

M5290P,FP

±5V TRACKING REGULATOR WITH RESET CIRCUIT

DESCRIPTION

M5290 is a semiconductor integrated circuit designed for voltage regulator which is dual tracking type (positive/negative output voltage) with system reset circuit.

Since the output voltage is fixed inside, User can omit the outside resistors, and this IC includes the system reset circuit for detecting the abnormal status of Power Supply. When Power Supply of system is in abnormal status, this IC sends the system reset output (Low) to the MPU/CPU, so User can make the system operate safely.

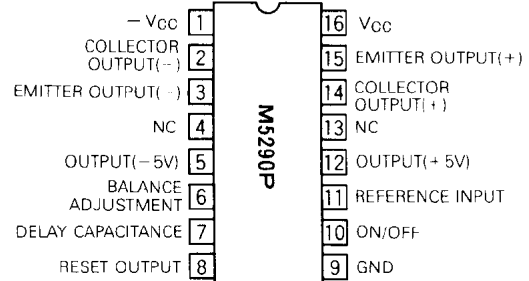
FEATURES

- High input voltage..... $V_I = \pm 20V$
- Fixed output voltage..... $V_O = \pm 5V$
- Internal system reset circuit (with hysteresis)
detectable voltage.....4.2V
(delay time is variable by connecting capacity at 7pin
(6pin for the FP))
- Current limiting circuit, thermal protection circuit
- Capable of ON/OFF control (10pin)
- Very Low input-output voltage differential operation by using transistor
- Variable output voltage (with external resistors connected between terminals ⑪ and GND and between positive output terminals).

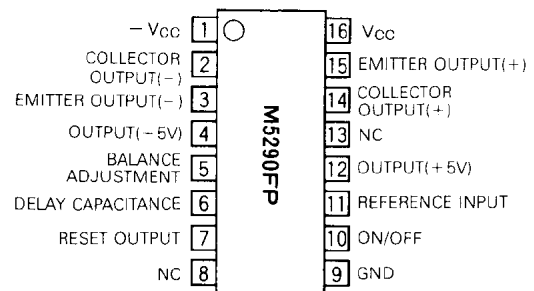
APPLICATION

Dual power supply for CD players and stereo set pre-/main-amplifiers

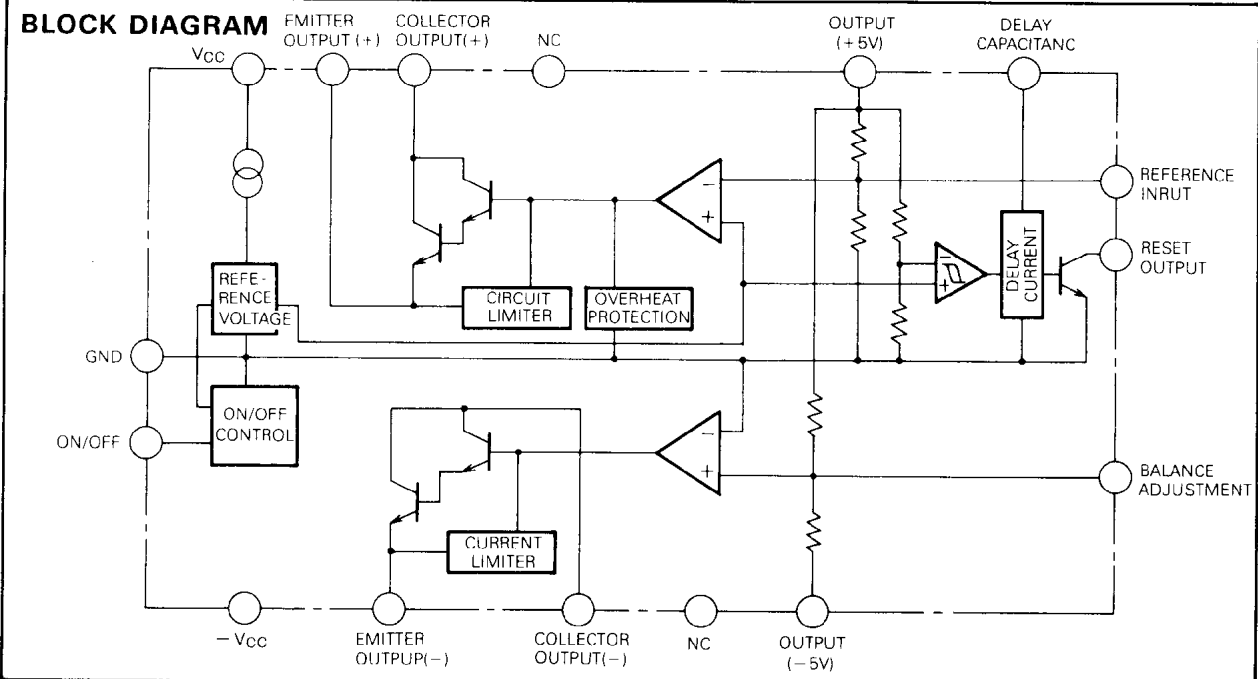
PIN CONFIGURATION (TOP VIEW)



