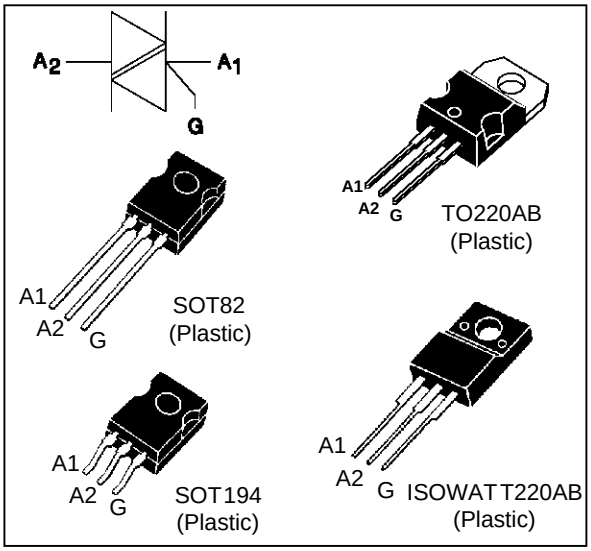
SGS-THOMSON MICROELECTRONICS

# T410
# T435

## HIGH PERFORMANCE TRIACS

### FEATURES

- $I_{TRMS}$ = 4 A
- $V_{DRM}$ = 400 V to 800 V
- SENSITIVE GATE : $I_{GT} \leq$ 10 mA
- HIGH COMMUTATION : (dI/dt)c > 3.5 A/ms




### DESCRIPTION

The T410 / T435 high voltage TRIAC Families are high performance planar diffused PNPN devices glass passivated technology.
Packaged either in TO220AB, SOT82, SOT194 and ISOWATT220AB these products are intented for all bi-directional switch applications.

### ABSOLUTE RATINGS (limiting values)

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{T(RMS)}$ | RMS on-state current (360° conduction angle) | TO220AB SOT194/SOT82 | Tc = 110 °C | 4 | A |
| | | ISOWATT220AB | Tc = 100 °C | | |
| $I_{TSM}$ | Non repetitive surge peak on-state current ( Tj initial = 25°C ) | | tp = 8.3 ms | 35 | A |
| | | | tp = 10 ms | 30 | |
| $I^2t$ | $I^2t$ value | | tp = 10 ms | 4.5 | $A^2s$ |
| dI/dt | Critical rate of rise of on-state current Gate supply : $I_G$ = 500mA $di_G/dt$ = 1A/µs | | Repetitive F = 50 Hz | 10 | A/µs |
| | | | Non Repetitive | 50 | |
| Tstg<br>Tj | Storage and operating junction temperature range | | | - 40 to + 150<br>- 40 to + 125 | °C<br>°C |
| Tl | Maximum lead temperature for soldering during 10 s at 4.5 mm from case | | | 260 | °C |

| Symbol | Parameter | T410 or T435 | | | | Unit |
|---|---|---|---|---|---|---|
| | | -400 | -600 | -700 | -800 | |
| $V_{DRM}$<br>$V_{RRM}$ | Repetitive peak off-state voltage Tj = 125 °C | 400 | 600 | 700 | 800 | V |

## THERMAL RESISTANCES

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| Rth (j-a) | Junction to ambient | SOT82 / SOT194 | 100 | °C/W |
| | | TO220AB | 60 | |
| | | ISOWATT220AB | 50 | |
| Rth (j-c) DC | Junction to case for DC | SOT82 / SOT194 TO220AB | 3.5 | °C/W |
| | | ISOWATT220AB | 5.3 | |
| Rth (j-c) AC | Junction to case for 360° conduction angle ( F= 50 Hz) | SOT82 / SOT194 TO220AB | 2.6 | °C/W |
| | | ISOWATT220AB | 4 | |

## GATE CHARACTERISTICS (maximum values)

$P_{G(AV)}$ = 1 W $P_{GM}$= 10 W (tp = 20 µs) $I_{GM}$ = 4 A (tp = 20 µs) $V_{GM}$ = 16 V (tp = 20 µs).

