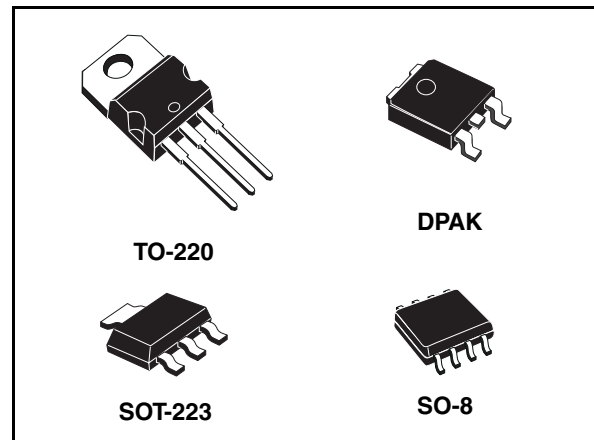


## Low drop fixed and adjustable positive voltage regulators

### 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, 2.85 V, 3.0 V, 3.3 V, 5.0 V
- Adjustable version availability ( $V_{ref} = 1.25\text{ V}$ )
- 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 ( $V_{REF} = 1.25\text{ V}$ ). 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  $\mu\text{F}$  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	LD1117XX50
LD1117XX12C	LD1117XX28	LD1117XX50C
LD1117XX18	LD1117XX30	LD1117XX
LD1117XX18C	LD1117XX33	LD1117XXC
LD1117XX25	LD1117XX33C	

# Contents

1	<b>Diagram</b> .....	5
2	<b>Pin configuration</b> .....	6
3	<b>Maximum ratings</b> .....	7
4	<b>Schematic application</b> .....	8
5	<b>Electrical characteristics</b> .....	9
6	<b>Typical application</b> .....	23
7	<b>LD1117 adjustable: application note</b> .....	26
8	<b>Package mechanical data</b> .....	27
9	<b>Order code</b> .....	39
10	<b>Revision history</b> .....	40

## List of figures

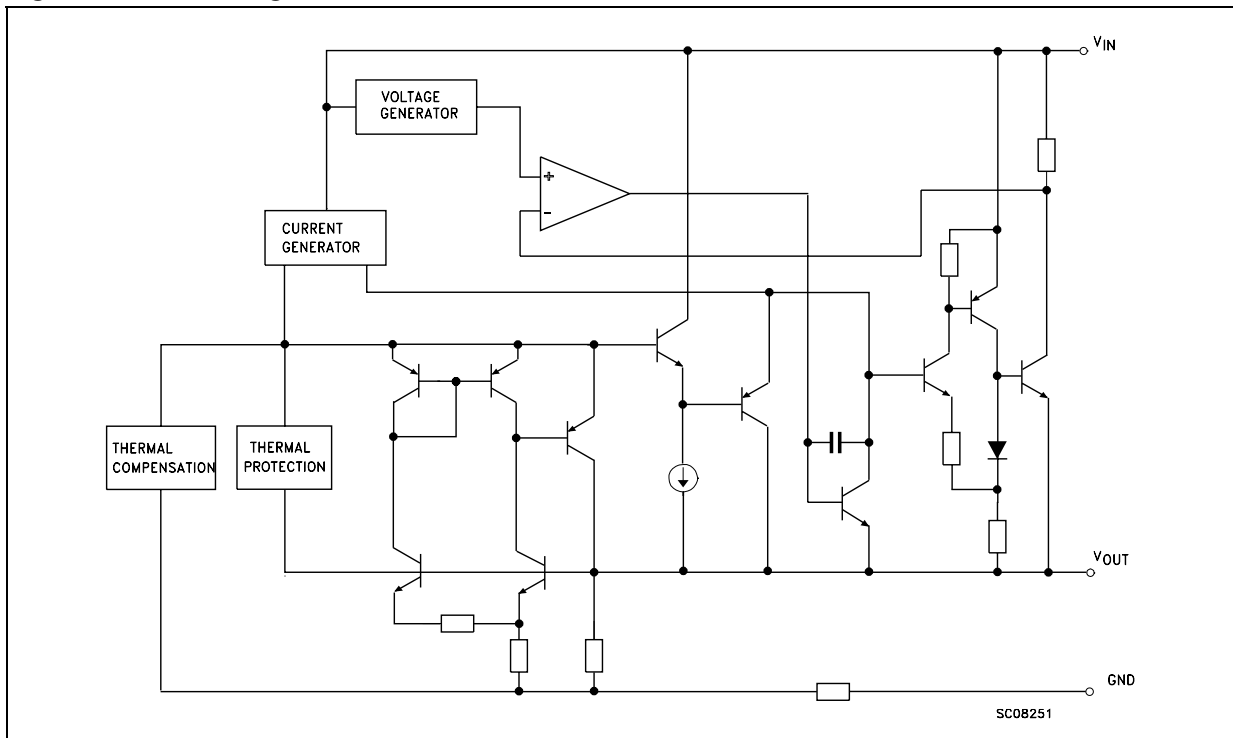
Figure 2.	Pin connections (top view) . . . . .	6
Figure 3.	Application circuit (for 1.2 V) . . . . .	8
Figure 4.	Application circuit (for other fixed output voltages) . . . . .	8
Figure 5.	Negative supply . . . . .	23
Figure 6.	Active terminator for SCSI-2 BUS . . . . .	23
Figure 7.	Circuit for increasing output voltage . . . . .	23
Figure 8.	Voltage regulator with reference . . . . .	24
Figure 9.	Battery backed-up regulated supply . . . . .	24
Figure 10.	Post-regulated dual supply . . . . .	25
Figure 11.	Adjustable output voltage application . . . . .	26
Figure 12.	Adjustable output voltage application with improved ripple rejection . . . . .	26
Figure 13.	Drawing dimension DPAK (type STD-ST) . . . . .	30
Figure 14.	Drawing dimension DPAK (type FUJITSU-SUBCON.) . . . . .	31
Figure 15.	Drawing dimension DPAK (type IDS-SUBCON.) . . . . .	32
Figure 16.	DPAK footprint recommended data . . . . .	34

## List of tables

Table 1.	Device summary . . . . .	1
Table 2.	Absolute maximum ratings . . . . .	7
Table 3.	Thermal data . . . . .	7
Table 4.	Electrical characteristics of LD1117#12 . . . . .	9
Table 5.	Electrical characteristics of LD1117#18 . . . . .	10
Table 6.	Electrical characteristics of LD1117#25 . . . . .	11
Table 7.	Electrical characteristics of LD1117#28 . . . . .	12
Table 8.	Electrical characteristics of LD1117#30 . . . . .	13
Table 9.	Electrical characteristics of LD1117#33 . . . . .	14
Table 10.	Electrical characteristics of LD1117#50 . . . . .	15
Table 11.	Electrical characteristics of LD1117 (adjustable) . . . . .	16
Table 12.	Electrical characteristics of LD1117#12C . . . . .	17
Table 13.	Electrical characteristics of LD1117#18C . . . . .	18
Table 14.	Electrical characteristics of LD1117#25C . . . . .	19
Table 15.	Electrical characteristics of LD1117#33C . . . . .	20
Table 16.	Electrical characteristics of LD1117#50C . . . . .	21
Table 17.	Electrical characteristics of LD1117C (adjustable) . . . . .	22
Table 18.	DPAK mechanical data . . . . .	33
Table 19.	Footprint data . . . . .	34
Table 20.	Order code . . . . .	39
Table 21.	Document revision history . . . . .	40

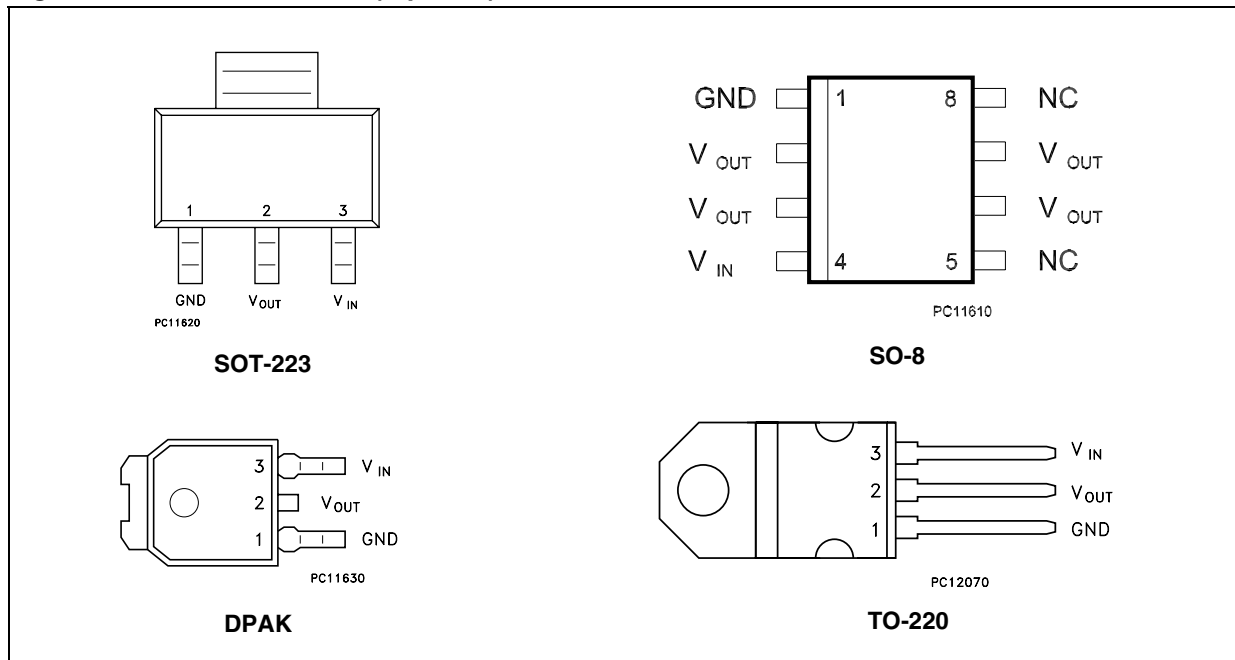
# 1 Diagram

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 +150
		for standard Version	0 to +150

