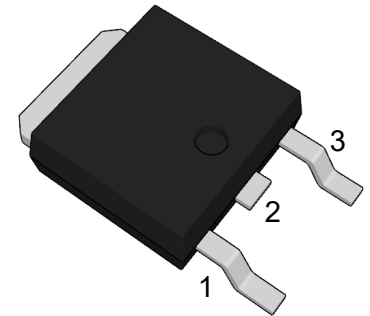


### Description

The PJ78MXXTE series of three-terminal positive regulators are available in TO-252 package. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, it can deliver over 0.5A output current. Although designed as fixed voltage regulator, this device can be used with external components to obtain adjustable voltage and currents.

### TO-252



1. VIN 2. GND 3. VOUT

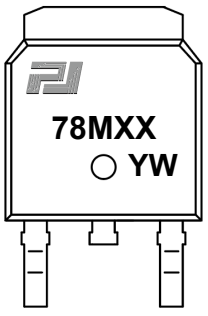
### Features

- Input voltage: up to 35V
- Output voltage: 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 24V
- Output current up to 500 mA
- Thermal overload protection
- Short circuit current limiting

### Applications

- DC motor drivers
- Household electric appliances
- Industrial power supplies
- Test and measurement equipment

### Ordering Information

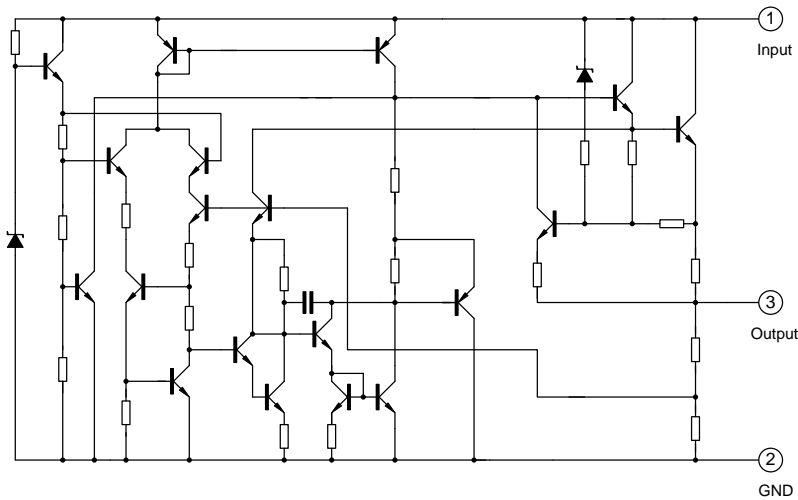
Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan <sup>Note</sup>	MSL Level	Marking Code
PJ78M05TE	TO-252	13	2500	RoHS & Green	MSL3	 <p>78MXX: Product code e.g. PJ78M05TE:78M05 YW: Year code and Week code</p>
PJ78M06TE						
PJ78M08TE						
PJ78M09TE						
PJ78M10TE						
PJ78M12TE						
PJ78M15TE						
PJ78M18TE						
PJ78M24TE						

#### Note:

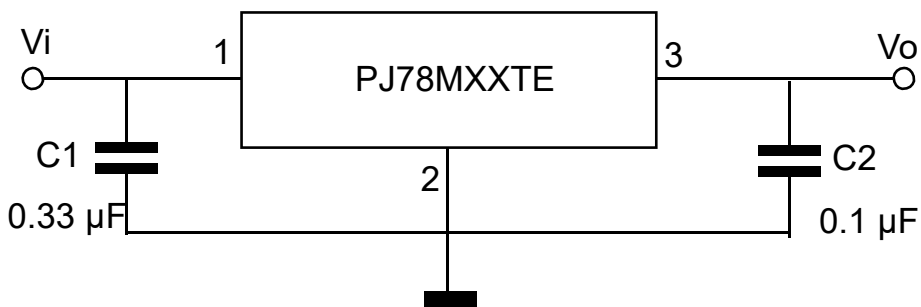
RoHS: PJ defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials.

Green: PJ defines "Green" to mean Halogen-Free and Antimony-Free.

