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 μF 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 ±2%
- Ultra−Low Iq Current of 1.0 μA
- Very Low Shutdown Current of 0.1 μA
- Wide Output Voltage Range of 1.5 V to 3.3 V
- Low Temperature Drift Coefficient on the Output Voltage of ±100 ppm/°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

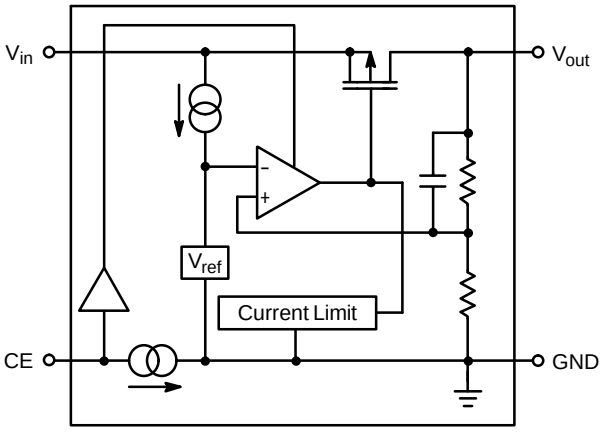

Figure 1. Simplified Block Diagram

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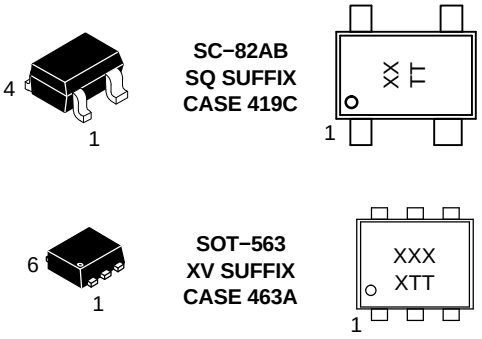
MARKING DIAGRAMS



X = Device Code
T = Traceability Information

ORDERING INFORMATION

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

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 (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
Thermal Junction Resistance SC−82AB SOT−563	$R_{\theta JA}$	 263 200	°C/W
ESD Capability, Human Body Model, C = 100 pF, R = 1.5 kΩ	ESD_{HBM}	2000	V
ESD Capability, Machine Model, C = 200 pF, R = 0 Ω	ESD_{MM}	200	V
Operating Ambient Temperature Range	T_A	−40 to +85	°C
Maximum Junction Temperature	$T_{J(max)}$	125	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ELECTRICAL CHARACTERISTICS (V_{in} = V_{out} + 1.0 V, T_A = −40°C to +85°C, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Input Voltage	V_{in}	1.7	−	6.0	V
Output Voltage (1.0 μA ≤ I_{out} ≤ 30 mA)	V_{out}	V_{out} x 0.98	−	V_{out} x 1.02	V
Line Regulation (I_{out} = 30 mA) (V_{out} + 0.5 V ≤ Vin ≤ 6.0 V)	Reg_{line}	−	0.05	0.20	%/V
Load Regulation (1.0 μA ≤ I_{out} ≤ 150 mA)	Reg_{load}	−	20	40	mV
Dropout Voltage (I_{out} = 150 mA) V_{out} = 1.5 V 1.7 V ≤ V_{out} ≤ 1.9 V 2.1 V ≤ V_{out} ≤ 2.7 V 2.8 V ≤ V_{out} ≤ 3.3 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 mA)	Iq	−	1.0	1.5	μA
Output Current	I_{out}	150	−	−	mA
Shutdown Current (V_{CE} = 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	Vth_{enh} Vth_{enl}	1.2 0	− −	6.0 0.3	V
Output Voltage Temperature Coefficient (I_{out} = 30 mA, −40°C ≤ T_A ≤ 85°C)	$\Delta V_{out}/\Delta T$	−	±100	−	ppm/°C

