


**TO-252-3L**

**TO-220F-3L**

### ORDERING INFORMATION

Product	Marking	Package
SN79xxD	SN79MxxD	TO-252-3L
SN79xxPI	SN79MxxPI	TO-220F-3L

#### ▲ Marking Detail Information

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



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

### Description

The SN79Mxxx series are three-terminal Negative regulators providing over 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 SN79Mxxx series can be used with external components to obtain adjustable voltages and Currents.

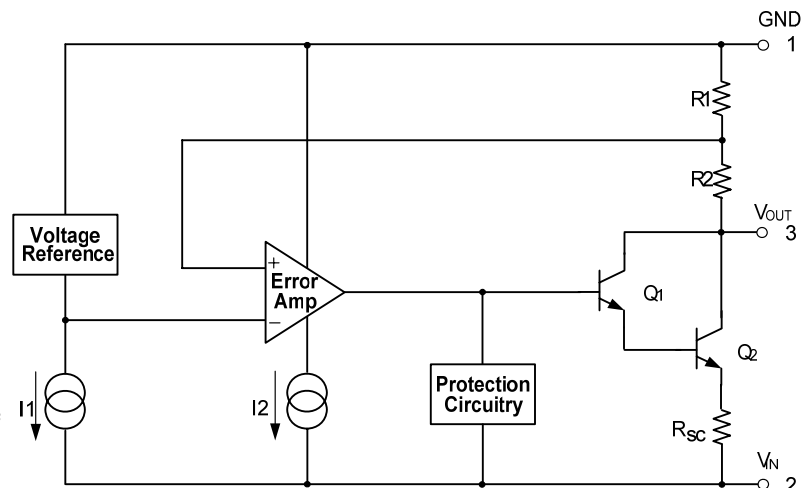
### Application

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

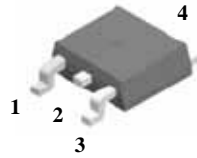
### Features and Benefits

- ◆ Output Current up to 1.0A
- ◆ Output Voltage : -5, -6, -8, -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 ↑ ]

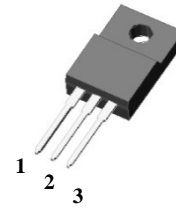
### Equivalent Circuit



### ◆ Pin Configuration

**TO-252-3L**

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

**TO-220F-3L**

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

### ◆ Product Line-up

Product Name	$V_{OUT}$	Operating Temperature	Package
SN79M05D	-5.0V	-40~125°C	TO-252-3L
SN79M06D	-6.0V	-40~125°C	TO-252-3L
SN79M08D	-8.0V	-40~125°C	TO-252-3L
SN79M12D	-12V	-40~125°C	TO-252-3L
SN79M15D	-15V	-40~125°C	TO-252-3L
SN79M18D	-18V	-40~125°C	TO-252-3L
SN79M24D	-24V	-40~125°C	TO-252-3L
SN79M05PI	-5.0V	-40~125°C	TO-220F-3L
SN79M06PI	-6.0V	-40~125°C	TO-220F-3L
SN79M08PI	-8.0V	-40~125°C	TO-220F-3L
SN79M12PI	-12V	-40~125°C	TO-220F-3L
SN79M15PI	-15V	-40~125°C	TO-220F-3L
SN79M18PI	-18V	-40~125°C	TO-220F-3L
SN79M24PI	-24V	-40~125°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 ( $V_O = -24\text{V}$ )		V
		-35.0 ( $V_O = -5$ to $-18\text{V}$ )		
Power Dissipation	$P_d$	2.0	1.3	W
Thermal Resistance Junction to Case	$R_{\theta JC}$	5	5	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Air	$R_{\theta JA}$	65	92	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_J$	150		$^\circ\text{C}$
Operate Temperature Range	$T_{opr}$	-40 ~ +125		$^\circ\text{C}$
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,  $\theta_{JA}$ , 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**

