


**TO-252-3L**

**TO-220F-3L**

### ORDERING INFORMATION

Product	Marking	Package
SN78MxxD	SN78Mxx	TO-252-3L
SN78MxxPI	SN78Mxx	TO-220F-3L

#### ▲ Marking Detail Information

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



- ① AUK Logo
- ② Grade & M Code & Y/M/D Code
- ③ Device Code

### Description

The SN78Mxxx series are three-terminal positive regulators providing 0.5A 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 SN78Mxxx series can be used with external components to obtain adjustable voltages and currents.

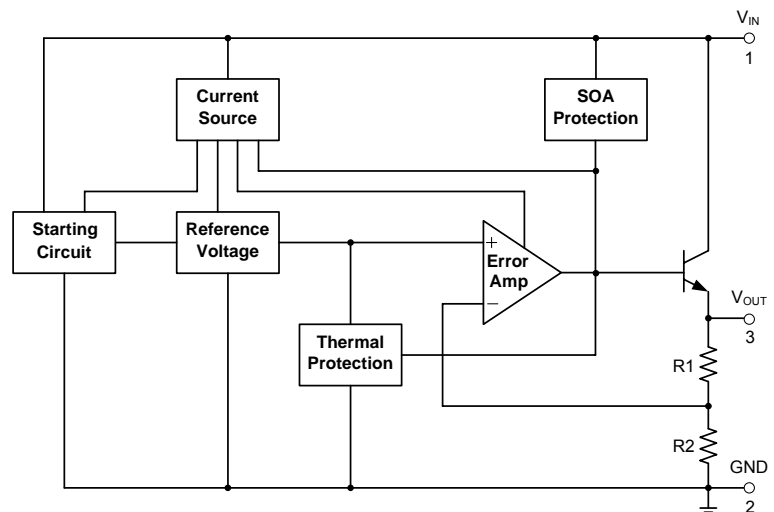
### Application

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

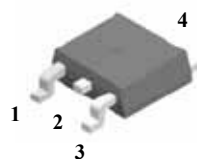
### Features and Benefits

- ◆ Output Current up to 0.5A
- ◆ 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 ↑

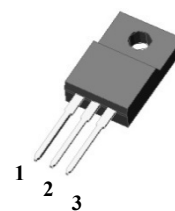
### Equivalent Circuit



### ◆ 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
SN78M05D	5.0V	-40~125°C	TO-252-3L
SN78M06D	6.0V	-40~125°C	TO-252-3L
SN78M08D	8.0V	-40~125°C	TO-252-3L
SN78M09D	9.0V	-40~125°C	TO-252-3L
SN78M10D	10V	-40~125°C	TO-252-3L
SN78M12D	12V	-40~125°C	TO-252-3L
SN78M15D	15V	-40~125°C	TO-252-3L
SN78M18D	18V	-40~125°C	TO-252-3L
SN78M24D	24V	-40~125°C	TO-252-3L
SN78M05PI	5.0V	-40~125°C	TO-220F-3L
SN78M06PI	6.0V	-40~125°C	TO-220F-3L
SN78M08PI	8.0V	-40~125°C	TO-220F-3L
SN78M09PI	9.0V	-40~125°C	TO-220F-3L
SN78M10PI	10V	-40~125°C	TO-220F-3L
SN78M12PI	12V	-40~125°C	TO-220F-3L
SN78M15PI	15V	-40~125°C	TO-220F-3L
SN78M18PI	18V	-40~125°C	TO-220F-3L
SN78M24PI	24V	-40~125°C	TO-220F-3L

◆ **Absolute Maximum Ratings ( Ta = 25°C )**

Parameter	Symbol	Limits		Unit
		TO-220F-3L	TO-252-3L	
Input Voltage	V <sub>IN</sub>	40.0 (for V <sub>O</sub> =24V)		V
		35.0 (for V <sub>O</sub> =5 to 18V)		
Power Dissipation	P <sub>d</sub>	2.0	1.3	W
Thermal Resistance Junction to Case	R <sub>θJC</sub>	5	5	°C/W
Thermal Resistance Junction to Air	R <sub>θJA</sub>	65	92	°C/W
Junction Temperature	T <sub>J</sub>	150		°C
Operate Temperature Range	T <sub>opr</sub>	-40 ~ +125		°C
Storage Temperature Range	T <sub>stg</sub>	-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<sub>J(max)</sub>, the junction-to-ambient thermal resistance, θ<sub>JA</sub>, and the ambient temperature, T<sub>A</sub>.

