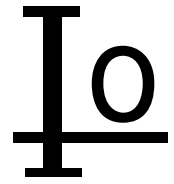


# 2CL70A



PLASTIC SEALED HIGH VOLTAGE DIODE

## 1. 适用范围

Scope

本规格书适用于 2CL70A 型塑封高压硅堆

The present specifications shall apply to plastic sealed high voltage Diode 2CL70A

## 2. 概要

General

### 2.1 类型

Type

硅整流二极管

Silicon Rectification Diode

### 2.2 主要用途

Application

适用于电视接收机及其它电子设备中作高压整流用

For high voltage rectification for TV and other electronic products

## 3. 外观、外形尺寸、标识、结构

Appearance, Dimensions, Marking and Structure

### 3.1 外观

Appearance

管体洁净, 无任何沾污、锈迹或开裂

The body shall be clean and shall not bear any stain, rust or flaw.

管体呈黑色。

The color of the case will be black.

### 3.2 外形尺寸、标识: 参见 9.1

Dimensions refer to 9.1

### 3.3 结构和部件材料: 参见 9.2

Structure and Component materials to 9.2

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4. 绝对最大数值

Absolute Maximum Ratings

序号 No.	项 目 Item	符 号 Symbol	单 位 Unit	数 值 Rating	条 件 Conditions
1	反向重复峰值电压 Repetitive Peak Reverse Voltage	$V_{RRM}$	KV	6	
2	反向不重复峰值电压 Non-Repetitive Peak Reverse Voltage	$V_{RSM}$	KV	8	
3	正向平均电流 Average Forward Current	$I_{F(AV)}$	mA	5	50HZ 正弦半波平均值, ( $T_{amb}=50^{\circ}C$ ) 50HZ Sine-half Wave Rectification Average Value ( $T_{amb}=50^{\circ}C$ )
4	正向(不重复)浪涌电流 Non-Repetitive Forward Surge Current	$I_{FSM}$	A	0.5	50HZ 10ms 正弦半波 ( $T_{amb}=25^{\circ}C$ ) 50HZ 10ms Sine-half Wave, ( $T_{amb}=25^{\circ}C$ )
5	工作环境温度 Ambient Temperature	$T_{amb}$	$^{\circ}C$	-40~+100	
6	最高结温 Maximum Junction Temperature	$T_{(VJ)}$	$^{\circ}C$	120	
7	贮存温度 Storage Temperature	$T_{stg}$	$^{\circ}C$	-40~+120	

5. 电特性(除非另有规定,Tamb=25°C)

Electrical Characteristics(Tamb=25 °C,unless otherwise specified)

序号 NO.	项目 Item	符号 Symbol	单位 Unit	数值 Rating	测试条件 Test conditions
1	正向压降 Forward Voltage Drop	$V_{FM}$	V	20.0max	$I_{FM}=10mA$
2	常温反向漏电流 Normal Temperature Reverse Current	$I_{RM1}$	$\mu A$	2max	$V_{RM}=6KV$
3	高温反向漏电流 High Temperature Reverse Current	$I_{RM2}$	$\mu A$	5max	Tamb=100°C $V_{RM}=6KV$
4	结电容 Junction Capacitance	$C_j$	pF	1max	1MHZ, $V_B=0V$
5	反向恢复时间 Reverse Recovery Time	trr	$\mu S$	0.1 max	$I_F=2mA, I_{RM}=4 mA$ 脉冲前沿小于 0.01 $\mu S$ Fore edge of pulse less than 0.01 $\mu s$

6. 物理特性

Mechanical Characteristics

6.1 重量: 约 0.3 g

Weight Ca. 0.3 gr.

6.2 耐震性: 5G

Vibration proof 5G

7 测试和检验

Test and Inspection

除非另有说明,所有的测试在环境温度(5-35)°C,相对湿度(40-85)%的环境中进行。

Unless otherwise specified for the individual test, all tests shall be conducted at an ambient temperature of (5-35)°C and R.H. (40-85)%.

