

LOW-POWER VOLTAGE DOUBLER



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All miniature electronic devices operate off batteries. Some of them need higher than the standard battery voltages to operate

uses only a few components. Yet, the output efficiency is 75 to 85 per cent along its operating voltage range. The available battery voltage is almost doubled at the output of the circuit.

Here IC1 is wired as an astable multivibrator to generate rectangular pulses at around 10 kHz. This frequency

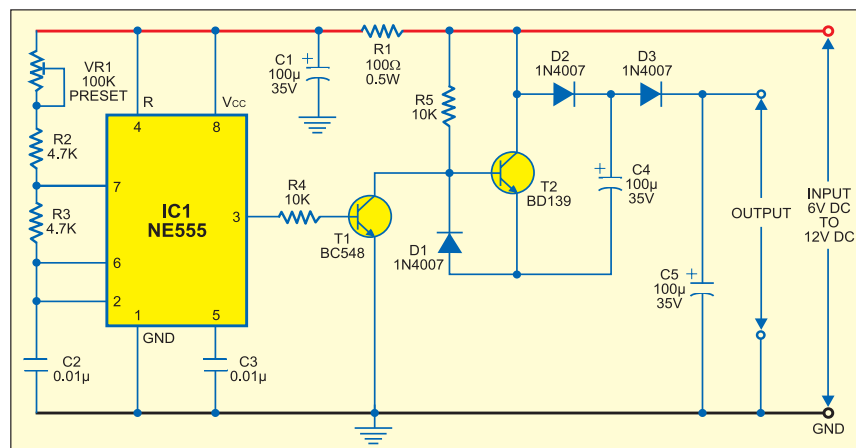
off while transistor T2 is driven into saturation. Now, transistor T2 raises the charge on the negative pole of capacitor C4 by another step equal to the supply voltage. Therefore an equal amount of charging is built up on capacitor C5 via diode D3. This doubling action increases the total voltage across capacitor C5 to almost double the input voltage. If the output of the pulse generator is maintained with a high enough amplitude and frequency, the output voltage and current remain constant and cater to the needs of the load.

Even with the half-wave function, this circuit is almost free of ripple voltage. If the connected load doesn't require a high current, the efficiency can be expected in the upper 90 per cent ranges. Since the input voltage is doubled, the current drain from the input power supply is also doubled at the input but halved at the output.

One point of caution is that if the multivibrator's frequency is fairly high, the output may suffer with the interference imposed over the DC voltage. In this case, the frequency must be set favourably by trials and actual load connection procedure.

This tiny circuit can be assembled on the general-purpose PCB. If all of the components are surface-mount type, the whole module can be genuinely miniaturised.

EFY Lab note. During testing with input of 8V and 1.25mA load current the output voltage was found to be around 13V. ●



efficiently. If the battery of that specific voltage is unavailable, we are forced to connect additional cells in series to step up the DC voltage. Thus, the true meaning of miniaturisation is lost. A simple way to overcome this problem is to employ a voltage doubler, if the device under consideration can operate at a small current.

Here we present a low-power voltage doubler circuit that can be readily used with devices that demand higher voltage than that of a standard battery but low operating current to work with. The circuit is quite simple as it

and duty cycle of the pulses can be varied using preset VR1. The pulses are applied to switching transistors T1 and T2 for driving the output section, which is configured as a voltage-doubling circuit. The doubled voltage is available across capacitor C5.

During each cycle of the pulse occurrence, the high level drives T1 into its saturation, keeping transistor T2 cut off. So transistor T1 charges capacitor C4 via the path formed by diodes D2 and D1 to a voltage level slightly lesser than the supply. But during the low period of the pulse, transistor T1 is cut