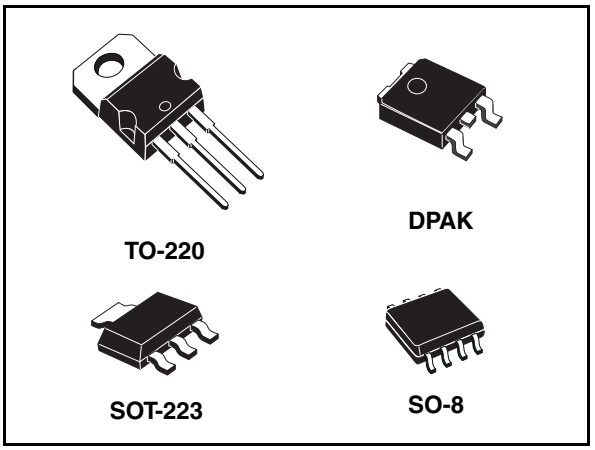
LD1117xx

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 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 10µF 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	LD1117XX50
LD1117XX12C	LD1117XX28	LD1117XX50C
LD1117XX18	LD1117XX30	LD1117XX
LD1117XX18C	LD1117XX33	LD1117XXC
LD1117XX25	LD1117XX33C	

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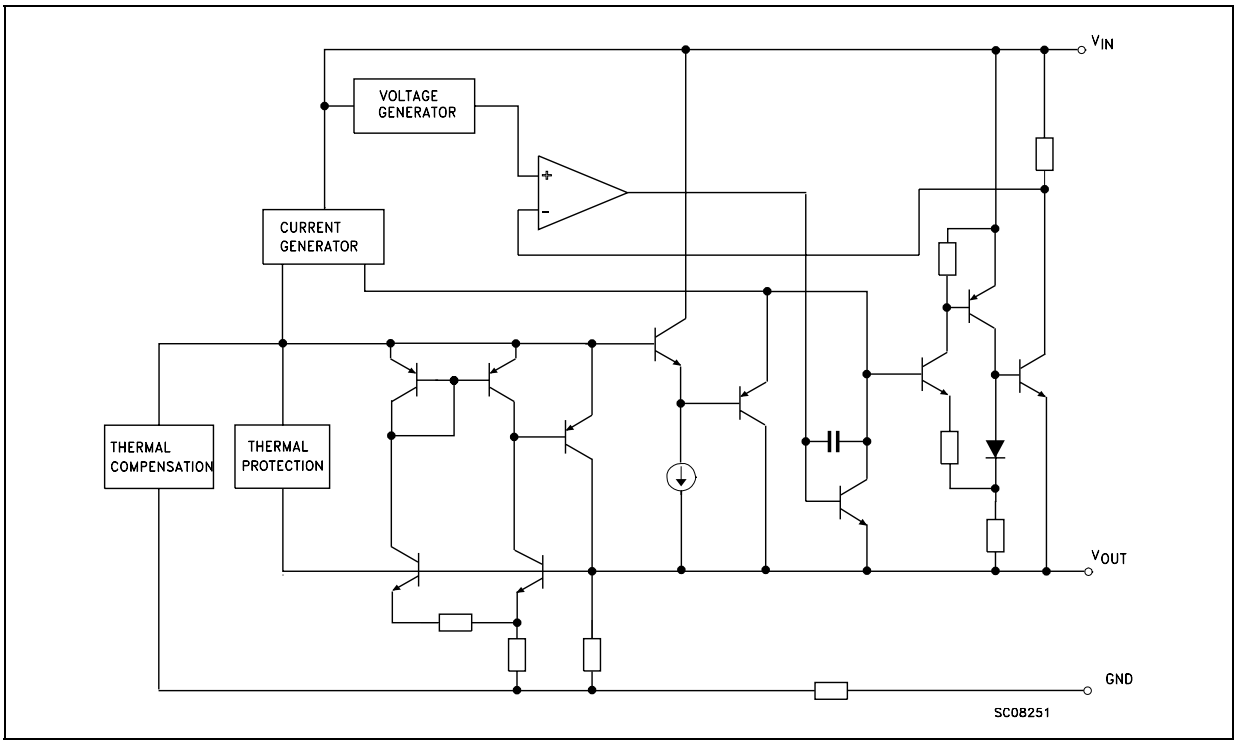
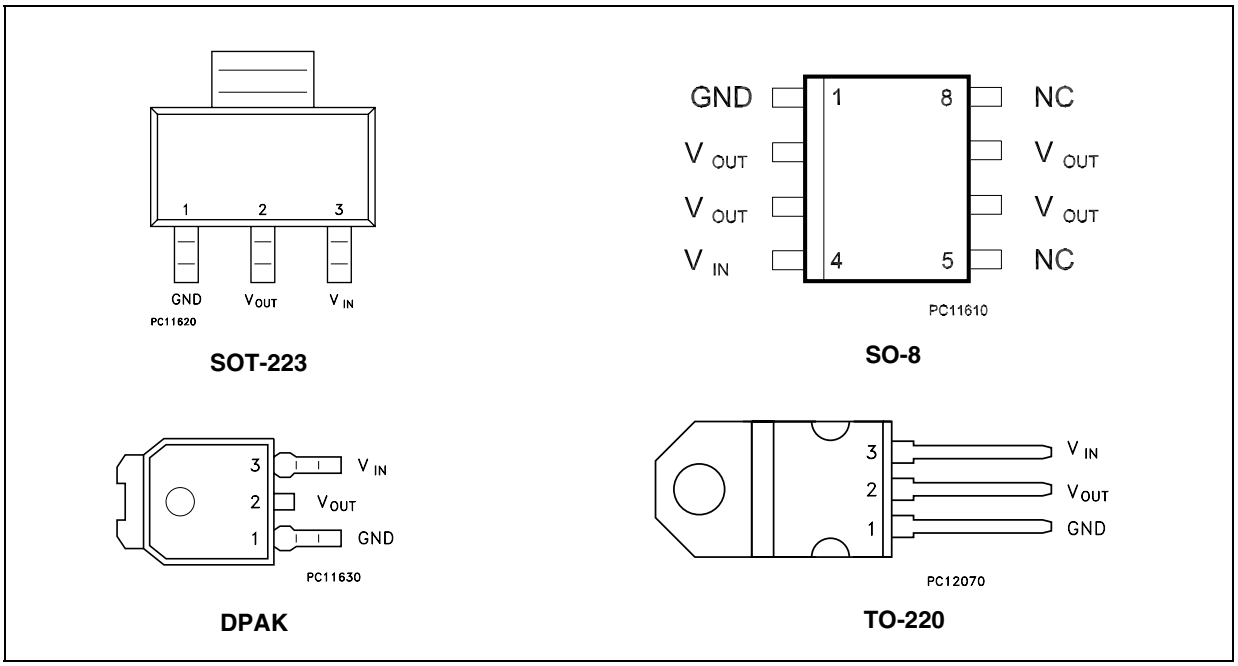
1 Diagram

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}	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	°C
		for standard Version	0 to +150	°C

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)

