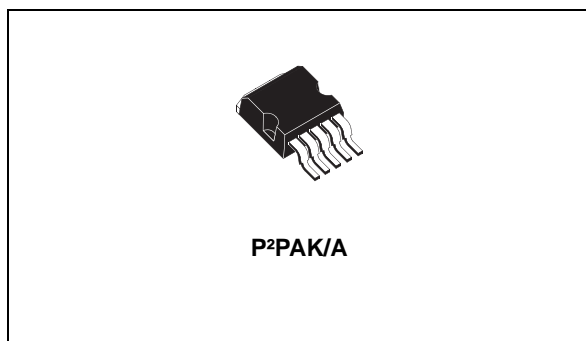


## 3 A, very low drop voltage regulators

Datasheet - production data



**Table 1. Device summary**

Order codes	Output voltages
LD29300P2M33R	3.3 V
LD29300P2MTR	ADJ

### Features

- Very low dropout voltage (typ. 0.4 at 3 A)
- Guaranteed output current up to 3 A
- Fixed voltage with  $\pm 1\%$  tolerance at 25 °C
- Internal current and thermal limit
- Logic controlled electronic shutdown available in P<sup>2</sup>PAK/A

### Description

The LD29300 is a high current, high accuracy, low-dropout voltage regulator series. These regulators feature 400 mV dropout voltage and very low ground current. Designed for high current loads, these devices are also used in lower current, extremely low dropout-critical systems, where their tiny dropout voltage and ground current values are important attributes. Typical applications are in power supply switching post regulation, series power supply for monitors, series power supply for VCRs and TVs, computer systems and battery powered systems.

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# 1 Diagram

Figure 1. Schematic diagram for adjustable version

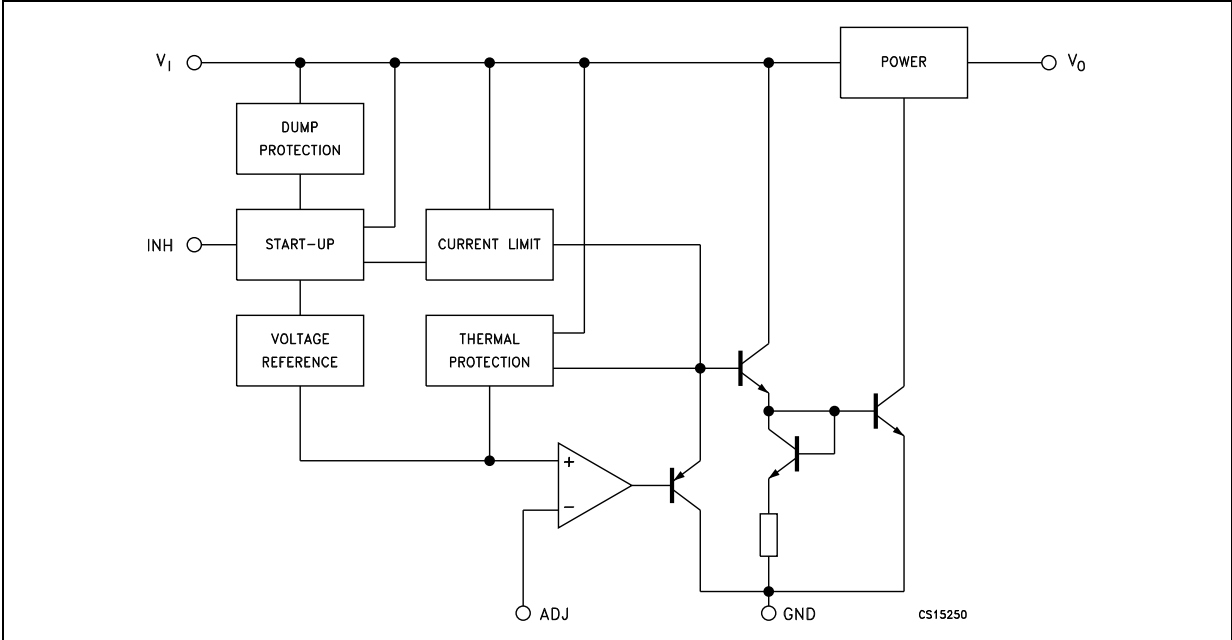
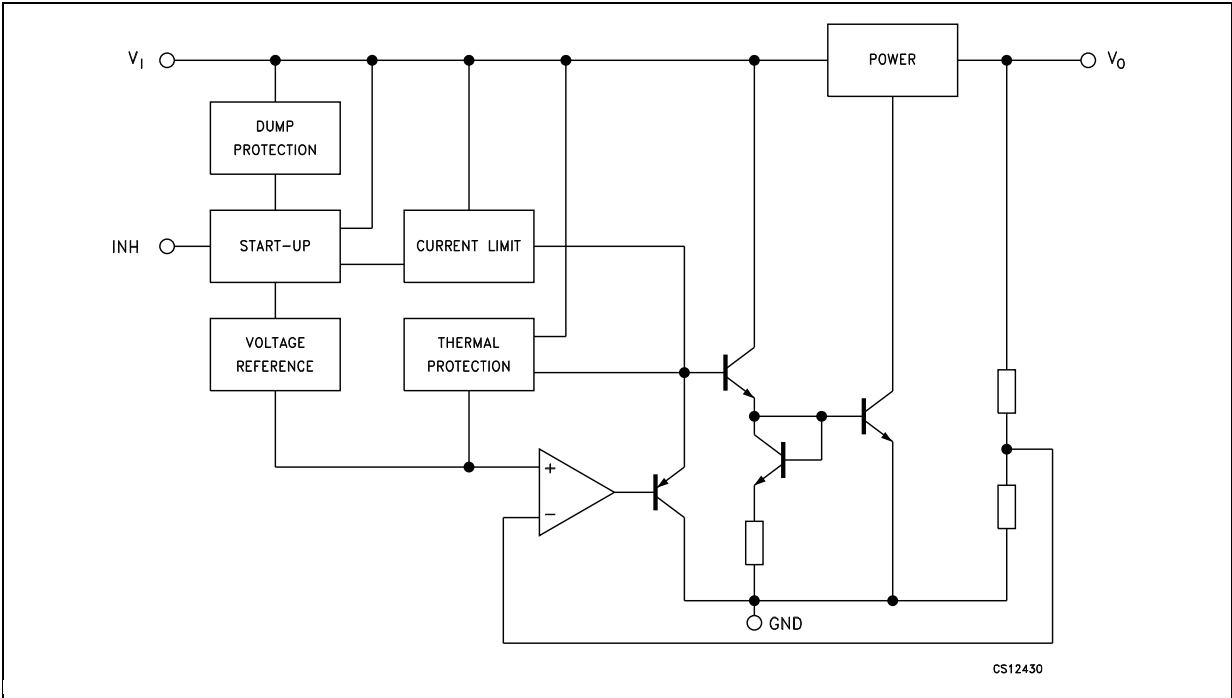
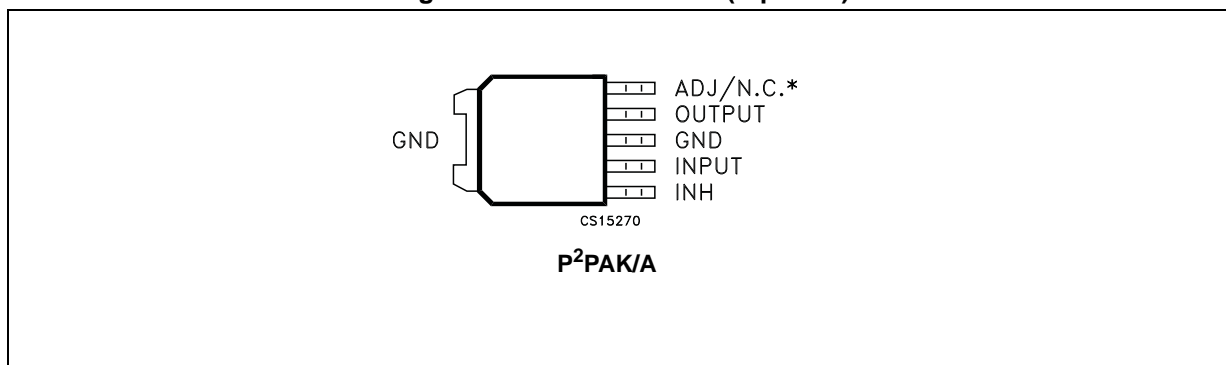


