

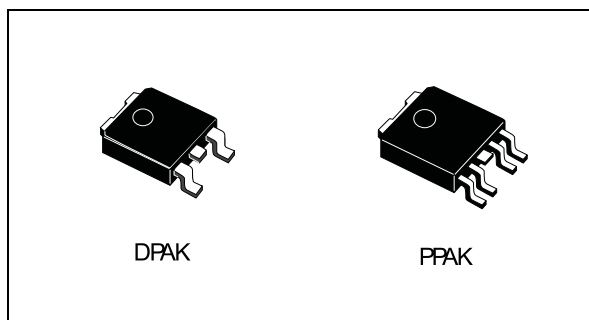


**THE DATASHEET OF  
LD29150P2T33R**



## 1.5 A, very low drop voltage regulators

Datasheet - production data



### Description

The LD29150 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.

### Features

- Very low dropout voltage (typ. 0.4 at 1.5 A)
- Guaranteed output current up to 1.5 A
- Fixed and adjustable output voltage ( $\pm 1\%$  at 25 °C)
- Internal current and thermal limit
- Logic controlled electronic shutdown available in PPAK

Table 1. Device summary

Order codes		Output voltages
DPAK	PPAK	
LD29150DT18R		1.8 V
LD29150DT25R		2.5 V
LD29150DT33R		3.3 V
LD29150DT50R	LD29150PT50R	5.0 V
	LD29150PTR	ADJ

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# 1 Diagram

Figure 1. Schematic diagram for adjustable version

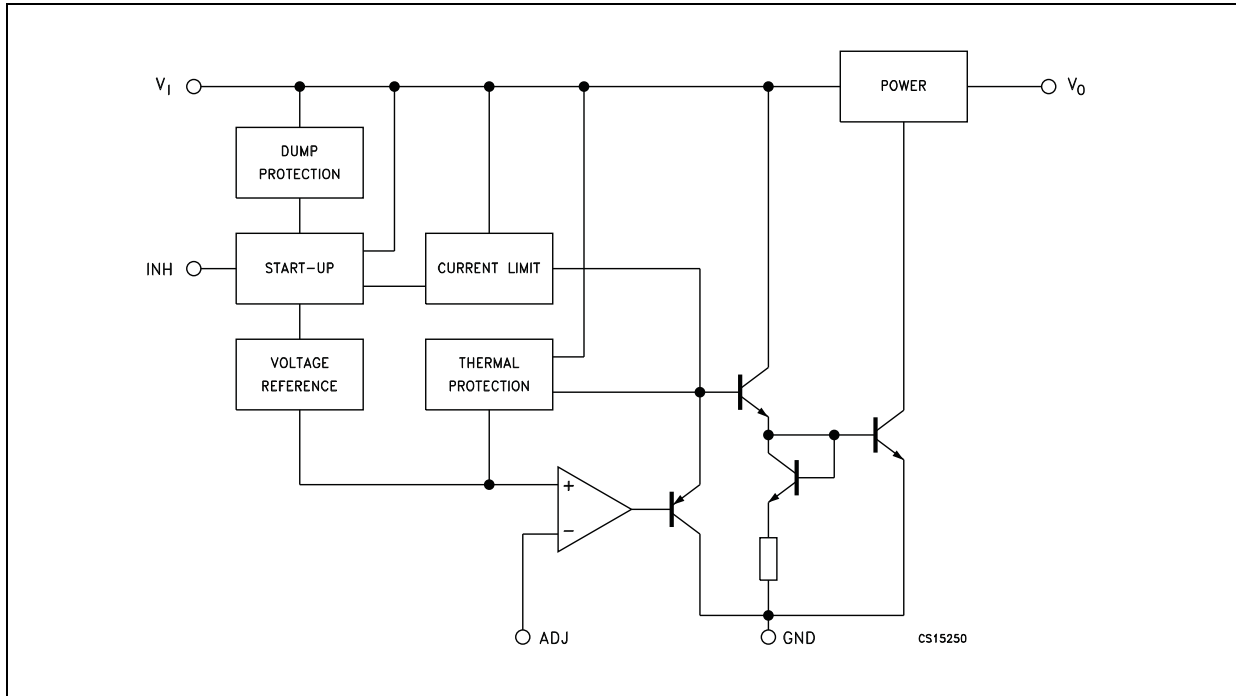
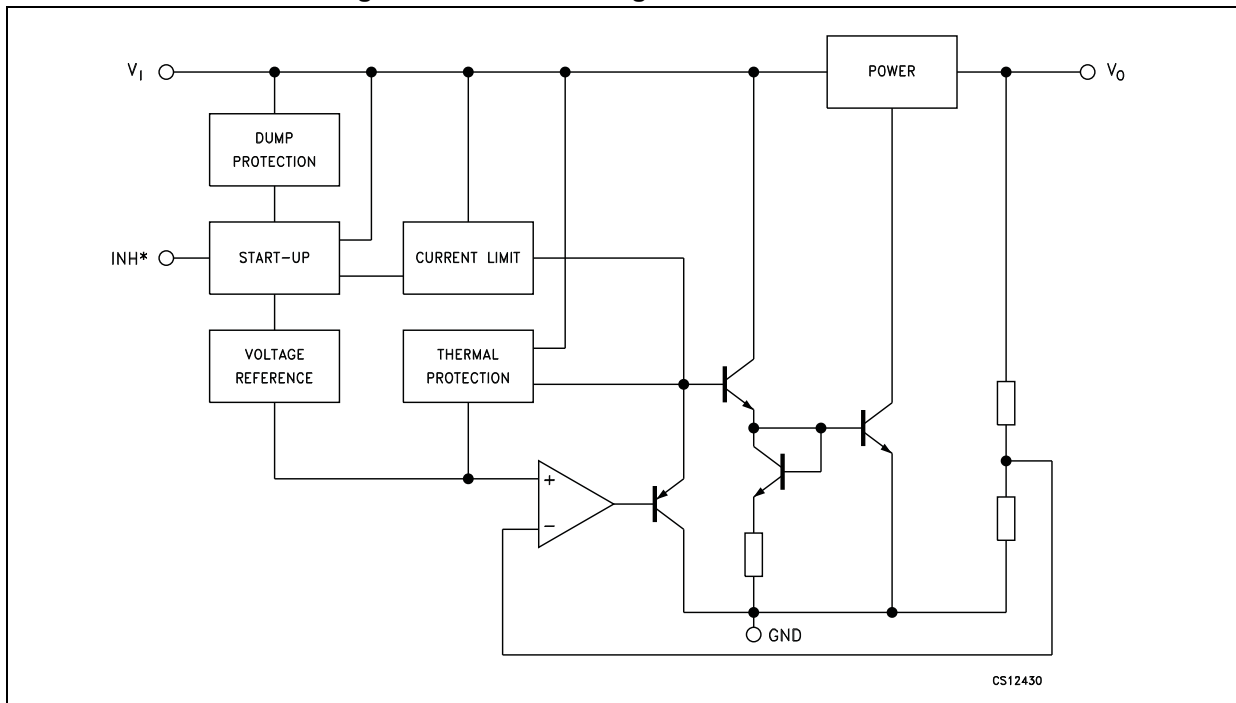


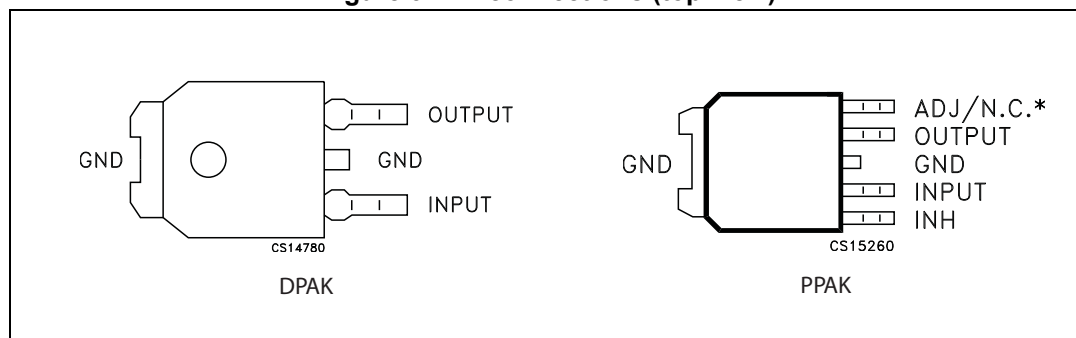
Figure 2. Schematic diagram for fixed version



\* Only for version with inhibit function.

