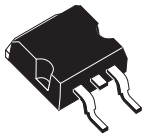
LD29300XX, LD29300XX18, LD29300XX33

3 A, very low drop voltage regulators

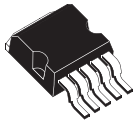
Datasheet – production data

Features

- Very low dropout voltage (typ. 0.4 at 3 A)
- Guaranteed output current up to 3 A
- Fixed voltage with ± 1% tolerance at 25 °C
- Internal current and thermal limit
- Logic controlled electronic shutdown available in P²PAK/A



D²PAK



P²PAK/A

Description

The LD29300xx 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.

Table 1. Device summary

Order codes		Output voltages
D²PAK	P²PAK/A	
LD29300D2T18R		1.8 V
	LD29300P2M33R	3.3 V
	LD29300P2MTR	ADJ

Contents

1 Diagram

Figure 1. Schematic diagram for adjustable version

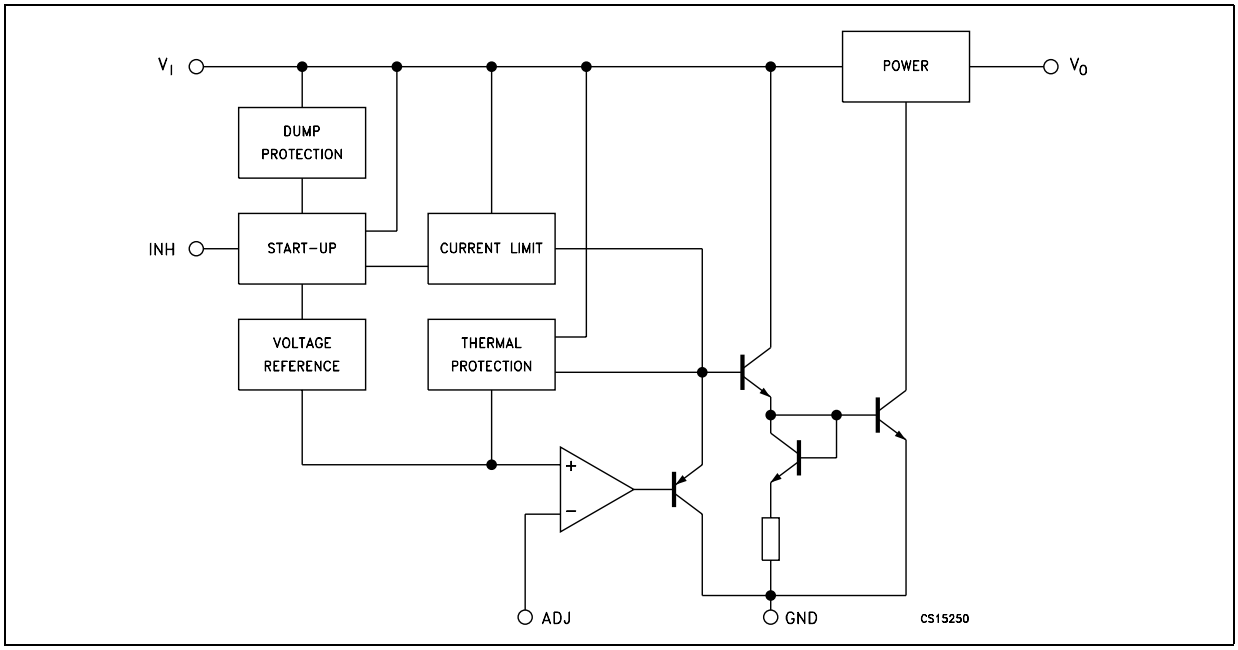
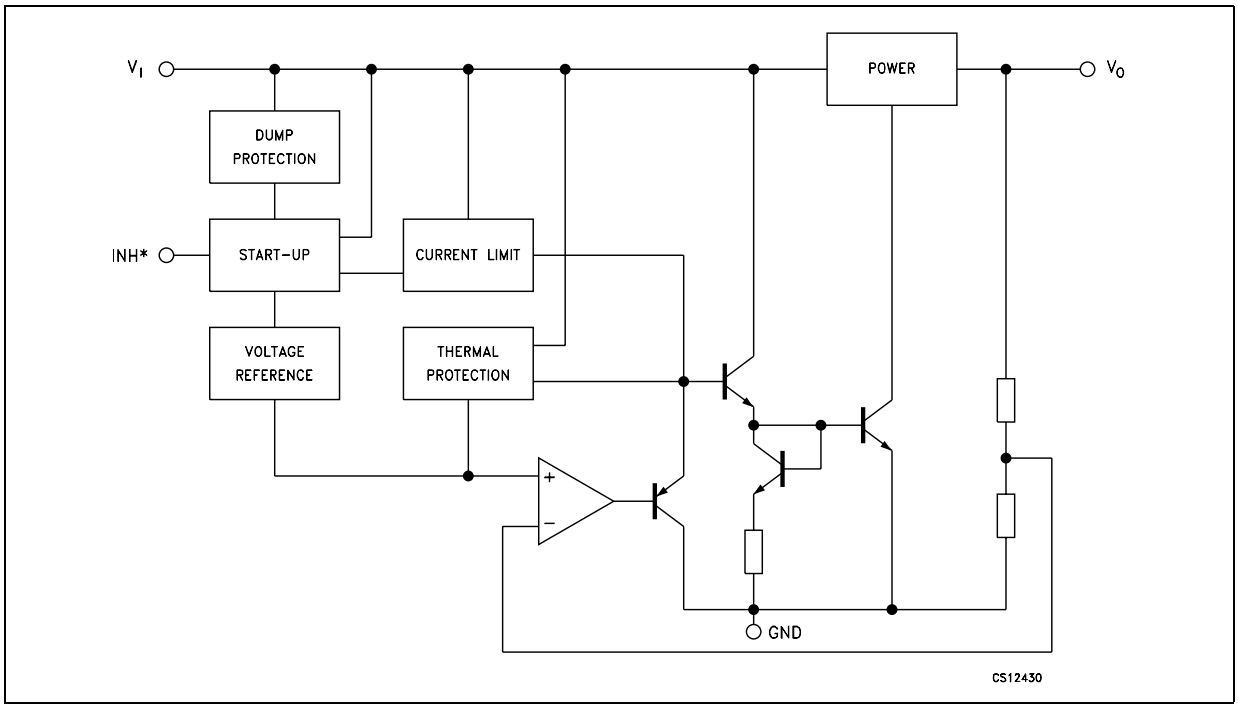


