NCP580

Ultra-Fast, Low Noise 120 mA CMOS LDO Regulator with Enable

The NCP580 series of low dropout regulators are designed for portable battery powered applications which require precise output voltage accuracy, low quiescent current, and high ripple rejection. These devices feature an enable function which lowers current consumption significantly and are offered in the small SC−82AB package.

A 2.2 μF ceramic capacitor or higher is the recommended value to be used with these devices on the output pin.

Features

- Ultra−Low Dropout Voltage of 150 mV at 100 mA
- Low Output Noise of 30 μVrms without Noise Reduction Cap
- Excellent Line Regulation of 0.02%/V
- Excellent Load Regulation of 12 mV
- High Output Voltage Accuracy of ±1.5%
- Low Iq Current of 90 μA
- Very Low Shutdown Current of 0.1 μA
- Excellent Power Supply Rejection Ratio of 70 dB at f = 1.0 kHz
- Wide Output Voltage Range of 1.5 V to 3.3 V
- Fold Back Protection Circuit
- Fast Dynamic Performance
- Low Temperature Drift Coefficient on the Output Voltage of ±100 ppm/°C
- Input Voltage up to 6.5 V
- These are Pb−Free Devices

Typical Applications

- Portable Equipment
- Hand−Held Instrumentation
- Camcorders and Cameras

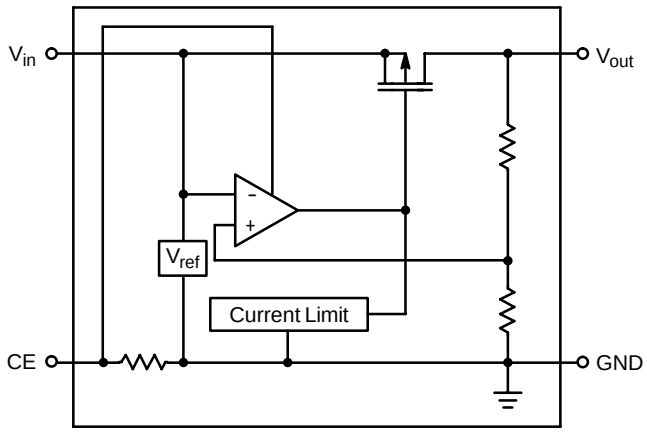

Figure 1. Simplified Block Diagram

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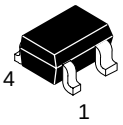
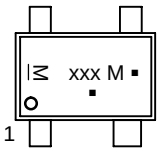
MARKING DIAGRAM



SC−82AB
SQ SUFFIX
CASE 419C



xxx = Device Code
M = Date Code*
▪ = Pb−Free Package
(Note: Microdot may be in either location)

*Date Code orientation and/or position may vary depending upon manufacturing location.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

PIN FUNCTION DESCRIPTION

Pin	Symbol	Description
1	V_{out}	Regulated output voltage.
2	GND	Power supply ground.
3	CE	Chip enable pin.
4	V_{in}	Power supply input voltage.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input Voltage	V_{in}	6.5	V
Input Voltage ($\overline{CE}$ or CE Pin)	V_{CE}	−0.3 to V_{in} +0.3	V
Output Voltage	V_{out}	−0.3 to V_{in} +0.3	V
Output Current	I_{out}	140	mA
Power Dissipation	P_D	150	mW
Operating Junction Temperature Range	T_J	−40 to +85	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