## 2 Pin configuration

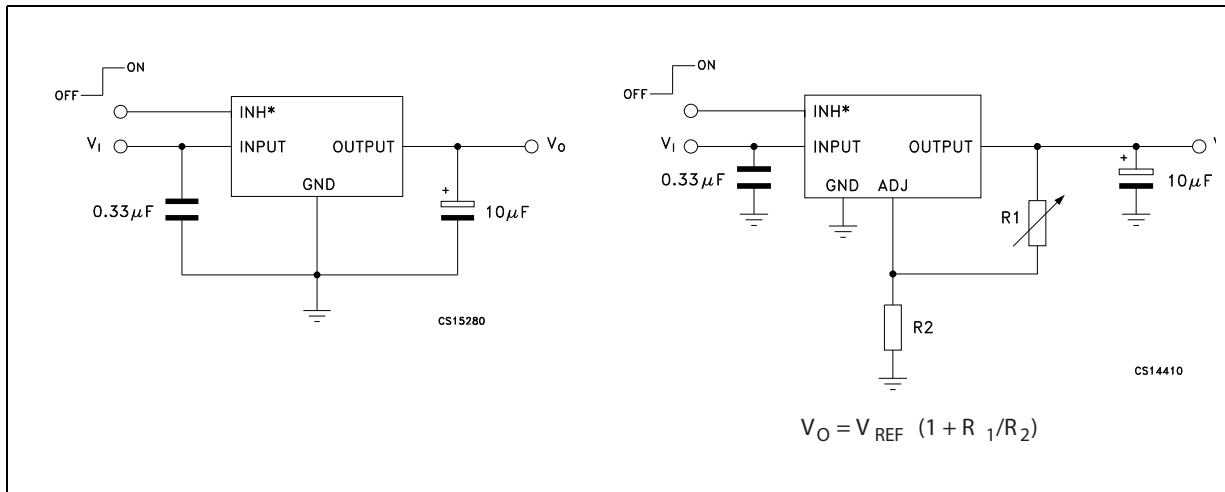
Figure 3. Pin connections (top view)



\* 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 <sup>(1)</sup>	V
$V_O$	DC output voltage	-0.3 to 20	V
$V_{INH}$	Inhibit input voltage	-0.3 to 20	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	DPAK	PPAK	Unit
$R_{thJA}$	Thermal resistance junction-ambient	100	100	°C/W
$R_{thJC}$	Thermal resistance junction-case	8	8	°C/W

## 5 Electrical characteristics

$I_O = 10 \text{ mA}$ ,  $T_J = 25 \text{ °C}$ ,  $V_I = 3.8 \text{ V}$ ,  $V_{INH} = 2 \text{ V}$  (*Note 3*),  $C_I = 330 \text{ nF}$ ,  $C_O = 10 \text{ μF}$ , unless otherwise specified.

**Table 4. Electrical characteristics of LD29150#18**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$I_O = 10 \text{ mA to } 1.5 \text{ A}$ , $V_I = 3 \text{ to } 7.3 \text{ V}$ $T_J = -40 \text{ to } 125 \text{ °C}$	1.782	1.8	1.818	V
			1.764		1.836	
$\Delta V_O$	Load regulation	$I_O = 10 \text{ mA to } 1.5 \text{ A}$		0.2	1.0	%
$\Delta V_O$	Line regulation	$V_I = 3 \text{ to } 13 \text{ V}$		0.06	0.5	%
SVR	Supply voltage rejection	$f = 120 \text{ Hz}$ , $V_I = 3.8 \pm 1 \text{ V}$ , $I_O = 0.75 \text{ A}$ ( <i>Note 1</i> )	62	72		dB
$V_{DROPO}$	Dropout voltage	$I_O = 250 \text{ mA}$ , $T_J = -40 \text{ to } 125 \text{ °C}$ ( <i>Note 2</i> )		0.1		V
		$I_O = 0.75 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ °C}$ ( <i>Note 2</i> )		0.2		
		$I_O = 1.5 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ °C}$ ( <i>Note 2</i> )		0.4	0.7	
$I_q$	Quiescent current	$I_O = 0.75 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ °C}$		15	40	mA
		$I_O = 1.5 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ °C}$		30	80	
		$V_I = 13 \text{ V}$ , $V_{INH} = \text{GND}$ , $T_J = -40 \text{ to } 125 \text{ °C}$		130	180	$\mu\text{A}$
$I_{sc}$	Short circuit current	$V_I - V_O = 5.5 \text{ V}$		2.2		A
$V_{IL}$	Control input logic low	OFF MODE, ( <i>Note 3</i> ), $T_J = -40 \text{ to } 125 \text{ °C}$			0.8	V
$V_{IH}$	Control input logic high	ON MODE, ( <i>Note 3</i> ), $T_J = -40 \text{ to } 125 \text{ °C}$	2			V
$I_{INH}$	Control input current	$T_J = -40 \text{ to } 125 \text{ °C}$ , $V_{INH} = 13 \text{ V}$		5	10	$\mu\text{A}$
eN	Output noise voltage	$B_P = 10 \text{ Hz to } 100 \text{ kHz}$ , $I_O = 100 \text{ mA}$ ( <i>Note 1</i> )		72		$\mu\text{V}_{RMS}$
$T_{SHDN}$	Thermal shutdown			150		$^{\circ}\text{C}$

Note: 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  $V_I$ .

3 Only for version with Inhibit function.

$I_O = 10 \text{ mA}$ ,  $T_J = 25 \text{ }^\circ\text{C}$ ,  $V_I = 4.5 \text{ V}$ ,  $V_{INH} = 2 \text{ V}$  (Note 3),  $C_I = 330 \text{ nF}$ ,  $C_O = 10 \text{ } \mu\text{F}$ , unless otherwise specified.

**Table 5. Electrical characteristics of LD29150#25**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$I_O = 10 \text{ mA to } 1.5 \text{ A}$ , $V_I = 3.5 \text{ to } 8 \text{ V}$ $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$	2.475	2.5	2.525	V
			2.45		2.55	
$\Delta V_O$	Load regulation	$I_O = 10 \text{ mA to } 1.5 \text{ A}$		0.2	1.0	%
$\Delta V_O$	Line regulation	$V_I = 3.5 \text{ to } 13 \text{ V}$		0.06	0.5	%
SVR	Supply voltage rejection	$f = 120 \text{ Hz}$ , $V_I = 4.5 \pm 1 \text{ V}$ , $I_O = 0.75 \text{ A}$ (Note 1)	55	70		dB
$V_{DROPO}$	Dropout voltage	$I_O = 250 \text{ mA}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$ (Note 2)		0.1		V
		$I_O = 0.75 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$ (Note 2)		0.2		
		$I_O = 1.5 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$ (Note 2)		0.4	0.7	
$I_q$	Quiescent current	$I_O = 0.75 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$		15	40	mA
		$I_O = 1.5 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$		30	80	
		$V_I = 13 \text{ V}$ , $V_{INH} = \text{GND}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$		130	180	$\mu\text{A}$
$I_{sc}$	Short circuit current	$V_I - V_O = 5.5 \text{ V}$		2.2		A
$V_{IL}$	Control input logic low	OFF MODE, (Note 3), $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$			0.8	V
$V_{IH}$	Control input logic high	ON MODE, (Note 3), $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$	2			V
$I_{INH}$	Control input current	$T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$ , $V_{INH} = 13 \text{ V}$		5	10	$\mu\text{A}$
eN	Output noise voltage	$B_P = 10 \text{ Hz to } 100 \text{ kHz}$ , $I_O = 100 \text{ mA}$ (Note 1)		100		$\mu\text{V}_{RMS}$
$T_{SHDN}$	Thermal shutdown			150		$^\circ\text{C}$

Note: 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  $V_I$ .

