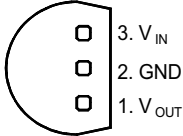
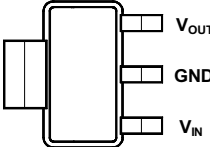




## AMC7628

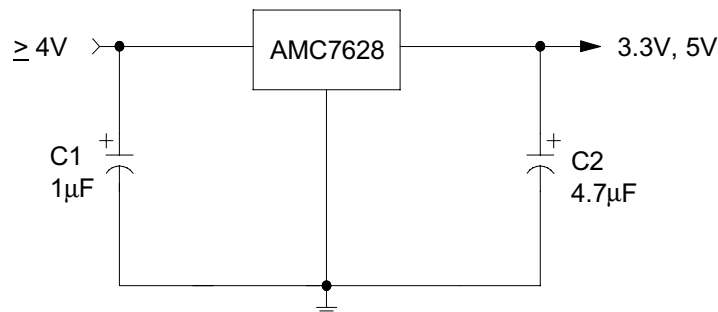
### 300mA Low Dropout REGULATOR

| DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | FEATURES                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The AMC7628 series is a low dropout regulator rated for 300mA output current. AMC7628-5.0 can regulate with as low as 100mV headroom between the input and output voltages at 150mA output current, thus minimizing power dissipation. In addition, it can be used in applications where worst case supplies require a low Input-Output differential to maintain regulation. The AMC7628-3.3/5.0 is a fixed 3.3V/5.0V output voltage version and these features make it ideal for battery powered applications that require low dropout from supply. A reverse battery protection scheme limits the reverse current when the input voltage falls below the output</p> | <ul style="list-style-type: none"> <li>■ <b>1% internally trimmed output</b></li> <li>■ <b>Output current is excess of 300mA</b></li> <li>■ <b>Input-Output differential of typ. 0.3V at 300mA &amp; low quiescent current</b></li> <li>□ Reverse battery protection</li> <li>□ Short circuit protection</li> <li>□ Internal thermal overload protection</li> <li>□ Available in 3L plastic TO-92 and surface mount SOT223 packages</li> </ul> |

| APPLICATIONS                                                                                                                                                                                                     | PACKAGE PIN OUT                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>■ Computer Monitors</li> <li>■ Battery Powered Circuitry</li> <li>■ Computer Add-On Cards</li> <li>■ USB Power</li> <li>■ DVD Driver</li> <li>■ Digital Camera</li> </ul> |  <p>3-Pin Plastic TO-92<br/>(Top View)</p>  <p>3-Pin Plastic SOT-223<br/>Surface Mount<br/>(Top View)</p> |

AMC7628-3.3 – 3.3V Fixed  
AMC7628-5.0 – 5.0V Fixed

| ORDER INFORMATION                                                                                                                                      |           |                        |                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------|------------------------------------|
| $T_A$ (°C)                                                                                                                                             | <b>LP</b> | Plastic TO-92<br>3-pin | <b>SK</b> Plastic SOT-223<br>3-pin |
| <b>0 to 70</b>                                                                                                                                         |           | <b>AMC7628-X.XLP</b>   | <b>AMC7628-X.XSK</b>               |
| Note: All surface-mount and TO-92 packages are available in Tape & Reel. Append the letter "T" to part number (i.e. AMC7628-X.XLPT or AMC7628-X.XSKT). |           |                        |                                    |

**TYPICAL APPLICATION****ABSOLUTE MAXIMUM RATINGS** (Note 1)

|                                                |                  |
|------------------------------------------------|------------------|
| Input Voltage ( $V_{IN}$ ) .....               | 13V              |
| Operating Junction temperature                 |                  |
| Plastic (LP, SK Package) .....                 | 150 °C           |
| Storage Temperature Range .....                | -65 °C to 150 °C |
| Lead temperature (Soldering, 10 seconds) ..... | 300 °C           |

Note 1: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

**THERMAL DATA****LP PACKAGE:**

|                                                       |          |
|-------------------------------------------------------|----------|
| Thermal Resistance-Junction to Ambient, $\theta_{JA}$ | 156 °C/W |
|-------------------------------------------------------|----------|

