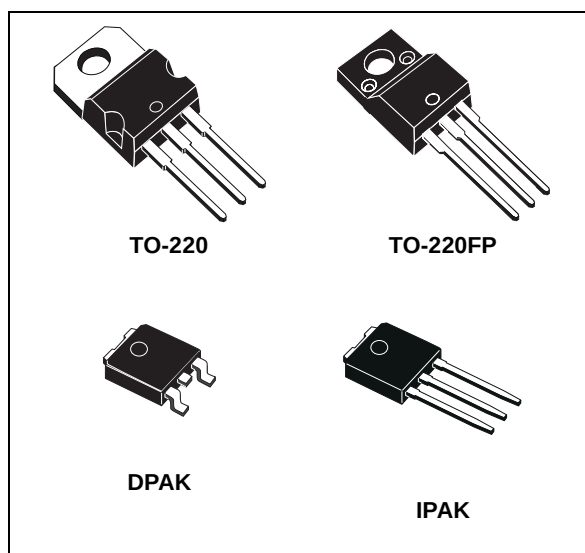


POSITIVE VOLTAGE REGULATORS

- OUTPUT CURRENT TO 0.5A
- OUTPUT VOLTAGES OF 5; 6; 8; 9; 12; 15; 18; 20; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION

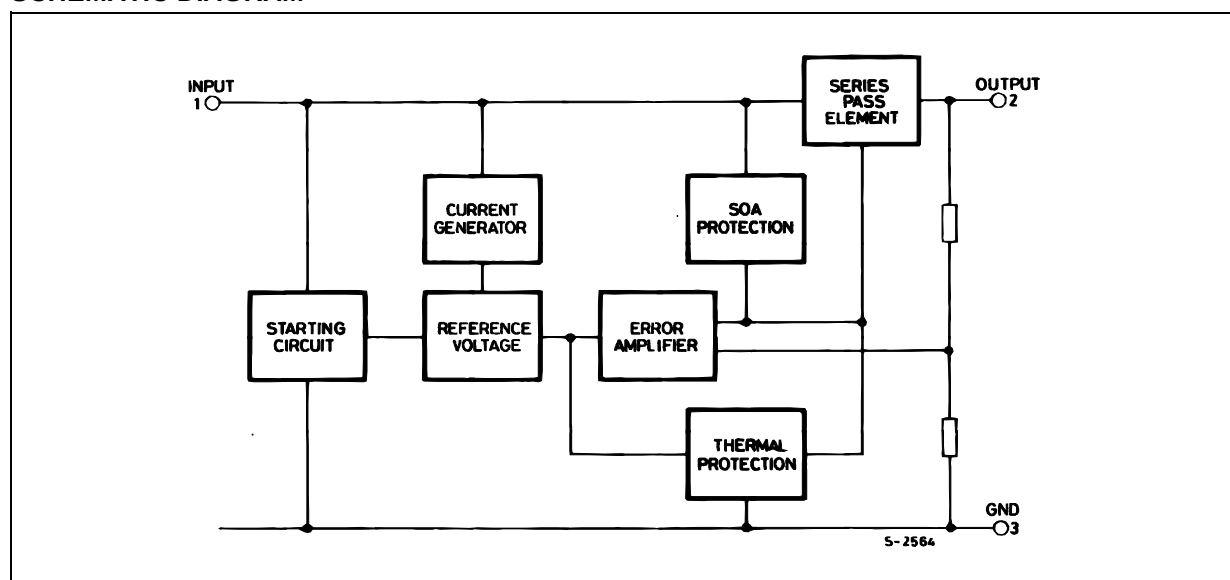
DESCRIPTION

The L78M00 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 0.5A 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



L78M00 SERIES

ABSOLUTE MAXIMUM RATINGS

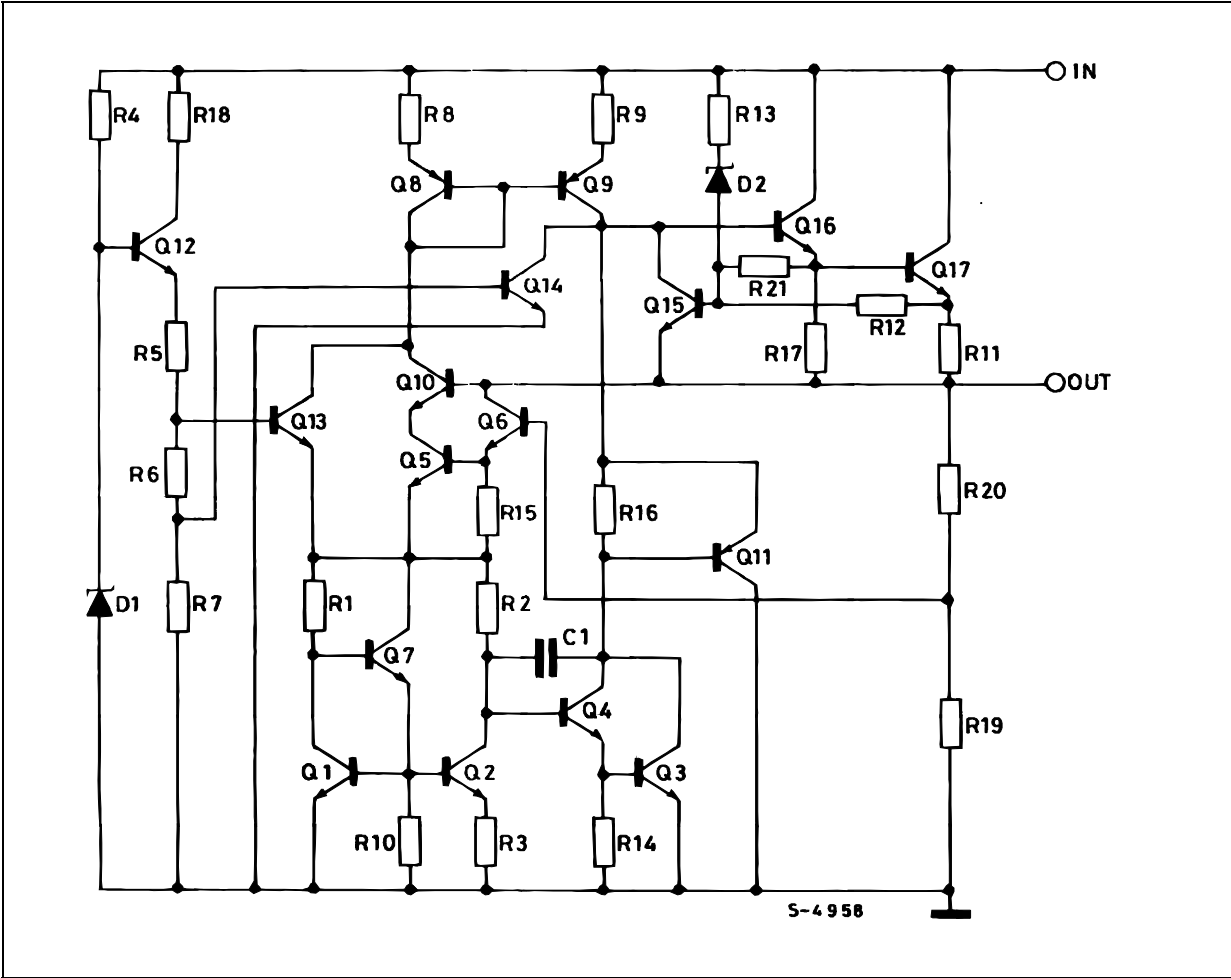
Symbol	Parameter ²	Value	Unit
V _I	DC Input Voltage (for V _O = 5 to 18V) (for V _O = 20, 24V)	35 40	V V
I _O	Output Current	Internally Limited	mA
P _D	Power Dissipation	Internally Limited	mW
T _{stg}	Storage Temperature Range	-65 to +150	°C
T _{op}	Operating Junction Temperature Range	0 to +150	°C

