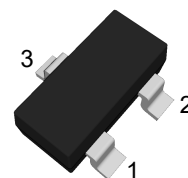


Description

The TN78LXXSA series of fixed voltage monolithic integrated circuit voltage three-terminal positive regulators are suitable for applications that required supply up to 100mA.

SOT-23



1. VOUT 2. VIN 3. GND

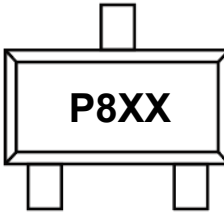
Features

- Input voltage: 30V($V_{OUT}=5\sim 10V$); 35V($V_{OUT}=12\sim 15V$)
- Output voltage: 5V,6V,8V,9V,10V,12V,15V
- Output current up to 100 mA
- Thermal overload protection
- Short circuit current limiting

Applications

- TV Board
- Air Conditioner
- Charging Device

Ordering Information

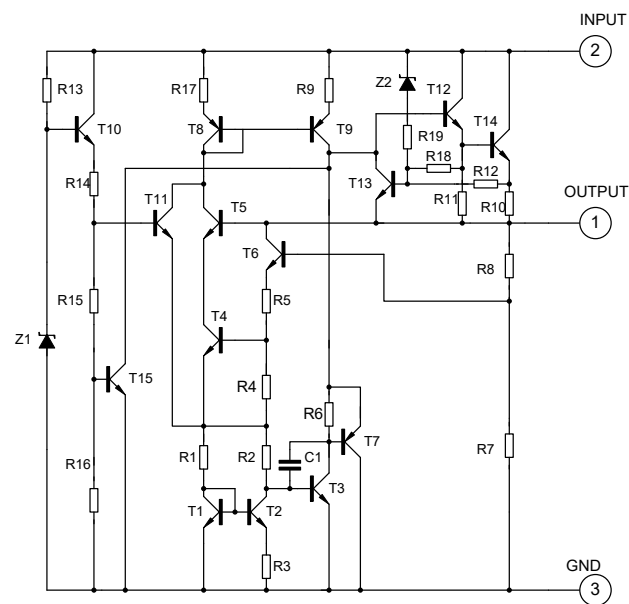
Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan ^{Note}	MSL Level	Marking Code
TN78L05SA	SOT-23	7	3000	RoHS & Green	MSL1	 XX:Output Voltage(5V=05) e.g. TN78L05SA=P805 TN78L12SA=P812
TN78L06SA						
TN78L08SA						
TN78L09SA						
TN78L10SA						
TN78L12SA						
TN78L15SA						

Note:

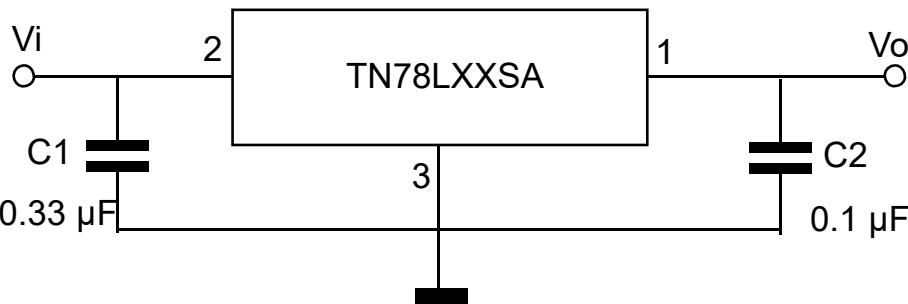
RoHS: TN defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials.

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	$V_{OUT}=5V\sim10V$	V_I	30	V
	$V_{OUT}=12V\sim15V$		35	V
Output Current		I_O	100	mA
Maximum Power Dissipation		P_D	300	mW
Junction Temperature		T_J	125	°C
Operating Temperature Range		T_{OPR}	-40 to +125	°C
Storage Temperature Range		T_{STG}	-40 to +150	°C

