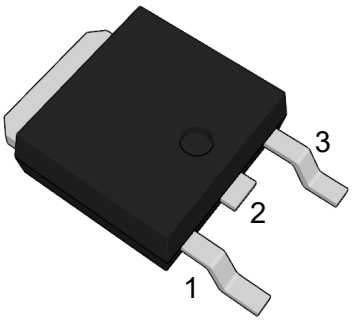
3-Terminal Voltage Regulators

Description

The TN78XXTE 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 1.5A 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

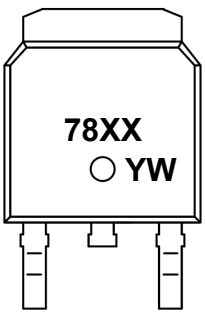
Features

- Input voltage: up to 35V
- Output voltage: 5V,6V,8V,9V,10V,12V,15V
- Output current up to 1.5 A
- Thermal overload protection
- Short circuit current limiting

Applications

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

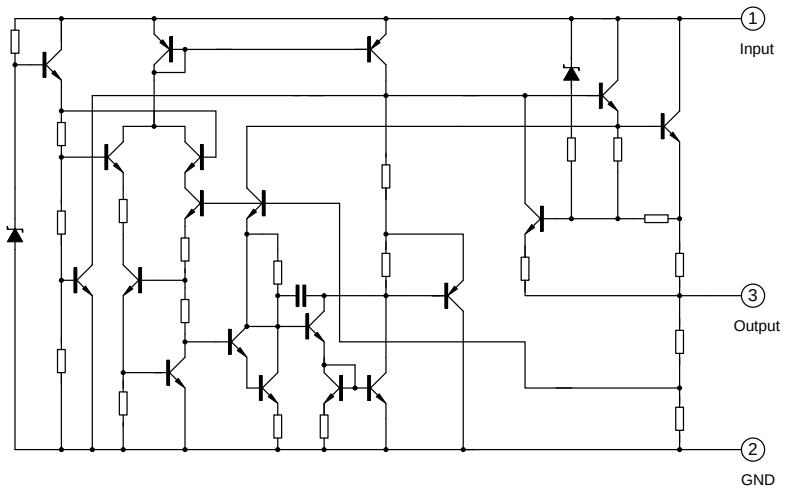
Ordering Information

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TN7805TE	TO-252	13	2500	RoHS & Green	MSL3	
TN7806TE						
TN7808TE						
TN7809TE						
TN7810TE						
TN7812TE						
TN7815TE						

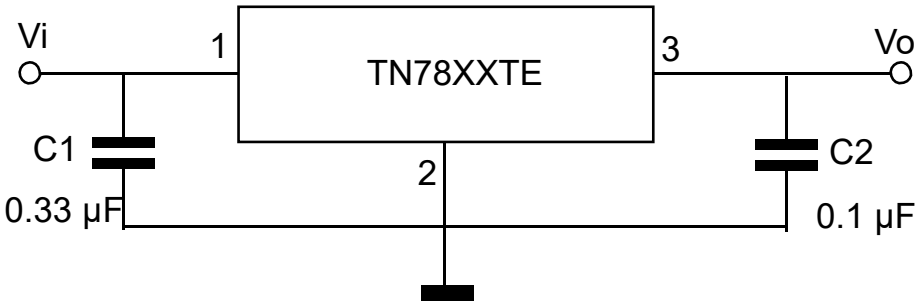
78XX: Product code
e.g. TN7805TE:7805
YW: Year code and Week code

Note:
RoHS: TN 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: TN 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	1.5	A
Maximum Power Dissipation	P_D	1.9	W
Operating Temperature Range	T_{OPR}	-40 to +125	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C

TN7805TE Electrical Characteristics

V_I=10V, I_O=500mA, 0<T_J<125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	4.8	5.0	5.2	V
		I_O=5mA to 1A, V_I=7.5V to 20V, P_D<15W	4.75	5.0	5.25	V
Line Regulation	$\triangle V_O$	V_I=7.5V to 25V,T_J=25°C	--	--	100	mV
		V_I=8V to 12V,T_J=25°C	--	--	50	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 1.5A,T_J=25°C	--	--	100	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	50	mV
Ripple Rejection	RR	V_I=8V to 18V, f=120Hz	62	73	--	dB
Dropout Voltage	V_D	I_O=1A,T_J=25°C	--	2	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	8	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA	--	0.8	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	V_I=8V to 25V	--	--	0.8	mA
		I_O=5mA to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz,T_A=25°C	--	42	--	μV

