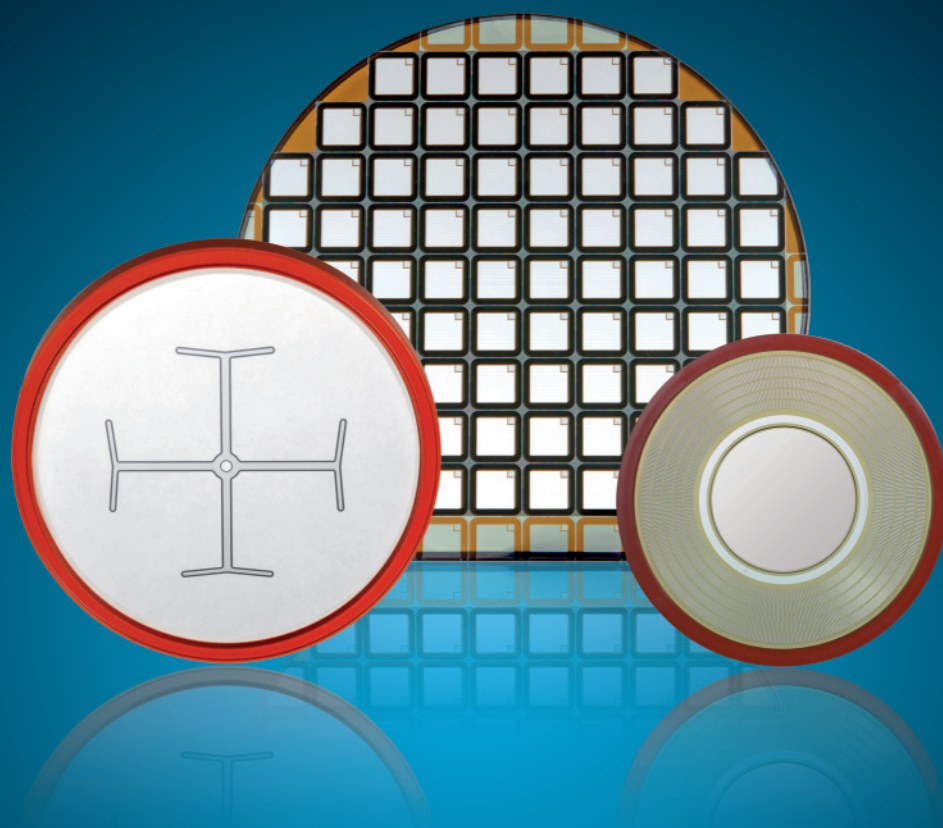
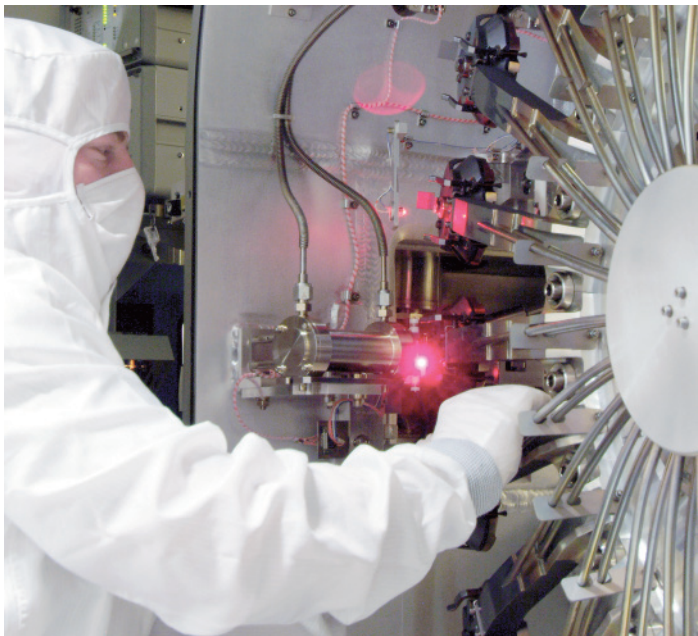




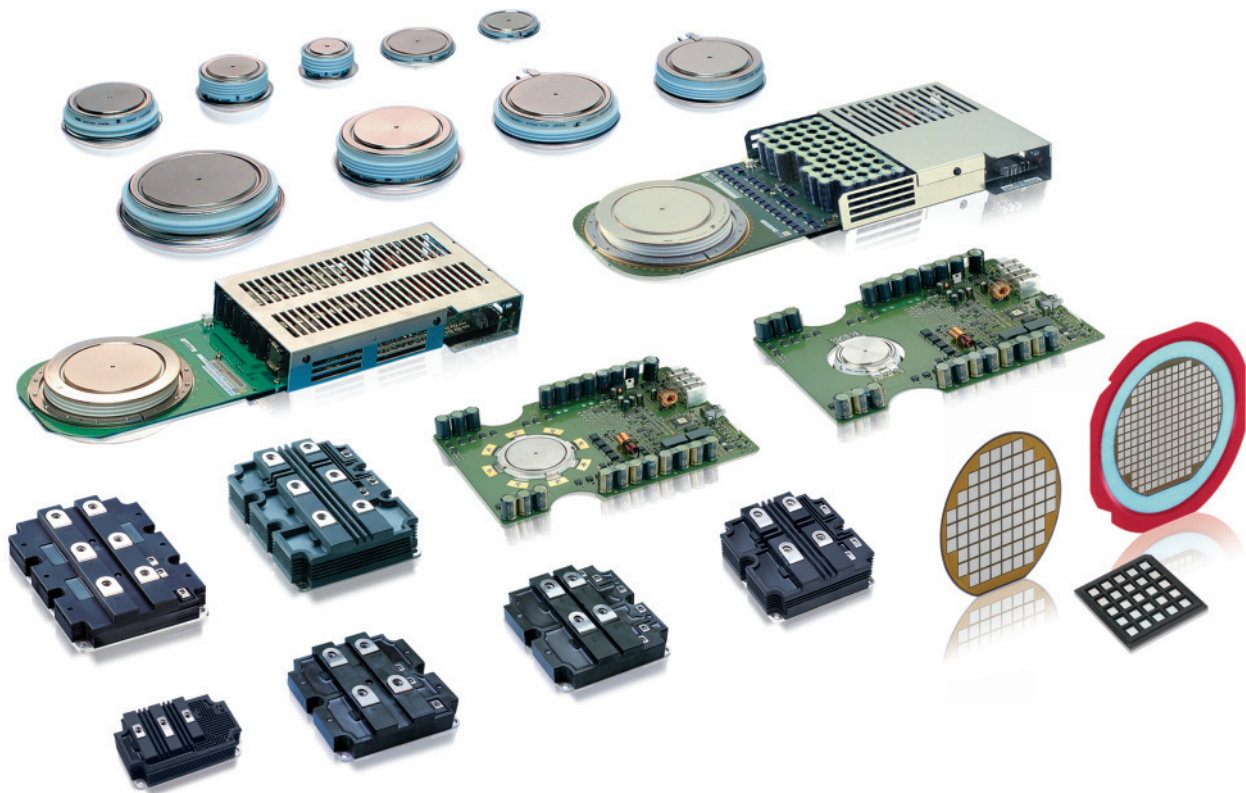
High Power Semiconductors Short Form Catalogue 2010

Short Form Catalogue

2010 Edition

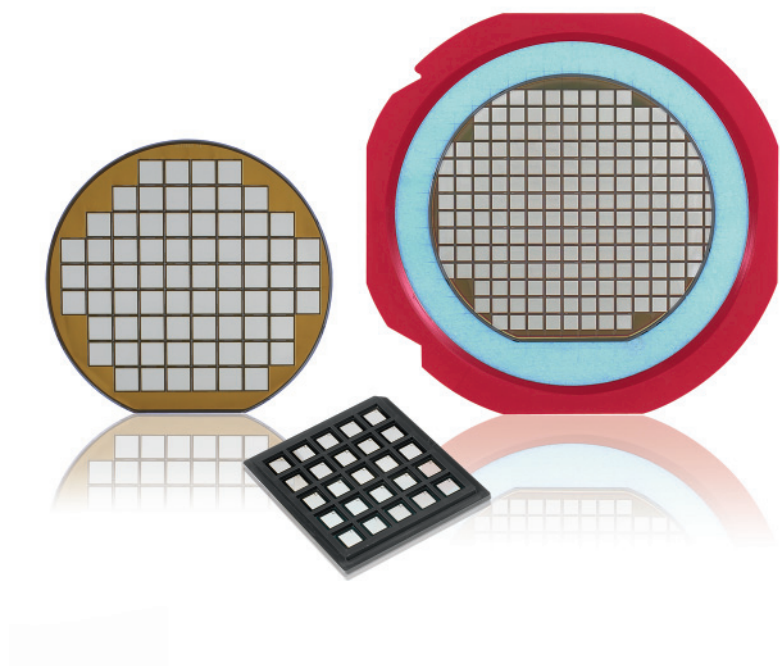


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Diode Dies



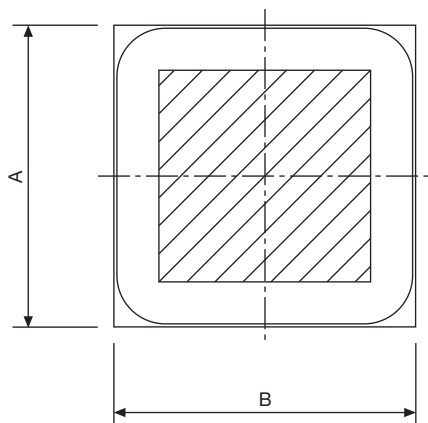
- state-of-the-art planar IGBT and matching fast diode dies
- high dynamic ruggedness, low switching losses, low on-state voltage
- positive temperature coefficient for easy paralleling
- SPT and SPT+ technology

