SiC MOSFET driver power supply

RoHS

3 years Warranty

FEATURES

- Reinforced insulation
- Isolation test: 5000VAC
- Partial Discharge 1700V
- CMTI>200kV/μs
- Max. Capacitive Load: 2200μF
- Capacitance: 4.2pF (typ.)
- High efficiency up to 85%
- DIP package
- Operating ambient temperature range: -40℃ to +105℃
- Continuous short-circuit protection

QAxx3HCD2-R3 is DC-DC module power supplie designed for SiC MOSFET driver requiring two sets of isolation power supply. The mode of common ground outputs is adopted internally for better energy provision of SiC MOSFET turn-on and turn-off. Output short-circuit protection and self-recovery capabilities are also provided. General application includes:

1. Universal converter

2. AC servo drive system

3. Electric welding machine

4. Uninterruptible power supply (UPS)

Selection Guide

Part No.	Input		Output		Full Load Efficiency (%) Min./Typ.	Max. Capacitive Load(μF)
	Voltage(VDC) (Range)	Current(mA, Typ.) Full Load/No Load	Voltage (VDC) +Vo/-Vo	Current (mA) +Io/-Io		
QA123HCD2-1504R3	12 (10.8-13.2)	460/15	+15/-4	+120/-120	80/85	2200
QA123HCD2-1803R3	12 (10.8-13.2)	450/15	+18/-3	+110/-110	80/85	2200
QA123HCD2-2005R3	12 (10.8-13.2)	450/16	+20/-5	+90/-90	80/85	2200
QA153HCD2-1504R3	15 (13.5-16.5)	360/13	+15/-4	+120/-120	80/85	2200
QA153HCD2-1803R3	15 (13.5-16.5)	370/14	+18/-3	+110/-110	80/85	2200
QA153HCD2-2005R3	15 (13.5-16.5)	350/13	+20/-5	+90/-90	80/85	2200
QA243HCD2-1504R3	24 (21.6-26.4)	240/11	+15/-4	+120/-120	74/80	2200
QA243HCD2-1803R3	24 (21.6-26.4)	250/11	+18/-3	+110/-110	74/80	2200
QA243HCD2-2005R3	24 (21.6-26.4)	240/11	+20/-5	+90/-90	74/80	2200

Note:*The specified maximum capacitive load for positive and negative output is identical.

Input Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage (1sec. max.)	Vin=12VDC	DC	-0.7	--	18	VDC
	Vin=15VDC	DC	-0.7	--	21	
	Vin=24VDC	DC	-0.7	--	30	
Input Filter			Capacitance Filter			
Hot Plug			Unavailable			

