

■ General Description

The AME8807 family of positive, linear regulators feature low ground current (30µA typ.) with low dropout voltage, making them ideal for battery applications. The space-saving SO-8 package is attractive for "Pocket" and "Hand Held" applications.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

The AME8807 is stable with an output capacitance of 2.2µF or greater.

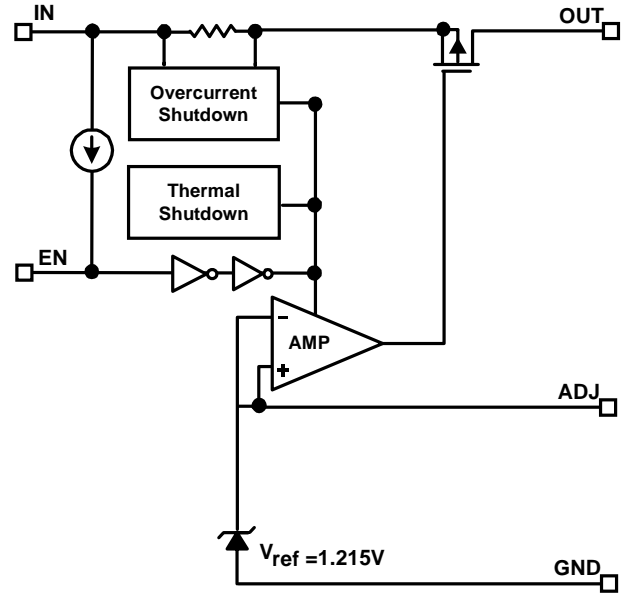
■ Features

- Very Low Dropout Voltage
- Guaranteed 600mA Output
- Accurate to within 1.5%
- Typical 30µA Ground Current
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Power-Saving Shutdown Mode
- Space-Saving SO-8 Package
- User Adjustable Output Voltages
- Low Temperature Coefficient

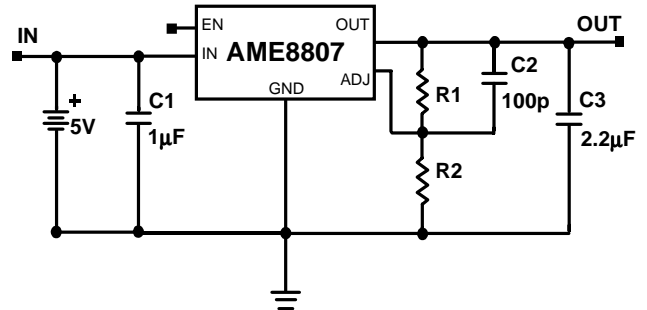
■ Applications

- Instrumentation
- Portable Electronics
- Wireless Devices
- Cordless Phones
- PC Peripherals
- Battery Powered Widgets
- Electronic Scales

■ Functional Block Diagram

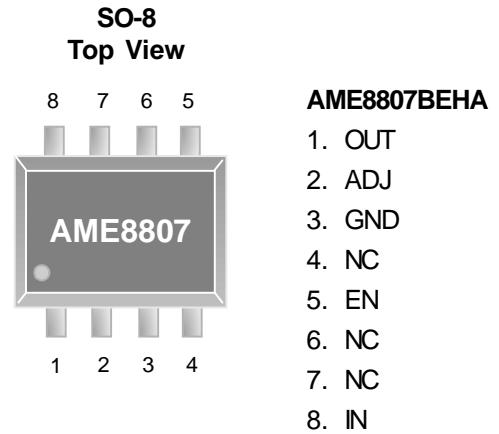
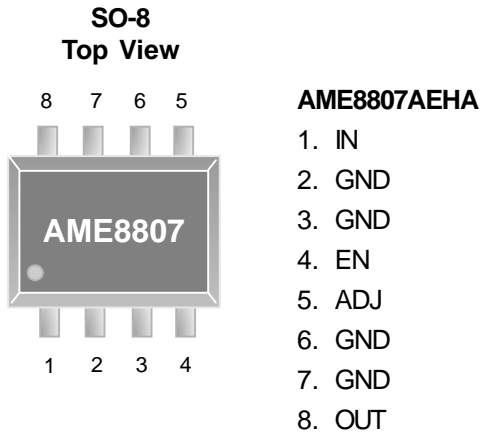
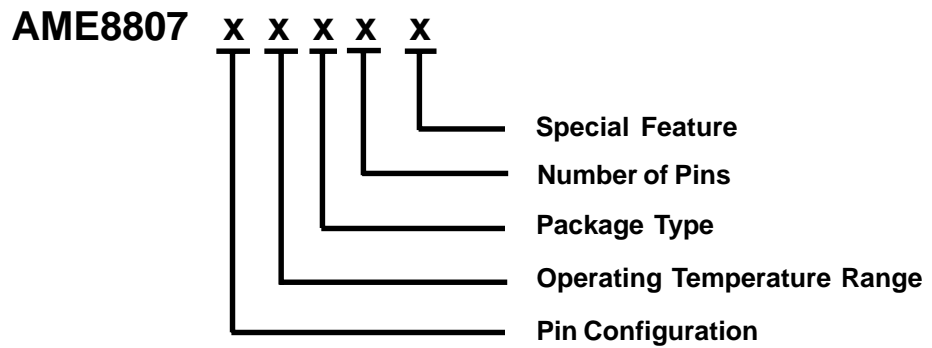


