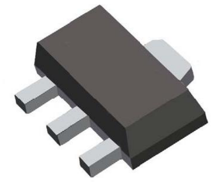
78HXXM

3-Terminal 300mA Positive Voltage Regulator



SOT89-3

General Description

The 78HXXM family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications requiring supply current up to 300mA.

The 78HXXM family is available in SOT89-3 package.

Features

- Output Current up to 300mA
- Fixed Output Voltage of 5V, 6V, 8V,9V,12V and 15V
- Thermal Overload Shutdown Protection
- Short Circuit Current Limiting

Package Information

Part NO.	Package Description	Package Marking	Package Option
78HXXM	SOT89-3	78HXXM SXXXX	1000/Reel

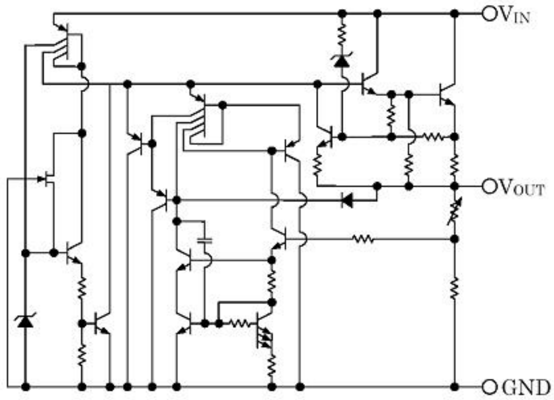
SXXXX:Lot NO. 78HXXM:Part NO. (XX:Output Voltage)

XX(Output Voltage): 05(5.0V)/06(6.0V)/08(8.0V)/09(9.0V)/12(12V)/15(15V)

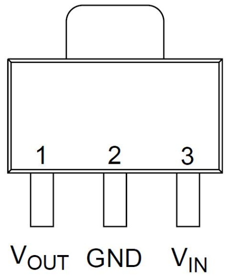
Applications

- Network Products
- Sound Card and Computer Motherboard
- Linear Regulator Source
- CD-ROM and DVD-ROM
- Controller

Functional Block Diagram



Pin Configuration



78HXXM(SOT89-3)

Pin Description

Pin Number	Pin Name	Function Description
1	V_{OUT}	Output pin
2	GND	Ground
3	V_{IN}	Input pin

Absolute Maximum Ratings (Operating temperature range applies, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Input Voltage	V_{IN}	30	V
Output Current	I_{OUT}	300	mA
Power Dissipation	P_D	550	mW
Operating Temperature Range	Topr	-40~125	°C
Storage Temperature Range	Tstg	-55~150	°C

*1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

*2. It is guarantee by design, not 100% be tested.

Electrical Characteristics (C1=0.33uF, CO=0.1uF, unless otherwise specified) *1

78H05M (V_{IN}=10V, I_{OUT}=40mA)

Characteristics	Test conditions	Symbol	Min	Typ	Max	Unit
Output Voltage	Tj=25°C	V_{OUT}	4.80	5.00	5.20	V
	7V ≦ V_{IN} ≦ V_{MAX} I_{OUT}=1mA~300mA *2		4.75		5.25	
Load Regulation	Tj=25°C; I_{OUT}=1mA~300mA	Δ V_{OUT}		11	60	mV
	Tj=25°C; I_{OUT} =1mA~40mA			5.0	30	mV
Line Regulation	Tj=25°C; 7V≤V_{IN}≤20V	Δ V_{OUT}		8	150	mV
	Tj=25°C; 8V≤V_{IN} ≤20V			6	100	mV
Quiescent Current		I_Q		2.0	5.5	mA
Quiescent Current Change	8V≤ V_{IN} ≤20V	ΔI_Q			1.5	mA
	1mA≤ V_{IN} ≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	eN		40		µV
Temperature Coefficient of V_{OUT}	I_{OUT}=5mA	ΔVo/ΔT		-0.65		mV/°C
Ripple Rejection	8V≤ V_{IN} ≤20V; f=120Hz; Tj=25°C	RR	41	80		dB
Dropout Voltage	Tj=25°C	V_D		1.7		V