TYPICAL CHARACTERISTICS

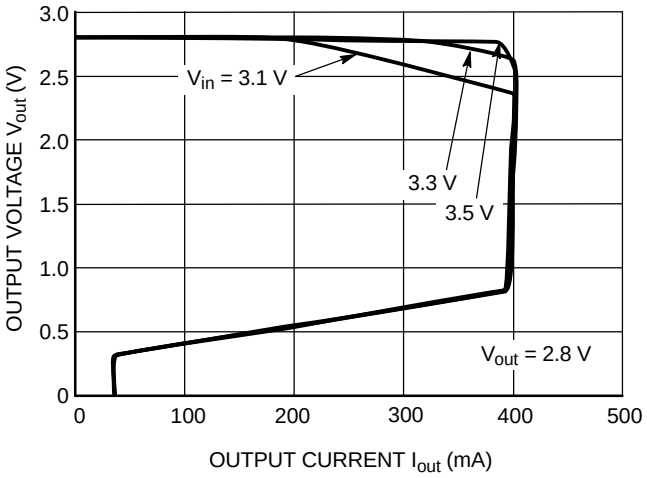


Figure 2. Output Voltage vs. Output Current

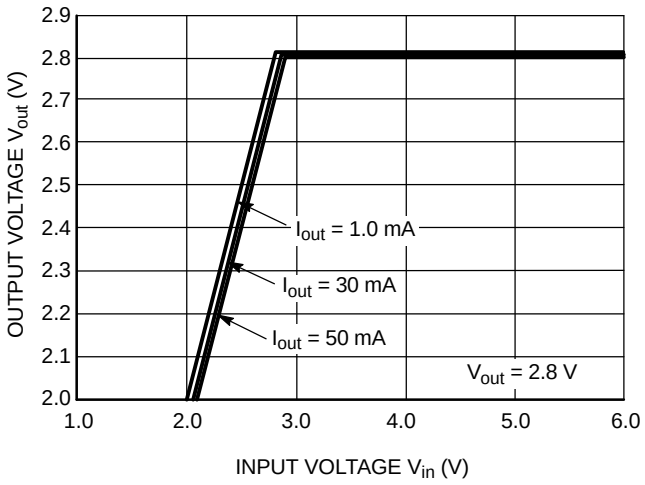


Figure 3. Output Voltage vs. Input Voltage

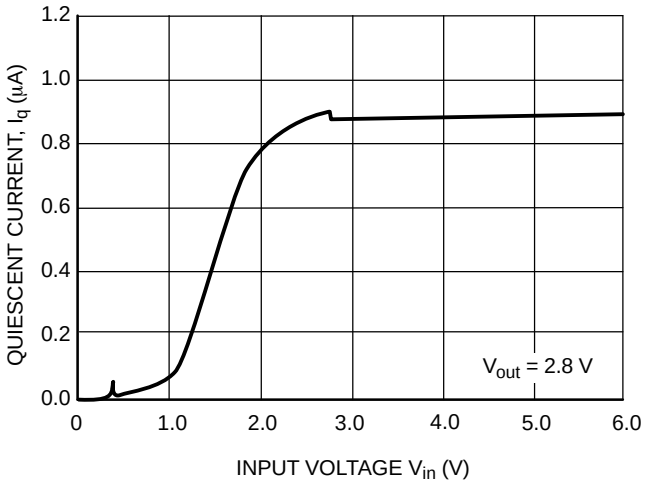


Figure 4. Quiescent Current vs. Input Voltage

