



High Efficiency Thyristor

$$V_{RRM} = 1200\text{ V}$$

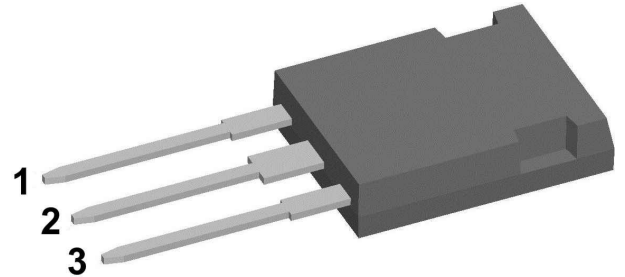
$$I_{TAV} = 80\text{ A}$$

$$V_T = 1.38\text{ V}$$

Single Thyristor

Part number

CLA80E1200HF



Backside: anode



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability

Applications:

- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

Package: PLUS247

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

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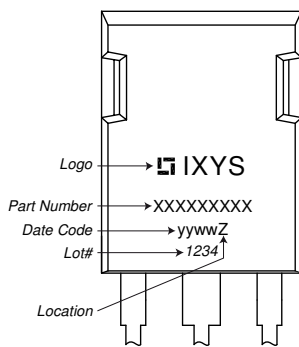


| Thyristor | | | Ratings | | | |
|----------------|--|---|---------------------------|------|------|-------------------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| $V_{RSM/DSM}$ | max. non-repetitive reverse/forward blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1300 | V |
| $V_{RRM/DRM}$ | max. repetitive reverse/forward blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V |
| I_{RD} | reverse current, drain current | $V_{R/D} = 1200 V$ | $T_{VJ} = 25^{\circ}C$ | | 50 | μA |
| | | $V_{R/D} = 1200 V$ | $T_{VJ} = 125^{\circ}C$ | | 5 | mA |
| V_T | forward voltage drop | $I_T = 80 A$ | $T_{VJ} = 25^{\circ}C$ | | 1.40 | V |
| | | $I_T = 160 A$ | | | 1.77 | V |
| | | $I_T = 80 A$ | $T_{VJ} = 125^{\circ}C$ | | 1.38 | V |
| | | $I_T = 160 A$ | | | 1.87 | V |
| I_{TAV} | average forward current | $T_C = 115^{\circ}C$ | $T_{VJ} = 150^{\circ}C$ | | 80 | A |
| $I_{T(RMS)}$ | RMS forward current | 180° sine | | | 126 | A |
| V_{T0} | threshold voltage | } for power loss calculation only | $T_{VJ} = 150^{\circ}C$ | | 0.88 | V |
| r_T | slope resistance | | | | 6.3 | m Ω |
| R_{thJC} | thermal resistance junction to case | | | | 0.2 | K/W |
| R_{thCH} | thermal resistance case to heatsink | | | 0.3 | | K/W |
| P_{tot} | total power dissipation | | $T_C = 25^{\circ}C$ | | 620 | W |
| I_{TSM} | max. forward surge current | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^{\circ}C$ | | 900 | A |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 970 | A |
| | | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 150^{\circ}C$ | | 765 | A |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 825 | A |
