

NCP583

Ultra-Low Iq 150 mA CMOS LDO Regulator with Enable

The NCP583 series of low dropout regulators are designed for portable battery powered applications which require precise output voltage accuracy and low quiescent current. These devices feature an enable function which lowers current consumption significantly and are offered in two small packages; SC-82AB and the SOT-563.

A 1.0 μ F ceramic capacitor is the recommended value to be used with these devices on the output pin.

Features

- Ultra-Low Dropout Voltage of 250 mV at 150 mA
- Excellent Line Regulation of 0.05%/V
- Excellent Load Regulation of 20 mV
- High Output Voltage Accuracy of $\pm 2\%$
- Ultra-Low Iq Current of 1.0 μ A
- Very Low Shutdown Current of 0.1 μ A
- Wide Output Voltage Range of 1.5 V to 3.3 V
- Low Temperature Drift Coefficient on the Output Voltage of ± 100 ppm/ $^{\circ}$ C
- Fold Back Protection Circuit
- Input Voltage up to 6.5 V
- These are Pb-Free Devices

Typical Applications

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

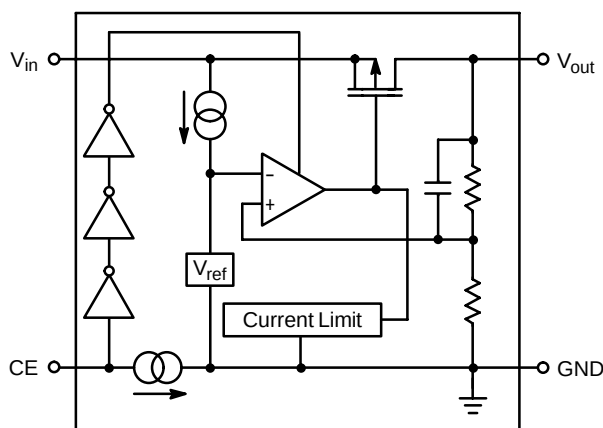


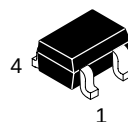
Figure 1. Simplified Block Diagram



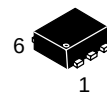
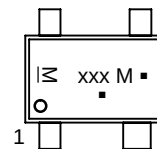
ON Semiconductor®

<http://onsemi.com>

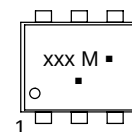
MARKING DIAGRAMS



SC-82AB
SQ SUFFIX
CASE 419C



SOT-563
XV SUFFIX
CASE 463A



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.

NCP583

PIN FUNCTION DESCRIPTION

SOT-563 Pin	SC-82AB Pin	Symbol	Description
1	4	V_{in}	Power supply input voltage.
2	2	GND	Power supply ground.
3	3	V_{out}	Regulated output voltage.
4	–	NC	No connect.
5	–	GND	Power supply ground.
6	1	CE	Chip enable pin.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input Voltage	V_{in}	6.5	V
Input Voltage ($\overline{CE}$ or CE Pin)	V_{CE}	6.5	V
Output Voltage	V_{out}	-0.3 to $V_{in} + 0.3$	V
Output Current	I_{out}	180	mA
Power Dissipation SC-82AB SOT-563	P_D	150 500	mW
Operating Junction Temperature Range	T_J	-40 to $+85$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$+150$	$^{\circ}\text{C}$

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.

ELECTRICAL CHARACTERISTICS ($V_{in} = V_{out} + 1.0\text{ V}$, $T_A = 25^{\circ}\text{C}$, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Input Voltage	V_{in}	1.7	–	6.0	V
Output Voltage ($1.0\text{ }\mu\text{A} \leq I_{out} \leq 30\text{ mA}$)	V_{out}	$V_{out} \times 0.980$	–	$V_{out} \times 1.020$	V
Line Regulation ($I_{out} = 30\text{ mA}$) ($V_{out} + 0.5\text{ V} \leq V_{in} \leq 6.0\text{ V}$)	Reg_{line}	–	0.05	0.20	%/V
Load Regulation ($1.0\text{ }\mu\text{A} \leq I_{out} \leq 100\text{ mA}$)	Reg_{load}	–	20	40	mV
Dropout Voltage ($I_{out} = 150\text{ mA}$) $V_{out} = 1.5\text{ V}$ $V_{out} = 1.8\text{ V}$ $V_{out} = 2.5\text{ V}$ $2.8\text{ V} \leq V_{out} \leq 3.3\text{ V}$	V_{DO}	– – – –	0.60 0.50 0.35 0.25	0.90 0.75 0.55 0.40	V
Quiescent Current ($I_{out} = 0\text{ mA}$)	I_q	–	1.0	1.5	μA
Output Current	I_{out}	150	–	–	mA
Shutdown Current ($V_{CE} = \text{Gnd}$)	I_{SD}	–	0.1	1.0	μA
Output Short Circuit Current ($V_{out} = 0$)	I_{lim}	–	40	–	mA
Enable Input Threshold Voltage High Low	$V_{th_{enh}}$ $V_{th_{enl}}$	1.2 0	– –	6.0 0.3	V

