

Phase Control Thyristors ~ Capsule types

Type	V_{DRM} V_{RRM} Range (Note 5) (V)	$I_{T(AV)}$ @ T_{ns} 55°C (A)	$I_{T(RMS)}$ @ T_{ns} 55°C (A)	I_T @ T_{ns} 55°C (A)	$I_{TSM(1)}$ 10ms $V_R \leq 60\%$ V_{RRM} (Note 1) (A)	$I_{TSM(2)}$ 10ms $V_R \leq 10V$ (Note 1) (A)	$I^2t_{(2)}$ (Note 1) (A ² s)	di/dt Non- Rep/Rep (Note 4) (A / μ s)	I_{GT}/V_{GT} @ 25°C (mA) (V)
N086CHx	200-1500	195	390	320	1700	1950	19 x 10 ³	1000/500	150/3
N105CHx	200-1500	256	500	440	2450	2695	36.3 x 10 ³	1000/500	150/3
N170CHx	200-1500	340	674	575	4200	4620	107 x 10 ³	1000/500	150/3
N195CHx	200-1500	390	780	668	4650	5120	131 x 10 ³	1000/500	150/3
N275CHx	200-800	490	986	818	6000	6600	218 x 10 ³	1000/500	150/3
N282CHx	2000-2200	607	1202	1029	7100	7810	305 x 10 ³	600/300	200/3
N281CHx	1200-1800	680	1350	1140	7500	8300	345 x 10 ³	1000/500	150/3
N280CHx	200-1600	735	1470	1230	8400	9270	430 x 10 ³	1000/500	150/3
N283CHx	200-1600	752	1500	1320	9280	10205	521 x 10 ³	1000/500	150/3
N310CHx	200-500	990	2000	1650	11000	12100	732 x 10 ³	1000/500	150/3
N200CHx Δ	4500-6500	485	970	880	4000†	4400†	96.8 x 10 ³ †	100/50*	300/4
N255CHx	3600-4500	590	1150	1040	5250	5780	167 x 10 ³	300/150	300/3
N257CHx Δ	2600-4200	610	1180	1075	7000	7700	0.296 x 10 ⁶	300/150	300/3
N260CHx	200-3600	620	1260	1135	5700	6270	196 x 10 ³	400/200	300/3
N330CHx	1600-2600	910	1790	1570	9200	10100	510 x 10 ³	500/300	300/3
N350CHx	200-1800	1045	2075	1760	11500	12650	800 x 10 ³	1000/500	300/3
N370CHx	200-1800	1130	2260	1890	12700	14000	975 x 10 ³	1000/500	300/3
N520CHx	200-1500	1265	2515	2130	15000	16000	1.28 x 10 ⁶	1000/500	300/3
N320CHx	3600-4500	880	1725	1535	7700	8470	359 x 10 ³	300/150	300/3
N360CHx	2200-3800	1010	1975	1750	12100	13300	884 x 10 ³	400/200	300/3
N390CHx	2200-3600	1130	2220	1945	14300	15700	1.23 x 10 ⁶	400/200	300/3
N450CHx	1400-2600	1300	2560	2220	17600	19400	1.88 x 10 ⁶	500/300	300/3
N490CHx	200-2600	1470	2915	2485	21500	23600	2.78 x 10 ⁶	1000/500	300/3
