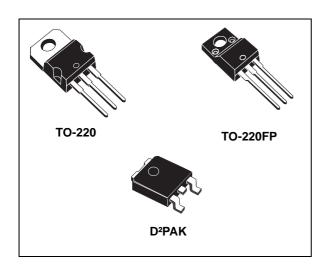


Negative voltage regulators

Datasheet - production data



Features

- Output current up to 1.5 A
- Output voltages of 5; 8; 12; 15 V
- Thermal overload protection
- Short circuit protection
- Output transition SOA protection
- Output tolerance 2% (AC version) or 4% (C version) at 25°C

Description

The L79 series of three-terminal negative regulators is available in TO-220, TO-220FP and D²PAK packages and several fixed output voltages, making it useful in a wide range of applications. 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 L78 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.

	Order codes						
TO-220 (single gauge)	TO-220 (dual gauge)	D²PAK	TO-220FP	Output voltages			
L7905ACV	L7905ACV-DG	L7905ACD2T-TR		- 5 V			
L7905CV	L7905CV-DG	L7905CD2T-TR	L7905CP	- 5 V			
L7908CV	L7908CV-DG			- 8 V			
L7912ACV	L7912ACV-DG			- 12 V			
L7912CV	L7912CV-DG	L7912CD2T-TR	L7912CP	- 12 V			
L7915ACV	L7915ACV-DG			- 15 V			
L7915CV	L7915CV-DG		L7915CP	- 15 V			

Table 1. Device summary

Contents

1	Diagram	3
2	Pin configuration	4
3	Maximum ratings	5
4	Test circuit	6
5	Electrical characteristics	7
6	Application information	4
7	Package mechanical data 16	6
8	Packaging mechanical data 28	5
9	Revision history	7



1 Diagram

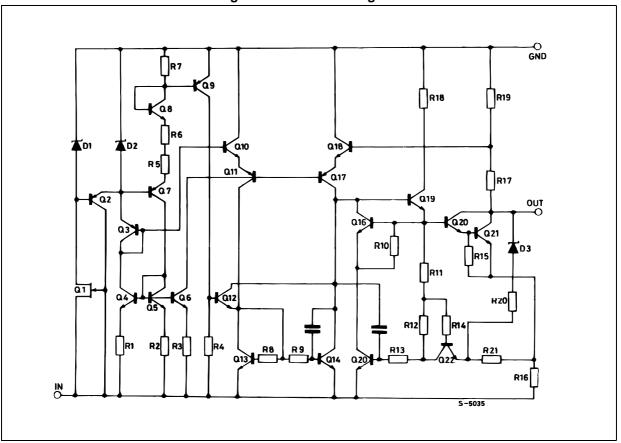
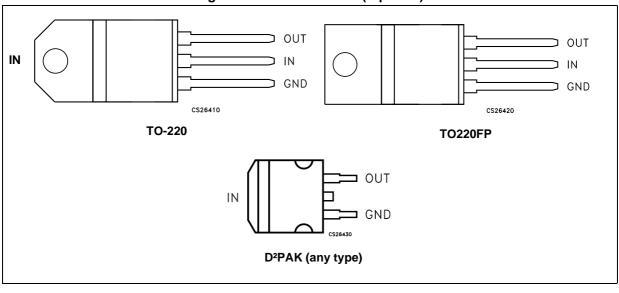


Figure 1. Schematic diagram



2 Pin configuration







3 Maximum ratings

Table 2. Absolute maximum	ratings
---------------------------	---------

Symbol	Parameter		Value	Unit
VI	DC input voltage		-35	V
Ι _Ο	Output current		Internally limited	
PD	Power dissipation		Internally limited	
T _{STG}	Storage temperature range		-65 to 150	°C
т	Operating junction temperature range	for L79xxC	0 to 150	°C
Т _{ОР}	Operating junction temperature range	for L79xxAC	0 to 125	C

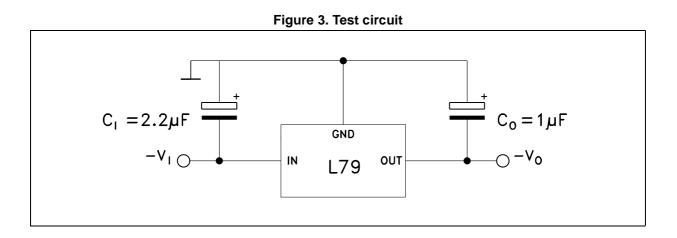
Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

