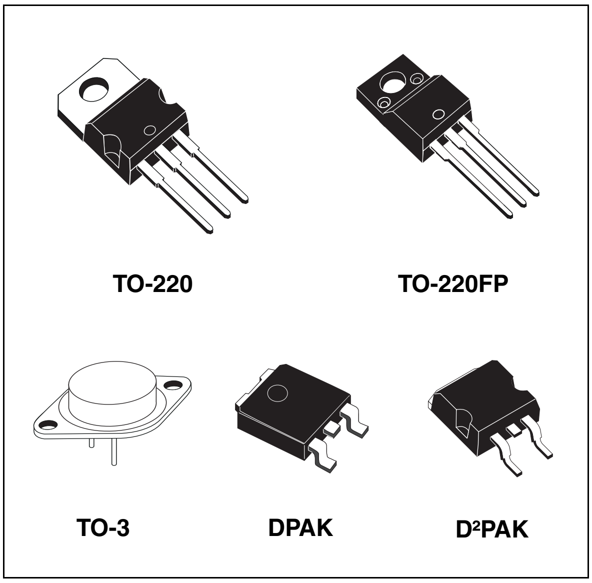
L78xx - L78xxC
L78xxAB - L78xxAC

Positive voltage regulators



Features

- Output current up to 1.5 A
- Output voltages of 5; 6; 8; 8.5; 9; 12; 15; 18; 24 V
- Thermal overload protection
- Short circuit protection
- Output transition SOA protection
- 2 % output voltage tolerance (A version)
- Guaranteed in extended temperature range (A version)

Description

The L78xx series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-3, D²PAK and DPAK 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. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

Table 1. Device summary

Part numbers			
L7805	L7806AC	L7809AB	L7815AB
L7805C	L7808C	L7809AC	L7815AC
L7805AB	L7808AB	L7812C	L7818C
L7805AC	L7808AC	L7812AB	L7824C
L7806C	L7885C	L7812AC	L7824AB
L7806AB	L7809C	L7815C	L7824AC

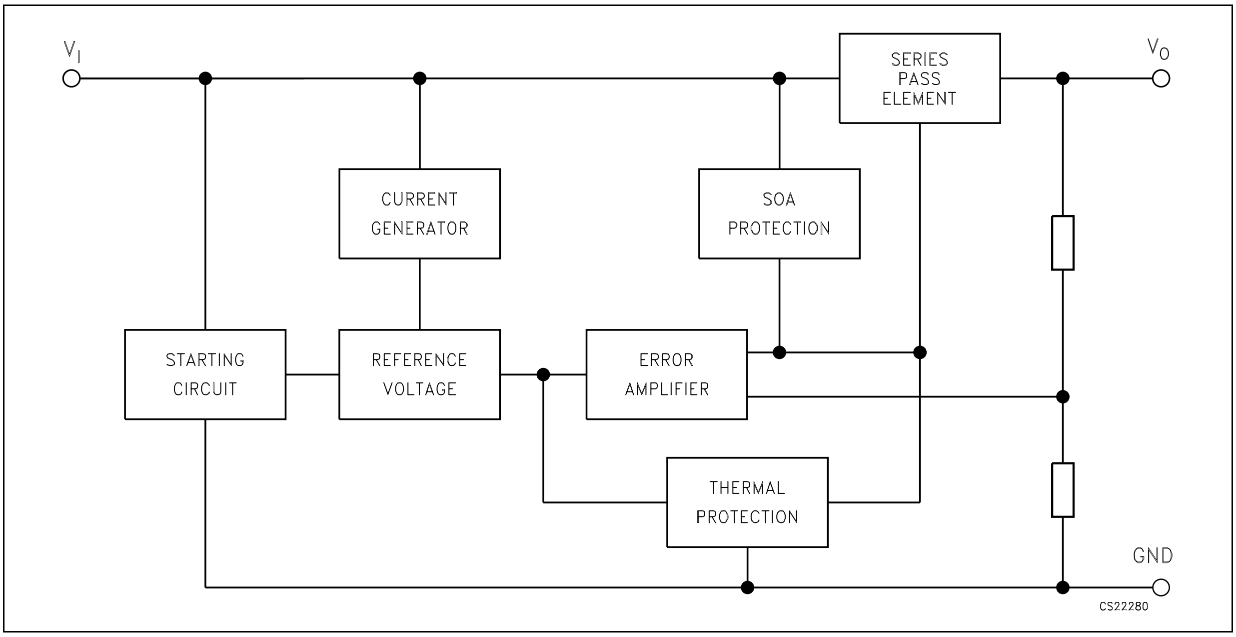
Contents

List of tables

List of figures

1 Diagram

Figure 1. Block diagram



2 Pin configuration

Figure 2. Pin connections (top view)

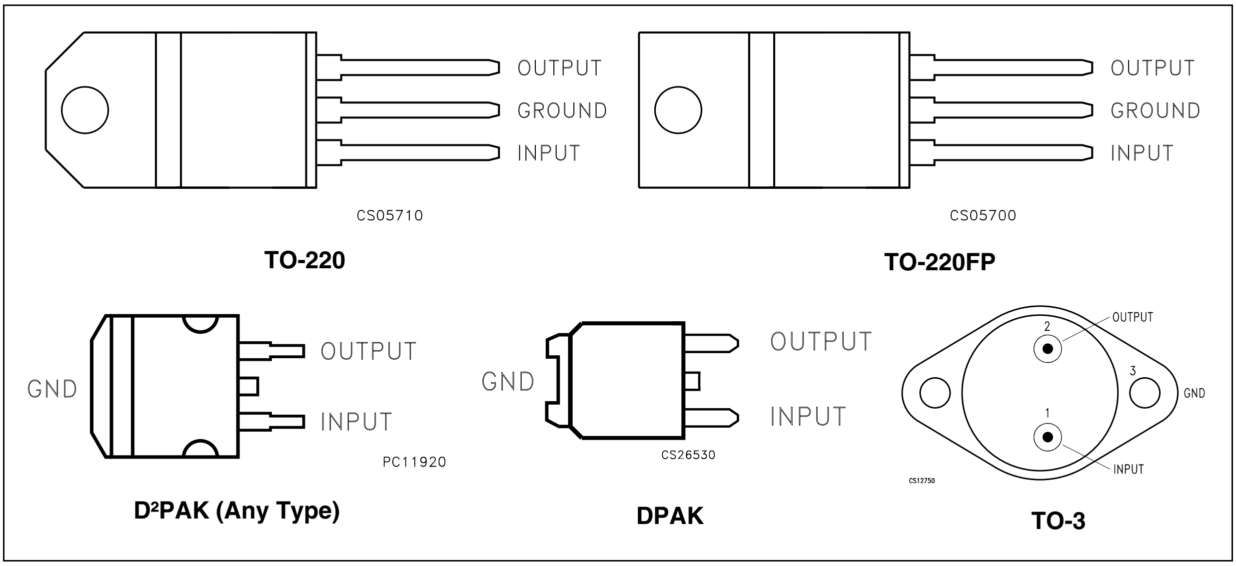
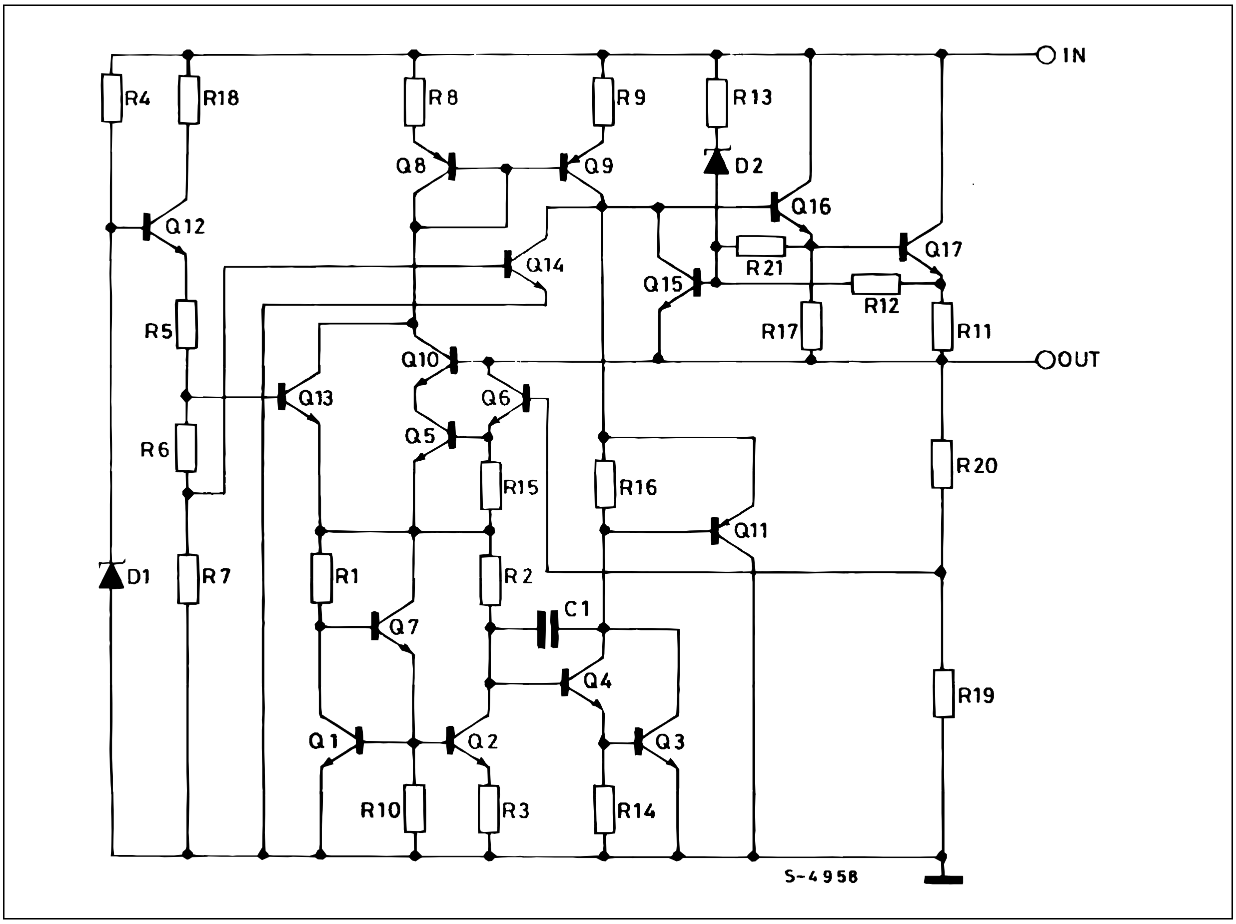


Figure 3. Schematic diagram



3 Maximum ratings

Table 2. Absolute maximum ratings

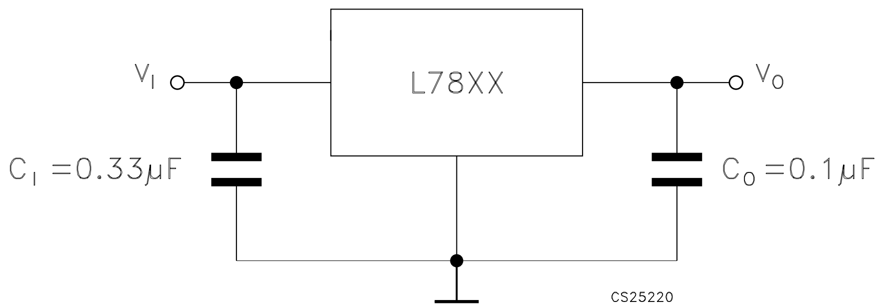
Symbol	Parameter		Value	Unit
V_I	DC input voltage	for V_O= 5 to 18 V	35	V
		for V_O= 20, 24 V	40	
I_O	Output current		Internally limited	
P_D	Power dissipation		Internally limited	
T_{STG}	Storage temperature range		-65 to 150	°C
T_{OP}	Operating junction temperature range	for L78xx	-55 to 150	°C
		for L78xxC, L78xxAC	0 to 125	
		for L78xxAB	-40 to 125	

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	D²PAK	DPAK	TO-220	TO-220FP	TO-3	Unit
R_{thJC}	Thermal resistance junction-case	3	8	5	5	4	°C/W
R_{thJA}	Thermal resistance junction-ambient	62.5	100	50	60	35	°C/W

Figure 4. Application circuits



4 Test circuits

Figure 5. DC parameter

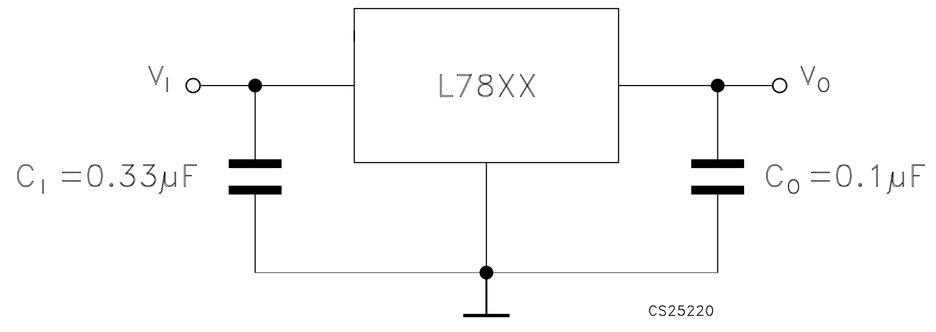


Figure 6. Load regulation

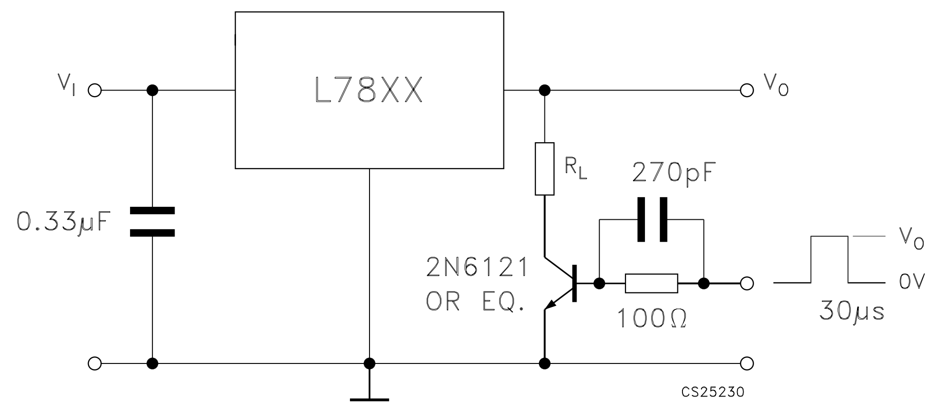
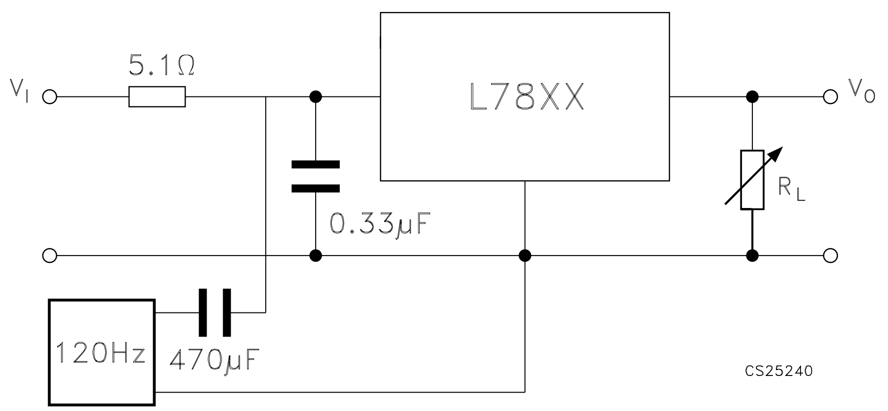


Figure 7. Ripple rejection



5 Electrical characteristics

Refer to the test circuits, T_J = -55 to 150 °C, V_I = 10 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 4. Electrical characteristics of L7805

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	4.8	5	5.2	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 8 to 20 V	4.65	5	5.35	V
ΔV_O(1)	Line regulation	V_I = 7 to 25 V, T_J = 25°C		3	50	mV
		V_I = 8 to 12 V, T_J = 25°C		1	25	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			100	mV
		I_O = 250 to 750 mA, T_J = 25°C			25	
I_d	Quiescent current	T_J = 25°C			6	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 8 to 25 V			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		0.6		mV/°C
eN	Output noise voltage	B =10 Hz to 100 kHz, T_J = 25°C			40	µV/V_O
SVR	Supply voltage rejection	V_I = 8 to 18 V, f = 120 Hz	68			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2	2.5	V
R_O	Output resistance	f = 1 kHz		17		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.75	1.2	A
I_{scp}	Short circuit peak current	T_J = 25°C	1.3	2.2	3.3	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.

