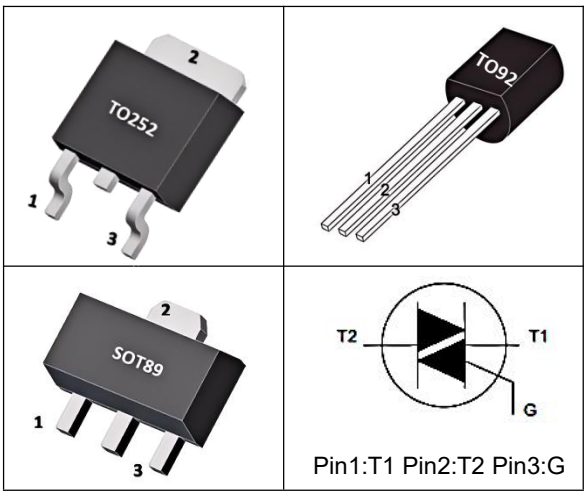
# MAC97A6&MAC97A8

TRIAC

## GENERAL DESCRIPTION

*The MAC97A6 triac is suitable for general purpose AC switching. It can be used as an ON/OFF function in applications such as heating regulation, induction motor starting circuits, for phase control operation in light dimmers, motor speed controllers.




## FEATURES

*Blocking voltage to 600V
*RMS on-state current to 0.6 A
*Sensitive gate in all four quadrants

## APPLICATIONS

*General purpose bidirectional switching
*Phase control applications
*Solid state relays.

## MARKING


97A6=DeVice Code

XXXX=Date Code


97A8=DeVice Code

XXXX=Date Code

## ABSOLUTE MAXIMUM RATINGS (TC=25°C, unless otherwise specified)

| SYMBOL | PARAMETER | TEST CONDITION | VALUE | UNIT |
|---|---|---|---|---|
| $V_{DRM}/V_{RRM}$ | Repetitive Peak off-state/reverse voltage 97A6<br>97A8 | $T_J$=25to125°C | 400<br>600 | V |
| $I_{T(RMS)}$ | RMS On-State Current(Full Sine Wave) | Tc=105°C | 0.6 | A |
| $I_{TSM}$ | Non Repetitive Surge Peak On-State Current ($T_J$=25°C) | t=20ms | 8.0 | A |
| | | t=16.7ms | 8.8 | |
| $I_{GM}$ | Peak Gate Current | t=2μs | 1 | A |
| $V_{GM}$ | Peak Gate voltage | t=2μs | 5 | V |
| $I^2t$ | $I^2t$ Value for Fusing | t=10ms | 0.32 | $A^2S$ |
| dI/dt | Repetitive Rate of Rise of on-State Current After Triggering ($I_G$=2×$I_{GT}$ , f=100Hz , Tj=125℃) | T2+ G+ | 50 | A/μs |
| | | T2+ G- | 50 | |
| | | T2- G- | 50 | |
| | | T2- G+ | 10 | |
| $P_{G(AV)}$ | Average Gate Power Dissipation | $T_J$=125°C | 0.1 | W |
| $P_{GM}$ | Peak gate Power | | 5 | W |
| Tstg | Storage Temperature | | -40 to +150 | ℃ |
| Tj | Operating junction temperature | | 125 | ℃ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

# MAC97A6&MAC97A8

TRIAC

## ■ THERMAL RESISTANCES

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Junction to Ambient | SOT-89 | $R\theta_{JA}$ | 165 | ℃/W |
| | TO-252 | | 62.5 | ℃/W |
| | TO-92 | | 150 | ℃/W |
| Junction to Case | SOT-89 | $R\theta_{JC}$ | 60 | ℃/W |
| | TO-252 | | 2.6 | ℃/W |
| | TO-92 | | 75 | ℃/W |

