



WESTCODE SEMICONDUCTORS

Technical
Publication
TN990C

Issue 2
August 1985

Converter Grade Capsule Thyristor Type N990C

2500 amperes average; up to 1600 volts V_{RRM}

Ratings (Maximum values at 125°C T_j unless stated otherwise)

RATING	CONDITIONS	SYMBOL	
Average on-state current	Half sine wave $\left\{ \begin{array}{l} 55^\circ\text{C heatsink temperature} \\ \text{(double side cooled)} \\ 85^\circ\text{C heatsink temperature} \\ \text{(single side cooled)} \end{array} \right.$	$I_{T(AV)}$	2500 A 990 A
R.M.S. on-state current	25°C heatsink temperature, double side cooled	$I_{T(RMS)}$	5000 A
Continuous on-state current	25°C heatsink temperature, double side cooled	I_T	4200 A
Peak one-cycle surge (non-repetitive) on state current	10ms duration, 60% V_{RRM} re-applied 10ms duration, $V_R \leq 10$ volts	$I_{TSM(1)}$ $I_{TSM(2)}$	37000 A 45000 A
Maximum permissible surge energy	10ms duration, $V_R \leq 10$ volts 3ms duration, $V_R \leq 10$ volts	$I^2t(2)$ I^2t	$10.1 \times 10^8 \text{ A}^2\text{s}$ $7.54 \times 10^8 \text{ A}^2\text{s}$
Peak forward gate current	Anode positive with respect to cathode	I_{FGM}	20 A
Peak forward gate voltage	Anode positive with respect to cathode	V_{FGM}	22 V
Peak reverse gate voltage		V_{RGM}	5 V
Average gate power		P_G	5 W
Peak gate power	100μs. pulse width	P_{GM}	120 W
Rate of rise of off-state voltage	To 80% V_{DRM} gate open-circuit	dv/dt	*200 V/μs
Rate of rise of on-state current (repetitive)	$\left\{ \begin{array}{l} \text{Gate drive 20 volts, 20 ohms with } t_r \leq 1\mu\text{s.} \\ \text{Anode voltage } \leq 80\% V_{DRM} \end{array} \right.$	$di/dt(1)$	150 A/μs
Rate of rise of on-state current (non-repetitive)		$di/dt(2)$	300 A/μs
Operating temperature range		T_{hs}	-40 + 125°C
Storage temperature range		T_{stg}	-40 + 150°C

Characteristics (Maximum values at 125°C T_j unless stated otherwise)

