

■ General Description

The AME8570 family allows the user to customize the CPU reset function without any external components. The user has several choices of reset voltage thresholds, reset time intervals, and output driver configurations, all of which are preset at the factory.

These circuits monitor the power supply voltage of μP based systems. When the power supply voltage drops below the voltage threshold a reset is asserted immediately (within an interval T_{D1}). The reset remains asserted after the supply voltage rises above the voltage threshold for a time interval, T_{D2} . The reset output may be either active high (RESET) or active low (RESETB). The reset output may be configured as either push/pull or open drain. The state of the reset output is guaranteed to be correct only when supply voltage is greater than 1V.

The AME8570 also provides a reset manually by pulling the MRB input to ground.

Space saving SC-70 package and micropower quiescent current ($< 5.0\mu\text{A}$) make this family a natural for portable battery powered equipment.

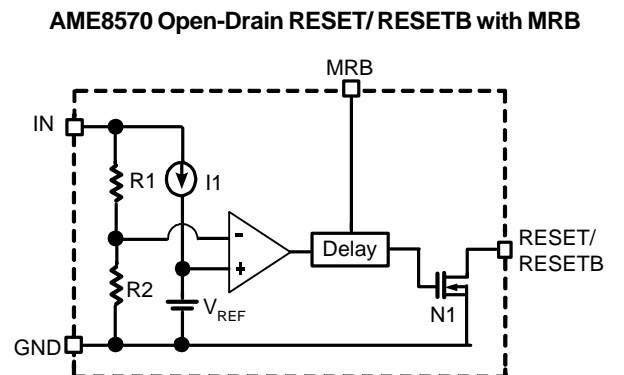
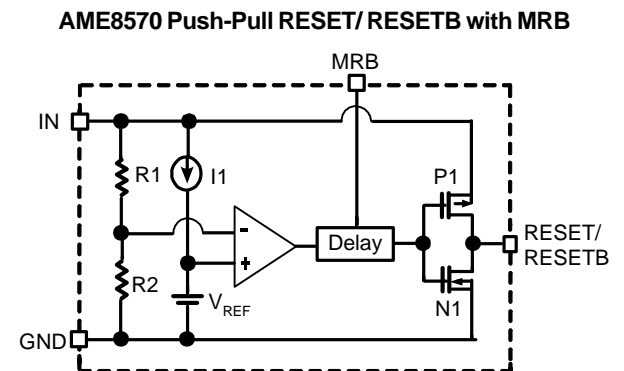
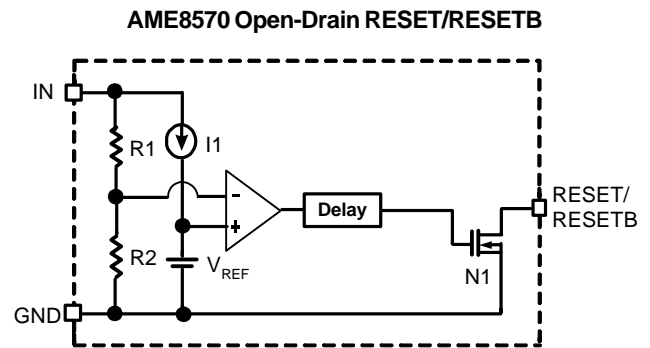
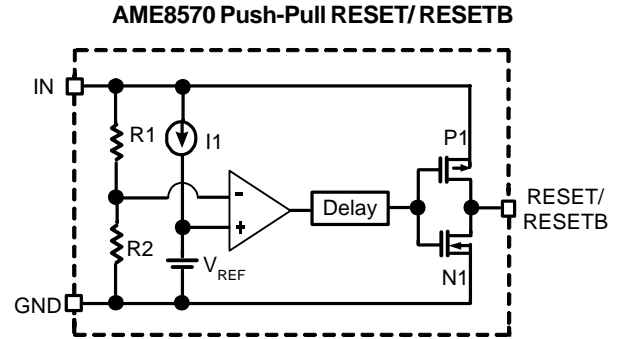
■ Features

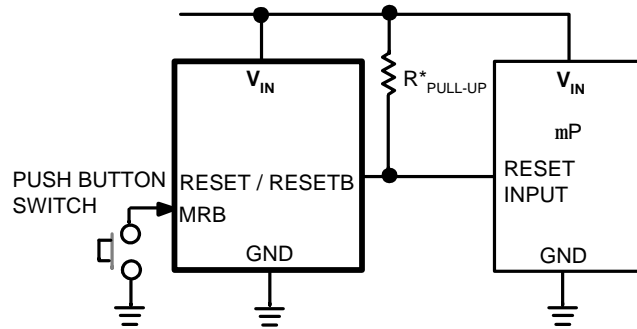
- Small Packages : SC-70, SOT-23
- Tight Voltage Threshold Tolerance : $\pm 1.50\%$
- Wide Temperature Range : -40°C to 85°C
- Low Quiescent Current $< 5.0\mu\text{A}$
- Manual Reset Input Option
- All AME's Lead Free Products Meet RoHS Standards

