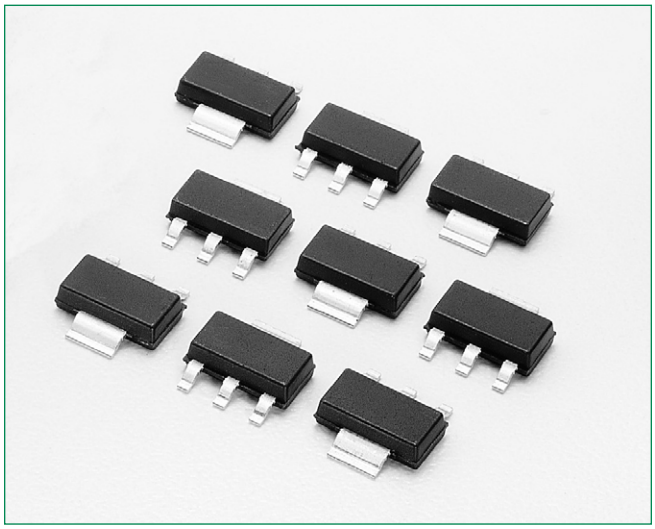
Littelfuse
Expertise Applied | Answers Delivered

Thyristors

Surface Mount – 600V - 800V > MCR08B, MCR08M

MCR08B, MCR08M

RoHS



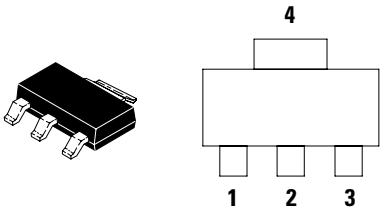
Description

PNPN devices designed for line powered consumer applications such as relay and lamp drivers, small motor controls, gate drivers for larger thyristors, and sensing and detection circuits. Supplied in surface mount package for use in automated manufacturing.

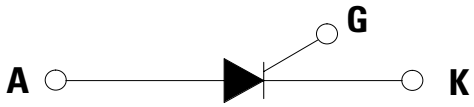
Features

- Sensitive Gate Trigger Current
- Blocking Voltage to 600 V
- Glass Passivated Surface for Reliability and Uniformity
- Surface Mount Package
- These Devices are Pb–Free and are RoHS Compliant

Pin Out



Functional Diagram



Additional Information

Datasheet | Resources | Samples

Revised: BA.08/26/20

Maximum Ratings (T_J = 25°C unless otherwise noted)

Rating		Symbol	Value	Unit
Peak Repetitive Off–State Voltage (Note 1) (–40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open)	MCR08B MCR08M	V_{DRM}, V_{RRM}	200 600	V
On-State RMS Current (All Conduction Angles; T_C = 80°C)		$I_{T\ (RMS)}$	0.8	A
Peak Non-Repetitive Surge Current (1/2 Cycle Sine Wave, 60 Hz, T_C = 25°C)		I_{TSM}	8.0	A
Circuit Fusing Consideration (t = 8.3 ms)		I^2t	0.4	A^2sec
Forward Peak Gate Power (T_C = 80°C, t = 1.0 µs)		P_{GM}	0.1	W
Average Gate Power (t = 8.3 ms, T_C = 80°C)		$P_{GM\ (AV)}$	0.01	W
Operating Junction Temperature Range		T_J	-40 to +125	°C
Storage Temperature Range		T_{stg}	-40 to +150	°C

Thermal Characteristics

Rating	Symbol	Value	Unit
Thermal Resistance, Junction–to–Case (AC) PCB Mounted per Figure 1	$R_{\theta JC}$	2.2	°C/W
Thermal Resistance, Junction–to–Tab Measured on Anode Tab Adjacent to Compound	$R_{\theta JT}$	25	°C/W
Maximum Device Temperature for Soldering Purposes (for 10 Seconds Maximum)	T_L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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.