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

Table 3. Thermal data



4 Test circuit





5 Electrical characteristics

Refer to the test circuits, T_J = 0 to 125 °C, V_I = -10 V, I_O = 500 mA, C_I = 2.2 $\mu F,$ C_O = 1 μF unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit	
Vo	Output voltage	$T_J = 25^{\circ}C$	-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	
$\Delta V_0^{(1)}$	Line regulation	$V_{I} = -7 \text{ to } -25 \text{ V}, \text{T}_{J} = 25^{\circ}\text{C}$			100	mV	
Δv0, ,	Line regulation	$V_{I} = -8 \text{ to } -12 \text{ V}, \text{ T}_{J} = 25^{\circ}\text{C}$			50	IIIV	
$\Delta V_0^{(1)}$	l a s d as av de tie a	$I_0 = 5 \text{ mA to } 1.5 \text{ A}, T_J = 25^{\circ}\text{C}$			100	- mV	
740. 1	Load regulation	$I_{O} = 250 \text{ to } 750 \text{ mA}, T_{J} = 25^{\circ}\text{C}$			50		
I _d	Quiescent current	$T_J = 25^{\circ}C$			3	mA	
41		$I_0 = 5 \text{ mA to 1 A}$			0.5	mA	
ΔI_d	Quiescent current change	V _I = -8 to -25 V			1.3	ША	
$\Delta V_{O} / \Delta T$	Output voltage drift	I _O = 5 mA		-0.4		mV/°C	
eN	Output noise voltage	B = 10 Hz to 100 kHz, $T_J = 25^{\circ}C$		100		μV	
SVR	Supply voltage rejection	ΔV _I = 10 V, f = 120 Hz	54	60		dB	
V _d	Dropout voltage	$I_{O} = 1 \text{ A}, \text{ T}_{J} = 25^{\circ}\text{C}, \Delta V_{O} = 100 \text{ mV}$		1.4		V	
I _{sc}	Short circuit current			2.1		А	
I _{scp}	Short circuit peak current	$T_J = 25^{\circ}C$		2.5		А	



Refer to the test circuits, T_J = 0 to 125 °C, V_I = -10 V, I_O = 500 mA, C_I = 2.2 μ F, C_O = 1 μ F unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
Vo	Output voltage	$T_J = 25^{\circ}C$	-4.8	-5	-5.2	V
Vo	Output voltage	I_{O} = -5 mA to -1 A, P_{O} \leq 15 W V_{I} = -8 to -20 V	-4.75	-5	-5.25	V
$\Delta V_{O}^{(1)}$	Line regulation	$V_{I} = -7 \text{ to } -25 \text{ V}, \text{T}_{J} = 25^{\circ}\text{C}$			100	mV
Δνο. ,		$V_{I} = -8 \text{ to } -12 \text{ V}, \text{ T}_{J} = 25^{\circ}\text{C}$			50	
ΔV _O ⁽¹⁾		$I_0 = 5 \text{ mA to } 1.5 \text{ A}, T_J = 25^{\circ}\text{C}$			100	mV
Δνο. ,	Load regulation	I _O = 250 to 750 mA, T _J = 25°C			50	
I _d	Quiescent current	$T_J = 25^{\circ}C$			3	mA
41	Quiescent current change	$I_0 = 5 \text{ mA to 1 A}$			0.5	mA
ΔI_d	Quiescent current change	V ₁ = -8 to -25 V			1.3	IIIA
$\Delta V_O / \Delta T$	Output voltage drift	I _O = 5 mA		-0.4		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, $T_J = 25^{\circ}C$		100		μV
SVR	Supply voltage rejection	ΔV _I = 10 V, f = 120 Hz	54	60		dB
V _d	Dropout voltage	$I_{O} = 1 \text{ A}, \text{ T}_{J} = 25^{\circ}\text{C}, \Delta V_{O} = 100 \text{ mV}$		1.4		V
I _{sc}	Short circuit current			2.1		А