3 Only for version with Inhibit function.

$I_O = 10 \text{ mA}$ ,  $T_J = 25 \text{ °C}$ ,  $V_I = 5.3 \text{ V}$ ,  $V_{INH} = 2 \text{ V}$  (Note 3),  $C_I = 330 \text{ nF}$ ,  $C_O = 10 \text{ }\mu\text{F}$ , unless otherwise specified.

**Table 6. Electrical characteristics of LD29150#33**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$I_O = 10 \text{ mA to } 1.5 \text{ A}$ , $V_I = 4.3 \text{ to } 8.8 \text{ V}$ $T_J = -40 \text{ to } 125 \text{ °C}$	3.267	3.3	3.333	V
			3.234		3.366	
$\Delta V_O$	Load regulation	$I_O = 10 \text{ mA to } 1.5 \text{ A}$		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	$f = 120 \text{ Hz}$ , $V_I = 5.3 \pm 1 \text{ V}$ , $I_O = 0.75 \text{ A}$ (Note 1)	52	67		dB
$V_{DROP}$	Dropout voltage	$I_O = 250 \text{ mA}$ , $T_J = -40 \text{ to } 125 \text{ °C}$ (Note 2)		0.1		V
		$I_O = 0.75 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ °C}$ (Note 2)		0.2		
		$I_O = 1.5 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ °C}$ (Note 2)		0.4	0.7	
$I_q$	Quiescent current	$I_O = 0.75 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ °C}$		15	40	mA
		$I_O = 1.5 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ °C}$		30	80	
		$V_I = 13 \text{ V}$ , $V_{INH} = \text{GND}$ , $T_J = -40 \text{ to } 125 \text{ °C}$		130	180	$\mu\text{A}$
$I_{sc}$	Short circuit current	$V_I - V_O = 5.5 \text{ V}$		2.2		A
$V_{IL}$	Control input logic low	OFF MODE, (Note 3), $T_J = -40 \text{ to } 125 \text{ °C}$			0.8	V
$V_{IH}$	Control input logic high	ON MODE, (Note 3), $T_J = -40 \text{ to } 125 \text{ °C}$	2			V
$I_{INH}$	Control input current	$T_J = -40 \text{ to } 125 \text{ °C}$ , $V_{INH} = 13 \text{ V}$		5	10	$\mu\text{A}$
eN	Output noise voltage	$B_P = 10 \text{ Hz to } 100 \text{ kHz}$ , $I_O = 100 \text{ mA}$ (Note 1)		132		$\mu\text{V}_{RMS}$
$T_{SHDN}$	Thermal shutdown			150		$^{\circ}\text{C}$

Note: 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  $V_I$ .

3 Only for version with Inhibit function.

$I_O = 10 \text{ mA}$ ,  $T_J = 25 \text{ }^\circ\text{C}$ ,  $V_I = 7 \text{ V}$ ,  $V_{INH} = 2 \text{ V}$  (*Note 3*),  $C_I = 330 \text{ nF}$ ,  $C_O = 10 \text{ } \mu\text{F}$ , unless otherwise specified.

**Table 7. Electrical characteristics of LD29150#50**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$I_O = 10 \text{ mA to } 1.5 \text{ A}$ , $V_I = 6 \text{ to } 10.5 \text{ V}$ $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$	4.95	5	5.05	V
			4.9		5.1	
$\Delta V_O$	Load regulation	$I_O = 10 \text{ mA to } 1.5 \text{ A}$		0.2	1.0	%
$\Delta V_O$	Line regulation	$V_I = 6 \text{ to } 13 \text{ V}$		0.06	0.5	%
SVR	Supply voltage rejection	$f = 120 \text{ Hz}$ , $V_I = 7 \pm 1 \text{ V}$ , $I_O = 0.75 \text{ A}$ ( <i>Note 1</i> )	49	64		dB
$V_{DROP}$	Dropout voltage	$I_O = 250 \text{ mA}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$ ( <i>Note 2</i> )		0.1		V
		$I_O = 0.75 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$ ( <i>Note 2</i> )		0.2		
		$I_O = 1.5 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$ ( <i>Note 2</i> )		0.4	0.7	
$I_q$	Quiescent current	$I_O = 0.75 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$		15	40	mA
		$I_O = 1.5 \text{ A}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$		30	80	
		$V_I = 13 \text{ V}$ , $V_{INH} = \text{GND}$ , $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$		130	180	$\mu\text{A}$
$I_{sc}$	Short circuit current	$V_I - V_O = 5.5 \text{ V}$		2.2		A
$V_{IL}$	Control input logic low	OFF MODE, ( <i>Note 3</i> ), $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$			0.8	V
$V_{IH}$	Control input logic high	ON MODE, ( <i>Note 3</i> ), $T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$	2			V
$I_{INH}$	Control input current	$T_J = -40 \text{ to } 125 \text{ }^\circ\text{C}$ , $V_{INH} = 13 \text{ V}$		5	10	$\mu\text{A}$
eN	Output noise voltage	$B_P = 10 \text{ Hz to } 100 \text{ kHz}$ , $I_O = 100 \text{ mA}$ ( <i>Note 1</i> )		200		$\mu\text{V}_{RMS}$
$T_{SHDN}$	Thermal shutdown			150		$^\circ\text{C}$

Note: 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  $V_I$ .

3 Only for version with Inhibit function.

$I_O = 10 \text{ mA}$ ,  $T_J = 25 \text{ }^\circ\text{C}$ ,  $V_I = 3.23 \text{ V}$ ,  $V_{INH} = 2 \text{ V}$  (*Note 3*),  $C_I = 330 \text{ nF}$ ,  $C_O = 10 \text{ } \mu\text{F}$  adjust pin tied to output pin.

**Table 8. Electrical characteristics of LD29150#ADJ**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_I$	Minimum operating input voltage	$I_O = 10 \text{ mA}$ to $1.5 \text{ A}$ , $T_J = -40$ to $125 \text{ }^\circ\text{C}$	2.5			V
$\Delta V_O$	Load regulation	$I_O = 10 \text{ mA}$ to $1.5 \text{ A}$		0.2	1.0	%
$\Delta V_O$	Line regulation	$V_I = 2.5 \text{ V}$ to $13 \text{ V}$ , $I_O = 10 \text{ mA}$		0.06	0.5	%
$V_{REF}$	Reference voltage	$I_O = 10 \text{ mA}$ to $1.5 \text{ A}$ , $V_I = 2.5$ to $4.5 \text{ V}$ $T_J = -40$ to $125 \text{ }^\circ\text{C}$ ( <i>Note 2</i> )	-1%	1.23	+1%	V
			-2%		+2%	
SVR	Supply voltage rejection	$f = 120 \text{ Hz}$ , $V_I = 3.23 \pm 1 \text{ V}$ , $I_O = 0.75 \text{ A}$ ( <i>Note 1</i> )	45	75		dB
$I_q$	Quiescent current	$I_O = 0.75 \text{ A}$ , $T_J = -40$ to $125 \text{ }^\circ\text{C}$		15	40	mA
		$I_O = 1.5 \text{ A}$ , $T_J = -40$ to $125 \text{ }^\circ\text{C}$		30	80	
		$V_I = 13 \text{ V}$ , $V_{INH} = \text{GND}$ , $T_J = -40$ to $125 \text{ }^\circ\text{C}$		130	180	$\mu\text{A}$
$I_{ADJ}$	Adjust pin current	$T_J = -40$ to $125 \text{ }^\circ\text{C}$ ( <i>Note 1</i> )			1	$\mu\text{A}$
$I_{sc}$	Short circuit current	$V_I - V_O = 5.5 \text{ V}$		2.2		A
$V_{IL}$	Control input logic low	OFF MODE, ( <i>Note 3</i> ), $T_J = -40$ to $125 \text{ }^\circ\text{C}$			0.8	V
$V_{IH}$	Control input logic high	ON MODE, ( <i>Note 3</i> ), $T_J = -40$ to $125 \text{ }^\circ\text{C}$	2			V
$I_{INH}$	Control input current	$T_J = -40$ to $125 \text{ }^\circ\text{C}$ , $V_{INH} = 13 \text{ V}$		5	10	$\mu\text{A}$
eN	Output noise voltage	$B_P = 10 \text{ Hz}$ to $100 \text{ kHz}$ , $I_O = 100 \text{ mA}$ ( <i>Note 1</i> )		50		$\mu\text{V}_{RMS}$
$T_{SHDN}$	Thermal shutdown			150		$^\circ\text{C}$

Note: 1 Guaranteed by design.

