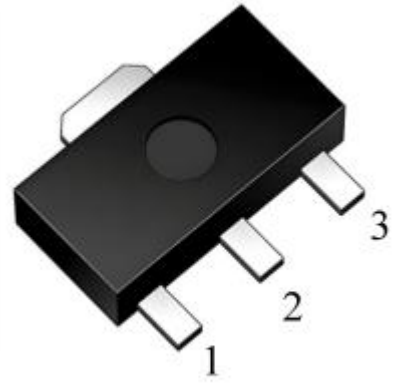
3-Terminal Voltage Regulator

Features

- Input voltage:up to 30V、35V
- Output voltage:5V、6V、8V、9V、10V、12V、15V
- Output current up to 100 mA, internal thermal overload protection and short-circuit current limiting.

SOT-89



1. VOUT 2. GND 3. VIN

Marking Code

- TN78L05SQ：78L05
- TN78L06SQ：78L06
- TN78L08SQ：78L08
- TN78L09SQ：78L09
- TN78L10SQ：78L10
- TN78L12SQ：78L12
- TN78L15SQ：78L15

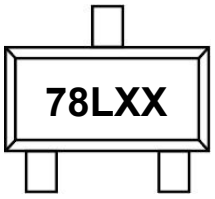
Absolute Maximum Ratings

Ratings at 25℃ ambient temperature unless otherwise specified.

Parameter	Symbol	Value		Unit
Input Voltage	V_I	TN78L06SQ、TN78L08SQ、TN78L09SQ、TN78L10SQ	30	V
		TN78L05SQ、TN78L12SQ、TN78L15SQ	35	
Output Current	I_O	100		mA
Maximum Power Dissipation	P_D	350		mW
Thermal Resistance Junction-Air	$R_{\theta JA}$	250		°C/W
Junction Temperature	T_J	150		°C
Operating Temperature Range	T_{OPR}	-40 to +125		°C
Storage Temperature Range	T_{STG}	-55 to +150		°C

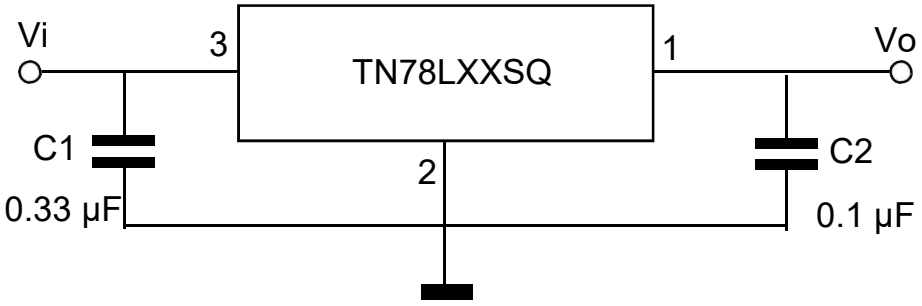
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Ordering Information

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TN78L05SQ	SOT-89	7&13	1,000PCS/Reel&7inches 3,000PCS/Reel&13inches	RoHS & Green	MSL1	
TN78L06SQ						
TN78L08SQ						
TN78L09SQ						
TN78L10SQ						
TN78L12SQ						
TN78L15SQ						

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

Typical Application Circuit



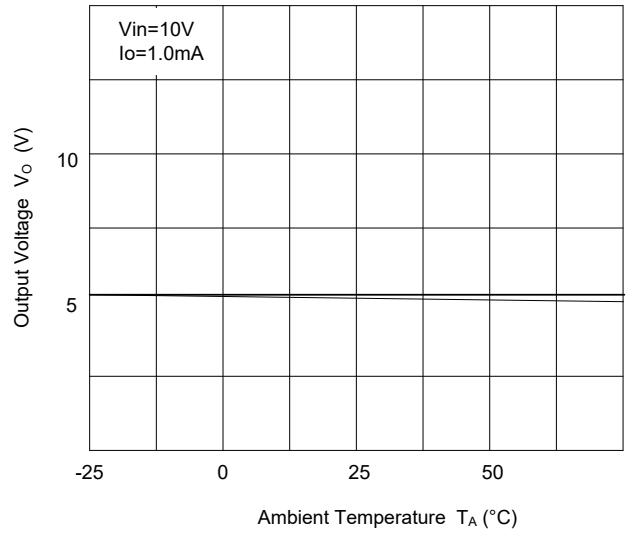
Note: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

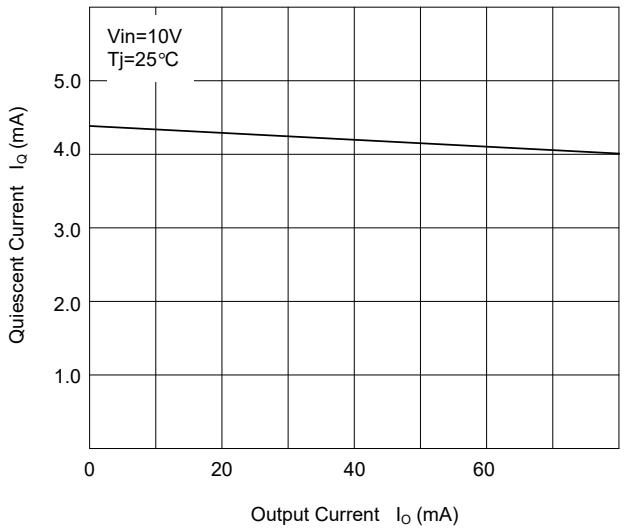
TN78L05SQ Electrical Characteristics

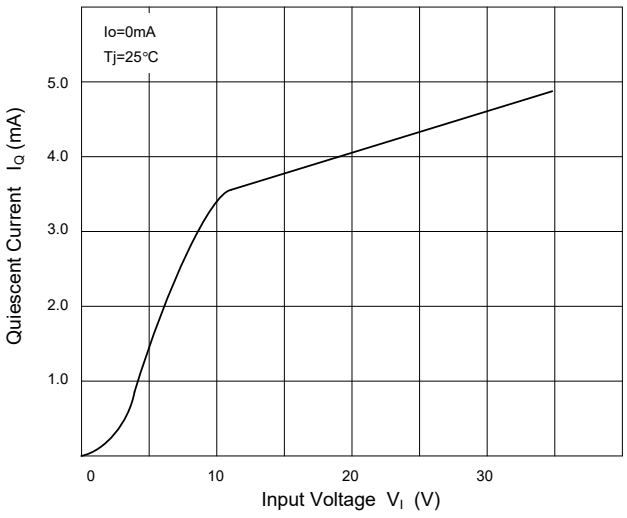
Ratings at 0℃≤TJ≤125℃ V_I=10V, I_O=40mA, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

