# S15C & S15CH SERIES
# 1200-600 VOLTS RANGE
# 140 AMP RMS, CENTER GATE
# PHASE CONTROL TYPE STUD MOUNTED SCRs

## VOLTAGE RATINGS

| VOLTAGE CODE (1) | $V_{RRM}$, $V_{DRM}$ – (V) Max. rep. peak reverse and off-state voltage | $V_{RSM}$ – (V) Max. non-rep. peak reverse voltage $t_p \leq 5ms$ | NOTES |
|---|---|---|---|
| | $T_J$ = -40°C to max. rated | $T_J$ = 25°C to max. rated | |
| 12A | 1200 | 1300 | Gate open |
| 10A | 1000 | 1100 | |
| 8B | 800 | 900 | |
| 6B | 600 | 700 | |

(1) To complete the part number, refer to the Ordering Information table.

## MAXIMUM ALLOWABLE RATINGS

| PARAMETER | | SERIES | VALUE | UNITS | NOTES |
|---|---|---|---|---|---|
| $T_J$ | Junction temperature | S15C | -40 to 125 | °C | |
| | | S15CH | -40 to 150 | | |
| $T_{stg}$ | Storage temperature | ALL | -40 to 150 | °C | |
| $I_{T(AV)}$ | Max. av. current | ALL | 90 | A | 180° half sine wave |
| | Max. $T_C$ | S15C | 89 | °C | |
| | | S15CH | 114 | | |
| $I_{T(RMS)}$ | Max. RMS current | ALL | 140 | A | |
| $I_{TSM}$ | Max. peak non-rep. surge current | ALL | 2390 | A | 50Hz half cycle sine wave; Initial $T_J$ = 125°C, rated $V_{RRM}$ applied after surge. |
| | | | 2500 | | 60Hz half cycle sine wave |
| | | | 2840 | | 50Hz half cycle sine wave; Initial $T_J$ = 125°C, no voltage applied after surge. |
| | | | 2970 | | 60Hz half cycle sine wave |
| $I^2t$ | Max. $I^2t$ capability | ALL | 28 | $kA^2s$ | t = 10ms; Initial $T_J$ = 125°C, rated $V_{RRM}$ applied after surge. |
| | | | 28 | | t = 8.3ms |
| | | | 40 | | t = 10ms; Initial $T_J$ = 125°C, no voltage applied after surge. |
| | | | 37 | | t = 8.3ms |
| $I^2\sqrt{t}$ | Max. $I^2\sqrt{t}$ capability | ALL | 400 | $kA^2\sqrt{s}$ | Initial $T_J$ = 125°C, no voltage applied after surge. $I^2t$ for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$. $0.1 \leq t_x \leq 10ms$. |
| di/dt | Max. non-rep. rate-of-rise of current | ALL | 300 | A/µs | $T_J$ = 125°C, $V_D = V_{DRM}$, $I_{TM}$ = 600A. Gate pulse: 20V, 20Ω, 10µs, 0.5µs rise. Max. repetitive di/dt is approximately 40% of non-repetitive value. |
| $P_{GM}$ | Max. peak gate power | ALL | 10 | W | $t_p \leq 5ms$ |
| $P_{G(AV)}$ | Max. av. gate power | ALL | 2 | W | |
| $+I_{GM}$ | Max. peak gate current | ALL | 3 | A | $t_p \leq 5ms$ |
| $-V_{GM}$ | Max. peak neg. gate voltage | ALL | 5 | V | |
| T | Mounting torque | ALL | 15.5 (137) ± 10% | N·m | Non-lubricated threads. |
| | | | 14 (120) ± 10% | (lbf-in) | Lubricated threads. |

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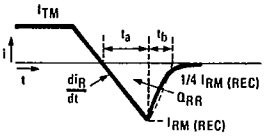
## CHARACTERISTICS

