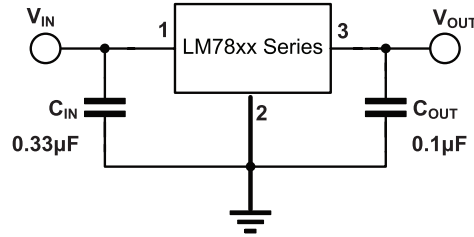


# Linear Voltage Regulator

## 3 Terminal

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RoHS  
Compliant



Fixed Output Voltage Regulator

### Features

- Internal Current Limit
- Output Transistor SOA Protection
- Short Circuit Protection
- Thermal Shutdown Protection

### Specification

- Output Current : up to 1.5A at  $T_J = 25^\circ\text{C}$
- Available in Fixed : 5.0V, 6.0V, 8.0V, 9.0V, 12V and 15V
- Output Voltage Tolerance :  $\pm 3\%$  at  $T_J = 25^\circ\text{C}$ ,  $\pm 5\%$  over the Operating  $T_J$
- Line Regulation : 4mV to 12mV (Typ.) at  $T_J = 25^\circ\text{C}$
- Load Regulation : 9mV to 14mV (Typ.) at  $T_J = 25^\circ\text{C}$
- Dropout Voltage : 2V@1A ( $V_{OUT} = 5.0\text{V}$ )
- Power Supply Rejection Ratio :  $>55\text{dB}@120\text{Hz}$  ( $V_{OUT} = 5.0\text{V}$ )
- Operating Junction Temperature :  $-40^\circ\text{C}$  to  $125^\circ\text{C}$

### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	
Maximum Input Voltage	$V_I$	35	V	
Maximum Power Dissipation	PD	1.53	W	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	5.5	°C/W	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	64.3		
Electrostatic Discharge	Human body model	$V_{ESD-HBM}$	2000	V
	Machine model	$V_{ESD-MM}$	200	
Operating Junction Temperature	$T_{opr}$	-40 to 125	°C	
Maximum Junction Temperature	$T_J$	-55 to 150		
Storage Temperature Range	$T_{stg}$	-65 to 150		

Note : Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

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# Linear Voltage Regulator

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**Electrical Characteristics** LM7805 ( $V_{IN} = 10V$ ,  $I_{OUT} = 500mA$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified)

Parameter Name	Symbol	Test Conditions	Min	Typ	Max	Unit	
Output voltage	$V_{OUT}$	$T_J = 25^\circ C$	4.85	5	5.15	V	
		$I_{OUT} = 5mA$ to 1A, $V_{IN} = 7$ to 20V, $T_J = 0$ to $125^\circ C$	4.75		5.25		
Line regulation	$\Delta V_{OUT}$	$V_{IN} = 7$ to 25V	--	4	100	mV	
		$V_{IN} = 8$ to 12V		1.6	50		
Load regulation	$\Delta V_{OUT}$	$I_{OUT} = 5mA$ to 1.5A		9	100		
		$I_{OUT} = 250$ to 750mA		4	50		
Quiescent current	$I_Q$	$T_J = 25^\circ C$		5	8	mA	
Quiescent current change	$\Delta I_Q$	$I_{OUT} = 5mA$ to 1A		0.03	0.5		
		$V_{IN} = 7$ to 25V		0.3	1.3		
Output voltage drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT} = 5mA$		--	-1.1	--	mV/ $^\circ C$
Output noise voltage	$V_N$	$f = 10$ to 100k Hz		42			$\mu V$
Ripple rejection	RR	$f = 120Hz$ , $V_{IN} = 8$ to 18V		73			dB
Dropout voltage	$V_D$	$I_{OUT} = 1A$	2		V		
Output resistance	$R_{OUT}$	$f = 1kHz$	10		m $\Omega$		
Short circuit current	$I_{SC}$		230		mA		
Peak current	$I_{PK}$		2.2		A		

LM7809 ( $V_{IN} = 16V$ ,  $I_{OUT} = 500mA$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified)

