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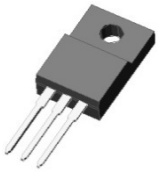
SN78xxx

3 Terminal 1A Positive Voltage Regulator

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 : 500V / HBM 5KV

ORDERING INFORMATION

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

▲ **Marking Detail Information**

[TO-220F-3L & TO-253-3L PKG Marking]

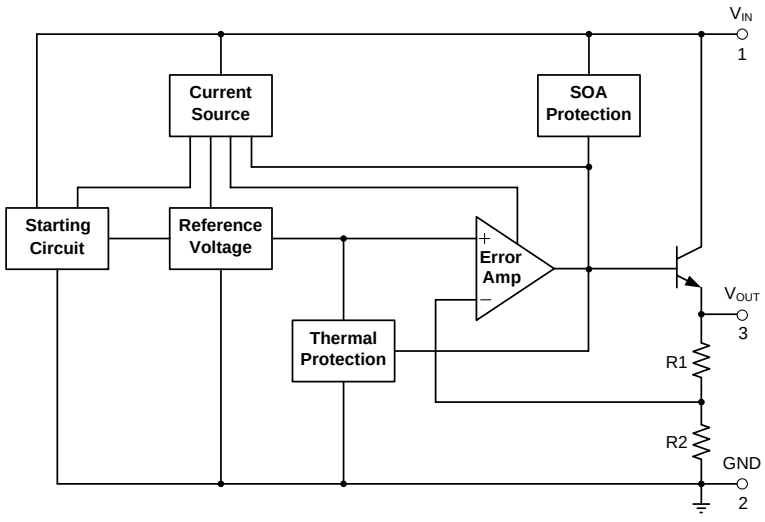
AUK(①)
G△YWW (②)
SN78xxx (③)

① AUK Logo

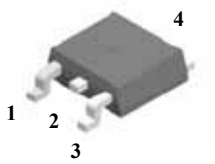
② Grade & M Code & Year & Week Code

③ Device Code

Equivalent Circuit



◈ Pin Configuration



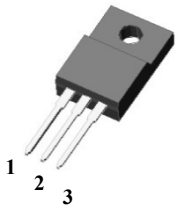
TO-252-3L

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	-40~125℃	TO-252-3L
SN7806D	6.0V	-40~125℃	TO-252-3L
SN7808D	8.0V	-40~125℃	TO-252-3L
SN7809D	9.0V	-40~125℃	TO-252-3L
SN7810D	10V	-40~125℃	TO-252-3L
SN7812D	12V	-40~125℃	TO-252-3L
SN7815D	15V	-40~125℃	TO-252-3L
SN7818D	18V	-40~125℃	TO-252-3L
SN7824D	24V	-40~125℃	TO-252-3L
SN7805PI	5.0V	-40~125℃	TO-220F-3L
SN7806PI	6.0V	-40~125℃	TO-220F-3L
SN7808PI	8.0V	-40~125℃	TO-220F-3L
SN7809PI	9.0V	-40~125℃	TO-220F-3L
SN7810PI	10V	-40~125℃	TO-220F-3L
SN7812PI	12V	-40~125℃	TO-220F-3L
SN7815PI	15V	-40~125℃	TO-220F-3L
SN7818PI	18V	-40~125℃	TO-220F-3L
SN7824PI	24V	-40~125℃	TO-220F-3L

◈ Absolute Maximum Ratings (Ta = 25℃)

