# 1A LOW NOISE CMOS LDO REGULATOR WITH ENABLE AP2114

## General Description

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

The AP2114 features low power consumption.

The AP2114 is available in 1.2V, 1.5V, 1.8V, 2.5V and 3.3V regulator output and 0.8V to 5V adjustable 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), TO-252-2 (4), TO-263-3, SOIC-8 and PSOP-8.

## 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%A (Typ) @ $I_{OUT}$=1mA to 1A
- Low Quiescent Current: 60μA (1.2V/1.5V/1.8V /2.5V/ADJ)
- Low Output Noise: 30$\mu V_{RMS}$
- PSRR: 68dB @ Freq=1KHz (1.2V/1.5V/1.8V /ADJ)
- OTSD Protection
- Operating Temperature Range: -40°C to 85°C
- ESD: MM 400V, HBM 4000V

## Applications

- LCD Monitor
- LCD TV
- STB

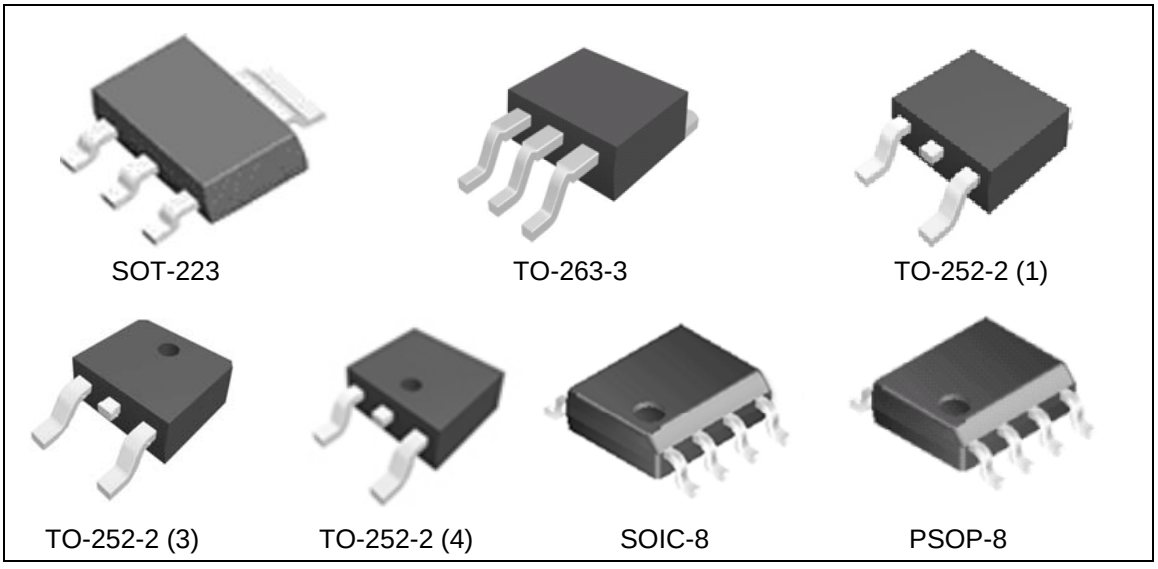



Figure 1. Package Types of AP2114

## Pin Configuration

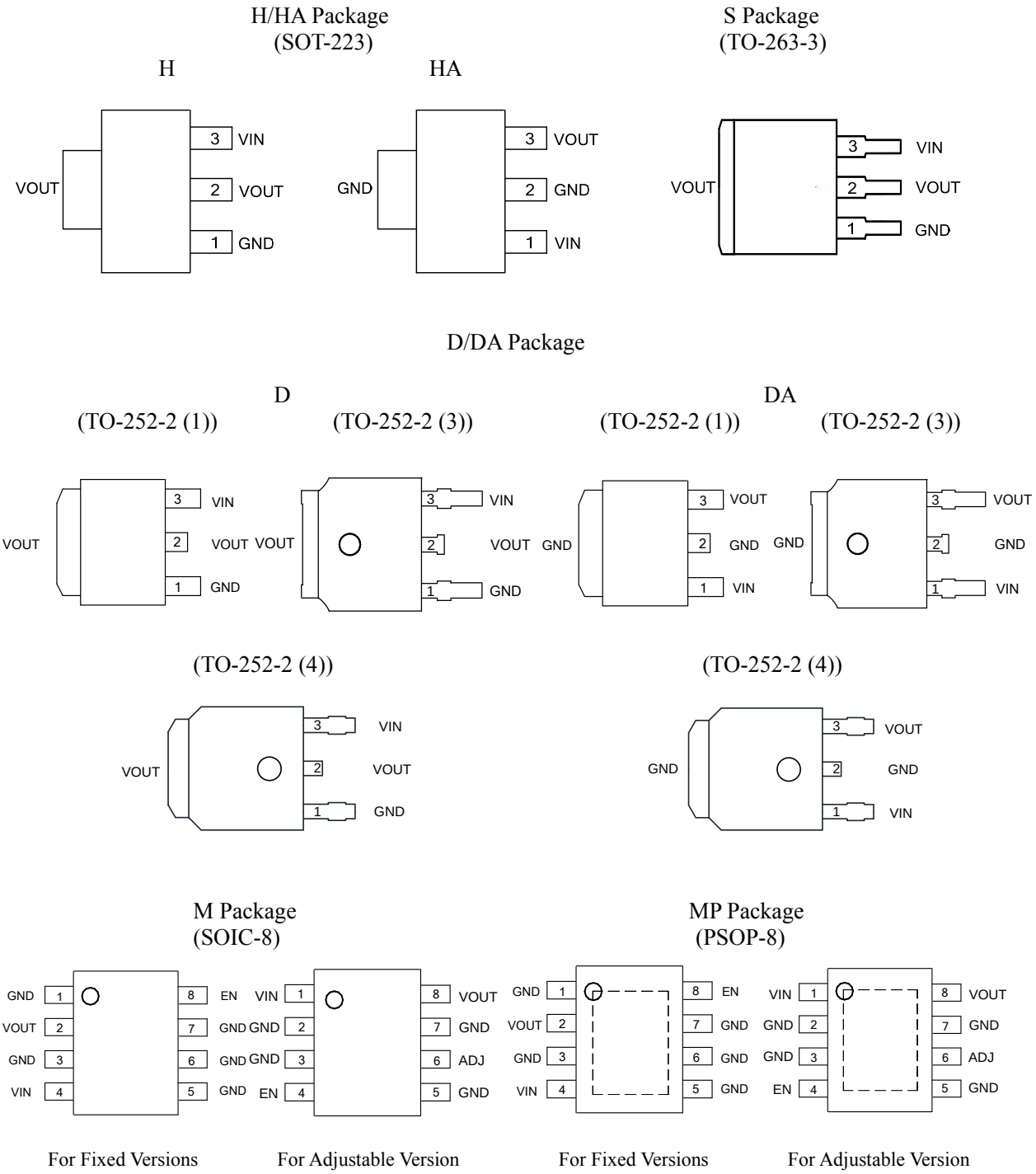
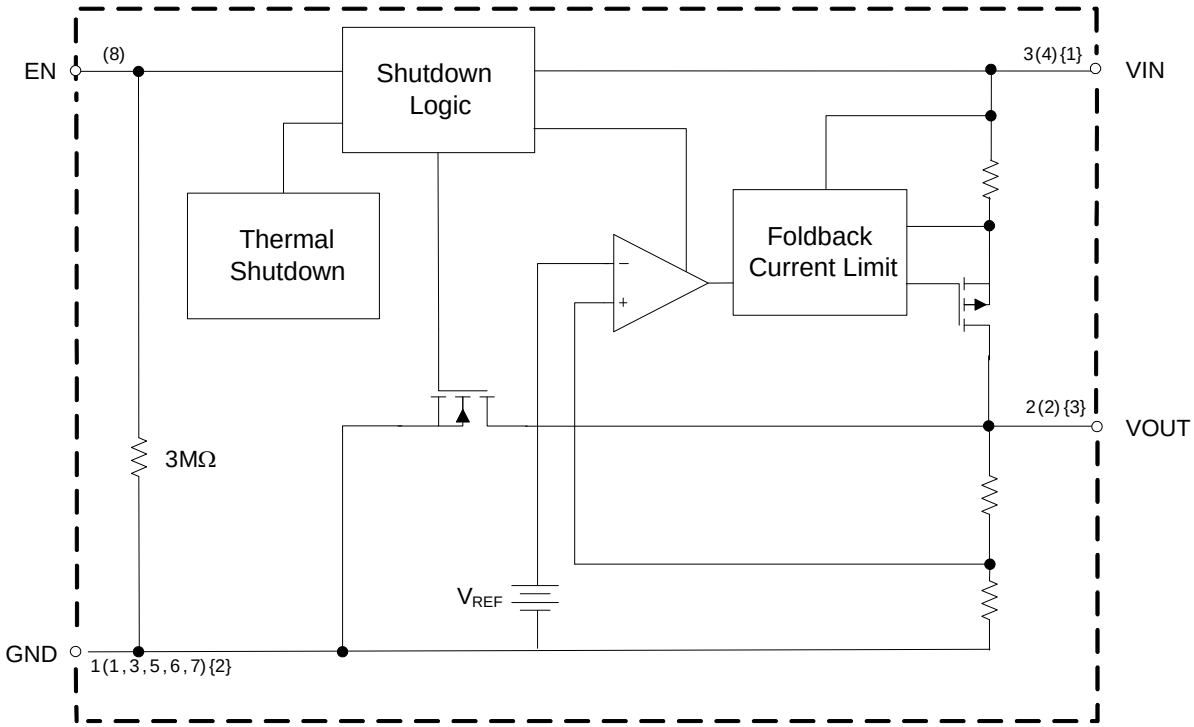



Figure 2. Pin Configuration of AP2114 (Top View)

## Pin Descriptions

| Pin Number | | | | Pin Name | Function |
|---|---|---|---|---|---|
| SOT-223 (H), TO-263-3, TO-252-2 (1) (D) TO-252-2 (3) (D) TO-252-2 (4) (D) | SOT-223 (HA), TO-252-2 (1) (DA) TO-252-2 (3) (DA) TO-252-2 (4) (DA) | SOIC-8, PSOP-8 (Fixed) | SOIC-8, PSOP-8 (ADJ) | | |
| 1 | 2 | 1, 3, 5, 6, 7 | 2, 3, 5, 7 | GND | Ground |
| 2 | 3 | 2 | 8 | VOUT | Regulated Output |
| 3 | 1 | 4 | 1 | VIN | Input Voltage Pin |
| | | 8 | 4 | EN | Chip Enable, H–Normal Work, L– Shutdown Output |
| | | | 6 | ADJ | Adjust Output |

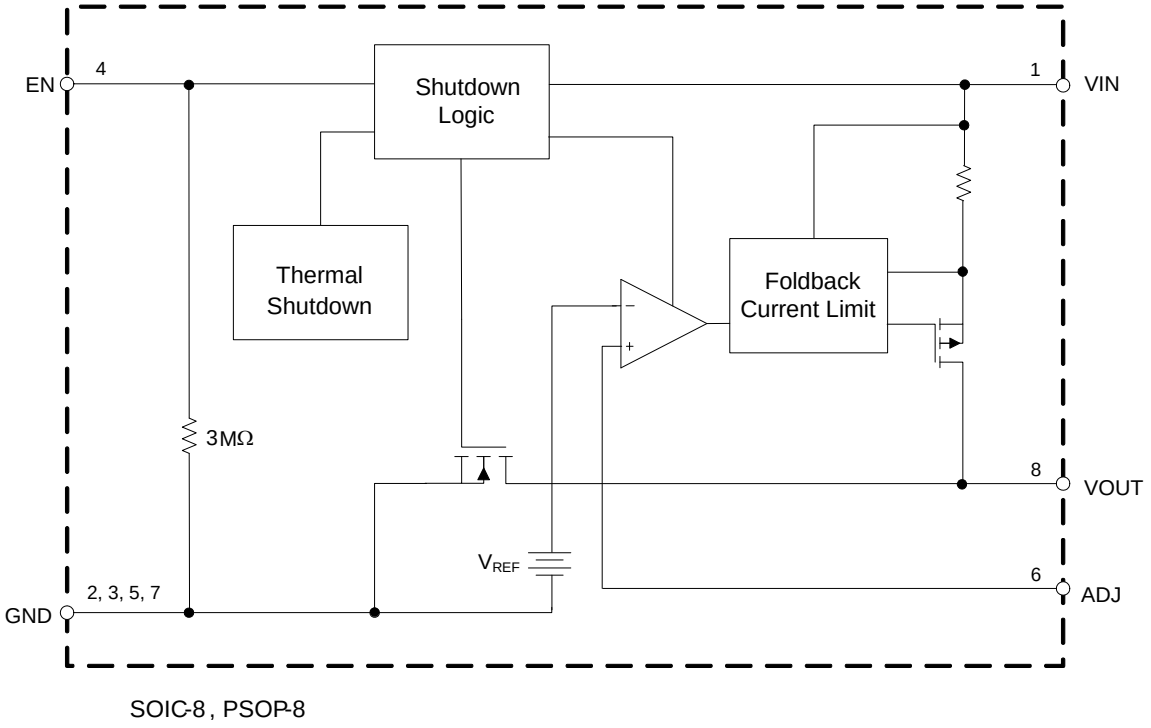
## Functional Block Diagram




A(B){C}
A: SOT-223(H), TO-263-3, TO-252-2(1)/(3)/(4)(D)
B: SOIC-8, PSOP-8
C: SOT-223(HA), TO-252-2(1)/(3)/(4)(DA)

