

5A LOW DROP OUT REGULATOR
DESCRIPTION

The AMC7585 is a high performance low dropout regulator rated for 5A output current with fixed 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.

On chip trimming adjusts the reference voltage to 1%. These features are ideal for low voltage microprocessor applications requiring a regulated 2.5V to 3.6V power supply.

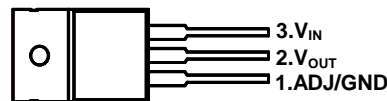
In addition, the AMC7585 provides the device protections including over current and thermal shutdown. Also, reverse battery protection scheme limits the reverse current when the input voltage falls below the output.

FEATURES

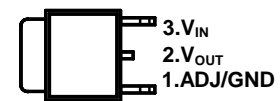
- Output current is excess of 5A
- Fast transient response
- Reverse battery protection
- Short circuit protection
- Internal thermal overload protection
- Available in 3L plastic TO-220 and surface mount 3L TO-263/252 packages
- Pin assignment identical to EZ1585B and LT1585A series.

APPLICATIONS

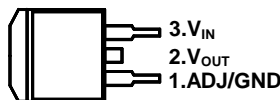
- Pentium® Processor Supplies
- PowerPCTM Supplies
- Computer Add-On Cards
- Other Applications Requiring Low Dropout Voltage Over Rated Current

PACKAGE PIN OUT


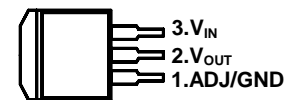
3-Pin Plastic TO-220
(Top View)



3-Pin Plastic TO-252
Surface Mount
(Top View)



3-Pin Plastic TO-263 (ST)
Surface Mount
(Top View)



3-Pin Plastic TO-263-3 (ST3)
Surface Mount
(Top View)

VOLTAGE OPTIONS

AMC7585-2.5 – 2.5V Fixed

AMC7585-3.3 – 3.3V Fixed

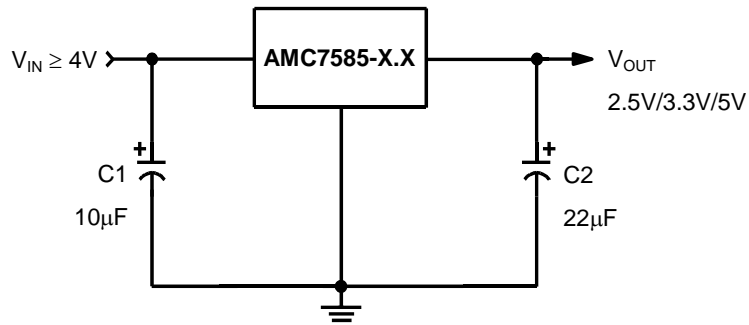
AMC7585-5.0 – 5.0V Fixed

AMC7585-ADJ – Adjustable

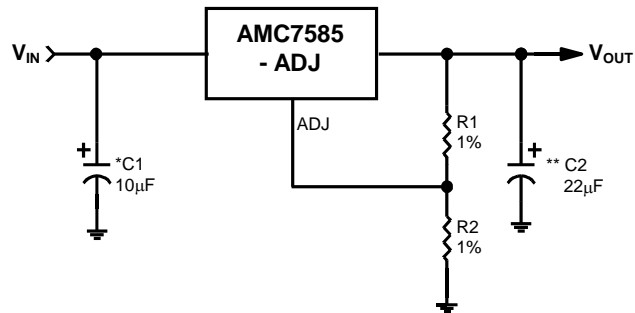
ORDER INFORMATION

T _A (°C)	T	TO-220	ST	TO-263	ST3	TO-263-3	SJ	TO-252
		3-pin		3-pin		3-pin		3-pin
0 to 70		AMC7585-X.XT		AMC7585-X.XST		-		AMC7585-X.XSJ
0 to 70		AMC7585-X.XTF(Lead Free)		AMC7585-X.XSTF(Lead Free)		-		AMC7585-X.XSJF(Lead Free)
0 to 70		AMC7585-ADJT		AMC7585-ADJST		AMC7585-ADJST3		AMC7585-ADJSJ
0 to 70		AMC7585-ADJTF(Lead Free)		AMC7585-ADJSTF(Lead Free)		AMC7585-ADJST3F(Lead Free)		AMC7585-ADJSJF(Lead Free)

