±12V TRACKING REGULATOR WITH RESET CIRCUIT

DESCRIPTION

M5292 is a semiconductor integrated circuit designed for voltage regulator which is dual tracking type (positive/ negative output voltage) with system reset circuit.
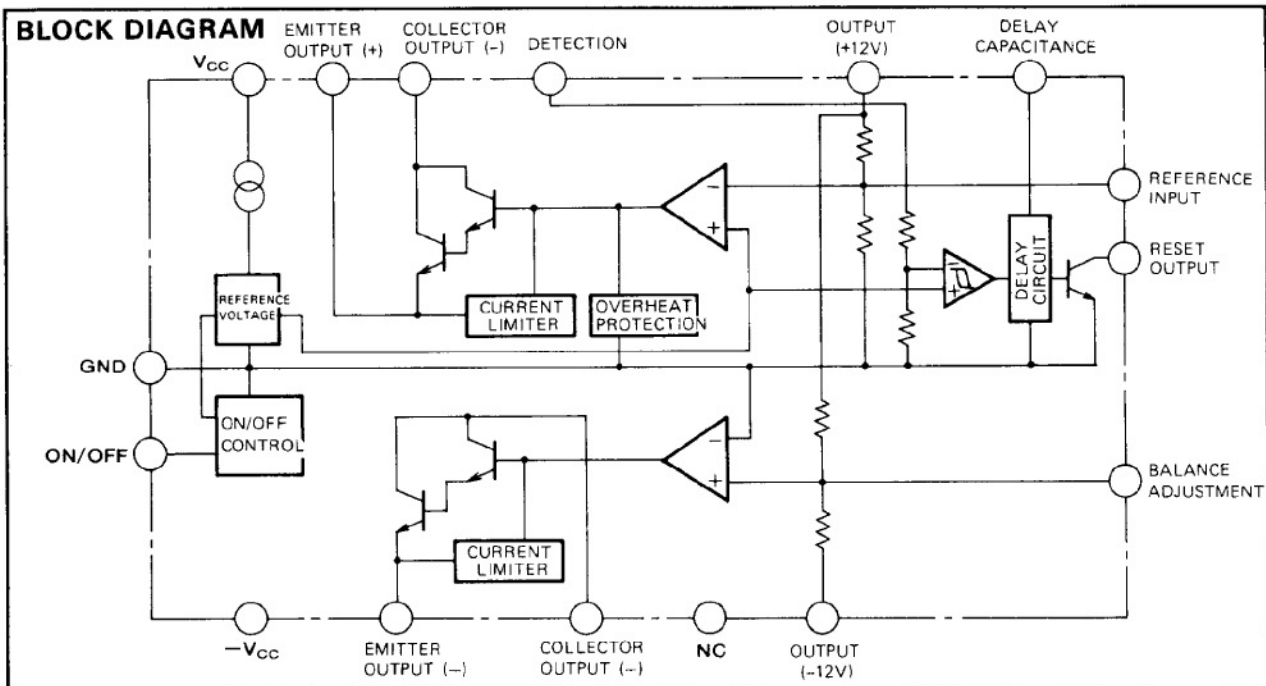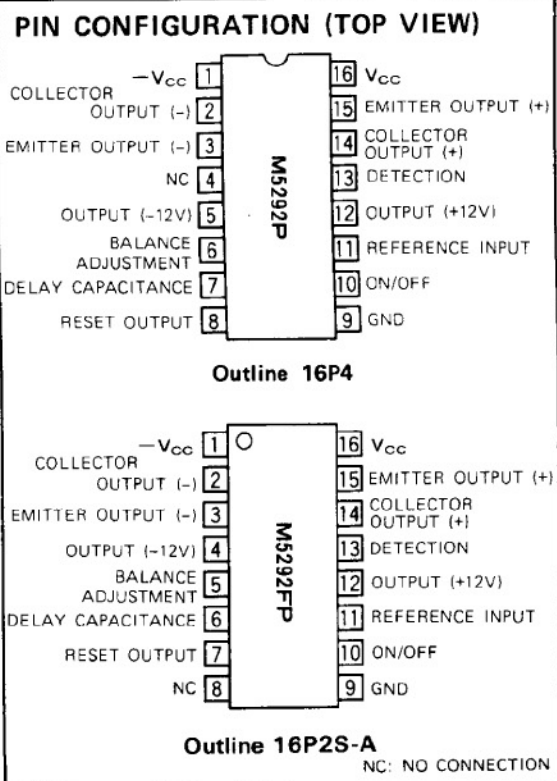
Since the output voltage is fixed inside, User can omit the outside resistors, and this IC includes the system reset circuit for detecting the abnormal status of Power Supply. When Power Supply of system is in abnormal status, this IC sends the system reset output (Low) to the MPU/CPU, so User can make the system operate safely.