TYPICAL CHARACTERISTICS

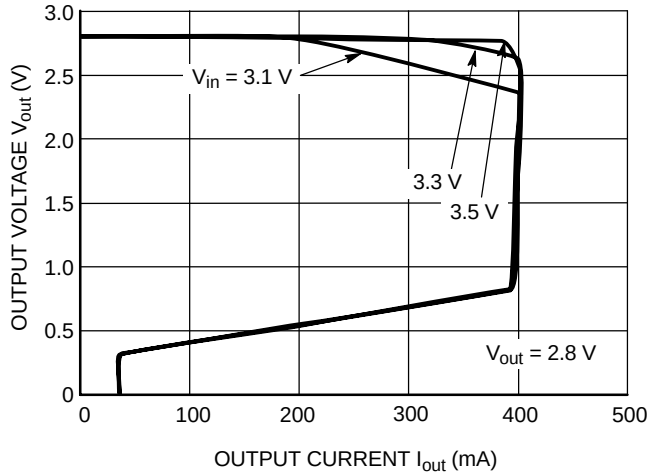


Figure 2. Output Voltage vs. Output Current

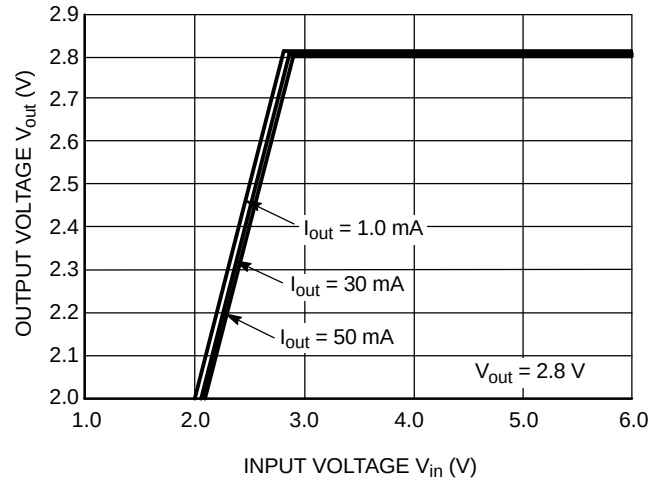


Figure 3. Output Voltage vs. Input Voltage

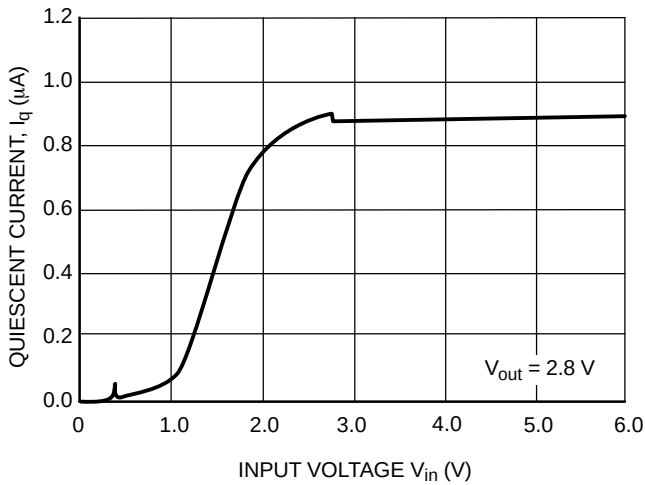


Figure 4. Quiescent Current vs. Input Voltage