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

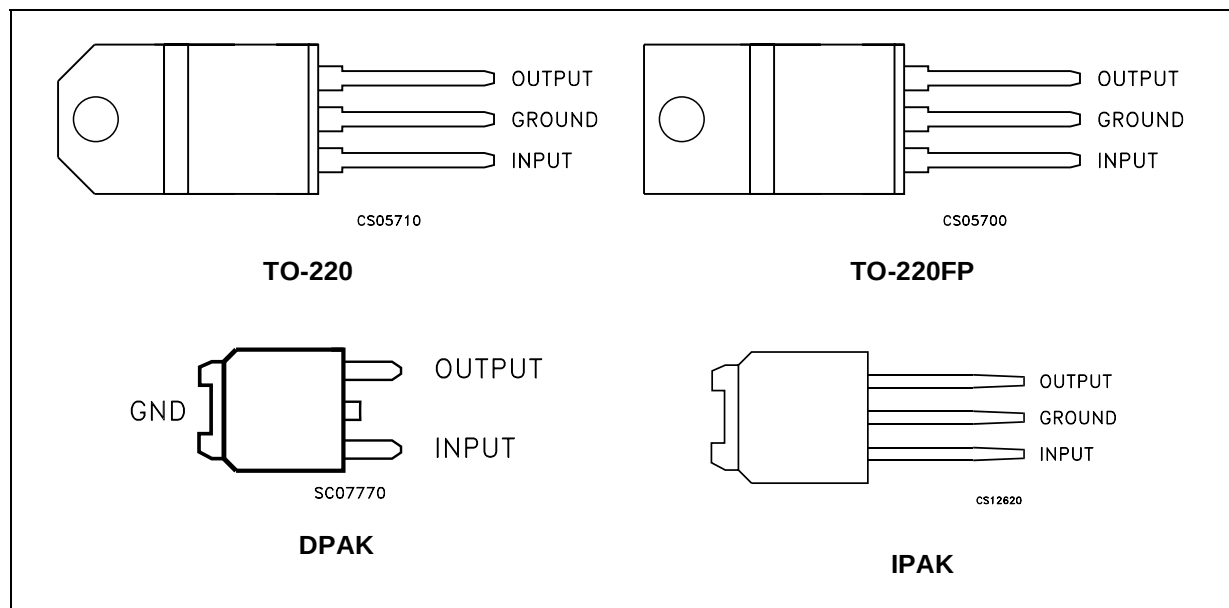
THERMAL DATA

Symbol	Parameter	TO-220	TO-220FP	DPAK	IPAK	Unit
R _{thj-case}	Thermal Resistance Junction-case	3	5	8		°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	50	60	100		°C/W

SHEMATIC DIAGRAM



CONNECTION DIAGRAM (top view)

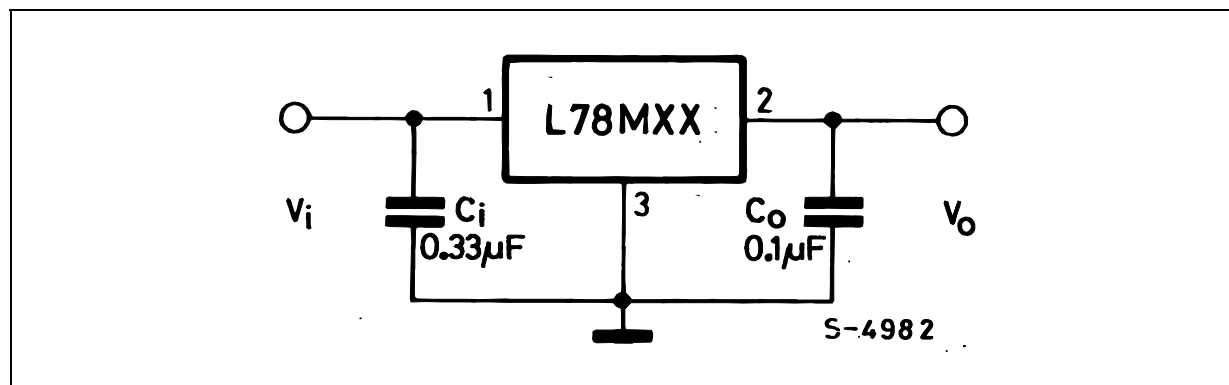


ORDERING CODES

TYPE	TO-220	TO-220FP	DPAK (*)	IPAK	OUTPUT VOLTAGE
L78M05	L78M05CV	L78M05CP	L78M05CDT	L78M05CDT-1	5 V
L78M06	L78M06CV	L78M06CP	L78M06CDT	L78M06CDT-1	6 V
L78M08	L78M08CV	L78M08CP	L78M08CDT	L78M08CDT-1	8 V
L78M09	L78M09CV	L78M09CP	L78M09CDT	L78M09CDT-1	9 V
L78M10	L78M10CV	L78M10CP	L78M10CDT	L78M10CDT-1	10 V
L78M12	L78M12CV	L78M12CP	L78M12CDT	L78M12CDT-1	12 V
L78M15	L78M15CV	L78M15CP	L78M15CDT	L78M15CDT-1	15 V
L78M18	L78M18CV	L78M18CP	L78M18CDT	L78M18CDT-1	18 V
L78M20	L78M20CV	L78M20CP	L78M20CDT	L78M20CDT-1	20 V
L78M24	L78M24CV	L78M24CP	L78M24CDT	L78M24CDT-1	24 V

(*) Available in Tape & Reel with the suffix "-TR".

