

2N6400-2N6405

SILICON CONTROLLED RECTIFIERS

Available Non-RoHS (standard) or RoHS compliant (add PBF suffix).

Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|---------------------|------------|----------------------|
| Peak repetitive off-state voltage ⁽¹⁾ ($T_J = -40$ to 125°C , sine wave 50 to 60Hz, gate open) | | | |
| 2N6400 | | 50 | Volts |
| 2N6401 | V_{DRM} | 100 | |
| 2N6402 | V_{RRM} | 200 | |
| 2N6403 | | 400 | |
| 2N6404 | | 600 | |
| 2N6405 | | 800 | |
| On-state RMS current (180° conduction angles), $T_C = 100^\circ\text{C}$) | $I_{\text{T(RMS)}}$ | 16 | Amps |
| Average on-state current (180° conduction angles), $T_C = 100^\circ\text{C}$) | $I_{\text{T(AV)}}$ | 10 | Amps |
| Peak non-repetitive surge current (1/2 cycle, sine wave 60Hz, $T_J = 90^\circ\text{C}$) | I_{TSM} | 160 | Amps |
| Circuit fusing ($t = 8.3\text{ms}$) | I^2t | 145 | A^2s |
| Forward peak gate power (pulse width $\leq 1.0\mu\text{s}$, $T_C = 100^\circ\text{C}$) | P_{GM} | 20 | Watts |
| Forward average gate power ($t = 8.3\text{ms}$, $T_C = 100^\circ\text{C}$) | $P_{\text{G(AV)}}$ | 0.5 | Watts |
| Forward peak gate current (Pulse width $\leq 1.0\mu\text{s}$, $T_C = 100^\circ\text{C}$) | I_{GM} | 2.0 | Amps |
| Operating junction temperature range | T_J | -40 to 125 | $^\circ\text{C}$ |
| Storage temperature range | T_{stg} | -40 to 150 | $^\circ\text{C}$ |

1. V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage, however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------------|-----|---------------------------|
| Thermal resistance, junction to case | $R_{\theta\text{JC}}$ | 1.5 | $^\circ\text{C}/\text{W}$ |
| Maximum lead temperature for soldering purposes 1/8" from case for 10 seconds | T_L | 260 | $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|--------------------------------------|--------|------------|----------------------------------|
| OFF CHARACTERISTICS | | | | | |
| Peak repetitive forward or reverse blocking current ($V_{\text{AK}} = \text{rated } V_{\text{DRM}}$ or V_{RRM} , gate open) | $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ | I_{DRM} I_{RRM} | - - | - - | 10 2.0 μA mA |
| ON CHARACTERISTICS | | | | | |
| Peak forward on-state voltage ($I_{\text{TM}} = 32\text{A}$ peak, pulse width $\leq 1\text{ms}$, duty cycle $\leq 2\%$) | V_{TM} | - | - | 1.7 | Volts |
| Gate trigger current (continuous dc) ($V_D = 12\text{Vdc}$, $R_L = 100\text{ohms}$) | $T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$ | I_{GT} | - - | 9.0 60 | mA |
| Gate trigger voltage (continuous dc) ($V_D = 12\text{Vdc}$, $R_L = 100\text{ohms}$) | $T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$ | V_{GT} | - - | 0.7 2.5 | Volts |
| Gate non-trigger voltage ($V_D = 12\text{Vdc}$, $R_L = 100\text{ohms}$) | $T_C = 125^\circ\text{C}$ | V_{GD} | 0.2 | - | Volts |

