■ 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 SOP-8 & DFN-8 (3mmx3mmx0.75mm) packages are 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" operating conditions.

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

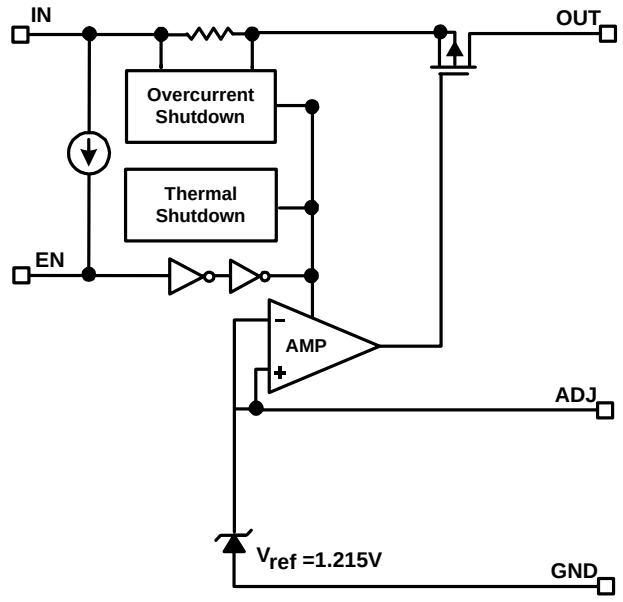
■ Features

- Very Low Dropout Voltage
- Guaranteed 600mA Output
- Typical 30μA Quiescent Current
- Accurate to within 1.5%
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Power-Saving Shutdown Mode
- Space-Saving SOP-8 & DFN-8 (3mmx3mmx0.75mm) Packages
- User Adjustable Output Voltages
- Low Temperature Coefficient
- All AME's Lead Free Products Meet RoHS Standards

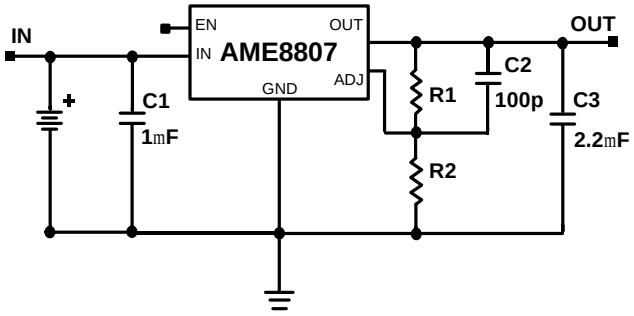
■ Applications

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

■ Functional Block Diagram



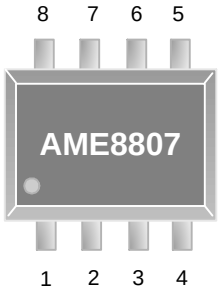
■ Typical Application



V_{OUT} = 1.215 (R1/R2 +1)
C2 is unnecessary if R1 or R2 < 20 K Ohms
R_1 and R_2 use resistance value within 1% accuracy for correct V_{OUT}

