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## L78M00AB/AC series

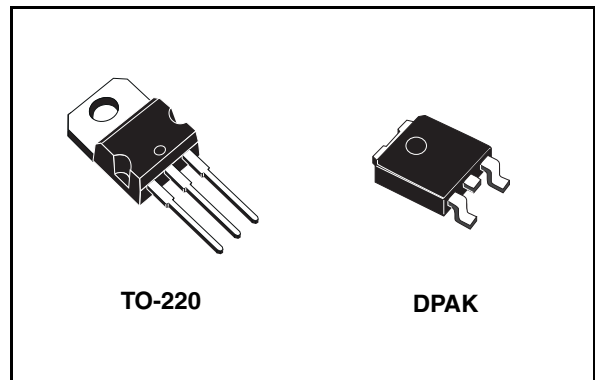
### Precision 500mA regulators

#### Feature summary

- Output current to 0.5A
- Output voltages of 5; 6; 8; 9; 10; 12; 15; 18; 24V
- Thermal overload protection
- Short circuit protection
- Output transition SOA protection
- $\pm 2\%$  Output voltage tolerance
- Guaranteed in extended temperature range

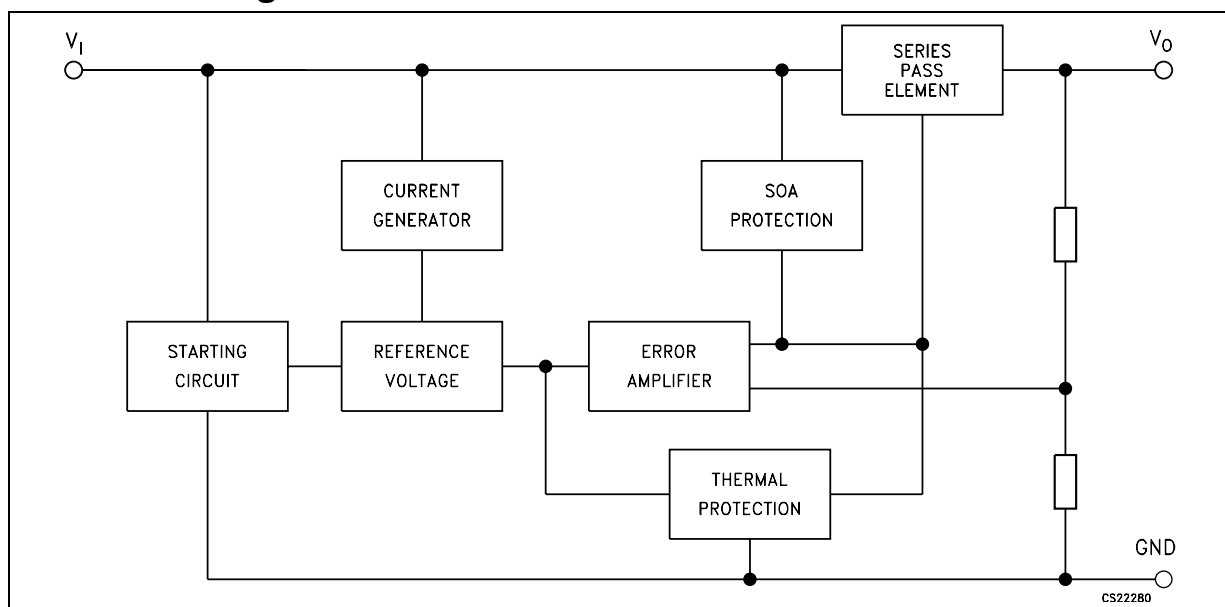
#### Description

The L78M00AB series of three-terminal positive regulators is available in TO-220 and DPAK 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 0.5A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

#### Schematic diagram



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# 1 Pin configuration

Figure 1. Pin connections (top view)

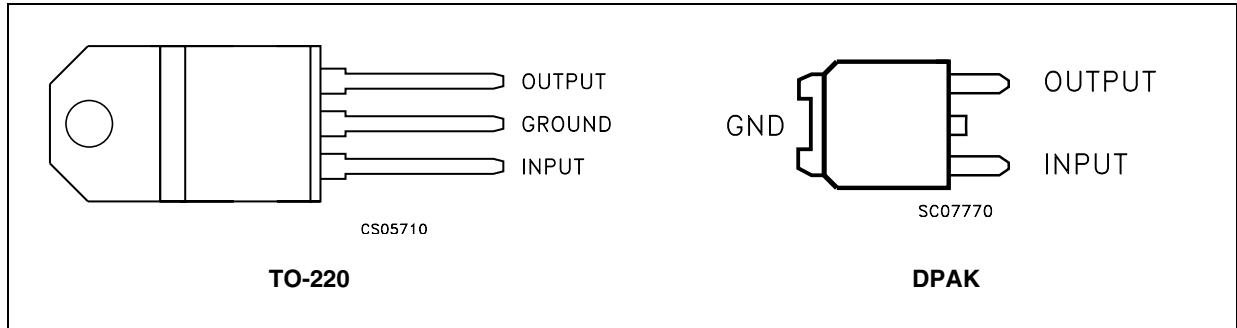
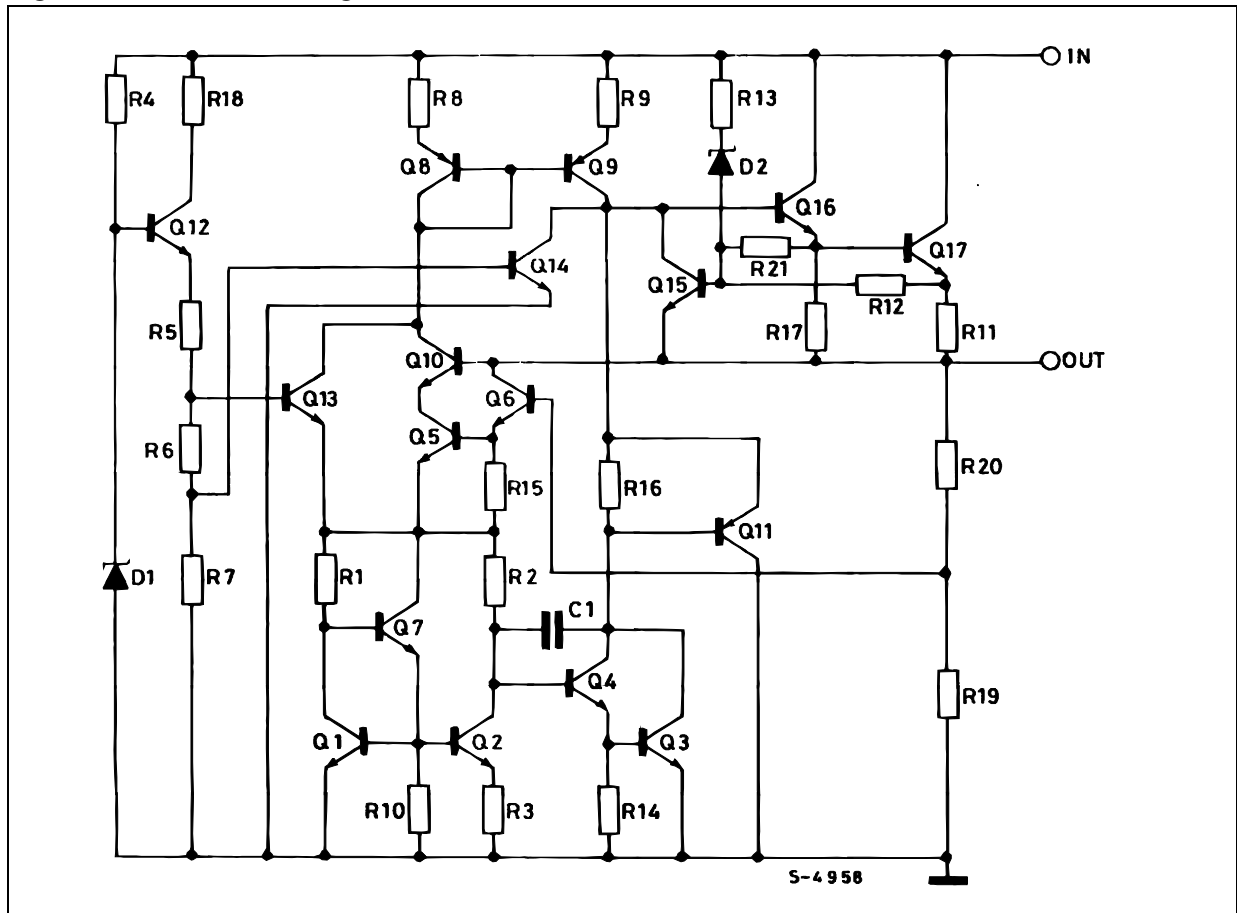