Parameter	Symbol	Limits		Unit
		TO-220F-3L	TO-252-3L	
Input Voltage	V_{IN}	40.0 (V_O=24V)		V
		35.0 (V_O=5 to 18V)		
Power Dissipation	P_d	2.0	1.3	W
Thermal Resistance Junction to Case	$R_{\Theta JC}$	5	5	°C/W
Thermal Resistance Junction to Air	$R_{\Theta JA}$	65	92	°C/W
Junction Temperature	T_J	150		°C
Operate Temperature Range	T_{opr}	-40 ~ +125		°C
Storage Temperature Range	T_{stg}	-55 ~ +150		°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, TA.
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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_J=0℃~125℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN7805x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		4.80	5.00	5.20	V
		7.0V ≤ V_{IN} ≤ 20.0V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		4.75	5.00	5.25	
Line Regulation	$\triangle V_{O(\triangle VI)}$	7.0V ≤ V_{IN} ≤ 25.0V	T_J =25℃	-	4.0	100	mV
		8.0V ≤ V_{IN} ≤ 12.0V		-	1.6	50	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	9.0	100	mV
		250mA ≤ I_O ≤ 750mA		-	4.0	50	
Quiescent Current	I_{QC}	T_J =25℃		-	3.2	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	7.0V ≤ V_{IN} ≤ 25V		-	0.3	1.3	mA
		5.0mA ≤ I_O ≤ 1.0A			0.03	0.5	
Ripple Rejection	RR	8.0V ≤ V_{IN} ≤ 18.0V f=120Hz		62	73	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	42	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	15	-	mΩ
Short Circuit Current	I_{SC}	V_I=35V	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-0.8	-	mV/°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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_J=0℃~125℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN7806x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		5.75	6.00	6.25	V
		8.0V ≤ V_{IN} ≤ 21V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		5.70	6.00	6.30	
Line Regulation	$\triangle V_{O(\triangle VI)}$	8.0V ≤ V_{IN} ≤ 25.0V	T_J =25℃	-	5.0	120	mV
		9.0V ≤ V_{IN} ≤ 13.0V		-	1.5	60	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	9.0	120	mV
		250mA ≤ I_O ≤ 750mA		-	3.0	60	
Quiescent Current	I_{QC}	T_J =25℃		-	5.0	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	8.0V ≤ V_{IN} ≤ 25.0V		-	-	1.3	mA
		5.0mA ≤ I_O ≤ 1.0A		-	-	0.5	
Ripple Rejection	RR	9.0V ≤ V_{IN} ≤ 19.0V f=120Hz		59	75	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	45	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	19	-	mΩ
Short Circuit Current	I_{SC}	V_I=35V	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-0.8	-	mV/°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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_J=0℃~125℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN7808x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		7.70	8.00	8.30	V
		10.5V ≤ V_{IN} ≤ 23.0V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		7.60	8.00	8.40	
Line Regulation	$\triangle V_{O(\triangle VI)}$	10.5V ≤ V_{IN} ≤ 25.0V	T_J =25℃	-	5.0	160	mV
		11.5V ≤ V_{IN} ≤ 17.0V		-	2.0	80	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	10.0	160	mV
		250mA ≤ I_O ≤ 750mA		-	5.0	80	
Quiescent Current	I_{QC}	T_J =25℃		-	5.0	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	10.5V ≤ V_{IN} ≤ 25.0V		-	0.5	1.0	mA
		5.0mA ≤ I_O ≤ 1.0A		-	0.05	0.5	
Ripple Rejection	RR	11.5V ≤ V_{IN} ≤ 21.5V f=120Hz		56	73	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	52	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	17	-	mΩ
Short Circuit Current	I_{SC}	V_I =35V,	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-0.8	-	mV/°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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_j=0℃~125℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN7809x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		8.65	9.00	9.35	V
		11.5V ≤ V_{IN} ≤ 24.0V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		8.60	9.00	9.40	
Line Regulation	$\triangle V_{O(\triangle VI)}$	11.5V ≤ V_{IN} ≤ 25.0V	T_J =25℃	-	6.0	180	mV
		12.0V ≤ V_{IN} ≤ 17.0V		-	2.0	90	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	12.0	180	mV
		250mA ≤ I_O ≤ 750mA		-	4.0	90	
Quiescent Current	I_{QC}	T_J =25℃		-	5.0	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	11.5V ≤ V_{IN} ≤ 26.0V		-	-	1.3	mA
		5.0mA ≤ I_O ≤ 1.0A		-	-	0.5	
Ripple Rejection	RR	12.0V ≤ V_{IN} ≤ 22.0V f=120Hz		56	71	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	58	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	17	-	mΩ
