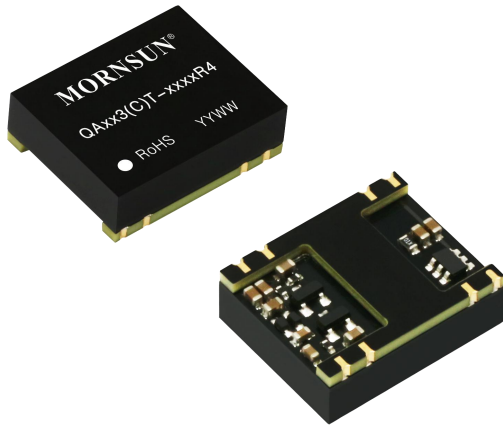


IGBT/SiC/MOSFET driver power supply

FEATURES



- Reinforced insulation
- Ultra-low isolation capacitance: 3pF( typ.)
- I/O isolation test voltage: 5.0kVAC
- Partial Discharge 2kV
- CMTI>200 kV/μs
- High efficiency up to 86%
- Operating ambient temperature range: -40°C to +105°C
- Continuous short-circuit protection
- Maximum power 2.4W, Rated power 2W
- SMD package
- MSL 3
- Meet AEC-Q100 experimental requirements

patent protection    RoHS



The QAx3(C)T-xxxxR4 series is a dual-channel DC-DC specifically designed for gate drive applications. Its output configuration is not suitable for use as a general dual-output DC-DC power supply, but it can be used as a general single-output DC-DC power supply, outputting from +Vout to -Vout. Its internal design incorporates an asymmetric voltage output form to minimize gate drive losses. At the same time with output short circuit protection and self-recovery ability. The product is suitable for:

- 1.General frequency converter
- 2.AC servo drive system
- 3.Arc welder
- 4.Uninterruptible power supply (UPS)

Selection Guide

Part No.	Input		Output		Full load efficiency(%) Min./Typ.	Capacitive Load (μF)Max.
	Input voltage (VDC) (Range)	Input Current (mA,Typ.) Full / No load	Voltage(VDC) +Vo/-Vo	Current(mA) +Vout to -Vout		
QA053CT-1505R4	5 (4.5-5.5)	485/30	+15/-5	100	82	680
QA053T-1509R4	5 (4.5-5.5)	485/30	+15/-9	80	83	680
QA053CT-2005R4	5 (4.5-5.5)	485/30	+20/-5	80	82	680
QA053CT-1803R4	5 (4.5-5.5)	485/30	+18/-3	95	82	680
QA123CT-1505R4	12 (10.8-13.2)	205/10	+15/-5	100	83	680
QA123T-1509R4	12 (10.8-13.2)	205/10	+15/-9	80	83	680
QA123CT-2005R4	12 (10.8-13.2)	205/10	+20/-5	80	82	680
QA123CT-1803R4	12 (10.8-13.2)	205/10	+18/-3	95	82	680
QA153CT-1505R4	15 (13.5-16.5)	160/13	+15/-5	100	84	680
QA153T-1509R34	15 (13.5-16.5)	160/13	+15/-9	80	82	680
QA153CT-2005R4	15 (13.5-16.5)	160/13	+20/-5	80	82	680
QA153CT-1803R4	15 (13.5-16.5)	160/13	+18/-3	95	84	680
QA243CT-1505R4	24 (21.6-26.4)	95/15	+15/-5	100	86	680
QA243T-1509R34	24 (21.6-26.4)	95/15	+15/-9	80	84	680

QA243CT-2005R4	24 (21.6-26.4)	95/15	+20/-5	80	83	680
QA243CT-1803R4	24 (21.6-26.4)	95/15	+18/-3	95	84	680

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℃, the time above 217℃ is maximum 60s. Refer to the IPC / JEDEC J-STD-020D.1 standard for practical application.			

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	5VDC Nominal input series	-0.7	--	9	VDC
	12VDC Nominal input series	-0.7	--	18	
	15VDC Nominal input series	-0.7	--	21	
	24VDC Nominal input series	-0.7	--	30	
Input Filter	Capacitor filtering				
Hot plug	Unavailable				

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output voltage	QA053CT-1505R4 +Vo -Vo	Vin=5VDC, Io= 100mA	14.25	15.00	15.75	VDC
			-4.80	-5.05	-5.30	
	QA053T-1509R4 +Vo -Vo	Vin=5VDC, Io= 80mA	14.40	15.15	15.90	
			-8.64	-9.09	-9.54	
	QA053CT-2005R4 +Vo -Vo	Vin=5VDC, Io= 80mA	18.20	19.20	20.20	
			-4.65	-4.90	-5.15	
	QA053CT-1803R4 +Vo -Vo	Vin=5VDC, Io= 95mA	16.38	17.28	18.18	
			-2.76	-2.91	-3.06	
	QA123CT-1505R4 +Vo -Vo	Vin=12VDC, Io= 100mA	15.00	15.75	16.50	
			-5.00	-5.25	-5.50	
	QA123T-1509R4 +Vo -Vo	Vin=12VDC, Io= 80mA	14.40	15.15	15.90	
			-8.73	-9.18	-9.63	
	QA123CT-2005R4 +Vo -Vo	Vin=12VDC, Io= 80mA	18.20	19.20	20.20	
			-4.75	-5.00	-5.25	
	QA123CT-1803R4 +Vo -Vo	Vin=12VDC, Io= 95mA	16.92	17.82	18.72	
			-2.82	-2.97	-3.12	
	QA153CT-1505R4 +Vo -Vo	Vin=15VDC, Io= 100mA	14.40	15.15	15.90	
			-4.85	-5.10	-5.35	
	QA153T-1509R34 +Vo -Vo	Vin=15VDC, Io= 80mA	15.00	15.75	16.50	
			-9.00	-9.45	-9.90	
QA153CT-2005R4 +Vo -Vo	Vin=15VDC, Io= 80mA	18.80	19.80	20.80		
		-4.75	-5.00	-5.25		
QA153CT-1803R4 +Vo -Vo	Vin=15VDC, Io= 95mA	17.64	18.54	19.44		
		-2.91	-3.06	-3.21		
QA243CT-1505R4 +Vo -Vo	Vin=24VDC, Io= 100mA	14.70	15.45	16.20		
		-4.95	-5.20	-5.45		
QA243T-1509R34 +Vo -Vo	Vin=24VDC, Io= 80mA	14.85	15.60	16.35		
		-8.91	-9.36	9.81		