For Fixed Versions

## Functional Block Diagram (Continued)

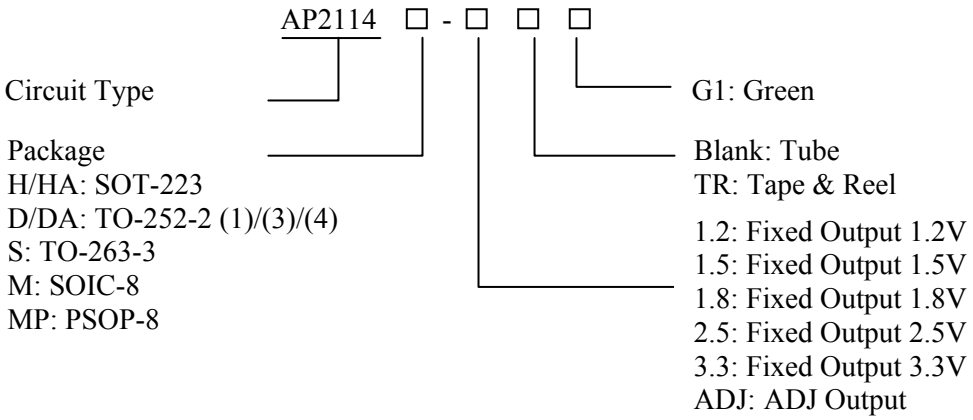



For ADJ Version

Figure 3. Functional Block Diagram of AP2114

# 1A LOW NOISE CMOS LDO REGULATOR WITH ENABLE AP2114

## Ordering Information




| Package | Temperature Range | Output Voltage | Part Number | Marking ID | Packing Type |
|---|---|---|---|---|---|
| SOT-223 | -40 to 85°C | 1.2V (H) | AP2114H-1.2TRG1 | GH12C | Tape & Reel |
| | | 1.5V (H) | AP2114H-1.5TRG1 | GH16G | Tape & Reel |
| | | 1.8V (H) | AP2114H-1.8TRG1 | GH12D | Tape & Reel |
| | | 2.5V (H) | AP2114H-2.5TRG1 | GH14C | Tape & Reel |
| | | 3.3V (H) | AP2114H-3.3TRG1 | GH12E | Tape & Reel |
| SOT-223 | -40 to 85°C | 1.2V (HA) | AP2114HA-1.2TRG1 | GH13B | Tape & Reel |
| | | 1.5V (HA) | AP2114HA-1.5TRG1 | GH16H | Tape & Reel |
| | | 1.8V (HA) | AP2114HA-1.8TRG1 | GH14D | Tape & Reel |
| | | 2.5V (HA) | AP2114HA-2.5TRG1 | GH14E | Tape & Reel |
| | | 3.3V (HA) | AP2114HA-3.3TRG1 | GH14F | Tape & Reel |
| TO-252-2 (1)/ TO-252-2 (3)/ TO-252-2 (4) | -40 to 85°C | 1.2V (D) | AP2114D-1.2TRG1 | AP2114D-1.2G1 | Tape & Reel |
| | | 1.5V (D) | AP2114D-1.5TRG1 | AP2114D-1.5G1 | Tape & Reel |
| | | 1.8V (D) | AP2114D-1.8TRG1 | AP2114D-1.8G1 | Tape & Reel |
| | | 2.5V (D) | AP2114D-2.5TRG1 | AP2114D-2.5G1 | Tape & Reel |
| | | 3.3V (D) | AP2114D-3.3TRG1 | AP2114D-3.3G1 | Tape & Reel |
| TO-252-2 (1)/ TO-252-2 (3)/ TO-252-2 (4) | -40 to 85°C | 1.2V (DA) | AP2114DA-1.2TRG1 | AP2114DA-1.2G1 | Tape & Reel |
| | | 1.5V (DA) | AP2114DA-1.5TRG1 | AP2114DA-1.5G1 | Tape & Reel |
| | | 1.8V (DA) | AP2114DA-1.8TRG1 | AP2114DA-1.8G1 | Tape & Reel |
| | | 2.5V (DA) | AP2114DA-2.5TRG1 | AP2114DA-2.5G1 | Tape & Reel |
| | | 3.3V (DA) | AP2114DA-3.3TRG1 | AP2114DA-3.3G1 | Tape & Reel |
| TO-263-3 | -40 to 85°C | 1.2V | AP2114S-1.2TRG1 | AP2114S-1.2G1 | Tape & Reel |
| | | 1.5V | AP2114S-1.5TRG1 | AP2114S-1.5G1 | Tape & Reel |
| | | 1.8V | AP2114S-1.8TRG1 | AP2114S-1.8G1 | Tape & Reel |
| | | 2.5V | AP2114S-2.5TRG1 | AP2114S-2.5G1 | Tape & Reel |
| | | 3.3V | AP2114S-3.3TRG1 | AP2114S-3.3G1 | Tape & Reel |
| SOIC-8 | -40 to 85°C | 1.2V | AP2114M-1.2TRG1 | 2114M-1.2G1 | Tape & Reel |
| | | 1.5V | AP2114M-1.5TRG1 | 2114M-1.5G1 | Tape & Reel |
| | | 1.8V | AP2114M-1.8TRG1 | 2114M-1.8G1 | Tape & Reel |
| | | 2.5V | AP2114M-2.5TRG1 | 2114M-2.5G1 | Tape & Reel |
| | | 3.3V | AP2114M-3.3TRG1 | 2114M-3.3G1 | Tape & Reel |
| | | ADJ | AP2114M-ADJG1 | 2114M-ADJG1 | Tube |
| | | | AP2114M-ADJTRG1 | 2114M-ADJG1 | Tape & Reel |

## Ordering Information (Continued)

| Package | Temperature Range | Output Voltage | Part Number | Marking ID | Packing Type |
|---|---|---|---|---|---|
| PSOP-8 | -40 to 85°C | 1.2V | AP2114MP-1.2TRG1 | 2114MP-1.2G1 | Tape & Reel |
| | | 1.5V | AP2114MP-1.5TRG1 | 2114MP-1.5G1 | Tape & Reel |
| | | 1.8V | AP2114MP-1.8TRG1 | 2114MP-1.8G1 | Tape & Reel |
| | | 2.5V | AP2114MP-2.5TRG1 | 2114MP-2.5G1 | Tape & Reel |
| | | 3.3V | AP2114MP-3.3TRG1 | 2114MP-3.3G1 | Tape & Reel |
| | | ADJ | AP2114MP-ADJG1 | 2114MP-ADJG1 | Tube |
| | | | AP2114MP-ADJTRG1 | 2114MP-ADJG1 | 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 | $V_{IN}$ | 6.5 | | V |
| Operating Junction Temperature Range | $T_J$ | 150 | | ºC |
| Storage Temperature Range | $T_{STG}$ | -65 to 150 | | ºC |
| Lead Temperature (Soldering, 10sec) | $T_{LEAD}$ | 260 | | ºC |
| Thermal Resistance （Junction to Ambient）(No Heatsink) | $\theta_{JA}$ | SOIC-8 | 144 | °C/W |
| | | PSOP-8 | 143 | |
| | | SOT-223 | 128 | |
| | | TO-252-2 (1)/ TO-252-2 (3)/ TO-252-2 (4) | 90 | |
| | | TO-263-3 | 73 | |
| ESD (Machine Model) | | 400 | | V |
| ESD (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 |
| Operating Ambient 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≤$T_A$≤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 | $V_{IN}$ | | | | | 6.0 | 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 | | -0.1 | 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 |
| | | | 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/°C |
| Short Current Limit | $I_{SHORT}$ | $V_{OUT}$=0V | | | 50 | | mA |
| RMS Output Noise | $V_{NOISE}$ | 10Hz ≤ f ≤100kHz (No Load) | | | 30 | | $\mu V_{RMS}$ |
| $V_{EN}$ High Voltage | $V_{IH}$ | Enable logic high, regulator on | | 1.5 | | | V |
| $V_{EN}$ Low Voltage | $V_{IL}$ | Enable logic low, regulator off | | | | 0.4 | |
| Standby Current | $I_{STD}$ | $V_{IN}$=2.5V, $V_{EN}$ in OFF mode | | | 0.01 | 1.0 | μA |
| Start-up Time | $t_S$ | No Load | | | 20 | | μs |
| EN Pull Down Resistor | $R_{PD}$ | | | | 3.0 | | MΩ |
| $V_{OUT}$ Discharge Resistor | $R_{DCHG}$ | Set EN pin at Low | | | 60 | | Ω |
| Thermal Shutdown Temperature | $T_{OTSD}$ | | | | 160 | | °C |
| Thermal Shutdown Hysteresis | $T_{HYOTSD}$ | | | | 25 | | |
| Thermal Resistance (Junction to Case) | $\theta_{JC}$ | SOIC-8 | | | 74.6 | | °C/W |
| | | PSOP-8 | | | 43.7 | | |
| | | SOT-223 | | | 50.9 | | |
| | | TO-252-2 (1) /(3) /(4) | | | 35 | | |
| | | TO-263-3 | | | 22 | | |

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)

### AP2114-1.5 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≤$T_A$≤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% | 1.5 | $V_{OUT}$ ×101.5% | V |
| Input Voltage | $V_{IN}$ | | | | 6.0 | V |
| Maximum Output Current | $I_{OUT(MAX)}$ | $V_{IN}$=2.5V, $V_{OUT}$=1.478V to 1.523V | 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 | -0.1 | 0.02 | 0.1 | %/V |
| Dropout Voltage | $V_{DROP}$ | $I_{OUT}$=1.0A | | 800 | 1000 | 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 | | dB |
| Output Voltage Temperature Coefficient | $\frac{\triangle V_{OUT}/V_{OUT}}{\triangle T}$ | $I_{OUT}$=30mA, $T_A$ =-40°C to 85°C | | **±30** | | ppm/°C |
| Short Current Limit | $I_{SHORT}$ | $V_{OUT}$=0V | | 50 | | mA |
| RMS Output Noise | $V_{NOISE}$ | 10Hz ≤ f ≤100kHz (No Load) | | 30 | | $\mu V_{RMS}$ |
| $V_{EN}$ High Voltage | $V_{IH}$ | Enable logic high, regulator on | 1.5 | | | V |
| $V_{EN}$ Low Voltage | $V_{IL}$ | Enable logic low, regulator off | | | 0.4 | V |
| Standby Current | $I_{STD}$ | $V_{IN}$=2.5V, $V_{EN}$ in OFF mode | | 0.01 | 1.0 | μA |
| Start-up Time | $t_S$ | No Load | | 20 | | μs |
| EN Pull Down Resistor | $R_{PD}$ | | | 3.0 | | MΩ |
| $V_{OUT}$ Discharge Resistor | $R_{DCHG}$ | Set EN pin at Low | | 60 | | Ω |
| Thermal Shutdown Temperature | $T_{OTSD}$ | | | 160 | | °C |
| Thermal Shutdown Hysteresis | $T_{HYOTSD}$ | | | 25 | | °C |
| Thermal Resistance (Junction to Case) | $\theta_{JC}$ | SOIC-8 | | 74.6 | | °C/W |
| | | PSOP-8 | | 43.7 | | °C/W |
| | | SOT-223 | | 50.9 | | °C/W |
| | | TO-252-2 (1) /(3) /(4) | | 35 | | °C/W |
| | | TO-263-3 | | 22 | | °C/W |