ELECTRICAL CHARACTERISTICS (V_{in} = V_{out} + 1.0 V, T_A = 25°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Input Voltage	V_{in}	2.2	–	6.0	V
Output Voltage (I_{out} = 1.0 mA to 30 mA)	V_{out}	V_{out} X 0.985	–	V_{out} X 1.015	V
Line Regulation (I_{out} = 30 mA) (V_{out} + 0.5 V ≤ V_{in} ≤ 6.0 V) (V_{out} = 1.5 V, 2.2 V ≤ V_{in} ≤ 6.0 V)	Reg_{line}	–	0.02	0.10	%/V
Load Regulation (I_{out} = 1.0 mA to 120 mA)	Reg_{load}	–	12	40	mV
Dropout Voltage (I_{out} = 120 mA) V_{out} = 1.5 V V_{out} = 1.8 V V_{out} = 2.5 V 2.8 V ≤ V_{out} ≤ 3.3 V	V_{DO}	 – – – –	 0.36 0.28 0.24 0.18	 0.70 0.40 0.35 0.28	V
Quiescent Current (I_{out} = 0 mA)	Iq	–	90	160	μA
Output Current	I_{out}	120	–	–	mA
Shutdown Current (V_{in} = V_{CE})	I_{SD}		0.1	1.0	μA
Output Short Circuit Current (V_{out} = 0)	I_{lim}	–	40	–	mA
Ripple Rejection (I_{out} = 30 mA) f = 1.0 kHz (V_{out} = 1.5 V, V_{in} – V_{out} = 1.2 V) (V_{out} ≥ 2.5 V, V_{in} – V_{out} = 1.0 V)	RR	 – –	 75 70	 – –	dB
Enable Input Threshold Voltage High Low	 Vth_{enh} Vth_{enl}	 1.5 0	 – –	 V_{in} 0.3	V
Output Noise Voltage (Bandwidth = 10 Hz to 100 kHz)	V_n	–	30	–	μVrms
Output Voltage Temperature Coefficient (I_{out} = 30 mA, −40°C ≤ T_A ≤ 85°C)	$\Delta V_{out}/\Delta T$	–	±100	–	ppm/°C