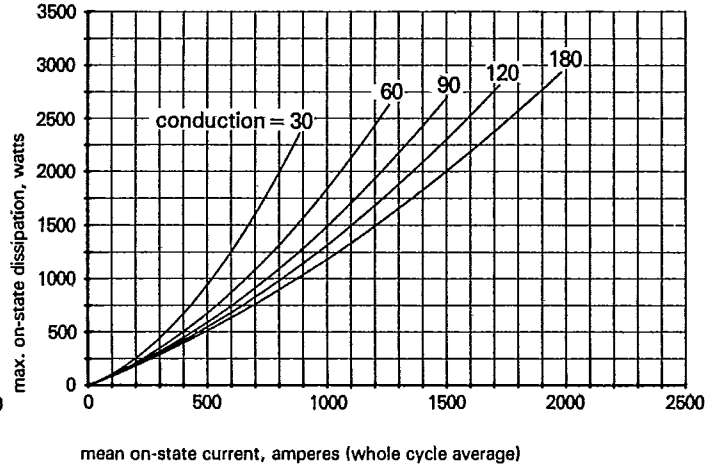
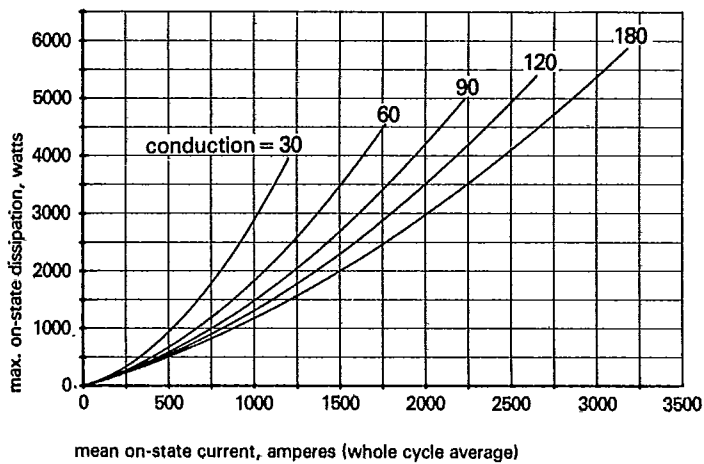
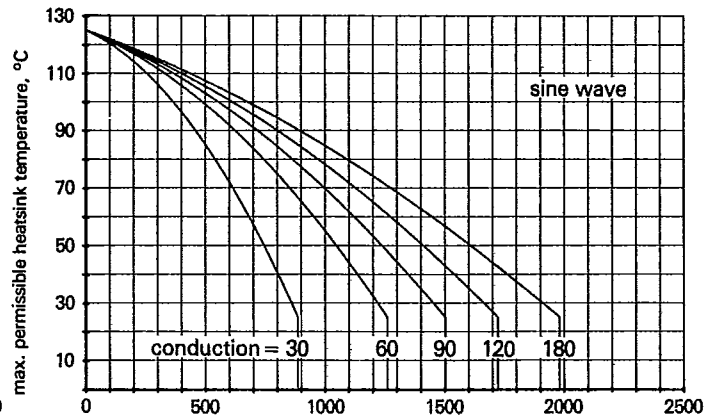
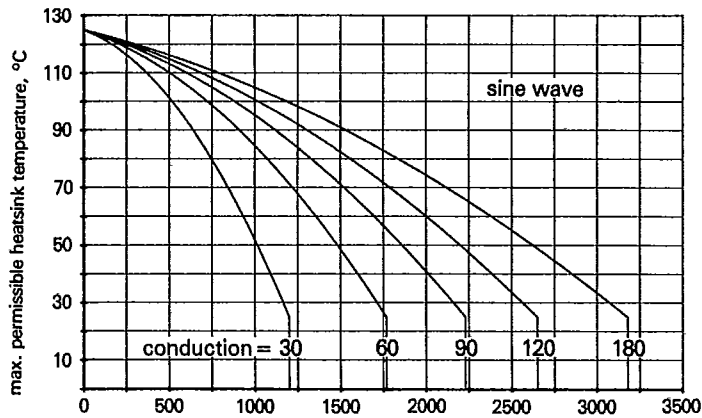
CHARACTERISTIC	CONDITIONS	SYMBOL	
Peak on-state voltage	At 3220 A, I_{TM}	V_{TM}	1.28 V
Forward conduction threshold voltage		V_O	0.88 V
Forward conduction slope resistance		r	0.124 mΩ
Repetitive peak off-state current	At V_{DRM}	I_{DRM}	100 mA
Repetitive peak reverse current	At V_{RRM}	I_{RRM}	100 mA
Maximum gate current required to fire all devices	$\left\{ \begin{array}{l} V_A = 6 \text{ V, } I_A = 2 \text{ A at } 25^\circ\text{C T}_j \end{array} \right.$	I_{GT}	300 mA
Maximum gate voltage required to fire all devices		V_{GT}	3 V
Maximum holding current		I_H	1 A
Maximum gate voltage which will not trigger any device		V_{GD}	0.25 V
Thermal resistance, junction to heatsink, for a device with a maximum forward volt drop characteristic	Double side cooled Single side cooled	$R_{th(j-hs)}$	0.017°C/W 0.034°C/W

VOLTAGE CODE		H02	H04	H06	H08	H10	H12	H14	H16	
Repetitive peak voltages	V_{RRM} V_{DSM}	200	400	600	800	1000	1200	1400	1600	
Non-repetitive peak off-state voltage										
Non-repetitive peak reverse blocking voltage	V_{RSM}	300	500	700	900	1100	1300	1500	1700	

Ordering Information (Please quote device code as explained below – 8 digits)

N 9 9 0 C	● ● ●	Typical code: N990CH16 = 1600 V_{RRM} 1600 V_{DRM} , 200 V/μs dv/dt to 80% V_{DRM}
	Voltage code (see ratings)	

* Other values of dv/dt may be available.