Output Specifications

Item			Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage	QA123HCD2-1504R3	+Vo1/2	Vin=12VDC, Pin11/14 & Pin12/13 +Io= +120mA	14.34	15.09	15.84	VDC
		-Vo1/2	Vin=12VDC, Pin10/15 & Pin11/14 +Io= -120mA	-4.00	-4.20	-4.40	
	QA123HCD2-1803R3	+Vo1/2	Vin=12VDC, Pin11/14 & Pin12/13 +Io= +110mA	16.81	17.71	18.61	
		-Vo1/2	Vin=12VDC, Pin10/15 & Pin11/14 +Io= -110mA	-2.85	-3.00	-3.15	
	QA123HCD2-2005R3	+Vo1/2	Vin=12VDC, Pin11/14 & Pin12/13 +Io= +90mA	19.00	20.00	21.00	
		-Vo1/2	Vin=12VDC, Pin10/15 & Pin11/14 +Io= -90mA	-4.65	-4.90	-5.15	
	QA153HCD2-1504R3	+Vo1/2	Vin=15VDC, Pin11/14 & Pin12/13 +Io= +120mA	14.55	15.30	16.05	
		-Vo1/2	Vin=15VDC, Pin10/15 & Pin11/14 +Io= -120mA	-3.70	-3.90	-4.10	
	QA153HCD2-1803R3	+Vo1/2	Vin=15VDC, Pin11/14 & Pin12/13 +Io= +110mA	17.30	18.20	19.10	
		-Vo1/2	Vin=15VDC, Pin10/15 & Pin11/14 +Io= -110mA	-2.90	-3.05	-3.20	
	QA153HCD2-2005R3	+Vo1/2	Vin=15VDC, Pin11/14 & Pin12/13 +Io= +90mA	18.80	19.80	20.80	
		-Vo1/2	Vin=15VDC, Pin10/15 & Pin11/14 +Io= -90mA	-4.85	-5.10	-5.35	
	QA243HCD2-1504R3	+Vo1/2	Vin=24VDC, Pin11/14 & Pin12/13 +Io= +120mA	13.76	14.51	15.26	
		-Vo1/2	Vin=24VDC, Pin10/15 & Pin11/14 +Io= -120mA	-3.90	-4.10	-4.30	
	QA243HCD2-1803R3	+Vo1/2	Vin=24VDC, Pin11/14 & Pin12/13 +Io= +110mA	17.69	18.59	19.49	
		-Vo1/2	Vin=24VDC, Pin10/15 & Pin11/14 +Io= -110mA	-2.88	-3.03	-3.18	
	QA243HCD2-2005R3	+Vo1/2	Vin=24VDC, Pin11/14 & Pin12/13 +Io= +90mA	19.20	20.20	21.20	
		-Vo1/2	Vin=24VDC, Pin10/15 & Pin11/14 +Io= -90mA	-4.65	-4.90	-5.15	
Voltage Accuracy			10% - 100% load	See output regulation curve (Fig. 2 to19)			%
Linear Regulation			Full voltage input range +Vo1/2	--	±1.1	±1.5	--
			Full voltage input range -Vo1/2	--	±1.1	±1.5	
Load Regulation			10% - 100% load +Vo1/2	--	10	20	%
			10% - 100% load -Vo1/2	--	10	20	
Temperature Coefficient			Full load	--	±0.04	±0.1	%/℃
Ripple & Noise*			20MHz bandwidth	--	50	100	mVp-p
Short-circuit Protection				Continuous, self-recovery			

Note:* The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input-output1, Input-output2, test time 1 minute, leakage current less than 1mA		5000	--	--	VAC
	Output1- output2, test time 1 minute, leakage current less than 1mA		3750	--	--	VAC
Partial Discharge	Input-output1, Input-output2(According to IEC61800-5-1)		1700	--	--	V
CMTI	Input-output1, Input-output2		±200	--	--	kV/μs
Insulation Resistance	Input-output1, Input-output2, insulation voltage 500VDC		1000	--	--	MΩ
Isolation capacitor	Input-output1, Input-output2, capacitor at 100kHz/0.1V	Vin=12VDC	--	4.2	5.0	pF
		Vin=15VDC	--	5.0	6.0	
		Vin=24VDC	--	5.5	6.5	
Operating Temperature	Derating when operating temperature≥85℃, (see Fig. 1)		-40	--	105	℃
Storage Temperature			-55	--	125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10s seconds		--	--	300	
Case Temperature Rise	Ta=25℃, nominal input voltage, full load		--	30	60	
Storage Humidity	Non-condensing		5	--	95	%RH

Switching Frequency	Full load, nominal input voltage	--	200	--	kHz
MTBF	MIL-HDBK-217F@25℃	3500	--	--	K hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant
Dimensions	31.70 x 20.30 x 12.65mm
Weight	14 g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE		CISPR32/EN55032	CLASS A (see Fig. 25 for recommended circuit)		
	RE		CISPR32/EN55032	CLASS A (see Fig. 25 for recommended circuit)		
Immunity	ESD	Vin=12/15VDC series	IEC/EN61000-4-2	Contact	±6kV	perf. Criteria B
		Vin=24VDC series	IEC/EN61000-4-2	Contact	±4kV	perf. Criteria B

