PEAK 3A CMOS LDO REGULATOR WITH ENABLE AND POWER GOOD

Description

The AP2132A series are positive voltage regulator ICs fabricated by CMOS process. The ICs consist of a voltage reference, an error amplifier, a power transistor, a resistor network for setting output voltage, a current limit circuit for current protection, and a chip enable circuit.

The AP2132A have features of large current, low dropout voltage, high output voltage accuracy and low input voltage. The AP2132A provide a power good (PG) signal to indicate if the voltage level of V_{OUT} reaches 92% of its rating value. And it operates with a V_{IN} as low as 1.4V and V_{CTRL} voltage 5V with output voltage programmable as low as 0.6V.

The AP2132A are available in 1.2V, 1.5V, 1.8V, 2.5V fixed output voltage versions and adjustable output voltage version. The fixed versions integrate the adjust resistors. It is also available in an adjustable version, which can set the output voltage with external resistor. If the pin of adjustable output voltage is to ground, it will switch to fixed output voltage.

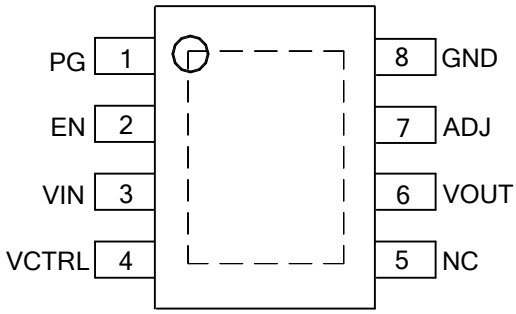
The AP2132A series are available in PSOP-8 package.

Features

- Adjustable Output: 0.6V to 3.0V
- Low Dropout Voltage: 300mV at I_{OUT} = 2A, V_{OUT} = 1.2V
- Over Current and Over Temperature Protection
- Enable Pin
- PSOP-8 Package with Thermal Pad
- Maximum Output Current: 3A (Peak)
- High Output Voltage Accuracy: 2%
- V_{OUT} Power Good Signal
- Excellent Line/Load Regulation

Pin Assignments

(Top View)