Note: 1. All surface-mount packages are available in Tape & Reel. Append the letter "T" to part number (i.e., AMC7585-X.XSTT, AMC7585-X.XST3T, AMC7585-X.XSJT).
 2. The letter "F" is marked for Lead Free process.

TYPICAL APPLICATION


AMC7585-X.X Application Schematic



$$V_{OUT} = V_{REF} (1 + (R2/R1)) + I_{ADJ}R2$$

- * REQUIRED IF REGULATOR IS LOCATED FAR FROM POWER SUPPLY FILTER
- ** DESIGN C2 AS CLOSE TO V_{OUT} PIN AS POSSIBLE

AMC7585-ADJ Application Schematic

ABSOLUTE MAXIMUM RATINGS (Note)

Input Voltage (V_{IN})	7V
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	θ_{JT} (°C/W)	θ_{JA} (°C/W)	Derating factor (mW/°C) $T_A \geq 25^\circ\text{C}$	$T_A \leq 25^\circ\text{C}$ Power rating (mW)	$T_A = 70^\circ\text{C}$ Power rating (mW)	$T_A = 85^\circ\text{C}$ Power rating (mW)
T	6	45	22.2	2775	1776	1443
TF	6	45	22.2	2775	1776	1443
ST/ST3	6	45	22.2	2775	1776	1443
STF/ST3F	6	45	22.2	2775	1776	1443
SJ	7	80	12.5	1562	1000	812
SJF	7	80	12.5	1562	1000	812

Note: $T_j = T_A + (P_D \times \theta_{JA})$

P_D : Power dissipation.

θ_{JA} : Thermal resistance from Junction to Ambient.

For T and ST/ST3 packages, $\theta_{JT} = 6.0^\circ\text{C/W}$.

For SJ package, $\theta_{JT} = 7.0^\circ\text{C/W}$.

$T_j = T_{TAB} + (P_D \times \theta_{JT})$

T_{TAB} : Tab temperature.

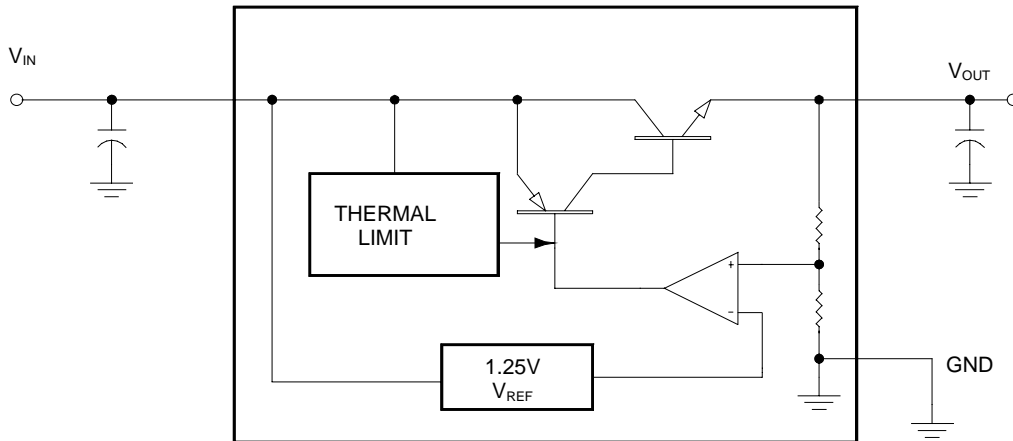
θ_{JT} : Thermal resistance from junction to tab of the package.

