DC/DC Converter
QAXX3C-XXXXR3 Series

Typical Product Features

- ◆ Fixed Voltage Input, Isolated unregulated output
- ◆ Efficiency up to 87%
- ◆ Continuous short-circuit protection
- ◆ Reinforced insulated
- ◆ Mini SIP Package
- ◆ Isolation voltage 5000Vac/6000Vdc
- ◆ Ambient temperature: -40℃～+105℃
- ◆ Plastic case, flame class UL94 V-0

Test conditions: Unless otherwise specified, all parameter values are tested at Rated input voltage, pure resistive rated load, and at room temperature of 25°C.

Application

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

Product List

Certificate	Part No.	Input Voltage Range (VDC)		Output Voltage/ Current (Vo/Io)		Input Current (mA Typ.) Rated voltage		Max capacitive load	Ripple & Noise (20MHz) Max./ Typ.	Efficiency (%) @full load/rated input	
		Rated	Range	Vo (VDC)	Io(mA) Max./ Min.	Full Load	No load	uF	mVp-p	Min.	Typ.
-	QA053C-1505R3	5	4.5 - 5.5	+15/-5	+80/-40	328	26	1000	150/80	79	83
-	*QA053C-1803R3			+18/-3.5	+80/-80	405	22	680	150/80	79	83
-	QA053C-2003R3			+20/-3.5	+80/-80	435	35	470	150/80	79	83
-	*QA053C-2004R3			+20/-4	+80/-40	400	35	470	150/80	79	83
-	*QA123C-1502R3	12	10.8 – 13.2	+15/-2.5	+100/-100	165	10	2200	150/80	82	87
-	QA123C-1504R3			+15/-4	+120/-120	215	10	2200	150/80	82	87
-	QA123C-1803R3			+18/-3	+100/-100	200	10	1000	150/80	82	87
-	*QA123C-2005R3			+20/-5	+90/-90	210	14	470	150/80	82	87
-	*QA153C-1504R3	15	13.5 - 16.5	+15/-4	+120/-120	170	10	2200	150/80	82	87
-	QA153C-1803R3			+18/-3	+100/-100	165	10	1500	150/80	82	87
-	*QA153C-2005R3			+20/-5	+90/-90	165	10	2200	150/80	82	87
-	QA243C-1504R3	24	21.6 - 26.4	+15/-4	+120/-120	113	8	2200	150/80	76	82
-	*QA243C-1803R3			+18/-3	+100/-100	110	8	2200	150/80	78	83
-	*QA243C-2005R3			+20/-5	+90/-90	125	8	2200	150/80	76	82

Note: 1. The part number with * marked has been developed in process.

2. Both positive and negative output capacitive loads are the same.

Input Specifications

Item	Operating 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	
	24Vdc Input	-0.7	--	30	
Input filter	Capacitive filter				
Hot Plug	Unavailable				