Short Circuit Current	I_{SC}	V_I=35V	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-1.0	-	mV/°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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_J=0℃~125℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN7810x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		9.60	10.00	10.40	V
		12.5V ≤ V_{IN} ≤ 25.0V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		9.50	10.00	10.50	
Line Regulation	$\triangle V_{O(\triangle VI)}$	12.5V ≤ V_{IN} ≤ 25.0V	T_J =25℃	-	10.0	200	mV
		13.0V ≤ V_{IN} ≤ 18.0V		-	3.0	100	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	12.0	200	mV
		250mA ≤ I_O ≤ 750mA		-	4.0	100	
Quiescent Current	I_{QC}	T_J =25℃		-	5.1	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	12.5V ≤ V_{IN} ≤ 29V		-	-	1.0	mA
		5.0mA ≤ I_O ≤ 1.0A		-	-	0.5	
Ripple Rejection	RR	13.0V ≤ V_{IN} ≤ 23.0V f=120Hz		56	71	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	58	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	17	-	mΩ
Short Circuit Current	I_{SC}	V_I =35V,	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-1.0	-	mV/°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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_J=0℃~125℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN7812x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		11.50	12.00	12.50	V
		14.5V ≤ V_{IN} ≤ 27.0V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		11.40	12.00	12.60	
Line Regulation	$\triangle V_{O(\triangle VI)}$	14.5V ≤ V_{IN} ≤ 30.0V	T_J =25℃	-	10.0	240	mV
		16.0V ≤ V_{IN} ≤ 22.0V		-	3.0	120	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	11.0	240	mV
		250mA ≤ I_O ≤ 750mA		-	5.0	120	
Quiescent Current	I_{QC}	T_J =25℃		-	5.1	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	14.5V ≤ V_{IN} ≤ 30.0V		-	0.5	1.0	mA
		5.0mA ≤ I_O ≤ 1.0A		-	0.1	0.5	
Ripple Rejection	RR	15.0V ≤ V_{IN} ≤ 25.0V f=120Hz		55	71	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	76	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	15	-	mΩ
Short Circuit Current	I_{SC}	V_I=35V	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-1.0	-	mV/°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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_J=0℃~125℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN7815x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		14.40	15.00	15.60	V
		17.5V ≤ V_{IN} ≤ 30.0V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		14.25	15.00	15.75	
Line Regulation	$\triangle V_{O(\triangle VI)}$	17.5V ≤ V_{IN} ≤ 30.0V	T_J =25℃	-	11.0	300	mV
		20.0V ≤ V_{IN} ≤ 26.0V		-	3.0	150	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	12.0	300	mV
		250mA ≤ I_O ≤ 750mA		-	4.0	150	
Quiescent Current	I_{QC}	T_J =25℃		-	5.2	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	17.5V ≤ V_{IN} ≤ 30.0V		-	-	1.0	mA
		5.0mA ≤ I_O ≤ 1.0A		-	-	0.5	
Ripple Rejection	RR	18.5V ≤ V_{IN} ≤ 28.5V f=120Hz		54	70	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	90	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	19	-	mΩ
Short Circuit Current	I_{SC}	V_I=35V	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-1.0	-	mV/°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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_J=0℃~125℃ ; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN7818x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		17.30	18.00	18.70	V
		21.0V ≤ V_{IN} ≤ 33.0V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		17.10	18.00	18.90	
Line Regulation	$\triangle V_{O(\triangle VI)}$	21.0V ≤ V_{IN} ≤ 33.0V	T_J =25℃	-	15.0	360	mV
		24.0V ≤ V_{IN} ≤ 30.0V		-	5.0	180	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	15.0	360	mV
		250mA ≤ I_O ≤ 750mA		-	5.0	180	
Quiescent Current	I_{QC}	T_J =25℃		-	5.2	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	21.0V ≤ V_{IN} ≤ 33.0V		-	-	1.0	mA
		5.0mA ≤ I_O ≤ 1.0A		-	-	0.5	
Ripple Rejection	RR	22.0V ≤ V_{IN} ≤ 32.0V f=120Hz		53	69	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	110	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	22	-	mΩ
Short Circuit Current	I_{SC}	V_I=35V	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-1.0	-	mV/°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} = 0.33uF, C_{OUT} = 0.1 uF, I_{OUT} = 500mA, T_J=0℃~125℃ ; unless otherwise specified)

