

300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

General Description

The AP2127 Series are positive voltage regulator ICs fabricated by CMOS process.

The AP2127 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.

AP2127 has 1.0V, 1.2V, 1.5V, 1.8V, 2.5V, 2.8V, 3.0V, 3.3V, 4.2V, 4.75V, 5.2V fixed voltage versions and 0.8V to 5.5V adjustable voltage versions.

AP2127 series are available in SOT-23-5 Package.

Features

- Wide Operating Voltage: 2.5V to 6V
- High Output Voltage Accuracy: $\pm 2\%$
- High Ripple Rejection:
68dB@ f=1kHz, 54dB@ f=10kHz
- Low Standby Current: 0.1 μ A
- Low Dropout Voltage: 170mV@300mA for $V_{OUT}=3.3V$, 140mV@300mA for $V_{OUT}=5.2V$
- Low Quiescent Current: 60 μ A Typical
- Low Output Noise: 60 μ Vrms@ $V_{OUT}=0.8V$
- Short Current Limit: 50mA
- Over Temperature Protection
- Compatible with Low ESR Ceramic Capacitor: 1 μ F for C_{IN} and C_{OUT}
- Excellent Line/Load Regulation
- Soft Start Time: 50 μ s
- Auto Discharge Resistance: $R_{DS(ON)}=60\Omega$

Applications

- Datacom
- Notebook Computers
- Mother Board

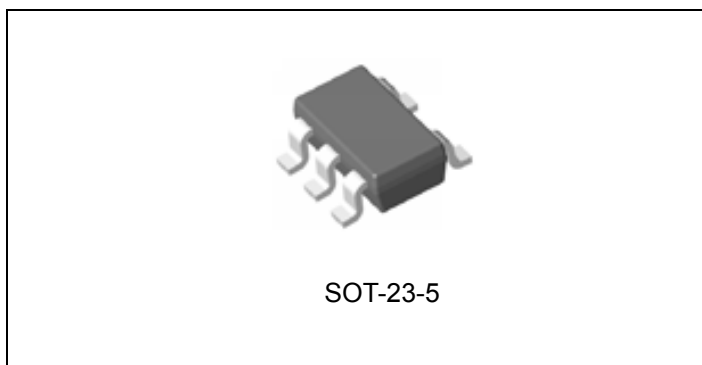


Figure 1. Package Type of AP2127

Pin Configuration

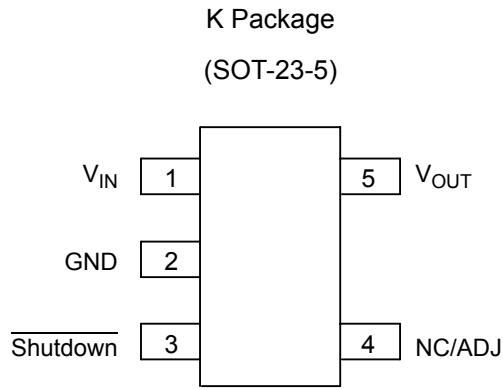


Figure 2. Pin Configuration of AP2127 (Top View)

Functional Block Diagram

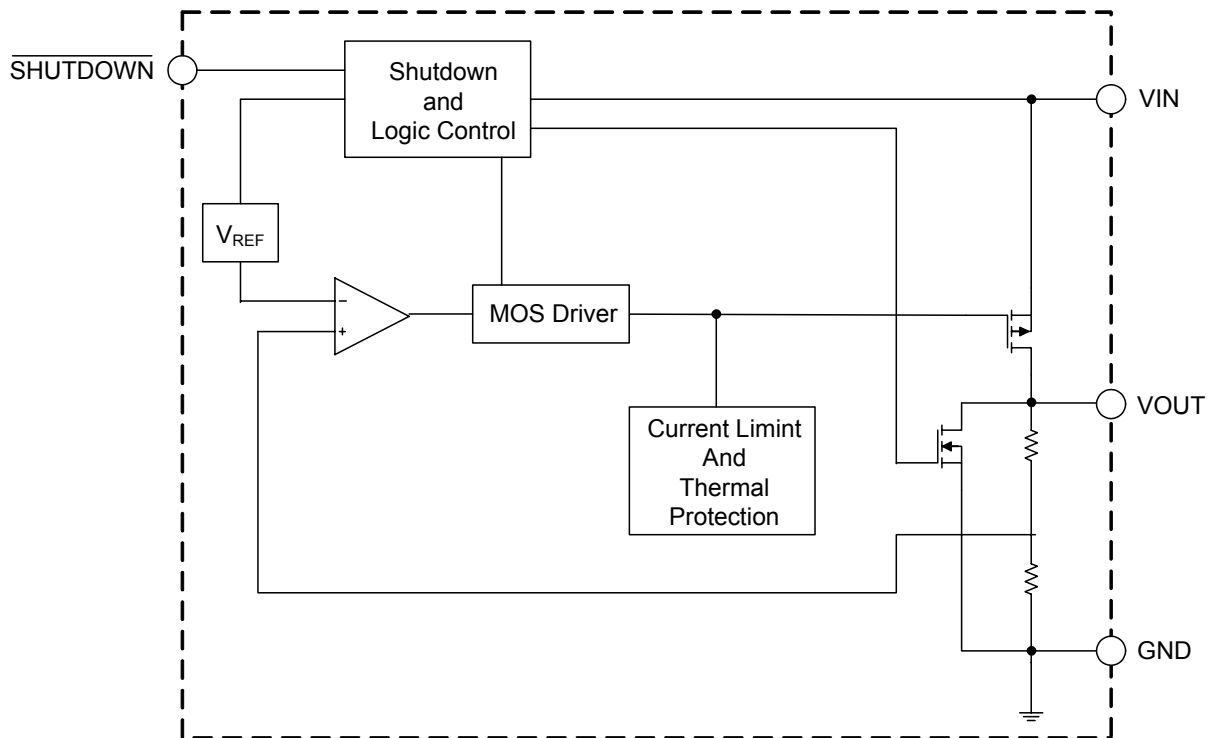


Figure 3. Functional Block Diagram of AP2127 for Fixed Version

Functional Block Diagram (Continued)