TYPICAL CHARACTERISTICS

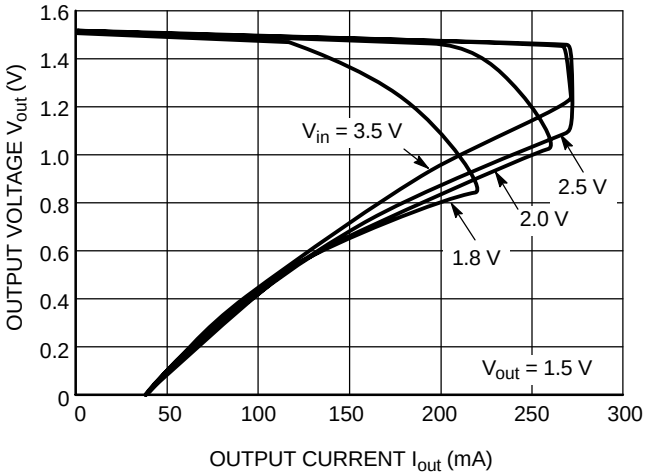


Figure 2. Output Voltage vs. Output Current

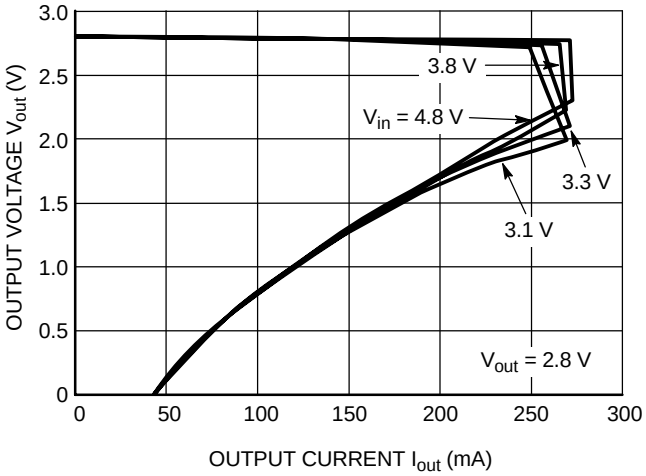


Figure 3. Output Voltage vs. Output Current

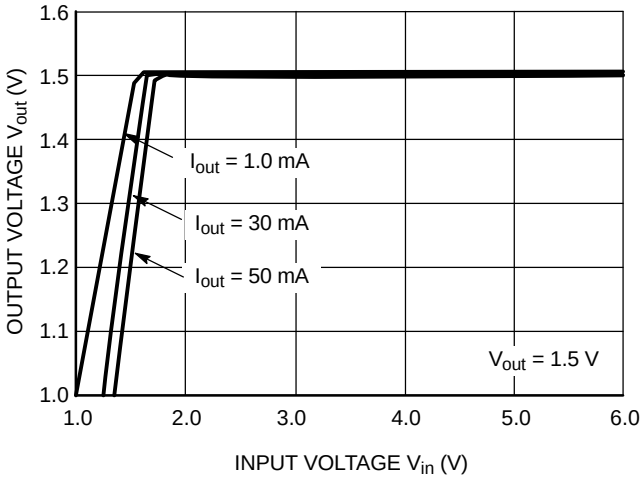


Figure 4. Output Voltage vs. Input Voltage

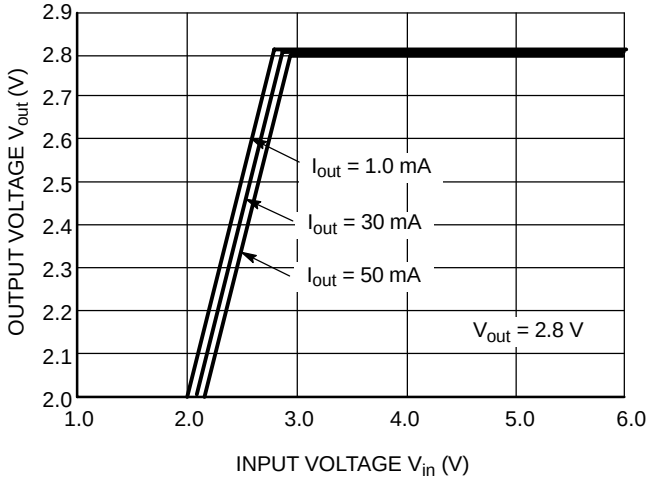


Figure 5. Output Voltage vs. Input Voltage

