

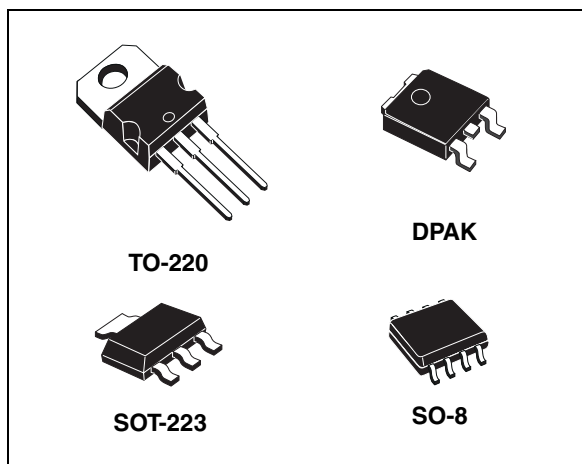
## Adjustable and fixed low drop positive voltage regulator

### 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  $\pm 1$  % (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  $\mu$ F minimum capacitor is needed for stability.



On chip trimming allows the regulator to reach a very tight output voltage tolerance, within  $\pm 1$  % 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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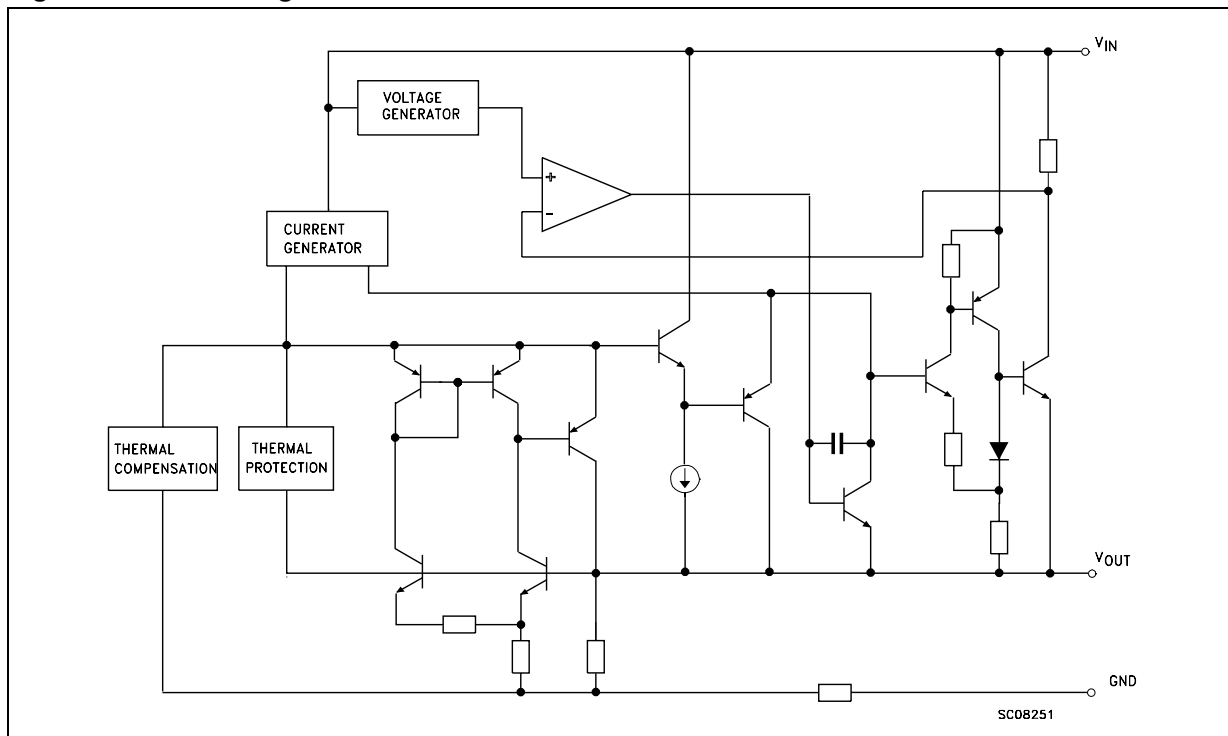
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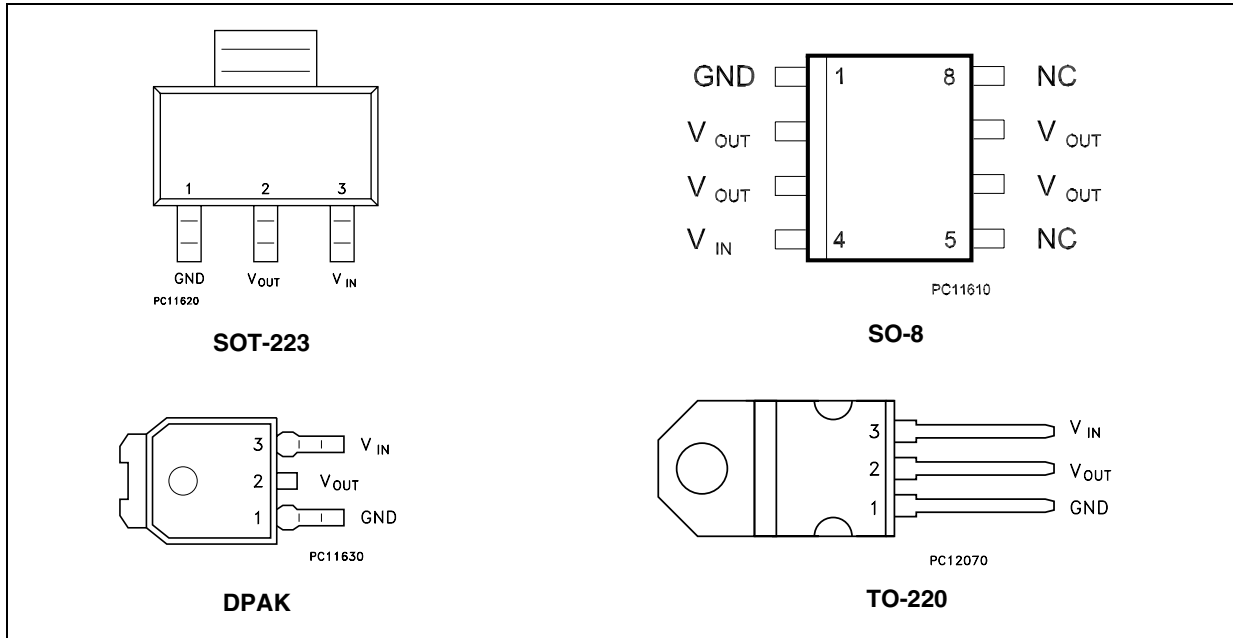
# 1 Diagram

Figure 1. Block diagram



## 2 Pin configuration

Figure 2. Pin connections (top view)



Note: The TAB is connected to the V<sub>OUT</sub>.

### 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	5	°C/W
$R_{thJA}$	Thermal resistance junction-ambient				50	°C/W

## 4 Schematic application

Figure 3. Application circuit (for 1.2 V)

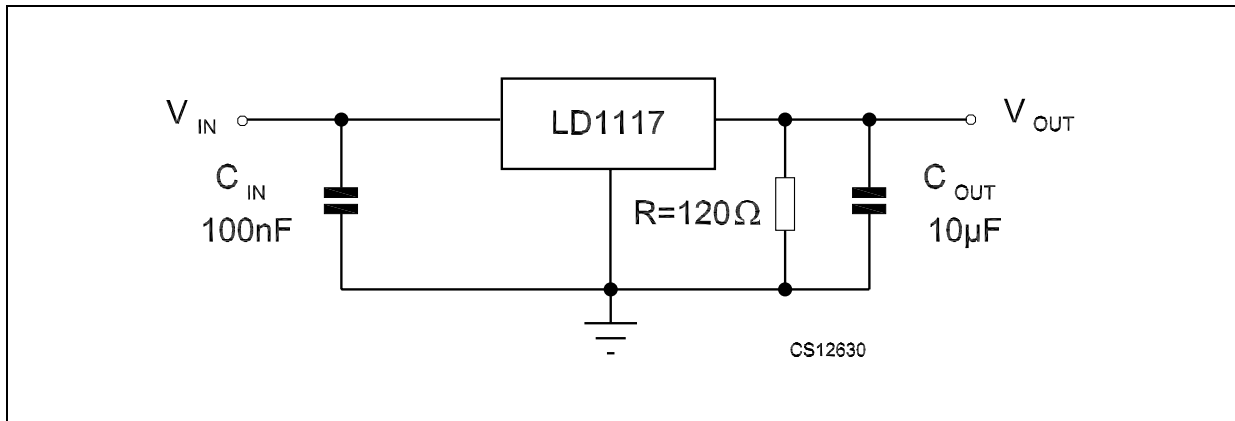
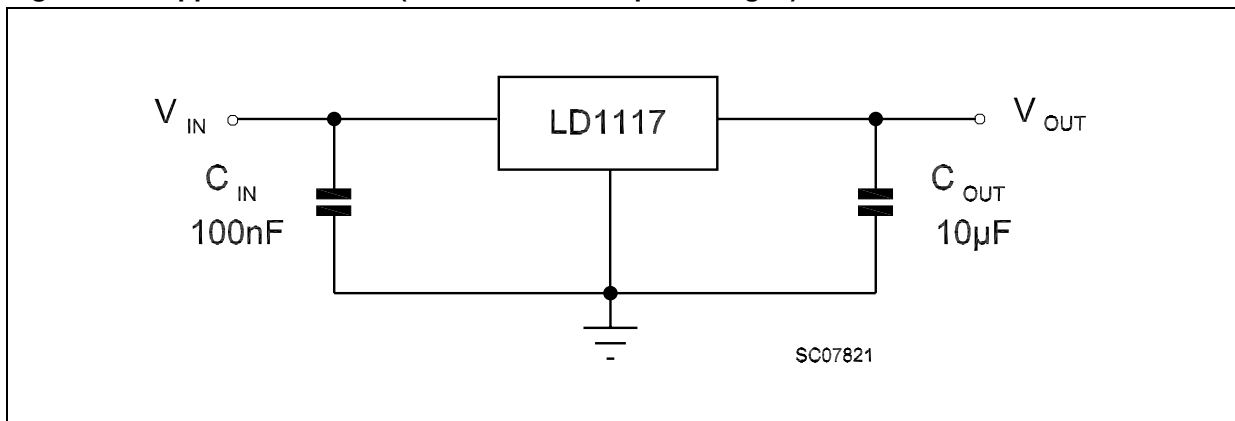


Figure 4. Application circuit (for other fixed output voltages)





## 5 Electrical characteristics

Refer to the test circuits,  $T_J = 0$  to  $125$  °C,  $C_O = 10$   $\mu$ F,  $R = 120$   $\Omega$  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
$\Delta V_O$	Line regulation	$V_{in} - V_O = 1.5$ to $13.75$ V, $I_O = 10$ mA		0.035	0.2	%
$\Delta V_O$	Load regulation	$V_{in} - V_O = 3$ V, $I_O = 10$ to $800$ mA		0.1	0.4	%
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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	$\mu$ A
$\Delta I_{adj}$	Adjustment pin current change	$V_{in} - V_O = 1.4$ to $10$ V $I_O = 10$ to $800$ mA		1	5	$\mu$ A
$I_{O(min)}$	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 <sub>PP</sub>	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  $125\text{ }^\circ\text{C}$ ,  $C_O = 10\text{ }\mu\text{F}$ , unless otherwise specified.

