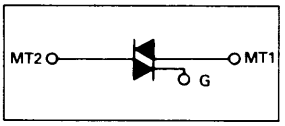
Triacs
Silicon Bidirectional Thyristors

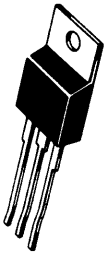
MAC16 Series

. . . designed for full-wave ac control applications primarily in industrial environments needing noise immunity.

- Guaranteed High Noise Immunity
  dv/dt(s) — 500 V/μs Min @ T_C = 25°C
- High Blocking Voltage — V_{DRM} to 800 V
- Photo Glass Passivated Junction for Improved Power Cycling Capability and Reliability

TRIACs
15 AMPERES RMS
200 thru 800 VOLTS





CASE 221A-04
(TO-220AB)
STYLE 4

MAXIMUM RATINGS

Rating		Symbol	Value	Unit
Peak Repetitive Off-State Voltage, Note 1 (T_J = −40 to 125°C)	MAC16-4 -6 -8 -10	V_{DRM}	200 400 600 800	Volts
Peak Gate Voltage		V_{GM}	±10	Volts
On-State Current RMS Full Cycle Sine Wave 50 to 60 Hz (T_C = +90°C)		$I_{T(RMS)}$	15	Amps
Circuit Fusing (t = 8.3 ms)		I^2t	93	A^2s
Peak Surge Current (One Full Cycle, 60 Hz, T_C = +80°C) Preceded and followed by rated current		I_{TSM}	150	Amps
Peak Gate Power (T_C = +80°C, Pulse Width = 2.0 μs)		P_{GM}	20	Watts
Average Gate Power (T_C = +80°C, t = 8.3 ms)		$P_{G(AV)}$	0.5	Watt
Peak Gate Current		I_{GM}	2.0	Amps
Operating Junction Temperature Range		T_J	−40 to +125	°C
Storage Temperature Range		T_{stg}	−40 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.0	°C/W

ELECTRICAL CHARACTERISTICS (T_C = +25°C, and either polarity of MT2 to MT1 Voltage, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward or Reverse Blocking Current (Rated V_{DRM} or V_{RRM}, gate open) T_J = 25°C T_J = 125°C	I_{DRM}, I_{RRM}	— —	— —	10 2.0	μA mA
Peak On-State Voltage (I_{TM} = 21 A Peak; Pulse Width ≤ 2.0 ms, Duty Cycle ≤ 2%)	V_{TM}	—	1.3	1.6	Volts
Gate Trigger Current (Continuous dc) (V_D = 12 Vdc, R_L = 100 Ohms) MT2(+), Gate(+) MT2(+), Gate(−) MT2(−), Gate(−)	I_{GT}	 — — —	 — — —	 100 100 100	mA

Note 1. Ratings apply for open gate conditions. Thyristor devices shall not be tested with a constant current source for blocking capability such that the voltage applied exceeds the rated blocking voltage. (continued)

ELECTRICAL CHARACTERISTICS — continued (T_C = +25°C, and either polarity of MT2 to MT1 Voltage, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Gate Trigger Voltage (Continuous dc)	V_{GT}				Volts
(V_D = 12 Vdc, R_L = 100 Ohms)					
MT2(+), G(+)		—	0.9	2.0	
MT2(+), G(−)		—	0.9	2.0	
MT2(−), G(−)		—	1.1	2.0	
(V_D = Rated V_{DRM}, R_L = 10 k Ohms, T_J = +110°C)					
MT2(+), G(+); MT2(−), G(−); MT2(+), G(−)		0.2	—	—	
Holding Current (Either Direction)	I_H	—	—	100	mA
(V_D = 12 Vdc, Gate Open)					
(I_T = 200 mA)					
Critical Rate of Rise of Off-State Voltage	dv/dt(s)				V/μs
(V_D = Rated V_{DRM}, Exponential Voltage Rise, Gate Open)					
T_J = 25°C		500	—	—	
T_J = 125°C		200	—	—	

