


TO-252-3L

TO-220F-3L

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 ↑]

ORDERING INFORMATION

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

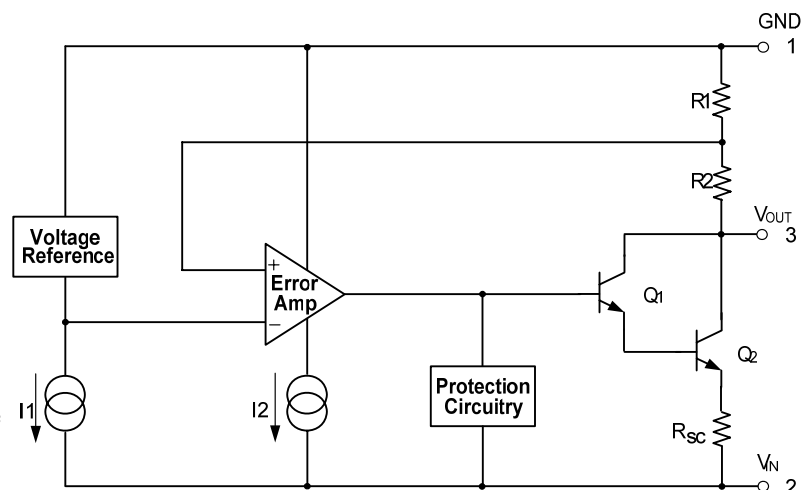
▲ Marking Detail Information

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

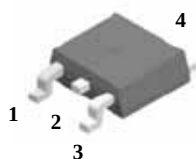


- ① AUK Logo
- ② Grade & M Code & Year & Week Code
- ③ Device Code

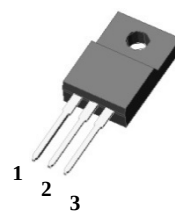
Equivalent Circuit



◆ Pin Configuration

**TO-252-3L**

- 1: 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 =-24V)		V
		-35.0 (V _O =-5 to -18V)		
Power Dissipation	P _d	2.0	1.3	W
Thermal Resistance Junction to Case	R _{ΘJC}	5	5	°C/W
Thermal Resistance Junction to Air	R _{ΘJA}	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, 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	$\Delta V_{O(\Delta V_I)}$	$-7.0V \leq V_{IN} \leq -25.0V$	$T_J = 25^\circ C$	-	7.0	50	mV
		$-8.0V \leq V_{IN} \leq -25.0V$		-	2.0	30	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	100	mV
Quiescent Current	I_{QC}	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	ΔI_{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	ΔI_{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	-	$mV/^\circ C$

* 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

($V_{IN} = -14V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $I_{OUT} = 350mA$, $T_J = 0^\circ C \sim 125^\circ C$; 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	$\Delta V_{O(\Delta V_I)}$	$-10.5V \leq V_{IN} \leq -25.0V$	$T_J = 25^\circ C$	-	7.0	80	mV
		$-11V \leq V_{IN} \leq -21V$		-	2.0	50	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	160	mV
Quiescent Current	I_{QC}	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	ΔI_{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}	$I_O = 500mA$	$T_J = 25^\circ C$	-	1.1	-	V
Output Noise Voltage	V_N	$10Hz \leq f \leq 100kHz$	$T_A = 25^\circ C$	-	60	-	$\mu V / V_O$
Short Circuit Current	I_{SC}	$V_I = -35V$	$T_A = 25^\circ C$	-	140	-	mA
Temperature coefficient of Output voltage	$\frac{\Delta V_O}{\Delta Temp}$	$I_O = 5.0mA$		-	-0.6	-	$mV/^\circ C$

* 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.

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

◆ Electrical characteristics

($V_{IN} = -19V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $I_{OUT} = 350mA$, $T_J = 0^\circ C \sim 125^\circ C$; 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	$\Delta V_{O(\Delta V_I)}$	$-14.5V \leq V_{IN} \leq -30.0V$	$T_J = 25^\circ C$	-	8.0	80	mV
		$-15.0V \leq V_{IN} \leq -25.0V$		-	3.0	50	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	240	mV
Quiescent Current	I_{QC}	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	ΔI_{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	-	$mV/^\circ C$