Table 5. Electrical characteristics of L7905C



Refer to the test circuits, T_J = 0 to 125 °C, V_I = -14 V, I_O = 500 mA, C_I = 2.2 μ F, C_O = 1 μ F unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
Vo	Output voltage	$T_J = 25^{\circ}C$	-7.7	-8	-8.3	V
V _O	Output voltage	I_{O} = -5 mA to -1 A, P_{O} \leq 15 W V_{I} = -11.5 to -23 V	-7.6	-8	-8.4	V
$\Delta V_0^{(1)}$	Line regulation	$V_{I} = -10.5 \text{ to } -25 \text{ V}, T_{J} = 25^{\circ}\text{C}$			160	mV
Δνο. ,	Line regulation	$V_{I} = -11$ to -17 V, $T_{J} = 25^{\circ}C$			80	IIIV
ΔV _O ⁽¹⁾		$I_0 = 5 \text{ mA to } 1.5 \text{ A}, T_J = 25^{\circ}\text{C}$			160	mV
Δνο. ,	Load regulation	I _O = 250 to 750 mA, T _J = 25°C			80	
I _d	Quiescent current	$T_{\rm J} = 25^{\circ}{\rm C}$			3	mA
41	Ouisseent surrent shores	$I_0 = 5 \text{ mA to 1 A}$			0.5	
ΔI_d	Quiescent current change	V _I = -11.5 to -25 V			1	mA
$\Delta V_O / \Delta T$	Output voltage drift	I _O = 5 mA		-0.6		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, $T_J = 25^{\circ}C$		175		μV
SVR	Supply voltage rejection	ΔV _I = 10 V, f = 120 Hz	54	60		dB
V _d	Dropout voltage	$I_{O} = 1 \text{ A}, \text{ T}_{J} = 25^{\circ}\text{C}, \Delta V_{O} = 100 \text{ mV}$		1.1		V
I _{sc}	Short circuit current			1.5		Α



Refer to the test circuits, T_J = 0 to 125 °C, V_I = -19 V, I_O = 500 mA, C_I = 2.2 μ F, C_O = 1 μ F unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
Vo	Output voltage	$T_J = 25^{\circ}C$	-11.75	-12	-12.25	V
Vo	Output voltage	I_O = -5 mA to -1 A, P_O \leq 15 W V_I = -15.5 to -27 V	-11.5	-12	-12.5	V
$\Delta V_{O}^{(1)}$		$V_{\rm I} = -14.5$ to -30 V, $T_{\rm J} = 25^{\circ}{\rm C}$			240	m)/
Δv _O ()	Line regulation	$V_{I} = -16 \text{ to } -22 \text{ V}, \text{ T}_{J} = 25^{\circ}\text{C}$			120	mV
$\Delta V_{O}^{(1)}$	Lood regulation	$I_{O} = 5 \text{ mA to } 1.5 \text{ A}, T_{J} = 25^{\circ}\text{C}$			240	- mV
Δv _O ()	Load regulation	$I_{O} = 250$ to 750 mA, $T_{J} = 25^{\circ}C$			120	
I _d	Quiescent current	$T_J = 25^{\circ}C$			3	mA
41		$I_{O} = 5 \text{ mA to } 1 \text{ A}$			0.5	
ΔI_d	Quiescent current change	V _I = -15 to -30 V			1	mA
$\Delta V_O / \Delta T$	Output voltage drift	I _O = 5 mA		-0.8		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, $T_J = 25^{\circ}C$		200		μV
SVR	Supply voltage rejection	ΔV _I = 10 V, f = 120 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		А
I _{scp}	Short circuit peak current	T _J = 25°C		2.5		А

Refer to the test circuits, T_J = 0 to 125 °C, V_I = -19 V, I_O = 500 mA, C_I = 2.2 μ F, C_O = 1 μ F unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit	
Vo	Output voltage	$T_J = 25^{\circ}C$	-11.5	-12	-12.5	V	
V _O	Output voltage	I_{O} = -5 mA to -1 A, P_{O} \leq 15 W V_{I} = -15.5 to -27 V	-11.4	-12	-12.6	V	
$\Delta V_0^{(1)}$	Line regulation	$V_{I} = -14.5 \text{ to } -30 \text{ V}, T_{J} = 25^{\circ}\text{C}$			240	mV	
Δνο()	Line regulation	$V_{I} = -16$ to -22 V, $T_{J} = 25^{\circ}C$			120	IIIV	
ΔV _O ⁽¹⁾	Load regulation	$I_0 = 5 \text{ mA to } 1.5 \text{ A}, T_J = 25^{\circ}\text{C}$			240	mV	
Δνο. ,		I _O = 250 to 750 mA, T _J = 25°C			120		
l _d	Quiescent current	$T_{\rm J} = 25^{\circ}{\rm C}$			3	mA	
41	Quiescent current change	$I_0 = 5 \text{ mA to 1 A}$			0.5	mA	
ΔI_d		V ₁ = -15 to -30 V			1	ШA	
$\Delta V_O / \Delta T$	Output voltage drift	I _O = 5 mA		-0.8		mV/°C	
eN	Output noise voltage	B = 10 Hz to 100 kHz, $T_J = 25^{\circ}C$		200		μV	
SVR	Supply voltage rejection	ΔV _I = 10 V, f = 120Hz	54	60		dB	
V _d	Dropout voltage	$I_{O} = 1 \text{ A}, \text{ T}_{J} = 25^{\circ}\text{C}, \Delta V_{O} = 100 \text{ mV}$		1.1		V	
I _{sc}	Short circuit current			1.5		Α	