FEATURES

- High input voltage·····················Vı=±20V
- Fixed output voltage·····················Vo=±12V
- Internal system reset circuit (with hysteresis) detectable voltage ·····················4.2V
  (deray 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)

```
            -Vcc  [1]        [16] Vcc
COLLECTOR
   OUTPUT (-) [2]            [15] EMITTER OUTPUT (+)
EMITTER OUTPUT (-) [3]       [14] COLLECTOR OUTPUT (+)
            NC  [4]   M5292P [13] DETECTION
   OUTPUT (-12V) [5]         [12] OUTPUT (+12V)
       BALANCE [6]           [11] REFERENCE INPUT
     ADJUSTMENT
DELAY CAPACITANCE [7]        [10] ON/OFF
   RESET OUTPUT [8]          [9] GND
```

Outline 16P4

```
            -Vcc  [1]  ○      [16] Vcc
COLLECTOR
   OUTPUT (-) [2]            [15] EMITTER OUTPUT (+)
EMITTER OUTPUT (-) [3]       [14] COLLECTOR OUTPUT (+)
   OUTPUT (-12V) [4]  M5292FP [13] DETECTION
       BALANCE [5]           [12] OUTPUT (+12V)
     ADJUSTMENT
DELAY CAPACITANCE [6]        [11] REFERENCE INPUT
   RESET OUTPUT [7]          [10] ON/OFF
            NC  [8]          [9] GND
```

Outline 16P2S-A

NC: NO CONNECTION

BLOCK DIAGRAM

±12V TRACKING REGULATOR WITH RESET CIRCUIT

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

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		±20(40)	V
ILP	Load current		±30	mA
VDIF	Input/output voltage difference		±15(30)	V
Pd	Internal power consumption		1.0(P)/0.55(FP)	W
Kθ	Thermal derating	Ta≧25℃	10.0(P)/5.5(FP)	mW/℃
Topr	Operating ambient temperature		−20 ~ +75	℃
Tstg	Storage temperature		−55 ~ +125	℃

ELECTRICAL CHARACTERISTICS (Ta=25℃, Vcc=±15V, IL=±10mA, unless otherwise stated)

Symbol	Parameter	Test condition	Limit			Unit
			Min	Typ	Max	
Icc	Circuit current	V13=5V		3.0	6.0	mA

REGULATOR PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
VIN	Input voltage		±VO±2		±20	V
VO	Output voltage		±11.4	±12.0	±12.6	V
VREF	Reference input voltage		1.15	1.20	1.25	V
△VO	Positive/negative voltage tracking			0.5	2	%
RR	Ripple rejection	CREF=1μF, f=120Hz	50	62		dB
Reg-in	Input voltage variation	VI=±15~±18V		0.05	0.2	%/V
Reg-LO	Load variation	IL=0~20mA		30	240	mV
VNO	Output noise voltage	f=20Hz~100kHz		15		μVrms
VO(OFF)	Output cut-off voltage	Terminal to GND			+0.1	V

RESET PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
VS	Detected voltage		3.95	4.2	4.45	V
△VS	Hysteresis voltage		50	100	300	mV
tpd	Delay time	Cd=0.1μF	3	7	14	ms
Vsat	Output saturation voltage	Isink=3mA		0.2	0.4	V

