

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
 - Class Q Military
 - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)

• Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.



www.fairchildsemi.com

MC78XXE/LM78XXE/MC78XXAE 3-Terminal 1A Positive Voltage Regulator

Features

- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 12, 15, 18, 24V
- Thermal Overload Protection

Internal Block Digram

- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

Description

The MC78XXE/LM78XXE/MC78XXAE series of three terminal positive regulators are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.



THERMAL PROTECTION

INPUT SERIES PASS ELEMENT CURRENT SOA PROTECTION GENERATOR REFERENCE STARTING ERROR VOLTAGE AMPLIFIER CIRCUIT

C

GND

0 2

OUTPUT

3

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input Voltage (for $V_O = 5V$ to 18V) (for $V_O = 24V$)	VI VI	35 40	V V
Thermal Resistance Junction-Cases (TO-220)	R _θ JC	5	°C/W
Thermal Resistance Junction-Air (TO-220)	RθJA	65	°C/W
Operating Temperature Range	TOPR	0 ~ +125	°C
Storage Temperature Range	TSTG	-65 ~ +150	°C

Electrical Characteristics (MC7805E/LM7805E)

(Refer to test circuit ,0°C < TJ < 125°C, IO = 500mA, VI = 10V, CI = 0.33μ F, CO= 0.1μ F, unless otherwise specified)

Baramatar	Symbol			MC78	05E/LM	7805E	Unit
Farameter	Symbol		manions	Min.	Тур.	Max.	Unit
		TJ = +25°C		4.8	5.0	5.2	
Output Voltage	Vo	$5.0mA \le Io \le VI = 7V to 20V$	1.0A, $P_0 \le 15W$	4.75	5.0	5.25	V
Line Pequilation (Note1)	Poglino	T - +25°C	Vo = 7V to 25V	-	4.0	100	m\/
	Regime	15 = +25 C	VI = 8V to 12V	-	1.6	50	1110
			IO = 5.0mA to1.5A	-	9	100	
Load Regulation (Note1)	Regload TJ = +25°C	TJ = +25°C	IO =250mA to 750mA	-	4	50	mV
Quiescent Current	lQ	TJ = +25°C		-	5.0	8.0	mA
Quiescent Current Change		IO = 5mA to 1.	0A	-	0.03	0.5	m۸
Quiescent Current Change	ΔIQ	VI = 7V to 25V	,	-	0.3	1.3	IIIA
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	IO = 5mA		-	-0.8	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100	0kHz, TA = +25°C	-	42	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz Vo = 8V to 18	V	62	73	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =+	25°C	-	2	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	15	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA =	+25°C	-	230	-	mA
Peak Current (Note2)	Iрк	TJ = +25°C		-	2.2	-	A

Note:

1. 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 is used.

Electrical Characteristics (MC7806E) (Continued)

(Refer to test circuit ,0°C < TJ < 125°C, IO = 500mA, VI =11V, CI= 0.33µF, CO= 0.1µF, unless otherwise specified)

Baramotor	Symbol	Conditions		N	1C7806	E	Unit
Falameter	Symbol			Min.	Тур.	Max.	Unit
		TJ = +25°C		5.75	6.0	6.25	
Output Voltage	Vo	$5.0\text{mA} \le \text{IO} \le 1.0\text{A}, \text{PO} \le 15\text{W}$ VI = 8.0V to 21V		5.7	6.0	6.3	V
Line Regulation (Note1)	Poglino	T - + 25°C	VI = 8V to 25V	-	5	120	m\/
	Regime	1 J = + 2 J C	VI = 9V to 13V	-	1.5	60	1110
Load Pogulation (Noto1)	Pogload	T + 25°C	IO =5mA to 1.5A	-	9	120	m\/
	Regioau	1 J = + 2 J C	IO =250mA to750A	-	3	60	IIIV
Quiescent Current	lQ	TJ =+25°C		-	5.0	8.0	mA
Quiescent Current Change		IO = 5mA to $1A$		-	-	0.5	m۸
Quiescent Current Change	ΔIQ	$V_I = 8V$ to 25V		-	-	1.3	
Output Voltage Drift (Note2)	ΔVΟ/ΔΤ	IO = 5mA		-	-0.8	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100k	Hz, T _A = +25°C	-	45	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz VI = 9V to 19V		59	75	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ = +25°C		-	2	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	19	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA= -	+25°C	-	250	-	mA
Peak Current (Note2)	IPK	TJ =+25°C		-	2.2	-	Α

Note:

1. 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 is used.

