



大功率半导体器件产品目录2018  
POWER SEMICONDUCTOR  
PRODUCT GUIDE



株洲中车时代电气股份有限公司  
ZHUSHOU CRRC TIMES ELECTRIC CO., LTD.

半导体事业部  
SEMICONDUCTOR BUSINESS UNIT  
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株洲中车时代电气股份有限公司  
ZHUSHOU CRRC TIMES ELECTRIC CO., LTD.



连接世界 造福人类

## 企业简介 About Us

半导体事业部是株洲中车时代电气股份有限公司（香港上市，HK3898）下属的核心业务单位，专业从事大功率半导体器件的研发与制造，是我国最早开发大功率半导体器件的单位之一。现已成为我国唯一一家全面掌握IGBT、晶闸管、IGCT、SIC、IGBT及功率组件全套技术，能为用户提供全面系统的半导体解决方案的厂家。产品技术水平、产业化规模、市场影响力均处于国内领先地位，且有很强的国际影响。

2008年，成功并购全球知名的半导体器件独立供应商——加拿大丹尼克斯电力电子股份有限公司。2010年在英国设立功率半导体海外研发中心，形成公司大功率半导体器件产业化的国际化布局。

基于先进的技术和完整的产业化平台，公司是世界第一家推出商用HVDC 6英寸晶闸管，全球第三家拥有IGCT自主研发能力，国内首个研发出高压IGBT芯片与模块的企业，拥有功率半导体芯片—模块—装置—系统完整产业链。

公司建立了ISO9001、EHS14001、OHSAS18001体系，通过了IRIS质量体系、IATF16949（汽车行业质量管理）等体系认证，致力于以一流的产品解决方案和服务，满足客户需求。

Semiconductor Business Unit is branch of Zhuzhou CRRC Times Electric Co., Ltd. (listed in Hong Kong-HK3898), specialized in R&D and manufacture of high-power semiconductor devices. Semiconductor Business Unit is one of the earliest companies in high-power semiconductor industry of China and has become the only one mastering full set of technologies in thyristor, IGCTs, IGBTs and power assemblies, providing comprehensive solutions for customers. Nowadays, we are holding leading position in technology innovation, industrialization in China and strong brand influence overseas.

In 2008, We acquired Dynex Power Inc. listed in Canada, which is one of the independent suppliers in the world. In 2010, power semiconductor R & D center set up in Lincoln UK, international operation footprint formed and broadened.

Based on advanced technology and complete industrial platform, we are the first one in the world releasing 6-inch thyristor applied in HVDC project and the third one with IGCT development capabilities in the world. Meanwhile, we are also the first one releasing high-voltage IGBT chips and modules in China and established complete industry chain from Chip - module - device to system.

The company established systems of ISO9001、EHS14001、OHSAS18001 and qualified in IRIS and IATF16949. We committed to offering perfect products and best service to customers all over the world.

CRRC for the World





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## 01

# 绝缘栅双极型晶体管

## IGBTs

主要产品：电压等级为 650V~ 6500V 的包括单开关、半桥等各种电路结构的IGBT模块

Main products: IGBT modules rated 650V~6500V, including all kinds of circuit configuration like single switch, half bridge, etc

### 产品特点 Features

#### 压接式IGBT模块

双面散热	Double-side Cooling
失效短路	Short-circuit Failure Mode
高热循环能力	High Thermal Cycling Capability
低杂散电感	Low Stray Inductance

#### 高压IGBT模块

高直流稳定性	High DC Stability
高短路能力	High Short Circuit Capability
低饱和电压	Low Vce(sat)
正温度系数电压	Vce(sat) With Positive Temperature Coefficient
低杂散电感	Low Inductance Module Structure
高功率循环与热循环能力	High Power And Thermal Cycling Capability

#### 中低压IGBT模块

铜基板	Cu Baseplate
增强型氧化铝衬板	Enhanced Al <sub>2</sub> O <sub>3</sub> Substrate
高热循环能力	High Thermal Cycling Capability
10μs短路承受能力	10μs Short Circuit Withstand

### 主要应用领域 Main Applications

#### 压接式IGBT模块

柔直换流阀	MMC-HVDC Valve
直流断路器	DC Breaker
海上风电	Off-shore Wind Power
大型工业传动	Large-scale Industrial Drive

#### 高压IGBT模块

电力牵引	Electric Traction
柔性输电	Flexible Power Transmission
风力发电	Wind Power
电力补偿	Power Compensator
电机驱动	Motor Drive

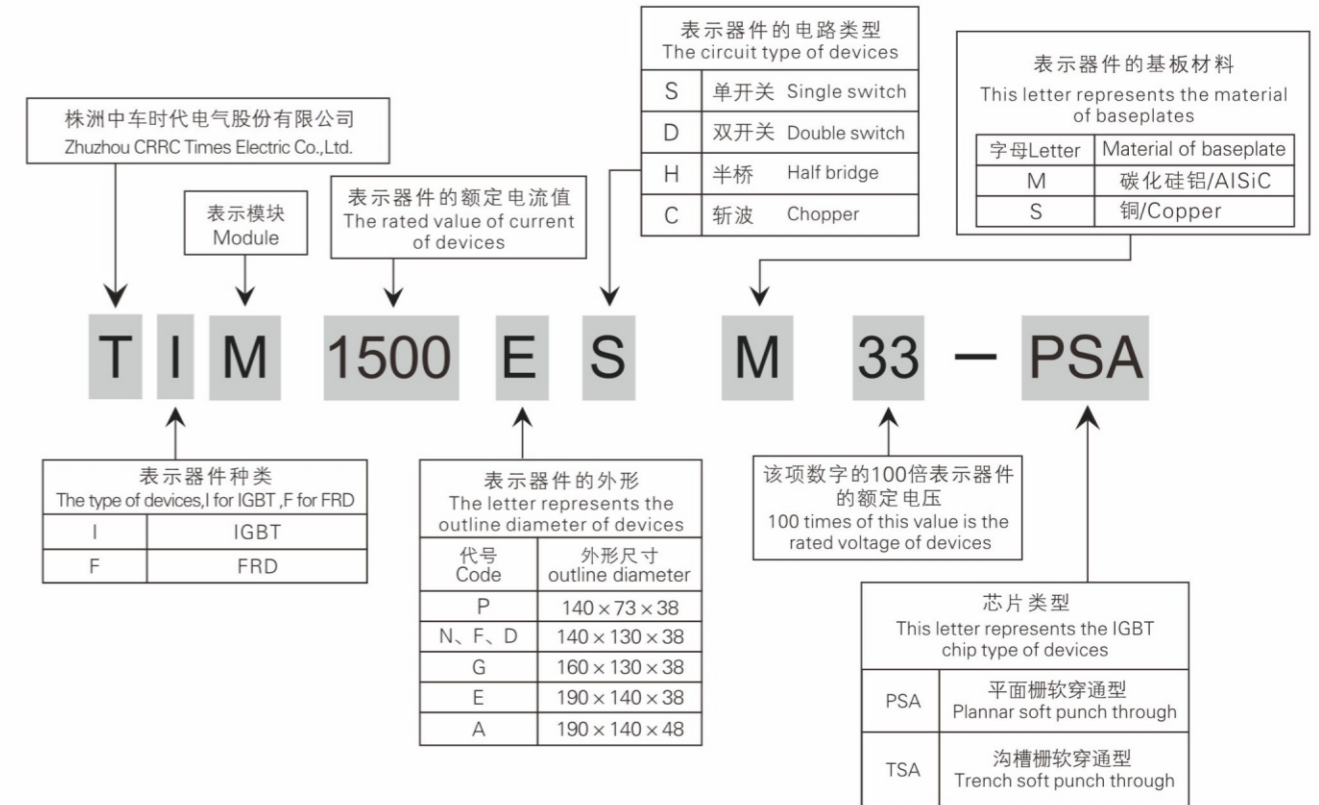
#### 中低压IGBT模块

电动汽车	EV/HEV
马达驱动	Motor Drive
充电装置	Power Charging Equipment
无功补偿	Reactive Compensation
高可靠性逆变器	High Reliability Inverter

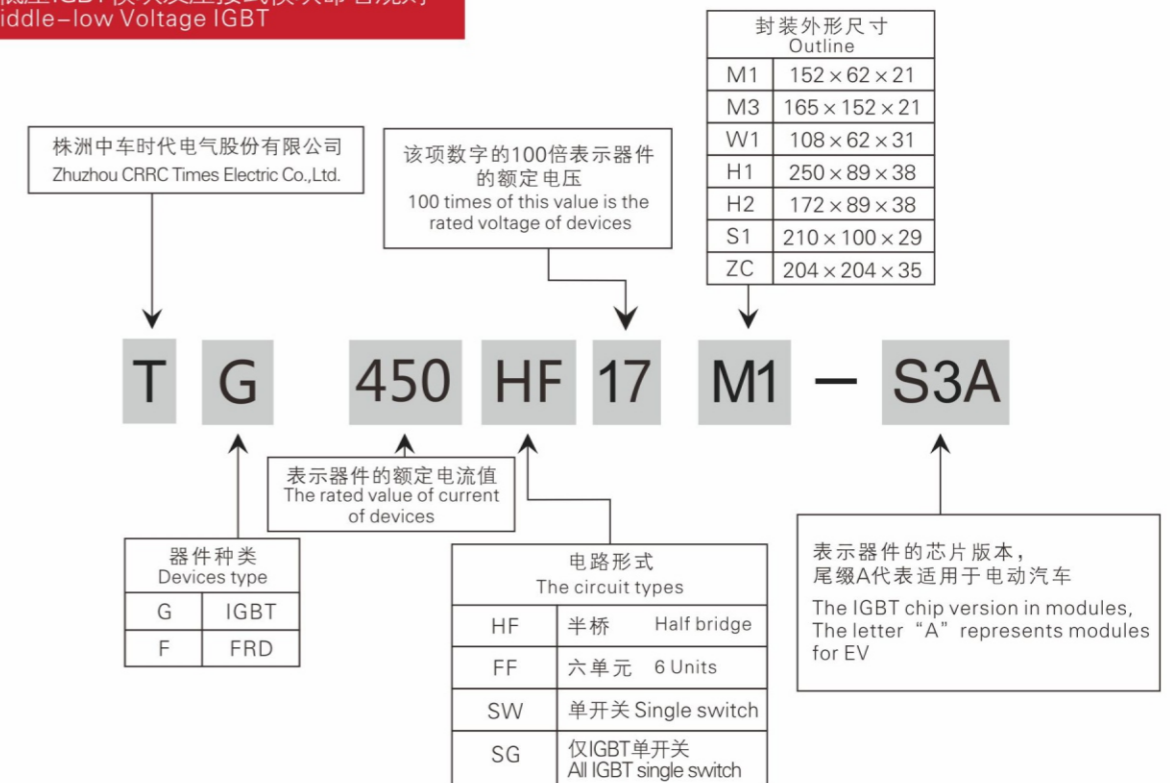


型号 Type	$I_C$		$V_{CES}$	$I_{CRM}$	$V_{CEISAT}$ @ $I_C$ & $T_C=25^\circ C$	$E_{SW}$ @ $T_{VJM}$	$T_{VJM}$	$R_{thJC IGBT}$	封装外形 Assembly Outline		
	A	@ $T_C$ (S模块为T <sub>C</sub> ) °C							V	A	V
电压至: 750V											
TG600HF08M1-S3A	600	65	750	1200	1.5	76	175	0.09	M1	152×62×21	Cu
TG800FF08S1-S3A	550	65	750	1600	1.45	50	175	0.109	S1	216×100×29	Cu
TG600FF08S3-S3A	600	80	750	1200	1.35	41.5	175	0.134	S3	155×127×27	Cu
电压至: 1200V											
TG600HF12M1-S3A	600	85	1200	1200	1.7	139	150	0.049	M1	152×62×21	Cu
TG450HF12M1-S3A	450	95	1200	900	1.65	78	150	0.052	M1	152×62×21	Cu
电压至: 1700V											
TIM800DDM17-PSA	800	80	1700	1600	2.3	520	125	0.018	DD	140×130×38	AlSiC
TIM800DCM17-PSA	800	80	1700	1600	2.3	520	125	0.018	DC	140×130×38	AlSiC
TIM1600FSM17-PSA	1600	80	1700	3200	2.3	1210	125	0.009	FS	140×130×38	AlSiC
TIM2400NSM17-TSA	2400	85	1700	4800	2.1	2220	150	0.01	ES	140×130×38	AlSiC
TG1000HF17H1-S3	1000	100	1700	2000	1.85	745	150	0.02	H1	250×89×38	Cu
TG650HF17H2-S3	650	100	1700	1300	1.85	580	150	0.03	H2	172×89×38	Cu
TG450HF17M1-S3	450	85	1700	900	1.8	276	150	0.055	M1	152×62×21	Cu
电压至: 3300V											
TIM250PHM33-PSA	250	100	3300	500	2.5	965	150	0.048	PH	140×73×38	AlSiC
TIM500GDM33-PSA	500	95	3300	1000	2.1	2430	150	0.024	GD	160×130×38	AlSiC
TIM1000NSM33-PSA	1000	95	3300	2000	2.1	4650	150	0.012	NS	140×130×38	AlSiC
TIM1000ECM33-PSA	1000	95	3300	2000	2.1	4650	150	0.012	EC	190×140×38	AlSiC
TIM1500ESM33-PSA	1500	95	3300	3000	2.0	6600	150	0.008	ES	190×140×38	AlSiC
电压至: 4500V											
TIM1200ASM45-PSA	1200	85	4500	3000	2.3	10810	125	0.008	AS	190×140×48	AlSiC
TIM1200ESM45-PSA	1200	85	4500	2400	2.3	10810	125	0.008	ES	190×140×38	AlSiC
TG3000SW45ZC-P2	3000	90	4500	6000	2.65	34000	125	0.003	ZC	204×204×35	Cu
TG4000SW45ZC-P2	4000	90	4500	8000	2.65	45300	125	0.0023	ZC	204×204×35	Cu
TG4500SG45ZC-P2	4500	90	4500	9000	2.65	51100	125	0.002	ZC	204×204×35	Cu
TG2000SW45ZC-P2	2000	90	4500	4000	2.65	22900	125	0.0043	ZC	204×204×35	Cu
电压至: 6500V											
TIM750ASM65-PSA	750	80	6500	1500	3.0	10200	125	0.009	AS	190×140×48	AlSiC