**Table 5. Electrical characteristics of LD1117#18**

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

Refer to the test circuits,  $T_J = 0$  to  $125$  °C,  $C_O = 10$   $\mu$ F, 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
$\Delta V_O$	Line regulation	$V_{in} = 3.9$ to 10 V, $I_O = 0$ mA		1	6	mV
$\Delta V_O$	Load regulation	$V_{in} = 3.9$ V, $I_O = 0$ to 800 mA		1	10	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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		$\mu$ V
SVR	Supply voltage rejection	$I_O = 40$ mA, $f = 120$ Hz, $T_J = 25$ °C $V_{in} = 5.5$ V, $V_{ripple} = 1$ V <sub>PP</sub>	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,  $C_O = 10$   $\mu$ F, 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
$\Delta V_O$	Line regulation	$V_{in} = 4.5$ to 12 V, $I_O = 0$ mA		1	6	mV
$\Delta V_O$	Load regulation	$V_{in} = 4.5$ V, $I_O = 0$ to 800 mA		1	10	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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		$\mu$ F
SVR	Supply voltage rejection	$I_O = 40$ mA, $f = 120$ Hz, $T_J = 25$ °C $V_{in} = 6$ V, $V_{ripple} = 1$ V <sub>PP</sub>	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,  $C_O = 10$   $\mu$ F, 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
$\Delta V_O$	Line regulation	$V_{in} = 4.75$ to 15 V, $I_O = 0$ mA		1	6	mV
$\Delta V_O$	Load regulation	$V_{in} = 4.75$ V, $I_O = 0$ to 800 mA		1	10	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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		$\mu$ V
SVR	Supply voltage rejection	$I_O = 40$ mA, $f = 120$ Hz, $T_J = 25$ °C $V_{in} = 6.3$ V, $V_{ripple} = 1$ V <sub>PP</sub>	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  $125\text{ }^\circ\text{C}$ ,  $C_O = 10\text{ }\mu\text{F}$ , unless otherwise specified.

**Table 9. Electrical characteristics of LD1117#50**

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

Refer to the test circuits,  $T_J = 0$  to  $125\text{ }^\circ\text{C}$ ,  $C_O = 10\text{ }\mu\text{F}$ , unless otherwise specified.

**Table 10. Electrical characteristics of LD1117 (adjustable)**

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

Refer to the test circuits,  $T_J = -40$  to  $125$  °C,  $C_O = 10$   $\mu$ F,  $R = 120$   $\Omega$  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
$\Delta V_O$	Line regulation	$V_{in} - V_O = 1.5$ to 13.75 V, $I_O = 10$ mA			1	%
$\Delta V_O$	Load regulation	$V_{in} - V_O = 3$ V, $I_O = 10$ to 800 mA			1	%
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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	$\mu$ A
$\Delta I_{adj}$	Adjustment pin current change	$V_{in} - V_O = 1.4$ to 10 V $I_O = 10$ to 800 mA		1	5	$\mu$ A
$I_{O(min)}$	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 <sub>PP</sub>	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,  $C_O = 10$   $\mu$ F, 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
$\Delta V_O$	Line regulation	$V_{in} = 3.3$ to 8 V, $I_O = 0$ mA		1	30	mV
$\Delta V_O$	Load regulation	$V_{in} = 3.3$ V, $I_O = 0$ to 800 mA		1	30	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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		$\mu$ V
SVR	Supply voltage rejection	$I_O = 40$ mA, $f = 120$ Hz, $T_J = 25$ °C $V_{in} = 5.5$ V, $V_{ripple} = 1$ V <sub>PP</sub>	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,  $C_O = 10$   $\mu$ F, 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
$\Delta V_O$	Line regulation	$V_{in} = 3.9$ to 10 V, $I_O = 0$ mA		1	30	mV
$\Delta V_O$	Load regulation	$V_{in} = 3.9$ V, $I_O = 0$ to 800 mA		1	30	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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		$\mu$ V
SVR	Supply voltage rejection	$I_O = 40$ mA, $f = 120$ Hz, $T_J = 25$ °C $V_{in} = 5.5$ V, $V_{ripple} = 1$ V <sub>PP</sub>	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,  $C_O = 10$   $\mu$ F, 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
$\Delta V_O$	Line regulation	$V_{in} = 4.75$ to 15 V, $I_O = 0$ mA		1	30	mV
$\Delta V_O$	Load regulation	$V_{in} = 4.75$ V, $I_O = 0$ to 800 mA		1	30	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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		$\mu$ V
SVR	Supply voltage rejection	$I_O = 40$ mA, $f = 120$ Hz, $T_J = 25$ °C $V_{in} = 6.3$ V, $V_{ripple} = 1$ V <sub>PP</sub>	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,  $C_O = 10$   $\mu$ F, 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
$\Delta V_O$	Line regulation	$V_{in} = 6.5$ to 15 V, $I_O = 0$ mA		1	50	mV
$\Delta V_O$	Load regulation	$V_{in} = 6.5$ V, $I_O = 0$ to 800 mA		1	50	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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		$\mu$ V
SVR	Supply voltage rejection	$I_O = 40$ mA, $f = 120$ Hz, $T_J = 25$ °C $V_{in} = 8$ V, $V_{ripple} = 1$ V <sub>PP</sub>	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,  $C_O = 10$   $\mu$ F, 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
$\Delta V_O$	Line regulation	$V_{in} - V_O = 1.5$ to 13.75 V, $I_O = 10$ mA			1	%
$\Delta V_O$	Load regulation	$V_{in} - V_O = 3$ V, $I_O = 10$ to 800 mA			1	%
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	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	$\mu$ A
$\Delta I_{adj}$	Adjustment pin current change	$V_{in} - V_O = 1.4$ to 10 V, $I_O = 10$ to 800 mA		1	10	$\mu$ A
$I_{O(min)}$	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 <sub>PP</sub>	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

