

NCP4671

400 mA, Dual Rail Ultra Low Dropout Linear Regulator

The NCP4671 is a CMOS Dual Supply Rail Linear Regulator designed to provide very low output voltages. The Dual Rail architecture which separates the power for the LDO control circuitry (provided via the Vbias pin) from the main power path (VIN) offers ultra-low dropout performance, allowing the device to operate from input voltages down to 0.9 V and to generate a fixed high accuracy output voltage as low as 0.6 V.

The NCP4671 offers excellent transient response with very low quiescent currents. The family is available in a variety of packages: SC-70, SOT23 and a small, ultra thin 1.2 x 1.2 x 0.4mm XDFN.

Features

- Bias Supply Voltage Range : 2.4 V to 5.25 V ($V_{OUT} < 0.8$ V)
Set $V_{OUT} + 1.6$ V to 5.25 V ($V_{OUT} \geq 0.8$ V)
- Power Input Voltage Range : 0.9 V to V_{BIAS} ($V_{OUT} < 0.8$ V)
Set $V_{OUT} + 0.1$ V to V_{BIAS} ($V_{OUT} \geq 0.8$ V)
- Output Voltage Range: 0.6 to 1.5 V (available at 0.1 steps)
- Very Low Dropout: 180 mV Typ. at 400 mA
- Quiescent Current: 28 μ A
- Standby Current: 0.1 μ A
- ± 15 mV Output Voltage Accuracy ($T_A = 25^\circ\text{C}$)
- High PSRR: 80 dB at 1 kHz (Ripple at VIN)
50 dB at 1 kHz (Ripple at VBIAS)
- Current Fold Back Protection Typ. 120 mA
- Available in XDFN, SC-70, SOT23 Package
- These are Pb-Free Devices

Typical Applications

- Battery Powered Equipments
- Portable Communication Equipments
- Cameras, VCRs and Camcorders

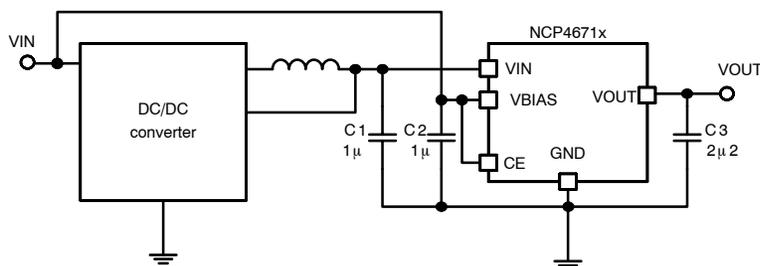


Figure 1. Typical Application Schematic



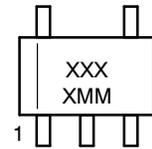
ON Semiconductor™

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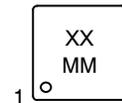
MARKING DIAGRAMS



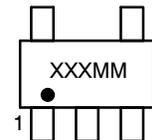
SC-70
CASE 419A
(In Development)



XDFN6
CASE 711AA



SOT-23-5
CASE 1212



XX, XXX= Specific Device Code
M, MM = Date Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb-Free Package

(*Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 20 of this data sheet.

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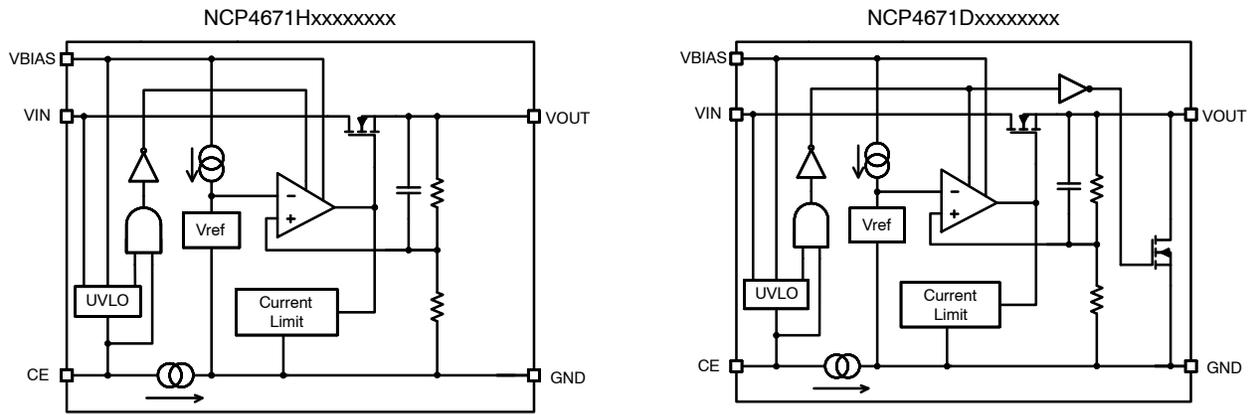


Figure 2. Simplified Schematic Block Diagram

PIN FUNCTION DESCRIPTION

| Pin No. XDFN | Pin No. SC-70 | Pin No. SOT23 | Pin Name | Description |
|--------------|---------------|---------------|----------|------------------------------|
| 1 | 1 | 4 | VBIAS | Input Pin 1 |
| 2 | 2 | 2 | GND | Ground Pin |
| 3 | 5 | 3 | CE | Chip Enable Pin ("H" Active) |
| 4 | 4 | 1 | VIN | Input Pin 2 |
| 5 | - | - | NC | Not connected |
| 6 | 3 | 5 | VOUT | Output Pin |

ABSOLUTE MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------------------------|--------------|--------------------------|------|
| Bias Supply Input Voltage (Note 1) | V_{BIAS} | 6.0 | V |
| Power Supply Input Voltage (for Driver) (Note 1) | V_{IN} | -0.3 to $V_{BIAS} + 0.3$ | V |
| Output Voltage | V_{OUT} | -0.3 to $V_{IN} + 0.3$ | V |
| Chip Enable Input | V_{CE} | 6.0 | V |
| Output Current | I_{OUT} | 500 | mA |
| Power Dissipation XDFN | P_D | 400 | mW |
| Power Dissipation SC-70 | | 380 | |
| Power Dissipation SOT23 | | 420 | |
| Maximum Junction Temperature | $T_{J(MAX)}$ | 150 | °C |
| Storage Temperature | T_{STG} | -55 to 125 | °C |
| ESD Capability, Human Body Model (Note 2) | ESD_{HBM} | 2000 | V |
| ESD Capability, Machine Model (Note 2) | ESD_{MM} | 200 | V |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Refer to ELECTRICAL CHARACTERISTICS and APPLICATION INFORMATION for Safe Operating Area.
2. This device series incorporates ESD protection and is tested by the following methods:
 ESD Human Body Model tested per AEC-Q100-002 (EIA/JESD22-A114)
 ESD Machine Model tested per AEC-Q100-003 (EIA/JESD22-A115)
 Latchup Current Maximum Rating tested per JEDEC standard: JESD78.

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THERMAL CHARACTERISTICS

| Rating | Symbol | Value | Unit |
|-----------------------------------------------------------------------|-----------------|-------|-----------------------------|
| Thermal Characteristics, XDFN Thermal Resistance, Junction-to-Air | $R_{\theta JA}$ | 250 | $^{\circ}\text{C}/\text{W}$ |
| Thermal Characteristics, SOT23 Thermal Resistance, Junction-to-Air | $R_{\theta JA}$ | 238 | $^{\circ}\text{C}/\text{W}$ |
| Thermal Characteristics, SC-70 Thermal Resistance, Junction-to-Air | $R_{\theta JA}$ | 263 | $^{\circ}\text{C}/\text{W}$ |

ELECTRICAL CHARACTERISTICS

$-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$, $V_{BIAS} = V_{CE} = 3.6\text{ V}$, $V_{IN} = V_{OUT(NOM)} + 0.5\text{ V}$, $I_{OUT} = 1\text{ mA}$, $C_{BIAS} = C_{IN} = 1.0\text{ }\mu\text{F}$, $C_{OUT} = 2.2\text{ }\mu\text{F}$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}\text{C}$.

| Parameter | Test Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------------------|----------------------------------------------------------------------------------------------|---------------------|-----------------|------------------|-----------------|-------------------------|
| Operating Supply Input Voltage (Note 3) | $V_{OUT} < 0.8\text{ V}$ | V_{BIAS} | 2.4 | | 5.25 | V |
| | $V_{OUT} \geq 0.8\text{ V}$ | | $V_{OUT} + 1.6$ | 5.25 | | |
| Operating Power Input Voltage (Note 3) | $V_{OUT} < 0.8\text{ V}$ | V_{IN} | 0.9 | | V_{BIAS} | V |
| | $V_{OUT} \geq 0.8\text{ V}$ | | $V_{OUT} + 0.1$ | V_{BIAS} | | |
| Output Voltage | $T_A = +25^{\circ}\text{C}$ | V_{OUT} | -15 | | +15 | mV |
| | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | | -20 | +20 | | |
| Output Voltage Temp. Coefficient | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | | | ± 50 | | ppm/ $^{\circ}\text{C}$ |
| Line Regulation | $V_{BIAS} = 2.4\text{ V}$ to 5.0 V | Line_{Reg} | | 0.02 | 0.10 | %/ V |
| | $V_{IN} = V_{OUT} + 0.3\text{ V}$ to 2.4 V | | | 0.02 | 0.10 | |
| Load Regulation | $I_{OUT} = 1\text{ mA}$ to 400 mA | Load_{Reg} | | 30 | 50 | mV |
| Dropout Voltage | Please refer to following detailed table. | | | | | |
| Output Current | | I_{OUT} | 400 | | | mA |
| Short Current Limit | $V_{OUT} = 0\text{ V}$ | I_{SC} | | 120 | | mA |
| Quiescent Current | $I_{OUT} = 0\text{ mA}$ | I_Q | | 28 | 40 | μA |
| Standby Current | $V_{CE} = 0\text{ V}$, $T_A = 25^{\circ}\text{C}$ | I_{STB} | | 0.1 | 3 | μA |
| CE Pin Threshold Voltage | CE Input Voltage "H" | V_{CEH} | 0.8 | | | V |
| | CE Input Voltage "L" | V_{CEL} | | | 0.3 | |
| CE Pull Down Current | | I_{PD} | | 1 | | μA |
| V_{IN} Under Voltage Lock Out | $I_{OUT} = 1\text{ }\mu\text{A}$ | V_{IN_UVLO} | | $V_{OUT} + 0.05$ | $V_{OUT} + 0.1$ | V |
| Power Supply Rejection Ratio | $I_{OUT} = 30\text{ mA}$, $f = 1\text{ kHz}$, V_{IN} Ripple 0.2 V_{P-P} | PSRR | | 80 | | dB |
| | $I_{OUT} = 30\text{ mA}$, $f = 1\text{ kHz}$, V_{BIAS} Ripple 0.2 V_{P-P} | | | 50 | | |
| Output Noise Voltage | $V_{OUT} = 0.6\text{ V}$, $I_{OUT} = 30\text{ mA}$, $f = 10\text{ Hz}$ to 100 kHz | V_N | | 70 | | μV_{rms} |
| Low Output Nch Tr. On Resistance | D Version only, $V_{BIAS} = 3.6\text{ V}$, $V_{CE} = \text{"L"}$ | R_{LOW} | | 50 | | Ω |

