Product Manual

Data Sheet

CTM1051(A)HP

High surge protection isolated CAN transceiver



RoHS

Product Series

Product Series	Temperature Range	Isolated Voltage	Package
CTM1051AHP	-40℃～+85℃	2500VDC	DIP8
CTM1051HP	-40℃～+85℃	2500VDC	DIP8

Features

- Conforms to "ISO 11898-2" standard
- Power-off nodes do not affect the bus
- Surge: differential mode 4kV/common mode 4kV
- ESD: Contact±8kV/ Air±15kV
- Up to 110 nodes can be connected
- The shell and potting materials meet the UL94 V-0 standard
- Low EME and high EMS
- Wide operating temperature range

Applications

- Instruments, meters
- Petrochemical industry
- Electrical power monitoring
- Industrial control
- Railway transportation
- Automobile electronics
- Smart home

Product Model

Part Number	Supply Voltage (Range) (VDC)	Quiescent Current (mA,Typ)	Maximum Operating Current (mA)	Baud Rate (bps)	Nodes (pcs)	Type
CTM1051AHP	3.3 (3.15-3.45)	25	105	40k~1M	110	High-speed
CTM1051HP	5 (4.75-5.25)	20	80	40k~1M		

Input Characteristics

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Input Voltage		V_{CC}	CTM1051AHP	3.15	3.3	3.45	VDC
			CTM1051HP	4.75	5	5.25	
TXD Input	High Level	V_{IH}	--	$0.7V_{CC}$	--	V_{CC}+0.5	
	Low Level	V_{IL}	--	0	--	$0.3V_{CC}$	
RXD Output	High Level	V_{OH}	I_{RXD} = -1.5mA	V_{CC}-0.5	V_{CC}-0.2	--	
	Low Level	V_{OL}	I_{RXD} = 1.5mA	--	0.2	0.4	
TXD Driving Current		I_T	--	2	--	--	mA
RXD Output Current		I_R	--	--	--	10	
TXD Pull-up Resistor		R_{UP}	--	--	10	--	kΩ
Serial Interface		CTM1051AHP		3.3V standard CAN controller interface			
		CTM1051HP		5V standard CAN controller interface			

Output Characteristics

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Dominant Output Voltage	CANH	$V_{(OD)CANH}$	R_L=60Ω	2.75	3.5	4.5	VDC
	CANL	$V_{(OD)CANL}$	R_L=60Ω	0.5	1.5	2.25	
Recessive Output Voltage	CANH	$V_{(OR)CANH}$	no load	2	2.5	3	
	CANL	$V_{(OR)CANL}$	no load	2	2.5	3	
Differential Output Voltage	Dominant	$V_{diff(d)}$	R_L=60Ω	1.5	2	3	
	Recessive	$V_{diff(r)}$	no load	-0.05	0	0.05	
Maximum Voltage On Bus Pin		V_X	CANH、CANL	-7	--	+12	
Bus Instantaneous Voltage		V_{trt}	CANH、CANL	-150	--	+100	
Leakage Current		I_L	V_{CC}=0V, $V_{CANH/L}$=5V	-5	--	+5	μA
CAN Bus Interface		Conform to the ISO 11898-2 standard, twisted pair output					

Transmission Characteristics

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
Data Delay	TXD Transmitting Delay	t_T	R_L=60Ω	--	105	--	ns
	RXD Receiving Delay	t_R	R_L=60Ω	--	105	--	
	Loop Delay	$t_{PD(TXD-RXD)}$	R_L=60Ω	--	210	250	
TXD Dominant Timeout		$t_{to(dom)TXD}$	V_{TXD}=0V	0.3	1.5	5	ms

Limit Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Input Inrush Voltage (1) （1s，max）	CTM1051AHP	-0.7	--	5	VDC
	CTM1051HP	-0.7	--	7	
Lead Soldering Temperature	The distance of soldering joint from the shell is 1.5mm,10 seconds	--	--	300	℃
Hot Swap		N/A			

General Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Isolated Withstand Voltage	Input-output,1minute,leakage current less than 1mA	2500	--	--	VDC
Insulation Resistance	Input-output,isolation voltage 500VDC	1	--	--	GΩ
Package Size		19.90×16.90×7.10			mm
Package Material		Black flame retardant plastic shell, comply with UL94V-0 standard			

Environmental Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Operating Temperature		-40	--	+85	℃
Storage Temperature		-40	--	+85	
Shell Temperature Rise	Ta=25℃	--	15	25	
Storage Humidity	No condensation	--	--	95	%
Cooling Method		Natural air cooling			

