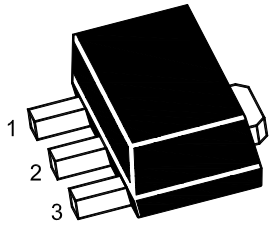
# TN78SxxSQ

## 3-Terminal Voltage Regulator

### Features

- Input voltage:up to 30~35V
- Output voltage:5~33V
- Output current up to 200 mA, internal thermal overload protection and short-circuit current limiting.

**SOT-89**




1. VOUT 2. GND 3. VIN

### Marking Code

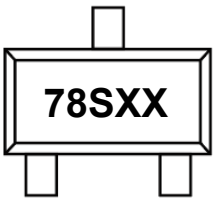
- TN78S05SQ：78S05
- TN78S06SQ：78S06
- TN78S33SQ：78S09

### Absolute Maximum Ratings

Ratings at 25℃ ambient temperature unless otherwise specified.

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Input Voltage | $V_I$ | TN78S05SQ：35 | V |
| | | TN78S06SQ：30 | |
| | | TN78S33SQ：30 | |
| Output Current | $I_O$ | 200 | mA |
| Maximum Power Dissipation | $P_D$ | 500 | mW |
| Junction Temperature | $T_J$ | TN78S05SQ：35 | °C |
| | | TN78S06SQ：30 | |
| | | TN78S33SQ：30 | |
| Operating Temperature Range | $T_{OPR}$ | -40 to +120 | °C |
| Storage Temperature Range | $T_{STG}$ | -40 to +150 | °C |

### Ordering Information

| Orderable Device | Package | Reel (inch) | Package Qty (PCS) | Eco Plan Note | MSL Level | Marking Code |
|---|---|---|---|---|---|---|
| TN78S05SQ | SOT-89 | 7 | 1,000PCS/Reel&7inches<br>3,000PCS/Reel&13inches | RoHS & Green | MSL1 |  |
| TN78S06SQ | | | | | | |
| TN78S33SQ | | | | | | |

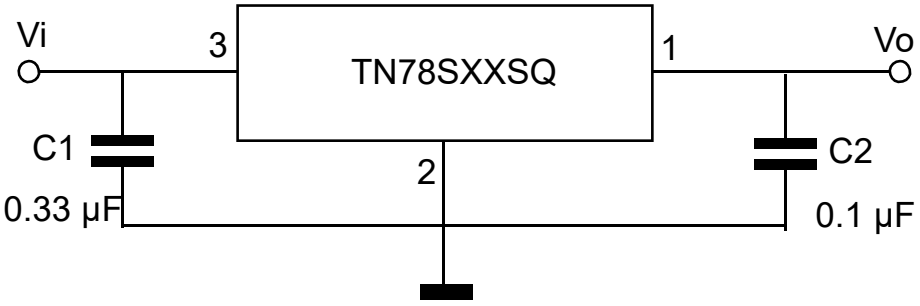


**Note:**

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.

