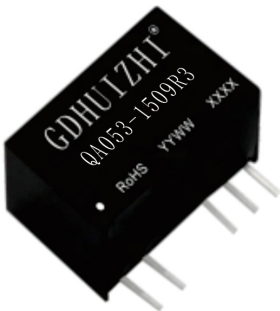


Typical Characteristics

Power Module for SiC MOSFET Drivers

- Isolation voltage: 5000VAC
- Low no-load power consumption:
0.025W(Typ.)
- Efficiency: up to 87% (Typ.)
- Operating ambient temperature: -40℃ ~ +105℃
- MTBF≥3.5 million hours (3500000Hrs)
- Output short-circuit protection:
Continuous short-circuit protection
automatic recovery
- Compact SIP package, plastic housing
- Industry standard pin-out
- Ripple/noise (20MHz bandwidth):
50mVp-p(Typ.)



The QAxx3-R3 series is a DC-DC power module designed by Huizhi Electronics specifically for SiC drivers. It features an asymmetric voltage output configuration to minimize SiC drive losses as much as possible. It also includes output short-circuit protection and self-recovery capabilities. This product is suitable for:

- General-purpose variable-frequency drives
- AC servo drive systems
- Electric welding machine
- Uninterruptible power supplies (UPS)

Product selection table

Certi ficat ion	Model number	Input voltage range (Vdc)	Output Voltage/Current		Ripple and Noise	Efficiency@ Full load	Max. capaci tive load
		Rated value ② (Range)	Output Voltage (Vdc)	Output I (mA) (Max. Min.)	Full Load (mVp-p) Typ./Max .	%, (Min./Typ.)	μ F
	QA053-1509R3	5 (4.5-5.5)	+15. 0/-8. 7	+80/-40	50/100	78/82	1000
	QA123-1509R3	12 (10. 8-13. 2)	+15. 0/-9. 0	+100/-100		82/87	2200
	QAW123-1509R3	12 (9-15)					
	QA153-1509R3	15 (13. 5-16. 5)					
	QA243-1509R3	24 (21. 6-26. 4)					
	QA053-1509R3G	5 (4. 5-5. 5)	+15. 0/-8. 7	+80/-40		77/81	1000

	QA123-1509R3G	12 (10.8-13.2)	+15.0/-9.0	+100/-100	82/87	2200
	QAW123-1509R3G	12 (9-15)				1000
	QA153-1509R3G	15 (13.5-16.5)				2200
	QA243-1509R3G	24 (21.6-26.4)			77/82	2200

Note: 1. Due to space limitations, the above is only a list of representative products. For products not included in this list, please contact our Sales Department.

2. The maximum capacitive load indicates the maximum capacitive load that can be connected to +Vo or -Vo. If this value is exceeded, the product will not start properly.

Test Conditions: Unless otherwise specified, all parameter measurements were taken at the nominal input voltage, with a purely resistive rated load, and at an ambient temperature of 25° C.

Input characteristics

Items		Working conditions	Min	Typ.	Max.	Unit
Input voltage	Vin=5VDC	DC	-0.7	--	9	VDC
	Vin=12VDC	DC	-0.7	--	18	
	Vin=15VDC	DC	-0.7	--	21	
	Vin=24VDC	DC	-0.7	--	30	
Input filter type		Capacitor filtering				
Hot swap		Not supported				

Output characteristics

Items		Working conditions	Min.	Typ.	Max.	Unit
QA053-1509R3	+Vo	Vin=5VDC, Pin6 & Pin7 +Io= +80mA	14.55	15.3	16.05	VDC
	-Vo	Vin=5VDC, Pin5 & Pin6 -Io= -40mA	-8.32	-8.76	-9.20	
QA123-1509R3	+Vo	Vin=12VDC, Pin6 & Pin7 +Io= +100mA	13.50	14.25	15.00	
	-Vo	Vin=12VDC, Pin5 & Pin6 -Io= -100mA	-7.92	-8.37	-8.82	
QAW123-1509R3	+Vo	Vin=12VDC, Pin6 & Pin7 +Io= +100mA	13.50	14.25	15.00	
	-Vo	Vin=12VDC, Pin5 & Pin6 -Io= -100mA	-7.92	-8.37	-8.82	
QA153-1509R3	+Vo	Vin=15VDC, Pin6 & Pin7 +Io= +100mA	14.25	15.00	15.75	
	-Vo	Vin=15VDC, Pin5 & Pin6 -Io= -100mA	-7.92	-8.37	-8.82	
QA243-1509R3	+Vo	Vin=24VDC, Pin6 & Pin7 +Io= +100mA	14.55	15.30	16.05	
	-Vo	Vin=24VDC, Pin5 & Pin6 -Io= -100mA	-8.37	-8.82	-9.27	
QA053-1509R3G	+Vo	Vin=5VDC, Pin6 & Pin7 +Io= +80mA	14.40	15.15	15.90	
	-Vo	Vin=5VDC, Pin5 & Pin6 -Io= -40mA	-8.18	-8.61	-9.05	

