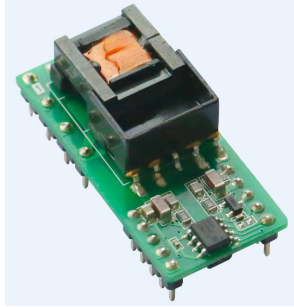


3W AC-DC power supply
Integrated isolated CAN bus



FEATURES

- Universal 85-305V AC and wide 100-430V DC input voltage range
- Accepts AC and/or DC input (dual-use of same terminal)
- I/O isolation test voltage of 4000VAC
- Output short circuit and over current protection
- High baud rate up to 1Mbps
- Bus supports up to 110 nodes maximum
- Compact open frame design with high power density
- Flexible design of peripheral circuit reduces layout issues
- EN60950 approval, meets UL60950 standard

TLAxx-03KCAN series are 3W AC-DC power converters with integrated CAN bus. The products can directly be connected to 220V AC mains power sources. The main DC power output of the supply is 2.5W and the auxiliary DC power output is used for bus communication. They feature a very high isolation test voltage of 4000VAC between AC input and each of the two DC power outputs, and 1500VDC in between the two DC power outputs. The products are widely used in industrial and electrical instrumentation and similar demanding applications for controller area networks requiring wide input voltage ranges, a completely isolated bus and compliance to UL/CE safety and EMC standards. For applications in extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

Selection Guide

Certification	Part No.	Output Power	Rated Output Voltage (V)	Rated Output Current I _o (mA)	Efficiency at 230VAC(%) Typ.	Baud Rate (kbps)	Number of Nodes
CE	TLA03-03KCAN	3W	3.3V(1.65W)/5V(0.125W)	500/25	55	5-1000	110
	TLA05-03KCAN		5V(2.5W)/5V(0.125W)	500/25	68		
--	TLA12-03KCAN		12V(2.4W)/5V(0.125W)	200/25	70		

Power Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	305	VAC
	DC input	100	--	430	VDC
Input Frequency		47	--	63	Hz
Input Current	115VAC	--	--	0.15	A
	277VAC	--	--	0.07	
Input Surge Voltage	115VAC	--	--	13	
	277VAC	--	--	23	
Required External Input Fuse		1.0A rated slow-blow fuse, required			
Hot Plug		Unavailable			

Power Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit		
Output Voltage Accuracy	Balanced load	Primary output Vo1	TLA03-03KCAN	3.0	3.3	3.6	VDC
			TLA05-03KCAN	4.75	5	5.25	
			TLA12-03KCAN	11.4	12	12.6	
		Secondary output Vo2	--	5	--		
Line Regulation	Balanced load	Primary output Vo1	--	--	±1.5	%	
		Secondary output Vo2	--	--	±2		
Load Regulation	Double Isolated output (Primary output)	--	--	±5			
Ripple & Noise*	20MHz bandwidth (peak-to-peak)	Primary output Vo1	--	--	200	mVpp	
		Secondary output Vo2	--	--	300		
Temperature Coefficient		--	--	±0.15	%/°C		
Short Circuit Protection		Continuous, self-recovery					
Overcurrent Protection		120 - 300% I _o , self-recovery					
Minimum Load	Double Isolated output	10%I _o	--	--	mA		

	Double isolated output (Secondary output)	10	--	--	
Capacitive Load (μF) Max.	Primary output /	TLA03/05-03KCAN		1500 / 22	μF
	Secondary output	TLA12-03KCAN		470 / 22	

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

Signal Input Specifications (TLA03-03KCAN: VDD=3.3V)

Item		Symbol	Min.	Typ.	Max.	Unit
TXD Logic Level	High-level	V_{IH}	0.7 *VDD	--	VDD	VDC
	Low-level	V_{IL}	0	--	0.8	
RXD Logic Level	High-level	V_{OH}	VDD - 0.4	VDD - 0.2	-	
	Low-level	V_{OL}	0	0.2	0.4	
TXD Drive Current		I_t	2	--	--	mA
RXD Output Current		I_r	--	--	4	
Serial Interface	Standard CAN controller interface for +3.3V					

Signal Input Specifications (TLA05-03KCAN: VDD=5.0V/3.3V)

Item		Symbol	Min.	Typ.	Max.	Unit
TXD Logic Level	High-level	V_{IH}	0.7 *VDD	--	VDD	VDC
	Low-level	V_{IL}	0	--	0.8	
RXD Logic Level	High-level	V_{OH}	VDD - 0.4	VDD - 0.2	-	
	Low-level	V_{OL}	0	0.2	0.4	
TXD Drive Current		I_t	2	--	--	mA
RXD Output Current		I_r	--	--	4	
Serial Interface	Standard CAN controller interface for both +3.3V and +5.0V.					