Figure 2. Schematic diagram for fixed version



* Only for version with inhibit function.

2 Pin configuration

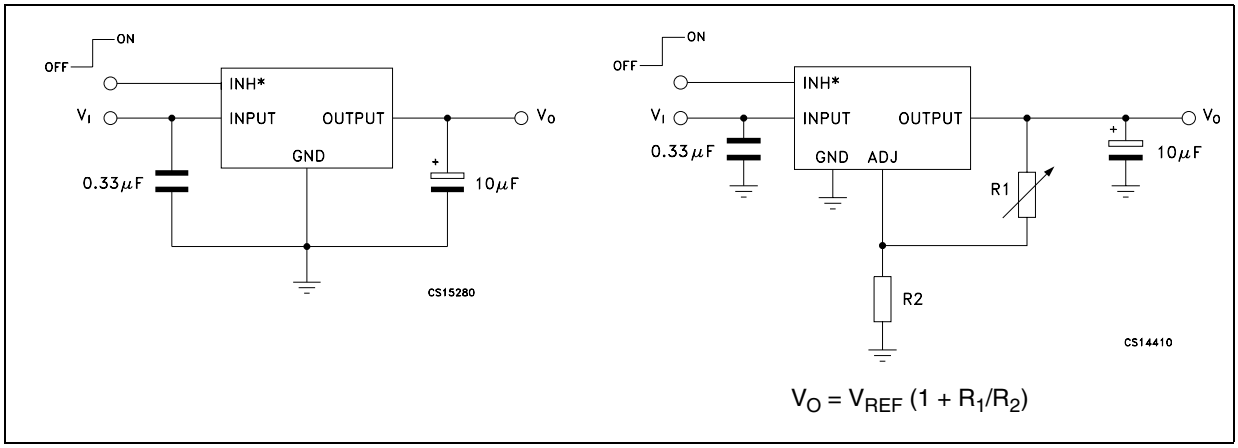
Figure 3. Pin connections (top view)

D^2PAK P^2PAK/A

* Not connected for fixed version.

3 Typical application

Figure 4. Application circuit



* Only for version with inhibit function.

4 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	DC input voltage	30 (1)	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	D²PAK-P²PAK/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 mA, T_J = 25 °C, V_I = 3.8 V, V_{INH} = 2 V [a], C_I = 330 nF, C_O = 10 µF, unless otherwise specified.

