

Description

The AP2129 is a 300mA, positive Voltage regulator ICs fabricated by CMOS process. The AP2129 provides two kinds of output voltage operation modes for setting the output voltage. Fixed output voltage mode senses the output voltage on V_{OUT} , adjustable output voltage mode needs two resistors as a voltage divider.

The AP2129 series have features of low dropout voltage, low noise, high output voltage accuracy, and low current consumption which make them ideal for use in various battery-powered devices.

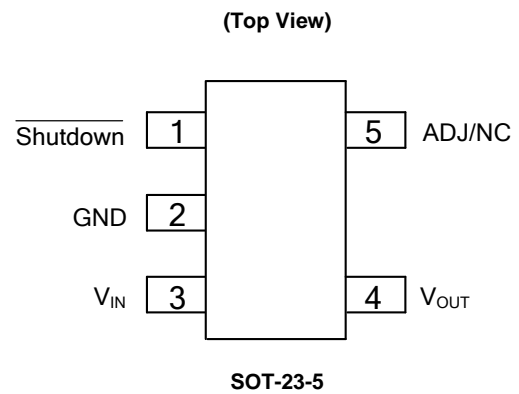
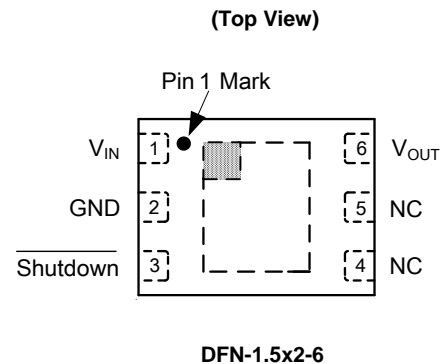
The AP2129 has 1.0V, 1.2V, 1.8V, 2.6V, 2.8V, 3.0V and 3.3V fixed voltage version and 0.8V to 4.5V adjustable voltage version.

The AP2129 series are available in DFN-1.5x2-6 (1.0V, 1.2V, 1.8V, 2.6V, 2.8V, 3.0V, 3.3V) and SOT-23-5 (1.0V, 1.2V, 3.3V, ADJ) packages.

Features

- Wide Operating Voltage: 1.8V to 6V
- High Output Voltage Accuracy: $\pm 2\%$
- High Ripple Rejection: 65dB@ $f = 1\text{kHz}$, 45dB@ $f = 10\text{kHz}$
- Low Standby Current: 0.1 μA
- Low Quiescent Current: 60 μA Typical
- Low Output Noise: 60 μVrms
- Short Current Limit: 50mA
- Over Temperature Protection
- Compatible with Low ESR Ceramic Capacitor: 1 μF for C_{IN} and C_{OUT}
- Excellent Line/Load Regulation
- Soft Start Time: 50 μs
- Auto Discharge Resistance: $R_{DS(ON)} = 60\Omega$