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

(  $V_{IN}=10V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN78M05x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J=25^{\circ}C$		4.80	5.0	5.20	V
		$7.0V \leq V_{IN} \leq 20.0V$ $5.0mA \leq I_O \leq 350mA$		4.75	5.0	5.25	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$7.0V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$	$T_J=25^{\circ}C$	-	-	100	mV
		$8.0V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$		-	-	50	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J=25^{\circ}C$	-	-	100	mV
		$5.0mA \leq I_O \leq 200mA$		-	-	50	
Quiescent Current	$I_{QC}$	$T_J=25^{\circ}C$		-	4.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$8.0V \leq V_{IN} \leq 25V$ , $I_O=200mA$		-	-	0.8	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5	
Ripple Rejection	RR	$8.0V \leq V_{IN} \leq 18.0V$ , $I_O=300mA$ $f=120Hz$		62	-	-	dB
Dropout Voltage	$V_{DROD}$	$I_O=500mA$	$T_J=25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$		-	40	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$	$T_A=25^{\circ}C$	-	300	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-0.5	-	$mV/^{\circ}C$

\* 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.

### ◆ Electrical characteristics

(  $V_{IN}=11V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN78M06x			Unit	
				Min.	Typ.	Max.		
Output Voltage**	$V_O$	$T_J=25^{\circ}C$		5.75	6.0	6.25	V	
		$8.0V \leq V_{IN} \leq 21.0V$ $5.0mA \leq I_O \leq 350mA$		5.70	6.0	6.3		
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$8.0V \leq V_{IN} \leq 25.0V$	$T_J=25^{\circ}C$	-	-	100	mV	
		$9.0V \leq V_{IN} \leq 25.0V$		-	-	50		
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	$T_J=25^{\circ}C$	-	-	120	mV	
		$5mA \leq I_O \leq 500mA$		-	-	60		
Quiescent Current	$I_{QC}$	$T_J=25^{\circ}C$		-	4.0	6.0	mA	
Quiescent Current Change	$\Delta I_{QC}$	$9.0V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$		-	-	0.8	mA	
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5		
Ripple Rejection	RR	$9.0V \leq V_{IN} \leq 19.0V$ $f=120Hz$		59	-	-	dB	
Dropout Voltage	$V_{DROP}$	$I_O=500mA$	$T_J=25^{\circ}C$	-	2.0	-	V	
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$		$T_A=25^{\circ}C$	-	45	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$		$T_A=25^{\circ}C$	-	300	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-0.5	-	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.

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### ◆ Electrical characteristics

(  $V_{IN}=14V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN78M08x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J=25^{\circ}C$		7.7	8.0	8.3	V
		$10.5V \leq V_{IN} \leq 23.0V$ $5.0mA \leq I_O \leq 350mA$		7.6	8.0	8.4	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$10.5V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$	$T_J=25^{\circ}C$	-	-	100	mV
		$11.0V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$		-	-	50	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J=25^{\circ}C$	-	-	160	mV
		$5.0mA \leq I_O \leq 200mA$		-	-	80	
Quiescent Current	$I_{QC}$	$T_J=25^{\circ}C$		-	4.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$10.5V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$		-	-	0.8	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5	
Ripple Rejection	RR	$11.5V \leq V_{IN} \leq 21.5V$ , $I_O=300mA$ $f=120Hz$		56	-	-	dB
Dropout Voltage	$V_{DROP}$	$I_O=500mA$	$T_J=25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$		-	52	-	$\mu V/V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$	$T_A=25^{\circ}C$	-	300	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-0.5	-	$mV/^{\circ}C$

\* 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.

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◆ Electrical characteristics

(  $V_{IN}=15V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN78M09x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J=25^{\circ}C$		8.65	9.0	9.35	V
		$11.5V \leq V_{IN} \leq 24.0V$ $5.0mA \leq I_O \leq 350mA$		8.55	9.0	9.45	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$11.5V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$	$T_J=25^{\circ}C$	-	-	100	mV
		$12.0V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$		-	-	50	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J=25^{\circ}C$	-	-	180	mV
		$5.0mA \leq I_O \leq 200mA$		-	-	90	
Quiescent Current	$I_{QC}$	$T_J=25^{\circ}C$		-	4.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$11.5V \leq V_{IN} \leq 25.0V$		-	-	0.8	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5	
Ripple Rejection	RR	$12.5V \leq V_{IN} \leq 23.0V$ , $I_O=300mA$ $f=120Hz$		56	-	-	dB
Dropout Voltage	$V_{DROP}$	$I_O=500mA$	$T_J=25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A=25^{\circ}C$	-	58	-	$\mu V/V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$	$T_A=25^{\circ}C$	-	250	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-0.5	-	$mV/^{\circ}C$

\* 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.

