

Synchronous Rectifier MOSFET Driver

■ Features

- V_{OUT} slew-rate minimum 100V/uS @ $CL=3000pF$
- $I_{OUT}(\text{sink \& source})=1.2 / 0.9 A$
- Safety considered.
- Reduce power system thermal & increase system efficiency.
- **Pb-free packages:** SOT89-5L, SOP-8L

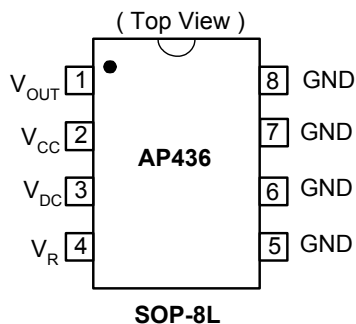
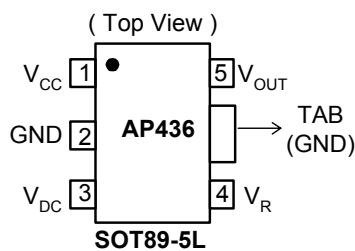
■ Application

- Power Adapter.
(50~120W for LCD Monitor & NB...etc.)

■ General Descriptions

The AP436 is a high-speed controller designed to drive N-channel power MOSFET used as synchronous rectifiers in high current, high frequency fly-back converters. The circuit does not require any ties to the primary side and derives its operating power directly from the secondary. The circuit functions are structured by anticipating transformer output transitions then turns the power MOSFET on or off before the transitions of the transformer to minimize body drain diode conduction and reduce associated losses.

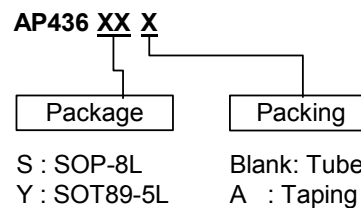
■ Pin Assignment



■ Pin Descriptions

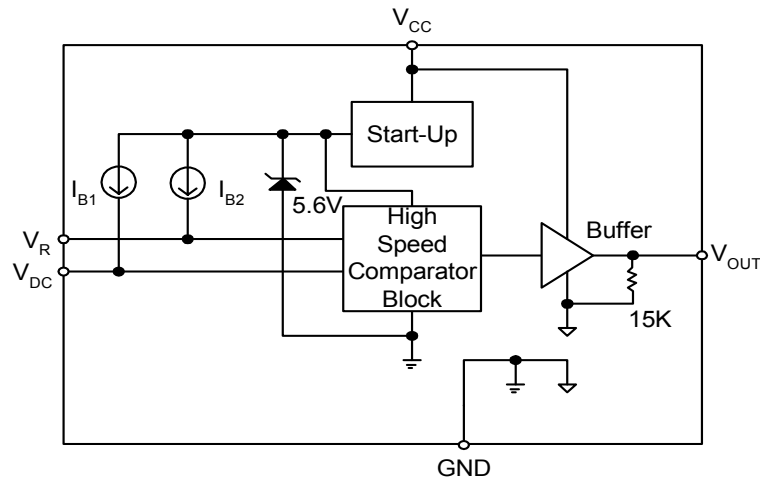
Name	Description
V_{CC}	Operating voltage input
V_R	Reference input voltage
V_{DC}	Duty cycle input voltage
V_{OUT}	Output voltage for driving N channel MOSFET
GND	Ground

■ Ordering Information



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■ Block Diagrams



■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{CC}	Supply Voltage	14	V
V_R	Reference input voltage	$-0.3 \leq V \leq 2.5$	V
V_{DC}	Duty cycle input voltage	$-0.3 \leq V \leq V_{CC} - 2.1$	V
V_{OUT}	Output voltage to Ground	-0.7	V
P_D	Power dissipation	1	W
T_{ST}	Storage temperature range	-65 to 150	°C
T_{OP}	Operating temperature range	-40 to +125	°C
V_{OP}	Operating voltage range	7.2 to 14	V

