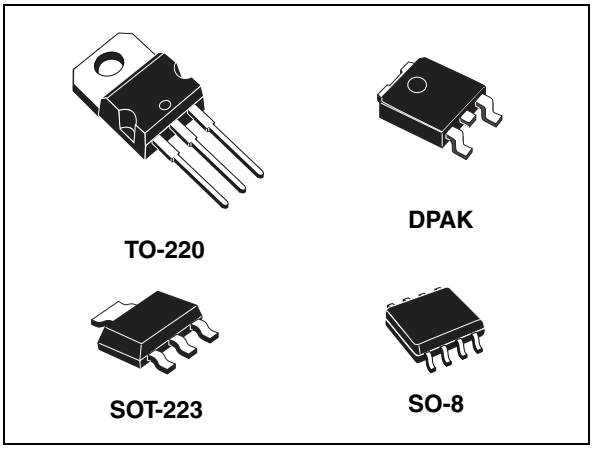
LD1117xx

Adjustable and fixed low drop positive voltage regulator

Features

- Low dropout voltage (1 V typ.)
- 2.85 V device performances are suitable for SCSI-2 active termination
- Output current up to 800 mA
- Fixed output voltage of: 1.2 V, 1.8 V, 2.5 V, 3.0 V, 3.3 V, 5.0 V
- Adjustable version availability (V_{ref} = 1.25 V)
- Internal current and thermal limit
- Available in ± 1% (at 25 °C) and 2% in full temperature range
- Supply voltage rejection: 75 dB (typ.)



Description

The LD1117 is a low drop voltage regulator able to provide up to 800 mA of output current, available even in adjustable version (V_{REF} = 1.25 V). Concerning fixed versions, are offered the following output voltages: 1.2 V, 1.8 V, 2.5 V, 2.85 V, 3.0 V, 3.3 V and 5.0 V. The 2.85 V type is ideal for SCSI-2 lines active termination. The device is supplied in: SOT-223, DPAK, SO-8 and TO-220.

The SOT-223 and DPAK surface mount packages optimize the thermal characteristics even offering a relevant space saving effect.

High efficiency is assured by NPN pass transistor. In fact in this case, unlike than PNP one, the quiescent current flows mostly into the load. Only a very common 10 µF minimum capacitor is needed for stability. On chip trimming allows the regulator to reach a very tight output voltage tolerance, within ± 1% at 25°C. The adjustable LD1117 is pin to pin compatible with the other standard. Adjustable voltage regulators maintaining the better performances in terms of drop and tolerance.

Table 1. Device summary

Part numbers		
LD1117XX12	LD1117XX25C	LD1117XX50C
LD1117XX12C	LD1117XX30	LD1117XX
LD1117XX18	LD1117XX33	LD1117XXC
LD1117XX18C	LD1117XX33C	
LD1117XX25	LD1117XX50	

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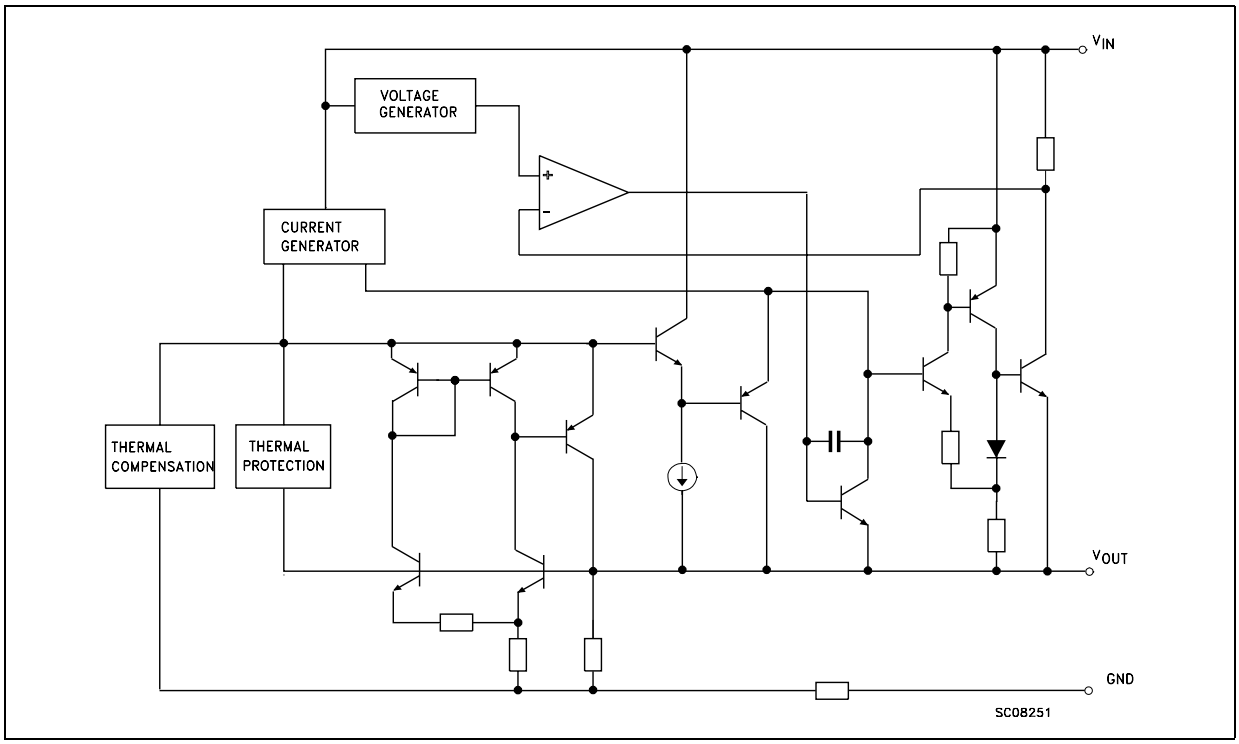
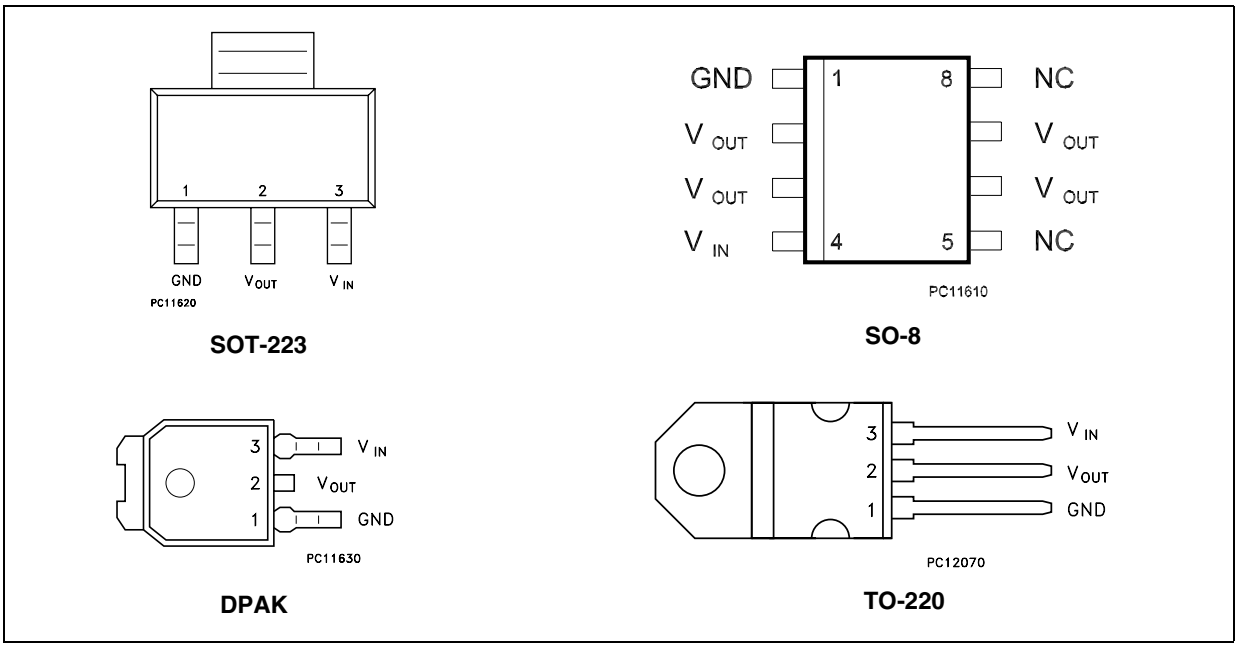
1 Diagram

Figure 1. Block diagram



2 Pin configuration

Figure 2. Pin connections (top view)



Note: The TAB is connected to the V_{OUT}.

3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter		Value	Unit
V_{IN} (1)	DC input voltage		15	V
P_{TOT}	Power dissipation		12	W
T_{STG}	Storage temperature range		-40 to +150	°C
T_{OP}	Operating junction temperature range	for C Version	-40 to +125	°C
		for standard Version	0 to +125	°C

1. Absolute maximum rating of V_{IN} = 18 V, when I_{OUT} is lower than 20 mA.

Table 3. Thermal data

Symbol	Parameter	SOT-223	SO-8	DPAK	TO-220	Unit
R_{thJC}	Thermal resistance junction-case	15	20	8	3	°C/W
R_{thJA}	Thermal resistance junction-ambient				50	°C/W

4 Schematic application

Figure 3. Application circuit (for 1.2 V)

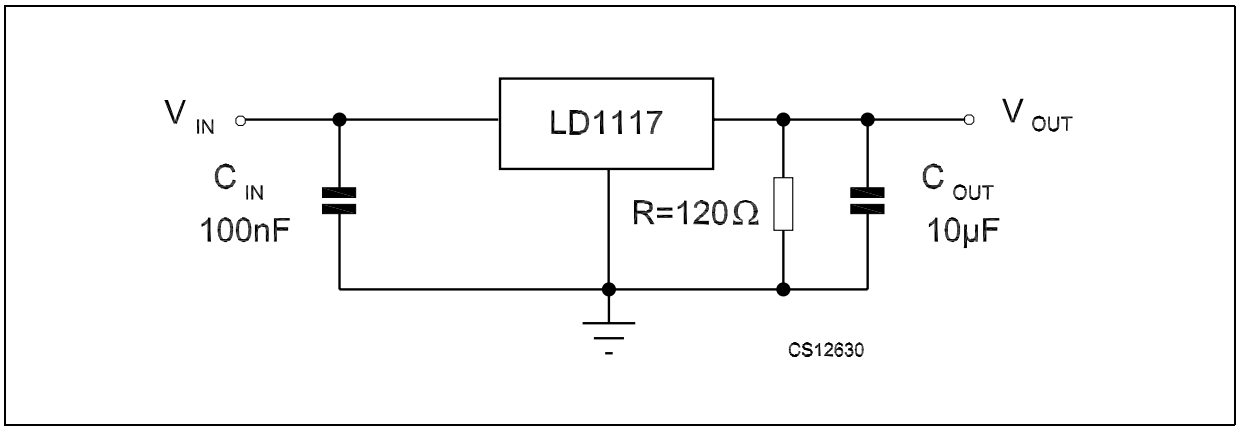
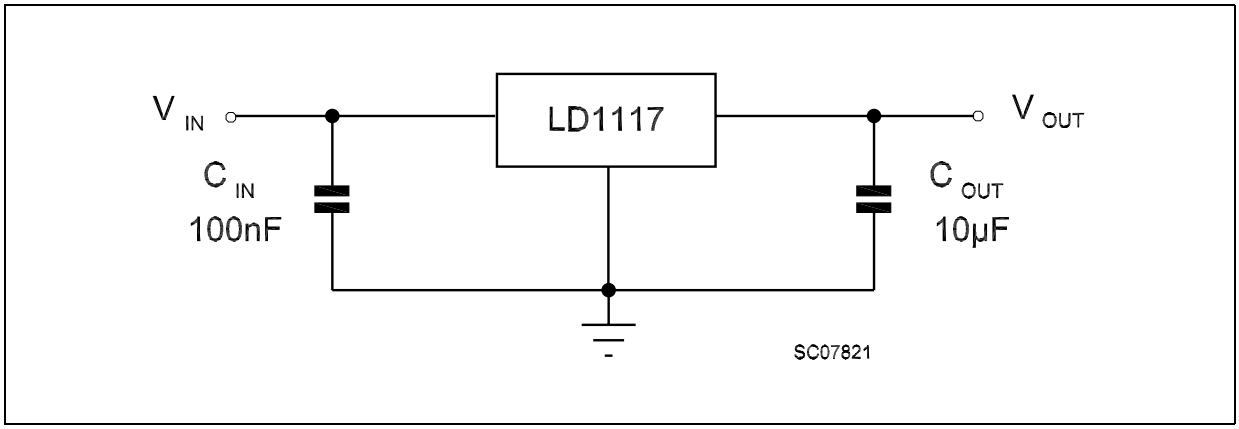


Figure 4. Application circuit (for other fixed output voltages)



5 Electrical characteristics

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, R = 120 Ω between GND and OUT pins, unless otherwise specified.

