

Descriptions

2.4W isolated, DC/DC Converter



RoHS



Features

- Reinforced insulation
- Ultra-low isolation capacitance: 2.5pF(typ.)
- I/O isolation test voltage: 5.0kVAC
- Partial Discharge 2.5kV
- CMTI>200 kV/μs
- Max. Capacitive Load: 2200μF
- High efficiency up to 86%
- Operating ambient temperature range: -40°C to +105°C
- Continuous short-circuit protection
- SMD package
- MSL 1

Applications

- General frequency converter
- AC servo drive system
- Arc welder
- Uninterruptible power supply (UPS)

Selection Guide

Certification	Part No.	Inport		Output		Full load efficiency(%) Min./Typ.	Capacitive Load (μF)Max.*
		Input voltage(VDC) (Range)	Input currenton (mA,Typ.) Full/No load	Voltage(VDC) +Vo/-Vo	Current (mA) +Io/-Io		
--	DQP2.4-12M2005	¹² (10.8-13.2)	240/9	+20/-5	+90/-90	80/86	1000
	DQP2.4-12M1803	¹² (10.8-13.2)	220/9	+18/-3	+100/-100		1000
	DQP2.4-12M1504	¹² (10.8-13.2)	190/9	+15/-4	+100/-100		1000
	DQP2.4-15M2005	¹⁵ (13.5-16.5)	180/8	+20/-5	+90/-90		2200
	DQP2.4-15M1803	¹⁵ (13.5-16.5)	170/8	+18/-3	+100/-100		2200
	DQP2.4-15M1504	¹⁵ (13.5-16.5)	180/8	+15/-4	+120/-120		2200
	DQP2.4-24M2005	²⁴ (21.6-26.4)	120/7	+20/-5	+90/-90	77/81	2200
	DQP2.4-24M1803	²⁴ (21.6-26.4)	110/7	+18/-3	+100/-100		2200
	DQP2.4-24M1504	²⁴ (21.6-26.4)	120/7	+15/-4	+120/-120		2200
	DQP2.4-12M1509	¹² (10.8-13.2)	240/9	+15.0/-9.0	+100/-100	80/86	1000

	DQP2.4-15M1509	15 (13.5-16.5)	180/8	+15.0/-9.0	+100/-100	80/86	2200
	DQP2.4-24M1509	24 (21.6-26.4)	120/7	+15.0/-9.0	+100/-100	77/81	2200

Note: * The output capacitive load per channel is the same.

Limiting Character

Project	Operating Conditions	Min.	Typ.	Max.	Unit
Reflux welding temperature	--	The peak temperature Tc 245°C, the time above 217°C is maximum 60s, Refer to the IPC / JEDEC J-STD-020D.1 standard for practical application.			

Specifications

Product Specifications	Item			Operating Conditions	Min.	Typ.	Max.	Unit
Input Specifications	Input Voltage (1sec. max.)			Vin=12VDC	-0.7	--	18	VDC
				Vin=15VDC	-0.7	--	21	
				Vin=24VDC	-0.7	--	30	
	Input the filter type				Capacitor filtering			
	Hot plug				Unavailable			
Output Specifications	Output voltage	DQP2.4-1	+Vo	Vin=12VDC, Pin7 & Pin10 +Io= +90mA	18.20	19.20	20.20	VDC
		2M2005	-Vo	Vin=12VDC, Pin7 & Pin8 -Io= -90mA	-4.75	-5.00	-5.25	
		DQP2.4-1	+Vo	Vin=12VDC, Pin9 & Pin10 +Io= +100mA	17.10	18.00	18.90	
		2M1803	-Vo	Vin=12VDC, Pin7 & Pin9 -Io= -100mA	-2.85	-3.00	-3.15	
		DQP2.4-1	+Vo	Vin=12VDC, Pin9 & Pin10 +Io= +100mA	14.25	15.00	15.75	
		2M1504	-Vo	Vin=12VDC, Pin7 & Pin9 -Io= -100mA	-3.60	-3.80	-4.00	
		DQP2.4-1	+Vo	Vin=15VDC, Pin7 & Pin10 +Io= +90mA	18.40	19.40	20.40	
		5M2005	-Vo	Vin=15VDC, Pin7 & Pin8 -Io= -90mA	-4.75	-5.00	-5.25	
		DQP2.4-1	+Vo	Vin=15VDC, Pin9 & Pin10 +Io= +100mA	16.38	17.28	18.18	
		5M1803	-Vo	Vin=15VDC, Pin7 & Pin9 -Io= -100mA	-2.94	-3.09	-3.24	
		DQP2.4-1	+Vo	Vin=15VDC, Pin9 & Pin10 +Io= +120mA	13.65	14.40	15.15	
		5M1504	-Vo	Vin=15VDC, Pin7 & Pin9 -Io= -120mA	-3.72	-3.92	-4.12	
		DQP2.4-2	+Vo	Vin=24VDC, Pin7 & Pin10 +Io= +90mA	19.00	20.00	21.00	
		4M2005	-Vo	Vin=24VDC, Pin7 & Pin8 -Io= -90mA	-4.70	-4.95	-5.20	
		DQP2.4-2	+Vo	Vin=24VDC, Pin9 & Pin10 +Io= +100mA	17.10	18.00	18.90	
		4M1803	-Vo	Vin=24VDC, Pin7 & Pin9 -Io= -100mA	-2.85	-3.00	-3.15	
		DQP2.4-2	+Vo	Vin=24VDC, Pin9 & Pin10 +Io= +120mA	14.25	15.00	15.75	
		4M1504	-Vo	Vin=24VDC, Pin7 & Pin9 -Io= -120mA	-3.80	-4.00	-4.20	
		DQP2.4-1	+Vo	Vin=12VDC, Pin9 & Pin10 +Io= +100mA	14.10	14.85	15.60	
		2M1509	-Vo	Vin=12VDC, Pin8 & Pin9 -Io= -100mA	-8.10	-8.55	-9.00	
		DQP2.4-1	+Vo	Vin=15VDC, Pin9 & Pin10 +Io= +100mA	14.25	15.00	15.75	
		5M1509	-Vo	Vin=15VDC, Pin8 & Pin9 -Io= -100mA	-8.10	-8.55	-9.00	
		DQP2.4-2	+Vo	Vin=24VDC, Pin9 & Pin10 +Io= +100mA	13.65	14.40	15.15	
		4M1509	-Vo	Vin=24VDC, Pin8 & Pin9 -Io= -100mA	-8.28	-8.73	-9.18	