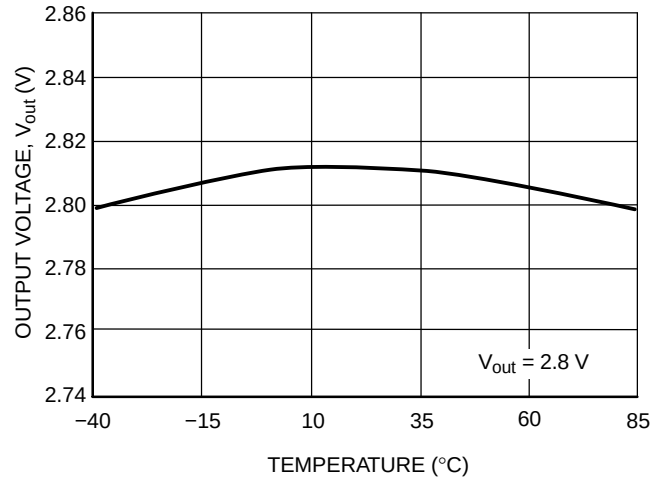


Figure 5. Output Voltage vs. Temperature

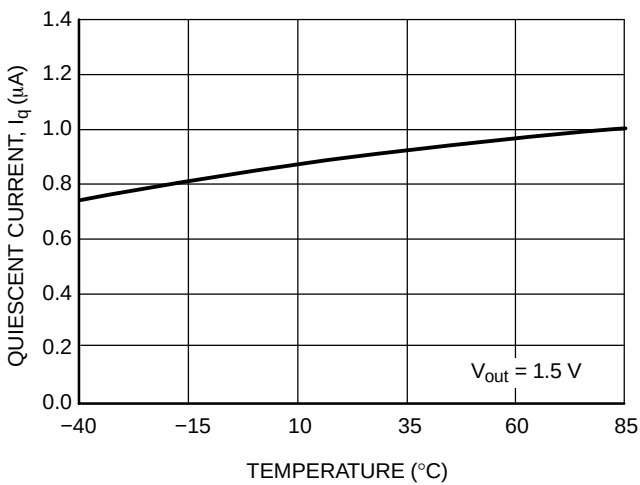


Figure 6. Quiescent Current vs. Temperature

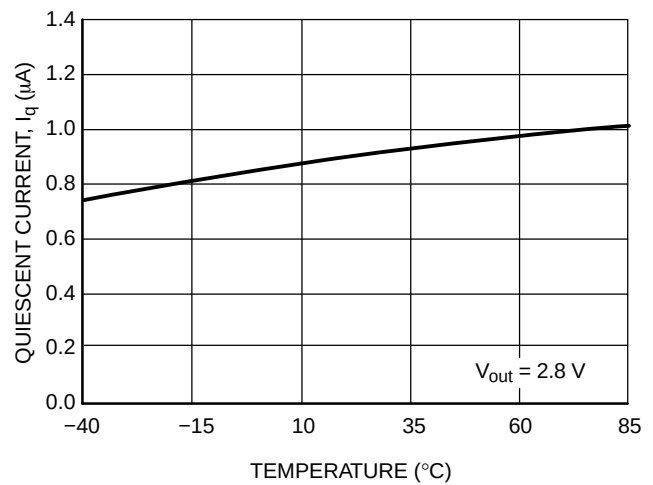


Figure 7. Quiescent Current vs. Temperature

TYPICAL CHARACTERISTICS

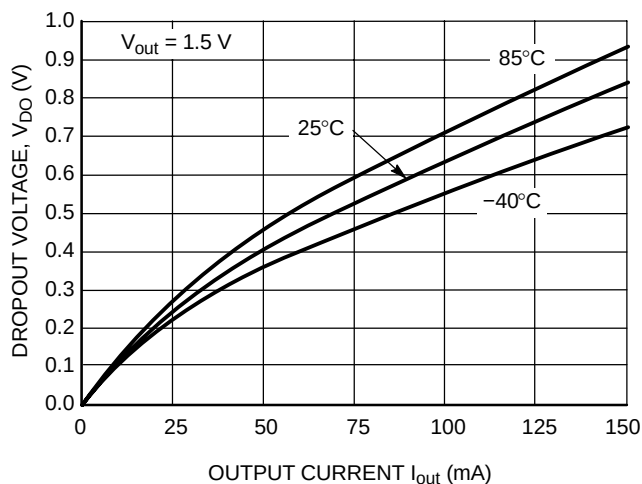