## ELECTRICAL CHARACTERISTICS

| Symbol | Test Conditions | | Quadrant | | Suffix | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | T410 | T435 | |
| $I_{GT}$ | $V_D$=12V (DC) $R_L$=33Ω | Tj=25°C | I-II-III | MAX | 10 | 35 | mA |
| $V_{GT}$ | $V_D$=12V (DC) $R_L$=33Ω | Tj=25°C | I-II-III | MAX | 1.5 | | V |
| $V_{GD}$ | $V_D$=$V_{DRM}$ $R_L$=3.3kΩ | Tj=125°C | I-II-III | MIN | 0.2 | | V |
| tgt | $V_D$=$V_{DRM}$ $I_G$ = 500mA $dI_G/dt$ = 3A/µs $I_{TM}$ = 5.5A | Tj=25°C | I-II-III | TYP | 2 | | µs |
| $I_L$ | $I_G$=1.2 $I_{GT}$ | Tj=25°C | I-II-III | MAX | 30 | 60 | mA |
| $I_H$ * | $I_T$= 100mA gate open | Tj=25°C | | MAX | 15 | 35 | mA |
| $V_{TM}$ * | $I_{TM}$= 5.5A tp= 380µs | Tj=25°C | | MAX | 1.75 | | V |
| $I_{DRM}$ $I_{RRM}$ | $V_{DRM}$ Rated $V_{RRM}$ Rated | Tj=25°C | | MAX | 0.01 | | mA |
| | | Tj=125°C | | MAX | 2 | | |
| dV/dt * | Linear slope up to $V_D$=67%$V_{DRM}$ gate open; $V_{DRM}$ = 400V / 600V | Tj=125°C | | MIN | 50 | 250 | V/µs |
| | Linear slope up to $V_D$=67%$V_{DRM}$ gate open; $V_{DRM}$ = 700V / 800V | | | | 30 | 250 | |
| (dI/dt)c * | dV/dt = 0.1V/µs | Tj=125°C | | MIN | 2.7 | 4.4 | A/ms |
| | dV/dt = 20V/µs | | | MIN | 1.8 | 2.7 | |

* For either polarity of electrode $A_2$ voltage with reference to electrode $A_1$.

## ORDERING INFORMATION

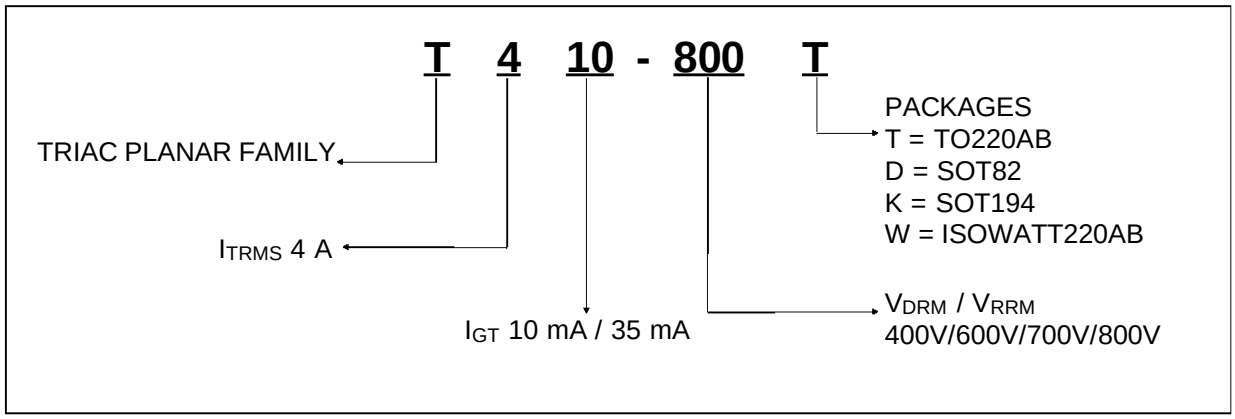



**Fig.1 :** Maximum RMS power dissipation versus RMS on-state current (F=50Hz).
(Curves are cut off by (dI/dt)c limitation)

