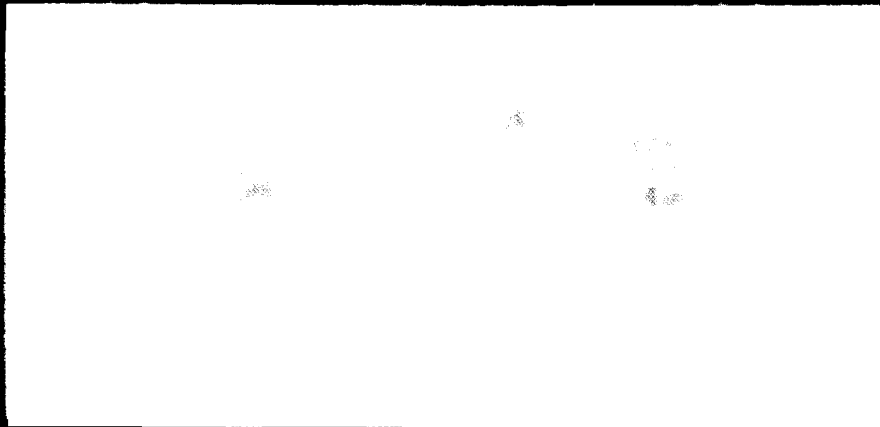


**WESTINGHOUSE
SEMICONDUCTORS**

Fast Turn-Off Thyristors



Shortform Design Guide



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: -

PO27RH	08	F	J	O
(1)	(2)	(3)	(4)	(5)

- (1) Type number selected from table opposite
- (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 PO27R 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	V _{DRM} and V _{RRM}	V _{RSM}
02	200	300
04	400	500
05	500	600
06	600	700
08	800	900
10	1000	1100
12	1200	1300
14	1400	1500

Table 2 dv/dt Code

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

Table 3 Turn-off Time Code

T _q (µsec)	Code
10	N
12	M
15	L
20	K
25	J
30	H
35	G
40	2K

Turn-off times and recovered charges shown in the table are measured at 125°C with reapplied dv/dt of 200V/µsec linear to 80% V_{DRM}. Current pulse and di/dt are as shown 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 Offices.

Table 4 Turn-off Time and Recovered Charge Conditions

Note	I _{TM}	di/dt	V _{RM}
1	50	5	50
2	200	10	50
3	300	20	50
4	550	40	50
5	800	50	50

Note 6

$$\left. \begin{aligned} I_{TSM}(8.3\text{msec}) &= I_{TSM}(10\text{msec}) \times 1.066 \\ I^2t(8.3\text{msec}) &= I^2t(10\text{msec}) \times 0.943 \end{aligned} \right\} \text{ at } T_j \text{ Max.}$$

Note 7

$$\left. \begin{aligned} V_o & \text{ Threshold voltage} \\ r & \text{ Slope resistance} \end{aligned} \right\} \text{ for conduction loss and } \left. \begin{aligned} & \text{ heatsink calculations} \end{aligned} \right\} \text{ at } T_j \text{ Max.}$$