Outline 16P4



Outline 16P2S-A



±5V TRACKING REGULATOR WITH RESET CIRCUIT

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

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		$\pm 20(40)$	V
I_{LP}	Load current		± 30	mA
V_{DIF}	Input/Output Voltage difference		$\pm 15(30)$	V
P_d	Power dissipation		$1.0(P)/0.55(FP)$	W
K_θ	Thermal derating	$T_a \geq 25^\circ\text{C}$	$10.0(P)/5.5(FP)$	mW/ $^\circ\text{C}$
T_{opr}	Ambient temperature		$-20 \sim +75$	$^\circ\text{C}$
T_{stg}	Storage temperature		$-55 \sim +125$	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$, $V_{CC} = \pm 8\text{V}$, $I_L = \pm 10\text{mA}$, unless otherwise noted)

Symbol	Parameter	Test condition	Limits			Unit
			MIN	TYP	MAX	
I_{CC}	Circuit current		—	3.0	6.0	mA

REGULATOR PART

Symbol	Parameter	Test conditions	Limits			Unit
			MIN	TYP	MAX	
V_{IN}	Input voltage		$\pm V_O \pm 2$	—	± 20	V
V_O	Output voltage		± 4.75	± 5.0	± 5.25	V
V_{REF}	Reference input voltage		1.15	1.20	1.25	V
ΔV_O	Dual voltage tracking		—	0.5	2	%
R.R	Ripple rejection	$C_{REF} = 1\mu\text{F}$, $f = 120\text{Hz}$	50	65	—	dB
REG-IN	Input voltage rejection	$V_I = \pm 8 \sim \pm 18\text{V}$	—	0.05	0.2	%/V
REG- I_O	Loading voltage rejection	$I_{L0} = 0 \sim 20\text{mA}$	—	20	100	mV
V_{NO}	Output noise voltage	$f = 20\text{Hz} \sim 100\text{kHz}$	—	10	—	μV_{rms}
$V_{O(off)}$	Output cut-off voltage	10pin GND	—	—	± 0.1	V

RESET PART

Symbol	Parameter	Test conditions	Limits			Unit
			MIN	TYP	MAX	
V_S	Detected voltage		3.95	4.2	4.45	V
ΔV_S	Hysteresis voltage		50	100	300	mA
T_{pd}	Delay time	$C_d = 0.1\mu\text{F}$	3	7	14	mS
V_{sat}	Output saturation voltage	$I_{sink} = 3\text{mA}$	—	0.2	0.4	V

Note: The employed measurement circuit conforms to application circuit example (1).