Table 4. Electrical characteristics of LD29300#18

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 10mA to 3A, V_I = 3 to 7.3V T_J = -40 to 125°C	1.782	1.8	1.818	V
			1.764		1.836	
ΔV_O	Load regulation	I_O = 10mA to 3A		0.2	1.0	%
ΔV_O	Line regulation	V_I = 3 to 13V		0.06	0.5	%
SVR	Supply voltage rejection	f = 120 Hz, V_I = 3.8 ±1V, I_O = 1.5A (1)	62	72		dB
V_{DROP}	Dropout voltage	I_O = 500mA, T_J = -40 to 125°C (2)		0.1		V
		I_O = 1.5A, T_J = -40 to 125°C (3)		0.2		
		I_O = 3A, T_J = -40 to 125°C (3)		0.4	0.7	
I_q	Quiescent current	I_O = 1.5A, T_J = -40 to 125°C		20	50	mA
		I_O = 3A, T_J = -40 to 125°C		45	100	
		V_I = 13V, V_{INH} = GND, T_J = -40 to 125°C		130	180	µA
I_{sc}	Short circuit current	V_I - V_O = 5.5V		4.5		A
V_{IL}	Control input logic low	OFF MODE (1), T_J = -40 to 125°C			0.8	V
V_{IH}	Control input logic high	ON MODE (1), T_J = -40 to 125°C	2			V
I_{INH}	Control input current	T_J = -40 to 125°C, V_{INH} = 13V		5	10	µA
eN	Output noise voltage	B_P = 10Hz to 100kHz, I_O = 100mA		60		μV_{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 V applied to V_I.

a. Only for version with Inhibit function.

I_O = 10 mA, T_J = 25 °C, V_I = 5.3 V, V_{INH} = 2 V [b], C_I = 330 nF, C_O = 10 µF, unless otherwise specified.

Table 5. Electrical characteristics of LD29300#33

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

b. Only for version with Inhibit function.

I_O = 10 mA, T_J = 25 °C, V_I = 3.23 V, V_{INH} = 2 V [c], C_I = 330 nF, C_O = 10 µF adjust pin tied to output pin.

Table 6. Electrical characteristics of LD29300#ADJ

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

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

c. Only for version with Inhibit function.

