# Ruttonsha International Rectifier Ltd.

## SILICON CONTROLLED RECTIFIERS

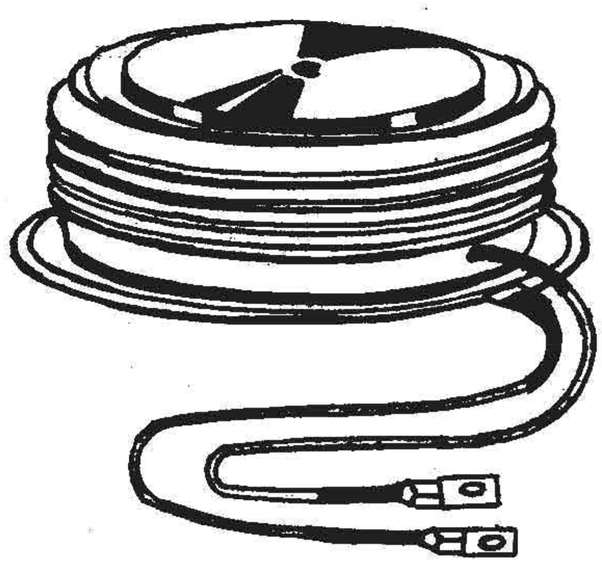
# High Power Thyristor
# Hockey Puk Version

Types : **1660PL/PM300 to 360**

### FEATURES

- *Center amplifying gate.*
- *Metal case with ceramic insulator*
- *High profile hockey - puk.*

1660PL/PM (L-PUK/M-PUK)



### TYPICAL APPLICATIONS

- *DC motor control (e.g. for machine tools).*
- *Controlled rectifiers (e.g. for battery charging, Uninterrupted Power Supply).*
- *AC controllers (e.g. for temperature control, lights control).*

## Major Ratings and Characteristics

| **Parameter** | | 1660PL/M | Units |
|---|---|---|---|
| $I_{T(AV)}$ | | 1660 | A |
| | @ $T_{hs}$ | 55 | ℃ |
| $I_{T(RMS)}$ | | 2606 | A |
| | @ $T_{hs}$ | 55 | ℃ |
| $I_{TSM}$ | @ 50 Hz | 23 | kA |
| $I^2t$ | @ 50 Hz | 2645 | $KA^2s$ |
| $V_{DRM}/V_{RRM}$ | | 3000 TO 3600 | V |
| $t_q$ | typical | 400 | µs |
| $T_J$ | | -40 to 125 | ℃ |

## ELECTRICAL SPECIFICATIONS 1660PL/PM

### Voltage Ratings

| Type number | Voltage Code | $V_{DRM}/V_{RRM}$, max repetitive peak and off-state voltage V | $V_{RSM}$,maximum non-repetitive peak voltage V | $I_{DRM}/I_{RRM}$ max. @ $T_J = T_J$ max. mA |
|---|---|---|---|---|
| 1660PL/PM | 300 | 3000/ 3000 | 3100 | 150 |
| | 320 | 3200/3200 | 3300 | |
| | 340 | 3400/3400 | 3500 | |
| | 360 | 3600/3600 | 3700 | |

### On - state Conduction

| | Parameter | 1660PL/PM | Units | Conditions | |
|---|---|---|---|---|---|
| $I_{T(AV)}$ | Max. average on-state current | 1660 | A | 180° conduction, half sine wave | |
| | @ Heatsink temperature | 55 | °C | double side cooled | |
| $I_{T(RMS)}$ | Max RMS on-state current | 2606 | A | DC@ 55°C heatsink temperature double side cooled | |
| $I_{TSM}$ | Max. peak, one-cycle non-repetitive surge current | 23 | KA | t = 10 ms | Sinusoidal half wave, Initial $T_J=T_J$ max. |
| $I^2t$ | Maximum $I^2t$ for fusing | 2645 | $KA^2s$ | t = 10 ms | |
| $V_{T(TO)}$ | Threshold voltage | 1.04 | V | $T_J=T_J$ max | |
| $r_t$ | On-state slope resistance | 0.35 | mΩ | $T_J=T_J$ max. | |
| $V_{TM}$ | Max. on state voltage | 2.17 | V | $I_{PK}$ = 3220A,$T_J=T_J$ max, $t_P$ = 10 ms sine pulse | |
| $I_H$ | Maximum holding current | 600 | mA | $T_J$ = 25°C , anode supply 12 V resistive load | |
| $I_L$ | Maximum latching current | 1000 | | | |