Electrical Characteristics - OFF (T_J = 25°C unless otherwise noted ; Electricals apply in both directions)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Repetitive Forward or Reverse Blocking Current (Note 3) (V_{AK} = Rated V_{DRM} or V_{RRM}, R_{GK} = 1 kΩ	T_J = 25°C	I_{DRM},	-	-	10	µA
	T_J = 125°C	I_{RRM}	-	-	200	mA

Electrical Characteristics - ON (T_J = 25°C unless otherwise noted; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward On-State Voltage (Note 2) (I_T = 1.0 A Peak)	V_{TM}	–	–	1.7	V
Gate Trigger Current (Continuous dc) (Note 4) (V_{AK} = 12 Vdc, R_L = 100 Ω)	I_{GT}	–	–	200	mA
Gate Trigger Voltage (Continuous dc) (V_D = 12 V, R_L = 100 Ω)	I_H	–	–	5.0	mA
Holding Current (Note 3) (V_{AK} = 12 Vdc, Initiating Current = 20 mA)	V_{GT}	–	–	0.8	V
Turn–On Time (V_{AK} = 12 Vdc, I_{TM} = 5 Adc, IGT = 5 mA)	tgt	–	1.25	–	µs

2. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2%.
3. RGK = 1000 Ω is included in measurement.
4. RGK is not included in measurement.

Dynamic Characteristics

Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate-of-Rise of Off State Voltage (Vpk = Rated VDRM, TC = 110°C, RGK = 1 kΩ, Exponential Method)	dv/dt	10	–	–	V/µs
Critical Rate of Rise of On–State Current (IPK = 50 A, Pw = 40 sec, diG/dt = 1 A/sec, Igt = 50 mA	di/dt	–	–	50	A/ms

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Voltage Current Characteristic of SCR

Symbol	Parameter
V_{DRM}	Peak Repetitive Forward Off State Voltage
I_{DRM}	Peak Forward Blocking Current
V_{RRM}	Peak Repetitive Reverse Off State Voltage
I_{RRM}	Peak Reverse Blocking Current
V_{TM}	Maximum On State Voltage
I_H	Holding Current

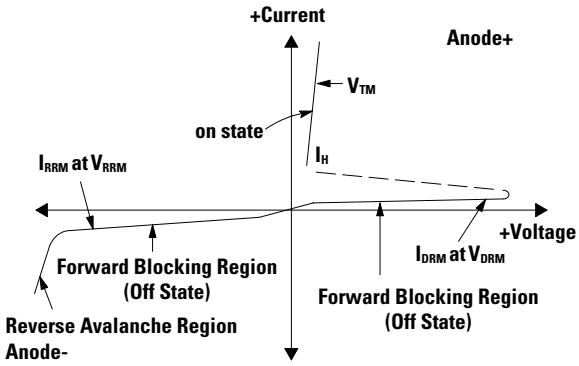
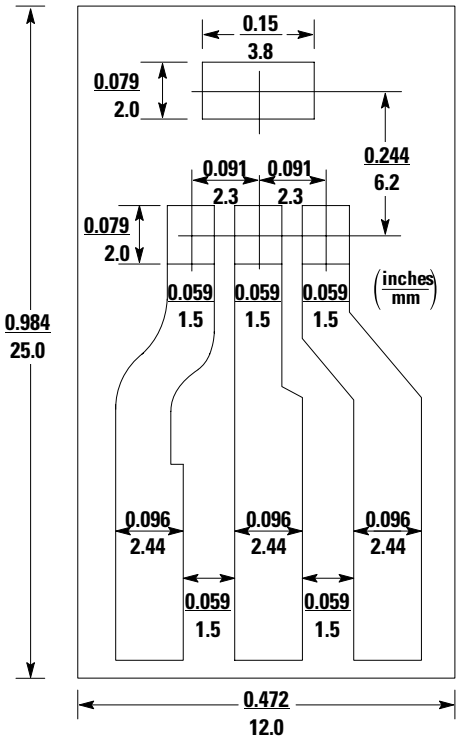


Figure 1. PCB for Thermal Impedance and Power Testing of SOT-223



Board mounted vertically cinch 8840 edge connector.
Board Thickness = 65Mil.
Foil Thickness = 2.5Mil.
Material: G10 Fiberglass Base Epoxy

