

Descriptions

DC/DC Module Power Supply for IGBT/SiC MOSFET Drivers



UL62368-1



Report

EN62368-1



Report

BS EN62368-1

Features

- Reinforced insulation
- I/O isolation test voltage: 5.0kVAC
- Partial Discharge 1700V
- Characterised CMTI>200kV/μs
- Max. Capacitive Load: 2200μF
- Ultra-low isolation capacitance: 3.5pF (typ.)
- High efficiency up to 87%
- SIP package
- Operating ambient temperature range: -40°C to +105°C
- Continuous short-circuit protection

Applications

- Universal converter
- AC servo drive system
- Electric welding machine
- Uninterruptible power supply (UPS)

Selection Guide

Certification	Part No.	Input		Output		Full Load Efficiency (%) Min./Typ.	Max. Capacitive Load(μF)*
		Voltage(VDC) Nominal value (Range)	Current (mA, Typ.) Full Load/No Load	Voltage (VDC) +Vo/-Vo	Current (mA) +Io/-Io		
--	DQP2-05S1505	5 (4.5-5.5)	348/31	+15/-5	+80/-40	77/81	1000
	DQP2-05S1509		383/33	+15.0/-8.7	+80/-40		
	DQP2-05S1803		415/36	+18/-3.5	+80/-80		680
	DQP2-05S2004		426/32	+20/-4	+80/-40		470
EN/BS EN	DQP2-12S1504	12 (10.8-13.2)	214/12	+15/-4	+120/-120	82/87	1500
UL/EN/BS EN	DQP2-12S1509		231/16	+15.0/-9.0	+100/-100		2200
	DQP2-12S1803		211/17	+18/-3	+100/-100		1000
EN/BS EN	DQP2-12S2005		216/17	+20/-5	+90/-90	82/87	470

UL/EN/BS EN	DQP2-12S1508V0	12 (9-15)	223/20	+15/-8.0	+100/-80	77/80	220
	DQP2-15S1504	15 (13.5-16.5)	170/11	+15/-4	+120/-120	82/87	2200
UL/EN/BS EN	DQP2-15S1509		189/16	+15.0/-9.0	+100/-100		2200
EN/BS EN	DQP2-15S1803		167/14	+18/-3	+100/-100	80/85	1500
	DQP2-15S2005		24 (21.6-26.4)	171/15	+20/-5	+90/-90	82/87
UL/EN/BS EN	DQP2-24S1504	119/12		+15/-4	+120/-120	77/82	
	DQP2-24S1509	123/13		+15.0/-9.0	+100/-100		
EN/BS EN	DQP2-24S1803	112/14		+18/-3	+100/-100	73/78	2200
	DQP2-24S2005	117/16	+20/-5	+90/-90	76/81		
		DQP2-24S1508	24 (23.3-24.7)	81/20	+15/-8.7	+80/-40	77/80

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

Specifications

Product Specifications	Item			Operating Conditions	Min.	Typ.	Max.	Unit
Input Specifications	Input Voltage (1sec.max.)	Vin=5VDC			-0.7	--	9	VDC
		Vin=12VDC			-0.7	--	18	
		Vin=15VDC			-0.7	--	21	
		Vin=24VDC			-0.7	--	30	
		DQP2-12S1508V0			-0.7	--	15	
		DQP2-24S1508			-0.7	--	26	
	Input Filter				Capacitance Filter			
Hot Plug				Unavailable				
Output Specifications	Output Voltage	DQP2-05S1505	+Vo	Vin=5VDC, Pin6 & Pin7 +Io= +80mA	14.48	15.23	15.98	VDC
			-Vo	Vin=5VDC, Pin5 & Pin6 -Io= -40mA	-4.43	-4.68	-4.93	
		DQP2-05S1509	+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	
		DQP2-05S1803	+Vo	Vin=5VDC, Pin6 & Pin7 +Io= +80mA	16.74	17.64	18.54	
			-Vo	Vin=5VDC, Pin5 & Pin6 -Io= -80mA	-3.12	-3.29	-3.47	
		DQP2-05S2004	+Vo	Vin=5VDC, Pin6 & Pin7 +Io= +80mA	18.80	19.80	20.80	
			-Vo	Vin=5VDC, Pin5 & Pin6 -Io= -40mA	-3.78	-3.98	-4.18	
		DQP2-12S1504	+Vo	Vin=12VDC, Pin6 & Pin7 +Io= +120mA	13.80	14.55	15.30	
			-Vo	Vin=12VDC, Pin5 & Pin6 -Io= -120mA	-3.42	-3.62	-3.82	
		DQP2-12S1509	+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	
		DQP2-12S1803	+Vo	Vin=12VDC, Pin6 & Pin7 +Io= +100mA	17.19	18.09	18.99	
			-Vo	Vin=12VDC, Pin5 & Pin6 -Io= -100mA	-2.87	-3.02	-3.17	
		DQP2-12S2005	+Vo	Vin=12VDC, Pin6 & Pin7 +Io= +90mA	18.40	19.40	20.40	
			-Vo	Vin=12VDC, Pin5 & Pin6 -Io= -90mA	-4.75	-5.00	-5.25	
		DQP2-12S1508V0	+Vo	Vin=12VDC, Pin6 & Pin7 +Io=+100mA	14.25	15	15.75	
			-Vo	Vin=12VDC, Pin5 & Pin6 -Io=-80mA	-7.36	-8	-8.64	
		DQP2-15S1504	+Vo	Vin=15VDC, Pin6 & Pin7 +Io= +120mA	13.58	14.33	15.08	