Output Specifications

Item		Operating 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	
*QA053C-1803R3	+Vo	Vin=5Vdc, Pin6 & Pin7 +Io= +80mA	--	--	--	
	-Vo	Vin=5Vdc, Pin5 & Pin6 -Io= -80mA	--	--	--	
QA053C-2003R3	+Vo	Vin=5Vdc, Pin6 & Pin7 +Io= +80mA	18.80	19.80	20.80	
	-Vo	Vin=5Vdc, Pin5 & Pin6 -Io= -80mA	-3.395	-3.57	3.745	
*QA053C-2004R3	+Vo	Vin=5Vdc, Pin6 & Pin7 +Io= +80mA	--	--	--	
	-Vo	Vin=5Vdc, Pin5 & Pin6 -Io= -40mA	--	--	--	
*QA123C-1502R3	+Vo	Vin=12Vdc, Pin6 & Pin7 +Io= +100mA	--	--	--	
	-Vo	Vin=12Vdc, Pin5 & Pin6 -Io= -100mA	--	--	--	
QA123C-1504R3	+Vo	Vin=12Vdc, Pin6 & Pin7 +Io= +120mA	14	14.75	15.5	
	-Vo	Vin=12Vdc, Pin5 & Pin6 -Io= -120mA	3.8	4	4.2	
QA123C-1803R3	+Vo	Vin=12Vdc, Pin6 & Pin7 +Io= +100mA	17.1	18	18.9	
	-Vo	Vin=12Vdc, Pin5 & Pin6 -Io= -100mA	3.0	3.15	3.3	
*QA123C-2005R3	+Vo	Vin=12Vdc, Pin6 & Pin7 +Io= +90mA	--	--	--	
	-Vo	Vin=12Vdc, Pin5 & Pin6 -Io= -90mA	--	--	--	
QA153C-1504R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +120mA	14.25	15.00	15.75	
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -120mA	-3.72	-3.91	-4.11	
QA153C-1803R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +100mA	17.10	18.00	18.90	
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -100mA	-2.88	-3.03	-3.18	
*QA153C-2005R3	+Vo	Vin=15Vdc, Pin6 & Pin7 +Io= +90mA	--	--	--	
	-Vo	Vin=15Vdc, Pin5 & Pin6 -Io= -90mA	--	--	--	
QA243C-1504R3	+Vo	Vin=24Vdc, Pin6 & Pin7 +Io= +120mA	14.25	15.00	15.75	
	-Vo	Vin=24Vdc, Pin5 & Pin6 -Io= -120mA	3.8	4.03	4.23	
*QA243C-1803R3	+Vo	Vin=24Vdc, Pin6 & Pin7 +Io= +100mA	--	--	--	
	-Vo	Vin=24Vdc, Pin5 & Pin6 -Io= -100mA	--	--	--	
*QA243C-2005R3	+Vo	Vin=24Vdc, Pin6 & Pin7 +Io= +90mA	--	--	--	
	-Vo	Vin=24Vdc, Pin5 & Pin6 -Io= -90mA	--	--	--	

Output Voltage Accuracy	Please refer to the output voltage deviation curves (Figure 1-14)					
Load Regulation	10%~100% load	Positive output	--	10	17	%
		Negative output	--	13	17	
Line Regulation	Input voltage change ±1%	Positive output	--	±1.2	±1.5	%
		Positive output	--	±1.2	±1.5	
Temperature Drift Coefficient	100% Load		--	--	±0.03	%/°C
Output Short Circuit Protection	Continuous, self-recovery					

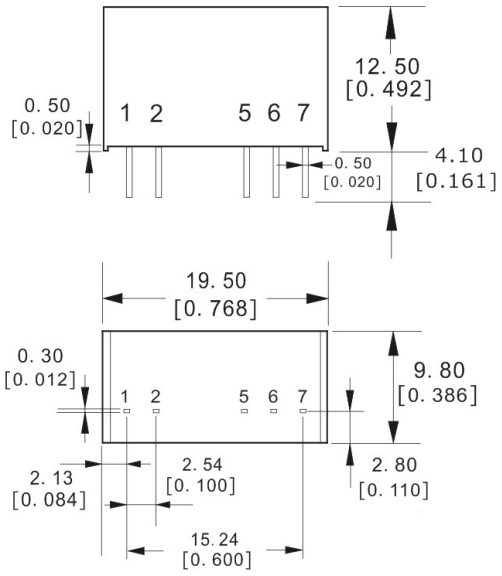
General Specifications

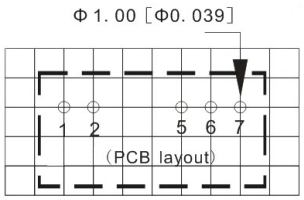
Item	Operating conditions	Min.	Typ.	Max.	Unit
Switching Frequency	Rated input voltage, full load	--	260	--	KHz
Operating Temperature	Please refer to temperature derating curve (Figure 15)	-40	--	+105	℃
Storage Temperature		-55	--	+125	
Case temperature rise	Operating at Ta =25℃	--	25	--	
Pin Soldering Temperature	1.5mm from the case, 10S	--	--	300	
Relative humidity	No condensation	5	--	95	%RH
Isolation Voltage	Input-Output, test 1min, leakage current<0.5mA	5000	--	--	Vac
		6000	--	--	Vdc
Insulation Resistance	Input/Output, @500Vdc	1000			MΩ
Isolation Capacitor	Input/Output,100KHz/0.1V	--	6	--	pF
Vibration		10-150Hz, 5G, 30 Min. along X, Y and Z			
MTBF	MIL-HDBK-217F@25℃	3500	--	--	K Hours
Case Material	Plastic in Black, flame class UL94 V-0				
Product Weight	3.7g (Typ.)				
Cooling Method	Natural air				
Packing	Tube(525*18*10mm)	25PCS			
	Carton(542*110*155mm)	1400PCS (Total 56 Tubes)			
Unit Package Size	L x W x H	19.50 × 9.80 × 12.50 mm		0.768 × 0.386 × 0.492 inch	