Table 4. Electrical characteristics of LD1117#12

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 3.2 V, I_O = 10 mA, T_J = 25 °C	1.188	1.20	1.212	V
V_O	Reference voltage	I_O = 10 to 800 mA V_{in} - V_O = 1.4 to 10 V	1.140	1.20	1.260	V
ΔV_O	Line regulation	V_{in} - V_O = 1.5 to 13.75 V, I_O = 10 mA		0.035	0.2	%
ΔV_O	Load regulation	V_{in} - V_O = 3 V, I_O = 10 to 800 mA		0.1	0.4	%
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage				15	V
I_{adj}	Adjustment pin current	$V_{in} \leq$ 15 V		60	120	µA
ΔI_{adj}	Adjustment pin current change	V_{in} - V_O = 1.4 to 10 V I_O = 10 to 800 mA		1	5	µA
$I_{O(min)}$	Minimum load current	V_{in} = 15 V		2	5	mA
I_O	Output current	V_{in} - V_O = 5 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise (%V_O)	B = 10 Hz to 10 kHz, T_J = 25 °C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} - V_O = 3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 5. Electrical characteristics of LD1117#18

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 3.8 V, I_O = 10 mA, T_J = 25 °C	1.78	1.8	1.82	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 3.3 to 8 V	1.76		1.84	V
ΔV_O	Line regulation	V_{in} = 3.3 to 8 V, I_O = 0 mA		1	6	mV
ΔV_O	Load regulation	V_{in} = 3.3 V, I_O = 0 to 800 mA		1	10	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq 8$ V		5	10	mA
I_O	Output current	V_{in} = 6.8 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 5.5 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 6. Electrical characteristics of LD1117#25

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 4.5 V, I_O = 10 mA, T_J = 25 °C	2.475	2.5	2.525	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 3.9 to 10 V	2.45		2.55	V
ΔV_O	Line regulation	V_{in} = 3.9 to 10 V, I_O = 0 mA		1	6	mV
ΔV_O	Load regulation	V_{in} = 3.9 V, I_O = 0 to 800 mA		1	10	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 10 V		5	10	mA
I_O	Output current	V_{in} = 7.5 V T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 5.5 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 7. Electrical characteristics of LD1117#30

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 5 V, I_O = 10 mA, T_J = 25 °C	2.97	3	3.03	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 4.5 to 10 V	2.94		3.06	V
ΔV_O	Line regulation	V_{in} = 4.5 to 12 V, I_O = 0 mA		1	6	mV
ΔV_O	Load regulation	V_{in} = 4.5 V, I_O = 0 to 800 mA		1	10	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 12 V		5	10	mA
I_O	Output current	V_{in} = 8 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µF
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 6 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 8. Electrical characteristics of LD1117#33

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 5.3 V, I_O = 10 mA, T_J = 25 °C	3.267	3.3	3.333	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 4.75 to 10 V	3.235		3.365	V
ΔV_O	Line regulation	V_{in} = 4.75 to 15 V, I_O = 0 mA		1	6	mV
ΔV_O	Load regulation	V_{in} = 4.75 V, I_O = 0 to 800 mA		1	10	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 15 V		5	10	mA
I_O	Output current	V_{in} = 8.3 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 6.3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 9. Electrical characteristics of LD1117#50

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 7 V, I_O = 10 mA, T_J = 25 °C	4.95	5	5.05	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 6.5 to 15 V	4.9		5.1	V
ΔV_O	Line regulation	V_{in} = 6.5 to 15 V, I_O = 0 mA		1	10	mV
ΔV_O	Load regulation	V_{in} = 6.5 V, I_O = 0 to 800 mA		1	15	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 15 V		5	10	mA
I_O	Output current	V_{in} = 10 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 8 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 10. Electrical characteristics of LD1117 (adjustable)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage	V_{in} - V_O = 2 V, I_O = 10 mA, T_J = 25 °C	1.238	1.25	1.262	V
V_{ref}	Reference voltage	I_O = 10 to 800 mA, V_{in} - V_O = 1.4 to 10 V	1.225		1.275	V
ΔV_O	Line regulation	V_{in} - V_O = 1.5 to 13.75 V, I_O = 10 mA		0.035	0.2	%
ΔV_O	Load regulation	V_{in} - V_O = 3 V, I_O = 10 to 800 mA		0.1	0.4	%
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage				15	V
I_{adj}	Adjustment pin current	$V_{in} \leq$ 15 V		60	120	µA
ΔI_{adj}	Adjustment pin current change	V_{in} - V_O = 1.4 to 10 V, I_O = 10 to 800 mA		1	5	µA
$I_{O(min)}$	Minimum load current	V_{in} = 15 V		2	5	mA
I_O	Output current	V_{in} - V_O = 5 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise (%V_O)	B = 10 Hz to 10 kHz, T_J = 25 °C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} - V_O = 3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA		1	1.1	V
		I_O = 500 mA		1.05	1.15	
		I_O = 800 mA		1.10	1.2	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, R = 120 Ω between GND and OUT pins, unless otherwise specified.

Table 11. Electrical characteristics of LD1117#12C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage	V_{in} - V_O = 2 V, I_O = 10 mA, T_J = 25 °C	1.176	1.20	1.224	V
V_{ref}	Reference voltage	I_O = 10 to 800 mA, V_{in} - V_O = 1.4 to 10 V	1.120	1.20	1.280	V
ΔV_O	Line regulation	V_{in} - V_O = 1.5 to 13.75 V, I_O = 10 mA			1	%
ΔV_O	Load regulation	V_{in} - V_O = 3 V, I_O = 10 to 800 mA			1	%
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage				15	V
I_{adj}	Adjustment pin current	$V_{in} \leq$ 15 V		60	120	µA
ΔI_{adj}	Adjustment pin current change	V_{in} - V_O = 1.4 to 10 V I_O = 10 to 800 mA		1	5	µA
$I_{O(min)}$	Minimum load current	V_{in} = 15 V		2	5	mA
I_O	Output current	V_{in} - V_O = 5 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise (%V_O)	B = 10 Hz to 10 kHz, T_J = 25 °C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} - V_O = 3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.2	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 12. Electrical characteristics of LD1117#18C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 3.8 V, I_O = 10 mA, T_J = 25 °C	1.76	1.8	1.84	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 3.9 to 10 V	1.73		1.87	V
ΔV_O	Line regulation	V_{in} = 3.3 to 8 V, I_O = 0 mA		1	30	mV
ΔV_O	Load regulation	V_{in} = 3.3 V, I_O = 0 to 800 mA		1	30	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq 8$ V		5	10	mA
I_O	Output current	V_{in} = 6.8 V T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 5.5 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 13. Electrical characteristics of LD1117#25C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 4.5 V, I_O = 10 mA, T_J = 25 °C	2.45	2.5	2.55	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 3.9 to 10 V	2.4		2.6	V
ΔV_O	Line regulation	V_{in} = 3.9 to 10 V, I_O = 0 mA		1	30	mV
ΔV_O	Load regulation	V_{in} = 3.9 V, I_O = 0 to 800 mA		1	30	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 10 V		5	10	mA
I_O	Output current	V_{in} = 7.5 V T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 5.5 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 14. Electrical characteristics of LD1117#33C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 5.3 V, I_O = 10 mA, T_J = 25 °C	3.24	3.3	3.36	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 4.75 to 10 V	3.16		3.44	V
ΔV_O	Line regulation	V_{in} = 4.75 to 15 V, I_O = 0 mA		1	30	mV
ΔV_O	Load regulation	V_{in} = 4.75 V, I_O = 0 to 800 mA		1	30	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 15 V		5	10	mA
I_O	Output current	V_{in} = 8.3 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 6.3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 15. Electrical characteristics of LD1117#50C

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 7 V, I_O = 10 mA, T_J = 25 °C	4.9	5	5.1	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 6.5 to 15 V	4.8		5.2	V
ΔV_O	Line regulation	V_{in} = 6.5 to 15 V, I_O = 0 mA		1	50	mV
ΔV_O	Load regulation	V_{in} = 6.5 V, I_O = 0 to 800 mA		1	50	mV
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage	I_O = 100 mA			15	V
I_d	Quiescent current	$V_{in} \leq$ 15 V		5	10	mA
I_O	Output current	V_{in} = 10 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise voltage	B = 10 Hz to 10 kHz, T_J = 25 °C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} = 8 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

Refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified.

