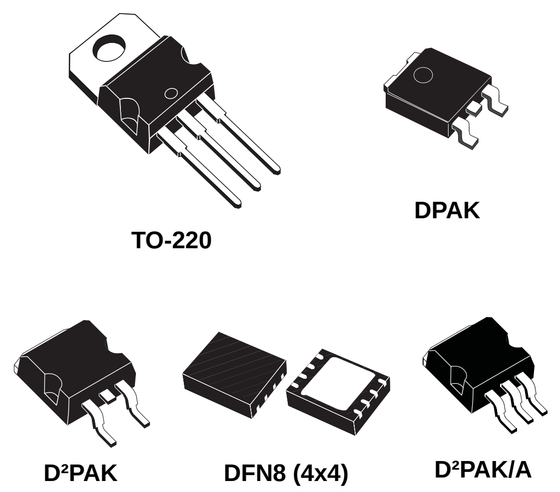
LD1086xx

1.5 A adjustable and fixed low drop positive voltage regulator

Datasheet - production data



Features

- Typical dropout: 1.3 V at 1.5 A
- Three-terminal adjustable or fixed output voltage: 1.8 V, 2.5 V, 3.3 V, 5 V, 12 V
- Automotive grade (adjustable V_{OUT} in TO-220 and DPAK packages only)
- Output current guaranteed up to 1.5 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, D²PAK, D²PAK/A, DPAK and DFN8 (4 x 4 mm)
- Pinout compatibility with standard adjustable voltage regulators

Description

The LD1086xx is a low drop voltage regulator capable of providing up to 1.5 A of output current. Dropout is guaranteed at a maximum of 1.2 V at the maximum output current, decreasing at lower loads. The LD1086xx is pin-to-pin compatible with older 3-terminal adjustable regulators, but has better performance in terms of drop and output tolerance. The 2.85 V output version is suitable for SCSI-2 active terminations. Unlike PNP regulators, where a part of the output current is wasted as quiescent current, the LD1086xx quiescent current flows into the load, increasing efficiency. Only a 10 µF (minimum) capacitor is needed for stability. The device is available in a TO-220, D²PAK, D²PAK/A, DPAK or DFN8 (4x4 mm) package. On-chip trimming allows the regulator to reach a very tight output voltage tolerance; within ± 1 % at 25 °C. The LD1086xx is available as automotive grade for adjustable output voltages in the TO-220 and DPAK packages. The PAT, SYL, SBL statistical tests have been performed, and the devices are qualified according to the AEC-Q100 specification for the automotive market in the temperature range of - 40 °C to 125 °C.

Table 1. Device summary

Part numbers		
LD1086XX	LD1086XX18	LD1086XX33
LD1086XX12	LD1086XX25	LD1086XX50

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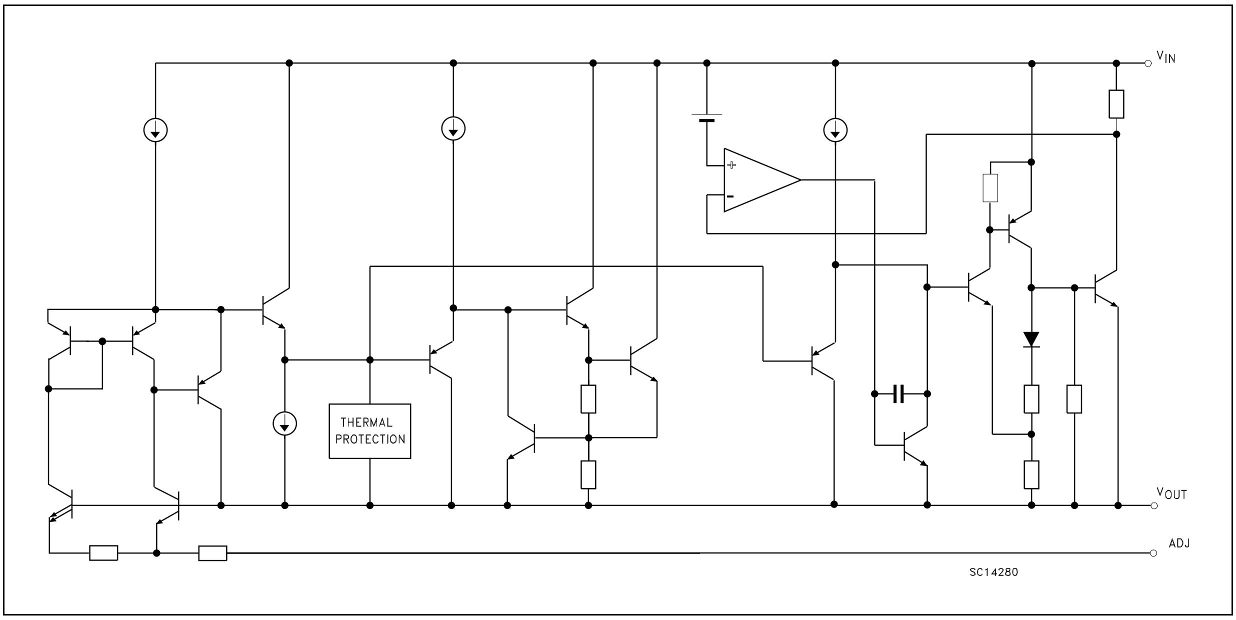
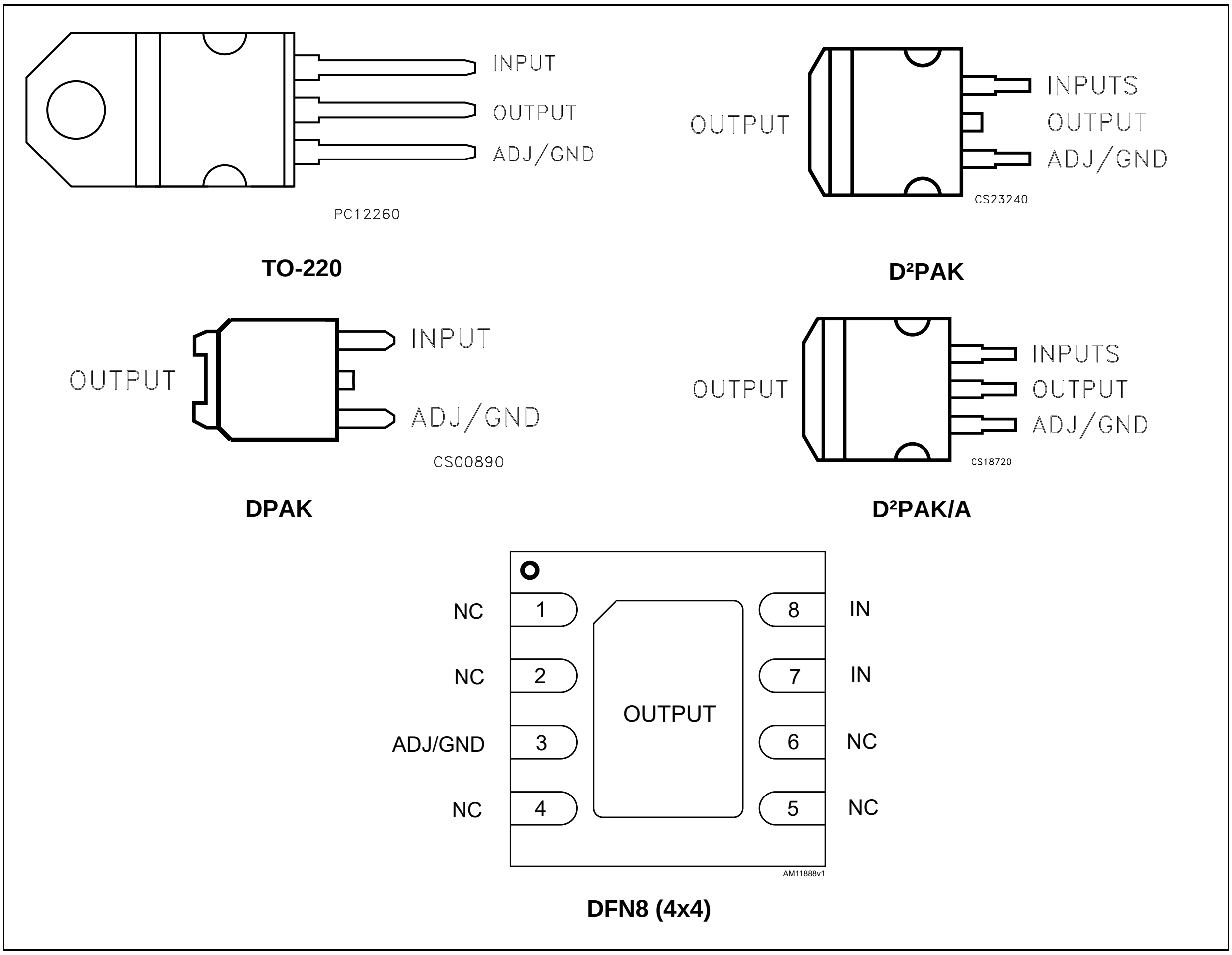
1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connections (top view)



Note: The TAB is physically connected to the output (this is valid for the TO-220 package too).

3 Maximum ratings

Table 2. 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

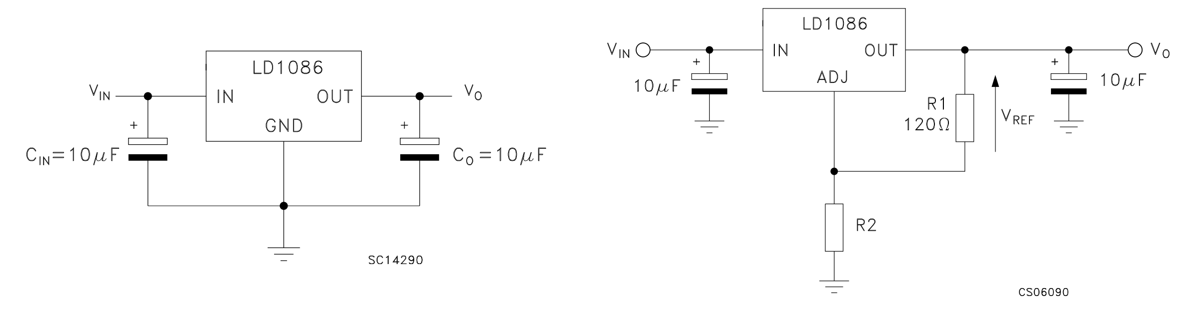
Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Table 3. Thermal data

Symbol	Parameter	TO-220	D²PAK D²PAK/A	DPAK	DFN8	Unit
R_{thJC}	Thermal resistance junction-case	5	3	8	1.5	°C/W
R_{thJA}	Thermal resistance junction-ambient	50	62.5	100	33	°C/W

4 Schematic application

Figure 3. Application circuit



$$V_O = V_{REF} \cdot \left(1 + \frac{R_2}{R_1}\right)$$

5 Electrical characteristics

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

Table 4. Electrical characteristics of LD1086#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 1.5A, V_I = 3.4 to 30V	1.764	1.8	1.836	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 3.4 to 18V, T_J = 25°C		0.2	4	mV
		I_O = 0 mA, V_I = 3.4 to 15V		0.4	4	mV
ΔV_O	Load regulation	I_O = 0 to 1.5A, T_J = 25°C		0.5	8	mV
		I_O = 0 to 1.5A		1	16	mV
V_d	Dropout voltage	I_O = 1.5A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30V		5	10	mA
I_{sc}	Short circuit current	V_I - V_O = 5V	1.5	2		A
		V_I - V_O = 25V	0.05	0.02		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 1.5A V_I = 6.8 $\pm$ 3V	60	82		dB
eN	RMS Output noise voltage (% of V_O)	T_A = 25°C, f =10Hz to 10kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000Hrs		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 5. Electrical characteristics of LD1086#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 1.5A, V_I = 4.1 to 30V	2.45	2.5	2.55	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 4.1 to 18V, T_J = 25°C		0.2	4	mV
		I_O = 0 mA, V_I = 4.1 to 18V		0.4	4	mV
ΔV_O	Load regulation	I_O = 0 to 1.5A, T_J = 25°C		0.5	8	mV
		I_O = 0 to 1.5A		1	16	mV
V_d	Dropout voltage	I_O = 1.5A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30V		5	10	mA
I_{sc}	Short circuit current	V_I - V_O = 5V	1.5	2		A
		V_I - V_O = 25V	0.05	0.2		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.008	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 1.5A V_I = 7.5 ± 3V	60	81		dB
eN	RMS Output noise voltage (% of V_O)	T_A = 25°C, f =10Hz to 10kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000Hrs		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 6. Electrical characteristics of LD1086#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 1.5A, V_I = 4.9 to 30V	3.234	3.3	3.366	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 4.9 to 18V, T_J = 25°C		0.5	6	mV
		I_O = 0 mA, V_I = 4.9 to 18V		1	6	mV
ΔV_O	Load regulation	I_O = 0 to 1.5A, T_J = 25°C		1	10	mV
		I_O = 0 to 1.5A		7	25	mV
V_d	Dropout voltage	I_O = 1.5A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30V		5	10	mA
I_{sc}	Short circuit current	V_I - V_O = 5V	1.5	2		A
		V_I - V_O = 25V	0.05	0.2		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.008	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 1.5A V_I = 8.3 ± 3V	60	79		dB
eN	RMS Output noise voltage (% of V_O)	T_A = 25°C, f =10Hz to 10kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000Hrs		0.5		%

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

V_I = 6.6 V, C_I = C_O =10 µF, T_A = -40 to 125 °C, unless otherwise specified.

