

## PWM Fan Speed Controller

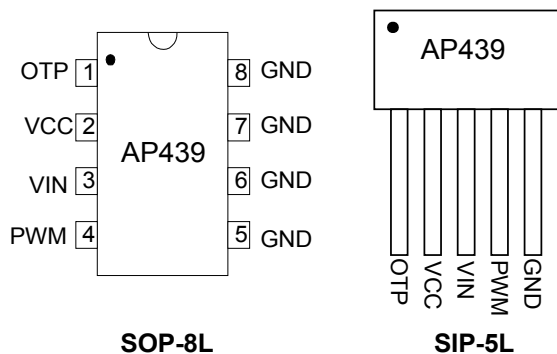
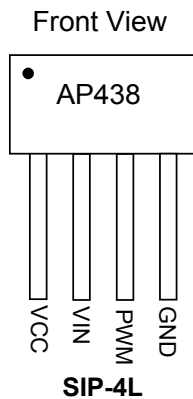
### ■ Features

- Built-in 30Khz OSC provide 0%~100% PWM output
- Over Temperature Protector(OTP) flag. (AP439 only).
- Open collect output(OTP & PWM pins).
- SIP-4L package for AP438.
- SIP-5L, SOP-8L package for AP439.

### ■ Applications

- PC Power.
- DC Fan

### ■ Pin Assignment



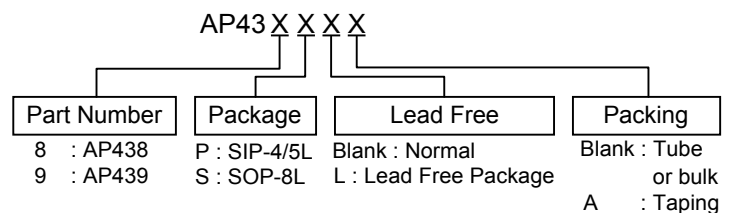
### ■ General Descriptions

The AP438/9 series's PWM output has built-in NPN power transistor that controls the Fan current & Fan speed. AP439 built-in over temperature alarm flag.

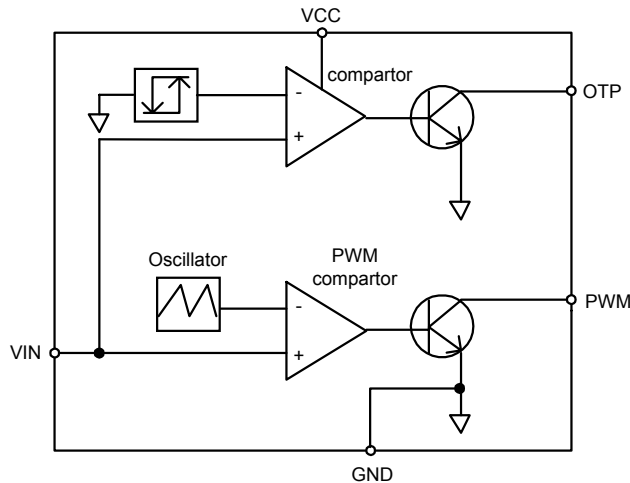
### ■ Pin Descriptions

Name	Description
V <sub>CC</sub>	Operating voltage input
V <sub>IN</sub>	Reference input voltage
OTP	Over Temperature protect flag.
PWM	PWM Open Collect Output.
GND	Ground

### ■ Ordering Information



### ■ Block Diagrams



### ■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
$V_{CC}$	Supply Voltage	20	V
VIN	Input voltage	20	V
OTP	Over temperature output.	20	V
PWM	Output voltage to Ground	20	V
$P_D$	Power dissipation (SIP-4/5L)	0.5	W
$P_D$	Power dissipation (SOP-8L)	0.8	W
$T_{ST}$	Storage temperature range	-65 to 150	°C
$T_{OP}$	Operating temperature range	0 to +85	°C
$V_{OP}$	Operating voltage range	7.0 to 18	V