Table 16. Electrical characteristics of LD1117C (adjustable)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage	V_{in} - V_O = 2 V, I_O = 10 mA, T_J = 25 °C	1.225	1.25	1.275	V
V_{ref}	Reference voltage	I_O = 10 to 800 mA, V_{in} - V_O= 1.4 to 10 V	1.2		1.3	V
ΔV_O	Line regulation	V_{in} - V_O = 1.5 to 13.75 V, I_O = 10 mA			1	%
ΔV_O	Load regulation	V_{in} - V_O = 3 V, I_O = 10 to 800 mA			1	%
ΔV_O	Temperature stability			0.5		%
ΔV_O	Long term stability	1000 hrs, T_J = 125 °C		0.3		%
V_{in}	Operating input voltage				15	V
I_{adj}	Adjustment pin current	$V_{in} \leq$ 15 V		60	120	µA
ΔI_{adj}	Adjustment pin current change	V_{in} - V_O = 1.4 to 10 V, I_O = 10 to 800 mA		1	10	µA
$I_{O(min)}$	Minimum load current	V_{in} = 15 V		2	5	mA
I_O	Output current	V_{in} - V_O = 5 V, T_J = 25 °C	800	950	1300	mA
eN	Output noise (%V_O)	B = 10 Hz to 10 kHz, T_J = 25 °C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120 Hz, T_J = 25 °C V_{in} - V_O = 3 V, V_{ripple} = 1 V_{PP}	60	75		dB
V_d	Dropout voltage	I_O = 100 mA, T_J = 0 to 125 °C		1	1.1	V
		I_O = 500 mA, T_J = 0 to 125 °C		1.05	1.15	
		I_O = 800 mA, T_J = 0 to 125 °C		1.10	1.2	
V_d	Dropout voltage	I_O = 100 mA			1.1	V
		I_O = 500 mA			1.2	
		I_O = 800 mA			1.3	
	Thermal regulation	T_a = 25 °C, 30 ms Pulse		0.01	0.1	%/W

6 Typical application

Figure 5. Negative supply

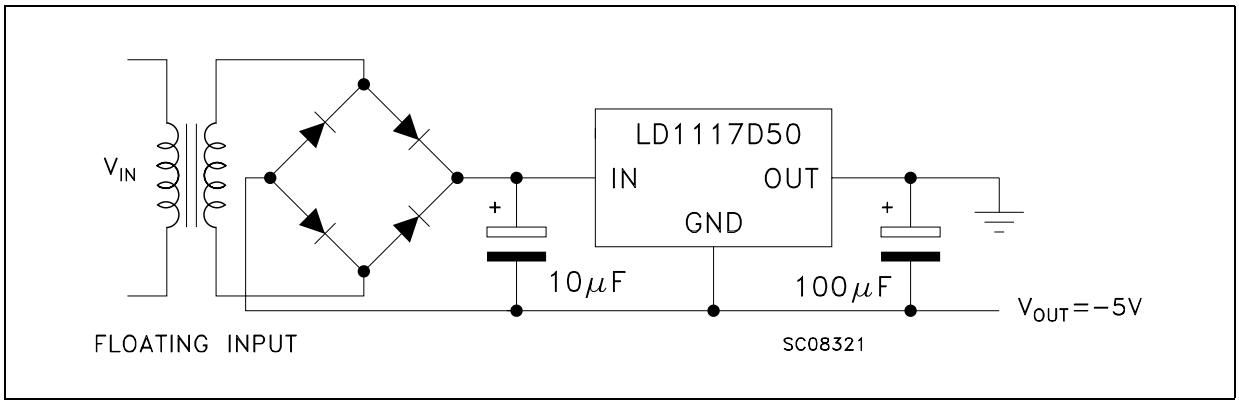


Figure 6. Active terminator for SCSI-2 bus

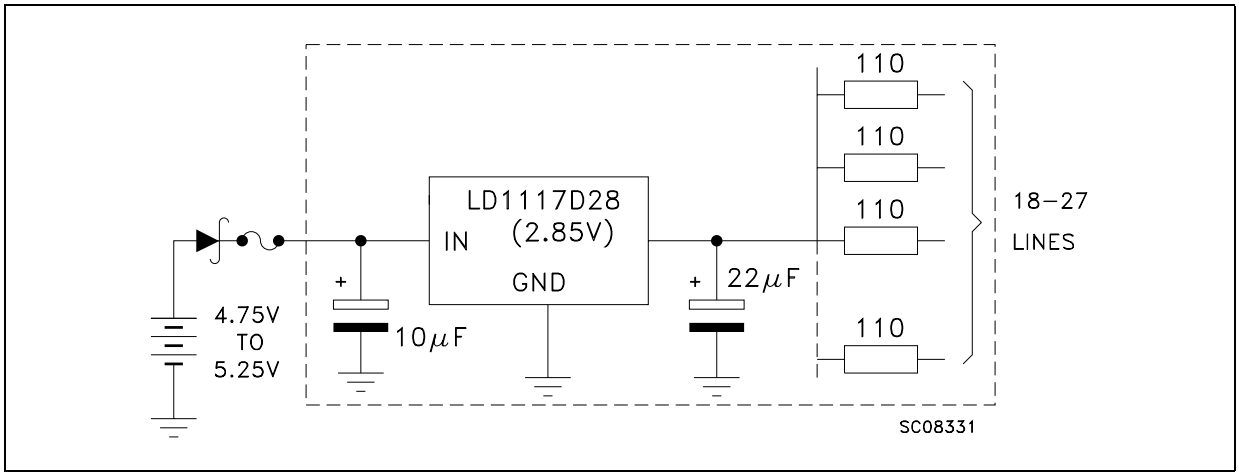


Figure 7. Circuit for increasing output voltage

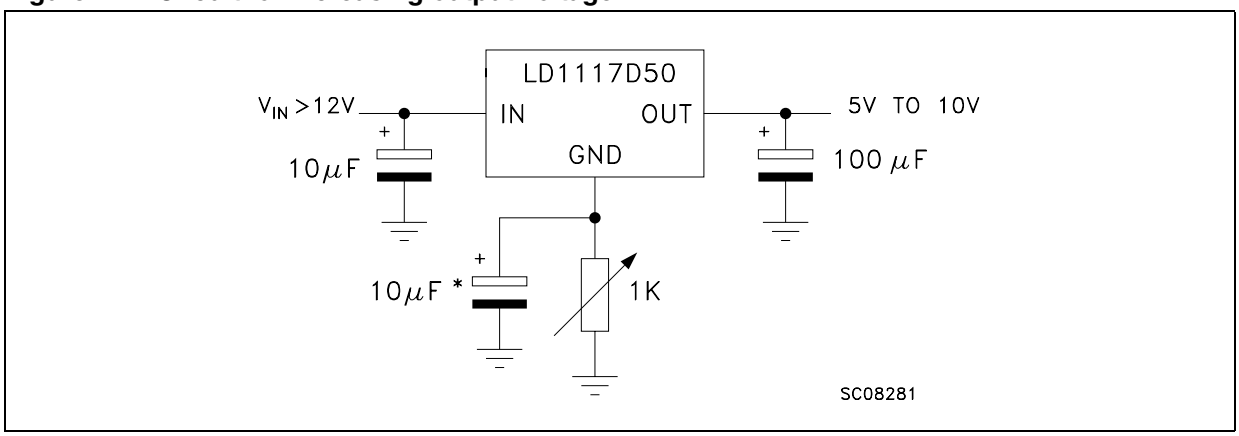


Figure 8. Voltage regulator with reference

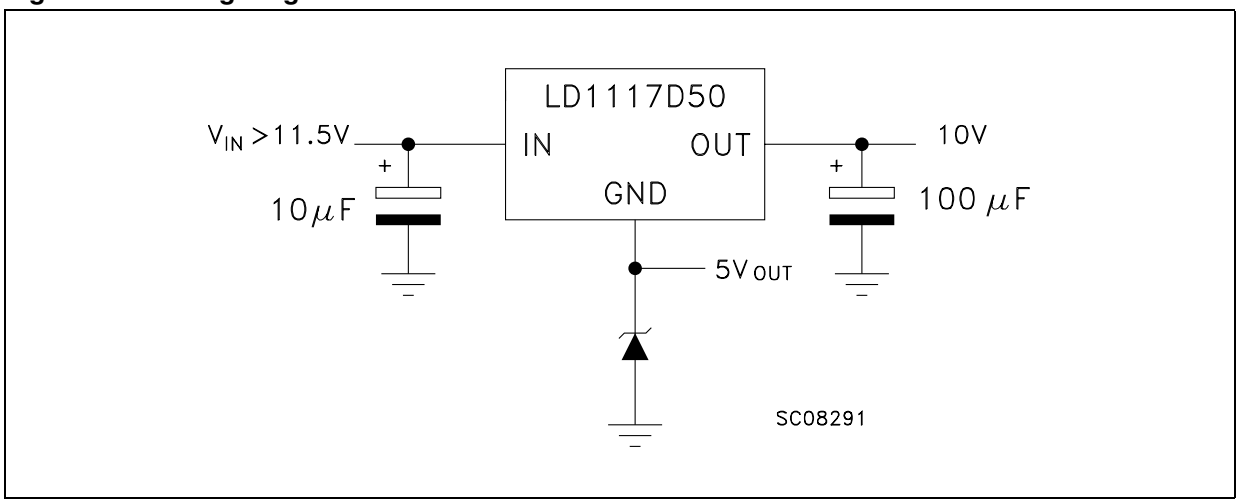


Figure 9. Battery backed-up regulated supply

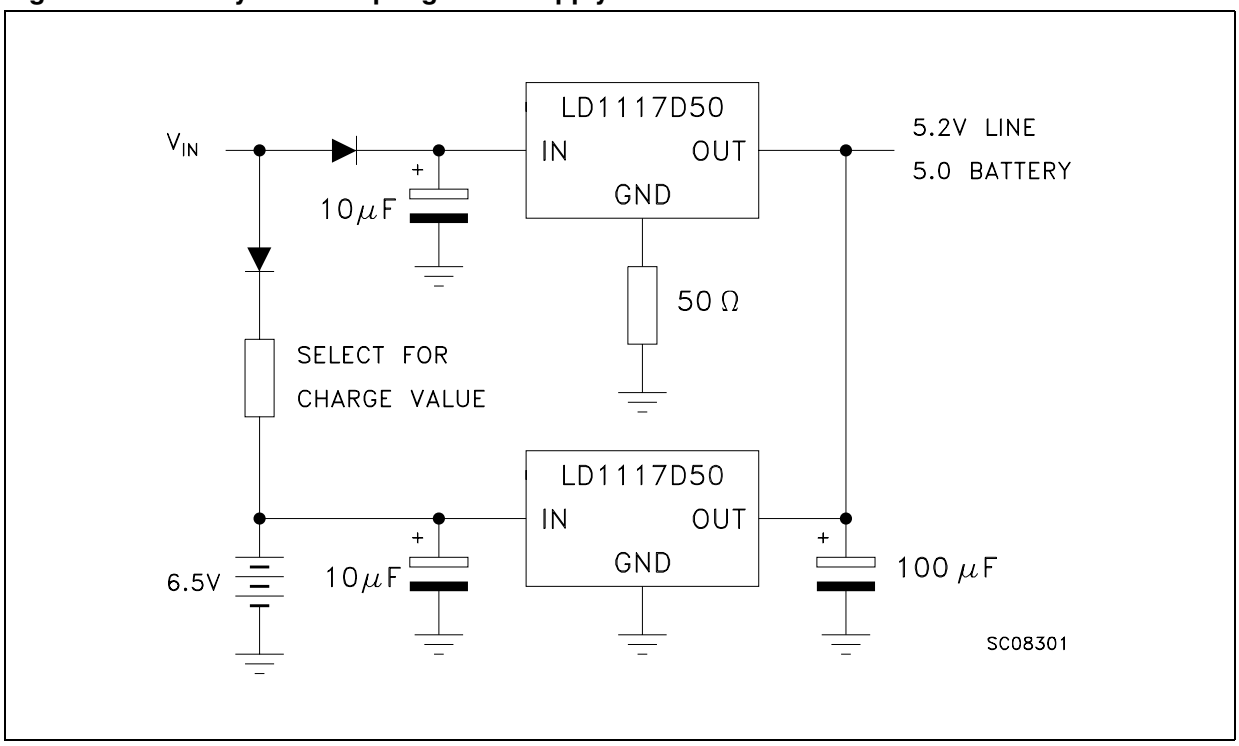
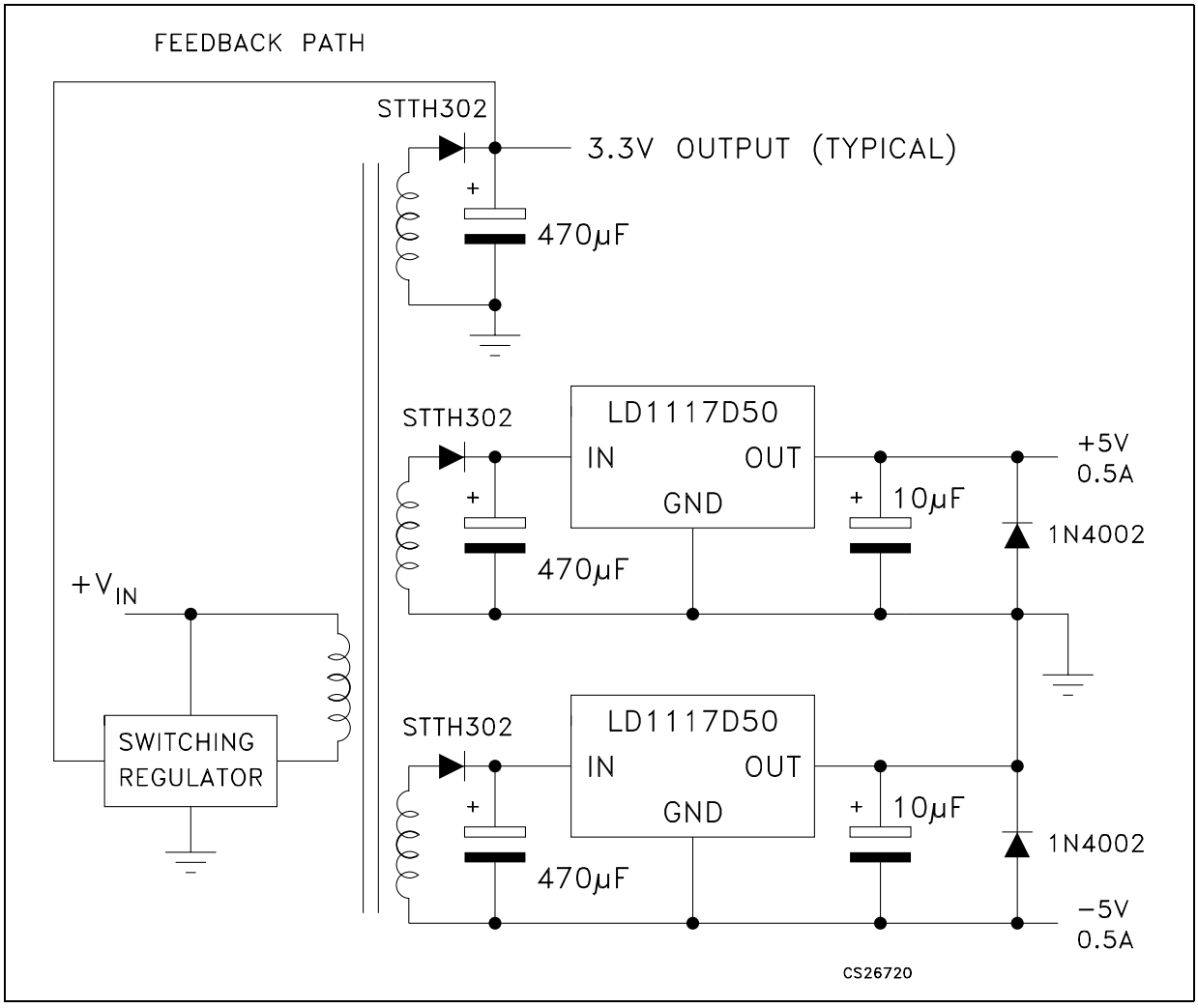