* 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

($V_{IN} = -23V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $I_{OUT} = 350mA$, $T_J = 0^\circ C \sim 125^\circ C$; 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	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	240	mV
Quiescent Current	I_{QC}	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	ΔI_{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	-	$mV/^\circ C$

* 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

($V_{IN} = -27V$, $C_{IN} = 0.33\mu F$, $C_{OUT} = 0.1\mu F$, $I_{OUT} = 350mA$, $T_J = 0^\circ C \sim 125^\circ C$; 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	$\Delta V_{O(\Delta V_I)}$	$-21.0V \leq V_{IN} \leq -33.0V$	$T_J = 25^\circ C$	-	9.0	80	mV
		$-24.0V \leq V_{IN} \leq -30.0V$		-	5.0	80	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	36	360	mV
Quiescent Current	I_{QC}	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	ΔI_{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.

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

◆ Electrical characteristics

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

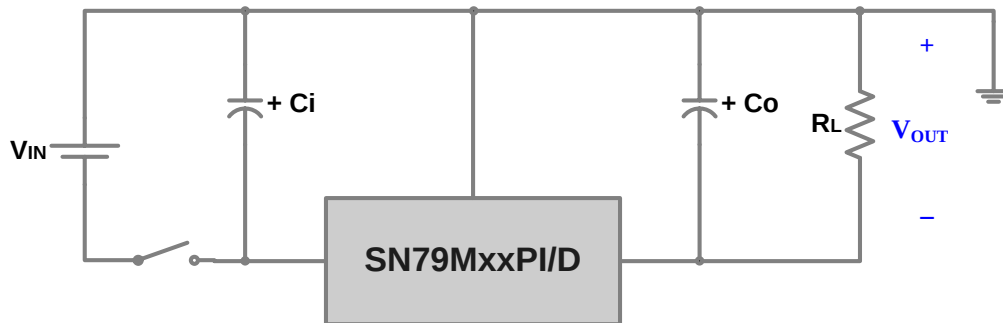
Characteristic	Symbol	Test Condition*		SN79M24x			Unit
				Min.	Typ.	Max.	
Output Voltage**	V_O	$T_J = 25^\circ C$		-23.0	-24.0	-25.0	V
		$-27.0V \leq V_{IN} \leq -38.0V$ $5.0mA \leq I_O \leq 350mA$		-22.8	-24.0	-25.2	
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$-27.0V \leq V_{IN} \leq -38.0V$	$T_J = 25^\circ C$	-	9.0	80	mV
		$-30.0V \leq V_{IN} \leq -36.0V$		-	5.0	70	
Load Regulation	$\Delta V_{O(\Delta I_L)}$	$5.0mA \leq I_O \leq 500mA$	$T_J = 25^\circ C$	-	30	300	mV
Quiescent Current	I_{QC}	$T_J = 25^\circ C$		-	3.0	6.0	mA
Quiescent Current Change	ΔI_{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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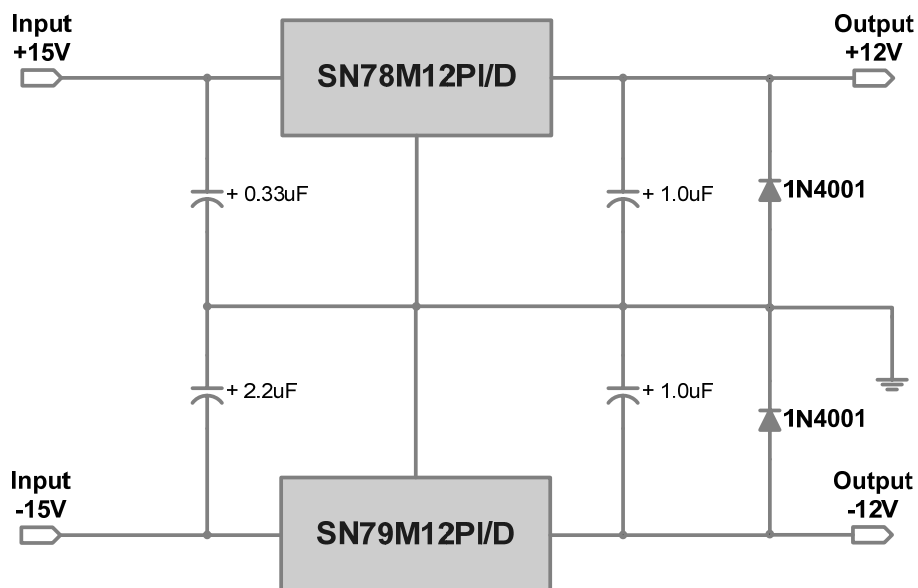
Typical Application