■ Typical Application



$$V_{OUT} = 1.215 (R1/R2 + 1)$$

C2 is unnecessary if R1 or R2 < 20 K Ohms

■ Pin Configuration

■ Ordering Information


Pin Configuration	Operating Temperature Range	Package Type	Number of Pins	Special Feature
A: 1. IN 2. GND 3. GND 4. EN 5. ADJ 6. GND 7. GND 8. OUT B: 1. OUT 2. ADJ 3. GND 4. NC 5. EN 6. NC 7. NV 8. EN	E: -40°C to 85°C	H: SO-8	A: 8	Z: Lead Free



■ Ordering Information (contd.)

Part Number	Marking	Output Voltage	Package	Operating Temp. Range
AME8807AEHA	8807 AEHA yyww	Adjustable	SO-8	- 40°C to + 85°C
AME8807AEHAZ	8807 AEHA yyww	Adjustable	SO-8	- 40°C to + 85°C
AME8807BEHA	8807 BEHA yyww	Adjustable	SO-8	- 40°C to + 85°C

Please consult AME sales office or authorized Rep./Distributor for other package type availability.



■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Input Voltage	8	V
Output Current	$P_D / (V_{IN} - V_O)$	A
Output Voltage	GND - 0.3 to $V_{IN} + 0.3$	V
ESD Classification	B	

Caution: Stress above the listed absolute maximum rating may cause permanent damage to the device

■ Recommended Operating Conditions

Parameter	Rating	Unit
Ambient Temperature Range	- 40 to + 85	°C
Junction Temperature	- 40 to + 125	°C

■ Thermal Information

Parameter		Maximum	Unit
Thermal Resistance (θ_{ja})	8807AEHA	124	°C / W
	8807BEHA	124	
Internal Power Dissipation (P_D) ($\Delta T = 100^\circ\text{C}$)	8807AEHA	810	mW
	8807BEHA	810	
Maximum Junction Temperature		150	°C
Maximum Lead Temperature (10 Sec)		300	°C

■ Electrical Specifications

TA = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Input Voltage	V_{IN}		Note 1		7	V
Output Voltage Accuracy	V_O	$I_O=1mA$	-1.5		1.5	%
Dropout Voltage	$V_{DROPOUT}$	$I_O=600mA$ $V_O=V_{O(NOM)}-2.0%$	$1.5V < V_{O(NOM)} \leq 2.0V$	See chart	1400	mV
			$2.0V < V_{O(NOM)} \leq 2.8V$		800	
			$2.8V < V_{O(NOM)}$		600	
Output Current	I_O	$V_O > 1.2V$	600			mA
Current Limit	I_{LIM}	$V_O > 1.2V$	600	800		mA
Short Circuit Current	I_{SC}	$V_O < 0.8V$		300	600	mA
Ground Pin Current	I_{GND}	$I_O=1mA$ to 600mA		30		μA
Line Regulation	REG_{LINE}	$I_O=1mA$ $V_{IN}=V_O+1$ to V_O+2	$V_O < 2.0V$		0.15	%
			$V_O \geq 2.0V$		0.02	0.1
Load Regulation	REG_{LOAD}	$I_O=1mA$ to 600mA		0.2	1	%
Over Temperature Shutdown	OTS			150		°C
Over Temperature Hysteresis	OTH			30		°C
V_O Temperature Coefficient	TC			30		ppm/°C
Power Supply Rejection	PSRR	$I_O=100mA$ $C_O=2.2\mu F$	$f=1kHz$		50	dB
			$f=10kHz$		20	
			$f=100kHz$		15	
Output Voltage Noise	eN	$f=10Hz$ to 100kHz $I_O=10mA$			30	μV_{rms}
ADJ Reference Voltage	V_{REF}		1.203	1.215	1.227	V
EN Input Threshold	V_{EH}	$V_{IN}=2.7V$ to 7V	2.0		V_{in}	V
	V_{EL}	$V_{IN}=2.7V$ to 7V	0		0.4	V
EN Input Bias Current	I_{EH}	$V_{EN}=V_{IN}$, $V_{IN}=2.7V$ to 7V			0.1	μA
	I_{EL}	$V_{EN}=0V$, $V_{IN}=2.7V$ to 7V			0.5	μA
Shutdown Supply Current	I_{SD}	$V_{IN}=5V$, $V_O=0V$, $V_{EN} < V_{EL}$		0.5	1	μA