Figure 10. Post-regulated dual supply



7 LD1117 adjustable: application note

The LD1117 adjustable has a thermal stabilized 1.25 ± 0.012 V reference voltage between the OUT and ADJ pins. I_{ADJ} is 60 µA typ. (120 µA max.) and ΔI_{ADJ} is 1 µA typ. (5 µA max.).

R_1 is normally fixed to 120 Ω. From *Figure 10* we obtain:

$V_{OUT} = V_{REF} + R_2 (I_{ADJ} + I_{R1}) = V_{REF} + R_2 (I_{ADJ} + V_{REF} / R_1) = V_{REF} (1 + R_2 / R_1) + R_2 \times I_{ADJ}$.

In normal application R_2 value is in the range of few kΩ, so the $R_2 \times I_{ADJ}$ product could not be considered in the V_{OUT} calculation; then the above expression becomes:

$V_{OUT} = V_{REF} (1 + R_2 / R_1)$.

In order to have the better load regulation it is important to realize a good Kelvin connection of R_1 and R_2 resistors. In particular R_1 connection must be realized very close to OUT and ADJ pin, while R_2 ground connection must be placed as near as possible to the negative Load pin. Ripple rejection can be improved by introducing a 10 µF electrolytic capacitor placed in parallel to the R_2 resistor (see *Figure 11*).

Figure 11. Adjustable output voltage application

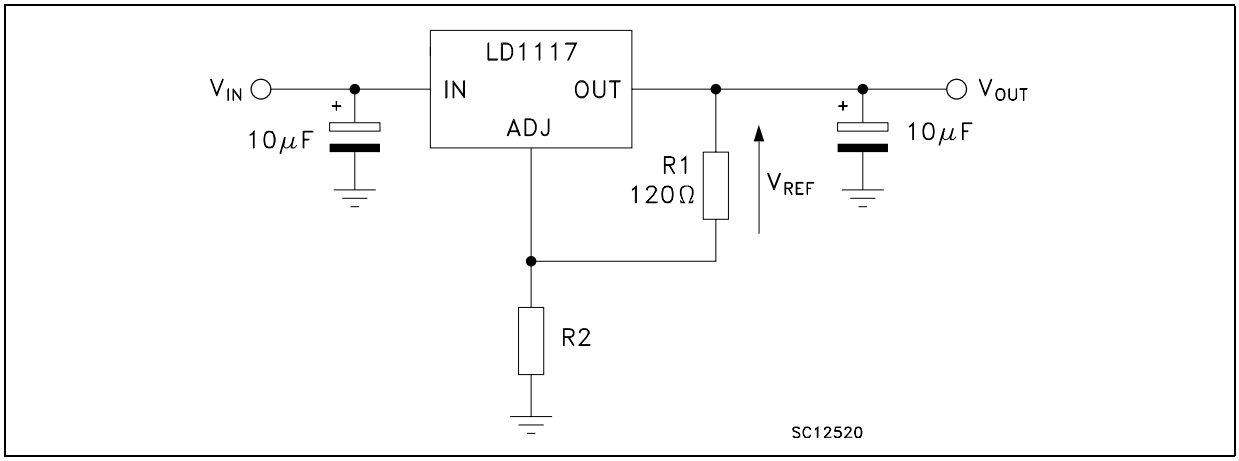
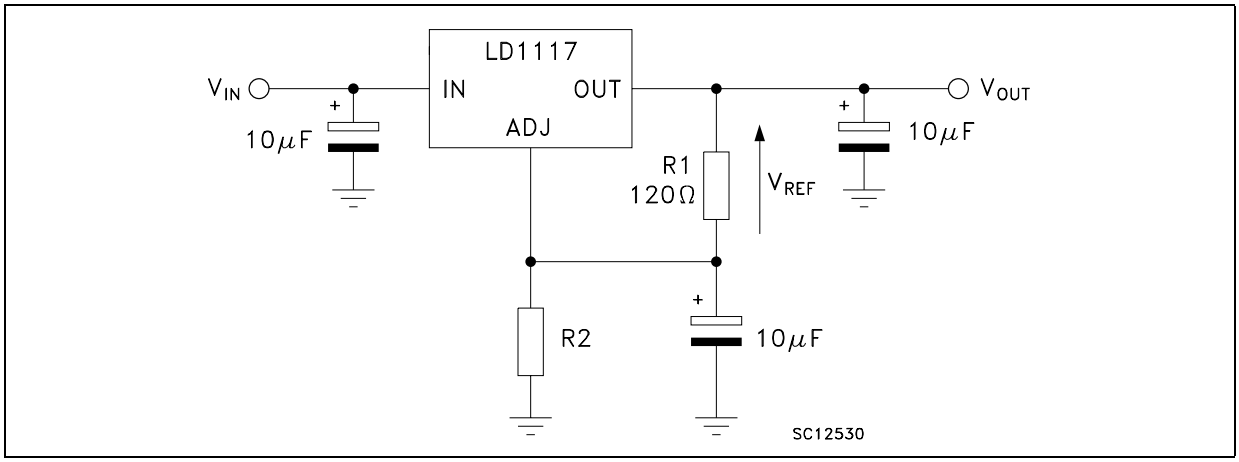


Figure 12. Adjustable output voltage application with improved ripple rejection



8 Package mechanical data

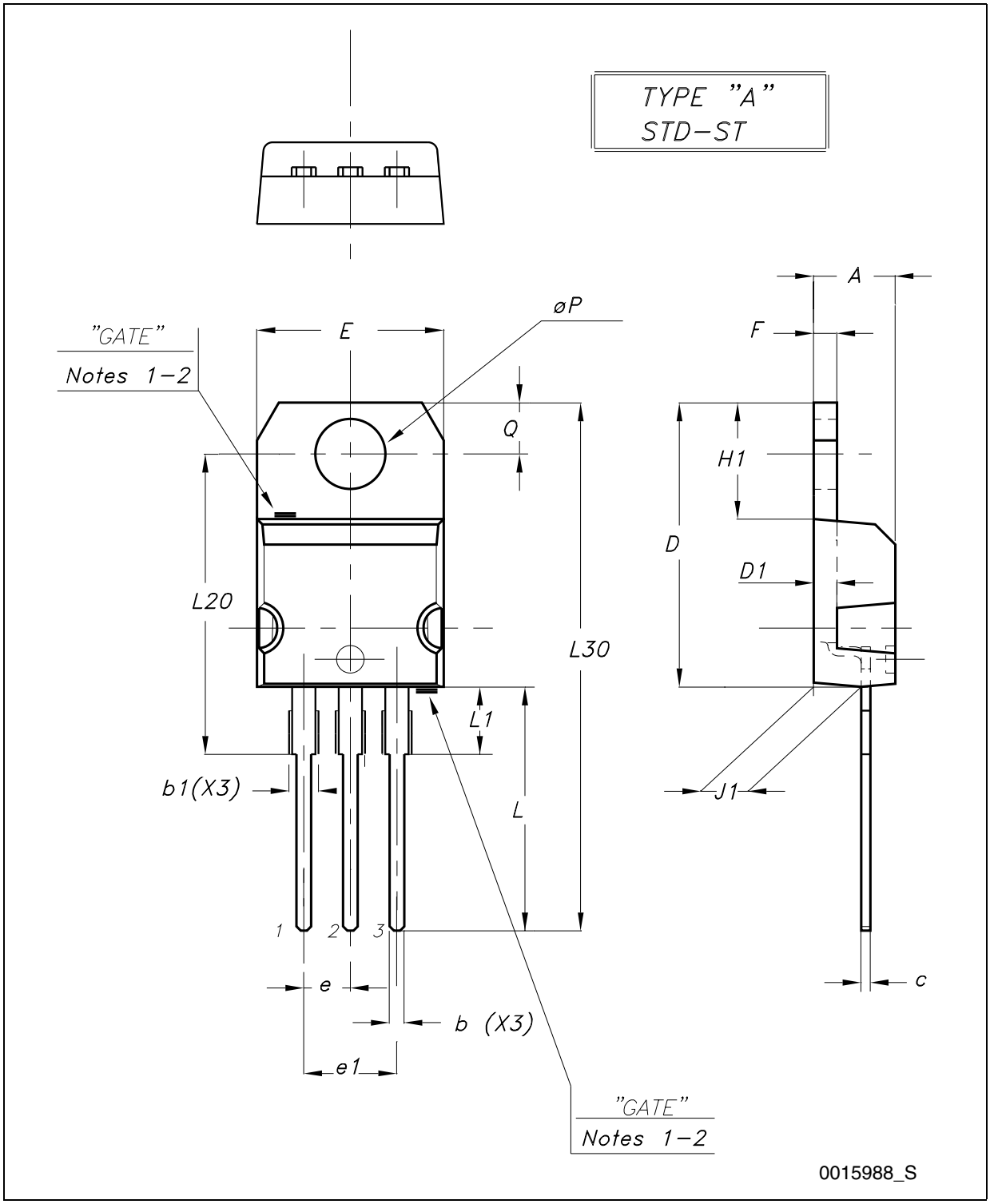
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Table 17. 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 13. 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 14. Drawing dimension TO-220 (type STD-ST Single Gauge)

