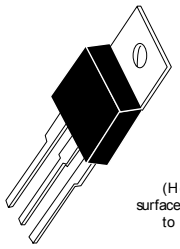
IL78XXC SERIES

THREE-TERMINAL POSITIVE VOLTAGE REGULATORS

TO-220 AB



Pin 1. Input
2. Ground
3. Output

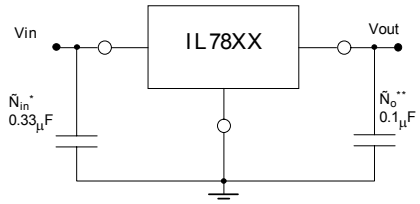
(Heatsink surface connected to Pin 2.)

These voltage regulators are monolithic integrated circuits designed fixed-voltage regulators for a wide variety of applications including local, on card regulation. These regulators employ internal current limiting, thermal shutdown, and safe-area compensation. With adequate heatsinking they can deliver output currents in excess of 1.0 ampere. Although designed primarily as a fixed voltage regulator, these devices can be used with external components to obtain adjustable voltages and currents.

- Output Current in Excess of 1.0 Ampere
- No External Components Required
- Internal Thermal Overload Protection
- Internal Short - Circuit Current Limiting
- Output Transistor Safe-Area Compensation
- Output Voltage Offered in 2% and 4% Tolerance

Device type/nominal output voltage			
IL7806	5 V	IL7812	12 V
IL7806	6 V	IL7815	15 V
IL7808	8 V	IL7818	18 V
IL7809	9 V	IL7824	24 V

Standard application



A common ground is required between the input and the output voltage. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

XX = these two digits of the type number indicate voltage.

* = C_{in} is required if regulator is located an appreciabl distance from power supply filter.

** = C_o is not needed for stability ; however, is does improve transient response

XX indicates nominal voltage

Maximum ratings (T_A = +25 °C unless otherwise noted)

Rating	**Symbol**	**Value**	**Unit**
Input Voltage (5.0 V - 18 V) (24 V)	V_{in}	35 40	V_{dc}
Power Dissipation and Thermal Characteristics Plastic Package T_A **= +**25 °C Derate above T_A **=** 25 °C Thermal Resistance, Junction to Air T_A **= +**25 °C Derate above T_C **= +**75 °C (See Figure 1) Thermal Resistance, Junction to Case	 P_D $1/R_{\Theta JA}$ $R_{\Theta JC}$ P_D $1/R_{\Theta JC}$ $R_{\Theta JC}$	 Internally Limited 15.4 65 Internally Limited 200 5.0	 Watts mW/°C °C/W Watts mW/°C °C/W
Storage Junction Temperature Range	T_{stg}	-65 to +150	°C
Operating Junction Temperature Range IL78XXC	T_J	0 to +125	°C

INTEGRAL

IL7805

Electrical characteristics

(Vin = 10V, I_o = 500mA, T_J = Tlow to Thigh (Note 1) unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (TJ=+25°C)	V_o	4.8	5.0	5.2	V_{dc}
Output Voltage (5.0 mA≤I_o≤1.0A, P_o≤15 W) 7.0V_{dc}≤V_{in}≤20V_{dc}	V_o	4.75	5.0	5.25	V_{dc}
Line Regulation(TJ=+25°C, Note2) 7.0V_{dc}≤Vin≤25V_{dc} 8.0Vdc≤Vin≤13Vdc	Reg_{line}	 - -	 9.0 3.0	 100 50	mV
Load Regulation(TJ=+25°C,Note2) 5.0mA≤ Io ≤1.5A 250mA≤ Io ≤750 mA	Reg_{load}	 - -	 43 16	 100 50	mV
Quiescent Current (TJ=+25°C)	IB	-	4.3	8.0	mA
Quiescent Current Change 7.0Vdc ≤Vin ≤25Vdc 5.0mA≤ Io ≤1.0A	Δ IB	 - -	 - -	 1.3 0.5	mA
Ripple Rejection 8.0Vdc≤Vin≤18Vdc, f = 120 Hz	RR	-	68	-	dB
Dropout Voltage (Io=1.0A,T =+25°C)	Vin-Vo	-	2.0	-	Vdc
Output Noise Voltage(TA=+25°C) 10 Hz ≤f≤100 kHz	Vn	-	10	-	μV/Vo
Output Resistance f = 1.0 kHz	ro	-	17	-	mΩ
Short -Circuit Current Limit (TA=+25°C) Vin = 35 Vdc	Isc	-	0.2	-	A
Peak Output Current(TJ=+25°C)	Imax	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCVo	-	-0.8	-	mV/°C