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≤$T_A$≤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 | | $V_{OUT}$ ×98.5% | 1.8 | $V_{OUT}$ ×101.5% | V |
| Maximum Output Current | $I_{OUT(MAX)}$ | $V_{IN}$=2.8V, $V_{OUT}$=1.773V to 1.827V | | 1.0 | | | A |
| Load Regulation | $\frac{\triangle V_{OUT}/V_{OUT}}{\triangle I_{OUT}}$ | $V_{IN}$=2.8V, 1mA ≤ $I_{OUT}$ ≤1A | | | 0.2 | 1.0 | %/A |
| Line Regulation | $\frac{\triangle V_{OUT}/V_{OUT}}{\triangle V_{IN}}$ | 2.8V≤$V_{IN}$≤6V, $I_{OUT}$=30mA | | -0.1 | 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 |
| | | | 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/°C |
| Short Current Limit | $I_{SHORT}$ | $V_{OUT}$=0V | | | 50 | | mA |
| RMS Output Noise | $V_{NOISE}$ | 10Hz ≤ f ≤100kHz (No load) | | | 30 | | $\mu V_{RMS}$ |
| $V_{EN}$ High Voltage | $V_{IH}$ | Enable logic high, regulator on | | 1.5 | | | V |
| $V_{EN}$ Low Voltage | $V_{IL}$ | Enable logic low, regulator off | | | | 0.4 | |
| Standby Current | $I_{STD}$ | $V_{IN}$=2.8V, $V_{EN}$ in OFF mode | | | 0.01 | 1.0 | μA |
| Start-up Time | $t_S$ | No Load | | | 20 | | μs |
| EN Pull Down Resistor | $R_{PD}$ | | | | 3.0 | | MΩ |
| $V_{OUT}$ Discharge Resistor | $R_{DCHG}$ | Set EN pin at Low | | | 60 | | Ω |
| Thermal Shutdown Temperature | $T_{OTSD}$ | | | | 160 | | °C |
| Thermal Shutdown Hysteresis | $T_{HYOTSD}$ | | | | 25 | | |
| Thermal Resistance (Junction to Case) | $\theta_{JC}$ | SOIC-8 | | | 74.6 | | °C /W |
| | | PSOP-8 | | | 43.7 | | |
| | | SOT-223 | | | 50.9 | | |
| | | TO-252-2 (1) /(3) /(4) | | | 35 | | |
| | | TO-263-3 | | | 22 | | |

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)

### AP2114-2.5 Electrical Characteristics (Note 2)

($V_{IN}$=3.5V, $C_{IN}$=4.7μF (Ceramic), $C_{OUT}$=4.7μF (Ceramic), Typical $T_A$= 25°C, **Bold** typeface applies over -40°C≤$T_A$≤85°C ranges, unless otherwise specified (Note 3))

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $V_{IN}$=3.5V, 1mA ≤ $I_{OUT}$ ≤ 30mA | | $V_{OUT}$ ×98.5% | 2.5 | $V_{OUT}$ ×101.5% | V |
| Maximum Output Current | $I_{OUT(MAX)}$ | $V_{IN}$=3.5V, $V_{OUT}$=2.463V to 2.537V | | 1.0 | | | A |
| Load Regulation | $\frac{\triangle V_{OUT}/V_{OUT}}{\triangle I_{OUT}}$ | Vout=2.5V, $V_{IN}$=Vout+1V<br>1mA ≤ $I_{OUT}$ ≤1A | | | 0.2 | 1.0 | %/A |
| Line Regulation | $\frac{\triangle V_{OUT}/V_{OUT}}{\triangle V_{IN}}$ | 3.5V≤$V_{IN}$≤6V, $I_{OUT}$=30mA | | -0.1 | 0.02 | 0.1 | %/V |
| Dropout Voltage | $V_{DROP}$ | $I_{OUT}$ =1A | | | 450 | 750 | mV |
| Quiescent Current | $I_Q$ | $V_{IN}$=3.5V, $I_{OUT}$=0mA | | | 60 | 80 | μA |
| Power Supply Rejection Ratio | PSRR | Ripple 1Vp-p<br>$V_{IN}$=3.5V,<br>$I_{OUT}$=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/°C |
| Short Current Limit | $I_{SHORT}$ | $V_{OUT}$=0V | | | 50 | | mA |
| RMS Output Noise | $V_{NOISE}$ | 10Hz ≤ f ≤100kHz | | | 30 | | $\mu V_{RMS}$ |
| $V_{EN}$ High Voltage | $V_{IH}$ | Enable logic high, regulator on | | 1.5 | | | V |
| $V_{EN}$ Low Voltage | $V_{IL}$ | Enable logic low, regulator off | | | | 0.4 | |
| Standby Current | $I_{STD}$ | $V_{IN}$=3.5V, $V_{EN}$ in OFF mode | | | 0.01 | 1.0 | μA |
| Start-up Time | $t_S$ | No Load | | | 20 | | μs |
| EN Pull Down Resistor | $R_{PD}$ | | | | 3.0 | | MΩ |
| $V_{OUT}$ Discharge Resistor | $R_{DCHG}$ | Set EN pin at Low | | | 60 | | Ω |
| Thermal Shutdown Temperature | $T_{OTSD}$ | | | | 160 | | °C |
| Thermal Shutdown Hysteresis | $T_{HYOTSD}$ | | | | 25 | | |
| Thermal Resistance (Junction to Case) | $\theta_{JC}$ | SOIC-8 | | | 74.6 | | °C /W |
| | | PSOP-8 | | | 43.7 | | |
| | | SOT-223 | | | 50.9 | | |
| | | TO-252-2 (1) /(3) /(4) | | | 35 | | |
| | | TO-263-3 | | | 22 | | |

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≤$T_A$≤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 | | $V_{OUT}$ ×98.5% | 3.3 | $V_{OUT}$ ×101.5% | V |
| Maximum Output Current | $I_{OUT(MAX)}$ | $V_{IN}$ =4.3V, $V_{OUT}$=3.25V to 3.35V | | 1.0 | | | A |
| Load Regulation | $\frac{\triangle V_{OUT}/V_{OUT}}{\triangle I_{OUT}}$ | $V_{IN}$=4.3V, 1mA ≤ $I_{OUT}$ ≤1A | | | 0.2 | 1.0 | %/A |
| Line Regulation | $\frac{\triangle V_{OUT}/V_{OUT}}{\triangle V_{IN}}$ | 4.3V≤$V_{IN}$≤6V, $I_{OUT}$=30mA | | -0.1 | 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/°C |
| Short Current Limit | $I_{SHORT}$ | $V_{OUT}$=0V | | | 50 | | mA |
| RMS Output Noise | $V_{NOISE}$ | 10Hz ≤ f ≤100kHz (No load) | | | 30 | | $\mu V_{RMS}$ |
| $V_{EN}$ High Voltage | $V_{IH}$ | Enable logic high, regulator on | | 1.5 | | | V |
| $V_{EN}$ Low Voltage | $V_{IL}$ | Enable logic low, regulator off | | | | 0.4 | |
| Standby Current | $I_{STD}$ | $V_{IN}$=4.3V, $V_{EN}$ in OFF mode | | | 0.01 | 1.0 | μA |
| Start-up Time | $t_S$ | No Load | | | 20 | | μs |
| EN Pull Down Resistor | $R_{PD}$ | | | | 3.0 | | MΩ |
| $V_{OUT}$ Discharge Resistor | $R_{DCHG}$ | Set EN pin at Low | | | 60 | | Ω |
| Thermal Shutdown Temperature | $T_{OTSD}$ | | | | 160 | | °C |
| Thermal Shutdown Hysteresis | $T_{HYOTSD}$ | | | | 25 | | |
| Thermal Resistance (Junction to Case) | $\theta_{JC}$ | SOIC-8 | | | 74.6 | | °C/W |
| | | PSOP-8 | | | 43.7 | | |
| | | SOT-223 | | | 50.9 | | |
| | | TO-252-2 (1) /(3) /(4) | | | 35 | | |
| | | TO-263-3 | | | 22 | | |

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-ADJ 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≤$T_A$≤85°C ranges, unless otherwise specified (Note 3))

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Reference Voltage | $V_{REF}$ | $V_{IN}$=2.5V, 1mA ≤ $I_{OUT}$ ≤ 30mA | | $V_{REF}$ ×98.5% | 0.8 | $V_{REF}$ ×101.5% | V |
| Input Voltage | $V_{IN}$ | | | | | 6.0 | V |
| Maximum Output Current | $I_{OUT(MAX)}$ | $V_{IN}$=2.5V, $V_{OUT}$= 0.788V to 0.812V | | 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 | | -0.1 | 0.02 | 0.1 | %/V |
| 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 |
| | | | 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/°C |
| Short Current Limit | $I_{SHORT}$ | $V_{OUT}$=0V | | | 50 | | mA |
| RMS Output Noise | $V_{NOISE}$ | 10Hz ≤ f ≤100kHz (No Load) | | | 30 | | $\mu V_{RMS}$ |
| $V_{EN}$ High Voltage | $V_{IH}$ | Enable logic high, regulator on | | 1.5 | | | V |
| $V_{EN}$ Low Voltage | $V_{IL}$ | Enable logic low, regulator off | | | | 0.4 | |
| Standby Current | $I_{STD}$ | $V_{IN}$=2.5V, $V_{EN}$ in OFF mode | | | 0.01 | 1.0 | μA |
| Start-up Time | $t_S$ | No Load | | | 20 | | μs |
| EN Pull Down Resistor | $R_{PD}$ | | | | 3.0 | | MΩ |
| $V_{OUT}$ Discharge Resistor | $R_{DCHG}$ | Set EN pin at Low | | | 60 | | Ω |
| Thermal Shutdown Temperature | $T_{OTSD}$ | | | | 160 | | °C |
| Thermal Shutdown Hysteresis | $T_{HYOTSD}$ | | | | 25 | | |
| Thermal Resistance (Junction to Case) | $\theta_{JC}$ | SOIC-8 | | | 74.6 | | °C/W |
| | | PSOP-8 | | | 43.7 | | |

