

AME9172

Bus Termination Regulator

■ General Description

The AME9172 is a voltage regulator which could convert the input voltage ranging from 1.3V to 6V to an output voltage that user settled. The regulator can provide sourcing or sinking current. The AME9172 used in conjunction with series termination resistors, provides an excellent voltage source for active termination schemes of high speed transmission lines as those seen in high speed memory buses and distributed backplane designs.

The voltage output of the regulator can be used as a termination voltage for DDR SDRAM.

Current limits in both sourcing and sinking mode, plus on-chip thermal shutdown make the circuit tolerant of the output fault conditions.

■ Features

- Support Both DDR 1 (1.25VTT), DDR 2 (0.9VTT) & DDR 3 (0.75VTT) Requirements
- Capable of Sourcing and Sinking Current
- Current-limiting Protection
- Thermal Protection
- Integrated Power MOSFETs
- Generates Termination Voltages for SSTL-2
- High Accuracy Output Voltage at Full-Load
- Adjustable VOUT by External Resistors
- Minimum External Components
- Shutdown for Standby or Suspend Mode Operation with High-impedance Output
- All AME's Lead Free Products Meet RoHS Standards

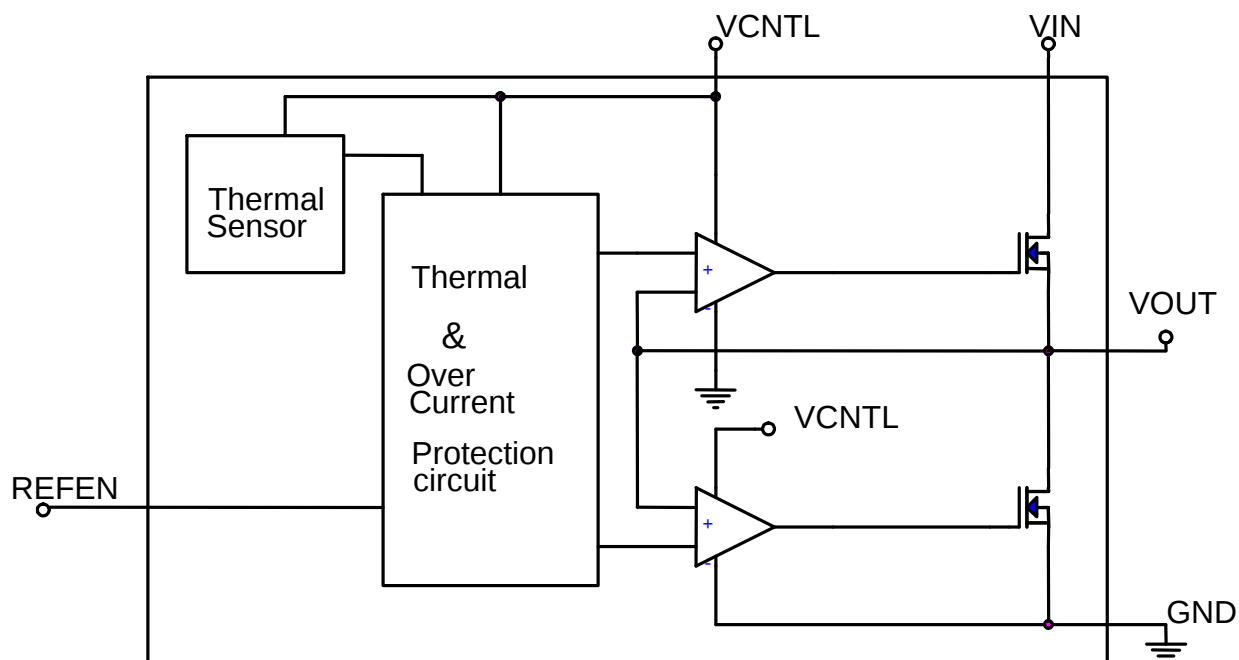
■ Applications

- DDR Memory Termination Supply
- Active Termination Buses
- Desktop PC/AGP Graphics
- Supply Splitters
- Set Top Box/IPC