Figure 8. Dropout Voltage vs. Output Current

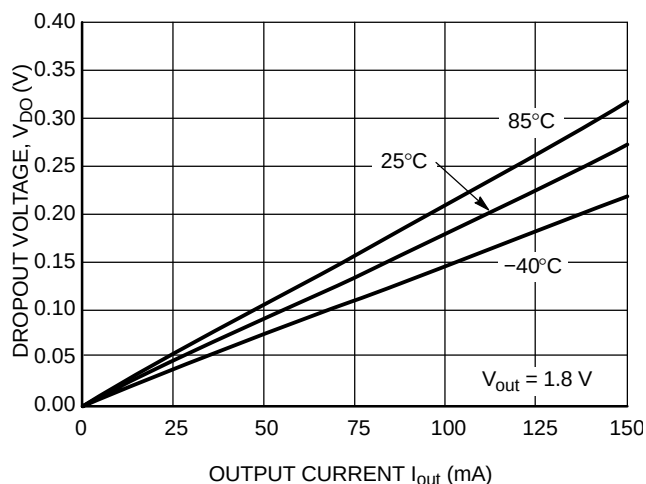


Figure 9. Dropout Voltage vs. Output Current

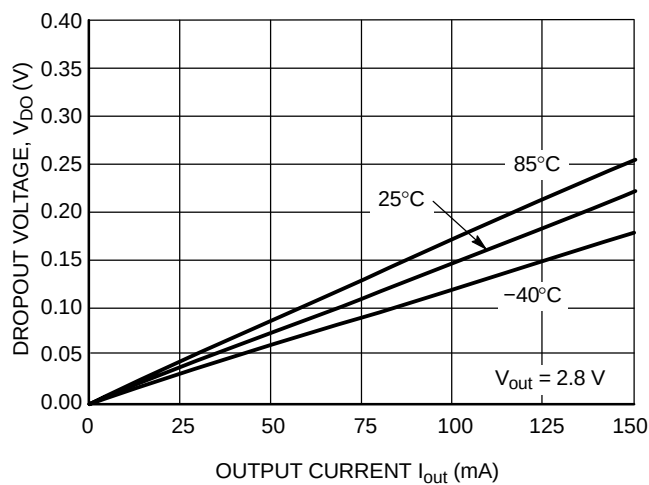


Figure 10. Dropout Voltage vs. Output Current

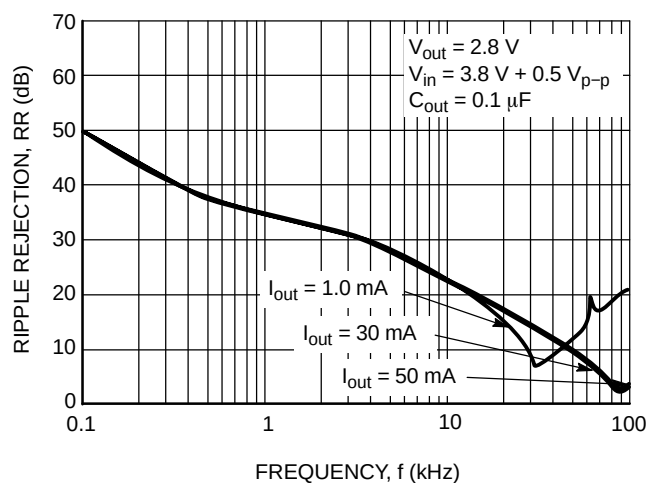