■ Applications

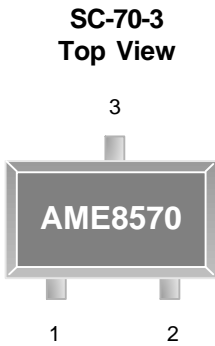
- Portable Electronics
- Power Supplies
- Computer Peripherals
- Data Acquisition Systems
- Applications using CPUs
- Consumer Electronics

■ Functional Block Diagram

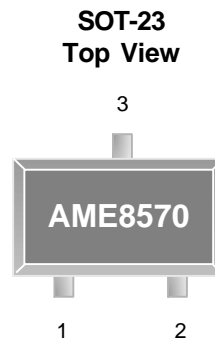


■ Typical Operating Circuit


Note: * External pull-up resistor is required if open-drain output is used. 10KΩ is recommended.

■ Pin Configuration


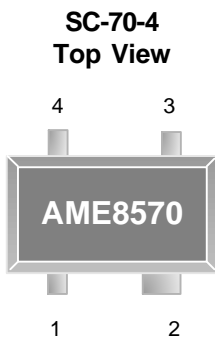
- AME8570AET**
1. GND
 2. RESET/RESETB
 3. IN



- AME8570AET**
1. GND
 2. RESET/RESETB
 3. IN

*** Die Attach:
Non-Conductive Epoxy**

*** Die Attach:
Non-Conductive Epoxy**



- AME8570AEIU**
1. GND
 2. RESET/RESETB
 3. MRB
 4. IN

*** Die Attach:
Non-Conductive Epoxy**



■ Pin Description

AME8570AEIT / AME8570AEET

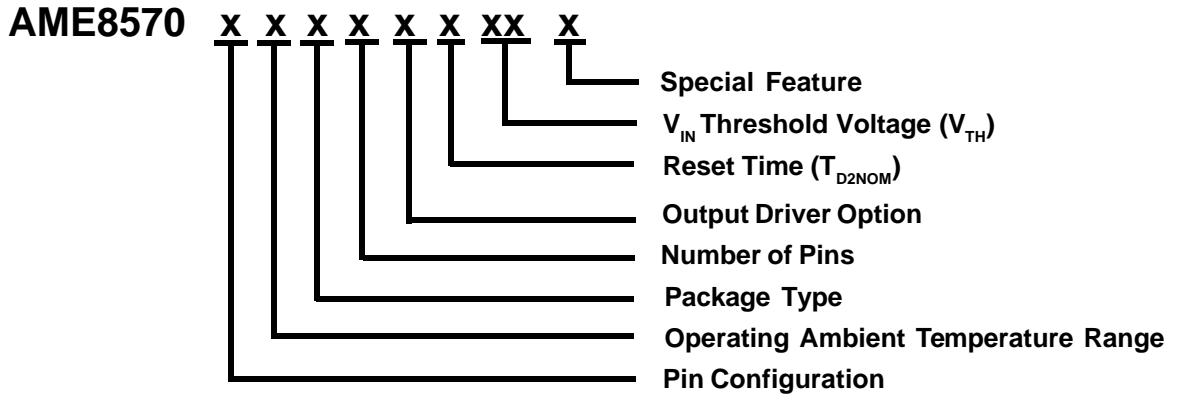
Pin Number	Pin Name	Pin Description
1	GND	Ground
2	RESET/RESETB	This pin can be ordered as RESET or RESETB. Reset is active high. RESETB is active low. It is also available with an open-drain or push-pull output.
3	IN	Positive power supply. A reset is asserted after this voltage drops below a predetermined level. After V_{IN} rises above that level the reset output remains asserted until the end of the reset timeout period.

AME8570AEIU

Pin Number	Pin Name	Pin Description
1	GND	Ground
2	RESET/RESETB	This pin can be ordered as RESET or RESETB. Reset is active high. RESETB is active low. It is also available with an open-drain or push-pull output.
3	MRB	Manual RESET. Active low. Pulling this pin low forces a reset. After a low to high transition reset, remains asserted for exactly one reset timeout period. This pin is internally pulled high. The pin is floating or tied to V_{IN} , if it is unused.
4	IN	Positive power supply. A reset is asserted after this voltage drops below a predetermined level. After V_{IN} rises above that level the reset output remains asserted until the end of the reset timeout period.



