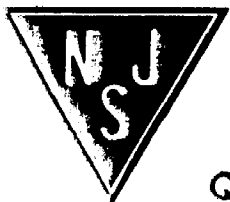
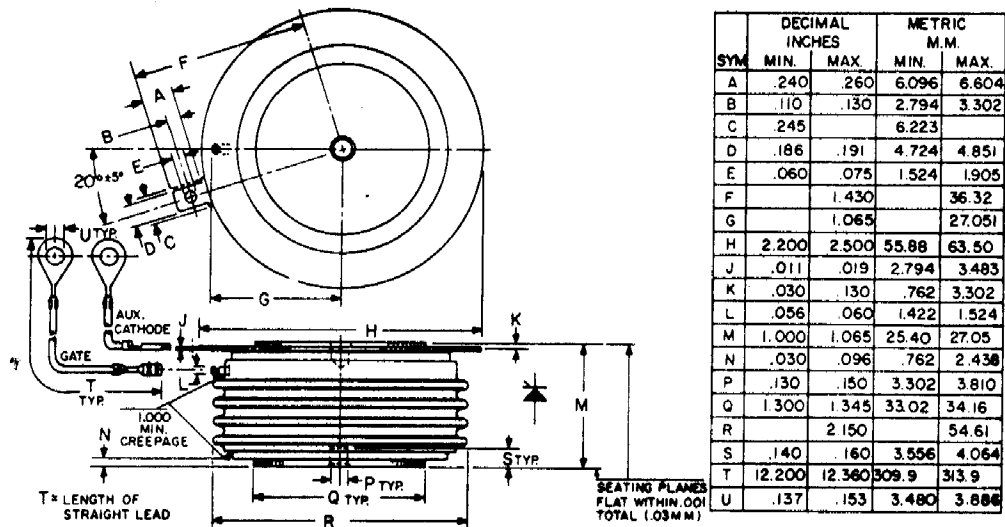


# SCR

## C387/C388

† I<sub>RMS</sub> (Max) for half sine wave current @ TC = 65°C, 60 Hz is 500 amperes.  
 † I<sub>RMS</sub> (Max) for rectangular wave current @ TC = 65°C, 60 Hz and 50% Duty Cycle at low di/dt (5A/μsec) is 481 amperes.

- Forward and reverse blocking capabilities to 1200 volts
- Very low switching losses at high frequencies
- 40 μsec. maximum turnoff time at severe operating conditions (C387)
- 30 μsec. maximum turnoff at severe operating conditions (C388)
- di/dt rating of 800 A/μsec.
- Soft firing gate
- 1" creepage-path, glazed-ceramic package



NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

Quality Semi-Conductors

# C387/C388

## MAXIMUM ALLOWABLE RATINGS

Types	Repetitive Peak Off-State Voltage, $V_{DRM}(1)$	Repetitive Peak Reverse Voltage, $V_{RRM}(1)$	Non-repetitive Peak Reverse Voltage, $V_{RSM}(1)$
	$T_C = -40^\circ\text{C to } +125^\circ\text{C}$	$T_C = -40^\circ\text{C to } +125^\circ\text{C}$	$T_C = +125^\circ\text{C}$
C387/C388E	500 Volts	500 Volts	600 Volts
C387/C388M	600	600	720
C387/C388S	700	700	840
C387/C388N	800	800	960
C387/C388T	900	900	1080
C387/C388P	1000	1000	1200
C387/C388PA	1100	1100	1300
C387/C388PB	1200	1200	1400

(1) Half sine wave voltage pulse, 10 millisecond maximum duration.