## ■ ELECTRICAL CHARACTERISTICS(Tj=25℃ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Repetitive Peak off-state current | $I_{DRM}$ | $V_D=V_{DRM}$ | | | 0.4 | 5 | μA |
| Gate Trigger current | $I_{GT}$ | $V_D$=12V $R_L$=33Ω | T2+, G+ | | | 5 | mA |
| | | | T2+, G - | | | 5 | |
| | | | T2-, G - | | | 5 | |
| | | | T2-, G+ | | | 10 | |
| Gate Trigger voltage | $V_{GT}$ | $V_D$=12V $R_L$=33Ω | T2+, G+ | | | 1.3 | V |
| | | | T2+, G - | | | 1.3 | |
| | | | T2-, G - | | | 1.3 | |
| | | | T2-, G+ | | | 1.3 | |
| Latching Current | $I_L$ | $I_G$=1.2$I_{GT}$ | T2+, G+ | | | 10 | mA |
| | | | T2+, G - | | | 10 | |
| | | | T2-, G - | | | 10 | |
| | | | T2-, G+ | | | 20 | |
| Holding Current | $I_H$ | $I_G$=20mA, $I_T$=600mA | | | | 10 | mA |
| On-state voltage | $V_T$ | $I_T$=2A | | | 1.3 | 1.7 | V |
| Off-state leakage current | $I_D$ | $V_D=V_{DRM(max)}$;Tj=125℃ | | | | 0.5 | mA |
| Critical Rate of Rise of Off-state Voltage | dV/dt | $V_D$=2/3$V_{DRM}$ ;Gate Open Tj=125℃ | | | 60 | | V/us |
| **DYNAMIC CHARACTERISTICS** | | | | | | | |
| Critical Rate of Rise of off-state Voltage | $dV_D/dt$ | $V_{DM}$=67%$V_{DRM(max)}$ circuit | | 30 | 45 | | V/μs |
| Gate Controlled Turn-on Time | $t_{gt}$ | $I_{TM}$=1.5A,$V_D=V_{DRM(max)}$, $I_G$=0.1A $dI_G/dt$=5A/μs | | | 2 | | μs |