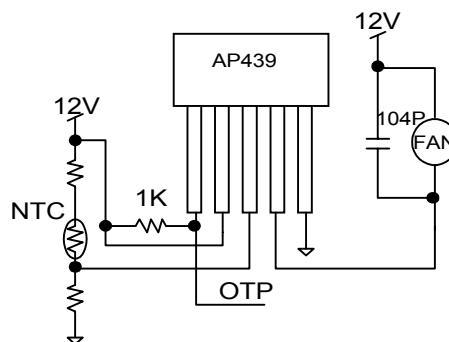
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### ■ Electrical Characteristics

Unless otherwise specified, guaranteed for  $T_j=25^{\circ}\text{C}$ ,  $V_{CC}=12\text{V}$ .

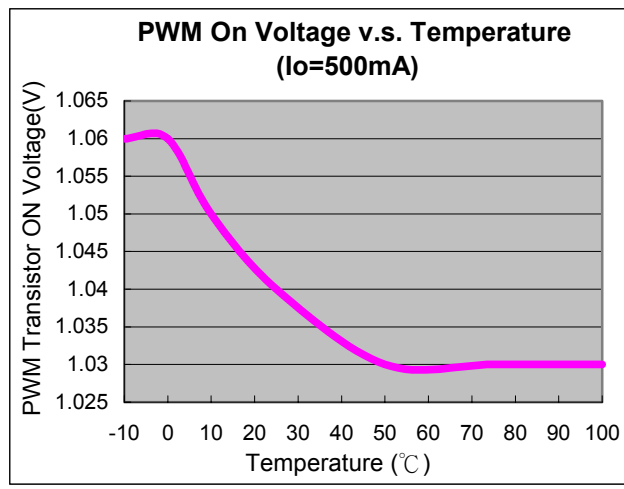
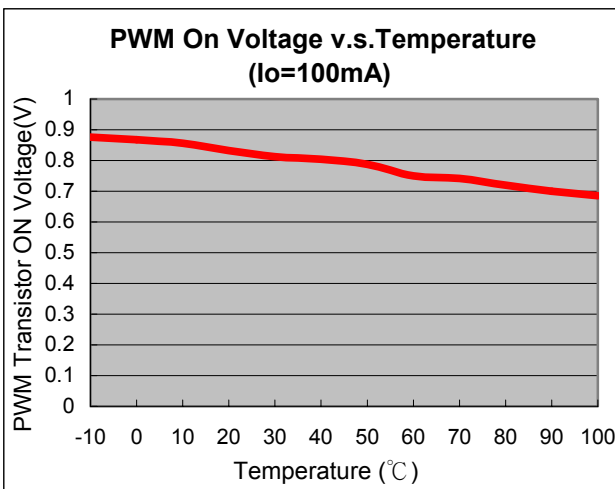
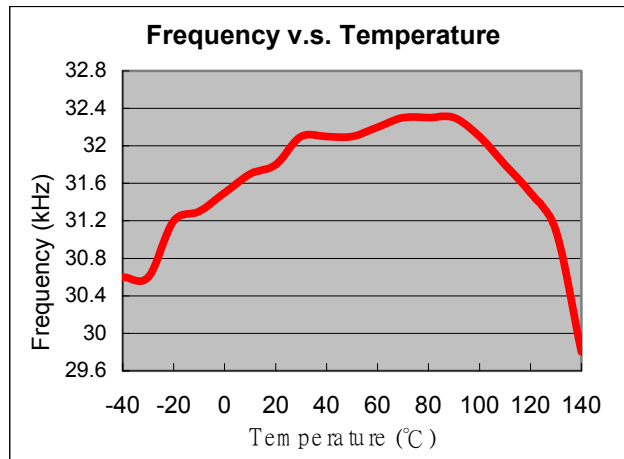
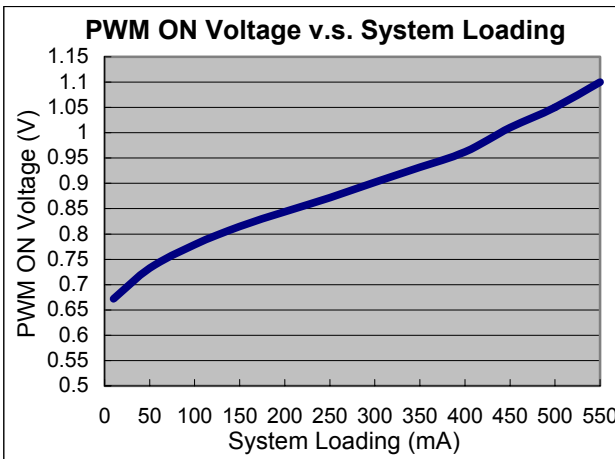
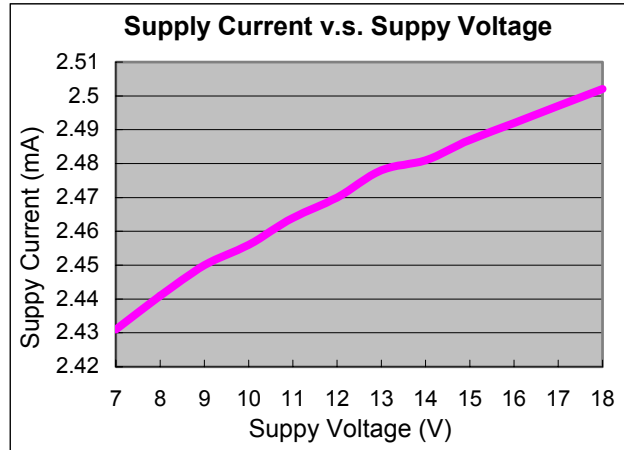
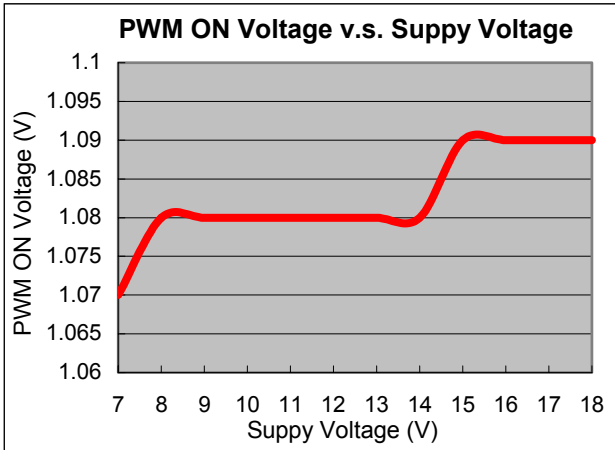
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$V_{CC}$	Supply Voltage		7.0	-	18	V
$I_{IN}$	Input Bias Current( $V_{IN}$ Pin)	$V_{IN}=2.0\text{V}$ ,	0.5	2	7	$\mu\text{A}$
$V_{IN}$	Input Voltage Range		0		$V_{CC}-0.5$	V
DUTY	PWM duty cycle range		0		100	%
$V_{IN(OTP)}$	OTP Detect Voltage		3.3	3.4	3.5	V
$V_{IN(Release)}$	OTP release Voltage		2.65	2.75	2.85	V
$V_{IN(HS)}$	OTP detect Voltage Hysteresis		450	650	850	mV
$V_{IN(PWM0)}$	Max Input voltage of 0% PWM		0.75	0.8	0.85	V
$V_{IN(PWM100)}$	Min Input voltage of 100% PWM		2.80	2.85	2.90	V
$I_S$	Supply Current	Output floating		2.5		mA
$V_{PWM(ON)}$	PWM transistor ON voltage	$I_{PWM}=500\text{mA}$ continued		1.1	1.3	V
$I_{PWM}$	Max. sink current		500			mA
$V_{OTP(L)}$	OTP low level voltage	$I_{OTP}=20\text{mA}$		0.3	0.6	V
$I_{OTP}$	Max. sink current		20			mA
$F_{OSC}$	OSC Frequency	$0^{\circ}\text{C}<T_j<85^{\circ}\text{C}$	22	30	38	Khz