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

Characteristic	Symbol	Test Condition*		SN79M05x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J = 25^\circ C$		-4.80	-5.0	-5.20	V
		$-7.0V \leq V_{IN} \leq -25.0V$ $5.0mA \leq I_O \leq 350mA$		-4.75	-5.0	-5.25	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$-7.0V \leq V_{IN} \leq -25.0V$	$T_J = 25^\circ C$	-	7.0	50	mV
		$-8.0V \leq V_{IN} \leq -25.0V$		-	2.0	30	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	100	mV
Quiescent Current	$I_{QC}$	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$-8.0V \leq V_{IN} \leq -25V$ , $I_O = 200mA$		-	-	0.4	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.4	
Ripple Rejection	RR	$-8.0V \leq V_{IN} \leq -18.0V$ $f = 120Hz$		54	60	-	dB
Dropout Voltage	$V_{DROP}$	$I_O = 500mA$	$T_J = 25^\circ C$	-	1.1	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	40	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I = -35V$	$T_A = 25^\circ C$	-	140	-	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*		SN79M06x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J = 25^\circ C$		-5.75	-6.0	-6.25	V
		$-8.0V \leq V_{IN} \leq -25V$ $5.0mA \leq I_O \leq 350mA$		-5.70	-6.0	-6.30	
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$-8.0V \leq V_{IN} \leq -25.0V$	$T_J = 25^\circ C$	-	7.0	60	mV
		$-9.0V \leq V_{IN} \leq -19.0V$		-	2.0	40	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	120	mV
Quiescent Current	$I_{QC}$	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$-8.0V \leq V_{IN} \leq -25.0V$		-	-	0.4	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.4	
Ripple Rejection	RR	$-9.0V \leq V_{IN} \leq -19.0V$ $f = 120Hz$		54	60	-	dB
Dropout Voltage	$V_{DROP}$	$I_O = 500mA$	$T_J = 25^\circ C$	-	1.1	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	50	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I = -35V$	$T_A = 25^\circ C$	-	140	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O = 5.0mA$		-	-0.5	-	$mV/^\circ C$

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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*	SN79M08x			Unit
			Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J = 25^\circ C$	-7.7	-8.0	-8.3	V
		$-10.5V \leq V_{IN} \leq -25.0V$ $5.0mA \leq I_O \leq 350mA$	-7.6	-8.0	-8.4	
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$-10.5V \leq V_{IN} \leq -25.0V$	-	7.0	80	mV
		$-11V \leq V_{IN} \leq -21V$	-	2.0	50	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	-	30	160	mV
Quiescent Current	$I_{QC}$	$T_J = 25^\circ C$	-	3.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$-10.5V \leq V_{IN} \leq -25.0V$	-	-	0.4	mA
		$5.0mA \leq I_O \leq 1.0A$	-	-	0.4	
Ripple Rejection	RR	$-11.5V \leq V_{IN} \leq -21.5V$ $f = 120Hz$	54	59	-	dB
Dropout Voltage	$V_{DROP}$	$I_O = 500mA$	-	1.1	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	-	60	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I = -35V$	-	140	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O = 5.0mA$	-	-0.6	-	$mV/^\circ C$

\* 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*		SN79M12x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J = 25^\circ C$		-11.5	-12.0	-12.5	V
		$-14.5V \leq V_{IN} \leq -30.0V$ $5.0mA \leq I_O \leq 350mA$		-11.4	-12.0	-12.6	
Line Regulation	$\Delta V_{O(\Delta V)}$	$-14.5V \leq V_{IN} \leq -30.0V$	$T_J = 25^\circ C$	-	8.0	80	mV
		$-15.0V \leq V_{IN} \leq -25.0V$		-	3.0	50	
Load Regulation	$\Delta V_{O(\Delta I)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	240	mV
Quiescent Current	$I_{QC}$	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$-14.5V \leq V_{IN} \leq -30.0V$		-	-	0.4	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.4	
Ripple Rejection	RR	$-15.0V \leq V_{IN} \leq -25.0V$ $f = 120Hz$		54	60	-	dB
Dropout Voltage	$V_{DROP}$	$I_O = 500mA$	$T_J = 25^\circ C$	-	1.1	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	75	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I = -35V$	$T_A = 25^\circ C$	-	140	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O = 5.0mA$		-	-0.8	-	$mV/^\circ C$

