AMC76386

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Dual 450mA LDO REGULATOR

DESCRIPTION

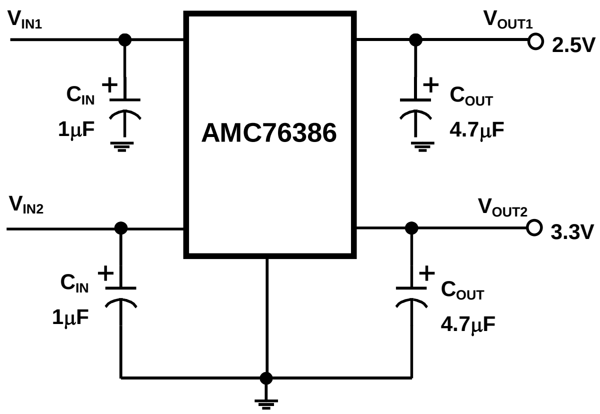
The AMC76386 series is a low dropout regulator rated for 450mA output current. Low power consumption and high accuracy is achieved through CMOS technology and internal trimmed reference voltage.

The AMC76386 series consists of a high-precision voltage reference, error correction circuit, and a current limit output driver. The fast transient response is an outstanding feature for applications with various loads.

FEATURES

- **2% internally trimmed output**
- **Output current is excess of 450mA**
- **Input-Output differential of typ. 360mV**
- **at 300mA & low quiescent current of 10μA typical**
- **P-MOS output stage with low RdsON.**
- **Short circuit protection**
- **Internal thermal overload protection**
- **Available in SOP-8 package**

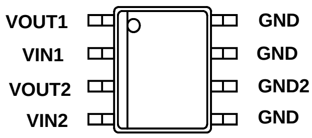
TYPICAL APPLICATION CIRCUIT



APPLICATIONS

- CD ROM, DVD
- Wireless Communication Systems
- Digital Camera
- Battery Powered Applications

PACKAGE PIN OUT



8-Pin Plastic SOP-8
Surface Mount
(Top View)

ORDER INFORMATION

T_A (°C)	DM: Plastic SOP-8, 8-pin
-40 to 85	**AMC76386-DMF (Lead Free)**

Note: 1.All surface-mount packages are available in Tape & Reel. Append the letter "T" to part number (i.e. AMC76386DMFT).
2.The letter "F" is marked for Lead Free process.

ABSOLUTE MAXIMUM RATINGS

Input Voltage, V_{IN1}, V_{IN2}	13V
Maximum Operating Junction Temperature, T_J	150°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (soldering, 10 seconds)	260°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.

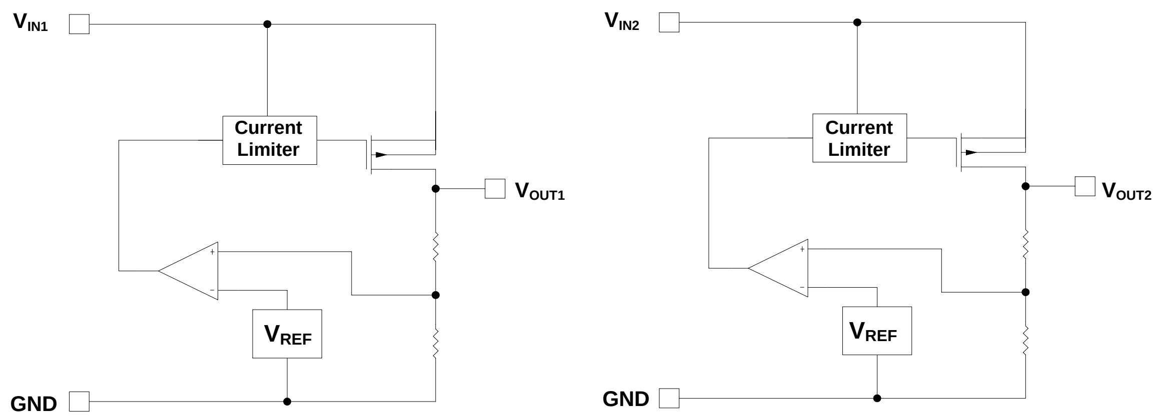
POWER DISSIPATION TABLE

Package	θ_{JA} (°C/ W)	Derating factor (mW/°C) $T_A \geq 25°C$	$T_A \leq 25°C$ Power rating (mW)	T_A=70°C Power rating (mW)
DM	165(Note)	6	757	487

Note: $T_J = T_A + (P_D \times \theta_{JA})$
P_D: Total Power dissipation.
θ_{JA}: Thermal resistance from Junction to Ambient.

