3A, 23V, 340kHz Synchronous Rectified Step-Down Converter

❖ GENERAL DESCRIPTION

The AX3484 is a monolithic synchronous buck regulator. The device integrates two 100mΩ MOSFETs, and provides 3A of continuous load current over a wide input voltage of 4.75V to 23V. Current mode control provides fast transient response and Cycle-by-Cycle current limit.

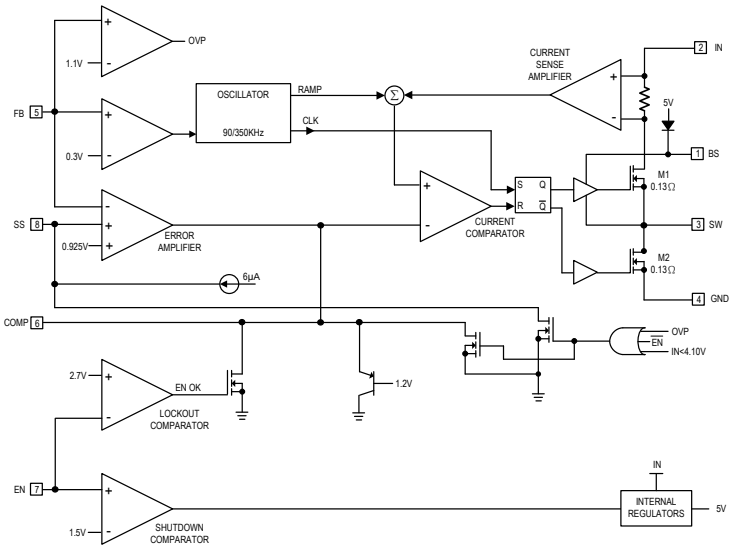
An adjustable soft-start prevents inrush current at turn-on, and in shutdown mode the supply current drops to 1μA.

This device, available in an 8-pin SOP with exposed pad package, provides a very compact solution with minimal external components.

❖ FEATURES

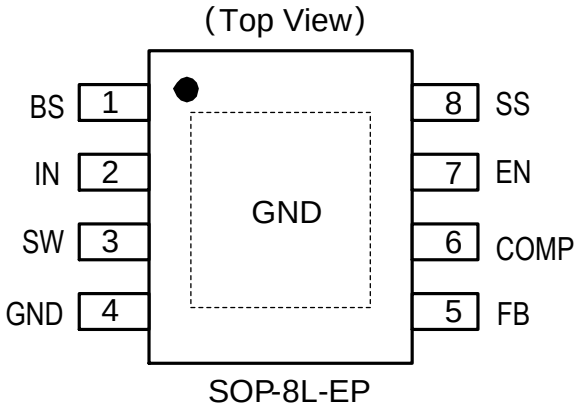
- 3A Output Current
- Wide 4.75V to 23V Operating Input Range
- Integrated 100mΩ Power MOSFET Switches
- Output adjust from V_{FB} to 20V
- Up to 95% Efficiency
- Programmable Soft-Start
- Stable with Low ESR Ceramic Output Capacitors
- Fixed 350KHz Frequency
- Cycle-by-Cycle Over Current Protection
- Thermal shutdown and short circuit protections

❖ BLOCK DIAGRAM



❖ PIN ASSIGNMENT

The package of AX3484 is SOP-8L-EP; the pin assignment is given by:



Name	Description
BS	High-Side Gate Drive Boost Input. BS supplies the drive for the high-side N-Channel MOSFET switch. Connect a 0.01μF or greater capacitor from SW to BS to power the high side switch.
IN	Power Input. IN supplies the power to the IC, as well as the step-down converter switches. Drive IN with a 4.75V to 23V power source. Bypass IN to GND with a suitably large capacitor to eliminate noise on the input to the IC. See Input Capacitor.
SW	Power Switching Output. SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load. Note that a capacitor is required from SW to BS to power the high-side switch.
GND	Ground.
FB	Feedback Input. FB senses the output voltage to regulate that voltage. Drive FB with a resistive voltage divider from the output voltage. The feedback threshold is 0.925V. See Setting the Output Voltage.
COMP	Compensation Node. COMP is used to compensate the regulation control loop. Connect a series RC network from COMP to GND to compensate the regulation control loop. In some cases, an additional capacitor from COMP to GND is required. See Compensation Components.
EN	Enable Input. EN is a digital input that turns the regulator on or off. Drive EN high to turn on the regulator, drive it low to turn it off. Pull up with 100kΩ resistor for automatic startup.
SS	Soft-Start Control Input. SS controls the soft start period. Connect a capacitor from SS to GND to set the soft-start period. A 0.1μF capacitor sets the soft-start period to 15ms. To disable the soft-start feature, leave SS unconnected.