## Typical Application Circuit

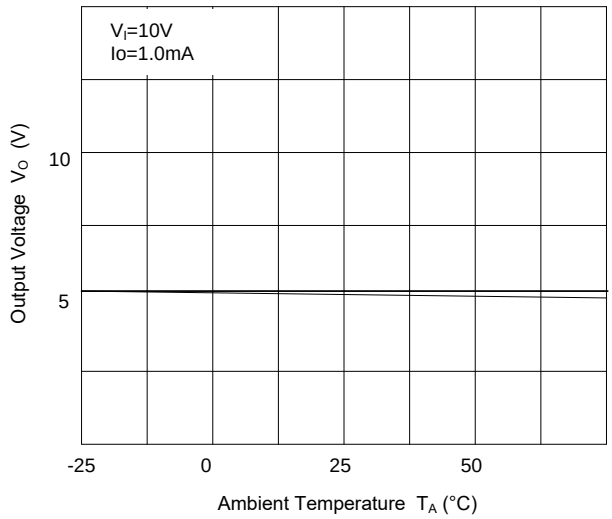


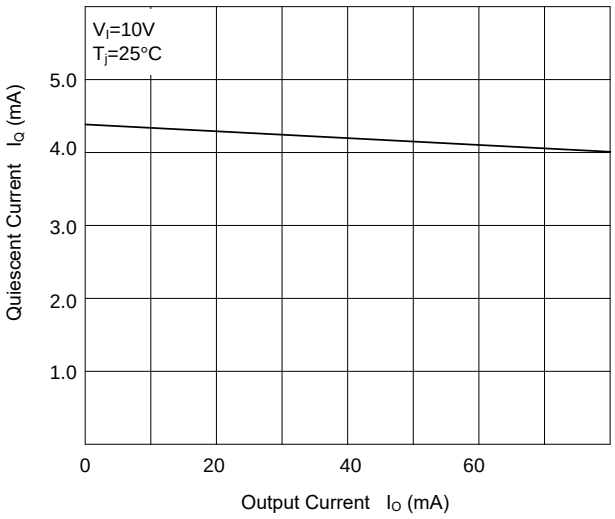

## TN78S05SQ Electrical Characteristics

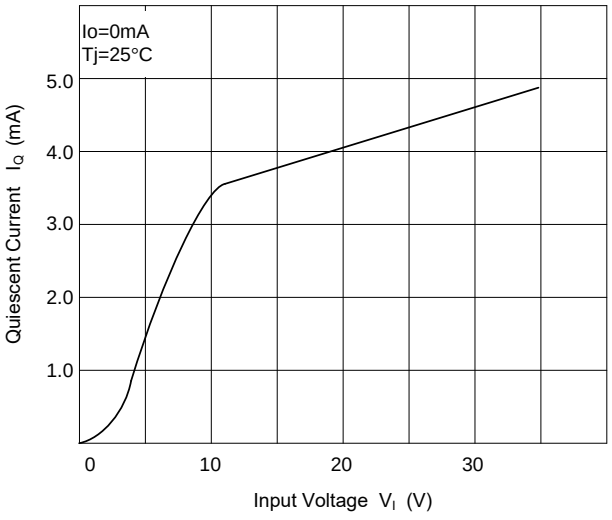
Ratings at 0℃≤TJ≤125℃ $V_I$=10V, $I_O$=40mA, $C_I$=0.33μF,$C_O$=0.1μF,unless otherwise specified.

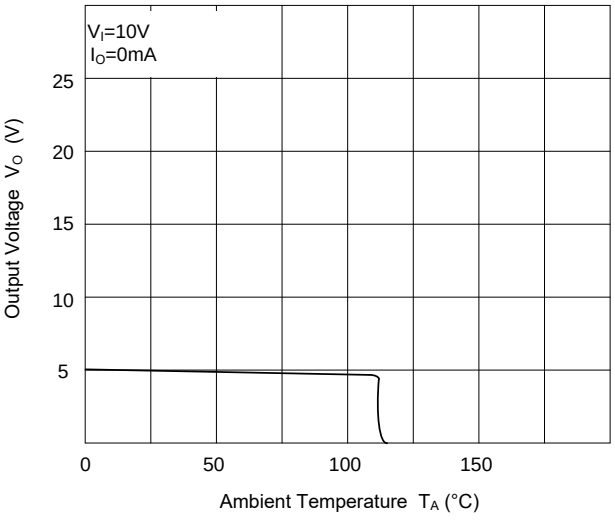
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 4.80 | 5.0 | 5.2 | V |
| | | $I_O$=1mA to 40mA, $V_I$=7V to 20V | 4.75 | 5.0 | 5.25 | V |
| | | $I_O$=1mA to 70mA,$V_I$=10V | 4.75 | 5.0 | 5.25 | V |
| Line Regulation | $\triangle V_O$ | $V_I$=7V to 20V, $T_J$=25°C | -- | 8 | 150 | mV |
| | | $V_I$=8V to 20V, $T_J$=25°C | -- | 6 | 100 | mV |
| Load Regulation | $\triangle V_O$ | $I_O$=1mA to 100mA ,$T_J$=25°C | -- | 11 | 60 | mV |
| | | $I_O$=1mA to 40 mA, $T_J$=25°C | -- | 5 | 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 | $I_Q$ | | -- | 2 | 5.5 | 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 Voltage | $V_N$ | 10Hz≤f≤100KHz | -- | 40 | -- | μV |

