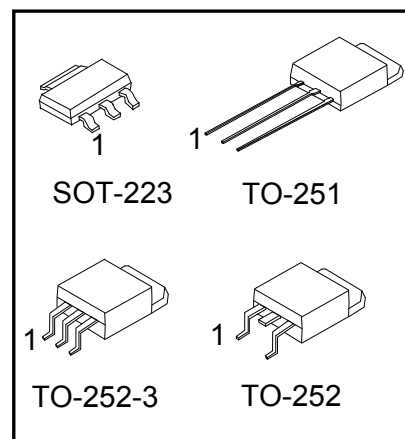


## Features

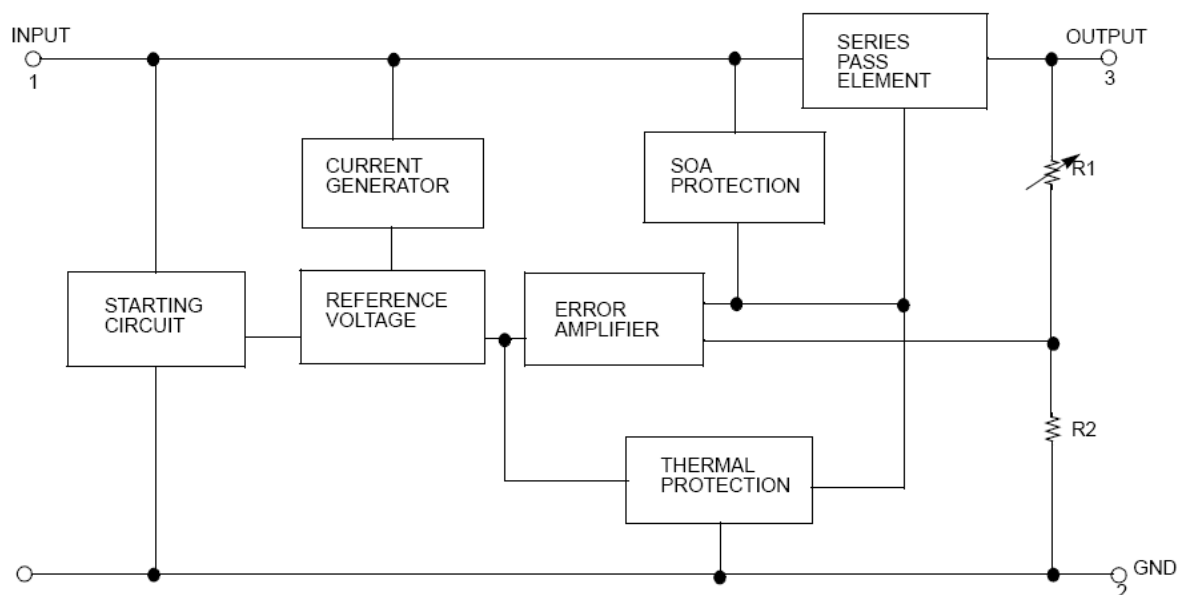
- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 12, 15, 18, 24V
- Thermal Overload Protection Short Circuit Protection
- Output Transistor Safe Operating area (SOA)Protection

## Description

The 78DXX 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 ( $T_C=25^{\circ}C$ )	SOT-223	8.3	W
	TO-251/TO-252	10	
	TO-252-3		
Operating Junction Temperature	$T_J$	-40 ~ 120	
Storage Temperature	$T_{STG}$	-55 ~ +150	

**Thermal Data**

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

**Electrical Characteristics (78D05)**

(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,  $C_1 = 0.33\mu\text{F}$ ,  $C_O=0.1\mu\text{F}$ )

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)	$\Delta V_O$	$I_O = 200\text{mA}$ $T_J = 25^{\circ}\text{C}$	$V_I = 7\text{V} \sim 25\text{V}$		100	mV
			$V_I = 8\text{V} \sim 25\text{V}$		50	
Load Regulation(Note)	$\Delta V_O$	$T_J = 25^{\circ}\text{C}$	$I_O = 5\text{mA} \sim 500\text{mA}$		100	mV
			$I_O = 5\text{mA} \sim 200\text{mA}$		50	
Quiescent Current	$I_Q$	$T_J = 25^{\circ}\text{C}$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA} \sim 350\text{mA}$			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/°C
Output Noise Voltage	$V_N$	$f = 10\text{Hz} \sim 100\text{KHz}$		40		$\mu\text{V}$
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 (78D06)