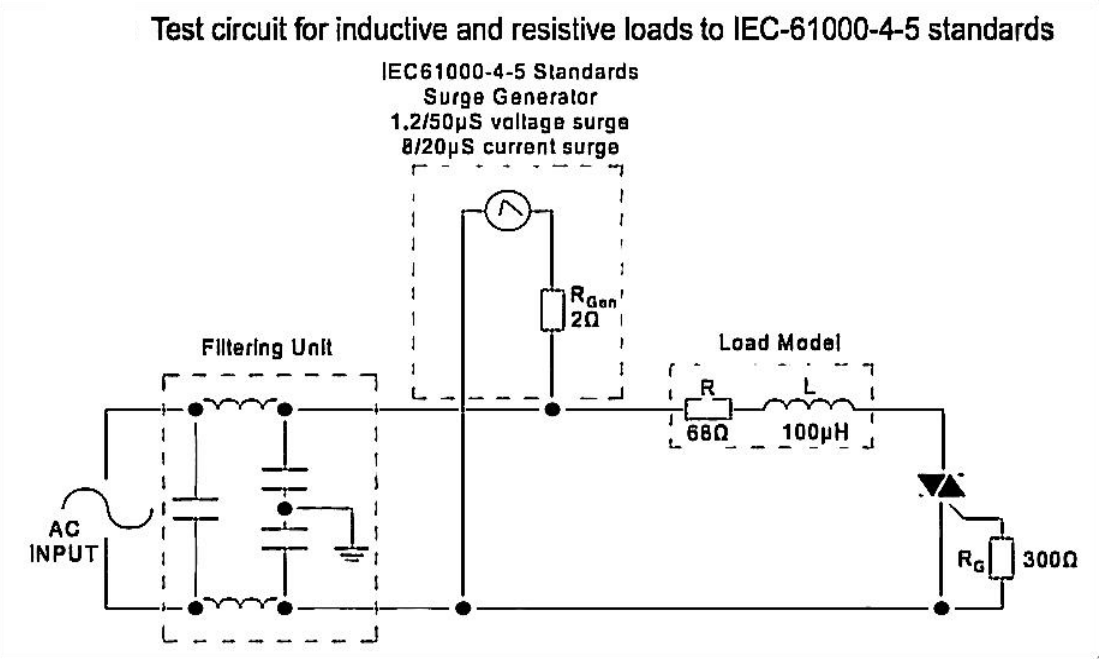
# MAC97A6&MAC97A8

TRIAC

## ■ STATIC CHARACTERISTICS

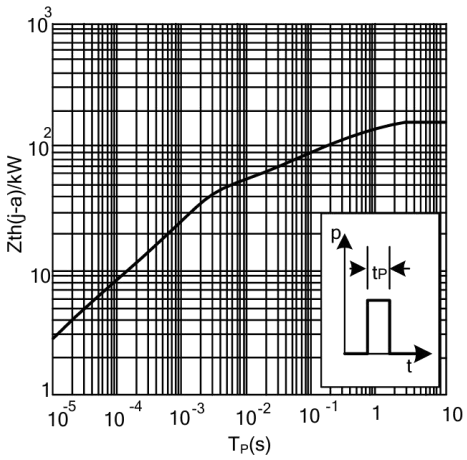
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Peak On-State Voltage | $V_{TM}$ | $I_{TM}$=0.85A, $t_P$=380μs | $T_J$=25°C | | | 1.5 | V |
| Threshold Voltage | $V_{TO}$ | | $T_J$=125°C | | | 0.98 | V |
| Dynamic Resistance | $R_D$ | | $T_J$=125°C | | | 362 | mΩ |
| Repetitive Peak Off-State Current | $I_{DRM}$ | $V_D$=$V_{DRM}$ $V_R$=$V_{RRM}$ | $T_J$=25°C | | | 5 | μA |
| | $I_{RRM}$ | | $T_J$=125°C | | | 0.15 | mA |

## ■ TEST CIRCUITS AND WAVEFORMS

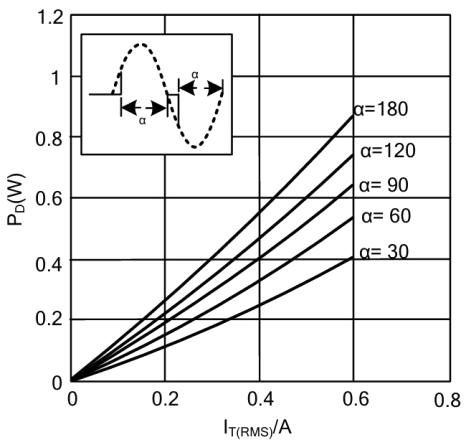



## ■ TYPICAL CHARACTERISTICS（1）

Transient Thermal Impedance From Junction to Ambient as a Function of Pulse Duration.

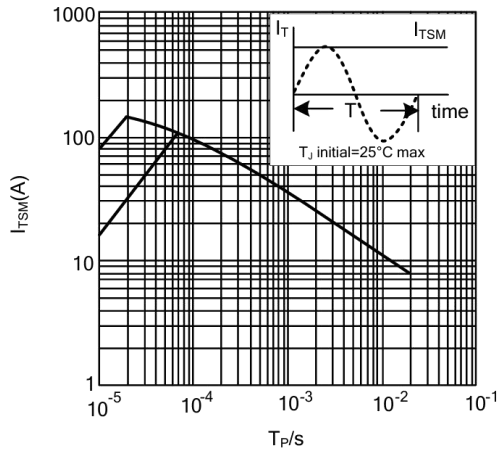



Maximum On-State Dissipation as a Function of RMS On-State Current; Typical Values. α=Conduction Angle.

