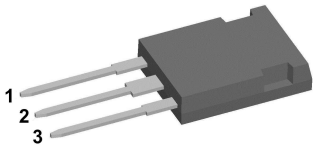
# High Efficiency Thyristor

| | | |
|---|---|---|
| $V_{RRM}$ | = | 1200 V |
| $I_{TAV}$ | = | 80 A |
| $V_T$ | = | 1,38 V |

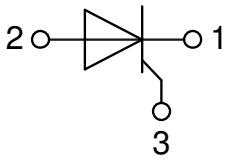
Single Thyristor

**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

**Terms _Conditions of usage:**

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact the sales office, which is responsible for you.
Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.
Should you intend to use the product in aviation, in health or live endangering or life support applications, please notify. For any such application we urgently recommend
- to perform joint risk and quality assessments;
- the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

IXYS reserves the right to change limits, conditions and dimensions. Data according to IEC 60747and per semiconductor unless otherwise specified 20150827c

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sales@prom-elec.com / ООО ПРОМЭЛЕКТРОНИКА

| Thyristor | | | | Ratings | | | |
|---|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| $V_{RSM/DSM}$ | *max. non-repetitive reverse/forward blocking voltage* | | $T_{VJ}$ = 25°C | | | 1300 | V |
| $V_{RRM/DRM}$ | *max. repetitive reverse/forward blocking voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $I_{R/D}$ | *reverse current, drain current* | $V_{R/D}$ = 1200 V | $T_{VJ}$ = 25°C | | | 50 | µA |
| | | $V_{R/D}$ = 1200 V | $T_{VJ}$ = 125°C | | | 5 | mA |
| $V_T$ | *forward voltage drop* | $I_T$ = 80 A | $T_{VJ}$ = 25°C | | | 1,40 | V |
| | | $I_T$ = 160 A | | | | 1,77 | V |
| | | $I_T$ = 80 A | $T_{VJ}$ = 125°C | | | 1,38 | V |
| | | $I_T$ = 160 A | | | | 1,87 | V |
| $I_{TAV}$ | *average forward current* | $T_C$ = 115°C | $T_{VJ}$ = 150°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°C | | | 0,88 | V |
| $r_T$ | *slope resistance* } *for power loss calculation only* | | | | | 6,3 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 0,2 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0,25 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 620 | W |
| $I_{TSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 900 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 970 | A |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 765 | A |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 825 | A |
| $I^2t$ | *value for fusing* | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 45°C | | | 4,05 | kA²s |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 3,92 | kA²s |
| | | t = 10 ms; (50 Hz), sine | $T_{VJ}$ = 150°C | | | 2,93 | kA²s |
| | | t = 8,3 ms; (60 Hz), sine | $V_R$ = 0 V | | | 2,83 | kA²s |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V f = 1 MHz | $T_{VJ}$ = 25°C | | 36 | | pF |
| $P_{GM}$ | *max. gate power dissipation* | $t_P$ = 30 µs | $T_C$ = 150°C | | | 10 | W |
| | | $t_P$ = 300 µs | | | | 5 | W |
| $P_{GAV}$ | *average gate power dissipation* | | | | | 0,5 | W |
| $(di/dt)_{cr}$ | *critical rate of rise of current* | $T_{VJ}$ = 150°C; f = 50 Hz repetitive, $I_T$ = 240 A | | | | 150 | A/µs |
| | | $t_P$ = 200 µs; $di_G/dt$ = 0,3 A/µs; $I_G$ = 0,3 A; V = ⅔ $V_{DRM}$ non-repet., $I_T$ = 80 A | | | | 500 | A/µs |
| $(dv/dt)_{cr}$ | *critical rate of rise of voltage* | V = ⅔ $V_{DRM}$ | $T_{VJ}$ = 150°C | | | 1000 | V/µs |
| | | $R_{GK}$ = ∞; method 1 (linear voltage rise) | | | | | |
| $V_{GT}$ | *gate trigger voltage* | $V_D$ = 6 V | $T_{VJ}$ = 25°C | | | 1,5 | V |
| | | | $T_{VJ}$ = -40°C | | | 1,6 | V |
| $I_{GT}$ | *gate trigger current* | $V_D$ = 6 V | $T_{VJ}$ = 25°C | | | 38 | mA |
| | | | $T_{VJ}$ = -40°C | | | 80 | mA |
| $V_{GD}$ | *gate non-trigger voltage* | $V_D$ = ⅔ $V_{DRM}$ | $T_{VJ}$ = 150°C | | | 0,2 | V |
| $I_{GD}$ | *gate non-trigger current* | | | | | 5 | mA |
| $I_L$ | *latching current* | $t_p$ = 10 µs | $T_{VJ}$ = 25°C | | | 150 | mA |
| | | $I_G$ = 0,3 A; $di_G/dt$ = 0,3 A/µs | | | | | |
| $I_H$ | *holding current* | $V_D$ = 6 V $R_{GK}$ = ∞ | $T_{VJ}$ = 25°C | | | 100 | mA |
| $t_{gd}$ | *gate controlled delay time* | $V_D$ = ½ $V_{DRM}$ | $T_{VJ}$ = 25°C | | | 2 | µs |
| | | $I_G$ = 0,3 A; $di_G/dt$ = 0,3 A/µs | | | | | |
| $t_q$ | *turn-off time* | $V_R$ = 100 V; $I_T$ = 80 A; V = ⅔ $V_{DRM}$ | $T_{VJ}$ = 125 °C | | 150 | | µs |
| | | di/dt = 20 A/µs dv/dt = 20 V/µs $t_p$ = 200 µs | | | | | |



