

MITSUBISHI <LINEAR ICs>
M5278DXX

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

MITSUBISHI ELEK (LINEAR) 53E D ■ 6249826 0014252 45T ■ MIT2

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, heat 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

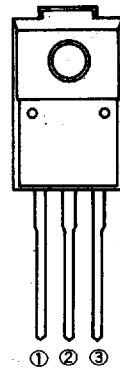
- The operation by a low input-output differential $V_{DIF} = 1V$
- Low bias current 1.2mA
- Internal fold-back protection circuit limits current due to shorted loads.
- Variety of output voltage ranks (5V, 5.6V, 6V, 9V, 12V, 15V)

APPLICATION

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

PIN CONFIGURATION (TOP VIEW)

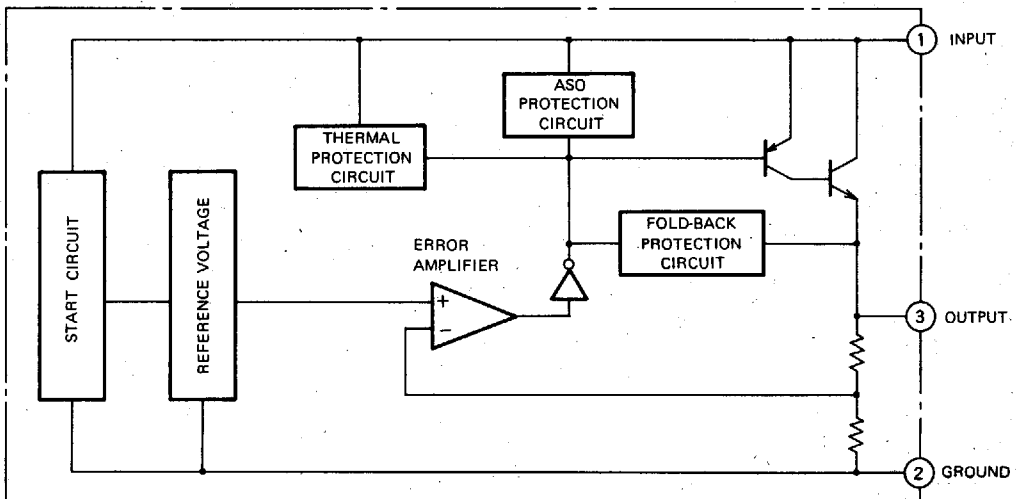
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- ① INPUT
- ② GROUND
- ③ OUTPUT

Outline 3P9

BLOCK DIAGRAM

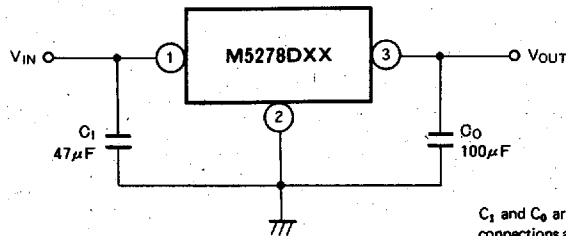


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ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_i	Input voltage		36	V
I_L	Loading current		300	mA
P_d	Internal power dissipation		2 (no heat sink)	W
T_{opr}	Operating ambient temperature		$-20 \sim +75$	$^\circ\text{C}$
T_{stg}	Storage temperature		$-55 \sim +150$	$^\circ\text{C}$

STANDARD CONNECTION

C_i and C_o are oscillation-preventive capacitors connections as close to the IC as possible.