❖ ORDER/MARKING INFORMATION

Order Information	Top Marking
AX3484 XX X Package Type ES: SOP-8L-EP Packing Blank: Tube A : Taping	Logo ← AX3484 → Part number YYWWX → ID code:internal WW: 01~52 Year: 10=2010 11=2011

❖ ABSOLUTE MAXIMUM RATINGS (at T_A=25°C)

Characteristics	Symbol	Rating	Unit
Input Voltage	V_{IN}	–0.3 to +24	V
Switch Node Voltage	V_{SW}	-1V to V_{IN}+0.3V	V
Boost Voltage	V_{BS}	V_{SW} – 0.3 to VSW + 6	V
All Other Pins		–0.3 to +6	V
Lead Temperature		260	°C
Storage Temperature		–65 to +150	°C
Junction Temperature	T_J	150	°C
Output Voltage	V_{OUT}	0.925 to 20	V
Ambient Operating Temperature		–40 to +85	°C
Thermal Resistance from Junction to case	θ_{JC}	15	°C/W
Thermal Resistance from Junction to ambient	θ_{JA}	40	°C/W

Note: θ_{JA} is measured with the PCB copper area of approximately 1 in^2(Multi-layer).

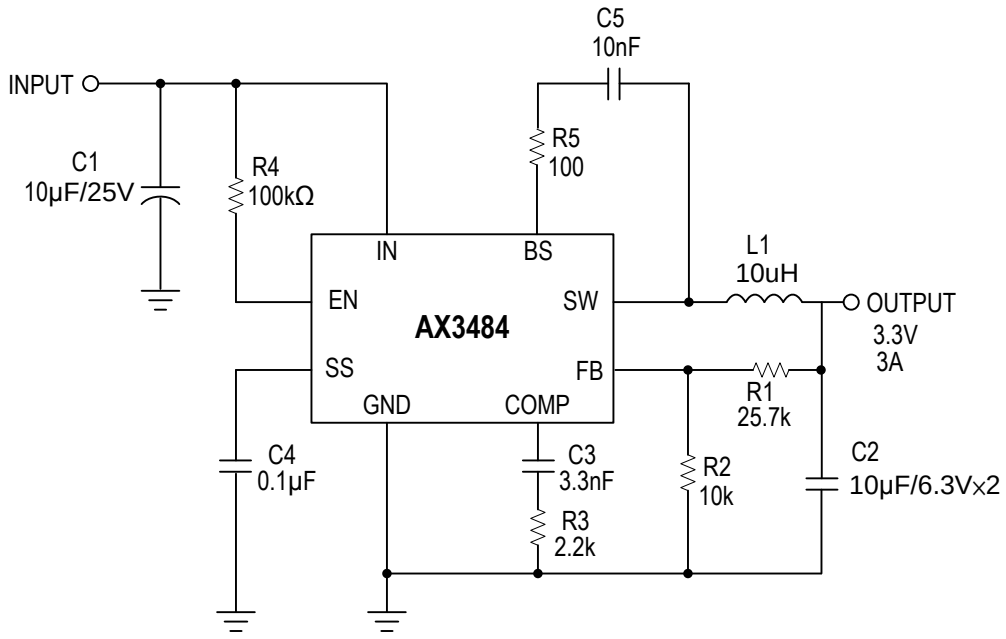
❖ ELECTRICAL CHARACTERISTICS

(V_{IN} = 12V, T_A = +25°C, unless otherwise noted.)