Figure 2. Schematic diagram for fixed version



## 2 Pin configuration

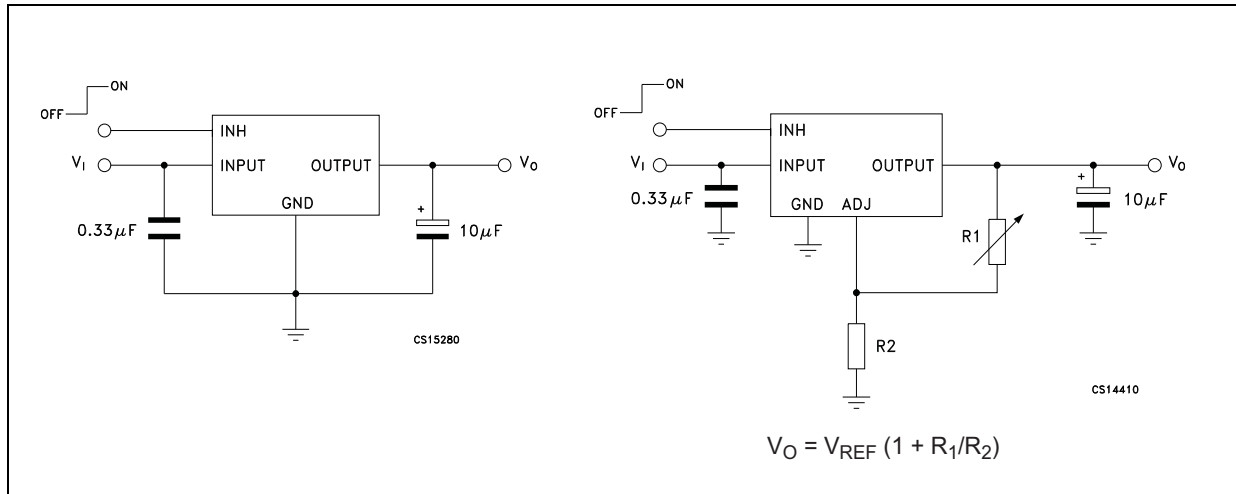
Figure 3. Pin connections (top view)



\* Not connected for fixed version.

