DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

# C147A-C147PB

## SILICON CONTROLLED RECTIFIERS

### FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

### MAXIMUM RATINGS

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| Part number | Repetitive peak off-state voltage | Repetitive peak reverse voltage | Non-repetitive peak reverse voltage | Units |
|---|---|---|---|---|
| | $V_{DRM}$[1] | $V_{RRM}$[1] | $V_{RSM}$[1] | |
| | $T_J$ = -40° to 125°C | $T_J$ = -40°C to 125°C | $T_J$ = 125°C | |
| **C147A** | 100 | 100 | 150 | V |
| **C147B** | 200 | 200 | 300 | V |
| **C147C** | 300 | 300 | 400 | V |
| **C147D** | 400 | 400 | 500 | V |
| **C147E** | 500 | 500 | 600 | V |
| **C147M** | 600 | 600 | 720 | V |
| **C147S** | 700 | 700 | 840 | V |
| **C147N** | 800 | 800 | 960 | V |
| **C147T** | 900 | 900 | 1080 | V |
| **C147P** | 1000 | 1000 | 1200 | V |
| **C147PA** | 1100 | 1100 | 1320 | V |
| **C147PB** | 1200 | 1200 | 1440 | V |

1: Pulse width: half sine wave waveform, 10 msec.

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| **RMS on-state current**<br>(All conduction angles) | $I_{T(RMS)}$ | 63 | A |
| **Average on-state current** | $I_{T(AV)}$ | Figures 2 and 3 | |
| **Critical rate of rise of on-state current** (non-repetitive)<br>Switching from 1200V<br>Switching from 600V | di/dt | <br>100<br>200 | A/µs |
| **Peak one cycle surge (non-repetitive) on-state current**<br>60Hz<br>50Hz | $I_{TSM}$ | <br>1000<br>910 | A |
| **Fusing**<br>Times ≥ 8.3ms<br>Times ≥ 1.5ms | $I^2t$ | <br>4150<br>2850 | $A^2s$ |
| **Peak gate power dissipation for 150µs** | $P_{GM}$ | 100 | W |
| **Average gate power dissipation** | $P_{G(AV)}$ | 2 | W |
| **Storage temperature** | $T_{stg}$ | -40 to 150 | °C |
| **Operating temperature** | $T_J$ | -40 to 125 | °C |
| **Maximum stud torque** | | 3-4 | N-m |

di/dt ratings for conditions of $V_{DRM}$ stated above; 20V, 20Ω gate trigger source with 0.5µsec short circuit trigger current rise time.

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**ELECTRICAL CHARACTERISTICS**

| Characteristic | Symbol | Min | Max | Units | Test Condition |
|---|---|---|---|---|---|
| **Peak off-state and reverse current** | | | | | $T_J$ = -40 to 125°C<br>$V_{DRM}$ = $V_{RRM}$ = |
| **C147A** | $I_{DRM}$, $I_{RRM}$ | - | 12 | mA | 100 Volts peak |
| **C147B** | | - | 12 | | 200 Volts peak |
| **C147C** | | - | 12 | | 300 Volts peak |
| **C147D** | | - | 10 | | 400 Volts peak |
| **C147E** | | - | 10 | | 500 Volts peak |
| **C147M** | | - | 10 | | 600 Volts peak |
| **C147S** | | - | 10 | | 700 Volts peak |
| **C147N** | | - | 9 | | 800 Volts peak |
| **C147T** | | - | 8 | | 900 Volts peak |
| **C147P** | | - | 7 | | 1000 Volts peak |
| **C147PA** | | - | 6.5 | | 1100 Volts peak |
| **C147PB** | | - | 6 | | 1200 Volts peak |
| **DC gate trigger current** | $I_{GT}$ | - | 150 | mAdc | $T_C$ = 25°C, $V_D$ = 12Vdc, $R_L$ = 12ohms |
| | | - | 300 | | $T_C$ = -40°C, $V_D$ = 12Vdc, $R_L$ = 12ohms |
| **DC gate trigger voltage** | $V_{GT}$ | - | 3 | Vdc | $T_C$ = 25°C, $V_D$ = 12Vdc, $R_L$ = 12ohms |
| | | - | 3.5 | | $T_C$ = -40°C, $V_D$ = 12Vdc, $R_l$ = 12ohms |
| | | 0.25 | - | | $T_C$ = 125°C, rated $V_{DRM}$, $R_L$ = 1000ohms |
| **Peak on-state voltage** | $V_{TM}$ | - | 3 | V | $T_C$ = 25°C, $I_{TM}$ = 500A(pk), 1ms wide pulse, duty cycle ≤ 1% |
| **Holding current** | $I_H$ | - | 250 | mAdc | $T_C$ = 25°C anode supply = 24Vdc, gate supply = 10V/20ohms.<br>Initial forward pulse = 2A, 0.1 ms to 10 ms wide |
| **Critical rate of rise of off-state voltage**<br>**(higher values may cause device switching)** | dv/dt | 200 | - | V/µs | $T_C$ = 125°C, rated $V_{DRM}$, using linear exponential rising waveform, gate open circuited<br>Exponential dv/dt = $V_{DRM}$ / τ) (0.632) |
| **Thermal resistance** | $R_{\Theta JC}$ | - | 0.35 | °C/W | Junction to case |
| **Typical turn-off time** | $t_q$ | 125 | | µsec | 1) $T_J$ = 125°C<br>2) $I_{TM}$ = 150A, peak<br>3) $V_R$ = 50V, min<br>4) $V_{DRM}$ (reapplied)<br>5) Rate-of-rise of reapplied off state voltage = 20V/µsec (linear)<br>6) Commutation di/dt = 5A/µsec<br>7) Repetition rate = 1PPS<br>8) Gate bias during turn-off interval = 0V, 100Ω |

