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TO-252-3L



TO-220F-3L

Description

The SN78xxx series are three-terminal positive regulators providing over 1A output current with internal current limiting, thermal shutdown and safe area protection. These regulators are useful in a wide range of applications. Although they are just fixed voltage regulators, the SN78xxx series can be used with external components to obtain adjustable voltages and currents.

Application

- ◆ Consumer and personal electronics
- ◆ SMPS post-regulator / dc-to-dc modules
- ◆ High-efficiency linear power supplies

Features and Benefits

- ◆ Output Current up to 1.0A
- ◆ Output Voltage : 5, 6, 8, 9, 10, 12, 15, 18, 24V
- ◆ Built in OVP, CLP circuit.
- ◆ Built in TSD Protection.
- ◆ Output Transistor Safe Area Protection.
- ◆ Ultra High level of ESD [Built in ESD Protection Cell]

MM : 800V / HBM 8KV

ORDERING INFORMATION

Product	Marking	Package
SN78xxD	SN78xxD	TO-252-3L
SN78xxPI	SN78xxPI	TO-220F-3L

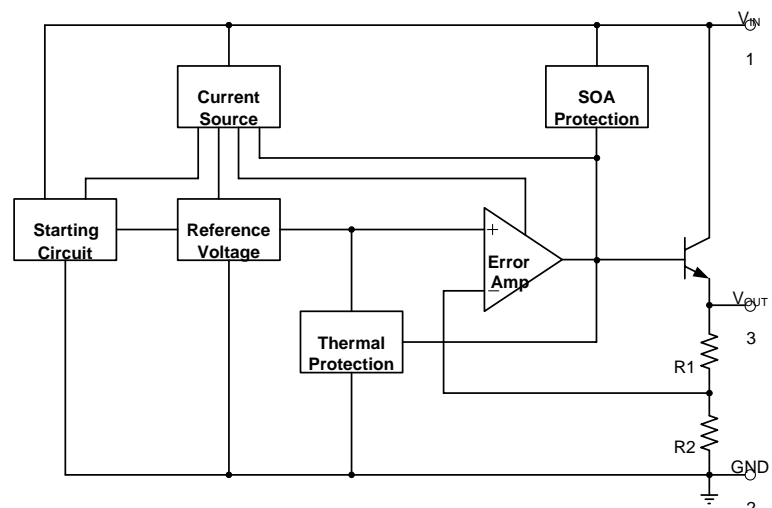
▲ Marking Detail Information

[TO-220F-3L & TO-252-3L PKG Marking]

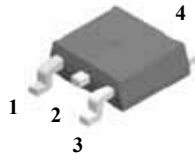


- ① AUK Logo
- ② Grade & M Code & Year & Week Code
- ③ Device Code

Equivalent Circuit

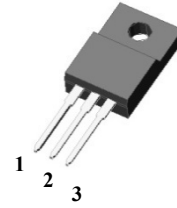


◆ Pin Configuration



TO-252-3L

- 1: V_{IN}
- 2: GND
- 3: V_{OUT}
- 4: GND



TO-220F-3L

- 1: V_{IN}
- 2: GND
- 3: V_{OUT}

◆ Product Line-up

Product Name	V_{OUT}	Operating Temperature	Package
SN7805D	5.0V	-40~85°C	TO-252-3L
SN7806D	6.0V	-40~85°C	TO-252-3L
SN7808D	8.0V	-40~85°C	TO-252-3L
SN7809D	9.0V	-40~85°C	TO-252-3L
SN7810D	10V	-40~85°C	TO-252-3L
SN7812D	12V	-40~85°C	TO-252-3L
SN7815D	15V	-40~85°C	TO-252-3L
SN7818D	18V	-40~85°C	TO-252-3L
SN7824D	24V	-40~85°C	TO-252-3L
SN7805PI	5.0V	-40~85°C	TO-220F-3L
SN7806PI	6.0V	-40~85°C	TO-220F-3L
SN7808PI	8.0V	-40~85°C	TO-220F-3L
SN7809PI	9.0V	-40~85°C	TO-220F-3L
SN7810PI	10V	-40~85°C	TO-220F-3L
SN7812PI	12V	-40~85°C	TO-220F-3L
SN7815PI	15V	-40~85°C	TO-220F-3L
SN7818PI	18V	-40~85°C	TO-220F-3L
SN7824PI	24V	-40~85°C	TO-220F-3L

◆ Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Parameter		Symbol	Limits		Unit
			TO-220F-3L	TO-252-3L	
Input Voltage		V_{IN}	40.0 (SN7824x)		V
			35.0 (All Others)		
Power Dissipation	TO-252-3L	P_d	1.3		W
	TO-220F-3L		2.0		
Thermal Resistance Junction to Case(TO-220F)		$R_{\theta JC}$	5	5	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Air(TO-220F)		$R_{\theta JA}$	65	92	$^\circ\text{C}/\text{W}$
Junction Temperature		T_J	150		$^\circ\text{C}$
Operate Temperature Range		T_{opr}	-40 ~ +85		$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55 ~ +150		$^\circ\text{C}$

Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its operating ratings. The maximum allowable power dissipation is a function of the maximum junction temperature, $T_{J(max)}$, the junction-to-ambient thermal resistance, θ_{JA} , and the ambient temperature, T_A .