### 3 Typical application

Figure 4. Application circuit



## 4 Maximum ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_I$	DC input voltage	30 <sup>(1)</sup>	V
$I_O$	Output current	Internally limited	mA
$P_D$	Power dissipation	Internally limited	mW
$T_{STG}$	Storage temperature range	- 55 to 150	°C
$T_{OP}$	Operating junction temperature range	- 40 to 125	°C

1. Above 14 V the device is automatically in shut-down.

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

**Table 3. Thermal data**

Symbol	Parameter	P <sup>2</sup> PAK/A	Unit
$R_{thJA}$	Thermal resistance junction-ambient	60	°C/W
$R_{thJC}$	Thermal resistance junction-case	3	°C/W

## 5 Electrical characteristics

$I_O = 10 \text{ mA}$ ,  $T_J = 25 \text{ }^\circ\text{C}$ ,  $V_I = 5.3 \text{ V}$ ,  $V_{INH} = 2 \text{ V}$ ,  $C_I = 330 \text{ nF}$ ,  $C_O = 10 \text{ } \mu\text{F}$ , unless otherwise specified.

**Table 4. Electrical characteristics of LD29300#33**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$I_O = 10\text{mA to } 3\text{A}$ , $V_I = 4.3 \text{ to } 8.8\text{V}$ $T_J = -40 \text{ to } 125^\circ\text{C}$	3.267	3.3	3.333	V
			3.234		3.366	
$\Delta V_O$	Load regulation	$I_O = 10\text{mA to } 3\text{A}$		0.2	1.0	%
$\Delta V_O$	Line regulation	$V_I = 4.3 \text{ to } 13\text{V}$		0.06	0.5	%
SVR	Supply voltage rejection	$f = 120 \text{ Hz}$ , $V_I = 5.3 \pm 1\text{V}$ , $I_O = 1.5\text{A}^{(1)}$	52	67		dB
$V_{DROP}$	Dropout voltage	$I_O = 500\text{mA}$ , $T_J = -40 \text{ to } 125^\circ\text{C}^{(2)}$		0.1		V
		$I_O = 1.5\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}^{(2)}$		0.2		
		$I_O = 3\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}^{(2)}$		0.4	0.7	
$I_q$	Quiescent current	$I_O = 1.5\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$		20	50	mA
		$I_O = 3\text{A}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$		45	100	
		$V_I = 13\text{V}$ , $V_{INH} = \text{GND}$ , $T_J = -40 \text{ to } 125^\circ\text{C}$		130	180	$\mu\text{A}$
$I_{sc}$	Short circuit current	$V_I - V_O = 5.5\text{V}$		4.5		A
$V_{IL}$	Control input logic low	OFF MODE <sup>(1)</sup> , $T_J = -40 \text{ to } 125^\circ\text{C}$			0.8	V
$V_{IH}$	Control input logic high	ON MODE <sup>(1)</sup> , $T_J = -40 \text{ to } 125^\circ\text{C}$	2			V
$I_{INH}$	Control input current	$T_J = -40 \text{ to } 125^\circ\text{C}$ , $V_{INH} = 13\text{V}$		5	10	$\mu\text{A}$
eN	Output noise voltage	$B_P = 10\text{Hz to } 100\text{kHz}$ , $I_O = 100\text{mA}^{(1)}$		132		$\mu\text{V}_{RMS}$

1. Guaranteed by design.

2. Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with  $V_O + 1 \text{ V}$  applied to  $V_I$ .

$I_O = 10\text{ mA}$ ,  $T_J = 25\text{ }^\circ\text{C}$ ,  $V_I = 3.23\text{ V}$ ,  $V_{INH} = 2\text{ V}$ ,  $C_I = 330\text{ nF}$ ,  $C_O = 10\text{ }\mu\text{F}$  adjust pin tied to output pin.

Table 5. Electrical characteristics of LD29300#ADJ

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_I$	Minimum operating input voltage	$I_O = 10\text{mA}$ to $3\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$	2.5			V
$\Delta V_O$	Load regulation	$I_O = 10\text{mA}$ to $3\text{A}$		0.2	1.0	%
$\Delta V_O$	Line regulation	$V_I = 2.5\text{ V}$ to $13\text{V}$		0.06	0.5	%
$V_{REF}$	Reference voltage	$I_O = 10\text{mA}$ to $3\text{A}$ , $V_I = 2.5$ to $4.5\text{V}$ $T_J = -40$ to $125^\circ\text{C}$ <sup>(1)</sup>	-1%	1.23	+1%	V
			-2%		+2%	
SVR	Supply voltage rejection	$f = 120\text{ Hz}$ , $V_I = 3.23 \pm 1\text{V}$ , $I_O = 1.5\text{A}$ <sup>(2)</sup>	65	75		dB
$I_q$	Quiescent current	$I_O = 1.5\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$		20	50	mA
		$I_O = 3\text{A}$ , $T_J = -40$ to $125^\circ\text{C}$		45	100	
		$V_I = 13\text{V}$ , $V_{INH} = \text{GND}$ , $T_J = -40$ to $125^\circ\text{C}$		130	180	$\mu\text{A}$
$I_{ADJ}$	Adjust pin current	$T_J = -40$ to $125^\circ\text{C}$			1	$\mu\text{A}$
$I_{sc}$	Short circuit current	$V_I - V_O = 5.5\text{V}$		4.5		A
$V_{IL}$	Control input logic low	OFF MODE <sup>(1)</sup> , $T_J = -40$ to $125^\circ\text{C}$			0.8	V
$V_{IH}$	Control input logic high	ON MODE <sup>(1)</sup> , $T_J = -40$ to $125^\circ\text{C}$	2			V
$I_{INH}$	Control input current	$T_J = -40$ to $125^\circ\text{C}$ , $V_{INH} = 13\text{V}$		5	10	$\mu\text{A}$
eN	Output noise voltage	$B_P = 10\text{Hz}$ to $100\text{kHz}$ , $I_O = 100\text{mA}$ <sup>(2)</sup>		50		$\mu\text{V}_{RMS}$