高压IGBT模块产品命名规则 High Voltage IGBT

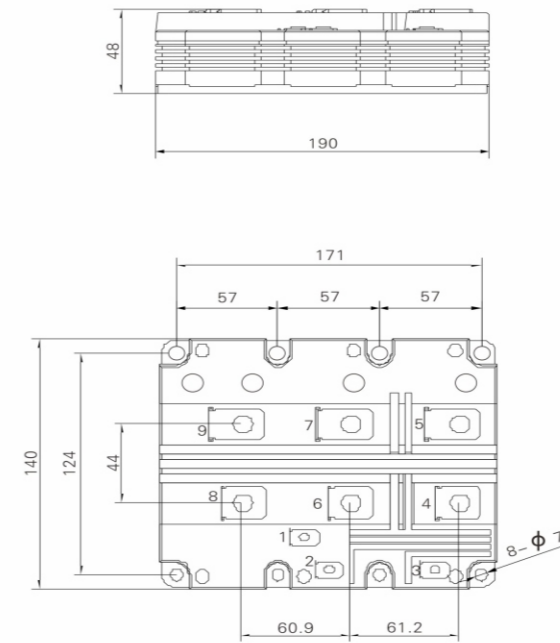


中低压IGBT模块及压接式模块命名规则 Middle-low Voltage IGBT

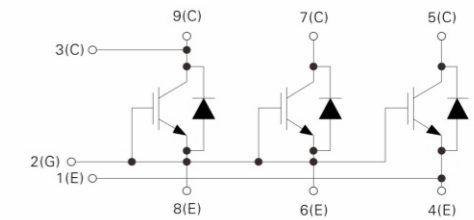




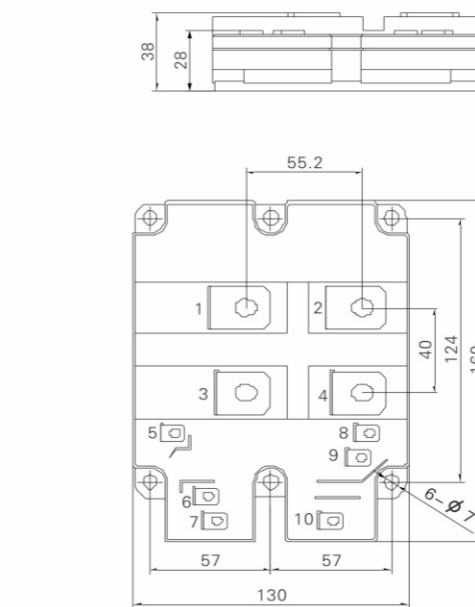
符号 Symbols	参数名称	Characteristics
$V_{CES}$	集电极-发射极电压	Collector-emitter voltage
$V_{GES}$	栅极-发射极电压	Gate-emitter voltage
$I_C$	集电极直流电流	DC collector current
$I_{CRM}$	集电极重复峰值电流	Peak collector current
$P_{tot}$	总耗散功率	Total power dissipation.
$V_{isol}$	绝缘电压	Isolation voltage
$Q_{PD}$	局部放电	Partial discharge
$R_{thJC IGBT}$	IGBT结壳热阻	IGBT thermal resistance junction to case
$R_{thJC Diode}$	二极管结壳热阻	Diode thermal resistance junction to case
$R_{thCH}$	接触热阻	IGBT thermal resistance case to heatsink
$T_{VJM}$	最高(等效)结温	Max. (Virtual) junction temperature
$T_{stg}$	存储温度	Storage temperature
$M$	安装力矩	Mounting torque
$I_{CES}$	集电极截止电流	Collector cut-off current
$I_{GES}$	栅极漏电流	Gate leakage current
$V_{GE(TH)}$	栅极-发射极阈值电压	Gate-Emitter threshold voltage
$V_{CE(sat)}$	集电极-发射极饱和电压	Collector-Emitter saturation voltage
$I_F$	二极管正向直流电流	Diode DC forward current
$I_{FRM}$	二极管正向重复峰值电流	Diode Peak forward current
$V_F$	二极管正向电压	Diode Forward voltage
$C_{ies}$	输入电容	Input capacitance
$Q_g$	栅极电荷	Gate charge
$C_{res}$	反向传输电容	Reverse transfer capacitance
$I_{SC}$	短路电流	Short circuit current
$t_{d(off)}$	关断延迟时间	Turn-off delay time
$t_f$	下降时间	Fall time
$E_{OFF}$	关断损耗	Turn-off switching energy
$t_{d(on)}$	开通延迟时间	Turn-on delay time.
$t_r$	上升时间	Rise time
$E_{ON}$	开通损耗	Turn-on switching energy
$Q_{rr}$	二极管反向恢复电荷	Diode Reverse recovery charge
$I_{rr}$	二极管反向恢复电流	Diode Reverse recovery current
$E_{rec}$	二极管反向恢复损耗	Diode Reverse recovery energy
$E_{SW}$	IGBT总开关损耗	IGBT total switching energy ( $E_{on}+E_{off}$ )



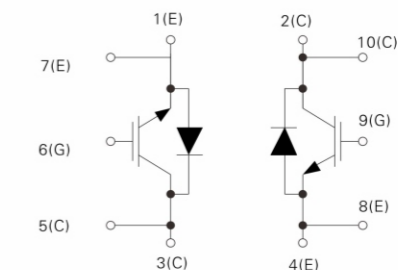
重量: 1700g    Nominal weight: 1700g  
封装类型AS:    Package type: AS



1-辅助发射极    1-Aux Emitter  
2-栅极    2-Gate  
3-辅助集电极    3-Aux Collector  
4,6,8-发射极    4,6,8-Emitter  
5,7,9-集电极    5,7,9-Collector

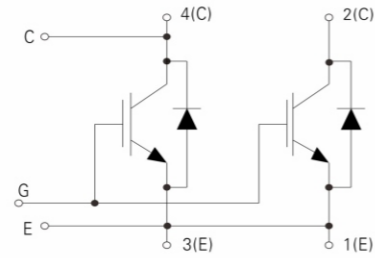
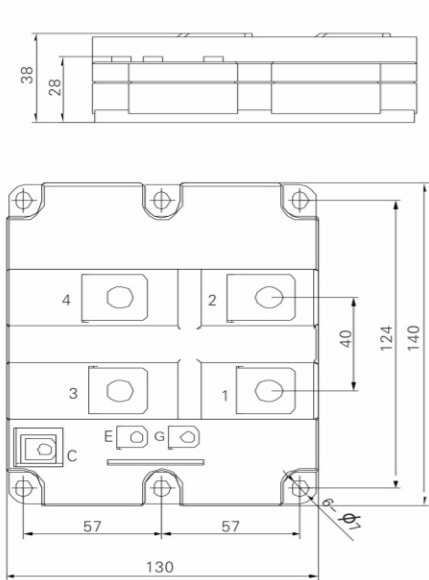


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封装类型: GD    Package type: GD



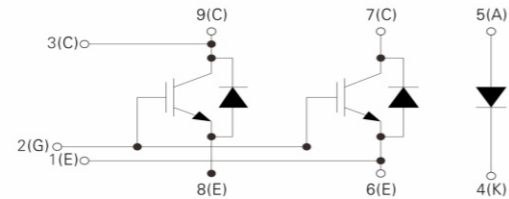
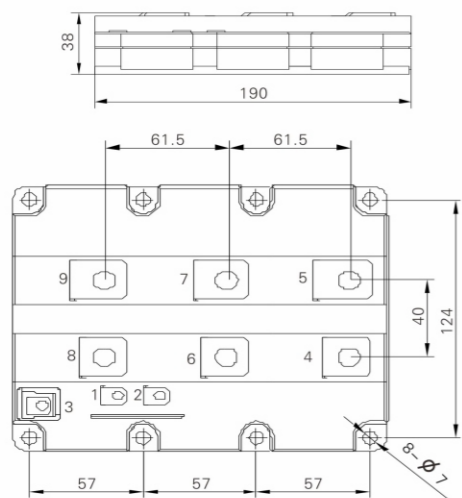
1,4-发射极    1,4-Emitter  
2,3-集电极    2,3-Collector  
5,10-辅助发射极    5,10-Aux emitter  
6,9-栅极    6,9-Gate  
7,8-辅助发射极    7,8-Aux emitter





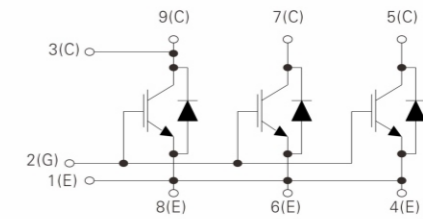
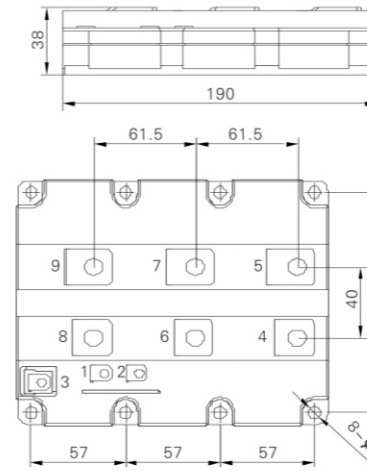
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|---------|-----------------|
| 1,3-发射极 | 1,3-Emitter     |
| 2,4-发射极 | 2,4-Collector   |
| C-辅助集电极 | C-Aux collector |
| E-辅助发射极 | E-Aux emitter   |
| G-栅极    | G-Gate          |

重量: 1050g      Nominal weight: 1050g  
 封装类型: NS      Package type: NS



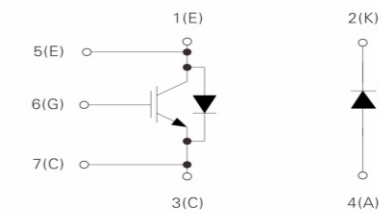
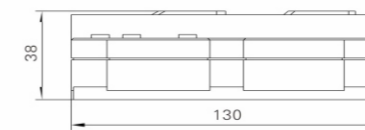
- |           |                   |
|-----------|-------------------|
| 1 - 辅助发射极 | 1 - Aux emitter   |
| 2 - 栅极    | 2 - Gate          |
| 3 - 辅助集电极 | 3 - Aux collector |
| 4 - 二极管正极 | 4 - Diode anode   |
| 5 - 二极管负极 | 5 - Diode cathode |
| 6,8 - 发射极 | 6,8 - Emitter     |
| 7,9 - 集电极 | 7,9 - Collector   |

重量: 1400g      Nominal weight: 1400g  
 封装类型: EC      Package type: EC



- |             |                   |
|-------------|-------------------|
| 1 - 辅助发射极   | 1 - Aux emitter   |
| 2 - 栅极      | 2 - Gate          |
| 3 - 辅助集电极   | 3 - Aux collector |
| 4,6,8 - 发射极 | 4,6,8 - Emitter   |
| 5,7,9 - 集电极 | 5,7,9 - Collector |

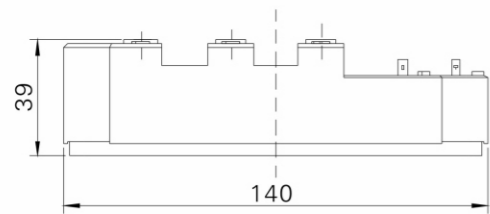
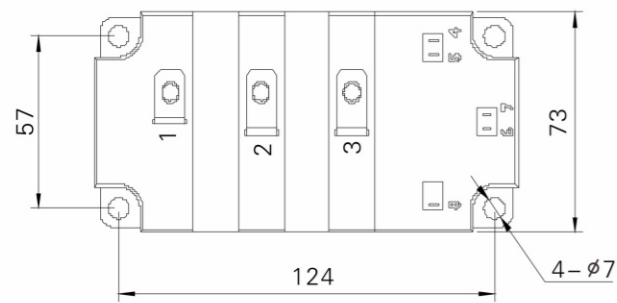
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 封装类型: ES      Package type: ES



