

Positive voltage regulators

Features

- Output current to 0.5 A
- Output voltages of 5; 6; 8; 9; 12; 15; 24 V
- Thermal overload protection
- Short circuit protection
- Output transition SOA protection

Description

The L78Mxx series of three-terminal positive regulators is available in TO-220, TO-220FP, DPAK and IPAK packages and with several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 0.5 A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

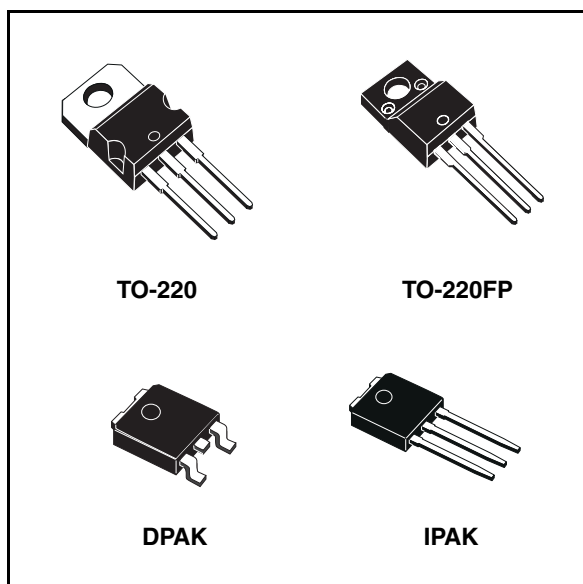


Table 1. Device summary

Part numbers	
L78M05C	L78M12C
L78M06C	L78M15C
L78M08C	L78M24C
L78M09C	

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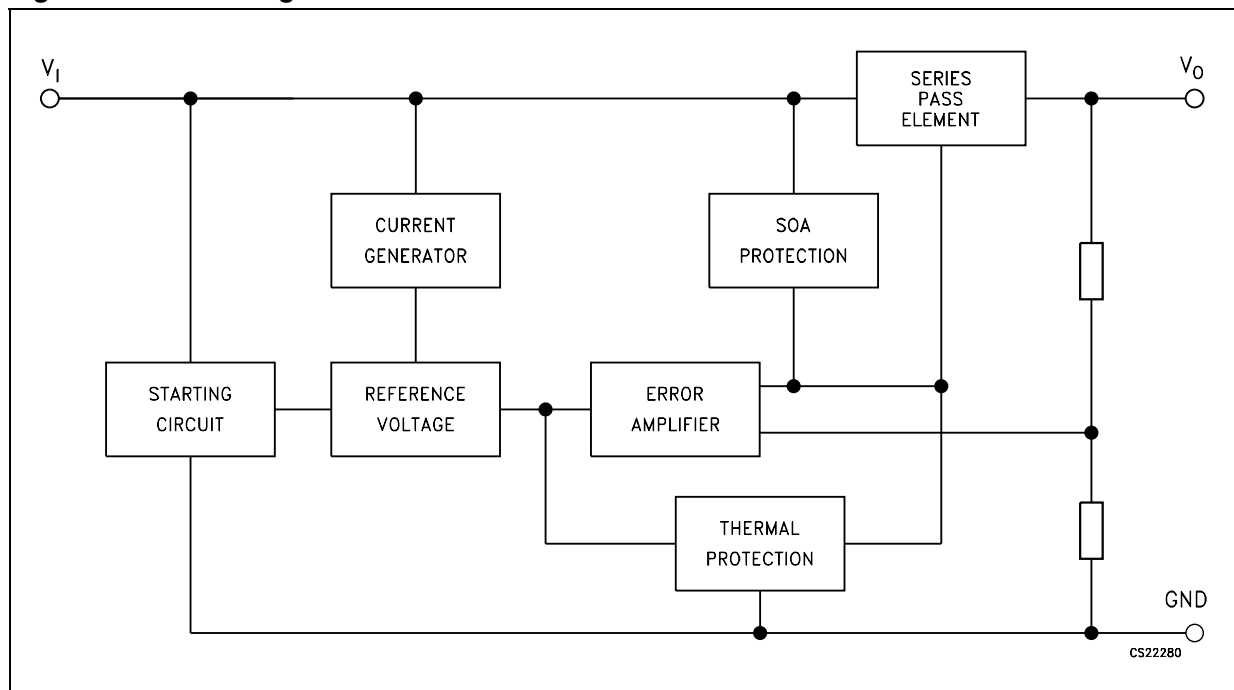
8 **Order codes** **27**

9 **Revision history** **28**



1 Diagram

Figure 1. Block diagram



2 Pin configuration

Figure 2. Pin connections (top view)

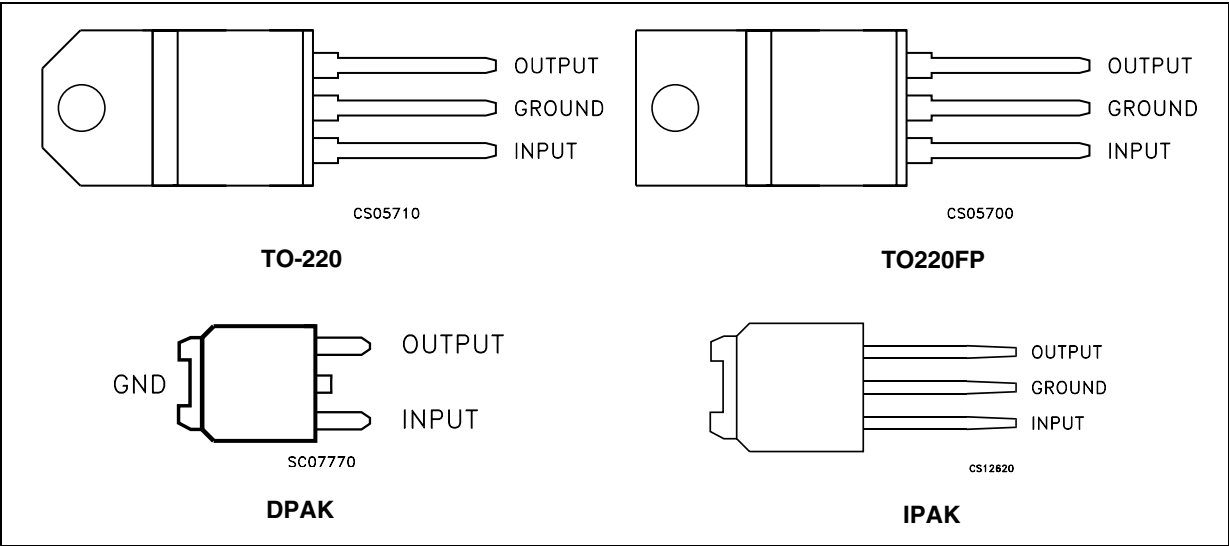
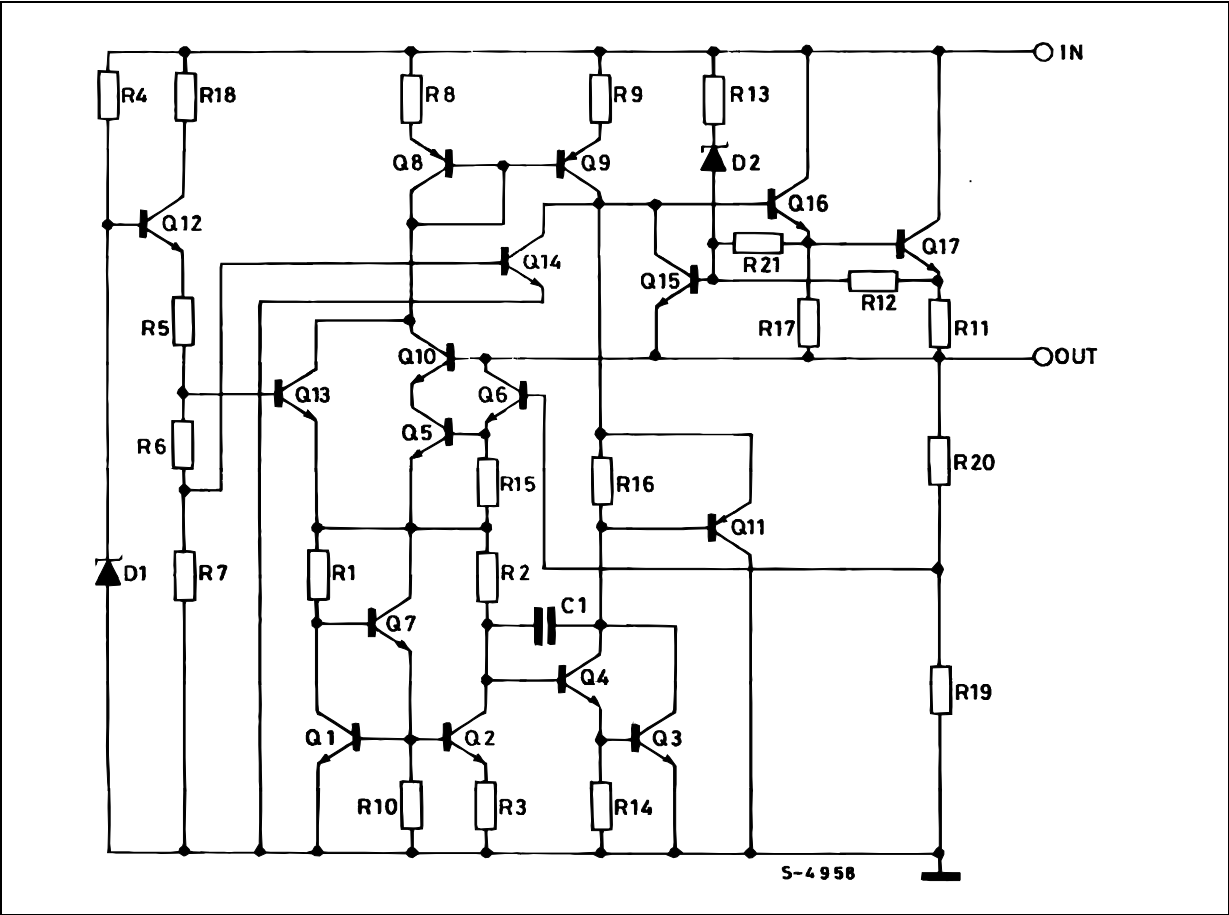


