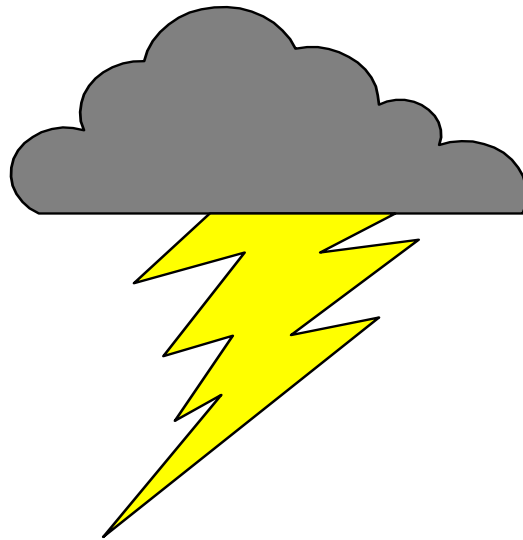


AN-OVP

Overvoltage Protection

For Silver Telecom SLICs and Trunks

Nov 2007 Rev 2.8



***Engineering
Advantage***

Regulatory Specifications

- **FCC Part 68 (now TIA-968-A) USA**
Must have this approval for connection to US PSTN. Specifies only lightning tests. Type B must be met without damage. Type A are allowed to cause some damage. Severe test, up to 1.5kV, 200A
- **ITU-T K20 (network) and K21 (subscriber)**
Many countries use parts of this as a reference. Specifies lightning and power cross tests with various levels of severity
- **Telcordia GR1089-CORE**
Comprehensive EMC spec. Used by network providers in USA. Lightning tests more severe than FCC 68, also includes power cross.
- **UL60950**
Mandatory US safety specification. Requires 600VAC power cross test. Very severe, needs special fuses or PTC devices to meet it.
- Many other individual country specifications may need to be met.



**Engineering
Advantage**

3 Levels of Protection

- **1 Electrostatic Discharge**

Minimum level of protection. Suitable for wiring within buildings. Protects against static discharge from handling and installation.

- **2 Lightning**

Average level of protection. Suitable for normal outside wiring. Protects against static and lightning up to 1.5kV.

- **3 Power Cross**

Highest level of protection. Suitable for outside wiring which may contact power cables. Protects against static, lightning up to 1.5kV or 4kV and power voltages of 250V or 600V.



***Engineering
Advantage***

Different protection for SLICs and Trunks

- SLICs are ground referenced
Simple protection requires only diode clamping from Tip and Ring to ground and -48V.
- Trunks are floating - no ground reference
Simple protection requires special overvoltage devices from Tip to Ring.
Diode clamping from Tip and Ring to ground and -48V must not be used. It prevents correct operation of telephone ringing

