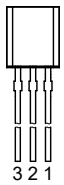
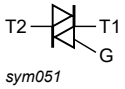
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| | | $V_D$ = 12 V; $I_T$ = 0.1 A; T2- G+; $T_j$ = 25 °C; Fig. 7 | | - | - | 5 | mA |
| $I_H$ | holding current | $V_D$ = 12 V; $T_j$ = 25 °C; Fig. 9 | | - | - | 7 | mA |
| $V_T$ | on-state voltage | $I_T$ = 1.4 A; $T_j$ = 25 °C; Fig. 10 | | - | 1.3 | 1.6 | V |
| **Dynamic characteristics** | | | | | | | |
| $dV_D/dt$ | rate of rise of off-state voltage | $V_{DM}$ = 402 V; $T_j$ = 110 °C; ($V_{DM}$ = 67% of $V_{DRM}$); exponential waveform; gate open circuit; Fig. 12 | | 10 | - | - | V/µs |
| $dV_{com}/dt$ | rate of change of commutating voltage | $V_D$ = 400 V; $T_j$ = 110 °C; $dI_{com}/dt$ = 0.44 A/ms; $I_T$ = 1 A; gate open circuit | | 0.5 | - | - | V/µs |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | T2 | main terminal 2 |   **TO-92 (SOT54)** |   *sym051* |
| 2 | G | gate | | |
| 3 | T1 | main terminal 1 | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| Z0103MA | TO-92 | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |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# 7. Limiting values

**Table 4. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{DRM}$ | repetitive peak off-state voltage [1] | | | - | 600 | V |
| $I_{T(RMS)}$ | RMS on-state current | full sine wave; $T_{lead} \leq 45$ °C; Fig. 1; Fig. 2; Fig. 3 | | - | 1 | A |
| $I_{TSM}$ | non-repetitive peak on-state current | full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; Fig. 4; Fig. 5 | | - | 8 | A |
| | | full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms | | - | 8.5 | A |
| $I^2t$ | $I^2t$ for fusing | $t_p = 10$ ms; SIN | | - | 0.32 | A²s |
| $dI_T/dt$ | rate of rise of on-state current | $I_G = 20$ mA; T2+ G+ | | - | 50 | A/µs |
| | | $I_G = 20$ mA; T2+ G- | | - | 50 | A/µs |
| | | $I_G = 20$ mA; T2- G- | | - | 50 | A/µs |
| | | $I_G = 20$ mA; T2- G+ | | - | 20 | A/µs |
| $I_{GM}$ | peak gate current | | | - | 1 | A |
| $P_{GM}$ | peak gate power | | | - | 2 | W |
| $P_{G(AV)}$ | average gate power | over any 20 ms period | | - | 0.1 | W |
| $T_{stg}$ | storage temperature | | | -40 | 150 | °C |
| $T_j$ | junction temperature | | | - | 125 | °C |

[1] Although not recommended, off-state voltage up to $V_{DRM}$ may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 3A/µs.

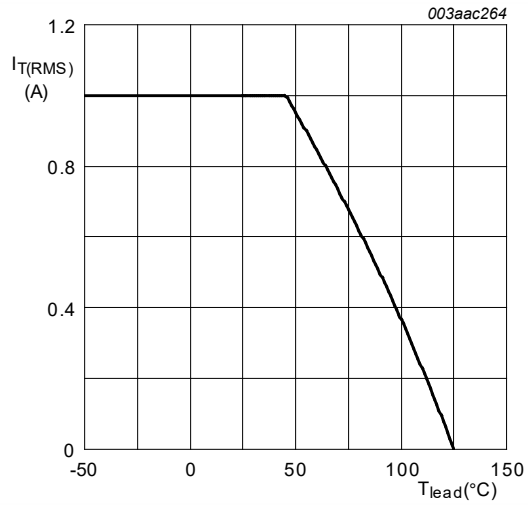
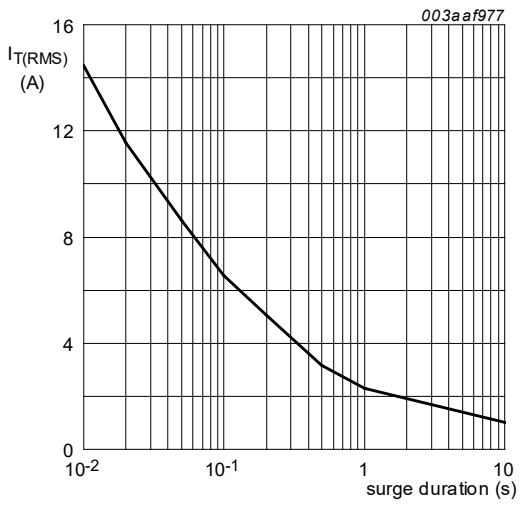



