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NCP5501
LDO Voltage Regulator

500 mA

These linear low drop voltage regulators provide up to 500 mA over a user−adjustable output range of 1.25 V to 5.0 V, or at a fixed output voltage of 1.5 V, 3.3 V or 5.0 V, with typical output voltage accuracy better than 3%. An internal PNP pass transistor permits low dropout voltage and operation at full load current at the minimum input voltage. NCP5500 DPAK 3 for applications that do not require logi cal on/off control.

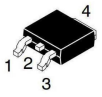
This regulator family is ideal for applications that require a broad input voltage range, and low dropout performance up to 500 mA load using low cost ceramic capacitors. Integral protection features include short circuit current and thermal shutdown.

Features

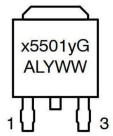
- Output Current up to 500 mA
- 2.9% Output Voltage Accuracy
- Low Dropout Voltage (230 mV at 500 mA)
- Enable Control Pin
- Reverse Bias Protection
- Short Circuit Protection
- Thermal Shutdown
- Wide Operating Temperature Rang
  NCP5501; −40°C to +85°C Ambient Temperature
- Stable with Low Cost Ceramic Capacitors
- These are Pb−Free Devices

Typical Applications

- Automotive
- Industrial and Consumer
- Post SMPS Regulation
- Point of Use Regulation



DPAK 3
SINGLE GAUGE
CASE 369C



Pin 1. V_{in}
TAB, 2. GND
3. V_{out}

x = P (NCP), V (NCV)
5500/1 = Device Code
y = Output Voltage
L = 1.5 V
T = 3.3 V
U = 5.0 V
W = Adjustable
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

Pin 1. V_{in}
2. GND
3. GND
4. V_{out}
5. NC/ADJ
6. GND
7. GND
8. EN

x = Output Voltage, NCP
= Adjustable, NCP
A = Assembly Locati
on
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb−Free Package

ORDERING INFORMATION

Device	Nominal Output Voltage*	Package Marking	Package	Shipping†
NCP5501DT15RKG	1.5	P5501LG	DPAK 3 (Pb−Free)	2500 / Tape & Reel
NCP5501DT33RKG	3.3	P5501TG	DPAK 3 (Pb−Free)	2500 / Tape & Reel
NCP5501DT50RKG	5.0	P5501UG	DPAK 3 (Pb−Free)	2500 / Tape & Reel

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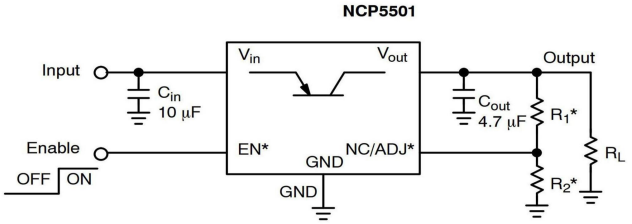


Figure 1. Typical Application Circuit

PIN FUNCTION DESCRIPTIONS

DPAK 3 Pin No.			Pin Name	Description
–			EN	Enable. This pin allows for on/off control of the regulator. High level turns on the output. To disable the device, connect to ground. If this function is not in use, connect to V_{in}.
1			V_{in}	Positive power supply input voltage.
2, Tab			GND	Ground. This pin is internally connected to the Tab heat sink.
3			V_{out}	Regulated output voltage.
–			NC/ADJ	No connection (Fixed output versions). Voltage−adjust input (Adjustable output version). Use an external voltage divider to set the output voltage over a range of 1.25 V to 5.0 V.

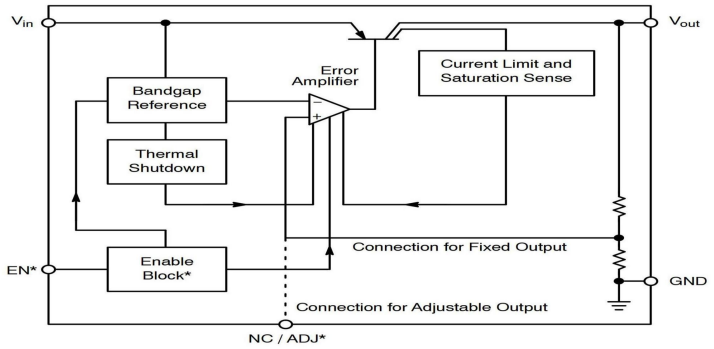
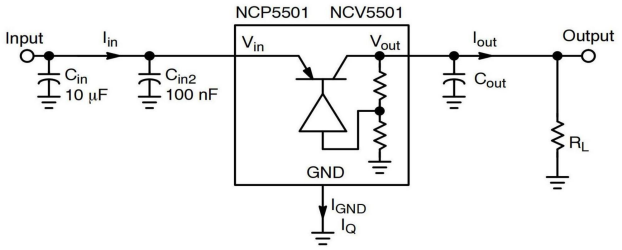