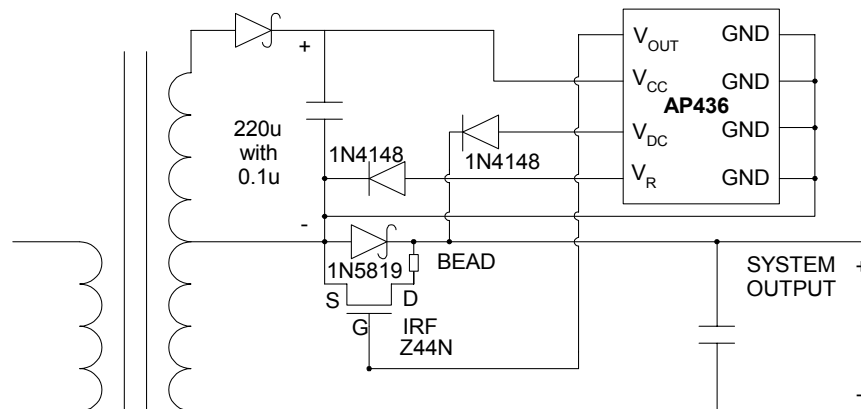
**Synchronous Rectifier MOSFET Driver****■ Electrical Characteristics**Unless otherwise specified, guaranteed for $T_j=25^{\circ}\text{C}$, $V_{CC}=12\text{V}$.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{CC}	Supply Voltage		7.2	12	14	V
I_{B1}	Input Bias Current (Pin V_R)	$V_R=0.7\text{V}, V_{CC}=12\text{V}$	-74	-103	-150	μA
I_{B2}	Input Bias Current (Pin V_{DC})	$V_{DC}=0.7\text{V}, V_{CC}=12\text{V}$	-74	-103	-150	μA
V_R	Reference Pin Voltage Range		0.3	0.7	1.5	V
V_{DCL}	Minimum Input Signal Voltage		-0.3			V
V_{OH}	Output High	$C_L=3000\text{pF}$	$V_{CC}-1.5$			V
V_{OL}	Output Low	$R_L=2\text{K}$		0.8	0.9	V
V_{DC}	Detection Voltage		V_R		V_R+6	mV
V_{CM}	Common Mode Range		0.7		1.5	V
I_S	Supply Current (Average Value)	$V_{CC}=12\text{V}, \text{No Load}$		5.5	6	mA
I_{SOURCE}	Sourcing Current (Transient Value)	$V_{CC}=12\text{V}, C_L=3000\text{pF}$ $R_L=2\text{K}, C_{in}=47\mu\text{F},$		1250		mA
I_{SINK}	Sinking Current (Transient Value)	$F_{Vdc}=200\text{KHz}$		900		mA
I_{OP}	Operation Current (Average Value)			14		mA
T_{PD}	Output Delay Time(Low to High)	$V_{CC}=12\text{V}, C_L=3000\text{pF}$ $R_L=2\text{K}, C_{in}=47\mu\text{F},$ $F_{Vdc}=60\text{KHz}$	80	100		nS
	Output Delay Time(High to Low)		60	100		nS
T_R	Output Rise Time (10% ~ 90% Rise Edge)		35	100		nS
T_F	Output Fall Time (10% ~ 90% Fall Edge)		60	100		nS
F_{OP}	Maximum Operation Frequency					200
P_D	Power Dissipation	SOT89-5L, SOP-8L		1		W
I_{SD}	(Icc Shutdown Current)	$V_{CC}=5\text{V},$ $C_L=3000\text{pF}$ $R_L=2\text{K}, C_{in}=47\mu\text{F},$ $F_{Vdc}=60\text{KHz}$		0.2	0.43	mA

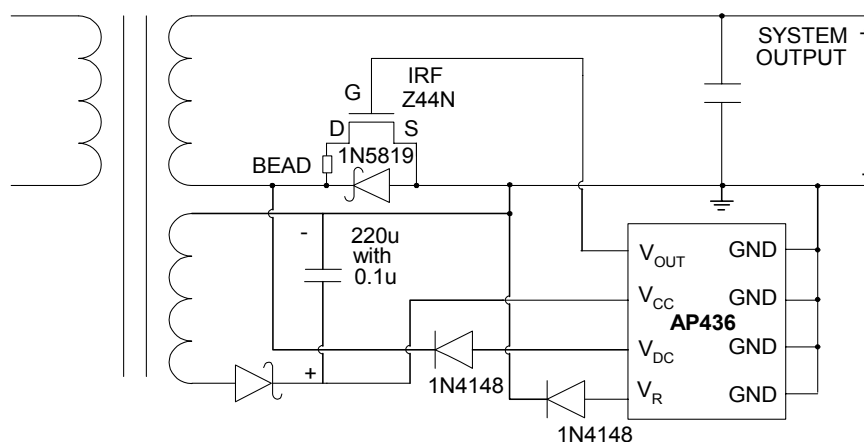
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■ Typical Application Circuit

(1)

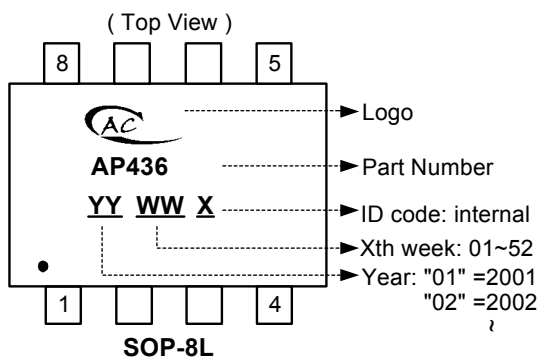


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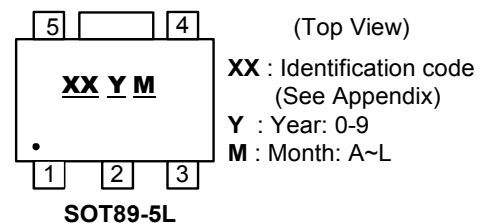


■ Marking Information

(1)



(2)