**SK PACKAGE:**

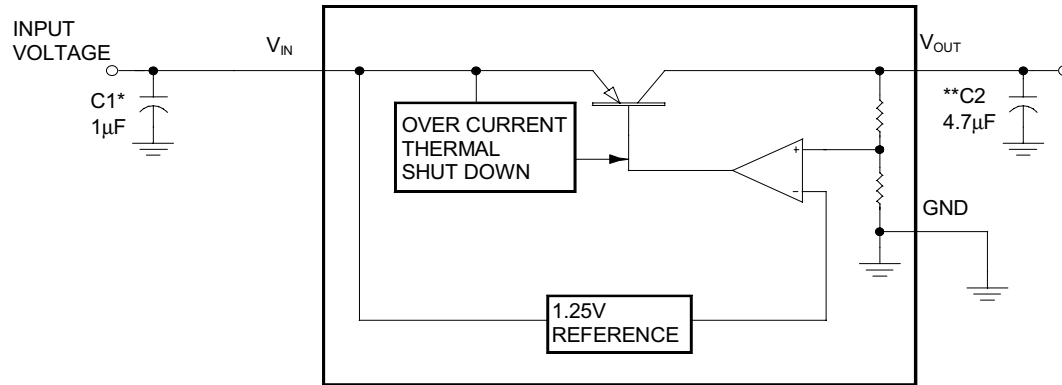
|                                                       |          |
|-------------------------------------------------------|----------|
| Thermal Resistance-Junction to Tab, $\theta_{JT}$     | 15 °C/W  |
| Thermal Resistance-Junction to Ambient, $\theta_{JA}$ | 136 °C/W |

Junction Temperature Calculation:  $T_J = T_A + (P_D \times \theta_{JA})$ .

The  $\theta_{JA}$  numbers are guidelines for the thermal performance of the device/pc-board system.

All of the above assume no ambient airflow.

**BLOCK DIAGRAM**



\* REQUIRED IF REGULATOR IS LOCATED FAR FROM POWER SUPPLY FILTER

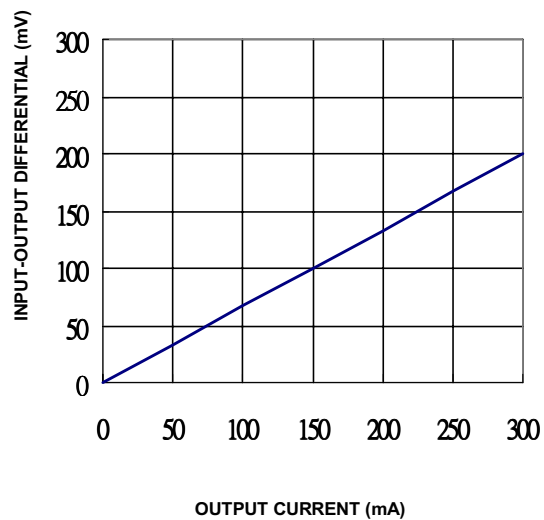
\*\* DESIGN C2 AS CLOSE TO  $V_{OUT}$  PIN AS POSSIBLE

| RECOMMENDED OPERATING CONDITIONS                                  |          |                                  |      |      |             |
|-------------------------------------------------------------------|----------|----------------------------------|------|------|-------------|
| Parameter                                                         | Symbol   | Recommended Operating Conditions |      |      | Units       |
|                                                                   |          | Min.                             | Typ. | Max. |             |
| Input Voltage                                                     | $V_{IN}$ | 4.0                              |      | 12   | V           |
| Load Current (with adequate heatsinking)                          | $I_O$    | 5                                |      | 300  | mA          |
| Input Capacitor ( $V_{IN}$ to GND)                                |          | 0.1                              |      |      | $\mu F$     |
| Output Capacitor with ESR of $10\Omega$ max., ( $V_{OUT}$ to GND) |          | 4.7                              |      |      | $\mu F$     |
| Junction temperature                                              | $T_J$    |                                  |      | 125  | $^{\circ}C$ |