1. The θ_{JA} numbers are guidelines for the thermal performance of the device/PC-board system.
2. All of the above assume no ambient airflow.
3. If power consumption is over above rating, adequate heat sink is required to dissipate heat.

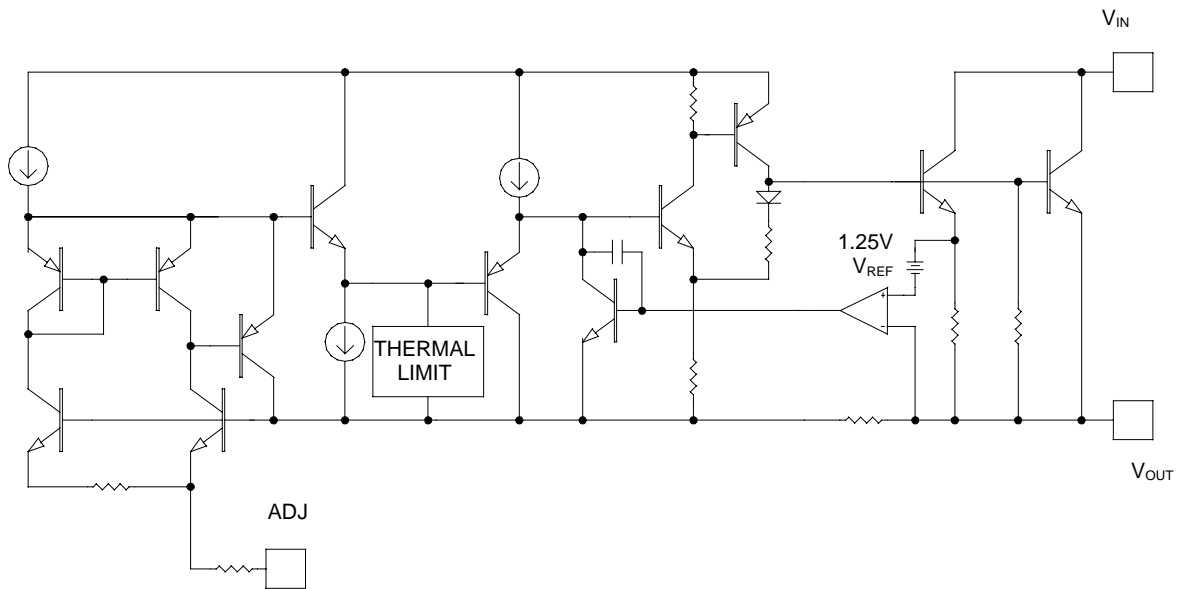
RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Recommended Operating Conditions			Units
		Min.	Typ.	Max.	
Input Voltage	V_{IN}	2.75		7	V
Load Current (with adequate heatsinking)	I_o	0.010		5	A
Input Capacitor (V_{IN} to GND)		1			μF
Output Capacitor with ESR of 10 Ω max., (V_{OUT} to GND)		10			μF
Operating Ambient Temperature Range		0		70	°C
Operating junction temperature	T_j			125	°C