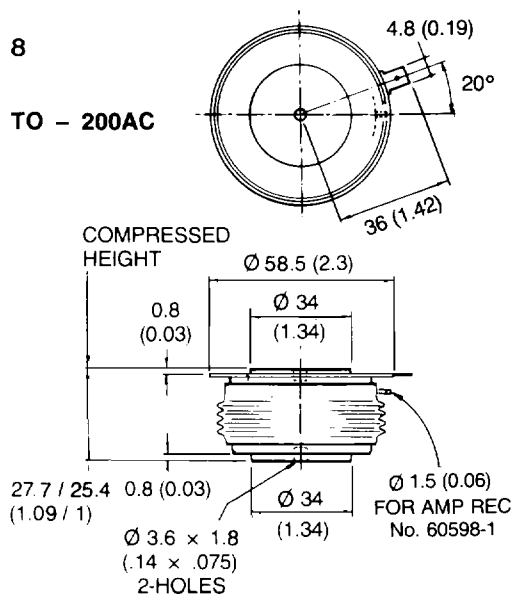
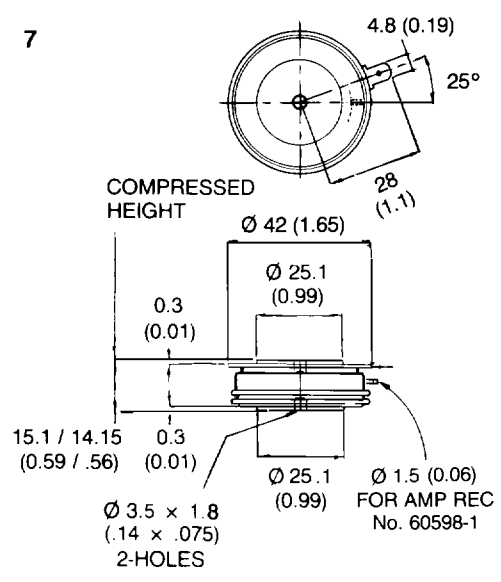
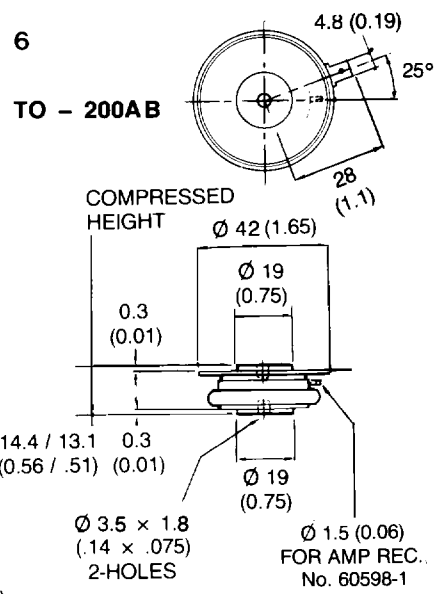
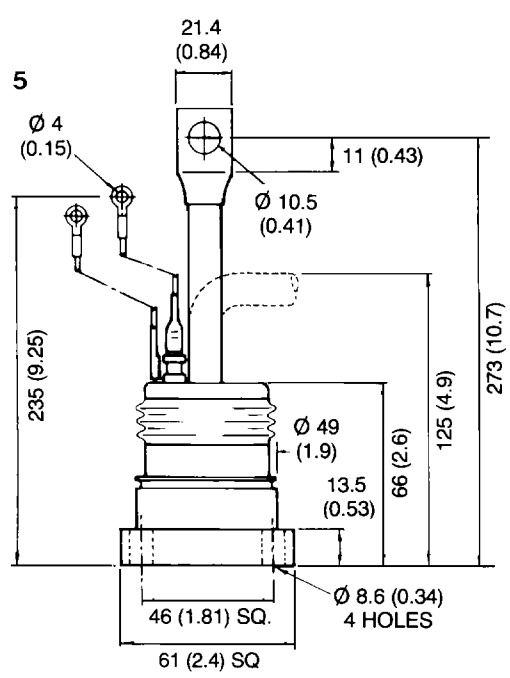
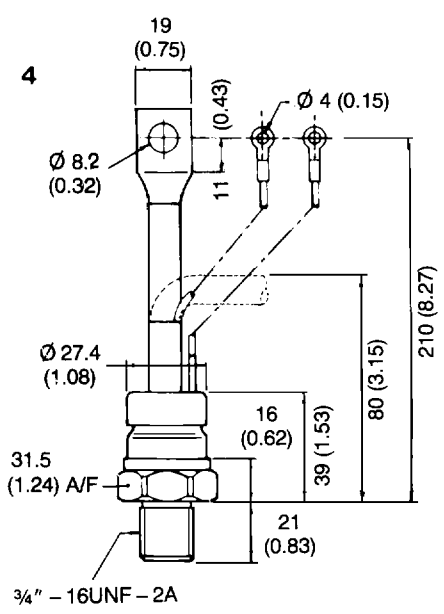
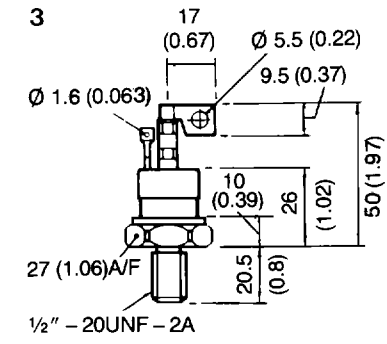
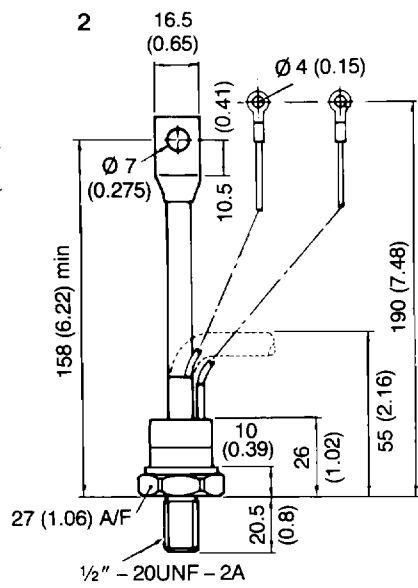
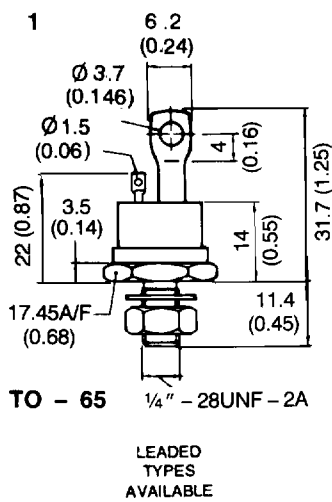
Stud & Flat Base Thyristors