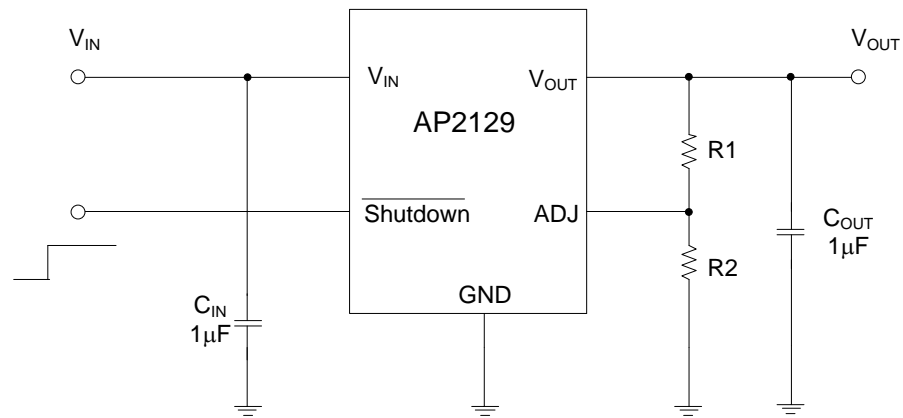
Pin Assignments



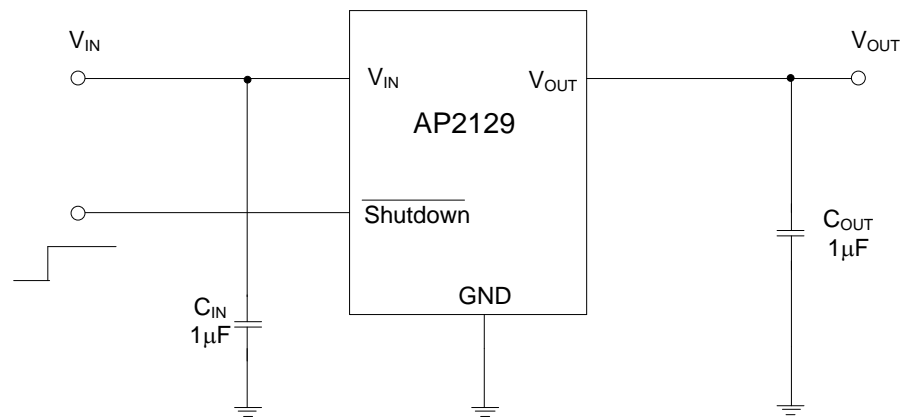
Applications

- Datacom
- Notebook Computers
- Mother Board

Typical Applications Circuit



$$V_{OUT} = 0.8 \cdot (1 + R1/R2) V$$

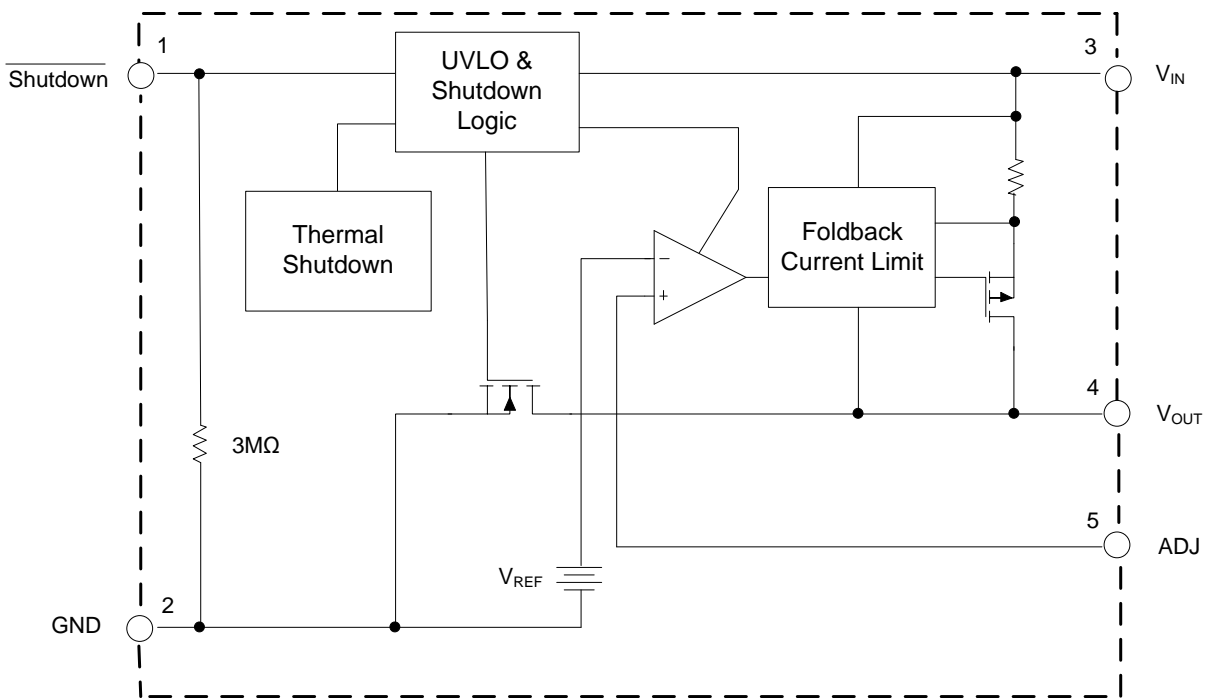
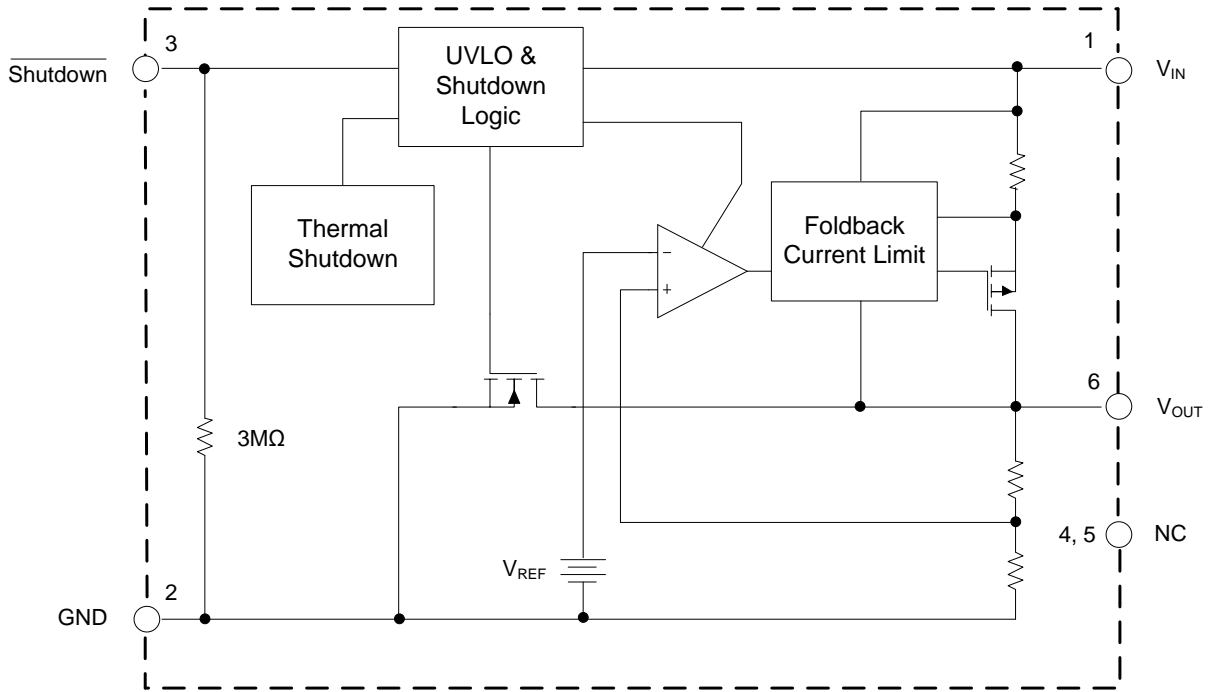


$$V_{OUT} = 1.0V, 1.2V, 1.8V, 2.6V, 2.8V, 3.0V, 3.3V$$

Pin Descriptions

Pin Number		Pin Name	Function
DFN-1.5x2-6	SOT-23-5		
1	3	V _{IN}	Input Voltage
2	2	GND	Ground
3	1	Shutdown	Active High Enable Input Pin. Logic high=enable, logic low=shutdown
4, 5	—	NC	No Connection
—	5	ADJ/NC	Adjust Output for ADJ version/No Connection for Fixed Version
6	4	V _{OUT}	Regulated Output Voltage