### Function Block Diagram



### Typical Application Circuit



### Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Input Voltage	$V_I$	35	V
Output Current	$I_O$	500	mA
Maximum Power Dissipation	$P_D$	1.25	W
Operating Temperature Range	$T_{OPR}$	-40 to +125	°C
Storage Temperature Range	$T_{STG}$	-65 to +150	°C



# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M05TE Electrical Characteristics

$V_I=10V$ ,  $I_O=350mA$ ,  $T_J=25^{\circ}C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		4.8	5.0	5.2	V
		$I_O=5mA$ to $350mA$ , $V_I=7V$ to $20V$	4.75	--	5.25	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=7V$ to $25V$	--	--	100	mV
		$I_O=200mA$ , $V_I=8V$ to $25V$	--	--	50	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to $500mA$	--	--	100	mV
		$I_O=5mA$ to $200mA$	--	--	50	mV
Ripple Rejection	RR	$V_I=8V$ to $18V$ , $f=120Hz$ , $I_O=300mA$	62	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^{\circ}C\sim 125^{\circ}C$	--	0.5	--	mV/ $^{\circ}C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=8V$ to $25V$	--	--	0.8	mA
		$I_O=5mA$ to $350mA$	--	--	0.5	mA
Output Noise Voltage	$V_N$	$10Hz\leq f\leq 100kHz$	--	40	--	$\mu V$



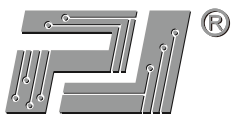
# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M06TE Electrical Characteristics

$V_I=11V$ ,  $I_O=350mA$ ,  $T_J=25^{\circ}C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		5.75	6.0	6.25	V
		$I_O=5mA$ to 350mA, $V_I=8V$ to 21V	5.7	6.0	6.3	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=8V$ to 25V	--	--	120	mV
		$I_O=200mA$ , $V_I=9V$ to 25V	--	--	60	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to 500mA	--	--	120	mV
		$I_O=5mA$ to 200mA	--	--	60	mV
Ripple Rejection	RR	$V_I=9V$ to 19V, $f=120Hz$ , $I_O=300mA$	59	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^{\circ}C\sim 125^{\circ}C$	--	0.6	--	mV/ $^{\circ}C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=9V$ to 25V	--	--	0.8	mA
		$I_O=5mA$ to 350mA	--	--	0.5	mA
Output Noise Voltage	$V_N$	10Hz $\leq f \leq$ 100kHz	--	45	--	$\mu V$



# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M08TE Electrical Characteristics

$V_I=14V$ ,  $I_O=350mA$ ,  $T_J=25^{\circ}C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		7.7	8.0	8.3	V
		$I_O=5mA$ to $350mA$ , $V_I=10.5V$ to $23V$	7.6	8.0	8.4	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=10.5V$ to $25V$	--	--	160	mV
		$I_O=200mA$ , $V_I=11V$ to $25V$	--	--	80	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to $500mA$	--	--	160	mV
		$I_O=5mA$ to $200mA$	--	--	80	mV
Ripple Rejection	RR	$V_I=11.5V$ to $21.5V$ , $f=120Hz$ , $I_O=300mA$	56	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^{\circ}C\sim 125^{\circ}C$	--	0.7	--	mV/ $^{\circ}C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=10V$ to $25V$	--	--	0.8	mA
		$I_O=5mA$ to $350mA$	--	--	0.5	mA
Output Noise Voltage	$V_N$	$10Hz\leq f\leq 100kHz$	--	52	--	$\mu V$



# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M09TE Electrical Characteristics

$V_I=15V$ ,  $I_O=350mA$ ,  $T_J=25^\circ C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		8.65	9.0	9.35	V
		$I_O=5mA$ to 350mA, $V_I=11.5V$ to 24V	8.55	9.0	9.45	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=11.5V$ to 25V	--	--	180	mV
		$I_O=200mA$ , $V_I=12V$ to 25V	--	--	90	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to 500mA	--	--	180	mV
		$I_O=5mA$ to 200mA	--	--	90	mV
Ripple Rejection	RR	$V_I=12.5V$ to 23V, $f=120Hz$ , $I_O=300mA$	56	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^\circ C\sim 125^\circ C$	--	0.9	--	mV/ $^\circ C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=11.5V$ to 25V	--	--	0.8	mA
		$I_O=5mA$ to 350mA	--	--	0.5	mA
Output Noise Voltage	$V_N$	10Hz $\leq f \leq$ 100kHz	--	58	--	$\mu V$



# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M10TE Electrical Characteristics

$V_I=17V$ ,  $I_O=350mA$ ,  $T_J=25^{\circ}C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		9.6	10	10.4	V
		$I_O=5mA$ to $350mA$ , $V_I=12.5V$ to $25V$	9.5	10	10.5	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=12.5V$ to $28V$	--	--	210	mV
		$I_O=200mA$ , $V_I=14V$ to $20V$	--	--	120	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to $500mA$	--	--	210	mV
		$I_O=5mA$ to $200mA$	--	--	120	mV
Ripple Rejection	RR	$V_I=12.5V$ to $28V$ , $f=120Hz$ , $I_O=300mA$	55	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^{\circ}C\sim 125^{\circ}C$	--	1	--	mV/ $^{\circ}C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=12.5V$ to $28V$	--	--	0.8	mA
		$I_O=5mA$ to $350mA$	--	--	0.5	mA
Output Noise Voltage	$V_N$	$10Hz\leq f\leq 100kHz$	--	75	--	$\mu V$



# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M12TE Electrical Characteristics

$V_I=19V$ ,  $I_O=350mA$ ,  $T_J=25^\circ C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		11.5	12	12.5	V
		$I_O=5mA$ to $350mA$ , $V_I=14.5V$ to $27V$	11.4	12	12.6	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=14.5V$ to $30V$	--	--	240	mV
		$I_O=200mA$ , $V_I=16V$ to $30V$	--	--	120	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to $500mA$	--	--	240	mV
		$I_O=5mA$ to $200mA$	--	--	120	mV
Ripple Rejection	RR	$V_I=15V$ to $25V$ , $f=120Hz$ , $I_O=300mA$	55	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^\circ C \sim 125^\circ C$	--	1	--	mV/ $^\circ C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=14.5V$ to $30V$	--	--	0.8	mA
		$I_O=5mA$ to $350mA$	--	--	0.5	mA
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	--	75	--	$\mu V$





# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M15TE Electrical Characteristics

$V_I=23V$ ,  $I_O=350mA$ ,  $T_J=25^{\circ}C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		14.4	15	15.6	V
		$I_O=5mA$ to $350mA$ , $V_I=17.5V$ to $30V$	14.25	15	15.75	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=17.5V$ to $30V$	--	--	300	mV
		$I_O=200mA$ , $V_I=20V$ to $30V$	--	--	150	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to $500mA$	--	--	300	mV
		$I_O=5mA$ to $200mA$	--	--	150	mV
Ripple Rejection	RR	$V_I=18.5V$ to $28.5V$ , $f=120Hz$ , $I_O=300mA$	53	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^{\circ}C$ ~ $125^{\circ}C$	--	1.2	--	mV/ $^{\circ}C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=17.5V$ to $30V$	--	--	0.8	mA
		$I_O=5mA$ to $350mA$	--	--	0.5	mA
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	--	100	--	$\mu V$



# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M18TE Electrical Characteristics

$V_I=26V$ ,  $I_O=350mA$ ,  $T_J=25^{\circ}C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		17.3	18	18.7	V
		$I_O=5mA$ to 350mA, $V_I=20.5V$ to 33V	17.1	18	18.9	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=21V$ to 33V	--	--	360	mV
		$I_O=200mA$ , $V_I=24V$ to 33V	--	--	180	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to 500mA	--	--	360	mV
		$I_O=5mA$ to 200mA	--	--	180	mV
Ripple Rejection	RR	$V_I=22V$ to 32V, $f=120Hz$ , $I_O=300mA$	53	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^{\circ}C\sim 125^{\circ}C$	--	-1.1	--	mV/ $^{\circ}C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=21V$ to 33V	--	--	0.8	mA
		$I_O=5mA$ to 350mA	--	--	0.5	mA
Output Noise Voltage	$V_N$	$10Hz\leq f\leq 100kHz$	--	100	--	$\mu V$