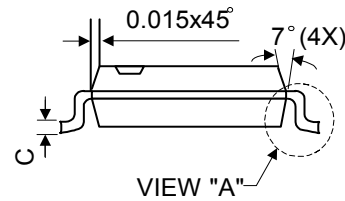
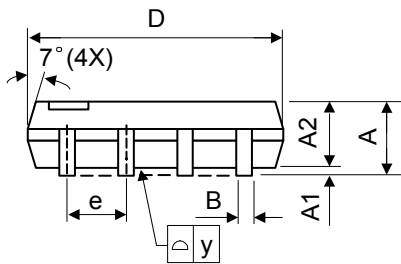
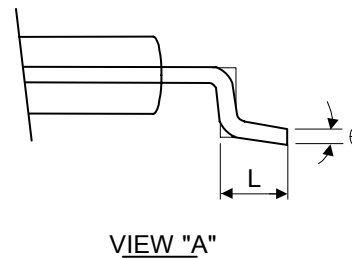
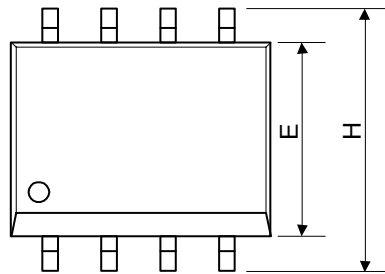
Appendix

Part Number	Package	Identification Code
AP436	SOT89-5L	FM

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■ Package Information

(1) Package Type: SOP-8L

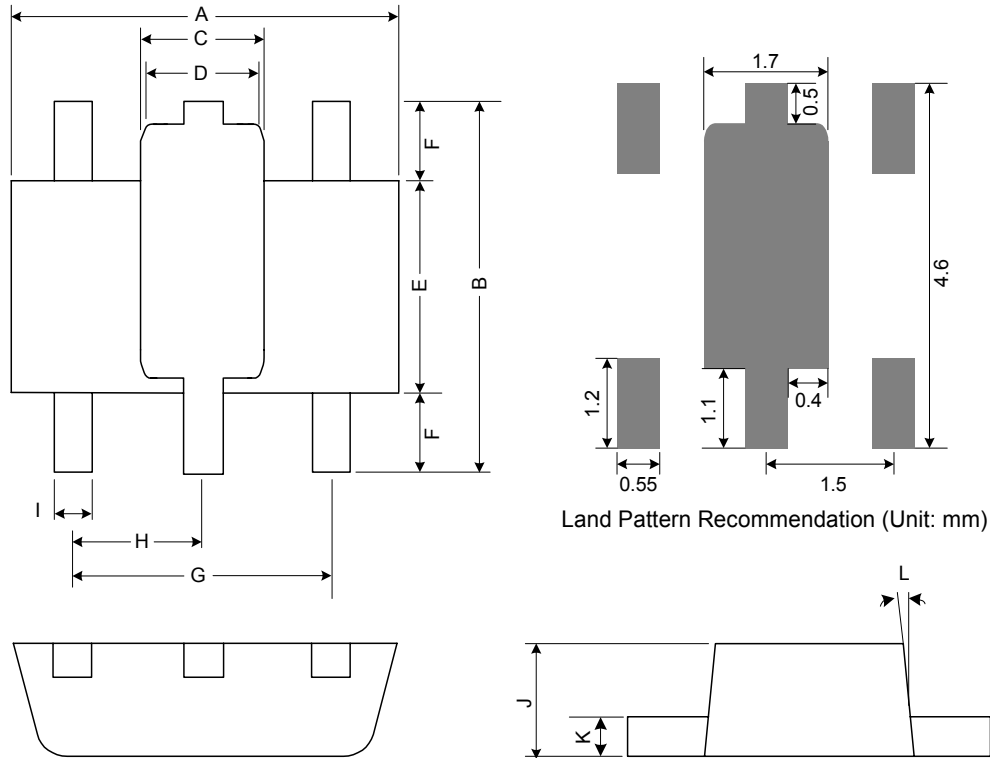


Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.40	1.60	1.75	0.055	0.063	0.069
A1	0.10	-	0.25	0.040	-	0.100
A2	1.30	1.45	1.50	0.051	0.057	0.059
B	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.010
D	4.80	5.05	5.30	0.189	0.199	0.209
E	3.70	3.90	4.10	0.146	0.154	0.161
e	-	1.27	-	-	0.050	-
H	5.79	5.99	6.20	0.228	0.236	0.244
L	0.38	0.71	1.27	0.015	0.028	0.050
y	-	-	0.10	-	-	0.004
θ	0°	-	8°	0°	-	8°

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■ Package Information (Continued)

(2) Package Type: SOT89-5L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.40	4.50	4.60	0.173	0.177	0.181
B	4.05	4.15	4.25	0.159	0.163	0.167
C	1.50	1.60	1.70	0.059	0.063	0.067
D	1.30	1.40	1.50	0.051	0.055	0.059
E	2.40	2.50	2.60	0.094	0.098	0.102
F	0.80	-	-	0.031	-	-
G	3.00 Ref.			0.118 Ref.		
H	1.50 Ref.			0.059 Ref.		
I	0.40	0.46	0.52	0.016	0.018	0.020
J	1.40	1.50	1.60	0.055	0.059	0.063
K	0.35	0.39	0.43	0.014	0.015	0.017
L	5° Typ.			5° Typ.		