Figure 3. Schematic diagram



3 Maximum ratings

Table 2. Absolute maximum ratings

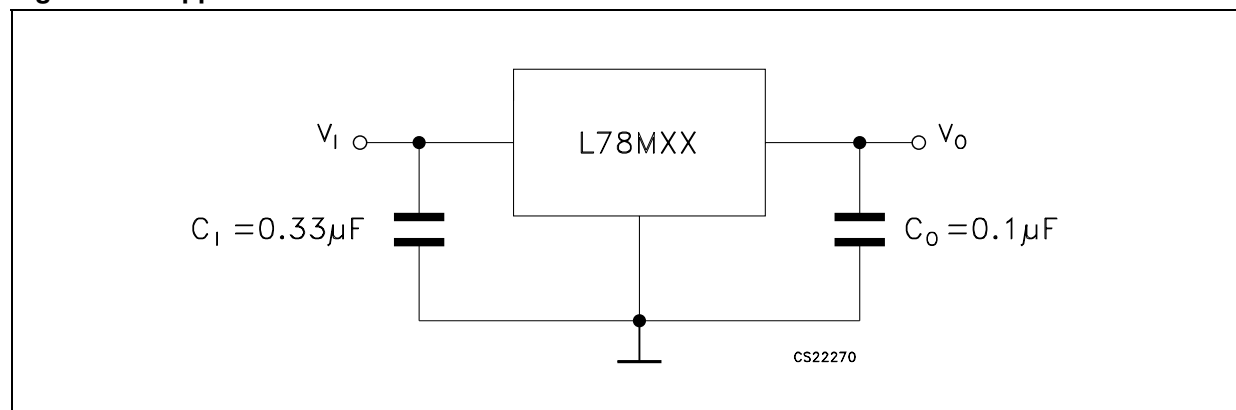
Symbol	Parameter		Value	Unit
V_I	DC input voltage	for $V_O = 5$ to $18V$	35	V
		for $V_O = 20, 24V$	40	
I_O	Output current		Internally limited	mA
P_D	Power dissipation		Internally limited	mW
T_{STG}	Storage temperature range		-65 to 150	°C
T_{OP}	Operating junction temperature range		0 to 150	°C

Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied

Table 3. Thermal data

Symbol	Parameter	TO-220	TO-220FP	DPAK	IPAK	Unit
R_{thJC}	Thermal resistance junction-case	3	5	8		°C/W
R_{thJA}	Thermal resistance junction-ambient	50	60	100		°C/W

Figure 4. Application circuit



4 Test circuits

Figure 5. DC parameter

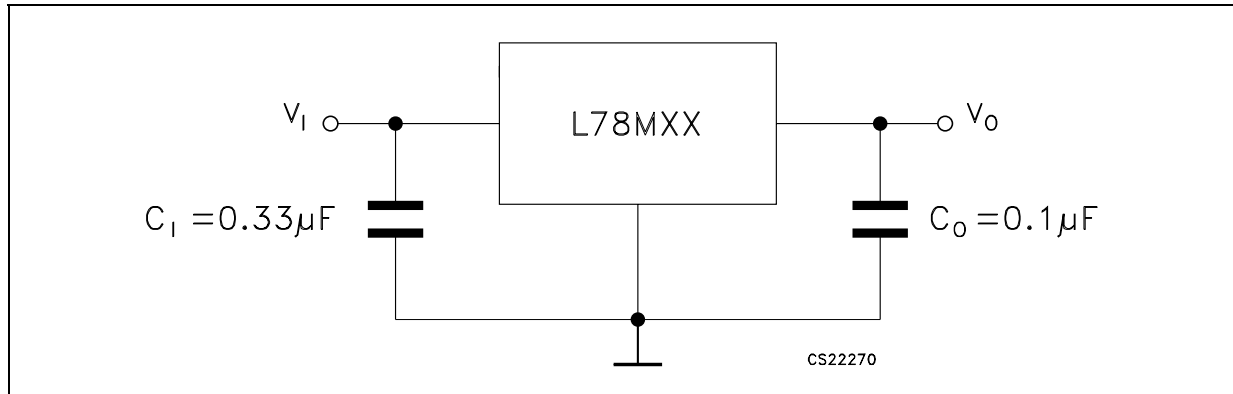


Figure 6. Load regulation

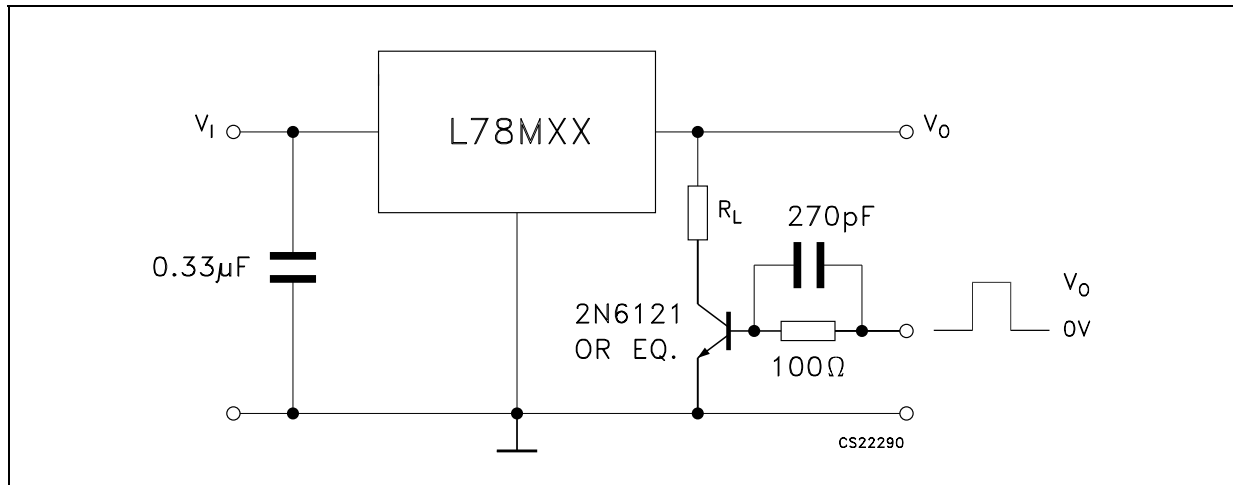
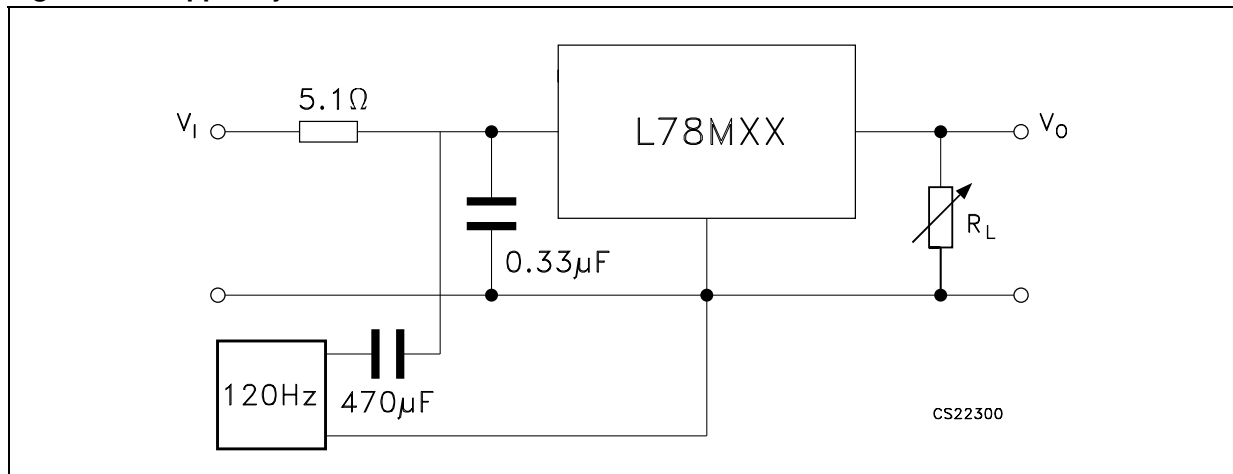


Figure 7. Ripple rejection



5 Electrical characteristics

Table 4. Electrical characteristics of L78M05C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 10\text{ V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage		4.8	5	5.2	V
V_O	Output voltage	$I_O = 5\text{ to }350\text{ mA}$, $V_I = 7\text{ to }20\text{ V}$	4.75	5	5.25	V
ΔV_O	Line regulation	$V_I = 7\text{ to }25\text{ V}$, $I_O = 200\text{ mA}$			100	mV
		$V_I = 8\text{ to }25\text{ V}$, $I_O = 200\text{ mA}$			50	
ΔV_O	Load regulation	$I_O = 5\text{ to }500\text{ mA}$, $T_J = 25^\circ\text{C}$			100	mV
		$I_O = 5\text{ to }200\text{ mA}$, $T_J = 25^\circ\text{C}$			50	
I_d	Quiescent current				6	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$, $V_I = 8\text{ to }25\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$, $T_J = 0\text{ to }125^\circ\text{C}$		-0.5		mV/ $^\circ\text{C}$
SVR	Supply voltage rejection	$V_I = 8\text{ to }18\text{ V}$, $f = 120\text{ Hz}$, $I_O = 300\text{ mA}$	62			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$		40		μV
V_d	Dropout voltage			2		V
I_{sc}	Short circuit current	$V_I = 35\text{ V}$		300		mA

Table 5. Electrical characteristics of L78M06C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 11\text{ V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage		5.75	6	6.25	V
V_O	Output voltage	$I_O = 5\text{ to }350\text{ mA}$, $V_I = 8\text{ to }21\text{ V}$	5.7	6	6.3	V
ΔV_O	Line regulation	$V_I = 8\text{ to }25\text{ V}$, $I_O = 200\text{ mA}$			100	mV
		$V_I = 9\text{ to }25\text{ V}$, $I_O = 200\text{ mA}$			50	
ΔV_O	Load regulation	$I_O = 5\text{ to }500\text{ mA}$, $T_J = 25^\circ\text{C}$			120	mV
		$I_O = 5\text{ to }200\text{ mA}$, $T_J = 25^\circ\text{C}$			60	
I_d	Quiescent current				6	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$, $V_I = 9\text{ to }25\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$, $T_J = 0\text{ to }125^\circ\text{C}$		-0.5		mV/ $^\circ\text{C}$
SVR	Supply voltage rejection	$V_I = 9\text{ to }19\text{ V}$, $f = 120\text{ Hz}$, $I_O = 300\text{ mA}$	59			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$		45		μV
V_d	Dropout voltage			2		V
I_{sc}	Short circuit current	$V_I = 35\text{ V}$		270		mA