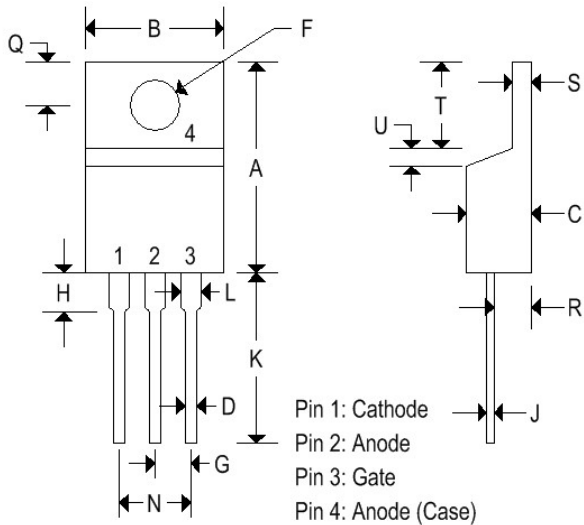
2N6400-2N6405

SILICON CONTROLLED RECTIFIERS

| ON CHARACTERISTICS | | | | | | |
|--|---------------------------|----------|---|-----|----|------------------------|
| Holding current ($V_D = 12\text{Vdc}$, initiating current = 200mA, gate open) | $T_C = 25^\circ\text{C}$ | I_H | - | 18 | 40 | mA |
| | $T_C = -40^\circ\text{C}$ | | - | - | 60 | |
| Turn-on time ($I_{TM} = 16\text{A}$, $I_{GT} = 40\text{mA}$, $V_D = \text{rated } V_{DRM}$) | | t_{gt} | - | 1.0 | - | μs |
| Turn-off time ($I_{TM} = 16\text{A}$, $I_R = 16\text{A}$, $V_D = \text{rated } V_{DRM}$) | $T_C = 25^\circ\text{C}$ | t_q | - | 15 | - | μs |
| | $T_J = 125^\circ\text{C}$ | | - | 35 | - | |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Critical rate of rise of off state voltage ($V_D = \text{rated } V_{DRM}$, exponential waveform) | $T_J = 125^\circ\text{C}$ | dv/dt | - | 50 | - | $\text{V}/\mu\text{s}$ |

MECHANICAL CHARACTERISTICS

| | |
|----------------|---------------|
| Case | TO-220AB |
| Marking | Alpha-numeric |
| Pin out | See below |



| | TO-220AB | | | |
|---|----------|-------|-------------|--------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| A | 0.575 | 0.620 | 14.600 | 15.750 |
| B | 0.380 | 0.405 | 9.650 | 10.290 |
| C | 0.160 | 0.190 | 4.060 | 4.820 |
| D | 0.025 | 0.035 | 0.640 | 0.890 |
| F | 0.142 | 0.147 | 3.610 | 3.730 |
| G | 0.095 | 0.105 | 2.410 | 2.670 |
| H | 0.110 | 0.155 | 2.790 | 3.930 |
| J | 0.014 | 0.022 | 0.360 | 0.560 |
| K | 0.500 | 0.562 | 12.700 | 14.270 |
| L | 0.045 | 0.055 | 1.140 | 1.390 |
| N | 0.190 | 0.210 | 4.830 | 5.330 |
| Q | 0.100 | 0.120 | 2.540 | 3.040 |
| R | 0.080 | 0.110 | 2.040 | 2.790 |
| S | 0.045 | 0.055 | 1.140 | 1.390 |
| T | 0.235 | 0.255 | 5.970 | 6.480 |
| U | - | 0.050 | - | 1.270 |
| V | 0.045 | - | 1.140 | - |
| Z | - | 0.080 | - | 2.030 |

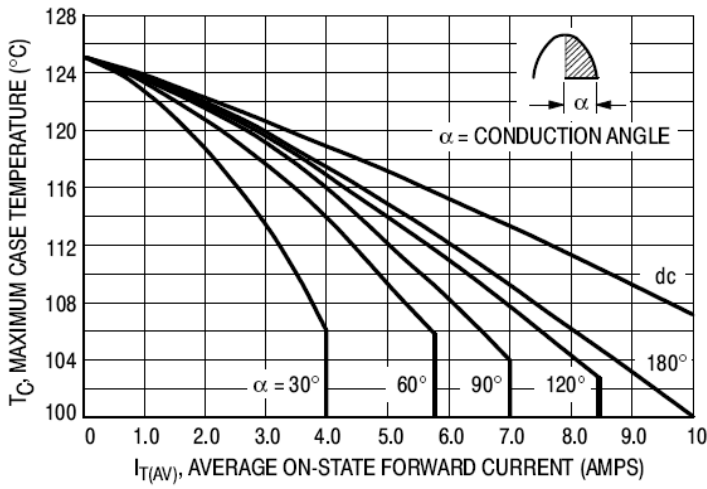
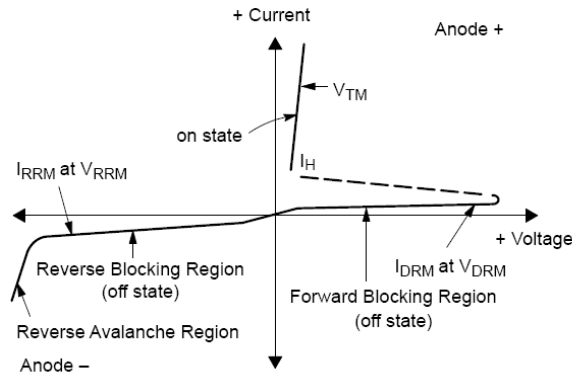