V_I = 10 V, I_O = 1 A, T_J = 0 to 125 °C (L7805AC), T_J = -40 to 125 °C (L7805AB), unless otherwise specified.

Table 5. Electrical characteristics of L7805A

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	4.9	5	5.1	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 7.5 to 18 V	4.8	5	5.2	V
V_O	Output voltage	I_O = 1 A, V_I = 18 to 20 V, T_J = 25°C	4.8	5	5.2	V
ΔV_O (1)	Line regulation	V_I = 7.5 to 25 V, I_O = 500 mA		7	50	mV
		V_I = 8 to 12 V		10	50	mV
		V_I = 8 to 12 V, T_J = 25°C		2	25	mV
		V_I = 7.3 to 20 V, T_J = 25°C		7	50	mV
ΔV_O (1)	Load regulation	I_O = 5 mA to 1 A		25	100	mV
		I_O = 5 mA to 1.5 A, T_J = 25°C		30	100	V
		I_O = 250 to 750 mA		8	50	V
I_q	Quiescent current	T_J = 25°C		4.3	6	mA
					6	mA
ΔI_q	Quiescent current change	V_I = 8 to 23 V, I_O = 500 mA			0.8	mA
		V_I = 7.5 to 20 V, T_J = 25°C			0.8	mA
		I_O = 5 mA to 1 A			0.5	mA
SVR	Supply voltage rejection	V_I = 8 to 18 V, f = 120 Hz, I_O = 500 mA		68		dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
eN	Output noise voltage	T_A = 25°C, B =10 Hz to 100 kHz		10		$\mu V/V_O$
R_O	Output resistance	f = 1 kHz		17		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_A = 25°C		0.2		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		A
$\Delta V_O/\Delta T$	Output voltage drift			-1.1		mV/°C

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.

V_I = 11 V, I_O = 1 A, TJ = 0 to 125 °C (L7806AC), T_J = -40 to 125 °C (L7806AB), unless otherwise specified.

Table 6. Electrical characteristics of L7806A

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	5.88	6	6.12	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 8.6 to 19 V	5.76	6	6.24	V
V_O	Output voltage	I_O = 1 A, V_I = 19 to 21 V, T_J = 25°C	5.76	6	6.24	V
ΔV_O (1)	Line regulation	V_I = 8.6 to 25 V, I_O = 500 mA		9	60	mV
		V_I = 9 to 13 V		11	60	mV
		V_I = 9 to 13 V, T_J = 25°C		3	30	mV
		V_I = 8.3 to 21 V, T_J = 25°C		9	60	mV
ΔV_O (1)	Load regulation	I_O = 5 mA to 1 A		25	100	mV
		I_O = 5 mA to 1.5 A, T_J = 25°C		30	100	V
		I_O = 250 to 750 mA		10	50	V
I_q	Quiescent current	T_J = 25°C		4.3	6	mA
					6	mA
ΔI_q	Quiescent current change	V_I = 9 to 24 V, I_O = 500 mA			0.8	mA
		V_I = 8.6 to 21 V, T_J = 25°C			0.8	mA
		I_O = 5 mA to 1 A			0.5	mA
SVR	Supply voltage rejection	V_I = 9 to 19 V, f = 120 Hz, I_O = 500 mA		65		dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
eN	Output noise voltage	T_A = 25°C, B =10 Hz to 100 kHz		10		µV/V_O
R_O	Output resistance	f = 1 kHz		17		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_A = 25°C		0.2		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		A
$\Delta V_O/\Delta T$	Output voltage drift			-0.8		mV/°C

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.

V_I = 14 V, I_O = 1 A, TJ = 0 to 125 °C (L7808AC), T_J = -40 to 125 °C (L7808AB), unless otherwise specified.

Table 7. Electrical characteristics of L7808A

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	7.84	8	8.16	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 10.6 to 21 V	7.7	8	8.3	V
V_O	Output voltage	I_O = 1 A, V_I = 21 to 23 V, T_J = 25°C	7.7	8	8.3	V
ΔV_O (1)	Line regulation	V_I = 10.6 to 25 V, I_O = 500 mA		12	80	mV
		V_I = 11 to 17 V		15	80	mV
		V_I = 11 to 17 V, T_J = 25°C		5	40	mV
		V_I = 10.4 to 23 V, T_J = 25°C		12	80	mV
ΔV_O (1)	Load regulation	I_O = 5 mA to 1 A		25	100	mV
		I_O = 5 mA to 1.5 A, T_J = 25°C		30	100	V
		I_O = 250 to 750 mA		10	50	V
I_q	Quiescent current	T_J = 25°C		4.3	6	mA
					6	mA
ΔI_q	Quiescent current change	V_I = 11 to 23 V, I_O = 500 mA			0.8	mA
		V_I = 10.6 to 23 V, T_J = 25°C			0.8	mA
		I_O = 5 mA to 1 A			0.5	mA
SVR	Supply voltage rejection	V_I = 11.5 to 21.5 V, f = 120 Hz, I_O = 500 mA		62		dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
eN	Output noise voltage	T_A = 25°C, B =10 Hz to 100 kHz		10		µV/V_O
R_O	Output resistance	f = 1 kHz		18		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_A = 25°C		0.2		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		A
$\Delta V_O/\Delta T$	Output voltage drift			-0.8		mV/°C

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.

V_I = 15 V, I_O = 1 A, TJ = 0 to 125 °C (L7809AC), T_J = -40 to 125 °C (L7809AB), unless otherwise specified.

Table 8. Electrical characteristics of L7809A

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	8.82	9	9.18	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 10.6 to 22 V	8.65	9	9.35	V
V_O	Output voltage	I_O = 1 A, V_I = 22 to 24 V, T_J = 25°C	8.65	9	9.35	V
ΔV_O (1)	Line regulation	V_I = 10.6 to 25 V, I_O = 500 mA		12	90	mV
		V_I = 11 to 17 V		15	90	mV
		V_I = 11 to 17 V, T_J = 25°C		5	45	mV
		V_I = 10.4 to 23 V, T_J = 25°C		12	90	mV
ΔV_O (1)	Load regulation	I_O = 5 mA to 1 A		25	100	mV
		I_O = 5 mA to 1.5 A, T_J = 25°C		30	100	V
		I_O = 250 to 750 mA		10	50	V
I_q	Quiescent current	T_J = 25°C		4.3	6	mA
					6	mA
ΔI_q	Quiescent current change	V_I = 11 to 25 V, I_O = 500 mA			0.8	mA
		V_I = 10.6 to 23 V, T_J = 25°C			0.8	mA
		I_O = 5 mA to 1 A			0.5	mA
SVR	Supply voltage rejection	V_I = 11.5 to 21.5 V, f = 120 Hz, I_O = 500 mA		61		dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
eN	Output noise voltage	T_A = 25°C, B =10 Hz to 100 kHz		10		$\mu V/V_O$
R_O	Output resistance	f = 1 kHz		18		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_A = 25°C		0.2		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		A
$\Delta V_O/\Delta T$	Output voltage drift			-0.8		mV/°C

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.

V_I = 19 V, I_O = 1 A, TJ = 0 to 125 °C (L7812AC), T_J = -40 to 125 °C (L7812AB), unless otherwise specified.

Table 9. Electrical characteristics of L7812A

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	11.75	12	12.25	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 14.8 to 25 V	11.5	12	12.5	V
V_O	Output voltage	I_O = 1 A, V_I = 25 to 27 V, T_J = 25°C	11.5	12	12.5	V
ΔV_O (1)	Line regulation	V_I = 14.8 to 30 V, I_O = 500 mA		13	120	mV
		V_I = 16 to 12 V		16	120	mV
		V_I = 16 to 12 V, T_J = 25°C		6	60	mV
		V_I = 14.5 to 27 V, T_J = 25°C		13	120	mV
ΔV_O (1)	Load regulation	I_O = 5 mA to 1 A		25	100	mV
		I_O = 5 mA to 1.5 A, T_J = 25°C		30	100	V
		I_O = 250 to 750 mA		10	50	V
I_q	Quiescent current	T_J = 25°C		4.4	6	mA
					6	mA
ΔI_q	Quiescent current change	V_I = 15 to 30 V, I_O = 500 mA			0.8	mA
		V_I = 14.8 to 27 V, T_J = 25°C			0.8	mA
		I_O = 5 mA to 1 A			0.5	mA
SVR	Supply voltage rejection	V_I = 15 to 25 V, f = 120 Hz, I_O = 500 mA		60		dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
eN	Output noise voltage	T_A = 25°C, B = 10 Hz to 100 kHz		10		$\mu V/V_O$
R_O	Output resistance	f = 1 kHz		18		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_A = 25°C		0.2		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		A
$\Delta V_O/\Delta T$	Output voltage drift			-1		mV/°C

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.

V_I = 23 V, I_O = 1 A, TJ = 0 to 125 °C (L7815AC), T_J = -40 to 125 °C (L7815AB), unless otherwise specified.

Table 10. Electrical characteristics of L7815A

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	14.7	15	15.3	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 17.9 to 28 V	14.4	15	15.6	V
V_O	Output voltage	I_O = 1 A, V_I = 28 to 30 V, T_J = 25°C	14.4	15	15.6	V
ΔV_O (1)	Line regulation	V_I = 17.9 to 30 V, I_O = 500 mA		13	150	mV
		V_I = 20 to 26 V		16	150	mV
		V_I = 20 to 26 V, T_J = 25°C		6	75	mV
		V_I = 17.5 to 30 V, T_J = 25°C		13	150	mV
ΔV_O (1)	Load regulation	I_O = 5 mA to 1 A		25	100	mV
		I_O = 5 mA to 1.5 A, T_J = 25°C		30	100	V
		I_O = 250 to 750 mA		10	50	V
I_q	Quiescent current	T_J = 25°C		4.4	6	mA
					6	mA
ΔI_q	Quiescent current change	V_I = 17.5 to 30 V, I_O = 500 mA			0.8	mA
		V_I = 17.5 to 30 V, T_J = 25°C			0.8	mA
		I_O = 5 mA to 1 A			0.5	mA
SVR	Supply voltage rejection	V_I = 18.5 to 28.5 V, f = 120 Hz, I_O = 500 mA		58		dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
eN	Output noise voltage	T_A = 25°C, B = 10Hz to 100 kHz		10		µV/V_O
R_O	Output resistance	f = 1 kHz		19		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_A = 25°C		0.2		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		A
$\Delta V_O/\Delta T$	Output voltage drift			-1		mV/°C

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.

V_I = 33 V, I_O = 1 A, TJ = 0 to 125 °C (L7824AC), T_J = -40 to 125 °C (L7824AB), unless otherwise specified.

Table 11. Electrical characteristics of L7824A

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	23.5	24	24.5	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 27.3 to 37 V	23	24	25	V
V_O	Output voltage	I_O = 1 A, V_I = 37 to 38 V, T_J = 25°C	23	24	25	V
ΔV_O (1)	Line regulation	V_I = 27 to 38 V, I_O = 500 mA		31	240	mV
		V_I = 30 to 36 V		35	200	mV
		V_I = 30 to 36 V, T_J = 25°C		14	120	mV
		V_I = 26.7 to 38 V, T_J = 25°C		31	240	mV
ΔV_O (1)	Load regulation	I_O = 5 mA to 1 A		25	100	mV
		I_O = 5 mA to 1.5 A, T_J = 25°C		30	100	V
		I_O = 250 to 750 mA		10	50	V
I_q	Quiescent current	T_J = 25°C		4.6	6	mA
					6	mA
ΔI_q	Quiescent current change	V_I = 27.3 to 38 V, I_O = 500 mA			0.8	mA
		V_I = 27.3 to 38 V, T_J = 25°C			0.8	mA
		I_O = 5 mA to 1 A			0.5	mA
SVR	Supply voltage rejection	V_I = 28 to 38 V, f = 120 Hz, I_O = 500 mA		54		dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
eN	Output noise voltage	T_A = 25°C, B = 10 Hz to 100 kHz		10		µV/V_O
R_O	Output resistance	f = 1 kHz		20		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_A = 25°C		0.2		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		A
$\Delta V_O/\Delta T$	Output voltage drift			-1.5		mV/°C

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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 10 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 12. Electrical characteristics of L7805C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	4.8	5	5.2	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 7 to 18 V	4.75	5	5.25	V
V_O	Output voltage	I_O = 1 A, V_I = 18 to 20V, T_J = 25°C	4.75	5	5.25	V
ΔV_O(1)	Line regulation	V_I = 7 to 25 V, T_J = 25°C		3	100	mV
		V_I = 8 to 12 V, T_J = 25°C		1	50	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			100	mV
		I_O = 250 to 750 mA, T_J = 25°C			50	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 7 to 23 V			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-1.1		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		40		µV/V_O
SVR	Supply voltage rejection	V_I = 8 to 18 V, f = 120 Hz	62			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		17		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.75		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 11 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 13. Electrical characteristics of L7806C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	5.75	6	6.25	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 8 to 19 V	5.7	6	6.3	V
V_O	Output voltage	I_O = 1 A, V_I = 19 to 21 V, T_J = 25°C	5.7	6	6.3	V
ΔV_O(1)	Line regulation	V_I = 8 to 25 V, T_J = 25°C			120	mV
		V_I = 9 to 13 V, T_J = 25°C			60	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			120	mV
		I_O = 250 to 750 mA, T_J = 25°C			60	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 8 to 24 V			1.3	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-0.8		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		45		µV/V_O
SVR	Supply voltage rejection	V_I = 9 to 19 V, f = 120 Hz	59			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		19		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.55		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 14 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 14. Electrical characteristics of L7808C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	7.7	8	8.3	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 10.5 to 21 V	7.6	8	8.4	V
V_O	Output voltage	I_O = 1 A, V_I = 21 to 25 V, T_J = 25°C	7.6	8	8.4	V
ΔV_O(1)	Line regulation	V_I = 10.5 to 25 V, T_J = 25°C			160	mV
		V_I = 11 to 17 V, T_J = 25°C			80	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			160	mV
		I_O = 250 to 750 mA, T_J = 25°C			80	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 10.5 to 25 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-0.8		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		52		µV/V_O
SVR	Supply voltage rejection	V_I = 11.5 to 21.5 V, f = 120 Hz	56			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		16		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.45		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 14.5 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 15. Electrical characteristics of L7885C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	8.2	8.5	8.8	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 11 to 21.5 V	8.1	8.5	8.9	V
V_O	Output voltage	I_O = 1 A, V_I = 21.5 to 26 V, T_J = 25°C	8.1	8.5	8.9	V
ΔV_O (1)	Line regulation	V_I = 11 to 27 V, T_J = 25°C			160	mV
		V_I = 11.5 to 17.5 V, T_J = 25°C			80	
ΔV_O (1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			160	mV
		I_O = 250 to 750 mA, T_J = 25°C			80	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 11 to 26 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-0.8		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		55		µV/V_O
SVR	Supply voltage rejection	V_I = 12 to 22 V, f = 120 Hz	56			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		16		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.45		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 15 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 16. Electrical characteristics of L7809C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	8.64	9	9.36	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 11.5 to 22 V	8.55	9	9.45	V
V_O	Output voltage	I_O = 1 A, V_I = 22 to 26 V, T_J = 25°C	8.55	9	9.45	V
ΔV_O(1)	Line regulation	V_I = 11.5 to 26 V, T_J = 25°C			180	mV
		V_I = 12 to 18 V, T_J = 25°C			90	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			180	mV
		I_O = 250 to 750 mA, T_J = 25°C			90	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 11.5 to 26 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-1		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		70		µV/V_O
SVR	Supply voltage rejection	V_I = 12 to 23 V, f = 120 Hz	55			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		17		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.40		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 15 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 17. Electrical characteristics of L7810C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	9.6	10	10.4	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 12.5 to 23 V	9.5	10	10.5	V
V_O	Output voltage	I_O = 1 A, V_I = 23 to 26 V, T_J = 25°C	9.5	10	10.5	V
ΔV_O (1)	Line regulation	V_I = 12.5 to 26 V, T_J = 25°C			200	mV
		V_I = 13.5 to 19 V, T_J = 25°C			100	
ΔV_O (1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			200	mV
		I_O = 250 to 750 mA, T_J = 25°C			100	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 12.5 to 26 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-1		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		70		µV/V_O
SVR	Supply voltage rejection	V_I = 13 to 23 V, f = 120 Hz	55			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		17		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.40		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 19 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 18. Electrical characteristics of L7812C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	11.5	12	12.5	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 14.5 to 25 V	11.4	12	12.6	V
V_O	Output voltage	I_O = 1 A, V_I = 25 to 27 V, T_J = 25°C	11.4	12	12.6	V
ΔV_O (1)	Line regulation	V_I = 14.5 to 30 V, T_J = 25°C			240	mV
		V_I = 16 to 22 V, T_J = 25°C			120	
ΔV_O (1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			240	mV
		I_O = 250 to 750 mA, T_J = 25°C			120	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 14.5 to 30 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-1		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		75		µV/V_O
SVR	Supply voltage rejection	V_I = 15 to 25 V, f = 120 Hz	55			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		18		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.35		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 23 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 19. Electrical characteristics of L7815C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	14.5	15	15.6	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 17.5 to 28 V	14.25	15	15.75	V
V_O	Output voltage	I_O = 1 A, V_I = 28 to 30 V, T_J = 25°C	14.25	15	15.75	V
ΔV_O(1)	Line regulation	V_I = 17.5 to 30 V, T_J = 25°C			300	mV
		V_I = 20 to 26 V, T_J = 25°C			150	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			300	mV
		I_O = 250 to 750 mA, T_J = 25°C			150	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1A			0.5	mA
		V_I = 17.5 to 30 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-1		mV/°C
eN	Output noise voltage	B = 10 Hz to 100kHz, T_J = 25°C		90		µV/V_O
SVR	Supply voltage rejection	V_I = 18.5 to 28.5 V, f = 120 Hz	54			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		19		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.23		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.2		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 26 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 20. Electrical characteristics of L7818C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	17.3	18	18.7	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 21 to 31 V	17.1	18	18.9	V
V_O	Output voltage	I_O = 1 A, V_I = 31 to 33 V, T_J = 25°C	17.1	18	18.9	V
ΔV_O(1)	Line regulation	V_I = 21 to 33 V, T_J = 25°C			360	mV
		V_I = 24 to 30 V, T_J = 25°C			180	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			360	mV
		I_O = 250 to 750 mA, T_J = 25°C			180	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 21 to 33 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-1		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		110		µV/V_O
SVR	Supply voltage rejection	V_I = 22 to 32 V, f = 120 Hz	53			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		22		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.20		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.1		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 28 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 21. Electrical characteristics of L7820C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	19.2	20	20.8	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 23 to 33 V	19	20	21	V
V_O	Output voltage	I_O = 1 A, V_I = 33 to 35 V, T_J = 25°C	19	20	21	V
ΔV_O(1)	Line regulation	V_I = 22.5 to 35 V, T_J = 25°C			400	mV
		V_I = 26 to 32 V, T_J = 25°C			200	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			400	mV
		I_O = 250 to 750 mA, T_J = 25°C			200	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 23 to 35 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-1		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		150		µV/V_O
SVR	Supply voltage rejection	V_I = 24 to 35 V, f = 120 Hz	52			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		24		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.18		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.1		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.