Functional Block Diagram



Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Rating		Unit
V_{IN}	Input Voltage	6.5		V
V_{CE}	Shutdown Input Voltage	-0.3 to $V_{IN} + 0.3$		V
I_{OUT}	Output Current	450		mA
T_J	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 (Junction to Ambient)	DFN-1.5x2-6	100	°C/W
		SOT-23-5	250	
ESD	ESD (Human Body Model)	6000		V
ESD	ESD (Machine Model)	200		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	1.8	6	V
T_A	Operating Ambient Temperature Range	-40	+85	°C

Electrical Characteristics
AP2129-1.0/1.2/1.8/2.6/2.8/3.0/3.3 Electrical Characteristics (@C_{IN} = 1μF, C_{OUT} = 1μF, **Bold** type applies over -40°C ≤ T_J ≤ +85°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V _{OUT}	Output Voltage	V _{IN} = V _{OUT} + 1V, (Note 2) 1mA ≤ I _{OUT} ≤ 300mA	98%* V _{OUT}	—	102%* V _{OUT}	V	
V _{IN}	Input Voltage	—	1.8	—	6	V	
I _{OUT(MAX)}	Maximum Output Current	—	—	450	—	mA	
ΔV _{OUT} /(ΔI _{OUT} *V _{OUT})	Load Regulation	V _{IN} -V _{OUT} = 1V, (Note 2), 1mA ≤ I _{OUT} ≤ 300mA	—	—	1.5	%/A	
ΔV _{OUT} /(ΔV _{IN} *V _{OUT})	Line Regulation	V _{OUT} + 0.5V ≤ V _{IN} ≤ 6V, (Note 2), I _{OUT} = 30mA	—	—	0.06	%/V	
V _{DROP}	Dropout Voltage	V _{OUT} = 1.0V, I _{OUT} = 300mA	—	800	—	mV	
		V _{OUT} = 1.2V, I _{OUT} = 300mA	—	600	—		
		V _{OUT} = 1.8V, I _{OUT} = 300mA	—	600	700		
		V _{OUT} = 2.6V/2.8V/3.0V/3.3V, I _{OUT} = 300mA	—	170	300		
I _Q	Quiescent Current	V _{IN} = V _{OUT} + 1V, I _{OUT} = 0mA	—	60	90	μA	
I _{STD}	Standby Current	V _{IN} = V _{OUT} + 1V, V _{Shutdown} in off mode	—	0.1	1.0	μA	
PSRR	Power Supply Rejection Ratio	Ripple 1Vp-p, V _{IN} = V _{OUT} + 1V	f = 100Hz	—	65	—	dB
			f = 1kHz	—	65	—	dB
			f = 10kHz	—	45	—	dB
(ΔV _{OUT} /V _{OUT})/ΔT	Output Voltage Temperature Coefficient	I _{OUT} = 30mA, -40°C ≤ T _J ≤ +85°C	—	±100	—	ppm/°C	
I _{LIMIT}	Output Current Limit	V _{IN} -V _{OUT} = 1V, V _{OUT} = 0.98*V _{OUT}	—	400	—	mA	
I _{SHORT}	Short Current Limit	V _{OUT} = 0V	—	50	—	mA	
t _{UP}	Soft Start Time	—	—	50	—	μs	
V _{NOISE}	RMS Output Noise	T _A = +25°C, 10Hz ≤ f ≤ 100kHz	—	60	—	μVrms	
—	Shutdown "High" Voltage	Shutdown Input Voltage "High"	1.5	—	6	V	
—	Shutdown "Low" Voltage	Shutdown Input Voltage "Low"	0	—	0.4	V	
—	V _{OUT} Discharge MOSFET R _{DS(ON)}	Shutdown Input Voltage "Low"	—	60	—	Ω	
—	Shutdown Pull Down Resistance	—	—	3	—	MΩ	
—	Thermal Shutdown	—	—	+165	—	°C	
—	Thermal Shutdown Hysteresis	—	—	+30	—	°C	
θ _{JC}	Thermal Resistance	DFN-1.5x2-6	—	20	—	°C/W	
		SOT-23-5	—	150	—		

 Note 2: V_{IN} = 2.8V for 1.0 and 1.2 version.

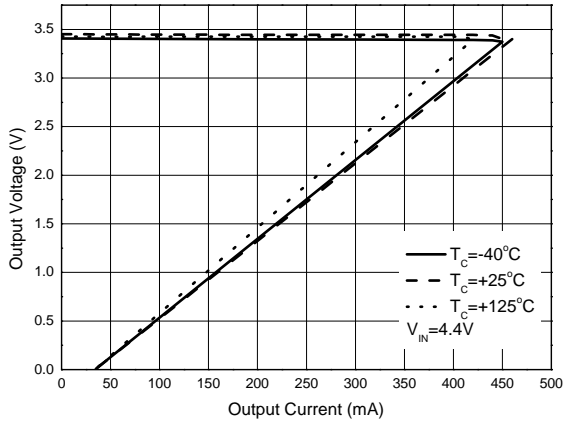
Electrical Characteristics (Cont.)

