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, 3.3V, 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: ±2%
- High Ripple Rejection:
  68dB@ f=1kHz, 54dB@ f=10kHz
- Low Standby Current: 0.1μA
- Low Dropout Voltage: 170mV@300mA for V_{OUT}=3.3V, 140mV@300mA for V_{OUT}=5.2V
- Low Quiescent Current: 60μA Typical
- Low Output Noise: 60μVrms@V_{OUT}=0.8V
- Short Current Limit: 50mA
- Over Temperature Protection
- Compatible with Low ESR Ceramic Capacitor: 1μF for C_{IN} and C_{OUT}
- Excellent Line/Load Regulation
- Soft Start Time: 50μs
- Auto Discharge Resistance: $R_{DS(ON)}$=60Ω

Applications

- Datacom
- Notebook Computers
- Mother Board

SOT-23-5

Figure 1. Package Type of AP2127

Pin Configuration

K Package

(SOT-23-5)

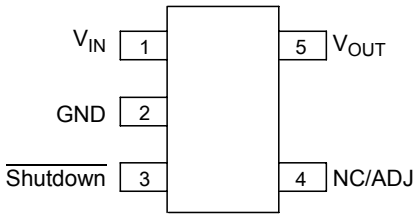


Figure 2. Pin Configuration of AP2127 (Top View)

Functional Block Diagram

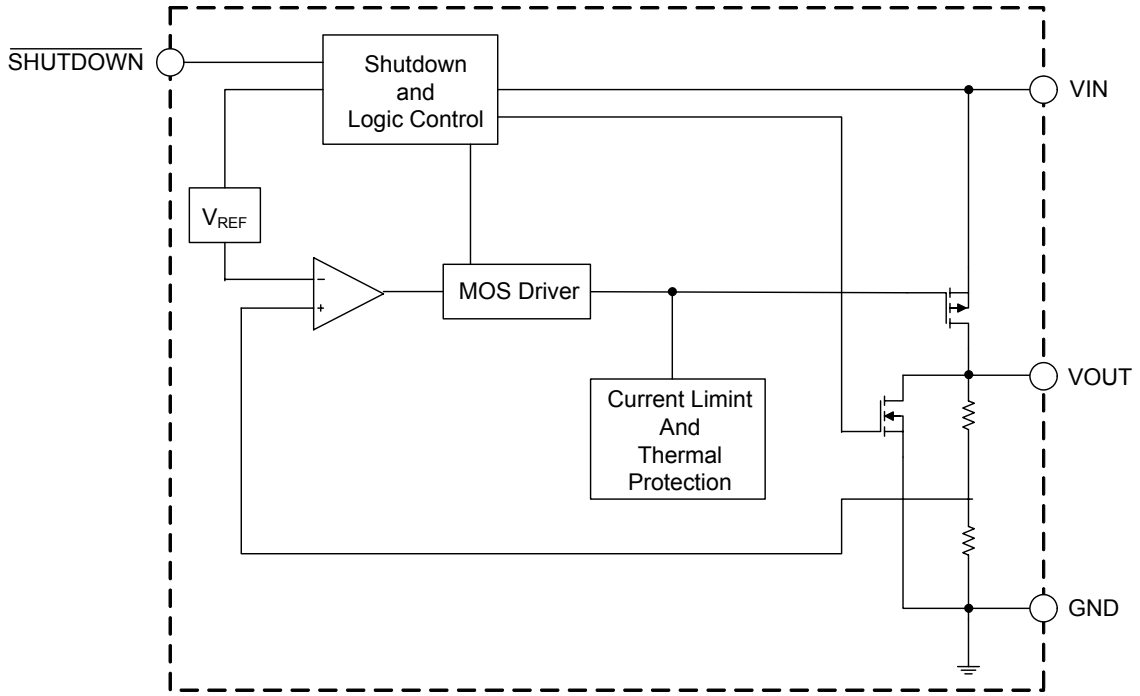


Figure 3. Functional Block Diagram of AP2127 for Fixed Version

Functional Block Diagram (Continued)