Table 7. Electrical characteristics of LD1086#36

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage [(1)]	I_O = 0 mA, T_J = 25°C	3.564	3.6	3.636	V
		I_O = 0 to 1.5A, V_I = 5.2 to 30V	3.528	3.6	3.672	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 5.2 to 18V, T_J = 25°C		0.5	10	mV
		I_O = 0 mA, V_I = 5.2 to 18V		1	10	mV
ΔV_O	Load regulation	I_O = 0 to 1.5A, T_J = 25°C		3	15	mV
		I_O = 0 to 1.5A		7	25	mV
V_d	Dropout voltage	I_O = 1.5A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30V		5	10	mA
I_{sc}	Short circuit current	V_I - V_O = 5V	1.5	2		A
		V_I - V_O = 25V	0.05	0.2		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 1.5A V_I = 8.6 ± 3V	60	78		dB
eN	RMS Output noise voltage (% of V_O)	T_A = 25°C, f =10Hz to 10kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000Hrs		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 8. Electrical characteristics of LD1086#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 1.5A, V_I = 6.6 to 30V	4.9	5	5.1	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 6.6 to 20V, T_J = 25°C		0.5	10	mV
		I_O = 0 mA, V_I = 6.6 to 20V		1	10	mV
ΔV_O	Load regulation	I_O = 0 to 1.5A, T_J = 25°C		5	20	mV
		I_O = 0 to 1.5A		10	35	mV
V_d	Dropout voltage	I_O = 1.5A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30V		5	10	mA
I_{sc}	Short circuit current	V_I - V_O = 5V	1.5	2		A
		V_I - V_O = 25V	0.05	0.2		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 1.5A V_I = 10 ± 3V	60	75		dB
eN	RMS Output noise voltage (% of V_O)	T_A = 25°C, f =10Hz to 10kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000Hrs		0.5		%

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

V_I = 15 V, C_I = C_O =10 µF, T_A = -40 to 125 °C, unless otherwise specified.

Table 9. Electrical characteristics of LD1086#12

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage (1)	I_O = 0 mA, T_J = 25°C	11.88	12	12.12	V
		I_O = 0 to 1.5A, V_I = 13.8 to 30V	11.76	12	12.24	V
ΔV_O	Line regulation	I_O = 0 mA, V_I = 13.8 to 25V, T_J = 25°C		1	25	mV
		I_O = 0 mA, V_I = 13.8 to 25V		2	25	mV
ΔV_O	Load regulation	I_O = 0 to 1.5A, T_J = 25°C		12	36	mV
		I_O = 0 to 1.5A		24	72	mV
V_d	Dropout voltage	I_O = 1.5A		1.3	1.5	V
I_q	Quiescent current	$V_I \leq$ 30V		5	10	mA
I_{sc}	Short circuit current	V_I - V_O = 5V	1.5	2		A
		V_I - V_O = 25V	0.05	0.2		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF, I_O = 1.5A V_I = 17 $\pm$ 3V	54	66		dB
eN	RMS Output noise voltage (% of V_O)	T_A = 25°C, f =10Hz to 10kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T_A = 125°C, 1000Hrs		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 10. Electrical characteristics of LD1086#

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage (1)	I_O = 10mA T_J = 25°C	1.237	1.25	1.263	V
		I_O = 10mA to 1.5A, V_I = 2.85 to 30V	1.225	1.25	1.275	V
ΔV_O	Line Regulation	I_O = 10mA, V_I = 2.8 to 16.5V, T_J = 25°C		0.015	0.2	%
		I_O = 10mA, V_I = 2.8 to 16.5V		0.035	0.2	%
ΔV_O	Load Regulation	I_O = 10mA to 1.5A, T_J = 25°C		0.1	0.3	%
		I_O = 0 to 1.5A		0.2	0.4	%
V_d	Dropout Voltage	I_O = 1.5A		1.3	1.5	V
$I_{O(min)}$	Minimum Load Current	V_I = 30V		3	10	mA
I_{sc}	Short Circuit Current	V_I - V_O = 5V	1.5	2.3		A
		V_I - V_O = 25V	0.05	0.2		A
	Thermal Regulation	T_A = 25°C, 30ms pulse		0.01	0.04	%/W
SVR	Supply Voltage Rejection	f = 120 Hz, C_O = 25 µF, C_{ADJ} = 25 µF, I_O = 1.5A, V_I = 6.25 ± 3V	60	88		dB
I_{ADJ}	Adjust Pin Current	V_I = 4.25V, I_O = 10 mA		40	120	µA
ΔI_{ADJ}	Adjust Pin Current Change (1)	I_O = 10mA to 1.5A, V_I = 2.8 to 16.5V		0.2	5	µA
eN	RMS Output Noise Voltage (% of V_O)	T_A = 25°C, f =10Hz to 10kHz		0.003		%
S	Temperature Stability			0.5		%
S	Long Term Stability	T_A = 125°C, 1000Hrs		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 11. Electrical characteristics of LD1086DTTRY and LD1086VY (Automotive Grade)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage (1)	I_O = 10 mA T_A = 25°C	1.237	1.25	1.263	V
		I_O = 10 mA to 1.5 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 = 2.8 to 16.5 V		0.035	0.2	%
ΔV_O	Load regulation	I_O = 0 to 1.5 A		0.2	0.4	%
V_d	Dropout voltage	I_O = 1.5 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, T_A = 25°C	1.5	2.3		A
		V_I - V_O = 25 V, T_A = 25°C	0.05	0.2		A
	Thermal regulation	T_A = 25°C, 30ms pulse		0.01	0.04	%/W
SVR	Supply voltage rejection	f = 120 Hz, C_O = 25 µF,C_{ADJ} = 25 µF, I_O = 1.5 A, V_I = 6.25 ± 3 V, T_A = 25°C	60	88		dB
I_{ADJ}	Adjust pin current	V_I = 4.25 V, I_O = 10 mA		40	120	µA
ΔI_{ADJ}	Adjust pin current change (1)	I_O = 10 mA to 1.5 A, V_I = 2.8 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 application

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

Figure 4. Output voltage vs. temp. (V_I = 5 V)

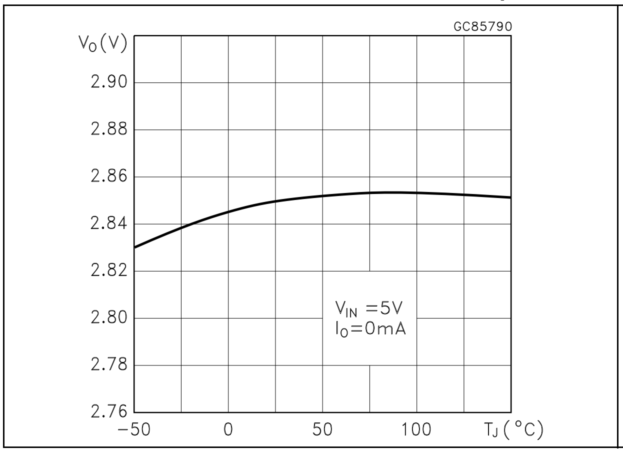


Figure 5. Output voltage vs. temp. (V_I = 15 V)

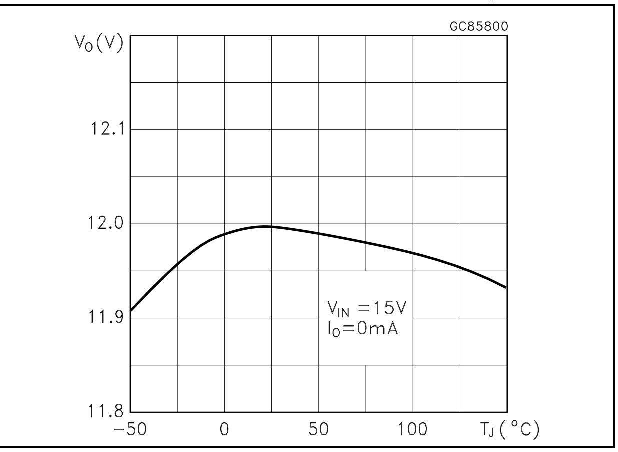


Figure 6. Output voltage vs. temperature (V_I = 4.25 V)

