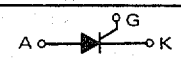
MOTOROLA Semiconductors

2N681 thru 2N692

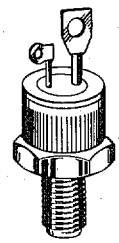


SILICON CONTROLLED RECTIFIERS

. . . designed primarily for half-wave ac control applications, such as motor controls, heating controls and power supplies; or wherever half-wave silicon gate-controlled, solid-state devices are needed.

- Glass Passivated Junctions and Center Gate Fire for Greater Parameter Uniformity and Stability
- Blocking Voltage to 800 Volts

THYRISTORS
25 AMPERE RMS
25-800 VOLTS



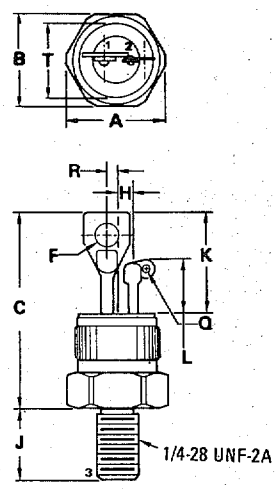
MAXIMUM RATINGS (T_J = 125°C unless otherwise noted.)

Rating	Symbol	Value	Unit
*Peak Repetitive Reverse Blocking Voltage (1)	V_{RRM}		Volts
2N681		25	
2N682		50	
2N683		100	
2N684		150	
2N685		200	
2N686		250	
2N687		300	
2N688		400	
2N689		500	
2N690		600	
2N691		700	
2N692		800	
*Non-Repetitive Peak Reverse Voltage	V_{RSM}		Volts
2N681		35	
2N682		75	
2N683		150	
2N684		225	
2N685		300	
2N686		350	
2N687		400	
2N688		500	
2N689		600	
2N690		720	
2N691		840	
2N692		960	
*RMS On-State Current (All Conduction Angles)	$I_{T(RMS)}$	25	Amp
*Average On-State Current (T_C = 65°C)	$I_{T(AV)}$	16	Amp
*Peak Non-Repetitive Surge Current (One cycle, 60 Hz, preceded and followed by rated current and voltage)	I_{TSM}	150	Amp
Circuit Fusing Considerations (T_J = -40 to +125°C, t = 1.0 to 8.3 ms)	I^2t	93	A^2s
*Peak Gate Power	P_{GM}	5.0	Watts
*Average Gate Power	$P_{G(AV)}$	0.5	Watt
*Peak Forward Gate Current 2N681-2N689	I_{GM}	2.0	Amp
2N690-2N692		1.2	
*Peak Gate Voltage — Forward	V_{FGM}	10	Volts
Reverse	V_{RGM}	5.0	
*Operating Junction Temperature Range	T_J	-65 to +125	°C
*Storage Temperature Range	T_{stg}	-65 to +150	°C

(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.

*Indicates JEDEC Registered Data.

▲Trademark of Motorola Inc.



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	15.34	15.60	0.604	0.614
B	14.00	14.20	0.551	0.559
C	26.67	30.23	1.050	1.190
F	3.43	4.06	0.135	0.160
H	2.29 REF		0.090 REF	
J	10.67	11.56	0.420	0.455
K	15.75	17.02	0.620	0.670
L	7.62	8.89	0.300	0.350
Q	1.40	1.65	0.055	0.065
R	1.65 REF		0.065 REF	
T	12.73	12.83	0.501	0.505