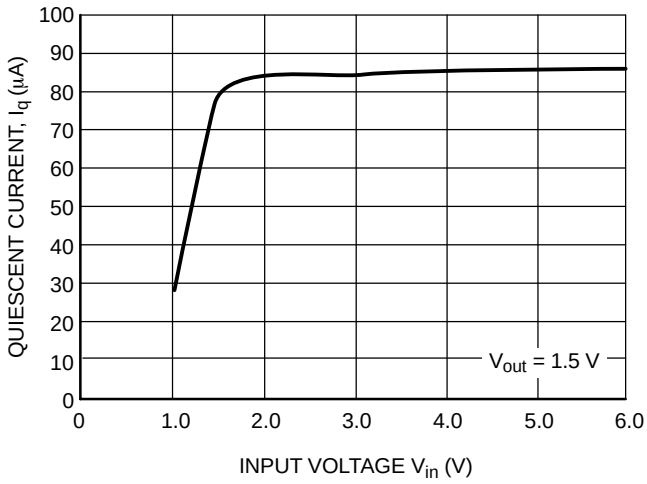


Figure 6. Quiescent Current vs. Input Voltage

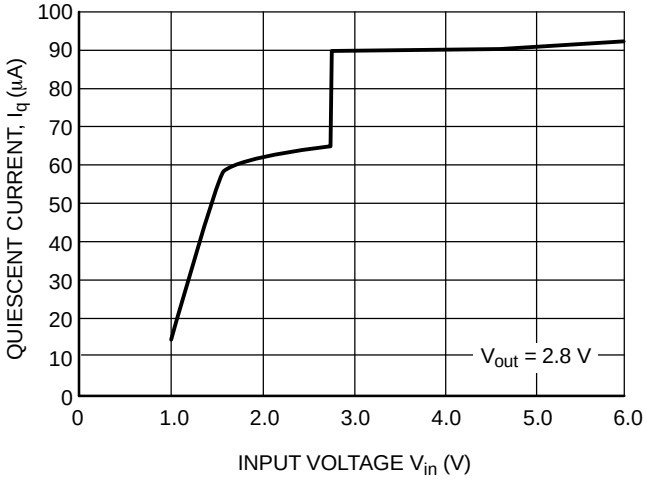


Figure 7. Quiescent Current vs. Input Voltage

TYPICAL CHARACTERISTICS

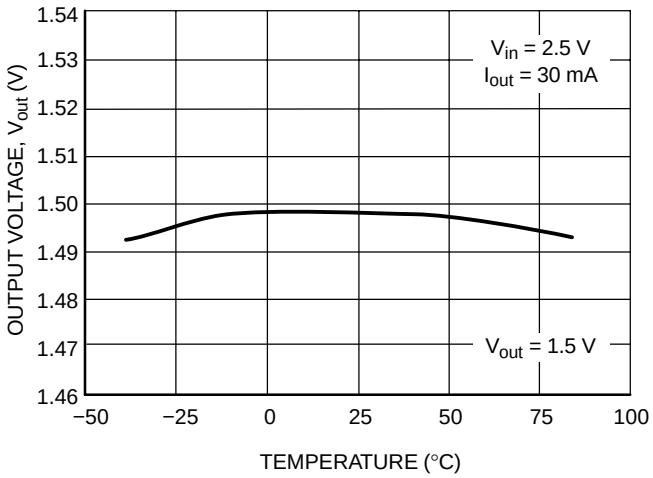


Figure 8. Output Voltage vs. Temperature

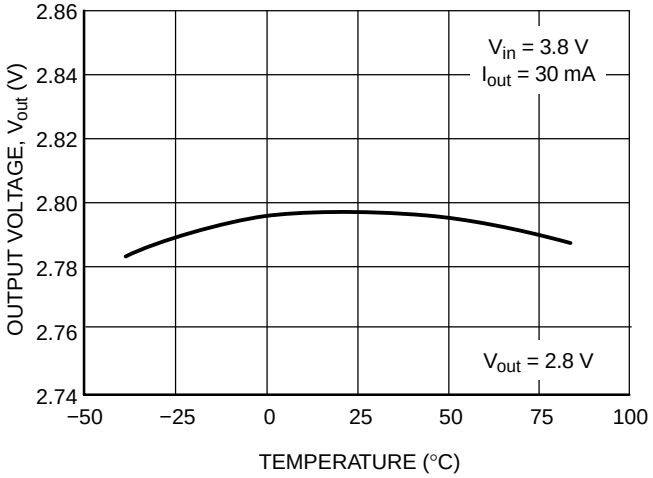


Figure 9. Output Voltage vs. Temperature

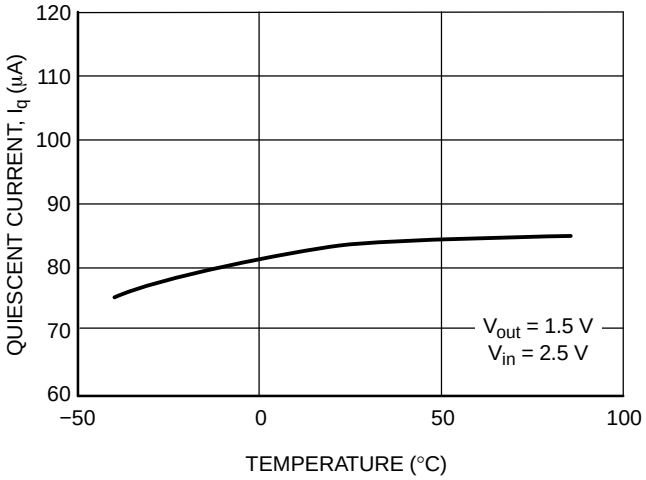