N510CHx	200-2000	1550	3065	2630	23280	25600	3.28 x 10 ⁶	1000/500	300/3
N540CHx	200-1800	1715	3435	2850	27200	29900	4.47 x 10 ⁶	1000/500	300/3
N600CHx	200-1500	1800	3600	3030	29600	32500	5.28 x 10 ⁶	1000/500	300/3
N610CHx	200-1000	2090	4210	3440	35000	38000	7.22 x 10 ⁶	1000/500	300/3
N410CHx	4200-6500	630	1270	1150	6650†	7300†	0.266 x 10 ⁶ †	100/50*	300/4
N500CHx	3000-4200	1160	2270	2014	14500	16100	1.30 x 10 ⁶	300/150	300/3
N570CHx	2600-3600	1315	2580	2280	16630	18290	1.67 x 10 ⁶	300/150	300/3
N620CHx	2000-3000	1467	2880	2534	21000	23000	2.65 x 10 ⁶	400/200	300/3
N680CHx Δ	1200-2000	1665	3305	2825	24600	27000	3.65 x 10 ⁶	100/50*	300/3
N740CHx	1400-1600	2045	4145	3340	29200	32200	5.18 x 10 ⁶	300/150	300/3
N560CHx	3600-4500	1350	2645	2350	17500	20000	2.00 x 10 ⁶	300/150	300/3
N630CHx	2600-3600	1663	3261	2875	23000	25000	3.13 x 10 ⁶	300/150	300/3
N640CHx	2000-3000	1715	3370	2950	24500	30000	4.50 x 10 ⁶	300/150	300/3
N760CHx	200-2200 ^b	2290	4575	3850	33800	40000	8.00 x 10 ⁶	300/150	300/3
N990CHx	200-1600	2500	5000	4200	37000	45000	10.1 x 10 ⁶	300/150	300/3
N635CHx Δ	4500-6500	1555	3110	2825	20000†	22000†	2.42 x 10 ⁶ †	100/50*	350/4
N750CHx	2600-4500	2175	4290	3700	28000	33500	5.61 x 10 ⁶	300/150	350/4
N850CHx	3000-3600	2420	4880	4160	30000	36000	6.48 x 10 ⁶	300/150	300/3
N880CHx	2000-3000	2550	4930	4515	32000	39000	7.61 x 10 ⁶	300/150	300/3
N900CHx	2000-2600	3015	5925	5190	45100	49700	12.40 x 10 ⁶	300/150	300/3
N980CHx	200-2200 ^b	3000	5900	5200	45600	55000	15.1 x 10 ⁶	300/150	300/3
N1400CHx	200-2000	3545	7060	5930	50000	60000	18.0 x 10 ⁶	300/150	300/3
N1600CHx	200-1200	4090	8165	6840	64000	70000	24.5 x 10 ⁶	300/150	300/3
N1200CHx	3600-4200	2835	5590	4850	35500	39000	7.60 x 10 ⁶	100/50*	300/3
N1300CHx	2000-3200	3170	6285	5380	38600	42500	9.03 x 10 ⁶	200/100	300/3
N1550CHx	2000-3200	3760	7433	6400	49500	54500	14.85 x 10 ⁶	200/100	300/3