Part number	Type	Size A x B mm	Thickness μm	V _{RRM} (V)	I _F (A)	V _F (V) typ. 125°C	Available as
Diodes							
5SLX 12K1711	SPT	11.9 x 11.9	385	1700	150	1.7	Unsawn, sawn wafer die
5SLX 12M1711	SPT	13.6 x 13.6	385	1700	200	1.7	Unsawn, sawn wafer die
5SLX 12L2507	SPT	12.4 x 12.4	310	2500	108	2.0	Die in waffle pack
5SLX 12L2510	SPT	12.4 x 12.4	305	2500	100	1.8	Die in waffle pack
5SLX 12M3301	SPT	13.6 x 13.6	385	3300	100	2.4	Die in waffle pack
5SLY 12E1200	SPT+	6.3 x 6.3	350	1200	50	1.85	Unsawn, sawn wafer die
5SLY 12F1200	SPT+	7.4 x 7.4	350	1200	75	1.85	Unsawn, sawn wafer die
5SLY 12G1200	SPT+	8.4 x 8.4	350	1200	100	1.85	Unsawn, sawn wafer die
5SLY 12J1200	SPT+	10.0 x 10.0	350	1200	150	1.85	Unsawn, sawn wafer die
5SLY 12M3300	SPT+	13.6 x 13.6	385	3300	125	2.2	Die in waffle pack
5SLY 12L4500	SPT+	12.9 x 12.9	560	4500	84	3.4	Die in waffle pack
5SLY 12N4500	SPT+	14.3 x 14.3	570	4500	110	3.5	Die in waffle pack
5SLX 12M6500	SPT+	13.6 x 13.6	670	6500	50	3.4	Die in waffle pack

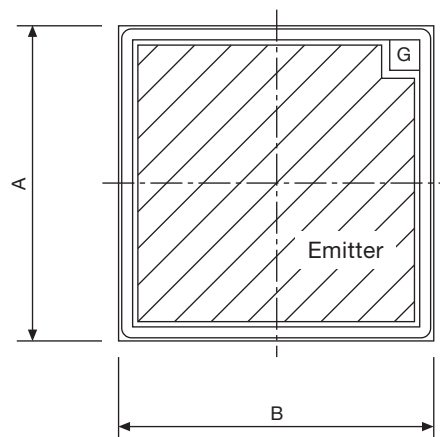
IGBT Dies

Part number	Type	Size A x B mm	Thickness μm	V_{CES} (V)	I_{C} (A)	I_{CM} (A)	V_{CEsat} (V) typ. 125°C	Available as
IGBTs								
5SMX 12E1280	SPT	6.5 x 6.6	140	1200	25	50	2.35	Unsawn, sawn wafer die
5SMX 12H1280	SPT	9.1 x 9.0	140	1200	50	100	2.20	Unsawn, sawn wafer die
5SMX 12K1280	SPT	11.0 x 11.0	140	1200	75	150	2.20	Unsawn, sawn wafer die
5SMX 12L1280	SPT	12.6 x 12.6	140	1200	100	200	2.20	Unsawn, sawn wafer die
5SMX 12K1701	SPT	11.9 x 11.9	210	1700	75	150	2.60	Unsawn, sawn wafer die
5SMX 12M1701	SPT	13.6 x 13.6	210	1700	100	200	2.60	Unsawn, sawn wafer die
5SMX 12L2510	SPT	12.4 x 12.4	305	2500	50	100	3.10	Die in waffle pack
5SMX 12L2511	SPT	12.4 x 12.4	310	2500	54	108	2.70	Die in waffle pack
5SMX 12M3300	SPT	13.6 x 13.6	385	3300	50	100	3.80	Die in waffle pack
5SMX 12N4507	SPT	14.3 x 14.3	530	4500	40	80	4.00	Die in waffle pack
5SMX 12M6500	SPT	13.6 x 13.6	670	6500	25	50	5.40	Die in waffle pack
5SMY 12H1200	SPT+	9.1 x 9.1	130	1200	57	114	2.00	Unsawn, sawn wafer die
5SMY 12J1200	SPT+	10.2 x 10.2	130	1200	75	150	2.00	Unsawn, sawn wafer die
5SMY 12K1201	SPT+	11.2 x 11.9	130	1200	100	200	2.00	Unsawn, sawn wafer die
5SMY 12M1200	SPT+	13.5 x 13.5	130	1200	150	300	2.10	Unsawn, sawn wafer die
5SMY 12M3300	SPT+	13.6 x 13.6	380	3300	62.5	125	3.00	Die in waffle pack
5SMY 12L4500	SPT+	12.8 x 12.8	520	4500	42	84	3.70	Die in waffle pack
5SMY 12N4500	SPT+	14.3 x 14.3	530	4500	55	110	3.50	Die in waffle pack
5SMY 12M4500	SPT+	13.6 x 13.6	525	4500	50	100	3.55	Die in waffle pack
5SMY 12M6500	SPT+	13.6 x 13.6	675	6500	31.25	63	3.90	Die in waffle pack

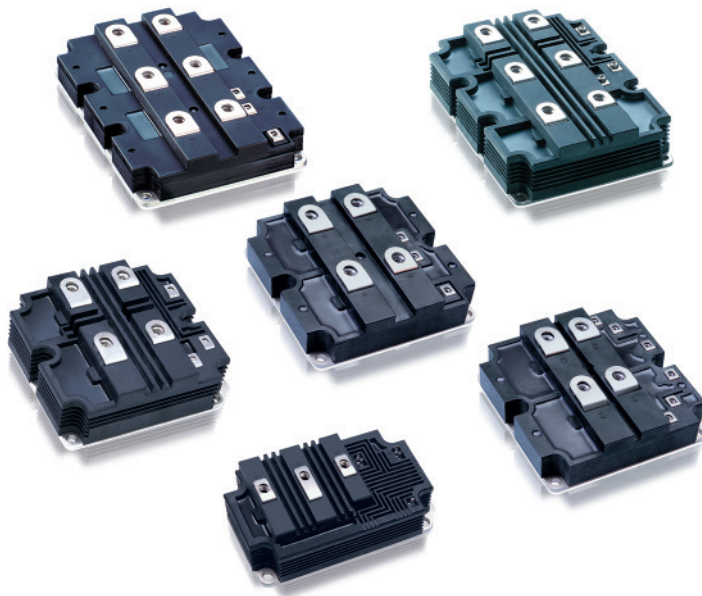
Diode Die Drawing



IGBT Die Drawing



IGBT & Diode Modules

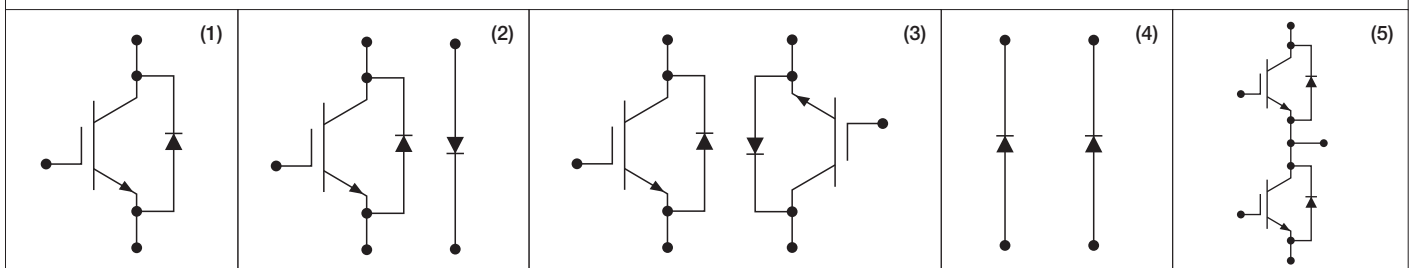


HiPak:

- high power, industry standard package
- designed for high reliability
- Aluminium Silicon Carbide base plate for high power cycling
- Aluminium Nitride substrates for low thermal resistance
- designed for very high SOA (Safe Operating Area)
- smooth switching characteristics for good EMC
- SPT and SPT⁺ chip technology
- Insulation capability up to > 10 kV