■ Ordering Information



Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Output Options	Reset Time (T _{D2NOM})	V _{IN} Threshold Voltage (V _{TH})	Special Feature
A 1. GND <small>(SOT-23)</small> 2. RESET/ <small>(SC-70-3)</small> RESETB 3. IN A 1. GND <small>(SC-70-4)</small> 2. RESET/ RESETB 3. MRB 4. IN	E: -40°C to 85°C	E: SOT-2X I: SC-70	T: 3 U: 4	A: RESETB/PP B: RESETB/OD C: RESET/PP D: RESET/OD (RESET=Active High) (RESETB=Active Low) (PP=Push-pull out) (OD=Open-Drain)	F: 210ms	23: V _{TH} =2.32V 26: V _{TH} =2.63V 29: V _{TH} =2.93V 31: V _{TH} =3.08V 46: V _{TH} =4.63V	Z: Lead free

■ Ordering Information

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8570AEETAF23Z	BJOww	2.32V	SOT-23	-40°C to 85°C
AME8570AEITAF23Z	BJPw	2.32V	SC-70-3	-40°C to 85°C
AME8570AEIUAF23Z	BJQw	2.32V	SC-70-4	-40°C to 85°C
AME8570AEETAF26Z	BJRww	2.63V	SOT-23	-40°C to 85°C
AME8570AEITAF26Z	BJSw	2.63V	SC-70-3	-40°C to 85°C
AME8570AEIUAF26Z	BJTw	2.63V	SC-70-4	-40°C to 85°C
AME8570AEETAF29Z	BJUww	2.93V	SOT-23	-40°C to 85°C
AME8570AEITAF29Z	BJVw	2.93V	SC-70-3	-40°C to 85°C
AME8570AEIUAF29Z	BJWw	2.93V	SC-70-4	-40°C to 85°C
AME8570AEETCF29Z	BJXww	2.93V	SOT-23	-40°C to 85°C
AME8570AEITCF29Z	BJYw	2.93V	SC-70-3	-40°C to 85°C
AME8570AEIUAF29Z	BJZw	2.93V	SC-70-4	-40°C to 85°C
AME8570AEETAF31Z	BKAww	3.08V	SOT-23	-40°C to 85°C
AME8570AEITAF31Z	BKBw	3.08V	SC-70-3	-40°C to 85°C
AME8570AEIUAF31Z	BKCw	3.08V	SC-70-4	-40°C to 85°C
AME8570AEETBF31Z	BKDww	3.08V	SOT-23	-40°C to 85°C
AME8570AEITBF31Z	BKEw	3.08V	SC-70-3	-40°C to 85°C
AME8570AEIUBF31Z	BKFw	3.08V	SC-70-4	-40°C to 85°C
AME8570AEETAF46Z	BKGww	4.63V	SOT-23	-40°C to 85°C
AME8570AEITAF46Z	BKHw	4.63V	SC-70-3	-40°C to 85°C
AME8570AEIUAF46Z	BKlw	4.63V	SC-70-4	-40°C to 85°C
AME8570AEETCF46Z	BKJww	4.63V	SOT-23	-40°C to 85°C
AME8570AEITCF46Z	BKKw	4.63V	SC-70-3	-40°C to 85°C
AME8570AEIUAF46Z	BKLw	4.63V	SC-70-4	-40°C to 85°C

Note: ww & w represents the date code and pls refer to the Date Code Rule on Package Dimension.

* A line on top of the first letter represents lead free plating such as BJOww.

Pls consult AME sales office or authorized Rep./Distributor for the availability of output voltage or package type.



■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Supply Voltage	6	V
Input Current, V_{IN}	20	mA
Output Current, RESET, RESETB		
ESD Classification	B*	

Note: Caution: Stress above the listed in absolute maximum ratings 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	
Storage Temperature Range	T_{STG}	- 65 to 150	

■ Thermal Information

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	SOT-23	Non-Conductive Epoxy	θ_{JC}	140	°C / W
Thermal Resistance (Junction to Ambient)	SOT-23		θ_{JA}	280	
Internal Power Dissipation	SOT-23		P_D	400	mW
Solder Iron (10 Sec) **				350	°C