	QA243CT-2005R4	+Vo	Vin=24VDC, Io= 80mA	19.00	20.00	21.00	
		-Vo		-4.80	-5.05	-5.30	
	QA243CT-1803R4	+Vo	Vin=24VDC, Io= 95mA	16.92	17.82	18.72	
		-Vo		-2.82	-2.97	-3.12	
Output Voltage Accuracy		10% -100% of load		See output regulation curve (Figure 5 - Figur 36)			%
Linear Regulation	+Vo	Full input voltage range		--	±1.0	±1.2	--
	-Vo			--	±1.0	±1.2	
Load Regulation	+Vo	QA053CT-1505R4		--	12	16	%
	-Vo			--	11	15	
	+Vo	QA053T-1509R4		--	9	14	
	-Vo			--	9	14	
	+Vo	QA053CT-2005R4		--	10	15	
	-Vo			--	10	14	
	+Vo	QA053CT-1803R4		--	12	16	
	-Vo			--	10	15	
	+Vo	QA123CT-1505R4		--	10	15	
	-Vo			--	10	14	
	+Vo	QA123T-1509R4		--	10	15	
	-Vo			--	10	14	
	+Vo	QA123CT-2005R4		--	10	15	
	-Vo			--	10	14	
	+Vo	QA123CT-1803R4		--	10	15	
	-Vo			--	10	14	
	+Vo	QA153CT-1505R4		--	10	14	
	-Vo			--	10	13	
	+Vo	QA153T-1509R4		--	8	12	
	-Vo			--	7	11	
	+Vo	QA153CT-2005R4		--	9	12	
	-Vo			--	8	12	
	+Vo	QA153CT-1803R4		--	8	11	
	-Vo			--	7	11	
	+Vo	QA243CT-1505R4		--	6	10	
	-Vo			--	5	9	
	+Vo	QA243T-1509R4		--	5	9	
	-Vo			--	4	9	
	+Vo	QA243CT-2005R4		--	5	10	
	-Vo			--	4	9	
	+Vo	QA243CT-1803R4		--	6	10	
	-Vo			--	5	9	
Temperature Coefficient		Full load		--	±0.04	±0.1	%/°C
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-output, Test for 1 minute with a leakage current of 1mA max	5000	--	--	VAC
Continuous barrier withstand voltage	Input- output	--	2000	--	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	--	3	/	pF
Operating Temperature	See temperature rerating curve (Fig.1-Fig.4)	-40	--	105	°C
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25°C, nominal input voltage, full load	--	20	45	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	200	--	kHz
Safety Class		CLASS III			
MTBF	MIL-HDBK-217F@25°C	3500	15000	--	k hours

Mechanical Specifications

Dimensions	18.75 x 14.99 x 5.95mm
Weight	3.5g (Typ.)
Cooling Method	Natural air cold

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS A (see Figure 1 and Figure 2 for recommended circuit)
	RE	CISPR32/EN55032 CLASS A (see Figure 1 and Figure 2 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Contact ±8kV perf. Criteria B