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

CASE 263-02

THERMAL CHARACTERISTICS

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

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

Characteristic		Symbol	Min	Typ	Max	Unit
*Peak Repetitive Forward Blocking Voltage (T_J = 125°C)	2N681	V_{DRM}	25	–	–	Volts
	2N682		50	–	–	
	2N683		100	–	–	
	2N684		150	–	–	
	2N685		200	–	–	
	2N686		250	–	–	
	2N687		300	–	–	
	2N688		400	–	–	
	2N689		500	–	–	
	2N690		600	–	–	
	2N691		700	–	–	
	2N692		800	–	–	
*Average Forward or Reverse Blocking Current (Rated V_{DRM} or V_{RRM}, gate open, T_J = 125°C)	2N681-2N684	$I_{D(AV)}$, $I_{R(AV)}$	–	–	6.5	mA
	2N685		–	–	6.0	
	2N686		–	–	5.5	
	2N687		–	–	5.0	
	2N688		–	–	4.0	
	2N689		–	–	3.0	
	2N690		–	–	2.5	
	2N691		–	–	2.25	
	2N692		–	–	2.0	
Peak Forward or Reverse Blocking Current (Rated V_{DRM} or V_{RRM}, gate open, T_J = 125°C)		I_{DRM}, I_{RRM}	–	–	2.0	mA
*Peak On-State Voltage (I_{TM} = 50.3 A peak, Pulse Width ≤ 1.0 ms, Duty Cycle ≤ 2.0%)		V_{TM}	–	–	2.0	Volts
Gate Trigger Current, Continuous dc (V_{AK} = 12 Vdc, R_L = 50 Ω)		I_{GT}	–	6.0	40	mA
*(V_{AK} = 12 Vdc, R_L = 50 Ω, T_C = -65°C)			–	–	80	
Gate Trigger Voltage, Continuous dc (V_{AK} = 12 Vdc, R_L = 50 Ω)		V_{GT}	–	0.65	2.0	Volts
*(V_{AK} = 12 Vdc, R_L = 50 Ω, T_J = -65°C)			–	–	3.0	
*Gate Non-Trigger Voltage (Rated V_{DRM}, R_L = 50 Ω, T_J = 125°C)		V_{GD}	–	–	0.25	Volts
Holding Current (V_{AK} = 12 Vdc, Gate Open)		I_H	–	7.3	50	mA
Critical Rate of Rise of Off-State Voltage (Rated V_{DRM}, Exponential Waveform, T_J = 125°C, Gate Open)		dv/dt	–	30	–	V/μs

*Indicates JEDEC Registered Data.