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Operating Voltage	V_{IN}		4.75	-	23	V
Shutdown Supply Current	I_{SD}	V_{EN} = 0V	-	1	3.0	μA
Feedback Voltage	V_{FB}	4.75V ≤ V_{IN} ≤ 23V	0.900	0.925	0.950	V
High-Side Switch On Resistance (Note)	$R_{DS(ON)1}$		-	100	-	mΩ
Low-Side Switch On Resistance (Note)	$R_{DS(ON)2}$		-	100	-	mΩ
High-Side Switch Leakage Current		V_{EN} = 0V, V_{SW} = 0V	-	-	10	μA
Switch Current Limit			3.8	-	-	A
Oscillation Frequency	F_{OSC1}		280	350	430	KHz
Short Circuit Oscillation Frequency	F_{OSC2}	V_{FB} = 0V	-	90	-	KHz
Maximum Duty Cycle	D_{MAX}	V_{FB} = 0.8V	-	90	-	%
EN Shutdown Threshold Voltage	ENH	V_{EN} Rising	1.1	1.5	2.0	V
EN Shutdown Threshold Voltage Hysterisis			-	210	-	mV
EN Lookout Threshold Voltage			2.4	2.7	3.0	V
EN Lookout Hysterisis			-	210	-	mV
Soft-Start Current	I_{SS}	V_{SS} = 0V	-	6	-	μA
Soft-Start Period		C_{SS} = 0.1μF	-	15	-	ms
Thermal Shutdown	T_{SD}		-	160	-	°C
Thermal Shutdown Hysterisis	T_{SH}		-	35	-	°C

Note: Guaranteed by design.

❖ APPLICATION CIRCUIT



$V_{OUT}=V_{FB} \times (1+\frac{R1}{R2})$, V_{FB} = 0.925V, R2 suggest 10k~30KΩ

Table Recommended Component Selection

V_{IN} (V)	V_{OUT} (V)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	C3 (nF)	L1 (μH)	C_{OUT} (μF)
12	5	44.1	10	2.2	3.3	15	10 X 2
5 or 12	3.3	25.7	10	2.2	3.3	10	10 X 2
5 or 12	1.8	9.5	10	2.2	3.3	4.7	10 X 2
5 or 12	1.2	3	10	2.2	3.3	3.3	10 X 2
5 or 12	1	0.81	10	2.2	3.3	2.2	10 X 2

❖ FUNCTION DESCRIPTIONS

The AX3484 is a synchronous rectified, current-mode, step-down regulator. It regulates input voltages from 4.75V to 23V down to an output voltage as low as 0.925V, and supplies up to 3A of load current.

The AX3484 uses current-mode control to regulate the output voltage. The output voltage is measured at FB through a resistive voltage divider and amplified through the internal Tran conductance error amplifier. The voltage at the COMP pin is compared to the switch current measured internally to control the output voltage.

The converter uses internal N-Channel MOSFET switches to step-down the input voltage to the regulated output voltage. Since the high side MOSFET requires a gate voltage greater than the input voltage, a boost capacitor connected between SW and BS is needed to drive the high side gate. The boost capacitor is charged from the internal 5V rail when SW is low.

❖ APPLICATION INFORMATION

COMPONENT SELECTION

Setting the Output Voltage

The output voltage is set using a resistive voltage divider from the output voltage to FB pin. The voltage divider divides the output voltage down to the feedback voltage by the ratio:

$$V_{FB}=V_{OUT} \times \frac{R2}{R1+R2}$$

Where VFB is the feedback voltage and V_{OUT} is the output voltage.
Thus the output voltage is:

$$V_{OUT}=0.925 \times \frac{R1+R2}{R2}$$

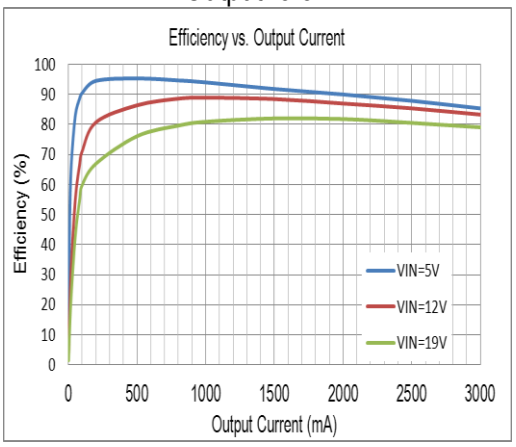
R2 can be as high as 100kΩ, but a typical value is 10kΩ. Using the typical value for R2, R1 is determined by:

$$R1=10.811 \times (V_{OUT} - 0.925)\ (k\Omega)$$

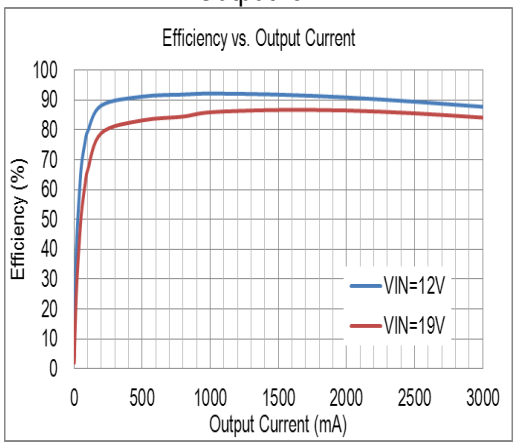
For example, for a 3.3V output voltage, R2 is 10kΩ, and R1 is 25.7kΩ.

