Fast Turn-off Thyristors ~ Capsule types

Type	V_{DRM} V_{RRM} Range (Note 3) (V)	Turn-off Time Tq at 200V/µs (Tables 3,4) (µs)	I_{TAV} T_{hs} 55°C (A)	$I_{T(RMS)}$ @ 25°C (A)	I_T @ 25°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) 10ms (Note 1) (A^2s)	Qra 50% Chord 125°C Typ (Table 4) (µC)	di/dt Non-Rep/ Rep (A/µs)	I_{DRM} I_{RRM} (mA)
P080CH	200-1400	25-40 (2)	175	350	290	1500	1650	13.6×10^3	25 (2)	1000/500	20
P086CH	200-1200	25-40 (2)	190	385	315	1700	1950	19.0×10^3	20 (2)	1000/500	20
P095CH	200-1200	25-40 (2)	215	428	356	1850	2035	20.7×10^3	20 (2)	1000/500	20
P100CH	200-800	12-30 (2)	215	440	336	1800	1980	19.6×10^3	20 (2)	1000/500	20
P105CH	200-800	12-30 (2)	240	490	395	2200	2420	29.3×10^3	20 (2)	1000/500	20
P140CH	200-500	10-15 (2)	354	720	568	3280	3610	65.1×10^3	20 (2)	1000/500	30
P200CH	200-1200	25-40 (3)	295	600	480	2700	2970	44.1×10^3	25 (3)	1000/500	30
P202CH	200-1200	25-40 (3)	330	670	525	3250	3575	63.9×10^3	30 (3)	1000/500	30
P205CH	200-1200	30-40 (3)	370	740	610	3600	3960	78.4×10^3	45 (3)	1000/500	30
P214CH	200-800	15-30 (3)	370	755	590	4700	5170	134×10^3	20 (3)	1000/500	30
P215CH	200-800	10-30 (3)	390	780	650	5000	5500	151×10^3	30 (3)	1000/500	30
P270CH	200-500	10-25 (3)	516	1050	835	6500	7150	256×10^3	70 (3)	1000/500	30
P280CH	200-500	10-25 (4)	850	1720	1385	8750	9625	463×10^3	80 (4)	1000/500	50
P300CH	200-1200	20-35 (5)	745	1535	1180	9500	10450	546×10^3	120 (5)	1000/500	75
P370CH	200-800	12-30 (5)	840	1710	1350	12300	13500	910×10^3	90 (5)	1000/500	75
P440CHΔ	2600-3600	400-500 (14)	1150	2320	1920	15000	16000	1.3×10^6	1800 (14)	500/250	100
P480CH	2000-3200	200-300 (14)	1183	2343	2010	10646	11710	686×10^3	1400 (14)	600/300	100
P855CHΔ	2600-4400	400-500 (14)	1935	3770	3390	25000	27500	3.78×10^6	4000 (14)	1000/500	150
P880CH	2600-4200	400-500 (10)	1995*	3885*	3490*	18200	20000	2.0×10^6	2625 (10)	1500/1000	150

Δ New Product

* Denotes up-rating

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

I_{GT}/ V_{GT}	I_H	V_{TM} at I_{TM} (Tj 125°C)		V_0 (Tj 125°C) (Note 2)	r	Rth j-hs d.c. & 180° sine	120° Rect.	Weight (typical)	Mounting Force	Fig. No.	Type
(mA) (V)	(mA)	(V)	(A)	(V)	(mΩ)	(K/W)	(K/W)	(g)	(kgf)		
200/3	600	2.99/430		1.70	3.00	0.135	0.19	70	330-550	1	**P080C**
200/3	600	2.62/430		1.64	2.29	0.135	0.19	70	330-550	1	**P086C**
200/3	600	2.23/430		1.35	2.04	0.135	0.19	70	330-550	1	**P095C**
200/3	600	2.32/430		1.79	1.23	0.135	0.19	70	330-550	1	**P100C**
200/3	600	1.92/430		1.32	1.39	0.135	0.19	70	330-550	1	**P105C**
200/3	600	1.27/430		0.95	0.747	0.135	0.19	70	330-550	1	**P140C**
200/3	600	2.48/715		1.60	1.23	0.095	0.11	70	330-550	1	**P200C**
200/3	600	2.17/715		1.55	0.87	0.095	0.11	70	330-550	1	**P202C**
200/3	600	1.83/715		1.17	0.92	0.095	0.11	70	330-550	1	**P205C**
200/3	600	1.88/715		1.40	0.67	0.095	0.11	70	330-550	1	**P214C**
200/3	600	1.68/715		1.05	0.88	0.095	0.11	70	330-550	1	**P215C**
200/3	600	1.39/1160		0.95	0.377	0.095	0.11	70	330-550	1	**P270C**
200/3	600	1.47/1490		1.04	0.29	0.05	0.065	80	530-1000	2	**P280C**
300/3	1000	1.90/1500		1.43	0.31	0.047	0.06	340	1000-2000	3	**P300C**
300/3	1000	1.68/1700		1.20	0.28	0.047	0.06	340	1000-2000	3	**P370C**
300/3	1000	2.20/2000		1.45	0.375	0.024	0.029	510	1900-2600	4	**P440C**
300/3	1000	2.10/2000		1.21	0.43	0.024	0.029	510	1900-2600	4	**P480C**
300/3	1000	2.51/3000		1.20	0.437	0.011	0.012	1700	2700-4700	5	**P855C**
300/3	1000	2.40/3000		1.18	0.408	0.011	0.012	1700	2700-4700	5	**P880C**

Fast Turn-off Thyristors ~ Notes

Westcode "P" series of fast-switching thyristors have regenerative gate structure to ensure low switching losses and high di/dt performance. Low reverse recovery charge values combined with the low forward switching losses make the "P" series particularly attractive in applications such as Inverters, D.C. Chopper Drives, Uninterruptable Power Supplies, etc.