AP2129-ADJ Electrical Characteristics (@C_{IN} = 1μF, C_{OUT} = 1μF, **Bold** type applies over -40°C ≤ T_J ≤ +85°C, unless otherwise specified.)

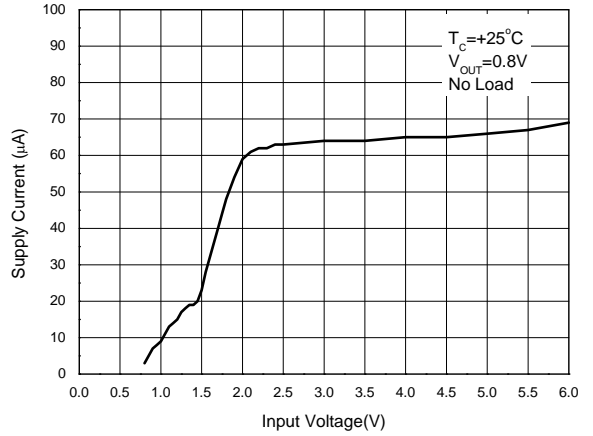
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V _{REF}	Reference Voltage	V _{IN} = 1.8V 1mA ≤ I _{OUT} ≤ 300mA	0.748	0.8	0.816	V	
V _{IN}	Input Voltage	—	1.8	—	6	V	
I _{OUT(MAX)}	Maximum Output Current	—	—	450	—	mA	
ΔV _{OUT} /(ΔI _{OUT} *V _{OUT})	Load Regulation	V _{IN} -V _{OUT} = 1V, 1mA ≤ I _{OUT} ≤ 300mA	—	—	1.5	%/A	
ΔV _{OUT} /(ΔV _{IN} *V _{OUT})	Line Regulation	V _{OUT} +0.5V ≤ V _{IN} ≤ 6V, I _{OUT} = 30mA	—	—	0.06	%/V	
I _Q	Quiescent Current	V _{IN} = V _{OUT} +1V, I _{OUT} = 0mA	—	60	90	μA	
I _{STD}	Standby Current	V _{IN} = V _{OUT} +1V, V _{Shutdown} in off mode	—	0.1	1.0	μA	
PSRR	Power Supply Rejection Ratio	Ripple 1Vp-p, V _{IN} = V _{OUT} +1V	f = 100Hz	—	65	—	dB
			f = 1kHz	—	65	—	dB
			f = 10kHz	—	45	—	dB
(ΔV _{OUT} /V _{OUT})/ΔT	Output Voltage Temperature Coefficient	I _{OUT} = 30mA, -40°C ≤ T _J ≤ +85°C	—	±100	—	ppm/°C	
I _{LIMIT}	Output Current Limit	—	—	400	—	mA	
I _{SHORT}	Short Current Limit	V _{OUT} = 0V	—	50	—	mA	
t _{UP}	Soft Start Time	—	—	50	—	μs	
V _{NOISE}	RMS Output Noise	T _A = +25°C, 10Hz ≤ f ≤ 100kHz	—	60	—	μVrms	
—	Shutdown "High" Voltage	Shutdown Input Voltage "High"	1.5	—	6	V	
—	Shutdown "Low" Voltage	Shutdown Input Voltage "Low"	0	—	0.4	V	
—	V _{OUT} Discharge MOSFET R _{DS(ON)}	Shutdown Input Voltage "Low"	—	60	—	Ω	
—	Shutdown Pull Down Resistance	—	—	3	—	MΩ	
—	Thermal Shutdown	—	—	+165	—	°C	
—	Thermal Shutdown Hysteresis	—	—	+30	—	°C	
θ _{JC}	Thermal Resistance	DFN-1.5x2-6	—	20	—	°C/W	
		SOT-23-5	—	150	—		