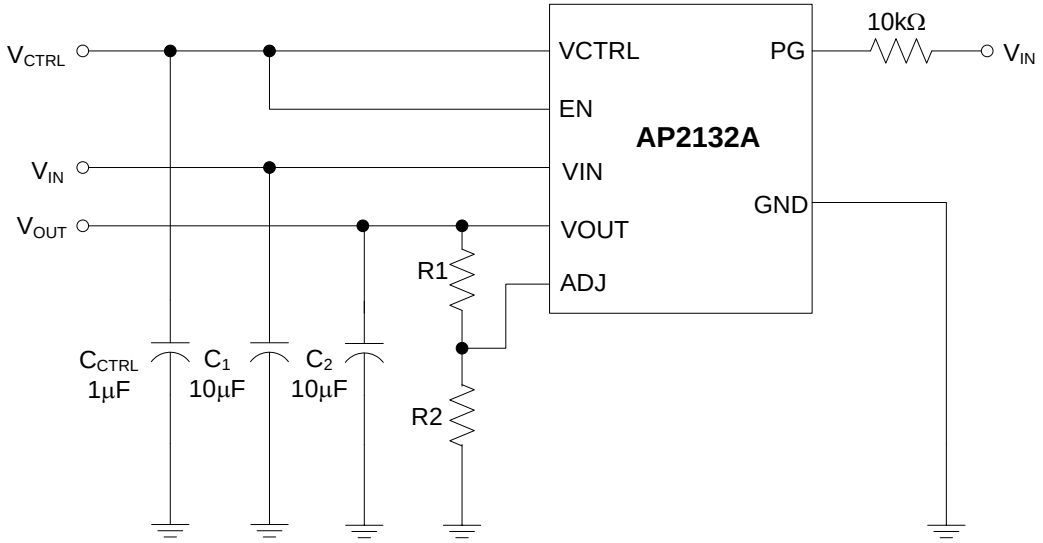


PSOP-8

Applications

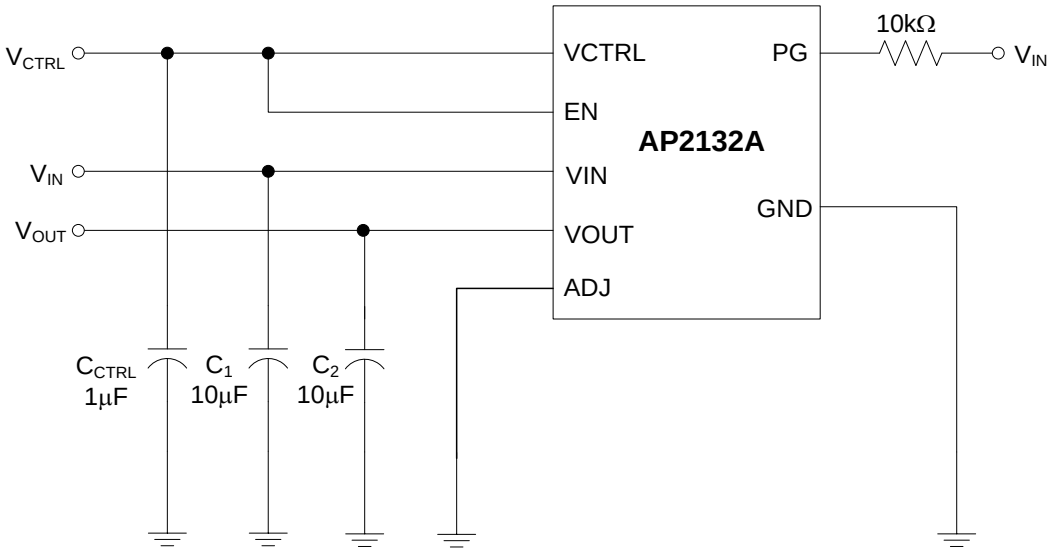
- Notebook

Typical Applications Circuit



$$V_{OUT} = \frac{0.6(R1+R2)}{R2} \quad (V)$$

Adjustable Version

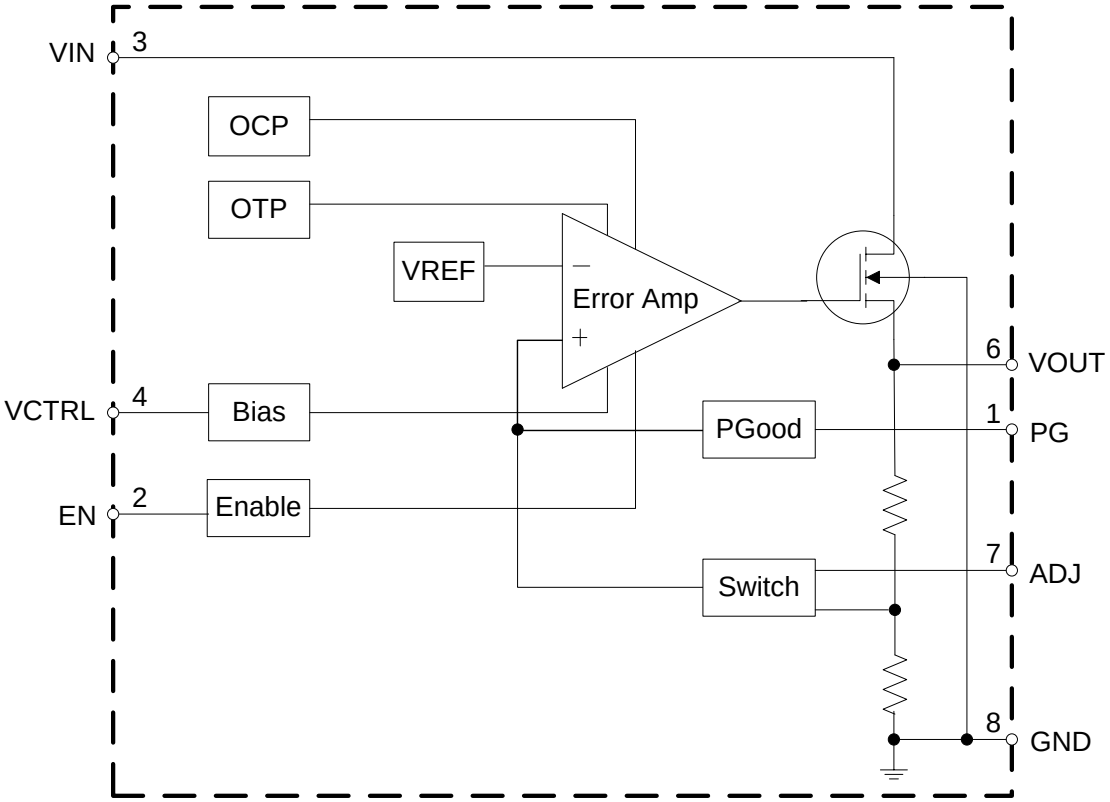


Fixed Version

Pin Descriptions

Pin Number	Pin Name	Function
1	PG	Assert high once V_{OUT} reaches 92% of its rating voltage
2	EN	Enable input
3	VIN	Input voltage
4	VCTRL	Input voltage for controlling circuit
5	NC	Not connected
6	VOUT	Regulated output voltage
7	ADJ	Adjust output: when connected to ground, the output voltage is set by internal resistors; when external feedback resistors are connected, the output voltage will be V_{OUT} = 0.6V×(R1+R2)/R2.
8	GND	Ground

Functional Block Diagram



Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Rating	Unit
