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by MAC4DSM/D

TRIACS
Silicon Bidirectional Thyristors

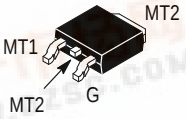
MAC4DSM
MAC4DSN

Motorola Preferred Devices

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

TRIACS
4.0 AMPERES RMS
600 thru 800 VOLTS



CASE 369A–13
STYLE 6

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

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) MAC4DSM / MAC4DSN	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^2t	6.6	A^2sec
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 — Junction to Ambient — Junction to Ambient (2)	$R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	3.5 88 80	°C/W
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.

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

Characteristics	Symbol	Min	Typ	Max	Unit
Peak Repetitive Blocking Current	I_{DRM}				mA
(V_D = Rated V_{DRM}, Gate Open) T_J = 25°C		—	—	0.01	
T_J = 125°C		—	—	2.0	
Peak On–State Voltage (1)	V_{TM}				Volts
(I_{TM} = ±6.0 A)		—	1.3	1.6	
Gate Trigger Current (Continuous dc) (V_D = 12 V, R_L = 100 Ω)	I_{GT}				mA
MT2(+), G(+)		2.9	4.0	10	
MT2(+), G(–)		2.9	5.0	10	
MT2(–), G(–)		2.9	7.0	10	
Gate Trigger Voltage (Continuous dc) (V_D = 12 V, R_L = 100 Ω)	V_{GT}				Volts
MT2(+), G(+)		0.5	0.7	1.3	
MT2(+), G(–)		0.5	0.65	1.3	
MT2(–), G(–)		0.5	0.7	1.3	
MT2(+), G(+); MT2(+), G(–); MT2(–), G(–) T_J = 125°C		0.2	0.4	—	
Holding Current	I_H				mA
(V_D = 12 V, Gate Open, I_T = ±200 mA)		2.0	5.5	15	
Latching Current (V_D = 12 V, I_G = 10 mA)	I_L				mA
MT2(+), G(+)		—	6.0	30	
MT2(+), G(–)		—	10	30	
MT2(–), G(–)		—	6.0	30	

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%.