Figure 2. Schematic diagram



## 2 Maximum ratings

**Table 1. Absolute maximum ratings**

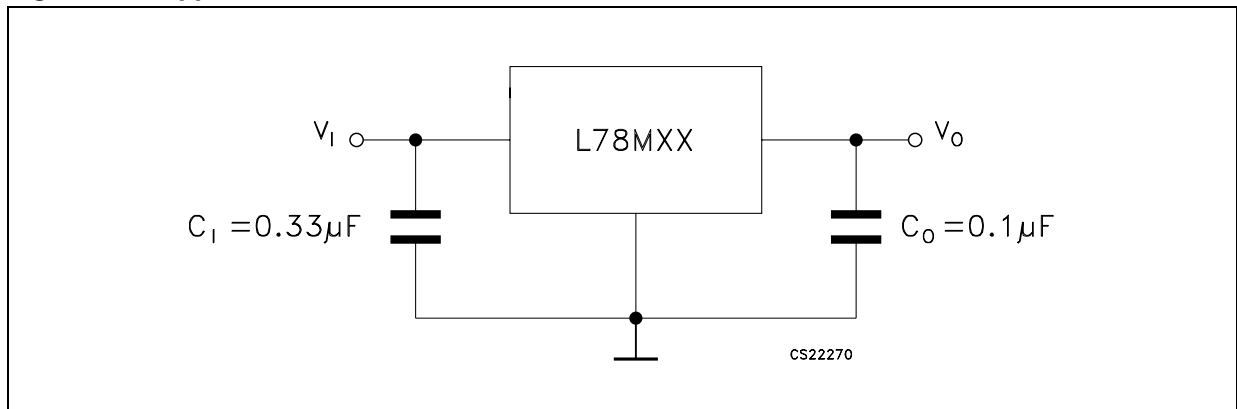
Symbol	Parameter		Value	Unit
$V_I$	DC Input voltage	for $V_O = 5$ to $18V$	35	V
		for $V_O = 20, 24V$	40	
$I_O$	Output current		Internally Limited	mA
$P_D$	Power dissipation		Internally Limited	mW
$T_{STG}$	Storage temperature range		-65 to 150	°C
$T_{OP}$	Operating junction temperature range	for L78M00AC	0 to 125	°C
		for L78M00AB	-40 to 125	