The maximum allowable power dissipation at any ambient temperature is calculated using:

$PD(max) = (T_{J(max)} - T_A) \div \theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

◆ Electrical characteristics

($V_{IN}=10V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^\circ C \sim 125^\circ C$; unless otherwise specified)

Characteristic	Symbol	Test Condition*	SN7805x			Unit	
			Min.	Typ.	Max.		
Output Voltage**	V_O	$T_J = 25^\circ C$	4.80	5.0	5.20	V	
		$7.0V \leq V_{IN} \leq 20.0V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	4.75	5.0	5.25		
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$7.0V \leq V_{IN} \leq 25.0V$	-	4.0	100	mV	
		$8.0V \leq V_{IN} \leq 12.0V$	-	1.6	50		
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	9.0	100	mV	
		$250mA \leq I_O \leq 750 \text{ mA}$	-	4.0	50		
Quiescent Current	I_{QC}	$T_J = 25^\circ C$	-	3.2	8.0	mA	
Quiescent Current Change	ΔI_{QC}	$7.0V \leq V_{IN} \leq 25V$	-	0.3	1.3	mA	
		$5.0mA \leq I_O \leq 1.0A$	-	0.03	0.5		
Ripple Rejection	RR	$8.0V \leq V_{IN} \leq 18.0V$, $I_O=500 \text{ mA}$ $f=120 \text{ Hz}$	62	73	-	dB	
Dropout Voltage	V_{DROP}	$I_O=1.0A$	$T_J = 25^\circ C$	-	2.0	-	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	42	-	$\mu V / V_O$
Output Resistance	r_o	$f=1.0kHz$	-	15	-	-	$m\Omega$
Short Circuit Current	I_{SC}	$V_I=35V$,	$T_A = 25^\circ C$	-	230	-	mA
Peak Output Current	I_{PK}	$T_J = 25^\circ C$	-	2.2	-	-	A
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0 \text{ mA}$	-	-0.8	-	-	$mV/^\circ C$

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

◆ Electrical characteristics

($V_{IN}=11V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^{\circ}C \sim 125^{\circ}C$; unless otherwise specified)

Characteristic	Symbol	Test Condition*	SN7806x			Unit	
			Min.	Typ.	Max.		
Output Voltage**	V_O	$T_J = 25^{\circ}C$	5.75	6.0	6.2	V	
		$8.0V \leq V_{IN} \leq 21V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	5.70	6.0	6.3		
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$8.0V \leq V_{IN} \leq 25.0V$	-	5.0	120	mV	
		$9.0V \leq V_{IN} \leq 13.0V$	-	1.5	60		
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	9.0	120	mV	
		$250mA \leq I_O \leq 750 \text{ mA}$	-	3.0	60		
Quiescent Current	I_{QC}	$T_J = 25^{\circ}C$	-	5.0	8.0	mA	
Quiescent Current Change	ΔI_{QC}	$8.0V \leq V_{IN} \leq 25.0V$	-	-	1.3	mA	
		$5.0mA \leq I_O \leq 1.0A$	-	-	0.5		
Ripple Rejection	RR	$9.0V \leq V_{IN} \leq 19.0V$ $f=120 \text{ Hz}$	59	75	-	dB	
Dropout Voltage	V_{DROP}	$I_O=1.0A$	$T_J = 25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^{\circ}C$	-	45	-	$\mu V / V_O$
Output Resistance	r_o	$f=1.0kHz$	-	19	-	$m\Omega$	
Short Circuit Current	I_{SC}	$V_I=35V$,	$T_A = 25^{\circ}C$	-	250	-	mA
Peak Output Current	I_{PK}	$T_J = 25^{\circ}C$	-	2.2	-	A	
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0 \text{ mA}$	-	-0.8	-	$mV/^{\circ}C$	

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

◆ Electrical characteristics

($V_{IN}=14V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^\circ C \sim 125^\circ C$; unless otherwise specified)

Characteristic	Symbol	Test Condition*	SN7808x			Unit	
			Min.	Typ.	Max.		
Output Voltage**	V_O	$T_J = 25^\circ C$	7.7	8.0	8.3	V	
		$10.5V \leq V_{IN} \leq 23.0V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	7.6	8.0	8.4		
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$10.5V \leq V_{IN} \leq 25.0V$	-	5.0	160	mV	
		$11.5V \leq V_{IN} \leq 17.0V$	-	2.0	80		
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	10.0	160	mV	
		$250mA \leq I_O \leq 750 \text{ mA}$	-	5.0	80		
Quiescent Current	I_{QC}	$T_J = 25^\circ C$	-	5.0	8.0	mA	
Quiescent Current Change	ΔI_{QC}	$10.5V \leq V_{IN} \leq 25.0V$	-	0.5	1.0	mA	
		$5.0mA \leq I_O \leq 1.0A$	-	0.05	0.5		
Ripple Rejection	RR	$11.5V \leq V_{IN} \leq 21.5V$ $f=120 \text{ Hz}$	56	73	-	dB	
Dropout Voltage	V_{DROP}	$I_O=1.0A$	$T_J = 25^\circ C$	-	2.0	-	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	52	-	$\mu V / V_O$
Output Resistance	r_o	$f=1.0kHz$		-	17	-	$m\Omega$
Short Circuit Current	I_{SC}	$V_I=35V$,	$T_A = 25^\circ C$	-	230	-	mA
Peak Output Current	I_{PK}	$T_J = 25^\circ C$		-	2.2	-	A
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0 \text{ mA}$		-	-0.8	-	$mV/^\circ C$