6 Typical characteristics

Figure 5. Output voltage vs. temperature

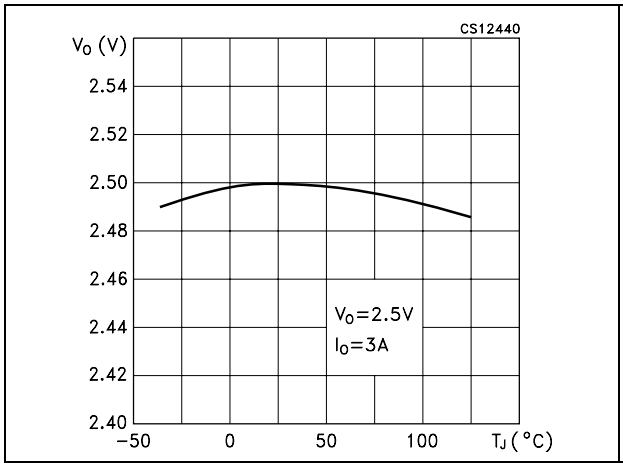


Figure 6. Dropout voltage vs. temperature

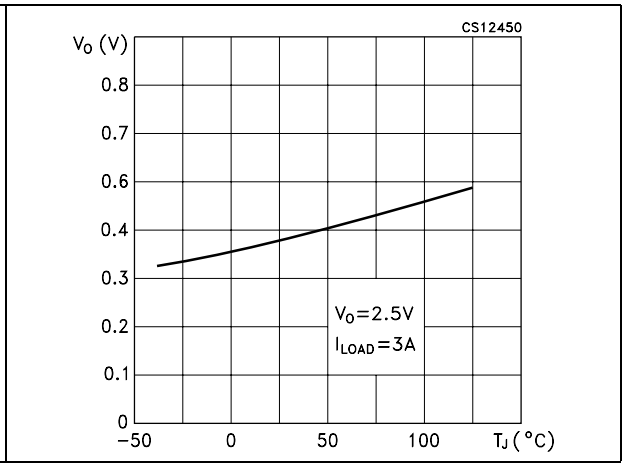


Figure 7. Dropout voltage vs. output current

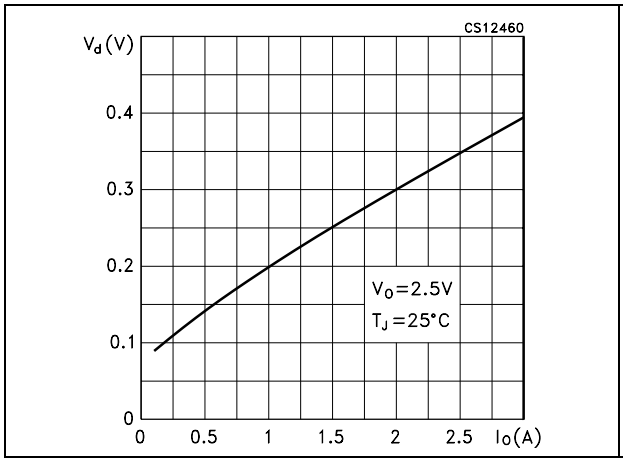


Figure 8. Quiescent current vs. output current (V_I = 13 V)

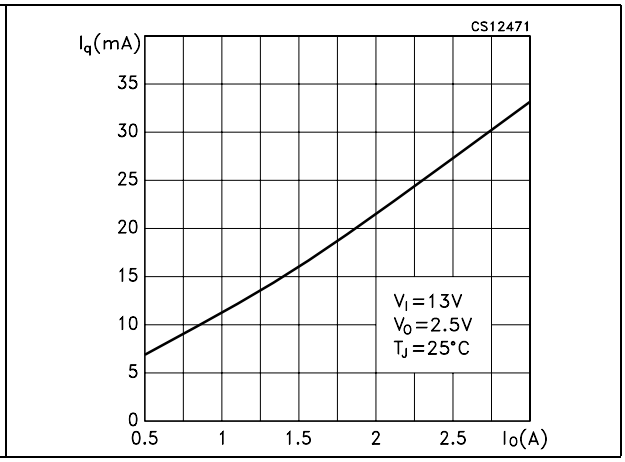


Figure 9. Quiescent current vs. output current (V_I = 4.5 V)

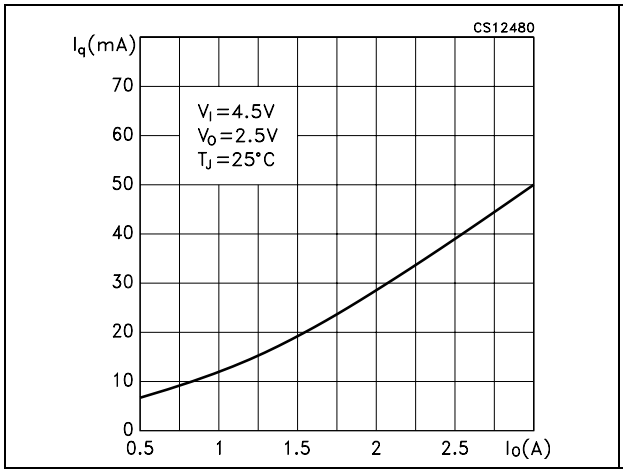


Figure 10. Quiescent current vs. supply voltage

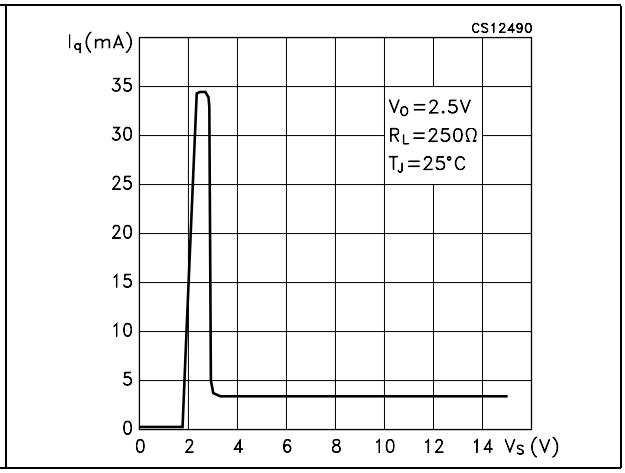


Figure 11. Quiescent current vs. temperature (I_O = 100 mA)