Negative Fixed Output Regulator

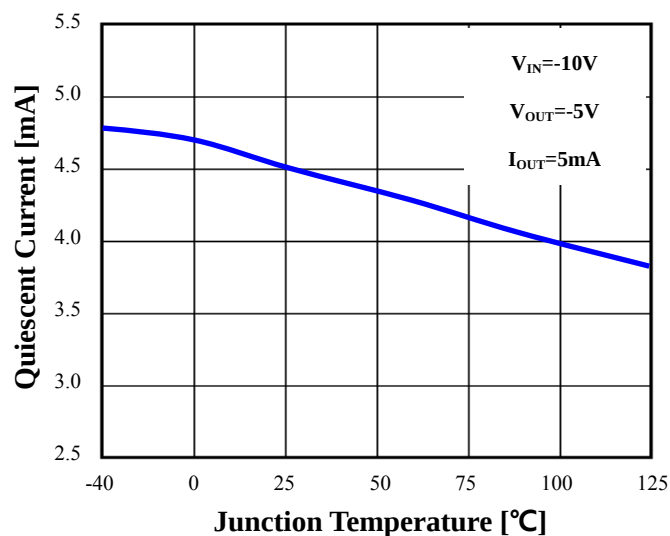


- 1) C_{IN} should be required if regulators are located far from power supply filter
- 2) C_O improves output stability and transient response
- 3) To specify an output voltage, substitute voltage value for “xx”