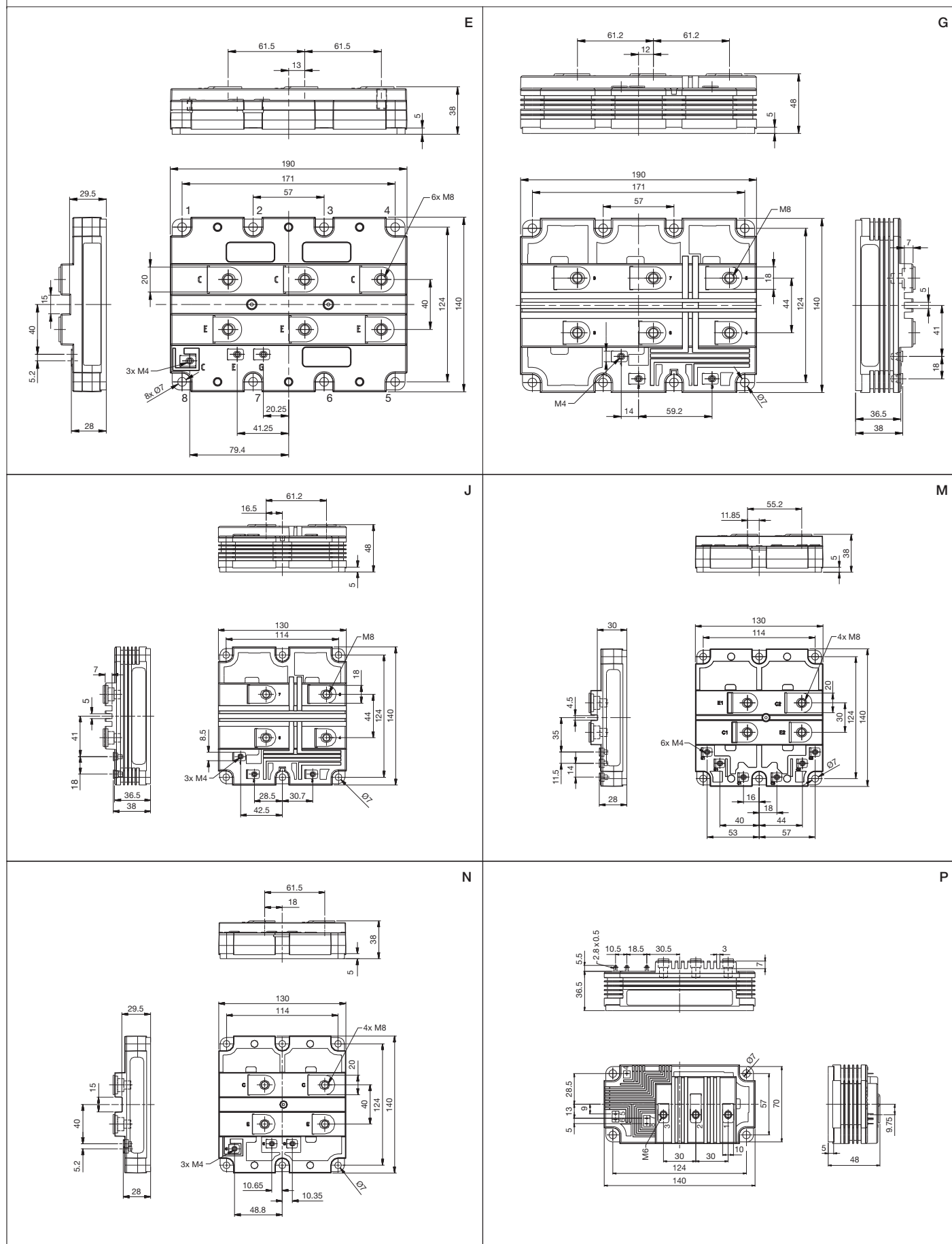
Part number	Voltage V_{CES} (V)	Current I_C (A)	Configuration / Outline	V_{CESat} (V) typ. 125°C	V_F (V) typ. 125°C	Housing
1.7 kV						
5SND 0800M170100	1700	2 x 800	(3) – Dual IGBT / M	2.6	1.7	HiPak1
5SNE 0800M170100	1700	800	(2) – Chopper / M	2.6	1.7	HiPak1
5SNA 1600N170100	1700	1600	(1) – Single IGBT / N	2.6	1.7	HiPak1
5SNA 1800E170100	1700	1800	(1) – Single IGBT / E	2.6	1.7	HiPak2
5SNA 2400E170100	1700	2400	(1) – Single IGBT / E	2.6	1.7	HiPak2
2.5 kV						
5SNA 1200E250100	2500	1200	(1) – Single IGBT / E	3.1	1.8	HiPak2
3.3 kV						
5SNA 0800N330100	3300	800	(1) – Single IGBT / N	3.8	2.35	HiPak1
5SNA 1200E330100	3300	1200	(1) – Single IGBT / E	3.8	2.35	HiPak2
5SNA 1200G330100	3300	1200	(1) – Single IGBT / G	3.85	2.35	HiPak2
5SNA 1500E330300	3300	1500	(1) – Single IGBT / E	3.0	2.1	HiPak2
4.5 kV						
5SNG 0150P450300	4500	2 x 150	(5) – Half Bridge / P	3.5	3.45	HiPak0
5SLD 0650J450300	4500	2 x 650	(4) – Dual Diode / J	-	3.4	HiPak1 HV
5SNA 0650J450300	4500	650	(1) – Single IGBT / J	3.7	3.4	HiPak1 HV
5SNA 0800J450300	4500	800	(1) – Single IGBT / J	3.55	3.5	HiPak1 HV
5SNA 1200G450300	4500	1200	(1) – Single IGBT / G	3.55	3.5	HiPak2
6.5 kV						
5SLD 0600J650100	6500	2 x 600	(4) – Dual Diode / J	-	3.4	HiPak1 HV
5SNA 0400J650100	6500	400	(1) – Single IGBT / J	5.4	3.4	HiPak1 HV
5SNA 0600G650100	6500	600	(1) – Single IGBT / G	5.4	3.4	HiPak2
5SNA 0750G650300	6500	750	(1) – Single IGBT / G	4.0	3.5	HiPak2

Configurations



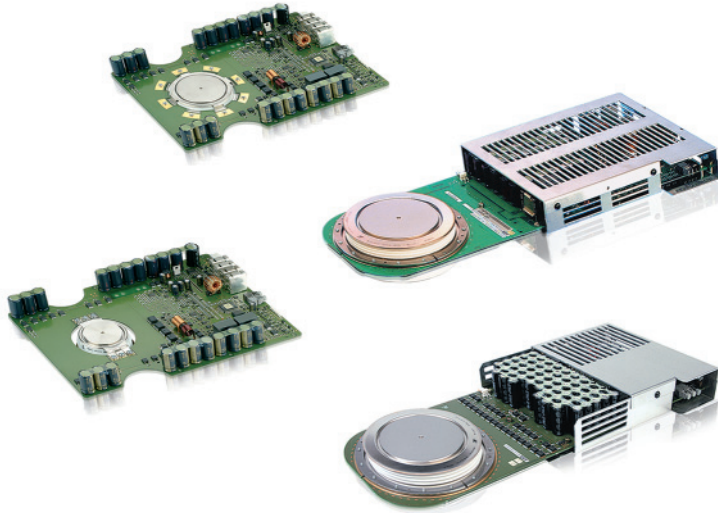
Please refer to page 20 for part numbering structure.

Outline Drawings



Dimensions in mm

Integrated Gate-Commutated Thyristors



- patented free-floating silicon technology
- optical trigger input and status feedback
- patented low-inductance housing technology
- fast response and precise timing
- exceptionally low on-state losses
- AC square wave or DC supply input
- cosmic radiation withstand rating

Asymmetric IGCTs

Part number	V_{DRM}	V_{DC}	V_{RRM}	I_{TGQM}	I_{TAVM}	I_{TSM}		V_{T}	V_{T0}	r_{T}	T_{VJM}	R_{thJC}	R_{thCH}	F_{m}	V_{GIN}	Outline
					$T_{\text{C}}=85^{\circ}\text{C}$	3ms	10ms	4000A								
	V	V	V	A	A	kA	kA	V	V	mΩ	°C	K/kW	K/kW	kN	V	
5SHY 35L4510	4500	2800	17	4000	1700	50	32	2.70	1.40	0.33	125	8.5	3	40	28-40	Fig. 1
5SHY 35L4512	4500	2800	17	4000	2100	56	35	2.00	1.15	0.21	125	8.5	3	40	28-40	Fig. 1
5SHY 55L4500	4500	2800	17	5000	1860	50	33	2.35	1.15	0.30	125	8.5	3	40	28-40	Fig. 2

- optimized for snubberless turn-off
- contact factory for series connection

Reverse conducting IGCTs

Part number	V_{DRM}	V_{DC}	I_{TGQM}	$I_{\text{TAVM}} / I_{\text{FAVM}}$	$I_{\text{TSM}} / I_{\text{FSM}}$	$V_{\text{T}} / V_{\text{F}}$	$V_{\text{T0}} / V_{\text{F0}}$	$r_{\text{T}} / r_{\text{F}}$	di/dt	I_{rr}	T_{VJM}	R_{thJC}	F_{m}	V_{GIN}	Outline
				$T_{\text{C}}=85^{\circ}\text{C}$	10ms	I_{TGQM}			max.						
	V	V	A	A	kA	V	V	mΩ	A/μs	A	°C	K/kW	kN	V	
5SHX 08F4510 GCT	4500	2800	630	250	5.0	3.00	1.80	2.00				40			Fig. 3
Diode part				130	6.1	5.70	2.80	4.60	250	400	115	53	16	28-40	
5SHX 14H4510 GCT	4500	2800	1100	420	8.8	3.00	1.65	1.20				25			Fig. 4
Diode part				160	9.4	6.65	3.15	3.20	360	460	115	42	20	28-40	
5SHX 26L4510 GCT	4500	2800	2200	1010	17.0	2.95	1.80	0.53				13			Fig. 1
Diode part				390	10.6	5.40	2.70	1.24	650	900	125	26	44	28-40	
5SHX 06F6010 GCT	5500	3300	520	210	3.5	3.50	2.30	2.30				40			Fig. 3
Diode part				110	2.5	6.30	3.30	5.80	190	320	115	53	16	28-40	
5SHX 10H6010 GCT	5500	3300	900	350	7.5	3.45	1.65	2.00				25			Fig. 4
Diode part				170	7.6	6.40	2.53	4.30	285	430	115	42	20	28-40	
5SHX 19L6010 GCT	5500	3300	1800	840	18.0	3.45	1.90	0.90				13			Fig. 1
Diode part				340	7.7	6.40	2.70	2.23	510	780	125	26	44	28-40	

- monolithic integrated freewheeling diode optimized for snubberless turn-off
- for corresponding diodes, please turn to page 11.

Please refer to page 21 for part numbering structure.