IL7806

Electrical characteristics

(Vin = 11V, Io = 500mA, TJ = Tlow to Thigh (Note 1) unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (TJ=+25°C)	Vo	5.75	6.0	6.25	Vdc
Output Voltage (5.0 mA≤Io≤1.0A, Po≤15 W) 8.0Vdc≤Vin≤21Vdc 9.0Vdc≤Vin≤21Vdc	Vo	 5.7 -	 6.0 -	 6.3 -	Vdc
Line Regulation(TJ=+25°C, Note2) 8.0Vdc≤Vin≤25Vdc 9.0Vdc≤Vin≤13Vdc	Regline	 - -	 9.0 3.0	 120 60	mV
Load Regulation(TJ=+25°C,Note2) 5.0mA≤Io≤1.5A 250mA≤Io≤750 mA	Regload	 - -	 43 16	 120 60	mV
Quiescent Current (TJ=+25°C)	IB	-	4.3	8.0	mA
Quiescent Current Change 8.0Vdc≤Vin≤25Vdc 5.0mA≤Io≤1.0A	Δ IB	 - -	 - -	 1.3 0.5	mA
Ripple Rejection 9.0Vdc≤Vin≤19Vdc, f = 120 Hz	RR	-	65	-	dB
Dropout Voltage (Io=1.0A,T =+25°C)	Vin-Vo	-	2.0	-	Vdc
Output Noise Voltage(TA=+25°C) 10 Hz ≤f≤100 kHz	Vn	-	10	-	μV/Vo
Output Resistance f = 1.0 kHz	ro	-	17	-	mΩ
Short -Circuit Current Limit(TA=+25°C) Vin = 35 Vdc	Isc	-	0.2	-	A
Peak Output Current(TJ=+25°C)	Imax	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCVo	-	-0.8	-	mV/°C

Note: 1. Tlow = 0 °C , Thigh = +125 0 °C

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

IL7808

Electrical characteristics

(Vin = 11V, Io = 500mA, TJ = Tlow to Thigh (Note 1) unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (TJ=+25°C)	Vo	7.7	8.0	8.0	Vdc
Output Voltage (5.0 mA≤Io≤1.0A, Po≤15 W) 10.5Vdc≤Vin≤23Vdc	Vo	7.6	8.0	8.4	Vdc
Line Regulation(TJ=+25°C, Note2) 10.5Vdc≤Vin≤25Vdc 11Vdc≤Vin≤17Vdc	Regline	 - -	 12 5.0	 160 80	mV
Load Regulation(TJ=+25°C,Note2) 5.0mA≤Io≤1.5A 250mA≤Io≤750 mA	Regload	 - -	 45 16	 160 80	mV
Quiescent Current (TJ=+25°C)	IB	-	4.3	8.0	mA
Quiescent Current Change 10.5Vdc≤Vin≤25Vdc 5.0mA≤Io≤1.0A	Δ IB	 - -	 - -	 1.0 0.5	mA
Ripple Rejection 11.5Vdc≤Vin≤21.5Vdc, f = 120 Hz	RR	-	62	-	dB
Dropout Voltage (Io=1.0A,T =+25°C)	Vin-Vo	-	2.0	-	Vdc
Output Noise Voltage(TA=+25°C) 10 Hz ≤f≤100 kHz	Vn	-	10	-	μV/Vo
Output Resistance f = 1.0 kHz	ro	-	18	-	mΩ
Short -Circuit Current Limit(TA=+25°C) Vin = 35 Vdc	Isc	-	0.2	-	A
Peak Output Current(TJ=+25°C)	Imax	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCVo	-	-0.8	-	mV/°C