			-Vo	Vin=15VDC, Pin5 & Pin6 -Io= -120mA	-3.74	-3.94	-4.14	
		DQP2-15S1509	+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	
		DQP2-15S1803	+Vo	Vin=15VDC, Pin6 & Pin7 +Io= +100mA	17.01	17.91	18.81	
			-Vo	Vin=15VDC, Pin5 & Pin6 -Io= -100mA	-2.70	-2.85	-3.00	
		DQP2-15S2005	+Vo	Vin=15VDC, Pin6 & Pin7 +Io= +90mA	18.30	19.30	20.30	
			-Vo	Vin=15VDC, Pin5 & Pin6 -Io= -90mA	-4.73	-4.98	-5.23	
		DQP2-24S1504	+Vo	Vin=24VDC, Pin6 & Pin7 +Io= +120mA	14.18	14.93	15.68	
			-Vo	Vin=24VDC, Pin5 & Pin6 -Io= -120mA	-3.74	-3.94	-4.14	
		DQP2-24S1509	+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	
		DQP2-24S1803	+Vo	Vin=24VDC, Pin6 & Pin7 +Io= +100mA	17.01	17.91	18.81	
			-Vo	Vin=24VDC, Pin5 & Pin6 -Io= -100mA	-2.84	-2.99	-3.14	
		DQP2-24S2005	+Vo	Vin=24VDC, Pin6 & Pin7 +Io= +90mA	18.80	19.80	20.80	
			-Vo	Vin=24VDC, Pin5 & Pin6 -Io= -90mA	-4.60	-4.85	-5.10	
		DQP2-24S1508	+Vo	Vin=24VDC, Pin6 & Pin7 +Io= +80mA	14.25	15	15.75	
			-Vo	Vin=24VDC, Pin5 & Pin6 -Io= -40mA	-8.00	-8.7	-9.4	
Voltage Accuracy	10% - 100% load				See output regulation curve (Fig. 3 to 38)			
Linear Regulation	5V Input model	Full voltage input range	+Vo Output	--	±1.1	±1.4	--	
	Other model		-Vo Output	--	±1.1	±1.4		
			+Vo Output	--	±1.1	±1.5		
			-Vo Output	--	±1.1	±1.5		
			DQP2-12S1508V0 DQP2-24S1508		--	±1.2		±1.5
Load Regulation	5V Input model DQP2-12S1508V0 DQP2-24S1508	10% - 100% load	+Vo Output	--	8	15	%	
	-Vo Output		--	10	15			
	DQP2-05S1803 DQP2-12S1803		+Vo Output	--	10	17		
	-Vo Output		--	12	17			
	DQP2-12S1504 DQP2-15S1504		+Vo Output	--	14	20		
	-Vo Output		--	16	20			
	Other model		+Vo Output	--	6	15		
			-Vo Output	--	8	15		
Ripple & Noise*	20MHz	5V Input model		--	50	150	mV	
		DQP2-12S1508V0、DQP2-24S1508		--	100	200		
		Other model		--	50	100		
Temperature Coefficient	DQP2-xxS1509	Full load		--	±0.04	±0.1	%/°C	
	DQP2-12S1508V0 DQP2-24S1508			--	--	±0.03		
	Other model			--	±0.02	--		
Short-circuit Protection					Continuous, self-recovery			

General Specifications	Isolation	DQP2-12S1508V0	Input- output, Test for 1 minute with a leakage current of 1mA max	3000	--	--	VAC	
		DQP2-24S1508		5000	--	--		
		Other model						
	Partial Discharge	Except for DQP2-12S1508V0	Input- output(According to IEC61800-5-1), leakage charge < 10 pC	1700	--	--	V	
	CMTI	DQP2-24S1508		Input- output	±200	--	--	kV/μs
	Insulation Resistance	Input- output, 500VDC			1000	--	--	MΩ
	Isolation capacitor	Input- output at 100kHz/0.1V	5V Input model	--	5	6.5	pF	
			DQP2-12S1508V0、DQP2-24S1508	--	6.6	--		
			Other model	--	3.5	5		
	Operating Temperature	Derating when operating temperature≥85°C, (see Fig. 1, 2)			-40	--	+105	°C
	Storage Temperature				-55	--	+125	
	Storage Humidity	DQP2-12S1508V0	Non-condensing	--	--	95	%RH	
		DQP2-24S1508		5	--	95		
		Other model						
	Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10s seconds			--	--	300	°C
	Case Temperature Rise	DQP2-12S1508V0	Ta=25°C, nominal input voltage, full load	--	25	--		
		DQP2-24S1508		--	30	60		
		Other model						
	Switching Frequency	DQP2-12S1508V0	Full load, nominal input voltage	--	100	300	kHz	
		DQP2-24S1508						
		Other model		--	200	--		
	Safety Class				CLASS III			
	MTBF	MIL-HDBK-217F@25°C			3500	--	--	k hours
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant						
	Dimensions	19.50 x 9.80 x 12.50mm						
	Weight	4.3g(Typ.)						
	Cooling Method	Free air convection						
Note:* The “parallel cable” method is used for Ripple and Noise test.								

Electromagnetic Compatibility (EMC)

Emissions (EMI)	CE	5V Input model	CISPR32/EN55032	CLASS B (see Fig. 42 for recommended circuit)
		DQP2-12S1508V0	CISPR32/EN55032	CLASS B (see Fig. 44 for recommended circuit)
		DQP2-24S1508	CISPR32/EN55032	CLASS A (see Fig. 42 for recommended circuit)
	RE	5V Input model	CISPR32/EN55032	CLASS A (see Fig. 42 for recommended circuit)
			CISPR32/EN55032	CLASS B (see Fig. 43 for recommended circuit)
		DQP2-12S1508V0	CISPR32/EN55032	CLASS B (see Fig. 44 for recommended circuit)
		DQP2-24S1508		

Immunity (EMS)	ESD	Other Input model	CISPR32/EN55032	CLASS A (see Fig. 42 for recommended circuit)	
		5V Input model	IEC/EN61000-4-2	Contact ±6kV	perf. Criteria B
		Other Input model	IEC/EN61000-4-2	Contact ±8kV	perf. Criteria B