**Figure 1 Dissipation and heatsink temperature
v. current (Double side cooled)**

**Figure 2 Dissipation and heatsink temperature
v. current (Single side cooled)**

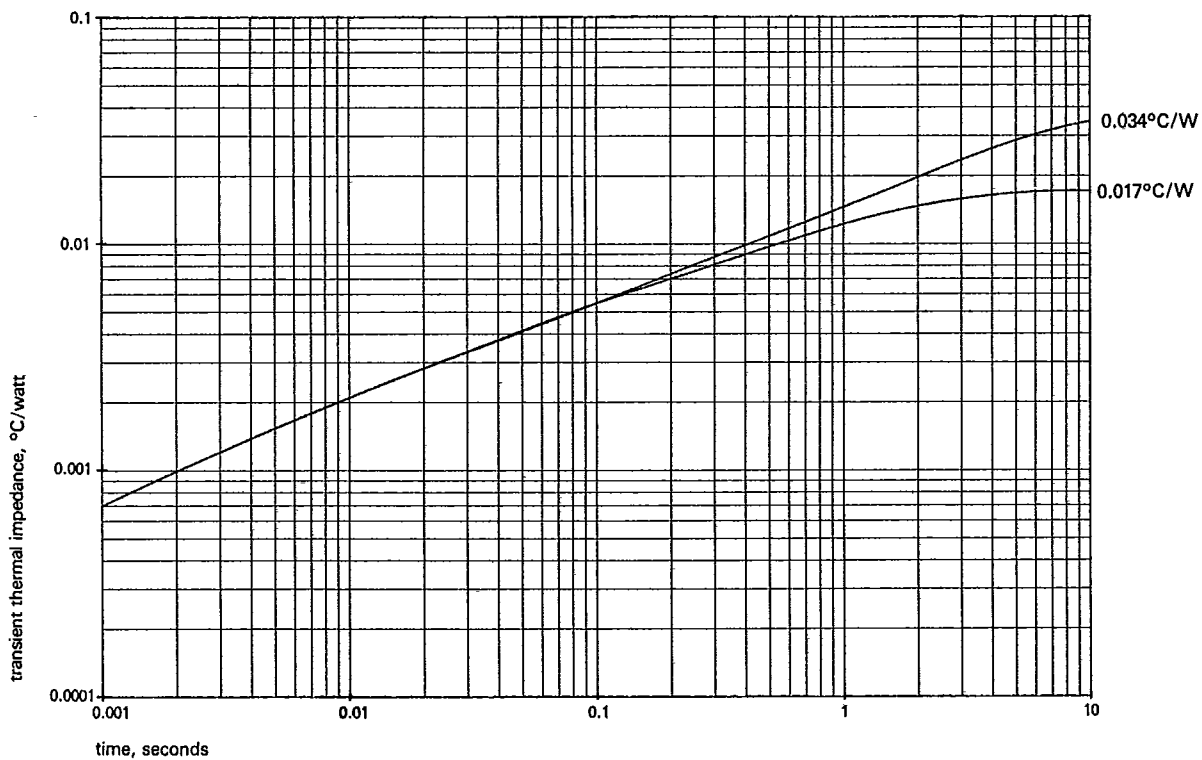


