

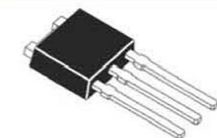
- **The implementation of standards:**  
 Seven post-secondary level: (Enterprise standard number: Q/PS QZJ07-2004)  
 QZJ840+15 "Seven special" Technical conditions  
 Prussians level: (Enterprise standard number: Q/PS 005-2004)  
 GB4589.1-89 (I Class) GB/T12750-91  
 Industrial Grade: (Enterprise standard number: Q/PS 005-2004)  
 GB4589.1-89 (I Class) GB/T12750-91
- **Main purposes:**  
 The role of regulator and protection for a variety of electrical appliances, electronic equipment, regulator circuit
- **Maximum Ratings**

Parameter		Symbol	Ratings	Unit
Input voltage ( $T_A=25^\circ\text{C}$ )	78M05~78M15	$V_i$	35	V
	78M18~78M24		40	
Output current		$I_o$	0.5	A
Total power dissipation ( $T_A=25^\circ\text{C}$ ) <sup>1)</sup>		$P_D$	1.3	W
Ambient temperature ( $T_C=25^\circ\text{C}$ ) <sup>2)</sup>		$P_D$	12	W
Work (tube shell) temperature		$T_{OP}$	-40~125	$^\circ\text{C}$
Storage temperature		$T_{stg}$	-55~150	$^\circ\text{C}$

In a well-ventilated

When the device is installed in  $T_C > 25^\circ\text{C}$  the radiator should be a derating

Three-terminal fixed output  
voltage regulator  
12W, 0.5A, 5V~24V



TO-251



TO-252

### 78M05 Electrical characteristics (Unless otherwise specified $0 \leq T_J \leq +125^\circ\text{C}$ , $V_i=10\text{V}$ , $I_o=350\text{mA}$ , $C_i=0.33\mu\text{F}$ , $C_o=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_o$	$T_J=25^\circ\text{C}$	4.8	5	5.2	V	
		$5\text{mA} \leq I_o \leq 350\text{mA}$ , $7\text{V} \leq V_i \leq 20\text{V}$	4.75	5	5.25		
Voltage Regulation	$S_v$	$T_J=25^\circ\text{C}$ $I_o=200\text{mA}$	$7\text{V} \leq V_i \leq 25\text{V}$	—	—	100	mV
			$8\text{V} \leq V_i \leq 25\text{V}$	—	—	50	
Current Regulation	$S_i$	$T_J=25^\circ\text{C}$	$5\text{mA} \leq I_o \leq 500\text{mA}$	—	—	100	mV
			$5\text{mA} \leq I_o \leq 200\text{mA}$	—	—	50	
Quiescent Current	$I_Q$	$T_J=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_o \leq 350\text{mA}$	—	—	0.5	mA	
		$I_o=200\text{mA}$ , $8\text{V} \leq V_i \leq 25\text{V}$	—	—	0.8		
Input - output differential pressure	$V_i - V_o$	$T_J=25^\circ\text{C}$ , $I_o=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_o=300\text{mA}$ , $8\text{V} \leq V_i \leq 18\text{V}$ , $f=120\text{Hz}$	—	78	—	dB	

### 78M06 Electrical characteristics (Unless otherwise specified $0 \leq T_J \leq +125^\circ\text{C}$ , $V_i=11\text{V}$ , $I_o=350\text{mA}$ , $C_i=0.33\mu\text{F}$ , $C_o=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_o$	$T_J=25^\circ\text{C}$	5.75	6	6.25	V	
		$5\text{mA} \leq I_o \leq 350\text{mA}$ , $8\text{V} \leq V_i \leq 21\text{V}$	5.7	6	6.3		
Voltage Regulation	$S_v$	$T_J=25^\circ\text{C}$ $I_o=200\text{mA}$	$8\text{V} \leq V_i \leq 25\text{V}$	—	—	100	mV
			$9\text{V} \leq V_i \leq 25\text{V}$	—	—	50	
Current Regulation	$S_i$	$T_J=25^\circ\text{C}$	$5\text{mA} \leq I_o \leq 500\text{mA}$	—	—	120	mV
			$5\text{mA} \leq I_o \leq 200\text{mA}$	—	—	60	
Quiescent Current	$I_Q$	$T_J=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_o \leq 350\text{mA}$	—	—	0.5	mA	
		$I_o=200\text{mA}$ , $9\text{V} \leq V_i \leq 25\text{V}$	—	—	0.8		
Input - output differential pressure	$V_i - V_o$	$T_J=25^\circ\text{C}$ , $I_o=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_o=300\text{mA}$ , $9\text{V} \leq V_i \leq 19\text{V}$ , $f=120\text{Hz}$	—	75	—	dB	