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

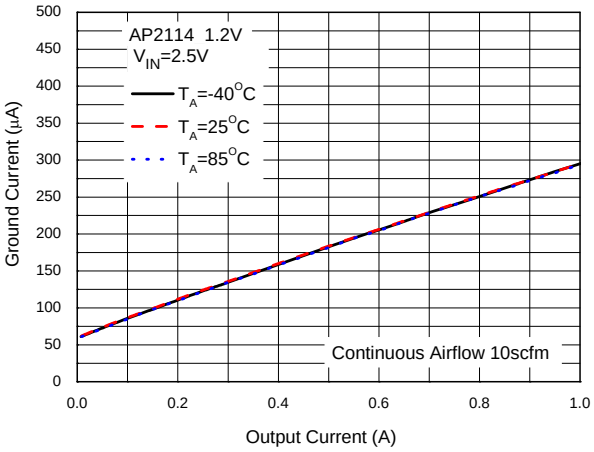



Figure 4. Ground Current vs. Output Current

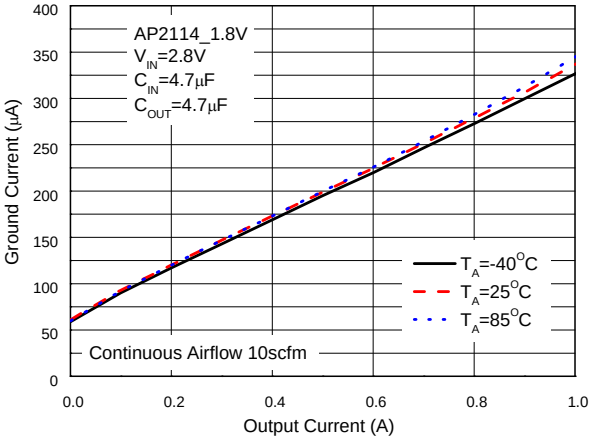



Figure 5. Ground Current vs. Output Current

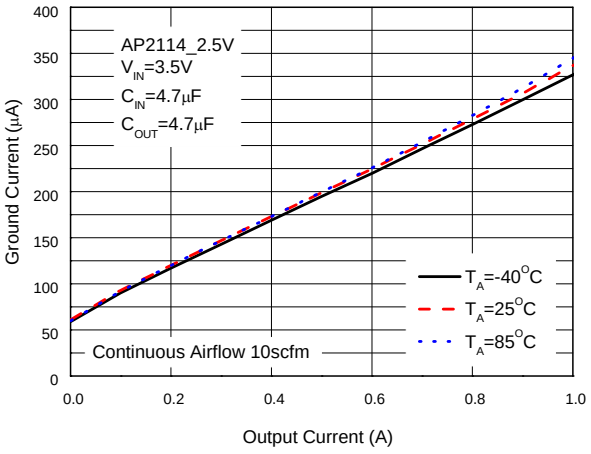



Figure 6. Ground Current vs. Output Current

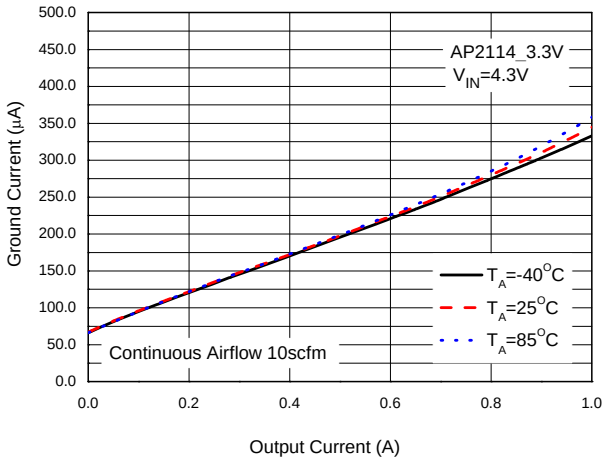



Figure 7. Ground Current vs. Output Current

## Typical Performance Characteristics (Continued)

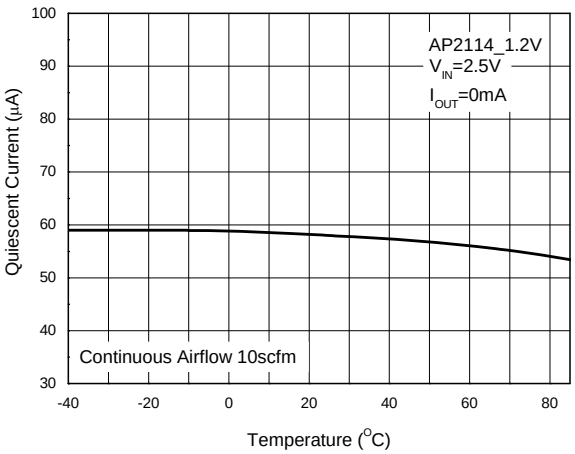



Figure 8. Quiescent Current vs. Temperature

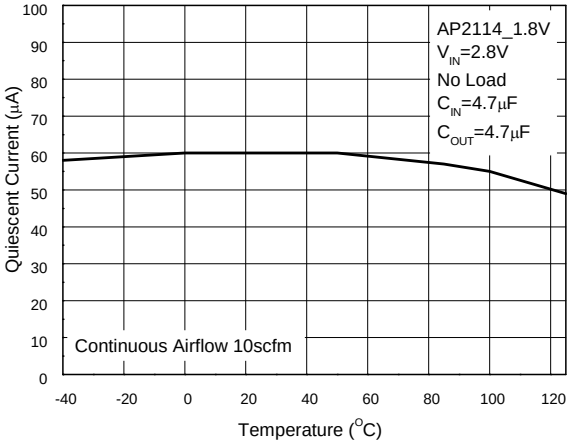



Figure 9. Quiescent Current vs. Temperature

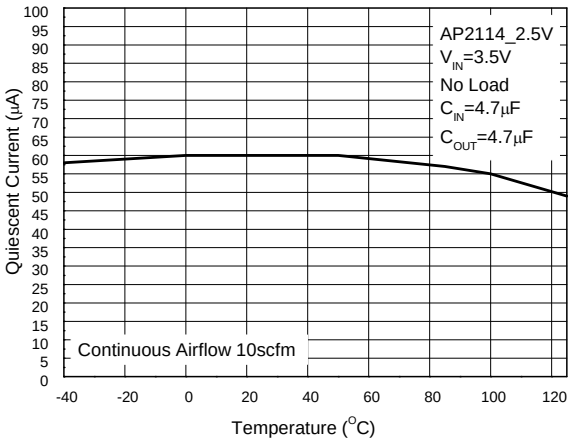



Figure 10. Quiescent Current vs. Temperature

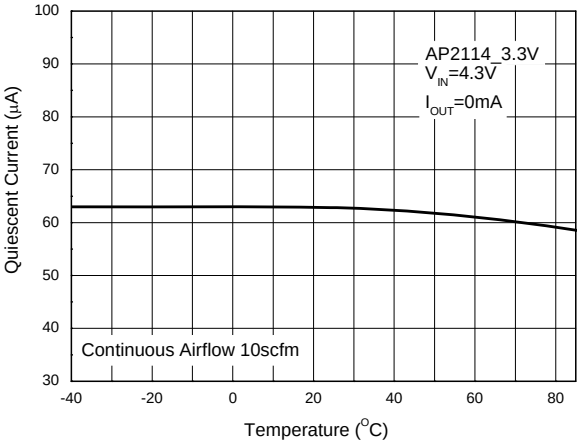



Figure 11. Quiescent Current vs. Temperature

## Typical Performance Characteristics (Continued)

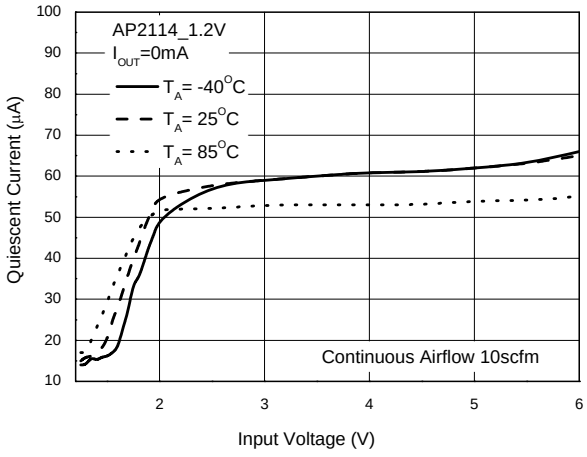



Figure 12. Quiescent Current vs. Input Voltage

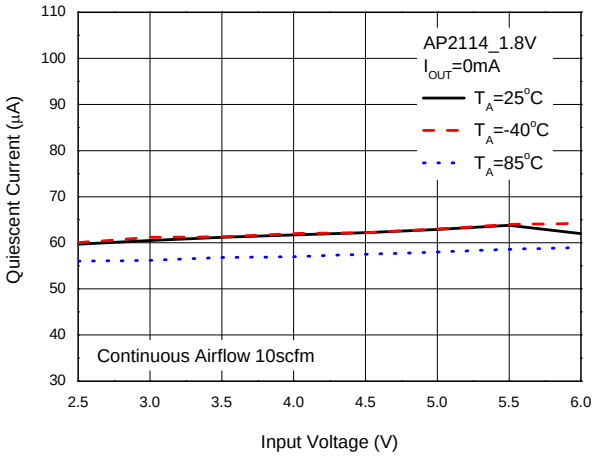



Figure 13. Quiescent Current vs. Input Voltage

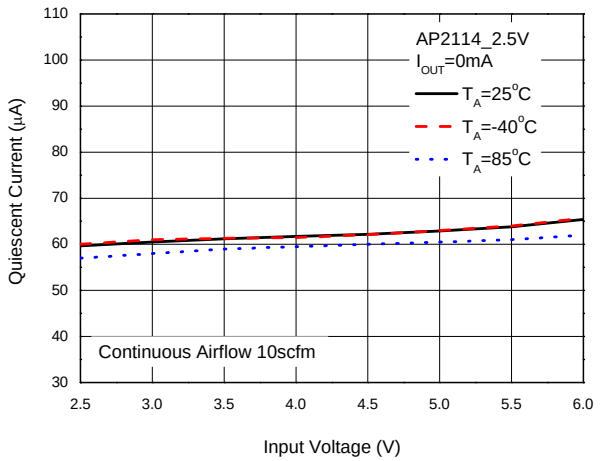



Figure 14. Quiescent Current vs. Input Voltage

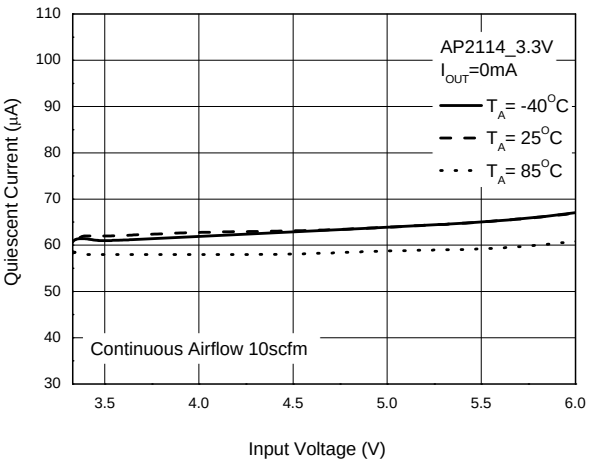



Figure 15. Quiescent Current vs. Input Voltage