APPLICATION CIRCUITS



TEST CIRCUITS

Figure 1 : DC Parameter

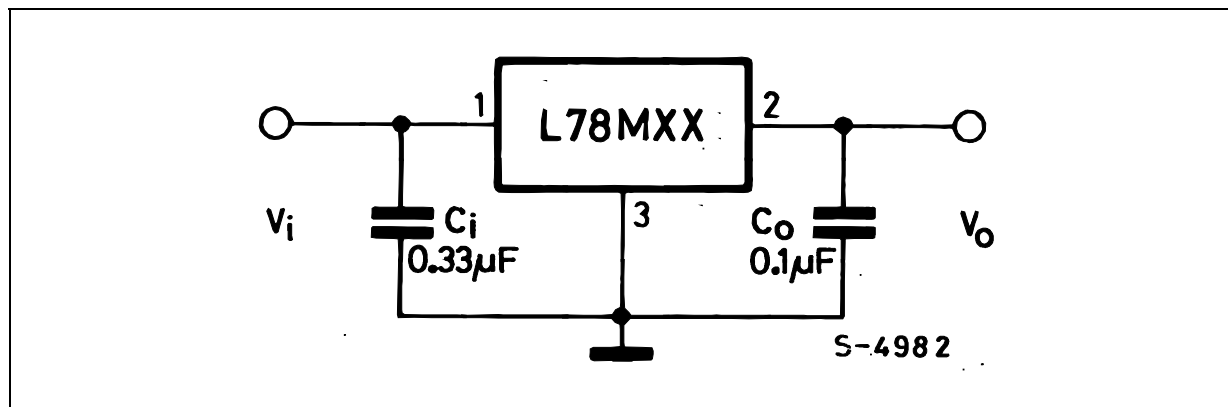


Figure 2 : Load Regulation

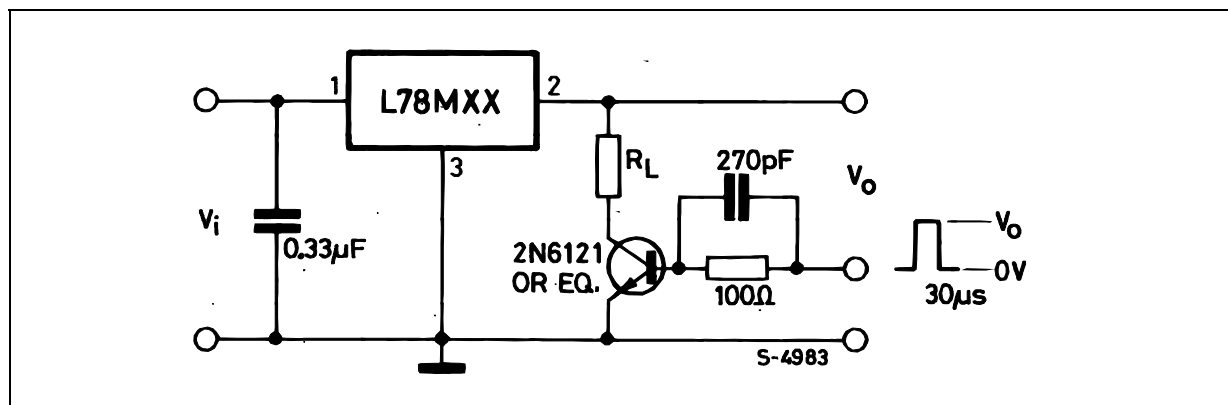
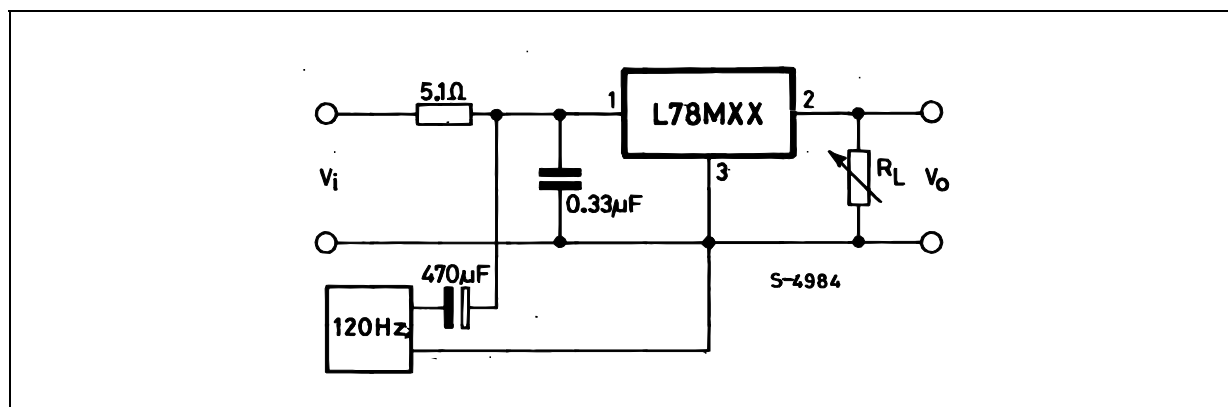


Figure 3 : Ripple Rejection



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

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

L78M00 SERIES

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

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

ELECTRICAL CHARACTERISTICS OF L78M10C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 16\text{V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage		9.6	10	10.4	V
V_O	Output Voltage	$I_O = 5\text{ to }350\text{ mA}$ $V_I = 12.5\text{ to }25\text{ V}$	9.5	10	10.5	V
ΔV_O	Line Regulation	$V_I = 12.5\text{ to }30\text{ V}$ $I_O = 200\text{ mA}$			100	mV
		$V_I = 13\text{ to }30\text{ V}$ $I_O = 200\text{ mA}$			50	
ΔV_O	Load Regulation	$I_O = 5\text{ to }500\text{ mA}$ $T_J = 25^\circ\text{C}$			200	mV
		$I_O = 5\text{ to }200\text{ mA}$ $T_J = 25^\circ\text{C}$			100	
I_d	Quiescent Current				6	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$ $V_I = 12.5\text{ to }30\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$ $T_J = 0\text{ to }125^\circ\text{C}$		-0.5		mV/ $^\circ\text{C}$
SVR	Supply Voltage Rejection	$V_I = 13.5\text{ to }24\text{ V}$ $f = 120\text{ Hz}$ $I_O = 300\text{ mA}$	56			dB
eN	Output Noise Voltage	$B = 10\text{ Hz to }100\text{ KHz}$		64		μV
V_d	Dropout Voltage			2		V
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$		245		mA

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/ $^\circ\text{C}$
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

L78M00 SERIES

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/ $^\circ\text{C}$
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

ELECTRICAL CHARACTERISTICS OF L78M18C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 26\text{V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage		17.3	18	18.7	V
V_O	Output Voltage	$I_O = 5\text{ to }350\text{ mA}$ $V_I = 20.5\text{ to }33\text{ V}$	17.1	18	18.9	V
ΔV_O	Line Regulation	$V_I = 21\text{ to }33\text{ V}$ $I_O = 200\text{ mA}$			100	mV
		$V_I = 24\text{ to }33\text{ V}$ $I_O = 200\text{ mA}$			50	
ΔV_O	Load Regulation	$I_O = 5\text{ to }500\text{ mA}$ $T_J = 25^\circ\text{C}$			360	mV
		$I_O = 5\text{ to }200\text{ mA}$ $T_J = 25^\circ\text{C}$			180	
I_d	Quiescent Current				6	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$ $V_I = 21\text{ to }33\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$ $T_J = 0\text{ to }125^\circ\text{C}$		-1.1		mV/ $^\circ\text{C}$
SVR	Supply Voltage Rejection	$V_I = 22\text{ to }32\text{ V}$ $f = 120\text{ Hz}$ $I_O = 300\text{ mA}$	53			dB
eN	Output Noise Voltage	$B = 10\text{ Hz to }100\text{ KHz}$		100		μV
V_d	Dropout Voltage			2		V
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$		240		mA

ELECTRICAL CHARACTERISTICS OF L78M20C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 29\text{V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage		19.2	20	20.8	V
V_O	Output Voltage	$I_O = 5\text{ to }350\text{ mA}$ $V_I = 23\text{ to }35\text{ V}$	19	20	21	V
ΔV_O	Line Regulation	$V_I = 23\text{ to }35\text{ V}$ $I_O = 200\text{ mA}$			100	mV
		$V_I = 24\text{ to }35\text{ V}$ $I_O = 200\text{ mA}$			50	
ΔV_O	Load Regulation	$I_O = 5\text{ to }500\text{ mA}$ $T_J = 25^\circ\text{C}$			400	mV
		$I_O = 5\text{ to }200\text{ mA}$ $T_J = 25^\circ\text{C}$			200	
I_d	Quiescent Current				6	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ to }350\text{ mA}$			0.5	mA
		$I_O = 200\text{ mA}$ $V_I = 23\text{ to }35\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$ $T_J = 0\text{ to }125^\circ\text{C}$		-1.1		mV/ $^\circ\text{C}$
SVR	Supply Voltage Rejection	$V_I = 24\text{ to }34\text{ V}$ $f = 120\text{ Hz}$ $I_O = 300\text{ mA}$	53			dB
eN	Output Noise Voltage	$B = 10\text{ Hz to }100\text{ KHz}$		110		μV
V_d	Dropout Voltage			2		V
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$		240		mA

ELECTRICAL CHARACTERISTICS OF L78M24C (refer to the test circuits, $T_J = 25^\circ\text{C}$, $V_I = 33\text{V}$, $I_O = 350\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ 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