| PARAMETER | | SERIES | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| $V_{TM}$ | Peak on-state voltage | ALL | — | 1.23 | 1.38 | V | Initial $T_J$ = 25°C, 60Hz half sine, $I_{peak}$ = 283A. |
| $V_{T(TO)1}$ | Low-level threshold | ALL | — | — | 0.801 | V | $T_J$ = max. rated<br>Av. power = $V_{T(TO)} * I_{T(AV)} + r_T * (I_{T(RMS)})^2$<br>Use low level values for<br>$I_{TM} \leq \pi I_{T(AV)}$ |
| $V_{T(TO)2}$ | High-level threshold | | — | — | 0.920 | | |
| $r_{T1}$ | Low-level resistance | ALL | — | — | 1.900 | mΩ | |
| $r_{T2}$ | High-level resistance | | — | — | 1.550 | | |
| $I_L$ | Latching current | ALL | — | 180 | — | mA | $T_C$ = 25°C, 12V anode. Gate pulse: 10V, 20Ω, 100µs. |
| $I_H$ | Holding current | ALL | — | 60 | 500 | mA | $T_C$ = 25°C, 12V anode. Initial $I_T$ = 3A. |
| $t_d$ | Delay time | ALL | — | 0.5 | 1.5 | µs | $T_C$ = 25°C, $V_D$ = $V_{DRM}$, 50A resistive load. Gate pulse: 10V, 20Ω, 10µs, 1µs rise. |
| $t_q$ | Turn-off time | S15C | — | 70 | — | µs | $T_J$ = max. rated. $I_{TM}$ = 200A, $di_R/dt$ = 10A/µs, $V_R$ = 50V, dv/dt = 20V/µs lin. to rated $V_{DRM}$. Gate: 0V, 100Ω. |
| | | S15CH | — | 90 | — | | |
| $t_a$ | Reverse current rise | ALL | — | 10.5 | — | µs | $T_J$ = 125°C, $I_{TM}$ = 200A, $di_R/dt$ = 1A/µs<br>  |
| $t_b$ | Reverse current fall | ALL | — | 3 | — | µs | |
| $I_{RM(REC)}$ | Reverse current | ALL | — | 10.5 | — | A | |
| $Q_{RR}$ | Recovered charge | ALL | — | 71 | — | µC | |
| dv/dt | Critical rate-of-rise of voltage | ALL | 500 | 700 | — | V/µs | $T_J$ = 125°C. Exp. to 100% or lin. to 80% $V_{DRM}$, gate open. Higher dv/dt values available. |
| | | | 1000 | — | — | | $T_J$ = 125°C. Exp. to 67% $V_{DRM}$, gate open. |
| $I_{RM}$, $I_{DM}$ | Peak reverse and off-state current | S15C | — | 7 | 15 | mA | $T_J$ = 125°C. Rated $V_{RRM}$ and $V_{DRM}$, gate open. |
| | | S15CH | — | 13 | 40 | | $T_J$ = 150°C |
| $I_{GT}$ | DC gate current to trigger | ALL | — | — | 300 | mA | $T_C$ = -40°C +12V anode. For recommended gate drive see "Gate Characteristics" figure. |
| | | | 25 | 50 | 150 | | $T_C$ = 25°C |
| $V_{GT}$ | DC gate voltage to trigger | ALL | — | — | 3.3 | V | $T_C$ = -40°C |
| | | | — | 1.2 | 2.5 | | $T_C$ = 25°C |
| $V_{GD}$ | DC gate voltage not to trigger | ALL | — | — | 0.3 | V | $T_C$ = 125°C. Max. value which will not trigger with rated $V_{DRM}$ anode. |
| $R_{thJC}$ | Thermal resistance, junction-to-case | ALL | — | — | 0.280 | °C/W | DC operation |
| | | | — | — | 0.328 | °C/W | 180° sine wave |
| | | | — | — | 0.335 | °C/W | 120° rectangular wave |
| $R_{thCS}$ | Thermal resistance, case-to-sink | ALL | — | — | 0.100 | °C/W | Mounting surface smooth, flat and greased. |
| wt | Weight | ALL | — | 100(3.5) | — | g(oz.) | |
| | Case Style | ALL | TO-209AC (TO-94) | | | JEDEC | |

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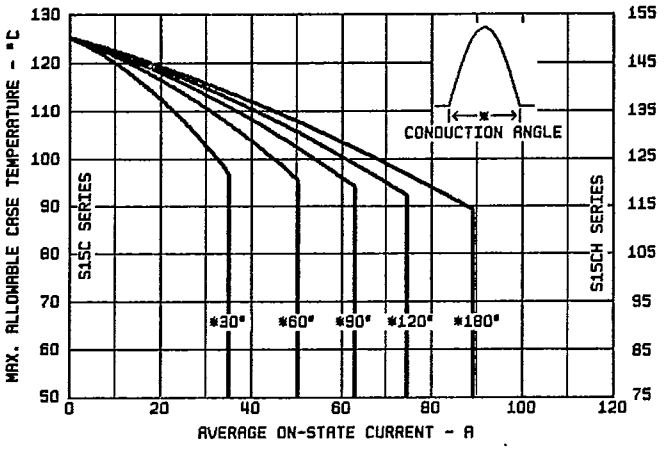