## Typical Performance Characteristics (Continued)

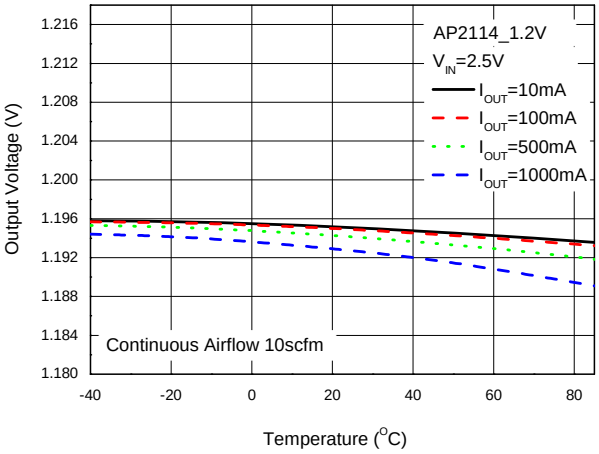



Figure 16. Output Voltage vs. Temperature

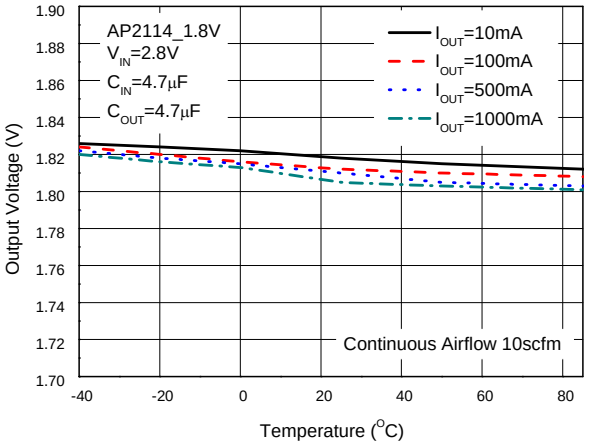



Figure 17. Output Voltage vs. Temperature

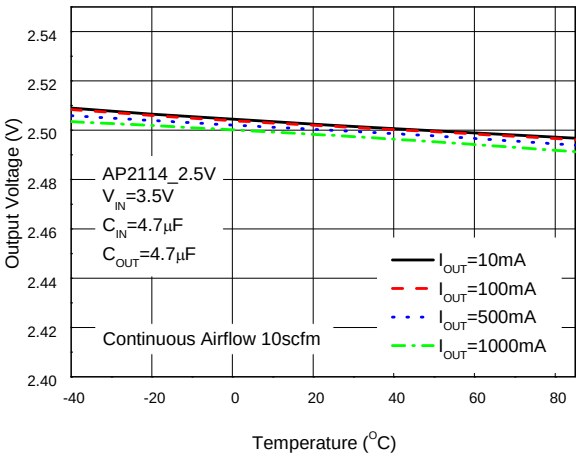



Figure 18. Output Voltage vs. Temperature

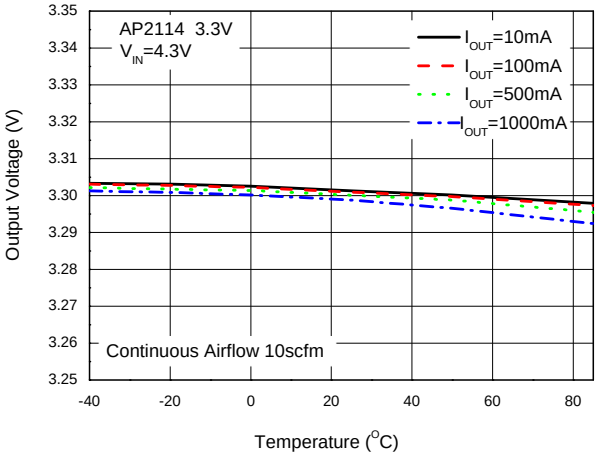



Figure 19. Output Voltage vs. Temperature

## Typical Performance Characteristics (Continued)

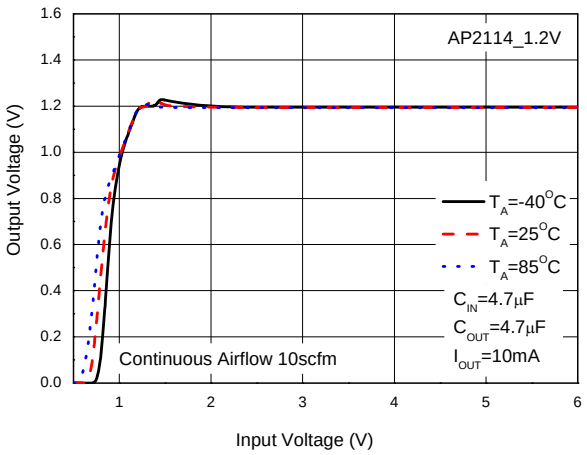



Figure 20. Output Voltage vs. Input Voltage

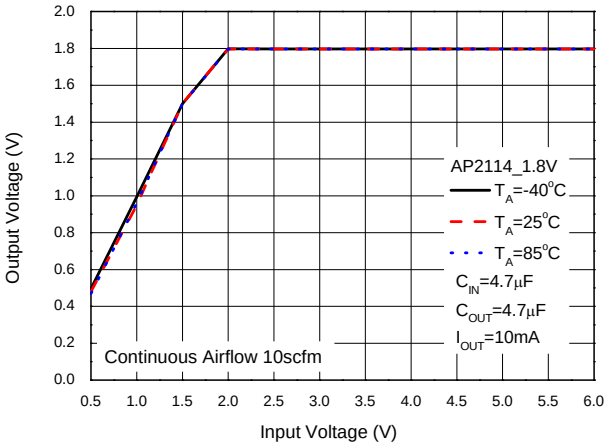



Figure 21. Output Voltage vs. Input Voltage

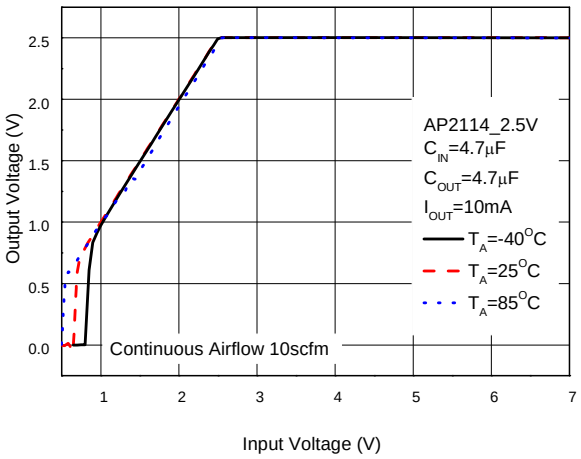



Figure 22. Output Voltage vs. Input Voltage

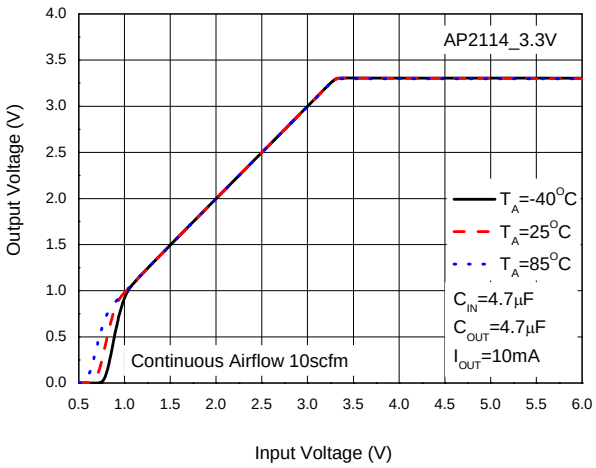



Figure 23. Output Voltage vs. Input Voltage

## Typical Performance Characteristics (Continued)

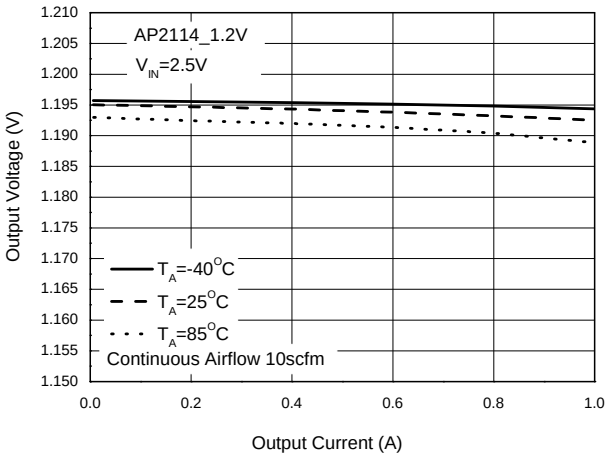



Figure 24. Output Voltage vs. Output Current

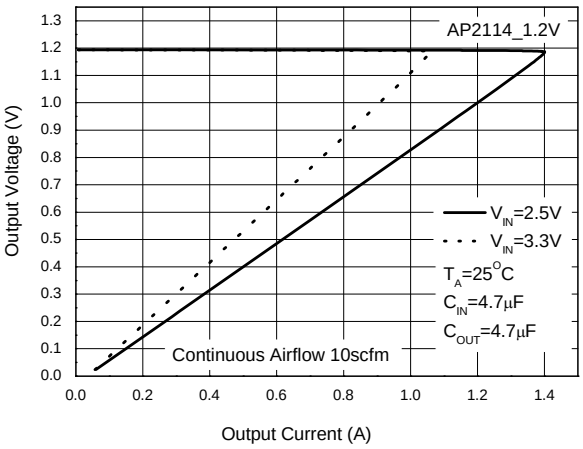



Figure 25. Output Voltage vs. Output Current

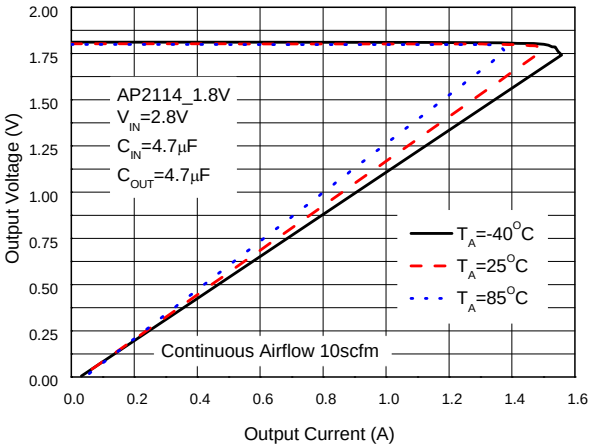



Figure 26. Output Voltage vs. Output Current

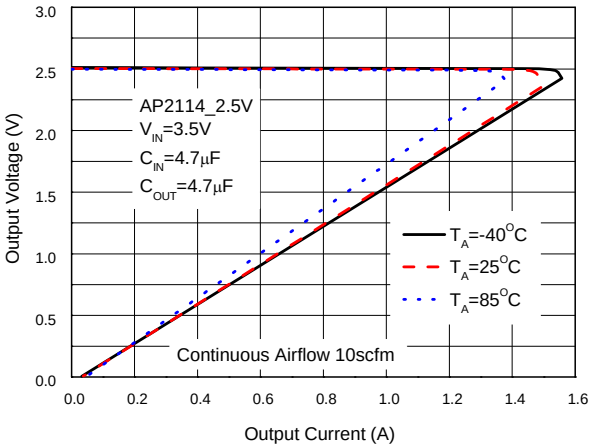



Figure 27. Output Voltage vs. Output Current