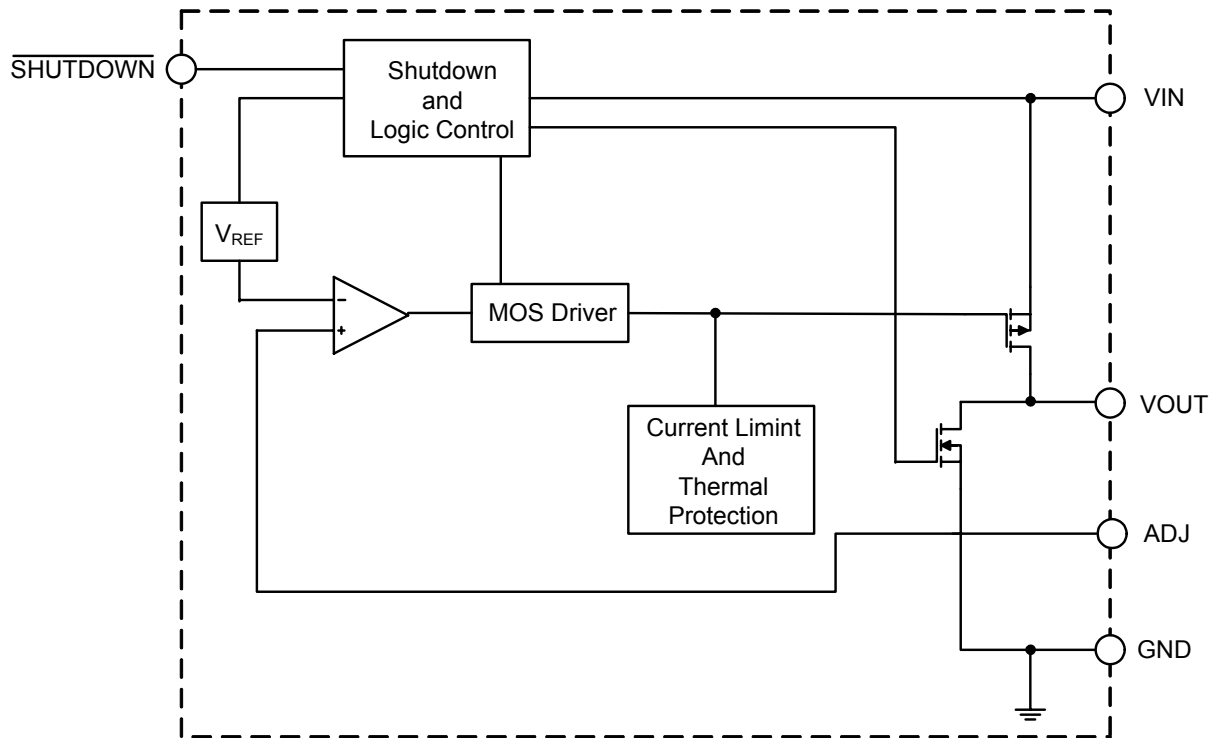
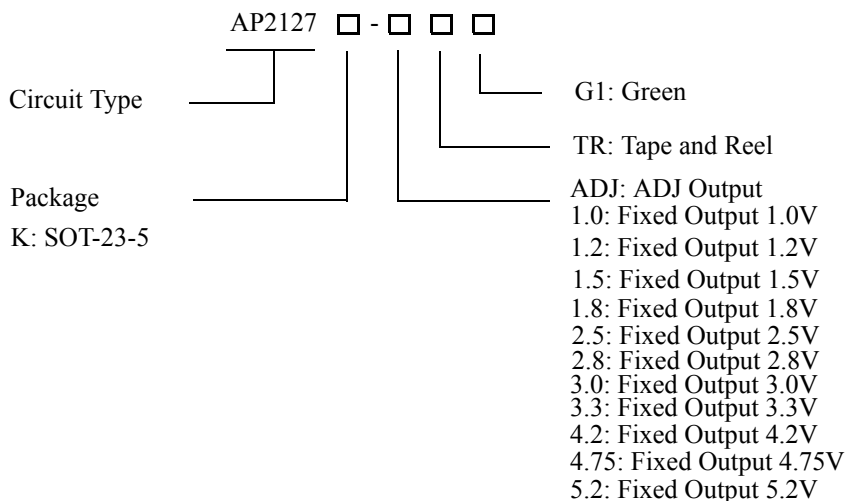


Figure 4. Functional Block Diagram of AP2127 for Adjustable Version



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Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
SOT-23-5	-40 to 85°C	AP2127K-ADJTRG1	GEH	Tape & Reel
		AP2127K-1.0TRG1	GEG	Tape & Reel
		AP2127K-1.2TRG1	GE1	Tape & Reel
		AP2127K-1.5TRG1	GEP	Tape & Reel
		AP2127K-1.8TRG1	GEQ	Tape & Reel
		AP2127K-2.5TRG1	GER	Tape & Reel
		AP2127K-2.8TRG1	GES	Tape & Reel
		AP2127K-3.0TRG1	GHF	Tape & Reel
		AP2127K-3.3TRG1	GET	Tape & Reel
		AP2127K-4.2TRG1	GEU	Tape & Reel
		AP2127K-4.75TRG1	GEZ	Tape & Reel
		AP2127K-5.2TRG1	GEW	Tape & Reel

BCD Semiconductor's products, as designated with "G1" suffix in the part number, are RoHS compliant and Green.

**300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127****Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value	Unit
Input Voltage	V_{IN}	6.5	V
Shutdown Input Voltage	V_{CE}	-0.3 to $V_{IN}+0.3$	V
Output Current	I_{OUT}	450	mA
Junction Temperature	T_A	150	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260	°C
Thermal Resistance	θ_{JA}	250	°C/W
ESD (Human Body Model)	ESD	6000	V
ESD (Machine Model)	ESD	250	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

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{IN}	2.5	6	V
Operating Junction Temperature Range	T_A	-40	85	°C



