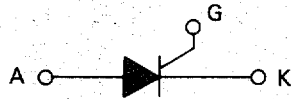




MOTOROLA SEMICONDUCTORS

P.O. BOX 20912 • PHOENIX, ARIZONA 85036

**2N6504
thru
2N6509** **MCR225-5
MCR225-7
MCR225-9
MCR225-12**



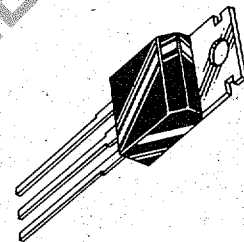
25 AMPERES RMS SILICON CONTROLLED RECTIFIERS

... designed primarily for half-wave ac control applications, such as motor controls, heating controls and power supply crowbar circuits.

- Glass Passivated Junctions with Center Gate Fire for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Constructed for Low Thermal Resistance, High Heat Dissipation and Durability
- Blocking Voltage to 1000 Volts
- 300 A Surge Current Capability

THYRISTORS

**25 AMPERES RMS
50-1000 VOLTS**



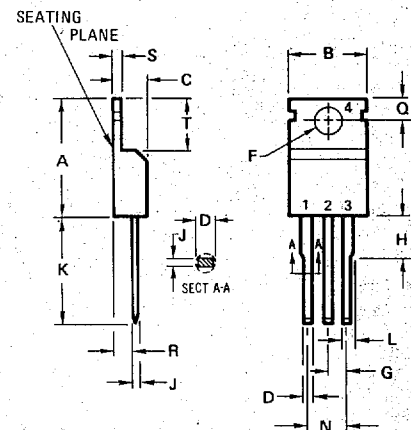
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Reverse Blocking Voltage (1)	V _{RRM}		Volts
	*2N6504	50	
	*2N6505	100	
	*2N6506	200	
	MCR225-5	300	
	*2N6507	400	
	MCR225-7	500	
	*2N6508	600	
	MCR225-9	700	
	*2N6509	800	
	MCR225-12	1000	
Forward Current (T _C = 85°C) (All Conduction Angles)	I _{T(RMS)} I _{T(AV)}	25 16	Amps
Peak Nonrepetitive Surge Current — 8.3 ms (1/2 Cycle, Sine Wave) 1.5 ms	I _{TSM}	300 350	Amps
Forward Peak Gate Power	P _{GM}	20	Watts
Forward Average Gate Power	P _{G(AV)}	0.5	Watt
Forward 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 _{θJC}	1.5	°C/W

(1) V_{RRM} for all types can be applied on a continuous dc basis without incurring damage. Ratings apply for zero or negative gate voltage. Devices should not be tested for blocking capability in a manner such that the voltage supplied exceeds the rated blocking voltage.



STYLE 1:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.23	15.87	0.560	0.625
B	9.66	10.66	0.380	0.420
C	3.56	4.82	0.140	0.190
D	0.51	1.14	0.020	0.045
F	3.531	3.733	0.139	0.147
G	2.29	2.79	0.090	0.110
H	-	6.35	-	0.250
J	0.31	1.14	0.012	0.045
K	12.70	14.27	0.500	0.562
L	1.14	1.77	0.045	0.070
N	4.83	5.33	0.190	0.210
Q	2.54	3.04	0.100	0.120
R	2.04	2.92	0.080	0.115
S	0.51	1.39	0.020	0.055
T	5.85	6.85	0.230	0.270