Figure 4 : Dropout Voltage vs Junction Temperature

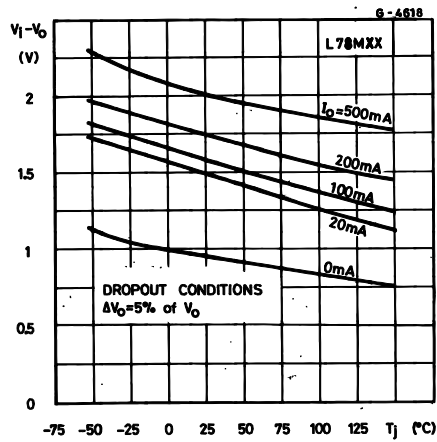


Figure 7 : Output Voltage vs Junction Temperature

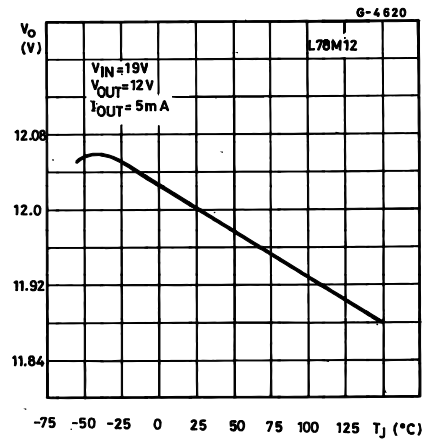


Figure 5 : Dropout Characteristics

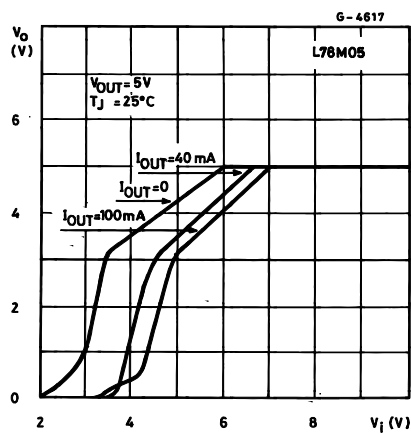


Figure 8 : Supply Voltage Rejection vs Frequency

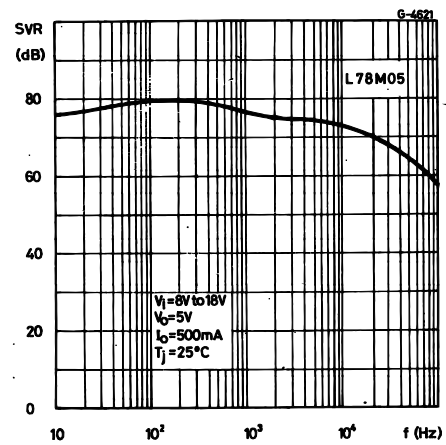


Figure 6 : Peak Output Current vs Input-Output Differential Voltage

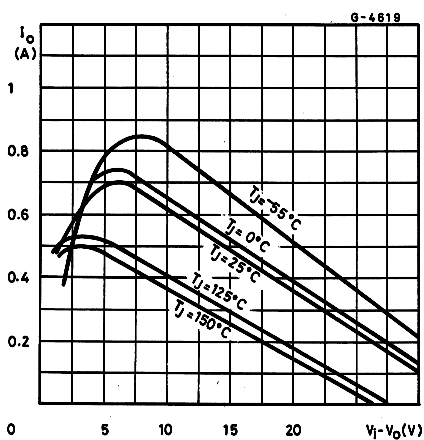


Figure 9 : Quiescent Current vs Junction Temperature

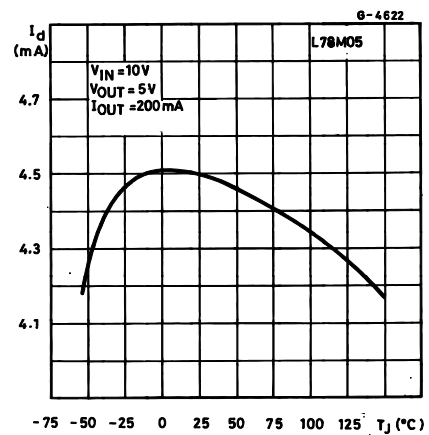


Figure 10 : Load Transient Response

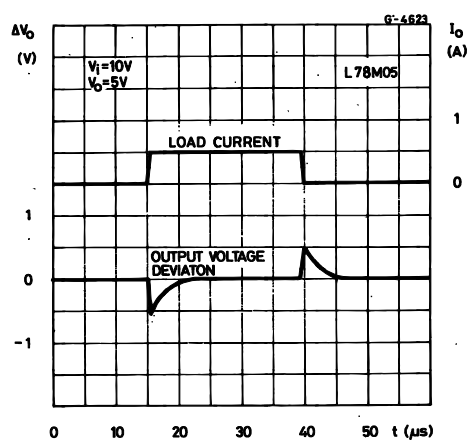


Figure 12 : Quiescent Current vs Input Voltage

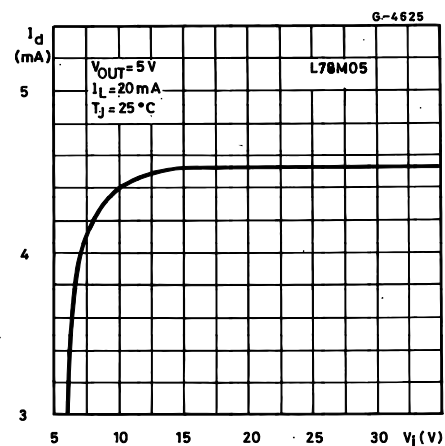
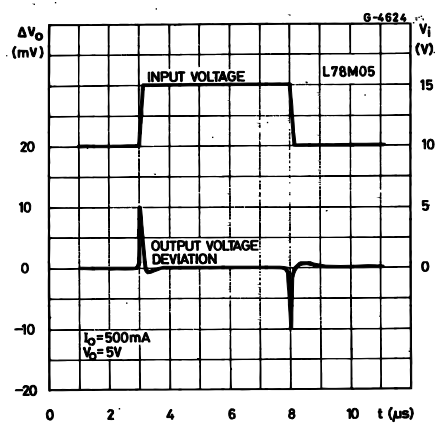
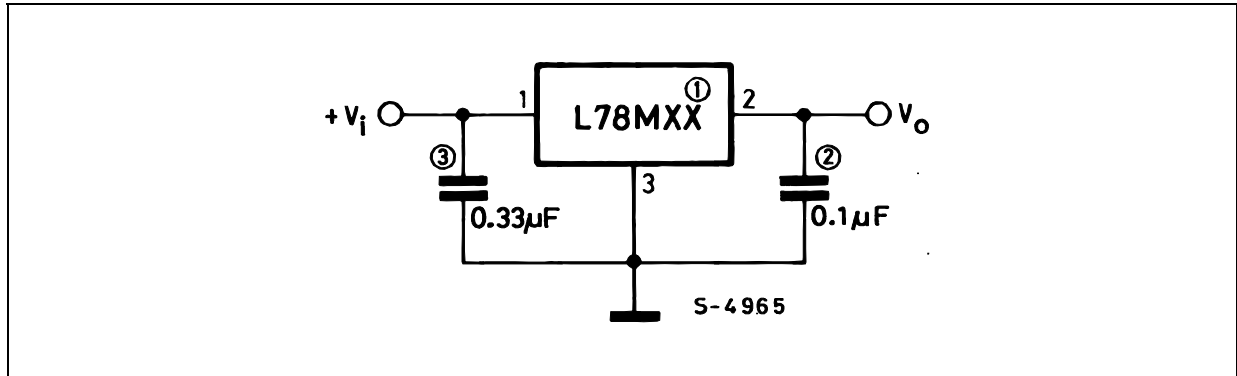


Figure 11 : Line Transient Response



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Figure 13 : Fixed Output Regulator



NOTE:

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 14 :