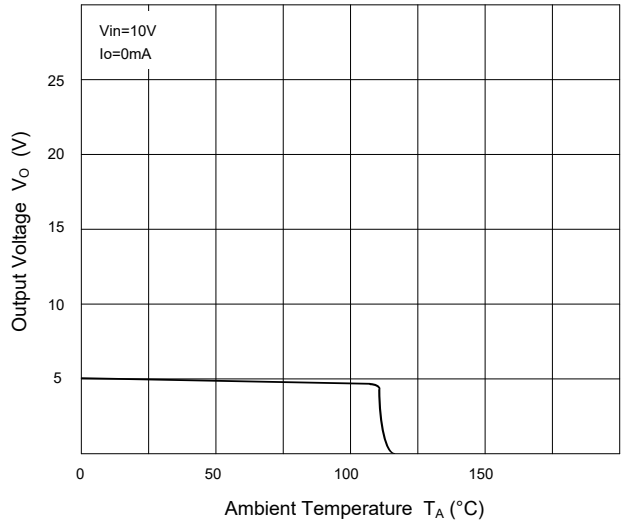
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	4.80	5.0	5.2	V
		I_O=1mA to 40mA, V_I=7V to 20V	4.75	5.0	5.25	V
		I_O=1mA to 70mA,V_I=10V	4.75	5.0	5.25	V
Line Regulation	$\triangle V_O$	V_I=7V to 20V, T_J=25°C	--	--	150	mV
		V_I=8V to 20V, T_J=25°C	--	--	100	mV
Load Regulation	$\triangle V_O$	I_O=1mA to 100mA ,T_J=25°C	--	--	60	mV
		I_O=1mA to 40 mA, T_J=25°C	--	--	30	mV
Ripple Rejection	RR	V_I=8V to 20V, f=120Hz, T_J=25°C	40	49	--	dB
Dropout Voltage	V_D	T_J=25°C	--	1.7	--	V
Quiescent Current	I_Q		--	3.8	6	mA
Quiescent Current Change	$\triangle I_Q$	V_I=8V to 20V	--	--	1.5	mA
		I_O=1mA to 40mA	--	--	0.1	mA
Output Noise Vol age	V_N	10Hz≤f≤100KHz, T_J=25°C	--	42	--	μV

