Description

The AP2318 is a series of ultra low dropout regulators optimized for low voltage applications where transient response and minimum input voltage are critical.

The AP2318 provides current limit and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within ±1.5%. On-chip thermal shutdown provides protection against any combination of overload and ambient temperatures that would create excessive junction temperatures.

The AP2318 has both fixed and adjustable versions. The 1.3V fixed versions integrate the corresponding resistor divider. The adjustable version can set the output voltage through two external resistors.

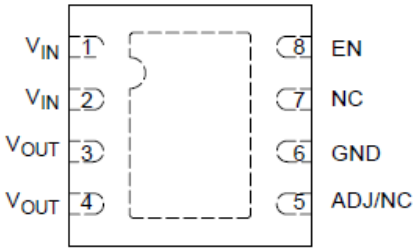
The AP2318 is available in the standard DFN-3x3-8 and SOIC-8 packages.

Features

- Wide Operating Voltage Ranges: 2.5V to 12V
- Output Voltage Accuracy: ±1.5%
- On-chip Thermal Shutdown
- ESD
  - Human Body Model 3kV
  - Machine Model 600V
- Operating Junction Temperature: -40°C to +125°C

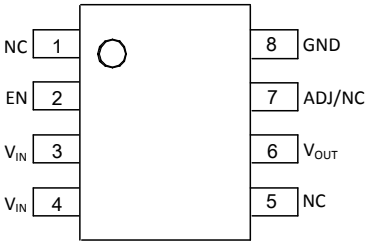
Pin Assignments

(Top View)



DFN-3x3-8

(Top View)

