

Description

The TN78XXSTE 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.

Features

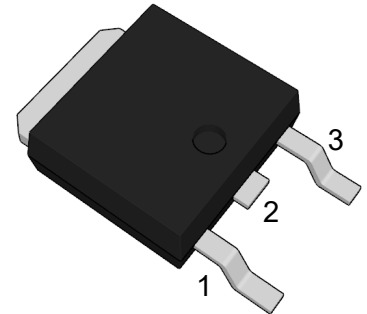
- Input voltage: up to 40V
- Output voltage: 5V,6V,8V,9V,12V,15V,18V,24V
- Output current up to 1.5 A
- Thermal overload protection
- Short circuit current limiting

Applications

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

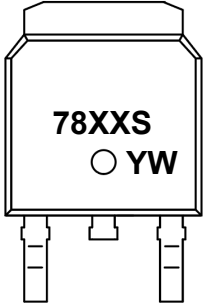
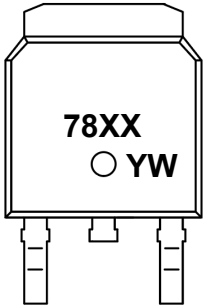
3-Terminal Voltage Regulators

TO-252



1. VIN 2. GND 3. VOUT

Ordering Information

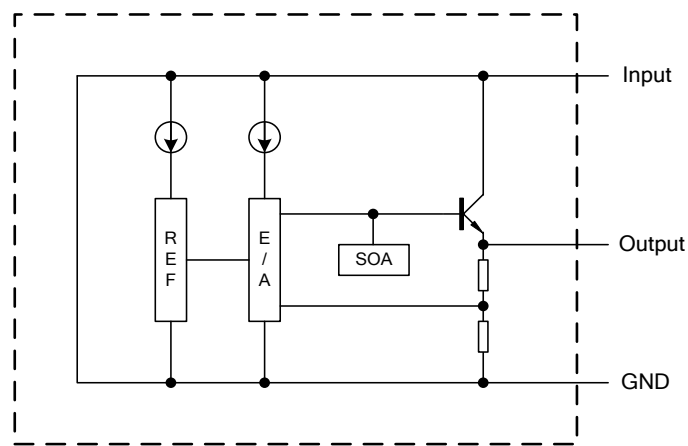
Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan ^{Note}	MSL Level	Marking Code
TN7805STE	TO-252	13	2500	RoHS & Green	MSL3	 78XXS: Product code e.g. TN7805STE:7805S YW: Year code and Week code
TN7806STE						
TN7808STE						
TN7809STE						
TN7812STE						
TN7815STE						
TN7818TE	TO-252	13	2500	RoHS & Green	MSL3	 78XX: Product code e.g. TN7818TE:7818 YW: Year code and Week code
TN7824TE						

Note:

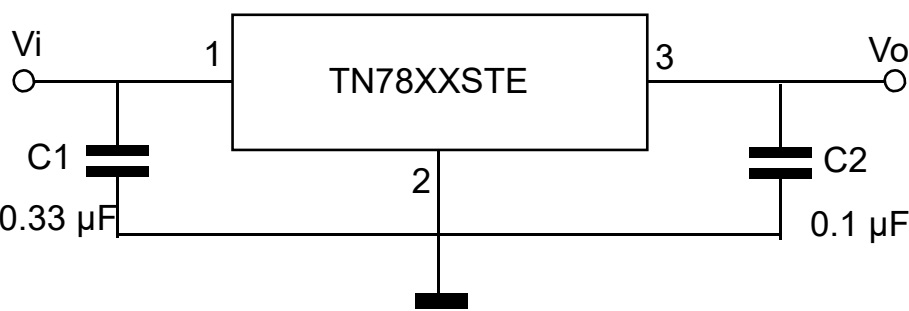
RoHS: TN defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials.