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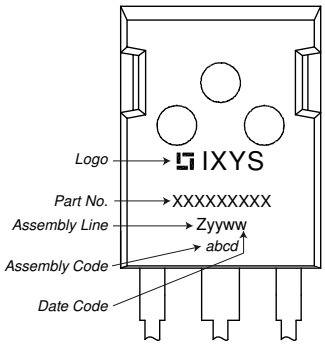
| Package PLUS247 | | | Ratings | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Definition** | **Conditions** | **min.** | **typ.** | **max.** | **Unit** |
| $I_{RMS}$ | *RMS current* | per terminal | | | 70 | A |
| $T_{VJ}$ | *virtual junction temperature* | | -40 | | 150 | °C |
| $T_{op}$ | *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

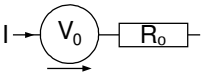



**Part description**

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 °C




**Thyristor**

| | | | |
|---|---|---|---|
| $V_{0\,max}$ | *threshold voltage* | 0,88 | V |
| $R_{0\,max}$ | *slope resistance ** | 3,8 | mΩ |



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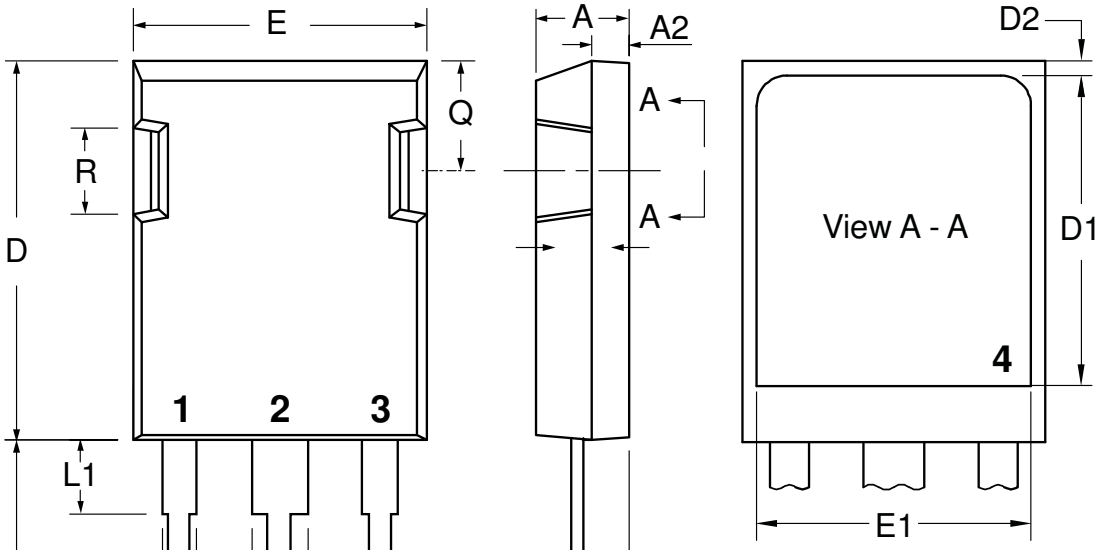
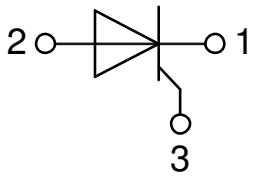
## Outlines PLUS247