**78M08 Electrical characteristics** (Unless otherwise specified  $0 \leq T_j \leq +125^\circ\text{C}$ ,  $V_i=14\text{V}$ ,  $I_o=350\text{mA}$ ,  $C_i=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_o$	$T_j=25^\circ\text{C}$	7.7	8	8.3	V	
		$5\text{mA} \leq I_o \leq 350\text{mA}$ , $10.5\text{V} \leq V_i \leq 23\text{V}$	7.6	8	8.4		
Voltage Regulation	$S_v$	$T_j=25^\circ\text{C}$ $I_o=200\text{mA}$	$10.5\text{V} \leq V_i \leq 25\text{V}$	—	—	100	mV
			$11\text{V} \leq V_i \leq 25\text{V}$	—	—	50	
Current Regulation	$S_i$	$T_j=25^\circ\text{C}$	$5\text{mA} \leq I_o \leq 500\text{mA}$	—	—	160	mV
			$5\text{mA} \leq I_o \leq 200\text{mA}$ ,	—	—	80	
Quiescent Current	$I_Q$	$T_j=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_o \leq 350\text{mA}$ $I_o=200\text{mA}$ , $10.5\text{V} \leq V_i \leq 25\text{V}$	—	—	0.5	mA	
			—	—	0.8		
Input - output differential pressure	$V_i - V_o$	$T_j=25^\circ\text{C}$ , $I_o=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_o=300\text{mA}$ , $9\text{V} \leq V_i \leq 19\text{V}$ , $f=120\text{Hz}$	—	73	—	dB	

**78M09 Electrical characteristics** (Unless otherwise specified  $0 \leq T_j \leq +125^\circ\text{C}$ ,  $V_i=15\text{V}$ ,  $I_o=350\text{mA}$ ,  $C_i=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_o$	$T_j=25^\circ\text{C}$	8.6	9	9.4	V	
		$5\text{mA} \leq I_o \leq 350\text{mA}$ , $11.5\text{V} \leq V_i \leq 24\text{V}$	8.55	9	9.45		
Voltage Regulation	$S_v$	$T_j=25^\circ\text{C}$ $I_o=200\text{mA}$	$11.5\text{V} \leq V_i \leq 25\text{V}$	—	—	100	mV
			$12\text{V} \leq V_i \leq 25\text{V}$	—	—	50	
Current Regulation	$S_i$	$T_j=25^\circ\text{C}$	$5\text{mA} \leq I_o \leq 500\text{mA}$	—	—	180	mV
			$5\text{mA} \leq I_o \leq 200\text{mA}$ ,	—	—	90	
Quiescent Current	$I_Q$	$T_j=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_o \leq 350\text{mA}$ $I_o=200\text{mA}$ , $11.5\text{V} \leq V_i \leq 25\text{V}$	—	—	0.5	mA	
			—	—	0.8		
Input - output differential pressure	$V_i - V_o$	$T_j=25^\circ\text{C}$ , $I_o=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_o=300\text{mA}$ , $12.5\text{V} \leq V_i \leq 23\text{V}$ , $f=120\text{Hz}$	—	71	—	dB	

**78M10 Electrical characteristics** (Unless otherwise specified  $0 \leq T_j \leq +125^\circ\text{C}$ ,  $V_i=17\text{V}$ ,  $I_o=350\text{mA}$ ,  $C_i=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_o$	$T_j=25^\circ\text{C}$	9.6	10	10.4	V	
		$5\text{mA} \leq I_o \leq 350\text{mA}$ , $12.5\text{V} \leq V_i \leq 25\text{V}$	9.5	10	10.5		
Voltage Regulation	$S_v$	$T_j=25^\circ\text{C}$ $I_o=200\text{mA}$	$12.5\text{V} \leq V_i \leq 25\text{V}$	—	—	100	mV
			$13\text{V} \leq V_i \leq 25\text{V}$	—	—	50	
Current Regulation	$S_i$	$T_j=25^\circ\text{C}$	$5\text{mA} \leq I_o \leq 500\text{mA}$	—	—	200	mV
			$5\text{mA} \leq I_o \leq 200\text{mA}$ ,	—	—	100	
Quiescent Current	$I_Q$	$T_j=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_o \leq 350\text{mA}$ $I_o=200\text{mA}$ , $12.5\text{V} \leq V_i \leq 25\text{V}$	—	—	0.5	mA	
			—	—	0.8		
Input - output differential pressure	$V_i - V_o$	$T_j=25^\circ\text{C}$ , $I_o=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_o=300\text{mA}$ , $13\text{V} \leq V_i \leq 23\text{V}$ , $f=120\text{Hz}$	—	71	—	dB	