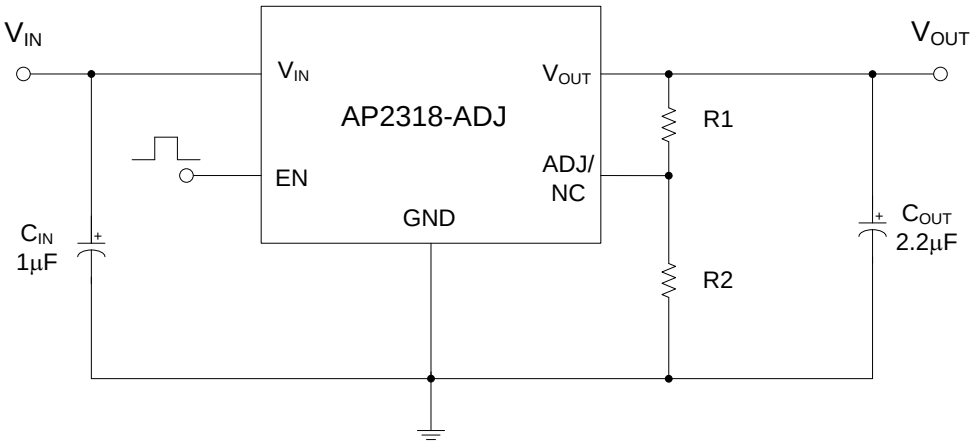


SOIC-8

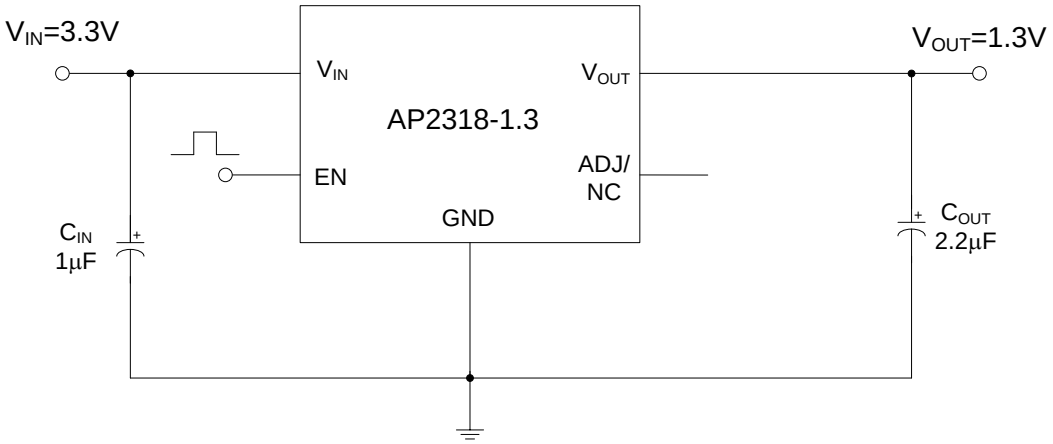
Applications

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

Typical Applications Circuit



ADJ Version, V_{OUT} = 0.8*(R1+R2)/R2

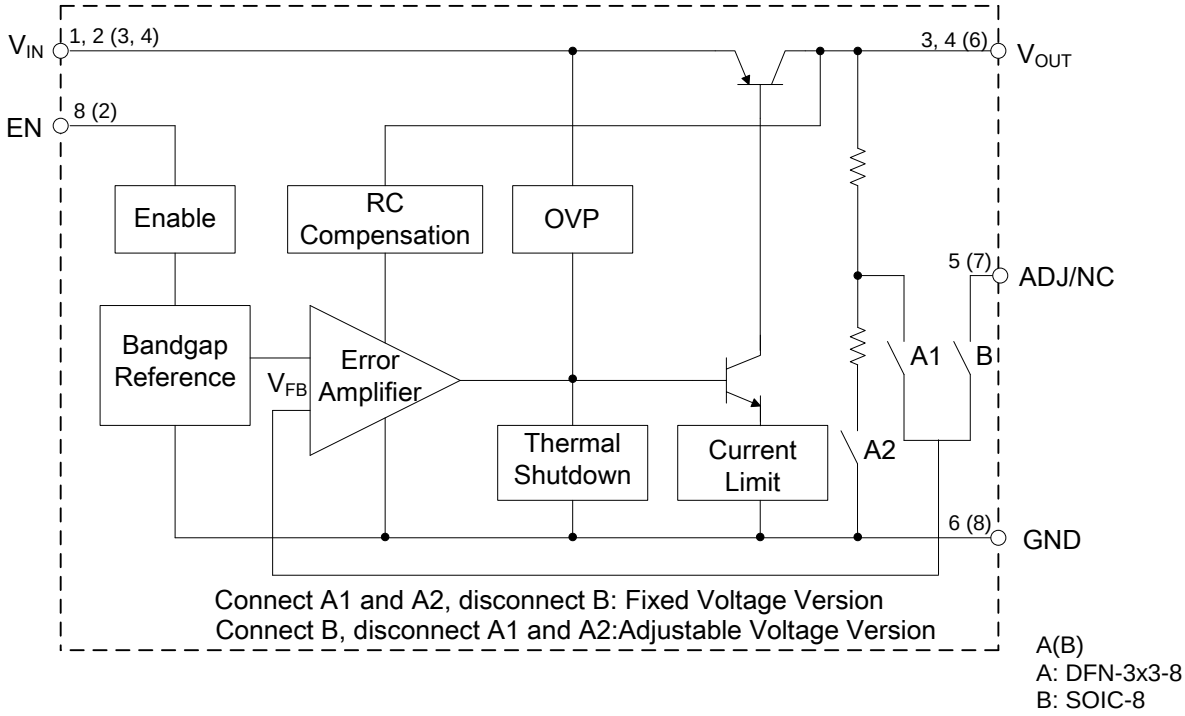


Fixed 1.3V Version, V_{OUT} = 1.3V

Pin Description

Pin Number		Pin Name	Function
DFN-3x3-8	SOIC-8		
1, 2	3, 4	V_{IN}	Input Voltage
3, 4	6	V_{OUT}	Output Voltage
5	7	ADJ/NC	Adjust Voltage/No Connection
6	8	GND	Ground
7	1, 5	NC	No Connection
8	2	EN	On/Off Control

Functional Block Diagram



Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Rating		Unit
V_{IN}	Input Voltage	15		V
T_J	Operating Junction Temperature	+150		°C
T_{STG}	Storage Temperature Range	-65 to +150		°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)	+260		°C
θ_{JA}	Thermal Resistance (Note 2)	SOIC-8	135	°C/W
		DFN-3x3-8	120	
ESD	ESD (Human Body Model)	3000		V
ESD	ESD (Machine Model)	600		V

Notes:
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.
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(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: $P_D(max) = (T_J(max)-T_A)/\theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

Recommended Operating Conditions

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

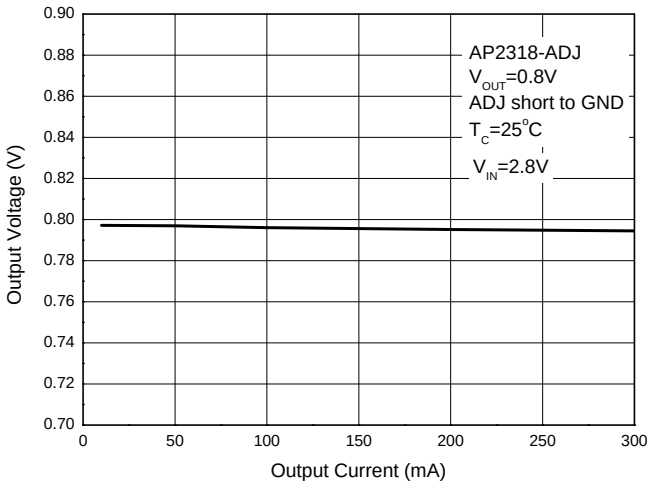
Electrical Characteristics

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

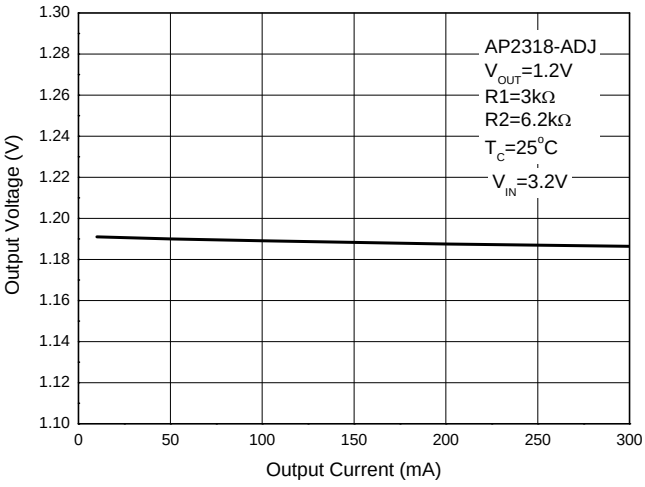
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	Reference Voltage	AP2318-ADJ I_{OUT} = 10mA, V_{IN}-V_{OUT} = 2V, T_J = +25°C 10mA ≤ I_{OUT} ≤ 600mA, V_{OUT}+2V ≤ V_{IN} ≤ 12V	0.788 **0.784**	0.800 **0.800**	0.812 **0.816**	V
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 2.5V, T_J = +25°C 10mA ≤ I_{OUT} ≤ 600mA, 2.5V ≤ V_{IN} ≤ 12V	-1.5% **-2%**	—	1.5% **2%**	V
I_{OUT}(max)	Maximum Output Current	V_{IN}-V_{OUT} = 2V	0.85	1.2	—	A
V_{RLINE}	Line Regulation	AP2318-ADJ I_{OUT} = 10mA, V_{OUT}+2V ≤ V_{IN} ≤ 12V	—	1	**6**	mV
		I_{OUT} = 10mA, 2.5V ≤ V_{IN} ≤ 12V	—	1	**6**	mV
V_{RLOAD}	Load Regulation	AP2318-ADJ V_{IN} = V_{OUT}+2V, 10mA ≤ I_{OUT} ≤ 600mA	—	1	**10**	mV
		V_{IN} = 2.5V, 10mA ≤ I_{OUT} ≤ 600mA	—	1	**10**	mV
V_{DROP}	Dropout Voltage	ΔV_{OUT} (ΔV_{REF}) = 1%, I_{OUT} = 600mA	—	0.35	—	V
I_{ADJ}	Adjust Pin Current	—	—	0.05	**1**	μA
I_{LOAD}(min)	Minimum Load Current	V_{OUT}+2V ≤ V_{IN} ≤ 12V (ADJ only)	—	**1.7**	**5**	mA
I_Q	Quiescent Current	V_{IN} = V_{OUT}+2V, I_{OUT} = 0mA	—	250	—	μA
V_{NOI}	RMS Output Noise (% of V_{OUT})	T_A = +25°C, 10Hz ≤ f ≤ 20kHz	—	0.003	—	%
—	Thermal Shutdown Temperature	—	—	+150	—	°C
—	Thermal Shutdown Hysteresis	—	—	+25	—	°C
V_{EN}	Enable Input Voltage	Enable Logic Low	—	—	**0.8**	V
		Enable Logic High	2.25	—	—	
I_{EN}	Enable Input Current	V_{EN} = 2.25V	—	5	15	μA
		V_{EN} = 0.8V	—	—	4	μA
θ_{JC}	Thermal Resistance (Junction to Case)	DFN-3x3-8	—	15	—	°C/W
		SOIC-8	—	24	—	