Refer to the test circuits, T_J = 0 to 125 °C, V_I = 33 V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified.

Table 22. Electrical characteristics of L7824C

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	T_J = 25°C	23	24	25	V
V_O	Output voltage	I_O = 5 mA to 1 A, V_I = 27 to 37 V	22.8	24	25.2	V
V_O	Output voltage	I_O = 1 A, V_I = 37 to 38 V, T_J = 25°C	22.8	24	25.2	V
ΔV_O(1)	Line regulation	V_I = 27 to 38 V, T_J = 25°C			480	mV
		V_I = 30 to 36 V, T_J = 25°C			240	
ΔV_O(1)	Load regulation	I_O = 5 mA to 1.5 A, T_J = 25°C			480	mV
		I_O = 250 to 750 mA, T_J = 25°C			240	
I_d	Quiescent current	T_J = 25°C			8	mA
ΔI_d	Quiescent current change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 27 to 38 V			1	
$\Delta V_O/\Delta T$	Output voltage drift	I_O = 5 mA		-1.5		mV/°C
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_J = 25°C		170		µV/V_O
SVR	Supply voltage rejection	V_I = 28 to 38 V, f = 120 Hz	50			dB
V_d	Dropout voltage	I_O = 1 A, T_J = 25°C		2		V
R_O	Output resistance	f = 1 kHz		28		mΩ
I_{sc}	Short circuit current	V_I = 35 V, T_J = 25°C		0.15		A
I_{scp}	Short circuit peak current	T_J = 25°C		2.1		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.

6 Application information

6.1 Design consideration

The L78xx Series of fixed voltage regulators are designed with thermal overload protection that shuts down the circuit when subjected to an excessive power overload condition, internal short-circuit protection that limits the maximum current the circuit will pass, and output transistor safe-area compensation that reduces the output short-circuit current as the voltage across the pass transistor is increased. In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with capacitor if the regulator is connected to the power supply filter with long lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33 µF or larger tantalum, mylar or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulators input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

The addition of an operational amplifier allows adjustment to higher or intermediate values while retaining regulation characteristics. The minimum voltage obtained with the arrangement is 2 V greater than the regulator voltage.

The circuit of figure 6 can be modified to provide supply protection against short circuit by adding a short circuit sense resistor, RSC, and an additional PNP transistor. The current sensing PNP must be able to handle the short circuit current of the three terminal regulator Therefore a four ampere plastic power transistor is specified.

Figure 8. DC parameter

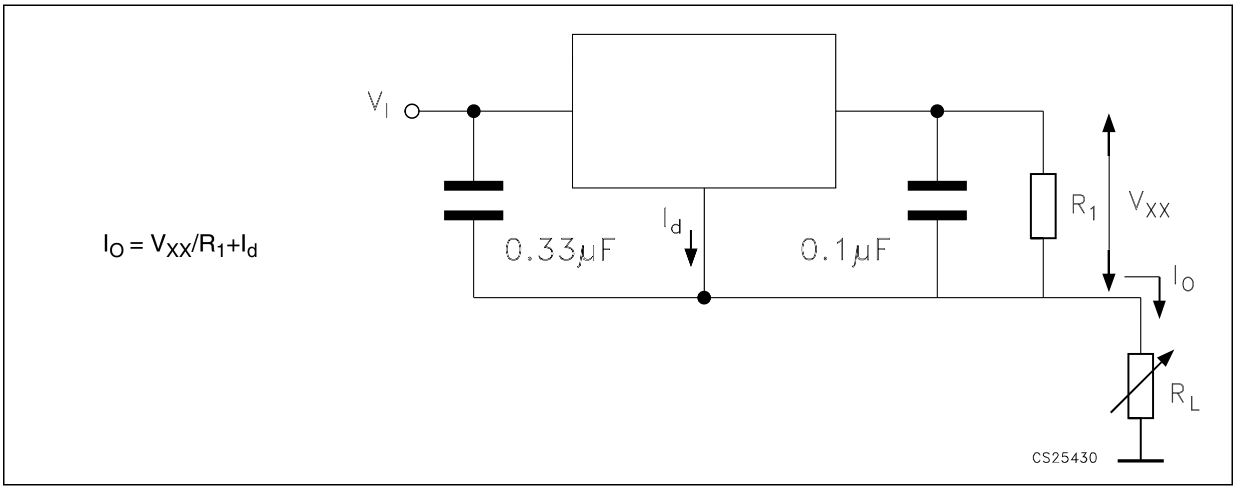


Figure 9. DC parameter

V_O = 7 to 20V

$V_I - V_O \geq 2V$

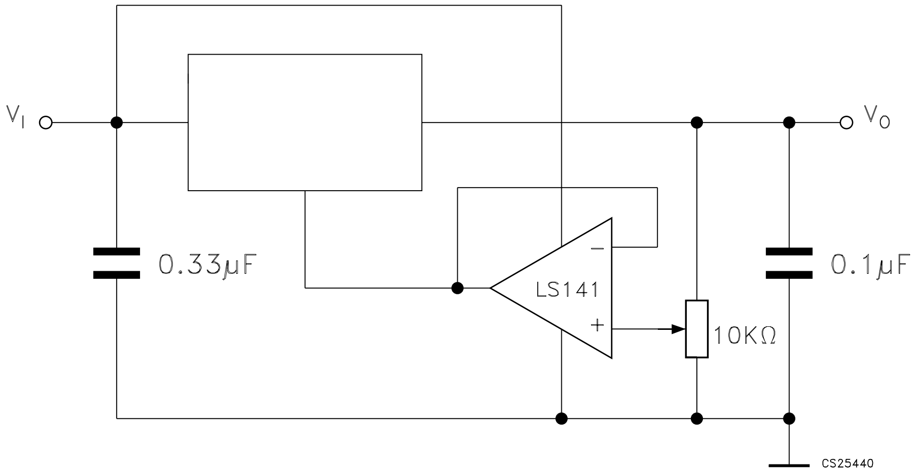


Figure 10. DC parameter

$$R_1 = \frac{V_{BEQ1}}{I_{REQ}-(I_{Q1}/\beta_{Q1})}$$

$$I_O = I_{REG} + Q_1 (I_{REG} \frac{V_{BEQ1}}{R_1})$$

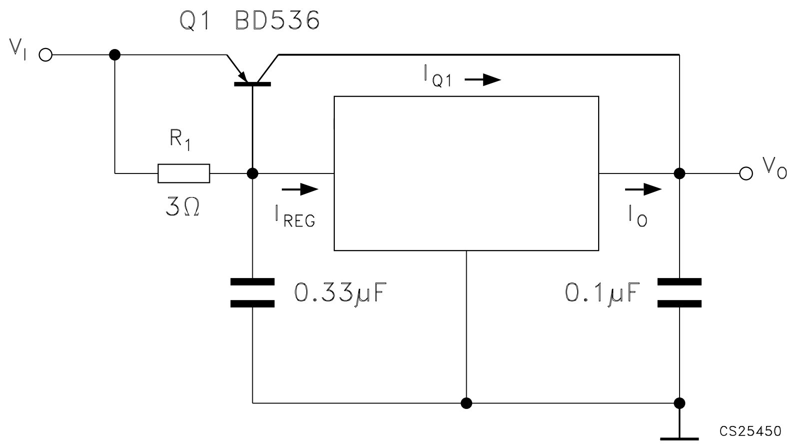


Figure 11. DC parameter

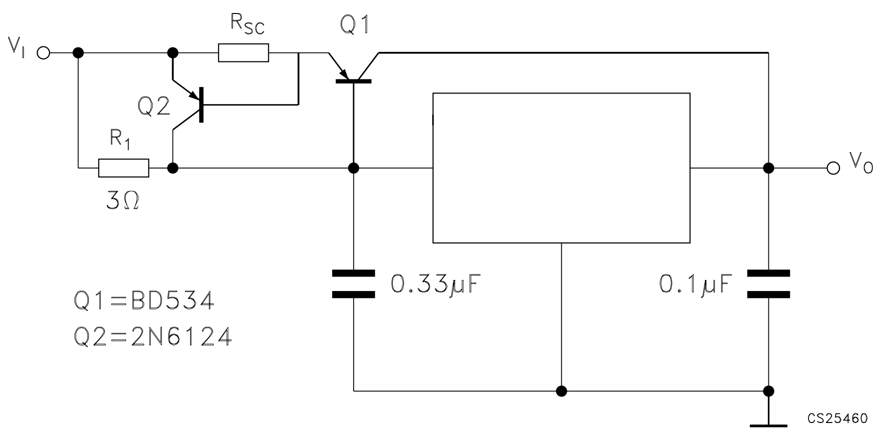
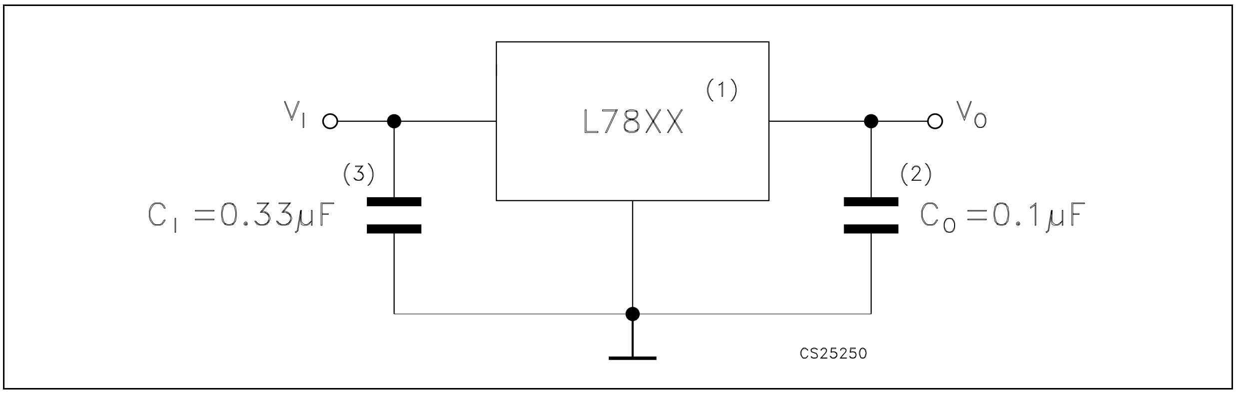


Figure 12. Fixed output regulator



1. To specify an output voltage, substitute voltage value for "XX".
2. Although no output capacitor is need for stability, it does improve transient response.
3. Required if regulator is locate an appreciable distance from power supply filter.

Figure 13. Current regulator

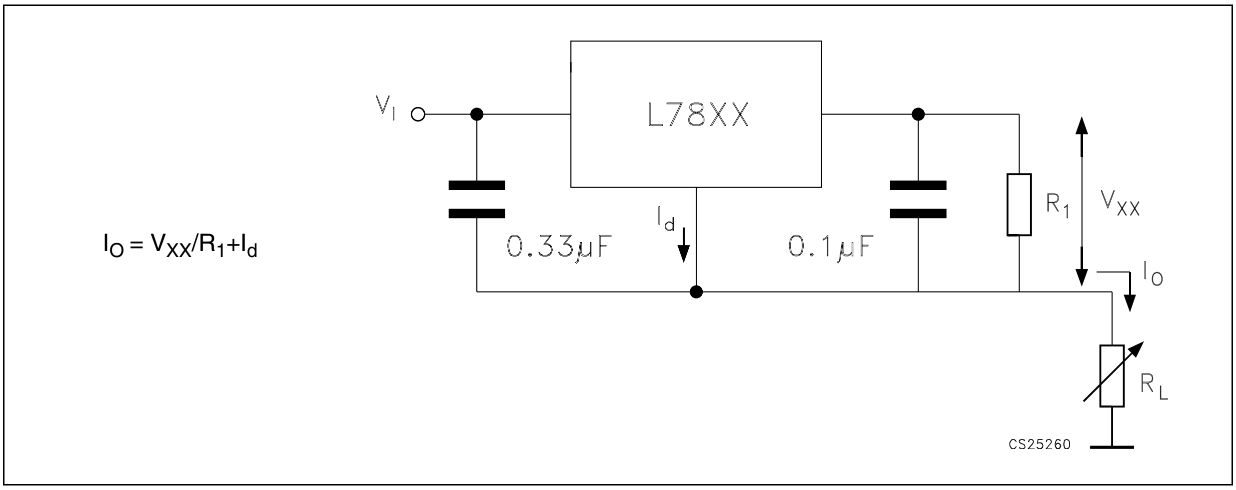


Figure 14. Circuit for increasing output voltage

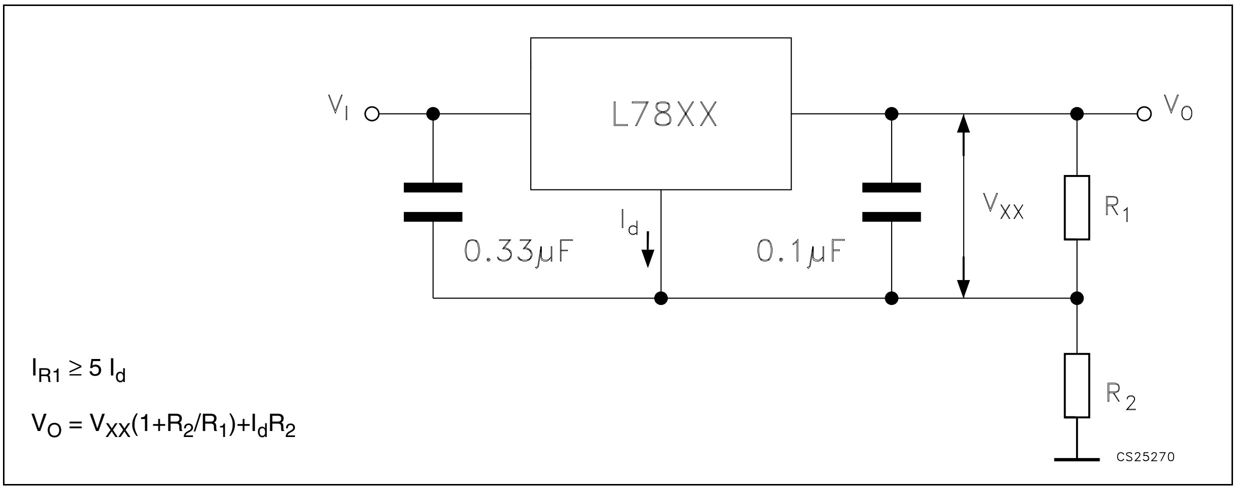


Figure 15. Adjustable output regulator (7 to 30 V)