**78M12 Electrical characteristics** (Unless otherwise specified  $0 \leq T_J \leq +125^\circ\text{C}$ ,  $V_I=19\text{V}$ ,  $I_O=350\text{mA}$ ,  $C_I=0.33\mu\text{F}$ ,  $C_O=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J=25^\circ\text{C}$	11.5	12	12.5	V	
		$5\text{mA} \leq I_O \leq 350\text{mA}$ , $14.5\text{V} \leq V_I \leq 27\text{V}$	11.5	12	12.6		
Voltage Regulation	$S_V$	$T_J=25^\circ\text{C}$ $I_O=200\text{mA}$	$14.5\text{V} \leq V_I \leq 30\text{V}$	—	—	100	mV
			$16\text{V} \leq V_I \leq 30\text{V}$	—	—	50	
Current Regulation	$S_I$	$T_J=25^\circ\text{C}$	$5\text{mA} \leq I_O \leq 500\text{mA}$	—	—	240	mV
			$5\text{mA} \leq I_O \leq 200\text{mA}$ ,	—	—	120	
Quiescent Current	$I_Q$	$T_J=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_O \leq 350\text{mA}$	—	—	0.5	mA	
		$I_O=200\text{mA}$ , $14.5\text{V} \leq V_I \leq 30\text{V}$	—	—	0.8		
Input - output differential pressure	$V_I - V_O$	$T_J=25^\circ\text{C}$ , $I_O=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_O=300\text{mA}$ , $15\text{V} \leq V_I \leq 25\text{V}$ , $f=120\text{Hz}$	—	71	—	dB	

**78M15 Electrical characteristics** (Unless otherwise specified  $0 \leq T_J \leq +125^\circ\text{C}$ ,  $V_I=23\text{V}$ ,  $I_O=350\text{mA}$ ,  $C_I=0.33\mu\text{F}$ ,  $C_O=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J=25^\circ\text{C}$	14.4	15	15.6	V	
		$5\text{mA} \leq I_O \leq 350\text{mA}$ , $17.5\text{V} \leq V_I \leq 30\text{V}$	14.25	15	15.75		
Voltage Regulation	$S_V$	$T_J=25^\circ\text{C}$ $I_O=200\text{mA}$	$17.5\text{V} \leq V_I \leq 30\text{V}$	—	—	100	mV
			$20\text{V} \leq V_I \leq 30\text{V}$	—	—	50	
Current Regulation	$S_I$	$T_J=25^\circ\text{C}$	$5\text{mA} \leq I_O \leq 500\text{mA}$	—	—	300	mV
			$5\text{mA} \leq I_O \leq 200\text{mA}$ ,	—	—	150	
Quiescent Current	$I_Q$	$T_J=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_O \leq 350\text{mA}$	—	—	0.5	mA	
		$I_O=200\text{mA}$ , $17.5\text{V} \leq V_I \leq 30\text{V}$	—	—	0.8		
Input - output differential pressure	$V_I - V_O$	$T_J=25^\circ\text{C}$ , $I_O=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_O=300\text{mA}$ , $18.5\text{V} \leq V_I \leq 28.5\text{V}$ , $f=120\text{Hz}$	—	70	—	dB	

**78M18 Electrical characteristics** (Unless otherwise specified  $0 \leq T_J \leq +125^\circ\text{C}$ ,  $V_I=26\text{V}$ ,  $I_O=350\text{mA}$ ,  $C_I=0.33\mu\text{F}$ ,  $C_O=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J=25^\circ\text{C}$	17.3	18	18.7	V	
		$5\text{mA} \leq I_O \leq 350\text{mA}$ , $20.5\text{V} \leq V_I \leq 33\text{V}$	17.1	18	18.9		
Voltage Regulation	$S_V$	$T_J=25^\circ\text{C}$ $I_O=200\text{mA}$	$21\text{V} \leq V_I \leq 33\text{V}$	—	—	100	mV
			$24\text{V} \leq V_I \leq 33\text{V}$	—	—	50	
Current Regulation	$S_I$	$T_J=25^\circ\text{C}$	$5\text{mA} \leq I_O \leq 500\text{mA}$	—	—	360	mV
			$5\text{mA} \leq I_O \leq 200\text{mA}$ ,	—	—	180	
Quiescent Current	$I_Q$	$T_J=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_O \leq 350\text{mA}$	—	—	0.5	mA	
		$I_O=200\text{mA}$ , $21\text{V} \leq V_I \leq 33\text{V}$	—	—	0.8		
Input - output differential pressure	$V_I - V_O$	$T_J=25^\circ\text{C}$ , $I_O=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_O=300\text{mA}$ , $22\text{V} \leq V_I \leq 32\text{V}$ , $f=120\text{Hz}$	—	69	—	dB	