TN7806TE Electrical Characteristics

V_I=11V, I_O=500mA, 0<T_J<125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	5.75	6.0	6.25	V
		I_O=5mA to 1A, V_I=8.5V to 21V, P_D<15W	5.7	6.0	6.3	V
Line Regulation	$\triangle V_O$	V_I=7.5V to 25V,T_J=25°C	--	--	120	mV
		V_I=9V to 13V,T_J=25°C	--	--	60	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 1.5A,T_J=25°C	--	--	130	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	60	mV
Ripple Rejection	RR	V_I=9V to 19V, f=120Hz	59	70	--	dB
Dropout Voltage	V_D	I_O=1A,T_J=25°C	--	2	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	8	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA	--	0.9	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	V_I=9V to 25V	--	--	0.8	mA
		I_O=5mA to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz,T_A=25°C	--	45	--	μV

TN7808TE Electrical Characteristics

V_I=14V, I_O=500mA, 0<T_J<125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	7.7	8.0	8.3	V
		I_O=5mA to 1A, V_I=11V to 23V, P_D<15W	7.6	8.0	8.4	V
Line Regulation	$\triangle V_O$	V_I=10.5V to 25V,T_J=25°C	--	--	160	mV
		V_I=11V to 17V,T_J=25°C	--	--	80	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 1.5A,T_J=25°C	--	--	160	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	80	mV
Ripple Rejection	RR	V_I=11.5V to 21.5V, f=120Hz	56	67	--	dB
Dropout Voltage	V_D	I_O=1A,T_J=25°C	--	2	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	8	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA	--	1.2	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	V_I=11V to 25V	--	--	0.8	mA
		I_O=5mA to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz,T_A=25°C	--	52	--	μV

TN7809TE Electrical Characteristics

V_I=15V, I_O=500mA, 0<T_J<125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	8.65	9.0	9.35	V
		I_O=5mA to 1A, V_I=11.5V to 24V, P_D<15W	8.6	9.0	9.4	V
Line Regulation	$\triangle V_O$	V_I=11.5V to 25V,T_J=25°C	--	--	180	mV
		V_I=12V to 25V,T_J=25°C	--	--	90	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 1.5A,T_J=25°C	--	--	180	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	90	mV
Ripple Rejection	RR	V_I=13V to 23V, f=120Hz	55	66	--	dB
Dropout Voltage	V_D	I_O=1A,T_J=25°C	--	2	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	8	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA	--	1.3	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	V_I=12V to 26V	--	--	0.8	mA
		I_O=5mA to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz,T_A=25°C	--	58	--	μV

TN7810TE Electrical Characteristics

V_I=16V, I_O=500mA, 0<T_J<125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	9.6	10	10.4	V
		I_O=5mA to 1A, V_I=12.5V to 25V, P_D<15W	9.5	10	10.5	V
Line Regulation	△V_O	V_I=12.5V to 25V,T_J=25°C	--	--	200	mV
		V_I=13V to 20V,T_J=25°C	--	--	100	mV
Load Regulation	△V_O	I_O=5mA to 1.5A,T_J=25°C	--	--	200	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	100	mV
Ripple Rejection	RR	V_I=14V to 24V, f=120Hz	54	65	--	dB
Dropout Voltage	V_D	I_O=1A,T_J=25°C	--	2	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	8	mA
Temperature coefficient of V_O	△V_O/△T	I_O=5mA	--	1.4	--	mV/°C
Quiescent Current Change	△I_Q	V_I=13V to 29V	--	--	0.8	mA
		I_O=5mA to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz,T_A=25°C	--	58	--	μV

TN7812TE Electrical Characteristics

V_I=19V, I_O=500mA, 0<T_J<125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

