



2 % negative voltage regulators

Features

- Output current to 1.5 A
- Output voltages of -5; -12; -15 V
- Thermal overload protection
- Short circuit protection
- Output transition SOA protection

Description

The L79xxAC series of three-terminal negative regulators is available in TO-220 and D²PAK packages and several fixed output voltages. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation; furthermore, having the same voltage option as the L78xxA positive standard series, they are particularly suited for split power supplies. If adequate heat sinking is provided, they can deliver over 1.5 A output current.

Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

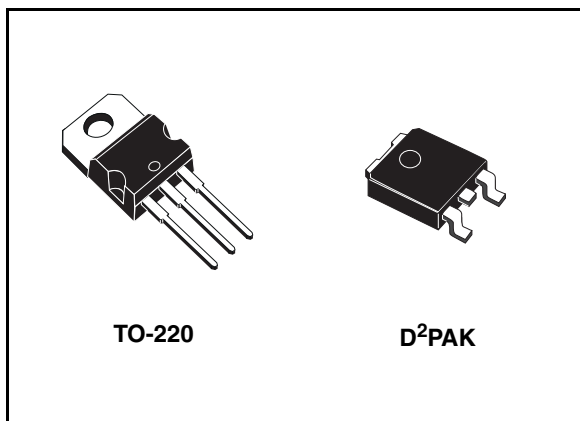


Table 1. Device summary

Part numbers	Order codes		Output voltages
	TO-220	D ² PAK	
L7905AC	L7905ACV	L7905ACD2T-TR	-5 V
L7912AC	L7912ACV	L7912ACD2T-TR	-12 V
L7915AC	L7915ACV		-15 V

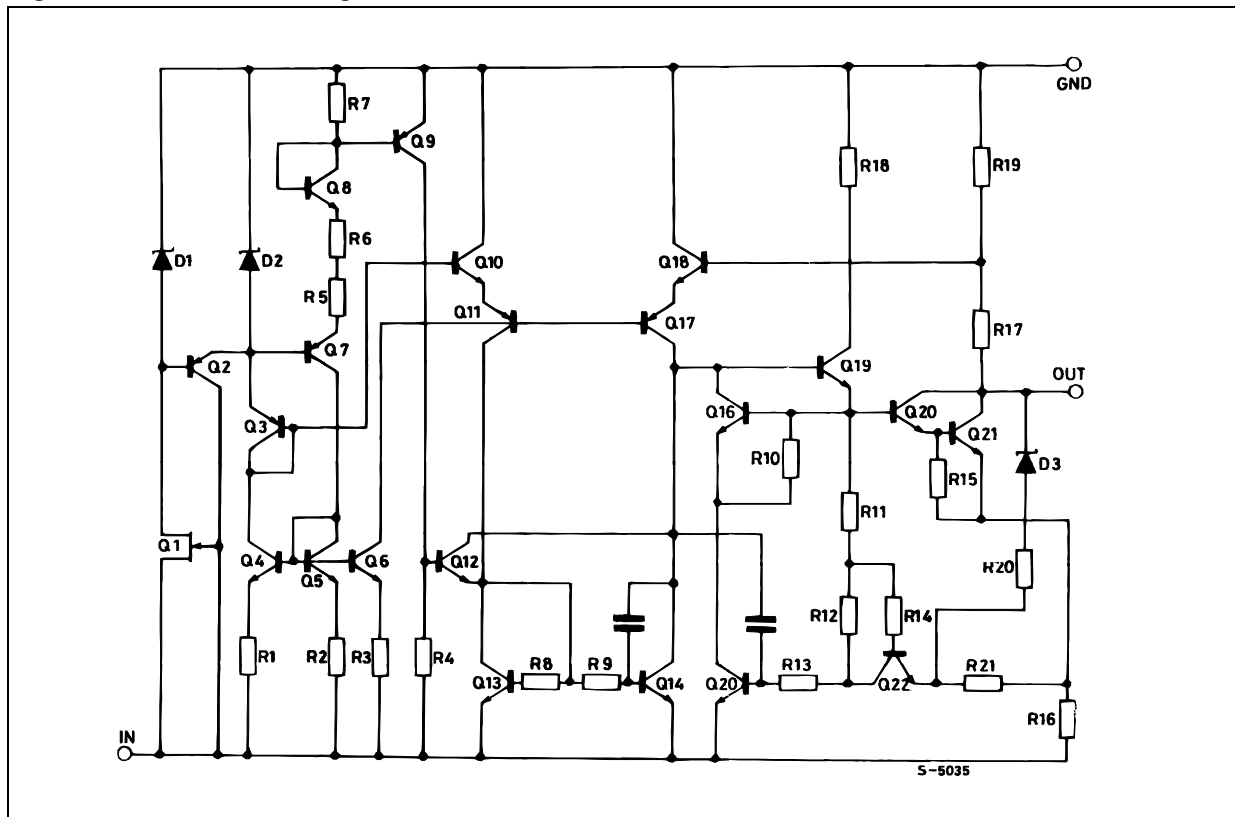
[查询"L7912ACD2T-TR"供应商](#)

Contents

1	Diagram	3
2	Pin configuration	4
3	Maximum ratings	5
4	Application	6
5	Electrical characteristics	7
6	Application information	10
7	Package mechanical data	12
8	Revision history	19