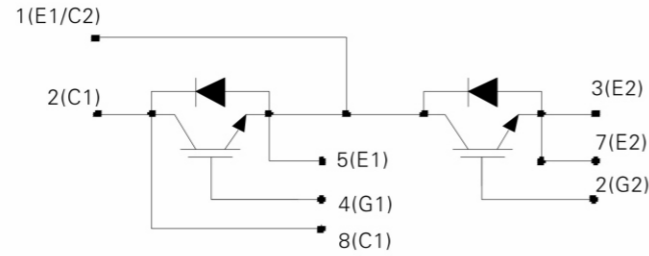
- |           |                   |
|-----------|-------------------|
| 1 - 发射极   | 1 - Emitter       |
| 2 - 二极管负极 | 2 - Diode cathode |
| 3 - 集电极   | 3 - Collector     |
| 4 - 二极管正极 | 4 - Diode anode   |
| 5 - 辅助发射极 | 5 - Aux emitter   |
| 6 - 栅极    | 6 - Gate          |
| 7 - 辅助集电极 | 7 - Aux collector |

重量: 900g      Nominal weight: 900g  
 封装类型: DC      Package type: DC

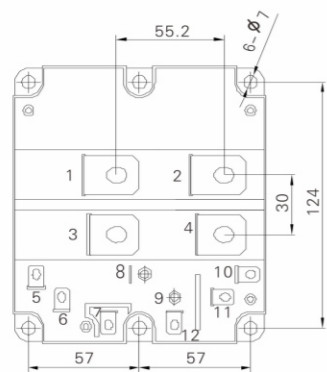
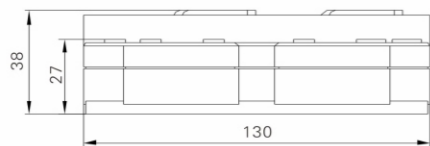




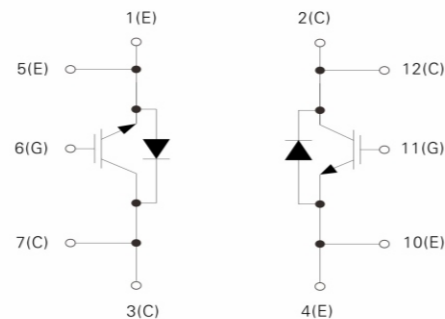
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封装类型: PH      Package type: PH



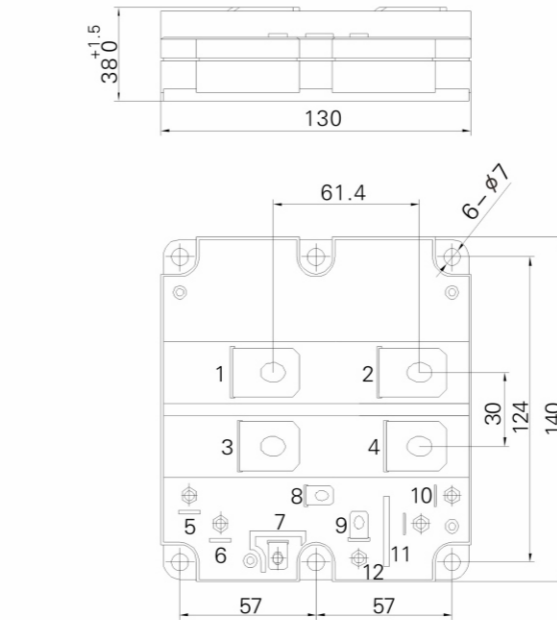
- |            |                     |
|------------|---------------------|
| 1-发射极/集电极  | 1-Emitter/Collector |
| 2-集电极      | 2-Collector         |
| 3-发射极      | 3-Emitter           |
| 4, 6-栅极    | 4, 6-Gate           |
| 5, 7-辅助发射极 | 5, 7-Aux Emitter    |
| 8-辅助集电极    | 8-Aux Collector     |



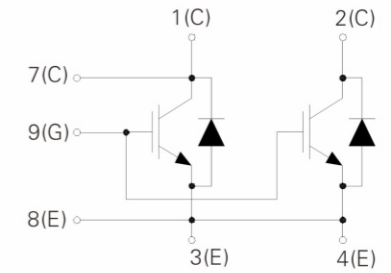
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封装类型: DD      Package type: DD



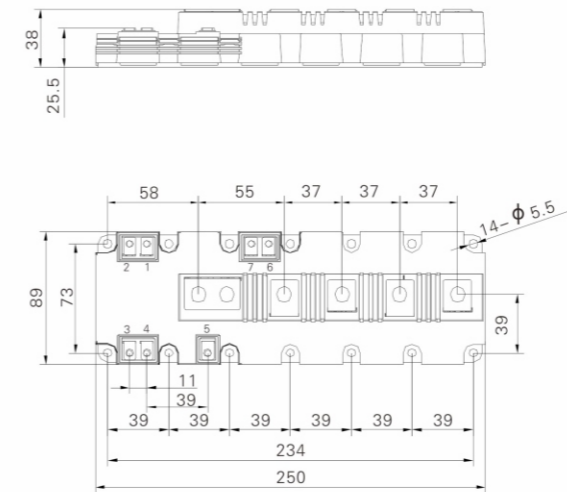
- |            |                      |
|------------|----------------------|
| 1,4-集电极    | 1,4 - Collector      |
| 2,3-发射极    | 2,3 - Emitter        |
| 5,10-辅助发射极 | 5,10 - Aux emitter   |
| 6,11-栅极    | 6,11 - Gate          |
| 7,12-辅助集电极 | 7,12 - Aux collector |



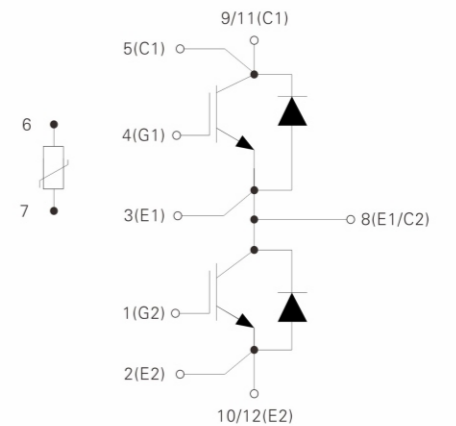
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封装类型: FS      Package type: FS



- |         |                   |
|---------|-------------------|
| 1,2-集电极 | 1,2 - Collector   |
| 3,4-发射极 | 3,4 - Emitter     |
| 7-辅助集电极 | 7 - Aux Collector |
| 8-辅助发射极 | 8 - Aux Emitter   |
| 9-栅极    | 9 - Gate          |

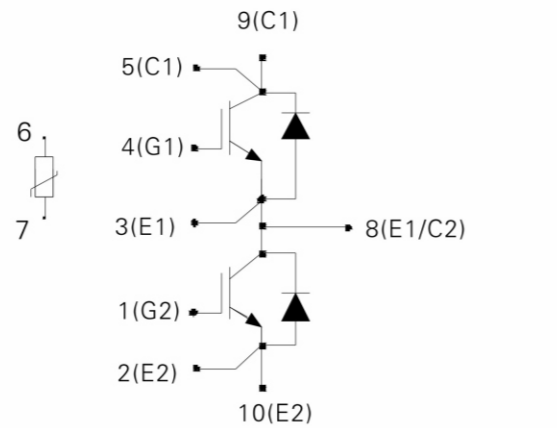
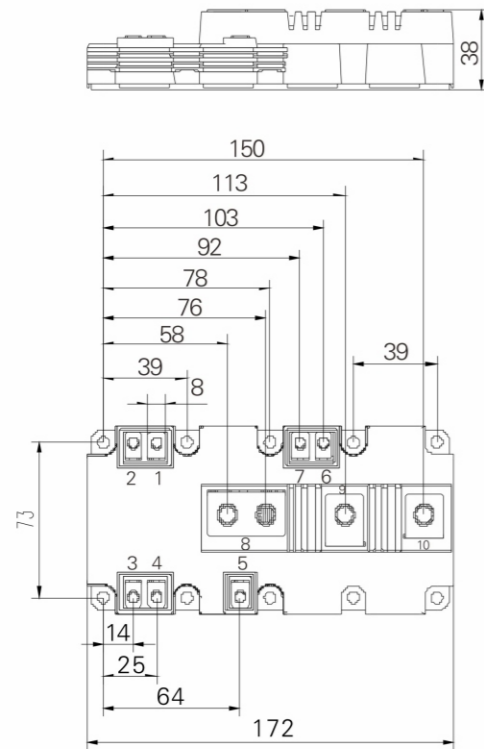


重量: 1200g      Nominal weight: 1200g  
封装类型: H1      Package type: H1



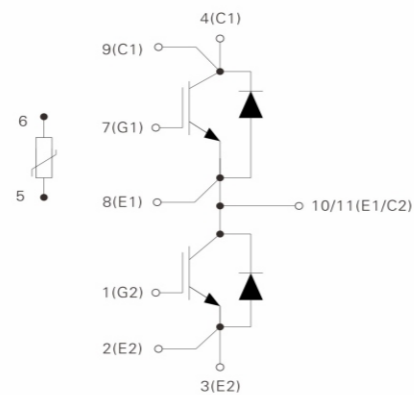
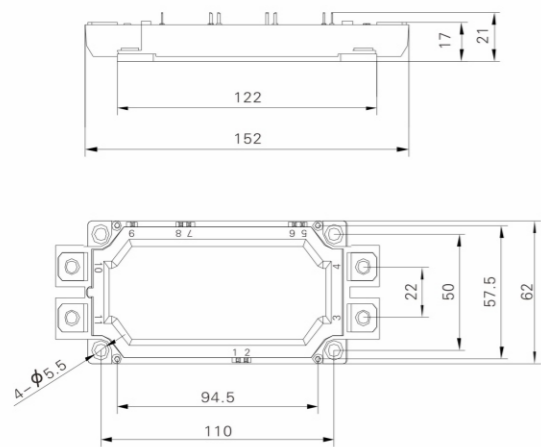
- |             |                     |
|-------------|---------------------|
| 1,4 - 栅极    | 1,4-Gate            |
| 2,3 - 辅助发射极 | 2,3-Aux emitter     |
| 5 - 辅助集电极   | 5- Aux collector    |
| 6,7 - 热敏电阻  | 6,7-NTC thermistor  |
| 8 - 发射极/集电极 | 8-Emitter/Collector |
| 9,11 - 集电极  | 9,11-Collector      |
| 10,12 - 发射极 | 10,12-Emitter       |





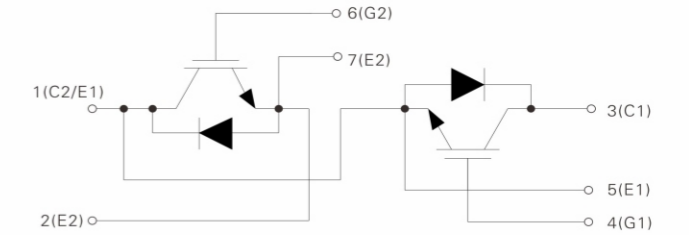
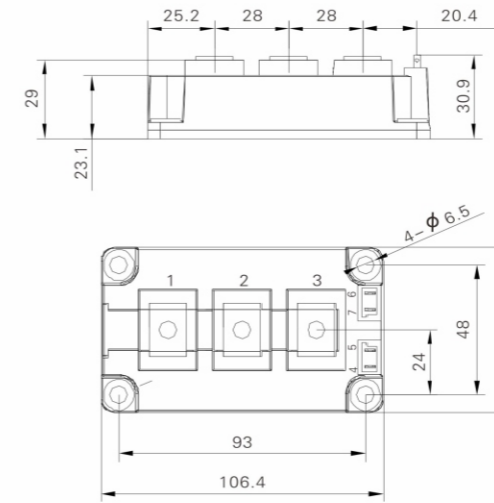
- |           |                     |
|-----------|---------------------|
| 1,4-栅极    | 1,4-Gate            |
| 2,3-辅助发射极 | 2,3-Aux Emitter     |
| 5-辅助集电极   | 5-Aux Collector     |
| 6,7-热敏电阻  | 6,7-NTC Thermistor  |
| 8-发射极/集电极 | 8-Emitter/Collector |
| 9,11-集电极  | 9,11-Collector      |
| 10,12-发射极 | 10,12-Emitter       |