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	$V_O=5V\sim18V$	V_I	35	V
	$V_O=24V$		40	
Output Current		I_O	1.5	A
Maximum Power Dissipation		P_D	1.6	W
Operating Temperature Range		T_{OPR}	-40 to +125	°C
Storage Temperature Range		T_{STG}	-65 to +150	°C

TN7805STE Electrical Characteristics

$V_I=10V$, $I_O=500mA$, $0<T_J<125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	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	ΔV_O	$V_I=7.5V$ to $25V$, $T_J=25^{\circ}C$	--	--	100	mV
		$V_I=8V$ to $12V$, $T_J=25^{\circ}C$	--	--	50	mV
Load Regulation	ΔV_O	$I_O=5mA$ to $1.5A$, $T_J=25^{\circ}C$	--	--	100	mV
		$I_O=250mA$ to $750mA$, $T_J=25^{\circ}C$	--	--	50	mV
Ripple Rejection	RR	$V_I=8V$ to $18V$, $f=120Hz$	--	73	--	dB
Dropout Voltage	V_D	$I_O=1A$, $T_J=25^{\circ}C$	--	2	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	8	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	0.8	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=8V$ to $25V$	--	--	0.8	mA
		$I_O=5mA$ to $1A$	--	--	0.5	mA
Output Noise Voltage	V_N	$10Hz\leq f\leq 100kHz$, $T_A=25^{\circ}C$	--	40	--	μV

TN7806STE Electrical Characteristics

$V_I=11V$, $I_O=500mA$, $0<T_J<125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	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	ΔV_O	$V_I=8.5V$ to 25V, $T_J=25^{\circ}C$	--	--	120	mV
		$V_I=9V$ to 13V, $T_J=25^{\circ}C$	--	--	60	mV
Load Regulation	ΔV_O	$I_O=5mA$ to 1.5A, $T_J=25^{\circ}C$	--	--	130	mV
		$I_O=250mA$ to 750mA, $T_J=25^{\circ}C$	--	--	60	mV
Ripple Rejection	RR	$V_I=9V$ to 19V, $f=120Hz$	--	70	--	dB
Dropout Voltage	V_D	$I_O=1A$, $T_J=25^{\circ}C$	--	2	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	8	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	0.9	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=9V$ to 25V	--	--	0.8	mA
		$I_O=5mA$ to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	$10Hz\leq f\leq 100kHz$, $T_A=25^{\circ}C$	--	45	--	μV

TN7808STE Electrical Characteristics

$V_I=14V$, $I_O=500mA$, $0<T_J<125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	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	ΔV_O	$V_I=10.5V$ to $25V$, $T_J=25^{\circ}C$	--	--	160	mV
		$V_I=11V$ to $17V$, $T_J=25^{\circ}C$	--	--	80	mV
Load Regulation	ΔV_O	$I_O=5mA$ to $1.5A$, $T_J=25^{\circ}C$	--	--	160	mV
		$I_O=250mA$ to $750mA$, $T_J=25^{\circ}C$	--	--	80	mV
Ripple Rejection	RR	$V_I=11.5V$ to $21.5V$, $f=120Hz$	--	67	--	dB
Dropout Voltage	V_D	$I_O=1A$, $T_J=25^{\circ}C$	--	2	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	8	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	1.2	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=11V$ to $25V$	--	--	0.8	mA
		$I_O=5mA$ to $1A$	--	--	0.5	mA
Output Noise Voltage	V_N	$10Hz\leq f\leq 100kHz$, $T_A=25^{\circ}C$	--	52	--	μV

TN7809STE Electrical Characteristics

$V_I=15V$, $I_O=500mA$, $0<T_J<125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	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	ΔV_O	$V_I=11.5V$ to 25V, $T_J=25^{\circ}C$	--	--	180	mV
		$V_I=12V$ to 25V, $T_J=25^{\circ}C$	--	--	90	mV
Load Regulation	ΔV_O	$I_O=5mA$ to 1.5A, $T_J=25^{\circ}C$	--	--	180	mV
		$I_O=250mA$ to 750mA, $T_J=25^{\circ}C$	--	--	90	mV
Ripple Rejection	RR	$V_I=13V$ to 23V, $f=120Hz$	--	66	--	dB
Dropout Voltage	V_D	$I_O=1A$, $T_J=25^{\circ}C$	--	2	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	8	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	1.3	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=12V$ to 26V	--	--	0.8	mA
		$I_O=5mA$ to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	$10Hz\leq f\leq 100kHz$, $T_A=25^{\circ}C$	--	58	--	μV

