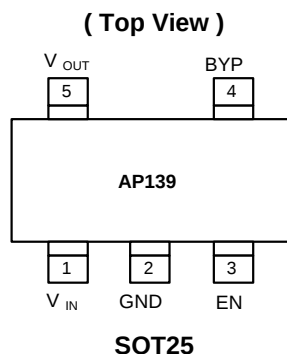


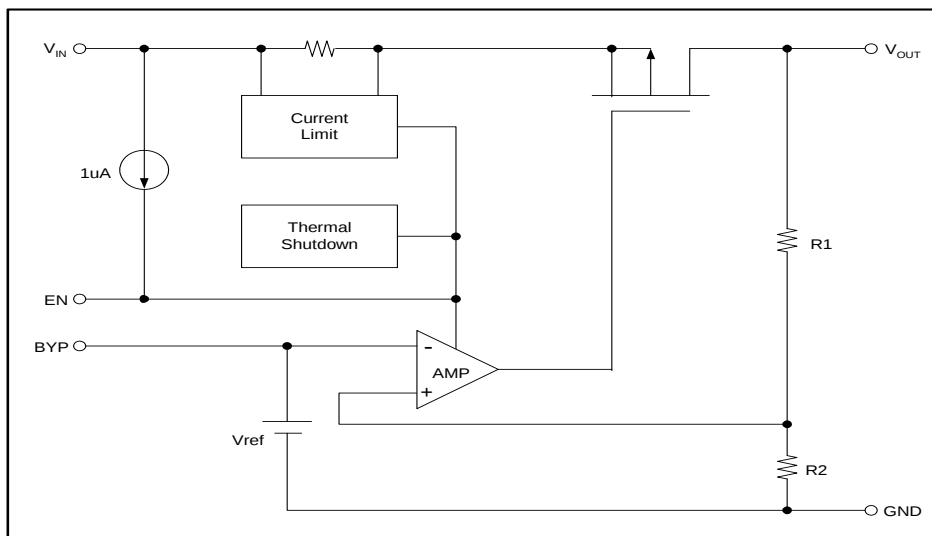
## Pin Assignments



## Pin Descriptions

| Pin Name         | Pin No. | Description       |
|------------------|---------|-------------------|
| V <sub>IN</sub>  | 1       | Power Supply      |
| GND              | 2       | Ground            |
| EN               | 3       | Enable Pin        |
| BYP              | 4       | Bypass Signal Pin |
| V <sub>OUT</sub> | 5       | Output            |

## Block Diagram



## Absolute Maximum Ratings

| Symbol           | Parameter                            | Rating                                             | Unit |
|------------------|--------------------------------------|----------------------------------------------------|------|
| V <sub>IN</sub>  | Input Voltage                        | +6                                                 | V    |
| I <sub>OUT</sub> | Output Current                       | P <sub>D</sub> /(V <sub>IN</sub> -V <sub>O</sub> ) | mA   |
| V <sub>OUT</sub> | Output Voltage                       | GND - 0.3 to V <sub>IN</sub> + 0.3                 | V    |
|                  | ESD Classification                   | B                                                  |      |
| T <sub>OP</sub>  | Operating Junction Temperature Range | -40 to +125                                        | °C   |
| T <sub>MJ</sub>  | Maximum Junction Temperature         | 150                                                | °C   |
| P <sub>D</sub>   | Internal Power Dissipation           | 250                                                | mW   |

## Recommended Operating Conditions

| Symbol    | Parameter                     | Min | Max | Unit |
|-----------|-------------------------------|-----|-----|------|
| $V_{IN}$  | Input voltage                 | 2.7 | 5.5 | V    |
| $I_{OUT}$ | Output Current                | 0   | 300 | mA   |
| $T_A$     | Operating Ambient Temperature | -40 | 85  | °C   |

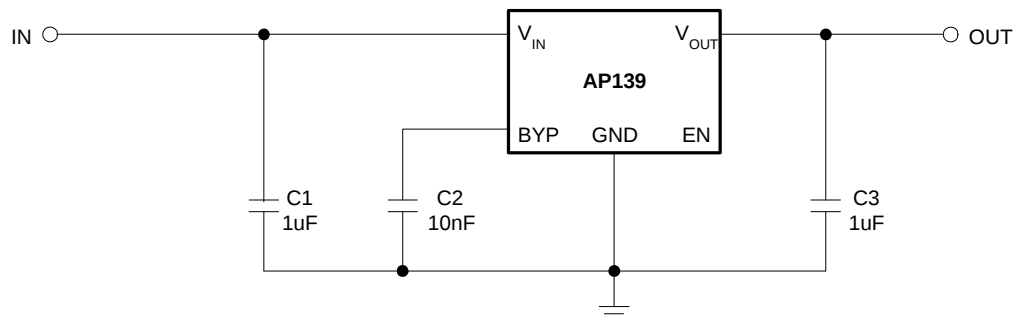
## Electrical Characteristics ( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