IL7809

Electrical characteristics

(V_{in} = 15V, I_o = 500mA, T_J = 0°C to +125°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (TJ=+25°C)	V_o	8.65	9.0	9.35	V_{dc}
Output Voltage (5.0 mA≤I_o≤1.0A, P_o≤15 W) 11.5V_{dc}≤Vin≤24V_{dc}	V_o	8.55	9.0	9.45	V_{dc}
Line Regulation(TJ=+25°C, Note2) 11.5V_{dc}≤Vin≤26V_{dc} 11.5Vdc≤Vin≤17Vdc	Reg_{line}	 - -	 12 5.0	 180 90	mV
Load Regulation(T_J=+25°C, Note2) 5.0mA≤I_o≤1.5A 250mA≤I_o≤750 mA	Reg_{load}	 - -	 35 12	 180 90	mV
Quiescent Current (T_J=+25°C)	I_B	-	4.3	8.0	mA
Quiescent Current Change 11.5V_{dc}≤Vin≤26V_{dc} 5.0mA≤I_o≤1.0A	Δ I_B	 - -	 - -	 1.0 0.5	mA
Ripple Rejection 11.5V_{dc}≤V_{in}≤21.5V_{dc}, f = 120 Hz	RR	-	61	-	dB
Dropout Voltage (I_o=1.0A,T =+25°C)	V_{in}-V_o	-	2.0	-	V_{dc}
Output Noise Voltage(T_A=+25°C) 10 Hz ≤f≤100 kHz	V_n	-	10	-	μV/Vo
Output Resistance f = 1.0 kHz	ro	-	18	-	mΩ
Short -Circuit Current Limit (T_A=+25°C) V_{in} = 35 Vdc	I_{sc}	-	0.2	-	A
Peak Output Current(TJ=+25°C)	I_{max}	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCV_o	-	-1.0	-	mV/°C

Note: 1. Tlow = 0 °C , Thigh = +125 0 °C

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

IL7812

Electrical characteristics

(Vin = 19V, Io = 500mA, TJ = Tlow to Tlow (Note 1) unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (TJ=+25°C)	Vo	11.5	12	12.5	Vdc
Output Voltage (5.0 mA≤Io≤1.0A, Po≤15 W) 14.5Vdc≤Vin≤27Vdc	Vo	11.4	12	12.6	Vdc
Line Regulation(TJ=+25°C, Note2) 14.5Vdc≤Vin≤30Vdc 16Vdc≤Vin≤22Vdc	Regline	 - -	 13 6.0	 240 120	mV
Load Regulation(TJ=+25°C,Note2) 5.0mA≤Io≤1.5A 250mA≤Io≤750 mA	Regload	 - -	 46 17	 240 120	mV
Quiescent Current (TJ=+25°C)	IB	-	4.4	8.0	mA
Quiescent Current Change 14.5Vdc≤Vin≤30Vdc 5.0mA≤Io≤1.0A	∆ IB	 - -	 - -	 1.0 0.5	mA
Ripple Rejection 15Vdc≤Vin≤25Vdc, f = 120 Hz	RR	-	60	-	dB
Dropout Voltage (Io=1.0A,T =+25°C)	Vin-Vo	-	2.0	-	Vdc
Output Noise Voltage(TA=+25°C) 10 Hz ≤f≤100 kHz	Vn	-	10	-	μV/Vo
Output Resistance f = 1.0 kHz	ro	-	18	-	mΩ
Short - Circuit Current Limit (TA=+25°C) Vin = 35 Vdc	Isc	-	0.2	-	A
Peak Output Current(TJ=+25°C)	Imax	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCVo	-	-1.0	-	mV/°C

IL7815

Electrical characteristics

(Vin = 11V, Io = 500mA, TJ = Tlow to Thigh (Note 1) unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (TJ=+25°C)	Vo	14.4	15	15.6	Vdc
Output Voltage (5.0 mA≤Io≤1.0A, Po≤15 W) 17.5Vdc≤Vin≤30Vdc	Vo	14.25	15	15.75	Vdc
Line Regulation(TJ=+25°C, Note2) 17.5Vdc≤Vin≤30Vdc 20Vdc≤Vin≤26Vdc	Regline	 - -	 13 6.0	 300 150	mV
Load Regulation(TJ=+25°C,Note2) 5.0mA≤Io≤1.5A 250mA≤Io≤750 mA	Regload	 - -	 52 20	 300 150	mV
Quiescent Current (TJ=+25°C)	IB	-	4.4	8.0	mA
Quiescent Current Change 17.5Vdc≤Vin≤30Vdc 5.0mA≤Io≤1.0A	∆ IB	 - -	 - -	 1.0 0.5	mA
Ripple Rejection 18.5Vdc≤Vin≤28.5Vdc, f = 120 Hz	RR	-	58	-	dB
Dropout Voltage (Io=1.0A,T =+25°C)	Vin-Vo	-	2.0	-	Vdc
Output Noise Voltage(TA=+25°C) 10 Hz ≤f≤100 kHz	Vn	-	10	-	μV/Vo
Output Resistance f = 1.0 kHz	ro	-	19	-	mΩ
Short - Circuit Current Limit (TA=+25°C) Vin = 35 Vdc	Isc	-	0.2	-	A
Peak Output Current(TJ=+25°C)	Imax	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCVo	-	-1.0	-	mV/°C

