1 Description

CN16A01/2 is a high-voltage input clamping protection chip. When the input voltage exceeds the set value, it clamps the output voltage at that set value, with an output voltage accuracy of ±10%. This product is suitable for the high-voltage input of industrial instruments with medium and small power, and is generally placed at the input of the ACDC converter. It greatly reduces the design difficulty of the switching power supply under the ultra-wide input voltage range and effectively improves the reliability of the switching power supply working under harsh environmental conditions.

This product can work safely and reliably under an ultra-wide input range ($60V_{DC}$-$1200V_{DC}$) voltage condition, and has the functions of surge protection and output voltage clamping. Among them, CN16A01 integrates a 1000V MOS, and CN16A02 integrates a 900V MOS. The system test can meet the 10kV lightning impulse system test requirements.

The chip loss is less than 0.15W under normal input voltage (non-clamping state), and the standby power consumption is very low.

This product adopts TO220-5 package.

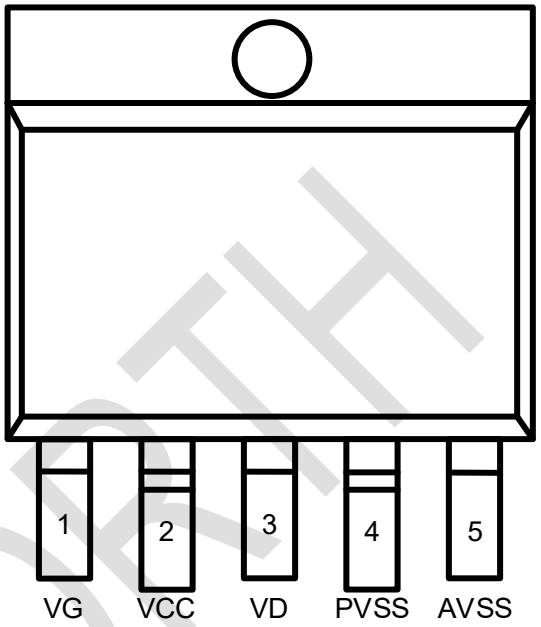
2 Features

- The ability to prevent surge impact
- Output high-voltage clamping
- Low current soft start
- Wide voltage input: 60Vdc - 1200Vdc
- TO220-5 package

3 Applications

- Single-phase, three-phase electric meter
- Concentrator and distribution terminal power supply
- Small to Medium Wattage Switching Power Supplies for Instrument

4 Pinout



5 Ordering information

Product Number	Package	Quantity/Tape
CN16A01	TO220-5	50/Tube
CN16A02	TO220-5	50/Tube

6 Marking

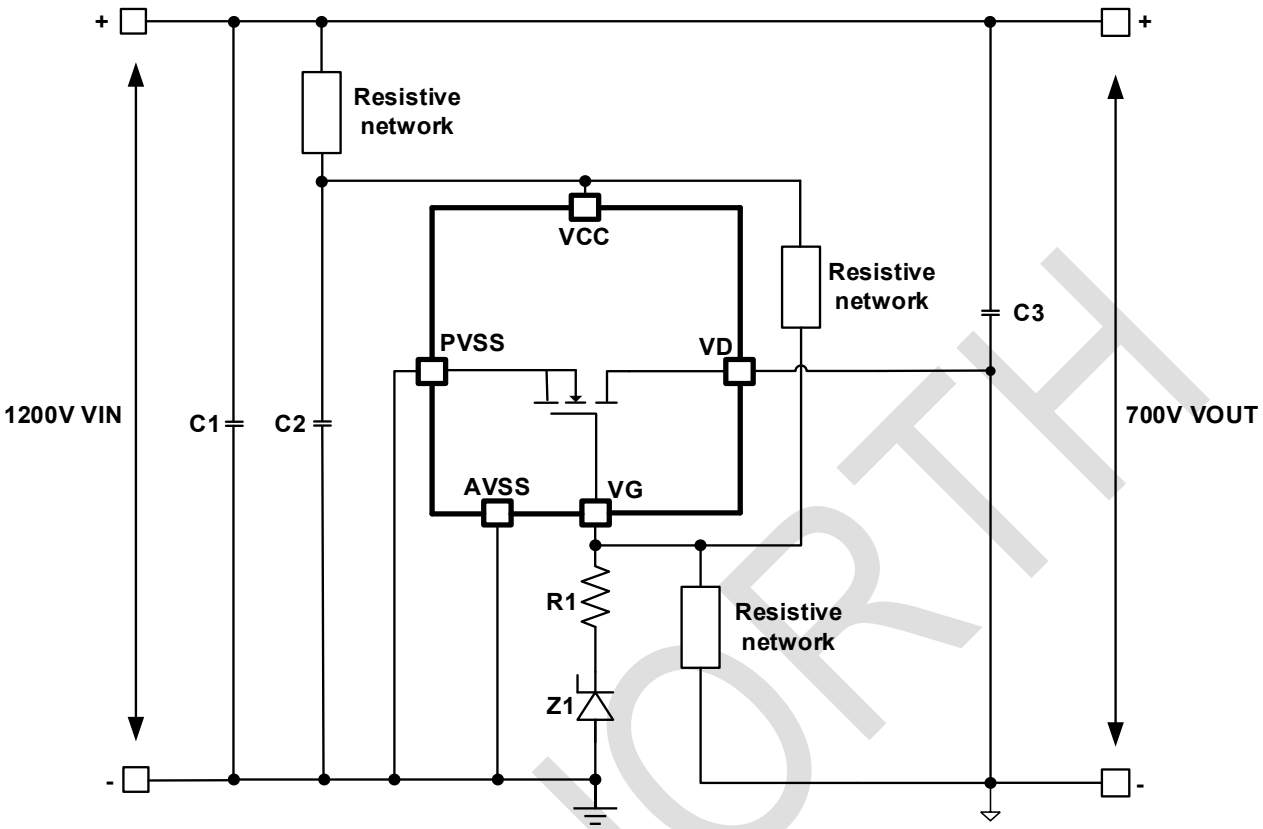
Product Number	Marking
CN16A01	CN16A01 YYWW
CN16A02	CN16A02 YYWW