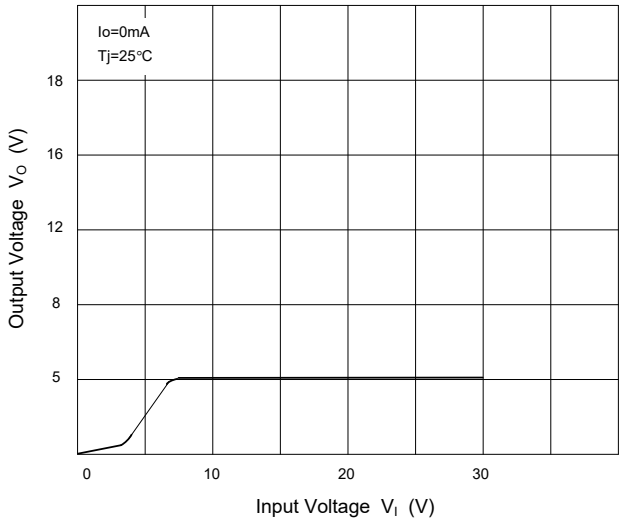
TN78L05SQ Typical Characteristic Curves

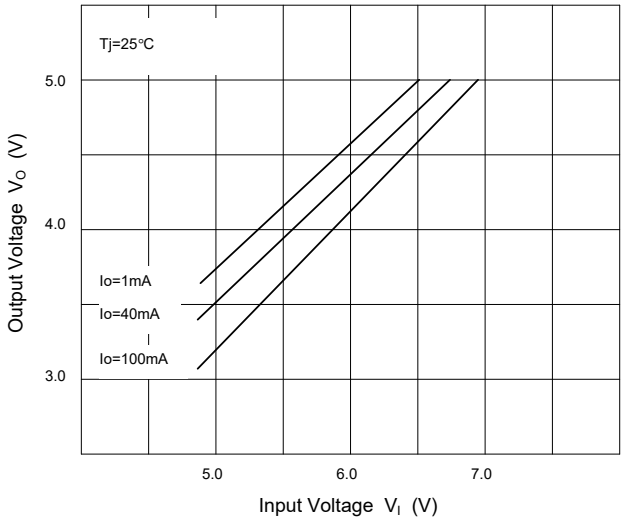










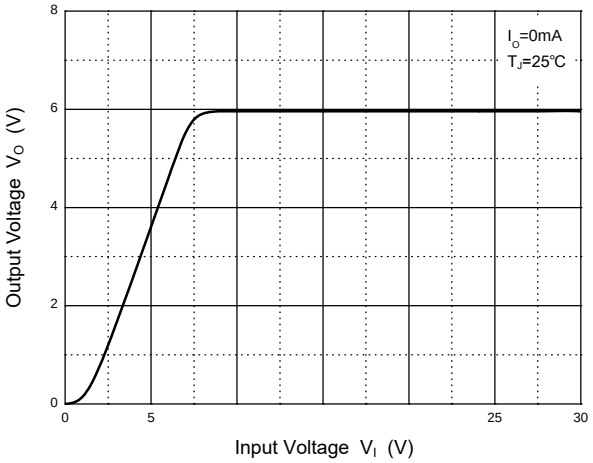


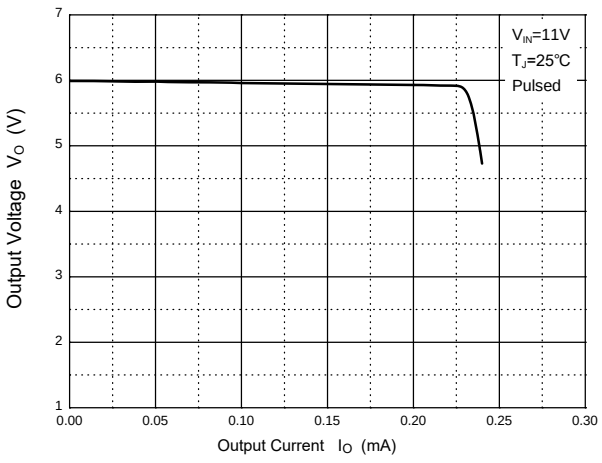
TN78L06SQ Electrical Characteristics

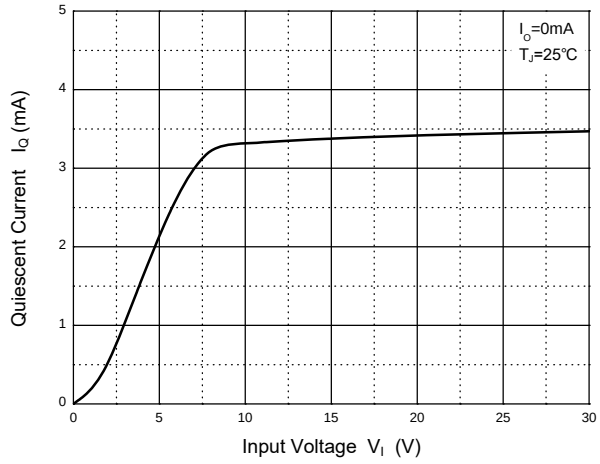
Ratings at 0℃≤T_J≤125℃ V_I=11V, I_O=40mA, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

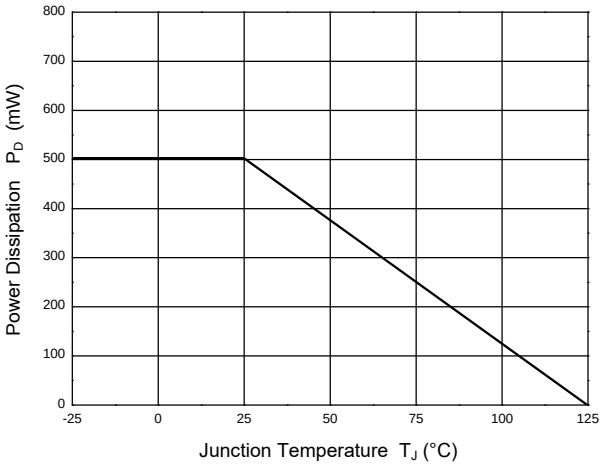
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	5.76	6.0	6.24	V
		I_O=1mA to 40mA, V_I=8.5V to 21V	5.7	6.0	6.3	V
		I_O=1mA to 70mA,V_I=11V	5.7	6.0	6.3	V
Line Regulation	△V_O	V_I=8.5V to 21V, T_J=25°C	--	--	155	mV
		V_I=9V to 21V, T_J=25°C	--	--	105	mV
Load Regulation	△V_O	I_O=1mA to 100mA ,T_J=25°C	--	--	65	mV
		I_O=1mA to 40 mA, T_J=25°C	--	--	35	mV
Ripple Rejection	RR	V_I=9V to 19V, f=120Hz, T_J=25°C	40	--	--	dB
Dropout Voltage	V_D	T_J=25°C	--	1.7	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	5.5	mA
Quiescent Current Change	△I_Q	V_I=9V to 21V,I_O=40mA	--	--	1.5	mA
		I_O=1mA to 40mA,V_I=11V	--	--	0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100KHz, T_J=25°C	--	49	--	μV