EMC Performance

EMI	CS	CISPR32/EN55032, CLASS B（With Recommended EMC Circuit）
	RS	CISPR32/EN55032, CLASS B（With Recommended EMC Circuit）
EMS	ESD	IEC/EN61000-4-2 Air±8kV, Contact±6kV perf.Criteria B

Mechanical Dimensions





Note:
Grid 2.54*2.54mm
Unit: mm[inch]
Pin section tolerance: ±0.10[±0.004]
General tolerance: ±0.50[±0.020]

Pin Definition

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

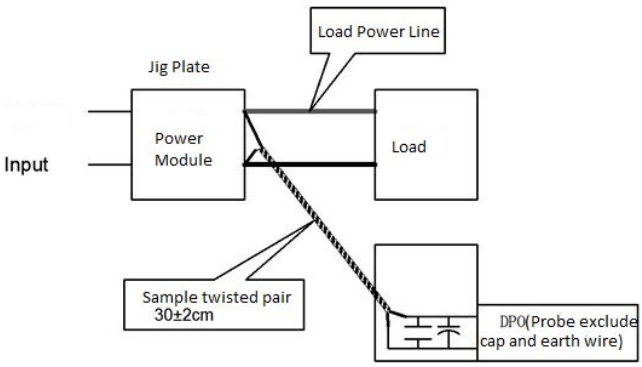
Note: Please take the pin definition on the product label as the right one if there is any difference between the data sheet and the one printed on the product label.

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

Test Method:

1) Ripple noise test need 12# twisted pair cables, an oscilloscope which bandwidth should be set to 20MHz, 0.1uF polypropylene capacitor and 10uF high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes (100M bandwidth). The oscilloscope should be set at the Sample Mode.

2) The output ripple noise test diagram is shown on the right. 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 twisted pair (length 30cm±2 cm) should be connected in parallel with the load, the location is as close as possible to the output pins or terminals. The test can be started after input power on.