BLOCK DIAGRAM



AMC7585-X.X Circuit Schematic



AMC7585-ADJ Circuit Schematic

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $V_{IN} = V_{OUT} + 1.5V$, $I_O = 10mA$. 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	AMC7585			Units	
			Min.	Typ.	Max.		
Output Voltage	AMC7585-2.5	V_{OUT}	$I_O = 10mA, T_A = 25^\circ C$	2.475	2.500	2.525	V
	AMC7585-3.3			3.267	3.300	3.333	
	AMC7585-5.0			4.950	5.000	5.050	
Output Voltage	AMC7585-2.5	V_{OUT}	$V_{IN} = V_{OUT} + 1.5V \text{ to } 10V,$ $I_O = 0mA \text{ to } 5A$	2.450	2.500	2.550	V
	AMC7585-3.3			3.234	3.300	3.366	
	AMC7585-5.0			4.900	5.000	5.100	
Reference Voltage	AMC7585-ADJ	V_{REF}	(Note 1)	1.238	1.250	1.262	V
			$I_O = 10mA \text{ to } 5A, \text{ (Note 1)}$	1.230	1.250	1.270	
Line Regulation (Note 2)	ΔV_{OI}	$(1.5V + V_{OUT}) \leq V_{IN} \leq 7V$		0.04	0.2	%	
