

**1A ULDO REGULATOR WITH ENABLE****AP2318A****General Description**

The AP2318A is a series of ultra low dropout regulators optimized for low voltage applications where transient response and minimum input voltage are critical.

The AP2318A provides current limit and thermal shutdown function. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within $\pm 1.5\%$. On-chip thermal shutdown provides protection against any combination of overload and ambient temperatures that would cause excessive junction temperatures.

The AP2318A has adjustable version, which can set the output voltage through two external resistors.

The AP2318A is available in the standard DFN-3x3-8 and PSOP-8 packages.

Features

- Wide Operating Voltage Range: 2.5V to 12V
- Output Voltage Accuracy: $\pm 1.5\%$
- On-chip Thermal Shutdown
- ESD Rating: 3000V (Human Body Model)
600V (Machine Model)
- Operation Junction Temperature: -40°C to 125°C

Applications

- Notebook
- USB Device
- Add-on Card
- DVD Player
- PC Motherboard

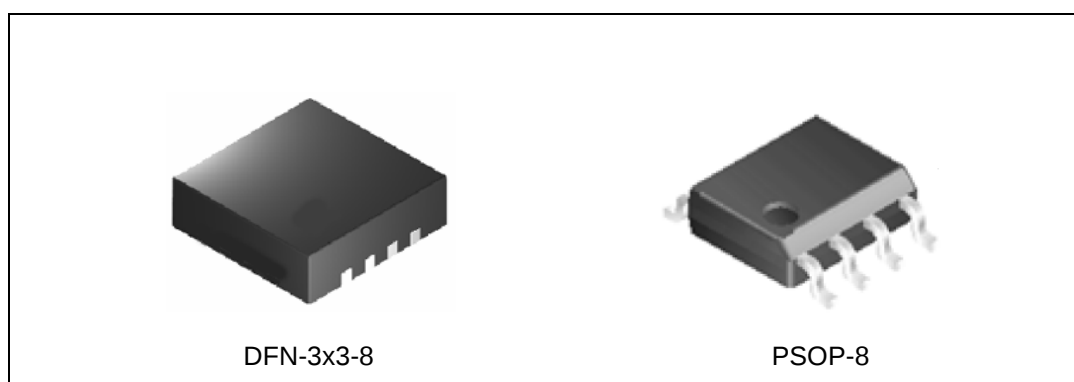


Figure 1. Package Type of AP2318A

1A ULDO REGULATOR WITH ENABLE

AP2318A

Pin Configuration

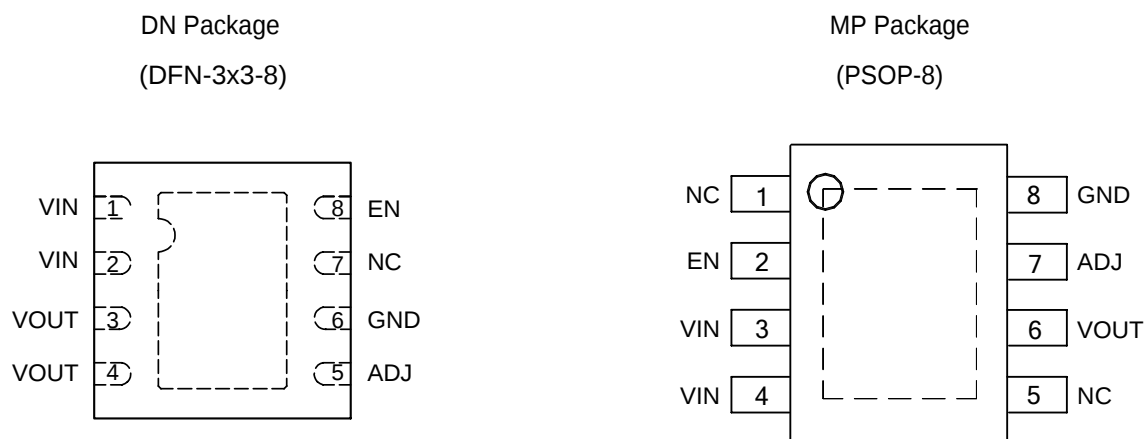
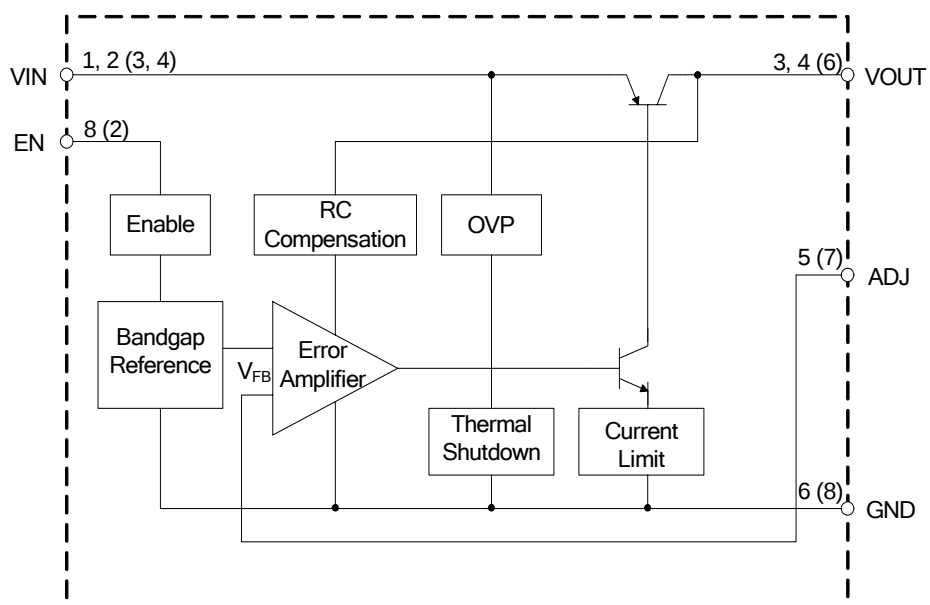


Figure 2. Pin Configuration of AP2318A (Top View)

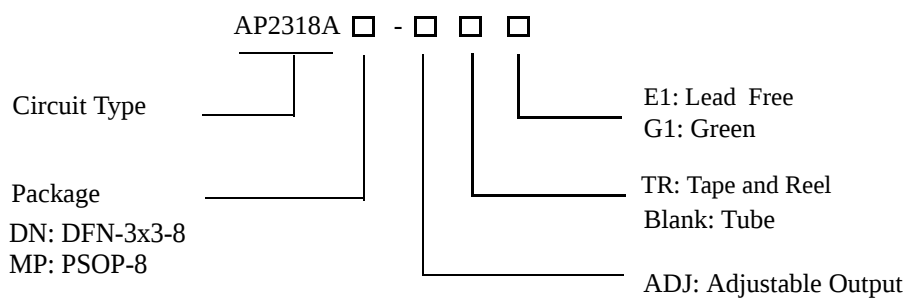
Pin Description

Pin Number		Pin Name	Function
DFN-3x3-8	PSOP-8		
1, 2	3, 4	VIN	Input voltage
3, 4	6	VOUT	Output voltage
5	7	ADJ	Adjustable voltage
6	8	GND	Ground
7	1, 5	NC	No connection
8	2	EN	On/Off control

**Functional Block Diagram**

A (B)
A: DFN-3x3-8
B: PSOP-8

Figure 3. Functional Block Diagram of AP2318A

**1A ULDO REGULATOR WITH ENABLE****AP2318A****Ordering Information**

Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
DFN-3x3-8	-40 to 125°C		AP2318ADN-ADJTRG1		B7B	Tube
PSOP-8	-40 to 125°C	AP2318AMP-ADJE1	AP2318AMP-ADJG1	2318A-ADJE1	2318A-ADJG1	Tube
		AP2318AMP-ADJTRE1	AP2318AMP-ADJTRG1	2318A-ADJE1	2318A-ADJG1	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

