN}$	600	2000	35	SOT-23 5L 2.85 x 2.8 x 1.2 TSOT23 5L 2.9 x 2.8 x 0.95
 AAT1142	2.7	5.5	0.6	2.0	800	2200	35	TSOPJW 12L 3 x 2.85 x 1 TDFN33 12L 3 x 3 x 0.75
 AAT1143	2.7	5.5	0.6	0.6	400	1000	25	SC70JW 8L 2 x 2.1 x 1.1
 AAT1145	2.5	5.5	0.6	$V_{IN}$	1500	1500	300	TDFN33 10L 3 x 3 x 0.75
 AAT1146	2.7	5.5	0.6	$V_{IN}$	400	1400	27	SC70JW-8 2.0 x 2.1 x 1.1 SOT-23 5L 2.85 x 2.8 x 1.2
 AAT1147	2.7	5.5	0.6	$V_{IN}$	400	1400	160	–
 AAT1149	2.7	5.5	1.000	$V_{IN}$	400	3000	45	SC70JW 8L 2 x 2.1 x 1.05 WLCSP 5L 1.235 x 0.91 x 0.58



















 Skyworks' Green™ products are compliant to all applicable materials legislation and are halogen-free. For additional information, please refer to Skyworks Definition of Green™, document number SQ04-0074. New products indicated in **blue**, **bold** are continually being introduced at Skyworks.


**Table 2. Step-down Converters (Continued)**

Part Number	Min. $V_{IN}$ (V)	Max. $V_{IN}$ (V)	Min. $V_{OUT}$ (V)	Max. $V_{OUT}$ (V)	$I_{OUT}$ (mA)	$f_{OSC}$ (kHz)	Typ. $I_Q$ ( $\mu$ A)	Package (mm)
 AAT1149A	2.2	5.5	1.875	1.875	400	2200	3000	WLCSP 5L 1.235 x 0.91 x 0.58
 AAT1149B	2.2	5.5	1.800	1.800	400	2200	45	WLCSP 5L 1.235 x 0.91 x 0.58
 AAT1150	2.7	5.5	1.000	4.200	1000	1000	160	MSOP 8L 4.9 x 3 x 0.95
 AAT1151	2.7	5.5	1.000	4.200	700	850	210	MSOP 8L 4.9 x 3 x 0.95 QFN33 16L 3 x 3 x 0.9
 AAT1153	2.5	5.5	0.600	$V_{IN}$	2000	1200	300	TDFN33 10L 3 x 3 x 0.75
 AAT1154	2.7	5.5	1.000	4.200	3000	1000	630	SOP 8L 4.9 x 6 x 1.55
 AAT1155	2.7	5.5	1.000	4.200	2500	1000	630	MSOP 8L 4.9 x 3 x 0.95
 AAT1157	2.7	5.5	0.800	0.800	1200	1000	160	QFN33 16L 3 x 3 x 0.85
 AAT1160	4.0	13.2	0.600	$V_{IN}$	3000	800	150	TDFN34 16L 3 x 4 x 0.75
 AAT1161	4.0	13.3	0.600	$V_{IN}$	3000	800	150	TDFN33 14L 3 x 3 x 0.75
 AAT1162	4.0	13.4	0.600	$V_{IN}$	1500	800	150	TDFN34 16L 3 x 4 x 0.75
 AAT1171	2.7	5.5	0.600	3.600	600	2000	420	TDFN33 12L 3 x 3 x 0.75 WLCSP 12L 2.235 x 1.535 x 0.645
 AAT1184	6.0	24.0	1.500	5.500	2500	490	600	TSOPJW 12L 3 x 2.85 x 1
 AAT1185	6.0	24.0	1.500	5.500	1000	490	1000	TSOPJW 14L 2.85 x 3.05 x 1.05
 AAT1189	6.0	24.0	1.500	5.500	2500	490	600	TDFN34 16L 3 x 4 x 0.85
 AAT2113B	2.7	5.5	1.000	2.500	1500	3300	55	FTDFN22 8L 2 x 2 x 0.75
 AAT2114A	2.7	5.5	1.000	$V_{IN}$	2500	3000	70	QFN33 16L 3 x 3 x 0.90
 AAT2120	2.7	5.5	0.600	$V_{IN}$	500	1800	45	STDFN22 8L 2 x 2 x 0.55
 AAT2138	2.7	5.5	3.000	$V_{IN}$	2500	2800	90	TDFN 14L 3 x 3 x 0.75
 AAT2146	2.7	5.5	0.600	$V_{IN}$	600	2000	37	SC70JW 8L, 2.0 x 2.1 x 1.05
 AAT2146W	2.7	5.5	0.600	$V_{IN}$	600	2000	37	–
 AAT2148	2.7	5.5	0.600	$V_{IN}$	1000	2000	37	QFN33 16L 3 x 3 x 0.85
 AAT2153	2.7	5.5	0.600	$V_{IN}$	2500	1400	42	QFN33 16L 3 x 3 x 0.85
 AAT2158	2.4	5.5	0.600	$V_{IN}$	1500	1400	42	QFN33 16L 3 x 3 x 0.90
 AAT2500	2.7	5.5	0.6	$V_{IN}$	400; LDO 300	1000	25; LDO 70	TDFN33 12L 3 x 3 x 0.75
 AAT2500M	2.7	5.5	0.6	$V_{IN}$	400; LDO 300	1800	130	TSOPJW 12L 3 x 2.85 x 1.02
 AAT2503	2.7	5.5	0.6	$V_{IN}$	800; LDO 300	2000	85	QFN34 20L 3 x 4 x 0.93
 AAT2504	2.7	5.5	0.6	$V_{IN}$	800; LDO 300	2000	80	QFN34 20L 3 x 4 x 0.925
 AAT2505	2.7	5.5	0.6	$V_{IN}$	600; LDO 300	1400	27; LDO 70	TDFN33 12L 3 x 3 x 0.75
 AAT2506	2.7	5.5	0.6	$V_{IN}$	600; LDO 300	1000	25; LDO 70	TDFN33 12L 3 x 3 x 0.75
 AAT2510	2.7	5.5	0.60	$V_{IN}$	400/ch	1000	25/ch	TDFN33 12L 3 x 3 x 0.75
 AAT2511	2.7	5.5	0.60	$V_{IN}$	600/ch	1000	25/ch	TDFN33 12L 3 x 3 x 0.75
 AAT2512	2.7	5.5	0.60	$V_{IN}$	400/ch	1400	27/ch	TDFN33 12L 3 x 3 x 0.75
 AAT2513	2.7	5.5	0.60	$V_{IN}$	600/ch	1700	60	QFN33 16L 3 x 3 x 0.85
 AAT2514	2.5	5.5	0.60	$V_{IN}$	600/ch	1500	500	TDFN33 10L 3 x 3 x 0.75
 AAT2515	2.7	5.5	0.60	$V_{IN}$	600/ch	1400	27	TDFN33 12L 3 x 3 x 0.75