FIGURE 1 – AVERAGE CURRENT DERATING

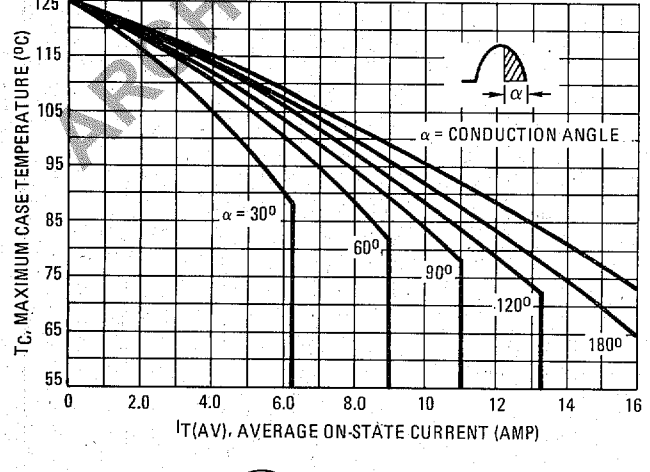


FIGURE 2 – MAXIMUM ON-STATE POWER DISSIPATION

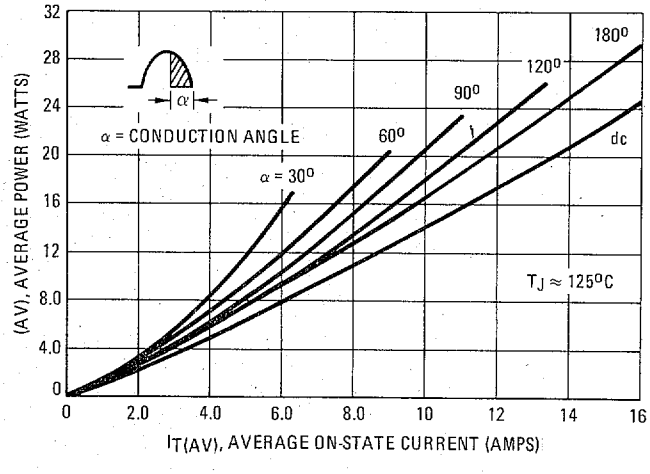


FIGURE 3 – MAXIMUM ON-STATE CHARACTERISTICS

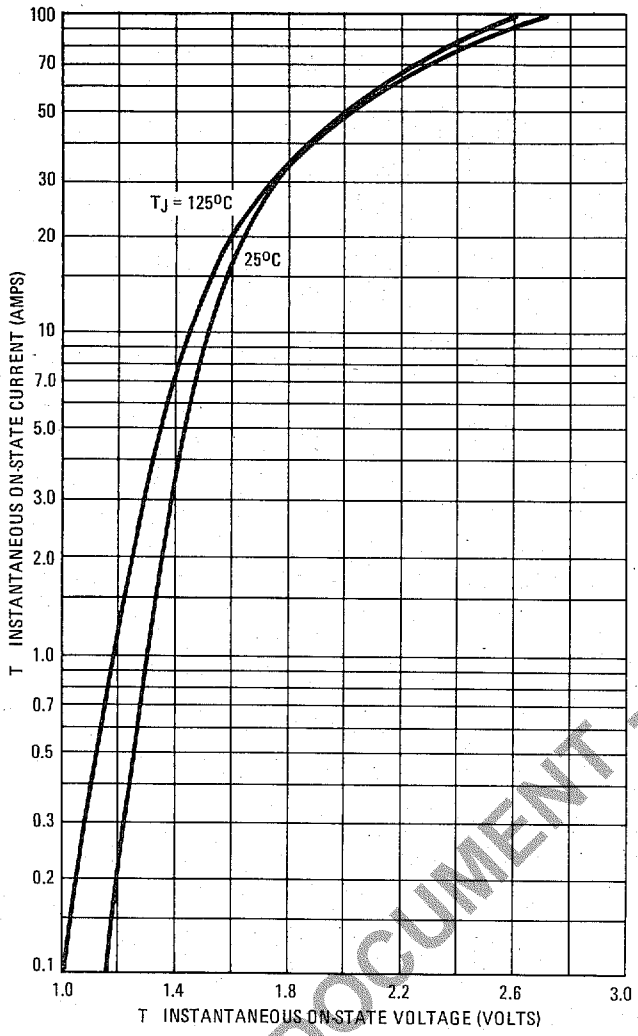


