

Features

Output Current up to 1A

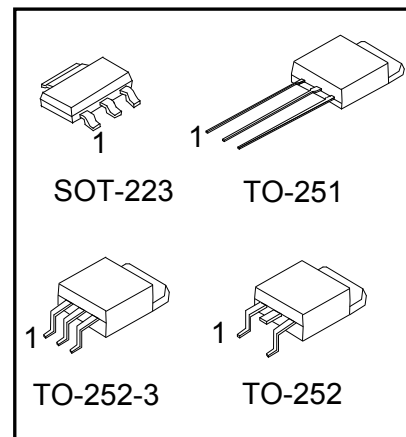
Output Voltages of 5, 6, 8, 9, 12, 15, 18, 24V

Thermal Overload Protection Short Circuit Protection

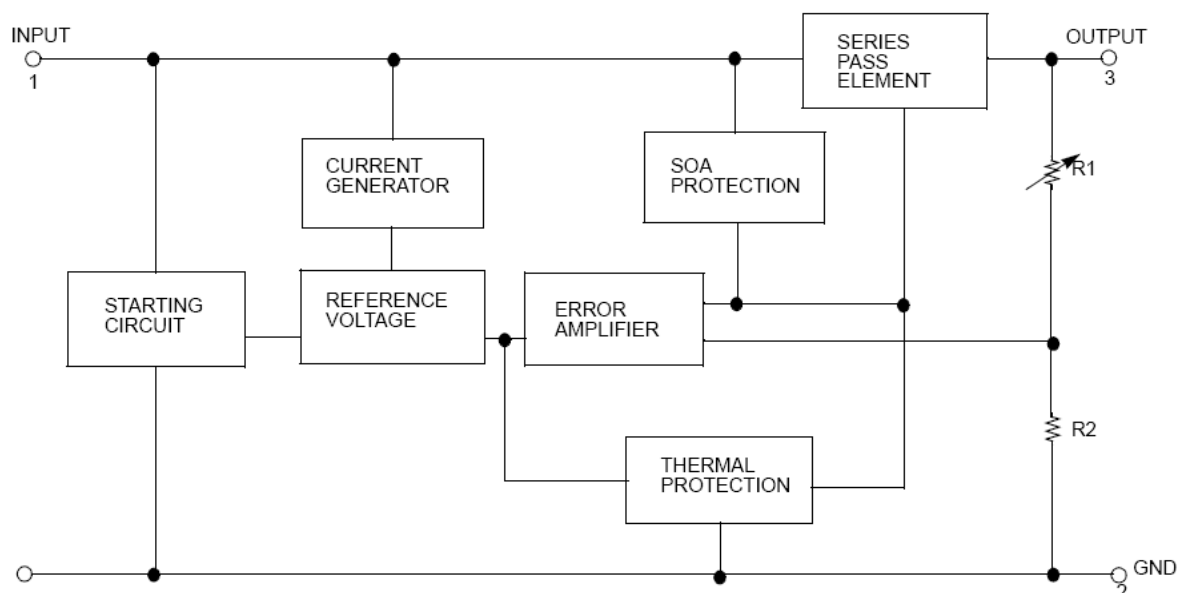
Output Transistor Safe Operating area (SOA)Protection

Description

The 78MXX three-terminal positive regulators are available in the TO-252 package with several fixed output voltages making it useful in a wide range of applications.



Internal Block Diagram



Absolute Maximum Ratings

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage		V _{IN}	35	V
Output Current		I _{OUT}	1	A
Power Dissipation (T _C =25°C)	SOT-223	P _D	1	W
	TO-251/TO-252 TO-252-3		2	
Operating Junction Temperature		T _J	-20 ~ 85	°C
Storage Temperature		T _{STG}	-55 ~ +150	°C

Thermal Data

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Case	SOT-223	θ_{JC}	15	$^{\circ}\text{C/W}$
	TO-251/TO-252		12.5	
	TO-252-3			

Electrical Characteristics (78M05)