1. Reference voltage is measured between output and GND pin, with ADJ PIN tied to  $V_{OUT}$ .

2. Guaranteed by design.



# 6 Typical characteristics

Figure 5. Output voltage vs. temperature

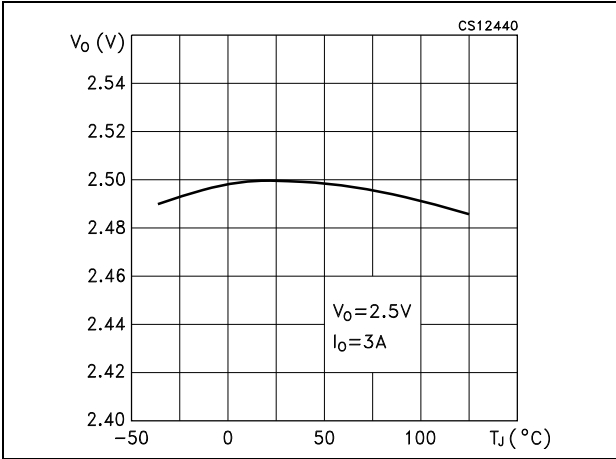


Figure 6. Dropout voltage vs. temperature

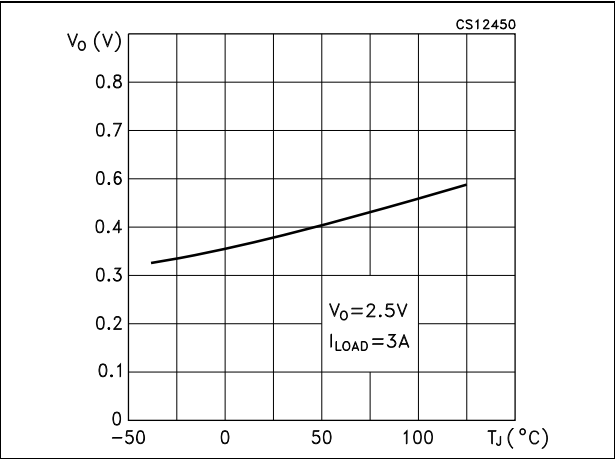


Figure 7. Dropout voltage vs. output current

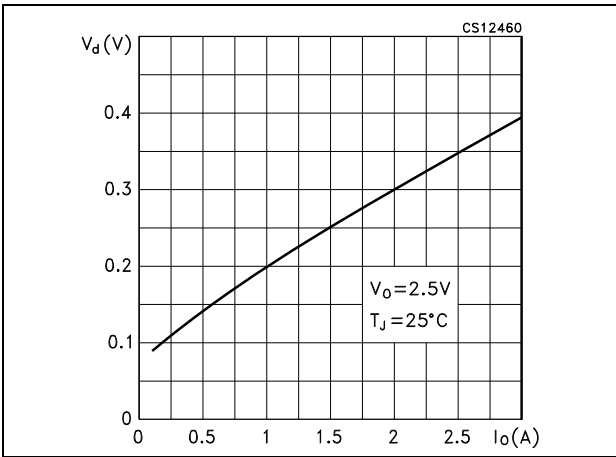


Figure 8. Quiescent current vs. output current ( $V_I = 13V$ )

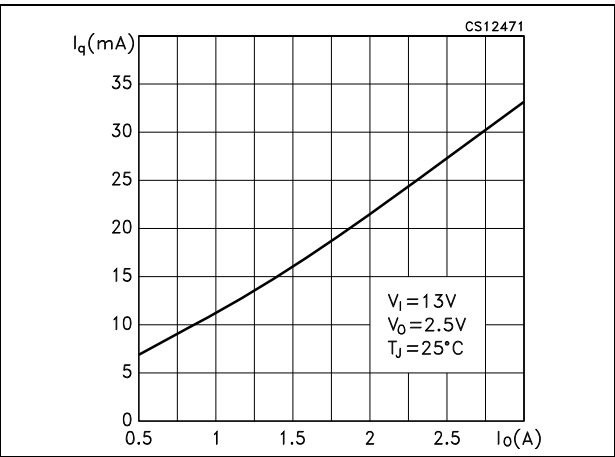


Figure 9. Quiescent current vs. output current ( $V_I = 4.5\text{ V}$ )