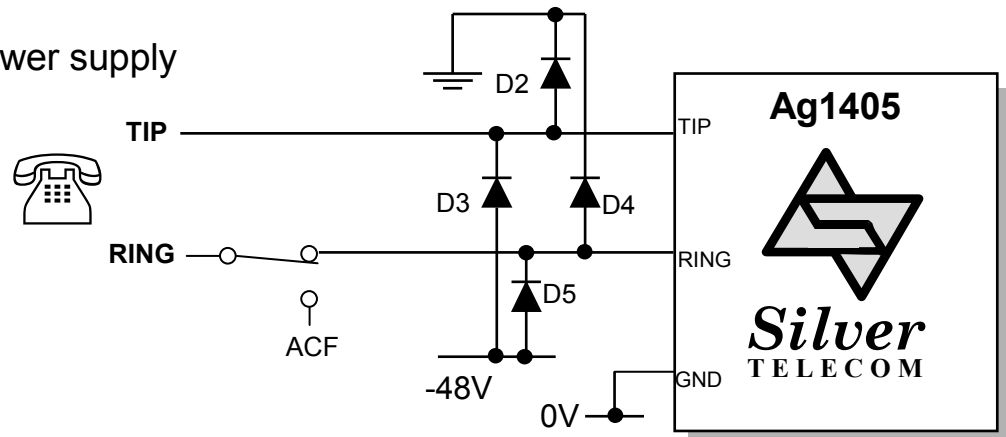


***Engineering
Advantage***

SLIC protection Level 1

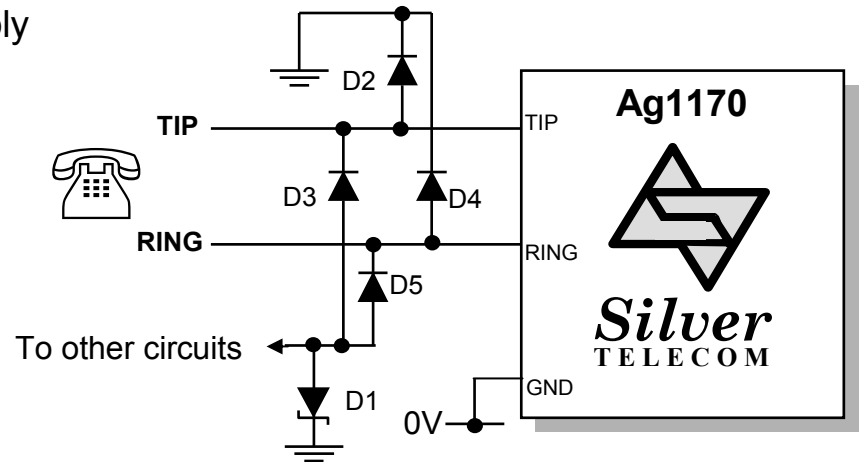
- For C.O. applications with large -48V power supply which can take transient overcurrent

D2 - 5 = 1N4004 or Diode bridge e.g. MB4S



- For applications with small DC/DC power supply transient overcurrent is taken by clamp diode

D2 - 5 = 1N4004 or Diode bridge e.g. MB4S
 D1 = Tranzorb type clamp diode, 75V standoff
 e.g. Vishay BZT03C82, P6KE82A, SMAJ70
 or similar, only one needed per linecard.