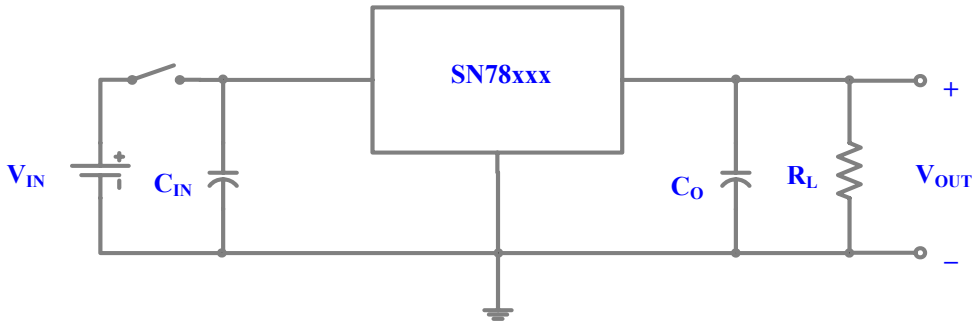
Characteristic	Symbol	Test Condition*		SN7824x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	T_J =25℃		23.00	24.00	25.00	V
		27.0V ≤ V_{IN} ≤ 38.0V 5.0mA ≤ I_O ≤ 1.0A, P_D ≤ 15W		22.80	24.00	25.25	
Line Regulation	$\triangle V_{O(\triangle VI)}$	27.0V ≤ V_{IN} ≤ 38.0V	T_J =25℃	-	17.0	480	mV
		30.0V ≤ V_{IN} ≤ 36.0V		-	6.0	240	
Load Regulation	$\triangle V_{O(\triangle IL)}$	5.0mA ≤ I_O ≤ 1.5A	T_J =25℃	-	15.0	480	mV
		250mA ≤ I_O ≤ 750mA		-	5.0	240	
Quiescent Current	I_{QC}	T_J =25℃		-	5.2	8.0	mA
Quiescent Current Change	$\triangle I_{QC}$	27.0V ≤ V_{IN} ≤ 38.0V		-	0.5	1.0	mA
		5.0mA ≤ I_O ≤ 1.0A		-	0.1	0.5	
Ripple Rejection	RR	28.0V ≤ V_{IN} ≤ 38.0V f=120Hz		50	67	-	dB
Dropout Voltage	V_{DROP}	I_O=1.0A	T_J =25℃	-	2.0	-	V
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	T_A =25℃	-	60	-	uV/ V_O
Output Resistance	r_O	f=1.0kHz		-	28	-	mΩ
Short Circuit Current	I_{SC}	V_I=35V	T_A =25℃	-	250	-	mA
Peak Output Current	I_{PK}	T_J =25℃		-	2.2	-	A
Temperature coefficient of Output voltage	$\triangle V_O$/ $\triangle$Temp	I_O=5.0mA		-	-1.5	-	mV/°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.