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

3 Only for version with Inhibit function.

## 6 Typical characteristics

Figure 5. Output voltage vs. temperature

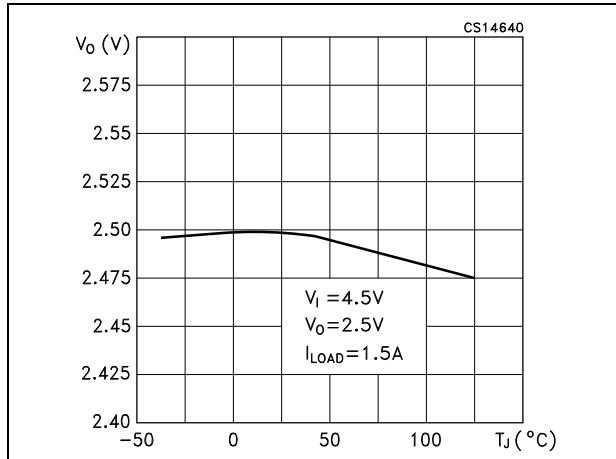


Figure 6. Reference voltage vs. temperature

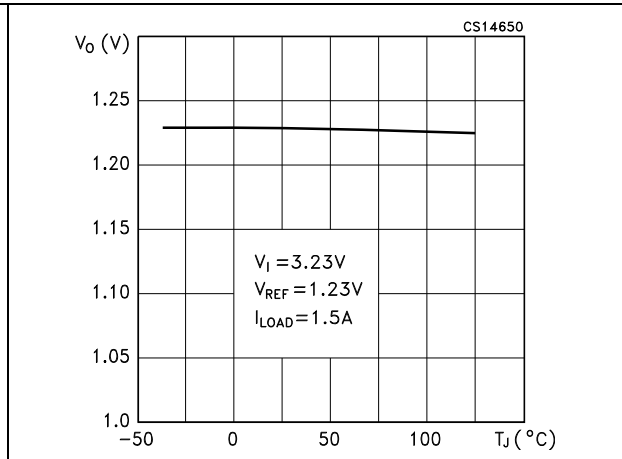


Figure 7. Dropout voltage vs. temperature

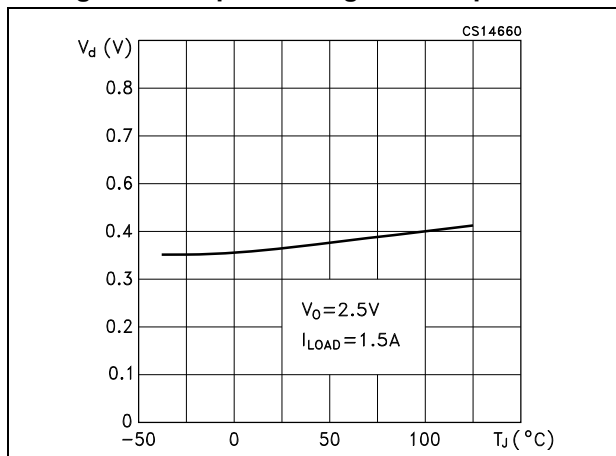


Figure 8. Dropout voltage vs. output current

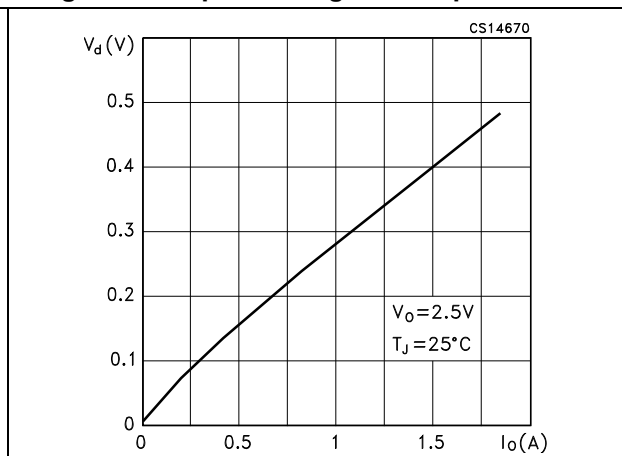


Figure 9. Quiescent current vs. output current  
( $V_i = 13\text{ V}$ )

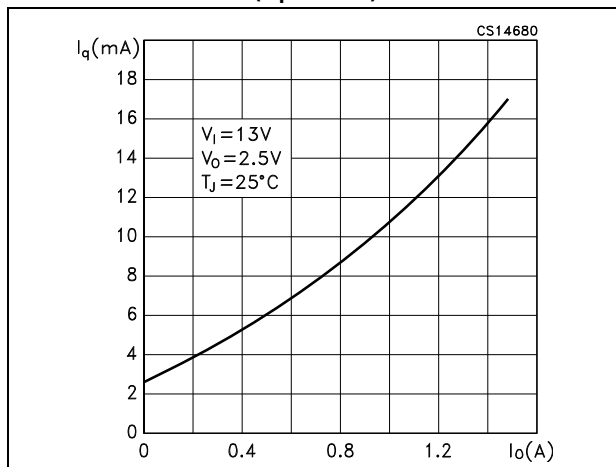


Figure 10. Quiescent current vs. output current  
( $V_i = 4.5\text{ V}$ )

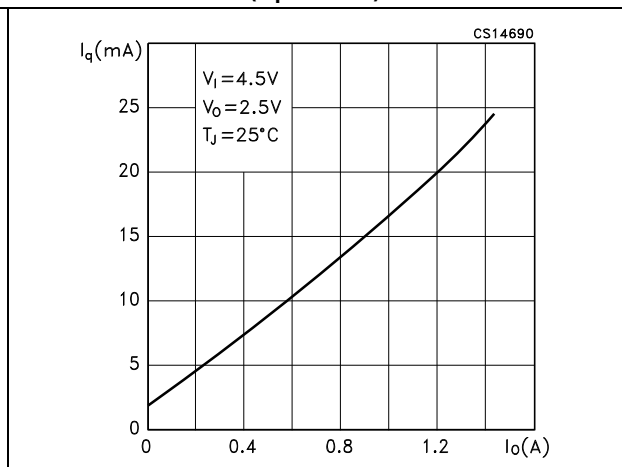


Figure 11. Quiescent current vs. supply voltage

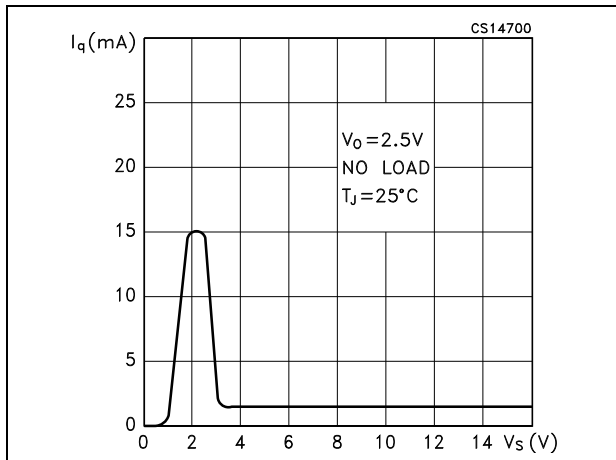


Figure 12. Quiescent current vs. temperature (Io = 10 mA)