78H06M (V_{IN}=12V, I_{OUT}=40mA)

Characteristics	Test conditions	Symbol	Min	Typ	Max	Unit
Output Voltage	Tj=25°C	V_{OUT}	5.76	6.00	6.24	V
	8.5V ≦ V_{IN} ≦ V_{MAX} I_{OUT}=1mA~300mA *2		5.7		6.3	
Load Regulation	Tj=25°C; I_{OUT}=1mA~300mA	Δ V_{OUT}		12.8	80	mV
	Tj=25°C; I_{OUT} =1mA~40mA			5.8	40	mV
Line Regulation	Tj=25°C; 8.5V≤V_{IN}≤20V	Δ V_{OUT}		64	175	mV
	Tj=25°C; 9V≤V_{IN} ≤20V			54	125	mV
Quiescent Current		I_Q		2.0	5.5	mA
Quiescent Current Change	9V≤ V_{IN} ≤20V	ΔI_Q			1.5	mA
	1mA≤ V_{IN} ≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	eN		49		µV
Temperature Coefficient of V_{OUT}	I_{OUT}=5mA	ΔVo/ΔT		0.75		mV/°C
Ripple Rejection	10V≤ V_{IN} ≤20V; f=120Hz; Tj=25°C	RR	40	46		dB
Dropout Voltage	Tj=25°C	V_D		1.7		V

78H08M (V_{IN}=14V, I_{OUT}=40mA)

Characteristics	Test conditions	Symbol	Min	Typ	Max	Unit
Output Voltage	Tj=25°C	V_{OUT}	7.68	8.00	8.32	V
	10.5V≦V_{IN}≦V_{MAX} I_{OUT}=1mA~300mA *2		7.6		8.4	
Load Regulation	Tj=25°C; I_{OUT}=1mA~300mA	Δ V_{OUT}		15	80	mV
	Tj=25°C; I_{OUT} =1mA~40mA			8.0	40	mV
Line Regulation	Tj=25°C; 10.5V≤V_{IN}≤23V	Δ V_{OUT}		10	175	mV
	Tj=25°C; 11V≤V_{IN} ≤23V			8	125	mV
Quiescent Current		I_Q		2.0	5.5	mA
Quiescent Current Change	11V≤ V_{IN} ≤20V	ΔI_Q			1.5	mA
	1mA≤ V_{IN} ≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	eN		49		μV
Temperature Coefficient of V_{OUT}	I_{OUT}=5mA	ΔVo/ΔT		0.75		mV/°C
Ripple Rejection	11V≤ V_{IN} ≤23V; f=120Hz; Tj=25°C	RR	39	70		dB
Dropout Voltage	Tj=25°C	V_D		1.7		V

78H09M (V_{IN}=15V, I_{OUT}=40mA)

Characteristics	Test conditions	Symbol	Min	Typ	Max	Unit
Output Voltage	Tj=25°C	V_{OUT}	8.64	9.00	9.36	V
	11.5V≦V_{IN}≦V_{MAX} I_{OUT}=1mA~300mA *2		8.55		9.45	
Load Regulation	Tj=25°C; I_{OUT}=1mA~300mA	Δ V_{OUT}		15	90	mV
	Tj=25°C; I_{OUT} =1mA~40mA			8.0	45	mV
Line Regulation	Tj=25°C; 11.5V≤V_{IN}≤24V	Δ V_{OUT}		15	200	mV
	Tj=25°C; 13V≤V_{IN} ≤24V			10	150	mV
Quiescent Current		I_Q		2.0	6.0	mA
Quiescent Current Change	13V≤ V_{IN} ≤24V	ΔI_Q			1.5	mA
	1mA≤ V_{IN} ≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	eN		49		μV
Temperature Coefficient of V_{OUT}	I_{OUT}=5mA	ΔVo/ΔT		0.75		mV/°C
Ripple Rejection	11V≤ V_{IN} ≤23V; f=120Hz; Tj=25°C	RR	38	70		dB
Dropout Voltage	Tj=25°C	V_D		1.7		V