Note: YY=Year WW=Week.

Green (RoHS & HF): CHIPNORTH defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your CHIPNORTH representative directly.

Moisture sensitivity level(MSL):3

7 Typical Application



8 Pin Descriptions

Pin No. CN16A01/2	Pin Name	Descriptions
1	VG	Voltage sampling pin, built-in high-voltage MOSFET drive pin
2	VCC	Chip power supply pin
3	VD	The drain of a MOSFET.Connect the ground wire of the switching power supply of the back stage
4	PVSS	Power ground
5	AVSS	Signal ground

9 Specifications

9.1 Absolute Maximum Ratings

Parameter		Symbol	Value	Units
Drain voltage	CN16A01	V_D	1000	V
	CN16A02	V_D	900	V
VCC voltage		V_{CC}	24	V
VG voltage		V_G	24	V
PVSS voltage		PVSS	12	V
Junction temperature		T_J	150	°C
Welding temperature		T_{LEAD}	260（soldering,10s）	°C
Storage temperature		T_{STG}	-65~150	°C

Note: Exceeding the "absolute maximum rated value" listed in the table may cause permanent damage to the chip. It is not recommended to operate under the conditions listed in the table or beyond the "recommended working conditions". Long-term operation under the absolute maximum rated conditions may affect the reliability of the equipment.

9.2 ESD Ratings

Discharge mode	Standard	Value	Unit
HBM	ESDA/JEDEC JS-001-2017	±4000	V
CDM	ANSI/ESDA/JEDEC JS-002-2022	±2000	V

9.3 Recommended Operating Range

Parameter		Symbol	Min.	Max.	Units
VD pin voltage	CN16A01	V_D	60	1000	V
	CN16A02	V_D	60	900	
VCC pin voltage		V_{CC}		12	V
Junction temperature		T_J	-40	125	°C

9.4 Thermal Information

Parameter	Package	Value	Unit
θ_{JA}	TO220-5	70	°C /W
θ_{JC}	T0220-5	6.5	°C /W

9.5 Electrical Characteristics

Test conditions:TA = 25°C, unless otherwise specified.

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
VCC clamping current		I_{VCC_CLP}		207	230	253	uA
VCC clamping voltage		V_{CC_CLP}			10		V
System startup voltage		V_{IN_STR}			60		V
On resistance	CN16A01	R_{DSON}			8.5		Ω
	CN16A02	R_{DSON}			2.4		Ω
DRAIN maximum voltage	CN16A01	V_D		1000			V
	CN16A02	V_D		900			V
Output voltage clamping		V_{CLP}	R_{VCC}=R_{VG}=3Mohm (When V_{IN_DC} is greater than V_{CLP}, the output voltage is clamped at V_{CLP})	630	700	770	V

10 Function Description

CN16A01/2 is a high-voltage clamping chip. When the input voltage is lower than the threshold, the internal MOSFET remains constantly on, keeping the output voltage equal to the input voltage. When the input voltage exceeds the threshold, the internal MOSFET operates in a saturated state, and the output voltage is clamped at 700V.