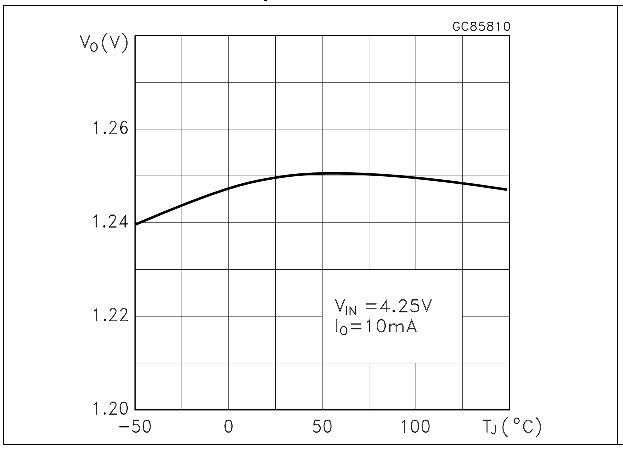


Figure 7. Short circuit current vs. dropout voltage

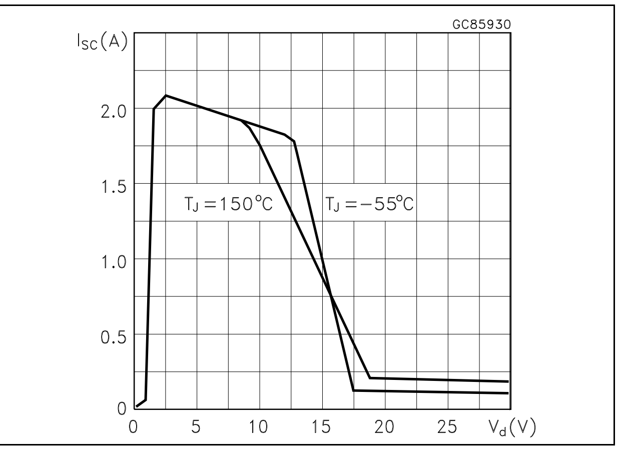


Figure 8. Line regulation vs. temperature

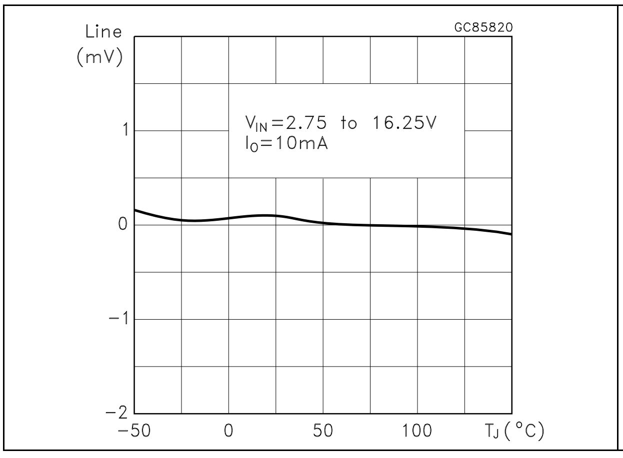


Figure 9. Load regulation vs. temperature

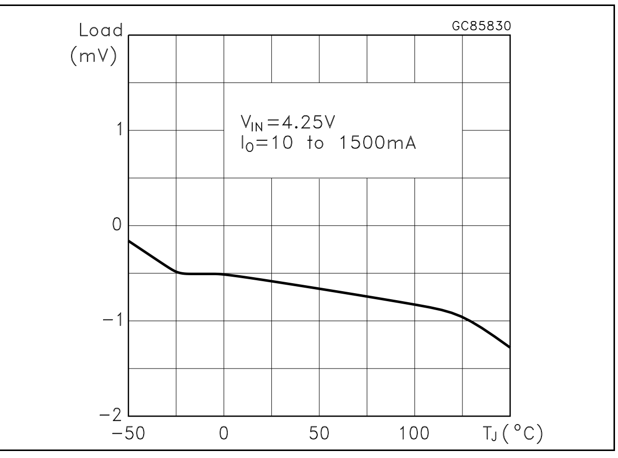


Figure 10. Dropout voltage vs. temperature

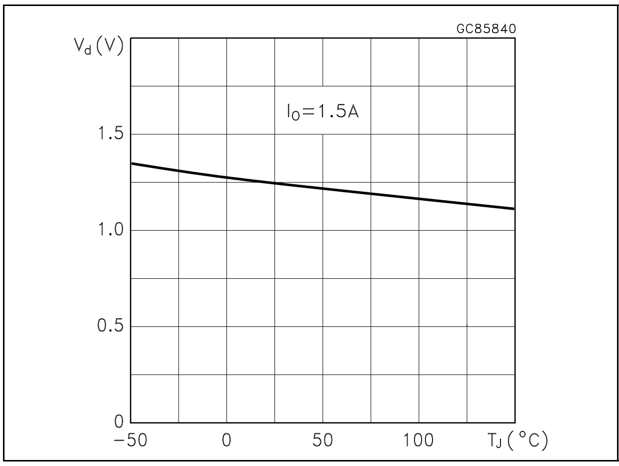


Figure 11. Dropout voltage vs. output current

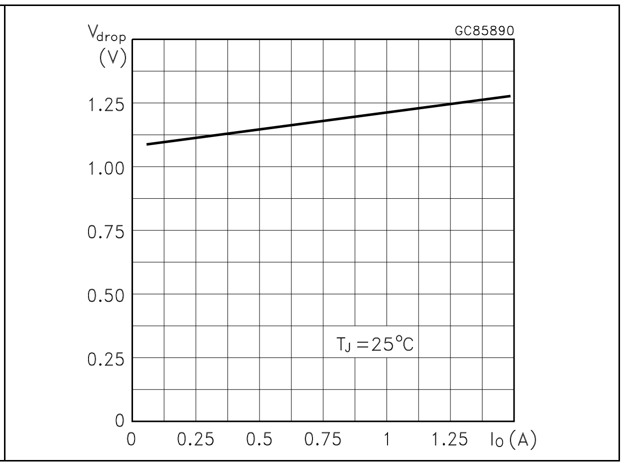


Figure 12. Adjust pin current vs. input voltage

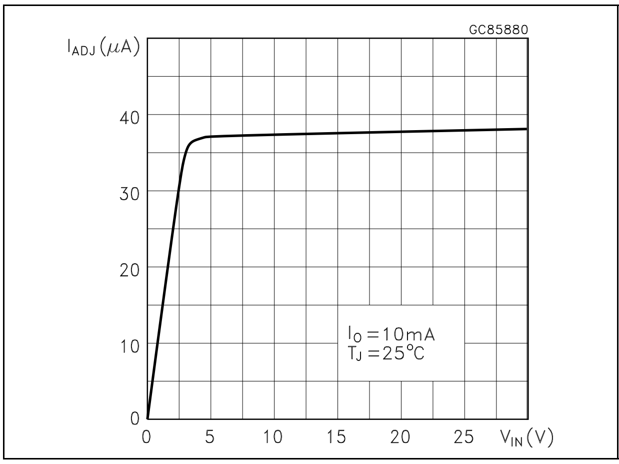


Figure 13. Adjust pin current vs. temperature

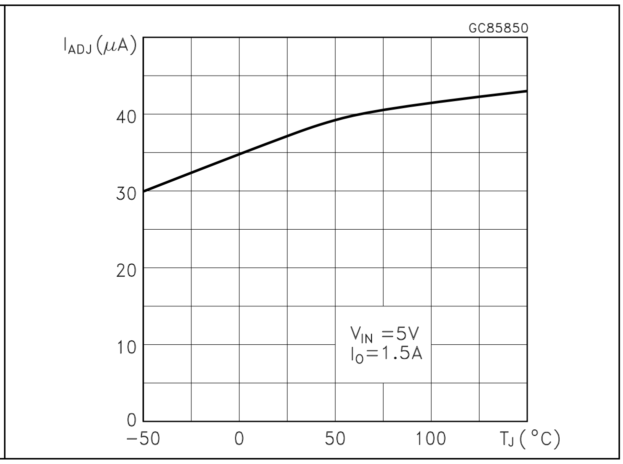


Figure 14. Adjust pin current vs. output current

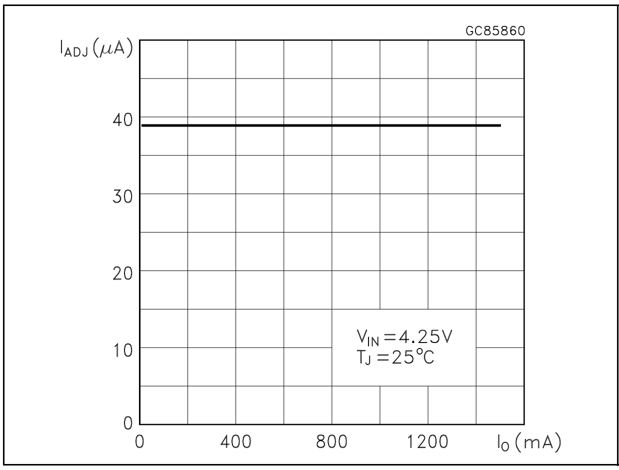


Figure 15. Quiescent current vs. output current

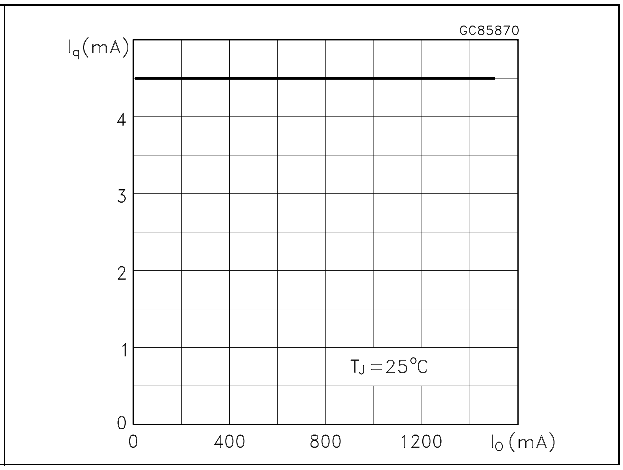


Figure 16. Quiescent current vs. input voltage

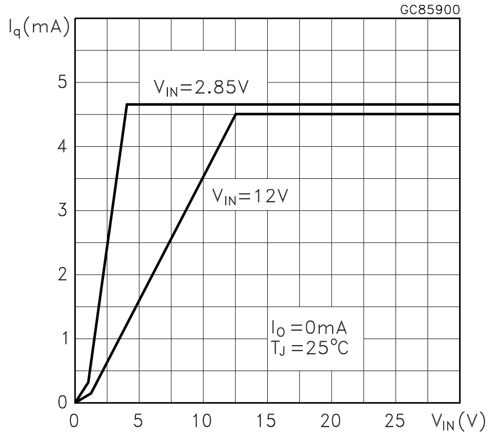


Figure 17. Supply voltage rejection vs. output current

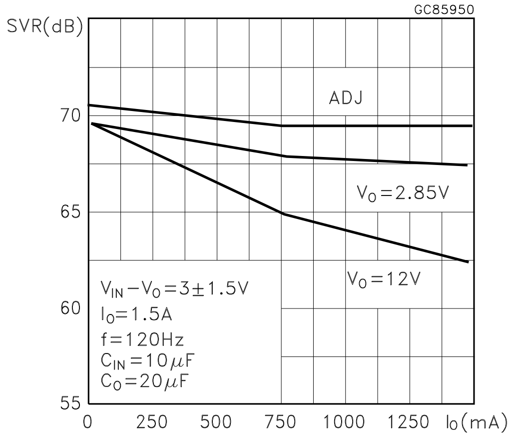


Figure 18. Supply voltage rejection vs. frequency

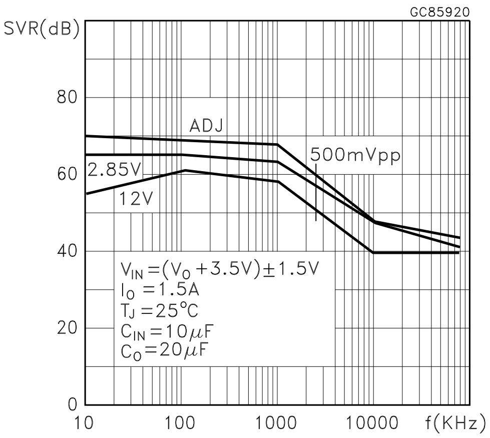


Figure 19. Supply voltage rejection vs. temperature

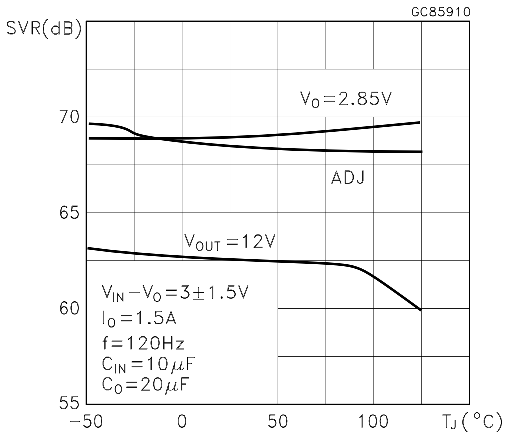


Figure 20. Minimum load current vs. temperature

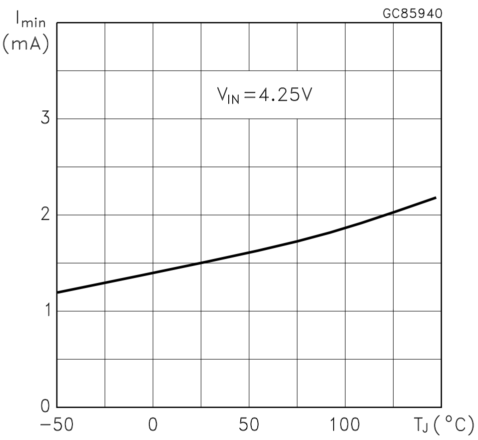


Figure 21. Stability for adjustable

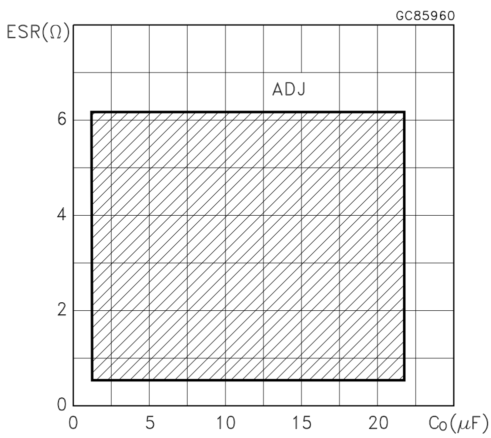


Figure 22. Stability for 2.85 V

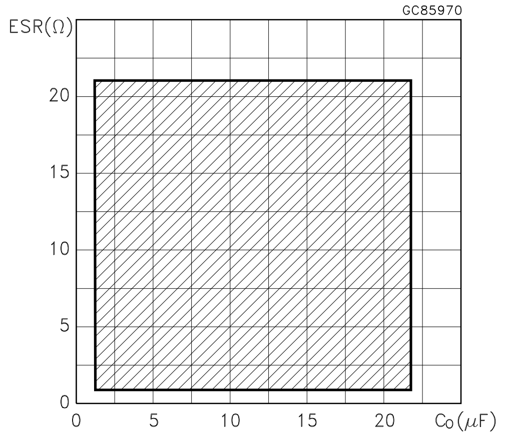


Figure 23. Stability for 12 V

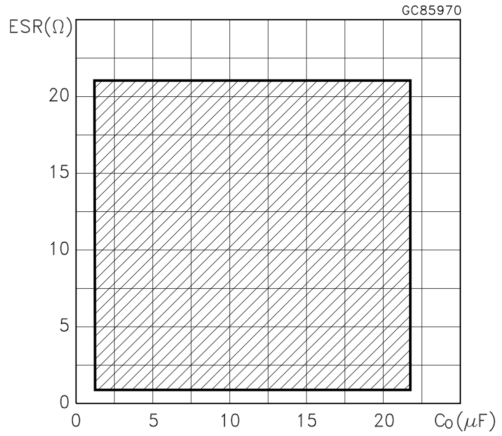
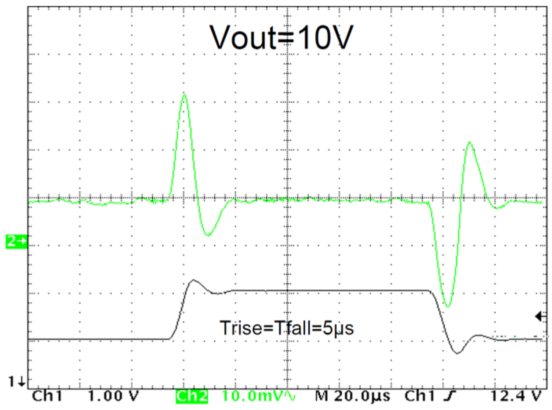
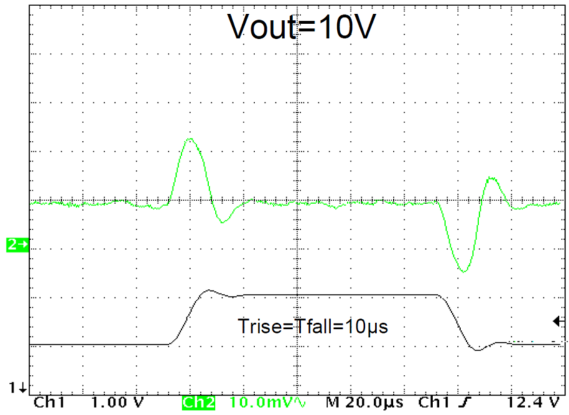