**Fig. 1 — Case Temperature Ratings — Sinusoidal Waveforms, 50 to 400 Hz**

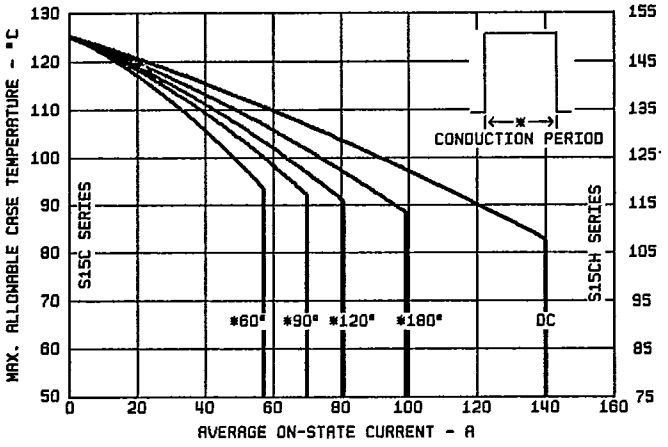


**Fig. 2 — Case Temperature Ratings — Rectangular Waveforms, 50 to 400 Hz**

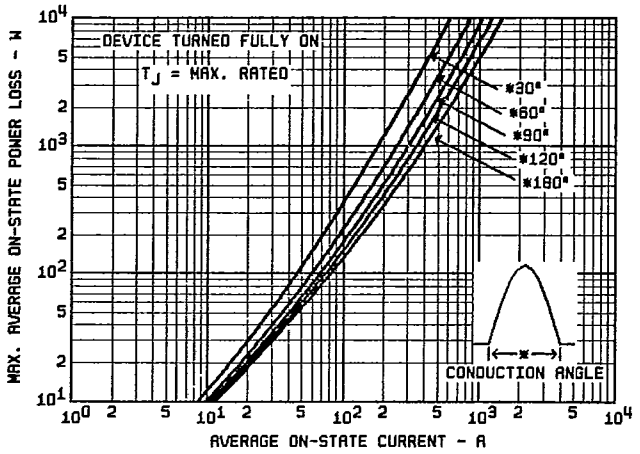


**Fig. 3 — Power Loss Characteristics — Sinusoidal Waveforms**

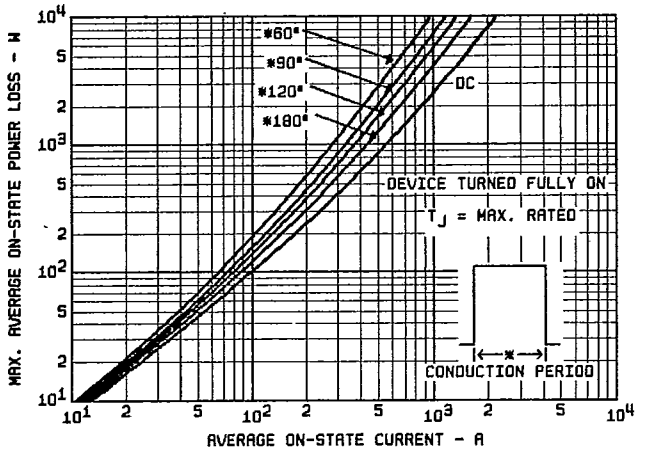


**Fig. 4 — Power Loss Characteristics — Rectangular Waveforms**

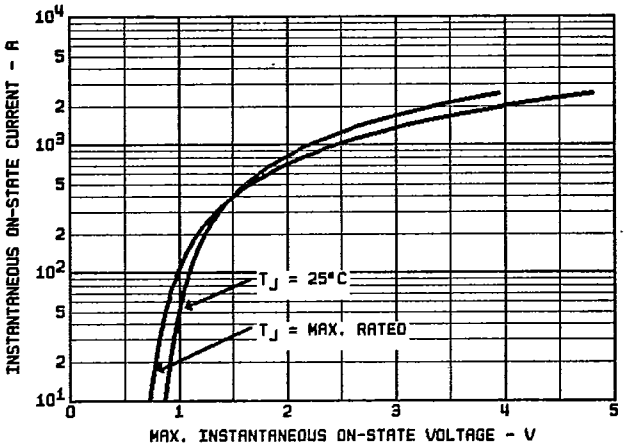


**Fig. 5 — On-State Characteristics**

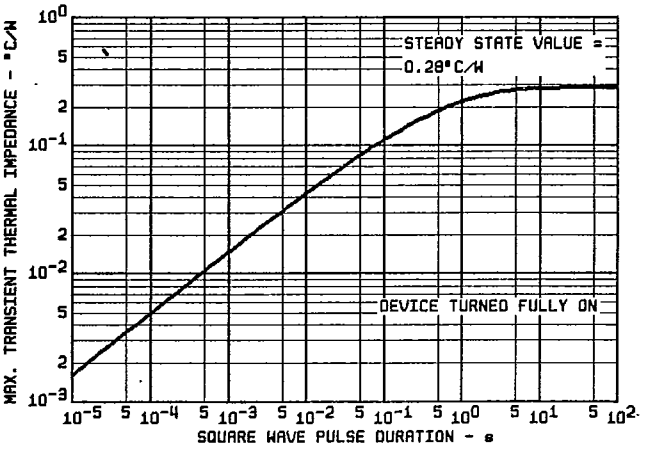


**Fig. 6 — Transient Thermal Impedance, Junction-to-Case**

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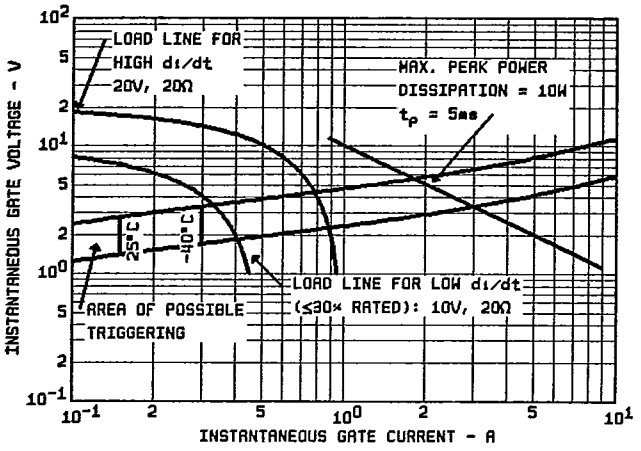


Fig. 7 — Gate Characteristics

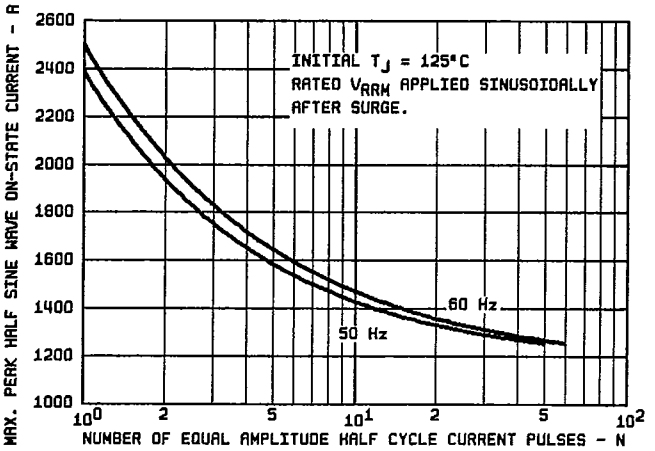


Fig. 8 — Non-Repetitive Surge Current Ratings

## ORDERING INFORMATION

| TYPE | PACKAGE | | TEMPERATURE | | VOLTAGE | | LEADS & TERMINALS | | BASE MODIFICATION (2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CODE | DESCRIPTION | CODE | MAX. $T_J$ | CODE | $V_{DRM}$ | CODE | DESCRIPTION | CODE | DESCRIPTION |
| S15 | CG | 1/2" stud, glass seal. Standard in USA. | — | 125°C | 12A | 1200V | 0 | Flexible leads, eyelet terminals. Standard in USA. (Fig. 1) | M | Metric threads. |
| | | | H | 150°C | 10A | 1000V | | | | |
| | | | | | 8B | 800V | | | | |
| | C | 1/2" stud, ceramic housing. Standard in Europe. | | | 6B | 600V | 1 | Flexible leads, fast-on terminals. Standard in Europe. (Fig. 2) | | |
| | | | | | | | 2 | Flag terminals (1). (Fig. 3 and 4) | | |

