1A LOW NOISE CMOS LDO REGULATOR AP2114

General Description

The AP2114 is CMOS process low dropout linear regulator, the regulator delivers a guaranteed 1A (min.) continuous load current

The AP2114 features low power consumption.

The AP2114 is available in 1.2V, 1.8V and 3.3V regulator output, and available in excellent output accuracy 1.5%, it is also available in an excellent load regulation and line regulation performance.

The AP2114 is available in standard packages of SOT-223, TO-252-2(1), TO-252-2(3) and TO-263-3.

Features

- Output voltage accuracy: ±1.5%
- Output Current: 1A(Min.)
- Fold-back Short Current Protection: 50mA
- Low Dropout Voltage (3.3V): 450mV (Typ.) @I_{OUT}=1A
- Stable with 4.7μF Flexible Cap: Ceramic, Tantalum and Aluminum Electrolytic
- Excellent Line Regulation: 0.02%/V(Typ.) , 0.1%/V(Max.) @ I_{OUT}=30mA
- Excellent Load Regulation: 0.2% @I_{OUT}=0A to 1A
- Low Quiescent Current: 60μA(1.2V/1.8V)
- Low Output Noise: 30μVRMS
- PSRR: 68dB @ Freq=1kHz(1.2V/1.8V)
- OTSD Protection
- Operation Temp Range: -40°C to 85°C
- ESD: MM 400V, HBM 4000V

Applications

- LCD Monitor
- LCD TV
- STB

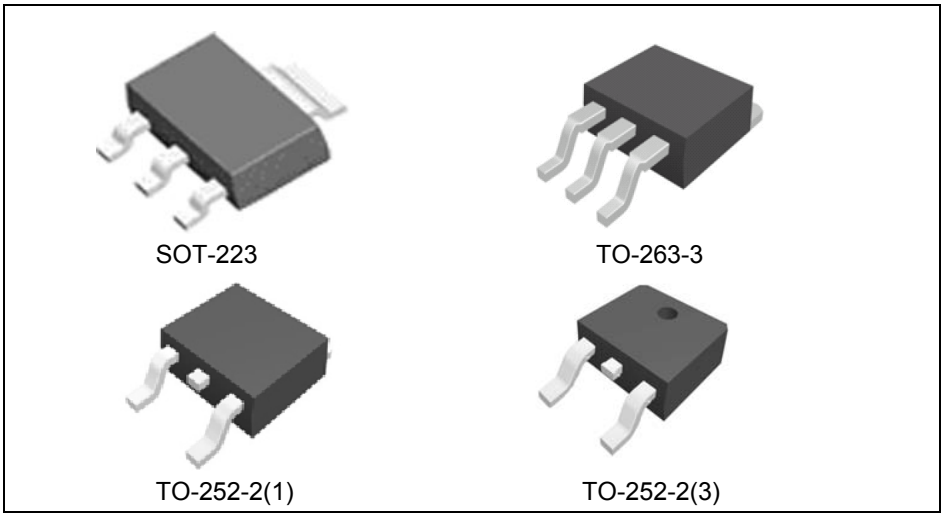
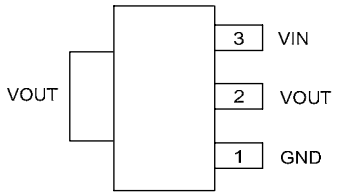


Figure 1. Package Type of AP2114

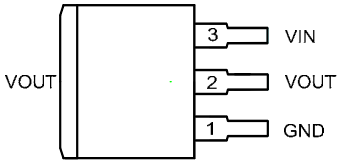
1A LOW NOISE CMOS LDO REGULATOR AP2114

Pin Configuration

H Package
SOT-223

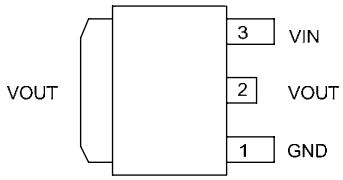


S Package
TO-263-3



D Package

TO-252-2(1)



TO-252-2(3)

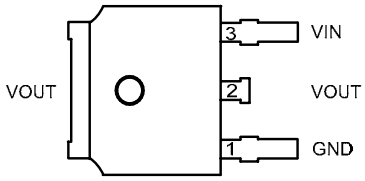


Figure 2. Pin Configuration of AP2124 (Top View)

Pin Descriptions

Pin No.	Name	Descriptions
1	GND	GND
2	VOUT	Regulated Output
3	VIN	Input Voltage Pin