Product Performance Curves

QA053C-1505R3
Output voltage V+ Deviation Curve

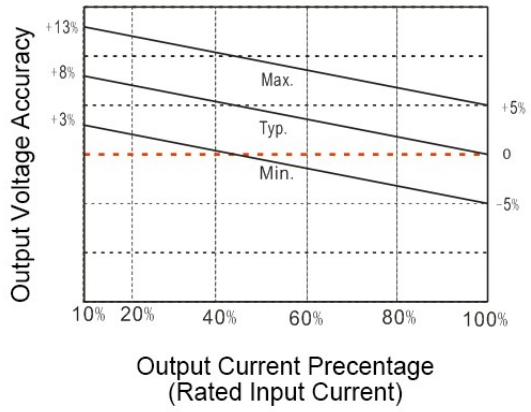


Figure 1

QA053C-1505R3
Output voltage V- Deviation Curve

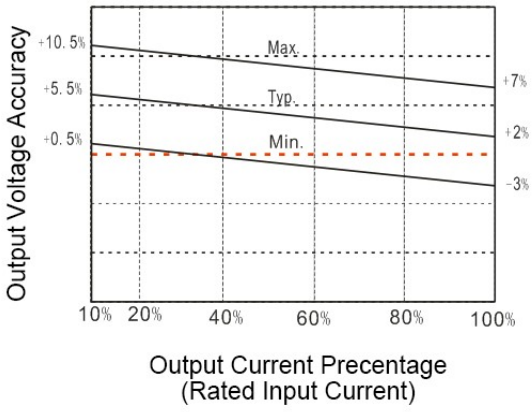


Figure 2

QA053C-2003R3
Output voltage V+ Deviation Curve

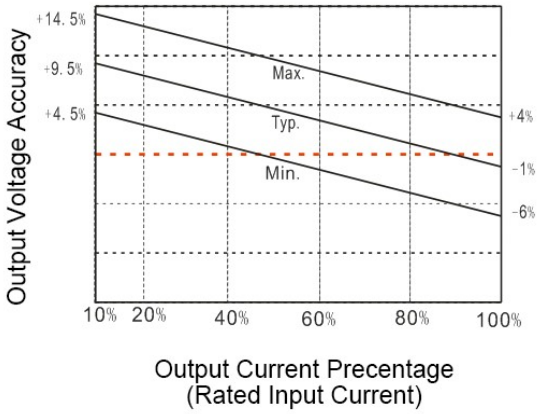


Figure 3

QA053C-2003R3
Output voltage V- Deviation Curve