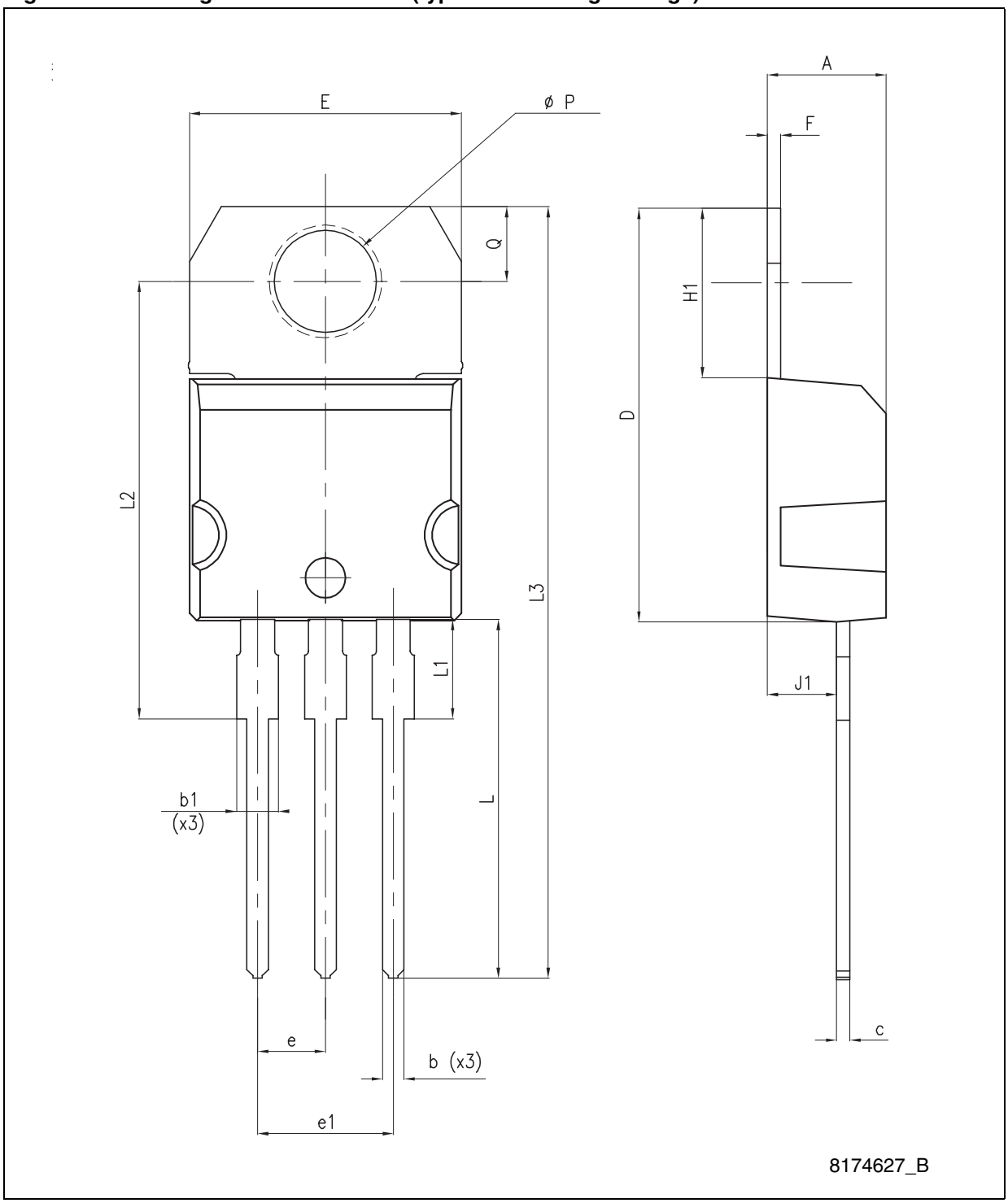


Figure 15. Drawing dimension tube for TO-220 Dual Gauge (mm.)

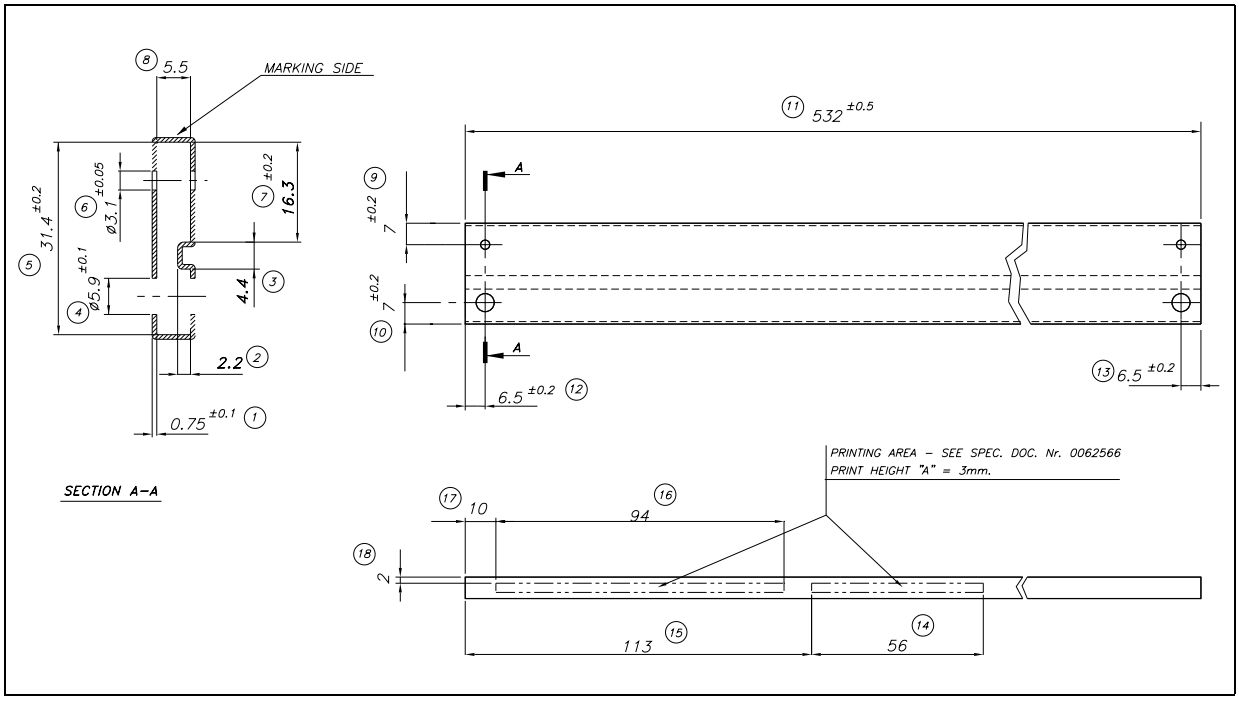
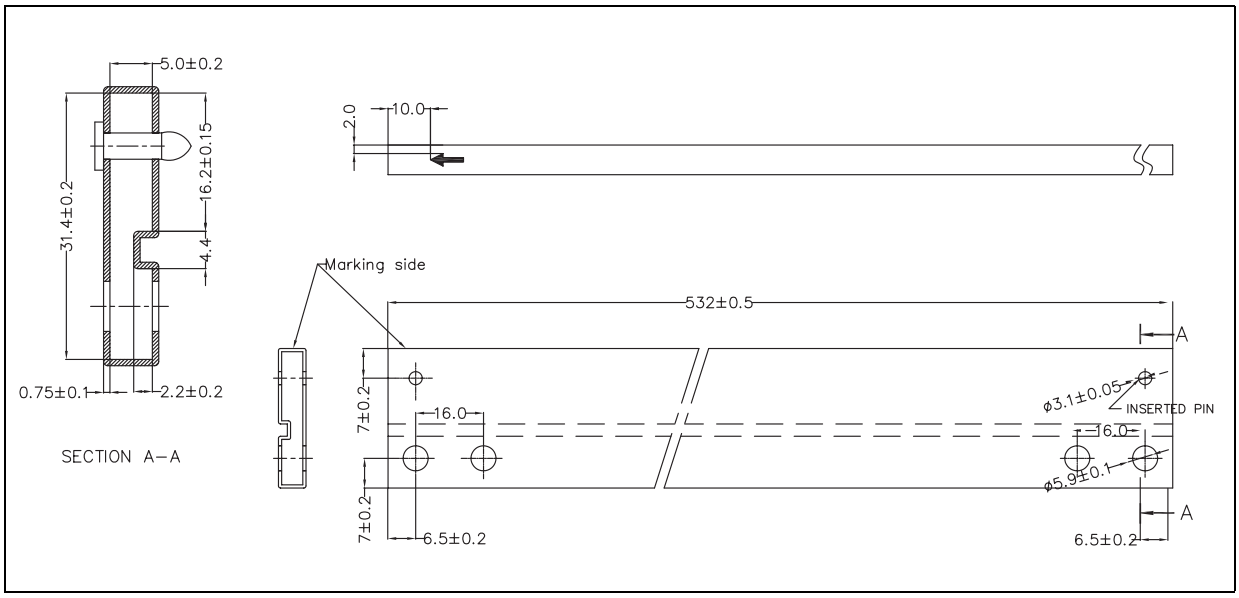
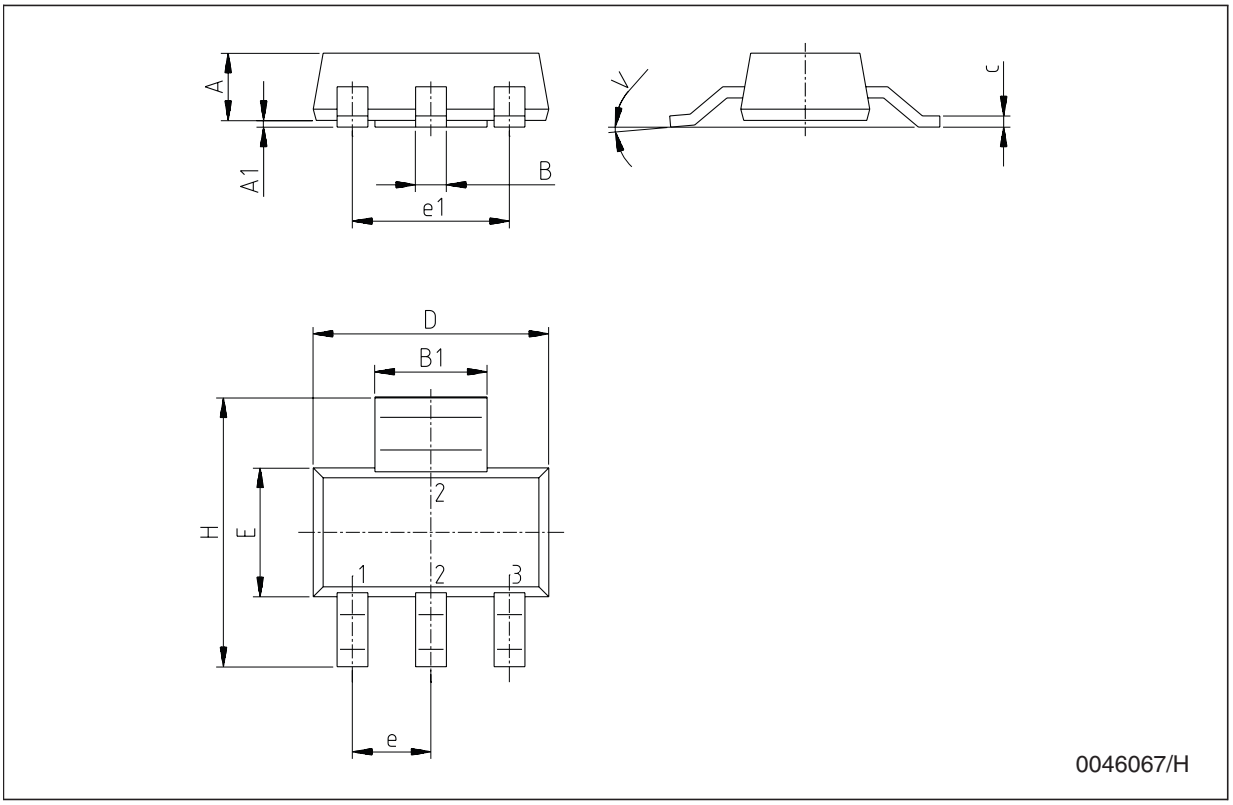


Figure 16. Drawing dimension tube for TO-220 Single Gauge (mm.)