Figure 3 Junction to heatsink thermal impedance

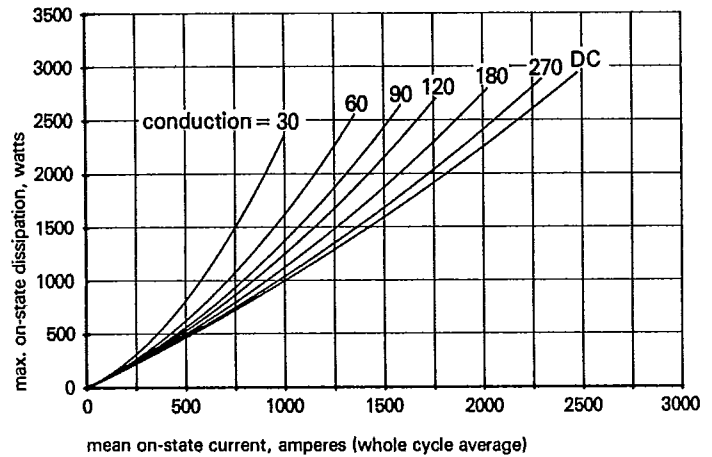
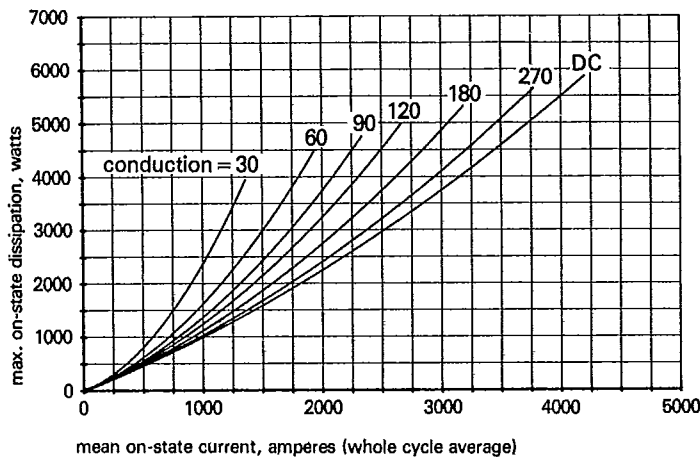
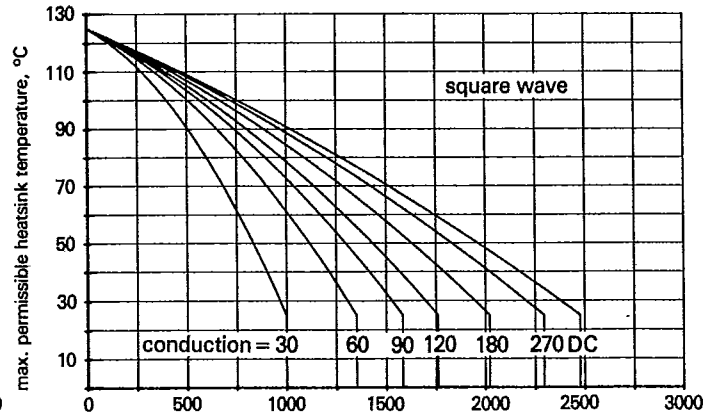
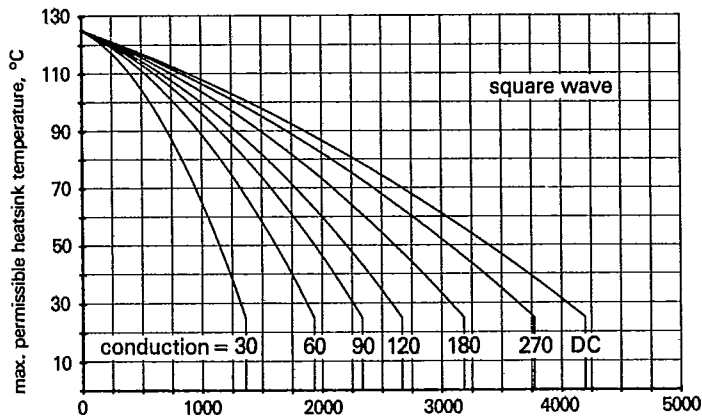