Table 6. Electrical characteristics of L78M08C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 14\text{ V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage		7.7	8	8.3	V
V_O	Output voltage	$I_O = 5\text{ to }350\text{ mA}$, $V_I = 10.5\text{ to }23\text{ V}$	7.6	8	8.4	V
ΔV_O	Line regulation	$V_I = 10.5\text{ to }25\text{ V}$, $I_O = 200\text{ mA}$			100	mV
		$V_I = 11\text{ to }25\text{ V}$, $I_O = 200\text{ mA}$			50	
ΔV_O	Load regulation	$I_O = 5\text{ to }500\text{ mA}$, $T_J = 25^\circ\text{C}$			160	mV
		$I_O = 5\text{ to }200\text{ mA}$, $T_J = 25^\circ\text{C}$			80	
I_d	Quiescent current				6	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$, $V_I = 10.5\text{ to }25\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$, $T_J = 0\text{ to }125^\circ\text{C}$		-0.5		mV/ $^\circ\text{C}$
SVR	Supply voltage rejection	$V_I = 11.5\text{ to }21.5\text{ V}$, $f = 120\text{ Hz}$, $I_O = 300\text{ mA}$	56			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$		52		μV
V_d	Dropout voltage			2		V
I_{sc}	Short circuit current	$V_I = 35\text{ V}$		250		mA

Table 7. Electrical characteristics of L78M09C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 15\text{ V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage		8.65	9	9.35	V
V_O	Output voltage	$I_O = 5\text{ to }350\text{ mA}$, $V_I = 11.5\text{ to }24\text{ V}$	8.55	9	9.45	V
ΔV_O	Line regulation	$V_I = 11.5\text{ to }25\text{ V}$, $I_O = 200\text{ mA}$			100	mV
		$V_I = 12\text{ to }25\text{ V}$, $I_O = 200\text{ mA}$			50	
ΔV_O	Load regulation	$I_O = 5\text{ to }500\text{ mA}$, $T_J = 25^\circ\text{C}$			180	mV
		$I_O = 5\text{ to }200\text{ mA}$, $T_J = 25^\circ\text{C}$			90	
I_d	Quiescent current				6	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$, $V_I = 11.5\text{ to }25\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$, $T_J = 0\text{ to }125^\circ\text{C}$		-0.5		mV/ $^\circ\text{C}$
SVR	Supply voltage rejection	$V_I = 12.5\text{ to }23\text{ V}$, $f = 120\text{ Hz}$, $I_O = 300\text{ mA}$	56			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$		58		μV
V_d	Dropout voltage			2		V
I_{sc}	Short circuit current	$V_I = 35\text{ V}$		250		mA

Table 8. Electrical characteristics of L78M12C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 19\text{ V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage		11.5	12	12.5	V
V_O	Output voltage	$I_O = 5\text{ to }350\text{ mA}$, $V_I = 14.5\text{ to }27\text{ V}$	11.4	12	12.6	V
ΔV_O	Line regulation	$V_I = 14.5\text{ to }30\text{ V}$, $I_O = 200\text{ mA}$			100	mV
		$V_I = 16\text{ to }30\text{ V}$, $I_O = 200\text{ mA}$			50	
ΔV_O	Load regulation	$I_O = 5\text{ to }500\text{ mA}$, $T_J = 25^\circ\text{C}$			240	mV
		$I_O = 5\text{ to }200\text{ mA}$, $T_J = 25^\circ\text{C}$			120	
I_d	Quiescent current				6	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$, $V_I = 14.5\text{ to }30\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$, $T_J = 0\text{ to }125^\circ\text{C}$		-1		mV/°C
SVR	Supply voltage rejection	$V_I = 15\text{ to }25\text{ V}$, $f = 120\text{ Hz}$, $I_O = 300\text{ mA}$	55			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$		75		μV
V_d	Dropout voltage			2		V
I_{sc}	Short circuit current	$V_I = 35\text{ V}$		240		mA

Table 9. Electrical characteristics of L78M15C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 23\text{ V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage		14.4	15	15.6	V
V_O	Output voltage	$I_O = 5\text{ to }350\text{ mA}$, $V_I = 17.5\text{ to }30\text{ V}$	14.25	15	15.75	V
ΔV_O	Line regulation	$V_I = 17.5\text{ to }30\text{ V}$, $I_O = 200\text{ mA}$			100	mV
		$V_I = 20\text{ to }30\text{ V}$, $I_O = 200\text{ mA}$			50	
ΔV_O	Load regulation	$I_O = 5\text{ to }500\text{ mA}$, $T_J = 25^\circ\text{C}$			300	mV
		$I_O = 5\text{ to }200\text{ mA}$, $T_J = 25^\circ\text{C}$			150	
I_d	Quiescent current				6	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$, $V_I = 17.5\text{ to }30\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$, $T_J = 0\text{ to }125^\circ\text{C}$		-1		mV/°C
SVR	Supply voltage rejection	$V_I = 18.5\text{ to }28.5\text{ V}$, $f = 120\text{ Hz}$, $I_O = 300\text{ mA}$	54			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$		90		μV
V_d	Dropout voltage			2		V
I_{sc}	Short circuit current	$V_I = 35\text{ V}$		240		mA

Table 10. Electrical characteristics of L78M24C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 23\text{ V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage		23	24	25	V
V_O	Output voltage	$I_O = 5\text{ to }350\text{ mA}$, $V_I = 27\text{ to }38\text{ V}$	22.8	24	25.2	V
ΔV_O	Line regulation	$V_I = 27\text{ to }38\text{ V}$, $I_O = 200\text{ mA}$			100	mV
		$V_I = 28\text{ to }38\text{ V}$, $I_O = 200\text{ mA}$			50	
ΔV_O	Load regulation	$I_O = 5\text{ to }500\text{ mA}$, $T_J = 25^\circ\text{C}$			480	mV
		$I_O = 5\text{ to }200\text{ mA}$, $T_J = 25^\circ\text{C}$			240	
I_d	Quiescent current				6	mA
ΔI_d	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$, $V_I = 27\text{ to }38\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$, $T_J = 0\text{ to }125^\circ\text{C}$		-1.2		mV/ $^\circ\text{C}$
SVR	Supply voltage rejection	$V_I = 28\text{ to }38\text{ V}$, $f = 120\text{ Hz}$, $I_O = 300\text{ mA}$	50			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$		170		μV
V_d	Dropout voltage			2		V
I_{sc}	Short circuit current	$V_I = 35\text{ V}$		240		mA

6 Typical performance

Figure 8. Dropout voltage vs junction temp.

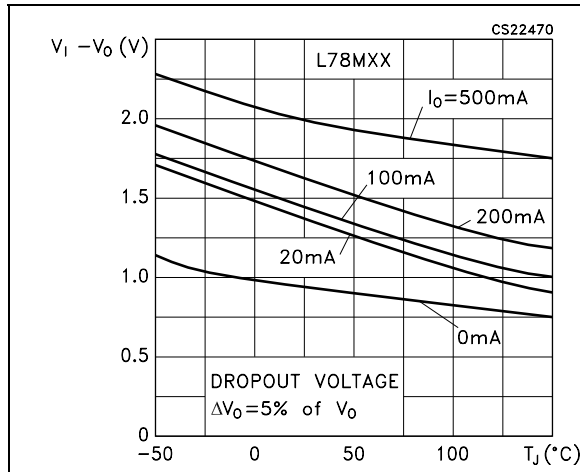


Figure 9. Dropout characteristics

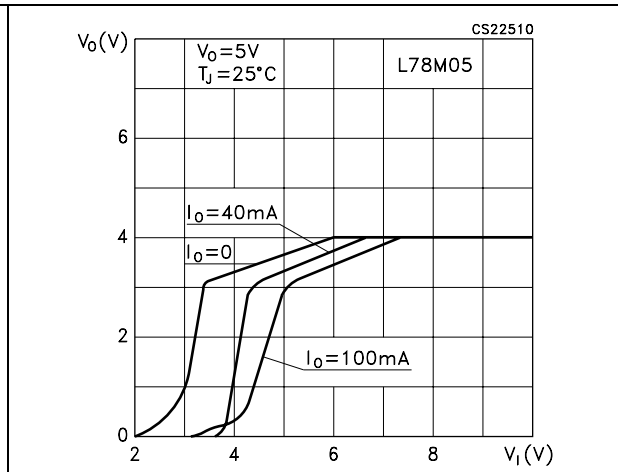


Figure 10. Peak output current vs input-output differential voltage

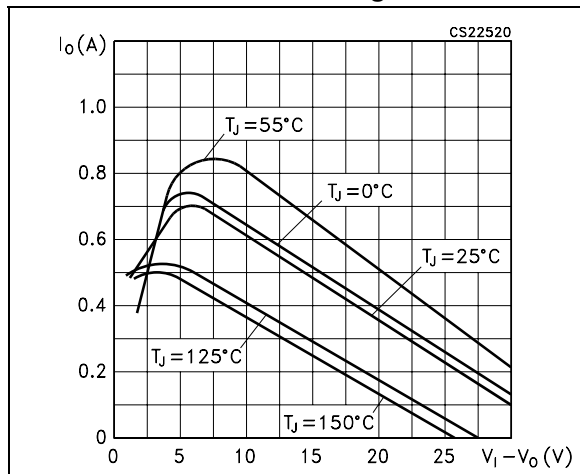


Figure 11. Output voltage vs junction temperature

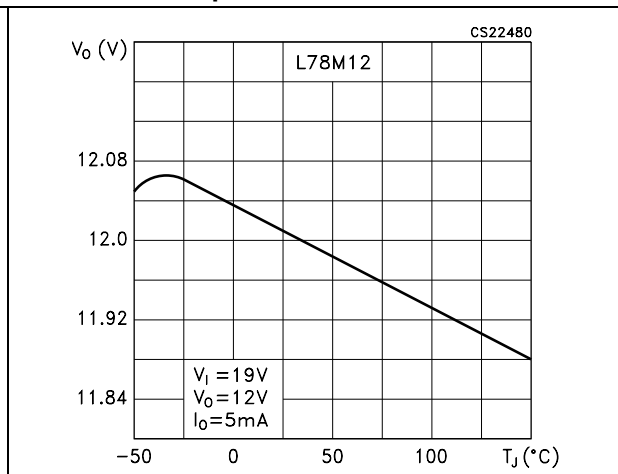


Figure 12. Supply voltage rejection vs freq.