Performance Characteristics

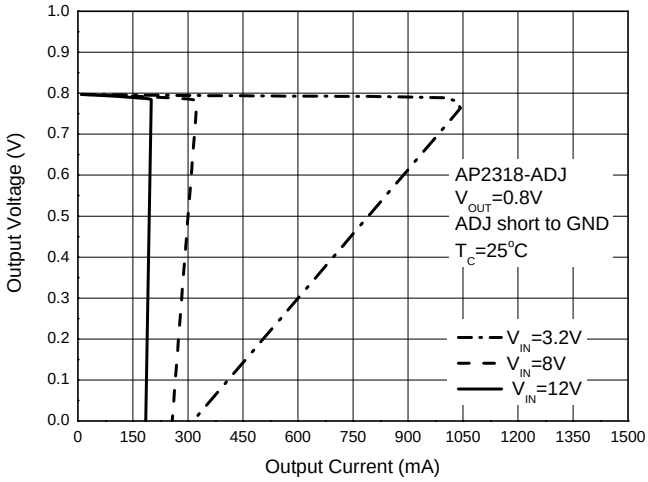
Output Voltage vs. Output Current
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)



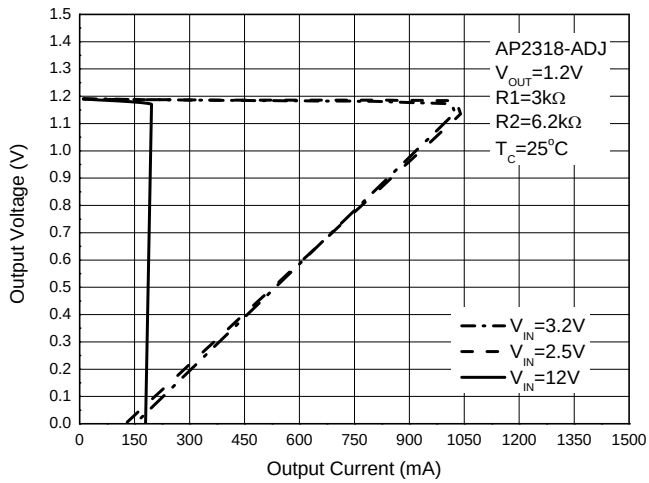
Output Voltage vs. Output Current
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)



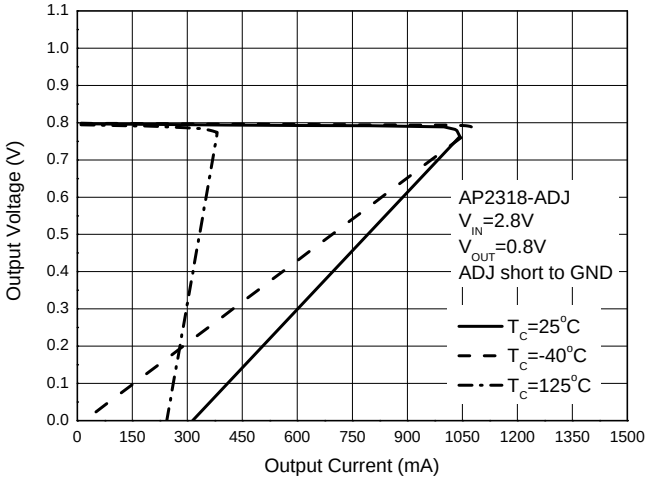
Output Voltage vs. Output Current
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)



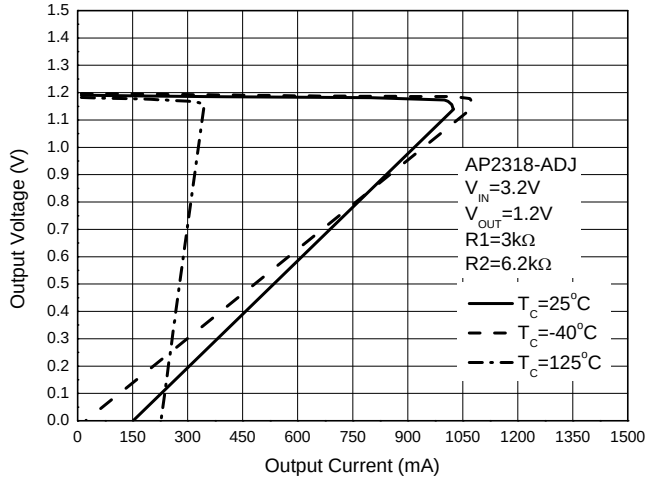
Output Voltage vs. Output Current
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)



Output Voltage vs. Output Current
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)

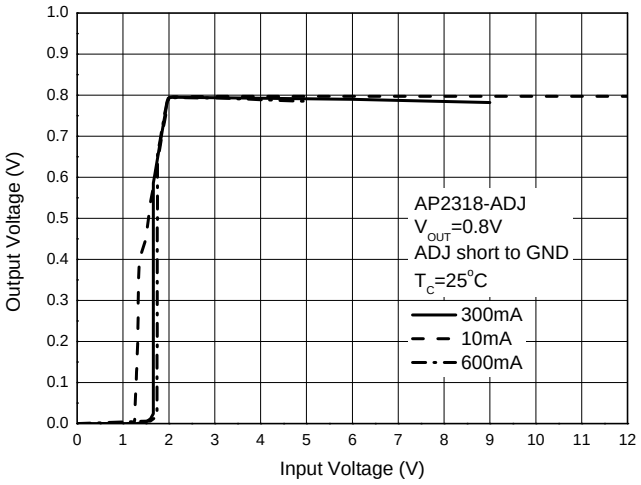


Output Voltage vs. Output Current
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)