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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*		SN79M15x			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	$\Delta V_{O(\Delta V)}$	$-17.5V \leq V_{IN} \leq -30.0V$	$T_J = 25^\circ C$	-	9.0	80	mV
		$-18.0V \leq V_{IN} \leq -28.0V$		-	5.0	50	
Load Regulation	$\Delta V_{O(\Delta I)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	240	mV
Quiescent Current	$I_{QC}$	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$-17.5V \leq V_{IN} \leq -28.0V$		-	-	0.4	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.4	
Ripple Rejection	RR	$-18.5V \leq V_{IN} \leq -28.5V$ $f = 120Hz$		54	59	-	dB
Dropout Voltage	$V_{DROP}$	$I_O = 500mA$	$T_J = 25^\circ C$	-	1.1	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	90	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I = -35V$	$T_A = 25^\circ C$	-	140	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O = 5.0mA$		-	-1.0	-	$mV/^\circ C$

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### ◆ Electrical characteristics

(  $V_{IN} = -27V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $I_{OUT} = 350mA$ ,  $T_J = 0^\circ C \sim 125^\circ C$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN79M18x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J = 25^\circ C$		-17.3	-18.0	-18.7	V
		$-21.0V \leq V_{IN} \leq -33.0V$ $5.0mA \leq I_O \leq 350mA$		-17.1	-18.0	-18.9	
Line Regulation	$\Delta V_{O(\Delta V)}$	$-21.0V \leq V_{IN} \leq -33.0V$	$T_J = 25^\circ C$	-	9.0	80	mV
		$-24.0V \leq V_{IN} \leq -30.0V$		-	5.0	80	
Load Regulation	$\Delta V_{O(\Delta I)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	36	360	mV
Quiescent Current	$I_{QC}$	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$-21.0V \leq V_{IN} \leq -33.0V$		-	-	0.4	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.4	
Ripple Rejection	RR	$-22.0V \leq V_{IN} \leq -32.0V$ $f = 120Hz$		54	59	-	dB
Dropout Voltage	$V_{DROP}$	$I_O = 500mA$	$T_J = 25^\circ C$	-	1.1	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	110	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I = -35V$	$T_A = 25^\circ C$	-	140	-	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

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

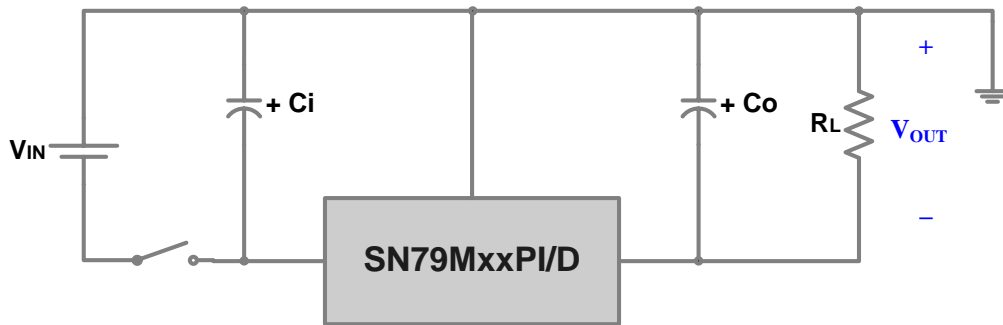
Characteristic	Symbol	Test Condition*		SN79M24x			Unit
				Min.	Typ.	Max.	
Output Voltage**	$V_O$	$T_J = 25^\circ C$		-23.0	-24.0	-25.0	V
		$-27.0V \leq V_{IN} \leq -38.0V$ $5.0mA \leq I_O \leq 350mA$		-22.8	-24.0	-25.2	
Line Regulation	$\Delta V_{O(\Delta VI)}$	$-27.0V \leq V_{IN} \leq -38.0V$	$T_J = 25^\circ C$	-	9.0	80	mV
		$-30.0V \leq V_{IN} \leq -36.0V$		-	5.0	70	
Load Regulation	$\Delta V_{O(\Delta IL)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	300	mV
Quiescent Current	$I_{QC}$	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	$\Delta I_{QC}$	$-27.0V \leq V_{IN} \leq -38.0V$		-	-	0.4	mA
		$5.0mA \leq I_O \leq 350mA$		-	-	0.4	
Ripple Rejection	RR	$28.0V \leq V_{IN} \leq 38.0V$ $f = 120Hz$		54	58	-	dB
Dropout Voltage	$V_{DROP}$	$I_O = 500mA$	$T_J = 25^\circ C$	-	1.1	-	V
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	180	-	$\mu V / V_O$
Short Circuit Current	$I_{SC}$	$V_I = -35V$	$T_A = 25^\circ C$	-	140	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O = 5.0mA$		-	-1.0	-	$mV/^\circ C$