The θ_{JA} numbers are guidelines for the thermal performance of the device/PC-board system.
All of the above assume no ambient airflow.

BLOCK DIAGRAM



RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Recommended Operating Conditions			Units
		Min.	Typ.	Max.	
Input Voltage	V_{IN}	3.0		10	V
Load Current (with adequate heat sinking)	I_o	5		450	mA
Input Capacitor (V_{IN} to GND)		0.1			μF
Output Capacitor with ESR of 10Ω max., (V_{OUT} to GND)		1.0			μF
Operating ambient temperature range	T_A	-40		85	^oC
Operating junction temperature	T_J			125	^oC

ELECTRICAL CHARACTERISTICS

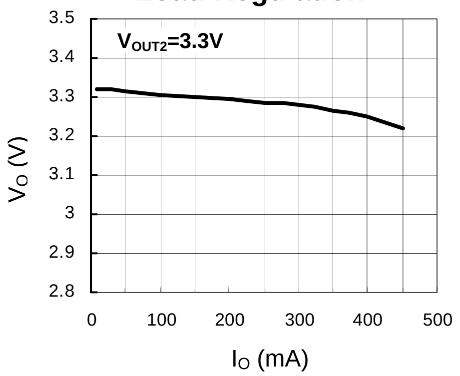
Unless otherwise specified, $V_{IN} = V_{OUT(TYP)} + 1V$, $I_O = 10mA$, $C_{OUT} = 4.7\mu F$, $T_A = 25\,^oC$, and are for DC characteristics only. (Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter		Symbol	Test Conditions	AMC76386			Units
				Min	Typ	Max	
Output Voltage	V_{OUT1}	V_O	$I_O = 10mA$	2.450	2.500	2.550	V
	V_{OUT2}			3.234	3.300	3.366	
Line Regulation		ΔV_{OI}	$V_{IN} = (V_{OUT} + 0.5V)$ to 8V		0.1	0.3	%/V
Load regulation		ΔV_{OL}	$10mA \le I_O \le 100mA$		15	30	mV
			$10mA \le I_O \le 300mA$		45	80	
			$10mA \le I_O \le 450mA$		95	140	
Dropout Voltage		ΔV	$I_O = 100mA$		120	180	mV
			$I_O = 300mA$		360	540	
			$I_O = 450mA$		540	810	
Ground Pin Current		I_Q	$I_O = 10mA\text{~}450mA$		8	20	μA
Current Limit		I_{CL}	$V_{IN} = V_{OUT} + 0.5V$	450			mA
Output Voltage Temperature Coefficient			$I_O=100mA$, $-40^oC \le T_J \le 125^oC$		±100		ppm/^oC

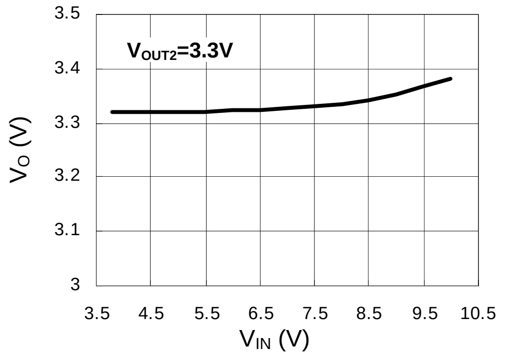
CHARACTERIZATION CURVES

Typical Performance Characteristics
(V_{IN}=5V，C_{IN}=1μF，C_{OUT}=4.7μF，T_A=25 °C unless otherwise specified.)