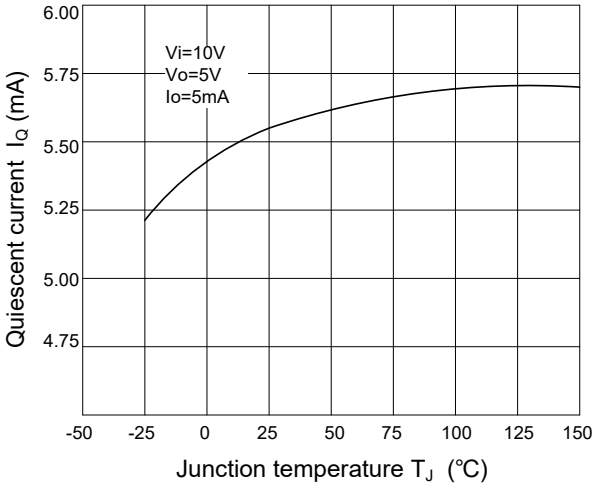
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	11.5	12	12.5	V
		I_O=5mA to 1A, V_I=14.5V to 27V, P_D<15W	11.4	12	12.6	V
Line Regulation	$\triangle V_O$	V_I=14.5V to 30V,T_J=25°C	--	--	240	mV
		V_I=16V to 22V,T_J=25°C	--	--	120	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 1.5A,T_J=25°C	--	--	240	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	120	mV
Ripple Rejection	RR	V_I=15V to 25V, f=120Hz	53	64	--	dB
Dropout Voltage	V_D	I_O=1A,T_J=25°C	--	2	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	8	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA	--	1.7	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	V_I=15V to 30V	--	--	0.8	mA
		I_O=5mA to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz,T_A=25°C	--	76	--	μV

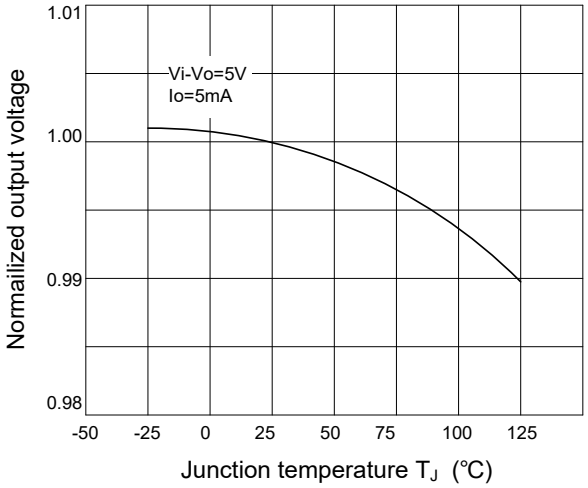
TN7815TE Electrical Characteristics

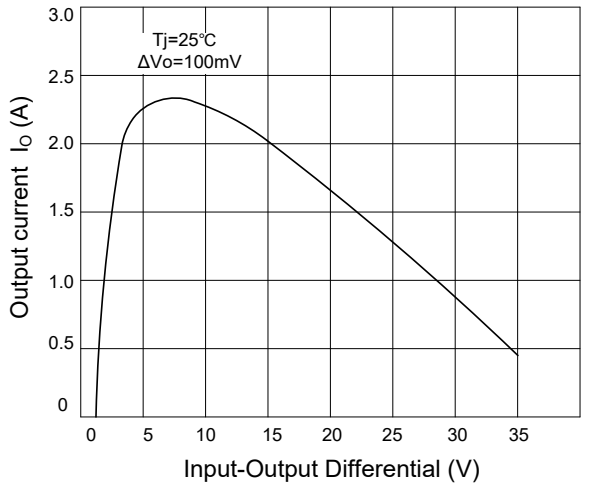
V_I=23V, I_O=500mA, 0<T_J<125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

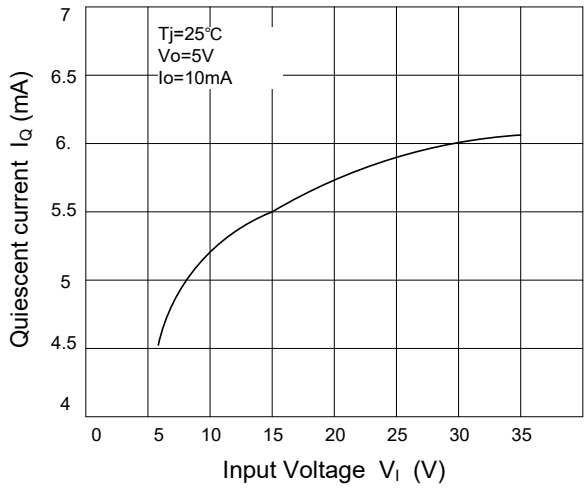
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	14.4	15	15.6	V
		I_O=5mA to 1A, V_I=17.5V to 30V, P_D<15W	14.25	15	15.75	V
Line Regulation	△V_O	V_I=17.5V to 30V,T_J=25°C	--	--	300	mV
		V_I=20V to 26V,T_J=25°C	--	--	150	mV
Load Regulation	△V_O	I_O=5mA to 1.5A,T_J=25°C	--	--	300	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	150	mV
Ripple Rejection	RR	V_I=18.5V to 28.5V, f=120Hz	51	62	--	dB
Dropout Voltage	V_D	I_O=1A,T_J=25°C	--	2	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	8	mA
Temperature coefficient of V_O	△V_O/△T	I_O=5mA	--	2	--	mV/°C
Quiescent Current Change	△I_Q	V_I=18V to 30.5V	--	--	0.8	mA
		I_O=5mA to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz,T_A=25°C	--	90	--	μV