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

**Table 2. Thermal data**

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

**Figure 3. Application circuits**



### 3 Test circuits

Figure 4. DC Parameter

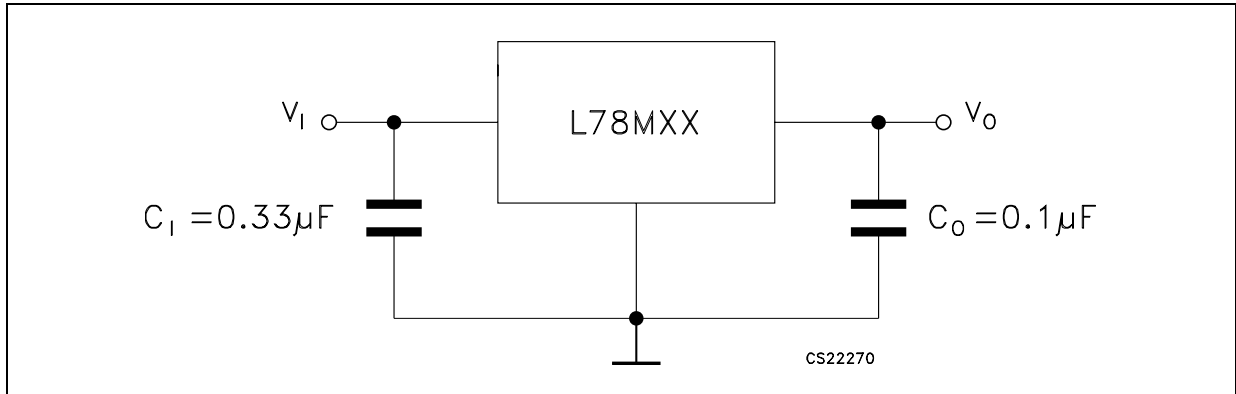


Figure 5. Load regulation

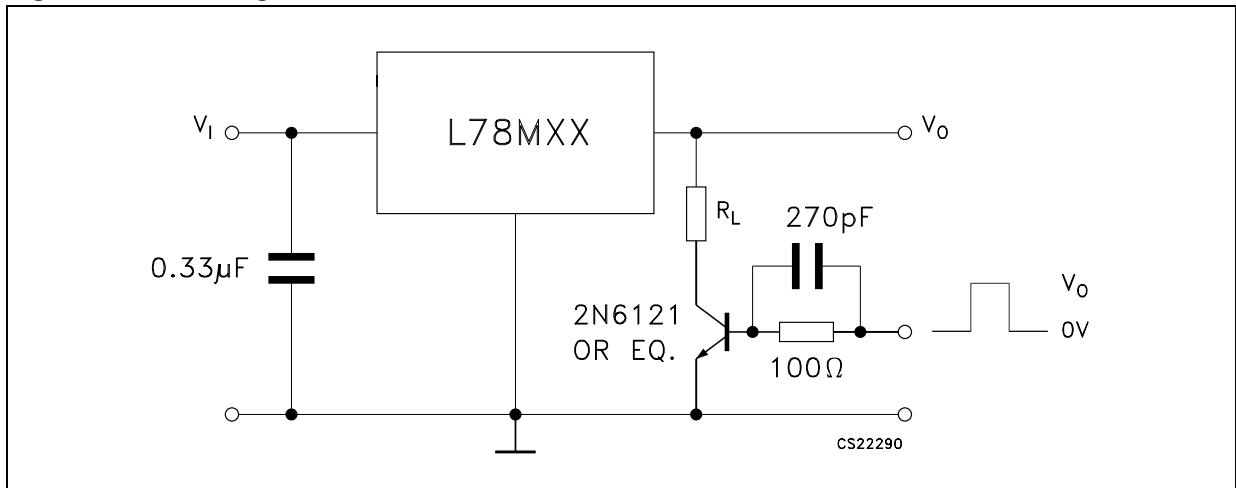
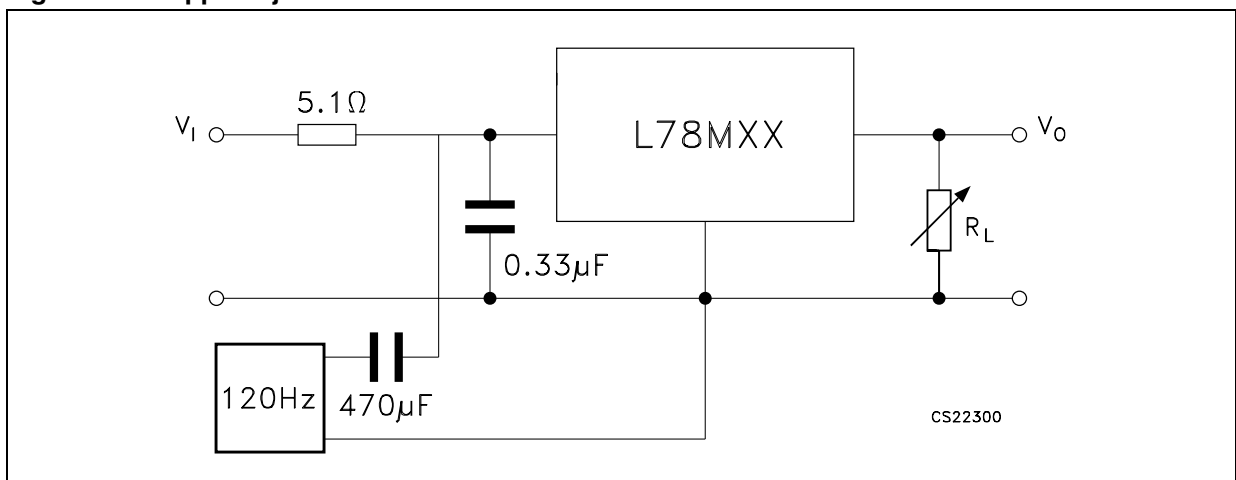


Figure 6. Ripple rejection



## 4 Electrical characteristics

**Table 3. Electrical characteristics of L78M05XX** (refer to the test circuits,  $V_I = 10V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	4.9	5	5.1	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 7\text{ to }20\text{ V}$	4.8	5	5.2	V
$\Delta V_O$	Line regulation	$V_I = 7\text{ to }25\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 8\text{ to }25\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			50	
$\Delta V_O$	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	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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	$I_O = 5\text{ mA}$		-0.5		mV/ $^\circ\text{C}$
SVR	Supply voltage rejection	$V_I = 8\text{ to }18\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	62			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ KHz}$ , $T_J = 25^\circ\text{C}$		40		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$T_J = 25^\circ\text{C}$ , $V_I = 35\text{ V}$		300		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA

**Table 4. Electrical characteristics of L78M06XX** (refer to the test circuits,  $V_I = 11V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	5.88	6	6.12	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 8\text{ to }21\text{ V}$	5.75	6	6.3	V
$\Delta V_O$	Line regulation	$V_I = 8\text{ to }25\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 9\text{ to }25\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	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	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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	$I_O = 5\text{ mA}$		-0.5		mV/°C
SVR	Supply voltage rejection	$V_I = 9\text{ to }19\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	59			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$		45		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$T_J = 25^\circ\text{C}$ , $V_I = 35\text{ V}$		270		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA



**Table 5. Electrical characteristics of L78M08XX** (refer to the test circuits,  $V_I = 14V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	7.84	8	8.16	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 10.5\text{ to }23\text{ V}$	7.7	8	8.3	V
$\Delta V_O$	Line regulation	$V_I = 10.5\text{ to }25\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 11\text{ to }25\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	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	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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	$I_O = 5\text{ mA}$		-0.5		mV/°C
SVR	Supply voltage rejection	$V_I = 11.5\text{ to }21.5\text{ V}$ , $f = 120\text{ Hz}$ $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	56			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ KHz}$ , $T_J = 25^\circ\text{C}$		52		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$T_J = 25^\circ\text{C}$ , $V_I = 35\text{ V}$		250		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA

**Table 6. Electrical characteristics of L78M09XX** (refer to the test circuits,  $V_I = 15V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	8.82	9	9.18	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 11.5\text{ to }24\text{ V}$	8.64	9	9.36	V
$\Delta V_O$	Line regulation	$V_I = 11.5\text{ to }25\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 12\text{ to }25\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	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	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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	$I_O = 5\text{ mA}$		-0.5		mV/°C
SVR	Supply voltage rejection	$V_I = 12.5\text{ to }23\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	56			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ KHz}$ , $T_J = 25^\circ\text{C}$		52		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$V_I = 35\text{ V}$ , $T_J = 25^\circ\text{C}$		250		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA

**Table 7. Electrical characteristics of L78M10XX** (refer to the test circuits,  $V_I = 16V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	9.8	10	10.2	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 12.5\text{ to }25\text{ V}$	9.6	10	10.4	V
$\Delta V_O$	Line regulation	$V_I = 12.5\text{ to }30\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 13\text{ to }30\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	Load regulation	$I_O = 5\text{ to }500\text{ mA}$ , $T_J = 25^\circ\text{C}$			200	mV
		$I_O = 5\text{ to }200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	
$I_d$	Quiescent current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$ , $V_I = 12.5\text{ to }30\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$		-0.5		mV/°C
SVR	Supply voltage rejection	$V_I = 13.5\text{ to }24\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	56			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ KHz}$ , $T_J = 25^\circ\text{C}$		64		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$V_I = 35\text{ V}$ , $T_J = 25^\circ\text{C}$		245		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA

**Table 8. Electrical characteristics of L78M12XX** (refer to the test circuits,  $V_I = 19V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	11.75	12	12.25	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 14.5\text{ to }27\text{ V}$	11.5	12	12.5	V
$\Delta V_O$	Line regulation	$V_I = 14.5\text{ to }30\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 16\text{ to }30\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	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	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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	$I_O = 5\text{ mA}$		-1		mV/°C
SVR	Supply voltage rejection	$V_I = 15\text{ to }25\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	55			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ KHz}$ , $T_J = 25^\circ\text{C}$		75		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$V_I = 35\text{ V}$ , $T_J = 25^\circ\text{C}$		240		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA

**Table 9. Electrical characteristics of L78M15XX** (refer to the test circuits,  $V_I = 23V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	14.7	15	15.3	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 17.5\text{ to }30\text{ V}$	14.4	15	15.6	V
$\Delta V_O$	Line regulation	$V_I = 17.5\text{ to }30\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 20\text{ to }30\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	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	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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	$I_O = 5\text{ mA}$		-1		mV/°C
SVR	Supply voltage rejection	$V_I = 18.5\text{ to }28.5\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	54			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ KHz}$ , $T_J = 25^\circ\text{C}$		90		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$V_I = 35\text{ V}$ , $T_J = 25^\circ\text{C}$		240		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA

**Table 10. Electrical characteristics of L78M18XX** (refer to the test circuits,  $V_I = 26V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	17.64	18	18.36	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 20.5\text{ to }33\text{ V}$	17.3	18	18.7	V
$\Delta V_O$	Line regulation	$V_I = 21\text{ to }33\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 24\text{ to }33\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	Load regulation	$I_O = 5\text{ to }500\text{ mA}$ , $T_J = 25^\circ\text{C}$			360	mV
		$I_O = 5\text{ to }200\text{ mA}$ , $T_J = 25^\circ\text{C}$			180	
$I_d$	Quiescent current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$ , $V_I = 21\text{ to }33\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$		-1.1		mV/°C
SVR	Supply voltage rejection	$V_I = 22\text{ to }32\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	53			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$ , $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$V_I = 35\text{ V}$ , $T_J = 25^\circ\text{C}$		240		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA

**Table 11. Electrical characteristics of L78M20XX** (refer to the test circuits,  $V_I = 29V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	19.6	20	20.4	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 23\text{ to }35\text{ V}$	19.2	20	20.8	V
$\Delta V_O$	Line regulation	$V_I = 23\text{ to }35\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 24\text{ to }35\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	Load regulation	$I_O = 5\text{ to }500\text{ mA}$ , $T_J = 25^\circ\text{C}$			400	mV
		$I_O = 5\text{ to }200\text{ mA}$ , $T_J = 25^\circ\text{C}$			200	
$I_d$	Quiescent current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent current change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$ , $V_I = 23\text{ to }35\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output voltage drift	$I_O = 5\text{ mA}$		-1.1		mV/°C
SVR	Supply voltage rejection	$V_I = 24\text{ to }34\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	53			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$ , $T_J = 25^\circ\text{C}$		110		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$V_I = 35\text{ V}$ , $T_J = 25^\circ\text{C}$		240		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA

**Table 12. Electrical characteristics of L78M24XX** (refer to the test circuits,  $V_I = 33V$ ,  $I_O = 350\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$ ,  $T_J = -40\text{ to }125^\circ\text{C}$  (AB),  $T_J = 0\text{ to }125^\circ\text{C}$  (AC) unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_O$	Output voltage	$T_J = 25^\circ\text{C}$	23.5	24	24.5	V
$V_O$	Output voltage	$I_O = 5\text{ to }350\text{ mA}$ , $V_I = 27\text{ to }38\text{ V}$	23	24	25	V
$\Delta V_O$	Line regulation	$V_I = 27\text{ to }38\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			100	mV
		$V_I = 28\text{ to }38\text{ V}$ , $I_O = 200\text{ mA}$ , $T_J = 25^\circ\text{C}$			30	
$\Delta V_O$	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	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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	$I_O = 5\text{ mA}$		-1.2		mV/ $^\circ\text{C}$
SVR	Supply voltage rejection	$V_I = 28\text{ to }38\text{ V}$ , $f = 120\text{ Hz}$ , $I_O = 300\text{ mA}$ , $T_J = 25^\circ\text{C}$	50			dB
eN	Output noise voltage	$B = 10\text{ Hz to }100\text{ kHz}$ , $T_J = 25^\circ\text{C}$		170		$\mu\text{V}$
$V_d$	Dropout voltage	$T_J = 25^\circ\text{C}$		2		V
$I_{sc}$	Short circuit current	$V_I = 35\text{ V}$ , $T_J = 25^\circ\text{C}$		240		mA
$I_{scp}$	Short circuit peak current	$T_J = 25^\circ\text{C}$		700		mA