Note1: $V_{IN(min)} = V_{OUT} + V_{DROPOUT}$



■ Detailed Description

The AME8807 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, and thermal shutdown.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150°C, or the current exceeds 600mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120°C.

The AME8807 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The AME8807 also incorporates current foldback to reduce power dissipation when the output is short circuited. This feature becomes active when the output drops below 0.8 volts, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8 volts.

■ External Capacitors

The AME8807 is stable with an output capacitor to ground of 2.2 μ F or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1 μ F ceramic capacitor with a 10 μ F Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

A second capacitor is recommended between the input and ground to stabilize V_{in} . The input capacitor should be at least 0.1 μ F to have a beneficial effect.

All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

■ Enable

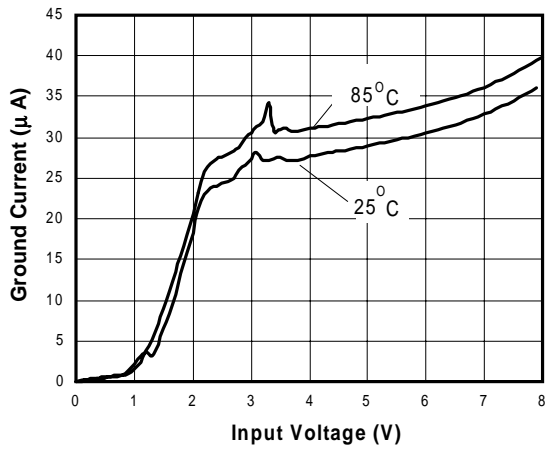
The Enable pin normally floats high. When actively, pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 1 μ A. This pin behaves much like an electronic switch.

■ ADJ

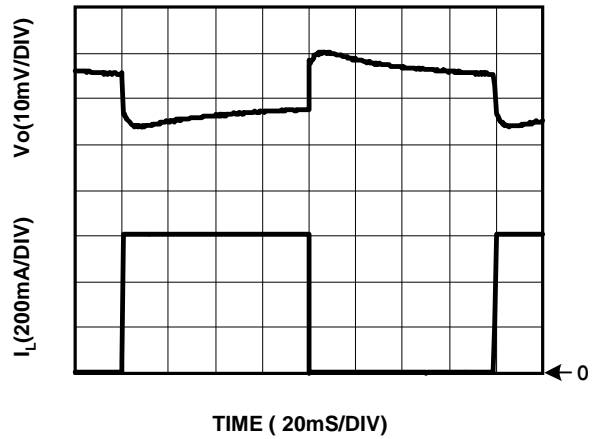
The ADJ pin is the positive input to the error amplifier which, due to the pmos pass element inversion, means it is actually the negative input of the LDO feedback loop. The feedback works to keep the voltage at the ADJ pin 1.215V with respect to ground. Since the internal circuitry at the ADJ pin is essentially an ESD protected CMOS gate the input current at the ADJ pin is virtually zero.