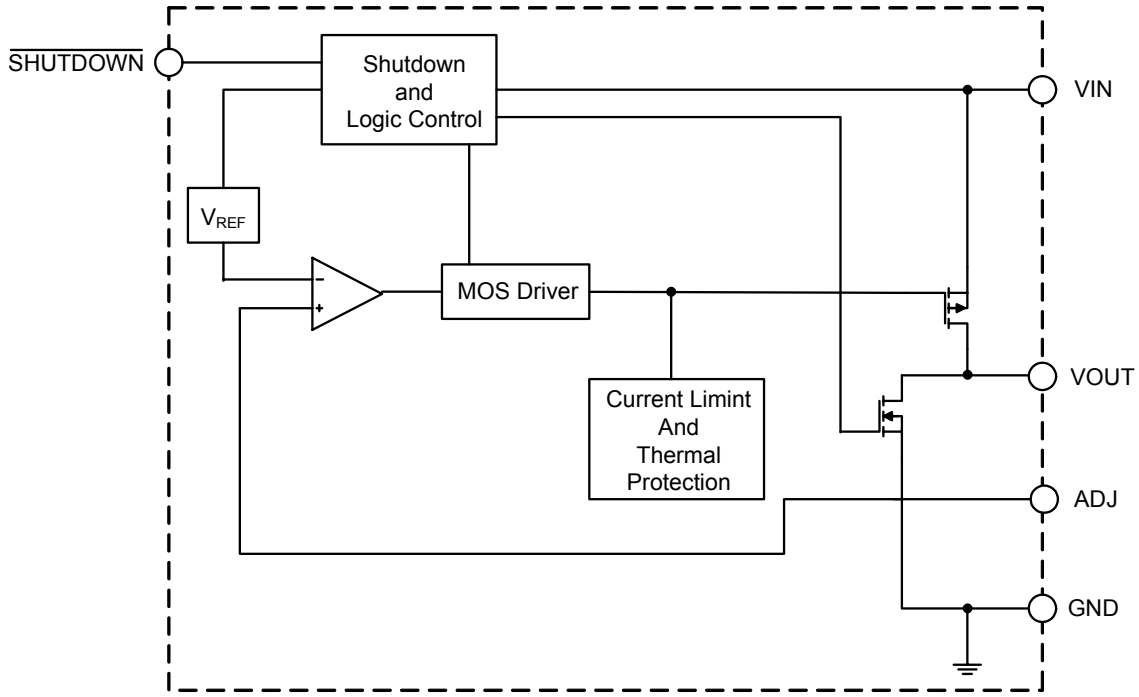
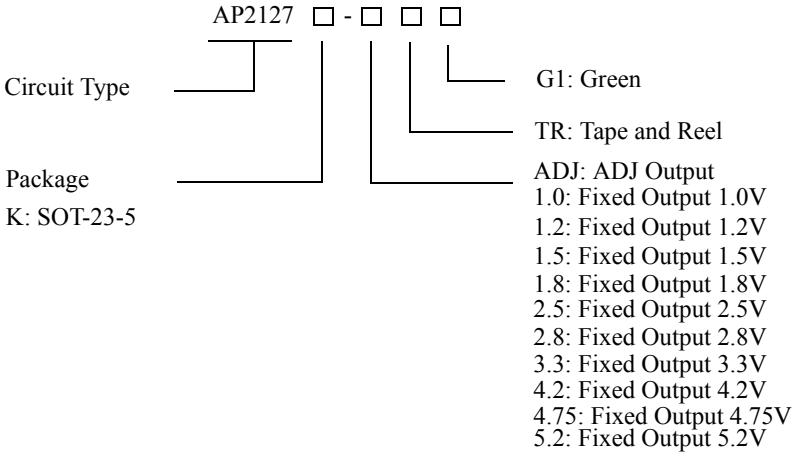


Figure 4. Functional Block Diagram of AP2127 for Adjustable Version

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-3.3TRG1	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.

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	300	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

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°C, C_{IN}=1μF, C_{OUT}=1μF, **Bold** typeface applies over -40°C≤T_A≤85°C, unless otherwise specified.)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Reference Voltage	V_{REF}	V_{IN}=V_{OUT}+1V 1mA≤I_{OUT}≤300mA		0.784	0.8	0.816	V
Output Voltage	V_{OUT}	V_{IN}=V_{OUT}+1V 1mA≤I_{OUT}≤300mA		98%* V_{OUT}		102%* 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*V_{OUT}		300	400		mA
Load Regulation	ΔV_{OUT} /(ΔI_{OUT}*V_{OUT})	V_{IN}-V_{OUT}=1V, 1mA≤I_{OUT}≤300mA				0.6	%/A
Line Regulation	ΔV_{OUT} /(ΔV_{IN}*V_{OUT})	V_{OUT}+0.5V≤V_{IN}≤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, 3.3V, 4.2V I_{OUT}=300mA			170	300	
		V_{OUT}=4.7V and 5.2V,			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, $V_{\overline{SHUTDOWN}}$ 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	(ΔV_{OUT}/V_{OUT}) /ΔT	I_{OUT}=30mA, -40°C≤T_A≤85°C			±100		ppm/°C
Short Current Limit	I_{SHORT}	V_{OUT}=0V			50		mA

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°C, C_{IN}=1μF, C_{OUT}=1μF, **Bold** typeface applies over -40°C≤T_A≤85°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°C, 10Hz ≤f≤100kHz, V_{OUT}=0.8V		60		μVrms
$\overline{\text{Shutdown}}$ "High" Voltage		$\overline{\text{Shutdown}}$ input voltage "High"	1.5		6	V
$\overline{\text{Shutdown}}$ "Low" Voltage		$\overline{\text{Shutdown}}$ input voltage "Low"	0		0.4	V
V_{OUT} Discharge MOSFET $R_{DS(ON)}$		$\overline{\text{Shutdown}}$ input voltage "Low"		60		Ω
$\overline{\text{Shutdown}}$ Pull Down Resistance				3		MΩ
Thermal Shutdown				165		°C
Thermal Shutdown Hysteresis				30		°C

