

Enigmas, etc.

RF Input Current

■ Takashi Ohira ^{ID}

Figure 1 shows the rectifier circuit of this “Enigmas, etc.” column series. The RF voltage source has a purely sinusoidal waveform. However, the current $i_s(t)$ flowing into the circuit is distorted from a sinusoid because of the diode nonlinearity. We can decompose $i_s(t)$ into its Fourier series:

$$i_s(t) = I_o + [I_P \ I_Q] \begin{bmatrix} \sin \omega t \\ \cos \omega t \end{bmatrix} + \dots$$

where I_o signifies the zeroth-order or dc term, I_P and I_Q stand for the orthogonal first-order components, and ... denotes the second-order and higher order

Takashi Ohira (ohira@tut.jp) is with Toyohashi University of Technology, Aichi 441-8580, Japan. He is a Life Fellow of IEEE.

Digital Object Identifier 10.1109/MMM.2023.3284796

Date of current version: 6 August 2023

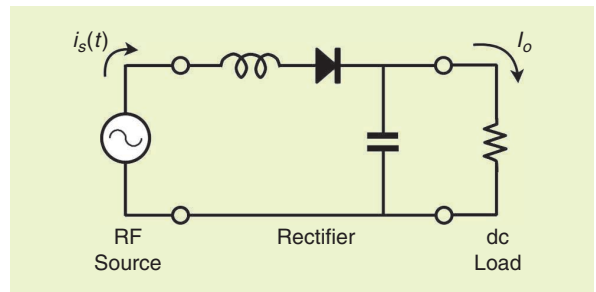


Figure 1. Single-series diode rectifier. Given the dc output current, can we calculate the RF input current?

harmonics that follow. Assuming a nominal 50% duty operation, we can infer I_P and I_Q backward from I_o . Which among the following is equal to I_P ?

- (a) I_o (b) $\frac{1}{2}I_o$ (c) $\frac{\pi}{2}I_o$ (d) $\frac{2}{\pi}I_o$



Are You Moving?

Update your contact information
so you don't miss an issue of this magazine!

Change your address

E-MAIL: address-change@ieee.org

PHONE: +1 800 678 4333 in the United States

or +1 732 981 0060 outside the United States

If you require additional assistance regarding your IEEE mailings,
visit the IEEE Support Center at supportcenter.ieee.org.



IMAGE LICENSED BY INGRAM PUBLISHING