

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.

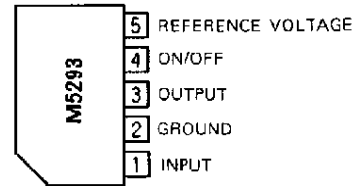
FEATURES

- 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

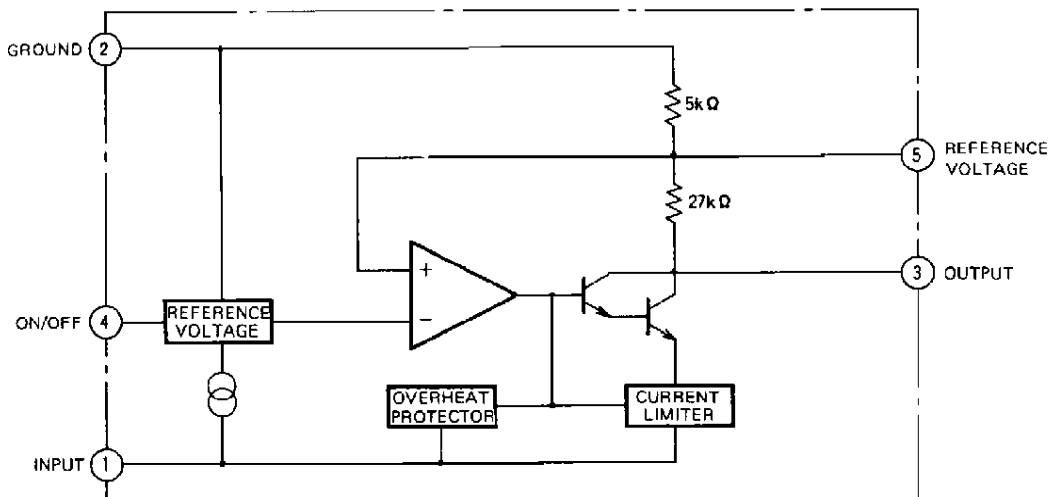
CD players, VTR, and other general electronic equipment

PIN CONFIGURATION (TOP VIEW)



Outline 5P5T

BLOCK DIAGRAM

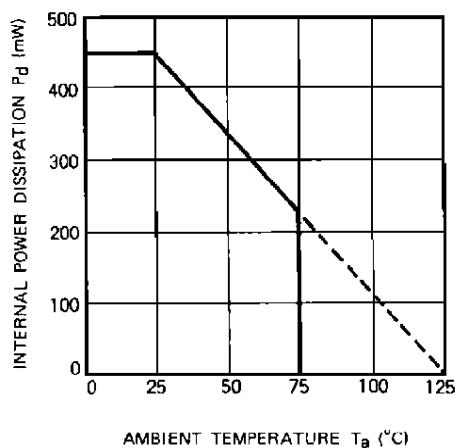
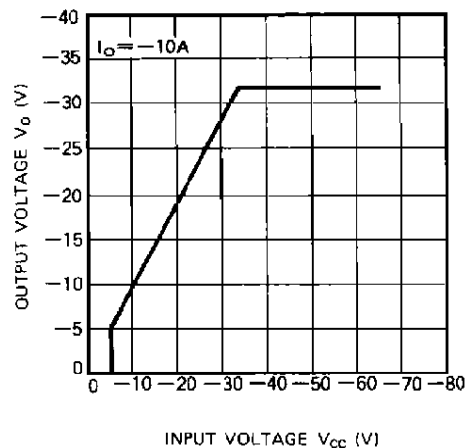


**FLUORESCENT CHARACTER DISPLAY TUBE
(-32V FIXED-VOLTAGE POWER SUPPLY) IC****ABSOLUTE MAXIMUM RATINGS** ($T_a = 25^\circ\text{C}$, unless otherwise noted)

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	$T_a \geq 25^\circ\text{C}$	4.5	mW/ $^\circ\text{C}$
T_{opr}	Operating ambient temperature		-20 - +75	$^\circ\text{C}$
T_{stg}	Storage temperature		-55 - +125	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($V_{IN} = -40\text{V}$, $I_O = -10\text{mA}$, $T_a = 25^\circ\text{C}$)

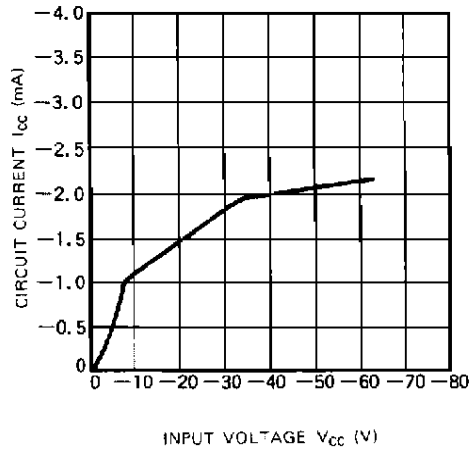
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{CC}	Circuit current	Under no load		-2.0	-6	mA
V_O	Output voltage		-30.0	-32.0	-34.0	V
Reg-in	Input variation	$V_{IN} = -40 \sim -50\text{V}$		0.05	0.2	%/V
Reg-LO	Load variation	$I_O = -1 \sim -20\text{mA}$		100	400	mV
RR	Ripple rejection ratio	$C_{REF} = 0.1\mu\text{F}$, $f = 120\text{Hz}$	40	60		dB
V_{NO}	Output noise voltage	$f = 20\text{Hz} \sim 100\text{kHz}$		100		μV_{rms}
$V_{O(off)}$	Output cutoff voltage	$-0.3\text{V} \leq V_4 \leq \text{GND}$			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**THERMAL DERATING****OUTPUT VOLTAGE VS. INPUT VOLTAGE**