	Voltage Accuracy			10% -100% of load	See output regulation curve (Figure 2-Figure 25)			%
Output Specifications	Linear Regulation	DQP2.4-xx	+Vo	Full voltage input range	--	±1.1	±1.3	--
		M1803	-Vo		--	±1.1	±1.4	
		The others	+Vo		--	±1.1	±1.3	
			-Vo		--	±1.1	±1.3	
	Load Regulation	DQP2.4-1	+Vo	10% - 100% load	--	8	12	%
		2M2005	-Vo		--	9	12	
		DQP2.4-1	+Vo		--	9	12	
		2M1803	-Vo		--	12	15	
		DQP2.4-1	+Vo		--	9	12	
		2M1504	-Vo		--	12	15	
		DQP2.4-1	+Vo		--	7	10	
		5M2005	-Vo		--	8	12	
		DQP2.4-1	+Vo		--	8	12	
		5M1803	-Vo		--	12	15	
		DQP2.4-1	+Vo		--	10	12	
		5M1504	-Vo		--	12	15	
		DQP2.4-2	+Vo		--	5	10	
		4M2005	-Vo		--	7	10	
		DQP2.4-2	+Vo		--	5	10	
		4M1803	-Vo		--	9	12	
		DQP2.4-2	+Vo		--	7	10	
		4M1504	-Vo		--	10	12	
		DQP2.4-1	+Vo		--	9	12	
		2M1509	-Vo		--	9	12	
		DQP2.4-1	+Vo		--	7	12	
		5M1509	-Vo		--	8	12	
		DQP2.4-2	+Vo		--	5	10	
		4M1509	-Vo		--	5	10	
	Temperature Coefficient			Full load	--	±0.04	±0.1	%/°C
	Ripple & Noise*			20MHz bandwidth	--	50	--	mVp-p
	Short-circuit Protection			Continuous, self-recovery				
General Specifications	Isolation			Input-output, Test for 1 minute with a leakage current of 1mA max	5000	--	--	VAC
	Continuous barrier withstand voltage			Input- output	--	2500	--	V
	CMTI			Input- output	±200	--	--	kV/μs
	Insulation Resistance			Input-output resistance at 500VDC	1000	--	--	MΩ
	Isolation capacitor			Input- output, capacitor at 100kHz/0.1V	--	2.5	4	pF
	Operating Temperature			Derating when operating temperature≥ 85°C, (see Fig. 1)	-40	--	105	°C
	Storage Temperature				-55	--	125	
	Pin Soldering Resistance			Soldering spot is 1.5mm away from case	--	--	300	

	Temperature	for 10s seconds				
	Case Temperature Rise	Ta=25°C, nominal input voltage, full load	--	30	60	
	Storage Humidity	Non-condensing	5	--	95	%RH
	Switching Frequency	Full load, nominal input voltage	--	200	--	kHz
	Safety Standard		--			
	Safety Class		CLASS III			
	MTBF	MIL-HDBK-217F@25°C	3500	15604	--	k hours
Mechanical Specifications	Dimensions	23.11*22.61*9.85mm				
	Weight	6.6g (Typ.)				
	Cooling Method	Natural air cold				

Note:* The "parallel cable" method is used for Ripple and Noise test,

Electromagnetic Compatibility (EMC)