Figure 1. Average Current Derating

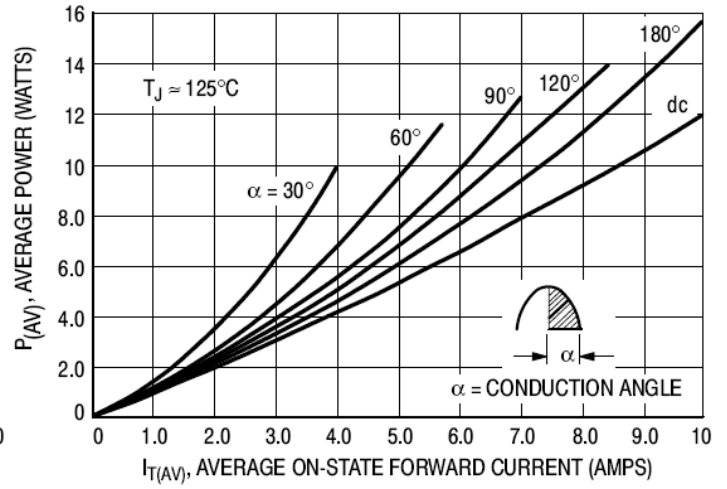


Figure 2. Maximum On-State Power Dissipation

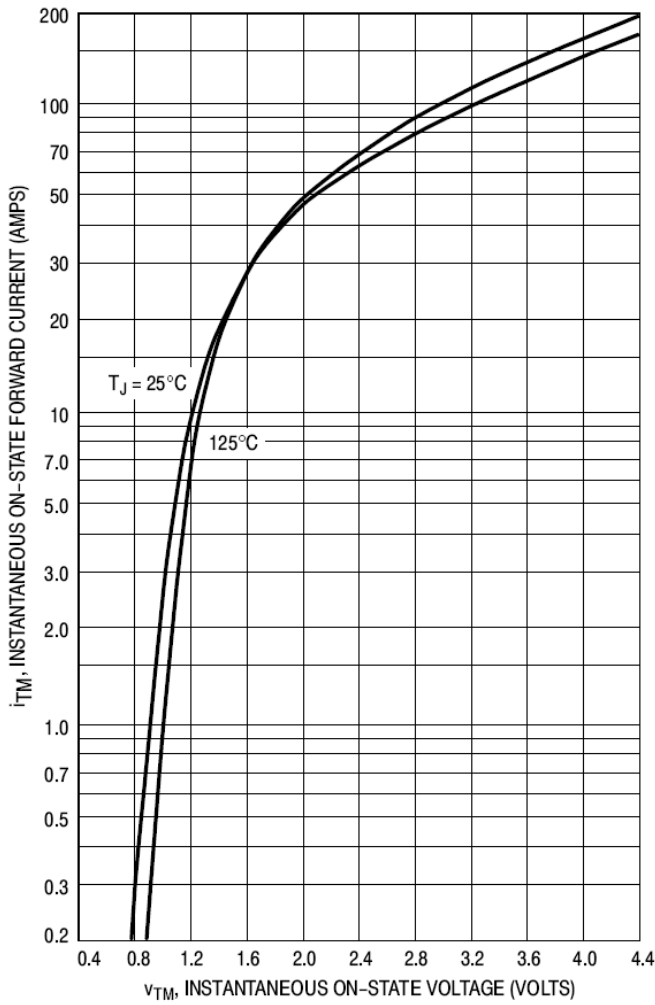


Figure 3. On-State Characteristics

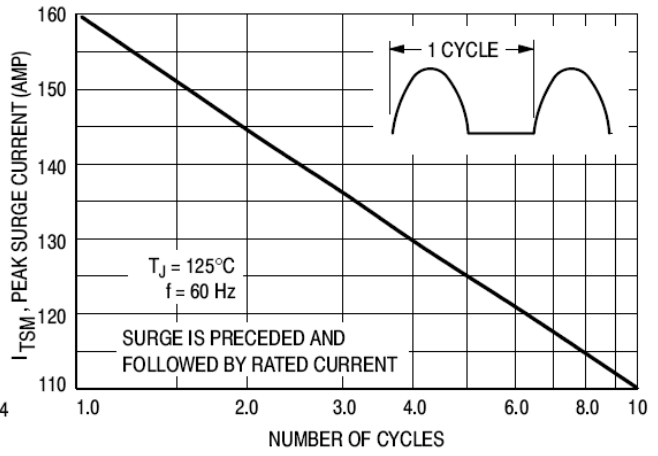