Load Regulation (Note 2)	ΔV_{OL}	$I_O = 10mA \text{ to } 5A$		0.2	0.4	%	
Dropout Voltage	ΔV	$I_O = 5A \text{ (Note 3)}$		1.30	1.50	V	
Quiescent Current (for AMC7585-X.X)	I_Q	$V_{IN} \leq 7V, I_O = 10mA \text{ to } 3A$		8	13	mA	
Adjust Pin Current (for AMC7585-ADJ)	I_{ADJ}			50	120	μA	
Current Limit	I_{CL}	$(V_{IN} - V_{OUT}) = 2V$	5.1	6.8		A	
Minimum Load Current (Note 4)	I_{min}			5	10	mA	
Ripple Rejection (Note 5)	R_R	$V_{RIPPLE} = 1V_{PP}, I_O = 100mA,$ $f_O = 120Hz$	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.

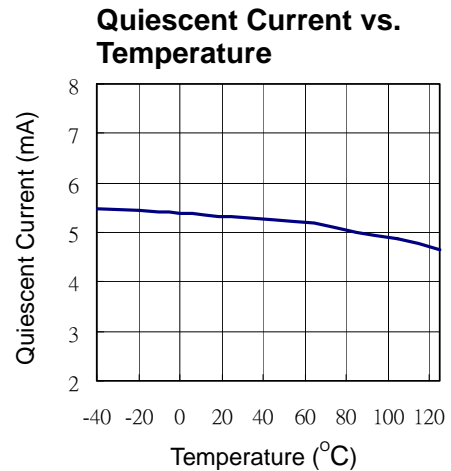
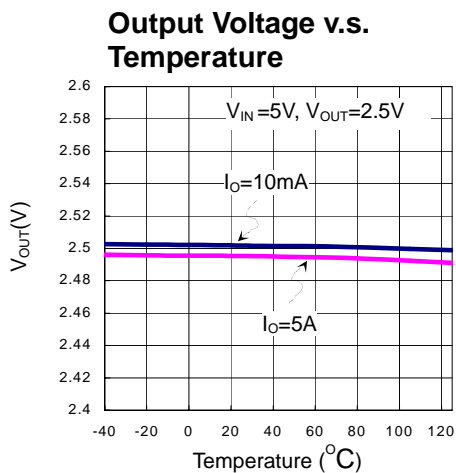
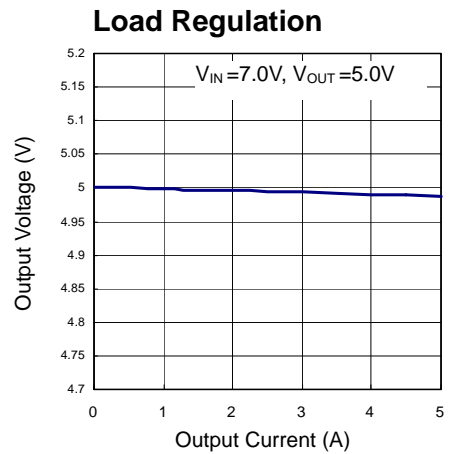
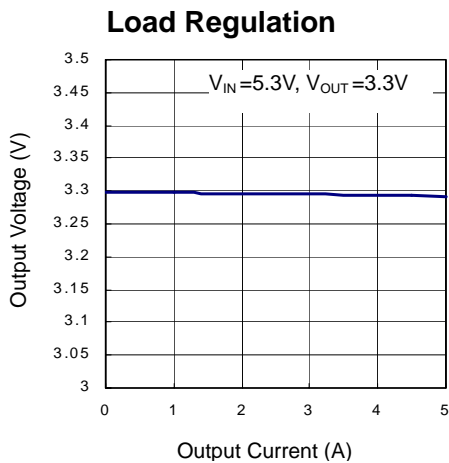
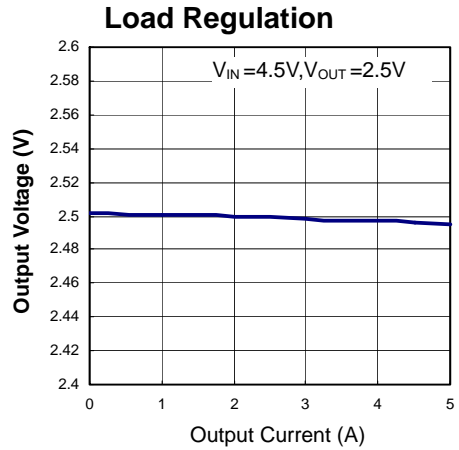
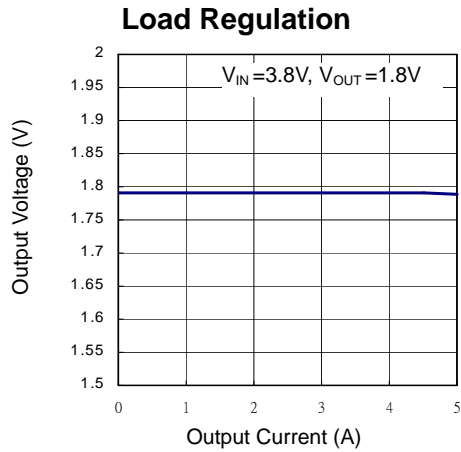
Note 3: The specifications represent the minimum input/output voltage required to maintain 1% regulation.