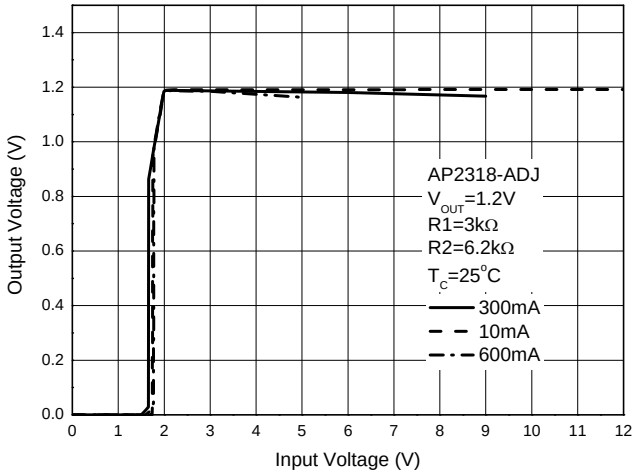


Performance Characteristics (Cont.)

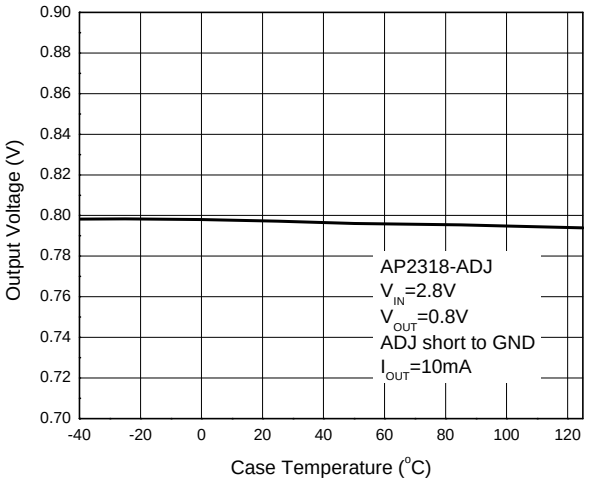
Output Voltage vs. Input Voltage
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)



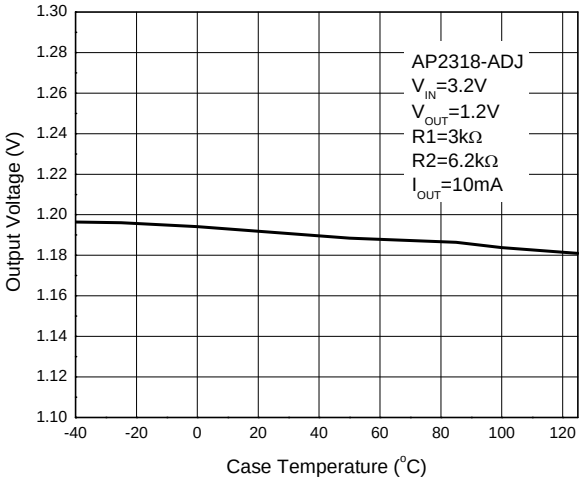
Output Voltage vs. Input Voltage
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)



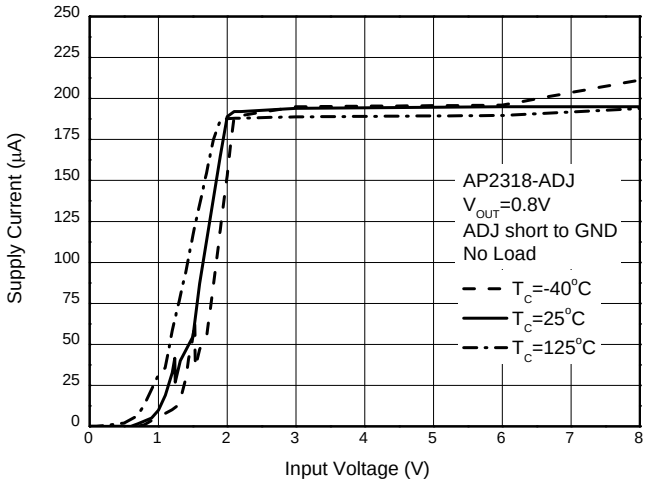
Output Voltage vs. Case Temperature
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)



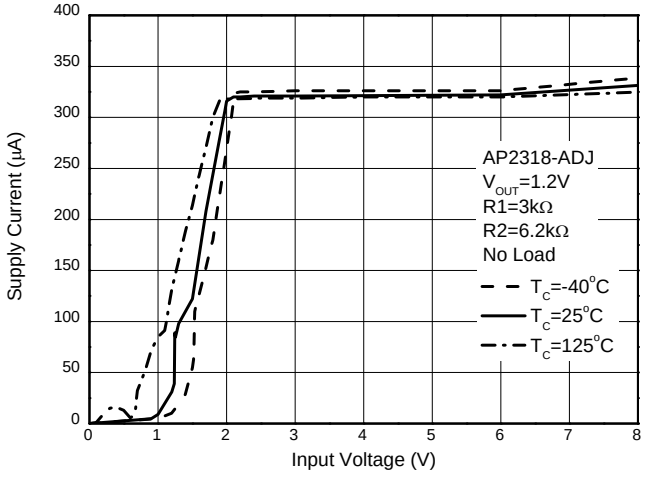
Output Voltage vs. Case Temperature
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)



Supply Voltage vs. Input Voltage
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)

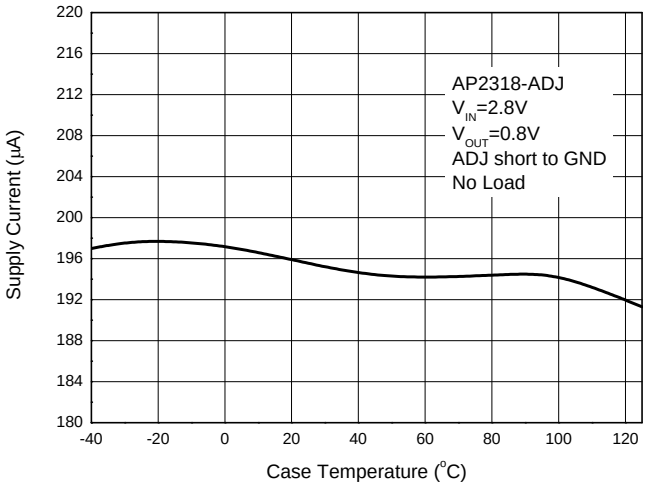


Supply Voltage vs. Input Voltage
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)