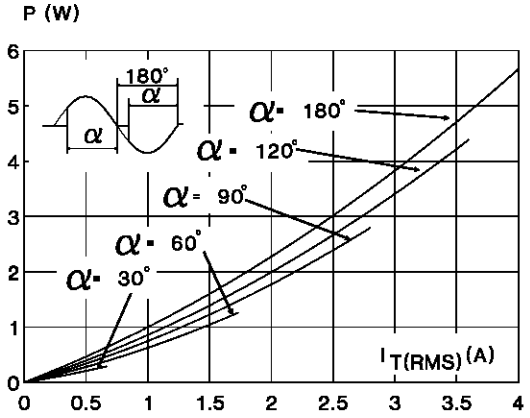



**Fig.2 :** Correlation between maximum RMS power dissipation and maximum allowable temperatures ($T_{amb}$ and $T_{case}$) for different thermal resistances heatsink + contact (TO220AB / SOT82 / SOT 94).

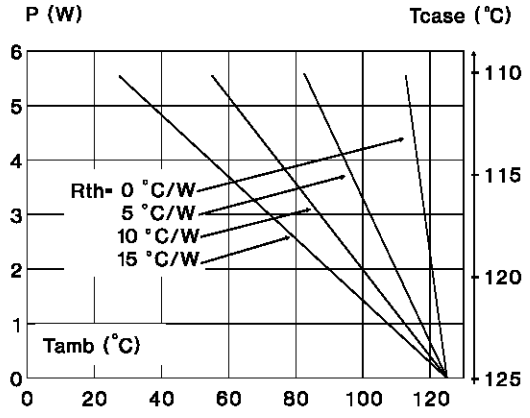



**Fig.3 :** Correlation between maximum RMS power dissipation and maximum allowable temperatures ($T_{amb}$ and $T_{case}$) for different thermal resistances heatsink + contact (ISOWATT220AB).