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

◆ Electrical characteristics

($V_{IN}=15V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^\circ C \sim 125^\circ C$; unless otherwise specified)

Characteristic	Symbol	Test Condition*	SN7809x			Unit	
			Min.	Typ.	Max.		
Output Voltage**	V_O	$T_J = 25^\circ C$	8.65	9.0	9.35	V	
		$11.5V \leq V_{IN} \leq 24.0V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	8.60	9.0	9.40		
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$11.5V \leq V_{IN} \leq 25.0V$	-	6.0	180	mV	
		$12.0V \leq V_{IN} \leq 17.0V$	-	2.0	90		
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	12.0	180	mV	
		$250mA \leq I_O \leq 750 \text{ mA}$	-	4.0	90		
Quiescent Current	I_{QC}	$T_J = 25^\circ C$	-	5.0	8.0	mA	
Quiescent Current Change	ΔI_{QC}	$11.5V \leq V_{IN} \leq 26.0V$	-	-	1.3	mA	
		$5.0mA \leq I_O \leq 1.0A$	-	-	0.5		
Ripple Rejection	RR	$13.0V \leq V_{IN} \leq 23.0V$ $f=120 \text{ Hz}$	56	71	-	dB	
Dropout Voltage	V_{DROP}	$I_O=1.0A$	$T_J = 25^\circ C$	-	2.0	-	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	58	-	$\mu V / V_O$
Output Resistance	r_o	$f=1.0kHz$	-	17	-	-	$m\Omega$
Short Circuit Current	I_{SC}	$V_I=35V$,	$T_A = 25^\circ C$	-	250	-	mA
Peak Output Current	I_{PK}	$T_J = 25^\circ C$	-	2.2	-	-	A
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0 \text{ mA}$	-	-1.0	-	-	$mV/^\circ C$

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

◆ Electrical characteristics

($V_{IN}=16V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^{\circ}C \sim 125^{\circ}C$; unless otherwise specified)

Characteristic	Symbol	Test Condition*	SN7810x			Unit
			Min.	Typ.	Max.	
Output Voltage**	V_O	$T_J = 25^{\circ}C$	9.6	10.0	10.4	V
		$12.5V \leq V_{IN} \leq 25.0V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	9.5	10.0	10.5	
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$12.5V \leq V_{IN} \leq 25.0V$	-	10.0	200	mV
		$13.0V \leq V_{IN} \leq 25.0V$	-	3.0	100	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	12.0	200	mV
		$250mA \leq I_O \leq 750 \text{ mA}$	-	4.0	100	
Quiescent Current	I_{QC}	$T_J = 25^{\circ}C$	-	5.1	8.0	mA
Quiescent Current Change	ΔI_{QC}	$12.5V \leq V_{IN} \leq 29V$	-	-	1.0	mA
		$5.0mA \leq I_O \leq 1.0A$	-	-	0.5	
Ripple Rejection	RR	$13.0V \leq V_{IN} \leq 23.0V$ $f=120 \text{ Hz}$	56	71	-	dB
Dropout Voltage	V_{DROP}	$I_O=1.0A$	$T_J = 25^{\circ}C$	-	2.0	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^{\circ}C$	-	58	$\mu V / V_O$
Output Resistance	r_o	$f=1.0kHz$	-	17	-	$m\Omega$
Short Circuit Current	I_{SC}	$V_I=35V$,	$T_A = 25^{\circ}C$	-	250	mA
Peak Output Current	I_{PK}	$T_J = 25^{\circ}C$	-	2.2	-	A
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0 \text{ mA}$	-	-1.0	-	$mV/^{\circ}C$

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

◆ Electrical characteristics

($V_{IN}=19V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^\circ C \sim 125^\circ C$; unless otherwise specified)