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■ Block Diagram





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■ Application Circuit

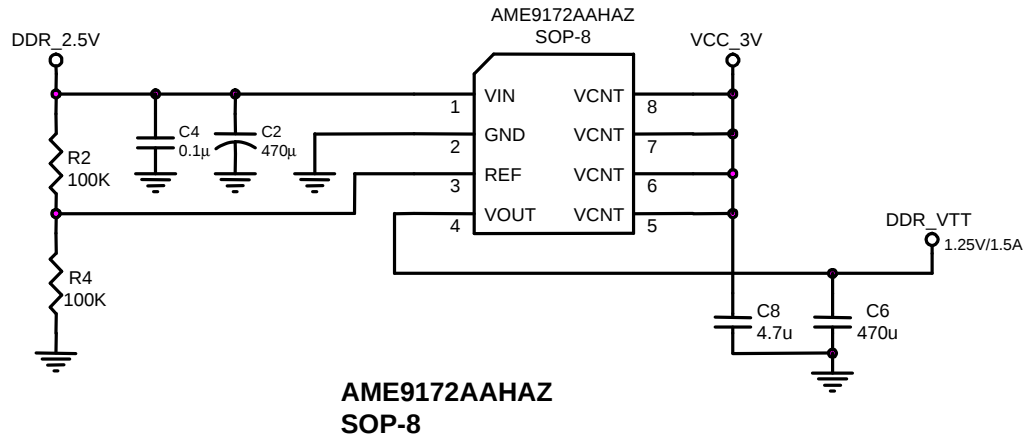


Fig 1 : Application Circuit AME9172AAHAZ

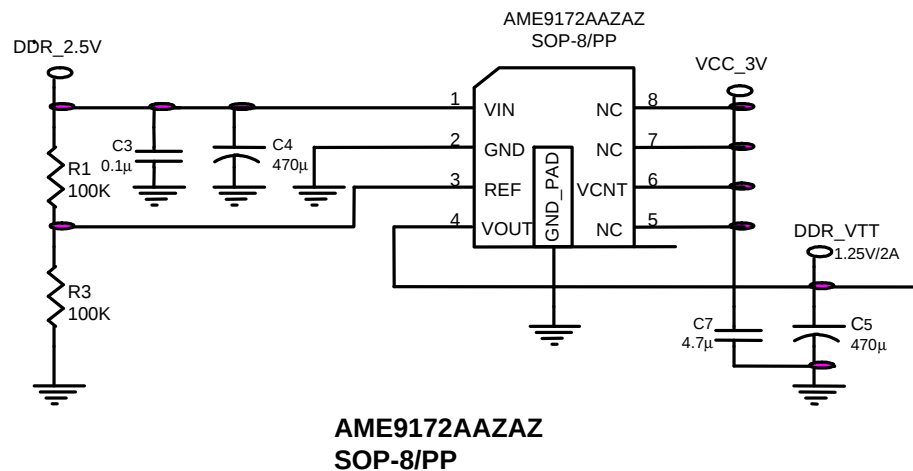
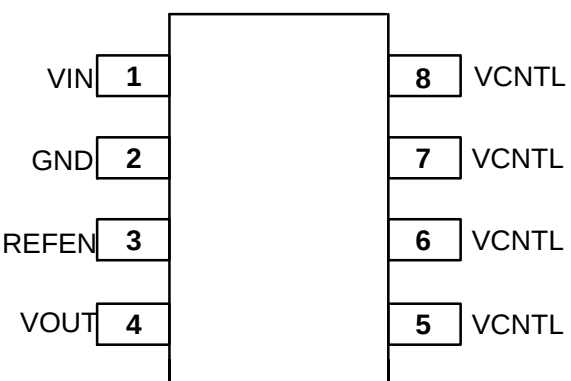


Fig 2 : Application Circuit AME9172AAZAZ

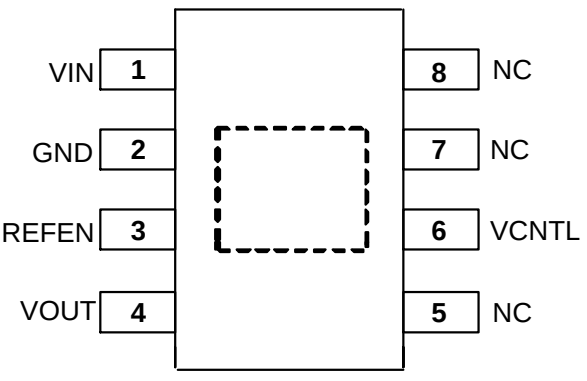
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■ Pin Configuration

Part Number	Pin Configurations
AME9172AAHAZ (SOP-8)	

AME9172 Pin Assignment

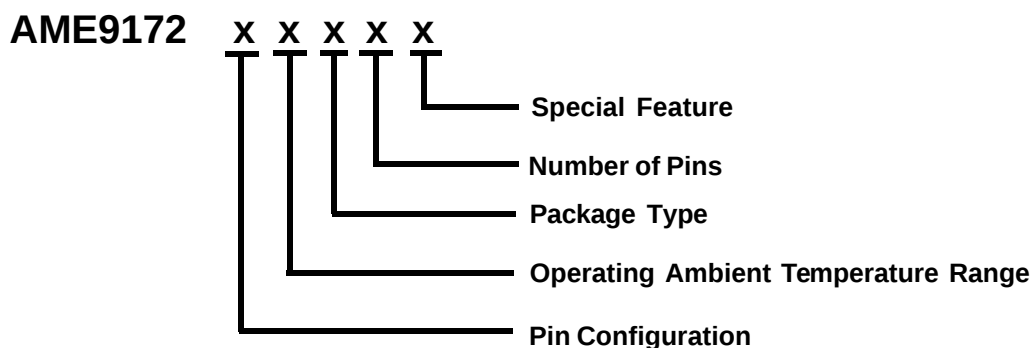
Part Number	Pin Configurations
AME9172AAZAZ (SOP-8/PP)	 NC= No internal connection  = Thermal Pad (Connected to GND plane for better heat dissipation). The Pad of dimension is 0.090 x 0.090 (Inch)