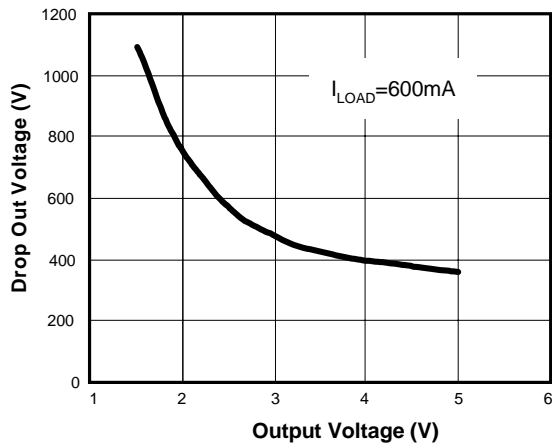
Ground Current vs. Input Voltage



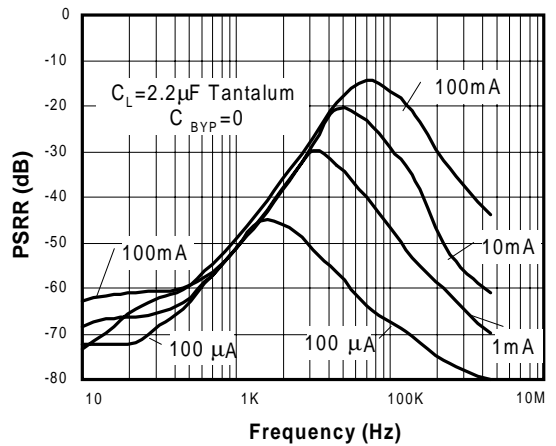
Load Step (1mA-600mA)