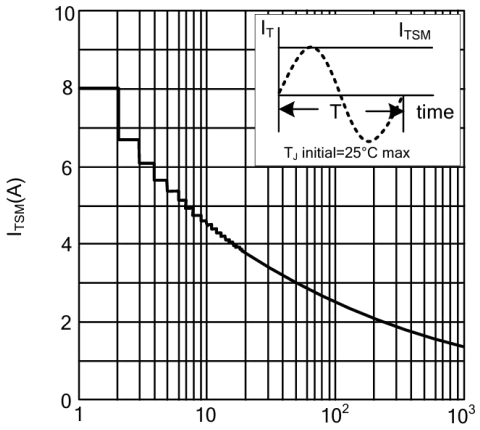


## ■ TYPICAL CHARACTERISTICS（2）

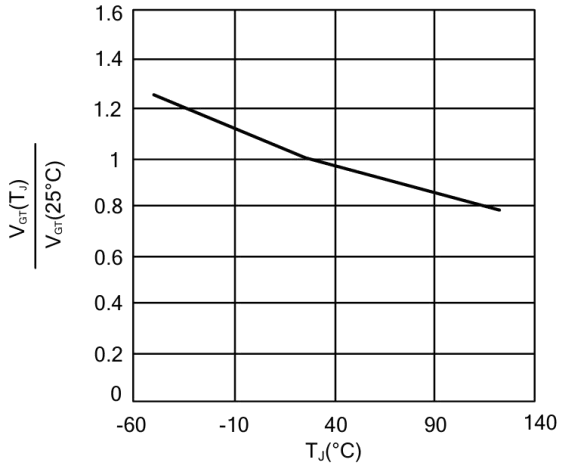
Maximum Permissible Non-Repetitive Peak on-State Current as a Function of Pulse Width for Sinusoidal Currents;Tyical Values. $t_p$ 20ms.



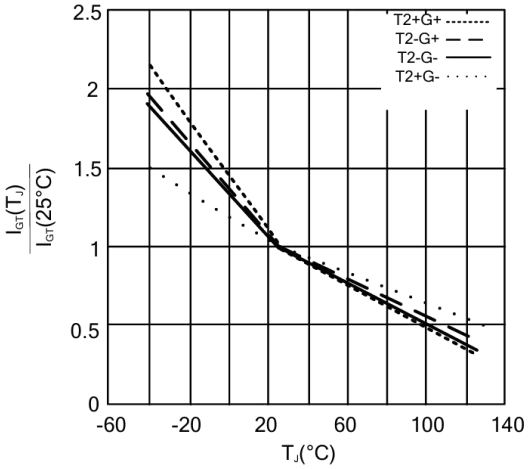

Maximum Permissible Non-Repetitive Peak On-State Current as a Function of Number of Cycles for Sinusoidal Currents; Typical Values . n=Number of Cycles at f=50Hz.



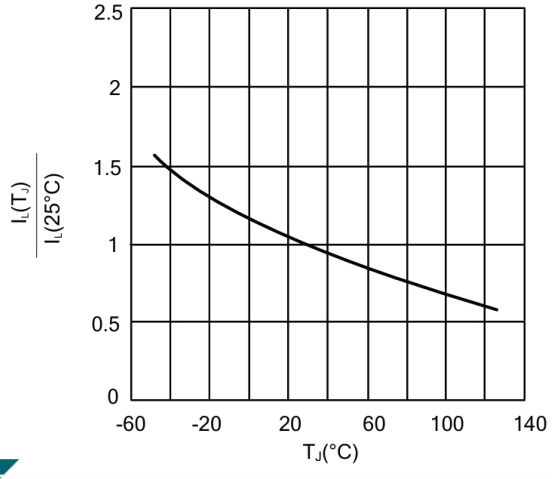

Normalized Gate Trigger Voltage as a of Function Junction Temperature; Typical Values.



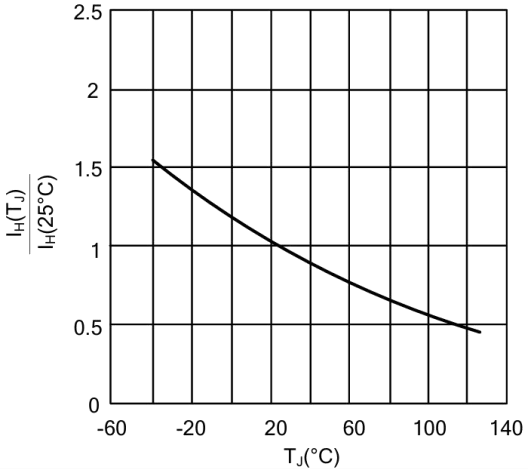

Normalized Gate Trigger Current as a Function of Junction Temperature; Typical Values.




Normalized Latching Current as a Function of Junction Temperature; Typical Values.




Normalized Holding Current as a Function of Junction Temperature; Typical Values.

