

TRIACS

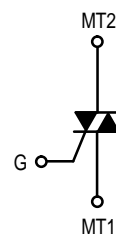
Silicon Bidirectional Thyristors

Designed for high volume, low cost, industrial and consumer applications such as motor control; process control; temperature, light and speed control.

- Small Size Surface Mount DPAK Package
- Passivated Die for Reliability and Uniformity
- Blocking Voltage to 800 V
- On-State Current Rating of 4.0 Amperes RMS at 108°C
- Low IGT — 10 mA Maximum in 3 Quadrants
- High Immunity to dv/dt — 50 V/μs at 125°C

ORDERING INFORMATION

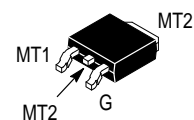
- To Obtain "DPAK" in Surface Mount Leadform (Case 369A)
Shipped in Sleeves — No Suffix, i.e. MAC4DSN
Shipped in 16 mm Tape and Reel — Add "T4" Suffix to Device Number, i.e. MAC4DSNT4
- To Obtain "DPAK" in Straight Lead Version (Case 369) Shipped in Sleeves — Add "-1" Suffix to Device Number, i.e. MAC4DSN-1



MAC4DSM
MAC4DSN

Motorola Preferred Devices

TRIACS
4.0 AMPERES RMS
600 thru 800 VOLTS



CASE 369A-13
STYLE 6

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|--|---------------------|------------|--------------------|
| Peak Repetitive Off-State Voltage ⁽¹⁾ (T _J = -40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open) | V _{DRM} | 600 800 | Volts |
| On-State RMS Current (Full Cycle Sine Wave, 60 Hz, T _C = 108°C) | I _{T(RMS)} | 4.0 | Amps |
| Peak Non-Repetitive Surge Current (One Full Cycle, 60 Hz, T _J = 125°C) | I _{TSM} | 40 | |
| Circuit Fusing Consideration (t = 8.3 msec) | i ² t | 6.6 | A ² sec |
| Peak Gate Power (Pulse Width ≤ 10 μsec, T _C = 108°C) | P _{GM} | 0.5 | Watts |
| Average Gate Power (t = 8.3 msec, T _C = 108°C) | P _{G(AV)} | 0.1 | |
| Peak Gate Current (Pulse Width ≤ 10 μsec, T _C = 108°C) | I _{GM} | 0.2 | Amps |
| Peak Gate Voltage (Pulse Width ≤ 10 μsec, T _C = 108°C) | V _{GM} | 5.0 | Volts |
| Operating Junction Temperature Range | T _J | -40 to 125 | °C |
| Storage Temperature Range | T _{stg} | -40 to 150 | |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|------------------|-----|------|
| Thermal Resistance — Junction to Case | R _{θJC} | 3.5 | °C/W |
| — Junction to Ambient | R _{θJA} | 88 | |
| — Junction to Ambient ⁽²⁾ | R _{θJA} | 80 | |
| Maximum Lead Temperature for Soldering Purposes ⁽³⁾ | T _L | 260 | °C |

(1) V_{DRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; 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 device are exceeded.

(2) Surface mounted on minimum recommended pad size.

(3) 1/8" from case for 10 seconds.

Preferred devices are Motorola recommended choices for future use and best overall value.

MAC4DSM MAC4DSN

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

| Characteristics | Symbol | Min | Typ | Max | Unit |
|--|------------------|--------------------------|---------------------------|------------------------|-------|
| Peak Repetitive Blocking Current (V _D = Rated V _{DRM} , Gate Open) T _J = 25°C T _J = 125°C | I _{DRM} | — — | — — | 0.01 2.0 | mA |
| Peak On-State Voltage (1) (I _{TM} = ±6.0 A) | V _{TM} | — | 1.3 | 1.6 | Volts |
| Gate Trigger Current (Continuous dc) (V _D = 12 V, R _L = 100 Ω) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) | I _{GT} | 2.9 2.9 2.9 | 4.0 5.0 7.0 | 10 10 10 | mA |
| Gate Trigger Voltage (Continuous dc) (V _D = 12 V, R _L = 100 Ω) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(+), G(+); MT2(+), G(-); MT2(-), G(-) T _J = 125°C | V _{GT} | 0.5 0.5 0.5 0.2 | 0.7 0.65 0.7 0.4 | 1.3 1.3 1.3 — | Volts |
| Holding Current (V _D = 12 V, Gate Open, I _T = ±200 mA) | I _H | 2.0 | 5.5 | 15 | mA |
| Latching Current (V _D = 12 V, I _G = 10 mA) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) | I _L | — — — | 6.0 10 6.0 | 30 30 30 | mA |

