Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

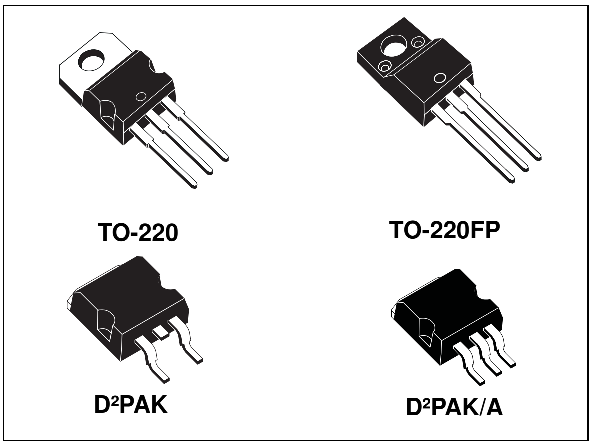
We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

3 A low drop positive voltage regulator: adjustable and fixed

Datasheet - production data



Features

- Typical dropout 1.3 V (at 3 A)
- Three terminal adjustable or fixed output voltage 1.8 V, 2.5 V, 3.3 V, 5 V
- Guaranteed output current up to 3 A
- Output tolerance ± 1% at 25 °C and ± 2% in full temperature range
- Internal power and thermal limit
- Wide operating temperature range -40 °C to 125 °C
- Package available: TO-220, TO-220FP, D²PAK, D²PAK/A
- Pinout compatibility with standard adjustable VREG

Description

The LD1085 is a low drop voltage regulator able to provide up to 3 A of output current. Dropout is guaranteed at a maximum of 1.2 V at the maximum output current, decreasing at lower loads. The LD1085 is pin-to-pin compatible with the older 3-terminal adjustable regulators, but offers better performance in terms of drop and output tolerance.

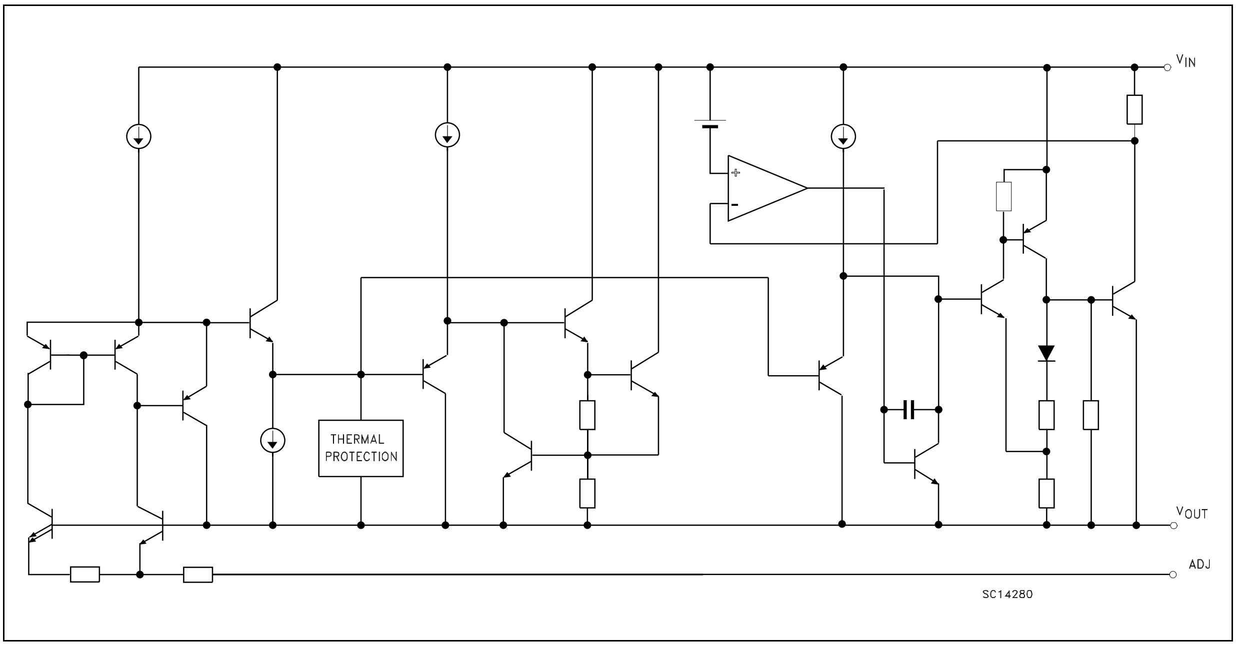
Unlike PNP regulators, where a part of the output current is wasted as quiescent current, the LD1085 quiescent current flows into the load, thus increase efficiency. Only a 10 µF minimum capacitor is need for stability.

The device is supplied in TO-220, TO-220FP, D²PAK and D²PAK/A packages. On-chip trimming allows the regulator to reach a very tight output voltage tolerance, within ± 1% at 25 °C.

Contents

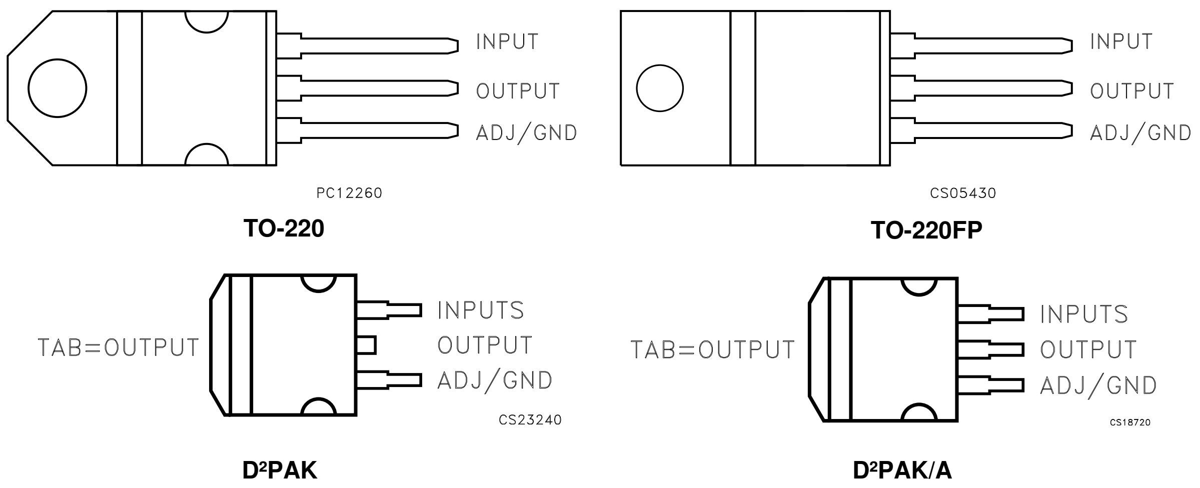
1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connections (top view)



3 Maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	DC input voltage	30	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