Characteristic Curve

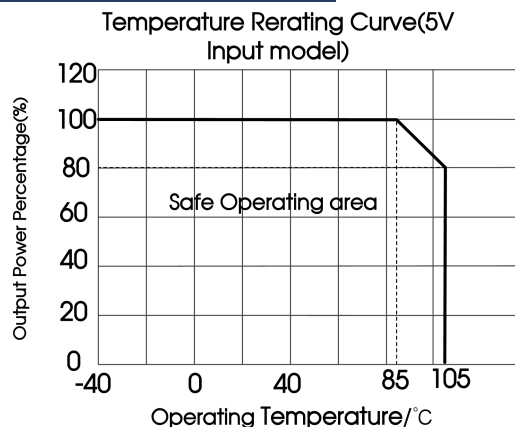


Fig. 1

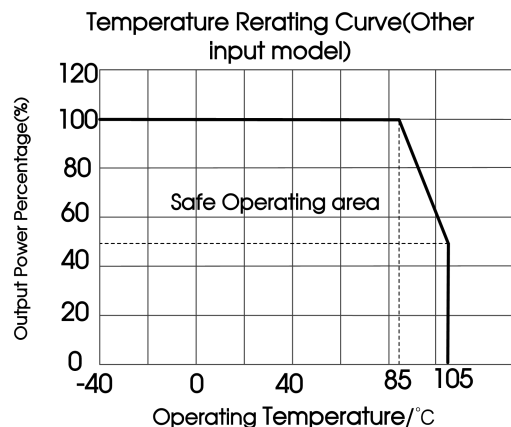


Fig. 2

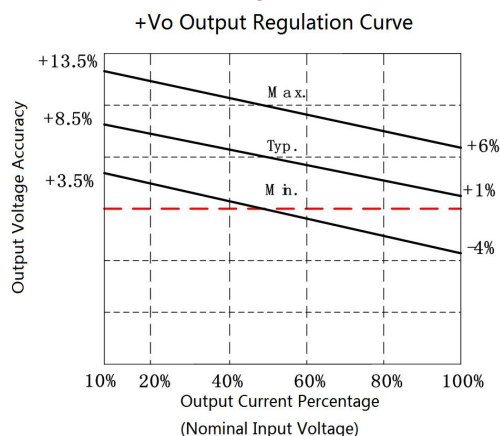


Fig. 3 DQP2-05S1509

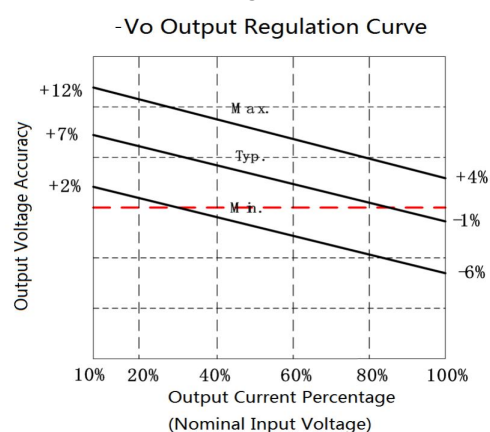


Fig. 4 DQP2-05S1509

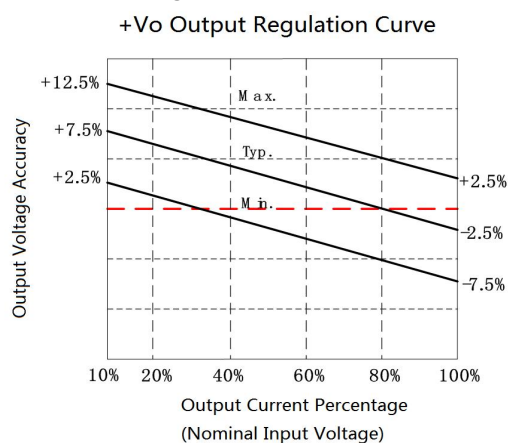


Fig. 5 DQP2-12S1509

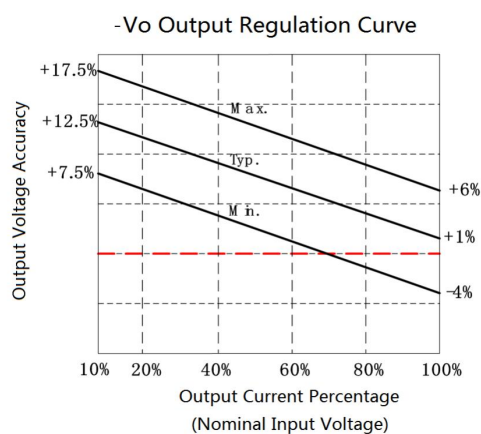


Fig. 6 DQP2-12S1509

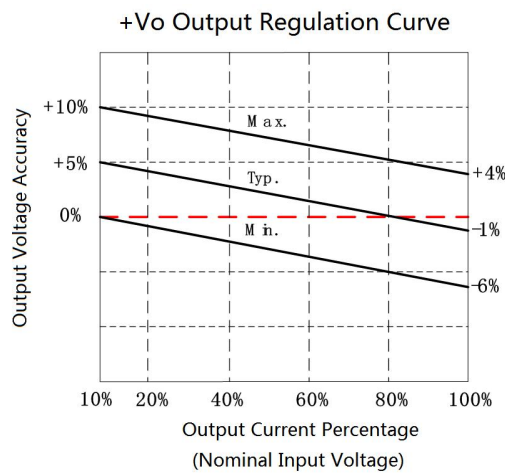


Fig. 7 DQP2-15S1509

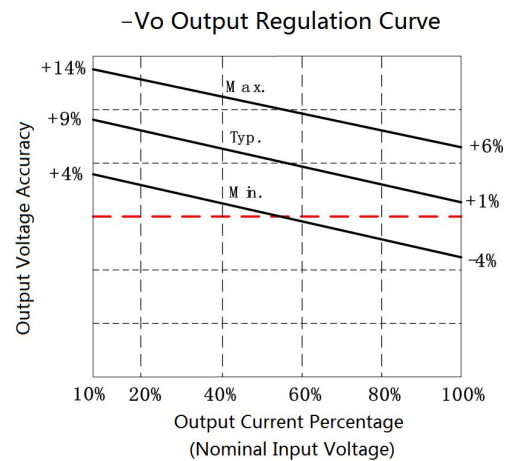


Fig. 8 DQP2-15S1509

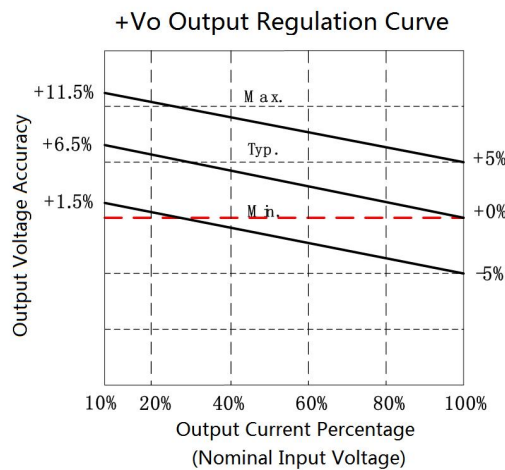


Fig. 9 DQP2-24S1509

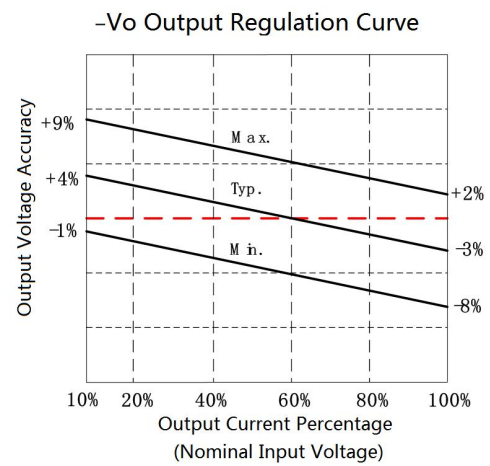


