

## 3-TERMINALS 0.5A POSITIVE VOLTAGE REGULATOR

TO-252W

### DESCRIPTION

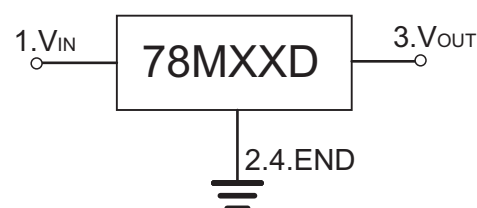
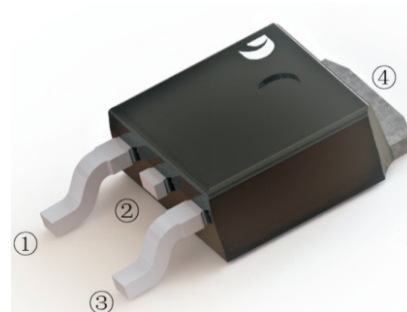
The 78MXXD family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current to 0.5A

### Features

- Peak output current to 0.5A
- Fixed output voltage of 5V, 6V, 8V, 9V, 12V, 15V available
- Thermal overload shutdown protection.
- Short circuit current limiting.
- Output transistor SOA protection.

### Mechanical data

- Case: TO-252W
- Approx. Weight: 0.315g (0.011oz)
- Lead free finish, RoHS compliant
- Case Material: "Green" molding compound, UL flammability classification 94V-0, "Halogen-free".



### ABSOLUTE MAXIMUM RATINGS (TA=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage	$V_{OUT}=5\sim 15V$	$V_{IN}$	35	V
Output Current		$I_{OUT}$	0.5	A
Power Dissipation (TC=25°C)		$P_D$	15	W
Junction Temperature		$T_J$	+150	°C
Operating Temperature		$T_{OPR}$	-40~+85	°C
Storage Temperature		$T_{STG}$	-55~+150	°C

Notes: 1. Absolute maximum ratings are stress ratings only and functional device operation is not implied. the device could be damaged beyond Absolute maximum ratings.

2. The maximum steady state usable output current are dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB. The data are showed as electrical characteristics table represents pulse test conditions with junction temperatures specified at the initiation of test.

### THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$R_{thJA}$	61.54	°C/W
Junction to Case	$R_{thJC}$	7.48	°C/W



**ELECTRICAL CHARACTERISTICS**

(T<sub>J</sub>=25°C, C<sub>I</sub>=0.33uF, C<sub>O</sub>=0.1uF, P<sub>D</sub>≤15W, unless otherwise specified)

78M05D(V<sub>IN</sub>=10V,I<sub>OUT</sub>=0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	Min	Typ	Max	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =10V,I <sub>OUT</sub> =350mA	4.8	5.00	5.2	V
		V <sub>IN</sub> =7~20V, I <sub>OUT</sub> =5mA~350mA	4.75		5.25	V
Load Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =10V,I <sub>OUT</sub> =5mA~0.5A			100	mV
		V <sub>IN</sub> =10V,I <sub>OUT</sub> =5mA~0.2A			50	mV
Line Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =7~25V,I <sub>OUT</sub> =200mA			100	mV
		V <sub>IN</sub> =8~25V,I <sub>OUT</sub> =200mA			50	mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =350mA,V <sub>i</sub> =10V			6.0	mA
Quiescent Current Change	Δ I <sub>Q</sub>	V <sub>IN</sub> =8~25V,I <sub>o</sub> =200mA			0.8	mA
		I <sub>OUT</sub> =5mA~350mA,V <sub>i</sub> =10V			0.5	mA
Peak Output Current	I <sub>PEAK</sub>	V <sub>IN</sub> =10V		2.0		A
Short-Circuit Current	I <sub>sc</sub>	V <sub>IN</sub> =35V		200		mA
Dropout Voltage	V <sub>D</sub>			2.0		V

78M06D(V<sub>IN</sub>=11V,I<sub>OUT</sub>=0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	Min	Typ	Max	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =11V,I <sub>OUT</sub> =350mA	5.75	6.00	6.25	V
		V <sub>IN</sub> =8~21V, I <sub>OUT</sub> =5mA~350mA	5.7		6.3	V
Load Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =11V,I <sub>OUT</sub> =5mA~0.5A			120	mV
		V <sub>IN</sub> =11V,I <sub>OUT</sub> =5mA~0.2A			60	mV
Line Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =8~25V,I <sub>OUT</sub> =200mA			100	mV
		V <sub>IN</sub> =9~20V,I <sub>OUT</sub> =200mA			50	mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =350mA,V <sub>i</sub> =10V			6.0	mA
Quiescent Current Change	Δ I <sub>Q</sub>	V <sub>IN</sub> =9~25V,I <sub>o</sub> =200mA			0.8	mA
		I <sub>OUT</sub> =5mA~350mA,V <sub>i</sub> =14V			0.5	mA
Peak Output Current	I <sub>PEAK</sub>	V <sub>IN</sub> =10V		2.0		A
Short-Circuit Current	I <sub>sc</sub>	V <sub>IN</sub> =35V		200		mA
Dropout Voltage	V <sub>D</sub>			2.0		V