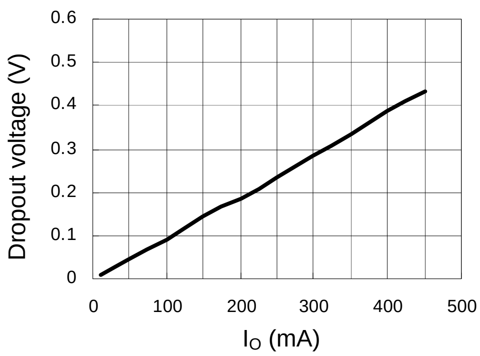
Load Regulation



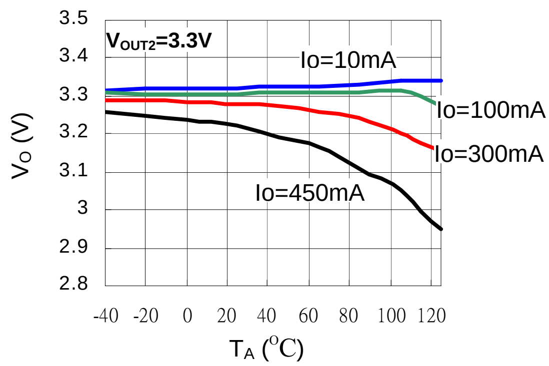
Line Regulation



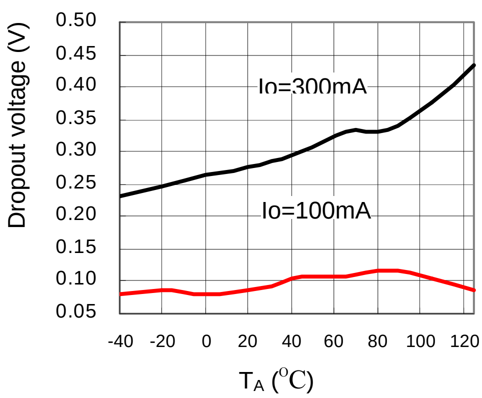
Dropout vs. Load Current



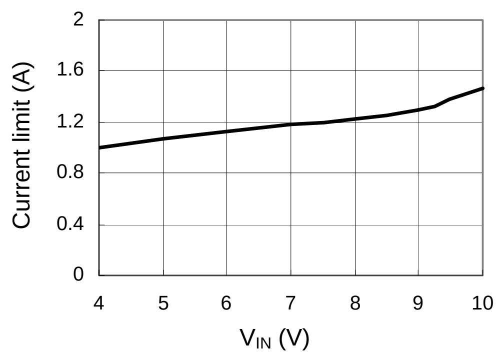
Output Voltage vs. Temperature



Dropout vs. Temperature



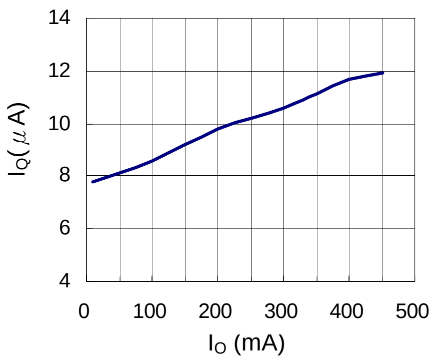
Current Limit vs. Supply Voltage



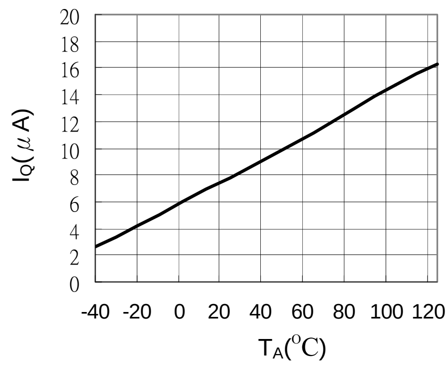
CHARACTERIZATION CURVES (Continued)

Typical Performance Characteristics
V_{IN}= 5V，C_{IN}=1μF，C_{OUT}= 4.7μF，T_A=25°C unless otherwise specified.