V_{IN} V_{CTRL}	Input Voltage Input Voltage for Controlling Circuit	6.0	V
V_{EN}	Enable Input Voltage	-0.3 to 6.0	V
θ_{JA}	Thermal Resistance (No Heatsink)	130	°C/W
T_J	Operating Junction Temperature	+150	°C
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)	+260	°C
—	ESD (Machine Model)	200	V
—	ESD (Human Body Model)	2000	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.

Recommended Operating Conditions

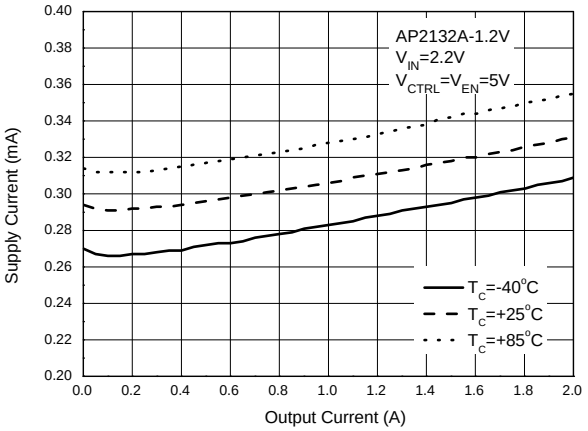
Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage	1.4	5.5	V
V_{CTRL}	Input Voltage for Controlling Circuit	4.5	5.5	V
T_A	Operating Ambient Temperature Range	-40	+85	°C

Electrical Characteristics (@V_{IN} = V_{OUT}+0.5V, V_{CTRL} = V_{EN} = 5V, T_A = +25°C, C_{IN} = C_{OUT} = 10µF, C_{CTRL} = 1µF, I_{OUT} = 10mA, **Bold** typeface applies over -40°C ≤ T_A ≤ +85°C, unless otherwise specified.)

