

M5293L

FLUORESCENT CHARACTER DISPLAY TUBE (-32V FIXED-VOLTAGE POWER SUPPLY) IC

DESCRIPTION

The M5293L is a semiconductor integrated circuits that is designed as a constant-voltage negative power supply. Since this high-voltage type integrated circuits accepts a maximum input voltage of -60V and provides a fixed output voltage of -32V, it serves, for instance, as an ideal fluorescent character display tube drive power supply. As the output voltage is fixed inside the integrated circuits, only a capacitor is needed as the external part. Further, the use of a small-size 5-pin SIP assures high packaging density for power supply circuits.

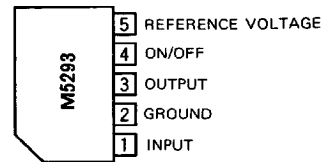
FEATURES

- High input voltage range $V_I = -20 \sim -60V$
- Fixed output voltage $V_O = -32V$ ($I_{LP} = -30mA$)
Variable with an external resistor . . . $V_O = -10 \sim -50V$
- Output ON/OFF control (Terminal ④)
- Built-in current-limiting circuit.
- Built-in overheat protection circuit.

APPLICATION

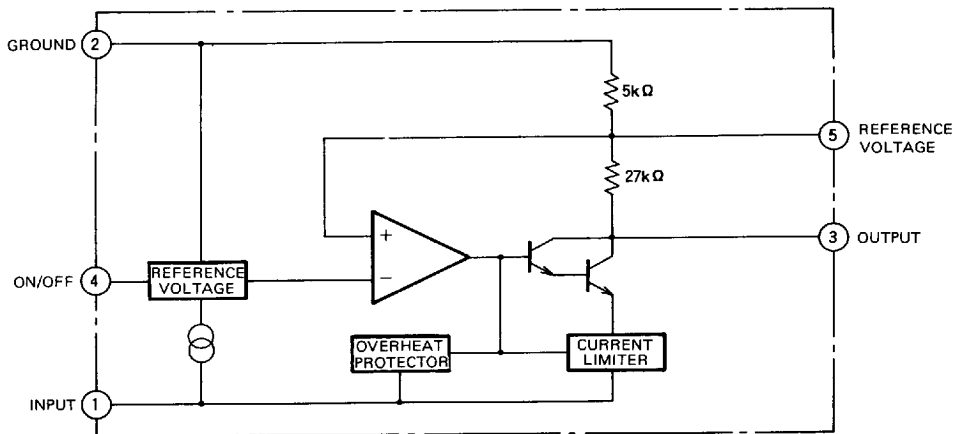
CD players, VTR, and other general electronic equipment

PIN CONFIGURATION (TOP VIEW)



Outline 5P5T

BLOCK DIAGRAM



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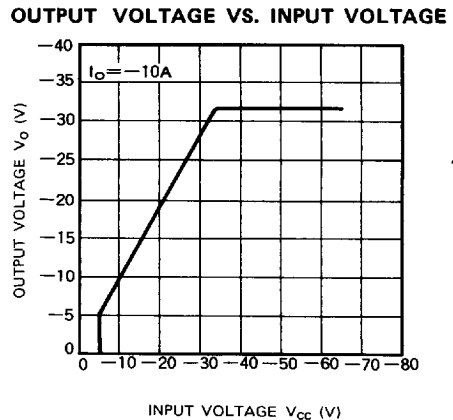
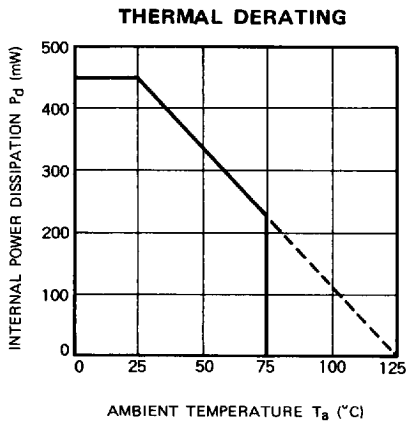
ABSOLUTE MAXIMUM RATINGS (Ta = 25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V _I	Input voltage		-60	V
I _{LP}	Load current		-30	mA
V _{DIF}	Input/output voltage differential		30	V
P _d	Internal power consumption		450	mW
K _θ	Thermal derating	T _a ≥ 25°C	4.5	mW/°C
T _{opr}	Operating ambient temperature		-20 ~ +75	°C
T _{stg}	Storage temperature		-55 ~ +125	°C

ELECTRICAL CHARACTERISTICS (V_{IN} = -40V, I_O = -10mA, Ta = 25°C)

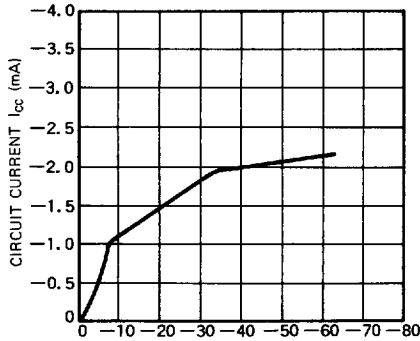
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I _{OC}	Circuit current	Under no load		-2.0	-6	mA
V _O	Output voltage		-30.0	-32.0	-34.0	V
Reg-in	Input variation	V _{IN} = -40 ~ -50V		0.05	0.2	%/V
Reg-LO	Load variation	I _O = -1 ~ -20mA		100	400	mV
RR	Ripple rejection ratio	C _{REF} = 0.1μF, f = 120Hz	40	60		dB
V _{NO}	Output noise voltage	f = 20Hz ~ 100kHz		100		μVrms
V _{O(off)}	Output cutoff voltage	-0.3V ≤ V ₄ ≤ GND			0.1	V
V _{ref}	Reference voltage		-4.65	-5.0	-5.35	V
V _{DIF}	Input/output voltage differential			1.5	3.5	V