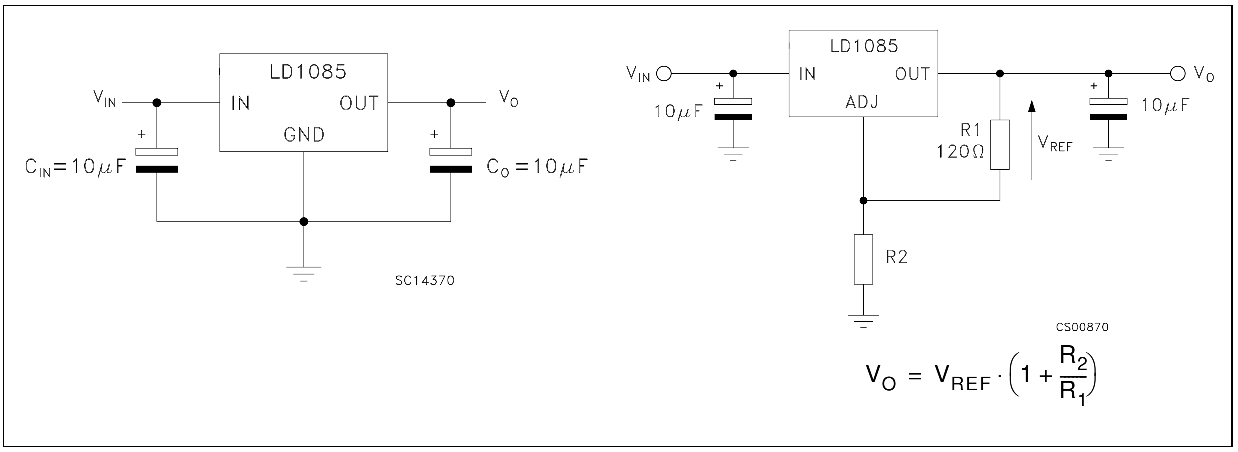
Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied

Table 2. Thermal data

Symbol	Parameter	TO-220	TO-220FP	D^2PAK D^2PAK/A	Unit
R_{thJC}	Thermal resistance junction-case	3	5	3	°C/W
R_{thJA}	Thermal resistance junction-ambient	50	60	62.5	°C/W

4 Application schematic

Figure 3. Application circuit



5 Electrical characteristics

V_I = 4.8 V, C_I = C_O =10 µF, T_A = -40 to 125 °C, unless otherwise specified.

Table 3. Electrical characteristics of LD1085#18

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage [1]	I_O = 0 mA, T_J = 25°C	1.782	1.8	1.818	V
		I_O = 0 to 3 A, V_I = 3.4 to 30 V	1.764	1.8	1.836	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 3.4 to 18 V T_J = 25°C		0.2	4	mV
		I_O = 0 mA, V_I = 3.4 to 15 V		0.4	4	mV
ΔV_O	Load regulation	I_O = 0 to 3 A, T_J = 25°C		2	10	mV
		I_O = 0 to 3 A		4	20	mV
V_d	Dropout voltage	I_O = 3 A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30 V		5	10	mA
I_{sc}	Short-circuit current	V_I - V_O = 5 V	3.2	4.5		A
		V_I - V_O = 25 V	0.2	0.5		A
	Thermal regulation	T_A = 25°C, 30 ms pulse		0.008	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 3 A V_I = 7.5 ± 3 V	60	72		dB
eN	RMS output noise voltage (% of V_O)	T_A = 25°C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000 Hrs		0.5		%

1. See short-circuit current curve for available output current at fixed dropout.

V_I = 5.5 V, C_I = C_O =10 µF, T_A = -40 to 125 °C, unless otherwise specified.

Table 4. Electrical characteristics of LD1085#25

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage [(1)]	I_O = 0 mA, T_J = 25°C	2.475	2.5	2.525	V
		I_O = 0 to 3 A, V_I = 4.1 to 30 V	2.45	2.5	2.55	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 4.1 to 18 V, T_J = 25°C		0.2	4	mV
		I_O = 0 mA, V_I = 4.1 to 18 V		0.4	4	mV
ΔV_O	Load regulation	I_O = 0 to 3 A, T_J = 25°C		2	10	mV
		I_O = 0 to 3 A		4	20	mV
V_d	Dropout voltage	I_O = 3 A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30 V		5	10	mA
I_{sc}	Short-circuit current	V_I - V_O = 5 V	3.2	4.5		A
		V_I - V_O = 25 V	0.2	0.5		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.008	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25µF, I_O = 3 A V_I = 7.5 $\pm$ 3 V	60	72		dB
eN	RMS output noise voltage (% of V_O)	T_A = 25°C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000 Hrs		0.5		%

1. See short-circuit current curve for available output current at fixed dropout.

V_I = 6.3 V, C_I = C_O =10 µF, T_A = -40 to 125 °C, unless otherwise specified.

Table 5. Electrical characteristics of LD1085#33

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage [1]	I_O = 0 mA, T_J = 25°C	3.267	3.3	3.333	V
		I_O = 0 to 3 A, V_I = 4.9 to 30 V	3.234	3.35	3.366	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 4.9 to 18 V, T_J = 25°C		0.5	6	mV
		I_O = 0 mA, V_I = 4.9 to 18 V		1	6	mV
ΔV_O	Load regulation	I_O = 0 to 3 A, T_J = 25°C		3	15	mV
		I_O = 0 to 3 A		7	20	mV
V_d	Dropout voltage	I_O = 3 A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq 30$ V		5	10	mA
I_{sc}	Short-circuit current	V_I - V_O = 5 V	3.2	4.5		A
		V_I - V_O = 25 V	0.2	0.5		A
	Thermal regulation	T_A = 25°C, 30 ms pulse		0.008	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 3 A $V_I = 8.3 \pm 3$ V	60	72		dB
eN	RMS output noise voltage (% of V_O)	T_A = 25°C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000 Hrs		0.5		%

1. See short-circuit current curve for available output current at fixed dropout.

V_I = 8 V, C_I = C_O =10 µF, T_A = -40 to 125 °C, unless otherwise specified.

Table 6. Electrical characteristics of LD1085#50

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage [(1)]	I_O = 0 mA, T_J = 25°C	4.95	5	5.05	V
		I_O = 0 to 3 A, V_I = 6.6 to 30 V	4.9	5	5.1	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 6.6 to 20 V, T_J = 25°C		0.5	10	mV
		I_O = 0 mA, V_I = 6.6 to 20 V		1	10	mV
ΔV_O	Load regulation	I_O = 0 to 3 A, T_J = 25°C		5	10	mV
		I_O = 0 to 3 A		10	35	mV
V_d	Dropout voltage	I_O = 3 A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30 V		5	10	mA
I_{sc}	Short-circuit current	V_I - V_O = 5 V	3.2	4.5		A
		V_I - V_O = 25 V	0.2	0.5		A
	Thermal regulation	T_A = 25°C, 30 ms pulse		0.008	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 3 A V_I = 10 $\pm$ 3 V	60	72		dB
eN	RMS output noise voltage (% of V_O)	T_A = 25°C, f = 10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000 Hrs		0.5		%

1. See short-circuit current curve for available output current at fixed dropout.

V_I = 4.25 V, C_I = C_O =10 µF, T_A = -40 to 125 °C, unless otherwise specified.