Δ New Product

ϕ Denotes up-rating

* To I_{TM} of 2 x $I_{T(AV)}$ in accordance with IEC 747-6

I _{ORM} I _{RRM} @ 125°C (mA)	I _H @ 25°C (mA)	R _{th j-hs}		V _o r @ T _j 125°C (Note 2)		V _{TM} at I _{TM} @ T _j 125 °C (V) (A)		Wt (typ.) (g)	Mounting Force (kgf)	Fig. No.	Type
		d.c. 180° sine (K/W)	120° Rect. (K/W)	(V)	(mΩ)						
20	600	0.135	0.190	1.57	2.29	2.66/475	70	330-550	1		N086C
20	600	0.135	0.190	0.90	1.79	1.75/475	70	330-550	1		N105C
20	600	0.095	0.110	1.08	1.30	2.08/770	70	330-550	1		N170C
20	600	0.095	0.110	0.92	0.99	1.68/770	70	330-550	1		N195C
20	400	0.095	0.110	0.85	0.535	1.26/770	70	330-550	1		N275C
40	500	0.050	0.058	1.14	0.781	2.35/1550	90	530-1000	2		N282C
40	500	0.050	0.058	1.09	0.587	2.00/1550	90	530-1000	2		N281C
40	500	0.050	0.058	1.03	0.483	1.78/1550	90	530-1000	2		N280C
40	500	0.050	0.058	0.92	0.45	1.62/1550	90	530-1000	2		N283C
40	500	0.050	0.058	0.82	0.24	1.19/1550	90	530-1000	2		N310C
60†	1000	0.032	0.0397	1.35†	2.10†	2.40/500†	340	1000-2000	3		N200C
60	1000	0.0342	0.042	1.22	1.53	2.90/1100	340	1000-2000	3		N255C
100	1000	0.0342	0.042	1.10	1.50	2.80/1100	340	1000-2000	3		N257C
60	1000	0.0342	0.042	1.21	1.36	2.71/1100	340	1000-2000	3		N260C
60	1000	0.0342	0.042	1.04	0.61	2.07/1700	340	1000-2000	3		N330C
60	1000	0.032	0.0397	1.08	0.40	1.75/1700	340	1000-2000	3		N350C
60	1000	0.032	0.0397	1.06	0.31	1.59/1700	340	1000-2000	3		N370C
60	1000	0.032	0.0397	0.90	0.265	1.35/1700	340	1000-2000	3		N520C
100	1000	0.024	0.0291	1.30	0.92	2.77/1600	510	1900-2600	4		N320C
100	1000	0.024	0.0291	1.17	0.687	2.43/1830	510	1900-2600	4		N360C
100	1000	0.024	0.0291	1.15	0.51	2.08/1830	510	1900-2600	4		N390C
100	1000	0.024	0.0291	1.03	0.38	2.00/2550	510	1900-2600	4		N450C
100	1000	0.024	0.0291	1.00	0.27	1.69/2550	510	1900-2600	4		N490C
100	1000	0.024	0.0291	0.92	0.252	1.56/2550	510	1900-2600	4		N510C
100	1000	0.024	0.0291	0.965	0.174	1.41/2550	510	1900-2600	4		N540C
100	1000	0.024	0.0291	0.855	0.171	1.29/2550	510	1900-2600	4		N600C
100	1000	0.024	0.0291	0.84	0.108	1.12/2550	510	1900-2600	4		N610C
150†	1000	0.024	0.0291	1.38†	1.64†	3.02/1000†	510	1900-2600	4		N410C
100	1000	0.022	0.027	1.10	0.574	2.15/1830	510	1900-2600	4		N500C
100	1000	0.022	0.027	1.00	0.437	2.11/2550	510	1900-2600	4		N570C
100	1000	0.022	0.027	0.92	0.345	1.80/2550	510	1900-2600	4		N620C
100	1000	0.022	0.027	0.95	0.233	1.54/2550	510	1900-2600	4		N680C
100	1000	0.022	0.027	0.98	0.114	1.27/2550	510	1900-2600	4		N740C
150	1000	0.017	0.020	1.20	0.553	3.00/3220	1000	2700-3400	5		N560C
150	1000	0.017	0.020	1.04	0.35	2.17/3220	1000	2700-3400	5		N630C
150	1000	0.017	0.020	1.05	0.32	2.08/3220	1000	2700-3400	5		N640C
150	1000	0.017	0.020	0.956	0.148	1.43/3220	1000	2700-3400	5		N760C
150	1000	0.017	0.020	0.88	0.124	1.28/3220	1000	2700-3400	5		N990C
200	1000	0.011	0.012	1.20	0.60	1.80/1000	1700	2700-4700	6		N635C
200	1000	0.011	0.012	1.35	0.294	2.23/3000	1700	2700-4700	6		N750C
200	1000	0.011	0.012	1.16	0.246	1.90/3000	1700	2700-4700	6		N850C
200	1000	0.011	0.012	0.78	0.274	1.60/3000	1700	2700-4700	6		N880C
200	1000	0.011	0.012	0.92	0.16	1.40/3000	1700	2700-4700	6		N900C
200	1000	0.011	0.012	0.88	0.164	1.37/3000	1700	2700-4700	6		N980C
200	1000	0.011	0.012	0.97	0.095	1.25/3000	1700	2700-4700	6		N1400C
200	1000	0.011	0.012	0.85	0.070	1.06/3000	1700	2700-4700	6		N1600C
300	1000	0.0095	0.010	1.20	0.20	2.40/6000	1300	6300-7700	7		N1200C
300	1000	0.0095	0.010	1.15	0.15	2.05/6000	1300	6300-7700	7		N1300C
300	1000	0.0095	0.010	0.94	0.11	1.27/3000	1300	6300-7700	7		N1550C

