

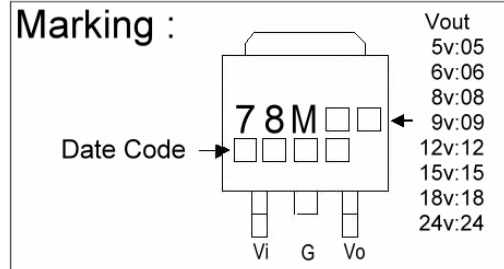
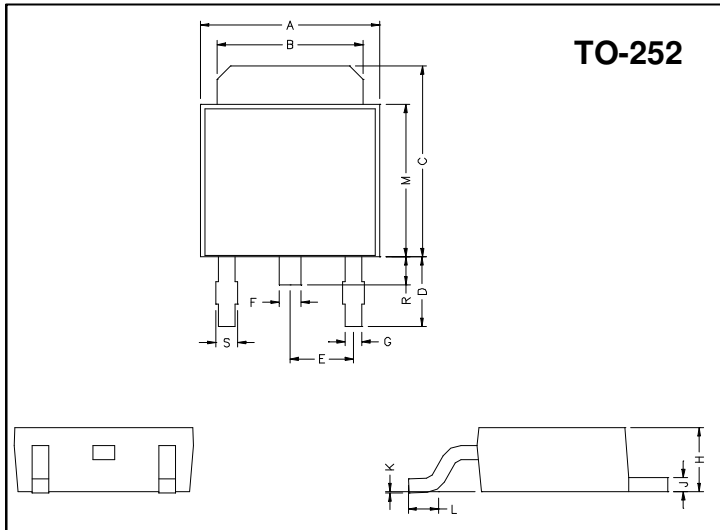
## GJ78MXX

### 3-TERMINAL POSITIVE VOLTAGE REGULATOR

#### Description

The GJ78MXX series of three-terminal positive regulators are available in the TO-252 package and with 5V, 6V, 8V, 9V, 12V, 15V, 18V and 24V 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 operating 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 voltages and currents. GJ78MXX is characterized for operation from 0°C to +125°C.

#### Package Dimensions



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	6.40	6.80	G	0.50	0.70
B	5.20	5.50	H	2.20	2.40
C	6.80	7.20	J	0.45	0.55
D	2.40	3.00	K	0	0.15
E	2.30 REF.		L	0.90	1.50
F	0.70	0.90	M	5.40	5.80
S	0.60	0.90	R	0.80	1.20

#### Absolute Maximum Ratings

Parameter	Ratings	Unit
Input Voltage	35V	V
Operating Temperature Range	0 ~ +125	°C
Output Current	500	mA
Storage Temperature Range	-65 ~ +150	°C
Total Power Dissipation	1.0*	W

\*Reduced by 8mW for each increase in Ta of 1°C over 25°C (without heat sink)

#### Electrical Characteristics

**GJ78M05** (Refer to the test circuits, Ta=25°C, Io=350mA, Vin=10V, Cin=0.33μF, Co=0.1μF unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
VO	4.80	5.0	5.20	V	Io=350mA 7.5V ≤ Vin ≤ 20V, 5mA ≤ Io ≤ 350mA
	4.75	-	5.25		
ΔVO (Line Regulation)	-	3	100	mV	7V ≤ Vin ≤ 25V, Io=200mA
	-	1	50		8V ≤ Vin ≤ 12V, Io=200mA
ΔVO (Load Regulation)	-	30	100	mV	5mA ≤ Io ≤ 500mA
	-	12	50		5mA ≤ Io ≤ 200mA
IQ	-	3.0	6.0	mA	Io=0mA
ΔIQ	-	-	0.5	mA	5mA ≤ Io ≤ 350mA
	-	-	0.8		8V ≤ Vin ≤ 25V, Io=200mA
Vn	-	40	-	μV	10Hz ≤ f ≤ 100KHz
RR	62	-	-	dB	8V ≤ Vin ≤ 18V, f=120Hz, Io=100mA, eN=1Vrms
VD	-	2.0	-	V	Io=500mA
Isc	-	400	-	mA	Vin=25V
Ipk	-	700	-	mA	Tj=25°C
ΔVo / ΔTj	-	-1.0	-	mV/°C	Io=5mA, 0°C ≤ Tj ≤ 125°C