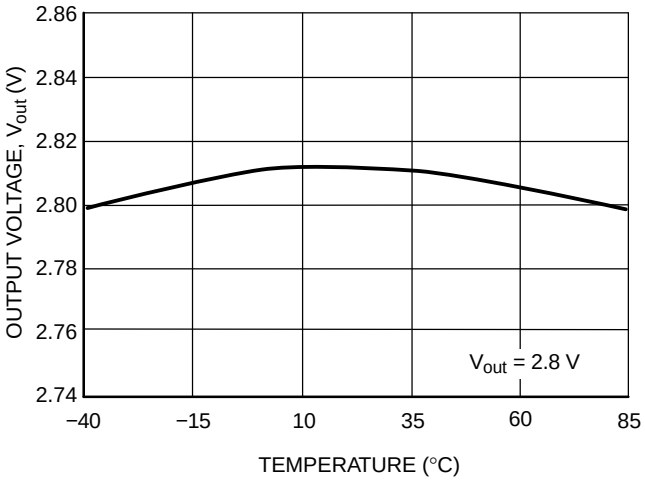


Figure 5. Output Voltage vs. Temperature

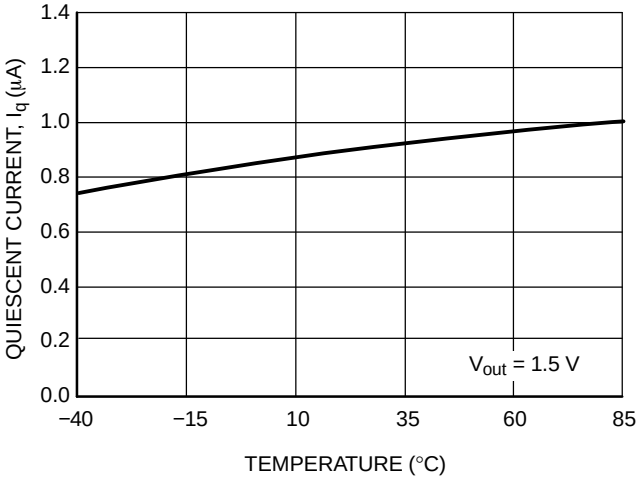


Figure 6. Quiescent Current vs. Temperature

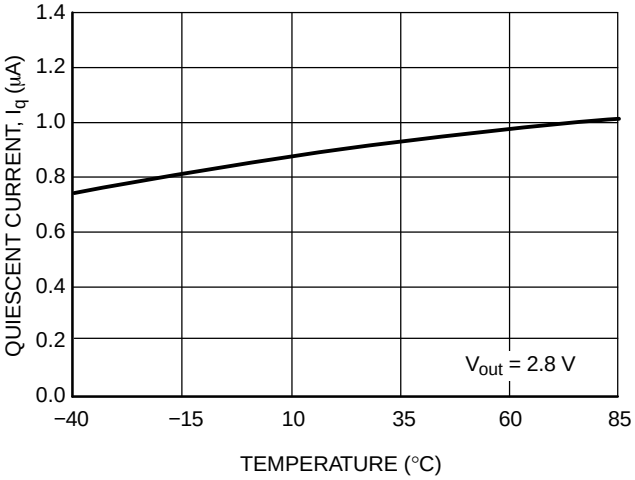


Figure 7. Quiescent Current vs. Temperature

TYPICAL CHARACTERISTICS