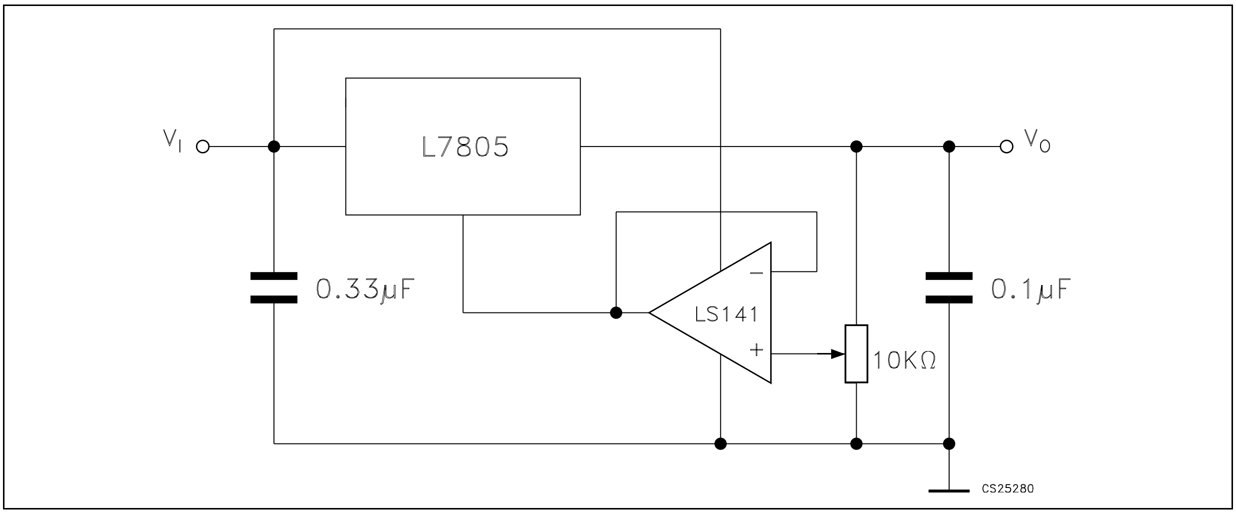


Figure 16. 0.5 to 10 V regulator

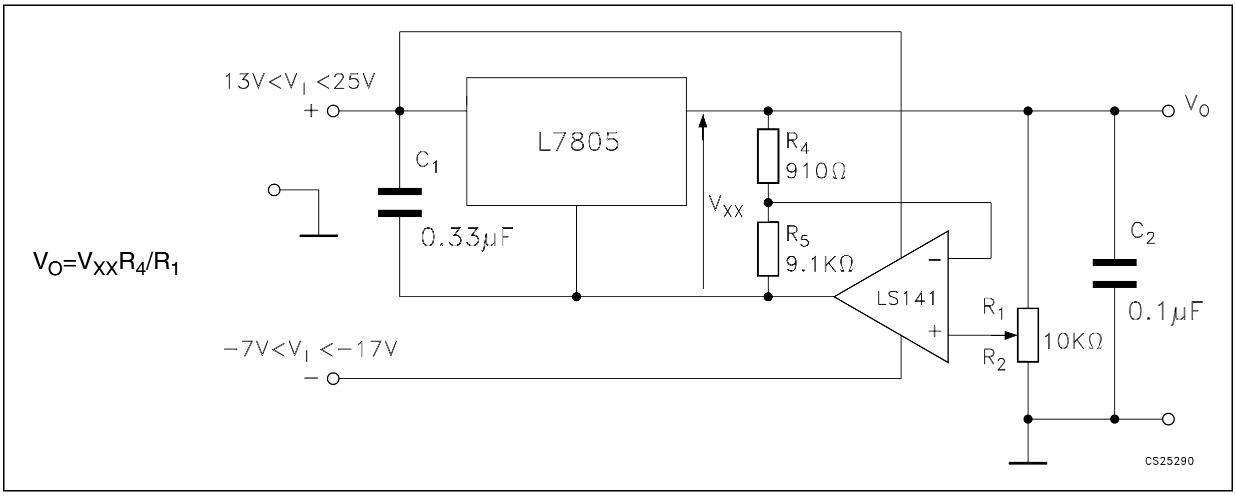


Figure 17. High current voltage regulator

$$R_1 = \frac{V_{BEQ1}}{I_{REQ}-(I_{Q1}/b_{Q1})}$$

$$I_O = I_{REG} + Q_1 \left(I_{REG} \frac{V_{BEQ1}}{R_1}\right)$$

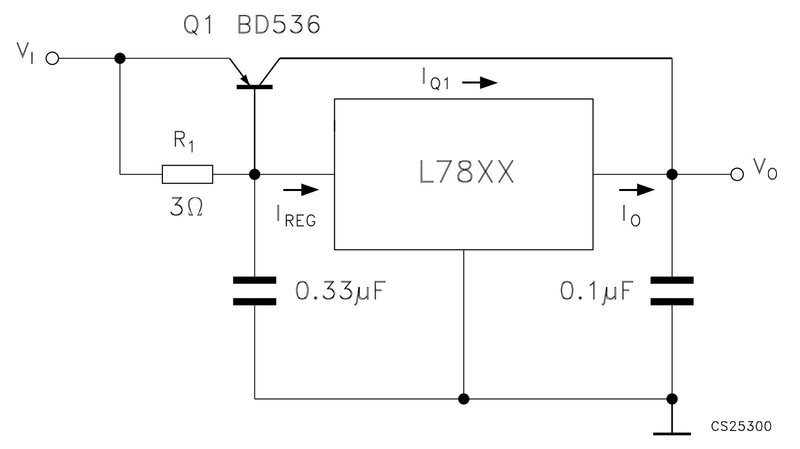


Figure 18. High output current with short circuit protection

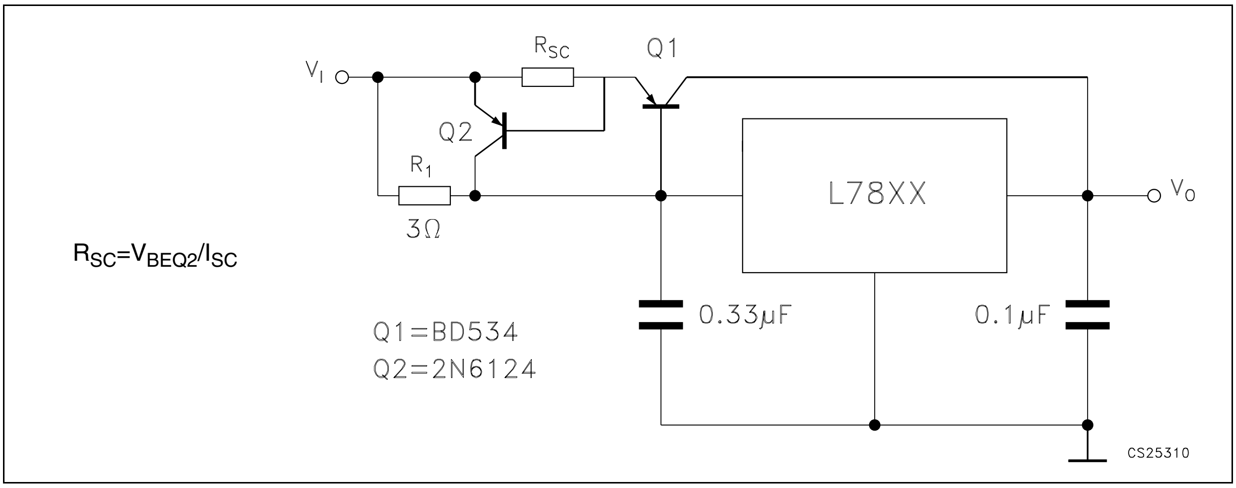


Figure 19. Tracking voltage regulator

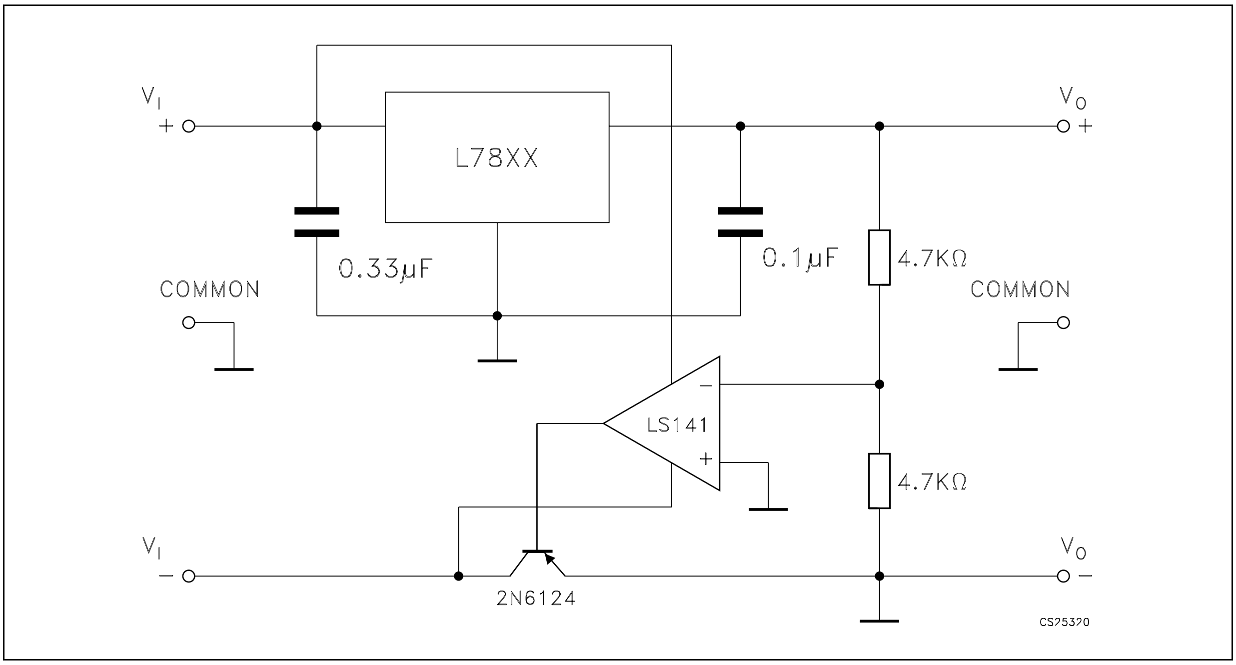
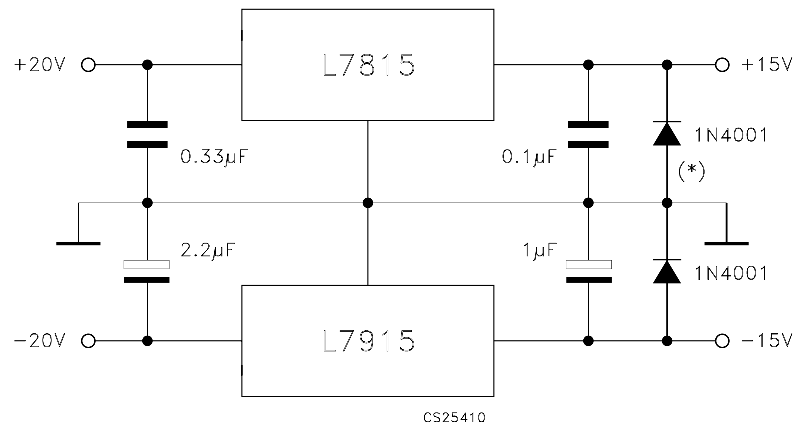


Figure 20. Split power supply (± 15 V - 1 A)



* Against potential latch-up problems.