Signal Input Specifications (TLA12-03KCAN: VDD=5.0V/3.3V)

Item		Symbol	Min.	Typ.	Max.	Unit
TXD Logic Level	High-level	V_{IH}	0.7 *VDD	--	VDD	VDC
	Low-level	V_{IL}	0	--	0.8	
RXD Logic Level	High-level	V_{OH}	VDD - 0.5	VDD - 0.3	-	
	Low-level	V_{OL}	0	0.2	0.4	
TXD Drive Current		I_t	2	--	--	mA
RXD Output Current		I_r	--	--	4	
Serial Interface	Standard CAN controller interface for both +3.3V and +5.0V.					

Signal Output Specifications

Item		Symbol	Min.	Typ.	Max.	Unit
Dominant Level (Logic 0)	CANH	$V_{(OD)CANH}$	2.75	3.5	4.5	VDC
	CANL	$V_{(OD)CANL}$	0.5	1.5	2.25	
Recessive Level (Logic 1)	CANH	$V_{(OR)CANH}$	2	2.5	3	
	CANL	$V_{(OR)CANL}$	2	2.5	3	
Differential Level	Dominant Level (Logic 0)	$V_{diff(\alpha)}$	1.5	2	3	
	Recessive Level (Logic 1)	$V_{diff(\sigma)}$	-0.12	0	0.05	
Bus Pin Maximum Withstand Voltage		V_x	-36	--	+36	
Bus Transient Voltage		V_{trf} , meets ISO7637-3 standard	-150	--	+100	
Bus Pin Leakage Current		(VDD=0V, $V_{CANH/L}=5V$)	-5	--	5	μA
Differential Load Resistance		R_L	45	60	65	Ω
CAN Bus Interface	Meets ISO/DIS 11898 standard Twisted-pair output					

Signal Transmission Specifications

Item	Symbol	Min.	Typ.	Max.	Unit
Data Delay	TXD Transmitter Delay	tr	55	115	ns
	RXD Receiver Delay	tr	65	135	
	Cycle Delay	t _{PRO(TXD-RXD)}	120	250	

General Specifications

Item	Symbol	Min.	Typ.	Max.	Unit	
Isolation Test	Input-Output	Electric strength test for 1min., leakage current <5mA	AC-DC	4000	--	VAC
			DC-DC	1500	--	VDC
Operating Temperature		-40	--	+85	°C	
Storage Temperature		-40	--	+105		
Storage Humidity		--	--	85	%RH	
Power Derating	Temperature derating	-40°C to -20°C (See Product Characteristic Curve)	3.0	--	--	% / °C
		+70°C to +85°C (See Product Characteristic Curve)	1.67	--	--	
	Input Voltage derating	85VAC-100VAC	1.2	--	--	% / VAC
		277VAC-305VAC	1.1	--	--	
MTBF	MIL-HDBk-217F@25°C	>300,000 h				

Mechanical Specifications

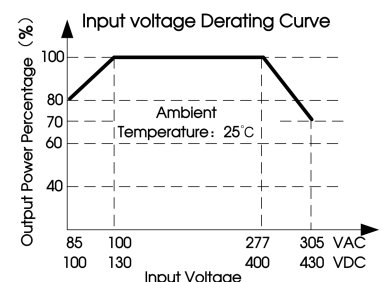
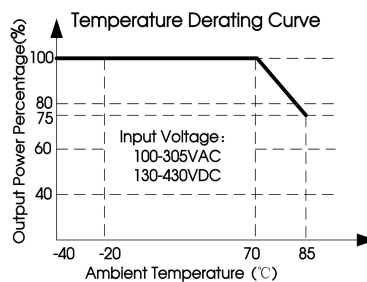
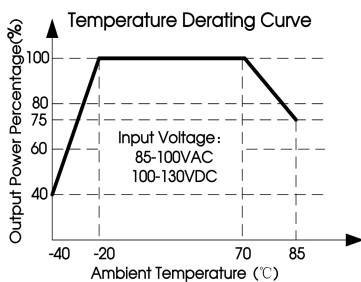
Dimensions	41.8 x 19.6 x 13.0 mm
Weight	8g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