3. If Input Voltage range is between 5.25 V and 5.50 V, the total operational time must be within 500 hrs.

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DROPOUT VOLTAGE (V_{DO} [V])

| V_{OUT} / V_{BIAS} | V_{DO} [V] @ $I_{OUT} = 200$ mA ($T_A = 25^\circ\text{C}$) | | | | | | V_{DO} [V] @ $I_{OUT} = 300$ mA | | V_{DO} [V] @ $I_{OUT} = 400$ mA | |
|----------------------|----------------------------------------------------------------|-------|-------|-------|-------|-------|-----------------------------------|-----------------------------------------------------|-----------------------------------|-----------------------------------------------------|
| | | | | | | | $T_A = 25^\circ\text{C}$ | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ | $T_A = 25^\circ\text{C}$ | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| | 2.5 V | 3.0 V | 3.3 V | 3.6 V | 4.2 V | 5.0 V | 3.6 V | 3.6 V | 3.6 V | 3.6 V |
| 0.6 V | 0.094 | 0.093 | 0.093 | 0.092 | 0.092 | 0.091 | 0.115 | 0.180 | 0.180 | 0.320 |
| 0.7 V | 0.094 | 0.093 | 0.093 | 0.092 | 0.092 | 0.092 | 0.120 | 0.190 | 0.180 | 0.320 |
| 0.8 V | 0.098 | 0.093 | 0.093 | 0.092 | 0.092 | 0.092 | 0.120 | 0.190 | 0.180 | 0.300 |
| 0.9 V | 0.098 | 0.094 | 0.093 | 0.092 | 0.092 | 0.092 | 0.120 | 0.190 | 0.180 | 0.300 |
| 1.0 V | * | 0.094 | 0.093 | 0.092 | 0.092 | 0.092 | 0.120 | 0.190 | 0.180 | 0.280 |
| 1.2 V | | 0.098 | 0.096 | 0.095 | 0.095 | 0.094 | 0.130 | 0.200 | 0.180 | 0.280 |
| 1.3 V | | 0.098 | 0.096 | 0.095 | 0.095 | 0.095 | 0.130 | 0.200 | 0.180 | 0.260 |
| 1.4 V | | 0.098 | 0.096 | 0.095 | 0.095 | 0.095 | 0.130 | 0.200 | 0.180 | 0.260 |
| 1.5 V | | * | 0.096 | 0.095 | 0.095 | 0.095 | 0.095 | 0.130 | 0.200 | 0.180 |

* V_{BIAS} voltage must be equal or more than $V_{OUT(NOM)} + 1.6$ V

TYPICAL CHARACTERISTICS

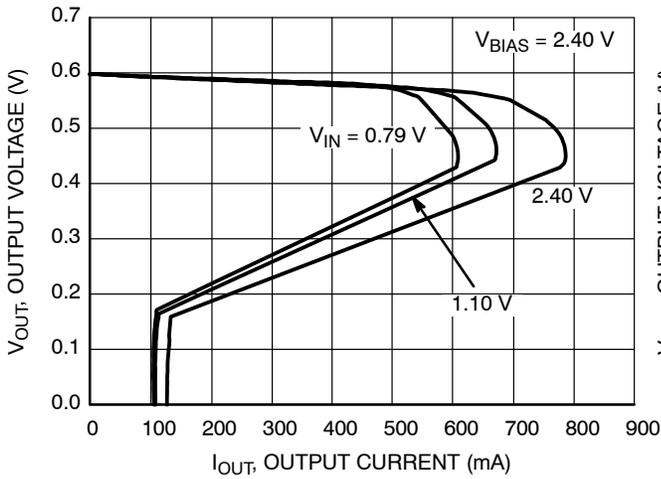


Figure 3. Output Voltage vs. Output Current
0.6 V Version ($T_A = 25^\circ\text{C}$)

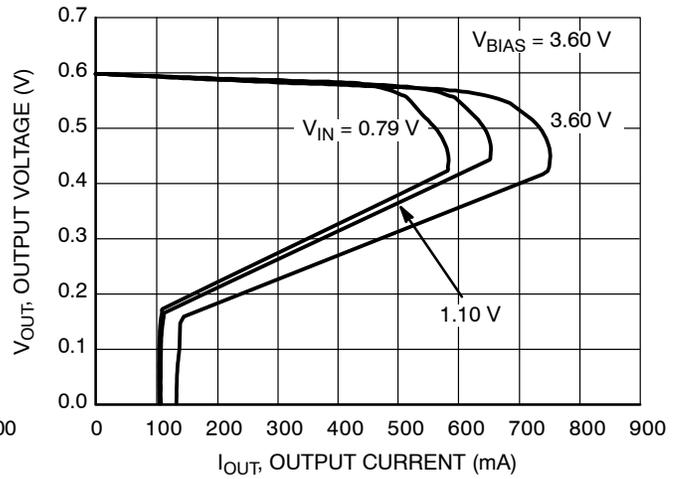


Figure 4. Output Voltage vs. Output Current
0.6 V Version ($T_A = 25^\circ\text{C}$)

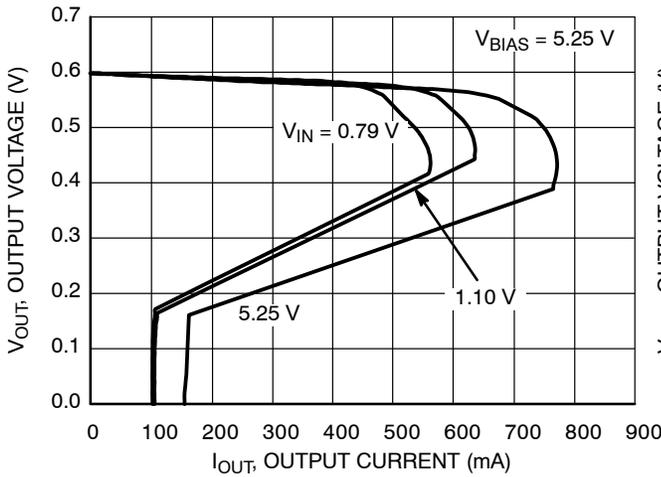


Figure 5. Output Voltage vs. Output Current
0.6 V Version ($T_A = 25^\circ\text{C}$)

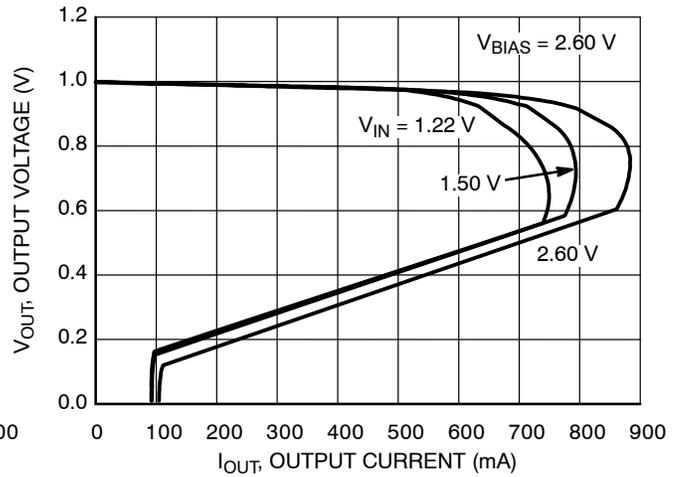


Figure 6. Output Voltage vs. Output Current
1.0 V Version ($T_A = 25^\circ\text{C}$)

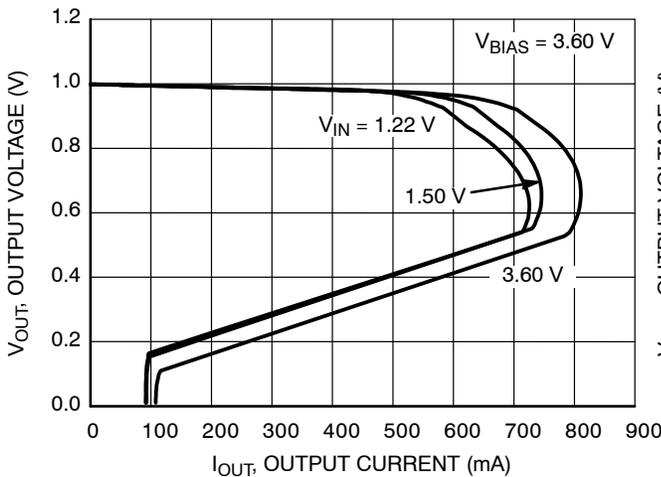


Figure 7. Output Voltage vs. Output Current
1.0 V Version ($T_A = 25^\circ\text{C}$)

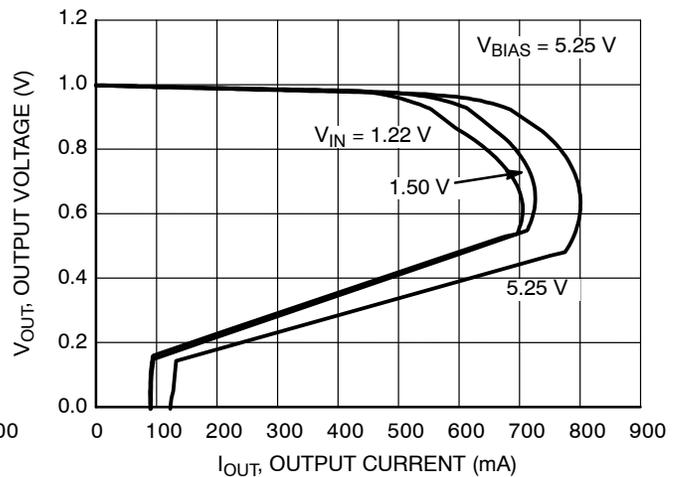


Figure 8. Output Voltage vs. Output Current
1.0 V Version ($T_A = 25^\circ\text{C}$)

TYPICAL CHARACTERISTICS

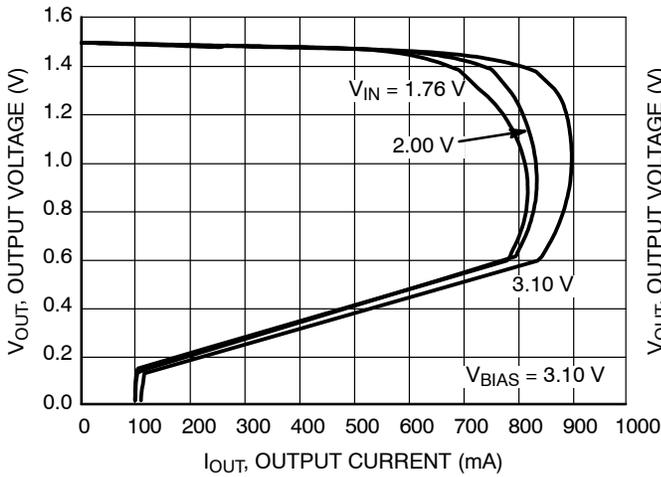


Figure 9. Output Voltage vs. Output Current
1.5 V Version ($T_A = 25^\circ\text{C}$)

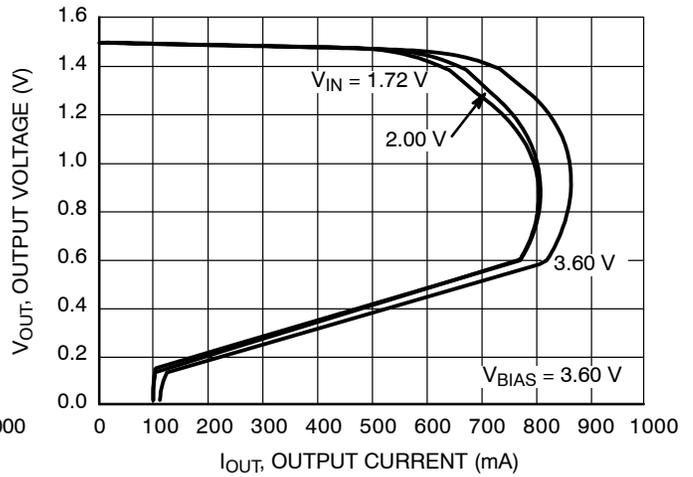


Figure 10. Output Voltage vs. Output Current
1.5 V Version ($T_A = 25^\circ\text{C}$)