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### ◆ Electrical characteristics

(  $V_{IN}=17V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN78M10x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J=25^{\circ}C$		9.6	10.0	10.4	V
		$12.5V \leq V_{IN} \leq 25.0V$ $5.0mA \leq I_O \leq 350mA$		9.5	10.0	10.5	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$12.5V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$	$T_J=25^{\circ}C$	-	-	100	mV
		$13.0V \leq V_{IN} \leq 25.0V$ , $I_O=200mA$		-	-	50	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J=25^{\circ}C$	-	-	200	mV
		$5mA \leq I_O \leq 200mA$		-	-	100	
Quiescent Current	$I_{QC}$	$T_J=25^{\circ}C$		-	4.1	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$12.5V \leq V_{IN} \leq 25V$ , $I_O=200mA$		-	-	0.8	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5	
Ripple Rejection	RR	$13.0V \leq V_{IN} \leq 23.0V$ , $I_O=300mA$ $f=120Hz$		55	-	-	dB
Dropout Voltage	$V_{DROP}$	$I_O=500mA$	$T_J=25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$		-	65	-	$\mu V/V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$	$T_A=25^{\circ}C$	-	300	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-0.5	-	$mV/^{\circ}C$

\* 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.

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### ◆ Electrical characteristics

(  $V_{IN}=19V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1 \mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN78M12x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J=25^{\circ}C$		11.5	12.0	12.5	V
		$14.5V \leq V_{IN} \leq 27.0V$ $5.0mA \leq I_O \leq 350mA$		11.4	12.0	12.6	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$14.5V \leq V_{IN} \leq 30.0V$ , $I_O=200mA$	$T_J=25^{\circ}C$	-	-	100	mV
		$16.0V \leq V_{IN} \leq 30.0V$ , $I_O=200mA$		-	-	50	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J=25^{\circ}C$	-	-	240	mV
		$5.0mA \leq I_O \leq 200mA$		-	-	120	
Quiescent Current	$I_{QC}$	$T_J=25^{\circ}C$		-	4.1	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$14.5V \leq V_{IN} \leq 30.0V$ , $I_O=200mA$		-	-	0.8	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5	
Ripple Rejection	RR	$15.0V \leq V_{IN} \leq 25.0V$ , $I_O=300mA$ $f=120Hz$		55	-	-	dB
Dropout Voltage	$V_{DROP}$	$I_O=500mA$	$T_J=25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A=25^{\circ}C$	-	75	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$	$T_A=25^{\circ}C$	-	300	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-0.5	-	$mV/^{\circ}C$

\* 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.

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### ◆ Electrical characteristics

(  $V_{IN}=23V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1 \mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN78M15x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J = 25^{\circ}C$		14.4	15.0	15.6	V
		$17.5V \leq V_{IN} \leq 30.0V$ $5.0mA \leq I_O \leq 350mA$		14.25	15.0	15.75	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$17.5V \leq V_{IN} \leq 30.0V$ , $I_O=200mA$	$T_J = 25^{\circ}C$	-	-	100	mV
		$20.0V \leq V_{IN} \leq 30.0V$ , $I_O=200mA$		-	-	50	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^{\circ}C$	-	-	300	mV
		$5.0mA \leq I_O \leq 200mA$		-	-	150	
Quiescent Current	$I_{QC}$	$T_J = 25^{\circ}C$		-	4.1	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$17.5V \leq V_{IN} \leq 30.0V$ , $I_O=200mA$		-	-	0.8	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5	
Ripple Rejection	RR	$18.5V \leq V_{IN} \leq 28.5V$ , $I_O=300mA$ $f=120Hz$		54	-	-	dB
Dropout Voltage	$V_{DROP}$	$I_O=500mA$	$T_J = 25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$		-	100	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$	$T_A = 25^{\circ}C$	-	300	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-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.