TN78L05SA Electrical Characteristics

$V_I=10V, I_O=40mA, 0^{\circ}C \leq T_J \leq 125^{\circ}C, C_I=0.33\mu F, C_O=0.1\mu F$, 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
		$I_O=1mA$ to $40mA, V_I=7V$ to $20V$	4.75	--	5.25	V
		$I_O=1mA$ to $70mA$	4.75	--	5.25	V
Line Regulation	ΔV_O	$V_I=7V$ to $20V, T_J=25^{\circ}C$	--	10	150	mV
		$V_I=8V$ to $20V, T_J=25^{\circ}C$	--	5	100	mV
Load Regulation	ΔV_O	$I_O=1mA$ to $100mA, T_J=25^{\circ}C$	--	15	60	mV
		$I_O=1mA$ to $40mA, T_J=25^{\circ}C$	--	10	30	mV
Ripple Rejection	RR	$V_I=8V$ to $18V, f=120Hz, T_J=25^{\circ}C$	40	49	--	dB
Dropout Voltage	V_D		--	1.7	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	2.0	5.5	mA
Temperature coefficient of V_O	$\Delta V_O/\Delta T$	$I_O=5mA$	--	0.65	--	mV/ $^{\circ}C$
Quiescent Current Change	ΔI_Q	$V_I=8V$ to $20V$	--	--	1.5	mA
		$I_O=1mA$ to $40mA$	--	--	0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz, T_J=25^{\circ}C$	--	40	--	μV

TN78L06SA Electrical Characteristics

$V_I=12V$, $I_O=40mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, 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
		$I_O=1mA$ to $40mA$, $V_I=8.5V$ to $20V$	5.7	--	6.3	V
		$I_O=1mA$ to $70mA$	5.7	--	6.3	V
Line Regulation	ΔV_O	$V_I=8.5V$ to $20V$, $T_J=25^{\circ}C$	--	--	150	mV
		$V_I=9V$ to $20V$, $T_J=25^{\circ}C$	--	--	100	mV
Load Regulation	ΔV_O	$I_O=1mA$ to $100mA$, $T_J=25^{\circ}C$	--	--	60	mV
		$I_O=1mA$ to $40mA$, $T_J=25^{\circ}C$	--	--	30	mV
Ripple Rejection	RR	$V_I=9V$ to $20V$, $f=120Hz$, $T_J=25^{\circ}C$	38	--	--	dB
Dropout Voltage	V_D		--	1.7	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	5.5	mA
Quiescent Current Change	ΔI_Q	$V_I=9V$ to $20V$	--	--	1.5	mA
		$I_O=1mA$ to $40mA$	--	--	0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$, $T_J=25^{\circ}C$	--	50	--	μV

TN78L08SA Electrical Characteristics

$V_I=14V$, $I_O=40mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, 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
		$I_O=1mA$ to $40mA$, $V_I=10.5V$ to $23V$	7.6	--	8.4	V
		$I_O=1mA$ to $70mA$	7.6	--	8.4	V
Line Regulation	ΔV_O	$V_I=10.5V$ to $23V$, $T_J=25^{\circ}C$	--	--	175	mV
		$V_I=11V$ to $23V$, $T_J=25^{\circ}C$	--	--	125	mV
Load Regulation	ΔV_O	$I_O=1mA$ to $100mA$, $T_J=25^{\circ}C$	--	--	80	mV
		$I_O=1mA$ to $40mA$, $T_J=25^{\circ}C$	--	--	40	mV
Ripple Rejection	RR	$V_I=12V$ to $23V$, $f=120Hz$, $T_J=25^{\circ}C$	36	--	--	dB
Dropout Voltage	V_D		--	1.7	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	5.5	mA
Quiescent Current Change	ΔI_Q	$V_I=11V$ to $23V$	--	--	1.5	mA
		$I_O=1mA$ to $40mA$	--	--	0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$, $T_J=25^{\circ}C$	--	60	--	μV

TN78L09SA Electrical Characteristics

$V_I=15V$, $I_O=40mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	8.64	9.0	9.36	V
		$I_O=1mA$ to $40mA$, $V_I=11.5V$ to $23V$	8.55	--	9.45	V
		$I_O=1mA$ to $70mA$	8.55	--	9.45	V
Line Regulation	ΔV_O	$V_I=11.5V$ to $23V$, $T_J=25^{\circ}C$	--	18	225	mV
		$V_I=12V$ to $23V$, $T_J=25^{\circ}C$	--	9	150	mV
Load Regulation	ΔV_O	$I_O=1mA$ to $100mA$, $T_J=25^{\circ}C$	--	27	80	mV
		$I_O=1mA$ to $40mA$, $T_J=25^{\circ}C$	--	18	40	mV
Ripple Rejection	RR	$V_I=12V$ to $23V$, $f=120Hz$, $T_J=25^{\circ}C$	36	44	--	dB
Dropout Voltage	V_D		--	1.7	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	2.0	5.5	mA
Quiescent Current Change	ΔI_Q	$V_I=12V$ to $23V$	--	--	1.5	mA
		$I_O=1mA$ to $40mA$	--	--	0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$, $T_J=25^{\circ}C$	--	70	--	μV