SOT-223 mechanical data

Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.8			70.9
A1	0.02		0.1	0.8		3.9
B	0.6	0.7	0.85	23.6	27.6	33.5
B1	2.9	3	3.15	114.2	118.1	124.0
c	0.24	0.26	0.35	9.4	10.2	13.8
D	6.3	6.5	6.7	248.0	255.9	263.8
e		2.3			90.6	
e1		4.6			181.1	
E	3.3	3.5	3.7	129.9	137.8	145.7
H	6.7	7	7.3	263.8	275.7	287.5
V			10°			10°



0046067/H

SO-8 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04

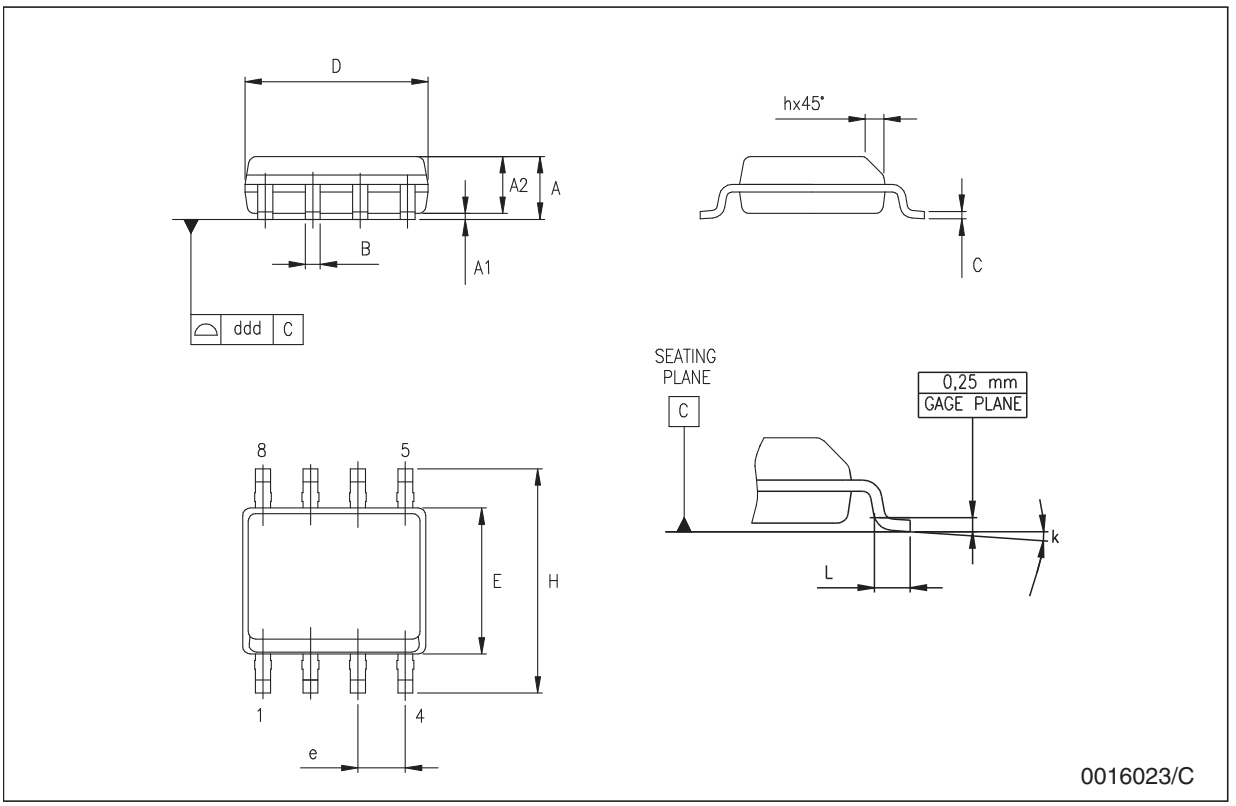
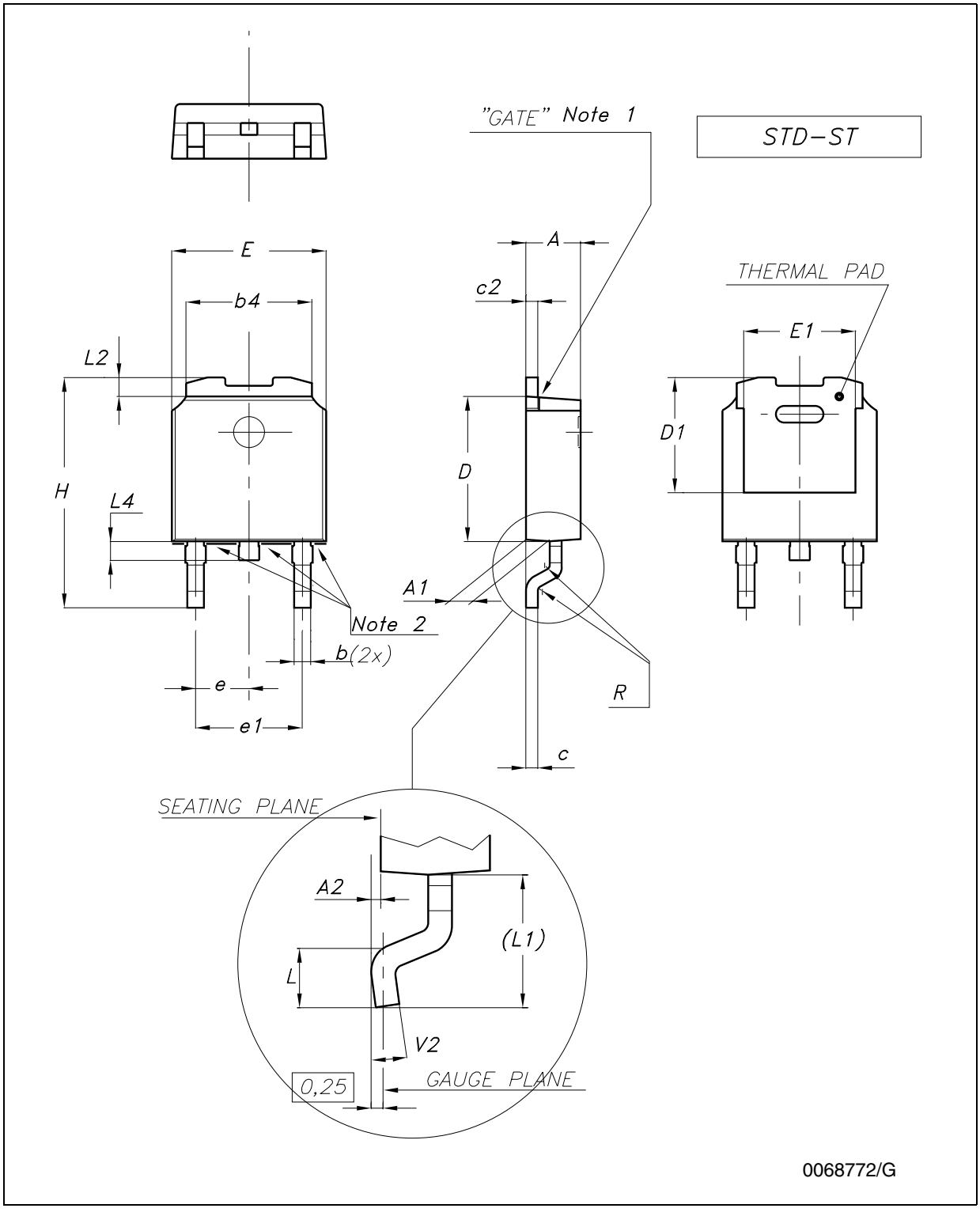


Figure 17. Drawing dimension DPAK (type STD-ST)



Note: 1 Maximum resin gate protrusion: 0.5 mm.

2 Maximum resin protrusion: 0.25 mm.

Figure 18. Drawing dimension DPAK (type Fujitsu-subcon.)