Functional Block Diagram

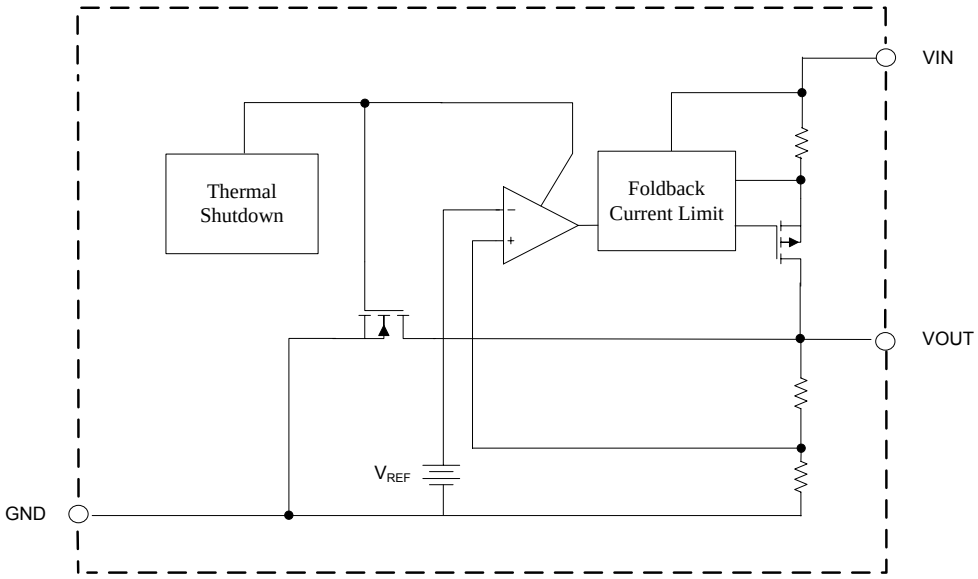
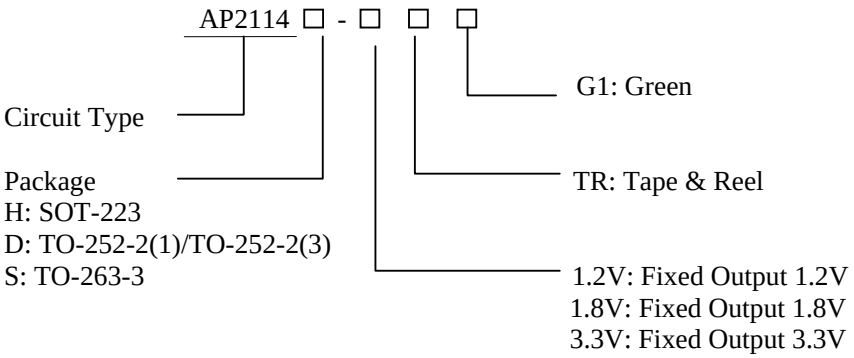


Figure 3. Functional Block Diagram of AP2114

1A LOW NOISE CMOS LDO REGULATOR AP2114

Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
SOT-223	-40 to 85°C	AP2114H-1.2TRG1	GH12C	Tape & Reel
		AP2114H-1.8TRG1	GH12D	Tape & Reel
		AP2114H-3.3TRG1	GH12E	Tape & Reel
TO-252-2(1)/ TO-252-2(3)	-40 to 85°C	AP2114D-1.2TRG1	AP2114D-1.2G1	Tape & Reel
		AP2114D-1.8TRG1	AP2114D-1.8G1	Tape & Reel
		AP2114D-3.3TRG1	AP2114D-3.3G1	Tape & Reel
TO-263-3	-40 to 85°C	AP2114S-1.2TRG1	AP2114S-1.2G1	Tape & Reel
		AP2114S-1.8TRG1	AP2114S-1.8G1	Tape & Reel
		AP2114S-3.3TRG1	AP2114S-3.3G1	Tape & Reel

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

Absolute Maximum Ratings (Note 1)

Parameter		Symbol	Value	Unit
Power Supply Voltage		V_{CC}	6.5	V
Operating Junction Temperature Range		T_J	150	°C
Storage temperature Range		T_{STG}	-65 to 150	°C
Lead Temperature (Soldering,10 Seconds)		T_{LEAD}	260	°C
ESD	Machine Model		400	V
	Human Body Model		4000	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
Supply Voltage	V_{IN}	2.5	6.0	V
Ambient Operation Temperature Range	T_A	-40	85	°C

Electrical Characteristics

AP2114-1.2 Electrical Characteristics (Note 2)

(V_{IN}=2.5V, C_{IN}=4.7μF(Ceramic), C_{OUT}=4.7μF(Ceramic), Typical T_A = 25°C, **Bold** typeface applies over -40°C≤T_J≤85°C ranges, unless otherwise specified (Note 3))

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN} =2.5V, 1mA ≤ I_{OUT} ≤ 30mA	V_{OUT} *98.5%	1.2	V_{OUT} *101.5%	V
Input Voltage	V_{IN}				6	V
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=2.5V, V_{OUT}=1.182V to 1.218V	1			A
Load Regulation	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle I_{OUT}}$	V_{IN}=2.5V, 1mA ≤ I_{OUT} ≤1A		0.2	1	%/A
Line Regulation	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle V_{IN}}$	2.5V≤V_{IN}≤6V, I_{OUT}=30mA		0.02	±0.1	%/V
Dropout Voltage	V_{DROP}	I_{OUT}=1.0A		1200	1300	mV
Quiescent Current	I_Q	V_{IN}=2.5V, I_{OUT}=0mA		60	75	μA
Power Supply Rejection Ratio	PSRR	Ripple 1Vp-p, V_{IN}=2.5V, I_{OUT}=100mA, f=100Hz		68		dB
		Ripple 1Vp-p, V_{IN}=2.5V, I_{OUT}=100mA, f=1KHz		68		
Output Voltage Temperature Coefficient	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle T}$	I_{OUT}=30mA, T_A =-40°C to 85°C		±30		ppm
Short Current Limit	I_{SHORT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	10Hz ≤ f ≤100kHz (No Load)		30		μV_{RMS}
Thermal Shutdown Temperature	T_{OTSD}			160		°C
Thermal Shutdown Hysteresis	T_{HYOTSD}			25		

Note 2: To prevent the Short Circuit Current protection feature from being prematurely activated, the input voltage must be applied before a current source load is applied.
Note 3: Production testing at T_A=25°C. Over temperature specifications guaranteed by design only.

