Ordering number : EN5920A

Monolithic Linear IC

LA7995M

Charge Pump Type DC-DC Converter

Overview

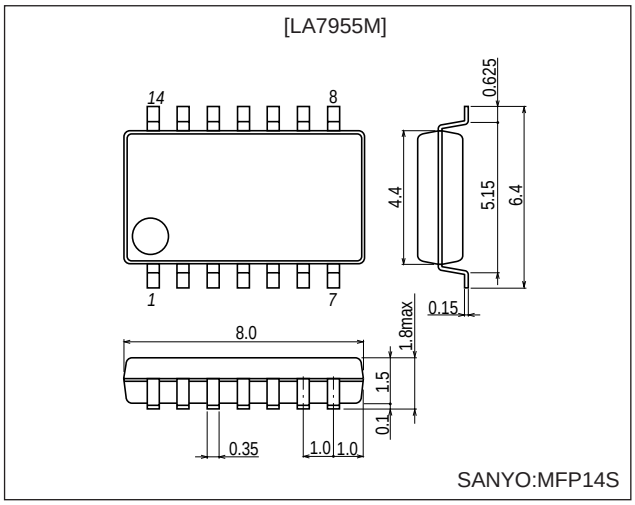
This DC-DC converter IC supplies 30V from a V_{CC} of 5V. Possible applications include use as a power supply for tuner circuitry on a PC video board.

Conventional DC-DC converters utilize the counterelectromotive force in a coil to step up the voltage. This method suffers from high-frequency noise caused by sharp pulses. The so-called charge pump principle adopted in the LA7995M chip results in much lower noise and also has the advantage of using only capacitors, reducing the cost for peripheral components.

Package Dimensions

unit:mm

3111-MFP14S



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC}max		7	V
Allowable power dissipation	Pd max	Ta ≦ 65°C*	380	mW
Operating temperature	Topr		–10 to +65	°C
Storage temperature	Tstg		–55 to +150	°C

Note: *Includes substrate (phenol) 144.3 x 76.1 x 1.6 mm

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Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5	V
Operating supply voltage range	V_{CC}op		4.75 to 5.25	V

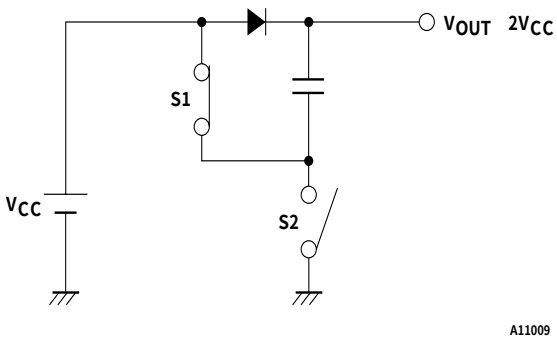
Operating Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{IN}	I_O=1 mA, V_{CC}=5V	19	24	29	mA
Output voltage	V_{OUT}	I_O=1 mA, V_{CC}=5V	29	30.7	32	V
Output voltage fluctuation	$\triangle V_{OUT}$	I_O=1 mA, V_{IN}=4.75 to 5.25V		1.0	1.5	V
Output current	I_{OUT}	V_O=29V	1.5	1.7		mA
Oscillation frequency	f	C_{OSC}=150pF	35	50	65	KHz

Note: The above specifications are measured with external capacitance provided by three 0.33 µF chip capacitors(C1, C2, C3).

Charge Pump Principle

Figure 1 shows a charge pump circuit. Driving S1 and S2 with opposite phase produces a doubled voltage



Figrue 1 Chrage pump circuit

In order to supply 30V from 5V, the LA7995M uses three charge pump circuits in series to produce a step-up factor of 2 x 2 x 2 = 8.