Figure 21. Negative output voltage circuit

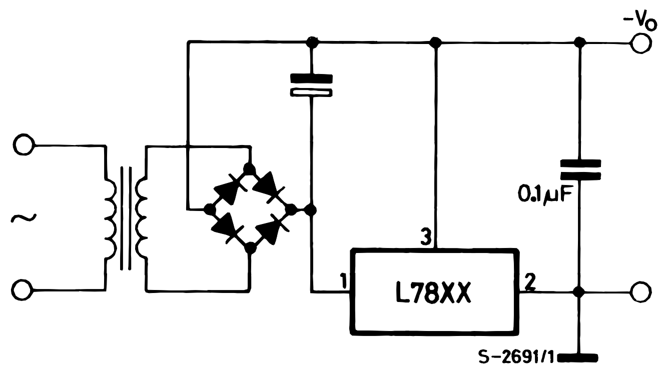


Figure 22. Switching regulator

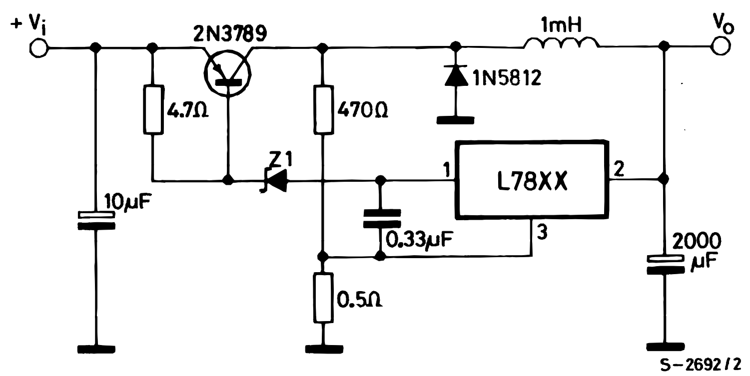


Figure 23. High input voltage circuit

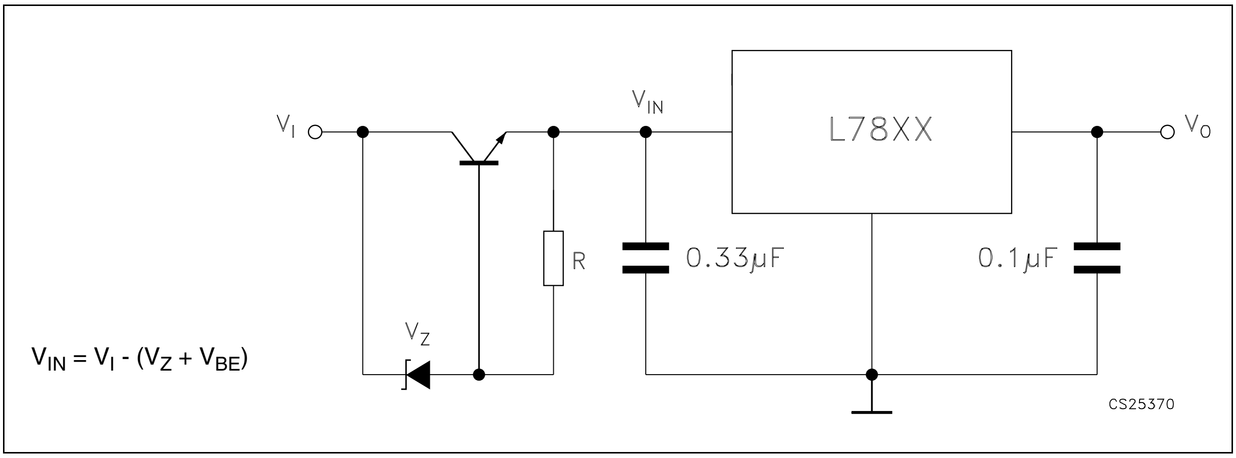


Figure 24. High input voltage circuit

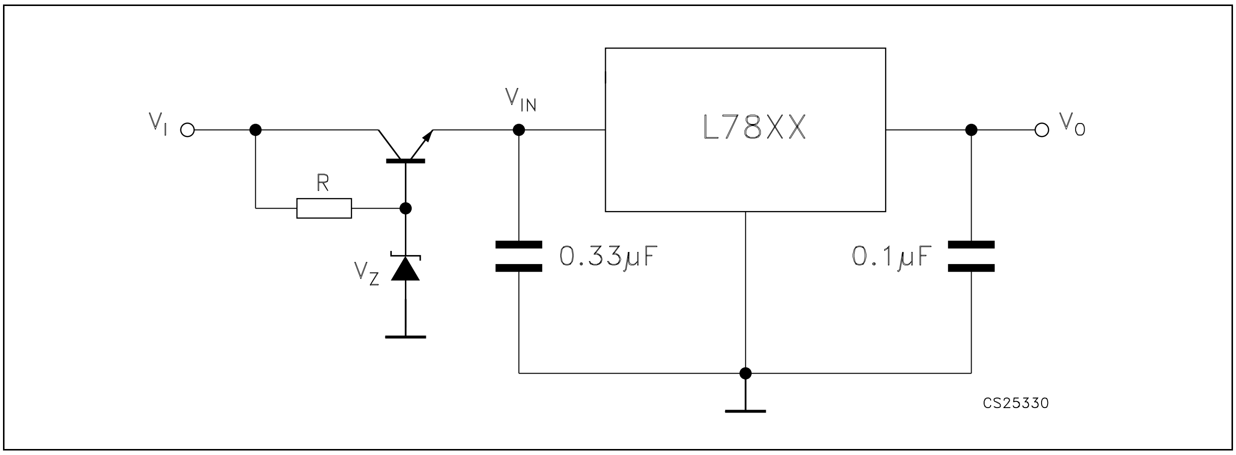


Figure 25. High output voltage regulator

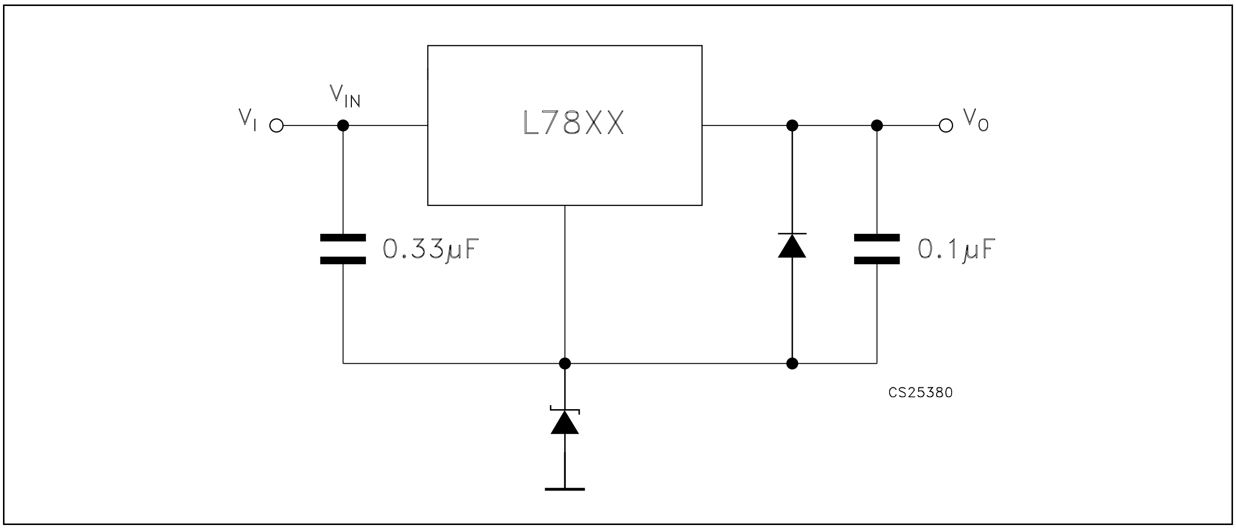


Figure 26. High input and output voltage

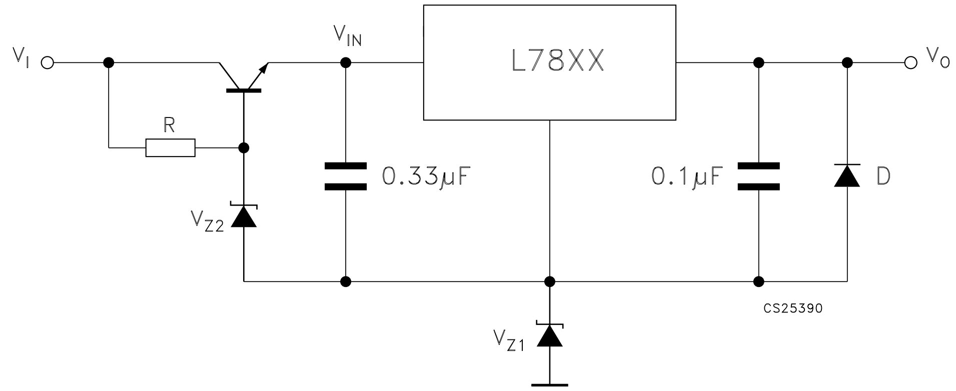
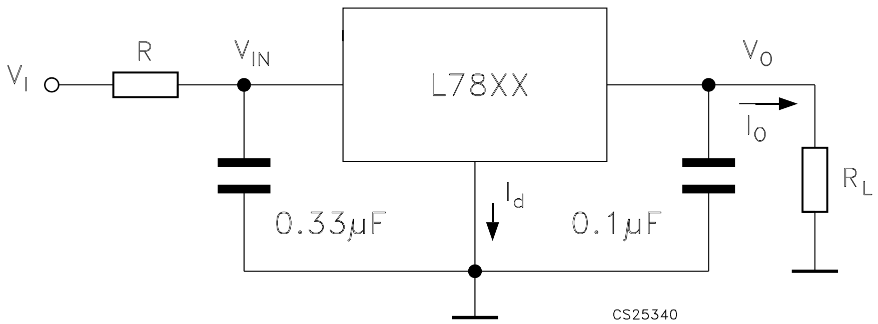


Figure 27. Reducing power dissipation with dropping resistor



$$R = \frac{V_{I(min)} - V_{XX} - V_{DROP(max)}}{I_{O(max)} + I_{d(max)}}$$

Figure 28. Remote shutdown

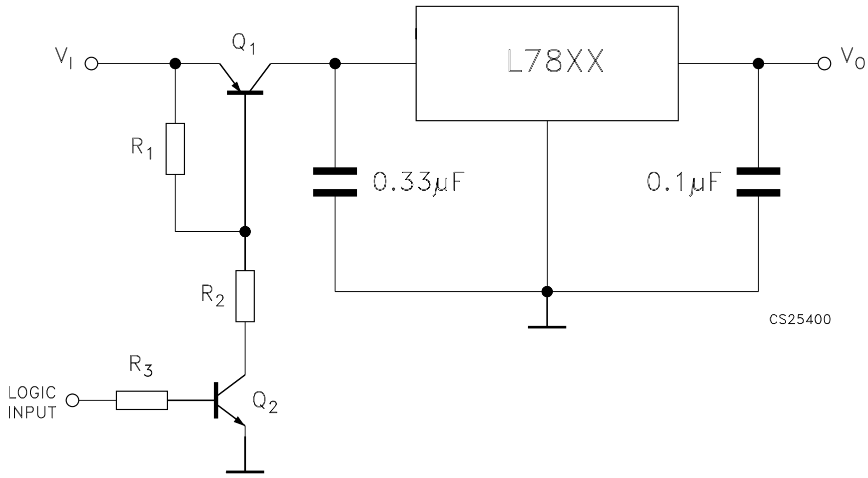
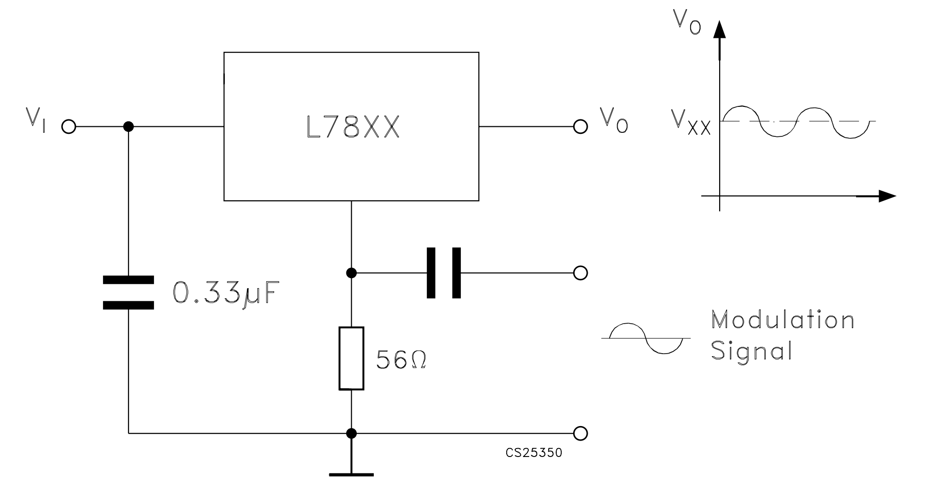
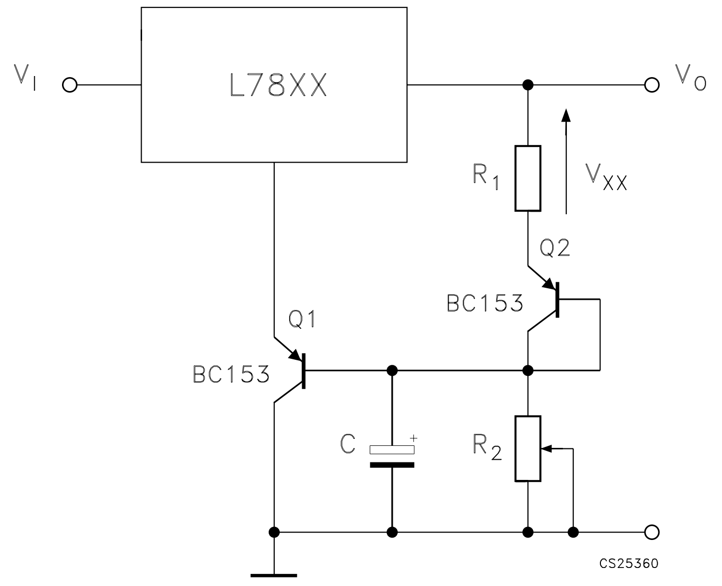


Figure 29. Power AM modulator (unity voltage gain, $I_O \leq 0.5$)



Note: The circuit performs well up to 100 kHz.

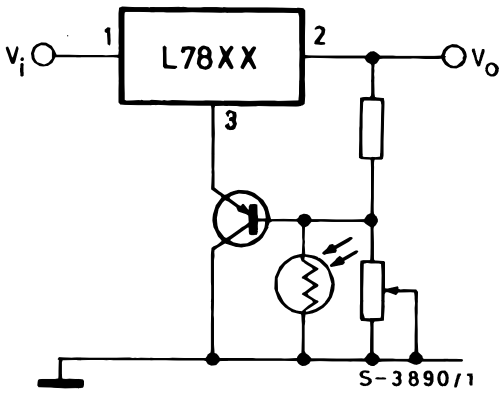
Figure 30. Adjustable output voltage with temperature compensation



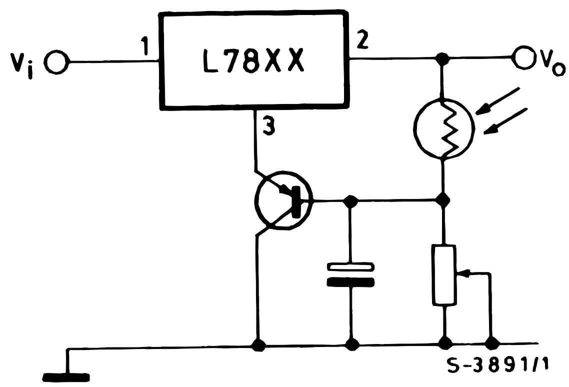
$V_O = V_{XX} (1+R_2/R_1) + V_{BE}$

Note: Q_2 is connected as a diode in order to compensate the variation of the Q_1 V_{BE} with the temperature. C allows a slow rise time of the V_O.

Figure 31. Light controllers ($V_{O(min)} = V_{XX} + V_{BE}$)

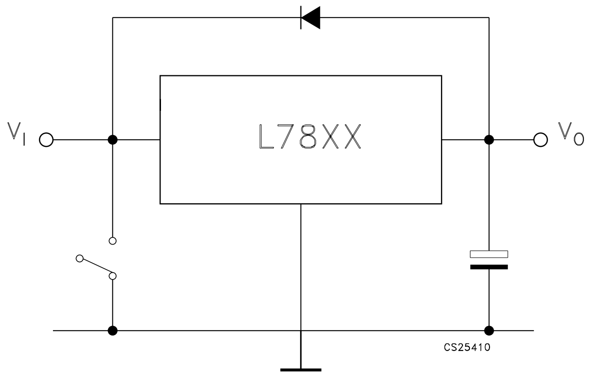


V_O falls when the light goes up



V_O rises when the light goes up

Figure 32. Protection against input short-circuit with high capacitance loads



Note: Application with high capacitance loads and an output voltage greater than 6 volts need an external diode (see Figure 27 on page 36) to protect the device against input short circuit. In this case the input voltage falls rapidly while the output voltage decrease slowly. The capacitance discharges by means of the base-emitter junction of the series pass transistor in the regulator. If the energy is sufficiently high, the transistor may be destroyed. The external diode by-passes the current from the IC to ground.

7 Typical performance

Figure 33. Dropout voltage vs. junction temperature

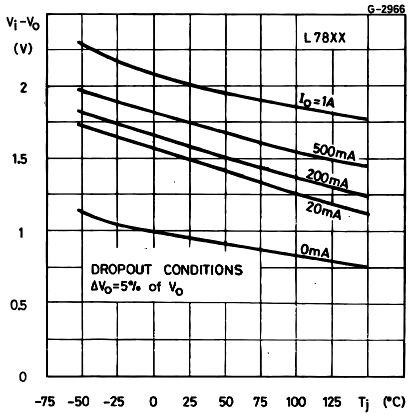


Figure 34. Peak output current vs. input/output differential voltage

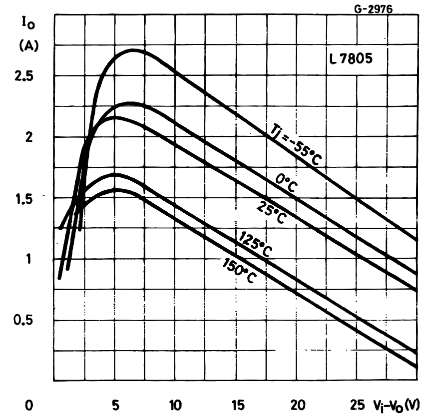


Figure 35. Supply voltage rejection vs. frequency

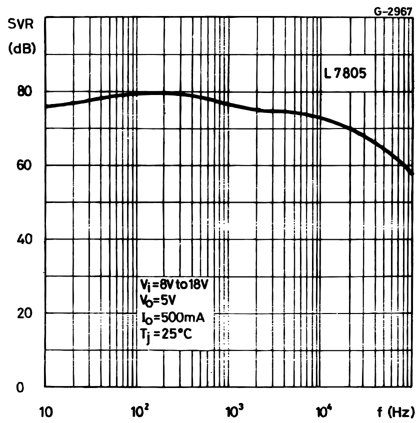


Figure 36. Output voltage vs. junction temperature

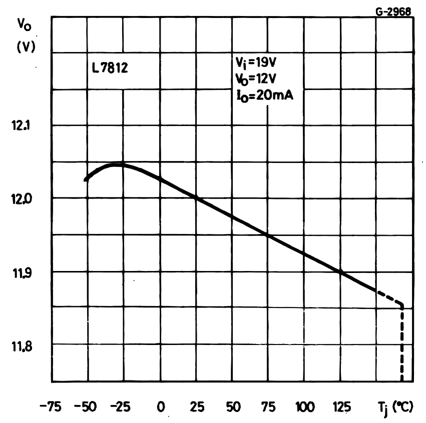


Figure 37. Output impedance vs. frequency

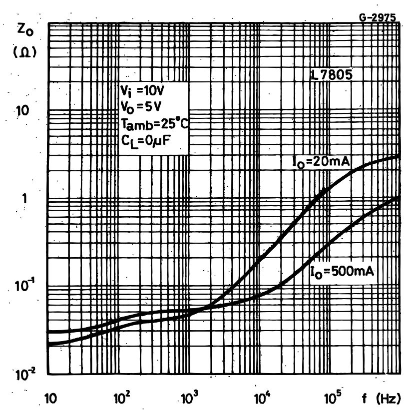


Figure 38. Quiescent current vs. junction temp.

