

HRD05003

Specifications

1. Maximum ratings

Input Voltage	0 to 50 VDC	
Remote On/Off Terminals Impressed Voltage	0 to $V_{in}-2V$	
Operating Ambient Temperature	-10°C to 80°C	Refer to the Derating Chart (Fig. 2)
Storage Temperature	-30°C to 100°C	
Operating Surface Temperature	Max. 100°C	

2. Characteristics (at 25°C)

Input		
Voltage Range	8 to 40VDC	
Efficiency	80%(Avr.) 73%(Min.)	$V_{in} = 24V, I_o = 3A$
Operating Frequency	240 to 360 kHz	$V_{in} = 24V, I_o = 3A$
Output		
Regulation	4.8V to 5.3V	Note 1
Deviation from Output Voltage Setting Point (at 5V)	4.82 to 5.18V	$V_{in} = 24V, I_o = 3A$
Output Voltage Fluctuation	Line	38mV $V_{in} = 8V \text{ to } 40V$
	Load	95mV $I_o = 0A \text{ to } 3A$
	Temp. drift coefficient	$\pm 0.33 \text{ mV}/^\circ\text{C}$
Output Current	0A to 3A	
Ripple and Noise	25(Avr.) 60(Max.)mVp-p	$V_{in} = 24V, I_o = 3A$ (Note 2)
Variable Output Voltage Range	3.3V to 24V	Using recommended external parts (Note 3)
Remote On/Off Control Voltage		
Output Power On	Max. 0.9V	
Output Power Off	Min. 1.0V	
Protection		
Over Load Protection	More than 3A	Auto reset
Humidity		
Operating	20% to 90%	Non-condensing
Storage	10% to 95%	Non-condensing
Others		
Weight	25g	
Vibration	Amplitude 1.5mm, 10 to 55Hz/min. 2 hours each for X, Y, Z directions	
Shock	100G, 3 times each for X, Y, Z directions	
Soldering Conditions	260°C, 10 sec.	
Dimensions	Refer to the outline drawing	

Note 1: The value includes the deviation from output voltage setting point, line and load.

Note 2: Value at standard connection with recommended external parts (Refer to Fig.1)

Note 3: Refer to "Output voltage variation"

The diagram shows a voltage doubler circuit using the HRD05003 IC. The input is $+V_{in}$, connected to pin 2. Pin 1 is connected to G. Pin 3 is connected to pin 9. Pin 4 is connected to pin 8. Pin 5 is connected to pin 6. Pin 7 is connected to pin 1. The output is $+V_o$, connected to pin 6. The circuit includes capacitors C_1 , C_2 , C_3 , and C_4 , and resistors VR_1 and VR_2 . The IC is labeled HRD05003.

Note 1: Connect the RC terminal to the ground line when not using remote on/off.

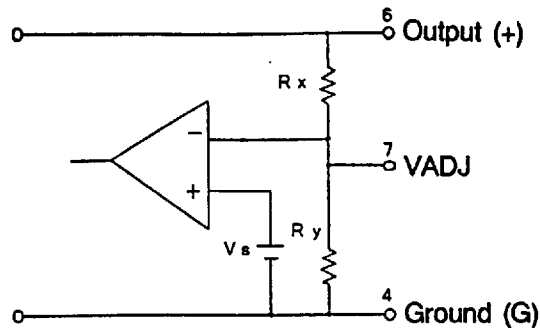
Note 2: The VADJ terminal should be open when not changing the output voltage.

Note 3: Connect a film or ceramic capacitor at the C3(50V 0.1 – 1 μ F) and C4(50V 0.01 – 0.1 μ F) when the noise is high.

Note 4: Connect the input and output capacitors as near the terminals as possible.

A line graph showing the relationship between Output Current (%) and Ambient Temperature (°C) for five different input voltages (V_{in}). The y-axis represents Output Current (%) from 0 to 100 in increments of 20. The x-axis represents Ambient Temperature (°C) from -10 to 80 in increments of 10. Five lines are plotted, each corresponding to a different V_{in} value: 40V, 32V, 24V, 12V, and 8V. All lines show a positive linear correlation between temperature and output current. The lines are labeled with their respective V_{in} values and arrows pointing to the right.

Ambient Temperature (°C)	Output Current (%) $V_{in}=40V$	Output Current (%) $V_{in}=32V$	Output Current (%) $V_{in}=24V$	Output Current (%) $V_{in}=12V$	Output Current (%) $V_{in}=8V$
25	70	60	50	40	35
45	82	72	62	52	47
65	94	84	74	64	59
85	106	96	86	76	71

Output voltage variation


Vs	2.5V
Rx	6.2kΩ
Ry	6.2kΩ
Vo	Required output voltage(V)

The value of the resistor is calculated by following formula.

- a. Vout down: Connect a resistor VR1 between the terminal 6 and the terminal 7. Do not connect VR2.

$$VR1 = \frac{Rx * Ry(Vo - Vs)}{Rx * Vs - Ry(Vo - Vs)}$$

- b. Vout up: Connect a resistor VR2 between the terminal 4 and the terminal 7. Do not connect VR1.

$$VR2 = \frac{Rx * Ry * Vs}{Ry(Vo - Vs) - Rx * Vs}$$

Note 1: Output voltage deviation

When the resister's stability is +/- 1% : approximately +/- 4.5%
 When the resister's stability is +/- 5% : approximately +/- 8%

- Note 2: The temperature at surface of the case should be less than 100°C when operating.

- Note 3: A certain voltage difference between input and output is required. The minimum required voltage difference can be calculated by following formula.

$$Vin = \frac{Vo + K}{D}$$

Vin	Minimum DC input voltage (V)
Vo	Required output voltage(V)
D	0.85(Max. duty)
K	0.8(factor)

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Others

Do not use a IC connector to the ground terminal No. 4. When the connector opens, the DC/DC converter will be broken.