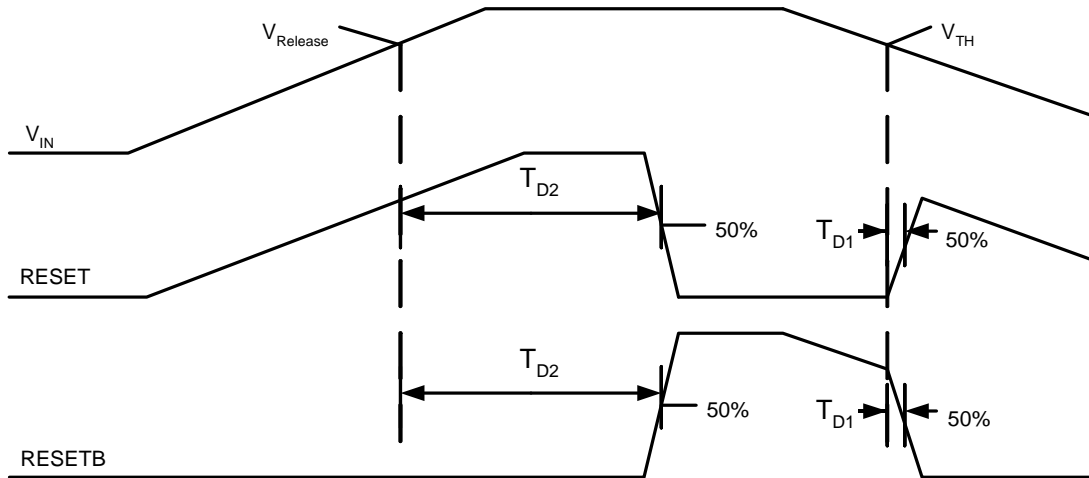
* Measure θ_{JC} on center of molding compound if IC has no tab.

** MIL-STD-202G 210F

■ Electrical Specifications
 $T_A = 25^\circ\text{C}$ unless otherwise noted.

Parameter	Symbol	Test Condition	Min	Typ	Max	Units	
V_{IN} Range	V_{RANGE}	$T_A = -40^\circ\text{C}$ to 85°C	1		5.5	V	
Supply Current	I_{IN}	$V_{IN} = V_{TH} \times 1.10$, $T_A = -40^\circ\text{C}$ to 85°C MRB unconnected		5	10	μA	
RESET Threshold	V_{TH}		V_{TH} -1.5%		V_{TH} +1.5%	V	
		$T_A = -40^\circ\text{C}$ to 85°C	V_{TH} -2%		V_{TH} +2%		
Hysteresis Range	V_{HYST}	$V_{Release} - V_{TH}$	10	30	60	mV	
RESETB Output Voltage High	V_{OH}	$V_{IN} > V_{TH (MAX)}$	$I_{SOURCE} = 0.5\text{mA}$, $V_{IN} > 1.8\text{V}$	0.8 V_{IN}		V	
RESET Output Voltage High			$I_{SOURCE} = 0.15\text{mA}$, $1.8\text{V} \geq V_{IN} > 1.0\text{V}$				
RESETB Output Voltage Low	V_{OL}	$V_{IN} < V_{TH (MIN)}$	$I_{SOURCE} = 0.5\text{mA}$, $V_{IN} > 1.8\text{V}$				
RESET Output Voltage Low			$I_{SOURCE} = 0.15\text{mA}$, $1.8\text{V} \geq V_{IN} > 1.0\text{V}$				
RESETB Output Voltage Low	V_{OL}	$V_{IN} < V_{TH (MIN)}$	$I_{SINK} = 1.2\text{mA}$, $T_J = -40^\circ\text{C}$ to 85°C		0.5	V	
RESET Output Voltage Low		$V_{IN} > V_{TH (MAX)}$					
V_{IN} to RESET Delay	T_{D1}	$V_{IN} = V_{TH} - 100\text{mV}$; $T_A = -40^\circ\text{C}$ to 85°C		40		μS	
RESET Timeout Period	T_{D2}	$T_A = -40^\circ\text{C}$ to 85°C	Version F	140	210	600	mS
MRB Input Threshold	MRB _{IL}	$V_{IN} = V_{TH} \times 1.2$			0.7	V	
	MRB _{IH}			0.8 V_{IN}			
MRB Pulse Width			1			μS	
MRB Noise Immunity (pulse width with no reset)				100		nS	
MRB to RESET Delay				500		nS	
MRB Pull Up Resistance			80		120	K Ω	