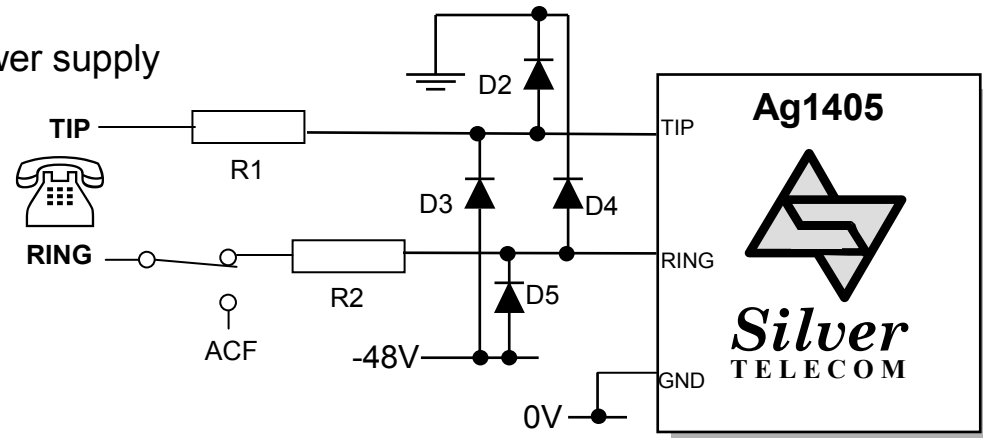


**Engineering
Advantage**

SLIC protection Level 2

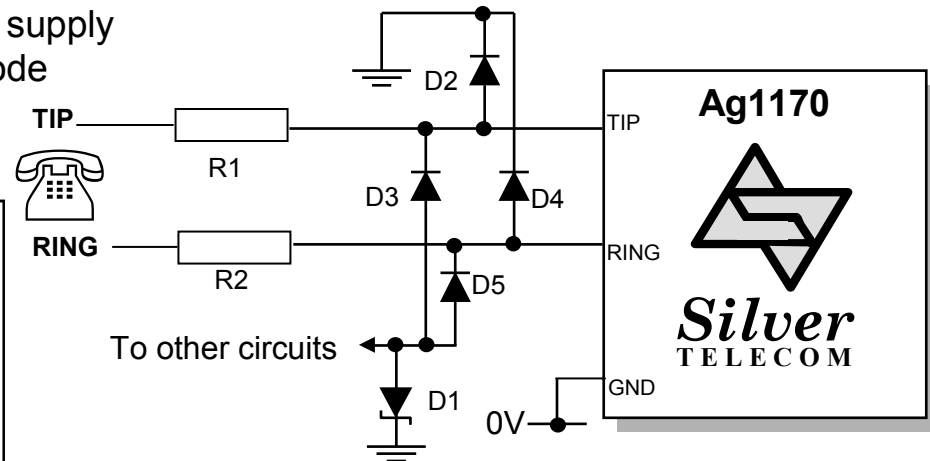
- For C.O. applications with large -48V power supply which can take transient overcurrent

D2 - 5 = 1N4004 or Diode bridge MB4S
R1-2 = 47R 2W 5% wirewound



- For applications with small DC/DC power supply transient overcurrent is taken by clamp diode

D2 - 5 = 1N4004 or Diode bridge e.g. MB4S
R1-2 = 47R 2W 5% wirewound
D1: = Transorb type clamp diode 75V standoff e.g. Vishay BZT03C82, P6KE82A, SMAJ70 for general use. Semitron 5KP82 for ITU-T K20, KN61000-4-5, FCC 68 Semitron 15KP82 for GR1089-CORE only one needed per line card

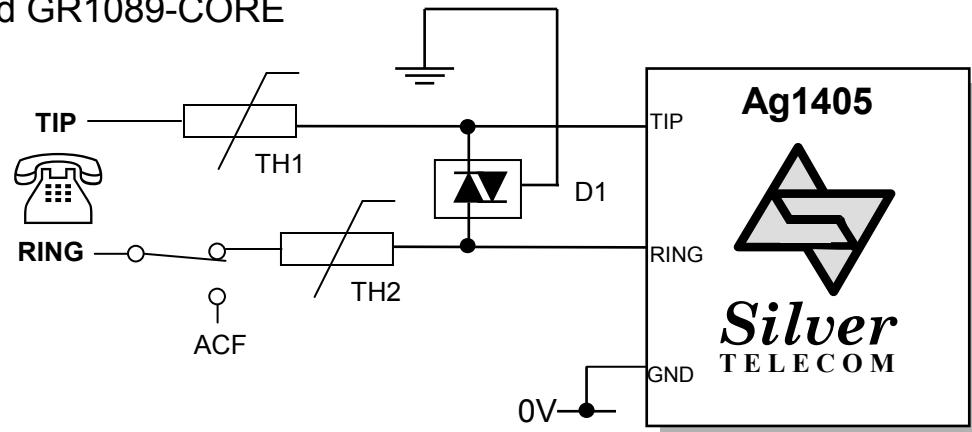


**Engineering
Advantage**

SLIC protection Level 3

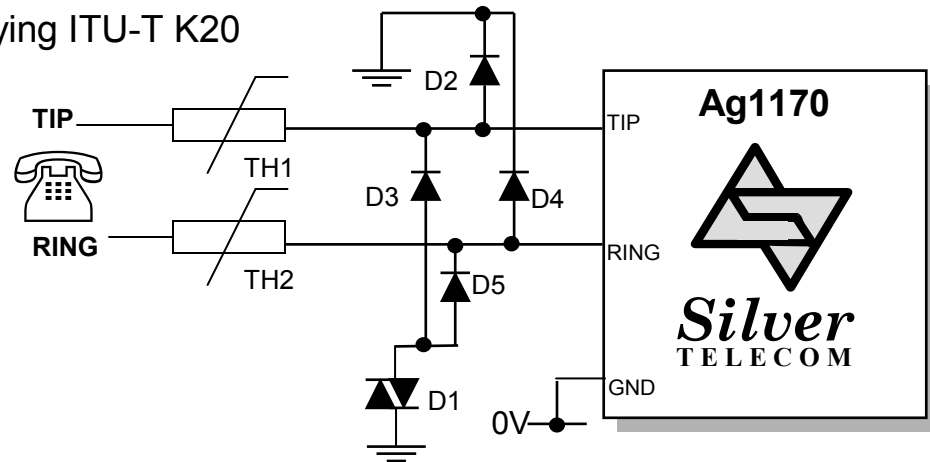
- For C.O. applications in USA. FCC 68 and GR1089-CORE