[查询"L7912ACD2T-TR"供应商](#)
1 **Diagram**

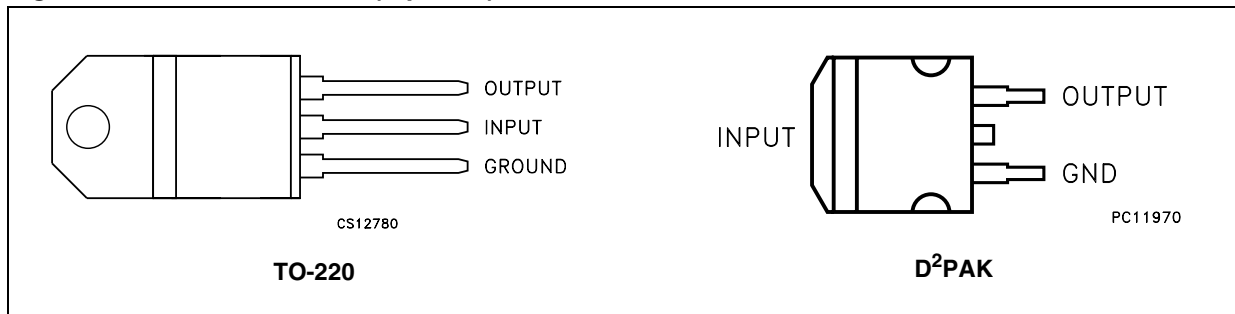
Figure 1. Schematic diagram



[查询"L7912ACD2T-TR"供应商](#)

2 Pin configuration

Figure 2. Pin connections (top view)



[查询"L7912ACD2T-TR"供应商](#)

3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	DC input voltage	for $V_O = -5$ to $-18V$	-35
		for $V_O = -20, -24V$	-40
I_O	Output current	Internally limited	
P_D	Power dissipation	Internally limited	
T_{STG}	Storage temperature range	-65 to 150	°C
T_{OP}	Operating junction temperature range	0 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.

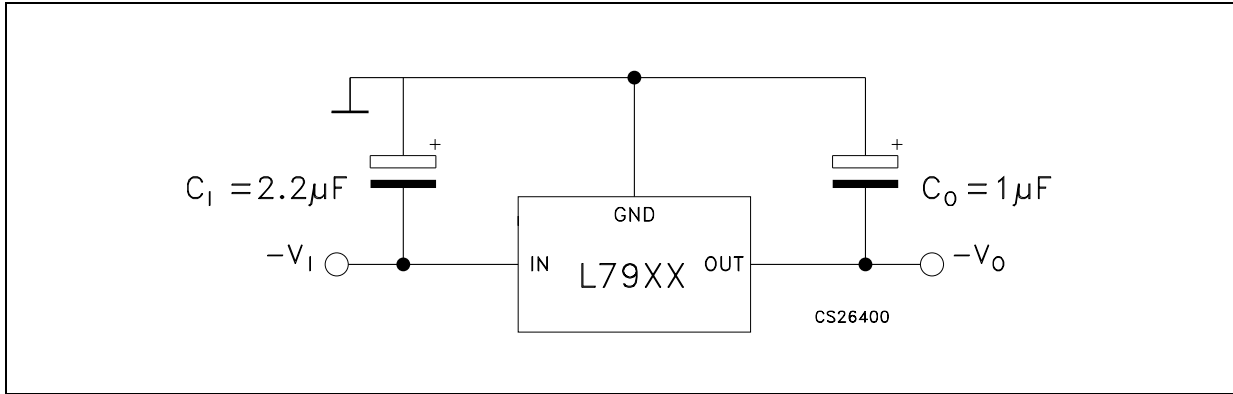
Table 3. Thermal data

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

[查询"L7912ACD2T-TR"供应商](#)

4 Application

Figure 3. Application circuit



[查询"L7912ACD2T-TR"供应商](#)

5 Electrical characteristics

Table 4. Electrical characteristics of L7905AC (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = -10$ V, $I_O = 500$ mA, $C_I = 2.2$ μF , $C_O = 1$ μF unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$T_J = 25^\circ\text{C}$	-4.9	-5	-5.1	V
V_O	Output voltage	$I_O = -5$ mA to -1 A, $P_O \leq 15$ W $V_I = -8$ to -20 V	-4.8	-5	-5.2	V
$\Delta V_O^{(1)}$	Line regulation	$V_I = -7$ to -25 V, $T_J = 25^\circ\text{C}$			100	mV
		$V_I = -8$ to -12 V, $T_J = 25^\circ\text{C}$			50	
$\Delta V_O^{(1)}$	Load regulation	$I_O = 5$ mA to 1.5 A, $T_J = 25^\circ\text{C}$			100	mV
		$I_O = 250$ to 750 mA, $T_J = 25^\circ\text{C}$			50	
I_d	Quiescent current	$T_J = 25^\circ\text{C}$			3	mA
ΔI_d	Quiescent current change	$I_O = 5$ mA to 1 A			0.5	mA
		$V_I = -8$ to -25 V			1.3	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5$ mA		-0.4		mV/ $^\circ\text{C}$
eN	Output noise voltage	$B = 10$ Hz to 100 kHz, $T_J = 25^\circ\text{C}$		100		μV
SVR	Supply voltage rejection	$\Delta V_I = 10$ V, $f = 120$ Hz	54	60		dB
V_d	Dropout voltage	$I_O = 1$ A, $T_J = 25^\circ\text{C}$, $\Delta V_O = 100$ mV		1.4		V
I_{sc}	Short circuit current			2.1		A
I_{scp}	Short circuit peak current	$T_J = 25^\circ\text{C}$		2.5		A