Fig. 1

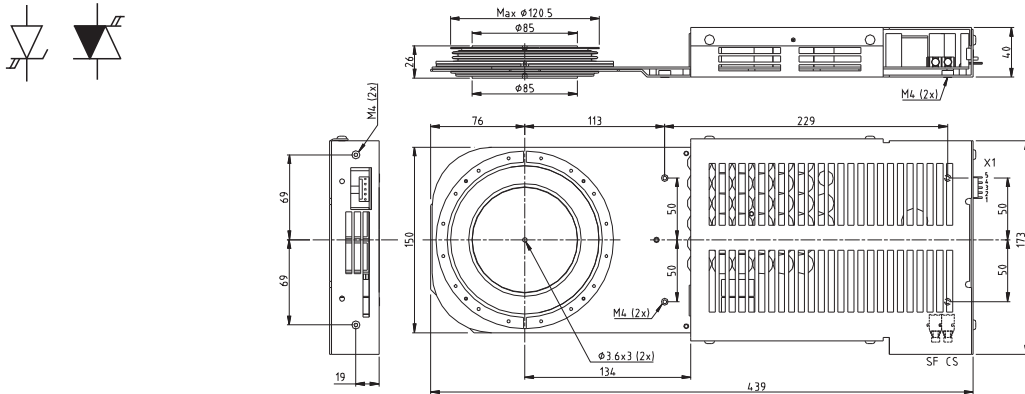


Fig. 2

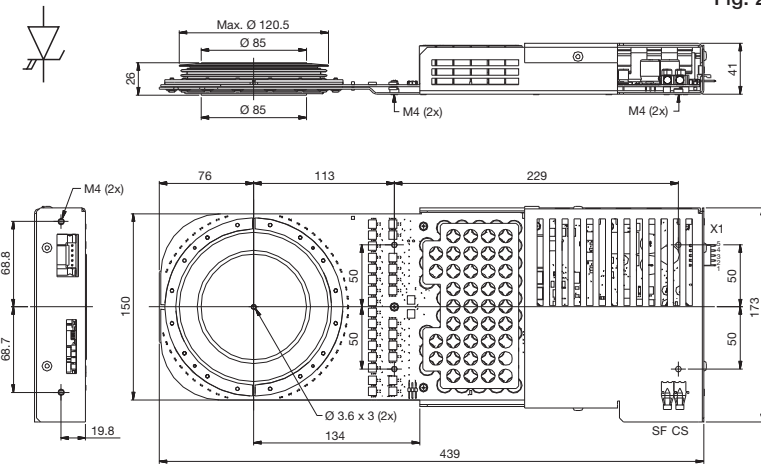


Fig. 3

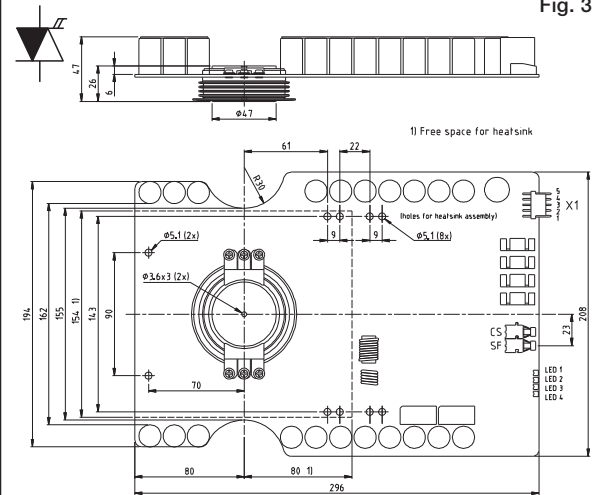
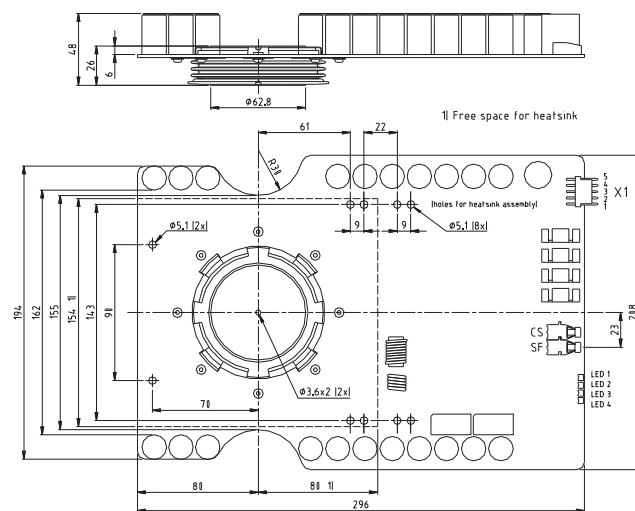


Fig. 4



Dimensions in mm

Fast Recovery Diode Recommendation

For all asymmetric and reverse conducting IGCTs, we also offer matching freewheeling, neutral point (NPC) and clamp diodes. The actual choice of the diode depends on the specific application. For technical data on the diode, please refer to page 10.

Asymmetric GTO Thyristors

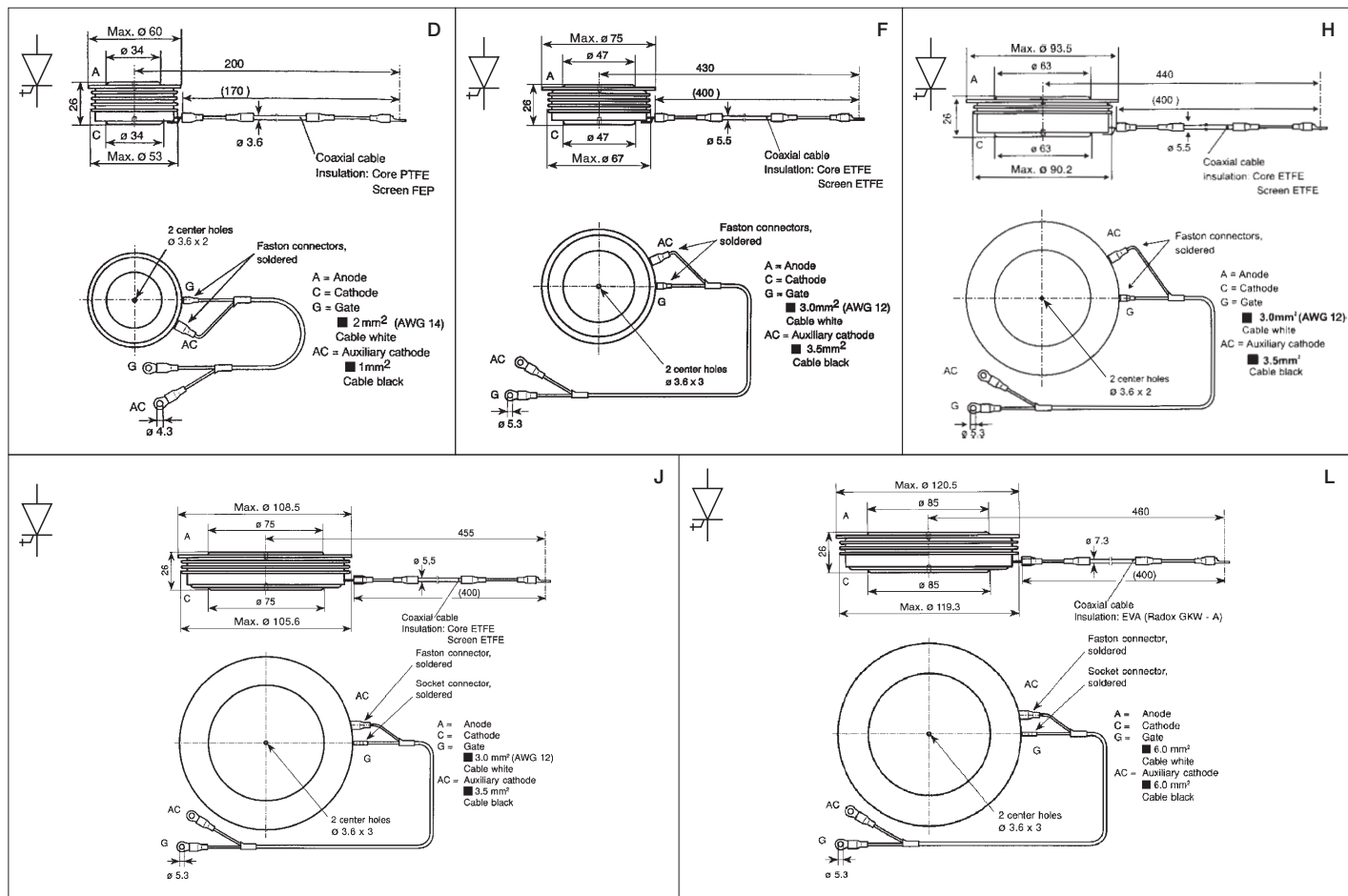


- patented free-floating silicon technology
- excellent trade-off between on-state and switching losses
- cosmic radiation withstand rating

Part number	V _{DRM}	V _{DC}	V _{RRM}	I _{TGQM} at C _S		I _{TAVM}	I _{TSM}		V _T	V _{T0}	r _T	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing	
						T _C =85°C	8.3ms	10ms	I _{TGQM}	T _{VJM}							
							T _{VJM}	T _{VJM}									T _{VJM}
							V	V									V
Standard																	
5SGA 15F2502	2500	1400	17	1500	3	570	10.6	10	2.8	1.45	0.90	125	27	8	15	F	
5SGA 20H2501	2500	1400	17	2000	4	830	17.0	16	2.8	1.66	0.57	125	17	5	20	H	
5SGA 25H2501	2500	1400	17	2500	6	830	17.0	16	3.1	1.66	0.57	125	17	5	20	H	
5SGA 30J2501	2500	1400	17	3000	5	1300	31.0	30	2.5	1.50	0.33	125	12	3	40	J	
5SGA 06D4502	4500	2800	17	600	1	210	3.1	3	4.0	1.90	3.50	125	50	8	11	D	
5SGA 20H4502	4500	2200	17	2000	4	710	14.0	13	3.5	1.80	0.85	125	17	5	20	H	
5SGA 30J4502	4500	2800	17	3000	6	930	25.0	24	4.0	2.20	0.60	125	12	3	40	J	
5SGA 40L4501	4500	2800	17	4000	6	1000	26.0	25	4.4	2.10	0.58	125	11	3	40	L	
Buffer Layer																	
Fine Pattern Type																	
5SGF 30J4502	4500	3000	17	3000	3	960	25	24	3.90	1.80	0.70	125	12	3	33	J	
5SGF 40L4502	4500	2800	17	4000	6	1180	26	25	3.80	1.20	0.65	125	11	3	40	L	

- low on-state and dynamic losses
- for corresponding diodes, please turn to page 11.

Please refer to page 21 for part numbering structure.



Dimensions in mm

Fast Recovery Diode Recommendation

For all GTO types, we also offer matching freewheeling and snubber diodes.

The actual choice of the diode depends on the specific application.

For technical data on the diode, please refer to page 10.

