

**TwinChip™ Series - DO-214**



**Agency Approvals**

Agency	Agency File Number
	E133083

**Pinout Designation**

NOT APPLICABLE

**Schematic Symbol**



**Description**

TwinChip™ Series DO-214 are very low capacitance SIDACtor® thyristors designed to protect broadband equipment such as VoIP, DSL modems and DSLAMs from damaging overvoltage transients. This series provides a surface mount solution that enables equipment to comply with global regulatory standards, while limiting the impact to broadband signals.

**Features and Benefits**

- Low voltage overshoot
- Low on-state voltage
- Does not degrade surge capability after multiple surge events within limit.
- Low distortion
- Fails short circuit when surged in excess of ratings
- 40% lower than comparable product
- RoHS Compliant and Halogen-Free
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

**Applicable Global Standards**

- TIA/968-A/B
- ITU K.20/21/45
- IEC 61000-4-5 2<sup>nd</sup> edition
- GR 1089 Intra-building
- YD/T 1082
- YD/T 993
- YD/T 950
- ITU K.20/21/45 Enhanced\*
- GR 1089 Inter-building\*

\* Additional series resistance may be required to comply

**Electrical Characteristics**

Part Number	Marking	$V_{DRM}$ @ $I_{DRM}=5\mu A$	$V_s$ @ 100V/ $\mu s$	$I_H$	$I_s$	$I_T$	$V_T$ @ $I_T=2.2$ Amps	@ 1MHz, 2V bias	
		V min	V max	mA min	mA max	A max	V max	pF min	pF max
P0642SALRP	P062A	58	77	120	800	2.2	8	10	20
P0722SALRP	P072A	65	88	120	800	2.2	8	10	20
P0902SALRP	P092A	75	98	120	800	2.2	8	20	40
P1102SALRP	P112A	90	130	120	800	2.2	8	5	20
P1302SALRP	P132A	120	160	120	800	2.2	8	5	20
P1502SALRP	P152A	140	180	120	800	2.2	8	15	30
P1802SALRP	P182A	170	220	120	800	2.2	8	10	30
P2302SALRP	P232A	190	260	120	800	2.2	8	10	25
P2602SALRP	P262A	220	300	120	800	2.2	8	10	25
P3002SALRP	P302A	280	360	120	800	2.2	8	10	25
P3502SALRP	P352A	320	400	120	800	2.2	8	10	20
P4202SALRP	P422A	380	500	120	800	2.2	8	10	20
P4802SALRP	P482A	440	600	120	800	2.2	8	5	20
P6002SALRP	P602A	550	700	120	800	2.2	8	5	20

Table continues on next page.

### Electrical Characteristics (continued)

Part Number	Marking	$V_{DRM}$ @ $I_{DRM}=5\mu A$	$V_S$ @ 100V/ $\mu s$	$I_H$	$I_S$	$I_T$	$V_T$ @ $I_T=2.2 A$	@ 1MHz, 2V bias	
		V min	V max	mA min	mA max	A max	V max	pF min	pF max
P0642SBLRP	P062B	58	77	120	800	2.2	8	10	20
P0722SBLRP	P072B	65	88	120	800	2.2	8	10	20
P0902SBLRP	P092B	75	98	120	800	2.2	8	5	20
P1102SBLRP	P112B	90	130	120	800	2.2	8	5	20
P1302SBLRP	P132B	120	160	120	800	2.2	8	15	30
P1502SBLRP	P152B	140	180	120	800	2.2	8	15	30
P1802SBLRP	P182B	170	220	120	800	2.2	8	10	30
P2302SBLRP	P232B	190	260	120	800	2.2	8	10	25
P2602SBLRP	P262B	220	300	120	800	2.2	8	10	25
P3002SBLRP	P302B	280	360	120	800	2.2	8	10	25
P3502SBLRP	P352B	320	400	120	800	2.2	8	10	20
P4202SBLRP	P422B	380	500	120	800	2.2	8	10	20
P4802SBLRP	P482B	440	600	120	800	2.2	8	5	20
P6002SBLRP	P602B	550	700	120	800	2.2	8	5	20
P3002SCLRP	P302C	280	360	120	800	2.2	8	20	35
P3502SCLRP	P352C	320	400	120	800	2.2	8	20	30
P4202SCLRP	P422C	380	500	120	800	2.2	8	15	30
P4802SCLRP	P482C	440	600	120	800	2.2	8	15	30
P6002SCLRP	P602C	550	700	120	800	2.2	8	10	25
P7002SCLRP*	P702C	640	850	120	800	2.2	8	10	30