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

[查询"L7912ACD2T-TR"供应商](#)**Table 5. Electrical characteristics of L7912AC** (refer to the test circuits, $T_J = 0$ to $125\text{ }^\circ\text{C}$, $V_I = -19\text{ V}$, $I_O = 500\text{ mA}$, $C_I = 2.2\text{ }\mu\text{F}$, $C_O = 1\text{ }\mu\text{F}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$T_J = 25^\circ\text{C}$	-11.75	-12	-12.25	V
V_O	Output voltage	$I_O = -5\text{ mA to } -1\text{ A}$, $P_O \leq 15\text{ W}$ $V_I = -15.5\text{ to } -27\text{ V}$	-11.5	-12	-12.5	V
$\Delta V_O^{(1)}$	Line regulation	$V_I = -14.5\text{ to } -30\text{ V}$, $T_J = 25^\circ\text{C}$			240	mV
		$V_I = -16\text{ to } -22\text{ V}$, $T_J = 25^\circ\text{C}$			120	
$\Delta V_O^{(1)}$	Load regulation	$I_O = 5\text{ mA to } 1.5\text{ A}$, $T_J = 25^\circ\text{C}$			240	mV
		$I_O = 250\text{ to } 750\text{ mA}$, $T_J = 25^\circ\text{C}$			120	
I_d	Quiescent current	$T_J = 25^\circ\text{C}$			3	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ mA to } 1\text{ A}$			0.5	mA
		$V_I = -15\text{ to } -30\text{ V}$			1	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$		-0.8		mV/ $^\circ\text{C}$
eN	Output noise voltage	$B = 10\text{ Hz to } 100\text{ kHz}$, $T_J = 25^\circ\text{C}$		200		μV
SVR	Supply voltage rejection	$\Delta V_I = 10\text{ V}$, $f = 120\text{ Hz}$	54	60		dB
V_d	Dropout voltage	$I_O = 1\text{ A}$, $T_J = 25^\circ\text{C}$, $\Delta V_O = 100\text{ mV}$		1.1		V
I_{sc}	Short circuit current			1.5		A
I_{scp}	Short circuit peak current	$T_J = 25^\circ\text{C}$		2.5		A

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

[查询"L7912ACD2T-TR"供应商](#)**Table 6. Electrical characteristics of L7915AC** (refer to the test circuits, $T_J = 0$ to $125\text{ }^\circ\text{C}$, $V_I = -23\text{ V}$, $I_O = 500\text{ mA}$, $C_I = 2.2\text{ }\mu\text{F}$, $C_O = 1\text{ }\mu\text{F}$ unless otherwise specified)

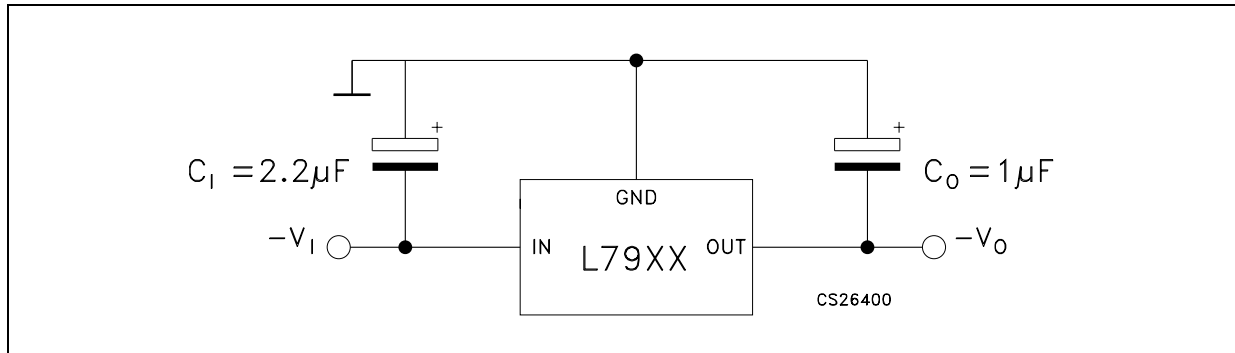
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$T_J = 25^\circ\text{C}$	-14.7	-15	-15.3	V
V_O	Output voltage	$I_O = -5\text{ mA to } -1\text{ A}$, $P_O \leq 15\text{ W}$ $V_I = -18.5\text{ to } -30\text{ V}$	-14.4	-15	-15.6	V
$\Delta V_O^{(1)}$	Line regulation	$V_I = -17.5\text{ to } -30\text{ V}$, $T_J = 25^\circ\text{C}$			300	mV
		$V_I = -20\text{ to } -26\text{ V}$, $T_J = 25^\circ\text{C}$			150	
$\Delta V_O^{(1)}$	Load regulation	$I_O = 5\text{ mA to } 1.5\text{ A}$, $T_J = 25^\circ\text{C}$			300	mV
		$I_O = 250\text{ to } 750\text{ mA}$, $T_J = 25^\circ\text{C}$			150	
I_d	Quiescent current	$T_J = 25^\circ\text{C}$			3	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ mA to } 1\text{ A}$			0.5	mA
		$V_I = -18.5\text{ to } -30\text{ V}$			1	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$		-0.9		mV/ $^\circ\text{C}$
eN	Output noise voltage	$B = 10\text{ Hz to } 100\text{ kHz}$, $T_J = 25^\circ\text{C}$		250		μV
SVR	Supply voltage rejection	$\Delta V_I = 10\text{ V}$, $f = 120\text{ Hz}$	54	60		dB
V_d	Dropout voltage	$I_O = 1\text{ A}$, $T_J = 25^\circ\text{C}$, $\Delta V_O = 100\text{ mV}$		1.1		V
I_{sc}	Short circuit current			1.3		A
I_{scp}	Short circuit peak current	$T_J = 25^\circ\text{C}$		2.5		A