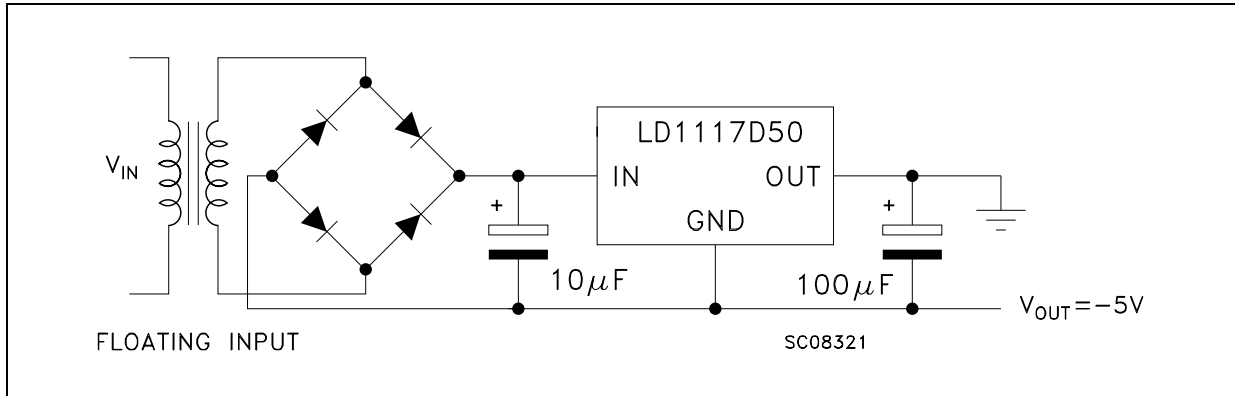


Figure 6. Active terminator for SCSI-2 bus

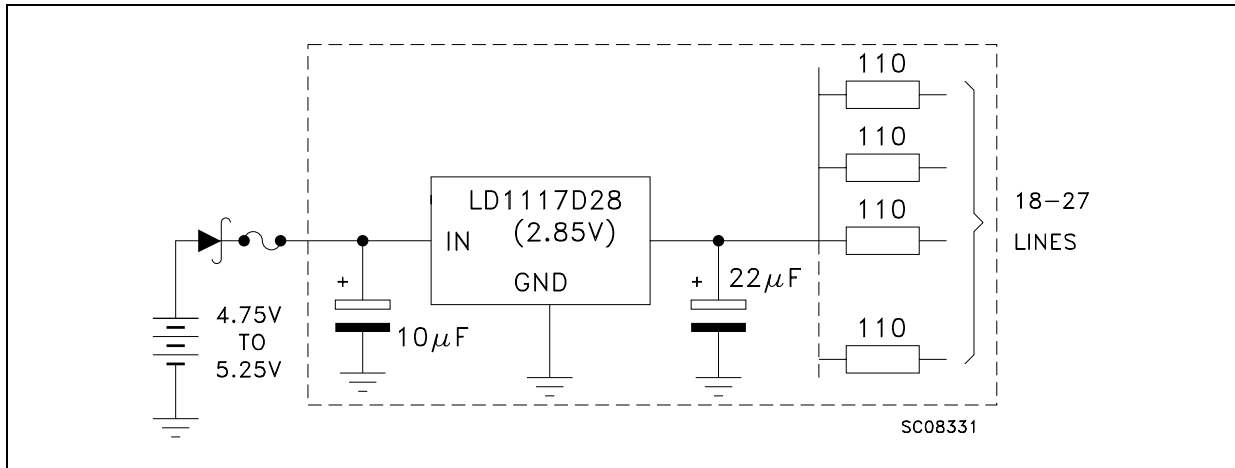


Figure 7. Circuit for increasing output voltage

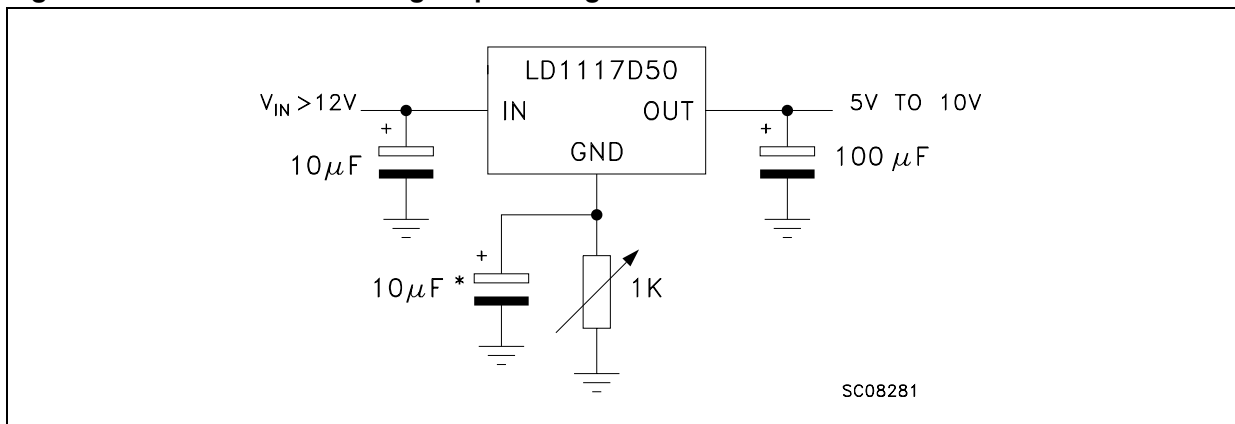


Figure 8. Voltage regulator with reference

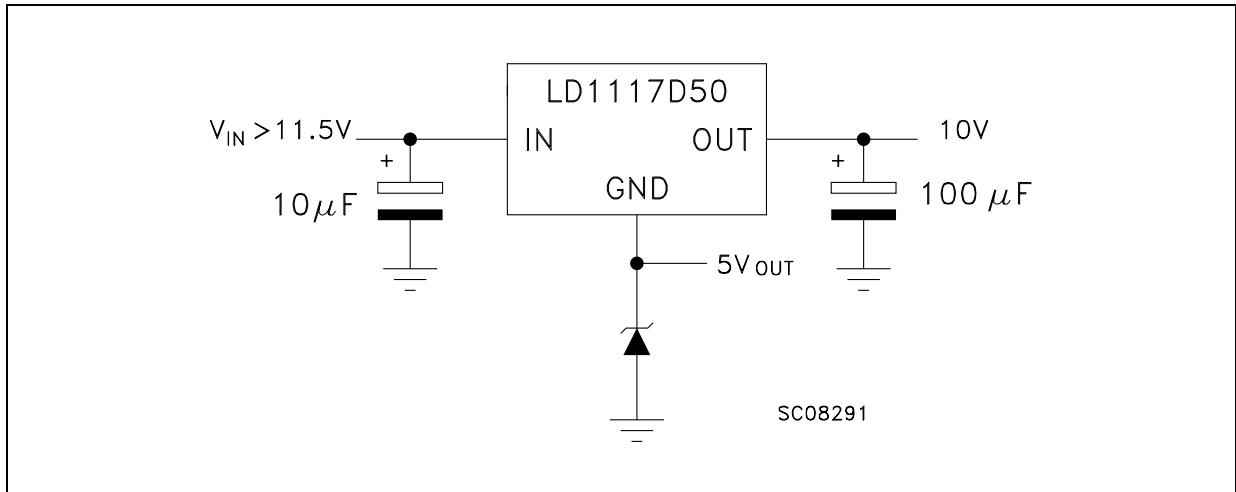


Figure 9. Battery backed-up regulated supply

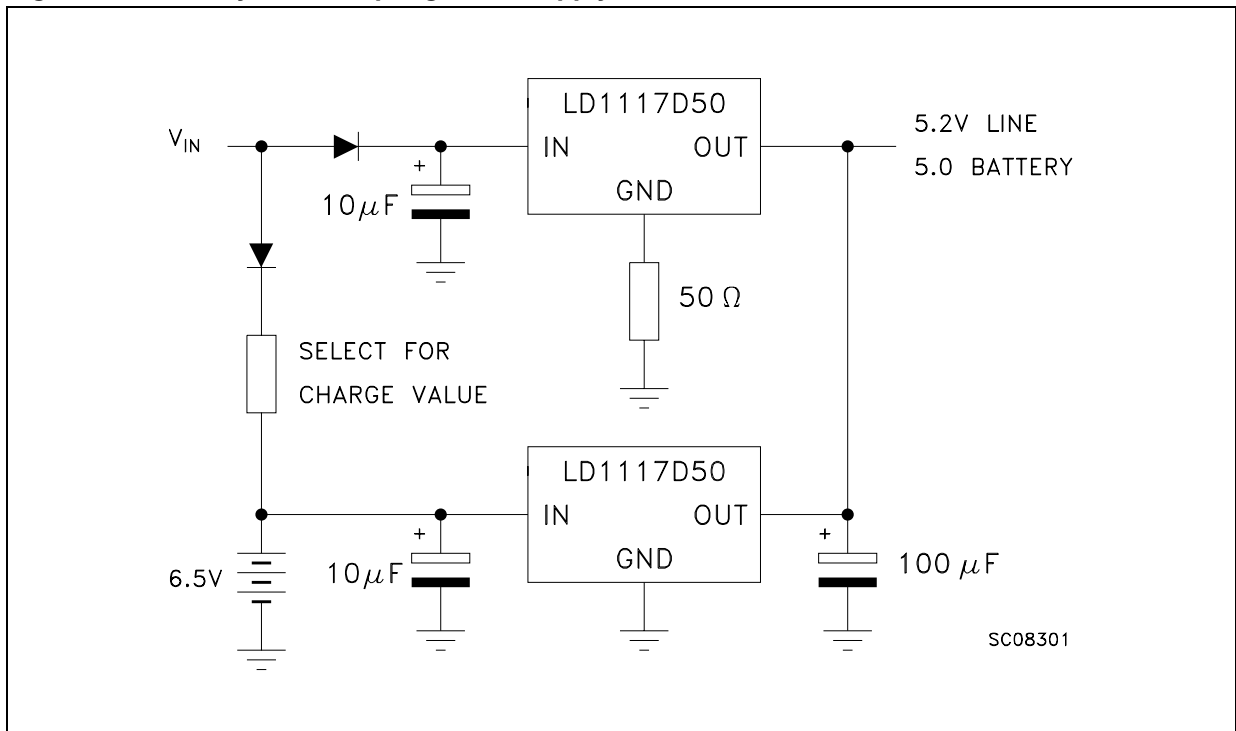
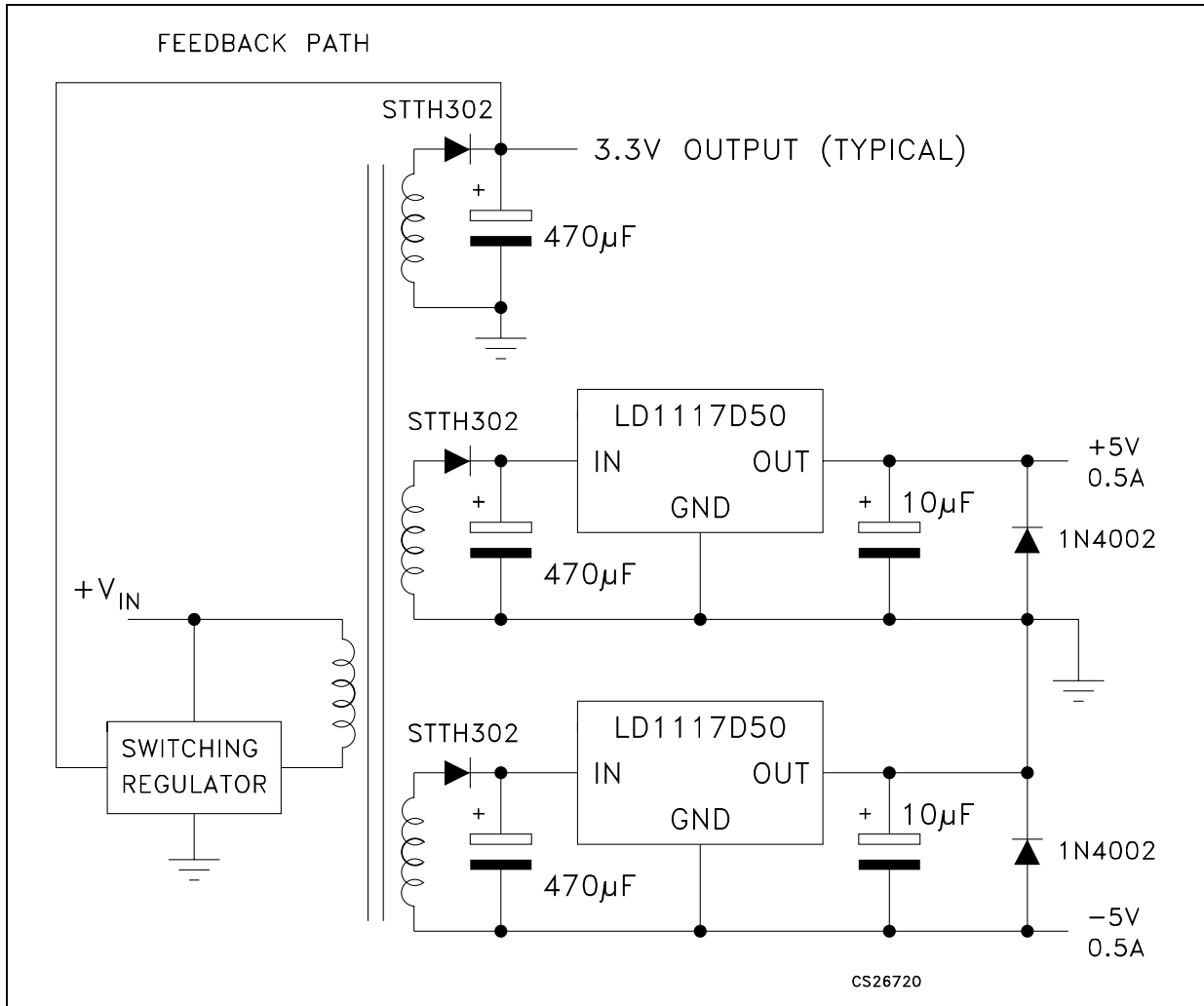


Figure 10. Post-regulated dual supply





## 7 LD1117 adjustable: application note

The LD1117 adjustable has a thermal stabilized  $1.25 \pm 0.012$  V reference voltage between the OUT and ADJ pins.  $I_{ADJ}$  is  $60 \mu\text{A}$  typ. ( $120 \mu\text{A}$  max.) and  $\Delta I_{ADJ}$  is  $1 \mu\text{A}$  typ. ( $5 \mu\text{A}$  max.).