Emissions (EMI)	CE (12V/15V Series)	CISPR32/EN55032	CLASS B	(see Table 2. for recommended circuit)
	CE (24V Series)	CISPR32/EN55032	CLASS A	(see Table 2. for recommended circuit)
	RE	CISPR32/EN55032	CLASS A	(see Table 2. for recommended circuit)
Immunity (EMS)	ESD	IEC/EN61000-4-2	Contact ±8kV	perf. Criteria B

Characteristic Curve

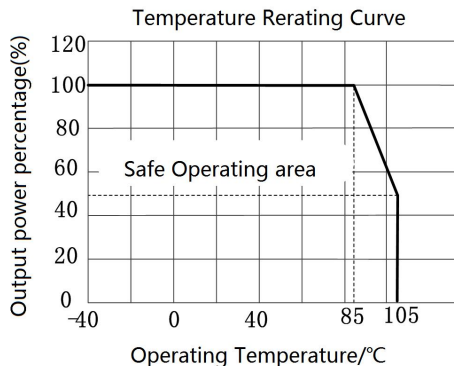


Fig.1

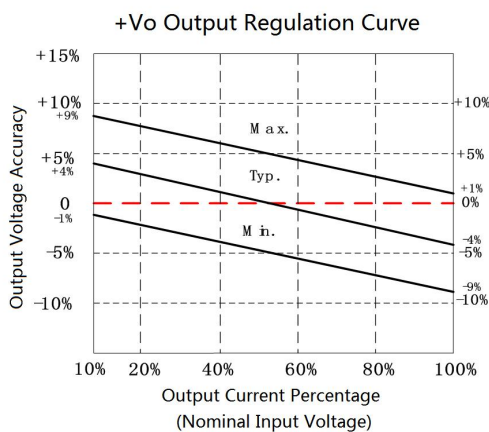


Fig.2(DQP2.4-12M2005)

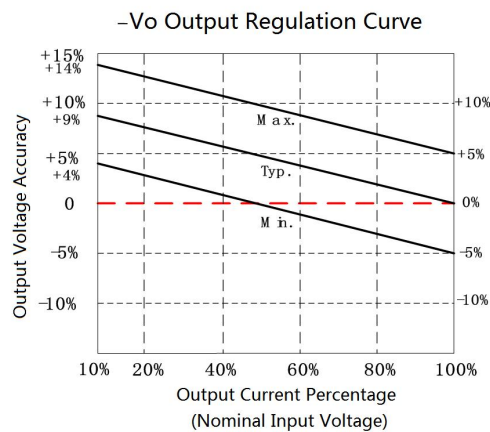


Fig.3(DQP2.4-12M2005)

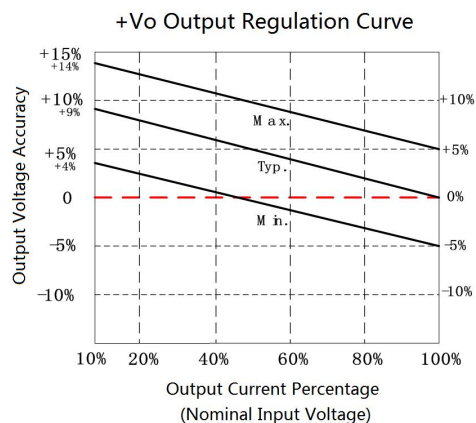


Fig.4(DQP2.4-12M1803)

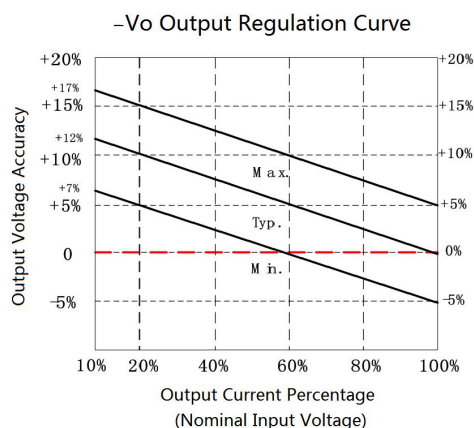


Fig.5(DQP2.4-12M1803)

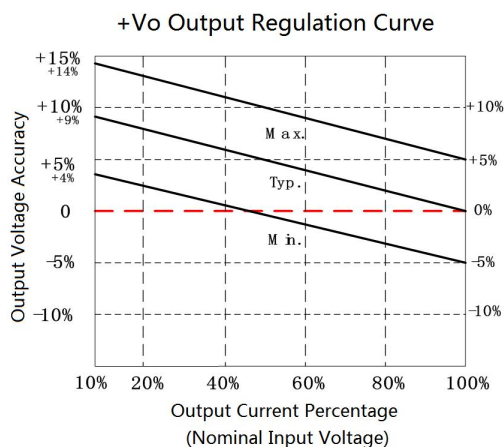


Fig.6(DQP2.4-12M1504)