D1 = Bourns TISP3095 or similar
 TH1-2 = PTC Thermistor 600VAC
 e.g. Raychem TR600-150 or similar



- For Korea and worldwide application specifying ITU-T K20

D2 - 5 = 1N4004 or Diode bridge e.g. DF04S, MB4S
 D1 = Sidactor type foldback clamp diode 75V standoff
 e.g. Teccor P0900SA or similar, one per SLIC
 TH1-2 = PTC thermistor 250VAC
 e.g. Raychem TR250-120 or similar

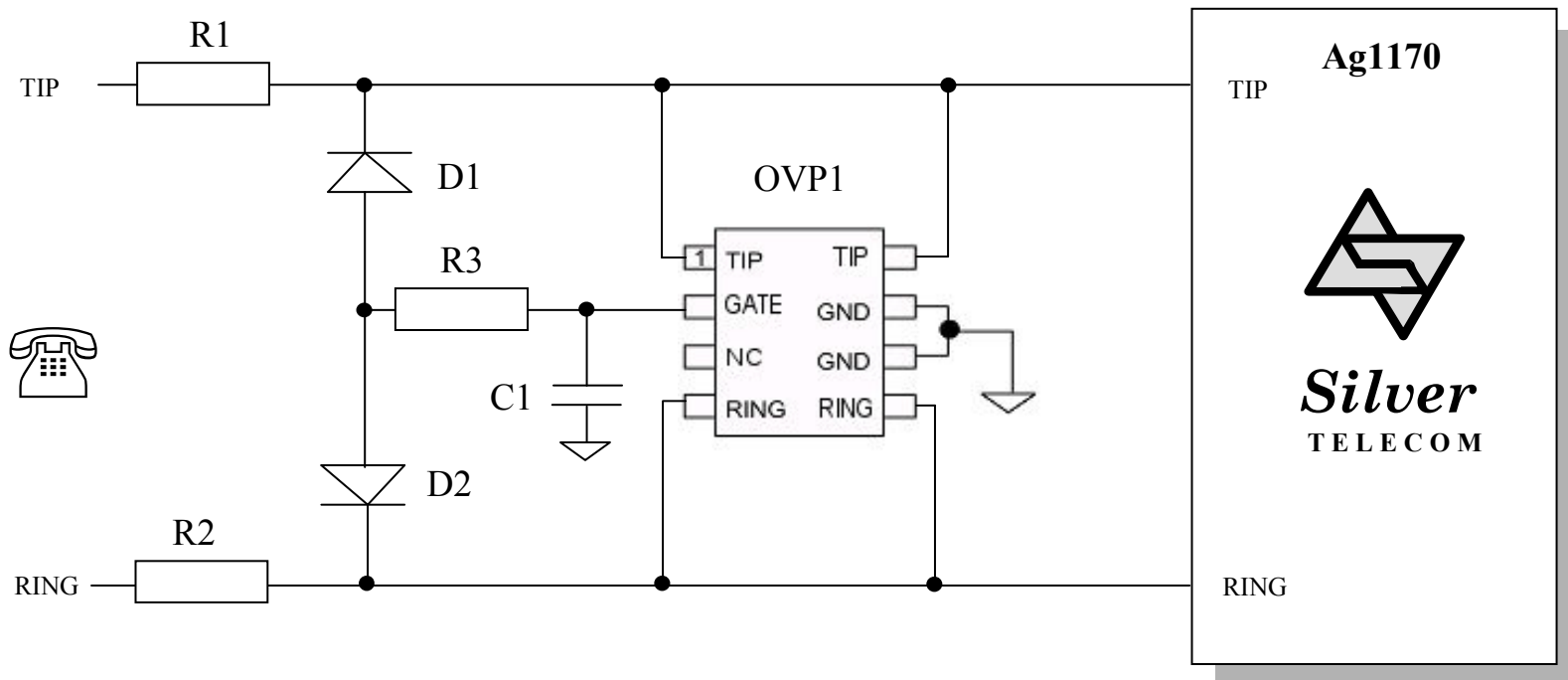


**Engineering
 Advantage**

SLIC programmable protection

For highest level of protection for Silver Telecom ringing SLICs use a programmable device

