



3-Terminal Negative voltage Regulators

DESCRIPTION

These voltage regulators are designed as fixed negative voltage regulators for a wide variety of applications including local, on-card regulation. Although designed primarily as a fixed voltage regulator, these devices can be used with external components to obtain adjustable voltages and currents.

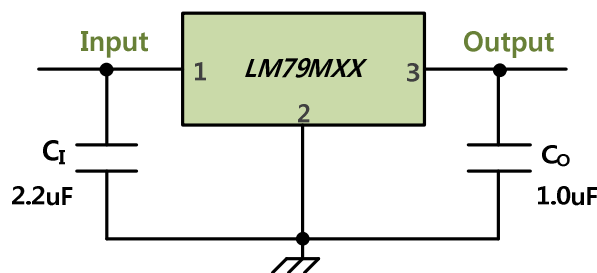
FEATURES

- Output current in excess of 0.5A
- No external components required
- Output Voltages (-5V, -6V, -8V, -9V, -10V, -12V, -15V, -18V, -24V)
- Internal Thermal shutdown and SOA protection
- Output voltage offered in 4% Tolerance
- Pb-Free Packages are available
- High ESD Level (HBM>8000V, MM>800V)

TYPICAL APPLICATION

The input voltage must remain typically 2.0V above the output voltage even during the low point on the ripple voltage.

- * C_i is required if regulator is located an appreciable Distance from power filter.
- * C_o improves transient response.
Values of $\leq 1.0 \mu\text{F}$ could cause instability.