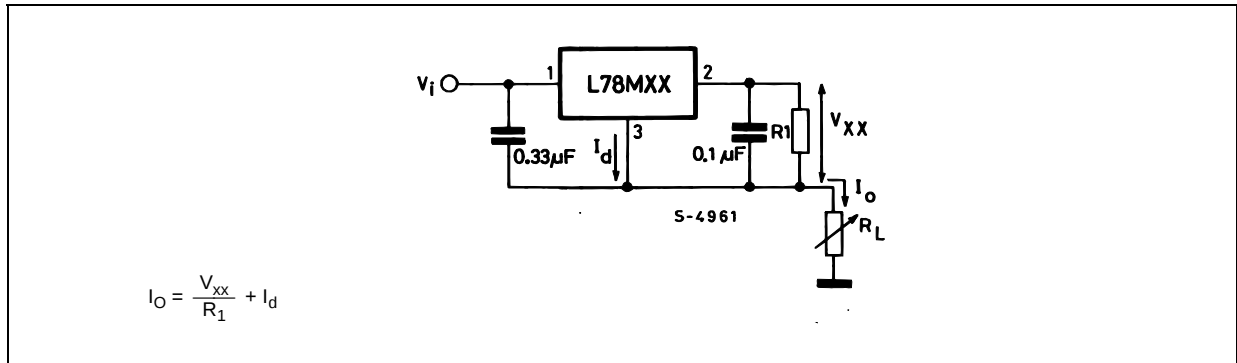


Figure 15 :

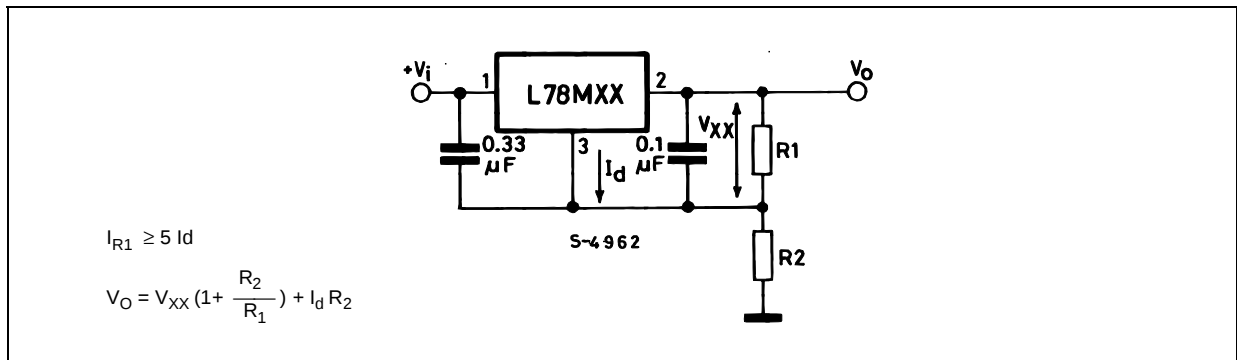


Figure 16 : Adjustable Output Regulator (7 to 30V)

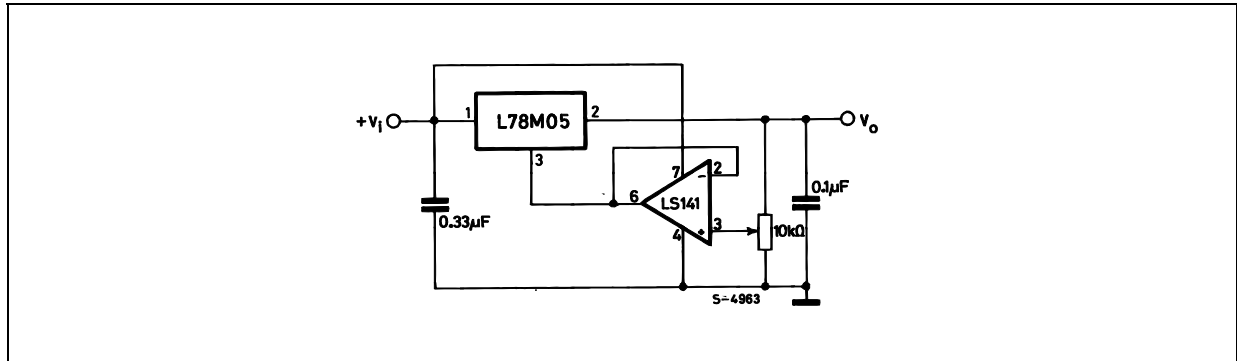


Figure 17 : 0.5 to 10V Regulator

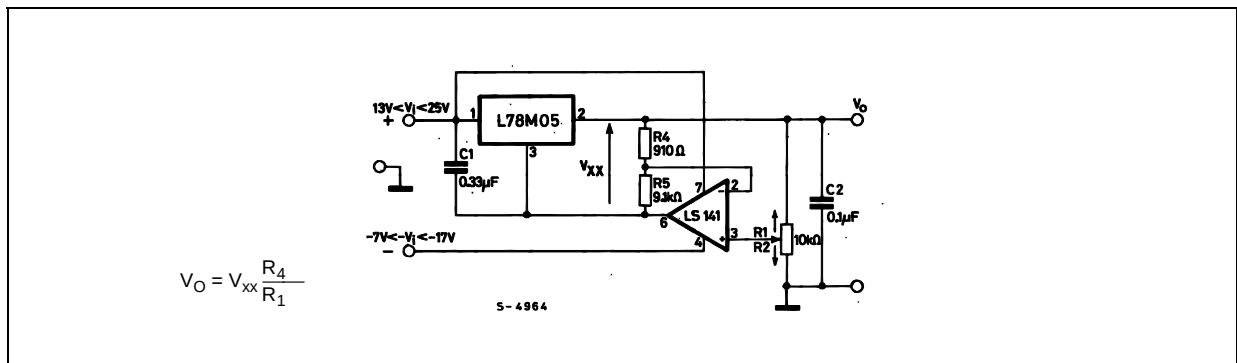


Figure 18 : High Current Voltage Regulator

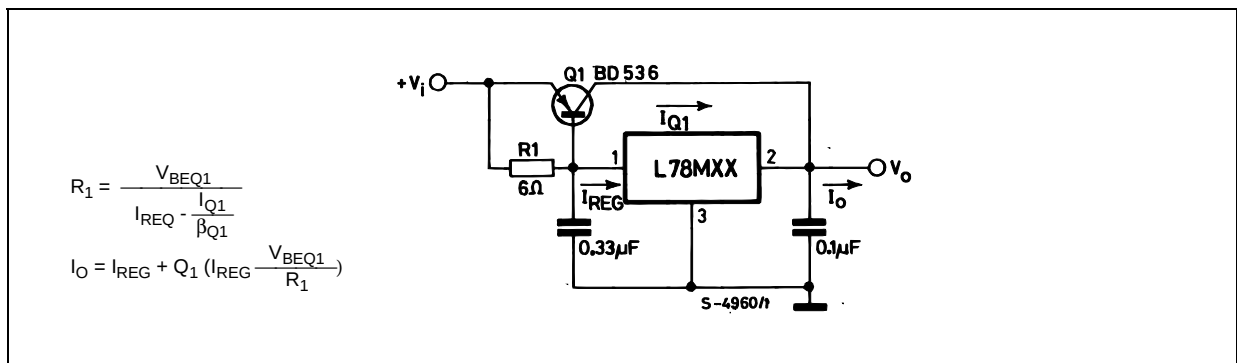
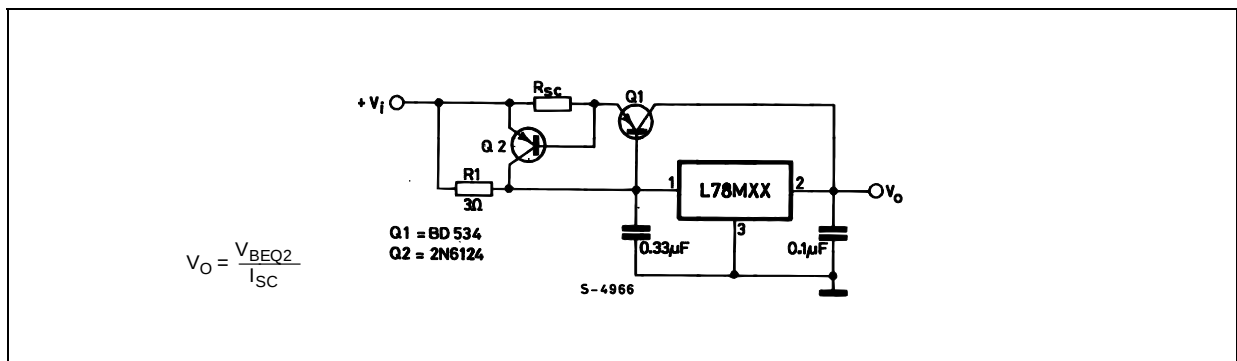