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### ◆ Electrical characteristics

(  $V_{IN}=26V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN78M18x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J=25^{\circ}C$		17.3	18.0	18.7	V
		$20.5V \leq V_{IN} \leq 33.0V$ $5.0mA \leq I_O \leq 350mA$		17.1	18.0	18.9	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$21.0V \leq V_{IN} \leq 33.0V$ , $I_O=200mA$	$T_J=25^{\circ}C$	-	-	100	mV
		$24.0V \leq V_{IN} \leq 33.0V$ , $I_O=200mA$		-	-	50	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J=25^{\circ}C$	-	-	360	mV
		$5.0mA \leq I_O \leq 200mA$		-	-	180	
Quiescent Current	$I_{QC}$	$T_J=25^{\circ}C$		-	4.2	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$21.0V \leq V_{IN} \leq 33.0V$ , $I_O=200mA$		-	-	0.8	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5	
Ripple Rejection	RR	$22.0V \leq V_{IN} \leq 32.0V$ , $I_O=300mA$ $f=120Hz$		53	-	-	dB
Dropout Voltage	$V_{DROP}$	$I_O=500mA$	$T_J=25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A=25^{\circ}C$	-	100	-	$\mu V/V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$	$T_A=25^{\circ}C$	-	300	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-1.1	-	$mV/^{\circ}C$

\* 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.

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### ◆ Electrical characteristics

(  $V_{IN}=33V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J=0^{\circ}C \sim 125^{\circ}C$  ; unless otherwise specified )

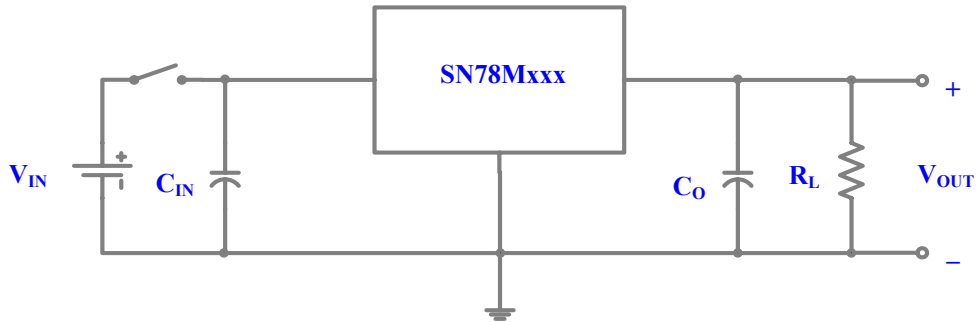
Characteristic	Symbol	Test Condition*		SN78M24x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J=25^{\circ}C$		23.0	24.0	25.0	V
		$27.0V \leq V_{IN} \leq 38.0V$ $5.0mA \leq I_O \leq 350mA$		22.8	24.0	25.25	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$27.0V \leq V_{IN} \leq 38.0V$ , $I_O=200mA$	$T_J=25^{\circ}C$	-	-	100	mV
		$28.0V \leq V_{IN} \leq 38.0V$ , $I_O=200mA$		-	-	50	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J=25^{\circ}C$	-	-	480	mV
		$5.0mA \leq I_O \leq 200mA$		-	-	240	
Quiescent Current	$I_{QC}$	$T_J=25^{\circ}C$		-	4.2	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$27.0V \leq V_{IN} \leq 38.0V$ , $I_O=200mA$		-	-	0.8	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.5	
Ripple Rejection	RR	$28.0V \leq V_{IN} \leq 38.0V$ , $I_O=300mA$ $f=120Hz$		50	-	-	dB
Dropout Voltage	$V_{DROPP}$	$I_O=500mA$	$T_J=25^{\circ}C$	-	2.0	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A=25^{\circ}C$	-	170	-	$\mu V/V_O$
Short Circuit Current	$I_{SC}$	$V_I=35V$ ,	$T_A=25^{\circ}C$	-	300	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O=5.0mA$		-	-1.2	-	$mV/^{\circ}C$

\* 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.