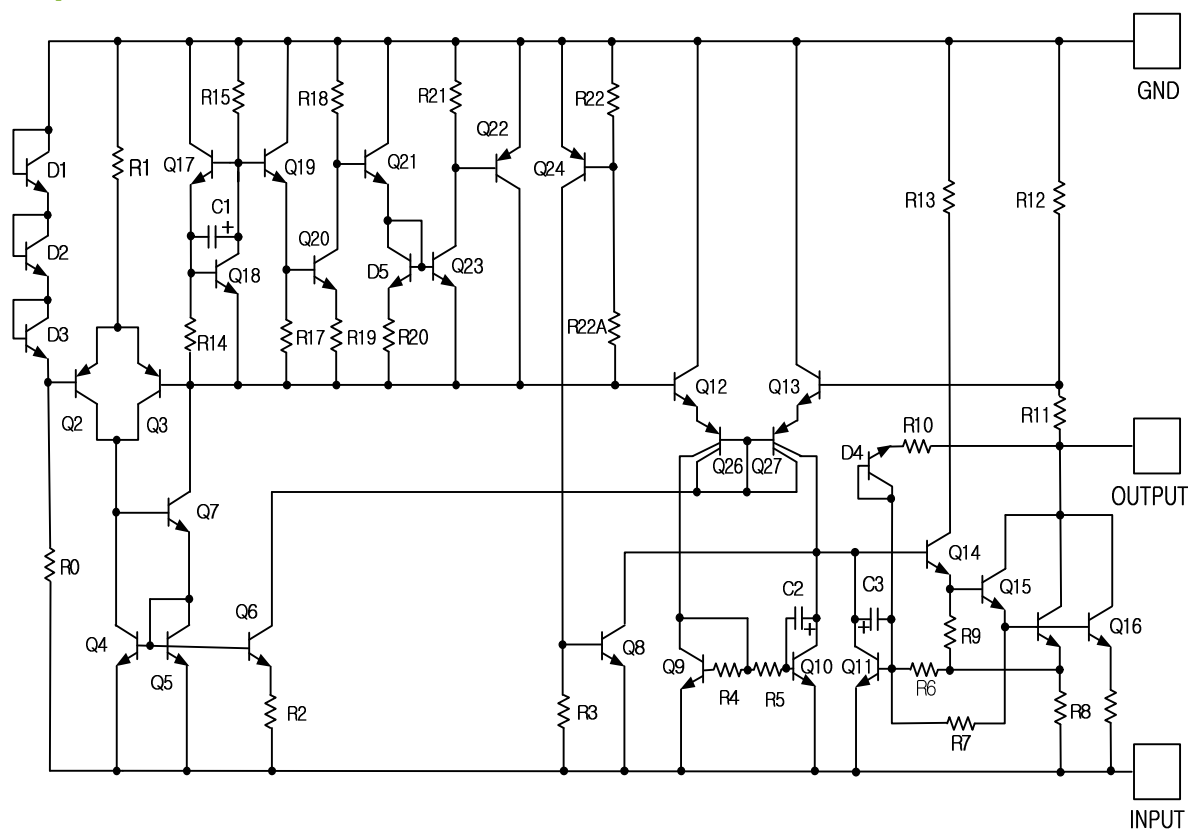
0.5A ,Negative voltage Regulators

Maximum Ratings (TA=25 °C, unless otherwise noted)

Rating	Symbol	Value			Unit
		TO-220F	TO-220	TO-252	
Input Voltage	VI	-5V ~ -18V			V
		-24V			
Power Dissipation	PD	Internally Limited			W
Thermal Resistance of Junction to Ambient	RθJA	65	65	92	°C/W
Thermal Resistance of Junction to Case	RθJC	5	5	5	°C/W
Storage Temperature	TSTG	-55 ~ 125			°C
Junction Temperature	TJ	+ 150			°C
Operating Temperature	TOPR	-40 ~ 125			°C

Stresses exceeding Maximum ratings may damage the device. Maximum ratings are stress ratings. Functional operation above the recommended operating conditions is not implied. Extended exposure to stresses the above the recommended operating conditions may affect device reliability.

Representative Schematic of LM79MXX



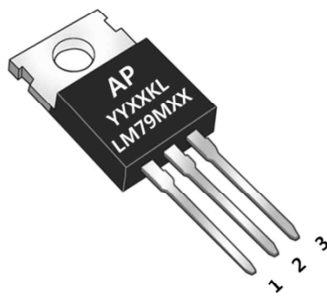


Ordering Information

Part No	Package	Packing	Finish	Halogen	Packing Unit	Remark
LM79MXXRTRL	TO-252	Tape & Reel	Sn	Free	2,500ea	*XX : Output Voltage Option
LM79MXXTL	TO-220	Tube	Sn	Free	5,000ea	*XX : Output Voltage Option
LM79MXXFTL	TO-220F	Tube	Sn	Free	5,000ea	*XX : Output Voltage Option

*Voltage Option(XX) : (05)=-5V, (06)=-6V, (08)=-8V, (09)=-9V, (10)=-10V, (15)=-15V, (18)=-18V, (24)=-24V

Package Outline



TO-220



TO-220F



TO-252

PIN INFO.

1. INPUT PIN

2. GND PIN

3. OUTPUT PIN



Electrical characteristics

***Note 1** Line and Load regulation are specified at constant junction temperature. Changes of V_o due to heating effects must be taken into account separately. Pulse testing with low duty circle is used.

