

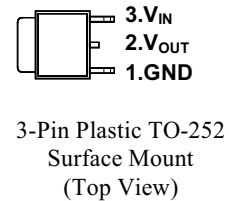
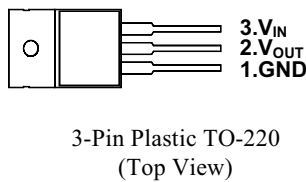


**AMC7586**  
**3A LOW DROPOUT REGULATOR**

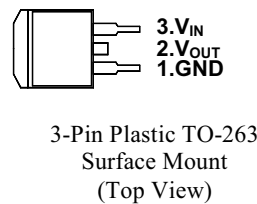
DESCRIPTION	FEATURES
<p>The AMC7586 is a high performance low dropout regulator rated for 3A output current with fixed 1.8V/2.5V/3.3V/5.0V and adjustable output. It is designed for use in applications requiring low dropout characteristics over the rated current range.</p> <p>On chip trimming adjusts the reference voltage to 1%. These features are ideal for low voltage microprocessor applications requiring a regulated 1.8V to 3.6V power supply.</p> <p>In addition, the AMC7586 provides the device protections including over current and thermal shutdown. Also, 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>Input-Output differential of typical 1.1V at 3A and low quiescent current</b></li> <li>■ <b>Output current is excess of 3A</b></li> <li>□ Fast transient response</li> <li>□ Reverse battery protection</li> <li>□ Short circuit protection</li> <li>□ Internal thermal overload protection</li> <li>□ Available in 3L plastic TO-220 and surface mount 3L TO-263/252 packages</li> <li>□ Pin assignment identical to EZ1585B and LT1585A series.</li> </ul>

APPLICATIONS	PACKAGE PIN OUT
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- Pentium® Processor Supplies
- PowerPC™ Supplies
- Computer Add-On Cards
- Other Applications Requiring Low Dropout Voltage Over Rated Current.

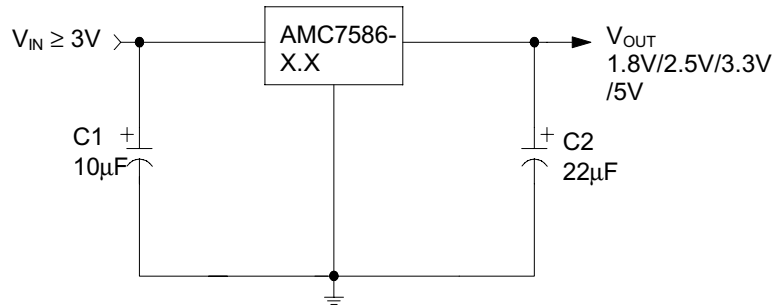


- AMC7586-1.8 – 1.8V Fixed
- AMC7586-2.5 – 2.5V Fixed
- AMC7586-3.3 – 3.3V Fixed
- AMC7586-5.0 – 5.0V Fixed



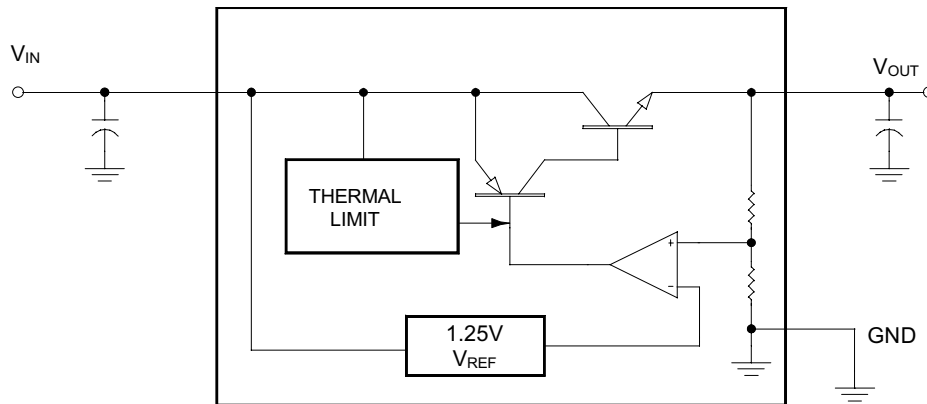
ORDER INFORMATION						
T <sub>A</sub> (°C)	TO-220		TO-263		TO-252	
	<b>T</b>	3-pin	<b>ST</b>	3-pin	<b>SJ</b>	3-pin
0 to 70	<b>AMC7586-X.XT</b>		<b>AMC7586-X.XST</b>		<b>AMC7586-X.XSJ</b>	
Note: All surface-mount packages are available in Tape & Reel. Append the letter "T" to part number (i.e., AMC7586-X.XSTT, AMC7586-X.XSJT).						