78H12M (V_{IN}=18V, I_{OUT}=40mA)

Characteristics	Test conditions	Symbol	Min	Typ	Max	Unit
Output Voltage	Tj=25°C	V_{OUT}	11.52	12.00	12.48	V
	14.5V≦V_{IN}≦V_{MAX} I_{OUT}=1mA~300mA *2		11.40		12.60	
Load Regulation	Tj=25°C; I_{OUT}=1mA~300mA	Δ V_{OUT}		20	150	mV
	Tj=25°C; I_{OUT} =1mA~40mA			8.0	75	mV
Line Regulation	Tj=25°C; 14.5V≤V_{IN}≤27V	Δ V_{OUT}		20	300	mV
	Tj=25°C; 16V≤V_{IN} ≤27V			15	250	mV
Quiescent Current		I_Q		2.0	6.0	mA
Quiescent Current Change	16V≤ V_{IN} ≤27V	ΔI_Q			1.5	mA
	1mA≤ V_{IN} ≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	eN		80		μV
Temperature Coefficient of V_{OUT}	I_{OUT}=5mA	ΔVo/ΔT		0.75		mV/°C
Ripple Rejection	11V≤ V_{IN} ≤23V; f=120Hz; Tj=25°C	RR	37	70		dB
Dropout Voltage	Tj=25°C	V_D		1.7		V

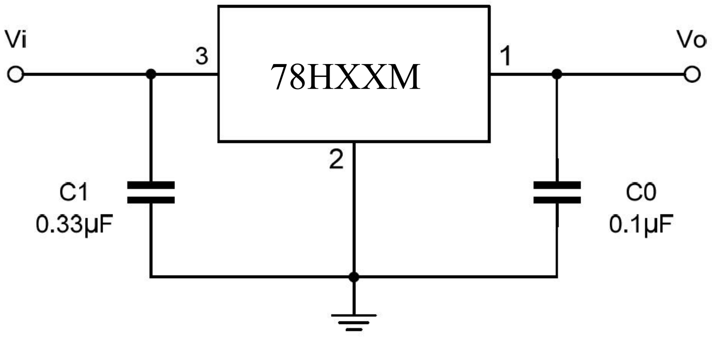
78H15M (V_{IN}=21V, I_{OUT}=40mA)

Characteristics	Test conditions	Symbol	Min	Typ	Max	Unit
Output Voltage	Tj=25°C	V_{OUT}	14.40	15.00	15.60	V
	17.5V≦V_{IN}≦V_{MAX} I_{OUT}=1mA~300mA *2		14.25		15.75	
Load Regulation	Tj=25°C; I_{OUT}=1mA~300mA	Δ V_{OUT}		30	160	mV
	Tj=25°C; I_{OUT} =1mA~40mA			10	80	mV
Line Regulation	Tj=25°C; 17.5V≤V_{IN}≤30V	Δ V_{OUT}		30	300	mV
	Tj=25°C; 20V≤V_{IN} ≤30V			20	250	mV
Quiescent Current		I_Q		2.2	6.5	mA
Quiescent Current Change	20V≤ V_{IN} ≤30V	ΔI_Q			1.5	mA
	1mA≤ V_{IN} ≤40mA				0.1	mA
Output Noise Voltage	10Hz≤f≤100kHz	eN		90		μV
Temperature Coefficient of V_{OUT}	I_{OUT}=5mA	ΔVo/ΔT		0.75		mV/°C
Ripple Rejection	11V≤ V_{IN} ≤23V; f=120Hz; Tj=25°C	RR	34	70		dB
Dropout Voltage	Tj=25°C	V_D		1.7		V

*1. The Maximum steady state usable output current are dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB. The data above represent pulse test conditions with junction temperatures specified at the initiation of test.

*2. Power dissipation<0.5W

Typical Application



*1. To specify an output voltage, substitute voltage value for "XX".