Typical Characteristic Curves

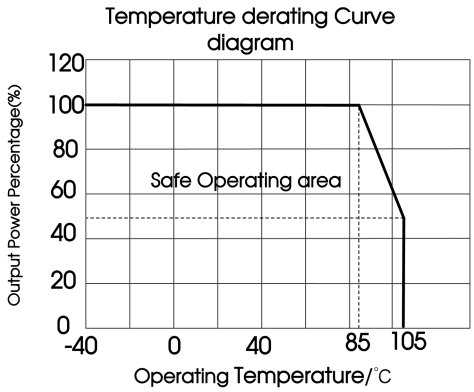


Fig. 1

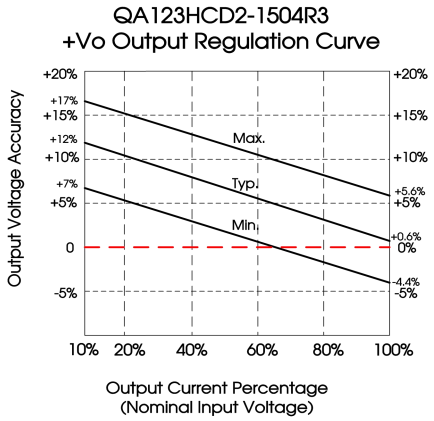


Fig. 2

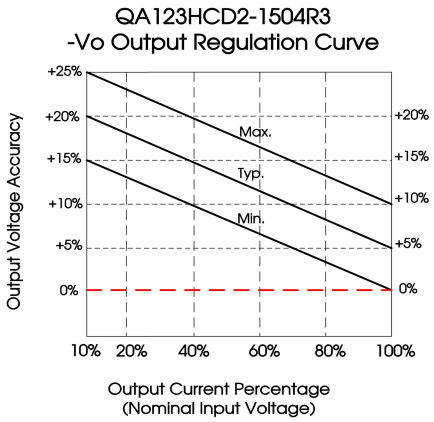


Fig. 3

QA123HCD2-1803R3
+Vo Output Regulation Curve

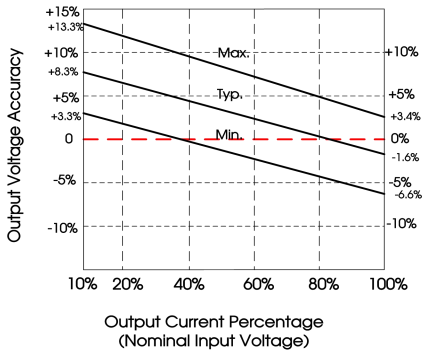


Fig. 4

QA123HCD2-1803R3
-Vo Output Regulation Curve

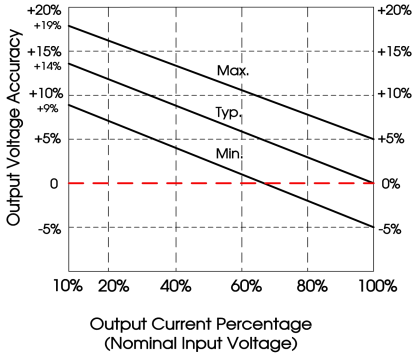


Fig. 5

QA123HCD2-2005R3
+Vo Output Regulation Curve

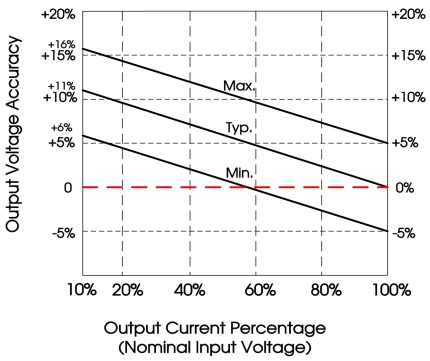


Fig. 6

QA123HCD2-2005R3
-Vo Output Regulation Curve

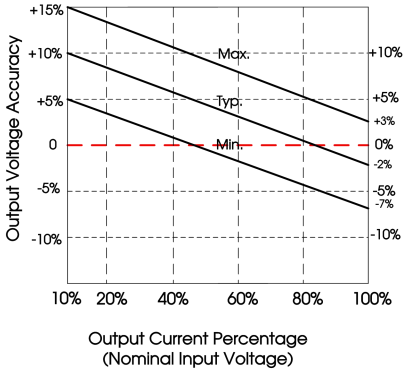


Fig. 7

QA153HCD2-1504R3