# 5 Typical performance

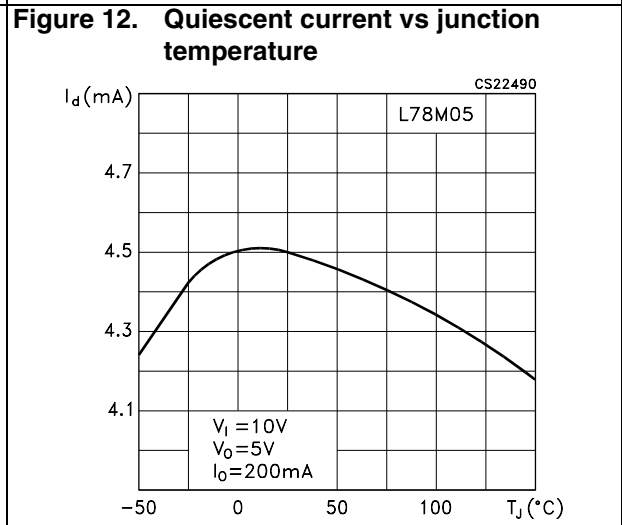
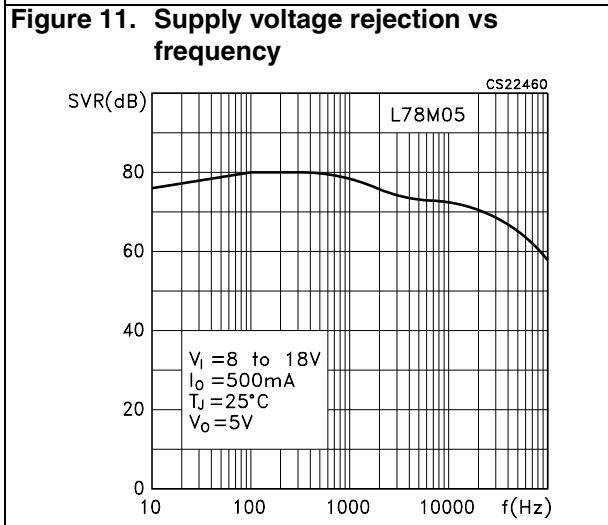
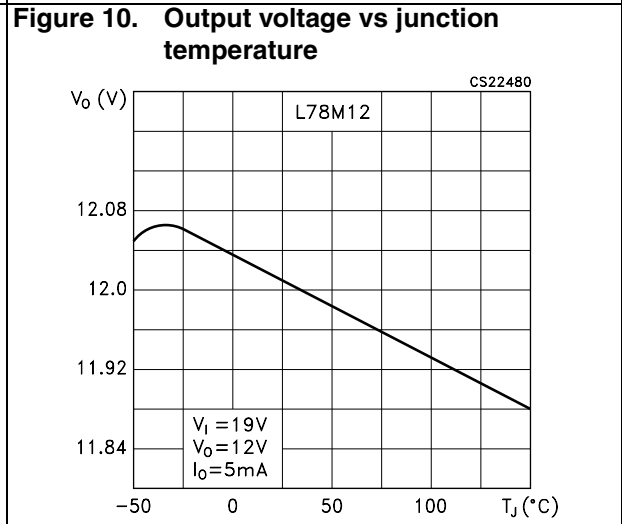
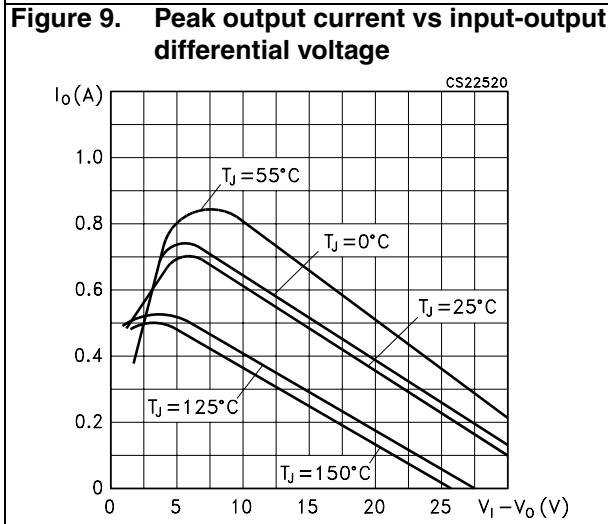
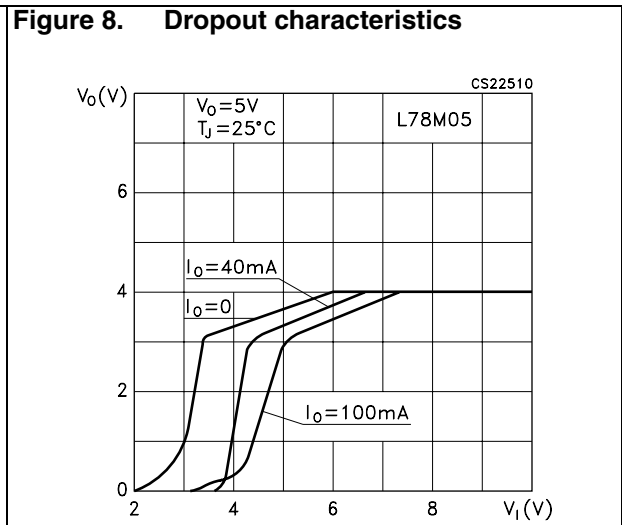
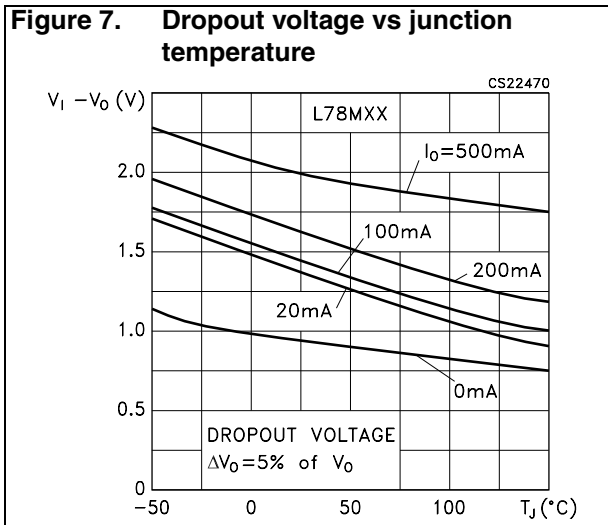


Figure 13. Load transient response

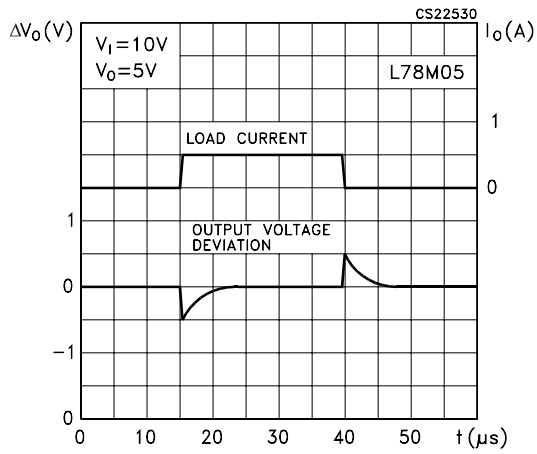


Figure 14. Line transient response

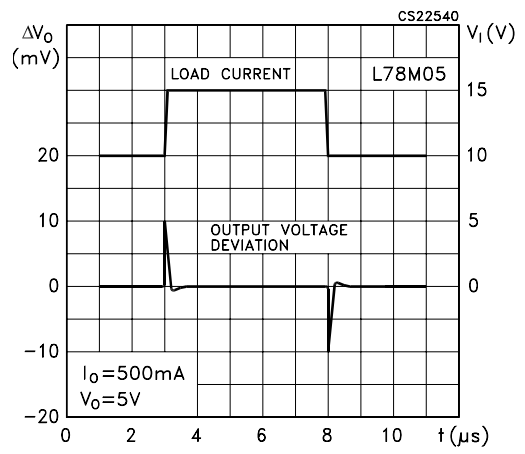
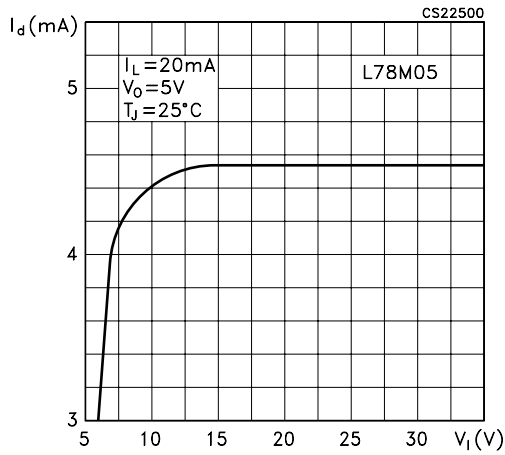


