



PJ78LxxSQ

3-Terminal Voltage Regulators

Description

The PJ78LxxSQ series of fixed voltage monolithic integrated circuit voltage three-terminal positive regulators are suitable for applications that required supply up to 100mA.

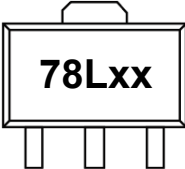
Features

- Input voltage: 30V($V_{OUT}=3.3\sim10V$); 35V($V_{OUT}=12\sim15V$)
- Output voltage: 3.3V, 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V
- Output current up to 100 mA
- Thermal overload protection
- Short circuit current limiting

Applications

- TV Board
- Air Conditioner
- Charging Device

Ordering Information

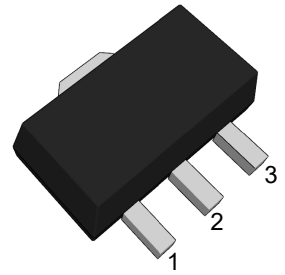
Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan ^{Note}	MSL Level	Marking Code
PJ78L33SQ	SOT-89	7/13	1000/3000	RoHS & Green	MSL1	 78Lxx: Product Code e.g. PJ78L33SQ: 78L33
PJ78L05SQ						
PJ78L06SQ						
PJ78L08SQ						
PJ78L09SQ						
PJ78L10SQ						
PJ78L12SQ						
PJ78L15SQ						
PJ78L18SQ						

Note:

RoHS: PJ 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: PJ defines "Green" to mean Halogen-Free and Antimony-Free.

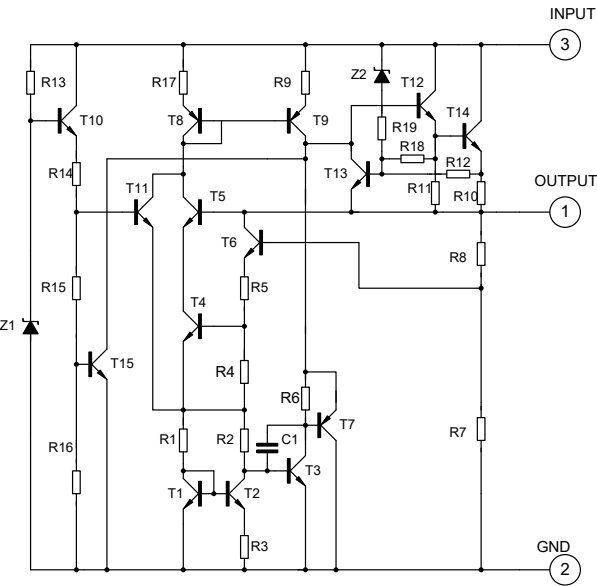
SOT-89



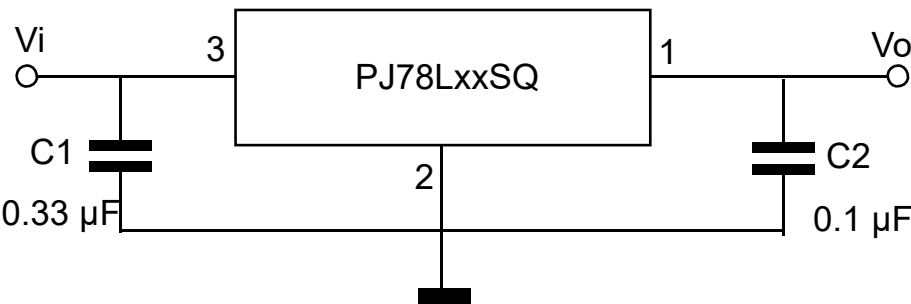
1. VOUT 2. GND 3. VIN



Function Block Diagram



Typical Application Circuit



Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter		Symbol	Value	Unit
Input Voltage	$V_{OUT}=3.3V\sim 10V$	V_I	30	V
	$V_{OUT}=12V\sim 15V$		35	V
Output Current		I_O	100	mA
Maximum Power Dissipation		P_D	500	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

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance,Junction-to-Ambient	$R_{\theta JA}$	200	°C/W
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	50	°C/W



PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L33SQ Electrical Characteristics