Electrical Characteristics (MC7808E) (Continued)

(Refer to test circuit ,0°C < TJ < 125°C, IO = 500mA, VI =14V, CI = 0.33µF, CO= 0.1µF, unless otherwise specified)

Baramatar	Symbol		Μ	MC7808E			
Farameter	Symbol		bhaillons	Min.	Тур.	Max.	Unit
		TJ =+25°C		7.7	8.0	8.3	
Output Voltage	Vo	$\begin{array}{l} \text{5.0mA} \leq \text{I}_{O} \leq 1\\ \text{VI} = 10.5 \text{V to } 23 \text{V} \end{array}$.0A, P_O \leq 15W V	7.6	8.0	8.4	V
Line Regulation (Note1)	Poglino	T + 25°C	VI = 10.5V to 25V	-	5.0	160	m\/
	Regime	1 j = + 2 j C	VI = 11.5V to 17V	-	2.0	80	IIIV
Load Population (Noto1)	Pogload	T + 25°C	IO = 5.0mA to 1.5A	-	10	160	m\/
	Regioau		IO= 250mA to 750mA	-	5.0	80	IIIV
Quiescent Current	lQ	TJ =+25°C	TJ =+25°C		5.0	8.0	mA
Quisseent Current Change	Ale	IO = 5mA to 1.0A		-	0.05	0.5	~^^
Quiescent Current Change	ΔIQ	VI = 10.5A to 25	V	-	0.5	1.0	mA
Output Voltage Drift (Note2)	$\Delta VO/\Delta T$	IO = 5mA		-	-0.8	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kH	z, TA = +25°C	-	52	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz, VI = 1	1.5V to 21.5V	56	73	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ = +2	5°C	-	2	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	17	-	mΩ
Short Circuit Current	Isc	VI = 35V, TA = +	25°C	-	230	-	mA
Peak Current (Note2)	IPK	TJ =+25°C		-	2.2	-	А

Note:

1. 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 is used.

Electrical Characteristics (MC7809E) (Continued)

(Refer to test circuit ,0°C < TJ < 125°C, IO = 500mA, VI =15V, CI= 0.33µF, CO= 0.1µF, unless otherwise specified)

Baramotor	Symbol	Conditions		Conditions MC7809E		E	Unit
Farameter	Symbol		Diamons	Min.	Тур.	Max.	Unit
		$T_J = +25^{\circ}C$		8.65	9	9.35	
Output Voltage	Vo	$5.0 \text{mA} \le \text{IO} \le 1.0$ VI = 11.5V to 24V	0A, P _O ≤ 15W V	8.6	9	9.4	V
Line Regulation (Note1)	Realine	T = +25°C	VI = 11.5V to 25V	-	6	180	m\/
	Regime	1] = +25 C	VI = 12V to 17V	-	2	90	1110
Load Pogulation (Noto1)	Pogload	T = +25°C	$I_{O} = 5 mA$ to 1.5A	-	12	180	m\/
	Regioau	TJ = +25 C	IO = 250mA to 750mA	-	4	90	IIIV
Quiescent Current	lq	$T_{J} = +25^{\circ}C$		-	5.0	8.0	mA
Quieseent Current Change		IO = 5mA to 1.0A	ł	-	-	0.5	m۸
Quescent Current Change	ΔIQ	VI = 11.5V to 26	V	-	-	1.3	mA
Output Voltage Drift (Note2)	$\Delta VO/\Delta T$	IO = 5mA		-	-1	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kH	z, TA = +25°C	-	58	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz VI = 13V to 23V		56	71	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ = +2	5°C	-	2	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	17	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA = +	25°C	-	250	-	mA
Peak Current (Note2)	Iрк	TJ = +25°C		-	2.2	-	А

Note:

1. 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 is used.

Electrical Characteristics (MC7812E) (Continued)

(Refer to test circuit ,0°C < TJ < 125°C, IO = 500mA, VI =19V, CI= 0.33µF, CO=0.1µF, unless otherwise specified)