Average On-State Current, $I_{T(AV)}$ . . . . .	(See Charts)
Peak One Cycle Surge (non-rep) On-State Current, $I_{TSM}$ . . . . .	5500 Amperes
$I^2t$ (for fusing) for times $\geq 1.5$ milliseconds . . . . .	50,000 Ampere <sup>2</sup> seconds
$I^2t$ (for fusing) for times $\geq 8.3$ milliseconds . . . . .	120,000 Ampere <sup>2</sup> seconds
Critical Rate-of-Rise of On-State Current, $di/dt$ During Turn-On Interval . . . . .	800 Amperes per microsecond†
Long Term Repetitive $DI/DT$ (refer to fig. 17, note 4) . . . . .	500 A/ $\mu$ sec.*
Peak Gate Power Dissipation, $P_{GM}$ . . . (Pulse Width = 10 $\mu$ sec) . . . . .	400 Watts
Average Gate Power Dissipation, $P_{G(AV)}$ . . . . .	2 Watts
Peak Negative Gate Voltage, $V_{GM}$ . . . . .	20 Volts
Storage Temperature, $T_{STG}$ . . . . .	$-40^\circ\text{C to } +125^\circ\text{C}$
Operating Temperature, $T_J$ . . . . .	$-40^\circ\text{C to } +125^\circ\text{C}$
Mounting Force. . . . .	2000 lb. $\pm$ 200 lb.

†Required trigger source—20 volts, 20 ohms; maximum switching voltage — 1200 volts; short-circuit gate supply current risetime  $\sim 0.05\mu$  sec. (This short-circuit current may be measured with a TEKTRONICS current probe.).

$di/dt$  rating is established in accordance with EIA-NEMA Standard RS-397 Section 5.1.2.4. Immediately after each current pulse, off-state (blocking) voltage capability may be temporarily lost for durations less than the period of the applied pulse repetition rate. The pulse repetition rate for this test is 400 Hz. The duration of the  $di/dt$  test condition is 5.0 seconds (minimum).

\*This rating established by long term life test on similar devices.

## CHARACTERISTICS

TEST	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITION
Repetitive Peak Reverse and Off-State Current	$I_{RRM}$ and $I_{DRM}$	—	5	20	mA	$T_C = +25^\circ\text{C}$ $V_{DRM} = V_{RRM} =$ 500 Volts peak 600 Volts peak 700 Volts peak 800 Volts peak 900 Volts peak 1000 Volts peak 1100 Volts peak 1200 Volts peak
Repetitive Peak Reverse and Off-State Current	$I_{RRM}$ and $I_{DRM}$	—	20	45	mA	$T_C = 125^\circ\text{C}$ $V_{DRM} = V_{RRM} =$ 500 Volts peak 600 Volts peak 700 Volts peak 800 Volts peak 900 Volts peak 1000 Volts peak 1100 Volts peak 1200 Volts peak
C387/C388E		—	5	20		
C387/C388M		—	5	20		
C387/C388S		—	5	20		
C387/C388N		—	5	20		
C387/C388T		—	5	20		
C387/C388P		—	5	20		
C387/C388PA		—	5	20		
C387/C388PB		—	5	20		
C387/C388E		—	20	45		
C387/C388M		—	20	45		
C387/C388S		—	20	45		
C387/C388N		—	20	45		
C387/C388T		—	20	45		
C387/C388P		—	20	45		
C387/C388PA		—	20	45		
C387/C388PB		—	20	45		