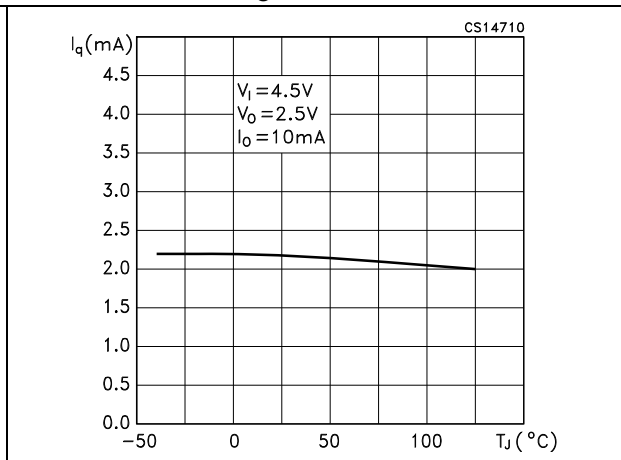


Figure 13. Quiescent current vs. temperature (Io = 1.5 A)

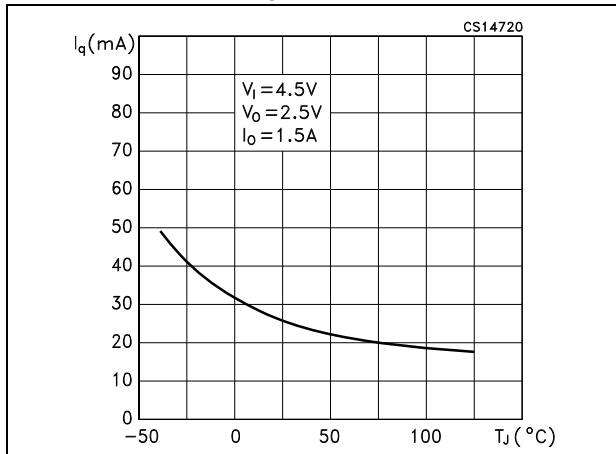


Figure 14. Short circuit current vs. temperature

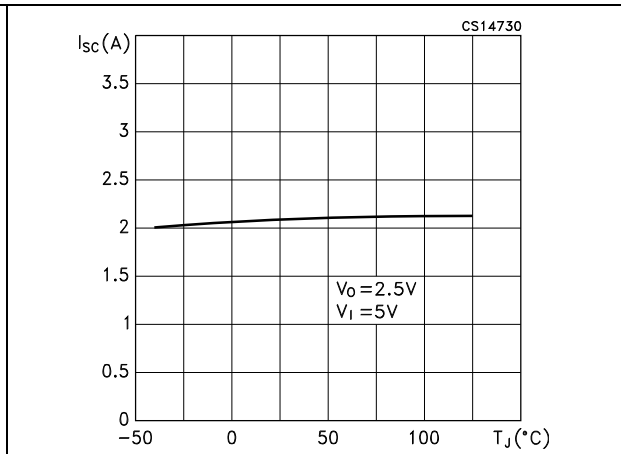


Figure 15. Adjust pin current vs. temperature

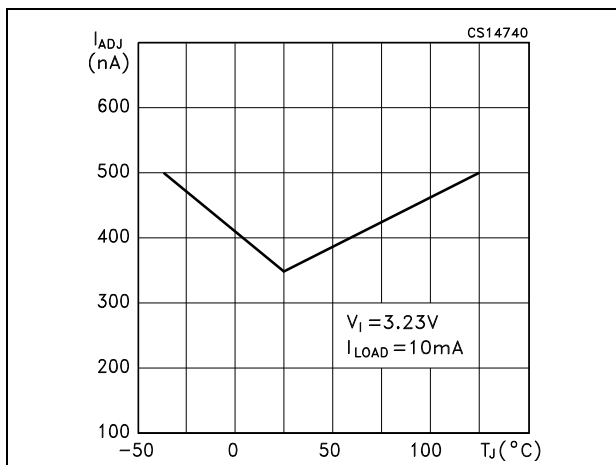


Figure 16. Supply voltage rejection vs. temperature

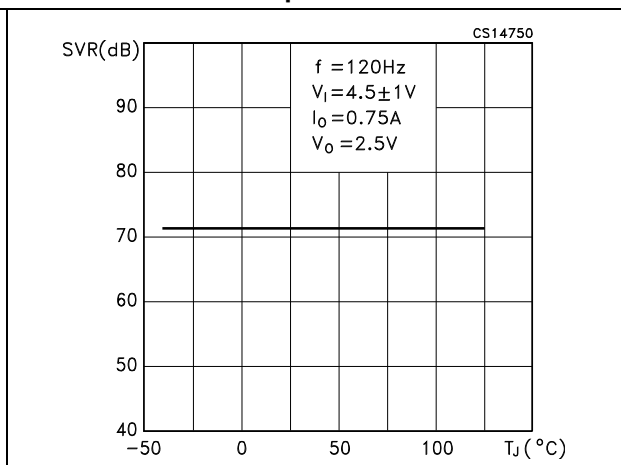


Figure 17. Output voltage vs. input voltage

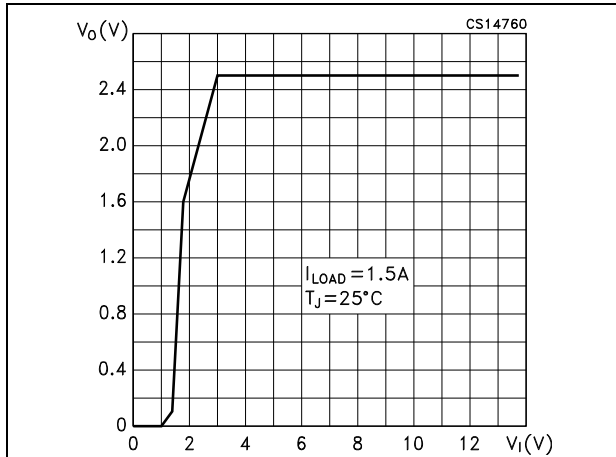


Figure 18. Stability vs. Co

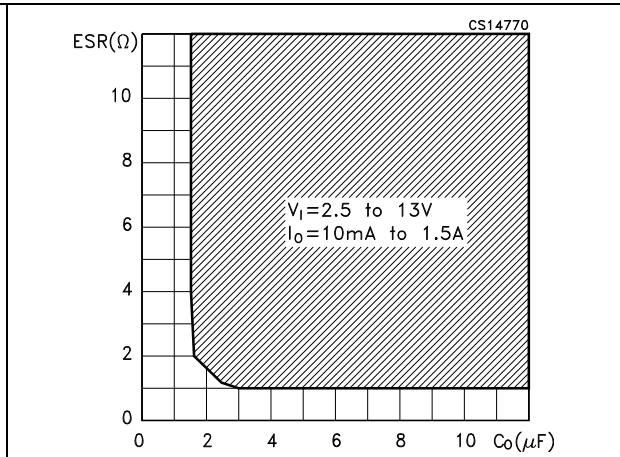
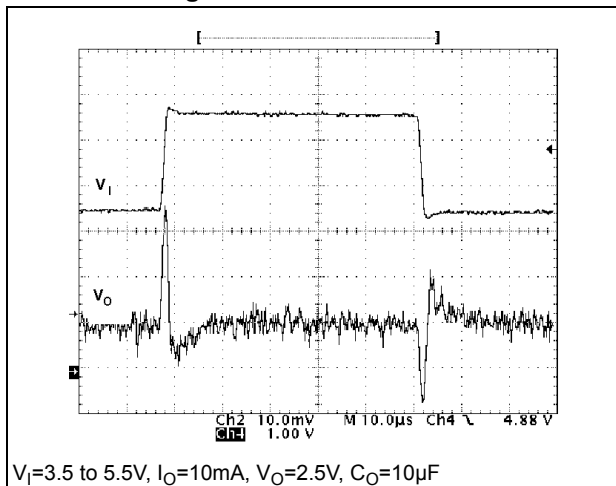
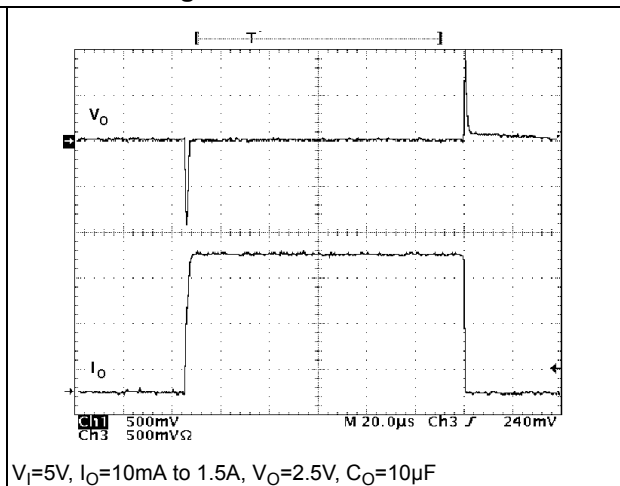