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

CHARACTERISTIC CURVES

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



APPLICATION INFORMATION
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 AMC7585 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 AMC7585 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: $T_J = P_D (\theta_{JT} + \theta_{TS} + \theta_{SA}) + T_A$

P_D : Dissipated power.

θ_{JT} : Thermal resistance from the junction to the mounting tab of the package.

(For TO-220, TO-263, and TO-263-3 packages, $\theta_{JT}=6^\circ\text{C/W}$. For TO-252 package, $\theta_{JT}=7^\circ\text{C/W}$)

θ_{TS} : Thermal resistance through the interface between the IC and the surface on which it is mounted.

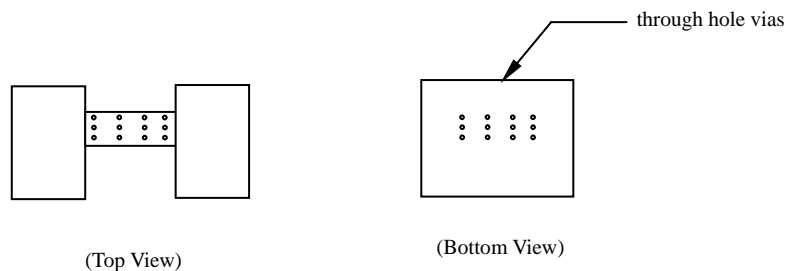
(typically, $\theta_{CS} < 1.0^\circ\text{C/W}$)

