



advanced

High Efficiency Thyristor

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

$$I_{TAV} = 20\text{ A}$$

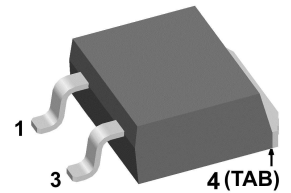
$$V_T = 1.4\text{ V}$$

Triode
Single Reverse Conducting Thyristor

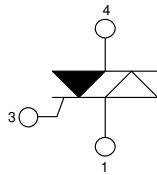
Part number

CLA20EF1200PZ

Marking on Product: *CLA20EF1200PZ*



Backside: anode



Features / Advantages:

- Thyristor for fast turn-on switching
- Integrated free wheeling diode
- Planar passivated chip
- Long-term stability

Applications:

- Ignition for HD lamps
- Capacity discharge

Package: TO-263 (D2Pak-HV)

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

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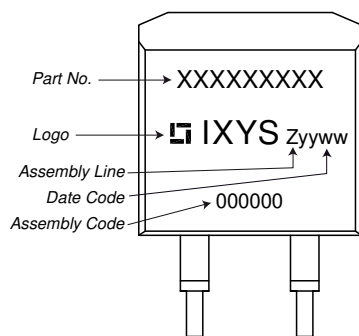


| Thyristor | | | | Ratings | | | |
|----------------|--|--|-------------------------|---------|------------|------------------|--|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| V_{DSM} | max. non-repetitive forward blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1300 | V | |
| V_{DRM} | max. repetitive forward blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V | |
| I_D | drain current | $V_D = 1200 V$ | $T_{VJ} = 25^{\circ}C$ | | 10 | μA | |
| | | $V_D = 1200 V$ | $T_{VJ} = 125^{\circ}C$ | | 1 | mA | |
| V_T | forward voltage drop Note: reverse voltage drop $\sim 1.2 \times VT$ | $I_T = 20 A$ | $T_{VJ} = 25^{\circ}C$ | | 1.40 | V | |
| | | $I_T = 40 A$ | | | 1.60 | V | |
| | | $I_T = 20 A$ | $T_{VJ} = 125^{\circ}C$ | | 1.40 | V | |
| | | $I_T = 40 A$ | | | 1.60 | V | |
| I_{TAV} | average forward current | $T_C = 115^{\circ}C$ DC | $T_{VJ} = 150^{\circ}C$ | | 20 | A | |
| V_{T0} | threshold voltage slope resistance } for power loss calculation only | | $T_{VJ} = 150^{\circ}C$ | | 0.90 | V | |
| r_T | | | | 25 | m Ω | | |
| R_{thJC} | thermal resistance junction to case | | | | 0.65 | K/W | |
| R_{thCH} | thermal resistance case to heatsink | | | 0.25 | | K/W | |
| P_{tot} | total power dissipation | | $T_C = 25^{\circ}C$ | | 190 | W | |
| I_{TSM} | max. forward surge current | $t = 10 ms$; (50 Hz), sine | $T_{VJ} = 45^{\circ}C$ | | 120 | A | |
| | | $t = 8,3 ms$; (60 Hz), sine | $V_R = 0 V$ | | 130 | A | |
| | | $t = 10 ms$; (50 Hz), sine | $T_{VJ} = 150^{\circ}C$ | | 100 | A | |
| | | $t = 8,3 ms$; (60 Hz), sine | $V_R = 0 V$ | | 110 | A | |
| I^2t | value for fusing | $t = 10 ms$; (50 Hz), sine | $T_{VJ} = 45^{\circ}C$ | | 72 | A ² s | |
| | | $t = 8,3 ms$; (60 Hz), sine | $V_R = 0 V$ | | 70 | A ² s | |
| | | $t = 10 ms$; (50 Hz), sine | $T_{VJ} = 150^{\circ}C$ | | 50 | A ² s | |
| | | $t = 8,3 ms$; (60 Hz), sine | $V_R = 0 V$ | | 50 | A ² s | |
| C_J | junction capacitance | $V_R = 400 V$ $f = 1 MHz$ | $T_{VJ} = 25^{\circ}C$ | 6 | | 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 | $T_{VJ} = 150^{\circ}C$; $f = 50 Hz$ repetitive, $I_T = 60 A$ | | | 500 | A/ μs | |
| | | $t_p = 1 \mu s$; $di_G/dt = 0.5 A/\mu s$; $I_{TSA} = 600 A$ $I_G = 0.07 A$; $V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 20 A$ | | | 1500 | A/ μs | |
| $(dv/dt)_{cr}$ | critical rate of rise of voltage | $V = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise) | $T_{VJ} = 150^{\circ}C$ | | 500 | V/ μs | |
| V_{GT} | gate trigger voltage | $V_D = 6 V$ | $T_{VJ} = 25^{\circ}C$ | | 1.3 | V | |
| | | | $T_{VJ} = -40^{\circ}C$ | | 1.6 | V | |
| I_{GT} | gate trigger current | $V_D = 6 V$ | $T_{VJ} = 25^{\circ}C$ | | 20 | mA | |
| | | | $T_{VJ} = -40^{\circ}C$ | | 35 | 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 | | | | 1 | mA | |
| I_L | latching current | $t_p = 10 \mu s$ | $T_{VJ} = 25^{\circ}C$ | | 30 | mA | |
| | | $I_G = 0.07 A$; $di_G/dt = 0.5 A/\mu s$ | | | | | |
| I_H | holding current | $V_D = 6 V$ $R_{GK} = \infty$ | $T_{VJ} = 25^{\circ}C$ | | 25 | mA | |
| t_{gd} | gate controlled delay time | $V_D = \frac{1}{2} V_{DRM}$ $I_G = 0.07 A$; $di_G/dt = 0.5 A/\mu s$ | $T_{VJ} = 25^{\circ}C$ | | 2 | μs | |
| t_q | turn-off time | $V_R = 0 V$; $I_T = 20 A$; $V = \frac{2}{3} V_{DRM}$ $di/dt = 10 A/\mu s$ $dv/dt = 20 V/\mu s$ $t_p = 200 \mu s$ | $T_{VJ} = 125^{\circ}C$ | 150 | | μs | |