TYPICAL CHARACTERISTIC



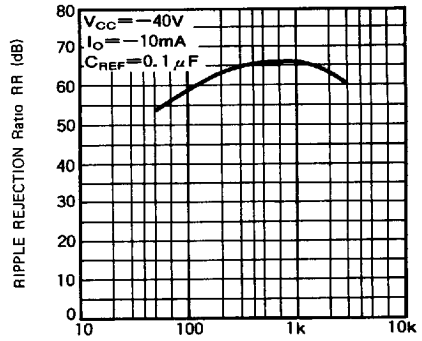
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(-32V FIXED-VOLTAGE POWER SUPPLY) IC**

CIRCUIT CURRENT VS. INPUT VOLTAGE



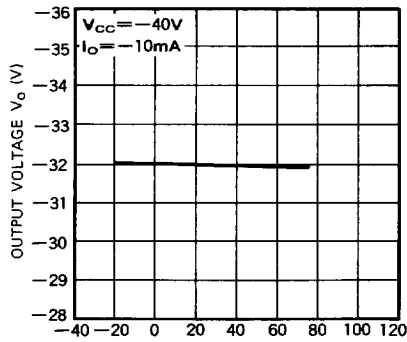
INPUT VOLTAGE V_{CC} (V)

RIPPLE REJECTION RATIO



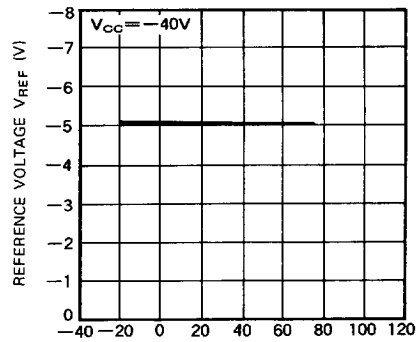
FREQUENCY f (Hz)

OUTPUT VOLTAGE VS. AMBIENT TEMPERATURE



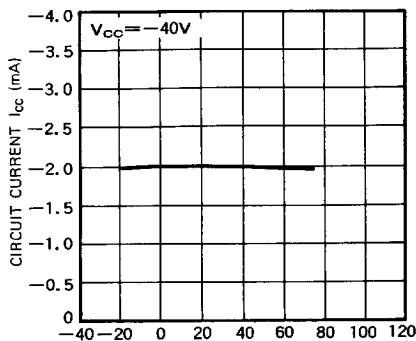
AMBIENT TEMPERATURE T_a (°C)

REFERENCE VOLTAGE VS. AMBIENT TEMPERATURE



AMBIENT TEMPERATURE T_a (°C)

CIRCUIT CURRENT VS. AMBIENT TEMPERATURE



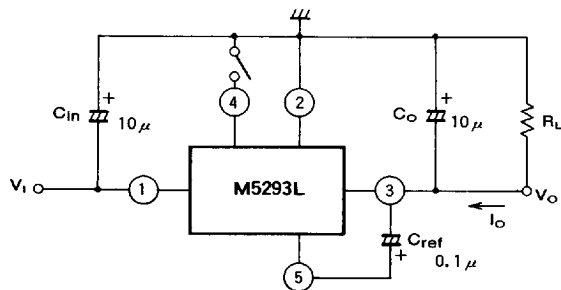
AMBIENT TEMPERATURE T_a (°C)

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APPLICATION EXAMPLES

(1) Standard Application Circuit Example



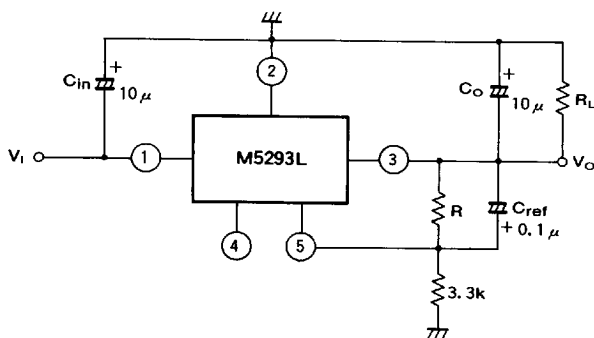
When terminal ④ is set at the ground level (0 to -0.3V), an output voltage of 0V can be obtained.

C_{REF}

Connection of this capacitor provides ripple rejection ratio improvement, output noise voltage improvement, and output voltage rise time constant adjustment (use a 1000pF to 1µF capacitor).

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

(2) Output Voltage Variation Procedure



$$V_O = \left(1 + \frac{R//27k}{5k//3.3k}\right) \cdot V_{REF}$$

$$R = \frac{1}{\frac{1}{\left(\frac{V_O}{V_{REF}} - 1\right) \cdot 5k//3.3k} - \frac{1}{27k}}$$

(V_{REF} = 5.00V, 5k//3.3k = 1.988k)

(BUILT-IN RESISTORS
BETWEEN TERMINALS ② AND ⑤ 5kΩ
BETWEEN TERMINALS ③ AND ⑤ 27kΩ)