- Notes:
- Absolute maximum ratings measured at  $T_A=25^\circ C$  (unless otherwise noted).
  - Components are bi-directional.
  - Part with \* is under development

### Surge Ratings

Series	$I_{PP}$									$I_{TSM}$ 50/60 Hz	di/dt A/ $\mu s$
	0.2/310 <sup>1</sup> 0.5/700 <sup>2</sup>	2/10 <sup>1</sup> 2/10 <sup>2</sup>	8/20 <sup>1</sup> 1.2/50 <sup>2</sup>	10/160 <sup>1</sup> 10/160 <sup>2</sup>	10/560 <sup>1</sup> 10/560 <sup>2</sup>	5/320 <sup>1</sup> 9/720 <sup>2</sup>	10/360 <sup>1</sup> 10/360 <sup>2</sup>	10/1000 <sup>1</sup> 10/1000 <sup>2</sup>	5/310 <sup>1</sup> 10/700 <sup>2</sup>		
	A min	A min	A min	A min	A min	A min	A min	A min	A min		
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	25	500
C	50	500	400	200	150	200	175	100	200	30	500

- Notes:
- 1 Current waveform in  $\mu s$
  - 2 Voltage waveform in  $\mu s$
  - Peak pulse current rating ( $I_{PP}$ ) is repetitive and guaranteed for the life of the product that remains in thermal equilibrium.
  - The component must initially be in thermal equilibrium with  $-40^\circ C \leq T_J \leq +150^\circ C$

### Additional Information



Datasheet

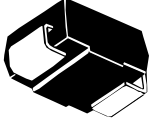


Resources

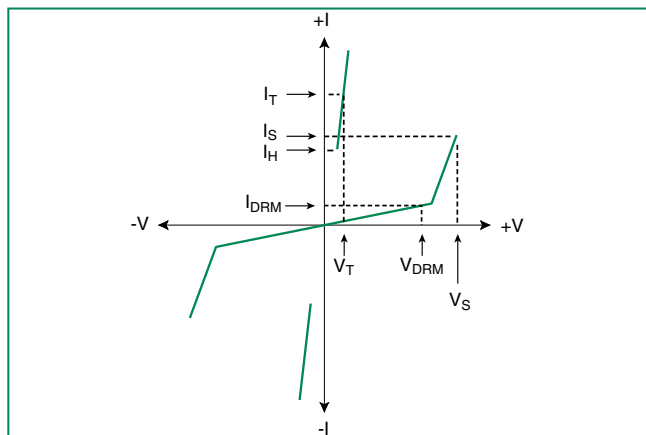


Samples

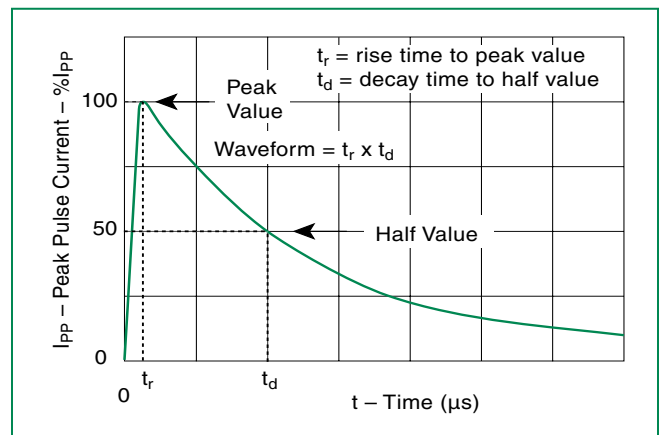
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
DO-214AA 	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	90	°C/W