Performance Characteristics

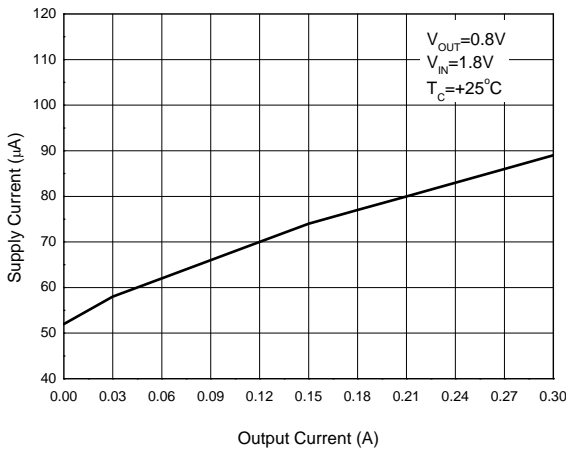
Output Voltage vs. Output Current



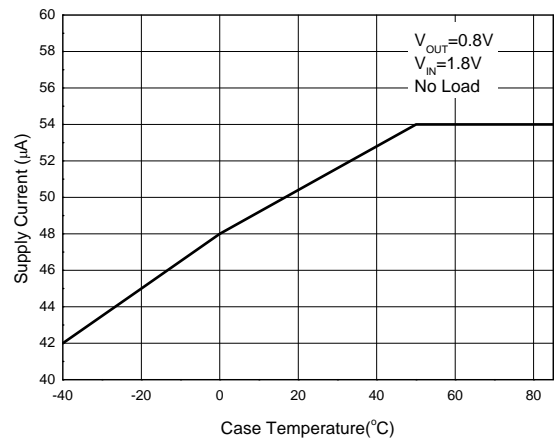
Supply Current vs. Input Voltage



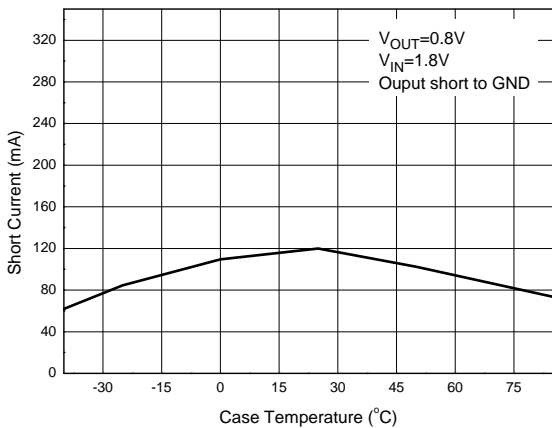
Supply Current vs. Output Current



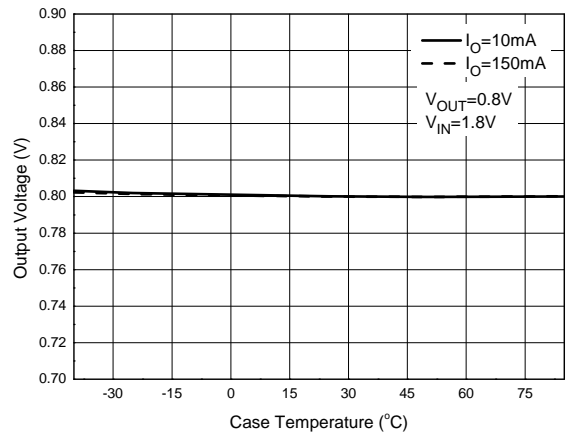
Supply Current vs. Case Temperature



Short Current vs. Case Temperature

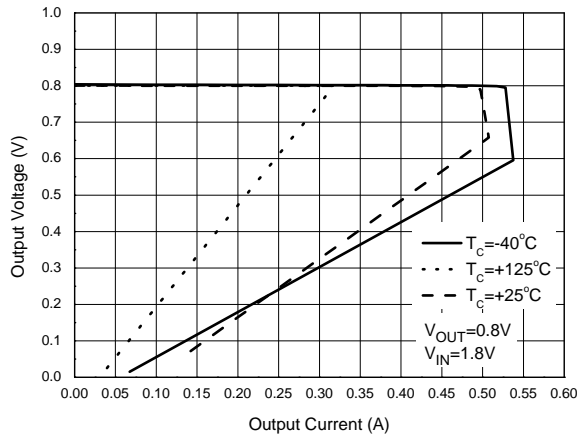


Output Voltage vs. Case Temperature

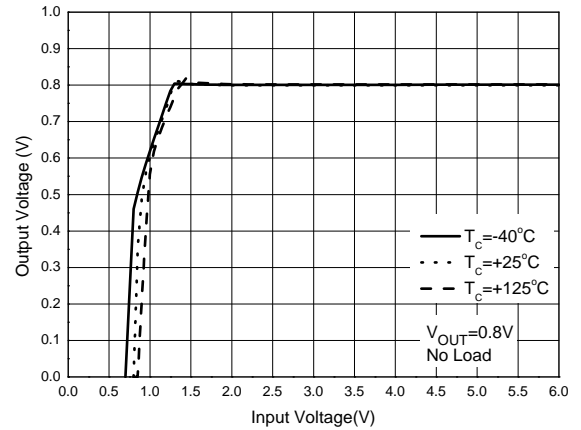


Performance Characteristics (Cont.)

