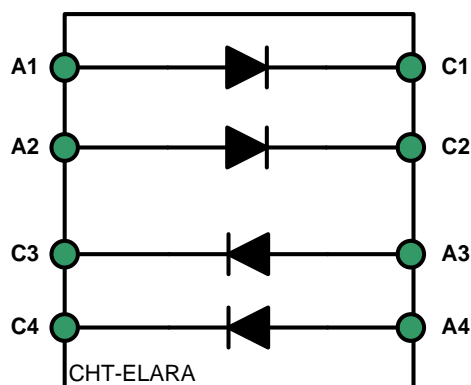


CHT-ELARA DATASHEET 80V High Temperature Quad Diode

Version: 1.6
14-Dec-23
(Last Modification Date)

General description

The CHT-ELARA is a high temperature 80V/500mA quad diode in a hermetically sealed TDFP16 ceramic package. It is designed to achieve high performance in an extremely wide temperature range: typical operation temperature goes from -55°C to 225°C while keeping leakage currents low. This quad diode can be used in a variety of applications, including rectification, clamping and general purpose.



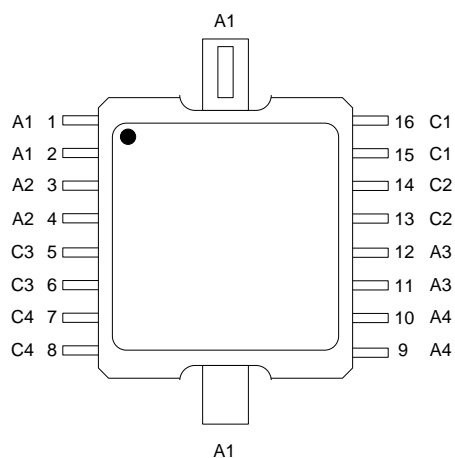
Features

- Specified from **-55 to +225°C** (T_j)
- Reverse voltage: **V_R = 80V** (max)
- Forward current: **I_F = 450 mA** (max @ 225°C (T_j) and V_F = 1.5V)
- Forward voltage:
 - **V_F = 0.6V** (typ. @ I_F = 1mA)
- Junction capacitance:
 - **C_j = 15pF** (typ. @ V_R = 25V)
- Dielectric isolation: min 80V
- Monolithic design
 - Excellent matching between on-die diodes
 - Superior thermal tracking
- Low thermal resistance
- Package: Hermetically sealed TDFP16 ceramic package
- Validated at 225°C for 1000 hours (and still on-going)

Applications

- Full bridge rectification
- Power supplies
- General purpose diode

Package Configuration^{1,2}



Pin #	Pin name	Pin description
1	A1	Anode diode 1 ³ (should be connected to the most negative voltage of the application (even if diode “A1-K1” is not used))
2	A1	Anode diode 13 should be connected to the most negative voltage of the application (even if diode “A1-K1” is not used)
3	A2	Anode diode 2
4	A2	Anode diode 2
5	C3	Cathode diode 3
6	C3	Cathode diode 3
7	C4	Cathode diode 4
8	C4	Cathode diode 4
9	A4	Anode diode 4
10	A4	Anode diode 4
11	A3	Anode diode 3
12	A3	Anode diode 3
13	C2	Cathode diode 2
14	C2	Cathode diode 2
15	C1	Cathode diode 1
16	C1	Cathode diode 1

¹ Pins with the same name are internally connected

² Package heat sink (exposed pad) is internally connected to terminal A1

³ See Mode of operations section

Absolute Maximum Ratings

Reverse voltage V_R	80V
Forward surge current I_{FSM}	1A
Power dissipation $T_c=25^\circ\text{C}$	3W
Junction temperature T_j	250°C

Operating Conditions

Reverse voltage V_R	0V to 80V
Continuous forward current I_F	0mA to 900mA
Forward voltage V_F	0V to 2V
Power dissipation $T_c=25^\circ\text{C}$	3W
Junction temperature	-55°C to +225°C

Electrical characteristics (per diode)