DYNAMIC CHARACTERISTICS

| Characteristics | Symbol | Min | Typ | Max | Unit |
|---|----------|-----|-----|-----|------|
| Rate of Change of Commutating Current (1) (V _D = 400 V, I _{TM} = 3.5 A, Commutating dv/dt = 10 V/μsec, Gate Open, T _J = 125°C, f = 500 Hz, CL = 5.0 μF, LL = 20 mH, No Snubber) See Figure 15 | di/dt(c) | 3.0 | 4.0 | — | A/ms |
| Critical Rate of Rise of Off-State Voltage (V _D = 0.67 X Rated V _{DRM} , Exponential Waveform, Gate Open, T _J = 125°C) | dv/dt | 50 | 175 | — | V/μs |

(1) Pulse test: Pulse Width ≤ 2.0 msec, Duty Cycle ≤ 2%.

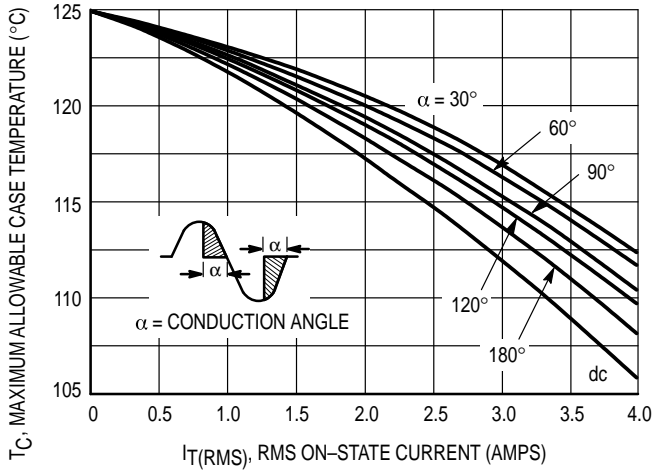