Figure 2. On-State Characteristics

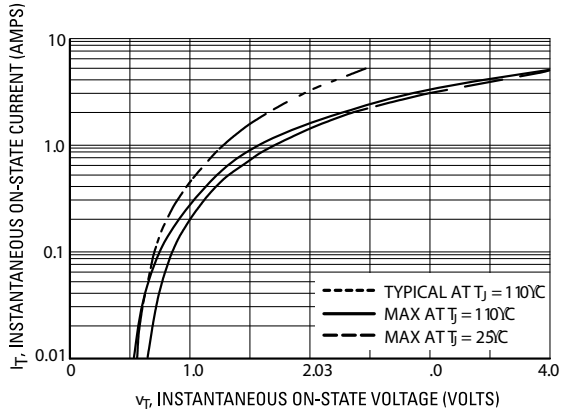


Figure 3. Junction to Ambient Thermal Resistance vs Copper Tab Area

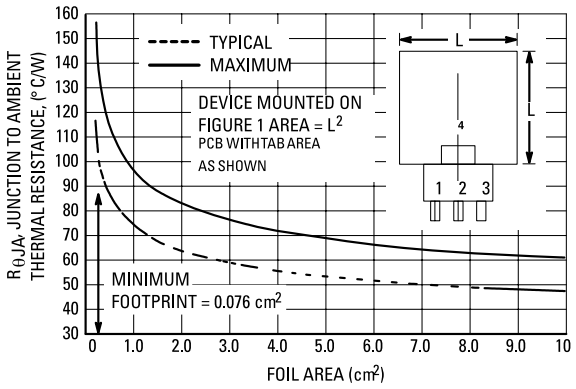


Figure 4. Current Derating, Minimum Pad Size Reference: Ambient Temperature

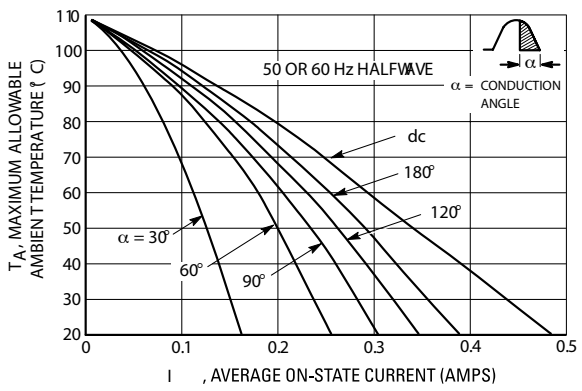


Figure 5. Current Derating, 1.0 cm Square Pad Reference: Ambient Temperature

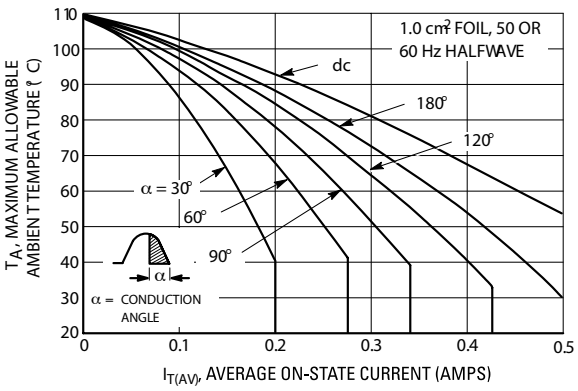


Figure 6. Current Derating, 2.0 cm Square Pad Reference: Ambient Temperature

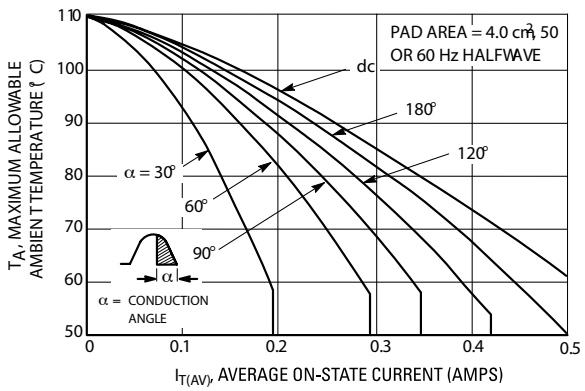