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Forward voltage	V_F	$I_F=1\text{mA}$, $T_j=25^\circ\text{C}$		0.65		V
Forward current	I_F	$V_F=1.5\text{V}$; $T_j=25^\circ\text{C}$		450		mA
		$V_F=1.5\text{V}$; $T_j=225^\circ\text{C}$		450		mA
Reverse leakage current	I_R	$V_R=80\text{V}$, $T_j=25^\circ\text{C}$		2		nA
		$V_R=80\text{V}$, $T_j=225^\circ\text{C}$		2.5		uA
Breakdown reverse voltage	$V_{(BR)}$		80			V
Junction capacitance	C_j	$V_R=25\text{V}$; $f = 1\text{ MHz}$		15		pF
Reverse recovery time ⁴	t_{rr}	$V_R = 80\text{V}$		57		ns
Peak reverse recovery current	I_{rrp}	$I_F = 900\text{ mA}$ $T_a = 25^\circ\text{C}$		750		mA

Thermal Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Junction to case thermal resistance ⁵	Θ_{JC}	TDFP16 package		11		$^\circ\text{C/W}$
Junction to air thermal resistance ⁶	Θ_{JA}	TDFP16 package		70		$^\circ\text{C/W}$

⁴ t_{rr} measured between point where current crosses zero and current reaches 10% of peak reverse recovery current

⁵ Power equally distributed through the 4 diodes

⁶ Power equally distributed through the 4 diodes; see Safe operating area, power dissipation, and PCB layout considerations section

Typical Performance Characteristics (applicable to each diode)

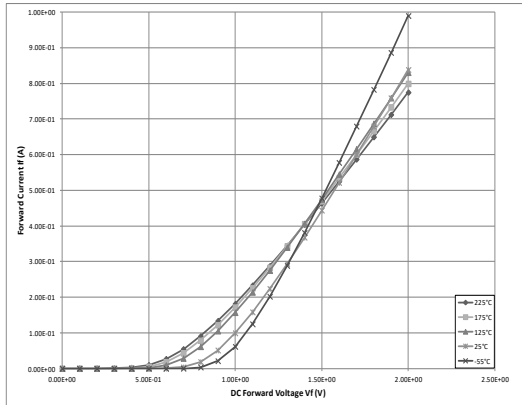


Figure 1: Forward current vs. forward voltage and temperature (linear scale).

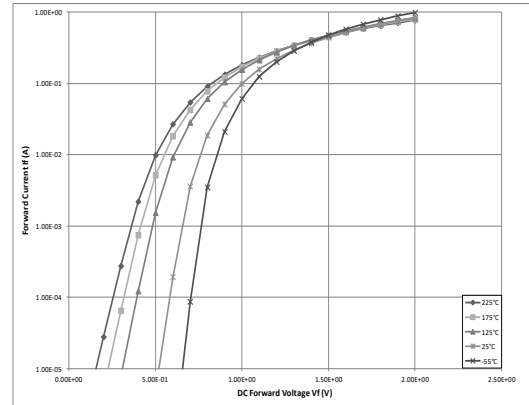


Figure 2: Forward current vs. forward voltage and temperature (\log_{10} scale).

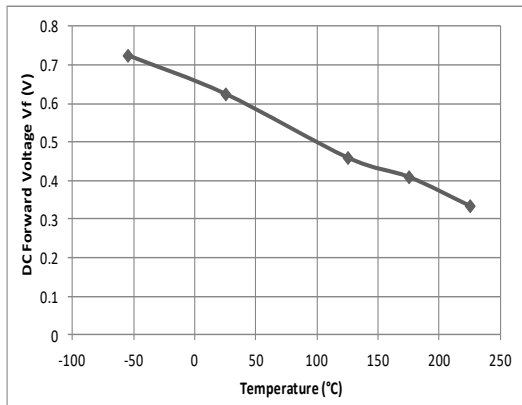


Figure 3: Forward voltage (at forward current $I_f=1\text{mA}$) vs. temperature.