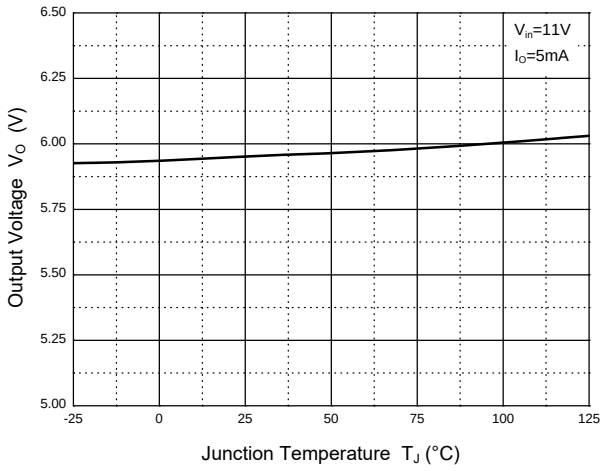
TN78L06SQ Typical Characteristic Curves









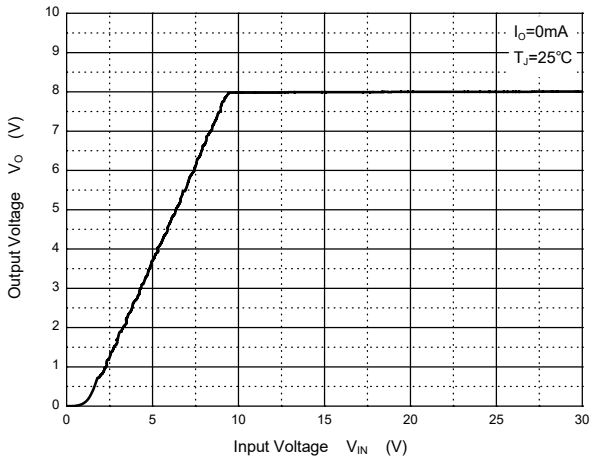


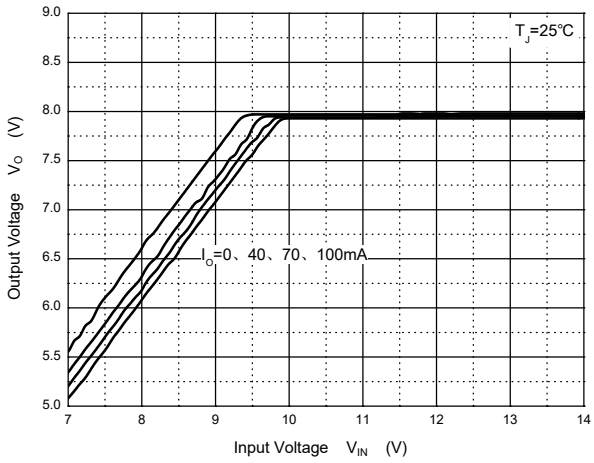
TN78L08SQ Electrical Characteristics

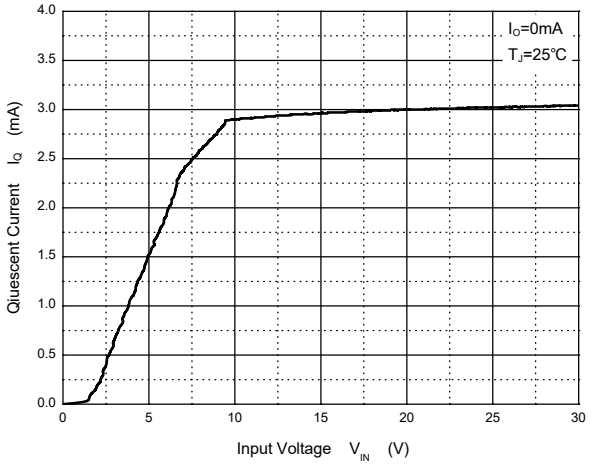
V_I=14V, I_O=40mA,0℃≤ T_J≤125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

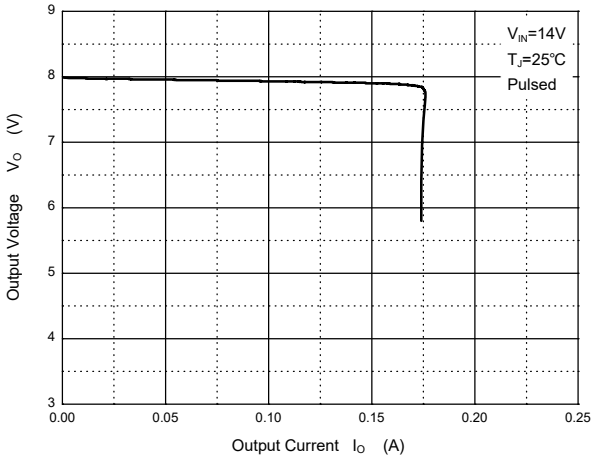
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	7.70	8.0	8.30	V
		I_O=1mA to 40mA, V_I=10.5V to 23V	7.60	8.0	8.40	V
		I_O=1mA to 70mA	7.60	8.0	8.40	V
Line Regulation	$\triangle V_O$	V_I=10.5V to 23V, T_J=25°C	--	--	175	mV
		V_I=11V to 23V, T_J=25°C	--	--	125	mV
Load Regulation	$\triangle V_O$	I_O=1mA to 100mA ,T_J=25°C	--	--	80	mV
		I_O=1mA to 70 mA, T_J=25°C	--	--	40	mV
Ripple Rejection	RR	V_I=11V to 23V, f=120Hz, T_J=25°C	36	45	--	dB
Dropout Voltage	V_D	T_J=25°C	--	1.7	--	V
Quiescent Current	I_Q		--	--	5.5	mA
Quiescent Current Change	$\triangle I_Q$	V_I=11V to 23V	--	--	1.5	mA
		I_O=1mA to 40mA	--	--	0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100KHz	--	49	--	μV