Typical Characteristic Curves

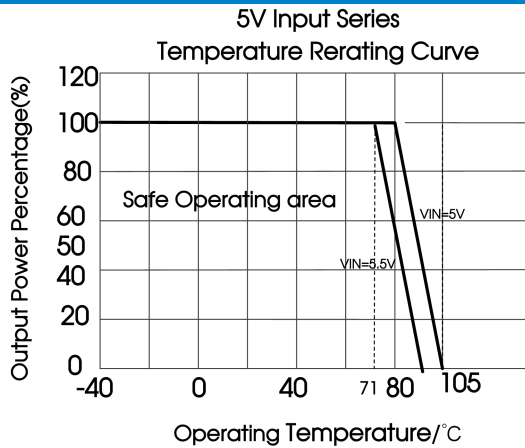


Figure 1

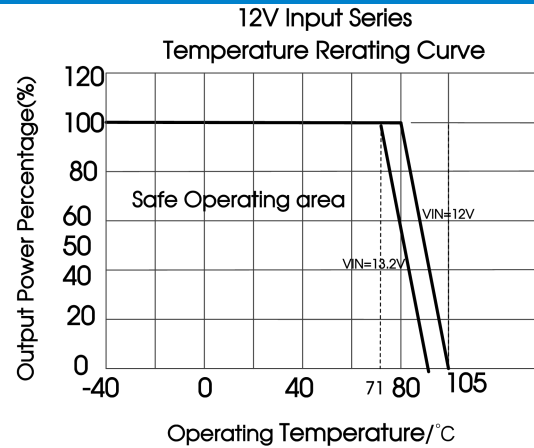


Figure 2

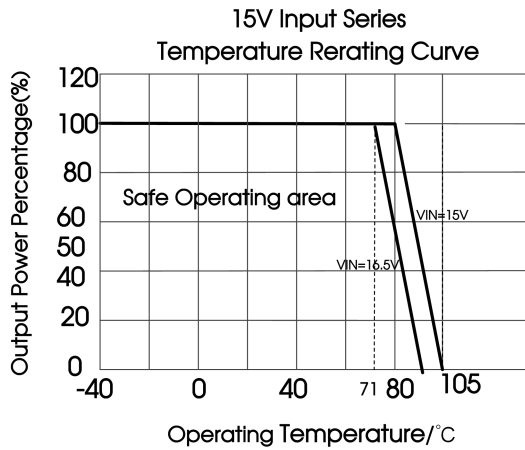


Figure 3

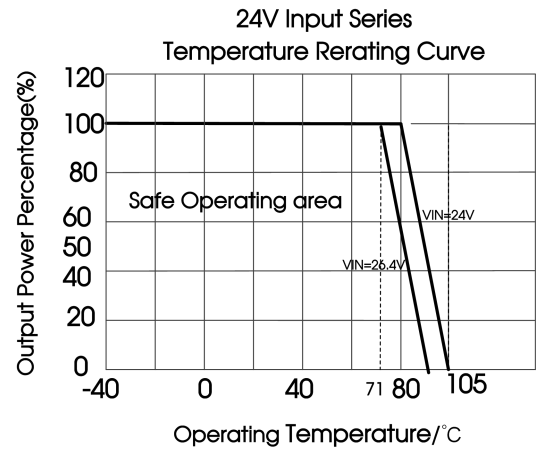


Figure 4

QA053T-1509R4  
+Vo Output Regulation Curve

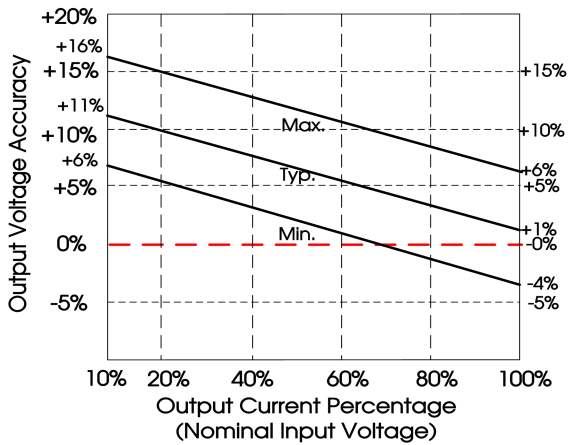


Figure 5

QA053T-1509R4  
-Vo Output Regulation Curve

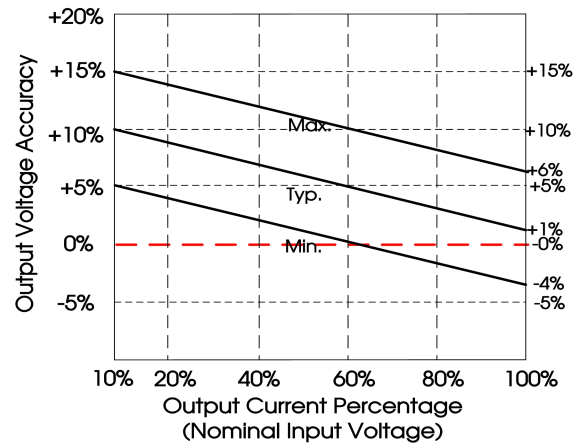


Figure 6

QA053CT-2005R4  
+Vo Output Regulation Curve

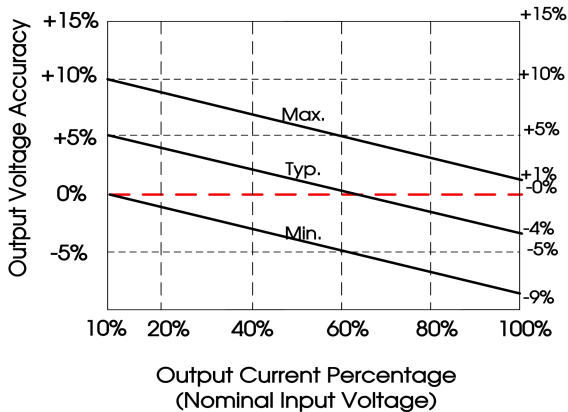


Figure 7

QA053CT-2005R4  
-Vo Output Regulation Curve

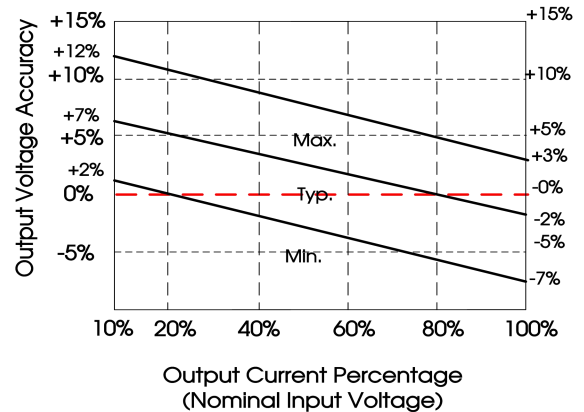