Typical Performance Characteristics

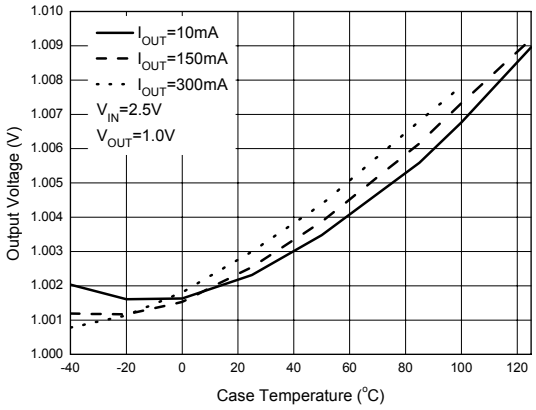


Figure 5. Output Voltage vs. Case Temperature

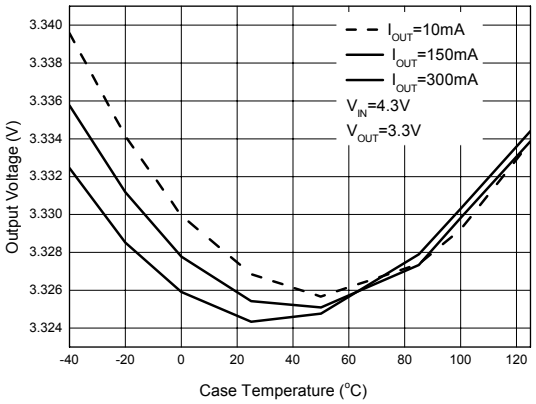


Figure 6. Output Voltage vs. Case Temperature

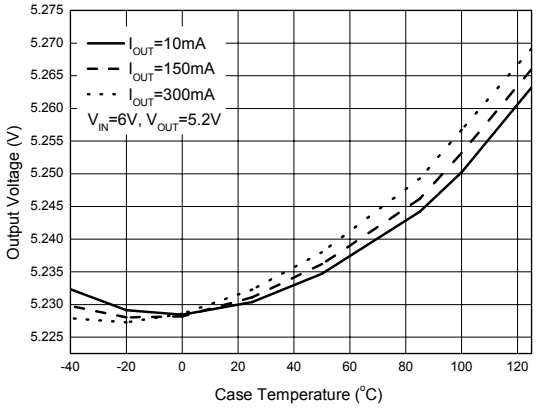


Figure 7. Output Voltage vs. Case Temperature

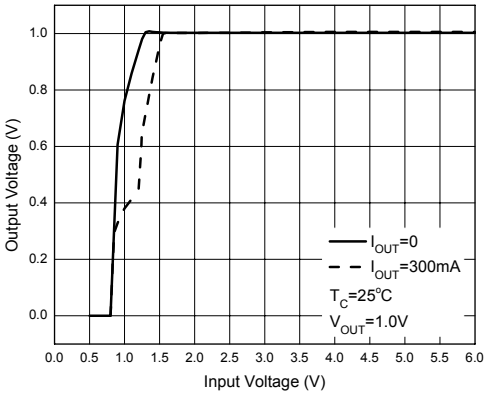


Figure 8. Output Voltage vs. Input Voltage

Typical Performance Characteristics (Continued)

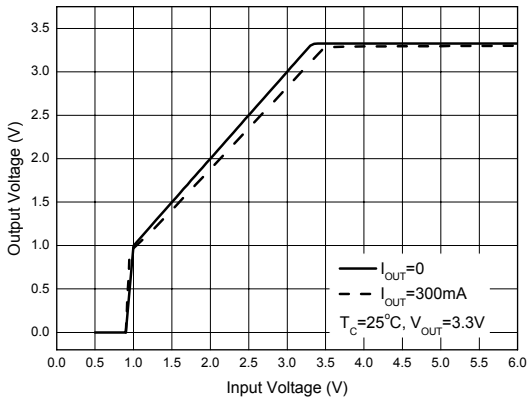


Figure 9. Output Voltage vs. Input Voltage

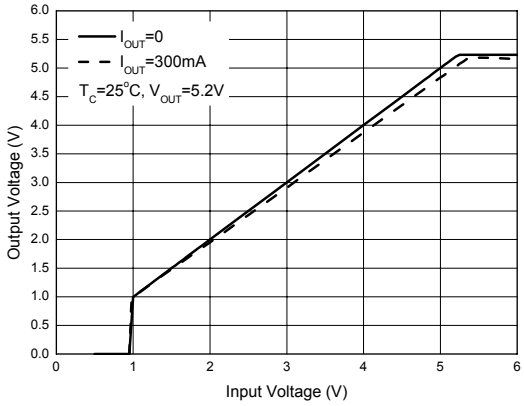


Figure 10. Output Voltage vs. Input Voltage

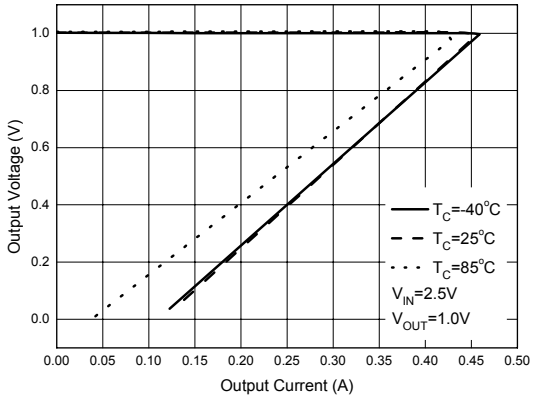


Figure 11. Output Voltage vs. Output Current

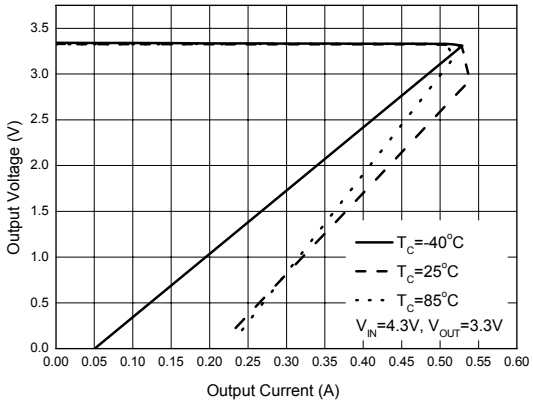


Figure 12. Output Voltage vs. Output Current

Typical Performance Characteristics (Continued)