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Electrical Characteristics

($V_{IN}=2.5V$ (for 0.8V to 1.8V voltage versions), $V_{IN}=V_{OUT}+1V$ (for 2.5V to 4.75V voltage versions), $V_{IN}=6V@V_{OUT}=5.2V$, $T_A=25^{\circ}C$, $C_{IN}=1\mu F$, $C_{OUT}=1\mu F$, **Bold** typeface applies over $-40^{\circ}C \leq T_A \leq 85^{\circ}C$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{REF}	$V_{IN}=V_{OUT}+1V$ $1mA \leq I_{OUT} \leq 300mA$	0.784	0.8	0.816	V
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+1V$ $1mA \leq I_{OUT} \leq 300mA$	$98\% \times V_{OUT}$		$102\% \times V_{OUT}$	V
Input Voltage	V_{IN}		2.5		6	V
Maximum Output Current	$I_{OUT(MAX)}$	$V_{IN}-V_{OUT}=1V$, $V_{OUT}=0.98 \times V_{OUT}$	300	400		mA
Load Regulation	$\frac{\Delta V_{OUT}}{(\Delta I_{OUT} \times V_{OUT})}$	$V_{IN}-V_{OUT}=1V$, $1mA \leq I_{OUT} \leq 300mA$			0.6	%/A
Line Regulation	$\frac{\Delta V_{OUT}}{(\Delta V_{IN} \times V_{OUT})}$	$V_{OUT}+0.5V \leq V_{IN} \leq 6V$ $I_{OUT}=30mA$			0.06	%/V
Dropout Voltage	V_{DROP}	$V_{OUT}=1.0V, I_{OUT}=300mA$		1400	1500	mV
		$V_{OUT}=1.2V, I_{OUT}=300mA$		1200	1300	
		$V_{OUT}=1.5V, I_{OUT}=300mA$		900	1000	
		$V_{OUT}=1.8V, I_{OUT}=300mA$		600	700	
		$V_{OUT}=2.5V, 2.8V, 3.0V, 3.3V,$ $4.2V, I_{OUT}=300mA$		170	300	
		$V_{OUT}=4.75V$ and $5.2V$, $I_{OUT}=300mA$		140	300	
Quiescent Current	I_Q	$V_{IN}=V_{OUT}+1V, I_{OUT}=0mA$		60	90	μA
Standby Current	I_{STD}	$V_{IN}=V_{OUT}+1V$, $V_{SHUTDOWN}$ in off mode		0.1	1.0	μA
Power Supply Rejection Ratio	PSRR	AP2127-1.0V to 4.2V, Ripple 1Vp-p $V_{IN}=V_{OUT}+1V$	$f=100Hz$		68	dB
			$f=1kHz$		68	dB
			$f=10kHz$		54	dB
		AP2127-4.75V and 5.2V, Ripple 0.5Vp-p $V_{IN}=V_{OUT}+1V$	$f=100Hz$		63	dB
			$f=1kHz$		63	dB
			$f=10kHz$		45	dB
Output Voltage Temperature Coefficient	$\frac{(\Delta V_{OUT}/V_{OUT})}{\Delta T}$	$I_{OUT}=30mA, -40^{\circ}C \leq T_A \leq 85^{\circ}C$		± 100		ppm/ $^{\circ}C$
Short Current Limit	I_{SHORT}	$V_{OUT}=0V$		50		mA

**300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127****Electrical Characteristics (Continued)**

($V_{IN}=2.5V$ (for 0.8V to 1.8V voltage versions), $V_{IN}=V_{OUT}+1V$ (for 2.5V to 4.75V voltage versions), $V_{IN}=6V@V_{OUT}=5.2V$, $T_A=25^{\circ}C$, $C_{IN}=1\mu F$, $C_{OUT}=1\mu F$, **Bold** typeface applies over $-40^{\circ}C \leq T_A \leq 85^{\circ}C$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Soft Start Time	t_{SS}			50		μs
RMS Output Noise	V_{NOISE}	$T_A=25^{\circ}C$, $10Hz \leq f \leq 100kHz$, $V_{OUT}=0.8V$		60		μV_{rms}
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		$M\Omega$
Thermal Shutdown				165		$^{\circ}C$
Thermal Shutdown Hysteresis				30		$^{\circ}C$
Thermal Resistance	θ_{JC}	SOT-23-5		150		$^{\circ}C/W$



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Typical Performance Characteristics

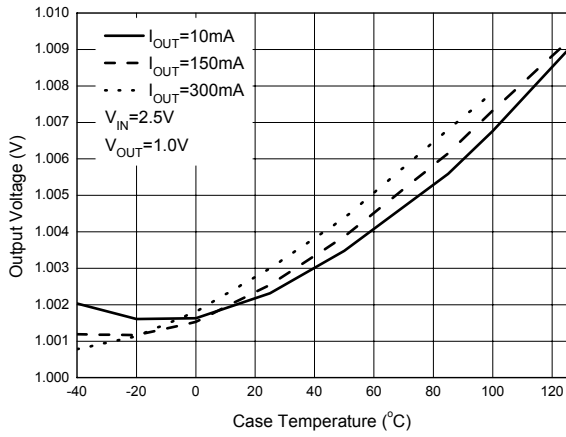


Figure 5. Output Voltage vs. Case Temperature

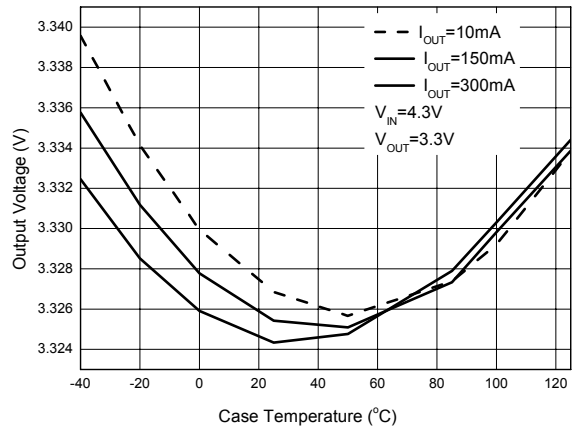


Figure 6. Output Voltage vs. Case Temperature

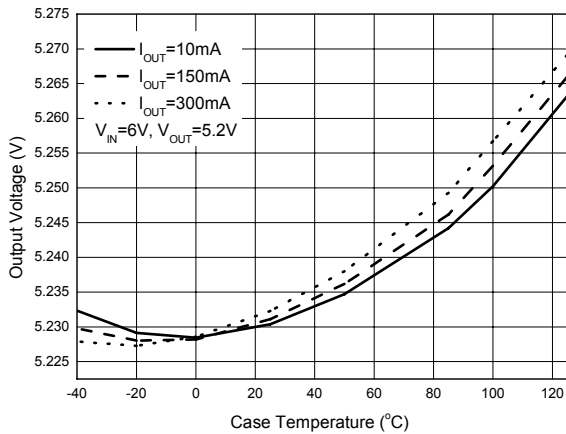


Figure 7. Output Voltage vs. Case Temperature

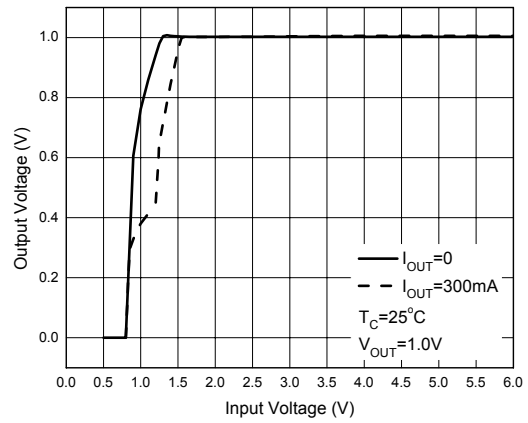


Figure 8. Output Voltage vs. Input Voltage



300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

Typical Performance Characteristics (Continued)