TN7812STE Electrical Characteristics

$V_I=19V$, $I_O=500mA$, $0<T_J<125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	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	ΔV_O	$V_I=14.5V$ to $30V$, $T_J=25^{\circ}C$	--	--	240	mV
		$V_I=16V$ to $22V$, $T_J=25^{\circ}C$	--	--	120	mV
Load Regulation	ΔV_O	$I_O=5mA$ to $1.5A$, $T_J=25^{\circ}C$	--	--	240	mV
		$I_O=250mA$ to $750mA$, $T_J=25^{\circ}C$	--	--	120	mV
Ripple Rejection	RR	$V_I=15V$ to $25V$, $f=120Hz$	--	64	--	dB
Dropout Voltage	V_D	$I_O=1A$, $T_J=25^{\circ}C$	--	2	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	8	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	1.7	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=15V$ to $30V$	--	--	0.8	mA
		$I_O=5mA$ to $1A$	--	--	0.5	mA
Output Noise Voltage	V_N	$10Hz\leq f\leq 100kHz$, $T_A=25^{\circ}C$	--	76	--	μV

TN7815STE Electrical Characteristics

$V_I=23V$, $I_O=500mA$, $0<T_J<125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	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	ΔV_O	$V_I=17.5V$ to $30V$, $T_J=25^{\circ}C$	--	--	300	mV
		$V_I=20V$ to $26V$, $T_J=25^{\circ}C$	--	--	150	mV
Load Regulation	ΔV_O	$I_O=5mA$ to $1.5A$, $T_J=25^{\circ}C$	--	--	300	mV
		$I_O=250mA$ to $750mA$, $T_J=25^{\circ}C$	--	--	150	mV
Ripple Rejection	RR	$V_I=18.5V$ to $28.5V$, $f=120Hz$	--	62	--	dB
Dropout Voltage	V_D	$I_O=1A$, $T_J=25^{\circ}C$	--	2	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	8	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	2	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=18V$ to $30.5V$	--	--	0.8	mA
		$I_O=5mA$ to $1A$	--	--	0.5	mA
Output Noise Voltage	V_N	$10Hz\leq f\leq 100kHz$, $T_A=25^{\circ}C$	--	90	--	μV

TN7818TE Electrical Characteristics

$V_I=26V$, $I_O=500mA$, $0<T_J<125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