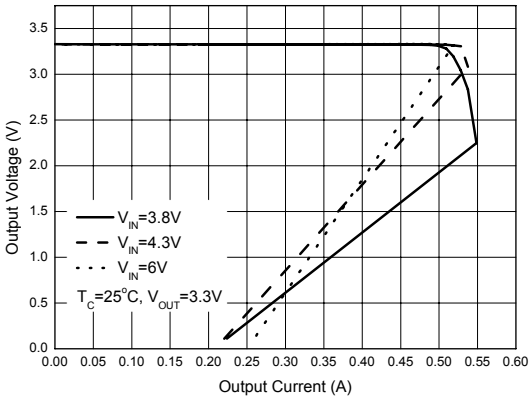


Figure 13. Output Voltage vs. Output Current

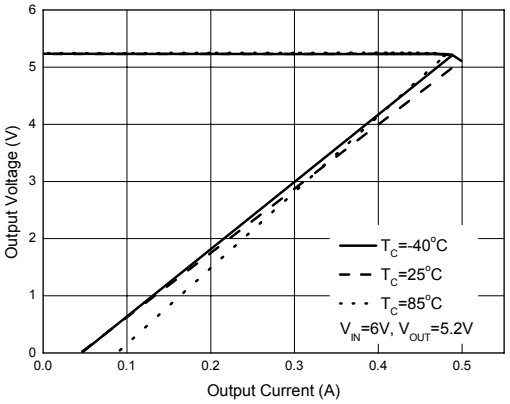


Figure 14. Output Voltage vs. Output Current

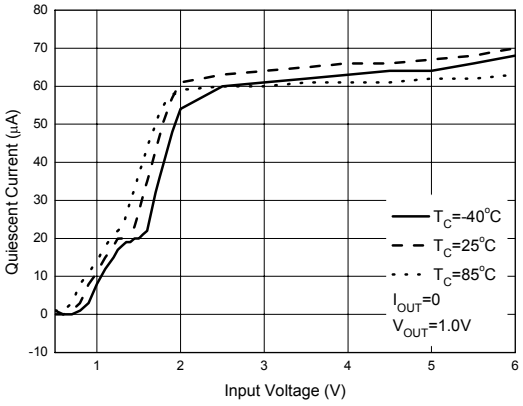


Figure 15. Quiescent Current vs. Input Voltage

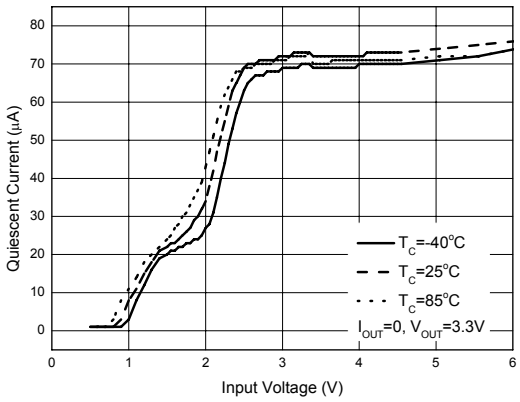


Figure 16. Quiescent Current vs. Input Voltage

Typical Performance Characteristics (Continued)