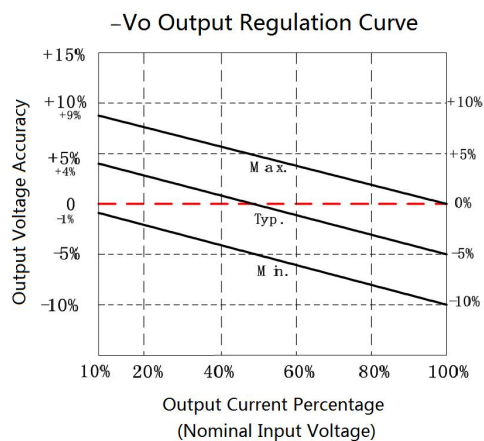


Fig.7(DQP2.4-12M1504)

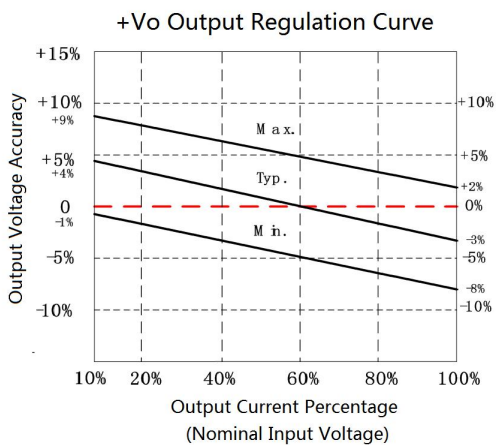


Fig.8(DQP2.4-15M2005)

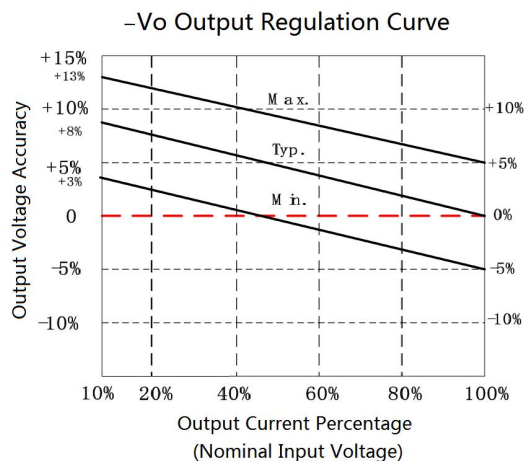


Fig.9(DQP2.4-15M2005)

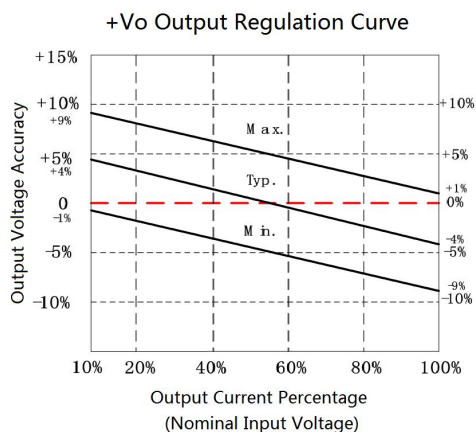


Fig.10(DQP2.4-15M1803)

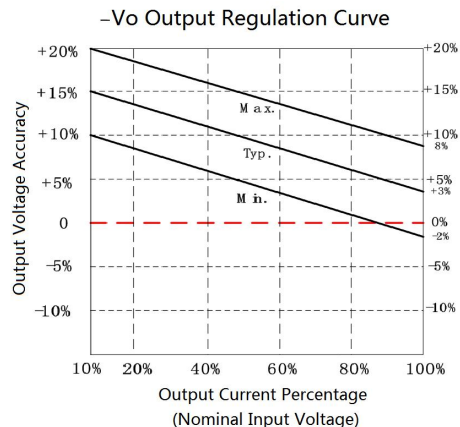


Fig.11(DQP2.4-15M1803)

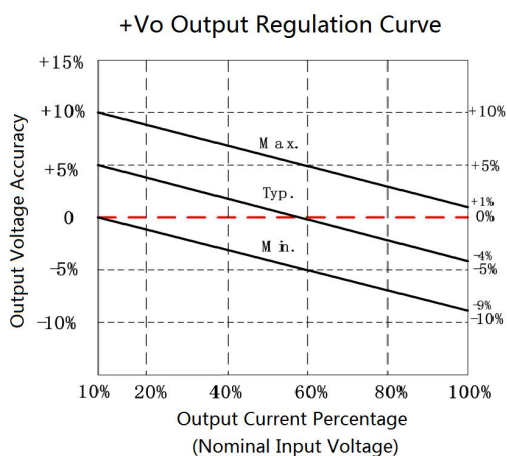


Fig.12(DQP2.4-15M1504)

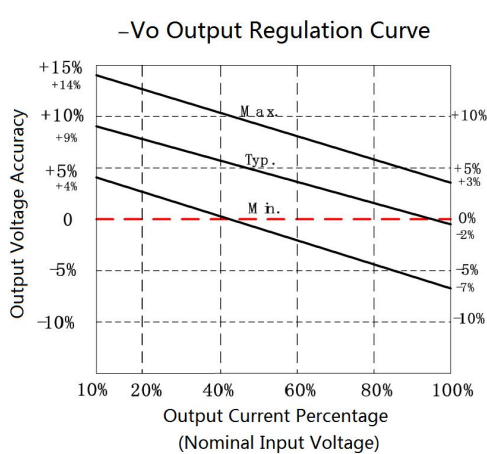


Fig.13(DQP2.4-15M1504)