**Fig. 1. RMS on-state current as a function of lead temperature; maximum values**




f = 50 Hz; $T_{lead}$ = 45 °C

**Fig. 2. RMS on-state current as a function of surge duration; maximum values**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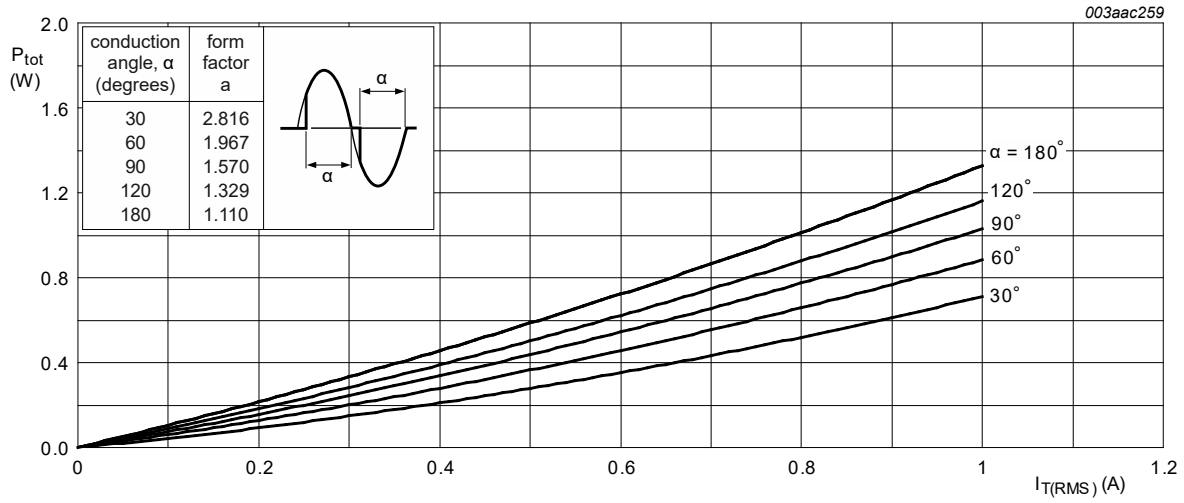
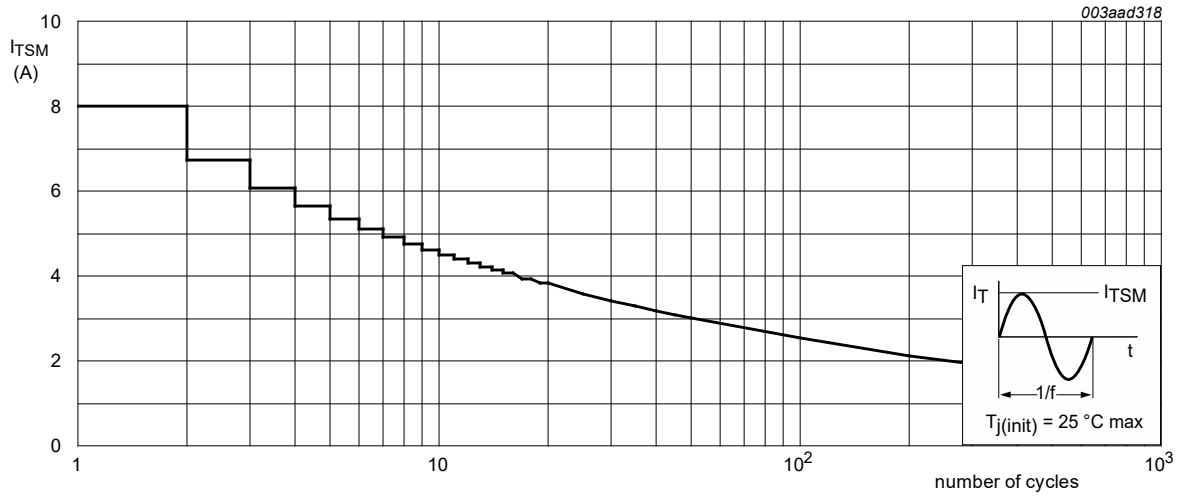