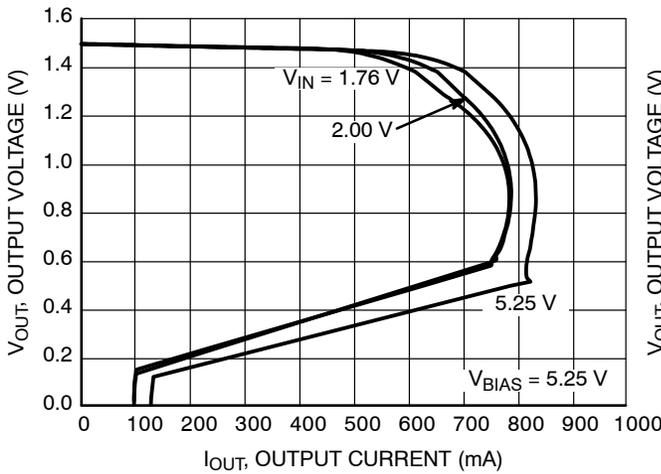


Figure 11. Output Voltage vs. Output Current
1.5 V Version ($T_A = 25^\circ\text{C}$)

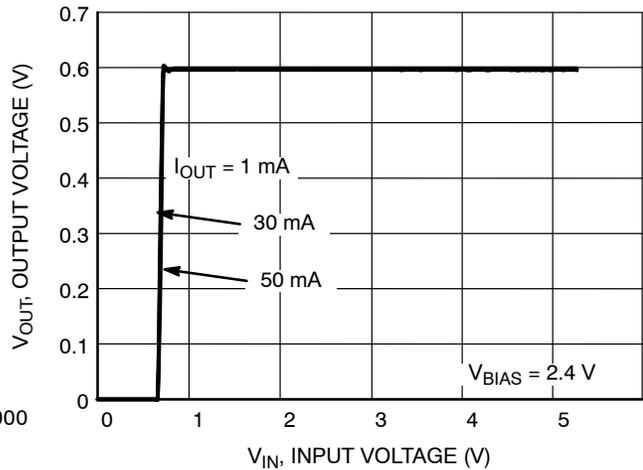


Figure 12. Output Voltage vs. Input Voltage
0.6 V Version ($T_A = 25^\circ\text{C}$)

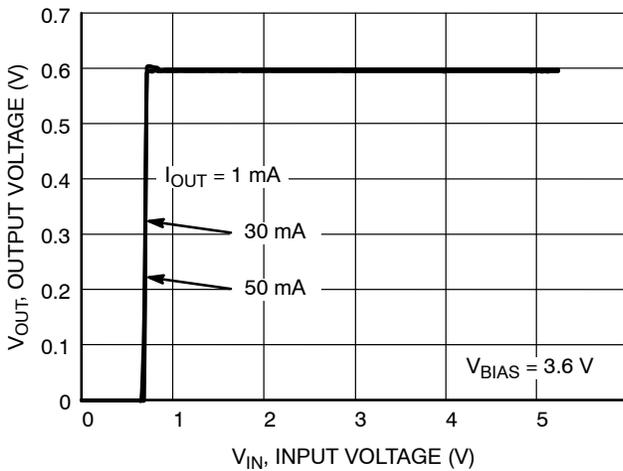


Figure 13. Output Voltage vs. Input Voltage
0.6 V Version ($T_A = 25^\circ\text{C}$)

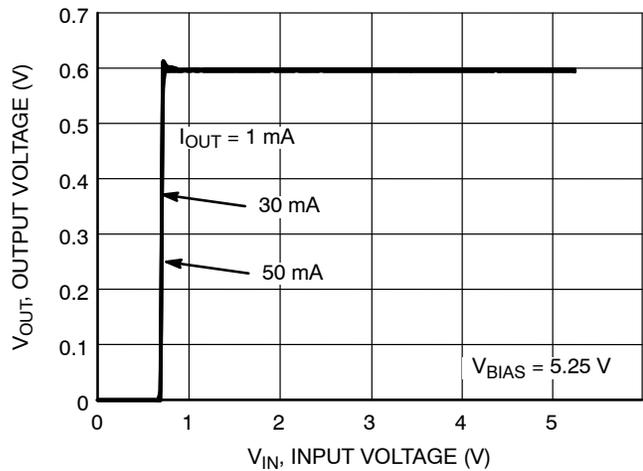


Figure 14. Output Voltage vs. Input Voltage
0.6 V Version ($T_A = 25^\circ\text{C}$)

TYPICAL CHARACTERISTICS

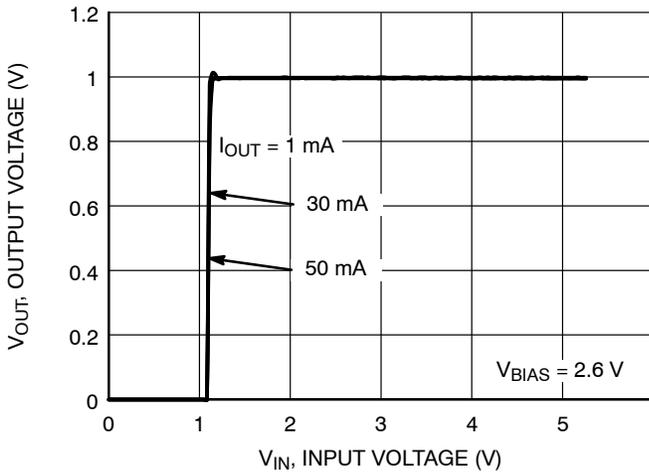


Figure 15. Output Voltage vs. Input Voltage 1.0 V Version ($T_A = 25^\circ\text{C}$)

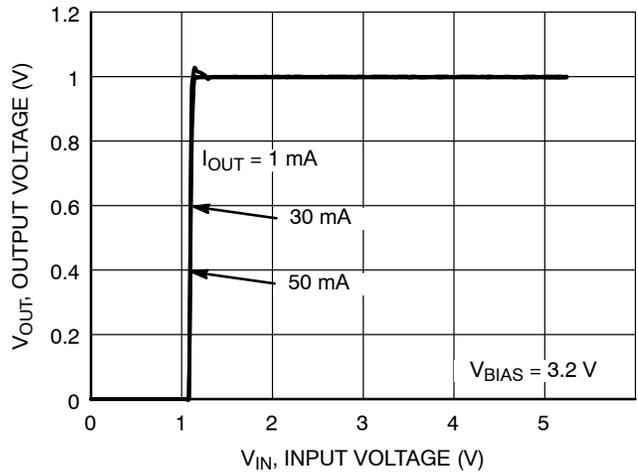


Figure 16. Output Voltage vs. Input Voltage 1.0 V Version ($T_A = 25^\circ\text{C}$)

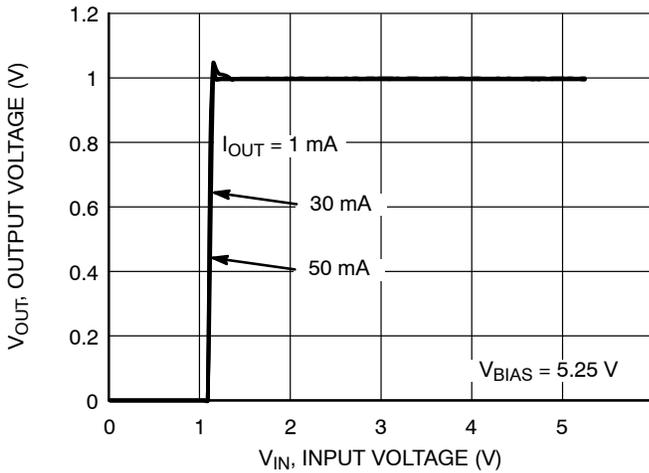


Figure 17. Output Voltage vs. Input Voltage 1.0 V Version ($T_A = 25^\circ\text{C}$)

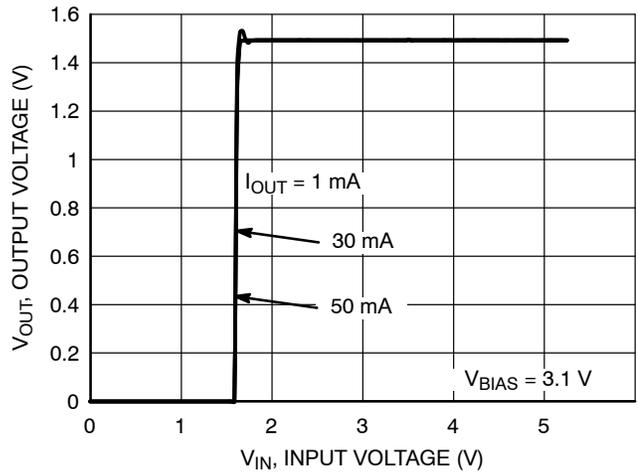


Figure 18. Output Voltage vs. Input Voltage 1.5 V Version ($T_A = 25^\circ\text{C}$)

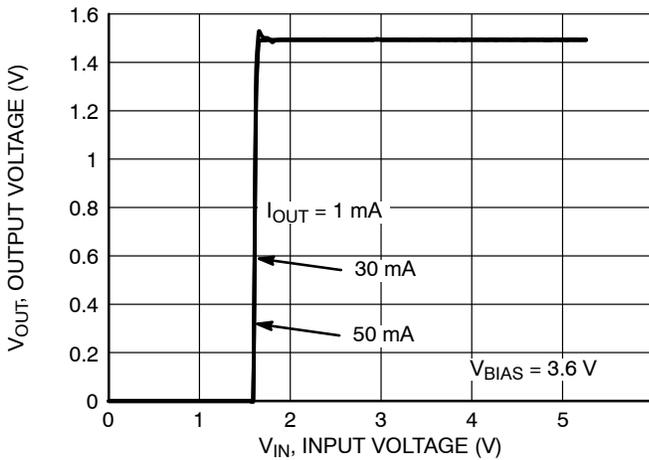


Figure 19. Output Voltage vs. Input Voltage 1.5 V Version ($T_A = 25^\circ\text{C}$)

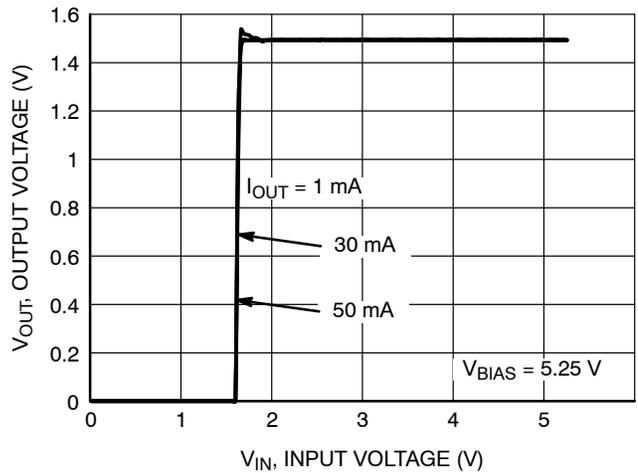


Figure 20. Output Voltage vs. Input Voltage 1.5 V Version ($T_A = 25^\circ\text{C}$)

TYPICAL CHARACTERISTICS

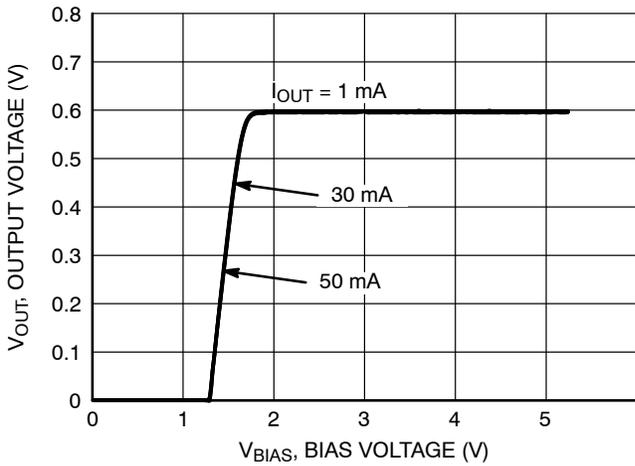


Figure 21. Output Voltage vs. Bias Voltage 0.6 V Version ($T_A = 25^\circ\text{C}$)