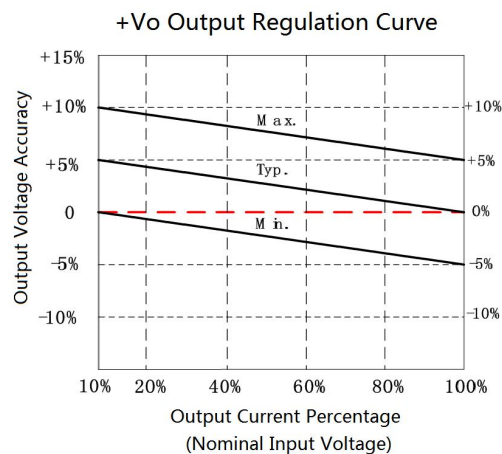


Fig.14(DQP2.4-24M2005)

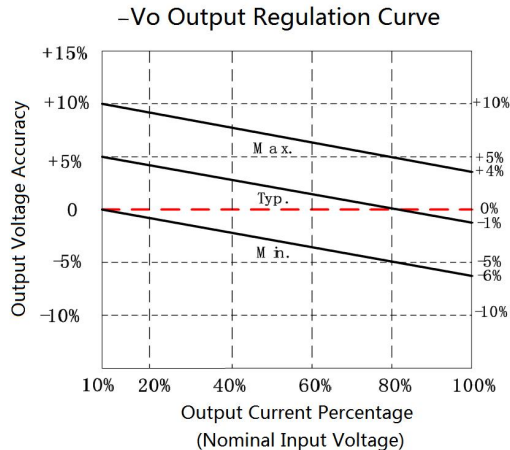


Fig.15(DQP2.4-24M2005)

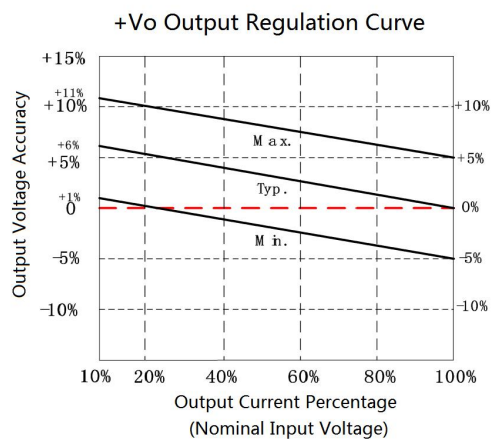


Fig.16(DQP2.4-24M1803)

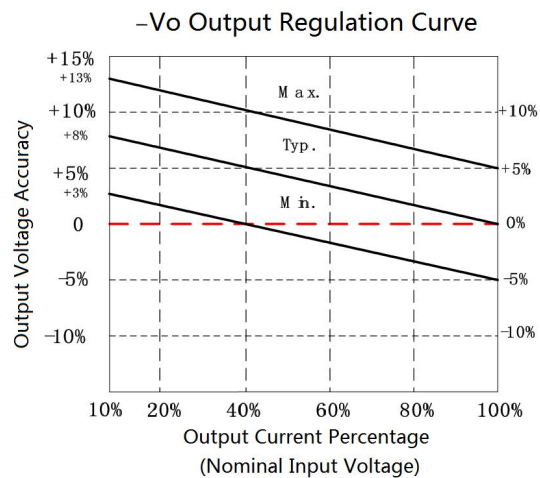


Fig.17(DQP2.4-24M1803)

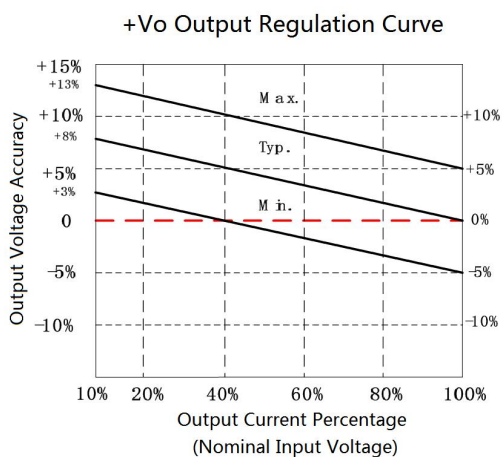


Fig.18(DQP2.4-24M1504)