78M08D(V<sub>IN</sub>=14V,I<sub>OUT</sub>=0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	Min	Typ	Max	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =14V,I <sub>OUT</sub> =350mA	7.7	8.00	8.3	V
		V <sub>IN</sub> =10.5~23V, I <sub>o</sub> =5mA~350mA	7.6		8.4	V
Load Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =14V,I <sub>OUT</sub> =5mA~0.5A			160	mV
		V <sub>IN</sub> =14V,I <sub>OUT</sub> =5mA~0.2A			80	mV
Line Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =10.5~25V,I <sub>OUT</sub> =200mA			100	mV
		V <sub>IN</sub> =11~25V,I <sub>OUT</sub> =200mA			50	mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =350mA,V <sub>i</sub> =14V			6.0	mA
Quiescent Current Change	Δ I <sub>Q</sub>	V <sub>IN</sub> =10.5~25V,I <sub>o</sub> =200mA			0.8	mA
		I <sub>OUT</sub> =5mA~350mA,V <sub>i</sub> =14V			0.5	mA
Peak Output Current	I <sub>PEAK</sub>	V <sub>IN</sub> =10V		2.0		A
Short-Circuit Current	I <sub>sc</sub>	V <sub>IN</sub> =35V		200		mA
Dropout Voltage	V <sub>D</sub>			2.0		V

78M09D(V<sub>IN</sub>=16V,I<sub>OUT</sub>=0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	Min	Typ	Max	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =16V,I <sub>OUT</sub> =350mA	8.73	9.00	9.27	V
		V <sub>IN</sub> =11.5~24V, I <sub>o</sub> =5mA~350mA	8.55		9.45	V
Load Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =15V,I <sub>OUT</sub> =5mA~0.5A			180	mV
		V <sub>IN</sub> =15V,I <sub>OUT</sub> =5mA~0.2A			90	mV
Line Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =11.5~25V,I <sub>OUT</sub> =200mA			100	mV
		V <sub>IN</sub> =12~25V,I <sub>OUT</sub> =200mA			50	mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =350mA,V <sub>i</sub> =10V			6.0	mA
Quiescent Current Change	Δ I <sub>Q</sub>	V <sub>IN</sub> =11.5~25V,I <sub>o</sub> =200mA			0.8	mA
		I <sub>OUT</sub> =5mA~350mA,V <sub>i</sub> =15V			0.5	mA
Peak Output Current	I <sub>PEAK</sub>	V <sub>IN</sub> =10V		2.0		A
Short-Circuit Current	I <sub>sc</sub>	V <sub>IN</sub> =35V		200		mA
Dropout Voltage	V <sub>D</sub>			2.0		V



78M12D(VIN=19V,IOUT=0.5A)