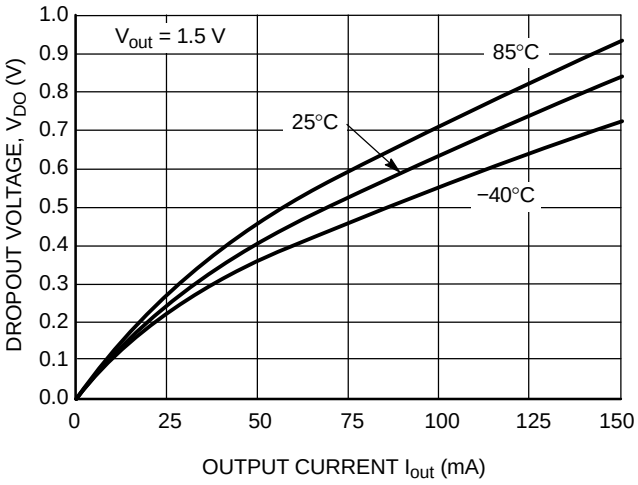


Figure 8. Dropout Voltage vs. Output Current

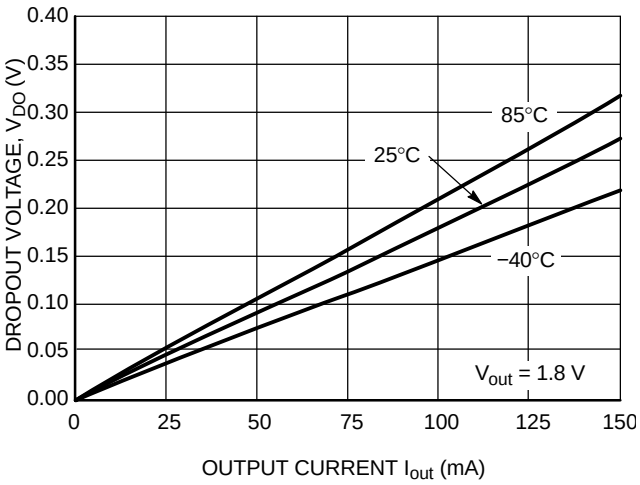


Figure 9. Dropout Voltage vs. Output Current

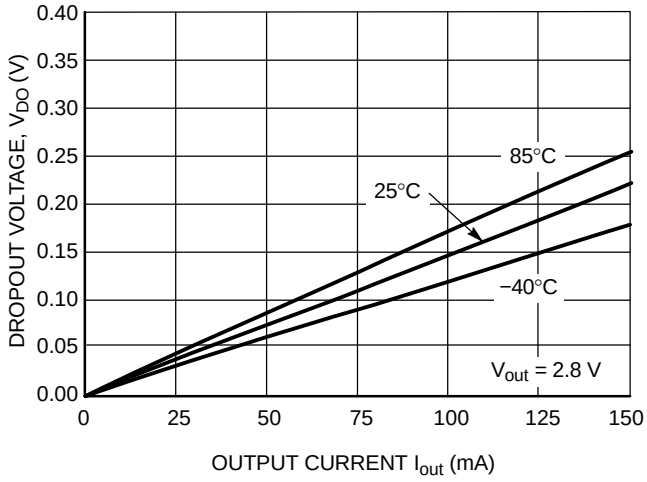


Figure 10. Dropout Voltage vs. Output Current

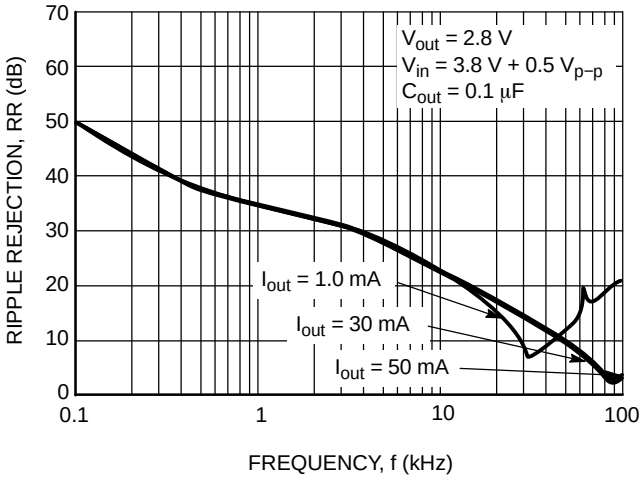