7.1 引线断裂试验: 引线末端加力 0.25kg, 在距管体 6mm 固定住并转 90°, 然后朝反向转 180°, 然后恢复原样, 引线不松弛, 不折断。

Lead bend test : With a 0.25kg weight attached to the end of the lead ,the same lead shall be clamped 6mm from the rectifier body and clamp turned 90 degrees ,then 180 degrees in the opposite direction ,then returned to the original position .The leads shall sustain this cycle without losing and breaking.

7.2 正向压降试验: 采用图 1 电路,  $I_F=10mA$ , 正向压降不得超过 22V。

Forward voltage drop test: Measured in Fig. 1 circuit at  $I_F= 10mA$ ,forward voltage drop ( $V_F$ )shall not exceed 22V.

7.3 反向电流试验: 采用图 2 电路,  $V_R=6KV$  单向正弦半波 50HZ, 反向电流不得超过 4  $\mu A$ (25°C时)。

Reverse current test : Measured in Fig. 2 circuit at  $V_R =6KV$  at the half sine wave of 50HZ,reverse current shall not exceed 4  $\mu A$  at 25°C.

7.4 反向恢复时间:采用插图 3 电路, $I_F=2\text{mA}$ , $I_{RM}=4\text{mA}$ ,脉冲前沿小于  $0.01\ \mu\text{S}$ 。反向恢复时间小于  $0.1\ \mu\text{S}$   
 Reverse recovery time : Measured in Fig. 3 circuit at  $I_F=2\text{mA}$ ,  $I_{RM}=4\text{mA}$  ,Fore edge of pulse less than  $0.01\ \mu\text{s}$  .Reverse recovery time shall not exceed  $0.1\ \mu\text{S}$  .

7.5 温度变化继之以变湿热试验: 整流管必须经过 5 个周期温度和 2 个周期交变湿热循环,  $[-40^\circ\text{C}$  (30 分钟)  $\rightarrow$  室温 (3 分钟)  $\rightarrow +130^\circ\text{C}$  (30 分钟)  $\rightarrow$  室温 (3 分钟)]  $\times 5$ ,  $[25^\circ\text{C} \nearrow 55^\circ\text{C}$ ,相对湿度:98%, (3 小时)  $\rightarrow 55^\circ\text{C}$ ,相对湿度:98%  $\searrow$  93%, (10 分钟)  $\rightarrow 55^\circ\text{C}$ ,相对湿度: :93%, (8 小时 40 分钟)  $\rightarrow 55^\circ\text{C}$ ,相对湿度:93%  $\nearrow$  98%, (10 分钟)  $\rightarrow 55^\circ\text{C} \searrow 25^\circ\text{C}$ .,相对湿度:98%, (3 小时)  $\rightarrow 25^\circ\text{C}$ .,相对湿度:98% (9 小时)]  $\times 2$ , 整流管须符合 7.2-7.3 要求。

Temperature Change go on Damp Heat Cyclic Test :The rectifier shall be subjected to 5 temperature cycles and 2 damp heat cyclic cycles ,  $[-40^\circ\text{C}(30\text{min})\rightarrow\text{R.T.}(3\text{min})\rightarrow+130^\circ\text{C}(30\text{min})\rightarrow\text{R.T.}(3\text{min})]$   $\times 5$ , $[25^\circ\text{C} \nearrow 55^\circ\text{C}$  ,98%R.H,(3h)  $\rightarrow 55^\circ\text{C}$  ,98%R.H  $\searrow$  93%R.H, (10min)  $\rightarrow 55^\circ\text{C}$  ,93%R.H,(8h 40min)  $\rightarrow 55^\circ\text{C}$  ,93%R.H  $\nearrow$  98%R.H,(10min) $\rightarrow 55^\circ\text{C} \searrow 25^\circ\text{C}$ 98%R.H,(3h) $\rightarrow 25^\circ\text{C}$  , 98%R.H,(9h)]  $\times 2$  ,the rectifier shall satisfy item 7.2 to 7.3.

7.6 贮存试验:整流管在环境温度为  $120^\circ\text{C}$  时放置 1000 小时,室温下稳定 1 小时,整流管须符合 7.2-7.3 要求。  
 Storage test : The rectifier shall be left in an ambient temperature of  $120^\circ\text{C}$  for 1000 hours. Stabilized to room temperature for 1 hour, the rectifier shall satisfy item 7.2 to 7.3.