Figure 19 : High Output Current with Short Circuit



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Figure 20 : Tracking Voltage Regulator

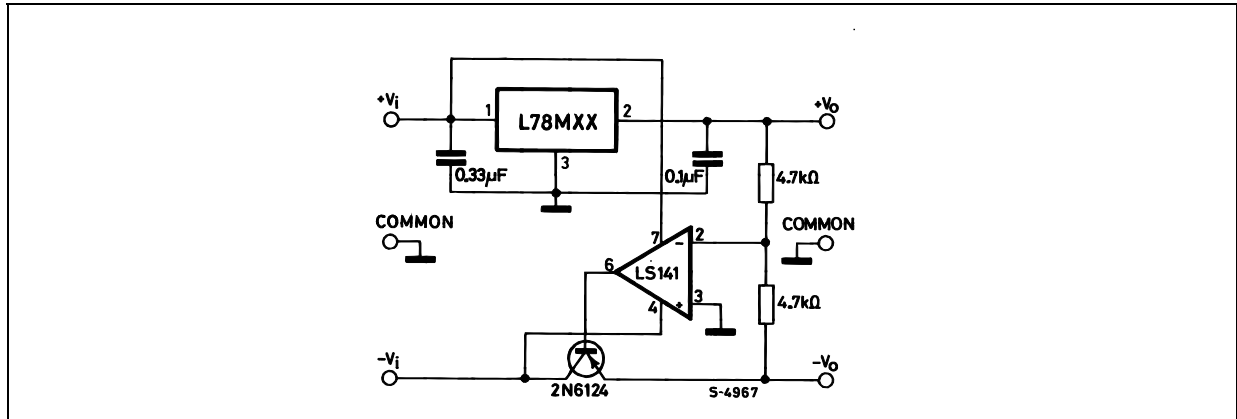


Figure 21 : High Input Voltage Circuit

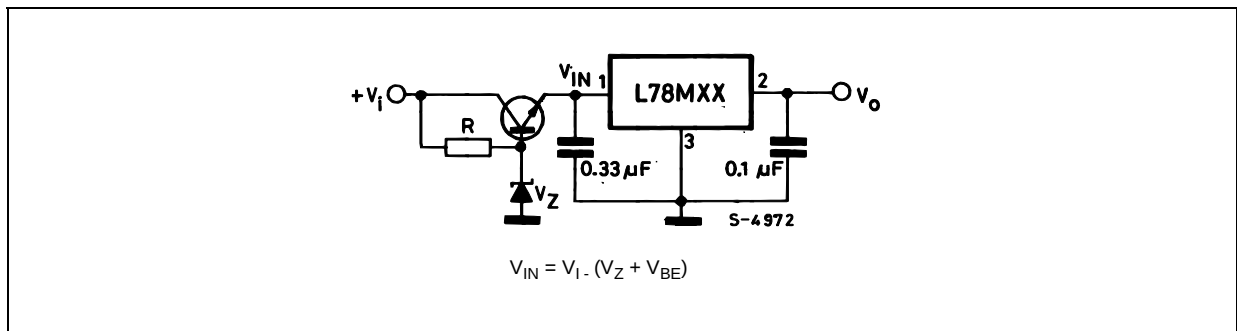


Figure 22 : Reducing Power Dissipation with Dropping Resistor

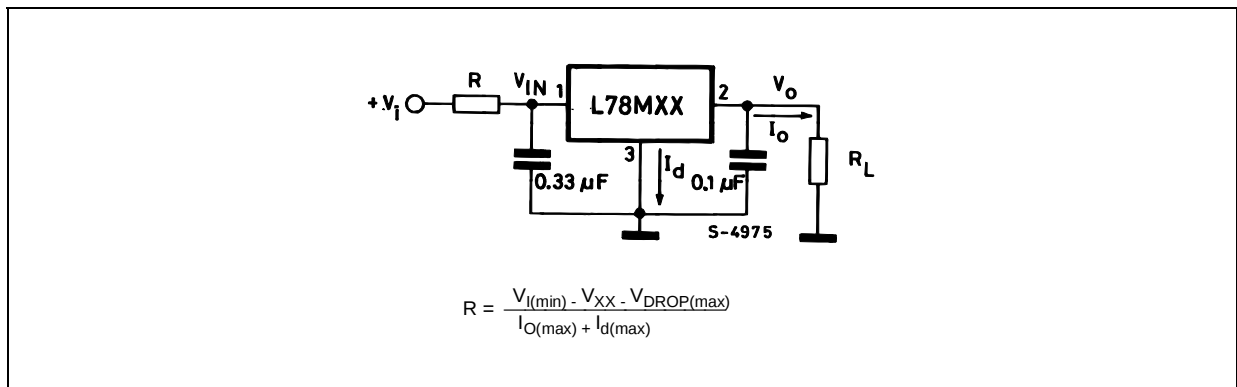
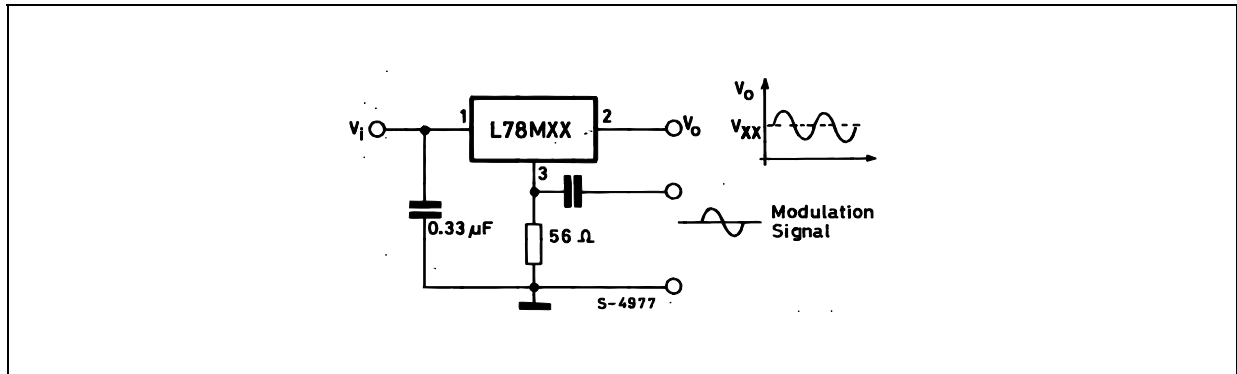
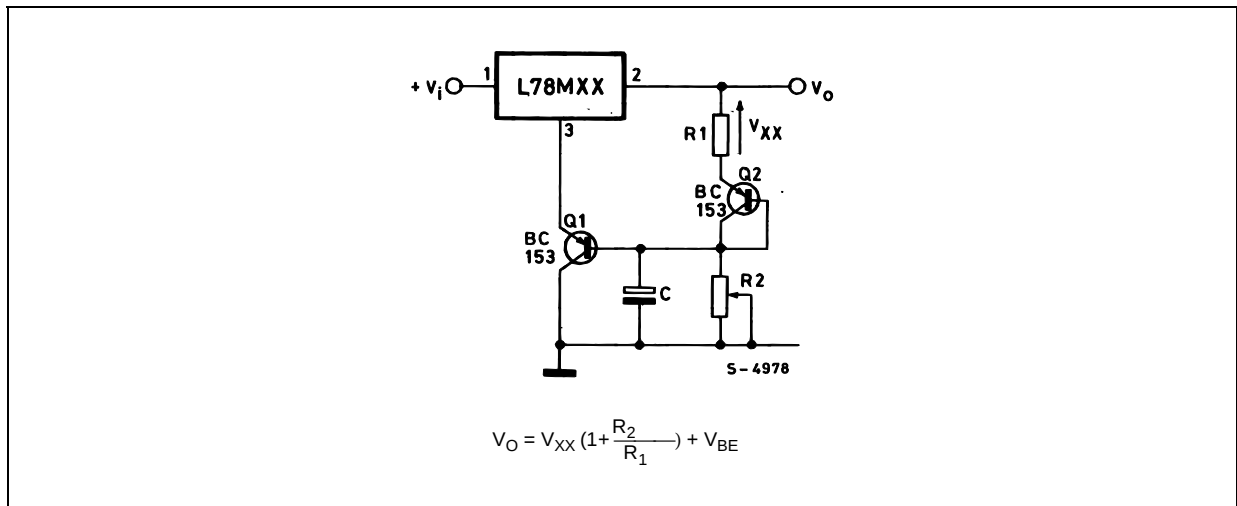