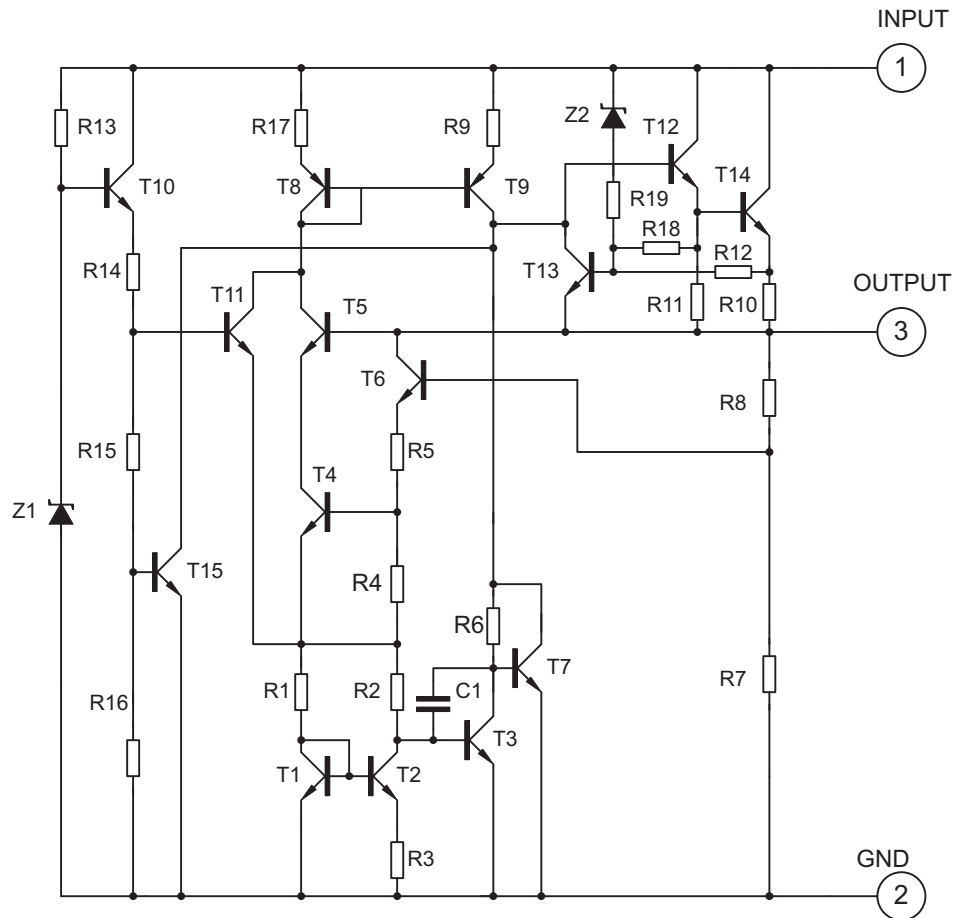
PARAMETER	SYMBOL	TEST CONDITIONS	Min	Typ	Max	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =19V,I <sub>OUT</sub> =350mA	11.5	12.0	12.5	V
		V <sub>IN</sub> =14.5~27V, I <sub>o</sub> =5mA~350mA	11.4		12.6	V
Load Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =19V,I <sub>OUT</sub> =5mA~0.5A			240	mV
		V <sub>IN</sub> =19V,I <sub>OUT</sub> =5mA~0.2A			120	mV
Line Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =14.5~30V,I <sub>OUT</sub> =200mA			100	mV
		V <sub>IN</sub> =16~30V,I <sub>OUT</sub> =200mA			50	mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =350mA,V <sub>i</sub> =19V			6.0	mA
Quiescent Current Change	Δ I <sub>Q</sub>	V <sub>IN</sub> =14.5~30V,I <sub>o</sub> =200mA			0.8	mA
		I <sub>OUT</sub> =5mA~350mA,V <sub>i</sub> =19V			0.5	mA
Peak Output Current	I <sub>PEAK</sub>	V <sub>IN</sub> =10V		2.0		A
Short-Circuit Current	I <sub>sc</sub>	V <sub>IN</sub> =35V		200		mA
Dropout Voltage	V <sub>D</sub>			2.0		V

78M15D(VIN=23V,IOUT=0.5A)

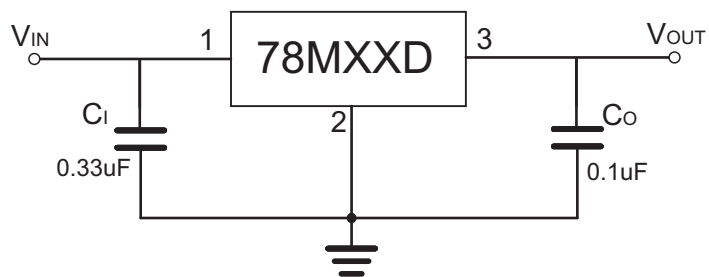
PARAMETER	SYMBOL	TEST CONDITIONS	Min	Typ	Max	UNIT
Output Voltage	V <sub>OUT</sub>	V <sub>IN</sub> =23V,I <sub>OUT</sub> =350mA	14.5	15.0	15.5	V
		V <sub>IN</sub> =17.5~30V, I <sub>o</sub> =5mA~350mA	14.4		15.6	V
Load Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =23V,I <sub>OUT</sub> =5mA~0.5A			300	mV
		V <sub>IN</sub> =23V,I <sub>OUT</sub> =5mA~0.2A			150	mV
Line Regulation	Δ V <sub>OUT</sub>	V <sub>IN</sub> =17.5~30V,I <sub>OUT</sub> =200mA			100	mV
		V <sub>IN</sub> =20~30V,I <sub>OUT</sub> =200mA			50	mV
Quiescent Current	I <sub>Q</sub>	I <sub>OUT</sub> =350mA,V <sub>i</sub> =23V			6.0	mA
Quiescent Current Change	Δ I <sub>Q</sub>	V <sub>IN</sub> =17.5~30V,I <sub>o</sub> =200mA			0.8	mA
		I <sub>OUT</sub> =5mA~350mA,V <sub>i</sub> =23V			0.5	mA
Peak Output Current	I <sub>PEAK</sub>	V <sub>IN</sub> =10V		2.0		A
Short-Circuit Current	I <sub>sc</sub>	V <sub>IN</sub> =35V		200		mA
Dropout Voltage	V <sub>D</sub>			2.0		V