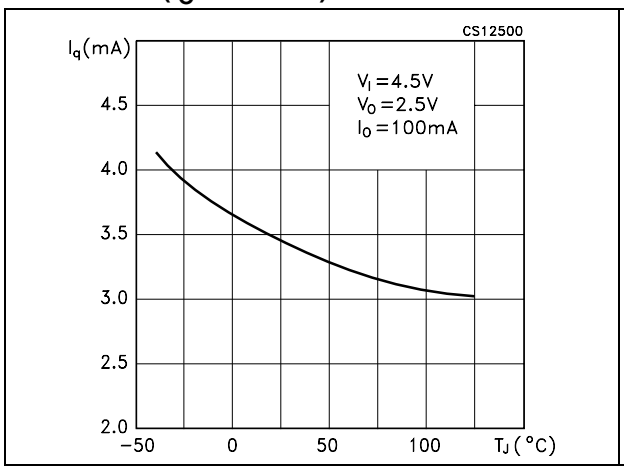


Figure 12. Quiescent current vs. temperature (I_O = 3 A)

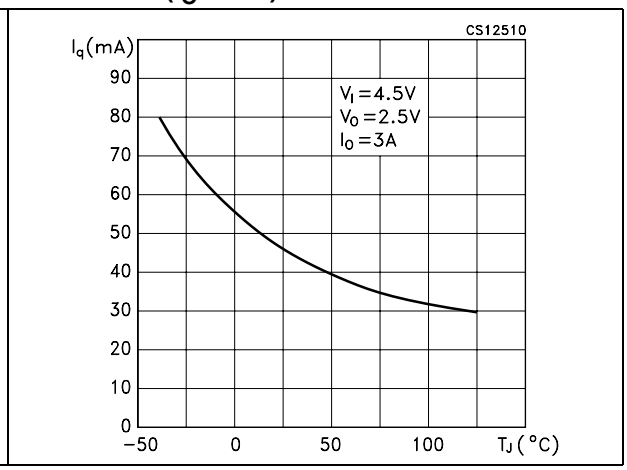


Figure 13. Short circuit current vs. temperature

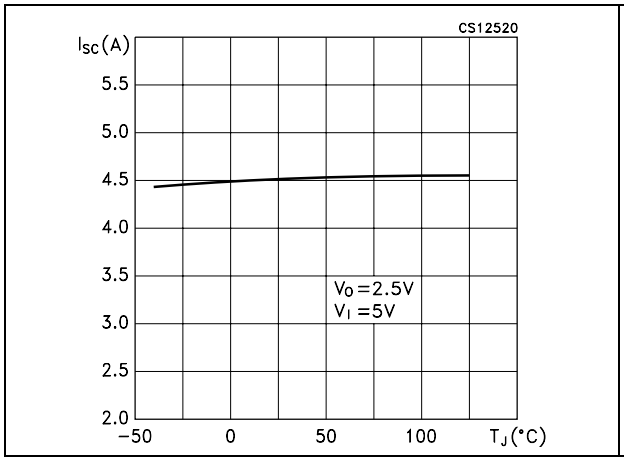


Figure 14. Supply voltage rejection vs. temperature

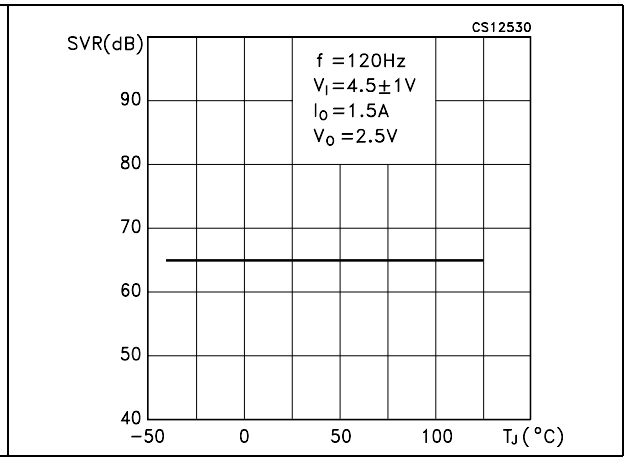


Figure 15. Stability vs. C_O