Parameter	Symbol	Conditions		MC7812E			Unit
Falameter	Symbol		Julions	Min.	Тур.	Max.	Unit
		TJ = +25°C		11.5	12	12.5	
Output Voltage	Vo	$5.0 \text{mA} \le \text{IO} \le 1.0$ VI = 14.5V to 27V	$5.0 \text{mA} \le \text{IO} \le 1.0 \text{A}, \text{PO} \le 15 \text{W}$ VI = 14.5V to 27V		12	12.6	V
Line Regulation (Note1)	Realine	T I = +25°C	VI = 14.5V to 30V	-	10	240	m\/
	Regime	15 - +25 0	VI = 16V to 22V	-	3.0	120	1110
Load Population (Noto1)	Pogload	T + - +25°C	$I_O = 5mA$ to 1.5A	-	11	240	m\/
	Regioau	IJ = +23 C	IO = 250mA to 750mA	-	5.0	120	111V
Quiescent Current	lQ	TJ = +25°C	$T_J = +25^{\circ}C$		5.1	8.0	mA
Quiescent Current Change		IO = 5mA to 1.0A		-	0.1	0.5	m۸
Quescent Current Change	ΔIQ	VI = 14.5V to 30\	/	-	0.5	1.0	IIIA
Output Voltage Drift (Note2)	$\Delta VO/\Delta T$	IO = 5mA		-	-1	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kHz	z, T _A = +25°C	-	76	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz VI = 15V to 25V		55	71	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ = +2	5°C	-	2	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	18	-	mΩ
Short Circuit Current	Isc	VI = 35V, TA= +2	25° C	-	230	-	mA
Peak Current (Note2)	Iрк	TJ = +25°C		-	2.2	-	А

Note:

1. 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 is used.

Electrical Characteristics (MC7815E) (Continued)

(Refer to test circuit ,0°C < TJ < 125°C, IO = 500mA, VI =23V, CI= 0.33µF, CO=0.1µF, unless otherwise specified)

Baramotor	Symbol Conditions		N	IC7815	E	Unit	
Farameter	Symbol		nations	Min.	Тур.	Max.	Unit
		TJ =+25°C		14.4	15	15.6	
Output Voltage	Vo	$5.0mA \le IO \le 1$ VI = 17.5V to 3	I.0A, P _O ≤ 15W 30V	14.25	15	15.75	V
Line Regulation (Note1)	Poglino	T1 - +25°C	VI = 17.5V to 30V	-	11	300	m\/
	Regime	1J = +25 C	VI = 20V to 26V	-	3	150	IIIV
			$I_{O} = 5mA$ to 1.5A	-	12	300	
Load Regulation (Note1)	Regload	$T_{J} = +25^{\circ}C$	IO = 250mA to 750mA	-	4	150	mV
Quiescent Current	lQ	TJ =+25°C		-	5.2	8.0	mA
Quiescent Current Change	Alo	$I_{O} = 5 mA$ to 1.0A		-	-	0.5	mΔ
Quiescent Current Change	ΔIQ	VI = 17.5V to 3	30V	-	-	1.0	IIIA
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	IO = 5mA		-	-1	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100	kHz, TA = +25°C	-	90	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz VI = 18.5V to 2	28.5V	54	70	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ=+2	IO = 1A, TJ=+25°C		2	-	V
Output Resistance (Note2)	rO	f = 1kHz	f = 1kHz		19	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA =	= +25°C	-	250	-	mA
Peak Current (Note2)	IPK	TJ =+25°C		-	2.2	-	Α

Note:

1. 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 is used.

Electrical Characteristics (MC7818E) (Continued)

(Refer to test circuit ,0°C < TJ < 125°C, IO = 500mA, VI = 27V, CI = 0.33μ F, CO= 0.1μ F, unless otherwise specified)

Parameter	Symbol	Symbol Conditions		M	IC7818	Ε	Unit
Falameter	Symbol		Julions	Min.	Тур.	Max.	Unit
		TJ =+25°C		17.3	18	18.7	
Output Voltage	Vo	$5.0 \text{mA} \le \text{IO} \le 1.0 \text{A}$ VI = 21V to 33V	A, Po ≤15W	17.1	18	18.9	V
Line Regulation (Note1)	Realine	T , -+25°C	VI = 21V to 33V	-	15	360	m\/
	rtegime	15 - 725 0	VI = 24V to 30V	-	5	180	1110
Load Population (Noto1)	Pogload	T + -+25°C	$I_{O} = 5 mA$ to 1.5A	-	15	360	m\/
	Regioau	I J = +23 C	IO = 250mA to 750mA	-	5.0	180	IIIV
Quiescent Current	lq	TJ = +25°C	$T_J = +25^{\circ}C$		5.2	8.0	mA
Quiecoant Current Change	410	IO = 5mA to 1.0A	١	-	-	0.5	m۸
Quiescent Current Change	ΔIQ	VI = 21V to 33V		-	-	1	IIIA
Output Voltage Drift (Note2)	$\Delta VO/\Delta T$	IO = 5mA		-	-1	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kH	z, TA = +25°C	-	110	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz VI = 22V to 32V	f = 120Hz VI = 22V to 32V		69	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ = +2	IO = 1A, TJ = +25°C		2	-	V
Output Resistance (Note2)	rO	f = 1kHz	f = 1kHz		22	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA = +2	25°C	-	250	-	mA
Peak Current (Note2)	lрк	TJ = +25°C		-	2.2	-	Α

Note:

1. 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 is used.