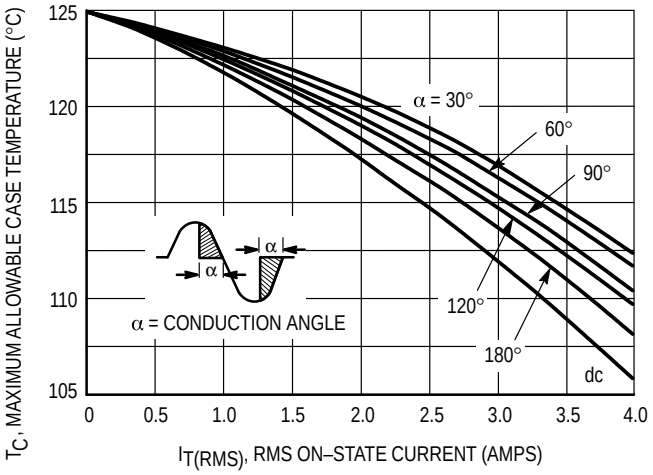


Figure 1. RMS Current Derating

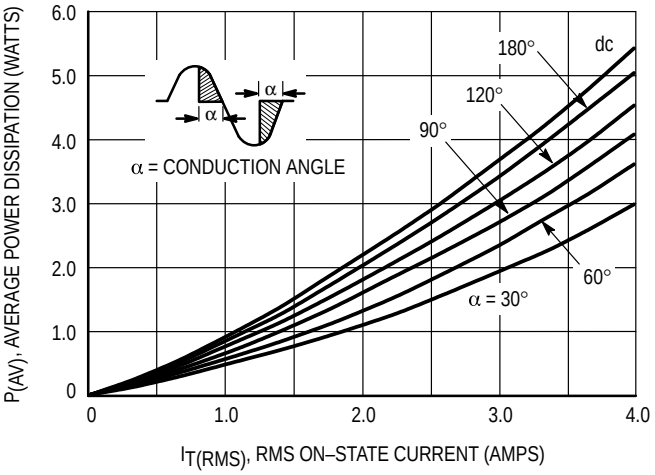


Figure 2. On–State Power Dissipation

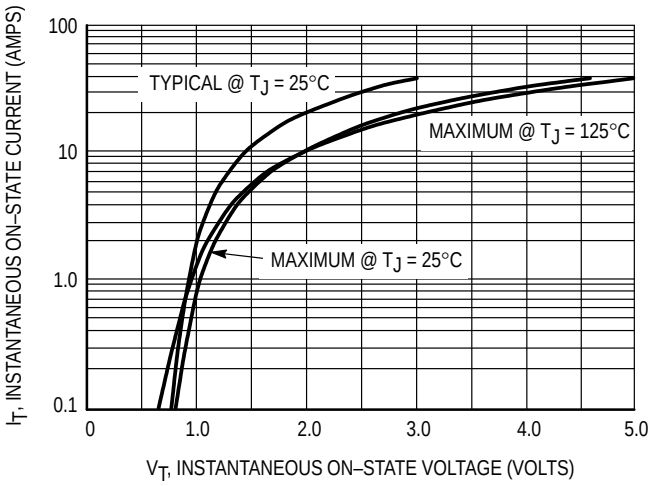


Figure 3. On–State Characteristics

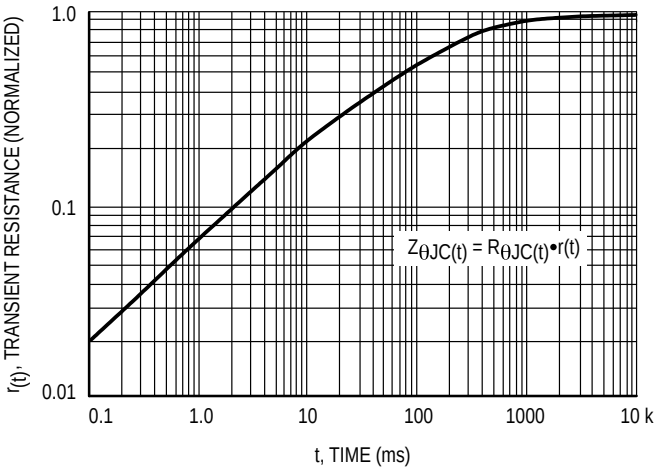


Figure 4. Transient Thermal Response

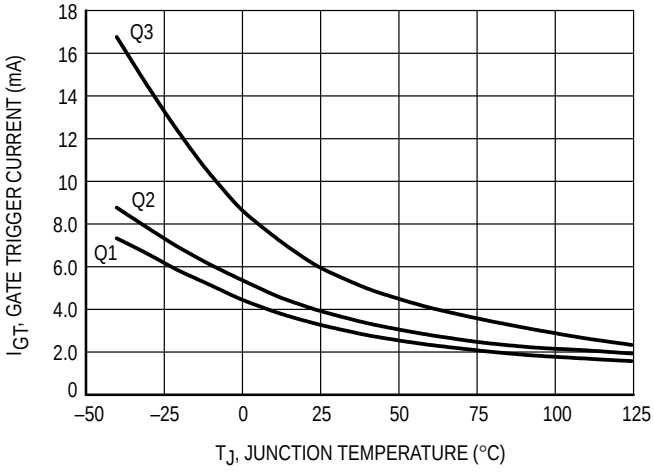


Figure 5. Typical Gate Trigger Current versus Junction Temperature

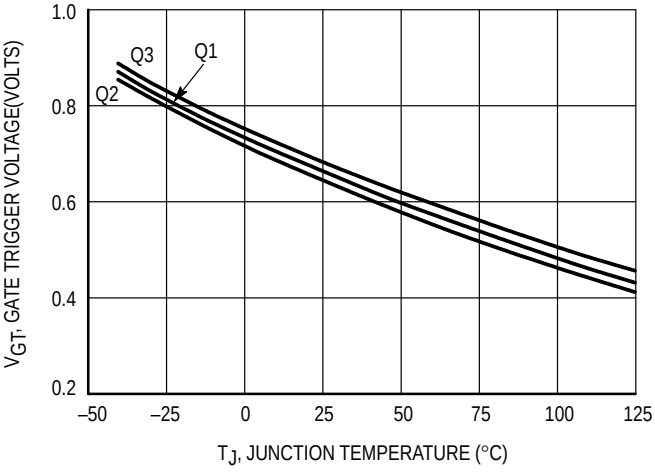