### ■ Application Circuit



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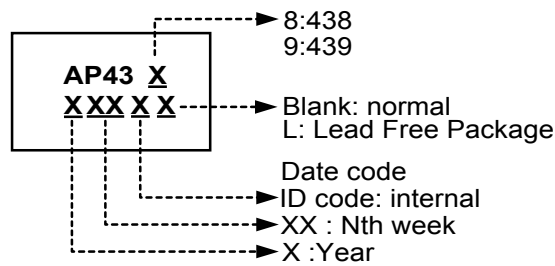
### ■ Typical Characteristics



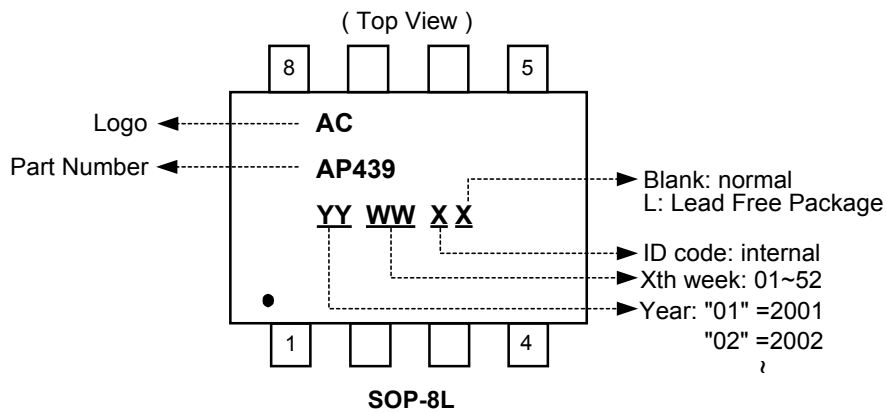
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### ■ Marking Information