Electrical characteristics LM79M05

($T_J = 0$ to 125 °C, $V_{IN} = -10V$, $I_O = 350$ mA, $C_I = 0.33$ μF , $C_O = 1.0$ μF , unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_o	$T_J = 25^\circ C$	-4.8	-5.0	-5.2	V
		$5.0\text{ mA} \leq I_o \leq 350\text{ mA}$, $-7.0V \geq V_{IN} \geq -20.0V$	-4.75	-5.0	-5.25	
Line regulation ($T_J = 25^\circ C$) (Note 1)	Regline	$-7.0V \geq V_{IN} \geq -25.0V$			50	mV
		$-8.0V \geq V_{IN} \geq -12.0V$			30	
Load regulation ($T_J = 25^\circ C$) (Note 1)	Regload	$5.0\text{ mA} \leq I_o \leq 500\text{ mA}$			100	mV
Quiescent current	I_Q	$T_J = 25^\circ C$			6.0	mA
Quiescent current change	ΔI_Q	$5.0\text{ mA} \leq I_o \leq 350\text{ mA}$ $-8.0V \geq V_{IN} \geq -25.0V$, $I_o = 200\text{ mA}$			0.4	mA
					0.4	
Output Voltage Drift	$\Delta V_o / \Delta T$	$I_o = 5\text{ mA}$		-0.4		mV/°C
Output noise voltage	V_N	$10\text{ Hz} \leq f \leq 100\text{ KHz}$, $T_A = 25^\circ$		40		$\mu V / V_o$
Ripple rejection	RR	$-8.0V \geq V_{IN} \geq -18.0V$, $f = 120\text{ Hz}$	54	60		dB
Dropout voltage	V_{DROP}	$I_o = 500\text{ mA}$, $T_J = 25^\circ C$		1.1		V
Short circuit current limit	ISC	$V_{IN} = -35V$, $T_A = 25^\circ C$		200		mA
Peak output current	IPK	$T_J = 25^\circ C$		1.0		A

Electrical characteristics LM79M06

($T_J = 0$ to 125 °C, $V_{IN} = -11V$, $I_O = 350$ mA, $C_I = 0.33$ μF , $C_O = 1.0$ μF , unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_o	$T_J = 25^\circ C$	-5.75	-6.0	-6.25	V
		$5.0\text{ mA} \leq I_o \leq 350\text{ mA}$ $-8.0V \geq V_{IN} \geq -21.0V$	-5.7	-6.0	-6.3	
Line regulation ($T_J = 25^\circ C$) (Note 1)	Regline	$-8.0V \geq V_{IN} \geq -25.0V$			60	mV
		$-9.0V \geq V_{IN} \geq -13.0V$			40	
Load regulation ($T_J = 25^\circ C$) (Note 1)	Regload	$5.0\text{ mA} \leq I_o \leq 500\text{ mA}$			120	mV
Quiescent current	I_Q	$T_J = 25^\circ C$			6.0	mA
Quiescent current change	ΔI_Q	$5.0\text{ mA} \leq I_o \leq 350\text{ mA}$ $-8.0V \geq V_{IN} \geq -25.0V$			0.4	mA
					0.4	
Output Voltage Drift	$\Delta V_o / \Delta T$	$I_o = 5\text{ mA}$		-0.5		mV/°C
Output noise voltage	V_N	$10\text{ Hz} \leq f \leq 100\text{ KHz}$, $T_A = 25^\circ$		130		$\mu V / V_o$
Ripple rejection	RR	$-9.0V \geq V_{IN} \geq -19.0V$, $f = 120\text{ Hz}$	54	60		dB
Dropout voltage	V_{DROP}	$I_o = 500\text{ mA}$, $T_J = 25^\circ C$		1.1		V
Short circuit current limit	ISC	$V_{IN} = -35V$, $T_A = 25^\circ C$		200		mA
Peak output current	IPK	$T_J = 25^\circ C$		1.0		A



Electrical characteristics LM79M08

(T_J = 0 to 125 °C, V_{IN}=-14V, I_O=350 mA, C_I=0.33 μF, C_O=1.0 μF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V _O	T _J =25°C	-7.7	-8.0	-8.3	V
		5.0 mA ≤ I _O ≤ 350 mA , -10.5V ≥ V _{IN} ≥ -23.0V	-7.6	-8.0	-8.4	
Line regulation (T _J =25°C) (Note 1)	Regline	-10.5V ≥ V _{IN} ≥ -25.0V -11.5V ≥ V _{IN} ≥ -17.0V			80	mV
					50	
Load regulation (T _J =25°C) (Note 1)	Regload	5.0 mA ≤ I _O ≤ 500 mA			160	mV
Quiescent current	I _Q	T _J =25°C			6.0	mA
Quiescent current change	Δ I _Q	5.0 mA ≤ I _O ≤ 350 mA -10.5V ≥ V _{IN} ≥ -25.0V			0.4	mA
					0.4	
Output Voltage Drift	ΔV _O / ΔT	I _O = 5 mA		-0.6		mV/°C
Output noise voltage	V _N	10 Hz ≤ f ≤ 100 KHz, T _A =25°		175		μV/V _O
Ripple rejection	RR	-11.5V ≥ V _{IN} ≥ -21.5V, f=120 Hz	54	60		dB
Dropout voltage	V _{DROP}	I _O = 500mA, T _J =25°C		1.1		V
Short circuit current limit	I _{SC}	V _{IN} = -35V, T _A =25°C		200		mA
Peak output current	I _{PK}	T _J =25°C		1.0		A