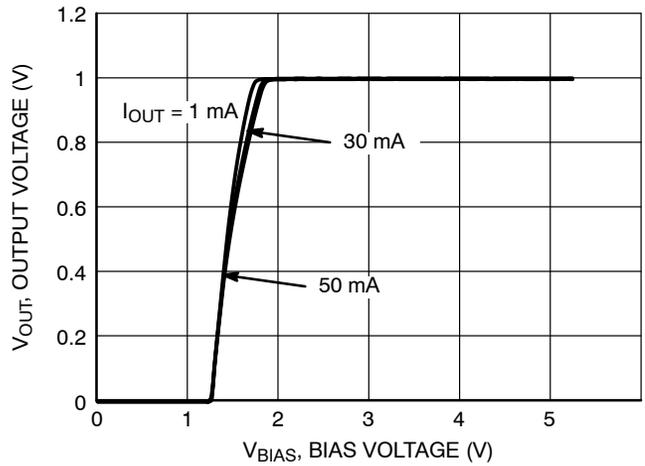


Figure 22. Output Voltage vs. Bias Voltage 1.0 V Version ($T_A = 25^\circ\text{C}$)

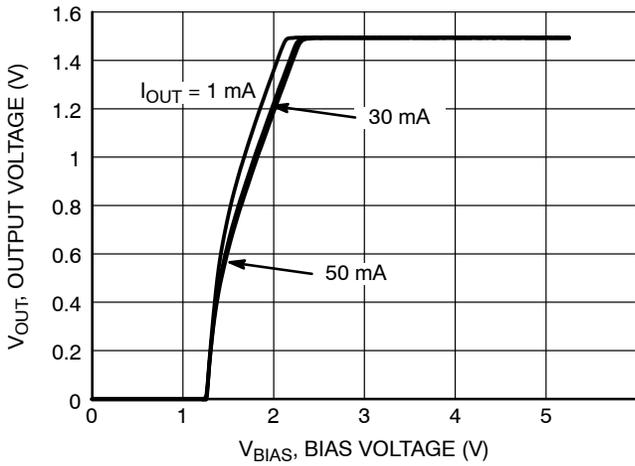


Figure 23. Output Voltage vs. Bias Voltage 1.5 V Version ($T_A = 25^\circ\text{C}$)

