# YC431-Power Thyristor

**Jiangsu Yangjie Runau Semiconductor Co.,Ltd**

1000- 2000 V$_{RRM}$

****************************************************************************************
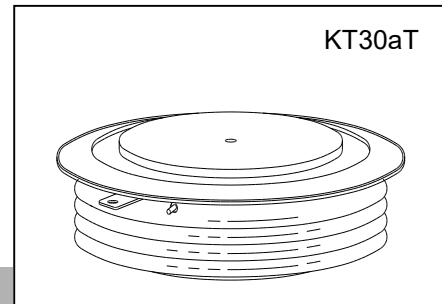
## HIGH POWER THYRISTOR FOR PHASE CONTROL APPLICATIONS

### Features:
- . All Diffused Structure
- . Interdigitated Amplifying Gate Configuration
- . Blocking capabilty up to 2000 volts
- . Guaranteed Maximum Turn-Off Time
- . High dV/dt Capability
- . Pressure Assembled Device

KT30aT

## ELECTRICAL CHARACTERISTICS AND RATINGS

### Blocking - Off State

| Device Type | V$_{RRM}$ (1) | V$_{DRM}$ (1) | V$_{RSM}$ (1) |
|---|---|---|---|
| YC431P | 1000 | 1000 | 1100 |
| YC431PA | 1100 | 1100 | 1200 |
| YC431PB | 1200 | 1200 | 1300 |
| YC431PD | 1400 | 1400 | 1500 |
| YC431PM | 1600 | 1600 | 1700 |
| YC431PN | 1800 | 1800 | 1900 |
| YC431L | 2000 | 2000 | 2100 |

V$_{RRM}$ = Repetitive peak reverse voltage

V$_{DRM}$ = Repetitive peak off state voltage

V$_{RSM}$ = Non repetitive peak reverse voltage (2)

| Repetitive peak reverse leakage and off state leakage | I$_{RRM}$ / I$_{DRM}$ | 15 mA<br>35 mA (3) |
|---|---|---|
| Critical rate of voltage rise | dV/dt (4) | 200 V/µsec |

Notes:

All ratings are specified for Tj=25 $^{o}$C unless otherwise stated.

(1) All voltage ratings are specified for an applied 50Hz/60zHz sinusoidal waveform over the temperature range   -40 to +125 $^{o}$C.

(2) 10 msec. max. pulse width

(3) Maximum value for Tj = 125 $^{o}$C.

(4) Minimum value for linear and exponential waveshape to 80% rated V$_{DRM}$. Gate open. Tj = 125 $^{o}$C.

(5) Non-repetitive value.

(6) The value of di/dt is established in accordance with EIA/NIMA Standard RS-397, Section 5-2-2-6. The value defined would be in addition to that obtained from a snubber circuit, comprising a 0.2 µF capacitor and 20 ohms resistance in parallel with the thristor under test.

### Conducting - on state

| Parameter | Symbol | Min. | Max. | Typ. | Units | Conditions |
|---|---|---|---|---|---|---|
| Average value of on-state current | I$_{T(AV)}$ | | 600 | | A | Sinewave,180$^{o}$ conduction,T$_c$=65$^{o}$C |
| RMS value of on-state current | I$_{TRMS}$ | | 940 | | A | Nominal value |
| Peak one cycle surge (non repetitive) current | I$_{TSM}$ | | 8000 | | A | 8.3 msec (60Hz), sinusoidal waveshape, 180$^{o}$ conduction, T$_j$ = 125 $^{o}$C |
| | | | 7400 | | A | 10.0 msec (50Hz), sinusoidal waveshape, 180$^{o}$ conduction, T$_j$ = 125 $^{o}$C |
| I square t | I$^2$t | | 265000 | | A$^2$s | 8.3 msec |
| Latching current | I$_L$ | | 800 | | mA | V$_D$ = 24 V; R$_L$= 12 ohms |
| Holding current | I$_H$ | | 400 | | mA | V$_{D =}$ 24 V; I = 2.5 A |
| Peak on-state voltage | V$_{TM}$ | | 2.30 | | V | I$_{TM}$ = 2000 A; |
| Critical rate of rise of on-state current (5, 6) | di/dt | | 400 | | A/µs | Switching from V$_{DRM}$ ≤ 1000 V, non-repetitive |
| Critical rate of rise of on-state current (6) | di/dt | | 150 | | A/µs | Switching from V$_{DRM}$ ≤ 1000 V |