FIGURE 4 – MAXIMUM NON-REPETITIVE SURGE CURRENT

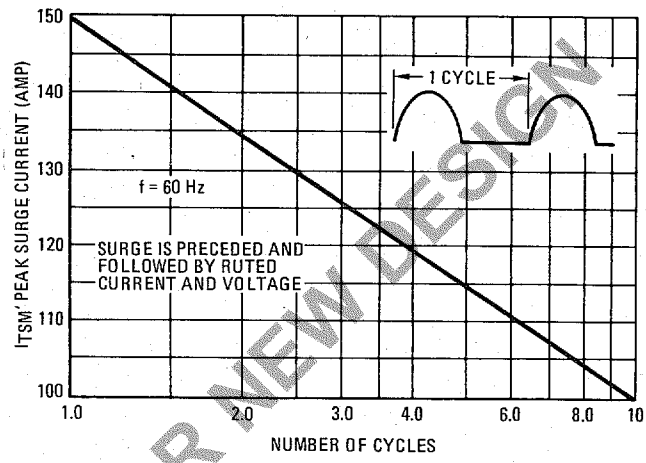


FIGURE 5 – CHARACTERISTICS AND SYMBOLS

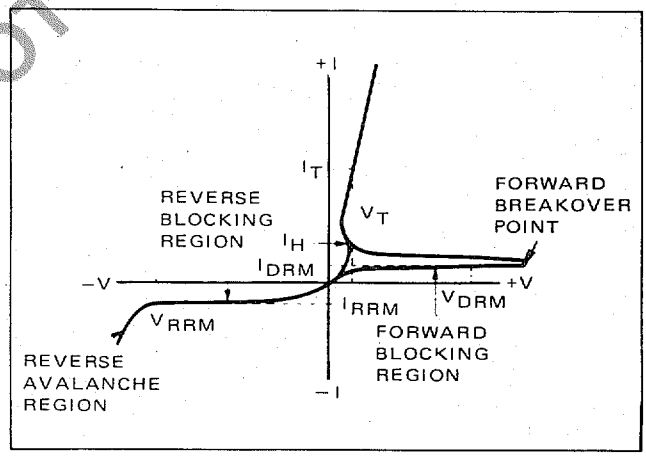
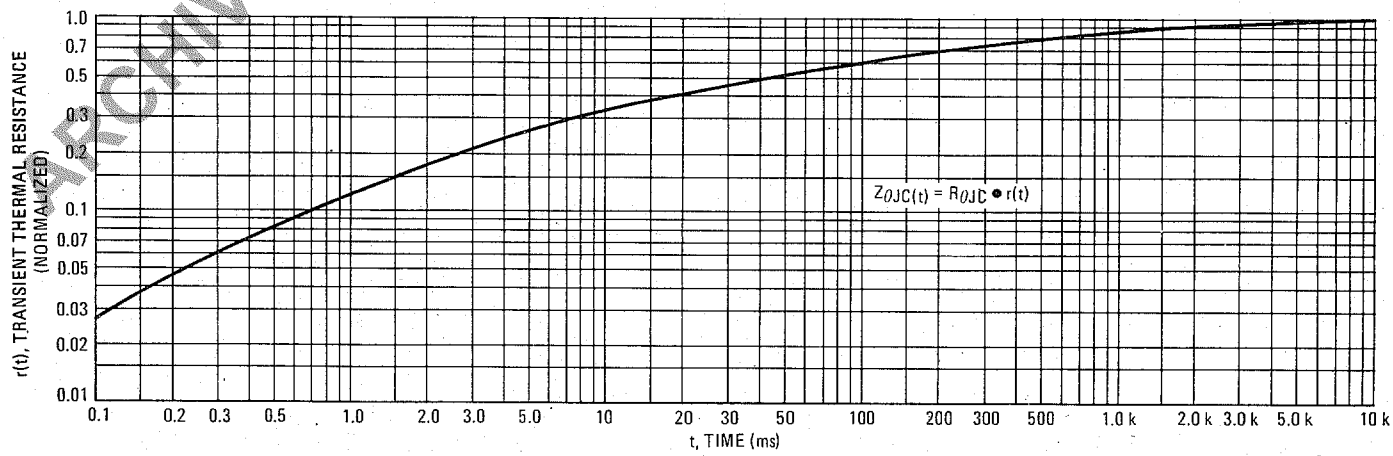