Electrical characteristics LM79M09

(T_J = 0 to 125 °C, V_{IN}=-15V, I_O=350 mA, C_I=0.33 μF, C_O=1.0 μF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V _O	T _J =25°C	-8.65	-9.0	-9.35	V
		5.0 mA ≤ I _O ≤ 350 mA , -11.5V ≥ V _{IN} ≥ -24.0V	-8.6	-9.0	-9.4	
Line regulation (T _J =25°C) (Note 1)	Regline	-11.5V ≥ V _{IN} ≥ -25.0V -12.0V ≥ V _{IN} ≥ -17.0V			80	mV
					50	
Load regulation (T _J =25°C) (Note 1)	Regload	5.0 mA ≤ I _O ≤ 500 mA			180	mV
Quiescent current	I _Q	T _J =25°C			6.0	mA
Quiescent current change	Δ I _Q	5.0 mA ≤ I _O ≤ 350 mA -11.5V ≥ V _{IN} ≥ -26.0V			0.4	mA
					0.4	
Output Voltage Drift	ΔV _O / ΔT	I _O = 5 mA		-0.6		mV/°C
Output noise voltage	V _N	10 Hz ≤ f ≤ 100 KHz, T _A =25°		175		μV/V _O
Ripple rejection	RR	-13.0V ≥ V _{IN} ≥ -22.0V, f=120 Hz	54	60		dB
Dropout voltage	V _{DROP}	I _O = 500mA, T _J =25°C		1.1		V
Short circuit current limit	I _{SC}	V _{IN} = -35V, T _A =25°C		200		mA
Peak output current	I _{PK}	T _J =25°C		1.0		A



Electrical characteristics LM79M10

($T_J = 0$ to 125 °C, $V_{IN} = -16V$, $I_O = 350$ mA, $C_I = 0.33$ μF , $C_O = 1.0$ μF , unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	$T_J = 25^\circ C$	-9.6	-10.0	-10.4	V
		$5.0\text{ mA} \leq I_O \leq 350\text{ mA}$, $-12.5V \geq V_{IN} \geq -25.0V$	-9.5	-10.0	-10.5	
Line regulation ($T_J = 25^\circ C$) (Note 1)	Regline	$-12.5V \geq V_{IN} \geq -25.0V$			80	mV
		$-13.0V \geq V_{IN} \geq -25.0V$			50	
Load regulation ($T_J = 25^\circ C$) (Note 1)	Regload	$5.0\text{ mA} \leq I_O \leq 500\text{ mA}$			200	mV
Quiescent current	I_Q	$T_J = 25^\circ C$			6.0	mA
Quiescent current change	ΔI_Q	$5.0\text{ mA} \leq I_O \leq 350\text{ mA}$ $-12.5V \geq V_{IN} \geq -29.0V$			0.4	mA
					0.4	
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		-0.8		mV/°C
Output noise voltage	V_N	$10\text{ Hz} \leq f \leq 100\text{ KHz}$, $T_A = 25^\circ$		280		$\mu V / V_O$
Ripple rejection	RR	$-13.0V \geq V_{IN} \geq -23.0V$, $f = 120\text{ Hz}$	54	60		dB
Dropout voltage	V_{DROP}	$I_O = 500\text{ mA}$, $T_J = 25^\circ C$		1.1		V
Short circuit current limit	I_{SC}	$V_{IN} = -35V$, $T_A = 25^\circ C$		200		mA
Peak output current	I_{PK}	$T_J = 25^\circ C$		1.0		A

