# ACR44U

## Fast Turn-off Asymmetric Thyristor

Replaces March 1998 version, DS4222-3.4

DS4222-4.0 January 2000

### APPLICATIONS

- High Frequency Applications
- Regulated Power Supplies
- Capacitor Discharge
- Ultrasonic Generators
- Induction Heating

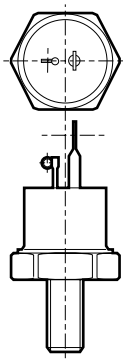
### KEY PARAMETERS

| | |
|---|---|
| $V_{DRM}$ | 1600V |
| $I_{T(AV)}$ | 44A |
| $I_{TSM}$ | 550A |
| dVdt* | 600V/µs |
| dI/dt | 2000A/µs |
| $t_q$ | 6.0µs |

*dV/dt Available to 1000V/µs

### FEATURES

- The ACR44U is a glass passivated asymmetric thyristor which has exceptionally fast turn-off capabilities combined with good turn-on characteristics.



Outline type code: SO28.
See Package Details for further information.

### VOLTAGE RATINGS

| Type Number | Repetitive Peak Off-state Voltage $V_{DRM}$ V | Repetitive Peak Reverse Voltage $V_{RRM}$ V |
|---|---|---|
| ACR44U 16LE | 1600 | 2 |
| ACR44U 14LE | 1400 | 2 |
| ACR44U 12LE | 1200 | 2 |
| ACR44U 10LE | 1000 | 2 |
| ACR44U 08LE | 800 | 2 |

**Lower voltage grades available.**

### CURRENT RATINGS

| Symbol | Parameter | Conditions | Max. | Units |
|---|---|---|---|---|
| $I_{T(AV)}$ | Mean on-state current | Half wave resistive load, $T_{case}$ = 80°C | 44 | A |
| $I_{T(RMS)}$ | RMS value | $T_{case}$ = 70°C | 69 | A |
| $I_T$ | Continuous (direct) on-state current | $T_{case}$ = 85°C | 57 | A |

## SURGE RATINGS

| Symbol | Parameter | Conditions | Max. | Units |
|---|---|---|---|---|
| $I_{TSM}$ | Surge (non-repetitive) forward current | 10ms half sine; $T_{case}$ = 125°C | 550 | A |
| $I^2t$ | $I^2t$ for fusing | | 1500 | $A^2s$ |

## THERMAL AND MECHANICAL DATA

| Symbol | Parameter | Conditions | Min. | Max. | Units |
|---|---|---|---|---|---|
| $R_{th(j-c)}$ | Thermal resistance - junction to case | d.c. | - | 0.35 | °C/W |
| $R_{th(c-h)}$ | Thermal resistance - case to heatsink | Mounting torque 3.5Nm with mounting compound | - | 0.25 | °C/W |
| $T_{vj}$ | Virtual junction temperature | On-state (conducting) | - | 125 | °C |
| $T_{stg}$ | Storage temperature range | | -55 | 125 | °C |
| - | Mounting torque | | 3.5 | 4.0 | Nm |

## DYNAMIC CHARACTERISTICS

$T_{case}$ = 125°C unless otherwise stated.