Figure 1. RMS Current Derating

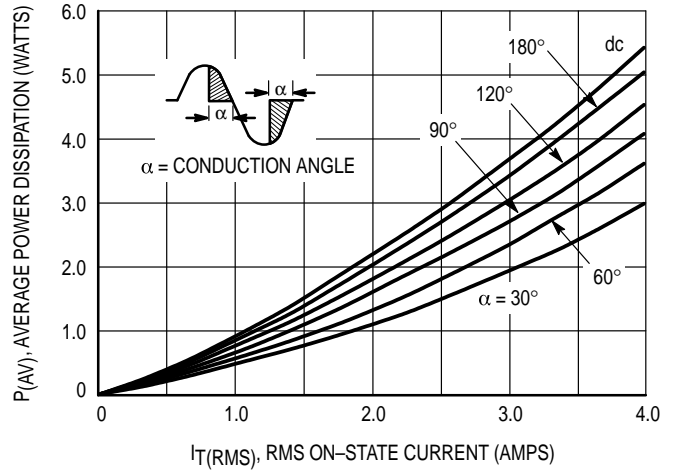


Figure 2. On-State Power Dissipation

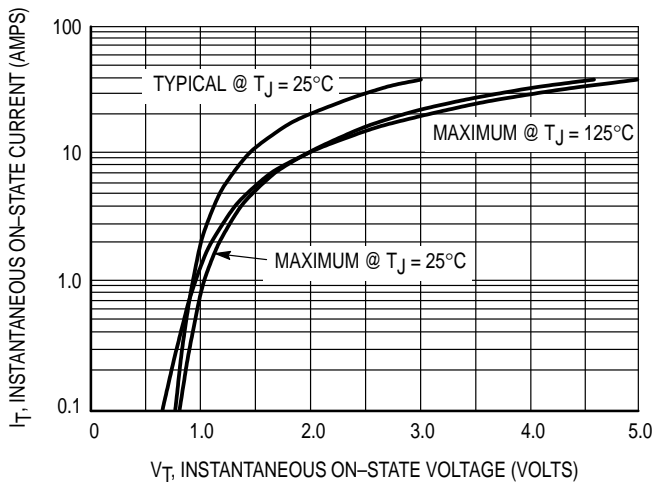


Figure 3. On-State Characteristics

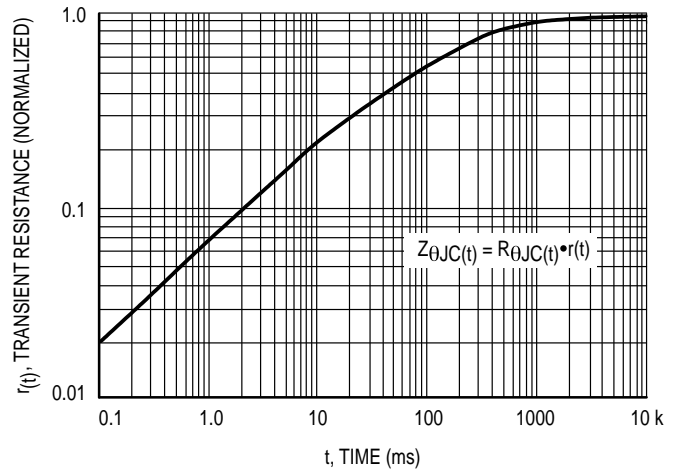


Figure 4. Transient Thermal Response

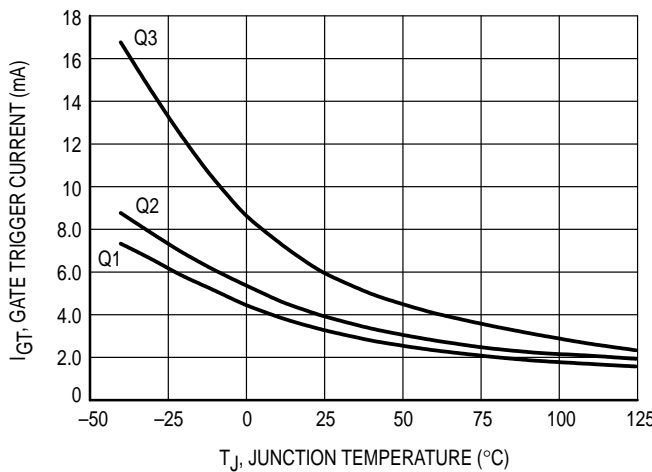


Figure 5. Typical Gate Trigger Current versus Junction Temperature

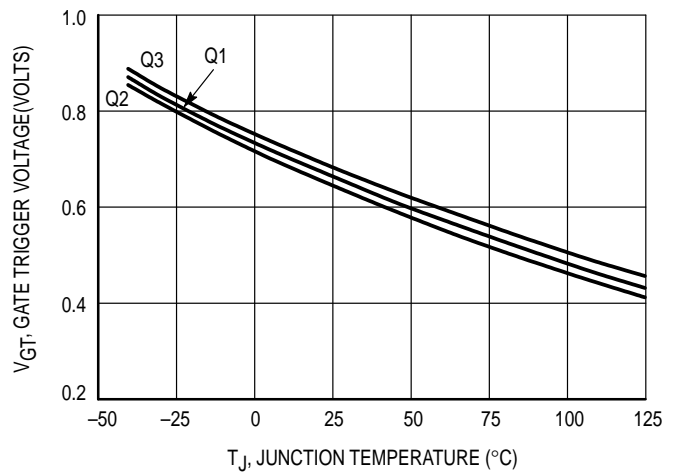


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

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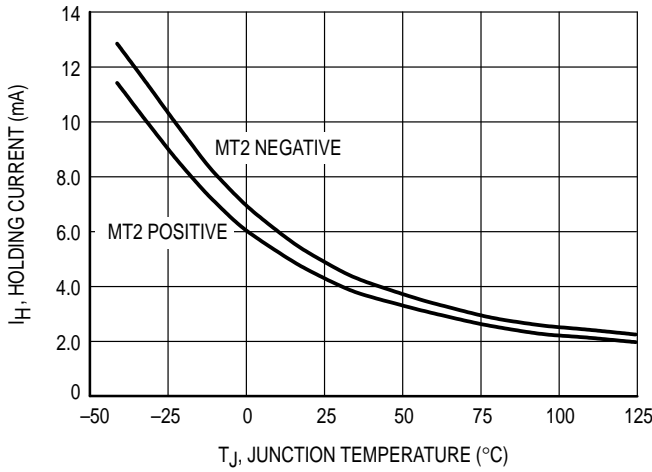