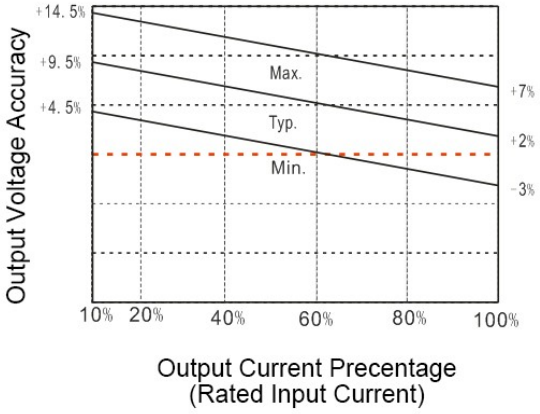


Figure 4

QA123C-1504R3
Output voltage V+ Deviation Curve

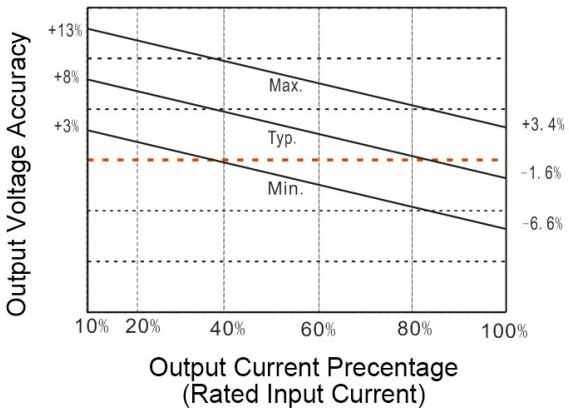


Figure 5

QA123C-1504R3
Output voltage V- Deviation Curve

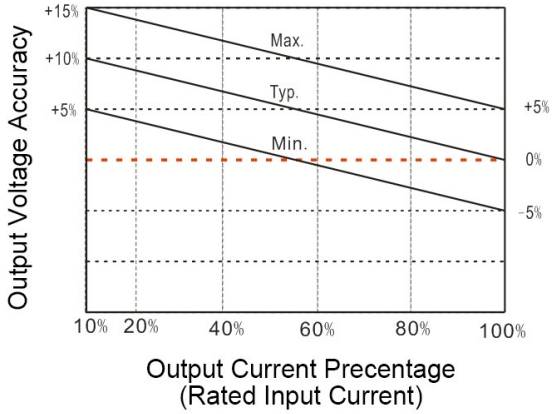


Figure 6

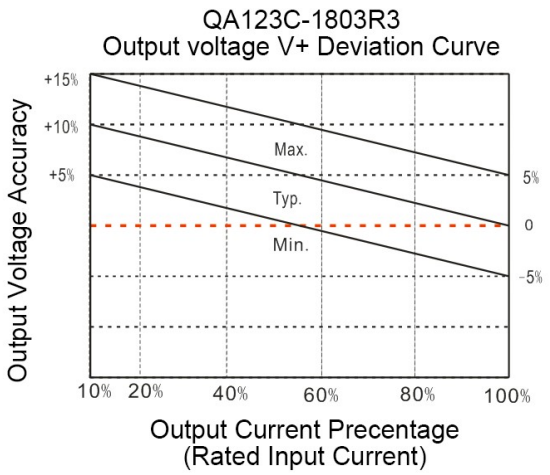


Figure 7

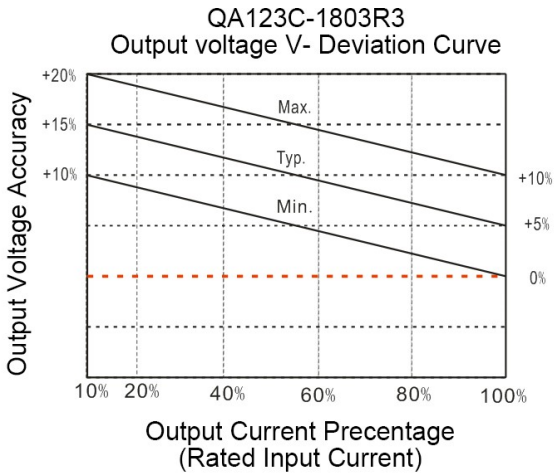


Figure 8

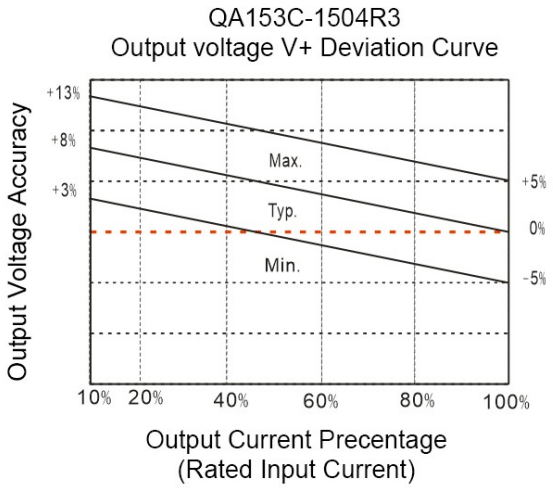


Figure 9