$R_1$  is normally fixed to  $120 \Omega$ . From [Figure 10](#) we obtain:

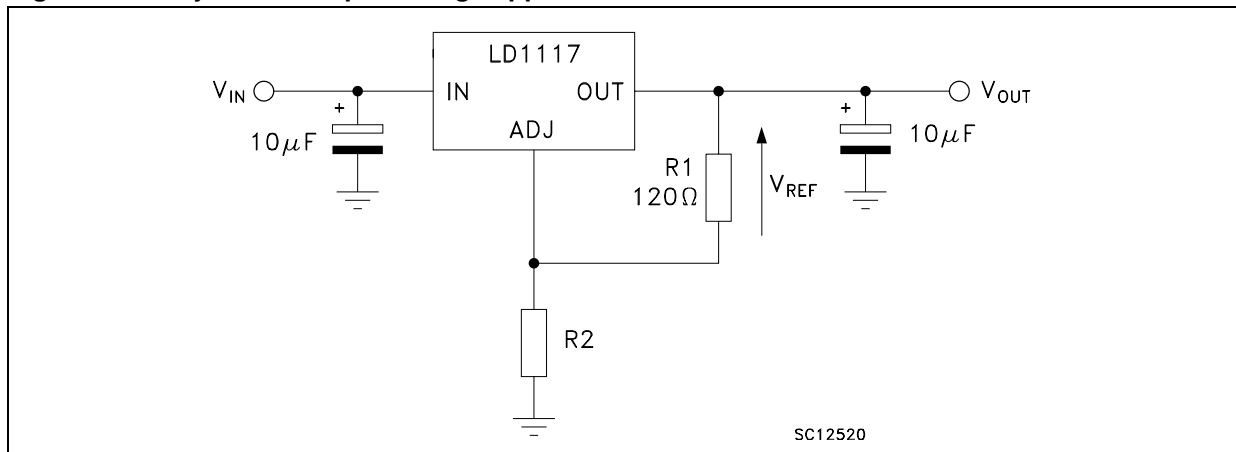
$$V_{OUT} = V_{REF} + R_2 (I_{ADJ} + I_{R1}) = V_{REF} + R_2 (I_{ADJ} + V_{REF} / R_1) = V_{REF} (1 + R_2 / R_1) + R_2 \times I_{ADJ}$$

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

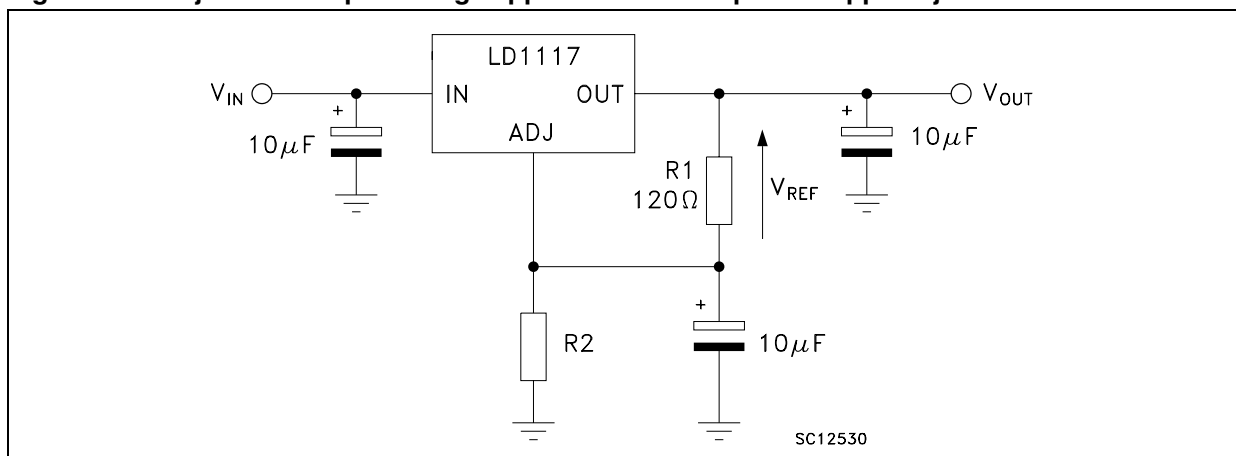
$$V_{OUT} = V_{REF} (1 + R_2 / R_1).$$

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  $10 \mu\text{F}$  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

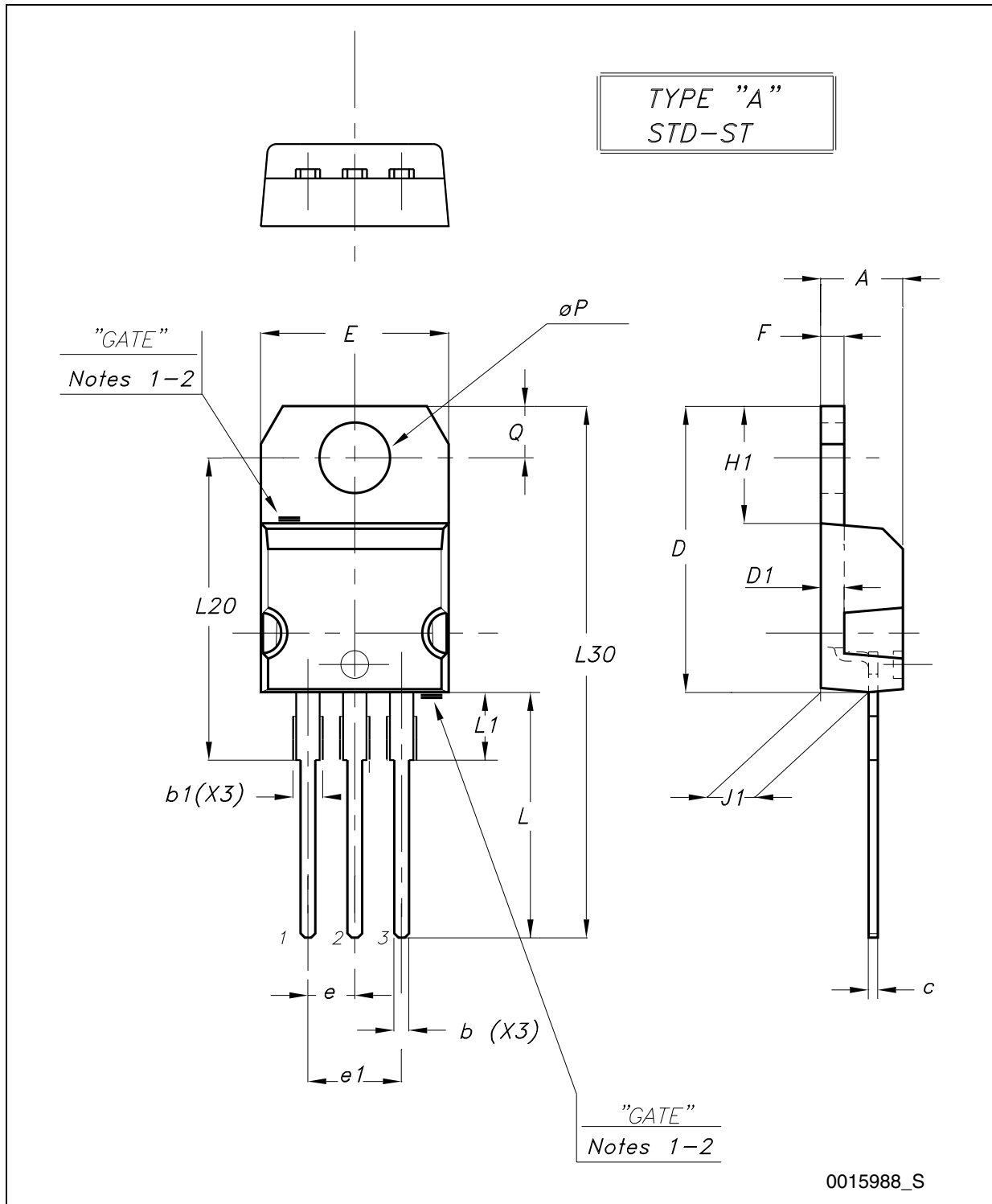
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**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