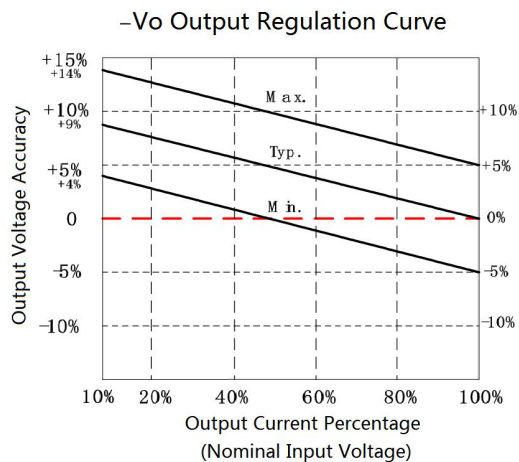


Fig.19(DQP2.4-24M1504)

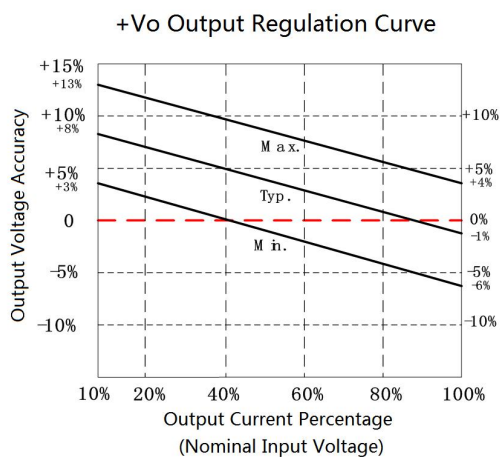


Fig.20(DQP2.4-12M1509)

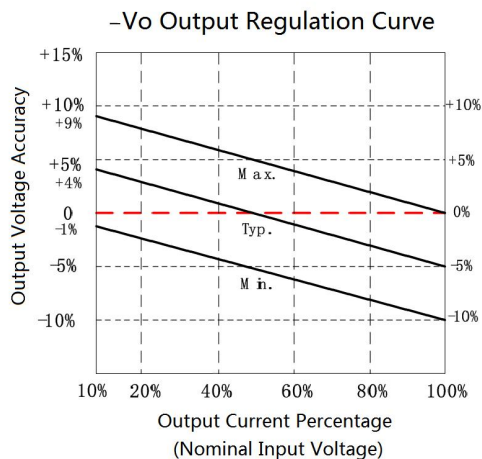


Fig.21(DQP2.4-12M1509)

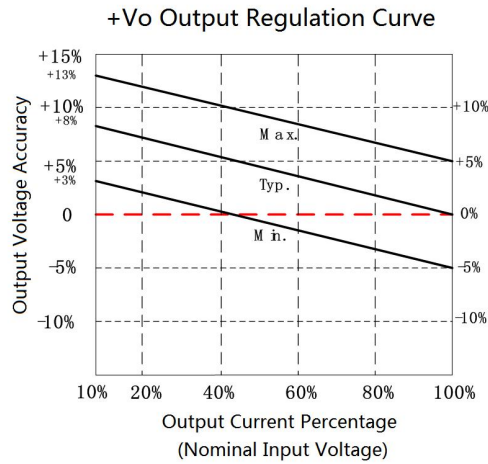


Fig.22(DQP2.4-15M1509)

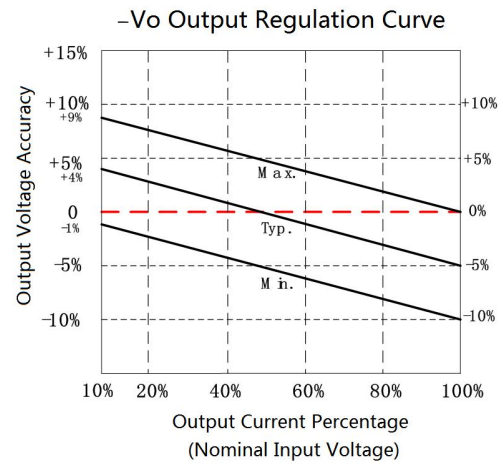


Fig.23(DQP2.4-15M1509)

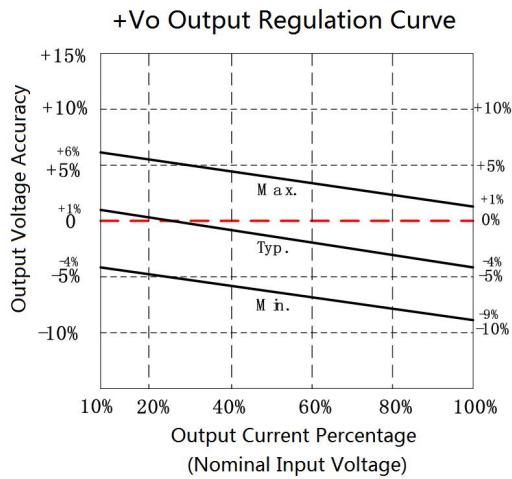


Fig.24(DQP2.4-24M1509)