Figure 4 Dissipation and heatsink temperature v. current (Double side cooled)

Figure 5 Dissipation and heatsink temperature v. current (Single side cooled)

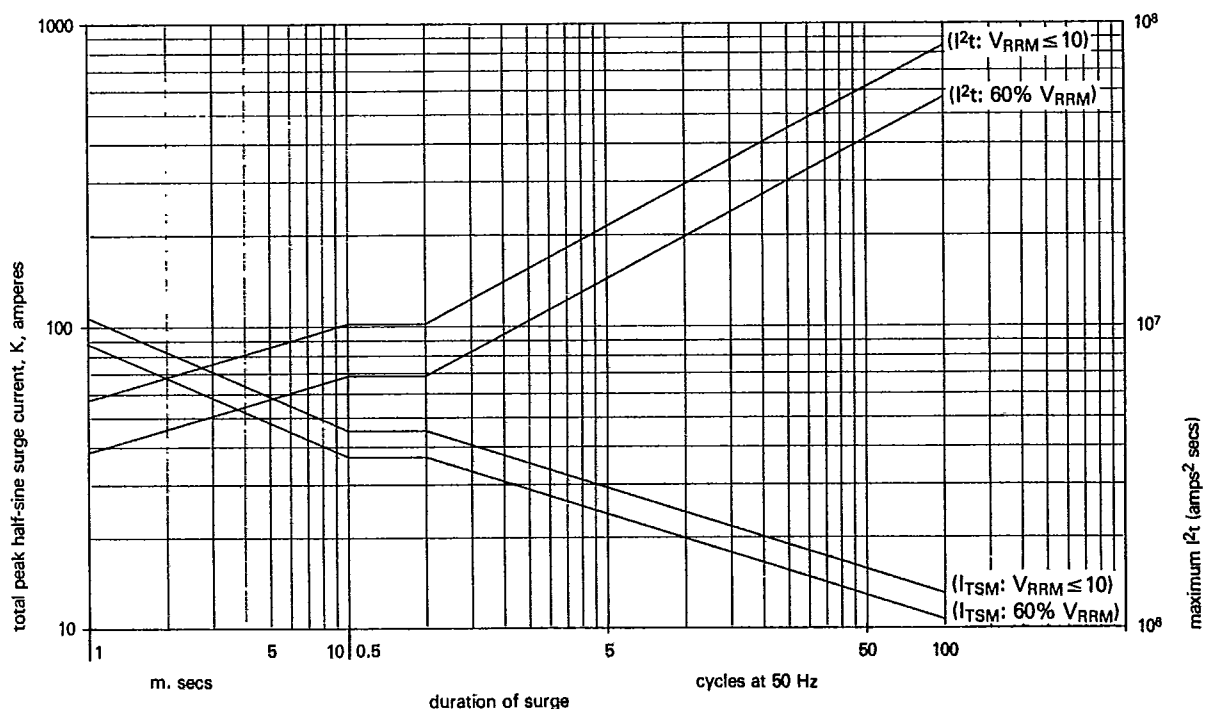


Figure 6 Max. non-repetitive surge current at initial junction temperature 125°C.
(gate may temporarily lose control of firing angle)
Note: This rating must not be interpreted as an intermittent rating