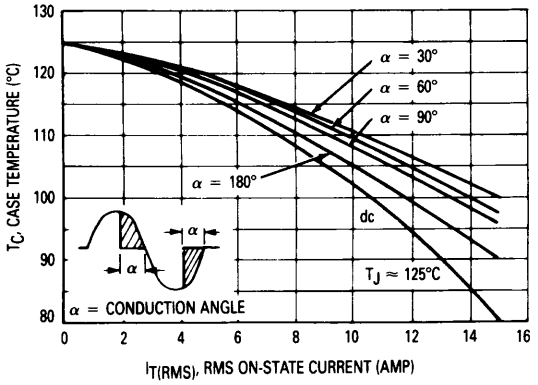


Figure 1. RMS Current Derating

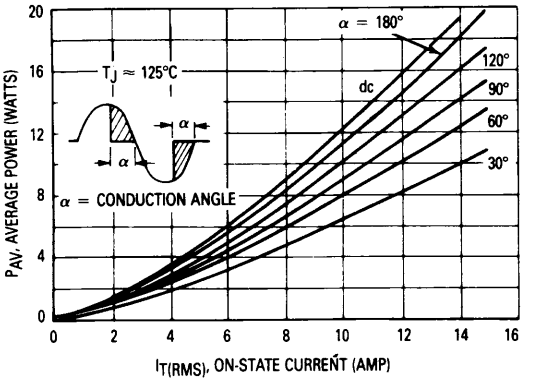


Figure 2. On-State Power Dissipation

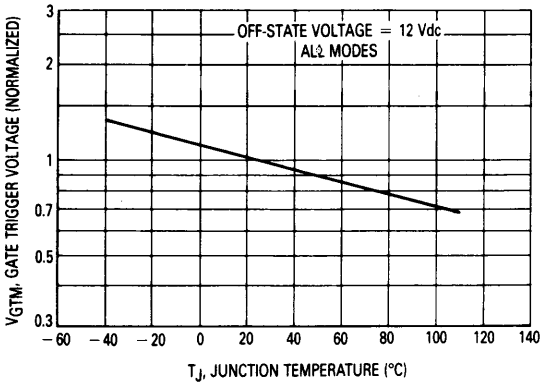


Figure 3. Typical Gate Trigger Voltage

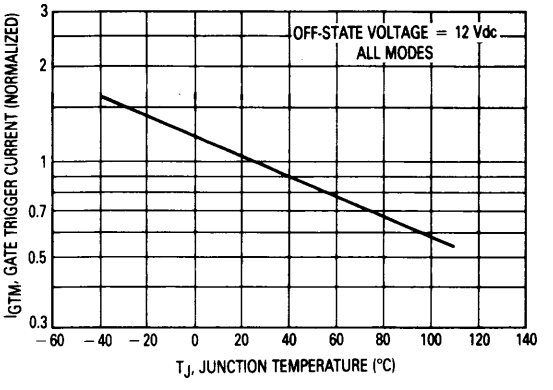


Figure 4. Typical Gate Trigger Current

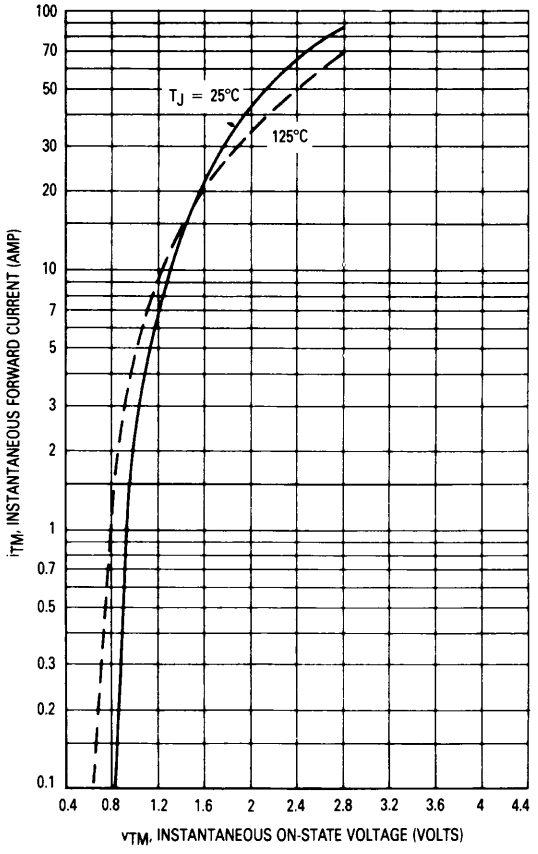


Figure 5. On-State Characteristics

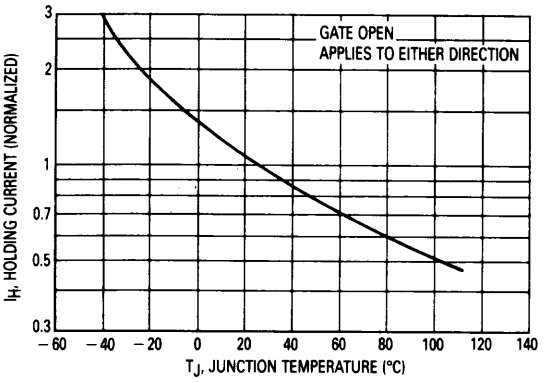