Figure 10. Quiescent Current vs. Temperature

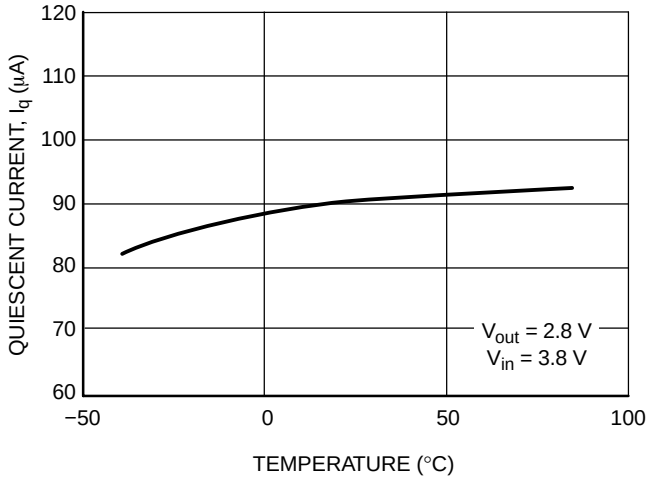


Figure 11. Quiescent Current vs. Temperature

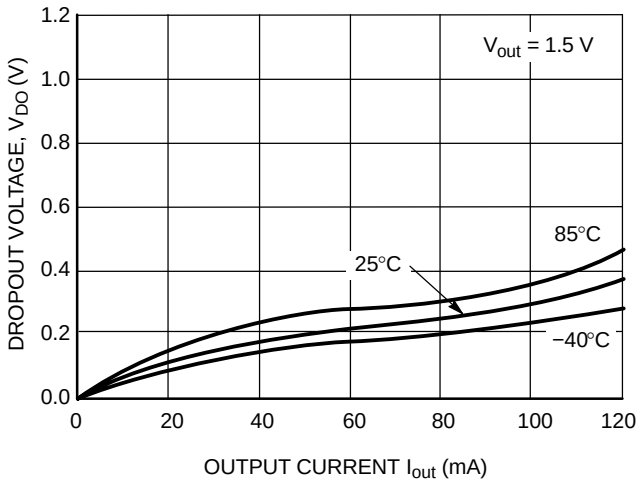


Figure 12. Dropout Voltage vs. Output Current

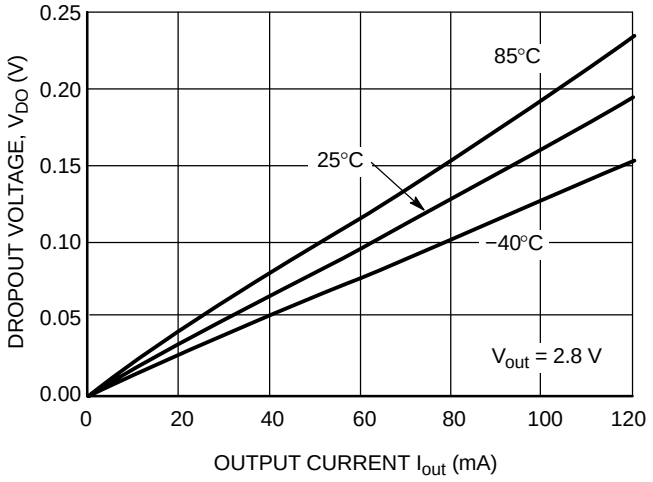


Figure 13. Dropout Voltage vs. Output Current

TYPICAL CHARACTERISTICS

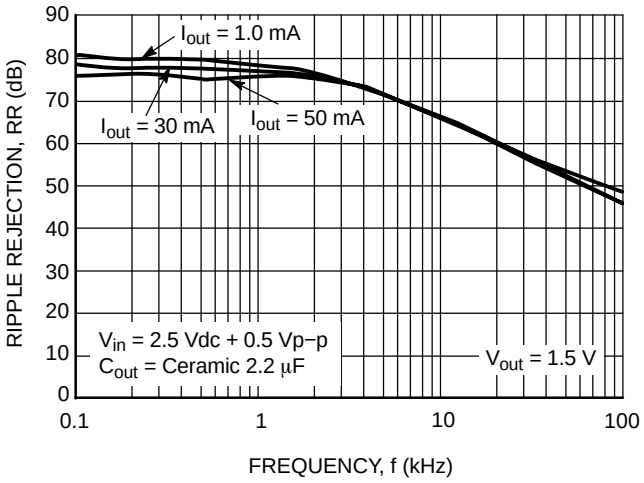