$V_I=8.3V$, $I_O=40mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	3.168	3.3	3.432	V
		$I_O=1mA$ to $40mA$, $V_I=5.3V$ to $20V$	3.135	--	3.465	V
		$I_O=1mA$ to $70mA$	3.135	--	3.465	V
Line Regulation	ΔV_O	$V_I=5.3V$ to $20V$, $T_J=25^{\circ}C$	--	--	150	mV
		$V_I=6.3V$ 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	$V_I=6.3V$ to $16.3V$, $f=120Hz$, $T_J=25^{\circ}C$	40	--	--	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	$V_I=6.3V$ 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



PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L05SQ 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



PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L06SQ 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



PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L08SQ 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



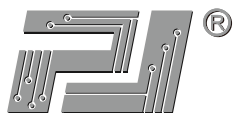
PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L09SQ 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



PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L10SQ 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



PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L12SQ 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



PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L15SQ 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



PJ78LxxSQ

3-Terminal Voltage Regulators

PJ78L18SQ Electrical Characteristics

$V_I=26V$, $I_O=40mA$, $0^{\circ}C \leq T_J \leq 125^{\circ}C$, $C_I=0.33\mu F$, $C_O=0.1\mu F$, unless otherwise specified.

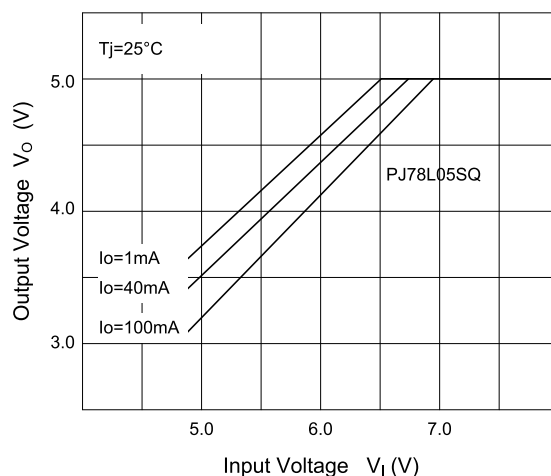
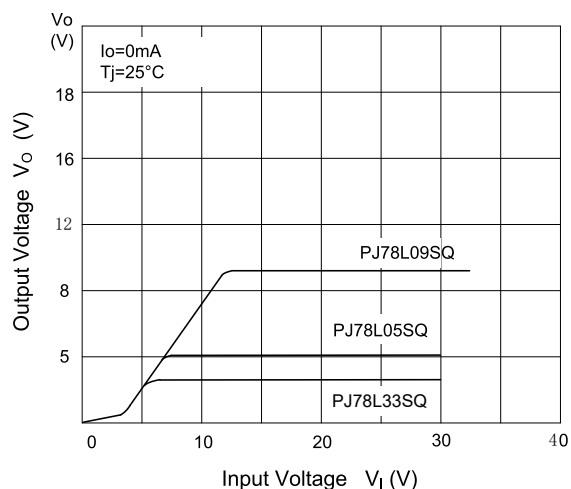
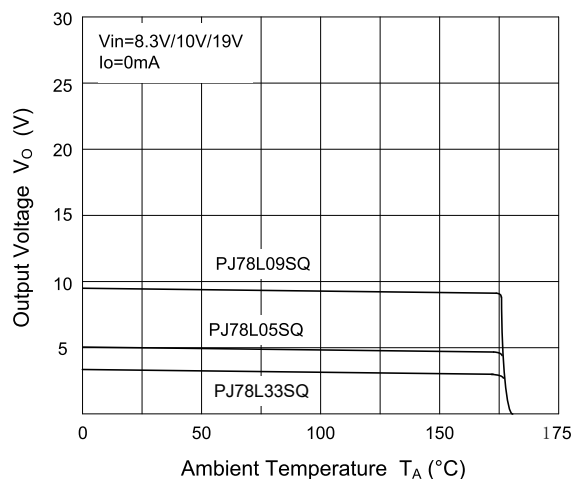
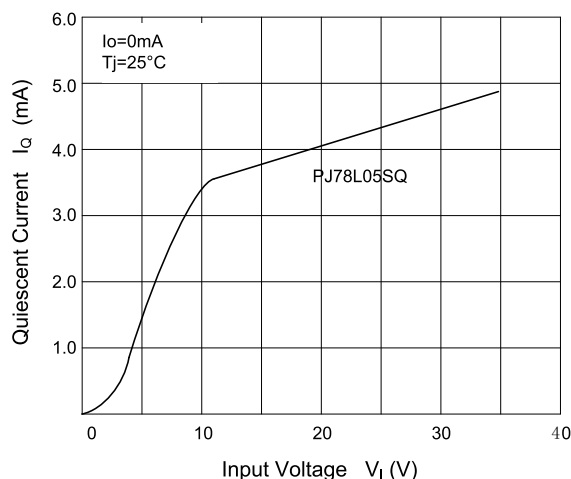
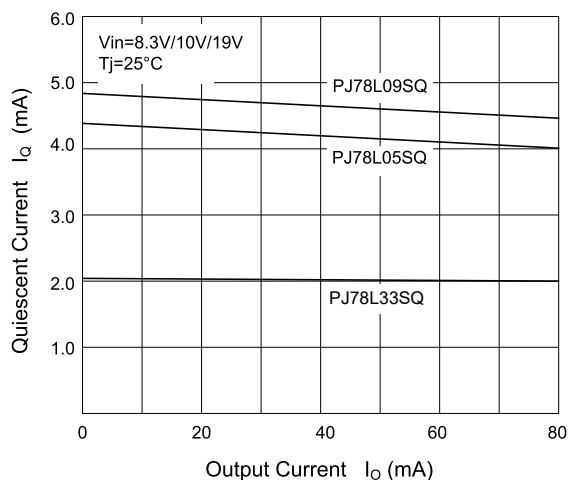
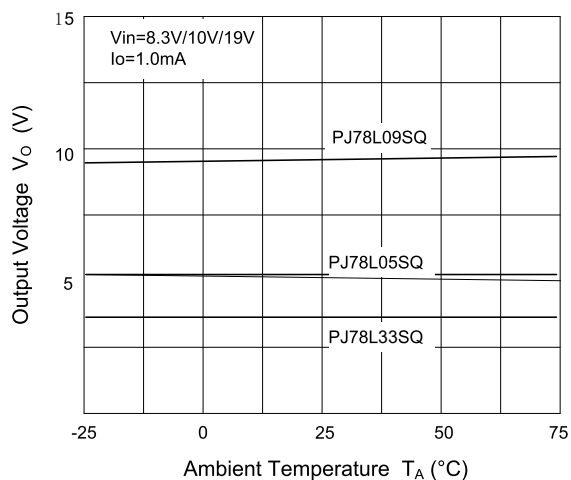
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J=25^{\circ}C$	17.3	18	18.7	V
		$I_O=1mA$ to $40mA$, $V_I=20.5V$ to $33V$	17.1	--	18.9	V
		$I_O=1mA$ to $70mA$	17.1	--	18.9	V
Line Regulation	ΔV_O	$V_I=20.5V$ to $33V$, $T_J=25^{\circ}C$	--	--	360	mV
		$V_I=22V$ to $33V$, $T_J=25^{\circ}C$	--	--	300	mV
Load Regulation	ΔV_O	$I_O=1mA$ to $100mA$, $T_J=25^{\circ}C$	--	--	180	mV
		$I_O=1mA$ to $40mA$, $T_J=25^{\circ}C$	--	--	90	mV
Ripple Rejection	RR	$V_I=21.5V$ to $31.5V$, $f=120Hz$, $T_J=25^{\circ}C$	32	--	--	dB
Dropout Voltage	V_D		--	1.7	--	V
Quiescent Current	I_Q	$T_J=25^{\circ}C$	--	--	6.5	mA
Quiescent Current Change	ΔI_Q	$V_I=22V$ to $33V$	--	--	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