Fast Recovery Diodes



- optimized for fast and soft turn-off
- small reverse recovery charge
- high di/dt capability at turn-off
- range optimally suited for GTO and IGCT applications
- cosmic radiation withstand rating

GTO Freewheeling Diodes

Part number	V _{RRM}	V _{DC}	I _{FAVM}	I _{FSM}		V _{F0}	r _F	I _{rr}	Q _{rr}	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
			T _C =85°C	1ms T _{VJM}	10ms T _{VJM}	T _{VJM}		di/dt=300 A/μs						
	V	V	A	kA	kA	V	mΩ	A	μC	°C	K/kW	K/kW	kN	
5SDF 05D2505	2500	1500	420	27	8.5	1.7	0.62	470	840	125	40	8	11	D
5SDF 11F2501	2500	1500	950	65	21	1.2	0.38	550	1200	125	20	5	22	F
5SDF 07F4501	4500	2800	650	44	16	1.4	1.00	600	1900	125	20	5	22	F
5SDF 13H4501	4500	2800	1200	60	25	1.3	0.48	800	3000	125	12	3	40	H
5SDF 10H6004	6000	3800	1100	44	18	1.5	0.60	1000	6000	125	12	3	40	H

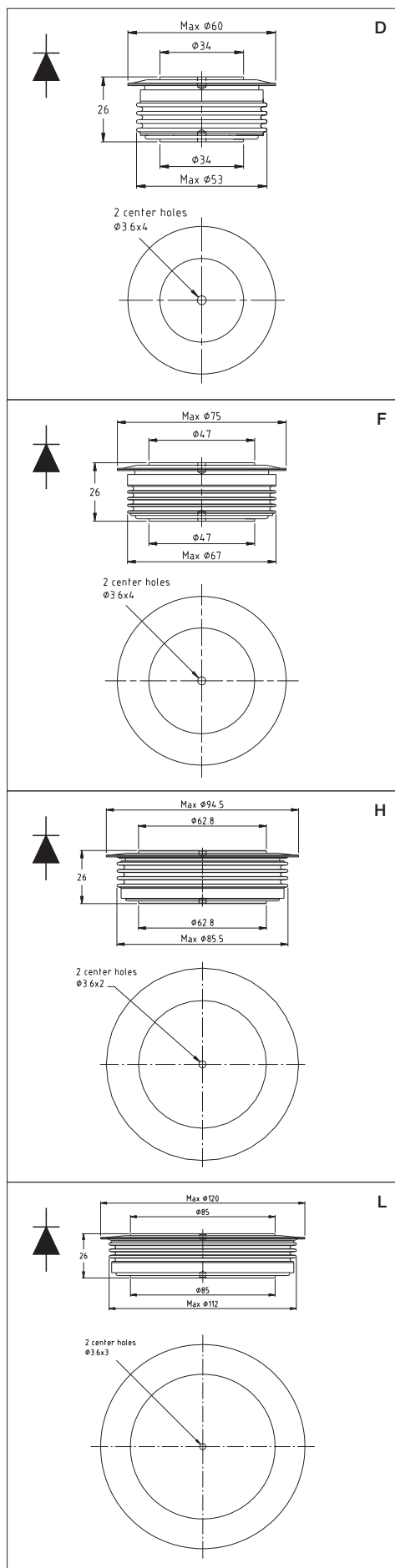
Snubber Diodes

Part number	V _{RRM}	V _{DC}	I _{FAVM}	I _{FSM}		V _{F0}	r _F	I _{rr}	Q _{rr}	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
			T _C =85°C	1ms	10ms	T _{VJM}		di/dt=100 A/μs						
				T _{VJM}	T _{VJM}									
	V	V	A	kA	kA	V	mΩ	A	μC	°C	K/kW	K/kW	kN	
5SDF 05D2501	2500	1100	490	27	8.5	1.4	0.5	250	900	125	40	8	11	D
5SDF 03D4501	4500	2400	320	12	5.0	2.0	1.5	200	1000	125	40	8	11	D
5SDF 07H4501	4500	2400	900	40	16.0	1.8	0.9	260	1700	125	12	3	40	H
5SDF 02D6002	6000	3000	250	11.4	3.6	2.5	2.5	260	2000	125	40	8	11	D

IGCT Diodes

Part number	V _{RRM}	V _{DC}	I _{FAVM}	I _{FSM}		V _{F0}	r _F	I _{rr}	di/dt	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
			T _C =70°C	1ms	10ms	T _{VJM}			max.					
				T _{VJM}	T _{VJM}									
	V	V	A	kA	kA	V	mΩ	A	A/μs	°C	K/kW	K/kW	kN	
5SDF 03D4502	4500	2800	275	10	5	2.15	2.80	355	300	115	40	8	16	D
5SDF 05F4502	4500	2800	435	32	16	2.42	2.10	610	430	115	17	5	20	F
5SDF 10H4502	4500	2800	810	40	24	2.42	1.10	1150	650	115	12	3	40	H
5SDF 10H4503	4500	2800	1100	47	20	1.75	0.88	1520	600	125	12	3	40	H
5SDF 10H4520	4500	2800	1440	56	25	1.75	0.88	1600	600	140	10	3	40	H
5SDF 16L4503	4500	2800	1650	47	26	1.90	0.79	1200	600	125	6.5	3	40	L
5SDF 02D6004	5500	3300	175	8	3	3.35	7.20	300	220	115	40	8	16	D
5SDF 04F6004	5500	3300	380	22	10	2.70	2.80	600	340	115	22	5	20	F
5SDF 08H6005	5500	3300	585	40	18	4.50	1.30	900	440	115	12	3	40	H

Please refer to page 21 for part numbering structure.



Dimensions in mm

Fast Recovery Diode Recommendation

Please note:

The nominal mounting force of all press packs in a single stack assembly should be the same for all devices of the stack. To ensure uniform pressure where devices are of dissimilar diameter, load spreaders of sufficient thickness and hardness must be used between devices. Failure to apply uniform pressure within the specified tolerances will reduce load-cycling capability or crack the wafer.

Recommendation for GTO Applications

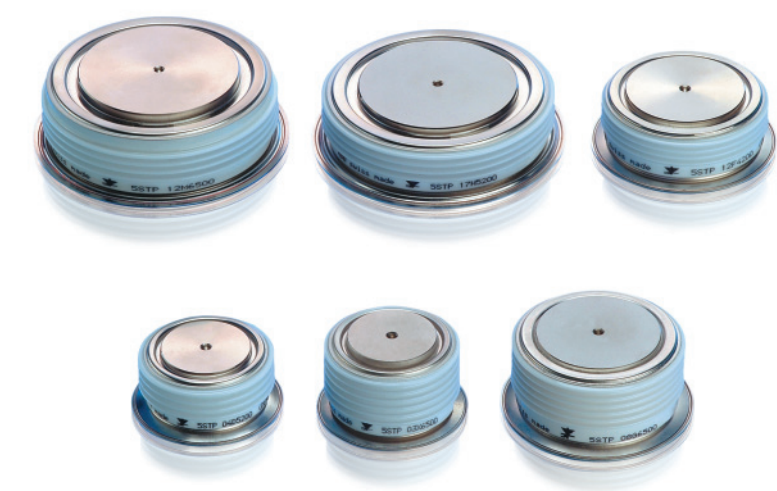
GTO Type	Recommended freewheeling diodes	Recommended snubber diodes
5SGA 15F2502	5SDF 05D2505 5SDF 11F2501	5SDF 05D2501
5SGA 20H2501	5SDF 05D2505 5SDF 11F2501	5SDF 05D2501
5SGA 25H2501	5SDF 05D2505 5SDF 11F2501	5SDF 05D2501
5SGA 30J2501	5SDF 11F2501	5SDF 05D2501
5SGA 06D4502	5SDF 03D4501	5SDF 03D4501
5SGA 20H4502	5SDF 03D4501 5SDF 07F4501	5SDF 03D4501
5SGA 30J4502	5SDF 07F4501 5SDF 13H4501	5SDF 03D4501
5SGA 40L4501	5SDF 13H4501	5SDF 03D4501 5SDF 07H4501
5SGF 30J4502	5SDF 07F4501 5SDF 13H4501	5SDF 03D4501 5SDF 07H4501
5SGF 40L4502	5SDF 13H4501	5SDF 03D4501 5SDF 07H4501

Recommendation for IGCT Applications

IGCT Type	Recommended freewheeling diodes	Recommended clamp diodes	Recommended NPC diodes**
5SHX 08F4510	Integrated	5SDF 03D4502	5SDF 03D4502
5SHX 14H4510	Integrated	5SDF 03D4502 5SDF 05F4502	5SDF 03D4502 5SDF 05F4502 5SDF 10H4503
5SHX 26L4510	Integrated	5SDF 03D4502 5SDF 05F4502	5SDF 05F4502 5SDF 10H4503 5SDF 10H4520
5SHX 06F6010	Integrated	5SDF 02D6004	5SDF 02D6004 5SDF 04F6004
5SHX 10H6010	Integrated	5SDF 02D6004 5SDF 04F6004	5SDF 04F6004 5SDF 08H6005
5SHX 19L6010	Integrated	5SDF 02D6004 5SDF 08H6005	5SDF 04F6004 5SDF 08H6005
5SHY 35L4510	5SDF 10H4503	5SDF 05F4502	5SDF 10H4503
5SHY 35L4512	5SDF 10H4520	5SDF 10H4503	5SDF 10H4520
5SHY 55L4500	5SDF 16L4503	5SDF 10H4520	5SDF 16L4503

** Note: NPC diode stands for **N**eutral **P**oint **C**lamp diode.

Phase Control Power Thyristors



- designed for high power industrial and power transmission applications
- optimized for low on-state voltage drop
- matched Q_{rr} and V_T values available for series and/or parallel connections