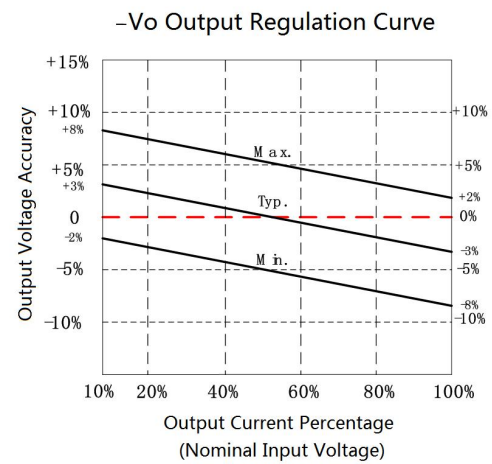


Fig.25(DQP2.4-24M1509)

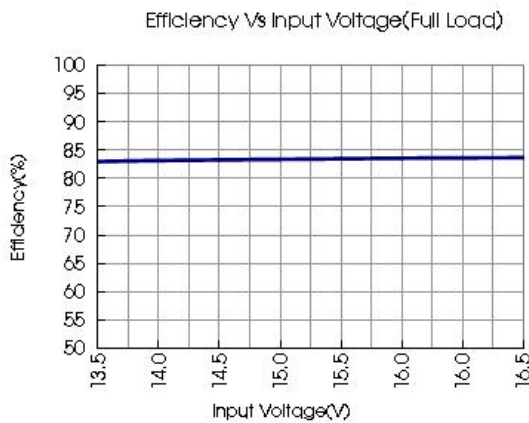


Fig.26

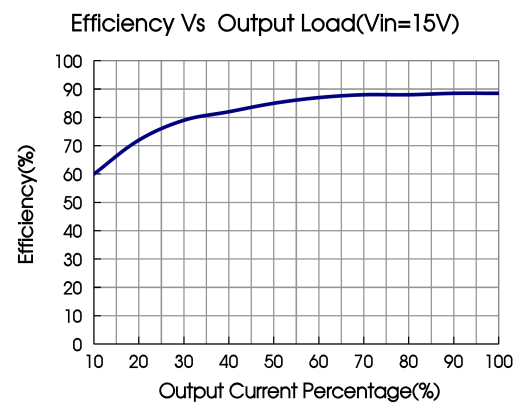


Fig.27

Note: Take DQP2.4-15M2005 as an example, other models can be corresponding reference.

Design Reference

1. Test configurations

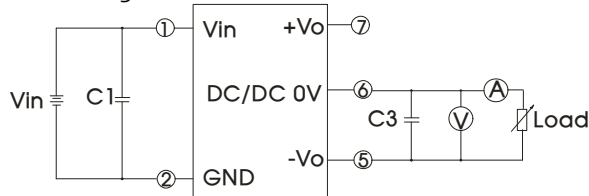


Fig.28

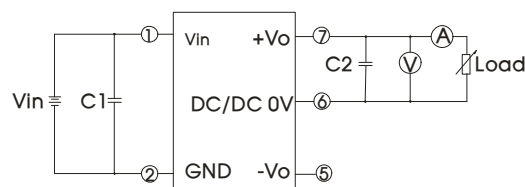


Fig.29

Note: C1, C2, and C3, respectively, are 100 μ F/35V (low internal resistance capacitance).

2. Typical applications

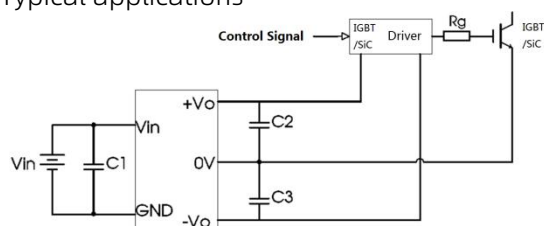


Fig.30

Table 1.

C1/C2/C3
100 μ F / 35V (low internal resistance capacitor)