Figure 23 : Power AM Modulator (unity voltage gain, $I_O \leq 0.5$)

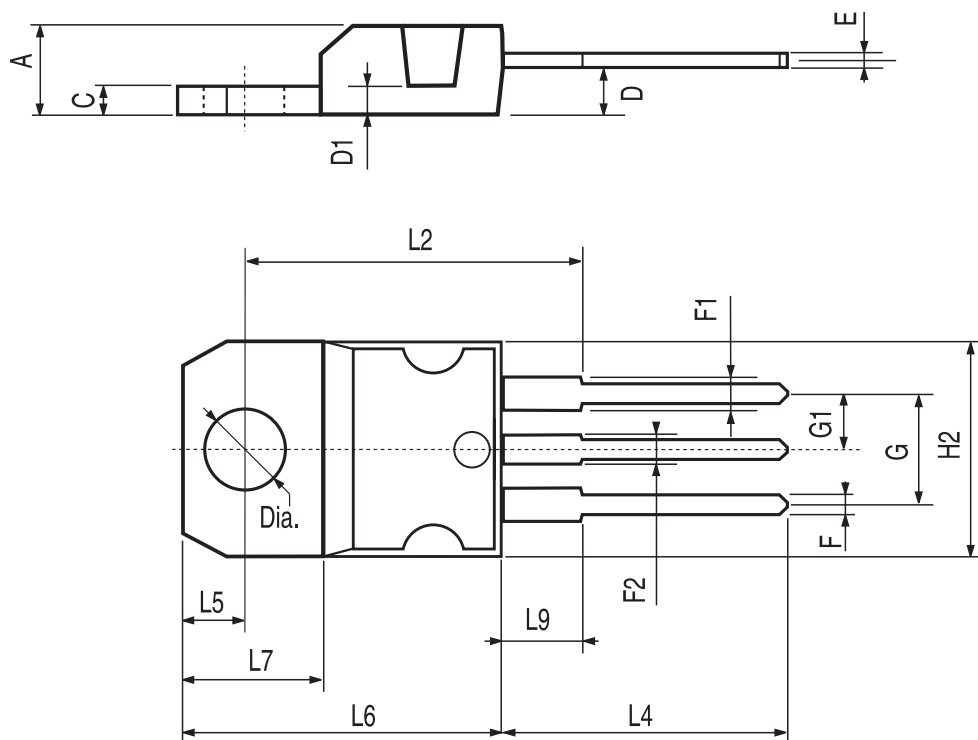
NOTE: The circuit performs well up to 100 KHz.

Figure 24 : 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 risetime of the V_O .