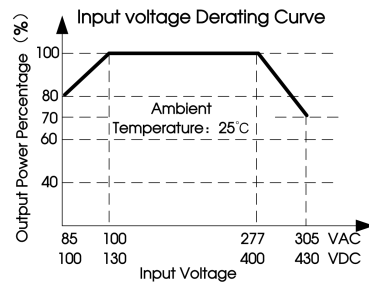
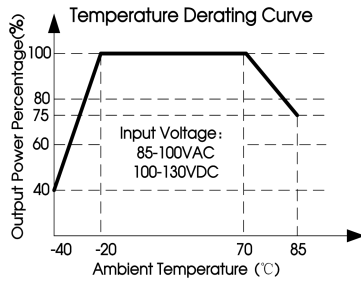
Emission	CE	CISPR32/EN55032	CLASS A (see Fig.1)	
		CISPR32/EN55032	CLASS B (see Fig.2)	
	RE	CISPR32/EN55032	CLASS A (see Fig.1)	
		CISPR32/EN55032	CLASS B (see Fig.2)	
Immunity	ESD	IEC/EN 61000-4-2	Contact ±4kV (Power output port and bus port)	Perf. Criteria B
	EFT	IEC/EN61000-4-4	±2kV (see Fig.1)	perf. Criteria B
		IEC/EN61000-4-4	±4kV (L, N) (see Fig.2)	perf. Criteria B
		IEC/EN61000-4-5	±1kV (L, N) (see Fig.1)	perf. Criteria B
	Surge	IEC/EN61000-4-5	±2kV (CANH, CANL, see Fig.3)	perf. Criteria B

Product Characteristic Curve

1. TLA03-03KCAN/TLA05-03KCAN product characteristic curve



2. TLA12-03KCAN product characteristic curve



Note: ① With an AC input between 85 - 100VAC/277- 305VAC and a DC input between 100 - 130VDC/400 - 430VDC the output power must be derated as per temperature derating curves;
② This product is suitable for applications using natural air cooling; for applications in closed environment please consult factory or one of our FAE.

Design Reference

1. Typical application circuit

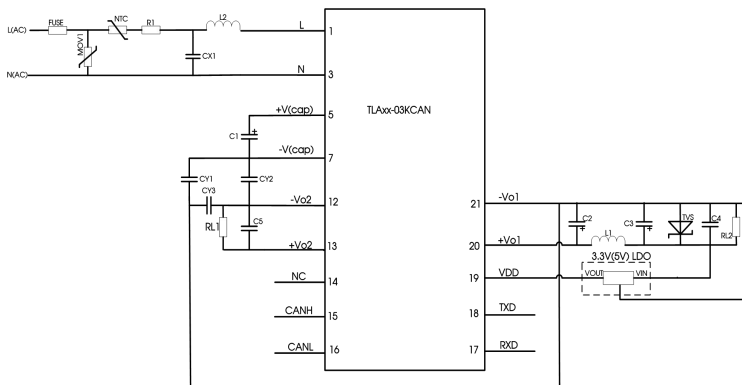


Fig.1

Component	Recommended part, value	
	TLA03/05-03KCAN	TLA12-03KCAN
FUSE (required)	1A/300V	
R1	12 Ω /2W	
MOV1	14D561	
C1 (required)	22uF/450V -40°C to 85°C	15uF/450V -40°C to 85°C
L2	4.7mH	
NTC	13D-5	
C2 (required)	270uF/16V (Solid Capacitor)	
L1 (required)	4.7uH	
C3 (required)	120uF/25V	
C4	0.1uF	
CY1/ CY2(required)	2200pF	
TVS	SMBJ7.0A	
CY3 (required)	560pF	
CX1	0.047uF/480V	
C5 (required)	100uF/16V	
LDO(TLA12-03KCAN required)	MORNSUN P/N:K78(L)03-500R3(3.3V) K78(L)05-500R3(5V)	

