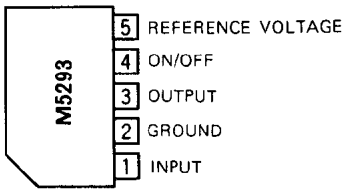
M5293L

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.

PIN CONFIGURATION (TOP VIEW)



Outline 5P5T

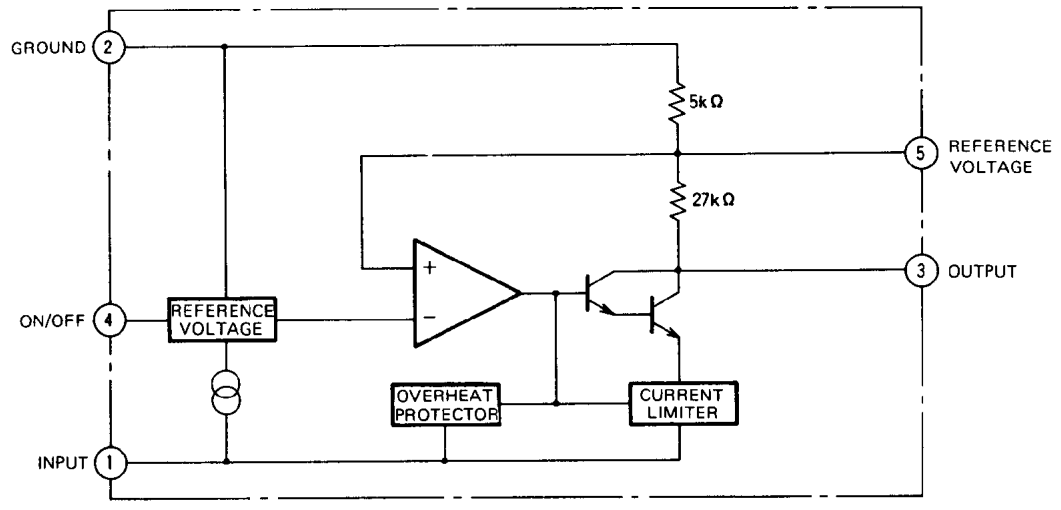
FEATURES

- High input voltage range . . . . . V_I = −20 ~ −60V
- Fixed output voltage . . . . . V_O = −32V (I_{LP} = −30mA)
  Variable with an external resistor . . . V_O = −10 ~ −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

BLOCK DIAGRAM



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

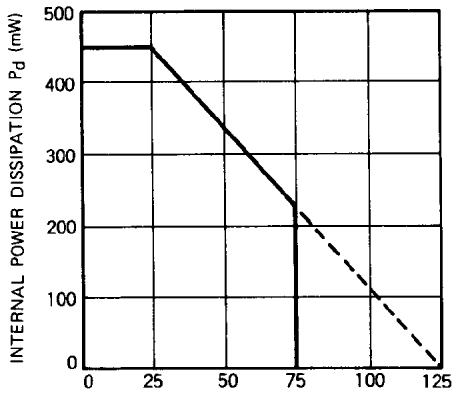
Symbol	Parameter	Conditions	Ratings	Unit
V_I	Input voltage		−60	V
I_{LP}	Load current		−30	mA
V_{DIF}	Input/output voltage differential		30	V
Pd	Internal power consumption		450	mW
K_θ	Thermal derating	Ta≧25℃	4.5	mW/℃
Topr	Operating ambient temperature		−20 ~ +75	℃
Tstg	Storage temperature		−55 ~ +125	℃

ELECTRICAL CHARACTERISTICS (V_{IN}=−40V, I_O=−10mA, Ta=25℃)

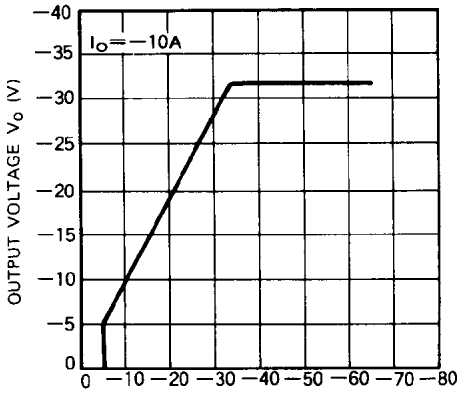
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
Icc	Circuit current	Under no load		−2.0	−6	mA
Vo	Output voltage		−30.0	−32.0	−34.0	V
Reg-in	Input variation	V_{IN}=−40 ~ −50V		0.05	0.2	%/V
Reg-Lo	Load variation	I_O=−1 ~ −20mA		100	400	mV
RR	Ripple rejection ratio	C_{REF}=0.1μF, f=120Hz	40	60		dB
V_{NO}	Output noise voltage	f=20Hz ~ 100kHz		100		μVrms
$V_{O(off)}$	Output cutoff voltage	−0.3V≦V4≦GND			0.1	V
Vref	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