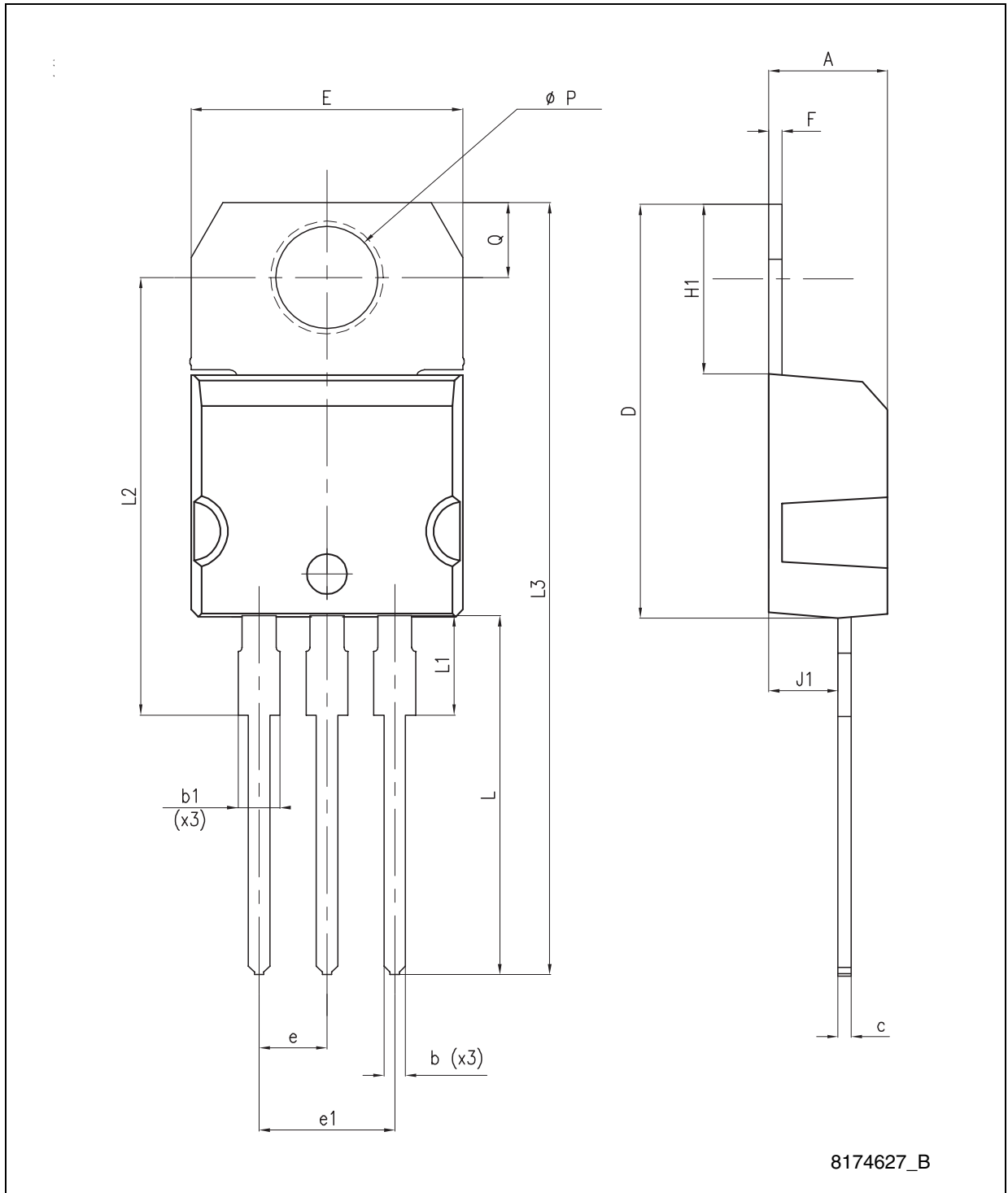
*In spite of some difference in tolerances, the packages are compatible.*

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)



8174627\_B

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

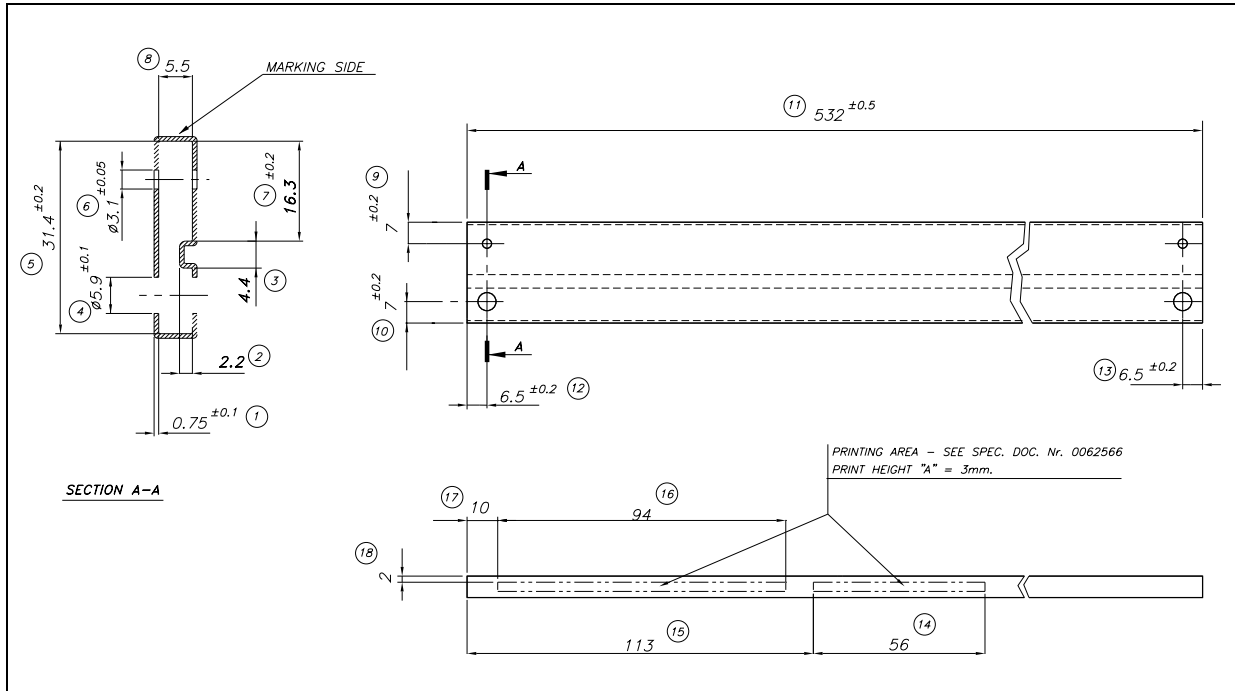
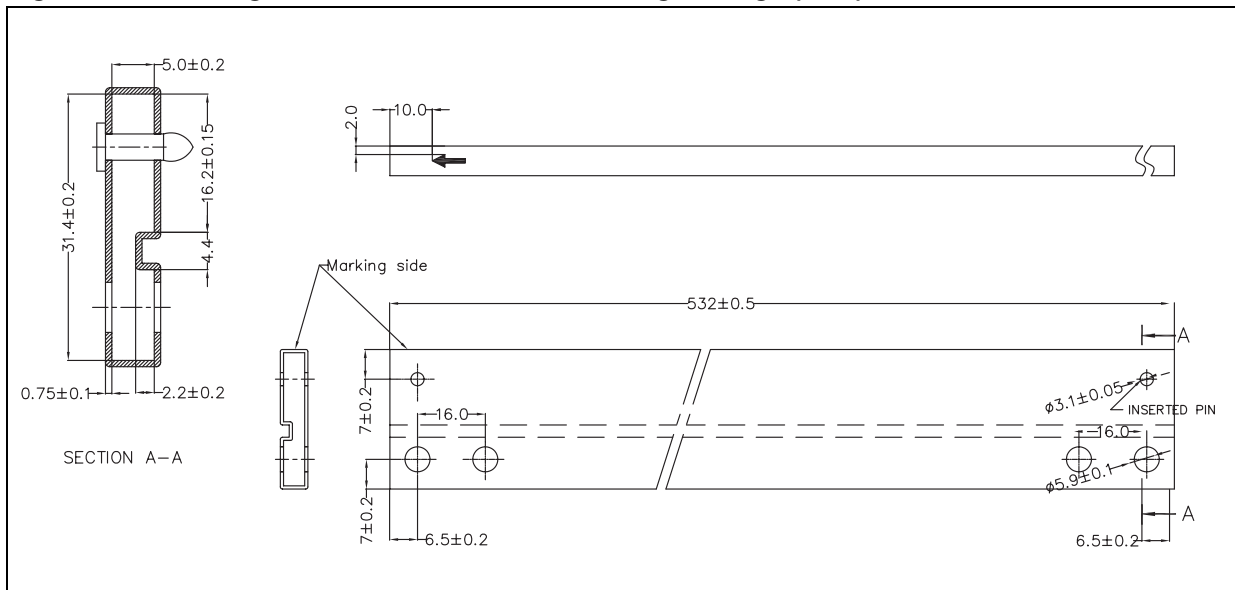
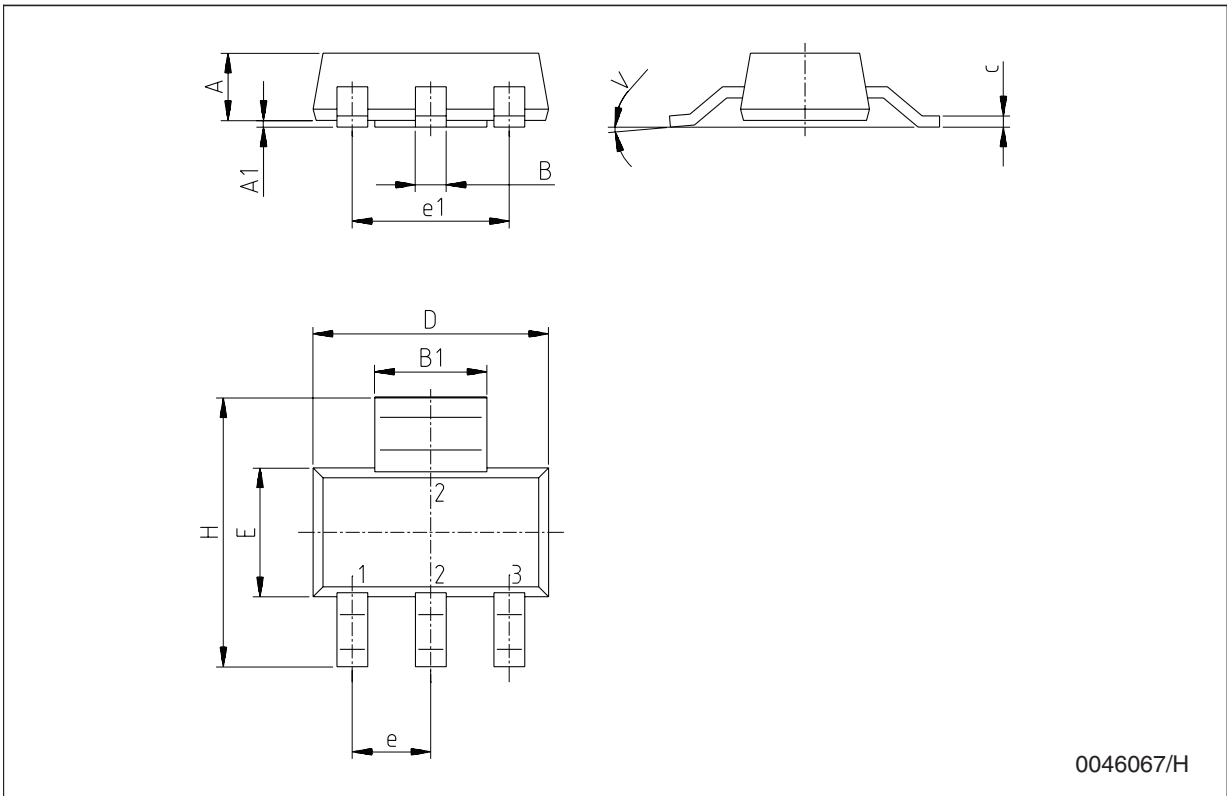


Figure 16. Drawing dimension tube for TO-220 Single Gauge (mm.)