# PJ78MXXTE

## 3-Terminal Voltage Regulators

### PJ78M24TE Electrical Characteristics

$V_I=33V$ ,  $I_O=350mA$ ,  $T_J=25^{\circ}C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_O$		23	24	25	V
		$I_O=5mA$ to 350mA, $V_I=27V$ to 38V	22.8	24	25.2	V
Line Regulation	$\Delta V_O$	$I_O=200mA$ , $V_I=27V$ to 38V	--	--	480	mV
		$I_O=200mA$ , $V_I=28V$ to 38V	--	--	240	mV
Load Regulation	$\Delta V_O$	$I_O=5mA$ to 500mA	--	--	480	mV
		$I_O=5mA$ to 200mA	--	--	240	mV
Ripple Rejection	RR	$V_I=28V$ to 38V, $f=120Hz$ , $I_O=300mA$	50	--	--	dB
Dropout Voltage	$V_D$		--	2	--	V
Quiescent Current	$I_Q$		--	--	6	mA
Temperature coefficient of $V_O$	$\Delta V_O/\Delta T$	$I_O=5mA$ , $T_J=0^{\circ}C\sim 125^{\circ}C$	--	-1.2	--	mV/ $^{\circ}C$
Quiescent Current Change	$\Delta I_Q$	$I_O=200mA$ , $V_I=27V$ to 38V	--	--	0.8	mA
		$I_O=5mA$ to 350mA	--	--	0.5	mA
Output Noise Voltage	$V_N$	10Hz $\leq f \leq$ 100kHz	--	170	--	$\mu V$



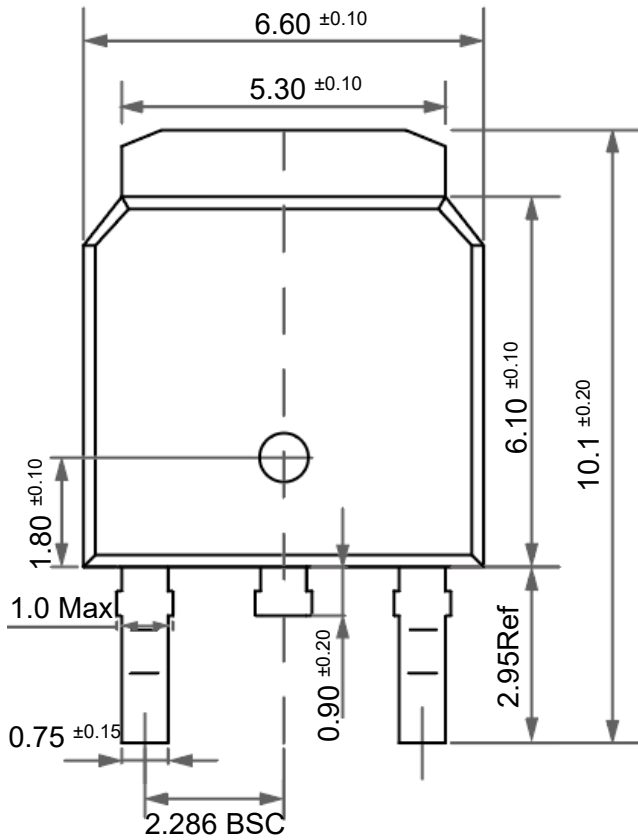
# PJ78MXXTE

## 3-Terminal Voltage Regulators

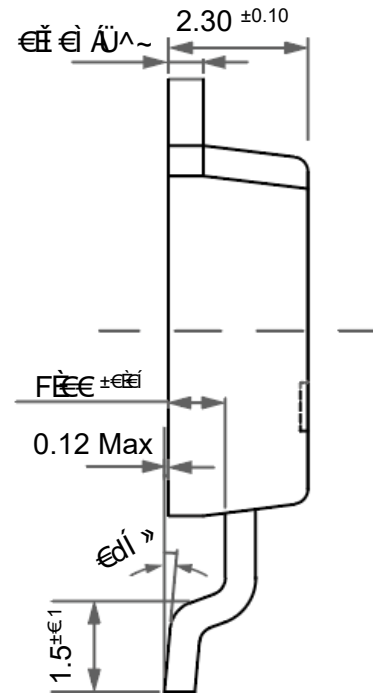
### Package Outline

TO-252

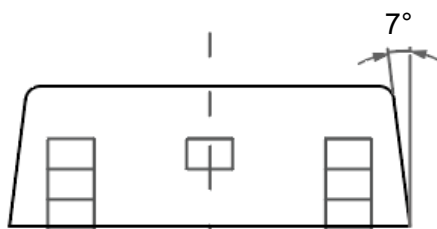
Dimensions in mm



Front View



Side View



Bottom View