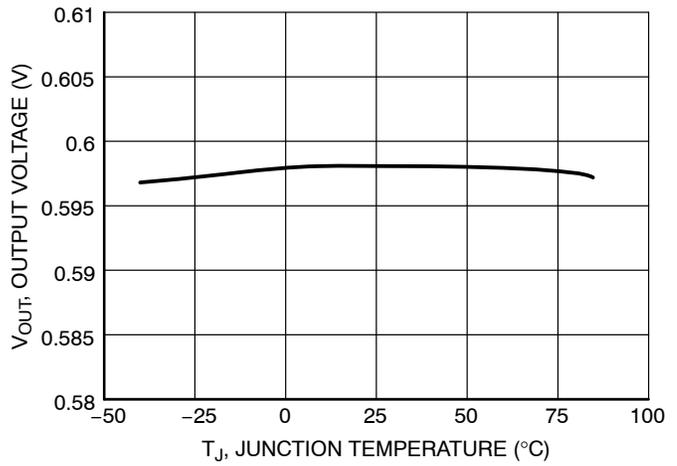


Figure 24. Output Voltage vs. Temperature 0.6 V Version

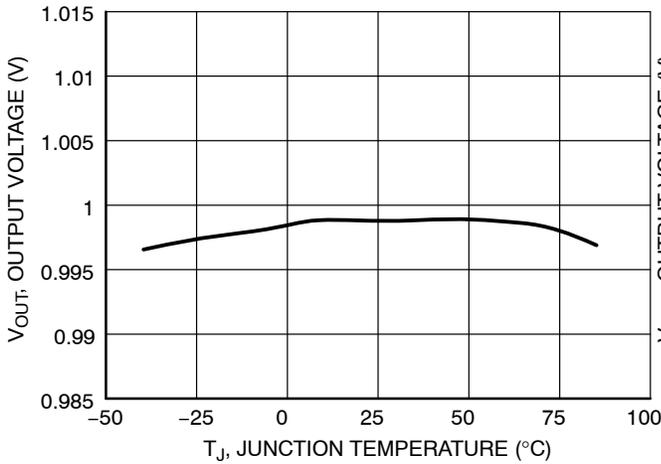


Figure 25. Output Voltage vs. Temperature 1.0 V Version

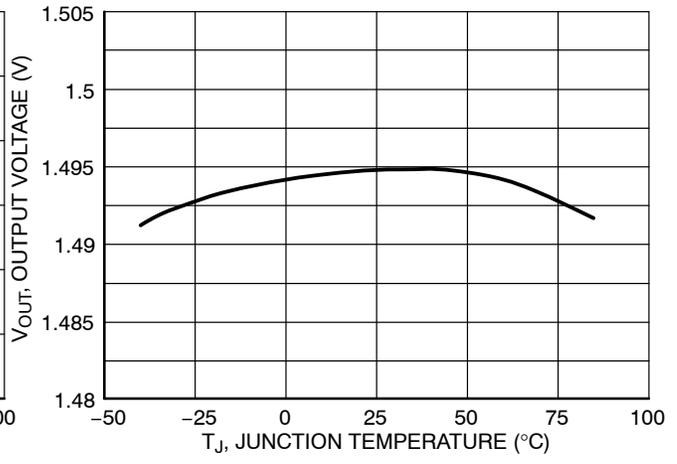


Figure 26. Output Voltage vs. Temperature 1.5 V Version

TYPICAL CHARACTERISTICS

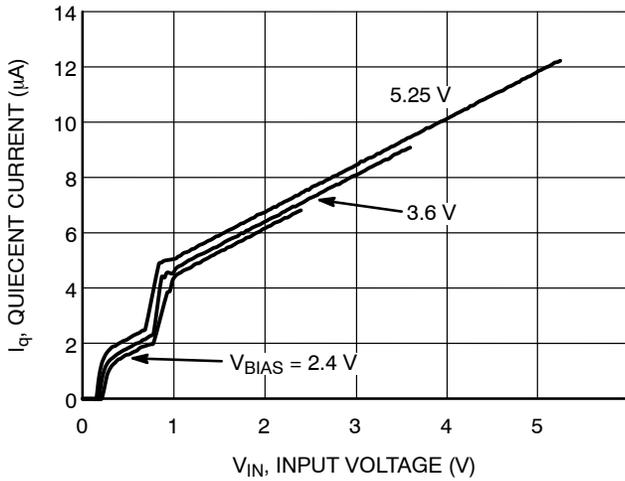


Figure 27. Quiescent Current vs. Input Voltage 0.6 V Version

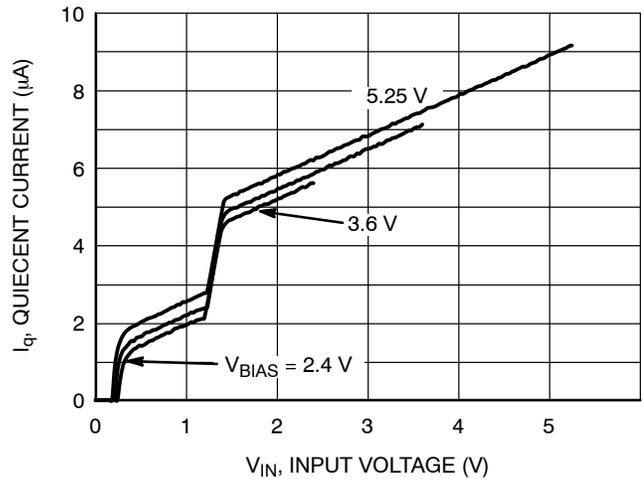


Figure 28. Quiescent Current vs. Input Voltage 1.0 V Version

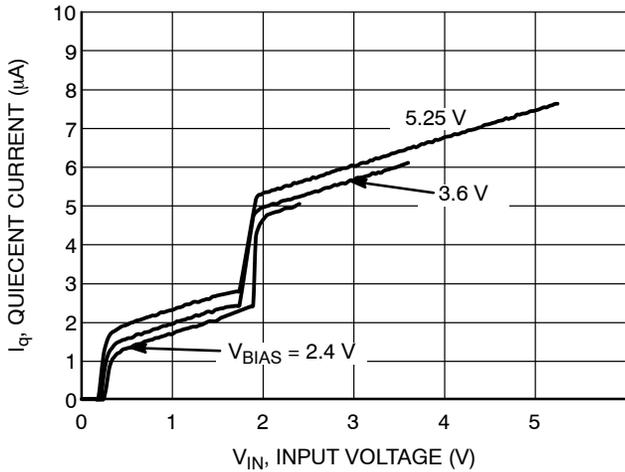


Figure 29. Quiescent Current vs. Input Voltage 1.5 V Version

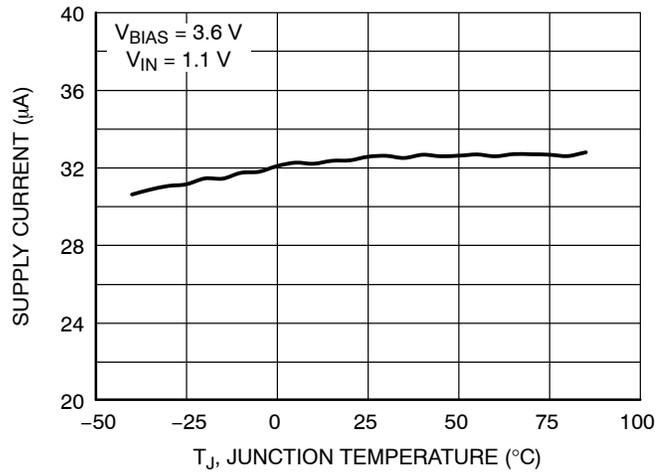


Figure 30. Supply Current vs. Temperature 0.6 V Version

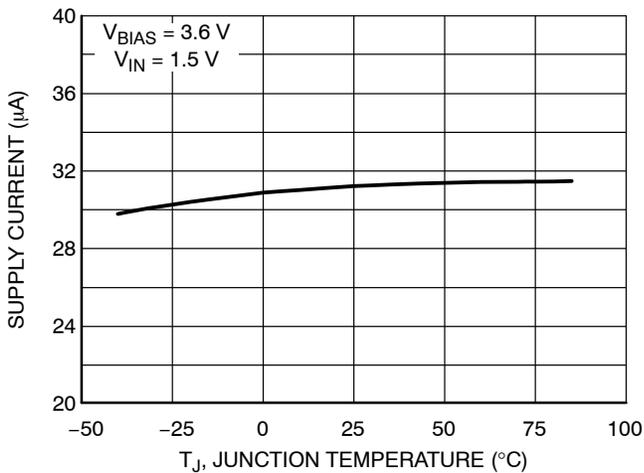


Figure 31. Supply Current vs. Temperature 1.0 V Version

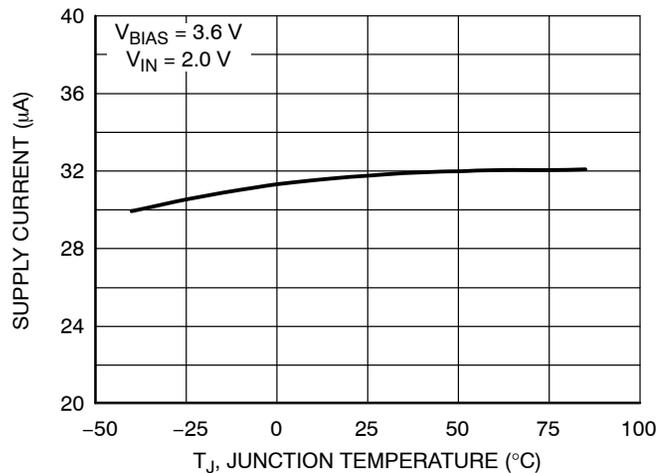


Figure 32. Supply Current vs. Temperature 1.5 V Version

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TYPICAL CHARACTERISTICS

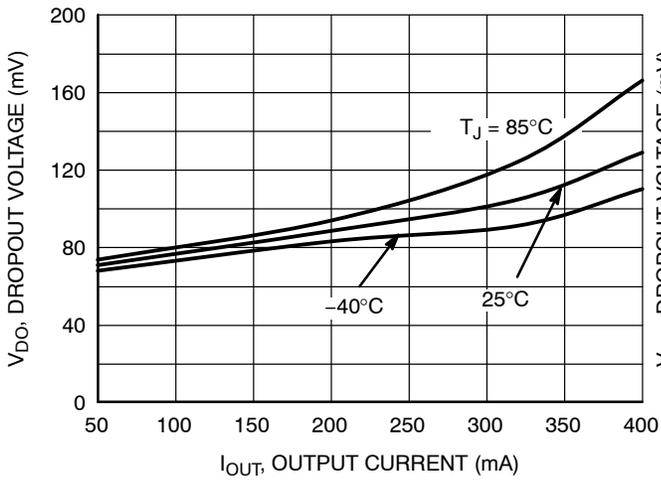


Figure 33. Dropout Voltage vs. Output Current 0.6 V Version

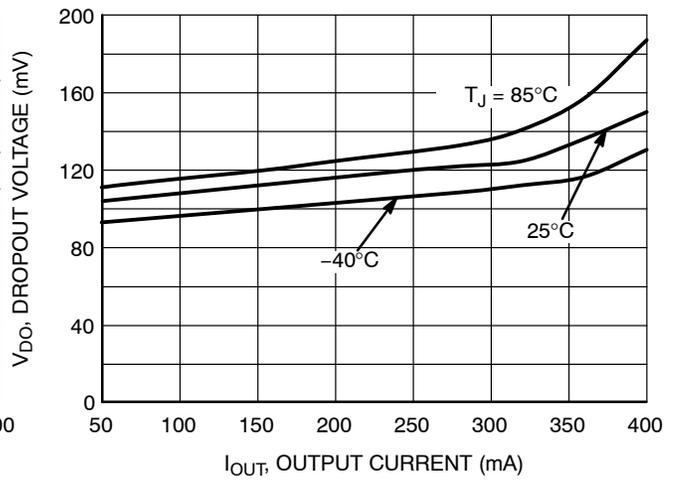


Figure 34. Dropout Voltage vs. Output Current 1.0 V Version

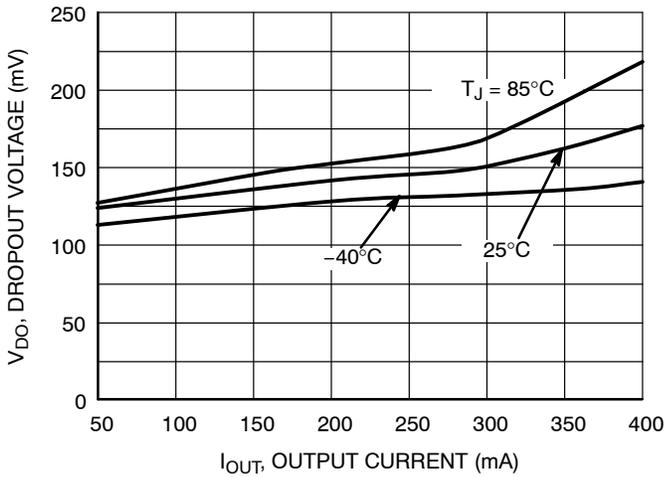


Figure 35. Dropout Voltage vs. Output Current 1.5 V Version

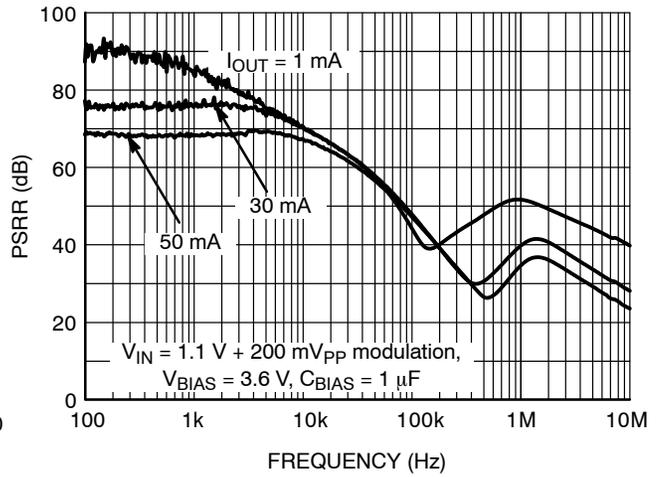


Figure 36. PSRR vs. Frequency 0.6 V Version

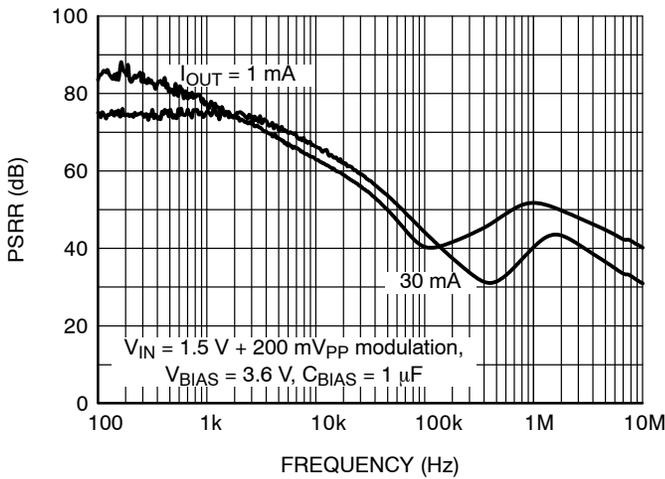


Figure 37. PSRR vs. Frequency 1.0 V Version

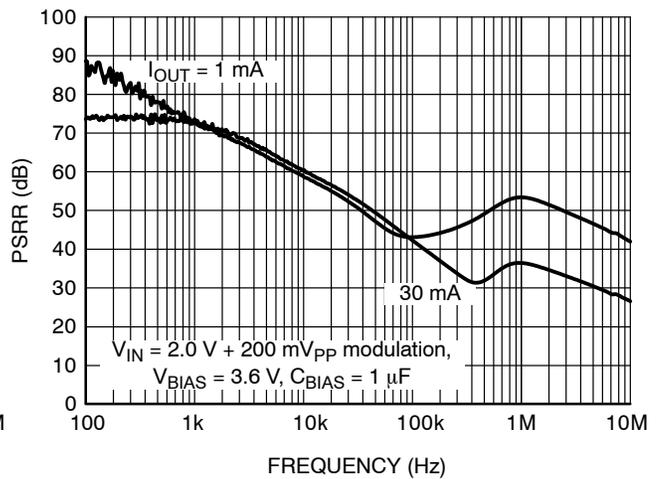