BLOCK DIAGRAM



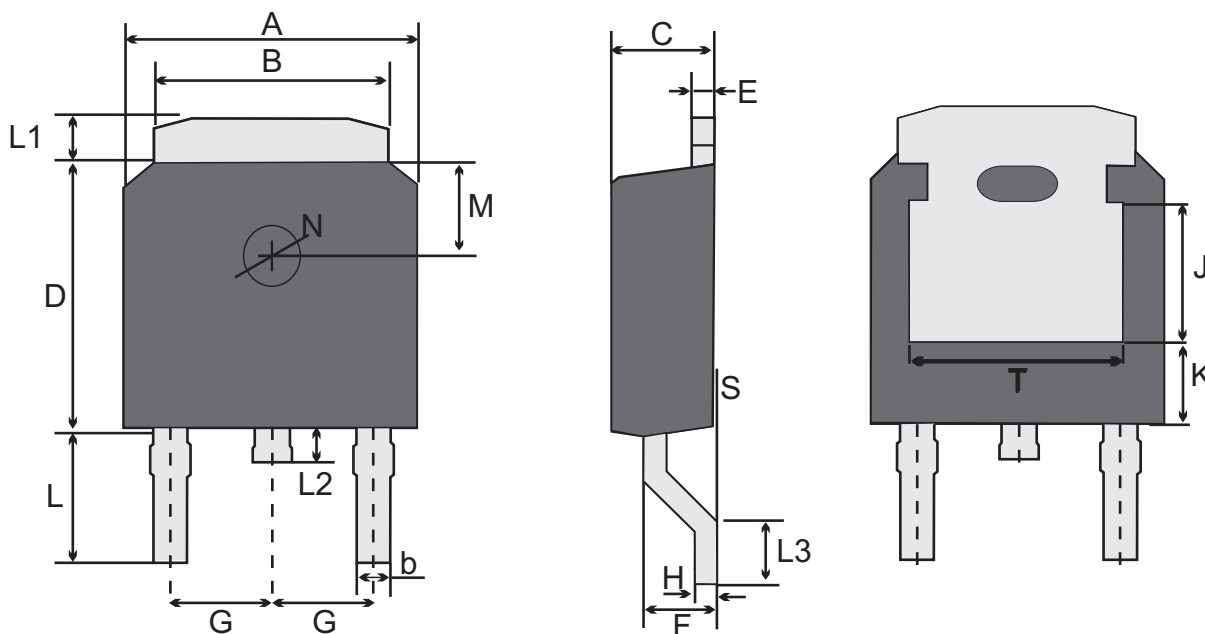
APPLICATION CIRCUIT



Note: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.



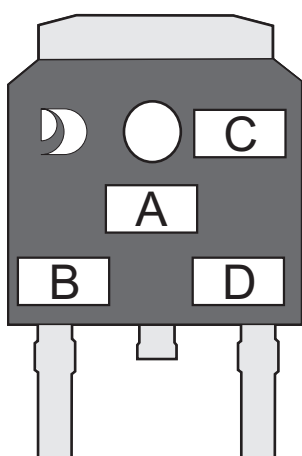
TO-252W(D-PAK) Package Outline Dimensions



TO-252W(D-PAK) mechanical data

UNIT	A	B	b	C	D	E	F	G	H	L	L1	L2	L3	S	M	N	J	K	T	
mm	max	6.7	5.5	0.8	2.5	6.3	0.6	1.8	2.29 TYPICAL	0.55	3.1	1.2	1.0	1.75	0.23	1.8 TYPICAL	1.3 TYPICAL	3.16 ref.	1.80 ref.	4.83 ref.
	typ	6.6	5.3	0.7	2.3	6.1	0.5	1.5		0.50	2.5	1.0	0.6	1.30	0.15					
	min	6.3	5.1	0.3	2.1	5.9	0.4	1.3		0.45	2.7	0.8	0.6	1.00	0.0					
mil	max	264	217	31	98	248	24	71	90 TYPICAL	22	122	47	39	69	9	71 TYPICAL	51 TYPICAL	124 ref.	71 ref.	190 ref.
	typ	260	209	28	90	240	20	59		20	98	39	24	51	6					
	min	248	201	12	83	232	16	51		18	106	31	24	55	0					

MARKING DIAGRAM



- Unmarkable Surfacea
- Marking Composition Field
- A: Marking Area
- B: Lot Code
- C: Additional Information
- D: Date Code (YWW)
- Y: Years(0~9)
- WW: Week



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