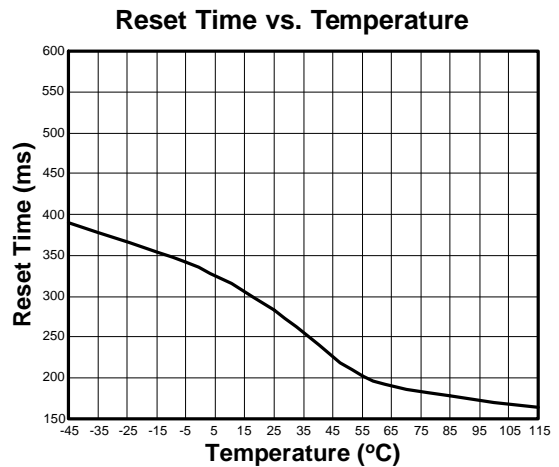
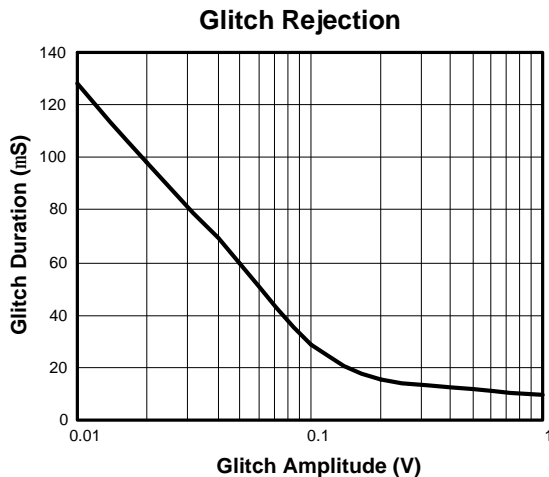
■ Timing Diagram



■ Applications Information

Supply Transients

These devices have a certain immunity to fast negative going transients. In the following pages the graph titled "Glitch Rejection" indicates the maximum allowable glitch amplitude and duration to avoid triggering an unintended reset. As shown in the graph shorter transients can have larger amplitudes without triggering resets.





■ Detailed Description

The AME8570 are designed to interface with the reset input of a microprocessor and to prevent code-execution errors due to power up, power down, and other power supply errors.

Reset Output

Each output pin in the family can be configured to be either push-pull or open-drain. In addition each output may be either active high or active low. Active high reset outputs are denoted as RESET. Active low reset outputs are denoted as RESETB. The selection guide on this data sheet shows all possible combinations of output driver configuration.

A reset will be asserted if any of two things happen:

- 1) V_{IN} drops below the threshold (V_{TH})
- 2) The MRB pin is pulled low.

The reset will remain asserted for the prescribed reset interval after:

- 1) V_{IN} rises above the threshold (V_{TH})
- 2) MRB goes high

Manual Reset Input

The AME8570 feature a manual reset feature (MRB). A logic low on the MRB pin asserts a reset. The reset remains asserted as long as the MRB pin remains low. After the MRB pin transitions to a high state the reset remains asserted for the prescribed reset interval (T_{D2}). The MRB pin is internally pulled up to V_{IN} by a 100K resistor. It is internally debounced to reject switching transients.

The MRB pin is ESD protected by diodes connected to V_{IN} and GND. So the MRB pin should never be driven higher than V_{IN} or lower than GND.

Glitch Rejection

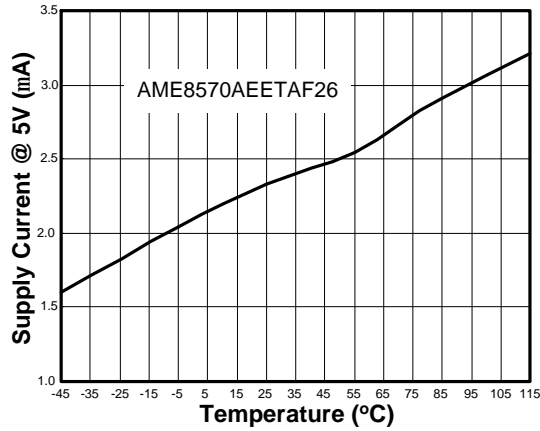
The AME8570 family will reject negative going transients on the V_{IN} line to some extent. The smaller the duration of the transient the larger its amplitude may be without triggering a reset. The "Glitch Rejection" chart in the graphs section of this datasheet shows the relation between glitch amplitude and allowable glitch duration to avoid unintended resets.

Accurate Output State at Low V_{IN}

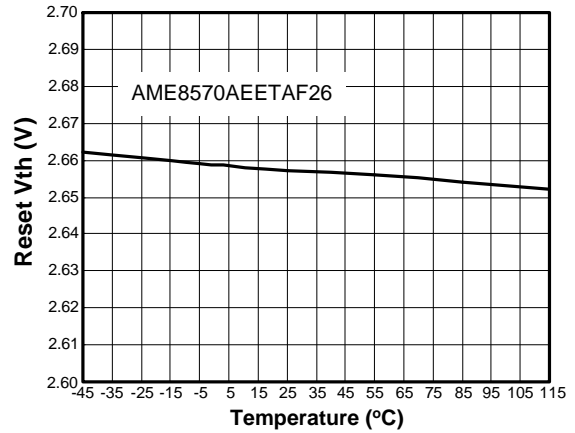
With V_{IN} voltage on the order of the MOS transistor threshold ($<1.0V$) the outputs of the AME8570 may become undefined. For parts with active low output (RESETB) a resistor placed between RESETB and GND on the order of 100K will ensure that the RESETB output stays low when V_{IN} is lower than the threshold voltage of the part. In a like manner a resistor on the order of 100K when placed between RESET and V_{IN} will ensure parts with active high output (RESET) will remain high when V_{IN} is lower than the threshold voltage of the part.