重量: 900g Nominal weight:900g  
封装类型: H2 Package type:H2



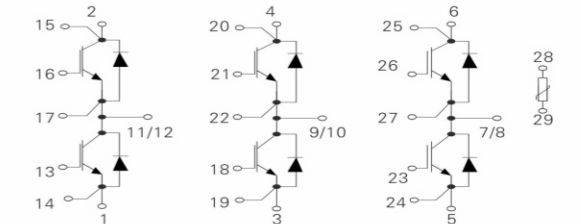
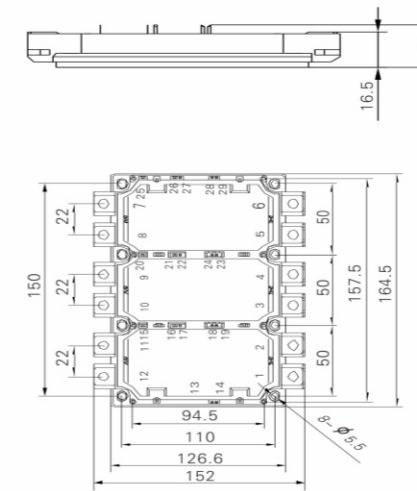
- |               |                         |
|---------------|-------------------------|
| 1,7-栅极        | 1,7-Gate                |
| 2,8-辅助发射极     | 2,8-Aux emitter         |
| 3-发射极         | 3- Emitter              |
| 4-集电极         | 4-Collector             |
| 5,6-热敏电阻      | 5,6-NTC thermistor      |
| 9-辅助集电极       | 9-Aux Collector         |
| 10,11-发射极/集电极 | 10,11-Emitter/Collector |

重量: 350g Nominal weight: 350g  
封装类型: M1 Package type: M1



- |           |                     |
|-----------|---------------------|
| 1-集电极/发射极 | 1-Collector/Emitter |
| 2-发射极     | 2-Emitter           |
| 3-集电极     | 3-Collector         |
| 4,6-栅极    | 4,6-Gate            |
| 5,7-辅助发射极 | 5,7-Aux emitter     |

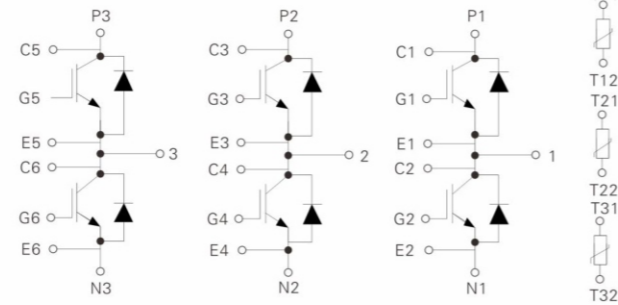
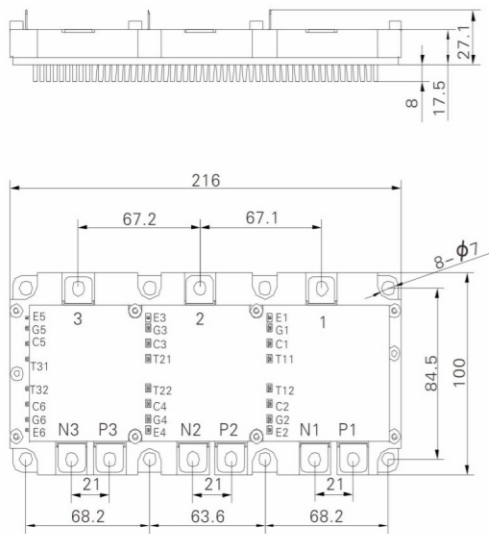
重量: 350g Nominal weight: 350g  
封装类型: W1 Package type: W1



- |                         |                                  |
|-------------------------|----------------------------------|
| 1,3,5-发射极               | 1,3,5-Emitter                    |
| 2,4,6-集电极               | 2,4,6-Collector                  |
| 7/8,9/10,11/12-发射极/集电极  | 7/8,9/10,11/12-Collector/Emitter |
| 13,16,18,21,23,26-栅极    | 13,16,18,21,23,26-Gate           |
| 14,17,19,22,24,27-辅助发射极 | 14,17,19,22,24,27-Aux emitter    |
| 15,20,25-辅助集电极          | 15,20,25-Aux collector           |
| 28,29-热敏电阻              | 28,29-NTC thermistor             |

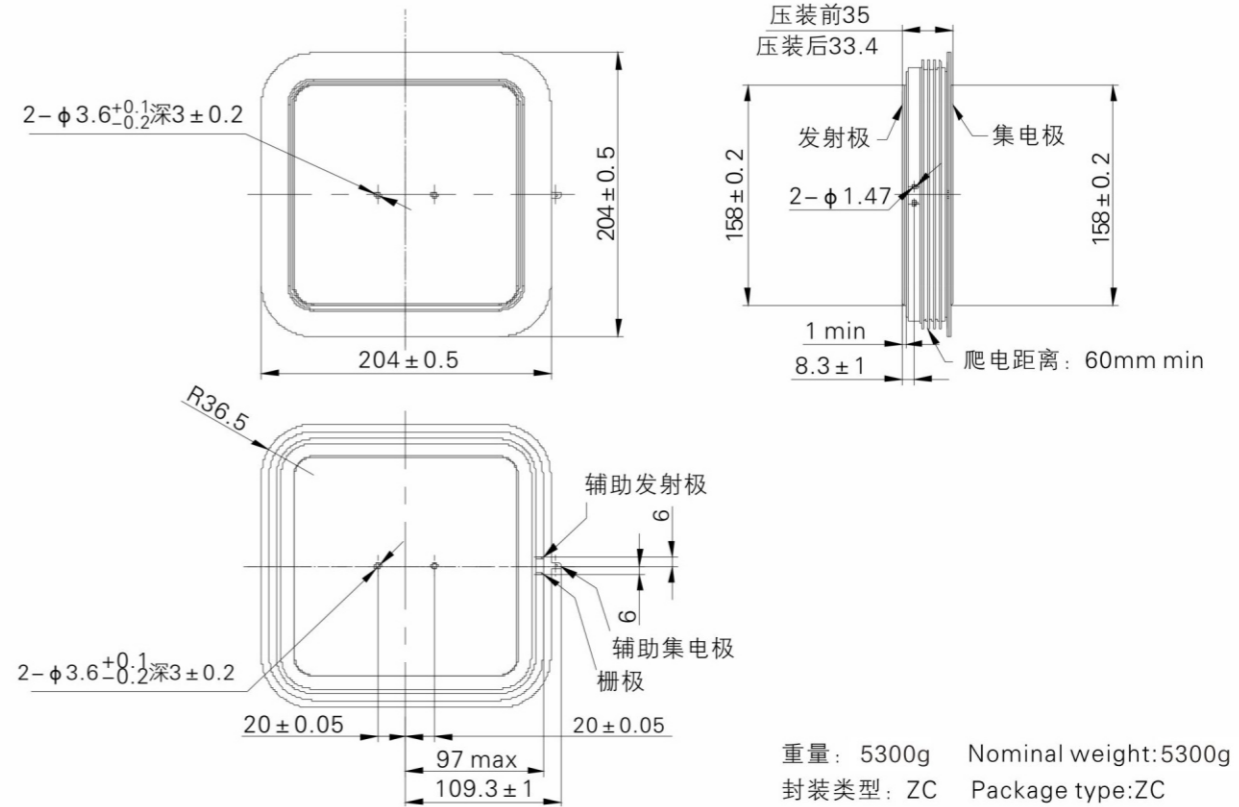
重量: 924g Nominal weight: 924g  
封装类型: M3 Package type: M3



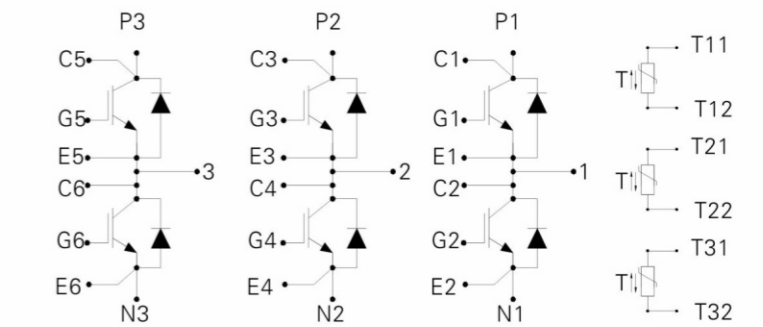
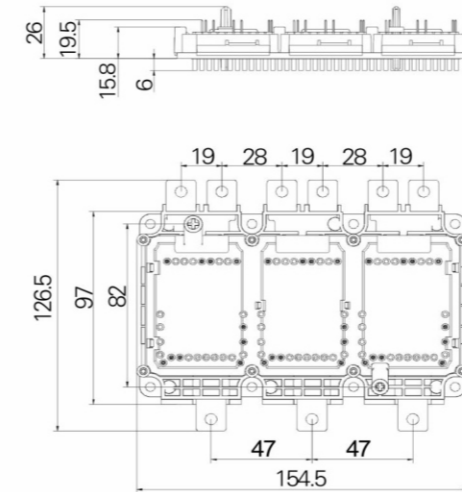


P1,P2,P3-集电极 P1,P2,P3-AC collector  
 N1,N2,N3-发射极 N1,N2,N3-DC emitter  
 1,2,3-发射极/集电极 1,2,3-Emitter/Collector  
 G1,G2,G3,G4,G5,G6-栅极 G1,G2,G3,G4,G5,G6-Gate  
 E1,E2,E3,E4,E5,E6-辅助发射极 E1,E2,E3,E4,E5,E6-Aux emitter  
 C1,C2,C3,C4,C5,C6-辅助集电极 C1,C2,C3,C4,C5,C6-Aux collector  
 T11/T12,T21/T22,T31/T32-热敏电阻 T11/T12,T21/T22,T31/T32-NTC thermistor

重量: 1250g Nominal weight: 1250g  
 封装类型: S1 Package type: S1



重量: 5300g Nominal weight: 5300g  
 封装类型: ZC Package type: ZC



重量: 800g Nominal weight: 800g  
 封装类型: S3 Package type: S3

G1,G2,G3,G4,G5,G6-栅极 G1,G2,G3,G4,G5,G6-Gate  
 E1,E2,E3,E4,E5,E6-辅助发射极 E1,E2,E3,E4,E5,E6-Aux Emitter  
 C1,C2,C3,C4,C5,C6-辅助集电极 C1,C2,C3,C4,C5,C6-Aux Collector  
 T11/T12,T21/T22,T31/T32-热敏电阻 T11/T12,T21/T22,T31/T32-NTC Thermistor  
 1,2,3-发射极/集电极 1,2,3-Emitter/Collector  
 P1,P2,P3-AC集电极 P1,P2,P3-AC Collector  
 N1,N2,N3-DC发射极 N1,N2,N3-DC Emitter

# 02

## 晶闸管及整流管

### THYRISTORS & RECTIFIER DIODES

主要产品：普通整流管、普通晶闸管、快速晶闸管、双向晶闸管、脉冲功率器件

Main Products: Rectifier diodes, Phase control thyristors, Fast switching thyristors, Bi-directional control thyristors, Pulsed power devices



## 产品特点 Features

分布门极设计	Distributed Gate Design
di/dt能力高	High di/dt Capability
低损耗	Low Loss
关断时间短	Short Turn-off Time