| Sym. | Inches min. | Inches max. | Millimeter min. | Millimeter 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 |



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## Thyristor

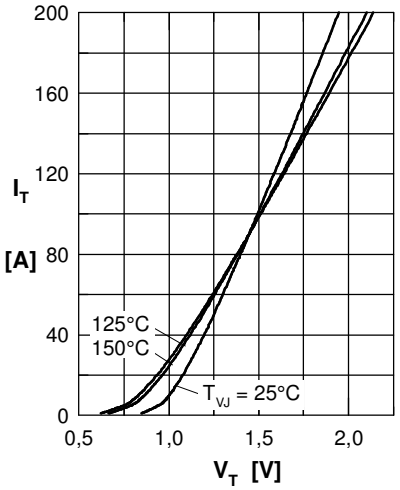


Fig. 1 Forward characteristics

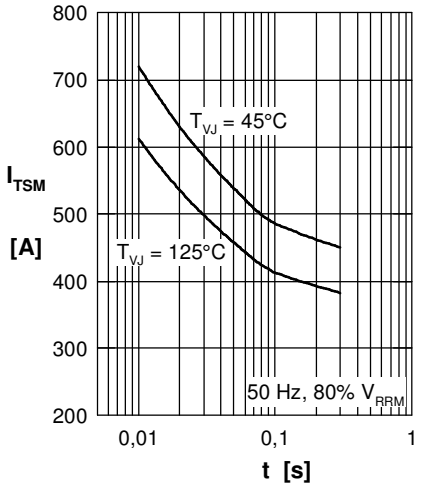


Fig. 2 Surge overload current

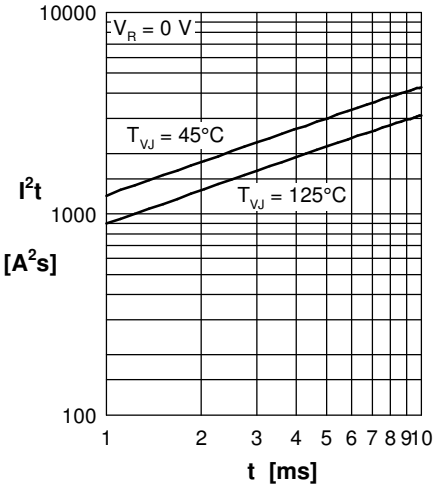


Fig. 3 $I^2t$ versus time (1-10 ms)