Fig. 10 DQP2-24S1509

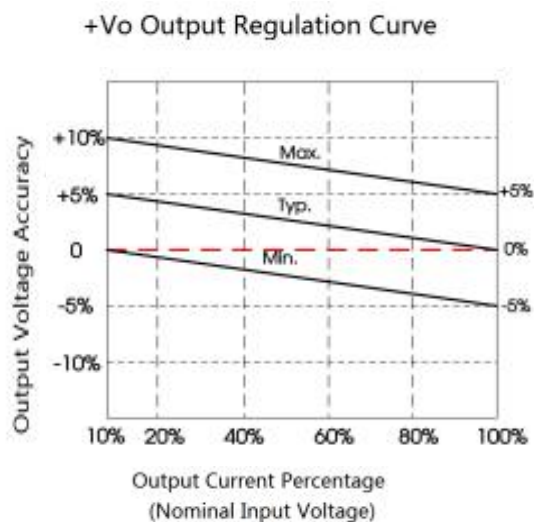


Fig. 11 DQP2-24S1508

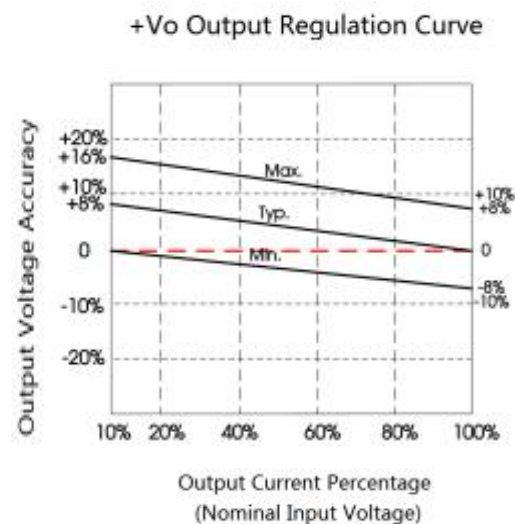


Fig. 12 DQP2-24S1508

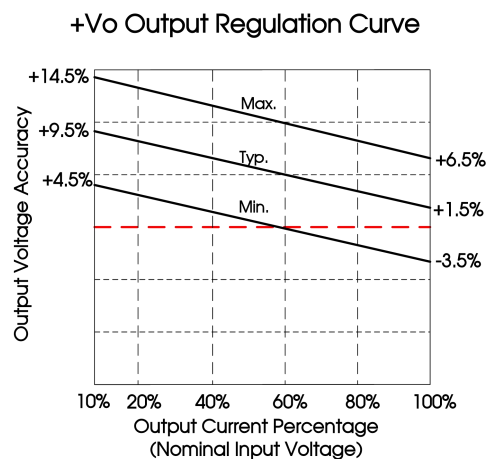


Fig. 13 DQP2-05S1505

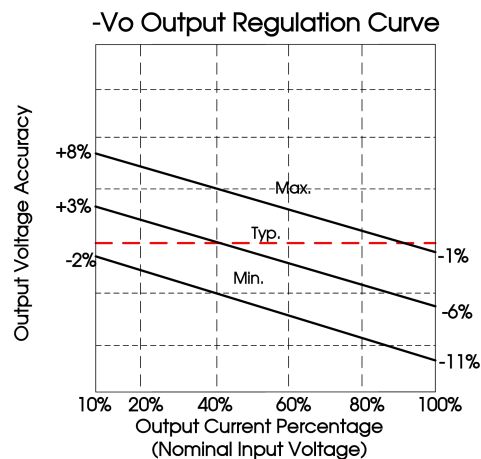


Fig. 14 DQP2-05S1505

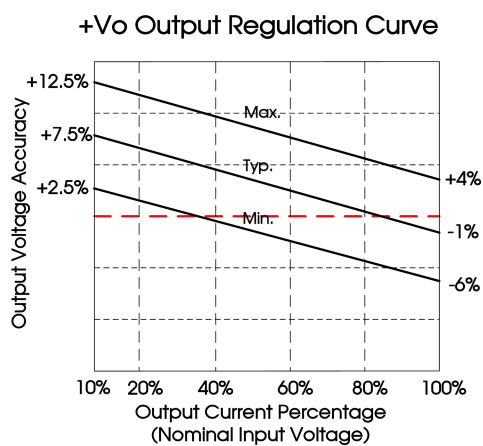


Fig. 15 DQP2-05S2004

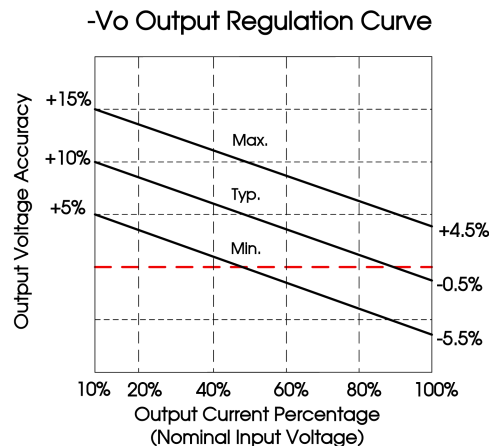


Fig. 16 DQP2-05S2004

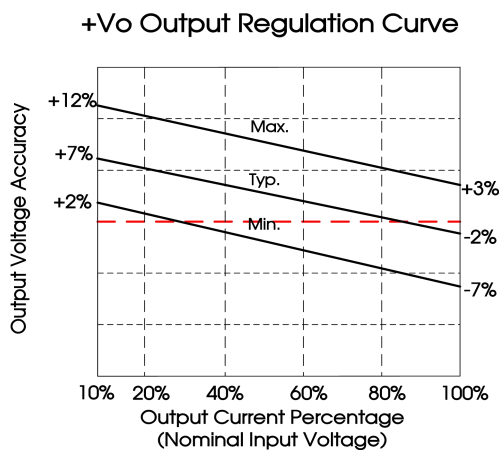


Fig. 17 DQP2-05S1803

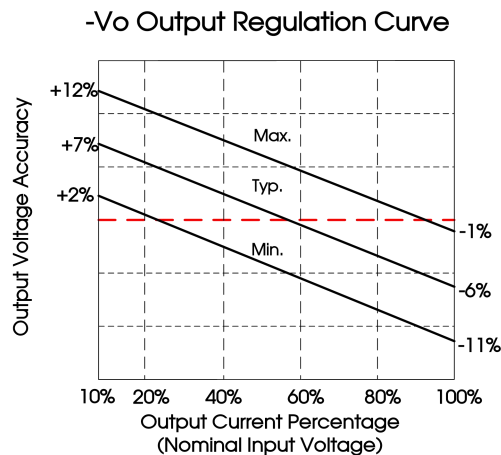


Fig. 18 DQP2-05S1803

+Vo Output Regulation Curve

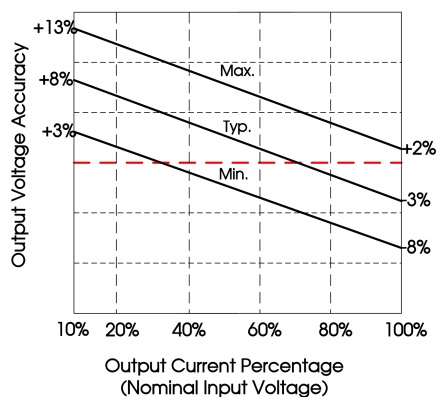


Fig. 19 DQP2-12S1504