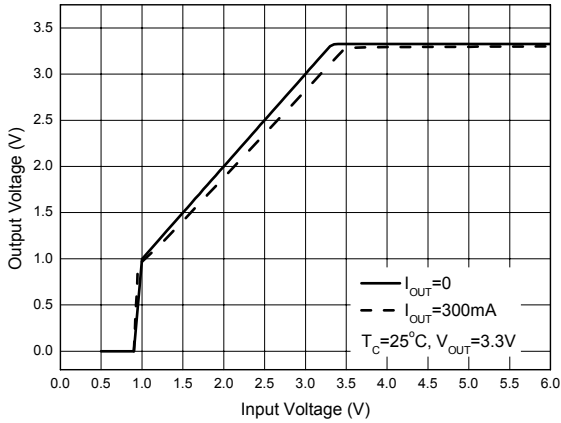


Figure 9. Output Voltage vs. Input Voltage

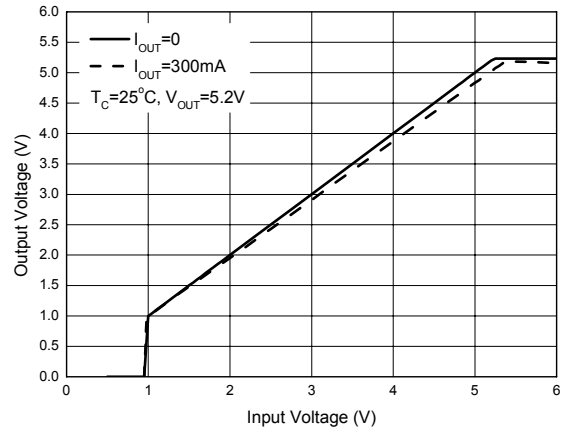


Figure 10. Output Voltage vs. Input Voltage

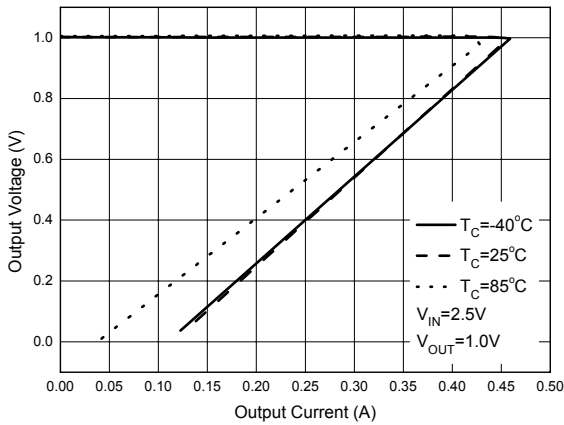


Figure 11. Output Voltage vs. Output Current

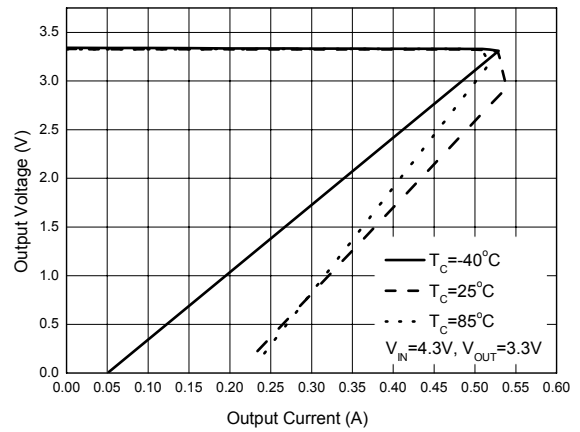


Figure 12. Output Voltage vs. Output Current



300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

Typical Performance Characteristics (Continued)