- Level 2 protection for ITU-K20 shown



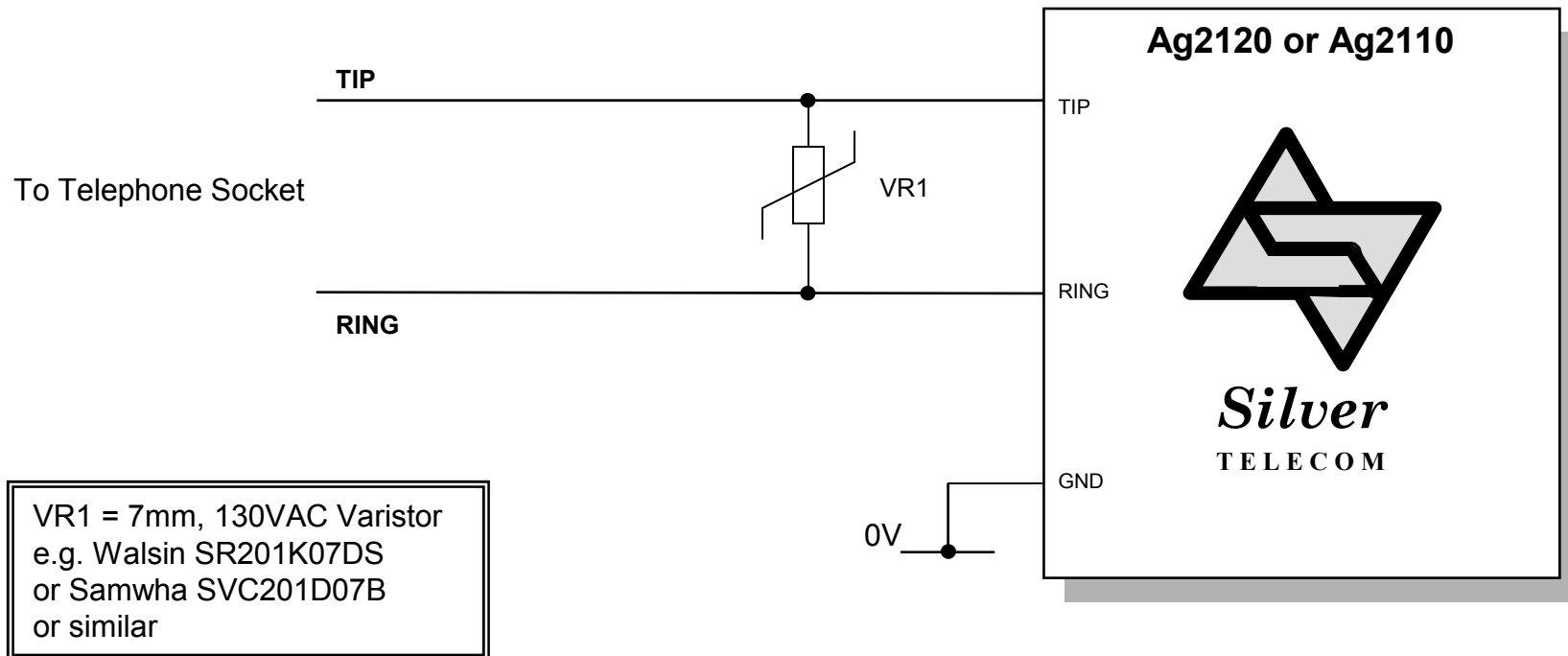
C1 = 100nF, 50V X7R ceramic ; D1, D2 = 1N4148 (or similar), R3 = 10K chip 0805
R1, R2 = 47R,2W 5% wirewound (optional for high current); OVP1 = ST LCP1521S (or similar)