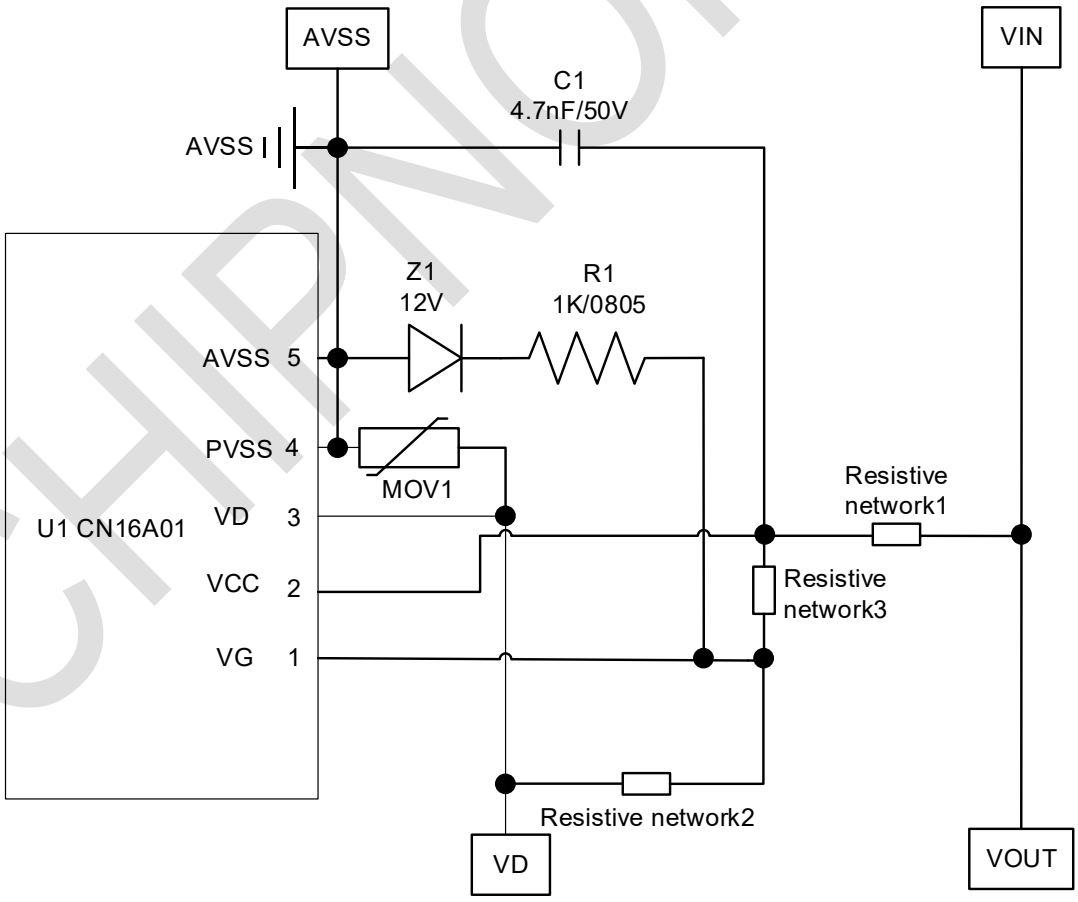
Output voltage clamping

The calculation formula for output voltage clamping is: $V_{CLP} = I_{VCC\_CLP} * 3Mohm$

Among them, the I_{VCC_CLP} of CN16A01/2 is 230uA. Please note that Rvcc=Rvg, and the resistance value of 3MOhm cannot be changed at will; otherwise, it will cause the output clamping voltage to deviate from the set value and the chip to work abnormally. The output clamping voltage corresponding to CN16A01/2 is 700V.

11 Application information

The following figure shows the typical application circuit schematic diagram of CN16A01/2, which can be used to evaluate its performance.