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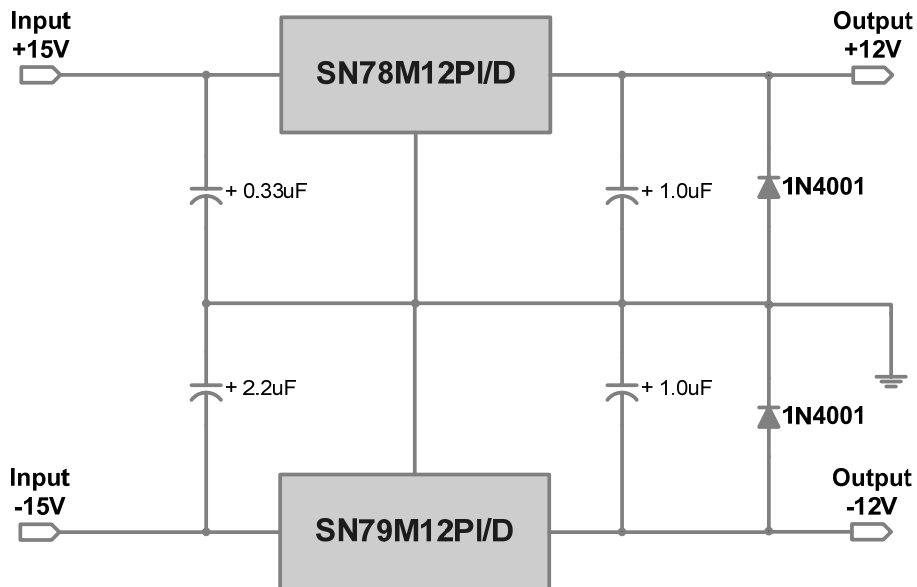
Typical Application

Negative Fixed Output Regulator

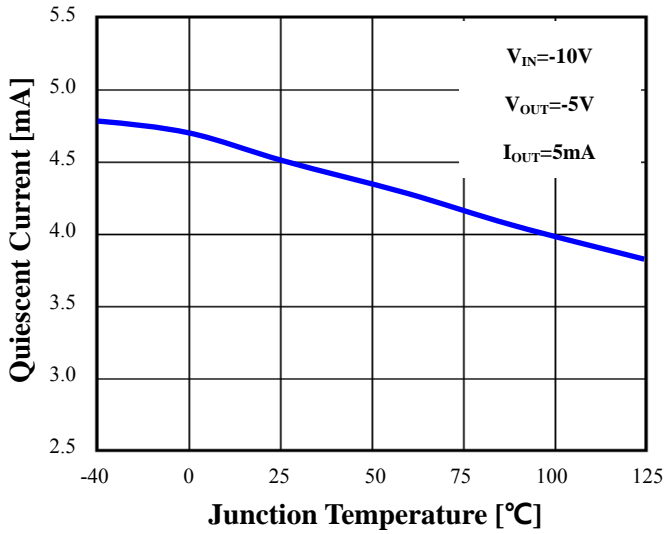


- 1)  $C_{IN}$  should be required if regulators are located far from power supply filter
- 2)  $C_O$  improves output stability and transient response
- 3) To specify an output voltage, substitute voltage value for “xx”