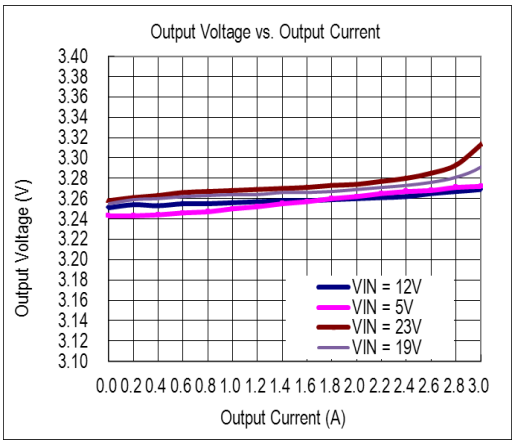
❖TYPICAL CHARACTERISTICS

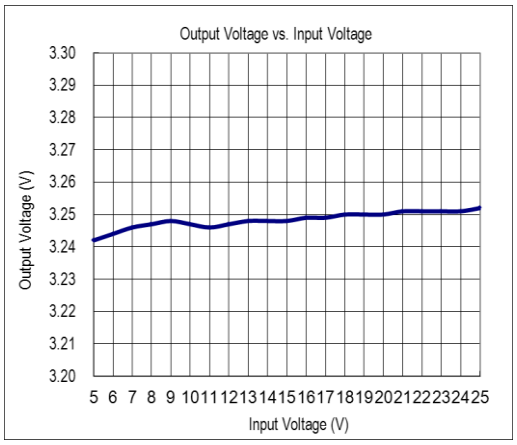
Output=3.3V

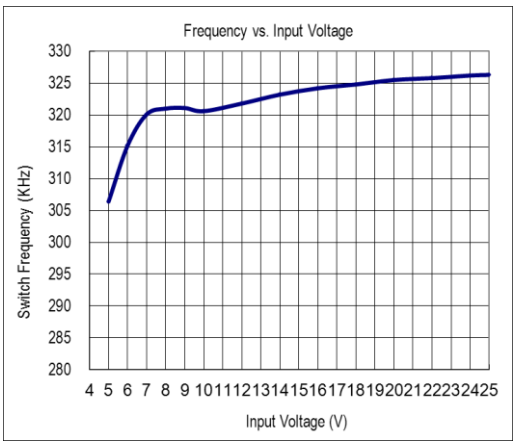


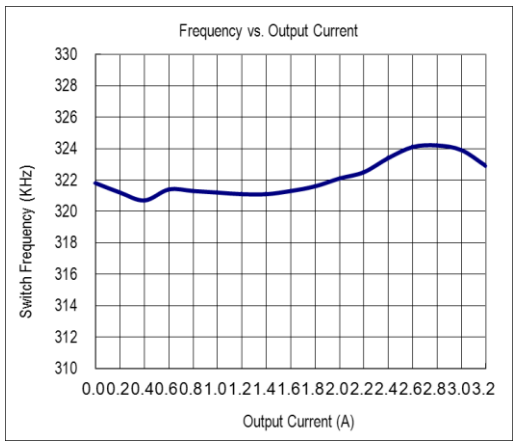
Output=5V





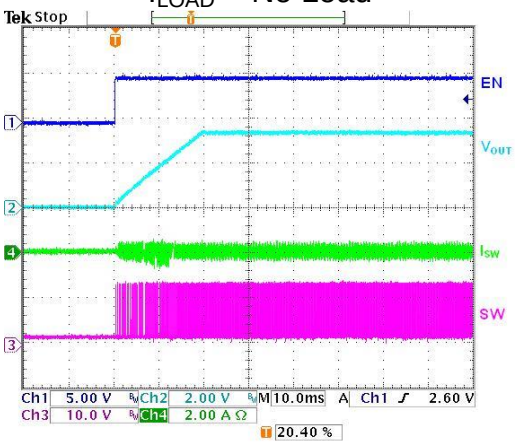




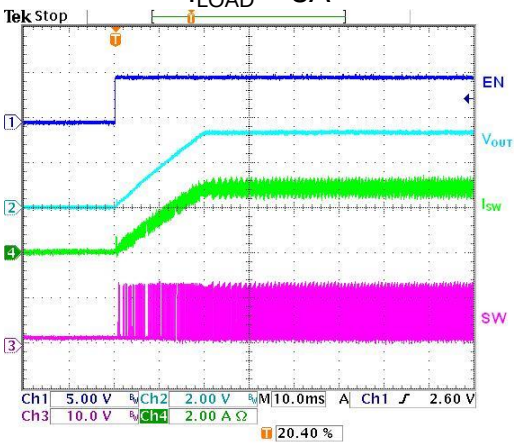


❖TYPICAL CHARACTERISTICS (COUNTINOUS)