Figure 4. Maximum Non-Repetitive Surge Current

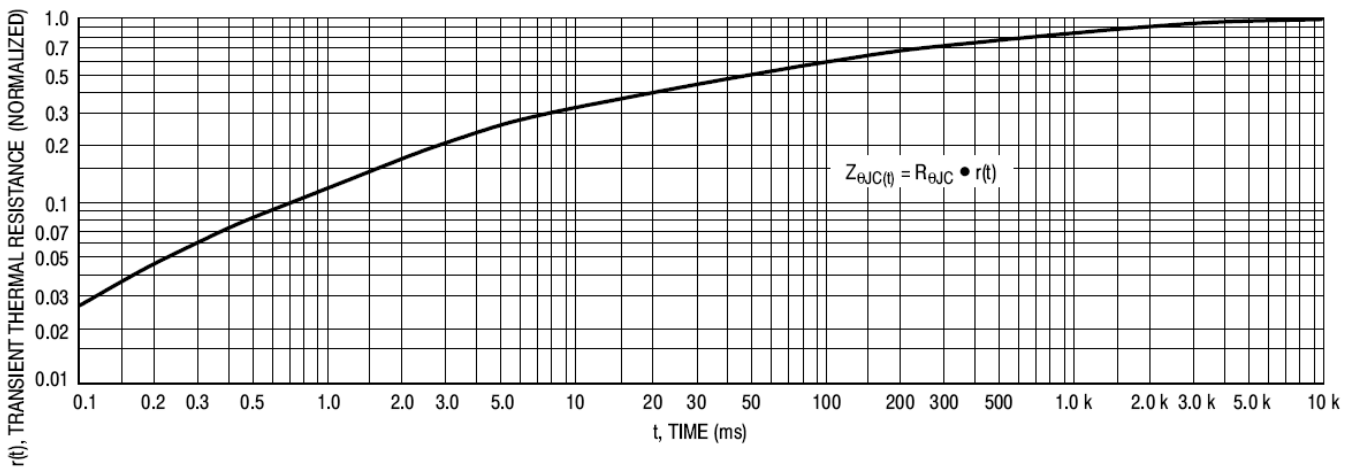


Figure 5. Thermal Response

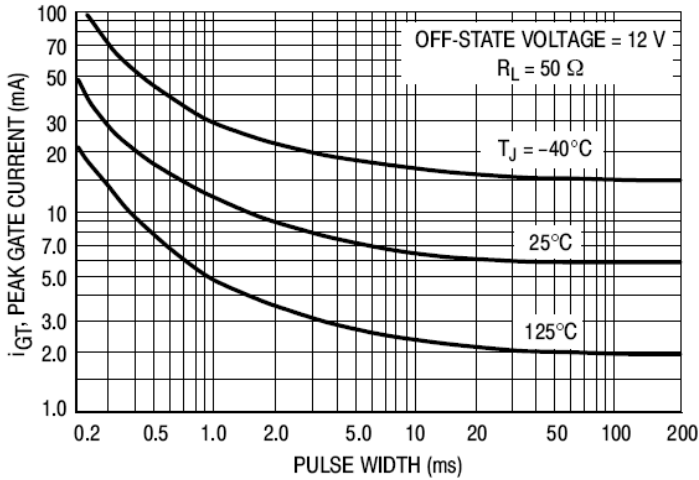


Figure 6. Typical Gate Trigger Current versus Pulse Width

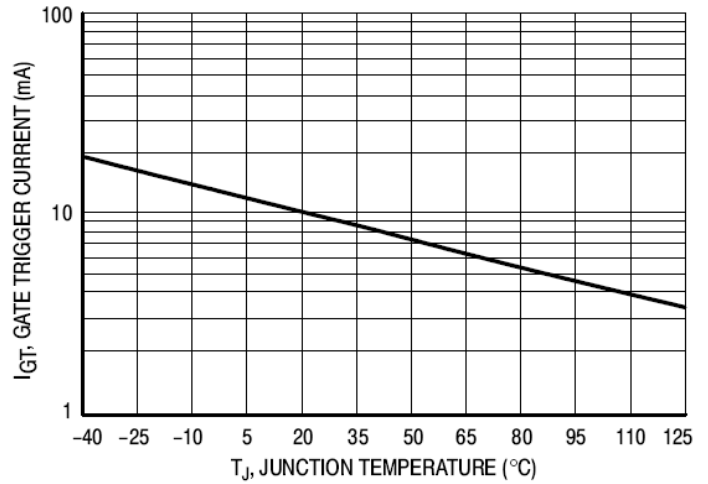