3. EMC typical recommended circuit

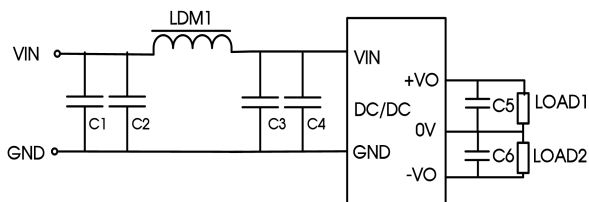


Fig.31

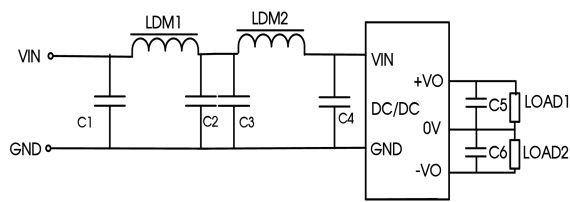


Fig.32

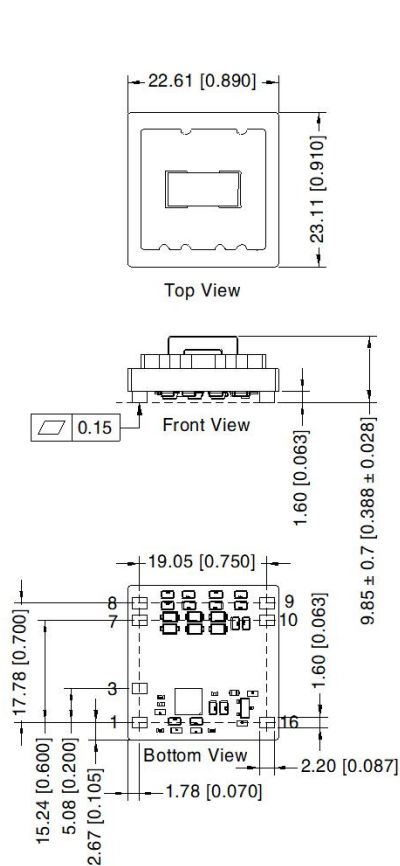
Table 2.

Part No.	Recommended circuit	C1	C2	C3	C4	LDM1	LDM2
DQP2.4-12M2005	Fig.31	1 μ F/50V	0.1 μ F/50V	1 μ F/50V	0.1 μ F/50V	33 μ H	---
DQP2.4-12M1803	Fig.31	1 μ F/50V	0.1 μ F/50V	1 μ F/50V	0.1 μ F/50V	27 μ H	---
DQP2.4-12M1504							
DQP2.4-15M2005							
DQP2.4-15M1803	Fig.32	4.7 μ F/50V	4.7 μ F/50V	0.1 μ F/50V	0.1 μ F/50V	33 μ H	33 μ H
DQP2.4-15M1504							
DQP2.4-24M2005							
DQP2.4-24M1803	Fig.31	4.7 μ F/50V	0.1 μ F/50V	4.7 μ F/50V	0.1 μ F/50V	33 μ H	---
DQP2.4-24M1504							
DQP2.4-12M1509							
DQP2.4-15M1509							
DQP2.4-24M1509		4.7 μ F/50V	0.1 μ F/50V	4.7 μ F/50V	0.1 μ F/50V	33 μ H	---

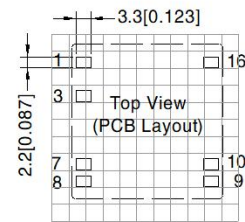
4. Electrolytic capacitors are recommended for external capacitors at the input or output of the product. Tantalum capacitors are not, otherwise there is a risk of failure.

5. The products do not support parallel connection of their output for power expansion purpose or hot-plug.

Dimensions and Recommended



THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

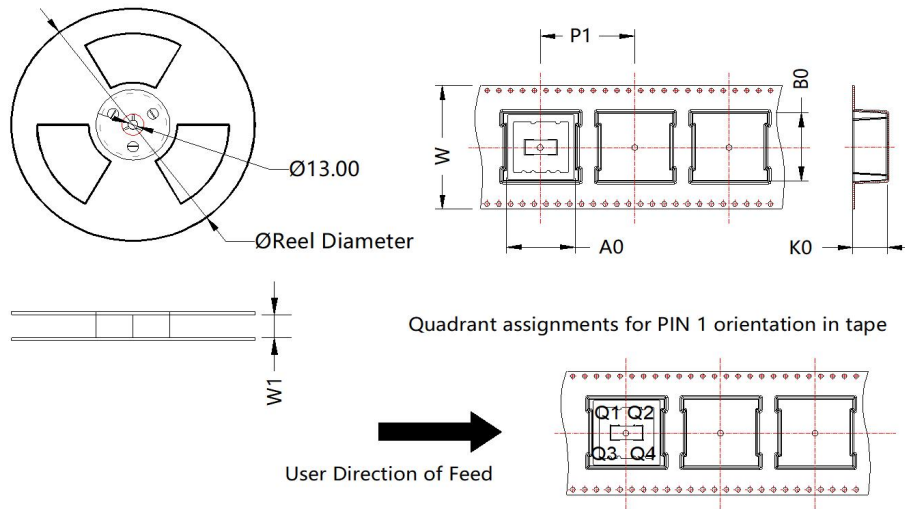
Pin-Out		Pin-Out		Pin-Out	
Pin	EP2.4-12M1504 EP2.4-15M1504	Pin	EP2.4-15M2005	Pin	EP2.4-15M1509
1	GND	1	GND	1	GND
3	NC	3	NC	3	NC
7	-V0	7	0V	7	NC
8	NC	8	-V0	8	-V0
9	0V	9	NC	9	0V
10	+V0	10	+V0	10	+V0
16	VCC	16	VCC	16	VCC

Note:

Unit: mm[inch]

Pin size tolerances: $\pm 0.10 [\pm 0.004]$ General tolerances: $\pm 0.50 [\pm 0.020]$ The layout of the device is for reference only,
please refer to the actual product

Package diagram:



MPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
170	180.0	44.5	23.78	24.28	11.6	32.0	44.0	Q1

Note:

- 1.The leads for the module and SiC drives are as short as possible;
- 2.The output filtering capacitor should be as close as possible to the power supply module and SiC driver;
- 3.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;
- 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 Ta=25°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.