Figure 24. Line transient (V_I = 12 to 13 V)



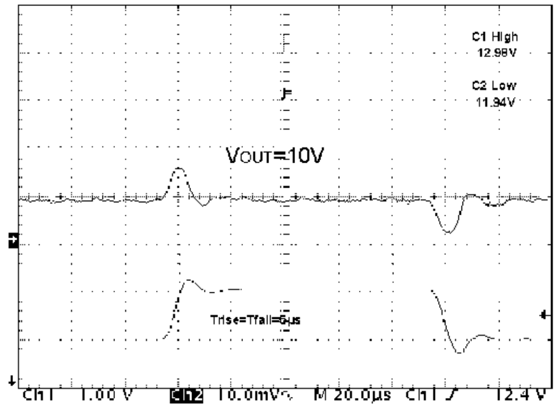
V_I = 12 to 13 V, I_O = 200 mA, C_I = 1 µF (tant), C_O = 10 µF (tant), No C_{ADJ}

Figure 25. Line transient (I_O = 200 mA)



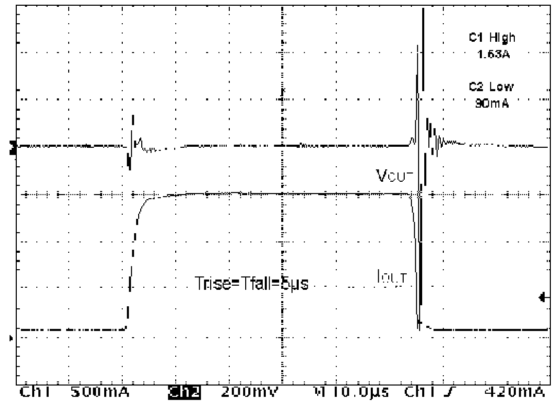
V_I = 12 to 13 V, I_O = 200 mA, C_I = 1 µF (tant), C_O = 10 µF (tant), No C_{ADJ}

Figure 26. Line transient (C_{ADJ} = 1 µF)



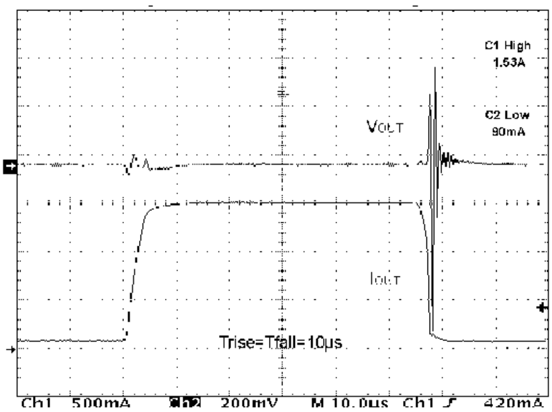
V_I = 12 to 13 V, I_O = 200 mA, C_I = 1 µF (tant), C_O = 10 µF (tant), C_{ADJ} = 1 µF

Figure 27. Load transient



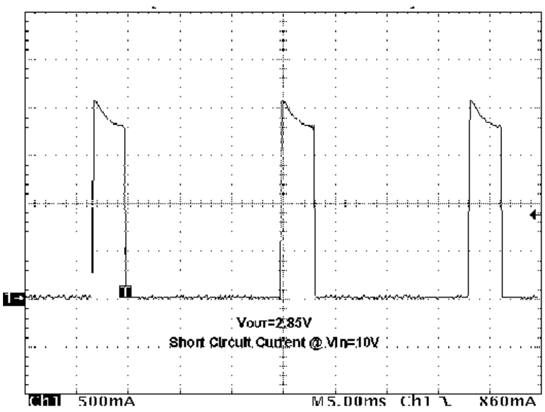
V_I = 13 V, I_O = 0.1 to 1.5 A, C_I = 1 µF (tant), C_O = 10 µF (tant) C_{ADJ} = 1 µF

Figure 28. Load transient ($T_{rise} = T_{fall} = 10\ \mu s$)



V_I = 13 V, I_O = 0.1 to 1.5 A, C_I = 1 µF (tant), C_O = 10 µF (tant), C_{ADJ} = 1 µF

Figure 29. Thermal protection



V_O = 2.85 V

7 Package mechanical data

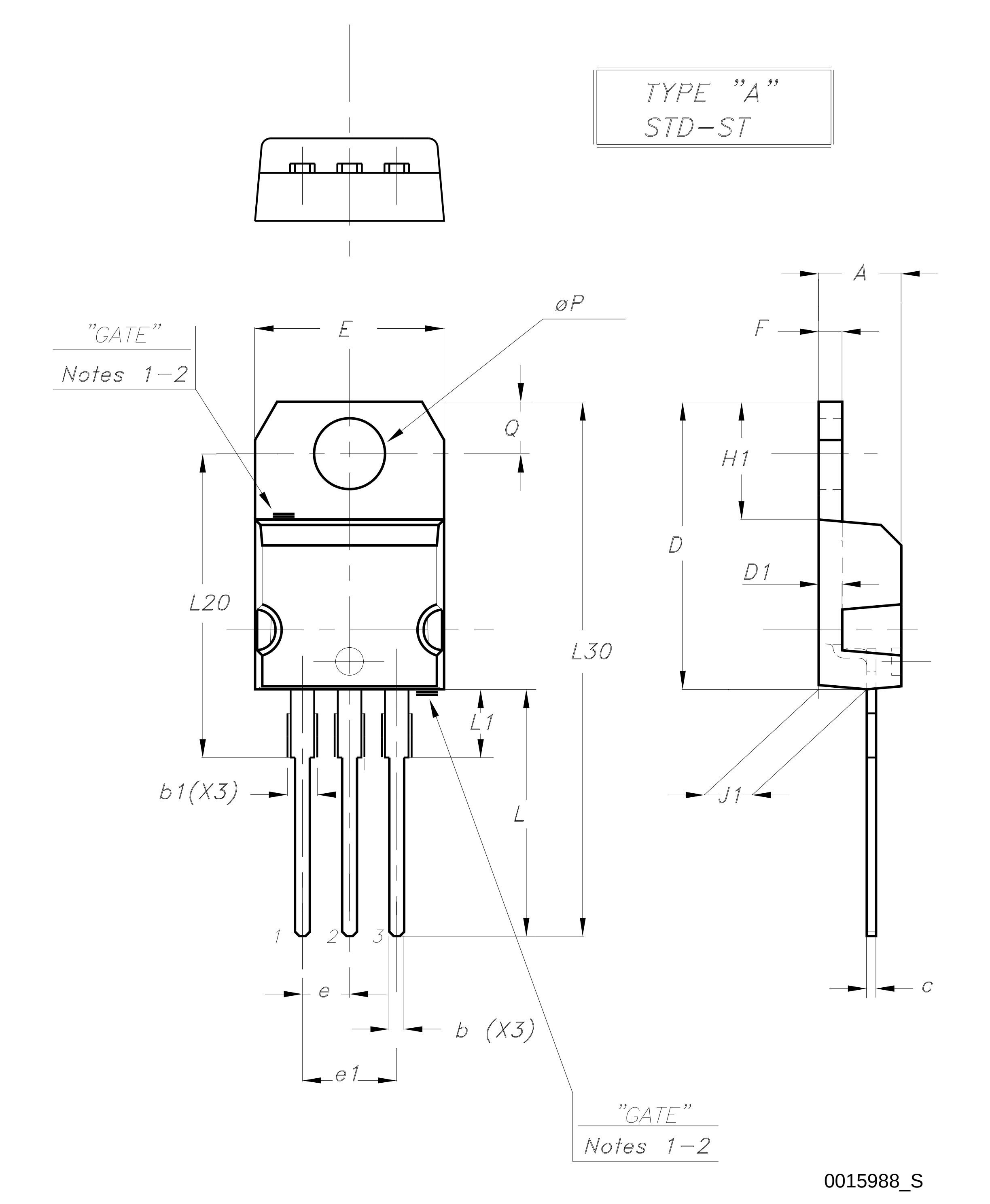
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 12. TO-220 mechanical data

Dim.	Type STD - ST Dual Gauge			Type STD - ST Single Gauge		
	mm.			mm.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	4.40		4.60
b	0.61		0.88	0.61		0.88
b1	1.14		1.70	1.14		1.70
c	0.48		0.70	0.48		0.70
D	15.25		15.75	15.25		15.75
D1		1.27				
E	10.00		10.40	10.00		10.40
e	2.40		2.70	2.40		2.70
e1	4.95		5.15	4.95		5.15
F	1.23		1.32	0.51		0.60
H1	6.20		6.60	6.20		6.60
J1	2.40		2.72	2.40		2.72
L	13.00		14.00	13.00		14.00
L1	3.50		3.93	3.50		3.93
L20		16.40			16.40	
L30		28.90			28.90	
∅P	3.75		3.85	3.75		3.85
Q	2.65		2.95	2.65		2.95

In spite of some difference in tolerances, the packages are compatible.

Figure 30. Drawing dimension TO-220 (type STD-ST Dual Gauge)



Note: 1 Maximum resin gate protrusion: 0.5 mm.

2 Resin gate position is accepted in each of the two positions shown on the drawing, or their symmetrical.

Figure 31. Drawing dimension TO-220 (type STD-ST Single Gauge)

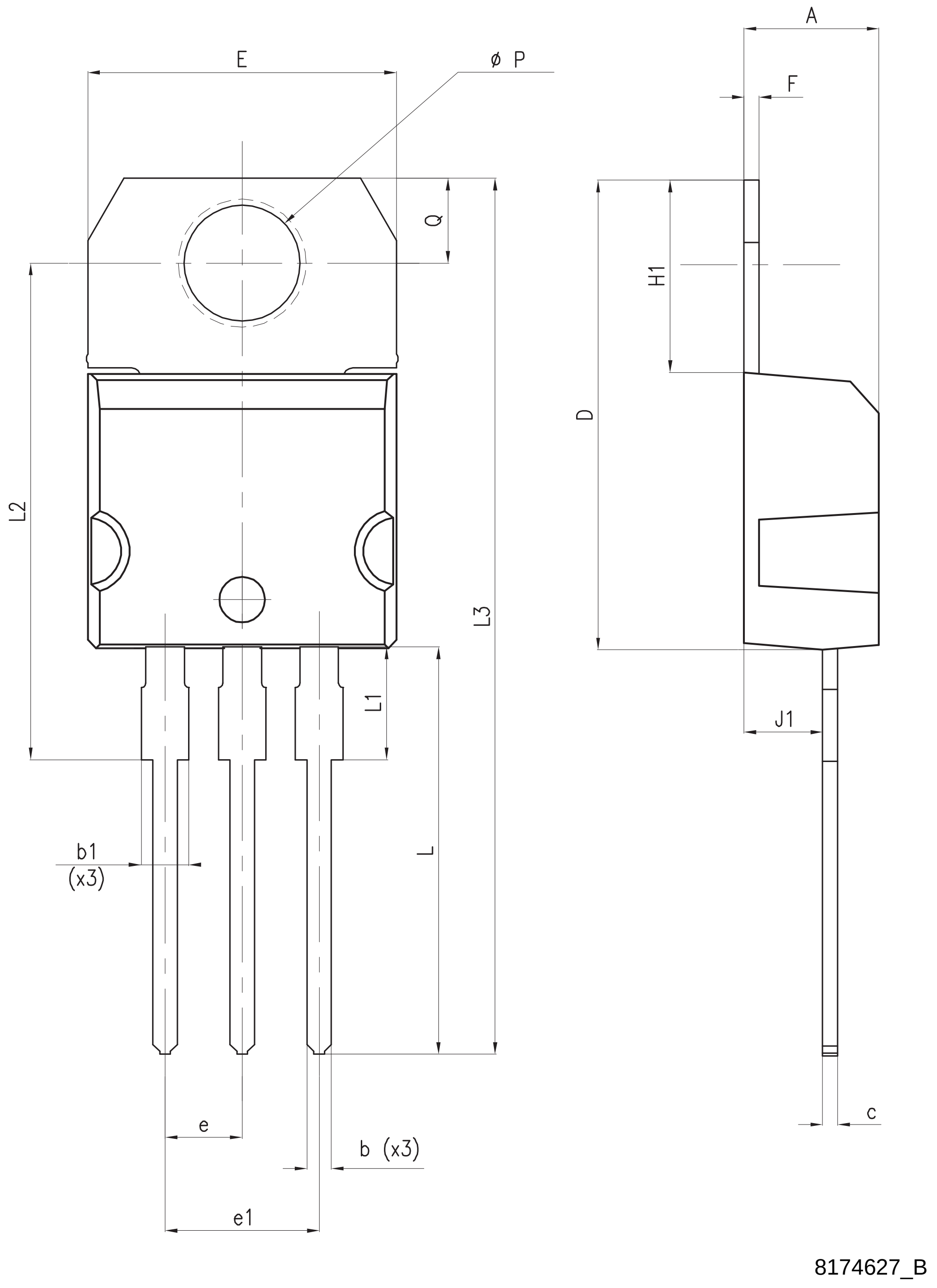


Figure 32. Drawing dimension tube for TO-220 Dual Gauge (mm.)