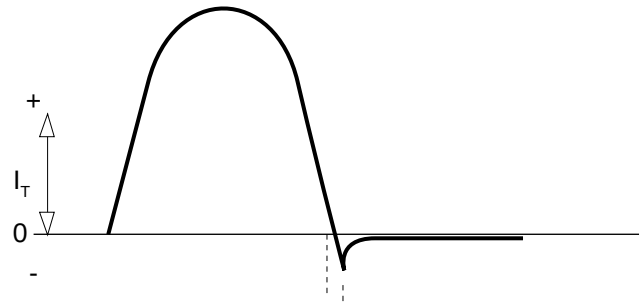
| Symbol | Parameter | Conditions | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $V_{TM}$ | Maximum on-state voltage | At 100A peak, $T_{case}$ = 25°C | - | 2.7 | V |
| $I_{RRM}/I_{DRM}$ | Peak reverse and off-state current | At $V_{RRM}/V_{DRM}$, $T_{case}$ = 125°C | - | 20/10 | mA |
| dV/dt | Maximum linear rate of rise of off-state voltage | To $V_{DRM}$ $T_j$ = 125°C, gate open circuit | - | 600* | V/µs |
| dI/dt | Rate of rise of on-state current | From $V_{DRM}$ to 125A. Gate source 15V, 15Ω $t_r$ = 50ns | - | 2000 | A/µs |
| $V_{T(TO)}$ | Threshold voltage | - | - | 1.5 | V |
| $r_T$ | On-state slope resistance | - | - | 13.3 | mΩ |
| $I_L$ | Latching current | - | 120 | - | mA |
| $I_H$ | Holding current | - | 25 | - | mA |
| $t_d$ | Delay time | $V_D$ = 300V, gate source = 15V, 15Ω | - | 250 | ns |
| $t_q$ | Turn-off time (with antiparallel diode) | $I_T$ = 50A, square wave $t_p$ = 50µs, $T_j$ = 120°C, $dI_R/dt$ = 50A/µs, dV/dt = 600V/µs to $V_{DRM}$, gate voltage at turn-off 3.5-4.5V. $V_R$ = -1V. | - | 6.0 | µs |

** Available to 1000V/µs.*

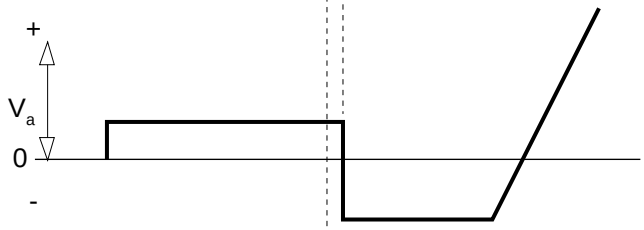
## GATE TRIGGER CHARACTERISTICS AND RATINGS

| Symbol | Parameter | Conditions | | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{GT}$ | Gate trigger voltage | $V_{DWM}$ = 12V, $R_L$ = 30Ω, $T_{case}$ = 25°C | | 0.9 | 3.0 | V |
| $I_{GT}$ | Gate trigger current | $V_{DWM}$ = 12V, $R_L$ = 30Ω, $T_{case}$ = 25°C | | 60 | 200 | mA |
| $V_{FGM}$ | Peak forward gate voltage | - | | - | 40 | V |
| $V_{RGM}$ | Peak reverse gate voltage | - | | - | 10 | V |
| $I_{FGM}$ | Peak forward gate current | - | | - | 10 | A |
| $P_{GM}$ | Peak gate power | - | | - | 40 | W |
| $P_{G(AV)}$ | Average gate power | Average time 10ms max | Forward | - | 10 | W |
| | | | Reverse | - | 6 | W |