PJ78LxxSQ

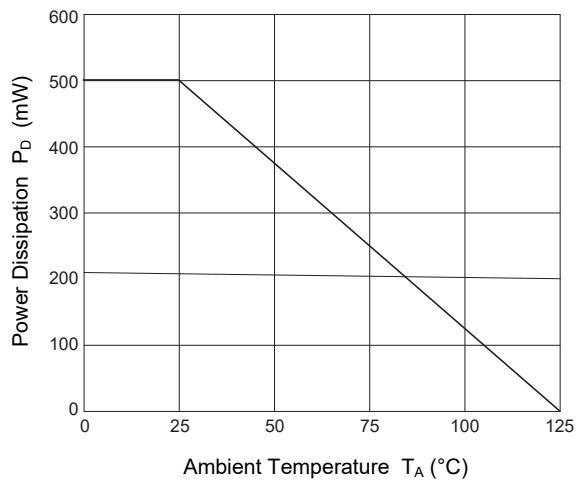
3-Terminal Voltage Regulators

Typical Characteristic Curves





Typical Characteristic Curves





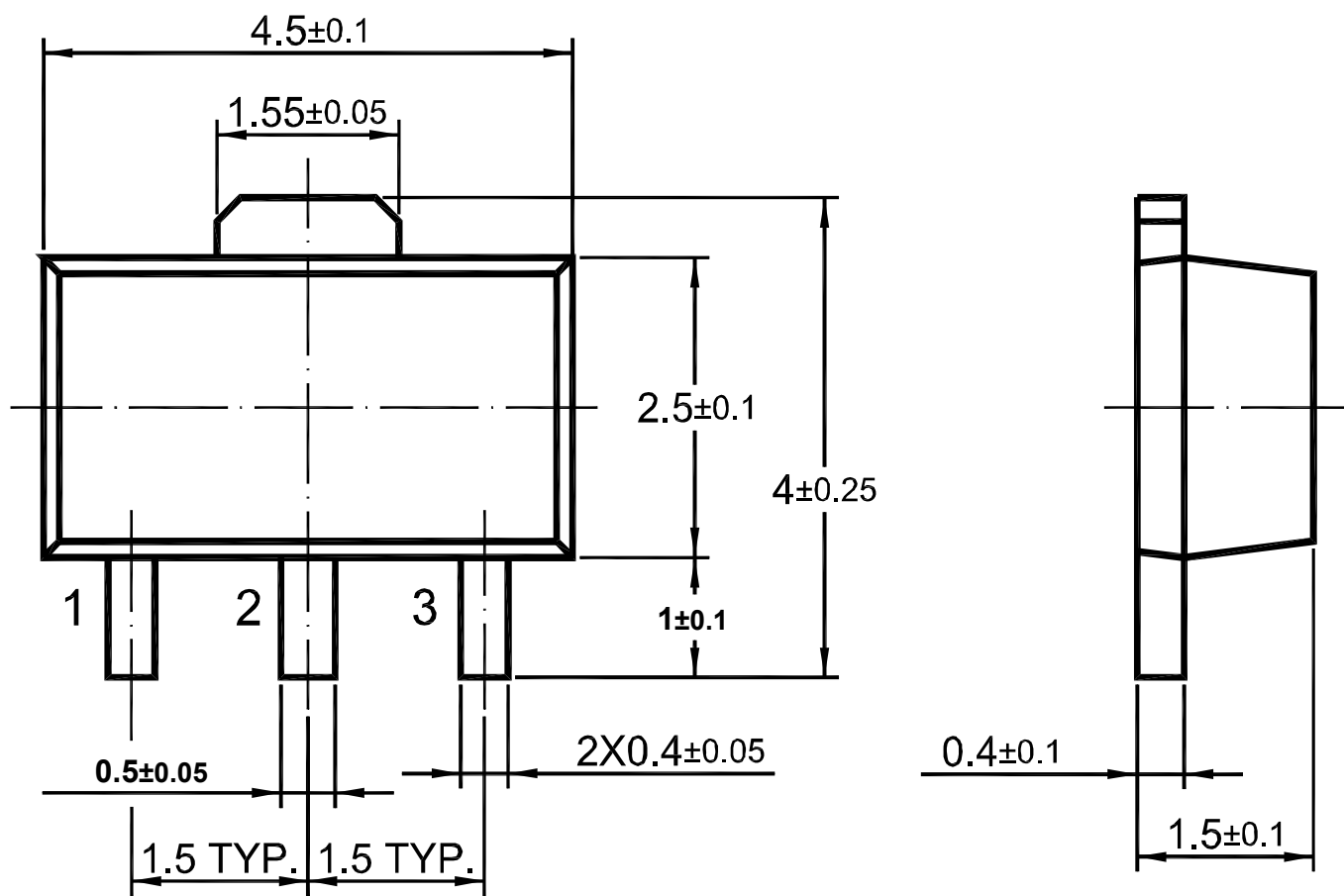
PJ78LxxSQ

3-Terminal Voltage Regulators

Package Outline

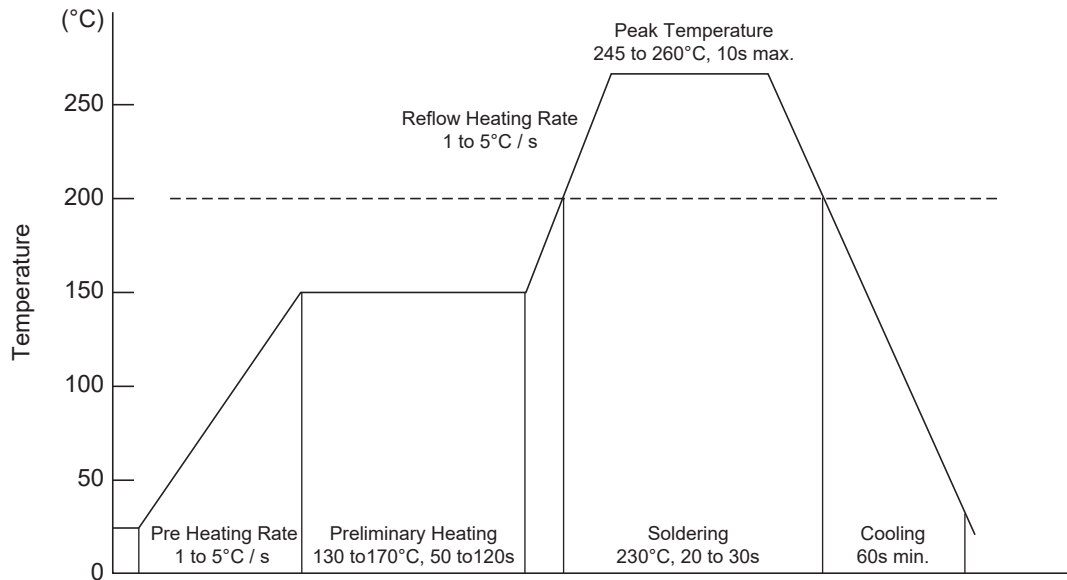
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Dimensions in mm