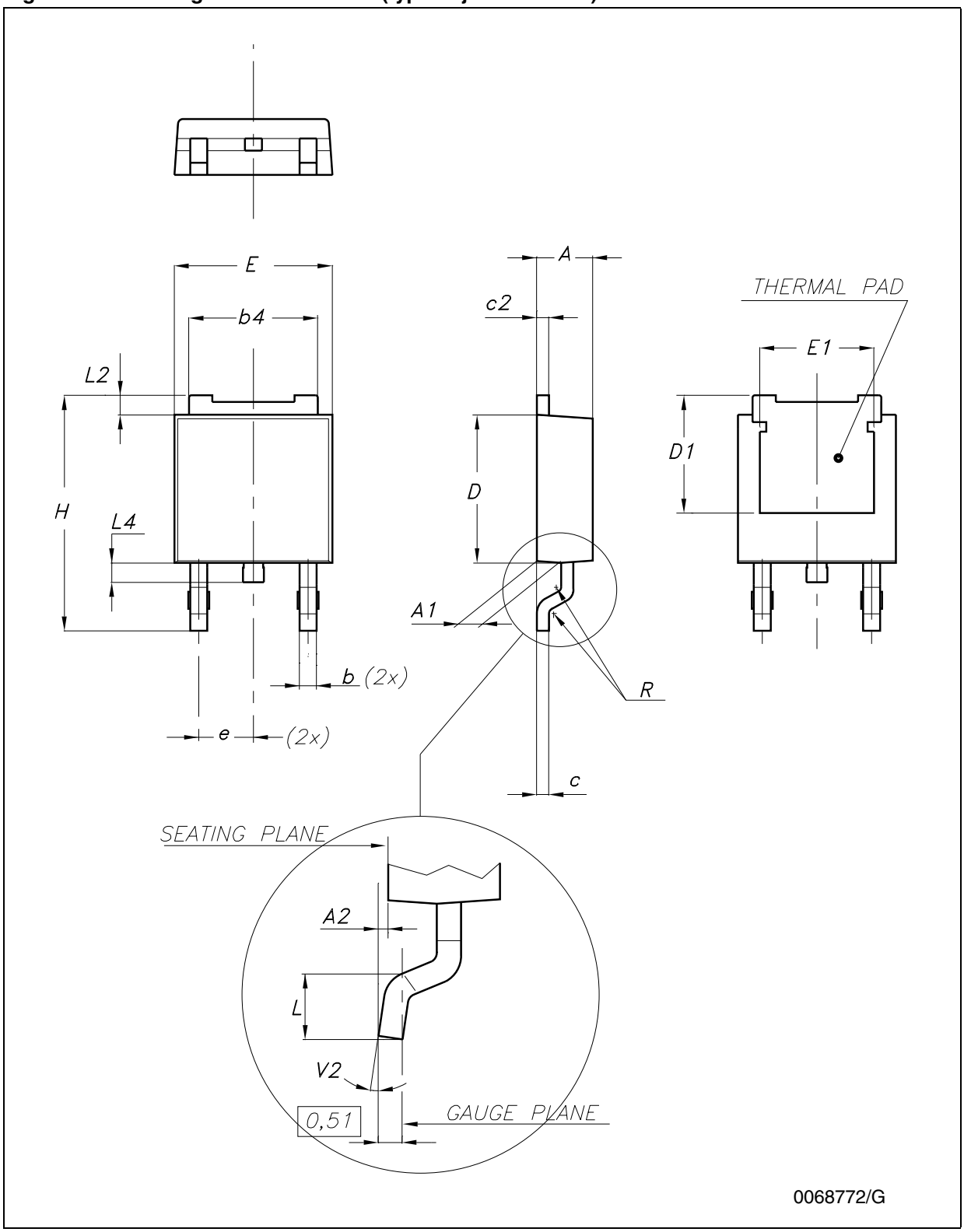


Figure 19. Drawing dimension DPAK (type IDS-subcon.)

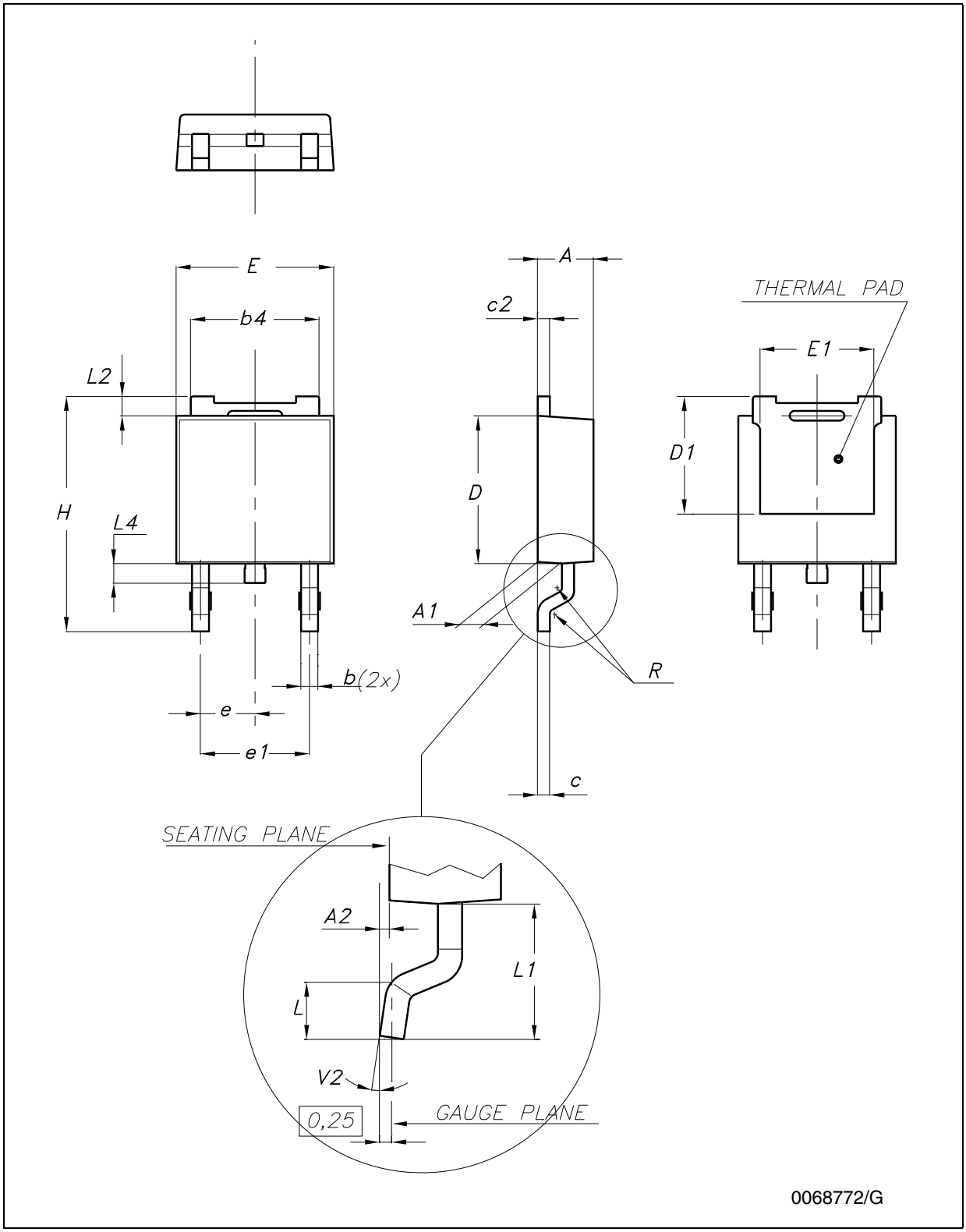


Table 18. DPAK mechanical data

Dim.	Type STD-ST			Type Fujitsu-subcon.			Type IDS-subcon		
	mm.			mm.			mm.		
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	2.25	2.30	2.35	2.19		2.38
A1	0.90		1.10	0.96		1.06	0.89		1.14
A2	0.03		0.23	0		0.10	0.03		0.23
b	0.64		0.90	0.76		0.86	0.64		0.88
b4	5.20		5.40	5.28		5.38	5.21		5.46
c	0.45		0.60	0.46		0.56	0.46		0.58
c2	0.48		0.60	0.46		0.56	0.46		0.58
D	6.00		6.20	6.05		6.15	5.97		6.22
D1		5.10		5.27		5.47		5.20	
E	6.40		6.60	6.55	6.60	6.65	6.35		6.73
E1		4.70			4.77			4.70	
e		2.28		2.23	2.28	2.33		2.28	
e1	4.40		4.60				4.51		4.61
H	9.35		10.10	9.90		10.30	9.40		10.42
L	1.00			1.40		1.60	0.90		
L1		2.80					2.50		2.65
L2		0.80		1.03		1.13	0.89		1.27
L4	0.60		1.00	0.70		0.90	0.64		1.02
R		0.20			0.40			0.20	
V2	0°		8°	0°		8°	0°		8°

Note: The DPAK package coming from the two subcontractors (Fujitsu and IDS) are fully compatible with the ST's package suggested footprint.

Figure 20. DPAK footprint recommended data

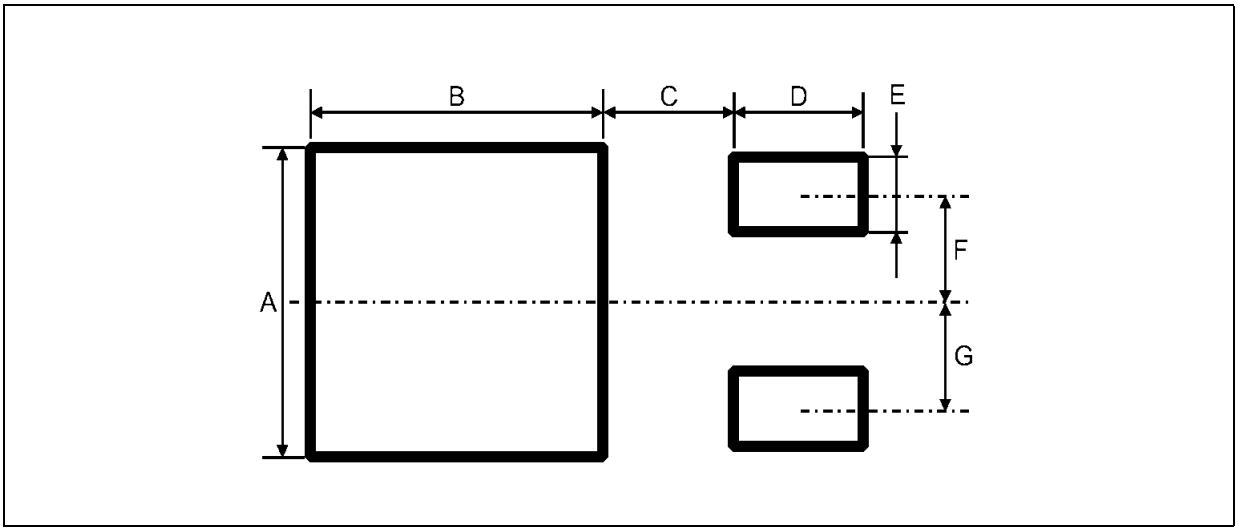
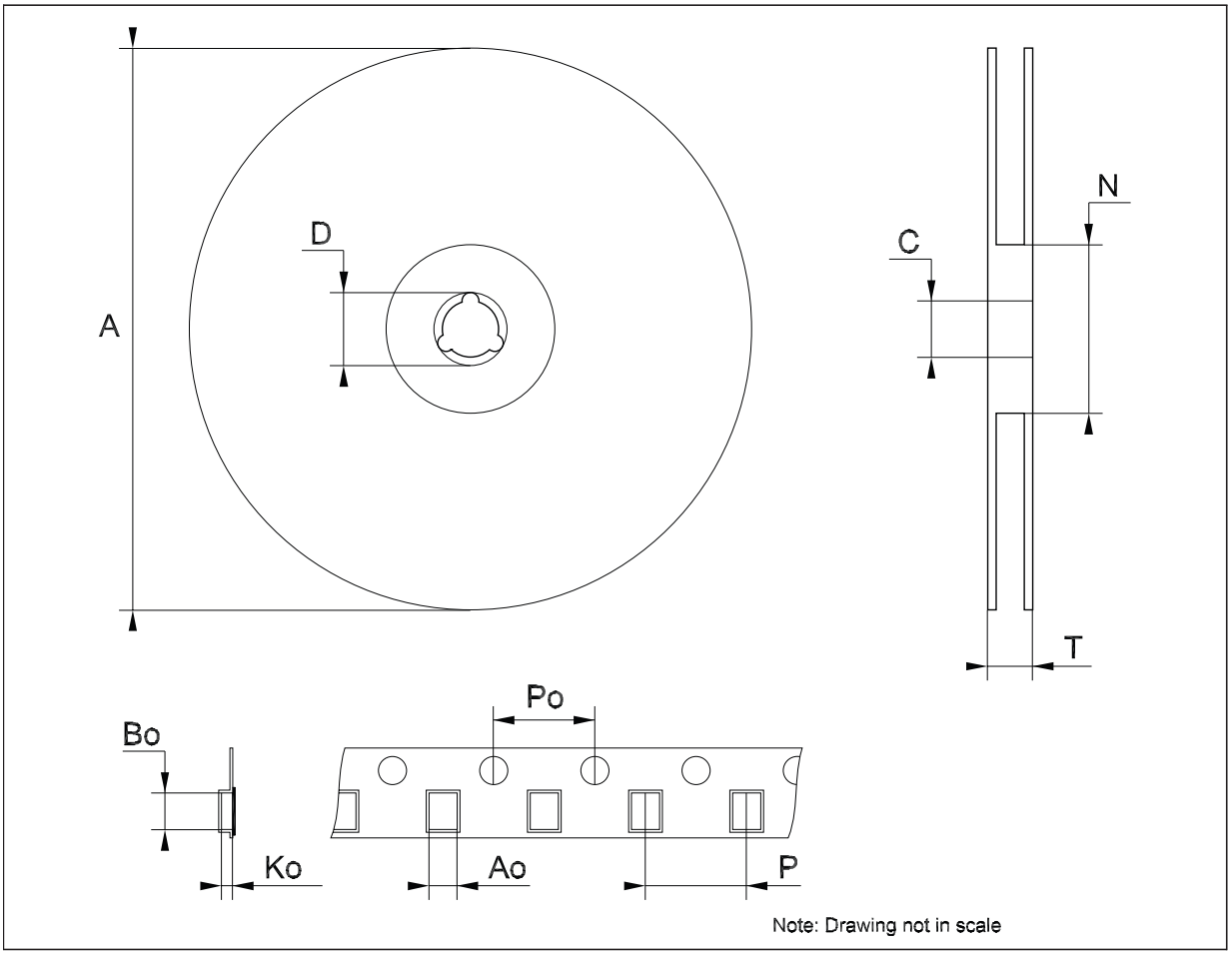