Figure 38. PSRR vs. Frequency 1.5 V Version

NCP4671

TYPICAL CHARACTERISTICS

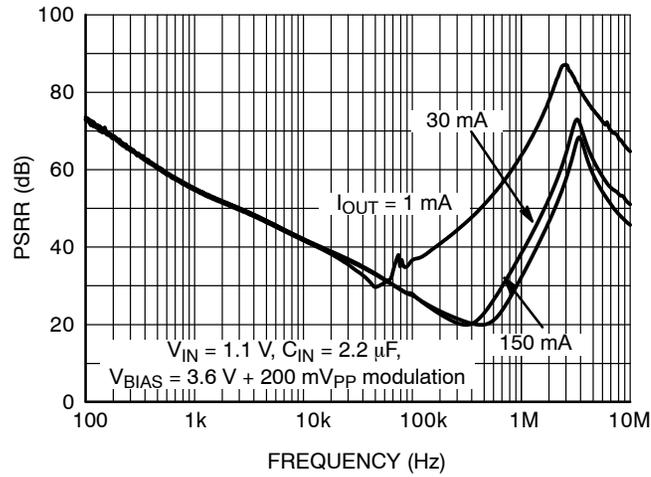


Figure 39. PSRR vs. Frequency 0.6 V Version

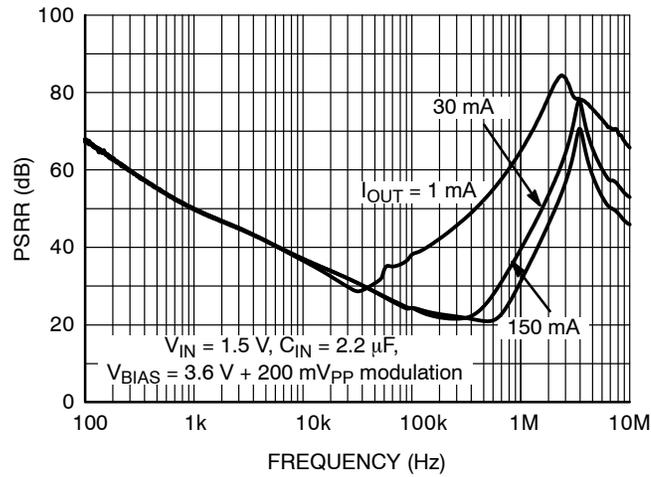


Figure 40. PSRR vs. Frequency 1.0 V Version

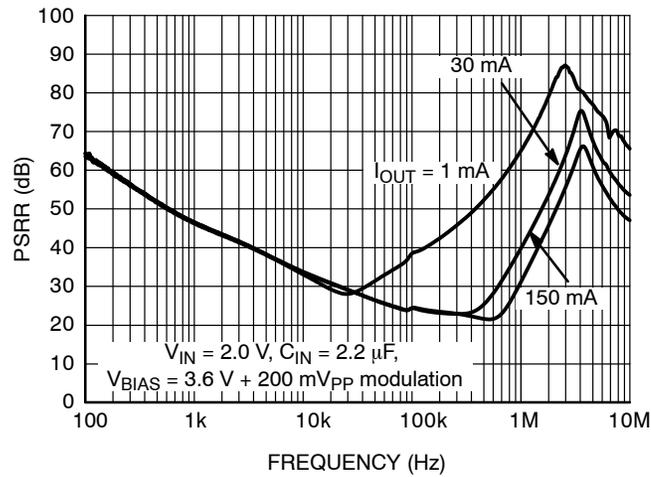


Figure 41. PSRR vs. Frequency 1.5 V Version

NCP4671

TYPICAL CHARACTERISTICS

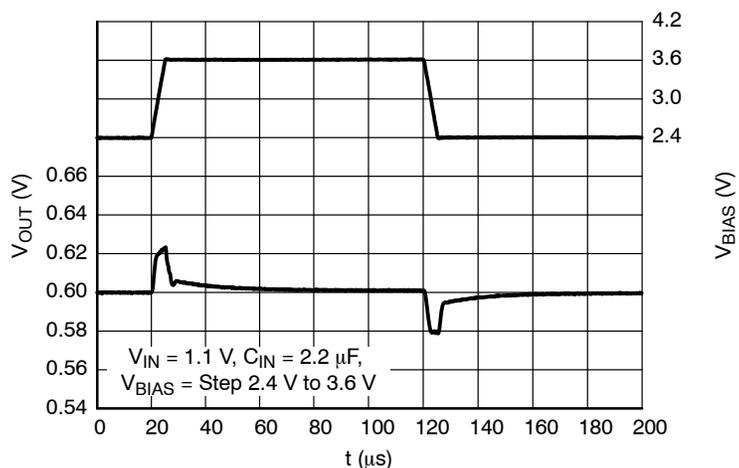


Figure 42. Line Transients Response, 0.6 V Version

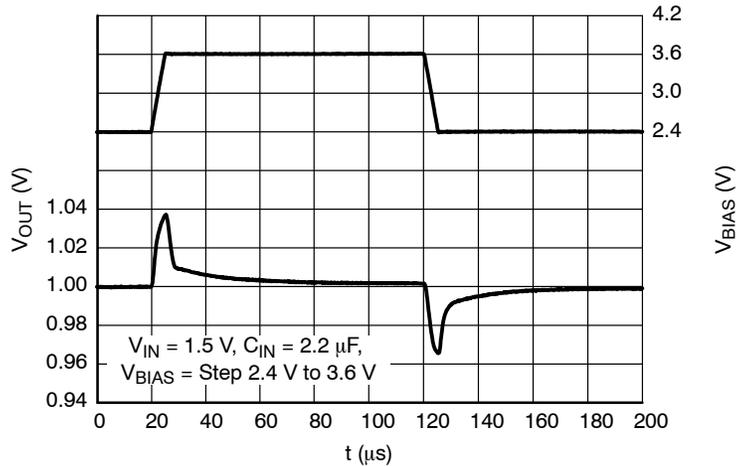


Figure 43. Line Transients Response, 1.0 V Version

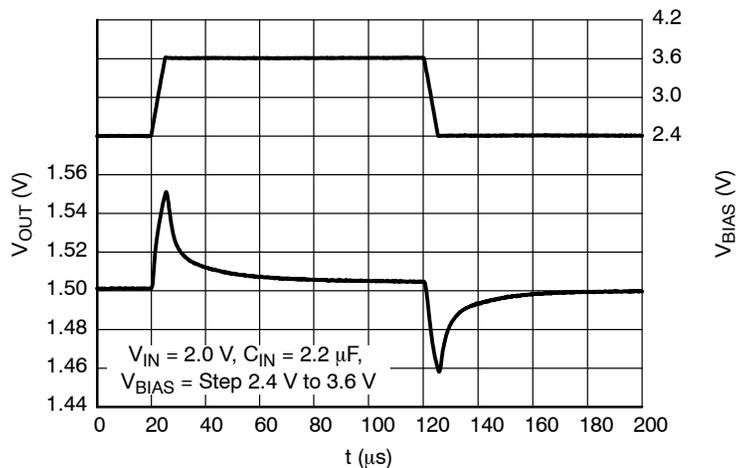


Figure 44. Line Transients Response, 1.5 V Version

NCP4671

TYPICAL CHARACTERISTICS

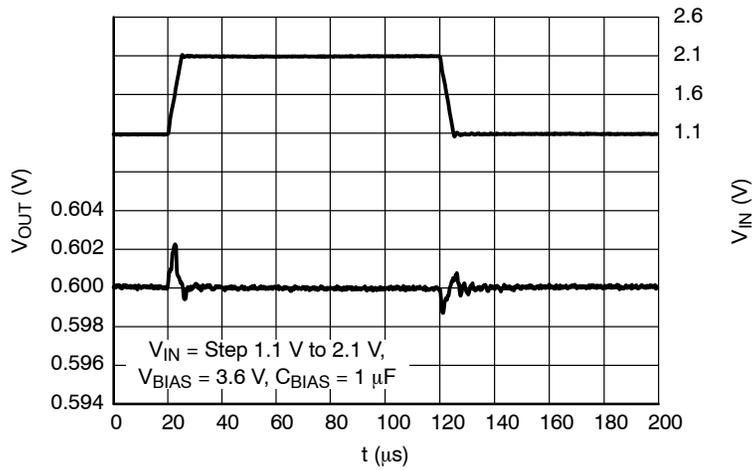


Figure 45. Line Transients Response, 0.6 V Version

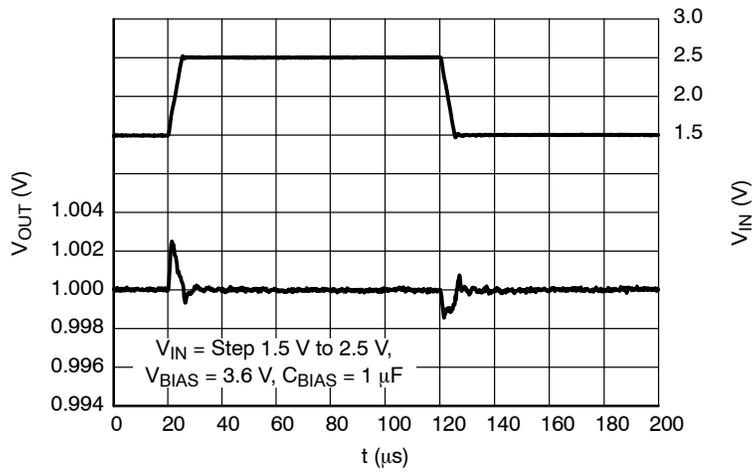


Figure 46. Line Transients Response, 1.0 V Version

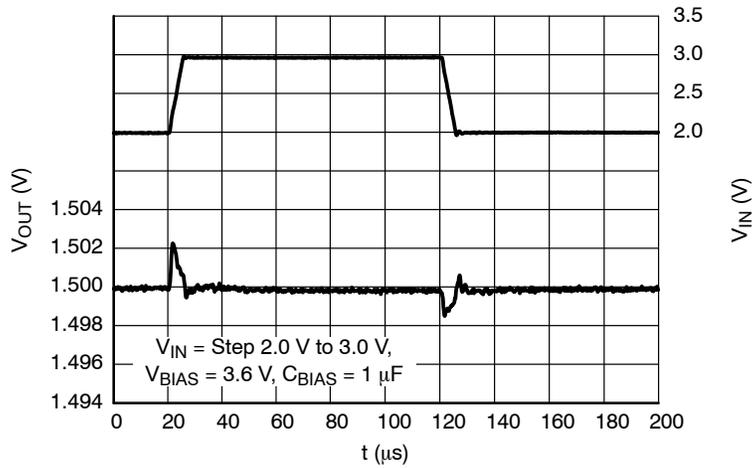


Figure 47. Line Transients Response, 1.5 V Version

NCP4671

TYPICAL CHARACTERISTICS

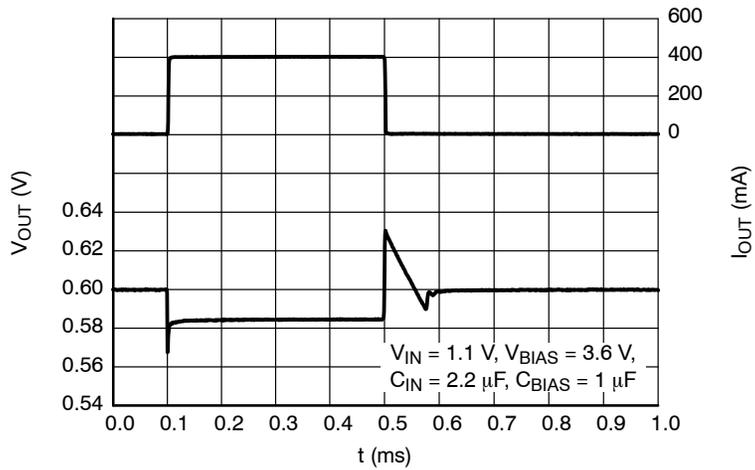


Figure 48. Load Transients Response, 0.6 V Version, I_{OUT} Step 1 mA to 400 mA

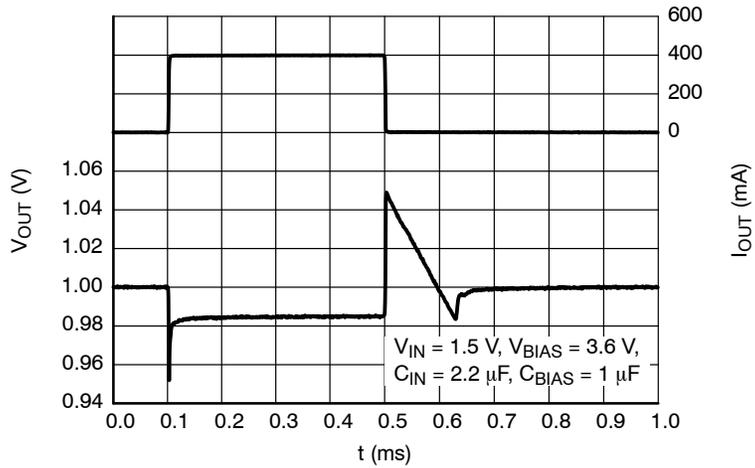


Figure 49. Load Transients Response, 1.0 V Version, I_{OUT} Step 1 mA to 400 mA

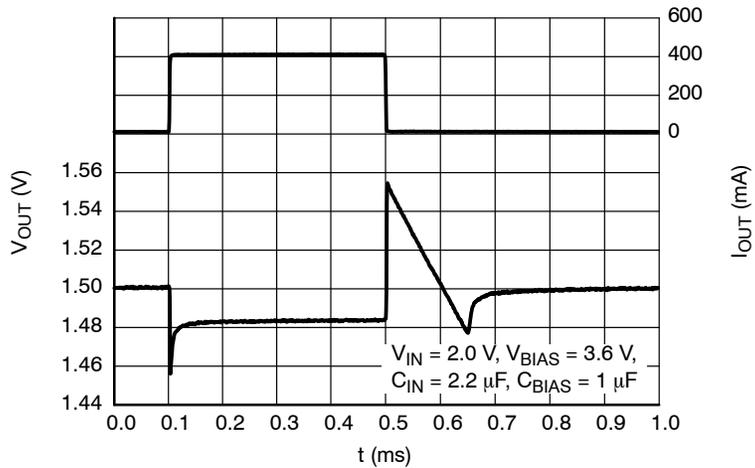


Figure 50. Load Transients Response, 1.5 V Version, I_{OUT} Step 1 mA to 400 mA

NCP4671

TYPICAL CHARACTERISTICS

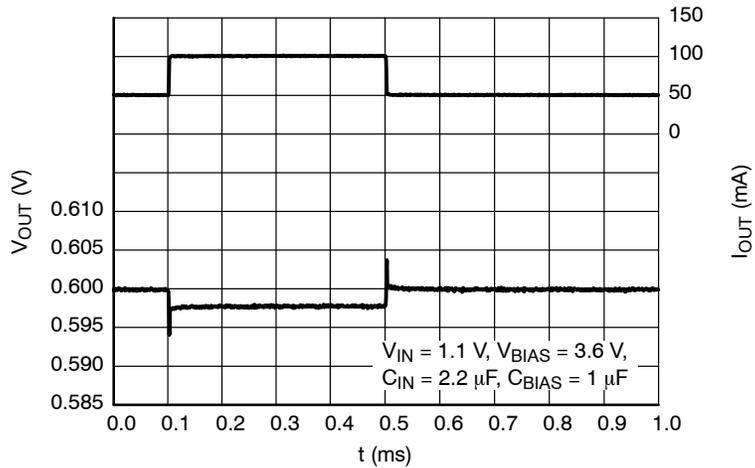


Figure 51. Load Transients Response, 0.6 V Version, I_{OUT} Step 50 mA to 100 mA