**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°



**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

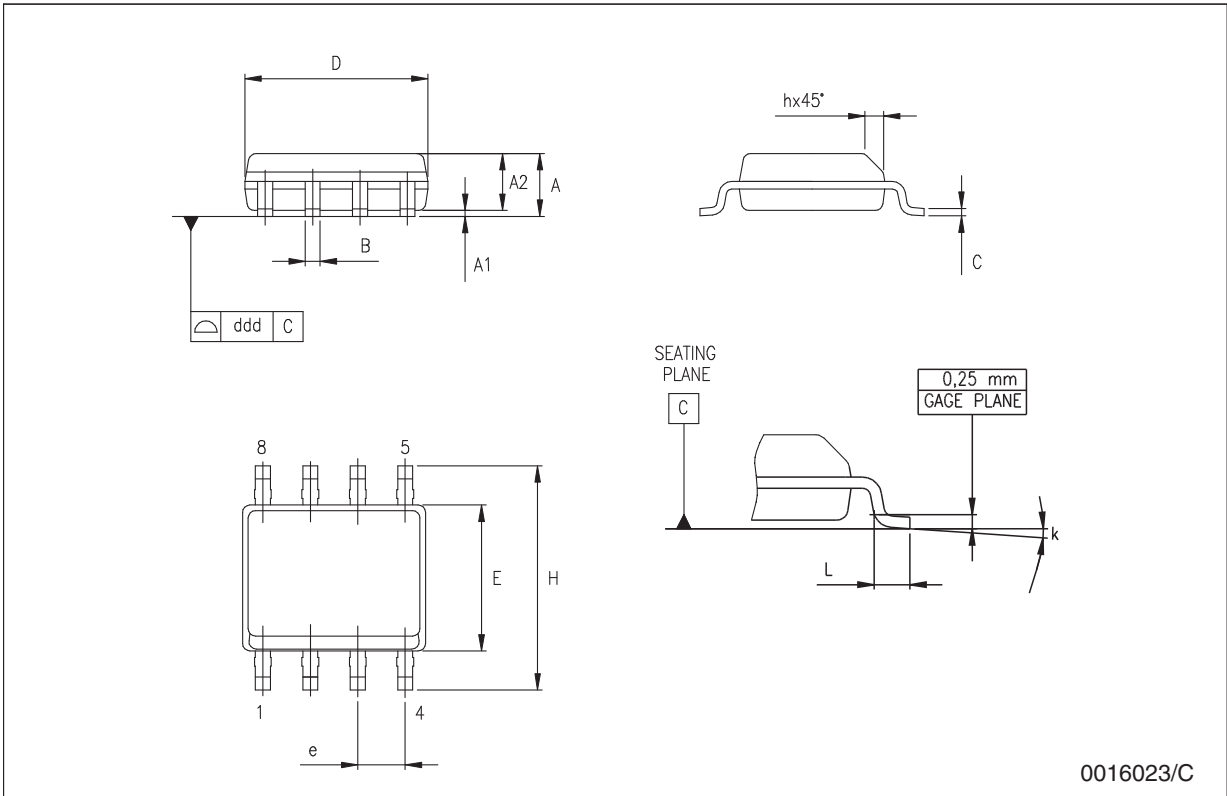
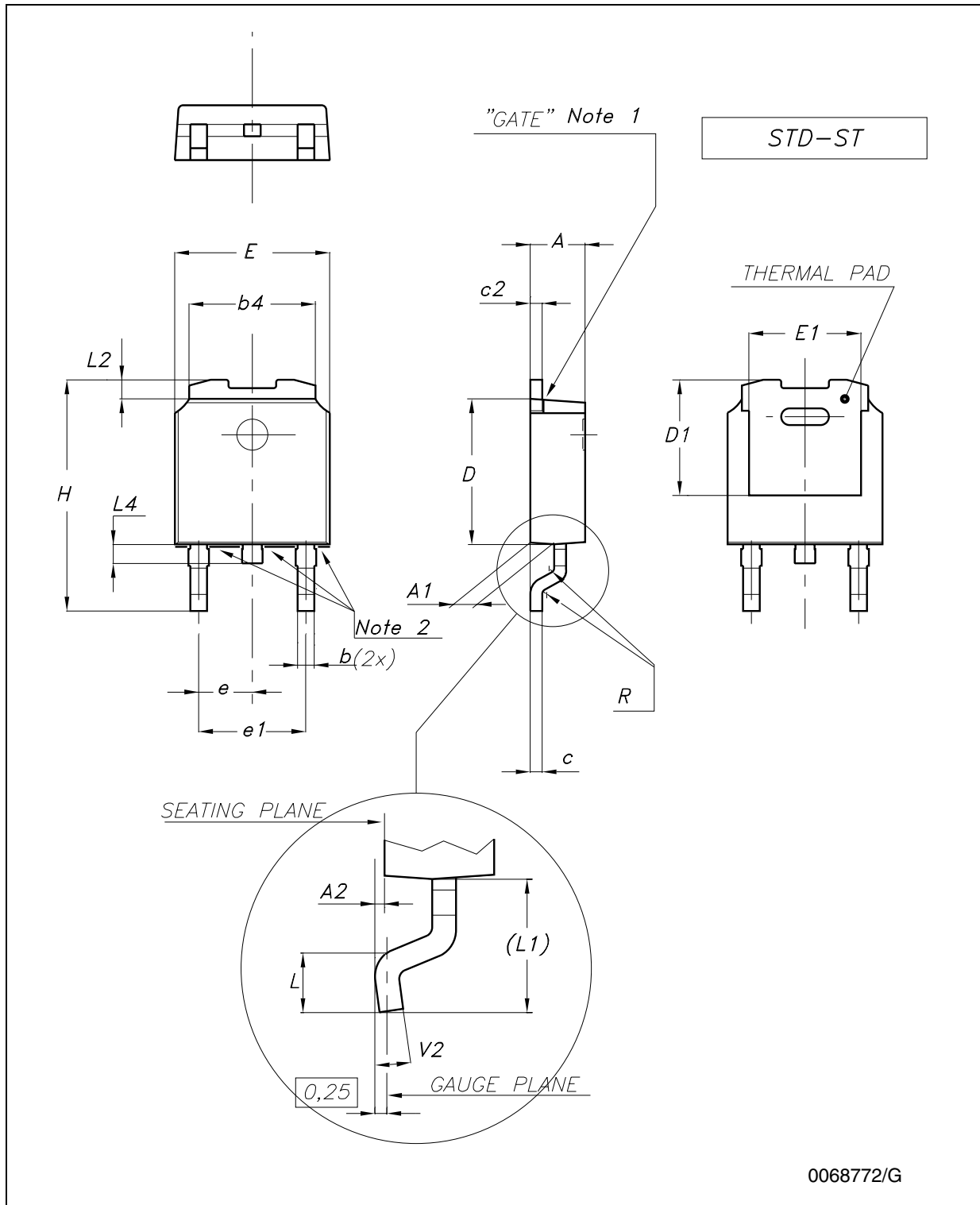


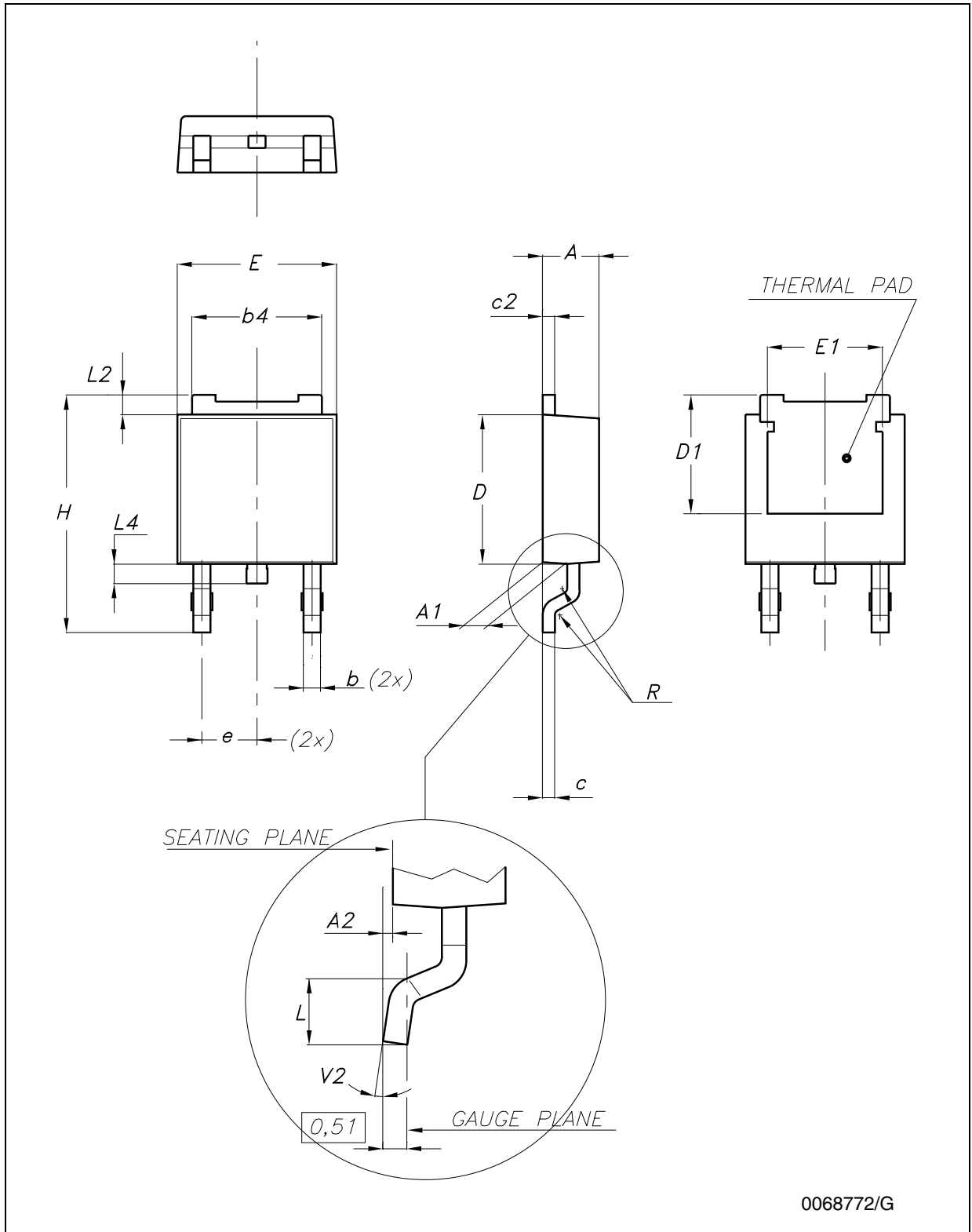
Figure 17. Drawing dimension DPAK (type STD-ST)



Note: 1 Maximum resin gate protrusion: 0.5 mm.  
 2 Maximum resin protrusion: 0.25 mm.