Figure 7. Typical Holding Current versus Junction Temperature

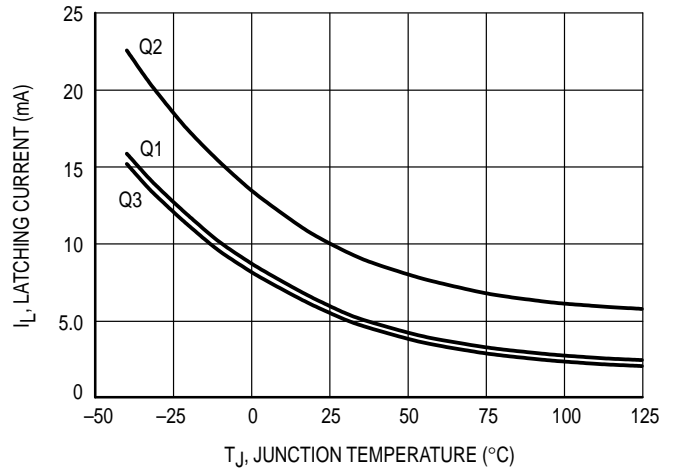


Figure 8. Typical Latching Current versus Junction Temperature

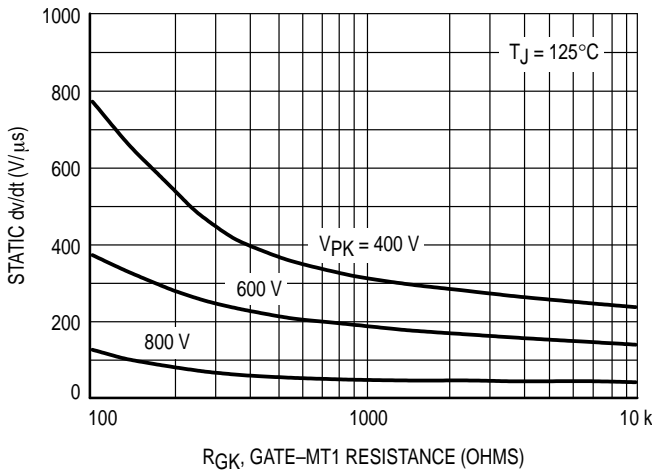


Figure 9. Exponential Static dv/dt versus Gate-MT1 Resistance, MT2(+)

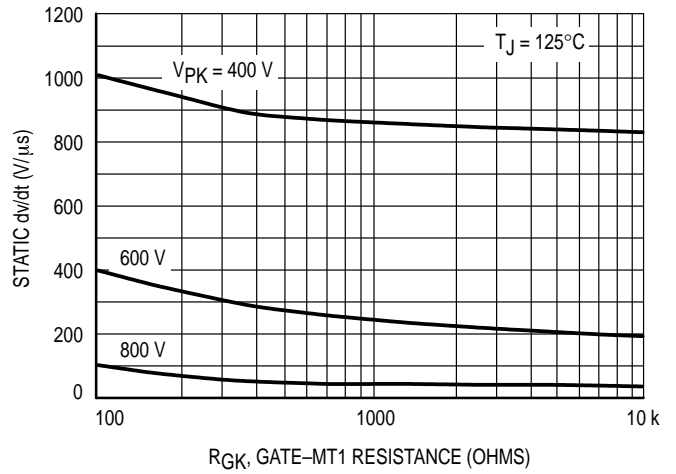


Figure 10. Exponential Static dv/dt versus Gate-MT1 Resistance, MT2(-)

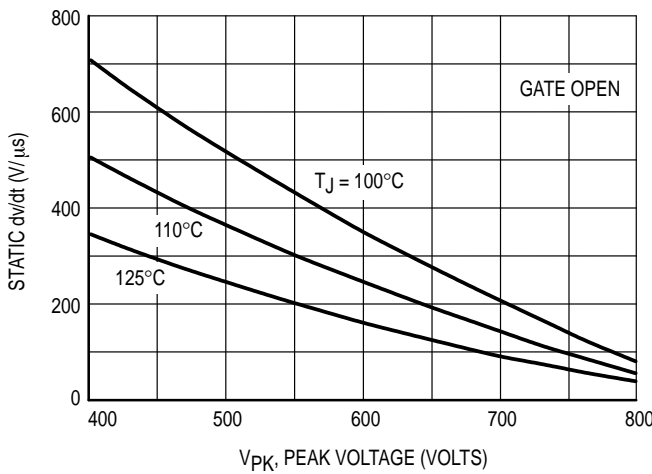


Figure 11. Exponential Static dv/dt versus Peak Voltage, MT2(+)