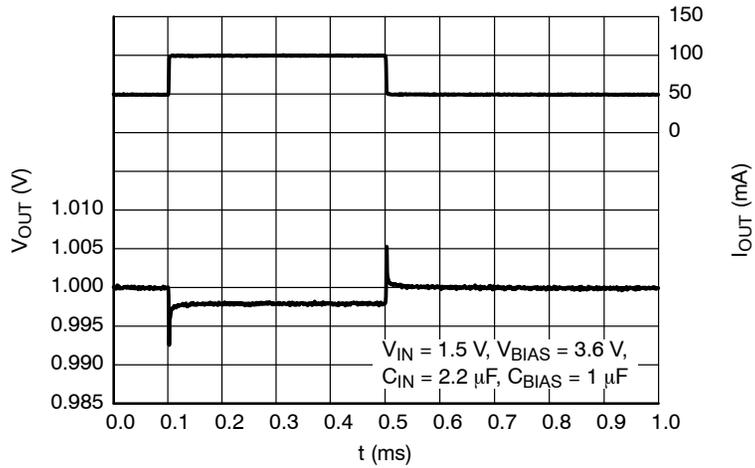


Figure 52. Load Transients Response, 1.0 V Version, I_{OUT} Step 50 mA to 100 mA

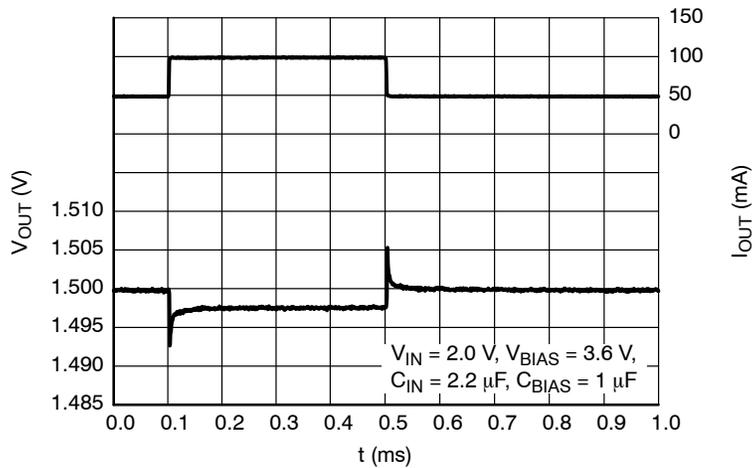


Figure 53. Load Transients Response, 1.5 V Version, I_{OUT} Step 50 mA to 100 mA

NCP4671

TYPICAL CHARACTERISTICS

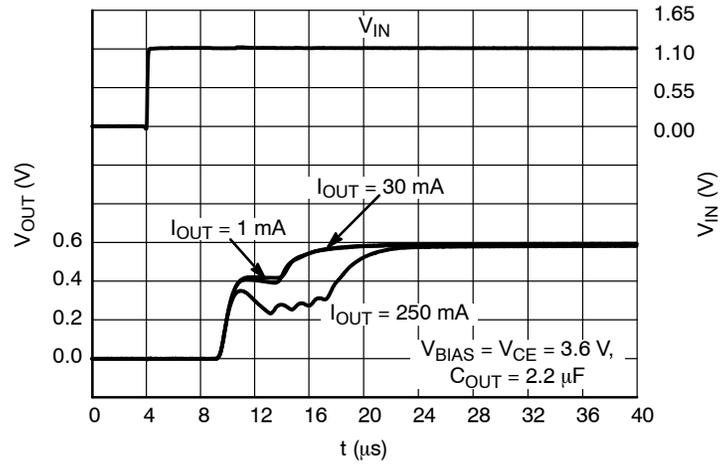


Figure 54. Turn On Behavior, 0.6 V Version

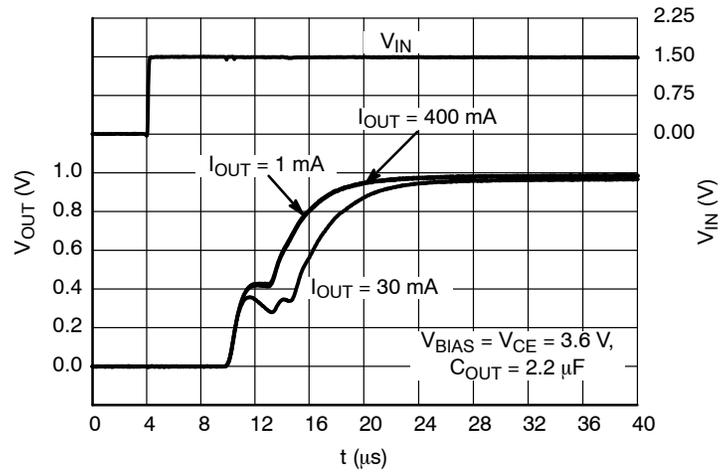


Figure 55. Turn On Behavior, 1.0 V Version

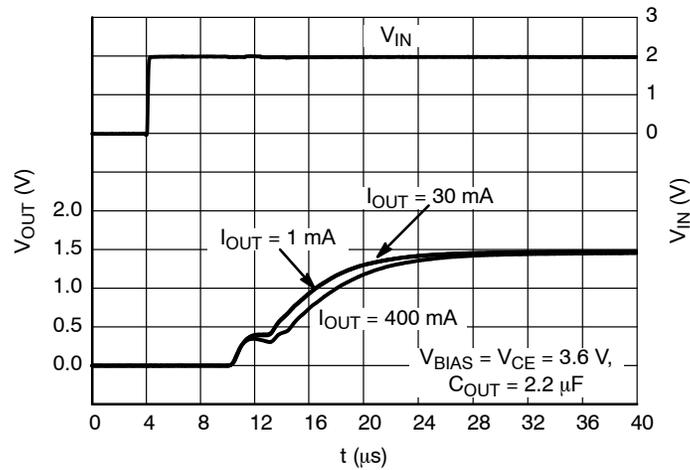


Figure 56. Turn On Behavior, 1.5 V Version

NCP4671

TYPICAL CHARACTERISTICS

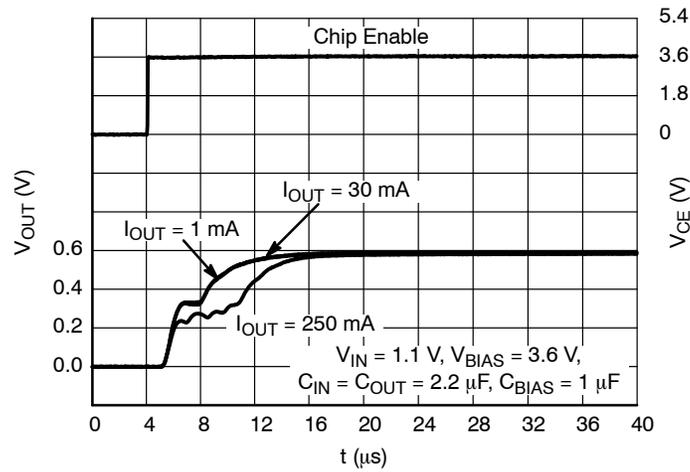


Figure 57. Turn On Behavior with CE, 0.6 V Version

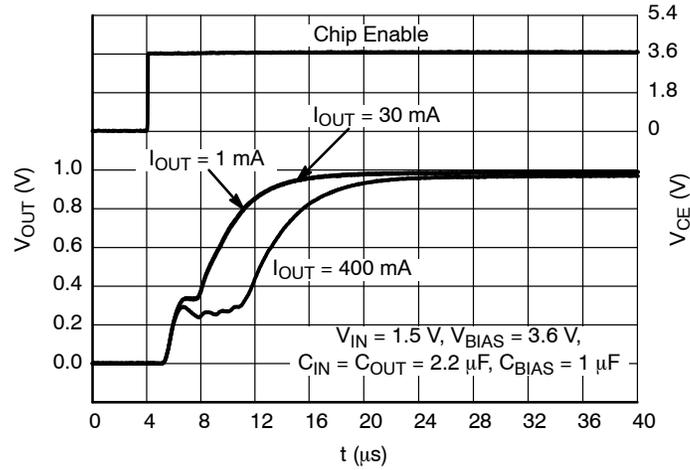


Figure 58. Turn On Behavior with CE, 1.0 V Version

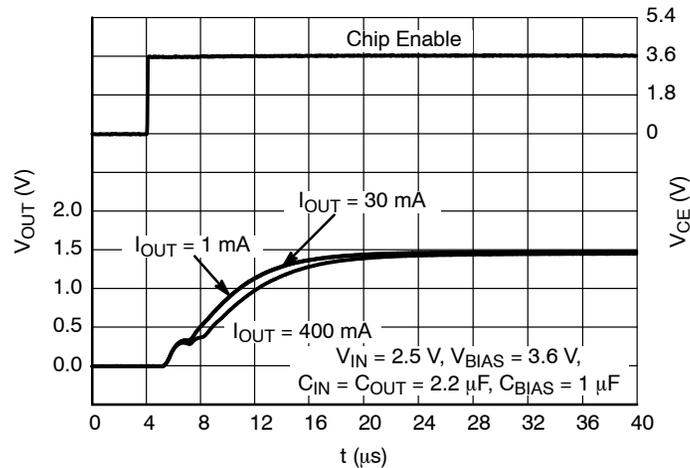


Figure 59. Turn On Behavior with CE, 1.5 V Version

NCP4671

TYPICAL CHARACTERISTICS

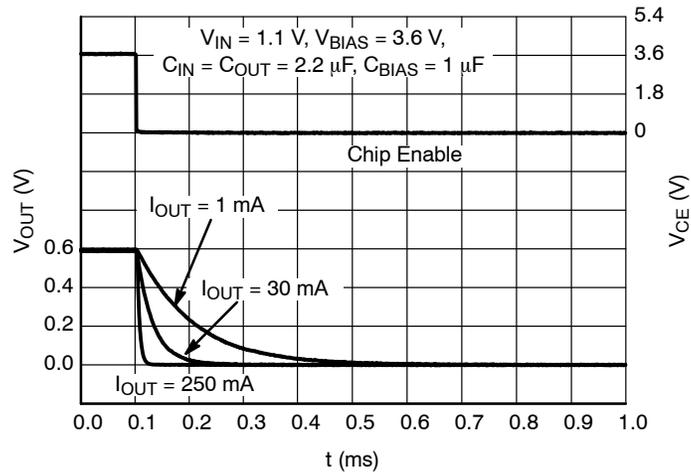


Figure 60. Turn Off Behavior with CE, 0.6 V Version

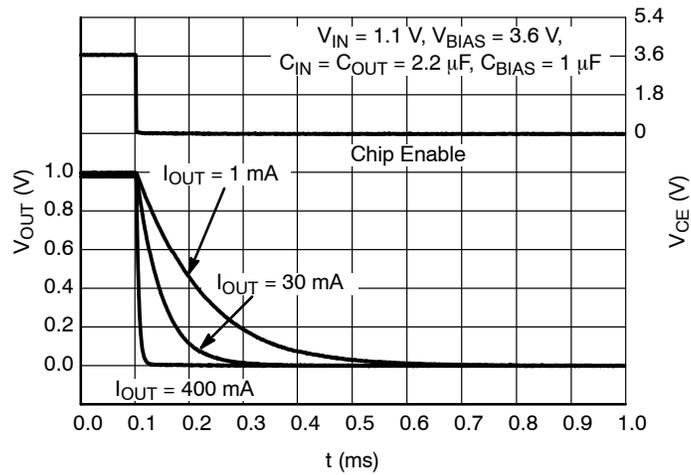


Figure 61. Turn Off Behavior with CE, 1.0 V Version

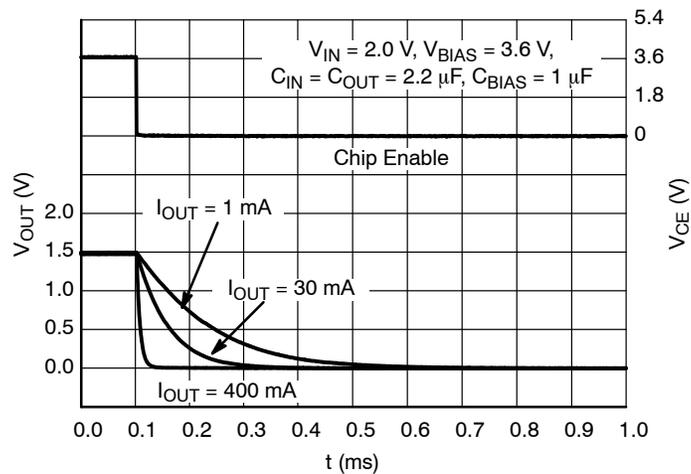


Figure 62. Turn Off Behavior with CE, 1.5 V Version

APPLICATION INFORMATION

A typical application circuit for the NCP4671 series is shown in Figure 63. The NCP4671 has two independent inputs, VBIAS pin is used for powering control part of the LDO and its value is equal or higher than value of second input pin VIN where voltage that has to be regulated is connected.