† @ T_j 115°C V_R ≤ 45% of V_{RRM}

Phase Control Thyristors ~ Notes

Ordering

The required voltage rating may be defined by substituting the appropriate voltage code number (see table 1) into the type number in place of the "x" symbol, see type list. When phase control thyristors are supplied with critical dv/dt other than 200V/μsec an additional code (see table 2) is appended to the type number.

Examples

N018RH12 : 1200 volt device with standard 200V/μsec critical dv/dt

N105PH12H00 : 1200 volt device with 400V/μsec critical dv/dt

Notes

- (1) $I_{TSM}(8.3ms) = I_{TSM}(10ms) \times 1.066$
 $I^2t(8.3ms) = I^2t(10ms) \times 0.943$
 @ initial temperature T_j 125°C
- (2) V_o Threshold voltage } for conduction loss
 r Slope resistance } and heatsink
 calculations
 (T_j = 125°C)
- (3) These outlines available with the following compressed heights :
 Outline 5 27.0 / 25.5
 Ordering code NxxxFHxx
 e.g. N560FH30
 Outline 6 25.0 / 27.00
 Ordering code NxxxDHxx
 e.g. N980DH12
- (4) di/dt ratings refer to the sum of snubber discharge and load currents.
- (5) A blocking voltage derating factor of 0.13% per deg. Celsius is applicable for T_j below 25 deg. C.
- (6) Outlines 1 and 2 - Leaded types available, code changes from RH to PH. Lead length 146mm.
 (base of hexagon to centre of lug hole)

Table 1. Voltage Code

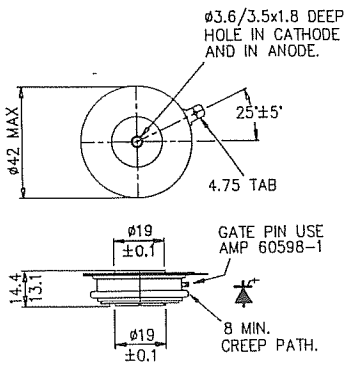
Voltage Code Number	V _{DRM} and V _{RRM}	V _{RSM}	V _{DSM}
02	200	300	200
04	400	500	400
06	600	700	600
08	800	900	800
10	1000	1100	1000
12	1200	1300	1200
14	1400	1500	1400
15	1500	1600	1500
16	1600	1700	1600
18	1800	1900	1800
20	2000	2100	2000
22	2200	2300	2200
24	2400	2500	2400
26	2600	2700	2600
28	2800	2900	2800
30	3000	3100	3000
32	3200	3300	3200
34	3400	3500	3400
36	3600	3700	3600
38	3800	3900	3800
40	4000	4100	4000
42	4200	4300	4200
44	4400	4500	4400
45	4500	4600	4500
50	5000	5100	5000
55	5500	5600	5500
60	6000	6100	6000
65	6500	6600	6500