AME9172 Pin Assignment

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■ Ordering Information



Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Special Feature
A: 1. VIN (SOP-8) 2. GND 3. REF 4. VOUT 5. VCNT 6. VCNT 7. VCNT 8. VCNT A: 1. VIN (SOP-8/PP) 2. GND 3. REF 4. VOUT 5. NC 6. VCNT 7. NC 8. NC	A: -25°C to 85°C	H: SOP Z: SOP/PP	A: 8	Z: Lead free

■ Ordering Information

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME9172AAHAZ	9172 AAHA yyww	N/A	SOP-8	-25°C to 85°C
AME9172AAZAZ	9172 AAZA yyww	N/A	SOP-8/PP	-25°C to 85°C

Note: yyww represents the date code.

* A line on top of the first letter represents lead free plating such as $\bar{9}$ 172

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

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■ Pin Description

Pin name	Pin Description
VIN	Power Input
GND	Ground
VCNTL	Driving Voltage
REFEN	Input voltage reference & chip enable
VOUT	Output Voltage

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■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
VIN	Input Voltage. VIN to GND	6	V
PD	Power Dissipation	Internally Limit	W
VESD	ESD Rating (Human Body Mode)	2	KV
TSTG	Storage Temperature	150	°C
TL	Lead Temperature (Soldering. 5sec)	245	°C

■ Thermal Characteristics

Symbol	Parameter	Symbol	Unit
θ_{JC}	Thermal Resistance In Case		°C/W
	SOP-8	25.7	
	SOP-8/PP	12	

■ Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
VIN	Supply Voltage to VIN	1.5 to 3.3	V
VCNT	Supply Voltage to VCNT	3.3	V
*I _{OUT}	Output Current of VOUT Pin *	-2 to 2	A
T _J	Junction Temperature	-25 to 125	°C

* The symbol "+" means the VOUT sources current to load; the symbol "-" means the VOUT sinks current to GND

**AME9172****Bus Termination Regulator****■ Electrical Specifications**

Limits in standard typeface are for $T_A = 25^\circ\text{C}$, unless otherwise specified:

DDR1 => $V_{IN} = 2.5\text{V}$, $V_{CNTL} = 3.3\text{V}$, $V_{REFEN} = 0.5V_{IN}$. (Note2)

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
Output Offset Voltage	V _{OS}	I _{OUT} = 0A (Note 1)		-20	0	20	mV
Load Regulation (DDR 1 / 2 / 3)	V _{LOAD}	I _L = 0 to 1.5A (Fig 4)		-20	0	20	mV
		I _L = 0 to -1.5A		-20	0	20	
Input Voltage Range (DDR 1 / 2 / 3)	V _{IN}	Keep V _{CNTL} ≥ V _{IN} on operation power on and power off	DDR 1	1.8	2.5	4	V
			DDR 2	1.6	1.8	4	
			DDR 3	1.3	1.5	4	
	V _{CNTL}		DDR 1 / 2 / 3	2.5	3.3	6	
Operating Current of V _{CNTL}	I _{CNTL}	No Load			1.4		mA
Short Circuit Protection							
DDR 1 / 2 / 3 Current Limit	I _{LIMIT}	Fig 6,7		2.0			A
Over Temperature Protection							
Thermal Shutdown Temperature	T _{SD}	3.3V ≤ V _{CNTL} ≤ 5 V		125			°C
Thermal Shutdown Hysteresis		Guaranteed by design			30		

Note1: V_{OS} offset is the voltage measurement defined as V_{OUT} subtracted from V_{REFEN} .