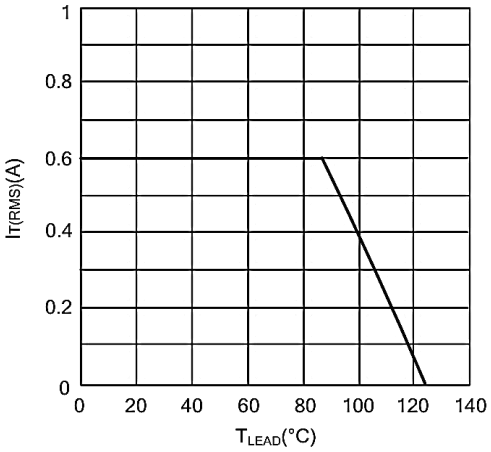


# MAC97A6&MAC97A8

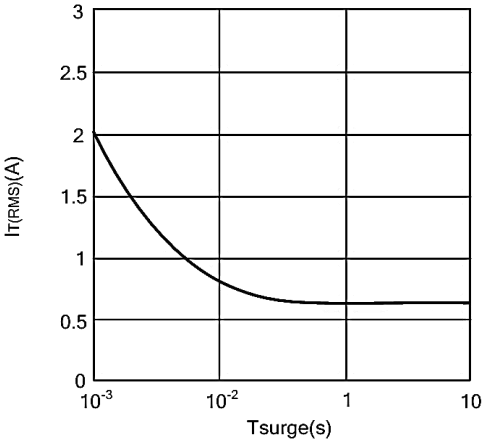
TRIAC

## ■ TYPICAL CHARACTERISTICS（3）

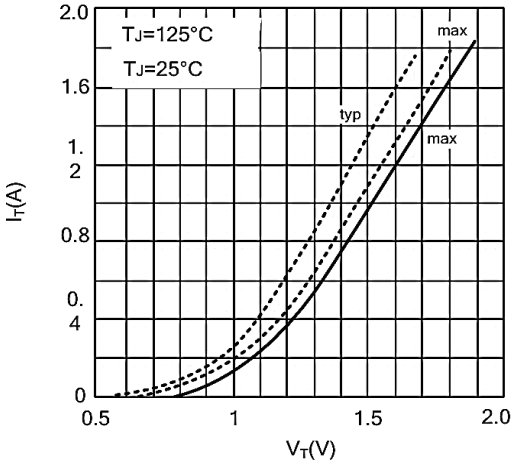
Maximum Permissible RMS Current as a Function of Lead Temperature; Typical Values.



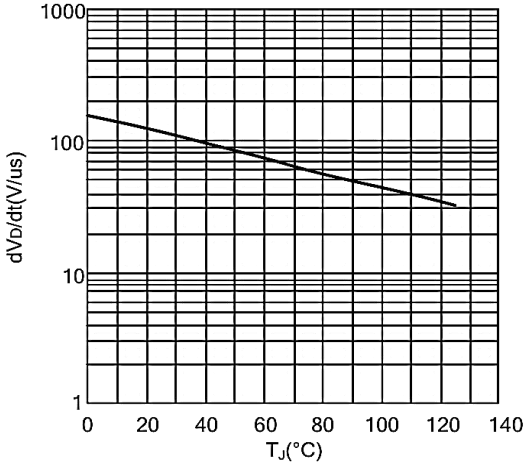

Maximum Permissible Repetitive RMS On-State Current as a Function of Surge Duration for Sinusoidal Currents; Typical Values. f=50Hz; $T_{LEAD}$ 50°C



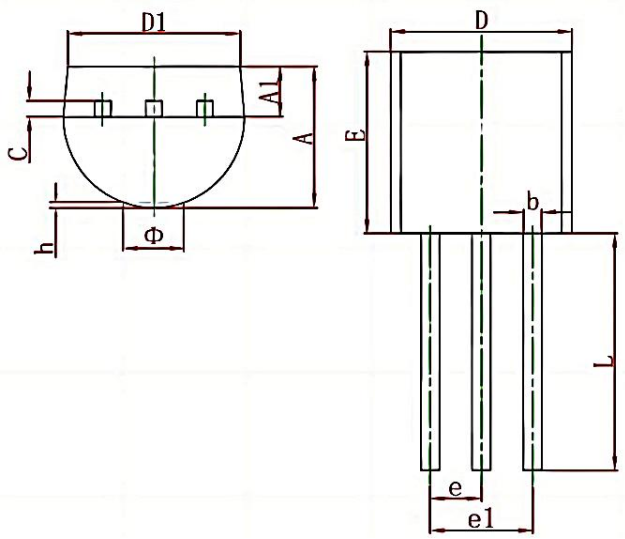

On-State Current as a Function of On-State Voltage; Typical and Maximum Values.