Figure 6. Typical Holding Current

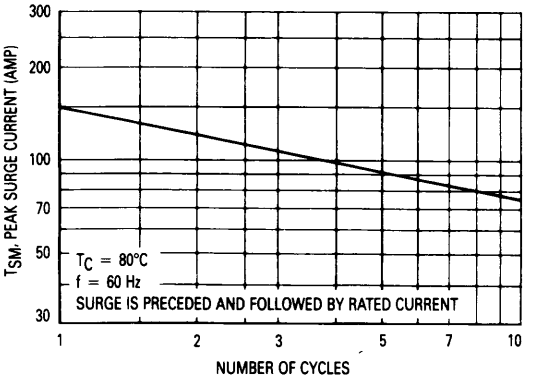


Figure 7. Maximum Non-Repetitive Surge Current

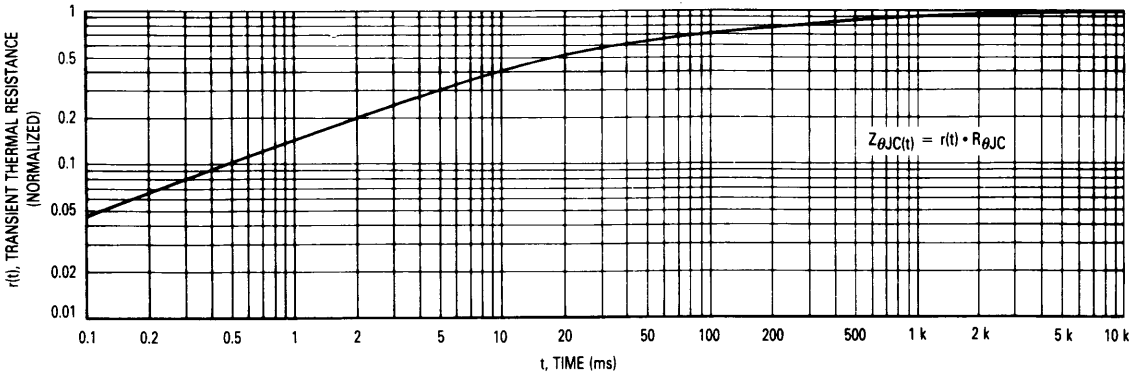


Figure 8. Thermal Response

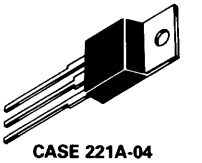
Triacs
Silicon Bidirectional Thyristors

MAC213 Series

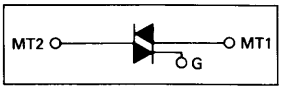
. . . designed for full-wave ac control applications primarily in industrial environments needing noise immunity.