Conditions of Soldering and Storage

◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245°C. If peak temperature is below 245°C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

◆ Conditions of hand soldering

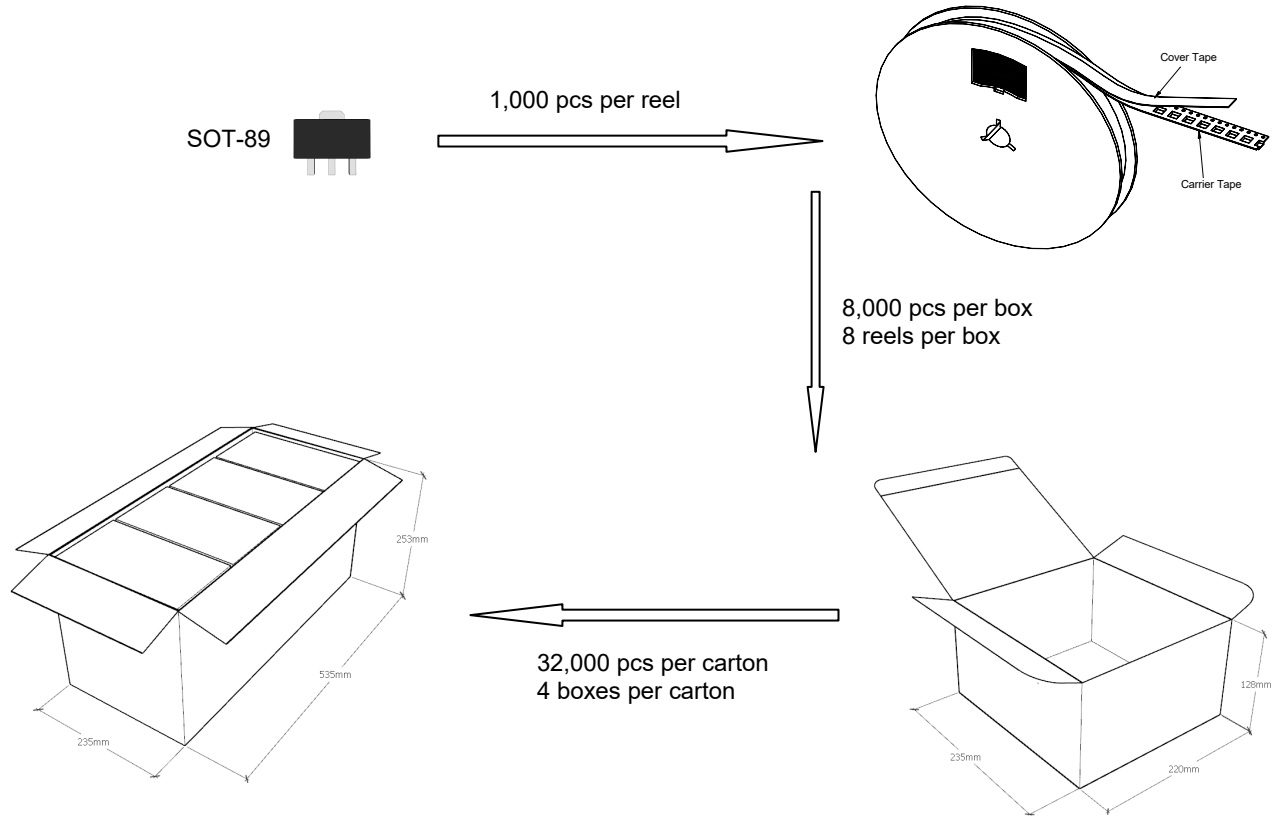
- Temperature: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