Figure 8

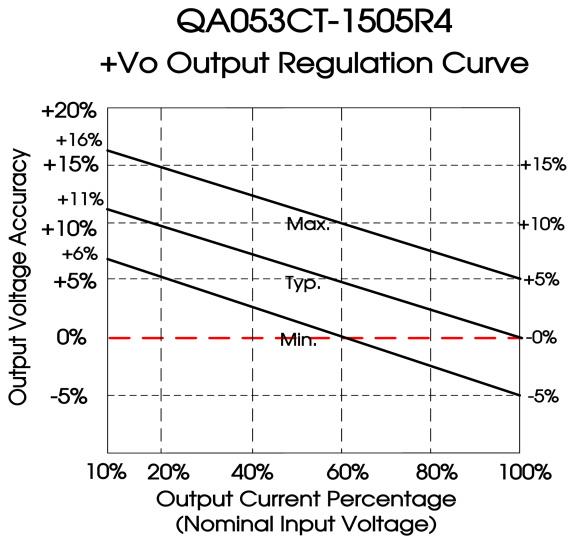


Figure 9

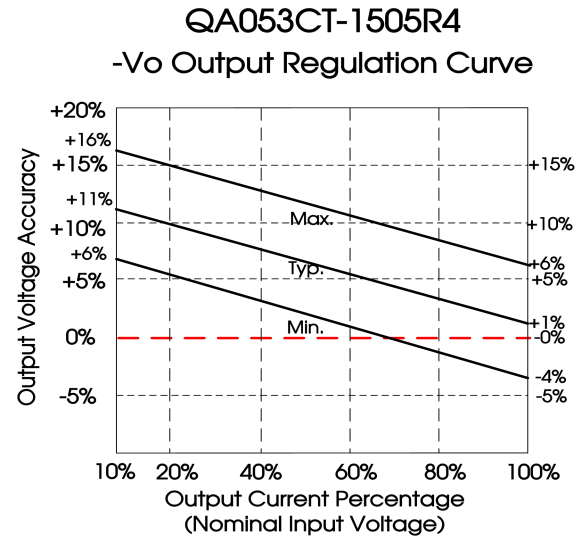


Figure 10

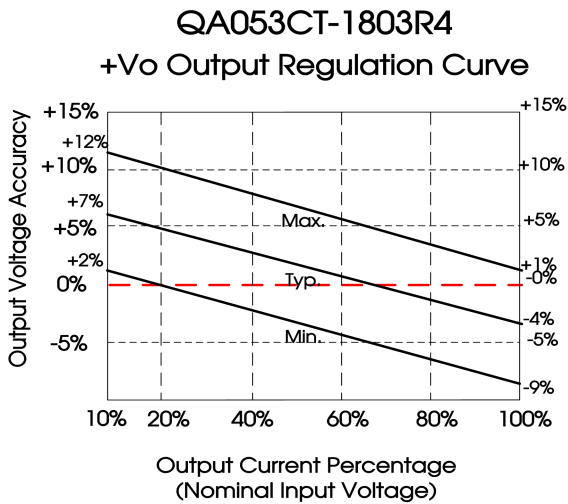


Figure 11

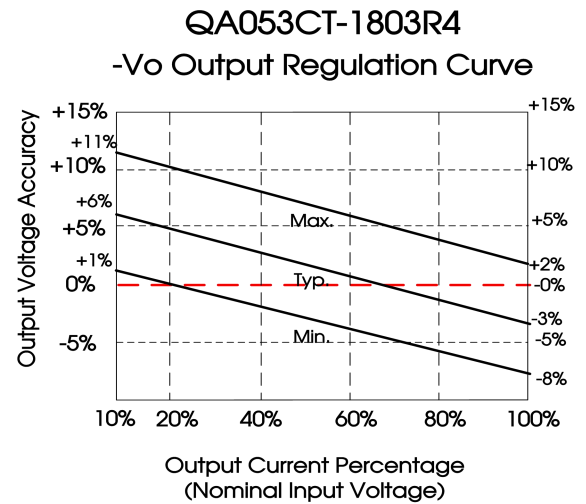


Figure 12

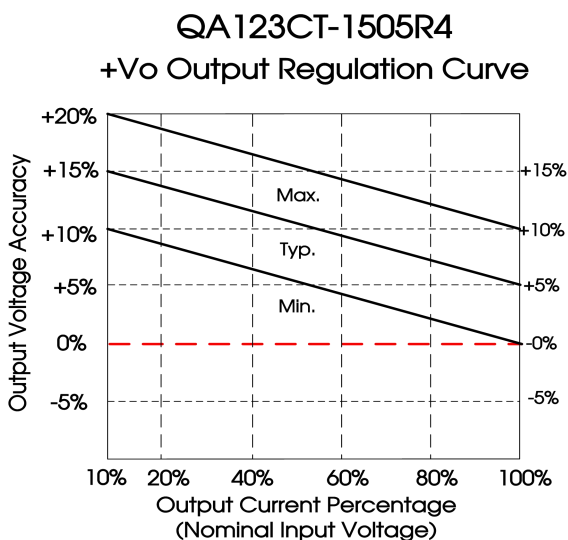


Figure 13

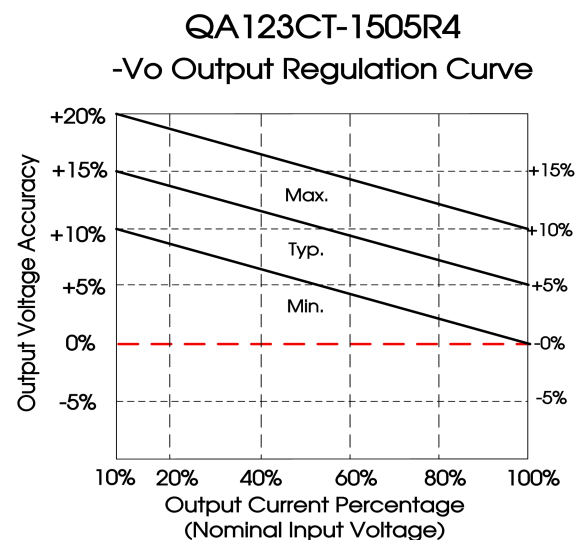


Figure 14

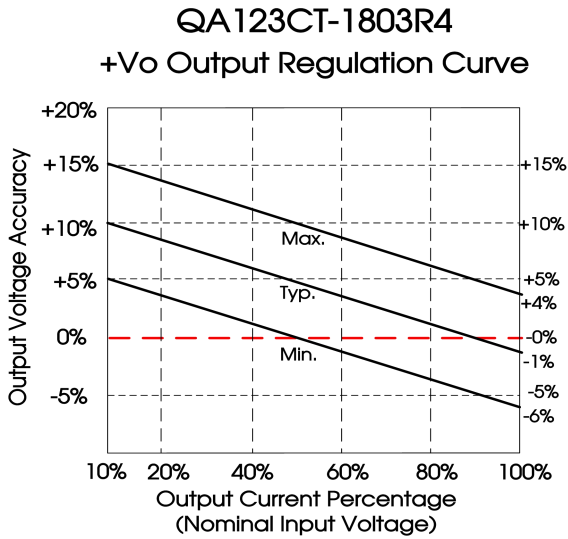


Figure 15

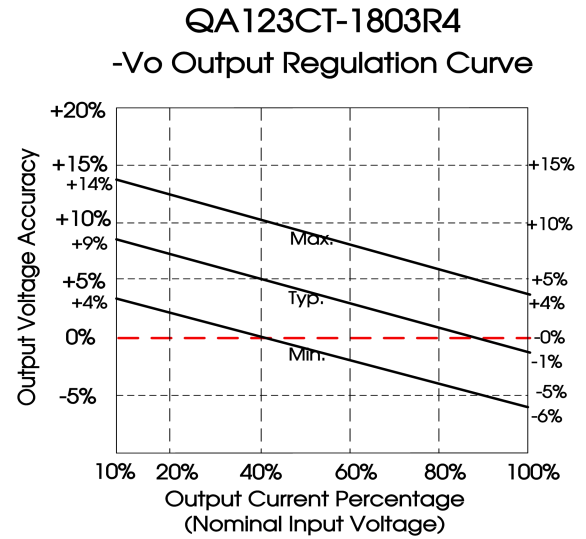


Figure 16

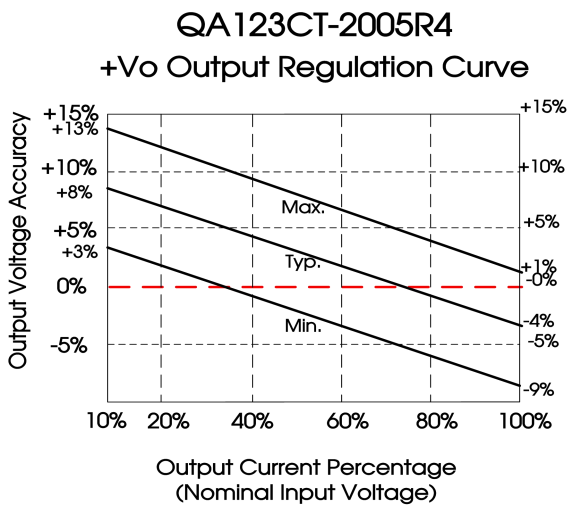


Figure 17

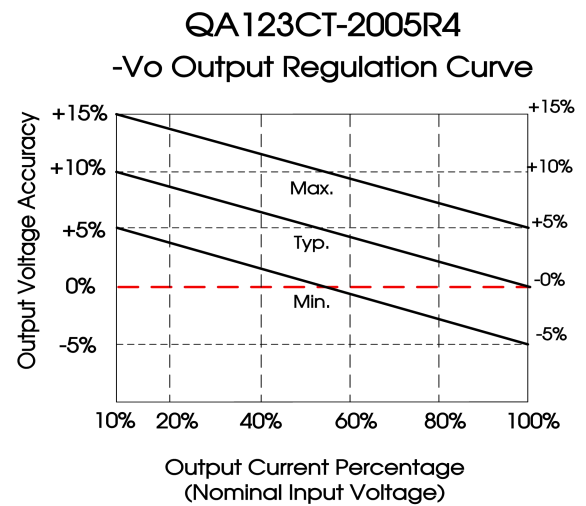


Figure 18

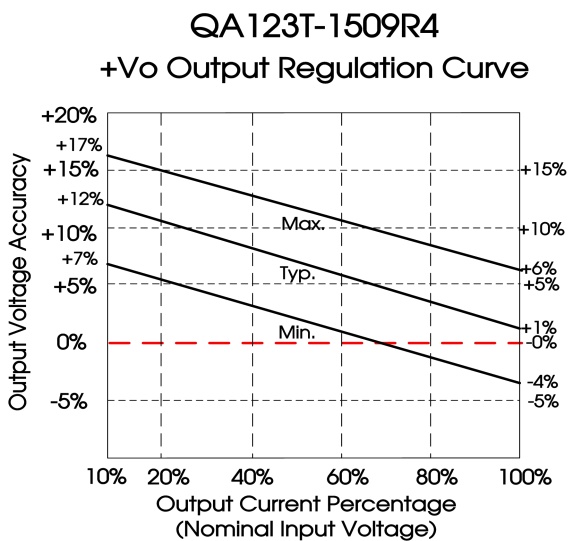


Figure 19

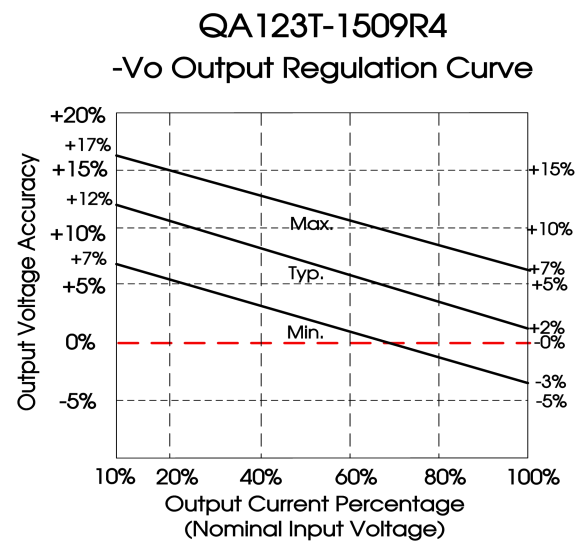