- Guaranteed High Commutation Voltage
  dv/dt — 500 V/μs Min @ T_C = 25°C
- High Blocking Voltage — V_{DRM} to 800 V
- Photo Glass Passivated Junction for Improved Power Cycling Capability and Reliability

TRIACs
12 AMPERES RMS
200 thru 800 VOLTS



CASE 221A-04
(TO-220AB)
STYLE 4



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Repetitive Peak Off-State Voltage, Note 1 (T_J = −40 to +125°C) MAC213-4	V_{DRM}	200	Volts
-6		400	
-8		600	
-10		800	
Peak Gate Voltage	V_{GM}	10	Volts
On-State Current RMS (T_C = +85°C) Full Cycle Sine Wave 50 to 60 Hz	$I_{T(RMS)}$	12	Amp
Peak Non-Repetitive Surge Current (One Full Cycle, 60 Hz, T_C = +85°C) preceded and followed by Rated Current	I_{TSM}	100	Amp
Circuit Fusing Considerations (T_C = +85°C, t = 1.0 to 8.3 ms)	I^2t	41	A^2s
Peak Gate Power (T_C = +85°C, Pulse Width = 10 μs)	P_{GM}	20	Watts
Average Gate Power (T_C = +85°C, t = 8.3 ms)	$P_{G(AV)}$	0.35	Watt
Peak Gate Current (T_C = +85°C, Pulse Width = 10 μs)	I_{GM}	2.0	Amp
Operating Junction Temperature Range	T_J	−40 to +125	°C
Storage Temperature Range	T_{stg}	−40 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.1	°C/W

Note 1. Ratings apply for open gate conditions. Thyristor devices shall not be tested with a constant current source for blocking capability such that the voltage applied exceeds the rated blocking voltage.

ELECTRICAL CHARACTERISTICS (T_C = +25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Blocking Current (Either Direction) Rated V_{DRM}, Gate Open T_J = 25°C T_J = +125°C	I_{DRM}	 — —	 — —	 10 2.0	 μA mA
Peak On-State Voltage (Either Direction) I_{TM} = 17 A Peak; Pulse Width ≤ 2.0 ms, Duty Cycle ≤ 2.0%	V_{TM}	—	1.3	1.75	Volts
Gate Trigger Current (Continuous dc) Main Terminal Voltage = 12 Vdc, R_L = 100 Ohms MT2(+), G(+) MT2(+), G(−) MT2(−), G(−)	I_{GT}	 — — —	 — — —	 100 100 100	mA
Gate Trigger Voltage (Continuous dc) Main Terminal Voltage = 12 Vdc, R_L = 100 Ohms MT2(+), G(+) MT2(+), G(−) MT2(−), G(−) Main Terminal Voltage = Rated V_{DRM}, R_L = 10 kΩ, T_J = +125°C MT2(+), G(+); MT2(−), G(−); MT2(+), G(−)	V_{GT}	 — — — 0.2	 — — — —	 2.0 2.0 2.0 —	Volts
Holding Current (Either Direction) Main Terminal Voltage = 12 Vdc, Gate Open, Initiating Current = 200 mA, T_C = +25°C	I_H	—	—	100	mA
Turn-On Time Rated V_{DRM}, I_{TM} = 17 A, I_{GT} = 120 mA, Rise Time = 0.1 μs, Pulse Width = 2.0 μs	t_{gt}	—	1.5	—	μs
Critical Rate of Rise of Off-State Voltage V_D = Rated V_{DRM}, Exponential Voltage Rise, Gate Open T_J = 25°C T_J = +125°C	dv/dt(s)	 500 200	 — —	 — —	V/μs