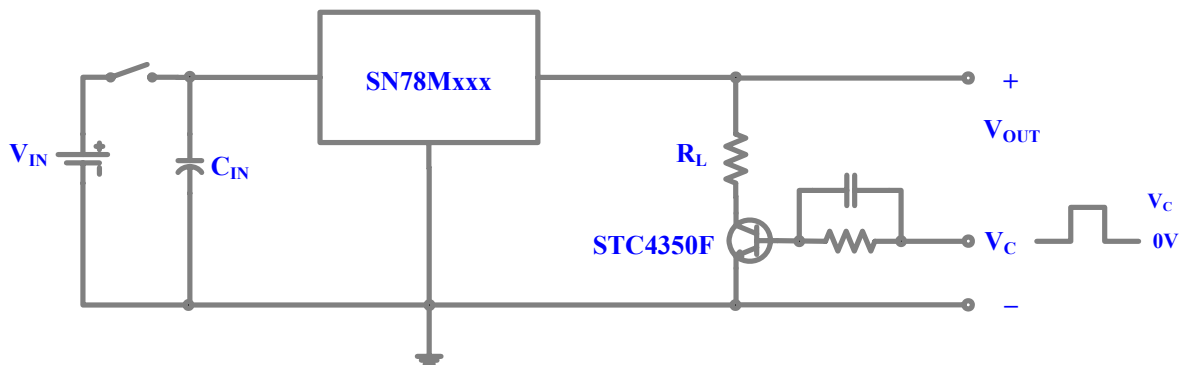
Typical Application

Fixed Output Regulator

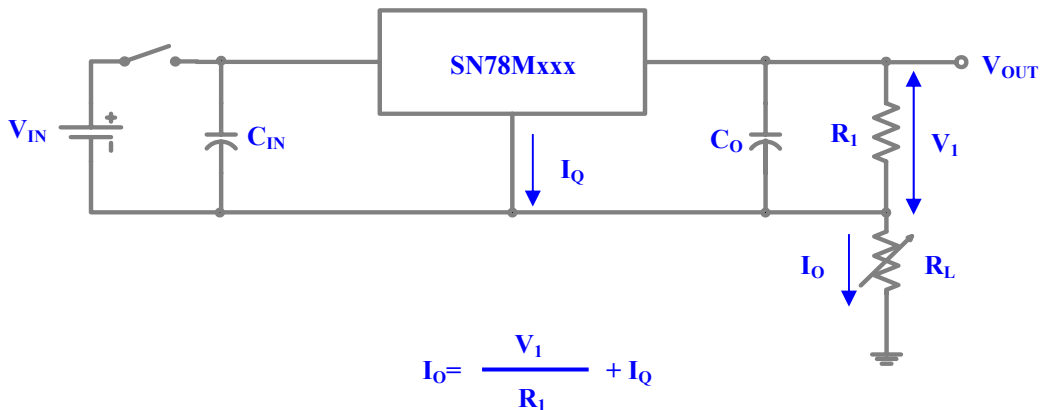


- 1) C<sub>IN</sub> should be required if regulators are located far from power supply filter
- 2) C<sub>O</sub> improves output stability and transient response