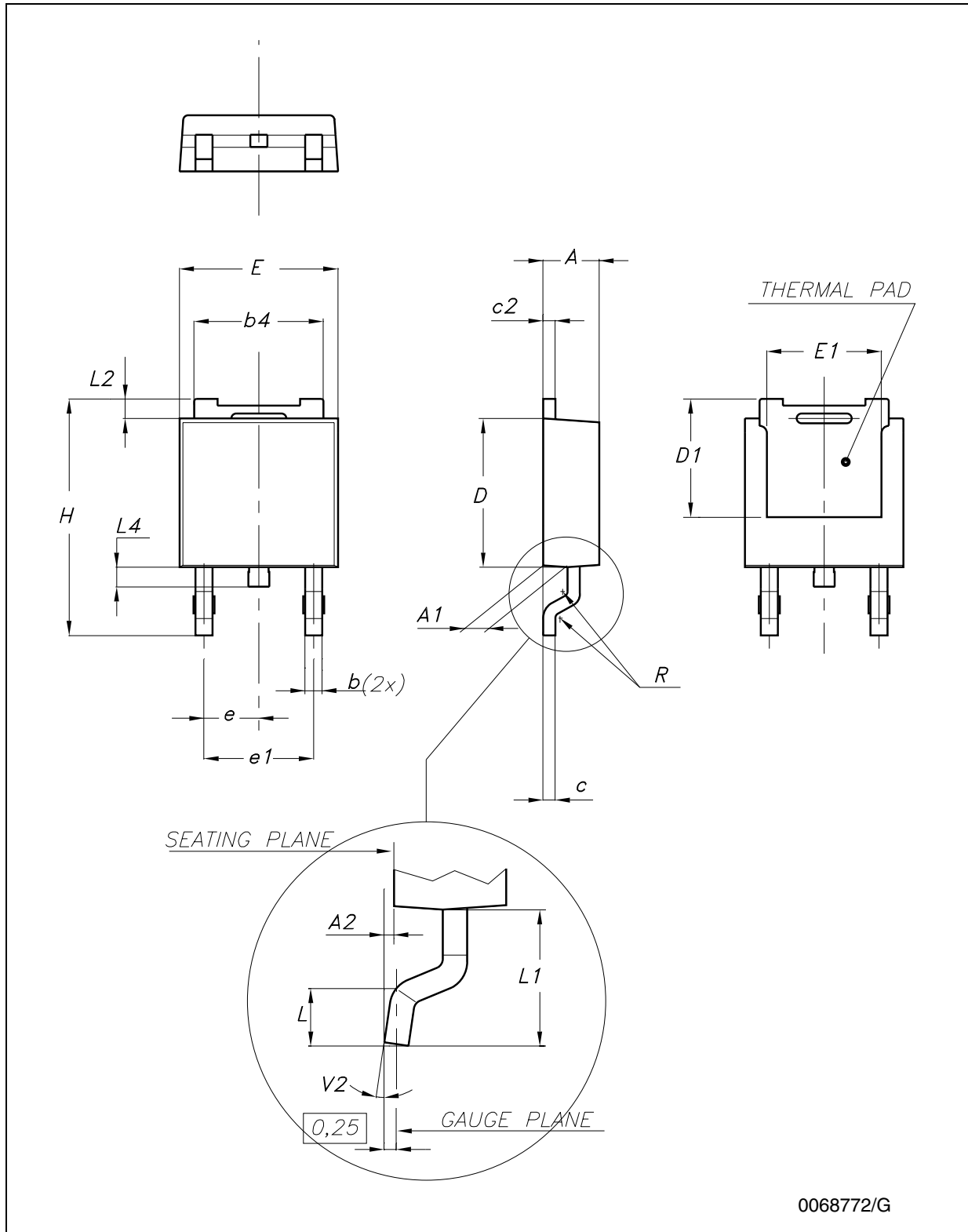


Figure 18. Drawing dimension DPAK (type Fujitsu-subcon.)



0068772/G

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



0068772/G

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

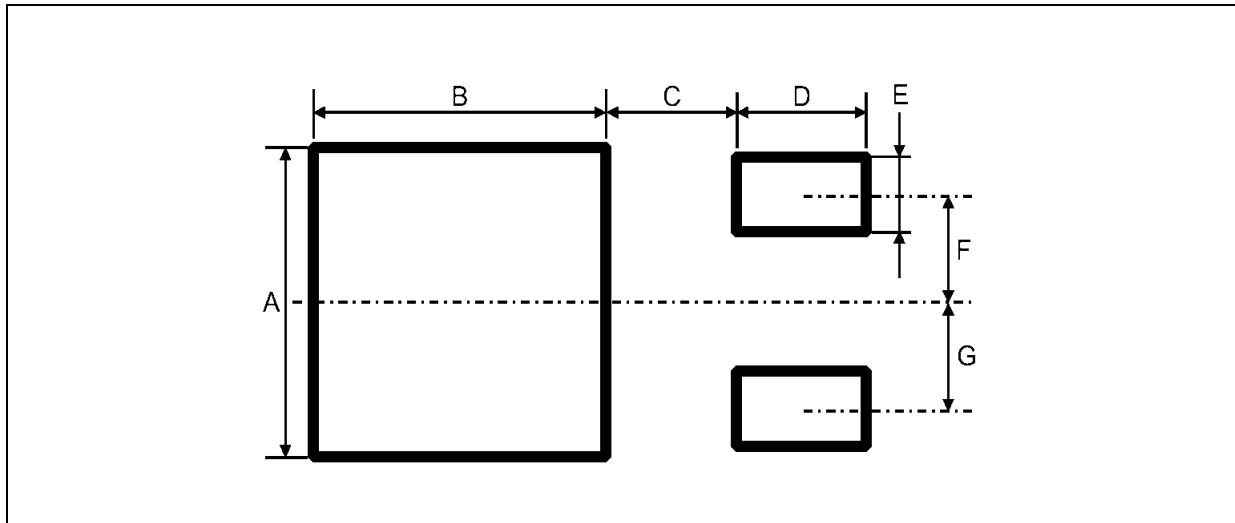
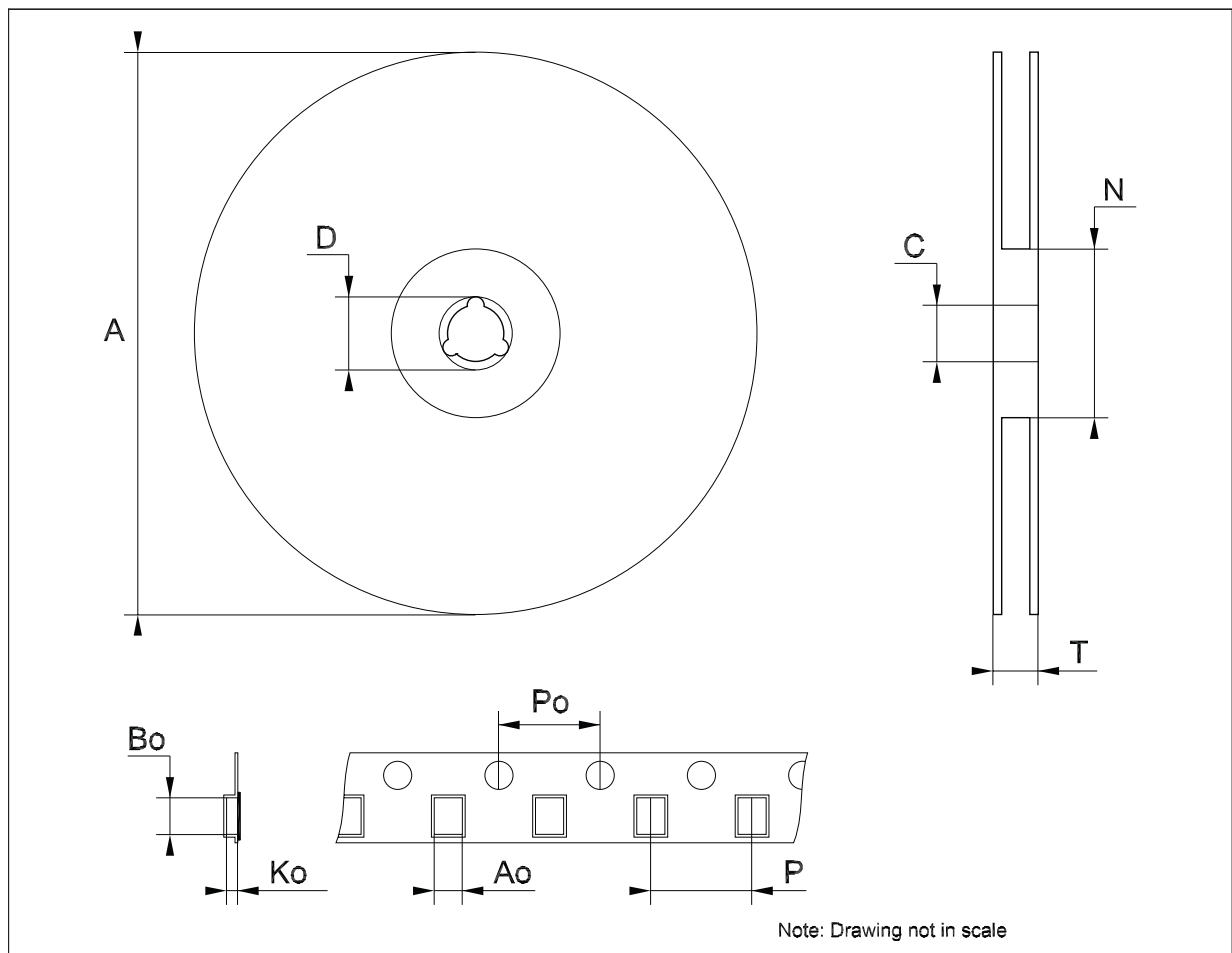