**Engineering
Advantage**

Trunk protection Level 1

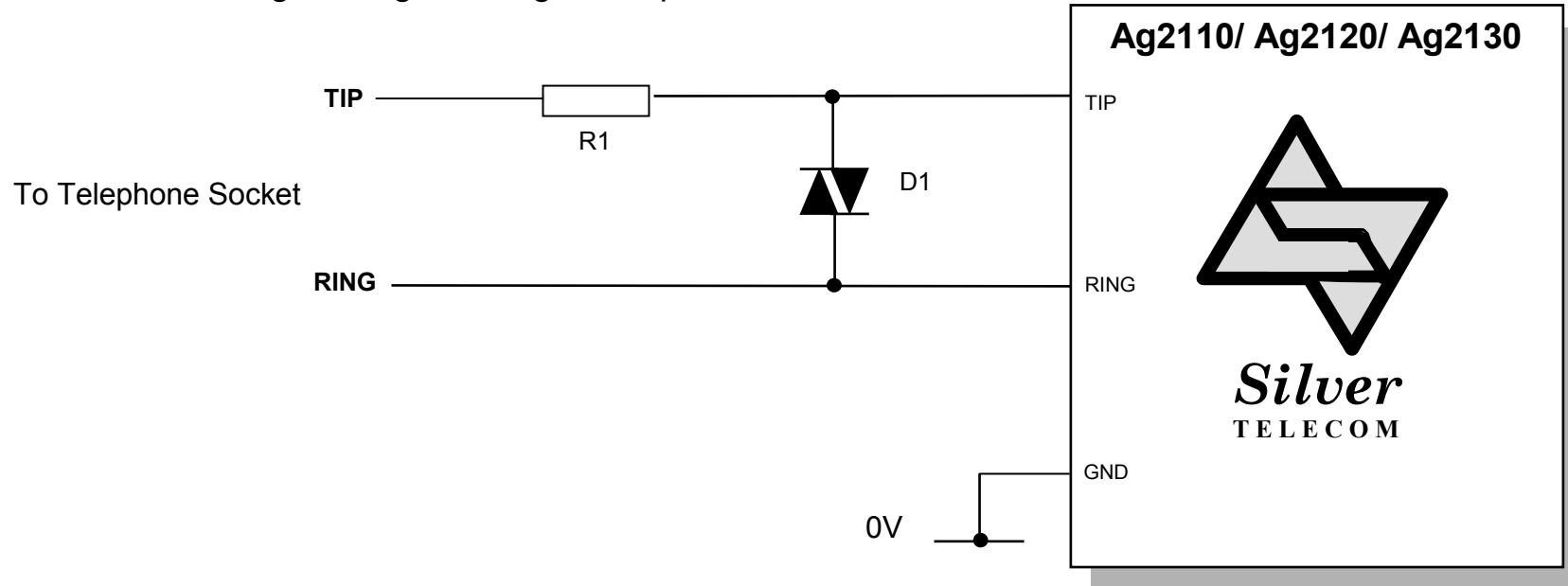
- On Hook protection for general applications worldwide



**Engineering
Advantage**

Trunk protection Level 2

- On Hook protection for applications worldwide up to 1500V surge voltage. Designed to pass FCC 68