α = conduction angle

a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

**Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values**




f = 50 Hz

**Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values**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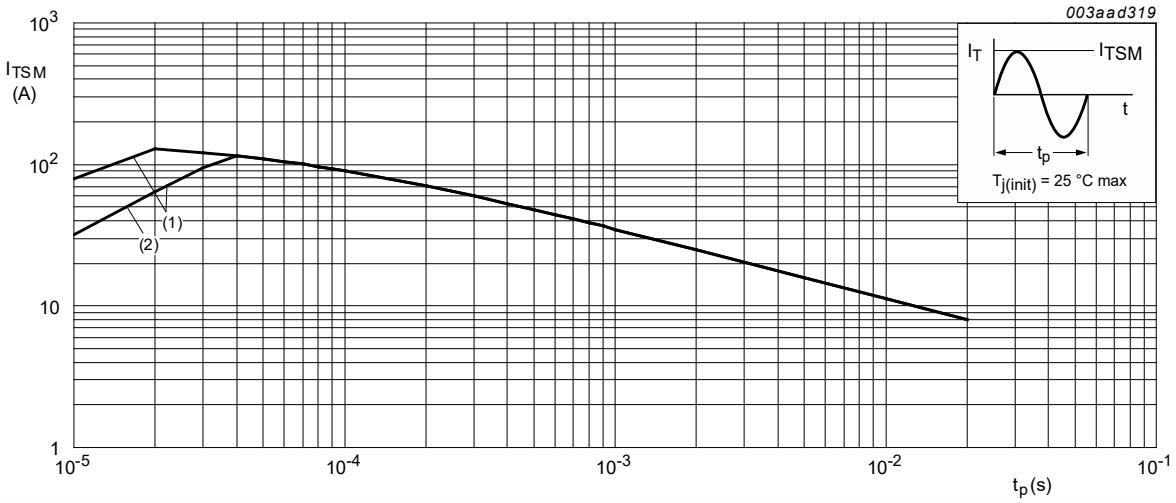


$t_p \leq 20$ ms
(1) $dI_T/dt$ limit
(2) T2- G+ quadrant limit

**Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values**


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# 8. Thermal characteristics

**Table 5. Thermal characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j\text{-}lead)}$ | thermal resistance from junction to lead | full cycle; Fig. 6 | | - | - | 60 | K/W |
| $R_{th(j\text{-}a)}$ | thermal resistance from junction to ambient free air | full cycle; printed circuit board mounted; lead length = 4 mm | | - | 150 | - | K/W |