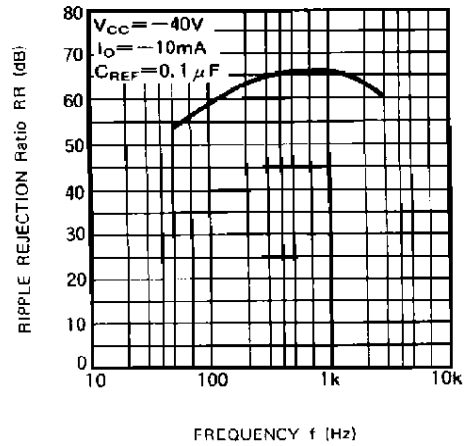
M5293L

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

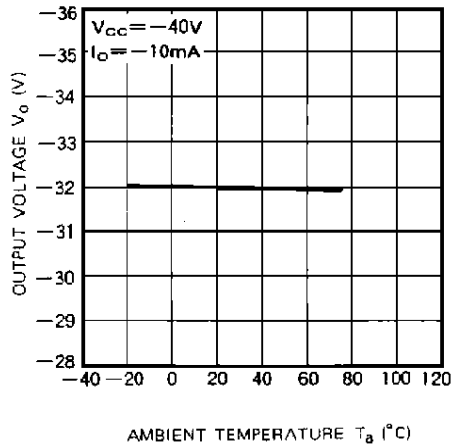
CIRCUIT CURRENT VS. INPUT VOLTAGE



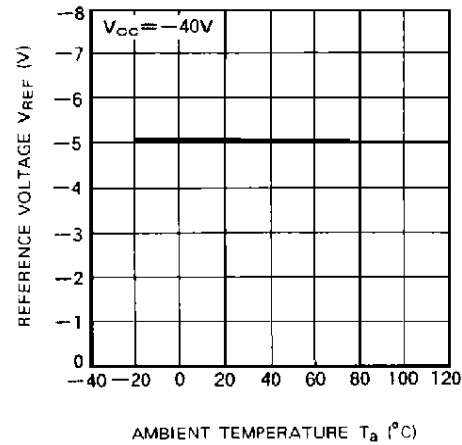
RIPPLE REJECTION RATIO



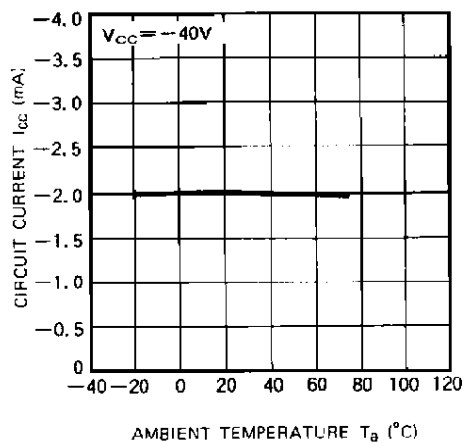
OUTPUT VOLTAGE VS. AMBIENT TEMPERATURE



REFERENCE VOLTAGE VS. AMBIENT TEMPERATURE



CIRCUIT CURRENT VS. AMBIENT TEMPERATURE

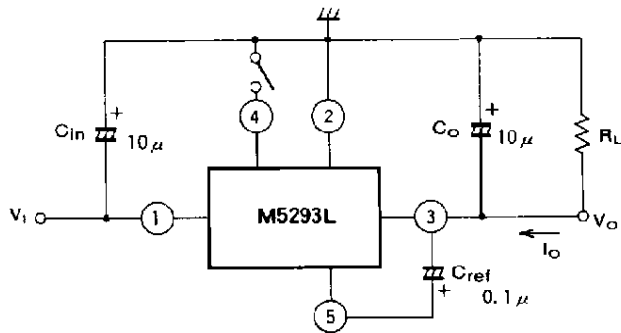


M5293L

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

APPLICATION EXAMPLES

(1) Standard Application Circuit Example



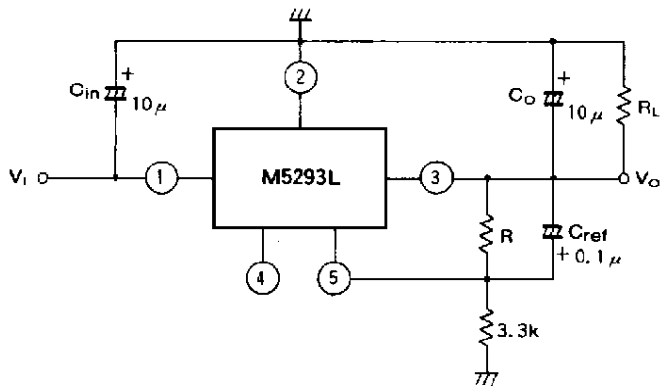
When terminal (4) is set at the ground level (0 to -0.3V), an output voltage of 0V can be obtained.

CREF

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)