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

[查询"L7912ACD2T-TR"供应商](#)

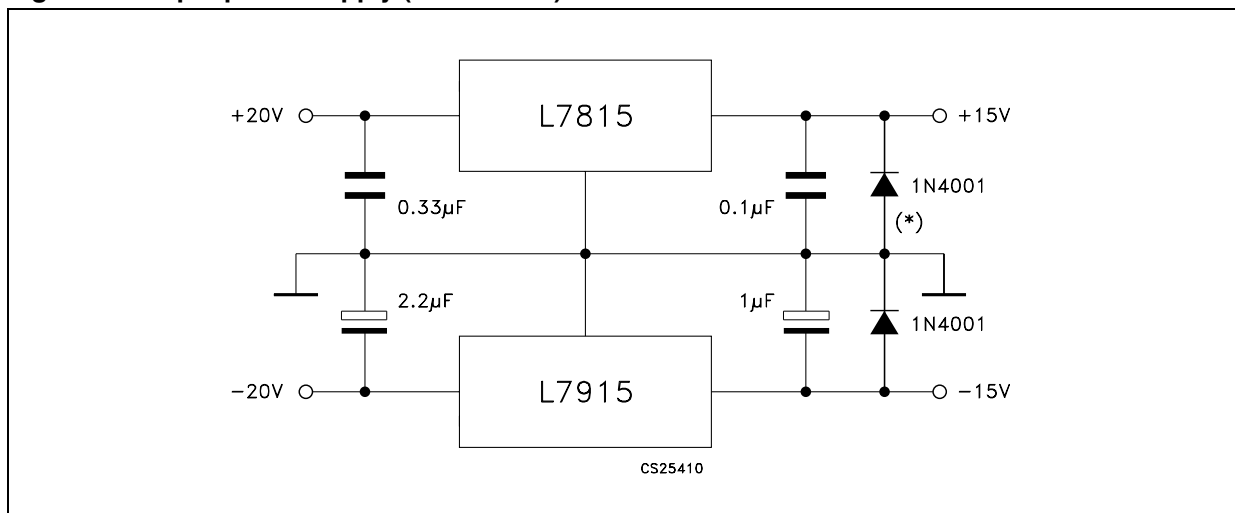
6 Application information

Figure 4. Fixed output regulator



1. To specify an output voltage, substitute voltage value for "XX".
2. Required for stability. For value given, capacitor must be solid tantalum. If aluminium electrolytic are used, at least ten times value should be selected. C1 is required if regulator is located an appreciable distance from power supply filter.
3. To improve transient response. If large capacitors are used, a high current diode from input to output (1N4001 or similar) should be introduced to protect the device from momentary input short circuit.

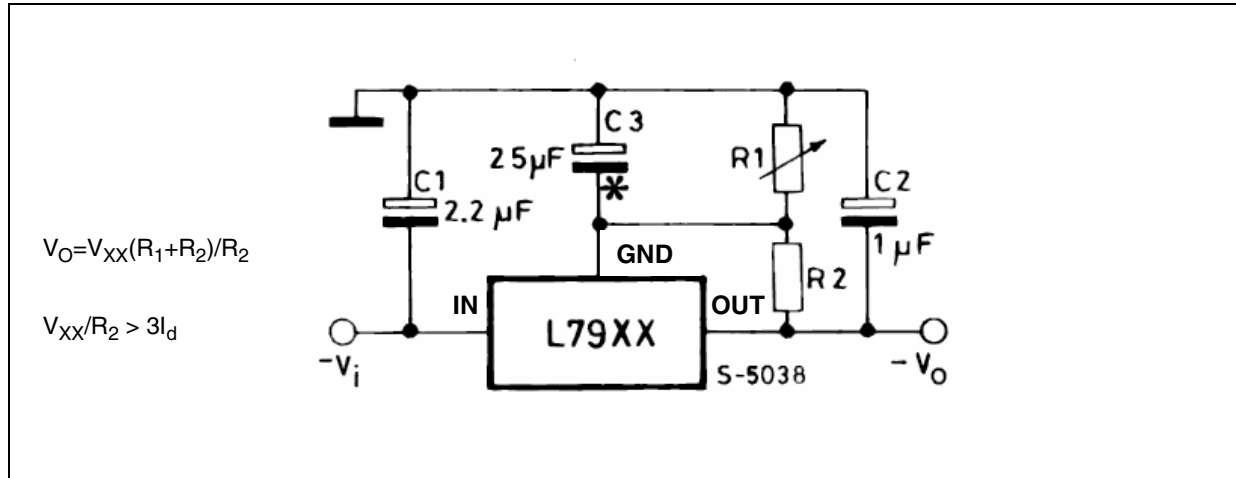
Figure 5. Split power supply ($\pm 15\text{ V} - 1\text{ A}$)



(*) Against potential latch-up problems.