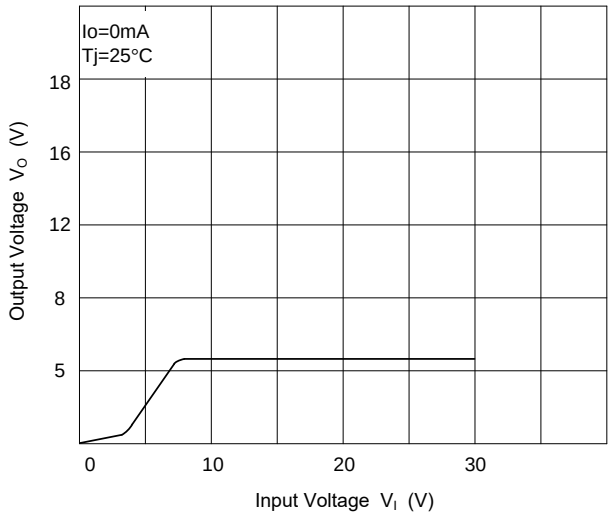
## TN78S05SQ Typical Characteristic Curves

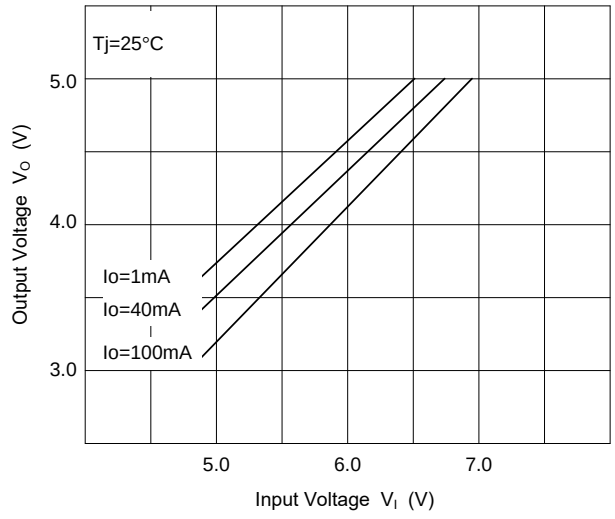


## TN78S06SQ Electrical Characteristics

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

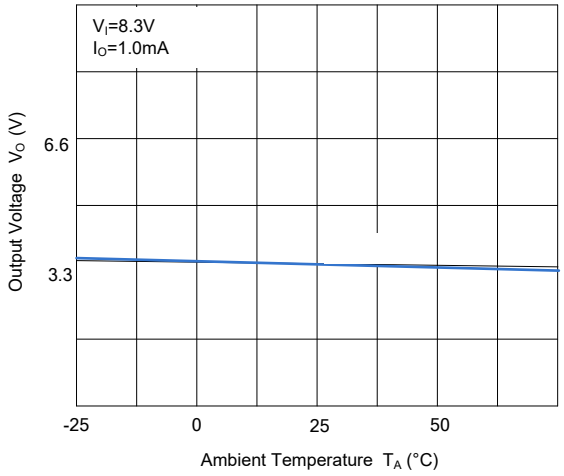
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 5.75 | 6.0 | 6.25 | V |
| | | $I_O$=1mA to 80mA, $V_I$=8.5V to 20V | 5.7 | 6.0 | 6.3 | V |
| | | $I_O$=1mA to 140mA | 5.7 | 6.0 | 6.3 | V |
| Line Regulation | $\triangle V_O$ | $V_I$=8.5V to 20V, $T_J$=25°C | -- | 12 | 150 | mV |
| | | $V_I$=9V to 20V, $T_J$=25°C | -- | 6 | 100 | mV |
| Load Regulation | $\triangle V_O$ | $I_O$=1mA to 200mA ,$T_J$=25°C | -- | 18 | 60 | mV |