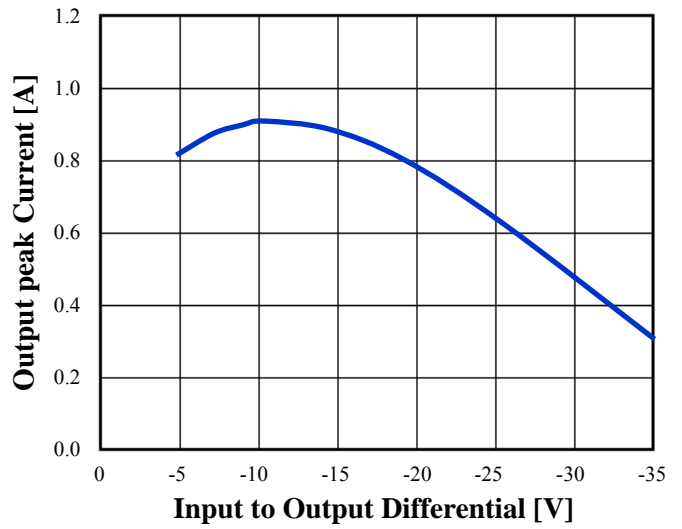
Split Power Supply / OP-AMP Supply ( $\pm 12V / 1.0A$ )



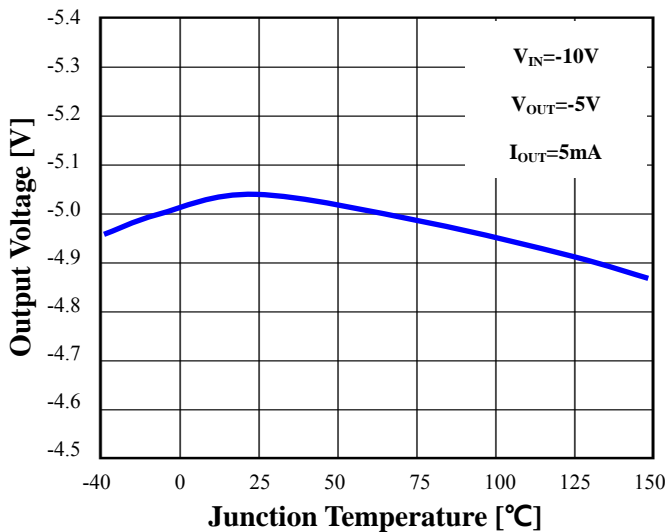
**Fig.1 Quiescent Current vs. Junction Temperature**



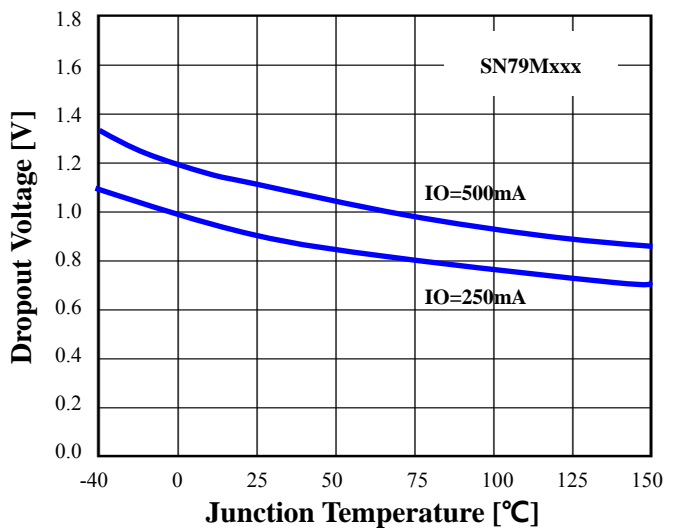
**Fig.2 Output Peak Current vs. Input to Output Differential**