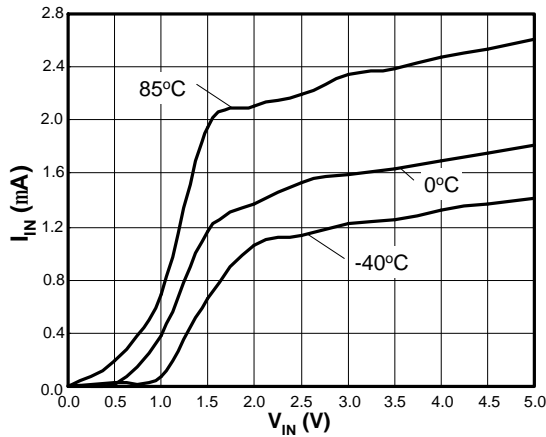
I_{IN} vs. Temperature



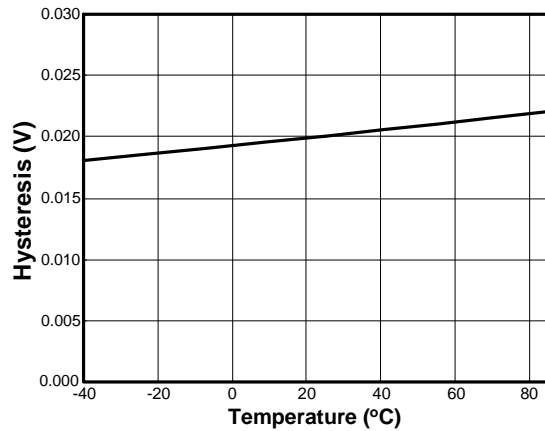
Reset V_{TH} vs. Temperature



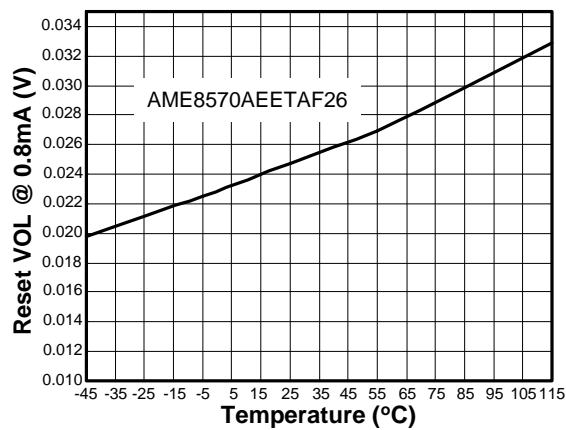
I_{IN} vs. V_{IN}



Threshold Hysteresis vs. Temperature



Reset VOL vs. Temperature





■ Date Code Rule

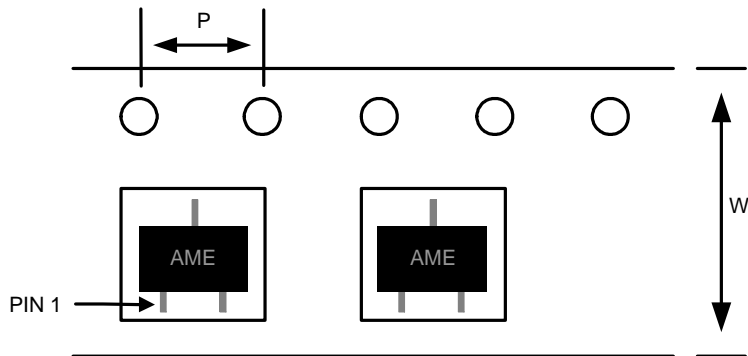
For SOT-23 Package Only

Marking			Date Code		Year
A	A	A	W	W	xxx0
A	A	A	W	<u>W</u>	xxx1
A	A	A	<u>W</u>	W	xxx2
A	A	A	<u>W</u>	<u>W</u>	xxx3
A	A	<u>A</u>	W	W	xxx4
A	A	<u>A</u>	W	<u>W</u>	xxx5
A	A	<u>A</u>	<u>W</u>	W	xxx6
A	A	<u>A</u>	<u>W</u>	<u>W</u>	xxx7
A	<u>A</u>	A	W	W	xxx8
A	<u>A</u>	A	W	<u>W</u>	xxx9