Note2: DDR3 => $V_{IN} = 1.5\text{V}$, $V_{CNTL} = 3.3\text{V}$, $V_{REFEN} = 0.5V_{IN}$

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■ Test Circuit

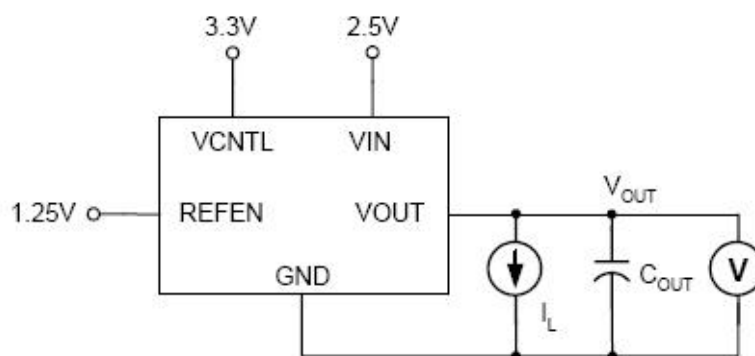


Fig 4: Output Voltage Tolerance, V_{OUT}

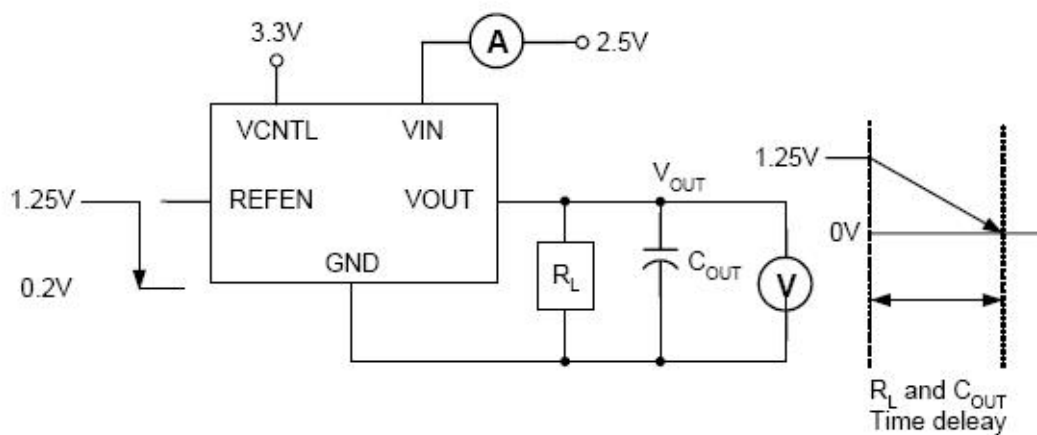


Fig 5: Current in Shutdown Mode, I_{SHDN}

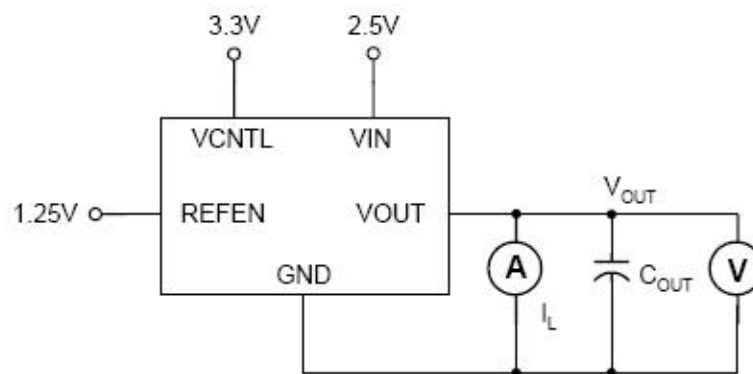
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Figure 6: Current Limit for High Side, I_{CLHIGH}