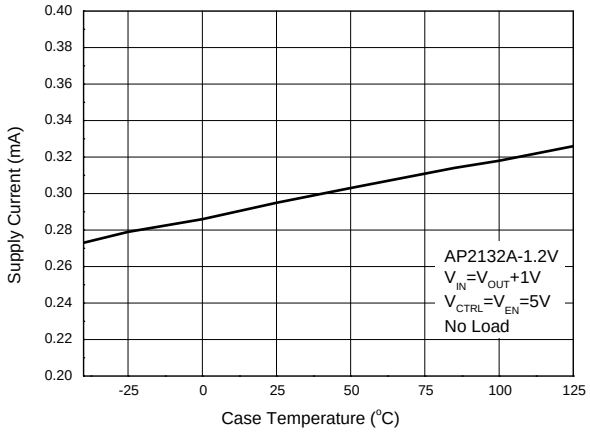
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	V_{IN} = V_{OUT}+0.5V, I_{OUT} = 10mA	V_{OUT} × 98%	—	V_{OUT} × 102%	V
V_{IN}	Input Voltage	—	1.4	—	5.5	V
I_{LIMIT}	Current Limit	V_{IN}–V_{OUT} = 1V	3	—	—	A
V_{RLOAD}	Load Regulation	V_{IN} = V_{OUT}+0.5V, 10mA ≤ I_{OUT} ≤ 2A	—	10	—	mV
V_{RLINE}	Line Regulation	V_{OUT}+0.5V ≤ V_{IN} ≤ 5V , I_{OUT} = 10mA	—	2	—	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 500mA	—	80	120	mV
		I_{OUT} = 1A	—	150	200	mV
		I_{OUT} = 2A	—	300	450	mV
I_{SUPPLY}	Supply Current	V_{IN} = V_{OUT}+0.5V, I_{OUT} = 0mA	—	300	—	µA
I_{CTRLH}	V_{CTRL} Current	V_{IN} = V_{OUT}+0.5V, V_{CTRL} = V_{EN} = 5V	—	250	500	µA
I_{CTRLL}		V_{IN} = V_{OUT}+0.5V, V_{CTRL}=5V, V_{EN} = 0V	—	0.1	1.0	µA
PSRR	Power Supply Rejection Ratio	Ripple 0.5Vp-p, V_{IN} = V_{OUT}+1V, f = 100Hz	—	60	—	dB
		Ripple 0.5Vp-p, V_{IN} = V_{OUT}+1V, f = 1kHz	—	60	—	dB
$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T}$	Output Voltage Temperature Coefficient	I_{OUT} = 10mA, -40°C ≤ T_A ≤ +85°C	—	**±100**	—	ppm/°C
V_{REF}	Reference Voltage	Adjust Short to V_{OUT}	0.588	0.6	0.612	V
—	Enable “High” Voltage	Enable Input Voltage “High”	1.5	—	—	V
—	Enable “Low” Voltage	Enable Input Voltage “Low”	—	—	0.4	V
OTSD	Thermal Shutdown	—	—	+165	—	°C
—	Thermal Shutdown Hysteresis	—	—	+20	—	°C
V_{THPG}	V_{OUT} Power Good Voltage	—	—	92	—	%
—	V_{PG} Hysteresis	—	—	7	—	%
—	Adjust Pin Threshold	—	—	200	—	mV
θ_{JC}	Thermal Resistance (Junction to Case)	PSOP-8	—	40	—	°C/W