Figure 11. Ripple Rejection vs. Frequency

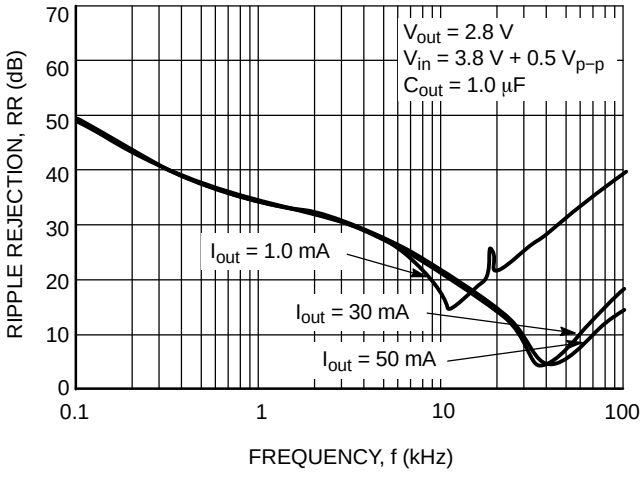


Figure 12. Ripple Rejection vs. Frequency

TYPICAL CHARACTERISTICS

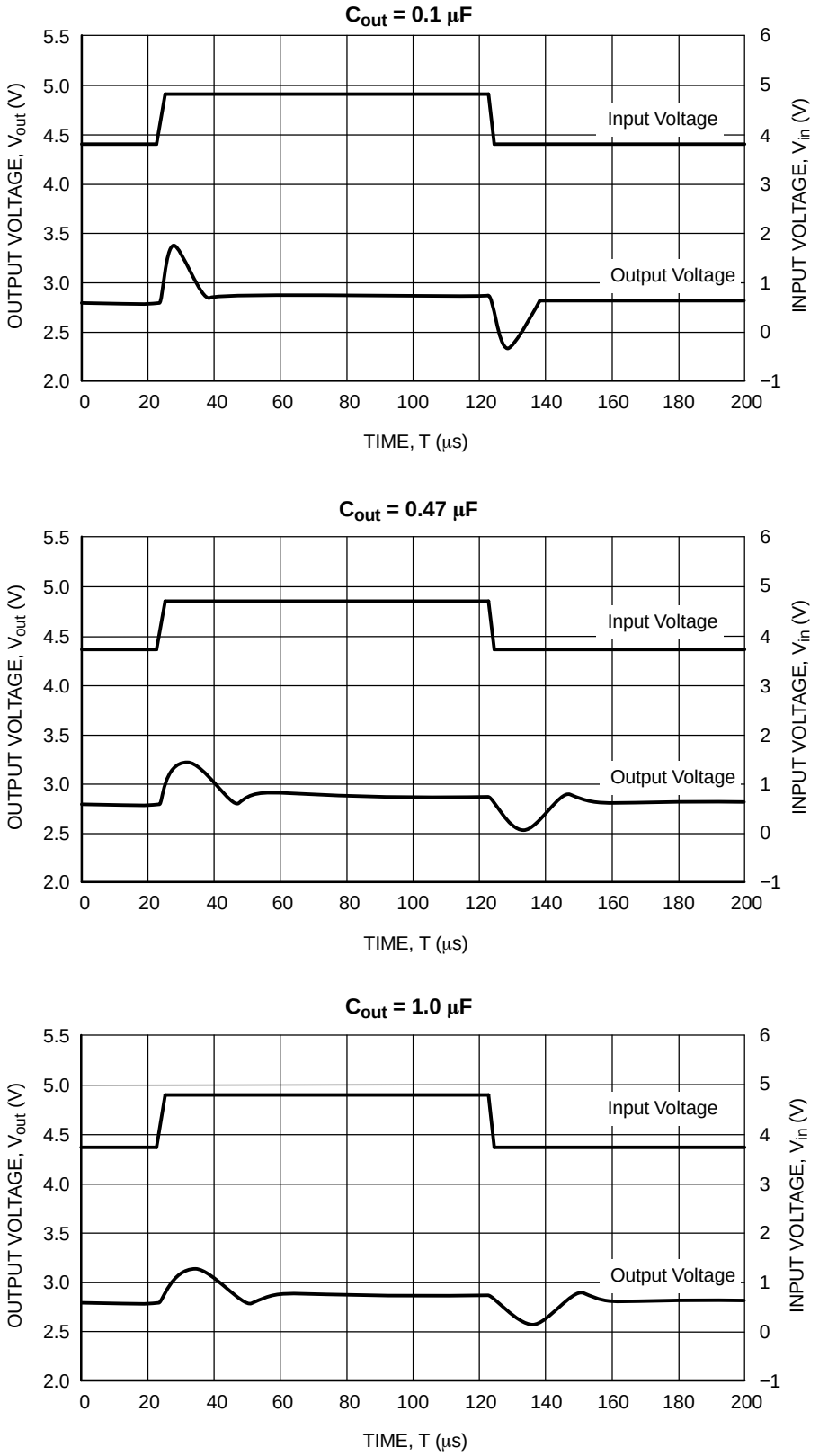


Figure 13. Input Transient Response
(V_{out} = 2.8 V, I_{out} = 30 mA, tr = tf = 5.0 μs, C_{in} = 0)