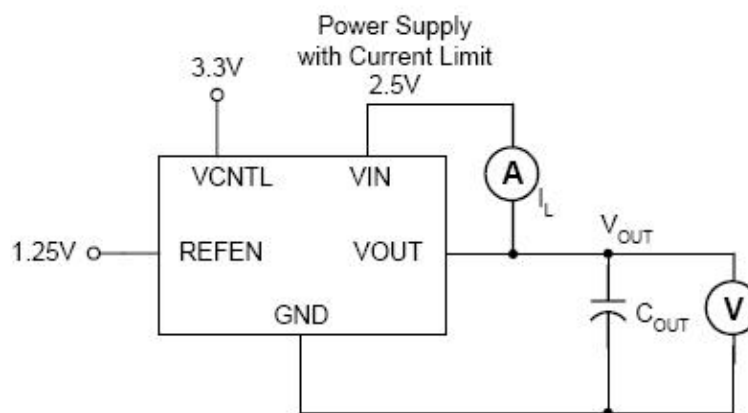
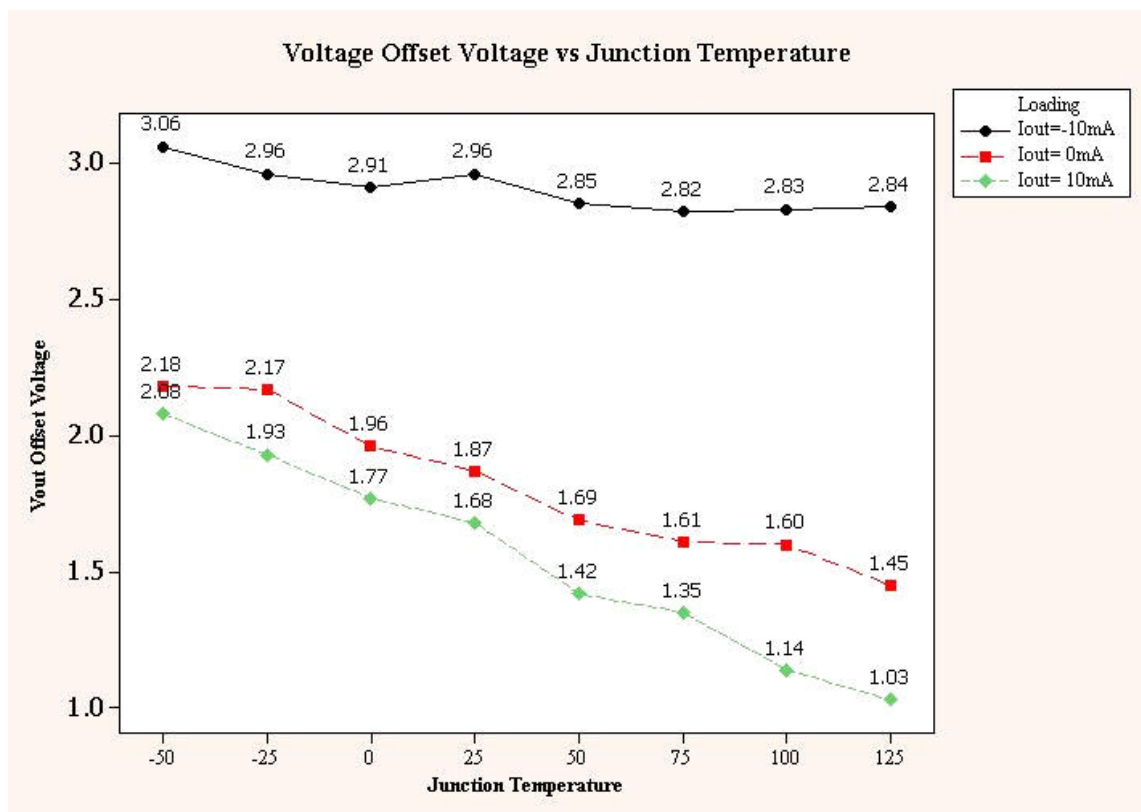
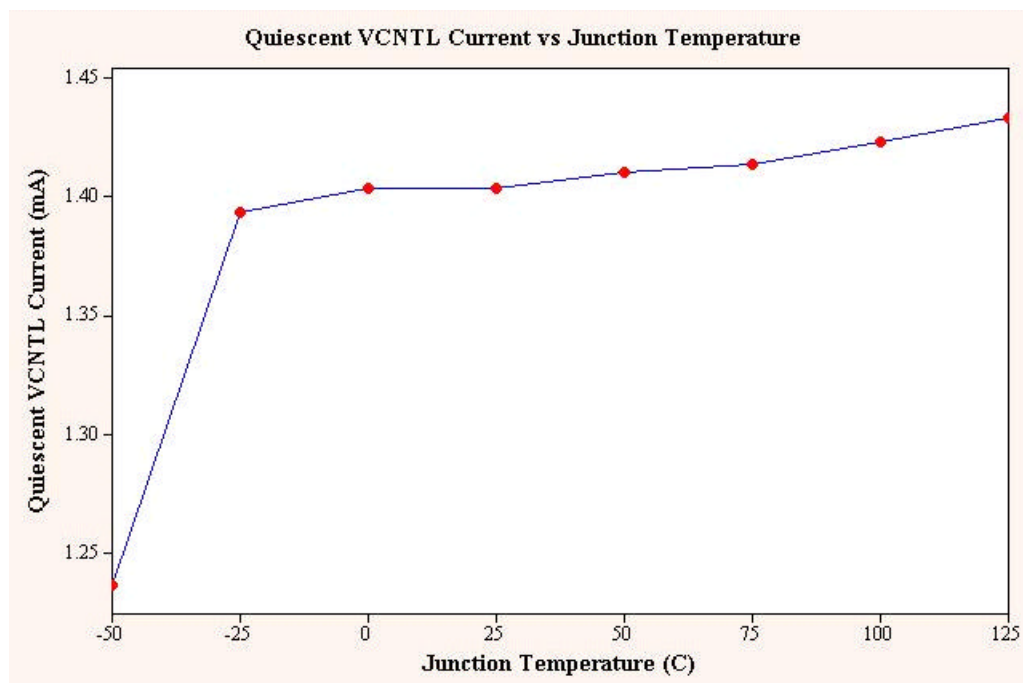