Performance Characteristics

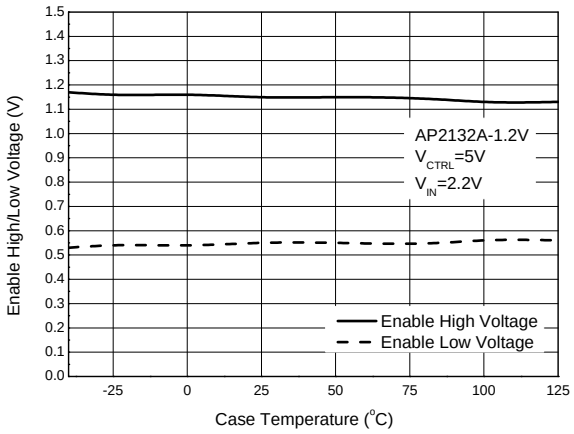
Supply Current vs. Output Current



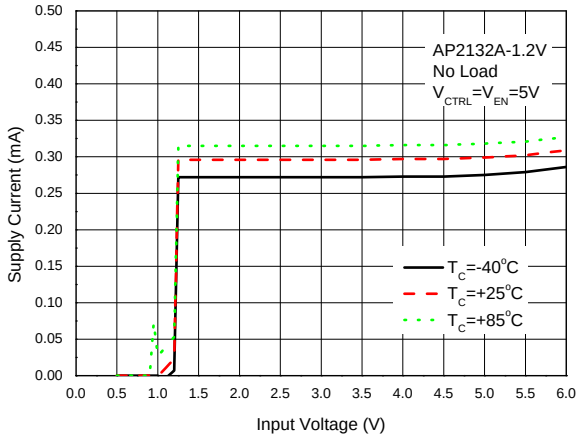
Supply Current vs. Case Temperature



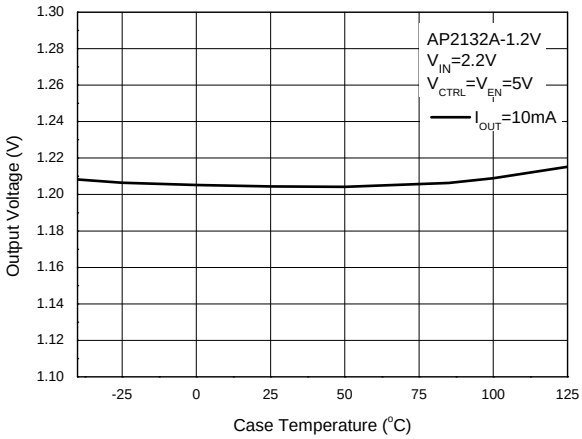
Enable High/Low Voltage vs. Case Temperature



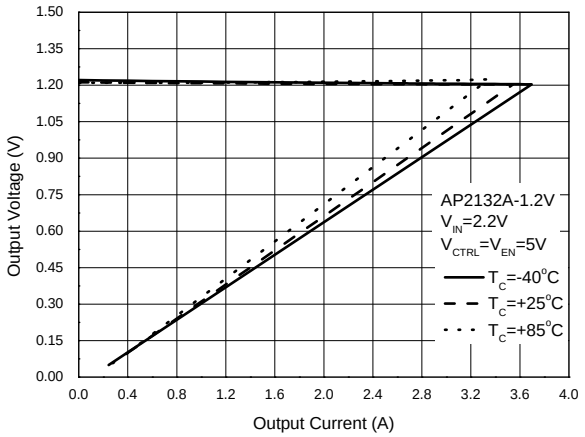
Supply Current vs. Input Voltage



Output Voltage vs. Case Temperature

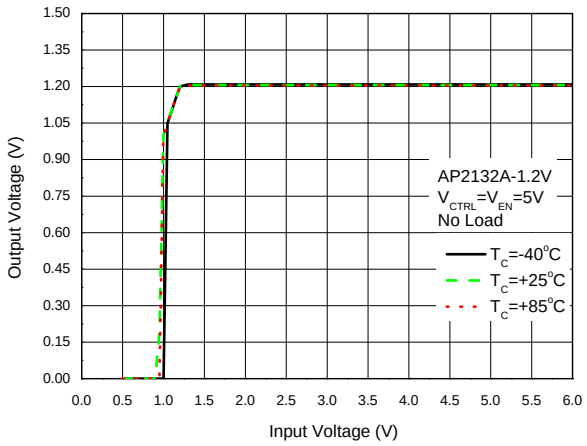


Output Voltage vs. Output Current

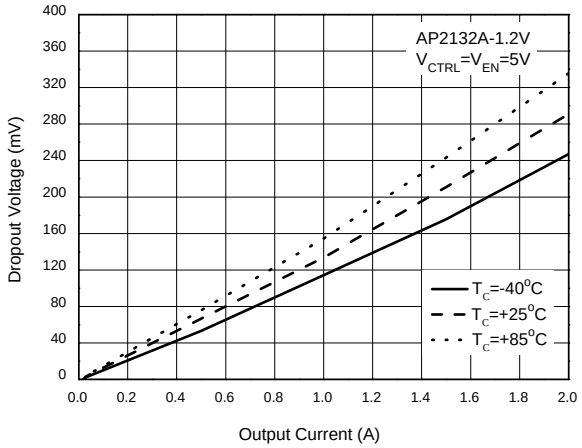


Performance Characteristics (Cont.)