Table 2. Critical off-state dv/dt Code
 Linear to 80% V_{DRM}

dv/dt (V/μsec)	Code
200	NO CODE
300	GOO
400	HOO
500	JOO
750	KOO
1000	LOO

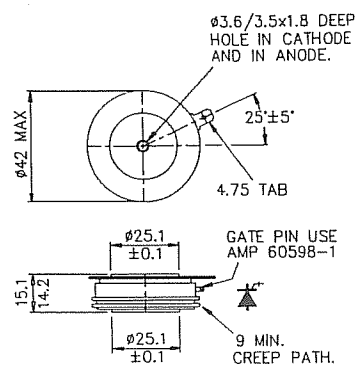
Phase Control Thyristors ~ Outlines

1



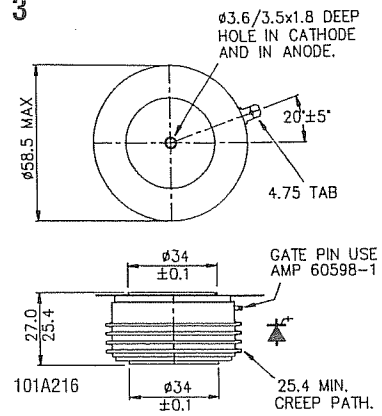
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2



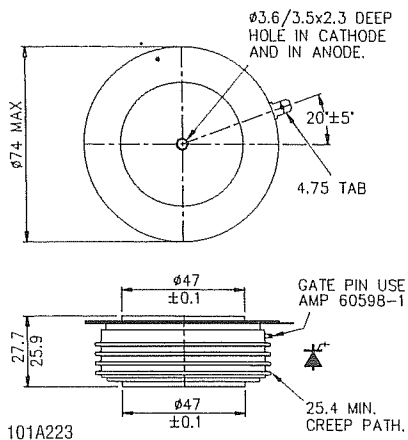
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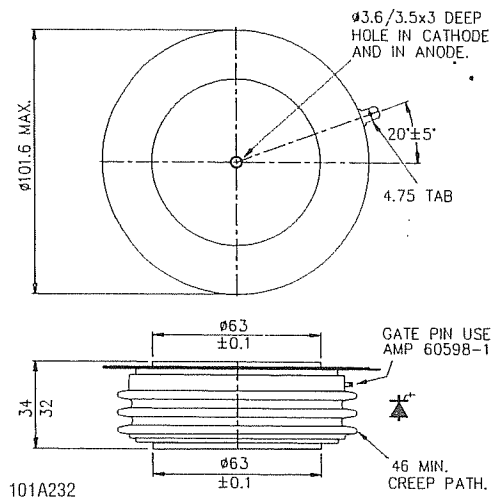
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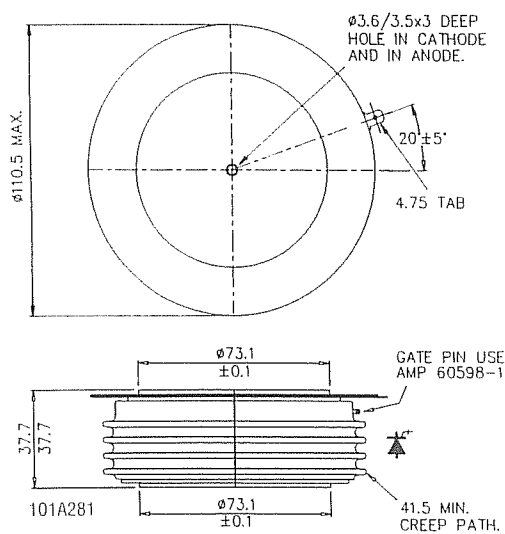
101A223