| Package TO-263 (D2Pak-HV) | | Ratings | | | | |
|---------------------------|--|----------------------|------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 35 | A |
| T_{VJ} | virtual junction temperature | | -40 | | 150 | °C |
| T_{op} | operation temperature | | -40 | | 125 | °C |
| T_{stg} | storage temperature | | -40 | | 150 | °C |
| Weight | | | | 1.5 | | g |
| F_C | mounting force with clip | | 20 | | 60 | N |
| $d_{Spp/App}$ | creepage distance on surface / striking distance through air | terminal to terminal | 4.2 | | | mm |
| $d_{Spb/Apb}$ | | terminal to backside | 4.7 | | | mm |

Product Marking



Part description

- C = Thyristor (SCR)
- L = High Efficiency Thyristor
- A = (up to 1200V)
- 20 = Current Rating [A]
- EF = Single Reverse Conducting Thyristor
- 1200 = Reverse Voltage [V]
- PZ = TO-263AB (D2Pak) (2HV)

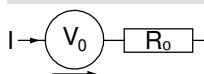
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|-------------------|--------------------|---------------|----------|----------|
| Standard | CLA20EF1200PZ-TRL | CLA20EF1200PZ | Tape & Reel | 800 | 522555 |
| Alternative | CLA20EF1200PZ-TUB | CLA20EF1200PZ | Tube | 50 | 523762 |

| Similar Part | Package | Voltage class |
|---------------|--------------|---------------|
| CLA20EF1200PB | TO-220AB (3) | 1200 |

