

Typical Features

- ◆ Fixed voltage input, isolated unregulated output
- ◆ Efficiency up to 87% (Typ.)
- ◆ Mini size SIP Package
- ◆ Reinforced insulated
- ◆ Isolation voltage 5000VAC/6000VDC
- ◆ Continuous short circuit protection, self-recovery
- ◆ Operating temperature from -40°C to +105°C
- ◆ Plastic case, flame class UL94-V0



Application

QAXX3C-XXXXR3 series --- DC-DC modular converters specially designed for SiC MOSFET driver. It has asymmetric voltage output to decrease SiC MOSFET drive loss, also the output short circuit protection and self-recovery.

Typical Product List

Certificate	Part No.	Input Voltage Range		Output Voltage/ Current (Vo/Io)		Input Current (mA) Typ. @Nominal volt.		Max Capacitive Load	Efficiency(%) @Full load nominal volt.	
		Nominal (VDC)	Range (VDC)	Vo (VDC)	Io (mA)	Full Load	No load	uF	Min	Typ.
CE	QA053C-1505R3	5	4.5 - 5.5	+15/-5	+80/-40	328	26	1000	79	83
-	QA053C-1803R3			+18/-3.5	+80/-80	405	22	680	79	83
CE	QA053C-2003R3			+20/-3.5	+80/-80	435	35	470	79	83
-	QA053C-2004R3			+20/-4	+80/-40	400	35	470	79	83
-	*QA123C-1502R3	12	10.8 - 13.2	+15/-2.5	+100/-100	165	10	2200	82	87
CE/UL	QA123C-1504R3			+15/-4	+120/-120	215	10	2200	82	87
CE/UL	QA123C-1803R3			+18/-3	+100/-100	200	10	1000	82	87
CE/UL	QA123C-2005R3			+20/-5	+90/-90	210	14	470	82	87
-	QA153C-1504R3	15	13.5 - 16.5	+15/-4	+120/-120	170	10	2200	82	87
-	QA153C-1802R3			+18/-2.5	+100/-100	160	10	1500	81	86
CE	QA153C-1803R3			+18/-3	+100/-100	165	10	1500	82	87
-	QA153C-1805R3			+18/-5	+100/-100	180	10	1500	80	84
-	QA153C-2004R3			+20/-4	+80/-40	140	10	470	79	83
-	*QA153C-2005R3			+20/-5	+90/-90	165	10	2200	82	87

Note 1: The maximum capacitive load is the capacitance allowed to be used when the power supply starts up at full load. The converter may not start if the capacitor exceeds this value.

Note 2: The efficiency is tested at the nominal input voltage and the rated load.

Note 3: Please contact Aipu sales for other output voltages requirements of this series but not listed in this table.

Note 4: The * marked parts have been developed in process.

Input Specifications

Item	Test conditions	Min.	Typ.	Max.	Unit
Input inrush voltage (1sec. max.)	5VDC Input	-0.7	--	9	VDC
	12VDC Input	-0.7	--	18	
	15VDC Input	-0.7	--	21	
Input filter	Capacitor filter				
Hot Plug	Unavailable				

Output Specifications

Item		Test conditions	Min.	Typ.	Max.	Unit
QA053C-1505R3	+Vo	Vin=5Vdc, Pin6 & Pin7 +Io= +80mA	14.25	15	15.75	VDC
	-Vo	Vin=5Vdc, Pin5 & Pin6 -Io= -40mA	-4.85	-5.10	-5.35	VDC
QA053C-1803R3	+Vo	Vin=5Vdc, Pin6 & Pin7 +Io= +80mA	16.72	17.6	18.48	VDC
	-Vo	Vin=5Vdc, Pin5 & Pin6 -Io= -80mA	-3.16	-3.33	-3.49	VDC
QA053C-2003R3	+Vo	Vin=5Vdc, Pin6 & Pin7 +Io= +80mA	18.80	19.80	20.80	VDC
	-Vo	Vin=5Vdc, Pin5 & Pin6 -Io= -80mA	-3.395	-3.57	-3.745	VDC
QA053C-2004R3	+Vo	Vin=5Vdc, Pin6 & Pin7 +Io= +80mA	18.8	19.8	20.8	VDC
	-Vo	Vin=5Vdc, Pin5 & Pin6 -Io= -40mA	-3.84	-4.04	-4.24	VDC
*QA123C-1502R3	+Vo	Vin=12Vdc, Pin6 & Pin7 +Io= +100mA	--	--	--	VDC
	-Vo	Vin=12Vdc, Pin5 & Pin6 -Io= -100mA	--	--	--	VDC
QA123C-1504R3	+Vo	Vin=12Vdc, Pin6 & Pin7 +Io= +120mA	14	14.75	15.5	VDC
	-Vo	Vin=12Vdc, Pin5 & Pin6 -Io= -120mA	-3.8	-4	-4.2	VDC
QA123C-1803R3	+Vo	Vin=12Vdc, Pin6 & Pin7 +Io= +100mA	17.1	18	18.9	VDC
	-Vo	Vin=12Vdc, Pin5 & Pin6 -Io= -100mA	-3.0	-3.15	-3.3	VDC
QA123C-2005R3	+Vo	Vin=12Vdc, Pin6 & Pin7 +Io= +90mA	18.80	19.80	20.80	VDC
	-Vo	Vin=12Vdc, Pin5 & Pin6 -Io= -90mA	-4.85	-5.10	-5.35	VDC
QA153C-1504R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +120mA	14.25	15.00	15.75	VDC
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -120mA	-3.72	-3.91	-4.11	VDC
QA153C-1802R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +100mA	17.10	18.00	18.90	VDC
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -100mA	-2.43	-2.55	-2.68	VDC
QA153C-1803R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +100mA	17.10	18.00	18.90	VDC
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -100mA	-2.88	-3.03	-3.18	VDC
QA153C-1805R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +100mA	17.00	17.9	18.80	VDC
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -100mA	-4.56	-4.80	-5.04	VDC
QA153C-2004R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +80mA	19.2	20.20	21.2	VDC
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -40mA	-3.84	-4.04	-4.24	VDC
*QA153C-2005R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +90mA	--	--	--	VDC
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -90mA	--	--	--	VDC
Output voltage accuracy		Please refer to the output voltage deviation graphs (Figure 1-12)				