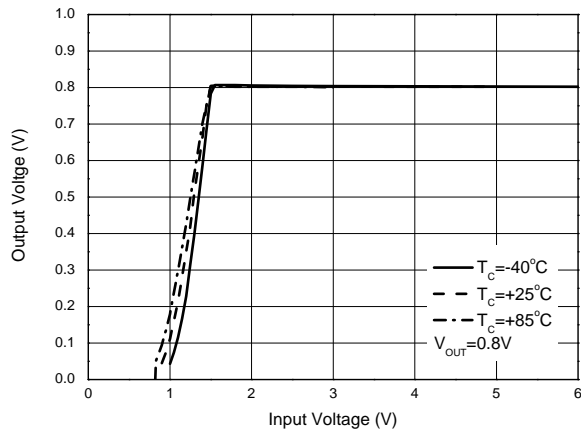
Output Voltage vs. Output Current



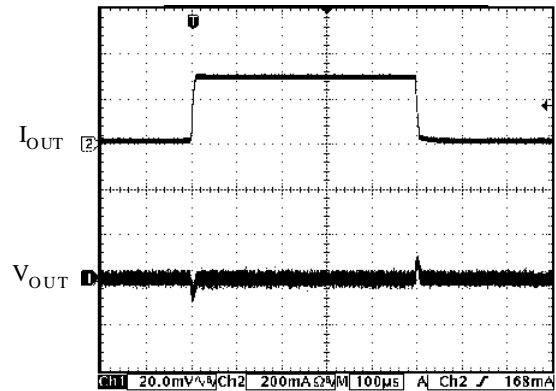
Output Voltage vs. Input Voltage



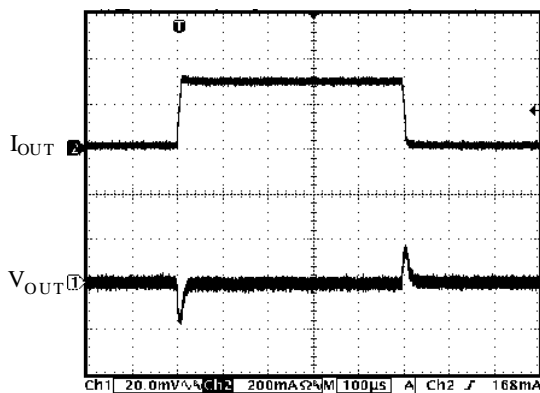
Output Voltage vs. Input Voltage ($I_{OUT}=300mA$)



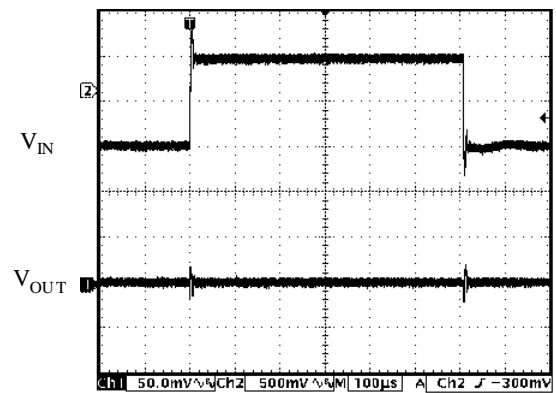
Load Transient
(Conditions: $C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=2.5V$, $V_{OUT}=0.8V$)



Load Transient
(Conditions: $C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=4.4V$, $V_{OUT}=3.3V$)

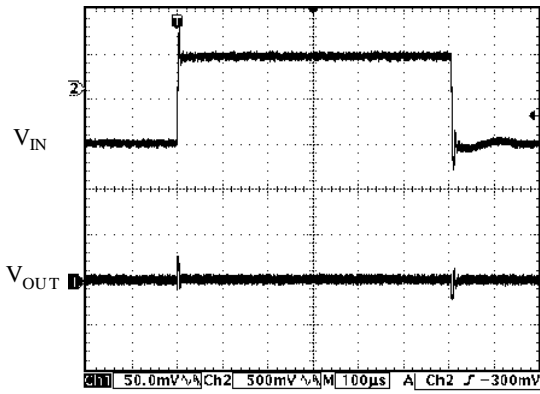


Line Transient
(Conditions: $I_{OUT}=30mA$, $C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=2.5$ to $3.5V$, $V_{OUT}=0.8V$)

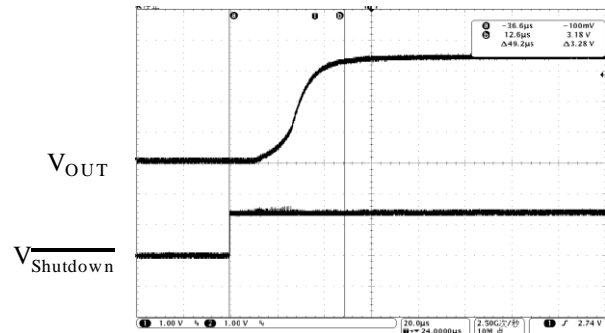


Performance Characteristics (Cont.)

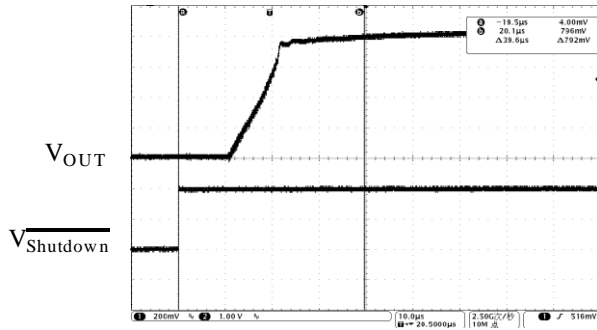
Line Transient
(Conditions: $I_{OUT}=30mA$, $C_{IN}=C_{OUT}=1\mu F$,
 $V_{IN}=4$ to $5V$, $V_{OUT}=3.3V$)



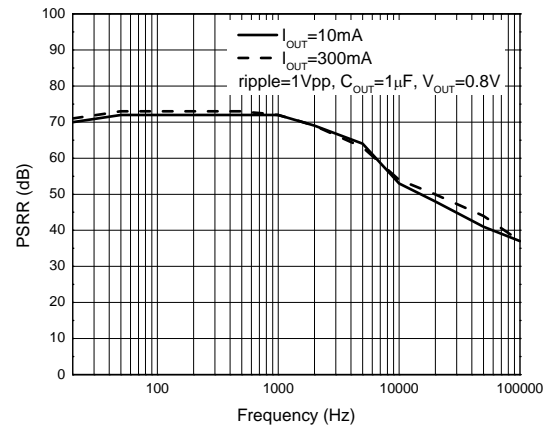
Soft Start Time
(Conditions: $I_{OUT}=0mA$, $C_{IN}=C_{OUT}=1\mu F$,
 $V_{Shutdown}=0$ to $2V$, $V_{OUT}=3.3V$)