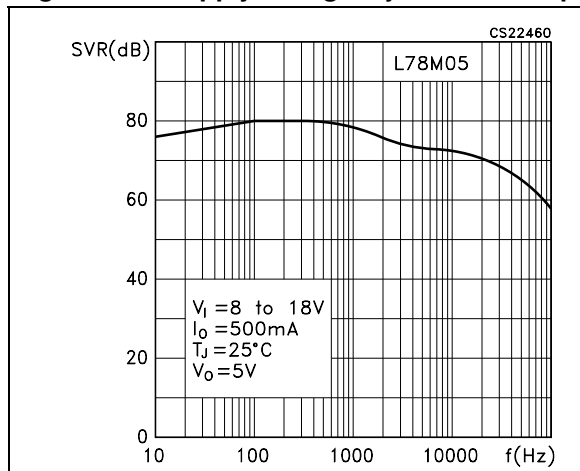


Figure 13. Quiescent current vs junction temp.

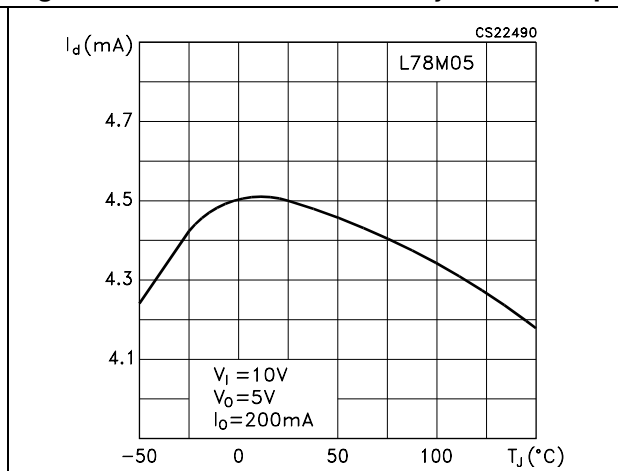


Figure 14. Load transient response

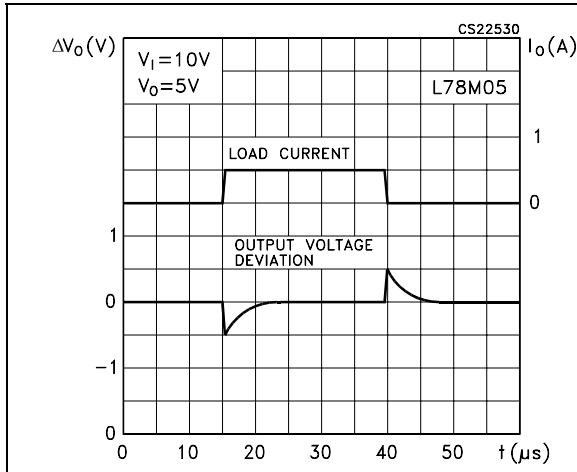


Figure 15. Line transient response

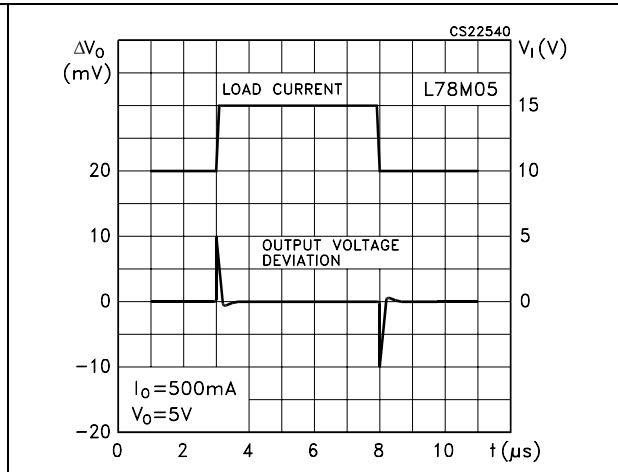


Figure 16. Quiescent current vs input voltage

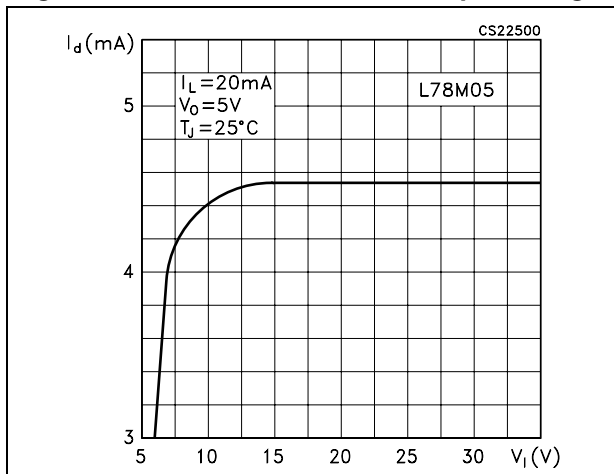
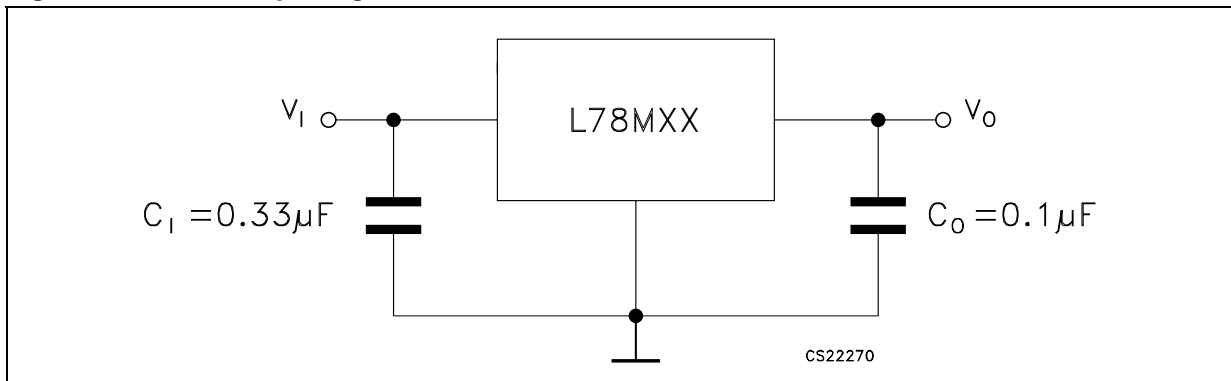


Figure 17. Fixed output regulator



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

Figure 18. Constant current regulator

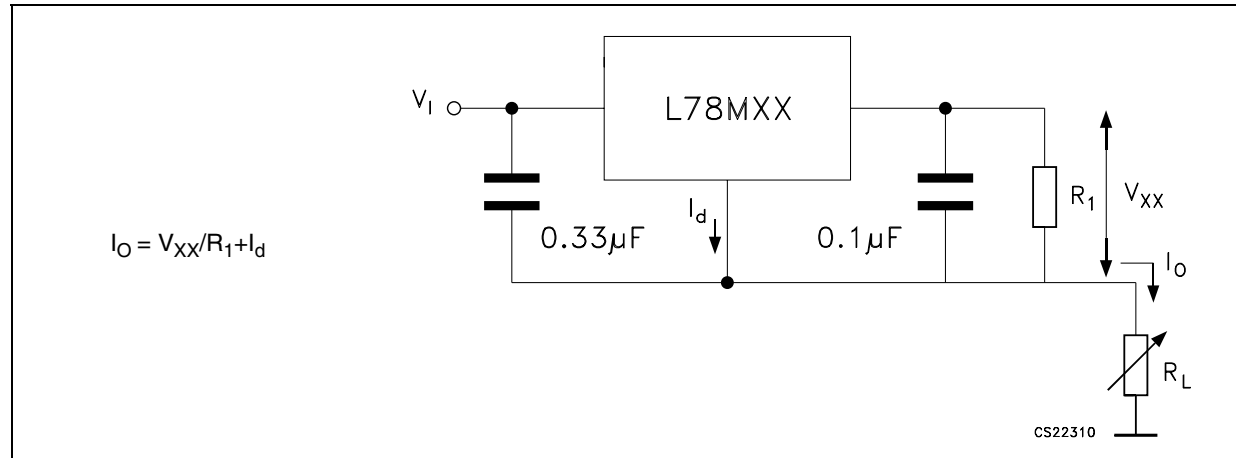


Figure 19. Circuit for increasing output voltage

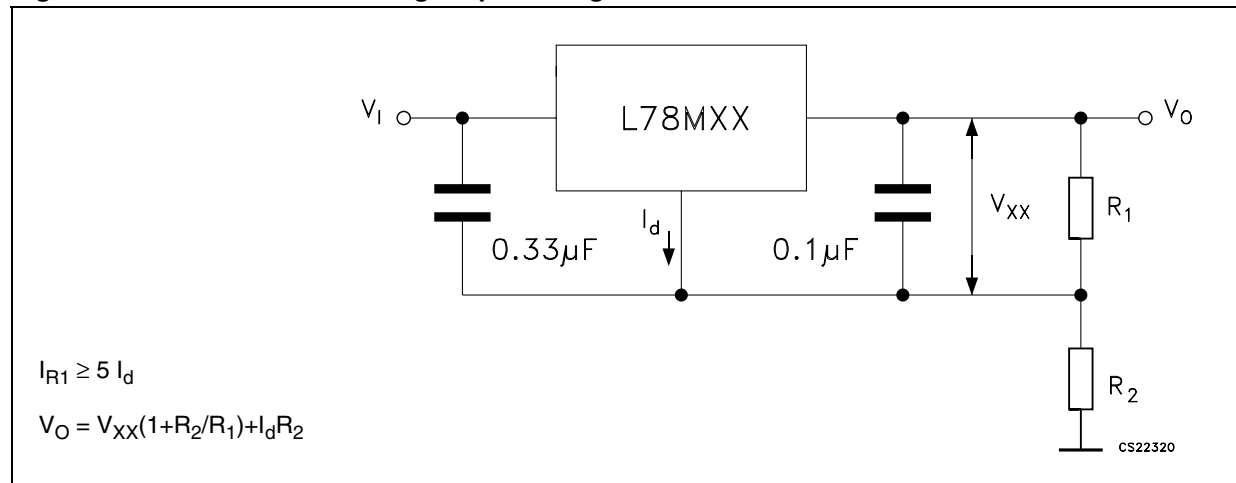


Figure 20. Adjustable output regulator (7 to 30 V)