Electrical Characteristics (Continued)

AP2114-1.8 Electrical Characteristics (Note 2)

(V_{IN}=2.8V, C_{IN}=4.7μF(Ceramic), C_{OUT}=4.7μF(Ceramic), Typical T_A = 25°C, **Bold** typeface applies over -40°C≤T_J≤85°C ranges, unless otherwise specified (Note 3))

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN} =2.8V, 1mA ≤ I_{OUT} ≤ 30mA	98.5% X V_{OUT}	1.8	101.5% X V_{OUT}	V
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN}=2.8V, V_{OUT}=1.773V to 1.827V	1			A
Load Regulation	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle I_{OUT}}$	V_{IN}=2.8V, 1mA ≤ I_{OUT} ≤1A		0.2	1	%/A
Line Regulation	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle V_{IN}}$	2.8V≤V_{IN}≤6V, I_{OUT}=30mA		0.02	±0.1	%/V
Dropout Voltage	V_{DROP}	I_{OUT}=1.0A		500	700	mV
Quiescent Current	I_Q	V_{IN}=2.8V, I_{OUT}=0mA		60	75	μA
Power Supply Rejection Ratio	PSRR	Ripple 1Vp-p, V_{IN}=2.8V, I_{OUT}=100mA, f=100Hz		68		dB
		Ripple 1Vp-p, V_{IN}=2.8V, I_{OUT}=100mA, f=1KHz		68		
Output Voltage Temperature Coefficient	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle T}$	I_{OUT}=30mA, T_A =-40°C to 85°C		±30		ppm
Short Current Limit	I_{SHORT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	10Hz ≤ f ≤100kHz (No load)		30		μV_{RMS}
Thermal Shutdown Temperature	T_{OTSD}			160		°C
Thermal Shutdown Hysteresis	T_{HYOTSD}			25		

Note 2: To prevent the Short Circuit Current protection feature from being prematurely activated, the input voltage must be applied before a current source load is applied.
Note 3: Production testing at T_A=25°C. Over temperature specifications guaranteed by design only.

Electrical Characteristics (Continued)

AP2114-3.3 Electrical Characteristics (Note 2)

(V_{IN}=4.3V, C_{IN}=4.7μF(Ceramic), C_{OUT}=4.7μF(Ceramic), Typical T_A = 25°C, **Bold** typeface applies over -40°C≤T_J≤85°C ranges, unless otherwise specified (Note 3))

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN} =4.3V, 1mA ≤ I_{OUT} ≤ 30mA		98.5% X V_{OUT}	3.3	101.5% X V_{OUT}	V
Maximum Output Current	$I_{OUT(MAX)}$	V_{IN} =4.3V, V_{OUT}=3.25V to 3.35V		1			A
Load Regulation	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle I_{OUT}}$	V_{IN}=4.3V, 1mA ≤ I_{OUT} ≤1A			0.2	1	%/A
Line Regulation	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle V_{IN}}$	4.3V≤V_{IN}≤6V, I_{OUT}=30mA			0.02	±0.1	%/V
Dropout Voltage	V_{DROP}	I_{OUT}=1A			450	750	mV
Quiescent Current	I_Q	V_{IN}=4.3V, I_{OUT}=0mA			65	90	μA
Power Supply Rejection Ratio	PSRR	Ripple 1Vp-p V_{IN}=4.3V, I_{OUT}=100mA	f=100Hz		65		dB
			f=1KHz		65		
Output Voltage Temperature Coefficient	$\frac{\triangle V_{OUT}/V_{OUT}}{\triangle T}$	I_{OUT}=30mA			±30		ppm
Short Current Limit	I_{SHORT}	V_{OUT}=0V			50		mA
RMS Output Noise	V_{NOISE}	10Hz ≤ f ≤100kHz (No load)			30		μV_{RMS}
Thermal Shutdown Temperature	T_{OTSD}				160		°C
Thermal Shutdown Hysteresis	T_{HYOTSD}				25		

Note 2: To prevent the Short Circuit Current protection feature from being prematurely activated, the input voltage must be applied before a current source load is applied.
Note 3: Production testing at T_A=25°C. Over temperature specifications guaranteed by design only.

Typical Performance Characteristics

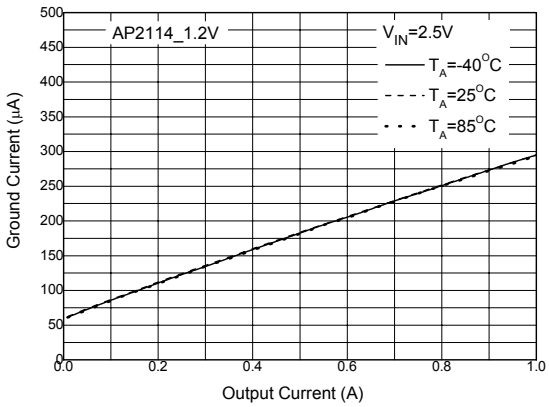


Figure 4. Ground Current vs. Output Current

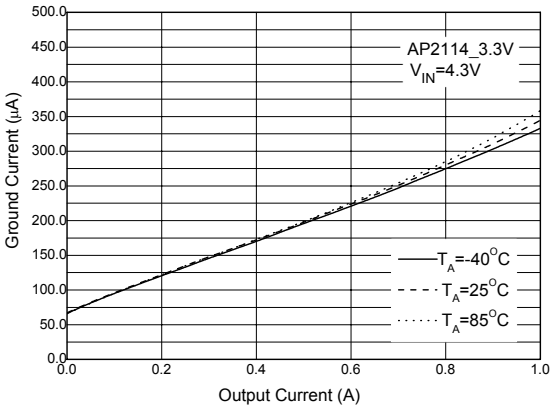


Figure 5. Ground Current vs. Output Current

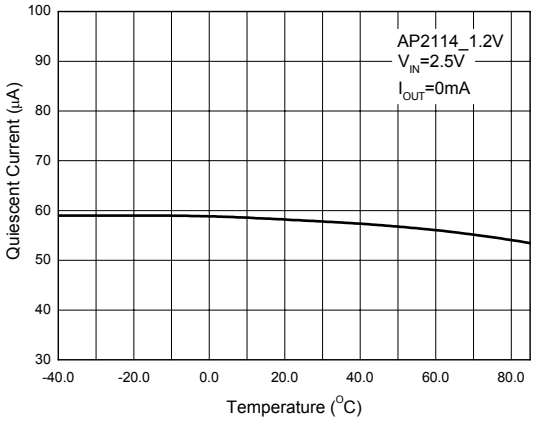


Figure 6. Quiescent Current vs. Temperature

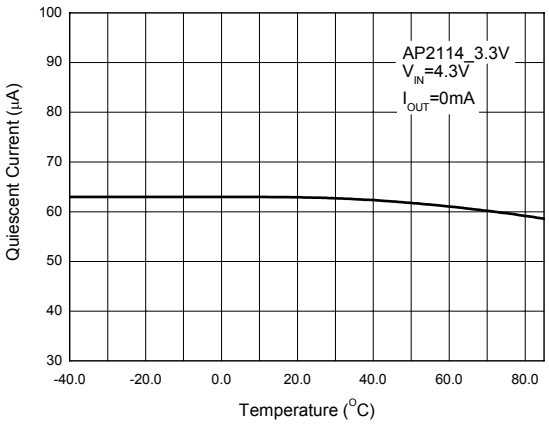


Figure 7. Quiescent Current vs. Temperature

Typical Performance Characteristics (Continued)