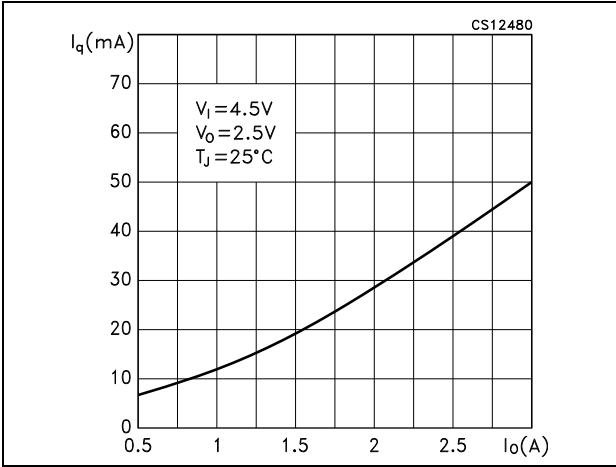


Figure 10. Quiescent current vs. supply voltage

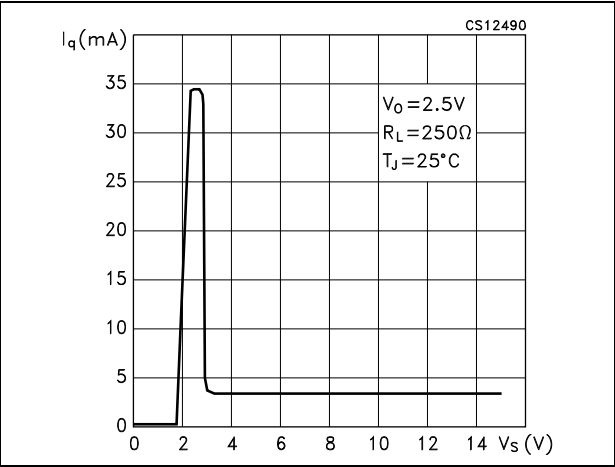


Figure 11. Quiescent current vs. temperature ( $I_o = 100\text{ mA}$ )

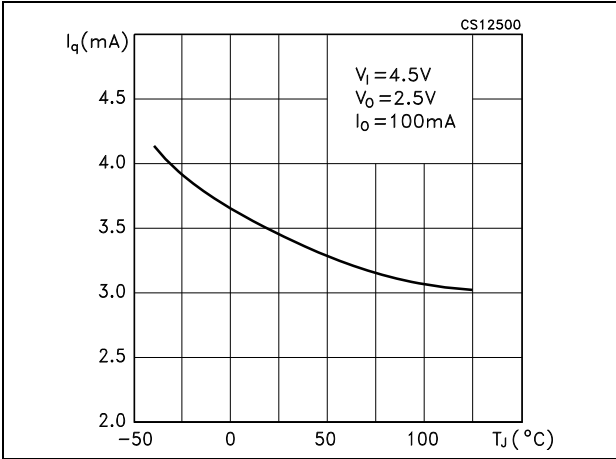


Figure 12. Quiescent current vs. temperature ( $I_o = 3\text{ A}$ )