EMC Characteristics

EMS	ESD	IEC/EN 61000-4-2 Contact ±8kV/Air ±15kV (bare, CAN bus) (2)	Perf.Criteria B
	EFT	IEC/EN 61000-4-4 ±2kV(bare, CAN bus) (2)	Perf.Criteria B
	Surge	IEC/EN 61000-4-5 (bare, CAN bus) (2) Differential-mode ±4kV，common-mode ±4kV	Perf.Criteria B
	CS	IEC/EN 61000-4-6 3Vr.m.s(bare)	Perf.Criteria A

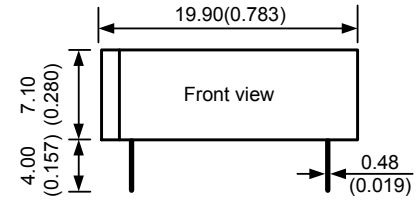
Notes:

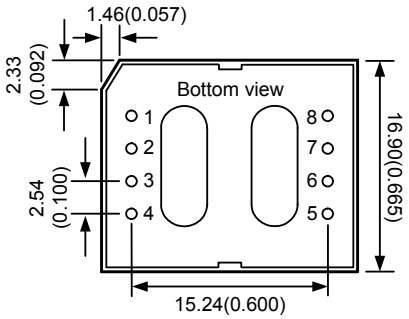
(1) Stresses beyond those listed maximum values may cause permanent damage to the device.

(2) This parameter only conforms to CAN bus terminals, CANH, CANL or CANG; All CAN bus terminals are suspended during the test. In addition, the surge immunity is tested with composite waves of 1.2/50μS open-circuit voltage and 8/20μS short-circuit current, the source impedance is 2Ω .

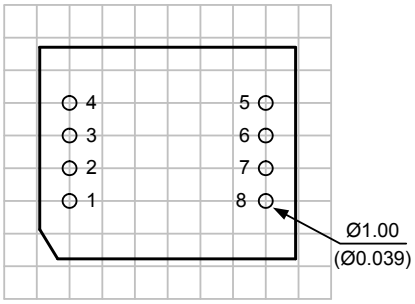
(3) Unless specified specially, parameters in this manual are measured under the conditions of 25℃, 40%~75% humidity, input nominal voltage and 60Ω CAN interface load.

Appearance and Packaging Dimensions



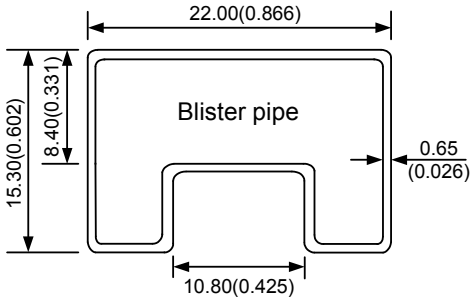


PCB Silkscreen Diagram
(Top View)



Note：
Size in mm：mm(inch)
Unlabeled talerance：±0.25(±0.010)
Grid distance：2.54×2.54mm

Pin	Name	Function
1	VCC	Power supply
2	GND	Ground
3	TXD	Transmitting input
4	RXD	Receiving output
5	PE	PE
6	CANH	CANH
7	CANL	CANL
8	CANG	Isolated power ground



Notes：
Size in mm：mm(inch)
Unlabeled tolerance：±0.50(±0.020)
L=282(11.102)，15pieces/pallet
Carton Size：304×120×40mm
150pieces/carton

Circuit Design and Application

1. Internal circuit schematic

CTM1051(A)HP series modules add surge suppression circuit to CAN interface on the basis of ordinary single-channel module, which improves the surge protection capability of the module and simplifies the development steps of users.

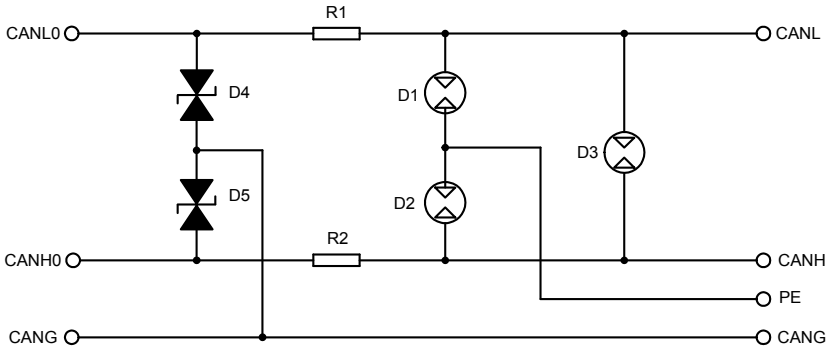


Figure 1 schematic diagram of surge suppression circuit

2. Typical Circuit

The CAN interface of CTM1051(A)HP series module can meet the requirements of IEC/EN61000-4-5 ±4kV surge protection, and the current capacity is 0.5KA. The module can be used in some occasions where high surge protection is needed, without external protection circuit. PE and CANG pins of the module should be properly connected to the ground. The baud rate range is 40kbps~1Mbps, and CAN interface meets ISO11898-2 standard. The typical application is shown in Figure 2.