Figure 7. Current Derating Reference: Anode Tab

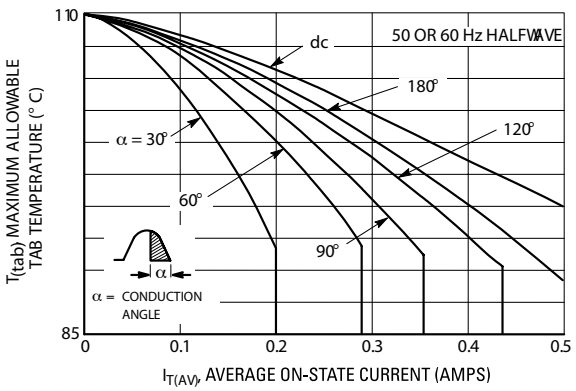


Figure 8. Power Dissipation

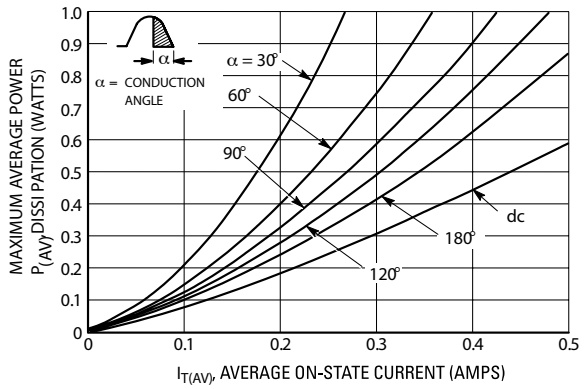


Figure 9. Thermal Response Device Mounted on Figure 1 Printed Circuit Board

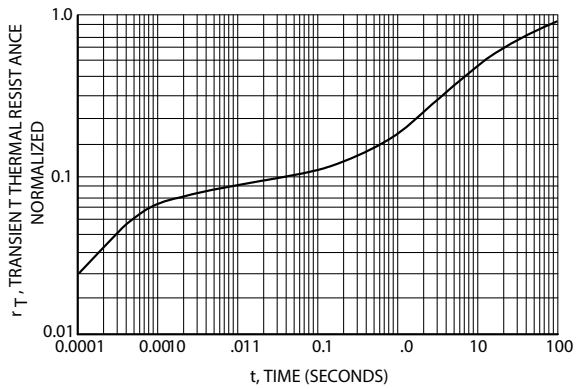


Figure 10. Typical Gate Trigger Voltage vs Junction Temperature

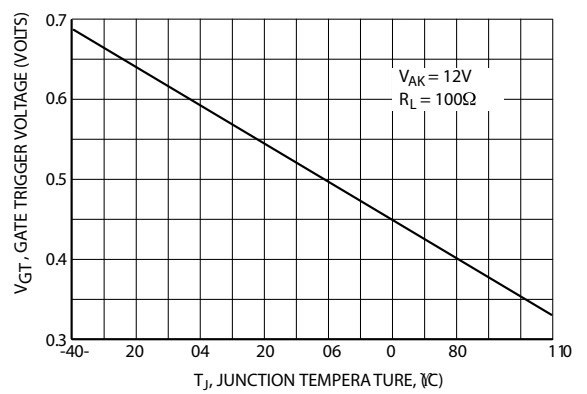


Figure 11. Typical Normalized Holding Current vs Junction Temperature

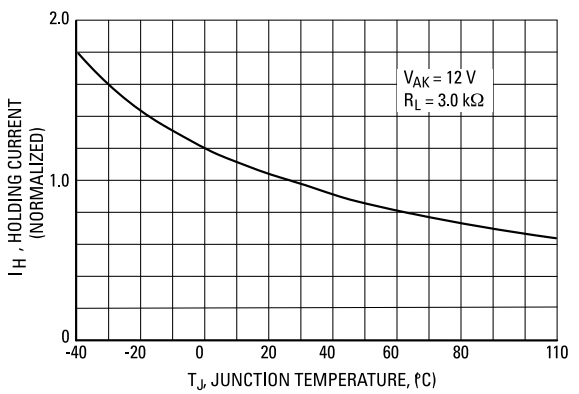