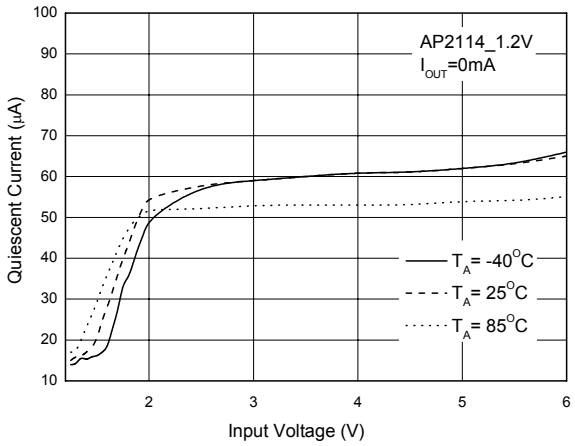


Figure 8. Quiescent Current vs. Input Voltage

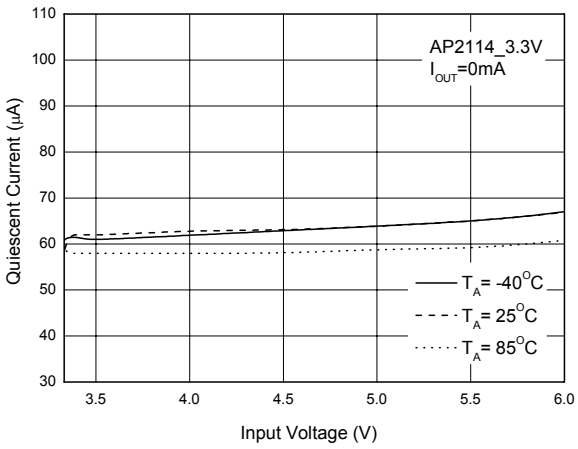


Figure 9. Quiescent Current vs. Input Voltage

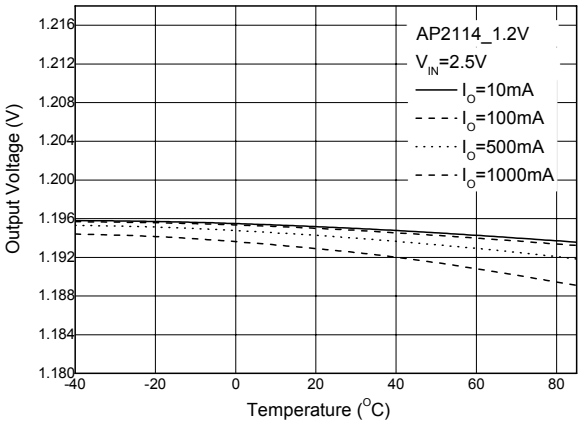


Figure 10. Output Voltage vs. Temperature

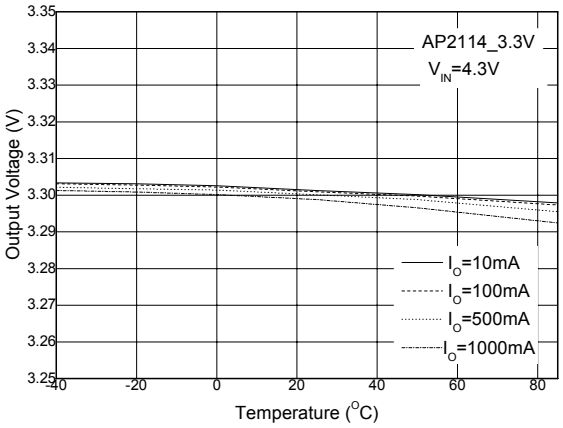


Figure 11. Output Voltage vs. Temperature

Typical Performance Characteristics (Continued)