## Gating

| Parameter | Symbol | Min. | Max. | Typ. | Units | Conditions |
|---|---|---|---|---|---|---|
| Peak gate power dissipation | $P_{GM}$ | | 200 | | W | $t_p$ = 40 us |
| Average gate power dissipation | $P_{G(AV)}$ | | 5 | | W | |
| Peak gate current | $I_{GM}$ | | 10 | | A | |
| Gate current required to trigger all units | $I_{GT}$ | | 300<br>200<br>125 | | mA<br>mA<br>mA | $V_D$ = 6 V;$R_L$ = 3 ohms;$T_j$ = -40 $^o$C<br>$V_D$ = 6 V;$R_L$ = 3 ohms;$T_j$ = +25 $^o$C<br>$V_D$ = 6 V;$R_L$ = 3 ohms;$T_j$ = +125$^o$C |
| Gate voltage required to trigger all units | $V_{GT}$ | 0.30 | 5<br>3 | | V<br>V<br>V | $V_D$ = 6 V;$R_L$ = 3 ohms;$T_j$ = -40 $^o$C<br>$V_D$ = 6 V;$R_L$ = 3 ohms;$T_j$ = 0-125$^o$C<br>$V_D$ = Rated $V_{DRM}$; $R_L$ = 1000 ohms;<br>$T_j$ = + 125 $^o$C |
| Peak negative voltage | $V_{GRM}$ | | 5 | | V | |

## Dynamic

| Parameter | Symbol | Min. | Max. | Typ. | Units | Conditions |
|---|---|---|---|---|---|---|
| Delay time | $t_d$ | | 1.5 | 0.7 | μs | $I_{TM}$ = 50 A; $V_D$ = 67% $V_{DRM}$<br>Gate pulse: $V_G$ = 30 V; $R_G$ = 10<br>ohms; $t_r$ = 0.1 μs; $t_p$ = 20 μs |
| Turn-off time (with $V_R$ = -5 V) | $t_q$ | | 250 | 125 | μs | $I_{TM}$ > 1000 A; di/dt = 25 A/μs;<br>$V_R \geq$ -5 V; Re-applied dV/dt =<br>20V/μs linear to 67% $V_{DRM}$ ;<br>$T_j$ = 125 $^o$C; Duty cycle $\geq$ 0.01% |
| Reverse recovery charge | $I_{rr}$ | | | | μC | $I_{TM}$ > 1000 A; di/dt = 25 A/μs;<br>$V_R \geq$ -50 V; $T_j$ = 125 $^o$C |

## THERMAL AND MECHANICAL CHARACTERISTICS AND RATINGS

| Parameter | Symbol | Min. | Max. | Typ. | Units | Conditions |
|---|---|---|---|---|---|---|
| Operating temperature | $T_j$ | -40 | +125 | | $^o$C | |
| Storage temperature | $T_{stg}$ | -40 | +150 | | $^o$C | |
| Thermal resistance - junction to case | $R_{\Theta (j-c)}$ | | 0.055<br>0.110 | | $^o$C/W | Double sided cooled<br>Single sided cooled |
| Thermal resistamce - case to sink | $R_{\Theta (c-s)}$ | | 0.030<br>0.060 | | $^o$C/W | Double sided cooled *<br>Single sided cooled |
| Mounting force | P | 800<br>3.6 | 2500<br>11.2 | | lb.<br>kN | |
| Weight | W | | | 9<br>70 | oz<br>g. | |

\* Mounting surfaces smooth, flat and greased