**CASE 221-02
TO-220AB**

All JEDEC dimensions and notes apply

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Forward Blocking Voltage ($T_J = 125^\circ\text{C}$)	V_{DRM}				Volts
*2N6504		50	—	—	
*2N6505		100	—	—	
*2N6506		200	—	—	
MCR225-5		300	—	—	
*2N6507		400	—	—	
MCR225-7		500	—	—	
*2N6508		600	—	—	
MCR225-9		700	—	—	
*2N6509		800	—	—	
MCR225-12		1000	—	—	
*Peak Forward Blocking Current (Rated V_{DRM} @ $T_J = 125^\circ\text{C}$)	I_{DRM}	—	—	2.0	mA
*Peak Reverse Blocking Current (Rated V_{RRM} @ $T_J = 125^\circ\text{C}$)	I_{RRM}	—	—	2.0	mA
*Forward "On" Voltage (1) ($I_{TM} = 50\text{ A}$)	V_{TM}	—	—	1.8	Volts
*Gate Trigger Current (Continuous dc) (Anode Voltage = 12 Vdc, $R_L = 100\text{ Ohms}$)	I_{GT}	—	—	40	mA
$T_C = 25^\circ\text{C}$		—	25	75	
$T_C = -40^\circ\text{C}$					
*Gate Trigger Voltage (Continuous dc) (Anode Voltage = 12 Vdc, $R_L = 100\text{ Ohms}$, $T_C = -40^\circ\text{C}$)	V_{GT}	—	1.0	1.5	Volts
Gate Non-Trigger Voltage (Anode Voltage = Rated V_{DRM} , $R_L = 100\text{ Ohms}$, $T_J = 125^\circ\text{C}$)	V_{GD}	0.2	—	—	Volts
*Holding Current (Anode Voltage = 12 Vdc, $T_C = -40^\circ\text{C}$)	I_H	—	35	40	mA
*Turn-On Time ($I_{TM} = 25\text{ A}$, $I_{GT} = 50\text{ mAdc}$)	t_{gt}	—	1.5	2.0	μs
Turn-Off Time ($V_{DRM} = \text{rated voltage}$) ($I_{TM} = 25\text{ A}$, $I_R = 25\text{ A}$) ($I_{TM} = 25\text{ A}$, $I_R = 25\text{ A}$, $T_J = 125^\circ\text{C}$)	t_q	—	15	—	μs
		—	35	—	
Critical Rate of Rise of Off-State Voltage (Gate Open, Rated V_{DRM} , Exponential Waveform)	dv/dt	—	50	—	V/ μs

*Indicates JEDEC Registered Data.