■ Pin Configuration

SOP-8
Top View

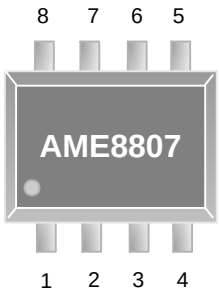


AME8807AEHA

1. IN
2. GND
3. GND
4. EN
5. ADJ
6. GND
7. GND
8. OUT

*** Die Attach:**
Conductive Epoxy

SOP-8
Top View

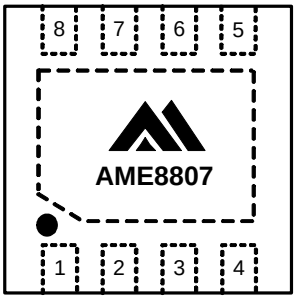


AME8807BEHA

1. OUT
2. ADJ
3. GND
4. NC
5. EN
6. NC
7. NC
8. IN

*** Die Attach:**
Conductive Epoxy

DFN-8
(3mmx3mmx0.75mm)
Top View



AME8807AEVA

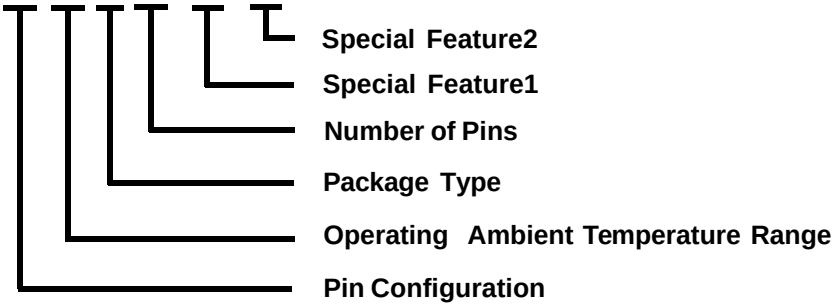
1. EN
2. GND
3. GND
4. IN
5. OUT
6. GND
7. GND
8. ADJ

*** Die Attach:**
Conductive Epoxy

Note:
The area enclosed by dashed line represents Exposed Pad and connect to GND.

■ Ordering Information

AME8807 x x x x x - x



Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Special Feature1	Special Feature 2 (For DFN package only)
A: 1. IN (SOP-8) 2. GND 3. GND 4. EN 5. ADJ 6. GND 7. GND 8. OUT	E: -40°C to 85°C	H: SOP V: DFN	A: 8	Z: Lead Free	3: 3x3x0.75(mm) (LxWxH)
B: 1. OUT (SOP-8) 2. ADJ 3. GND 4. NC 5. EN 6. NC 7. NC 8. IN					
A: 1. EN (DFN-8) 2. GND 3. GND 4. IN 5. OUT 6. GND 7. GND 8. ADJ					

■ Ordering Information

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8807AEHA	8807 AEHA yyww	Adjustable	SOP-8	- 40°C to 85°C
AME8807AEHAZ	8807 AEHA yyww	Adjustable	SOP-8	- 40°C to 85°C
AME8807BEHA	8807 BEHA yyww	Adjustable	SOP-8	- 40°C to 85°C
AME8807BEHAZ	8807 BEHA yyww	Adjustable	SOP-8	- 40°C to 85°C
AME8807AEVAZ-3	BEX yyww	Adjustable	DFN-8 (3mmx3mmx0.75mm)	- 40°C to 85°C

Note: yyww represents the date code

* A line on top of the first letter represents lead free plating such as $\bar{8}$807

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

■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Input Voltage	-0.3 to 8	V
EN Voltage	-0.3 to 8	V
Output Voltage	-0.3 to V_{IN} + 0.3	V
Output Current	P_D / (V_{IN} - V_{OUT})	mA
ESD Classification	B*	

Caution: Stress above the listed absolute maximum rating may cause permanent damage to the device.
*HBM B:2000V~3999V

■ Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
Ambient Temperature Range	T_A	- 40 to 85	°C
Junction Temperature Range	T_J	- 40 to 125	°C
Storage Temperature Range	T_{STG}	- 65 to 150	°C

■ Thermal Information

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	SOP-8	Conductive Epoxy	θ_{JC}	60	°C / W
	DFN-8 (3mmx3mmx0.75mm)			17	
Thermal Resistance (Junction to Ambient)	SOP-8		θ_{JA}	150	
	DFN-8 (3mmx3mmx0.75mm)			125	mW
Internal Power Dissipation	SOP-8		P_D	810	
	DFN-8 (3mmx3mmx0.75mm)			800	
Maximum Junction Temperature				150	°C
Solder Iron (10 Sec)**				350	°C

* Measure θ_{JC} on center of molding compound if IC has no tab.
** MIL-STD-202G 210F

■ Electrical Specifications

T_A = 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 < $V_{O(NOM)}$ <= 2.0V		See chart	1400	mV
			2.0V < $V_{O(NOM)}$ <= 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
Quiescent Current (For Fixed Output Voltage Options)	I_Q	I_O = 0mA			30	50	μA
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 >= 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 Hysterisis	OTH				30		°C
V_O Temperature Coefficient	TC				30		ppm/°C
Power Supply Rejection	PSRR	I_O = 100mA C_O = 2.2μF	f = 1kHz		50		dB
			f = 10kHz		20		
			f = 100kHz		15		
Output Voltage Noise	eN	f = 10Hz to 100kHz I_O = 10mA	Co = 2.2μF		30		μVrms
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		Vin	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^{o}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^{o}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 fold-back 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 2.2μF 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 0.1μF ceramic capacitor with a 10μF 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 Vin. The input capacitor should be at least 0.1μF 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.