Characteristic	Symbol	Test Condition*	SN7812x			Unit	
			Min.	Typ.	Max.		
Output Voltage**	V_O	$T_J = 25^\circ C$	11.5	12.0	12.5	V	
		$14.5V \leq V_{IN} \leq 27.0V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	11.4	12.0	12.6		
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$14.5V \leq V_{IN} \leq 30.0V$	-	10.0	240	mV	
		$16.0V \leq V_{IN} \leq 22.0V$	-	3.0	120		
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	11.0	240	mV	
		$250mA \leq I_O \leq 750 mA$	-	5.0	120		
Quiescent Current	I_{QC}	$T_J = 25^\circ C$	-	5.1	8.0	mA	
Quiescent Current Change	ΔI_{QC}	$14.5V \leq V_{IN} \leq 30.0V$	-	0.5	1.0	mA	
		$5.0mA \leq I_O \leq 1.0A$	-	0.1	0.5		
Ripple Rejection	RR	$15.0V \leq V_{IN} \leq 25.0V$, $I_O = 500 mA$ $f = 120 Hz$	55	71	-	dB	
Dropout Voltage	V_{DROP}	$I_O = 1.0A$	$T_J = 25^\circ C$	-	2.0	-	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	76	-	$\mu V / V_O$
Output Resistance	r_o	$f = 1.0kHz$	-	15	-	-	$m\Omega$
Short Circuit Current	I_{SC}	$V_I = 35V$,	$T_A = 25^\circ C$	-	230	-	mA
Peak Output Current	I_{PK}	$T_J = 25^\circ C$	-	2.2	-	-	A
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O = 5.0 mA$	-	-1.0	-	-	$mV / ^\circ C$

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

◆ Electrical characteristics

($V_{IN}=23V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^\circ C \sim 125^\circ C$; unless otherwise specified)

Characteristic	Symbol	Test Condition*	SN7815x			Unit
			Min.	Typ.	Max.	
Output Voltage**	V_O	$T_J = 25^\circ C$	14.4	15.0	15.6	V
		$17.5V \leq V_{IN} \leq 30.0V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	14.25	15.0	15.75	
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$17.5V \leq V_{IN} \leq 30.0V$	-	11.0	300	mV
		$20.0V \leq V_{IN} \leq 26.0V$	-	3.0	150	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	12.0	300	mV
		$250mA \leq I_O \leq 750 \text{ mA}$	-	4.0	150	
Quiescent Current	I_{QC}	$T_J = 25^\circ C$	-	5.2	8.0	mA
Quiescent Current Change	ΔI_{QC}	$17.5V \leq V_{IN} \leq 30.0V$	-	-	1.0	mA
		$5.0mA \leq I_O \leq 1.0A$	-	-	0.5	
Ripple Rejection	RR	$18.5V \leq V_{IN} \leq 28.5V$ $f=120 \text{ Hz}$	54	70	-	dB
Dropout Voltage	V_{DROP}	$I_O=1.0A$	$T_J = 25^\circ C$	-	2.0	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	90	uV/ V_O
Output Resistance	r_o	$f=1.0kHz$	-	19	-	$m\Omega$
Short Circuit Current	I_{SC}	$V_I=35V$,	$T_A = 25^\circ C$	-	250	mA
Peak Output Current	I_{PK}	$T_J = 25^\circ C$	-	2.2	-	A
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0 \text{ mA}$	-	-1.0	-	$mV/^\circ C$

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

◆ Electrical characteristics

($V_{IN}=27V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^{\circ}C \sim 125^{\circ}C$; unless otherwise specified)

Characteristic	Symbol	Test Condition*	SN7818x			Unit
			Min.	Typ.	Max.	
Output Voltage**	V_O	$T_J = 25^{\circ}C$	17.3	18.0	18.7	V
		$21.0V \leq V_{IN} \leq 33.0V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	17.1	18.0	18.9	
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$21.0V \leq V_{IN} \leq 33.0V$	-	15.0	360	mV
		$24.0V \leq V_{IN} \leq 30.0V$	-	5.0	180	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	15.0	360	mV
		$250mA \leq I_O \leq 750 \text{ mA}$	-	5.0	180	
Quiescent Current	I_{QC}	$T_J = 25^{\circ}C$	-	5.2	8.0	mA
Quiescent Current Change	ΔI_{QC}	$21.0V \leq V_{IN} \leq 33.0V$	-	-	1.0	mA
		$5.0mA \leq I_O \leq 1.0A$	-	-	0.5	
Ripple Rejection	RR	$22.0V \leq V_{IN} \leq 32.0V$ $f=120 \text{ Hz}$	53	69	-	dB
Dropout Voltage	V_{DROP}	$I_O=1.0A$	$T_J = 25^{\circ}C$	-	2.0	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^{\circ}C$	-	110	uV/ V_O
Output Resistance	r_o	$f=1.0kHz$	-	22	-	$m\Omega$
Short Circuit Current	I_{SC}	$V_I=35V$,	$T_A = 25^{\circ}C$	-	250	mA
Peak Output Current	I_{PK}	$T_J = 25^{\circ}C$	-	2.2	-	A
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0 \text{ mA}$	-	-1.0	-	$mV/^{\circ}C$

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

◆ Electrical characteristics

($V_{IN}=33V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1 \mu F$, $I_{OUT} = 500mA$, $T_J=0^\circ C \sim 125^\circ C$; unless otherwise specified)