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150\text{ °C}$

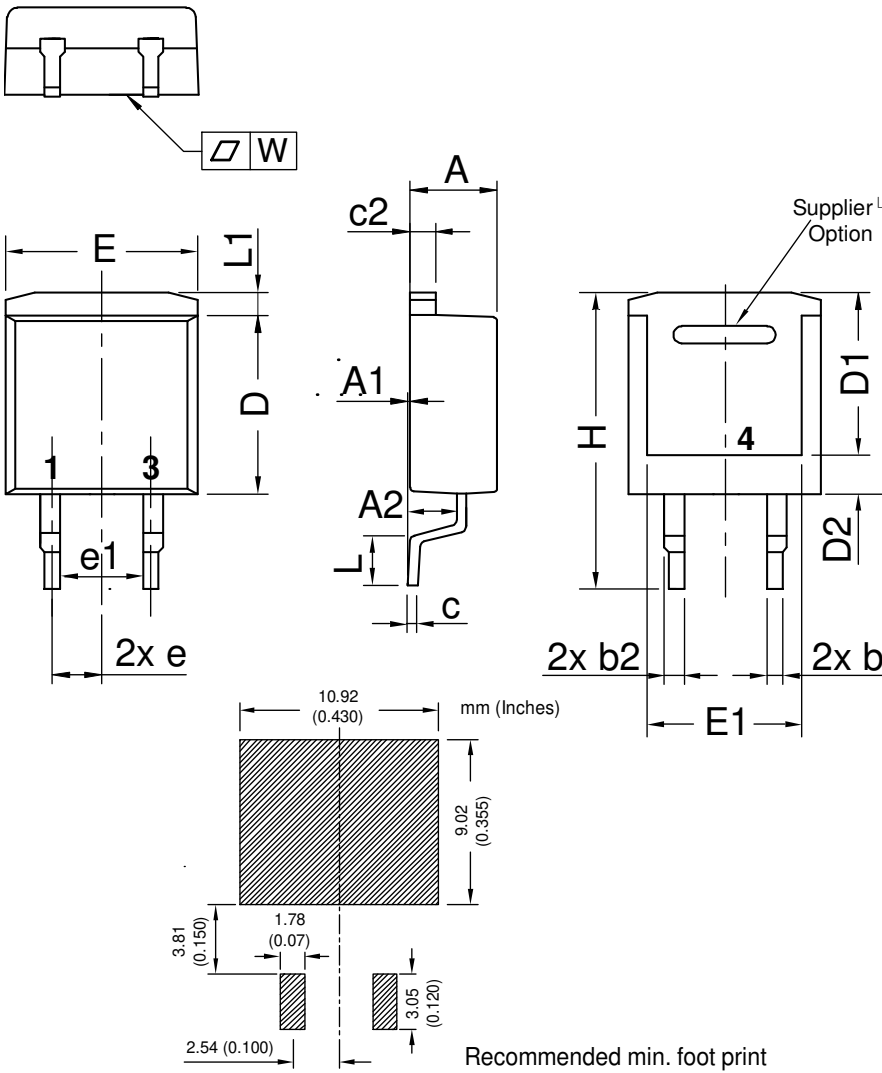


Thyristor

| | | | |
|--------------|--------------------|-----|----|
| $V_{0\ max}$ | threshold voltage | 0.9 | V |
| $R_{0\ max}$ | slope resistance * | 22 | mΩ |

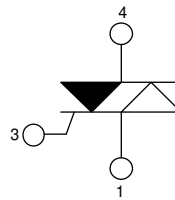


Outlines TO-263 (D2Pak-HV)



| Dim. | Millimeter | | Inches | |
|------|------------|-------|-------------|-------|
| | min | max | min | max |
| A | 4.06 | 4.83 | 0.160 | 0.190 |
| A1 | typ. 0.10 | | typ. 0.004 | |
| A2 | 2.41 | | 0.095 | |
| b | 0.51 | 0.99 | 0.020 | 0.039 |
| b2 | 1.14 | 1.40 | 0.045 | 0.055 |
| c | 0.40 | 0.74 | 0.016 | 0.029 |
| c2 | 1.14 | 1.40 | 0.045 | 0.055 |
| D | 8.38 | 9.40 | 0.330 | 0.370 |
| D1 | 8.00 | 8.89 | 0.315 | 0.350 |
| D2 | 2.3 | | 0.091 | |
| E | 9.65 | 10.41 | 0.380 | 0.410 |
| E1 | 6.22 | 8.50 | 0.245 | 0.335 |
| e | 2,54 BSC | | 0,100 BSC | |
| e1 | 4.28 | | 0.169 | |
| H | 14.61 | 15.88 | 0.575 | 0.625 |
| L | 1.78 | 2.79 | 0.070 | 0.110 |
| L1 | 1.02 | 1.68 | 0.040 | 0.066 |
| W | typ. 0.02 | 0.040 | typ. 0.0008 | 0.002 |

All dimensions conform with and/or within JEDEC standard.





Thyristor



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