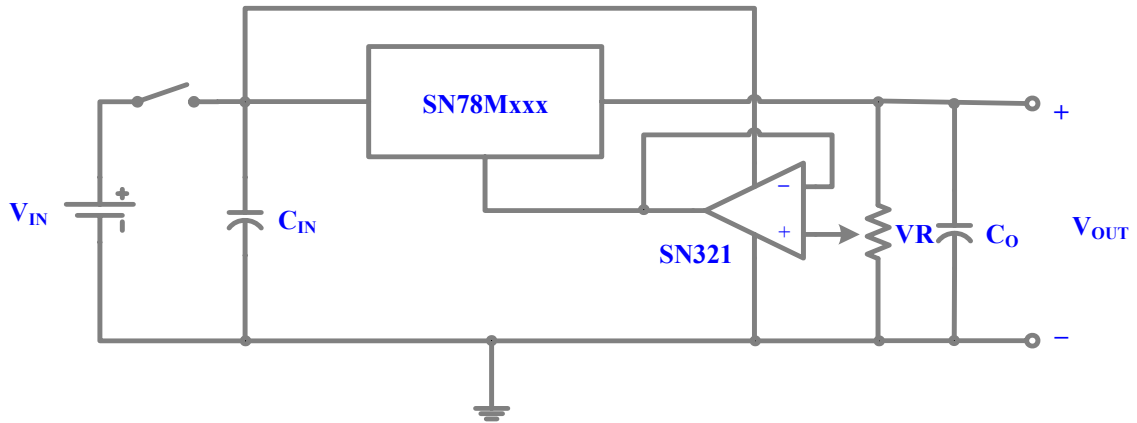
Load Regulation



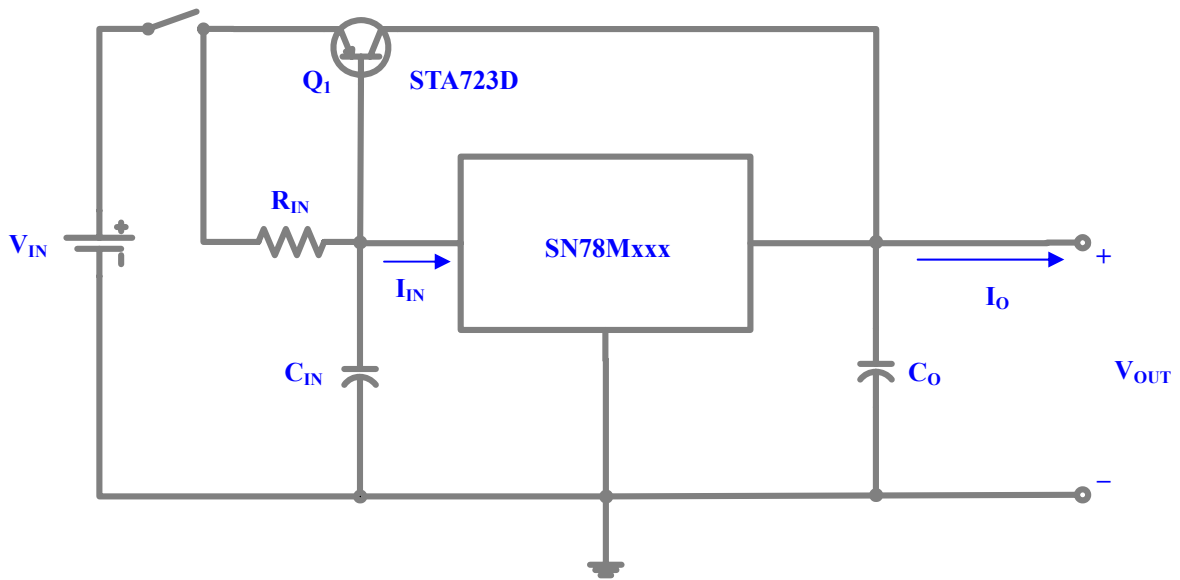
Constant Current Regulator



Adjustable Output Regulator

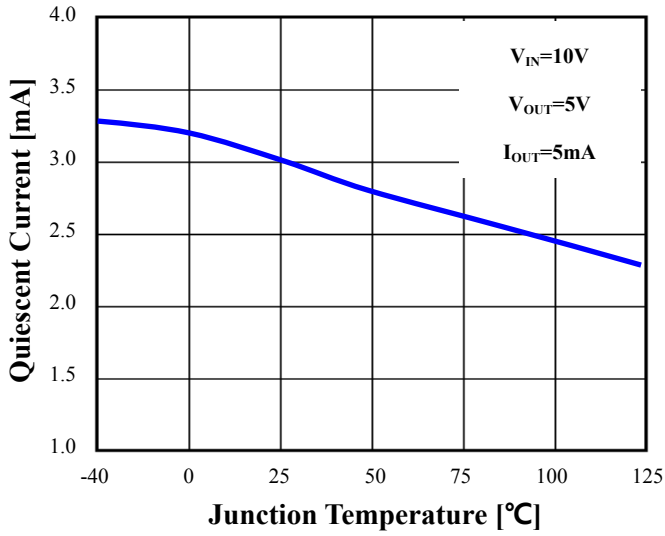


High Current Voltage Regulator

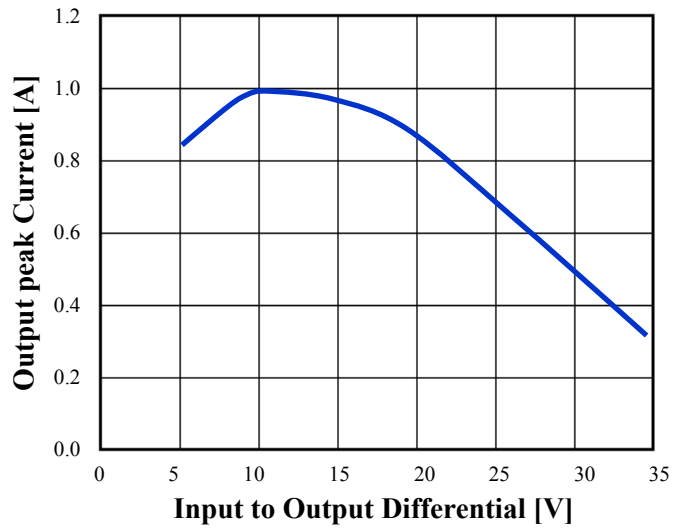


$$I_O = I_{IN} + \beta_{Q1}(I_{IN} - V_{BEQ1} / R_{IN})$$

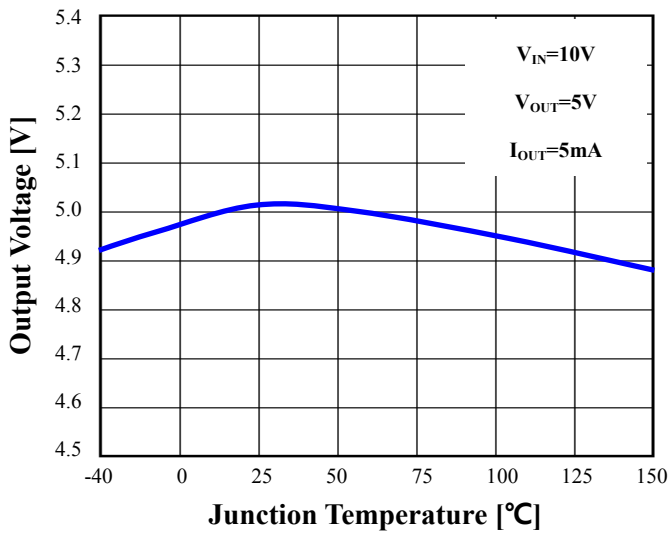
**Fig.1 Quiescent Current vs. Junction Temperature**