| I^2t | value for fusing | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 45^{\circ}C$ | | 4.05 | kA ² s |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 3.92 | kA ² s |
| | | $t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$ | $T_{VJ} = 150^{\circ}C$ | | 2.93 | kA ² s |
| | | $t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$ | $V_R = 0 V$ | | 2.83 | kA ² s |
| C_J | junction capacitance | $V_R = 400 V \quad f = 1 \text{ MHz}$ | $T_{VJ} = 25^{\circ}C$ | | 36 | pF |
| P_{GM} | max. gate power dissipation | $t_p = 30 \mu s$ | $T_C = 150^{\circ}C$ | | 10 | W |
| | | $t_p = 300 \mu s$ | | | 5 | W |
| P_{GAV} | average gate power dissipation | | | | 0.5 | W |
| $(di/dt)_{cr}$ | critical rate of rise of current | $T_{VJ} = 150^{\circ}C; f = 50 \text{ Hz}$ | repetitive, $I_T = 240 A$ | | 150 | A/ μs |
| | | $t_p = 200 \mu s; di_G/dt = 0.3 A/\mu s;$ | non-repet., $I_T = 80 A$ | | 500 | A/ μs |
| $(dv/dt)_{cr}$ | critical rate of rise of voltage | $V = \frac{2}{3} V_{DRM}$ | $T_{VJ} = 150^{\circ}C$ | | 1000 | V/ μs |
| | | $R_{GK} = \infty; \text{method 1 (linear voltage rise)}$ | | | | |
| V_{GT} | gate trigger voltage | $V_D = 6 V$ | $T_{VJ} = 25^{\circ}C$ | | 1.5 | V |
| | | | $T_{VJ} = -40^{\circ}C$ | | 1.6 | V |
| I_{GT} | gate trigger current | $V_D = 6 V$ | $T_{VJ} = 25^{\circ}C$ | | 38 | mA |
| | | | $T_{VJ} = -40^{\circ}C$ | | 80 | mA |
| V_{GD} | gate non-trigger voltage | $V_D = \frac{2}{3} V_{DRM}$ | $T_{VJ} = 150^{\circ}C$ | | 0.2 | V |
| I_{GD} | gate non-trigger current | | | | 5 | mA |
| I_L | latching current | $t_p = 10 \mu s$ | $T_{VJ} = 25^{\circ}C$ | | 150 | mA |
| | | $I_G = 0.3 A; di_G/dt = 0.3 A/\mu s$ | | | | |
| I_H | holding current | $V_D = 6 V \quad R_{GK} = \infty$ | $T_{VJ} = 25^{\circ}C$ | | 100 | mA |
| t_{gd} | gate controlled delay time | $V_D = \frac{1}{2} V_{DRM}$ | $T_{VJ} = 25^{\circ}C$ | | 2 | μs |
| | | $I_G = 0.3 A; di_G/dt = 0.3 A/\mu s$ | | | | |
| t_q | turn-off time | $V_R = 100 V; I_T = 80 A; V = \frac{2}{3} V_{DRM}$ | $T_{VJ} = 125^{\circ}C$ | | 150 | μs |
| | | $di/dt = 20 A/\mu s \quad dv/dt = 20 V/\mu s \quad t_p = 200 \mu s$ | | | | |