Figure 11. Ripple Rejection vs. Frequency

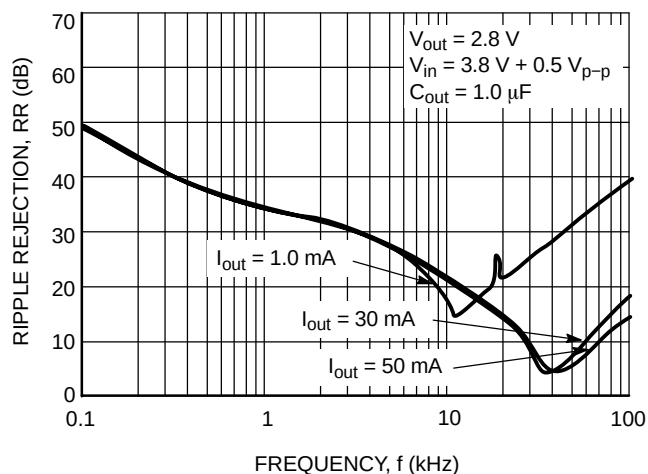


Figure 12. Ripple Rejection vs. Frequency

NCP583

TYPICAL CHARACTERISTICS

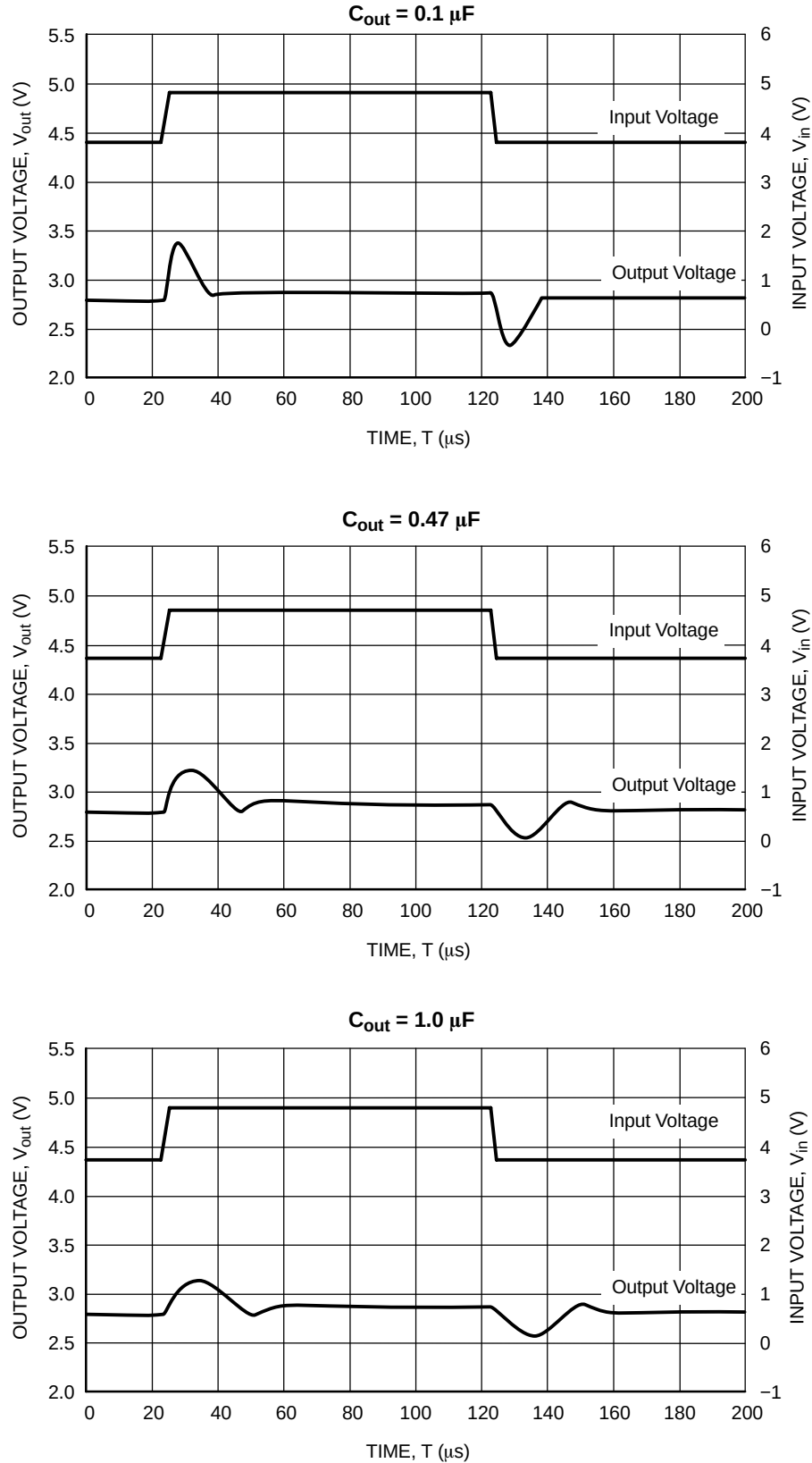


Figure 13. Input Transient Response
($V_{out} = 2.8 V$, $I_{out} = 30 mA$, $t_r = t_f = 5.0 \mu s$, $C_{in} = 0$)