**GJ78M06** (Refer to the test circuits,  $T_a=25^{\circ}\text{C}$ ,  $I_o=350\text{mA}$ ,  $V_{in}=11\text{V}$ ,  $C_{in}=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
VO	5.76	6.0	6.24	V	$I_o=350\text{mA}$
	5.70	-	6.30		$8.5\text{V} \leq V_{in} \leq 21\text{V}$ , $5\text{mA} \leq I_o \leq 350\text{mA}$
$\Delta\text{VO}$ (Line Regulation)	-	3	100	mV	$8\text{V} \leq V_{in} \leq 25\text{V}$ , $I_o=200\text{mA}$
	-	1	50		$9\text{V} \leq V_{in} \leq 25\text{V}$ , $I_o=200\text{mA}$
$\Delta\text{VO}$ (Load Regulation)	-	30	120	mV	$5\text{mA} \leq I_o \leq 500\text{mA}$
	-	15	60		$5\text{mA} \leq I_o \leq 200\text{mA}$
IQ	-	3.0	6.0	mA	$I_o=0\text{mA}$
$\Delta\text{IQ}$	-	-	0.5	mA	$5\text{mA} \leq I_o \leq 350\text{mA}$
	-	-	0.8		$9\text{V} \leq V_{in} \leq 25\text{V}$ , $I_o=200\text{mA}$
Vn	-	60	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$
RR	60	-	-	dB	$9\text{V} \leq V_{in} \leq 19\text{V}$ , $f=120\text{Hz}$ , $I_o=100\text{mA}$ , $e_{IN}=1\text{Vrms}$
VD	-	2.0	-	V	$I_o=500\text{mA}$
Isc	-	400	-	mA	$V_{in}=25\text{V}$
Ipk	-	700	-	mA	$T_j=25^{\circ}\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.5	-	$\text{mV}/^{\circ}\text{C}$	$I_o=5\text{mA}$ , $0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$

**GJ78M08** (Refer to the test circuits,  $T_a=25^{\circ}\text{C}$ ,  $I_o=350\text{mA}$ ,  $V_{in}=14\text{V}$ ,  $C_{in}=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
VO	7.68	8.0	8.32	V	$I_o=350\text{mA}$
	7.60	-	8.40		$10.5\text{V} \leq V_{in} \leq 23\text{V}$ , $5\text{mA} \leq I_o \leq 350\text{mA}$
$\Delta\text{VO}$ (Line Regulation)	-	4	100	mV	$10.5\text{V} \leq V_{in} \leq 25\text{V}$ , $I_o=200\text{mA}$
	-	1	50		$11\text{V} \leq V_{in} \leq 12\text{V}$ , $I_o=200\text{mA}$
$\Delta\text{VO}$ (Load Regulation)	-	30	160	mV	$5\text{mA} \leq I_o \leq 500\text{mA}$
	-	15	80		$5\text{mA} \leq I_o \leq 200\text{mA}$
IQ	-	3.0	6.0	mA	$I_o=0\text{mA}$
$\Delta\text{IQ}$	-	-	0.5	mA	$5\text{mA} \leq I_o \leq 350\text{mA}$
	-	-	0.8		$10.5\text{V} \leq V_{in} \leq 25\text{V}$ , $I_o=200\text{mA}$
Vn	-	80	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$
RR	56	-	-	dB	$11.5\text{V} \leq V_{in} \leq 21.5\text{V}$ , $f=120\text{Hz}$ , $I_o=100\text{mA}$ , $e_{IN}=1\text{Vrms}$
VD	-	2.0	-	V	$I_o=500\text{mA}$
Isc	-	400	-	mA	$V_{in}=25\text{V}$
Ipk	-	700	-	mA	$T_j=25^{\circ}\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.5	-	$\text{mV}/^{\circ}\text{C}$	$I_o=5\text{mA}$ , $0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$

**GJ78M09** (Refer to the test circuits,  $T_a=25^{\circ}\text{C}$ ,  $I_o=350\text{mA}$ ,  $V_{in}=15\text{V}$ ,  $C_{in}=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
VO	8.64	9.0	9.36	V	$I_o=350\text{mA}$
	8.55	-	9.45		$11.5\text{V} \leq V_{in} \leq 24\text{V}$ , $5\text{mA} \leq I_o \leq 350\text{mA}$
$\Delta\text{VO}$ (Line Regulation)	-	4	100	mV	$11.5\text{V} \leq V_{in} \leq 26\text{V}$ , $I_o=200\text{mA}$
	-	2	50		$12\text{V} \leq V_{in} \leq 25\text{V}$ , $I_o=200\text{mA}$
$\Delta\text{VO}$ (Load Regulation)	-	30	180	mV	$5\text{mA} \leq I_o \leq 500\text{mA}$
	-	15	90		$5\text{mA} \leq I_o \leq 200\text{mA}$
IQ	-	3.5	6.0	mA	$I_o=0\text{mA}$
$\Delta\text{IQ}$	-	-	0.5	mA	$5\text{mA} \leq I_o \leq 350\text{mA}$
	-	-	0.8		$12\text{V} \leq V_{in} \leq 25\text{V}$ , $I_o=200\text{mA}$
Vn	-	90	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$
RR	56	-	-	dB	$13\text{V} \leq V_{in} \leq 23\text{V}$ , $f=120\text{Hz}$ , $I_o=100\text{mA}$ , $e_{IN}=1\text{Vrms}$
VD	-	2.0	-	V	$I_o=500\text{mA}$
Isc	-	170	-	mA	$V_{in}=30\text{V}$
Ipk	-	700	-	mA	$T_j=25^{\circ}\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.5	-	$\text{mV}/^{\circ}\text{C}$	$I_o=5\text{mA}$ , $0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$