#### (1) SIP4/5L

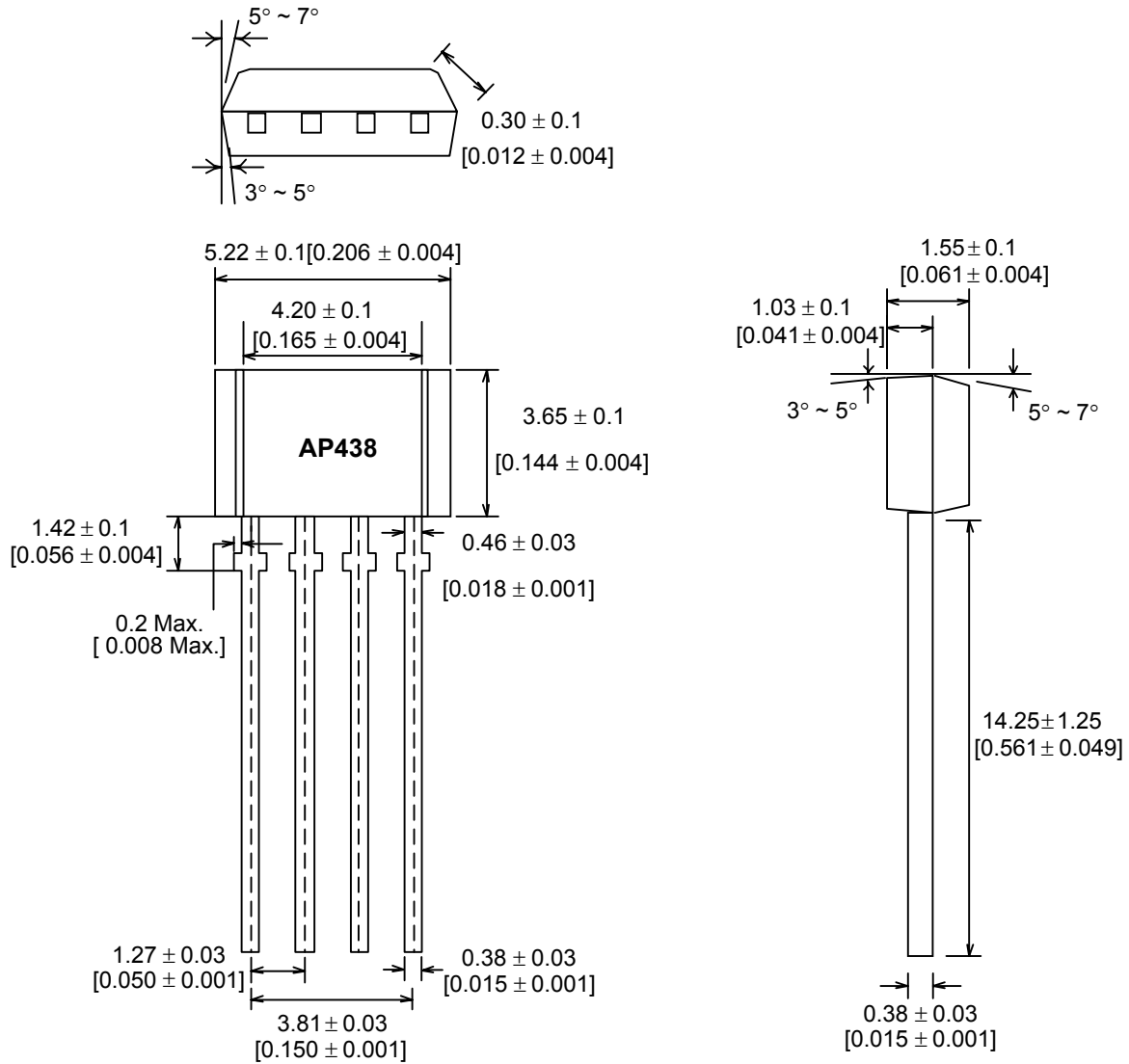


#### (2) SOP-8L



### ■ Package Information

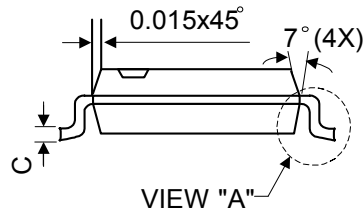
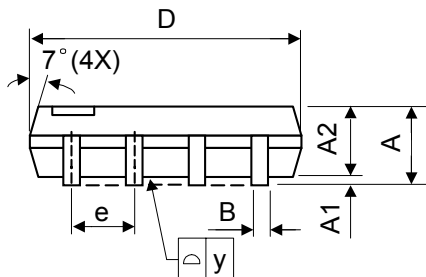
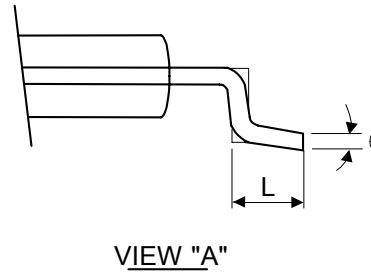
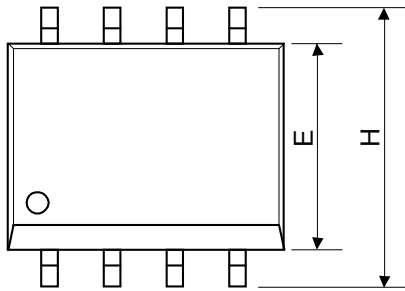
(1) Package Type: SIP-4L ( unit: mm / [inch] )





### ■ Package Information (Continued)

(3) 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
$\theta$	0°	-	8°	0°	-	8°