Figure 2. Block Diagram



Measuring Circuits

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ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Min	Max	Unit
Input Voltage (Note 1)	V_{in}	−0.3 (Note 2)	+18	V
Output, Enable Voltage	V_{out}, EN	−0.3	+16 or V_{in} + 0.3 (Notes 2 and 5)	V
Maximum Junction Temperature	T_J	−	150	°C
Storage Temperature	T_{Stg}	−55	+150	°C
Moisture Sensitivity Level All Packages	MSL	1		−
Lead Temperature Soldering Reflow (SMD Styles Only), Pb−Free Versions (Note 3)	T_{sld}		265 Peak	°C
ESD Capability, Human Body Model (Note 4)	ESD_{HBM}	4000	−	V
ESD Capability, Machine Model (Note 4)	ESD_{MM}	200	−	V
ESD Capability, Charged Device Model (Note 4)	ESD_{CDM}	1000	−	V

THERMAL CHARACTERISTICS

Rating	Symbol	Min	Max	Unit
Package Dissipation	P_D		Internally Limited	W
Thermal Characteristics, DPAK 3 and DPAK 5 (Note 1)				°C/W
Thermal Resistance, Junction−to−Air (Note 6)	$R_{\theta JA}$		60	
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$		5.2	
Thermal Characteristics, SOIC−8 (Note 1)				°C/W
Thermal Resistance, Junction−to−Air (Note 6)	$R_{\theta JA}$		80	
Thermal Reference, Junction−to−Lead	$R_{\Psi JL}$		22	

6. As measured using a copper heat spreading area of 650 mm^2, 1 oz copper thickness.

OPERATING RANGES

Rating	Symbol	Min	Max	Unit
Operating Input Voltage (Note 1)	V_{in}	V_{out} + V_{DO}, 2.5 V (Note 7)	16	V
Adjustable Output Voltage Range (Adjustable Version Only)	V_{out}	1.25	5.0	V
Operating Ambient Temperature Range	T_A			°C
NCP5501		−40	85	
		−40	125	