Load regulation	10%-100% load	Positive output	--	10	17	%
		Negative output	--	13	71	
Line regulation	Input voltage change $\pm 1\%$	Positive output	--	± 1.2	± 1.5	%
		Positive output	--	± 1.2	± 1.5	
Temperature drift coefficient	100% Load		--	--	± 0.03	%/ $^{\circ}\text{C}$
Ripple & Noise	10%-100% load, 20MHz bandwidth		--	80	150	mVp-p
Short circuit protection	Continuous, self-recovery					

Note: The Ripple & Noise is tested by the Twisted Pair Method, please refer to the following test instruction.

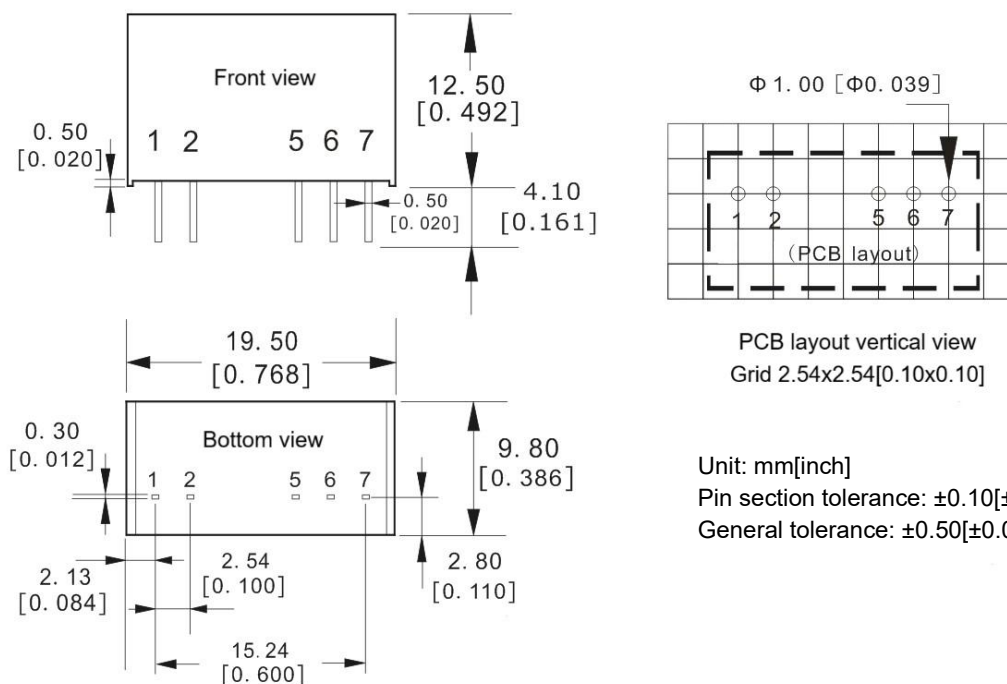
General Specifications

Item	Test conditions		Min.	Typ.	Max.	Unit
Switching frequency	Nominal input voltage, full load		--	260	--	KHz
Operating temperature	Refer to temperature derating graph (Figure 13)		-40	--	+105	$^{\circ}\text{C}$
Storage temperature			-55	--	+125	
Case temperature rise	Within the operating derating range		--	25 $^{\circ}$	--	
Pin soldering temperature	1.5mm from the case, soldering time 10S		--	--	300	
Relative humidity	No condensation		5	--	95	%RH
Isolation voltage	I/P-O/P	Test 1min, leakage current <1mA	5000	--	--	VAC
			6000	--	--	VDC
Insulation resistance	I/P-O/P	@500VDC	1000	--	--	M Ω
Isolation capacitance	I/P-O/P	100KHz/0.1V	--	6	--	pF
Vibration			10-150Hz, 5G, 30 Min. along X, Y and Z			
MTBF	MIL-HDBK-217F@25 $^{\circ}\text{C}$		3500	--	--	K Hours
Transformer CL distance			5	--	--	mm
Transformer CR distance			5	--	--	
PCB CL & CR distances			5.5	--	--	
Case material	Plastic in Black, flame class UL94-V0					
Unit weight	3.7g (Typ.)					
Cooling method	Natural air					
Packing	Tube size (525x18x10mm)		25PCS/Tube			
	Carton size (542x110x155mm)		1400PCS (Total 56 Tubes)			
Unit dimensions	L x W x H	19.50 × 9.80 × 12.50 mm		0.768 × 0.386 × 0.492 inch		

EMC Performance

Item		Test Standard	Performance/Class
EMI	CE	CISPR32/EN55032	CLASS B (With the Recommended EMC Circuit)
	RE	CISPR32/EN55032	CLASS B (With the Recommended EMC Circuit)
EMS	ESD	IEC/EN61000-4-2	Contact $\pm 6\text{kV}$, Air $\pm 8\text{kV}$ perf. Criteria B

Mechanical Dimensions

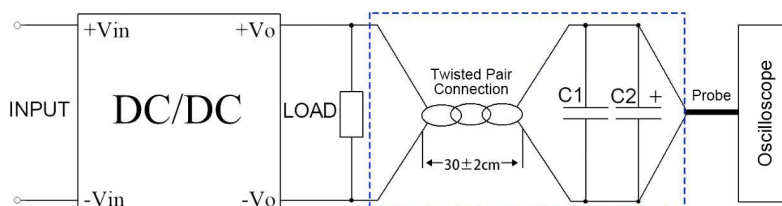


Pin-out Function Description

Pin No.	1	2	3	4	5	6	7
Dual (D)	+Vin	GND	No Pin	No Pin	-Vo	0V(COM)	+Vo

Note: Please take the pin definition on the product label as the right one if it is different than the data sheet description.

Ripple & Noise Test Instructions (Twisted Pair Method, 20MHz Bandwidth)



1. The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C1(0.1uF) polypropylene capacitor and C2(10uF) high frequency low impedance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair.
2. Refer to the test diagram, the converter output connects to the electronic load by the jig with cables which size should be defined according to the output current value. The other side of the twisted pair (length 30cm $\pm$ 2 cm) should be connected in parallel with the load. The test can start after the input power on.
3. It is recommended to use a $\geq 10\%$ load or a high frequency low impedance electrolytic capacitor ($\geq 100\mu\text{F}$) load at the output to avoid the output ripple increasing.