+Vo Output Regulation Curve

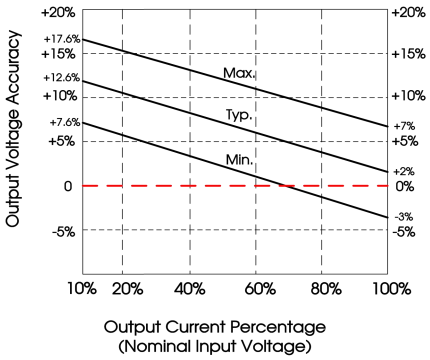


Fig. 8

QA153HCD2-1504R3
-Vo Output Regulation Curve

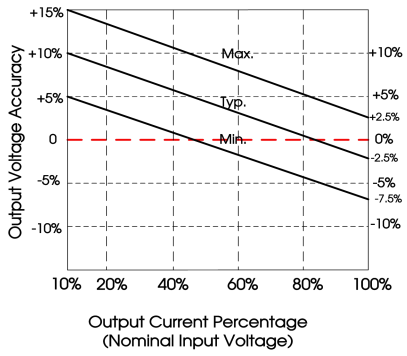


Fig. 9

QA153HCD2-1803R3
+Vo Output Regulation Curve

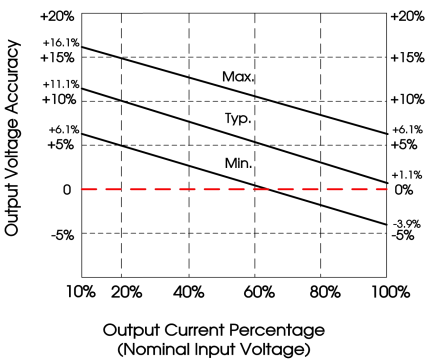


Fig. 10

QA153HCD2-1803R3
-Vo Output Regulation Curve

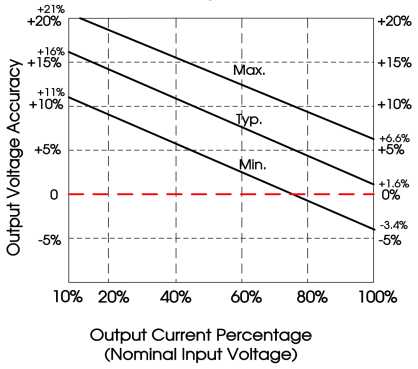


Fig. 11

QA153HCD2-2005R3
+Vo Output Regulation Curve

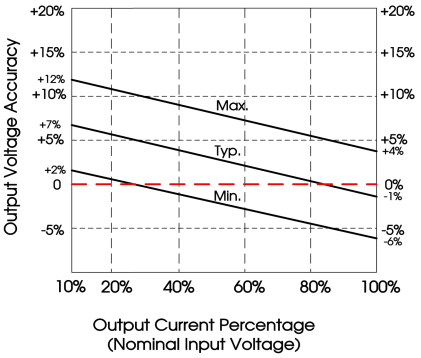


Fig. 12

QA153HCD2-2005R3
-Vo Output Regulation Curve

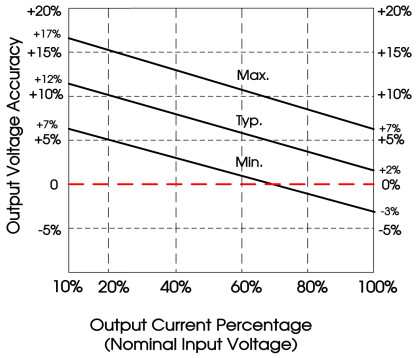


Fig. 13

QA243HCD2-1504R3
+Vo Output Regulation Curve