Table 19. Footprint data

	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

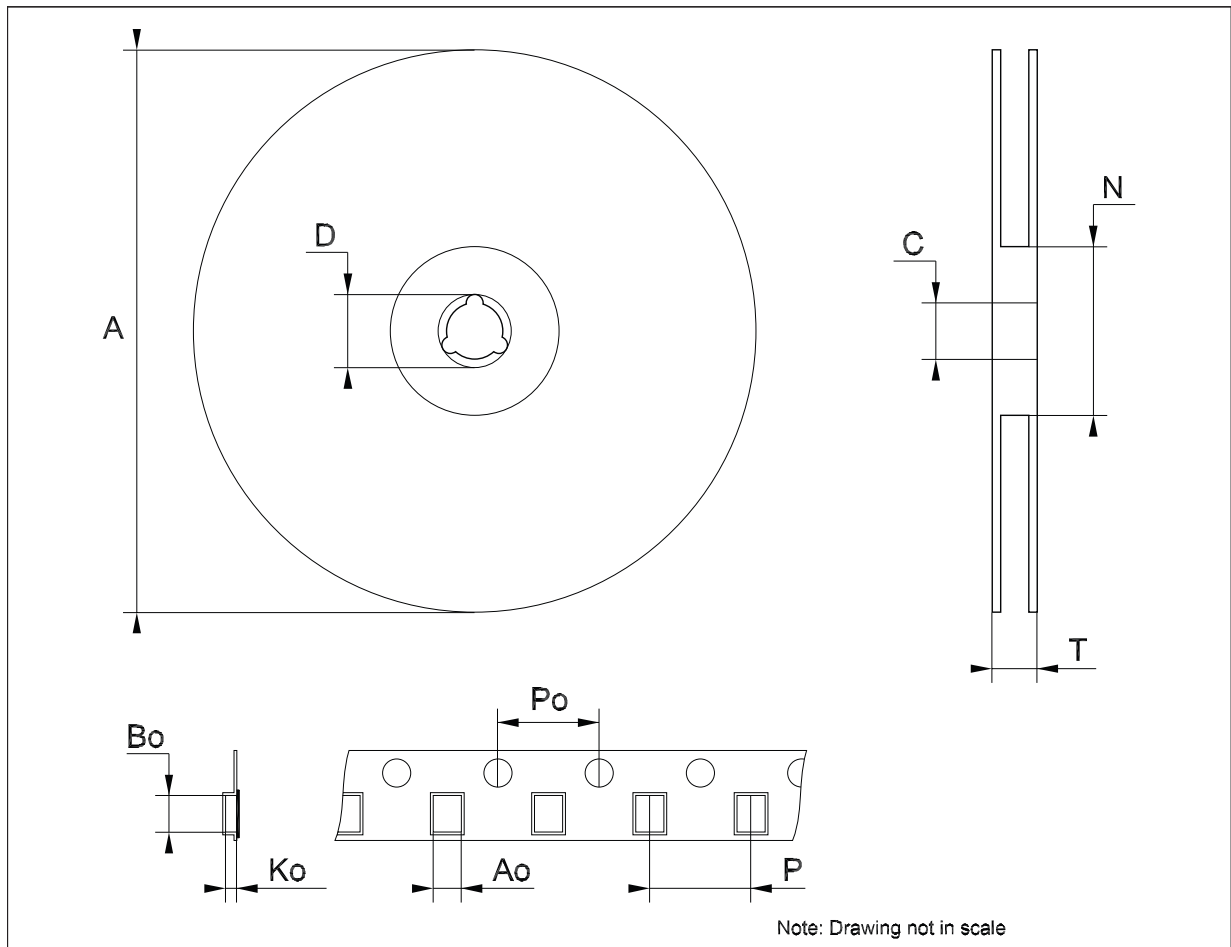
**Tape & reel SOT223 mechanical data**

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



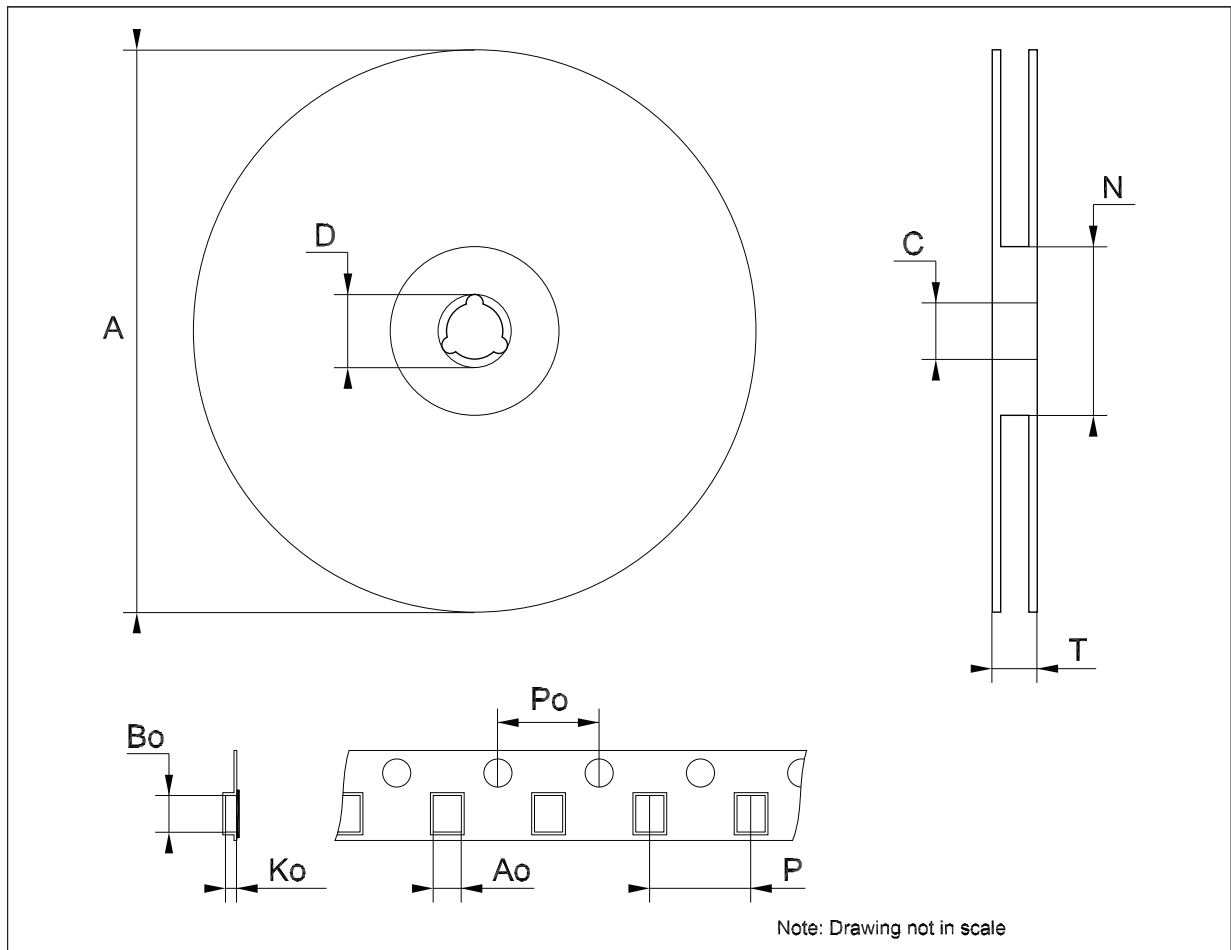
**Tape & reel SO-8 mechanical data**

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



**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	0.276
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



## 9 Order codes

Table 20. Order codes

Packages					
SOT-223	SO-8	DPAK	DPAK (T & R)	TO-220	Output voltages
LD1117S12TR	LD1117D12TR <sup>(1)</sup>	LD1117DT12 <sup>(1)</sup>	LD1117DT12TR		1.2 V
LD1117S12CTR	LD1117D12CTR <sup>(1)</sup>	LD1117DT12C <sup>(1)</sup>	LD1117DT12CTR	LD1117V12C <sup>(1)</sup>	1.2 V
LD1117S18TR	LD1117D18TR <sup>(1)</sup>		LD1117DT18TR	LD1117V18	1.8 V
LD1117S18CTR	LD1117D18CTR <sup>(1)</sup>		LD1117DT18CTR	LD1117V18C <sup>(1)</sup>	1.8 V
LD1117S25TR	LD1117D25TR <sup>(1)</sup>		LD1117DT25TR		2.5 V
LD1117S25CTR	LD1117D25CTR <sup>(1)</sup>		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	LD1117V50C	5 V
LD1117STR			LD1117DTTR	LD1117V	ADJ from 1.25 to 15V
LD1117SC-R	LD1117DC-R <sup>(1)</sup>	LD1117DTC <sup>(1)</sup>	LD1117DTC-R	LD1117VC <sup>(1)</sup>	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 <a href="#">Table 1</a> .
16-Apr-2008	23	Modified: <a href="#">Table 20 on page 40</a> .
08-Jul-2008	24	Added note <a href="#">1. on page 7</a> .
30-Mar-2009	25	Modified: $V_{IN}$ max value <a href="#">Table 5 on page 10</a> and <a href="#">Figure 10 on page 24</a> .
29-Jul-2009	26	Modified: <a href="#">Table 20 on page 40</a> .
03-Feb-2010	27	Modified <a href="#">Table 11 on page 16</a> .
22-Mar-2010	28	Added: <a href="#">Table 17 on page 26</a> , <a href="#">Figure 13 on page 27</a> , <a href="#">Figure 14 on page 28</a> , <a href="#">Figure 15</a> and <a href="#">Figure 16 on page 29</a> .
15-Nov-2010	29	Modified: $R_{thJC}$ value for TO-220 <a href="#">Table 3 on page 7</a> .

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