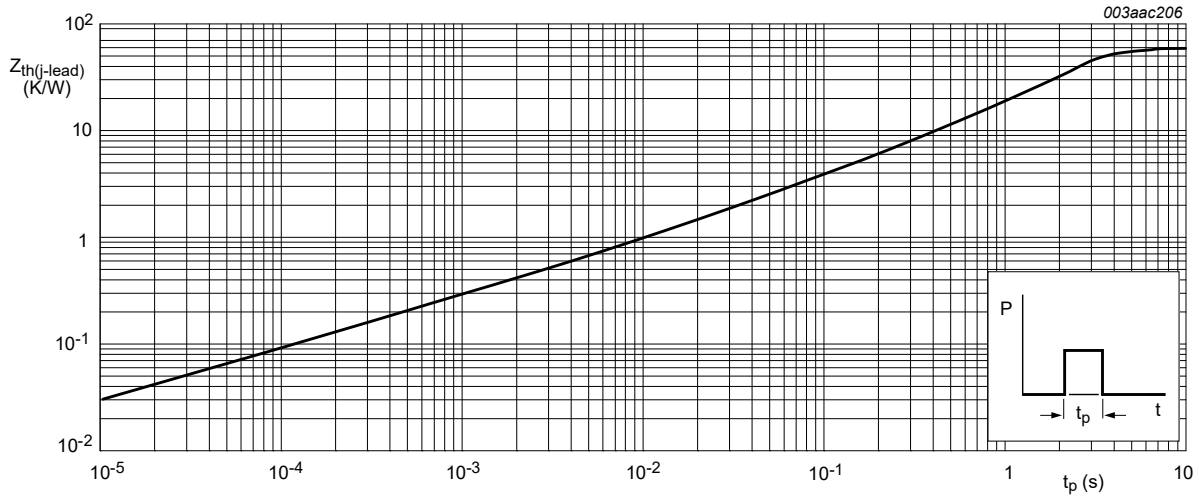


**Fig. 6. Transient thermal impedance from junction to lead as a function of pulse width**


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# 9. Characteristics

**Table 6. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | | |
| $I_{GT}$ | gate trigger current | $V_D$ = 12 V; $I_T$ = 0.1 A; T2+ G+; $T_j$ = 25 °C; Fig. 7 | | - | - | 3 | mA |
| | | $V_D$ = 12 V; $I_T$ = 0.1 A; T2+ G-; $T_j$ = 25 °C; Fig. 7 | | - | - | 3 | mA |
| | | $V_D$ = 12 V; $I_T$ = 0.1 A; T2- G-; $T_j$ = 25 °C; Fig. 7 | | - | - | 3 | mA |
| | | $V_D$ = 12 V; $I_T$ = 0.1 A; T2- G+; $T_j$ = 25 °C; Fig. 7 | | - | - | 5 | mA |
| $I_L$ | latching current | $V_D$ = 12 V; $I_G$ = 0.1 A; T2+ G+; $T_j$ = 25 °C; Fig. 8 | | - | - | 7 | mA |
| | | $V_D$ = 12 V; $I_G$ = 0.1 A; T2+ G-; $T_j$ = 25 °C; Fig. 8 | | - | - | 15 | mA |
| | | $V_D$ = 12 V; $I_G$ = 0.1 A; T2- G-; $T_j$ = 25 °C; Fig. 8 | | - | - | 7 | mA |
| | | $V_D$ = 12 V; $I_G$ = 0.1 A; T2- G+; $T_j$ = 25 °C; Fig. 8 | | - | - | 7 | mA |
| $I_H$ | holding current | $V_D$ = 12 V; $T_j$ = 25 °C; Fig. 9 | | - | - | 7 | mA |
| $V_T$ | on-state voltage | $I_T$ = 1.4 A; $T_j$ = 25 °C; Fig. 10 | | - | 1.3 | 1.6 | V |
| $V_{GT}$ | gate trigger voltage | $V_D$ = 12 V; $I_T$ = 0.1 A; $T_j$ = 25 °C; Fig. 11 | | - | - | 1 | V |
| | | $V_D$ = 600 V; $I_T$ = 0.1 A; $T_j$ = 125 °C; Fig. 11 | | 0.2 | - | - | V |
| $I_D$ | off-state current | $V_D$ = 600 V; $T_j$ = 125 °C | | - | - | 0.5 | mA |
| **Dynamic characteristics** | | | | | | | |
| $dV_D/dt$ | rate of rise of off-state voltage | $V_{DM}$ = 402 V; $T_j$ = 110 °C; ($V_{DM}$ = 67% of $V_{DRM}$); exponential waveform; gate open circuit; Fig. 12 | | 10 | - | - | V/µs |
| $dV_{com}/dt$ | rate of change of commutating voltage | $V_D$ = 400 V; $T_j$ = 110 °C; $dI_{com}/dt$ = 0.44 A/ms; $I_T$ = 1 A; gate open circuit | | 0.5 | - | - | V/µs |


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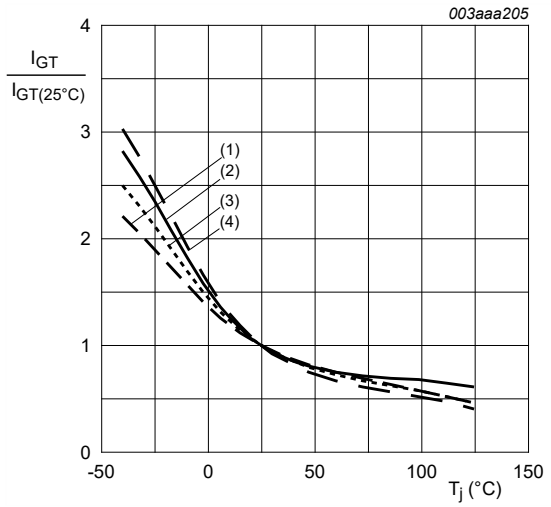