TN78L10SA Electrical Characteristics

$V_I=16V$, $I_O=40mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	9.6	10	10.4	V
		$I_O=1mA$ to $40mA$, $V_I=12.5V$ to $23V$	9.5	--	10.5	V
		$I_O=1mA$ to $70mA$	9.5	--	10.5	V
Line Regulation	ΔV_O	$V_I=12.5V$ to $23V$, $T_J=25^{\circ}C$	--	--	230	mV
		$V_I=13V$ to $23V$, $T_J=25^{\circ}C$	--	--	170	mV
Load Regulation	ΔV_O	$I_O=1mA$ to $100mA$, $T_J=25^{\circ}C$	--	--	90	mV
		$I_O=1mA$ to $40mA$, $T_J=25^{\circ}C$	--	--	45	mV
Ripple Rejection	RR	$V_I=14V$ to $23V$, $f=120Hz$, $T_J=25^{\circ}C$	36	--	--	dB
Dropout Voltage	V_D		--	1.7	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	5.5	mA
Quiescent Current Change	ΔI_Q	$V_I=13V$ to $23V$	--	--	1.5	mA
		$I_O=1mA$ to $40mA$	--	--	0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$, $T_J=25^{\circ}C$	--	60	--	μV

TN78L12SA Electrical Characteristics

$V_I=19V$, $I_O=40mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

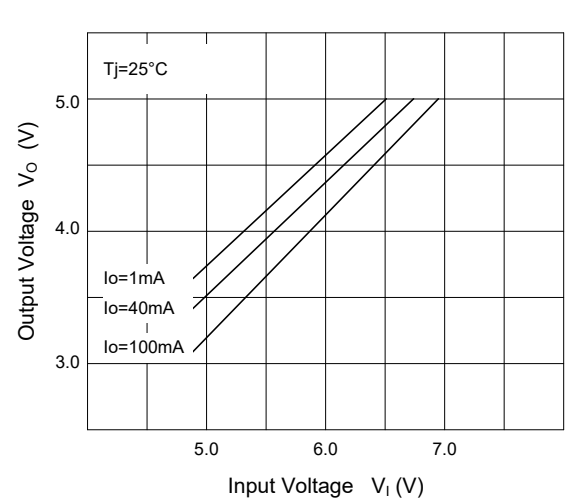