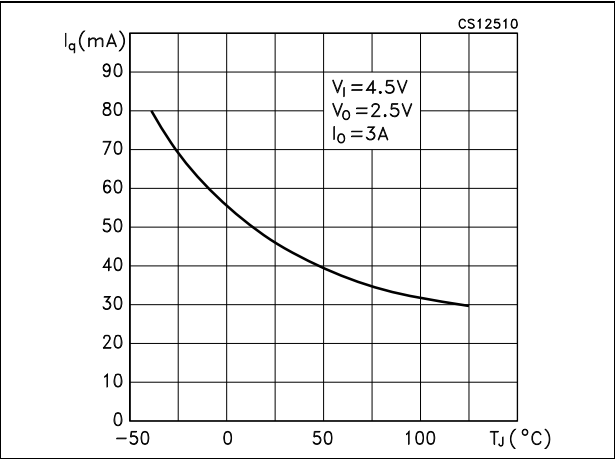


Figure 13. Short circuit current vs. temperature

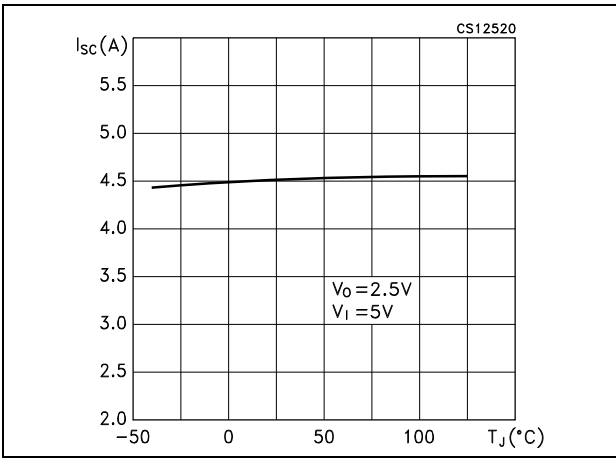


Figure 14. Supply voltage rejection vs. temperature

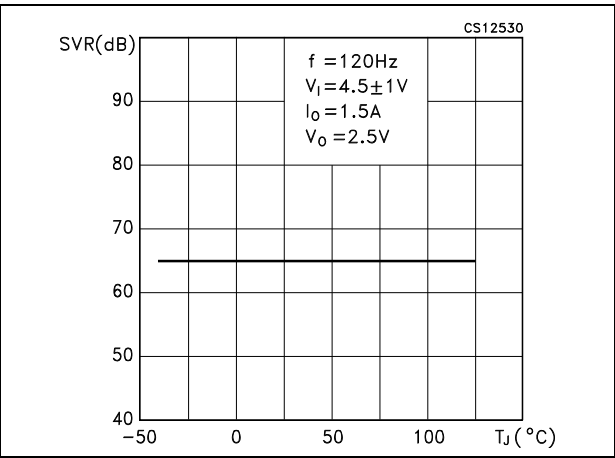


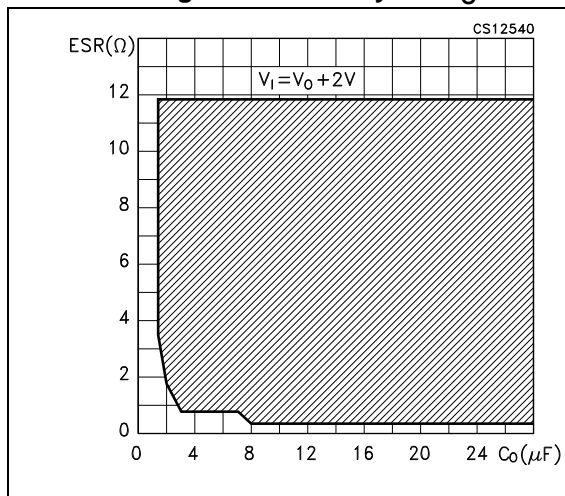
Figure 15. Stability vs.  $C_O$ 

Figure 16. Line transient

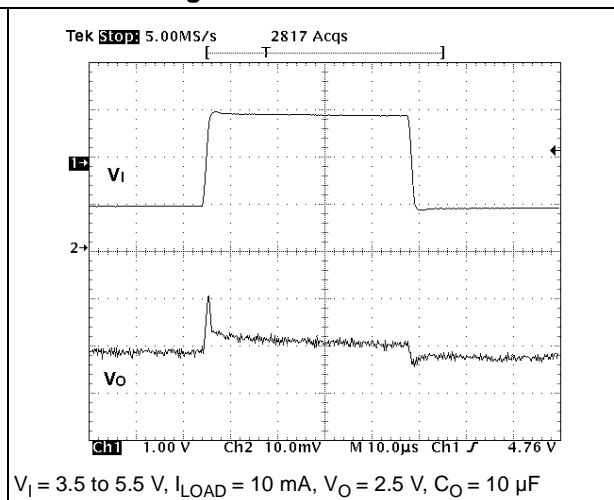
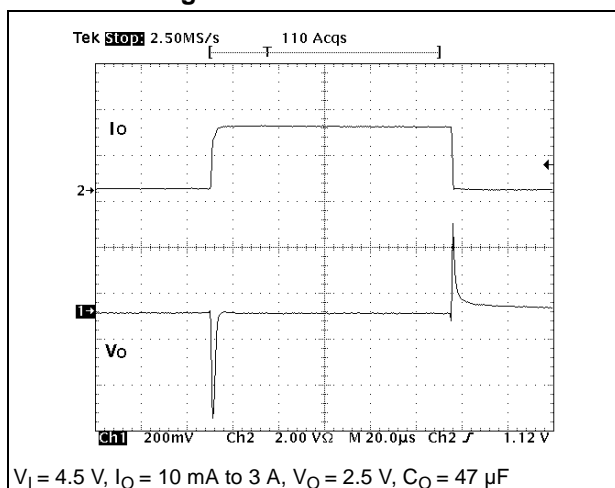


Figure 17. Load transient



$V_I = 4.5 \text{ V}$ ,  $I_O = 10 \text{ mA to } 3 \text{ A}$ ,  $V_O = 2.5 \text{ V}$ ,  $C_O = 47 \mu\text{F}$

## 7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**Table 6. P<sup>2</sup>PAK mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.30		4.80
A2	0.03		0.23
C	1.17		1.37
D	2.40		2.80
D1	8.95		9.35
E	0.45		0.60
F	0.80		1.05
G	3.20		3.60
G1	6.60		7.00
H1		8.5	
H2	10.00		10.40
L	15		15.85
L1		8	
L2	1.27		1.40
M	2.4		3.2
R		0.40	
V2	0°		8°