Table 7. Electrical characteristics of LD1085#

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage [1]	I_O = 10 mA T_J = 25°C	1.237	1.25	1.263	V
		I_O = 10 mA to 3 A, V_I = 2.85 to 30 V	1.225	1.25	1.275	V
ΔV_O	Line regulation	I_O = 10 mA, V_I = 2.85 to 16.5 V, T_J = 25°C		0.015	0.2	%
		I_O = 10 mA, V_I = 2.85 to 16.5 V		0.035	0.2	%
ΔV_O	Load regulation	I_O = 10 mA to 3 A, T_J = 25°C		0.1	0.3	%
		I_O = 0 to 3 A		0.2	0.4	%
V_d	Dropout voltage	I_O = 3 A		1.3	1.5	V
$I_{O(min)}$	Minimum load current	V_I = 30 V		3	10	mA
I_{sc}	Short-circuit current	V_I - V_O = 5 V	5.5	6.5		A
		V_I - V_O = 25 V	0.5	0.7		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.003	0.015	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF,C_{ADJ} = 25 µF, I_O = 3 A, V_I = 6.25 ± 3 V	60	72		dB
I_{ADJ}	Adjust pin current	V_I = 4.25 V, I_O = 10 mA		55	120	µA
ΔI_{ADJ}	Adjust pin current change [1]	I_O = 10 mA to 3 A, V_I = 2.85 to 16.5 V		0.2	5	µA
eN	RMS output noise voltage (% of V_O)	T_A = 25°C, f =10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000 Hrs		0.5		%

1. See short-circuit current curve for available output current at fixed dropout.

6 Typical characteristics

Unless otherwise specified T_J = 25 °C, C_I = C_O = 10 µF.

Figure 4. Output voltage vs. temp. (I_O = 3 A)

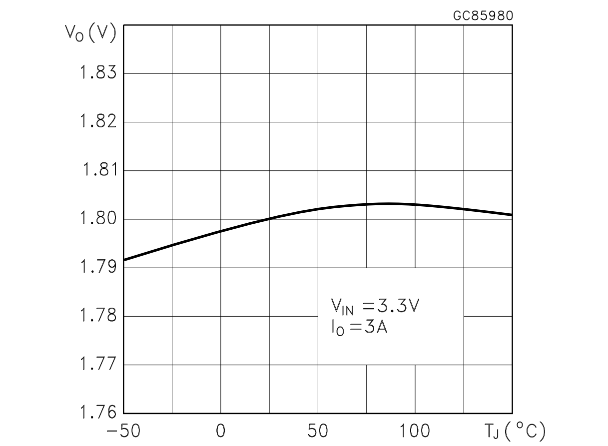


Figure 5. Output voltage vs. temp. (I_O = 0 mA)

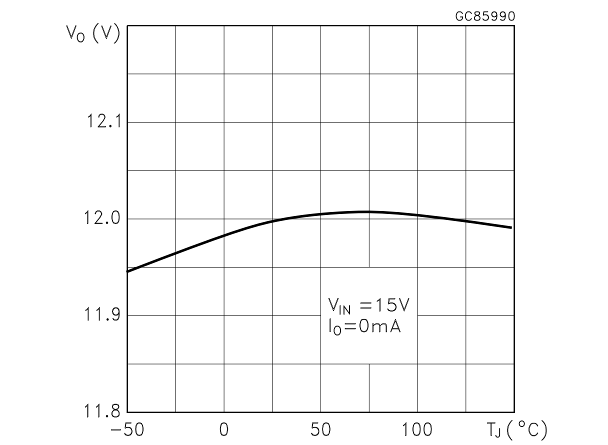


Figure 6. Output voltage vs. temp. (I_O = 10 mA)

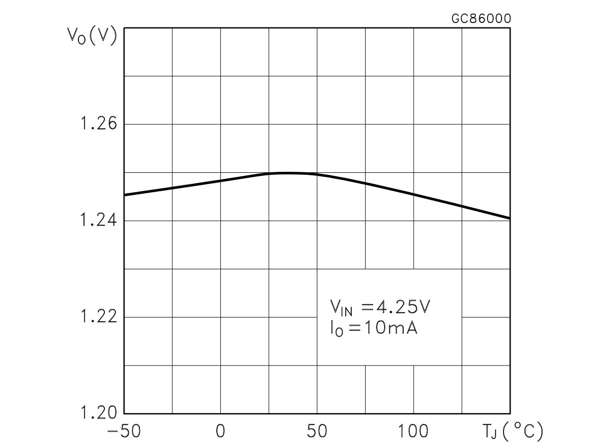


Figure 7. Short-circuit current vs. dropout voltage

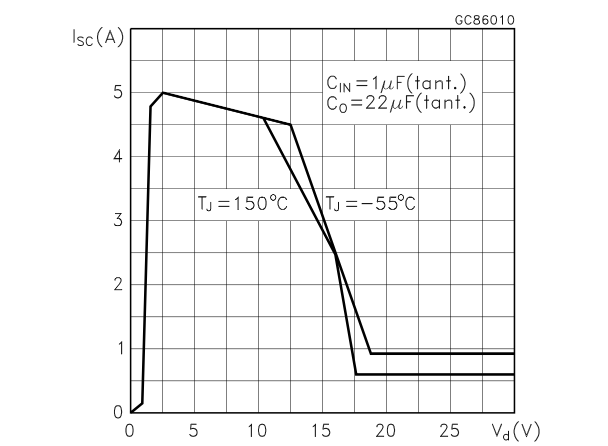


Figure 8. Line regulation vs. temp. (I_O = 10 mA)