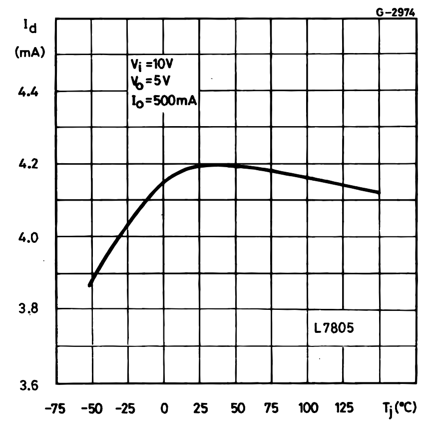


Figure 39. Load transient response

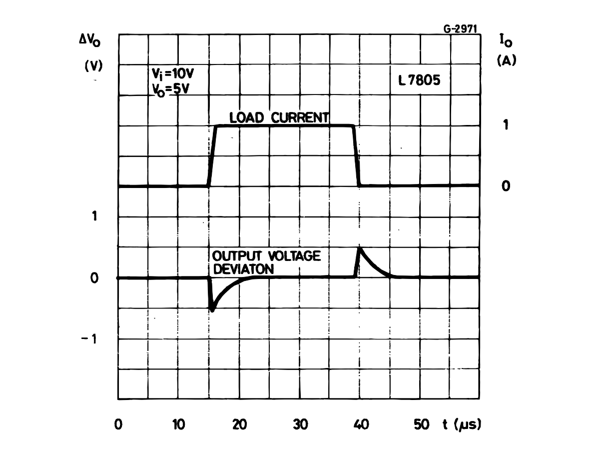


Figure 40. Line transient response

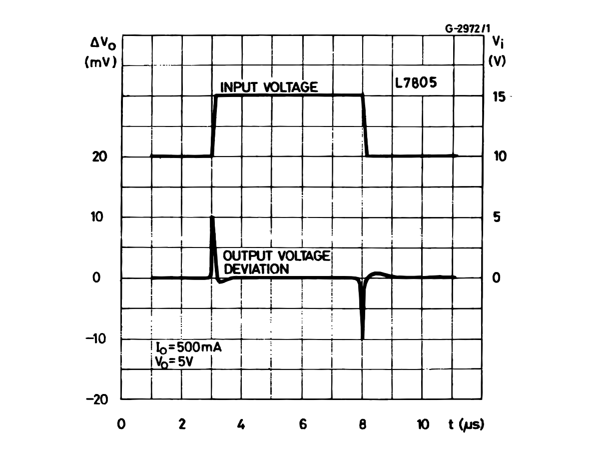
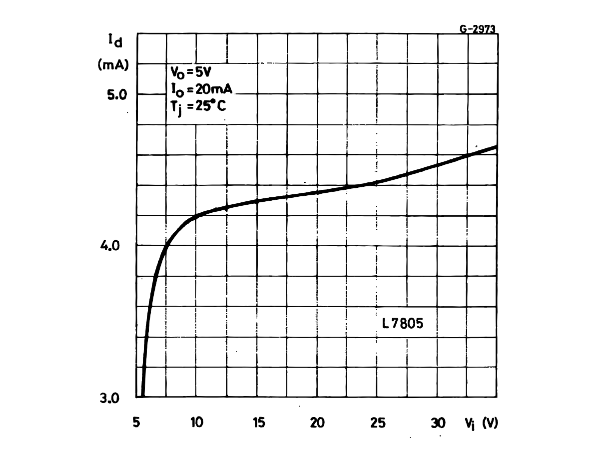


Figure 41. Quiescent current vs. input voltage



8 Package mechanical data

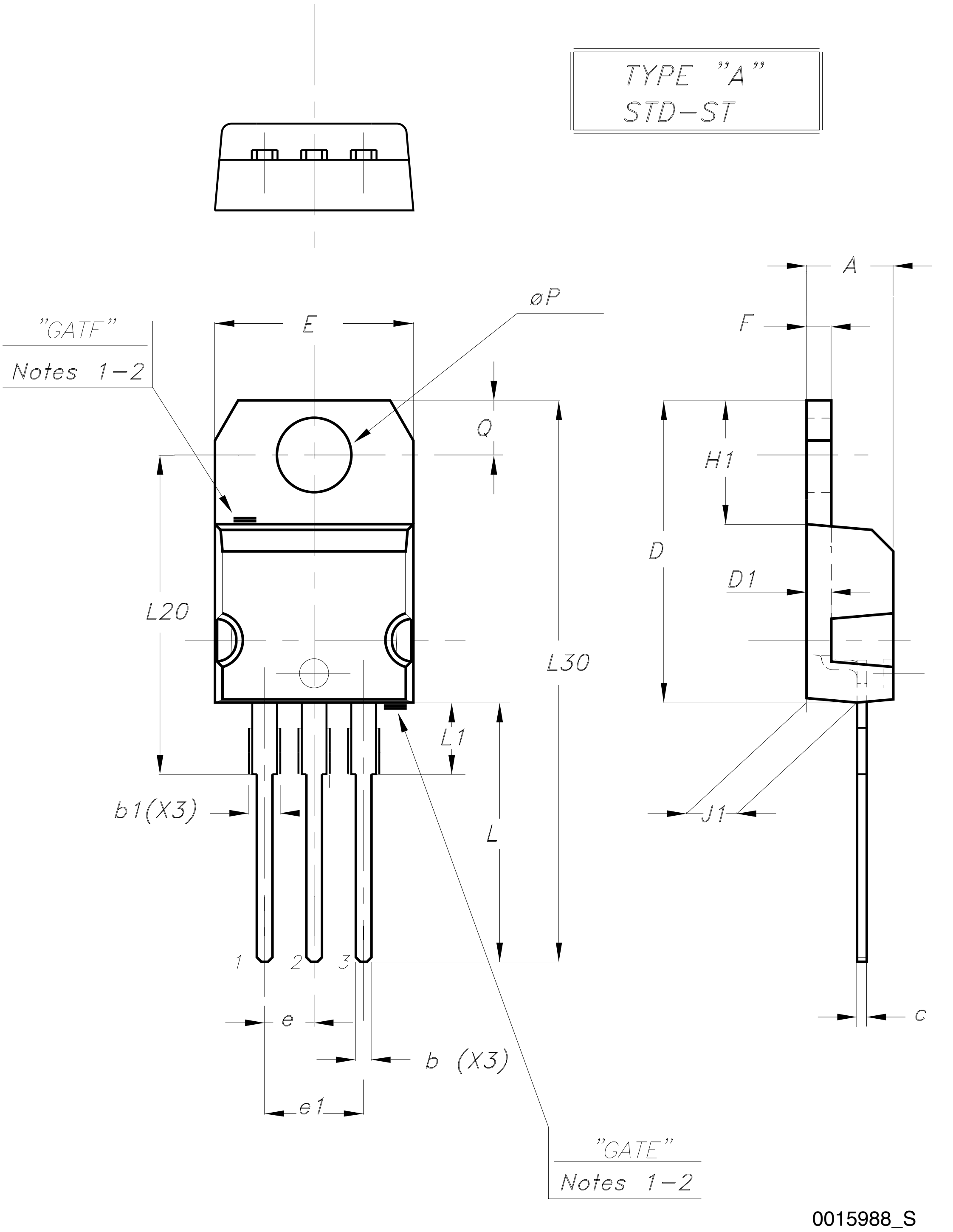
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 23. 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 42. Drawing dimension TO-220 (type STD-ST Dual Gauge)



Note: 1 Max resin gate protrusion: 0.5 mm.

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

Figure 43. Drawing dimension TO-220 (type STD-ST Single Gauge)

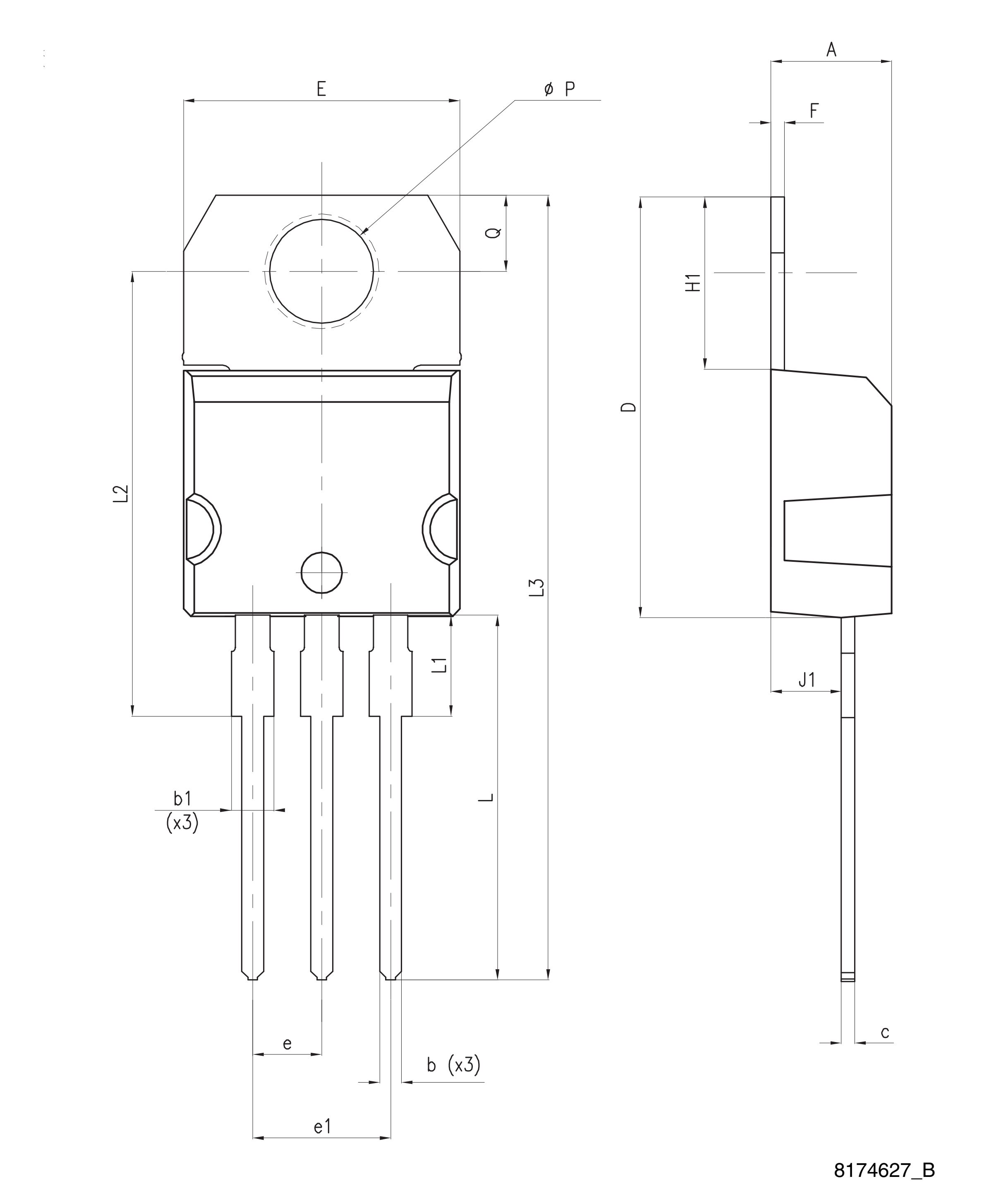


Figure 44. Drawing dimension tube for TO-220 Dual Gauge (mm.)

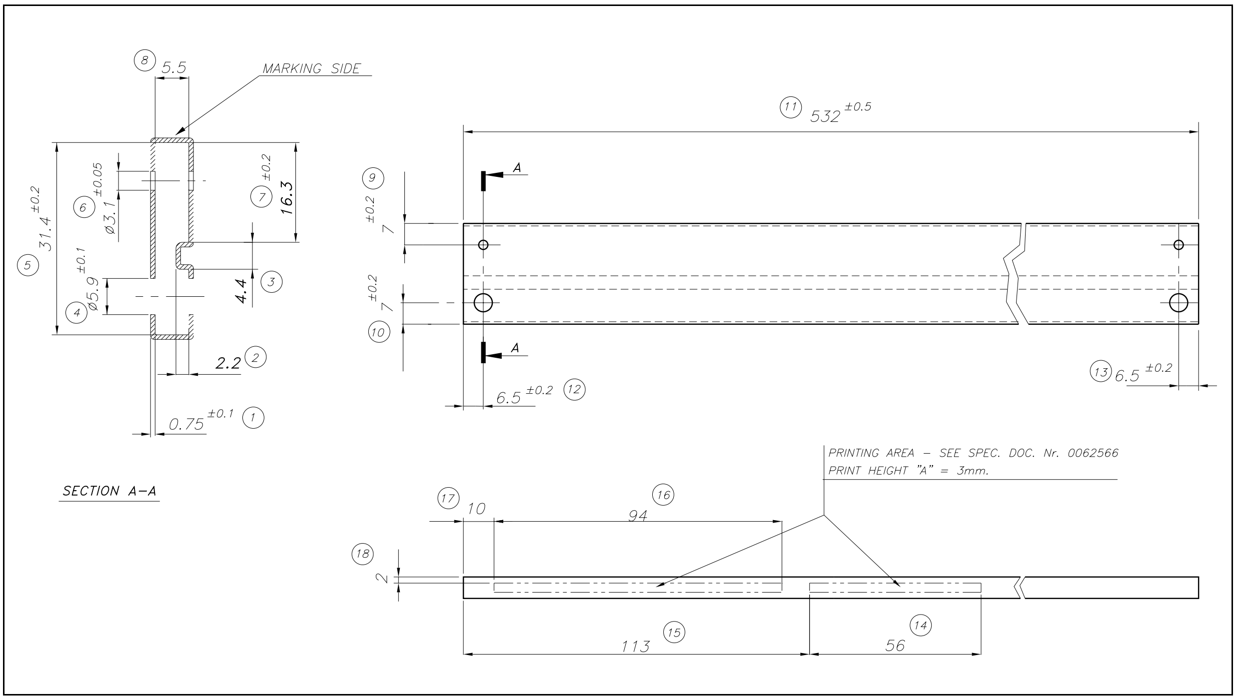


Figure 45. Drawing dimension tube for TO-220 Single Gauge (mm.)