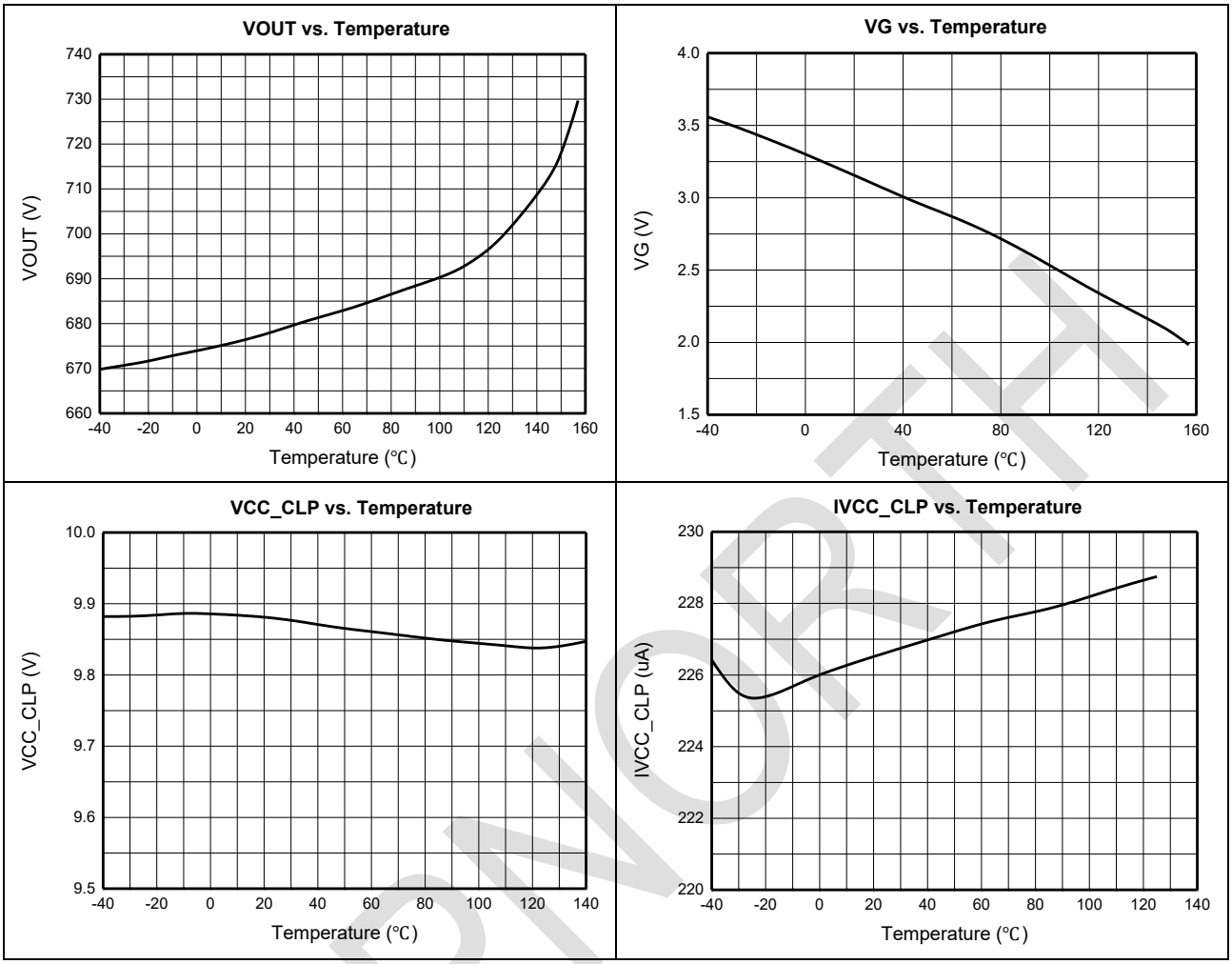


In the above application circuit, the resistance value of resistor network 1 is equal to that of resistor network 2; capacitor C1 is used to filter out the VCC glitch voltage of CN16A01/2; R1 and the Zener diode Z1 are used to suppress the overvoltage on the VG pin; the varistor protects the MOSFET from being

broken down by external high voltage; when the input voltage of the switching power supply is lower than 700VDC, the current flowing through resistor network 1 is less than 230uA, the internal MOSFET is in a constant conduction state, maintaining VIN ≈ VOUT, and the loss of the MOSFET can be ignored at this time. When the input voltage of the switching power supply is higher than 700VDC, the current flowing through resistor network 1 will be greater than 230uA. the internal MOSFET operates in saturation mode, clamping the output voltage at 700VDC.

