

# DIGITRON SEMICONDUCTORS

MAC250 SERIES, MAC250Q3 SERIES

SILICON BIDIRECTIONAL THYRISTORS

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
<b>Peak repetitive off-state voltage</b> SC251B, MAC250B, MAC250B3 SC251D, MAC250D, MAC250D3 SC251M, MAC250M, MAC250M3 SC251N, MAC250N	$V_{DRM}$	200 400 600 800	Volts
<b>RMS on-state current</b>	$I_{T(RMS)}$	15	Amps
<b>Peak non-repetitive surge current</b> (1 cycle, 60Hz)	$I_{TSM}$	100	Amps
<b>Circuit fusing considerations</b> (t = 1ms) (t = 8.3ms)	$I^2t$	20 41.5	A <sup>2</sup> s
<b>Peak gate power</b>	$P_{GM}$	10	Watts
<b>Average gate power</b>	$P_{G(AV)}$	0.5	Watts
<b>Peak gate power (pulse width = 10μs)</b>	$I_{GM}$	2	Amps
<b>Operating junction temperature range</b>	$T_J$	-40 to +115	°C
<b>Storage temperature range</b>	$T_{stg}$	-40 to +125	°C
<b>Mounting torque</b>		30	In. lb.

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Maximum	Unit
<b>Thermal resistance, junction to case</b> MAC250, SC251 MAC250()3	$R_{\theta JC}$	2.0 2.3	°C/W

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ$ unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
<b>Peak blocking current</b> ( $V_D = \text{Rated } V_{DRM}, T_C = 25^\circ\text{C}$ ) ( $V_D = \text{Rated } V_{DRM}, T_C = 115^\circ\text{C}$ )	$I_{DRM}$	- -	- -	10 0.5	μA mA
<b>Peak on-state voltage</b> ( $I_{TM} = 21\text{A peak, pulse width} = 1\text{ms, duty cycle} \leq 2\%$ )	$V_{TM}$	-	-	1.65	Volts
<b>Critical rate of rise of off-state voltage</b> (Rated $V_{DRM}$ , exponential waveform, gate open, $T_C = 115^\circ\text{C}$ )	dv/dt	100	-	-	V/μs
<b>Critical rate of rise of commutating off-state voltage</b> ( $I_{T(RMS)} = \text{rated RMS on-state current, } V_D = V_{DRM}, \text{ commutating } di/dt = 8\text{A/ms, gate open}$ ) $T_C = 84^\circ\text{C, MAC250, SC251}$ $T_C = 78^\circ\text{C MAC250()3}$	dv/dt(c)	4 4	- -	- -	V/μs
<b>DC gate trigger current (continuous dc)</b> ( $V_D = 12\text{V}$ ) MT2(+),G(+); MT2(-),G(-); $R_L = 100\Omega$ MT2(+),G(-), $R_L = 50\Omega$	$I_{GT}$	- -	- -	50 50	mA
<b>DC gate trigger current (continuous dc)</b> ( $V_D = 12\text{V, } T_C = -40^\circ\text{C}$ ) MT2(+),G(+); MT2(-),G(-); $R_L = 50\Omega$ MT2(+),G(-), $R_L = 25\Omega$	$I_{GT}$	- -	- -	80 80	mA