(1) Mounting torque on screw in flag terminal: 1.4 N•m (12 lbf-in) (2) Use only if required

For example, for a device with standard USA case, max. $T_J$ = 150°C, $V_{DRM}$ = 1000V, order as:

| TYPE | PACKAGE | TEMPERATURE | VOLTAGE | LEADS & TERMINALS |
|---|---|---|---|---|
| S15 | CG | — | 10A | 0 |

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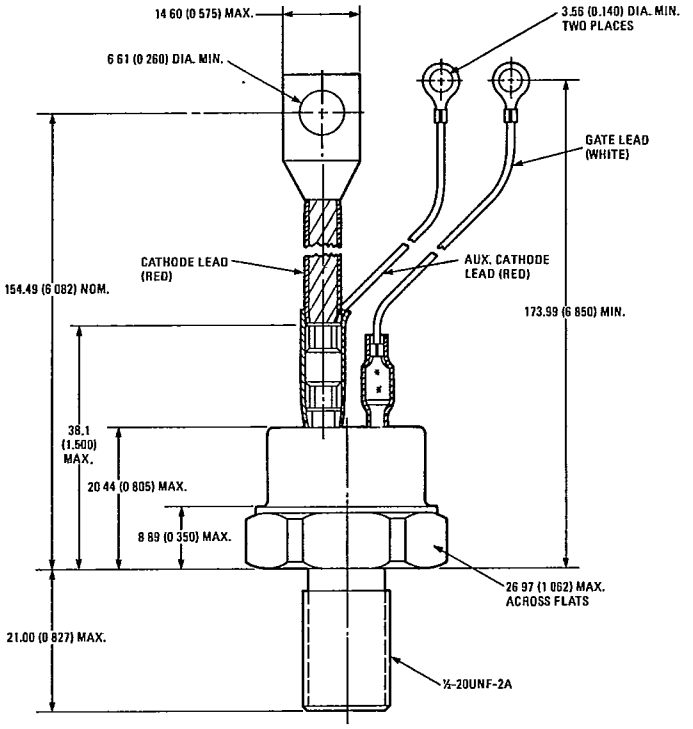