*2. Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

Characteristics Curves

Fig.7 78H05A Quiescent Current vs. Input Voltage (I_{OUT}=0mA,T_J=25°C)

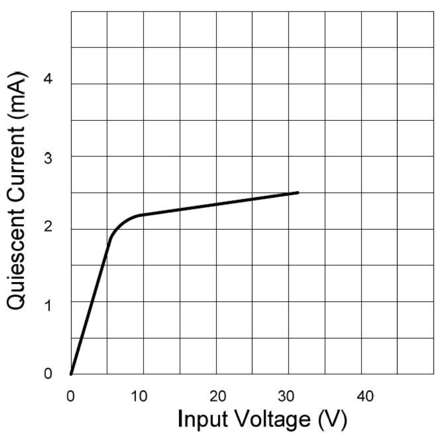


Fig.8 Peak Output Current vs Dropout Voltage Difference

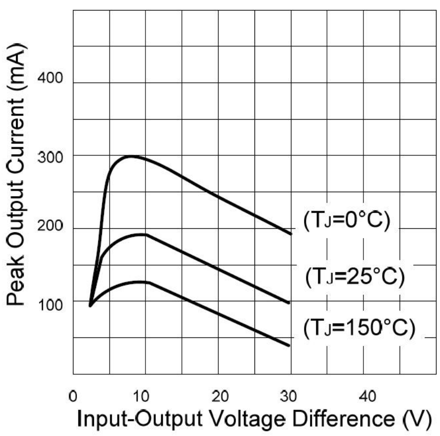


Fig.1 Ambient Temperature vs. Power Dissipation

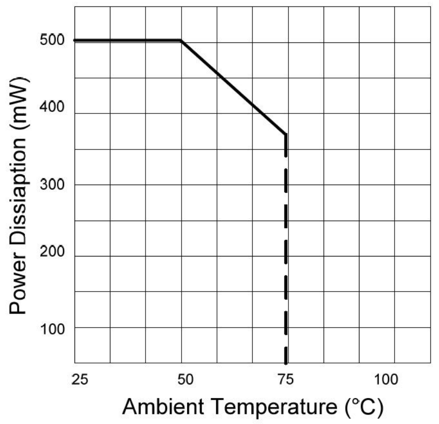


Fig.2 78H05A Output Voltage vs.Ambient Temperature

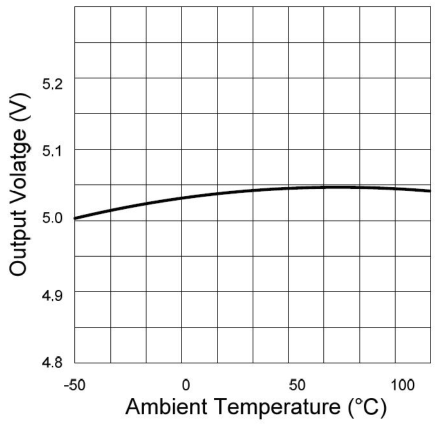


Fig.3 78H08A Output Volatge vs. Ambient Temperature

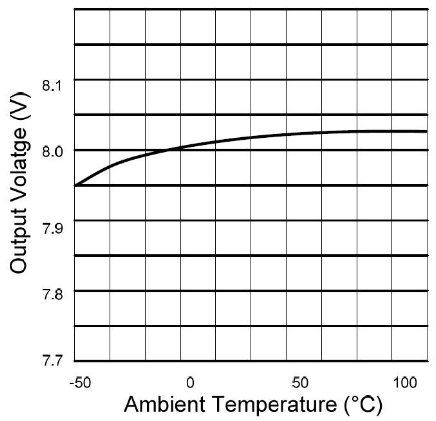


Fig.4 Output Characteristics (I_{OUT}=0mA,T_J=25℃)