| | | $I_O$=1mA to 80mA, $T_J$=25°C | -- | 12 | 30 | mV |
| Ripple Rejection | RR | $V_I$=9V to 20V, f=120Hz, $T_J$=25°C | 38 | 46 | -- | dB |
| Dropout Voltage | $V_D$ | | -- | 1.7 | -- | V |
| Quiescent Current | $I_Q$ | $T_J$=25°C | -- | 2 | 5.5 | mA |
| Quiescent Current Change | $\triangle I_Q$ | $V_I$=9V to 20V | -- | -- | 1.5 | mA |
| | | $I_O$=1mA to 80mA | -- | -- | 0.1 | mA |
| Output Noise Voltage | $V_N$ | 10Hz≤f≤100KHz | -- | 50 | -- | μV |

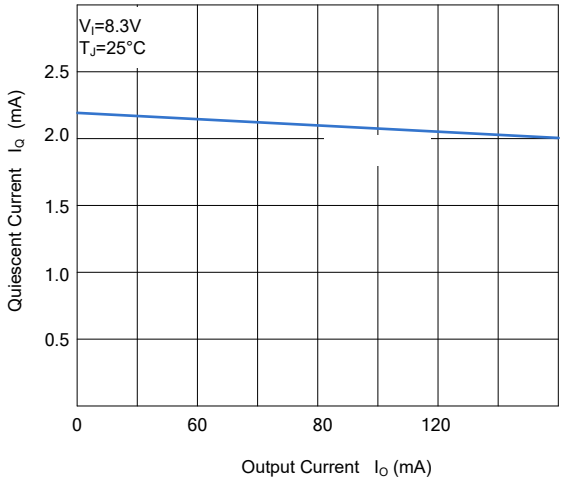
## TN78S33SQ Electrical Characteristics

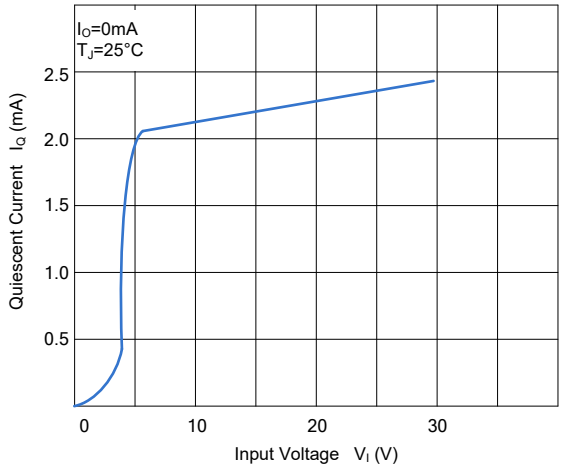
$V_I$=8.3V,$I_O$=80mA,0<$T_j$<125℃,$C_I$=0.33μF,$C_O$=0.1μF,unless otherwise specified.