Type	V _{ORM} V _{RRM} Range	Turn-off Time t _q at 200V/μs (Tables 3, 4)	I _{AV} Case 85°C	I _{TRMS}	I _T	I _{TSM} (1) I _{TSM} (2) V _R ≤ 60% V _R ≤ 10V V _{ORM} (Note 6)	I ² t(2) 10ms (Note 6)	Q _{rr} 50% Chord 125°C Type (Table 4)	dI/dt Non-Rep /Rep	I _{DRM} I _{FRM}	I _{G1} /V _{G1}	I _{FGM}	V _{FGM}	P _G	P _{SM}	I _H	V _{TM} at I _{TM} (T _J 125°C)	V _O (Note 7) (T _J 125°C)	r _F (mΩ)	R _{th(j-c)} dc & 180° Rect	R _{th(c-hb)} (°C/W)	Weight (gm)	Mounting Torque Kgm of Force	Fig	Type		
	(V)	(μs)	(A)	(A)	(A)	(A)	(A)	(A ² s)	(μs)	(A/μs)	(mA)	(mA/V)	(A)	(V)	(W)	(W)	(mA)	(V)	(mV)	(°C/W)	(°C/W)	(°C/W)	(gm)	(Kg)			
P027RH	200-600	10-25 (1)	34	100	100	350	400	610	10 (1)	400/200	10	100/3	5	25	1	20	400	2.57/105	1.52	10	0.5	0.63	0.1	33	0.41-0.48	1	P027R
	200-1000	20-25 (1)																									
	200-1200	30-35 (1)																									
P036RH	200-800	10-25 (1)	40	100	100	600	690	2390	10 (1)	400/200	10	100/3	5	25	1	20	400	2.29/126	1.50	6.3	0.45	0.52	0.1	33	0.41-0.48	1	P036R
	200-1000	20-35 (1)																									
	200-1200	35 (1)																									
P042RH	200-600	20-25 (1)	50	100	100	750	860	3725	10 (1)	400/200	10	100/3	5	25	1	20	400	2.03/157	1.23	5.1	0.45	0.52	0.1	33	0.41-0.48	1	P042R
	200-1400	25-40 (2)																									
	200-1200	25-40 (2)																									
P066RH	200-1200	25-40 (2)	85	175	175	1700	1950	19 × 10 ³	20 (2)	1000/500	20	200/3	14	20	1.5	60	600	2.28/280	1.64	2.29	0.23	0.28	0.08	130	1.45	2	P066R
	200-1200	25-40 (2)																									
	200-1200	25-40 (2)																									
P086RH	200-1200	25-40 (2)	85	175	175	1850	2035	20.7 × 10 ³	20 (2)	1000/500	20	200/3	14	20	1.5	60	600	1.92/290	1.35	2.04	0.23	0.28	0.08	130	1.45	2	P086R
	200-1200	25-40 (2)																									
	200-1200	25-40 (2)																									
P100PH	200-800	12-30 (2)	85	175	175	1800	1980	19.6 × 10 ³	20 (2)	1000/500	20	200/3	14	20	1.5	60	600	2.13/280	1.79	1.23	0.23	0.28	0.08	130	1.45	2	P100P
	200-800	12-30 (2)																									
	200-800	12-30 (2)																									
P105PH	200-800	12-30 (2)	105	175	175	2200	2420	29.3 × 10 ³	20 (2)	1000/500	20	200/3	14	20	1.5	60	600	1.71/280	1.32	1.39	0.23	0.28	0.08	130	1.45	2	P105P
	200-800	12-30 (2)																									
	200-800	12-30 (2)																									
P105RH	200-1200	25-40 (3)	160	355	355	2700	2970	44.1 × 10 ³	25 (3)	1000/500	30	200/3	18	12	1.5	60	600	2.34/600	1.60	1.23	0.12	0.14	0.04	280	2.5-2.77	4	P200P
	200-1200	25-40 (3)																									
	200-1200	25-40 (3)																									
P202PH	200-1200	30-40 (3)	175	355	355	3250	3575	63.9 × 10 ³	30 (3)	1000/500	30	200/3	18	12	1.5	60	600	2.07/600	1.55	0.87	0.12	0.14	0.04	280	2.5-2.77	4	P202P
	200-1200	30-40 (3)																									
	200-1200	30-40 (3)																									
P205PH	200-800	15-30 (3)	195	355	355	3600	3960	78.4 × 10 ³	45 (3)	1000/500	30	200/3	18	12	1.5	60	600	1.72/600	1.17	0.92	0.12	0.14	0.04	280	2.5-2.77	4	P205P
	200-800	15-30 (3)																									
	200-800	15-30 (3)																									
P214PH	200-800	10-30 (3)	220	355	355	5000	5500	151 × 10 ³	30 (3)	1000/500	30	200/3	18	12	1.5	60	600	1.80/600	1.40	0.67	0.12	0.14	0.04	280	2.5-2.77	4	P214P
	200-800	10-30 (3)																									
	200-800	10-30 (3)																									
P215PH	200-500	10-25 (3)	226+	355	355	6500	7150	256 × 10 ³	70 (3)	1000/500	30	200/3	18	12	1.5	60	600	1.18/600	0.95	0.377	0.12	0.14	0.04	280	2.5-2.77	4	P215P
	200-1200	20-35 (5)	300+	550	550	9500	10450	546 × 10 ³	120 (5)	1000/500	75	300/3	20	23	4.0	120	1000	1.72/950	1.43	0.31	0.08+	0.09+	-	1000	1.65-2.07	5	P270P
	200-800	12-25 (5)	350+	550	550	12300	13500	910 × 10 ³	90 (5)	1000/500	75	300/3	20	23	4.0	120	1000	1.51/1100	1.20	0.28	0.08+	0.09+	-	1000	1.65-2.07	5	P300K
P300KH	200-800	12-25 (5)																									
	200-800	12-25 (5)																									
	200-800	12-25 (5)																									