QA123-1509R3G		+Vo	Vin=12VDC, Pin6 & Pin7 +Io= +100mA	13.88	14.63	15.38		
		-Vo	Vin=12VDC, Pin5 & Pin6 -Io= -100mA	-8.64	-9.09	-9.54		
QAW123-1509R3G		+Vo	Vin=12VDC, Pin6 & Pin7 +Io= +100mA	13.88	14.63	15.38		
		-Vo	Vin=12VDC, Pin5 & Pin6 -Io= -100mA	-8.64	-9.09	-9.54		
QA153-1509R3G		+Vo	Vin=15VDC, Pin6 & Pin7 +Io= +100mA	14.10	14.85	15.60		
		-Vo	Vin=15VDC, Pin5 & Pin6 -Io= -100mA	-8.64	-9.09	-9.54		
QA243-1509R3G		+Vo	Vin=24VDC, Pin6 & Pin7 +Io= +100mA	14.25	15.00	15.75		
		-Vo	Vin=24VDC, Pin5 & Pin6 -Io= -100mA	-8.28	-8.73	-9.18		
Output voltage accuracy			10% -100% load		See the error envelope curve (Figure 3- Figure 24)			
Line Regulation	(5V Model No.)	Within the full input voltage range	+ output	--	±1.1	±1.4	---	
	Other Model No.		- output	--	±1.1	±1.4		
			+ output	--	±1.1	±1.5		
			- output	--	±1.1	±1.5		
Load Regulation	(5V Model No.)	10% -100% load	+ output	--	8	15	%	
	QA(W)123-1509R3G		- output	--	10	15		
			+ output	--	11	17		
	Other Model No.		- output	--	13	17		
			+ output	--	6	15		
			- output	--	8	15		
Temperature drift coefficient			Full load		--	±0.04	±0.1	%/°C
Ripple & Noise *			20MHz bandwidth		--	50	100	mVp-p
Output short-circuit protection				Sustainable, automatic recovery				

Note: *The test method for ripple and noise uses the twisted-pair test method; see the Test Application Reference.

General characteristics

Items	Working conditions	Min.	Typ.	Max.	Unit
Insulation voltage	Input-output, test duration: 1 minute, leakage current less than 1 mA.	5000	--	--	VDC
Insulation resistance	Input-output, insulation voltage 500 VDC.	1000	--	--	MΩ
Isolation capacitor	Input-Output, 100 kHz/0.1 V	--	3.5	5	pF
Operating temperature	Derate for use when temperature ≥85°C (see Figure 2)	-40	--	105	°C
Storage temperature		-55	--	+125	
Outside cover temperature rise while operating	Ta=25°C	--	30	--	

Storage temperature	No condensation	5	—	95	%RH
Pin soldering temperature resistance	The solder joint is 1.5 mm from the housing; 10 seconds	—	—	+300	°C
Switching frequency	Full load, rated voltage input	—	200	—	KHz
Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Housing material		Black flame-retardant, heat-resistant plastic (UL94 V-0)			
Minimum mean time between failures	MIL-HDBK-217F@25°C	3.5X10 ⁶	—	—	Hrs