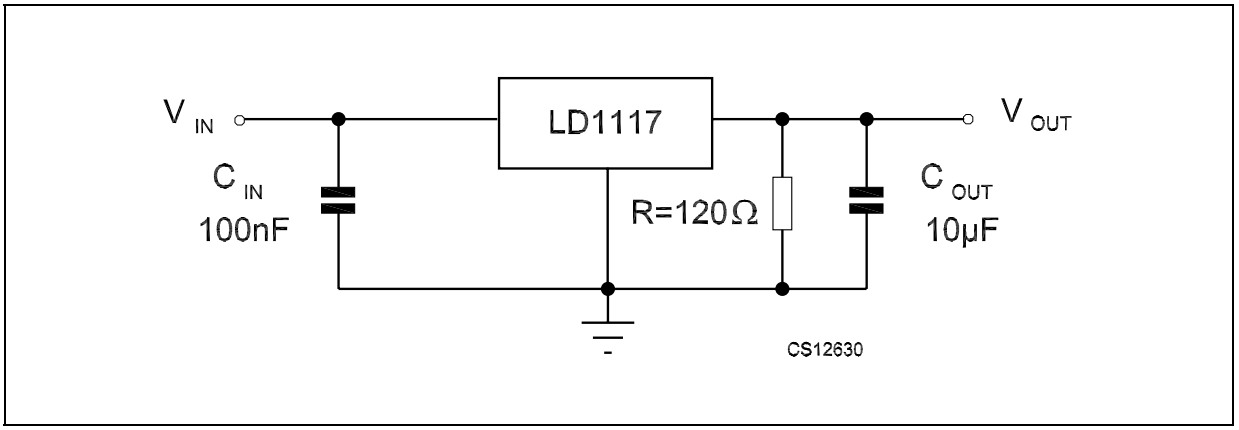
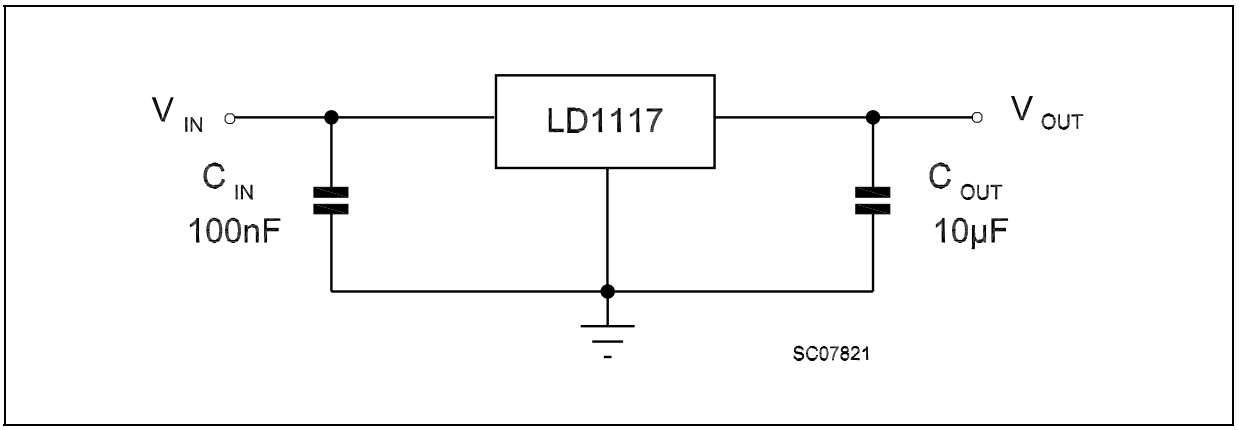


Figure 4. Application circuit (for other fixed output voltages)



5 Electrical characteristics

Table 4. Electrical characteristics of LD1117#12
(refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, R = 120 Ω 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°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} ≤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 =10Hz to 10kHz, T_J = 25°C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

Table 5. Electrical characteristics of LD1117#18
(refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified).

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			10	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 =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

Table 6. Electrical characteristics of LD1117#25
(refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, 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	2.475	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 VT_J = 25°C	800	950	1300	mA
eN	Output noise voltage	B =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

Table 7. Electrical characteristics of LD1117#28
(refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, unless otherwise specified).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_O	Output voltage	V_{in} = 4.85 V, I_O = 10 mA, T_J = 25°C	2.82	2.85	2.88	V
V_O	Output voltage	I_O = 0 to 800 mA, V_{in} = 4.25 to 10 V	2.79		2.91	V
ΔV_O	Line regulation	V_{in} = 4.25 to 10 V, I_O = 0 mA		1	6	mV
ΔV_O	Load regulation	V_{in} = 4.25 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} = 7.85 VT_J = 25°C	800	950	1300	mA
eN	Output noise voltage	B =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, T_J = 25°C V_{in} = 5.85 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, 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 µF, 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
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 =10Hz to 10kHz,T_J = 25°C		100		µF
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

Table 9. Electrical characteristics of LD1117#33
(refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, 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	3.267	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 =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

Table 10. Electrical characteristics of LD1117#50
(refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, 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	4.95	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 =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

Table 11. Electrical characteristics of LD1117 (adjustable)
(refer to the test circuits, T_J = 0 to 125 °C, C_O = 10 µF, 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	1.238	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} ≤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 =10Hz to 10kHz, T_J = 25°C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

Table 12. Electrical characteristics of LD1117#12C
(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).

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage	V_{in} - V_O= 2V, 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} ≤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 =10Hz to 10kHz, T_J = 25°C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

Table 13. Electrical characteristics of LD1117#18C
(refer to the test circuits, T_J = -40 to 125 °C, C_O = 10 µF, unless otherwise specified).

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			10	V
I_d	Quiescent current	$V_{in} \leq$8 V		5	10	mA
I_O	Output current	V_{in} = 6.8 VT_J = 25°C	800	950	1300	mA
eN	Output noise voltage	B =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 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 µF, 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
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 VT_J = 25°C	800	950	1300	mA
eN	Output noise voltage	B =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 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 µF, 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
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 =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 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 µF, 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
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 =10Hz to 10kHz, T_J = 25°C		100		µV
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 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 µF, 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
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} ≤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 =10Hz to 10kHz, T_J = 25°C		0.003		%
SVR	Supply voltage rejection	I_O = 40 mA, f = 120Hz, 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, 30ms Pulse		0.01	0.1	%/W