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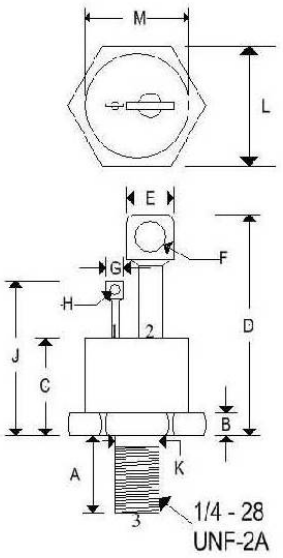
## SILICON CONTROLLED RECTIFIERS

**MECHANICAL CHARACTERISTICS**

| | |
|---|---|
| **Case** | TO-65 |
| **Marking** | Alpha-numeric |
| **Pin out** | See below |




Pin 1: Gate
Pin 2: Cathode
Pin 3: Anode

| | TO-65 | | | |
|---|---|---|---|---|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| A | 0.422 | 0.452 | 10.720 | 11.470 |
| B | 0.120 | 0.135 | 3.050 | 3.420 |
| C | 0.534 | 0.565 | 13.570 | 14.340 |
| D | 1.230 | 1.290 | 31.250 | 32.780 |
| E | 0.240 | 0.300 | 6.100 | 7.620 |
| F | 0.169 | 0.182 | 4.300 | 4.620 |
| G | 0.090 | 0.115 | 2.290 | 2.910 |
| H | 0.055 | 0.066 | 1.400 | 1.670 |
| J | 0.831 | 0.901 | 21.110 | 22.880 |
| K | 0.220 | - | 5.590 | - |
| L | 0.676 | 0.684 | 17.180 | 17.360 |
| M | - | 0.597 | - | 15.150 |

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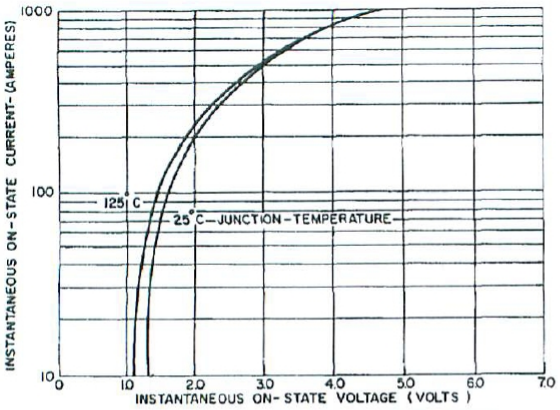
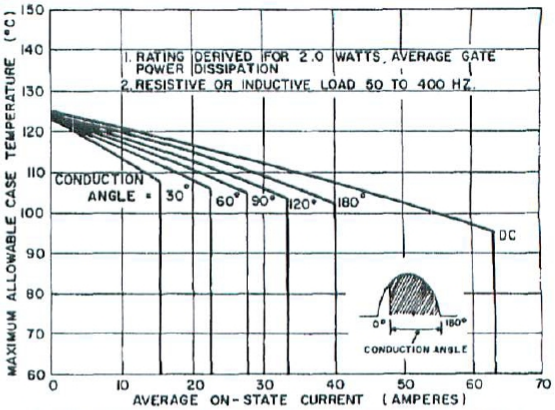
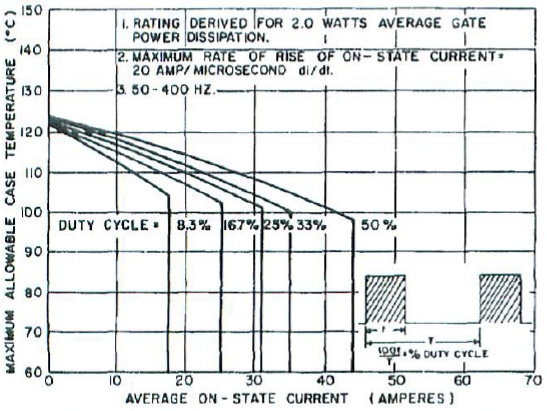
## SILICON CONTROLLED RECTIFIERS