Figure 6. Typical Gate Trigger Voltage versus Junction Temperature

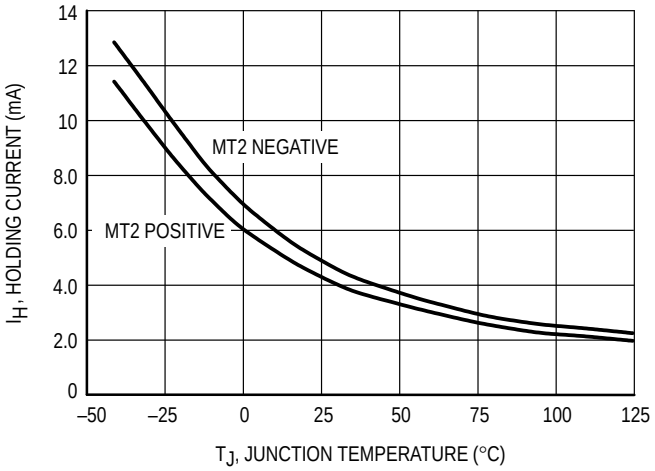


Figure 7. Typical Holding Current versus Junction Temperature

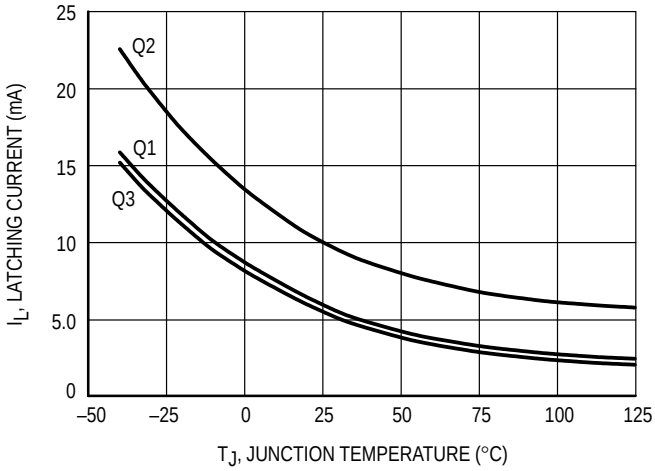


Figure 8. Typical Latching Current versus Junction Temperature

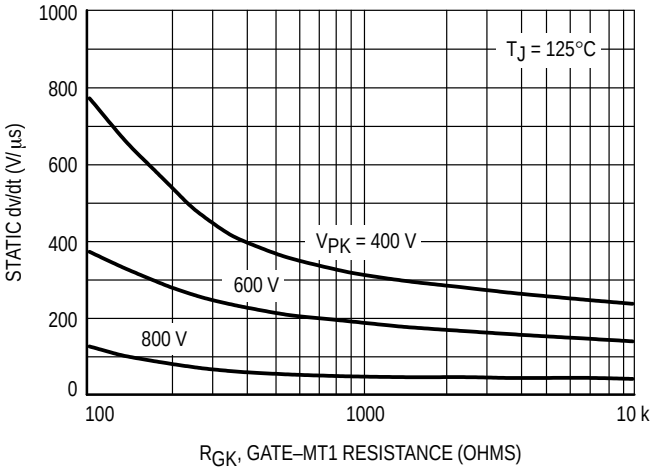


Figure 9. Exponential Static dv/dt versus Gate–MT1 Resistance, MT2(+)

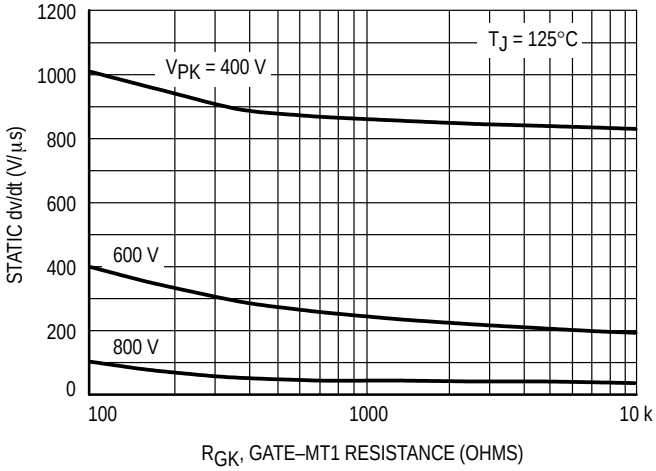


Figure 10. Exponential Static dv/dt versus Gate–MT1 Resistance, MT2(–)