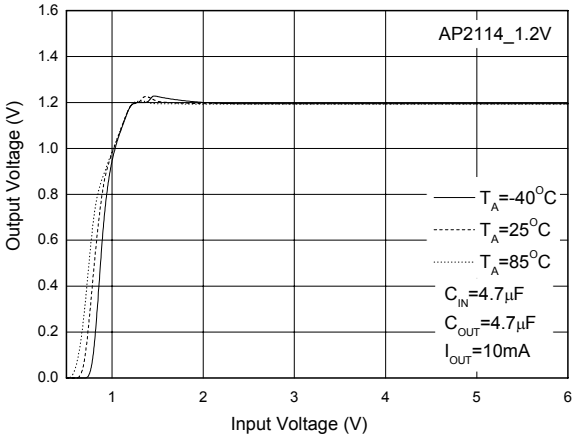


Figure 12. Output Voltage vs. Input Voltage

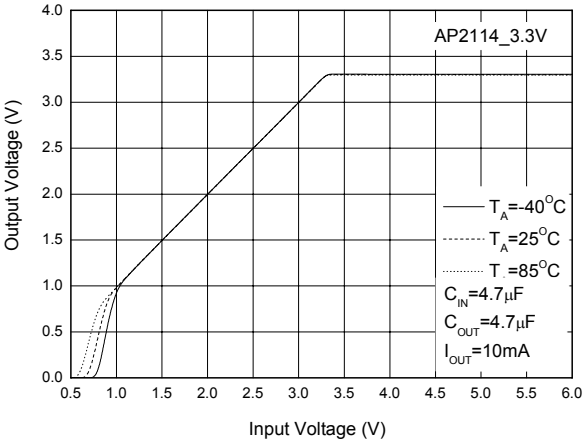


Figure 13. Output Voltage vs. Input Voltage

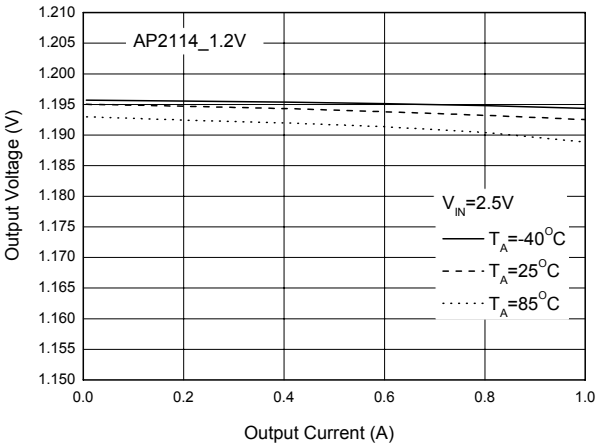


Figure 14. Output Voltage vs. Output Current

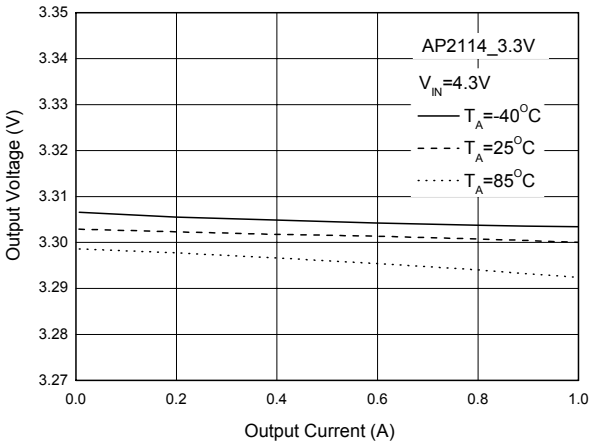


Figure 15. Output Voltage vs. Output Current

Typical Performance Characteristics (Continued)

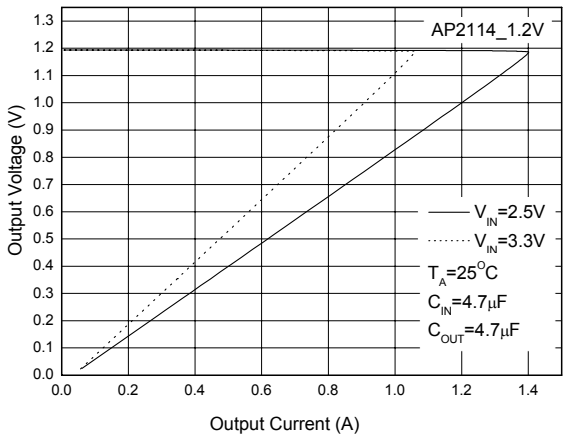


Figure 16. Output Voltage vs. Output Current

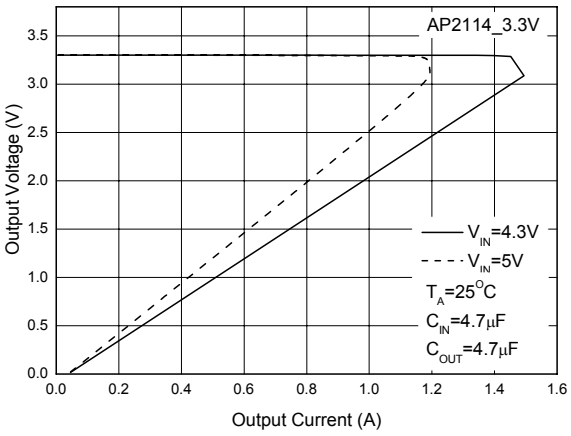


Figure 17. Output Voltage vs. Output Current

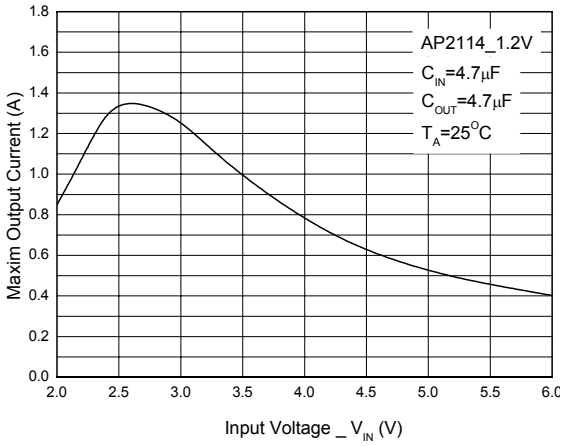


Figure 18. Maxim Output Current vs. Input Voltage

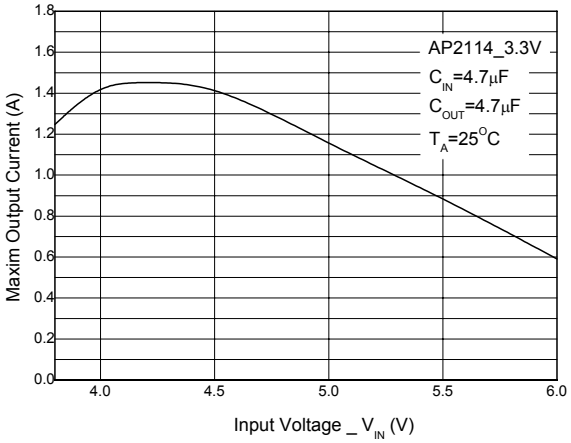


Figure 19. Maxim Output Current vs. Input Voltage

Typical Performance Characteristics (Continued)