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TYPICAL CHARACTERISTICS

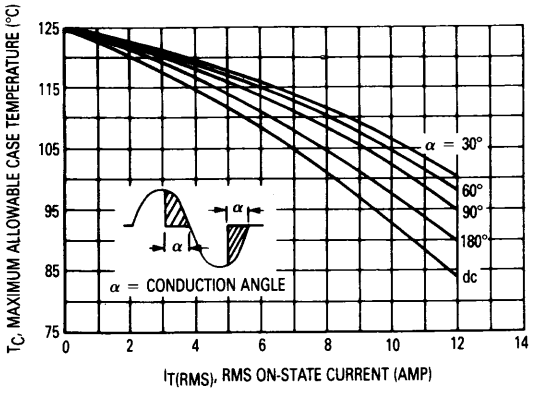


Figure 1. Current Derating

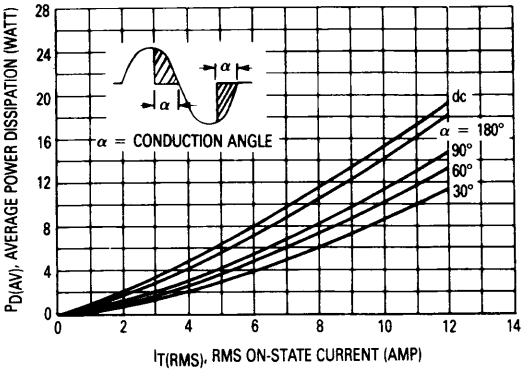


Figure 2. Power Dissipation

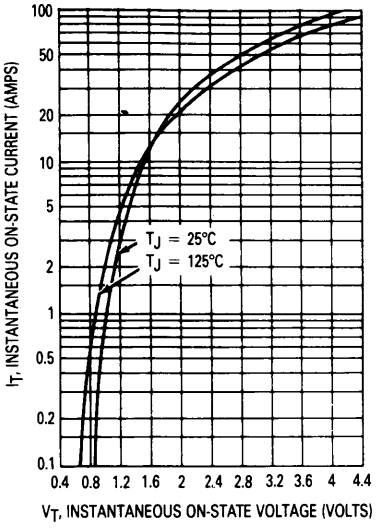


Figure 3. Maximum On-State Characteristics

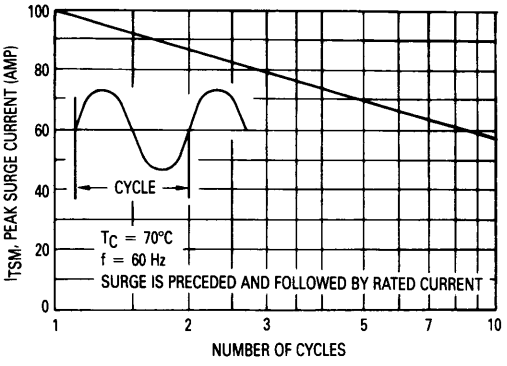


Figure 4. Maximum Non-Repetitive Surge Current

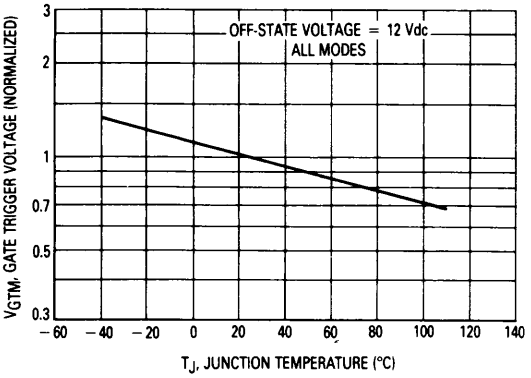


Figure 5. Typical Gate Trigger Voltage

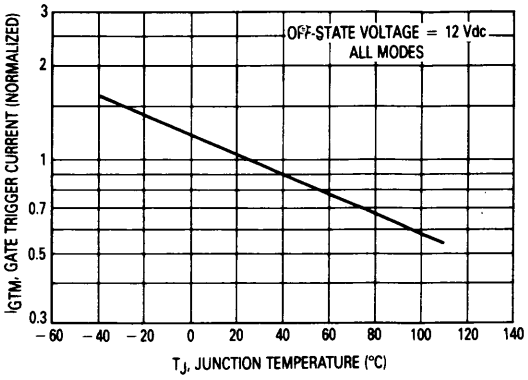


Figure 6. Typical Gate Trigger Current

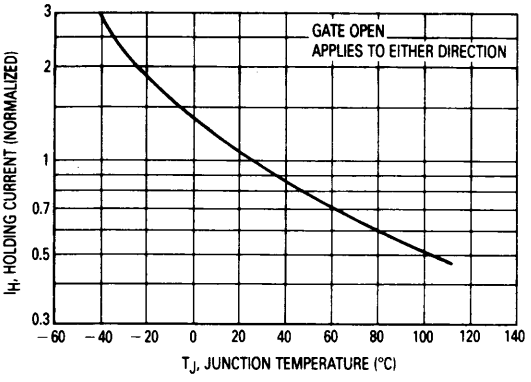


Figure 7. Typical Holding Current

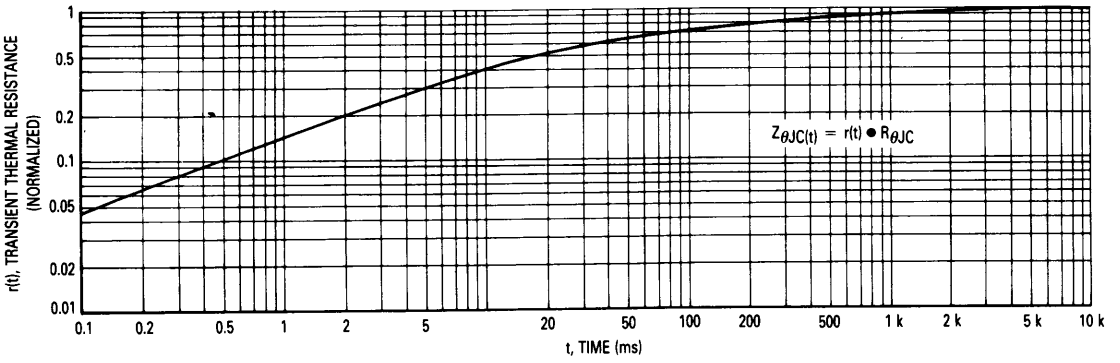


Figure 8. Thermal Response

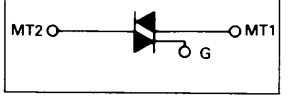
Triacs
Silicon Bidirectional Thyristors

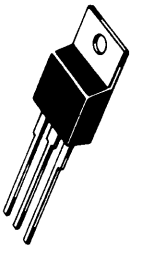
MAC219 Series

. . . designed for full-wave ac control applications primarily in industrial environments needing noise immunity.

- Guaranteed High Noise Immunity