NCP583

TYPICAL CHARACTERISTICS

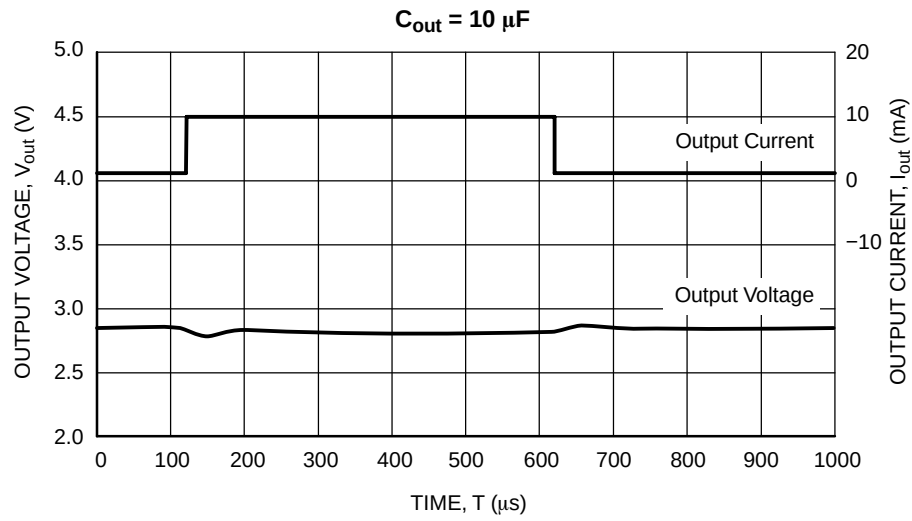
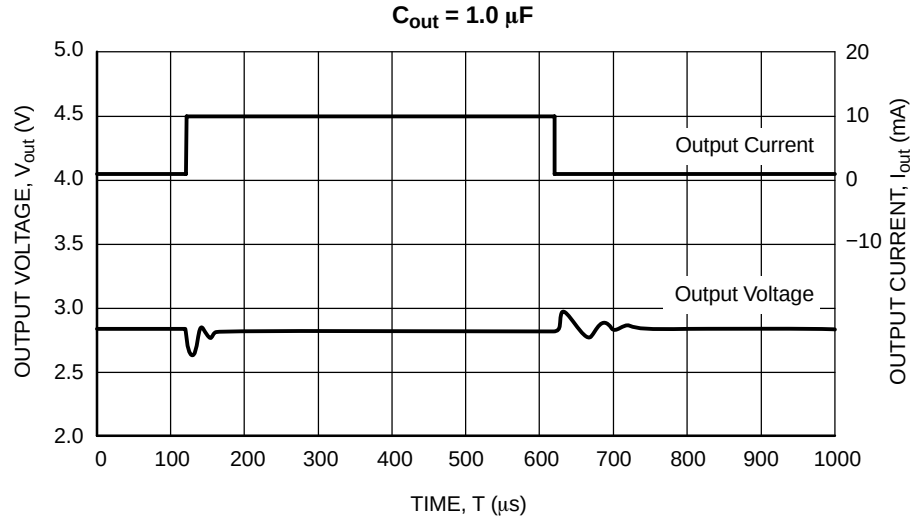


Figure 14. Load Transient Response
($V_{out} = 2.8$ V, $t_r = t_f = 5.0 \mu s$, $V_{in} = 3.8$ V)