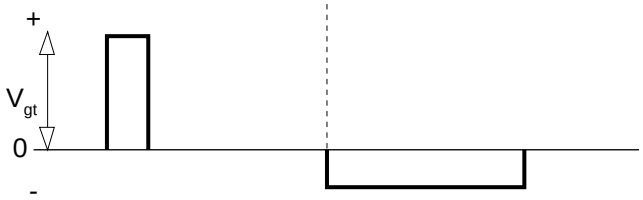
## WAVEFORM OF GATE VOLTAGE AT TURN-OFF




a) Anode current waveform




b) Anode voltage waveform




c) Gate voltage waveform

## CURVES

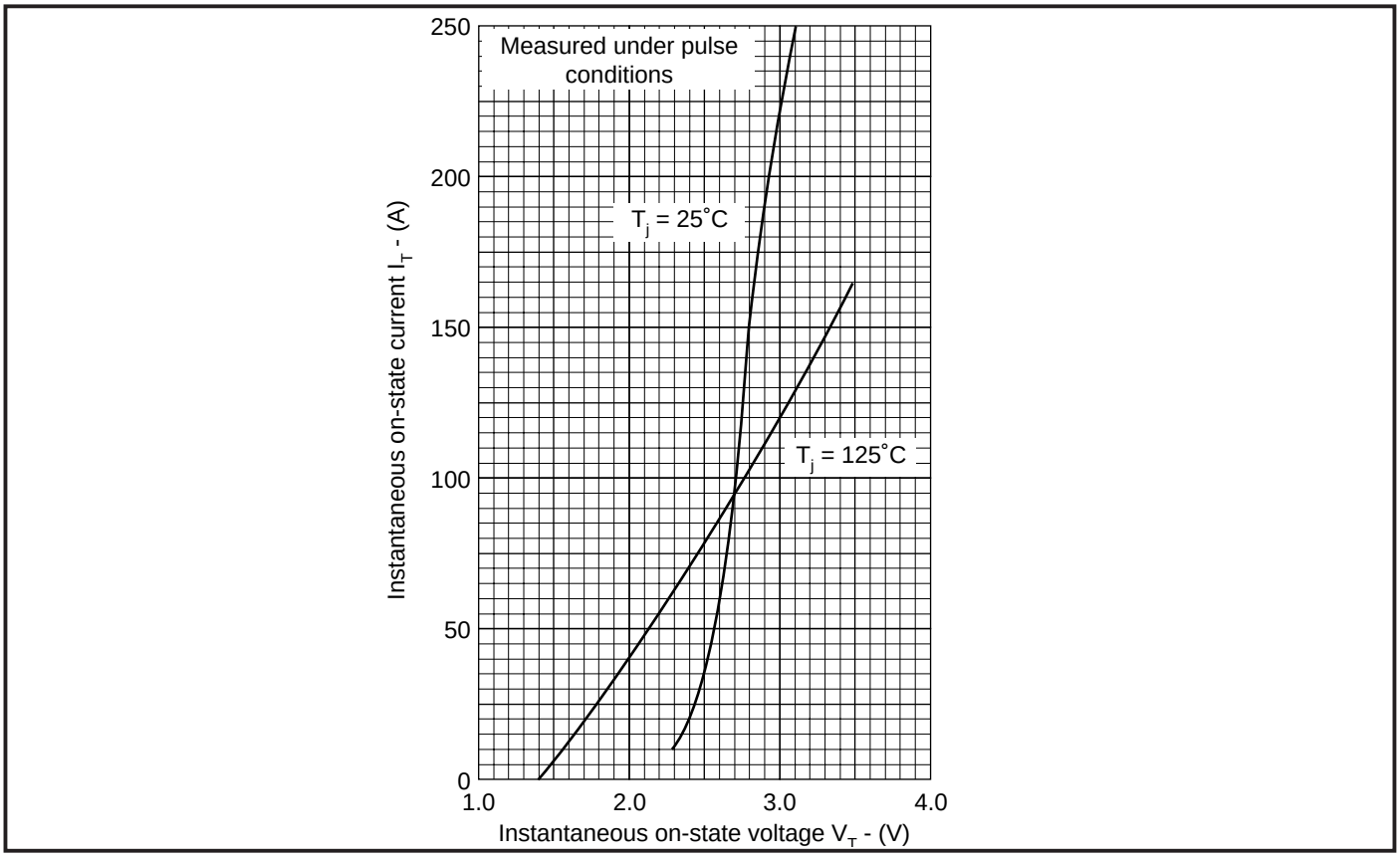