### TYPICAL APPLICATION



AMC7586-X.X application schematic

### BLOCK DIAGRAM



AMC7586-X.X circuit schematic

ABSOLUTE MAXIMUM RATINGS (Note)	
Input Voltage ( $V_{IN}$ )	10.5V
Operating Junction temperature	150°C
Storage Temperature Range	-65°C to 150°C
Lead temperature (Soldering, 10 seconds)	300°C
Note: 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.	

POWER DISSIPATION TABLE					
Package	$\theta_{JA}$ (°C/W)	Derating factor ( mW/°C ) $T_A \geq 25^\circ\text{C}$	$T_A \leq 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$	$T_A = 85^\circ\text{C}$
			Power rating(mW)	Power rating(mW)	Power rating
T	45	22.2	2775	1776	1443
ST	45	22.2	2775	1776	1443
SJ	80	12.5	1562	1000	812
<p>Note: <math>T_J = T_A + (P_D \times \theta_{JA})</math>  <math>P_D</math>: Power dissipation.  <math>\theta_{JA}</math>: Thermal resistance from Junction to Ambient.</p> <p>For T and ST/ST3 packages, <math>\theta_{JT} = 3.0^\circ\text{C}/\text{W}</math>.  For SJ package, <math>\theta_{JT} = 7.0^\circ\text{C}/\text{W}</math>.</p> <p><math>T_J = T_{TAB} + (P_D \times \theta_{JT})</math>  <math>T_{TAB}</math>: Tab temperature.  <math>\theta_{JT}</math>: Thermal resistance from junction to tab of the package.</p> <ol style="list-style-type: none"> <li>The <math>\theta_{JA}</math> numbers are guidelines for the thermal performance of the device/PC-board system.</li> <li>All of the above assume no ambient airflow.</li> <li>If power consumption is over above rating, adequate heat sink is required to dissipate heat.</li> </ol>					

RECOMMENDED OPERATING CONDITIONS					
Parameter	Symbol	Recommended Operating Conditions			Units
		Min.	Typ.	Max.	
Input Voltage	$V_{IN}$	3		10	V
Load Current (with adequate heat sinking)	$I_o$	0.010		3	A
Input Capacitor ( $V_{IN}$ to GND)		1			$\mu\text{F}$
Output Capacitor with ESR of $10\Omega$ max., ( $V_{OUT}$ to GND)		10			$\mu\text{F}$
Operating Ambient Temperature Range		0		70	°C
Operating junction temperature	$T_J$			125	°C

ELECTRICAL CHARACTERISTICS							
Unless otherwise specified, $V_{IN} = V_{OUT} + 2V$ , $I_O = 10mA$ . These specifications apply operating ambient temperature range, 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	AMC7586			Units	
			Min.	Typ.	Max.		
Output Voltage	AMC7586-1.8	$V_{OUT}$	$T_A = 25^\circ C$	1.782	1.800	1.818	V
	AMC7586-2.5			2.475	2.500	2.525	
	AMC7586-3.3			3.267	3.300	3.333	V
	AMC7586-5.0			4.950	5.000	5.050	
Output Voltage	AMC7586-1.8	$V_{OUT}$	$I_O = 10mA \text{ to } 3A$	1.771	1.800	1.829	V
	AMC7586-2.5			2.460	2.500	2.540	
	AMC7586-3.3			3.247	3.300	3.353	V
	AMC7586-5.0			4.920	5.000	5.080	
Line Regulation (Note 2)	$\Delta V_{OI}$	$(1.5V + V_{OUT}) \leq V_{IN} \leq 10V$			0.04	0.2	%
Load regulation (Note 2)	$\Delta V_{OL}$	$I_O = 10mA \text{ to } 3A$			0.08	0.3	%
Dropout Voltage	$\Delta V$	(Note 3)	$I_O = 10mA$		1.00	1.15	V
			$I_O = 3A$		1.15	1.30	
Quiescent Current ( for AMC7586-X.X)	$I_Q$	$V_{IN} \leq 10V, I_O = 10mA \text{ to } 3A$			8	13	mA
Current Limit	$I_{CL}$	$(V_{IN} - V_{OUT}) = 2V$		3	4		A
Minimum Load Current (Note 4)	$I_{min}$				5	10	mA
Ripple Rejection (Note 5)	$R_R$	$V_{RIPPLE} = 1V_{PP}, I_O = 100mA,$ $f_o = 120 \text{ Hz}$		60	80		dB