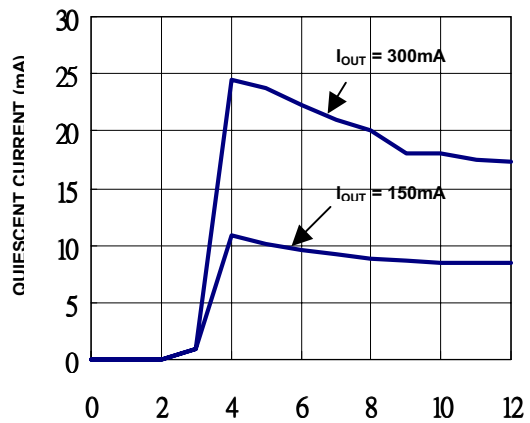
| ELECTRICAL CHARACTERISTICS                                                                                                                                                                                                                                                                                                                                                   |             |                 |                                               |         |      |       |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------|-----------------------------------------------|---------|------|-------|---------------|
| Unless otherwise specified, these specifications apply over the operating ambient temperature of $0^{\circ}C$ to $+70^{\circ}C$ for AMC7628; $V_{IN} = 7V$ , $I_O = 100mA$ , $C_{OUT} = 4.7\mu F$ , and are for DC characteristics only. (Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.) |             |                 |                                               |         |      |       |               |
| Parameter                                                                                                                                                                                                                                                                                                                                                                    |             | Symbol          | Test Conditions                               | AMC7628 |      |       | Units         |
|                                                                                                                                                                                                                                                                                                                                                                              |             |                 |                                               | Min.    | Typ. | Max.  |               |
| Output Voltage                                                                                                                                                                                                                                                                                                                                                               | AMC7628-3.3 | $V_O$           | $I_O = 10mA$ , $T_A = 25^{\circ}C$            | 3.267   | 3.3  | 3.333 | V             |
|                                                                                                                                                                                                                                                                                                                                                                              | AMC7628-5.0 |                 |                                               | 4.950   | 5.0  | 5.050 |               |
| Line Regulation                                                                                                                                                                                                                                                                                                                                                              |             | $\Delta V_{OI}$ | $V_O + 2V \leq V_{IN} \leq 12V$ , $I_O = 5mA$ |         | 10   | 50    | mV            |
| Load regulation                                                                                                                                                                                                                                                                                                                                                              |             | $\Delta V_{OL}$ | $50mA \leq I_O \leq 300mA$                    |         | 10   | 50    | mV            |
| Dropout Voltage                                                                                                                                                                                                                                                                                                                                                              |             | $\Delta V$      | $I_O = 100mA$                                 |         | 100  | 300   | mV            |
|                                                                                                                                                                                                                                                                                                                                                                              |             |                 | $I_O = 300mA$                                 |         | 200  | 400   |               |
| Quiescent Current                                                                                                                                                                                                                                                                                                                                                            |             | $I_Q$           | $I_O \leq 5mA$ , $4V \leq V_{IN} \leq 12V$    |         | 3    | 10    | mA            |
|                                                                                                                                                                                                                                                                                                                                                                              |             |                 | $I_O = 100mA$                                 |         | 6    | 15    |               |
|                                                                                                                                                                                                                                                                                                                                                                              |             |                 | $I_O = 300mA$                                 |         | 20   | 32    |               |
| Current Limit                                                                                                                                                                                                                                                                                                                                                                |             | $I_{CL}$        | $V_{IN} = 10V$                                | 300     | 330  |       | mA            |
| Output Noise Voltage (Note 1)                                                                                                                                                                                                                                                                                                                                                |             | $V_{O\ RMS}$    | 10Hz – 100kHz, $I_O = 5mA$                    |         | 150  |       | $\mu V_{RMS}$ |
| Long Term Stability (Note 1)                                                                                                                                                                                                                                                                                                                                                 |             |                 |                                               |         | 20   |       | mV/1000hr     |
| Ripple rejection (Note 1)                                                                                                                                                                                                                                                                                                                                                    |             | $R_R$           | $f_O = 120Hz$ , $1V_{RMS}$ , $I_O = 100mA$    |         | 66   |       | dB            |
| Note 1: These parameters, although guaranteed, are not tested in production.                                                                                                                                                                                                                                                                                                 |             |                 |                                               |         |      |       |               |