Refer to the test circuits, T_J = 0 to 125 °C, V_I = -23 V, I_O = 500 mA, C_I = 2.2 μ F, C_O = 1 μ F unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
Vo	Output voltage	T _J = 25°C	-14.7	-15	-15.3	V
Vo	Output voltage	I_O = -5 mA to -1 A, P_O \leq 15 W V_I = -18.5 to -30 V	-14.4	-15	-15.6	V
A) (1)		V _I = -17.5 to -30 V, T _J = 25°C			300	m)/
$\Delta V_{O}^{(1)}$	Line regulation	$V_{I} = -20$ to -26 V, $T_{J} = 25^{\circ}C$			150	mV
$\Delta V_{O}^{(1)}$	Lood regulation	$I_{O} = 5 \text{ mA to } 1.5 \text{ A}, T_{J} = 25^{\circ}\text{C}$			300	mV
$\Delta V_0^{(1)}$	Load regulation	$I_{O} = 250$ to 750 mA, $T_{J} = 25^{\circ}C$			150	
I _d	Quiescent current	$T_J = 25^{\circ}C$			3	mA
41	Quiescent current change	$I_{O} = 5 \text{ mA to } 1 \text{ A}$			0.5	- mA
ΔI_d		V _I = -18.5 to -30 V			1	
$\Delta V_{O} / \Delta T$	Output voltage drift	I _O = 5 mA		-0.9		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, $T_J = 25^{\circ}C$		250		μV
SVR	Supply voltage rejection	ΔV _I = 10 V, f = 120 Hz	54	60		dB
V _d	Dropout voltage	I_{O} = 1 A, T_{J} = 25°C, ΔV_{O} = 100 mV		1.1		V
I _{sc}	Short circuit current			1.3		А
I _{scp}	Short circuit peak current	T _J = 25°C		2.5		А

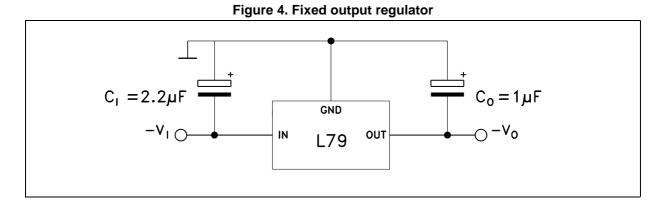
Table 9. Electrical characteristics of L7915AC

Refer to the test circuits, T_J = 0 to 125 °C, V_I = -23 V, I_O = 500 mA, C_I = 2.2 μ F, C_O = 1 μ F unless otherwise specified.