Figure 20

QA153CT-1803R4  
+Vo Output Regulation Curve

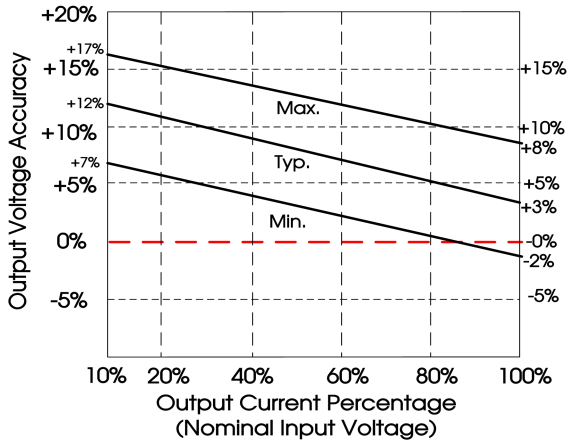


Figure 21

QA153CT-1803R4  
-Vo Output Regulation Curve

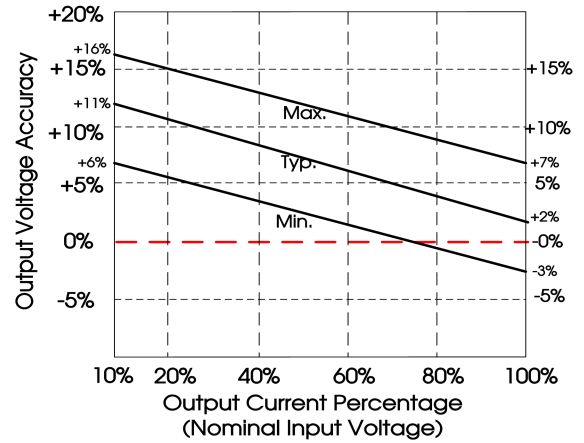


Figure 22

QA153CT-2005R4  
+Vo Output Regulation Curve

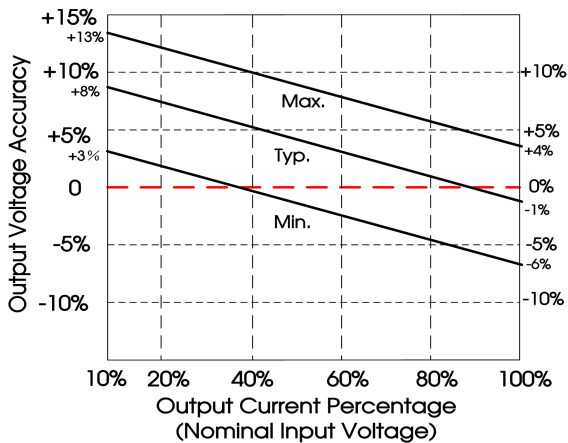


Figure 23

QA153CT-2005R4  
-Vo Output Regulation Curve

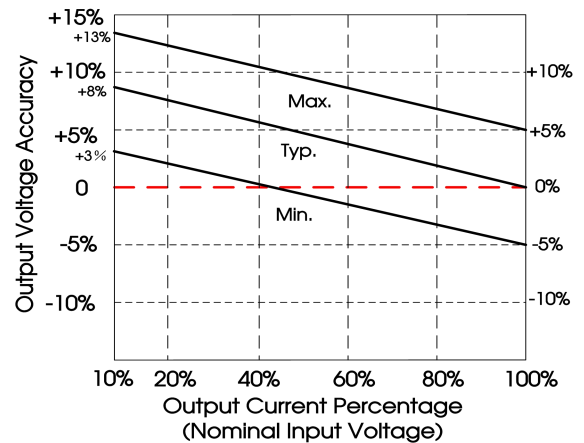


Figure 24

QA153T-1509R4  
+Vo Output Regulation Curve

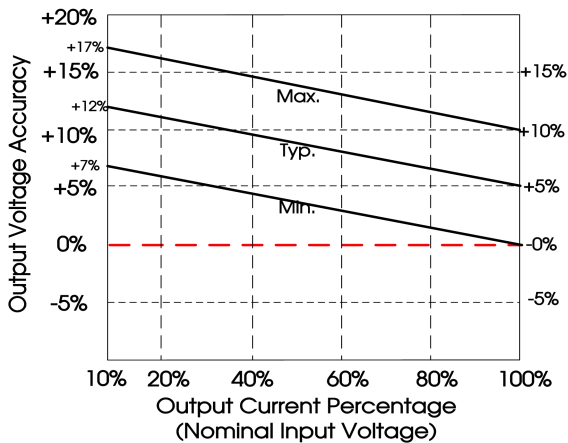


Figure 25

QA153T-1509R4  
-Vo Output Regulation Curve

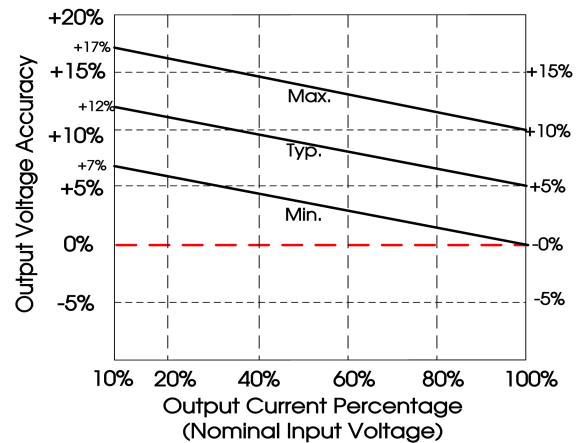


Figure 26