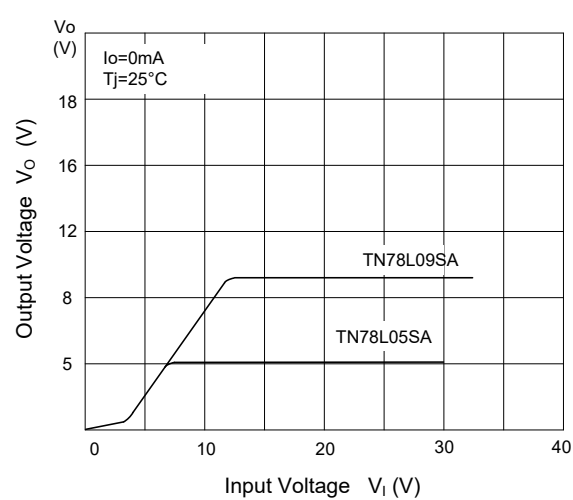
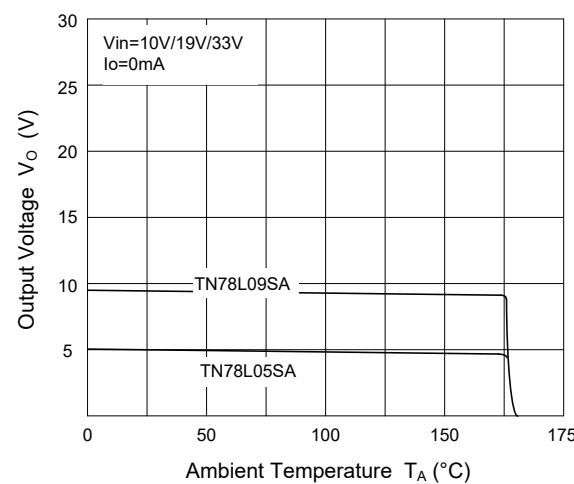
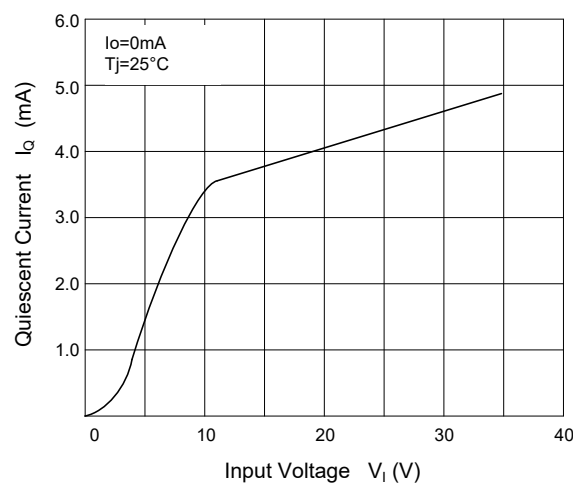
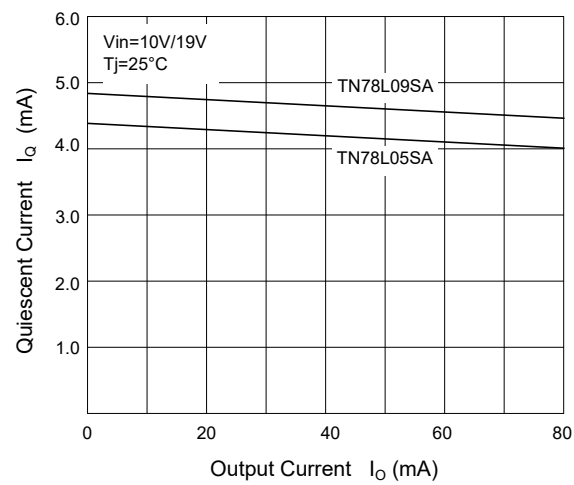
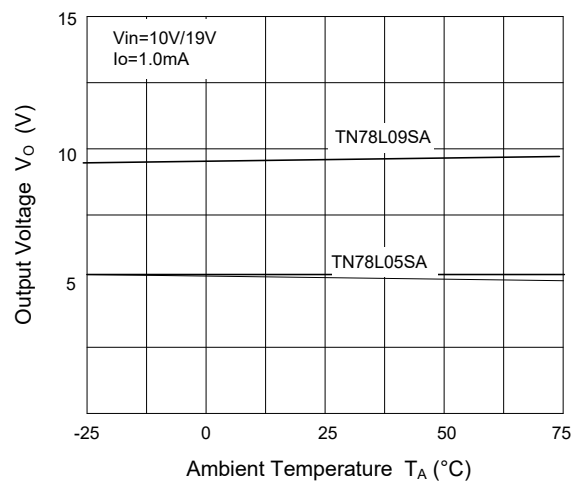
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	11.5	12	12.6	V
		$I_O=1mA$ to $40mA$, $V_I=14.5V$ to $27V$	11.4	--	12.6	V
		$I_O=1mA$ to $70mA$	11.4	--	12.6	V
Line Regulation	ΔV_O	$V_I=14.5V$ to $27V$, $T_J=25^{\circ}C$	--	--	250	mV
		$V_I=16V$ to $27V$, $T_J=25^{\circ}C$	--	--	200	mV
Load Regulation	ΔV_O	$I_O=1mA$ to $100mA$, $T_J=25^{\circ}C$	--	--	240	mV
		$I_O=1mA$ to $40mA$, $T_J=25^{\circ}C$	--	--	120	mV
Ripple Rejection	RR	$V_I=15V$ to $25V$, $f=120Hz$, $T_J=25^{\circ}C$	36	--	--	dB
Dropout Voltage	V_D		--	1.7	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	5.5	mA
Quiescent Current Change	ΔI_Q	$V_I=16V$ to $27V$	--	--	1.5	mA
		$I_O=1mA$ to $40mA$	--	--	0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$, $T_J=25^{\circ}C$	--	80	--	μV