2. EMC compliance recommended circuit

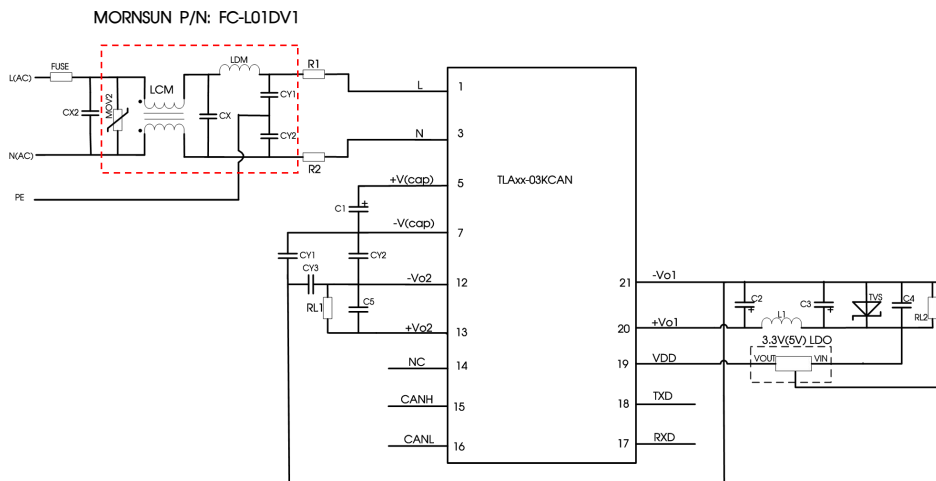


Fig.2

Note: We recommend using our EMC filter part no. FC-L01DV1 (indicated by dashed line);
Use 0.15uF/480V for CX2;
Use 12 Ω /2W current limiting resistors for R1, R2. Refer to typical application for all other component values.

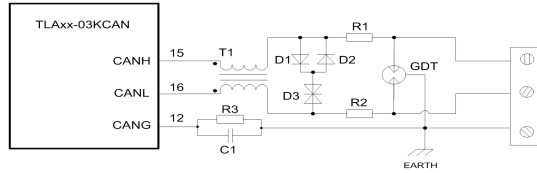


Fig.3

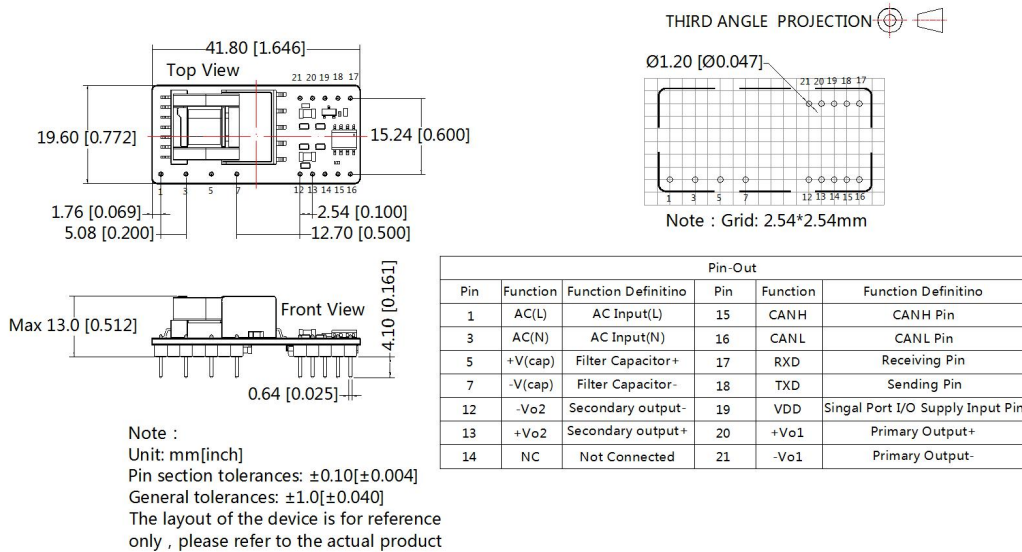
Component	Recommended part, value	Component	Recommended part, value
R3	1M Ω , 1206	R1, R2	2.7 Ω /2W
C1	1nF, 2kV	D1, D2	1N4007
T1	ACM2520-301-2P	D3	SMBJ15CA
GDT	B3D090L		

When the module is used in applications with harsh environment, it can be susceptible to large energy like lightning strike, etc. in which case, it is essential to add an adequate protection circuit to the CAN signal ports to protect the system from failure and maintain a reliable bus communication. Figure 3 provides a recommended protection circuit design for high-energy lightning surges, with a degree of protection related to the selected protection device. Parameter description lists a set of recommended circuit parameters, which can be adjusted according to the actual application situation. Also, when using the shielded cable, the reliable single-point grounding of the shield must be achieved.

Note: The recommended components and values is a general guideline only and must be verified for the actual user's application. We recommended using PTC's for R1 and R2 and to use fast recovery diodes for D1 and D2.

3. For additional information about Mornsun and its products, please refer to www.mornsun-power.com where you can also download application notes and the EMC Filter Selection Guide.

Dimensions and Recommended Layout



Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. The Packaging bag number: 58220026;
2. 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;
3. This model is open plate, in order to meet the safety requirements of the module primary and secondary external components between the need to maintain a safe distance of at least 6.4mm;
4. In order to improve the efficiency of conversion at light load, the module may have audio noise, but does not affect product performance and reliability;
5. After the module is assembled, it needs to be fixed;
6. All index testing methods in this datasheet are based on company corporate standards;
7. 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;
8. We can provide product customization service;
9. Products are related to laws and regulations: see "Features" and "EMC";
10. 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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