**1A ULDO REGULATOR WITH ENABLE****AP2318A****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value		Unit
Input Voltage	V_{IN}	15		V
Operating Junction Temperature	T_J	150		°C
Storage Temperature Range	T_{STG}	-65 to 150		°C
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260		°C
Thermal Resistance, Junction to Ambient (Note 2)	θ_{JA}	DFN-3x3-8	120	°C/W
		PSOP-8	108	
ESD (Human Body Model)	ESD	3000		V
ESD (Machine Model)	ESD	600		V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Note 2: Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its operating ratings. The maximum allowable power dissipation is a function of the maximum junction temperature, $T_J(\text{Max})$, the junction-to-ambient thermal resistance, θ_{JA} , and the ambient temperature, T_A . The maximum allowable power dissipation at any ambient temperature is calculated using: $P_D(\text{max}) = (T_J(\text{Max}) - T_A) / \theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{IN}	2.5	12	V
Enable Voltage	V_{EN}		12	V
Operating Junction Temperature Range	T_J	-40	125	°C


1A ULDO REGULATOR WITH ENABLE
AP2318A
Electrical Characteristics

Operating Conditions: $2.5V \leq V_{IN} \leq 12V$, $C_{IN}=1\mu F$, $C_{OUT}=2.2\mu F$, $T_J=25^\circ C$, unless otherwise specified. ($P \leq$ Maximum Power Dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation of $-40^\circ C$ to $125^\circ C$.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{REF}	AP2318A-ADJ, $I_{OUT}=10mA$, $V_{IN}-V_{OUT}=2V$, $T_J=25^\circ C$, $10mA \leq I_{OUT} \leq 1A$, $V_{OUT}+2V \leq V_{IN} \leq 12V$	1.231 1.225	1.250 1.250	1.269 1.275	V
Maximum Output Current	$I_{OUT(Max)}$	$V_{IN}-V_{OUT}=2V$	1.2	1.5		A
Line Regulation	V_{RLINE}	AP2318A-ADJ $I_{OUT}=10mA$, $V_{OUT}+2V \leq V_{IN} \leq 12V$		1	6	mV
		$I_{OUT}=10mA$, $2.5V \leq V_{IN} \leq 12V$		1	6	mV
Load Regulation	V_{RLOAD}	AP2318A-ADJ $V_{IN}=V_{OUT}+2V$, $10mA \leq I_{OUT} \leq 1A$		1	15	mV
		$V_{IN}=2.5V$, $10mA \leq I_{OUT} \leq 1A$		1	15	mV
Dropout Voltage	V_{DROP}	$\Delta V_{OUT} (\Delta V_{REF})=1\%$, $V_{OUT}>2V$, $I_{OUT}=1A$		0.5		V
Adjust Pin Current	I_{ADJ}			0.05	1	μA
Minimum Load Current	$I_{LOAD(Min)}$	$V_{OUT}+2V \leq V_{IN} \leq 12V$ (ADJ only)		1.7	5	mA
Quiescent Current	I_Q	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=0mA$		250		μA
RMS Output Noise (% of V_{OUT})	V_{NOI}	$T_A=25^\circ C$, $10Hz \leq f \leq 20kHz$		0.003		%
Thermal Shutdown Temperature				150		$^\circ C$
Thermal Shutdown Hysteresis				25		$^\circ C$
Enable Input Voltage	V_{EN}	Enable logic low			0.8	V
		Enable logic high	2.25			
Enable Input Current	I_{EN}	$V_{EN}=2.25V$		5		μA
		$V_{EN}=0.8V$			4	μA
Thermal Resistance (Junction to Case)	θ_{JC}	DFN-3x3-8		15		$^\circ C/W$
		PSOP-8		12		

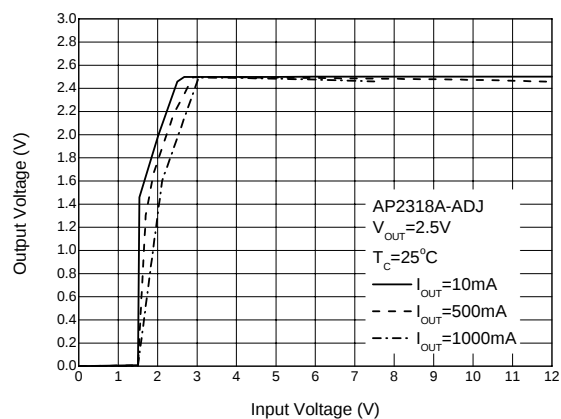
**1A ULDO REGULATOR WITH ENABLE****AP2318A****Typical Performance Characteristics**