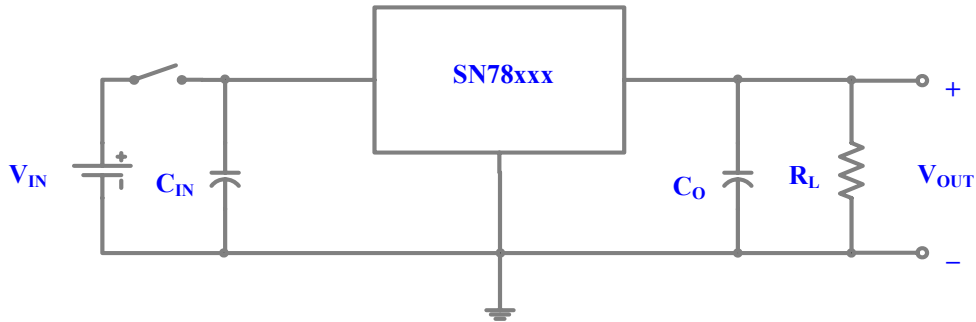
Characteristic	Symbol	Test Condition*	SN7824x			Unit	
			Min.	Typ.	Max.		
Output Voltage**	V_O	$T_J = 25^\circ C$	23.0	24.0	25.0	V	
		$27.0V \leq V_{IN} \leq 38.0V$ $5.0mA \leq I_O \leq 1.0A$, $P_D \leq 15W$	22.8	24.0	25.25		
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$27.0V \leq V_{IN} \leq 38.0V$	-	17.0	480	mV	
		$30.0V \leq V_{IN} \leq 36.0V$	-	6.0	240		
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 1.5A$	-	15.0	480	mV	
		$250mA \leq I_O \leq 750 mA$	-	5.0	240		
Quiescent Current	I_{QC}	$T_J = 25^\circ C$	-	5.2	8.0	mA	
Quiescent Current Change	ΔI_{QC}	$27.0V \leq V_{IN} \leq 38.0V$	-	0.5	1.0	mA	
		$5.0mA \leq I_O \leq 1.0A$	-	0.1	0.5		
Ripple Rejection	RR	$28.0V \leq V_{IN} \leq 38.0V$ $f=120 Hz$	50	67	-	dB	
Dropout Voltage	V_{DROP}	$I_O=1.0A$	$T_J = 25^\circ C$	-	2.0	-	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	60	-	$\mu V / V_O$
Output Resistance	r_o	$f=1.0kHz$	-	28	-	$m\Omega$	
Short Circuit Current	I_{SC}	$V_I=35V$,	$T_A = 25^\circ C$	-	230	-	mA
Peak Output Current	I_{PK}	$T_J = 25^\circ C$	-	2.2	-	A	
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0 mA$	-	-1.5	-	$mV/^\circ C$	

* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into separately.

** This specification applies only for dc power dissipation permitted by absolute maximum ratings.

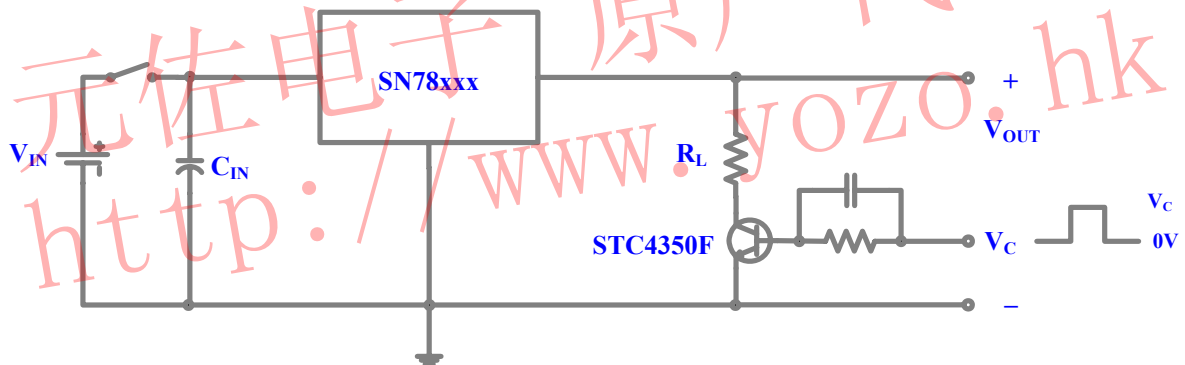
Typical Application

Fixed Output Regulator

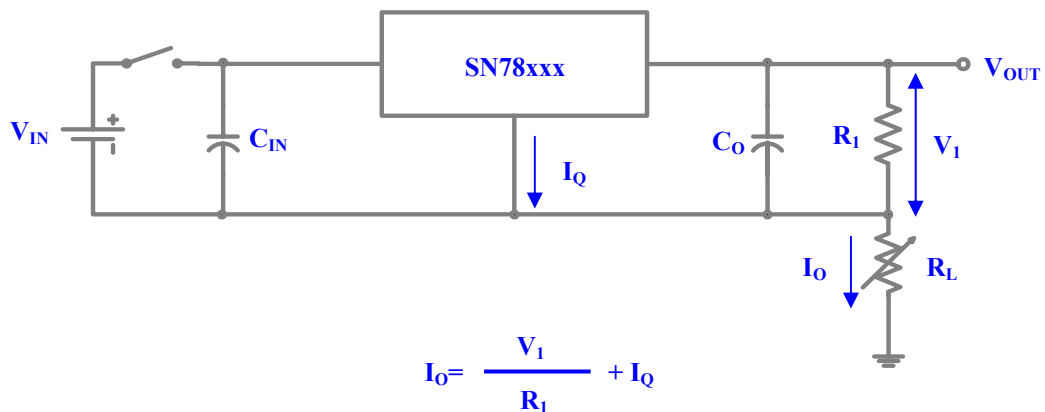


- 1) C_{IN} should be required if regulators are located far from power supply filter
- 2) C_O improves output stability and transient response