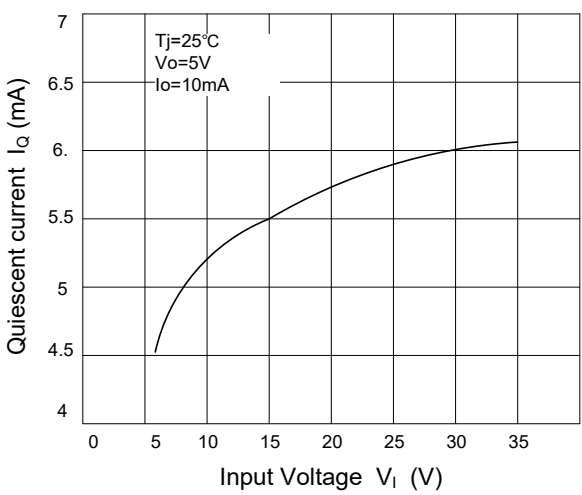
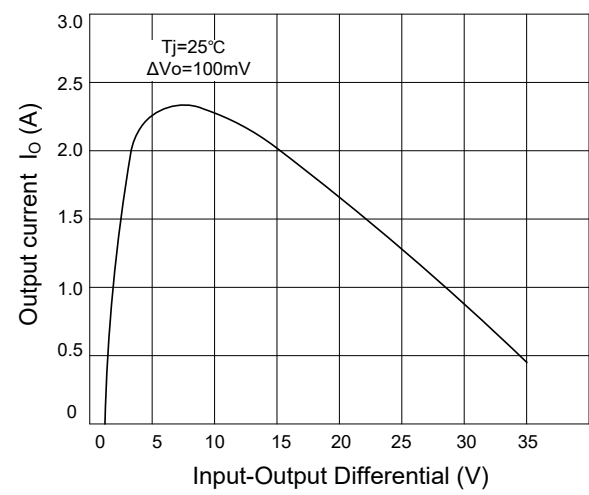
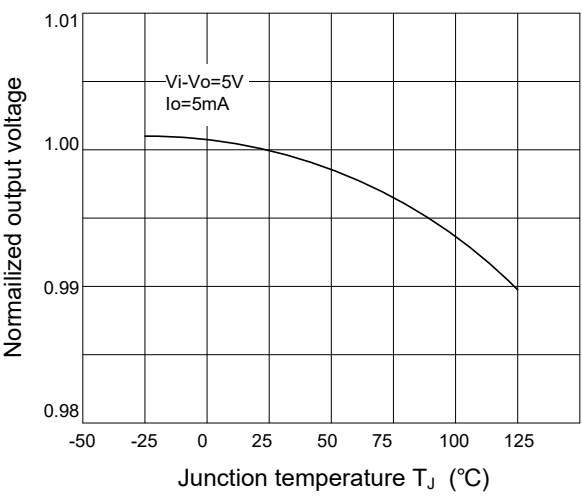
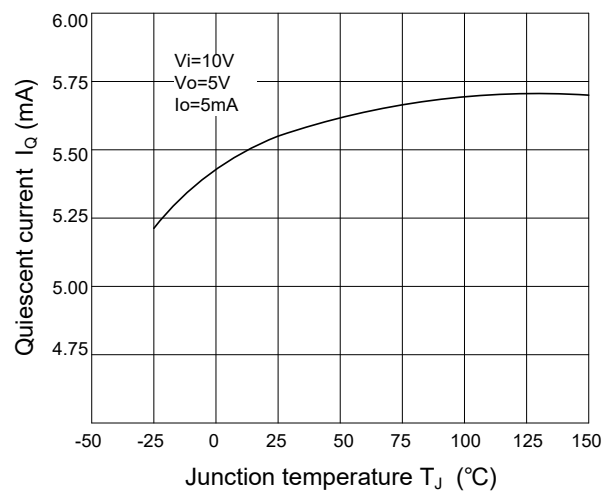
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	17.3	18	18.7	V
		$I_O=5mA$ to 1A, $V_I=21V$ to 33V, $P_D<15W$	17.1	18	18.9	V
Line Regulation	ΔV_O	$V_I=21V$ to 33V, $T_J=25^{\circ}C$	--	--	360	mV
		$V_I=24V$ to 30V, $T_J=25^{\circ}C$	--	--	180	mV
Load Regulation	ΔV_O	$I_O=5mA$ to 1.5A, $T_J=25^{\circ}C$	--	--	360	mV
		$I_O=250mA$ to 750mA, $T_J=25^{\circ}C$	--	--	180	mV
Ripple Rejection	RR	$V_I=22V$ to 32V, $f=120Hz$	--	57	--	dB
Dropout Voltage	V_D	$I_O=1A$, $T_J=25^{\circ}C$	--	2	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	8	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	2.3	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=21V$ to 33V	--	--	0.8	mA
		$I_O=5mA$ to 1A	--	--	0.5	mA
Output Noise Voltage	V_N	$10Hz\leq f\leq 100kHz$, $T_A=25^{\circ}C$	--	110	--	μV

TN7824TE Electrical Characteristics

$V_I=33V$, $I_O=500mA$, $0<T_J<125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	23	24	25	V
		$I_O=5mA$ to $1A$, $V_I=27V$ to 38 , $P_D<15W$	22.8	24	25.2	V
Line Regulation	ΔV_O	$V_I=27V$ to $38V$, $T_J=25^{\circ}C$	--	--	480	mV
		$V_I=30V$ to $36V$, $T_J=25^{\circ}C$	--	--	240	mV
Load Regulation	ΔV_O	$I_O=5mA$ to $1.5A$, $T_J=25^{\circ}C$	--	--	480	mV
		$I_O=250mA$ to $750mA$, $T_J=25^{\circ}C$	--	--	240	mV
Ripple Rejection	RR	$V_I=28V$ to $38V$, $f=120Hz$	--	54	--	dB
Dropout Voltage	V_D	$I_O=1A$, $T_J=25^{\circ}C$	--	2	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	8	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	3	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=27V$ to $38V$	--	--	0.8	mA
		$I_O=5mA$ to $1A$	--	--	0.5	mA
Output Noise Voltage	V_N	$10Hz\leq f\leq 100kHz$, $T_A=25^{\circ}C$	--	170	--	μV