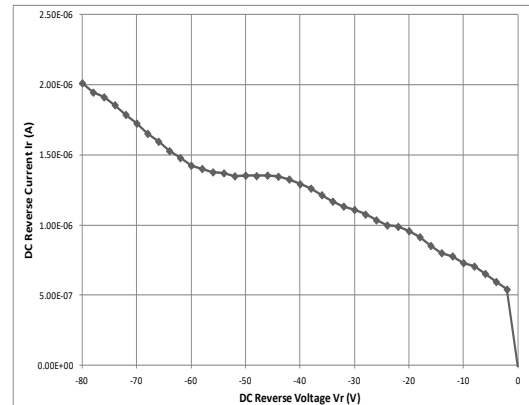


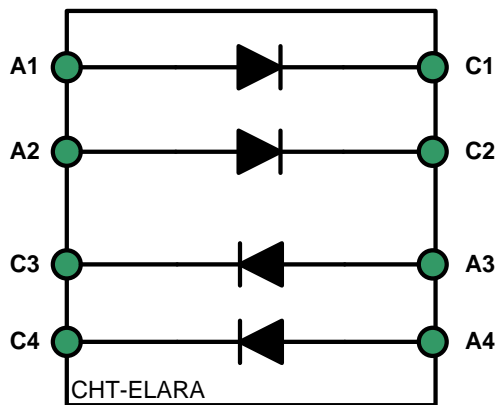
Figure 4: Reverse leakage current vs. reverse voltage ($T_j = 225^\circ\text{C}$)

Mode of operations

CHT-ELARA can be used in a variety of different applications:

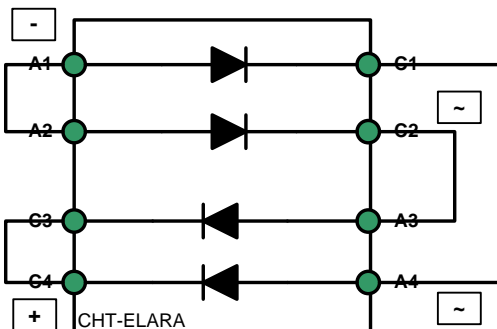
Stand-Alone diodes

Each diode can be used independently of each other. However, A1 pin should be connected to the most negative voltage of the application (even if diode "A1-K1" is not used).



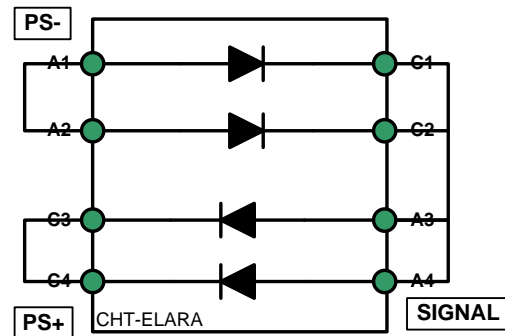
Full-bridge rectifier

In this configuration, A1 pin should be connected to the rectified negative voltage.



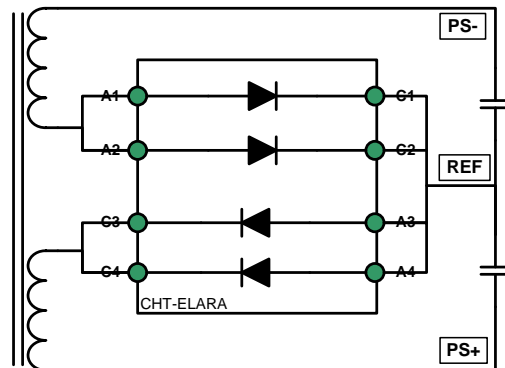
Clamping function

"SIGNAL" is clamped between positive "PS+" and negative "PS-" power supplies. A1 pin must be connected to the negative power supply (even if diode "A1-K1" is not used).



Rectification function

CHT-ELARA can also be used in applications where a positive and a negative power supplies are generated through a transformer.



Safe operating area, power dissipation, and PCB layout considerations

The tiny TDFP package used for CHT-ELARA requires adequate PCB layout in order to achieve efficient thermal dissipation, the minimization of the junction operating temperature, and maximizing the power dissipation taking advantage of the temperature behavior capability of CHT-ELARA.

