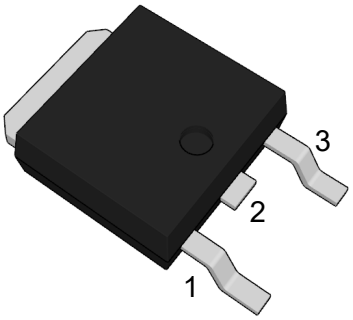
3-Terminal Voltage Regulators

Description

The TN78DXXTE 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 1.0A 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

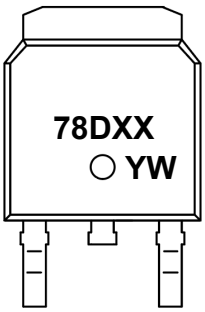
Features

- Input voltage: up to 35V
- Output voltage: 5V,6V,8V,9V,10V,12V,15V
- Output current up to 1.0A
- Thermal overload protection
- Short circuit current limiting

Applications

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

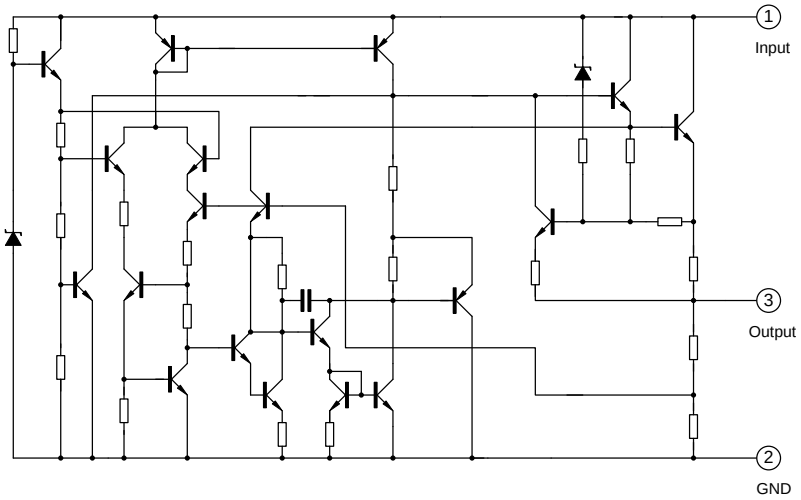
Ordering Information

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TN78D05TE	TO-252	13	2500	RoHS & Green	MSL3	
TN78D06TE						
TN78D08TE						
TN78D09TE						
TN78D10TE						
TN78D12TE						
TN78D15TE						

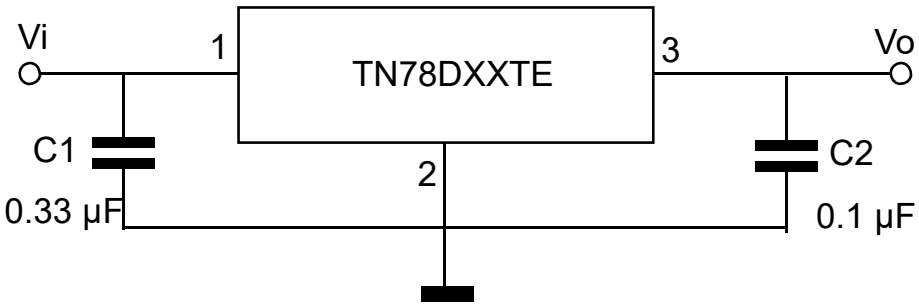
78DXX: Product code
e.g. TN78D05TE:78D05
YW: Year code and Week code

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

TN78D05TE 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=8V 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 1A,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

TN78D06TE 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=9V to 21V, P_D<15W	5.65	6.0	6.25	V
Line Regulation	△V_O	V_I=8.5V to 25V,T_J=25°C	--	--	120	mV
		V_I=9V to 13V,T_J=25°C	--	--	60	mV
Load Regulation	△V_O	I_O=5mA to 1A,T_J=25°C	--	--	120	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	60	mV
Ripple Rejection	RR	V_I=9V to 19V, f=120Hz	--	68	--	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	--	0.8	--	mV/°C
Quiescent Current Change	△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	--	42	--	μV

TN78D08TE 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	7.84	8.0	8.16	V
		I_O=5mA to 1A, V_I=11.5V to 23V, P_D<15W	7.7	8.0	8.3	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 1A,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	--	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	$\triangle V_O/\triangle T$	I_O=5mA	--	1	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	V_I=11.5V 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

TN78D09TE 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	8.82	9.0	9.18	V
		I_O=5mA to 1A, V_I=12.5V to 24V, P_D<15W	8.65	9.0	9.35	V
Line Regulation	$\triangle V_O$	V_I=11.5V to 26V,T_J=25°C	--	--	180	mV
		V_I=12V to 18V,T_J=25°C	--	--	90	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 1A,T_J=25°C	--	--	180	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	90	mV
Ripple Rejection	RR	V_I=12.5V to 22.5V, f=120Hz	--	61	--	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=12.5V 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