Product Performance Curve

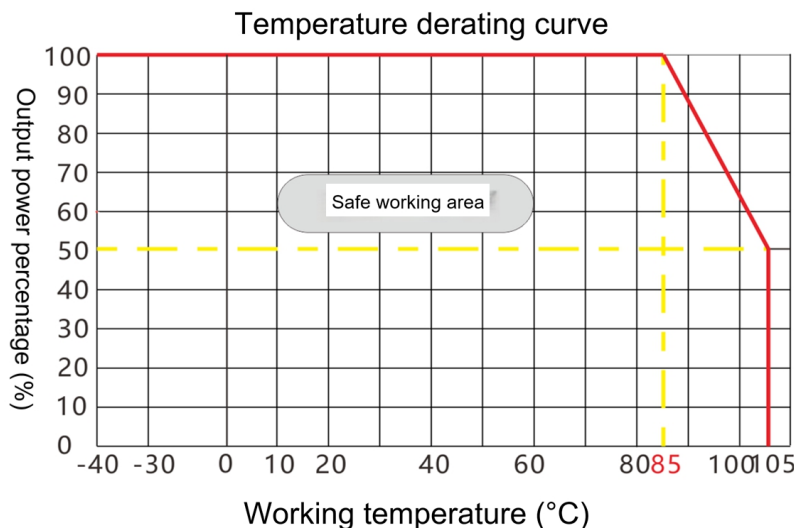
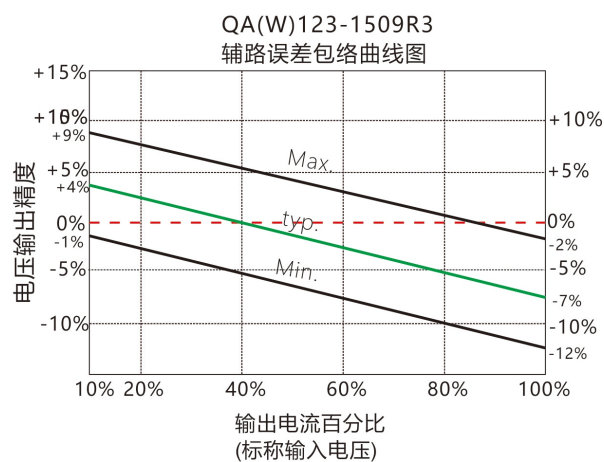
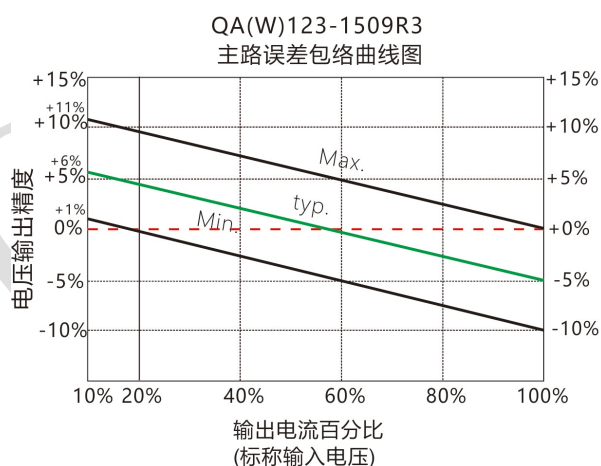
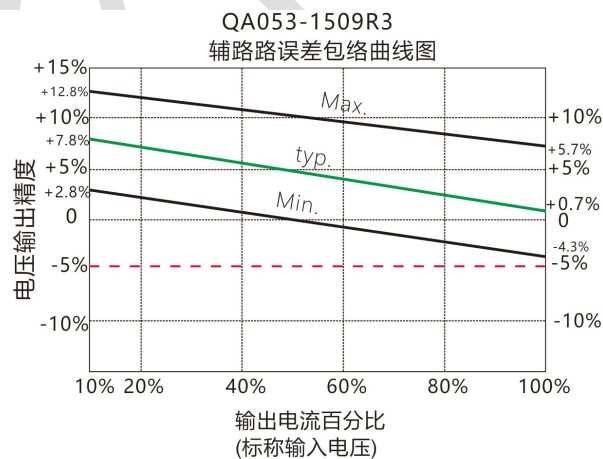
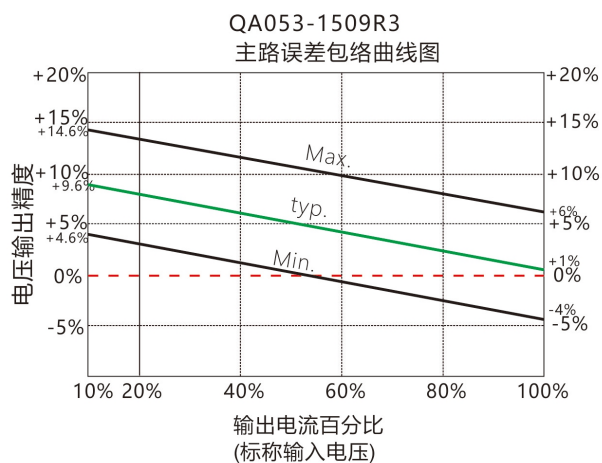