-Vo Output Regulation Curve

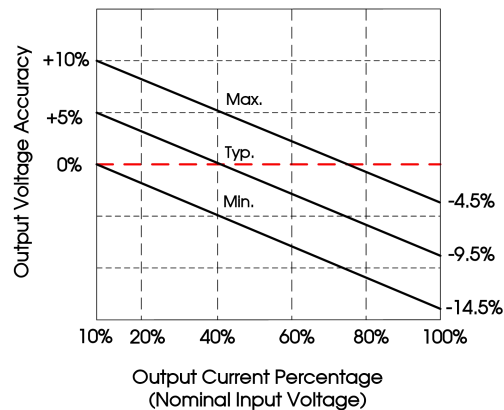


Fig. 20 DQP2-12S1504

+Vo Output Regulation Curve

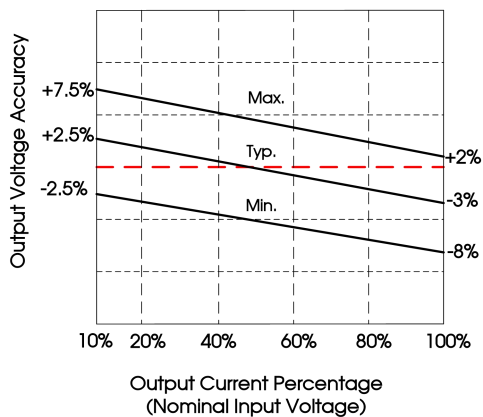


Fig. 21 DQP2-12S2005

-Vo Output Regulation Curve

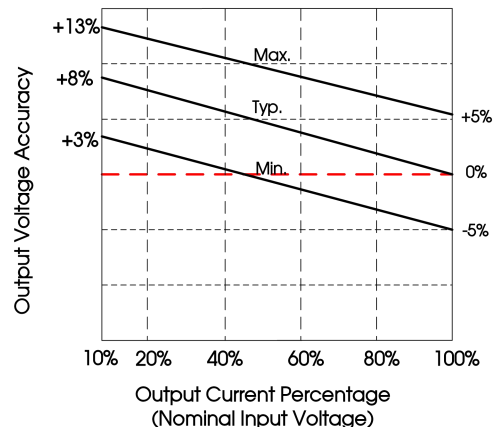


Fig. 22 DQP2-12S2005

+Vo Output Regulation Curve

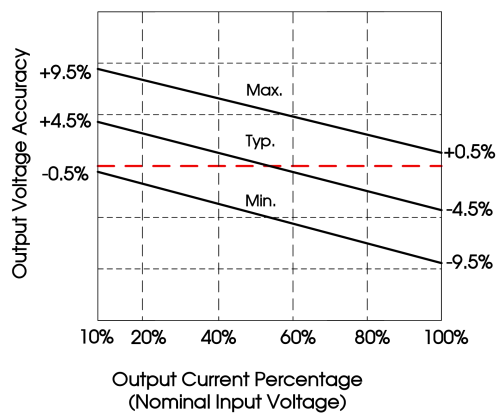


Fig. 23 DQP2-15S1504

-Vo Output Regulation Curve

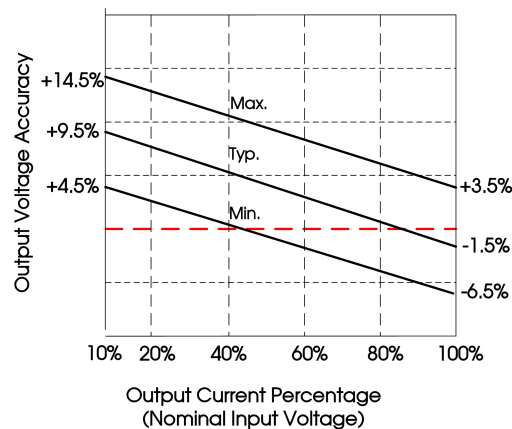


Fig. 24 DQP2-15S1504

+Vo Output Regulation Curve

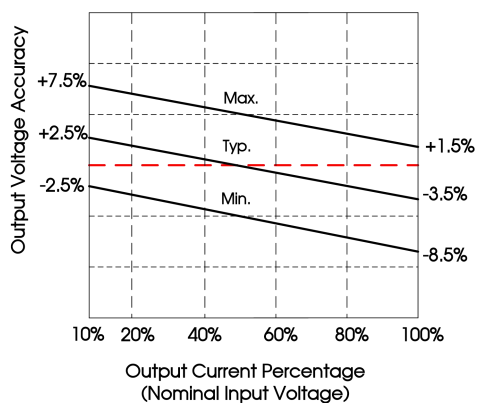


Fig. 25 DQP2-15S2005

-Vo Output Regulation Curve

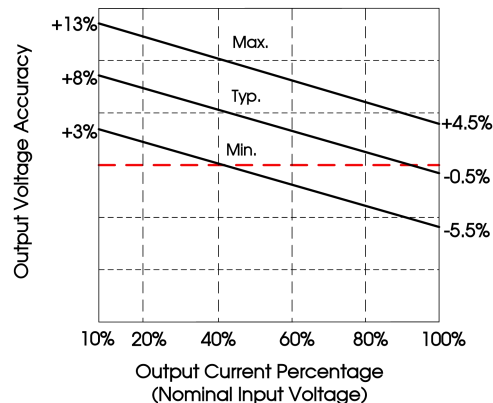