Figure 7: Current Limit for Low Side, I_{CLLOW}

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■ Typical Characteristics



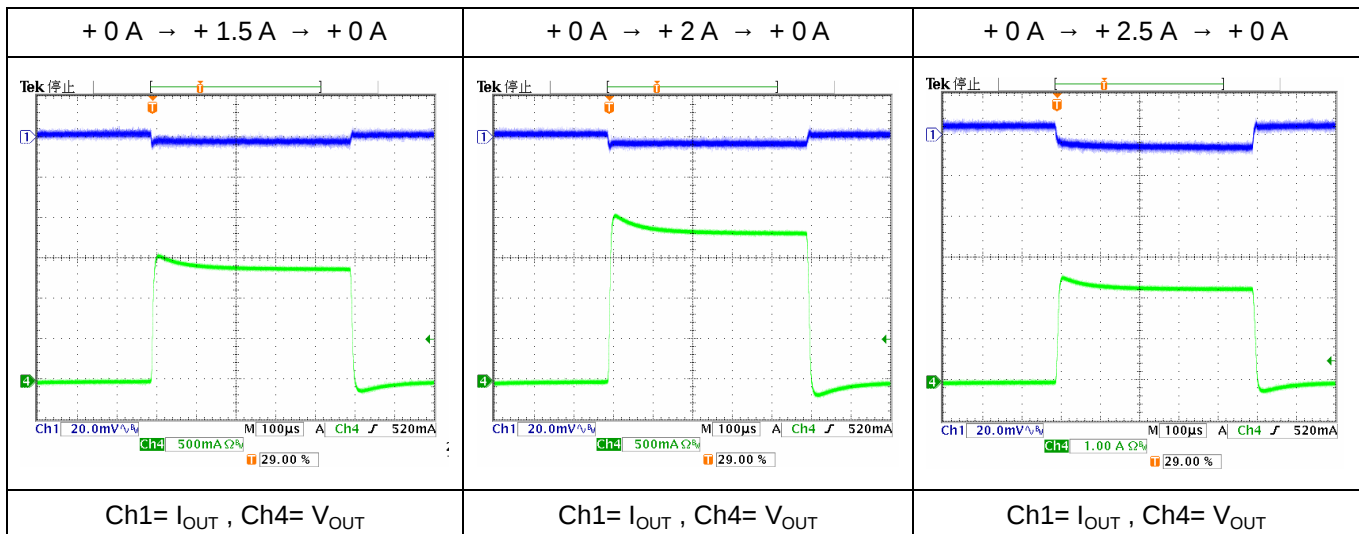
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■ Operation Waveforms DDR1

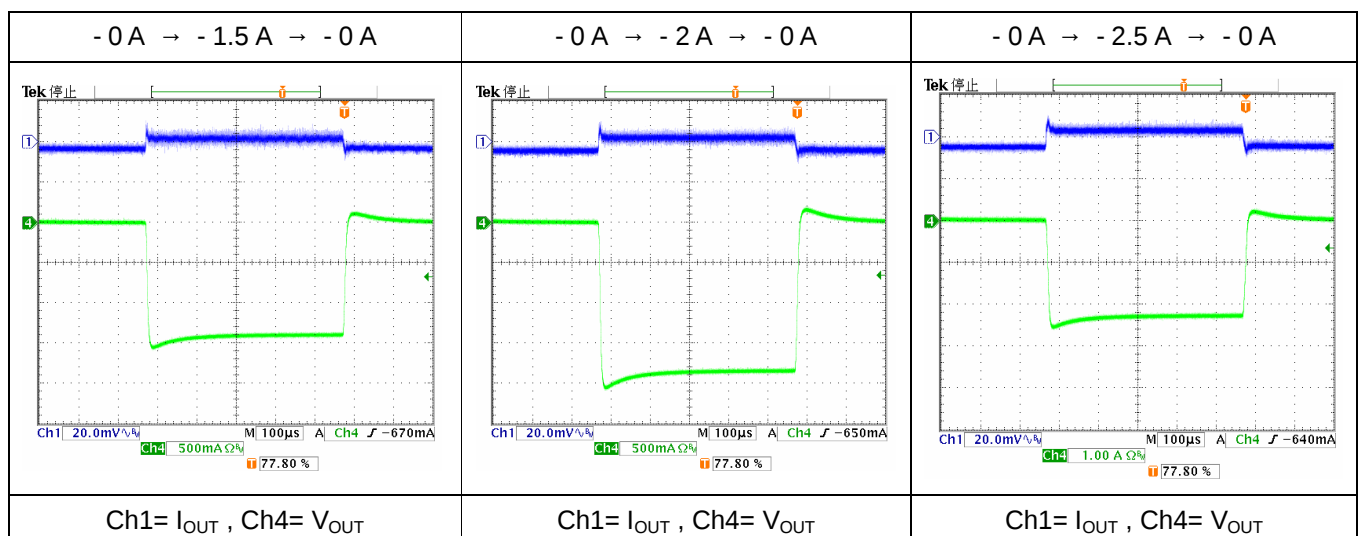
Load Transient Response

$V_{IN}=2.5V$, $V_{CNTL}=3.3V$
 V_{REF} is 1.25V supplied by a regulator
 $C_{OUT}=1000\mu F/35V$
 I_{OUT} slew rate = $\pm 0.25A/mS$