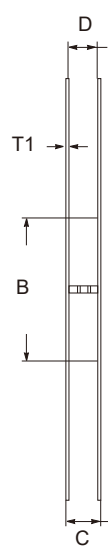
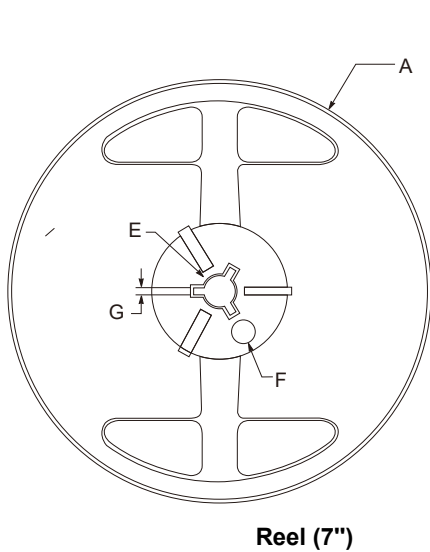
- **Temperature**
5 to 40°C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging (1,000PCS/Reel&7inches)



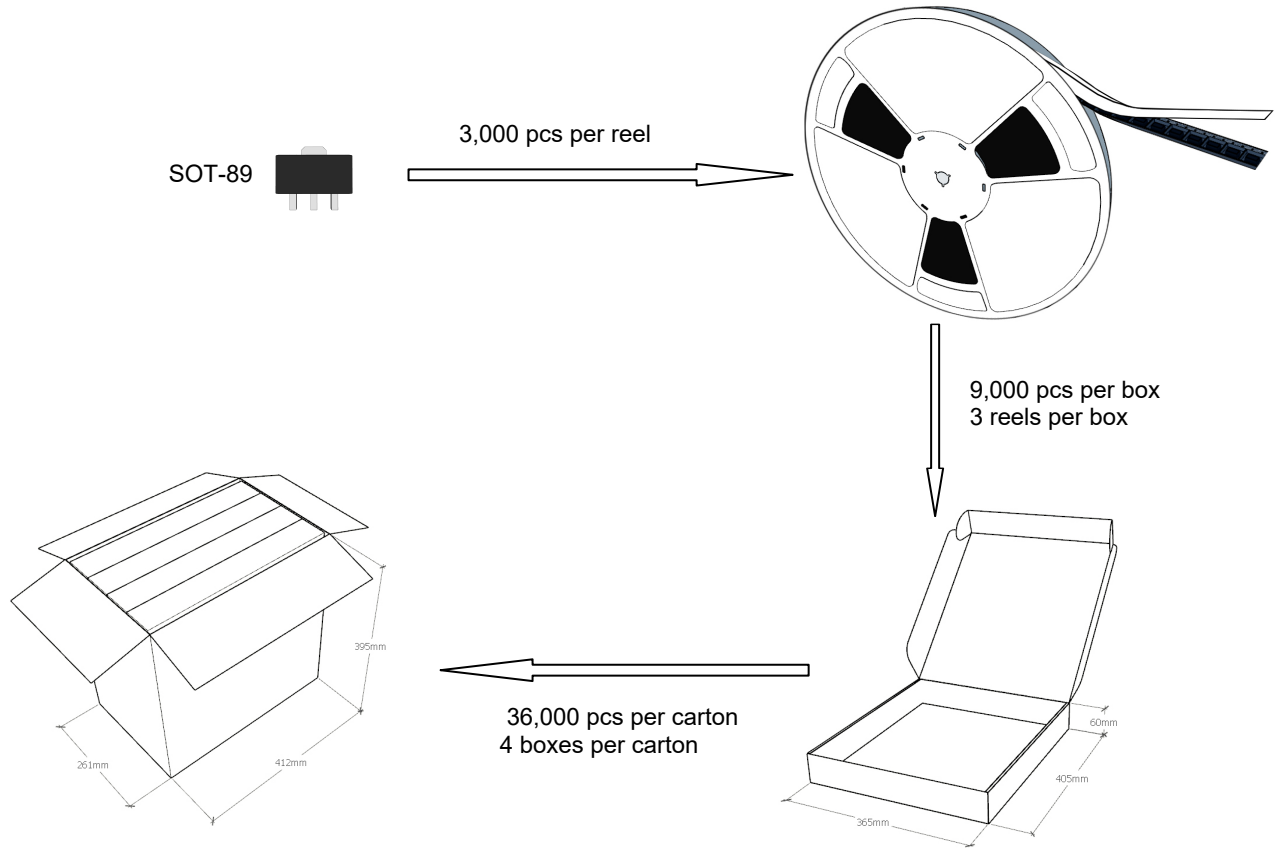
◆ reel data



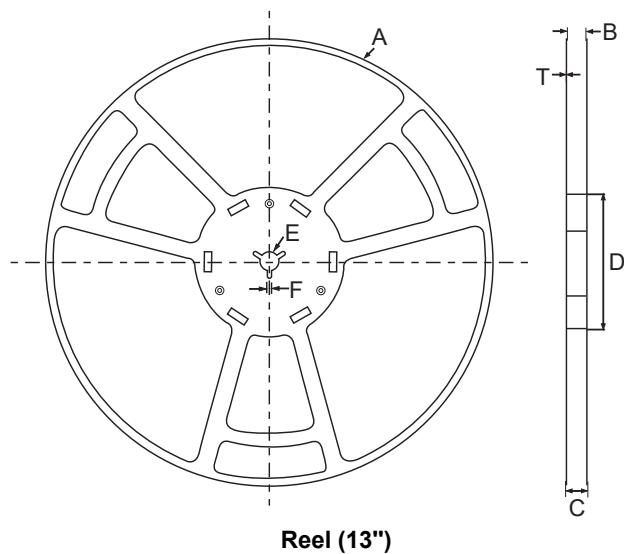
symbol	Value(unit:mm)
A	$\Phi 179 \pm 1$
B	60.5 ± 0.2
C	15.3 ± 0.3
D	$12.5 \sim 13.7$
E	$\Phi 13.5 \pm 0.2$
F	$\Phi 10.0 \pm 0.2$
G	2.7 ± 0.2
T1	1.0 ± 0.2

Package Specifications

- The method of packaging (3,000PCS/Reel&13inches)



reel data



symbol	Value(unit:mm)
A	$\phi 330 \pm 1$
B	12.7 ± 0.5
C	16.5 ± 0.3
D	$\phi 99.5 \pm 0.5$
E	$\phi 13.6 \pm 0.3$
F	2.8 ± 0.3
T	1.9 ± 0.2



Technical drawing of a cable tray assembly. The drawing shows a side view of a cable tray with a grid of cable slots. Dimensions are provided for the spacing between slots and the overall size of the tray. The dimensions are as follows:

- Horizontal spacing between the first and second slot: 8.00 ± 0.10
- Horizontal spacing between the second and third slot: 4.00 ± 0.10
- Horizontal spacing between the fourth and fifth slot: 2.00 ± 0.05
- Vertical spacing between the top and bottom of the tray: 12.00 ± 0.30
- Vertical spacing between the top and bottom of the tray: 5.50 ± 0.05
- Vertical spacing between the top and bottom of the tray: 1.75 ± 0.10
- Slot diameter: $\varnothing 1.55 \pm 0.10$
- Slot diameter: $\varnothing 1.55 \pm 0.10$