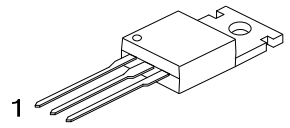
# TRIAC



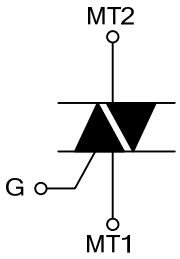

TO-220

## ■ DESCRIPTION

Passivated triacs in a plastic envelope, intended for use in applications requiring high bidirectional transient and blocking voltage capability and high thermal cycling performance.

Typical applications include motor control, industrial and domestic lighting, heating and static switching.

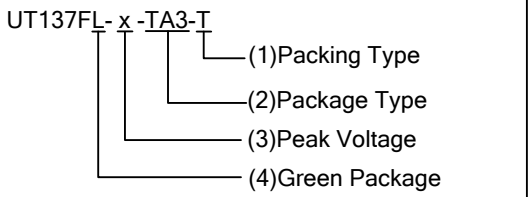
## ■ SYMBOL




## ■ ORDERING INFORMATION

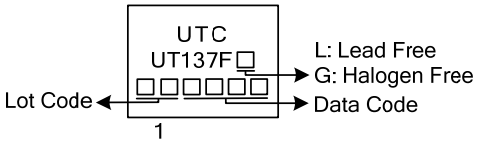
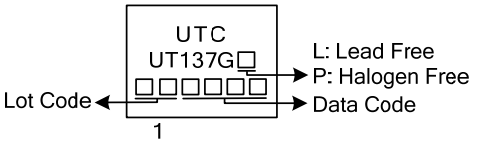
| Order Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UT137FL-x-TA3-T | UT137FG-x-TA3-T | TO-220 | MT1 | MT2 | G | Tube |
| UT137GL-x-TA3-T | UT137GP-x-TA3-T | TO-220 | MT1 | MT2 | G | Tube |

Note: Pin Assignment: G: Gate




(1) T: Tube
(2) TA3: TO-220
(3) 5: 500V, 6: 600V, 8: 800V
(4) L: Lead Free, G: Halogen Free and Lead Free
P: Halogen Free and Lead Free

## ■ MARKING

| UT137F | UT137G |
|---|---|
|  |  |

## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Repetitive peak off-state voltages | UT137F_G-5 | $V_{DRM}$ | 500 (Note 2) | V |
| | UT137F_G-6 | | 600 (Note 2) | V |
| | UT137F_G-8 | | 800 | V |
| RMS on-state current full sine wave; $T_{mb}$ ≤102°C | | $I_{T(RMS)}$ | 8 | A |
| Non-repetitive peak on-state current (Full sine wave; $T_J$ = 25°C prior to surge) | t = 20ms | $I_{TSM}$ | 65 | A |
| | t = 16.7 ms | | 71 | |
| $I^2t$ for fusing | t = 10 ms | $I^2t$ | 21 | $A^2s$ |
| Repetitive rate of rise of on-state current after triggering $I_{TM}$=12A; $I_G$=0.2A; $d_{IG}$ /dt=0.2A/μs | T2+ G+ | $dI_T$ /dt | 50 | A/μs |
| | T2+ G- | | 50 | A/μs |
| | T2- G- | | 50 | A/μs |
| | T2- G+ | | 10 | A/μs |
| Peak gate voltage | | $V_{GM}$ | 5 | V |
| Peak gate current | | $I_{GM}$ | 2 | A |
| Peak gate power | | $P_{GM}$ | 5 | W |
| Average gate power (over any 20 ms period) | | $P_{G(AV)}$ | 0.5 | W |
| Junction Temperature | | $T_J$ | 125 | °C |
| Storage Temperature | | $T_{STG}$ | -40 ~ +150 | °C |

Note: 1. 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.
2. Although not recommended, off-state voltages up to 800V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 6A/μs.