Electrical characteristics LM79M12

($T_J = 0$ to 125 °C, $V_{IN} = -19V$, $I_O = 350$ mA, $C_I = 0.33$ μF , $C_O = 1.0$ μF , unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	$T_J = 25^\circ C$	-11.5	-12.0	-12.5	V
		$5.0\text{ mA} \leq I_O \leq 350\text{ mA}$, $-14.5V \geq V_{IN} \geq -27.0V$	-11.4	-12.0	-12.6	
Line regulation ($T_J = 25^\circ C$) (Note 1)	Regline	$-14.5V \geq V_{IN} \geq -30.0V$			80	mV
		$-16.0V \geq V_{IN} \geq -22.0V$			50	
Load regulation ($T_J = 25^\circ C$) (Note 1)	Regload	$5.0\text{ mA} \leq I_O \leq 500\text{ mA}$			240	mV
Quiescent current	I_Q	$T_J = 25^\circ C$			6.0	mA
Quiescent current change	ΔI_Q	$5.0\text{ mA} \leq I_O \leq 350\text{ mA}$ $-14.5V \geq V_{IN} \geq -30.0V$			0.4	mA
					0.4	
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		-0.8		mV/°C
Output noise voltage	V_N	$10\text{ Hz} \leq f \leq 100\text{ KHz}$, $T_A = 25^\circ$		200		$\mu V / V_O$
Ripple rejection	RR	$-15.0V \geq V_{IN} \geq -25.0V$, $f = 120\text{ Hz}$	54	60		dB
Dropout voltage	V_{DROP}	$I_O = 500\text{ mA}$, $T_J = 25^\circ C$		1.1		V
Short circuit current limit	I_{SC}	$V_{IN} = -35V$, $T_A = 25^\circ C$		200		mA
Peak output current	I_{PK}	$T_J = 25^\circ C$		1.0		A



Electrical characteristics LM79M15

($T_J = 0$ to 125 °C, $V_{IN}=23V$, $I_O=350$ mA, $C_I=0.33$ μF , $C_O=1.0$ μF , unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	$T_J=25^\circ C$	-14.4	-15.0	-15.6	V
		$5.0\text{ mA} \leq I_O \leq 350\text{ mA}$, $-17.5V \geq V_{IN} \geq -30.0V$	-14.25	-15.0	-15.75	
Line regulation($T_J=25^\circ C$) (Note 1)	Regline	$-17.5V \geq V_{IN} \geq -30.0V$ $-20.0V \geq V_{IN} \geq -26.0V$			80	mV
					50	
Load regulation($T_J=25^\circ C$) (Note 1)	Regload	$5.0\text{ mA} \leq I_O \leq 500\text{ mA}$			240	mV
Quiescent current	I_Q	$T_J=25^\circ C$			6.0	mA
Quiescent current change	ΔI_Q	$5.0\text{ mA} \leq I_O \leq 350\text{ mA}$ $-17.5V \geq V_{IN} \geq -30.0V$			0.4	mA
					0.4	
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		-0.9		mV/°C
Output noise voltage	V_N	$10\text{ Hz} \leq f \leq 100\text{ KHz}$, $T_A=25^\circ$		250		$\mu V/V_O$
Ripple rejection	RR	$-18.5V \geq V_{IN} \geq -28.5V$, $f=120\text{ Hz}$	54	60		dB
Dropout voltage	V_{DROP}	$I_O = 500\text{ mA}$, $T_J=25^\circ C$		1.1		V
Short circuit current limit	ISC	$V_{IN} = -35V$, $T_A=25^\circ C$		200		mA
Peak output current	I_{PK}	$T_J=25^\circ C$		1.0		A

