

LD1580XX

7 A very low drop positive voltage regulator adjustable

Features

- Output current limit
- Low dropout voltage: typically 400 mV at 7 A output current
- Output voltage remote sense pin
- Fast transient response
- Thermal shutdown protection with hysteresis
- Wide operating temperature range -40 °C to 125 °C
- No supply sequencing problems in dual supply mode
- Output voltages available: adjustable

Description

The LD1580 is a very low dropout positive linear voltage regulator particularly suitable in applications requiring output currents up to 7 A.

The LD1580 typical dropout voltage is 400 mV at 7 A while it decreases at lighter loads.

This very low dropout is achieved thanks to a second input voltage pin, named VCONTROL, which is also responsible of the output power stage driving.

The LD1580 is provided with an output voltage remote sense pin which reduces dramatically any output voltage variations that could occur due to load changes.

The ADJ pin is still available. A small capacitor on this pin helps to improve transient response.

The LD1580 also features a built-in output current limit function and a thermal shutdown protection with hysteresis which prevents from excessive



power dissipation in case of insufficient heatsinking. On chip trimming allows the regulator to reach a very tight output voltage tolerance, within ± 2 % at the maximum output current and over the full temperature range.

Table 1. Device summary

Part number	Order code	Packaging
LD1580XX	LD1580P2T-R	tape and reel

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1 Diagram





2 Pin configuration

Figure 2. Pin connections (top view)





3 Maximum ratings

Table 2.	Absolute maximum ratings
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Symbol	Parameter	Value	Unit
V _{POWER}	DC V _{POWER} voltage	from -0.3 to 6	V
V _{CONTROL}	DC V _{CONTROL} voltage	from -0.3 to 13	V
I _{OUT}	Output current	Internally limited	
PD	Power dissipation	Internally limited	
T _{STG}	Storage temperature range	-55 to +150	°C
T _{OP}	Operating junction temperature range	-40 to +125	°C

Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Table 3.	Thermal	data
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Symbol	Parameter	P²PAK	Unit
R _{thJC}	Thermal resistance junction-case	3	°C/W
R _{thJA}	Thermal resistance junction-ambient	62.5	°C/W

4 Typical application







5 Electrical characteristics

Table 4.Electrical characteristics for LD1580 (T_J = - 40 °C to 125 °C, C_P = 330 µF, C_C = 10 µF, C_{OUT} = 100 µF, unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit	
V _O Output voltage	V _{CONTROL} =2.75 V, V _{POWER} =2 V T _J =25 °C, I _{OUT} =10 mA	1.237	1.250	1.263	V		
	$V_{CONTROL}$ =2.7 V to 12 V V_{POWER} =2.05 V to 5.5 V, I_{OUT} =0.01 to 7A	1.225	1.250	1.275	v		
ΔV _O	Line regulation	V _{CONTROL} =2.5 V to 12 V V _{POWER} =1.75 V to 5.5 V, I _{OUT} =10 mA		0.08	0.24	%	
ΔV _O	Load regulation	V _{CONTROL} =2.75 V, V _{POWER} =2.1 V I _{OUT} =0.01 to 7 A		0.08	0.4	%	
		V _{CONTROL} =2.75 V, V _{POWER} =2.05 V I _{OUT} =100 mA		6	10		
	V pip ourropt	V _{CONTROL} =2.75 V, V _{POWER} =2.05 V I _{OUT} =4 A		30	60	٣A	
IC VCONTROL pin current	CONTROL PIN Current	V _{CONTROL} =2.75 V, V _{POWER} =1.75 V I _{OUT} =4 A		33	70	mA	
		V _{CONTROL} =2.75 V, V _{POWER} =2.05 V I _{OUT} =7 A		60	120		
I _{ADJ}	Adjust pin current	V _{CONTROL} =2.75 V, V _{POWER} =2.05 V I _{OUT} =10 mA		50	120	μΑ	
I _{OUT}	Output current limit	$V_{CONTROL}$ =2.75 V, V_{POWER} =2.05 V ⁽¹⁾	8	9		А	
SVR	Supply voltage rejection	V _{CONTROL} =V _{POWER} =3.75 V Avg V _{RIPPLE} =1 V _{P-P} I _{OUT} =4 A, T _J =25 °C	61.5	81.5		dB	
		V_{POWER} =2.05 V, I _{OUT} =100 mA ⁽²⁾		0.95	1.15		
V	Minimum V _{CONTROL} voltage, (V _{CONTROL} -V _O)	/ _{POWER} =2.05 V, I _{OUT} =1 A 0.95		1.15	V		
▼DC		V _{POWER} =2.05 V, I _{OUT} =4 A		1	1.2	v	
		V _{POWER} =2.05 V, I _{OUT} =7 A		1.05	1.3		
V _{DP} Minimum		$V_{CONTROL}$ =2.75 V, I_{OUT} =1 A ⁽²⁾		0.05	0.15		
	VIINIMUM V _{POWER} voltage	V _{CONTROL} =2.75 V, I _{OUT} =4 A		0.2	0.4	V	
		V _{CONTROL} =2.75 V, I _{OUT} =7 A		0.4	0.6		
T _{SHDN}	Shutdown temperature threshold			170		°C	
T _{HYST}	Thermal shutdown hysteresis			5		°C	