6 Typical application

Figure 5. Negative supply

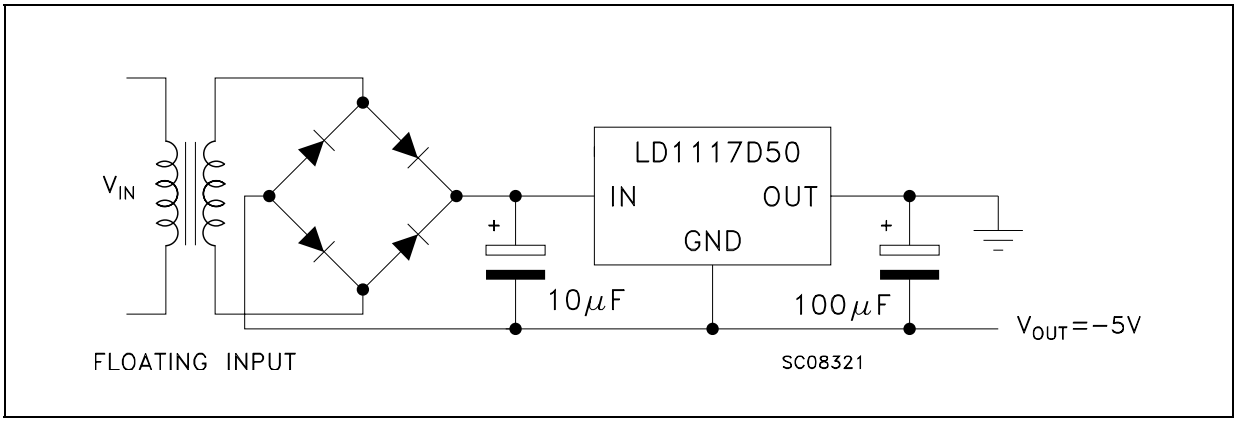


Figure 6. Active terminator for SCSI-2 BUS

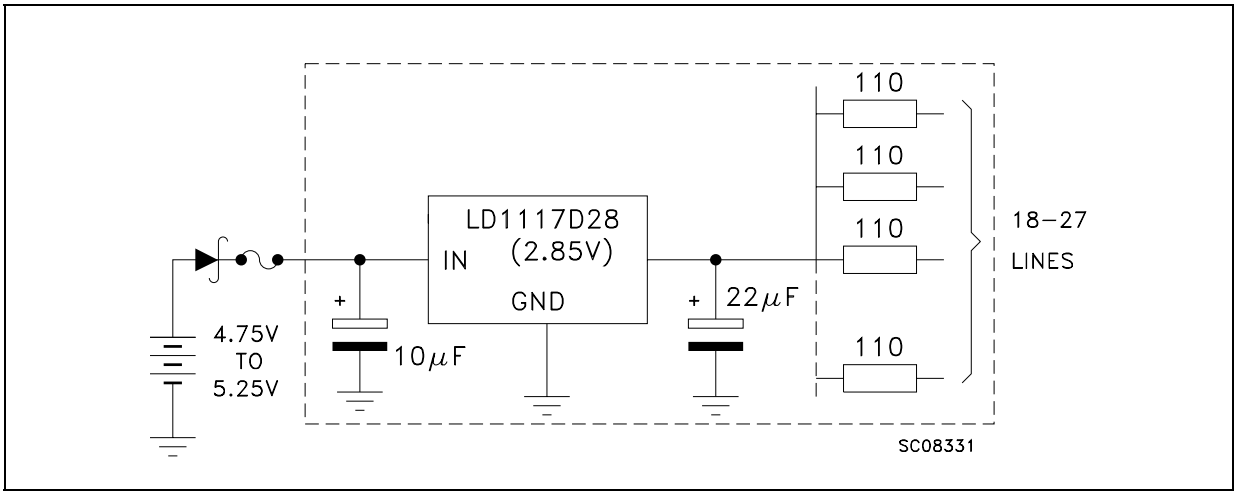


Figure 7. Circuit for increasing output voltage

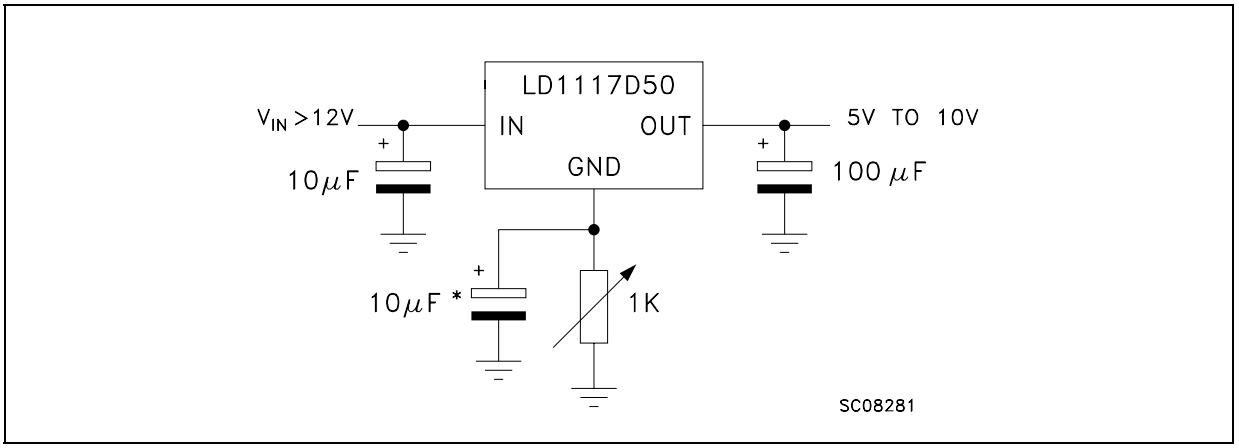


Figure 8. Voltage regulator with reference

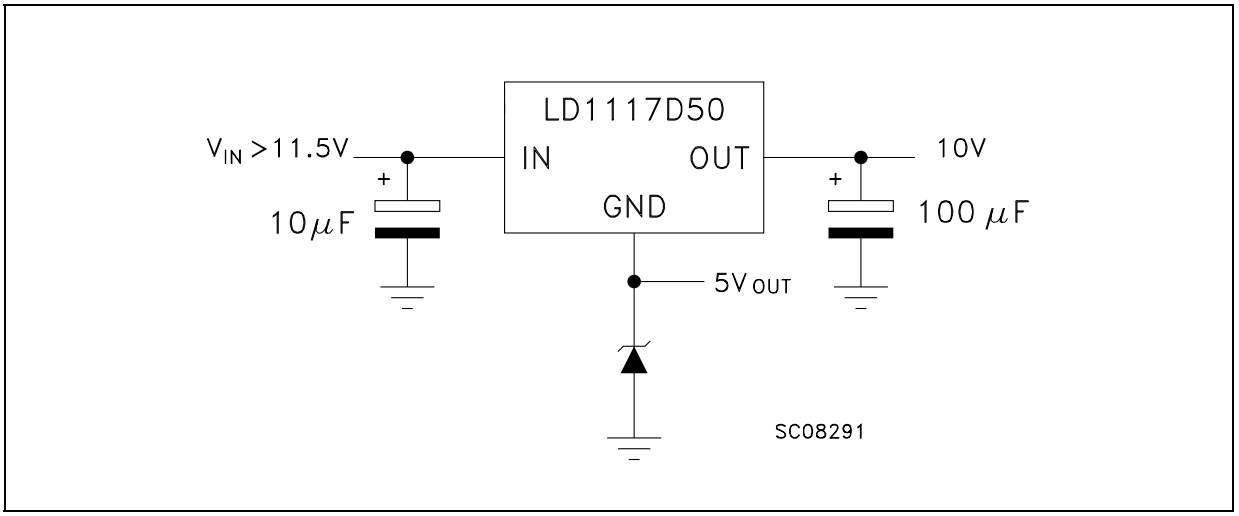


Figure 9. Battery backed-up regulated supply

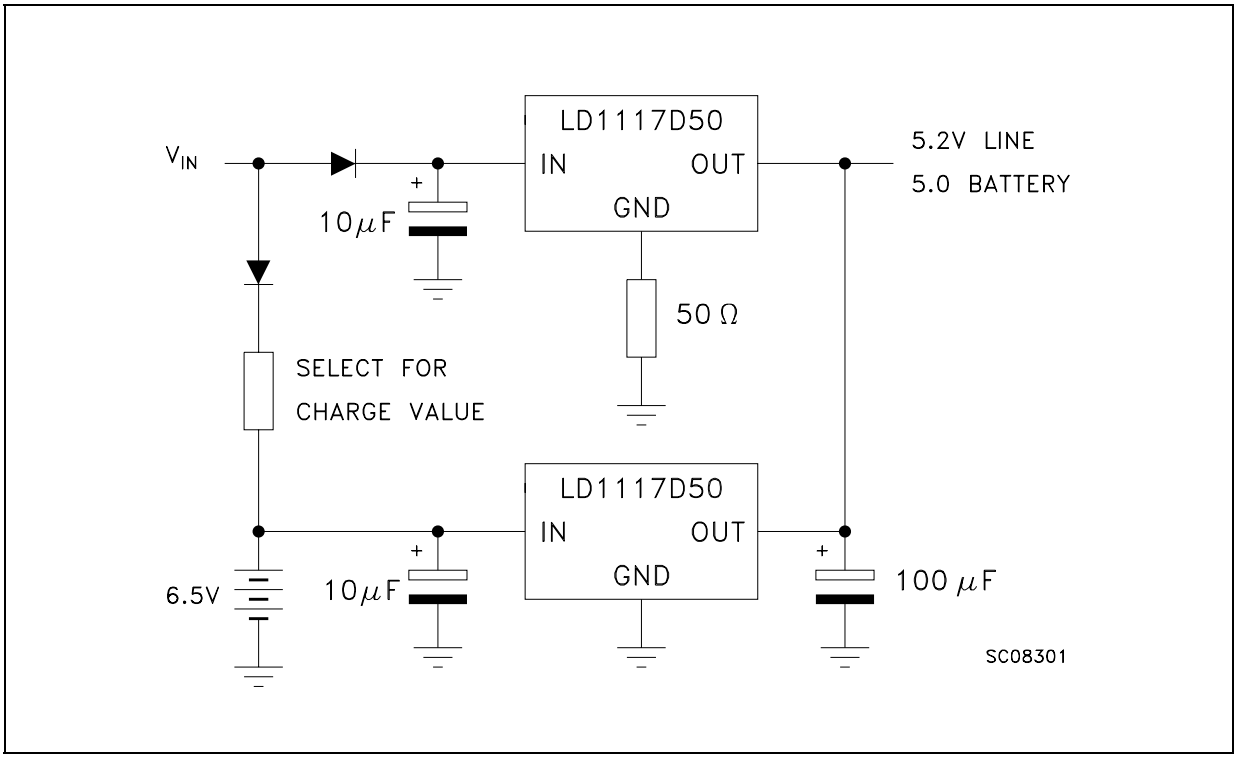
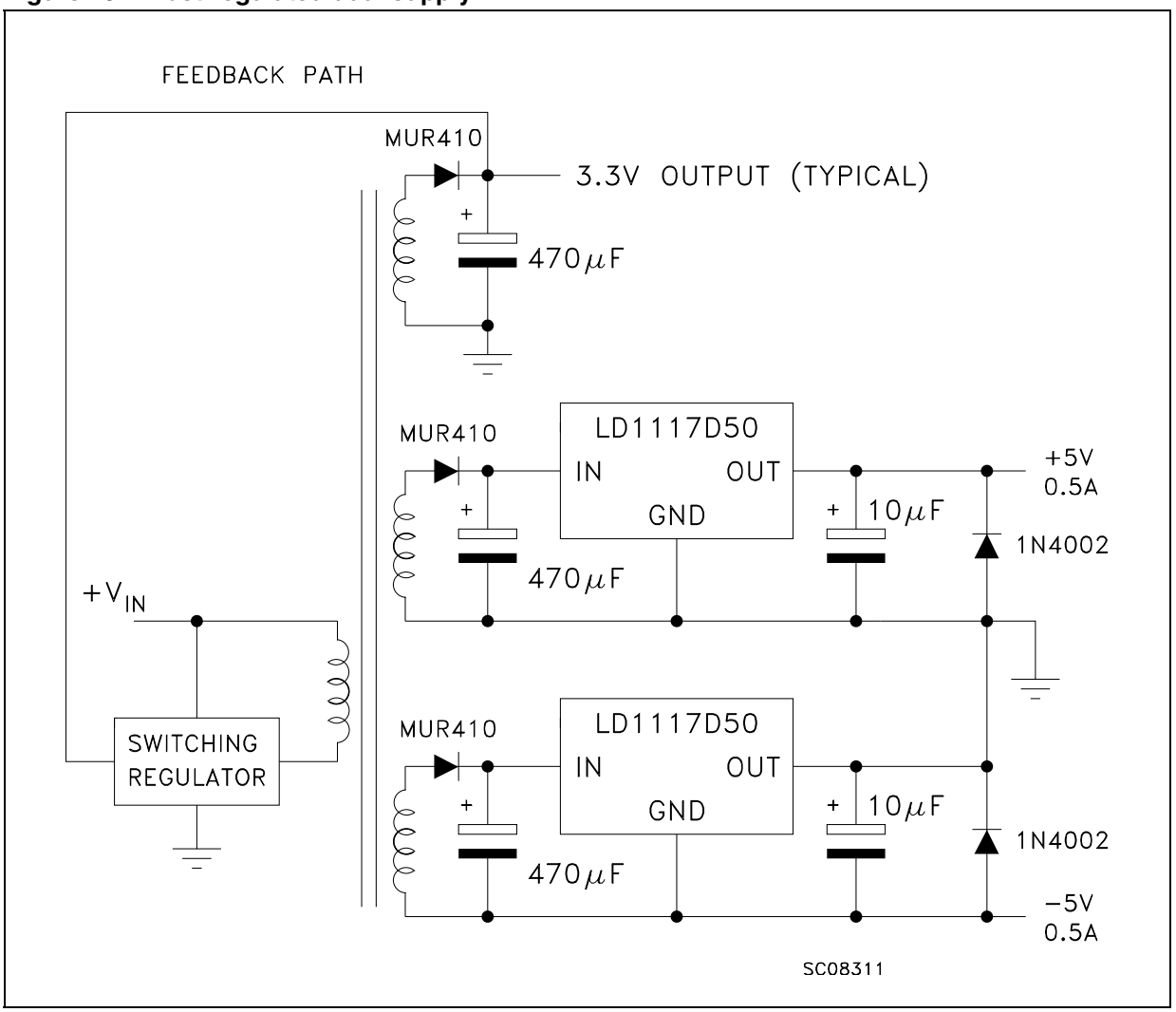


Figure 10. Post-regulated dual supply



7 LD1117 adjustable: application note