**CHARACTERISTICS CURVES**

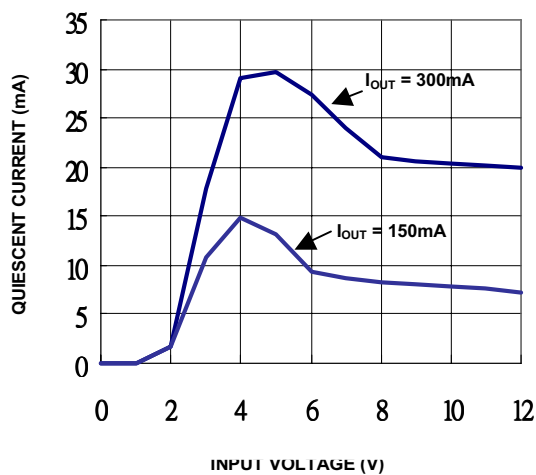
**Dropout Voltage (AMC7628-5.0V)**



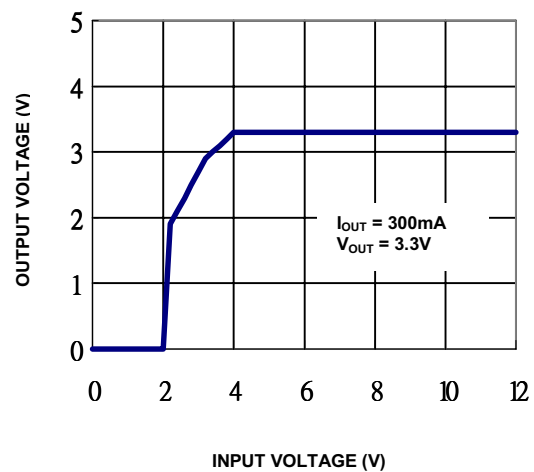
**Quiescent Current (AMC7628-3.3)**



**Quiescent Current (AMC7628-5.0)**

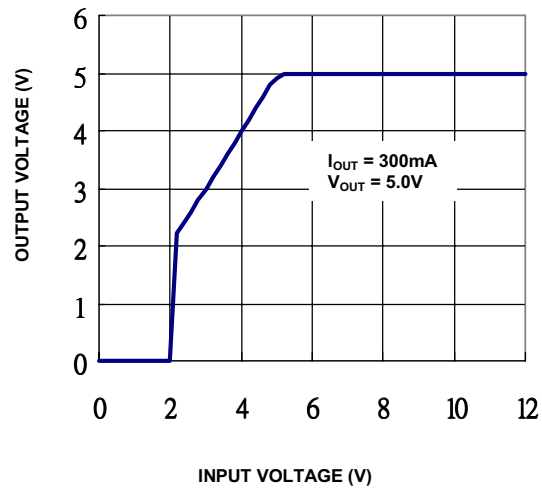


**Input Voltage vs. Output Voltage**

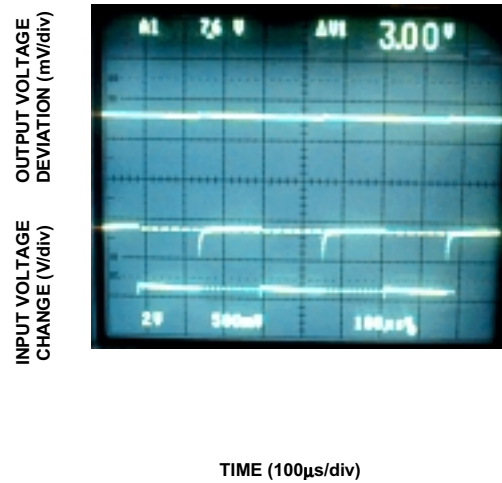


**CHARACTERISTICS CURVES**

**Input Voltage vs.  
Output voltage**



**Line Transient Response**



**Application Note:****Maximum Power Calculation:**

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_{A(MAX)}}{\theta_{JA}}$$

$T_J(^{\circ}\text{C})$ : Maximum recommended junction temperature

$T_A(^{\circ}\text{C})$ : Ambient temperature of the application

$\theta_{JA}(^{\circ}\text{C/W})$ : Junction-to-junction temperature thermal resistance of the package, and other heat dissipating materials.

**The maximum power dissipation of a single-output regulator :**

$$P_{D(MAX)} = [(V_{IN(MAX)} - V_{OUT(NOM)}) \times I_{OUT(NOM)} + V_{IN(MAX)} \times I_Q]$$

Where:  $V_{OUT(NOM)}$  = the nominal output voltage

$I_{OUT(NOM)}$  = the nominal output current, and

$I_Q$  = the quiescent current the regulator consumes at  $I_{OUT(MAX)}$

$V_{IN(MAX)}$  = the maximum input voltage

Then  $\theta_{JA} = (150^{\circ}\text{C} - T_A)/P_D$

**Thermal consideration:**

When power consumption is over about 404 mW ( SOT223 package, at  $T_A=70^{\circ}\text{C}$ ), additional heat sink is required to control the junction temperature below  $125^{\circ}\text{C}$ .

The junction temperature is:  $T_J = P_D (\theta_{JT} + \theta_{CS} + \theta_{SA}) + T_A$

$P_D \equiv$  Dissipated power.