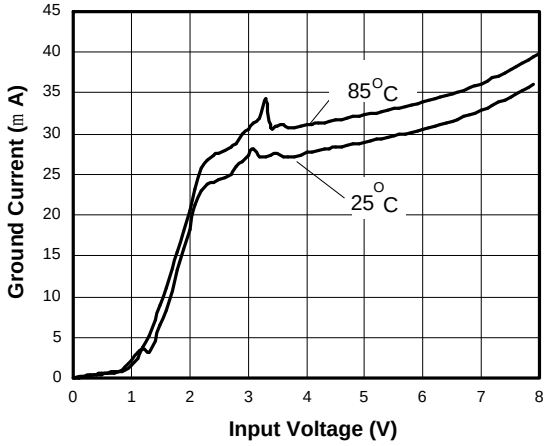
■ Enable

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 1μA. This pin behaves much like an electronic switch.

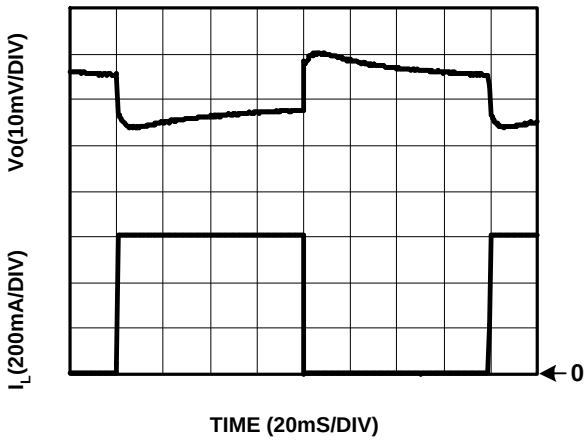
■ ADJ

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.

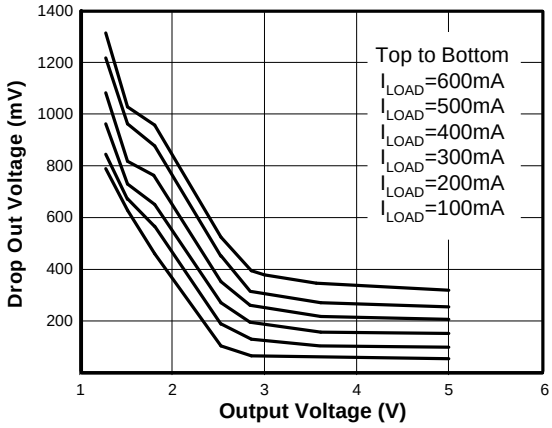
Ground Current vs. Input Voltage



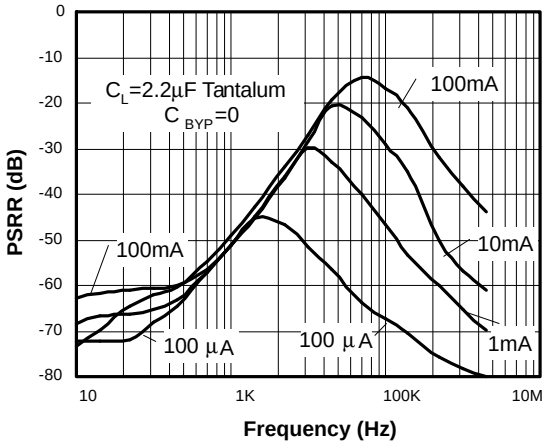
Load Step (1mA-600mA)