5



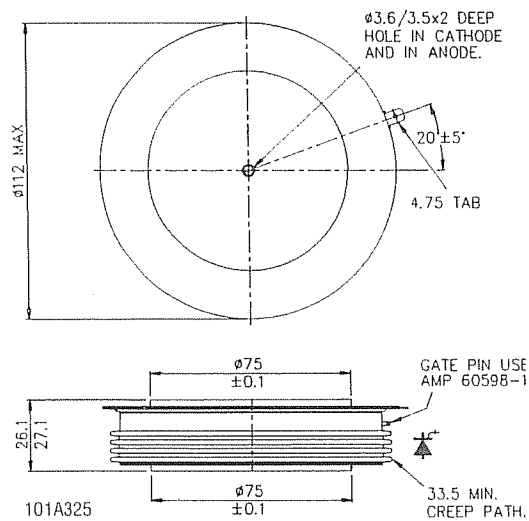
101A232

6



101A281

7



101A325

Mounting Procedures

It is important to observe the correct mounting procedures when using Power Semiconductors to ensure effective cooling, good current conduction and reliability. Heatsink preparation is a vital part of the procedure .

(1) ALUMINIUM HEATSINKS^(a) for CAPSULE and FLAT BASE devices:–

Apply a small amount of mounting grease^(b) to the heatsink. Scrub the heatsink area with a wire brush (a 25mm rotary wire cup brush is ideally suited); this action produces a 'slurry'. Clean the mounting surface, or surfaces, in the case of double cooling. Apply a thin film of mounting grease to the semiconductor, and clamp in position observing the clamping procedures below. Warning: a small amount of grease of approximately 0.1mm diameter should be squeezed out of the device/heatsink joint. Excessive use of grease will cause a high voltdrop across the joint and affect heat transfer.

(2) STUD BASE devices:–

Ensure that the device contact surface is clean (a scouring pad, such as 'Scotchbrite', will remove dirt effectively) then apply a thin film of mounting grease to the device ensuring that the threads are clean and free of mounting grease.

Assembly procedures are important:

(1) CAPSULE devices:–

Using 'bar' clamps, either double side or single side, it is important to ensure that all faces are parallel before tightening. The screws should be 'finger' tightened initially, then, using a suitable spanner (wrench) the nuts should be alternately tightened half a turn until the pressure indicating system shows that the required pressure has been achieved.

Using a 'box' clamp, position it over the device ensuring that the pins are correctly located. Position the square steel plate over the central rod, feed bolts (with shakeproof washer) through the clamp whilst holding it firmly in place. Screw the bolts 'finger tight', then alternately, clockwise, half a turn until the box touches the heatsink all the way round.

(2) FLAT (SQUARE) BASE devices:–

Apply mounting grease as for capsules. Ensure that no mounting grease or lubrication is on the fixing screws, then 'finger' tighten them, followed by a torque controlled spanner (wrench) to 1.66 - 2.07 Kgm torque.

(3) STUD BASE devices:–

Ensure that no mounting grease is on the screw thread. Tighten only the hexagonal base using a torque controlled spanner (wrench) to the limit stated for the device.

WESTCODE offer a range of mounting clamps for capsule devices:

<u>Pole Face dia.</u>	<u>Basic Clamp</u>	<u>Type of Clamp</u>
19mm	CMK 450B19M	Box Clamp
25mm	CMK 450x56M	Bar/single/double
25mm	CMK 450B25M	Box Clamp
29.5mm (GTO only)	CMK 550x56M	Bar/single/double
34mm	CMK 1130x76M	Bar/single/double
34mm	CMK 1500B34M	Box Clamp
47mm (GTO only)	CMK 2100x76M	Bar/single/double
47mm	CMK 2140x76M	Bar/single/double
63mm (GTO only)	CMK 2500x116M	Bar/single/double
63mm	CMK 3000x116M	Bar/single/double
75mm (GTO only)	CMK 3500x116M	Bar/single/double
73mm	CMK 4000x116M	Bar/single/double
87mm (GTO only)	CMK 5000x128M	Bar/single/double
87mm	CMK 7000x128M	Bar/single/double

NOTES :

- (a) Recommended machining tolerances over the device mounting area – Flatness 0.03mm, Roughness 1.6µ metres Ra
- (b) Recommended mounting grease – ILEX SCX 13 or PENETROX A-13