Parameter Name	Symbol	Test Conditions	Min	Typ	Max	Unit	
Output voltage	$V_{OUT}$	$T_J = 25^\circ C$	8.73	9	9.27	V	
		$I_{OUT} = 5mA$ to 1A, $V_{IN} = 11.5$ to 24V, $T_J = 0$ to $125^\circ C$	8.55		9.45		
Line regulation	$\Delta V_{OUT}$	$V_{IN} = 11.5$ to 27V	--	7	180	mV	
		$V_{IN} = 13$ to 19V		2	90		
Load regulation	$\Delta V_{OUT}$	$I_{OUT} = 5mA$ to 1.5A		12	180		
		$I_{OUT} = 250$ to 750mA		4	90		
Quiescent current	$I_Q$	$T_J = 25^\circ C$		4	8	mA	
Quiescent current change	$\Delta I_Q$	$I_{OUT} = 5mA$ to 1A			0.5		
		$V_{IN} = 11.5$ to 27V			1		
Output voltage drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT} = 5mA$		--	-1	--	mV/ $^\circ C$
Output noise voltage	$V_N$	$f = 10$ to 100k Hz		60			$\mu V$
Ripple rejection	RR	$f = 120Hz$ , $V_{IN} = 12$ to 22V		595	70		dB
Dropout voltage(8)	$V_D$	$I_{OUT} = 1A$	2		V		
Output resistance	$R_{OUT}$	$f = 1kHz$	18		m $\Omega$		
Short circuit current	$I_{SC}$		400		mA		
Peak current	$I_{PK}$		2.2		A		

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# Linear Voltage Regulator

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LM7812 ( $V_{IN} = 19V$ ,  $I_{OUT} = 500mA$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified)

Parameter Name	Symbol	Test Conditions	Min	Typ	Max	Unit
Output voltage	$V_{OUT}$	$T_J = 25^\circ C$	11.64	12	12.36	V
		$I_{OUT} = 5mA$ to 1A, $V_{IN} = 14.5$ to 27V, $T_J = 0$ to 125°C	11.4		12.6	
Line regulation	$\Delta V_{OUT}$	$V_{IN} = 14.5$ to 30V	--	12	240	mV
		$V_{IN} = 16$ to 22V		4	120	
Load regulation	$\Delta V_{OUT}$	$I_{OUT} = 5mA$ to 1.5A		10	240	
		$I_{OUT} = 250$ to 750mA		3	120	
Quiescent current	$I_Q$	$T_J = 25^\circ C$		4	8	mA
Quiescent current change	$\Delta I_Q$	$I_{OUT} = 5mA$ to 1A			0.5	
		$V_{IN} = 14.5$ to 30V		1		
Output voltage drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT} = 5mA$		-1	mV/°C	
Output noise voltage	$V_N$	$f = 10$ to 100kHz		75		$\mu V$
Ripple rejection	RR	$f = 120Hz$ , $V_{IN} = 15$ to 25V	55	71	dB	
Dropout voltage(8)	$V_D$	$I_{OUT} = 1A$	--	2	--	V
Output resistance	$R_{OUT}$	$f = 1kHz$		18		mΩ
Short circuit current	$I_{SC}$			350		mA
Peak current	$I_{PK}$			2.2		A

LM7815 ( $V_{IN} = 19V$ ,  $I_{OUT} = 500mA$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified)

Parameter Name	Symbol	Test Conditions	Min	Typ	Max	Unit
Output voltage	$V_{OUT}$	$T_J = 25^\circ C$	14.55	15	15.45	V
		$I_{OUT} = 5mA$ to 1A, $V_{IN} = 18.5$ to 30V, $T_J = 0$ to 125°C	14.25		15.75	
Line regulation	$\Delta V_{OUT}$	$V_{IN} = 17.5$ to 30V	--	15	300	mV
		$V_{IN} = 20$ to 26V		5	150	
Load regulation	$\Delta V_{OUT}$	$I_{OUT} = 5mA$ to 1.5A		10	240	
		$I_{OUT} = 250$ to 750mA		3	120	
Quiescent current	$I_Q$	$T_J = 25^\circ C$		4	8	mA
Quiescent current change	$\Delta I_Q$	$I_{OUT} = 5mA$ to 1A			0.5	
		$V_{IN} = 17.5$ to 30V		1		
Output voltage drift	$\Delta V_{OUT}/\Delta T$	$I_{OUT} = 5mA$		-1	mV/°C	
Output noise voltage	$V_N$	$f = 10$ to 100kHz		90	$\mu V$	
Ripple rejection	RR	$f = 120Hz$ , $V_{IN} = 15$ to 25V	55	--	dB	
Dropout voltage(8)	$V_D$	$I_{OUT} = 1A$	--	2	--	V
Output resistance	$R_{OUT}$	$f = 1kHz$		19		mΩ
Short circuit current	$I_{SC}$			350		mA
Peak current	$I_{PK}$			2.2		A