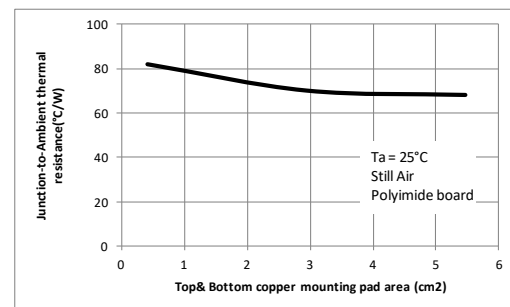
The junction-to-air overall thermal resistance of CHT-ELARA in TDFP package relies, to a large extent, on the implementation of the copper mounting pads that act as a heatsink for the integrated circuit. The design must take into consideration the size of the copper pad and its placement on either of the board surfaces, or both.

The maximum power dissipation is determined by the maximum junction temperature rating, the ambient temperature, and junction-to-ambient thermal resistance:

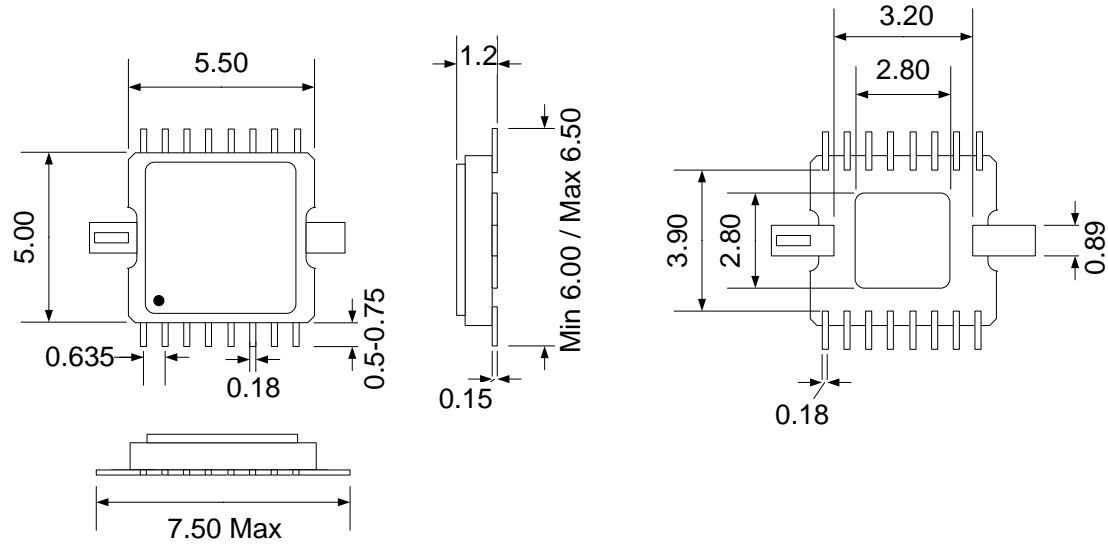
$$P_{D_{MAX}} = (T_{J_{MAX}} - T_A) / R_{\theta JA}$$

Where $T_{J_{MAX}} = 225^{\circ}\text{C}$ and $R_{\theta JA} = R_{\theta JC} + R_{\theta CA}$ with $R_{\theta JC} = 11^{\circ}\text{C/W}$ and $R_{\theta CA}$ (to be determined) is function of the size of the copper mounting pad and thermal coupling to the TDFP16.

The graph below indicates the junction-to-air thermal resistance of the TDFP package mounted on PCB versus the surface of the copper thermal pads on the PCB. The designer should refer to this graph when designing his PCB layout, taking into account his own operating configuration: expected power dissipation and the maximum expected ambient operating temperature.



Package Dimensions



TDFP16 physical dimensions (mm +/- 10%)

Ordering Information

Product Name	Ordering Reference	Package	Marking
CHT-ELARA	CHT-PLA9486A-TDFP16-T	TDFP16	CHT-PLA9486A

Contact & Ordering

CISSOID S.A.

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