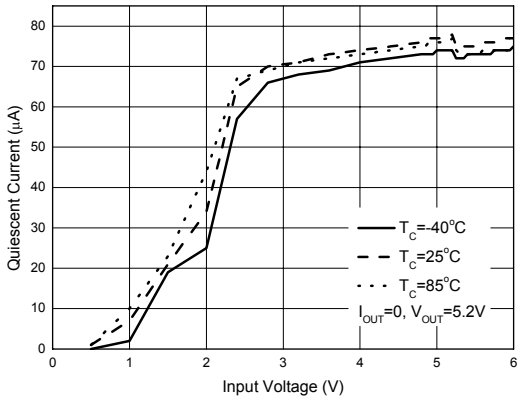


Figure 17. Quiescent Current vs. Input Voltage

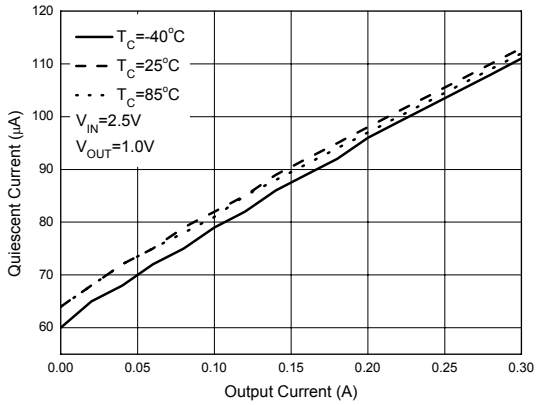


Figure 18. Quiescent Current vs. Output Current

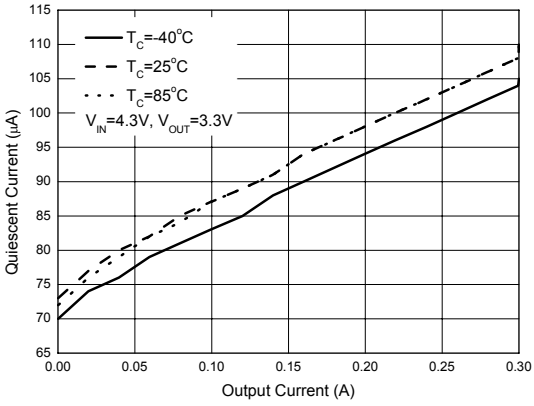


Figure 19. Quiescent Current vs. Output Current

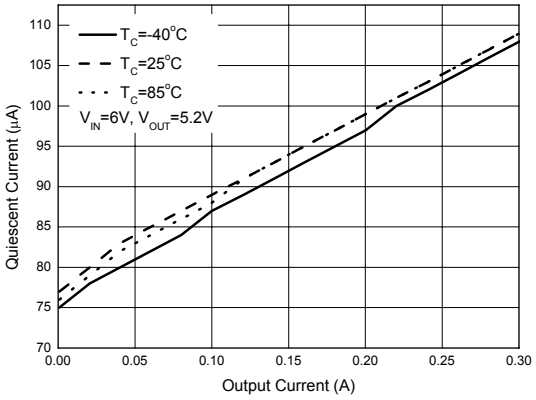


Figure 20. Quiescent Current vs. Output Current

Typical Performance Characteristics (Continued)

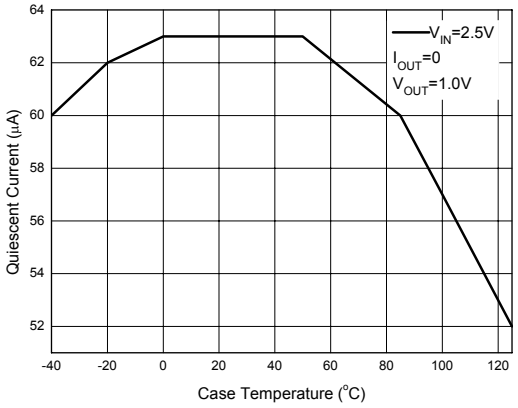


Figure 21. Quiescent Current vs. Case Temperature

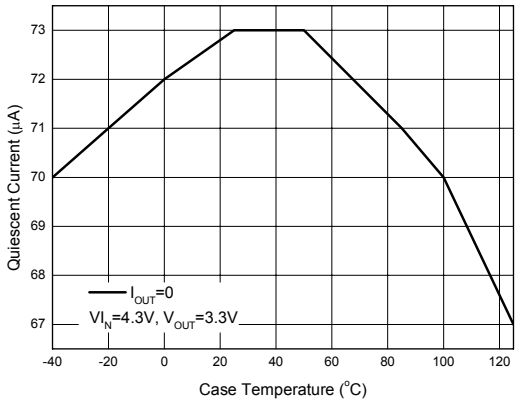


Figure 22. Quiescent Current vs. Case Temperature

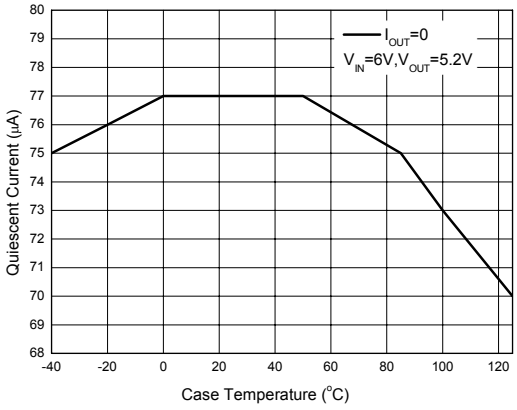


Figure 23. Quiescent Current vs. Case Temperature

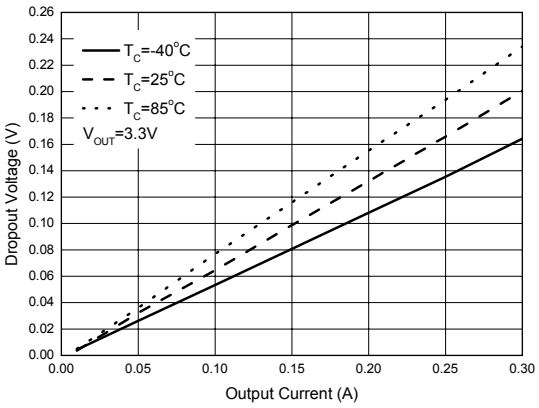


Figure 24. Dropout Voltage vs. Output Current

Typical Performance Characteristics (Continued)