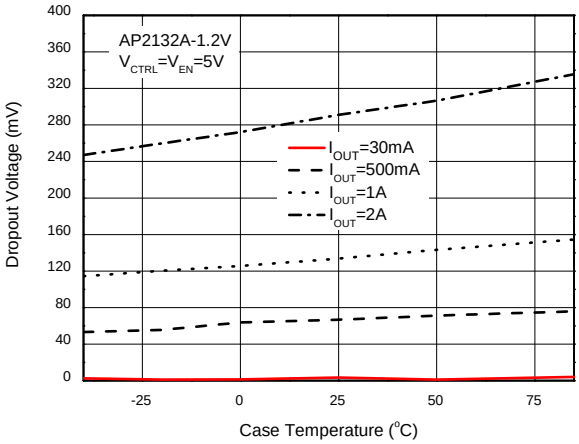
Output Voltage vs. Input Voltage



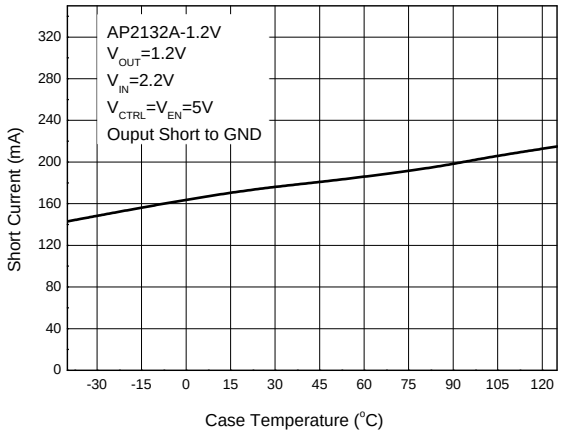
Dropout Voltage vs. Output Current



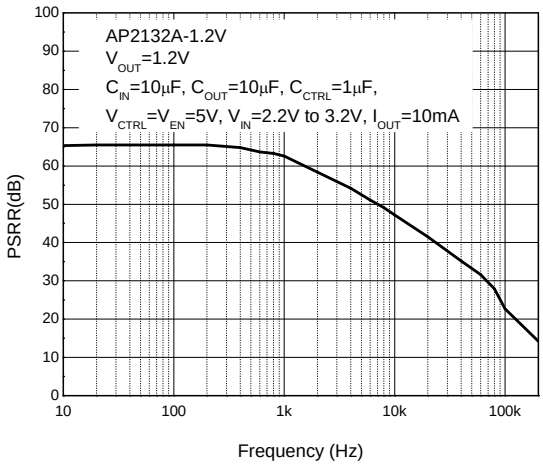
Dropout Voltage vs. Case Temperature



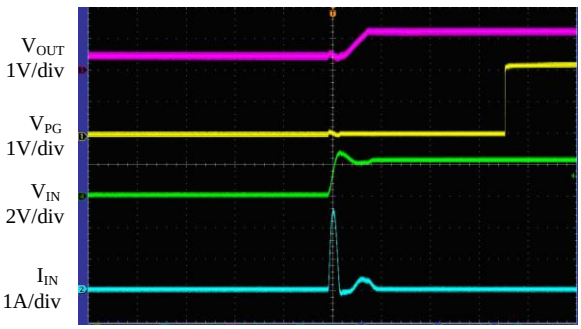
Short Current vs. Case Temperature



PSRR vs. Frequency



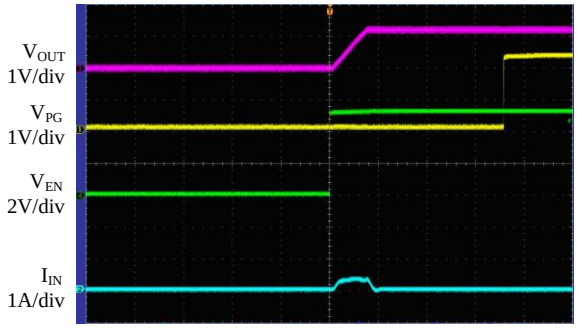
V_{IN} Start up Waveform (V_{CTRL}=V_{EN}=5V, V_{IN}=0 to 2.2V, No Load)



Time 80µs/div

Performance Characteristics (Cont.)