The LD1117 Adjustable has a thermal stabilized 1.25 ± 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.).

R1 is normally fixed to 120 Ω From *Figure 10* we obtain:

$V_{OUT} = V_{REF} + R2\ (I_{ADJ} + I_{R1}) = V_{REF} + R2\ (I_{ADJ} + V_{REF}/R_1) = V_{REF}\ (1 + R2 / R_1) + R2 \times I_{ADJ}$.

In normal application R2 value is in the range of few kΩ, so the R2 x 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 µF electrolytic capacitor placed in parallel to the R2 resistor (see *Figure 11*).

Figure 11. Adjustable output voltage application

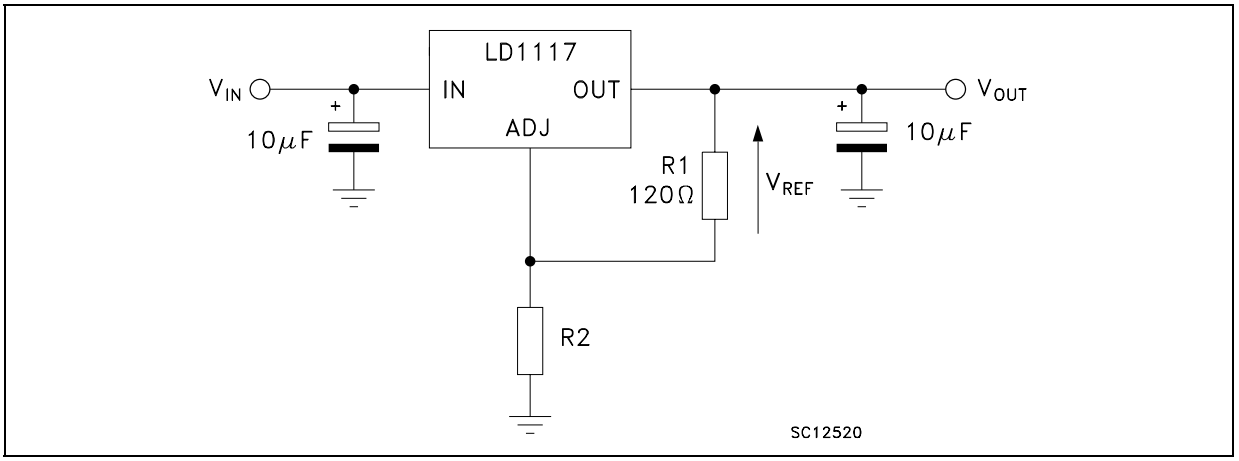
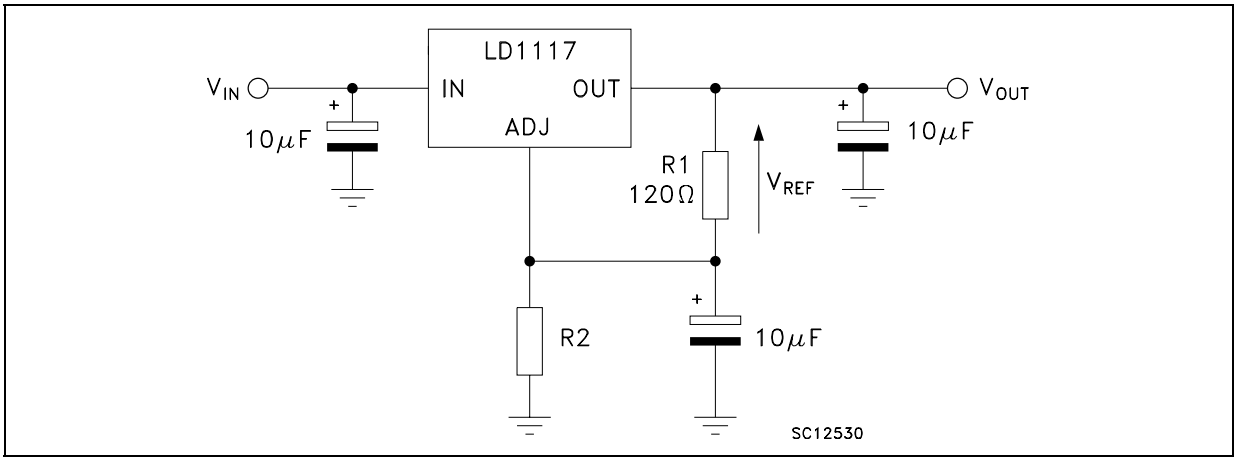