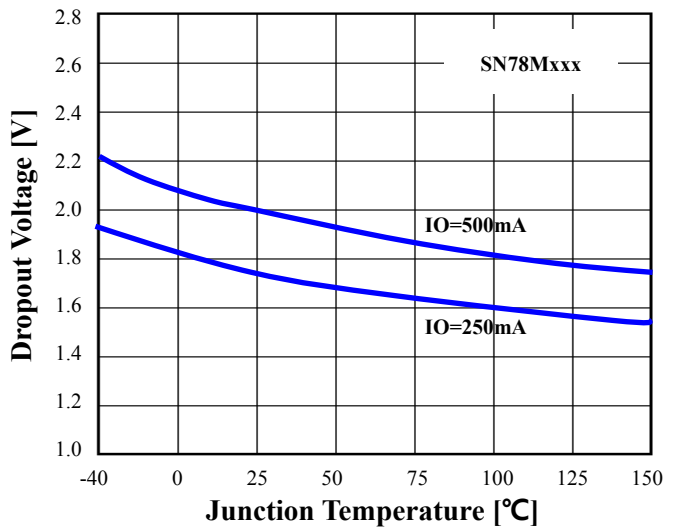
**Fig.2 Output Peak Current vs. Input to Output Differential**



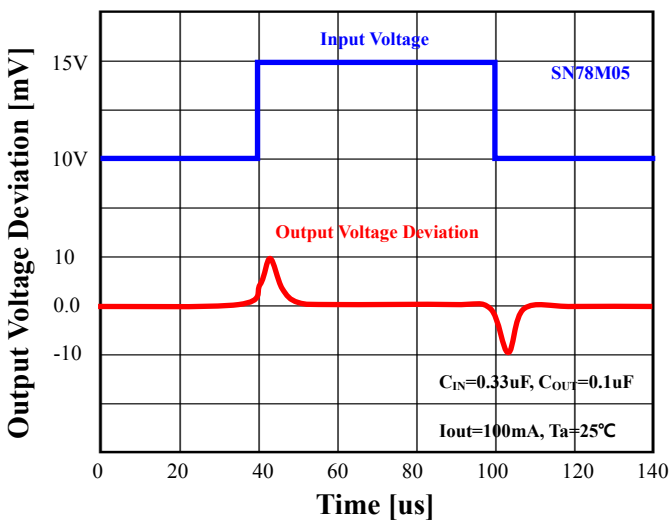
**Fig.3 Output Voltage vs. Junction Temperature**



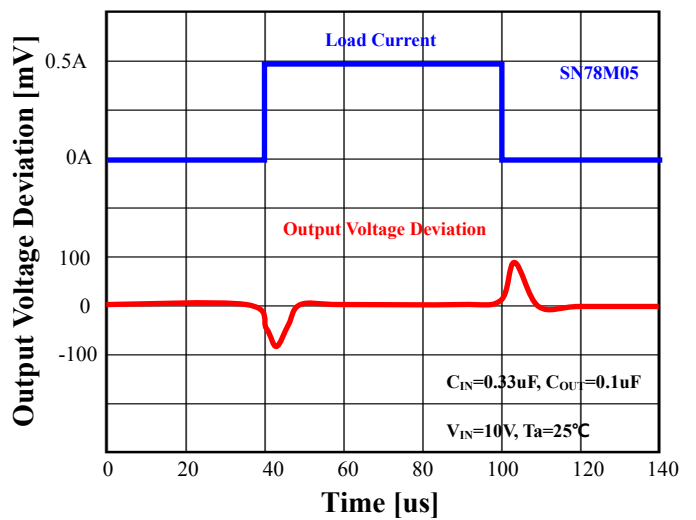
**Fig.4 Dropout Voltage vs. Input Voltage**