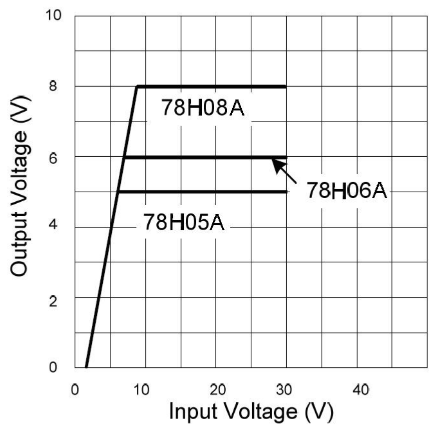


Fig.5 78H05A Dropout Characteristics (T_J=25°C)

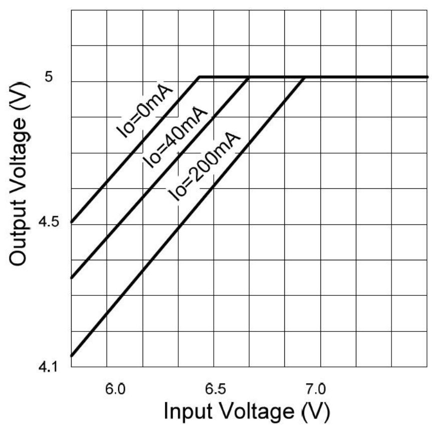
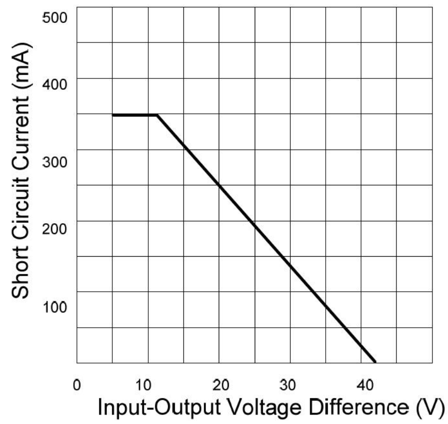
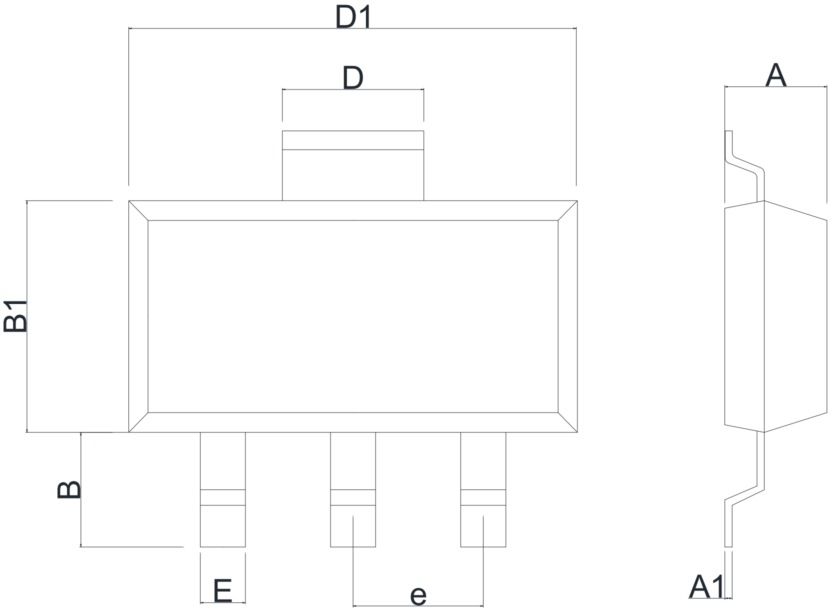


Fig.6 Short Circuit Output Current (T_J=25°C)



Outline Dimensions

SOT89-3 Unit：mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.550	0.057	0.061
A1	0.390	0.410	0.015	0.016
B	0.950	1.050	0.037	0.041
B1	2.350	2.550	0.092	0.100
E	0.350	0.450	0.013	0.017
D1	4.400	4.600	0.173	0.181
D	1.550 REF		0.061 REF	
e	1.500（BSC）		0.059（BSC）	

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