Product Characteristics Graphs

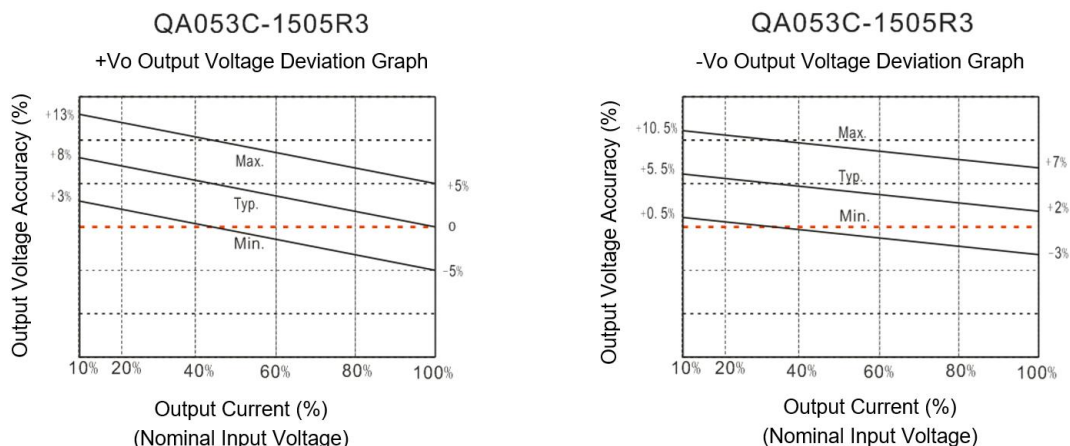


Figure 1

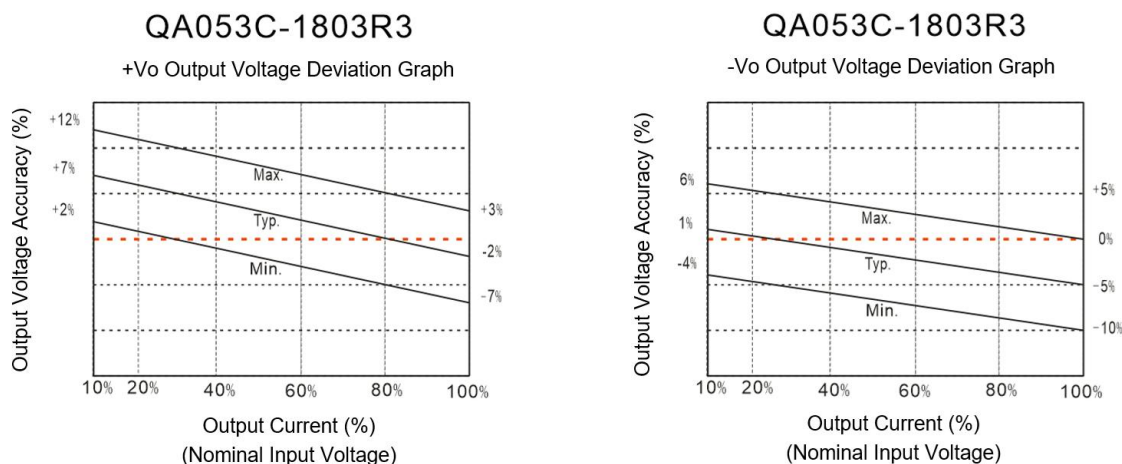


Figure 2