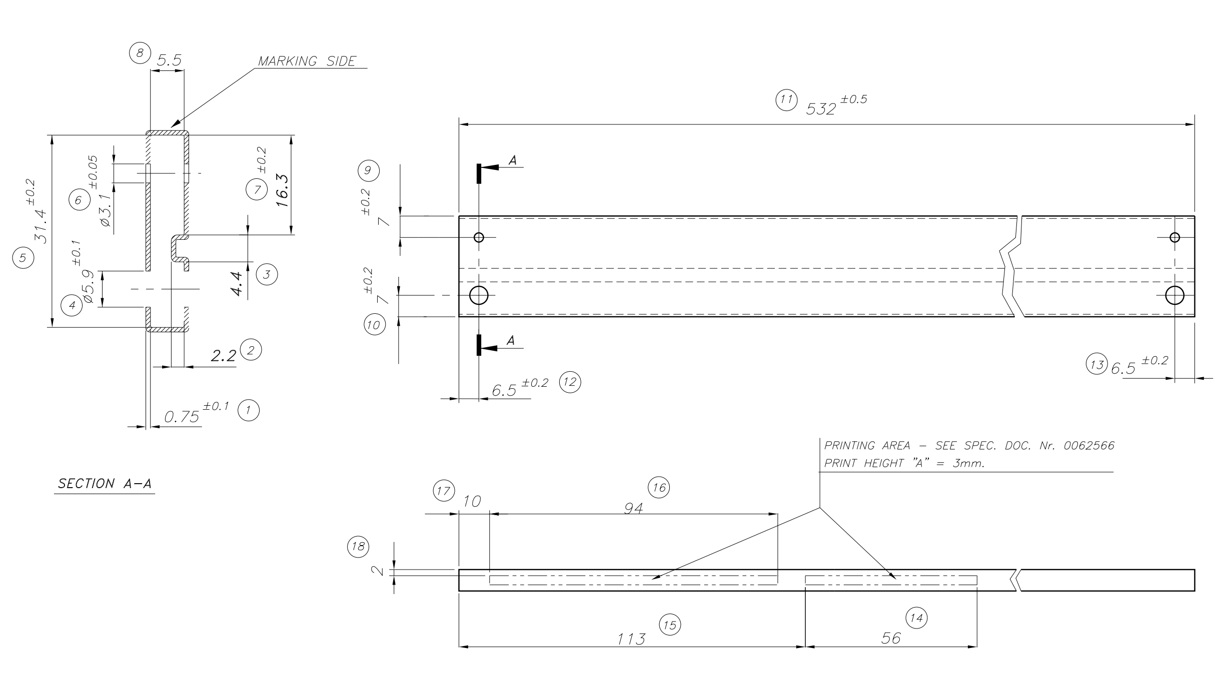
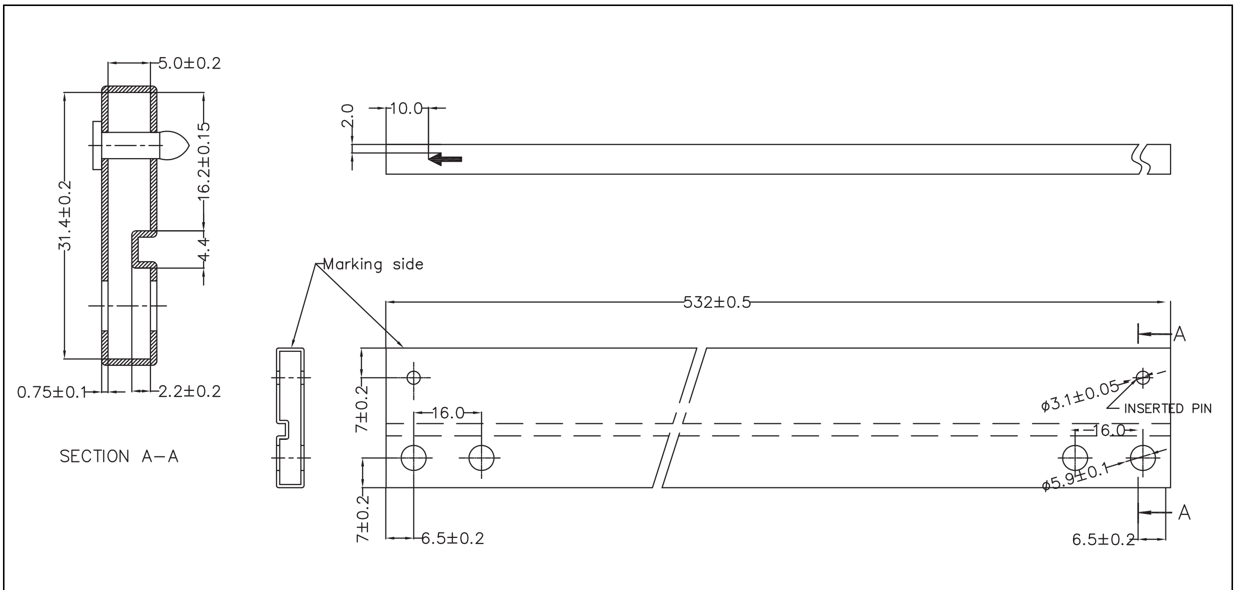
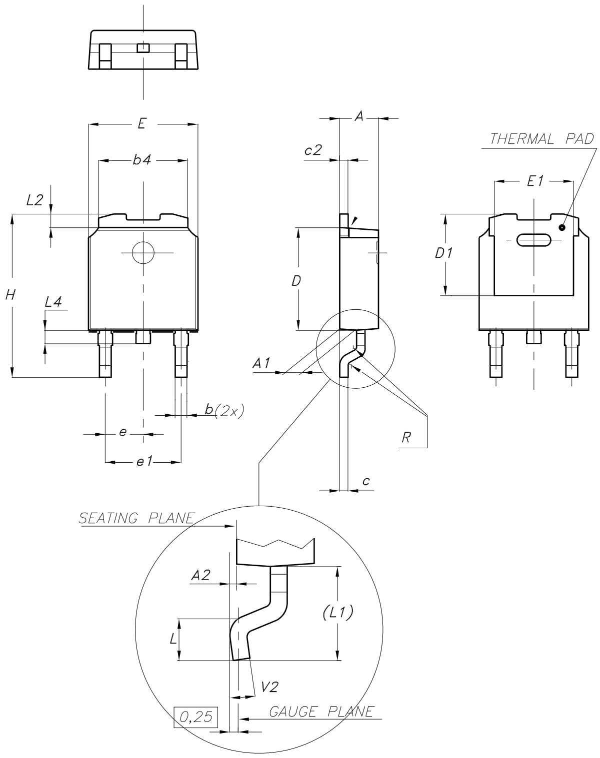


Figure 33. Drawing dimension tube for TO-220 Single Gauge (mm.)



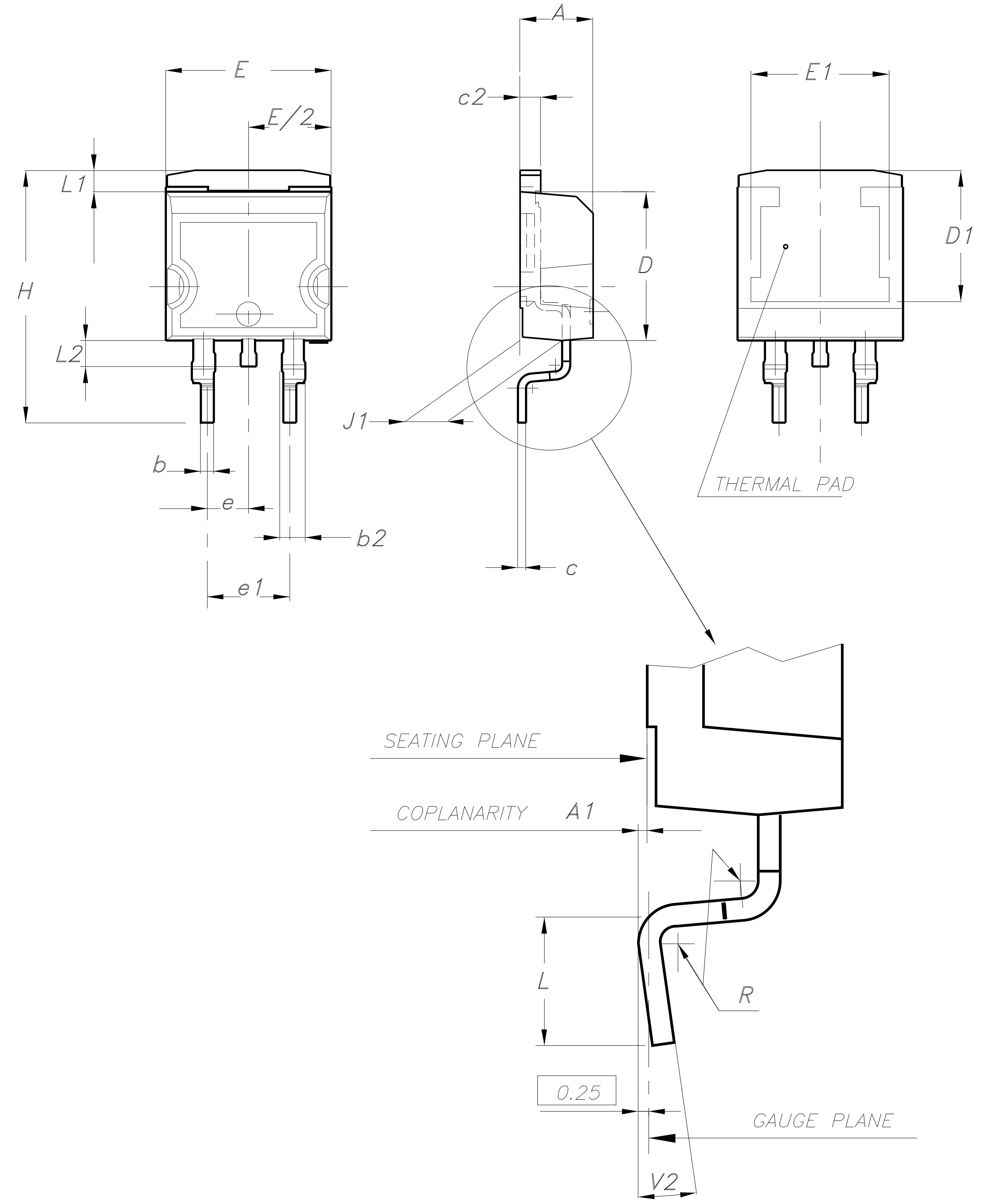
DPAK mechanical data

Dim.	mm.			inch.		
	Min.	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
b4	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
e		2.28			0.090	
e1	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L	1			0.039		
(L1)		2.8			0.110	
L2		0.8			0.031	
L4	0.6		1	0.023		0.039
R		0.2			0.008	
V2	0°		8°	0°		8°



0068772-F

Figure 34. Drawing dimension D²PAK (type STD-ST)



0079457/L

Figure 35. Drawing dimension D²PAK (type WOOSEOK-SUBCON.)