Ordering

The full type number identifies voltage rating, dv/dt and turn-off time and an example would be:-

P027RH	08	F	J	O
(1)	(2)	(3)	(4)	(5)

(1) Type number selected from table
(2) Voltage grade code from table 1
(3) dv/dt code from table 2
(4) Turn-off time code from table 3
(5) O (spare position)

Example is a P027R series device with 800 Volt repetitive forward and reverse rating and a turn-off time of 25µsec with 200V/µsec commutating dv/dt.

Table 1. Voltage Code

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
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
38	3800	3900	3800
40	4000	4100	4000
42	4200	4300	4200

Table 2. Re-applied dv/dt Code

dv/dt (V/µsec)	Code
20	C
50	D
100	E
200	F

Table 3. Turn-off Time Code

Tq (µsec)	Code	Tq (µsec)	Code	Tq (µsec)	Code	Tq (µsec)	Code
10	N	40	2K	100	D	250	5F
12	M	50	F	120	4H	280	8G
15	L	55	Y	140	4G	300	3D
20	K	60	2H	160	8K	400	4D
25	J	65	W	180	6H	500	5D
30	H	70	2G	200	2D		
35	G	75	E	240	8H		

Turn-off times shown in the table are measured at 125°C with re-applied dv/dt of 200V/µsec linear, and 50 volts reverse. Current pulse and di/dt are shown for recovered charge measurements in Table 4.

Other combinations of dv/dt and turn-off time giving shorter or longer turn-off times can be supplied subject to discussion with Westcode Sales Department.

Table 4. Turn-off Time and Recovered Charge Conditions

Note*	I_{TM}	di/dt	V_{RM}
1	50	10	50
2	200	10	50
3	300	20	50
4	550	40	50
5	800	50	50
10	1000	60	50
14	1000	10	50

* Refers to test method

Notes

(1) I_{TSM} (8.3msec) = I_{TSM} (10msec) x 1.066
I^2t (8.3msec) = I^2t (10msec) x 0.943

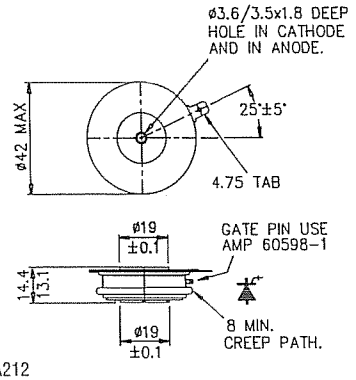
(2) V_o Threshold voltage
r Slope resistance
} for conduction loss and heatsink calculations. (Tj = 125°C)

(3) A blocking voltage derating factor of 0.13% per deg. C. is applicable for Tj below 25 deg. C.

(4) Outline 1 - Leaded type available, code changes from RH to PH.
Lead length 146mm.
(base of hexagon to centre of lug hole)

Fast Turn-off Thyristors ~ Outlines

1



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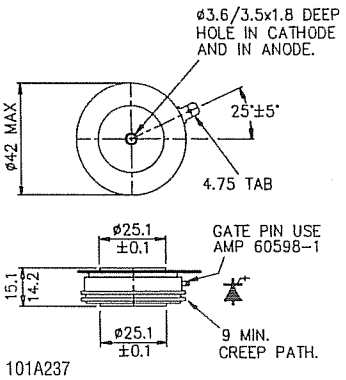
2



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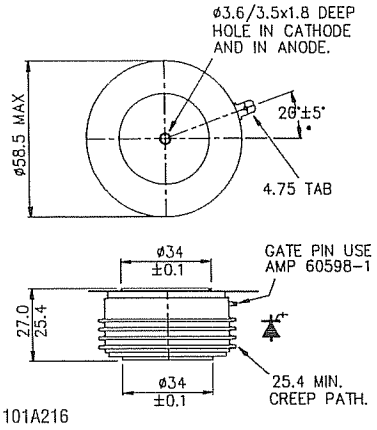
3



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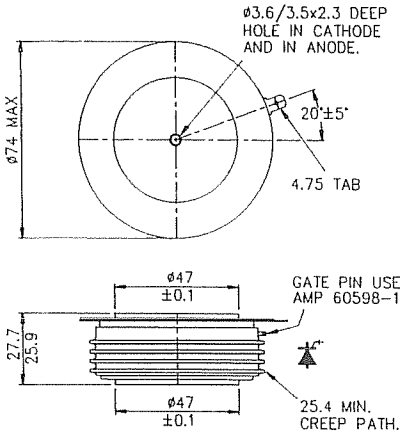

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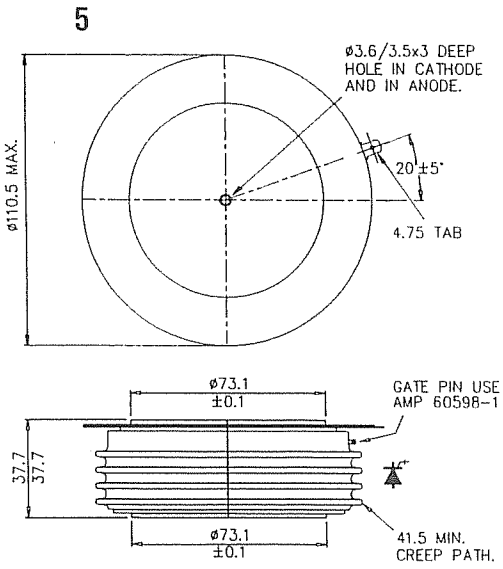
5



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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:

Pole Face dia.	Basic Clamp	Type of Clamp
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