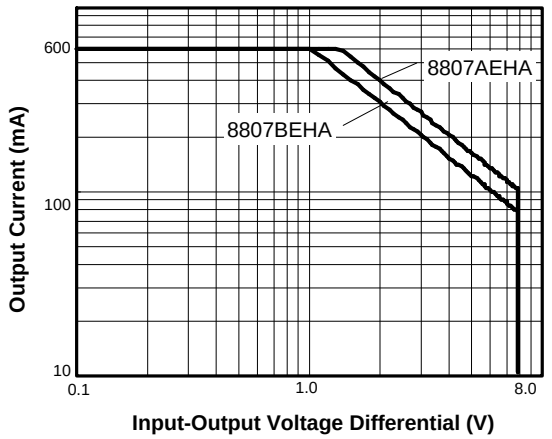
Drop Out Voltage vs. Output Voltage



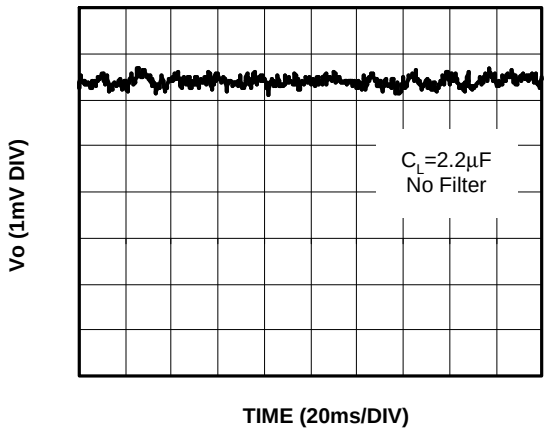
Power Supply Rejection Ratio



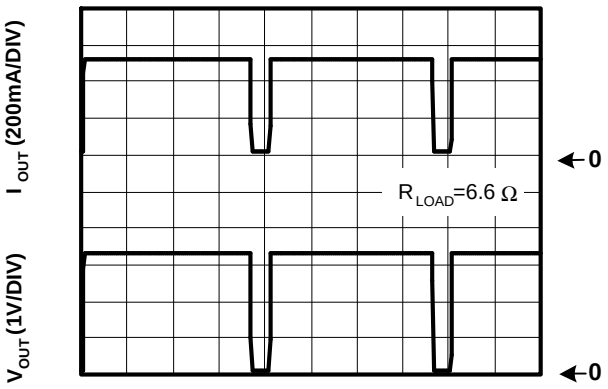
Safe Operating Area



Noise Measurement

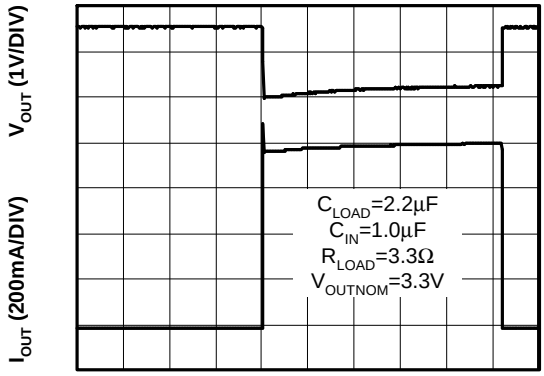


Overtemperature Shutdown



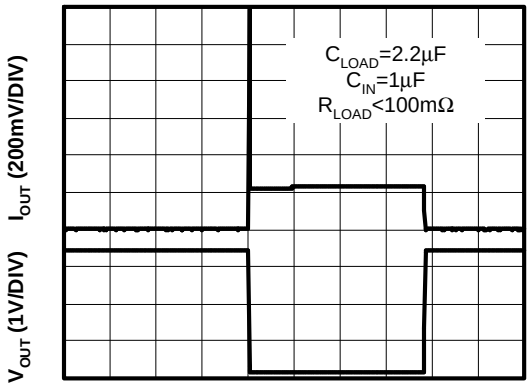
TIME (0.5Sec/DIV)