Figure 14. Ripple Rejection vs. Frequency

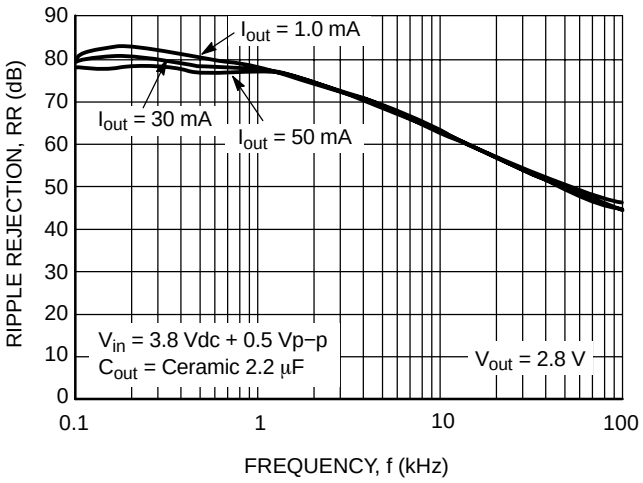
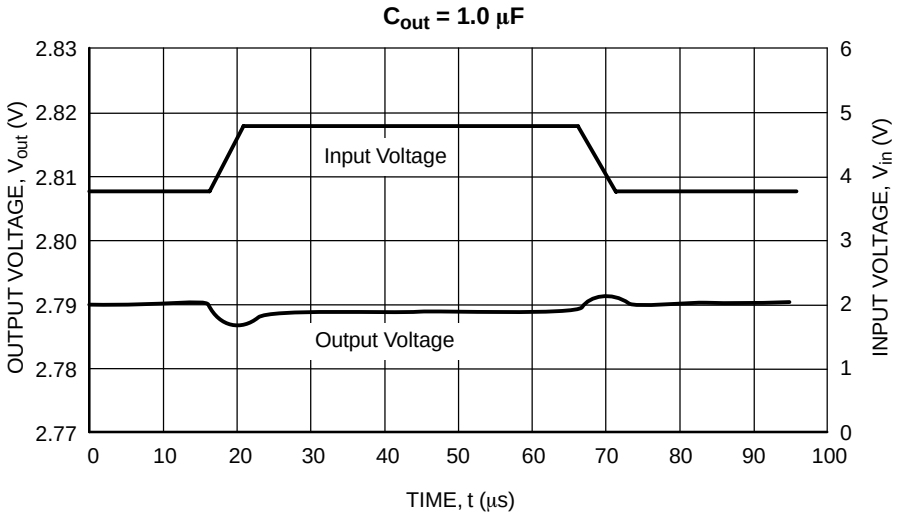
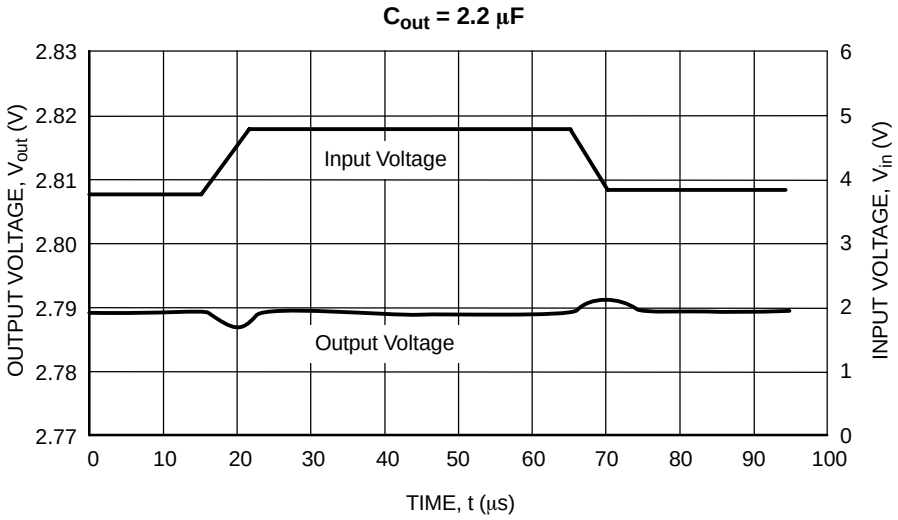


Figure 15. Ripple Rejection vs. Frequency

TYPICAL CHARACTERISTICS





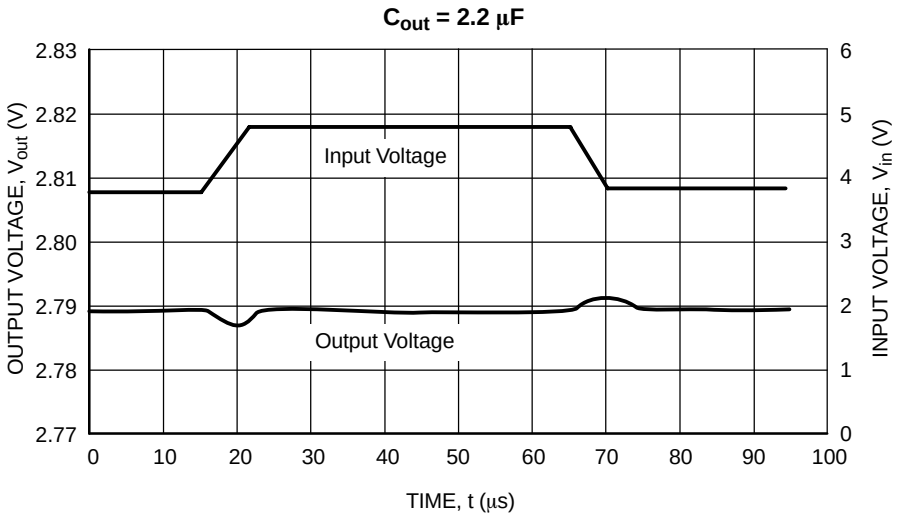


Figure 16. Input Transient Response
(V_{in} = 3.8 V to 4.8 V, I_{out} = 30 mA, tr = tf = 5.0 μs, V_{out} = 2.8 V)