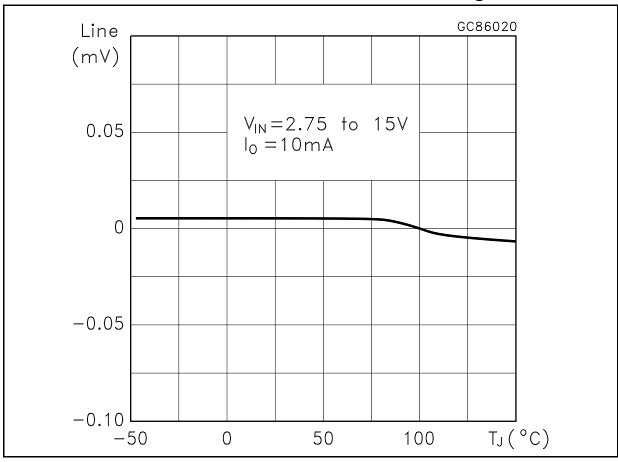


Figure 9. Load regulation vs. temperature

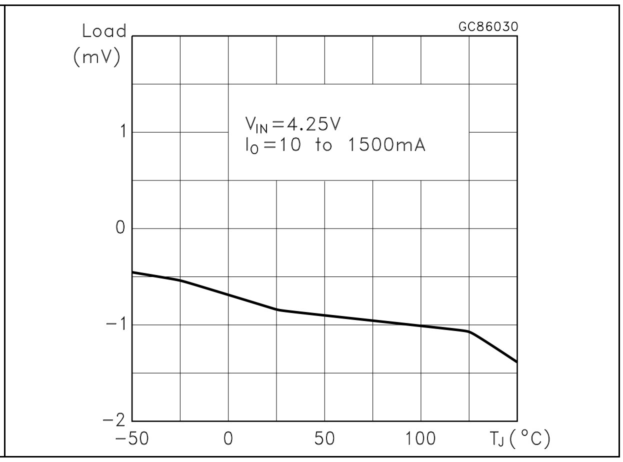


Figure 10. Dropout voltage vs. temperature

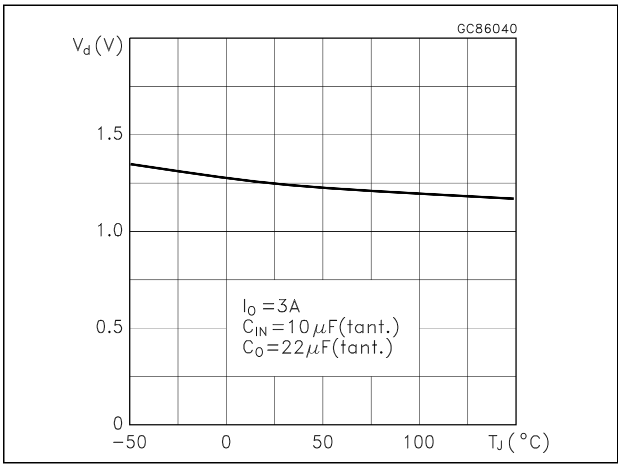


Figure 11. Dropout voltage vs. output current

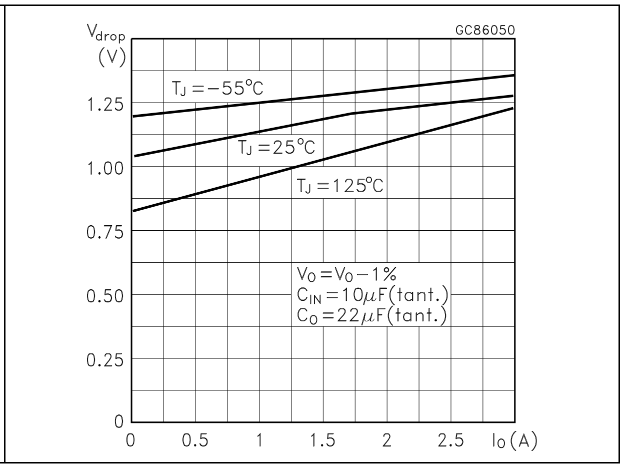


Figure 12. Adjust pin current vs. temperature

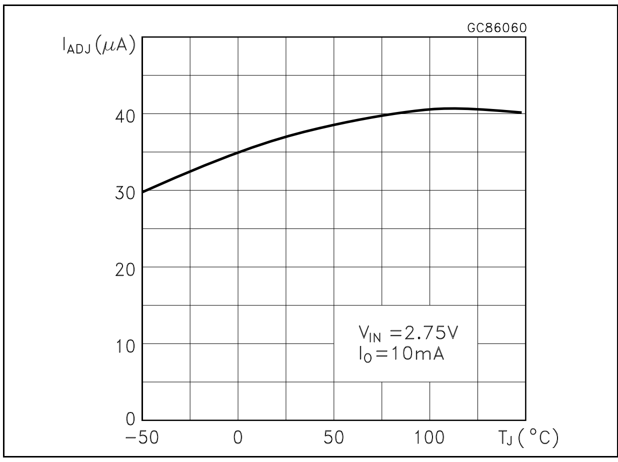
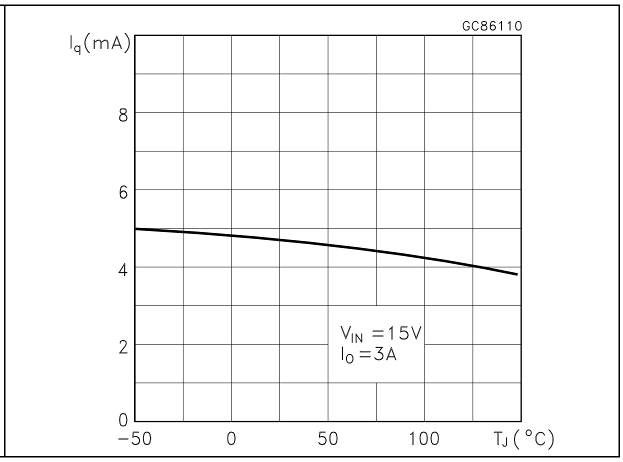


Figure 13. Quiescent current vs. temperature



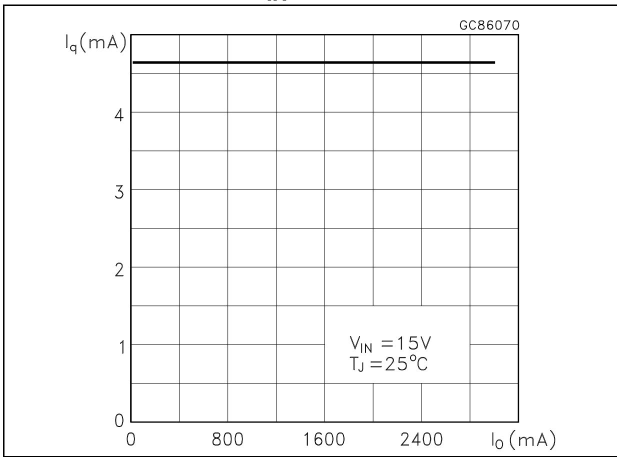


Figure 14. Line regulation vs. temperature (V_{IN} = 15 V)