Critical Rate of Rise of Off-State Voltage as a Function of Junction Temperature; Typical Values.




## ■ TO - 92 Package Outline Dimensions

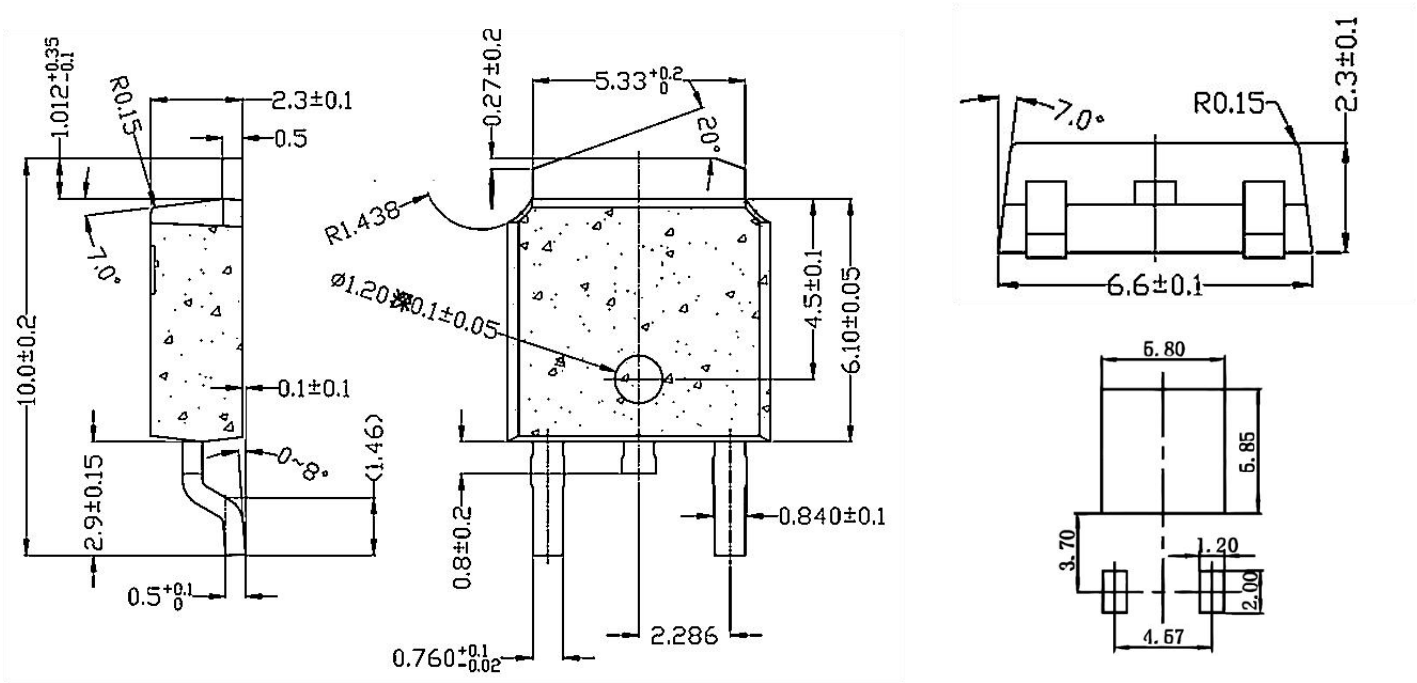



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 3.300 | 3.700 | 0.130 | 0.146 |
| A1 | 1.100 | 1.400 | 0.043 | 0.055 |
| b | 0.380 | 0.550 | 0.015 | 0.022 |
| c | 0.360 | 0.510 | 0.014 | 0.020 |
| D | 4.400 | 4.700 | 0.173 | 0.185 |
| D1 | 3.430 | | 0.135 | |
| E | 4.300 | 4.700 | 0.169 | 0.185 |
| e | 1.270 TYP | | 0.050 TYP | |
| e1 | 2.440 | 2.640 | 0.096 | 0.104 |
| L | 14.100 | 14.500 | 0.555 | 0.571 |
| Φ | | 1.600 | | 0.063 |
| h | 0.000 | 0.380 | 0.000 | 0.015 |