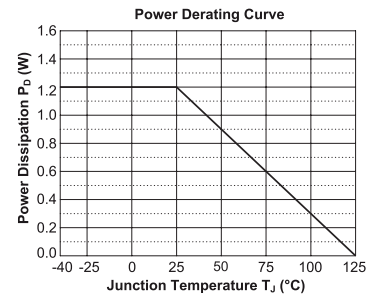
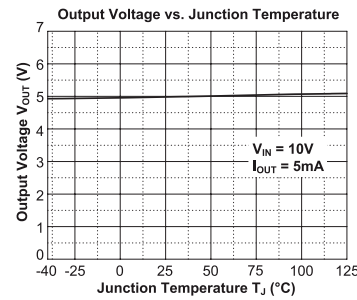
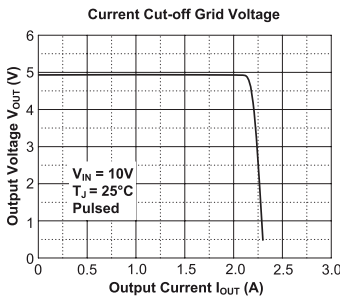
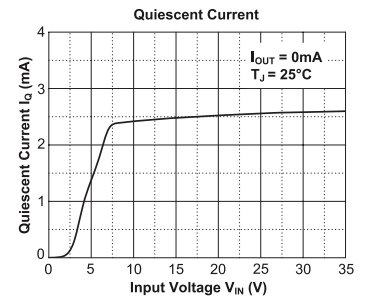
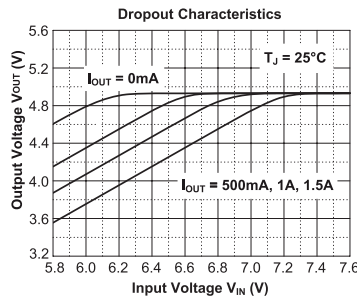
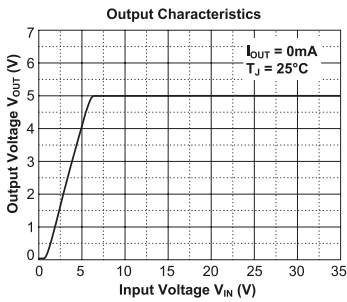
# Linear Voltage Regulator

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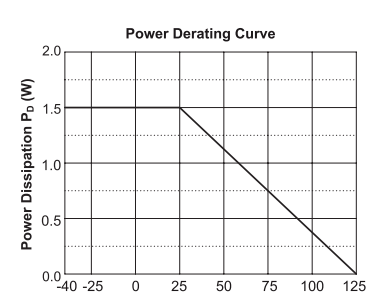
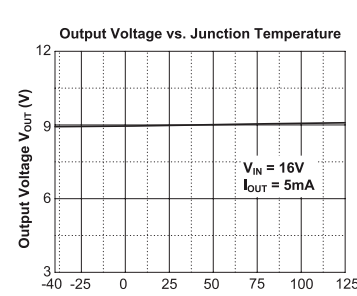
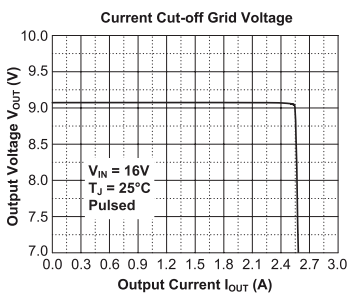
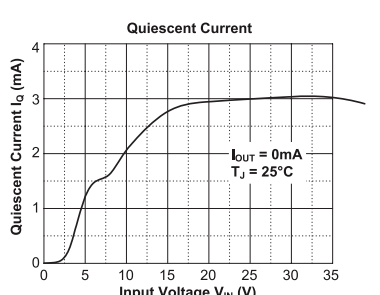
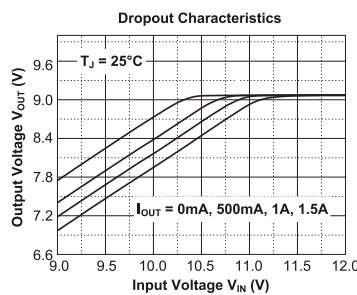
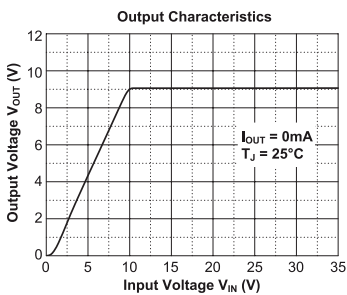
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### Typical Characteristics

LM7805 ( $V_{OUT} = 5V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified)



LM7809 ( $V_{OUT} = 9V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified)