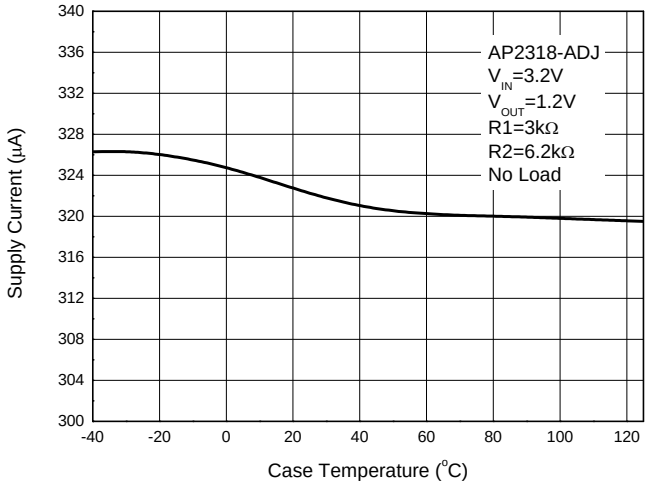


Performance Characteristics (Cont.)

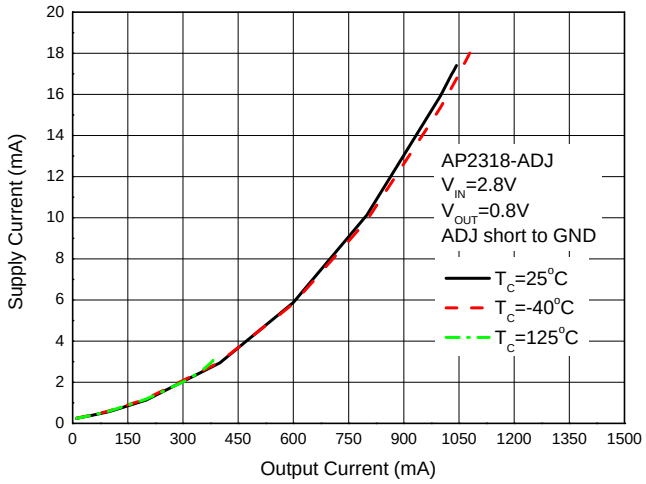
Supply Current vs. Case Temperature
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)



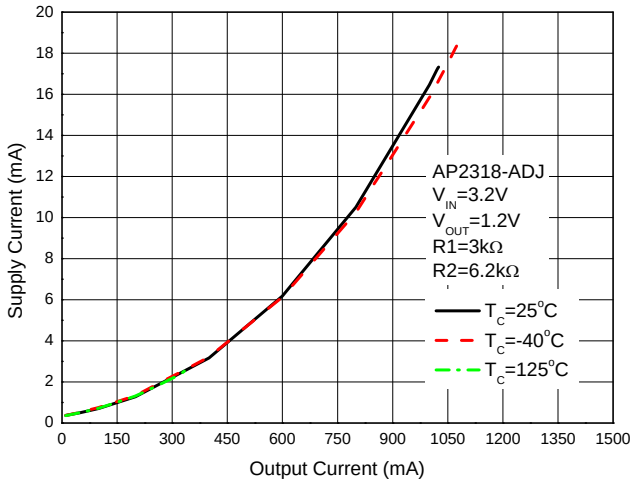
Supply Current vs. Case Temperature
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)



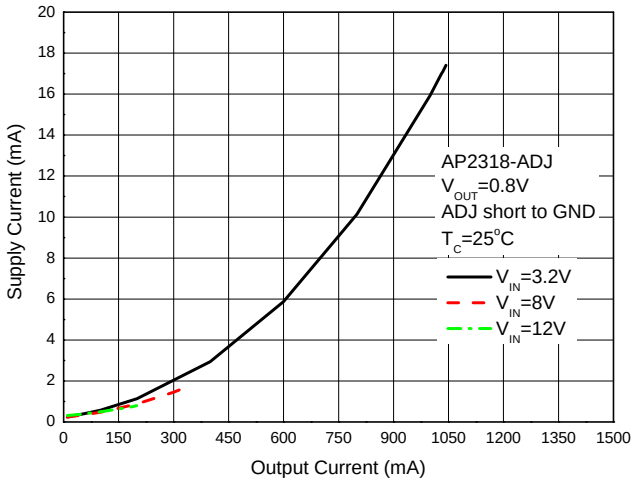
Supply Current vs. Output Current
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)



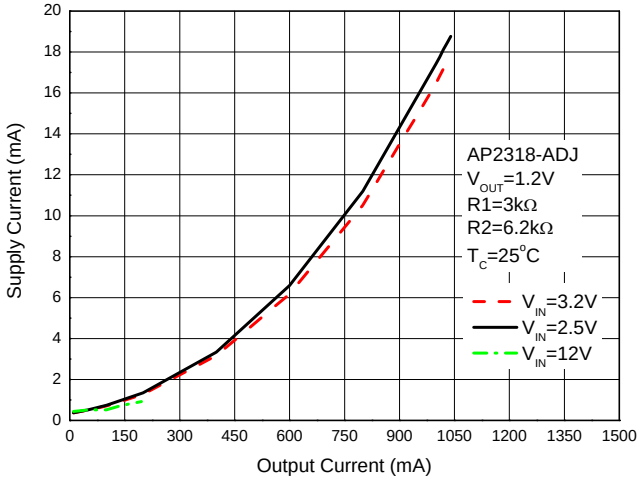
Supply Current vs. Output Current
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)



Supply Current vs. Output Current
(Conditions: V_{OUT} = 0.8V, ADJ Short to GND)