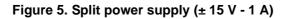
Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit	
Vo	Output voltage	$T_{\rm J} = 25^{\circ}{\rm C}$	-14.4	-15	-15.6	V	
V _O	Output voltage	I_{O} = -5 mA to -1 A, P_{O} \leq 15 W V_{I} = -18.5 to -30 V	-14.3	-15	-15.7	V	
$\Delta V_0^{(1)}$	Line regulation	$V_{I} = -17.5$ to -30 V, $T_{J} = 25^{\circ}C$			300		
Δv ₀ ()	Line regulation	$V_{I} = -20$ to -26 V, $T_{J} = 25^{\circ}C$			150	mV	
$\Delta V_0^{(1)}$	Load regulation	$I_0 = 5 \text{ mA to } 1.5 \text{ A}, T_J = 25^{\circ}\text{C}$			300	mV	
ΔνΟ()		$I_{O} = 250$ to 750 mA, $T_{J} = 25^{\circ}C$			150		
I _d	Quiescent current	$T_{\rm J} = 25^{\circ}{\rm C}$			3	mA	
41	Quiescent current change	$I_0 = 5 \text{ mA to 1 A}$			0.5	mA	
ΔI_d		V _I = -18.5 to -30 V			1	IIIA	
$\Delta V_{O} / \Delta T$	Output voltage drift	I _O = 5 mA		-0.9		mV/°C	
eN	Output noise voltage	B = 10 Hz to 100 kHz, $T_J = 25^{\circ}C$		250		μV	
SVR	Supply voltage rejection	$\Delta V_{I} = 10 \text{ V}, \text{ f} = 120 \text{ Hz}$	54	60		dB	
V _d	Dropout voltage	$I_{O} = 1 \text{ A}, \text{ T}_{J} = 25^{\circ}\text{C}, \Delta V_{O} = 100 \text{ mV}$		1.1		V	
I _{sc}	Short circuit current			1.3		Α	

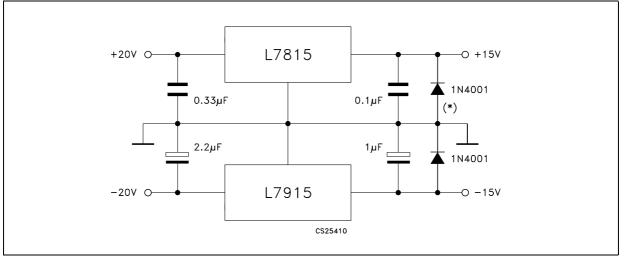


6 Application information



Note: C_1 is required for stability. For value given, capacitor must be solid tantalum. If aluminium electrolytic are used, at least ten times value should be selected. C_0 is required if regulator is located an appreciable distance from power supply filter. 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.





(*) Against potential latch-up problems.



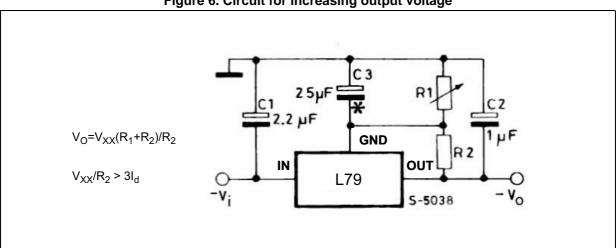


Figure 6. Circuit for increasing output voltage

C3 Optional for improved transient response and ripple rejection.

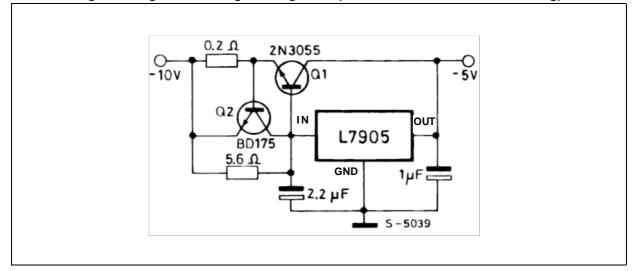


Figure 7. High current negative regulator (- 5 V / 4 A with 5 A current limiting)



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.