*T_{sink} 85°C
+T_{case} 95°C

Capsule Thyristors

Type	V _{ORM} V _{RRM} Range	Turn-off Time t _q at 200V/μs (Tables 3, 4)	I _{AV} Case 85°C	I _{TRMS}	I _T	I _{TSM} (1) I _{TSM} (2) V _R ≤ 60% V _R ≤ 10V V _{ORM} (Note 6)	I ² t(2) 10ms (Note 6)	Q _{rr} 50% Chord 125°C Type (Table 4)	dI/dt Non-Rep /Rep	I _{DRM} I _{FRM}	I _{G1} /V _{G1}	I _{FGM}	V _{FGM}	P _G	P _{SM}	I _H	V _{TM} at I _{TM} (T _J 125°C)	V _O (Note 7) (T _J 125°C)	r _F (mΩ)	R _{th(j-c)} dc & 180° Rect	R _{th(c-hb)} (°C/W)	Weight (gm)	Mounting Torque Kgm of Force	Fig	Type		
	(V)	(μs)	(A)	(A)	(A)	(A)	(A)	(A ² s)	(μs)	(A/μs)	(mA)	(mA/V)	(A)	(V)	(W)	(W)	(mA)	(V)	(mV)	(°C/W)	(°C/W)	(°C/W)	(gm)	(Kg)			
P080CH	200-1400	25-40 (2)	175*	350	290	1500	1650	13.6 × 10 ³	25 (2)	1000/500	20	200/3	14	20	1.5	60	600	2.99/430	1.70	3.00	0.135*	0.19*	-	70	330-550	6	P070C
	200-1200	25-40 (2)	190*	385	315	1700	1960	19.0 × 10 ³	20 (2)	1000/500	20	200/3	14	20	1.5	60	600	2.62/430	1.64	2.29	0.135*	0.19*	-	70	330-550	6	P086C
	200-1200	25-40 (2)	215*	428	356	1850	2035	20.7 × 10 ³	20 (2)	1000/500	20	200/3	14	20	1.5	60	600	2.23/430	1.35	2.04	0.135*	0.19*	-	70	330-550	6	P095C
P100CH	200-800	12-30 (2)	215*	440	336	1800	1980	19.6 × 10 ³	20 (2)	1000/500	20	200/3	14	20	1.5	60	600	2.32/430	1.79	1.23	0.135*	0.19*	-	70	330-550	6	P100C
	200-800	12-30 (2)																									
	200-800	12-30 (2)																									
P105CH	200-800	12-30 (2)	240*	490	395	2200	2420	29.3 × 10 ³	20 (2)	1000/500	20	200/3	14	20	1.5	60	600	1.92/430	1.32	1.39	0.135*	0.19*	-	70	330-550	6	P105C
	200-500	10-15 (2)	354*	720	568	3280	3610	65.1 × 10 ³	20 (2)	1000/500	30	200/3	14	12	1.5	60	600	1.23/430	1.00	0.535	0.135*	0.19*	-	70	330-550	6	P140C
	200-1200	25-40 (3)	295*	600	480	2700	2970	44.1 × 10 ³	25 (3)	1000/500	30	200/3	18	12	1.5	60	600	2.48/715	1.60	1.23	0.095*	0.11*	-	70	330-550	6	P200C
P200CH	200-1200	30-40 (3)	390*	670	525	3250	3575	63.9 × 10 ³																			



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