FIGURE 6 – THERMAL RESPONSE



TYPICAL CHARACTERISTICS

FIGURE 7 – PULSE TRIGGER CURRENT

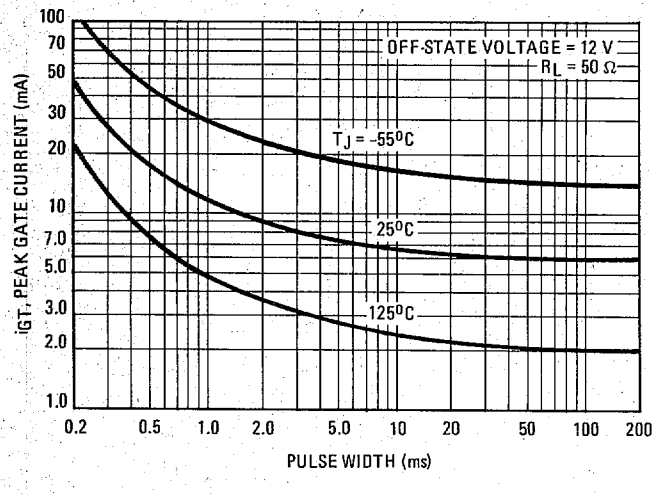


FIGURE 8 – GATE TRIGGER CURRENT

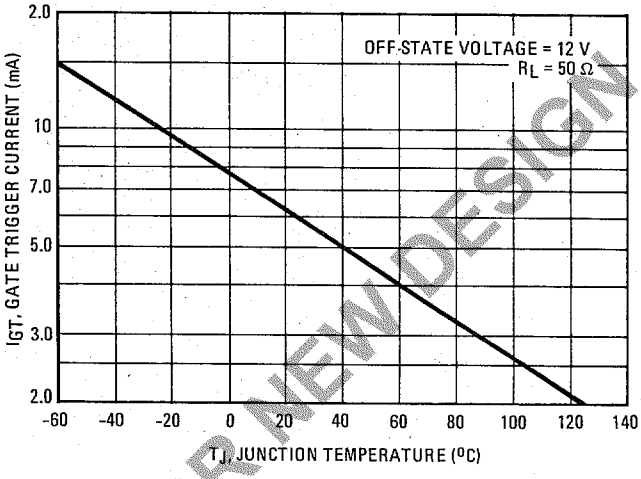


FIGURE 9 – GATE TRIGGER VOLTAGE

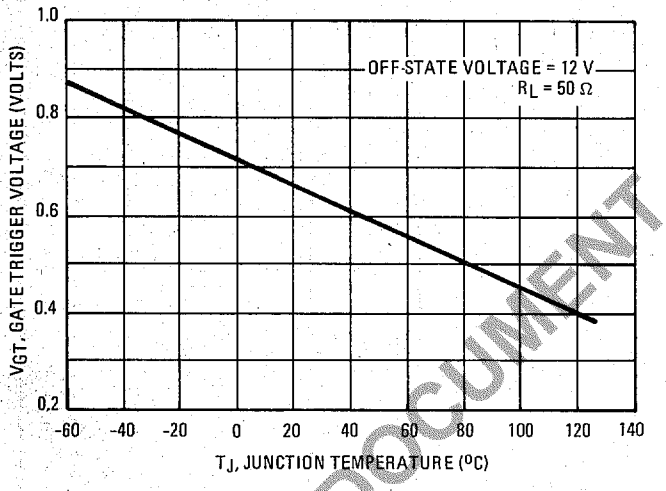
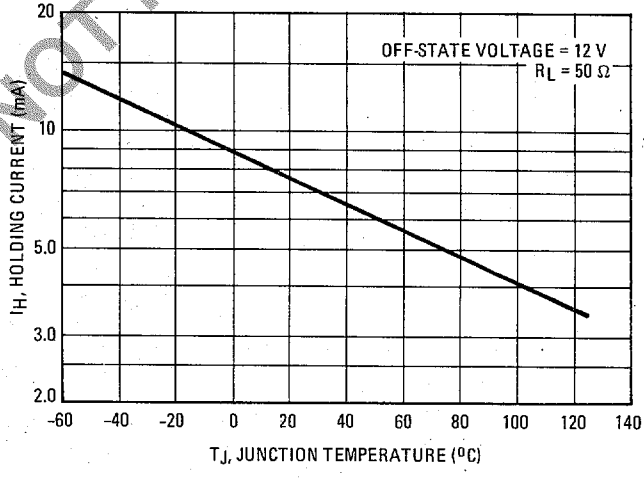


FIGURE 10 FIGURE 10 – HOLDING CURRENT



THYRISTER APPLICATION NOTES

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AN-240 SCR Power Control Fundamentals

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AN-482 Electronic Speed Control of Appliance Motors

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AN-527 Theory, Characteristics and Applications of the Programmable Unijunction Transistor

AN-568 A Fuse-Thyristor Coordinator Primer

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