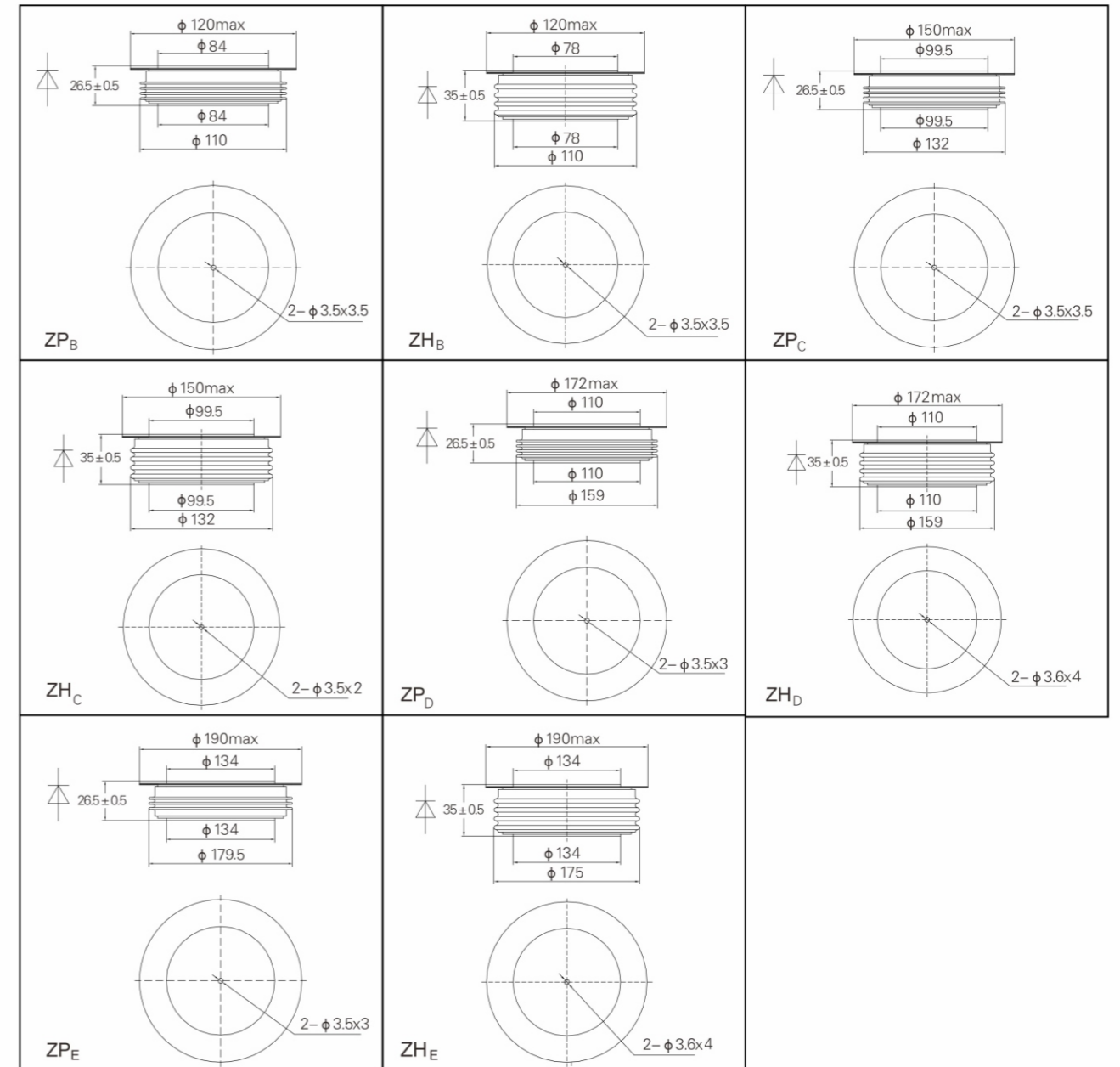
## 主要应用领域 Main Applications

高压直流输电	High Voltage Direct Current(HVDC) Transmission
牵引与传动	Traction And Transmission
静止无功补偿	Static Var Compensator(SVC)
感应加热	Inductive Heating
软启动	Soft Starter
大电流电源	High Current Power Supply
励磁	Excitation



全压接型 ( Free Floating Type )

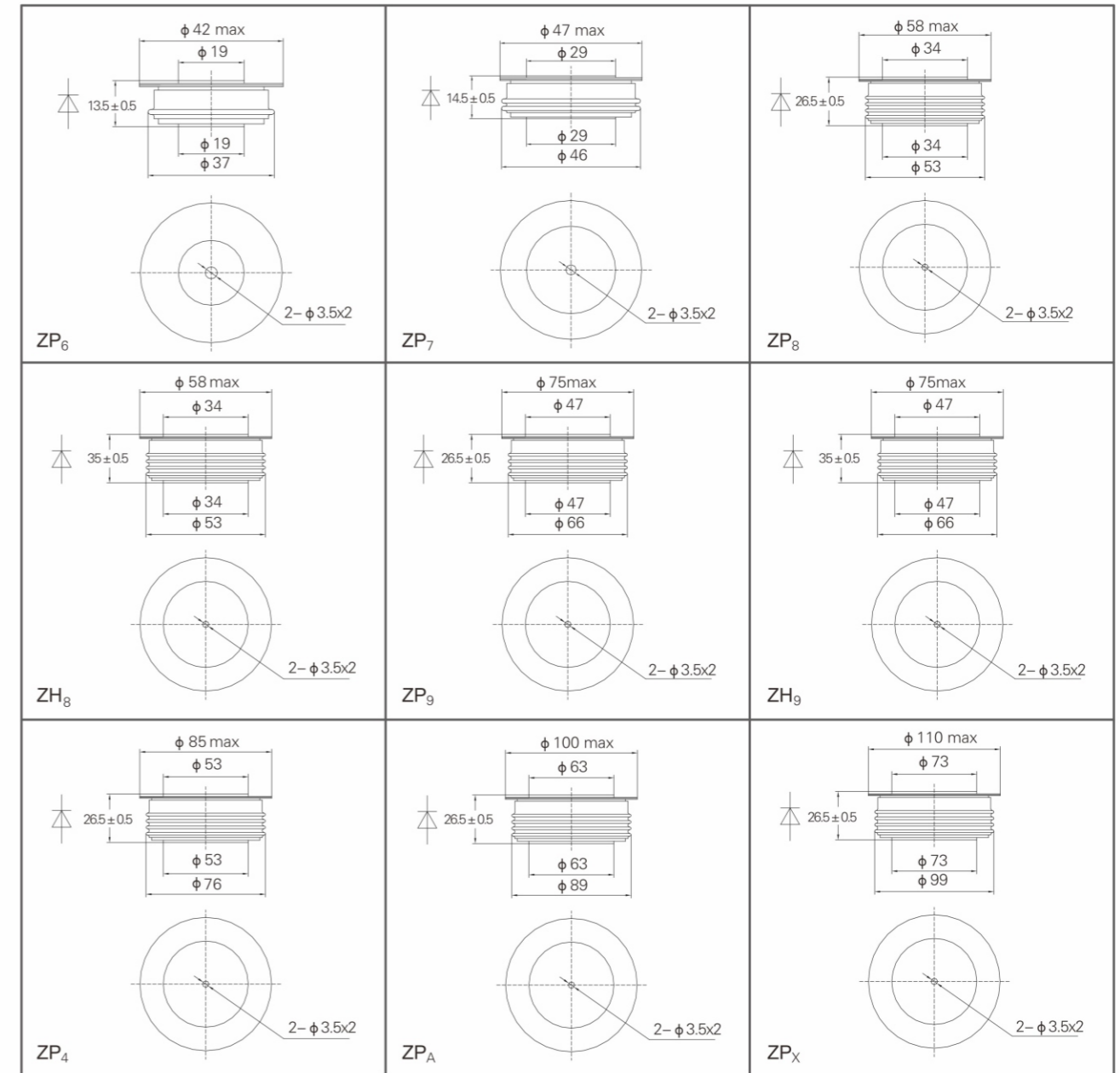
型号 TYPE -**= $V_{RRM}/100$	$I_{F(AV)}$		$V_{RSM}$	$V_{RRM}$	$I_{FSM}$ @ $T_{VJM}$ &10ms	$V_{FM}$ @ $I_{FM}$ & $T_C=T_{VJM}$	$V_{F0}$ @ $T_{VJM}$	$r_F$ @ $T_{VJM}$	$T_{VJM}$	$R_{thJC}$	$R_{thCH}$	$F$ $\pm 10\%$	外形 Outline	
	A	$^{\circ}C$												
电压至2200V ( Up to 2200V )														
ZP <sub>B</sub> 6900-**	6940	90	1600-2200	1600-2200	78.0	6000	1.09	0.82	0.045	175	0.007	0.002	70	ZP <sub>B</sub>
ZP <sub>C</sub> 7500-**	7570	90	1600-2200	1600-2200	94.0	6000	1.03	0.82	0.035	160	0.0057	0.0015	90	ZH <sub>C</sub>
ZP <sub>D</sub> 10000-**	10200	85	1600-2200	1600-2200	125.0	6000	0.98	0.77	0.035	160	0.004	0.0008	120	ZH <sub>D</sub>
电压至3400V ( Up to 3400V )														
ZP <sub>B</sub> 5600-**	5660	90	2400-3400	2400-3400	64.2	6000	1.29	0.80	0.082	175	0.007	0.002	70	ZP <sub>B</sub>
ZP <sub>C</sub> 6800-**	6800	90	2400-3400	2400-3400	84.4	6000	1.17	0.75	0.070	160	0.0057	0.0015	90	ZH <sub>C</sub>
ZP <sub>D</sub> 9000-**	9000	85	2400-3400	2400-3400	118.0	6000	1.06	0.72	0.057	160	0.004	0.0008	120	ZH <sub>D</sub>
ZP <sub>E</sub> 12000-**	12080	85	2400-3400	2400-3400	133.0	6000	0.97	0.68	0.048	160	0.0028	0.0005	180	ZH <sub>E</sub>
电压至4500V ( Up to 4500V )														
ZP <sub>B</sub> 4600-**	4630	90	3600-4500	3600-4500	59.4	6000	1.50	0.98	0.086	160	0.007	0.002	70	ZP <sub>B</sub>
ZP <sub>C</sub> 5600-**	5600	90	3600-4500	3600-4500	79.0	6000	1.32	0.80	0.086	160	0.0057	0.0015	90	ZH <sub>C</sub>
ZP <sub>D</sub> 6200-**	6280	100	3600-4500	3600-4500	99.4	6000	1.19	0.80	0.065	150	0.004	0.0008	120	ZH <sub>D</sub>
电压至5500V ( Up to 5500V )														
ZP <sub>B</sub> 3600-**	3600	90	4600-5500	4600-5500	53.9	3000	1.26	0.90	0.120	160	0.009	0.002	70	ZH <sub>B</sub>
ZP <sub>C</sub> 4700-**	4710	100	4600-5500	4600-5500	74.0	6000	1.44	0.82	0.104	160	0.0057	0.0015	90	ZH <sub>C</sub>
ZP <sub>D</sub> 6100-**	6140	100	4600-5500	4600-5500	96.9	6000	1.21	0.79	0.070	150	0.004	0.0008	120	ZH <sub>D</sub>
ZP <sub>E</sub> 8200-**	8270	100	4600-5500	4600-5500	120.0	6000	1.10	0.74	0.060	150	0.0028	0.0005	180	ZH <sub>E</sub>
电压至6500V ( Up to 6500V )														
ZP <sub>B</sub> 2600-**	2670	100	5600-6500	4900-6000	51.0	3000	1.35	0.90	0.150	150	0.009	0.002	70	ZH <sub>B</sub>
ZP <sub>C</sub> 3900-**	3960	100	5600-6500	4900-6000	61.5	6000	1.56	0.84	0.120	150	0.0057	0.0015	90	ZH <sub>C</sub>
ZP <sub>D</sub> 5500-**	5520	100	5600-6500	4900-6000	88.4	6000	1.37	0.83	0.090	150	0.004	0.0008	120	ZH <sub>D</sub>
电压至8500V ( Up to 8500V )														
ZP <sub>D</sub> 5000-**	5030	100	6600-7200	6100-6700	80.4	6000	1.58	0.95	0.105	150	0.004	0.0008	120	ZH <sub>D</sub>
ZP <sub>B</sub> 2200-**	2260	100	7400-8500	6900-8000	42.5	3000	1.70	1.07	0.210	150	0.009	0.002	70	ZH <sub>B</sub>
ZP <sub>C</sub> 3300-**	3360	100	7400-8500	6900-8000	53.0	6000	2.05	1.21	0.140	150	0.0057	0.0015	90	ZH <sub>C</sub>
ZP <sub>D</sub> 4800-**	4800	100	7400-8500	6900-8000	76.2	6000	1.66	1.00	0.115	150	0.004	0.0008	120	ZH <sub>D</sub>
ZP <sub>E</sub> 6500-**	6510	100	7400-8500	6900-8000	112.0	6000	1.59	1.05	0.090	150	0.0028	0.0005	180	ZH <sub>E</sub>



注：未标注数量单位的统一为毫米 ( mm )。  
Remark: All dimensions shown in mm unless stated otherwise.