1660PL/PM **Series**

## Switching

| | Parameter | 1660PL/PM | Units | Conditions |
|---|---|---|---|---|
| di/dt | Max. non-repetitive rate of rise of turned-on current | 100 | A/µs | Gate drive 20V, 20Ω , $t_r \leq 1\mu s$ <br> $T_J = T_J$ max. anode voltage ≤ 80% $V_{DRM}$ |
| $t_q$ | Typical turn-off time | 400 | µs | $I_{TM}$ =1000A, $T_J = T_J$ max. di/dt = 10A/µs ,$V_R$ = 50V <br> dv/dt = 200V/µs,80% $V_{DRM}$ Reapplied , $t_p$ = 1000µs |

## Blocking

| | Parameter | 1660PL/PM | Units | Conditions |
|---|---|---|---|---|
| dv/dt | Maximum critical rate of rise of off-state voltage | 500 | V/µs | $T_J = T_J$ max. linear to 80% rated $V_{DRM}$ |
| $I_{RRM}$ <br> $I_{DRM}$ | Max. peak reverse and off-state leakage current | 150 | mA | $T_J = T_J$ max. rated $V_{DRM}$ /$V_{RRM}$ applied |

*Higher dv/dt is available on request

## Triggering

| | Parameter | 1660PL/PM | Units | Conditions |
|---|---|---|---|---|
| $P_{GM}$ | Maximum peak gate power | 30 | W | $T_J = T_J$ max., $t_p \leq 5$ ms |
| $P_{G(AV)}$ | Maximum average gate power | 5 | | $T_J = T_J$ max., f = 50Hz, d% = 50 |
| $I_{GM}$ | Max. peak positive gate current | 3.0 | A | $T_J = T_J$ max., $t_p \leq 5$ ms |
| $+V_{GM}$ | Maximum peak positive gate voltage | 20 | V | $T_J = T_J$ max., $t_p \leq 5$ ms |
| $-V_{GM}$ | Maximum peak negative gate voltage | 5.0 | | |
| $I_{GT}$ | DC gate current required to trigger | 250 max | mA | $T_J$ = 25°C |
| $V_{GT}$ | DC gate voltage required to trigger | 3.0 max | V | $T_J$ = 25°C |

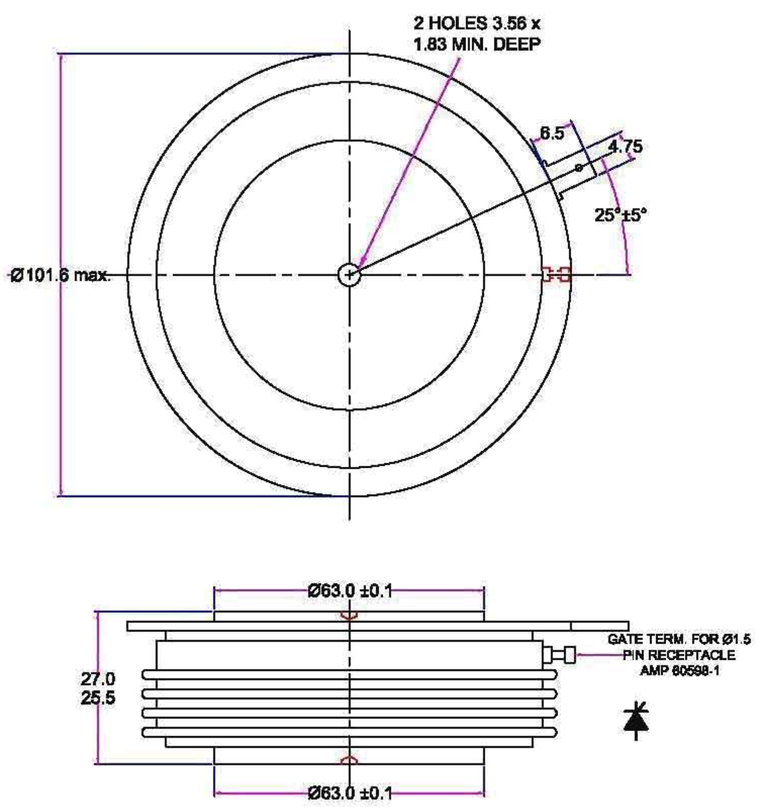
Max.required gate trigger/ current/voltage are the lowest value which will trigger all units 12 V anode-to-cathode applied