NCP583

TYPICAL CHARACTERISTICS

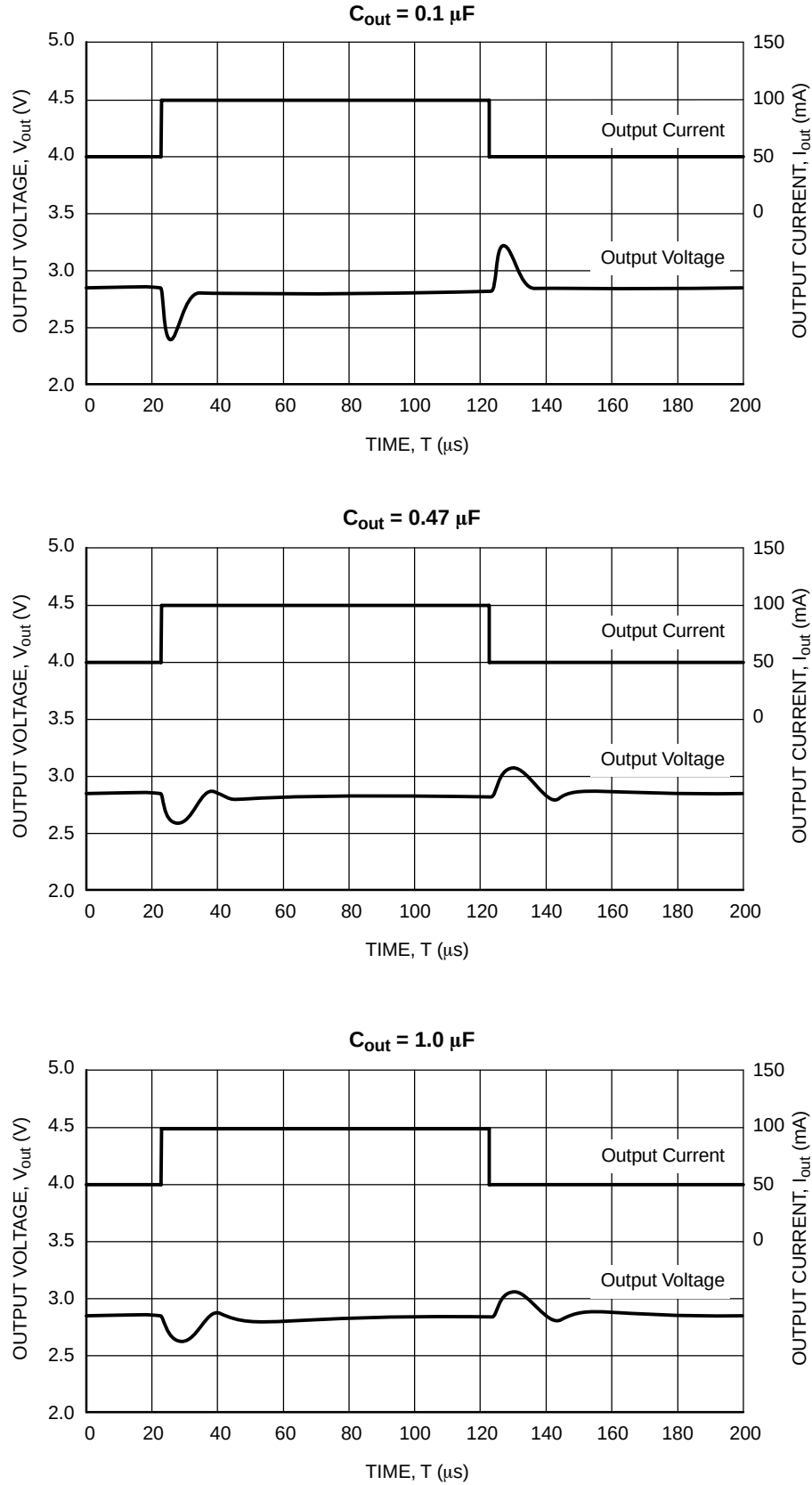


Figure 15. Load Transient Response
($V_{out} = 2.8$ V, $t_r = t_f = 5.0 \mu s$, $V_{in} = 3.8$ V)