| Symbol               | Parameter                                | Test Conditions                                                                  |                      | Min    | Typ. | Max  | Unit   |
|----------------------|------------------------------------------|----------------------------------------------------------------------------------|----------------------|--------|------|------|--------|
| V <sub>IN</sub>      | Input Voltage                            |                                                                                  |                      | Note 3 | -    | 5.5  | V      |
| I <sub>O</sub>       | Quiescent Current                        | I <sub>O</sub> = 0mA                                                             |                      | -      | 45   | 60   | μA     |
| I <sub>STB</sub>     | Standby Current                          | V <sub>IN</sub> = 5.0V, V <sub>OUT</sub> = 0V, V <sub>EN</sub> < V <sub>EL</sub> |                      | -      | 2.0  | 3.0  | μA     |
| V <sub>OUT</sub>     | Output Voltage Accuracy                  | I <sub>O</sub> = 1mA, V <sub>IN</sub> = 5V                                       |                      | -2     | -    | 2    | %      |
|                      | V <sub>OUT</sub> Temperature Coefficient |                                                                                  |                      | -      | 50   | -    | ppm/°C |
| V <sub>DROPOUT</sub> | Dropout Voltage                          | I <sub>O</sub> = 1mA to 300mA, V <sub>OUT</sub> = V <sub>O(NOM)</sub> - 1.5%     | V <sub>O</sub> ≥2.8V | -      | -    | 0.45 | V      |
| I <sub>OUT</sub>     | Output Current                           |                                                                                  |                      | 300    | -    | -    | mA     |
| I <sub>LIMIT</sub>   | Current Limit                            | V <sub>OUT</sub> > 1.05V                                                         |                      | 300    | 450  | -    | mA     |
| I <sub>short</sub>   | Short Circuit Current                    | V <sub>CC</sub> = 5V, V <sub>out</sub> < 1.05V                                   |                      | -      | 150  | 300  | mA     |
| ΔV <sub>LINE</sub>   | Line Regulation                          | I <sub>OUT</sub> = 1mA, V <sub>IN</sub> = (V <sub>OUT</sub> +1V) to 5.5V         |                      | -      | 0.1  | 0.3  | %      |
| ΔV <sub>LOAD</sub>   | Load Regulation                          | I <sub>O</sub> = 1mA to 300mA, V <sub>IN</sub> = 5V                              |                      | -      | 0.3  | 1    | %      |
| PSRR                 | Power Supply Rejection                   | I <sub>O</sub> = 100mA, C <sub>O</sub> = 2.2μF ceramic                           | f = 1KHz             | -      | 60   | -    | dB     |
|                      |                                          |                                                                                  | f = 10KHz            | -      | 50   | -    |        |
|                      |                                          |                                                                                  | f = 100KHz           | -      | 40   | -    |        |
| PSRR                 | Power Supply Rejection                   | I <sub>O</sub> = 100mA, C <sub>O</sub> = 2.2μF ceramic, C <sub>BYP</sub> = 20nF  | f = 1KHz             | -      | 75   | -    | dB     |
|                      |                                          |                                                                                  | f = 10KHz            | -      | 55   | -    |        |
|                      |                                          |                                                                                  | f = 100KHz           | -      | 30   | -    |        |
| V <sub>EH</sub>      | EN Input Threshold                       | Output ON                                                                        |                      | 1.7    | -    | -    | V      |
| V <sub>EL</sub>      |                                          | Output OFF                                                                       |                      | -      | -    | 0.8  | V      |
| I <sub>EN</sub>      | Enable Pin Current                       |                                                                                  |                      | -      | -    | <0.1 | μA     |
| OTS                  | Over Temperature Shutdown                |                                                                                  |                      | -      | 130  | -    | °C     |
| OTH                  | Over Temperature Hysteresis              |                                                                                  |                      | -      | 20   | -    | °C     |
| θ <sub>JA</sub>      | Thermal Resistance                       | SOT25 (Note 4)                                                                   |                      |        | 226  |      | °C/W   |
| θ <sub>JC</sub>      | Thermal Resistance                       | SOT25 (Note 4)                                                                   |                      |        | 34   |      | °C/W   |