7.7 耐焊接热试验: 将整流器的引线浸入熔融焊料中 5 秒钟, 焊料温度  $350 \pm 10^\circ\text{C}$ ,浸至距管体 10mm 外。室温中稳定一小时后, 整流器应符合 7.2-7.3 要求。

Soldering heat test : The leads of the rectifier shall be immersed for 5 sec. in molten solder, at a temperature of  $350 \pm 10^\circ\text{C}$ ,to a point 10mm from the body. Stabilized to room temperature for 1 hour, the rectifier shall satisfy item 7.2 to 7.3 .

7.8 易焊性试验: 将元件引线浸入温度为  $235 \pm 5^\circ\text{C}$  的熔融焊料槽中,焊料表面应保持清洁, 试验后, 引线表面的 90% 以上应覆盖焊料。

Solderability test : The surface of the solder bath shall be kept clean. The component termination shall be immersed into the bath of molten solder at  $235 \pm 5^\circ\text{C}$ . After the test, more than 90% of the surface must be covered with the solder.

7.9 高温反偏试验: 整流器在环境温度为  $100^\circ\text{C}$  时, 施加  $V_{RM}=V_{RRM}$ ,  $f=50\text{HZ}$  正弦半波电压 1000 小时, 。整流器应符合 7.2-7.3 要求。

High Temperature Reverse Voltage Test: The rectifier shall be threw Half sinewave voltage ( $V_{RM}=V_{RRM}$ )with  $f=50\text{HZ}$  for 1000 hours in an ambient temperature of  $100^\circ\text{C}$ . The rectifier shall satisfy item 7.2 to 7.3 .

7.10 高压蒸气试验: 整流器在  $121^\circ\text{C}$ , $2 \times 10^5\text{pa}$  条件下放置 10 小时后, 整流器应符合 7.2-7.3 要求。

High-pressure smoke Test: The rectifier shall be placed in  $121^\circ\text{C}$ , $2 \times 10^5\text{pa}$  for 10 hours, the rectifier shall satisfy item 7.2to 7.3 .

7.11 间隙通电试验: 将整流器施加  $I_F=30\text{mA}$ , $V_R=0$  的正向脉冲电流,通电 3 分钟,断电 3 分钟,持续 500 小时,最后测试应符合 7.2-7.3 要求。

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Discontinuity Electrify Test: The rectifier shall be threw forward pulse current of  $I_F=30\text{mA}$ ,  $V_R=0$ , turn on 3 min, turn off 3 min, went on 500 hours, the rectifier shall satisfy item 7.2 to 7.3 .

## 8. 使用须知

### Handling instructions

这种二极管在空气中不能保证其额定电压和反向特性, 故应使用以环氧为主体的树脂进行再次封装, 改变外形尺寸以增大爬电距离。

These diodes have been developed to attain size reduction assuming remolding with epoxy-base resin to endure the creeping distance. It is therefore, impossible to guarantee the rated voltage and backward characteristics in the air.

### 8.1 验收检查的特殊注意点

#### Special notes for acceptance inspection

a. 再次封装下的特性检查: 考虑到爬电距离和热辐射, 应将二极管用环氧封装成  $\phi 8\text{mm} \times 40\text{mm}$  的圆柱体, 然后进行特性检查或可靠性试验。

Characteristics inspection in remolded state: Molt the diode with epoxy to form a cylinder with the size of 8 mm DIA X 40mm L considering the creeping distance and heat radiation. Inspect the characteristics or reliability after remolding.

b. 在绝缘油中的特性检查: 非再次封装下的特性检查一般在绝缘油(硅油)或六氟化物中进行。然而六氟化物是挥发性的, 硅油是不挥发的。测试后的清洗要特别小心, 因为通常使用的是有机溶剂, 如: 三氯乙烯或二甲苯。

Characteristics inspection in insulating oil: Characteristics inspection without remolding is generally carried out in insulating oil (silicone oil or fluoride). While fluoride volatile, silicone oil is not. Washing after the test needs special care. Generally an organic solvent such as trichloroethylene or xylene is used.