Fig. 26 DQP2-15S2005

+Vo Output Regulation Curve

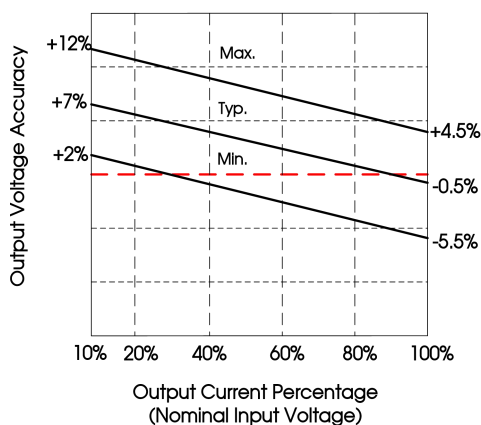


Fig. 27 DQP2-24S1504

-Vo Output Regulation Curve

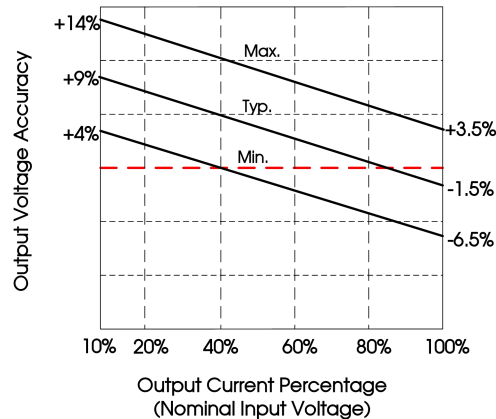


Fig. 28 DQP2-24S1504

+Vo Output Regulation Curve

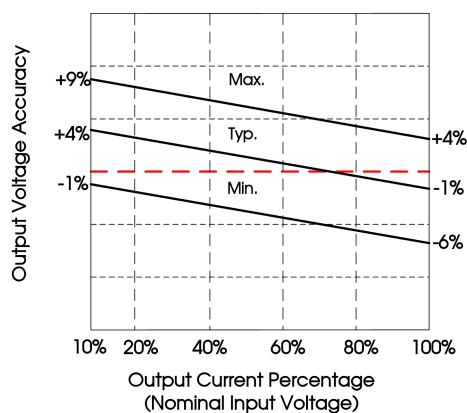


Fig. 29 DQP2-24S2005

-Vo Output Regulation Curve

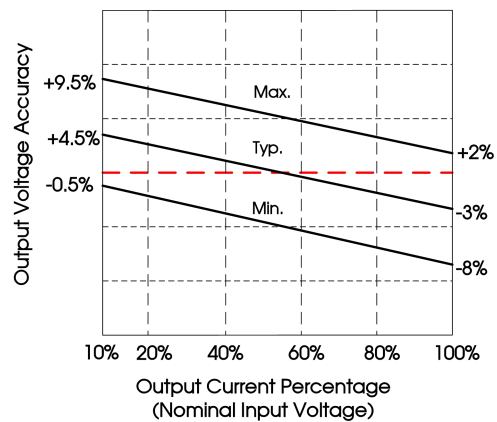


Fig. 30 DQP2-24S2005

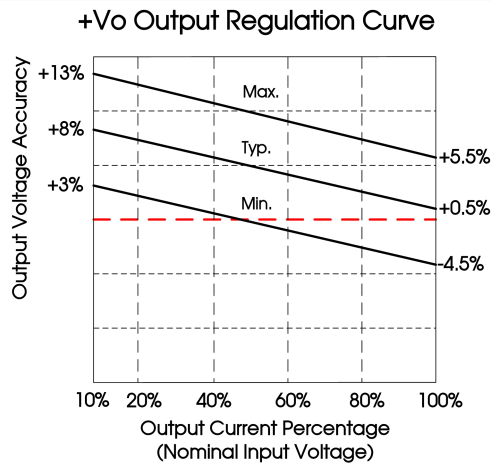


Fig. 31 DQP2-12S1803

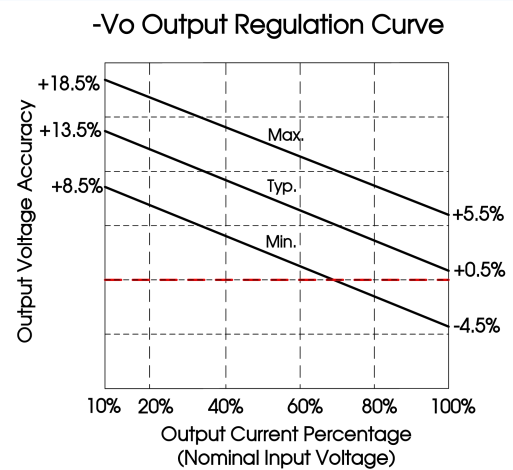


Fig. 32 DQP2-12S1803

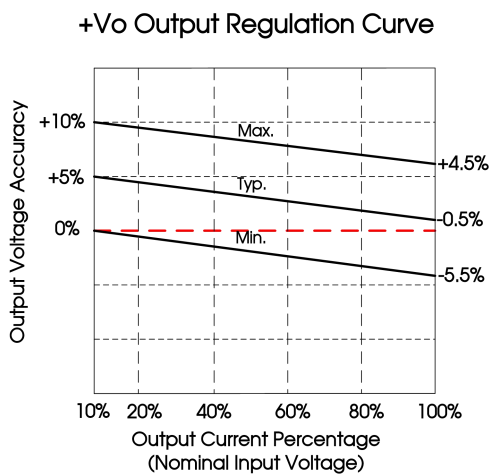


Fig. 33 DQP2-15S1803