(1) Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

FIGURE 1 — AVERAGE CURRENT DERATING

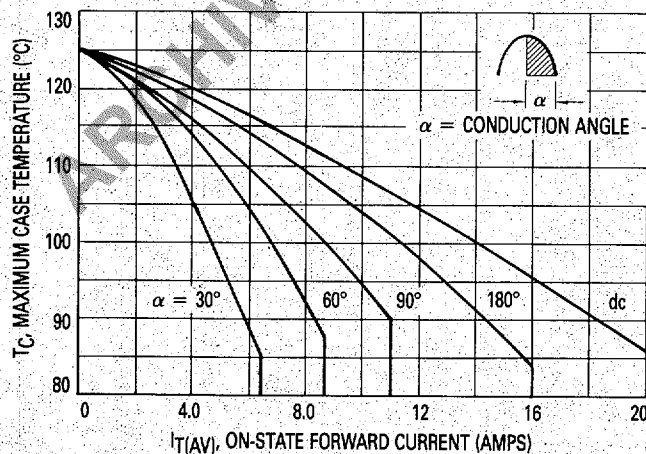


FIGURE 2 — MAXIMUM ON-STATE POWER DISSIPATION

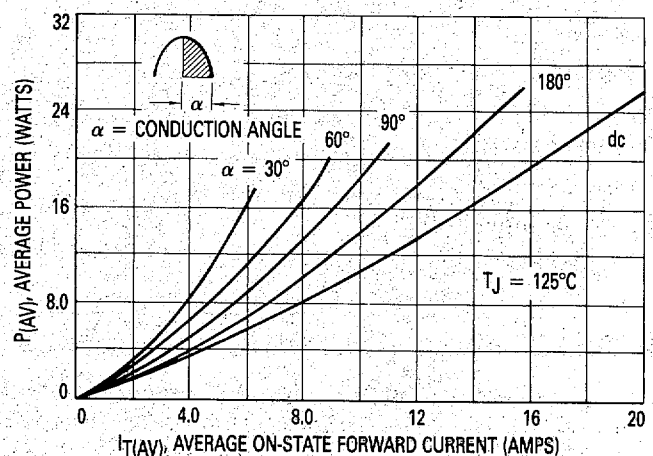


FIGURE 3 — MAXIMUM FORWARD VOLTAGE

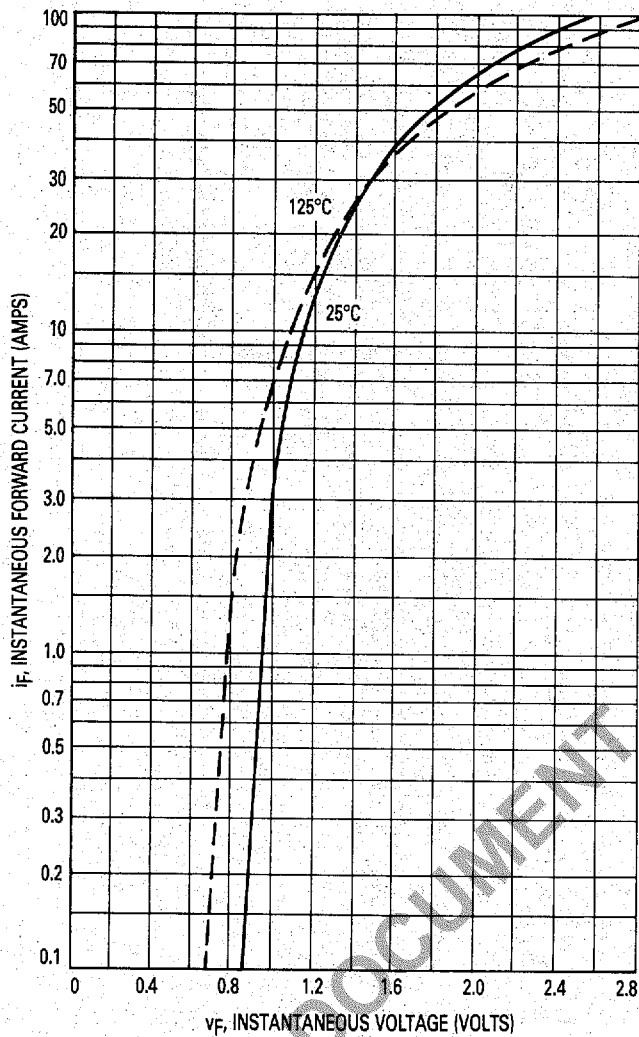


FIGURE 4 — MAXIMUM NON-REPETITIVE SURGE CURRENT

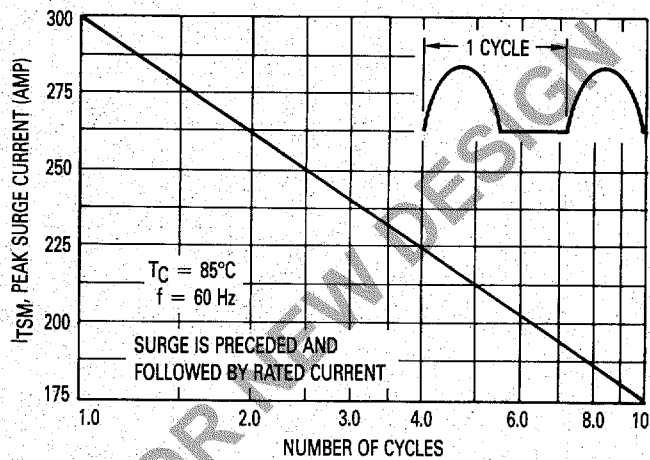


FIGURE 5 — CHARACTERISTICS AND SYMBOLS

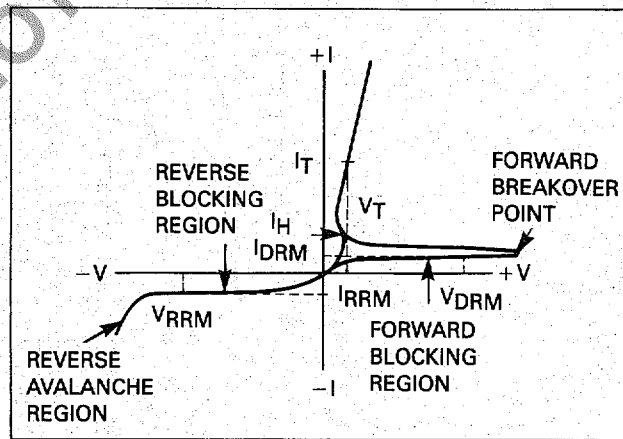
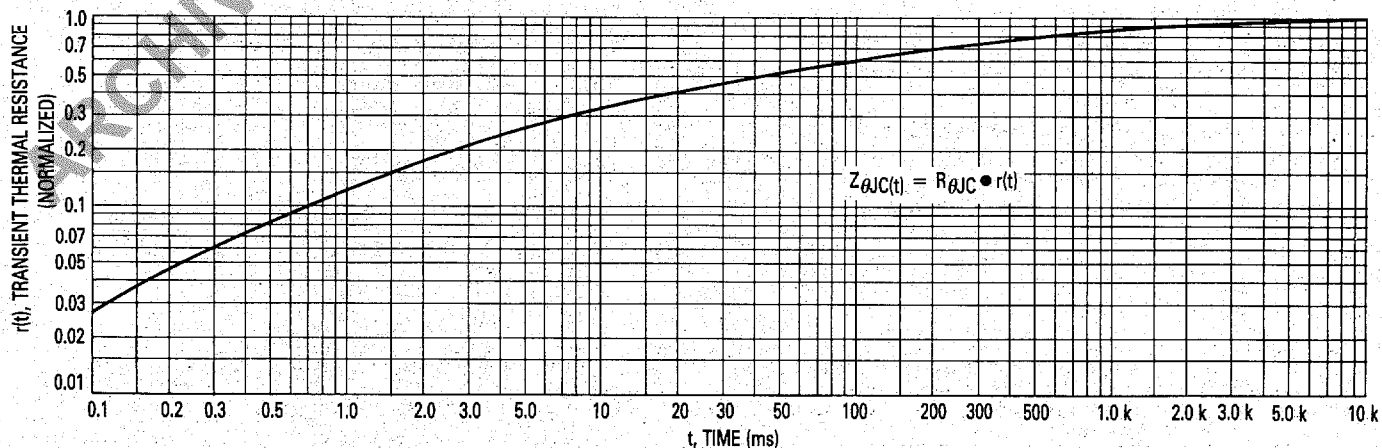