Figure 19. Line transient



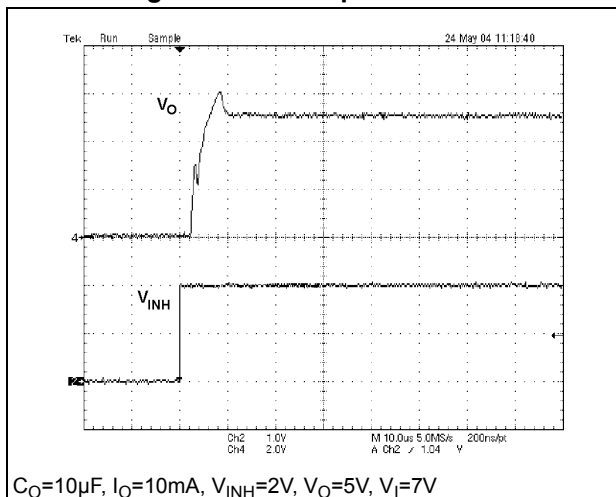
$V_I=3.5$  to  $5.5V$ ,  $I_O=10mA$ ,  $V_O=2.5V$ ,  $C_O=10\mu F$

Figure 20. Load transient



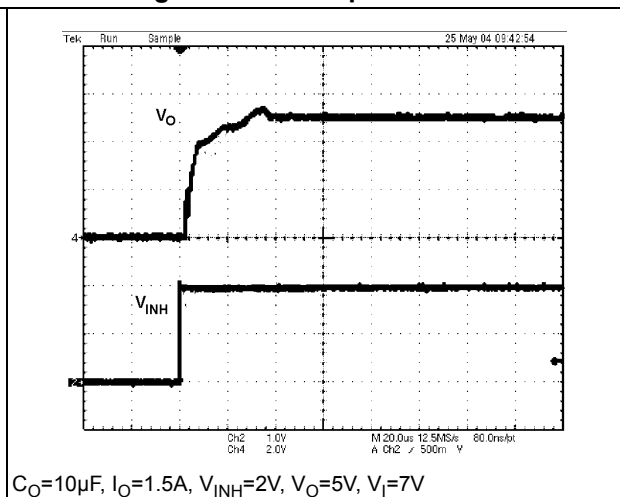
$V_I=5V$ ,  $I_O=10mA$  to  $1.5A$ ,  $V_O=2.5V$ ,  $C_O=10\mu F$

Figure 21. Start-up time 10 mA



$C_O=10\mu F$ ,  $I_O=10mA$ ,  $V_{INH}=2V$ ,  $V_O=5V$ ,  $V_I=7V$

Figure 22. Start-up time 1.5 A



$C_O=10\mu F$ ,  $I_O=1.5A$ ,  $V_{INH}=2V$ ,  $V_O=5V$ ,  $V_I=7V$

## 7 Package information

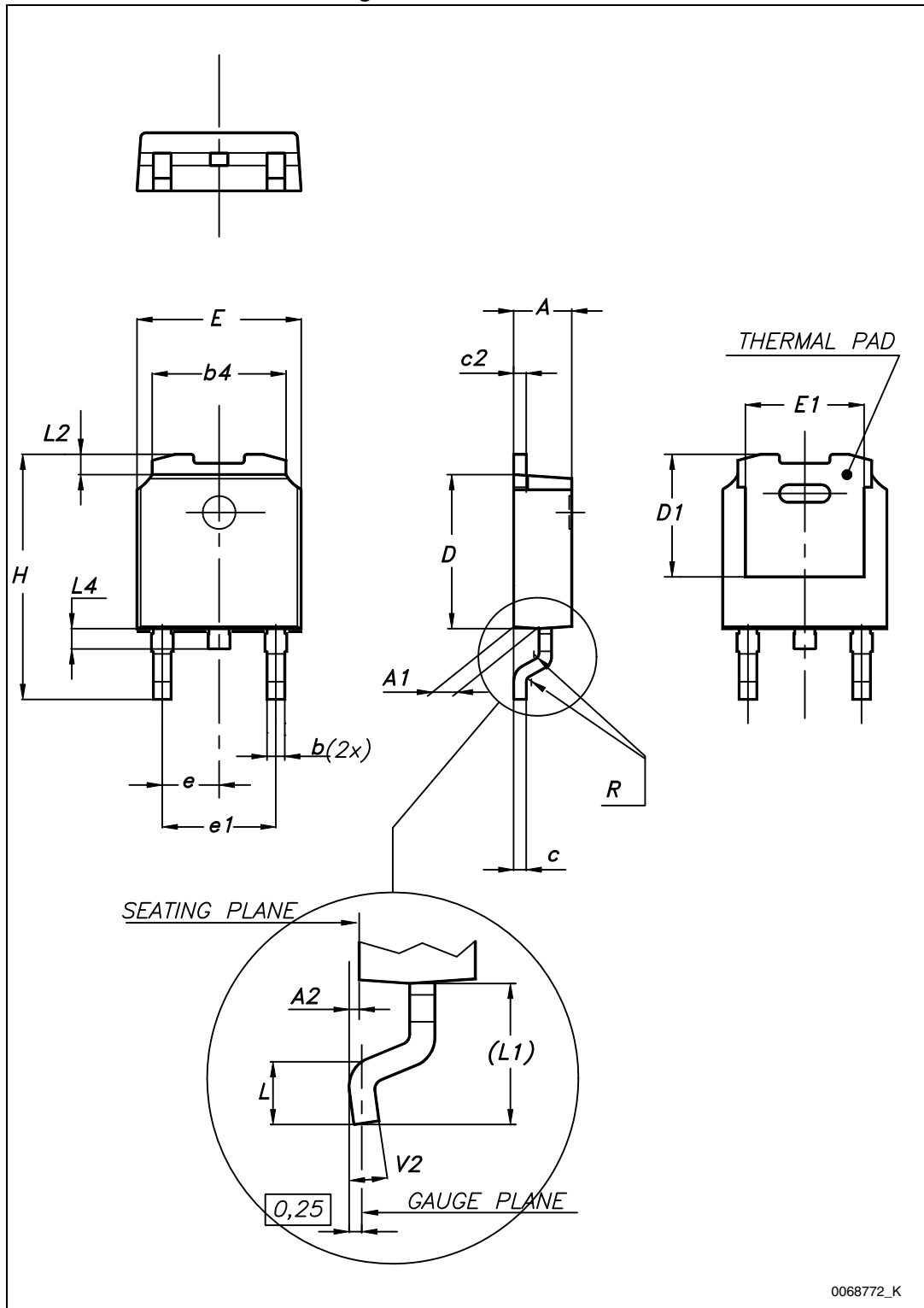
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK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