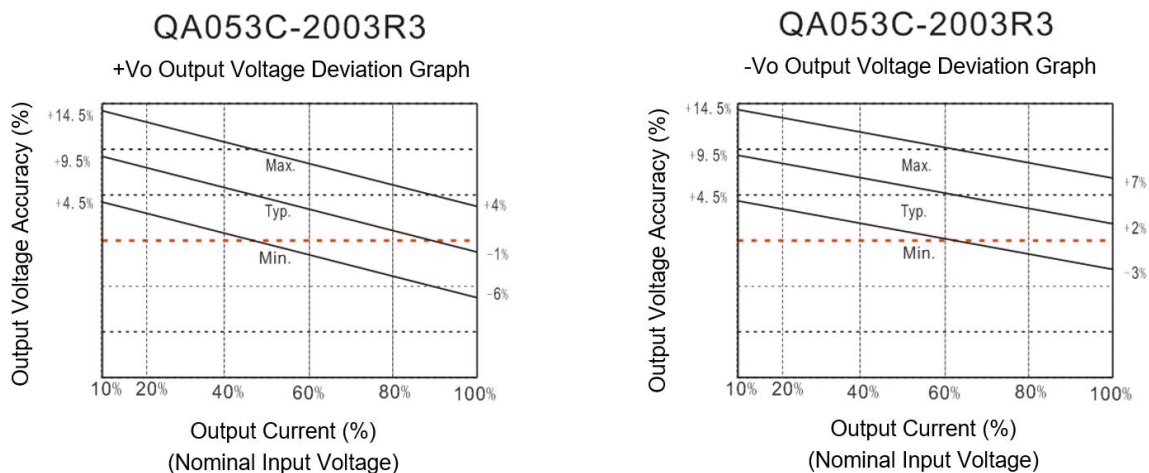


Figure 3

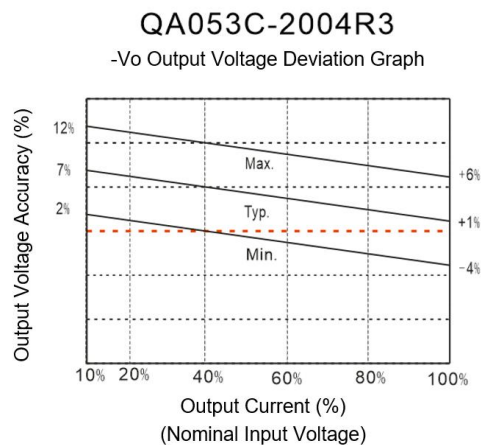
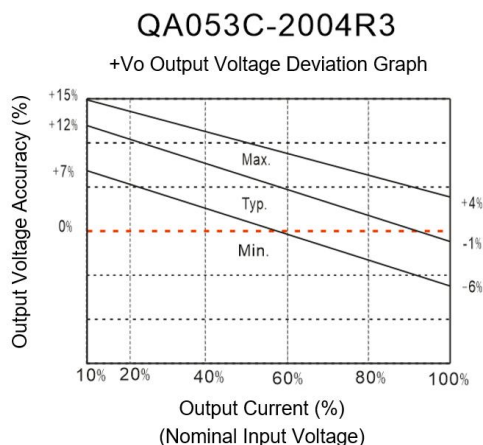