**Fig.1 Maximum (limit) on-state characteristics**

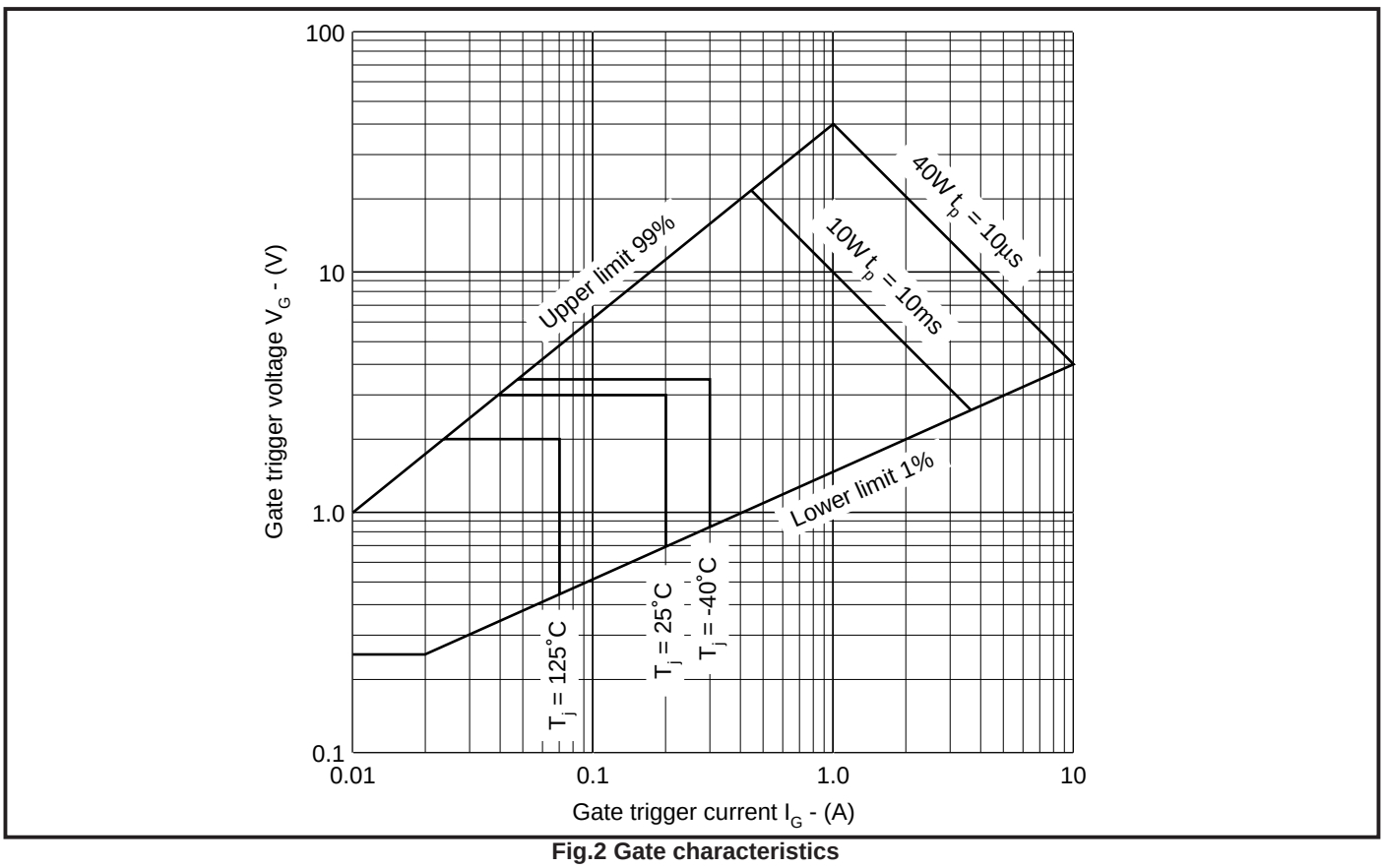



**Fig.2 Gate characteristics**

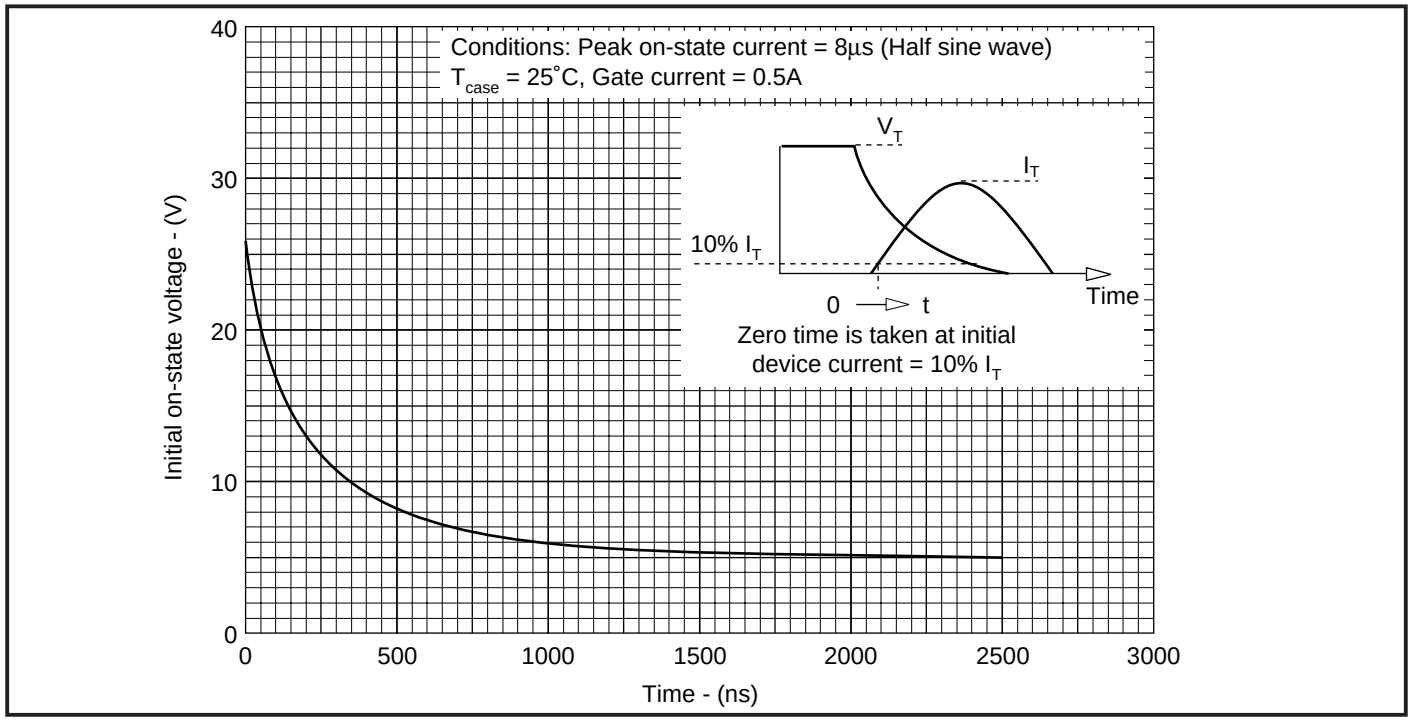



**Fig.3 Typical initial on-state voltage vs time**

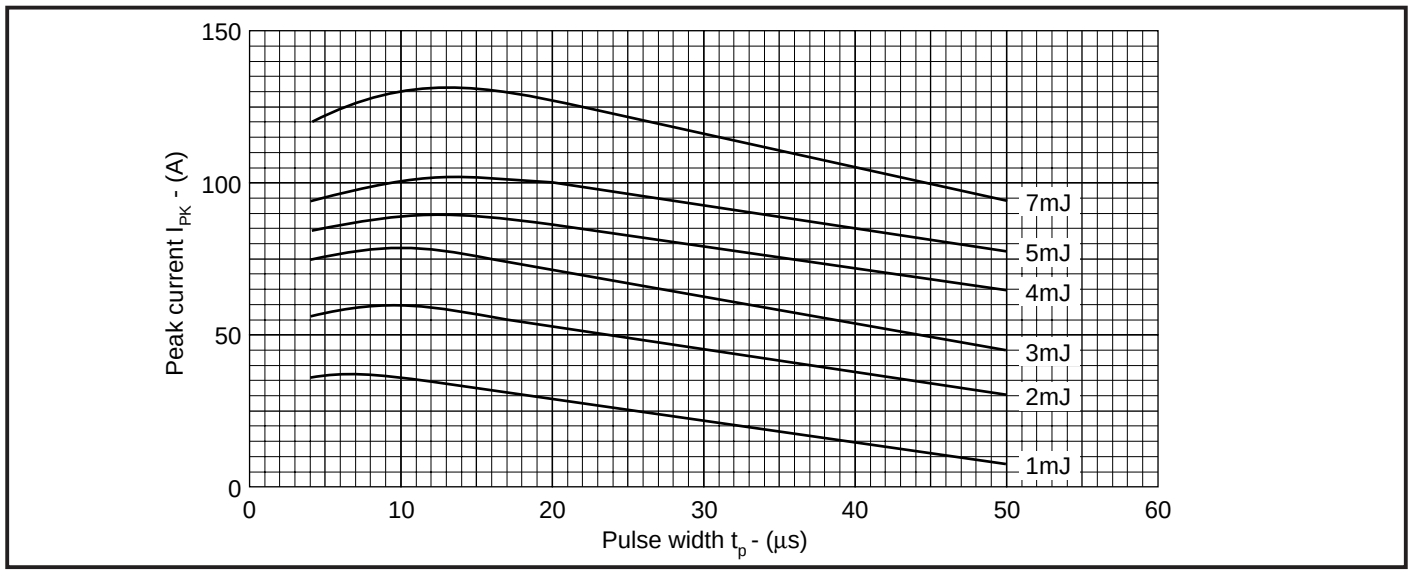