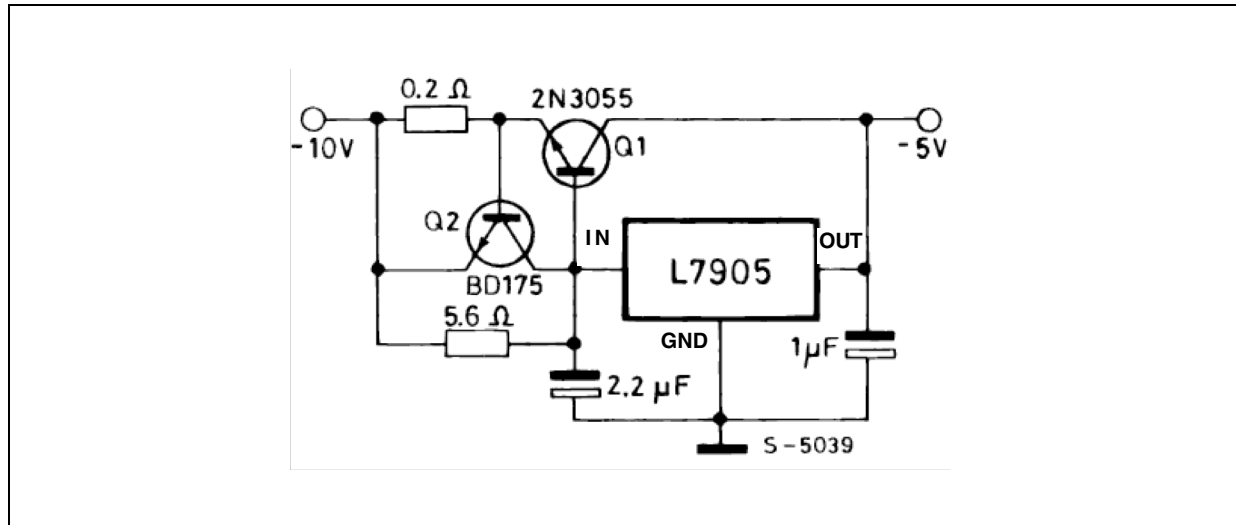
[查询"L7912ACD2T-TR"供应商](#)

Figure 6. Circuit for increasing output voltage



C3 Optional for improved transient response and ripple rejection.

Figure 7. High current negative regulator (-5 V / 4 A with 5 A current limiting)



[查询"L7912ACD2T-TR"供应商](#)

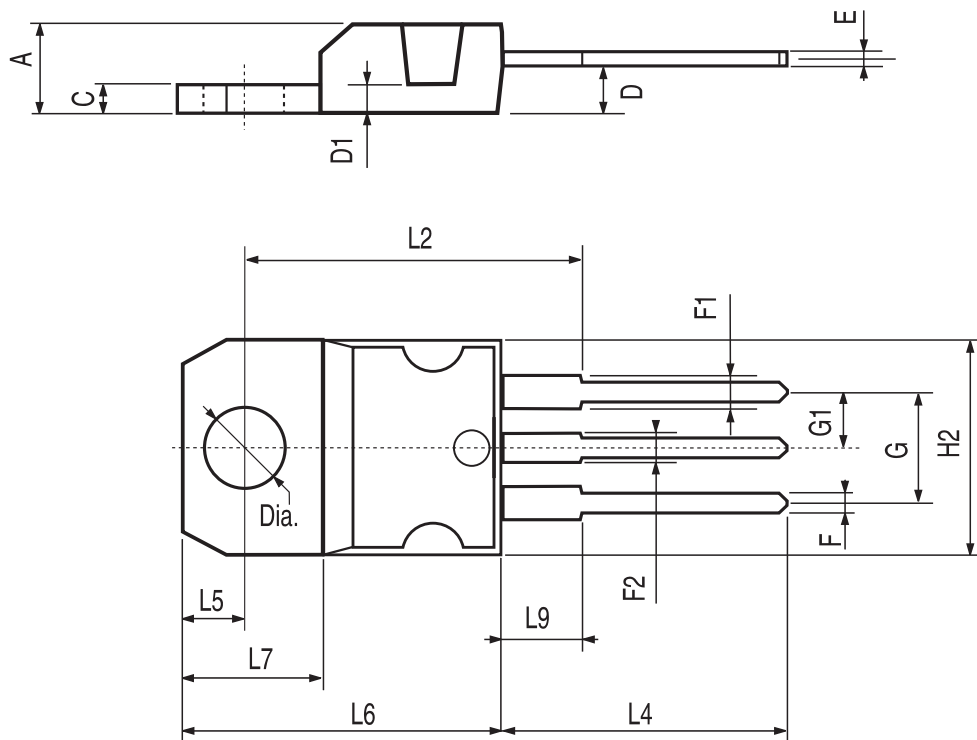
7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK[®] packages. These packages have a lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