Figure 4

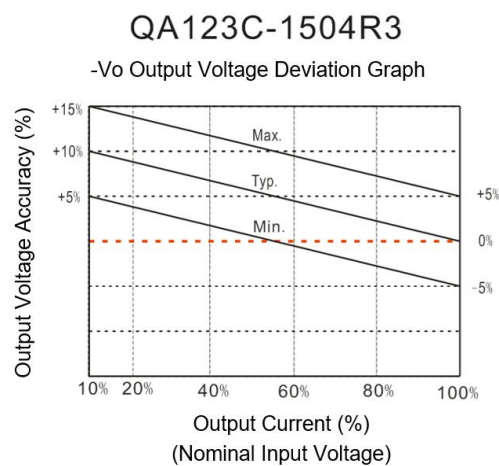
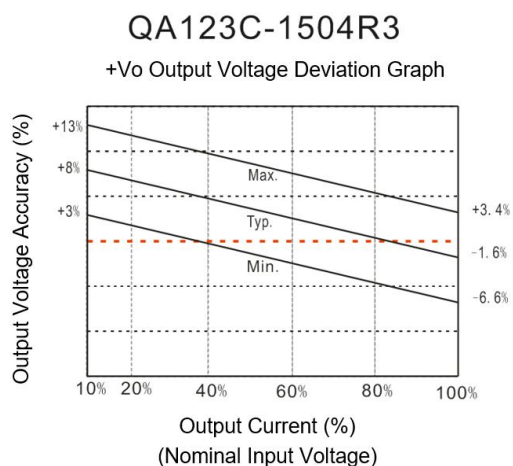


Figure 5

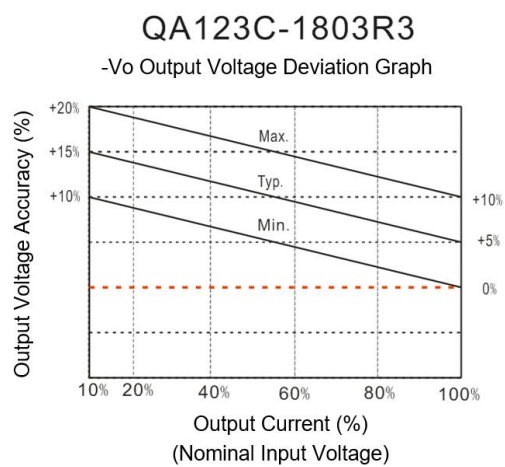
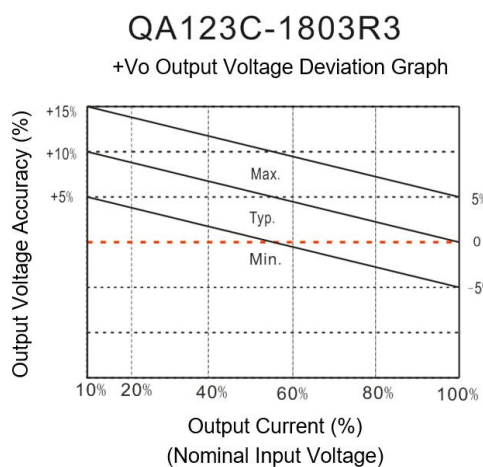


Figure 6

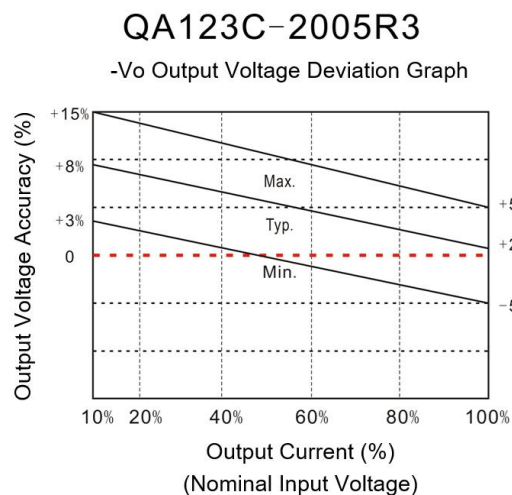
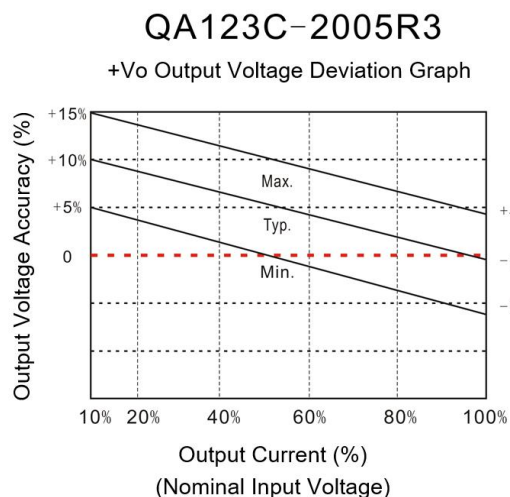