## Typical Performance Characteristics (Continued)

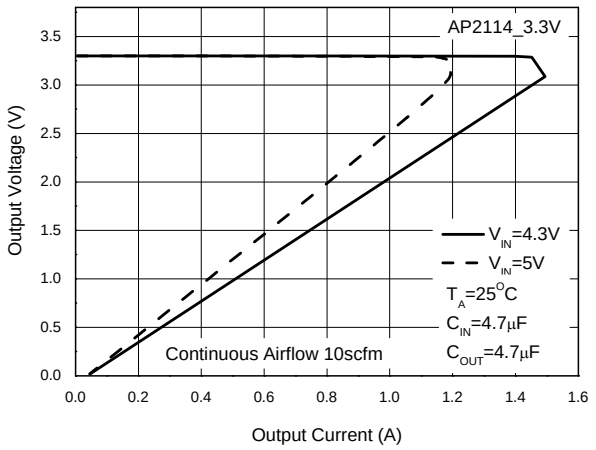



Figure 28. Output Voltage vs. Output Current

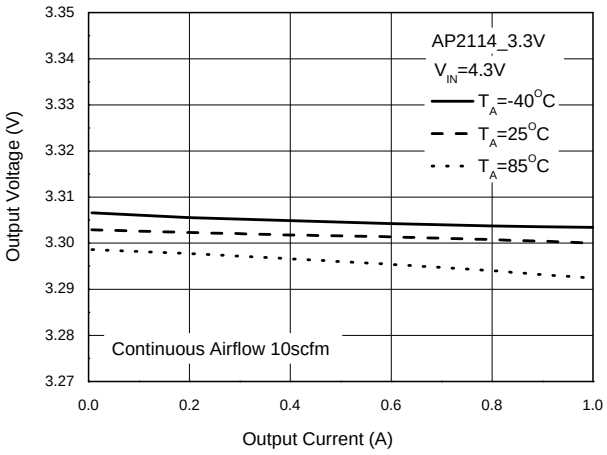



Figure 29. Output Voltage vs. Output Current

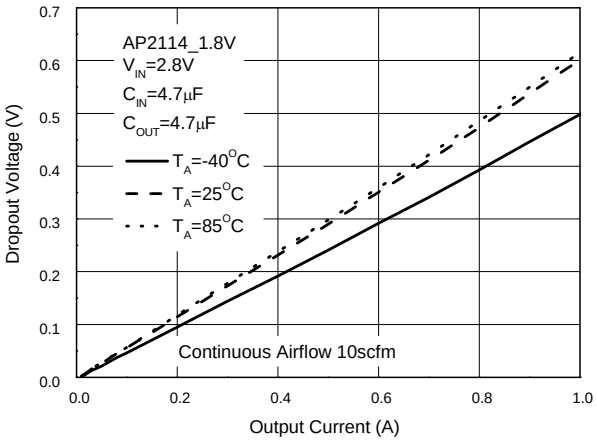



Figure 30. Dropout Voltage vs. Output Current

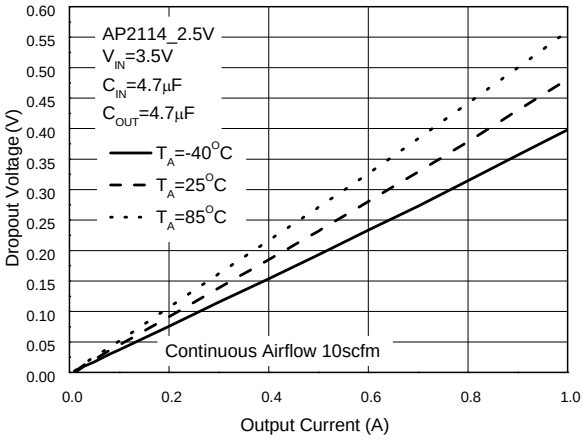



Figure 31. Dropout Voltage vs. Output Current

## Typical Performance Characteristics (Continued)

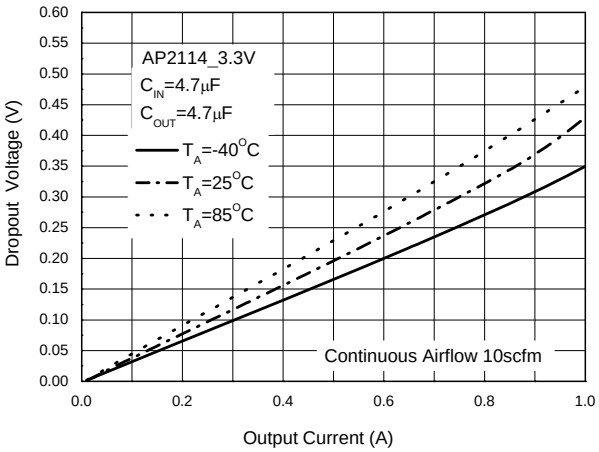



Figure 32. Dropout Voltage vs. Output Current

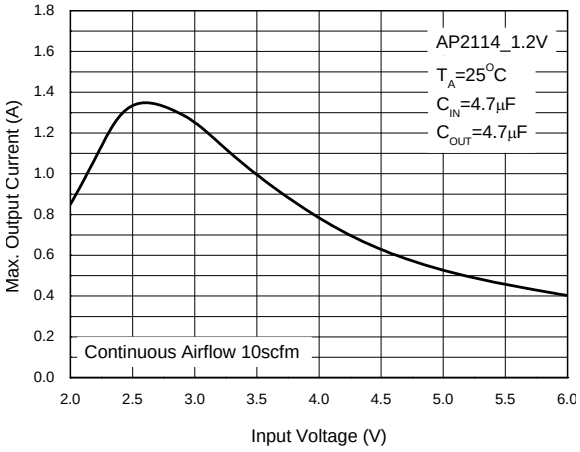



Figure 33. Max. Output Current vs. Input Voltage

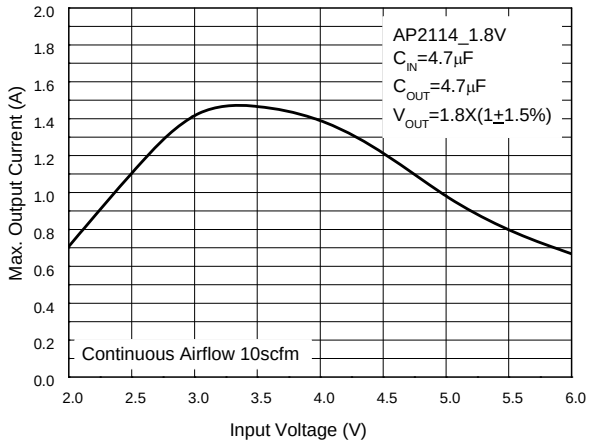



Figure 34. Max. Output Current vs. Input Voltage

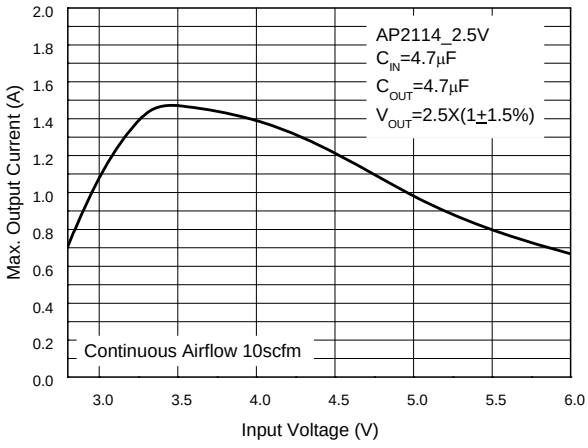



Figure 35. Max. Output Current vs. Input Voltage

## Typical Performance Characteristics (Continued)

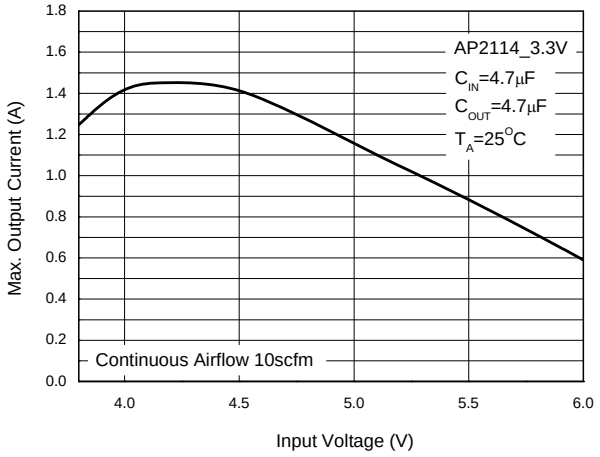



Figure 36. Max. Output Current vs. Input Voltage

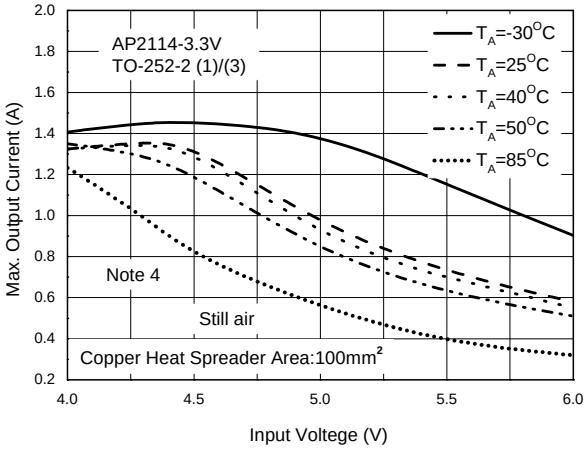



Figure 37. Max. Output Current vs. Input Voltage

Note 4: Considering power dissipation and thermal behavior, we suggest provide enough design margins in application design which are no less than 30% at least.