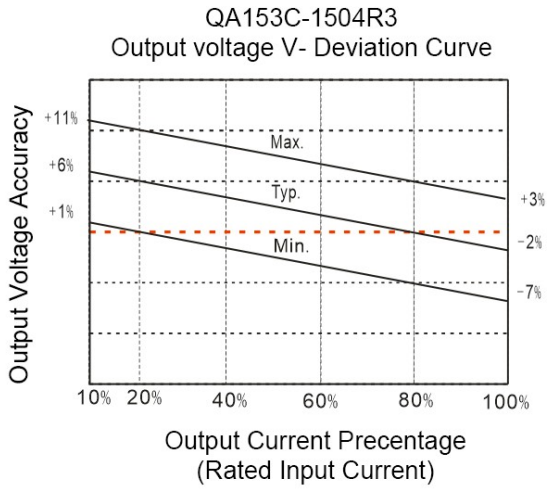


Figure 10

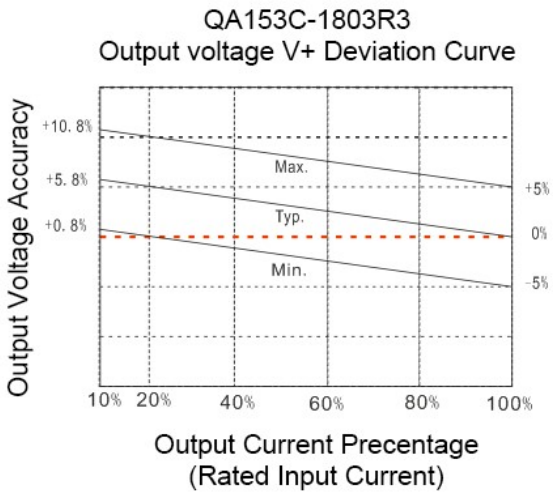


Figure 11

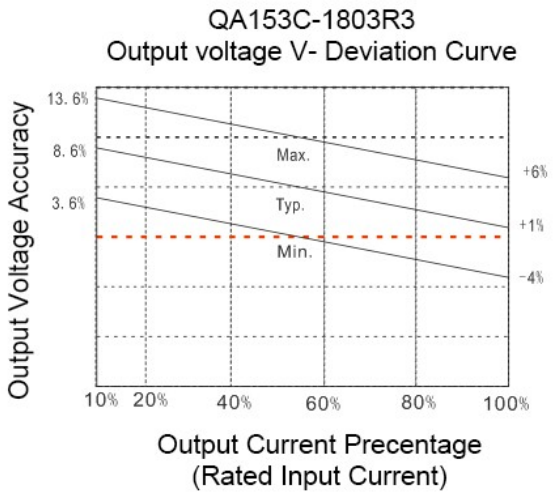


Figure 12

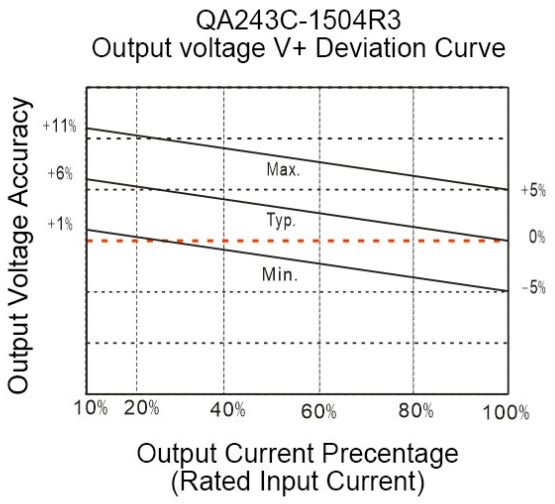


Figure 13

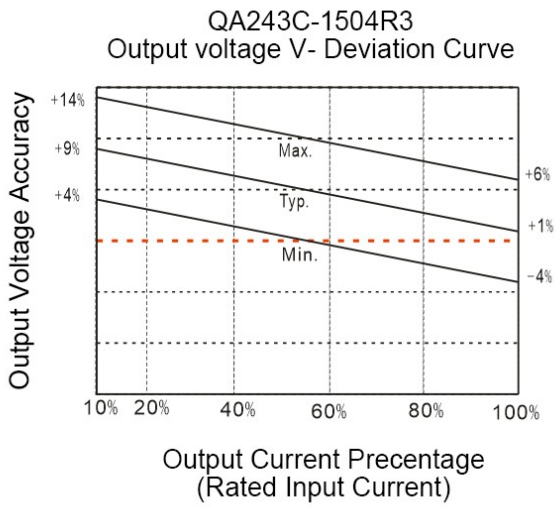


Figure 14

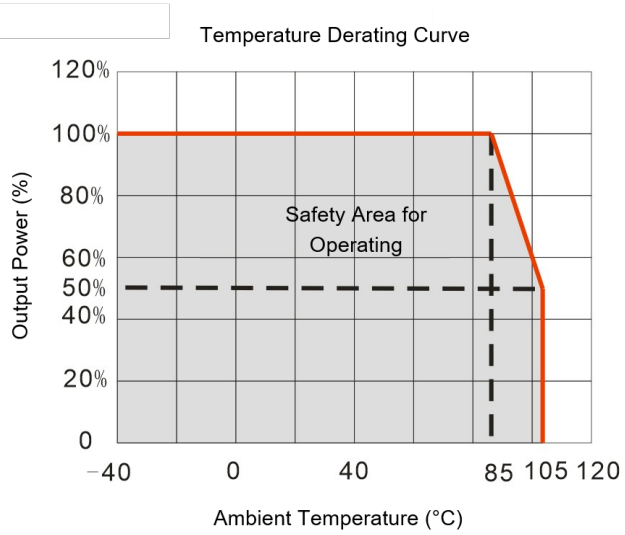
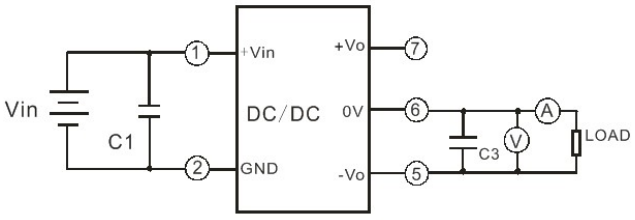
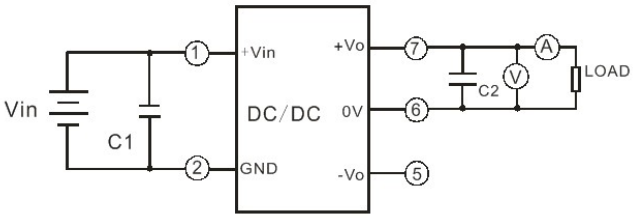