Figure 4. Output Voltage vs. Input Voltage

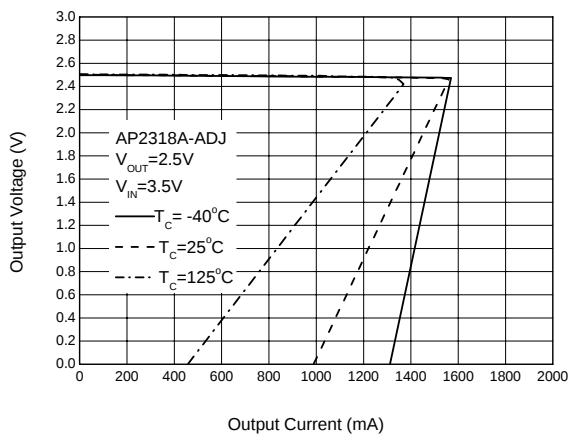


Figure 5. Output Voltage vs. Output Current

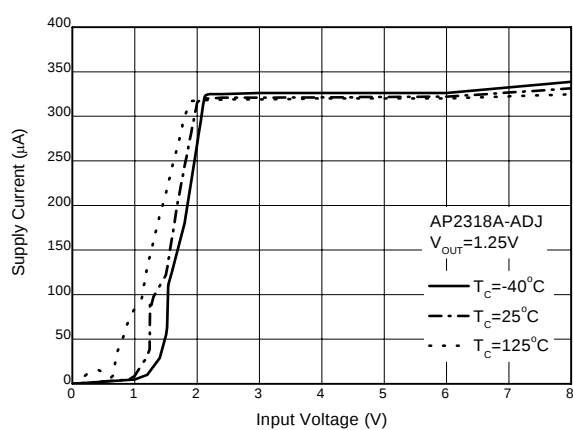


Figure 6. Supply Current vs. Input Voltage

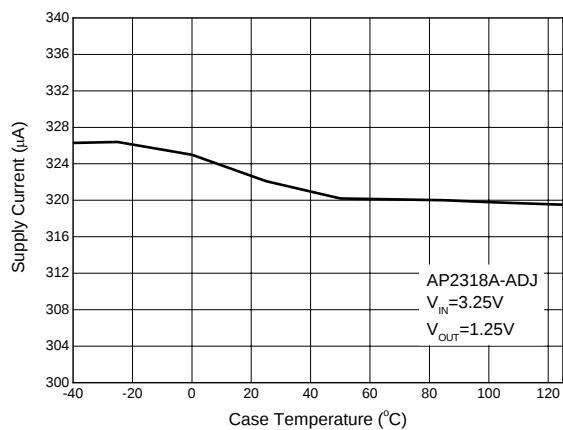


Figure 7. Supply Current vs. Case Temperature

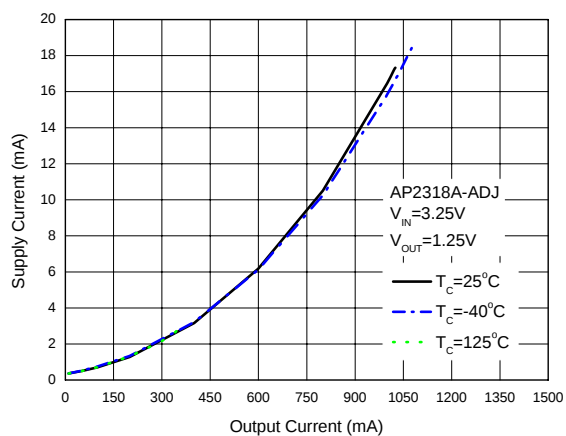
**1A ULDO REGULATOR WITH ENABLE****AP2318A****Typical Performance Characteristics(Continued)**