| Package PLUS247 | | Ratings | | | | |
|-----------------|--|----------------------|------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 70 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 150 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 150 | °C |
| Weight | | | | 6 | | g |
| F_C | mounting force with clip | | 20 | | 120 | N |
| $d_{Spp/App}$ | creepage distance on surface / striking distance through air | terminal to terminal | 5.5 | | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 5.5 | | | mm |

Product Marking



Part description

- C = Thyristor (SCR)
- L = High Efficiency Thyristor
- A = (up to 1200V)
- 80 = Current Rating [A]
- E = Single Thyristor
- 1200 = Reverse Voltage [V]
- HF = PLUS247 (3)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | CLA80E1200HF | CLA80E1200HF | Tube | 30 | 508680 |

Equivalent Circuits for Simulation

** on die level*

$T_{VJ} = 150^{\circ}C$

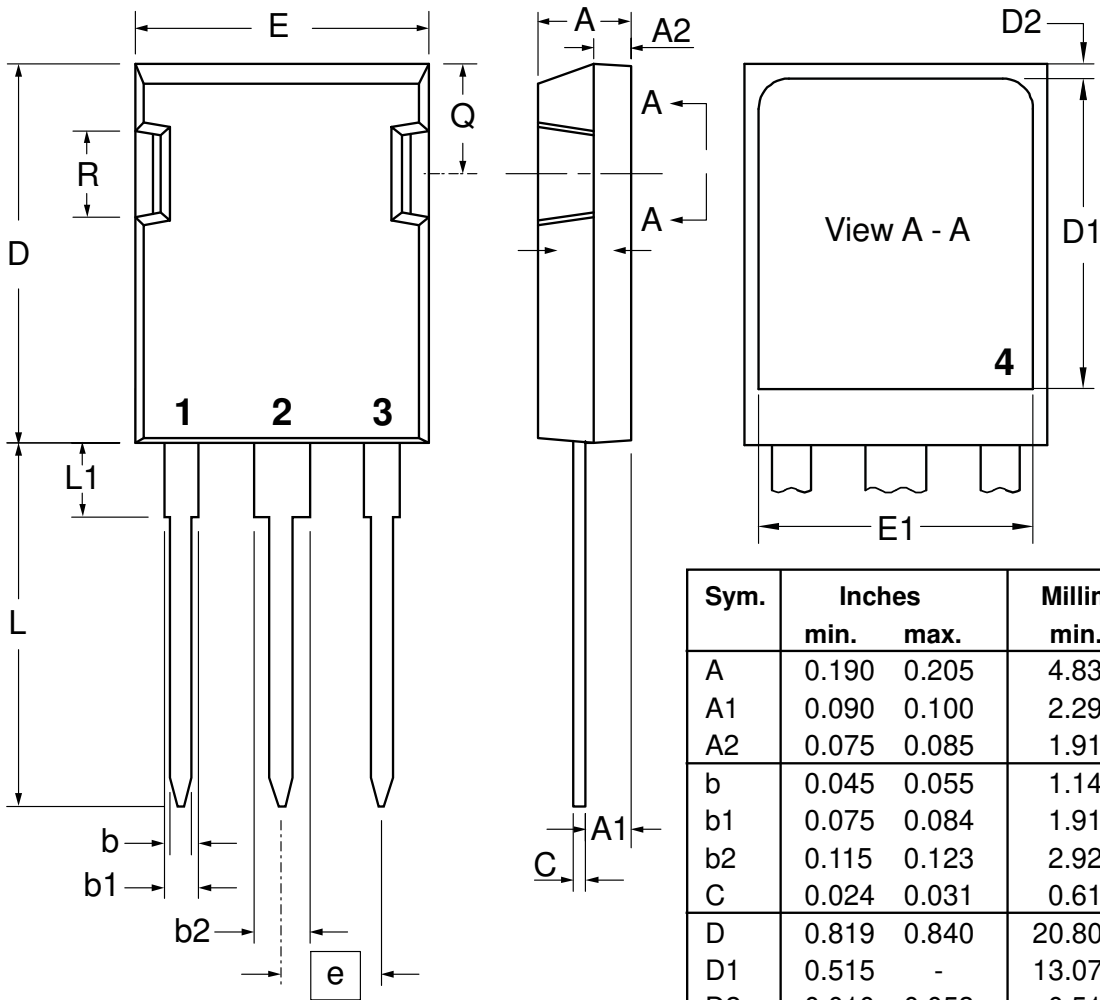


Thyristor

| | | | |
|--------------|--------------------|------|----|
| $V_{0\ max}$ | threshold voltage | 0.88 | V |
| $R_{0\ max}$ | slope resistance * | 3.8 | mΩ |