[查询"L7912ACD2T-TR"供应商](#)

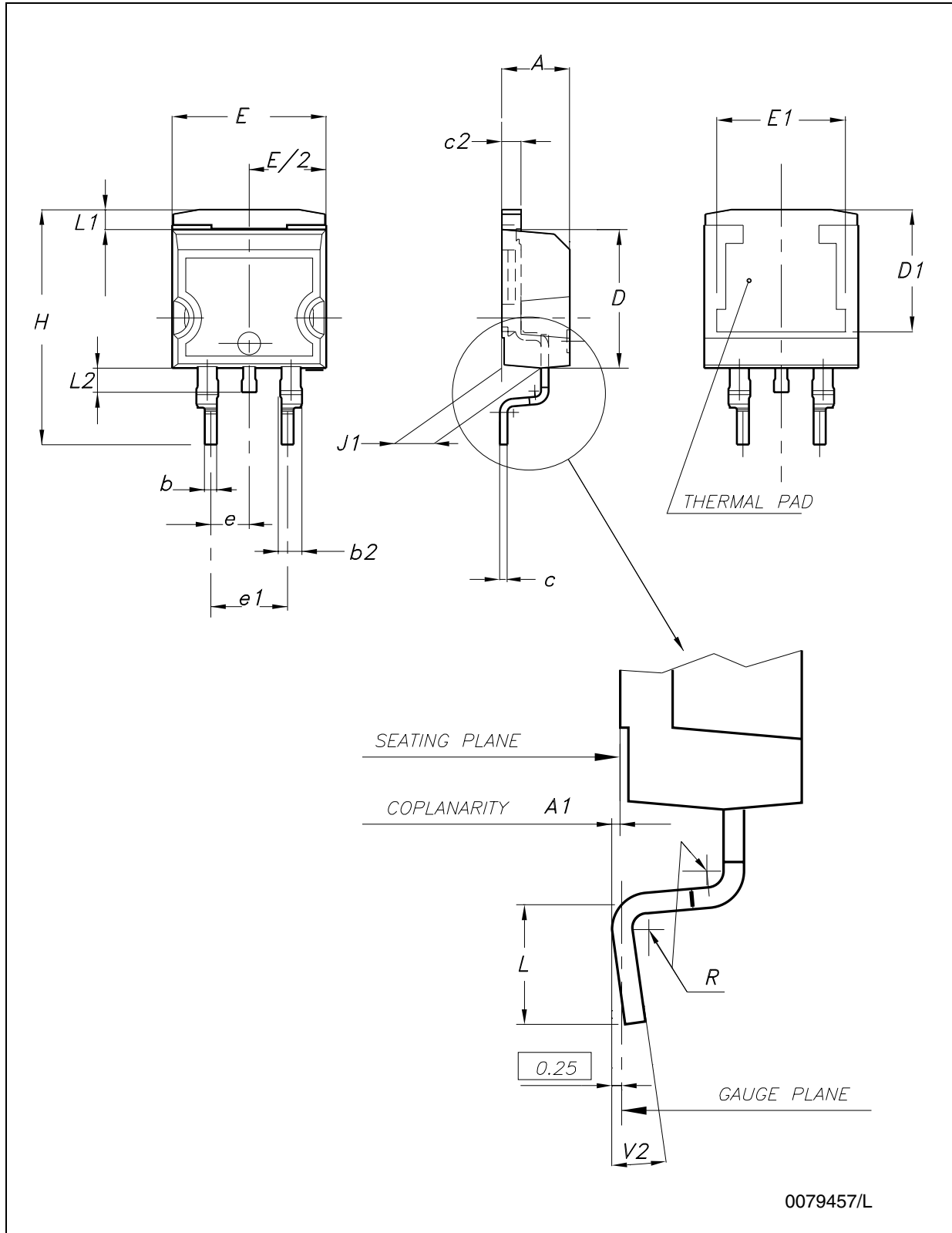
TO-220 mechanical data

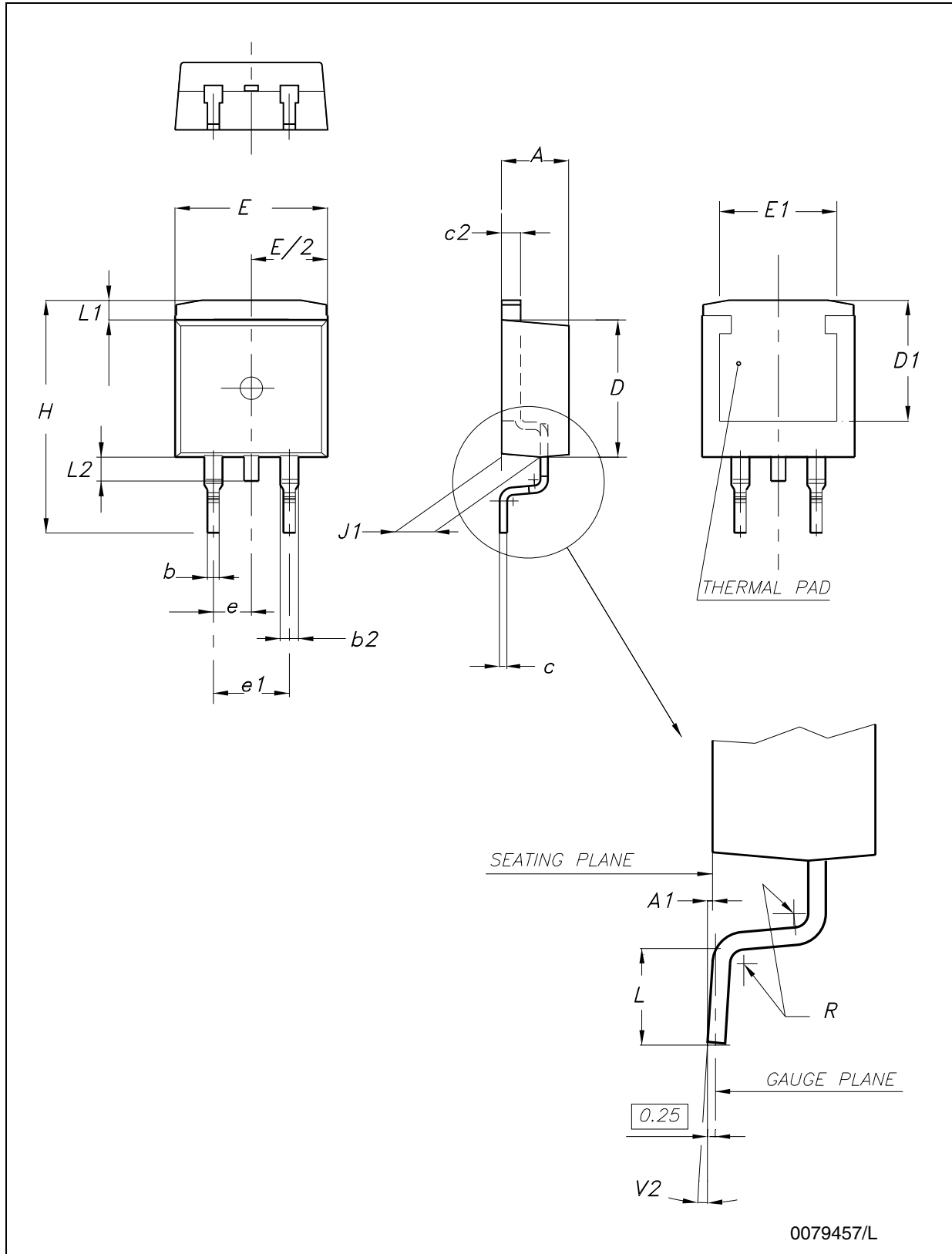
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



[查询"L7912ACD2T-TR"供应商](#)

Figure 8. Drawing dimension D²PAK (type STD-ST)



[查询"L7912ACD2T-TR"供应商](#)Figure 9. Drawing dimension D²PAK (type WOOSEOK-subcon.)

[查询"L7912ACD2T-TR"供应商](#)

Table 7. 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.

[查询"L7912ACD2T-TR"供应商](#)