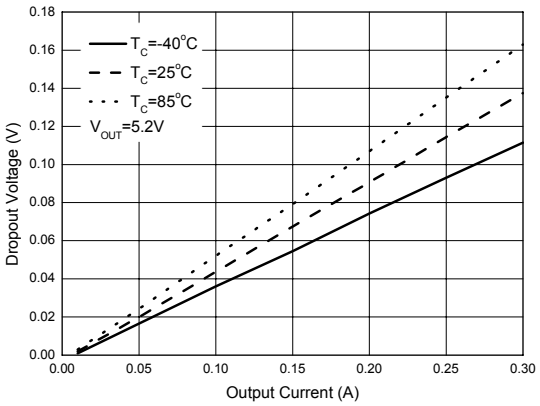


Figure 25. Dropout Voltage vs. Output Current

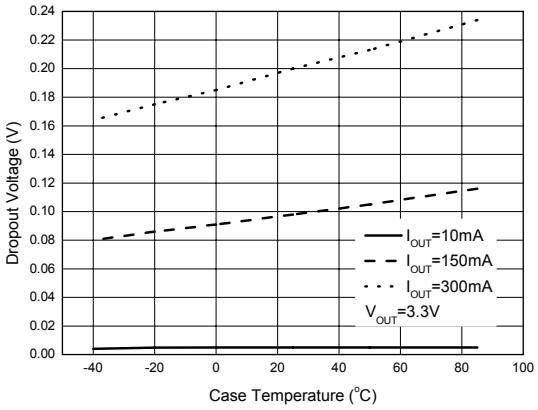


Figure 26. Dropout Voltage vs. Case Temperature

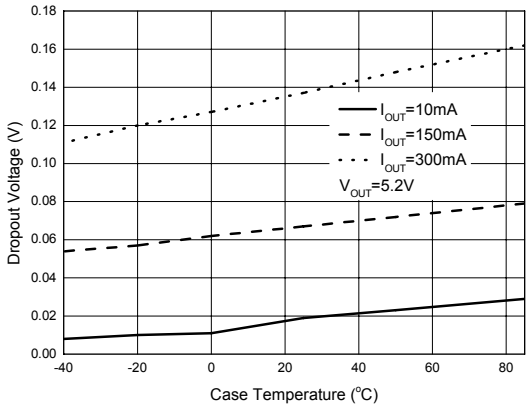


Figure 27. Dropout Voltage vs. Case Temperature

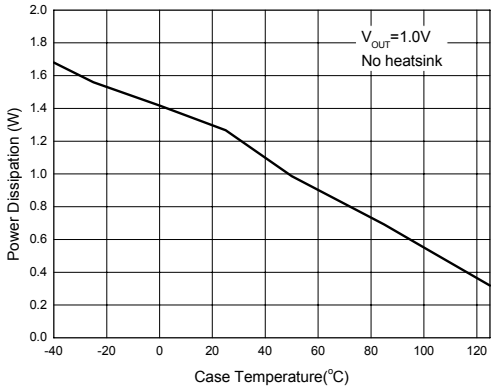


Figure 28. Power Dissipation vs. Case Temperature

Typical Performance Characteristics (Continued)

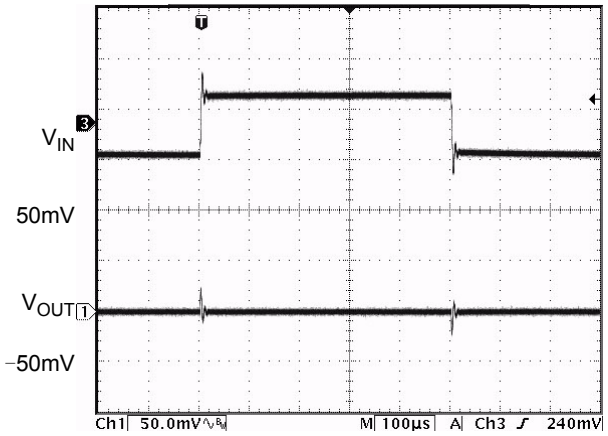


Figure 29. Line Transient
(Condition: C_{IN}=C_{OUT}=1µF, I_{OUT}=10mA,
V_{IN}=2.5V to 3.3V, V_{OUT}=1V)

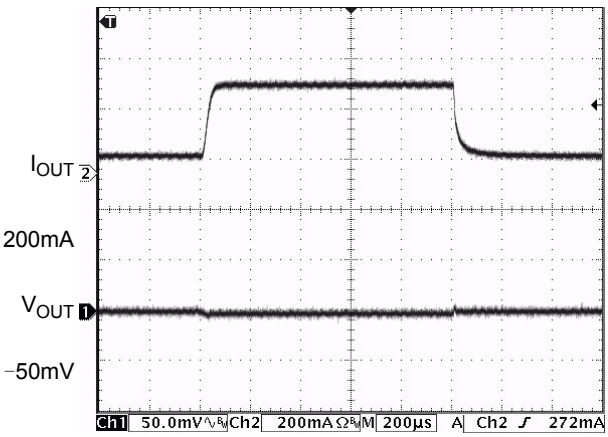


Figure 30. Load Transient
(Condition: C_{IN}=C_{OUT}=1µF,Sew Rate=20mA/µs,
V_{IN}=2.5V, V_{OUT}=1V, I_{OUT}=10mA to 300mA)