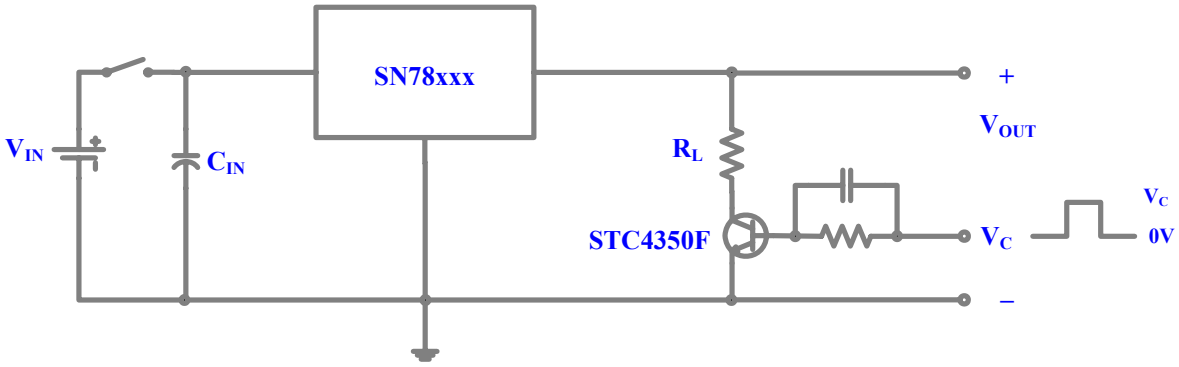
Typical Application

Fixed Output Regulator

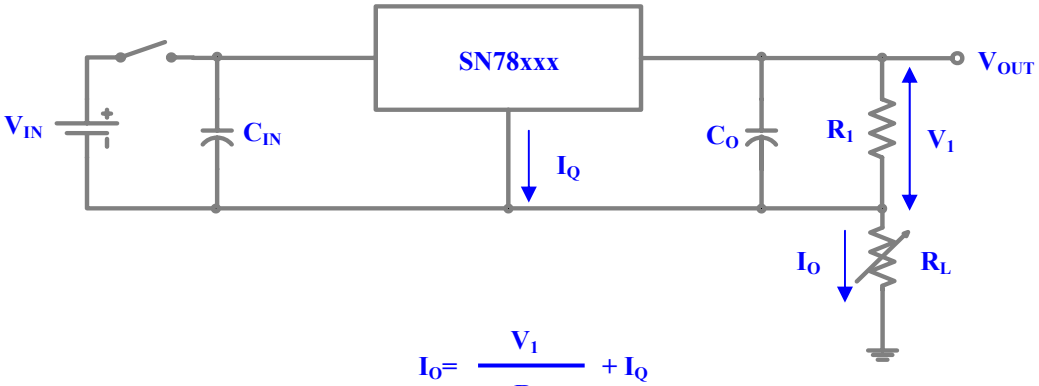


1) C_{IN} should be required if regulators are located far from power supply filter
2) C_O improves output stability and transient response