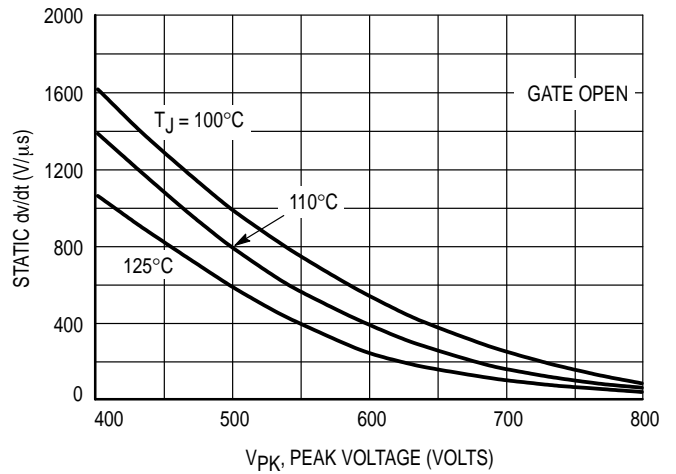


Figure 12. Exponential Static dv/dt versus Peak Voltage, MT2(-)

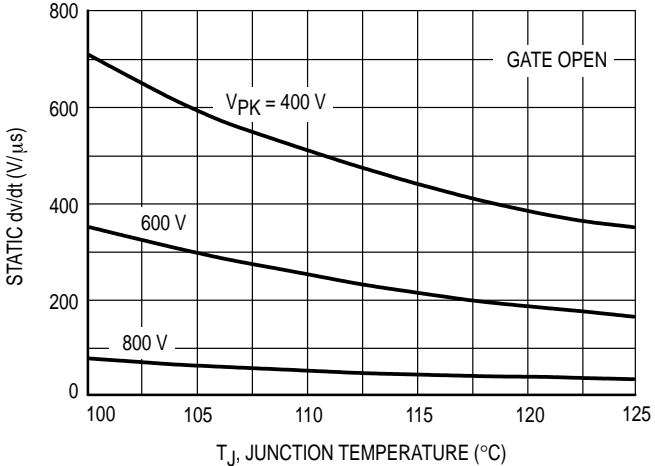


Figure 13. Typical Exponential Static dv/dt versus Junction Temperature, MT2(+)

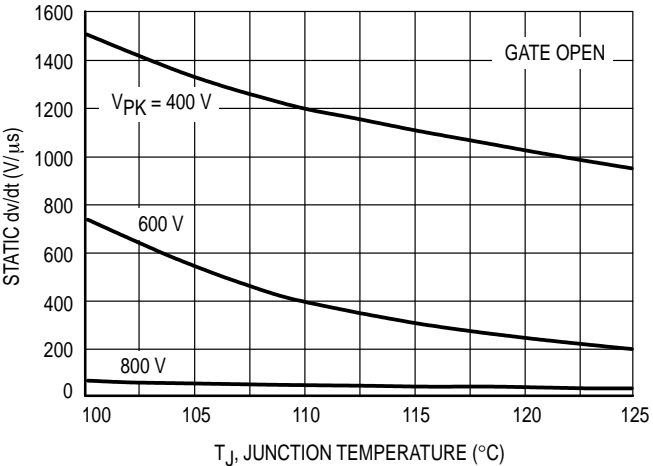


Figure 14. Typical Exponential Static dv/dt versus Junction Temperature, MT2(-)