NCP583

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 recommended to use a 0.1 μF ceramic capacitor 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†
NCP583SQ15T1G	Active High w/Enable	1.5	A5	SC-82AB (Pb-Free)	3000 Tape & Reel
NCP583SQ18T1G	Active High w/Enable	1.8	A8	SC-82AB (Pb-Free)	3000 Tape & Reel
NCP583SQ25T1G	Active High w/Enable	2.5	B5	SC-82AB (Pb-Free)	3000 Tape & Reel
NCP583SQ28T1G	Active High w/Enable	2.8	B8	SC-82AB (Pb-Free)	3000 Tape & Reel
NCP583SQ30T1G	Active High w/Enable	3.0	C0	SC-82AB (Pb-Free)	3000 Tape & Reel
NCP583SQ33T1G	Active High w/Enable	3.3	C3	SC-82AB (Pb-Free)	3000 Tape & Reel
NCP583XV15T2G	Active High w/Enable	1.5	G15B	SOT-563 (Pb-Free)	4000 Tape & Reel
NCP583XV18T2G	Active High w/Enable	1.8	G18B	SOT-563 (Pb-Free)	4000 Tape & Reel
NCP583XV25T2G	Active High w/Enable	2.5	G25B	SOT-563 (Pb-Free)	4000 Tape & Reel
NCP583XV28T2G	Active High w/Enable	2.8	G28B	SOT-563 (Pb-Free)	4000 Tape & Reel
NCP583XV29T2G	Active High w/Enable	2.9	G29B	SOT-563 (Pb-Free)	4000 Tape & Reel
NCP583XV30T2G	Active High w/Enable	3.0	G30B	SOT-563 (Pb-Free)	4000 Tape & Reel
NCP583XV33T2G	Active High w/Enable	3.3	G33B	SOT-563 (Pb-Free)	4000 Tape & Reel

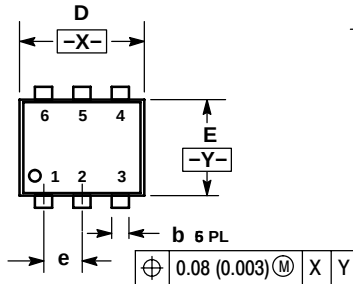
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

Other voltages are available. Consult your ON Semiconductor representative.

NCP583

PACKAGE DIMENSIONS

SOT-563
XV SUFFIX
CASE 463A-01
ISSUE F

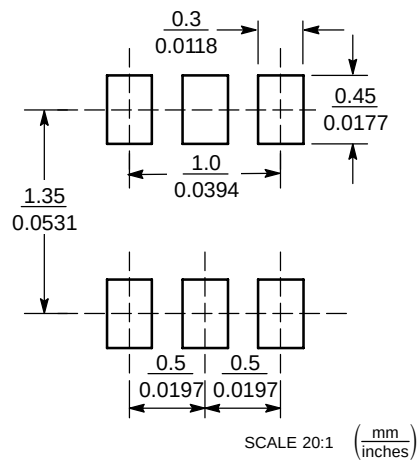


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.021	0.023
b	0.17	0.22	0.27	0.007	0.009	0.011
C	0.08	0.12	0.18	0.003	0.005	0.007
D	1.50	1.60	1.70	0.059	0.062	0.066
E	1.10	1.20	1.30	0.043	0.047	0.051
e	0.5 BSC			0.02 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H _E	1.50	1.60	1.70	0.059	0.062	0.066

SOLDERING FOOTPRINT*

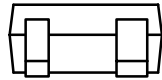
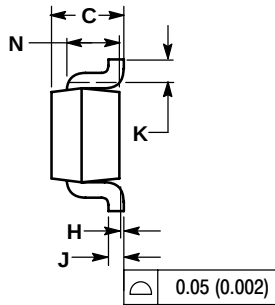
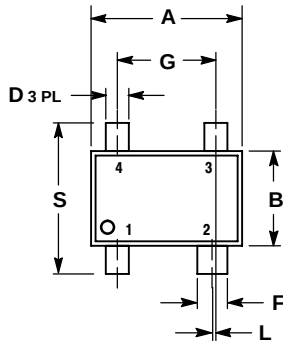


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NCP583

PACKAGE DIMENSIONS

SC-82AB
SQ SUFFIX
CASE 419C-02
ISSUE E

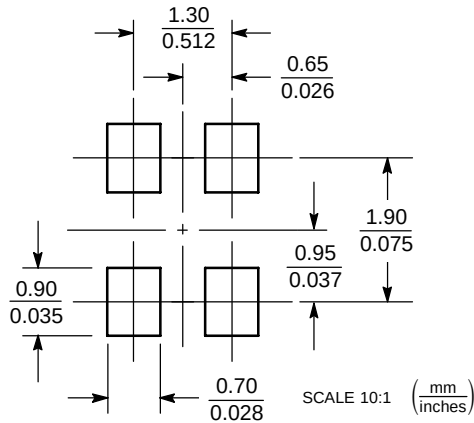


NOTES:

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.

DIM	MILLIMETERS		INCHES	
	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, SOLDERM/D.

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

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.