Figure 12. Adjustable output voltage application with improved ripple rejection

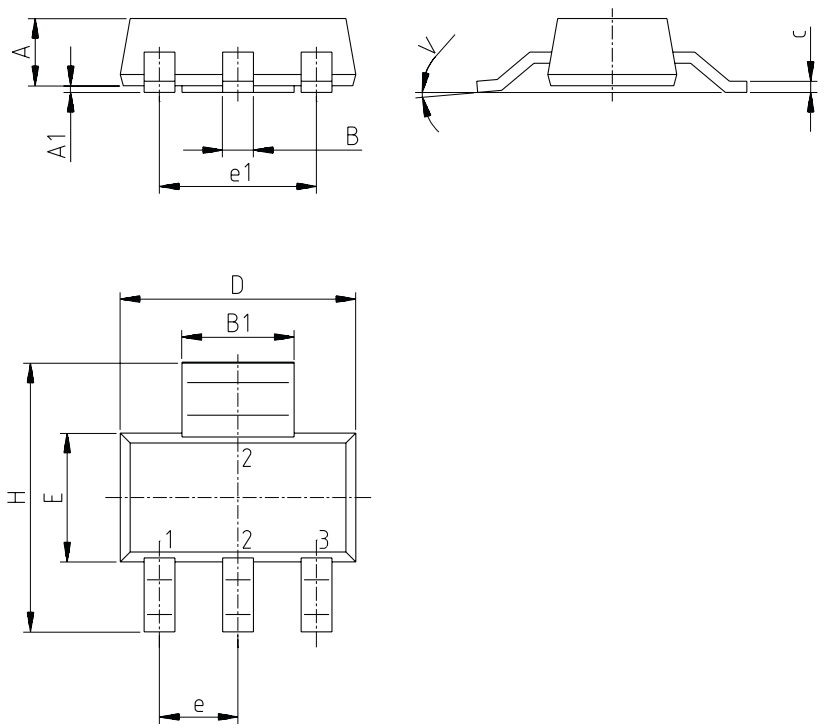


8 Package mechanical data

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.

SOT-223 mechanical data

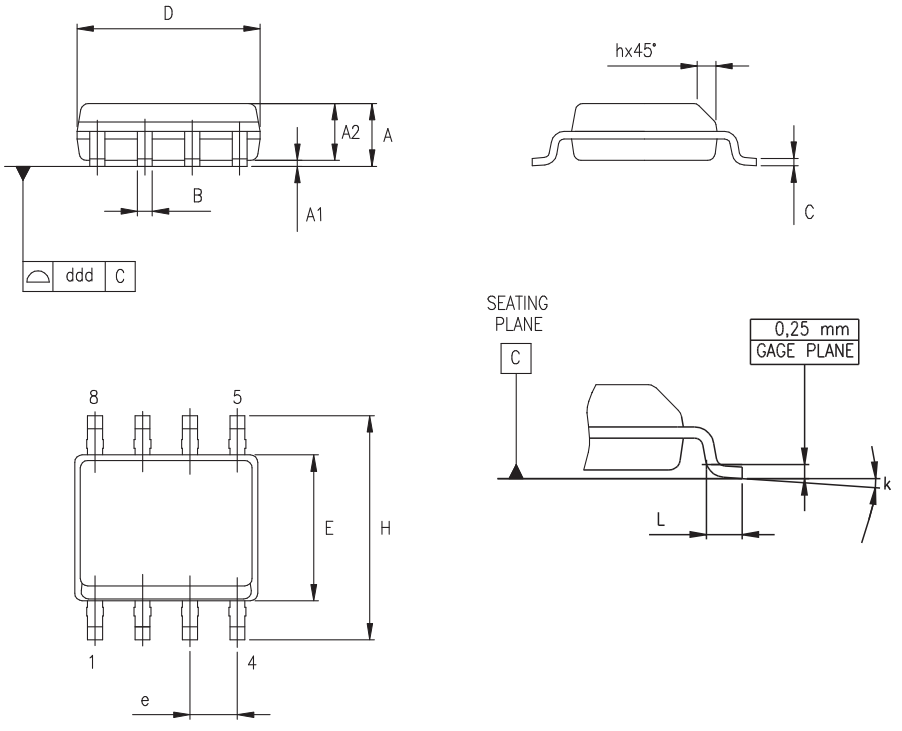
Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.8			70.9
A1	0.02		0.1	0.8		3.9
B	0.6	0.7	0.85	23.6	27.6	33.5
B1	2.9	3	3.15	114.2	118.1	124.0
c	0.24	0.26	0.35	9.4	10.2	13.8
D	6.3	6.5	6.7	248.0	255.9	263.8
e		2.3			90.6	
e1		4.6			181.1	
E	3.3	3.5	3.7	129.9	137.8	145.7
H	6.7	7	7.3	263.8	275.7	287.5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



0016023/C

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

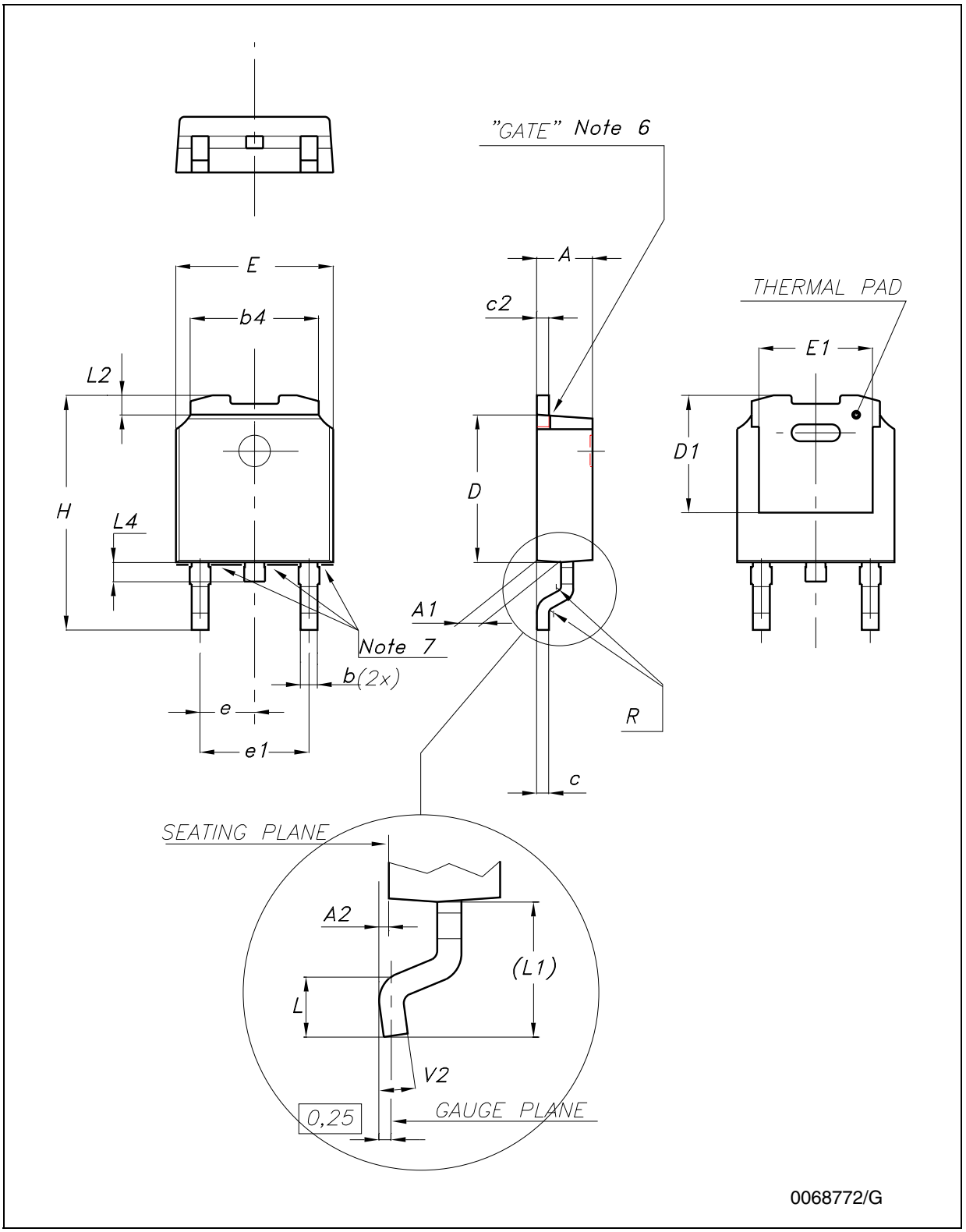


Figure 14. Drawing dimension DPAK (type FUJITSU-SUBCON.)