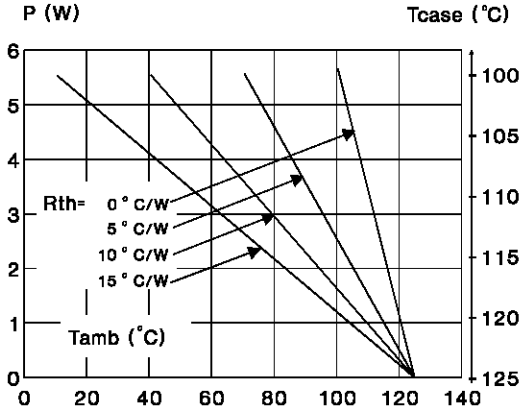



**Fig.4 :** RMS on-state current versus case temperature.

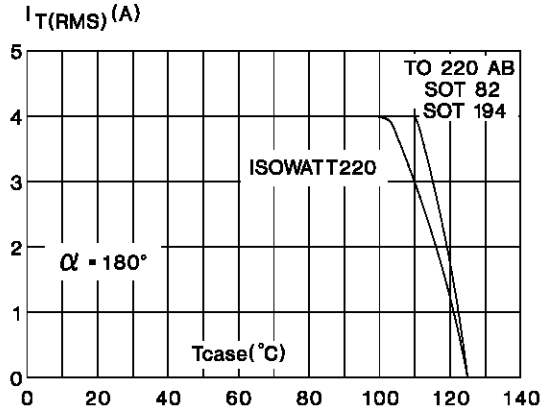


**Fig.5 :** Relative variation of thermal impedance versus pulse duration (SOT82 / SOT194 / TO220AB only).

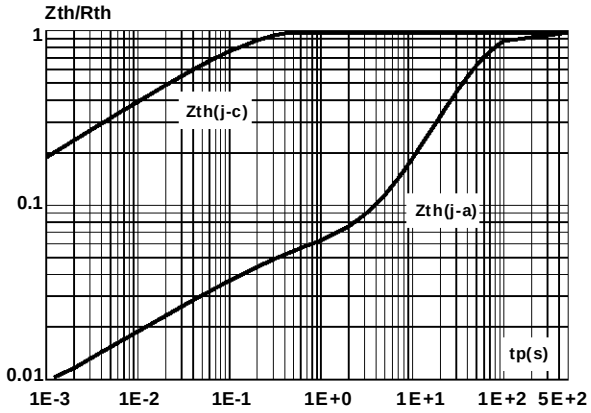



**Fig.6 :** Relative variation of thermal impedance versus pulse duration ( ISOWATT220AB only).

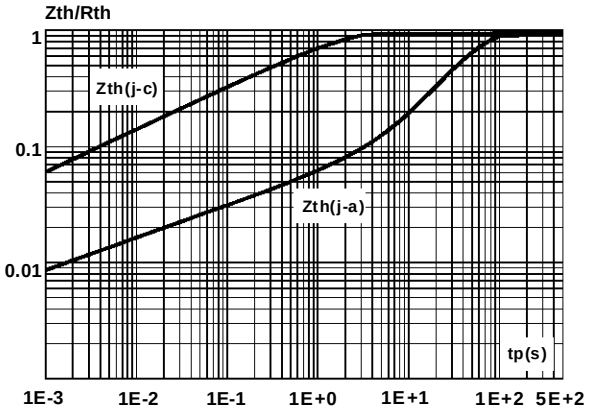



**Fig.7 :** Relative variation of gate trigger current and holding current versus junction temperature.

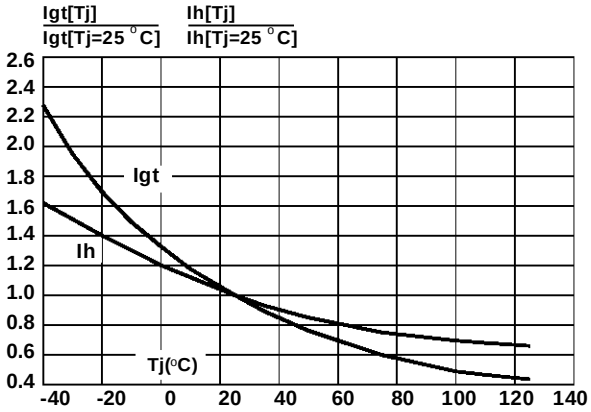



**Fig.8 :** Non Repetitive surge peak on-state current versus number of cycles.

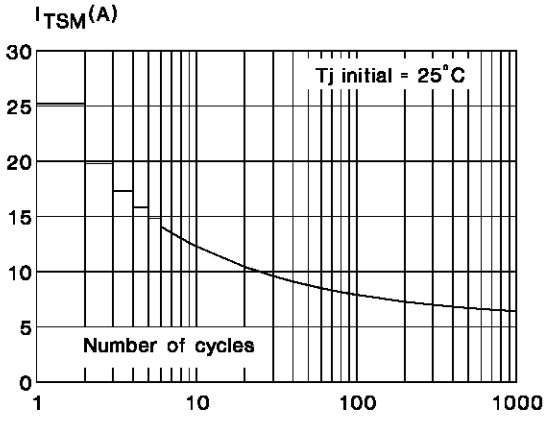



**Fig.9 :** Non repetitive surge peak on-state current for a sinusoidal pulse with width : t ≤ 10ms, and corresponding value of $I^2t$.

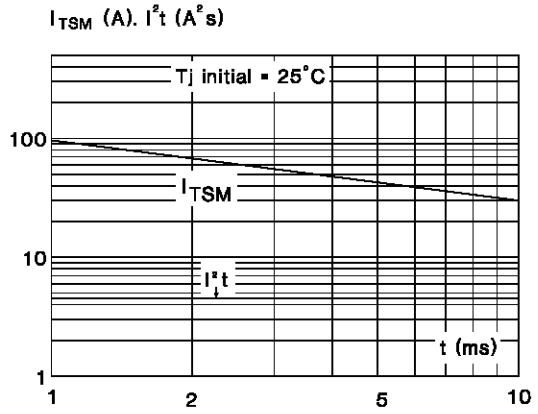
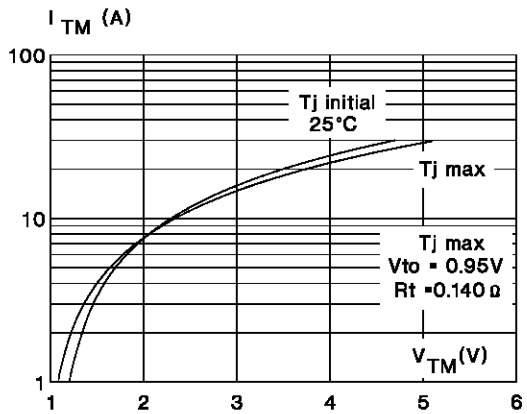
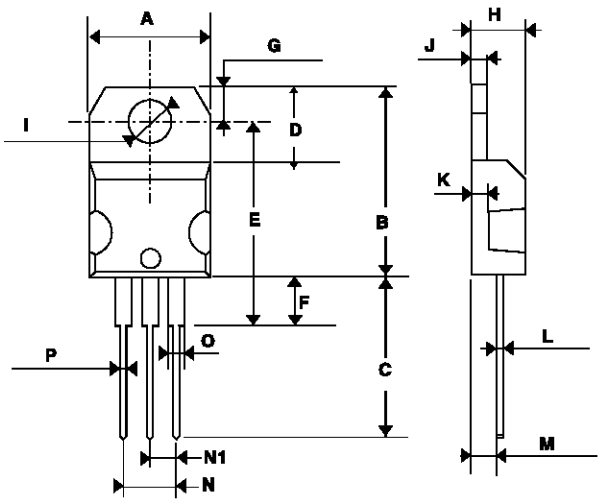



