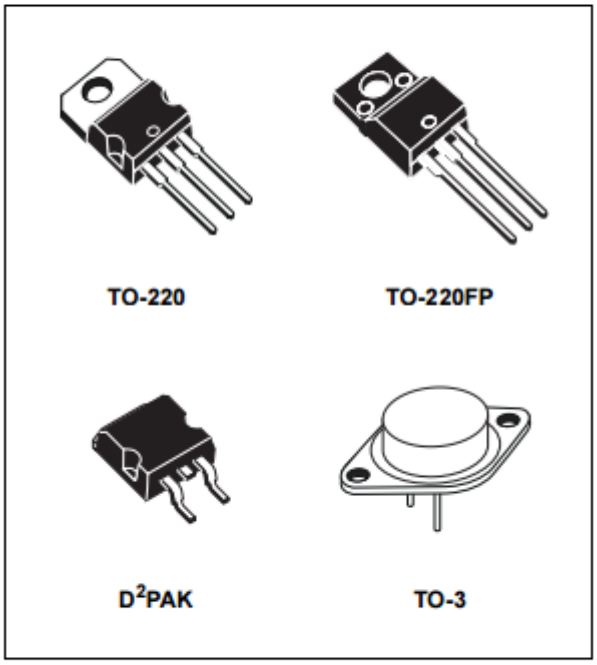
L7900 SERIES

NEGATIVE VOLTAGE REGULATORS

- OUTPUT CURRENT UP TO 1.5A
- OUTPUT VOLTAGES OF -5; -5.2; -6; -8; -9; -12; -15; -18; -20; -22; -24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION

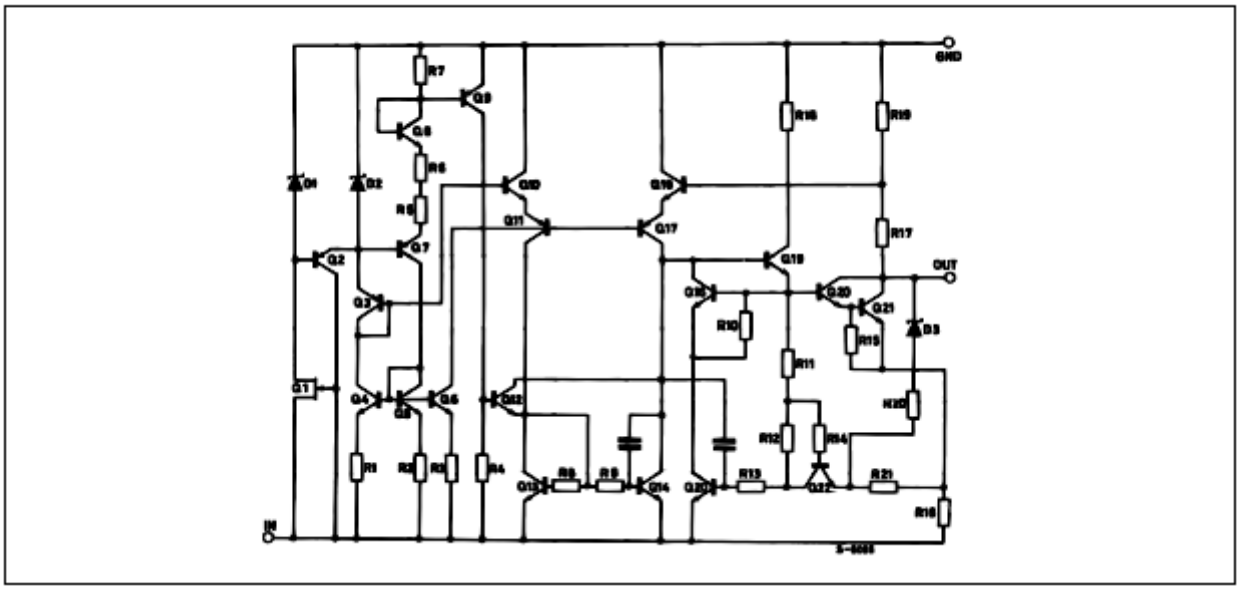


DESCRIPTION

The L7900 series of three-terminal negative regulators is available in TO-220, TO-220FP, TO-3 and D^2PAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation; furthermore, having the same voltage option as the L7800 positive standard series, they are particularly suited for split power supplies. In addition, the -5.2V is also available for ECL system. If adequate heat sinking is provided, they can deliver over 1.5A output current.

Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

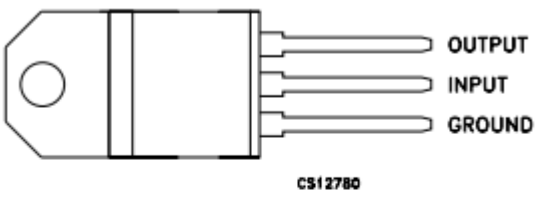
Symbol	Parameter[2]		Value	Unit
V_I	DC Input Voltage	for V_O = 5 to 18V	-35	V
		for V_O = 20, 24V	-40	
I_O	Output Current		Internally Limited	
P_{tot}	Power Dissipation		Internally Limited	
T_{stg}	Storage Temperature Range		-65 to 150	°C
T_{op}	Operating Junction Temperature Range		0 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

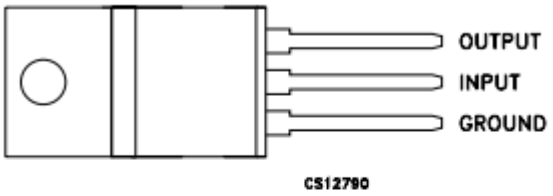
THERMAL DATA

Symbol	Parameter		D^2PAK	TO-220	TO-220FP	TO-3	Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	3	3	5	4	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	50	60	35	°C/W

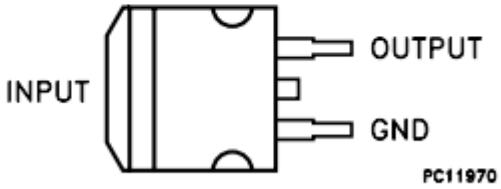
CONNECTION DIAGRAM (top view)



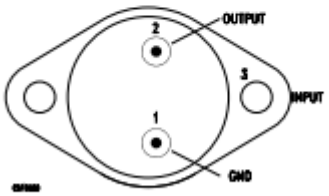
TO-220



TO-220FP



D^2PAK



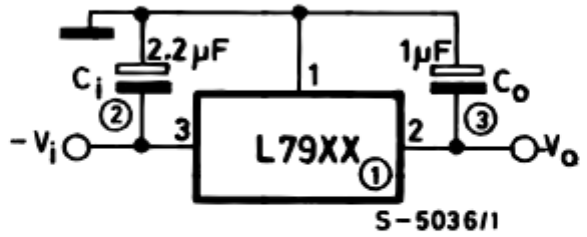
TO-3

ORDERING CODES

TYPE	TO-220	D^2PAK (*)	TO-220FP	TO-3	OUTPUT VOLTAGE
L7905C	L7905CV	L7905ACD2T	L7905CP	L7905CT	-5 V
L7952C	L7952CV	L7952ACD2T		L7952CT	-5.2 V
L7906C	L7906CV	L7906ACD2T	L7906CP	L7906CT	-6 V
L7908C	L7908CV	L7908ACD2T	L7908CP	L7908CT	-8 V
L7912C	L7912CV	L7912ACD2T	L7912CP	L7912CT	-12 V
L7915C	L7915CV	L7915ACD2T	L7915CP	L7915CT	-15 V
L7918C	L7918CV	L7918ACD2T	L7918CP	L7918CT	-18 V
L7920C	L7920CV	L7920ACD2T	L7920CP	L7920CT	-20 V
L7922C	L7922CV	L7922ACD2T		L7922CT	-22 V
L7924C	L7924CV	L7924ACD2T	L7924CP	L7924CT	-24 V

(*) Available in Tape & Reel with the suffix "-TR".