TYPICAL CHARACTERISTICS

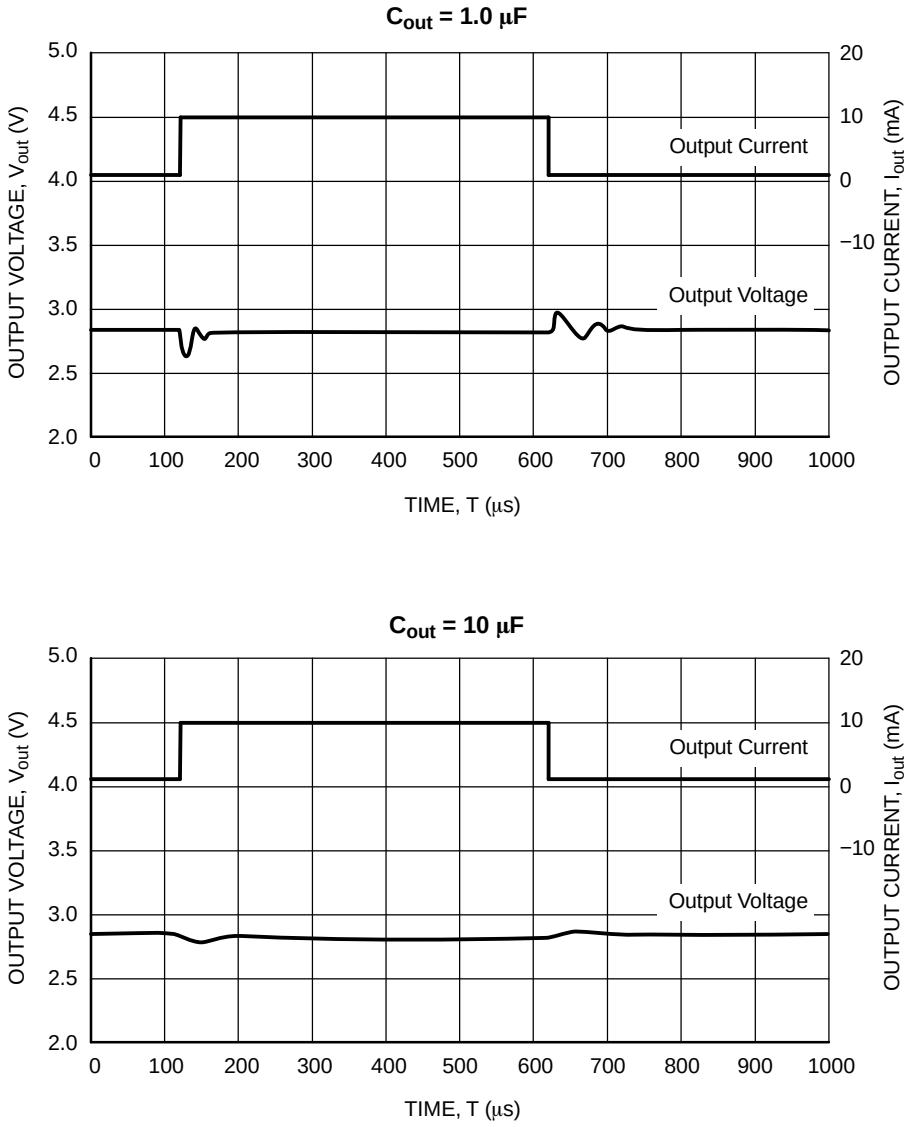


Figure 14. Load Transient Response
(V_{out} = 2.8 V, tr = tf = 5.0 μs, V_{in} = 3.8 V)