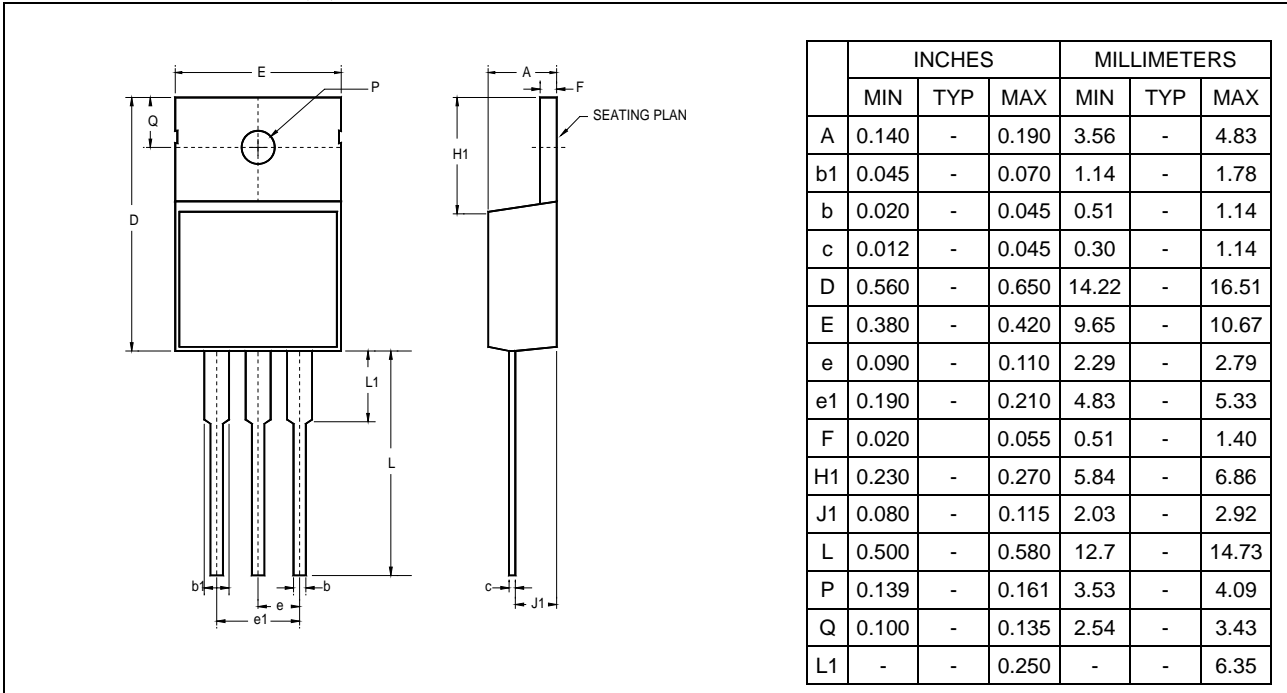
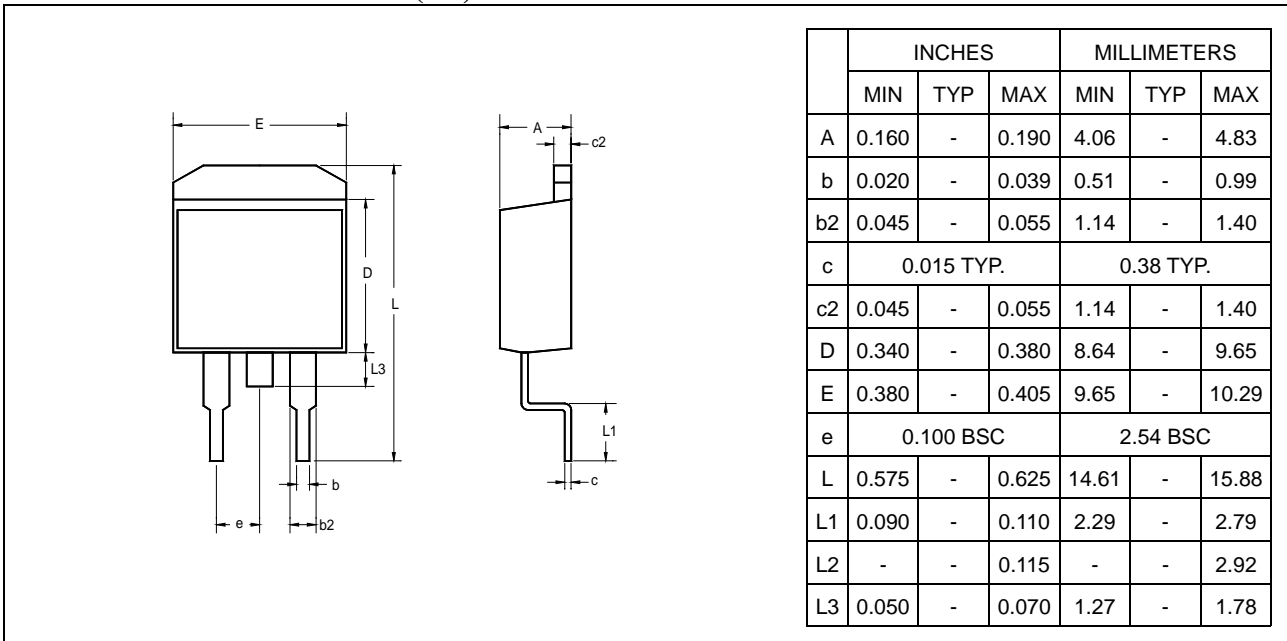
θ_{SA} : Thermal resistance from the mounting surface to ambient (thermal resistance of the heat sink).