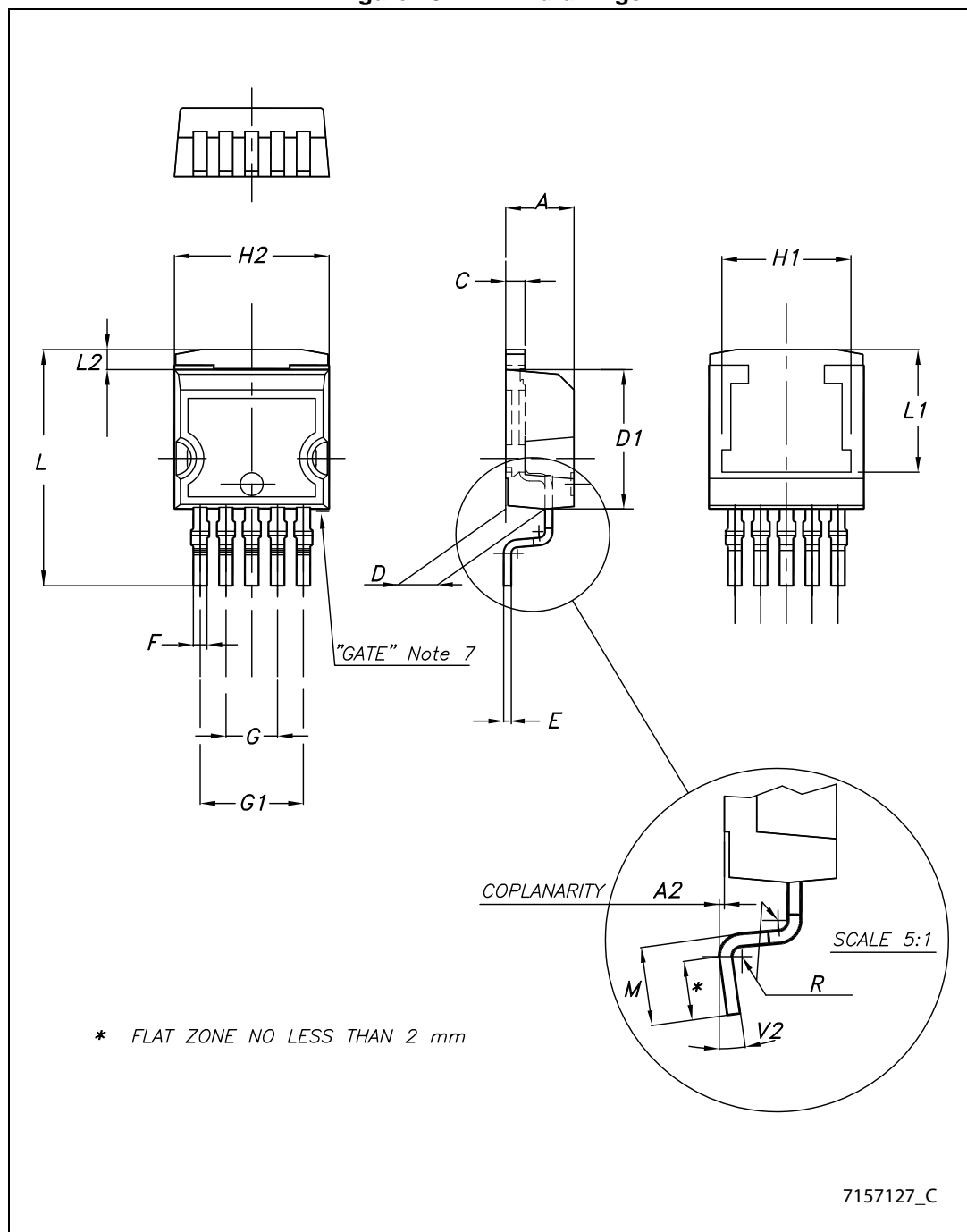
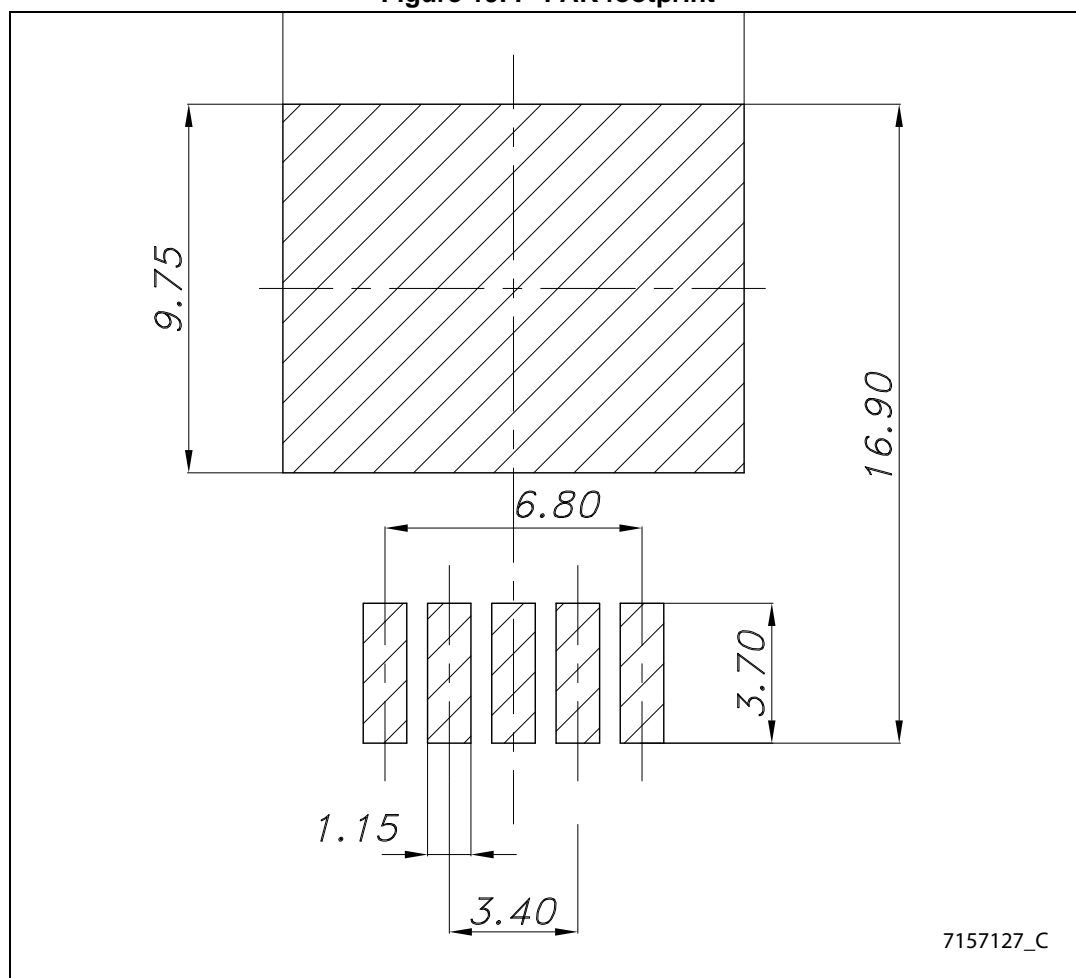
Figure 18. P<sup>2</sup>PAK drawings