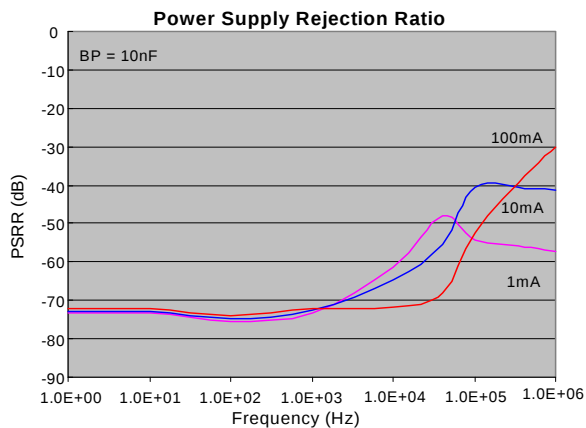
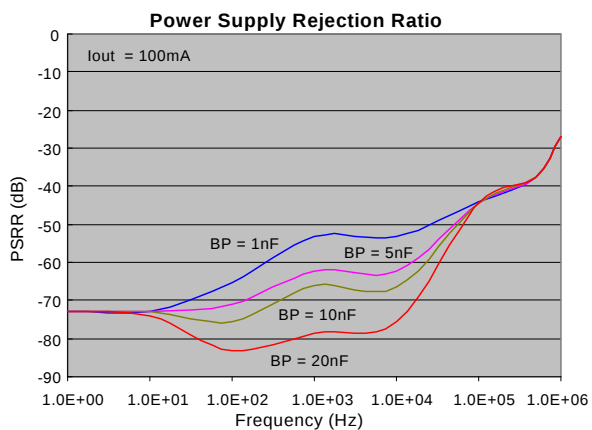
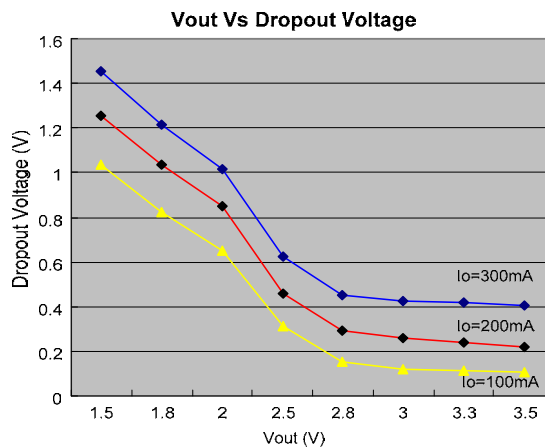
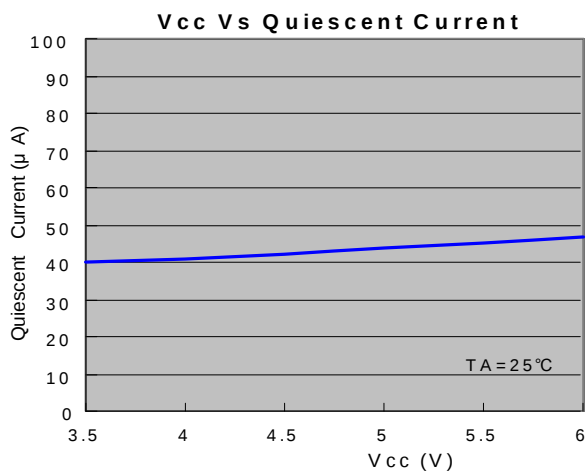
Notes: 3.  $V_{IN(MIN)} = V_{OUT} + V_{DROPOUT}$ .

4. Test conditions for SOT25: Devices mounted on FR-4 PC board, MRP, 1 oz. copper, single sided, calibrate at  $T_J = 85^\circ\text{C}$ , measure at  $T_A = 25^\circ\text{C}$ , no heat Sink, no air flow.