Load Regulation

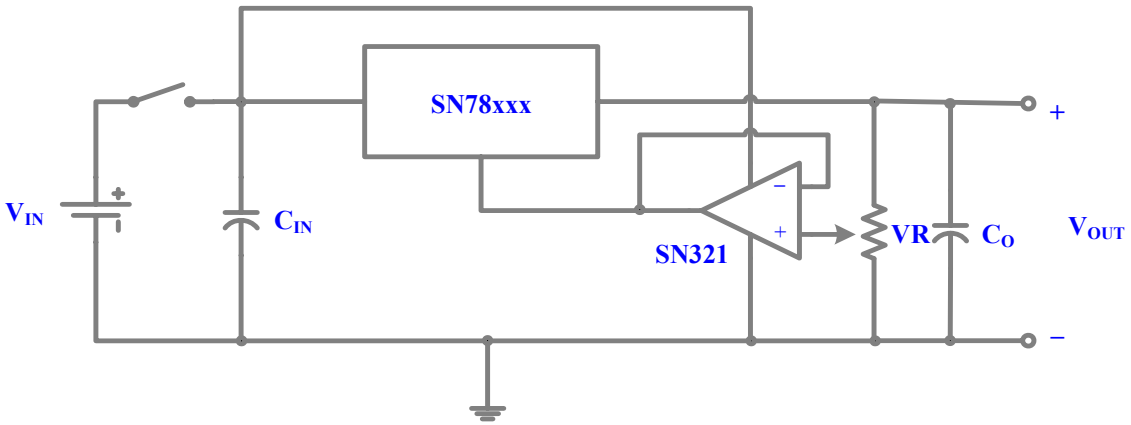


Constant Current Regulator

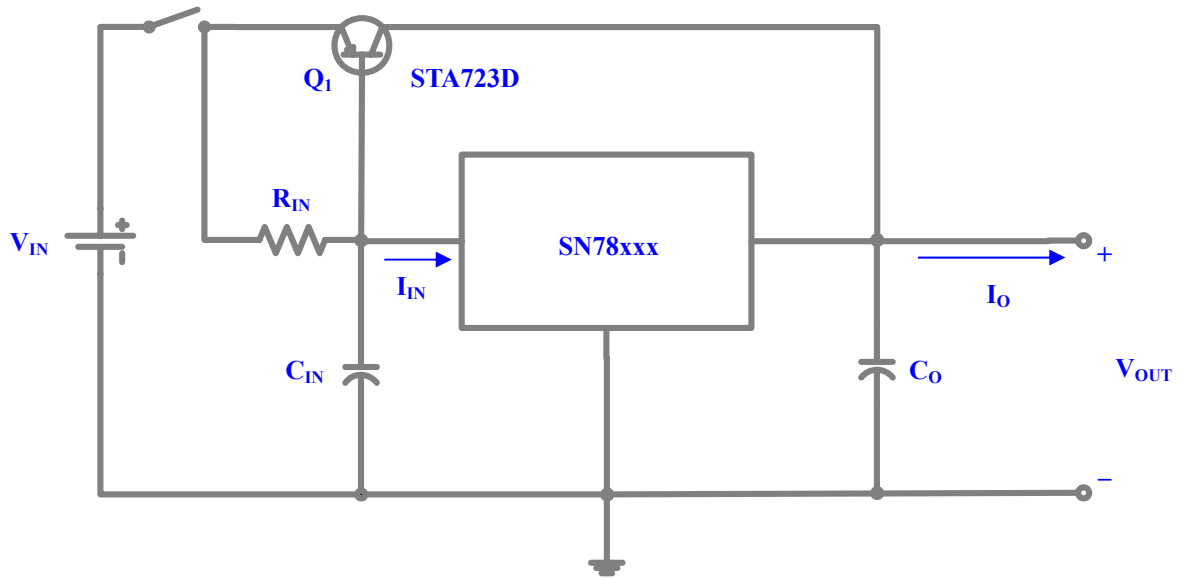


$$I_O = \frac{V_1}{R_1} + I_Q$$

Adjustable Output Regulator



High Current Voltage Regulator



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

Fig.1 Quiescent Current vs. Junction Temperature

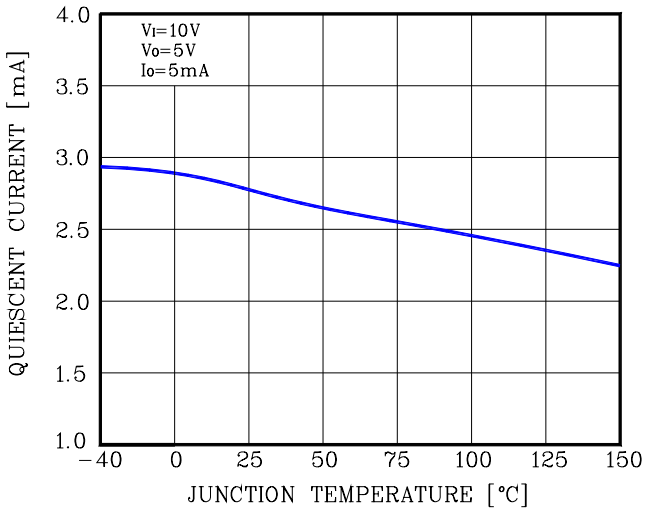


Fig.2 Output Peak Current vs. Input to Output Differential