Figure 12. Typical Range of V_{GT} versus Measured I_{GT}

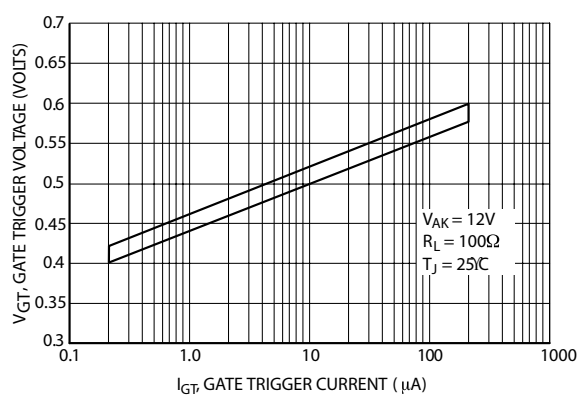


Figure 13. Typical Gate Trigger Current vs Junction Temperature

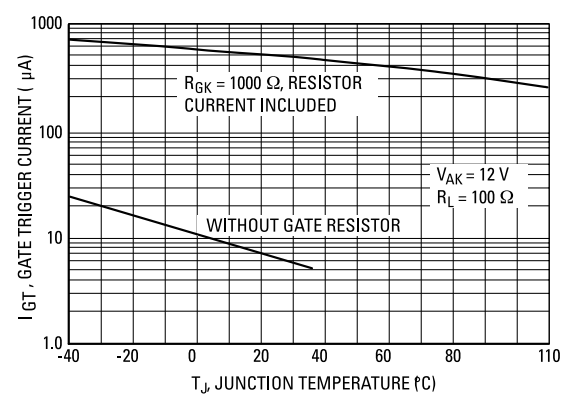


Figure 14. Holding Current Range vs Gate-Cathode Resistance

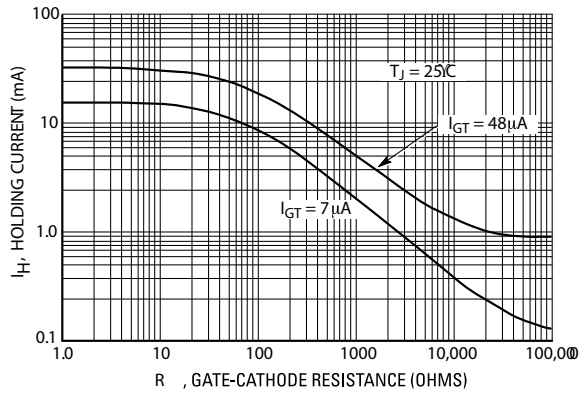


Figure 15. Exponential Static dv/dt vs. Junction Temperature and Gate-Cathode Termination Resistance

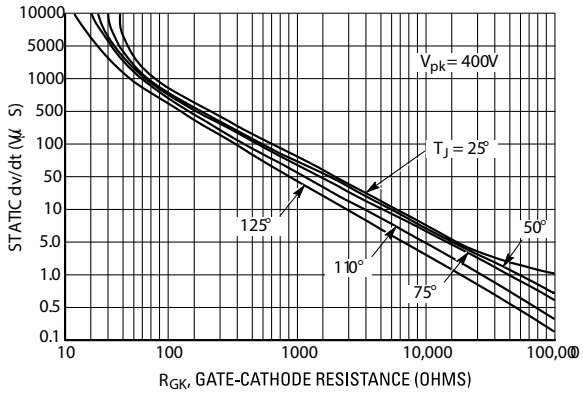


Figure 16. Exponential Static dv/dt vs Peak Voltage and Gate-Cathode Termination Resistance