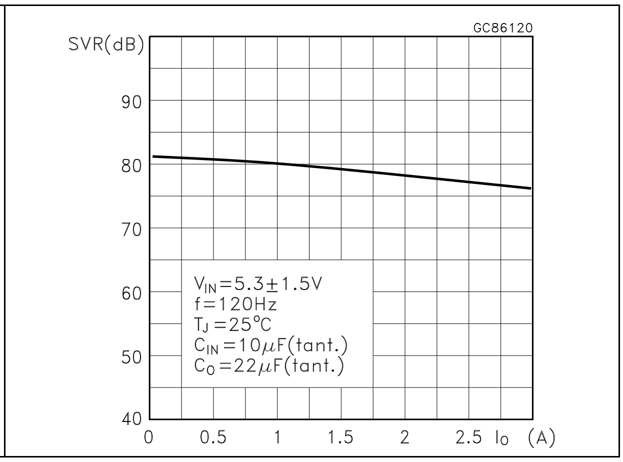


Figure 15. Supply voltage rejection vs. output current

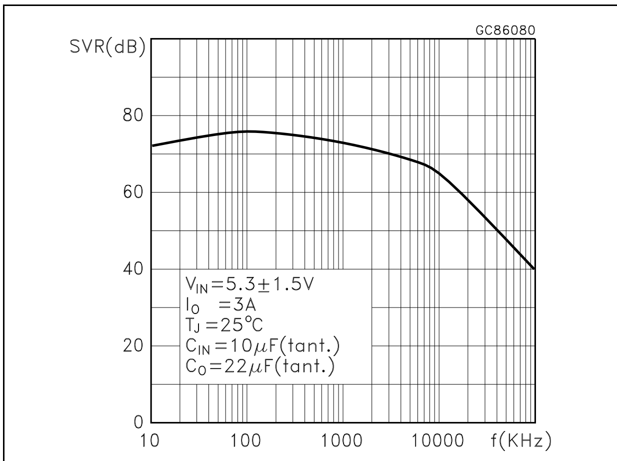


Figure 16. Supply voltage rejection vs. frequency

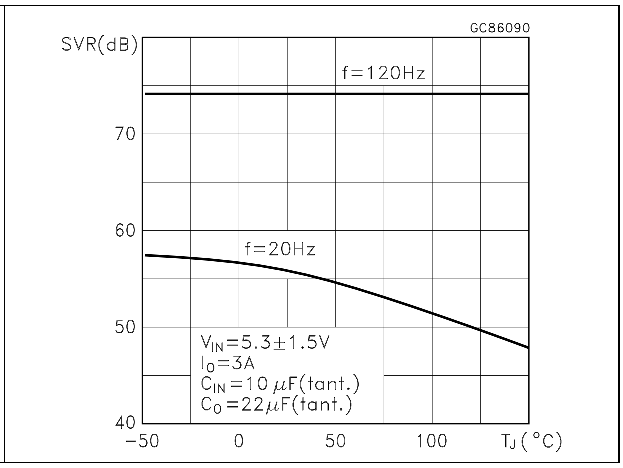


Figure 17. Supply voltage rejection vs. temperature

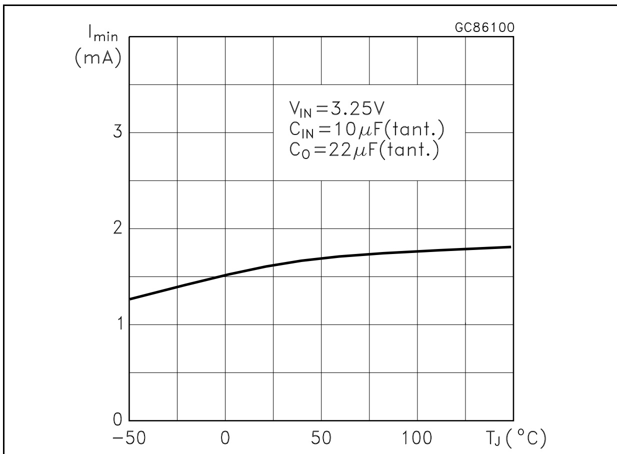


Figure 18. Minimum load current vs. temperature

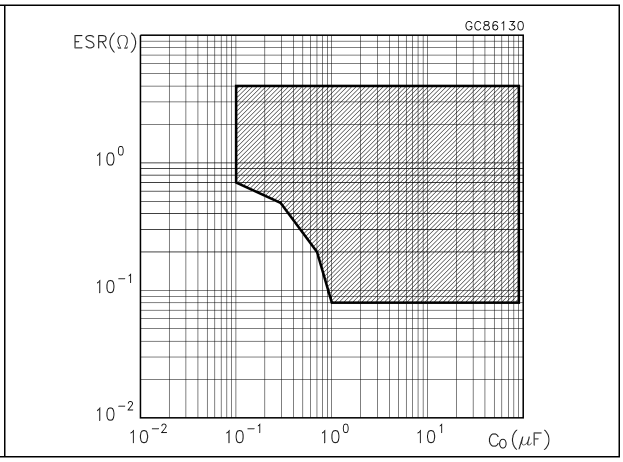


Figure 19. Stability, V_O = 1.8 V

Figure 20. Stability, V_O = 12 V

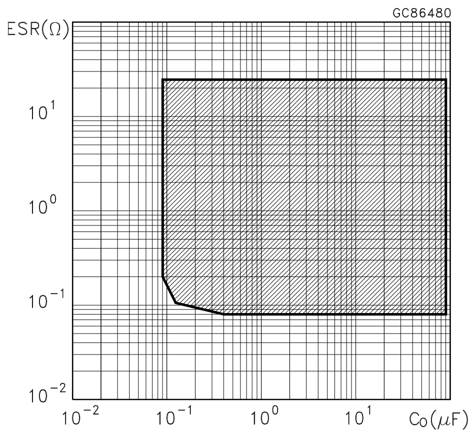
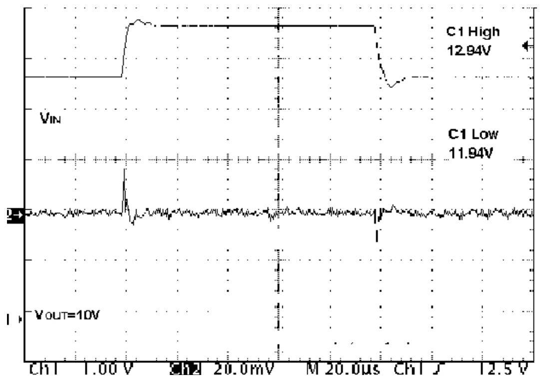
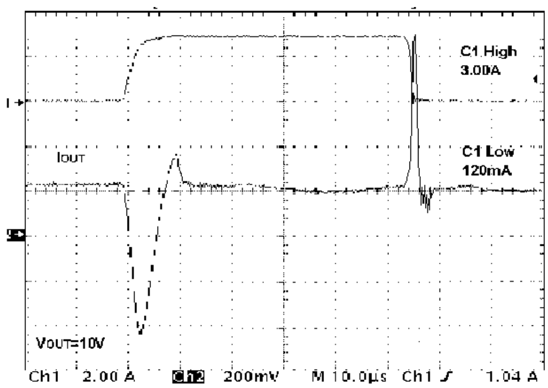


Figure 21. Line transient



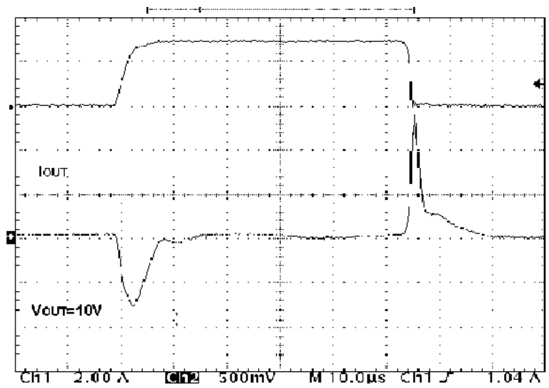
V_I=12 to 13V, I_O=200mA, C_I = 1µF(tant), C_O=10µF(tant), C_{ADJ}=1µF

Figure 22. Load transient



V_I=12V, I_O=0.12 to 3A, C_I = 1µF(tant), C_O=10µF(tant), C_{ADJ}=1µF

Figure 23. Load transient (No C_{ADJ})



V_I=12V, I_O=0.12 to 3A, C_I = 1µF(tant), C_O=10µF(tant), no C_{ADJ}

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.

Table 8. TO-220 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	0.51		0.60
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
∅P	3.75		3.85
Q	2.65		2.95