TYPICAL CHARACTERISTICS

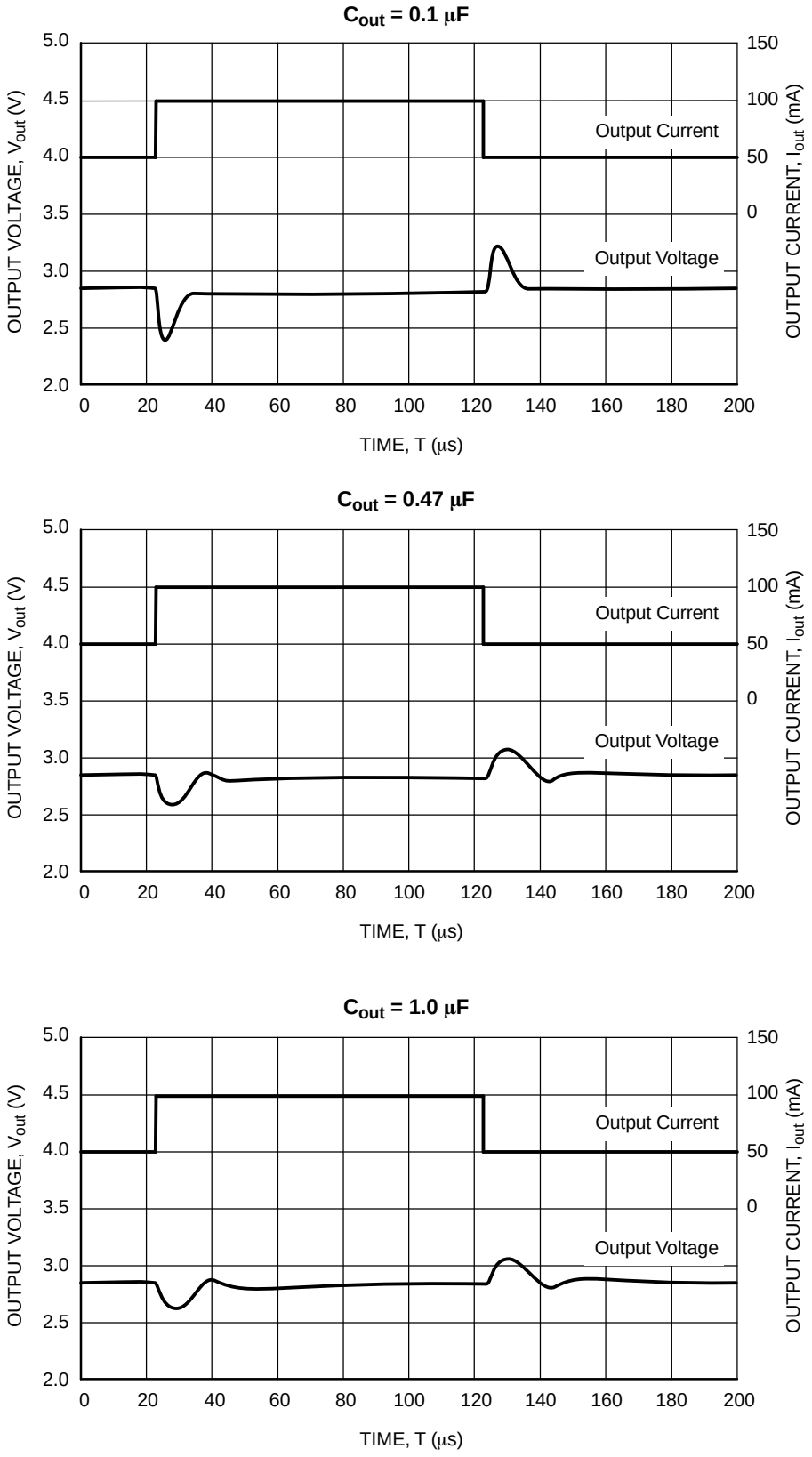


Figure 15. Load Transient Response
(V_{out} = 2.8 V, tr = tf = 5.0 μs, V_{in} = 3.8 V)

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 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