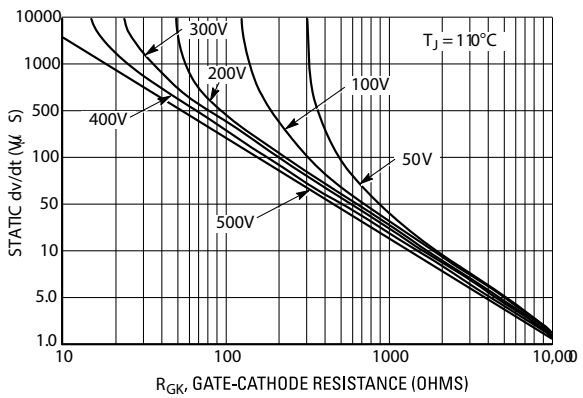


Figure 17. Exponential Static dv/dt vs Gate-Cathode Capacitance and Resistance

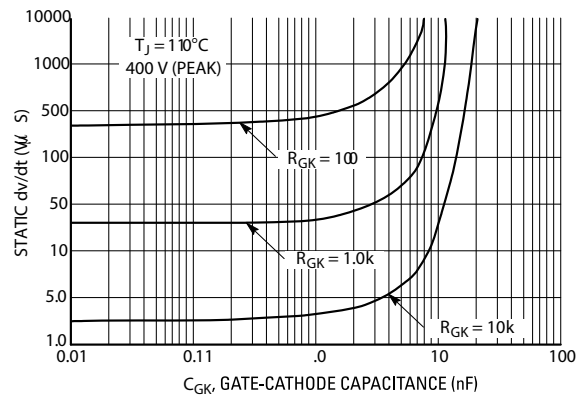
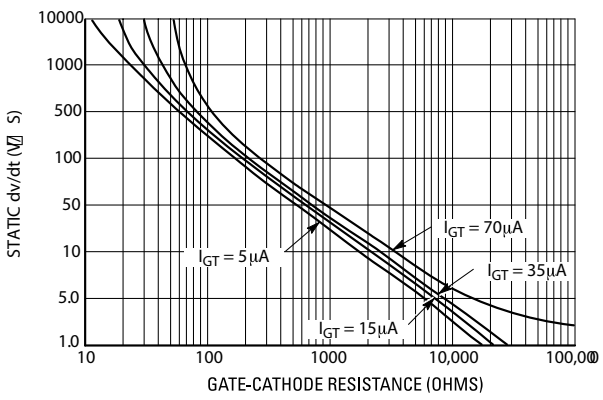


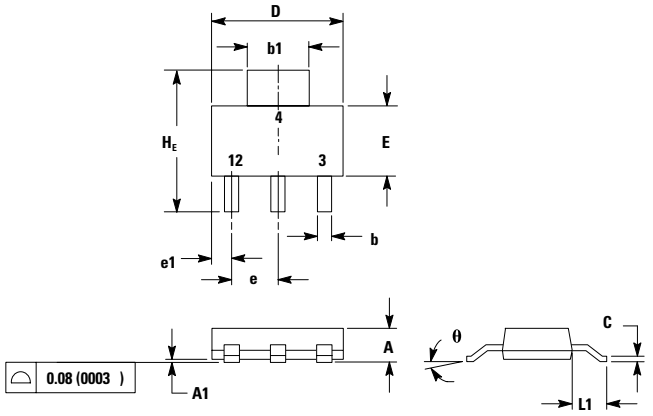
Figure 18. Exponential Static dv/dt vs Gate-Cathode Termination Resistance and Product Trigger Current Sensitivity



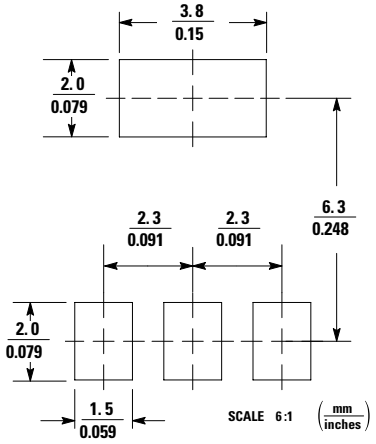
Thyristors

Surface Mount – 600V - 800V > MCR08B, MCR08M

Dimensions



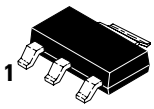
Soldering Footprint



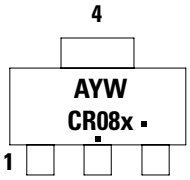
Dim	Inches			Millimeters		
	Min	Nom	Max	Min	Nom	Max
A	1.50	1.63	1.75	0.060	0.064	0.068
A1	0.02	0.06	0.10	0.001	0.002	0.004
b	0.60	0.75	0.89	0.024	0.030	0.035
b1	2.90	3.06	3.20	0.115	0.121	0.126
c	0.24	0.29	0.35	0.009	0.012	0.014
D	6.30	6.50	6.70	0.249	0.256	0.263
E	3.30	3.50	3.70	0.130	0.138	0.145
e	2.20	2.30	2.40	0.087	0.091	0.094
e1	0.85	0.94	1.05	0.033	0.037	0.041
L1	1.50	1.75	2.00	0.060	0.069	0.078
H_E	6.70	7.00	7.30	0.264	0.276	0.287
9	0°	–	10°	0°	–	10°

1. Dimensions and Tolerancing per Ansi Y14.5M. 1982.
2. Controlling Dimension: Inch.

Part Marking System



SOT-223
Case 318E
Style 10



CR08c = Device Code
x = B or M
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb-Free Packaging

Note: Microdot may be in either location

Ordering Information

Device	Package	Shipping
MCR08BT1G	SOT-223 (Pb-Free)	1000/Tape & Reel
MCR08MT1G	SOT-223 (Pb-Free)	1000/Tape & Reel

Pin Assignment	
1	Cathode
2	Anode
3	Gate
4	Anode

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