Outlines PLUS247



| Sym. | Inches | | Millimeter | |
|------|-----------|-------|------------|-------|
| | min. | max. | min. | max. |
| A | 0.190 | 0.205 | 4.83 | 5.21 |
| A1 | 0.090 | 0.100 | 2.29 | 2.54 |
| A2 | 0.075 | 0.085 | 1.91 | 2.16 |
| b | 0.045 | 0.055 | 1.14 | 1.40 |
| b1 | 0.075 | 0.084 | 1.91 | 2.13 |
| b2 | 0.115 | 0.123 | 2.92 | 3.12 |
| C | 0.024 | 0.031 | 0.61 | 0.80 |
| D | 0.819 | 0.840 | 20.80 | 21.34 |
| D1 | 0.515 | - | 13.07 | - |
| D2 | 0.010 | 0.053 | 0.51 | 1.35 |
| E | 0.620 | 0.635 | 15.75 | 16.13 |
| E1 | 0.530 | - | 13.45 | - |
| e | 0.215 BSC | | 5.45 BSC | |
| L | 0.780 | 0.800 | 19.81 | 20.32 |
| L1 | 0.150 | 0.170 | 3.81 | 4.32 |
| Q | 0.220 | 0.244 | 5.59 | 6.20 |
| R | 0.170 | 0.190 | 4.32 | 4.83 |



Thyristor

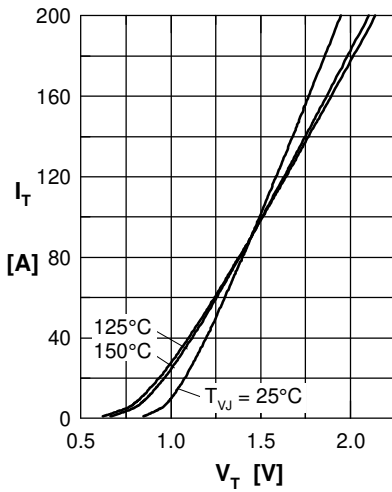


Fig. 1 Forward characteristics

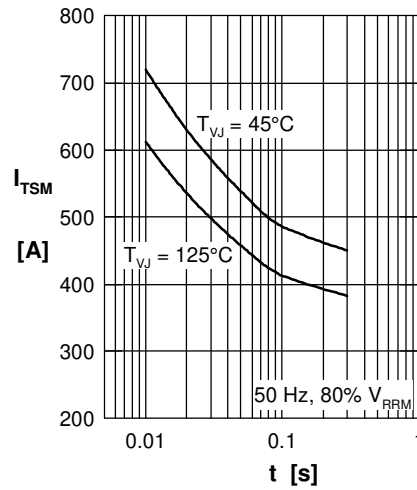


Fig. 2 Surge overload current

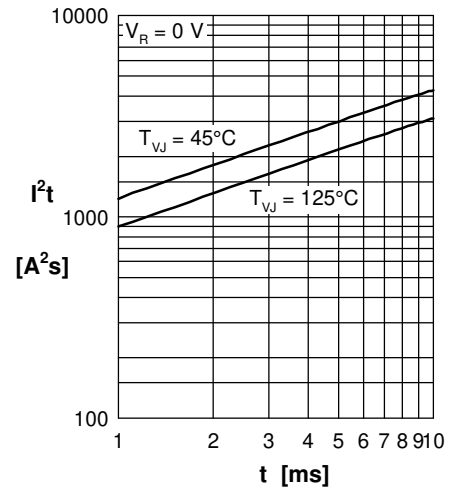


Fig. 3 I^2t versus time (1-10 ms)