Figure 24. TO-220 drawing

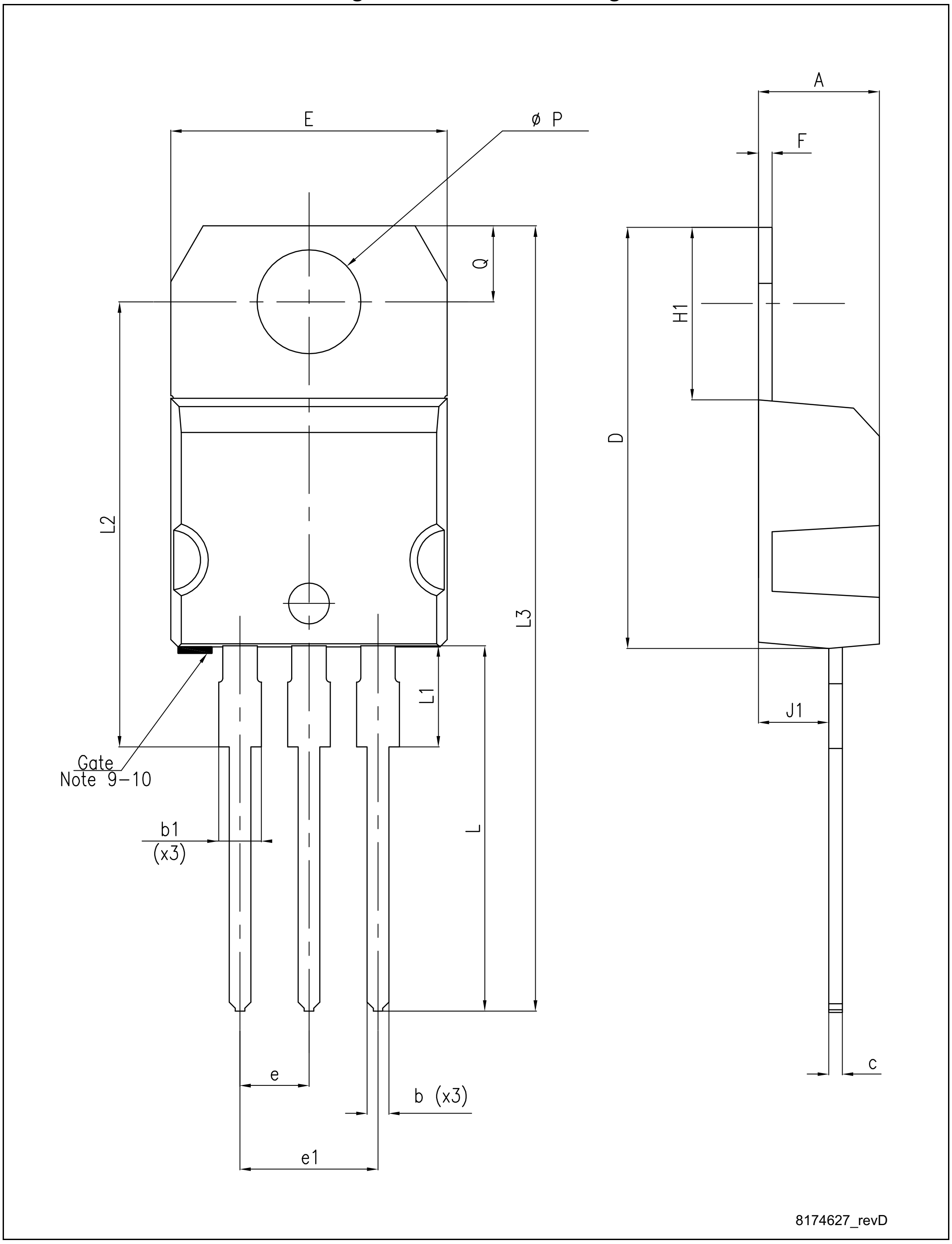


Table 9. TO-220FP mechanical data

Dim.	mm		
	Min.	**Typ.**	**Max.**
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2

Figure 25. TO-220FP drawing

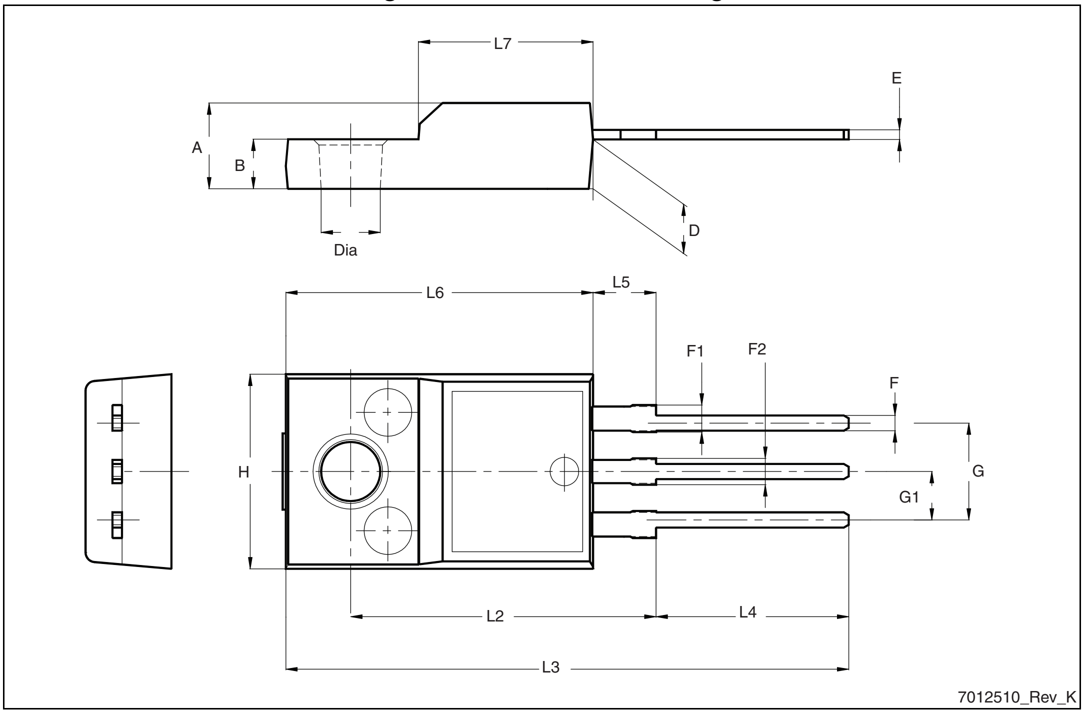


Table 10. D²PAK mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
A1	0.03		0.23
b	0.70		0.93
b2	1.14		1.70
c	0.45		0.60
c2	1.23		1.36
D	8.95		9.35
D1	7.50		
E	10		10.40
E1	8.50		
e		2.54	
e1	4.88		5.28
H	15		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
L2	1.30		1.75
R		0.4	
V2	0°		8°