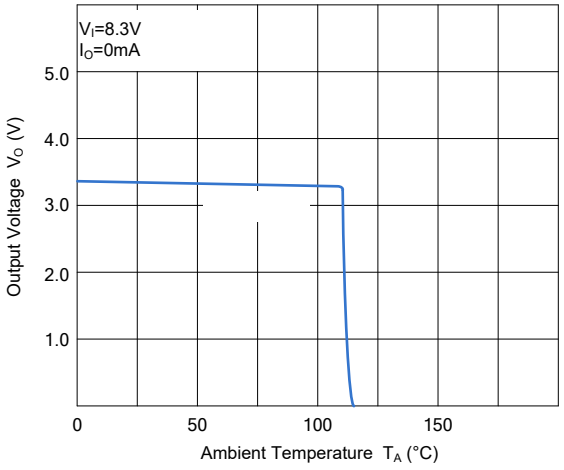
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 3.168 | 3.3 | 3.432 | V |
| | | $I_O$=1mA to 80mA, $V_I$=5.3V to 20V | 3.135 | -- | 3.465 | V |
| | | $I_O$=1mA to 140mA | 3.135 | -- | 3.465 | V |
| Line Regulation | $\triangle V_O$ | $V_I$=5.3V to 20V, $T_J$=25°C | -- | 7 | 150 | mV |
| | | $V_I$=6.3V to 20V, $T_J$=25°C | -- | 4 | 100 | mV |
| Load Regulation | $\triangle V_O$ | $I_O$=1mA to 200mA, $T_J$=25°C | -- | 10 | 60 | mV |
| | | $I_O$=1mA to 80 mA, $T_J$=25°C | -- | 7 | 30 | mV |
| Ripple Rejection | RR | $V_I$=9V to 20V, f=120Hz, $T_J$=25°C | 40 | 49 | -- | dB |
| Dropout Voltage | $V_D$ | | -- | 1.7 | -- | V |
| Quiescent Current | $I_Q$ | $T_J$=25°C | -- | 2.0 | 5.5 | mA |
| Quiescent Current Change | $\triangle I_Q$ | $V_I$=6.3V to 20V | -- | -- | 1.5 | mA |
| | | $I_O$=1mA to 80mA | -- | -- | 0.1 | mA |
| Output Noise Voltage | $V_N$ | 10Hz≤f≤100kHz, $T_J$=25°C | -- | 40 | -- | μV/Vo |

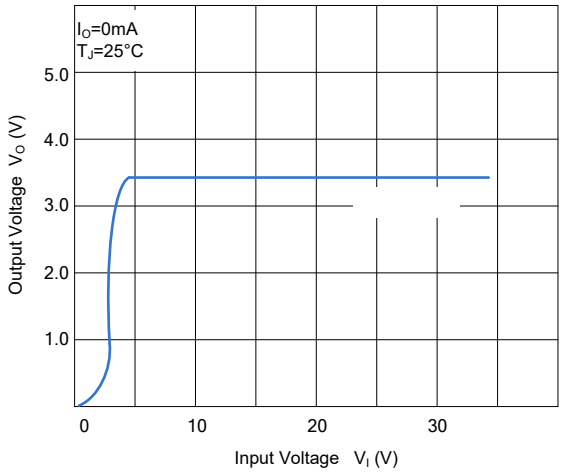
## TN78S33SQ Typical Characteristic Curves