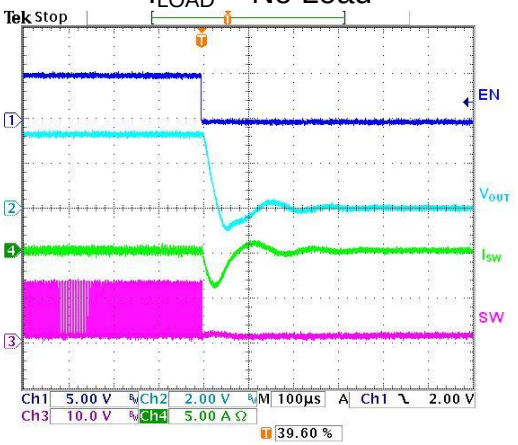
V_{IN} = 12V, V_{OUT} = 3.3V,
I_{LOAD} = No Load



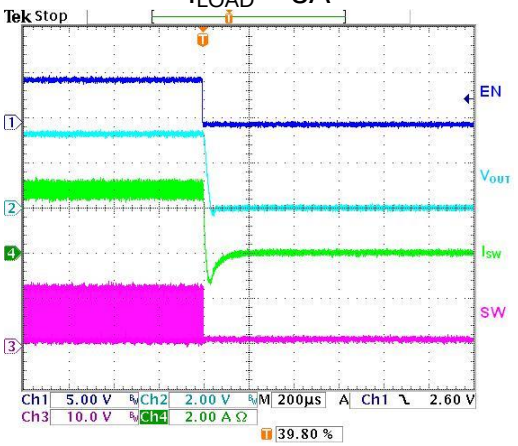
V_{IN} = 12V, V_{OUT} = 3.3V,
I_{LOAD} = 3A



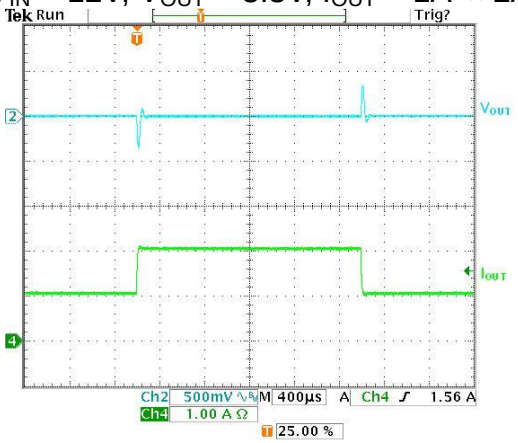
V_{IN} = 12V, V_{OUT} = 3.3V,
I_{LOAD} = No Load



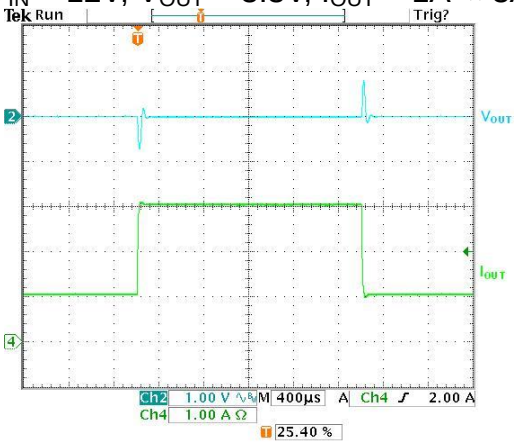
V_{IN} = 12V, V_{OUT} = 3.3V,
I_{LOAD} = 3A