(Refer to the test circuits, $0 < T_J < +125^{\circ}\text{C}$, $I_O=350\text{mA}$, $V_I=10\text{V}$, unless otherwise specified, $C_I = 0.33\mu\text{F}$, $C_O=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	$I_O = 5\text{mA} \sim 350\text{mA}$ $V_I = 7 \sim 20\text{V}$	4.75	5	5.25	V
Line Regulation(Note)	ΔV_O	$I_O = 200\text{mA}$ $T_J = 25^{\circ}\text{C}$	$V_I = 7\text{V} \sim 25\text{V}$		100	mV
			$V_I = 8\text{V} \sim 25\text{V}$		50	
Load Regulation(Note)	ΔV_O	$T_J = 25^{\circ}\text{C}$	$I_O = 5\text{mA} \sim 500\text{mA}$		100	mV
			$I_O = 5\text{mA} \sim 200\text{mA}$		50	
Quiescent Current	I_Q	$T_J = 25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA} \sim 350\text{mA}$			0.5	mA
		$I_O = 200\text{mA}$, $V_I = 8 \sim 25\text{V}$			0.8	
Output Voltage Drift	$\Delta V / \Delta T$	$I_O = 5\text{mA}$, $T_J = 0 \sim 125^{\circ}\text{C}$		-0.5		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz} \sim 100\text{KHz}$		40		μV
Ripple Rejection	RR	$f = 120\text{Hz}$, $V_I = 8 \sim 18\text{V}$		80		dB
Dropout Voltage	V_D	$T_J = 25^{\circ}\text{C}$, $I_O = 500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_J = 25^{\circ}\text{C}$, $V_I = 35\text{V}$		800		mA
Peak Current	I_{PK}	$T_J = 25^{\circ}\text{C}$		900		mA

Notes:

Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (78M06)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=11\text{V}$, unless otherwise specified, $C_i = 0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o = 5\text{mA} \sim 350\text{mA}$ $V_i = 8 \sim 21\text{V}$	5.7	6	6.3	V
Line Regulation(Note)	ΔV_o	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$ $V_i = 8\text{V} \sim 25\text{V}$			100	mV
		$V_i = 9\text{V} \sim 25\text{V}$			50	
Load Regulation(Note)	ΔV_o	$T_j = 25^{\circ}\text{C}$ $I_o = 5\text{mA} \sim 500\text{mA}$			120	mV
		$I_o = 5\text{mA} \sim 200\text{mA}$			60	
Quiescent Current	I_Q	$T_j = 25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o = 5\text{mA} \sim 350\text{mA}$			0.5	mA
		$I_o = 200\text{mA}$, $V_i = 9 \sim 25\text{V}$			0.8	
Output Voltage Drift	$\Delta V / \Delta T$	$I_o = 5\text{mA}$, $T_j = 0 \sim 125^{\circ}\text{C}$		-0.5		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz} \sim 100\text{KHz}$		45		μV
Ripple Rejection	RR	$f = 120\text{Hz}$, $V_i = 9 \sim 19\text{V}$		80		dB
Dropout Voltage	V_D	$T_j = 25^{\circ}\text{C}$, $I_o = 500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j = 25^{\circ}\text{C}$, $V_i = 35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j = 25^{\circ}\text{C}$		900		mA

Notes:

Load and line regulation are specified at constant junction temperature. Change in V_o due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (78M08)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=14\text{V}$, unless otherwise specified, $C_i = 0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o = 5\text{mA} \sim 350\text{mA}$ $V_i = 10.5 \sim 23\text{V}$	7.6	8	8.4	V
Line Regulation(Note)	ΔV_o	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$			100	mV
		$V_i = 11\text{V} \sim 25\text{V}$			50	
Load Regulation(Note)	ΔV_o	$T_j = 25^{\circ}\text{C}$			160	mV
		$I_o = 5\text{mA} \sim 200\text{mA}$			80	
Quiescent Current	I_Q	$T_j = 25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o = 5\text{mA} \sim 350\text{mA}$			0.5	mA
		$I_o = 200\text{mA}$, $V_i = 10.5 \sim 25\text{V}$			0.8	
Output Voltage Drift	$\Delta V / \Delta T$	$I_o = 5\text{mA}$, $T_j = 0 \sim 125^{\circ}\text{C}$		-0.8		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz} \sim 100\text{KHz}$		52		μV
Ripple Rejection	RR	$f = 120\text{Hz}$, $V_i = 11.5 \sim 21.5\text{V}$		80		dB
Dropout Voltage	V_D	$T_j = 25^{\circ}\text{C}$, $I_o = 500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j = 25^{\circ}\text{C}$, $V_i = 35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j = 25^{\circ}\text{C}$		900		mA

Notes:

Load and line regulation are specified at constant junction temperature. Change in V_o due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (78M09)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=15\text{V}$, unless otherwise specified, $C_i = 0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o = 5\text{mA} \sim 350\text{mA}$ $V_i = 11.5 \sim 24\text{V}$	8.45	9	9.55	V
Line Regulation(Note)	ΔV_o	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$	$V_i = 11.5\text{V} \sim 25\text{V}$		100	mV
			$V_i = 12\text{V} \sim 25\text{V}$		50	
Load Regulation(Note)	ΔV_o	$T_j = 25^{\circ}\text{C}$	$I_o = 5\text{mA} \sim 500\text{mA}$		180	mV
			$I_o = 5\text{mA} \sim 200\text{mA}$		90	
Quiescent Current	I_Q	$T_j = 25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o=5\text{mA} \sim 350\text{mA}$			0.5	mA
		$I_o = 200\text{mA}$, $V_i = 11.5 \sim 25\text{V}$			0.8	
Output Voltage Drift	$\Delta V / \Delta T$	$I_o = 5\text{mA}$, $T_j = 0 \sim 125^{\circ}\text{C}$		-0.8		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz} \sim 100\text{KHz}$		52		μV
Ripple Rejection	RR	$f = 120\text{Hz}$, $V_i = 12.5 \sim 22.5\text{V}$		80		dB
Dropout Voltage	V_D	$T_j = 25^{\circ}\text{C}$, $I_o = 500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j = 25^{\circ}\text{C}$, $V_i = 35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j = 25^{\circ}\text{C}$		900		mA

Notes:

Load and line regulation are specified at constant junction temperature. Change in V_o due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (78M12)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=19\text{V}$, unless otherwise specified, $C_i = 0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o = 5\text{mA} \sim 350\text{mA}$ $V_i = 14.5 \sim 27\text{V}$	11.4	12	12.6	V
Line Regulation(Note)	ΔV_o	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$ $V_i = 14.5\text{V} \sim 30\text{V}$			100	mV
		$V_i = 16\text{V} \sim 30\text{V}$			50	
Load Regulation(Note)	ΔV_o	$T_j = 25^{\circ}\text{C}$ $I_o = 5\text{mA} \sim 500\text{mA}$			240	mV
		$I_o = 5\text{mA} \sim 200\text{mA}$			120	
Quiescent Current	I_Q	$T_j = 25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o = 5\text{mA} \sim 350\text{mA}$			0.5	mA
		$I_o = 200\text{mA}$, $V_i = 14.5 \sim 30\text{V}$			0.8	
Output Voltage Drift	$\Delta V / \Delta T$	$I_o = 5\text{mA}$, $T_j = 0 \sim 125^{\circ}\text{C}$		-0.8		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz} \sim 100\text{KHz}$		75		μV
Ripple Rejection	RR	$f = 120\text{Hz}$, $V_i = 15 \sim 25\text{V}$		80		dB
Dropout Voltage	V_D	$T_j = 25^{\circ}\text{C}$, $I_o = 500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j = 25^{\circ}\text{C}$, $V_i = 35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j = 25^{\circ}\text{C}$		900		mA

Notes:

Load and line regulation are specified at constant junction temperature. Change in V_o due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (78M15)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=23\text{V}$, unless otherwise specified, $C_i = 0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o = 5\text{mA} \sim 350\text{mA}$ $V_i = 17.5 \sim 30\text{V}$	14.25	15	15.75	V
Line Regulation(Note)	ΔV_o	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$ $V_i = 17.5\text{V} \sim 30\text{V}$			100	mV
		$V_i = 20\text{V} \sim 30\text{V}$			50	
Load Regulation(Note)	ΔV_o	$T_j = 25^{\circ}\text{C}$ $I_o = 5\text{mA} \sim 500\text{mA}$			300	mV
		$I_o = 5\text{mA} \sim 200\text{mA}$			150	
Quiescent Current	I_Q	$T_j = 25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o=5\text{mA} \sim 350\text{mA}$			0.5	mA
		$I_o = 200\text{mA}$, $V_i = 17.5 \sim 30\text{V}$			0.8	
Output Voltage Drift	$\Delta V / \Delta T$	$I_o = 5\text{mA}$, $T_j = 0 \sim 125^{\circ}\text{C}$		-1.0		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz} \sim 100\text{KHz}$		100		μV
Ripple Rejection	RR	$f = 120\text{Hz}$, $V_i = 18.5 \sim 28.5\text{V}$		70		dB
Dropout Voltage	V_D	$T_j = 25^{\circ}\text{C}$, $I_o = 500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j = 25^{\circ}\text{C}$, $V_i = 35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j = 25^{\circ}\text{C}$		900		mA