TN78D10TE 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	9.7	10	10.3	V
		I_O=5mA to 1A, V_I=13.5V to 25V, P_D<15W	9.6	10	10.4	V
Line Regulation	△V_O	V_I=12.5V to 28V,T_J=25°C	--	--	200	mV
		V_I=14V to 20V,T_J=25°C	--	--	100	mV
Load Regulation	△V_O	I_O=5mA to 1A,T_J=25°C	--	--	200	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	100	mV
Ripple Rejection	RR	V_I=13V to 23V, f=120Hz	--	61	--	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	--	1.3	--	mV/°C
Quiescent Current Change	△I_Q	V_I=13V to 28V	--	--	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

TN78D12TE 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=15.5V 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 1A,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	--	60	--	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	--	1.5	--	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	--	42	--	μV

TN78D15TE Electrical Characteristics

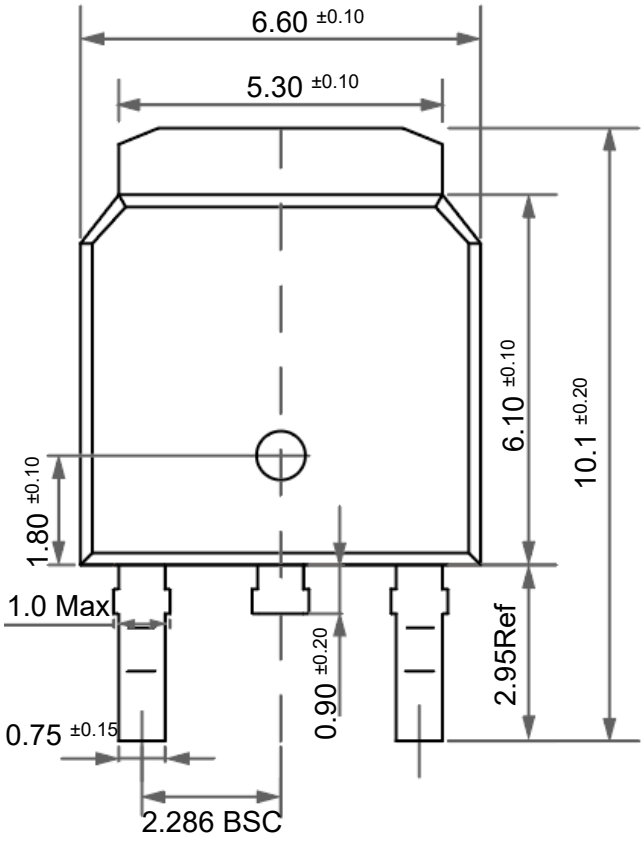
V_I=21V, I_O=500mA, 0<T_J<125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

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 1A,T_J=25°C	--	--	300	mV
		I_O=250mA to 750mA,T_J=25°C	--	--	150	mV
Ripple Rejection	RR	V_I=18V to 28V, f=120Hz	--	60	--	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	--	1.8	--	mV/°C
Quiescent Current Change	△I_Q	V_I=18V 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	--	42	--	μV

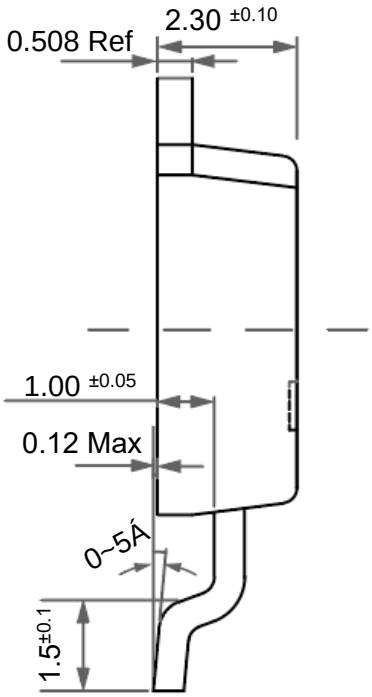
Package Outline

TO-252

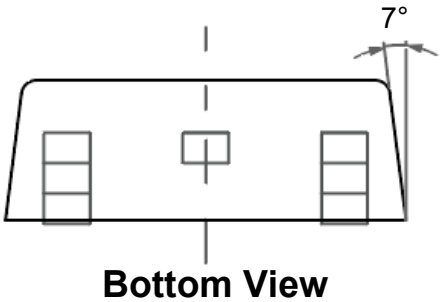
Dimensions in mm



Front View



Side View



Bottom View

Contact Information

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For additional information, please contact your local Sales Representative.

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