# DIGITRON SEMICONDUCTORS

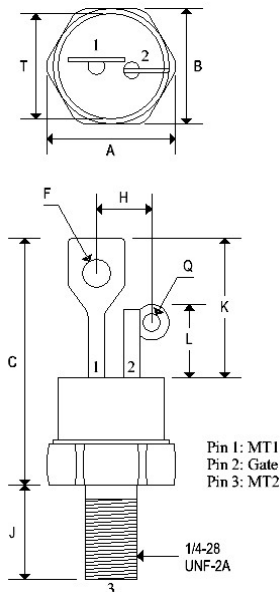
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Characteristic	Symbol	Min	Typ.	Max	Unit
<b>Gate trigger voltage</b> (continuous dc) $(V_D = 12V)$ MT2(+),G(+); MT2(-),G(-); $R_L = 100\Omega$ MT2(+),G(-), $R_L = 50\Omega$	$V_{GT}$	-	-	2.5	Volts
<b>Gate trigger voltage</b> (continuous dc) $(V_D = 12V, T_C = -40^\circ C)$ MT2(+),G(+); MT2(-),G(-); $R_L = 50\Omega$ MT2(+),G(-), $R_L = 25\Omega$	$V_{GT}$	-	-	3.5	Volts
<b>DC gate non-trigger voltage</b> $(V_D = \text{Rated } V_{DRM}, R_L = 1k\Omega, T_C = 115^\circ C)$ All trigger modes	$V_{GD}$	0.20	-	-	Volts
<b>Holding current</b> $(V_D = 24V, \text{peak initiating current} = 0.5A, \text{pulse width} = 0.1 \text{ to } 10\text{ms, gate trigger})$ (Source = 7V, 20 $\Omega$ ) $T_C = 25^\circ C$ $T_C = -40^\circ C$	$I_H$	-	-	50	mA
<b>Latching current</b> $(V_D = 24V, \text{gate trigger source} = 15V, 100\Omega, \text{pulse width} = 50\mu s, 5\mu s \text{ maximum rise and fall times})$ MT2(+),G(+); MT2(-),G(-); MT2(+),G(-), $T_C = 25^\circ C$ MT2(+),G(+); MT2(-),G(-); MT2(+),G(-), $T_C = -40^\circ C$	$I_L$	-	-	100	mA
		-	-	200	mA

## MECHANICAL CHARACTERISTIC

<b>Case</b>	TO-48 (MAC250 Series)
<b>Marking</b>	Alpha-numeric
<b>Polarity</b>	Cathode is stud



	TO-48			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.604	0.614	15.340	15.600
B	0.551	0.559	14.000	14.200
C	1.050	1.190	2.670	30.230
F	0.135	0.160	3.430	4.060
H	-	0.265	-	6.730
J	0.420	0.455	10.670	11.560
K	0.620	0.670	15.750	17.020
L	0.300	0.350	7.620	8.890
Q	0.055	0.085	1.400	2.160
T	0.501	0.505	12.730	12.830

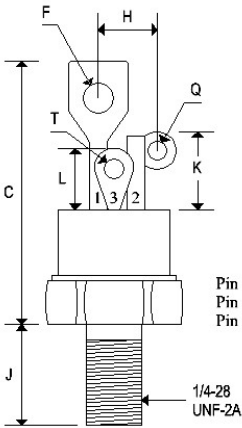
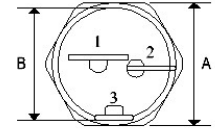
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## MECHANICAL CHARACTERISTIC

Case	TO-48 ISO (MAC250Q3 Series)
Marking	Alpha-numeric
Polarity	Cathode is stud



Pin 1: MT1  
Pin 2: Gate  
Pin 3: MT2

	TO-48 ISO			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.551	0.559	14.000	14.200
B	0.501	0.505	12.730	12.830
C	-	1.280	-	32.510
F	-	0.160	-	4.060
H	-	0.265	-	6.730
J	0.420	0.455	10.670	11.560
K	0.300	0.350	7.620	8.890
L	0.255	0.275	6.480	6.990
Q	0.055	0.085	1.400	2.160
T	0.135	0.150	3.430	3.810

FIGURE 1 – CURRENT DERATING

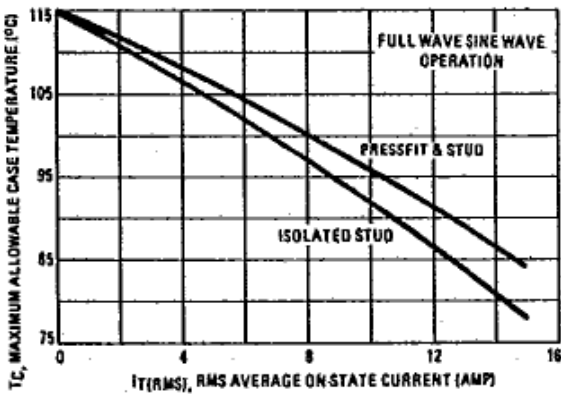


FIGURE 2 – MAXIMUM ON-STATE POWER DISSIPATION