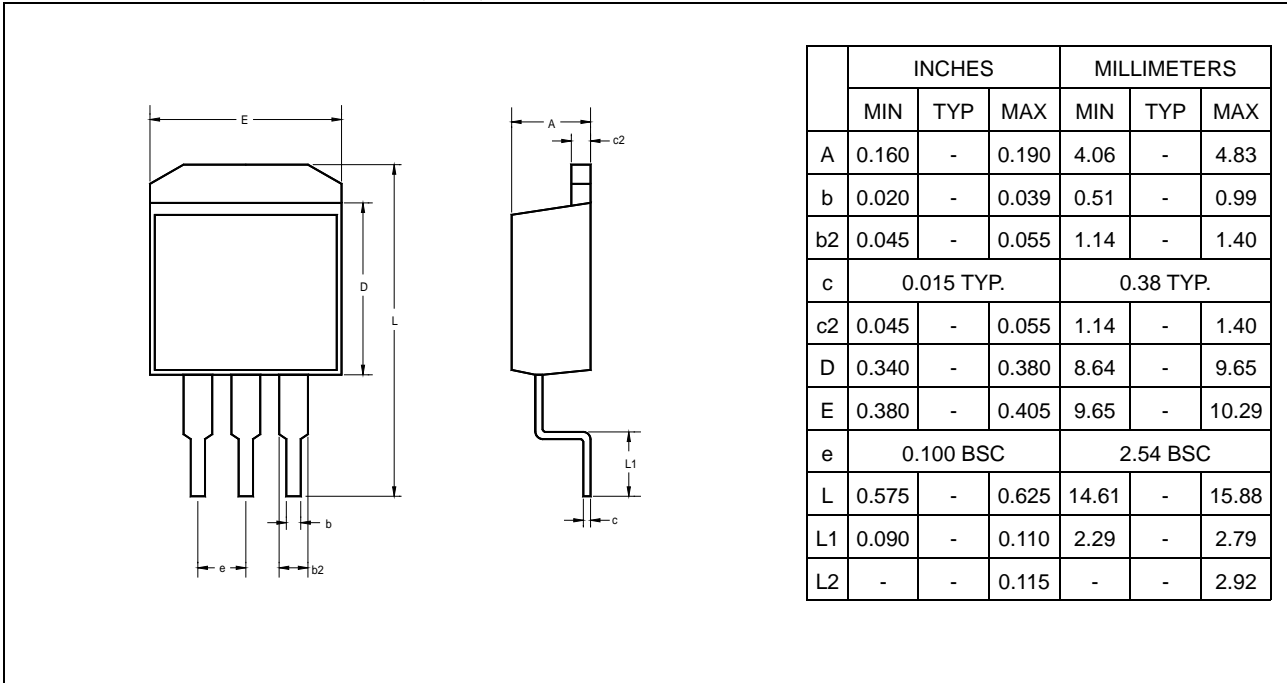
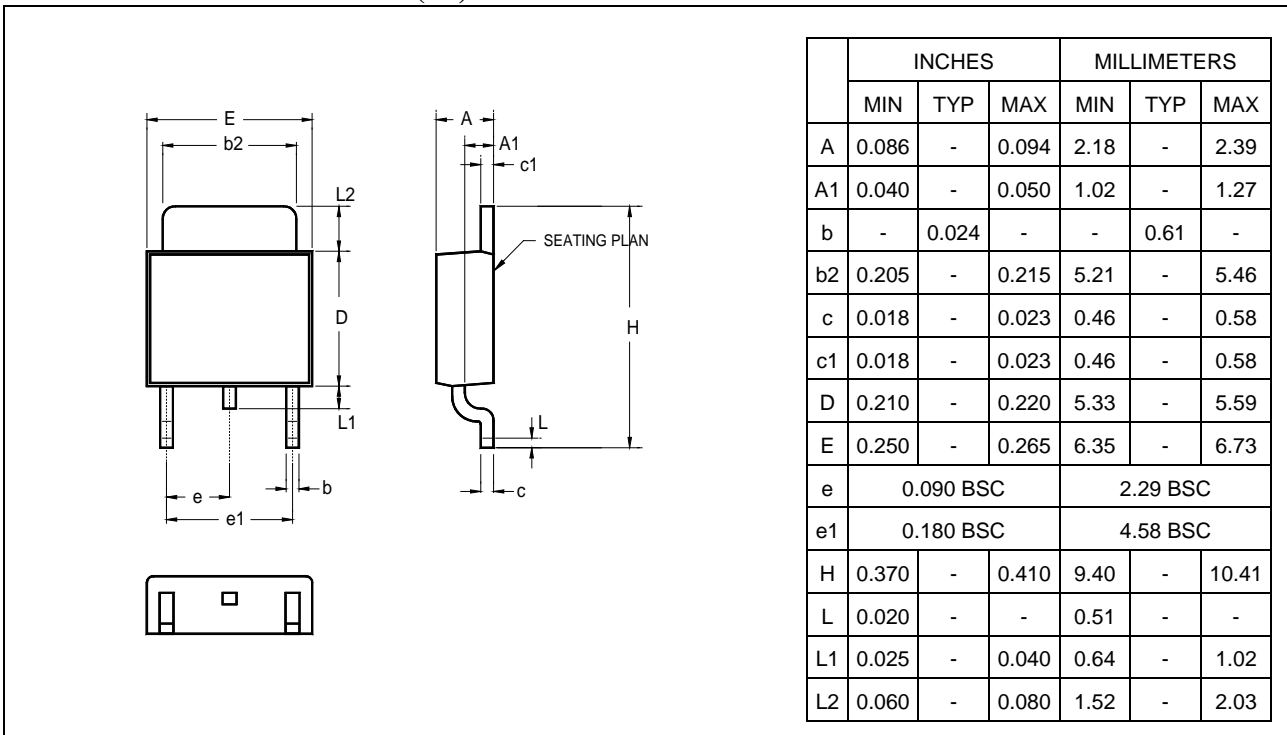
If PC Board copper is going to be used as a heat sink, below table can be used to determine the appropriate size of copper foil required. For multi-layered PCB, these layers can also be used as a heat sink. They can be connected with several through hole vias.

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

Recommended figure of PCB area used as a heat sink.



PACKAGE
3-Pin Plastic TO-220 (T)

3-Pin Surface Mount TO-263 (ST)


3-Pin Surface Mount TO-263 (ST3)

3-Pin Surface Mount TO-252 (SJ)


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