**Fig.10 :** On-state characteristics (maximum values).



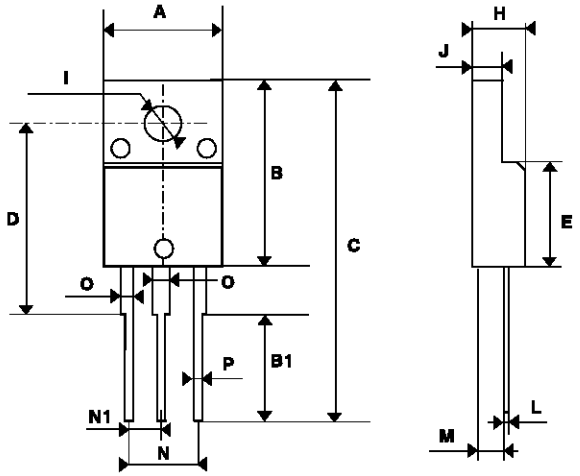
## PACKAGE MECHANICAL DATA
TO220AB Plastic




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 10.0 | 10.4 | 0.393 | 0.409 |
| B | 15.2 | 15.9 | 0.598 | 0.626 |
| C | 13 | 14 | 0.511 | 0.551 |
| D | 6.2 | 6.6• | 0.244 | 0.260 |
| E | 16.4 typ. | | 0.645 typ. | |
| F | 3.5 | 4.2 | 0.137 | 0.165 |
| G | 2.65 | 2.95 | 0.104 | 0.116 |
| H | 4.4 | 4.6 | 0.173 | 0.181 |
| I | 3.75 | 3.85 | 0.147 | 0.151 |
| J | 1.23 | 1.32 | 0.048 | 0.051 |
| K | 1.27 typ. | | 0.050 typ. | |
| L | 0.49 | 0.70 | 0.019 | 0.027 |
| M | 2.4 | 2.72 | 0.094 | 0.107 |
| N | 4.95 | 5.15 | 0.194 | 0.203 |
| N1 | 2.40 | 2.70 | 0.094 | 0.106 |
| O | 1.14 | 1.70 | 0.044 | 0.067 |
| P | 0.61 | 0.88 | 0.024 | 0.034 |

Cooling Method : C
Marking : Type number
Weight : 2 g
Recommended torque value : 0.55 m.N.
Maximum torque value : 0.70 m.N.