### 7.1 DPAK package information

Table 9. DPAK mechanical data

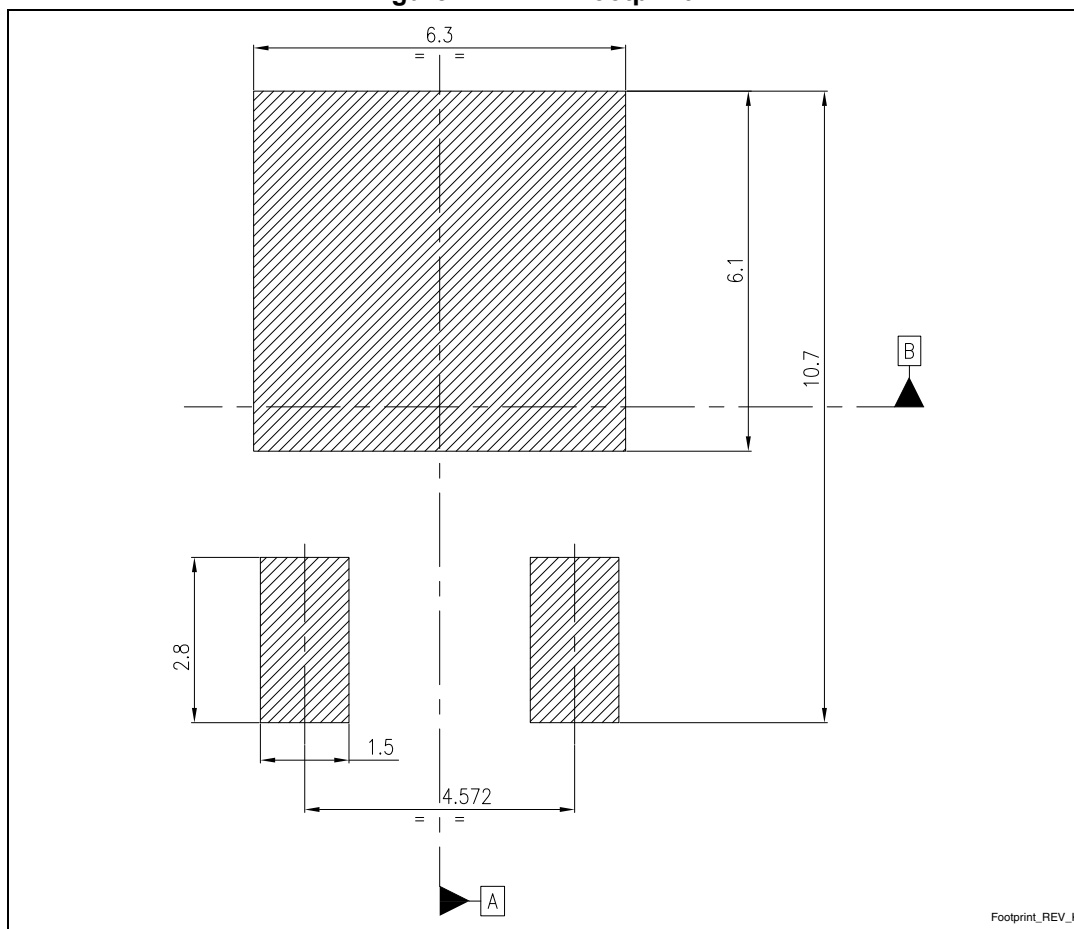
Dim.	mm		
	Min.	Typ.	Max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1.00		1.50
(L1)		2.80	
L2		0.80	
L4	0.60		1.00
R		0.20	
V2	0°		8°

Figure 23. DPAK outline



0068772\_K

Figure 24. DPAK footprint (a)



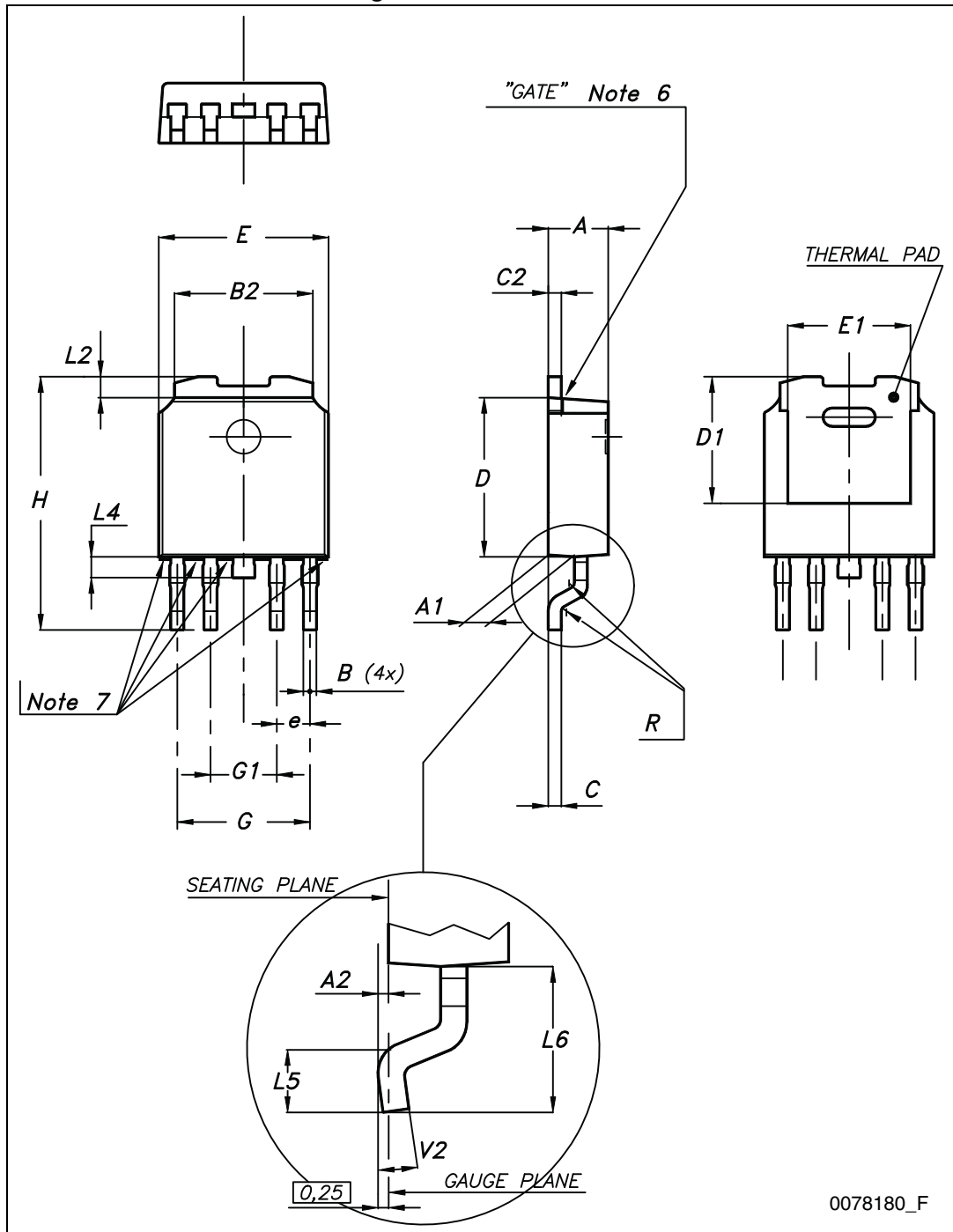
a. All dimensions are in millimeters

## 7.2 PPAK package information

Table 10. PPAK mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	2.2		2.4
A1	0.9		1.1
A2	0.03		0.23
B	0.4		0.6
B2	5.2		5.4
C	0.45		0.6
C2	0.48		0.6
D	6		6.2
D1		5.1	
E	6.4		6.6
E1		4.7	
e		1.27	
G	4.9		5.25
G1	2.38		2.7
H	9.35		10.1
L2		0.8	1
L4	0.6		1
L5	1		
L6		2.8	
R		0.20	
V2	0°		8°