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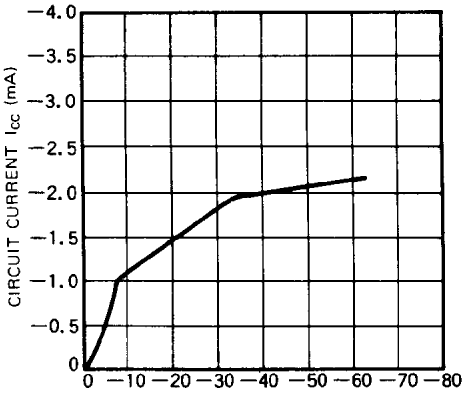
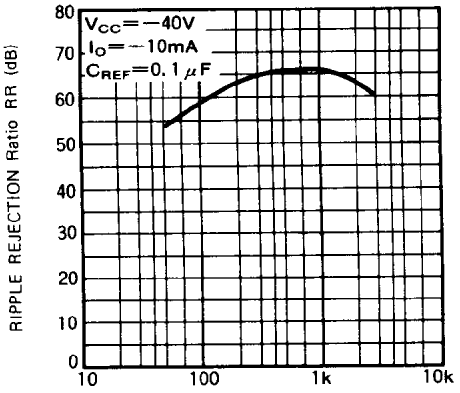
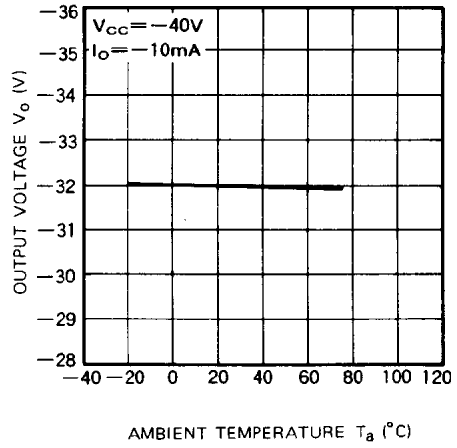
CIRCUIT CURRENT VS. INPUT VOLTAGE



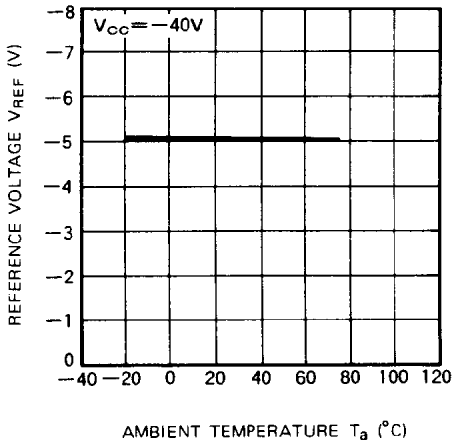
RIPPLE REJECTION RATIO



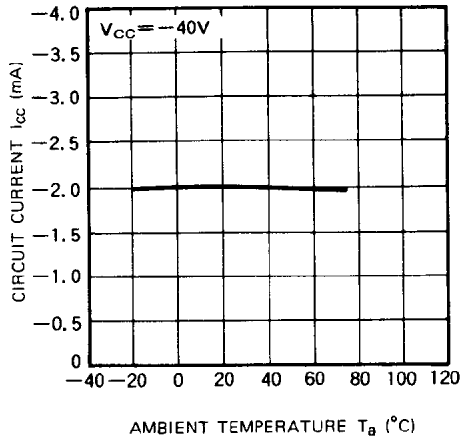
OUTPUT VOLTAGE VS. AMBIENT TEMPERATURE



REFERENCE VOLTAGE VS. AMBIENT TEMPERATURE



CIRCUIT CURRENT VS. AMBIENT TEMPERATURE



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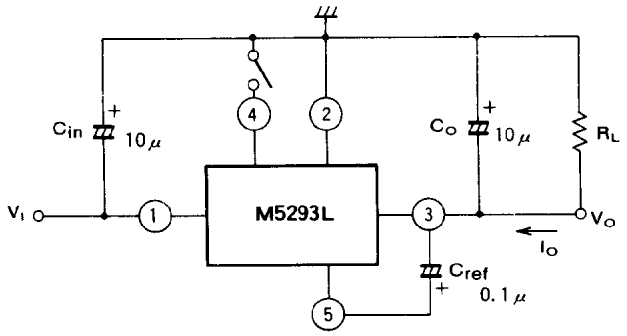
APPLICATION EXAMPLES

(1) Standard Application Circuit Example

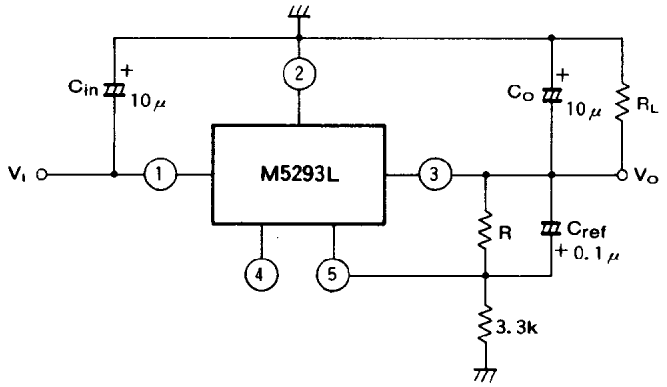


When terminal ④ is set at the ground level (0 to −0.3V), an output voltage of 0V can be obtained.

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



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

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

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

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