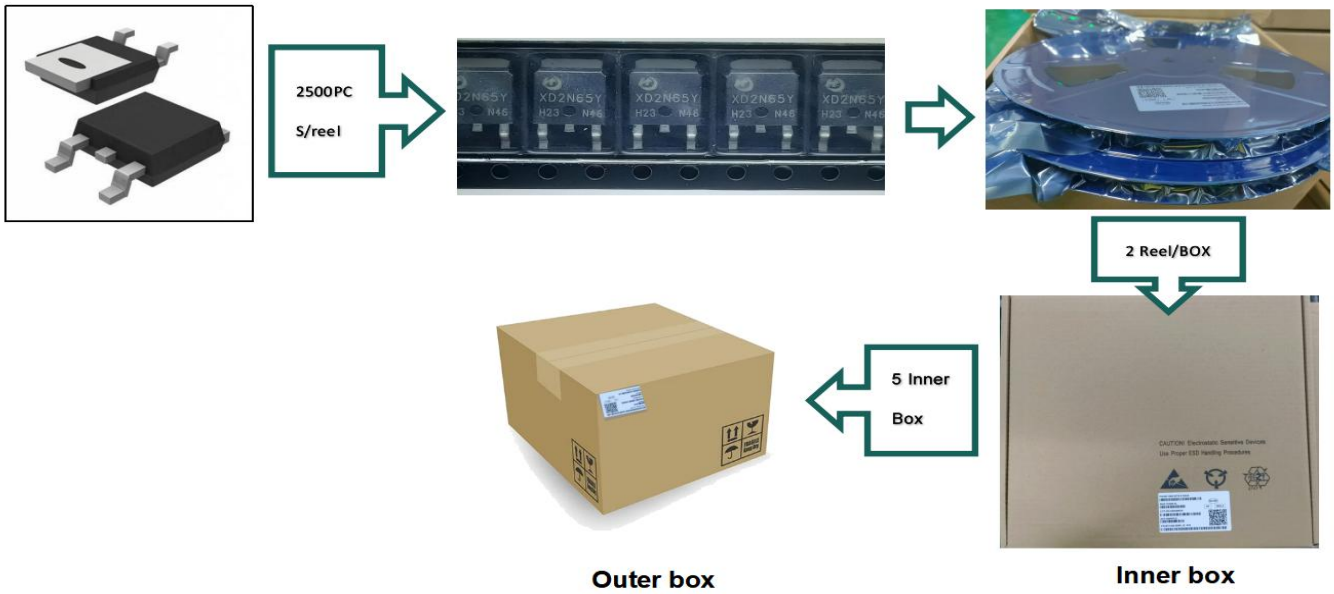
# MAC97A6&MAC97A8

TRIAC

## ■ TO - 252 Package Outline Dimensions




## ■ TO - 252 PACKING INFORMATION

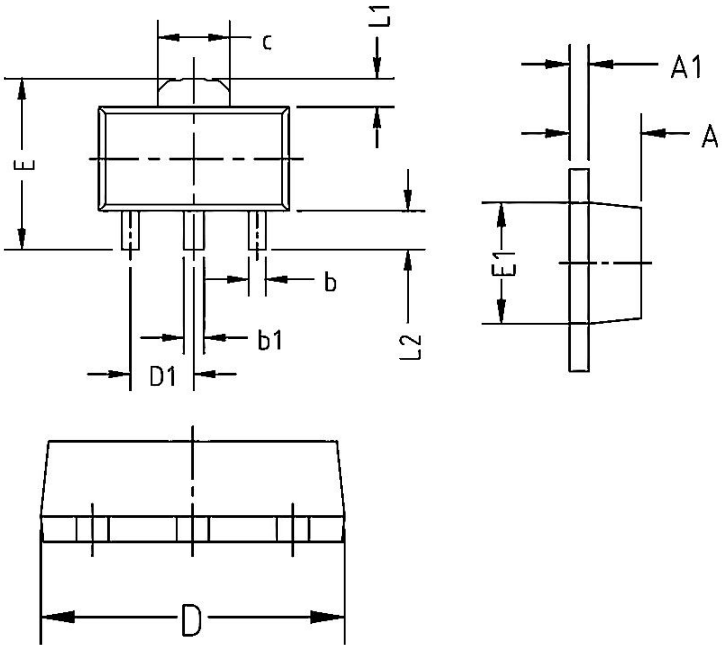



| Package version | Reel dimensions Φ×H (mm) | Per Reel (pcs) | Reels per box | Inner box dimensions L×W×H(mm) | Outer box (pcs) | Outer box dimensions L×W×H (mm) |
|---|---|---|---|---|---|---|
| TO-252 | Φ330*20 | 2500 | 2 | 360*340*50 | 25000 | 375*375*280 |