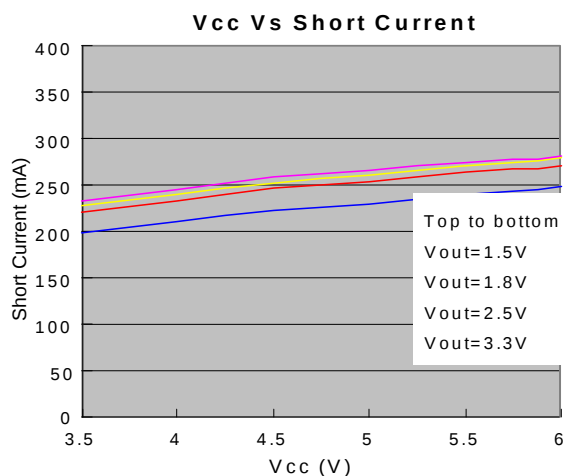
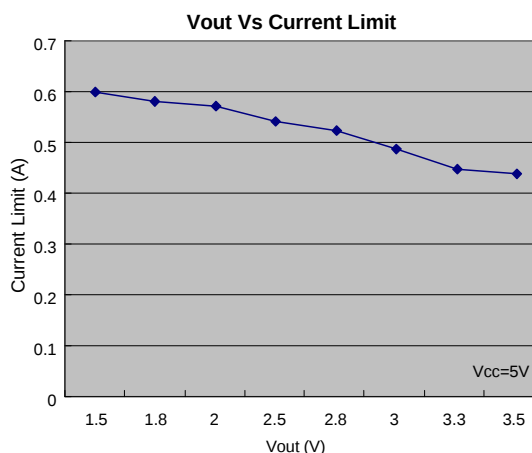
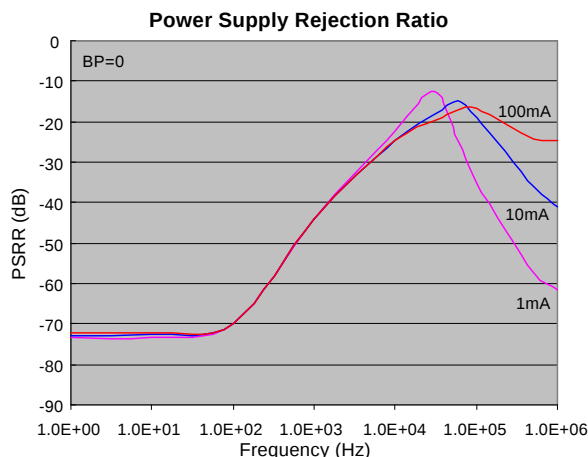
## Typical Application



## Typical Performance Characteristics



## Typical Performance Characteristics (Continued)



## Functional Description

The AP139 of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, thermal shutdown.

The P-channel pass transistor receives data from the error amplifier, over-current protection, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. The over-current and thermal shutdown circuits become active when the junction temperature exceeds 130°C, or the current exceeds 300mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 110°C.

The AP139 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress.

### Enable

The enable pin normally floats high. When actively, pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 2μA. This pin behaves much like an electronic switch.

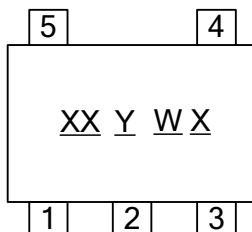
### External Capacitor

The AP139 is stable with a low ESR output capacitor to ground of 1.0μF or greater. It can keep stable even with higher ESR capacitors. A second capacitor is recommended between the input and ground to stabilize  $V_{IN}$ . The input capacitor should be larger than 0.1μF to have a beneficial effect. All capacitors should be placed in close proximity to the pins. A "quiet" ground termination is desirable.

## Marking Information

(1) SOT25

(Top View)



XX : Identification code

Y : Year 0~9

W : Week : A~Z : 1~26 week;

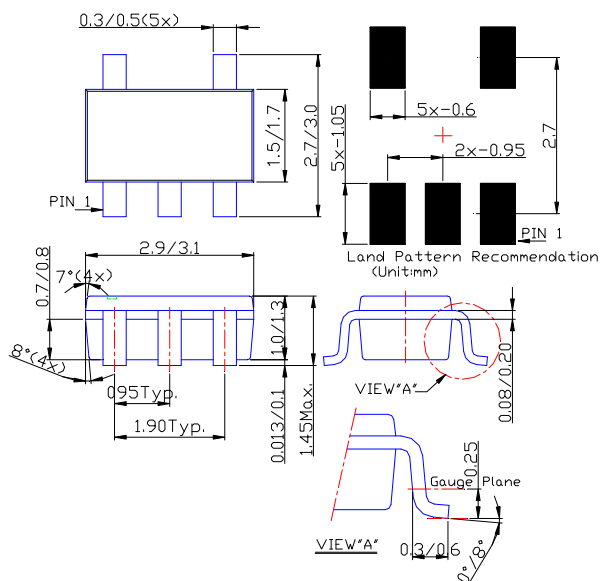
a~z : 27~52 week; z represents  
52 and 53 week

X : a~z : Lead Free

A~Z : Green

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AP139-15W   | SOT25   | N0                  |
| AP139-18W   | SOT25   | N1                  |
| AP139-20W   | SOT25   | N2                  |
| AP139-25W   | SOT25   | N3                  |
| AP139-28W   | SOT25   | N4                  |
| AP139-30W   | SOT25   | N5                  |
| AP139-33W   | SOT25   | N6                  |
| AP139-35W   | SOT25   | N7                  |

## Package Information (All Dimensions in mm)



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