## ■ THERMAL RESISTANCES

| PARAMETER | | SYMBOL | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Thermal resistance Junction to Ambient | In Free Air | $θ_{JA}$ | | 60 | | °C/W |
| Thermal resistance Junction to mounting base | Full cycle | $θ_{JC}$ | | | 2.0 | °C/W |
| | Half cycle | | | | 2.4 | °C/W |

## ■ STATIC CHARACTERISTICS ($T_J$=25°C, unless otherwise specified)

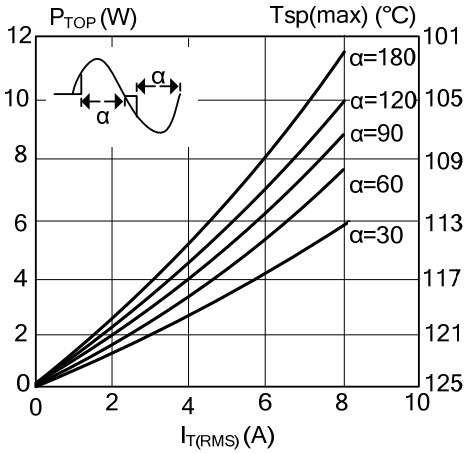
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | UT137F | UT137G | |
| Gate Trigger Current | $I_{GT}$ | $V_D$=12V, $I_T$=0.1A | T2+G+ | | 5 | 25 | 50 | mA |
| | | | T2+G- | | 8 | 25 | 50 | |
| | | | T2-G- | | 11 | 25 | 50 | |
| | | | T2-G+ | | 30 | 70 | 100 | |
| Latching Current | $I_L$ | $V_D$=12V, $I_{GT}$=0.1A | T2+G+ | | 7 | 30 | 45 | mA |
| | | | T2+G- | | 16 | 45 | 60 | |
| | | | T2-G- | | 5 | 30 | 45 | |
| | | | T2-G+ | | 7 | 45 | 60 | |
| Holding Current | $I_H$ | $V_D$=12V, $I_{GT}$=0.1A | | | 5 | 20 | 40 | mA |
| On-State Voltage | $V_T$ | $I_T$=10A | | | 1.3 | 1.65 | | V |
| Gate Trigger Voltage | $V_{GT}$ | $V_D$=12V, $I_T$=0.1A | | | 0.7 | 1.5 | | V |
| | | $V_D$=400V, $I_T$=0.1A, $T_J$=125°C | | 0.25 | 0.4 | | | V |
| Off-State Leakage Current | $I_D$ | $V_D$=$V_{DRM(max)}$, $T_J$=125°C | | | 0.1 | 0.5 | | mA |

■ DYNAMIC CHARACTERISTICS ($T_J$=25°C, unless otherwise specified)

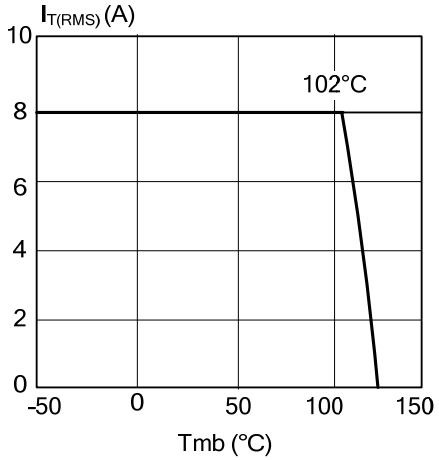
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| | | | UT137F | UT137G | | | |
| Critical Rate Of Rise Of Off-State Voltage | $dV_D/dt$ | $V_{DM}$=67% $V_{DRM(max)}$, $T_J$=125°C, Exponential waveform, gate open circuit | 50 | 200 | 250 | | V/μs |
| Critical Rate Of Change Of Commutating Voltage | $dV_{com}/dt$ | $V_{DM}$=400V, $T_J$=95°C, $I_{T(RMS)}$=8A, $dI_{com}/dt$=3.6A/ms, gate open circuit | | 10 | 20 | | V/μs |
| Gate Controlled Turn-On Time | $t_{gt}$ | $I_{TM}$=12A, $V_D$=$V_{DRM(max)}$, $I_G$=0.1A, $dI_G/dt$=5A/μs | | | 2 | | μs |