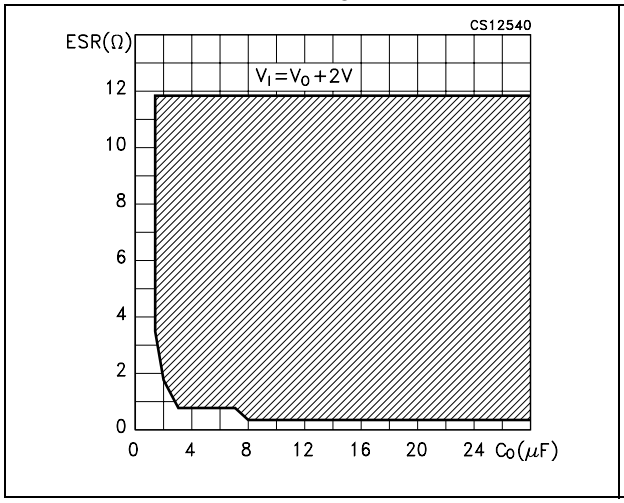
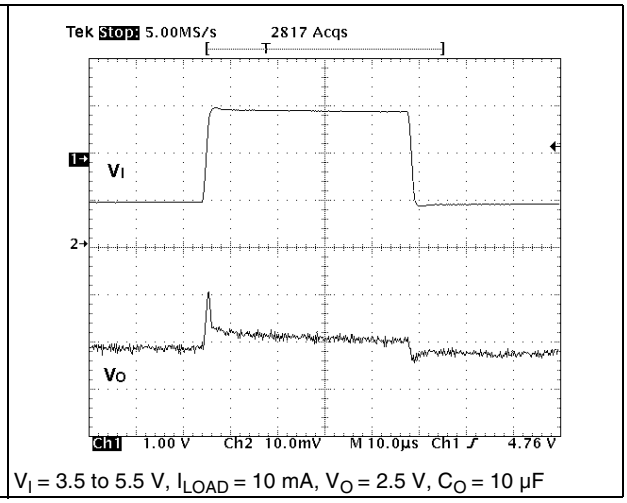
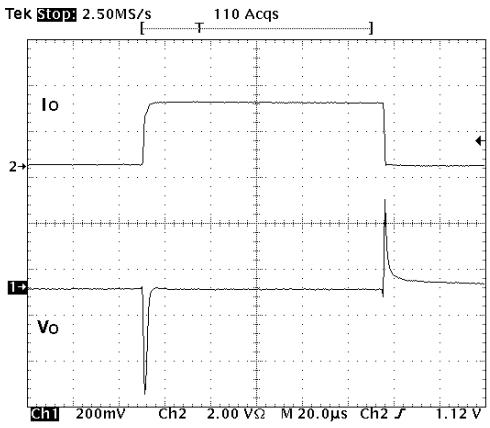


Figure 16. Line transient



V_I = 3.5 to 5.5 V, I_{LOAD} = 10 mA, V_O = 2.5 V, C_O = 10 µF

Figure 17. Load transient



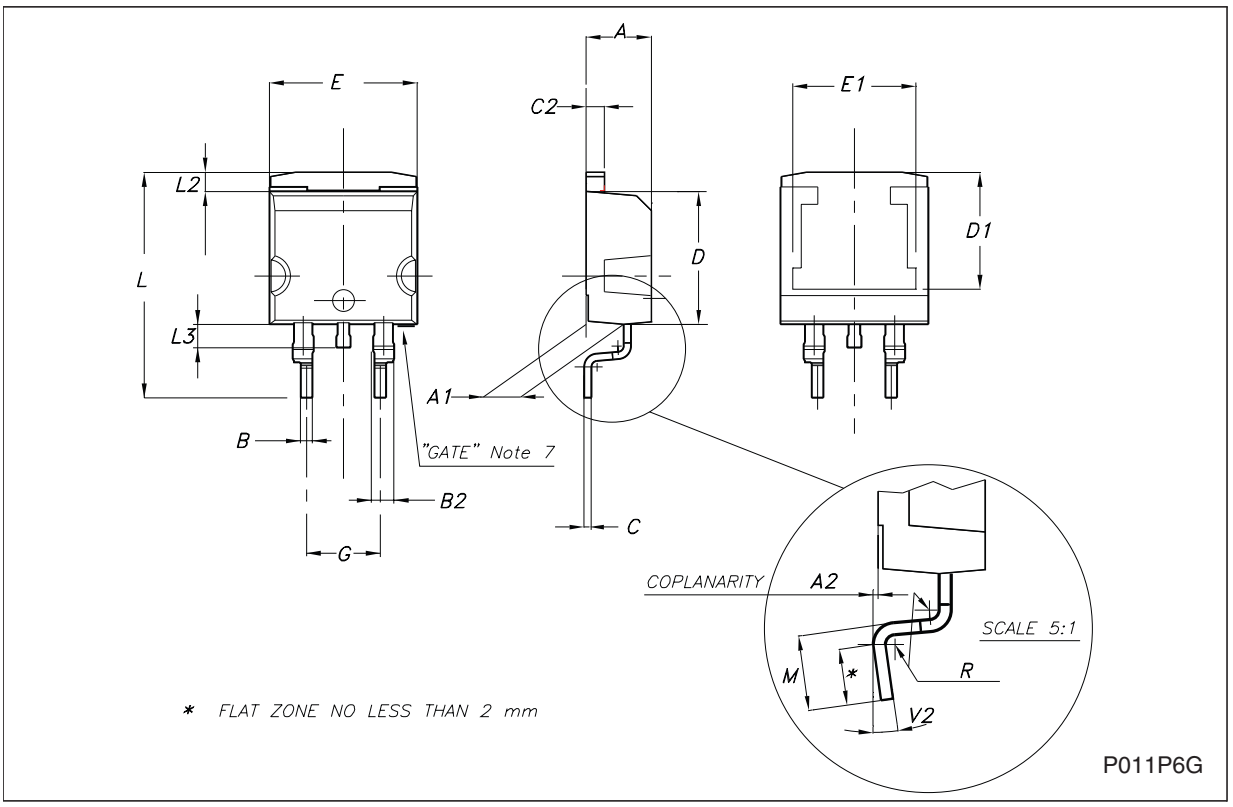
V_I = 4.5 V, I_O = 10 mA to 3 A, V_O = 2.5 V, C_O = 47 µF