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**

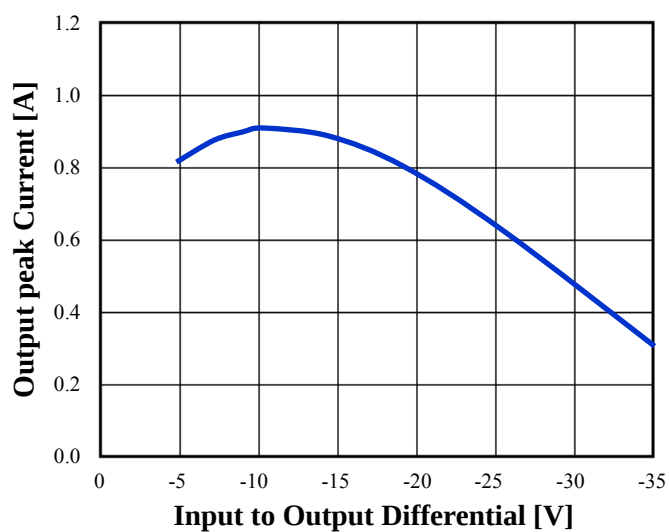


Fig.3 Output Voltage vs. Junction Temperature

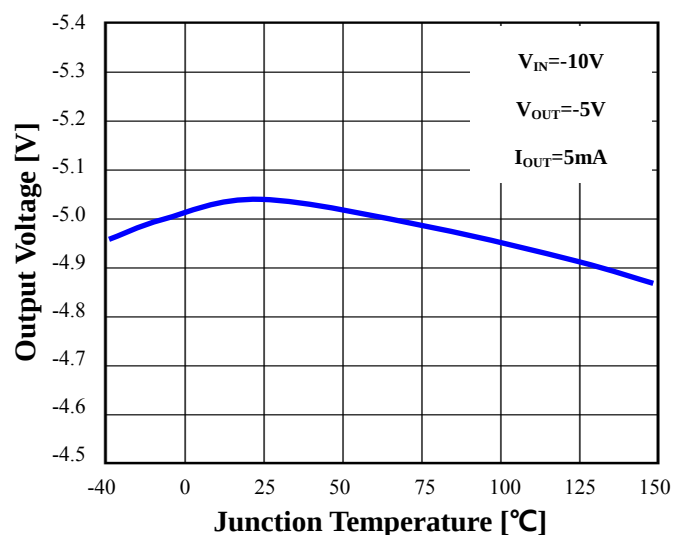


Fig.4 Dropout Voltage vs. Input Voltage

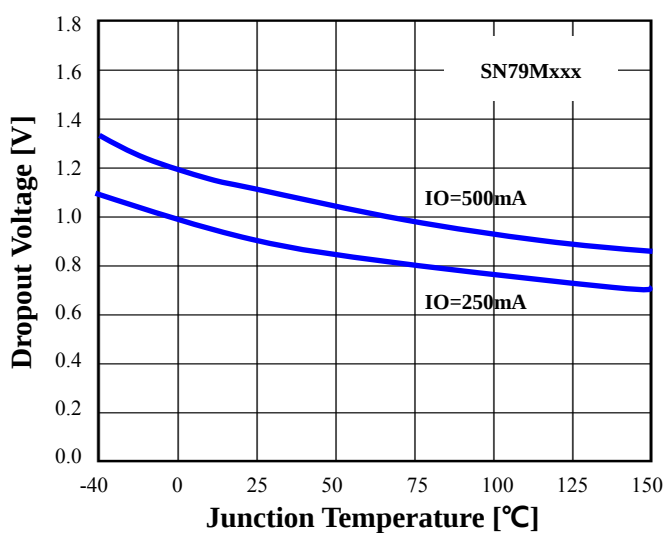


Fig.5 Line Transient Response

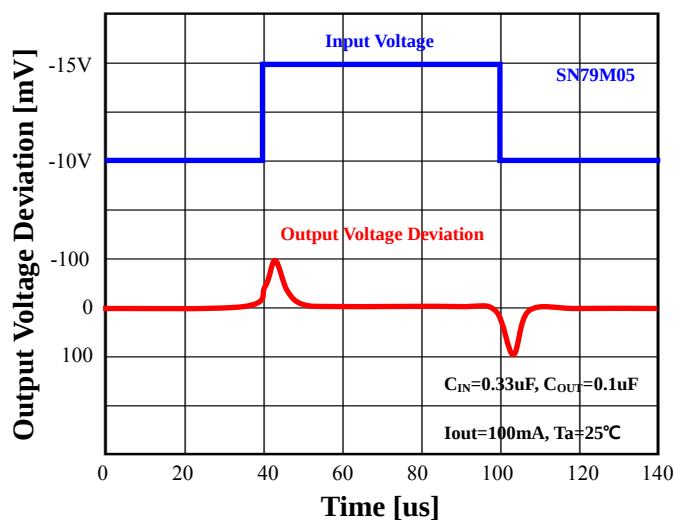
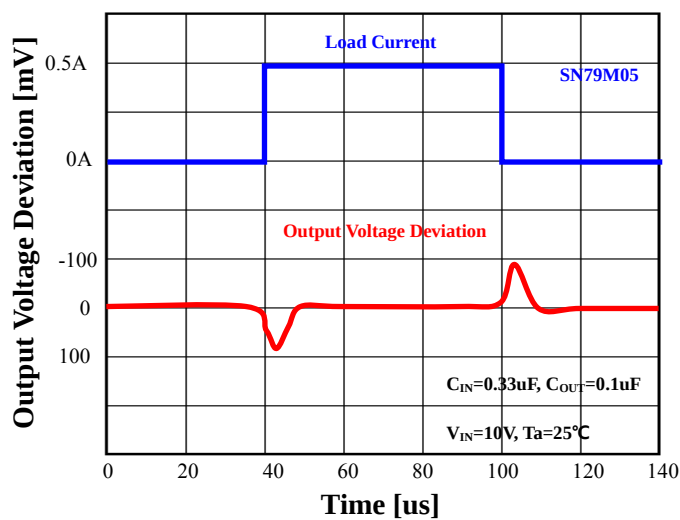
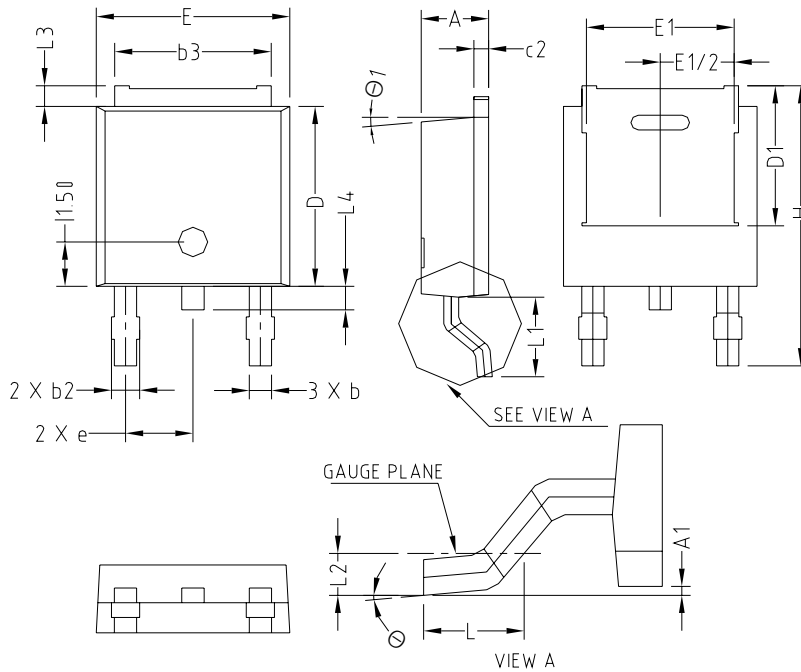