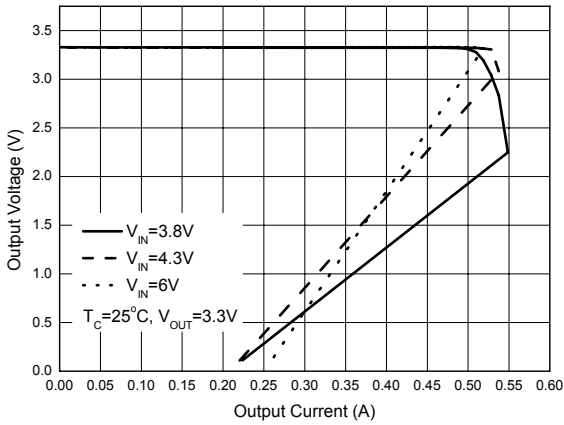


Figure 13. Output Voltage vs. Output Current

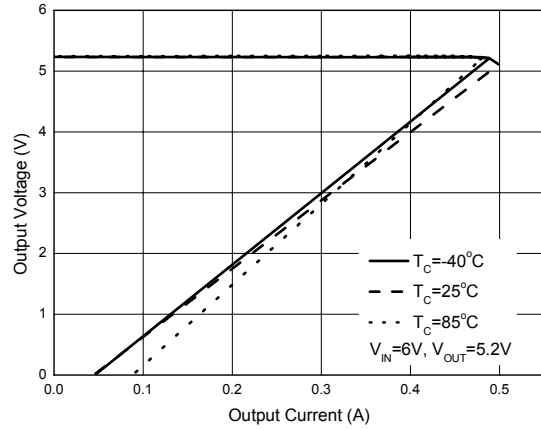


Figure 14. Output Voltage vs. Output Current

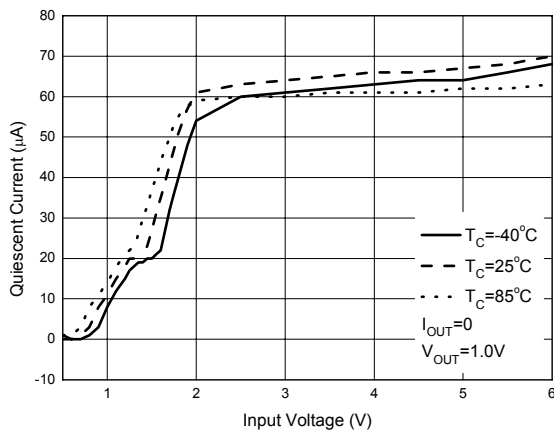


Figure 15. Quiescent Current vs. Input Voltage

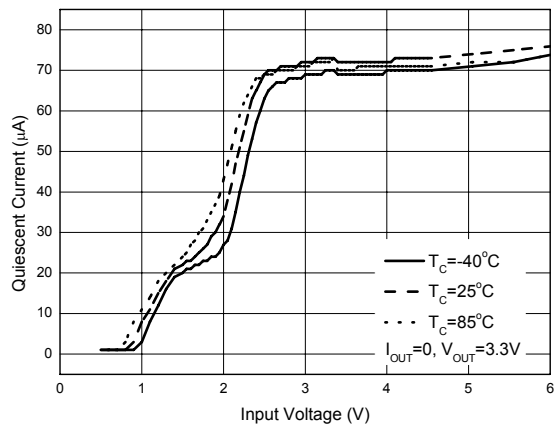


Figure 16. Quiescent Current vs. Input Voltage



300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

Typical Performance Characteristics (Continued)

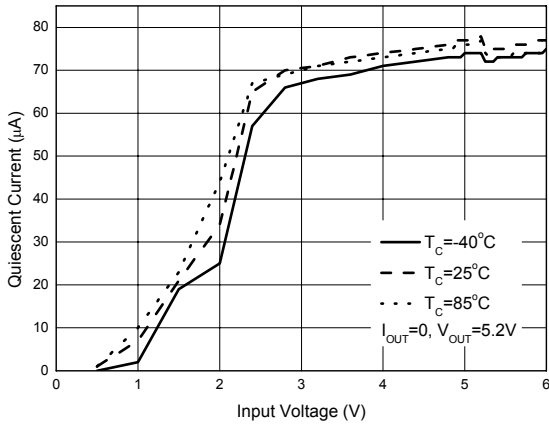


Figure 17. Quiescent Current vs. Input Voltage

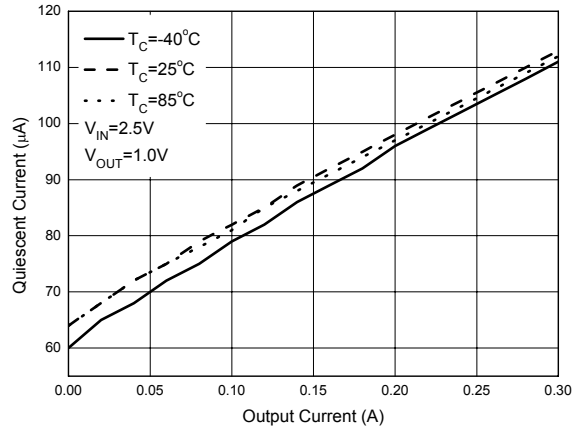


Figure 18. Quiescent Current vs. Output Current

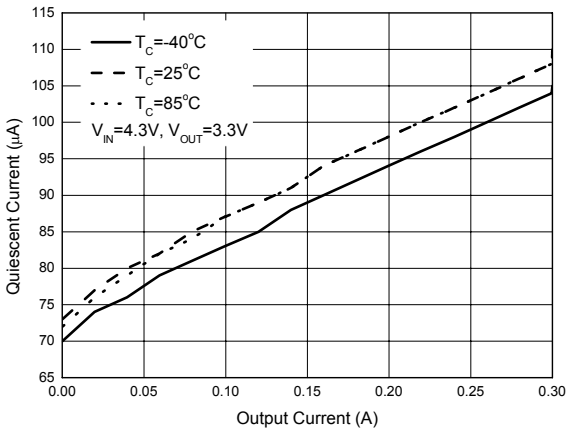


Figure 19. Quiescent Current vs. Output Current

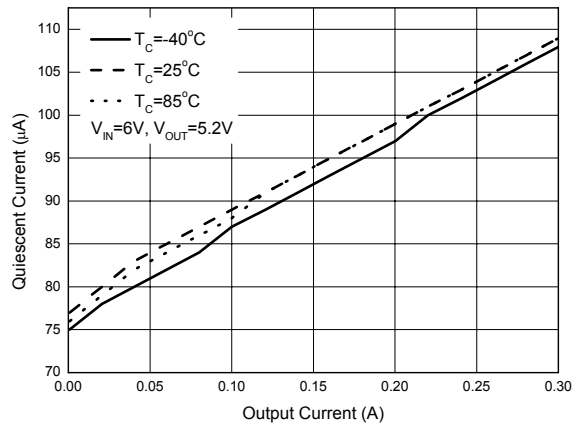


Figure 20. Quiescent Current vs. Output Current



300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

Typical Performance Characteristics (Continued)