V_{EN} Start up Waveform
(V_{CTRL}=5V, V_{EN}=0 to 5V, V_{IN}=2.2V, No Load)

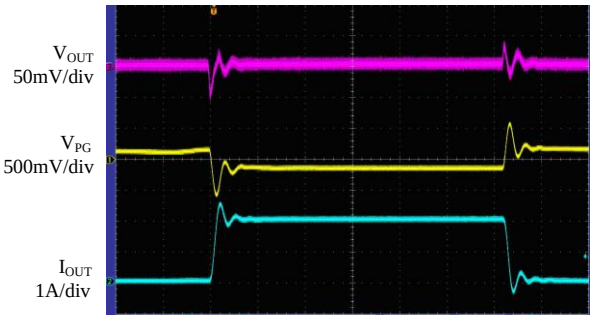


Time 80μs/div

V_{CTRL} Start up and Shut down Waveform
(V_{CTRL}=0 to 5V, V_{EN}=5V, V_{IN}=2.2V, No Load)

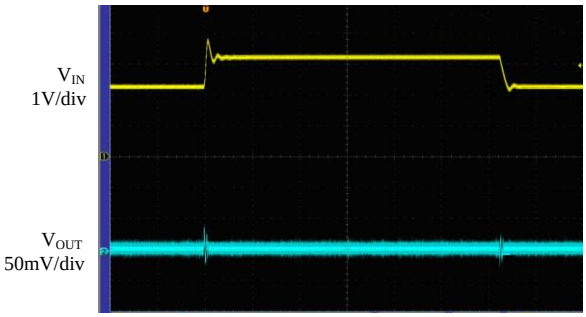
Time 80μs/div

Load Transient
(V_{CTRL}=V_{EN}=5V, V_{IN}=2.2V, I_{OUT}=0 to 2A)



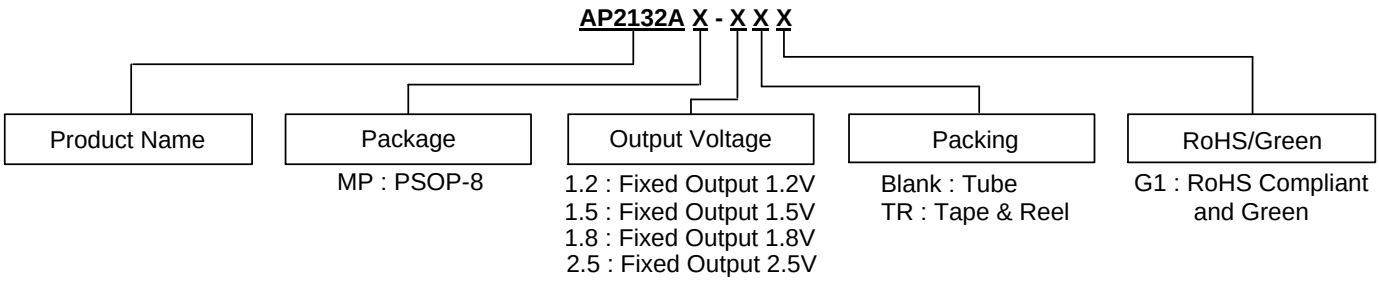
Time 80μs/div

Line Transient
(V_{CTRL}=V_{EN}=5V, C_{IN}=C_{CTRL}=1μF, C_{OUT}=10μF, V_{IN}=2.2V to 3.2V, I_{OUT}=10mA)