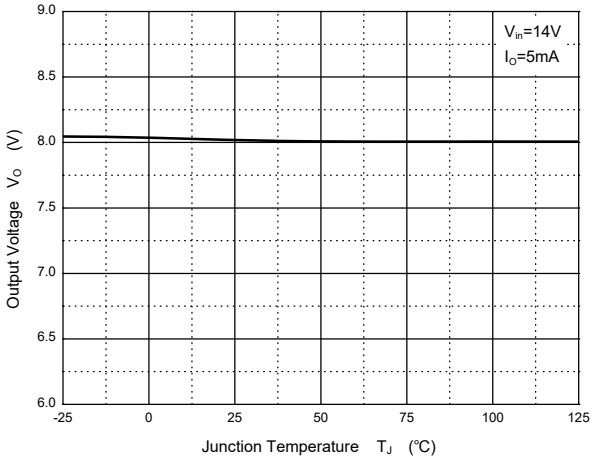
TN78L08SQ Typical Characteristic Curves

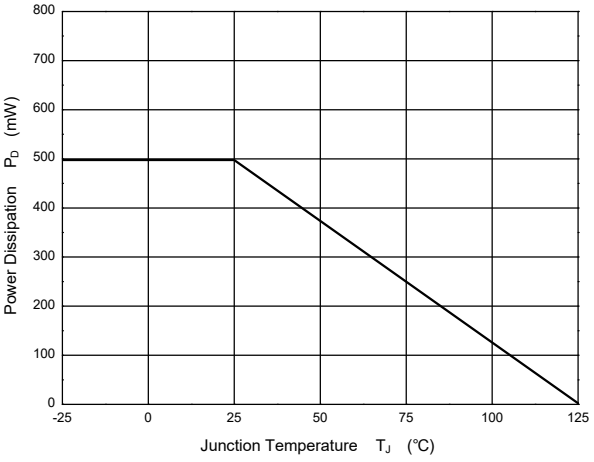










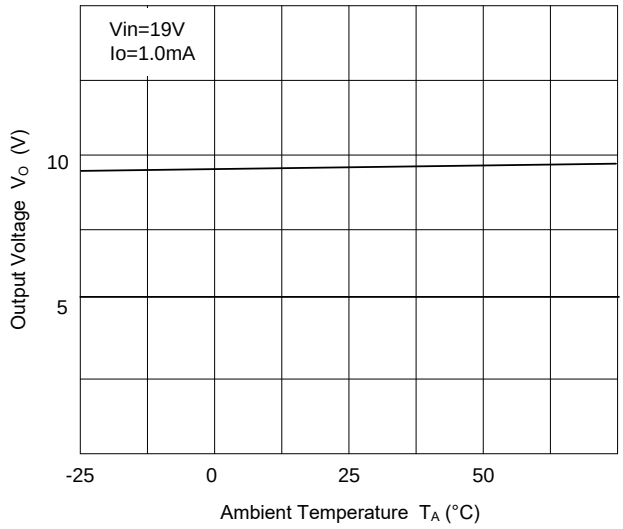


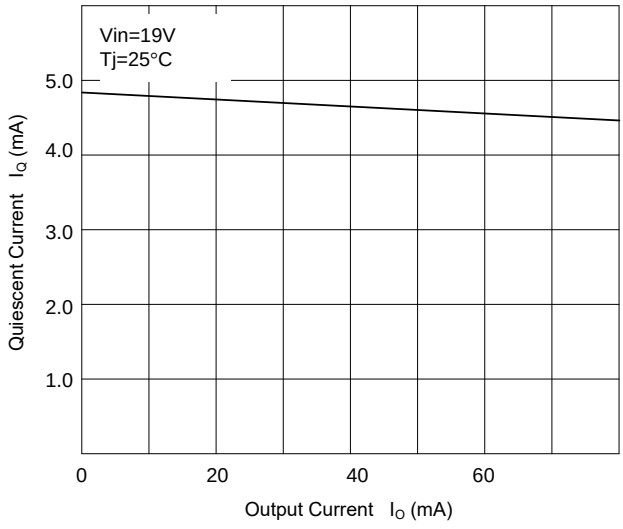
TN78L09SQ Electrical Characteristics

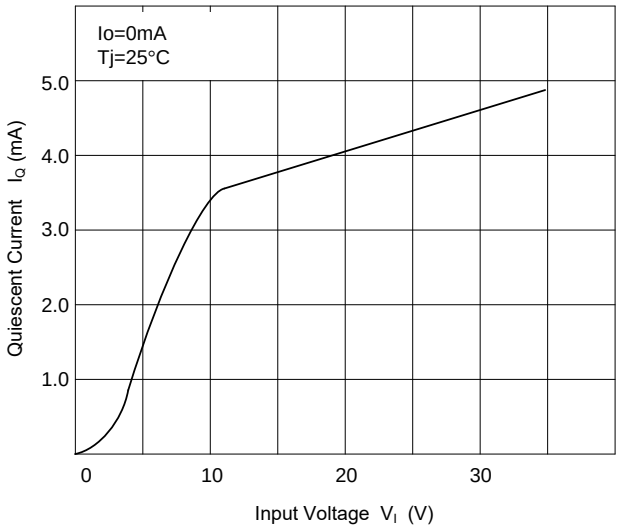
V_I=15V, I_O=40mA,0℃≤ T_J≤125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

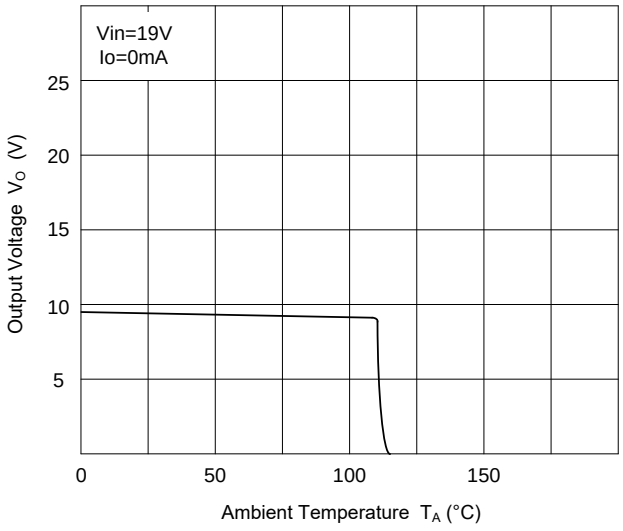
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	8.64	9	9.36	V
		I_O=1mA to 40mA, V_I=11.5V to 24V	8.55	9	9.45	V
		I_O=1mA to 70mA	8.55	9	9.45	V
Line Regulation	△V_O	V_I=11.5V to 24V, T_J=25°C	--	--	200	mV
		V_I=13V to 24V, T_J=25°C	--	--	150	mV
Load Regulation	△V_O	I_O=1mA to 100mA ,T_J=25°C	--	--	90	mV
		I_O=1mA to 40 mA, T_J=25°C	--	--	45	mV
Ripple Rejection	RR	V_I=12V to 23V, f=120Hz, T_J=25°C	36	44	--	dB
Dropout Voltage	V_D	T_J=25°C	--	1.7	--	V
Quiescent Current	I_Q		--	--	5.5	mA
Quiescent Current Change	△I_Q	V_I=13V to 24V	--	--	1.5	mA
		I_O=1mA to 40mA	--	--	0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100KHz	--	49	--	μV

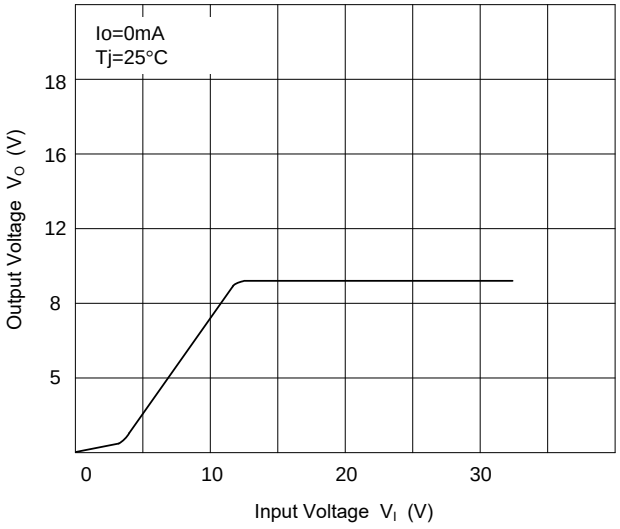
TN78L09SQ Typical Characteristic Curves

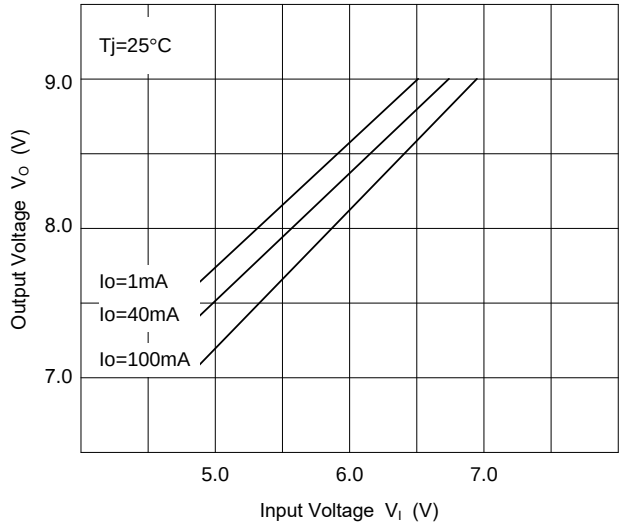












TN78L10SQ Electrical Characteristics

V_I=17V, I_O=40mA,0℃≤ T_J≤125℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