Figure 7

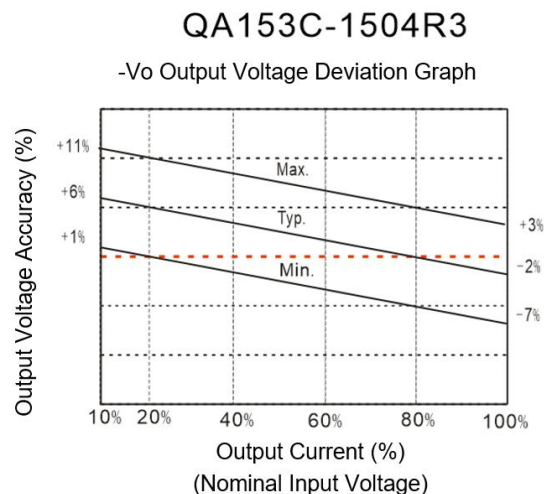
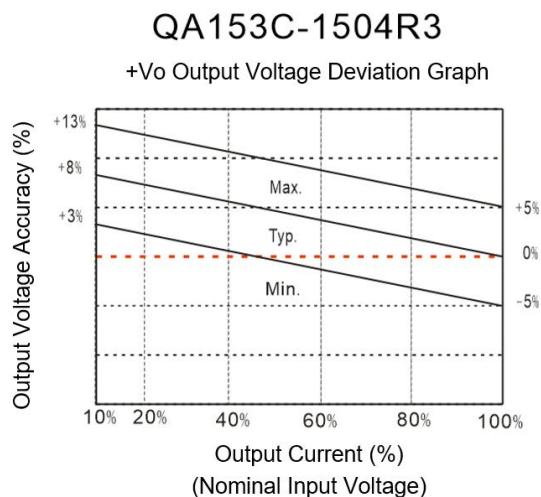


Figure 8

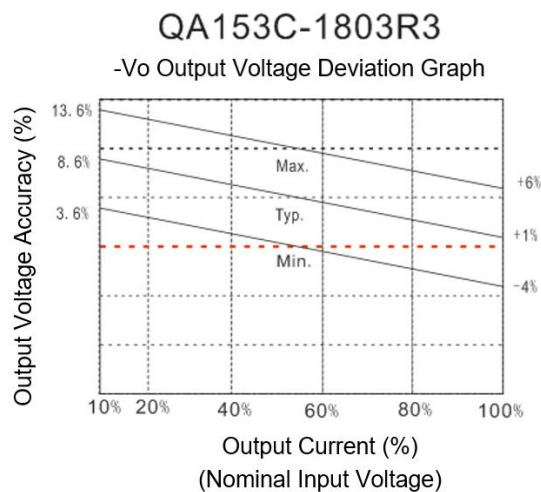
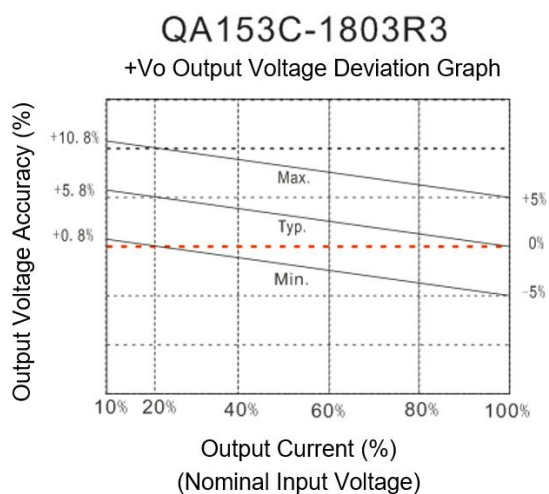


Figure 9

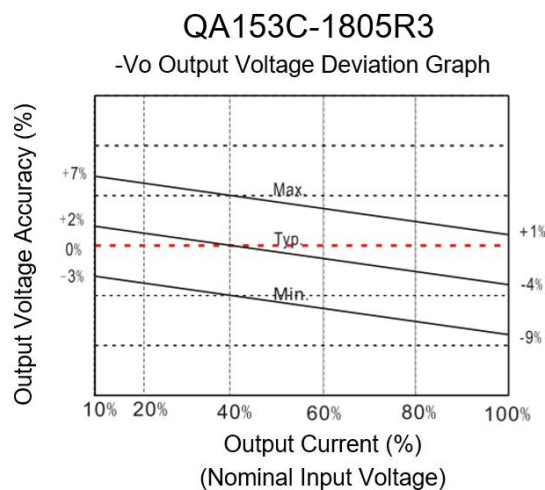
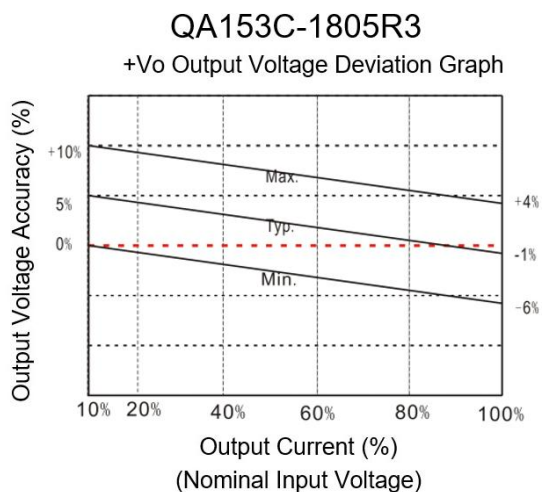