烧结型 (Alloying Type)

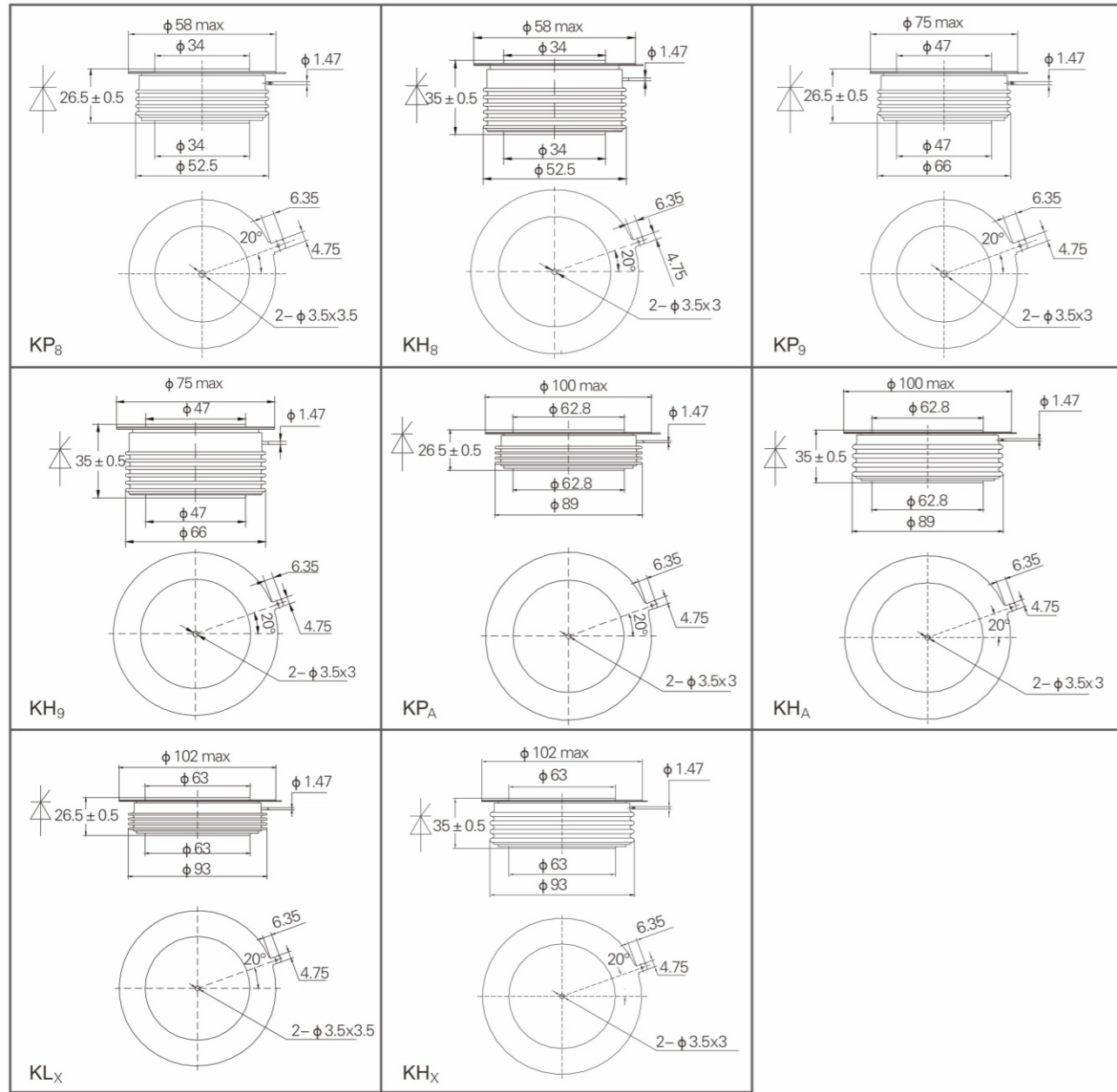
型号 TYPE -**= $V_{RRM}/100$	$I_{F(AV)}$	$V_{RRM}$	$I_{FSM}$	$V_{FM}$		$V_{FO}$	$r_F$	$T_{VJM}$	$R_{thJC}$	$R_{thCH}$	$F$	外形 Outline
	@ $T_C=100^\circ\text{C}$	V	@ $T_{VJM}$ &10ms	@ $I_{FM}$	@ $T_C=25^\circ\text{C}$	@ $T_{VJM}$	@ $T_{VJM}$	$^\circ\text{C}$	K/W	K/W	$\pm 10\%$ kN	
电压至1400V (Up to 1400V)												
ZP <sub>6</sub> 500-**	520	600-1400	5.9	800	1.45	0.80	0.657	190	0.08	0.020	5	ZP <sub>6</sub>
ZP <sub>7</sub> 1300-**	1360	600-1400	15.2	1500	1.30	0.78	0.257	190	0.035	0.010	10	ZP <sub>7</sub>
ZP <sub>8</sub> 1500-**	1510	600-1400	16.8	1500	1.20	0.78	0.188	190	0.035	0.008	15	ZP <sub>8</sub>
ZP <sub>9</sub> 2700-**	2770	600-1400	31.0	1500	1.05	0.78	0.092	190	0.02	0.005	22	ZP <sub>9</sub>
ZP <sub>4</sub> 3200-**	3220	600-1400	35.8	3000	1.15	0.77	0.073	190	0.018	0.005	30	ZP <sub>4</sub>
ZP <sub>A</sub> 4600-**	4650	600-1400	45.0	3000	1.05	0.76	0.051	190	0.0125	0.004	45	ZP <sub>A</sub>
ZP <sub>X</sub> 6000-**	6080	600-1400	60.0	3000	1.05	0.76	0.035	190	0.01	0.003	56	ZP <sub>X</sub>
电压至2200V (Up to 2200V)												
ZP <sub>6</sub> 400-**	410	1600-2200	4.9	800	1.85	0.82	1.110	175	0.08	0.020	5	ZP <sub>6</sub>
ZP <sub>7</sub> 900-**	990	1600-2200	12.5	1500	1.60	0.82	0.433	175	0.035	0.010	10	ZP <sub>7</sub>
ZP <sub>8</sub> 1100-**	1100	1600-2200	13.9	1500	1.45	0.82	0.318	175	0.035	0.008	15	ZP <sub>8</sub>
ZP <sub>9</sub> 2000-**	2030	1600-2200	25.7	1500	1.20	0.82	0.156	175	0.02	0.005	22	ZP <sub>9</sub>
ZP <sub>4</sub> 2300-**	2360	1600-2200	29.8	3000	1.35	0.81	0.125	175	0.018	0.005	30	ZP <sub>4</sub>
ZP <sub>A</sub> 3400-**	3430	1600-2200	42.2	3000	1.20	0.79	0.086	175	0.0125	0.004	45	ZP <sub>A</sub>
ZP <sub>X</sub> 4400-**	4460	1600-2200	56.4	3000	1.15	0.81	0.059	175	0.01	0.003	56	ZP <sub>X</sub>
电压至3400V (Up to 3400V)												
ZP <sub>7</sub> 800-**	850	2400-3400	10.8	1500	1.95	0.88	0.613	175	0.035	0.010	10	ZP <sub>7</sub>
ZP <sub>8</sub> 900-**	960	2400-3400	12.0	1500	1.70	0.88	0.450	175	0.035	0.008	15	ZP <sub>8</sub>
ZP <sub>9</sub> 1800-**	1830	2400-3400	23.0	1500	1.35	0.88	0.200	175	0.02	0.005	22	ZP <sub>9</sub>
ZP <sub>4</sub> 2000-**	2050	2400-3400	25.8	3000	1.55	0.86	0.180	175	0.018	0.005	30	ZP <sub>4</sub>
ZP <sub>A</sub> 2900-**	2980	2400-3400	36.5	3000	1.35	0.82	0.128	175	0.0125	0.004	45	ZP <sub>A</sub>
ZP <sub>X</sub> 3900-**	3920	2400-3400	49.5	3000	1.25	0.85	0.084	175	0.01	0.003	56	ZP <sub>X</sub>
电压至4500V (Up to 4500V)												
ZP <sub>8</sub> 600-**	640	3600-4500	10.6	1500	1.80	0.96	0.604	150	0.035	0.008	15	ZP <sub>8</sub>
ZP <sub>9</sub> 1200-**	1200	3600-4500	19.6	1500	1.55	0.96	0.296	150	0.02	0.005	22	ZP <sub>9</sub>
ZP <sub>4</sub> 1300-**	1370	3600-4500	22.8	3000	1.80	0.96	0.235	150	0.018	0.005	30	ZP <sub>4</sub>
ZP <sub>A</sub> 1900-**	1980	3600-4500	32.0	3000	1.60	0.96	0.162	150	0.0125	0.004	45	ZP <sub>A</sub>
ZP <sub>X</sub> 2600-**	2680	3600-4500	42.6	3000	1.35	0.80	0.135	150	0.01	0.003	56	ZP <sub>X</sub>
电压至6500V (Up to 6500V)												
ZP <sub>X</sub> 2100-**	2140	4600-5200	35.0	3000	1.60	1.00	0.195	150	0.01	0.003	56	ZP <sub>X</sub>
ZP <sub>A</sub> 1400-**	1470	5400-6500	25.7	3000	1.90	1.00	0.290	150	0.015	0.004	45	ZP <sub>A</sub>
ZP <sub>X</sub> 1900-**	1950	5400-6500	30.0	3000	1.80	1.21	0.230	150	0.01	0.003	56	ZP <sub>X</sub>
ZP <sub>8</sub> 600-**	600	5000-6500	9.5	1500	1.90	0.95	0.800	150	0.035	0.008	15	ZP <sub>8</sub> /ZH <sub>8</sub>
ZP <sub>9</sub> 1000-**	1060	5400-6500	16.5	1500	1.70	1.05	0.450	150	0.02	0.005	22	ZP <sub>9</sub> /ZH <sub>9</sub>
电压至8500V (Up to 8500V)												
ZP <sub>8</sub> 500-**	570	6600-7200	8.0	1500	1.95	1.10	0.850	150	0.035	0.008	15	ZH <sub>8</sub>
ZP <sub>9</sub> 900-**	960	6600-7200	11.0	1500	1.80	1.20	0.500	150	0.02	0.005	22	ZH <sub>9</sub>
ZP <sub>8</sub> 400-**	420	7500-8500	7.0	1500	2.00	1.15	0.900	150	0.035	0.008	15	ZH <sub>8</sub>
ZP <sub>9</sub> 900-**	910	7500-8500	11.0	1500	1.85	1.25	0.550	150	0.02	0.005	22	ZH <sub>9</sub>



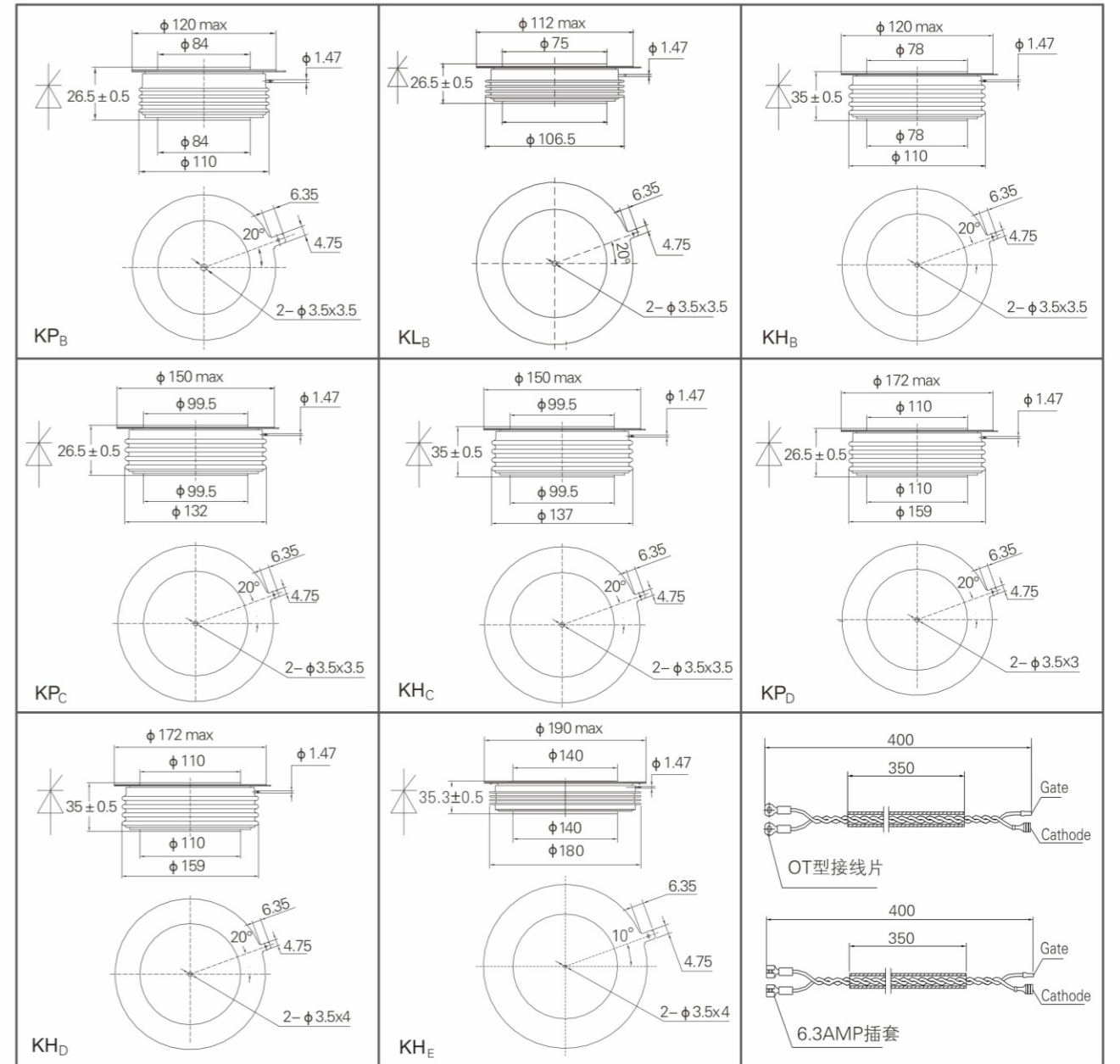
注: 未标注数量单位的统一为毫米 (mm)。  
Remark: All dimensions shown in mm unless stated otherwise.



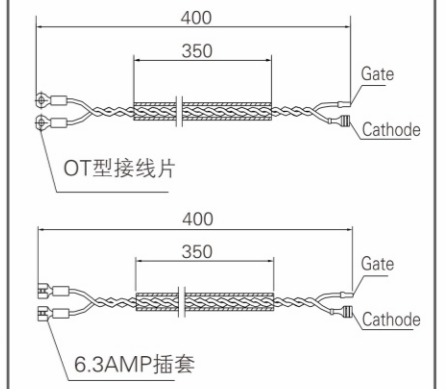




注：未标注数量单位的统一为毫米（mm）。  
Remark: All dimensions shown in mm unless stated otherwise.