7. Minimum V_{in} = 2.5 V or (V_{out} + V_{DO}), whichever is higher.

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TYPICAL CHARACTERISTICS

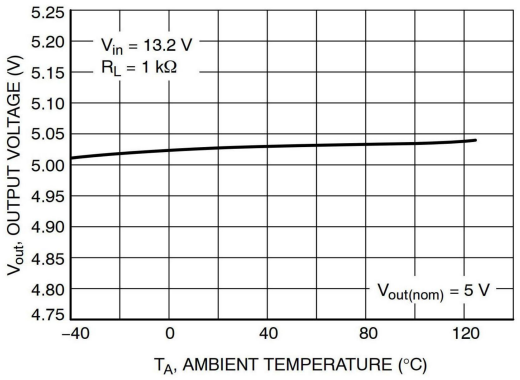

Figure 3. Output Voltage vs. Ambient Temperature

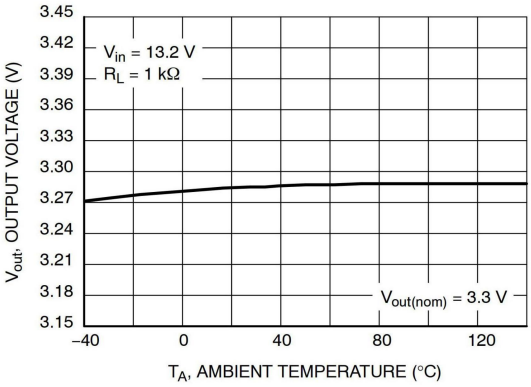

Figure 4. Output Voltage vs. Ambient Temperature

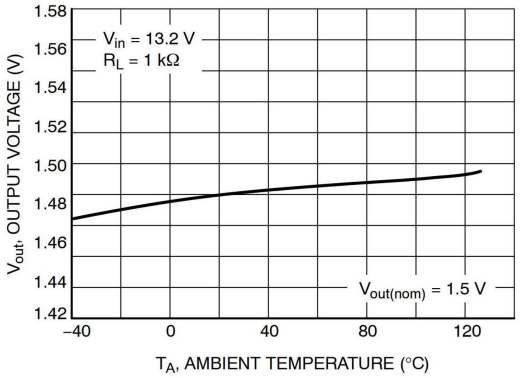

Figure 5. Output Voltage vs. Ambient Temperature

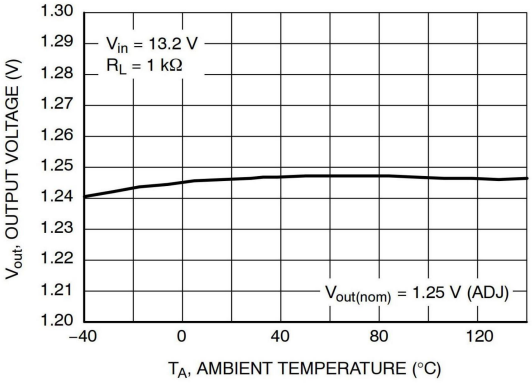

Figure 6. Output Voltage vs. Ambient Temperature

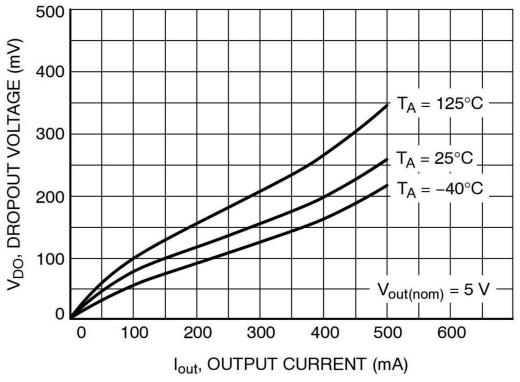

Figure 7. Dropout Voltage vs. Output Current

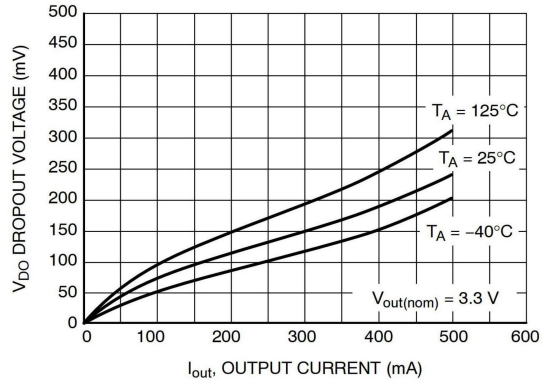

Figure 8. Dropout Voltage vs. Output Current

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TYPICAL CHARACTERISTICS

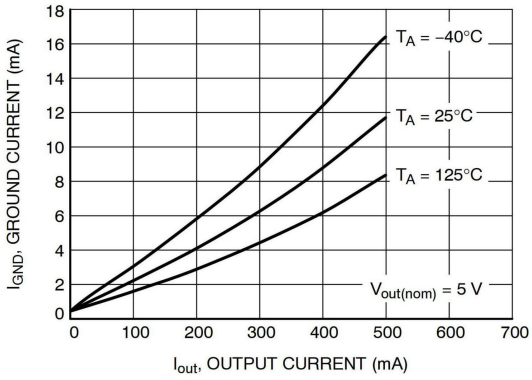

Figure 9. Ground Current vs. Output Current

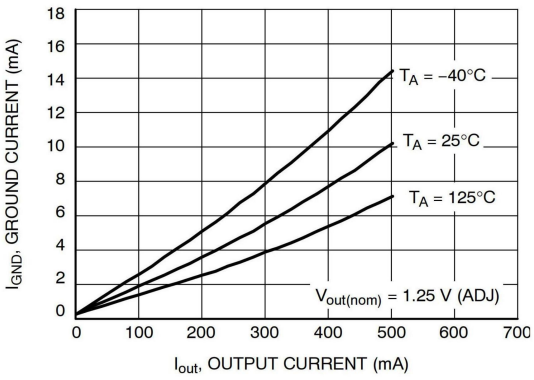

Figure 10. Ground Current vs. Output Current