Electrical Characteristics (MC7824E) (Continued)

(Refer to test circuit ,0°C < TJ < 125°C, IO = 500mA, VI =33V, CI= 0.33µF, CO=0.1µF, unless otherwise specified)

Parameter	Symbol		Μ	MC7824E			
Falameter	Symbol		Juitions	Min.	Тур.	Max.	Onit
		$T_J = +25^{\circ}C$		23	24	25	
Output Voltage	Vo	$5.0 \text{mA} \le \text{IO} \le 1.0$ VI = 27V to 38V	A, P _O ≤ 15W	22.8	24	25.25	V
Line Regulation (Note1)	Realine	T I = ±25°C	VI = 27V to 38V	-	17	480	m\/
	Regime	15 = +25 C	VI = 30V to 36V	-	6	240	IIIV
Load Population (Note1)	Pogload	T + - +25°C	$I_{O} = 5 mA$ to 1.5A	-	15	480	m\/
	Regioau	IJ = +23 C	IO = 250mA to 750mA	-	5.0	240	IIIV
Quiescent Current	lQ	$T_J = +25^{\circ}C$		-	5.2	8.0	mA
Quiescent Current Change		IO = 5mA to 1.0A	۱.	-	0.1	0.5	m۸
Quescent Current Change	ΔIQ	VI = 27V to 38V		-	0.5	1	IIIA
Output Voltage Drift (Note2)	$\Delta VO/\Delta T$	IO = 5mA		-	-1.5	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kH	z, T _A = +25°C	-	60	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz VI = 28V to 38V	f = 120Hz VI = 28V to 38V		67	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ= +25	°C	-	2	-	V
Output Resistance (Note2)	rO	f = 1kHz	f = 1kHz		28	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA= +2	25°C	-	230	-	mA
Peak Current (Note2)	IPK	TJ = +25°C		-	2.2	-	Α

Note:

1. 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 is used.

Electrical Characteristics (MC7805AE) (Continued)

(Refer to the test circuits. 0°C < TJ < 125°C, I₀ =1A, V I = 10V, C I=0.33µF, C O=0.1µF, unless otherwise specified)

Parameter	Symbol	Co	onditions	Min.	Тур.	Max.	Unit
		TJ = +25°C		4.9	5	5.1	
Output Voltage	Vo	IO = 5mA to 1 VI = 7.5V to 2	$I_O = 5mA$ to 1A, $P_O \le 15W$ VI = 7.5V to 20V		5	5.2	V
		VI = 7.5V to 2	5V, IO = 500mA	-	5	50	
Line Regulation (Note1)	Realine	VI = 8V to 12V	/	-	3	50	m\/
	Regime	T1 - +25°C	VI= 7.3V to 20V	-	5	50	1117
		1J = +25 C	VI= 8V to 12V	-	1.5	25	
		TJ = +25°C, Id	O = 5mA to 1.5A	-	9	100	
Load Regulation (Note1)	Regload	IO = 5mA to 1	A	-	9	100	mV
		IO = 250mA to	o 750mA	-	4	50	
Quiescent Current	lQ	TJ = +25°C		-	5.0	6	mA
		IO = 5mA to 1A		-	-	0.5	
Quiescent Current Change	ΔlQ	VI = 8 V to 25V, IO = 500mA		-	-	0.8	mA
		VI = 7.5V to 20V, TJ = +25°C		-	-	0.8	
Output Voltage Drift (Note2)	$\Delta V / \Delta T$	lo = 5mA		-	-0.8	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 10 TA =+25°C)0kHz	-	10	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz, IO VI = 8V to 18V	= 500mA /	-	68	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =-	+25°C	-	2	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	17	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA =	=+25°C	-	250	-	mA
Peak Current (Note2)	lрк	TJ = +25°C		-	2.2	-	A

Note:

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

Electrical Characteristics (MC7806AE) (Continued)

(Refer to the test circuits. 0°C < TJ < 125°C, Io =1A, V I =11V, C I=0.33µF, C O=0.1µF, unless otherwise specified)