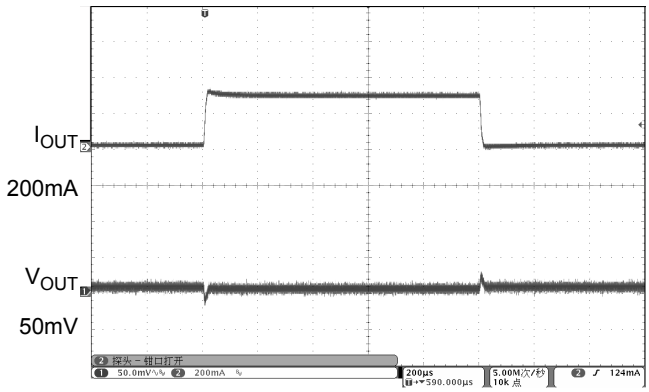


Figure 31. Load Transient
(Condition: C_{IN}=C_{OUT}=1µF, I_{OUT}=10mA to 300mA,
V_{IN}=4.3V, V_{OUT}=3.3V)

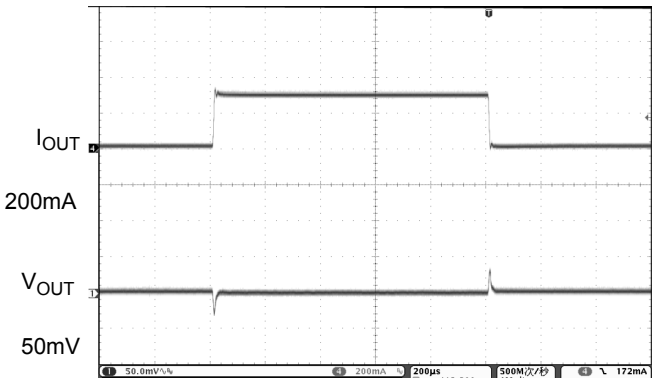


Figure 32. Load Transient
(Condition: C_{IN}=C_{OUT}=1µF,Sew Rate=20mA/µs,
V_{IN}=6V, V_{OUT}=5.2V, I_{OUT}=10mA to 300mA)

Typical Performance Characteristics (Continued)

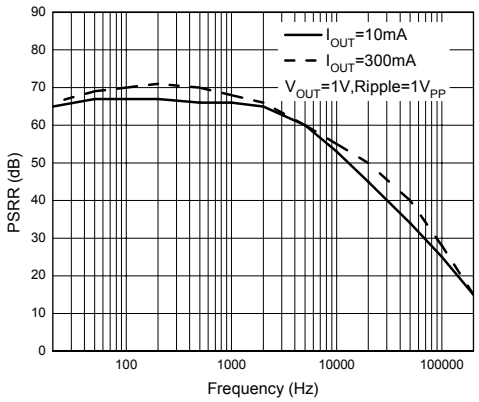


Figure 33. PSSR vs. Frequency
(Conditions: C_{IN}=C_{OUT}=1μF, V_{IN}=2.5V, V_{OUT}=1V
Ripple=1V_{PP})

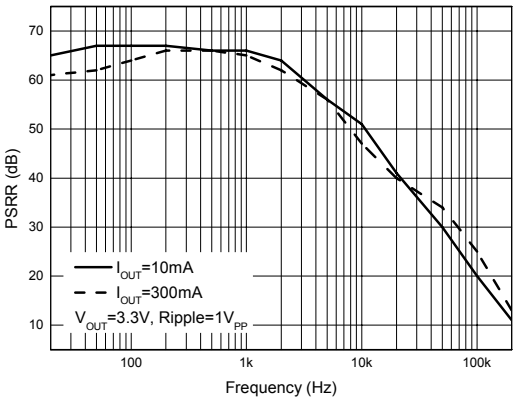


Figure 34. PSSR vs. Frequency
(Conditions: C_{IN}=C_{OUT}=1μF, V_{IN}=4.3V, V_{OUT}=3.3V
Ripple=1V_{PP})