TYPICAL CHARACTERISTICS

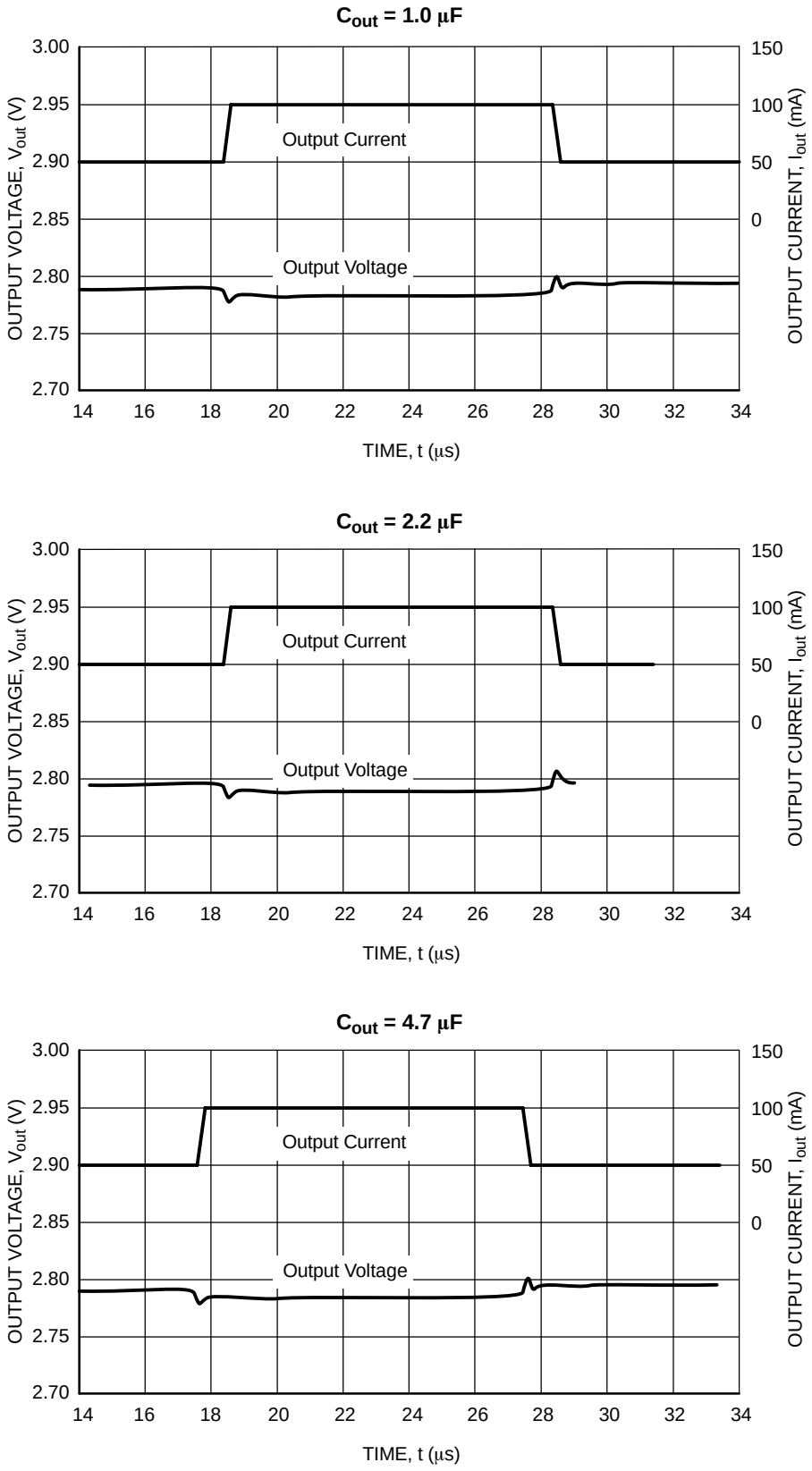


Figure 17. Load Transient Response
(V_{in} = 3.8 V, I_{out} = 50 mA to 100 mA, tr = tf = 5.0 μs, C_{in} = 1.0 μF, V_{out} = 2.8 V)

APPLICATION INFORMATION

Input Decoupling

A 1.0 μF ceramic capacitor is the recommended value to be connected between V_{in} and GND. For PCB layout considerations, the traces of V_{in} and GND should be sufficiently wide in order to minimize noise and prevent unstable operation.