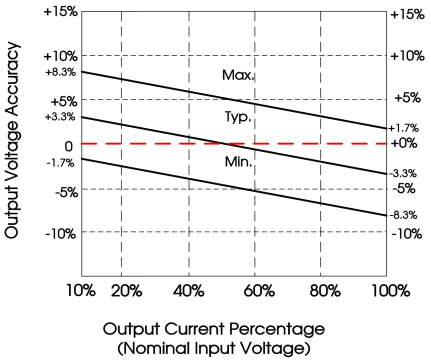


Fig. 14

QA243HCD2-1504R3
-Vo Output Regulation Curve

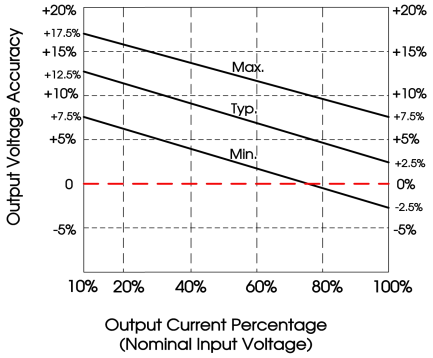


Fig. 15

QA243HCD2-1803R3
+Vo Output Regulation Curve

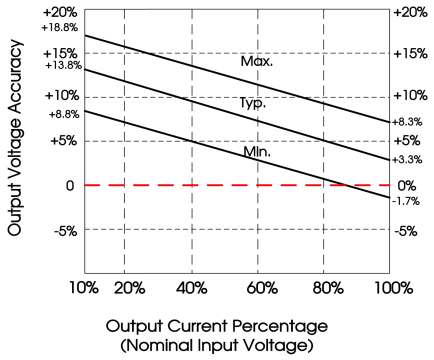


Fig. 16

QA243HCD2-1803R3
-Vo Output Regulation Curve

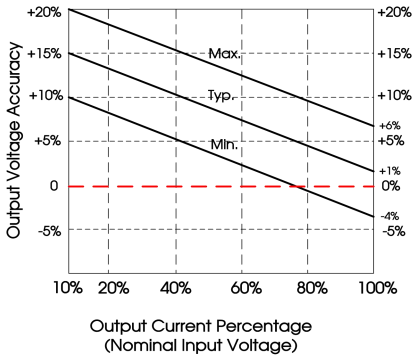


Fig. 17

QA243HCD2-2005R3
+Vo Output Regulation Curve

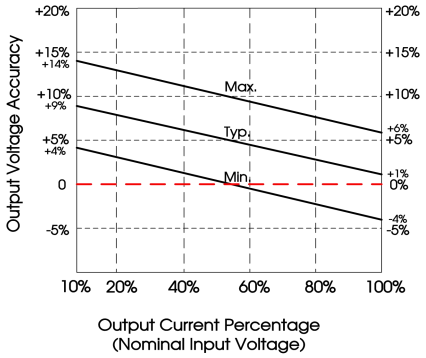


Fig. 18

QA243HCD2-2005R3
-Vo Output Regulation Curve

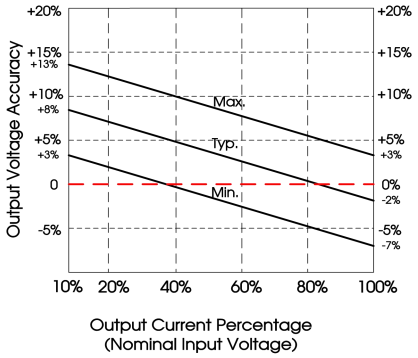


Fig. 19

Efficiency Vs Input Voltage(Full Load)