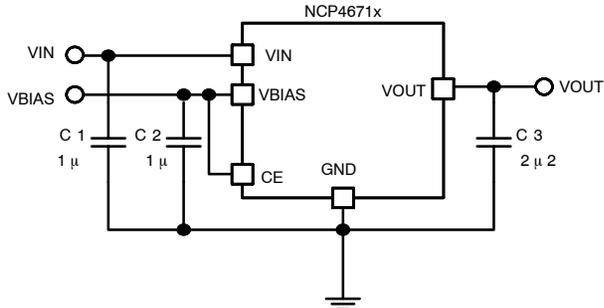


Figure 63. Typical Application Schematic

Dual rail architecture is appropriate when the regulator is connected for example behind a buck DC/DC converter. Bias voltage can be taken from input of the buck DC/DC converter and as input voltage is used output of the buck DC/DC converter as it is shown in Figure 64. Condition that bias voltage must be higher than input voltage can be in this schematic easy fulfilled.

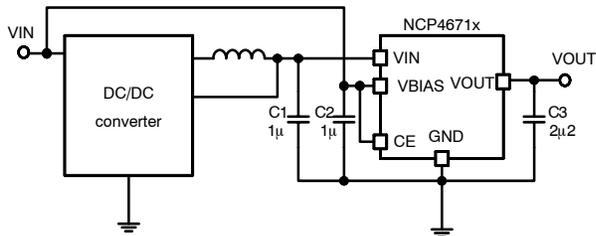


Figure 64. Typical Application Schematic with DC/DC Converter

Input Decoupling Capacitors (C1 and C2)

A 1 μF ceramic input decoupling capacitors should be connected as close as possible to the VIN and VBIAS input

and ground pin of the NCP4671. Higher values and lower ESR of capacitor C1 improves line transient response.

Output Decoupling Capacitor (C3)

A 2.2 μF or larger ceramic output decoupling capacitor is sufficient to achieve stable operation of the IC. If a tantalum capacitor is used, and its ESR is high, loop oscillation may result. The capacitors should be connected as close as possible to the output and ground pins. Larger values and lower ESR improves dynamic parameters.

Enable Operation

The enable pin CE may be used for turning the regulator on and off. The regulator is switched on when CE pin voltage is above logic high level. The enable pin has an internal pull down current source. If the enable function is not needed connect CE pin to VBIAS.

Output Discharger

The D version includes a transistor between VOUT and GND that is used for faster discharging of the output capacitor. This function is activated when the IC goes into disable mode.

Thermal

As power across the IC increases, it might become necessary to provide some thermal relief. The maximum power dissipation supported by the device is dependent upon board design and layout. Mounting pad configuration on the PCB, the board material, and also the ambient temperature affect the rate of temperature rise for the part. That is to say, when the device has good thermal conductivity through the PCB, the junction temperature will be relatively low with high power dissipation applications.

PCB layout

Make VIN, VBIAS and GND line sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect capacitors C1, C2 and C3 as close as possible to the IC, and make wiring as short as possible.

NCP4671

ORDERING INFORMATION

| Device | Nominal Output Voltage | Marking | Enable | Package | Shipping [†] |
|-----------------|------------------------|---------|----------------|--------------------|-----------------------|
| NCP4671DSN06T1G | 0.6 V | R1A | Auto-Discharge | SOT-23-5 (Pb-Free) | 3000 / Tape & Reel |
| NCP4671DSN09T1G | 0.9 V | R1D | Auto-Discharge | SOT-23-5 (Pb-Free) | 3000 / Tape & Reel |
| NCP4671DSN10T1G | 1.0 V | R1E | Auto-Discharge | SOT-23-5 (Pb-Free) | 3000 / Tape & Reel |
| NCP4671DSN12T1G | 1.2 V | R1F | Auto-Discharge | SOT-23-5 (Pb-Free) | 3000 / Tape & Reel |
| NCP4671DSN13T1G | 1.3 V | R1G | Auto-Discharge | SOT-23-5 (Pb-Free) | 3000 / Tape & Reel |
| NCP4671DSN15T1G | 1.5 V | R1J | Auto-Discharge | SOT-23-5 (Pb-Free) | 3000 / Tape & Reel |
| NCP4671DMX06TCG | 0.6 V | BA | Auto-Discharge | XDFN6 (Pb-Free) | 5000 / Tape & Reel |
| NCP4671DMX09TCG | 0.9 V | BD | Auto-Discharge | XDFN6 (Pb-Free) | 5000 / Tape & Reel |
| NCP4671DMX12TCG | 1.2 V | BF | Auto-Discharge | XDFN6 (Pb-Free) | 5000 / Tape & Reel |
| NCP4671DMX13TCG | 1.3 V | BG | Auto-Discharge | XDFN6 (Pb-Free) | 5000 / Tape & Reel |
| NCP4671DMX15TCG | 1.5 V | BJ | Auto-Discharge | XDFN6 (Pb-Free) | 5000 / Tape & Reel |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

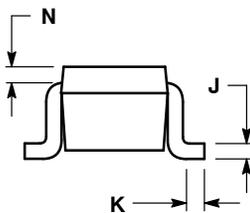
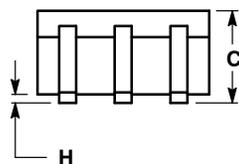
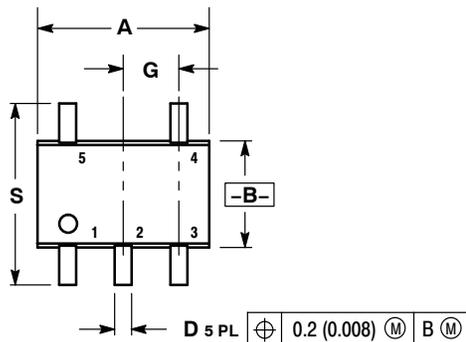
NCP4671

PACKAGE DIMENSIONS

SC-88A (SC-70-5/SOT-353)

CASE 419A-02

ISSUE K



NOTES:

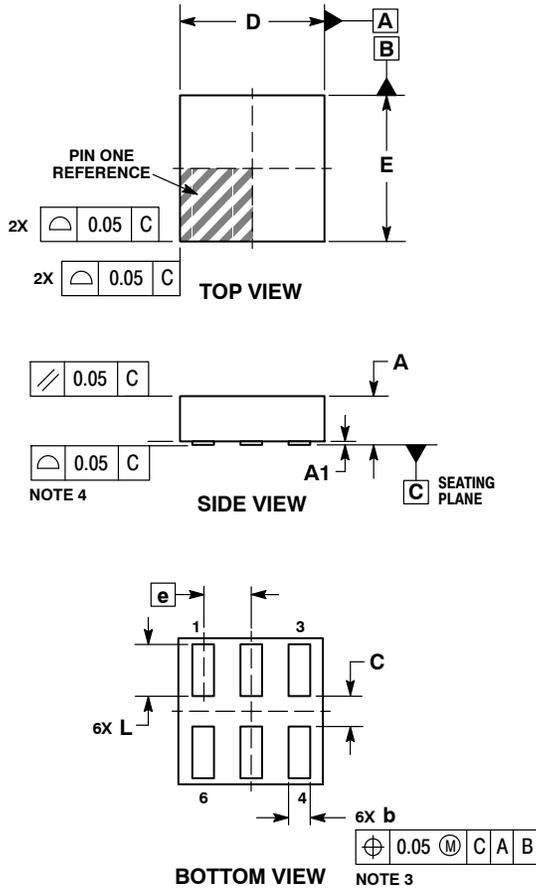
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.071 | 0.087 | 1.80 | 2.20 |
| B | 0.045 | 0.053 | 1.15 | 1.35 |
| C | 0.031 | 0.043 | 0.80 | 1.10 |
| D | 0.004 | 0.012 | 0.10 | 0.30 |
| G | 0.026 BSC | | 0.65 BSC | |
| H | --- | 0.004 | --- | 0.10 |
| J | 0.004 | 0.010 | 0.10 | 0.25 |
| K | 0.004 | 0.012 | 0.10 | 0.30 |
| N | 0.008 REF | | 0.20 REF | |
| S | 0.079 | 0.087 | 2.00 | 2.20 |

NCP4671

PACKAGE DIMENSIONS

XDFN6 1.2x1.2, 0.4P
CASE 711AA-01
ISSUE O

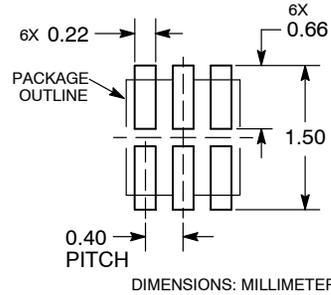


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25mm FROM TERMINAL TIPS.
4. COPLANARITY APPLIES TO ALL OF THE TERMINALS.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | --- | 0.40 |
| A1 | 0.00 | 0.05 |
| b | 0.13 | 0.23 |
| C | 0.20 | 0.30 |
| D | 1.20 BSC | |
| E | 1.20 BSC | |
| e | 0.40 BSC | |
| L | 0.37 | 0.48 |

RECOMMENDED MOUNTING FOOTPRINT*

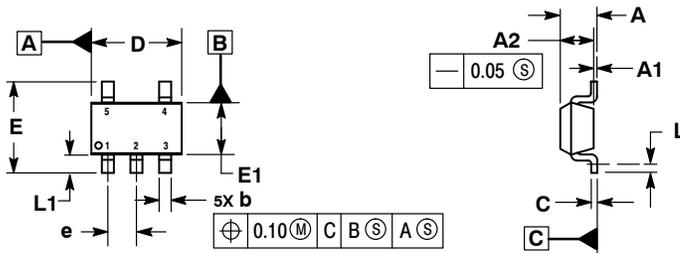


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NCP4671

PACKAGE DIMENSIONS

SOT-23 5-LEAD CASE 1212-01 ISSUE A

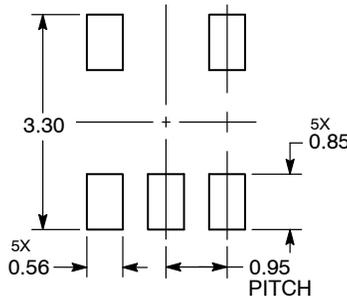


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. DATUM C IS THE SEATING PLANE.

| MILLIMETERS | | |
|-------------|----------|------|
| DIM | MIN | MAX |
| A | --- | 1.45 |
| A1 | 0.00 | 0.10 |
| A2 | 1.00 | 1.30 |
| b | 0.30 | 0.50 |
| c | 0.10 | 0.25 |
| D | 2.70 | 3.10 |
| E | 2.50 | 3.10 |
| E1 | 1.50 | 1.80 |
| e | 0.95 BSC | |
| L | 0.20 | --- |
| L1 | 0.45 | 0.75 |

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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