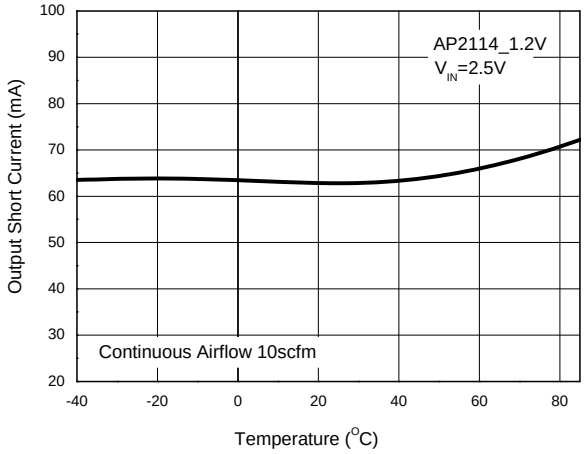



Figure 38. Output Short Current vs. Temperature

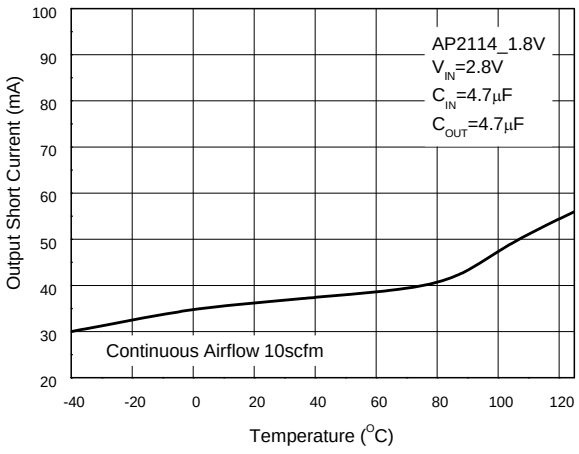



Figure 39. Output Short Current vs. Temperature

## Typical Performance Characteristics (Continued)

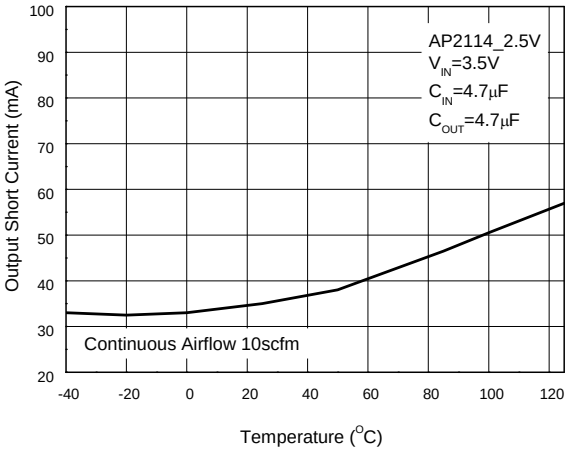



Figure 40. Output Short Current vs. Temperature

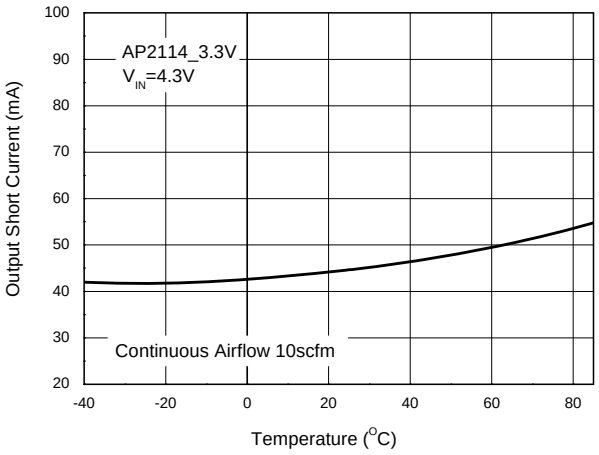



Figure 41. Output Short Current vs. Temperature

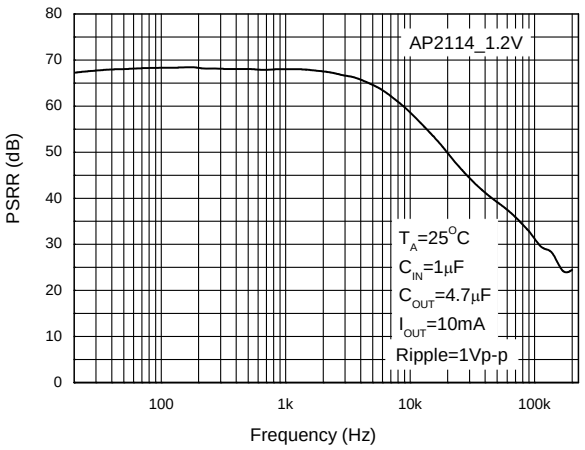



Figure 42. PSRR vs. Frequency

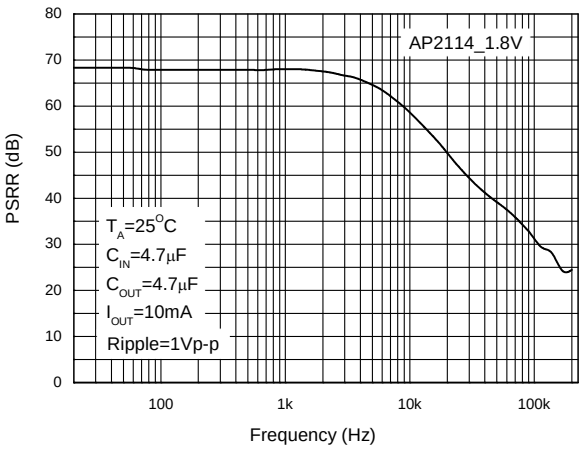



Figure 43. PSRR vs. Frequency

## Typical Performance Characteristics (Continued)

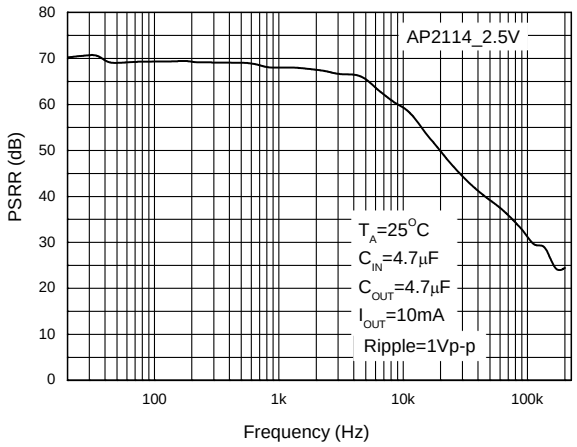



Figure 44. PSRR vs. Frequency

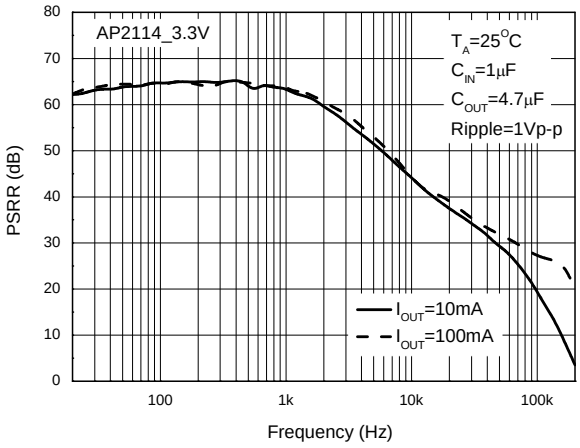



Figure 45. PSRR vs. Frequency

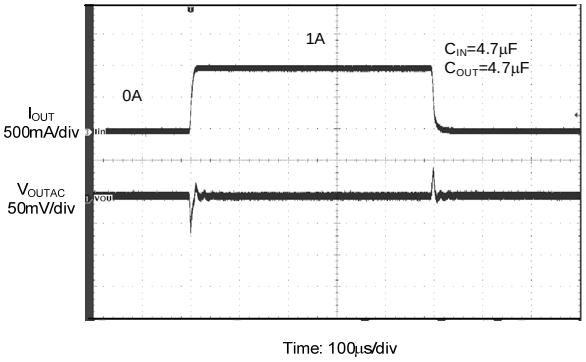
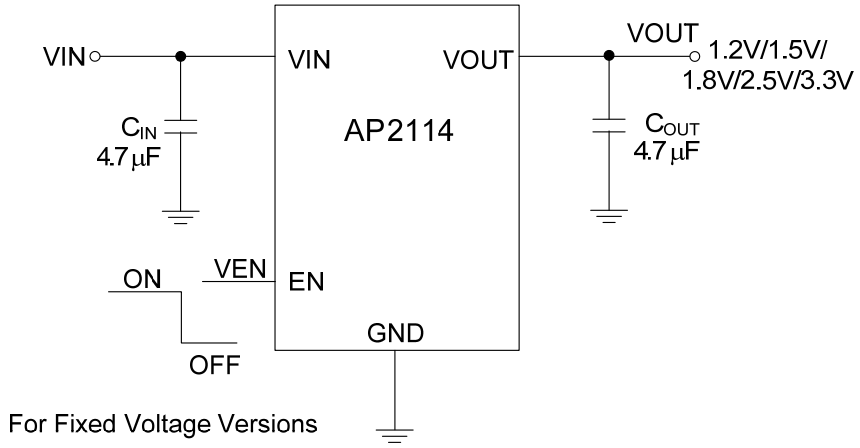



Figure 46. Load Transient

## Typical Application



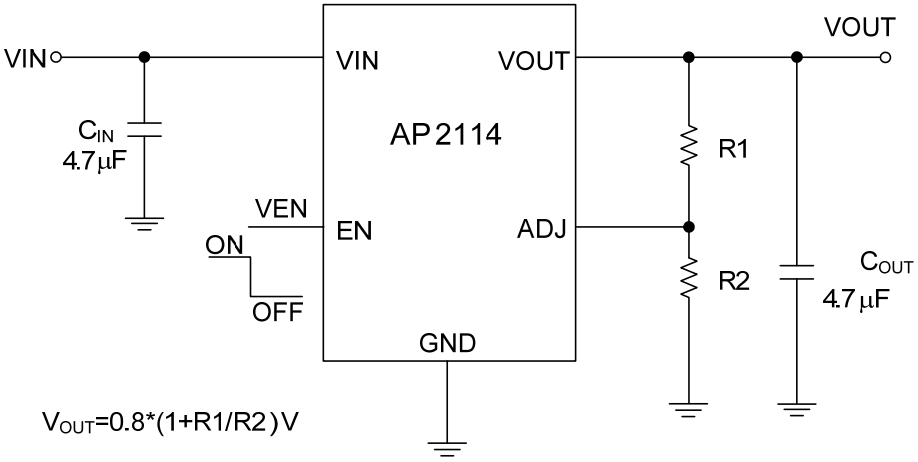
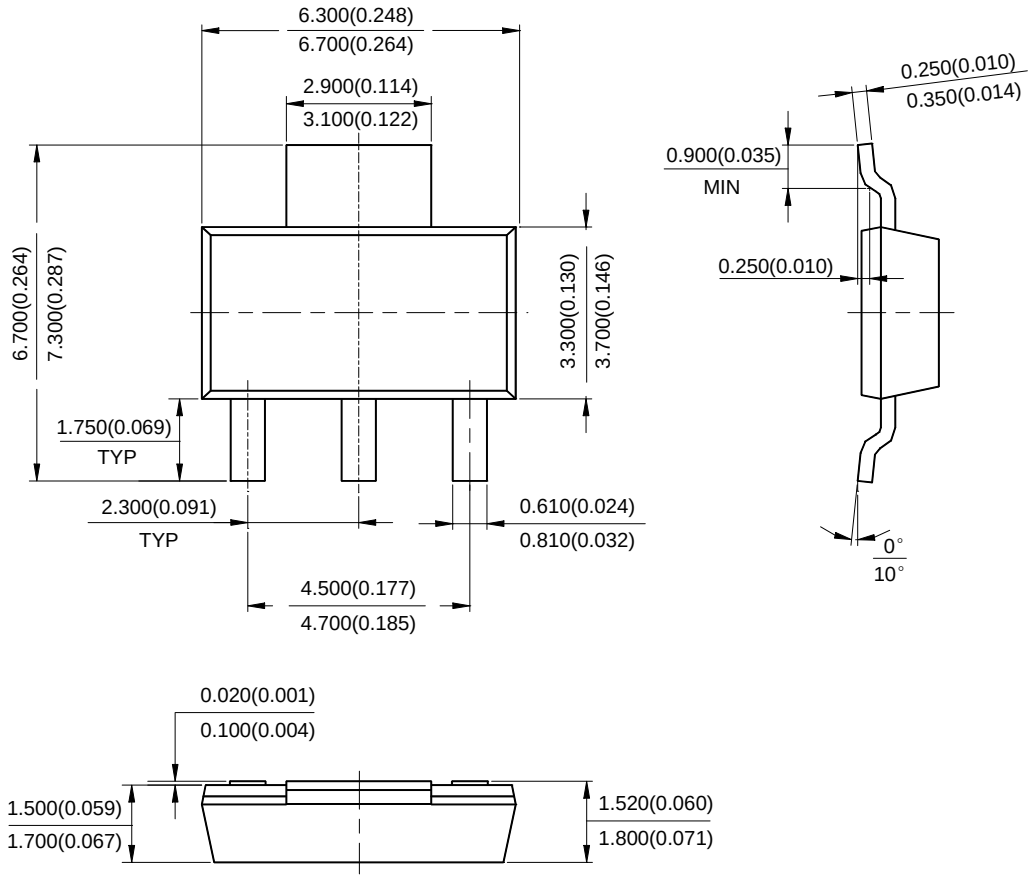




Figure 47. Typical Application of AP2114

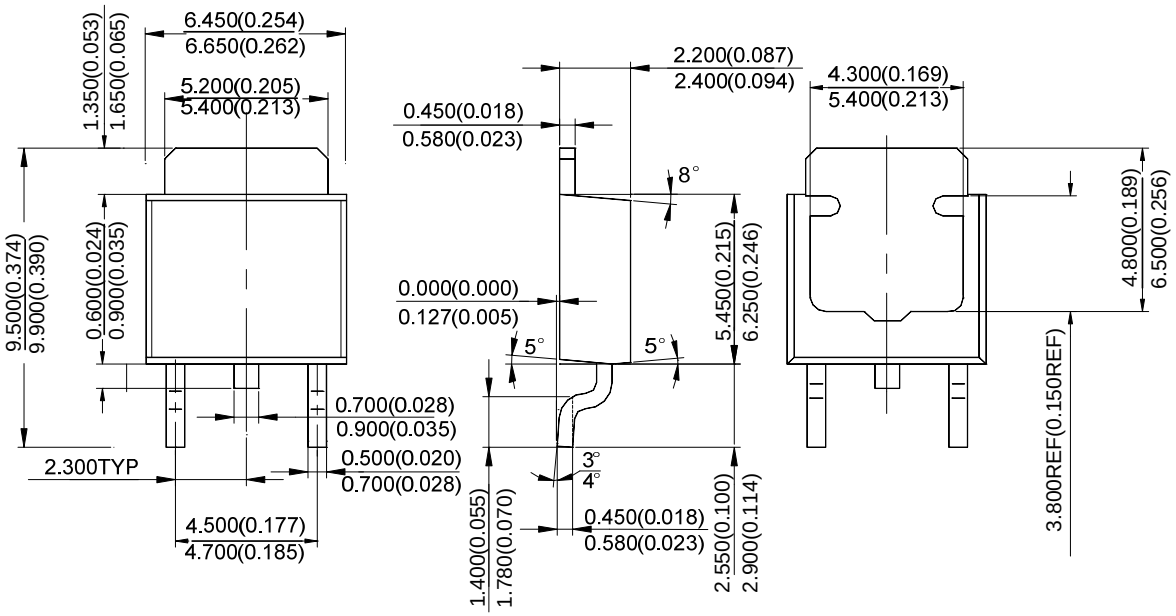
## Mechanical Dimensions

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



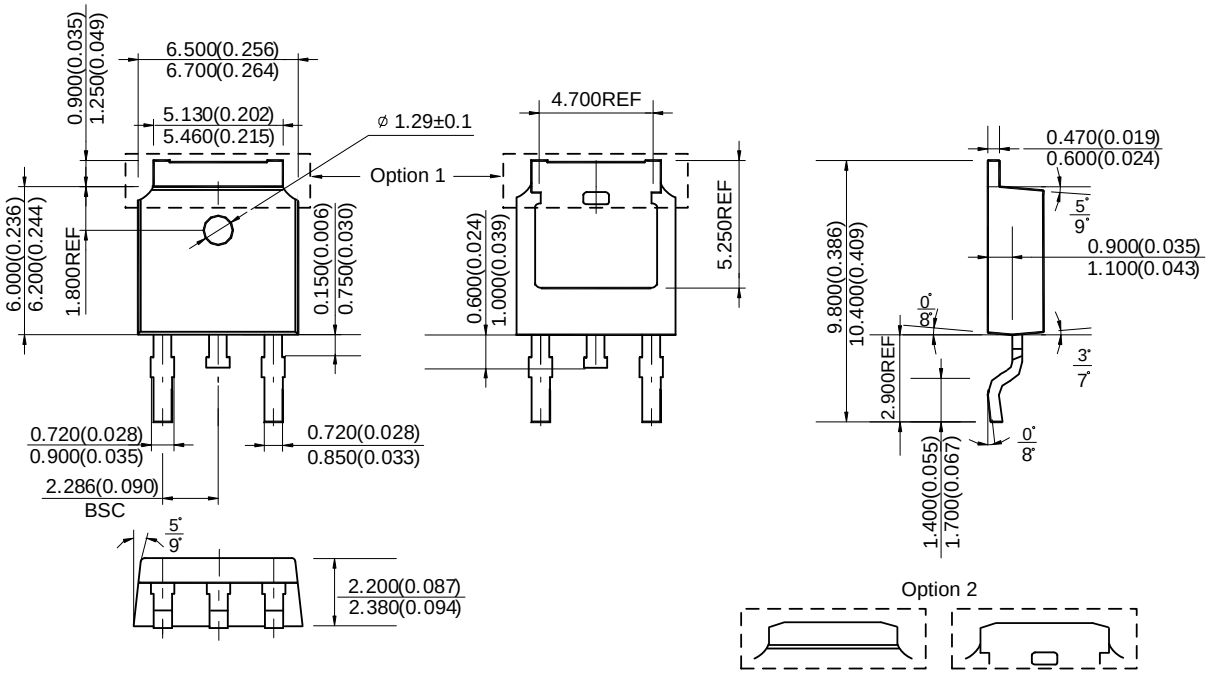
## Mechanical Dimensions (Continued)