$\theta_{JT} \equiv$  Thermal resistance from the junction to the mounting tab of the package.

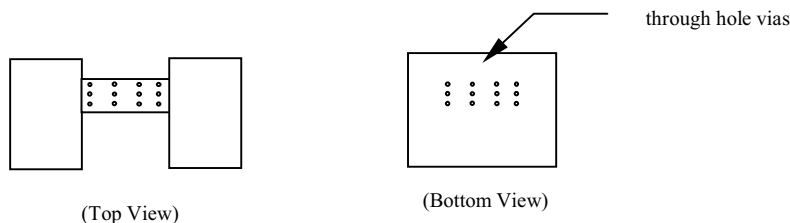
$\theta_{CS} \equiv$  Thermal resistance through the interface between the IC and the surface on which it is mounted.  
(typically,  $\theta_{CS} < 1.0^{\circ}\text{C/W}$ )

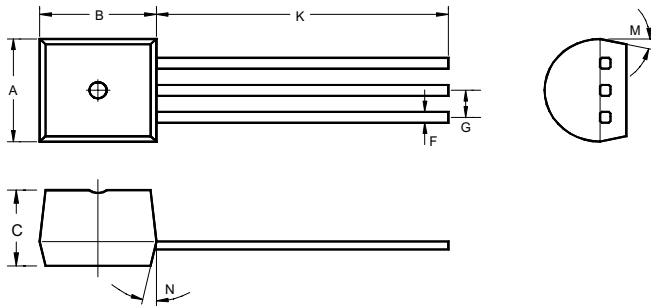
$\theta_{SA} \equiv$  Thermal resistance from the mounting surface to ambient (thermal resistance of the heat sink).

If PC Board copper is going to be used as a heat sink, below table can be used to determine the appropriate size of copper foil required. For multi-layered PCB, these layers can also be used as a heat sink. They can be connected with several through hole vias.

| PCB $\theta_{SA} (^{\circ}\text{C/W})$ | 59  | 45   | 38   | 33   | 27   | 24   | 21   |
|----------------------------------------|-----|------|------|------|------|------|------|
| PCB heat sink size ( $\text{mm}^2$ )   | 500 | 1000 | 1500 | 2000 | 3000 | 4000 | 5000 |

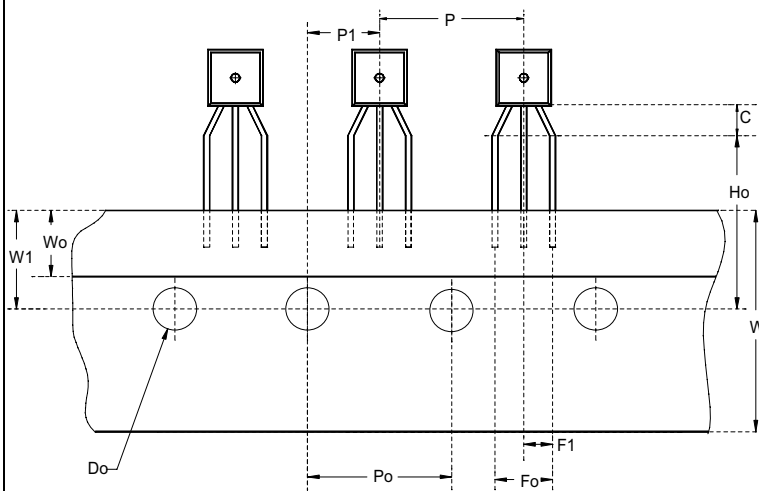
Recommended figure of PCB area used as a heat sink.



**3-Pin Plastic TO-92 (LP)**

Note: For TO-92 in tape and reel, refer to TO-92 package and carrier dimension data for lead dimensions.

|   | INCHES |       |       | MILLIMETERS |       |      |
|---|--------|-------|-------|-------------|-------|------|
|   | MIN    | TYP   | MAX   | MIN         | TYP   | MAX  |
| A | 0.175  | 0.180 | 0.205 | 4.45        | 4.57  | 5.21 |
| B | 0.170  | 0.180 | 0.210 | 4.32        | 4.57  | 5.33 |
| C | 0.125  | 0.142 | 0.165 | 3.18        | 3.62  | 4.19 |
| F | -      | 0.015 | -     | -           | 0.38  | -    |
| G | -      | 0.050 | -     | -           | 1.27  | -    |
| J | -      | 0.150 | -     | -           | 3.81  | -    |
| K | 0.500  | 0.580 | -     | 12.70       | 14.73 | -    |
| M | -      | 5°    | -     | -           | 5°    | -    |
| N | -      | 5°    | -     | -           | 5°    | -    |