±5V TRACKING REGULATOR WITH RESET CIRCUIT

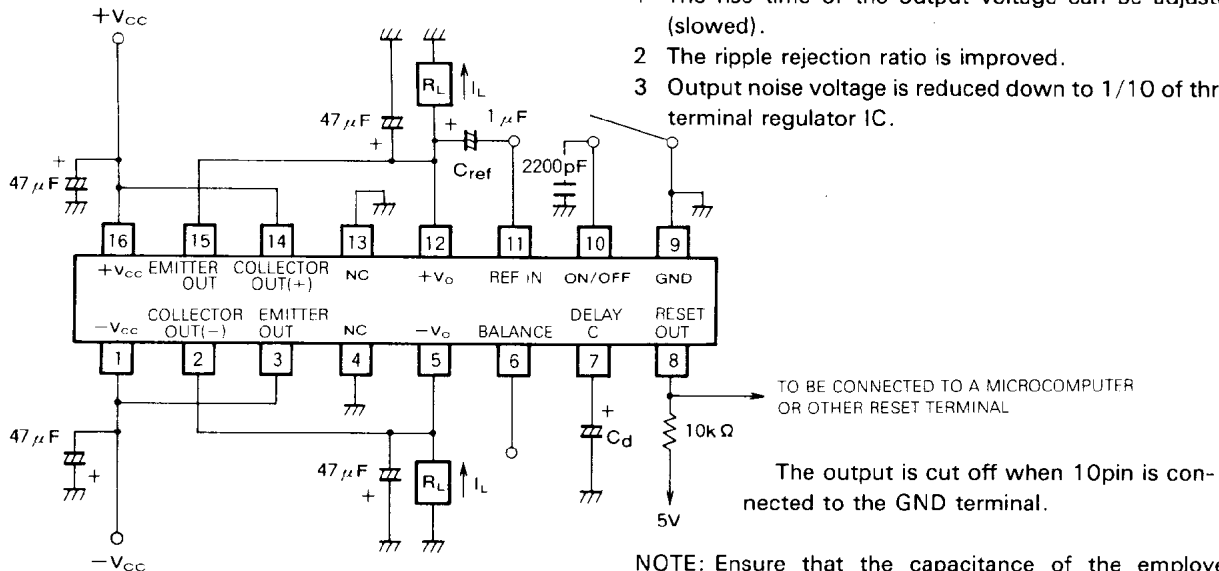
APPLICATION EXAMPLE

1. Standard application example ($I_L = \pm 30\text{mA}$)

C_{REF}

Connection of this capacitor gives the following characteristics.

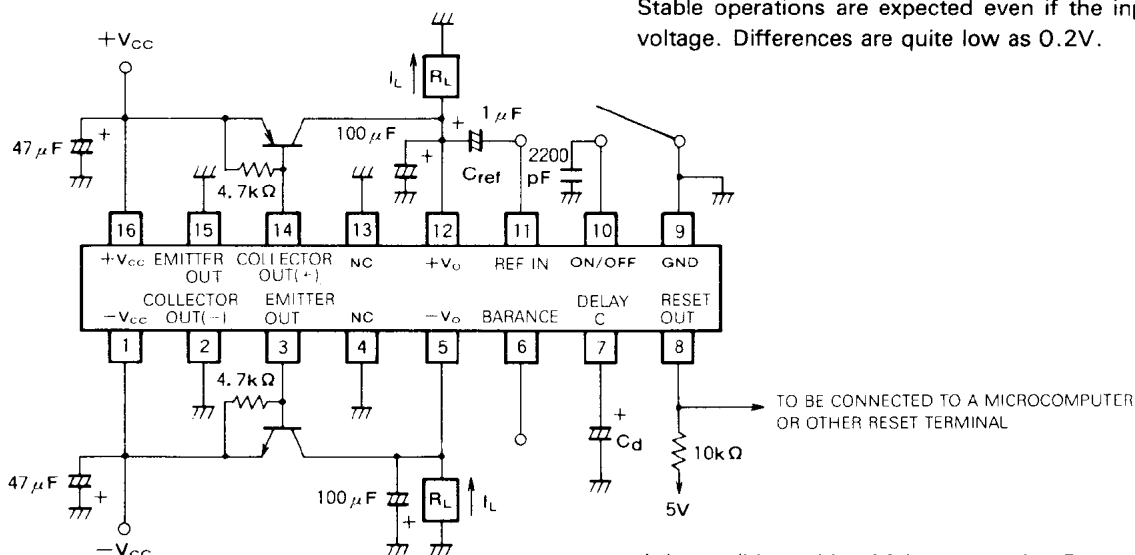
- 1 The rise time of the output voltage can be adjusted (slowed).
- 2 The ripple rejection ratio is improved.
- 3 Output noise voltage is reduced down to 1/10 of three terminal regulator IC.



NOTE: Ensure that the capacitance of the employed capacitor does not significantly vary with the temperature.

2. Very Low input-out voltage differential operation

Stable operations are expected even if the input-output voltage. Differences are quite low as 0.2V.