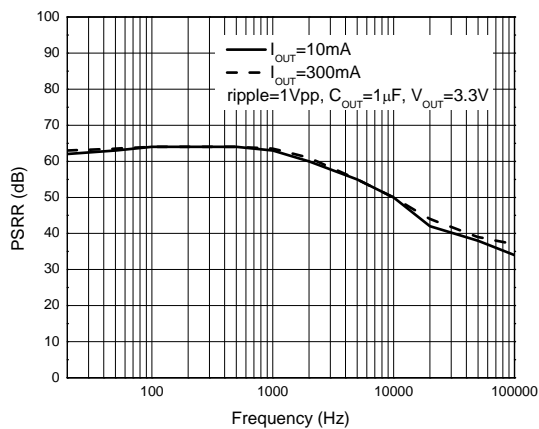
Soft Start Time
(Conditions: $I_{OUT}=0mA$, $C_{IN}=C_{OUT}=1\mu F$,
 $V_{Shutdown}=0$ to $2V$, $V_{OUT}=0.8V$)



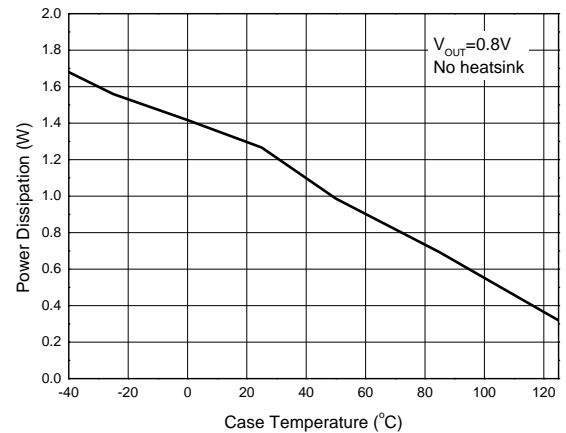
PSRR vs. Frequency



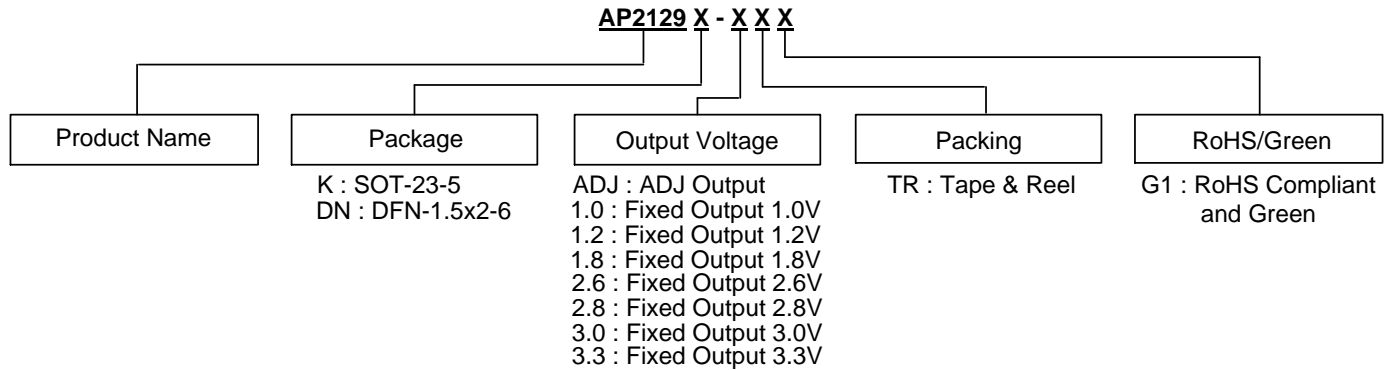
PSRR vs. Frequency



Power Dissipation vs. Case Temperature



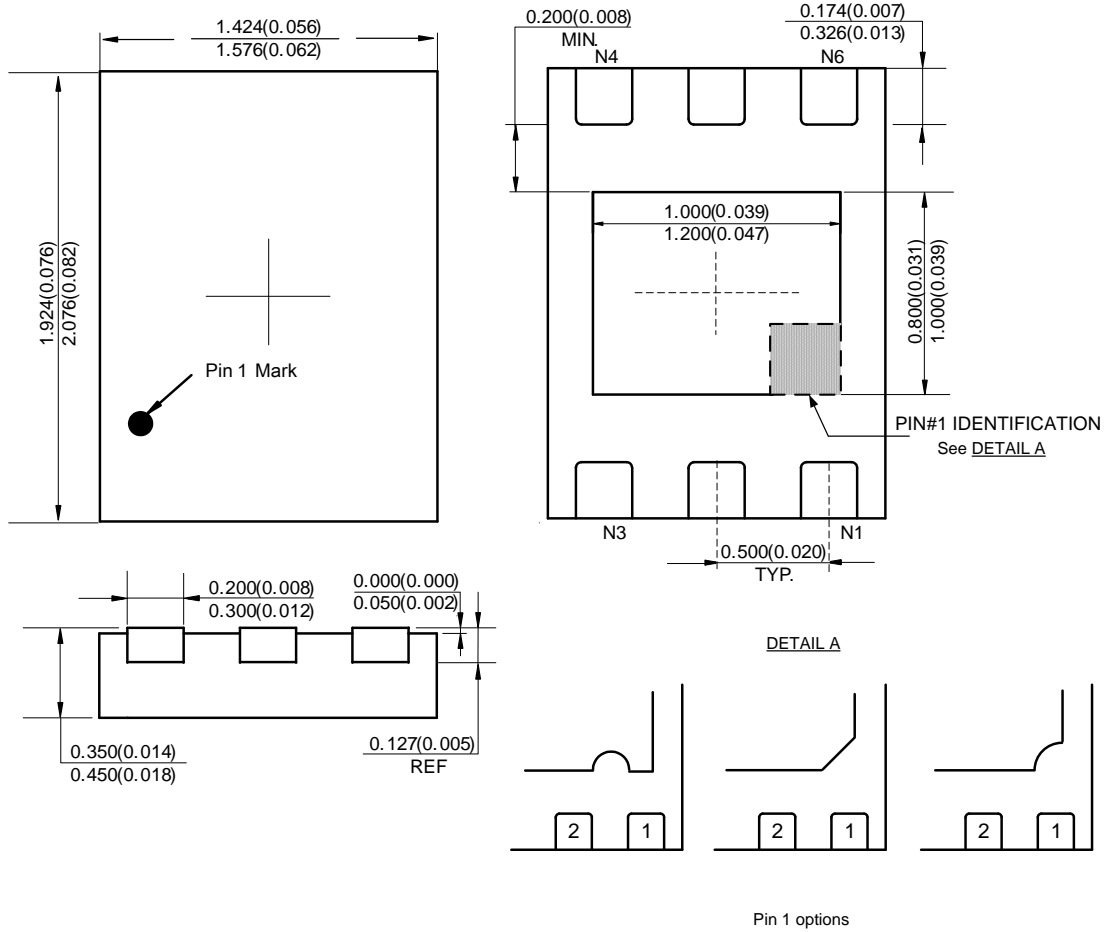
Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing
SOT-23-5	-40 to +85°C	AP2129K-ADJTRG1	GEJ	Tape & Reel
		AP2129K-1.0TRG1	GEK	Tape & Reel
		AP2129K-1.2TRG1	GEL	Tape & Reel