Note 1 Output voltage is set to be 2.5V.

Note 2: Line and load regulations are guaranteed up to maximum power dissipation determined by input/output differential and the output current. However, the maximum power will not be available over the full input/output voltage range.

Note 3: The specifications represent the minimum input/output voltage required to maintain 1% regulation.

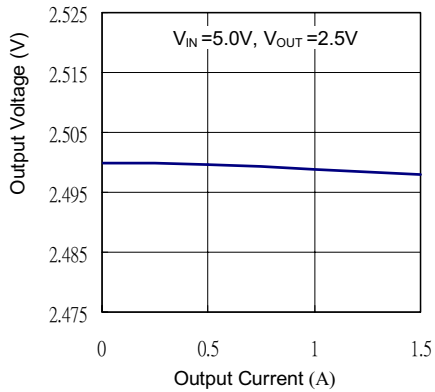
Note 4: The minimum load current is the minimum current required to maintain regulation. Normally the current in the resistor divider used to set the output voltage is selected to meet the minimum load current requirement.

Note 5: These parameters, although guaranteed, are not tested in production prior to shipment

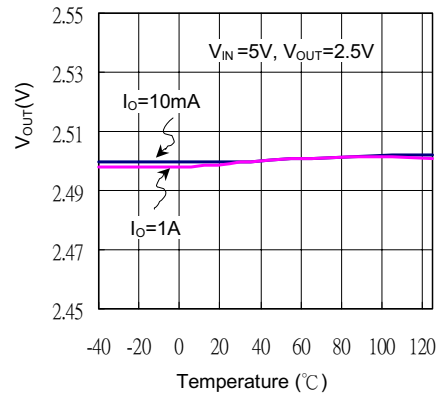
**CHARACTERIZATION CURVES**

$C_{IN}=10\mu F$ ,  $C_{OUT}=22\mu F$ ,  $T_A=25^\circ C$ , unless otherwise specified.