Parameter	Symbol	Co	onditions	Min.	Тур.	Max.	Unit
		TJ =+25°C		5.58	6	6.12	
Output Voltage	Vo	IO = 5mA to 1 VI = 8.6V to 2	A, P _O ≤ 15W 1V	5.76	6	6.24	V
		VI = 8.6V to 2	VI = 8.6V to 25V, IO = 500mA		5	60	
Line Regulation (Note1)	Poglino	$V_{I} = 9V \text{ to } 13V$	/	-	3	60	m\/
	Regime	T + -+25°C	VI = 8.3V to 21V	-	5	60	
		15=+25 C	VI = 9V to 13V	-	1.5	30	
		TJ =+25°C, IC) = 5mA to 1.5A	-	9	100	
Load Regulation (Note1)	Regload	IO = 5mA to 1	A	-	4	100	mV
		IO = 250mA to	o 750mA	-	5.0	50	
Quiescent Current	lq	TJ =+25°C	T _J =+25°C		4.3	6	mA
		IO = 5mA to 1	A	-	-	0.5	
Quiescent Current Change	ΔI_Q	$V_{I} = 9V$ to 25V, $I_{O} = 500$ mA		-	-	0.8	mA
		VI = 8.5V to 21V, TJ = +25°C		-	-	0.8	
Output Voltage Drift (Note2)	$\Delta V / \Delta T$	IO = 5mA		-	-0.8	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 10 TA = +25°C)0kHz	-	10	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz, IO VI = 9V to 19V	= 500mA /	-	65	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =	+25°C	-	2	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	17	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA =	=+25°C	-	250	-	mA
Peak Current (Note2)	IPK	TJ = +25°C		-	2.2	-	A

Note:

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

Electrical Characteristics (MC7808AE) (Continued)

(Refer to the test circuits. 0°C < TJ < 125°C, Io =1A, V I = 14V, C I=0.33µF, C O=0.1µF, unless otherwise specified)

Parameter	Symbol	Co	onditions	Min.	Тур.	Max.	Unit
		TJ =+25°C		7.84	8	8.16	
Output Voltage	Vo	IO = 5mA to 1 $V_I = 10.6V \text{ to}$	A, PO ≤15W 23V	7.7	8	8.3	V
		VI= 10.6V to 2	25V, IO = 500mA	-	6	80	
Line Regulation (Note1)	Doglino	VI= 11V to 17	V	-	3	80	m\/
	Regime	T 25°C	VI= 10.4V to 23V	-	6	80	mv
		1J =+25°C	V _I = 11V to 17V	-	2	40	
		TJ =+25°C, IC) = 5mA to 1.5A	-	12	100	
Load Regulation (Note1)	Regload	IO = 5mA to 1	A	-	12	100	mV
		IO = 250mA to 750mA		-	5	50	
Quiescent Current	lQ	TJ =+25°C		-	5.0	6	mA
	ΔlQ	IO = 5mA to 1	A	-	-	0.5	
Quiescent Current Change		VI = 11V to 25V, IO = 500mA		-	-	0.8	mA
		V _I = 10.6V to 23V, T _J =+25°C		-	-	0.8	
Output Voltage Drift (Note2)	$\Delta V / \Delta T$	IO = 5mA		-	-0.8	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 10 TA =+25°C)0kHz	-	10	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz, IO VI = 11.5V to	= 500mA 21.5V	-	62	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =-	IO = 1A, TJ =+25°C		2	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	18	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA =	=+25°C	-	250	-	mA
Peak Current (Note2)	IPK	TJ = +25°C		-	2.2	-	A

Note:

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

Electrical Characteristics (MC7809AE) (Continued)

(Refer to the test circuits. 0°C < TJ < 125°C, I₀ =1A, V I = 15V, C I=0.33µF, C O=0.1µF, unless otherwise specified)

Parameter	Symbol	Co	Min.	Тур.	Max.	Unit	
		TJ = +25°C	8.82	9.0	9.18		
Output Voltage	Vo	IO = 5mA to 1 VI = 11.2V to	A, P _O ≤ 15W 24V	8.65	9.0	9.35	V
		VI = 11.7V to	25V, IO = 500mA	-	6	90	
Line Regulation (Note1)	Poglino	V _I = 12.5V to 2	19V	-	4	45	m\/
	Regime	T1-+25°C	VI = 11.5V to 24V	-	6	90	IIIV
		15 = +25 C	VI = 12.5V to 19V	-	2	45	
		$T_J = +25^{\circ}C$, $I_O = 5mA$ to 1.0A		-	12	100	
Load Regulation (Note1)	Regload	$I_{O} = 5 mA \text{ to } 1.0 A$		-	12	100	mV
		IO = 250mA to 750mA		-	5	50	
Quiescent Current	lQ	T _J = +25°C		-	5.0	6.0	mA
	ΔlQ	VI = 11.7V to	-	-	0.8		
Quiescent Current Change		VI = 12V to 25	-	-	0.8	mA	
		IO = 5mA to 1.0A		-	-		0.5
Output Voltage Drift (Note2)	$\Delta V / \Delta T$	IO = 5mA	-	-1.0	-	mV/°C	
Output Noise Voltage	VN	f = 10Hz to 100kHz TA = +25°C		-	10	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz, IO = 500mA VI = 12V to 22V		-	62	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =+25°C		-	2.0	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	17	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA =	= +25°C	-	250	-	mA
Peak Current (Note2)	lрк	TJ = +25°C		-	2.2	-	А