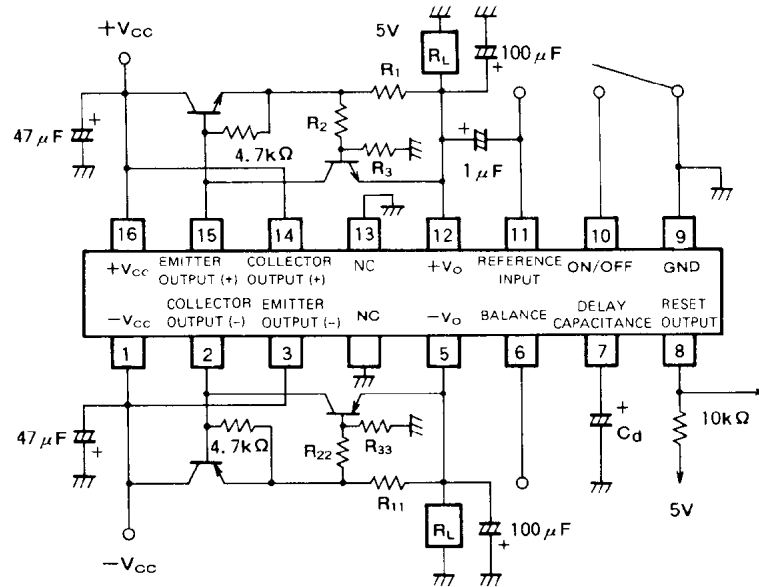


It is possible to drive 1A by connecting Power Transistor. By shorting the 10pin to the GND, the output is shut down.

±5V TRACKING REGULATOR WITH RESET CIRCUIT

(3) Foldback Protection Circuit Application
Example (M5290P Foldback System)

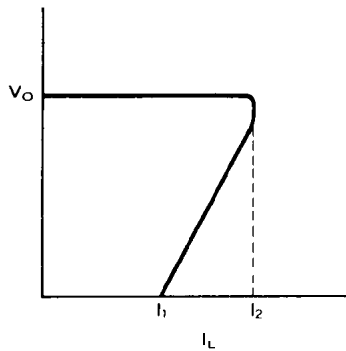
The input/output voltage differential V_{IO} should be adjusted to be high enough considering the voltage difference developed at R_1 .



When two protective transistors are employed, the M5290P/FP can provide foldback characteristic for protection purposes. The I_1 and I_2 values are determined according to the external resistance.

$$I_1 \approx \frac{R_2 + R_3}{R_1 \cdot R_3} \times 0.65 \text{ (A)}$$

$$I_2 \approx I_1 + \frac{R_2}{R_1 \cdot R_3} \times 12 \text{ (A)}$$



Cases where $I_{L(PEAK)} = I_2 \approx 500\text{mA}$ and $I_1 \approx 100\text{mA}$

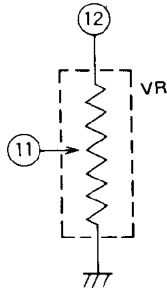
$R_1 = R_{11} = 13\Omega$, $R_2 = R_{22} = 2\text{k}\Omega$, $R_3 = R_{33} = 2\text{k}\Omega$

The required input/output voltage differential is 8V or greater.

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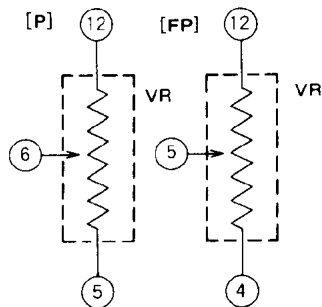
ATTENTION

1. In adjusting the output voltage (use ⑪ pin)



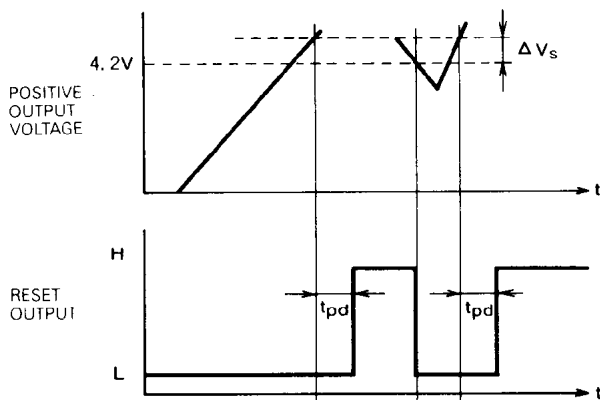
M5290P, FP is fixed the output voltage by inside resistors,
but user can adjust it by using the outside resistor.
(inside resistor: 2.4k Ω ⑪ to ⑨, 7.6k Ω ⑫ to ⑪)

2. In adjusting the tracking voltage (use ⑥ pin (⑤ pin on FP))



M5290P, FP is fixed the tracking voltage by inside resistor,
but user can adjust it by using the output resistor.
(inside resistor: ⑫ to ⑥ ⑥ to ⑤, 10k Ω for the M5290P)
: ⑫ to ⑤ ⑤ to ④, 10k Ω for the M5290FP)

3. Explaining figure of reset operation



When the positive output voltage is normal, the Reset output is High.
If it is lower than 4.2V, the Reset output is low.
(delay time is variable by connecting capacity at 7pin (6pin for the FP))

$$t_{pd} = 7.0 \times 10^4 \times C (\text{sec})$$

C: delay time capacity