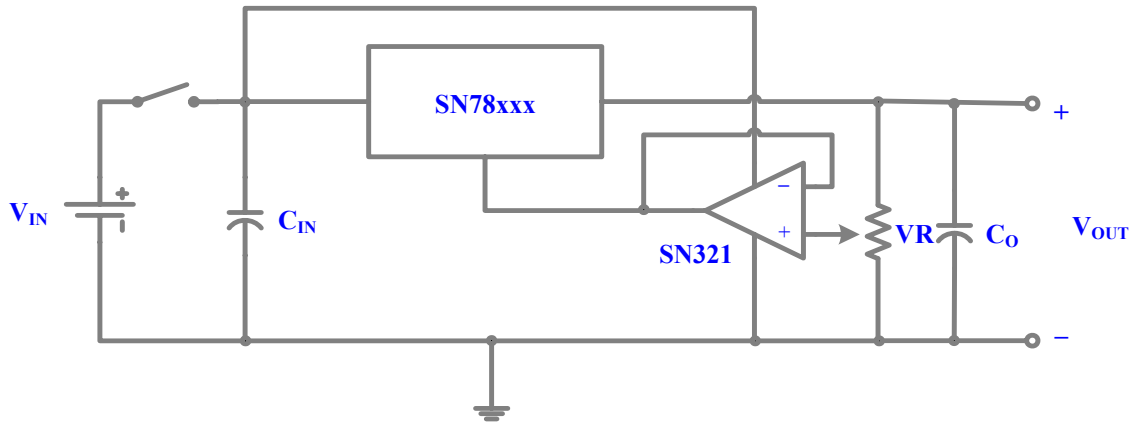
Load Regulation



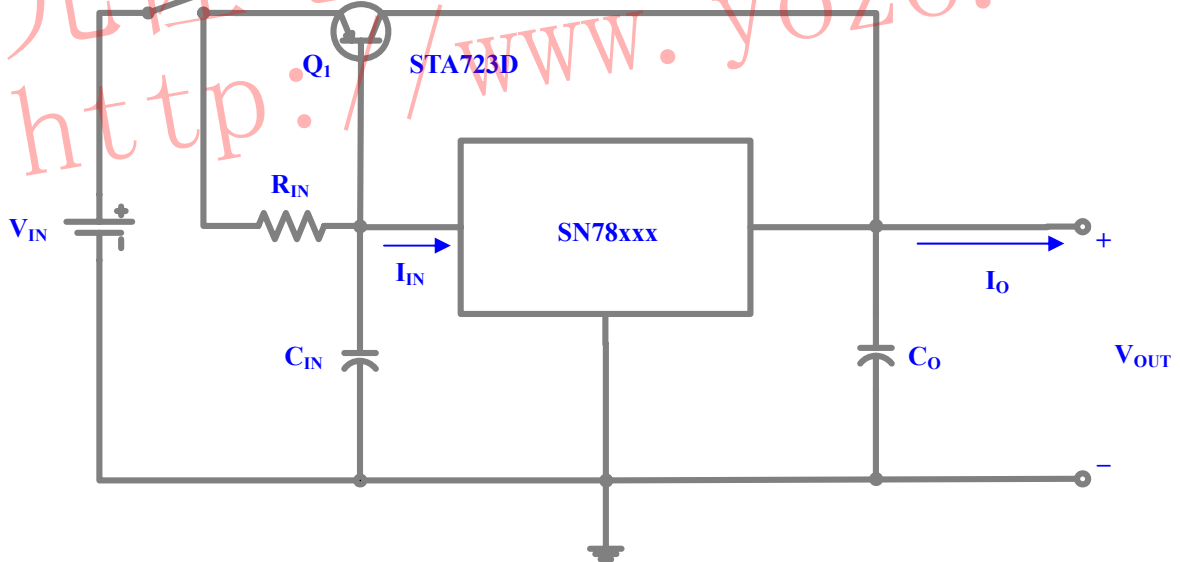
Constant Current Regulator



Adjustable Output Regulator



High Current Voltage Regulator



$$I_O = I_{IN} + \beta_{Q1}(I_{IN} - V_{BEQ1} / R_{IN})$$

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Fig.1 Quiescent Current vs. Junction Temperature

