M5278DXX

FIXED-POSITIVE OUTPUT 3-TERMINAL REGULATOR (WITH FOLD-BACK PROTECTION CIRCUIT)

DESCRIPTION

The M5278D series is a semiconductor integrated circuit which is designed for 3 terminal regulator which is available for maximum load current 300mA class positive output.

Fold-back protective circuit for limiting current in case of shorted loads, heart protection circuit and ASO protection circuit are included in the devices.

Especially, with the operation by a low input-output differential and a low bias current, the devices are suitable for use in a wide range of power supplies.

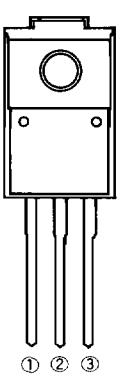
FEATURES

- The operation by a low input-output differential ..... V_{DIF} = 1V
- Low bias current 1.2mA
- Internal fold-back protection circuit limits current due to shorted loads.
- Variety of output voltage ranks (5V, 5.6V, 6V, 9V, 12V, 15V)

APPLICATION

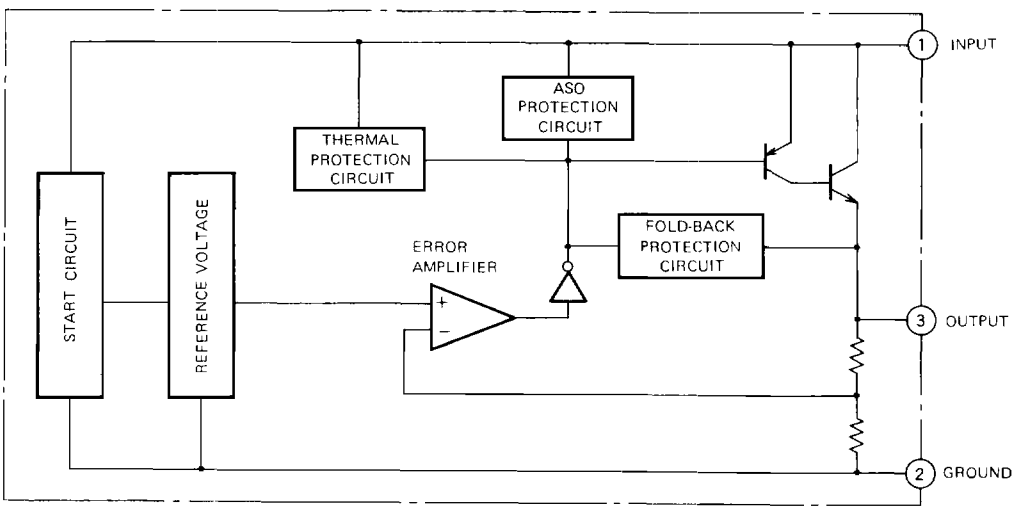
For general power supply of various types of equipment such as VCR, Compact Disk Player

PIN CONFIGURATION (TOP VIEW)



Outline 3P9

BLOCK DIAGRAM

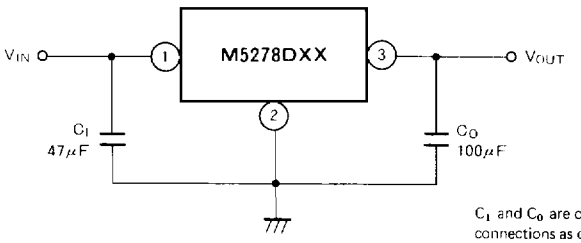


FIXED-POSITIVE OUTPUT 3-TERMINAL REGULATOR (WITH FOLD-BACK PROTECTION CIRCUIT)

ABSOLUTE MAXIMUM RATINGS (Ta = 25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_I	Input voltage		36	V
I_L	Loading current		300	mA
Pd	Internal power dissipation		2 (no heat sink)	W
Topr	Operating ambient temperature		−20 ~ +75	℃
Tstg	Storage temperature		−55 ~ +150	℃

STANDARD CONNECTION



C_I and C_O are oscillation-preventive capacitors connections as close to the IC as possible.