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)

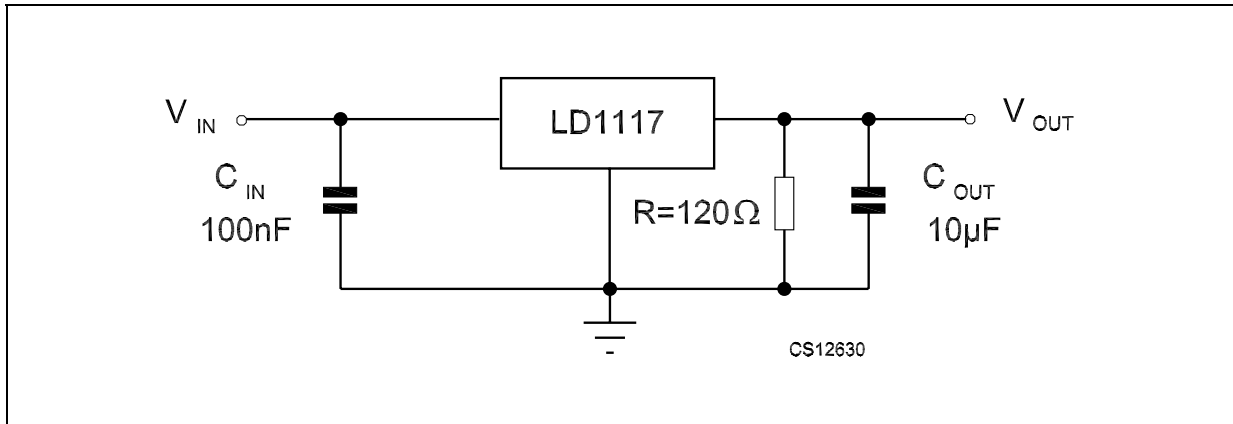
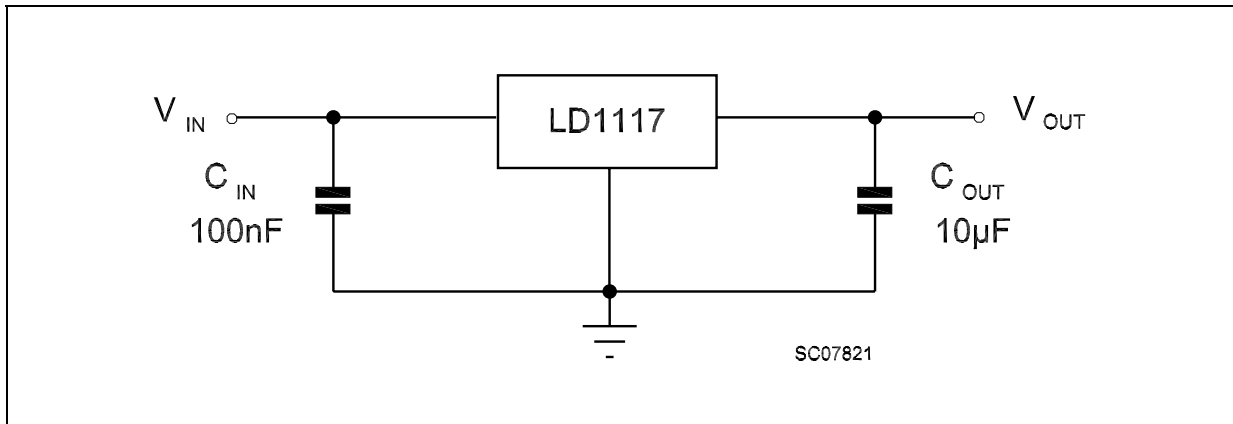


Figure 4. Application circuit (for other fixed output voltages)





## 5 Electrical characteristics

**Table 4. Electrical characteristics of LD1117#12**

(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).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$V_{in} = 3.2$ V, $I_O = 10$ mA, $T_J = 25^\circ\text{C}$	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, $T_J = 125^\circ\text{C}$		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, $T_J = 25^\circ\text{C}$	800	950	1300	mA
eN	Output noise (% $V_O$ )	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		0.003		%
SVR	Supply voltage rejection	$I_O = 40$ mA, $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{in} - V_O = 3$ 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	$T_a = 25^\circ\text{C}$ , 30ms Pulse		0.01	0.1	%/W

**Table 5. Electrical characteristics of LD1117#18**  
(refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $C_O = 10\ \mu\text{F}$ , unless otherwise specified).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$V_{in} = 3.8\ \text{V}$ , $I_O = 10\ \text{mA}$ , $T_J = 25^\circ\text{C}$	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, $T_J = 125^\circ\text{C}$		0.3		%
$V_{in}$	Operating input voltage	$I_O = 100\ \text{mA}$			10	V
$I_d$	Quiescent current	$V_{in} \leq 8\ \text{V}$		5	10	mA
$I_O$	Output current	$V_{in} = 6.8\ \text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1300	mA
eN	Output noise voltage	B = 10Hz to 10kHz, $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
SVR	Supply voltage rejection	$I_O = 40\ \text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{in} = 5.5\ \text{V}$ , $V_{\text{ripple}} = 1\ \text{V}_{\text{PP}}$	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	$T_a = 25^\circ\text{C}$ , 30ms Pulse		0.01	0.1	%/W

**Table 6. Electrical characteristics of LD1117#25**  
(refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $C_O = 10\ \mu\text{F}$ , unless otherwise specified).

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

**Table 7. Electrical characteristics of LD1117#28**  
(refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $C_O = 10\ \mu\text{F}$ , unless otherwise specified).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$V_{in} = 4.85\ \text{V}$ , $I_O = 10\ \text{mA}$ , $T_J = 25^\circ\text{C}$	2.82	2.85	2.88	V
$V_O$	Output voltage	$I_O = 0$ to $800\ \text{mA}$ , $V_{in} = 4.25$ to $10\ \text{V}$	2.79		2.91	V
$\Delta V_O$	Line regulation	$V_{in} = 4.25$ to $10\ \text{V}$ , $I_O = 0\ \text{mA}$		1	6	mV
$\Delta V_O$	Load regulation	$V_{in} = 4.25\ \text{V}$ , $I_O = 0$ to $800\ \text{mA}$		1	10	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	Long term stability	1000 hrs, $T_J = 125^\circ\text{C}$		0.3		%
$V_{in}$	Operating input voltage	$I_O = 100\ \text{mA}$			15	V
$I_d$	Quiescent current	$V_{in} \leq 10\ \text{V}$		5	10	mA
$I_O$	Output current	$V_{in} = 7.85\ \text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1300	mA
eN	Output noise voltage	B = 10Hz to 10kHz, $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
SVR	Supply voltage rejection	$I_O = 40\ \text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{in} = 5.85\ \text{V}$ , $V_{ripple} = 1\ \text{V}_{PP}$	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	$T_a = 25^\circ\text{C}$ , 30ms Pulse		0.01	0.1	%/W

**Table 8. Electrical characteristics of LD1117#30**  
(refer to the test circuits,  $T_J = 0$  to  $125$  °C,  $C_O = 10$   $\mu$ F, unless otherwise specified).

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 = 10Hz to 10kHz, $T_J = 25$ °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, 30ms Pulse		0.01	0.1	%/W

**Table 9. Electrical characteristics of LD1117#33**  
(refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $C_O = 10\ \mu\text{F}$ , unless otherwise specified).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$V_{in} = 5.3\ \text{V}$ , $I_O = 10\ \text{mA}$ , $T_J = 25^\circ\text{C}$	3.267	3.3	3.333	V
$V_O$	Output voltage	$I_O = 0$ to $800\ \text{mA}$ , $V_{in} = 4.75$ to $10\ \text{V}$	3.235		3.365	V
$\Delta V_O$	Line regulation	$V_{in} = 4.75$ to $15\ \text{V}$ , $I_O = 0\ \text{mA}$		1	6	mV
$\Delta V_O$	Load regulation	$V_{in} = 4.75\ \text{V}$ , $I_O = 0$ to $800\ \text{mA}$		1	10	mV
$\Delta V_O$	Temperature stability			0.5		%
$\Delta V_O$	Long term stability	1000 hrs, $T_J = 125^\circ\text{C}$		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	$V_{in} = 8.3\ \text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1300	mA
eN	Output noise voltage	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
SVR	Supply voltage rejection	$I_O = 40\ \text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{in} = 6.3\ \text{V}$ , $V_{ripple} = 1\ \text{V}_{PP}$	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	$T_a = 25^\circ\text{C}$ , 30ms Pulse		0.01	0.1	%/W

**Table 10. Electrical characteristics of LD1117#50**  
(refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $C_O = 10\ \mu\text{F}$ , unless otherwise specified).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$V_{in} = 7\ \text{V}$ , $I_O = 10\ \text{mA}$ , $T_J = 25^\circ\text{C}$	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, $T_J = 125^\circ\text{C}$		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	$V_{in} = 10\ \text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1300	mA
eN	Output noise voltage	B = 10Hz to 10kHz, $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
SVR	Supply voltage rejection	$I_O = 40\ \text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{in} = 8\ \text{V}$ , $V_{ripple} = 1\ \text{V}_{PP}$	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	$T_a = 25^\circ\text{C}$ , 30ms Pulse		0.01	0.1	%/W