Figure 15. Quiescent current vs input voltage



## 6 Applications information

### 6.1 Design considerations

The L78M00AB Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short-Circuit Protection that limits the maximum current the circuit will pass, and Output Transistor Safe-Area Compensation that reduces the output short-circuit as the voltage across the pass transistor is increased. In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high-frequency characteristics to insure stable operation under all load conditions. A 0.33µF or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulators input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

Figure 16. Current regulator

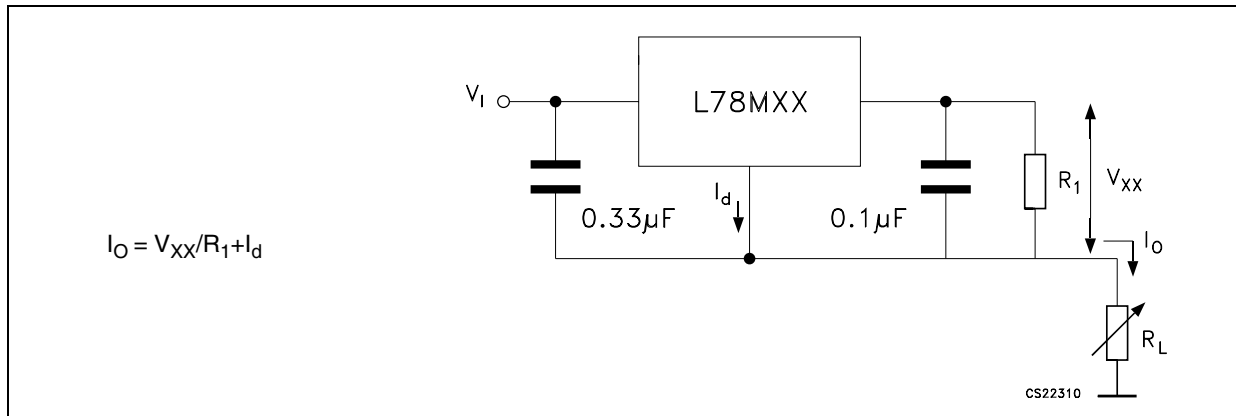


Figure 17. Adjustable output regulator

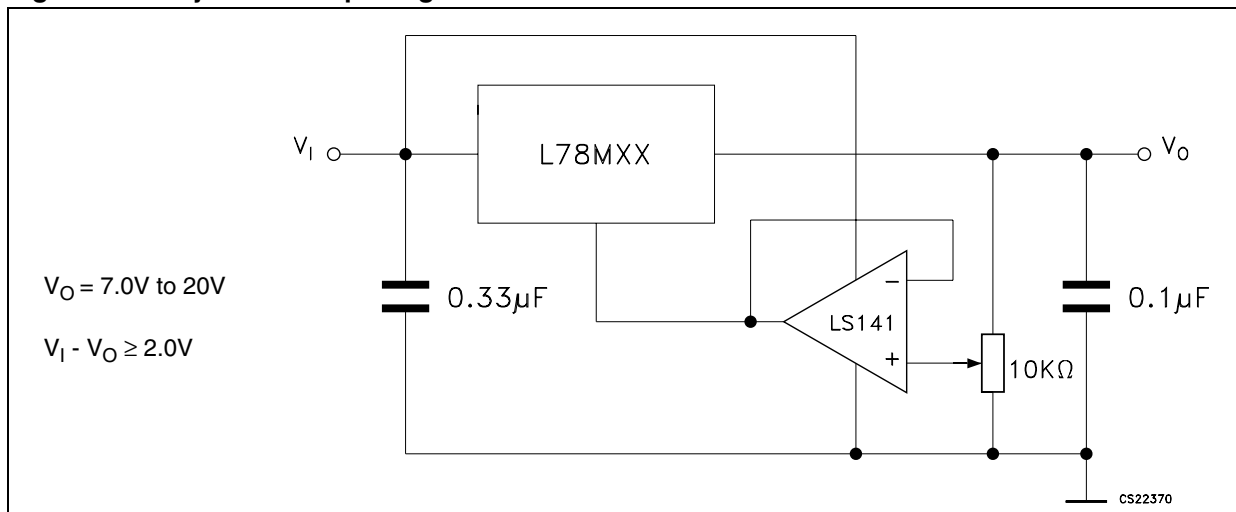


Figure 18. Current boost regulator

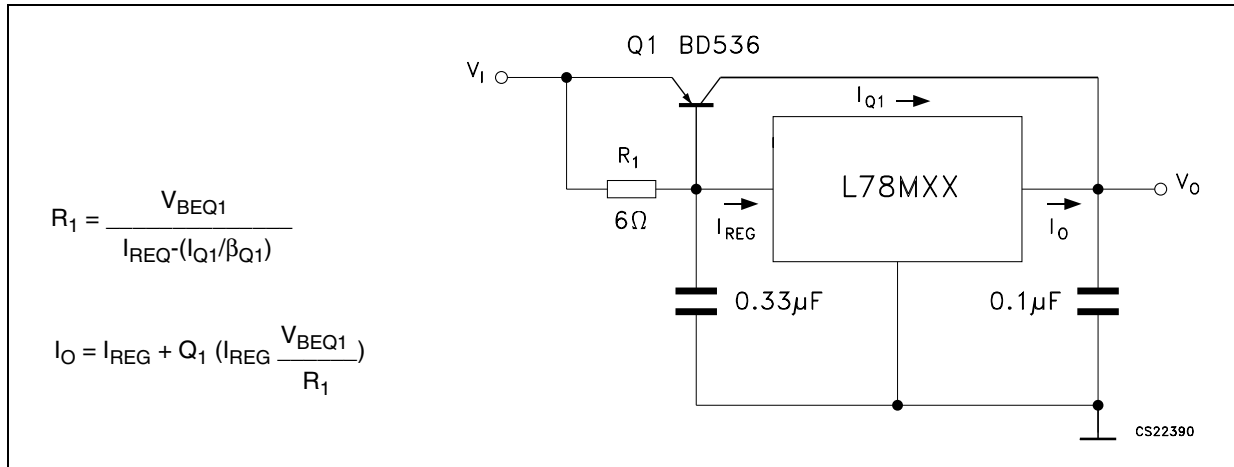
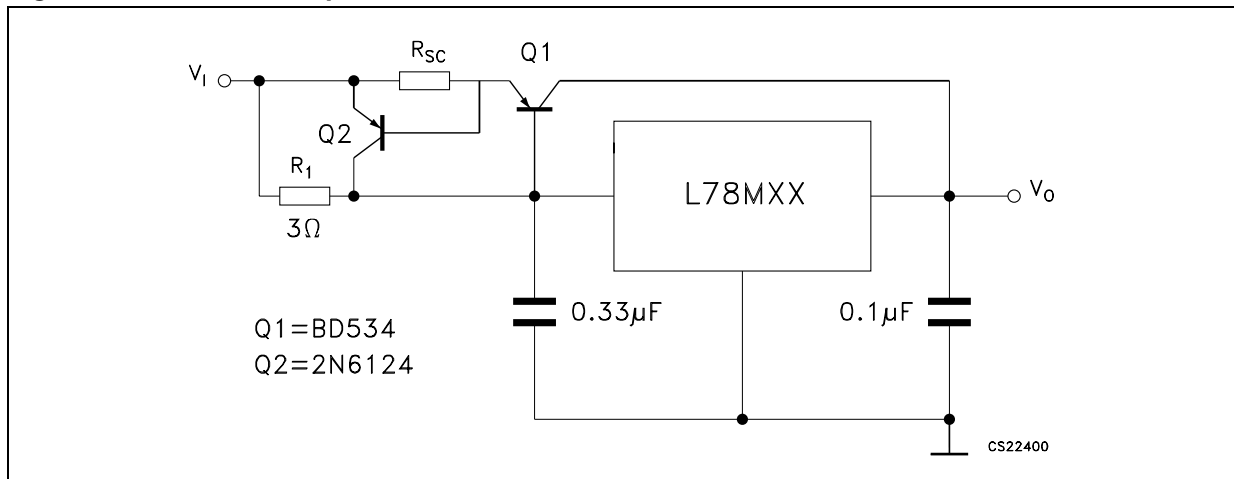