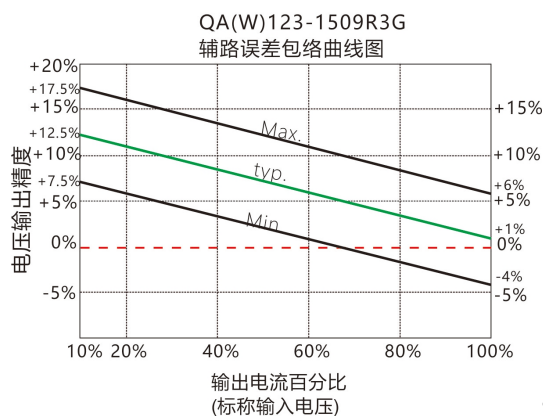
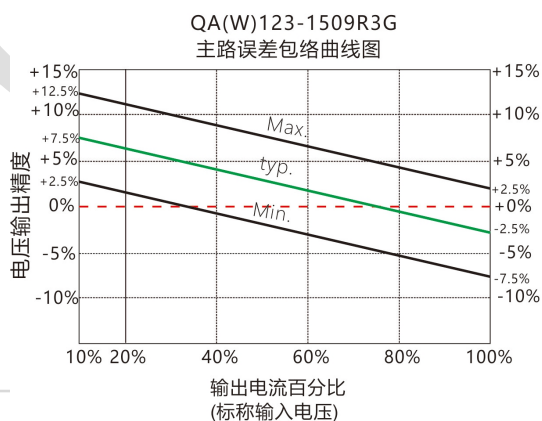
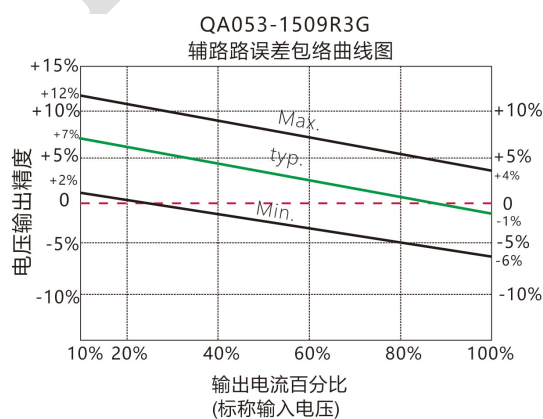
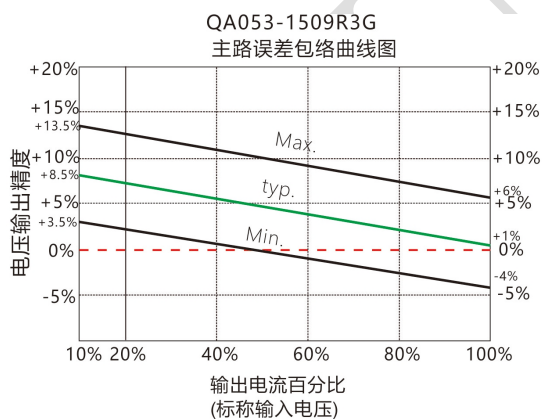
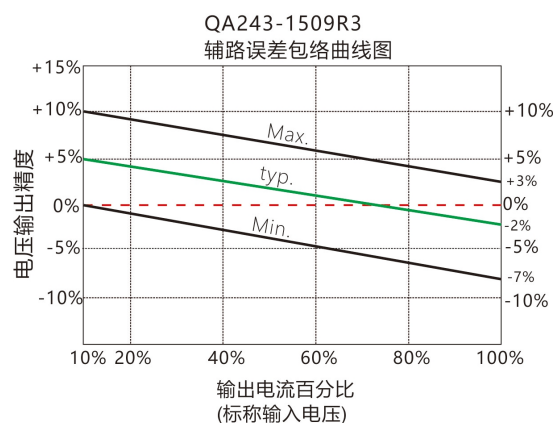