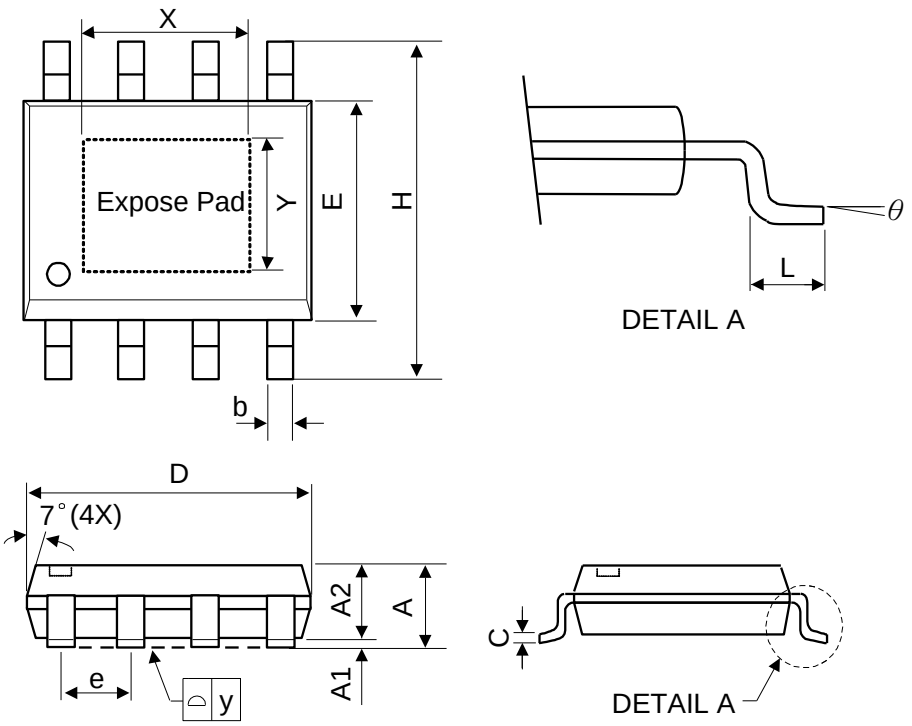
V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 1A ⇔2A



V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 1A ⇔3A



❖ PACKAGE OUTLINES



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.75	-	-	0.069
A1	0	-	0.15	0	-	0.06
A2	1.25	-	-	0.049	-	-
C	0.1	0.2	0.25	0.0075	0.008	0.01
D	4.7	4.9	5.1	0.185	0.193	0.2
E	3.7	3.9	4.1	0.146	0.154	0.161
H	5.8	6	6.2	0.228	0.236	0.244
L	0.4	-	1.27	0.015	-	0.05
b	0.31	0.41	0.51	0.012	0.016	0.02
e	1.27 BSC			0.050 BSC		
y	-	-	0.1	-	-	0.004
X	-	2.34	-	-	0.092	-
Y	-	2.34	-	-	0.092	-
θ	0°	-	8°	0°	-	8°

Mold flash shall not exceed 0.25mm per side
JEDEC outline: MS-012 BA

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Isolated DC/DC Converters ***category:***

Click to view products by Axelite ***manufacturer:***

Other Similar products are found below :

FMD15.24G PSL486-7LR Q48T30020-NBB0 18362 JAHW100Y1 SPB05C-12 SQ24S15033-PS0S 19-130041 CE-1003 RDS180245 MAU228 J80-0041NL DFC15U48D15 XGS-1205 NCT1000N040R050B SPB05B-15 SPB05C-15 L-DA20 DCG40-5G QME48T40033-PGB0 AK1601-9RT DPA423R VI-R5022-EXWW PSC128-7iR RPS8-350ATX-XE DAS1004812 PQA30-D24-S24-DH vi-m13-cw-03 VI-LN2-EW VI-PJW01-CZY CK2540-9ERT AK-1615-7R 700DNC40-CON-KIT-8G 350DNC40-CON-KIT-9G 088-101348-G VI-L52-EW VI-L53-CV PQA30-D48-S12-TH VI-L50-IY VI-LC63-EV AM2D-051212DZ 24IBX15-50-0ZG HZZ01204-G SPU02L-09 SPU02M-09 SPU02N-09 UNO-PS/350-900DC/24DC/60W QUINT4-BUFFER/24DC/20 QUINT4-CAP/24DC/5/4KJ QUINT4-CAP/24DC/10/8KJ