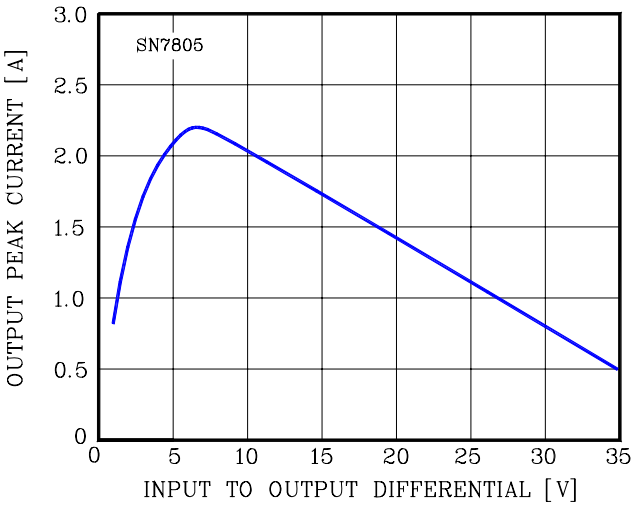


Fig.3 Output Voltage vs. Junction Temperature

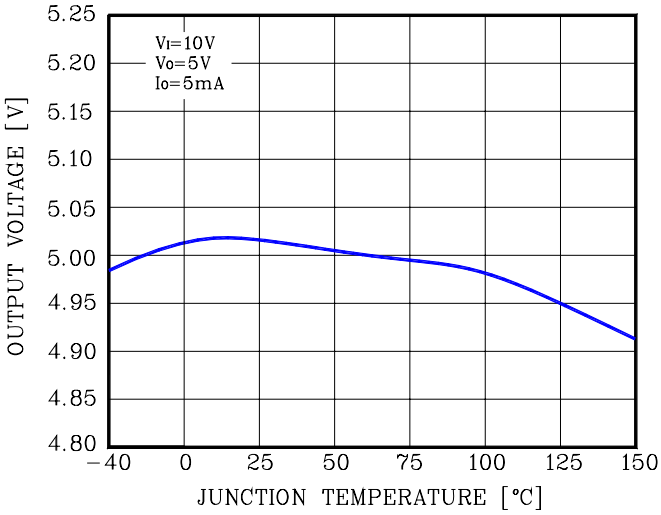


Fig.4 Dropout Voltage vs. Junction Temperature

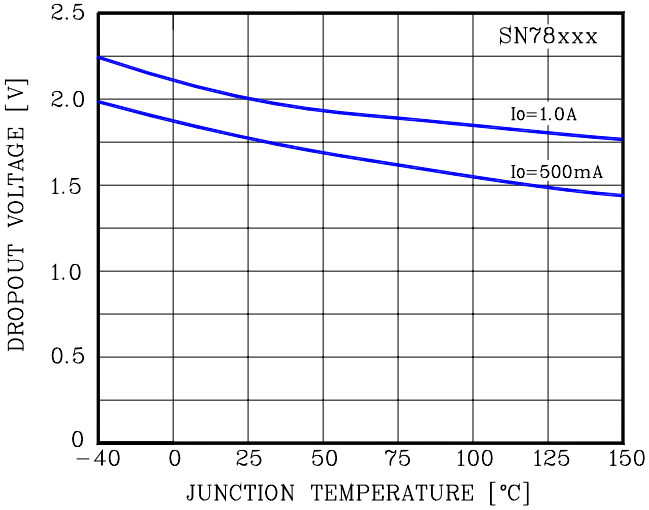


Fig.5 Line Transient Response

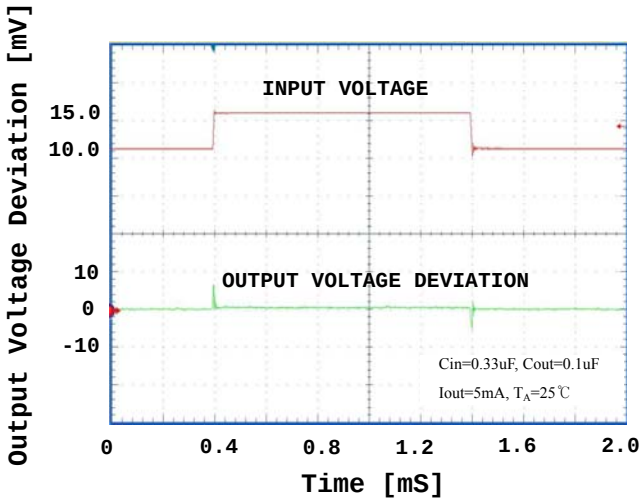
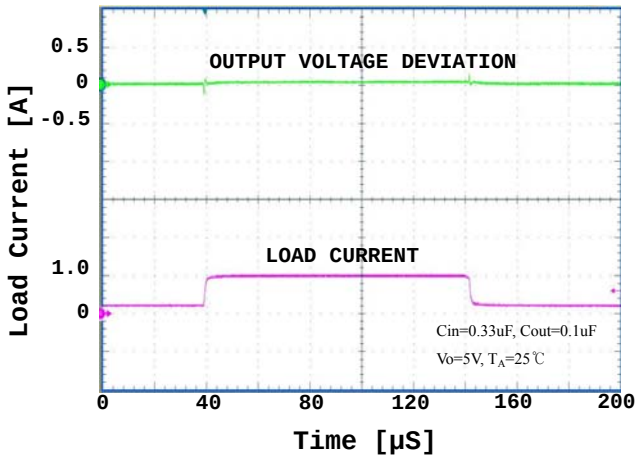
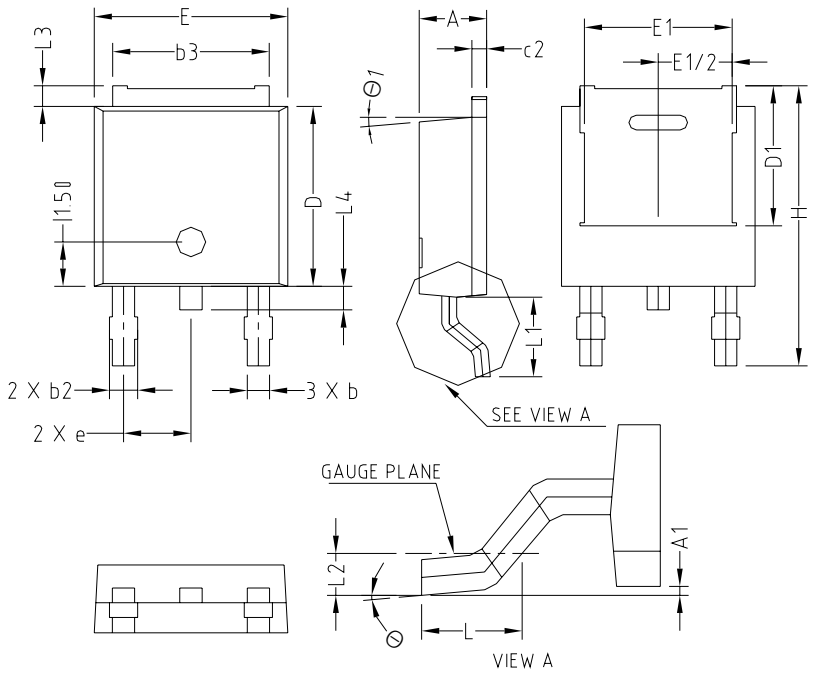