Figure 15

Recommended Circuits for Application

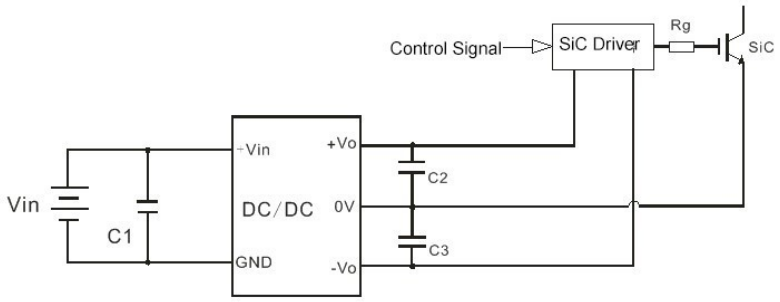
1. Typical Test circuit





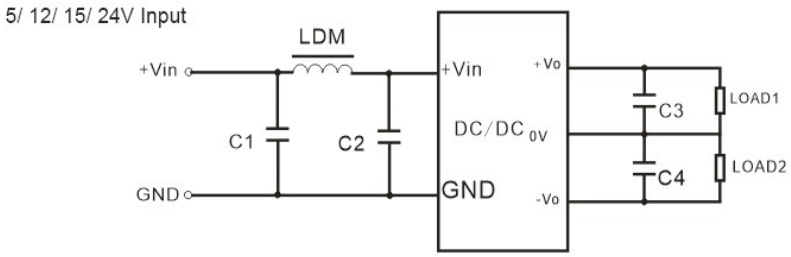
Note: C1/C2/C3 - 100μF/35V (Low internal resistance capacitor)

2. Typical Application Circuit

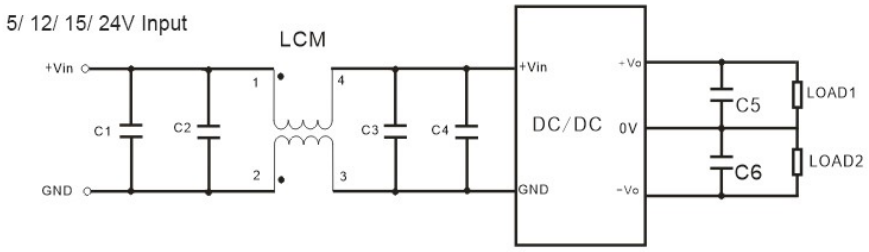


C1/C2/C3
100uF/50V(Low inter-resistance capacitor)

3. Recommended EMC Circuit



Input Voltage		5/12/15/24VDC
EMI	C1/C2	1μF/50V
	C3/C4	100μF/30V
	LDM	33μH



Input Voltage		5/12/15/24VDC
EMI	C1/C2	4.7μF/50V
	C3/C4	1μF/50V
	C5/C6	100μF/30V
	LCM	22μH(CMC)

Application Notice:

1. This product cannot be used in parallel and does not support hot plugging.
2. The connecting lead wire between the module converter and the SiC driver should be as short as possible.
3. The output filter (low inter-resistance electrolytic capacitor) should be close to the module converter and the SiC driver.
4. The SiC drive average output power must be less than the rated power of the module converter.
5. It is recommended to use ceramic capacitors or electrolytic capacitors at the input or output. Tantalum capacitor should not be used to avoid the risk of failure.
6. The product performance in this manual cannot be guaranteed if it works at a lower load than the minimum load defined.
7. All values or indicators in this manual had been tested based on Aipupower test specifications.

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