Load Transient Response

$V_{IN}=2.5V$, $V_{CNTL}=3.3V$
 V_{REF} is 1.25V supplied by a regulator
 $C_{OUT}=1000\mu F/35V$
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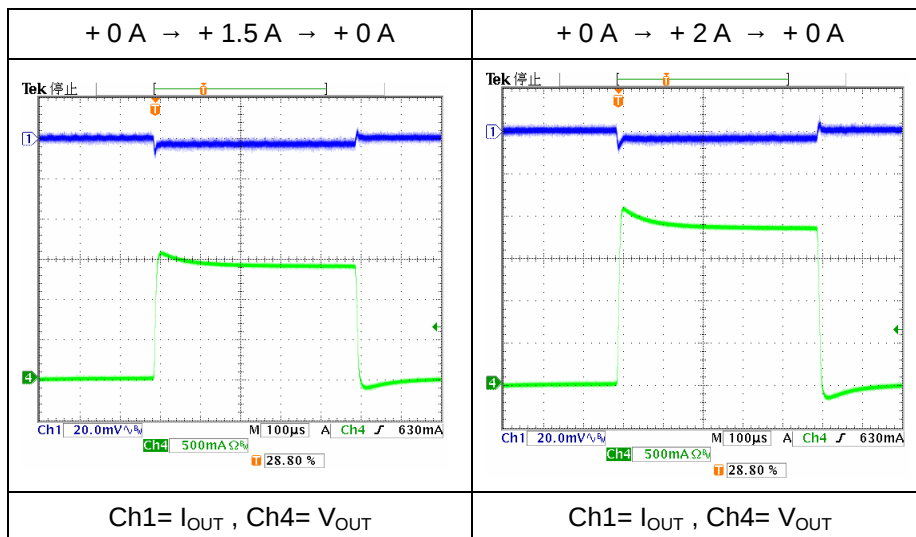
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Bus Termination Regulator

■ Operation Waveforms DDR3

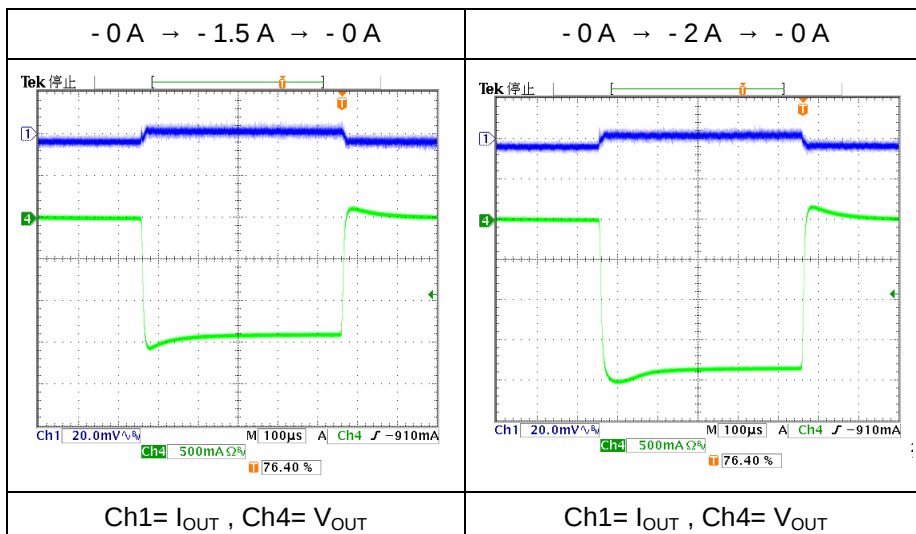
Load Transient Response

$V_{IN}=1.5V$, $V_{CNTL}=3.3V$
 V_{REF} is 0.75V supplied by a regulator
 $C_{OUT}=1000\mu F/35V$
 I_{OUT} slew rate = $\pm 0.25A/mS$



Load Transient Response

$V_{IN}=1.5V$, $V_{CNTL}=3.3V$
 V_{REF} is 0.75V supplied by a regulator
 $C_{OUT}=1000\mu F/35V$
 I_{OUT} slew rate = $\pm 0.25A/mS$