**GJ78M12** (Refer to the test circuits,  $T_a=25^{\circ}\text{C}$ ,  $I_o=350\text{mA}$ ,  $V_{in}=19\text{V}$ ,  $C_{in}=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
VO	11.52	12.0	12.48	V	$I_o=350\text{mA}$
	11.40	-	12.60		$15\text{V} \leq V_{in} \leq 27\text{V}$ , $5\text{mA} \leq I_o \leq 350\text{mA}$
$\Delta\text{VO}$ (Line Regulation)	-	5	100	mV	$14.5\text{V} \leq V_{in} \leq 30\text{V}$ , $I_o=200\text{mA}$
	-	3	50		$16\text{V} \leq V_{in} \leq 30\text{V}$ , $I_o=200\text{mA}$
$\Delta\text{VO}$ (Load Regulation)	-	30	240	mV	$5\text{mA} \leq I_o \leq 500\text{mA}$
	-	15	120		$5\text{mA} \leq I_o \leq 200\text{mA}$
IQ	-	3.5	6.0	mA	$I_o=0\text{mA}$
$\Delta\text{IQ}$	-	-	0.5	mA	$5\text{mA} \leq I_o \leq 350\text{mA}$
	-	-	0.8		$14.5\text{V} \leq V_{in} \leq 30\text{V}$ , $I_o=200\text{mA}$
Vn	-	110	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$
RR	55	-	-	dB	$15\text{V} \leq V_{in} \leq 25\text{V}$ , $f=120\text{Hz}$ , $I_o=100\text{mA}$ , $e_{IN}=1\text{Vrms}$
VD	-	2.0	-	V	$I_o=500\text{mA}$
Isc	-	170	-	mA	$V_{in}=30\text{V}$
Ipk	-	700	-	mA	$T_j=25^{\circ}\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.5	-	$\text{mV}/^{\circ}\text{C}$	$I_o=5\text{mA}$ , $0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$

**GJ78M15** (Refer to the test circuits,  $T_a=25^{\circ}\text{C}$ ,  $I_o=350\text{mA}$ ,  $V_{in}=23\text{V}$ ,  $C_{in}=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
VO	14.40	15.0	15.60	V	$I_o=350\text{mA}$
	14.25	-	15.75		$17.5\text{V} \leq V_{in} \leq 30\text{V}$ , $5\text{mA} \leq I_o \leq 350\text{mA}$
$\Delta\text{VO}$ (Line Regulation)	-	6	100	mV	$17.5\text{V} \leq V_{in} \leq 30\text{V}$ , $I_o=200\text{mA}$
	-	3	50		$20\text{V} \leq V_{in} \leq 30\text{V}$ , $I_o=200\text{mA}$
$\Delta\text{VO}$ (Load Regulation)	-	30	300	mV	$5\text{mA} \leq I_o \leq 500\text{mA}$
	-	15	150		$5\text{mA} \leq I_o \leq 200\text{mA}$
IQ	-	4.5	6.0	mA	$I_o=0\text{mA}$
$\Delta\text{IQ}$	-	-	0.5	mA	$5\text{mA} \leq I_o \leq 350\text{mA}$
	-	-	0.8		$17.5\text{V} \leq V_{in} \leq 30\text{V}$ , $I_o=200\text{mA}$
Vn	-	130	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$
RR	54	-	-	dB	$18.5\text{V} \leq V_{in} \leq 28.5\text{V}$ , $f=120\text{Hz}$ , $I_o=100\text{mA}$ , $e_{IN}=1\text{Vrms}$
VD	-	2.0	-	V	$I_o=500\text{mA}$
Isc	-	170	-	mA	$V_{in}=30\text{V}$
Ipk	-	700	-	mA	$T_j=25^{\circ}\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.6	-	$\text{mV}/^{\circ}\text{C}$	$I_o=5\text{mA}$ , $0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$