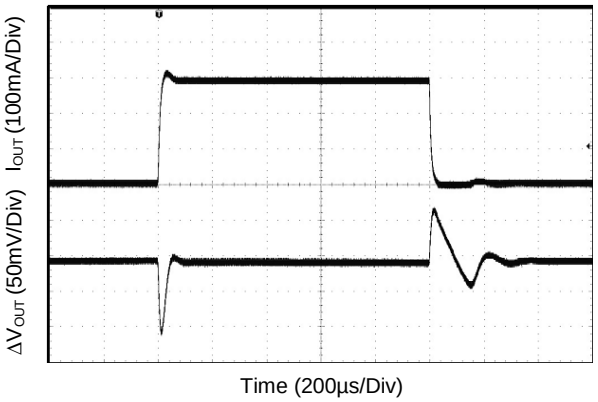


Supply Current vs. Output Current
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)

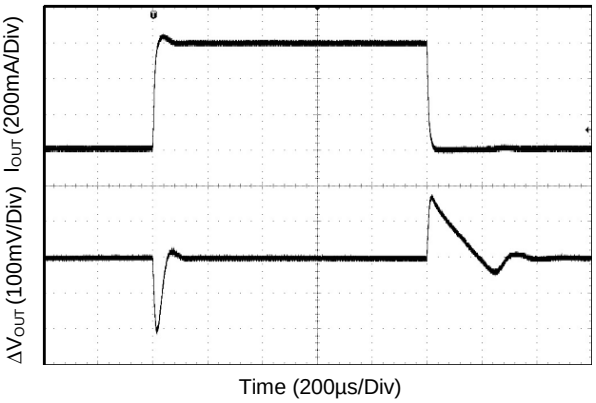


Performance Characteristics (Cont.)

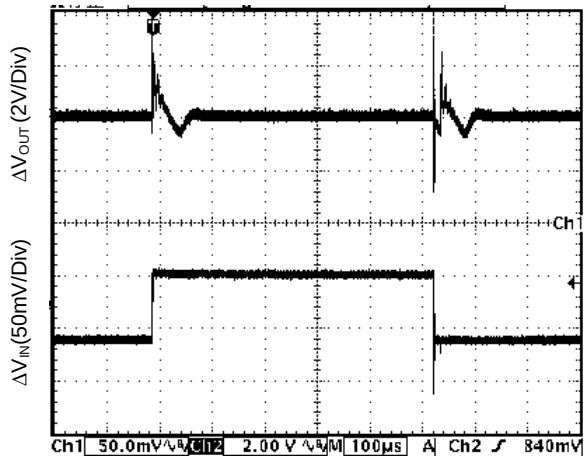
Load Transient Response
(Conditions: V_{IN} = 2.5V, V_{OUT} = 1.3V, I_{OUT} = 1mA to 300mA, C_{IN} = 1μF, C_{OUT} = 2.2μF)



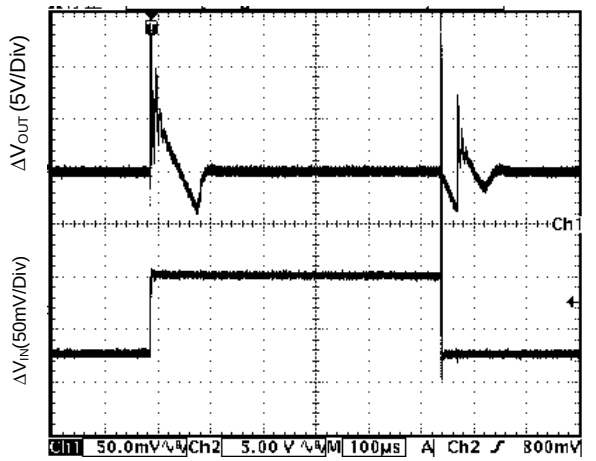
Load Transient Response
(Conditions: V_{IN} = 2.5V, V_{OUT} = 1.8V, I_{OUT} = 1mA to 600mA, C_{IN} = 1μF, C_{OUT} = 2.2μF)



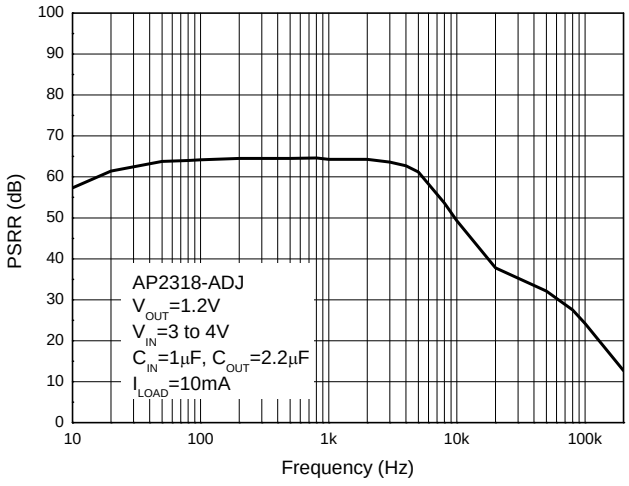
Line Transient Response
(Conditions: V_{IN} = 2.5V to 5V, V_{OUT} = 0.8V, I_{OUT} = 10mA, C_{IN} = 0μF, C_{OUT} = 2.2μF)



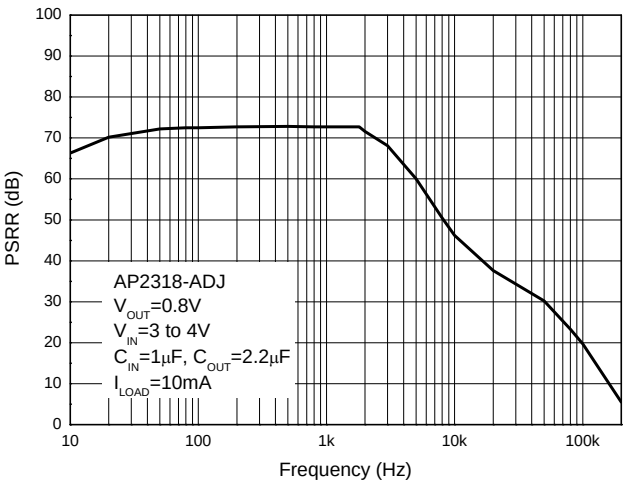
Line Transient Response
(Conditions: V_{IN} = 2.5V to 10V, V_{OUT} = 0.8V, I_{OUT} = 10mA, C_{IN} = 0μF, C_{OUT} = 2.2μF)