Figure 7. Typical Gate Trigger Current versus Junction Temperature

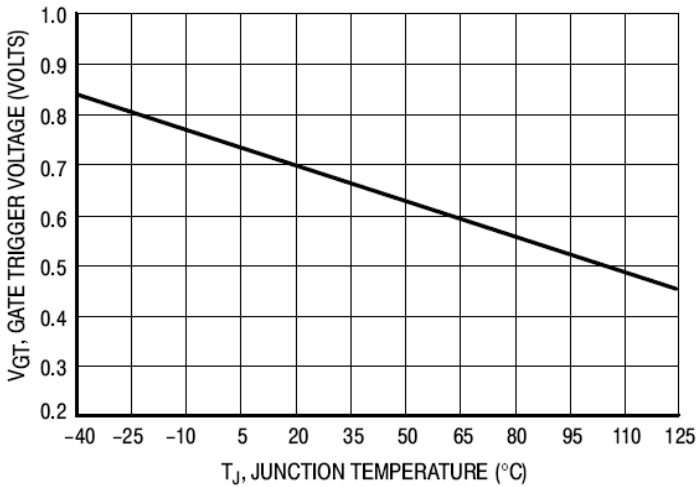


Figure 8. Typical Gate Trigger Voltage versus Junction Temperature

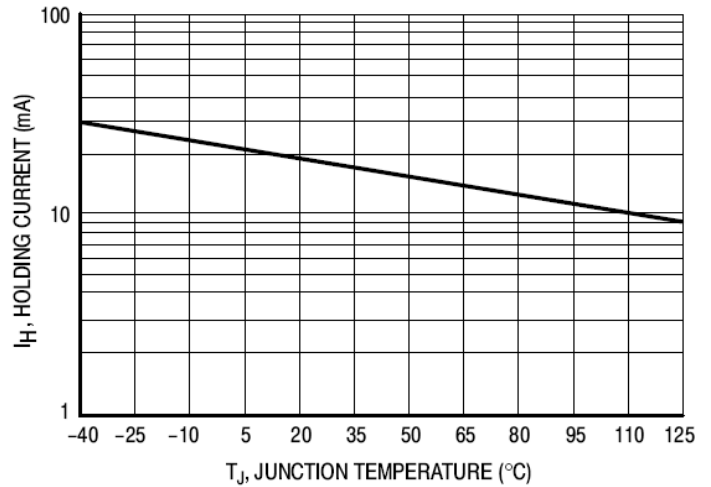


Figure 9. Typical Holding Current versus Junction Temperature