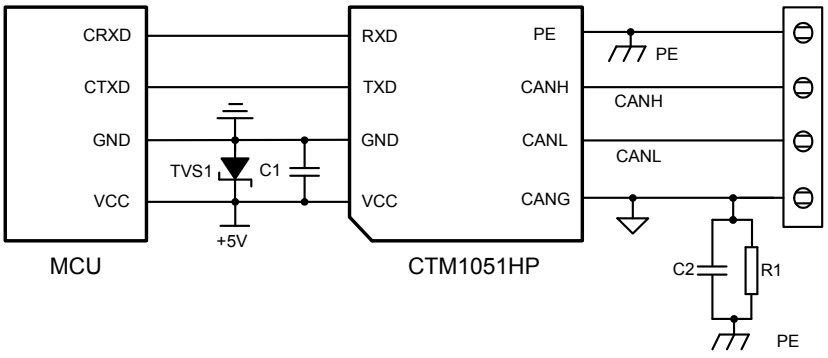


Figure 2 Typical application

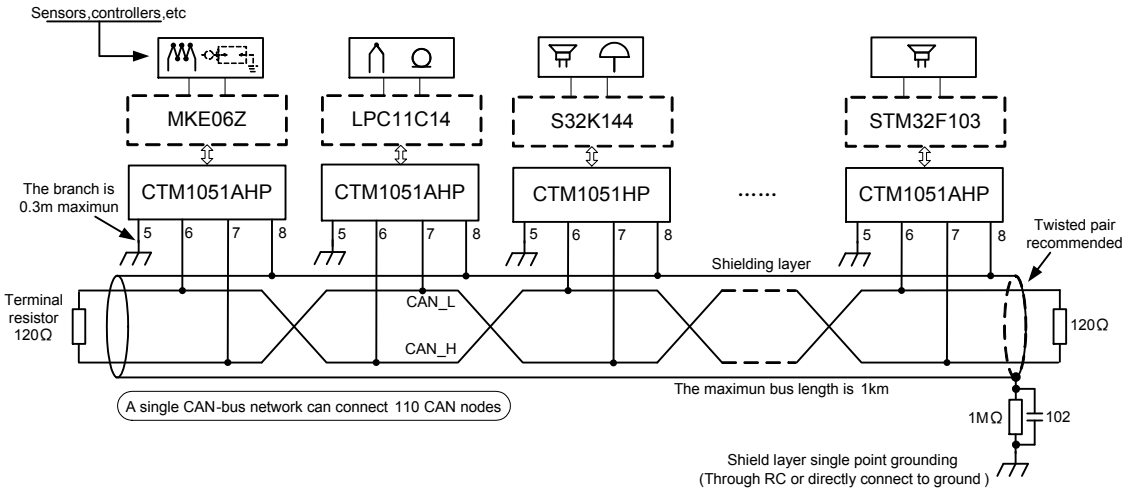


Figure 3 Recommended networking for single CAN bus network

A typical single CAN-bus network is shown in Figure 3. Each network can access up to 110 single-channel CTM isolated CAN transceiver modules. The modules support a minimum baud rate of 40kbps and a maximum communication distance of 1km. If more nodes need to be connected or the communication distance is longer, it can be extended by devices such as CAN repeaters. In addition, if the CAN-bus network is required to have better anti-interference ability, double-layer shielded twisted pair can be used. The CANG of each node is connected to the inner shielding layer of the network, and the outer shielding layer is connected to the earth at a single point.

3. Considerations

(1) Terminal resistors should always be connected to the CAN bus terminals whatever CAN node quantity,bus length or communication baud rate;

(2) The logic level of CAN controller should adapt to the level of the product, otherwise it may result in communication failure;

(3) The network communication distance and baud rate are related to the field application and they can be designed according to the practical application and reference standards.The communication cable can be either twisted pair or shielded twisted pair cable and should be kept away from interference sources. In long-distance network application, the terminal resistors should be selected according to the communication distance, the cable impedance and the node quantity.

Guangzhou ZHIYUAN Electronics Co.,Ltd.
Service Hotline: 400-888-4005
E-mail：power.sales@zlg.cn
Website：http://www.zlg.cn
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