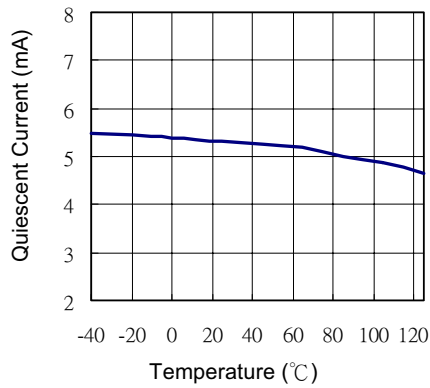
**Load Regulation**



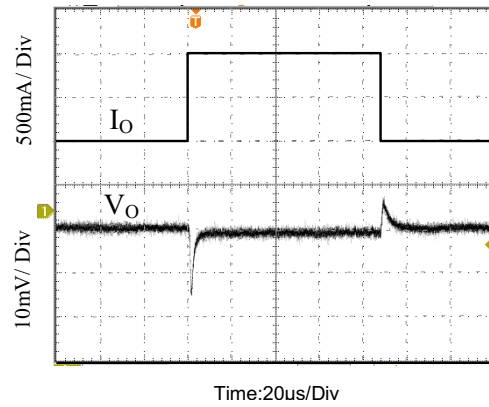
**Output Voltage vs. Temperature**



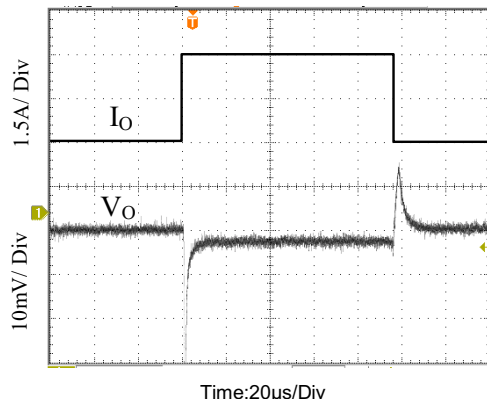
**Quiescent Current vs. Temperature**



**Load Transient Response with  $I_O=1A$**



**Load Transient Response with  $I_O=3A$**



**Application Note:**

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

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

$V_{OUT(NOM)}$  = 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

**Thermal consideration:**

The AMC7586 series have internal power and thermal limiting circuitry designed to protect the device under overload conditions. However maximum junction temperature ratings should not be exceeded under continuous normal load conditions. The thermal protection circuit of AMC7586 series will prevent the device from damage due to excessive power dissipation. When the device temperature rises to approximately 150°C, the regulator will be turned off.

When power consumption is over about 1.2W (for TO-220/ TO-263 package, 687mW for TO-252 package, at  $T_A=70^\circ\text{C}$ ), additional heat sink is required to control the junction temperature below 125°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.

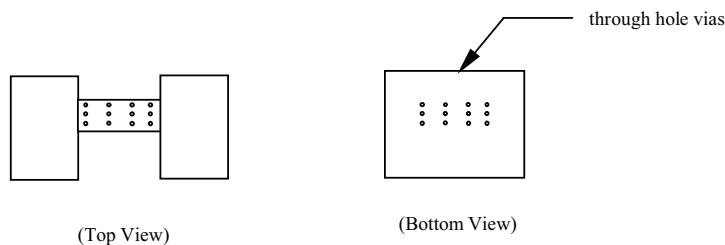
$\theta_{CS} \equiv$  Thermal resistance through the interface between the IC and the surface on which it is mounted.  
(typically,  $\theta_{CS} < 1.0^\circ\text{C/W}$ )

$\theta_{SA} \equiv$  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

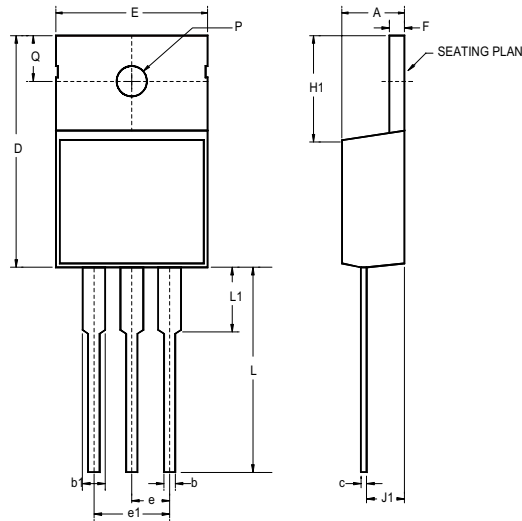
Recommended figure of PCB area used as a heat sink.