Figure 10

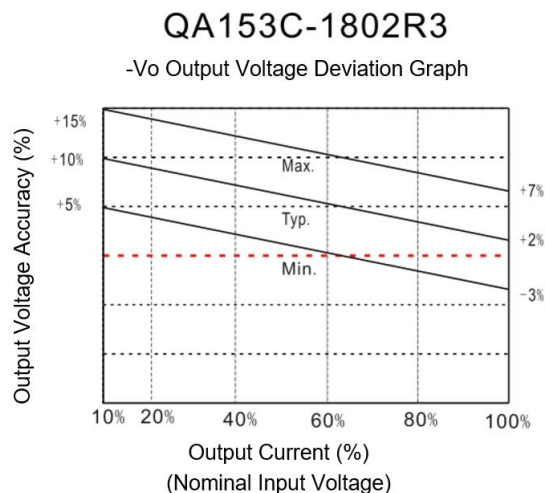
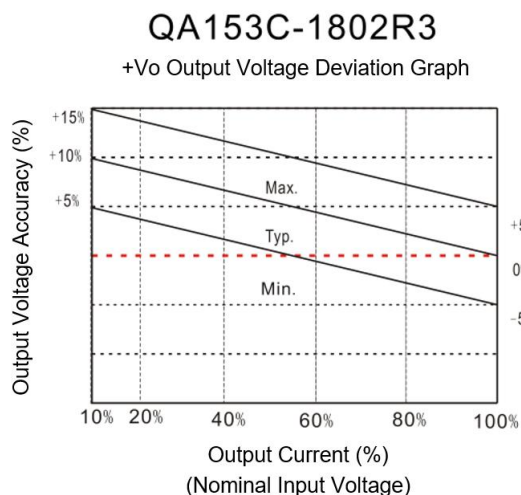


Figure 11

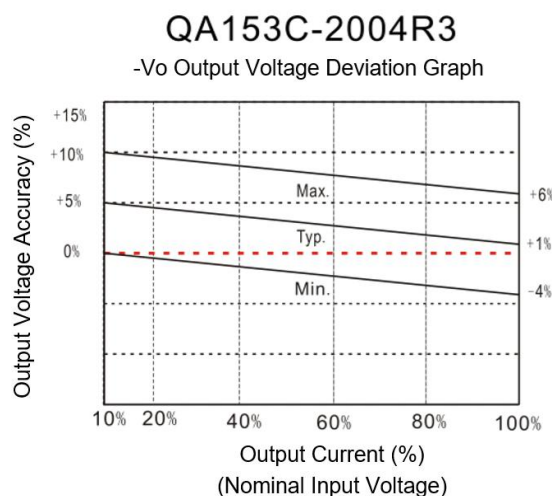
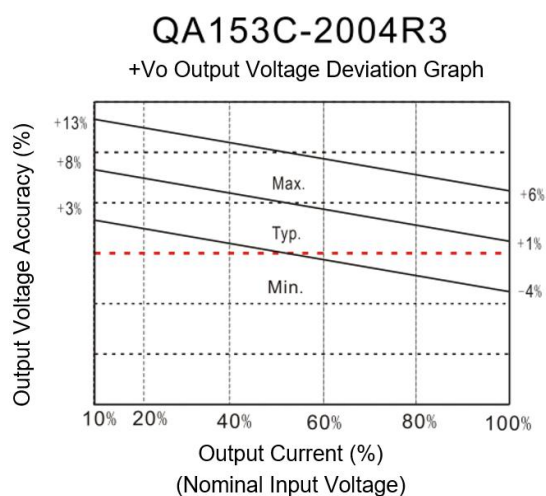