PSRR vs. Frequency

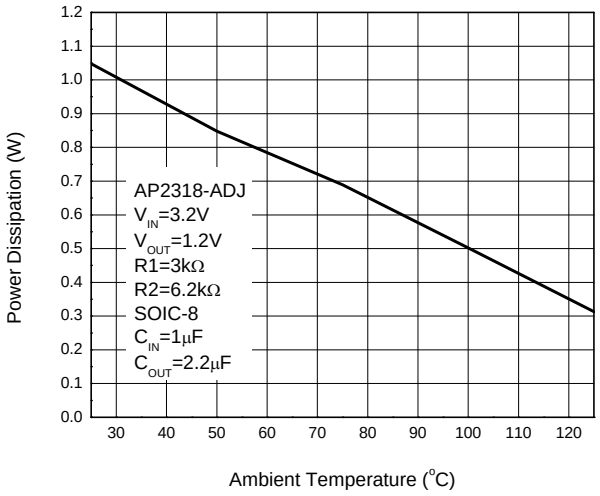


PSRR vs. Frequency

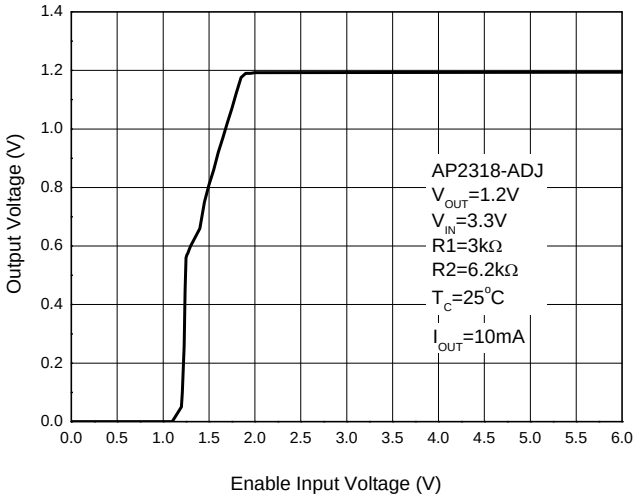


Performance Characteristics (Cont.)

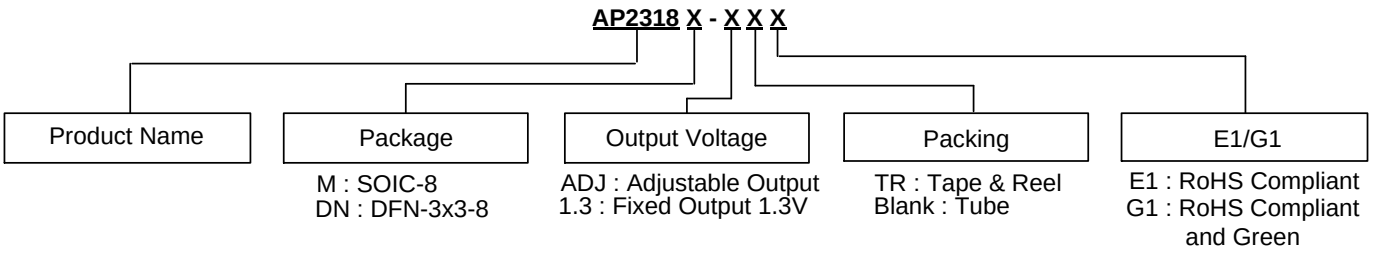
Power Dissipation vs. Ambient Temperature
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)



Output Voltage vs. Enable Input Voltage
(Conditions: V_{OUT} = 1.2V, R1 = 3kΩ, R2 = 6.2kΩ)