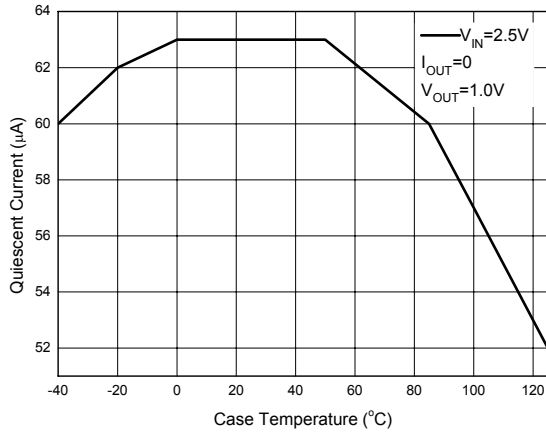


Figure 21. Quiescent Current vs. Case Temperature

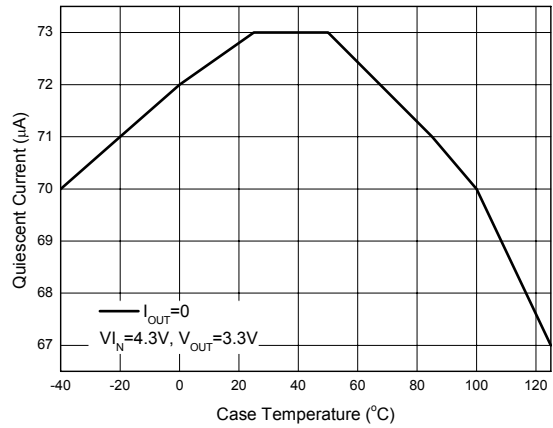


Figure 22. Quiescent Current vs. Case Temperature

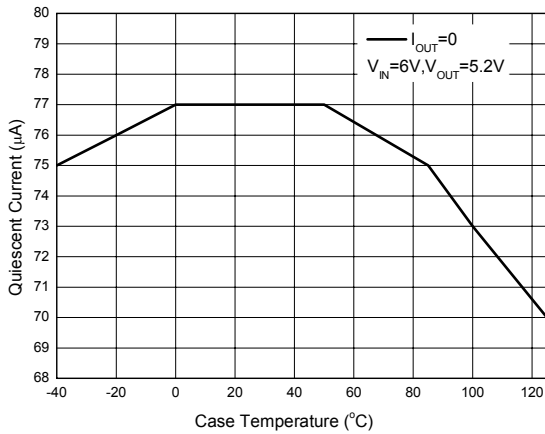


Figure 23. Quiescent Current vs. Case Temperature

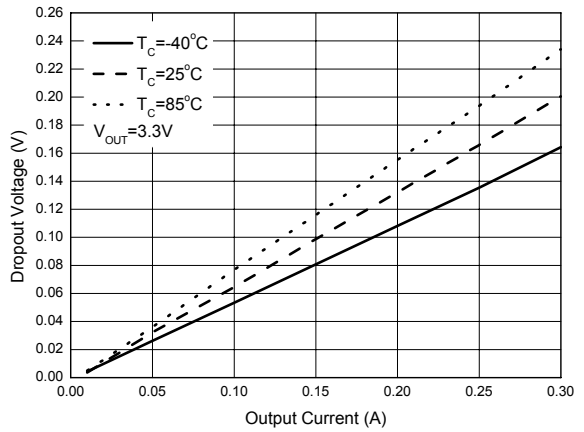


Figure 24. Dropout Voltage vs. Output Current



300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

Typical Performance Characteristics (Continued)

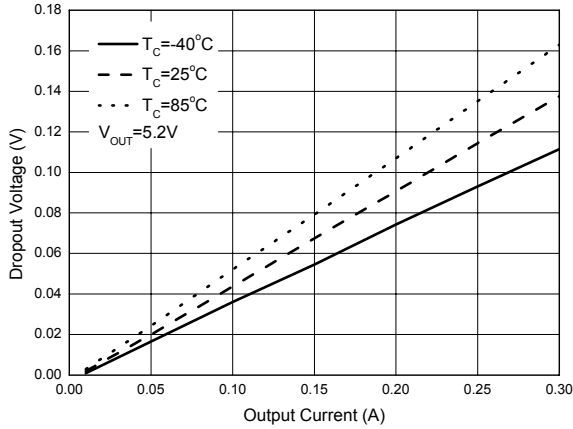


Figure 25. Dropout Voltage vs. Output Current

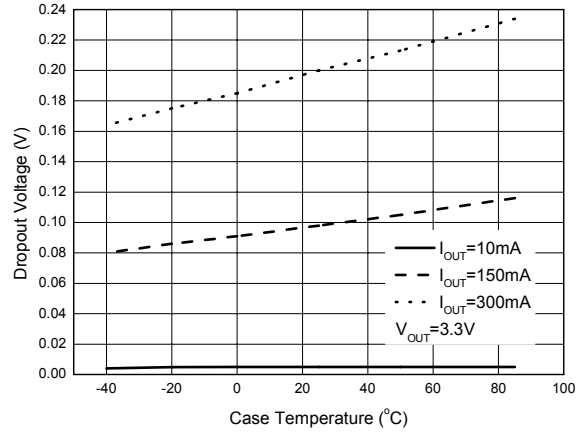


Figure 26. Dropout Voltage vs. Case Temperature

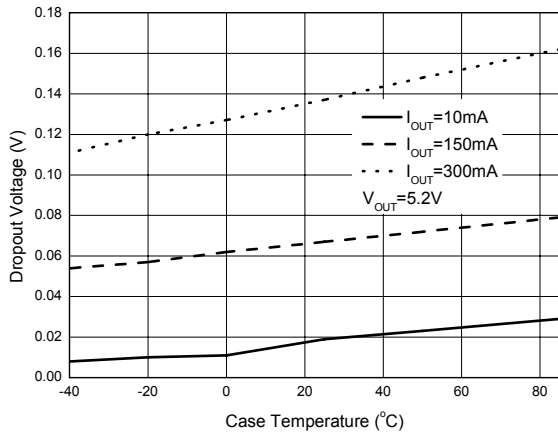


Figure 27. Dropout Voltage vs. Case Temperature

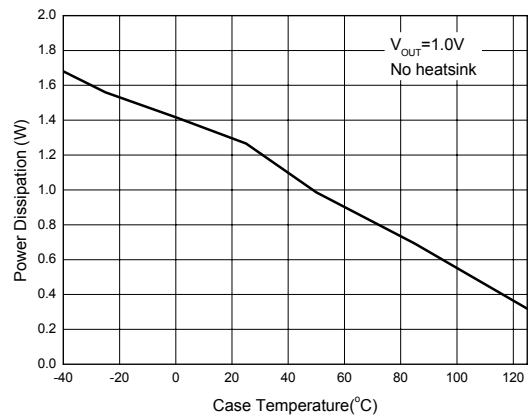


Figure 28. Power Dissipation vs. Case Temperature

300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

Typical Performance Characteristics (Continued)

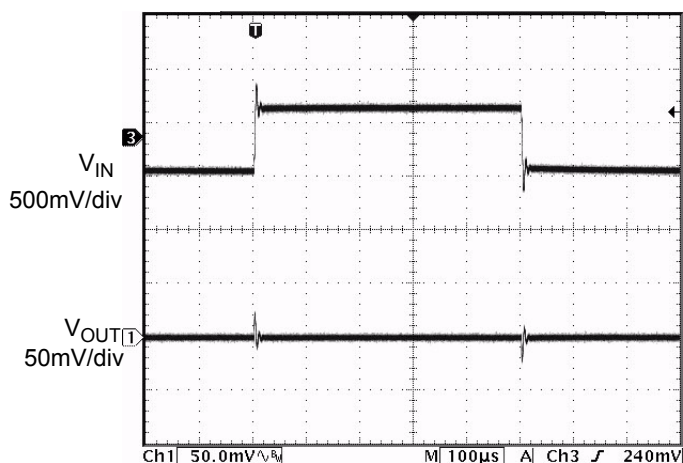


Figure 29. Line Transient
(Condition: $C_{IN}=C_{OUT}=1\mu F$, $I_{OUT}=10mA$,
 $V_{IN}=2.5V$ to $3.3V$, $V_{OUT}=1V$)