  dv/dt(s) — 500 V/μs Min @ T_C = 25°C
- High Blocking Voltage — V_{DRM} to 800 V
- Photo Glass Passivated Junction for Improved Power Cycling Capability and Reliability

TRIACs
8.0 AMPERES RMS
200 thru 800 VOLTS





CASE 221A-04
(TO-220AB)
STYLE 4

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Repetitive Peak Off-State Voltage, Note 1 (T_J = −40 to 125°C) MAC219-4	V_{DRM}	200	Volts
-6		400	
-8		600	
-10		800	
Peak Gate Voltage	V_{GM}	±10	Volts
On-State Current RMS (Conduction Angle = 360°, T_C = +80°C)	$I_{T(RMS)}$	8.0	Amps
Peak Non-Repetitive Surge Current (One Full Cycle, 60 Hz)	I_{TSM}	100	Amps
Fusing Current (t = 8.3 ms)	I^2t	35	A^2s
Peak Gate Power (T_C = +80°C, Pulse Width = 2.0 μs)	P_{GM}	16	Watts
Average Gate Power (T_C = +80°C, t = 8.3 ms)	$P_{G(AV)}$	0.35	Watt
Peak Gate Trigger Current (Pulse Width = 1.0 μs)	I_{GTM}	4.0	Amps
Operating Junction Temperature Range	T_J	−40 to +125	°C
Storage Temperature Range	T_{stg}	−40 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.2	°C/W