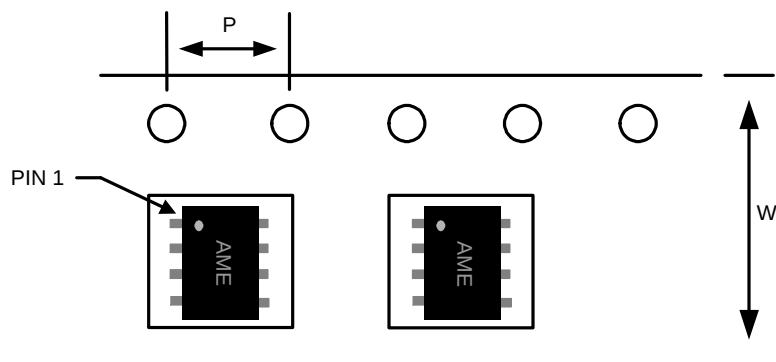


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■ Tape and Reel Dimension

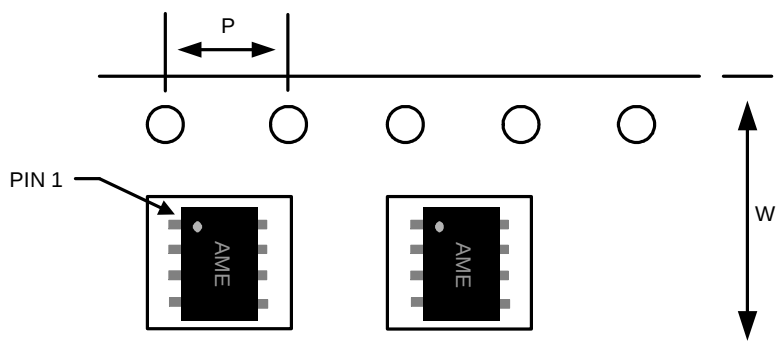
SOP-8



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

SOP-8/PP



Carrier Tape, Number of Components Per Reel and Reel Size

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

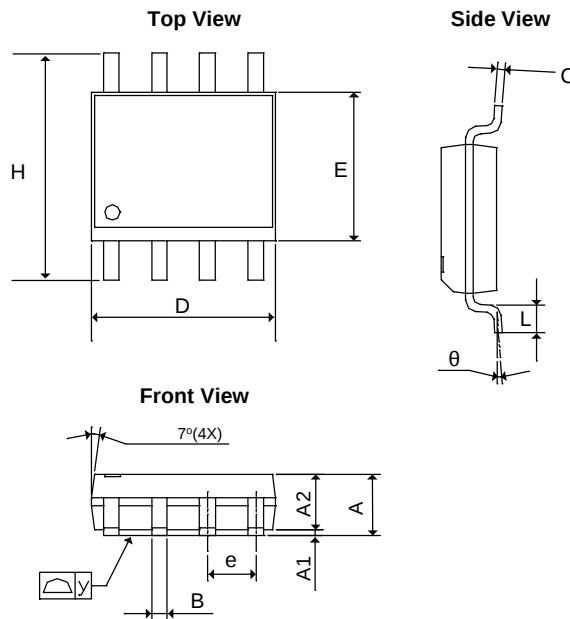


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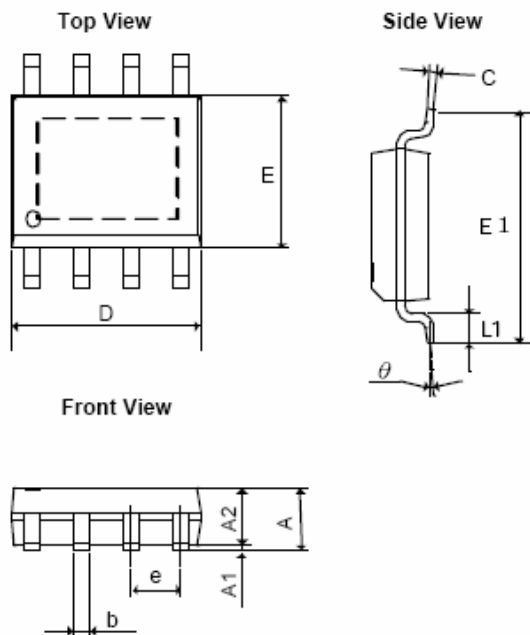
■ Package Dimension

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
A ₂	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°

SOP-8/PP



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	1.700	-	0.067
A ₁	0.050	0.150	0.002	0.006
A ₂	1.350	1.550	0.053	0.061
C	0.100	0.250	0.004	0.010
E	3.750	4.150	0.148	0.163
E ₁	5.700	6.300	0.224	0.248
L	0.300	0.700	0.012	0.028
b	0.310	0.510	0.012	0.020
D	4.720	5.120	0.186	0.202
e	1.270 BSC		0.05 BSC	
q	0°	8°	0°	8°



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