Figure 8. Supply Current vs. Output Current

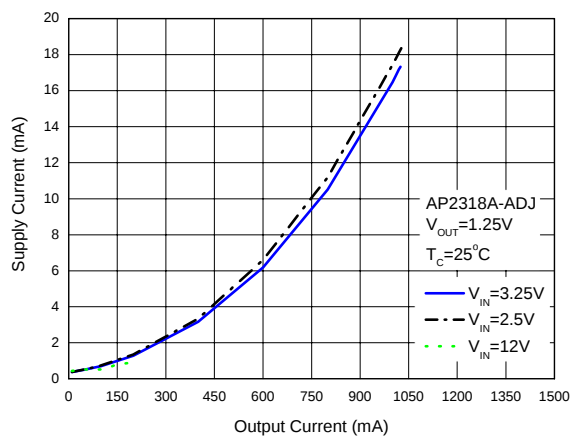


Figure 9. Supply Current vs. Output Current

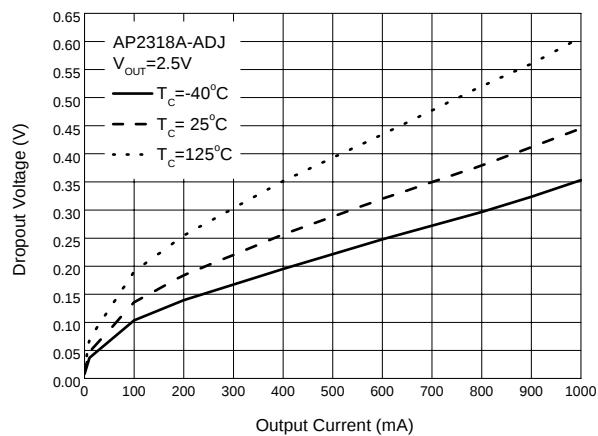


Figure 10. Dropout Voltage vs. Output Current

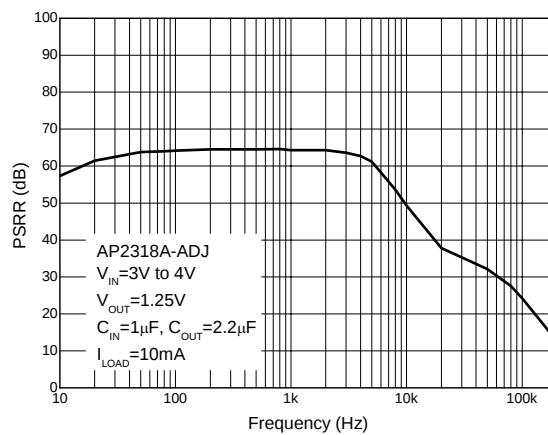


Figure 11. PSRR vs. Frequency

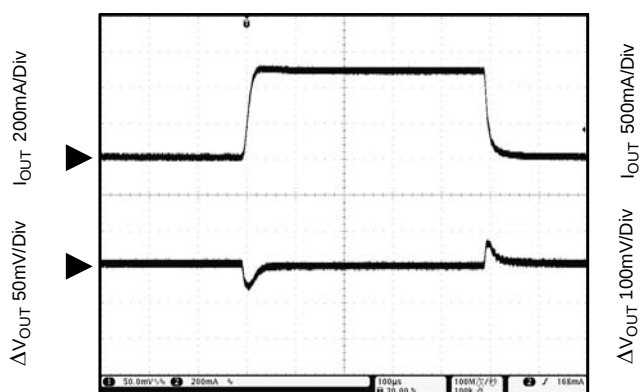
**1A ULDO REGULATOR WITH ENABLE****AP2318A****Typical Performance Characteristics (Continued)**

Figure 12. Load Transient Response
 $V_{IN}=2.5V$, $V_{OUT}=1.25V$, $I_{OUT}=1$ to $500mA$,
 $C_{IN}=1\mu F$, $C_{OUT}=2.2\mu F$