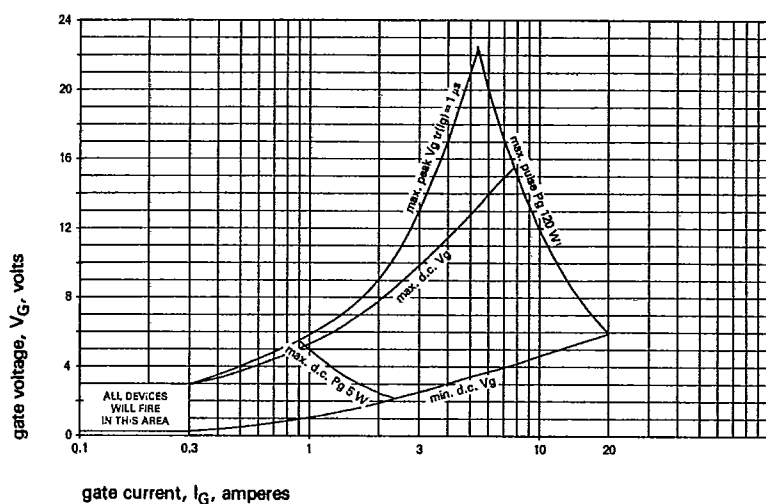


Figure 7 Gate characteristics at 25°C junction temperature

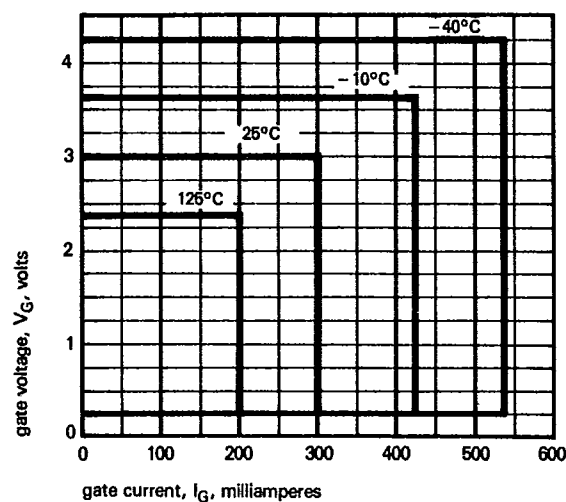


Figure 8 Gate triggering characteristics
Trigger points of all thyristors lie within the areas shown

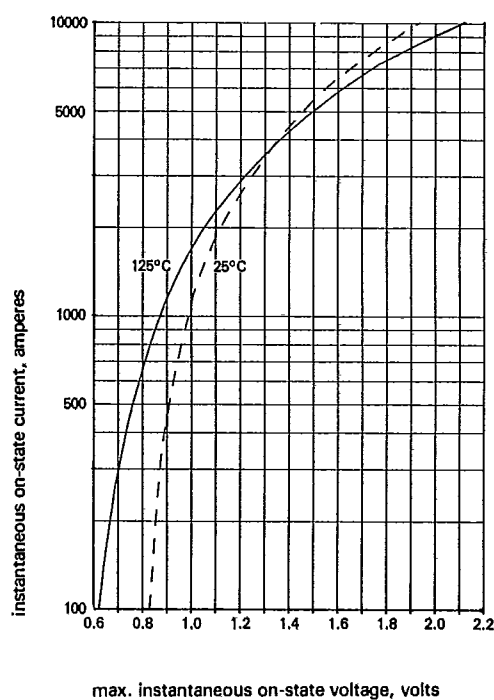
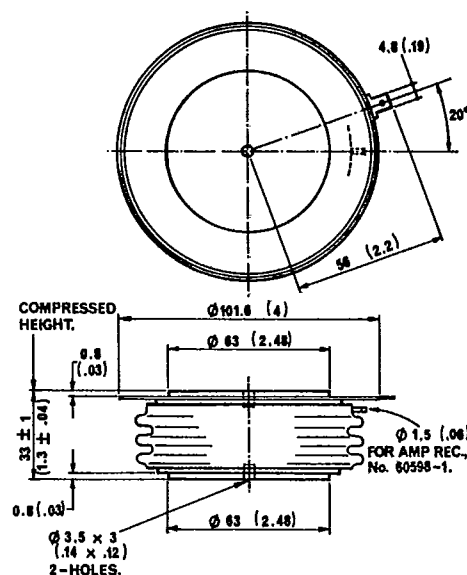


Figure 9 Limit on-state characteristic



Dimensions in mm (inches)
Mounting force: 2700–3400 Kg
Weight: 1000 grams

In the interest of product improvement, Westcode reserves the right to change specifications at any time without notice.

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