| | | | | | |
|---|---|---|---|---|---|
| $I_{GD}$ | DC gate current not to trigger | 10 | mA | $T_J = T_J$ max. | Max. gate current/voltage not to trigger is the max. value which will not trigger any unit with rated $V_{DRM}$ anode-to-cathode applied |
| $V_{GD}$ | DC gate voltage not to trigger | 0.25 | V | | |

## Thermal and Mechanical Specifications

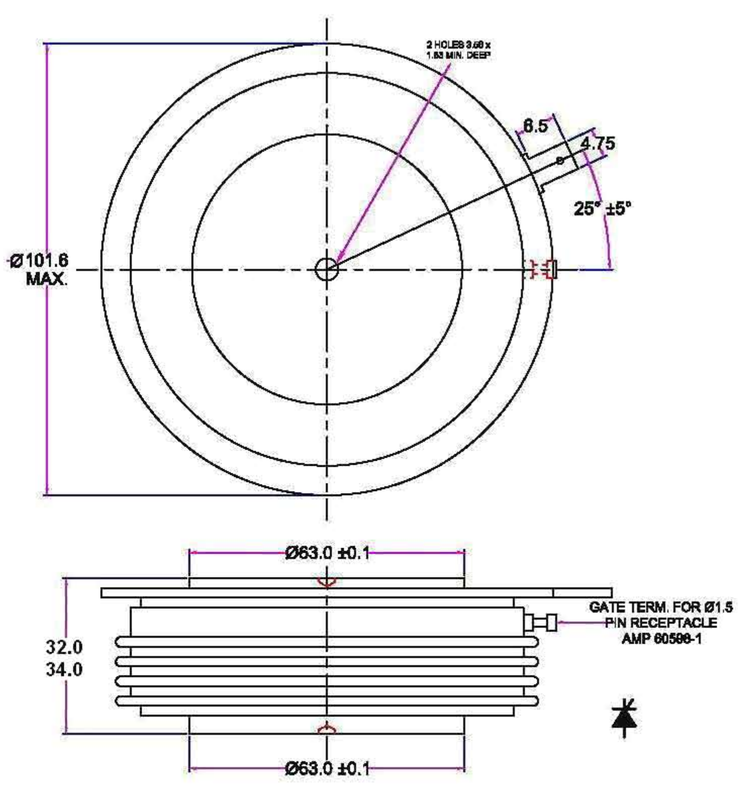
| | Parameter | 1660PL/PM | Units | Conditions |
|---|---|---|---|---|
| $T_J$ | Max.operating temperature range | -40 to 125 | °C | |
| $T_{stg}$ | Max.storage temperature range | -40 to 150 | | |
| $R_{thJ-hs}$ | Max. thermal resistance, junction to heatsink | 0.017 | K/W | DC operation double side cooled |
| F | Mounting force, ± 10% | 30 | KN | |
| wt | Approximate weight | 850 / 1000 | g | |
| | Case style | L-PUK/M-PUK | | See Outline Table |

**L-PUK**




UNIT : MM

**M-PUK**




UNIT : MM