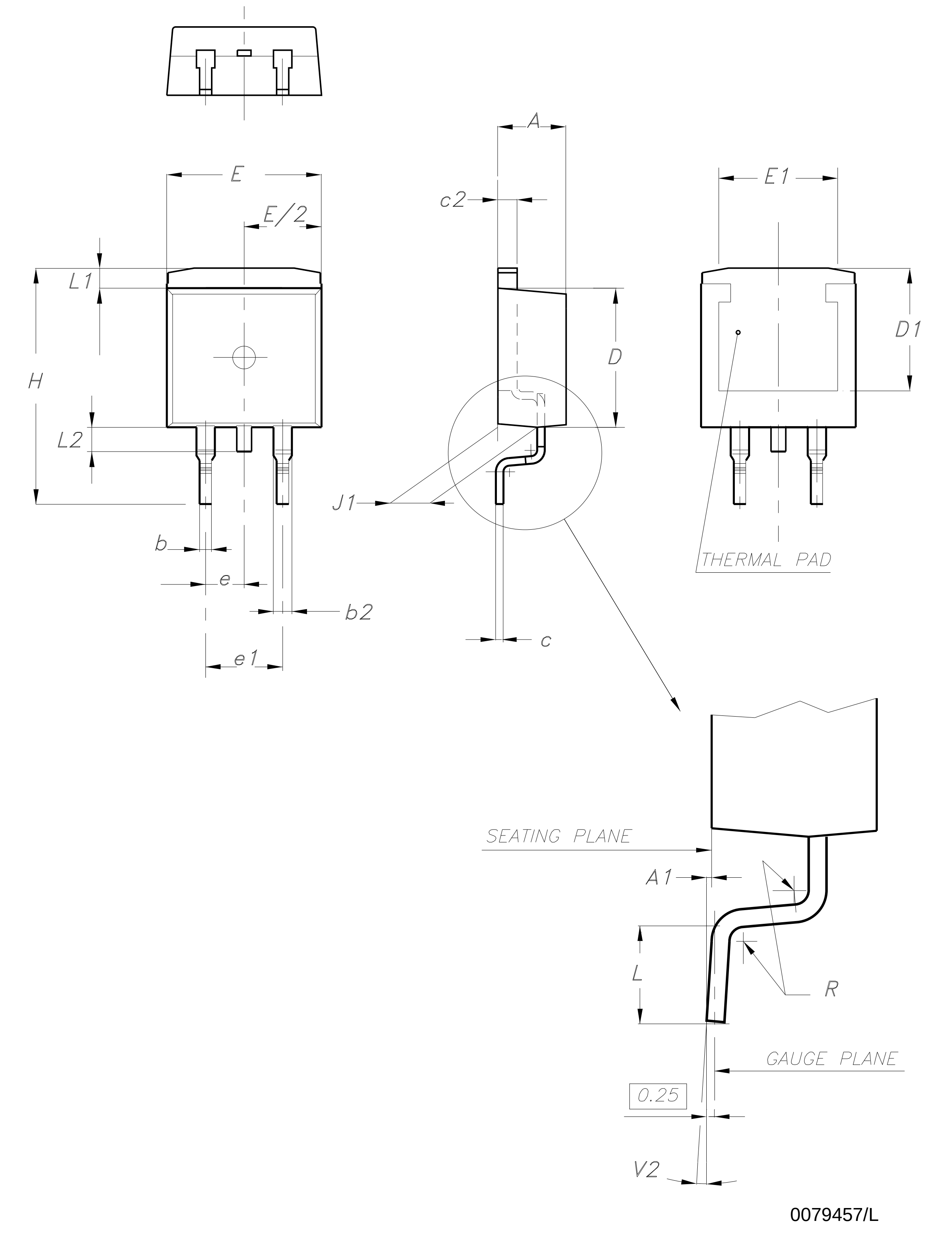


Table 13. D²PAK mechanical data

Dim.	Type STD-ST			Type WOOSEOK-Subcon.		
	mm.			mm.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	4.30		4.70
A1	0.03		0.23	0		0.20
b	0.70		0.93	0.70		0.90
b2	1.14		1.70	1.17		1.37
c	0.45		0.60	0.45	0.50	0.60
c2	1.23		1.36	1.25	1.30	1.40
D	8.95		9.35	9	9.20	9.40
D1	7.50			7.50		
E	10		10.40	9.80		10.20
E1	8.50			7.50		
e		2.54			2.54	
e1	4.88		5.28		5.08	
H	15		15.85	15	15.30	15.60
J1	2.49		2.69	2.20		2.60
L	2.29		2.79	1.79		2.79
L1	1.27		1.40	1		1.40
L2	1.30		1.75	1.20		1.60
R		0.4			0.30	
V2	0°		8°	0°		3°

Note: *The D²PAK package coming from the subcontractor Wooseok is fully compatible with the ST's package suggested footprint.*

Figure 36. D²PAK footprint recommended data

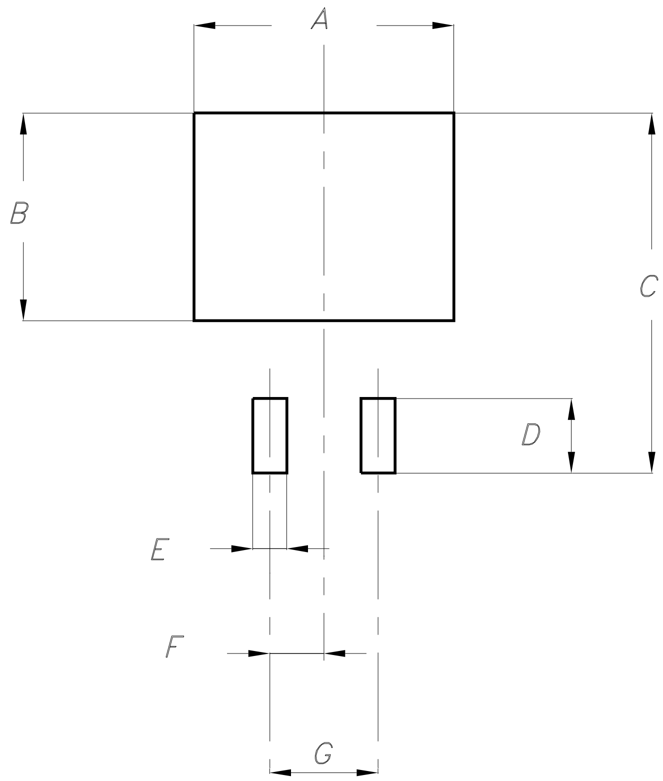
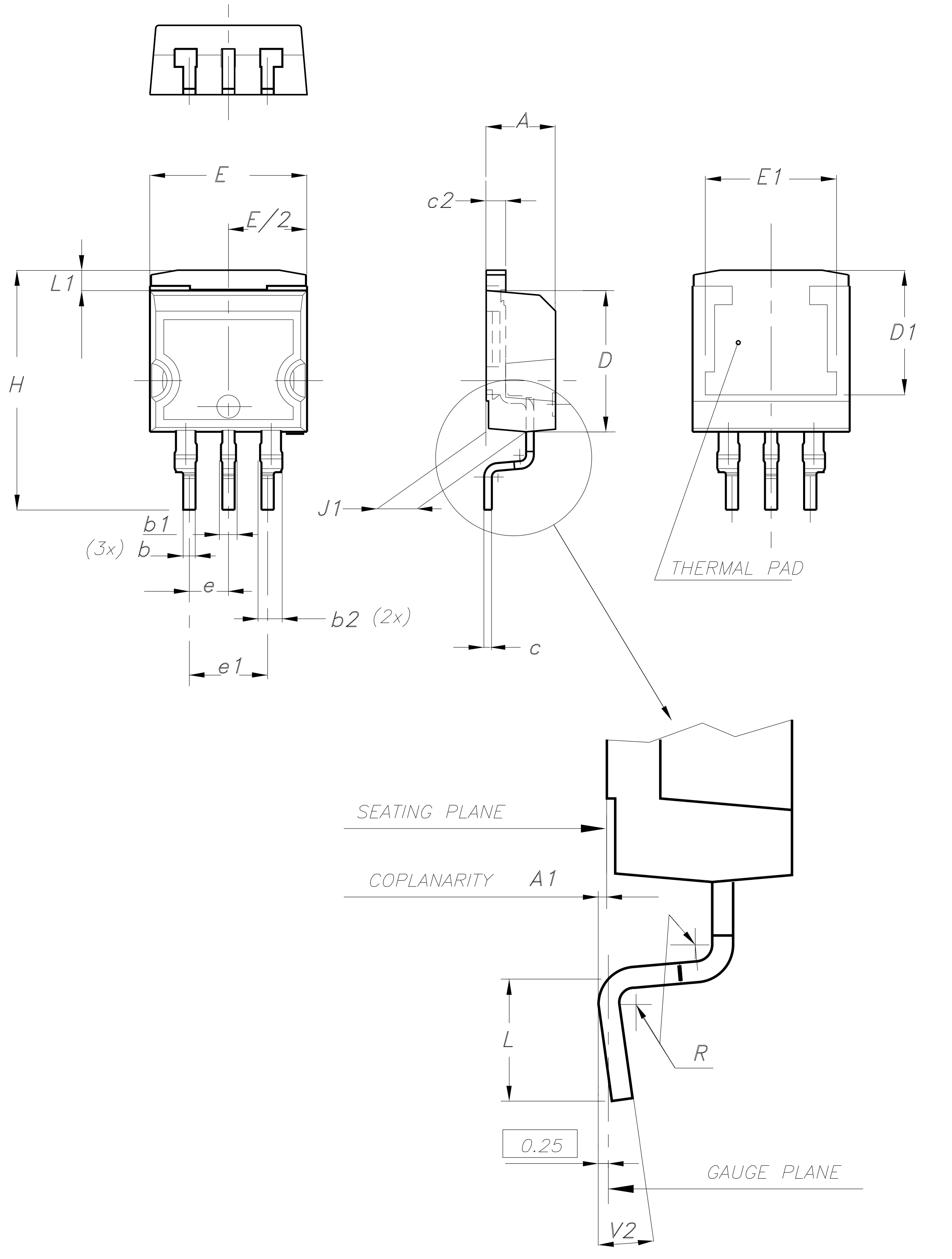


Table 14. Footprint data

Values		
	mm.	**inch.**
A	12.20	0.480
B	9.75	0.384
C	16.90	0.665
D	3.50	0.138
E	1.60	0.063
F	2.54	0.100
G	5.08	0.200

Figure 37. Drawing dimension D²PAK/A (type STD-ST)



7106164/E

Figure 38. Drawing dimension D²PAK/A (type WOOSEOK-Subcon.)

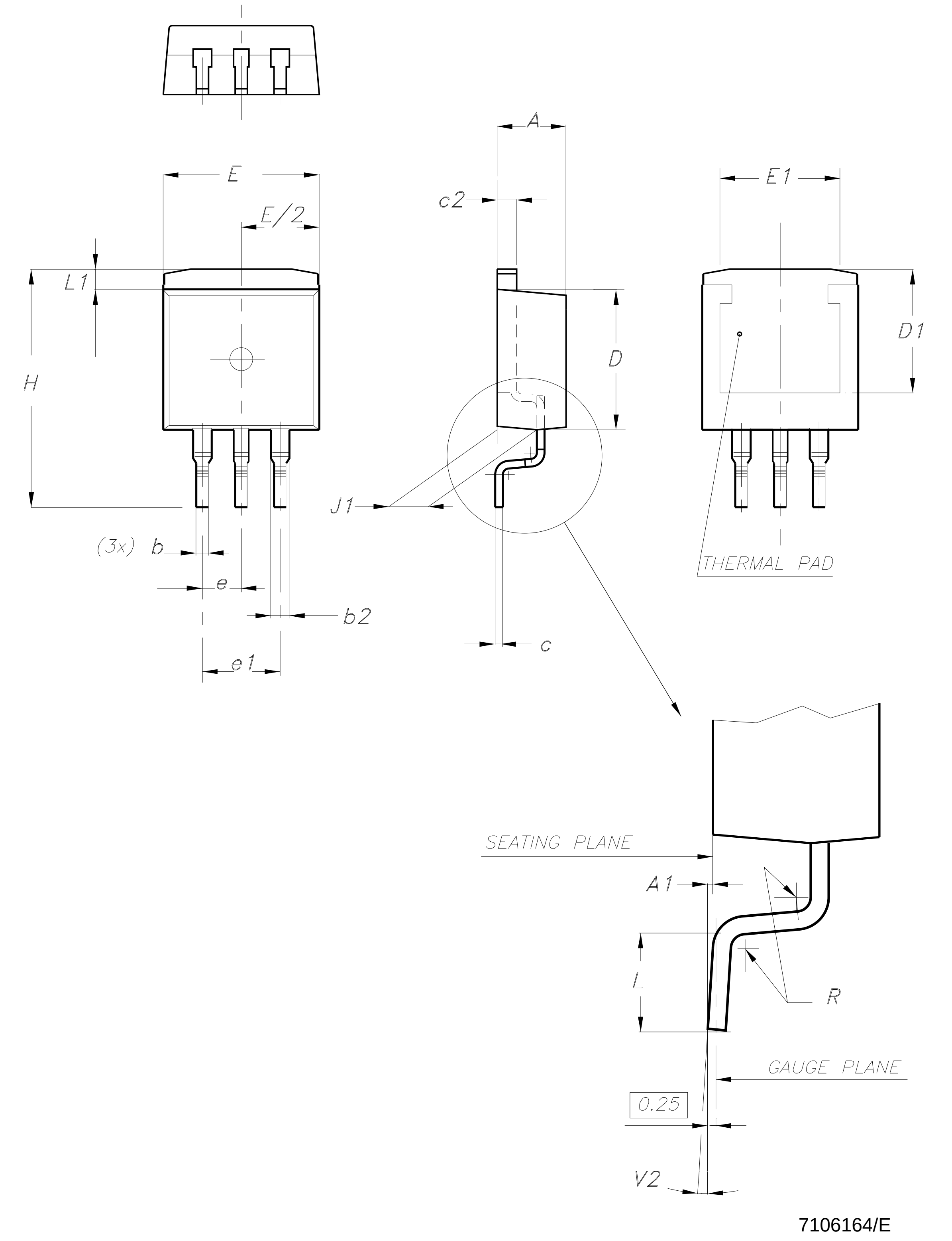


Table 15. D²PAK/A mechanical data

Dim.	Type STD-ST			Type WOOSEOK-Subcon.		
	mm.			mm.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	4.30		4.70
A1	0.03		0.23	0		0.20
b	0.70		0.93	0.70		0.90
b1	0.80		1.30			
b2	1.14		1.70	1.17		1.37
c	0.45		0.60	0.45	0.50	0.60
c2	1.23		1.36	1.25	1.30	1.40
D	8.95		9.35	9	9.20	9.40
D1	7.50			7.50		
E	10		10.40	9.80		10.20
E1	8.50			7.50		
e		2.54			2.54	
e1	4.88		5.28		5.08	
H	15		15.85	15	15.30	15.60
J1	2.49		2.69	2.20		2.60
L	2.29		2.79	1.79		2.79
L1	1.27		1.40	1		1.40
R		0.4			0.30	
V2	0°		8°	0°		3°

Note: The D²PAK/A package coming from the subcontractor Wooseok is fully compatible with the ST's package suggested footprint.