Part number	V _{DRM}	V _{RRM}	I _{TAVM}	I _{TSM}		V _{T0}	r _T	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
	T _{VJM}	T _C =70°C	8.3ms	10ms	T _{VJM}							
			T _{VJM}	T _{VJM}								
	V	A	kA	kA	V	mΩ	°C	K/kW	K/kW	kN		
5STP 10D1601	1600	969	16.0	15.0	0.93	0.302	125	32.0	7.5	10	D	
5STP 20F1601	1600	1901	29.2	27.3	0.95	0.152	125	16.0	4.0	22	F	
5STP 34H1601	1600	3370	52.3	49.0	0.94	0.066	125	10.0	3.0	50	H	
5STP 07D1800	1800	730	9.5	9.0	0.80	0.540	125	36.0	7.5	10	D	
5STP 09D1801	1800	932	14.6	13.7	0.94	0.341	125	32.0	7.5	10	D	
5STP 18F1800	1800	1660	22.0	21.0	0.83	0.230	125	17.0	4.0	22	F	
5STP 18F1801	1800	1825	28.0	26.2	0.97	0.170	125	16.0	4.0	22	F	
5STP 27H1800	1800	3000	53.3	50.5	0.88	0.103	125	10.0	2.0	50	H	
5STP 30H1801	1800	3108	50.2	47.0	0.98	0.081	125	10.0	3.0	50	H	
5STP 50Q1800	1800	6100	100.0	94.0	0.90	0.050	125	5.0	1.0	90	Q	
5STP 09D2201	2200	862	12.8	12.0	1.00	0.404	125	32.0	7.5	10	D	
5STP 17F2201	2200	1702	27.2	25.5	0.99	0.206	125	16.0	4.0	22	F	
5STP 29H2201	2200	2855	48.1	45.0	1.00	0.107	125	10.0	3.0	50	H	
5STP 06D2800	2800	620	8.5	8.0	0.92	0.780	125	36.0	7.5	10	D	
5STP 08D2801	2800	793	11.3	10.6	1.02	0.510	125	32.0	7.5	10	D	
5STP 16F2800	2800	1400	19.0	18.0	0.82	0.370	125	17.0	4.0	22	F	
5STP 16F2801	2800	1512	25.2	23.6	1.02	0.265	125	16.0	4.0	22	F	
5STP 24H2800	2800	2625	46.0	43.0	0.85	0.160	125	10.0	2.0	50	H	
5STP 27H2801	2800	2670	45.9	43.0	1.04	0.127	125	10.0	3.0	50	H	
5STP 33L2800	2800	3740	65.0	60.0	0.95	0.100	125	7.0	1.5	70	L	
5STP 45N2800	2800	5080	79.0	75.0	0.86	0.070	125	5.7	1.0	90	N	
5STP 45Q2800	2800	5490	79.0	75.0	0.86	0.070	125	5.0	1.0	90	Q	
5STP 04D4200	4200	470	7.0	6.4	1.00	1.500	125	36.0	7.5	10	D	
5STP 12F4200	4200	1150	16.0	15.0	0.95	0.575	125	17.0	4.0	22	F	
5STP 18H4200	4200	2075	35.0	32.0	0.96	0.285	125	10.0	2.0	50	H	
5STP 28L4200	4200	3170	55.6	52.0	0.97	0.158	125	7.0	1.5	70	L	
5STP 38N4200	4200	3960	65.0	60.0	0.95	0.130	125	5.7	1.0	90	N	
5STP 38Q4200	4200	4275	65.0	60.0	0.95	0.130	125	5.0	1.0	90	Q	

Please refer to page 21 for part numbering structure.

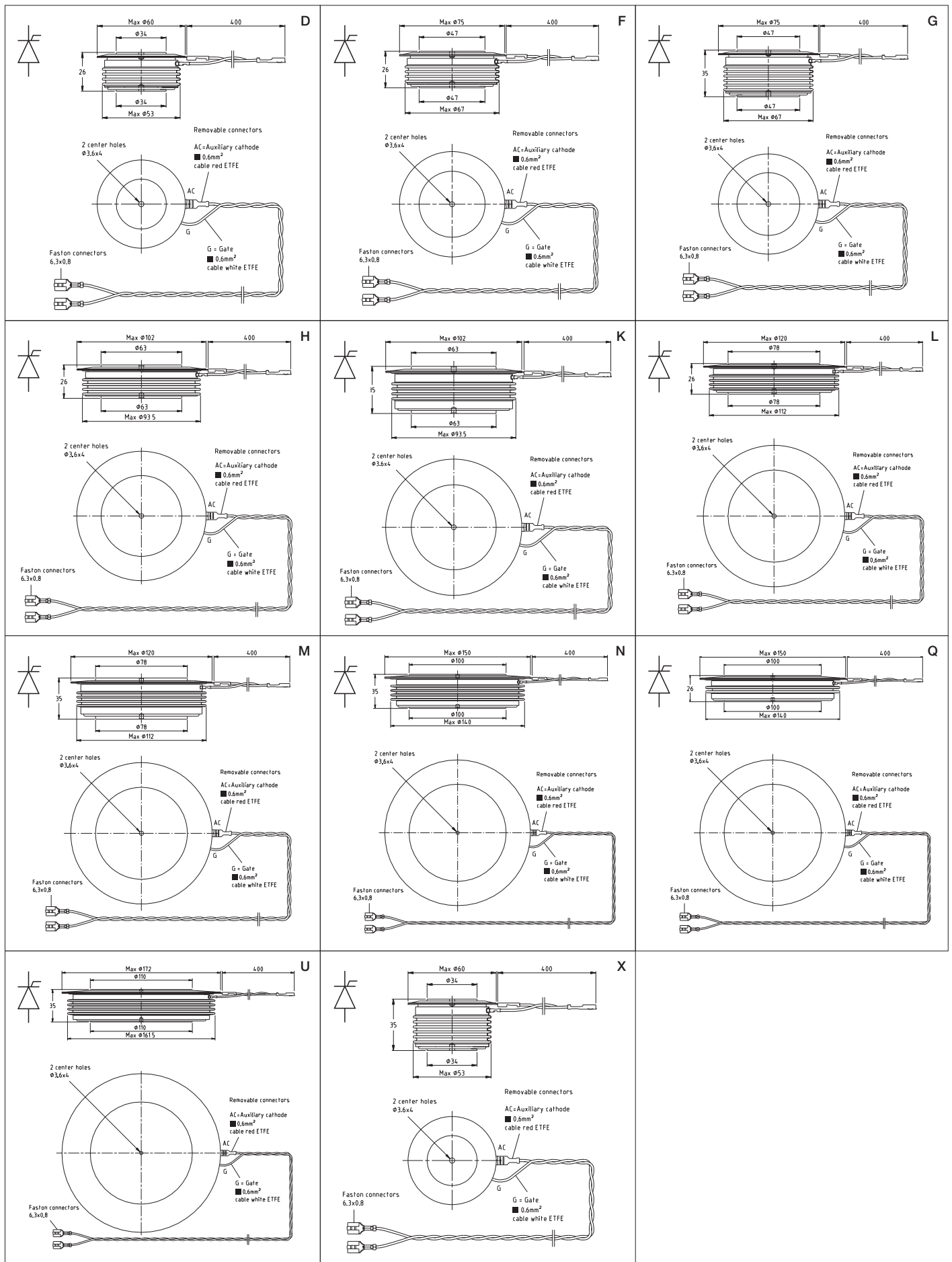
Phase Control Power Thyristors



- designed for high power industrial and power transmission applications
- optimized for low on-state voltage drop
- matched Q_{rr} and V_T values available for series and/or parallel connections

Part number	V _{DRM}	V _{RRM}	I _{TAVM}	I _{TSM}		V _{T0}	r _T	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
	T _{VJM}		T _C =70°C	8.3ms	10ms	T _{VJM}						
	V		A	kA	kA	V	mΩ					
5STP 04D5200	5200		440	5.4	5.0	1.20	1.600	125	36.0	7.5	10	D
5STP 17H5200	5200		1975	31.0	29.0	1.02	0.320	125	10.0	2.0	50	H
5STP 25L5200	5200		2760	45.0	42.0	1.00	0.225	125	7.0	1.5	70	L
5STP 25M5200	5200		2540	45.0	42.0	1.00	0.225	125	9.0	1.5	70	M
5STP 34N5200	5200		3600	60.0	55.0	1.03	0.160	125	5.7	1.0	90	N
5STP 34Q5200	5200		3875	60.0	55.0	1.03	0.160	125	5.0	1.0	90	Q
5STP 52U5200	5200		4120	90.3	82.5	1.04	0.115	110	4.0	0.8	135	U
5STP 03D6500	6500		380	4.8	4.5	1.20	2.300	125	36.0	7.5	10	D
5STP 08F6500	6500		830	12.8	11.8	1.24	1.015	125	17.0	4.0	22	F
5STP 08G6500	6500		720	12.8	11.8	1.24	1.015	125	22.0	4.0	22	G
5STP 12K6500	6500		1370	23.4	21.9	1.18	0.632	125	11.0	2.0	50	K
5STP 18M6500	6500		1800	35.0	32.0	1.20	0.430	125	9.0	1.5	70	M
5STP 26N6500	6500		2810	50.0	45.0	1.12	0.290	125	5.7	1.0	90	N
5STP 42U6500	6500		3430	76.2	71.4	1.24	0.162	110	4.0	0.8	135	U
5STP 03X6500	6500		350	4.8	4.5	1.20	2.300	125	45.0	7.5	10	X
5STP 12N8500	8500		1200	38.0	35.0	1.25	0.480	90	5.7	1.0	90	N

Please refer to page 21 for part numbering structure.