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*. ECOPACK® is an ST trademark.

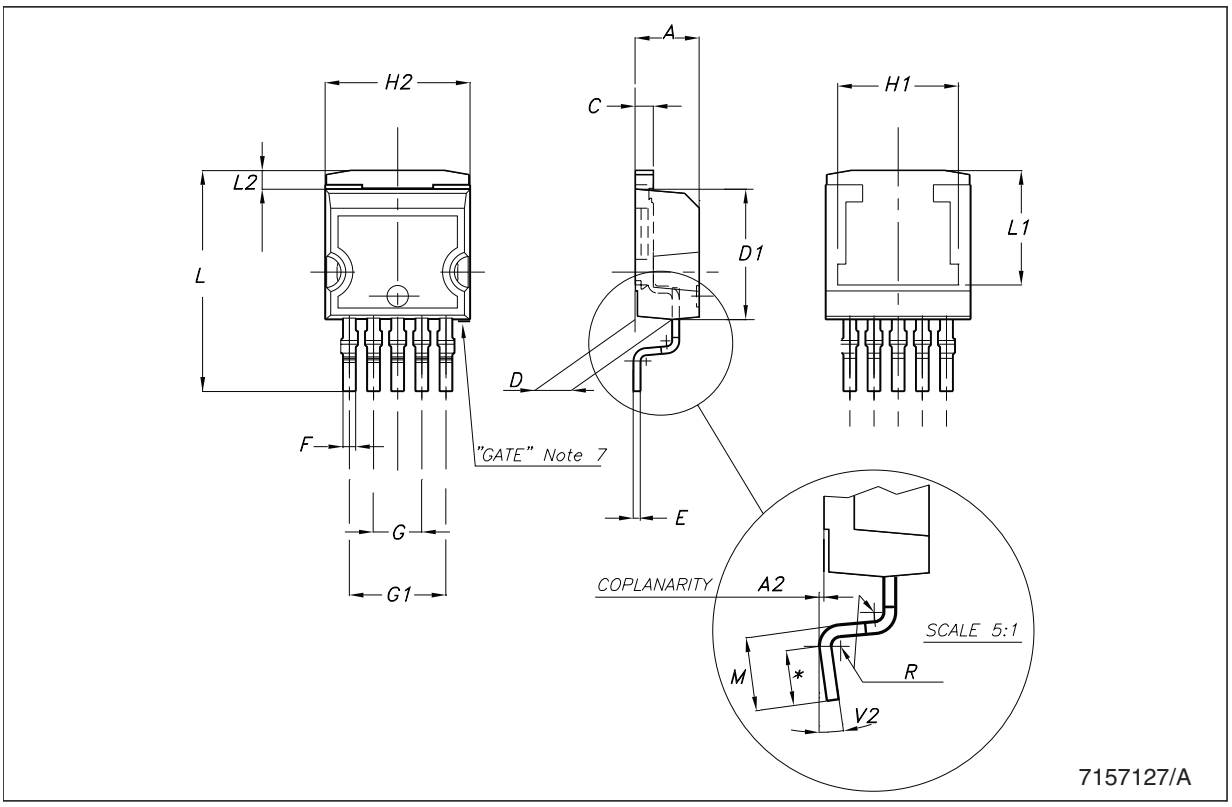
D²PAK mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		0.409
E1		8.5			0.335	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.016	
V2	0°		8°	0°		8°