Note:

1. Load and line regulation are specified at constant, junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (MC7812AE) (Continued)

(Refer to the test circuits. 0°C < TJ < 125°C, Io =1A, V I = 19V, C I=0.33µF, CO=0.1µF, unless otherwise specified)

Parameter	Symbol	Co	onditions	Min.	Тур.	Max.	Unit
		TJ =+25°C	11.75	12	12.25		
Output Voltage	Vo	$I_{O} = 5mA \text{ to } 1$ VI = 14.8V to 2	A, P _O ≤15W 27V	itionsMin.Typ.Max.U11.751212.25 $^{O} \leq 15W$ 11.51212.5 $, IO = 500mA$ -10120 $-$ 4120 $ = 14.5V \text{ to } 27V$ -10 $ = 16V \text{ to } 22V$ -3 $5mA \text{ to } 1.5A$ -12 $-$ 12100 $5mA \text{ to } 1.5A$ -12 $-$ 12100 $50mA$ -5 50 -5.1 $60mA$ -0.8 $-$ 0.8 $IO = 500mA$ -0.5 $-$ 10- I_2 -0.6 $-$ 10- 12 00mA- $-$ 10- 12 -10 $00mA$ -60 $-$ 18- $00mA$ -2.0 $-$ 18- $5^{\circ}C$ -250 $-$ 250-	V		
		VI= 14.8V to 3	30V, IO = 500mA	-	10	120	
Line Regulation (Note1)	Poglino	V _I = 16V to 22	V	-	4	120	m\/
	Regime	T1-+25°C	VI= 14.5V to 27V	-	10	120	IIIV
		15=+25 C	VI= 16V to 22V	-	3	60	
		$T_J = +25^{\circ}C$, IO = 5mA to 1.5A		-	12	100	
Load Regulation (Note1)	Regload	$I_O = 5 mA \text{ to } 1.0 A$		-	12	100	mV
		IO = 250mA to 750mA		-	5	50	
Quiescent Current	lq	TJ =+25°C	-	5.1	6.0	mA	
		VI = 15V to 30	-		0.8		
Quiescent Current Change	ΔlQ	VI = 14V to 27	-		0.8	mA	
		IO = 5mA to 1.0A		-		0.5	
Output Voltage Drift (Note2)	$\Delta V / \Delta T$	IO = 5mA	IO = 5mA			-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kHz TA =+25°C		-	10	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz, Io = 500mA VI = 14V to 24V		-	60	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =+25°C		-	2.0	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	18	-	mΩ
Short Circuit Current	ISC	VI= 35V, TA =	÷+25°C	-	250	-	mA
Peak Current (Note2)	IPK	TJ=+25°C		-	2.2	-	А

Note:

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

Electrical Characteristics (MC7815AE) (Continued)

(Refer to the test circuits. 0°C < TJ < 125°C, I₀ =1A, V I =23V, C I=0.33µF, CO=0.1µF, unless otherwise specified)

Parameter	Symbol	Co	onditions	Min.	Тур.	Max.	Unit	
		TJ =+25°C		14.7	15	15.3		
Output Voltage	Vo	IO = 5mA to 1A, PO ≤15W VI = 17.7V to 30V		14.4	15	15.6	V	
		VI = 17.9V to 3	30V, IO = 500mA	-	10	150		
Line Regulation (Note1)	Poglino	$V_{I} = 20V$ to 26	SV	-	5	150	m\/	
	Regime	T1-+25°C	VI = 17.5V to 30V	-	11	150	IIIV	
		1J =+25 C	VI = 20V to 26V	-	3	75		
		$T_J = +25^{\circ}C$, IO = 5mA to 1.5A		-	12	100		
Load Regulation (Note1)	Regload	IO = 5mA to 1	.0A	-	12	100	mV	
		IO = 250mA to 750mA		-	5	50		
Quiescent Current	lQ	TJ =+25°C		-	5.2	6.0	mA	
		VI = 17.5V to 30V, TJ =+25°C		-	-	0.8	mA	
Quiescent Current Change	ΔlQ	VI = 17.5V to 30V, IO = 500mA		-	-	0.8		
		IO = 5mA to 1.0A		-	-	0.5		
Output Voltage Drift (Note2)	$\Delta V / \Delta T$	IO = 5mA		-	-1.0	-	mV/°C	
Output Noise Voltage	VN	f = 10Hz to 10 TA =+25°C	f = 10Hz to 100kHz TA =+25°C		10	-	μV/Vo	
Ripple Rejection (Note2)	RR	f = 120Hz, IO = 500mA VI = 18.5V to 28.5V		-	58	-	dB	
Dropout Voltage	VDrop	IO = 1A, TJ =+25°C		-	2.0	-	V	
Output Resistance (Note2)	rO	f = 1kHz		-	19	-	mΩ	
Short Circuit Current	ISC	VI = 35V, TA =	=+25°C	-	250	-	mA	
Peak Current (Note2)	IPK	TJ =+25°C		-	2.2	-	Α	