Figure 25. PPAK outline



## 8 Packaging information

### 8.1 PPAK and DPAK packaging information

Table 11. PPAK and DPAK tape and reel mechanical data

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	6.8	7	A		330
B0	10.4	10.6	B	1.5	
B1		12.1	C	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
E	1.65	1.85	N	50	
F	7.4	7.6	T		22.4
K0	2.55	2.75			
P0	3.9	4.1	Base qty.		2500
P1	7.9	8.1	Bulk qty.		2500
P2	1.9	2.1			
R	40				
T	0.25	0.35			
W	15.7	16.3			

Figure 26. Tape for PPAK and DPAK

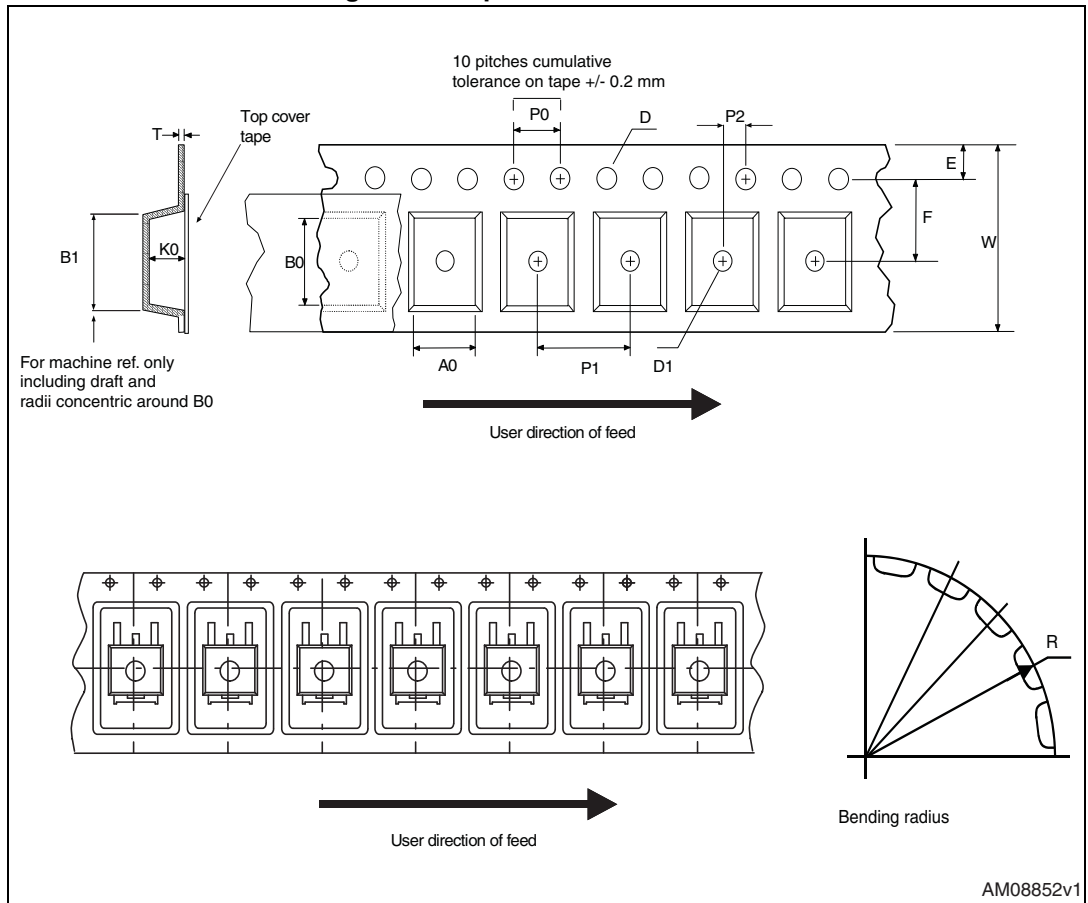
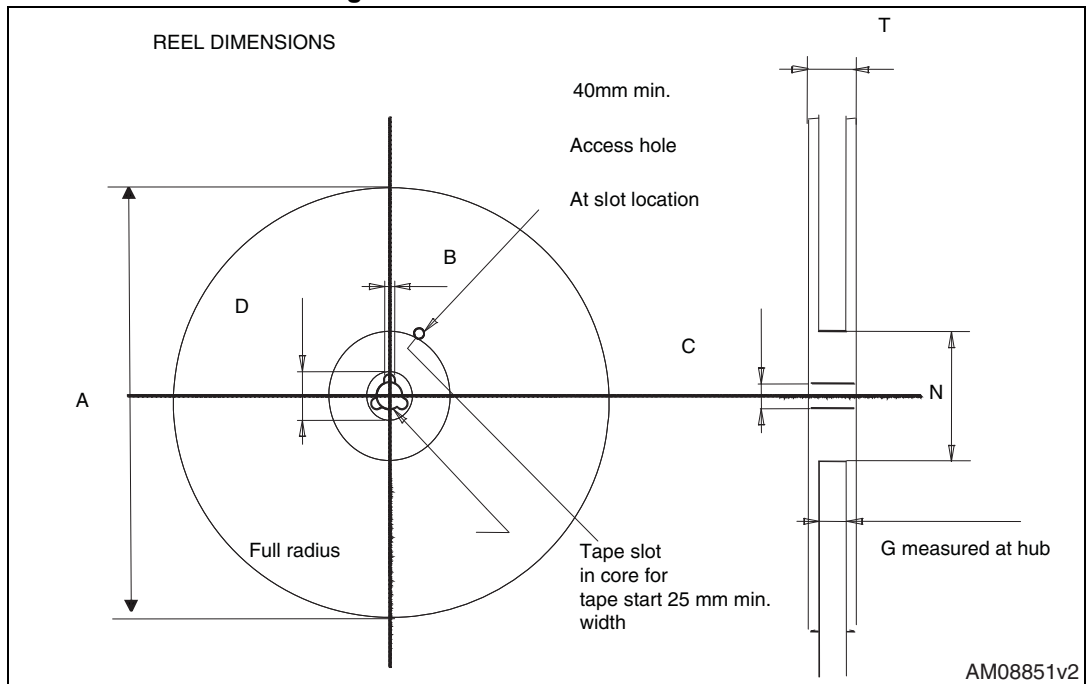


Figure 27. Reel for PPAK and DPAK



## 9 Revision history

**Table 12. Document revision history**

Date	Revision	Changes
17-Jun-2004	5	Add figures 20 and 21, PPAK, TO-220 and TO-220FP mechanical data updated.
19-Jul-2004	6	Remove Package TO-220FP4.
08-Nov-2004	7	Mistake Figure 7.
21-Mar-2005	8	Add $V_O$ and $V_{INH}$ on Table 2.
21-Oct-2005	9	Order Codes Has Been Updated.
17-Oct-2006	10	Add new package P <sup>2</sup> PAK.
13-Nov-2006	11	Add row $T_{SHDN}$ on tables of the electrical characteristics.
11-May-2007	12	Order codes updated.
15-Feb-2008	13	Added: <a href="#">Table 1 on page 1</a> .
28-Jul-2009	14	Modified: <a href="#">Table 1 on page 1</a> .
22-Sep-2010	15	Modified: <a href="#">Table 1 on page 1</a> .
27-Oct-2010	16	Updated: DPAK mechanical data <a href="#">on page 25</a> .
07-May-2012	17	Modified: pin connections for PPAK, P <sup>2</sup> PAK and DPAK <a href="#">Figure 3 on page 4</a> .
06-Sep-2012	18	Updated: figure for P <sup>2</sup> PAK in cover page.
30-Oct-2013	19	Changed the LD29150XX to LD29150. Updated: Description in cover page. Updated <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.
30-Aug-2017	20	Removed P <sup>2</sup> PAK package option (order code LD29150P2T33R)

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