**Table 11. Electrical characteristics of LD1117 (adjustable)**  
 (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $C_O = 10\ \mu\text{F}$ , unless otherwise specified).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_{\text{ref}}$	Reference voltage	$V_{\text{in}} - V_O = 2\ \text{V}$ , $I_O = 10\ \text{mA}$ , $T_J = 25^\circ\text{C}$	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, $T_J = 125^\circ\text{C}$		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	$V_{\text{in}} - V_O = 5\ \text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1300	mA
eN	Output noise ( $\%V_O$ )	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		0.003		%
SVR	Supply voltage rejection	$I_O = 40\ \text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{\text{in}} - V_O = 3\ \text{V}$ , $V_{\text{ripple}} = 1\ V_{\text{PP}}$	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	$T_a = 25^\circ\text{C}$ , 30ms Pulse		0.01	0.1	$\%/W$



**Table 12. Electrical characteristics of LD1117#12C**

(refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $C_O = 10\ \mu\text{F}$ ,  $R = 120\ \Omega$  between GND and OUT pins, unless otherwise specified).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_{\text{ref}}$	Reference voltage	$V_{\text{in}} - V_{\text{O}} = 2\text{V}$ , $I_{\text{O}} = 10\ \text{mA}$ , $T_J = 25^\circ\text{C}$	1.176	1.20	1.224	V
$V_{\text{ref}}$	Reference voltage	$I_{\text{O}} = 10$ to $800\ \text{mA}$ , $V_{\text{in}} - V_{\text{O}} = 1.4$ to $10\ \text{V}$	1.120	1.20	1.280	V
$\Delta V_{\text{O}}$	Line regulation	$V_{\text{in}} - V_{\text{O}} = 1.5$ to $13.75\ \text{V}$ , $I_{\text{O}} = 10\ \text{mA}$			1	%
$\Delta V_{\text{O}}$	Load regulation	$V_{\text{in}} - V_{\text{O}} = 3\ \text{V}$ , $I_{\text{O}} = 10$ to $800\ \text{mA}$			1	%
$\Delta V_{\text{O}}$	Temperature stability			0.5		%
$\Delta V_{\text{O}}$	Long term stability	1000 hrs, $T_J = 125^\circ\text{C}$		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	$V_{\text{in}} - V_{\text{O}} = 1.4$ to $10\ \text{V}$ $I_{\text{O}} = 10$ to $800\ \text{mA}$		1	5	$\mu\text{A}$
$I_{\text{O(min)}}$	Minimum load current	$V_{\text{in}} = 15\ \text{V}$		2	5	mA
$I_{\text{O}}$	Output current	$V_{\text{in}} - V_{\text{O}} = 5\ \text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1300	mA
eN	Output noise ( $\%V_{\text{O}}$ )	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		0.003		%
SVR	Supply voltage rejection	$I_{\text{O}} = 40\ \text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{\text{in}} - V_{\text{O}} = 3\ \text{V}$ , $V_{\text{ripple}} = 1\ \text{V}_{\text{PP}}$	60	75		dB
$V_{\text{d}}$	Dropout voltage	$I_{\text{O}} = 100\ \text{mA}$ , $T_J = 0$ to $125^\circ\text{C}$		1	1.1	V
		$I_{\text{O}} = 500\ \text{mA}$ , $T_J = 0$ to $125^\circ\text{C}$		1.05	1.2	
		$I_{\text{O}} = 800\ \text{mA}$ , $T_J = 0$ to $125^\circ\text{C}$		1.10	1.3	
	Thermal regulation	$T_{\text{a}} = 25^\circ\text{C}$ , 30ms Pulse		0.01	0.1	$\%/W$

**Table 13. Electrical characteristics of LD1117#18C**  
(refer to the test circuits,  $T_J = -40$  to  $125^\circ\text{C}$ ,  $C_O = 10\ \mu\text{F}$ , unless otherwise specified).

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

**Table 14. Electrical characteristics of LD1117#25C**  
(refer to the test circuits,  $T_J = -40$  to  $125$  °C,  $C_O = 10$   $\mu$ F, unless otherwise specified).

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 = 10Hz to 10kHz, $T_J = 25$ °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, 30ms Pulse		0.01	0.1	%/W

**Table 15. Electrical characteristics of LD1117#33C**  
(refer to the test circuits,  $T_J = -40$  to  $125$  °C,  $C_O = 10$   $\mu$ F, unless otherwise specified).

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 = 10Hz to 10kHz, $T_J = 25$ °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, 30ms Pulse		0.01	0.1	%/W

**Table 16. Electrical characteristics of LD1117#50C**  
(refer to the test circuits,  $T_J = -40$  to  $125$  °C,  $C_O = 10$   $\mu$ F, unless otherwise specified).

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 = 10Hz to 10kHz, $T_J = 25$ °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, 30ms Pulse		0.01	0.1	%/W

**Table 17. Electrical characteristics of LD1117C (adjustable)**  
 (refer to the test circuits,  $T_J = -40$  to  $125$  °C,  $C_O = 10$   $\mu$ F, unless otherwise specified).