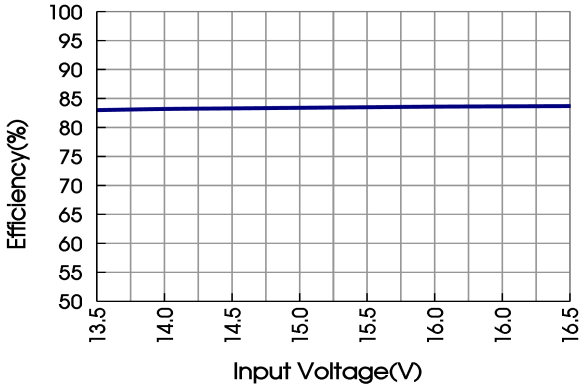


Fig. 20

Efficiency Vs Output Load(Vin=15V)

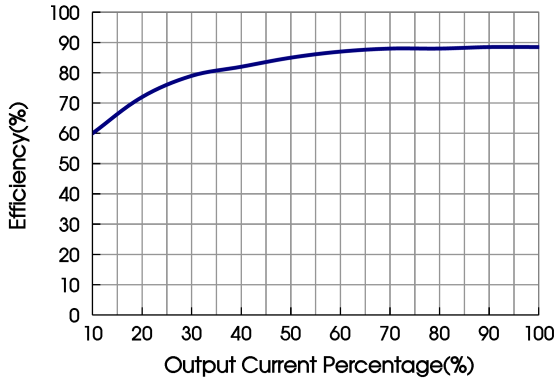


Fig. 21

Note: Take QA153HCD2-1803R3 as an example, other models can be corresponding reference

Design Reference

1. Test configurations

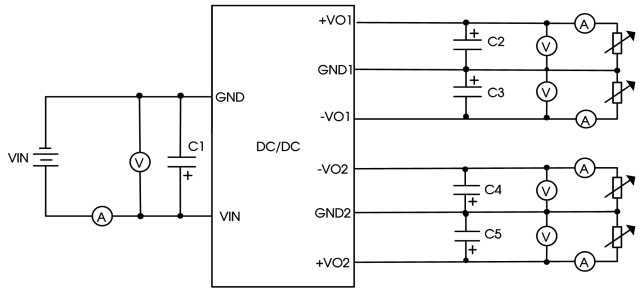


Fig. 22

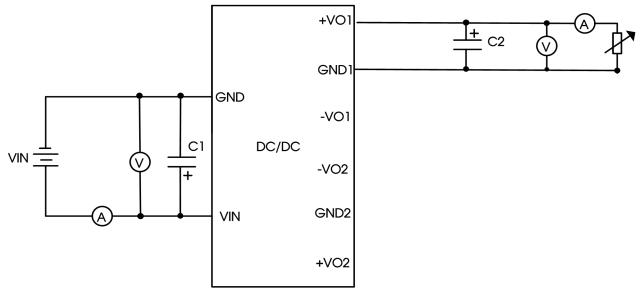


Fig. 23

Note: C1, C2, C3, C4, C5: 100μF/35V(Low internal resistance）

2. Typical application

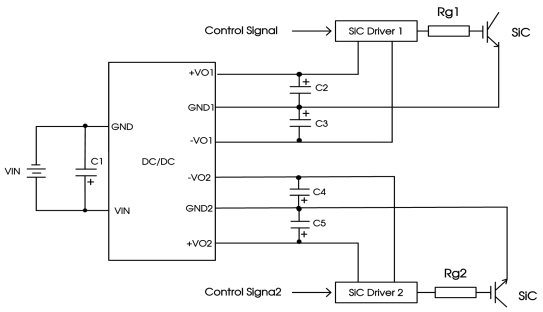


Fig. 24

C1/C2/C3/C4/C5
100μF/35V(Low resistance)