Note:

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

Electrical Characteristics (MC7818AE) (Continued)

(Refer to the test circuits. 0°C < TJ < 125°C, I₀ =1A, V I = 27V, C I=0.33µF, C O=0.1µF, unless otherwise specified)

Parameter	Symbol	Co	onditions	Min.	Тур.	Max.	Unit
		TJ =+25°C		17.64	18	18.36	
Output Voltage	SymbolConditionsVO $T_J = +25^{\circ}C$ VO $I_O = 5mA \text{ to } 1A, P_O \le 15W$ $V_I = 21V \text{ to } 33V$ $V_I = 21V \text{ to } 33V$ (Note1)Regline $V_I = 21V \text{ to } 33V$ (Note1)Regload $V_I = 21V \text{ to } 33V$ (Note1)Regload $T_J = +25^{\circ}C$ $V_I = 20.6V \text{ to } 33$ (Note1)Regload $T_J = +25^{\circ}C, I_O = 5mA \text{ to } 1.5A$ IO = 5mA to 1.0AIO = 5mA to 1.0AIO = 250mA to 750mAIO = 250mA to 750mAntIQ $T_J = +25^{\circ}C$ Nt Change ΔI_Q $V_I = 21V \text{ to } 33V, T_J = +25^{\circ}C$ Nt Change $\Delta V/\Delta T$ IO = 5mA to 1.0AIO = 250mA to 2000AIO = 50000AIo = 5mA to 1.0AIO = 50000AItage V_N $f = 10Hz \text{ to } 100 \text{ KHz}$ TA = +25^{\circ}CIO = 22V to 32VVDropIO = 1A, TJ = +25^{\circ}C	A, P _O ≤15W 3V	17.3	18	18.7	V	
		VI= 21V to 33	V, IO = 500mA	-	15	180	
Line Regulation (Note1)	Poglino	V _I = 21V to 33	V	-	5	180	m\/
	Regime	T + 25°C	VI= 20.6V to 33V	-	15	180	IIIV
		15 = +25 C	VI= 24V to 30V	-	5	90	
		$T_J = +25^{\circ}C$, $I_O = 5mA$ to 1.5A		-	15	100	
Load Regulation (Note1)	Regload	IO = 5mA to 1	.0A	-	15	100	mV
		IO = 250mA to 750mA		-	7	50	
Quiescent Current	lQ	TJ =+25°C		-	5.2	6.0	mA
	ΔlQ	VI = 21V to 33	-	-	0.8		
Quiescent Current Change		$V_{I} = 21V$ to 33	-	-	0.8	mA	
		IO = 5mA to 1.0A		-	-		0.5
Output Voltage Drift (Note2)	$\Delta V / \Delta T$	IO = 5mA		-	-1.0	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kHz TA =+25°C		-	10	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz, IO = 500mA VI = 22V to 32V		-	57	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =+25°C		-	2.0	-	V
Output Resistance (Note2)	rO	f = 1kHz	-	19	-	mΩ	
Short Circuit Current	ISC	VI= 35V, TA =	:+25°C	-	250	-	mA
Peak Current (Note2)	IPK	TJ=+25°C		-	2.2	-	Α

Note:

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

Electrical Characteristics (MC7824AE) (Continued)