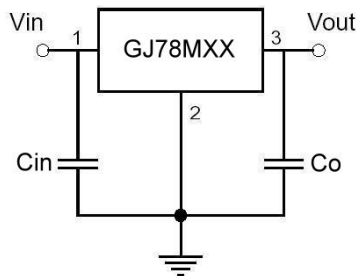
**GJ78M18** (Refer to the test circuits,  $T_a=25^{\circ}\text{C}$ ,  $I_o=350\text{mA}$ ,  $V_{in}=27\text{V}$ ,  $C_{in}=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
VO	17.28	18.0	18.72	V	$I_o=350\text{mA}$
	17.10	-	18.90		$21\text{V} \leq V_{in} \leq 33\text{V}$ , $5\text{mA} \leq I_o \leq 350\text{mA}$
$\Delta\text{VO}$ (Line Regulation)	-	7	100	mV	$21\text{V} \leq V_{in} \leq 33\text{V}$ , $I_o=200\text{mA}$
	-	3	50		$24\text{V} \leq V_{in} \leq 33\text{V}$ , $I_o=200\text{mA}$
$\Delta\text{VO}$ (Load Regulation)	-	30	360	mV	$5\text{mA} \leq I_o \leq 500\text{mA}$
	-	15	180		$5\text{mA} \leq I_o \leq 200\text{mA}$
IQ	-	4.5	6.0	mA	$I_o=0\text{mA}$
$\Delta\text{IQ}$	-	-	0.5	mA	$5\text{mA} \leq I_o \leq 350\text{mA}$
	-	-	0.8		$21\text{V} \leq V_{in} \leq 33\text{V}$ , $I_o=200\text{mA}$
Vn	-	140	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$
RR	53	-	-	dB	$22\text{V} \leq V_{in} \leq 32\text{V}$ , $f=120\text{Hz}$ , $I_o=100\text{mA}$ , $e_{IN}=1\text{Vrms}$
VD	-	2.0	-	V	$I_o=500\text{mA}$
Isc	-	170	-	mA	$V_{in}=30\text{V}$
Ipk	-	700	-	mA	$T_j=25^{\circ}\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.6	-	$\text{mV}/^{\circ}\text{C}$	$I_o=5\text{mA}$ , $0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$

**GJ78M24** (Refer to the test circuits,  $T_a=25^{\circ}\text{C}$ ,  $I_o=350\text{mA}$ ,  $V_{in}=33\text{V}$ ,  $C_{in}=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$  unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
VO	23.04	24.0	24.96	V	$I_o=350\text{mA}$
	22.80	-	25.20		$27\text{V} \leq V_{in} \leq 33\text{V}$ , $5\text{mA} \leq I_o \leq 350\text{mA}$
$\Delta\text{VO}$ (Line Regulation)	-	10	100	mV	$27\text{V} \leq V_{in} \leq 33\text{V}$ , $I_o=200\text{mA}$
	-	5	50		$28\text{V} \leq V_{in} \leq 33\text{V}$ , $I_o=200\text{mA}$
$\Delta\text{VO}$ (Load Regulation)	-	30	480	mV	$5\text{mA} \leq I_o \leq 500\text{mA}$
	-	15	240		$5\text{mA} \leq I_o \leq 200\text{mA}$
IQ	-	4.8	6.0	mA	$I_o=0\text{mA}$
$\Delta\text{IQ}$	-	-	0.5	mA	$5\text{mA} \leq I_o \leq 350\text{mA}$
	-	-	0.8		$27\text{V} \leq V_{in} \leq 33\text{V}$ , $I_o=200\text{mA}$
Vn	-	170	-	$\mu\text{V}$	$10\text{Hz} \leq f \leq 100\text{KHz}$
RR	50	-	-	dB	$28\text{V} \leq V_{in} \leq 38\text{V}$ , $f=120\text{Hz}$ , $I_o=100\text{mA}$ , $e_{IN}=1\text{Vrms}$
VD	-	2.0	-	V	$I_o=500\text{mA}$
Isc	-	170	-	mA	$V_{in}=30\text{V}$
Ipk	-	700	-	mA	$T_j=25^{\circ}\text{C}$
$\Delta\text{Vo} / \Delta\text{Tj}$	-	-0.7	-	$\text{mV}/^{\circ}\text{C}$	$I_o=5\text{mA}$ , $0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}$

## Typical Application



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