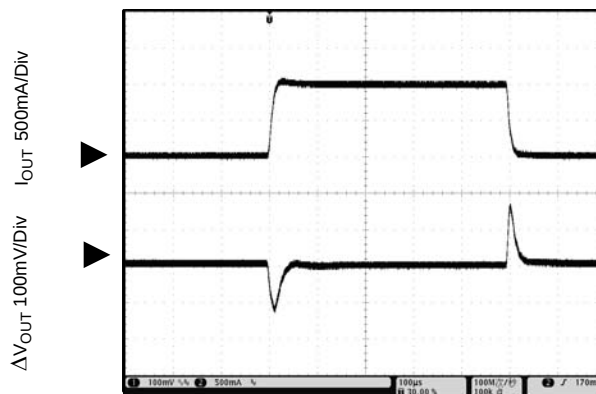


Figure 13. Load Transient Response
 $V_{IN}=2.5V$, $V_{OUT}=1.8V$, $I_{OUT}=1mA$ to $1A$,
 $C_{IN}=1\mu F$, $C_{OUT}=2.2\mu F$

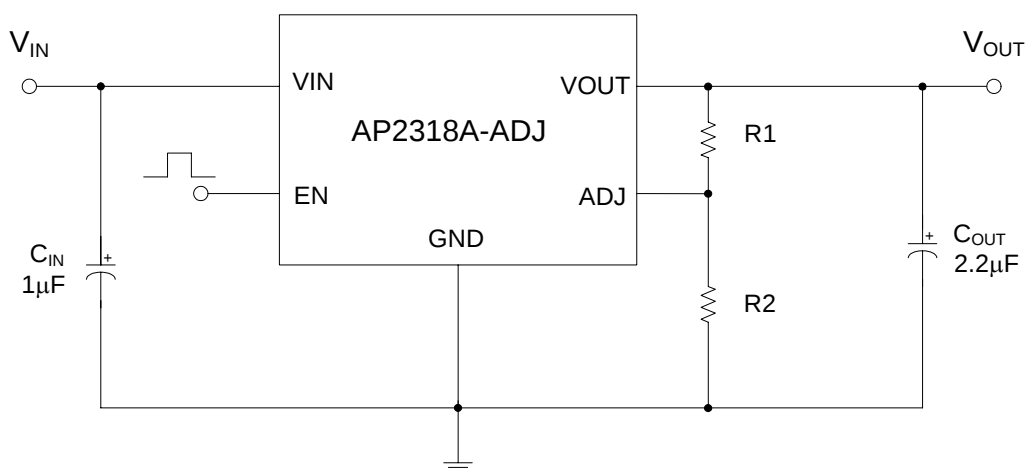
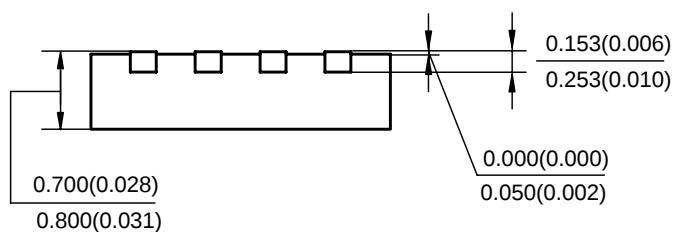
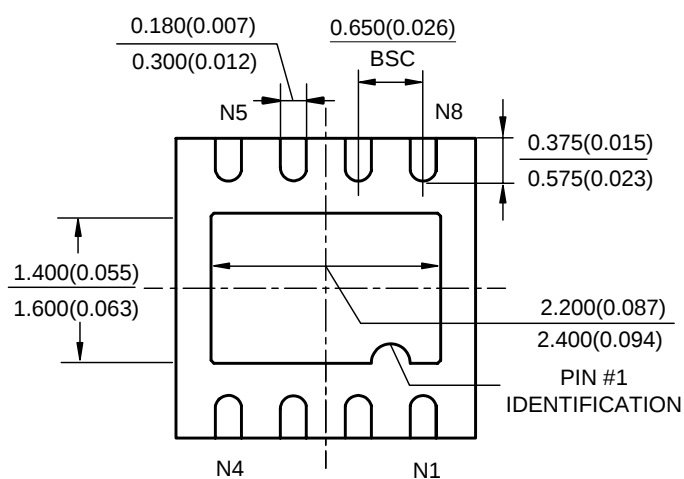
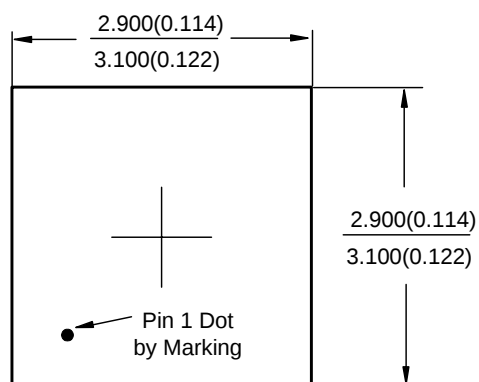
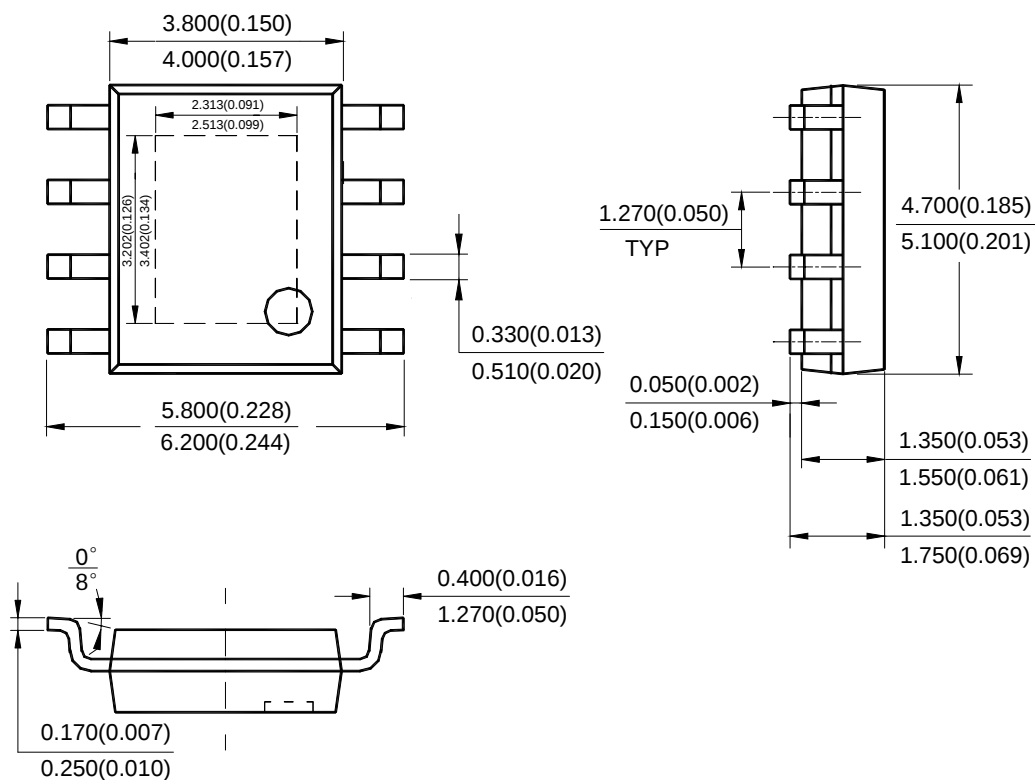
1A ULDO REGULATOR WITH ENABLE**AP2318A****Typical Application**

Figure 14. Typical Application of AP2318A ADJ Version, $V_{OUT}=1.25 \times (R1+R2)/R2$

**1A ULDO REGULATOR WITH ENABLE****AP2318A****Mechanical Dimensions****DFN-3x3-8****Unit: mm(inch)**

**1A ULDO REGULATOR WITH ENABLE****AP2318A****Mechanical Dimensions (Continued)****PSOP-8****Unit: mm(inch)**

Note: Eject hole, oriented hole and mold mark is optional.



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