**Fig.4 Maximum energy loss per pulse when switching a half sinusoidal pulse from 600V**

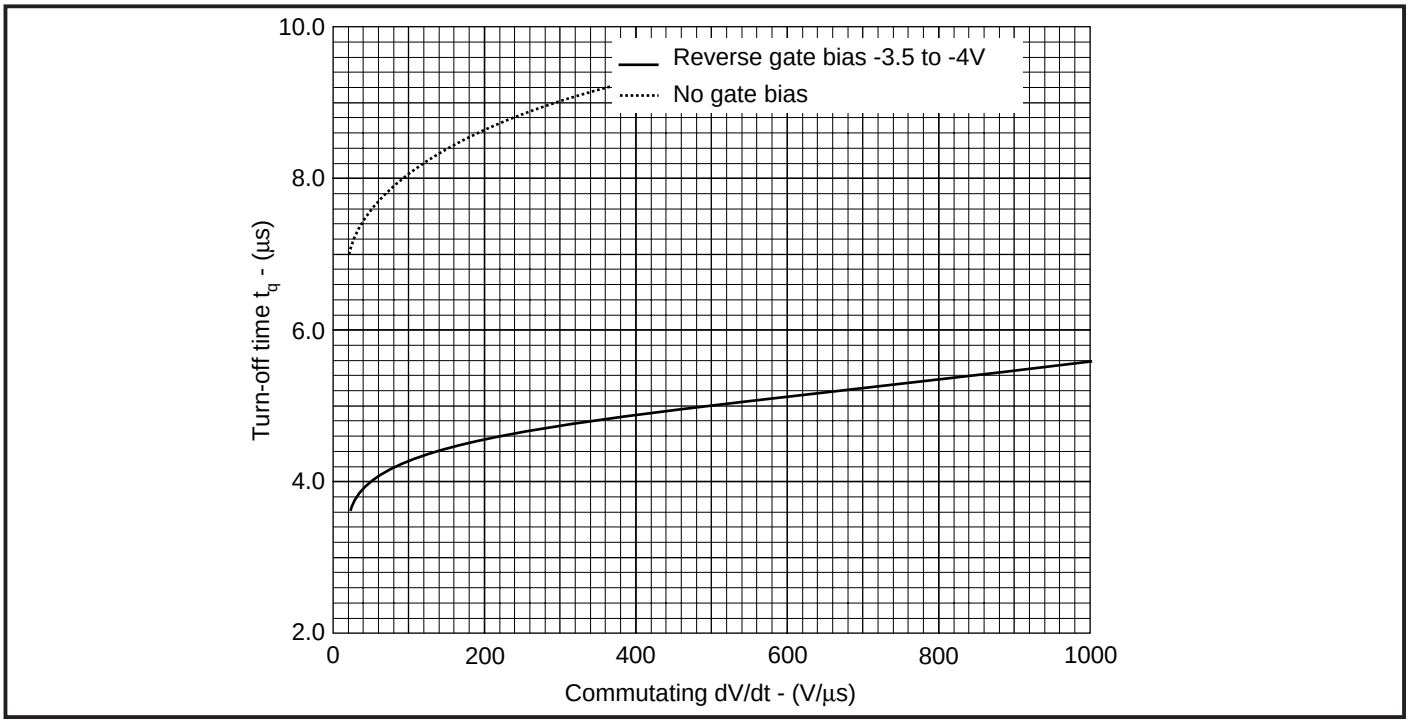



**Fig.5 Variation of turn-off time with commutating dV/dt**

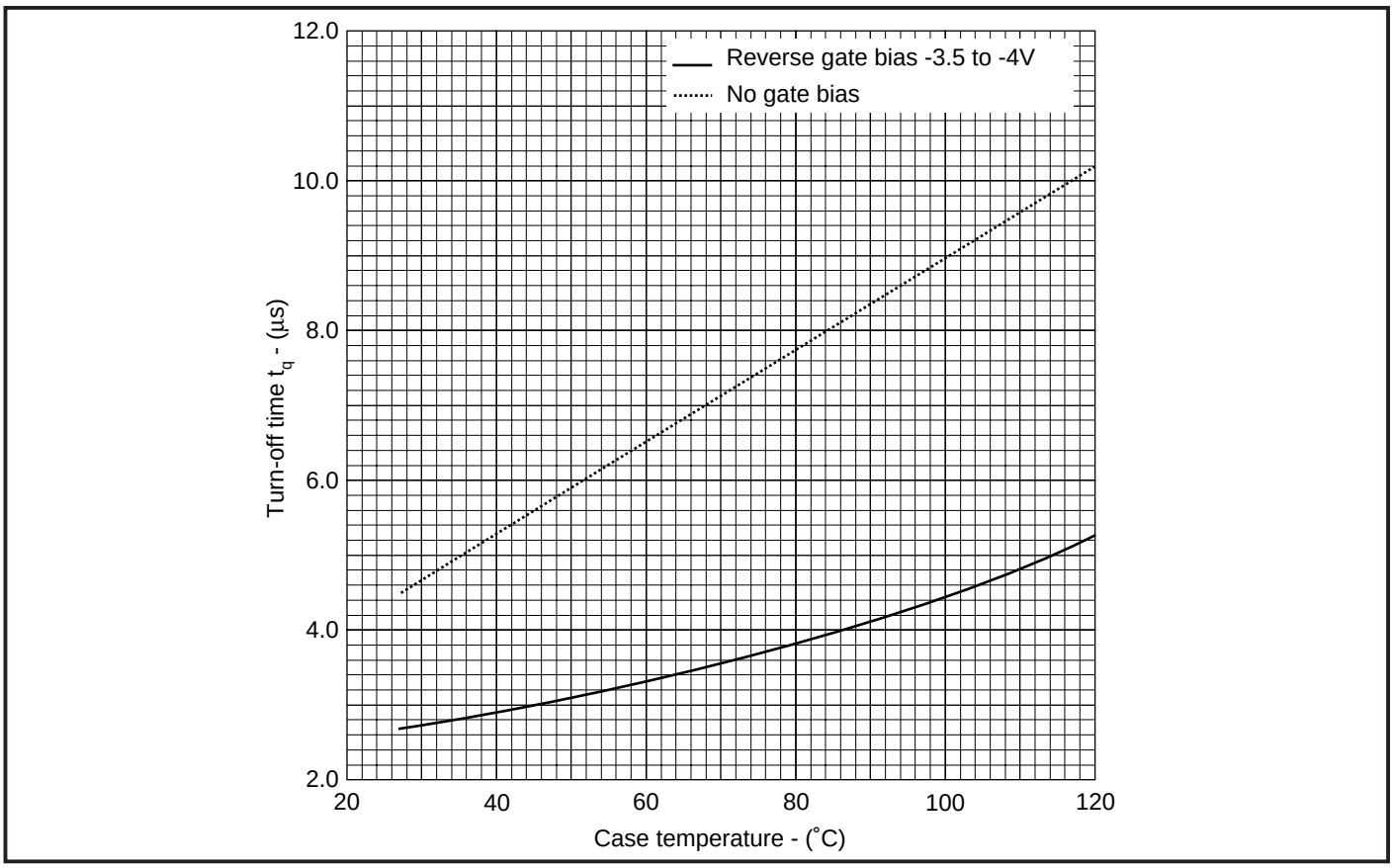