(1) T2- G+
(2) T2- G-
(3) T2+ G-
(4) T2+ G+

**Fig. 7. Normalized gate trigger current as a function of junction temperature**

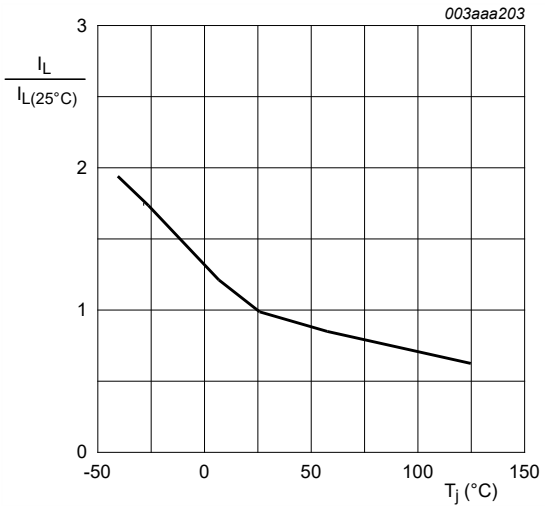



**Fig. 8. Normalized latching current as a function of junction temperature**

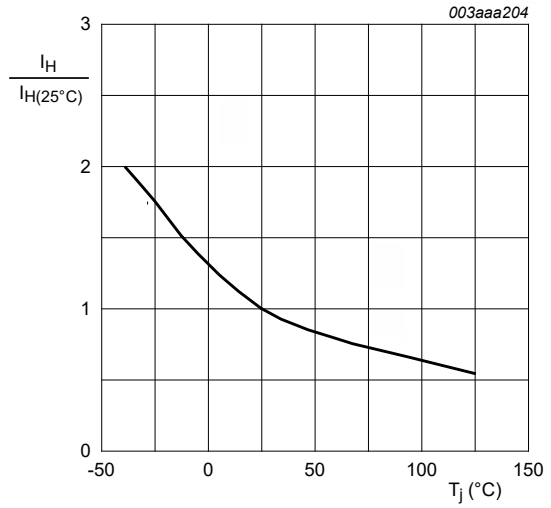
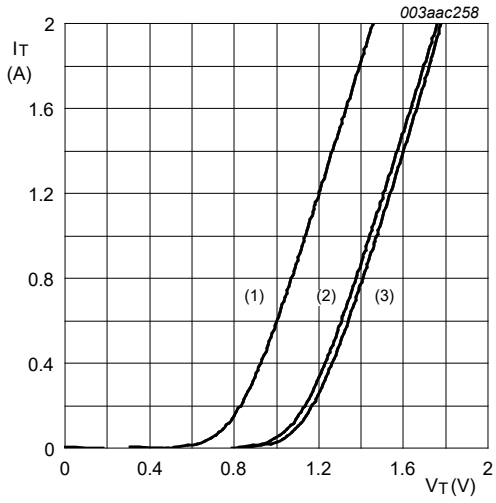



**Fig. 9. Normalized holding current as a function of junction temperature**




$V_o$ = 1.13 V
$R_s$ = 0.31 Ω
(1) $T_j$ = 125 °C; typical values
(2) $T_j$ = 125 °C; maximum values
(3) $T_j$ = 25 °C; maximum values

**Fig. 10. On-state current as a function of on-state voltage**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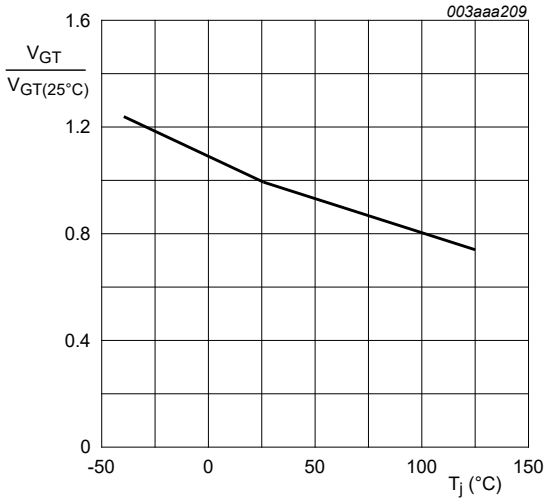
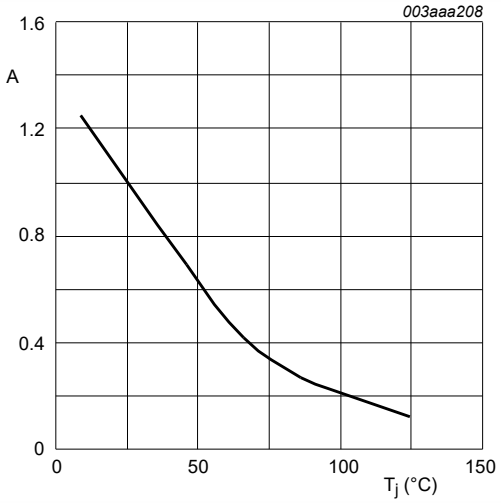