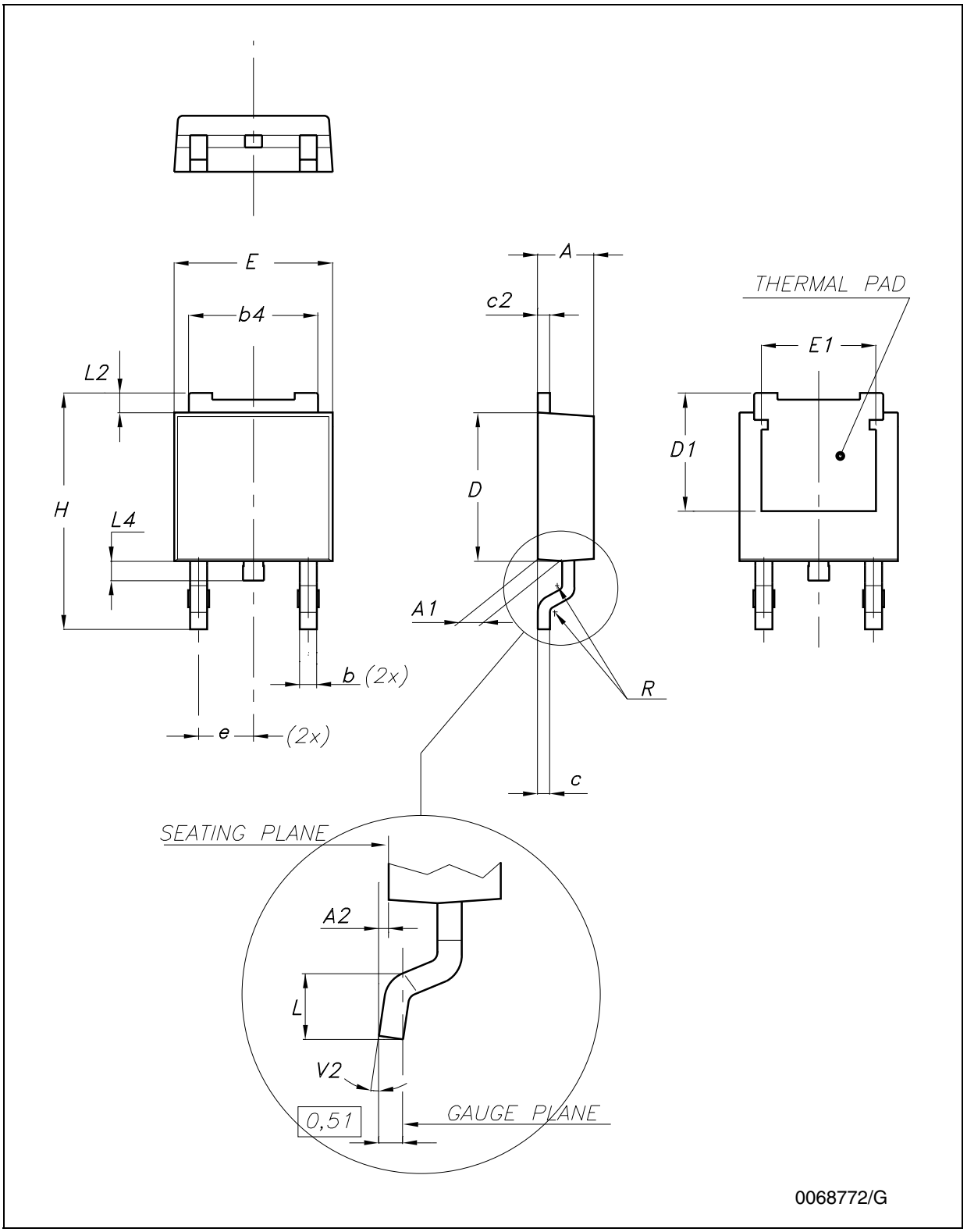


Figure 15. Drawing dimension DPAK (type IDS-SUBCON.)

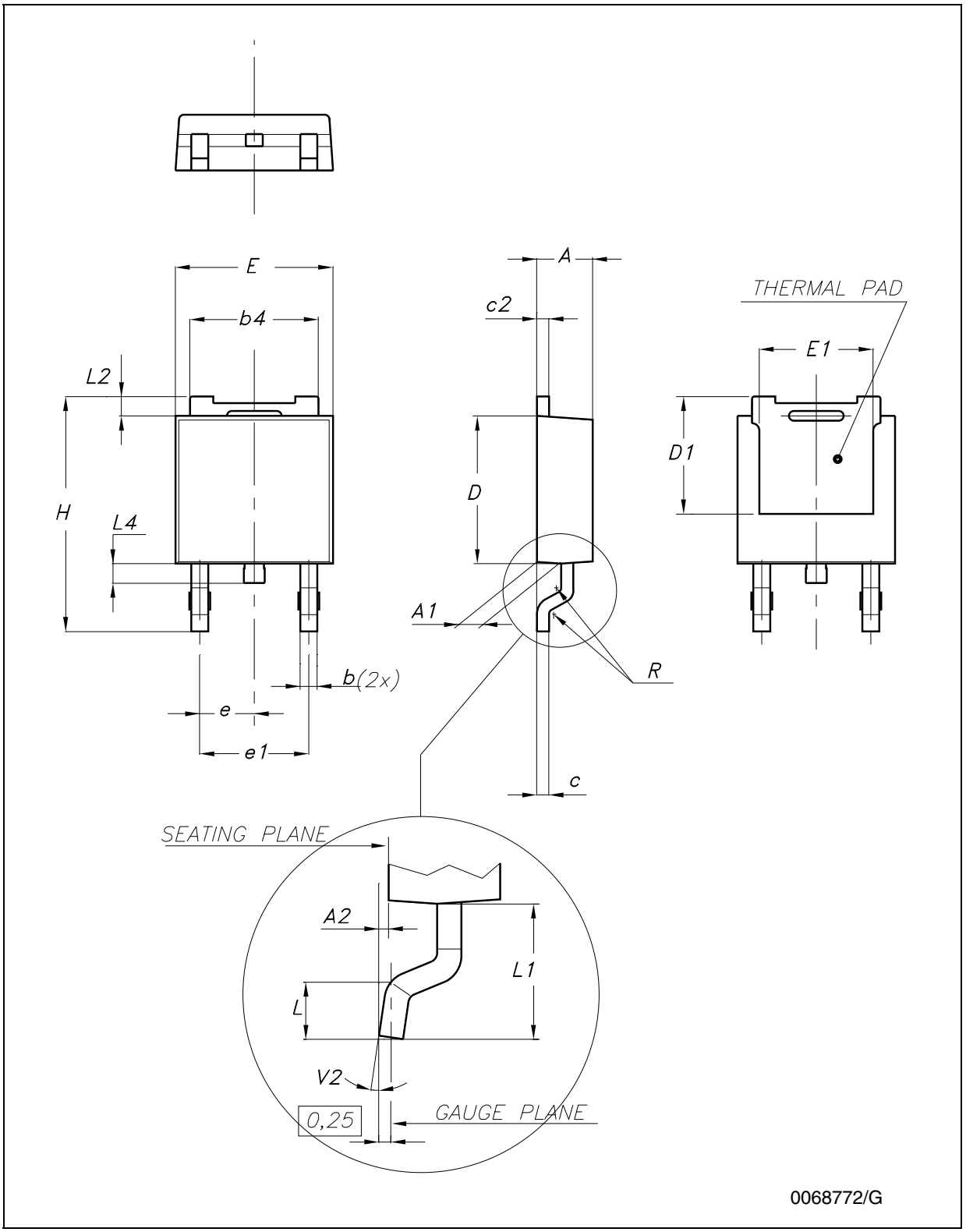


Table 18. DPAK mechanical data

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 16. DPAK footprint recommended data