## ■ TYPICAL CHARACTERISTICS

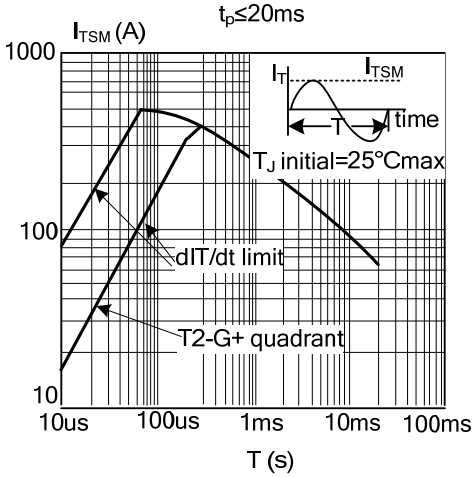
Maximum On -State Dissipation. $P_{tot}$ vs RMS On-State Current, $I_{T(RMS)}$, Where α=conduction Angle



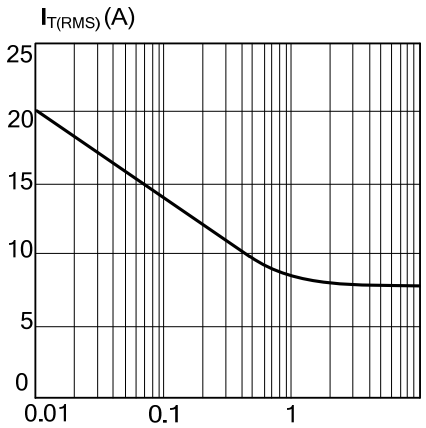

Maximum Permissible RMS Current $I_{T(RMS)}$ vs Mounting Base Temperature $T_{mb}$



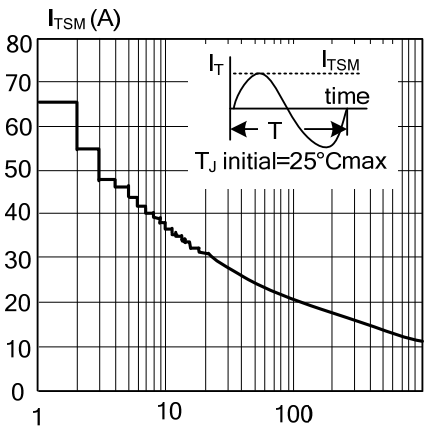

Maximum Permissible Non-Repetitive Peak On-State Current $I_{TSM}$, vs Pulse Width $t_p$, for Sinusoidal Currents, $t_p$≤20ms



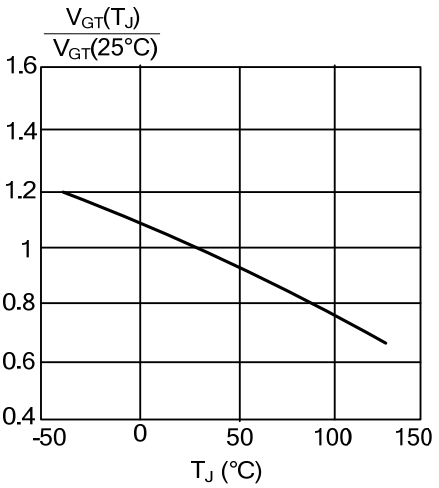

Maximum Permissible Repetitive RMS On-State Current $I_{T(RMS)}$, vs Surge Duration, for Sinusoidal Currents,f =50Hz, $T_{mb}$≤102°C




Maximum Permissible Non-Repetitive Peak On-State Current $I_{TSM}$, vs Number of Cycles, for Sinusoidal Currents, f=50Hz

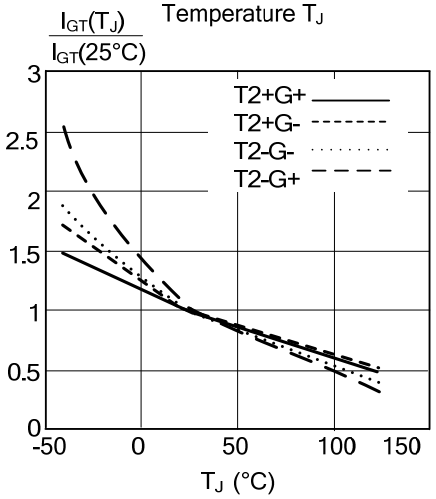



Normalised Gate Trigger Voltage $V_{GT}(T_J)/V_{GT}(25°C)$, vs Junction Temperature $T_J$