Electrical characteristics LM79M18

($T_J = 0$ to 125 °C, $V_{IN}=27V$, $I_O=350$ mA, $C_I=0.33$ μF , $C_O=1.0$ μF , unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V_O	$T_J=25^\circ C$	-14.4	-15.0	-15.6	V
		$5.0\text{ mA} \leq I_O \leq 350\text{ mA}$, $-17.5V \geq V_{IN} \geq -30.0V$	-14.25	-15.0	-15.75	
Line regulation($T_J=25^\circ C$) (Note 1)	Regline	$-17.5V \geq V_{IN} \geq -30.0V$ $-20.0V \geq V_{IN} \geq -26.0V$			80	mV
					50	
Load regulation($T_J=25^\circ C$) (Note 1)	Regload	$5.0\text{ mA} \leq I_O \leq 500\text{ mA}$			240	mV
Quiescent current	I_Q	$T_J=25^\circ C$			6.0	mA
Quiescent current change	ΔI_Q	$6.0\text{ mA} \leq I_O \leq 350\text{ mA}$ $-17.5V \geq V_{IN} \geq -30.0V$			0.4	mA
					0.4	
Output Voltage Drift	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		-0.9		mV/°C
Output noise voltage	V_N	$10\text{ Hz} \leq f \leq 100\text{ KHz}$, $T_A=25^\circ$		250		$\mu V/V_O$
Ripple rejection	RR	$-18.5V \geq V_{IN} \geq -28.5V$, $f=120\text{ Hz}$	54	60		dB
Dropout voltage	V_{DROP}	$I_O = 500\text{ mA}$, $T_J=25^\circ C$		1.1		V
Short circuit current limit	ISC	$V_{IN} = -35V$, $T_A=25^\circ C$		200		mA
Peak output current	I_{PK}	$T_J=25^\circ C$		1.0		A



Electrical characteristics LM79M24

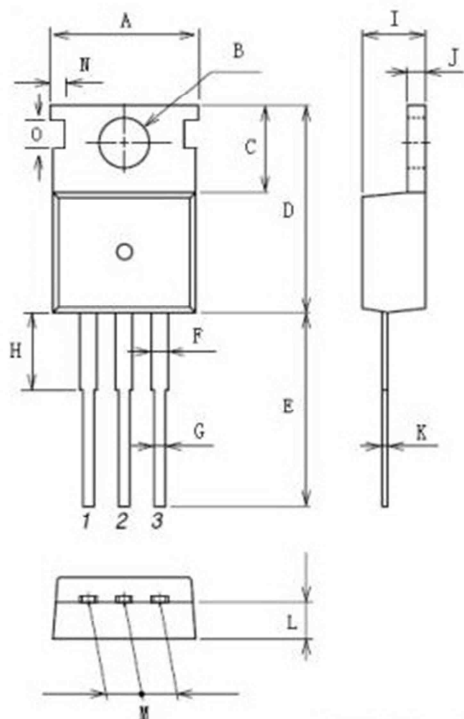
(T_J = 0 to 125 °C, V_{IN}=33V, I_O=350 mA, C_I=0.33 μF, C_O=1.0 μF, unless otherwise noted)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Output voltage	V _O	T _J =25°C	-23.0	-24.0	-25	V
		5.0 mA ≤ I _O ≤ 350 mA , -27.0V ≥ V _{IN} ≥ -38.0V	-22.8	-24.0	-25.25	
Line regulation (T _J =25°C) (Note 1)	Regline	-27.0V ≥ V _{IN} ≥ -38.0V			80	mV
		-30.0V ≥ V _{IN} ≥ -36.0V			70	
Load regulation (T _J =25°C) (Note 1)	Regload	5.0 mA ≤ I _O ≤ 500 mA			480	mV
Quiescent current	I _Q	T _J =25°C			6.0	mA
Quiescent current change	Δ I _Q	5.0 mA ≤ I _O ≤ 350 mA -27.0V ≥ V _{IN} ≥ -38.0V			0.4	mA
					0.4	
Output Voltage Drift	ΔV _O / ΔT	I _O = 5 mA		-1.0		mV/°C
Output noise voltage	V _N	10 Hz ≤ f ≤ 100 KHz, T _A =25°		400		μV/V _O
Ripple rejection	RR	-28.0V ≥ V _{IN} ≥ -38.0V, f=120 Hz	54	60		dB
Dropout voltage	V _{DROP}	I _O = 500mA, T _J =25°C		1.1		V
Short circuit current limit	I _{SC}	V _{IN} = -35V, T _A =25°C		200		mA
Peak output current	I _{PK}	T _J =25°C		1.0		A