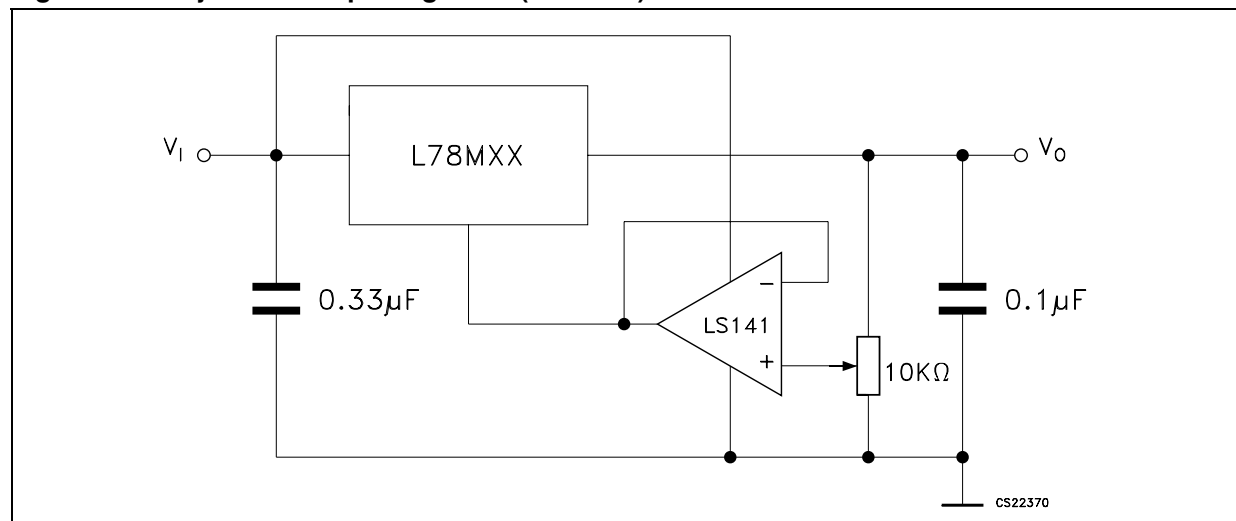


Figure 21. 0.5 to 10 V regulator

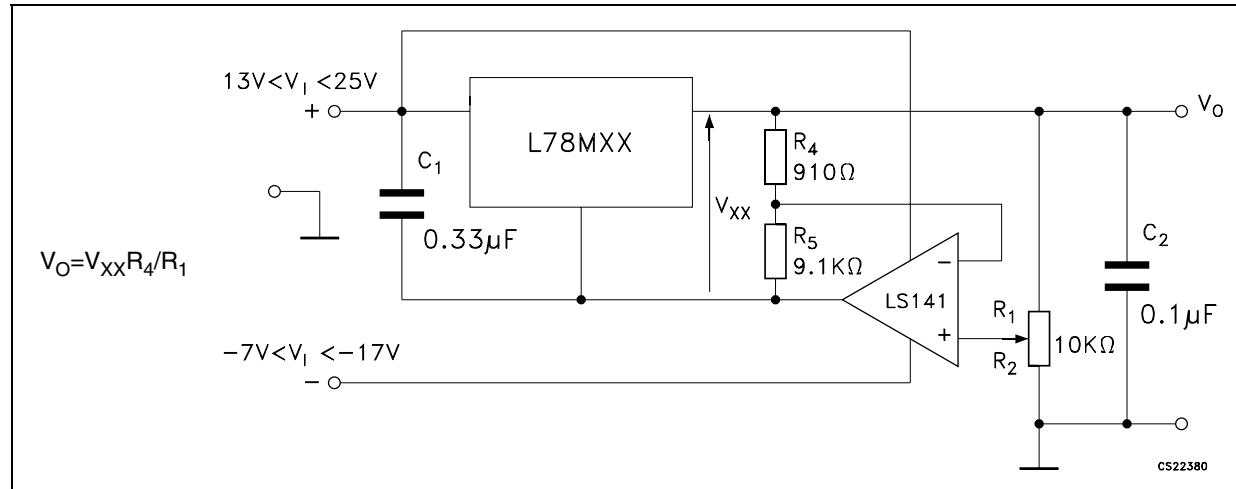


Figure 22. High current voltage regulator

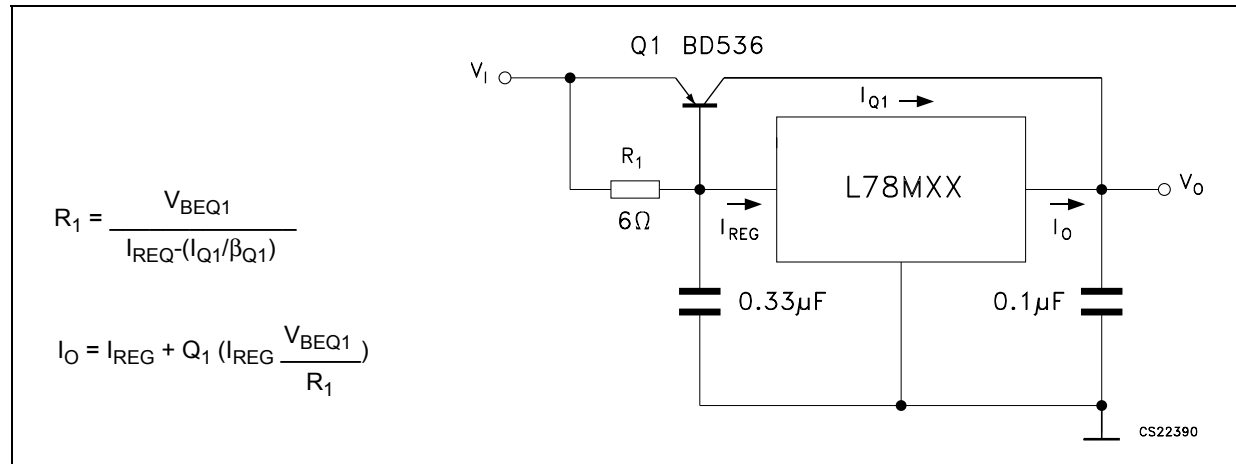
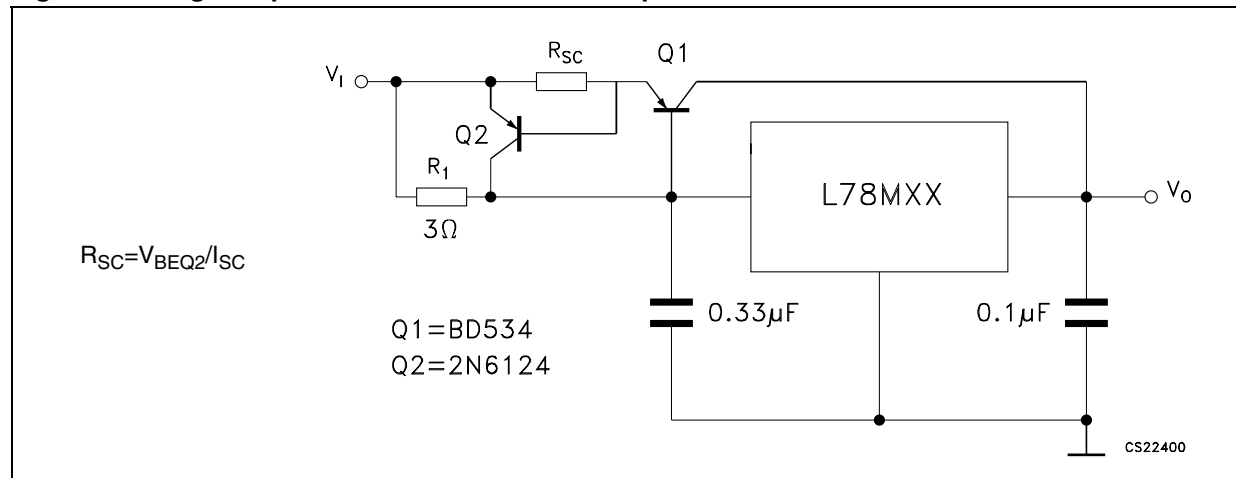