Time 80μs/div

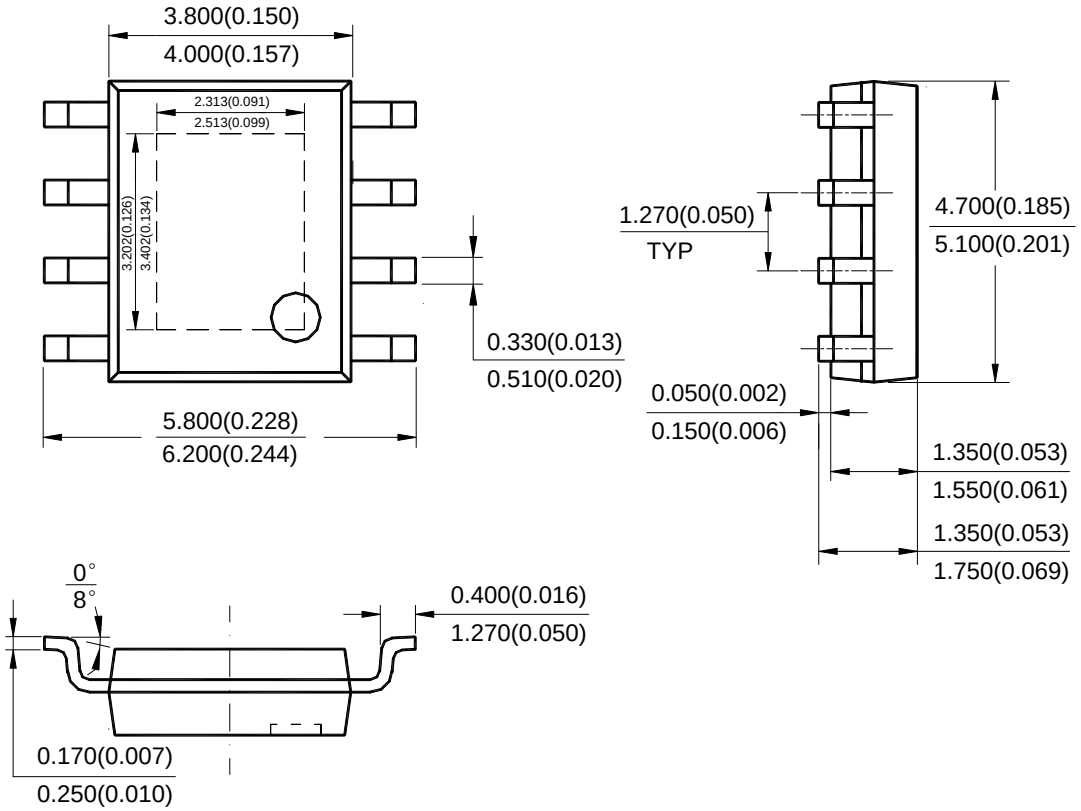
Ordering Information



Package	Temperature Range	Version Description	Part Number	Marking ID	Packing
PSOP-8	-40°C to +85°C	Each fixed output version integrates ADJ version	AP2132AMP-1.2G1	2132A-1.2G1	Tube
			AP2132AMP-1.2TRG1	2132A-1.2G1	Tape & Reel
			AP2132AMP-1.5G1	2132A-1.5G1	Tube
			AP2132AMP-1.5TRG1	2132A-1.5G1	Tape & Reel
			AP2132AMP-1.8G1	2132A-1.8G1	Tube
			AP2132AMP-1.8TRG1	2132A-1.8G1	Tape & Reel
			AP2132AMP-2.5G1	2132A-2.5G1	Tube
			AP2132AMP-2.5TRG1	2132A-2.5G1	Tape & Reel

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

(1) Package Type: PSOP-8



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

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