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**Table 2. Step-down Converters (Continued)**

Part Number	Min. $V_{IN}$ (V)	Max. $V_{IN}$ (V)	Min. $V_{OUT}$ (V)	Max. $V_{OUT}$ (V)	$I_{OUT}$ (mA)	$f_{OSC}$ (kHz)	Typ. $I_Q$ ( $\mu$ A)	Package (mm)
 AAT2522	2.7	5.5	0.60	$V_{IN}$	3000/ch	1400	90	TDFN34 16L 3 x 4 x 0.85
 AAT2687	6.0	24.0	1.50	5.5	4500; LDO 600	490	600	TQFN45 24L 4 x 5 x 0.75
 AAT2688	6.0	24.0	0.80	5.5	4500; LDO 600	490	600	TQFN45 24L 4 x 5 x 0.75
 AAT2689	6.0	24.0	1.50	5.5	2500; LDO 600	490	600	TDFN34 16L 3 x 4 x 0.75
 AAT2713	2.7	5.5	0.60	$V_{IN}$	600/ch	1700	70	QFN33 16L 3 x 3 x 0.85
 AAT2749	2.3	5.5	1.80	1.0	600; LDO 300	3000	100	WLCSP 9L 1.35 x 1.36 x 0.50 (205 $\mu$ m bump in 400 $\mu$ m pitch)
 AAT2782	2.7	5.5	0.60	$V_{IN}$	1200; 600; 400	1300	N/A	TDFN34 16L 3 x 4 x 0.85
 AAT2783	2.7	5.5	0.60	$V_{IN}$	1000; 400; LDO 400	1300	N/A	TDFN34 16L 3 x 4 x 0.85
 AAT2784	2.7	5.5	0.60	$V_{IN}$	1500; 300	1800	45–50	TDFN34 16L 3 x 4 x 0.85
 AAT2785	2.7	5.5	0.60	$V_{IN}$	1500; 600	1800	45–50	TDFN34 16L 3 x 4 x 0.85
 AAT2786	2.5	5.5	0.60	$V_{IN}$	1500; LDO 150	1500	40	TDFN34 16L 3 x 4 x 0.85
 AAT2789	2.7	5.5	0.60	$V_{IN}$	1700; 800	1400	42	TDFN34 16L 3 x 4 x 0.85
 AAT3183	2.7	5.5	1.34	1.5	300	2000	35	SC70JW 8L 2 x 2.1 x 1.1
 SKY87000-11	2.7	5.5	0.40	4.25	2500	2000	135	WLCSP 9B 1.42 x 1.49
 <b>SKY87000-13</b>	2.7	5.5	0.40	4.25	2000	2000	135	WLCSP 9B 1.42 x 1.49
 <b>SKY87201-11</b>	2.7	5.5	0.60	$V_{IN}$	600	2000	37	STDFN 8L 2.0 x 2.1 x 1.05
 <b>SKY87250</b>	2.7	5.5	0.60	$V_{IN}$	400	2000	40	DLN 8L 2.4 x 2.4 x 0.9
 <b>SKY87608</b>	4.5	28.0	0.90	$0.8 \times V_{IN}$	3000	450	1600	SOP 8L 4.54 x 6 x 1.75

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## Reference Materials

### Application Notes

For additional information, please refer to the following Application Notes and Published Articles.

*Setting the Current Limit for the AAT1184/85/89, AAT2687/88/89 High Voltage Step-Down Family, 202375*

*Design Type III Compensation Network for Voltage Mode Step-down Converters, 202376*

*Output Inductor Selection for the AAT115X Series Buck Converter, AN-108*

*Output Capacitor Selection for the AAT115X Series Buck Converter, AN-106*

### Gerber Files

Please refer to our Web site for Gerber files, which are available for some DC/DC converter products.

Our DC/DC converter products leverage Skyworks' extensive design knowledge, technical leadership, manufacturing expertise, and superior quality.

An application engineering team is available to assist you with your design efforts.

## Block Diagrams

Please visit [http://www.skyworksinc.com/BlockDiagrams\\_Power\\_Management.aspx](http://www.skyworksinc.com/BlockDiagrams_Power_Management.aspx) for Skyworks, complete library of Power Management block diagrams.

You may also visit <http://www.skyworksinc.com> for the full list of Skyworks' block diagrams representing our broad product portfolio.

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