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

RENESAS

±12V TRACKING REGULATOR WITH RESET CIRCUIT

APPLICATION EXAMPLES

(1) Standard Application Circuit Example
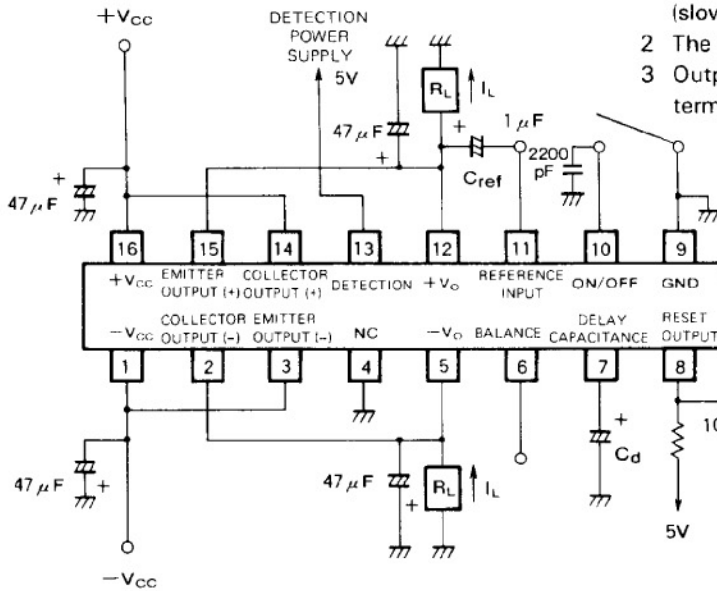
C_{REF}

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.

TO BE CONNECTED TO A MICROCOMPUTER OR OTHER RESET TERMINAL

The output is cut off when 10pin is connected to the GND terminal.

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

(2) Very Low Input/Output Voltage Differential Application Example
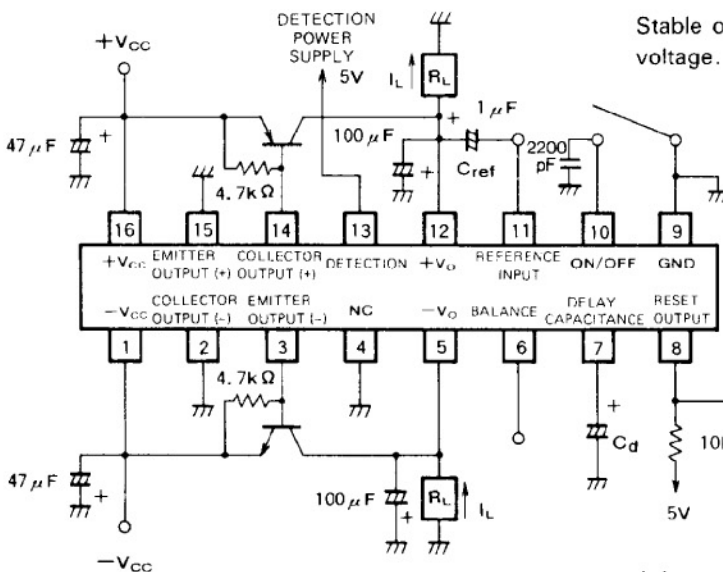
Stable operations are expected even if the input-output voltage. Differences are quite low as 0.2V.