R1 = 33R 10% 2W Wirewound

D1 = Sidactor type bi-directional foldback clamp diode

For FCC68 Type B 150VAC ringing use Teccor P2600SA or Bourns TISP4300M3

For countries with 120VAC max. ringing use TeccorP2300SA or similar

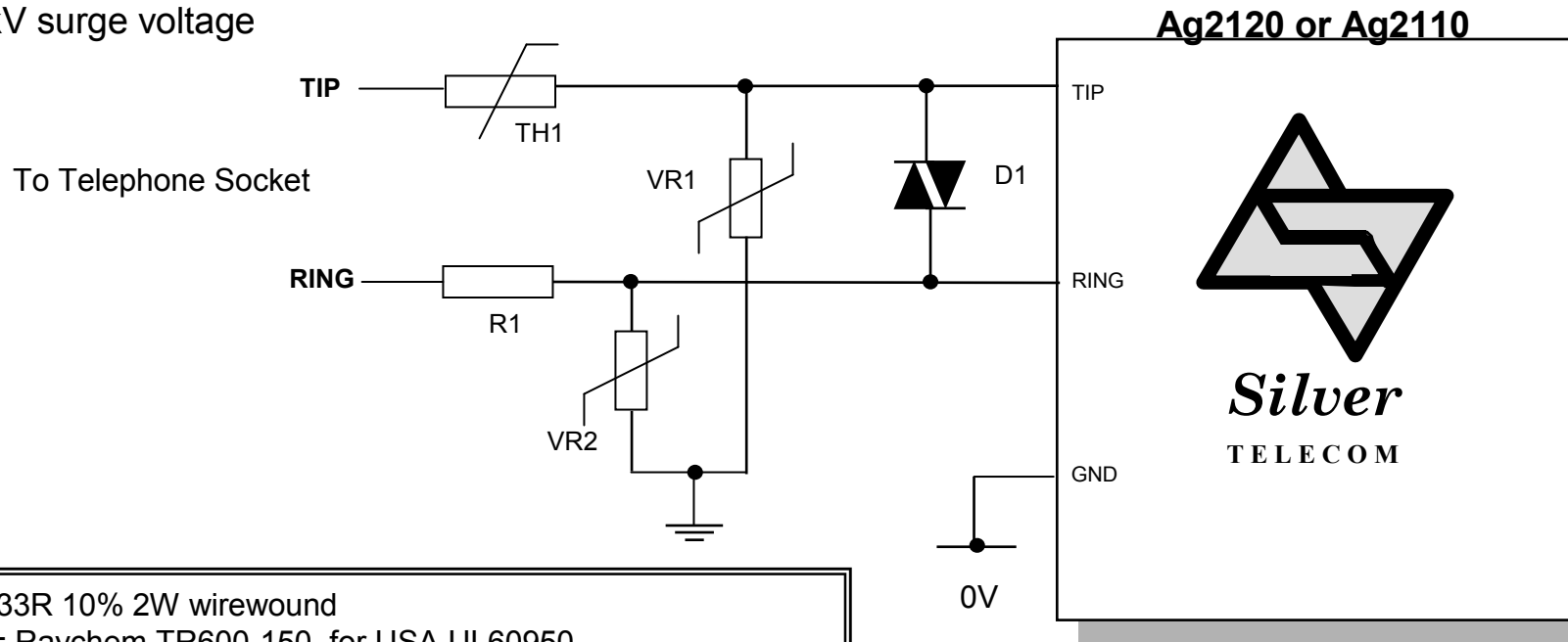
For countries with 100VAC max. ringing use TeccorP2100SA or similar



**Engineering
Advantage**

Trunk protection Level 3

- On Hook protection for applications worldwide up to 4kV surge voltage



R1 = 33R 10% 2W wirewound
TH1 = Raychem TR600-150 for USA UL60950
TH1 = Raychem TR250-120 for ITU-T K20 in rest of world
D1 = Teccor P2600SA or Bourns TISP4300M3 for USA
D1 = Teccor P2300SA or Bourns TISP4265M3 for rest of world
VR1, VR2 = Not Fitted for USA or 1.5kV surge
VR1, VR2 = Varistor 7mm 250VAC for 4kV surge e.g. Korea
e.g. Walsin SR391K07DS or Samwha SVC391D07A or similar