ELECTRICAL CHARACTERISTICS

M5278D05 (V_I = 8V, I_O = 100mA, Ta = 25℃, C_I = 47μF, C_O = 100μF, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		4.80	5.0	5.20	V
Reg-in	Load regulation	6.5V ≦ V_I ≦ 20V		15	150	mV
		7V ≦ V_I ≦ 20V		10	100	
Reg-L	Line regulation	1mA ≦ I_O ≦ 100mA		5	50	mV
		10mA ≦ I_O ≦ 300mA		10	100	
V_O	Output voltage	6.5V ≦ V_I ≦ 20V, 1mA ≦ I_O ≦ 300mA	4.75	5.0	5.25	V
I_B	Bias current	I_O = 0		1.2	2	mA
V_{NO}	Output noise voltage	BW : 10Hz ~ 100kHz		100		μVrms
R.R	Ripple rejection ratio	f = 120Hz, V_I = 0dBm	50	60		dB
V_{DIF}	Minimum input-output voltage difference			0.9		V
I_{LP}	Peak load current		300			mA
I_{OS}	Output short circuit sustain current			30		mA

M5278D56 (V_I = 9V, I_O = 100mA, Ta = 25℃, C_I = 47μF, C_O = 100μF, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		5.37	5.6	5.83	V
Reg-in	Load regulation	7.1V ≦ V_I ≦ 20V		17	170	mV
		7.6V ≦ V_I ≦ 20V		11	110	
Reg-L	Line regulation	1mA ≦ I_O ≦ 100mA		5.5	55	mV
		10mA ≦ I_O ≦ 300mA		11	110	
V_O	Output voltage	7.1V ≦ V_I ≦ 20V, 1mA ≦ I_O ≦ 300mA	5.32	5.6	5.88	V
I_B	Bias current	I_O = 0		1.2	2	mA
V_{NO}	Output noise voltage	BW : 10Hz ~ 100kHz		110		μVrms
R.R	Ripple rejection ratio	f = 120Hz, V_I = 0dBm	49	59		dB
V_{DIF}	Minimum input-output voltage difference			0.9		V
I_{LP}	Peak load current		300			mA
I_{OS}	Output short circuit sustain current			30		mA

FIXED-POSITIVE OUTPUT 3-TERMINAL REGULATOR (WITH FOLD-BACK PROTECTION CIRCUIT)

M5278D06 (V_I=9V, I_O=100mA, Ta=25℃, C_I=47μF, C_O=100μF, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		5.76	6.0	6.24	V
$R_{eg\text{-}in}$	Load regulation	7.5V≦V_I≦21V		18	180	mV
		8V≦V_I≦21V		12	120	
$R_{eg\text{-}L}$	Line regulation	1mA≦I_O≦100mA		6	60	mV
		10mA≦I_O≦300mA		12	120	
V_O	Output voltage	7.5V≦V_I≦21V, 1mA≦I_O≦300mA	5.70	6.0	6.30	V
I_B	Bias current	I_O=0		1.2	2	mA
V_{NO}	Output noise voltage	BW: 10Hz ~ 100kHz		120		μVrms
R.R	Ripple rejection ratio	f=120Hz, V_I=0dBm	48	58		dB
V_{DIF}	Minimum input-output voltage difference			0.9		V
I_{LP}	Peak load current		300			mA
I_{OS}	Output short circuit sustain current			30		mA

M5278D09 (V_I=12V, I_O=100mA, Ta=25℃, C_I=47μF, C_O=100μF, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		8.64	9.0	9.36	V
$R_{eg\text{-}in}$	Load regulation	10.5V≦V_I≦24V		27	270	mV
		11V≦V_I≦24V		18	180	
$R_{eg\text{-}L}$	Line regulation	1mA≦I_O≦100mA		9	90	mV
		10mA≦I_O≦300mA		18	180	
V_O	Output voltage	10.5V≦V_I≦24V, 1mA≦I_O≦300mA	8.55	9.0	9.45	V
I_B	Bias current	I_O=0		1.2	2	mA
V_{NO}	Output noise voltage	BW: 10Hz ~ 100kHz		180		μVrms
R.R	Ripple rejection ratio	f=120Hz, V_I=0dBm	45	55		dB
V_{DIF}	Minimum input-output voltage difference			0.9		V
I_{LP}	Peak load current		300			mA
I_{OS}	Output short circuit sustain current			30		mA

M5278D12 (V_I=15V, I_O=100mA, Ta=25℃, C_I=47μF, C_O=100μF, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		11.52	12.0	12.48	V
$R_{eg\text{-}in}$	Load regulation	13.5V≦V_I≦27V		36	360	mV
		14V≦V_I≦27V		24	240	
$R_{eg\text{-}L}$	Line regulation	1mA≦I_O≦100mA		12	120	mV
		10mA≦I_O≦300mA		24	240	
V_O	Output voltage	13.5V≦V_I≦27V, 1mA≦I_O≦300mA	11.40	12.0	12.60	V
I_B	Bias current	I_O=0		1.2	2	mA
V_{NO}	Output noise voltage	BW: 10Hz ~ 100kHz		240		μVrms
R.R	Ripple rejection ratio	f=120Hz, V_I=0dBm	42	52		dB
V_{DIF}	Minimum input-output voltage difference			0.9		V
I_{LP}	Peak load current		300			mA
I_{OS}	Output short circuit sustain current			30		mA