### 8.2 装配注意点

#### Special note for assembly

a. 高压硅二极管表面必须保持清洁, 高压硅二极管与再次封装树脂之间的界面必须保证足够的附着力。

The surface of a high voltage silicon diode must be kept clean. The interface between a high voltage silicon diode and the remolding resin must ensure sufficient adhesion.

b. 再次封装的树脂内不允许有气泡, 因为气泡会降低绝缘性和可靠性, 特别是在高压硅二极管的附近更另不允许有气泡。

No air bubble is allowed in the remolding, resin because it degrades the insulation and reliability. It must not exist especially near the high voltage silicon diode.

c. 再次封装时使用环氧树脂会使膨胀或收缩的应力最小, 从而避免对二极管产生影响。如果采用环氧系以外的树脂, 应仔细查其附着力和密封性, 以避免水气进入。

The resin material for remolding should be epoxy-base resin and minimum stress from expansion or contraction shall be generated as so to prevent bad influence on the diode .If any resin other than epoxy-base one is used, the adhesion and airtightness to prevent moisture entrance shall be well examined.

图 1 正向压降测试电路

Fig.1 Forward voltage drop test circuit

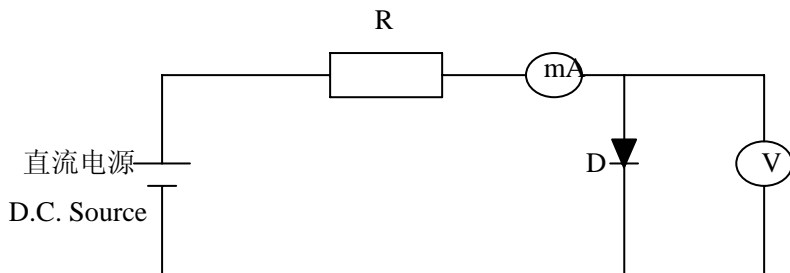


图 2 反向电流测试电路

Fig.2 Reverse current test circuit

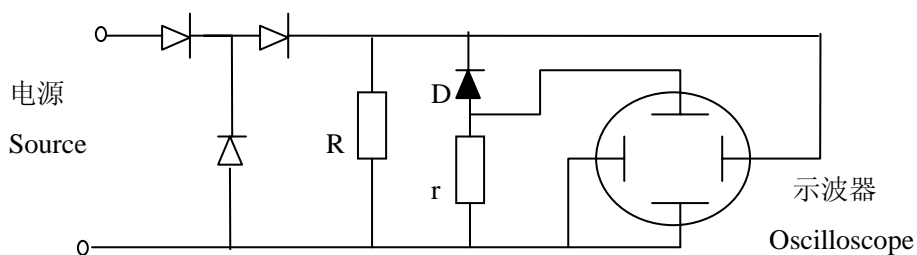
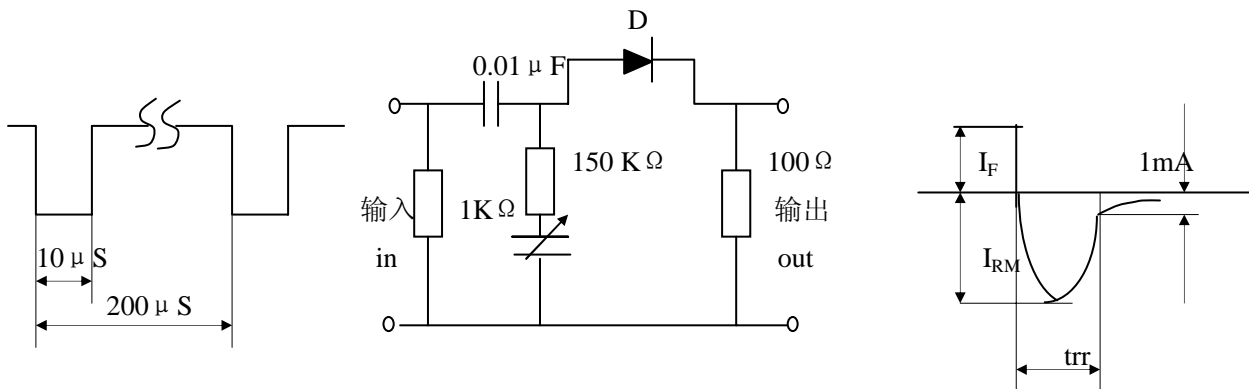