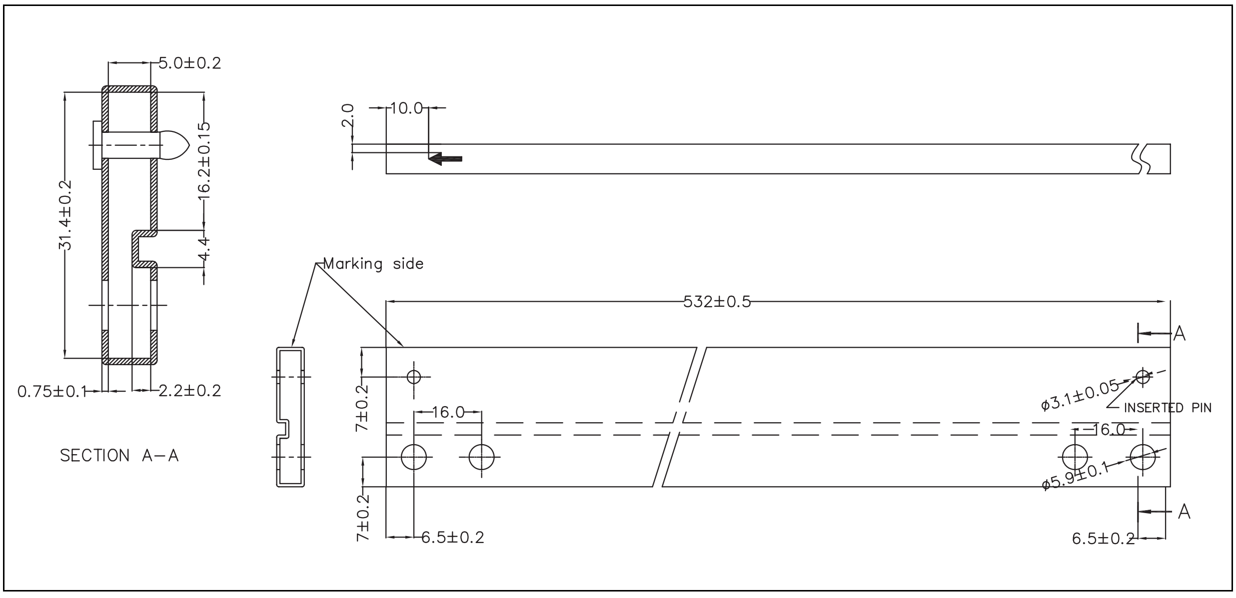


Figure 46. Drawing dimension TO-220FP

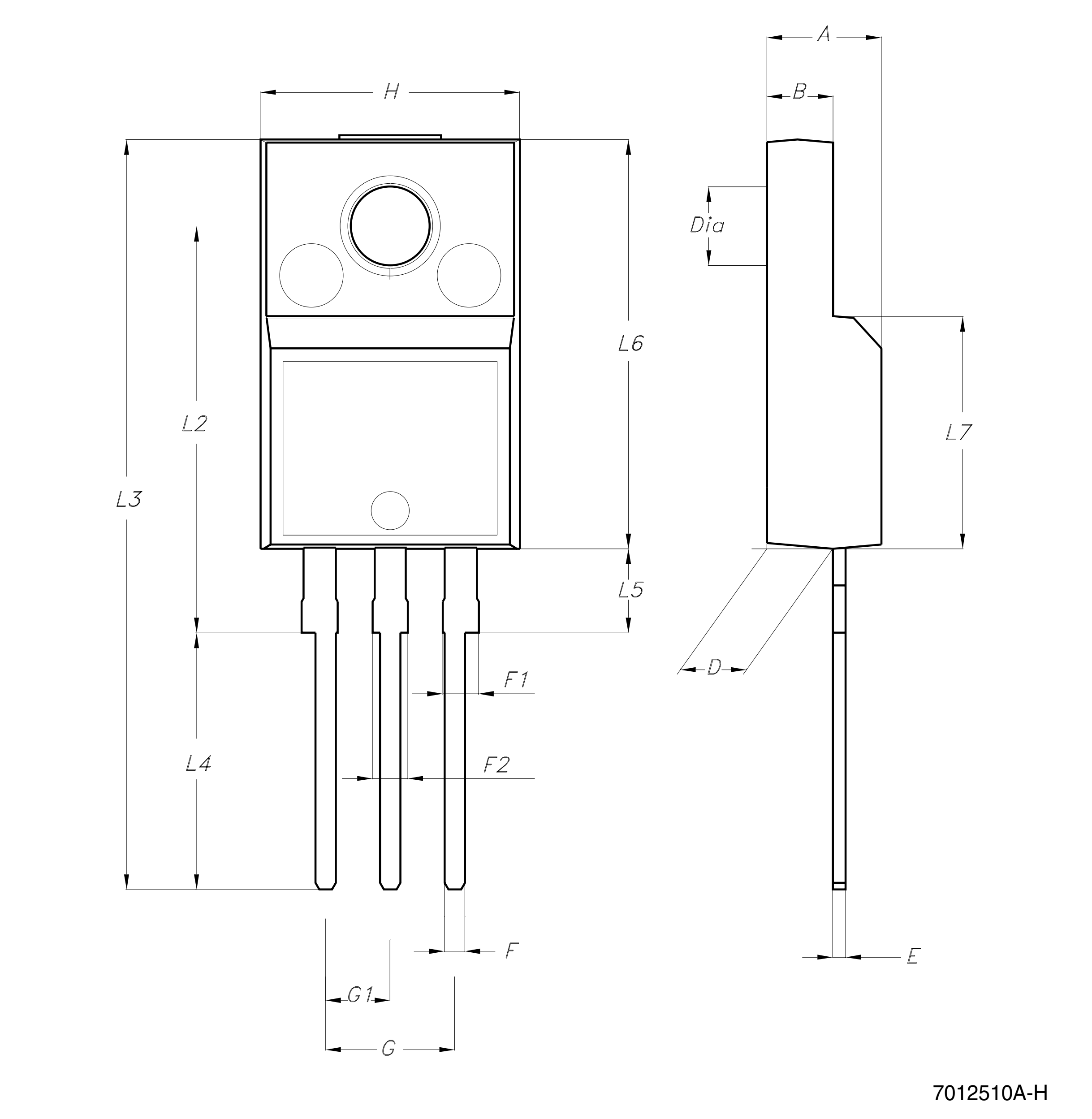


Table 24. TO-220FP mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.50	0.045		0.059
F2	1.15		1.50	0.045		0.059
G	4.95		5.2	0.194		0.204
G1	2.4		2.7	0.094		0.106
H	10.0		10.40	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L5	2.9		3.6	0.114		0.142
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
DIA.	3		3.2	0.118		0.126

Figure 47. Drawing dimension TO-3

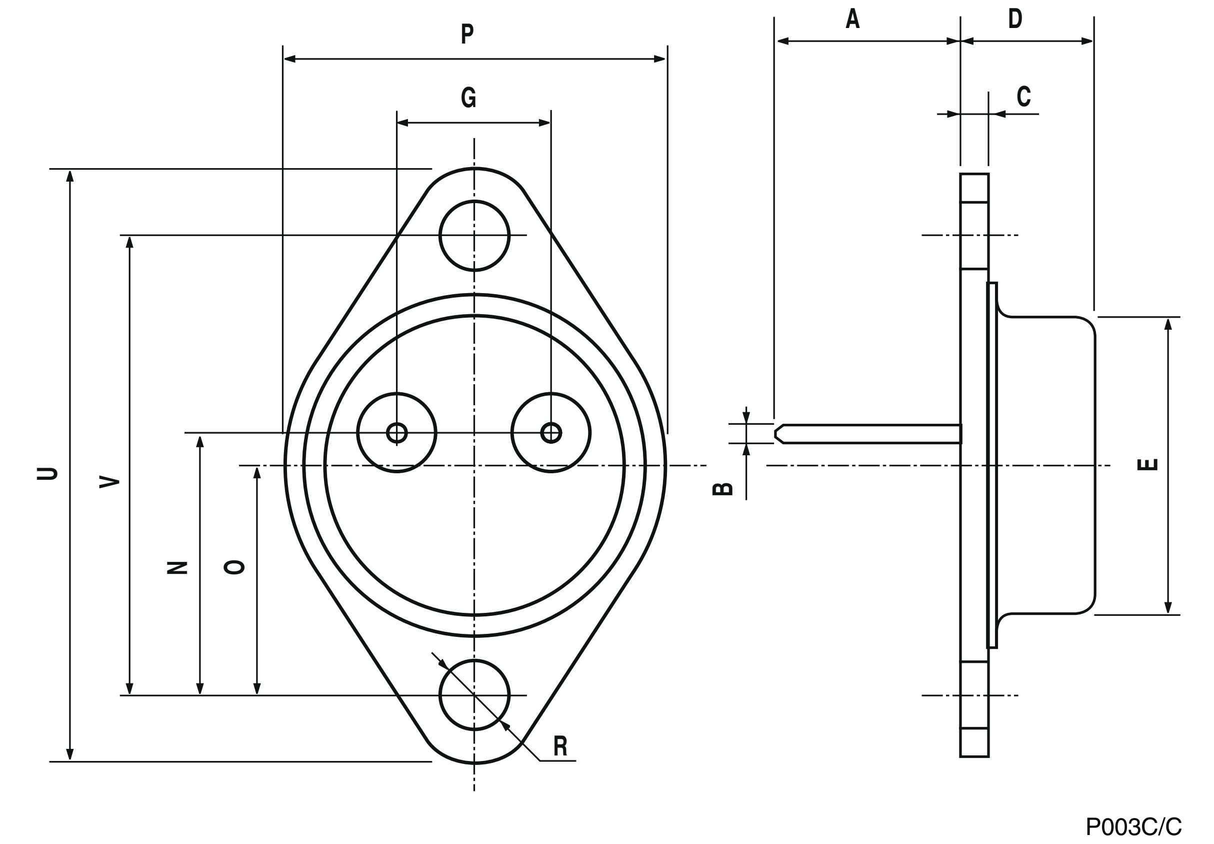


Table 25. TO-3 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		11.85			0.466	
B	0.96	1.05	1.10	0.037	0.041	0.043
C			1.70			0.066
D			8.7			0.342
E			20.0			0.787
G		10.9			0.429	
N		16.9			0.665	
P			26.2			1.031
R	3.88		4.09	0.152		0.161
U			39.5			1.555
V		30.10			1.185	

Figure 48. Drawing dimension DPAK

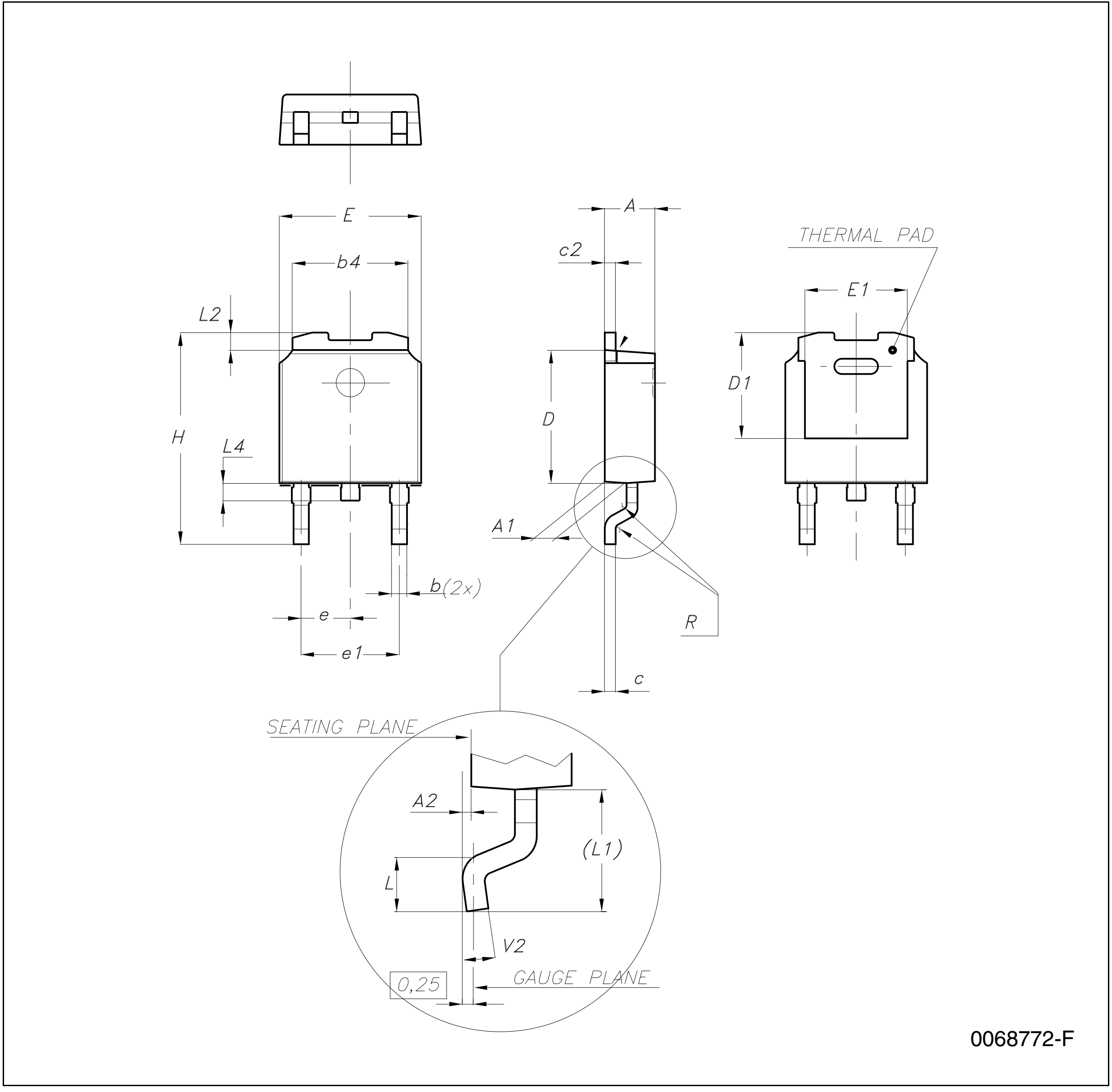


Table 26. DPAK mechanical data

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°

Figure 49. Drawing dimension tape and reel for DPAK

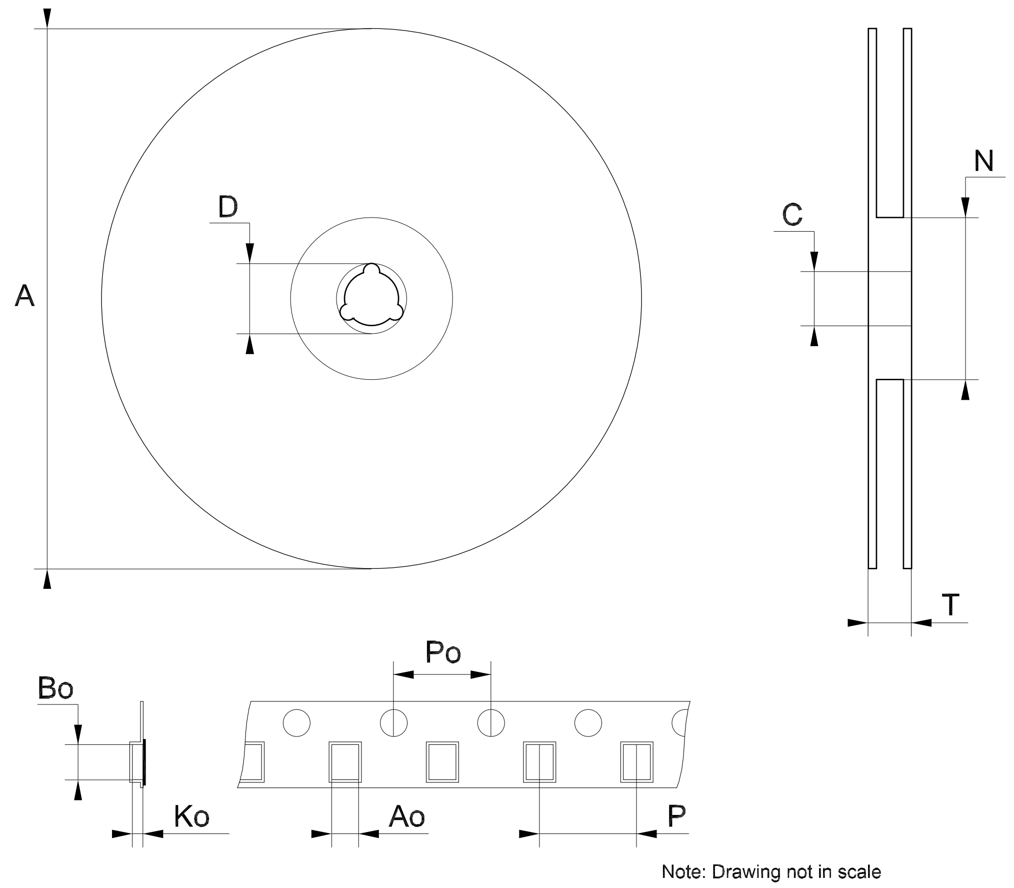


Table 27. Tape and reel DPAK mechanical data

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

Figure 50. Drawing dimension D²PAK (type STD-ST)