Fig.6 Load Transient Response

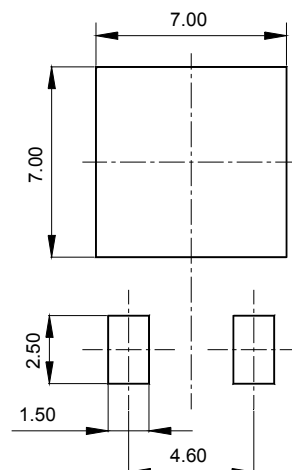


◆ TO-252-3L Outline Dimension (Unit : mm)

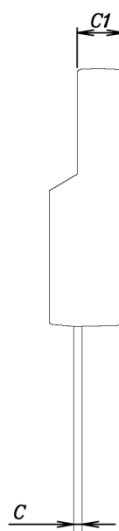
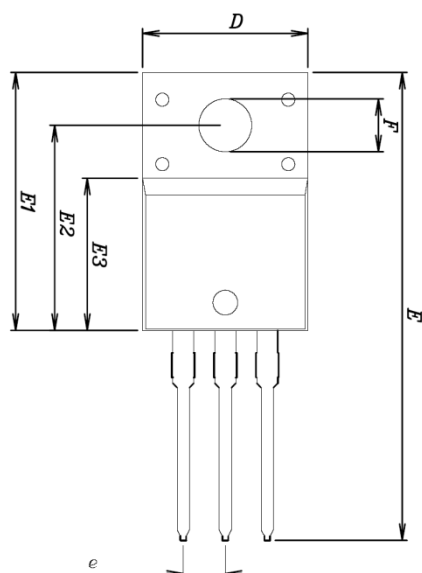


SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	2.20	2.30	2.40	
A1	0.00		0.127	
b	0.66	0.76	0.86	
b2	-	-	0.96	
b3	5.04	5.34	5.64	
c2	0.40	0.50	0.60	
D	5.90	6.10	6.30	
D1	[4.75]			
E	6.40	6.60	6.80	
E1	[5.04]			
e	2.30 BSC			
H	9.20	9.50	9.80	
L	1.27	1.47	1.67	
L1	2.50	2.70	2.90	
L2	0.508 BSC			
L3	0.50	0.70	0.90	
L4	0.60	0.80	1.00	
Θ	0°	-	10°	
Θ 1	5°			

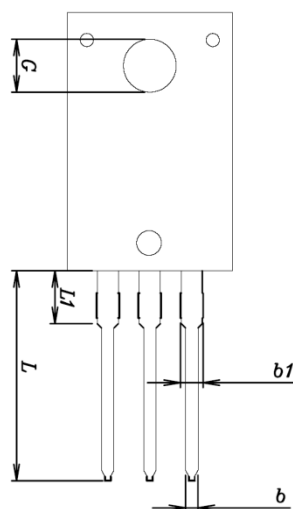
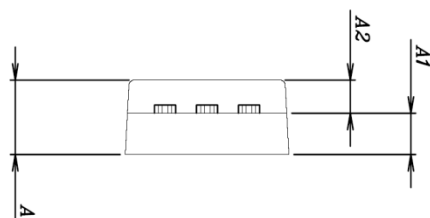
※ Recommend PCB solder land [Unit: mm]



◆ 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..

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