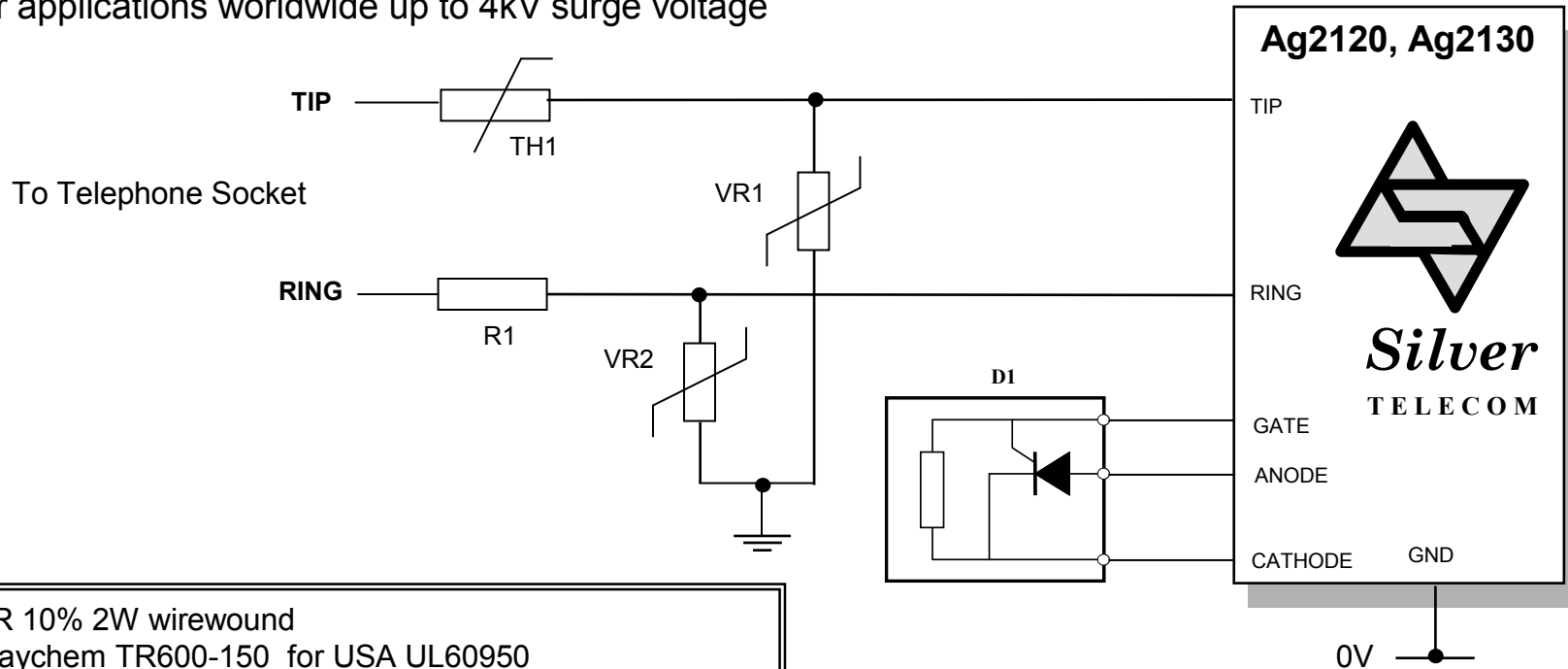


**Engineering
Advantage**

Ag2120, Ag2130 Off Hook Protection

The Ag2120 and Ag2130 have special provision for protection while Off Hook and On Hook

- For applications worldwide up to 4kV surge voltage



R1 = 47R 10% 2W wirewound
TH1 = Raychem TR600-150 for USA UL60950
TH1 = Raychem TR250-120 for ITU-T K20 in rest of world
D1 = ST TPP25011 or Bourns TISP8250
VR1, VR2 = Not Fitted for USA or 1.5kV surge
VR1, VR2 = Varistor 7mm 250VAC for 4kV surge e.g. Korea
e.g. Walsin SR391K07DS or Samwha SVC391D07A or similar



**Engineering
Advantage**

Ag2120, Ag2130 Safety Considerations

The Ag2120 and Ag2130 have been tested and approved under the international CB scheme to the following standards:-

EN60950-1:2001

IEC60950-1:First Edition 2001

AS/NZ60950-1:2003

UL60950-1:2003 1st Edition

CSA 22.2 No.60950-1-03 1st Edition

In order to maintain this approval when the Ag2120/Ag2130 is incorporated into a host system care must be taken to maintain the user protection provided by these parts. Adequate separation of the line side circuitry from components connected to the protected user circuitry must be provided so that the barrier is not compromised. Also, the system should be housed in a fire enclosure of suitable flame retardant material.

For USA and Canada, additionally, the line cord connecting the system to the network must have minimum 26AWG conductors.

On request Silver Telecom can supply copies of the Approval Certificates for the Ag2120 and/or Ag2130.



**Engineering
Advantage**