Figure 39. D²PAK/A footprint recommended data

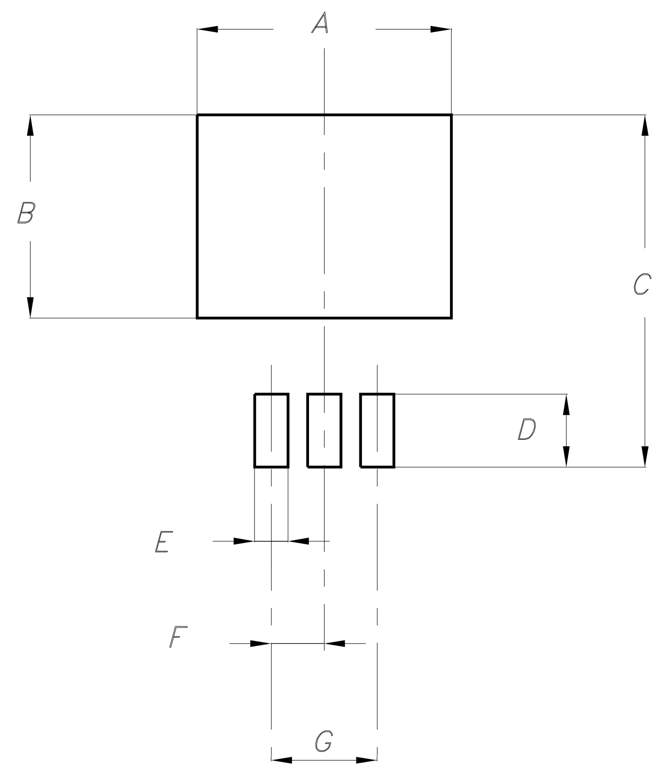


Table 16. Footprint data

Values		
	mm.	**inch.**
A	12.20	0.480
B	9.75	0.384
C	16.90	0.665
D	3.50	0.138
E	1.60	0.063
F	2.54	0.100
G	5.08	0.200

Table 17. DFN8L (4x4 mm.) mechanical data

Dim.	mm.		
	Min.	**Typ.**	**Max.**
A	0.80	0.90	1
A1	0	0.02	0.05
A3		0,20	
b	0.23	0.30	0.38
D	3.90	4	4.10
D2	2.82	3	3.23
E	3.90	4	4.10
E2	2.05	2.20	2.30
e		0.80	
L	0.40	0.50	0.60

Figure 40. DFN8L package outline

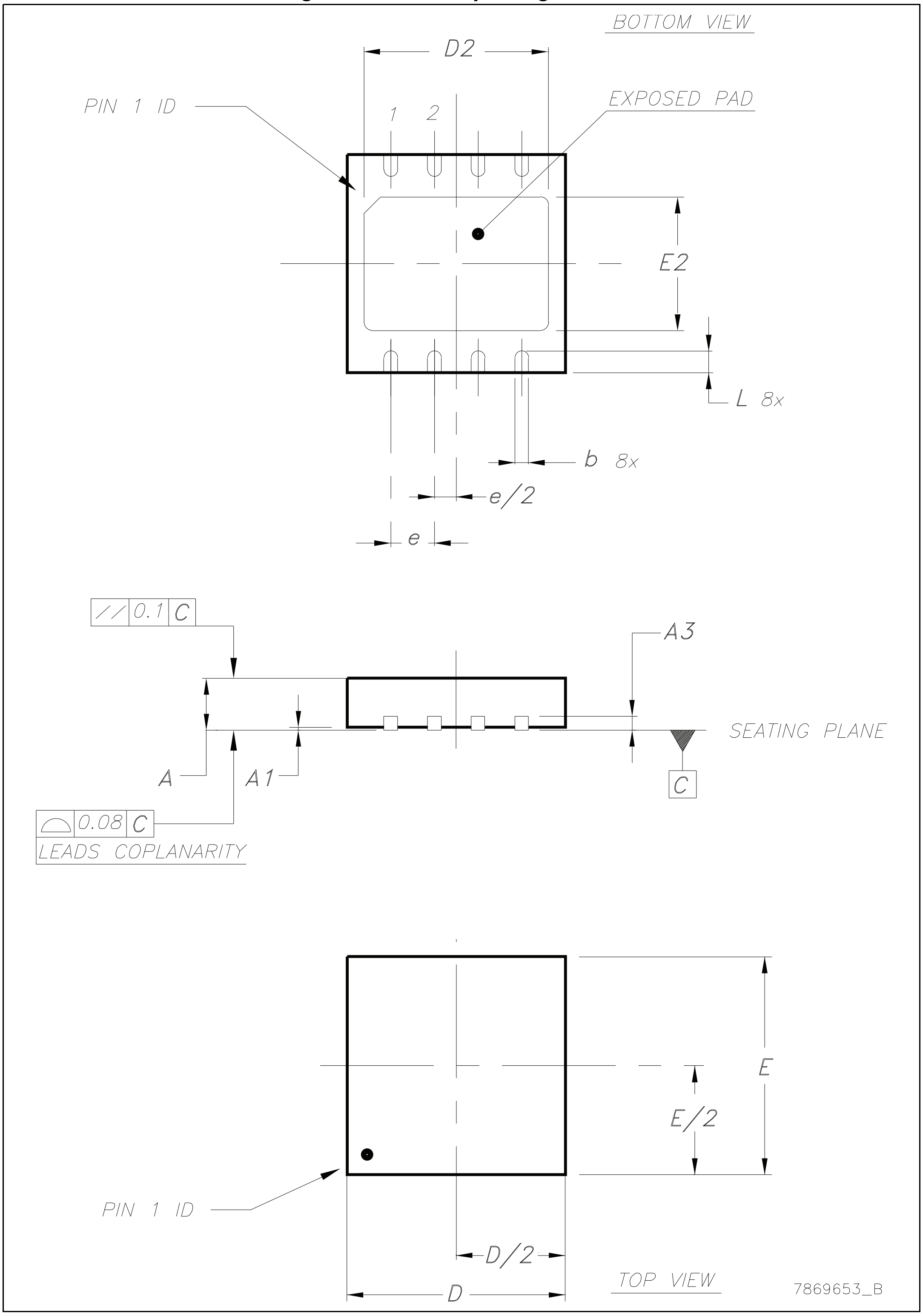


Figure 41. DFN8L footprint - recommended data

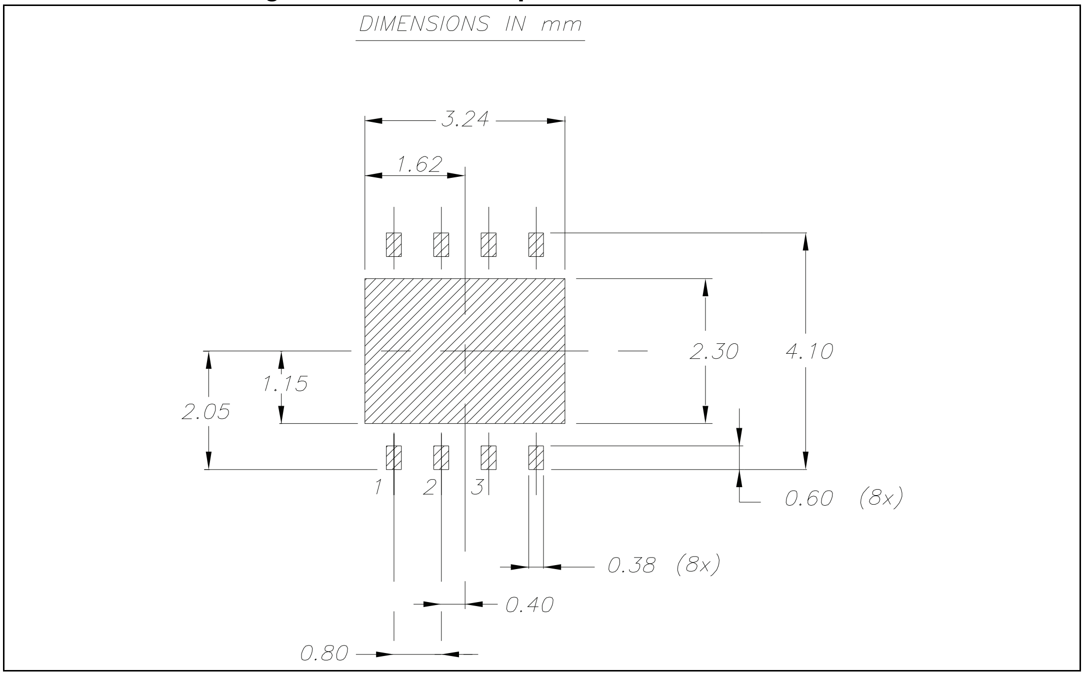


Figure 42. DFN8L carrier tape (dimension are in mm.)