Notes:

Load and line regulation are specified at constant junction temperature. Change in V_o due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (78M18)

(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=26\text{V}$, unless otherwise specified, $C_i = 0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o = 5\text{mA} \sim 350\text{mA}$ $V_i = 20.5 \sim 33\text{V}$	17.1	18	18.9	V
Line Regulation(Note)	ΔV_o	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$			100	mV
		$V_i = 24\text{V} \sim 33\text{V}$			50	
Load Regulation(Note)	ΔV_o	$T_j = 25^{\circ}\text{C}$			360	mV
		$I_o = 5\text{mA} \sim 200\text{mA}$			180	
Quiescent Current	I_Q	$T_j = 25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o=5\text{mA} \sim 350\text{mA}$			0.5	mA
		$I_o = 200\text{mA}$, $V_i = 21 \sim 33\text{V}$			0.8	
Output Voltage Drift	$\Delta V / \Delta T$	$I_o = 5\text{mA}$, $T_j = 0 \sim 125^{\circ}\text{C}$		-1.2		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz} \sim 100\text{KHz}$		100		μV
Ripple Rejection	RR	$f = 120\text{Hz}$, $V_i = 22 \sim 32\text{V}$		70		dB
Dropout Voltage	V_D	$T_j = 25^{\circ}\text{C}$, $I_o = 500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j = 25^{\circ}\text{C}$, $V_i = 35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j = 25^{\circ}\text{C}$		900		mA

Notes:

Load and line regulation are specified at constant junction temperature. Change in V_o due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (78M24)

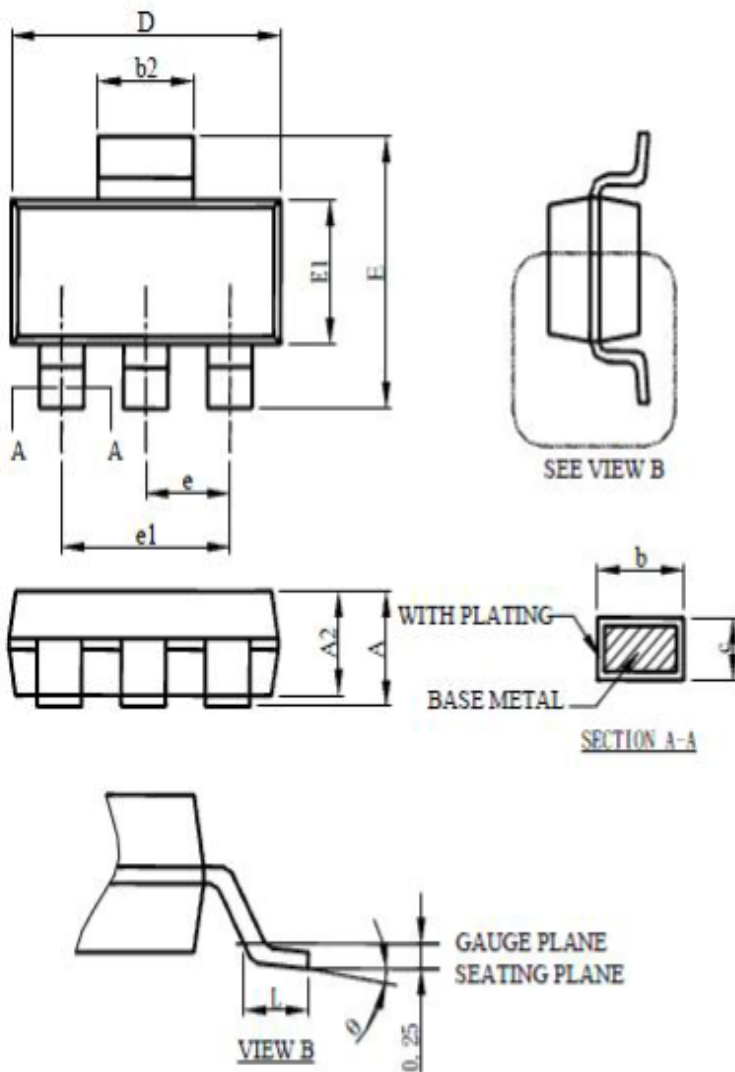
(Refer to the test circuits, $0 < T_j < +125^{\circ}\text{C}$, $I_o=350\text{mA}$, $V_i=33\text{V}$, unless otherwise specified, $C_i = 0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_o	$I_o = 5\text{mA} \sim 350\text{mA}$ $V_i = 27 \sim 38\text{V}$	22.8	24	25.2	V
Line Regulation(Note)	ΔV_o	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$			100	mV
		$V_i = 27\text{V} \sim 38\text{V}$ $V_i = 28\text{V} \sim 38\text{V}$			50	
Load Regulation(Note)	ΔV_o	$T_j = 25^{\circ}\text{C}$			480	mV
		$I_o = 5\text{mA} \sim 500\text{mA}$ $I_o = 5\text{mA} \sim 200\text{mA}$			240	
Quiescent Current	I_Q	$T_j = 25^{\circ}\text{C}$			6.0	mA
Quiescent Current Change	ΔI_Q	$I_o=5\text{mA} \sim 350\text{mA}$			0.5	mA
		$I_o = 200\text{mA}$, $V_i = 27 \sim 38\text{V}$			0.8	
Output Voltage Drift	$\Delta V / \Delta T$	$I_o = 5\text{mA}$, $T_j = 0 \sim 125^{\circ}\text{C}$		-1.2		mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz} \sim 100\text{KHz}$		170		μV
Ripple Rejection	RR	$f = 120\text{Hz}$, $V_i = 28 \sim 38\text{V}$		70		dB
Dropout Voltage	V_D	$T_j = 25^{\circ}\text{C}$, $I_o = 500\text{mA}$		2		V
Short Circuit Current	I_{SC}	$T_j = 25^{\circ}\text{C}$, $V_i = 35\text{V}$		800		mA
Peak Current	I_{PK}	$T_j = 25^{\circ}\text{C}$		900		mA