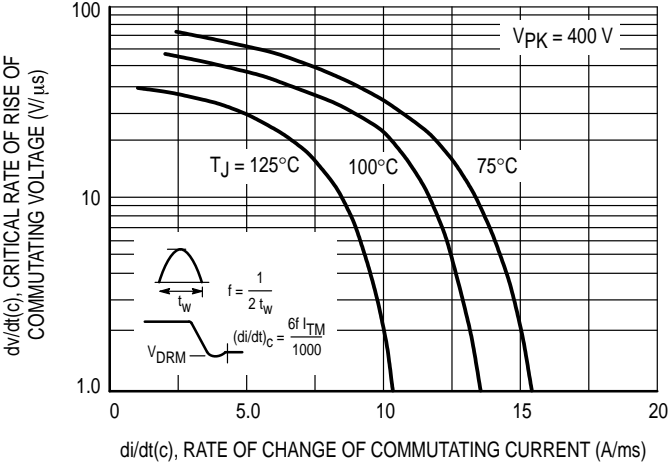


Figure 15. Critical Rate of Rise of Commutating Voltage

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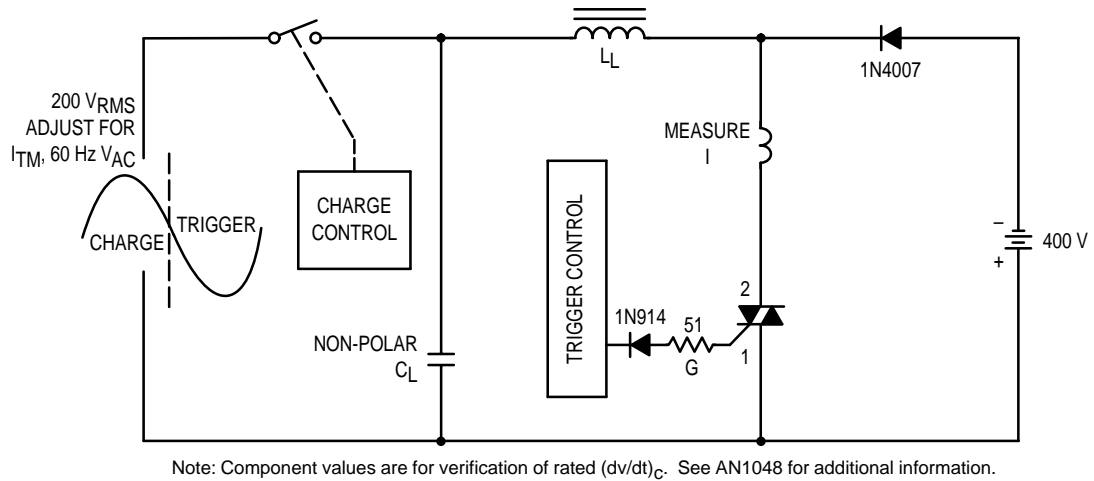
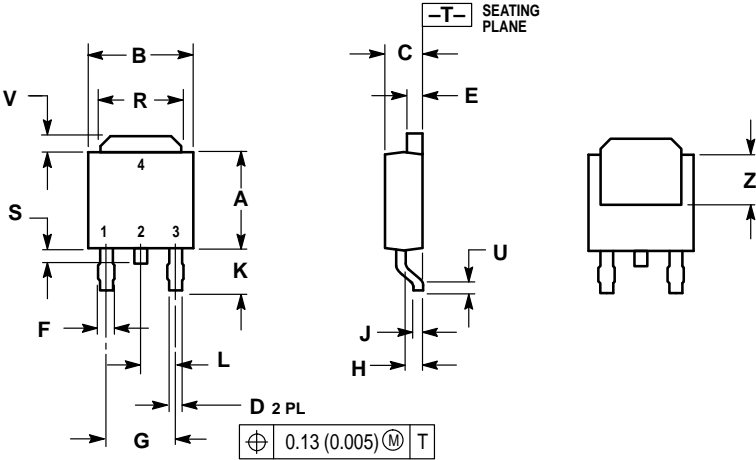


Figure 16. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Voltage

PACKAGE DIMENSIONS



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.235 | 0.250 | 5.97 | 6.35 |
| B | 0.250 | 0.265 | 6.35 | 6.73 |
| C | 0.086 | 0.094 | 2.19 | 2.38 |
| D | 0.027 | 0.035 | 0.69 | 0.88 |
| E | 0.033 | 0.040 | 0.84 | 1.01 |
| F | 0.037 | 0.047 | 0.94 | 1.19 |
| G | 0.180 BSC | | 4.58 BSC | |
| H | 0.034 | 0.040 | 0.87 | 1.01 |
| J | 0.018 | 0.023 | 0.46 | 0.58 |
| K | 0.102 | 0.114 | 2.60 | 2.89 |
| L | 0.090 BSC | | 2.29 BSC | |
| R | 0.175 | 0.215 | 4.45 | 5.46 |
| S | 0.020 | 0.050 | 0.51 | 1.27 |
| U | 0.020 | — | 0.51 | — |
| V | 0.030 | 0.050 | 0.77 | 1.27 |
| Z | 0.138 | — | 3.51 | — |

STYLE 6:
 PIN 1. MT1
 2. MT2
 3. GATE
 4. MT2

CASE 369A-13
 ISSUE Y

MAC4DSM MAC4DSN

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