TO BE CONNECTED TO A MICROCOMPUTER OR OTHER RESET TERMINAL

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

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(3) Foldback Protection Circuit Application Example (M5292P Foldback System)
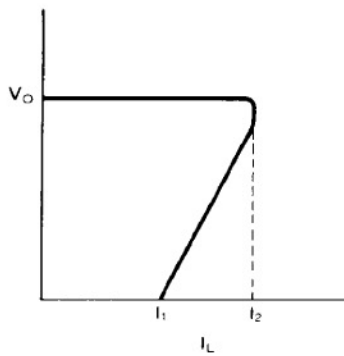
The input/output voltage differential V_{IO} should be adjusted to be high enough considering the voltage difference developed at R_1.
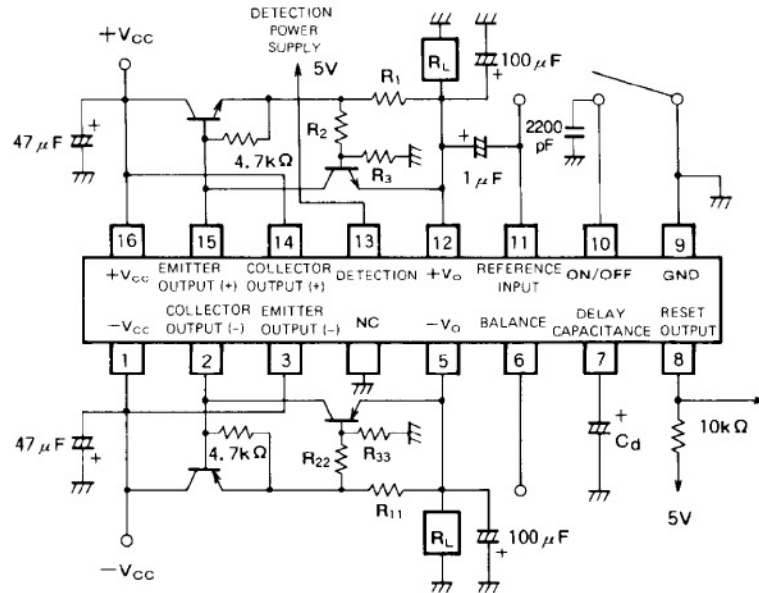
When two protective transistors are employed, the M5292P/FP can provide foldback characteristic for protection purposes. The I_1 and I_2 values are determined according to the external resistance.

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

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

Cases where $I_{L(PEAK)} = I_2 \approx 1.0A$ and $I_1 \approx 200mA$
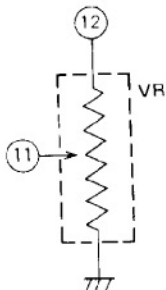
$R_1 = R_{11} = 4.0\,\Omega$, $R_2 = R_{22} = 1.0k\,\Omega$, $R_3 = R_{33} = 3.9k\,\Omega$

The required input/output voltage differential is 6V or greater.

RENESAS

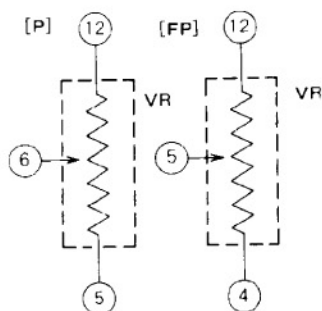## ±12V TRACKING REGULATOR WITH RESET CIRCUIT

PRECAUTIONS

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

M5292P, FP is fixed the output voltage by inside resistors, but user can adjust it by using the outside resistor.
(inside resistor: 2.4kΩ ⑪ to 9, 21.7kΩ ⑫ to ⑪)

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

M5292P, FP is fixed the tracking voltage by inside resistor, but user can adjust it by using the output resistor.

$\left(\begin{array}{l}\text{inside resistor: 12 to 6, 6 to 5, 10k}\Omega \text{ for the M5292P} \\ \text{: 12 to 5, 5 to 4, 10k}\Omega \text{ for the M5292FP}\end{array}\right)$

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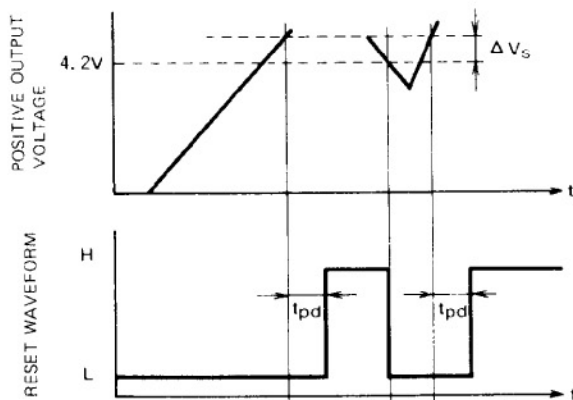
When the positive output voltage is normal, the Reset output is High.
If it is lower than 4.2V, the Reset output is low.
(delay time is variable by connecting capacity at 7pin (6pin for the FP))

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