Package Dimensions

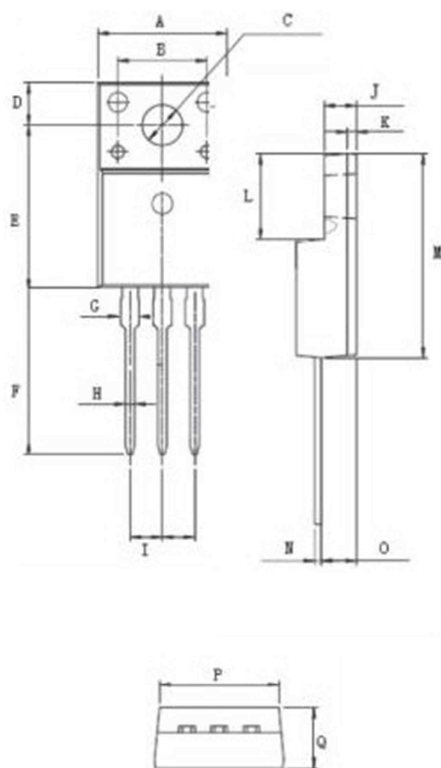
TO-220 Dual Gauge



Unit: mm

Item	Min	Max
A	9.85	10.15
B	3.60	3.70
C	6.35	6.55
D	15.55	15.95
E	12.85	13.15
F	1.17	1.37
G	0.70	0.90
H	2.30	2.70
I	4.40	4.60
J	1.20	1.40
K	0.40	0.60
L	2.23	2.53
M	4.98	5.18
N	0.55	0.75
O	1.62	1.82

TO-220F



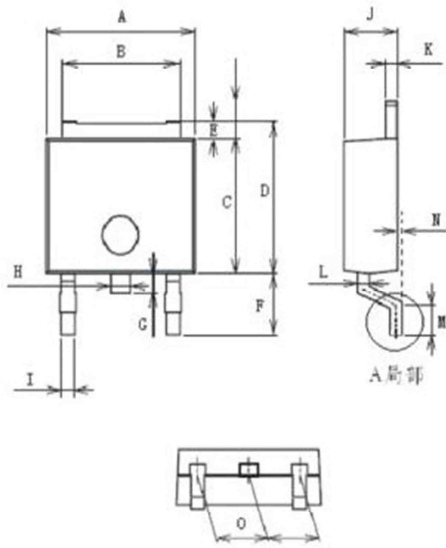
Unit: mm

Item	Min	Max
A	9.92	10.32
B	6.90	7.10
C	3.35	3.55
D	3.25	3.35
E	12.35	12.75
F	12.80	13.20
G	1.22	1.42
H	0.70	0.90
I	2.45Typical	
J	2.45	2.65
K	0.60	0.80
L	6.57	6.77
M	15.80	16.00
N	0.40	0.60
O	2.62	2.92
P	9.20	9.40
Q	4.62	4.80



Package Dimensions

TO-252



Unit: mm

Item	Min	Max
A	6.40	6.70
B	5.20	5.40
C	6.00	6.30
D	6.55	6.85
E	0.45	0.60
F	3.07	3.35
G	0.85	1.05
H	0.75	0.95
I	0.55	0.75
J	2.20	2.40
K	0.43	0.58
L	0.43	0.58
M	0.90	1.10
N	0.90	1.10
O	2.20	2.40



Revision History

No	Date	Contents
1	2015-01-30	Initial Brief Datasheet Release
2	2015-06-22	ESD Level Update



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IMPORTANT NOTICE

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