Fig.6 Load Transient Response

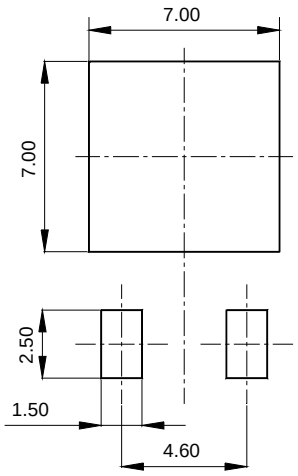


◈ TO-252-3L Outline Dimension (Unit : mm)

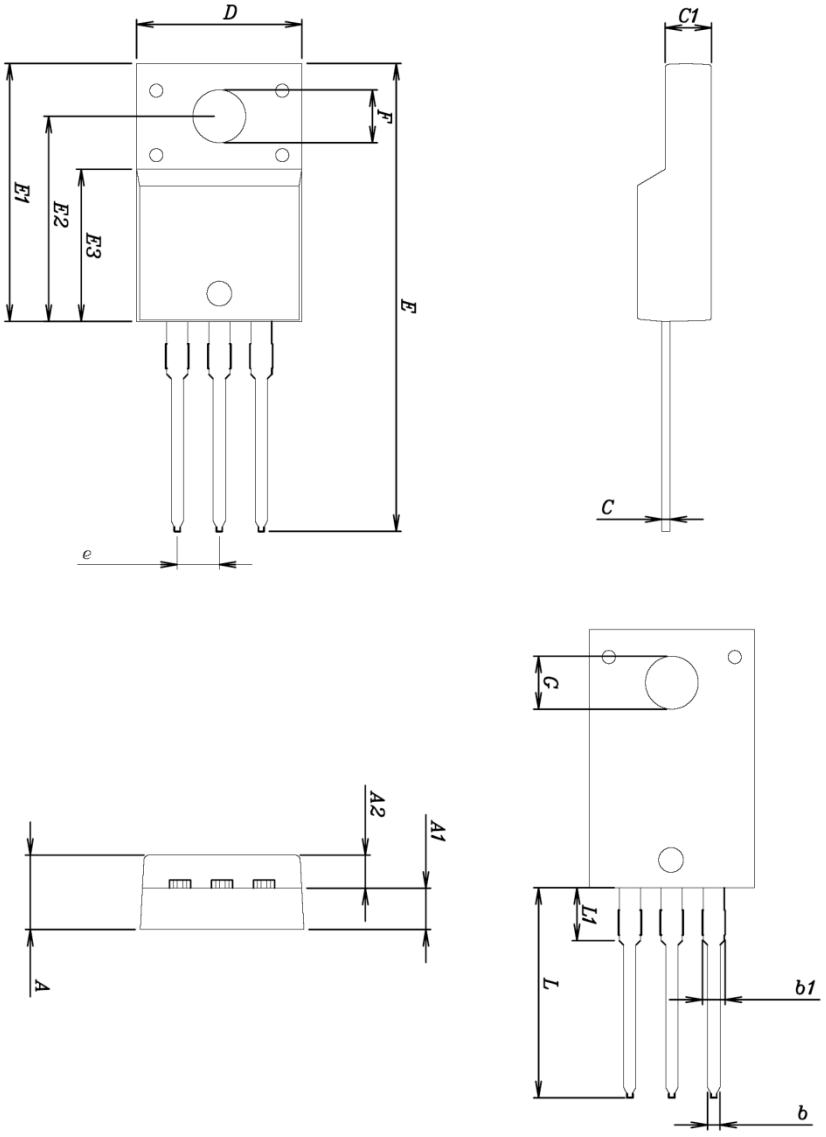


SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	2.20	2.30	2.40	
A1	0.00		0.127	
b	0.66	0.76	0.86	
b2	-	-	0.96	
b3	5.04	5.34	5.64	
c2	0.40	0.50	0.60	
D	5.90	6.10	6.30	
D1		4.75		
E	6.40	6.60	6.80	
E1		5.04		
e		2.30 BSC		
H	9.20	9.50	9.80	
L	1.27	1.47	1.67	
L1	2.50	2.70	2.90	
L2		0.508 BSC		
L3	0.50	0.70	0.90	
L4	0.60	0.80	1.00	
Θ	0°	-	10°	
Θ1		5°		

※ 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			

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