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, 30ms Pulse		0.01	0.1	%/W

## 6 Typical application

Figure 5. Negative supply

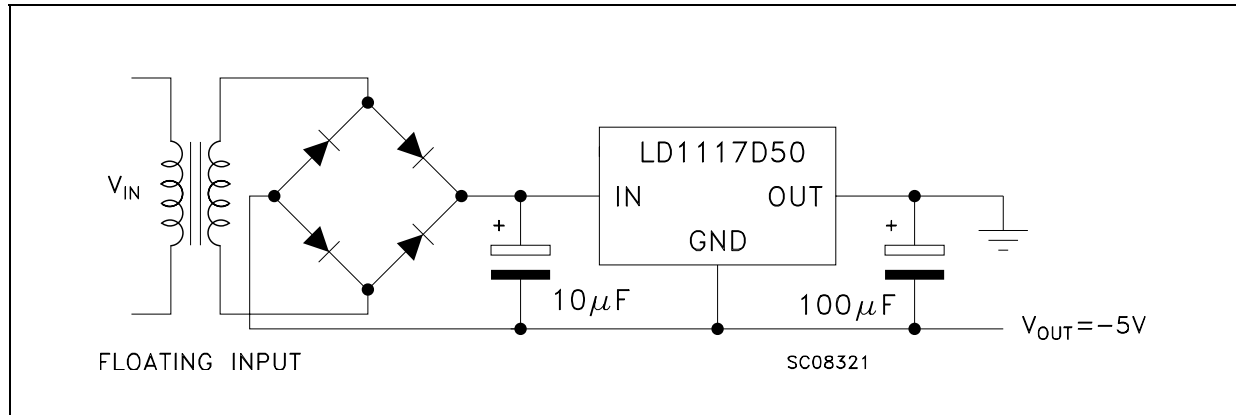


Figure 6. Active terminator for SCSI-2 BUS

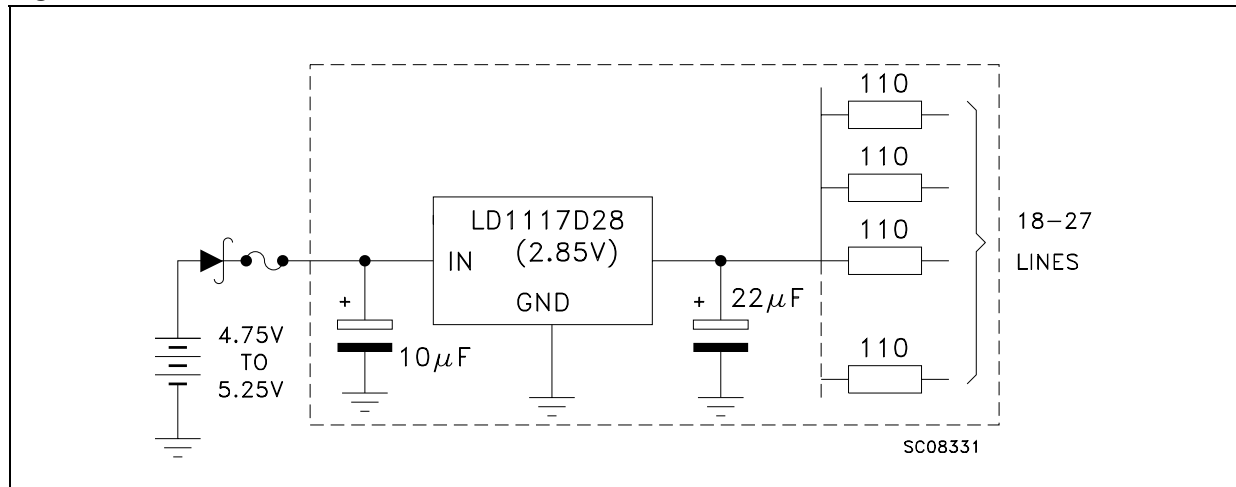


Figure 7. Circuit for increasing output voltage

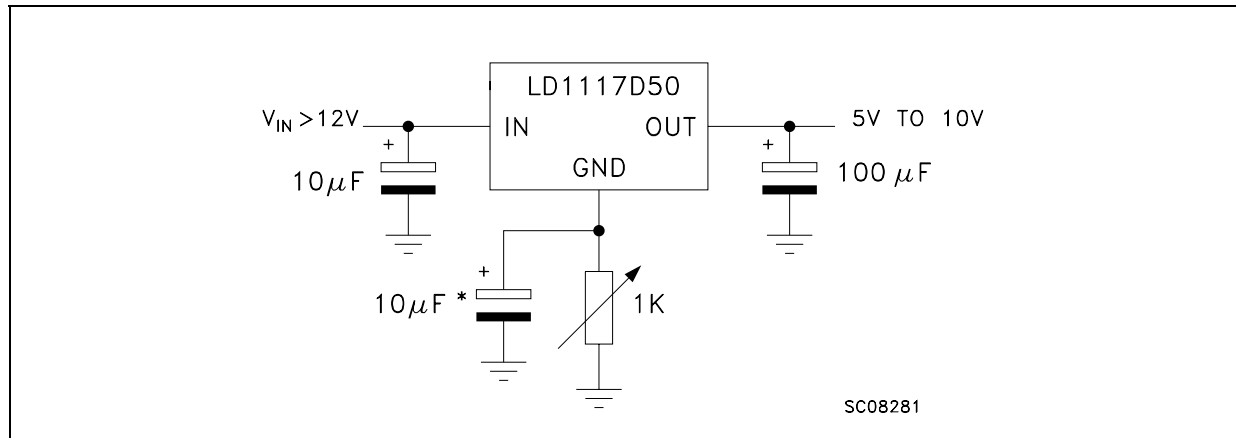


Figure 8. Voltage regulator with reference

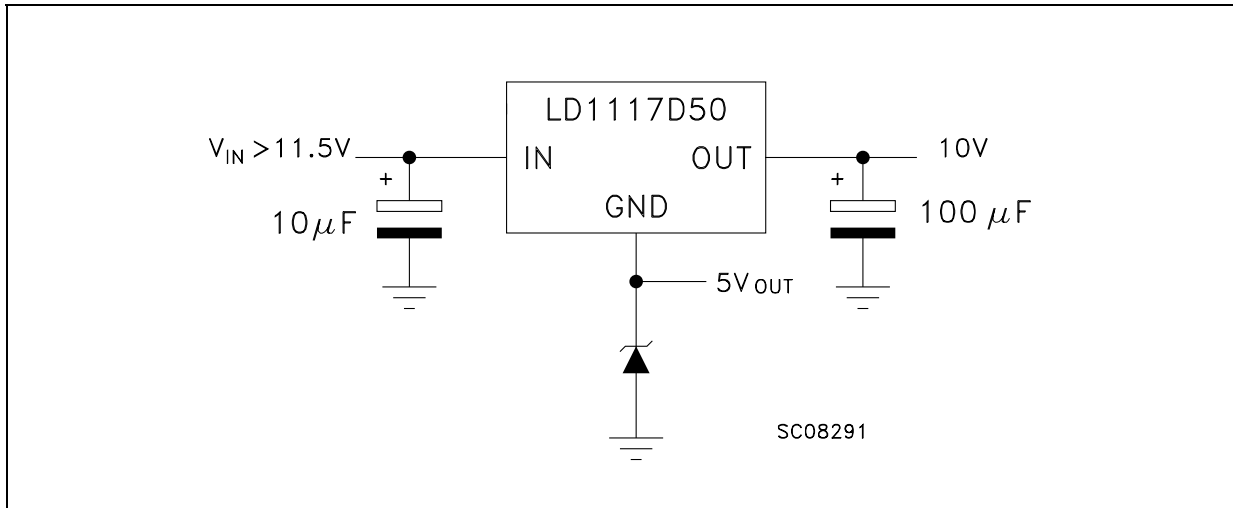


Figure 9. Battery backed-up regulated supply

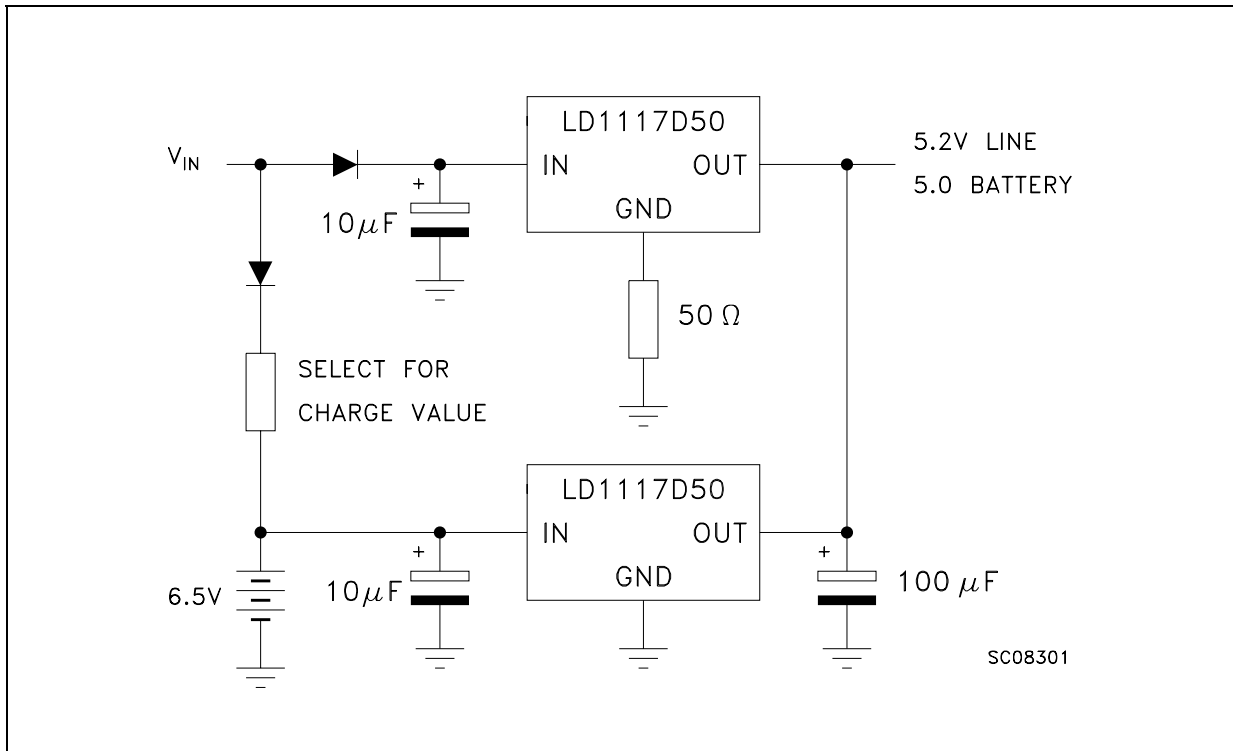
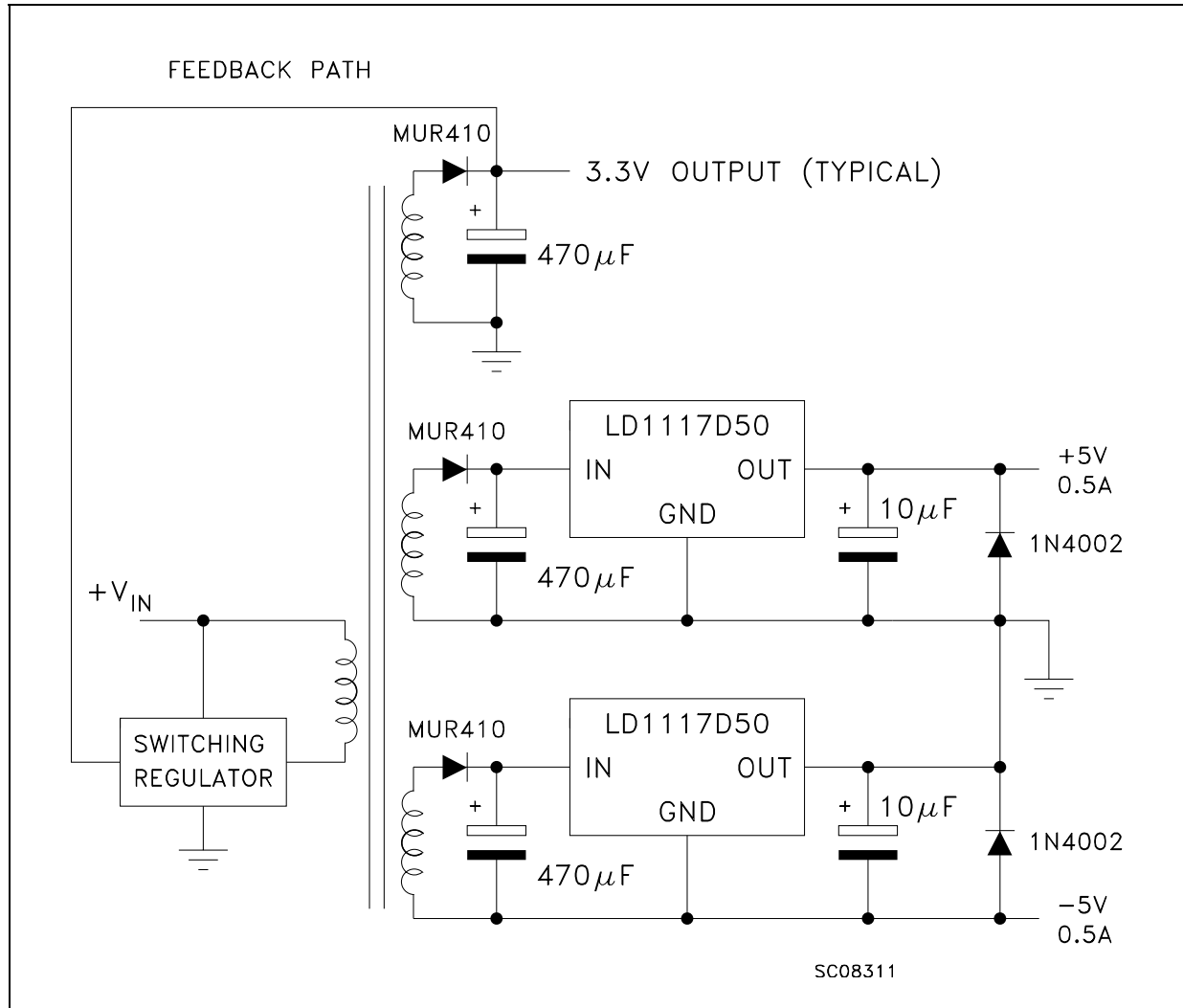




Figure 10. Post-regulated dual supply



## 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.).

R1 is normally fixed to  $120 \Omega$ . From [Figure 10](#) we obtain:

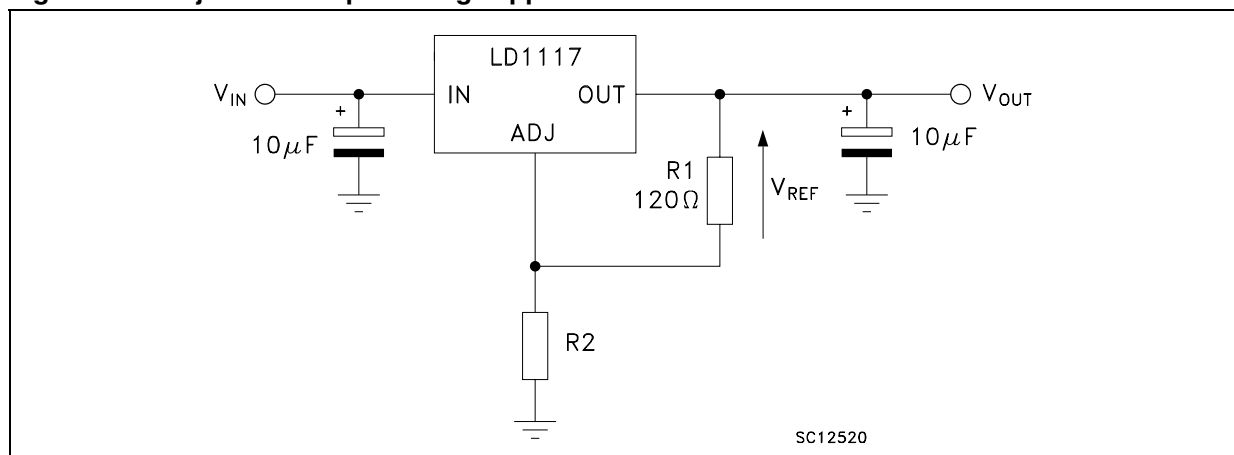
$$V_{OUT} = V_{REF} + R2 (I_{ADJ} + I_{R1}) = V_{REF} + R2 (I_{ADJ} + V_{REF} / R1) = V_{REF} (1 + R2 / R1) + R2 \times I_{ADJ}$$

In normal application R2 value is in the range of few  $k\Omega$ , so the  $R2 \times I_{ADJ}$  product could not be considered in the  $V_{OUT}$  calculation; then the above expression becomes:

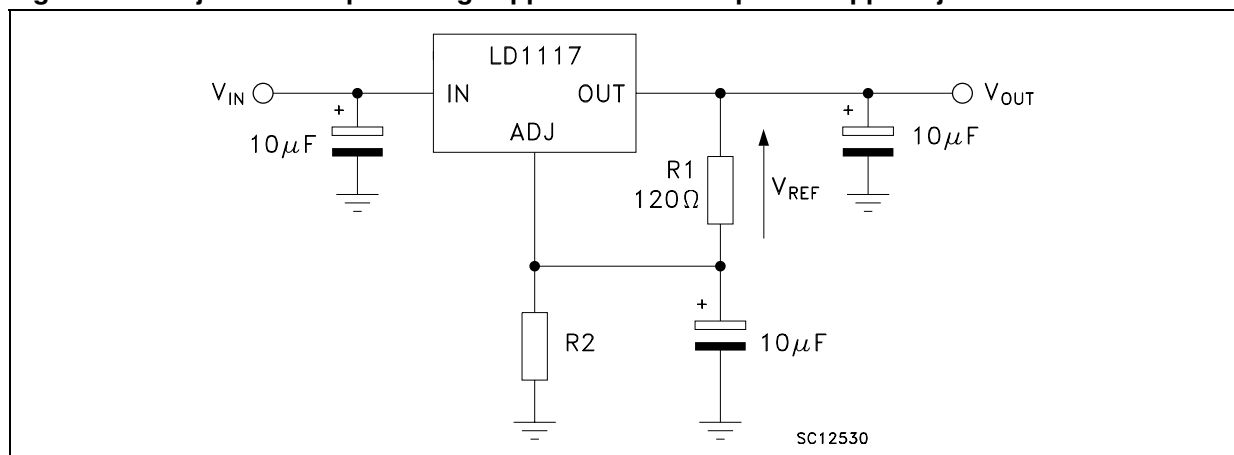
$$V_{OUT} = V_{REF} (1 + R2 / R1).$$

In order to have the better load regulation it is important to realize a good Kelvin connection of R1 and R2 resistors. In particular R1 connection must be realized very close to OUT and ADJ pin, while R2 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 R2 resistor (see [Figure 11](#)).

**Figure 11. Adjustable output voltage application**



**Figure 12. Adjustable output voltage application with improved ripple rejection**

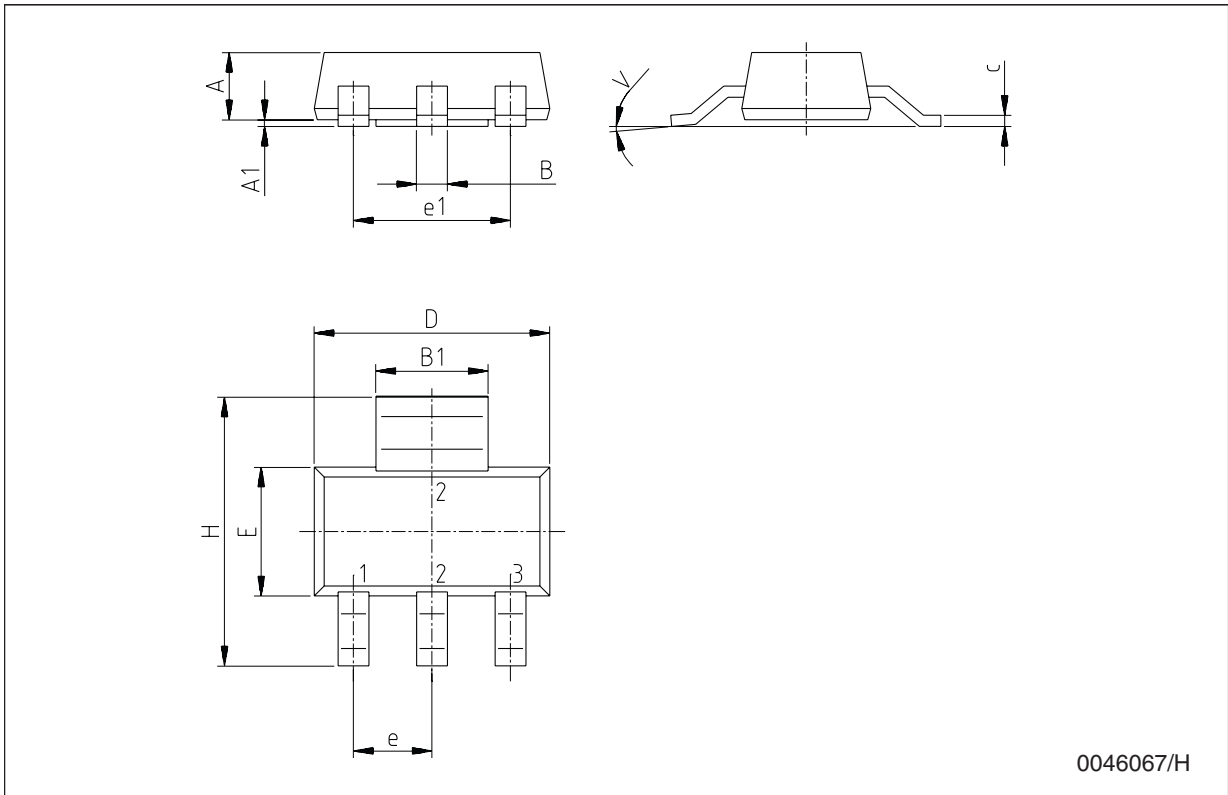


## 8 Package mechanical data

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

**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

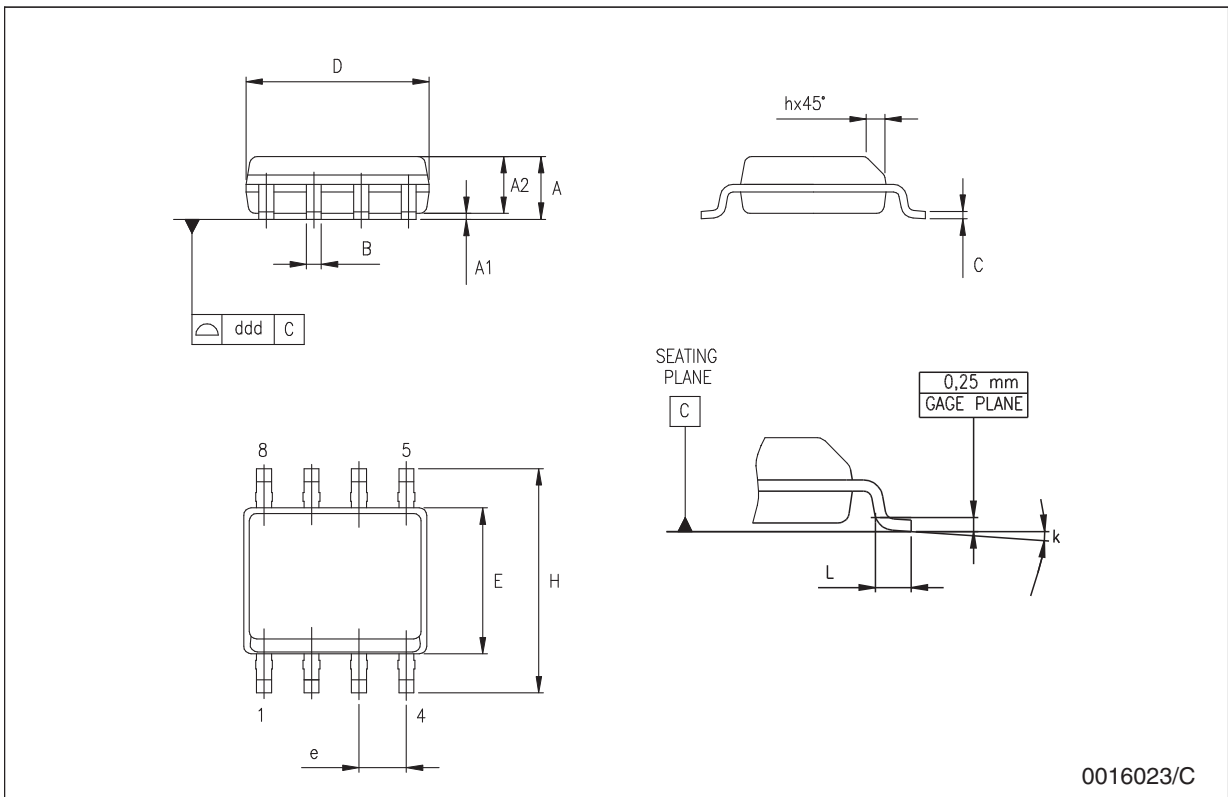


Figure 13. Drawing dimension DPAK (type STD-ST)