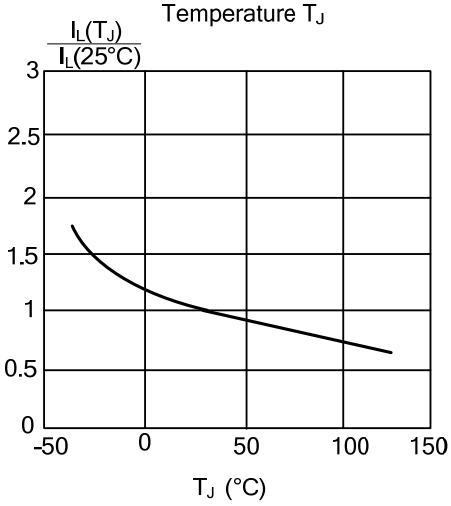


## ■ TYPICAL CHARACTERISTICS(Cont.)

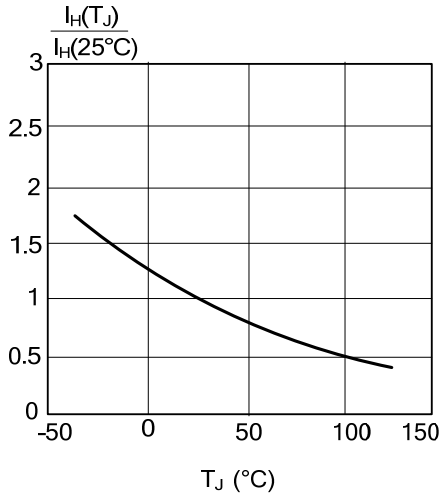
Normalised Gate Trigger Current $I_{GT}(T_J)/I_{GT}(25°C)$, vs Junction Temperature $T_J$



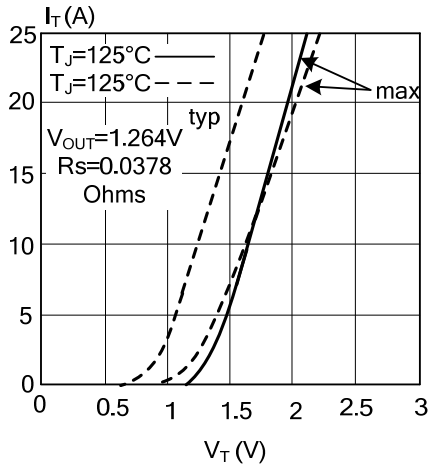

Normalised Latching Current $I_L(T_J)/I_L(25°C)$, vs Junction Temperature $T_J$



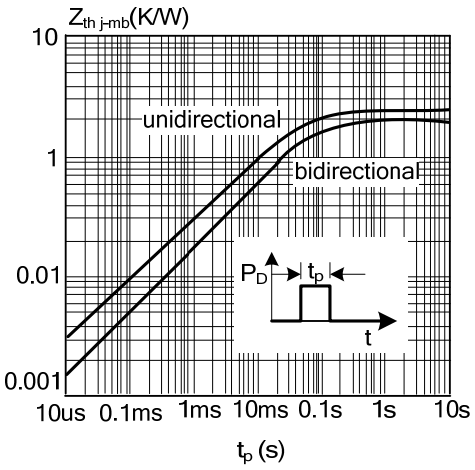

Normalised Holding Current $I_H(T_J)/I_H(25°C)$, vs Junction Temperature $T_J$




Typical and Maximum On-state Characteristic




Transient Thermal Impedance $Z_{th\ j\text{-}mb}$, vs Pulse Width $t_p$




Typical Commutation dV/dt Vs Junction Temperature, Parameter Commutation $dI_T/dt$. The Triac Should Commutate When The dV/dt Is Below The Value On The Appropriate Curve For Pre-Commutation dIV/dt