Note: 1. Tlow = 0 °C , Thigh = +125 0 °C

2.Load and line regulation are specified at constant junction temperature. Changes in Vo due to heating effects must be taken into accountseparately. Pulse testing with low duty cycle is used.

IL7818

Electrical characteristics

(Vin = 27V, Io = 500mA, TJ = Tlow to Thigh (Note 1) unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (TJ=+25°C)	Vo	17.3	18	18.7	Vdc
Output Voltage (5.0 mA≤Io≤1.0A, Po≤15 W) 21Vdc≤Vin≤33Vdc	Vo	17.1	18	18.9	Vdc
Line Regulation(TJ=+25°C, Note2) 21Vdc≤Vin≤33Vdc 24Vdc≤Vin≤30Vdc	Regline	 - -	 25 10	 360 180	mV
Load Regulation(TJ=+25°C,Note2) 5.0mA≤Io≤1.5A 250mA≤Io≤750 mA	Regload	 - -	 55 22	 360 180	mV
Quiescent Current (TJ=+25°C)	IB	-	4.5	8.0	mA
Quiescent Current Change 21Vdc≤Vin≤33Vdc 5.0mA≤Io≤1.0A	Δ IB	 - -	 - -	 1.0 0.5	mA
Ripple Rejection 22Vdc≤Vin≤33Vdc, f = 120 Hz	RR	-	57	-	dB
Dropout Voltage (Io=1.0A,T =+25°C)	Vin-Vo	-	2.0	-	Vdc
Output Noise Voltage(TA=+25°C) 10 Hz ≤f≤100 kHz	Vn	-	10	-	μV/Vo
Output Resistance f = 1.0 kHz	ro	-	19	-	mΩ
Short - Circuit Current Limit (TA=+25°C) Vin = 35 Vdc	Isc	-	0.2	-	A
Peak Output Current(TJ=+25°C)	Imax	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCVo	-	-1.0	-	mV/°C

IL7824

Electrical characteristics

(Vin = 33V, Io = 500mA, TJ = Tlow to Thigh (Note 1) unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (TJ=+25°C)	Vo	23	24	25	Vdc
Output Voltage (5.0 mA≤Io≤1.0A, Po≤15 W) 27Vdc≤Vin≤38Vdc	Vo	22.8	24	25.2	Vdc
Line Regulation(TJ=+25°C, Note2) 27Vdc≤Vin≤38Vdc 30Vdc≤Vin≤38Vdc	Regline	 - -	 31 14	 480 240	mV
Load Regulation(TJ=+25°C,Note2) 5.0mA≤Io≤1.5A 250mA≤Io≤750 mA	Regload	 - -	 60 25	 480 240	mV
Quiescent Current (TJ=+25°C)	IB	-	4.6	8.0	mA
Quiescent Current Change 27Vdc≤Vin≤38Vdc 5.0mA≤Io≤1.0A	Δ IB	 - -	 - -	 1.0 0.5	mA
Ripple Rejection 28Vdc≤Vin≤38Vdc, f = 120 Hz	RR	-	54	-	dB
Dropout Voltage (Io=1.0A,T =+25°C)	Vin-Vo	-	2.0	-	Vdc
Output Noise Voltage(TA=+25°C) 10 Hz ≤f≤13100 kHz	Vn	-	10	-	μV/Vo
Output Resistance f = 1.0 kHz	ro	-	20	-	mΩ
Short - Circuit Current Limit (TA=+25°C) Vin = 35 Vdc	Isc	-	0.2	-	A
Peak Output Current(TJ=+25°C)	Imax	-	2.2	-	A
Average Temperature Coefficient of Output Voltage	TCVo	-	-1.5	-	mV/°C

Note: 1. Tlow = 0 °C , Thigh = +125 0 °C

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