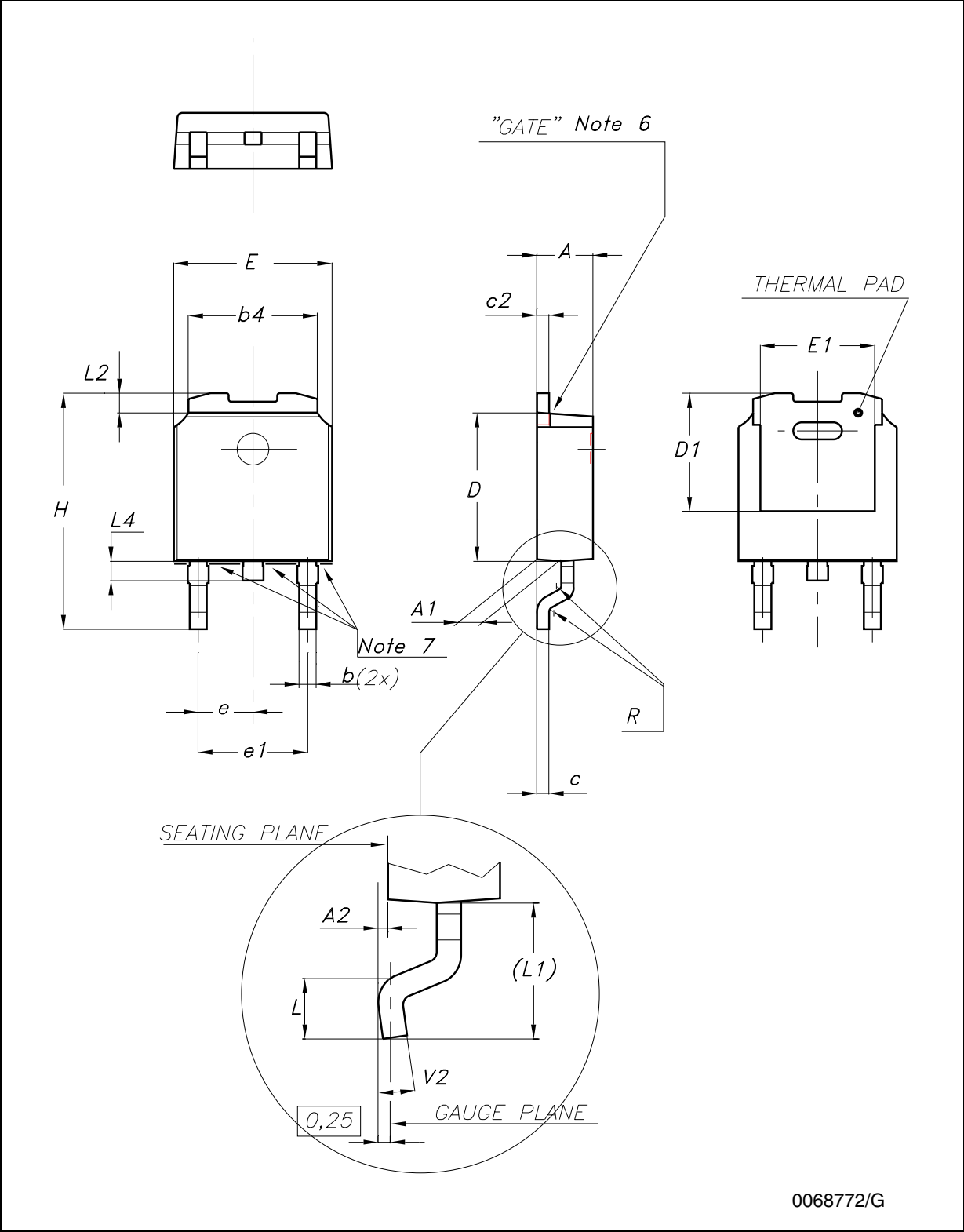
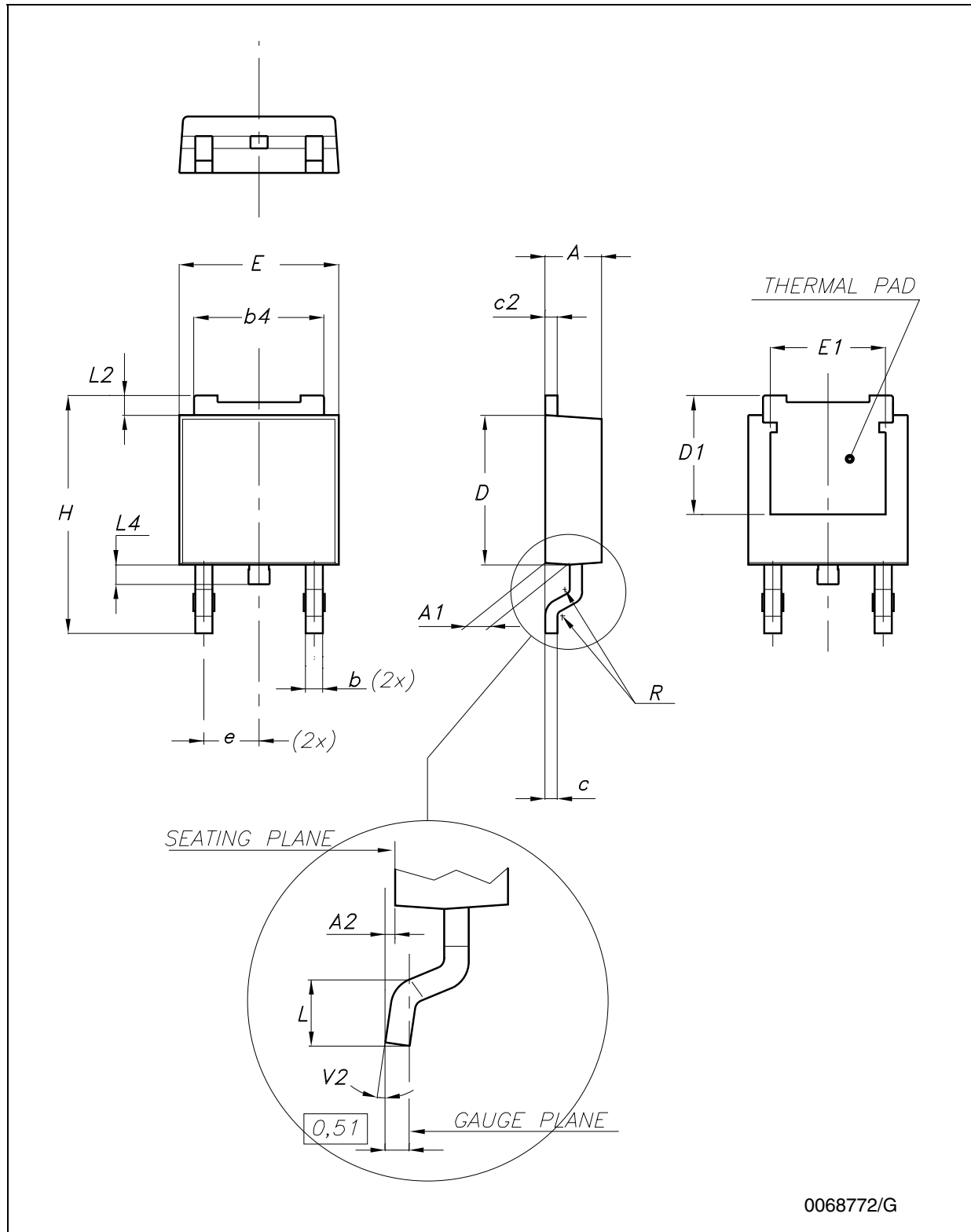
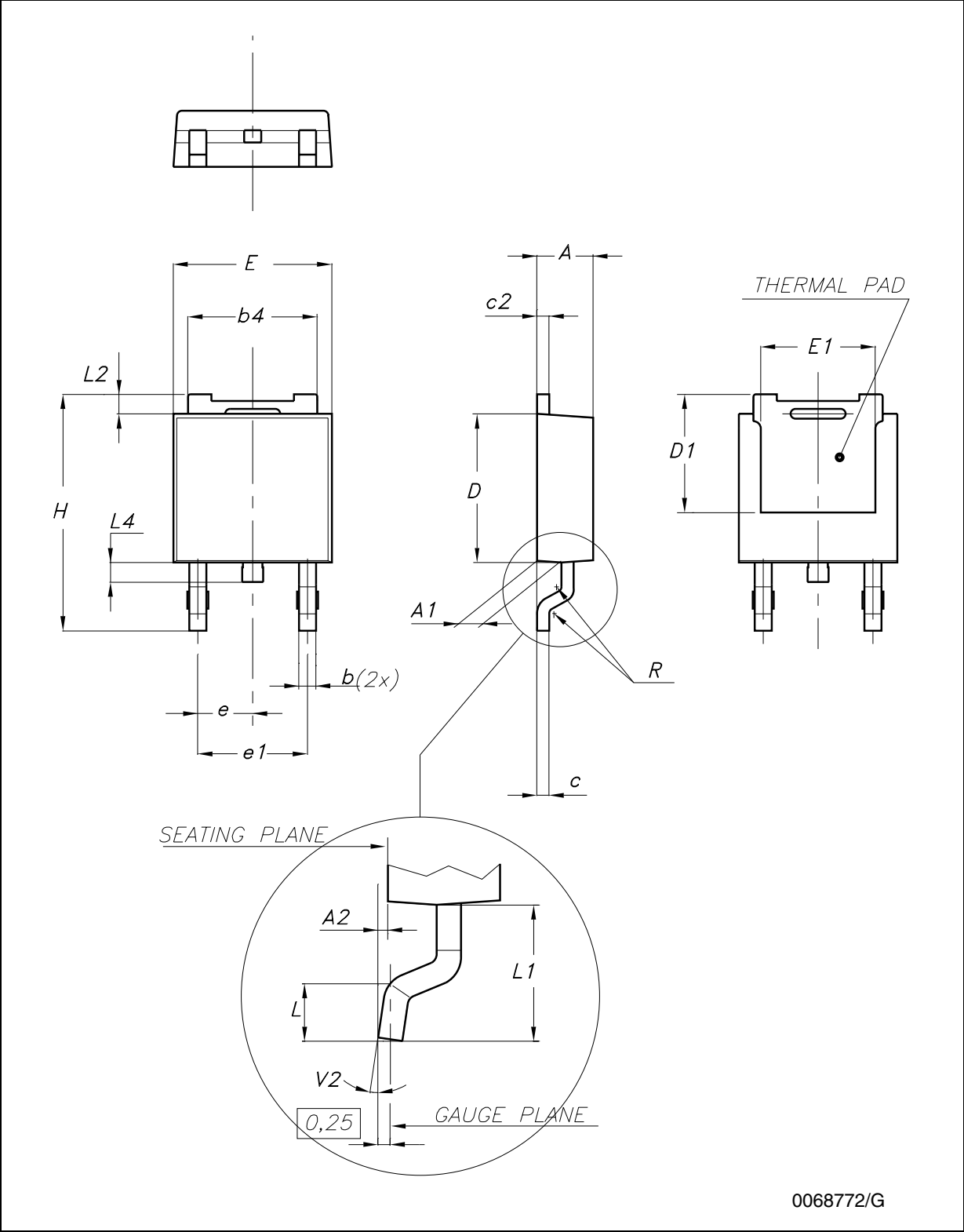