Current Limit Response



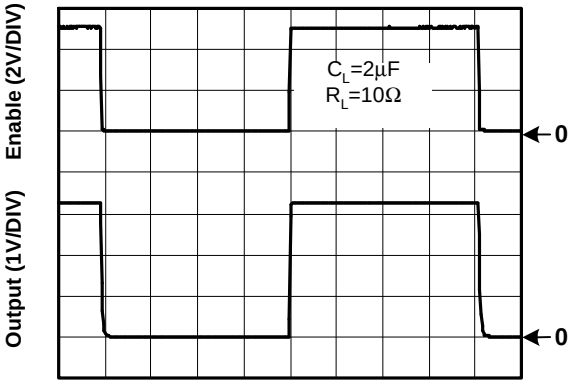
TIME (2mS/DIV)

Short Circuit Response



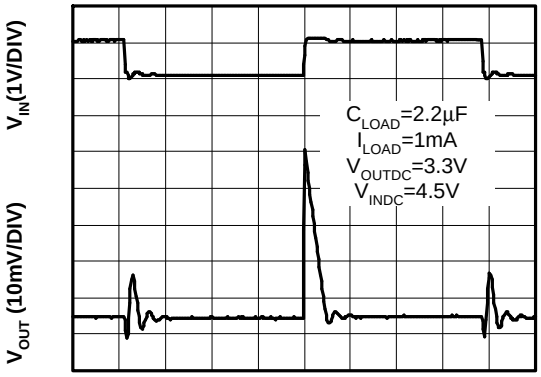
TIME (2mS/DIV)

Chip Enable Transient Response



TIME (1mS/DIV)

Line Transient Response



TIME (200mS/DIV)

■ External Resistor Divider Table

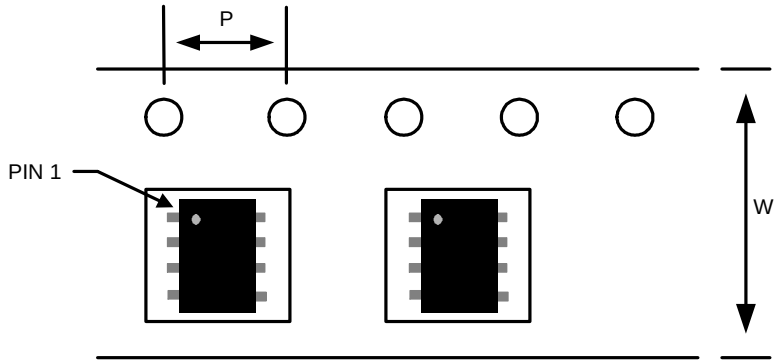
R1 (K Ohm)	1	2	3	4	5	6	7	8	9	10
Vout	R2(K Ohm)=(1.215*R1(K Ohm))/(Vout-1.215)									
1.30	14.29	28.59	42.88	57.18	71.47	85.76	100.06	114.35	128.65	142.94
1.35	9.00	18.00	27.00	36.00	45.00	54.00	63.00	72.00	81.00	90.00
1.40	6.57	13.14	19.70	26.27	32.84	39.41	45.97	52.54	59.11	65.68
1.45	5.17	10.34	15.51	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 (contd.)

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

■ Tape and Reel Dimension

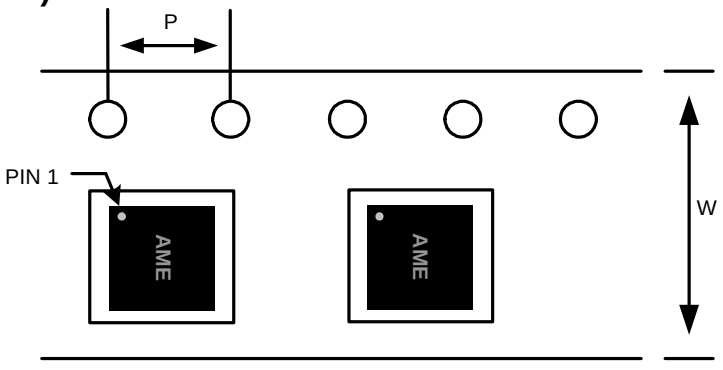
SOP-8



Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOP-8	12.0±0.1 mm	4.0±0.1 mm	2500pcs	330±1 mm

DFN-8 (3mmx3mmx0.75mm)