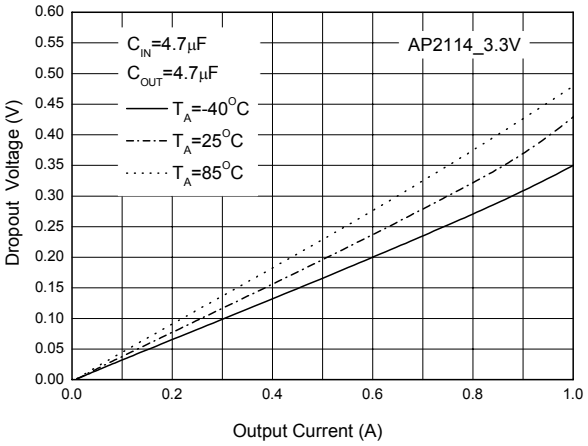


Figure 20. Dropout Voltage vs. Output Current

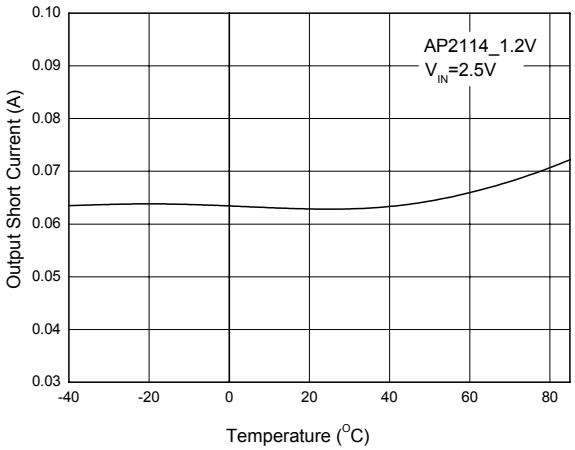


Figure 21. Output Short Current vs. Temperature

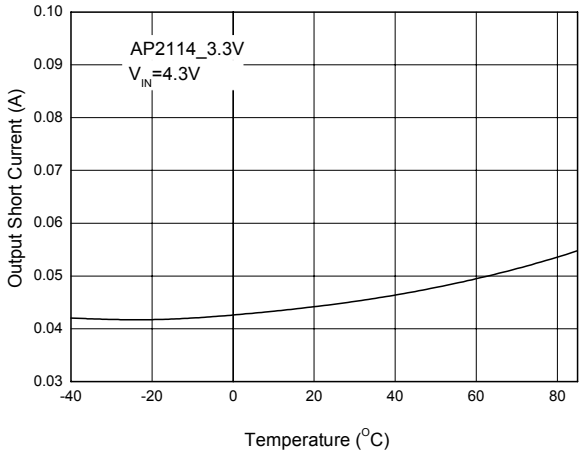


Figure 22. Output Short Current vs. Temperature

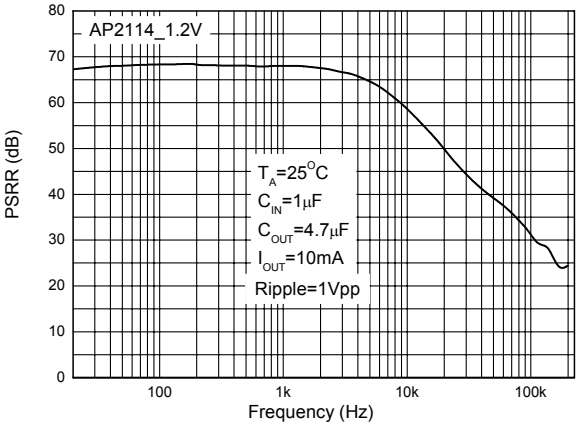


Figure 23. PSRR vs. Frequency

Typical Performance Characteristics (Continued)