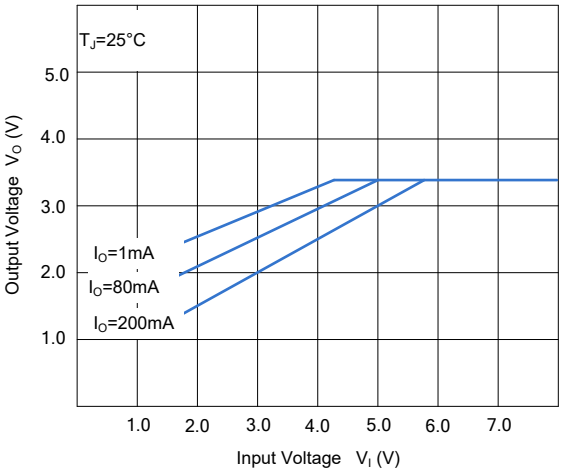


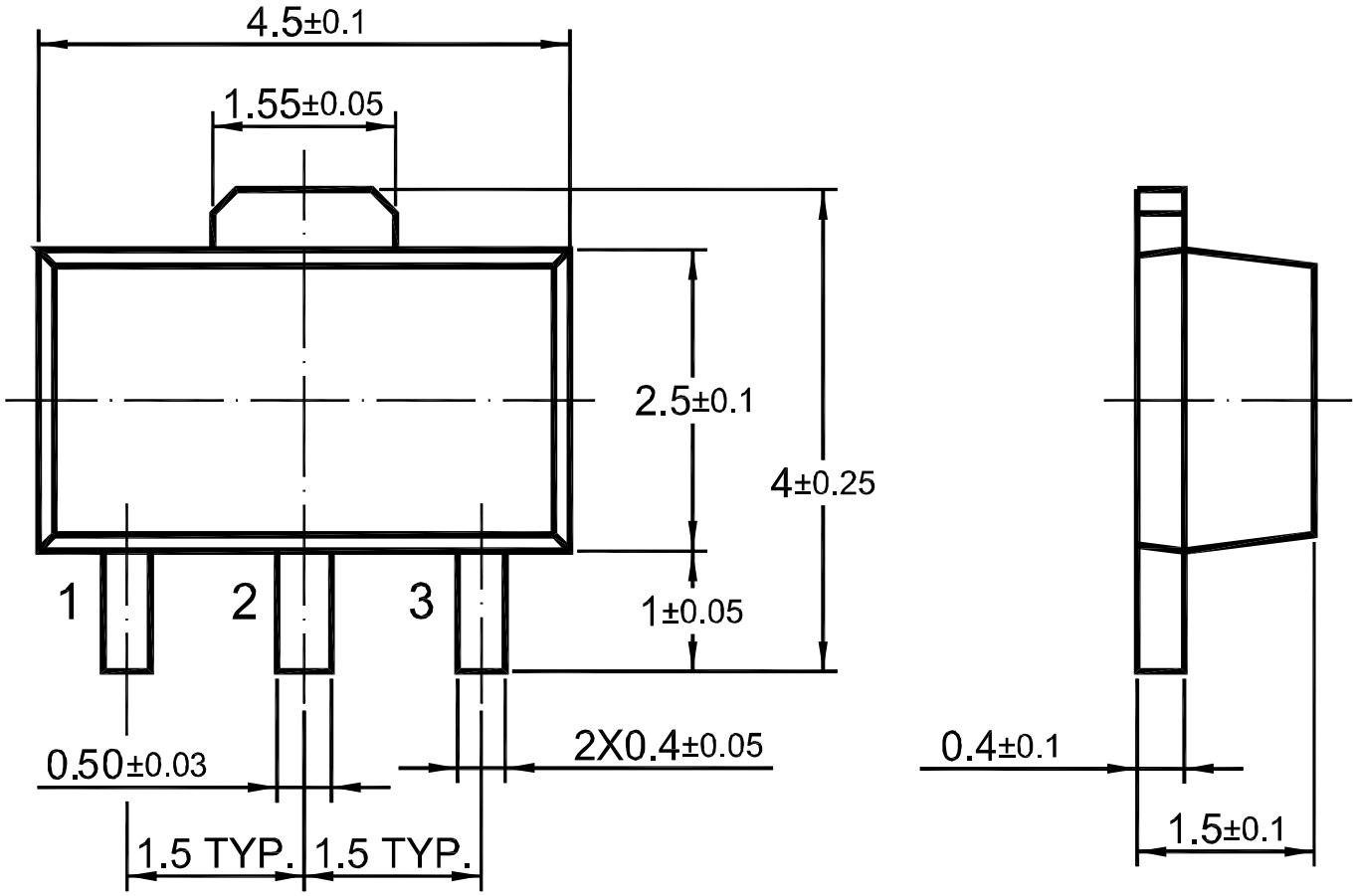



## Package Outline

SOT-89 Dimensions in mm




## Contact Information

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