注：未标注数量单位的统一为毫米（mm）。  
Remark: All dimensions shown in mm unless stated otherwise.



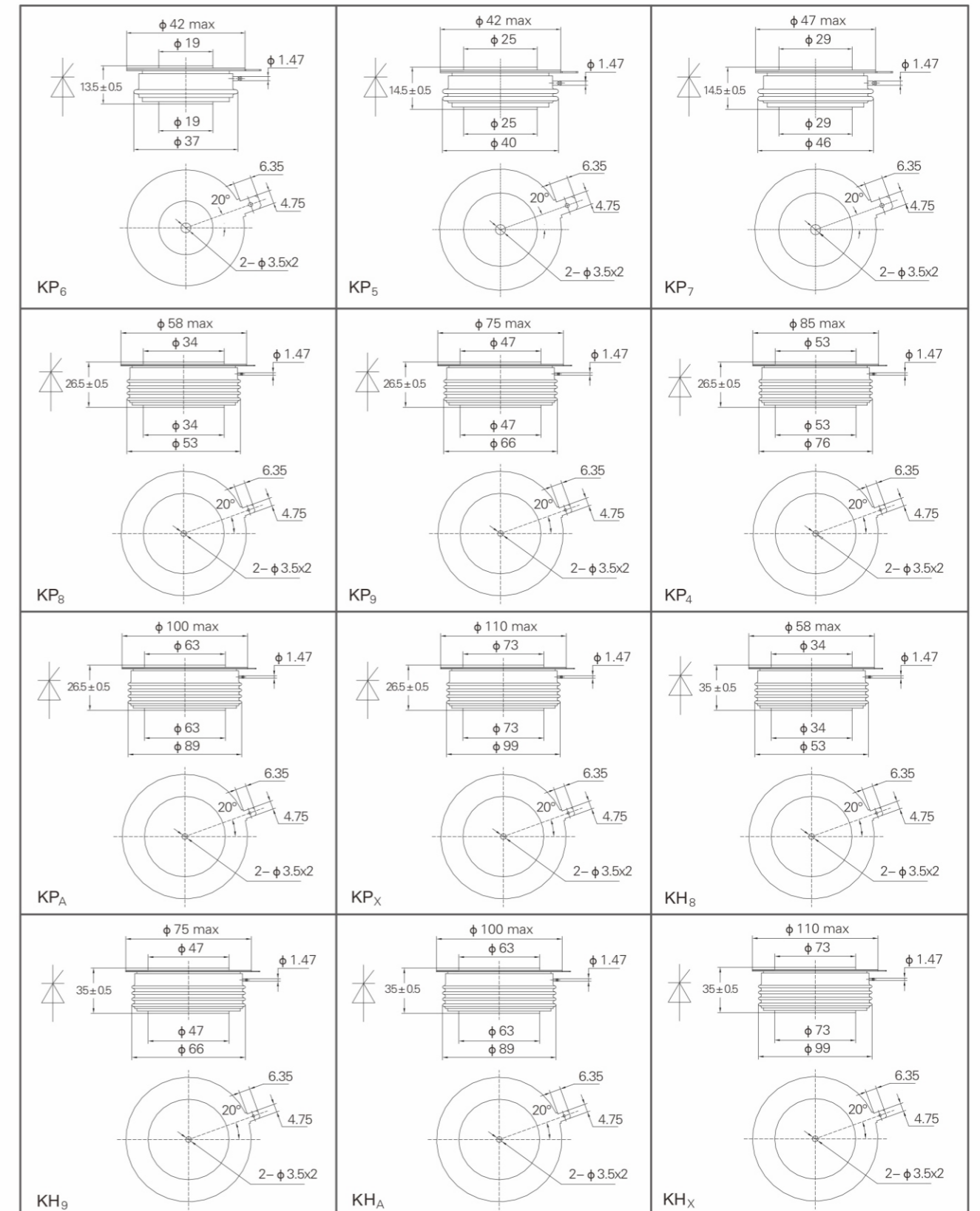


# 普通晶闸管 | Phase Control Thyristors

烧结型 (Alloying Type)

型号 TYPE -*= $V_{RRM}/100$	$I_{T(AV)}$ @ $T_C=70^\circ\text{C}$	$V_{DRM}$ $V_{RRM}$	$I_{TSM}$ @ $T_{VJM}$ &10ms	$V_{TM}$ @ $I_{TM}$ & $T_C=25^\circ\text{C}$		$V_{TO}$ @ $T_{VJM}$	$r_T$ @ $T_{VJM}$	$T_{VJM}$	$R_{thJC}$	$R_{thCH}$	$F$ $\pm 10\%$	外形 Outline
	A	V	kA	A	V	V	m $\Omega$	$^\circ\text{C}$	K/W	K/W	kN	
电压至1400V (Up to 1400V)												
KP <sub>6</sub> 400-**	400	600-1400	6.3	600	1.40	0.85	0.640	125	0.08	0.02	5	KP <sub>6</sub>
KP <sub>5</sub> 700-**	700	600-1400	9.1	1500	1.75	0.95	0.530	125	0.041	0.01	5	KP <sub>5</sub>
KP <sub>7</sub> 800-**	850	600-1400	12.8	1500	1.60	0.87	0.382	125	0.035	0.01	10	KP <sub>7</sub>
KP <sub>8</sub> 900-**	900	600-1400	15.0	1500	1.35	0.85	0.330	125	0.035	0.008	15	KP <sub>8</sub>
KP <sub>9</sub> 1700-**	1700	600-1400	26.0	1500	1.20	0.86	0.160	125	0.02	0.005	22	KP <sub>9</sub>
KP <sub>4</sub> 1800-**	1850	600-1400	29.0	3000	1.40	0.84	0.130	125	0.018	0.005	30	KP <sub>4</sub>
KP <sub>A</sub> 2600-**	2640	600-1400	47.0	3000	1.30	0.87	0.098	125	0.0125	0.004	45	KP <sub>A</sub>
KP <sub>X</sub> 3300-**	3310	600-1400	60.0	3000	1.15	0.83	0.092	125	0.01	0.003	56	KP <sub>X</sub>
电压至1800V (Up to 1800V)												
KP <sub>6</sub> 300-**	320	1600-1800	5.0	600	1.80	0.93	1.150	125	0.08	0.02	5	KP <sub>6</sub>
KP <sub>5</sub> 600-**	640	1600-1800	8.3	1500	1.90	1.09	0.587	125	0.041	0.01	5	KP <sub>5</sub>
KP <sub>7</sub> 700-**	770	1600-1800	11.5	1500	1.80	0.90	0.500	125	0.035	0.01	10	KP <sub>7</sub>
KP <sub>8</sub> 800-**	850	1600-1800	14.0	1500	1.60	0.91	0.360	125	0.035	0.008	15	KP <sub>8</sub>
KP <sub>9</sub> 1500-**	1520	1600-1800	25.0	1500	1.35	0.88	0.200	125	0.02	0.005	22	KP <sub>9</sub>
KP <sub>4</sub> 1700-**	1710	1600-1800	28.0	3000	1.50	0.88	0.160	125	0.018	0.005	30	KP <sub>4</sub>
KP <sub>A</sub> 2500-**	2520	1600-1800	45.0	3000	1.45	0.91	0.120	125	0.0125	0.004	45	KP <sub>A</sub>
KP <sub>X</sub> 3000-**	3030	1600-1800	60.0	3000	1.35	0.90	0.110	125	0.01	0.003	56	KP <sub>X</sub>
电压至2400V (Up to 2400V)												
KP <sub>5</sub> 500-**	510	2000-2400	7.8	1500	2.40	0.94	1.036	125	0.041	0.01	5	KP <sub>5</sub>
KP <sub>7</sub> 600-**	670	2000-2400	10.0	1500	2.15	0.92	0.720	125	0.035	0.01	10	KP <sub>7</sub>
KP <sub>4</sub> 1400-**	1470	2000-2400	23.0	3000	1.80	0.96	0.230	125	0.018	0.005	30	KP <sub>4</sub>
KP <sub>A</sub> 2100-**	2110	2000-2400	35.0	3000	1.65	0.96	0.179	125	0.0125	0.004	45	KP <sub>A</sub>
KP <sub>X</sub> 2700-**	2730	2000-2400	45.0	3000	1.45	0.90	0.137	125	0.01	0.003	56	KP <sub>X</sub>
KP <sub>8</sub> 750-**	750	2000-2400	11.0	1500	1.85	0.95	0.500	125	0.035	0.008	15	KP <sub>8</sub>
KP <sub>9</sub> 1400-**	1400	2000-2400	24.0	1500	1.50	0.89	0.270	125	0.02	0.005	22	KP <sub>9</sub>
电压至3400V (Up to 3400V)												
KP <sub>A</sub> 1800-**	1850	2600-2800	30.0	3000	1.90	1.02	0.250	125	0.0125	0.004	45	KP <sub>A</sub>
KP <sub>X</sub> 2400-**	2470	2600-2800	43.0	3000	1.65	0.98	0.170	125	0.01	0.003	56	KP <sub>X</sub>
KP <sub>8</sub> 700-**	700	2600-2800	10.5	1500	1.90	1.00	0.600	125	0.035	0.008	15	KP <sub>8</sub>
KP <sub>9</sub> 1300-**	1300	2600-2800	23.0	1500	1.55	0.95	0.300	125	0.02	0.005	22	KP <sub>9</sub>
KP <sub>5</sub> 400-**	410	2600-3400	6.3	1500	2.80	1.04	1.725	125	0.041	0.01	5	KP <sub>5</sub>
KP <sub>7</sub> 500-**	530	3000-3400	8.0	1500	2.65	0.98	1.200	125	0.035	0.01	10	KP <sub>7</sub>
KP <sub>8</sub> 500-**	580	3000-3400	8.4	1500	2.40	1.03	0.970	125	0.035	0.008	15	KP <sub>8</sub>
KP <sub>9</sub> 1000-**	1010	3000-3400	17.0	1500	2.05	1.08	0.560	125	0.02	0.005	22	KP <sub>9</sub>
KP <sub>4</sub> 1200-**	1240	2600-3400	19.2	3000	2.25	1.06	0.350	125	0.018	0.005	30	KP <sub>4</sub>
KP <sub>A</sub> 1700-**	1770	3000-3400	30.0	3000	2.10	1.05	0.298	125	0.0125	0.004	45	KP <sub>A</sub> /KH <sub>A</sub>
KP <sub>X</sub> 2100-**	2190	3000-3400	33.0	3000	1.85	1.00	0.235	125	0.01	0.003	56	KP <sub>X</sub> /KH <sub>X</sub>
电压至5200V (Up to 5200V)												
KP <sub>8</sub> 400-**	480	3600-4200	7.0	1000	2.85	1.15	1.470	125	0.035	0.008	15	KP <sub>8</sub> /KH <sub>8</sub>
KP <sub>9</sub> 800-**	870	3600-4200	15.0	1500	2.50	1.15	0.799	125	0.02	0.005	22	KP <sub>9</sub> /KH <sub>9</sub>
KP <sub>4</sub> 900-**	960	3600-4200	14.7	3000	2.80	1.15	0.680	125	0.018	0.005	30	KP <sub>4</sub>
KP <sub>A</sub> 1400-**	1440	3600-4200	25.0	3000	2.45	1.15	0.452	125	0.0125	0.004	45	KP <sub>A</sub> /KH <sub>A</sub>
KP <sub>X</sub> 1800-**	1880	3600-4200	25.0	3000	2.20	1.14	0.360	125	0.01	0.003	56	KP <sub>X</sub> /KH <sub>X</sub>
KP <sub>X</sub> 1400-**	1470	4600-5200	23.5	3000	2.80	1.18	0.525	125	0.01	0.003	56	KP <sub>X</sub> /KH <sub>X</sub>