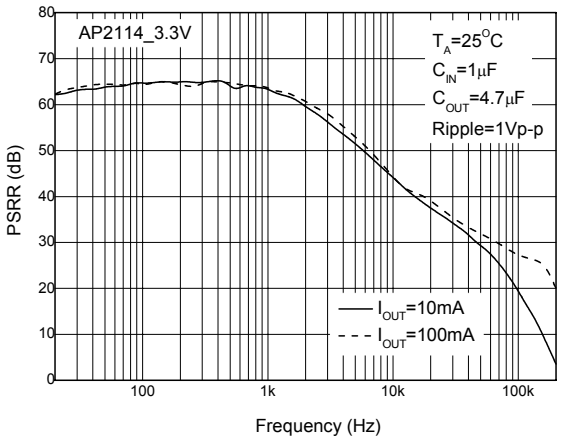


Figure 24. PSRR vs. Frequency

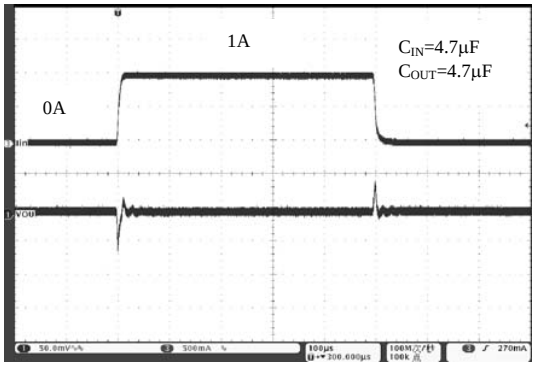


Figure 25. Load Transient

Typical Application

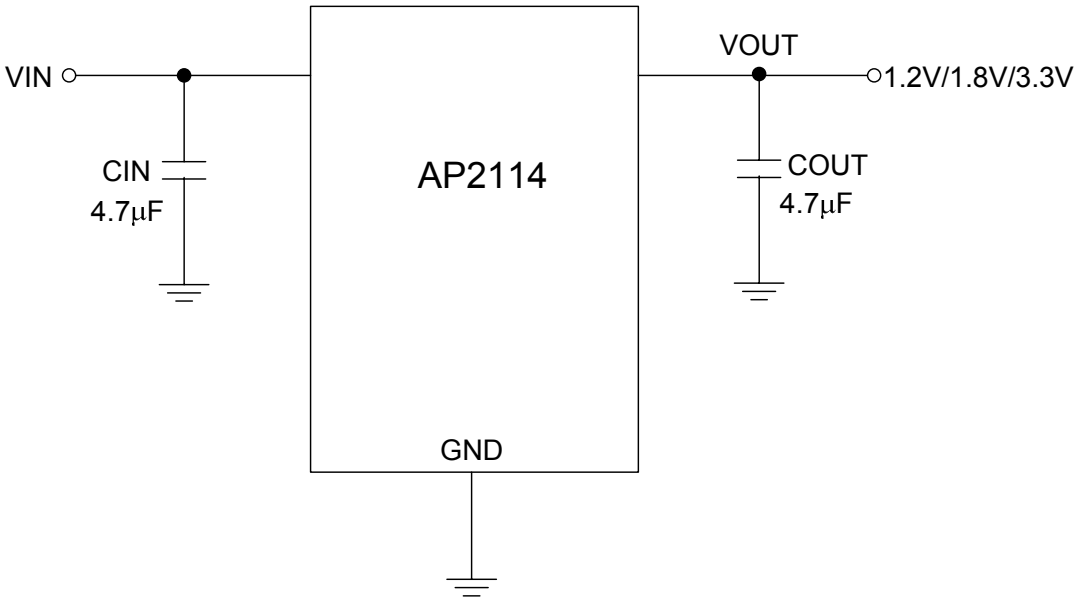
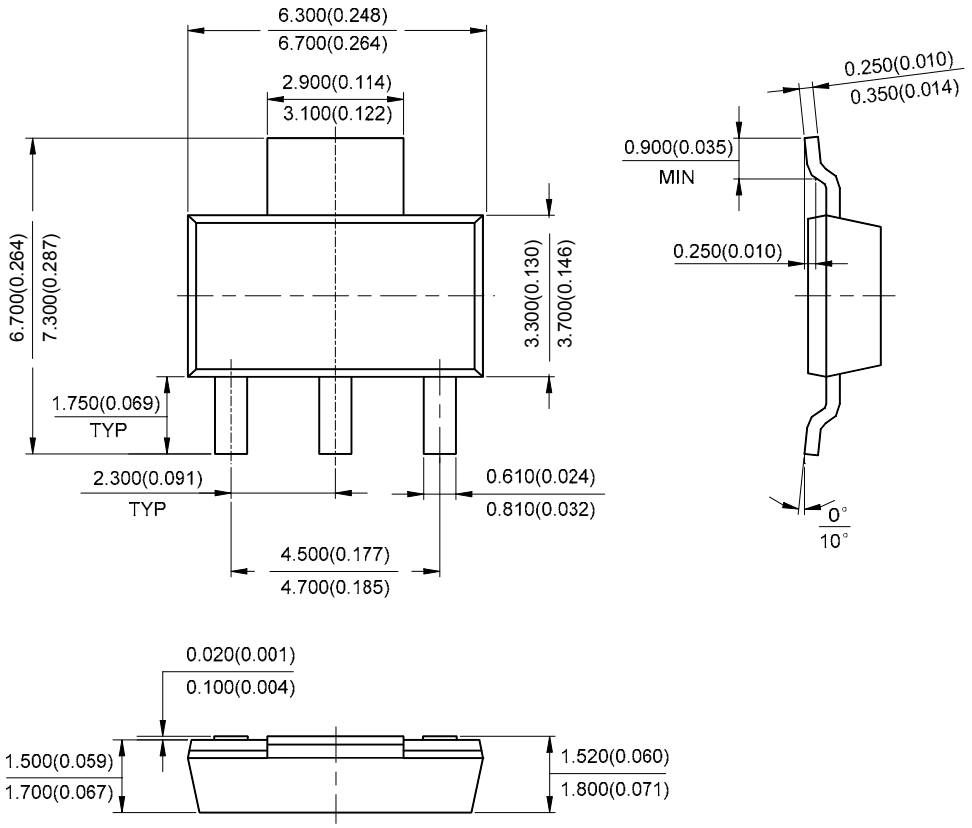