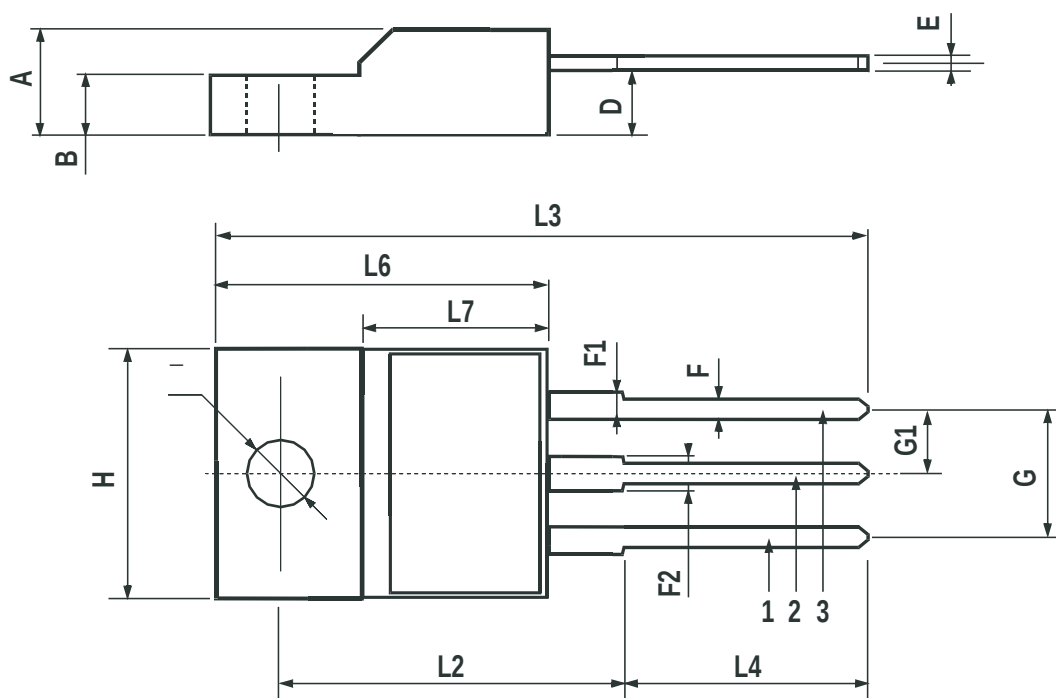
TO-220 MECHANICAL DATA

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



TO-220FP MECHANICAL DATA

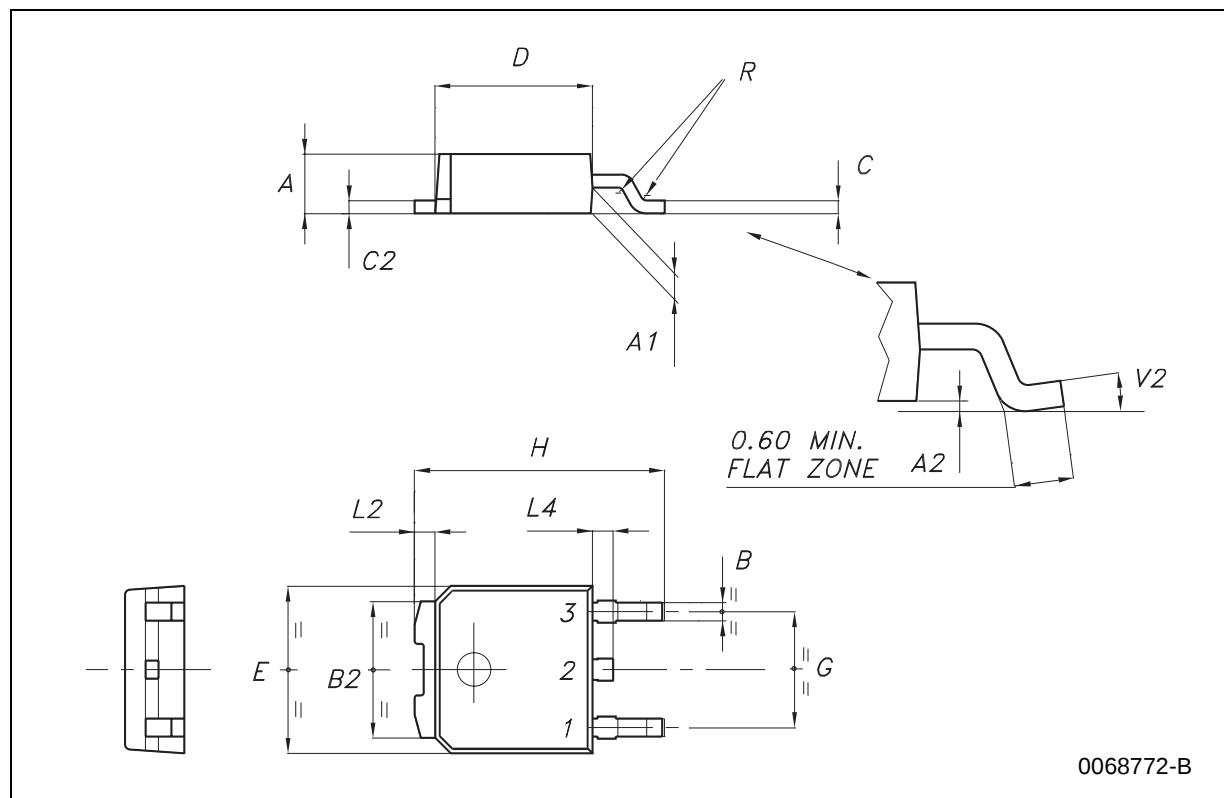
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.50	0.045		0.059
F2	1.15		1.50	0.045		0.059
G	4.95		5.2	0.194		0.204
G1	2.4		2.7	0.094		0.106
H	10.0		10.40	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
DIA.	3		3.2	0.118		0.126



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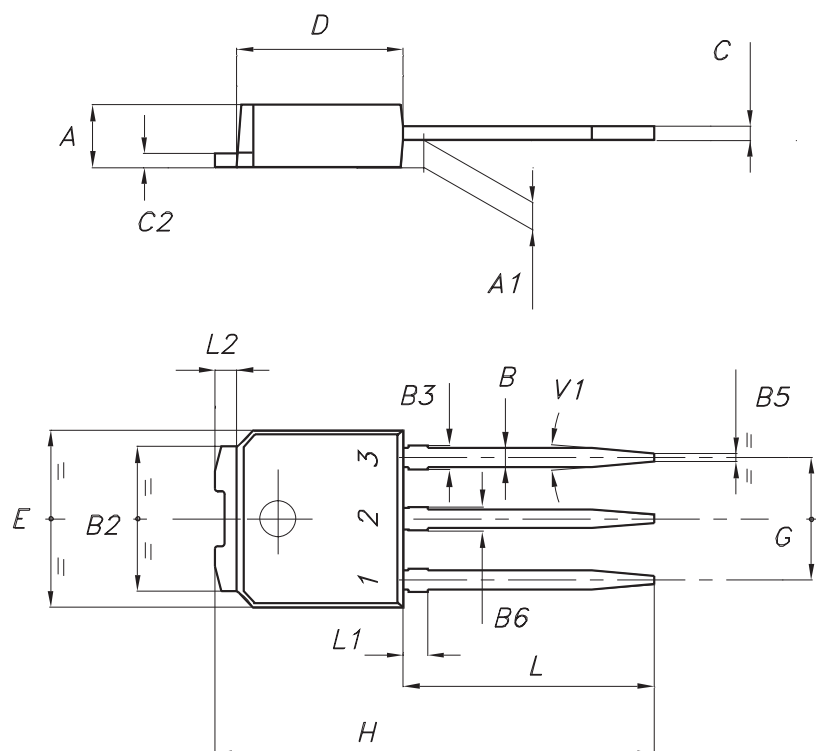
DPAK MECHANICAL DATA

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
B2	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
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L2		0.8			0.031	
L4	0.6		1	0.023		0.039



IPAK MECHANICAL DATA

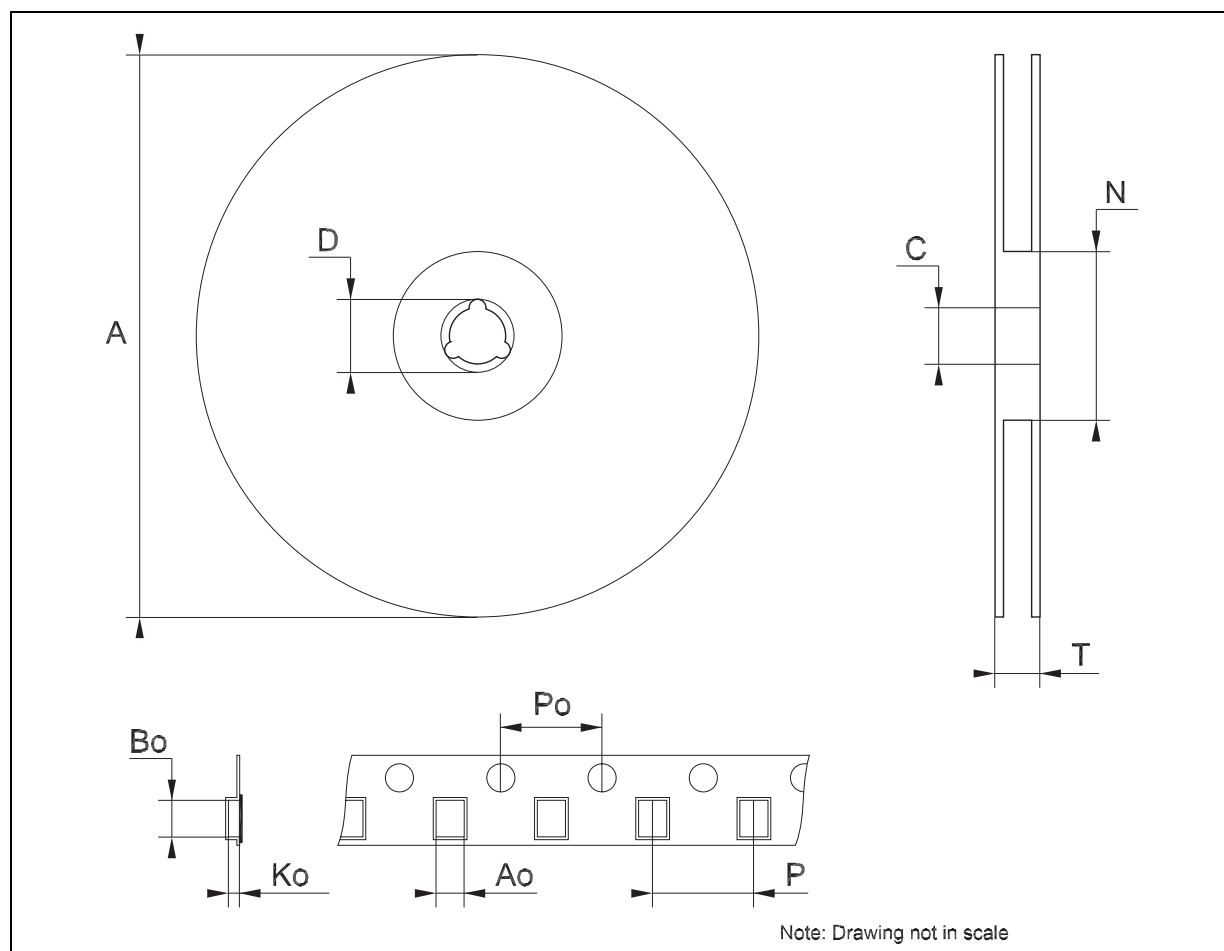
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
B3			0.95			0.037
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		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



0068771-F

Tape & Reel DPAK-PPAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			180			7.086
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	6.80	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



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