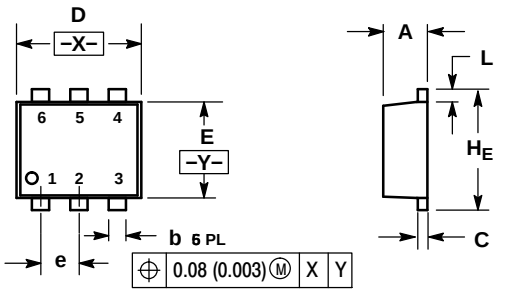
Device	Output Type / Features	Nominal Output Voltage	Marking	Package	Shipping†
NCP583SQ15T1G	Active High w/Enable	1.5	A5	SC−82AB (Pb−Free)	3000 / Tape & Reel
NCP583SQ18T1G	Active High w/Enable	1.8	A8	SC−82AB (Pb−Free)	3000 / Tape & Reel
NCP583SQ25T1G	Active High w/Enable	2.5	B5	SC−82AB (Pb−Free)	3000 / Tape & Reel
NCP583SQ27T1G	Active High w/Enable	2.7	B7	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
NCP583XV26T2G	Active High w/Enable	2.6	G26B	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
NCP583XV31T2G	Active High w/Enable	3.1	G31B	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.

PACKAGE DIMENSIONS

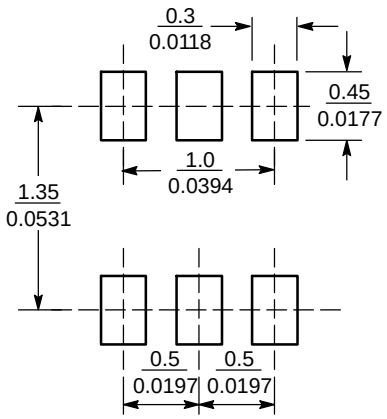
SOT−563
XV SUFFIX
CASE 463A
ISSUE G



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.

	MILLIMETERS			INCHES		
DIM	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

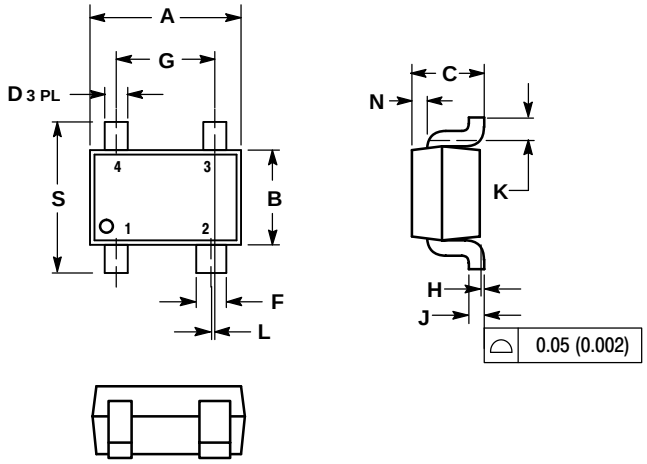
SOLDERING FOOTPRINT*



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

PACKAGE DIMENSIONS

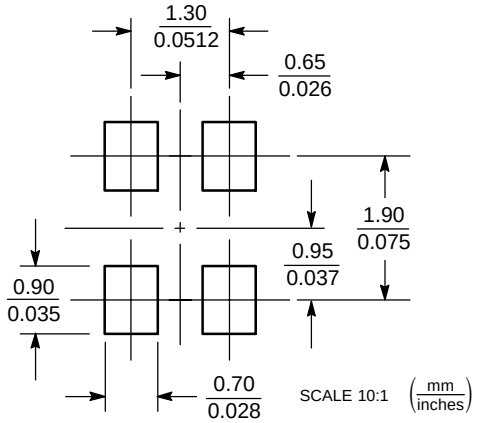
SC−82AB
SQ SUFFIX
CASE 419C−02
ISSUE F



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	1.80	2.20	0.071	0.087
B	1.15	1.35	0.045	0.053
C	0.80	1.10	0.031	0.043
D	0.20	0.40	0.008	0.016
F	0.30	0.50	0.012	0.020
G	1.10	1.50	0.043	0.059
H	0.00	0.10	0.000	0.004
J	0.10	0.26	0.004	0.010
K	0.10	−−−	0.004	−−−
L	0.05 BSC		0.002 BSC	
N	0.20 REF		0.008 REF	
S	1.80	2.40	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
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
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Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

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

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