Figure 12

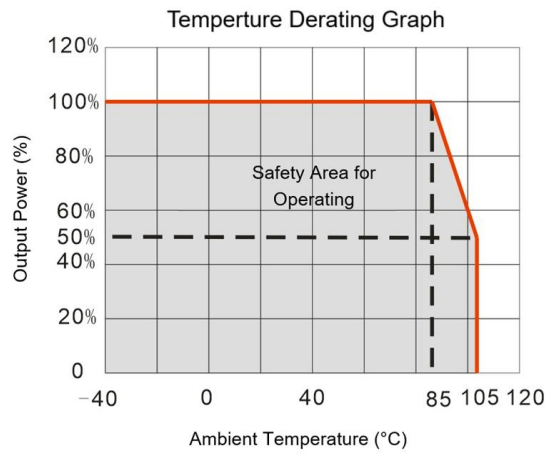


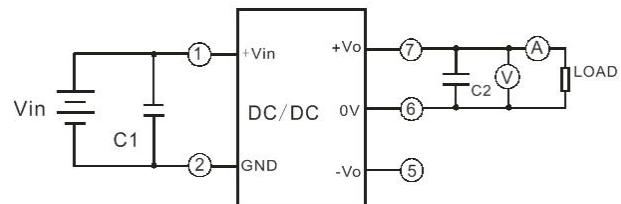
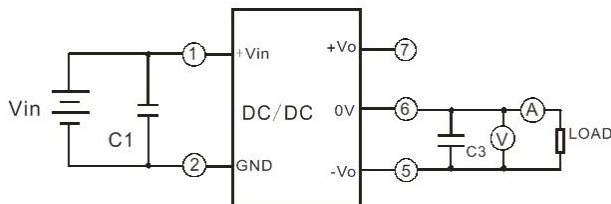
Figure 13

Recommended Circuits for Application

1. Output load requirements

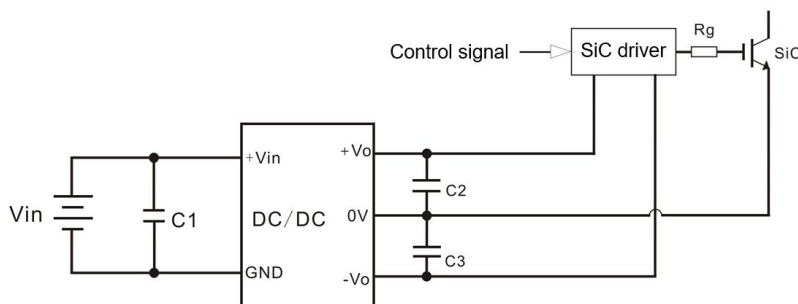
- To ensure the converter operating efficiently and reliably, its minimum load should not be less than 10% of the rated load. It is recommended to connect a resistor in parallel to the output when the real load is less than 10% (the sum of the power consumed should be bigger than or equal to 10% of the rated power).
- The maximum capacitive load is tested at the rated full load. The converter may not start or be broken at the capacitive over-load.

2. Test circuit diagrams



3. Typical application circuit diagram

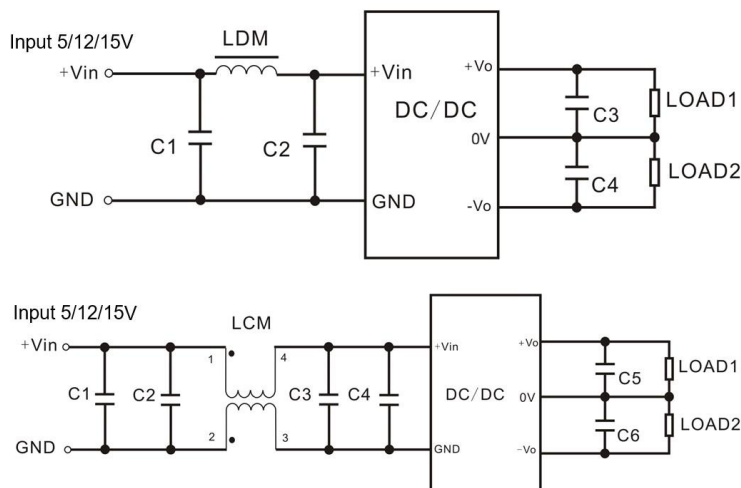
The capacitor filtering net can be used at the input and output to improve the output ripple and noise. The application circuit is shown below, suitable capacitors should be selected as the recommendation.



C1/C2/C3

100uF/50V (Low ESR Capacitors)

4. Recommended EMC circuit diagrams



Input Voltage		5/12/15Vdc
EMI	C1/C2	1uF/50V
	C3/C4	100uF/30V
	LDM	33uH

Input Voltage		5/12/15Vdc
EMI	C1/C2	4.7uF/50V
	C3/C4	1uF/50V
	C5/C6	100uF/50V
	LCM	22uH (CMC)

Application Notice

1. This series of products cannot be used in parallel, and do not support hot-plug.
2. The product should be used according to the specifications, otherwise it could be permanently damaged.
3. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.
4. The product performance cannot be guaranteed if it works under the over-load condition.
5. Unless otherwise specified, all values or indicators on this datasheet are tested at $T_a=25^{\circ}\text{C}$, humidity<75%RH, nominal input voltage and rated load (pure resistance load).
6. All values or indicators on this datasheet have been tested based on Aipupower test specifications.
7. The specifications are specially for the parts listed on this datasheet, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.
8. Aipupower can provide customization service.

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