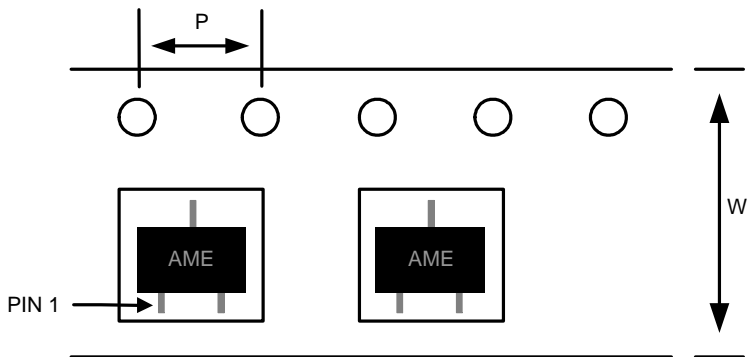
For SC-70 Package Only

Marking			Date Code	Year
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A	A	A	<u>W</u>	xxx1
A	A	<u>A</u>	W	xxx2
A	A	<u>A</u>	<u>W</u>	xxx3
A	<u>A</u>	A	W	xxx4
A	<u>A</u>	A	<u>W</u>	xxx5
A	<u>A</u>	<u>A</u>	W	xxx6
A	<u>A</u>	<u>A</u>	<u>W</u>	xxx7
<u>A</u>	A	A	W	xxx8
<u>A</u>	A	A	<u>W</u>	xxx9

w: Work Week Code		
A: 01&02	K: 21&22	U: 41&42
B: 03&04	L: 23&24	V: 43&44
C: 05&06	M: 25&26	W: 45&46
D: 07&08	N: 27&28	X: 47&48
E: 09&10	O: 29&30	Y: 49&50
F: 11&12	P: 31&32	Z: 51&52
G: 13&14	Q: 33&34	
H: 15&16	R: 35&36	
I: 17&18	S: 37&38	
J: 19&20	T: 39&40	

■ Tape and Reel Dimension
SOT-23

Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-23	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

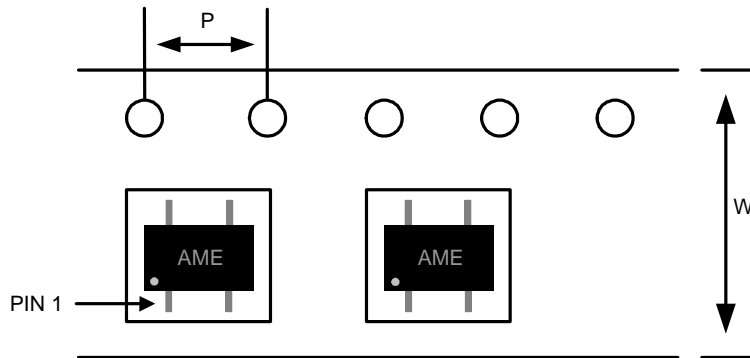
SC-70-3

Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SC-70-3	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm



■ Tape and Reel Dimension

SC-70-4



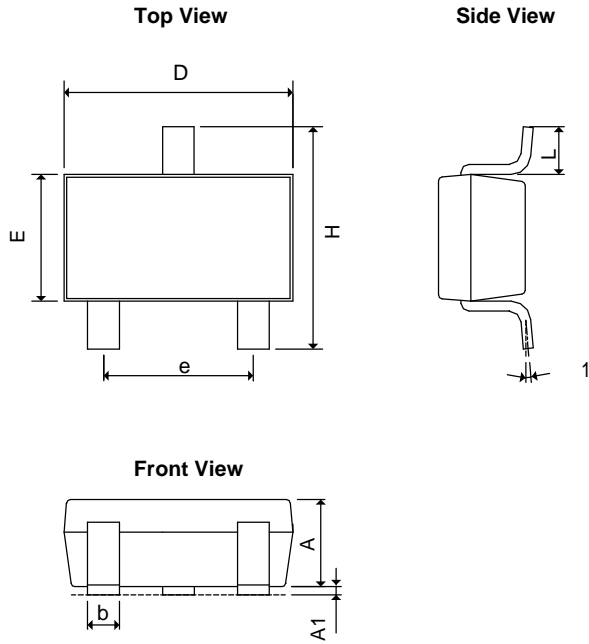
Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SC-70-4	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