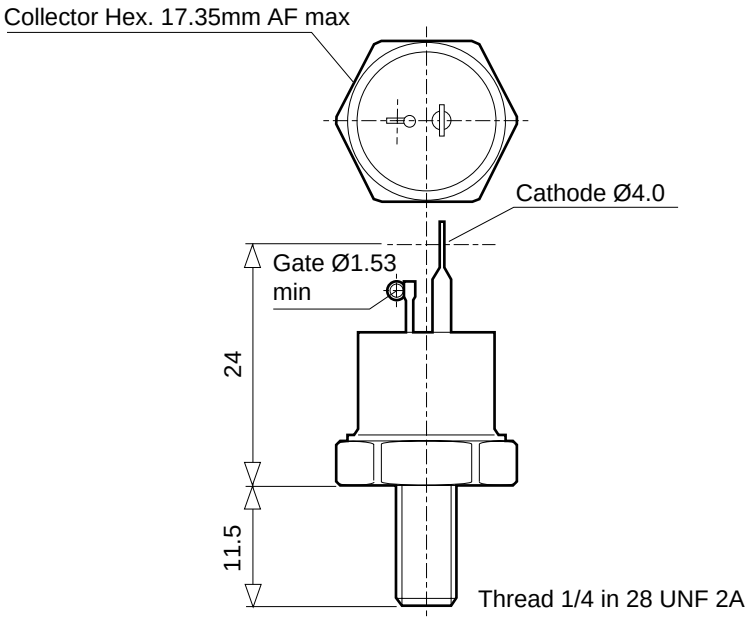



**Fig.6 Variation of turn-off time with case temperature**

## PACKAGE DETAILS

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.




Nominal weight: 16.5g

**Package outline type code: SO28**

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**Preliminary Information:** The product is in design and development. The datasheet represents the product as it is understood but details may change.

**Advance Information:** The product design is complete and final characterisation for volume production is well in hand.

**No Annotation:** The product parameters are fixed and the product is available to datasheet specification.