Figure 19. Short-circuit protection



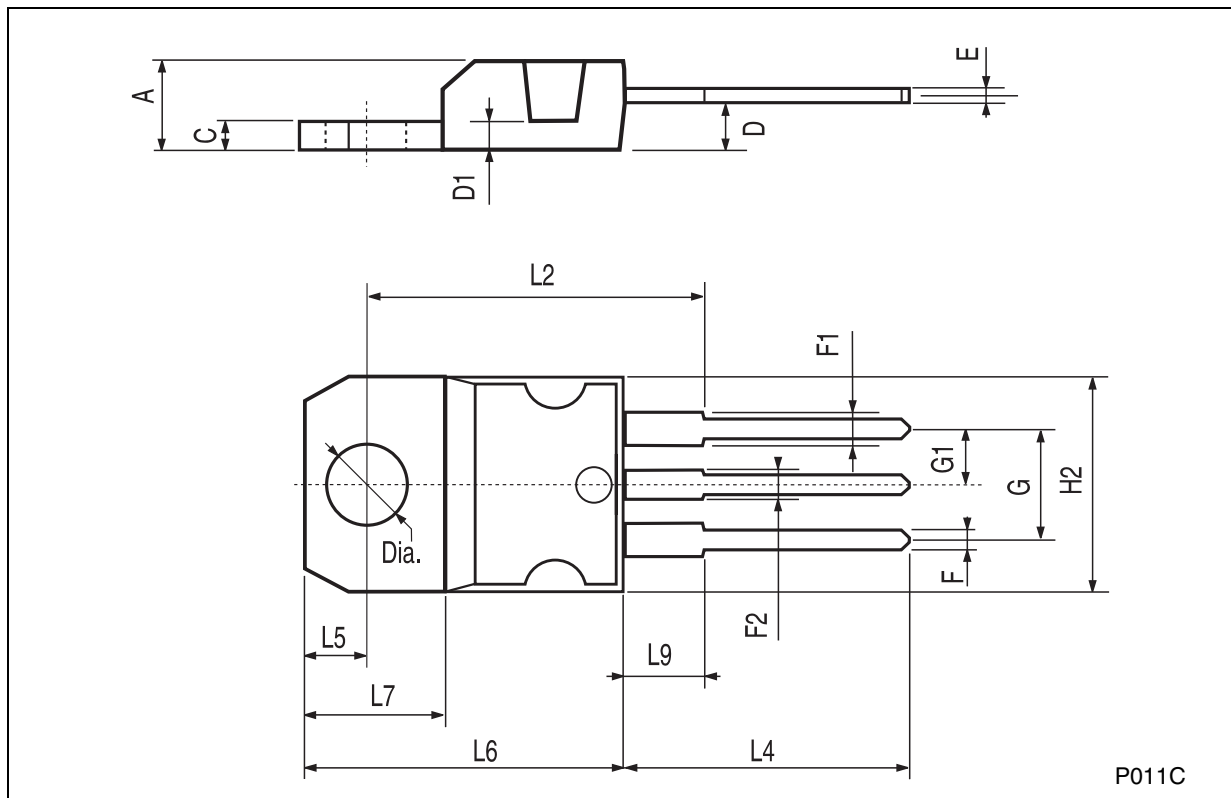
**Note:** The circuit of figure 19 can be modified to provide supply protection against short circuits by adding a short-circuit sense resistor,  $R_{SC}$ , and an additional PNP transistor. The current sensing PNP must be able to handle the short-circuit current of the three-terminal regulator. Therefore, a four-ampere plastic power transistor is specified.

## 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](http://www.st.com).

**TO-220 MECHANICAL DATA**

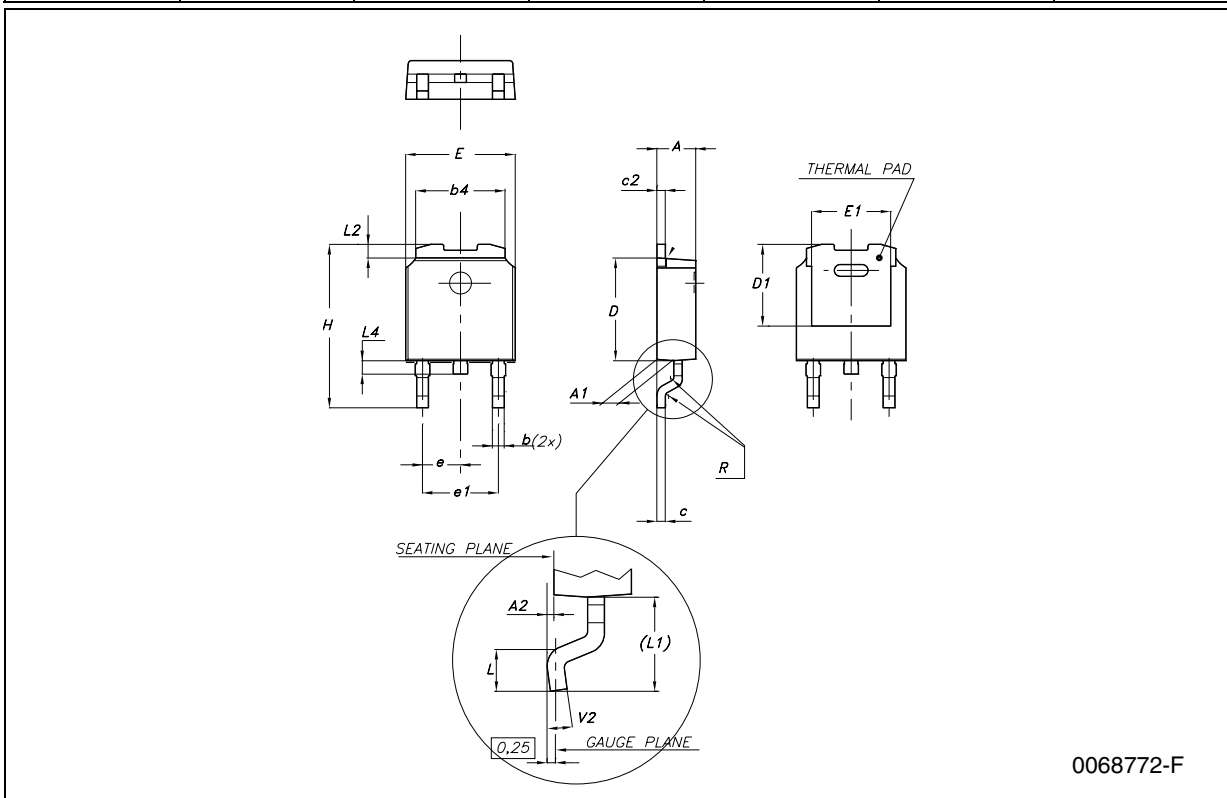
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
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