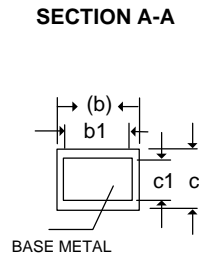
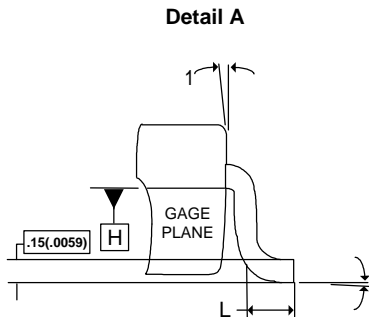
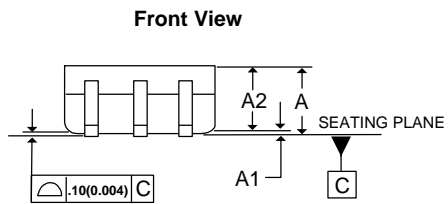
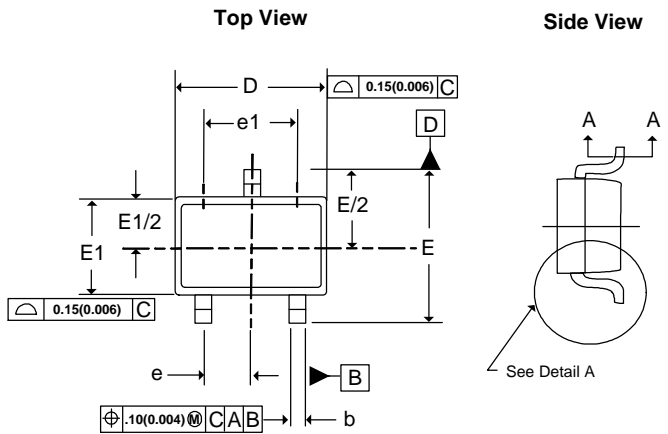


■ Package Dimension

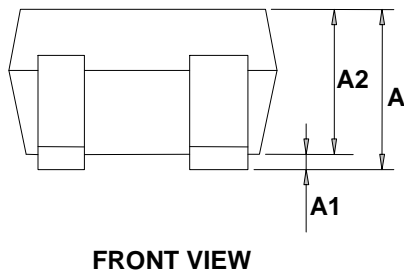
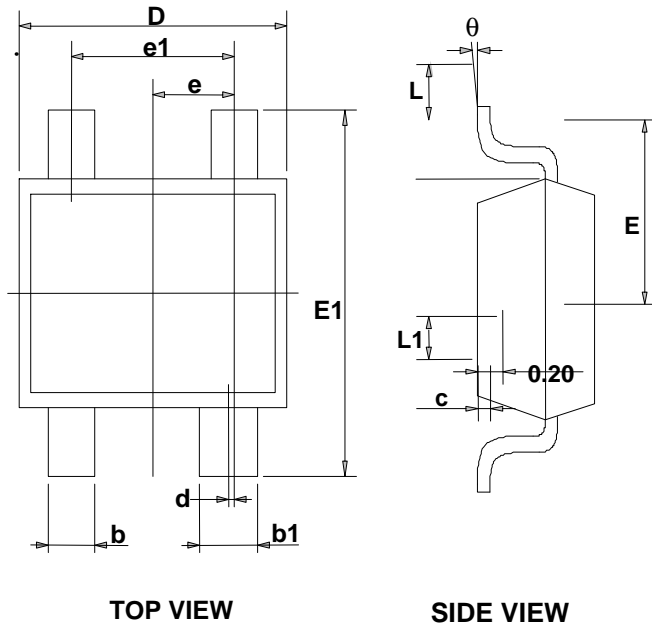
SOT-23



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.00	1.40	0.0394	0.0551
A₁	0.00	0.15	0.0000	0.0059
b	0.35	0.50	0.0138	0.0197
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
e	1.90 BSC		0.0748 BSC	
H	2.40	3.00	0.09449	0.11811
L	0.35BSC		0.0138BSC	
q1	0°	10°	0°	10°

■ Package Dimension
SC-70-3


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.10	0.031	0.043
A1	0.00	0.10	0.000	0.004
A2	0.80	1.00	0.031	0.039
b	0.15	0.40	0.006	0.016
b1	0.15	0.25	0.006	0.010
c	0.08	0.25	0.003	0.010
c1	0.08	0.20	0.003	0.008
D	1.90	2.20	0.075	0.087
E	2.00	2.45	0.079	0.096
E1	1.15	1.35	0.045	0.053
e	0.65BSC		0.0255BSC	
e1	1.20	1.40	0.047	0.055
L	0.26	0.46	0.010	0.018
q1	0°	8°	0°	8°
q2	4°	10°	4°	10°

■ Package Dimension
SC-70-4


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.250	0.400	0.010	0.016
b1	0.350	0.500	0.014	0.020
c	0.080	0.150	0.003	0.006
d	0.050 TYP		0.002 TYP	
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
q	0°	8°	0°	8°



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