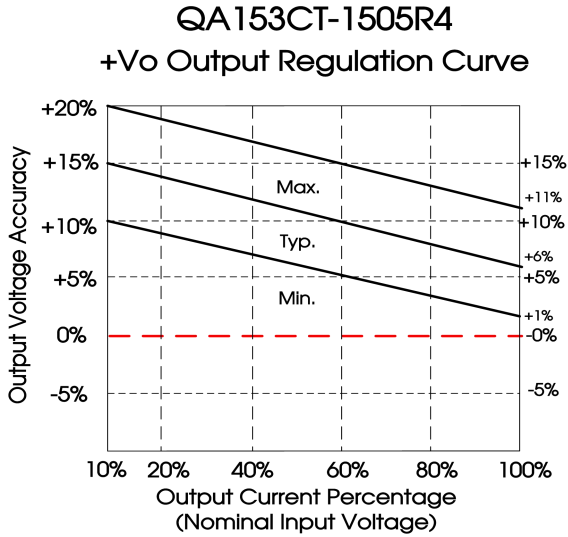


Figure 27

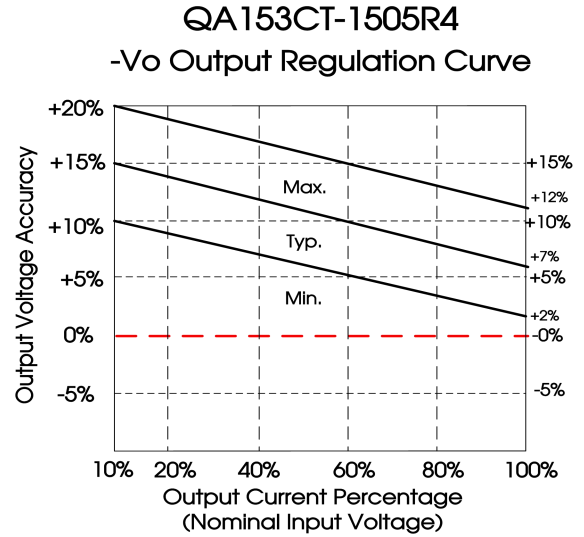


Figure 28

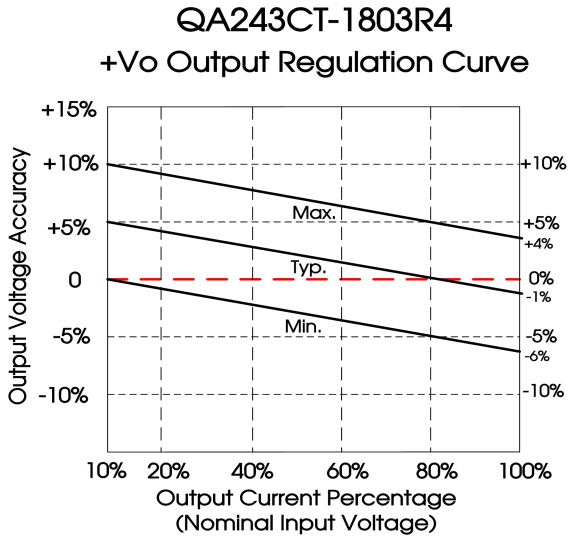


Figure 29

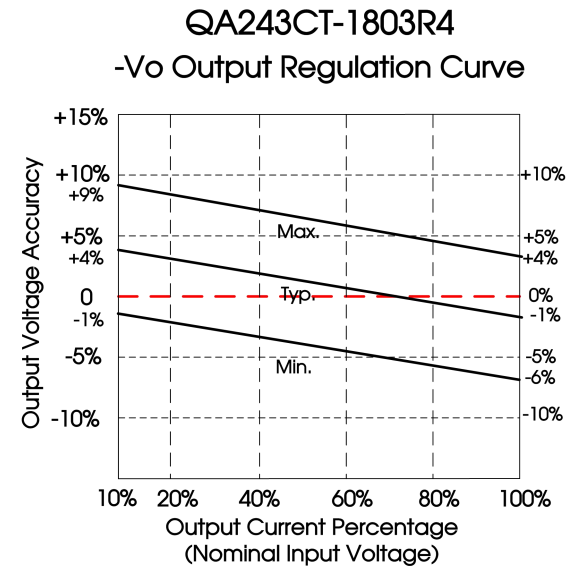


Figure 30

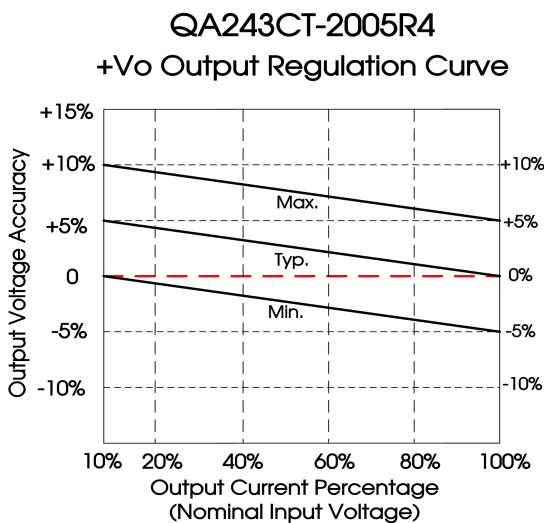


Figure 31

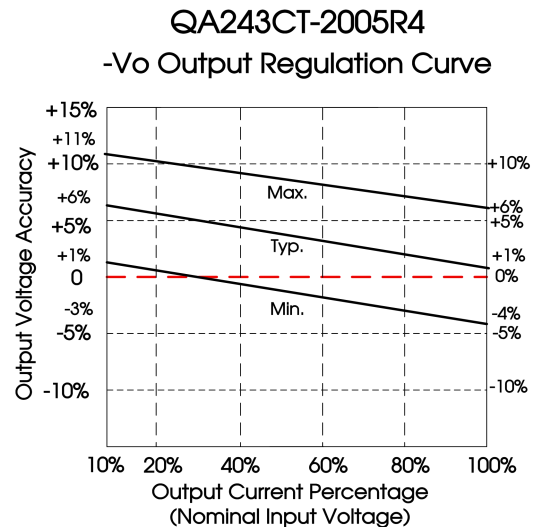


Figure 32

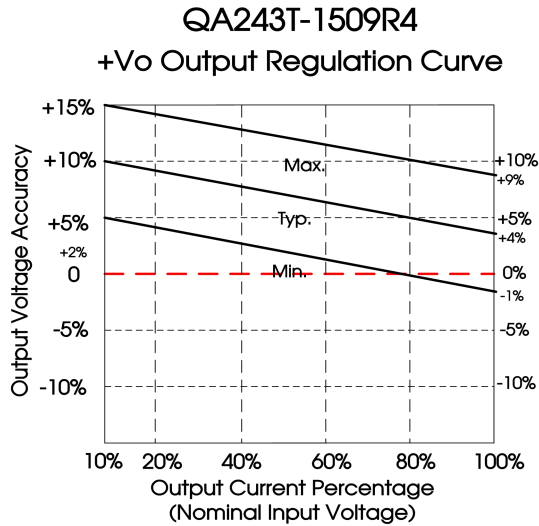


Figure 33

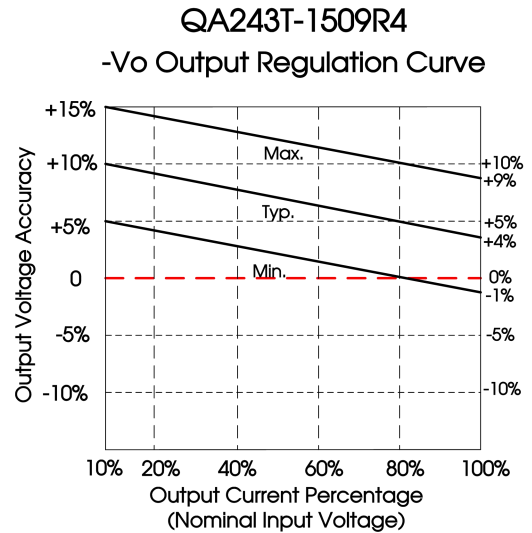


Figure 34

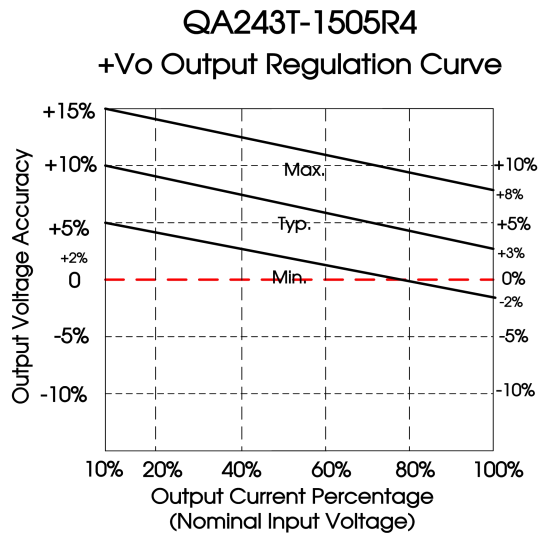


Figure 35

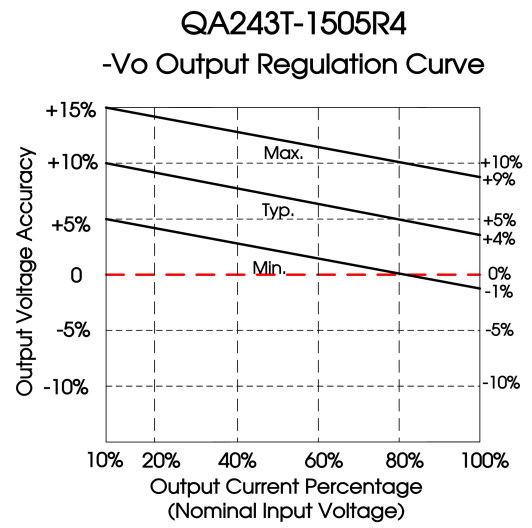


Figure 36

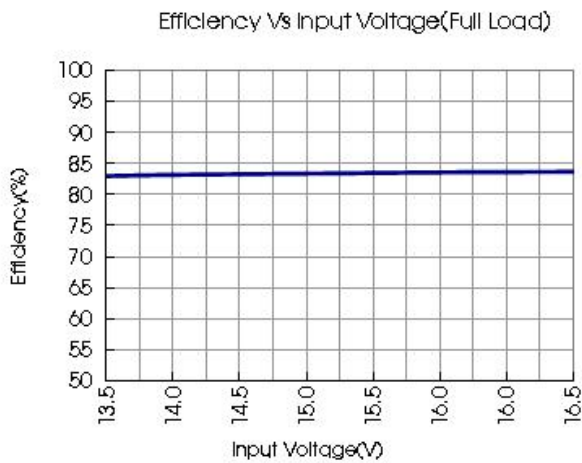


Figure 37

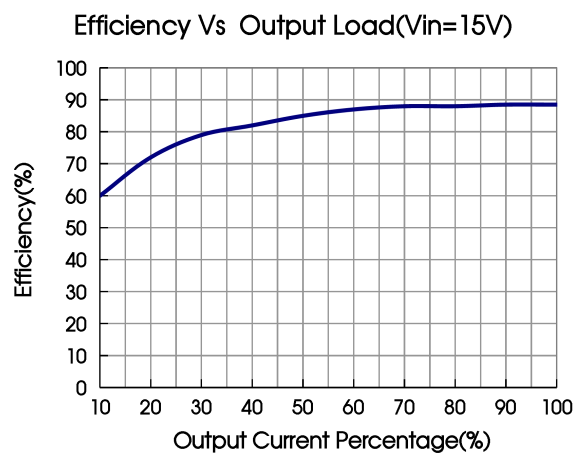


Figure 38