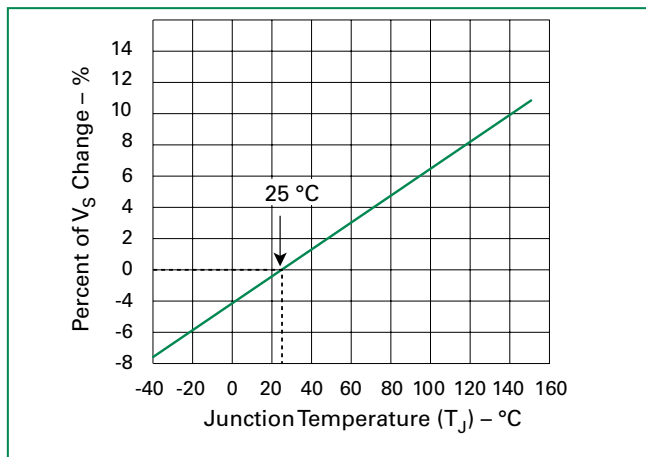
**V-I Characteristics**



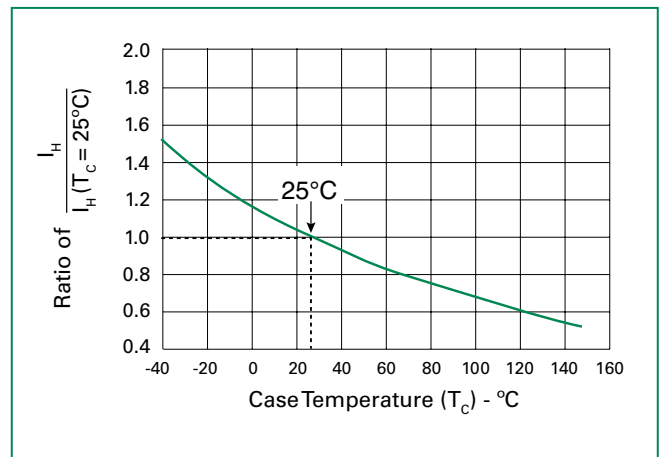
**$t_r \times t_d$  Pulse Waveform**



**Normalized  $V_S$  Change vs. Junction Temperature**

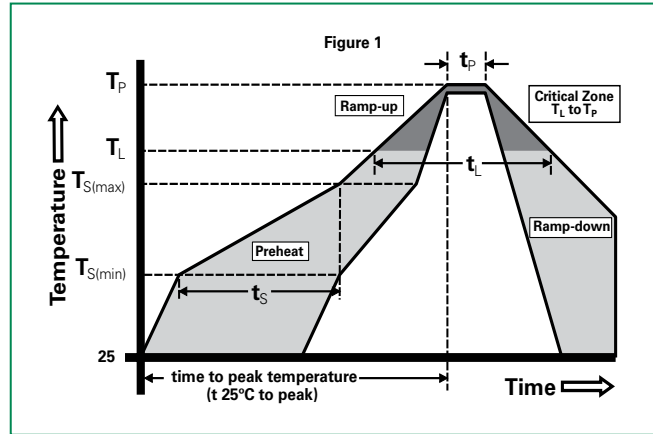


**Normalized DC Holding Current vs. Case Temperature**



**Soldering Parameters**

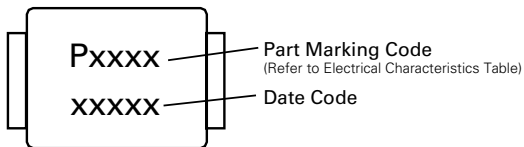
Reflow Condition		Pb-Free assembly (see Fig. 1)
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max ( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/sec. Max.
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max.
Reflow	-Temperature ( $T_L$ ) (Liquidus)	+217°C
	-Temperature ( $t_L$ )	60-150 secs.
Peak Temp ( $T_p$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		30 secs. Max.
Ramp-down Rate		6°C/sec. Max.
Time 25°C to Peak Temp ( $T_p$ )		8 min. Max.
Do not exceed		+260°C



**Physical Specifications**

<b>Lead Material</b>	Copper Alloy
<b>Terminal Finish</b>	100% Matte-Tin Plated
<b>Body Material</b>	UL Recognized compound meeting flammability rating V-0