1. Measured when the $V_{\mbox{OUT}}$ voltage drops below 100 mV with respect to its nominal value.

2. Measured when the $V_{\mbox{OUT}}$ voltage drops below 2 % with respect to its nominal value.

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(unless otherwise specified T_J = 25 °C, C_P = 330 $\mu\text{F},$ C_C = 10 $\mu\text{F},$ C_{OUT} = 100 $\mu\text{F})$ Minimum V_{CONTROL} voltage vs Output voltage vs temperature Figure 5. Figure 4.



Figure 6. Minimum V_{POWER} voltage vs output Figure 7. Output voltage vs temperature current







Minimum V_{POWER} voltage vs temp.



Figure 10. V_{CONTROL} pin current vs output current



Figure 12. Quiescent current vs temperature









Figure 11. Output current limit vs temperature



Figure 13. Supply voltage rejection vs output current











7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK[®] packages. These packages have a lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

P ² PAK mechanical data							
Dim		mm.		inch.			
Dini.	Min.	Тур.	Max.	Min.	Тур.	Max.	
А	4.30		4.80	0.169		0.188	
A1	2.40		2.80	0.094		0.110	
A2	0.03		0.23	0.001		0.009	
b	0.80		1.05	0.031		0.041	
С	0.45		0.60	0.017		0.023	
c2	1.17		1.37	0.046		0.053	
D	8.95		9.35	0.352		0.368	
D2		8			0.315		
E	10.00		10.40	0.393		0.409	
E1		8.5			0.334	0.409	
е	3.20		3.60	0.126		0.142	
e1	6.60		7.00	0.260		0.275	
L	13.70		14.50	0.539		0.571	
L2	1.25		1.40	0.049		0.055	
L3	0.90		1.70	0.035		0.067	
L5	1.55		2.40	0.061		0.094	
R		0.40			0.016		
V2	0°		8°	0°		8°	



Tape & reel D²PAK-P²PAK-D²PAK/A-P²PAK/A mechanical data

Dim	mm.			inch.		
Dim.	Min.	Тур.	Max.	Min.	Тур.	Max.
A			180			7.086
С	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
Ν	60			2.362		
Т			14.4			0.567
Ao	10.50	10.6	10.70	0.413	0.417	0.421
Во	15.70	15.80	15.90	0.618	0.622	0.626
Ko	4.80	4.90	5.00	0.189	0.193	0.197
Po	3.9	4.0	4.1	0.153	0.157	0.161
Р	11.9	12.0	12.1	0.468	0.472	0.476



8 Revision history

Table 5.	Document i	revision	history
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Date	Revision	Changes
08-Sep-2005	3	Order codes updated.
09-May-2007	4	Order codes updated.
16-Apr-2008	5	Modified: Table 1 on page 1.

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