Table 19. Footprint data

Values		
	mm.	**inch.**
A	6.70	0.264
B	6.70	0.64
C	1.8	0.070
D	3.0	0.118
E	1.60	0.063
F	2.30	0.091
G	2.30	0.091

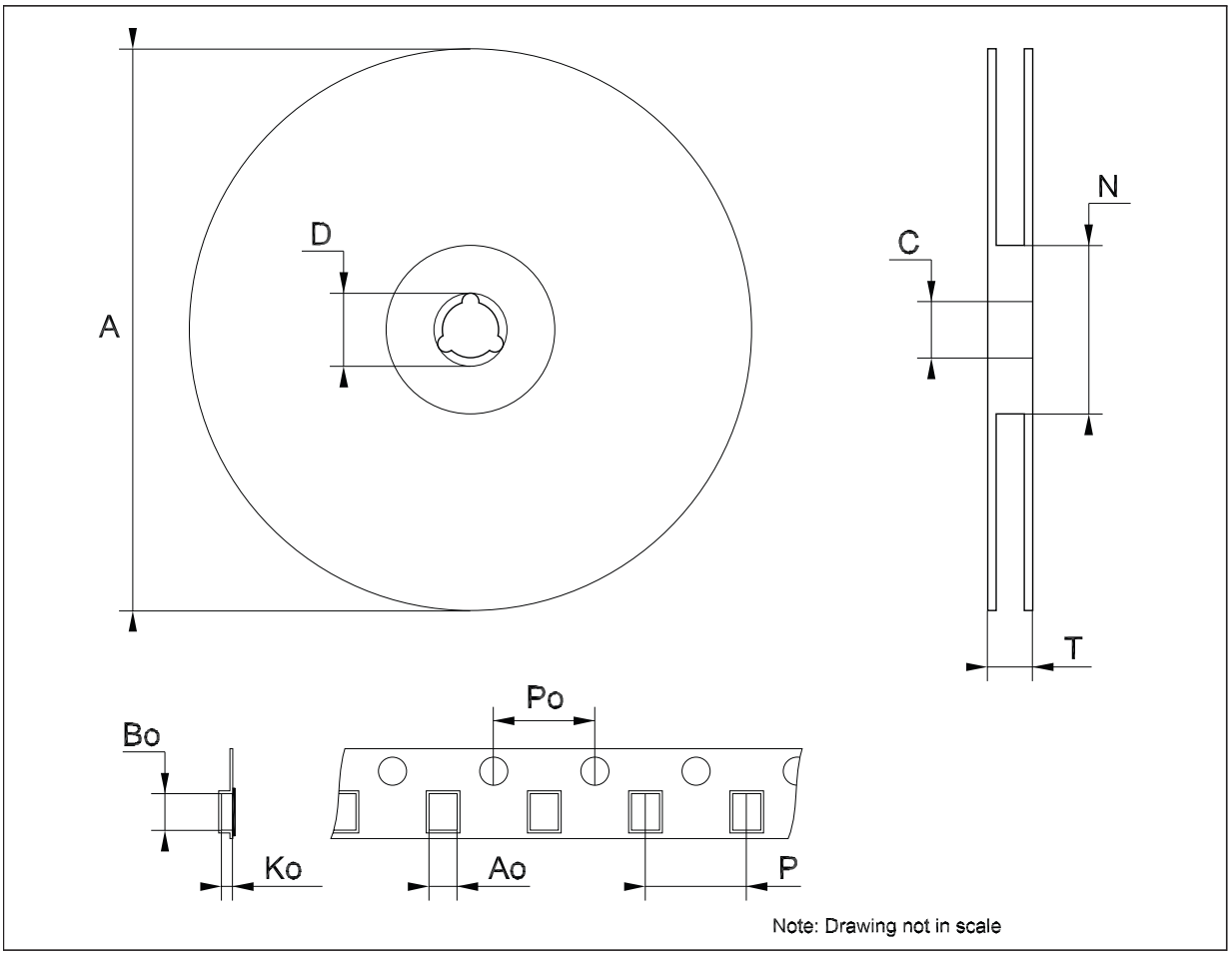
Tape & reel SOT223 mechanical data

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			14.4			0.567
Ao	6.73	6.83	6.93	0.265	0.269	0.273
Bo	7.32	7.42	7.52	0.288	0.292	0.296
Ko	1.78		2	0.070		0.078
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



Tape & reel SO-8 mechanical data

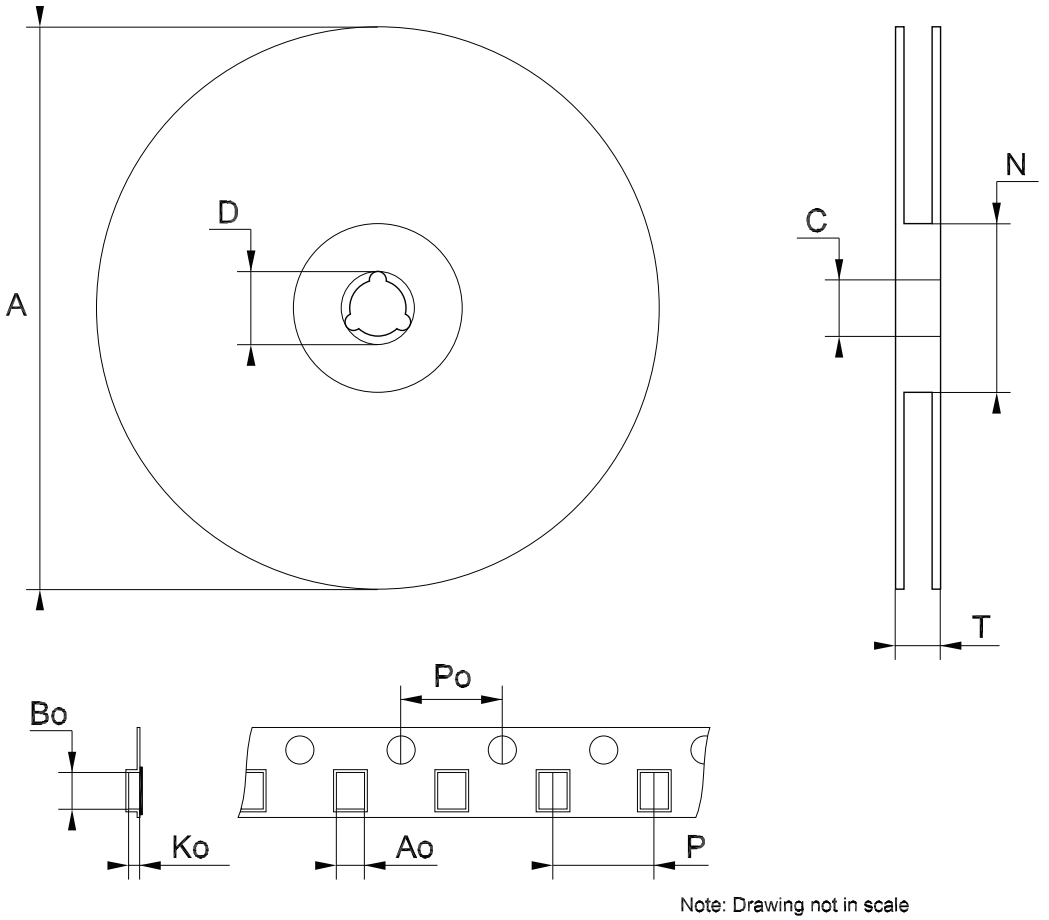
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Note: Drawing not in scale

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

9 Order codes

Table 20. Order codes

Packages					
SOT-223	**SO-8**	**DPAK**	**DPAK (T & R)**	**TO-220**	**Output voltages**
LD1117S12TR	LD1117D12TR (1)	LD1117DT12 (1)	LD1117DT12TR		1.2 V
LD1117S12CTR	LD1117D12CTR (1)	LD1117DT12C (1)		LD1117V12C (1)	1.2 V
LD1117S18TR	LD1117D18TR (1)		LD1117DT18TR	LD1117V18	1.8 V
LD1117S18CTR	LD1117D18CTR (1)		LD1117DT18CTR	LD1117V18C (1)	1.8 V
LD1117S25TR	LD1117D25TR (1)		LD1117DT25TR		2.5 V
LD1117S25CTR	LD1117D25CTR (1)		LD1117DT25CTR		2.5 V
LD1117S30TR					3 V
LD1117S33TR	LD1117D33TR		LD1117DT33TR	LD1117V33	3.3 V
LD1117S33CTR	LD1117D33CTR		LD1117DT33CTR	LD1117V33C	3.3 V
LD1117S50TR			LD1117DT50TR	LD1117V50	5 V
LD1117S50CTR			LD1117DT50CTR		5 V
LD1117STR	LD1117DTR (1)		LD1117DTTR	LD1117V	ADJ from 1.25 to 15V
LD1117SC-R	LD1117DC-R (1)	LD1117DTC (1)	LD1117DTC-R	LD1117VC (1)	ADJ from 1.25 to 15V

1. Available on request.

10 Revision history

Table 21. Document revision history

Date	Revision	Changes
22-Sep-2004	15	Add new part number #12C; typing error: note on table 2.
25-Oct-2004	16	Add V_{ref} reference voltage on table 12.
18-Jul-2005	17	The DPAK mechanical data updated.
25-Nov-2005	18	The TO220FM package removed.
14-Dec-2005	19	The T_{op} on table 2 updated.
06-Dec-2006	20	DPAK mechanical data updated and added footprint data.
05-Apr-2007	21	Order codes updated.
30-Nov-2007	22	Added *Table 1*.
16-Apr-2008	23	Modified: *Table 20 on page 40*.
08-Jul-2008	24	Added note *1. on page 7*.
30-Mar-2009	25	Modified: V_{IN} max value *Table 5 on page 10* and *Figure 10 on page 24*.
29-Jul-2009	26	Modified: *Table 20 on page 40*.
03-Feb-2010	27	Modified *Table 11 on page 16*.
22-Mar-2010	28	Added: *Table 17 on page 26*, *Figure 13 on page 27*, *Figure 14 on page 28*, *Figure 15* and *Figure 16 on page 29*.

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