Dimensions in mm

Bi-Directionally Controlled Thyristors



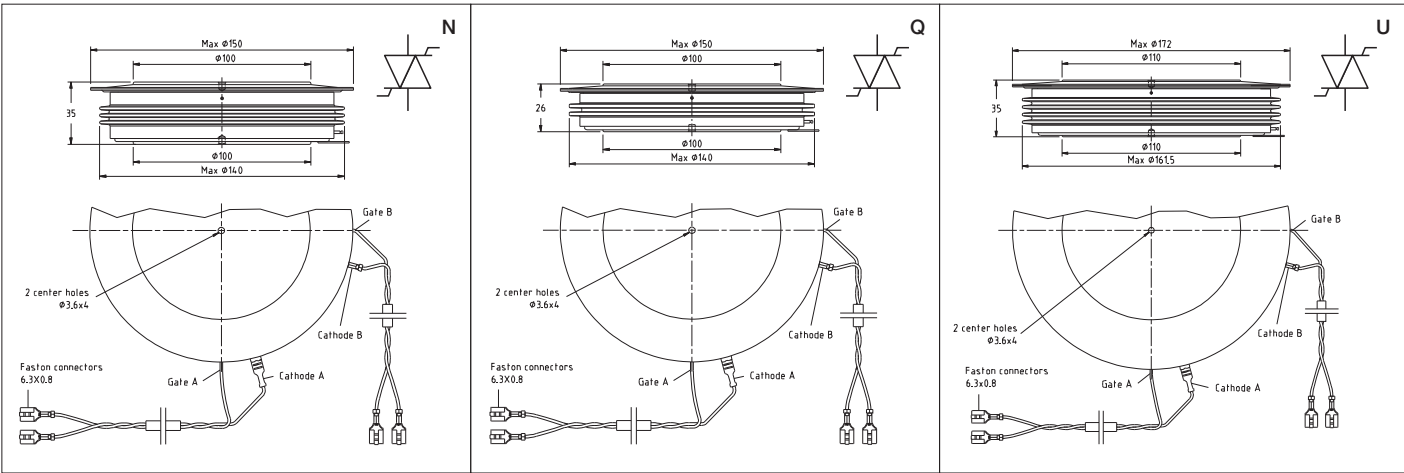
- two anti-parallel thyristors on one Si-wafer
- patented free-floating silicon technology
- designed for high power industrial and energy management applications
- matched Q_{rr} values available for series connection

Table of replacement of PCTs by BCTs

5STB 24Q2800	replaces two	5STP 24H2800
5STB 24N2800	replaces two	5STP 24H2800
5STB 18N4200	replaces two	5STP 18H4200
5STB 17N5200	replaces two	5STP 17H5200
5STB 13N6500	replaces two	5STP 12K6500
5STB 25U5200	replaces two	5STP 25L5200
5STB 18U6500	replaces two	5STP 18M6500

Part number	V _{RM}	I _{RMS} *	I _{TAVM}	I _{TSM}		V _{T0}	r _T	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
	T _{VJM}	T _C =70°C	T _C =70°C	8.3ms	10ms	T _{VJM}						
	V	A	A	kA	kA	V	mΩ	°C	K/kW	K/kW	kN	
5STB 24N2800	2800	5400	2430	46.0	43.0	0.85	0.160	125	11.4	2.0	90	N
5STB 24Q2800	2800	5840	2630	46.0	43.0	0.85	0.160	125	10.0	2.0	90	Q
5STB 18N4200	4200	4260	1920	35.0	32.0	0.96	0.285	125	11.4	2.0	90	N
5STB 17N5200	5200	4000	1800	31.0	29.0	1.02	0.320	125	11.4	2.0	90	N
5STB 25U5200	5200	4400	1980	45.0	42.0	1.06	0.219	110	8.5	1.6	135	U
5STB 13N6500	6500	3120	1405	24.0	22.0	1.20	0.600	125	11.4	2.0	90	N
5STB 18U6500	6500	3510	1580	31.8	29.7	1.20	0.458	110	8.5	1.6	135	U

* AC full-wave



Dimensions in mm

Please refer to page 21 for part numbering structure.

Rectifier Diodes

Avalanche Diodes

Part number	V _{RRM}	V _{Fmin}	V _{Fmax}	I _{FAVM}	I _{FSM}		V _{F0}	r _F	P _{RSM}	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
		1800 A 25°C		T _C =85°C	8.3ms	10ms	T _{VJM}	T _{VJM}	20μs					
	V	V	V	A	kA	kA	V	mΩ	kW	°C	K/kW	K/kW	kN	
5SDA 11D1702	1700	1.05	1.25	1310	16.0	15.0	0.74	0.250	50	160	40	8	11	D
5SDA 10D2303	2300	1.20	1.35	1140	14.5	13.5	0.83	0.300	50	160	40	8	11	D
5SDA 09D2604	2600	1.35	1.50	1020	12.5	11.5	0.87	0.390	50	160	40	8	11	D
5SDA 08D3205	3200	1.50	1.70	910	10.0	9.2	0.93	0.520	50	160	40	8	11	D
5SDA 07D3806	3800	1.70	2.00	790	8.2	7.6	1.01	0.720	50	160	40	8	11	D
5SDA 06D5007	5000	2.00	2.40	690	7.6	7.0	1.10	1.010	50	160	40	8	11	D
		4000 A 25°C												
5SDA 27F2002	2000	1.05	1.20	2700	33.5	31.0	0.79	0.090	100	160	20	5	22	F
5SDA 24F2303	2300	1.20	1.35	2350	30.5	29.0	0.84	0.130	75	160	20	5	22	F
5SDA 21F3204	3200	1.35	1.50	2110	28.0	26.0	0.89	0.170	75	160	20	5	22	F
5SDA 19F3205	3200	1.50	1.70	1870	25.0	23.5	0.95	0.230	75	160	20	5	22	F
5SDA 16F3806	3800	1.70	2.00	1620	22.3	20.5	1.03	0.320	50	160	20	5	22	F
5SDA 14F5007	5000	2.00	2.40	1410	19.0	17.5	1.13	0.440	50	160	20	5	22	F

- self protected against transient over-voltages - guaranteed avalanche power dissipation

Normal Recovery Diodes

Part number	V _{RSM}	V _{RRM}	I _{FAVM}	I _{FSM}		V _{F0}	r _F	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
			T _C =85°C	8.3ms	10ms	T _{VJM}						
	V	V	A	kA	kA	V	mΩ	°C	K/kW	K/kW	kN	
5SDD 51L2800	2800	2000	5380	70.0	65	0.770	0.082	175	8.0	3.0	70	L
5SDD 60N2800	2800	2000	6830	95.0	87	0.800	0.050	160	5.7	1.0	90	N
5SDD 60Q2800	2800	2000	7385	95.0	87	0.800	0.050	160	5.0	1.0	90	Q
5SDD 11D2800	3000	2800	1285	16.0	15	0.930	0.242	160	32.0	8.0	10	D
5SDD 24F2800	3000	2800	2600	32.0	30	0.910	0.135	160	15.0	4.0	22	F
5SDD 48H3200	3200	3200	4710	65.1	61	0.992	0.067	160	8.0	2.5	50	H
5SDD 54N4000	4000	3600	5200	90.0	85	0.800	0.086	150	5.7	1.0	90	N
5SDD 40H4000	4000	4000	3930	49.0	46	0.885	0.135	160	8.0	2.5	50	H
5SDD 38H5000	5000	5000	3810	48.1	45	0.903	0.136	160	8.0	2.5	50	H
5SDD 08D5000	5200	5000	1030	12.8	12	0.890	0.487	160	32.0	8.0	10	D
5SDD 20F5000	5200	5000	1980	25.6	24	0.940	0.284	160	15.0	4.0	22	F
5SDD 33L5500	5500	5000	3480	49.2	46	0.940	0.147	150	7.0	1.5	70	L
5SDD 50N5500	5500	5000	4700	80.0	73	0.800	0.107	150	5.7	1.0	90	N
5SDD 31H6000	6000	6000	3080	42.7	40	1.016	0.175	150	8.0	2.5	50	H