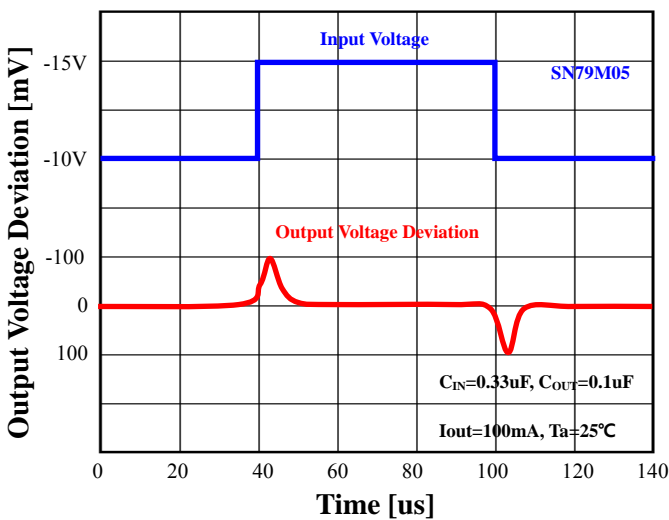
**Fig.3 Output Voltage vs. Junction Temperature**



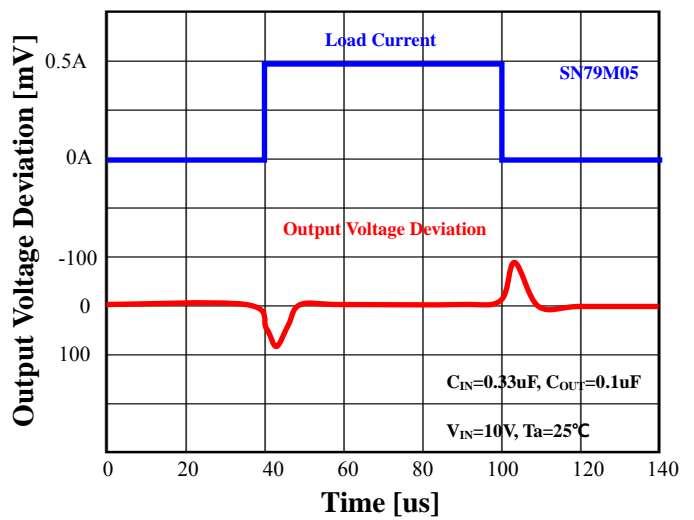
**Fig.4 Dropout Voltage vs. Input Voltage**