Output Decoupling

It is best to use a 2.2 μF or higher capacitor value on the V_{out} pin. For better performance, select a capacitor with low Equivalent Series Resistance (ESR). For PCB layout considerations, place the output capacitor close to the output pin and keep the leads short as possible.

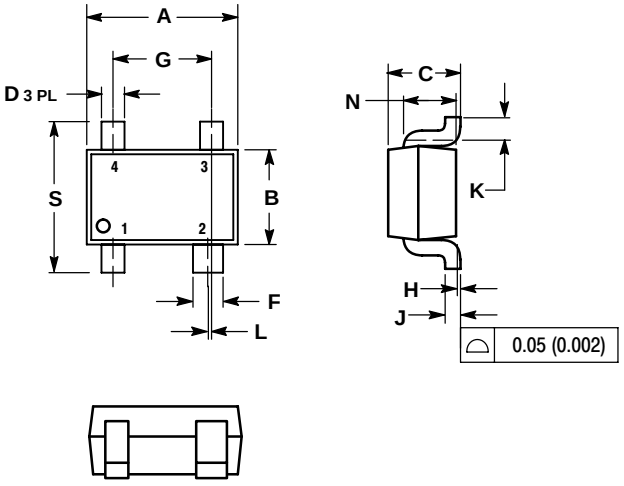
ORDERING INFORMATION

Device	Output Type / Features	Nominal Output Voltage	Marking	Package	Shipping†
NCP580SQ15T1G	Active High	1.5	AF	SC−82AB (Pb−Free)	3000 Tape & Reel
NCP580SQ18T1G	Active High	1.8	AK	SC−82AB (Pb−Free)	3000 Tape & Reel
NCP580SQ25T1G	Active High	2.5	BF	SC−82AB (Pb−Free)	3000 Tape & Reel
NCP580SQ28T1G	Active High	2.8	BJ	SC−82AB (Pb−Free)	3000 Tape & Reel
NCP580SQ30T1G	Active High	3.0	CA	SC−82AB (Pb−Free)	3000 Tape & Reel
NCP580SQ33T1G	Active High	3.3	CD	SC−82AB (Pb−Free)	3000 Tape & Reel

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

PACKAGE DIMENSIONS

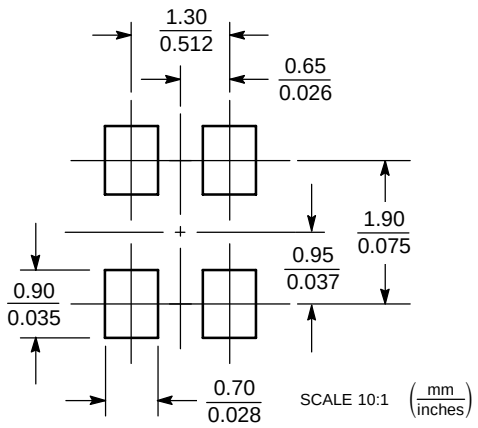
SC−82AB
SQ SUFFIX
CASE 419C−02
ISSUE D



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

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	1.8	2.2	0.071	0.087
B	1.15	1.35	0.045	0.053
C	0.8	1.1	0.031	0.043
D	0.2	0.4	0.008	0.016
F	0.3	0.5	0.012	0.020
G	1.1	1.5	0.043	0.059
H	0.0	0.1	0.000	0.004
J	0.10	0.26	0.004	0.010
K	0.1	−−−	0.004	−−−
L	0.05 BSC		0.002 BSC	
N	0.2 REF		0.008 REF	
S	1.8	2.4	0.07	0.09

SOLDERING 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082−1312 USA
Phone: 480−829−7710 or 800−344−3860 Toll Free USA/Canada
Fax: 480−829−7709 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2−9−1 Kamimeguro, Meguro−ku, Tokyo, Japan 153−0051
Phone: 81−3−5773−3850

ON Semiconductor Website: http://onsemi.com

Order Literature: http://www.onsemi.com/litorder

For additional information, please contact your local Sales Representative.

NCP580/D