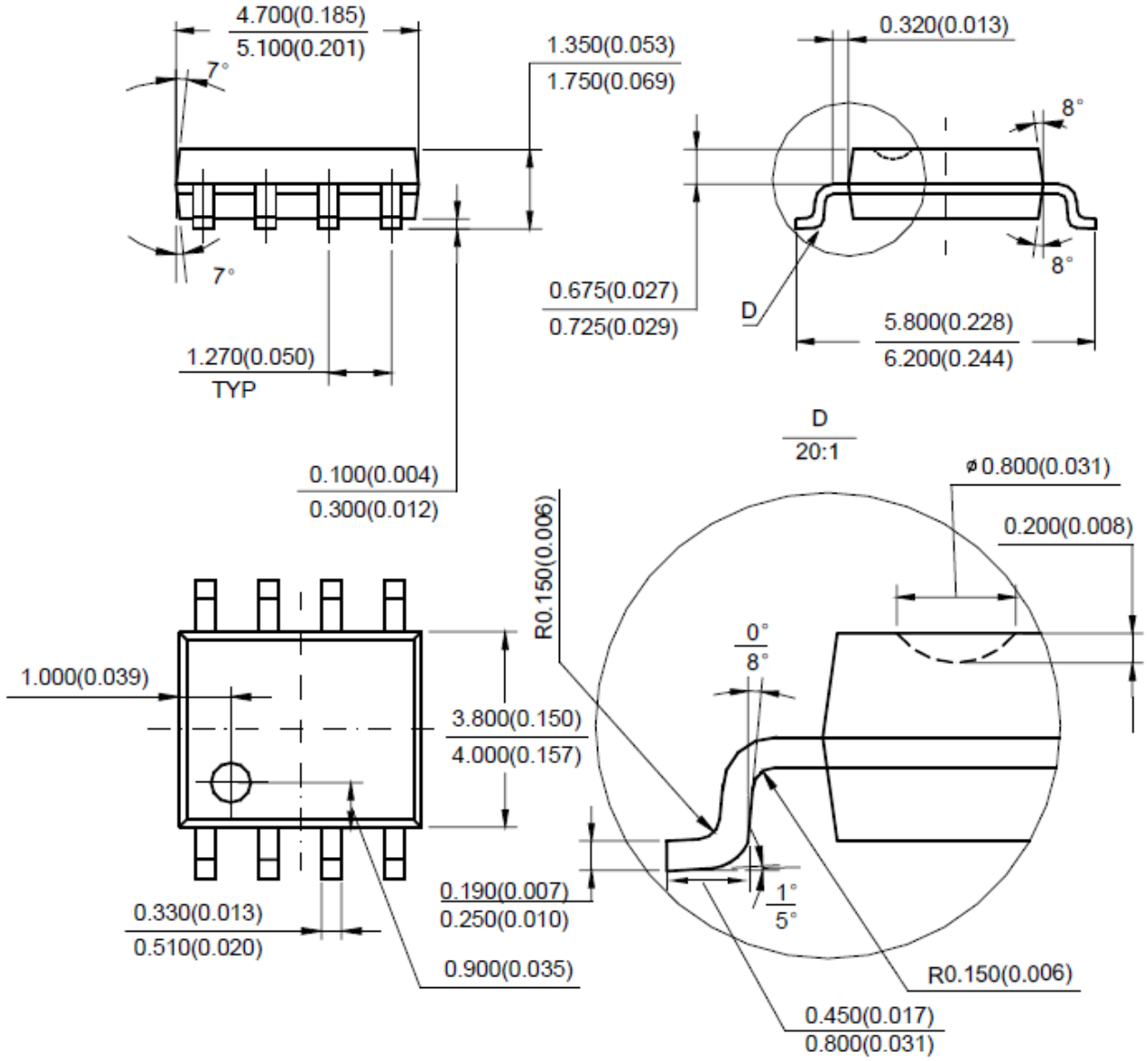
Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing
		RoHS Compliant	RoHS Compliant and Green	RoHS Compliant	RoHS Compliant and Green	
SOIC-8	-40 to +125°C	AP2318M-ADJE1	AP2318M-ADJG1	2318M-ADJE1	2318M-ADJG1	Tube
		AP2318M-ADJTRE1	AP2318M-ADJTRG1	2318M-ADJE1	2318M-ADJG1	Tape & Reel
		AP2318M-1.3E1	AP2318M-1.3G1	2318M-1.3E1	2318M-1.3G1	Tube
		AP2318M-1.3TRE1	AP2318M-1.3TRG1	2318M-1.3E1	2318M-1.3G1	Tape & Reel
DFN-3x3-8	-40 to +125°C	AP2318DN-ADJTRE1	AP2318DN-ADJTRG1	F9E	B9E	Tape & Reel
		AP2318DN-1.3TRE1	AP2318DN-1.3TRG1	F9B	B9B	Tape & Reel

Package Outline Dimensions (All dimensions in mm(inch).)

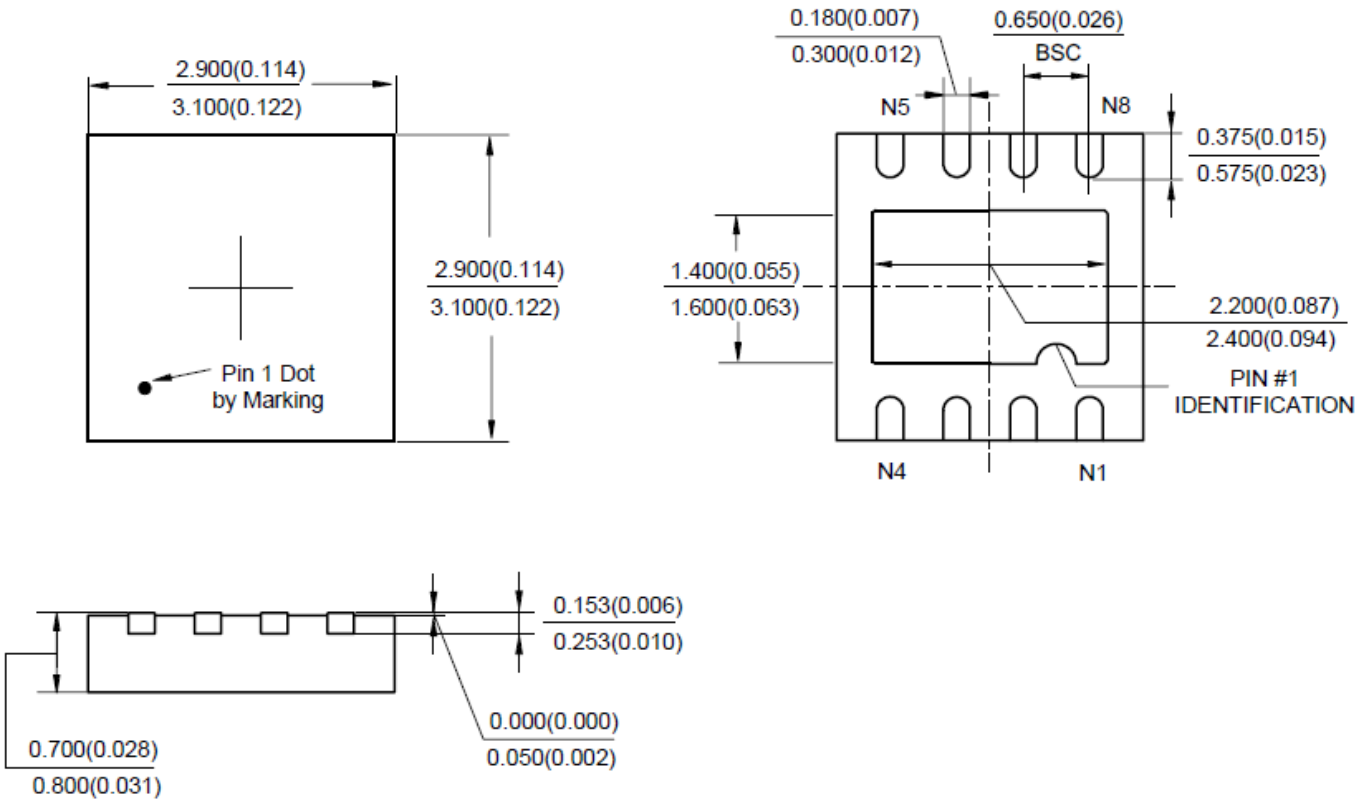
(1) Package Type: SOIC-8



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

Package Outline Dimensions (Cont. All dimensions in mm(inch).)

(2) Package Type: DFN-3x3-8



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Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

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