Figure 14. Drawing dimension DPAK (type FUJITSU-SUBCON.)



0068772/G

Figure 15. 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 16. DPAK footprint recommended data

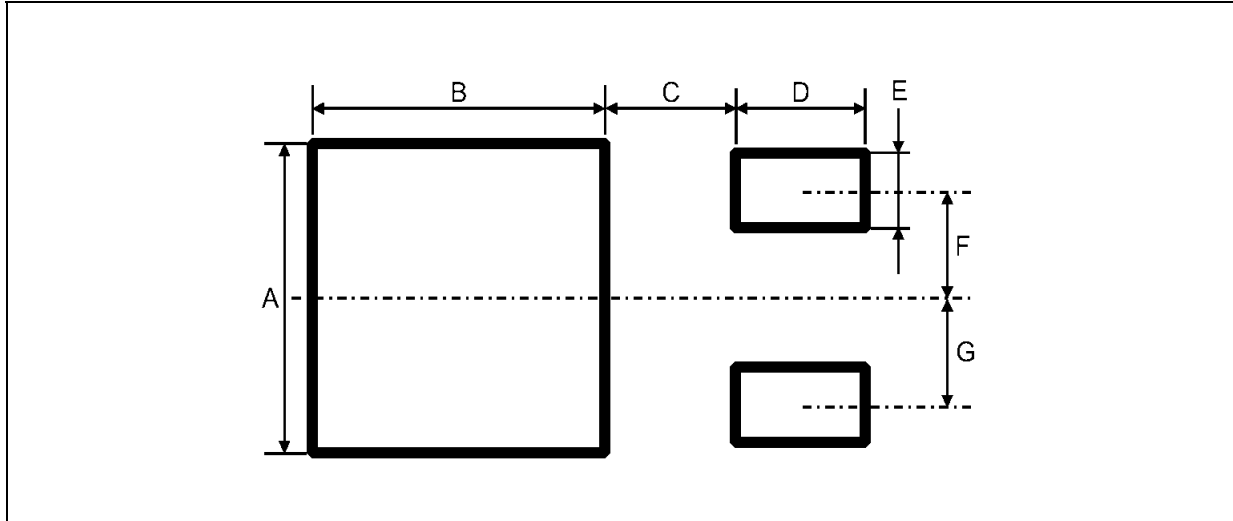
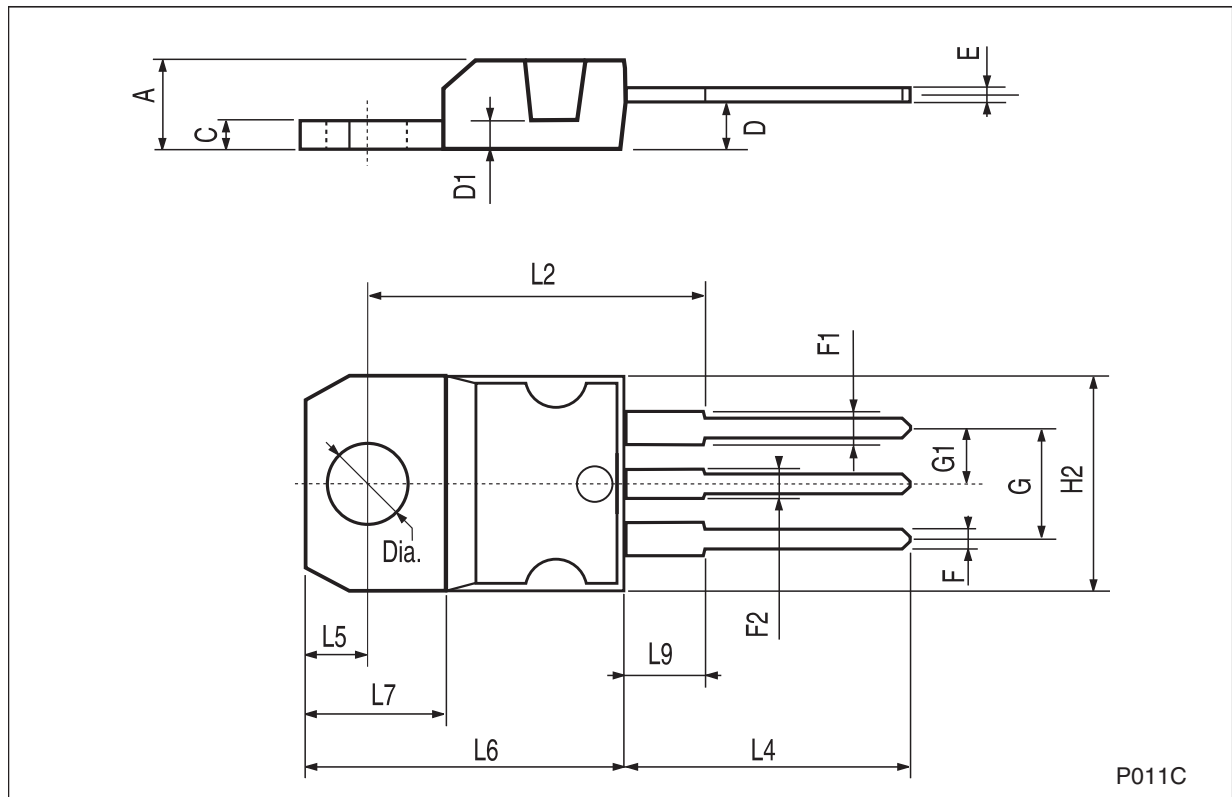


Table 19. Footprint data

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

**TO-220 mechanical data**

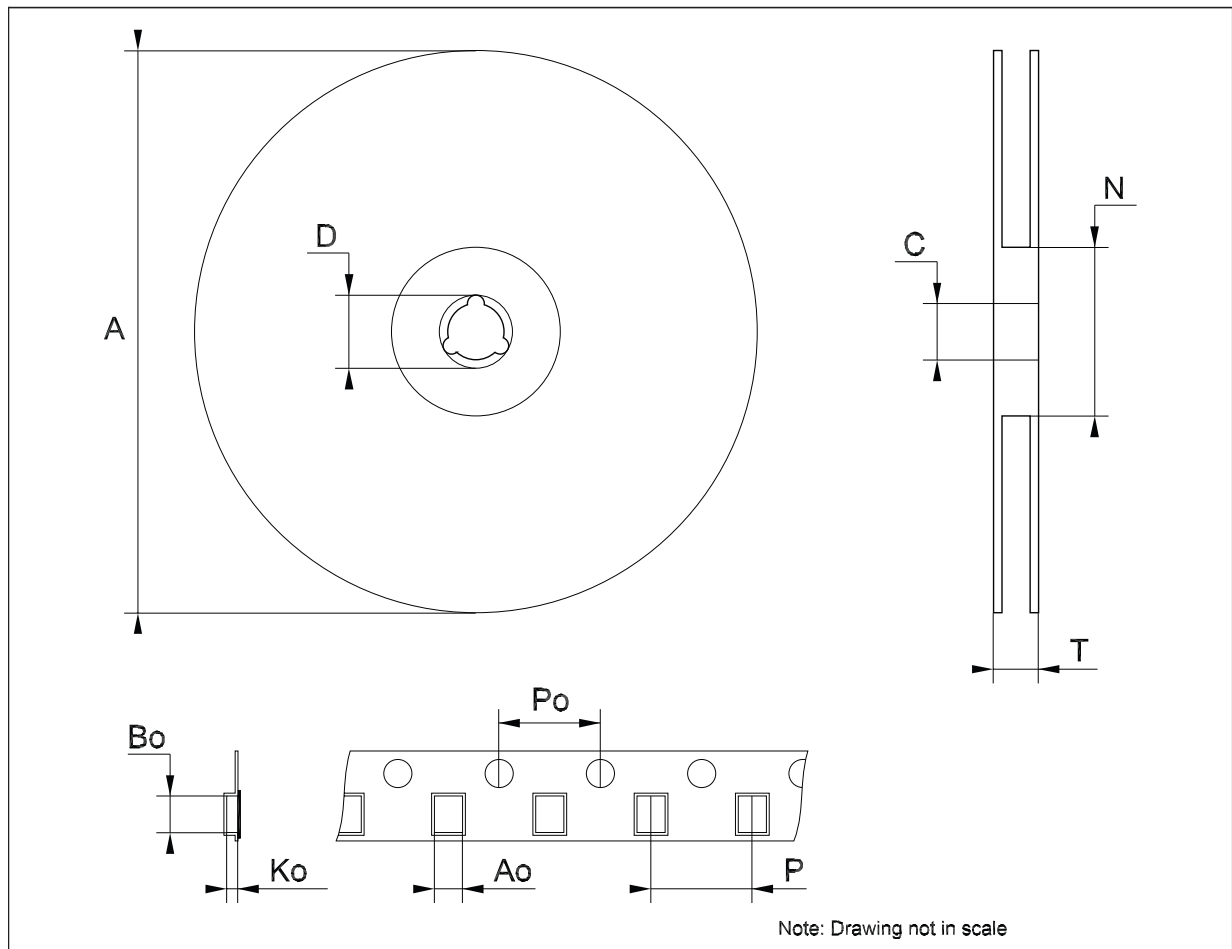
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106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