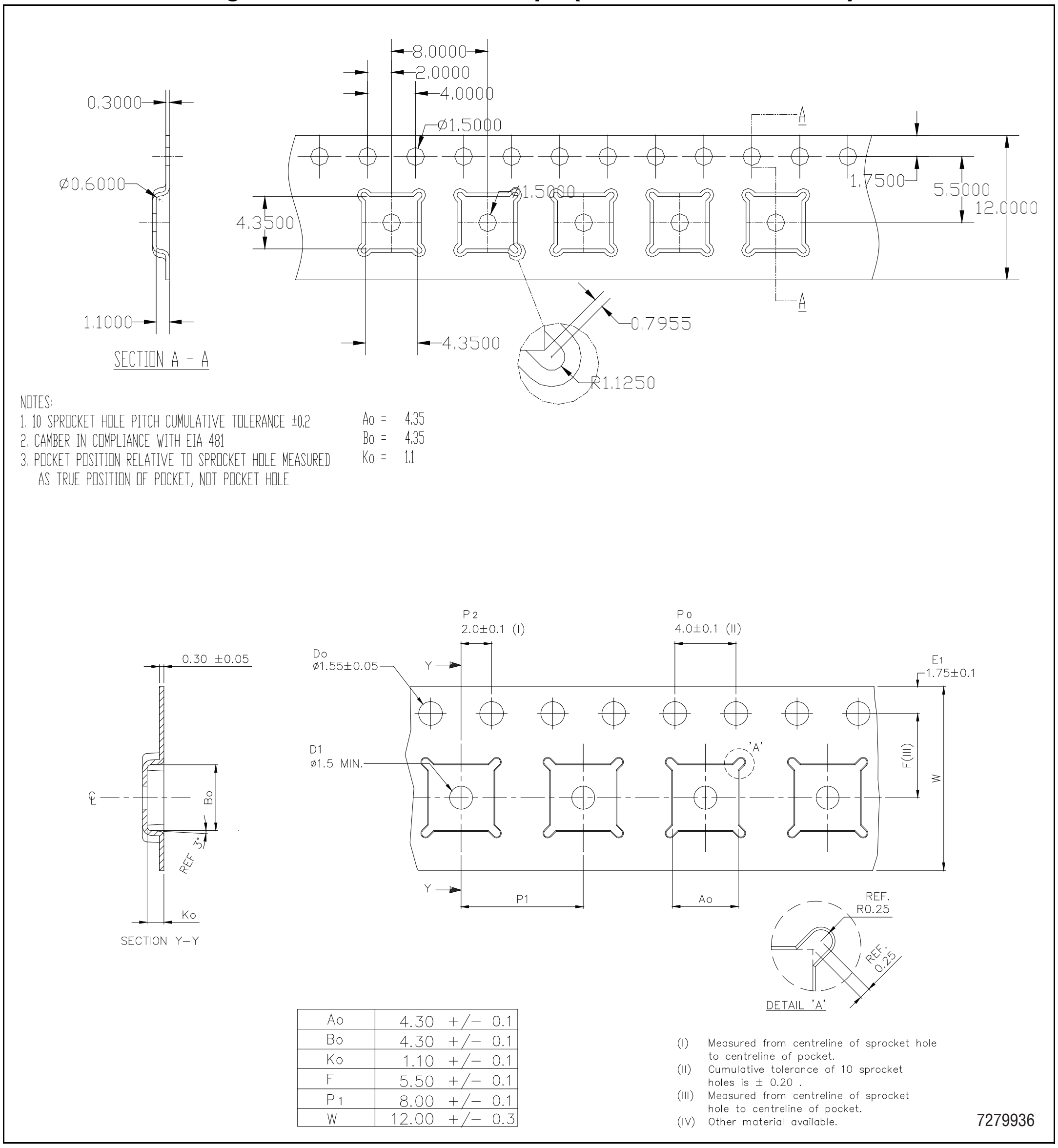


Figure 43. Reel DFN8L drawing

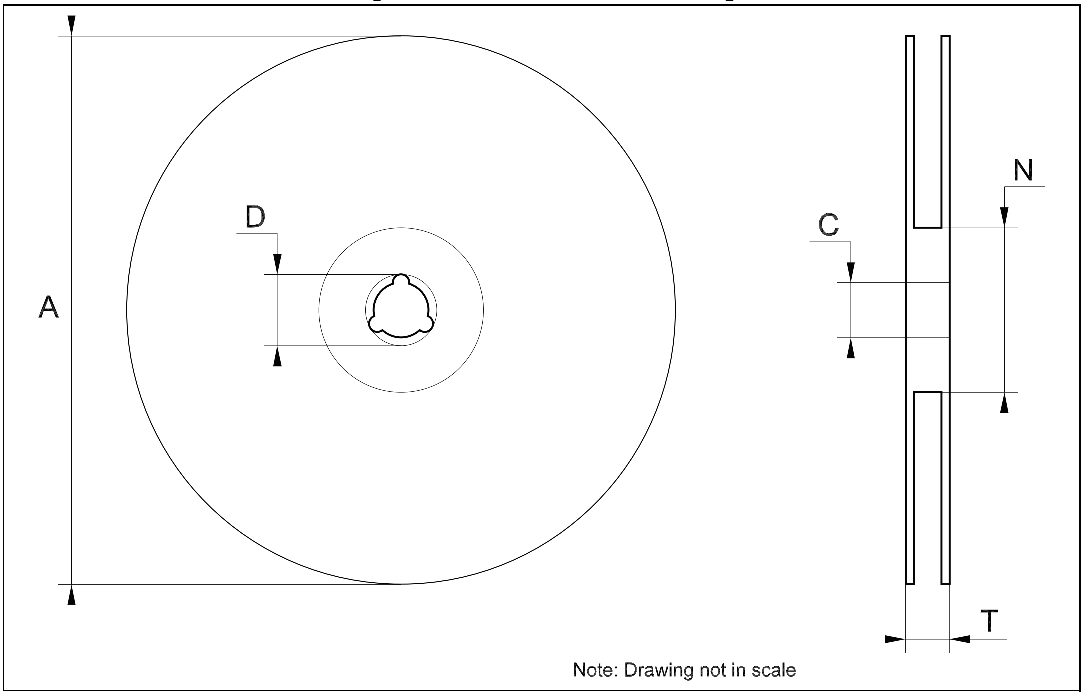
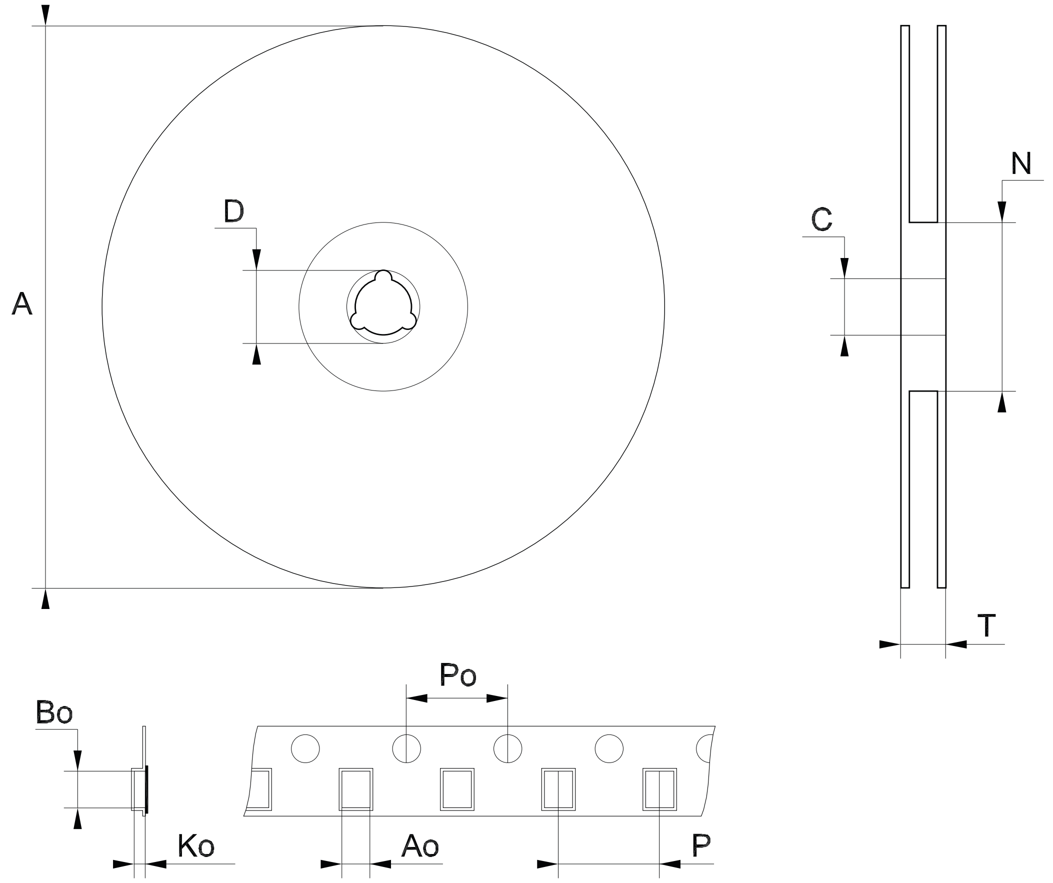


Table 18. Reel DFN8L dimensions

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882

Tape & reel DPAK-PPAK mechanical data

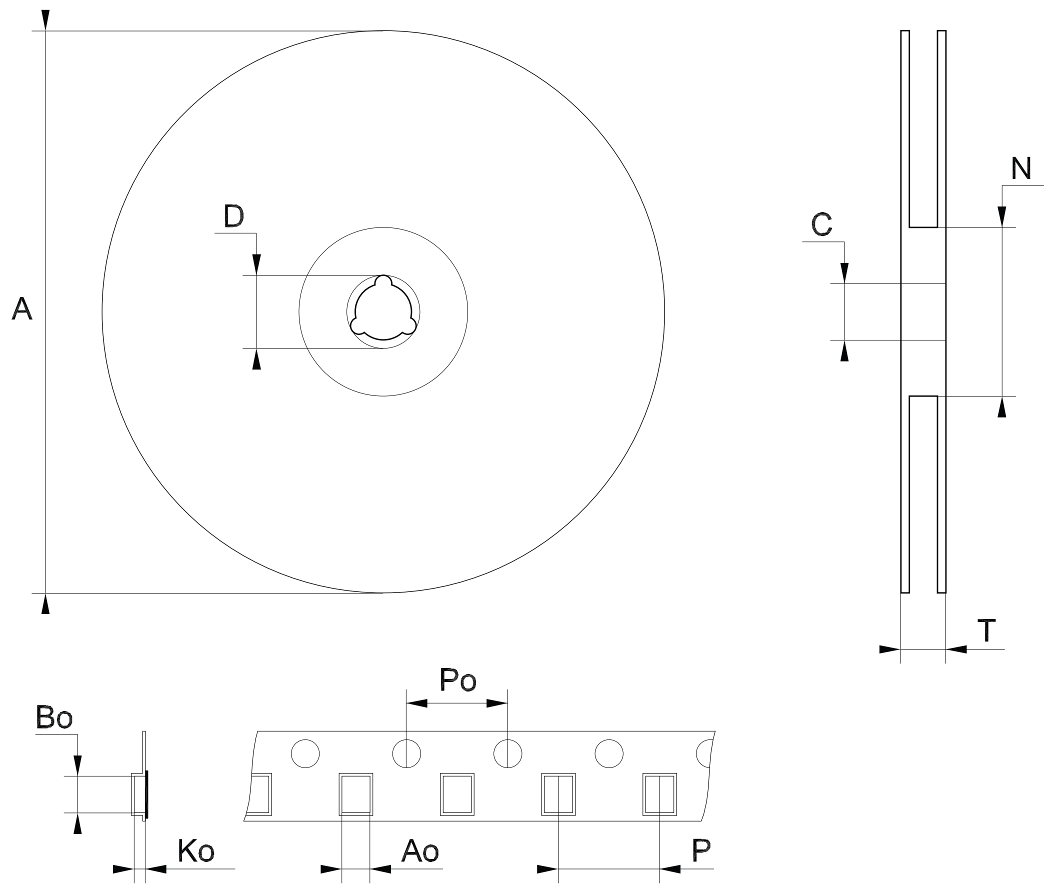
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.80	6.90	7.00	0.268	0.272	0.2.76
Bo	10.40	10.50	10.60	0.409	0.413	0.417
Ko	2.55	2.65	2.75	0.100	0.104	0.105
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	7.9	8.0	8.1	0.311	0.315	0.319



Note: Drawing not in scale

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 Order codes

Table 19. Order codes

Packages					
TO-220	**D²PAK**	**D²PAK/A**	**DPAK**	**DFN8**	**Output voltages**
LD1086V18	LD1086D2T18TR		LD1086DT18TR		1.8 V
	LD1086D2T25TR		LD1086DT25TR		2.5 V
LD1086V33	LD1086D2T33TR	LD1086D2M33TR	LD1086DT33TR		3.3 V
	LD1086D2T50TR		LD1086DT50TR		5.0 V
	LD1086D2T12TR				12.0 V
LD1086V	LD1086D2TTR	LD1086D2MTR	LD1086DTTR	LD1086PUR	ADJ
LD1086V-DG (1)					ADJ
LD1086VY (2)			LD1086DTTRY (2)		ADJ

1. TO-220 Dual Gauge frame.
2. Automotive Grade products.

9 Revision history

Table 20. Document revision history

Date	Revision	Changes
16-May-2006	14	Order codes updated and new template.
19-Jan-2007	15	D^2PAK mechanical data updated and add footprint data.
05-Apr-2007	16	Order codes updated.
07-Jun-2007	17	Order codes updated.
19-Jul-2007	18	Add note on *Figure 2*.
03-Dec-2007	19	Modified: *Table 19*.
31-Jan-2008	20	Added new order codes for Automotive grade products.
18-Feb-2008	21	Modified: *Table 19 on page 42*.
14-Jul-2008	22	Modified: *Table 1 on page 1* and *Table 19 on page 42*.
10-Mar-2010	23	Added: *Table 12 on page 22*, *Figure 30 on page 23*, *Figure 31 on page 24*, *Figure 32* and *Figure 33 on page 25*.
15-Nov-2010	24	Modified: R_{thJC} value for TO-220 *Table 3 on page 7*.
11-Jul-2011	25	Modified: *Figure 24*, *Figure 25 on page 20* and *Table 19 on page 42*.
10-Feb-2012	26	Added: order code LD1086V-DG *Table 19 on page 42*.
15-Mar-2012	27	Added: new order code LD1086PUR *Table 19 on page 42* and new package mechanical data DFN8 (4x4 mm) *Table 17 on page 35*, *Figure 40 on page 36*, *Figure 41 on page 37*, *Figure 42 on page 38* and *Figure 43 on page 39*.
19-Oct-2012	28	Added: R_{thJA} value for DPAK *Table 3 on page 7*.
13-Feb-2013	29	Modified: Output voltage in Voltage reference parameter *Table 10 on page 15* and *Table 11 on page 16*.
01-Mar-2013	30	Modified: DFN8 (4 x 4) pin configuration *Figure 2 on page 6*.