Notes:

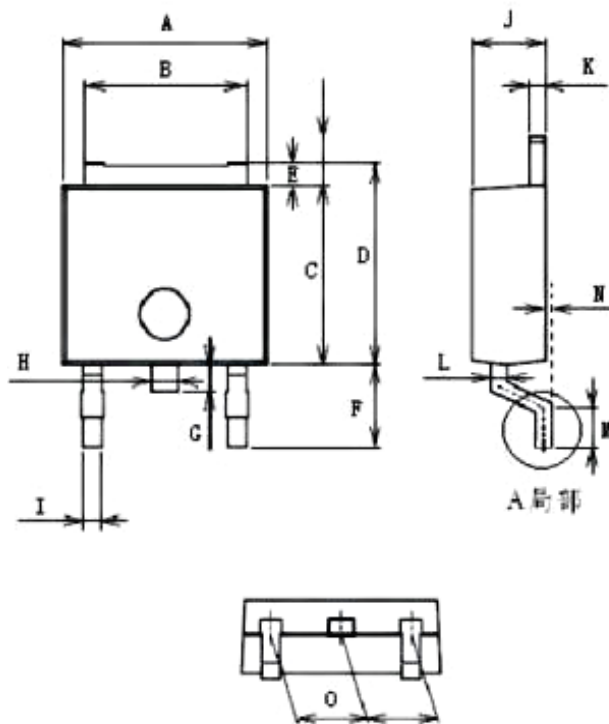
Load and line regulation are specified at constant junction temperature. Change in V_o due to heating effects must be taken into account separately. Pulse testing with low duty is used.

SOT-223 Package Information



SYMBOL	SOT-223	
	MILLIMETERS	
	MIN.	MAX.
A		1.80
A1	0.02	0.10
A2	1.55	1.65
b	0.66	0.84
b2	2.90	3.10
c	0.23	0.33
D	6.30	6.70
E	6.70	7.30
E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.90	
θ	0°	8°

TO-252 Package Information



Unit: mm

Item	Min	Max
A	6.40	6.70
B	5.20	5.40
C	6.00	6.30
D	6.55	6.85
E	0.45	0.60
F	3.07	3.35
G	0.85	1.05
H	0.75	0.95
I	0.55	0.75
J	2.20	2.40
K	0.43	0.58
L	0.43	0.58
M	0.90	1.10
N	0.90	1.10
O	2.20	2.40