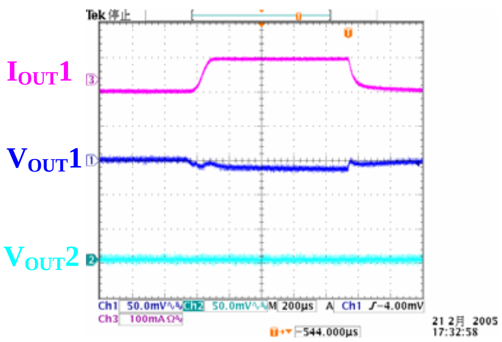
Quiescent Current vs. Load



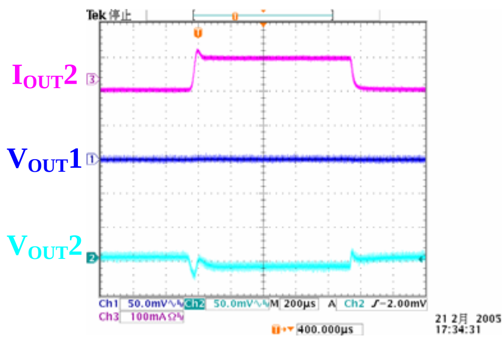
Quiescent Current vs. Temperature



Load Transient Regulation



Load Transient Regulation



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 AMC76386 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 AMC76386 series will prevent the device from damage due to excessive power dissipation. When the device temperature rises to approximately 150 ^{o}C, the regulator will be turned off.

When power consumption is over about 487mW (SOP-8 package, at T_A=70 ^{o}C), additional heat sink is required to control the junction temperature below 125 ^{o}C.

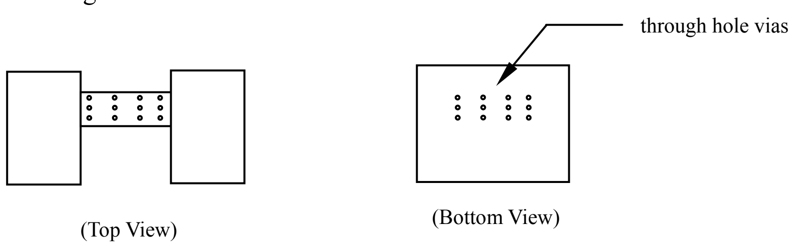
The junction temperature is: $T_J = P_D (\theta_{JT} + \theta_{CS} + \theta_{SA}) + T_A$

P_D: Total Dissipated power.
θ_{JT}:Thermal resistance from the junction to the mounting tab of the package.
θ_{CS}:Thermal resistance through the interface between the IC and the surface on which it is mounted. (typically, $\theta_{CS} < 1.0\,^{o}$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.

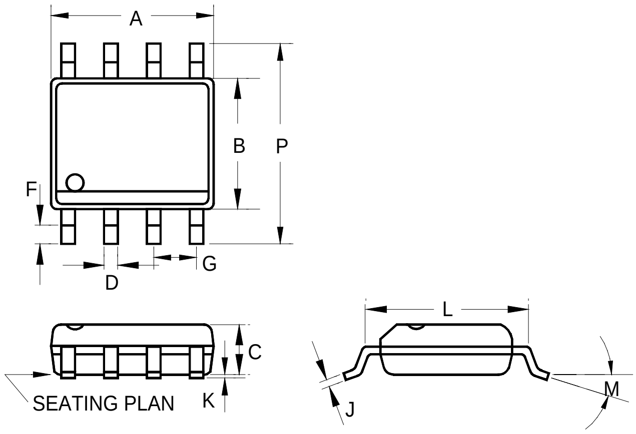
PCB θ_{SA} (^{o}C /W)	59	45	38	33	27	24	21
PCB heat sink size (mm^2)	500	1000	1500	2000	3000	4000	5000

Recommended figure of PCB area used as a heat sink.



PACKAGE

8-Pin Surface Mount SOP-8



	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.183	-	0.202	4.65	-	5.13
B	0.144	-	0.163	3.66	-	4.14
C	0.068	-	0.074	1.73	-	1.88
D	0.010	-	0.020	0.25	-	0.51
F	0.015	-	0.035	0.38	-	0.89
G	0.050 BSC			1.27 BSC		
J	0.007	-	0.010	0.19	-	0.25
K	0.005	-	0.010	0.13	-	0.25
L	0.189	-	0.205	4.80	-	5.21
M	-	-	8º	-	-	8º
P	0.228	-	0.244	5.79	-	6.20

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