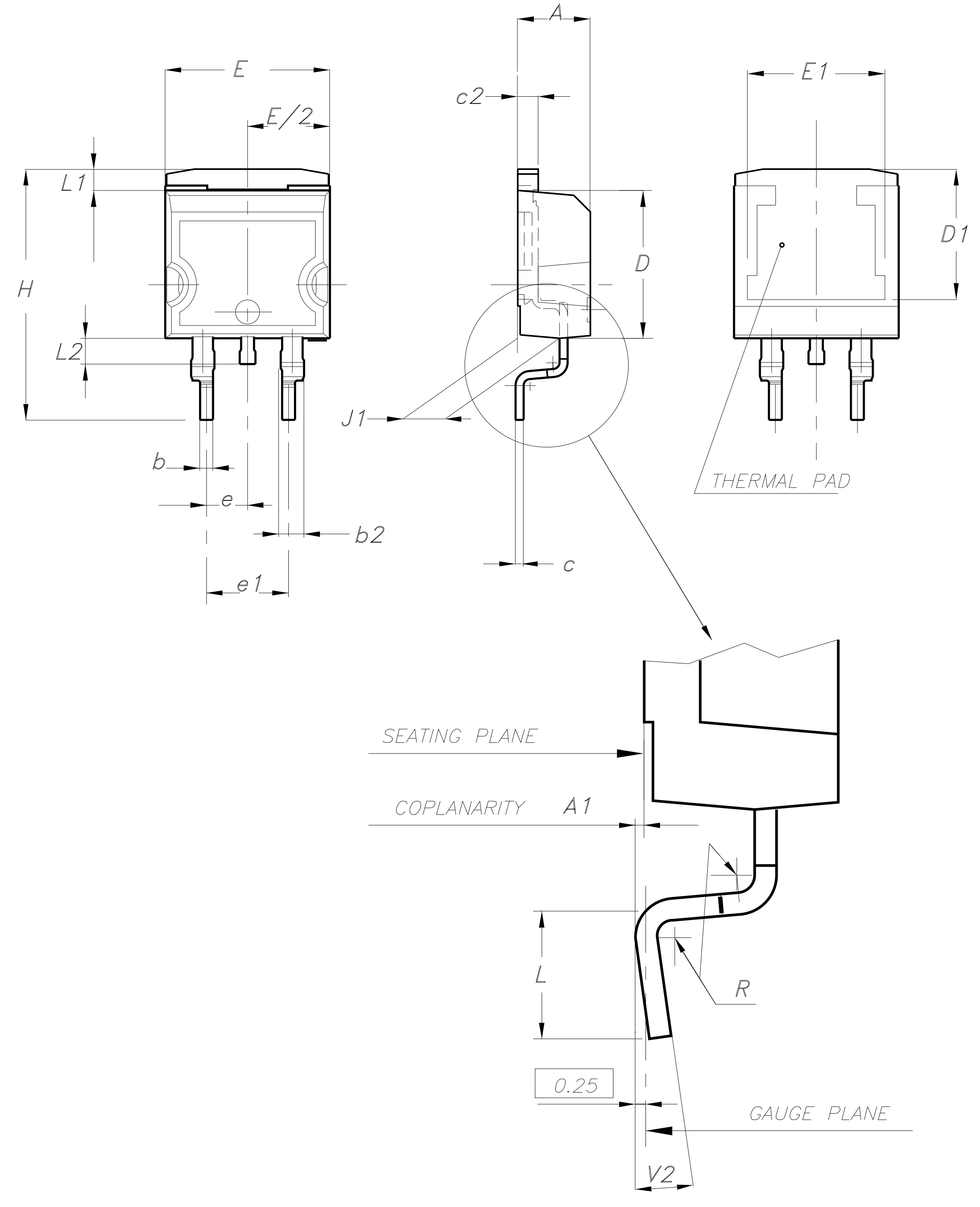


Figure 51. Drawing dimension D²PAK (type WOOSEOK-Subcon.)

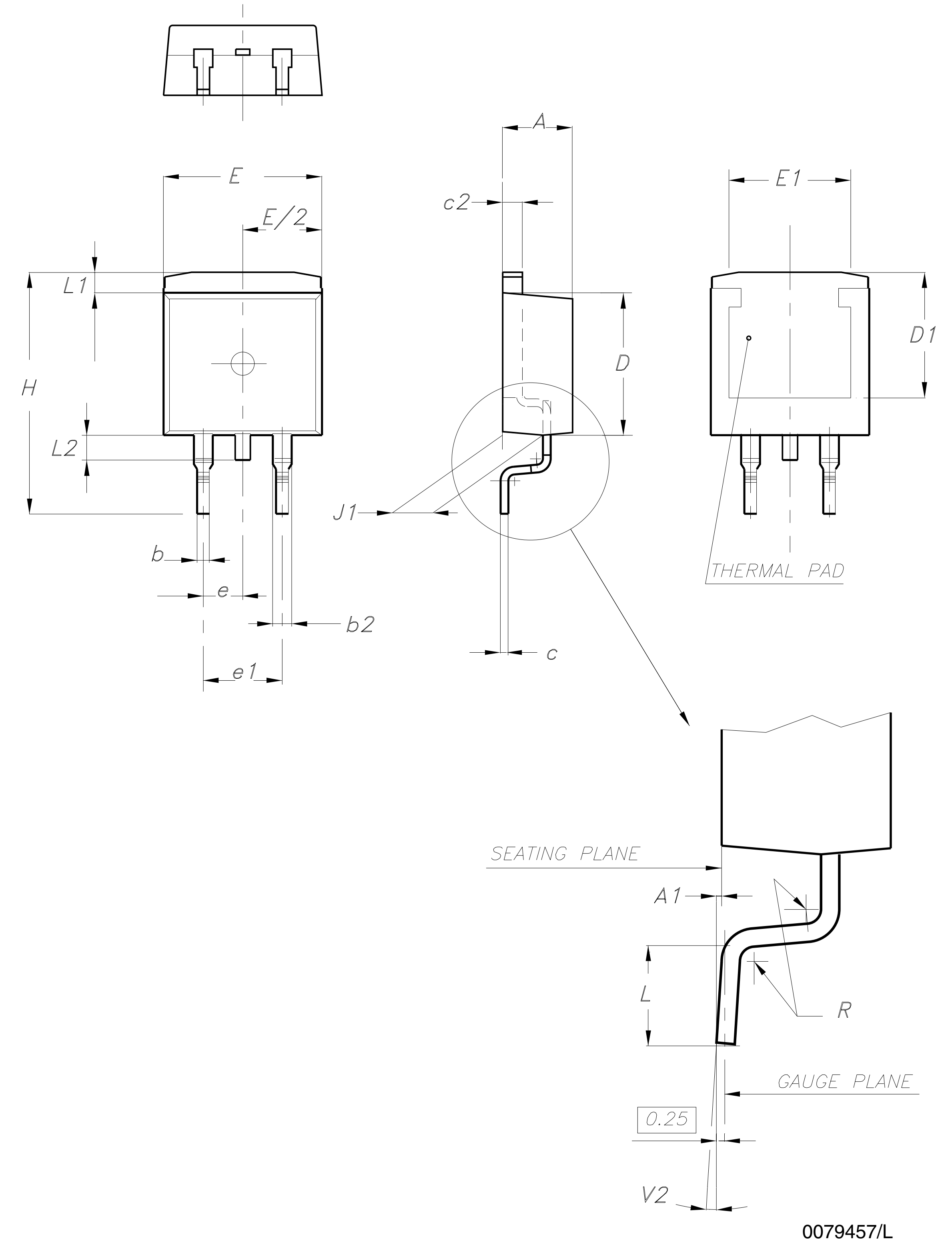


Table 28. D²PAK mechanical data

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 52. D²PAK footprint recommended data

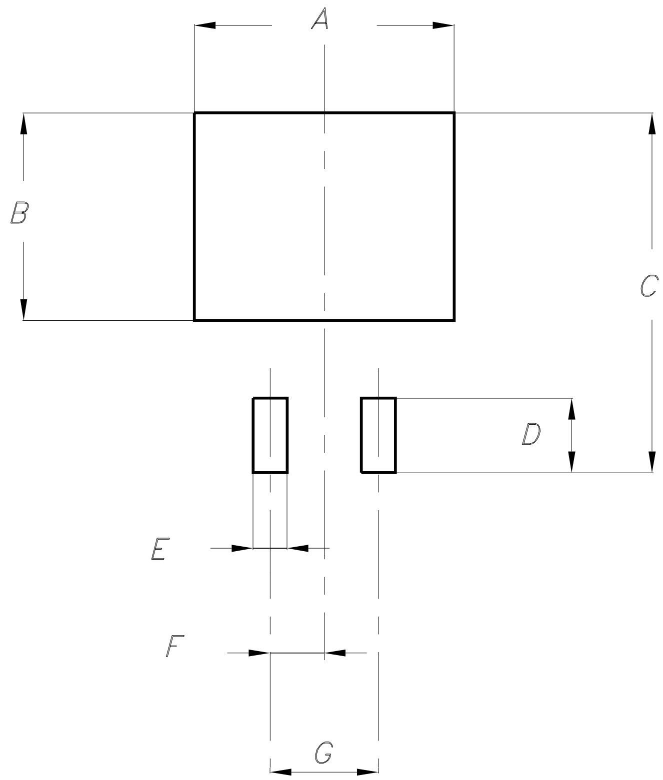


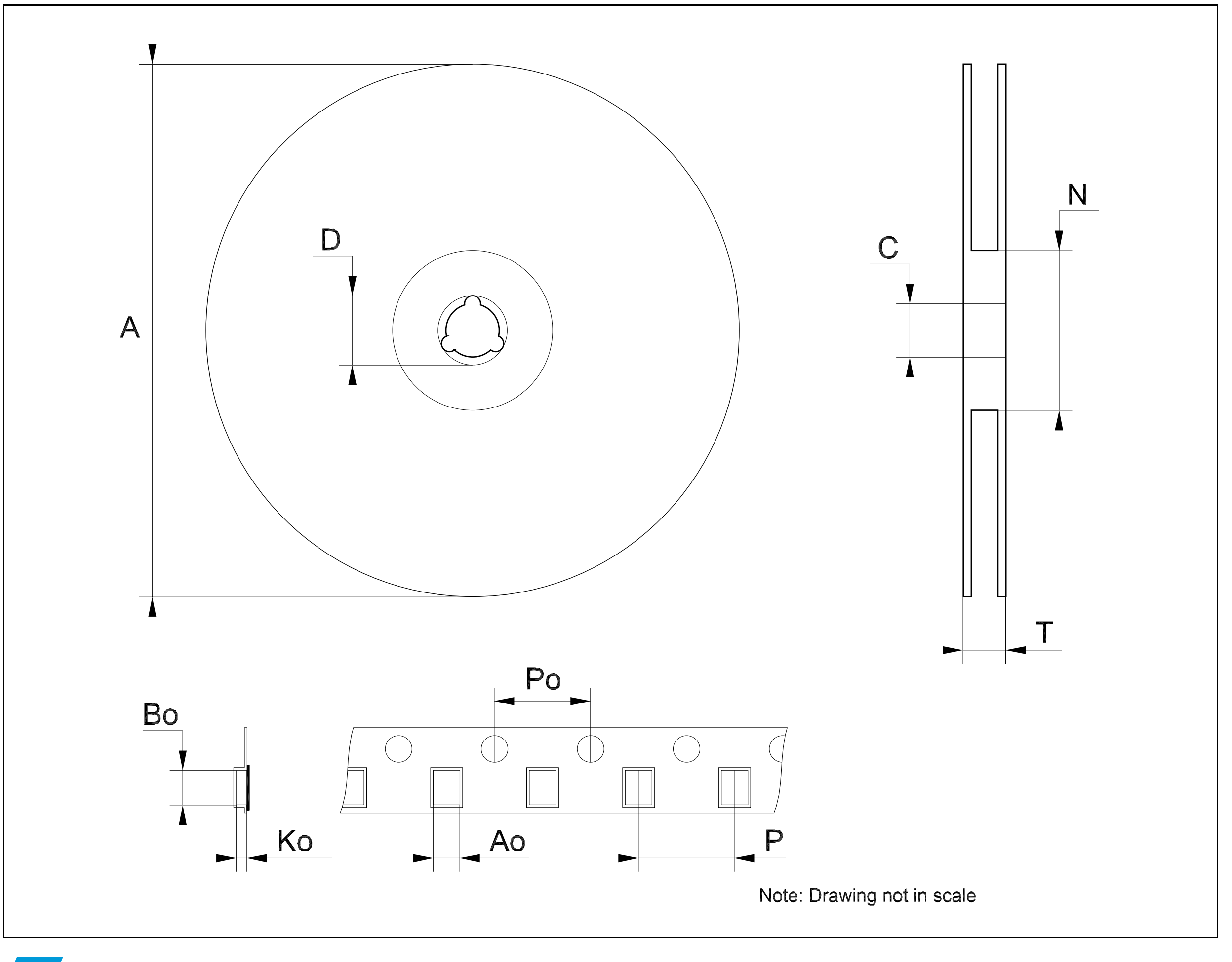
Table 29. D²PAK footprint data

Values		
Dim.	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 30. Tape and reel D²PAK 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

Figure 53. Drawing dimension tape and reel for D²PAK



9 Order codes

Table 31. Order codes

Part numbers	Order codes					
	TO-220	DPAK	D²PAK	TO-220FP	TO-3	Output voltages
L7805					L7805T	5 V
L7805C	L7805CV	L7805CDT-TR	L7805CD2T-TR	L7805CP	L7805CT	5 V
L7805AB	L7805ABV		L7805ABP	L7805ABP		5 V
L7805AC	L7805ACV		L7805ACP	L7805ACP		5 V
L7806C	L7806CV		L7806CD2T-TR		L7806CT	6 V
L7806AB	L7806ABV		L7806ABD2T-TR			6 V
L7806AC	L7806ACV		L7806ACD2T-TR			6 V
L7808C	L7808CV		L7808CD2T-TR	L7808CP		8 V
L7808AB	L7808ABV		L7808ABD2T-TR			8 V
L7808AC	L7808ACV		L7808ACD2T-TR			8 V
L7885C	L7885CV		L7885CD2T-TR (1)	L7885CP (1)	L7885CT (1)	8.5 V
L7809C	L7809CV		L7809CD2T-TR	L7809CP		9 V
L7809AB	L7809ABV		L7809ABD2T-TR			9 V
L7809AC	L7809ACV		L7809ACD2T-TR			9 V
L7812C	L7812CV		L7812CD2T-TR	L7812CP	L7812CT	12 V
L7812AB	L7812ABV		L7812ABD2T-TR			12 V
L7812AC	L7812ACV		L7812ACD2T-TR			12 V
L7815C	L7815CV		L7815CD2T-TR	L7815CP	L7815CT	15 V
L7815AB	L7815ABV		L7815ABD2T-TR			15 V
L7815AC	L7815ACV		L7815ACD2T-TR			15 V
L7818C	L7818CV		L7818CD2T-TR (1)		L7818CT	18 V
L7824C	L7824CV		L7824CD2T-TR	L7824CP	L7824CT	24 V
L7824AB	L7824ABV		L7824ABD2T-TR			24 V
L7824AC	L7824ACV					24 V

1. Available on request.

10 Revision history

Table 32. Document revision history

Date	Revision	Changes
21-Jun-2004	12	Document updating.
03-Aug-2006	13	Order codes has been updated and new template.
19-Jan-2007	14	D^2PAK mechanical data has been updated and add footprint data.
31-May-2007	15	Order codes has been updated.
29-Aug-2007	16	Added *Table 1* in cover page.
11-Dec-2007	17	Modified: *Table 31*.
06-Feb-2008	18	Added: TO-220 mechanical data *Figure 42 on page 42* , *Figure 43 on page 43*, and *Table 23 on page 41*. Modified: *Table 31 on page 56*.
18-Mar-2008	19	Added: *Table 26: DPAK mechanical data on page 49.*, *Table 27: Tape and reel DPAK mechanical data on page 50*. Modified: *Table 31 on page 56*.
26-Jan-2010	20	Modified *Table 1 on page 1* and *Table 23 on page 41*, added: *Figure 42 on page 42* and *Figure 43 on page 43*, *Figure 44 on page 44* and *Figure 45 on page 44*.
04-Mar-2010	21	Added notes *Figure 42 on page 42*.