## PACKAGE MECHANICAL DATA
ISOWATT220AB Plastic

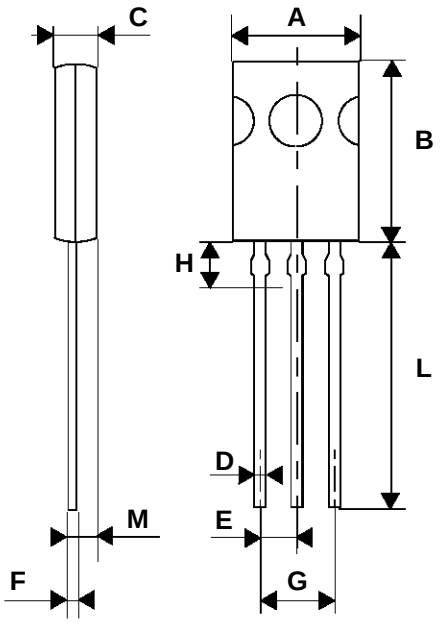



| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 10 | 10.4 | 0.393 | 0.409 |
| B | 15.9 | 16.4 | 0.626 | 0.645 |
| B1 | 9.8 | 10.6 | 0.385 | 0.417 |
| C | 28.6 | 30.6 | 1.126 | 1.204 |
| D | 16 typ | | 0.630 typ | |
| E | 9 | 9.3 | 0.354 | 0.366 |
| H | 4.4 | 4.6 | 0.173 | 0.181 |
| I | 3 | 3.2 | 0.118 | 0.126 |
| J | 2.5 | 2.7 | 0.098 | 0.106 |
| L | 0.4 | 0.7 | 0.015 | 0.027 |
| M | 2.5 | 2.75 | 0.098 | 0.108 |
| N | 4.95 | 5.2 | 0.195 | 0.204 |
| N1 | 2.4 | 2.7 | 0.094 | 0.106 |
| O | 1.15 | 1.7 | 0.045 | 0.067 |
| P | 0.75 | 1 | 0.030 | 0.039 |

Cooling Method : C
Marking : Type number
Weight : 2.1g
Recommended torque value : 0.55 m.N.
Maximum torque value : 0.70 m.N.

## PACKAGE MECHANICAL DATA

SOT82 Plastic



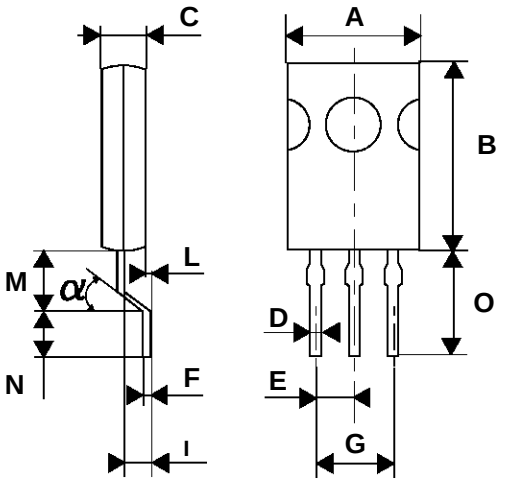

| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 7.4 | 7.8 | 0.291 | 0.307 |
| B | 10.5 | 10.8 | 0.413 | 0.425 |
| C | 2.4 | 2.7 | 0.094 | 0.106 |
| D | 0.7 | 0.9 | 0.027 | 0.035 |
| E | 2.2 typ. | | 0.087 typ. | |
| F | 0.49 | 0.75 | 0.019 | 0.029 |
| G | 4.15 | 4.65 | 0.163 | 0.183 |
| H (1) | | 2.54 | | 0.100 |
| L | 15.7 typ. | | 0.618 typ. | |
| M | 1.0 | 1.3 | 0.039 | 0.051 |

(1) Within this region the cross-section of the leads is uncontrolled

Marking : Type number
Weight : 0.72g

## PACKAGE MECHANICAL DATA

SOT194 Plastic




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 7.4 | 7.8 | 0.291 | 0.307 |
| B | 10.5 | 10.8 | 0.413 | 0.425 |
| C | 2.4 | 2.7 | 0.094 | 0.106 |
| D | 0.7 | 0.9 | 0.027 | 0.035 |
| E | 2.2 typ. | | 0.087 typ. | |
| F | 0.49 | 0.75 | 0.019 | 0.020 |
| G | 4.15 | 4.65 | 0.163 | 0.183 |
| I | 1.3 typ. | | 0.051 typ. | |
| L | 0.1 typ. | | 0.004 typ. | |
| M | 4 typ | | 0.158 typ | |
| N | 2 typ. | | 0.078 typ. | |
| O | 6 typ. | | 0.236 typ. | |
| α | 45° | | 45° | |

Marking : Type number
Weight : 0.68g

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