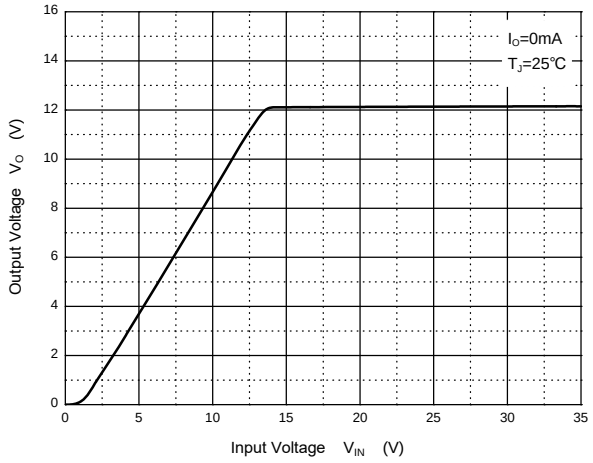
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	9.6	10	10.4	V
		I_O=1mA to 40mA, V_I=13V to 25V	9.5	10	10.5	V
		I_O=1mA to 70mA	9.5	10	10.5	V
Line Regulation	△V_O	V_I=13V to 25V, T_J=25°C	--	--	175	mV
		V_I=14V to 25V, T_J=25°C	--	--	125	mV
Load Regulation	△V_O	I_O=1mA to 100mA ,T_J=25°C	--	--	90	mV
		I_O=1mA to 40 mA, T_J=25°C	--	--	40	mV
Ripple Rejection	RR	V_I=9V to 19V, f=120Hz, T_J=25°C	37	44	--	dB
Dropout Voltage	V_D	T_J=25°C	--	1.7	--	V
Quiescent Current	I_Q		--	--	6	mA
Quiescent Current Change	△I_Q	V_I=14V to 25V	--	--	1.5	mA
		I_O=1mA to 40mA	--	--	0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100Hz	--	62	--	μV

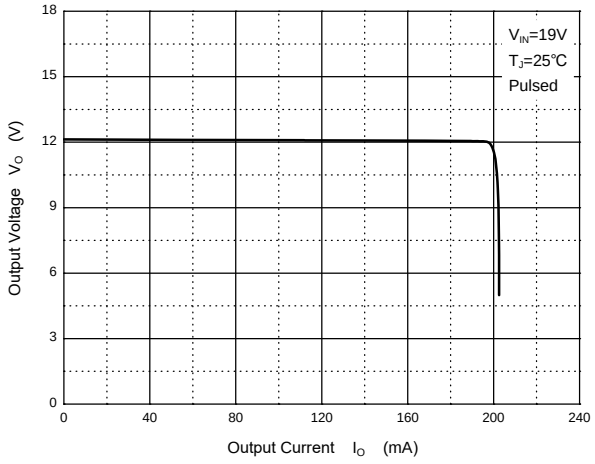
TN78L12SQ Electrical Characteristics

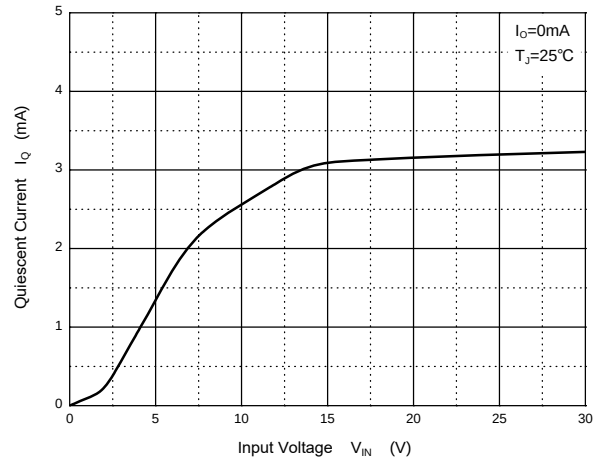
Ratings at 0℃≤T_J≤125℃ V_I=19V, I_O=40mA, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

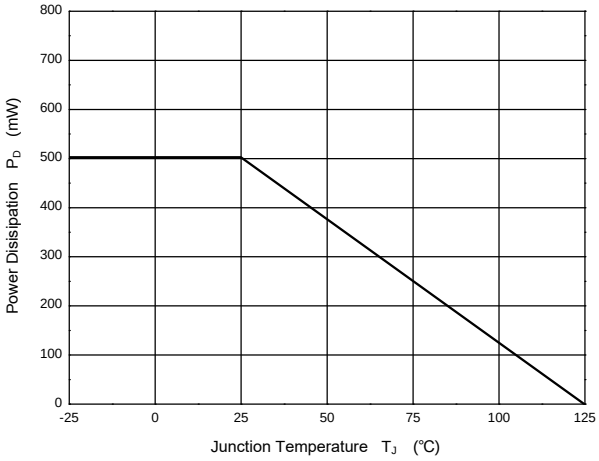
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	11.5	12	12.5	V
		I_O=1mA to 40mA, V_I=14.5V to 27V	11.4	12	12.6	V
		I_O=1mA to 70mA,V_I=19V	11.4	12	12.6	V
Line Regulation	$\triangle V_O$	V_I=14.5V to 27V, T_J=25°C	--	--	250	mV
		V_I=16V to 27V, T_J=25°C	--	--	200	mV
Load Regulation	$\triangle V_O$	I_O=1mA to 100mA, T_J=25°C	--	--	100	mV
		I_O=1mA to 40 mA, T_J=25°C	--	--	50	mV
Ripple Rejection	RR	V_I=15V to 25V, f=120Hz, T_J=25°C	37	--	--	dB
Dropout Voltage	V_D	T_J=25°C	--	1.7	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	6	mA
Quiescent Current Change	$\triangle I_Q$	V_I=16V to 27V	--	--	1.5	mA
		I_O=1mA to 80mA	--	--	0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz, T_J=25°C	--	70	--	μV/Vo