Figure 23. High output current with short circuit protection



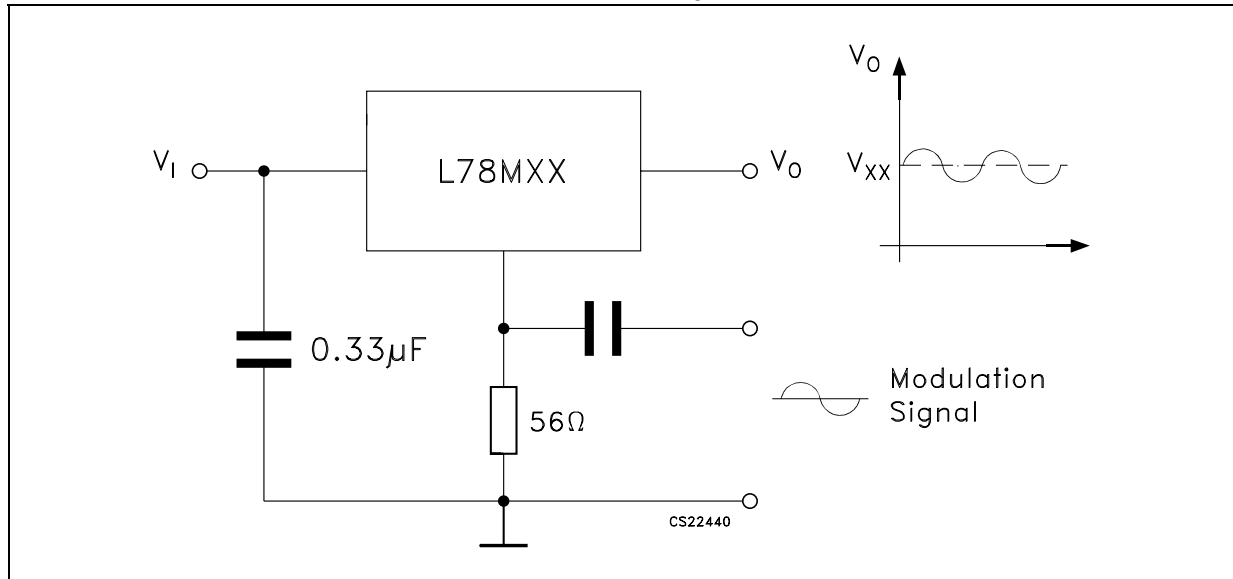
The circuit diagram shows a precision half-wave rectifier. The input V_I is connected to the non-inverting input (+) of the LS141 op-amp. The inverting input (-) of the op-amp is connected to the output V_O . The output V_O is also connected to the anode of the 2N6124 diode. The cathode of the diode is connected to the input V_I . The op-amp is powered by a positive supply V_{CC} and a negative supply V_{EE} . The positive supply V_{CC} is connected to the L78MXX voltage regulator, which is also connected to the non-inverting input (+) of the op-amp. The negative supply V_{EE} is connected to the inverting input (-) of the op-amp. The L78MXX is connected to the input V_I and the output V_O . The output V_O is also connected to the positive supply V_{CC} . The circuit includes two $0.33\mu F$ capacitors, one $0.1\mu F$ capacitor, and two $4.7K\Omega$ resistors. The output V_O is connected to the positive supply V_{CC} and the negative supply V_{EE} . The circuit is labeled CS27430.

The diagram shows a precision centration circuit. An input voltage V_I is connected to the base of an NPN transistor. The emitter of the transistor is connected to ground through a resistor R and a Zener diode V_Z in series. The collector of the transistor is connected to the input of an L78MXX voltage regulator. The output of the regulator is V_O . The input of the regulator is also connected to ground through a $0.33\mu F$ capacitor. The output of the regulator is connected to ground through a $0.1\mu F$ capacitor. The output voltage V_O is the precision centred voltage.

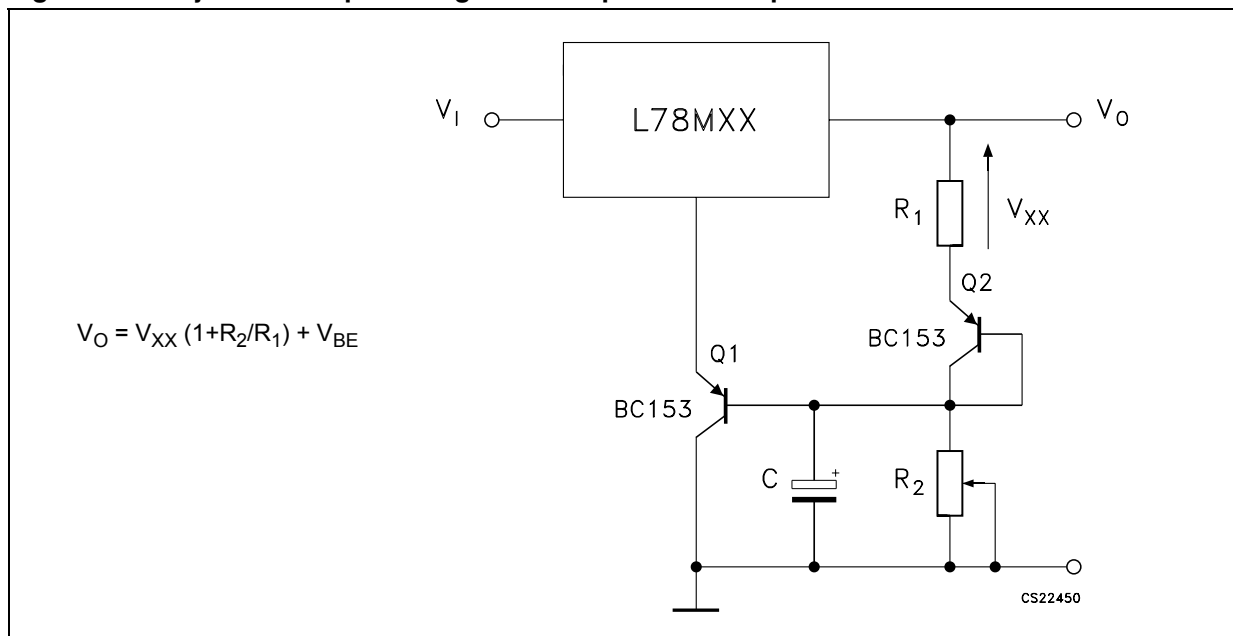
$$V_{IN} = V_I - (V_Z + V_{BE})$$

CS22410

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

Figure 27. Power AM modulator (unity voltage gain, $I_O \leq 0.5$)

Note: The circuit performs well up to 100 kHz.

Figure 28. Adjustable output voltage with temperature compensation

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

7 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.

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

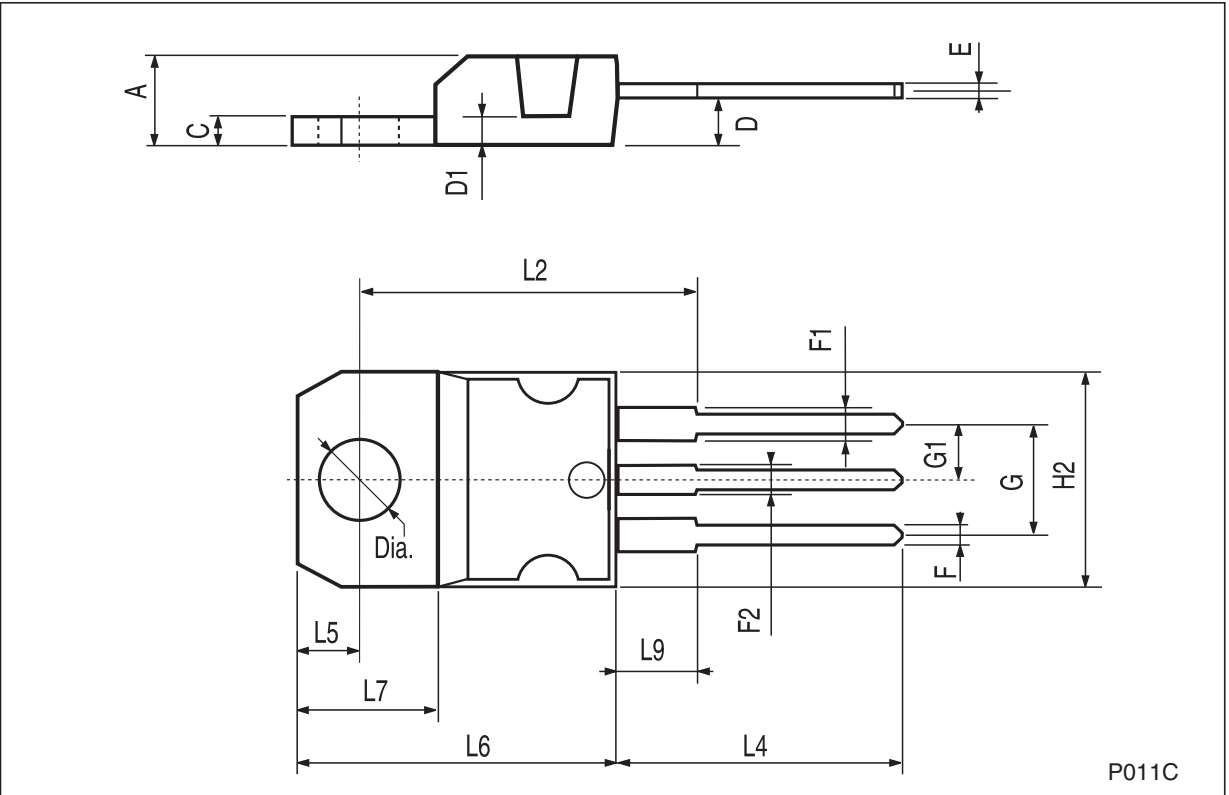


Figure 29. Drawing dimension DPAK (type STD-ST)