Figure 26. D²PAK drawing

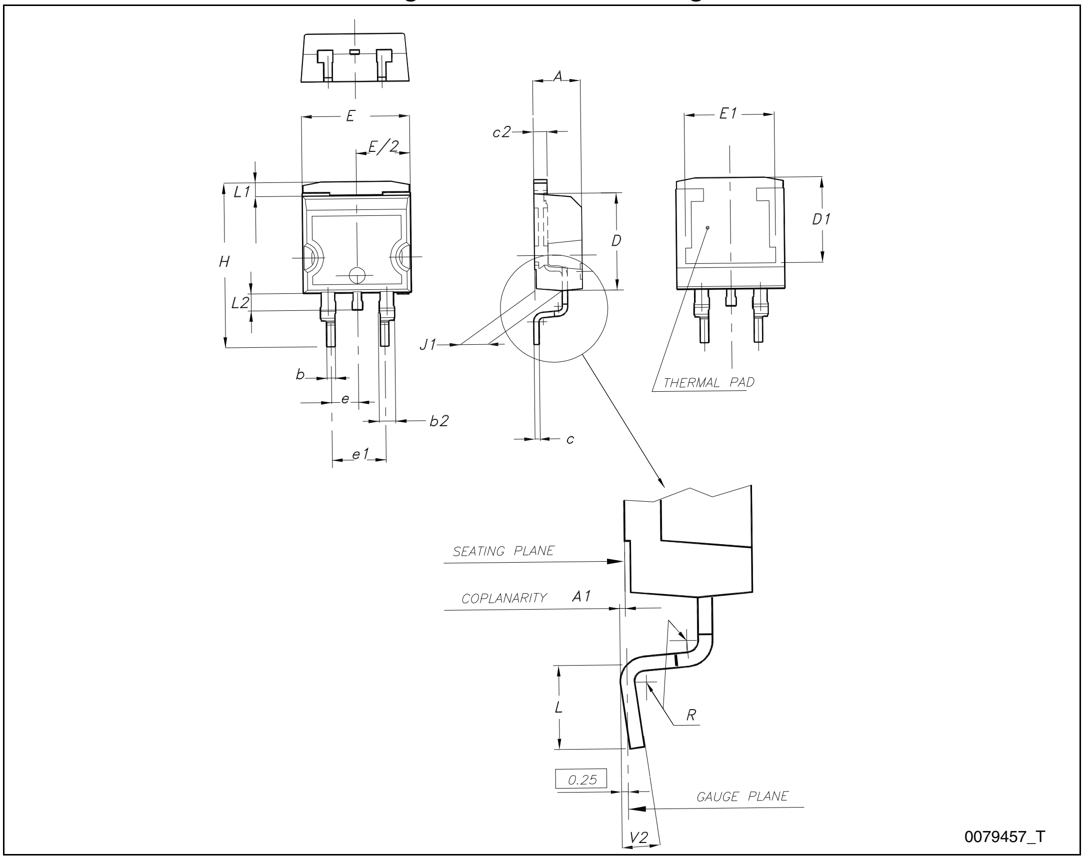
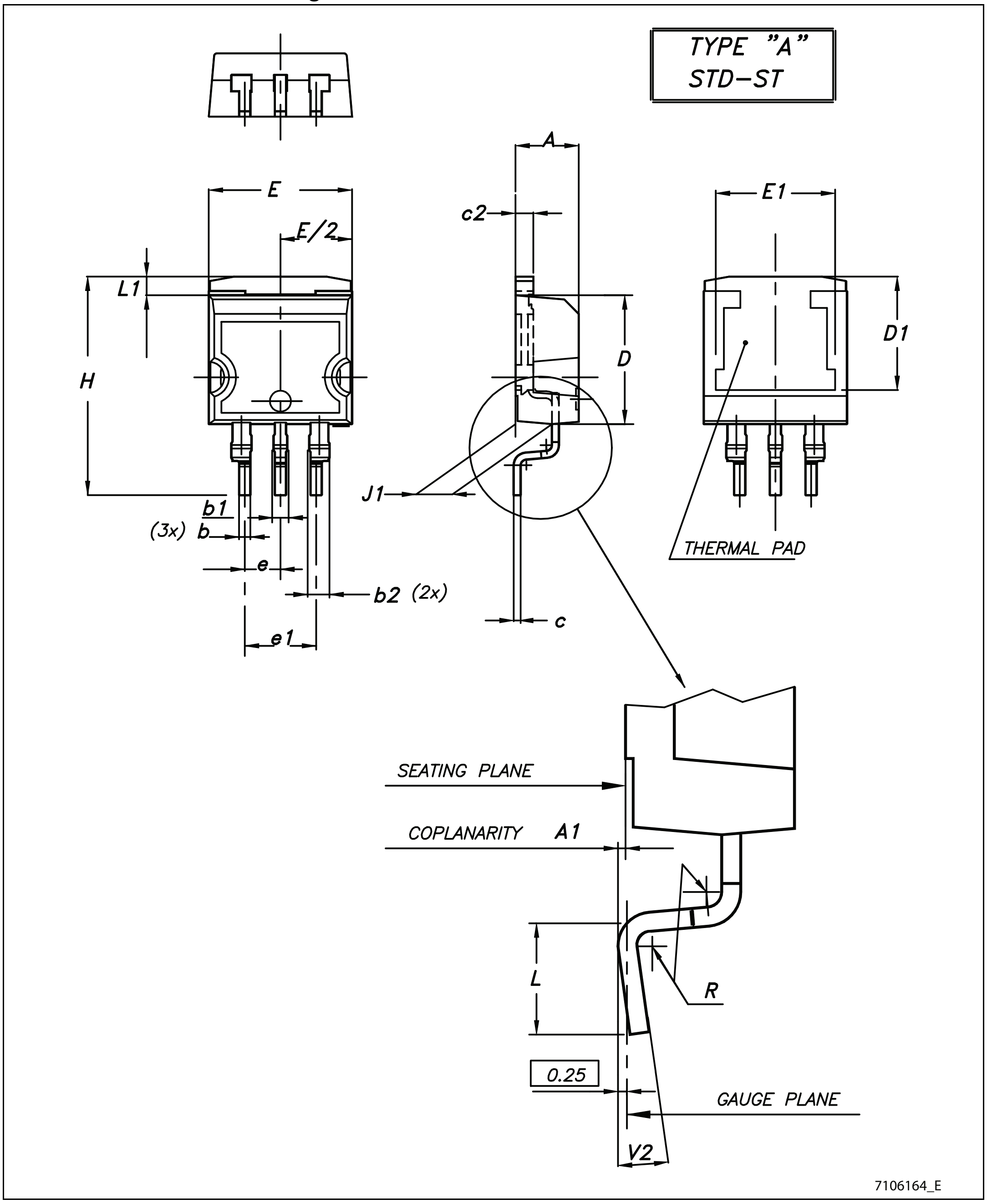


Table 11. D²PAK/A mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
A1	0.03		0.23
b	0.70		0.93
b2	1.14		1.70
c	0.45		0.60
c2	1.23		1.36
D	8.95		9.35
D1	7.50		
E	10		10.40
E1	8.50		
e		2.54	
e1	4.88		5.28
H	15		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
R		0.4	
V2	0°		8°

Figure 27. D²PAK/A mechanical data

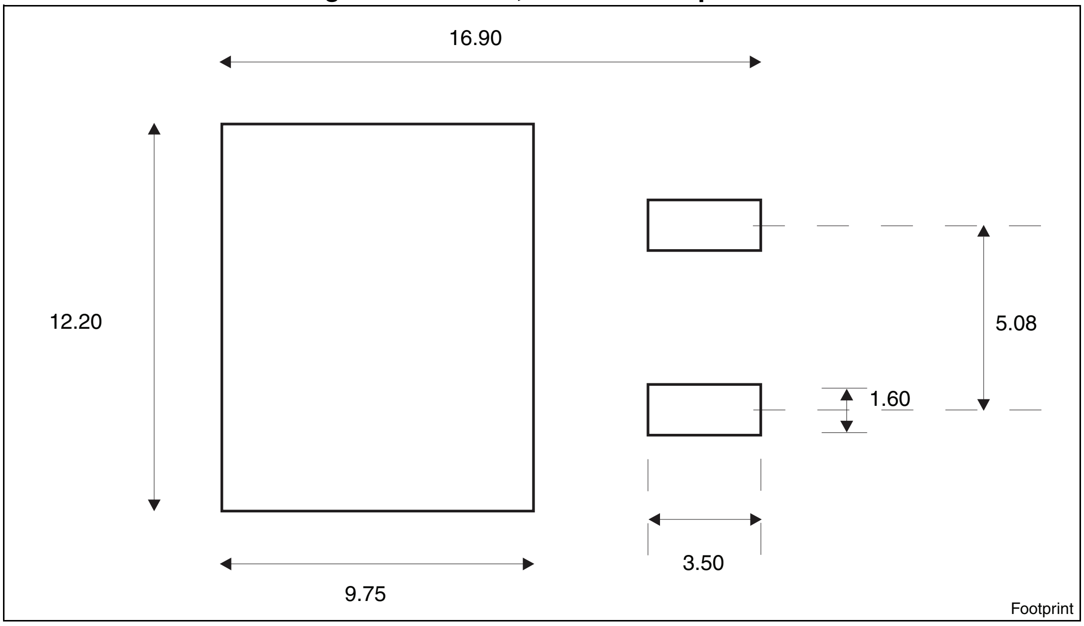


8 Packaging mechanical data

Table 12. D²PAK, D²PAK/A tape and reel mechanical data

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	10.5	10.7	A		330
B0	15.7	15.9	B	1.5	
D	1.5	1.6	C	12.8	13.2
D1	1.59	1.61	D	20.2	
E	1.65	1.85	G	24.4	26.4
F	11.4	11.6	N	100	
K0	4.8	5.0	T		30.4
P0	3.9	4.1			
P1	11.9	12.1	Base qty		1000
P2	1.9	2.1	Bulk qty		1000
R	50				
T	0.25	0.35			
W	23.7	24.3			