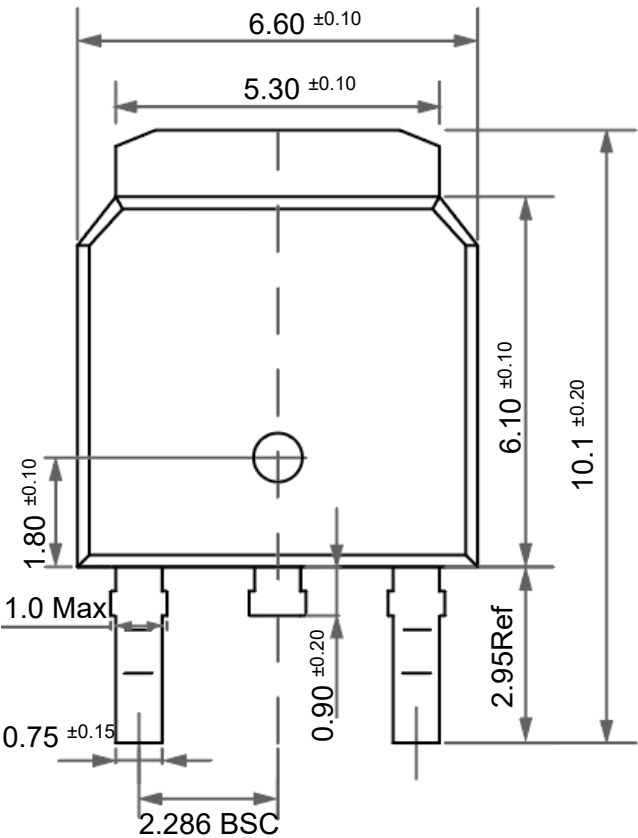
Typical Characteristic Curves



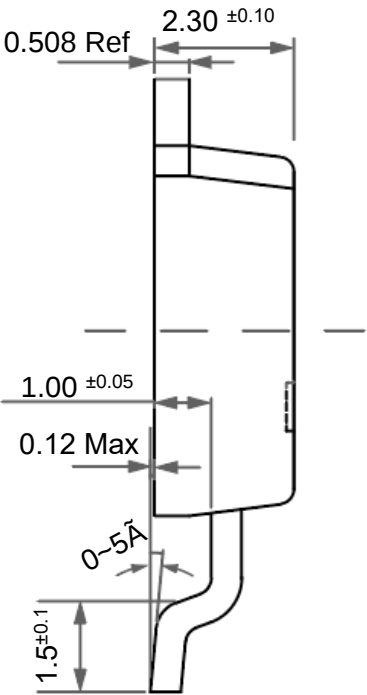
Package Outline

TO-252

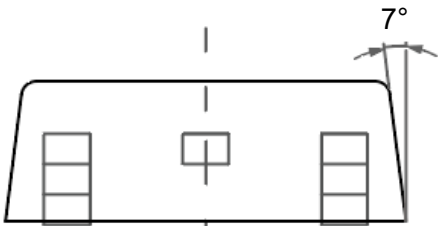
Dimensions in mm



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.

TANI reserves the right to revise or update the product specification and the products at any time without prior notice, and the user's continued use of the product specification is considered an acceptance of these revisions and updates. Prior to purchasing and using the product, users should verify the above information with TANI to ensure that the product specification is the most current, effective, and complete. If users are particularly concerned about product parameters, please consult TANI in detail or request relevant product test reports. Any data not explicitly mentioned in the product specification shall be subject to separate agreement.

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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