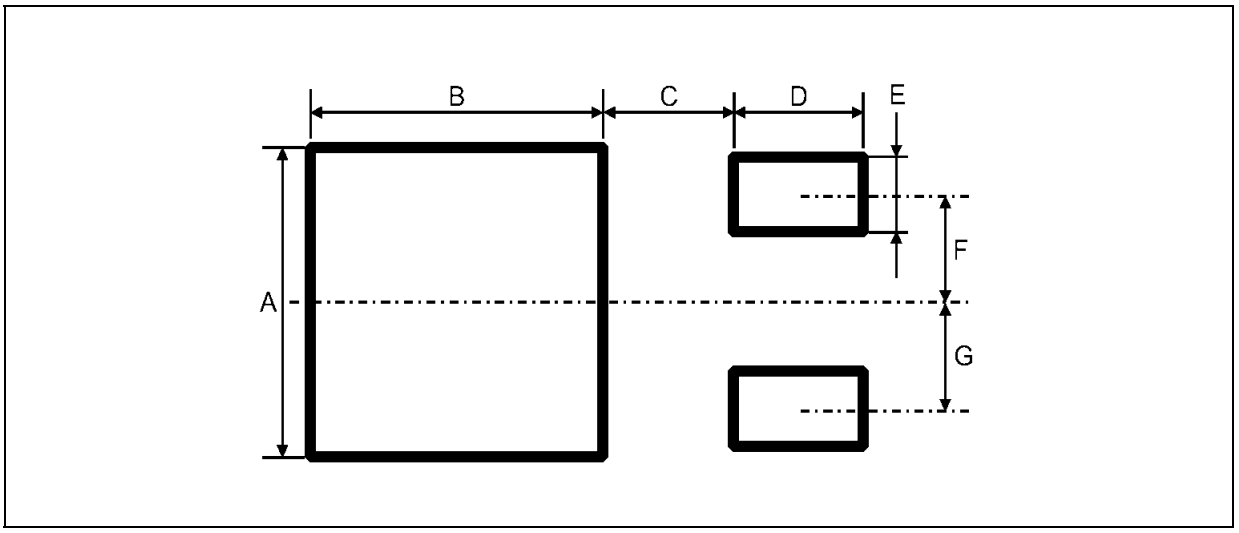
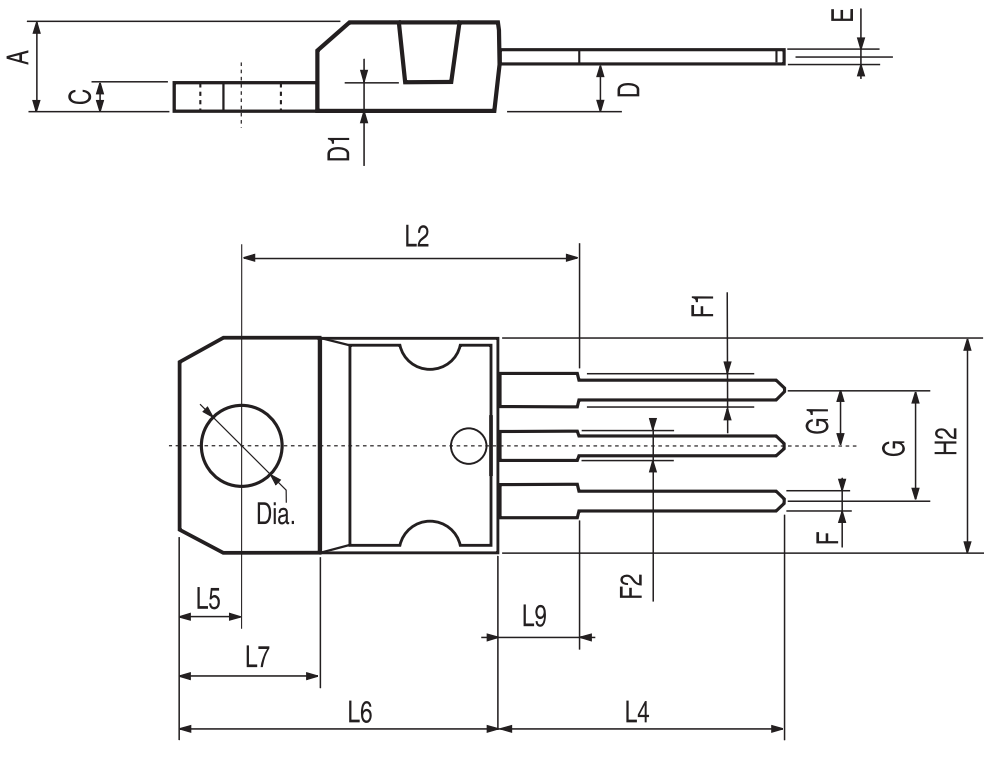