(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)	$\Delta V_o$	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$	$V_i = 8\text{V} \sim 25\text{V}$		100	mV
			$V_i = 9\text{V} \sim 25\text{V}$		50	
Load Regulation(Note)	$\Delta V_o$	$T_j = 25^{\circ}\text{C}$	$I_o = 5\text{mA} \sim 500\text{mA}$		120	mV
			$I_o = 5\text{mA} \sim 200\text{mA}$		60	
Quiescent Current	$I_Q$	$T_j = 25^{\circ}\text{C}$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$I_o = 5\text{mA} \sim 350\text{mA}$			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		$\mu\text{V}$
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 (78D08)

(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)	$\Delta V_o$	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$	$V_i = 10.5\text{V} \sim 25\text{V}$		100	mV
			$V_i = 11\text{V} \sim 25\text{V}$		50	
Load Regulation(Note)	$\Delta V_o$	$T_j = 25^{\circ}\text{C}$	$I_o = 5\text{mA} \sim 500\text{mA}$		160	mV
			$I_o = 5\text{mA} \sim 200\text{mA}$		80	
Quiescent Current	$I_q$	$T_j = 25^{\circ}\text{C}$			8.0	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5\text{mA} \sim 350\text{mA}$			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		$\mu\text{V}$
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	$I_{SC}$	$T_j = 25$ , $V_i = 35\text{V}$		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 (78D09)

(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)	$\Delta V_o$	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$	$V_i = 11.5\text{V} \sim 25\text{V}$		100	mV
			$V_i = 12\text{V} \sim 25\text{V}$		50	
Load Regulation(Note)	$\Delta V_o$	$T_j = 25^{\circ}\text{C}$	$I_o = 5\text{mA} \sim 500\text{mA}$		180	mV
			$I_o = 5\text{mA} \sim 200\text{mA}$		90	
Quiescent Current	$I_q$	$T_j = 25^{\circ}\text{C}$			8.0	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5\text{mA} \sim 350\text{mA}$			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		$\mu\text{V}$
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 (78D12)

(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)	$\Delta V_o$	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$	$V_i = 14.5\text{V} \sim 30\text{V}$		100	mV
			$V_i = 16\text{V} \sim 30\text{V}$		50	
Load Regulation(Note)	$\Delta V_o$	$T_j = 25^{\circ}\text{C}$	$I_o = 5\text{mA} \sim 500\text{mA}$		240	mV
			$I_o = 5\text{mA} \sim 200\text{mA}$		120	
Quiescent Current	$I_Q$	$T_j = 25^{\circ}\text{C}$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$I_o = 5\text{mA} \sim 350\text{mA}$			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		$\mu\text{V}$
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	$I_{SC}$	$T_j = 25$ , $V_i = 35\text{V}$		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 (78D15)

(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)	$\Delta V_o$	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$	$V_i = 17.5\text{V} \sim 30\text{V}$		100	mV
			$V_i = 20\text{V} \sim 30\text{V}$		50	
Load Regulation(Note)	$\Delta V_o$	$T_j = 25^{\circ}\text{C}$	$I_o = 5\text{mA} \sim 500\text{mA}$		300	mV
			$I_o = 5\text{mA} \sim 200\text{mA}$		150	
Quiescent Current	$I_q$	$T_j = 25^{\circ}\text{C}$			8.0	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5\text{mA} \sim 350\text{mA}$			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		$\mu\text{V}$
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 (78D18)

(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)	$\Delta V_o$	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$	$V_i = 21\text{V} \sim 33\text{V}$		100	mV
			$V_i = 24\text{V} \sim 33\text{V}$		50	
Load Regulation(Note)	$\Delta V_o$	$T_j = 25^{\circ}\text{C}$	$I_o = 5\text{mA} \sim 500\text{mA}$		360	mV
			$I_o = 5\text{mA} \sim 200\text{mA}$		180	
Quiescent Current	$I_q$	$T_j = 25^{\circ}\text{C}$			8.0	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5\text{mA} \sim 350\text{mA}$			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		$\mu\text{V}$
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	$I_{SC}$	$T_j = 25$ , $V_i = 35\text{V}$		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 (78D24)

(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)	$\Delta V_o$	$I_o = 200\text{mA}$ $T_j = 25^{\circ}\text{C}$	$V_i = 27\text{V} \sim 38\text{V}$		100	mV
			$V_i = 28\text{V} \sim 38\text{V}$		50	
Load Regulation(Note)	$\Delta V_o$	$T_j = 25^{\circ}\text{C}$	$I_o = 5\text{mA} \sim 500\text{mA}$		480	mV
			$I_o = 5\text{mA} \sim 200\text{mA}$		240	
Quiescent Current	$I_q$	$T_j = 25^{\circ}\text{C}$			8.0	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5\text{mA} \sim 350\text{mA}$			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		$\mu\text{V}$
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	$I_{SC}$	$T_j = 25$ , $V_i = 35\text{V}$		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.

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