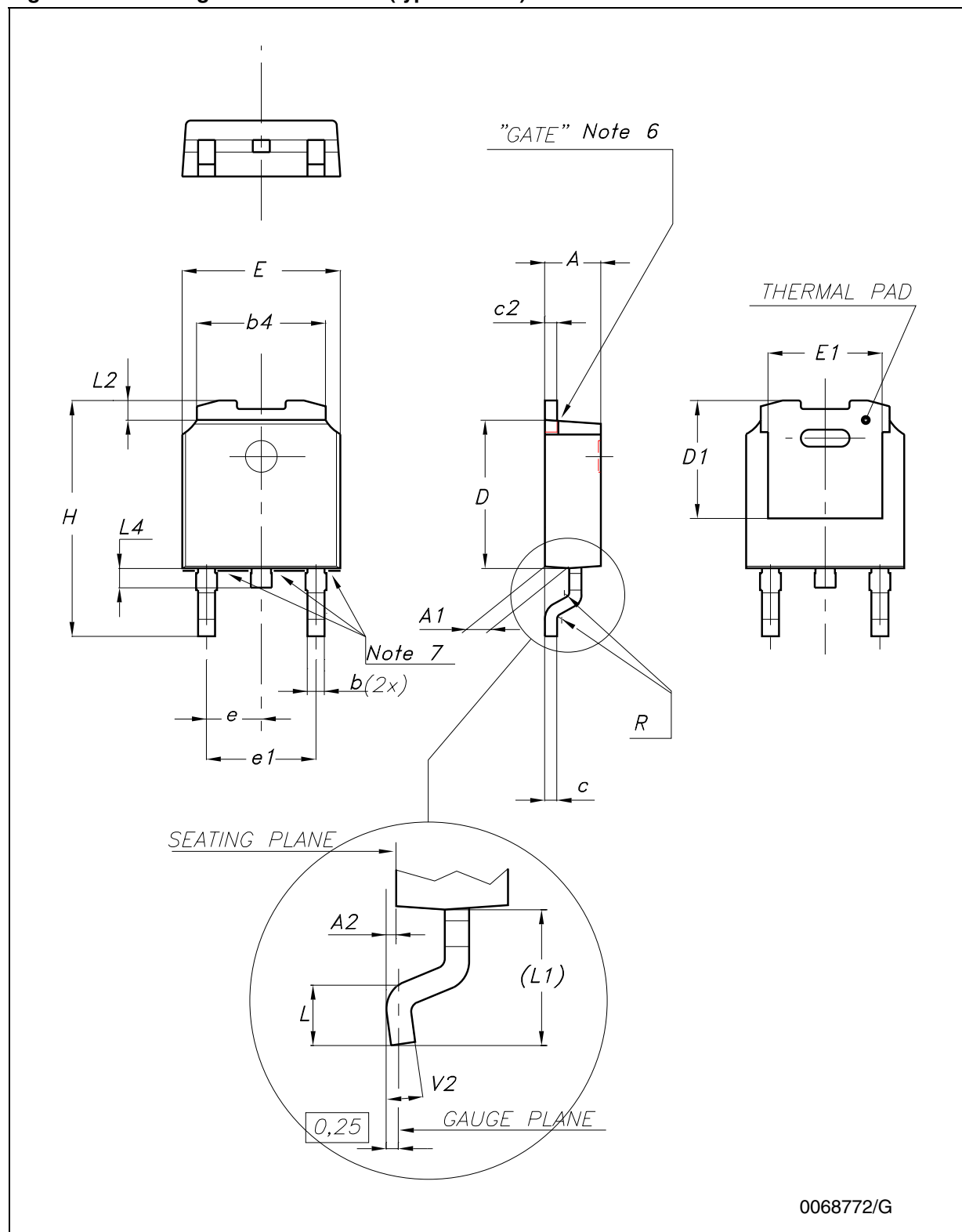


Figure 30. Drawing dimension DPAK (type FUJITSU-subcon.)

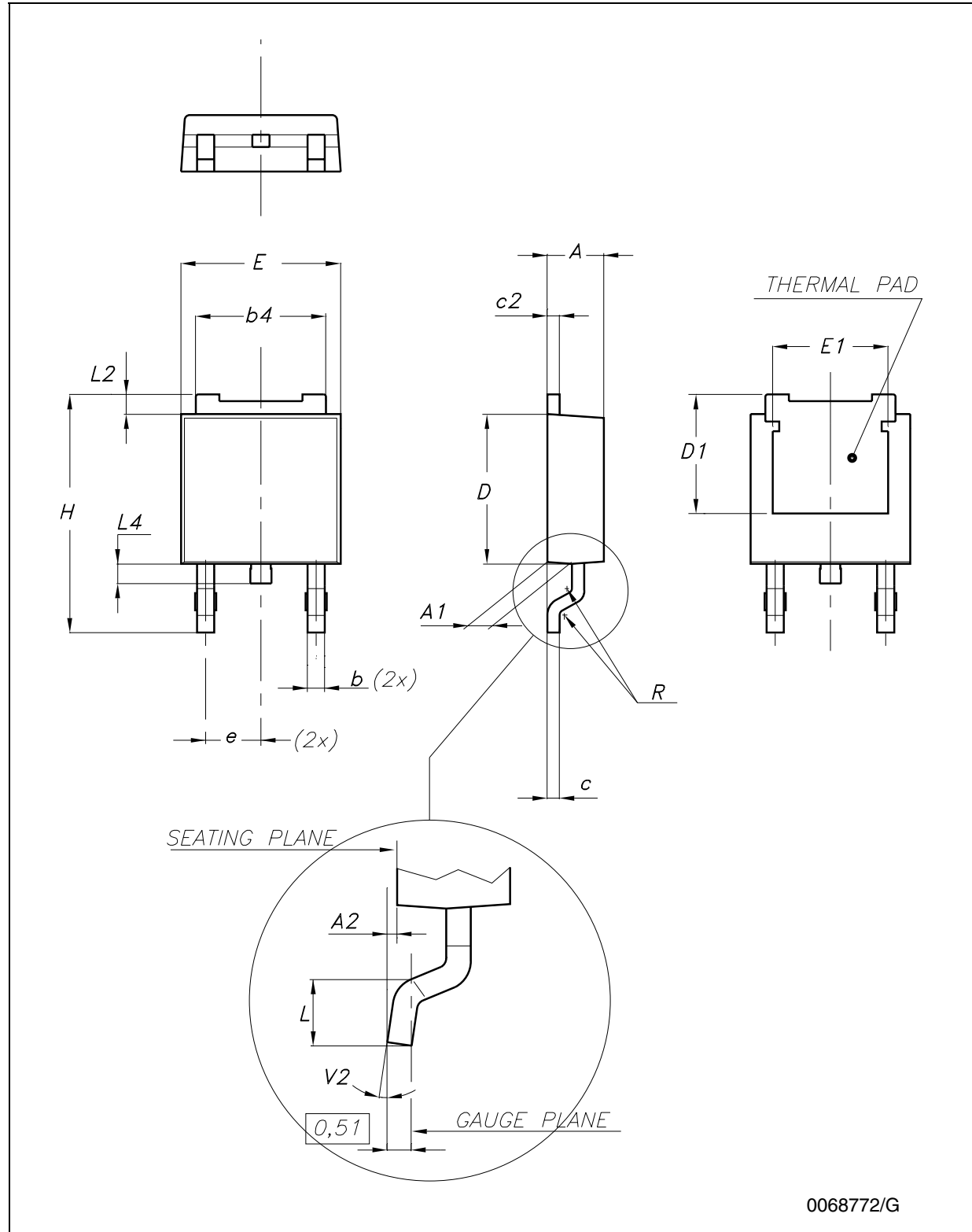


Figure 31. Drawing dimension DPAK (type IDS-subcon.)

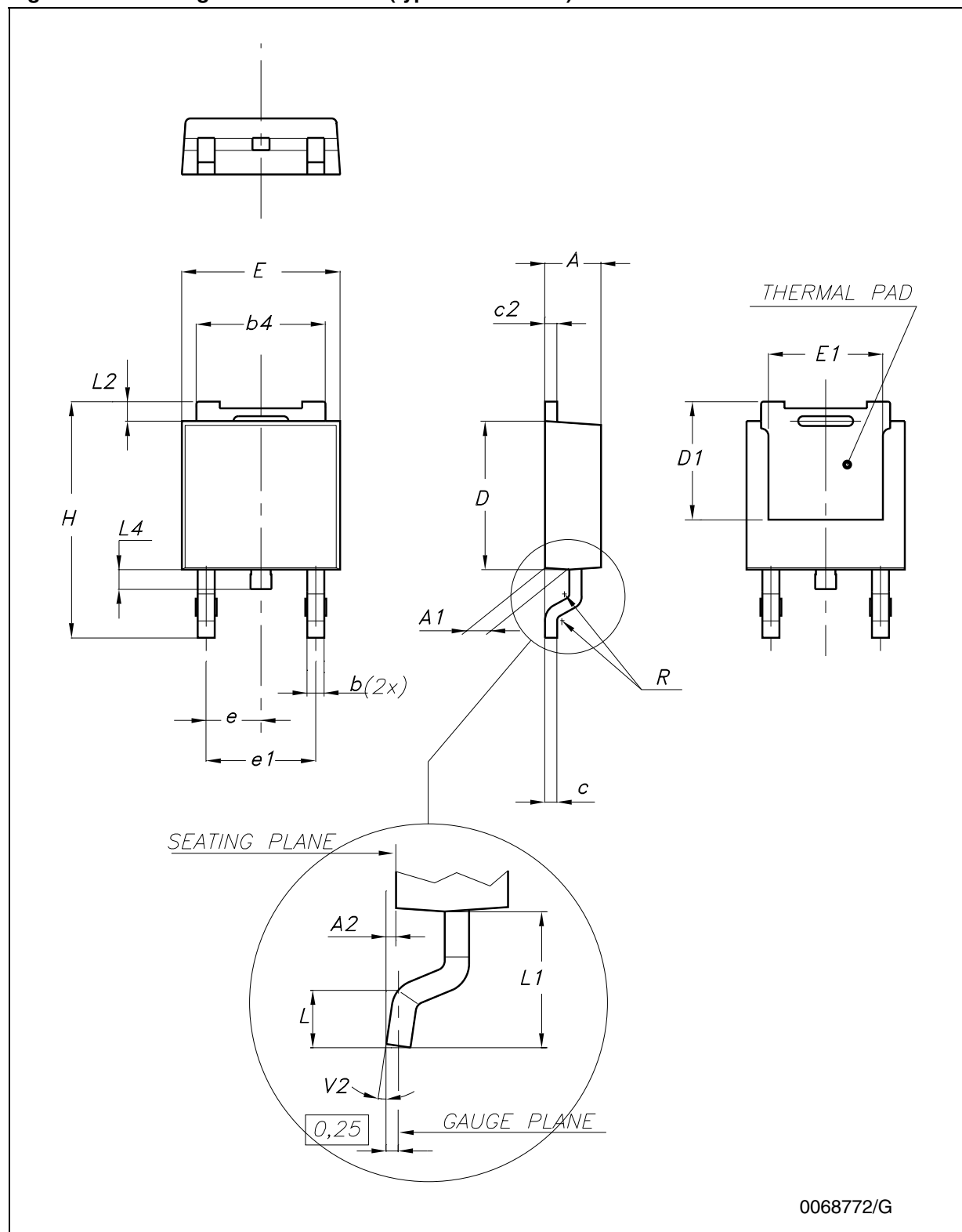


Table 11. DPAK mechanical data

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 32. DPAK footprint recommended data