**Fig. 1 – Conforms to JEDEC Outline TO-209AC (TO-94)**
**Dimensions in Millimeters and (Inches)**

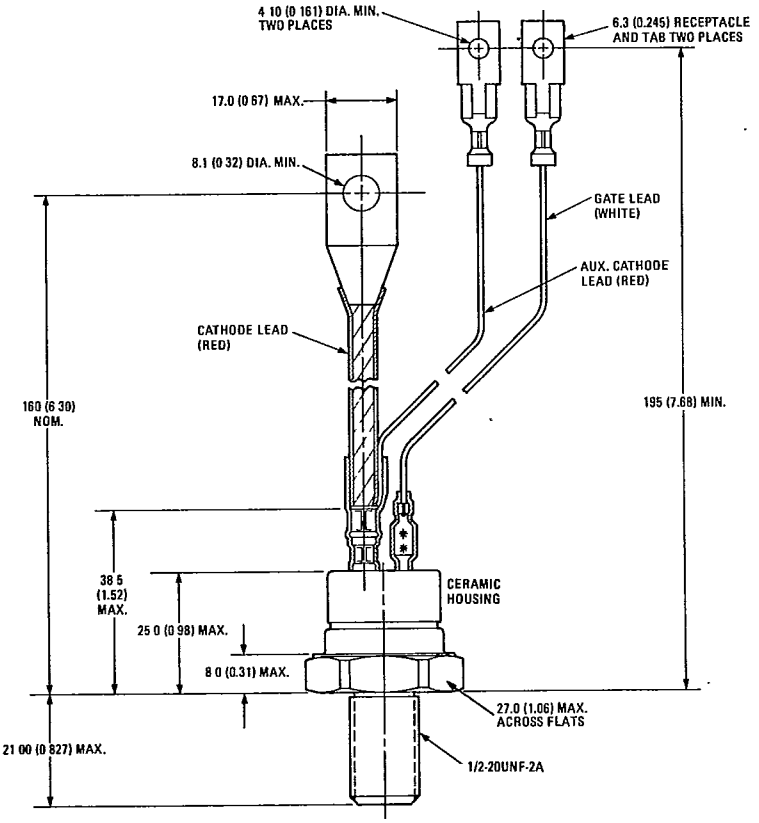


**Fig. 2 – Similar to JEDEC Outline TO-209AC (TO-94)**
**Dimensions in Millimeters and (Inches)**

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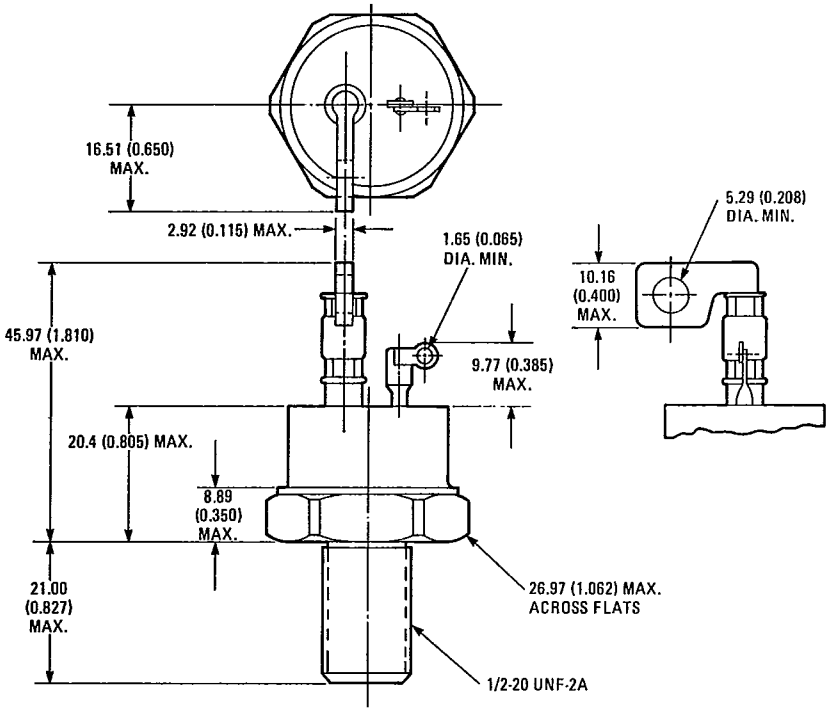


**Fig. 3 – Conforms to JEDEC Outline TO-208AD (TO-83)**
**(Standard in U.S.A.)**
**Dimensions in Millimeters and (Inches)**

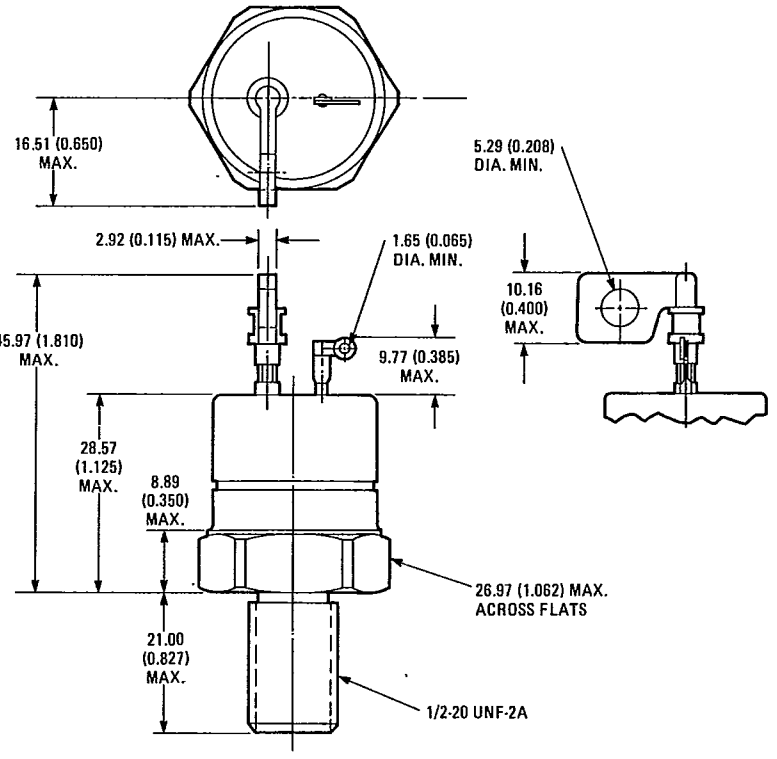


**Fig. 4 – Conforms to JEDEC Outline TO-208AD (TO-83)**
**(Standard in Europe)**
**Dimensions in Millimeters and (Inches)**