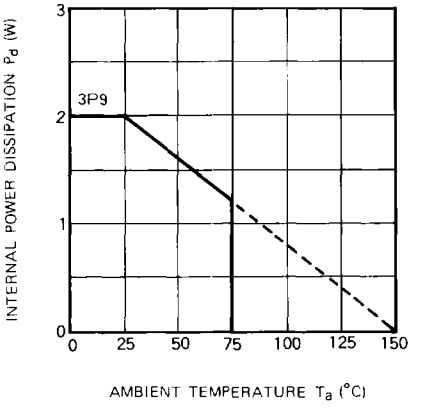
FIXED-POSITIVE OUTPUT 3-TERMINAL REGULATOR (WITH FOLD-BACK PROTECTION CIRCUIT)

M5278D15 (V_I = 18V, I_O = 100mA, T_a = 25℃, C_I = 47μF, C_O = 100μF, unless otherwise noted)

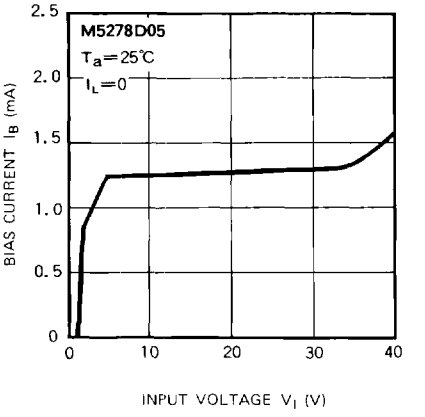
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		14.40	15.0	15.60	V
Reg-in	Load regulation	16.5V ≦ V_I ≦ 30V		45	450	mV
		17V ≦ V_I ≦ 30V		30	300	
Reg-L	Line regulation	1mA ≦ I_O ≦ 100mA		15	150	mV
		10mA ≦ I_O ≦ 300mA		30	300	
V_O	Output voltage	16.5V ≦ V_I ≦ 30V, 1mA ≦ I_O ≦ 300mA	14.25	15.0	15.75	V
I_B	Bias current	I_O = 0		1.2	2	mA
V_{NO}	Output noise voltage	BW : 10Hz ~ 100kHz		300		μVrms
R.R	Ripple rejection ratio	f = 120Hz, V_I = 0dBm	40	50		dB
V_{DIF}	Minimum input-output voltage difference			0.9		V
I_{LP}	Peak load current		300			mA
I_{OS}	Output short circuit sustain current			30		mA

CHARACTERISTIC CURVES

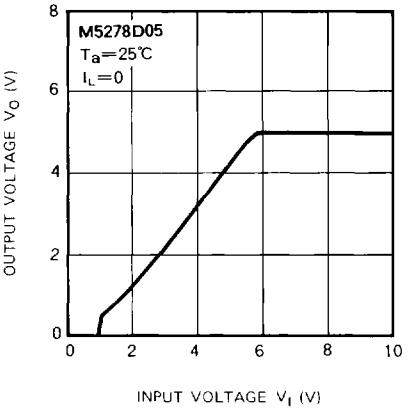
INTERNAL POWER DISSIPATION VS. AMBIENT TEMPERATURE (MAX)



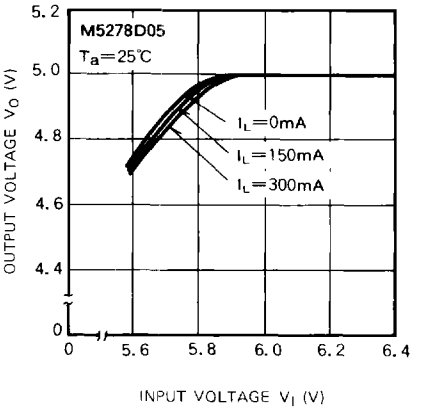
BIAS CURRENT VS. INPUT VOLTAGE



OUTPUT VOLTAGE VS. INPUT VOLTAGE



OUTPUT VOLTAGE VS. INPUT VOLTAGE



OUTPUT VOLTAGE VS. LOADING CURRENT