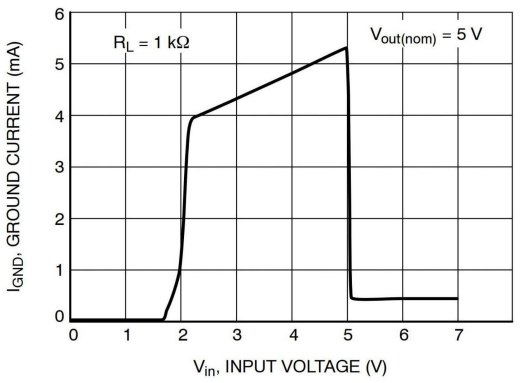

Figure 11. Ground Current vs. Input Voltage

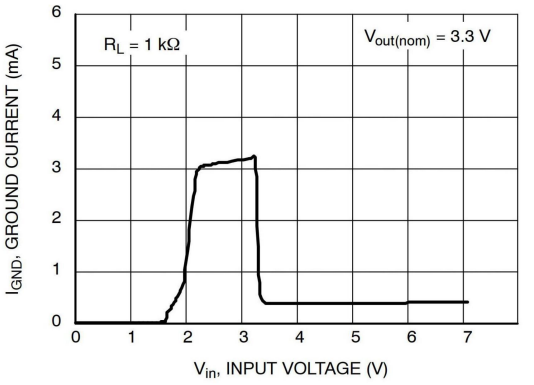

Figure 12. Ground Current vs. Input Voltage

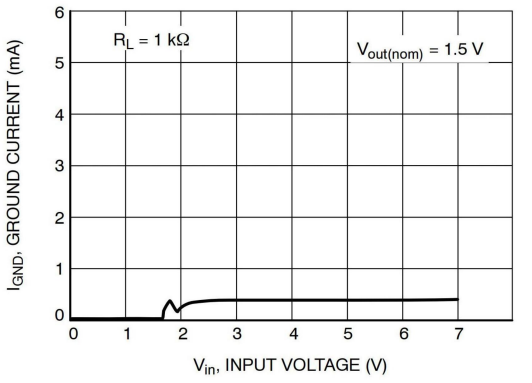

Figure 13. Ground Current vs. Input Voltage

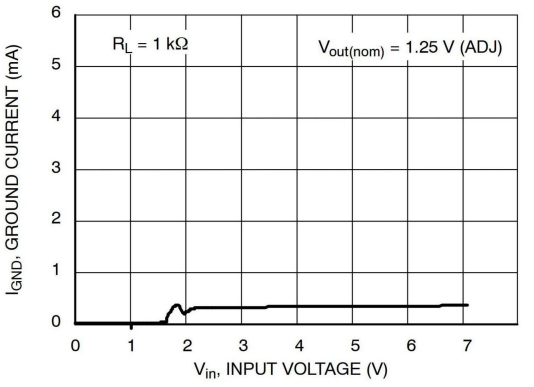

Figure 14. Ground Current vs. Input Voltage

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TYPICAL CHARACTERISTICS

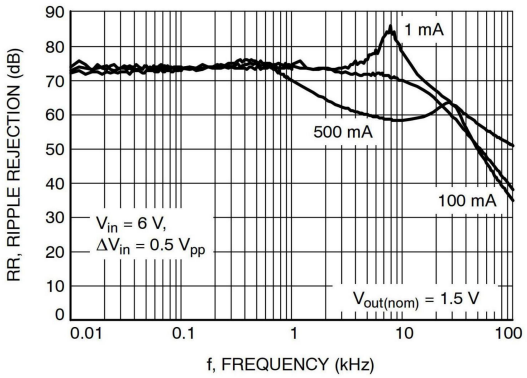

Figure 15. Ripple Rejection vs. Frequency

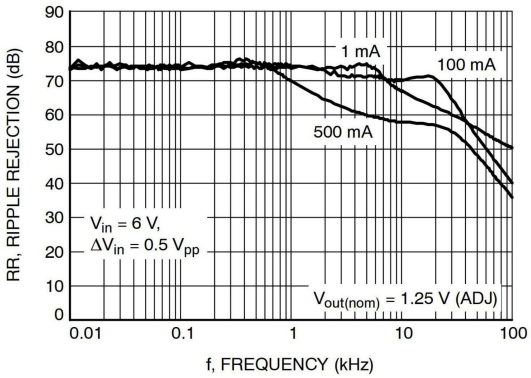

Figure 16. Ripple Rejection vs. Frequency

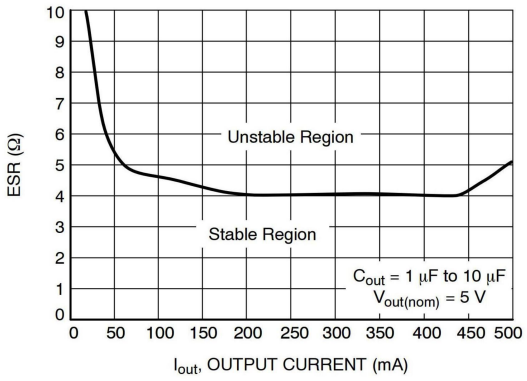

Figure 17. Output Capacitor ESR Stability vs. Output Current

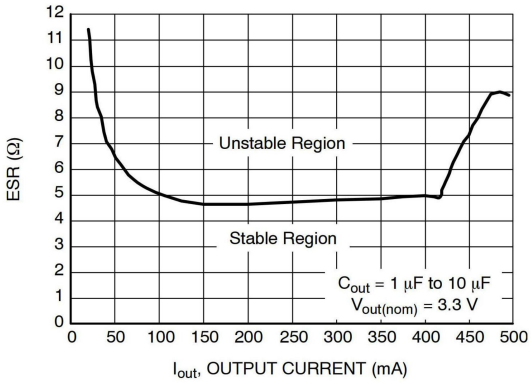

Figure 18. Output Capacitor ESR Stability vs. Output Current

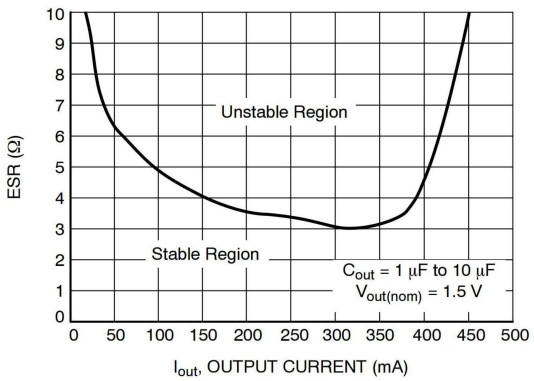

Figure 19. Output Capacitor ESR Stability vs. Output Current

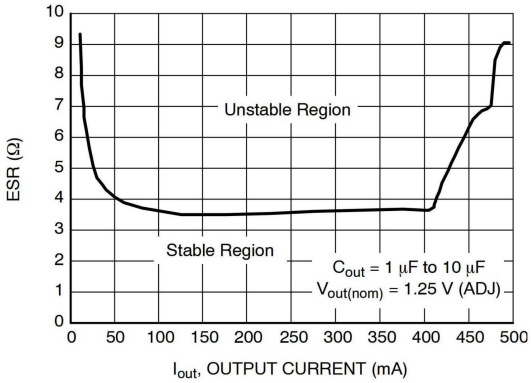