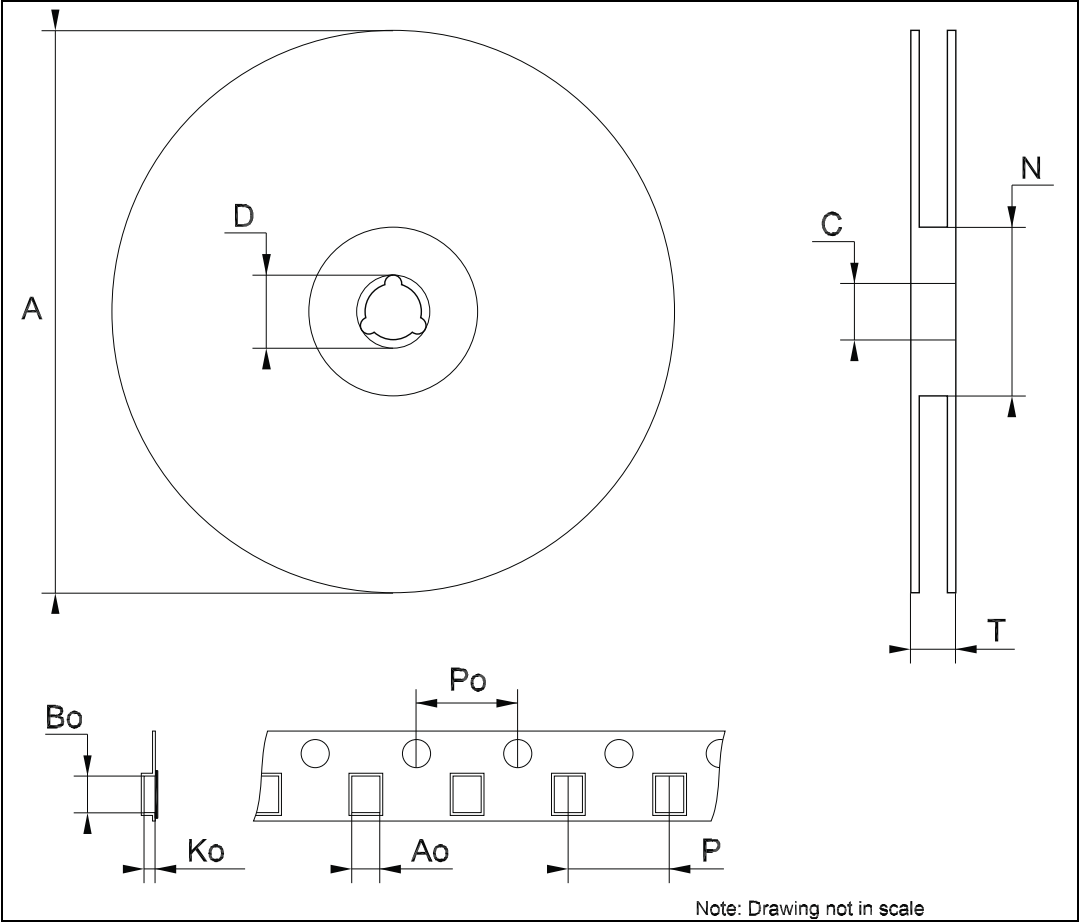
Figure 19. P<sup>2</sup>PAK footprint

## 8 Packaging mechanical data

**Table 7. P<sup>2</sup>PAK tape and reel mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A			180
C	12.8	13	13.2
D	20.2		
N	60		
T			14.4
Ao	10.50	10.6	10.70
Bo	15.70	15.80	15.90
Ko	4.80	4.90	5.00
Po	3.9	4.0	4.1
P	11.9	12.0	12.1

Figure 20. P<sup>2</sup>PAK tape and reel dimensions





## 9 Revision history

**Table 8. Document revision history**

Date	Revision	Changes
21-Oct-2005	7	Order codes updated.
10-Apr-2007	8	Order codes updated.
11-May-2007	9	Order codes updated.
08-Jun-2007	10	Order codes updated.
03-Apr-2008	11	Modified: <a href="#">Table 1 on page 1</a> .
11-Jul-2008	12	Modified: <a href="#">Table 1 on page 1</a> .
13-Sep-2012	13	Updated: <a href="#">Table 1 on page 1</a> .
18-Nov-2013	14	Part numbers LD29300XX, LD29300XX18 and LD29300XX33 have been changed to LD29300. Updated the Description in cover page and <a href="#">Table 1: Device summary</a> . Updated <a href="#">Table 3: Thermal data</a> , <a href="#">Section 5: Electrical characteristics</a> and <a href="#">Section 7: Package mechanical data</a> . Added <a href="#">Section 8: Packaging mechanical data</a> . Minor text changes.

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