TN78L15SA Electrical Characteristics

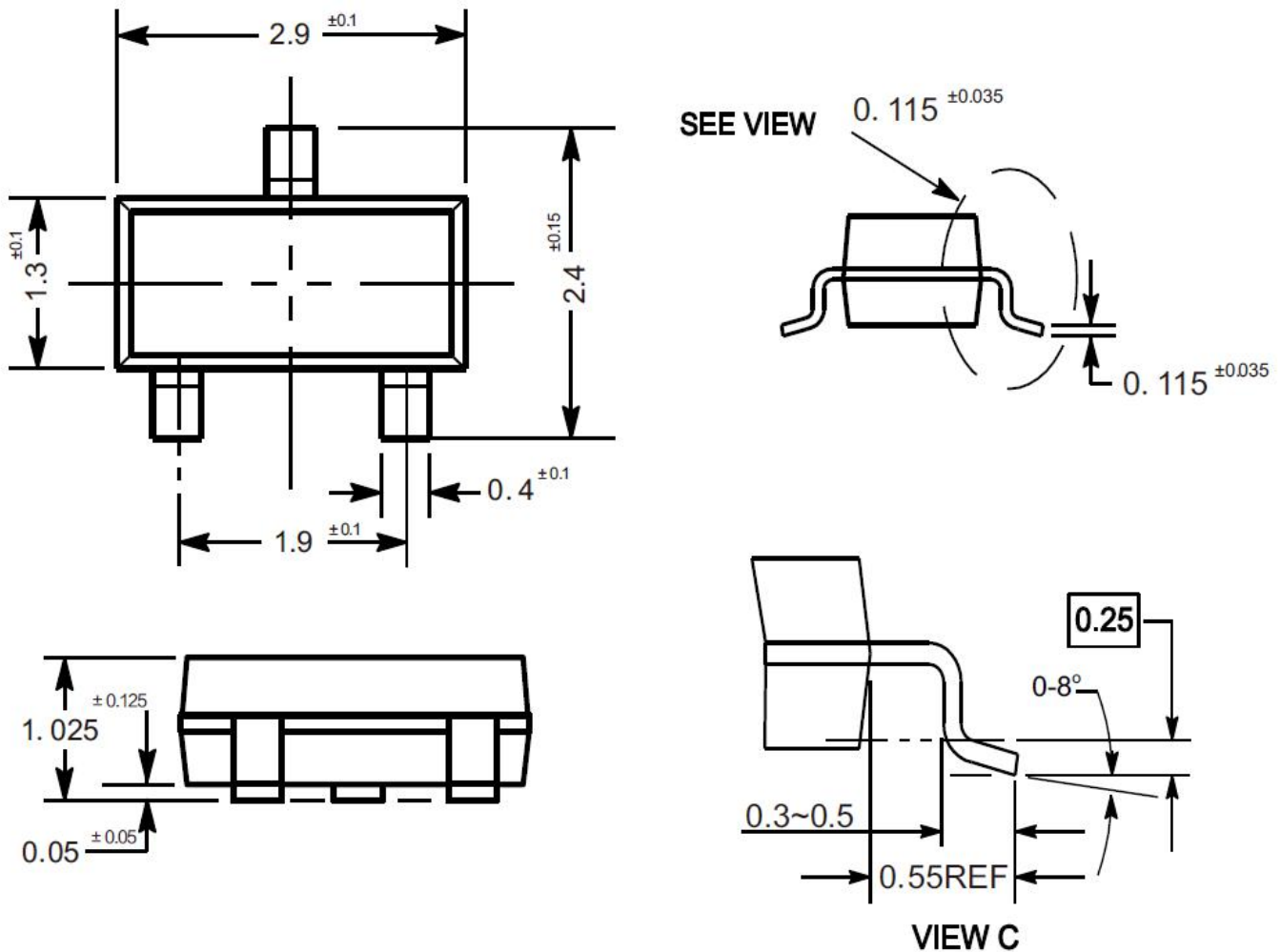
$V_I=23V$, $I_O=40mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	14.4	15	15.6	V
		$I_O=1mA$ to $40mA$, $V_I=17.5V$ to $30V$	14.25	--	15.75	V
		$I_O=1mA$ to $70mA$	14.25	--	15.75	V
Line Regulation	ΔV_O	$V_I=17.5V$ to $30V$, $T_J=25^{\circ}C$	--	--	300	mV
		$V_I=20V$ to $30V$, $T_J=25^{\circ}C$	--	--	250	mV
Load Regulation	ΔV_O	$I_O=1mA$ to $100mA$, $T_J=25^{\circ}C$	--	--	150	mV
		$I_O=1mA$ to $40mA$, $T_J=25^{\circ}C$	--	--	75	mV
Ripple Rejection	RR	$V_I=18.5V$ to $28.5V$, $f=120Hz$, $T_J=25^{\circ}C$	33	--	--	dB
Dropout Voltage	V_D		--	1.7	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	6.0	mA
Quiescent Current Change	ΔI_Q	$V_I=20V$ to $30V$	--	--	1.5	mA
		$I_O=1mA$ to $40mA$	--	--	0.1	mA
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$, $T_J=25^{\circ}C$	--	90	--	μV

Typical Characteristic Curves(TN78L05SA&TN78L09SA)



Package Outline(SOT-23 Dimensions in mm)



Contact Information

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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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