Figure 28. D²PAK, D²PAK/A footprint[a]



a. All dimensions are in millimeters

Figure 29. Tape for D²PAK and D²PAK/A

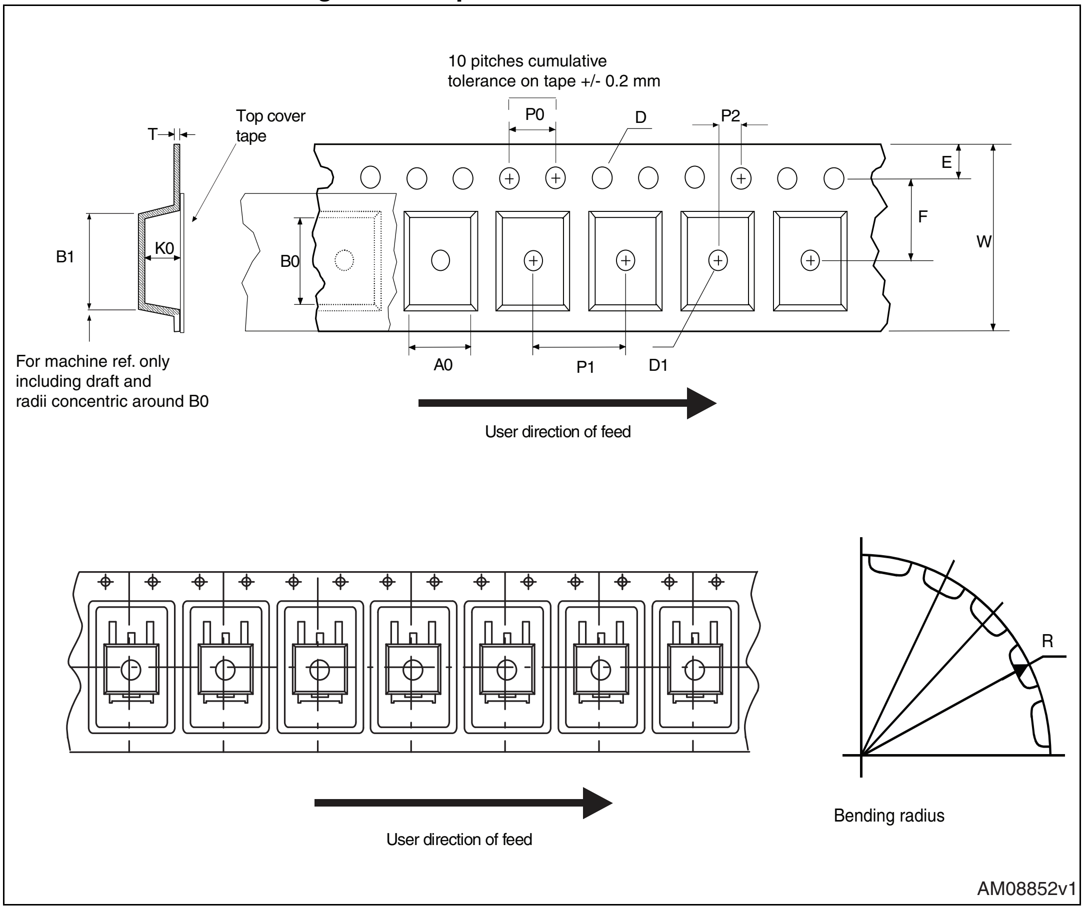
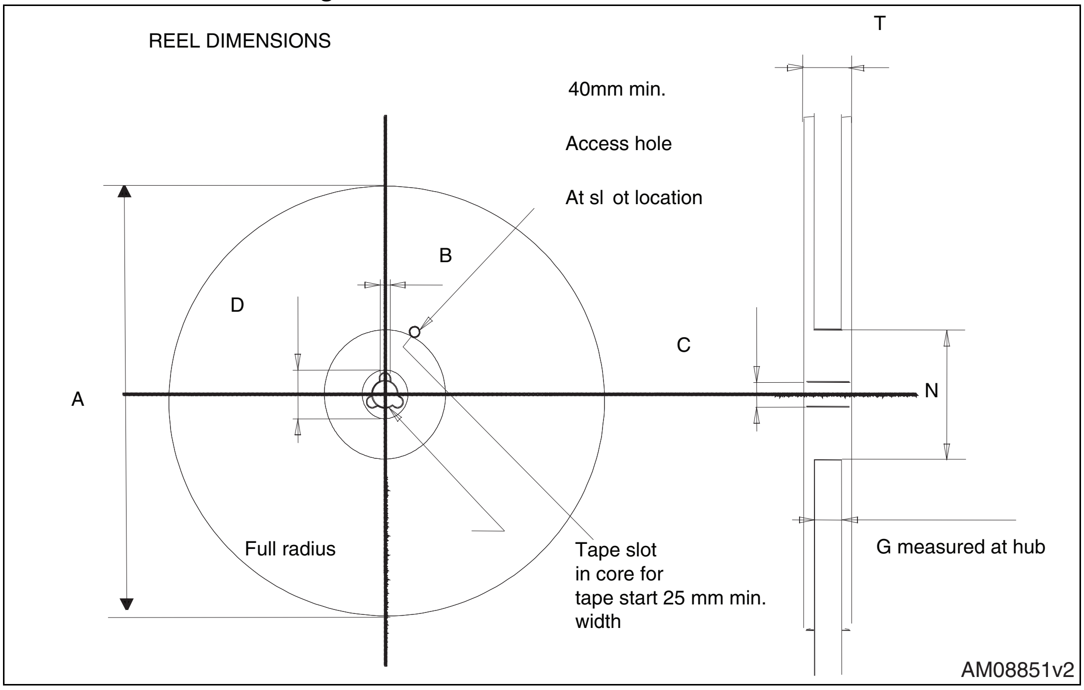


Figure 30. Reel for D²PAK and D²PAK/A



9 Order codes

Table 13. Order codes

Packages				Output voltage
TO-220	**TO-220FP**	**D²PAK**	**D²PAK/A (T&R)**	
			LD1085D2M18R	1.8 V
			LD1085D2M25R	2.5 V
		LD1085D2T33R	LD1085D2M33R	3.3 V
LD1085V50				5.0 V
LD1085V	LD1085P	LD1085D2T-R	LD1085D2M-R	ADJ