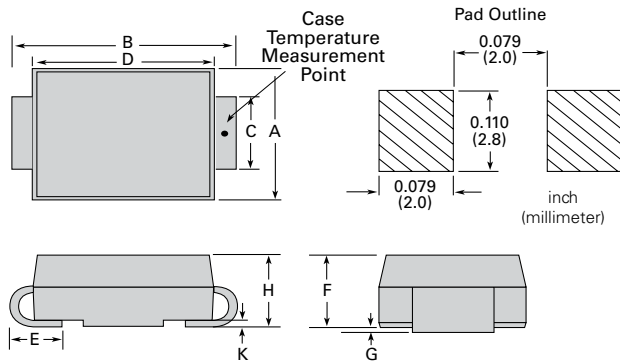
**Part Marking**



**Environmental Specifications**

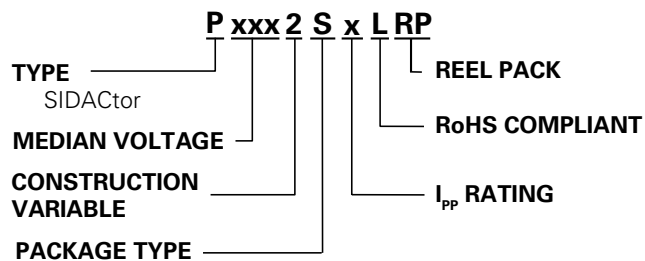
<b>High Temp Voltage Blocking</b>	80% Rated $V_{DRM}$ ( $V_{AC Peak}$ ) +125°C or +150°C, 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101
<b>Temp Cycling</b>	-65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104
<b>Biased Temp &amp; Humidity</b>	52 $V_{DC}$ (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101
<b>High Temp Storage</b>	+150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101
<b>Low Temp Storage</b>	-65°C, 1008 hrs.
<b>Thermal Shock</b>	0°C to +100°C, 5 min. dwell, 10 sec. transfer, 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106
<b>Autoclave (Pressure Cooker Test)</b>	+121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/JEDEC, JESD22-A-102
<b>Resistance to Solder Heat</b>	+260°C, 30 secs. MIL-STD-750 (Method 2031)
<b>Moisture Sensitivity Level</b>	85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1

**Dimensions — DO-214AA**



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	0.130	0.156	3.30	3.95
<b>B</b>	0.201	0.220	5.10	5.60
<b>C</b>	0.077	0.087	1.95	2.20
<b>D</b>	0.159	0.181	4.05	4.60
<b>E</b>	0.030	0.063	0.75	1.60
<b>F</b>	0.075	0.096	1.90	2.45
<b>G</b>	0.002	0.008	0.05	0.20
<b>H</b>	0.077	0.104	1.95	2.65
<b>K</b>	0.006	0.016	0.15	0.41

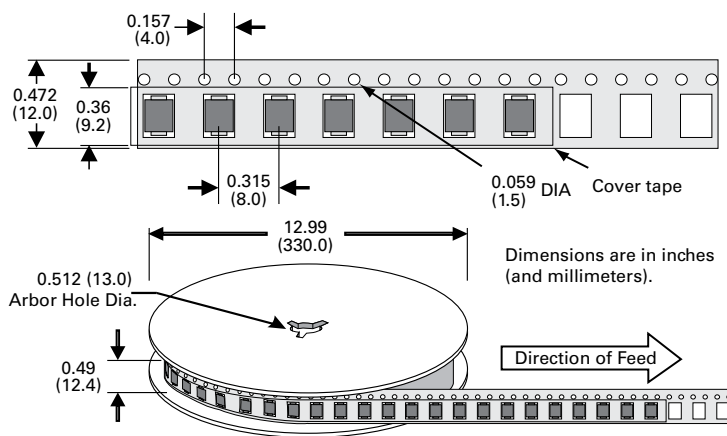
**Part Numbering**



**Packing Options**

Package Type	Description	Quantity	Added Suffix	Industry Standard
S	DO-214AA Tape & Reel	2500	RP	EIA-481-D

**Tape and Reel Specification — DO-214AA**



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