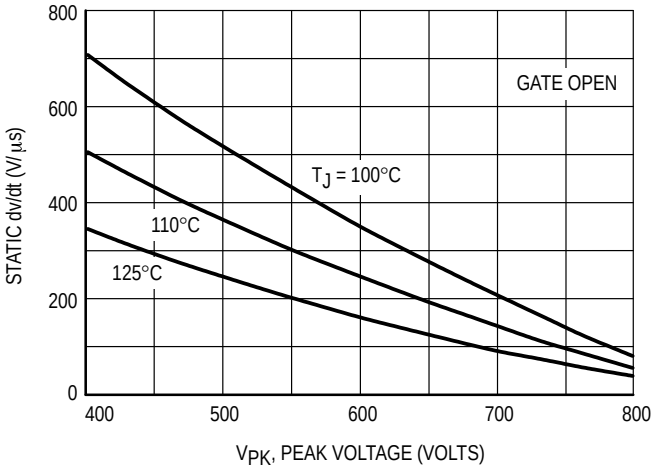


Figure 11. Exponential Static dv/dt versus Peak Voltage, MT2(+)

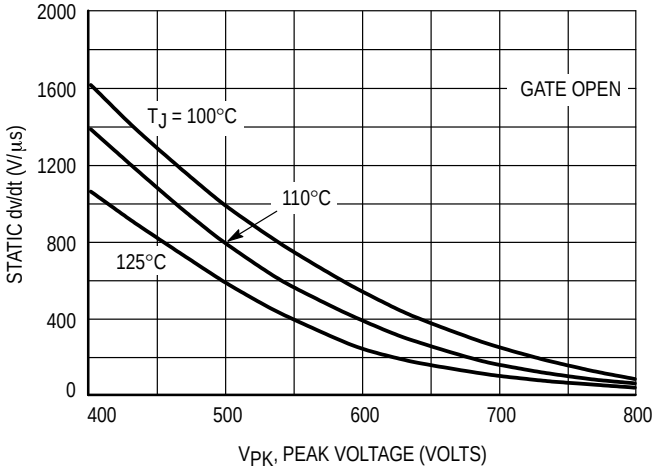


Figure 12. Exponential Static dv/dt versus Peak Voltage, MT2(–)

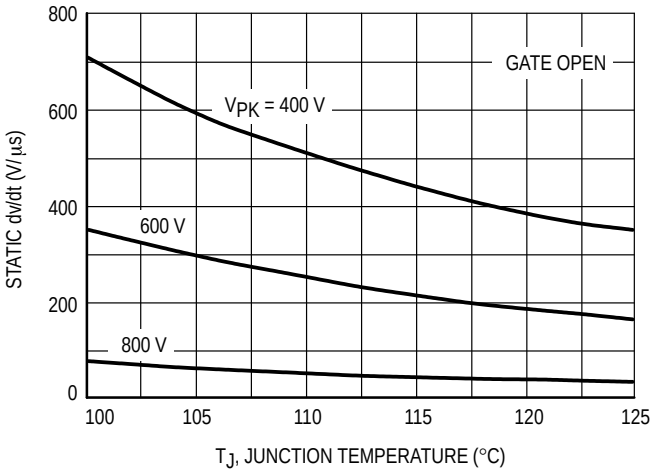


Figure 13. Typical Exponential Static dv/dt versus Junction Temperature, MT2(+)

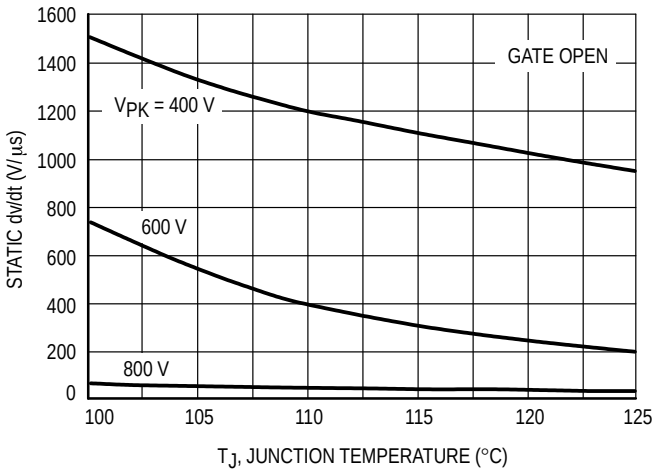


Figure 14. Typical Exponential Static dv/dt versus Junction Temperature, MT2(–)