(Refer to the test circuits. 0°C < TJ < 125°C, Io =1A, V I = 33V, C I=0.33µF, CO=0.1µF, unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Тур.	Max.	Unit
		TJ =+25°C	23.5	24	24.5		
Output Voltage	Vo	IO = 5mA to 1 VI = 27.3V to	A, P _O ≤15W 38V	23	24	25	V
		VI= 27V to 38	V, IO = 500mA	-	18	240	
Line Regulation (Note1)	Poglino	VI= 21V to 33	V	-	6	240	m\/
	Regime	T + -+25°C	VI= 26.7V to 38V	-	18	240	1110
		15 = +25 C	VI= 30V to 36V	-	6	120	
		$T_J = +25^{\circ}C$, $I_O = 5mA$ to 1.5A		-	15	100	
Load Regulation (Note1)	Regload	$I_O = 5 mA$ to 1.0A		-	15	100	mV
		IO = 250mA to 750mA		-	7	50	
Quiescent Current	lQ	TJ =+25°C		-	5.2	6.0	mA
		VI = 27.3V to 38V, TJ =+25°C		-	-	0.8	mA
Quiescent Current Change	ΔlQ	VI = 27.3V to 38V, IO = 500mA		-	-	0.8	
		IO = 5mA to 1.0A		-	-	0.5	
Output Voltage Drift (Note2)	$\Delta V / \Delta T$	IO = 5mA	IO = 5mA		-1.5	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kHz TA = 25°C		-	10	-	μV/Vo
Ripple Rejection (Note2)	RR	f = 120Hz, IO = 500mA VI = 28V to 38V		-	54	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ =+25°C		-	2.0	-	V
Output Resistance (Note2)	rO	f = 1kHz		-	20	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA =	=+25°C	-	250	-	mA
Peak Current (Note2)	IPK	TJ =+25°C		-	2.2	-	A

Note:

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

Typical Perfomance Characteristics



Figure 1. Quiescent Current



Figure 3. Output Voltage



Figure 2. Peak Output Current



Figure 4. Quiescent Current

Typical Applications





Figure 9. Constant Current Regulator

Notes:

- (1) To specify an output voltage. substitute voltage value for "XX." A common ground is required between the input and the Output voltage. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.
- (2) CI is required if regulator is located an appreciable distance from power Supply filter.
- (3) C_O improves stability and transient response.



Figure 10. Circuit for Increasing Output Voltage



Figure 11. Adjustable Output Regulator (7 to 30V)



Figure 12. High Current Voltage Regulator



Figure 13. High Output Current with Short Circuit Protection



Figure 14. Tracking Voltage Regulator



Figure 15. Split Power Supply (±15V-1A)



Figure 16. Negative Output Voltage Circuit



Figure 17. Switching Regulator

Mechanical Dimensions

Package

Dimensions in millimeters





10.00 ±0.20



Mechancal Dimensions (Continued)

Package

Dimensions in millimeters



D-PAK

Ordering Information

Product Number	Output Voltage Tolerance	Package	Operating Temperature
LM7805ECT	±4%	TO-220	0 ~ +125°C
Product Number	Output Voltage Tolerance	Package	Operating Temperature
MC7805ECT			
MC7806ECT			
MC7808ECT			
MC7809ECT		TO-220	
MC7812ECT		10-220	
MC7815ECT			
MC7818ECT	±4%		
MC7824ECT			
MC7805ECDT			
MC7806ECDT			
MC7808ECDT		D-PAK	0 ~ +125°C
MC7809ECDT			
MC7812ECDT			
MC7805AECT			
MC7806AECT			
MC7808AECT			
MC7809AECT	1.00/	TO 220	
MC7812AECT	±∠ /₀	10-220	
MC7815AECT			
MC7818AECT]		
MC7824AECT			

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MC7824E

3-Terminal 1A Positive Voltage Regulator

Contents

 General description Features Product status/pricing/packaging

Qualification Support

•Order Samples

General description

The MC78XXE/LM78XXE/MC78XXAE series of three terminal positive regulators are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

back to top

Features

- Output current up to 1A
- Output voltages of 5, 6, 8, 9, 12, 15, 18, 24V
- Thermal overload protection
- Short circuit protection
- Output transistor safe operating area protection

back to top

Product status/pricing/packaging







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(PCNs)

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How to order products

Product Change Notices

This page Print version

Product	Product status	Pb-free Status	Pricing*	Package type	Leads	Packing method	Package Marking Convention**
							Line 1: \$Y (Fairchild logo)

MC7824ECT	Full Production	Full Production	\$0.386	TO-220	3	RAIL	& Z (Asm. Plant Code) & 4 (4-Digit Date Code)
MC7824ECTBU	Lifetime Buy	Ø	N/A	TO-220	3	BULK	N/A

* Fairchild 1,000 piece Budgetary Pricing
** A sample button will appear if the part is available through Fairchild's on-line samples program. If there is no sample button, please contact a <u>Fairchild distributor</u> to obtain samples

Ø

Indicates product with Pb-free second-level interconnect. For more information click here.

Package marking information for product MC7824E is available. Click here for more information .

back to top

Qualification Support

Click on a product for detailed qualification data

Product	
MC7824ECT	
MC7824ECTBU	

back to top

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