**3-Pin Plastic TO-92 Package(Taped and Reeled) Carrier Dimensions**

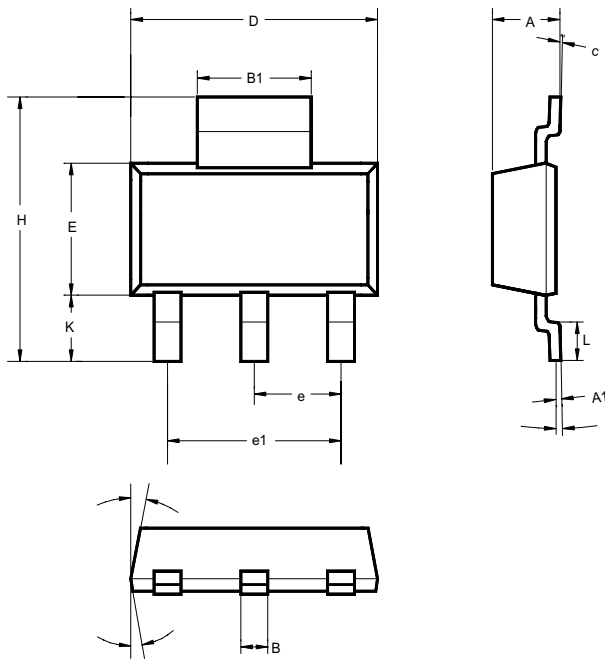
Note: For 3L TO92, 2,000 units per Reel

|    | INCHES |       |       | MILLIMETERS |      |      |
|----|--------|-------|-------|-------------|------|------|
|    | MIN    | TYP   | MAX   | MIN         | TYP  | MAX  |
| C  | 0.079  | -     | -     | 2.00        | -    | -    |
| P  | 0.480  | 0.500 | 0.520 | 12.2        | 12.7 | 13.2 |
| Po | 0.488  | 0.500 | 0.512 | 12.4        | 12.7 | 13.0 |
| Do | 0.150  | 0.157 | 0.165 | 3.8         | 4.0  | 4.2  |
| P1 | 0.230  | 0.250 | 0.256 | 5.85        | 6.35 | 6.85 |
| Fo | 0.165  | 0.197 | 0.220 | 4.2         | 5.0  | 5.6  |
| W  | 0.669  | 0.709 | 0.748 | 17.0        | 18.0 | 19.0 |
| Ho | 0.610  | 0.630 | 0.649 | 15.5        | 16.0 | 16.5 |
| W0 | 0.224  | 0.236 | 0.248 | 5.7         | 6.0  | 6.3  |
| W1 | 0.335  | 0.354 | 0.374 | 8.5         | 9.0  | 9.5  |

**3-Pin Surface Mount SOT-223 (SK)**

# AMC7628

## 300mA LOW DROPOUT REGULATOR



|          | MILLIMETERS |      |      |
|----------|-------------|------|------|
|          | MIN         | TYP  | MAX  |
| A        | 1.50        | 1.65 | 1.80 |
| A1       | 0.02        | 0.05 | 0.08 |
| B        | 0.60        | 0.70 | 0.80 |
| B1       | 2.90        | -    | 3.15 |
| c        | 0.28        | 0.30 | 0.32 |
| D        | 6.30        | 6.50 | 6.70 |
| E        | 3.30        | 3.50 | 3.70 |
| e        | 2.3 BSC     |      |      |
| e1       | 4.6 BSC     |      |      |
| H        | 6.70        | 7.00 | 7.30 |
| L        | 0.91        | 1.00 | 1.10 |
| K        | 1.50        | 1.75 | 2.00 |
| $\alpha$ | 0°          | 5°   | 10°  |
| $\beta$  |             | 3°   |      |

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**U.S.****ADD Microtech Inc.**

492 Altamont Drive  
Milpitas, CA 95035

TEL: (408) 9410420

FAX: (408) 9410864

**Asia Pacific region****ADD Microtech Corp**

3F, 132, Sec. 4, Chung Hsiao E. Rd.,  
Taipei, Taiwan

TEL: 2-27760166

FAX: 2-27764208