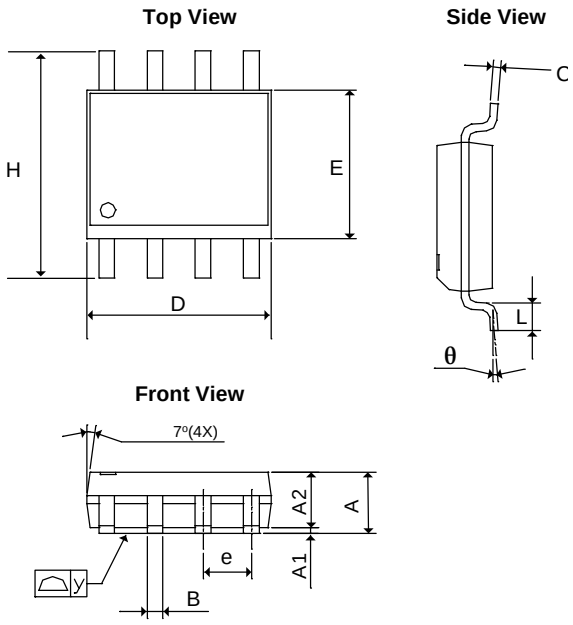


Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
DFN-8 (3x3x0.75mm)	12.0±0.1 mm	4.0±0.1 mm	3000pcs	330±1 mm

■ Package Dimension

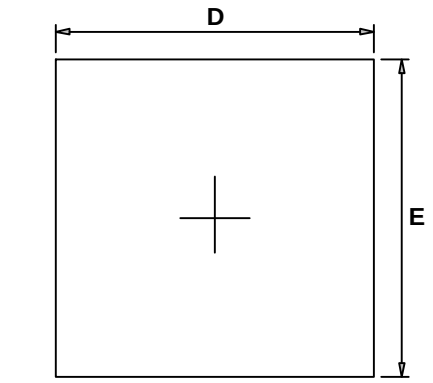
SOP-8



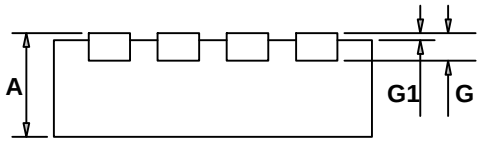
SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.05315	0.0689
A_1	0.10	0.30	0.00394	0.01181
A2	1.473 REF		0.05799 REF	
B	0.33	0.51	0.01299	0.02008
C	0.19	0.25	0.00748	0.00984
D	4.80	5.33	0.18898	0.20984
E	3.80	4.00	0.14961	0.15748
e	1.27 BSC		0.05000 BSC	
L	0.40	1.27	0.01575	0.05000
H	5.80	6.30	0.22835	0.24803
y	-	0.10	-	0.00394
q	0°	8°	0°	8°

■ Package Dimension

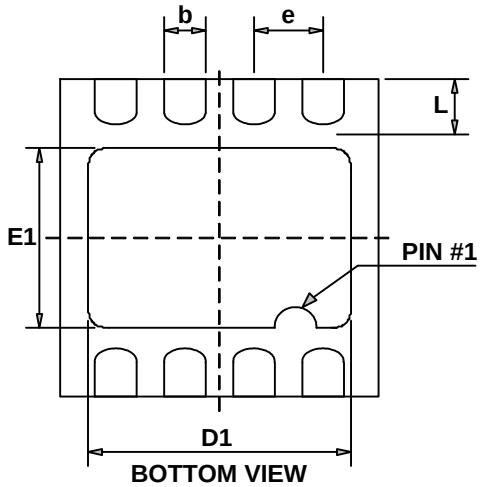
DFN-8 (3mmx3mmx0.75mm)



TOP VIEW



REAR VIEW



BOTTOM VIEW

SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
e	0.600	0.700	0.024	0.028
D1	2.200	2.400	0.087	0.094
E1	1.400	1.600	0.055	0.063
b	0.200	0.320	0.008	0.013
L	0.375	0.575	0.015	0.023
G	0.153	0.253	0.0060	0.010
G1	0.000	0.050	0.0000	0.002

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