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



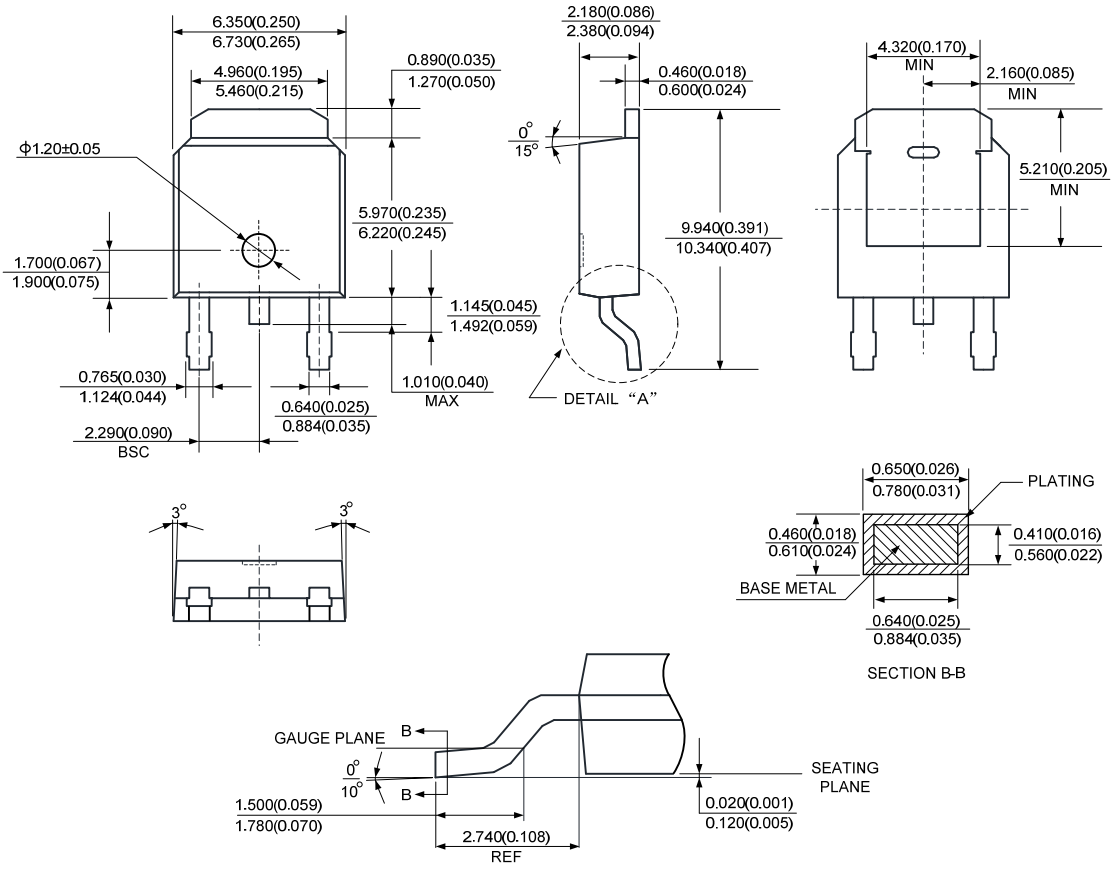
## Mechanical Dimensions (Continued)

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



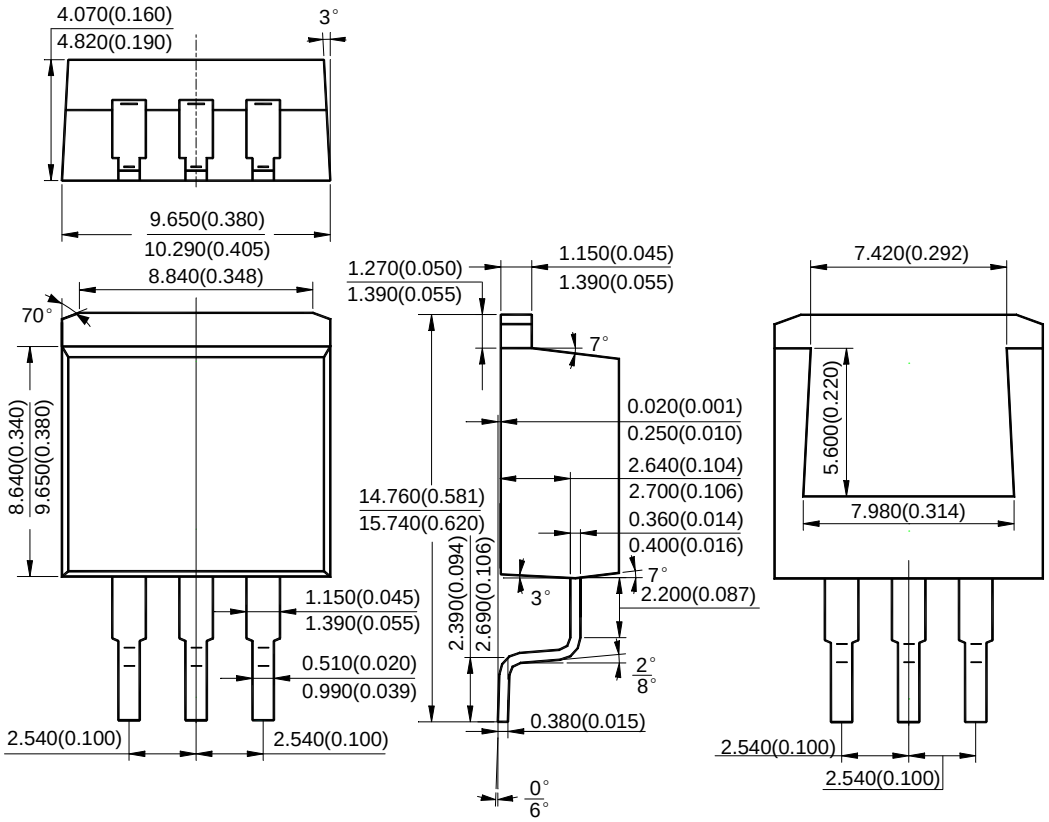
## Mechanical Dimensions (Continued)

**TO-252-2 (4)** **Unit: mm(inch)**



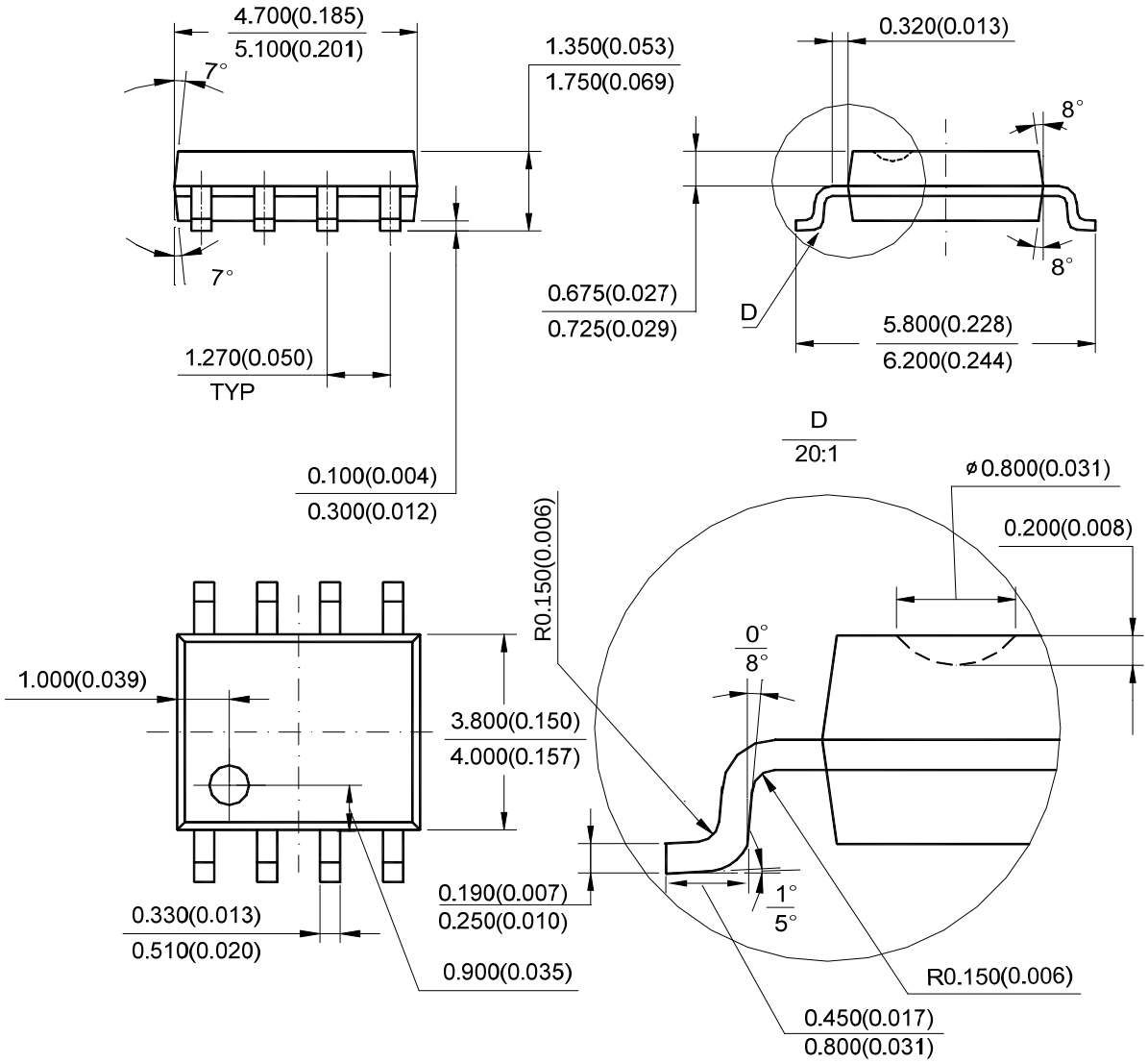
## Mechanical Dimensions (Continued)

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



## Mechanical Dimensions (Continued)

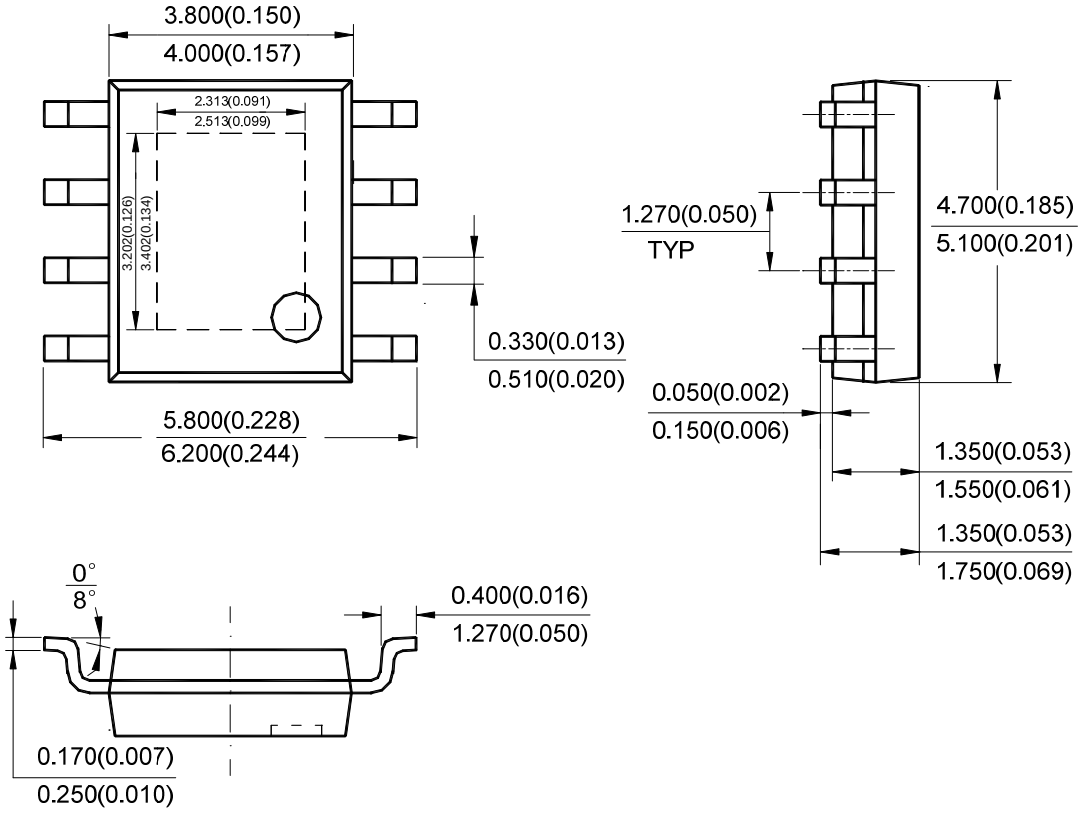
**SOIC-8** **Unit: mm(inch)**




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

## Mechanical Dimensions (Continued)

**PSOP-8** **Unit: mm(inch)**




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

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