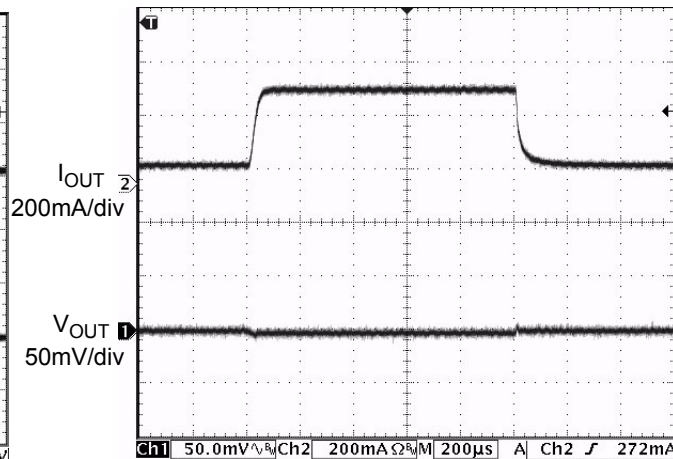


Figure 30. Load Transient
(Condition: $C_{IN}=C_{OUT}=1\mu F$, Sew Rate= $20mA/\mu s$,
 $V_{IN}=2.5V$, $V_{OUT}=1V$, $I_{OUT}=10mA$ to $300mA$)

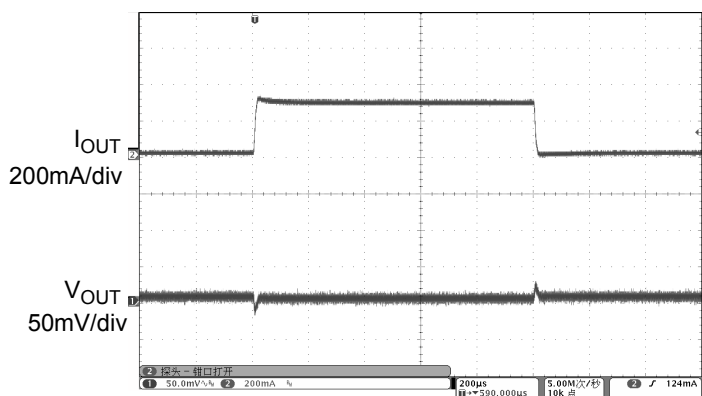


Figure 31. Load Transient
(Condition: $C_{IN}=C_{OUT}=1\mu F$, $I_{OUT}=10mA$ to $300mA$,
 $V_{IN}=4.3V$, $V_{OUT}=3.3V$)

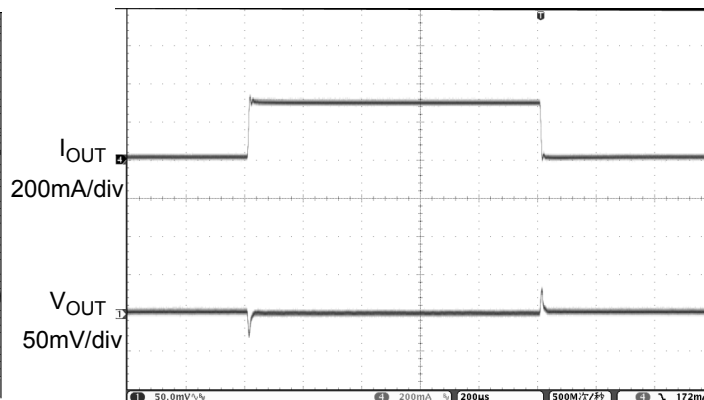


Figure 32. Load Transient
(Condition: $C_{IN}=C_{OUT}=1\mu F$, Sew Rate= $20mA/\mu s$,
 $V_{IN}=6V$, $V_{OUT}=5.2V$, $I_{OUT}=10mA$ to $300mA$)



300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

Typical Performance Characteristics (Continued)

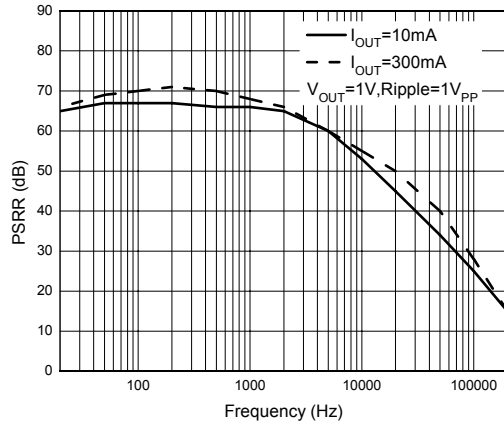


Figure 33. PSSR vs. Frequency
(Conditions: $C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=2.5V$, $V_{OUT}=1V$
Ripple= $1V_{PP}$)

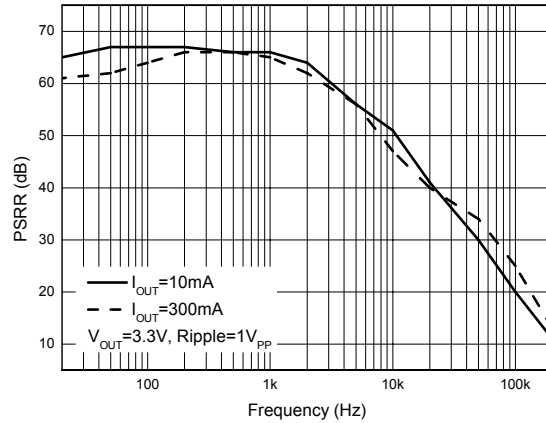


Figure 34. PSSR vs. Frequency
(Conditions: $C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=4.3V$, $V_{OUT}=3.3V$
Ripple= $1V_{PP}$)