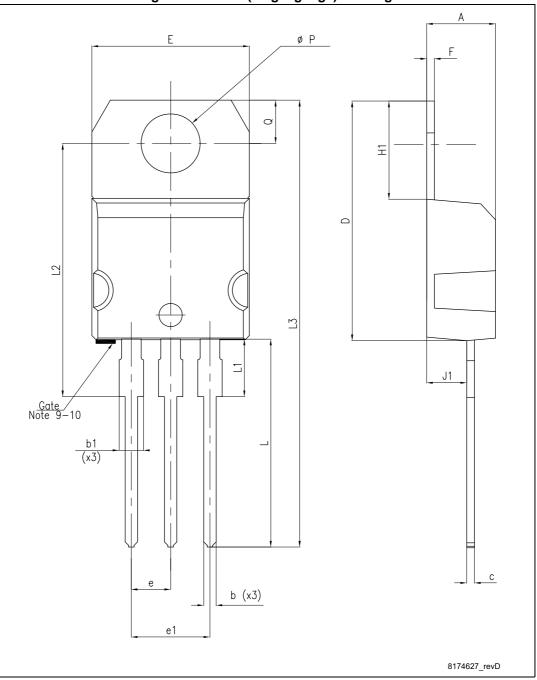


Figure 8. TO-220 (single gauge) drawing

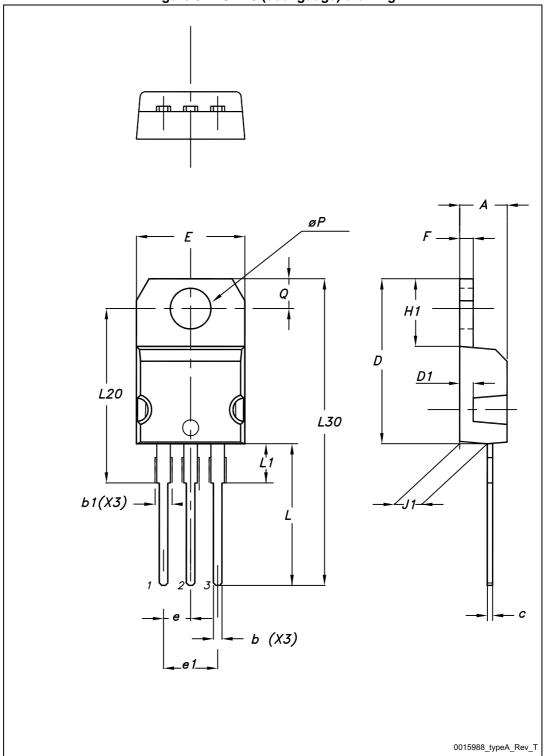




Dim	mm					
Dim. —	Min.	Тур.	Max.			
А	4.40		4.60			
b	0.61		0.88			
b1	1.14		1.70			
с	0.48		0.70			
D	15.25		15.75			
E	10		10.40			
е	2.40		2.70			
e1	4.95		5.15			
F	0.51		0.60			
H1	6.20		6.60			
J1	2.40		2.72			
L	13		14			
L1	3.50		3.93			
L20		16.40				
L30		28.90				
ØР	3.75		3.85			
Q	2.65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

Table 11. TO-220 (single gauge) mechanical data







		mm	
Dim. —	Min.	Тур.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
с	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
е	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
ØР	3.75		3.85
Q	2.65		2.95

Table 12. TO-220 (dual gauge) mechanical data



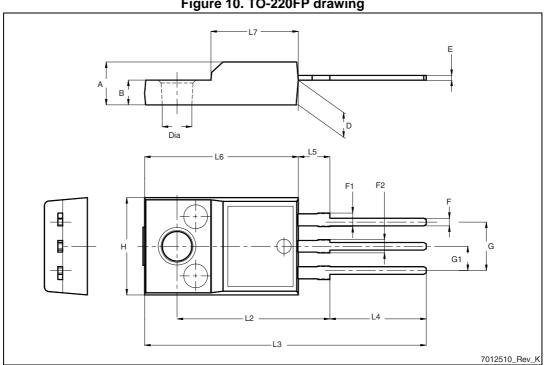


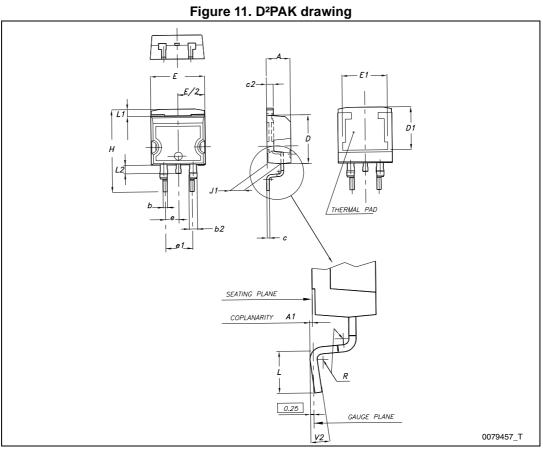
Figure 10. TO-220FP drawing



Dim.	mm					
Dini.	Min.	Тур.	Max.			
A	4.4		4.6			
В	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			
Н	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			