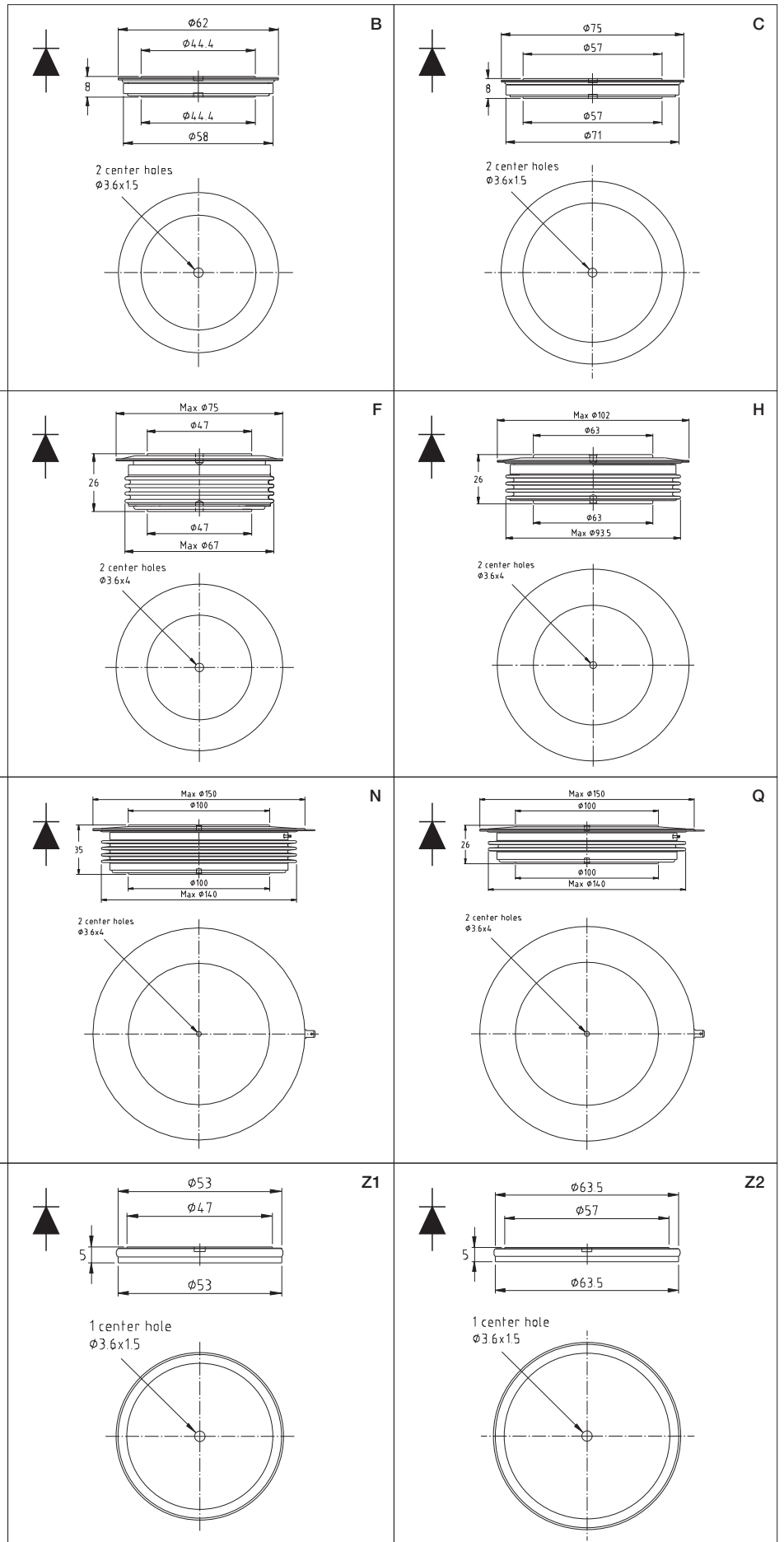
Welding Diodes

Part number	V _{RRM}	V _{Fmin}	V _{Fmax}	I _{FAVM}	I _{FSM}		V _{F0}	r _F	T _{VJM}	R _{thJC}	R _{thCH}	F _m	Housing
		T _C =25°C, I _F =5000 A		T _C =85°C	8.3ms	10ms	T _{VJM}	T _{VJM}					
	V	V	V	A	kA	kA	V	mΩ	°C	K/kW	K/kW	kN	
5SDD 71B0200	200	-	1.05	7110	60	55	0.74	0.026	170	10	5	22	B
5SDD 0120C0200	200	-	0.92*	11000	92	85	0.75	0.020	170	6	3	36	C
5SDD 71X0200	200	-	1.05	7110	60	55	0.74	0.026	170	10	5	22	X
5SDD 71X0400	400	0.97	1.02	7110	60	55	0.74	0.026	170	10	5	22	X
5SDD 0120C0400	400	0.83*	0.88*	11350	92	85	0.74	0.018	170	6	3	36	C
5SDD 92Z0400	400	-	1.03*	9250	64	60	0.78	0.031	180	5.6	3.6	22	Z1
5SDD 0135Z0400	400	-	0.92*	13500	91	85	0.758	0.021	180	3.9	2.6	35	Z2

* at 8000 A, 170°C

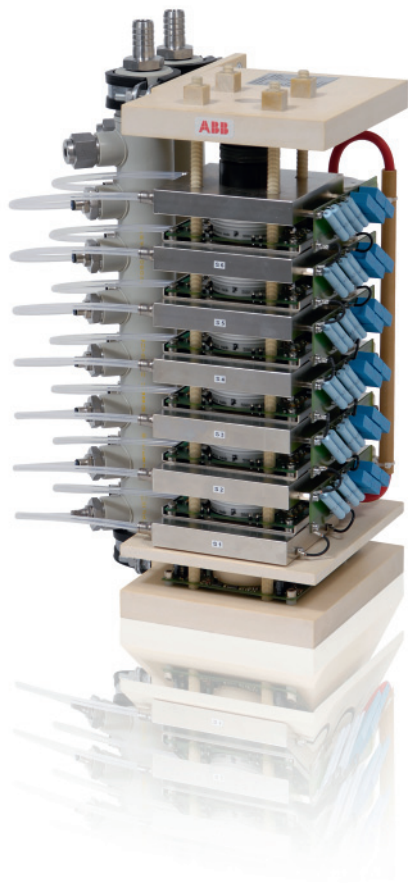
- designed for medium frequency welding equipment and optimized for high current rectifiers
- proven high reliability in welding equipment with very low on-state voltage and very low thermal resistance

Please refer to page 21 for part numbering structure.



Dimensions in mm

Pulsed Power



For special customer requirements, ABB has developed or optimized semiconductor devices for use in Pulsed Power Applications.

These components are designed to switch very high current rise rates (di/dt) and feature fast turn-on, very high current capability and high voltage blocking. Most of these devices include special driver units.

ABB designs and produces complete solid-state assemblies which include the semiconductor device, driving circuit, triggering, mechanical clamping, cooling and application-specific testing.

Due to higher reliability and lower maintenance costs, ABB's optimized devices, mostly as complete assemblies, are increasingly being used to replace thyratons and ignitrons.

5SVC 063508E00

Reverse Conducting Solid State Switch as Thyatron replacement

Charge Voltage : 15 kVdc
 I-pulse : 5 kA @ 4.0 μ s
 di/dt : 4 kA/ μ s
 Pulse Rep. Rate : 100 Hz
 Cooling : De-Ionized water
 Components : 6 x 5SPR 08F4522
 Power Supply : 5SPP 25X4000 (24 Vdc)
 Clamping system : Glass fiber epoxy 20 kN

Semiconductor Components optimized for Pulsed Power Applications

Part number	V _{DRM}	V _{RRM}	I-Pulse	Device	Type	Gate Driver
	V	V	kA			
Asymmetric Blocking						
5STH 20H4501	4500	18	80	discharge switch	repetitive	none
5STH 30J4501	4500	18	110	discharge switch	repetitive	none
5SPY 36L4503	4500	18	150	discharge switch	repetitive / on board supply	integrated
5SPY 36L4506	4500	18	150	discharge switch	repetitive, for series connection	integrated
Multiwafer Components						
5SDA 27Z1350		13.500	60	crowbar diode	non repetitive	

Current source power supplies are available on request.

For higher voltages, devices can be stacked in series connection. For higher currents, most devices can be used in parallel connection.

Due to the nature of different pulse power applications and their specific demands, ABB prefers to supply complete assembled switches which can be designed and tested per customer application conditions.

Contact our group for Pulsed Power applications: Tel: +41 58 586 13 81 / Fax: +41 58 586 13 10.



Charge Voltage	: 6.5 kVdc
I-pulse	: 2 kA @ 2.5 μ s
di/dt	: 4 kA/ μ s
Pulse rep. rate	: 1200 Hz
Cooling	: Forced air
Components	: 3 x 5SPR 08F4522
Power supply	: 5SPP 25X4000 (24 Vdc)
Clamping system	: Glass fiber epoxy 20 kN

Example of a 80 kV / 14 kA crowbar assembly with double triggering and over-voltage protection.
Application oriented designs possible.

Charge Voltage	: 20 kVdc
I-pulse	: up to 30 kA @ 12μs
di/dt	: up to 20 kA/μs
Pulse Rep. Rate	: 300 Hz
Cooling	: Transformer Oil (stainless steel manifolds)
Components	: 8 x 5SPR 26L4506
Power Supply	: 5SPP 25Z8000 (48 Vdc)
Clamping system	: Glass fiber epoxy 40 kN



Part Numbering Structure

Dies

Product group

5SM = IGBT
5SL = Diode

Technology

X = SPT / Y = SPT+

Type

76 = unsawn wafer die / 86 = sawn wafer die
12 = picked die (waffle pack)

Die size in mm

D = 5.00 – 5.99	J = 10.00 – 10.99
E = 6.00 – 6.99	K = 11.00 – 11.99
F = 7.00 – 7.99	L = 12.00 – 12.99
G = 8.00 – 8.99	M = 13.00 – 13.99
H = 9.00 – 9.99	N = 14.00 – 14.99

Blocking voltage (V/100)

Version number

5SM Y 12 M 12 00

IGBT / Diode Modules

Product group

5SNA = Single IGBT module
5SND = Dual IGBT module
5SNE = Low side chopper
5SNG = Half Bridge module
5SLA = Single diode module
5SLD = Dual diode module

Nominal collector current rating (A)

Package

M = HiPak1, 30 mm / N = HiPak1, 40 mm
J = HiPak1 HV, 44 mm
E = HiPak2, 40 mm / G = HiPak2 HV, 44 mm
P = HiPak0, 44 mm

Blocking voltage (V/100)

Package variation

0 = standard

Technology variation

1 = SPT / 3 = SPT+

Version number

5SND 0800 M 17 0 1 00

IGCT

Product group

5SHX = Reverse Conducting IGCT

5SHY = Asymmetric IGCT

Max. turn-off current (I/100)

Housing

Blocking voltage (V/100)

Version number

5SHY 35 L 45 10

GTO

Product group

5SGA = Asymmetric GTO

5SGF = Fine pattern GTO

Max. turn-off current (I/100)

Housing

Blocking voltage (V/100)

Version number

5SGA 20 H 25 01

Phase Control Thyristors

Product group

5STP = Phase control thyristor

5STB = Bi-directionally controlled thyristor

Average on-state current (I/100)

Housing

Blocking voltage (V/100)

Version number

5STP 26 N 65 00

Diodes

Product group

5SDA = Avalanche rectifier diode

5SDD = Rectifier diode

5SDF = Fast Recovery diode

Average on-state current (I/100)

Housing

Blocking voltage (V/100)

Version number

5SDA 14 F 50 07

Symbols

Symbol	Description
C_s	Snubber capacitance
di/dt_{max}	Maximum rate of rise or decline of on-state current
F_m	Mounting force
I_c	DC collector current
I_{CM}	Peak collector current
I_F	Diode nominal mean forward current
I_{FAVM}	Max. average forward current (180° sine wave)
I_{FSM}	Max. surge peak forward current for a 180° sine wave; no voltage reapplied after surge
I-pulse	Peak current pulse
I_{RMS}	Max. rms on-state current (AC full wave)
I_{rr}	Max. (typ. for IGBT diode) reverse recovery current
I_{TAVM}	Max. average on-state current (180° sine wave)
I_{TGQM}	Max. turn-off current
I_{TSM}	Max. surge peak on-state current for a 180° sine wave; no voltage reapplied after surge
P_{RSM}	Max. surge avalanche power dissipation (single pulse)
Q_{rr}	Max. reverse recovery charge
r_F	Slope resistance
r_T	Slope resistance
R_{thCH}	Thermal resistance case to heatsink
R_{thJC}	Thermal resistance junction to case
T_c	Case temperature
T_{vj}	Junction temperature
T_{VJM}	Max. junction temperature

Symbol	Description
--------	-------------

V_{CES}	IGBT collector emitter voltage
V_{CEsat}	Collector-emitter saturation voltage
V_{DC}	Max. DC voltage rating for 100 FIT, 100% duty
V_{DRM}	Max. repetitive peak forward blocking voltage
V_F	Forward voltage drop
V_{F0}	Threshold voltage
V_{Fmax}	Max. forward voltage drop
V_{Fmin}	Min. forward voltage drop
V_{GIN}	Input voltage of IGCT gate drive
V_{RM}	Max. repetitive peak blocking voltage
V_{RRM}	Max. repetitive peak reverse blocking voltage
V_{RSM}	Max. surge peak reverse blocking voltage
V_T	On-state voltage drop
V_{T0}	Threshold voltage

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