FIGURE 6 — THERMAL RESPONSE



TYPICAL TRIGGER CHARACTERISTICS

FIGURE 7 — GATE TRIGGER CURRENT

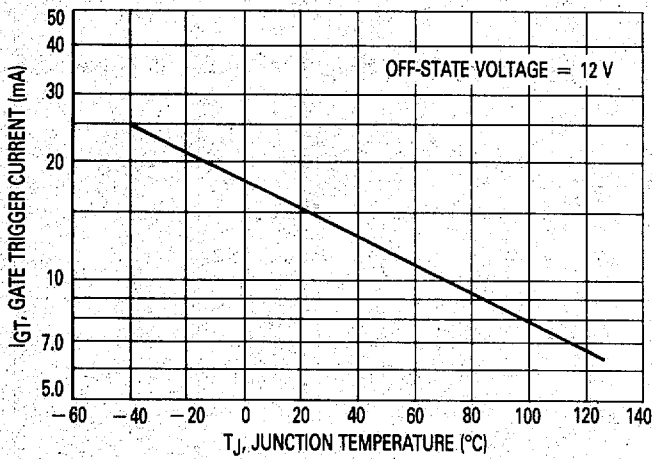


FIGURE 8 — GATE TRIGGER VOLTAGE

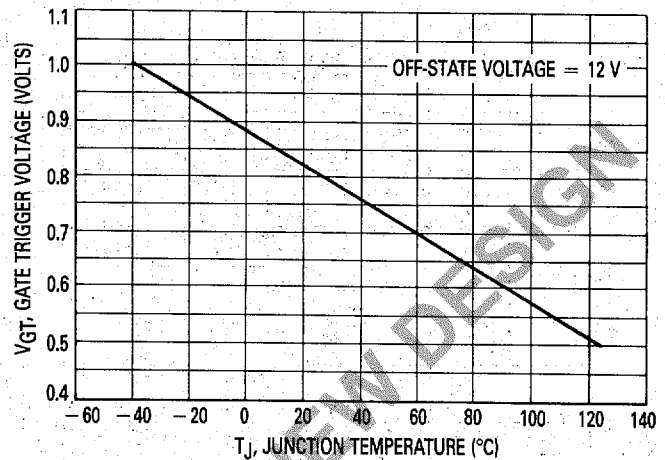
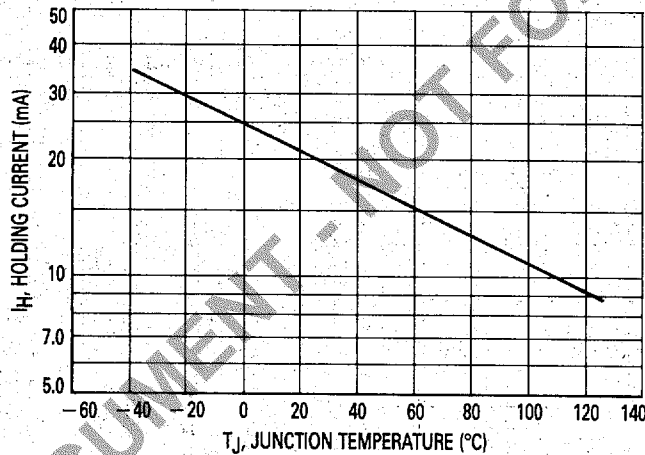


FIGURE 9 — HOLDING CURRENT



THYRISTOR APPLICATION NOTES

- AN-240 SCR Power Control Fundamentals
- AN-295 Suppressing RFI in Thyristor Circuits
- AN-443 Directional and Speed Control for Series, Universal and Shunt Motors
- AN-482 Electronic Speed Control of Appliance Motors
- AN-527 Theory, Characteristics and Applications of the Programmable Unijunction Transistor
- AN-725 A Low-Cost 80 V-1.5 A Color TV Power Supply

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