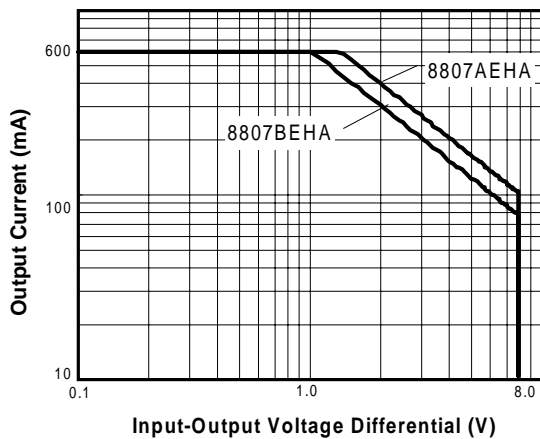
Drop Out Voltage vs. Output Voltage



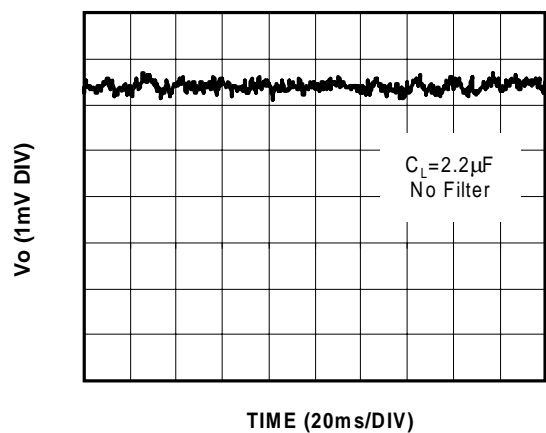
Power Supply Rejection Ratio



Safe Operating Area

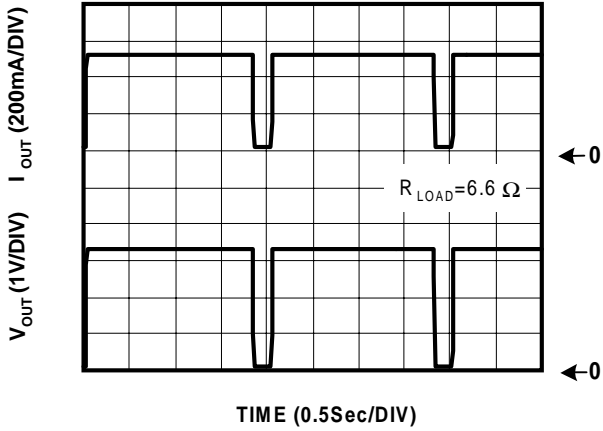


Noise Measurement

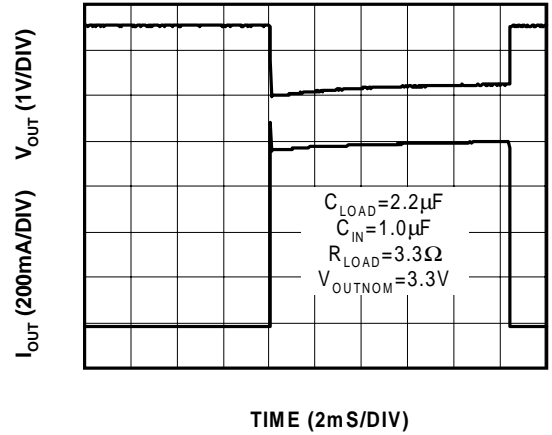




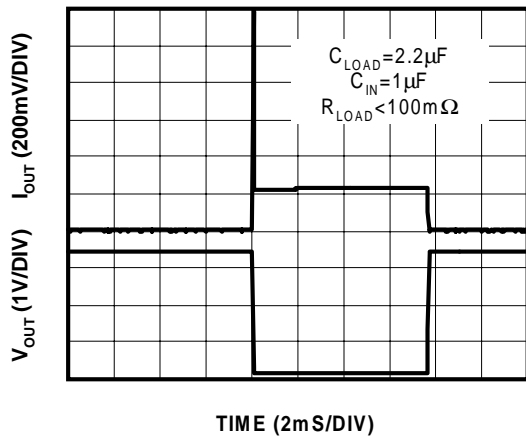
Overtemperature Shutdown



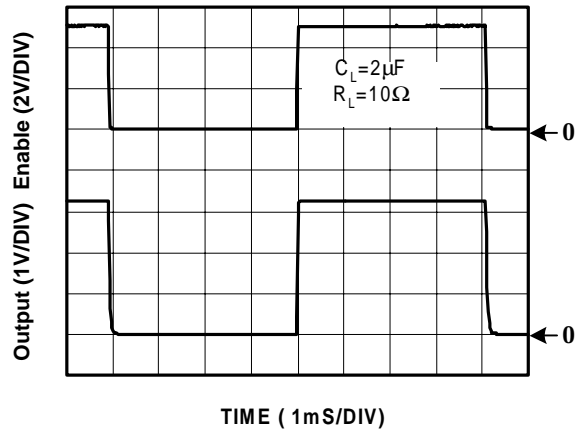
Current Limit Response



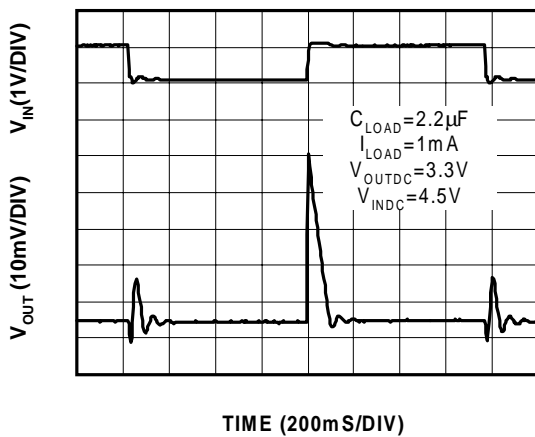
Short Circuit Response



Chip Enable Transient Response



Line Transient Response





External Resistor Divider Table

R1 (K Ohm)	1	2	3	4	5	6	7	8	9	10
Vout	$R2(K\text{ Ohm})=(1.215*R1(K\text{ Ohm}))/(Vout-1.215)$									
1.30	14.29	28.59	42.88	57.18	71.47	85.76	100.06	114.35	128.65	142.94
1.35	9.00	18.00	27.00	36.00	45.00	54.00	63.00	72.00	81.00	90.00
1.40	6.57	13.14	19.70	26.27	32.84	39.41	45.97	52.54	59.11	65.68
1.45	5.17	10.34	15.51	20.68	25.85	31.02	36.19	41.36	46.53	51.70
1.50	4.26	8.53	12.79	17.05	21.32	25.58	29.84	34.11	38.37	42.63
1.55	3.63	7.25	10.88	14.51	18.13	21.76	25.39	29.01	32.64	36.27
1.60	3.16	6.31	9.47	12.62	15.78	18.94	22.09	25.25	28.40	31.56
1.65	2.79	5.59	8.38	11.17	13.97	16.76	19.55	22.34	25.14	27.93
1.70	2.51	5.01	7.52	10.02	12.53	15.03	17.54	20.04	22.55	25.05
1.75	2.27	4.54	6.81	9.08	11.36	13.63	15.90	18.17	20.44	22.71
1.80	2.08	4.15	6.23	8.31	10.38	12.46	14.54	16.62	18.69	20.77
1.85	1.91	3.83	5.74	7.65	9.57	11.48	13.39	15.31	17.22	19.13