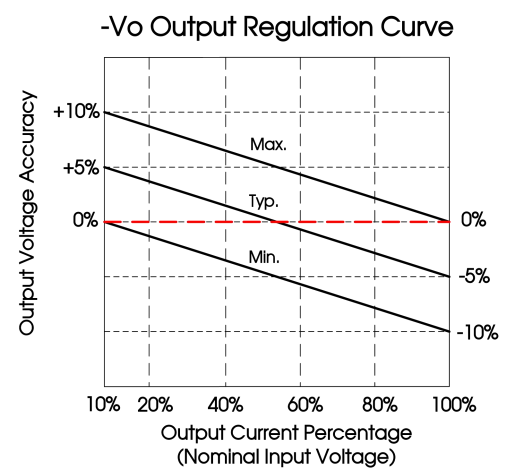


Fig. 34 DQP2-15S1803

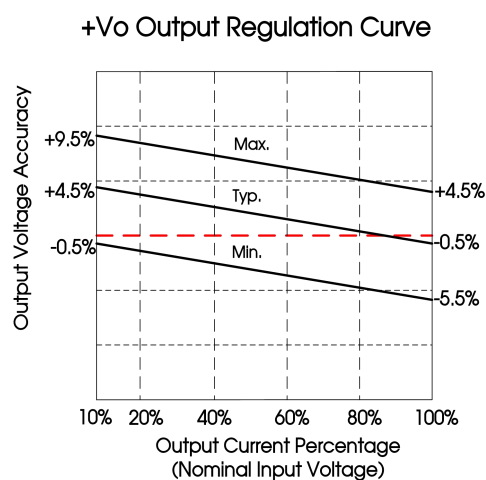


Fig. 35 DQP2-24S1803

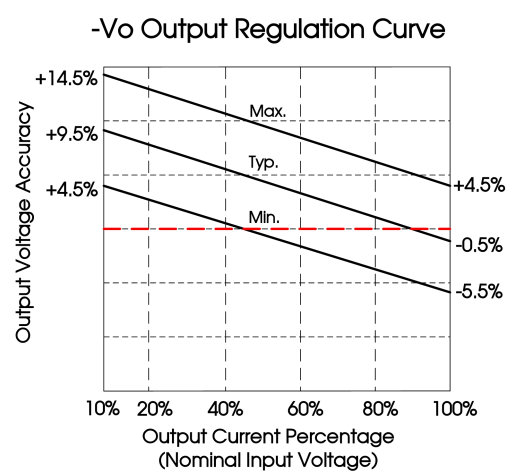


Fig. 36 DQP2-24S1803

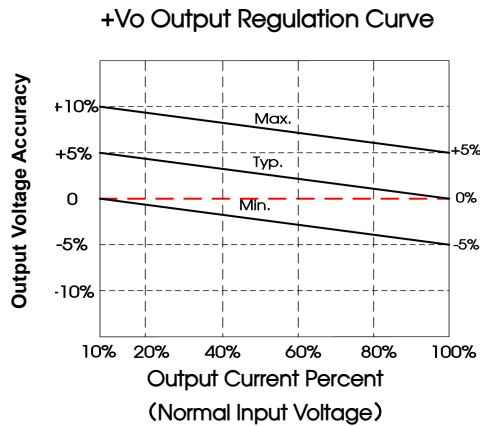


Fig. 37 DQP2-12S1508V0

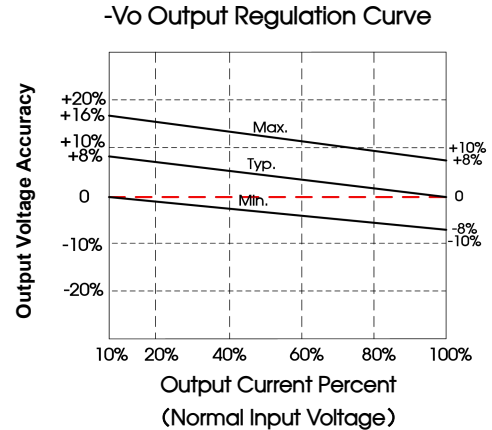


Fig. 38 DQP2-12S1508V0

Design Reference

1. Test configurations

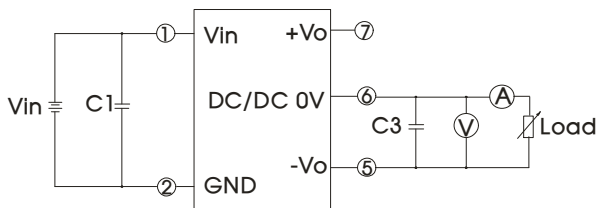


Fig. 39

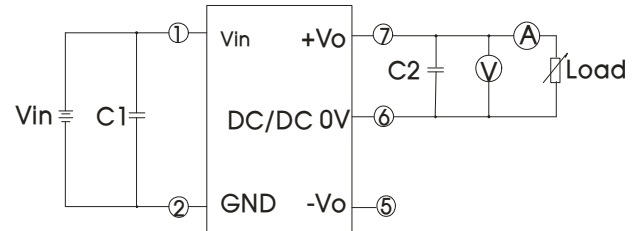


Fig. 40

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

2. Typical application

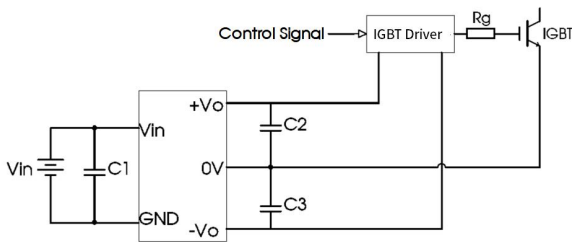
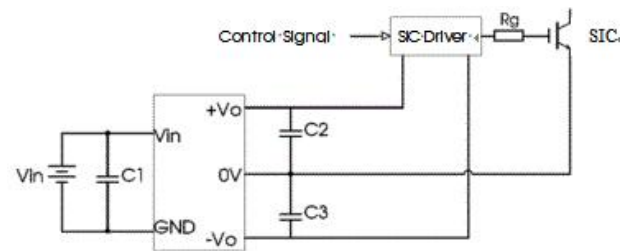