Table 19. Footprint data

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

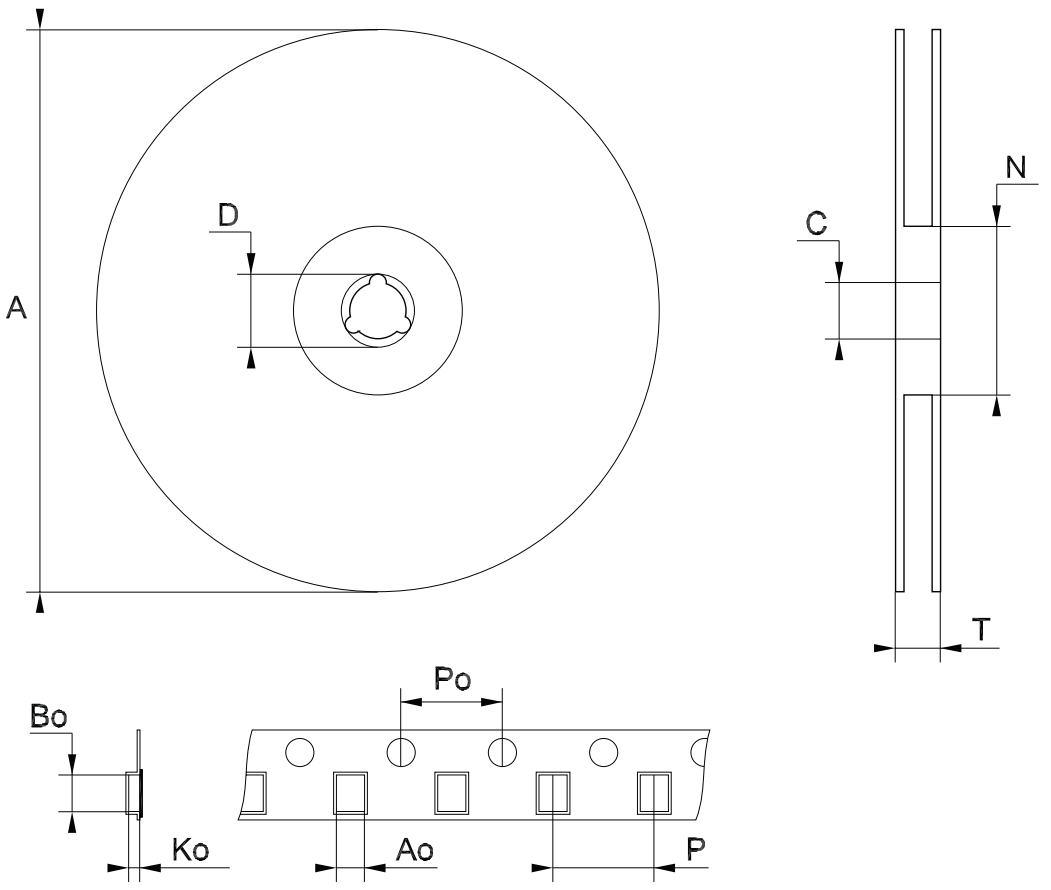
TO-220 mechanical data

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



Tape & reel SOT223 mechanical data

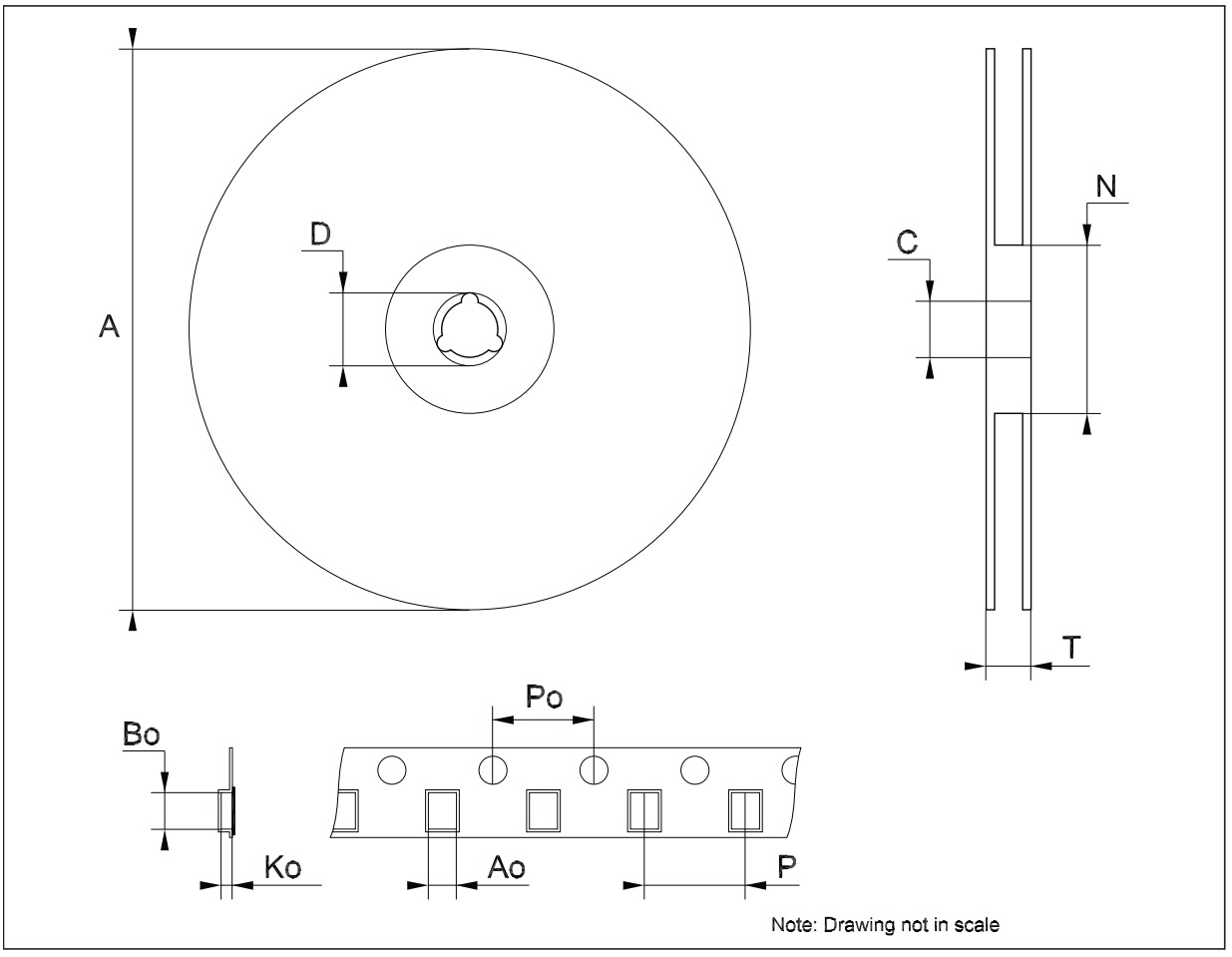
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	6.73	6.83	6.93	0.265	0.269	0.273
Bo	7.32	7.42	7.52	0.288	0.292	0.296
Ko	1.78		2	0.070		0.078
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	7.9	8.0	8.1	0.311	0.315	0.319



Note: Drawing not in scale

Tape & reel SO-8 mechanical data

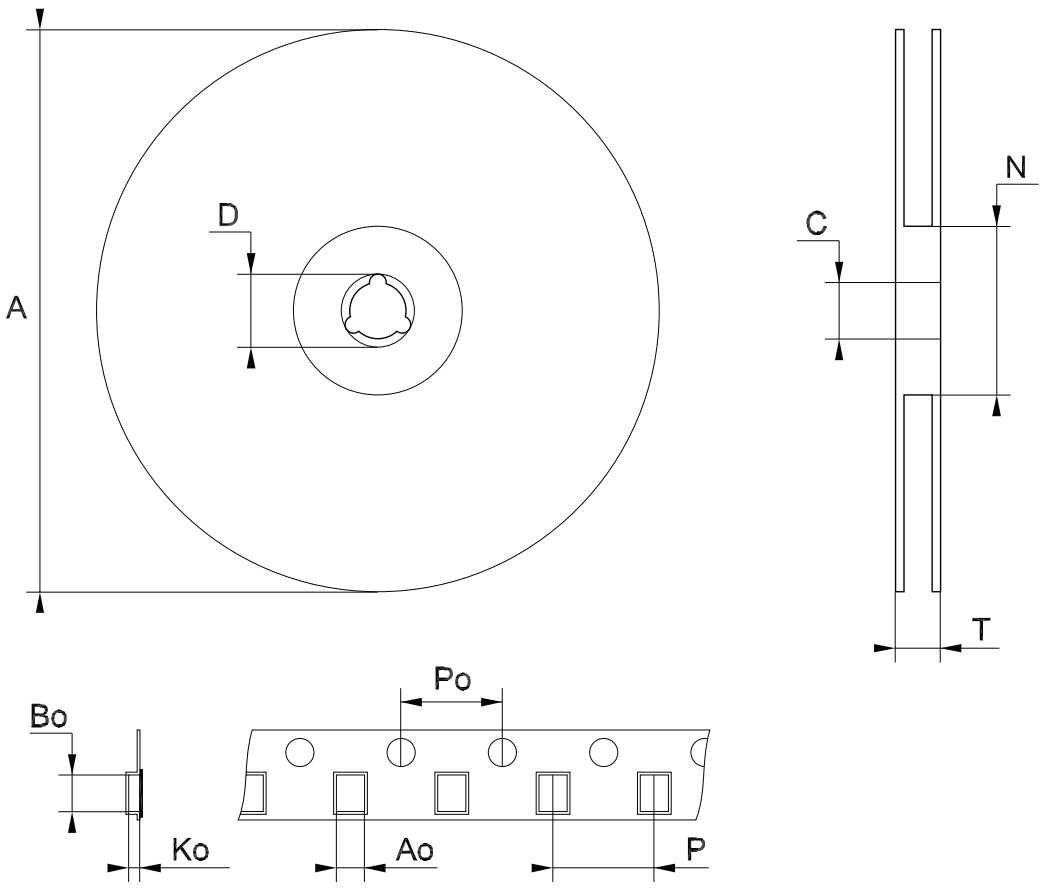
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



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 code

Table 20. Order code

Part numbers					
SOT-223	**SO-8**	**DPAK**	**DPAK (T&R)**	**TO-220**	**Output voltage**
LD1117S12TR	LD1117D12TR (1)	LD1117DT12 (1)	LD1117DT12TR		1.2 V
LD1117S12CTR (1)	LD1117D12CTR (1)	LD1117DT12C (1)		LD1117V12C (1)	1.2 V
LD1117S18TR	LD1117D18TR (1)		LD1117DT18TR	LD1117V18	1.8 V
LD1117S18CTR (1)	LD1117D18CTR (1)		LD1117DT18CTR	LD1117V18C (1)	1.8 V
LD1117S25TR	LD1117D25TR (1)		LD1117DT25TR	LD1117V25	2.5 V
LD1117S25CTR	LD1117D25CTR (1)		LD1117DT25CTR	LD1117V25C	2.5 V
LD1117S28TR	LD1117D28TR (1)		LD1117DT28TR		2.85 V
LD1117S30TR	LD1117D30TR (1)				3 V
LD1117S33TR	LD1117D33TR		LD1117DT33TR	LD1117V33	3.3 V
LD1117S33CTR	LD1117D33CTR		LD1117DT33CTR	LD1117V33C	3.3 V
LD1117S50TR			LD1117DT50TR	LD1117V50	5 V
LD1117S50CTR	LD1117D50CTR (1)		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 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 *Table 1*.

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