P011C

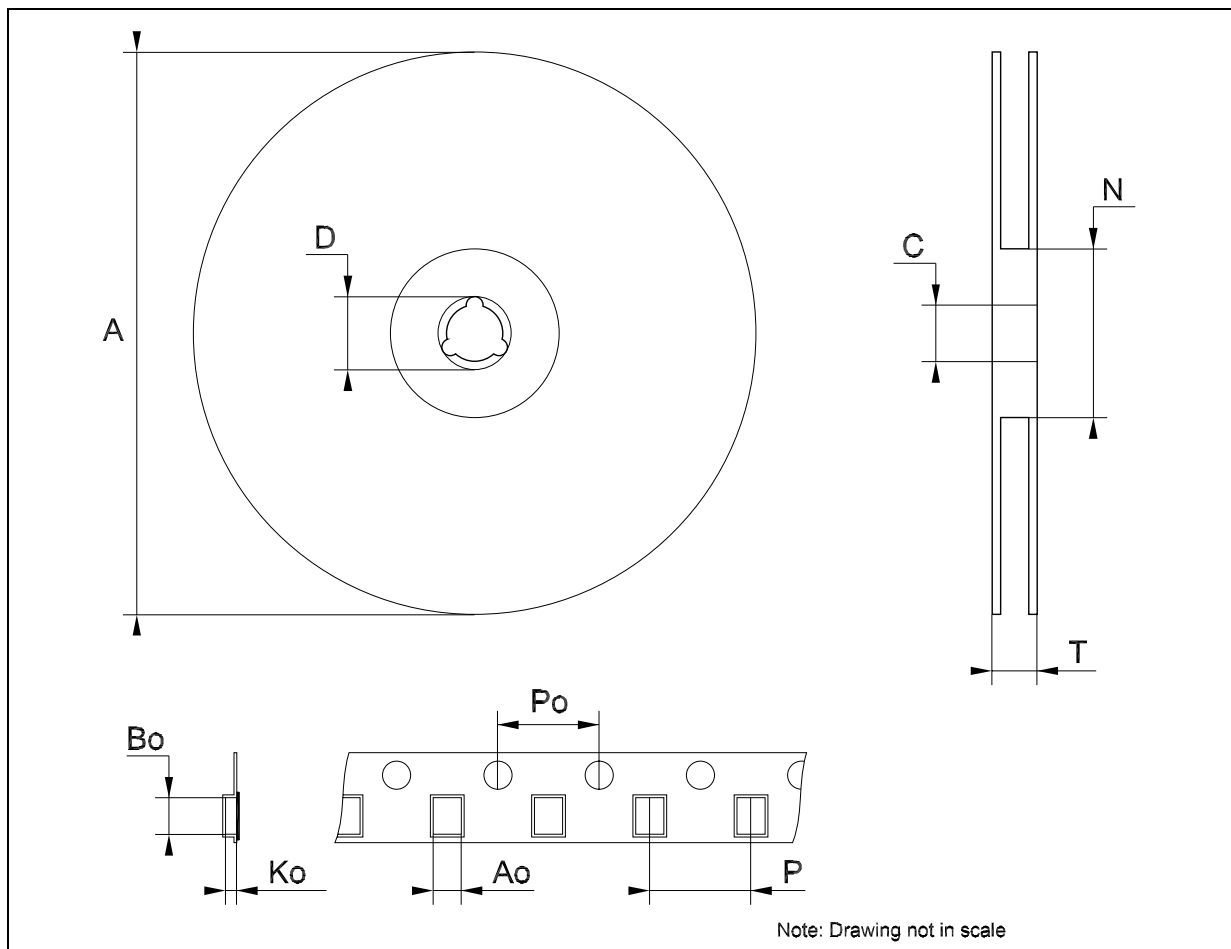
**DPAK MECHANICAL DATA**

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
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
b4	5.2		5.4	0.204		0.212
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
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
e		2.28			0.090	
e1	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L	1			0.039		
(L1)		2.8			0.110	
L2		0.8			0.031	
L4	0.6		1	0.023		0.039
R		0.2			0.008	
V2	0°		8°	0°		8°



**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 code

Table 13. Order code

Part numbers	Packaging		
	TO-220	DPAK	Output voltage
L78M05AB	L78M05ABV	L78M05ABDT-TR	5 V
L78M05AC		L78M05ACDT-TR	5 V
L78M06AB	L78M06ABV	L78M06ABDT-TR	6 V
L78M06AC		L78M06ACDT-TR	6 V
L78M08AB	L78M08ABV	L78M08ABDT-TR	8 V
L78M08AC		L78M08ACDT-TR	8 V
L78M09AB	L78M09ABV	L78M09ABDT-TR	9 V
L78M09AC		L78M09ACDT-TR	9 V
L78M10AB	L78M10ABV <sup>(1)</sup>	L78M10ABDT-TR	10 V
L78M10AC		L78M10ACDT-TR	10 V
L78M12AB	L78M12ABV	L78M12ABDT-TR	12 V
L78M12AC		L78M12ACDT-TR	12 V
L78M15AB	L78M15ABV	L78M15ABDT-TR	15 V
L78M15AC		L78M15ACDT-TR	15 V
L78M18AB	L78M18ABV <sup>(1)</sup>	L78M18ABDT-TR	18 V
L78M18AC		L78M18ACDT-TR	18 V
L78M24AB	L78M24ABV	L78M24ABDT-TR	24 V
L78M24AC		L78M24ACDT-TR	24 V

1. Available on request

## 9 Revision history

Table 14. Revision history

Date	Revision	Changes
30-Aug-2006	4	Order Codes has been updated and new template.

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