# MAC97A6&MAC97A8

TRIAC

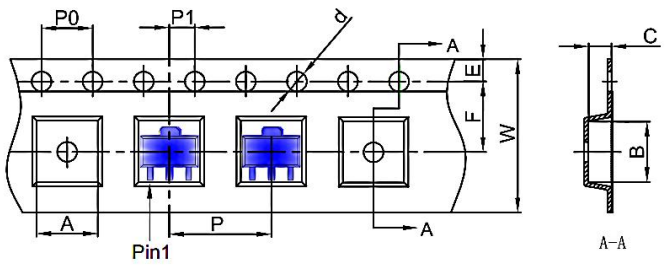
## ■ SOT89 PACKAGE OUTLINE DIMENSIONS



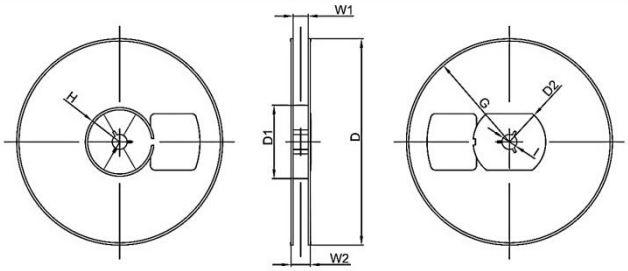

| COMMON DIMENSION(MM) | | | |
|---|---|---|---|
| PKG | SOT-89 | | |
| Symbol | MIN | MON | MAX |
| A | 1.450 | 1.500 | 1.550 |
| A1 | 0.350 | 0.400 | 0.450 |
| b | 0.350 | 0.400 | 0.48 |
| b1 | 0.430 | 0.480 | 0.550 |
| C | 1.500 | 1.550 | 1.650 |
| D | 4.450 | 4.550 | 4.700 |
| D1 | 1.470 | 1.500 | 1.550 |
| E | 4.100 | 4.200 | 4.300 |
| E1 | 2.500 | 2.550 | 2.650 |
| L1 | 0.650 | 0.700 | 0.750 |
| L2 | 0.900 | 0.950 | 1.000 |

## ■ SOT89 PACKAGING INFORMATION

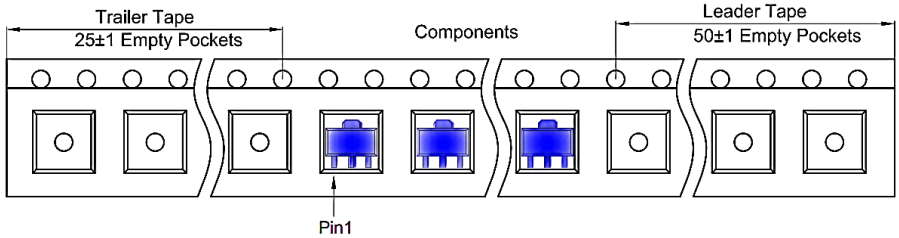
### SOT-89 Embossed Carrier Tape




### SOT-89 Reel




### SOT-89 Tape Leader and Trailer




| REEL | Reel Size |
|---|---|
| 1000 pcs | 7 Inch |

| Dimensions are in millimeter | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-89-3L | 4.85 | 4.45 | 1.85 | Ø1.50 | 1.75 | 5.50 | 4.00 | 8.00 | 2.00 | 12.00 |

| Dimensions are in millimeter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Reel Option | D | D1 | D2 | G | H | I | W1 | W2 |
| 7"Dia | Ø180.00 | 60.00 | R32.00 | R86.50 | R30.00 | Ø13.00 | 13.20 | 16.50 |