P011C

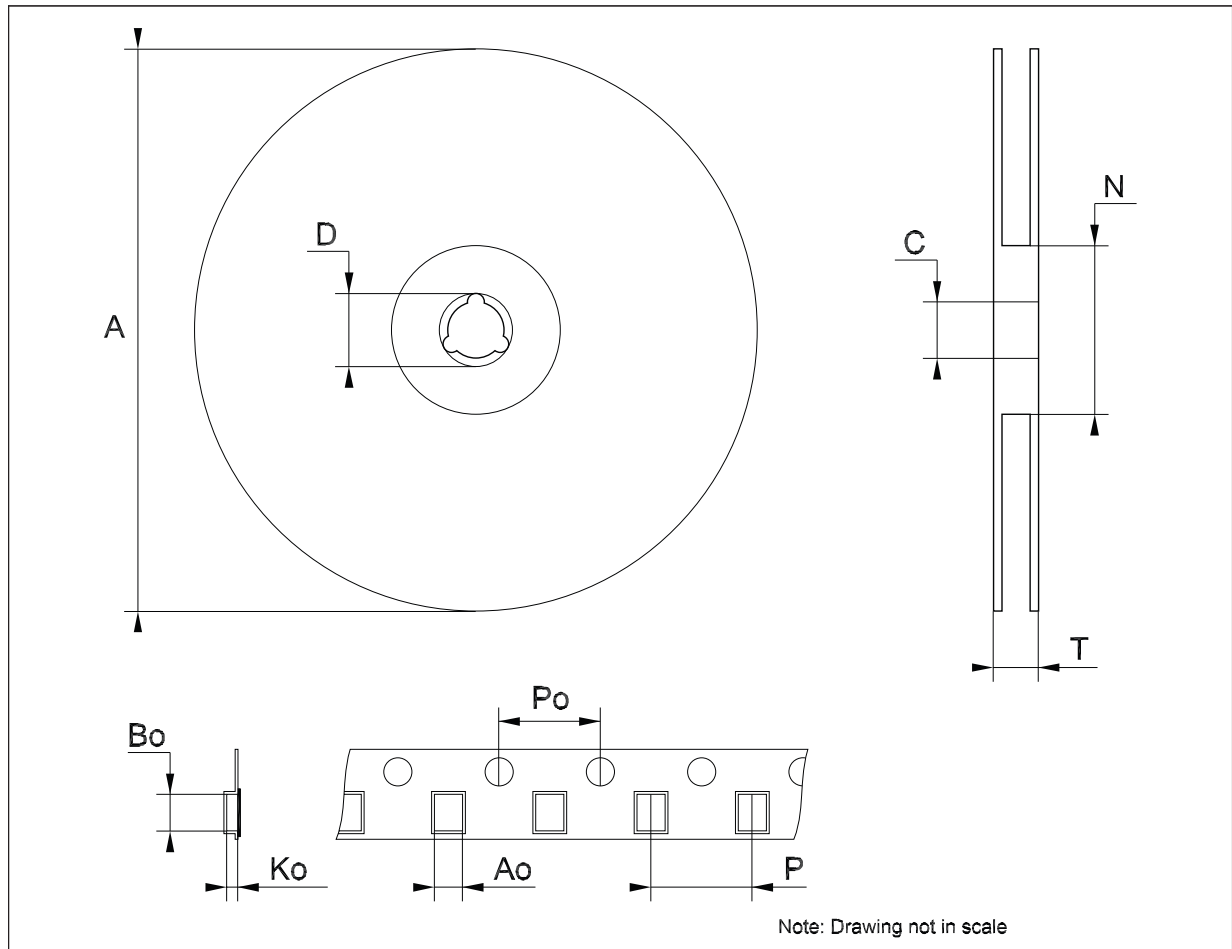
**Tape & reel SOT223 mechanical data**

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



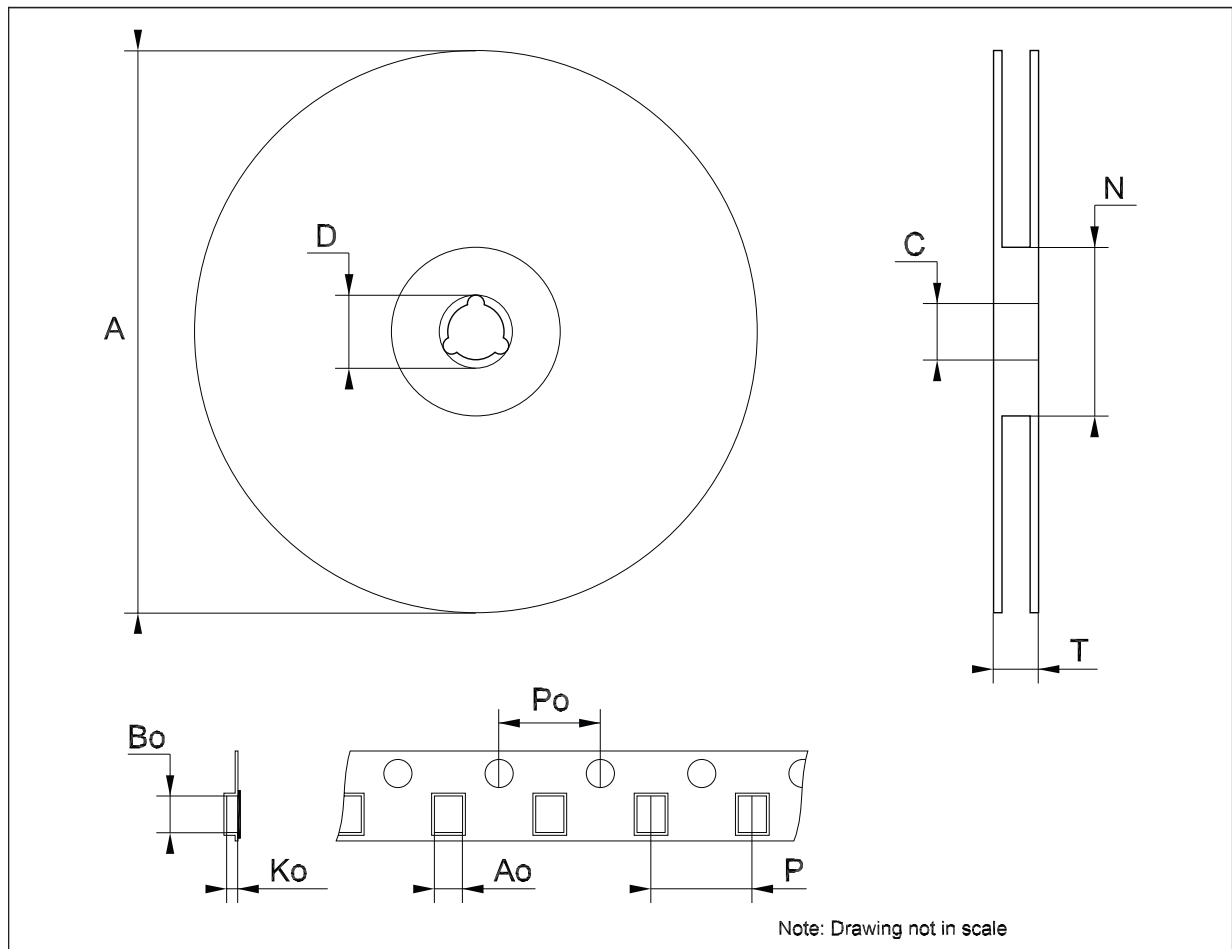
**Tape & reel SO-8 mechanical data**

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>		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	LD1117V25	2.5 V
LD1117S25CTR	LD1117D25CTR <sup>(1)</sup>		LD1117DT25CTR	LD1117V25C	2.5 V
LD1117S28TR			LD1117DT28TR		2.85 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 <sup>(1)</sup>		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 has been updated.
25-Nov-2005	18	The TO220FM Package has been removed.
14-Dec-2005	19	The $T_{op}$ on Table 2 has been updated.
06-Dec-2006	20	DPAK mechanical data has been updated and add 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 39</a> .
08-Jul-2008	24	Added note <a href="#">1. on page 7</a> .



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