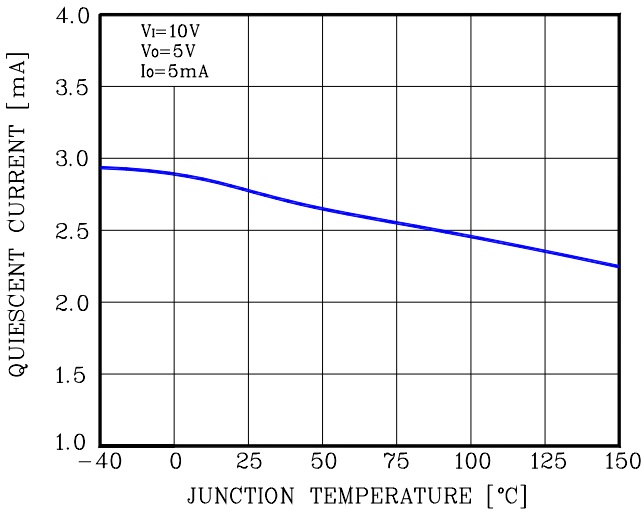


Fig.2 Output Peak Current vs. Input to Output Differential

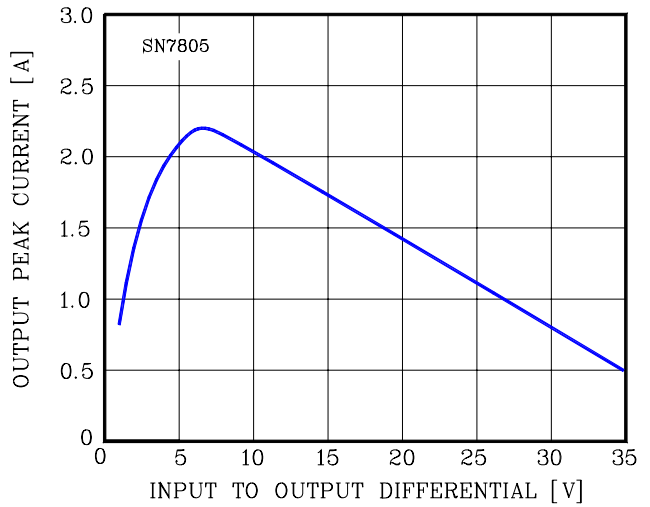


Fig.3 Output Voltage vs. Junction Temperature

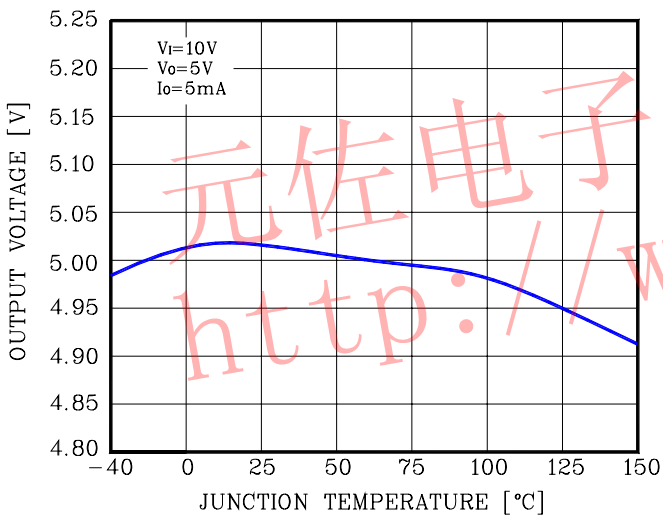


Fig.4 Dropout Voltage vs. Input Voltage

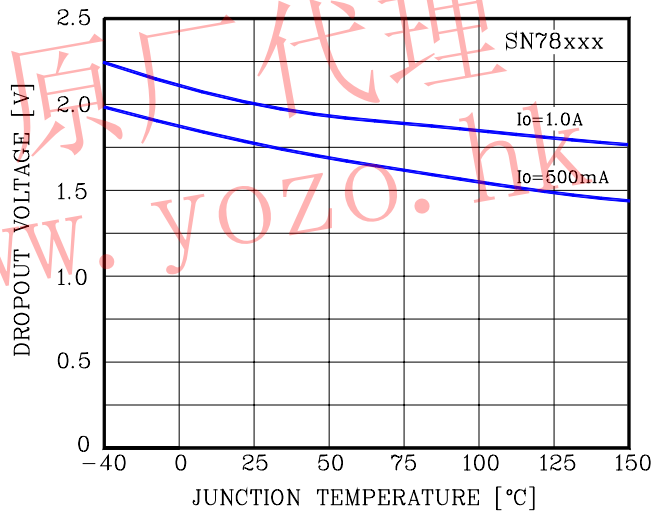


Fig.5 Line Transient Response

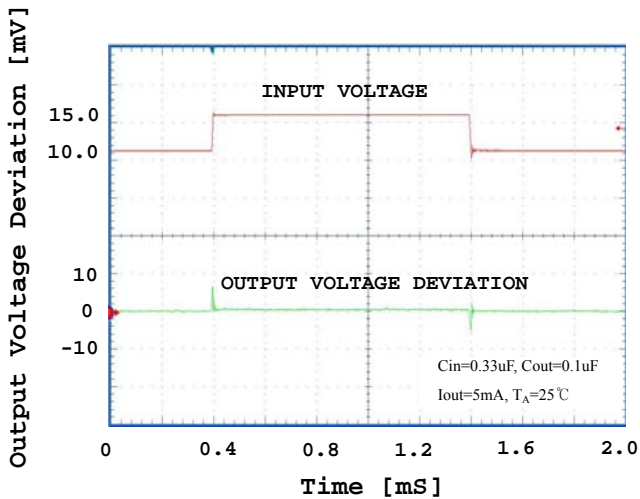
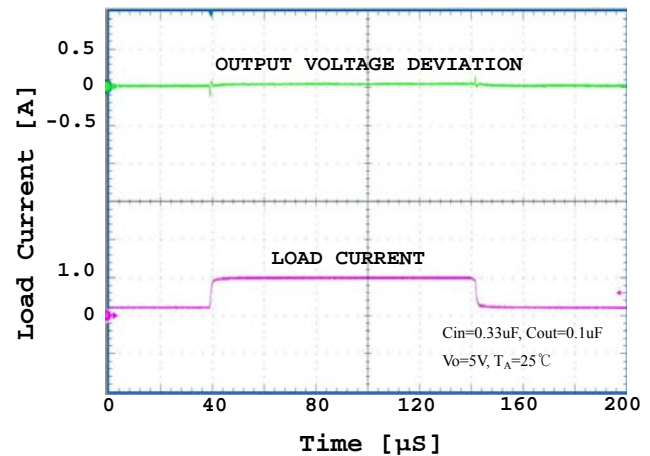
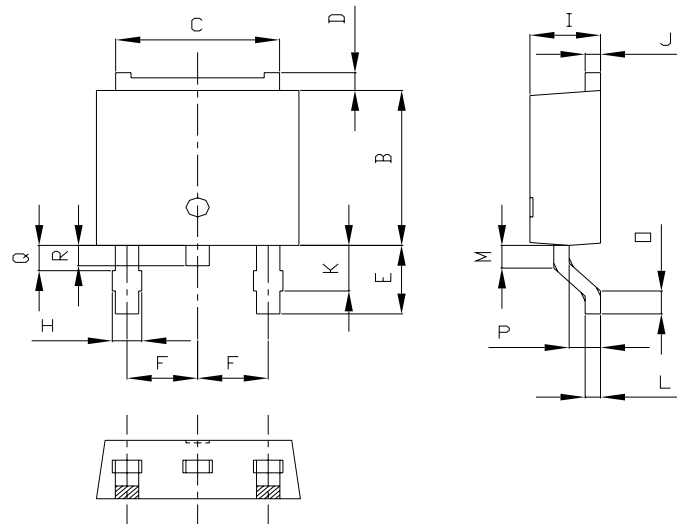


Fig.6 Load Transient Response



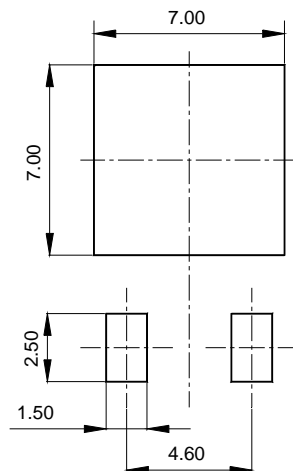
◆ TO-252-3L Outline Dimension (Unit : mm)



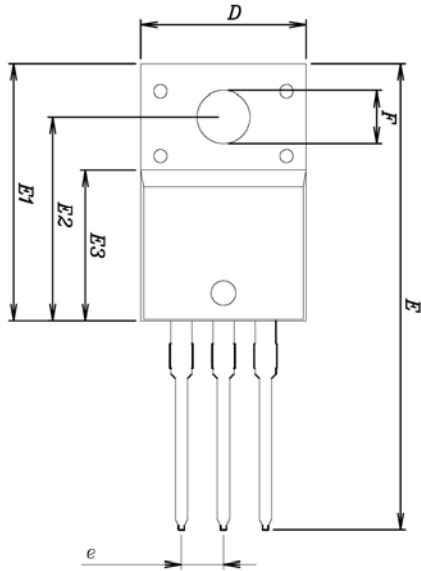
SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	6.40	6.60	6.80	
B	5.90	6.10	6.30	
C	5.04	5.34	5.64	
D	0.50	0.70	0.90	
E	2.50	2.70	2.90	
F	2.10	2.30	2.50	
H	0.96 MAX			
I	2.20	2.30	2.40	
J	0.40	0.50	0.60	
K	1.60	1.80	2.00	
L	0.40	0.50	0.60	
M	0.81	0.91	1.01	
O	0.80	0.90	1.00	
P	0.90	1.00	1.10	
Q	0.95 MAX			
R	0.60	0.80	1.00	

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※ Recommend PCB solder land [Unit: mm]



◆ TO-220F-3L Outline Dimension (Unit : mm)



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	-	-	4.60	
A1	2.45	2.50	2.55	
A2	1.95	2.00	2.05	
b	0.65	0.75	0.85	
b1	1.07	1.27	1.47	
C	0.40	0.50	0.60	
C1	2.70	2.80	2.90	
D	9.90	10.00	10.10	
E	28.00	-	28.60	
E1	15.50	15.60	15.70	
E2	12.30	12.40	12.50	
E3	9.15	9.20	9.25	
F	3.10	3.20	3.30	
G	3.30	3.40	3.50	
e	2.54 BSC			
L	12.40	-	13.00	
L1	3.46 BSC			