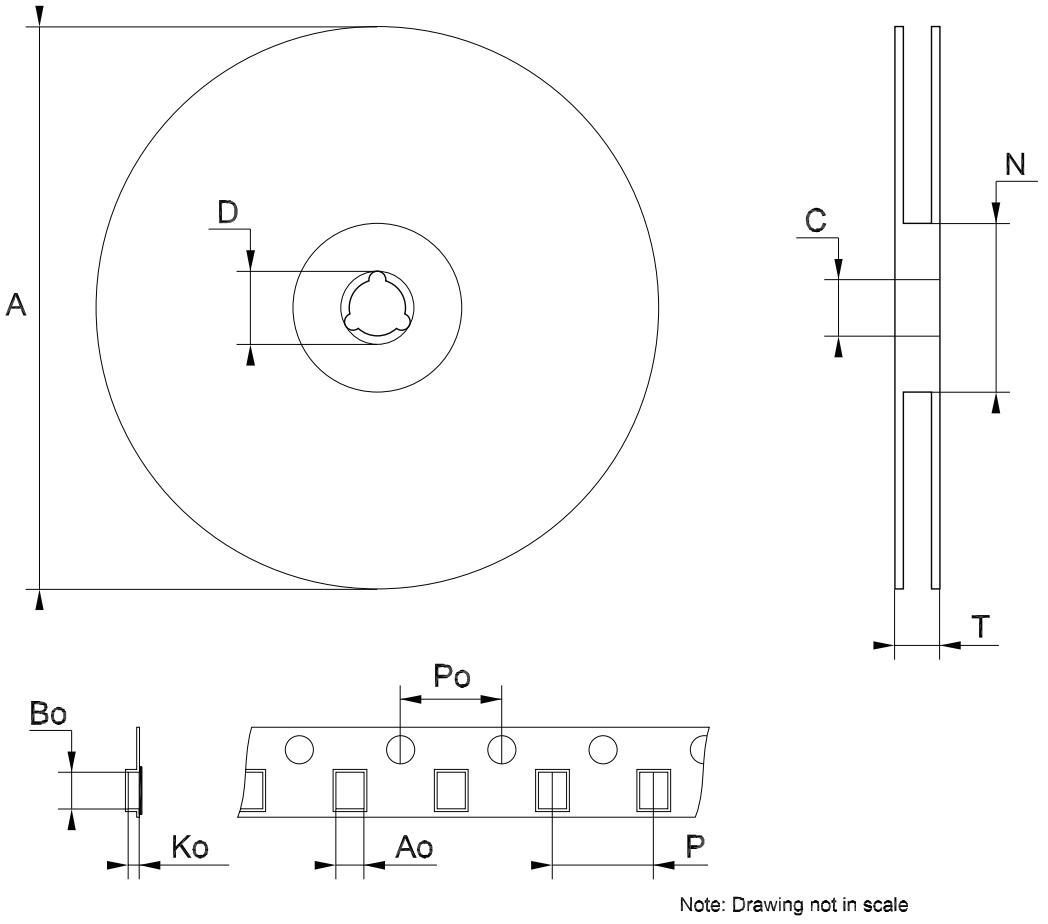
P²PAK/A mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.80	0.169		0.188
A2	0.03		0.23	0.001		0.009
C	1.17		1.37	0.046		0.053
D	2.40		2.80	0.094		0.110
D1	8.95		9.35	0.352		0.368
E	0.45		0.60	0.017		0.023
F	0.80		1.05	0.031		0.041
G	3.20		3.60	0.126		0.142
G1	6.60		7.00	0.260		0.275
H1		8.5			0.334	0.409
H2	10.00		10.40	0.393		0.409
L	15		15.85	0.590		0.624
L1		8			0.315	
L2	1.27		1.40	0.050		0.055
M	2.4		3.2	0.094		0.126
R		0.40			0.016	
V2	0°		8°	0°		8°



Tape & reel D^2PAK-P^2PAK-D^2PAK/A-P^2PAK/A mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	10.50	10.6	10.70	0.413	0.417	0.421
Bo	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
P	11.9	12.0	12.1	0.468	0.472	0.476



Note: Drawing not in scale

8 Revision history

Table 7. 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: *Table 1 on page 1*.
11-Jul-2008	12	Modified: *Table 1 on page 1*.
13-Sep-2012	13	Updated: *Table 1 on page 1*.

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