		AP2129K-3.3TRG1	GEM	Tape & Reel
DFN-1.5x2-6	-40 to +85°C	AP2129DN-1.0TRG1	LA	Tape & Reel
		AP2129DN-1.2TRG1	MA	Tape & Reel
		AP2129DN-1.8TRG1	LB	Tape & Reel
		AP2129DN-2.6TRG1	MB	Tape & Reel
		AP2129DN-2.8TRG1	LC	Tape & Reel
		AP2129DN-3.0TRG1	MC	Tape & Reel
		AP2129DN-3.3TRG1	LD	Tape & Reel

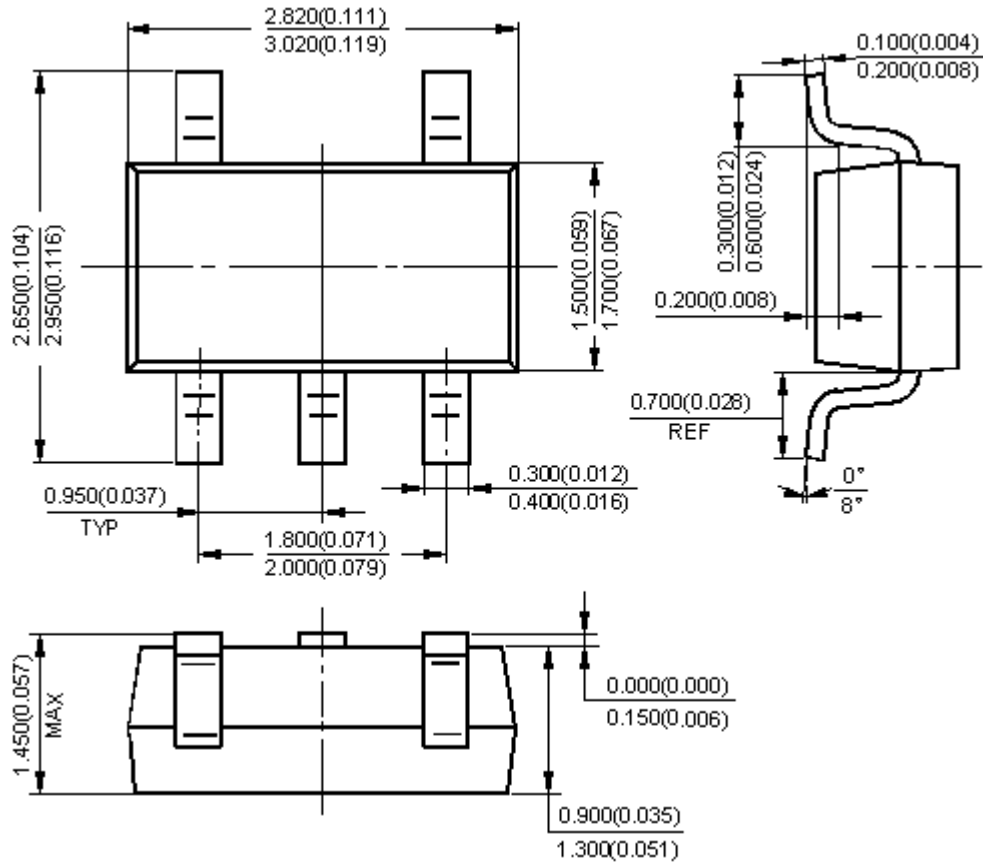
Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: DFN-1.5x2-6



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

(2) Package Type: SOT-23-5



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