1.90	1.77	3.55	5.32	7.09	8.87	10.64	12.42	14.19	15.96	17.74
1.95	1.65	3.31	4.96	6.61	8.27	9.92	11.57	13.22	14.88	16.53
2.00	1.55	3.10	4.64	6.19	7.74	9.29	10.83	12.38	13.93	15.48
2.05	1.46	2.91	4.37	5.82	7.28	8.73	10.19	11.64	13.10	14.55
2.10	1.37	2.75	4.12	5.49	6.86	8.24	9.61	10.98	12.36	13.73
2.15	1.30	2.60	3.90	5.20	6.50	7.80	9.10	10.40	11.70	12.99
2.20	1.23	2.47	3.70	4.93	6.17	7.40	8.63	9.87	11.10	12.34
2.25	1.17	2.35	3.52	4.70	5.87	7.04	8.22	9.39	10.57	11.74
2.30	1.12	2.24	3.36	4.48	5.60	6.72	7.84	8.96	10.08	11.20
2.35	1.07	2.14	3.21	4.28	5.35	6.42	7.49	8.56	9.63	10.70
2.40	1.03	2.05	3.08	4.10	5.13	6.15	7.18	8.20	9.23	10.25
2.45	0.98	1.97	2.95	3.94	4.92	5.90	6.89	7.87	8.85	9.84
2.50	0.95	1.89	2.84	3.78	4.73	5.67	6.62	7.56	8.51	9.46
2.55	0.91	1.82	2.73	3.64	4.55	5.46	6.37	7.28	8.19	9.10
2.60	0.88	1.75	2.63	3.51	4.39	5.26	6.14	7.02	7.90	8.77
2.65	0.85	1.69	2.54	3.39	4.23	5.08	5.93	6.77	7.62	8.47
2.70	0.82	1.64	2.45	3.27	4.09	4.91	5.73	6.55	7.36	8.18
2.75	0.79	1.58	2.37	3.17	3.96	4.75	5.54	6.33	7.12	7.92
2.80	0.77	1.53	2.30	3.07	3.83	4.60	5.37	6.13	6.90	7.67
2.85	0.74	1.49	2.23	2.97	3.72	4.46	5.20	5.94	6.69	7.43
2.90	0.72	1.44	2.16	2.88	3.61	4.33	5.05	5.77	6.49	7.21
2.95	0.70	1.40	2.10	2.80	3.50	4.20	4.90	5.60	6.30	7.00
3.00	0.68	1.36	2.04	2.72	3.40	4.08	4.76	5.45	6.13	6.81
3.05	0.66	1.32	1.99	2.65	3.31	3.97	4.63	5.30	5.96	6.62
3.10	0.64	1.29	1.93	2.58	3.22	3.87	4.51	5.16	5.80	6.45