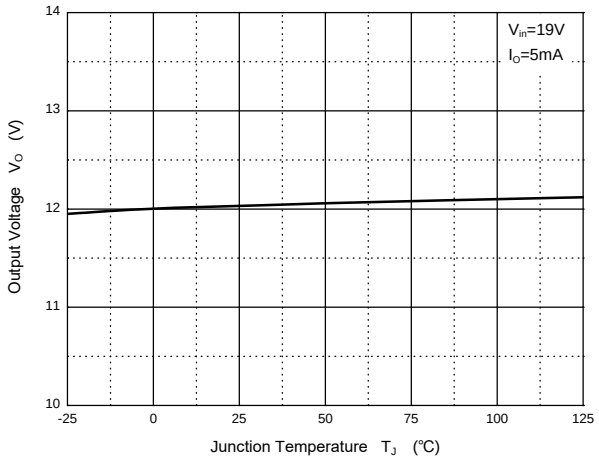
TN78L12SQ Typical Characteristic Curves









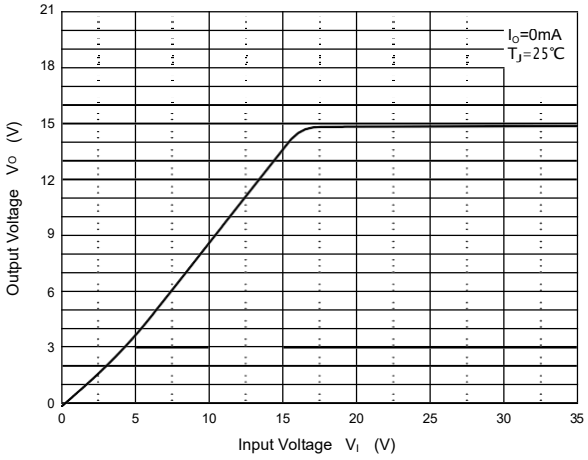


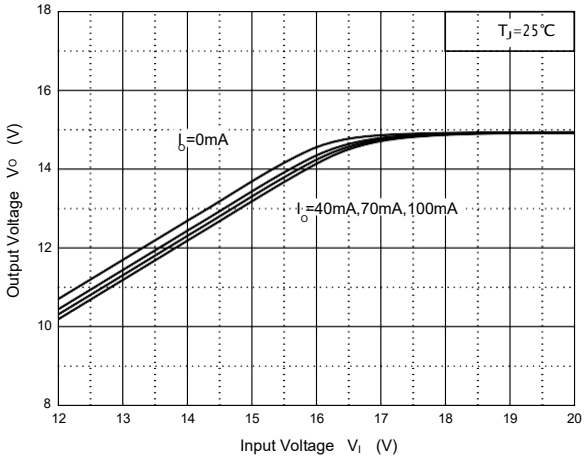
TN78L15SQ Electrical Characteristics

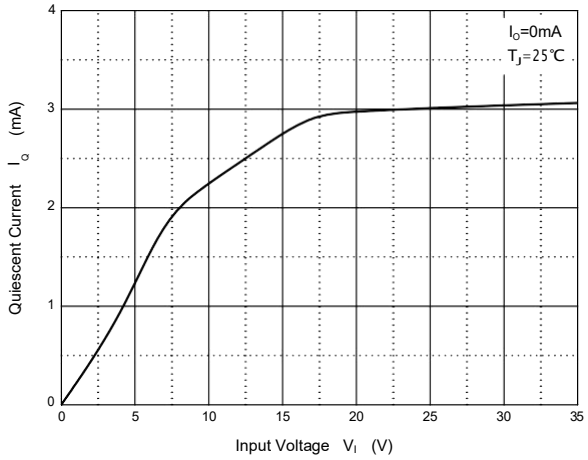
Ratings at 0℃≤T_J≤125℃ V_I=23V, I_O=40mA, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

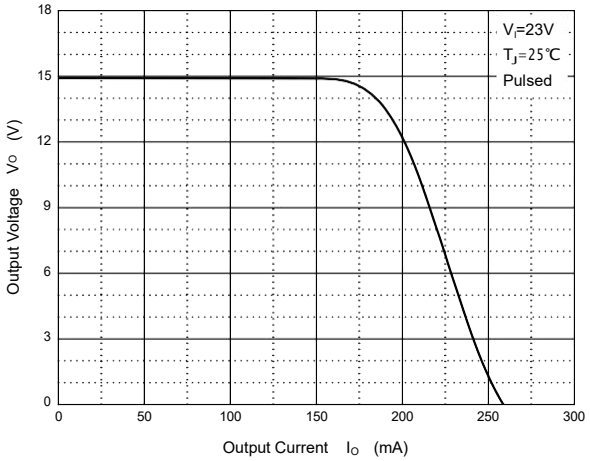
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	T_J=25°C	14.4	15	15.6	V
		I_O=1mA to 40mA, V_I=17.5V to 30V	14.25	15	15.75	V
		I_O=1mA to 70mA,VI=23V	14.25	15	15.75	V
Line Regulation	$\triangle V_O$	V_I=17.5V to 30V, T_J=25°C	--	25	150	mV
		V_I=20V to 30V, T_J=25°C	--	15	75	mV
Load Regulation	$\triangle V_O$	I_O=1mA to 100mA ,T_J=25°C	--	20	150	mV
		I_O=1mA to 70 mA, T_J=25°C	--	25	150	mV
Ripple Rejection	RR	V_I=18.5V to 28.5V, f=120Hz, T_J=25°C	33	--	--	dB
Dropout Voltage	V_D	T_J=25°C	--	1.7	--	V
Quiescent Current	I_Q	T_J=25°C	--	--	6	mA
Quiescent Current Change	$\triangle I_Q$	V_I=20V to 30V,T_J=25°C	--	--	1.5	mA
		I_O=1mA to 40mA	--	--	0.1	mA
Output Noise Voltage	V_N	10Hz≤f≤100KHz, T_J=25°C	--	90	--	μV