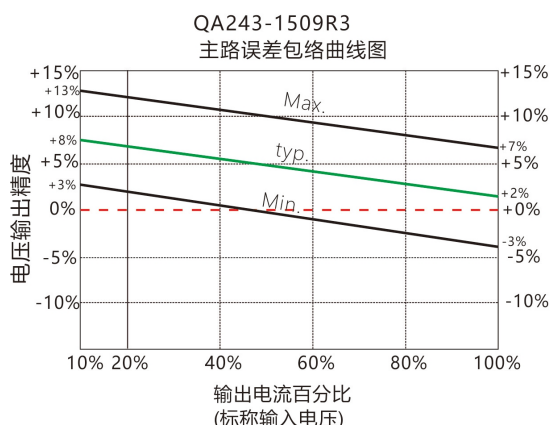
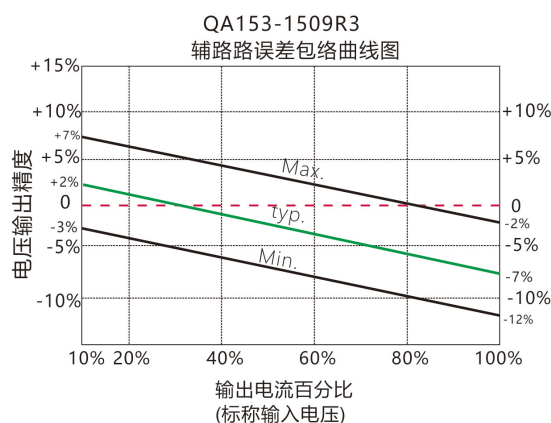
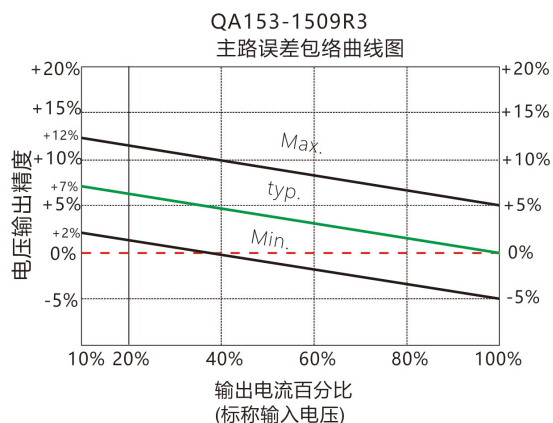
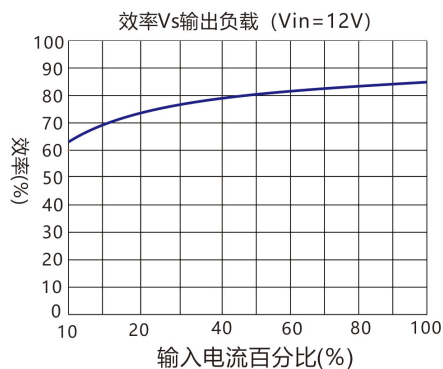
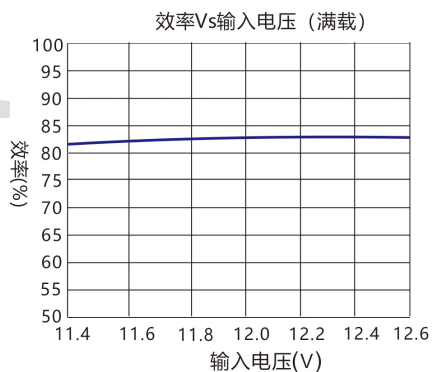
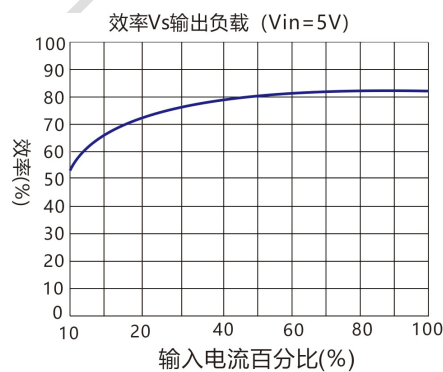