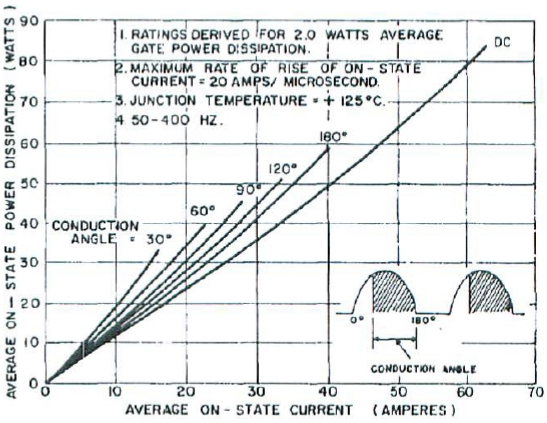

1. MAXIMUM ON-STATE CHARACTERISTICS



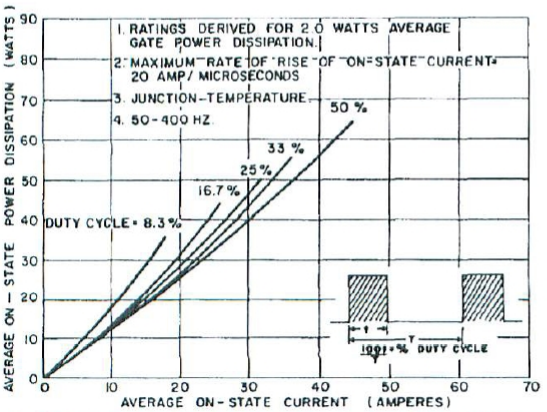

2. MAXIMUM ALLOWABLE CASE TEMPERATURE FOR SINUSOIDAL CURRENT WAVEFORM



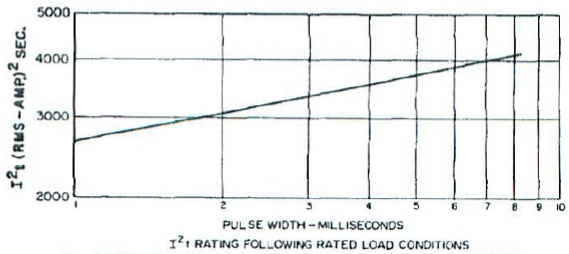

3. MAXIMUM ALLOWABLE CASE TEMPERATURE FOR RECTANGULAR CURRENT WAVEFORM




4. MAXIMUM ON-STATE POWER DISSIPATION FOR SINUSOIDAL CURRENT WAVEFORM




5. MAXIMUM ON-STATE POWER DISSIPATION FOR RECTANGULAR CURRENT WAVEFORM




6. MAXIMUM ALLOWABLE NON-REPETITIVE SURGE CURRENT

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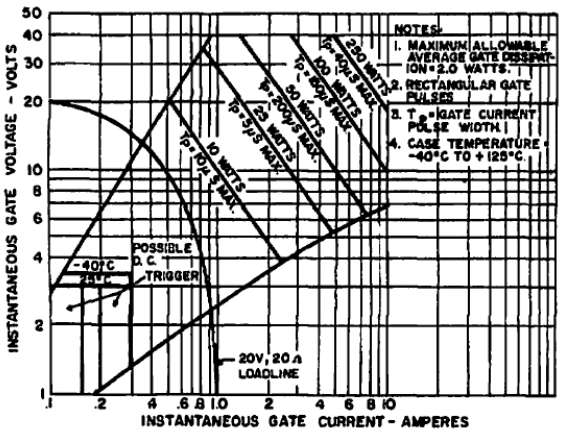
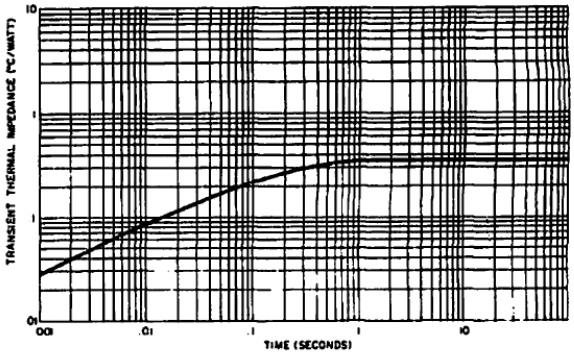



**7. GATE TRIGGER CHARACTERISTICS AND POWER RATINGS**




**8. TRANSIENT THERMAL IMPEDANCE – JUNCTION-TO-CASE**