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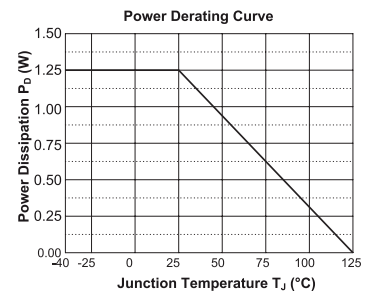
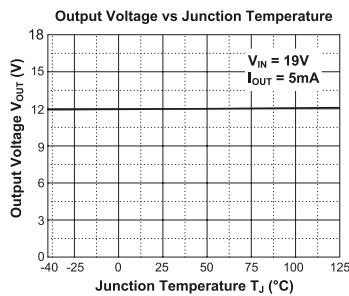
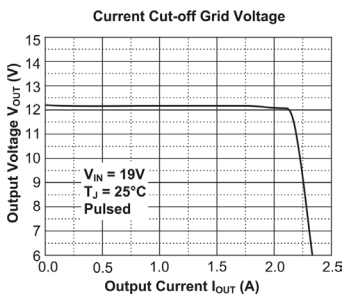
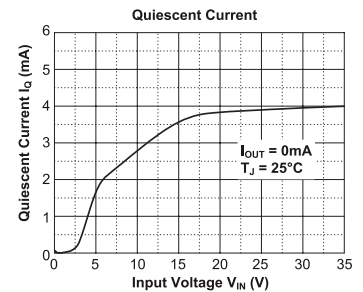
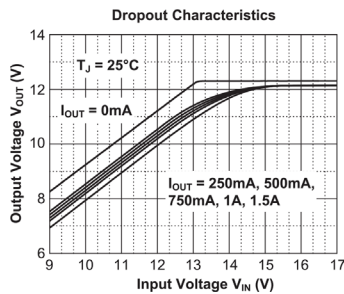
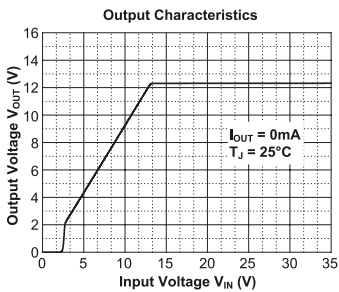
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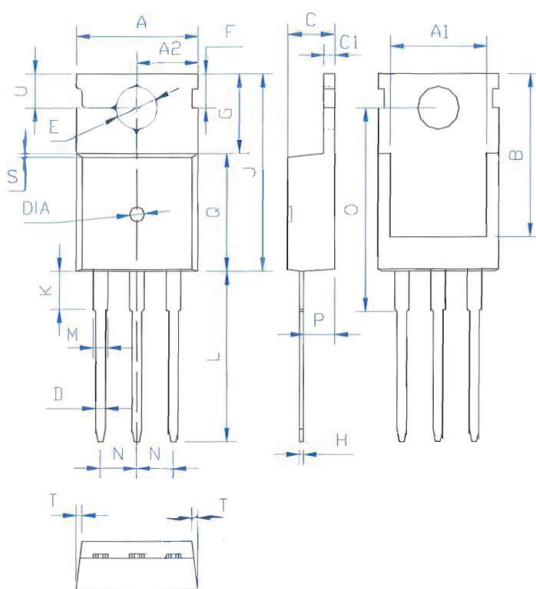
## 3 Terminal

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LM7812 ( $V_{OUT} = 12V$ ,  $C_{IN} = 0.33\mu F$ ,  $C_{OUT} = 0.1\mu F$ ,  $T_J = 25^\circ C$ , unless otherwise specified)



### Package Outline Dimensions



DIM.	mm.
A	10 ±0.2
A1	8.2 ±0.3
A2	5 ±0.2
B	13.3 ±0.2
C	4.5 ±0.13
C1	1.30-0.05/+0.1
D	0.8 ±0.10
E	3.6 ±0.1
F	3.6 ±0.1
G	3 ±0.15
H	6.6 ±0.2
J	15.8 ±0.2

DIM.	mm.
K	3 ±0.2
L	13 ±0.2
M	1.27 ±0.1
N	Typical 2.54
O	15.9 ±0.2
P	2.4 ±0.2
Q	9.2 ±0.2
S	0.25 ±0.1
T	0.25 ±0.1
U	2.8 ±0.15
DIA	Φ1.5 ±0.1 Depth: 0.05~0.45

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# Linear Voltage Regulator

## 3 Terminal

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### Part Number Table

Description	Part Number
Linear Voltage Regulator, Fixed, 5V, 1.5A, TO-220	LM7805
Linear Voltage Regulator, Fixed, 9V, 1.5A, TO-220	LM7809
Linear Voltage Regulator, Fixed, 12V, 1.5A, TO-220	LM7812
Linear Voltage Regulator, Fixed, 15V, 1.5A, TO-220	LM7815

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