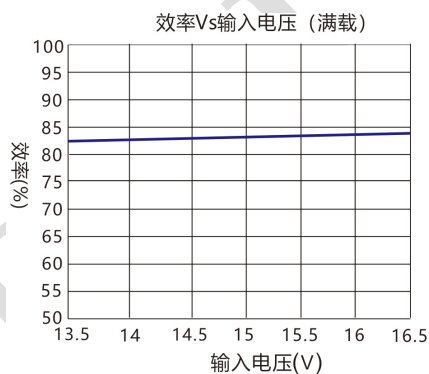
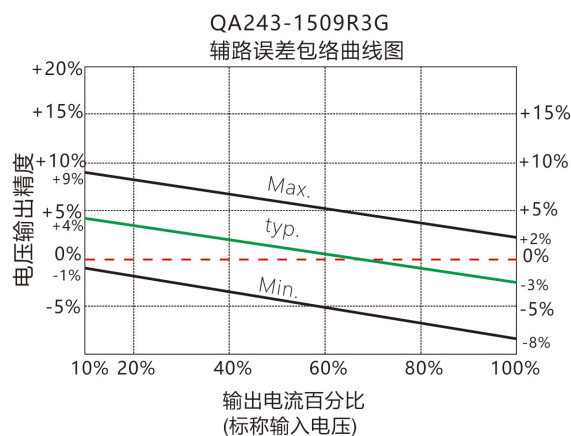
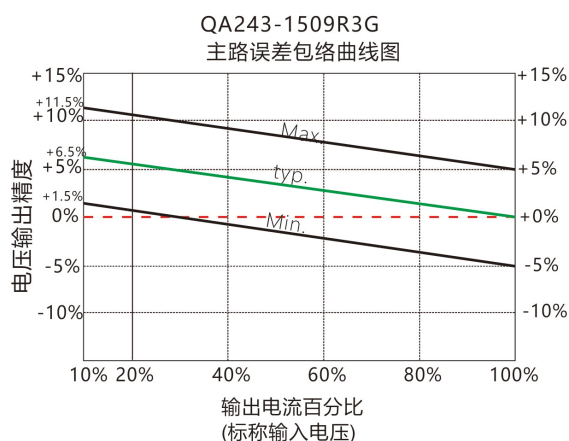
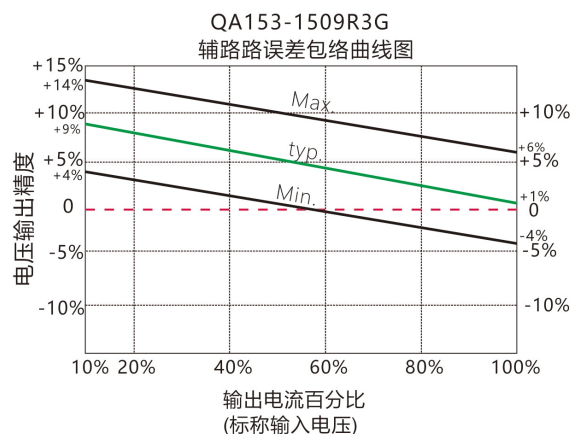
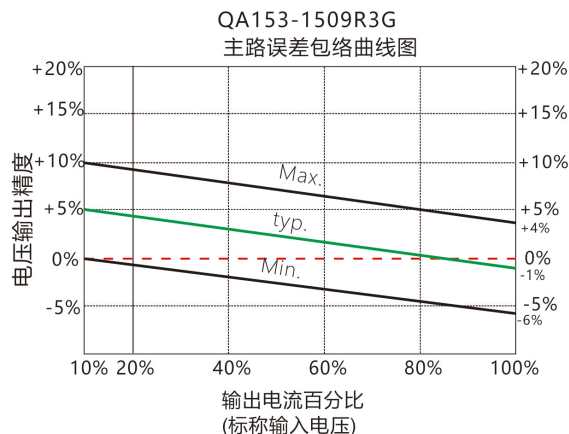