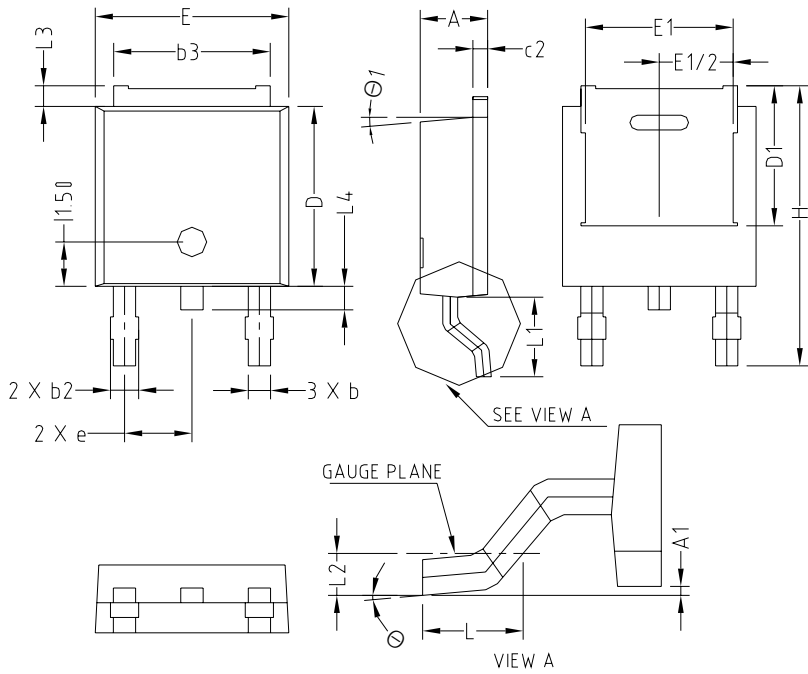
**Fig.5 Line Transient Response**



**Fig.6 Load Transient Response**

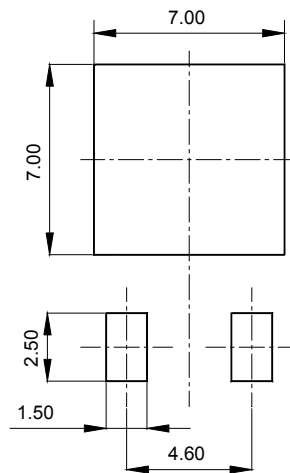


◆ TO-252-3L Outline Dimension (Unit : mm)



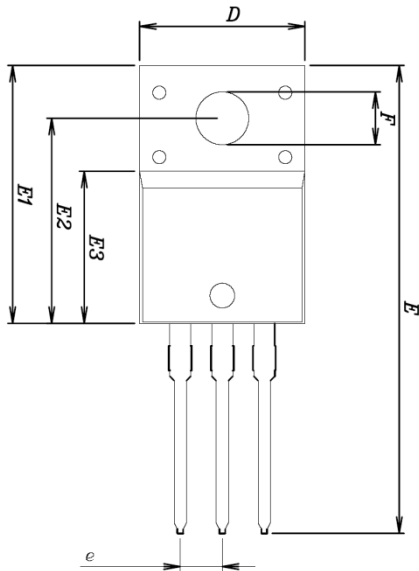
SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	2.20	2.30	2.40	
A1	0.00	-	0.127	
b	0.66	0.76	0.86	
b2	-	-	0.96	
b3	5.04	5.34	5.64	
c2	0.40	0.50	0.60	
D	5.90	6.10	6.30	
D1	4.75			
E	6.40	6.60	6.80	
E1	5.04			
e	2.30 BSC			
H	9.20	9.50	9.80	
L	1.27	1.47	1.67	
L1	2.50	2.70	2.90	
L2	0.508 BSC			
L3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

※ Recommend PCB solder land [Unit: mm]

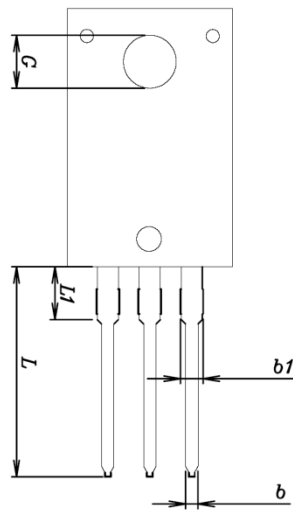
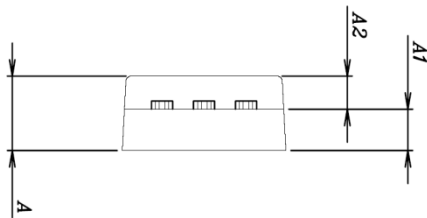




◆ TO-220F-3L Outline Dimension (Unit : mm)



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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