图 3 trr 测试电路和波形图

Fig. 3 Circuit and wave diagram for trr testing



9.尺寸、标识、内部结构和材料

Dimensions , Marking , Inner Construction and Materials

9.1 外形尺寸及标识

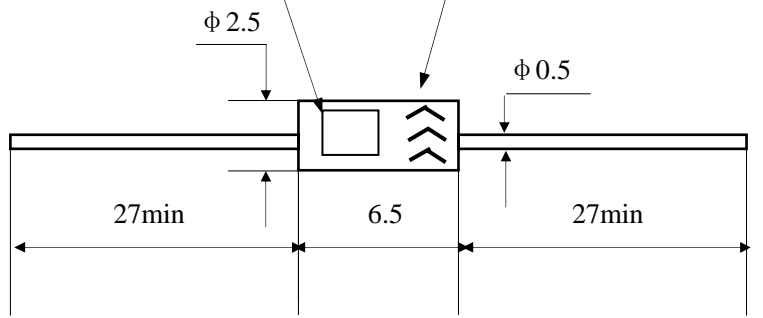
Dimensions and Marking

批号、制造商标记※

负极标记

Lot No, Coporate mark

Cathode mark



单位: mm  
Dimensions in mm

※批号、制造商标记:

Type name ,Lot NO. Coporate mark

制造商标  
Coporate mark

年份: 取公历年份的最后一位字符  
YEAR: the last character of the calendar year

月份: 用一位数表示该年份中的月份  
MONTH: use one digit express the month of this year

批号标记

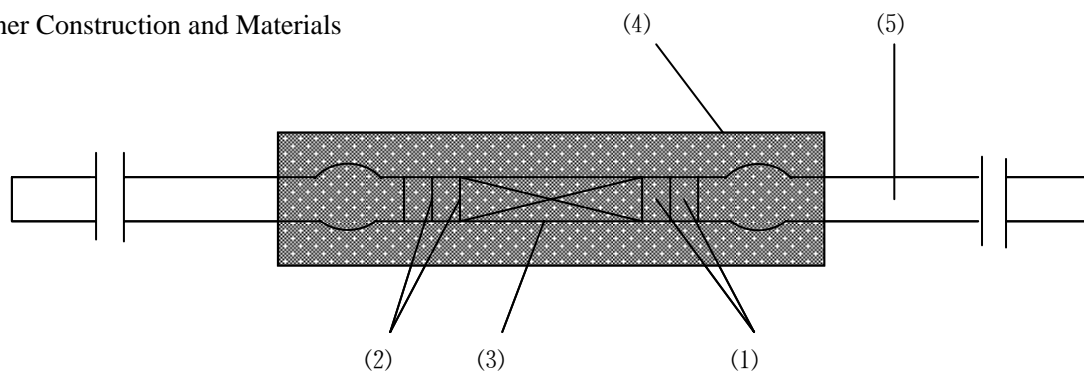
RG × ×

Lot No mark

月份 Month	1	2	3	4	5	6	7	8	9	10	11	12
标志 Mark	1	2	3	4	5	6	7	8	9	0	N	D

## 9.2 内部结构和材料

### Inner Construction and Materials



NO	部 件 名 Part name	材料名称和型号 Material and type name	备注 Note
(1)	二极管芯片 Diode chip	N 型硅 N-type Silicon	台面型 Mesa Type
(2)	连接材料 Contact Materials	铅锡焊料 Pb-Sn Solder	
(3)	表面钝化 Surface Passivation	JRC 涂布树脂 JRC Coating Resin	刚性型 Rigid Type
(4)	封装材料 Molding Material	UL94V-0 环氧树脂 Epoxy Resin ( UL 94V-0)	
(5)	引 线 Lead wire	镀锡铜线 Sn Plated Cu wire	