ELECTRICAL CHARACTERISTICS**M5278D05** ($V_i = 8\text{V}$, $I_o = 100\text{mA}$, $T_a = 25^\circ\text{C}$, $C_i = 47\mu\text{F}$, $C_o = 100\mu\text{F}$, 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	$6.5\text{V} \leq V_i \leq 20\text{V}$		15	150	mV
		$7\text{V} \leq V_i \leq 20\text{V}$		10	100	
Reg-L	Line regulation	$1\text{mA} \leq I_o \leq 100\text{mA}$		5	50	mV
		$10\text{mA} \leq I_o \leq 300\text{mA}$		10	100	
V_o	Output voltage	$6.5\text{V} \leq V_i \leq 20\text{V}$, $1\text{mA} \leq I_o \leq 300\text{mA}$	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		μV_{rms}
R.R	Ripple rejection ratio	$f = 120\text{Hz}$, $V_i = 0\text{dBm}$	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 ($V_i = 9\text{V}$, $I_o = 100\text{mA}$, $T_a = 25^\circ\text{C}$, $C_i = 47\mu\text{F}$, $C_o = 100\mu\text{F}$, 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	$7.1\text{V} \leq V_i \leq 20\text{V}$		17	170	mV
		$7.6\text{V} \leq V_i \leq 20\text{V}$		11	110	
Reg-L	Line regulation	$1\text{mA} \leq I_o \leq 100\text{mA}$		5.5	55	mV
		$10\text{mA} \leq I_o \leq 300\text{mA}$		11	110	
V_o	Output voltage	$7.1\text{V} \leq V_i \leq 20\text{V}$, $1\text{mA} \leq I_o \leq 300\text{mA}$	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		μV_{rms}
R.R	Ripple rejection ratio	$f = 120\text{Hz}$, $V_i = 0\text{dBm}$	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
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M5278D06 ($V_i=9V$, $I_O=100mA$, $T_a=25^\circ C$, $C_i=47\mu F$, $C_O=100\mu F$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		5.76	6.0	6.24	V
Reg-in	Load regulation	$7.5V \leq V_i \leq 21V$		18	180	mV
		$8V \leq V_i \leq 21V$		12	120	
Reg-L	Line regulation	$1mA \leq I_O \leq 100mA$		6	60	mV
		$10mA \leq I_O \leq 300mA$		12	120	
V_O	Output voltage	$7.5V \leq V_i \leq 21V$, $1mA \leq I_O \leq 300mA$	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		μV_{rms}
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 ($V_i=12V$, $I_O=100mA$, $T_a=25^\circ C$, $C_i=47\mu F$, $C_O=100\mu F$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		8.64	9.0	9.36	V
Reg-in	Load regulation	$10.5V \leq V_i \leq 24V$		27	270	mV
		$11V \leq V_i \leq 24V$		18	180	
Reg-L	Line regulation	$1mA \leq I_O \leq 100mA$		9	90	mV
		$10mA \leq I_O \leq 300mA$		18	180	
V_O	Output voltage	$10.5V \leq V_i \leq 24V$, $1mA \leq I_O \leq 300mA$	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		μV_{rms}
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 ($V_i=15V$, $I_O=100mA$, $T_a=25^\circ C$, $C_i=47\mu F$, $C_O=100\mu F$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_O	Output voltage		11.52	12.0	12.48	V
Reg-in	Load regulation	$13.5V \leq V_i \leq 27V$		36	360	mV
		$14V \leq V_i \leq 27V$		24	240	
Reg-L	Line regulation	$1mA \leq I_O \leq 100mA$		12	120	mV
		$10mA \leq I_O \leq 300mA$		24	240	
V_O	Output voltage	$13.5V \leq V_i \leq 27V$, $1mA \leq I_O \leq 300mA$	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		μV_{rms}
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
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M5278D15 ($V_i = 18V$, $I_o = 100mA$, $T_a = 25^\circ C$, $C_i = 47\mu F$, $C_o = 100\mu F$, 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	$16.5V \leq V_i \leq 30V$		45	450	mV
		$17V \leq V_i \leq 30V$		30	300	
Reg-L	Line regulation	$1mA \leq I_o \leq 100mA$		15	150	mV
		$10mA \leq I_o \leq 300mA$		30	300	
V_o	Output voltage	$16.5V \leq V_i \leq 30V$, $1mA \leq I_o \leq 300mA$	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		μV_{rms}
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

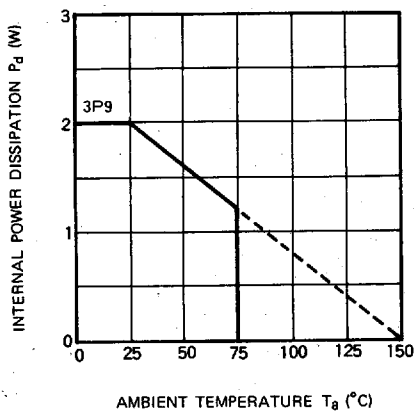
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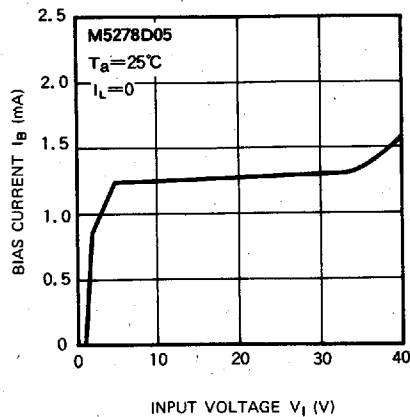
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CHARACTERISTIC CURVES

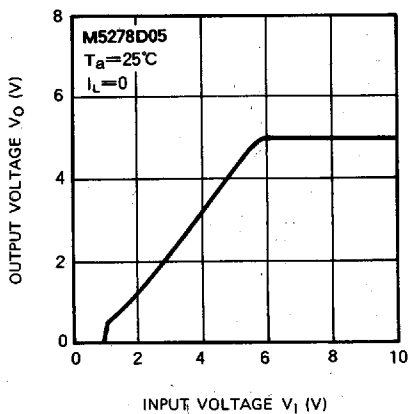
INTERNAL POWER DISSIPATION VS.
AMBIENT TEMPERATURE (MAX)



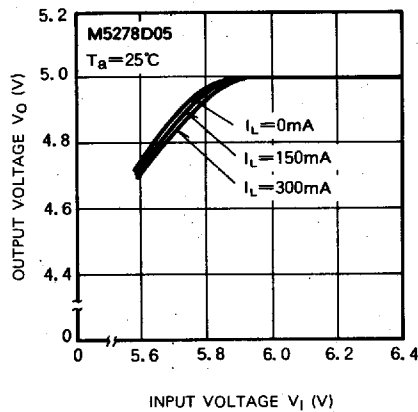
BIAS CURRENT VS.
INPUT VOLTAGE



OUTPUT VOLTAGE VS.
INPUT VOLTAGE



OUTPUT VOLTAGE VS.
INPUT VOLTAGE



OUTPUT VOLTAGE VS.
LOADING CURRENT