Table 13. TO-220FP mechanical data





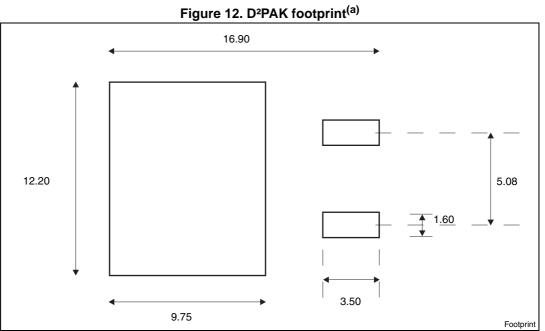




Dia		mm	
Dim. —	Min.	Тур.	Max.
А	4.40		4.60
A1	0.03		0.23
b	0.70		0.93
b2	1.14		1.70
С	0.45		0.60
c2	1.23		1.36
D	8.95		9.35
D1	7.50		
E	10		10.40
E1	8.50		
е		2.54	
e1	4.88		5.28
Н	15		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
L2	1.30		1.75
R		0.4	
V2	0°		8°

Table 14. D²PAK mechanical data





a. All dimensions are in millimeters.

DocID2149 Rev 22

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8 Packaging mechanical data

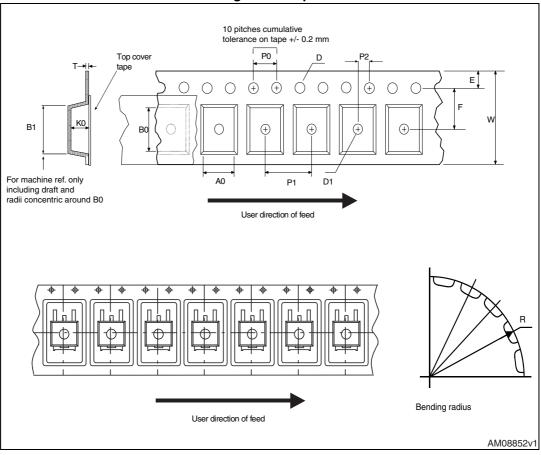
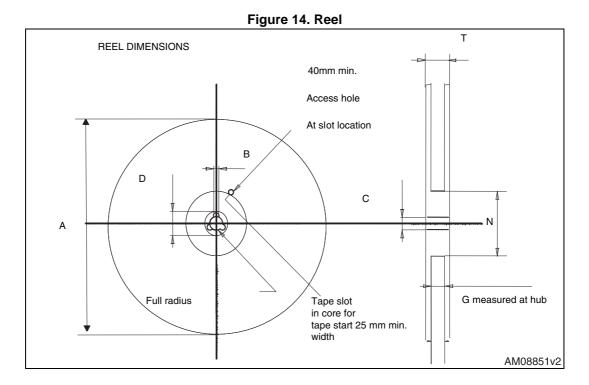


Figure 13. Tape





	Таре			Reel		
mm				mm		
Dim. —	Min.	Max.	— Dim. –	Min.	Max.	
A0	10.5	10.7	A		330	
B0	15.7	15.9	В	1.5		
D	1.5	1.6	С	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	Т		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				•	
Т	0.25	0.35				
W	23.7	24.3				

Table 15. D²PAK tape and reel mechanical data



9 on

9 Revision history

18

19

20

21

22

page 1.

Minor text changes.

Revision	Changes
9	Order codes updated Table 3.
10	Add new order codes (TO-220 E Type) on Table 3.
11	D ² PAK mechanical data updated and add footprint data.
12	Order codes updated.
13	Modified: Figure 3, Figure 4, Figure 6 and Figure 7.
14	Modified: Table 1.
15	Modified: Table 1 on page 1.
16	Modified: Table 1 on page 1.
17	Modified: Table 11 on page 14, added: Figure 8 on page 16, Figure page 17, Figure 10 and Figure 11 on page 18.
	9 10 11 12 13 14 15 16

Modified: V_I parameter Table 2 on page 5.

Modified: R_{thJC} value for TO-220 Table 3 on page 5.

Added: order codes L7908CV-DG *Table 1 on page 1*. Part numbers L79xxC and L79xxAC changed to L79. Updated the features and the description in cover page.

information, Section 7: Package mechanical data. Added Section 8: Packaging mechanical data.

Added: order codes L7905CV-DG, L7912CV-DG and L7915CV-DG Table 1 on

Updated Table 1: Device summary, Section 3: Maximum ratings, Section 4:

Test circuit, Section 5: Electrical characteristics, Section 6: Application

Table 16.	Document	revision	history
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26-May-2010

12-Nov-2010

18-Nov-2011

15-May-2012

04-Jun-2014

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