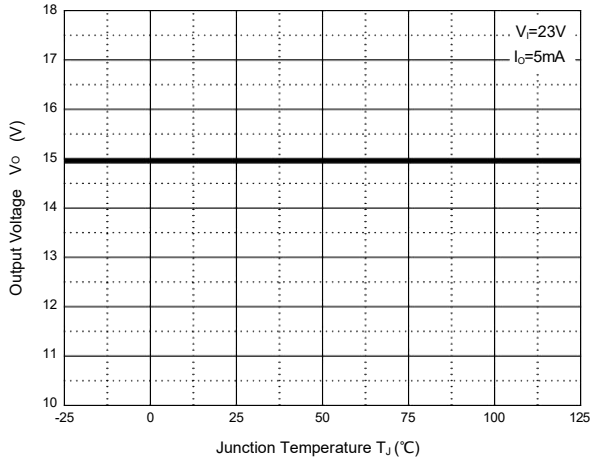
TN78L15SQ Typical Characteristic Curves

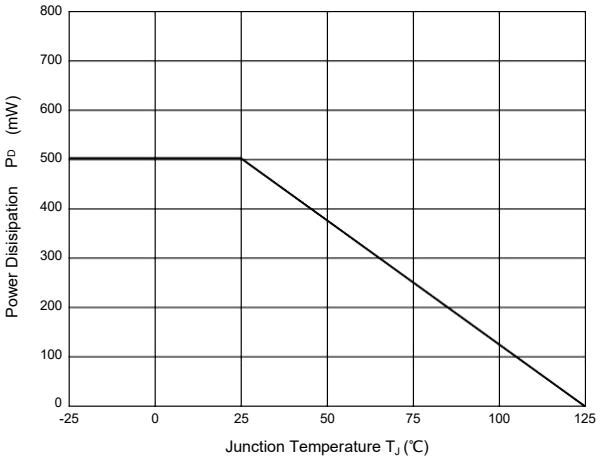






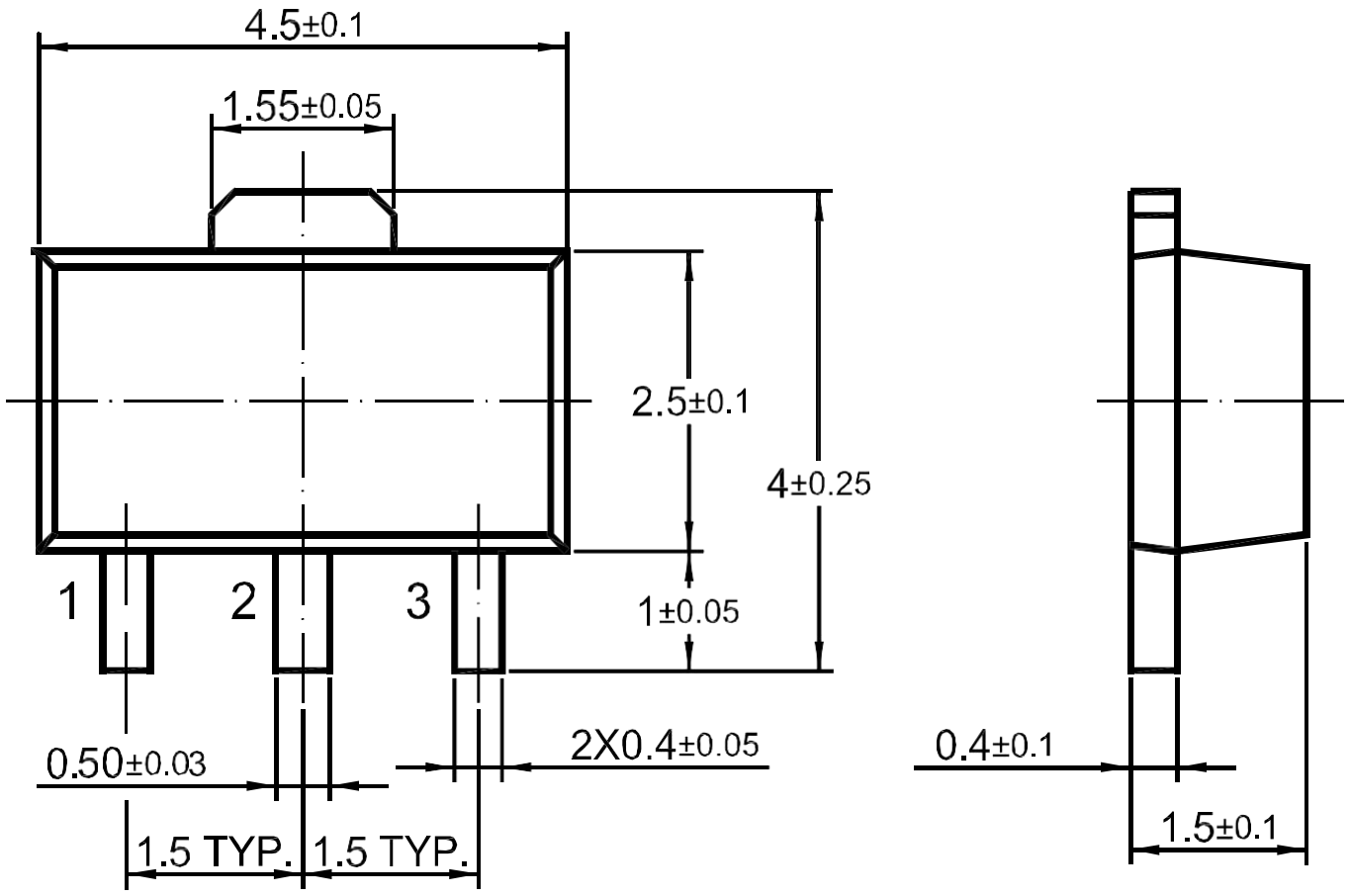






Package Outline

SOT-89 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.

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 prod uct 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.

Users should also comply with relevant laws, regulations, policies, and standards when using the product specification. Users are responsible for the risks and liabilities arising from the use of the product specification and must ensure that it is not used for illegal purposes. Additionally, users should respect the intellectual property rights related to the product specification and refrain from infringing upon any third- party legal rights. TANI shall assume no responsibility for any disputes or controv ersies arising from the above-mentioned issues in any form.