### CHARACTERISTICS

TEST	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITION
Effective Thermal Resistance	$R\theta_{JC}$	—	.05	.06	°C/watt	Junction to case (DC) Double Side Cooled
Critical Exponential Rate of Rise of Forward Blocking Voltage (Higher values may cause device switching)	$dv/dt$	200 ★	500	—	V/ $\mu$ sec	VDRM, TC = +125°C, Gate open.
Holding Current	I <sub>H</sub>	—	20	500	mAdc	TC = +25°C, Anode supply = 24 Vdc, Initial forward current = 2 amps.
DC Gate Trigger Current	I <sub>GT</sub>	—	50 75 15	150 300 125	mAdc mAdc mAdc	TC = +25°C, V <sub>D</sub> = 6 Vdc, R <sub>L</sub> = 3 ohms, TC = -40°C, V <sub>D</sub> = 6 Vdc, R <sub>L</sub> = 3 ohms, TC = +125°C, V <sub>D</sub> = 6 Vdc, R <sub>L</sub> = 3 ohms.
DC Gate Trigger Voltage	V <sub>GT</sub>	—	3 1.25	5 3.0	Vdc Vdc Vdc	TC = -40°C to 0°C, V <sub>D</sub> = 6 Vdc, R <sub>L</sub> = 3 ohms, TC = 0°C to +125°C, V <sub>D</sub> = 6 Vdc, R <sub>L</sub> = 3 ohms, TC = 125°C, VDRM, R <sub>L</sub> = 1000 ohms.
Peak On-State Voltage	V <sub>TM</sub>	—	3.3	4.2	Volts	TC = +25°C, I <sub>TM</sub> = 3000 peak, Duty cycle $\leq$ .01%.
Turn-On Time (Delay Time + Rise Time)	t <sub>GT</sub>	—	2	—	$\mu$ sec	TC = +25°C, I <sub>T</sub> = 50 Adc, VDRM, Gate supply: 10 volt open circuit, 20 ohm, 1.0 $\mu$ sec max. rise time. †††
Delay Time	t <sub>d</sub>	—	0.5	2.0	$\mu$ sec	TC = +25°C, I <sub>T</sub> = 50 Adc, VDRM, Gate supply: 10 volt open circuit, 20 ohm, 0.1 $\mu$ sec max. rise time. ††,†††
Conventional Circuit Commutated Turn-Off-Time (with Reverse Voltage)	t <sub>q</sub>	—	—	—	—	(1) TC = +125°C, (2) I <sub>T</sub> = 500A, (3) V <sub>R</sub> = 50 volts min., (4) VDRM (reapplied), (5) Rate of rise of reapplied forward blocking voltage = 20 V/ $\mu$ sec (linear), (6) Commutation di/dt = 25 Amps/ $\mu$ sec. (7) Repetition rate = 1 pps. (8) Gate bias during turn-off interval = 0 volts, 100 ohms.
	C388	—	15	20	$\mu$ sec	
	C387	—	20	30	$\mu$ sec	
	C388	—	20	30	$\mu$ sec	
Conventional Circuit Commutated Turn-Off-Time (with Feedback Diode)	t <sub>q</sub> (diode)	—	—	—	—	(1) TC = +125°C, (2) I <sub>T</sub> = 500A, (3) V <sub>R</sub> = 1 volt (Forward drop of GE A396 rectifier diode at I <sub>T</sub> = 150A) (4) VDRM, (5) Rate of rise of reapplied forward blocking voltage = 200 V/ $\mu$ sec (linear), (6) Commutation di/dt = 25 Amps/ $\mu$ sec. (7) Repetition rate = 1 pps. (8) Gate bias during turn-off interval = 0 volts, 100 ohms.
	C388	—	30	—†	$\mu$ sec	
Pulse Circuit Commutated Turn-off-Time (with Reverse Voltage)	t <sub>q</sub> (pulse)	—	—	—	—	(1) TC = +125°C, VDRM (reapplied), (2) Rate of rise of reapplied forward blocking voltage = 200 V/ $\mu$ sec (linear), (3) Rep. rate = 400 Hz., (4) Gate supply = 20 volts, 80 ohms, 1.0 $\mu$ sec max. rise time, (5) I <sub>T</sub> = 500A peak, t <sub>p</sub> = 3 $\mu$ sec (half sine wave), (6) V <sub>R</sub> = 50 volts min.
	C388	—	20	—	$\mu$ sec	
Pulse Circuit Commutated Turn-Off-Time (with Feedback Diode)	t <sub>q</sub> (pulse) (diode)	—	—	—	—	(1) TC = +125°C, VDRM (reapplied), (2) Rate of rise of reapplied forward blocking voltage = 200 V/ $\mu$ sec (linear), (3) Rep. rate = 400 Hz., (4) Gate supply = 20 volts, 80 ohms, 1.0 $\mu$ sec max. rise time, (5) I <sub>T</sub> = 500A peak, t <sub>p</sub> = 3 $\mu$ sec (half sine wave), (6) V <sub>R</sub> = 1 volt (Forward drop of GE A396 rectifier diode at I <sub>T</sub> = 150A).
	C388	—	30	—†	$\mu$ sec	
	C387	—	40	—†	$\mu$ sec	

† Consult Factory for specified maximum Turn-Off Time.

†† Delay Time may increase significantly as the gate drive approaches the I<sub>GT</sub> of the Device Under Test (D.U.T.).

††† Current risetime as measured with a current probe, or voltage rise time across a non-inductive resistor.

\* Consult factory for higher dv/dt selections of 300, 400, or 500 volts/ $\mu$ sec.