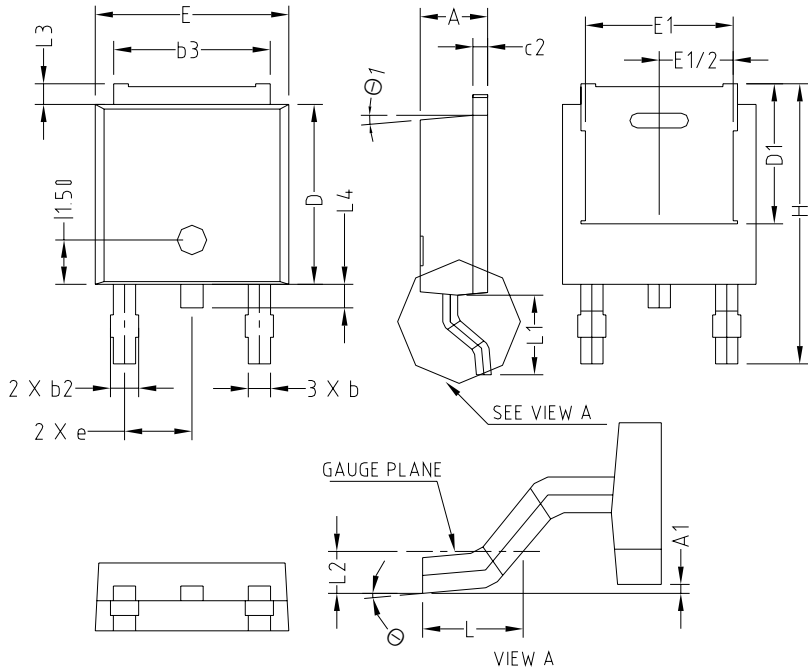
**Fig.5 Line Transient Response**



**Fig.6 Load Transient Response**

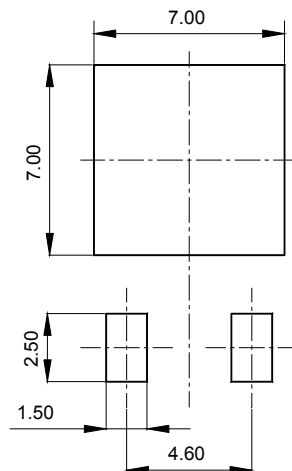


◆ TO-252-3L Outline Dimension (Unit : mm)

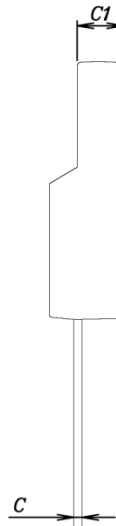
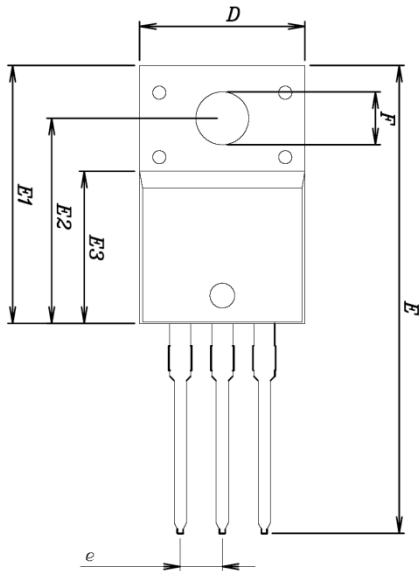


SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	2.20	2.30	2.40	
A1	0.00		0.127	
b	0.66	0.76	0.86	
b2	-	-	0.96	
b3	5.04	5.34	5.64	
c2	0.40	0.50	0.60	
D	5.90	6.10	6.30	
D1	4.75			
E	6.40	6.60	6.80	
E1	5.04			
e	2.30 BSC			
H	9.20	9.50	9.80	
L	1.27	1.47	1.67	
L1	2.50	2.70	2.90	
L2	0.508 BSC			
L3	0.50	0.70	0.90	
L4	0.60	0.80	1.00	
$\Theta$	0°	-	10°	
$\Theta1$	5°			

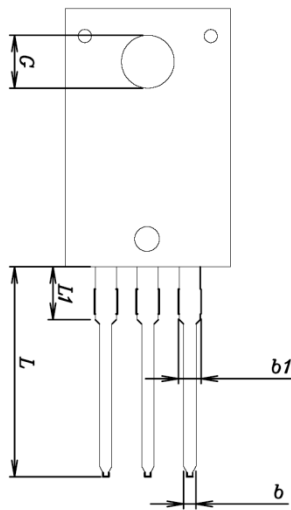
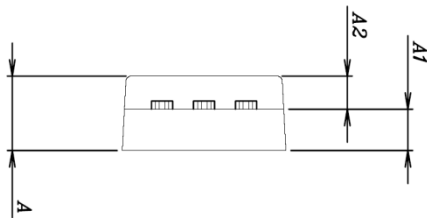
※ Recommend PCB solder land [Unit: mm]



◆ 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			



**The AUK Corp. products are intended for the use as components in general electronic equipment (Office and communication equipment, measuring equipment, home appliance, etc.).**

**Please make sure that you consult with us before you use these AUK Corp. products in equipments which require high quality and / or reliability, and in equipments which could have major impact to the welfare of human life(atomic energy control, airplane, spaceship, transportation, combustion control, all types of safety device, etc.). AUK Corp. cannot accept liability to any damage which may occur in case these AUK Corp. products were used in the mentioned equipments without prior consultation with AUK Corp..**

**Specifications mentioned in this publication are subject to change without notice.**