78M20 Electrical characteristics (Unless otherwise specified  $0 \leq T_j \leq +125^\circ\text{C}$ ,  $V_i=29\text{V}$ ,  $I_o=350\text{mA}$ ,  $C_i=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$ )

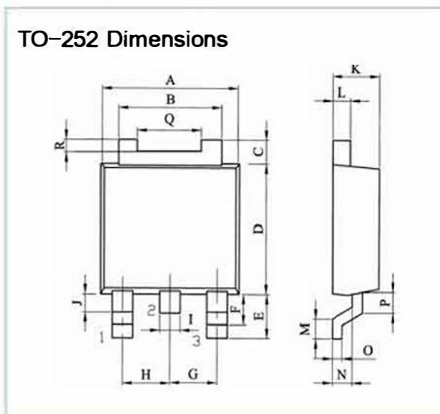
Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_o$	$T_j=25^\circ\text{C}$	19.2	20	20.8	V	
		$5\text{mA} \leq I_o \leq 350\text{mA}$ , $23\text{V} \leq V_i \leq 35\text{V}$	19	20	21		
Voltage Regulation	$S_v$	$T_j=25^\circ\text{C}$ $I_o=200\text{mA}$	$23\text{V} \leq V_i \leq 35\text{V}$	—	—	100	mV
			$24\text{V} \leq V_i \leq 35\text{V}$	—	—	50	
Current Regulation	$S_i$	$T_j=25^\circ\text{C}$	$5\text{mA} \leq I_o \leq 500\text{mA}$	—	—	400	mV
			$5\text{mA} \leq I_o \leq 200\text{mA}$	—	—	200	
Quiescent Current	$I_Q$	$T_j=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_o \leq 350\text{mA}$ $I_o=200\text{mA}$ , $23\text{V} \leq V_i \leq 35\text{V}$	—	—	0.5	mA	
			—	—	0.8		
Input - output differential pressure	$V_i - V_o$	$T_j=25^\circ\text{C}$ , $I_o=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_o=300\text{mA}$ , $24\text{V} \leq V_i \leq 34\text{V}$ , $f=120\text{Hz}$	—	69	—	dB	

78M24 Electrical characteristics (Unless otherwise specified  $0 \leq T_j \leq +125^\circ\text{C}$ ,  $V_i=33\text{V}$ ,  $I_o=350\text{mA}$ ,  $C_i=0.33\mu\text{F}$ ,  $C_o=0.1\mu\text{F}$ )

Parameter name	Symbol	Test Condition	Min	Typ	Max	Unit	
Output Voltage	$V_o$	$T_j=25^\circ\text{C}$	23	24	25	V	
		$5\text{mA} \leq I_o \leq 350\text{mA}$ , $27\text{V} \leq V_i \leq 38\text{V}$	22.8	24	25.2		
Voltage Regulation	$S_v$	$T_j=25^\circ\text{C}$ $I_o=200\text{mA}$	$27\text{V} \leq V_i \leq 38\text{V}$	—	—	100	mV
			$28\text{V} \leq V_i \leq 38\text{V}$	—	—	50	
Current Regulation	$S_i$	$T_j=25^\circ\text{C}$	$5\text{mA} \leq I_o \leq 500\text{mA}$	—	—	480	mV
			$5\text{mA} \leq I_o \leq 200\text{mA}$	—	—	240	
Quiescent Current	$I_Q$	$T_j=25^\circ\text{C}$	—	—	6	mA	
Quiescent Current Change	$\Delta I_Q$	$5\text{mA} \leq I_o \leq 350\text{mA}$ $I_o=200\text{mA}$ , $27\text{V} \leq V_i \leq 38\text{V}$	—	—	0.5	mA	
			—	—	0.8		
Input - output differential pressure	$V_i - V_o$	$T_j=25^\circ\text{C}$ , $I_o=500\text{mA}$	—	2	—	V	
Ripple Rejection Ratio	Srip	$I_o=300\text{mA}$ , $28\text{V} \leq V_i \leq 38\text{V}$ ; $f=120\text{Hz}$	—	67	—	dB	

Unit: mm

TO-252 Dimensions



1 IN 2 GND 3 OUT 4 GND

Size Symbol	TO-252		Size Symbol	TO-252	
	min	max		min	max
A	6.4	6.8	J	0.6	0.95
B	4.8	5.53	K	2.1	2.5
C	0.9	1.3	L	0.4	0.6
D	5.9	6.3	M	0.80	1.4
E	2.3	2.9	N	0.9	1.1
F	1.8	2.2	●	0.4	0.6
G	2.2	2.4	P	0.81	1.01
H	2.2	2.4	Q	3.6	4.0
I	0.66	0.92	R	0.4	0.6

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