Figure 1 (Temperature derating curve)







Typical Application Reference Circuit (Recommended Parameters)

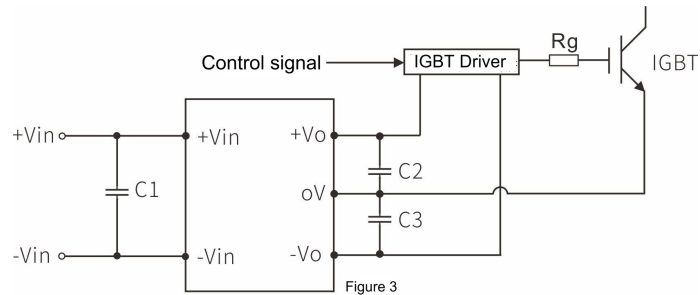
1. General applications:

If further reduction of input and output ripple is required, a capacitor filter network can be connected across the input and output terminals; the circuit is shown in Figure 1.

However, care must be taken to select an appropriate filter capacitor. If the capacitor is too large, it is likely to cause startup issues. For each output channel, the recommended capacitive load values—which ensure safe and reliable operation—are listed in Table 1.

Recommended capacitive load values (Table 1)

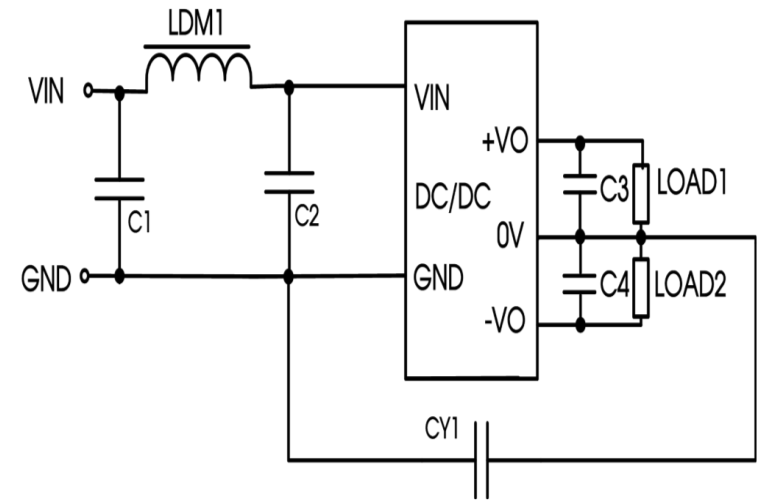
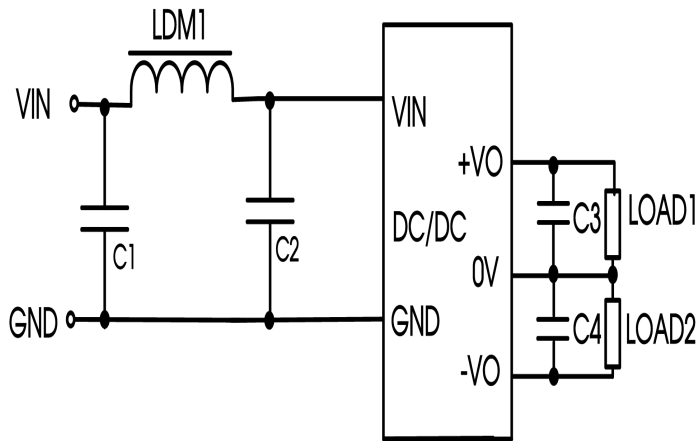
Vin	Cin	Vo	Cout
12VDC	2.2μF/25V	5VDC	4.7μF/16V
24VDC	1μF/50V	12VDC	1μF/16V
--	--	15VDC	1μF/25V



2. Typical EMI application circuit

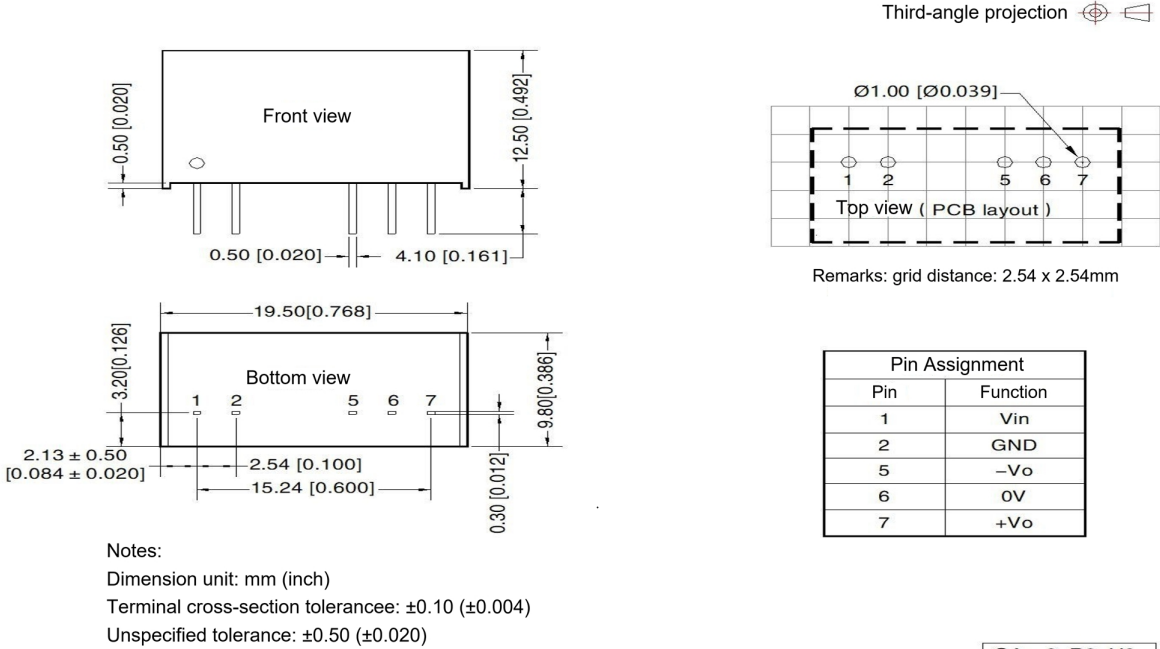
Recommended EMI reference circuit values (Table 2)

Items		5V Input model	Other model
EMI	C1/C2	4.7μF /16V	1μF/50V
	C3/C4	10μF /50V (Low-impedance capacitor)	100μF/30V (Low-impedance capacitor)
	LDM	6.8μH	33μH



EMI	C1/C2	4.7μF /16V
	C3/C4	10μF /50V (Low-impedance capacitor)
	LDM	6.8μH
	CY1	330pF

Appearance Dimensions and Pin Assignment, Recommended PCB Layout



*Note: If the pin assignments of the power module differ from those in the selection guide, refer to the labels on the actual unit.