Block Diagram

The LA7995M incorporates the following functions for controlling the 3-stage charge pump circuit:

• Oscillator

• Switching circuit

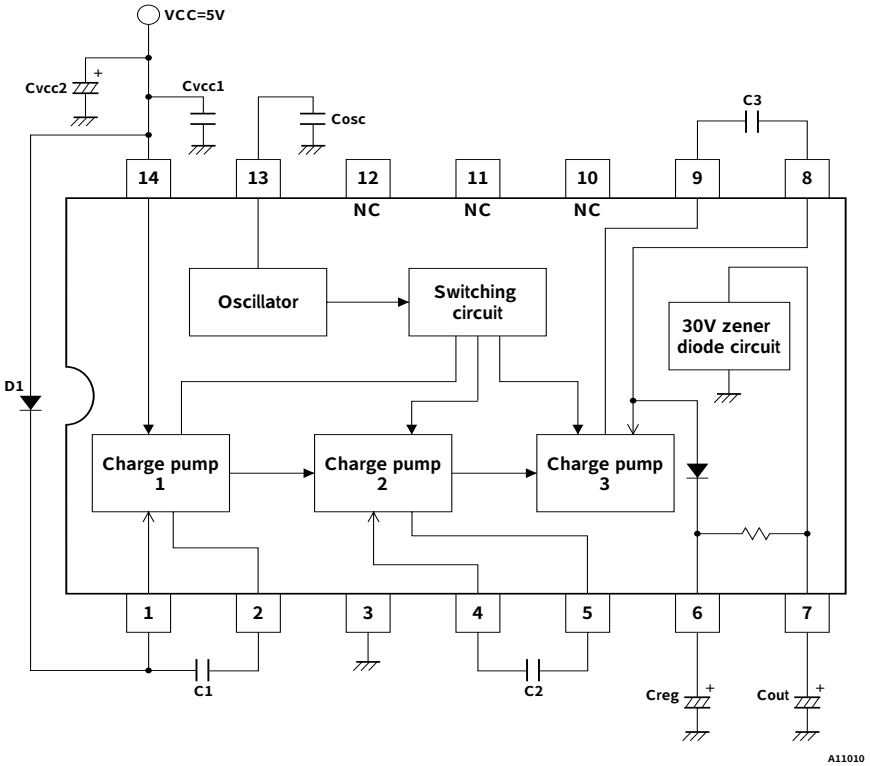
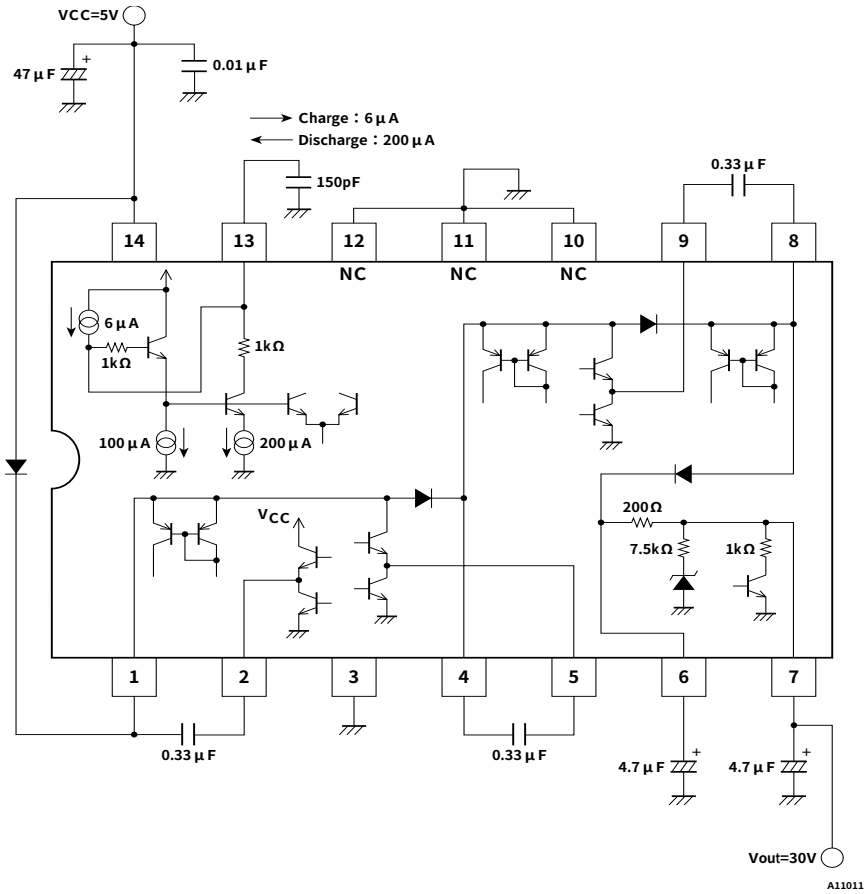
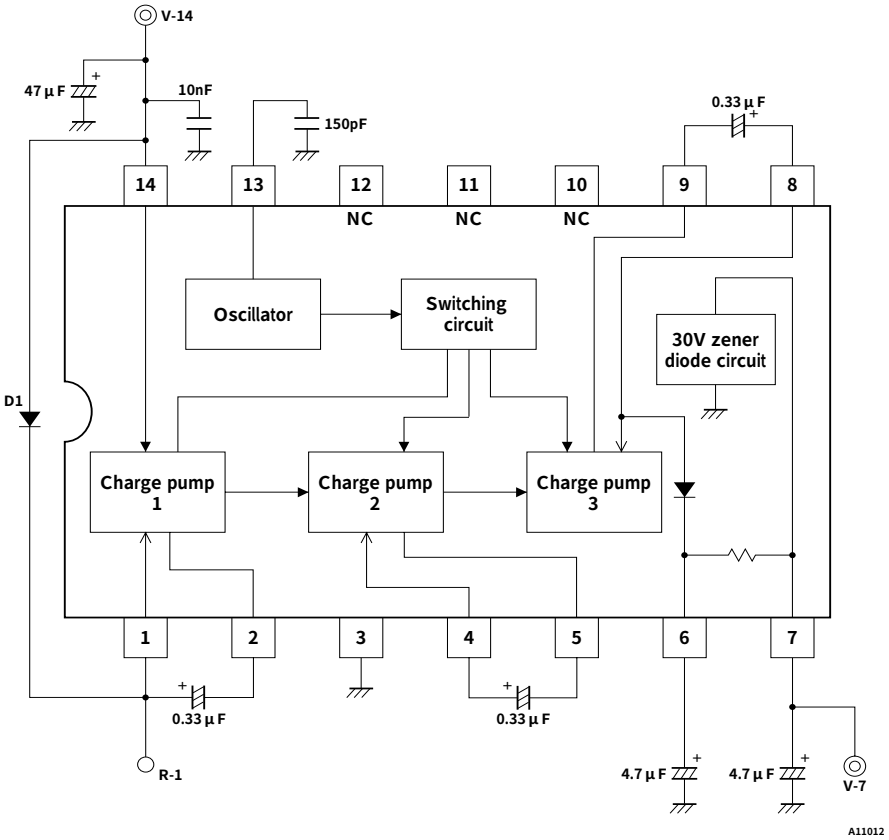


Figure 2 Block diagram

Equivalent Internal Circuit and Recommended Peripheral Circuitry



Test Circuit



Test Method

Item	Symbol	Measurement point	Test method	Output current (mA)
				V-7
Current consumption	I_{IN}	V-14	Connect a DC current generator to V-7 and use an ammeter to measure the current supplied to V-14 when 1mA is drawn from V-7.	1.0
Output voltage	V_{OUT}	V-7	Mesure voltage at V-7.	1.0
Output voltage fluctuation	$\triangle V_{OUT}$	V-7	Vary power supply voltage from 4.75 to 5.25V. Measure voltage change at V-7.	1.0
Output current	I_{OUT}	V-7	Measure output current required to obtain 29V from V-7.	-
Oscillation frequency	f	R-1	Measure frequency of pulse wave form at R-1.	1.0

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