Figure 10. D²PAK footprint recommended data

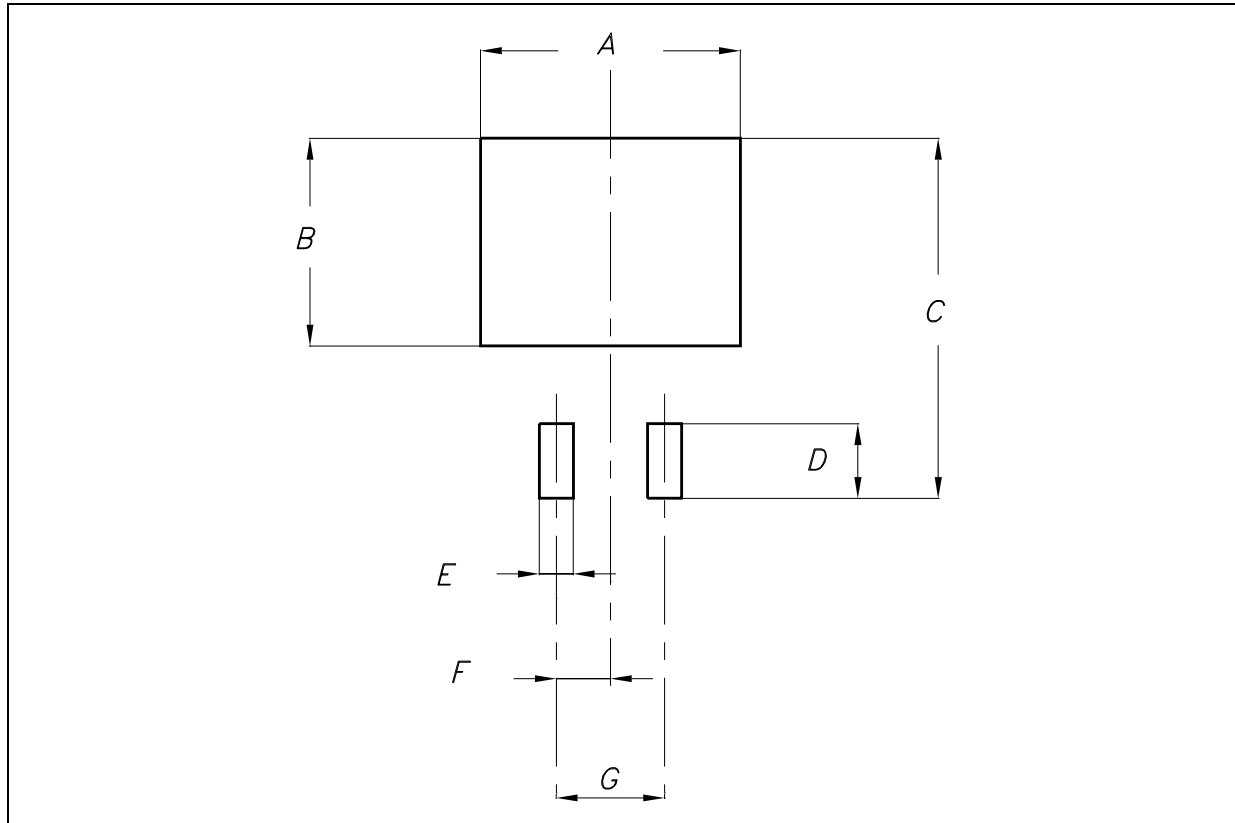


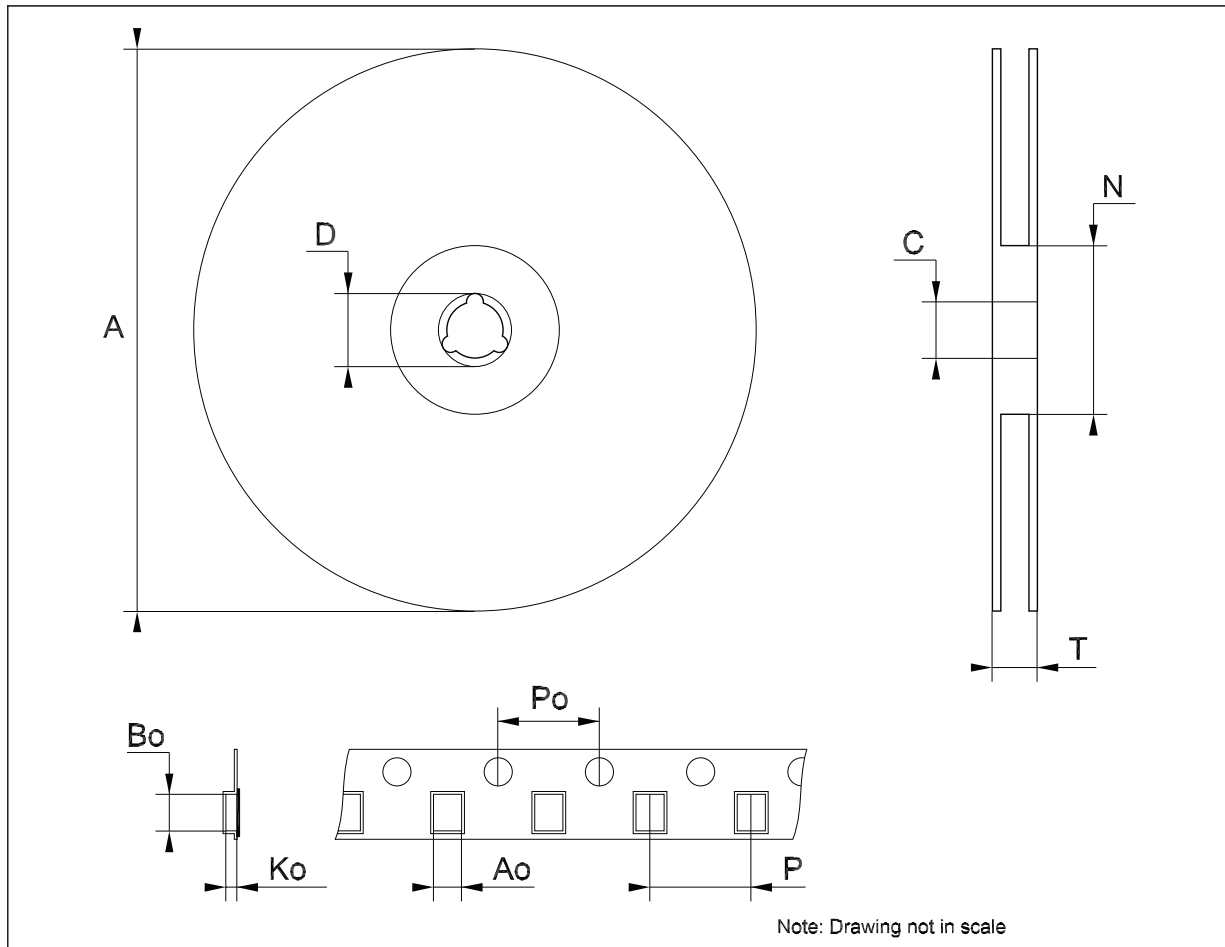
Table 8. Footprint data

Dim.	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

[查询"L7912ACD2T-TR"供应商](#)

Tape & reel D²PAK-P²PAK-D²PAK/A-P²PAK/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



[查询"L7912ACD2T-TR"供应商](#)

8 Revision history

Table 9. Document revision history

Date	Revision	Changes
22-Jun-2004	7	Order codes updated.
12-Dec-2007	8	Added: Table 1 .
18-Feb-2008	9	Modified: Table 1 on page 1 .

[查询"L7912ACD2T-TR"供应商](#)**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2008 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com