3. EMC typical recommended circuit

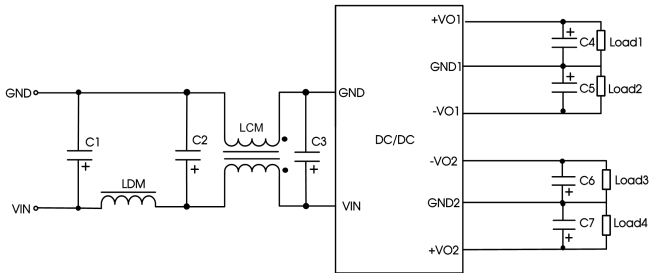
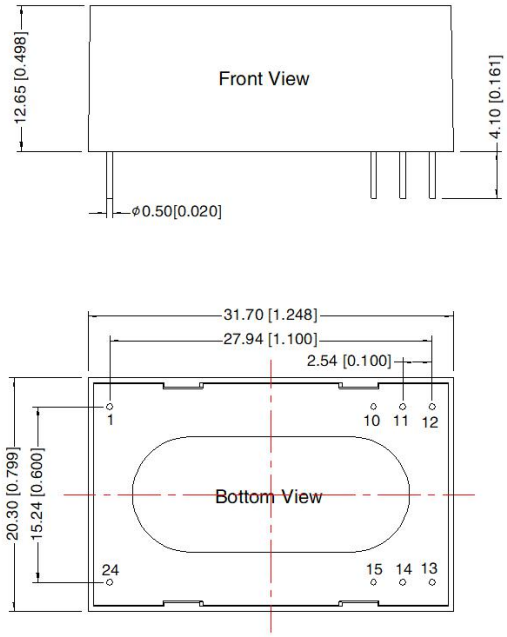


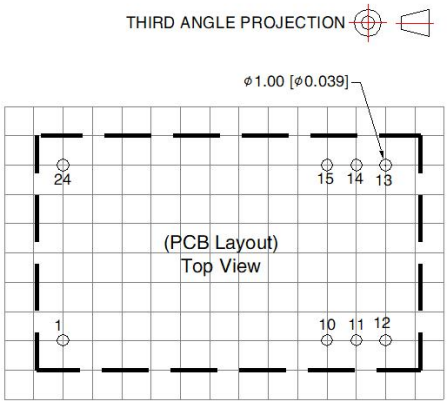
Fig. 25

Project		QAxx3HCD2-1803R3 QAxx3HCD2-2005R3	QAxx3HCD2-1504R3
EMI	C1/C2	4.7μF /50V	1.0μF /50V
	LDM	33μH	33μH
	C3	1μF /50V	--
	LCM	50uH	--
	C4/C5/C6/C7	10μF /50V(Low resistance）	10μF /50V(Low resistance）

4. Electrolytic capacitors are recommended for external capacitors at the input or output of the product. Tantalum capacitors are not, otherwise there is a risk of failure.
5. The products do not support parallel connection of their output for power expansion purpose or hot-plug.
6. For more information please find the application notes on www.mornsun-power.com

Dimensions and Recommended Layout





Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Mark
1	GND
10	-Vo1
11	GND1
12	+Vo1
13	+Vo2
14	GND2
15	-Vo2
24	Vin

Note:
Unit: mm[inch]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58000150;
2. The lead connecting the power supply module and SiC driver should be as short as possible during use;
3. The output filtering capacitor should be as close as possible to the power supply module and SiC driver;
4. The peak of the SiC driver gate drive current is high, so Low internal resistance electrolytic capacitor is recommended to be used for the power supply module output filter capacitor;
5. The average output power of the driver must be lower than that of the power supply module;
6. Consider fixing with glue near the module if being used in vibration occasion;
7. The maximum capacitive load offered were tested at nominal input voltage and full load;
8. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
9. All index testing methods in this datasheet are based on company corporate standards;
10. The above are the performance indicators of the product models listed in this datasheet. Some indicators of non-standard models will exceed the above requirements. For details, please contact our technical staff;
11. We can provide product customization service, please contact our technicians directly for specific information;
12. Products are related to laws and regulations: see "Features" and "EMC".
13. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units

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