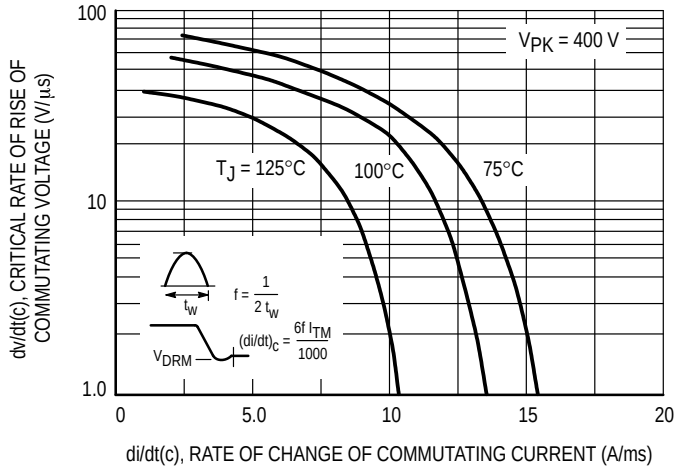
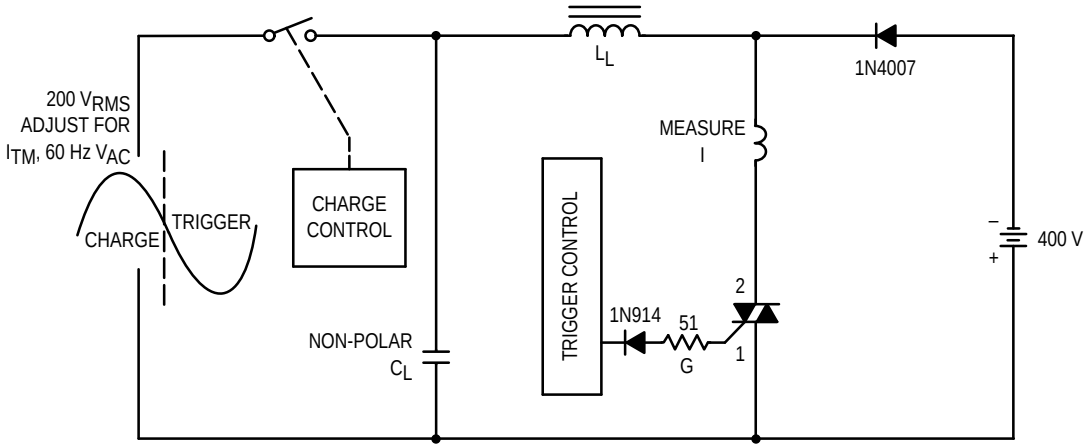


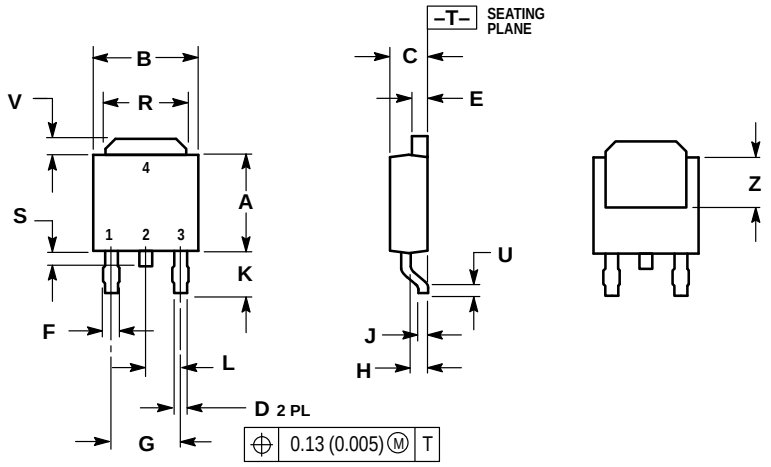
Figure 15. Critical Rate of Rise of Commutating Voltage



Note: Component values are for verification of rated $(dv/dt)_c$. See AN1048 for additional information.

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.

	INCHES		MILLIMETERS	
DIM	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

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