**3-Pin Plastic TO-220 (T)**

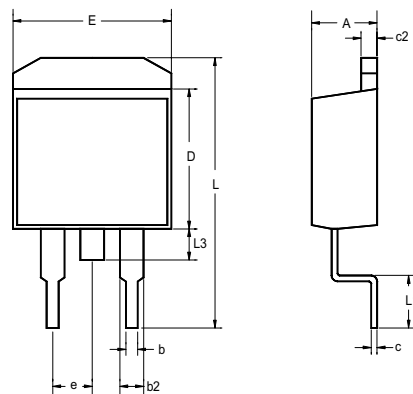
**AMC7586**

**3A LOW DROPOUT REGULATOR**



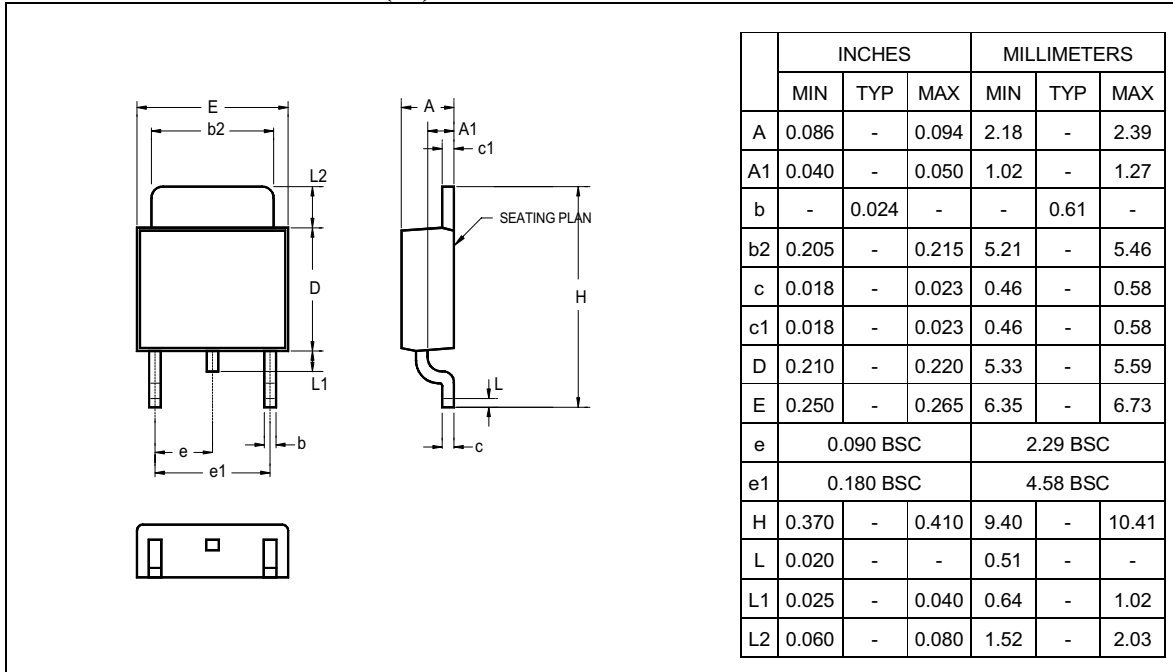
	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.140	-	0.190	3.56	-	4.83
b1	0.045	-	0.070	1.14	-	1.78
b	0.020	-	0.045	0.51	-	1.14
c	0.012	-	0.045	0.30	-	1.14
D	0.560	-	0.650	14.22	-	16.51
E	0.380	-	0.420	9.65	-	10.67
e	0.090	-	0.110	2.29	-	2.79
e1	0.190	-	0.210	4.83	-	5.33
F	0.020	-	0.055	0.51	-	1.40
H1	0.230	-	0.270	5.84	-	6.86
J1	0.080	-	0.115	2.03	-	2.92
L	0.500	-	0.580	12.7	-	14.73
P	0.139	-	0.161	3.53	-	4.09
Q	0.100	-	0.135	2.54	-	3.43
L1	-	-	0.250	-	-	6.35

**3-Pin Surface Mount TO-263 (ST)**



	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.160	-	0.190	4.06	-	4.83
b	0.020	-	0.039	0.51	-	0.99
b2	0.045	-	0.055	1.14	-	1.40
c	0.015 TYP.			0.38 TYP.		
c2	0.045	-	0.055	1.14	-	1.40
D	0.340	-	0.380	8.64	-	9.65
E	0.380	-	0.405	9.65	-	10.29
e	0.100 BSC			2.54 BSC		
L	0.575	-	0.625	14.61	-	15.88
L1	0.090	-	0.110	2.29	-	2.79
L2	-	-	0.115	-	-	2.92
L3	0.050	-	0.070	1.27	-	1.78

**3-Pin Surface Mount TO-252 (SJ)**





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