Fig. 41



C1/C2/C3
100μF/35V(Low resistance)

3. EMC typical recommended circuit

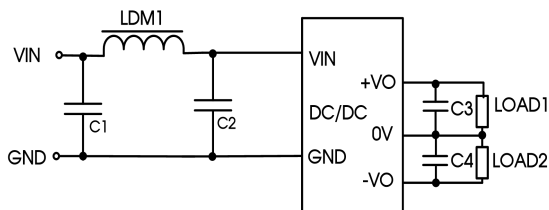


Fig. 42

Device selection			
Project		5V Input model	Other Input model
EMI	C1/C2	4.7μF /16V	1μF/50V
	C3/C4	10μF /50V (Low resistance)	100μF/30V (Low resistance)
	LDM	6.8μH	33μH

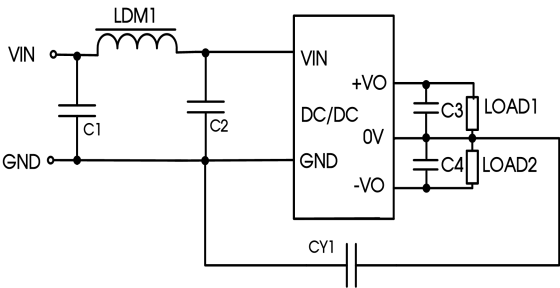


Fig. 43

Device selection		
EMI	C1/C2	4.7μF /16V
	C3/C4	10μF /50V (Low resistance)
	LDM	6.8μH
	CY1	330pF

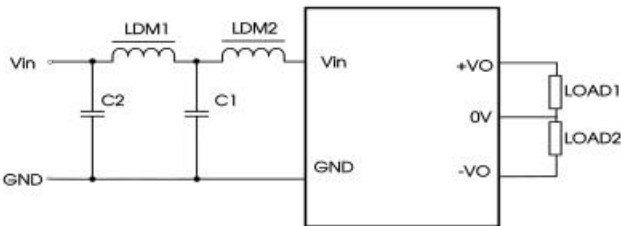
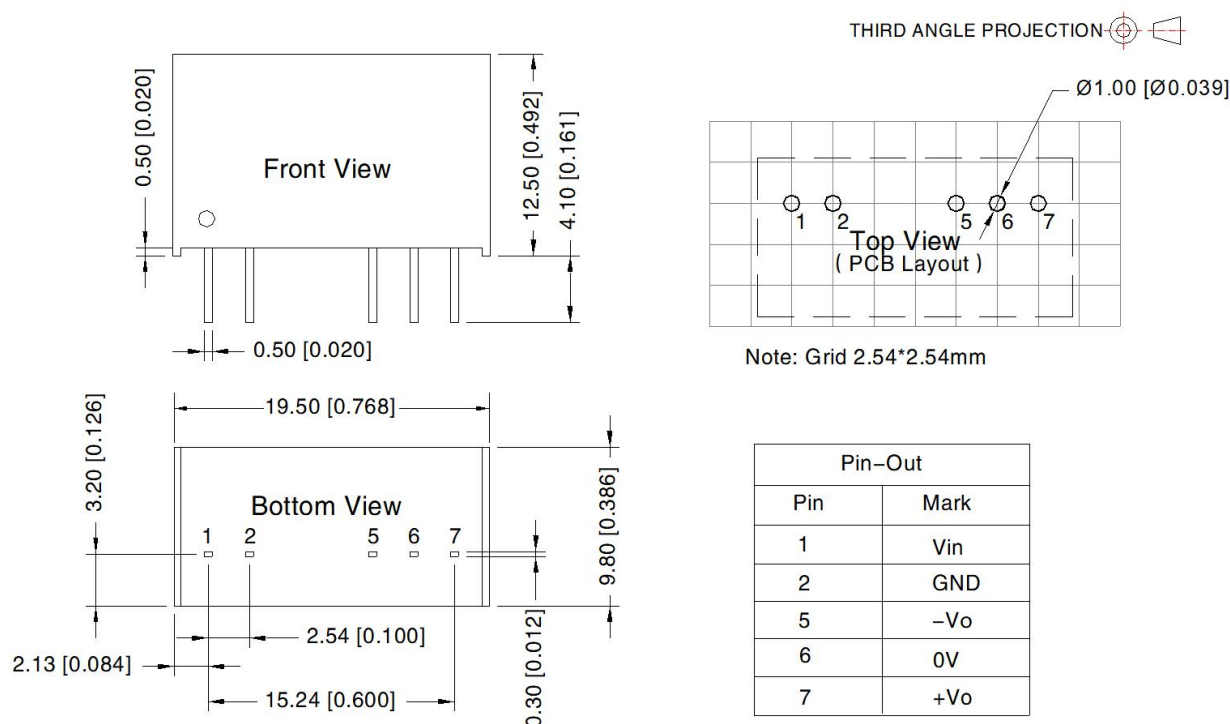


Fig. 44

输入电压		12VDC	24VDC
EMI	C1、C2	4.7μF /50V	
	LDM1	12μH	
	LDM2	47μH	

- 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.

Dimensions and Recommended



Note:

Unit: mm[inch]

Pin section tolerances: ± 0.10 [± 0.004]

General tolerances: ± 0.5 [± 0.020]

Note:

1. The lead connecting the power supply module and IGBT/SiC MOSFET driver should be as short as possible during use;
2. The output filtering capacitor should be as close as possible to the power supply module and IGBT/SiC MOSFET driver;
3. The peak of the IGBT/SiC MOSFET 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;
4. The average output power of the driver must be lower than that of the power supply module;
5. Consider fixing with glue near the module if being used in vibration occasion;
6. The maximum capacitive load offered were tested at nominal input voltage and full load;
7. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^\circ\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
8. All index testing methods in this datasheet are based on company corporate standards;
9. 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;
10. Products are related to laws and regulations: see "Features" and "EMC".
11. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.