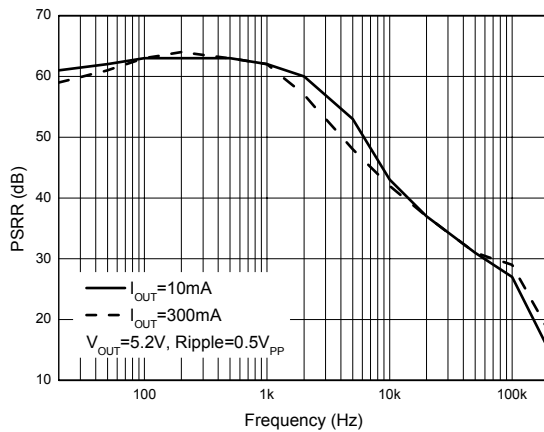
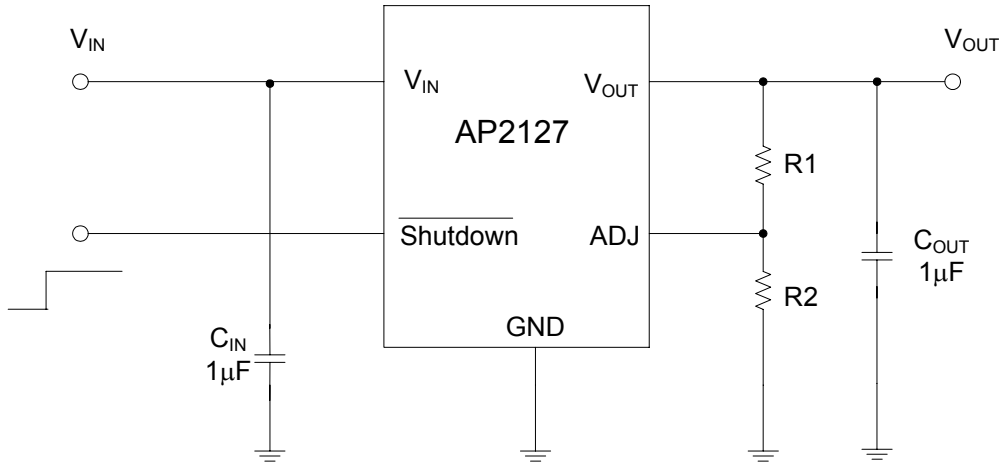
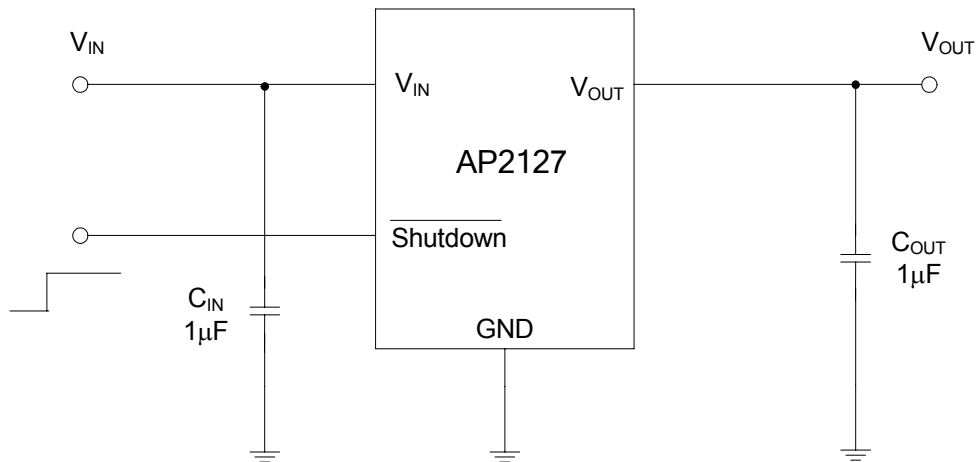


Figure 35. PSSR vs. Frequency
(Conditions: $C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=6V$, $V_{OUT}=5.2V$
Ripple= $0.5V_{PP}$)

Typical Application



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



For 1.0V to 5.2V fixed voltage versions

Figure 36. Typical Application of AP2127

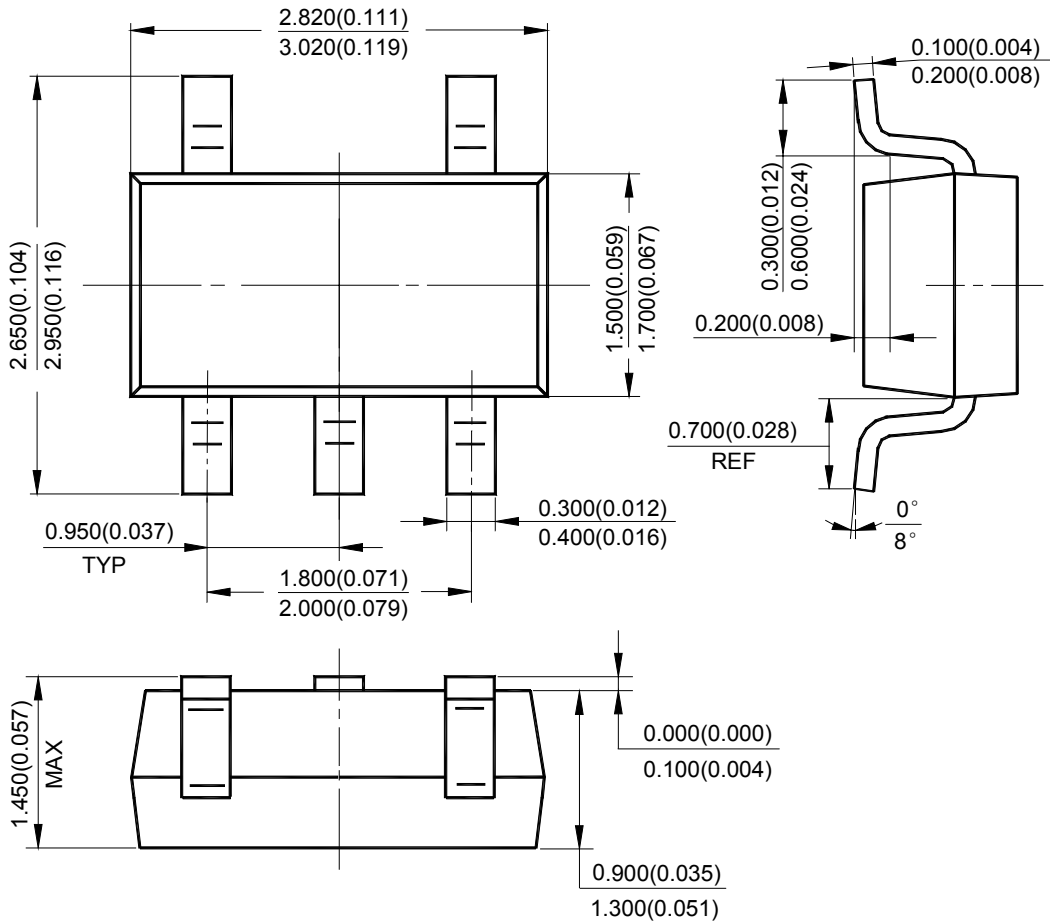


300mA HIGH SPEED, EXTREMELY LOW NOISE CMOS LDO REGULATOR AP2127

Mechanical Dimensions

SOT-23-5

Unit: mm(inch)





BCD Semiconductor Manufacturing Limited

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