Note: Figure 37 and Figure 38 take QA153T-1509R4 as an example, other models can be corresponding reference.

Design Reference

1. Test configurations

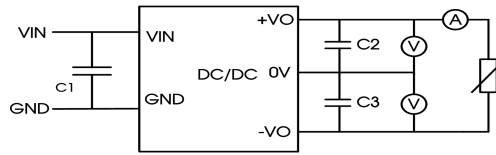


Figure 39

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

2. Typical applications

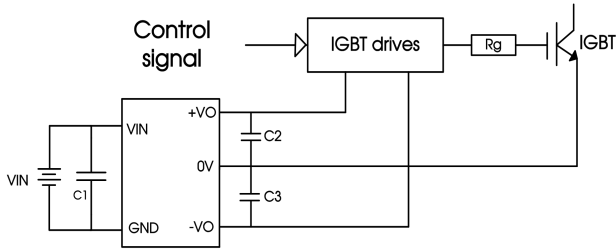


Figure 40

Table 1.

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

3. EMC typical recommended circuit

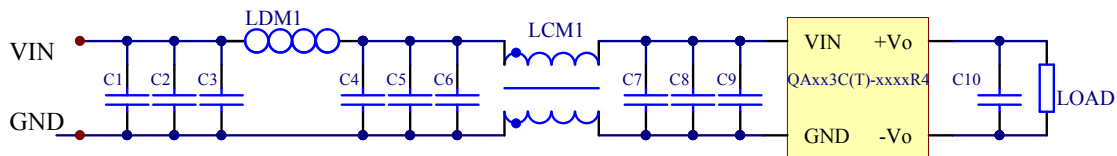


Figure 41. 5V/12V/15V input series EMC recommended circuit

EMI	C1,C2,C3,C4,C5,C6	22μF /50V
	C7,C8,C9,C10	
	LDM1	120uH
	LCM1	4.7mH (FL2D-30-472)