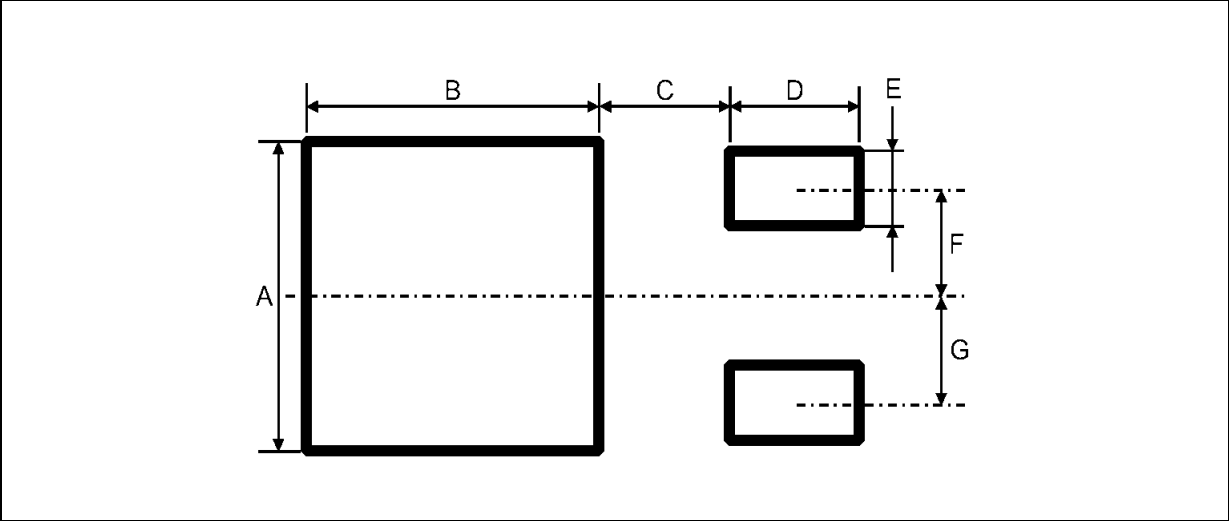
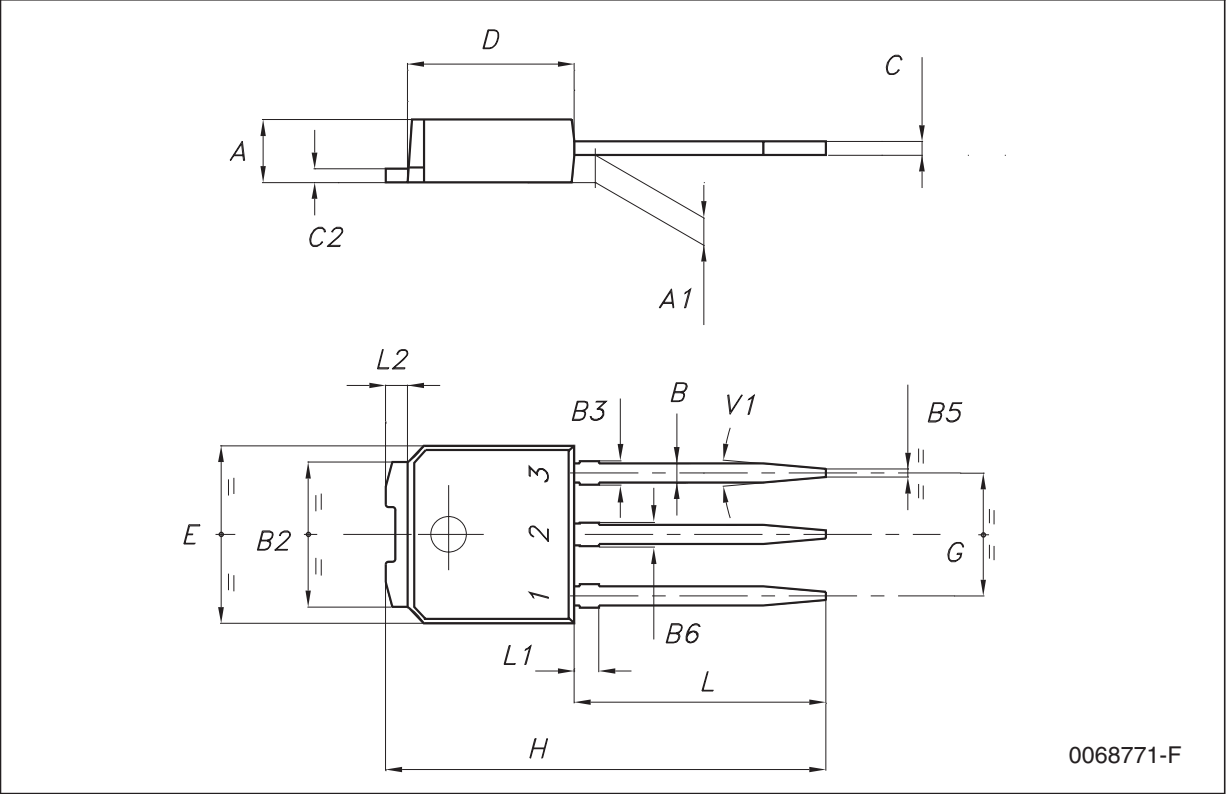


Table 12. Footprint data

Values		
Dim.	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

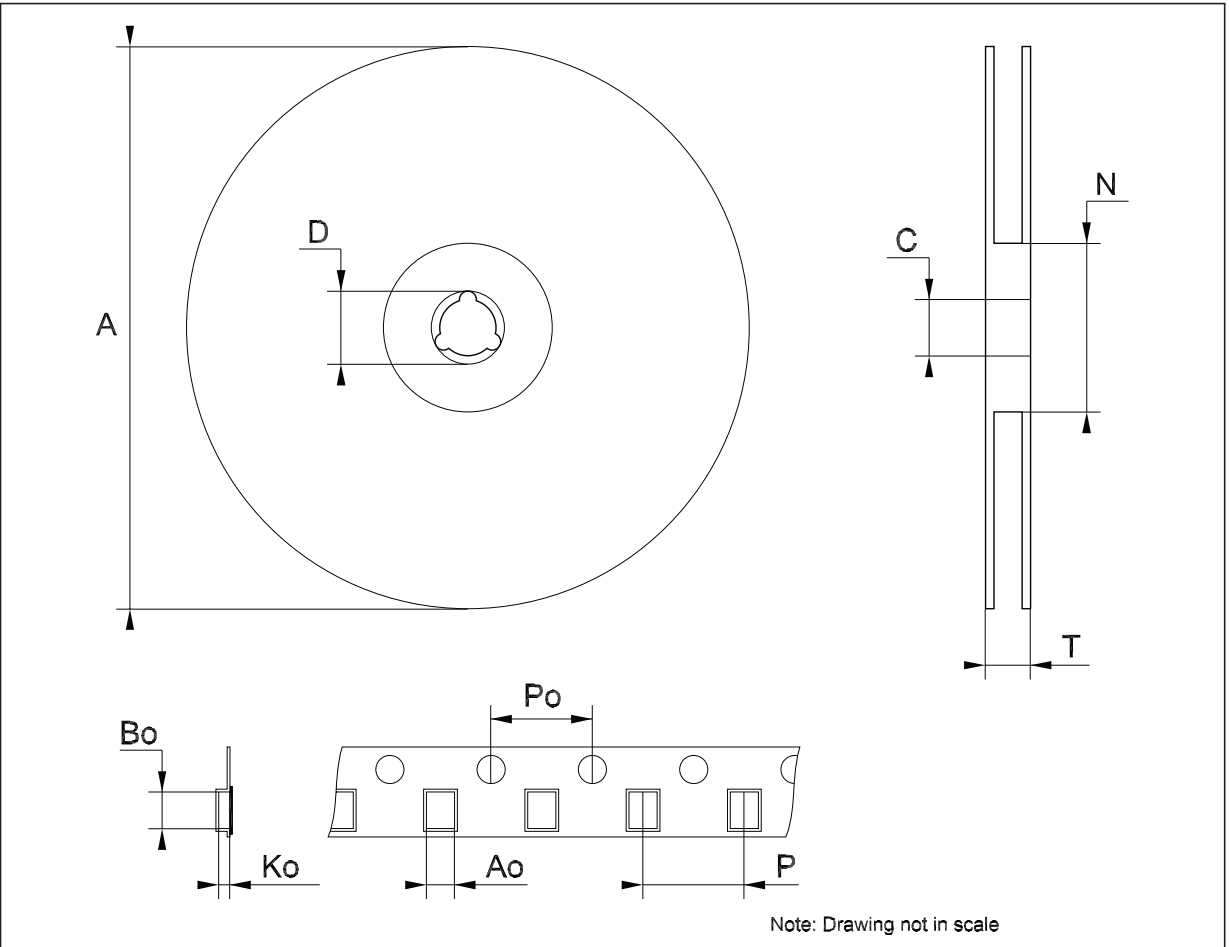
IPAK mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
B3			0.95			0.037
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039



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



8 Order codes

Table 13. Order codes

Packages				
TO-220	TO-220FP	DPAK	IPAK	Output voltage
L78M05CV	L78M05CP	L78M05CDT-TR	L78M05CDT-1	5 V
		L78M06CDT-TR	L78M06CDT-1 ⁽¹⁾	6 V
L78M08CV		L78M08CDT-TR	L78M08CDT-1 ⁽¹⁾	8 V
L78M09CV		L78M09CDT-TR	L78M09CDT-1 ⁽¹⁾	9 V
L78M12CV		L78M12CDT-TR		12 V
L78M15CV		L78M15CDT-TR		15 V
L78M24CV	L78M24CP ⁽¹⁾	L78M24CDT-TR	L78M24CDT-1 ⁽¹⁾	24 V

1. Available on request

9 Revision history

Table 14. Document revision history

Date	Revision	Changes
21-Jun-2004	6	Document updating.
30-Aug-2006	7	Order codes has been updated and new template.
29-Nov-2006	8	DPAK mechanical data has been updated and add footprint data.
06-Jun-2007	9	Order codes has been updated.
10-Dec-2007	10	Added Table 1 .
19-Feb-2008	11	Modified: Table 1 on page 1 .
15-Jul-2008	12	Modified: Table 1 on page 1 and Table 13 on page 27 .

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