Figure 26. AP2114 Typical Application

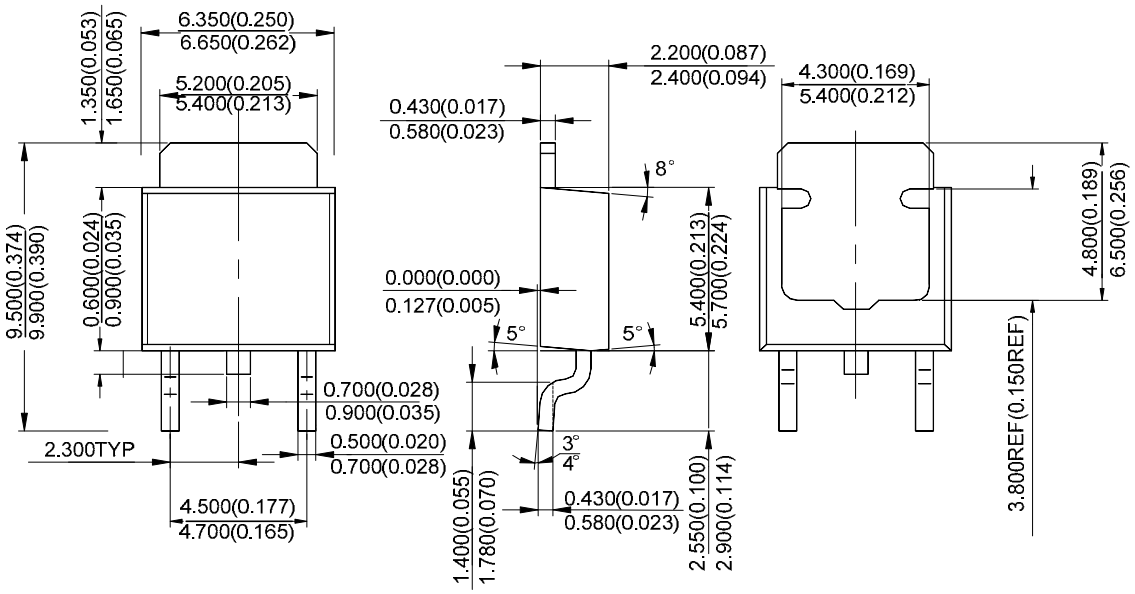
Mechanical Dimensions

SOT-223 **Unit: mm(inch)**



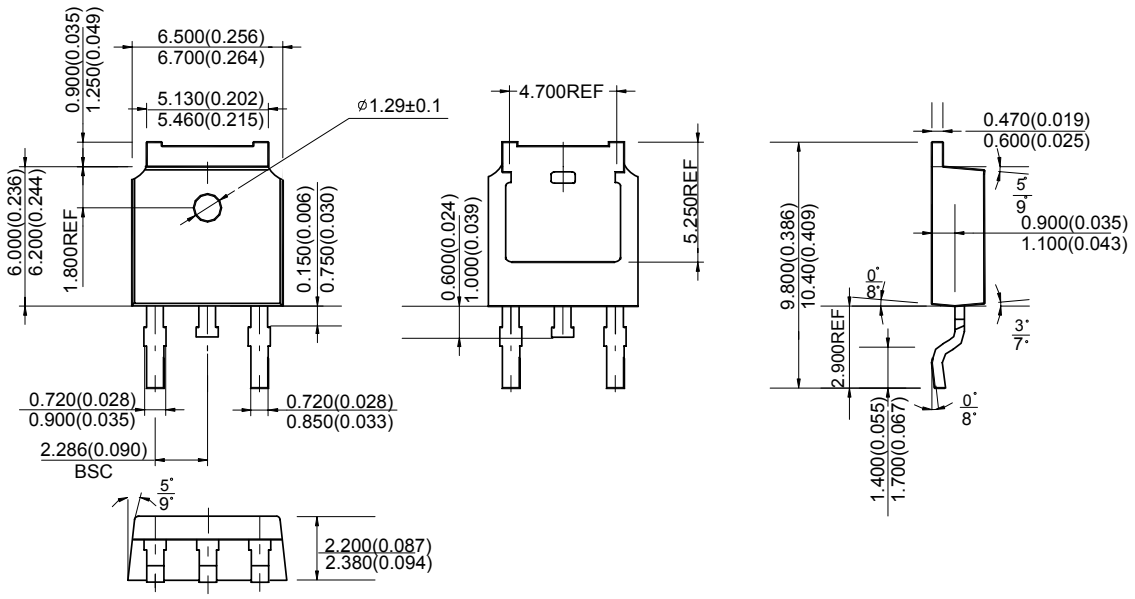
Mechanical Dimensions (Continued)

TO-252-2(1) **Unit: mm(inch)**



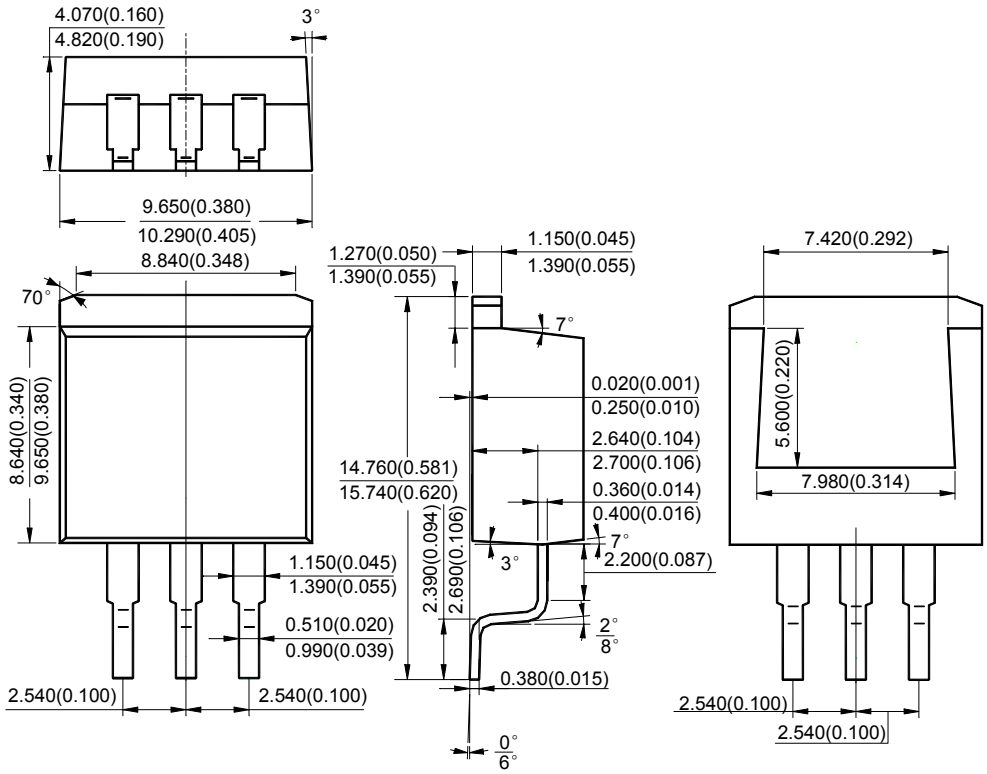
Mechanical Dimensions (Continued)

TO-252-2(3) **Unit: mm(inch)**



Mechanical Dimensions (Continued)

TO-263-3 **Unit: mm(inch)**



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