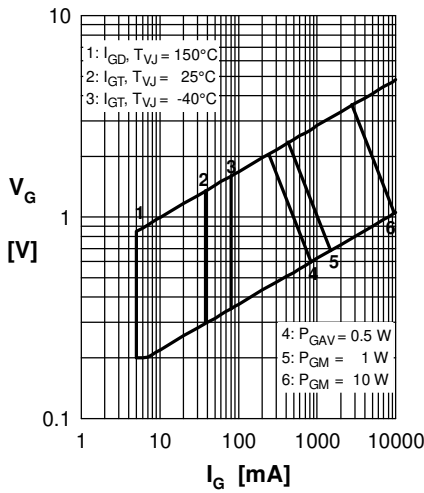


Fig. 4 Gate trigger characteristics

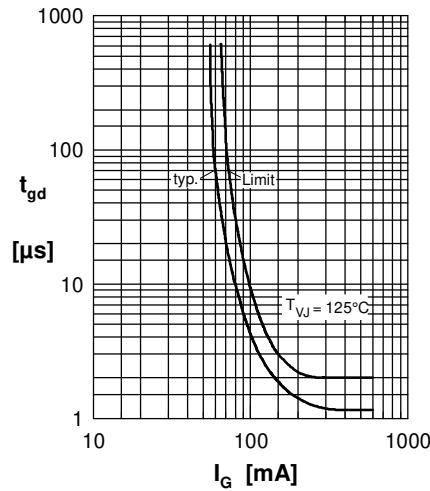


Fig. 5 Gate controlled delay time

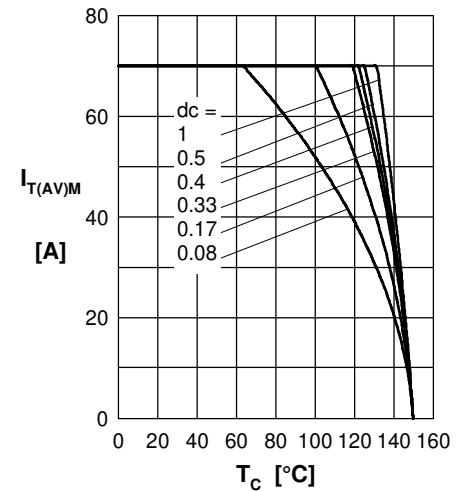


Fig. 6 Max. forward current at case temperature

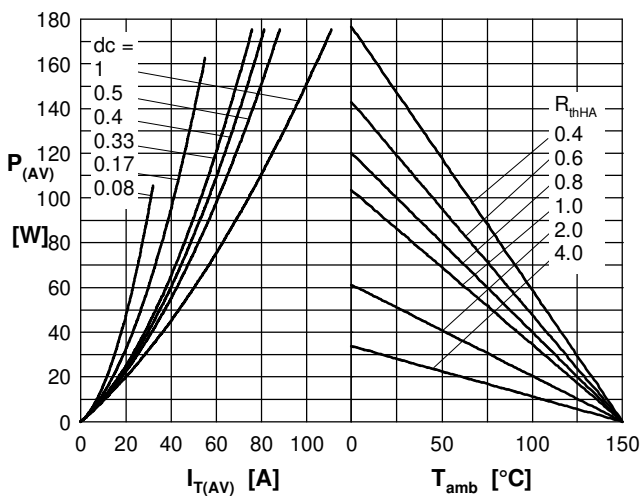


Fig. 7a Power dissipation versus direct output current
 Fig. 7b and ambient temperature

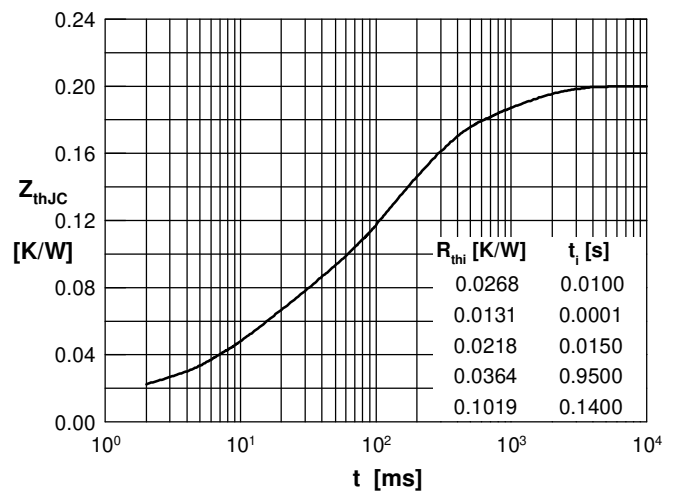


Fig. 8 Transient thermal impedance