Figure 20. Output Capacitor ESR Stability vs. Output Current

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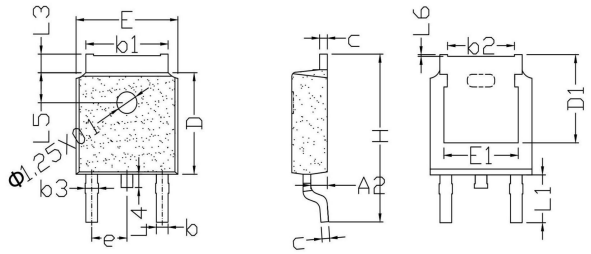
Ordering Information

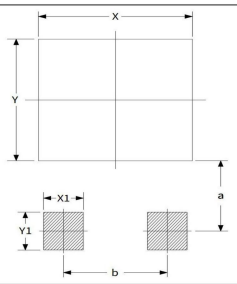
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
TO-252	R3	0.305	2500	5000	25000	13''

Package Outline Dimensions (TO-252)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A2	0.90	1.10	0.035	0.043
b	0.66	0.86	0.026	0.034
b1	5.10	5.46	0.201	0.215
b2	4.27	4.37	0.168	0.172
b3	0.78	0.90	0.031	0.035
c	0.45	0.55	0.018	0.022
D	5.90	6.30	0.232	0.248
D1	5.35 REF.		0.211REF.	
E	6.30	6.70	0.248	0.264
E1	4.83 REF.		0.190 REF.	
e	2.18	2.38	0.086	0.094
H	9.80	10.4	0.386	0.409
L1	2.70	3.10	0.106	0.122
L3	0.80	1.20	0.031	0.047
L4	0.60	1.00	0.024	0.039
L5	1.8 REF.		0.071 REF.	
L6	-	0.12	-	0.005

Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
a	3.70	-	0.146	-
b	4.37	-	0.172	-
X	-	5.80	-	0.228
X1	-	1.20	-	0.047
Y	-	5.85	-	0.230
Y1	-	2.00	-	0.079