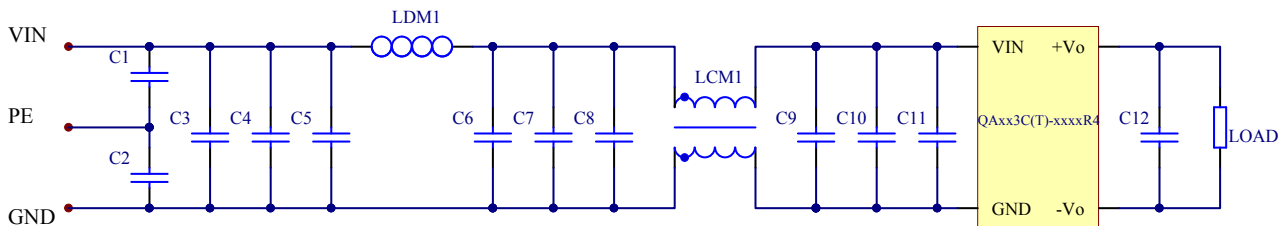


Figure 42. 24V input series EMC recommended circuit

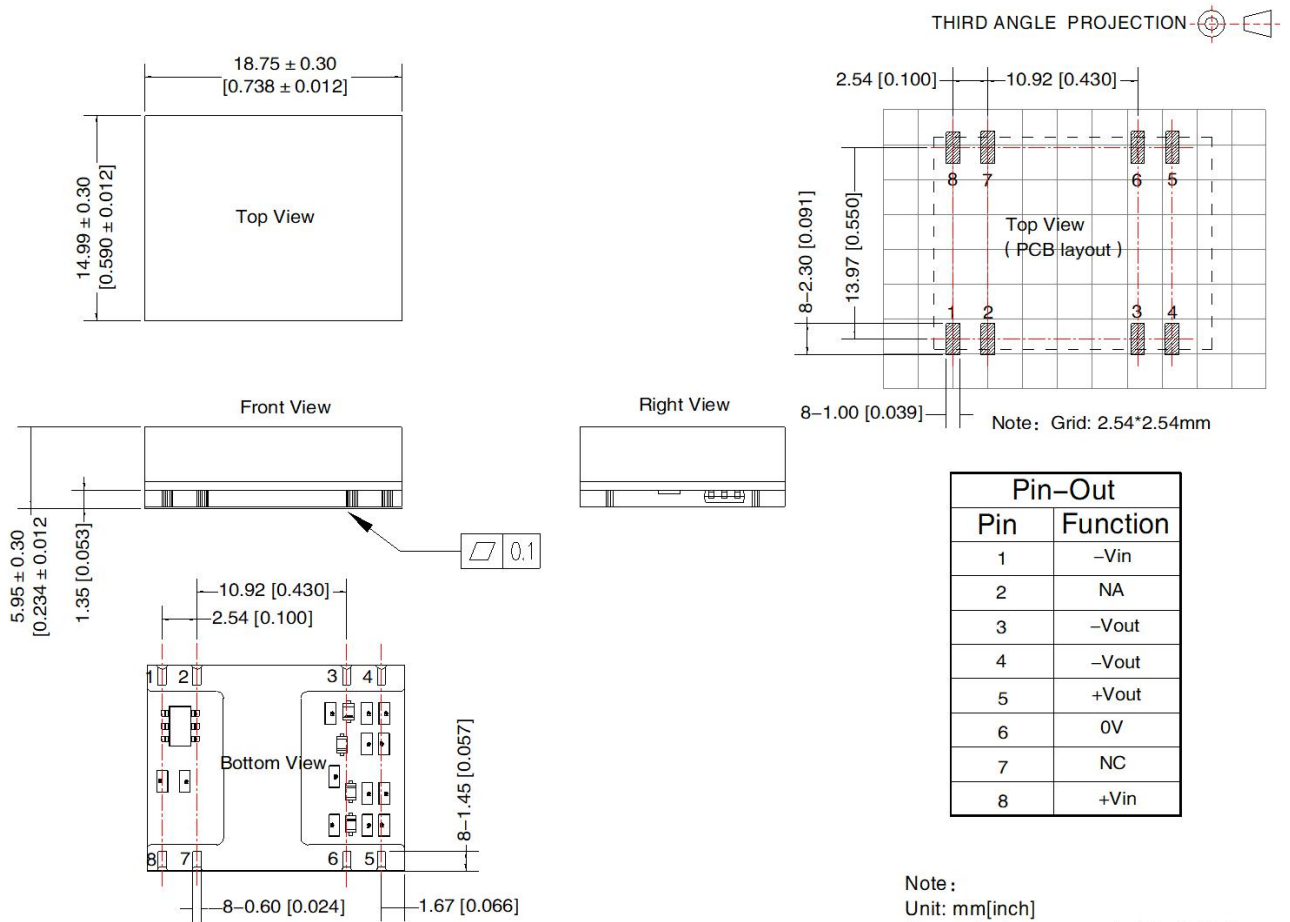
EMI	C1, C2, C3, C4, C5, C6	10μF /50V
	C7, C8, C9, C10, C11, C12	
	LDM1	120uH
	LCM1	470uH (FL2D-13-471R3)

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.

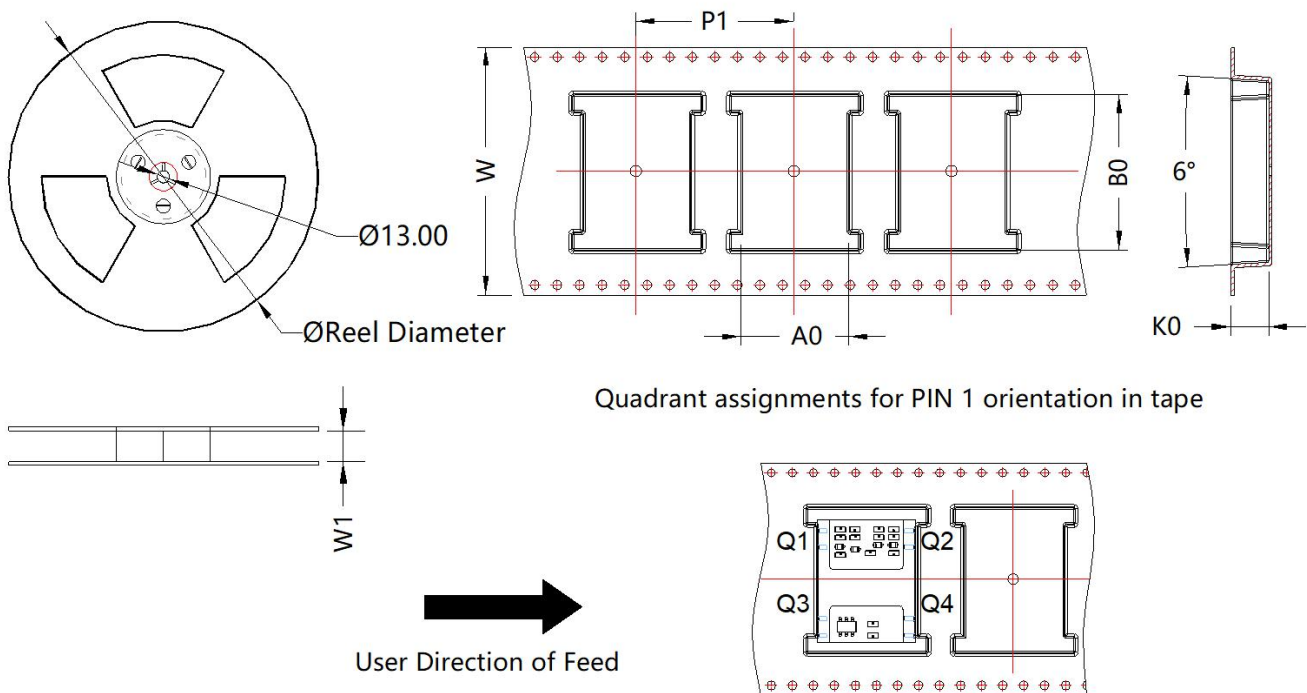
6. For more information please find the application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Note:  
Unit: mm[inch]  
General tolerances: ± 0.10[± 0.004]  
The layout of the device is for reference only, please refer to the actual product

Package diagram:



Device	MPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
QAxx3(C)T-xxxxR4	330	330.0	32.4	16.09	19.85	7.45	24.0	32.0	Q2

- Notes:
- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58210423;
  - The leads for the module and IGBT drives are as short as possible;
  - The output filtering capacitor should be as close as possible to the power supply module and IGBT driver;
  - The peak of the IGBT 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;
  - The average output power of the driver must be lower than that of the power supply module;
  - Consider fixing with glue near the module if being used in vibration occasion;
  - The maximum capacitive load offered were tested at nominal input voltage and full load;
  - 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;
  - All index testing methods in this datasheet are based on company corporate standards;
  - 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;
  - Products are related to laws and regulations: see "Features" and "EMC";
  - Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
  - We can provide product customization service, please contact our technicians directly for specific information.

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