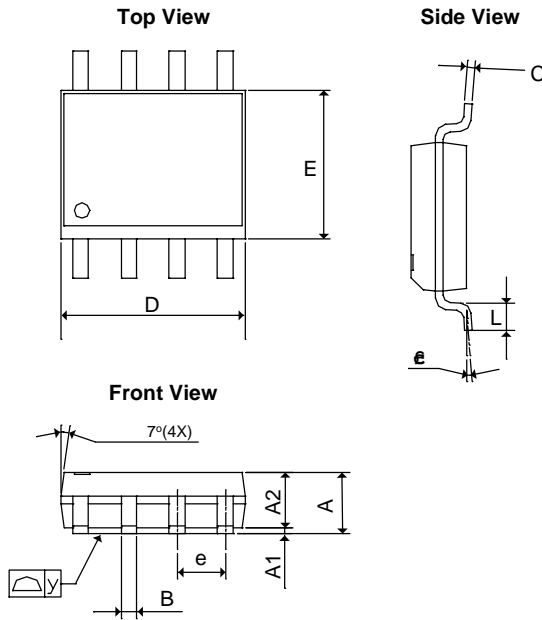
External Resistor Divider Table

R1 (K Ohm)	1	2	3	4	5	6	7	8	9	10
Vout	$R2(K\ Ohm)=(1.215*R1(K\ Ohm))/(Vout-1.215)$									
3.15	0.63	1.26	1.88	2.51	3.14	3.77	4.40	5.02	5.65	6.28
3.20	0.61	1.22	1.84	2.45	3.06	3.67	4.28	4.90	5.51	6.12
3.25	0.60	1.19	1.79	2.39	2.99	3.58	4.18	4.78	5.37	5.97
3.30	0.58	1.17	1.75	2.33	2.91	3.50	4.08	4.66	5.24	5.83
3.35	0.57	1.14	1.71	2.28	2.85	3.41	3.98	4.55	5.12	5.69
3.40	0.56	1.11	1.67	2.22	2.78	3.34	3.89	4.45	5.00	5.56
3.45	0.54	1.09	1.63	2.17	2.72	3.26	3.81	4.35	4.89	5.44
3.50	0.53	1.06	1.60	2.13	2.66	3.19	3.72	4.25	4.79	5.32
3.55	0.52	1.04	1.56	2.08	2.60	3.12	3.64	4.16	4.68	5.20
3.60	0.51	1.02	1.53	2.04	2.55	3.06	3.57	4.08	4.58	5.09
3.65	0.50	1.00	1.50	2.00	2.49	2.99	3.49	3.99	4.49	4.99
3.70	0.49	0.98	1.47	1.96	2.44	2.93	3.42	3.91	4.40	4.89
3.75	0.48	0.96	1.44	1.92	2.40	2.88	3.36	3.83	4.31	4.79
3.80	0.47	0.94	1.41	1.88	2.35	2.82	3.29	3.76	4.23	4.70
3.85	0.46	0.92	1.38	1.84	2.31	2.77	3.23	3.69	4.15	4.61
3.90	0.45	0.91	1.36	1.81	2.26	2.72	3.17	3.62	4.07	4.53
3.95	0.44	0.89	1.33	1.78	2.22	2.67	3.11	3.55	4.00	4.44
4.00	0.44	0.87	1.31	1.75	2.18	2.62	3.05	3.49	3.93	4.36
4.05	0.43	0.86	1.29	1.71	2.14	2.57	3.00	3.43	3.86	4.29
4.10	0.42	0.84	1.26	1.68	2.11	2.53	2.95	3.37	3.79	4.21
4.15	0.41	0.83	1.24	1.66	2.07	2.48	2.90	3.31	3.73	4.14
4.20	0.41	0.81	1.22	1.63	2.04	2.44	2.85	3.26	3.66	4.07
4.25	0.40	0.80	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00
4.30	0.39	0.79	1.18	1.58	1.97	2.36	2.76	3.15	3.54	3.94
4.35	0.39	0.78	1.16	1.55	1.94	2.33	2.71	3.10	3.49	3.88
4.40	0.38	0.76	1.14	1.53	1.91	2.29	2.67	3.05	3.43	3.81
4.45	0.38	0.75	1.13	1.50	1.88	2.25	2.63	3.00	3.38	3.76
4.50	0.37	0.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70
4.55	0.36	0.73	1.09	1.46	1.82	2.19	2.55	2.91	3.28	3.64
4.60	0.36	0.72	1.08	1.44	1.79	2.15	2.51	2.87	3.23	3.59
4.65	0.35	0.71	1.06	1.41	1.77	2.12	2.48	2.83	3.18	3.54
4.70	0.35	0.70	1.05	1.39	1.74	2.09	2.44	2.79	3.14	3.49
4.75	0.34	0.69	1.03	1.37	1.72	2.06	2.41	2.75	3.09	3.44
4.80	0.34	0.68	1.02	1.36	1.69	2.03	2.37	2.71	3.05	3.39
4.85	0.33	0.67	1.00	1.34	1.67	2.01	2.34	2.67	3.01	3.34
4.90	0.33	0.66	0.99	1.32	1.65	1.98	2.31	2.64	2.97	3.30
4.95	0.33	0.65	0.98	1.30	1.63	1.95	2.28	2.60	2.93	3.25
5.00	0.32	0.64	0.96	1.28	1.61	1.93	2.25	2.57	2.89	3.21



■ Package Dimension

SO-8



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.05315	0.0689
A₁	0.10	0.25	0.00394	0.00984
A₂	1.473 REF		0.058 REF	
B	0.33	0.51	0.01299	0.02008
C	0.19	0.25	0.00748	0.00984
D	4.80	5.00	0.18898	0.19685
E	3.80	4.00	0.14961	0.15748
e	1.27 BSC		0.050 BSC	
L	0.40	1.27	0.01575	0.05
y	-	0.10	-	0.004
θ	0°	8°	0°	8°



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