TEST CIRCUIT



ELECTRICAL CHARACTERISTICS OF L7905C (refer to the test circuits, T_J = 0 to 125°C, V_I = -10V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-4.8	-5	-5.2	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = 8 to 20 V	-4.75	-5	-5.25	V
ΔV_O(*)	Line Regulation	V_I = -7 to -25 V T_J = 25°C			100	mV
		V_I = -8 to -12 V T_J = 25°C			50	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			100	mV
		I_O = 250 to 750 mA T_J = 25°C			50	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -8 to -25 V			1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.4		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		100		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.4		V
I_{sc}	Short Circuit Current			2.1		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7952C (refer to the test circuits, T_J = 0 to 125°C, V_I = -10V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-5.0	-5.2	-5.4	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -9 to -21 V	-4.95	-5.2	-5.45	V
ΔV_O(*)	Line Regulation	V_I = -8 to -25 V T_J = 25°C			105	mV
		V_I = -9 to -12 V T_J = 25°C			52	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			105	mV
		I_O = 250 to 750 mA T_J = 25°C			52	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -9 to -25 V			1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.5		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		125		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.4		V
I_{sc}	Short Circuit Current			2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7906C (refer to the test circuits, T_J = 0 to 125°C, V_I = -11V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-5.75	-6	-6.25	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -9.5 to -21.5 V	-5.7	-6	-6.3	V
ΔV_O(*)	Line Regulation	V_I = -8.5 to -25 V T_J = 25°C			120	mV
		V_I = -9 to -15 V T_J = 25°C			60	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			120	mV
		I_O = 250 to 750 mA T_J = 25°C			60	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -9.5 to -25 V			1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.6		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		144		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.4		V
I_{sc}	Short Circuit Current			2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7908C (refer to the test circuits, T_J = 0 to 125°C, V_I = -14V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-7.7	-8	-8.3	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -11.5 to -23 V	-7.6	-8	-8.4	V
ΔV_O(*)	Line Regulation	V_I = -10.5 to -25 V T_J = 25°C			160	mV
		V_I = -11 to -17 V T_J = 25°C			80	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			160	mV
		I_O = 250 to 750 mA T_J = 25°C			80	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -11.5 to -25 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.6		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		175		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.5		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7912C (refer to the test circuits, T_J = 0 to 125°C, V_I = -19V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-11.5	-12	-12.5	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -15.5 to -27 V	-11.4	-12	-12.6	V
ΔV_O(*)	Line Regulation	V_I = -14.5 to -30 V T_J = 25°C			240	mV
		V_I = -16 to -22 V T_J = 25°C			120	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			240	mV
		I_O = 250 to 750 mA T_J = 25°C			120	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -15 to -30 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.8		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		200		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.5		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7915C (refer to the test circuits, T_J = 0 to 125°C, V_I = -23V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-14.4	-15	-15.6	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -18.5 to -30 V	-14.3	-15	-15.7	V
ΔV_O(*)	Line Regulation	V_I = -17.5 to -30 V T_J = 25°C			300	mV
		V_I = -20 to -26 V T_J = 25°C			150	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			300	mV
		I_O = 250 to 750 mA T_J = 25°C			150	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -18.5 to -30 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.9		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		250		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.3		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7918C (refer to the test circuits, T_J = 0 to 125°C, V_I = -27V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-17.3	-18	-18.7	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -22 to -33 V	-17.1	-18	-18.9	V
ΔV_O(*)	Line Regulation	V_I = -21 to -33 V T_J = 25°C			360	mV
		V_I = -24 to -30 V T_J = 25°C			180	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			360	mV
		I_O = 250 to 750 mA T_J = 25°C			180	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -22 to -33 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		300		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.1		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7920C (refer to the test circuits, T_J = 0 to 125°C, V_I = -29V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-19.2	-20	-20.8	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -24 to -35 V	-19	-20	-21	V
ΔV_O(*)	Line Regulation	V_I = -23 to -35 V T_J = 25°C			400	mV
		V_I = -26 to -32 V T_J = 25°C			200	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			400	mV
		I_O = 250 to 750 mA T_J = 25°C			200	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -24 to -35 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1.1		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		350		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			0.9		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7922C (refer to the test circuits, T_J = 0 to 125°C, V_I = -31V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-21.1	-22	-22.9	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -26 to -37 V	-20.9	-22	-23.1	V
ΔV_O(*)	Line Regulation	V_I = -25 to -37 V T_J = 25°C			440	mV
		V_I = -28 to -34 V T_J = 25°C			220	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			440	mV
		I_O = 250 to 750 mA T_J = 25°C			220	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -26 to -37 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1.1		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		375		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.1		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7924C (refer to the test circuits, T_J = 0 to 125°C, V_I = -33V, I_O = 500 mA, C_I = 2.2 µF, C_O = 1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	-23	-24	-24.5	V
V_O	Output Voltage	I_O = -5 mA to -1 A $P_O \leq$ 15 W V_I = -27 to -38 V	-22.8	-24	-25.2	V
ΔV_O(*)	Line Regulation	V_I = -27 to -38 V T_J = 25°C			480	mV
		V_I = -30 to -36 V T_J = 25°C			240	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			480	mV
		I_O = 250 to 750 mA T_J = 25°C			240	
I_d	Quiescent Current	T_J = 25°C			3	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = -27 to -38 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_J = 25°C		400		µV
SVR	Supply Voltage Rejection	ΔV_I = 10 V f = 120Hz	54	60		dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C ΔV_O = 100 mV		1.1		V
I_{sc}	Short Circuit Current			1.1		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.