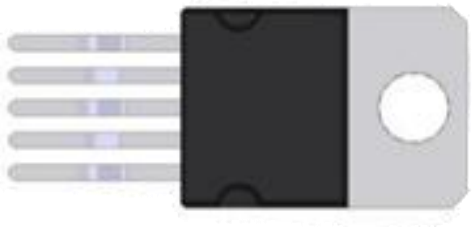
11.1 Characteristics Curve

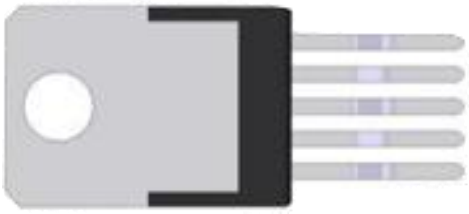
Test conditions:TA = 25°C, unless otherwise specified.

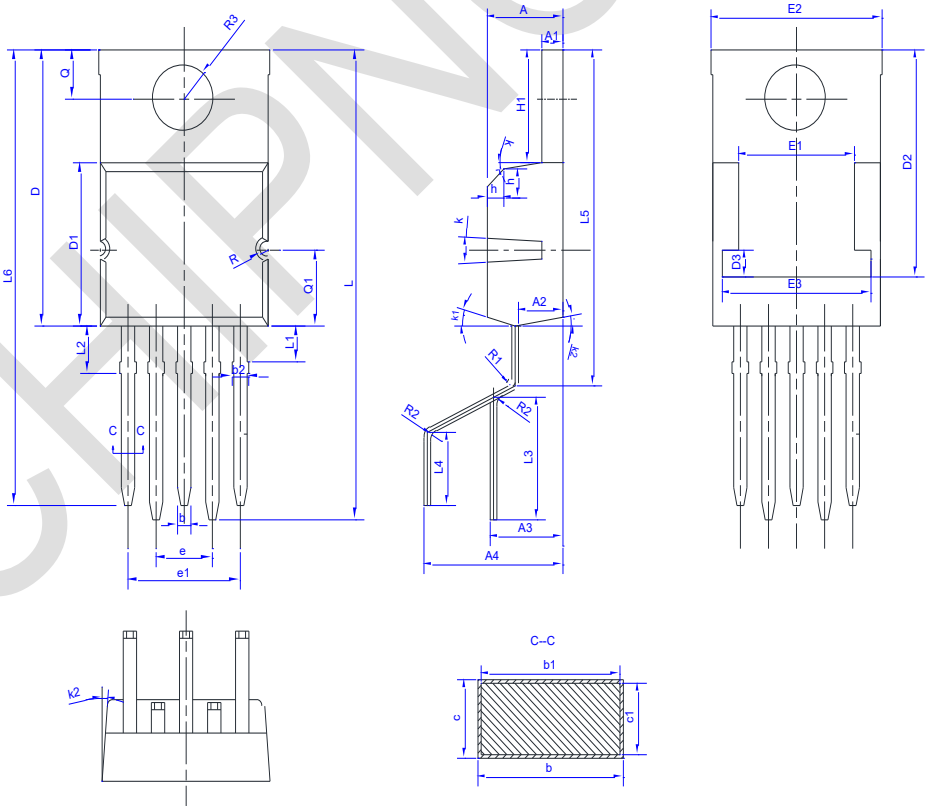


12 Package Information

TO220-5







Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)	Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A	4.40	4.57	4.70	e1		6.80BSC	
A1	1.22	1.27	1.32	h	0.90	1.00	1.10
A2	2.59	2.69	2.79	H1	6.15	6.30	6.45
A3	4.10	4.40	4.70	L	25.00	25.30	25.60
A4	8.10	8.40	8.70	L1	1.80	2.00	2.20
b	0.75	-	0.88	L2	2.45	2.65	2.85
b1	0.74	0.79	0.84	L3	5.70	6.00	6.30
b2	0.74	-	1.00	L4	3.70	4.00	4.30
c	0.37	-	0.44	L5	18.60	18.90	19.20
c1	0.36	0.38	0.40	L6	24.20	24.50	24.80
D	15.30	15.46	15.60	Q	2.65	2.75	2.85
D1	9.05	9.15	9.25	Q1	4.15	4.25	4.35
D2	11.50	12.15	12.30	R	0.85	1.00	1.15
D3	0.50	1.00	1.20	R1	0.25	0.40	0.55
E	10.06	10.16	10.26	R2	0.50	0.65	0.80
E1	6.90	7.00	7.10	R3	1.87	1.92	1.97
E2	10.00	-	10.30	k	3°	5°	7°
E3	8.50	9.00	9.50	k1	5°	7°	9°
e		3.40BSC		k2	1°	3°	5°

13 Important Statement

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