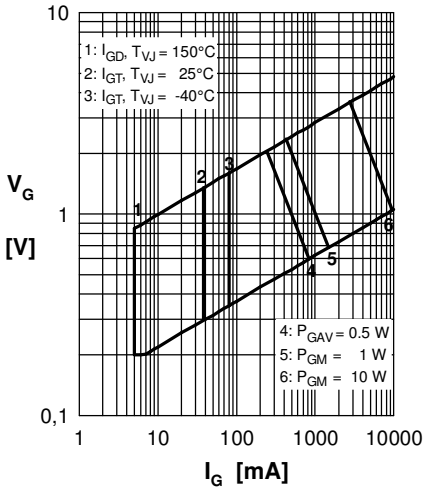


Fig. 4 Gate trigger characteristics

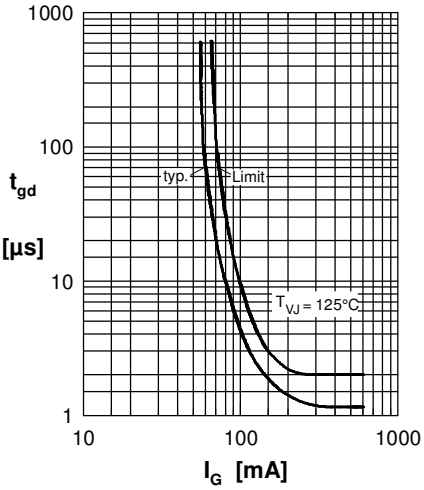


Fig. 5 Gate controlled delay time

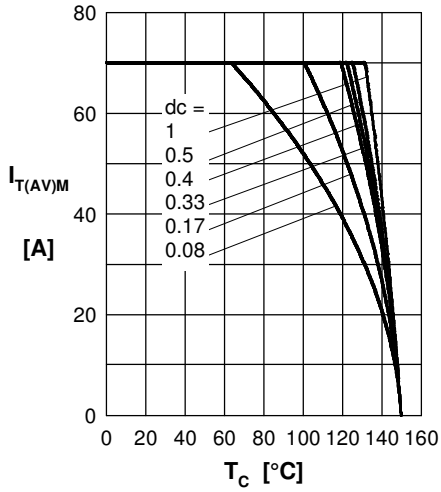


Fig. 6 Max. forward current at case temperature

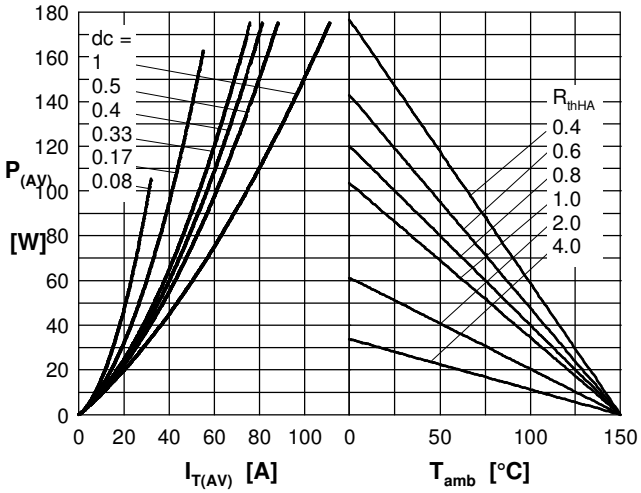


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

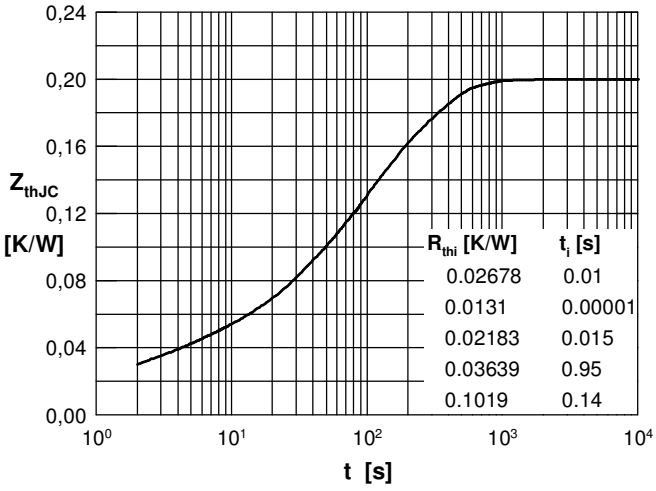


Fig. 8 Transient thermal impedance



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