**Fig. 11. Normalized gate trigger voltage as a function of junction temperature**




$$A = \frac{dV_{D(Tj\,^\circ C)} / dt}{dV_{D(25\,^\circ C)} / dt}$$

**Fig. 12. Normalized critical rate of rise of off-state voltage as a function of junction temperature; typical values**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## 10. Package outline

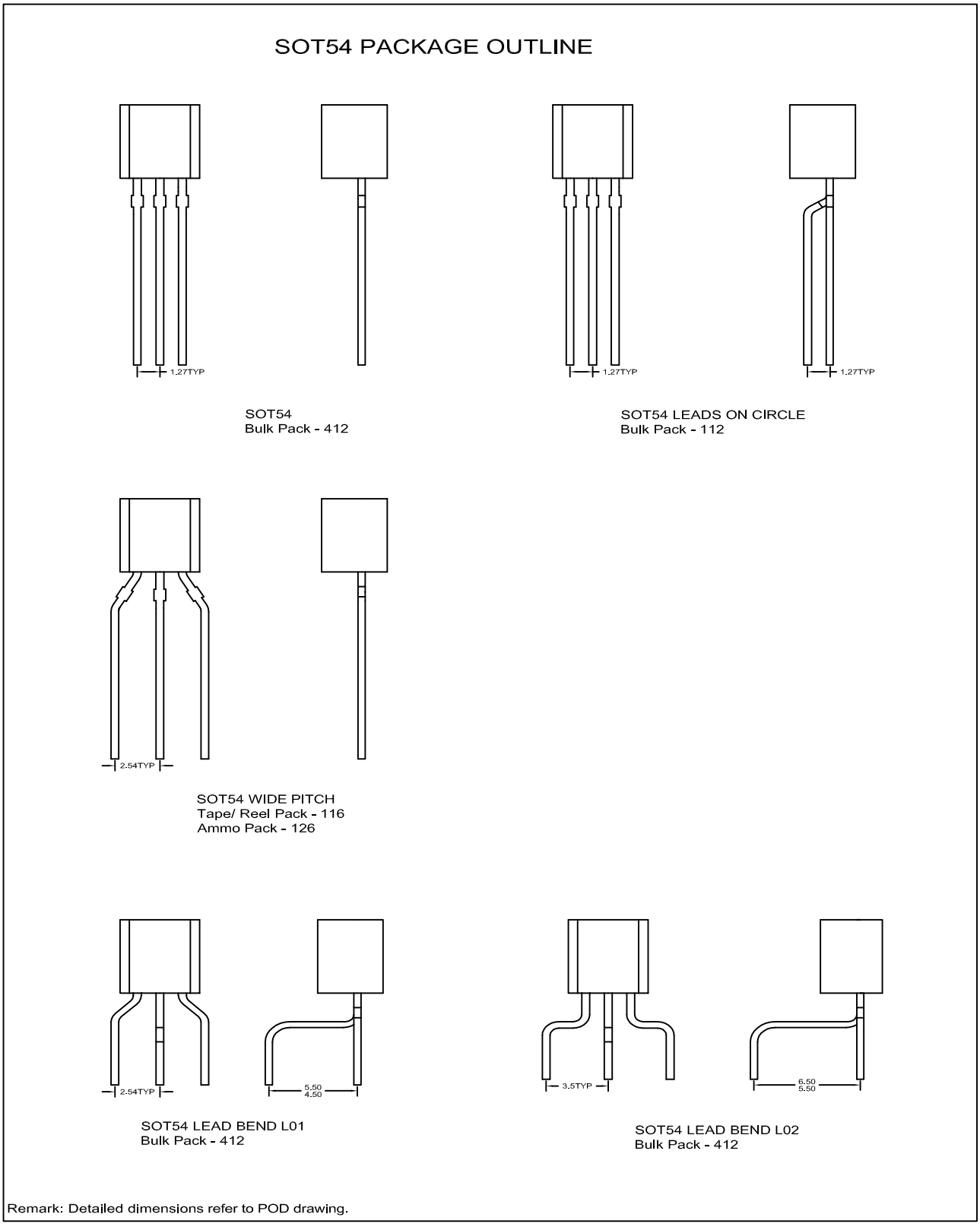


**Fig. 13. Package outline TO-92 (SOT54)**


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