ELECTRICAL CHARACTERISTICS (T_C = +25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward or Reverse Blocking Current (Rated V_{DRM} or V_{RRM}, gate open) T_J = 25°C	I_{DRM}, I_{RRM}	—	—	10	μA
T_J = 125°C		—	—	2.0	mA
Peak On-State Voltage (Either Direction) (I_{TM} = 11.3 A Peak; Pulse Width = ≤2.0 ms, Duty Cycle ≤ 2%)	V_{TM}	—	1.7	2.0	Volts
Gate Trigger Current (Continuous dc) (V_D = 12 Vdc, R_L = 12 Ω) Trigger Mode MT2(+), Gate(+); MT2(+), Gate (−); MT2(−), Gate(−)	I_{GT}	—	—	100	mA
Gate Trigger Voltage (Continuous dc)	V_{GT}				Volts
Main Terminal Voltage = 12 Vdc, R_L = 100 Ohms					
MT2(+), G(+)		—	0.9	2.0	
MT2(+), G(−)		—	0.9	2.0	
MT2(−), G(−)		—	1.1	2.0	
Main Terminal Voltage = Rated V_{DRM}, R_L = 10 kΩ, T_J = +125°C					
MT2(+), G(+); MT2(−), G(−); MT2(+), G(−)		0.2	—	—	

Note 1. Ratings apply for open gate conditions. Thyristor devices shall not be tested with a constant current source for blocking capability such that the voltage applied exceeds the rated blocking voltage.

(continued)

ELECTRICAL CHARACTERISTICS — continued (T_C = +25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Holding Current (Either Direction) (V_D = 12 Vdc, Gate Open, Initiating Current = 200 mA)	I_H	—	—	100	mA
Rate of Rise of Commutation Voltage (Rated V_{DROM}, $I_{T(RMS)}$ = 6.0 A, Commutating di/dt = 4.3 A/ms, Gate Unenergized, T_C = 80°C)	dv/dt(c)	—	5.0	—	V/μs
Critical Rate of Rise of Off-State Voltage (V_D = V_{DROM}, Exponential Voltage Rise, Gate Open) T_J = 25°C T_J = 125°C	dv/dt(s)	 500 200	 — —	 — —	V/μs

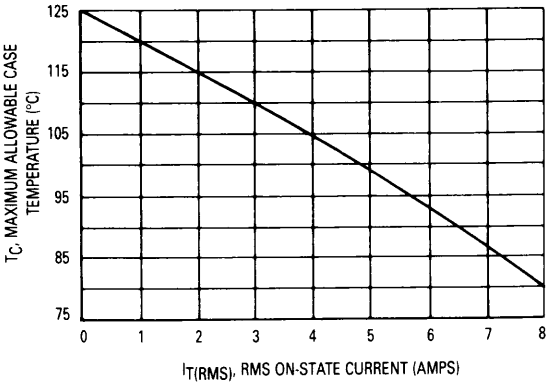


Figure 1. Current Derating

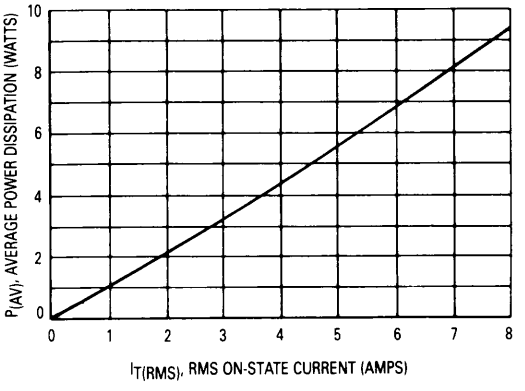


Figure 2. Power Dissipation

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