Package Description

Package code	L x W x H	
-	19.50 x 9.8 x 12.50 mm	0.767 × 0.385 × 0.492inch

Test Application Reference

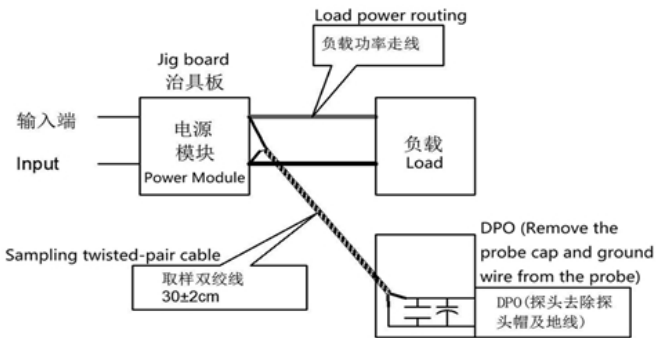
Ripple & Noise Testing: (Twisted-pair method, 20 MHz bandwidth)

Test Method:

1. For ripple and noise testing, use a Category 12 twisted-pair cable. Set the oscilloscope bandwidth to 20 MHz and use a 100 MHz bandwidth probe. Connect a 0.1 μ F polypropylene capacitor and a 4.7 μ F high-frequency, low-impedance electrolytic capacitor in parallel at the probe tip. Set the oscilloscope to “Sample” mode.

2. Schematic diagram for output ripple and noise testing:

Connect the power supply input to the power source. Connect the power supply output to the electronic load via the fixture board. For testing, use a 30 cm $\pm$ 2 cm sampling lead to take a direct sample from the power supply output port. Select insulated wires with appropriate gauge based on the magnitude of the output current.



Application Precautions

1. Input Requirements: Ensure that the output voltage fluctuation range of the power supply does not exceed the input requirements of the DC/DC module itself; the output power of the input power supply must be greater than the output power of the DC/DC module.
2. Recommended Circuit 1: For applications with general ripple and noise requirements, a filter capacitor can be connected in parallel at both the input and output terminals. The external circuit is shown in Figure (1) below; refer to Table (1). Output Load Requirements: Avoid operating under no-load conditions whenever possible. When the actual power consumption of the load is less than 10% of the module's rated output power or no-load conditions occur, it is recommended to connect a dummy load to the output. The dummy load (resistor) can be calculated based on 5 - 10% of the module's rated power, where the resistance value = $U_{out} / (1W \times R3 \times 10\%)$;
3. Overload Protection: Under normal operating conditions, the product's output circuit does not provide overload protection. Prolonged overload will trigger over-temperature protection, causing the output to shut down;
4. The output features continuous short-circuit protection with automatic recovery.
5. The capacitance of the external capacitor connected to the output should not be too large, as this may cause overcurrent or poor startup during module startup;
6. If the product operates below the minimum required load, performance compliance with all specifications in this manual cannot be guaranteed;
7. Maximum capacitive loads are tested within the input voltage range and under full-load conditions;
8. Unless otherwise specified, all specifications in this manual are measured at $T_a=25^\circ\text{C}$, humidity <75% RH, nominal input voltage, and rated output load;
9. All test methods for the specifications in this manual are based on our company's standards;
10. We offer product customization; please contact our technical staff directly for details;
11. Product specifications are subject to change without notice.

Contact

GDHUIZHI®

广东汇智电子技术有限公司

Guangdong Huizhi Electronic Technology Co., Ltd.

地址：广东省肇庆市端州区 11 区肇庆大道北侧厂房、办公楼(二期)3 楼

Add.: 3rd floor, factory and office building (phase II) on the north side of Zhaoqing Avenue,
District 11, Duanzhou District, Zhaoqing City, Guangdong Province, China

Homepage: www.huizhi-elec.com/www.chinaebizal.com

Tel: +86 - 758 - 2566 585

E-mail: sales@huizhi-elec.com