Typical Characteristic Curves





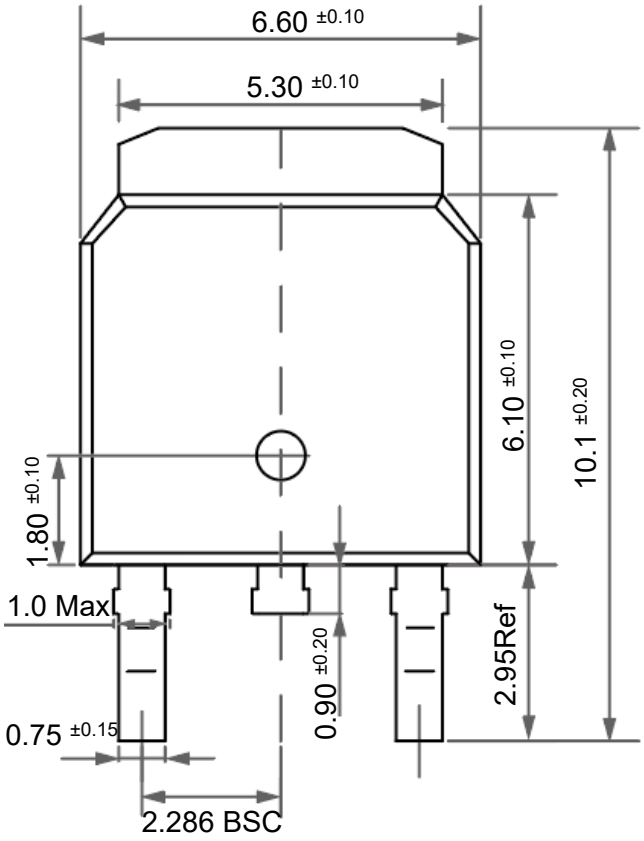




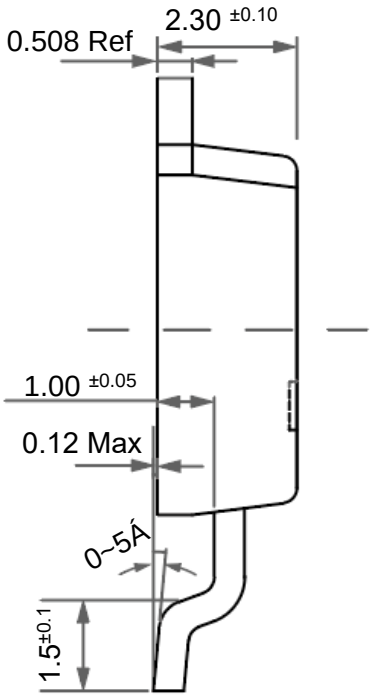
Package Outline

TO-252

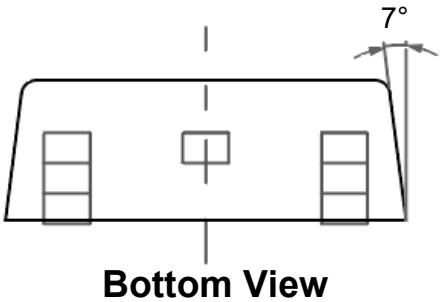
Dimensions in mm



Front View



Side View



Bottom View

Contact Information

TANI website: **http://www.tanisemi.com** Email:tani@tanisemi.com

For additional information, please contact your local Sales Representative.

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Product Specification Statement

The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. TANI shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and TANI assumes no responsibility for the application of the product. TANI strives to provide accurate and up -to- date information to the best of our ability. However, due to technical, human, or other reasons, TANI cannot guarantee that the information provided in the product specification is entirely accurate and error-free. TANI shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications.

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Users are advised to pay attention to the parameter limit values specified in the product specification and maintain a certain margin in design or application to ensure that the product does not exceed the parameter limit values defined in the product specification. This precaution should be taken to avoid exceeding one or more of the limit values, which may result in permanent irreversible damage to the product, ultimately affecting the quality and reliability of the system or equipment.

The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. TANI shall assume no responsibility for any consequences resulting from such usage.

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