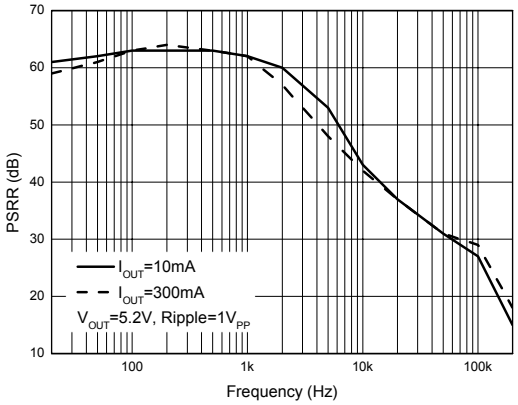
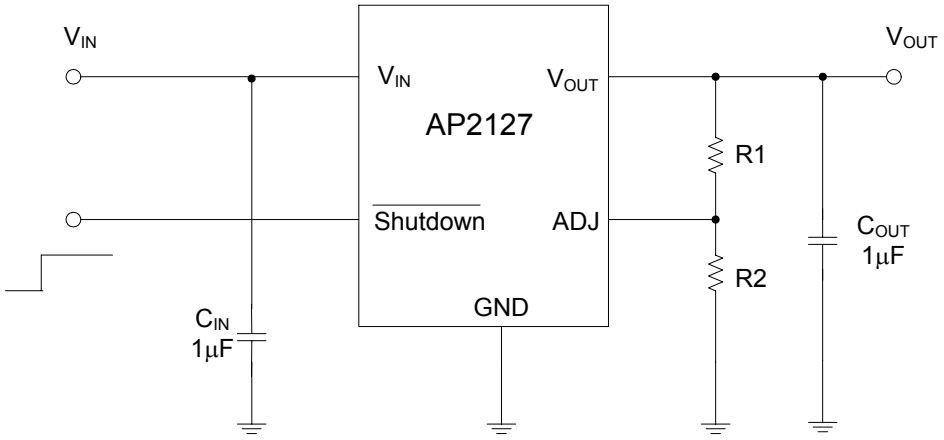
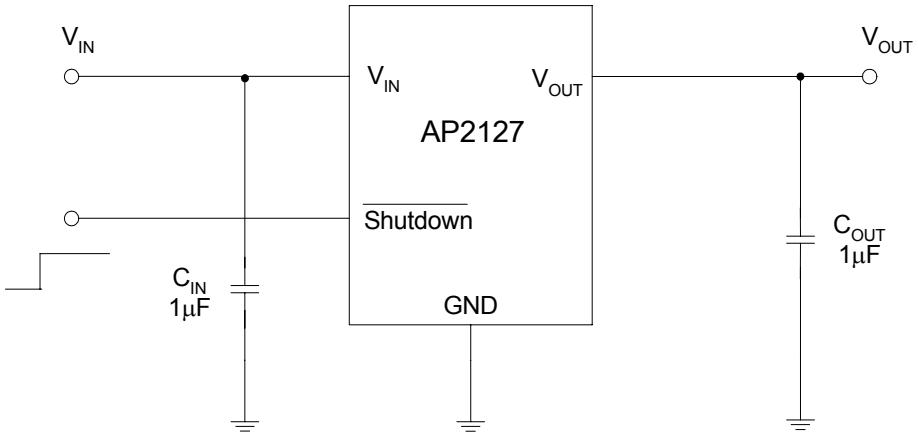


Figure 35. PSSR vs. Frequency
(Conditions: C_{IN}=C_{OUT}=1μF, V_{IN}=6V, V_{OUT}=5.2V
Ripple=0.5V_{PP})

Typical Application



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

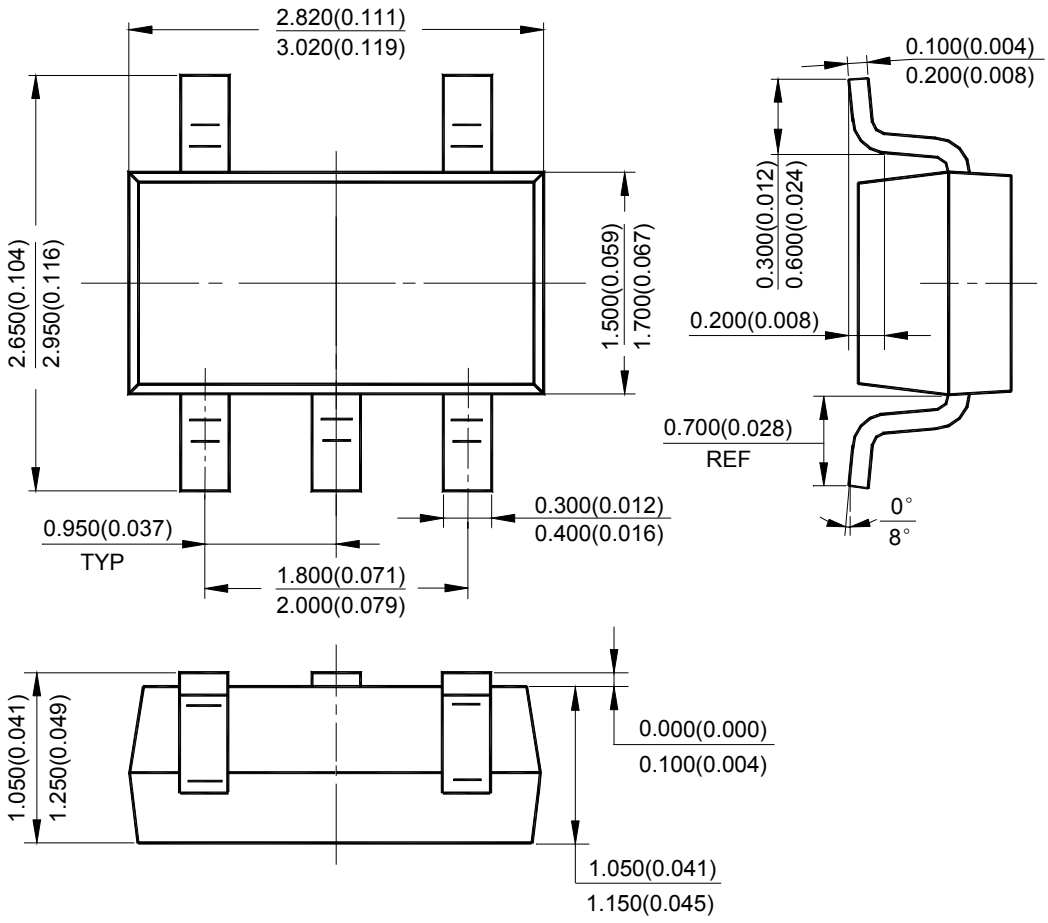


For 1.0V to5.2V fixed voltage versions

Figure 36. Typical Application of AP2127

Mechanical Dimensions

SOT-23-5 **Unit: mm(inch)**



BCD Semiconductor Manufacturing Limited

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