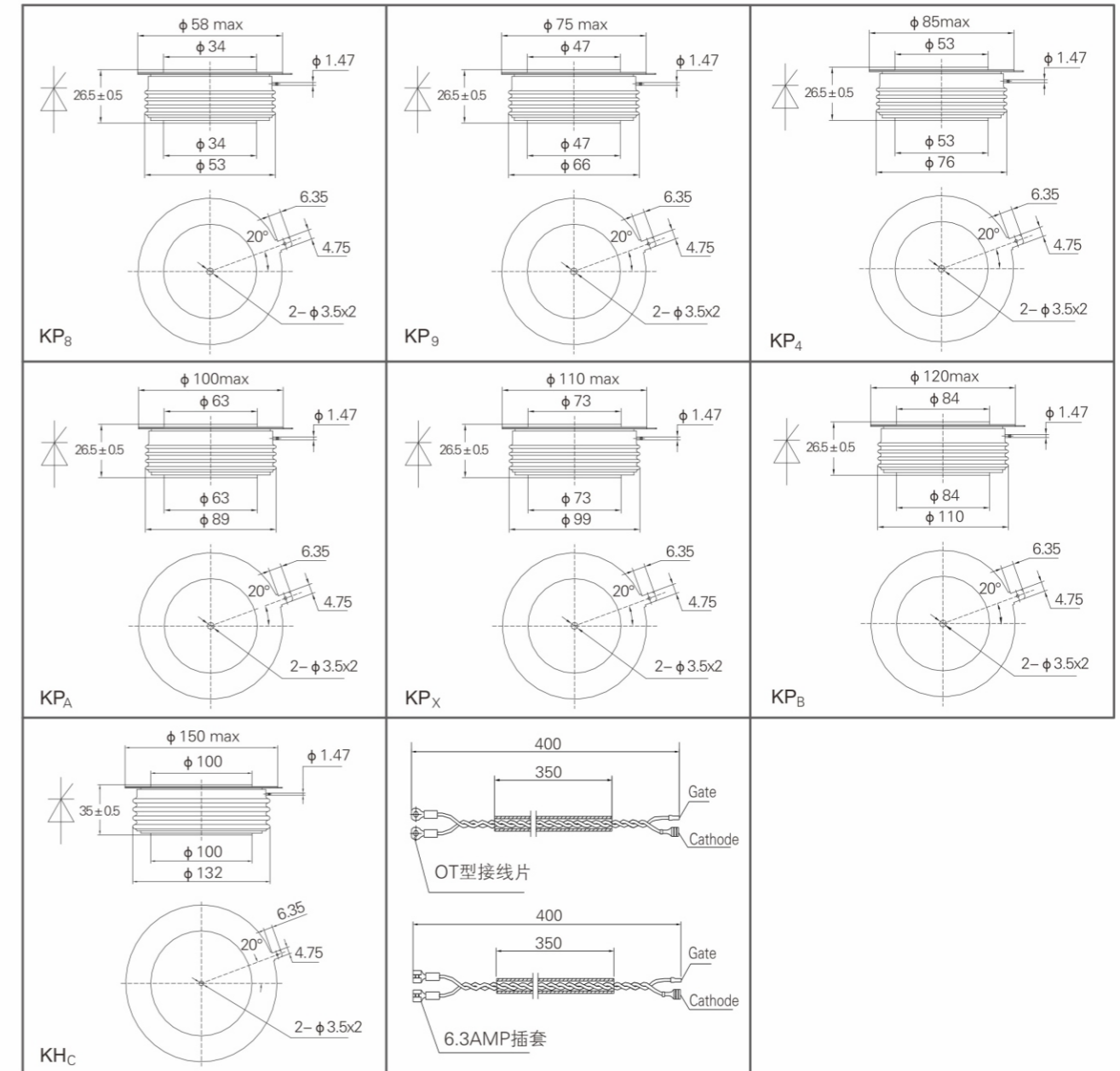
# 普通晶闸管 | Phase Control Thyristors



注: 未标注数量单位的统一为毫米 (mm)。  
Remark: All dimensions shown in mm unless stated otherwise.

门阴极引线图纸详见P28  
The gate and cathode leads drawings refer to page 28.

型号 TYPE -**= $V_{RRM}/100$	$I_{T(AV)}$ @ $T_C = 55^\circ\text{C}$	$V_{DRM}$ $V_{RRM}$	$I_{TSM}$ @ $T_{VJM}$ &10ms	$V_{TM}$ @ $I_{TM}$ & $T_C = T_{VJM}$		$T_{VJM}$	$R_{thJC}$	$R_{thCH}$	$t_q$ @ $T_{VJM}$	$F$ $\pm 10\%$	外形 Outline
	A	V	kA	A	V	$^\circ\text{C}$	K/W	K/W	$\mu\text{s}$	kN	
电压至1200V (Up to 1200V)											
KK <sub>8</sub> 800-**	850	800-1200	10.7	1500	2.08	125	0.035	0.008	25	15	KP <sub>8</sub>
KK <sub>9</sub> 1300-**	1380	800-1200	17.4	2000	1.85	125	0.02	0.005	25	22	KP <sub>9</sub>
KK <sub>4</sub> 1600-**	1680	800-1200	21.1	2000	1.75	125	0.018	0.005	25	30	KP <sub>4</sub>
KK <sub>A</sub> 2100-**	2190	800-1200	27.5	3000	2.00	125	0.0124	0.004	25	45	KP <sub>A</sub>
KK <sub>X</sub> 2900-**	2950	800-1200	31.6	4000	1.80	125	0.01	0.003	25	56	KP <sub>X</sub>
电压至1400V (Up to 1400V)											
KK <sub>8</sub> 700-**	750	1200-1400	9.5	1500	2.45	125	0.035	0.008	35	15	KP <sub>8</sub>
KK <sub>9</sub> 1200-**	1270	1200-1400	16.0	2000	2.00	125	0.02	0.005	35	22	KP <sub>9</sub>
KK <sub>4</sub> 1600-**	1600	1200-1400	20.2	2000	1.85	125	0.018	0.005	35	30	KP <sub>4</sub>
KK <sub>A</sub> 2100-**	2110	1200-1400	26.6	3000	2.15	125	0.0124	0.004	35	45	KP <sub>A</sub>
KK <sub>X</sub> 2900-**	2900	1200-1400	30.9	4000	1.90	125	0.01	0.003	35	56	KP <sub>X</sub>
电压至2000V (Up to 2000V)											
KK <sub>8</sub> 600-**	680	1600-2000	8.6	1500	2.80	125	0.035	0.008	50	15	KP <sub>8</sub>
KK <sub>9</sub> 1200-**	1200	1600-2000	15.1	2000	2.15	125	0.02	0.005	50	22	KP <sub>9</sub>
KK <sub>4</sub> 1500-**	1510	1600-2000	19.0	2000	2.00	125	0.018	0.005	50	30	KP <sub>4</sub>
KK <sub>A</sub> 2000-**	2010	1600-2000	25.3	3000	2.35	125	0.0124	0.004	50	45	KP <sub>A</sub>
KK <sub>X</sub> 2700-**	2740	1600-2000	28.9	4000	2.15	125	0.01	0.003	50	56	KP <sub>X</sub>
电压至3000V (Up to 3000V)											
KK <sub>A</sub> 2000-**	2000	2200-2500	25.2	3000	2.47	125	0.0124	0.004	65	45	KP <sub>A</sub>
KK <sub>X</sub> 2500-**	2520	2200-2500	26.4	4000	2.80	125	0.01	0.003	65	56	KP <sub>X</sub>
KK <sub>X</sub> 2000-**	2087	3000-3000	22.0	3000	2.80	125	0.01	0.003	100	56	KP <sub>X</sub>
KK <sub>B</sub> 3000-**	3000	2500-3000	32.2	4000	2.80	125	0.007	0.002	100	70	KP <sub>B</sub>
KK <sub>C</sub> 4000-**	4016	2500-3000	42.3	6000	2.80	125	0.0057	0.002	100	90	KH <sub>C</sub>
电压至3500V (Up to 3500V)											
KK <sub>X</sub> 2000-**	2008	3200-3500	21.2	3000	2.95	125	0.01	0.003	120	56	KP <sub>X</sub>
KK <sub>B</sub> 2500-**	2521	3200-3500	27.0	4000	3.20	125	0.007	0.002	120	70	KP <sub>B</sub>
KK <sub>C</sub> 3000-**	3005	3200-3500	32.3	4000	3.00	125	0.0057	0.002	120	90	KH <sub>C</sub>
电压至4500V (Up to 4500V)											
KK <sub>B</sub> 2300-**	2320	4000-4200	24.9	3000	3.20	125	0.007	0.002	150	70	KP <sub>B</sub>
KK <sub>C</sub> 2700-**	2766	4000-4200	31.2	4000	3.40	125	0.0057	0.002	150	90	KH <sub>C</sub>
KK <sub>C</sub> 2700-**	2786	4200-4500	36.8	4000	3.20	125	0.0057	0.002	200	90	KH <sub>C</sub>

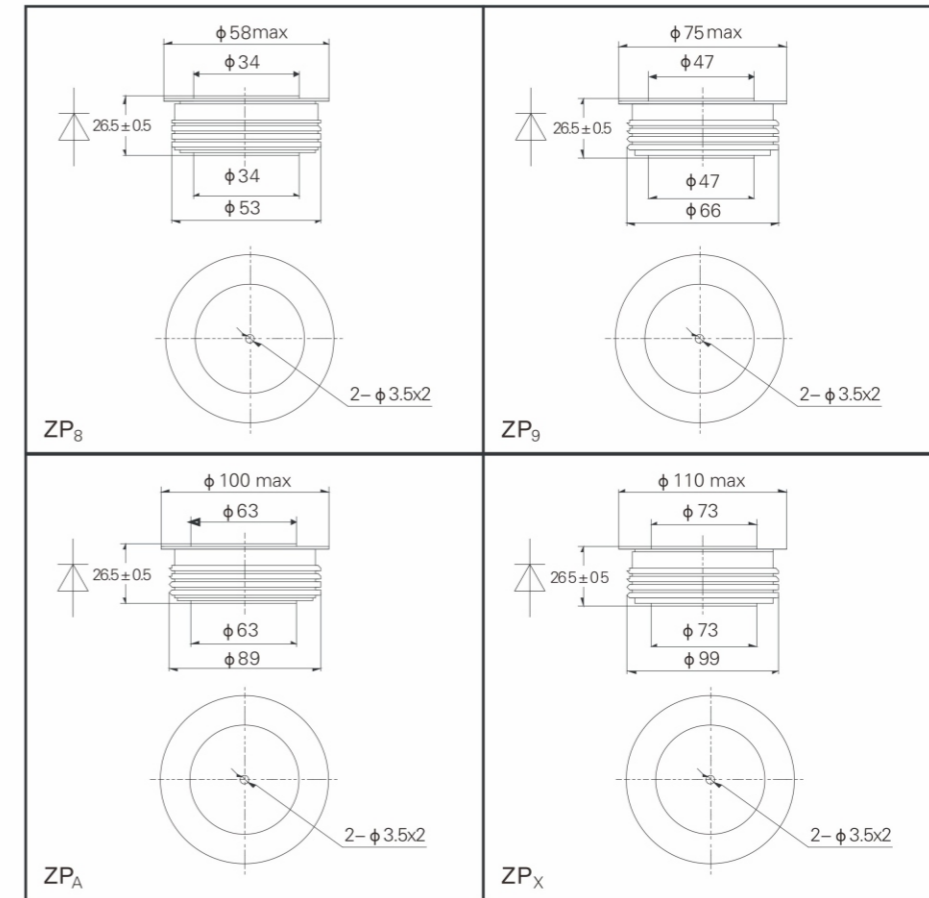


注：未标注数量单位的统一为毫米 (mm)。  
Remark: All dimensions shown in mm unless stated otherwise.



中频电源配套应用快速二极管 ( Fast Diode For Medium-frequency power Applications )

型号 TYPE -**= $V_{RRM}/100$	$I_{T(AV)}$ @ $T_C=70^\circ\text{C}$	$V_{RRM}$ V	$I_{FSM}$ @ $T_{VJM}$ &10ms kA	$V_{FM}$ @ $I_{FM}$ & $T_C = T_{VJM}$		$T_{VJM}$ °C	$R_{thJC}$ K/W	$R_{thCH}$ K/W	$t_{rr}$ @ $T_{VJM}$ µs	F ±10% kN	外形 Outline
	A			A	V						
电压至2200V (Up to 2200V)											
ZK <sub>8</sub> 800-**	816	1800-2200	10.8	1500	2.40	150	0.035	0.008	6.0	15	ZP <sub>B</sub>
ZK <sub>9</sub> 1200-**	1280	1800-2200	17.0	2000	2.40	150	0.02	0.005	6.0	22	ZP <sub>9</sub>
ZK <sub>A</sub> 2000-**	2082	1800-2200	27.5	3000	2.30	150	0.0124	0.004	6.5	45	ZP <sub>A</sub>
ZK <sub>X</sub> 2500-**	2598	1800-2200	34.3	4000	2.30	150	0.01	0.003	6.5	56	ZP <sub>X</sub>
电压至2800V (Up to 2800V)											
ZK <sub>8</sub> 700-**	770	2500-2800	10.1	1500	2.60	150	0.035	0.008	6.2	15	ZP <sub>B</sub>
ZK <sub>9</sub> 1100-**	1190	2500-2800	15.8	2000	2.60	150	0.02	0.005	6.2	22	ZP <sub>9</sub>
ZK <sub>A</sub> 2000-**	2030	2500-2800	26.8	3000	2.50	150	0.0125	0.004	6.7	45	ZP <sub>A</sub>
ZK <sub>X</sub> 2500-**	2531	2500-2800	33.4	4000	2.50	150	0.01	0.003	6.7	56	ZP <sub>X</sub>
电压至3500V (Up to 3500V)											
ZK <sub>8</sub> 600-**	680	3000-3500	9.9	1500	3.00	150	0.035	0.008	6.5	15	ZP <sub>B</sub>
ZK <sub>9</sub> 1000-**	1016	3000-3500	13.4	2000	3.00	150	0.02	0.005	6.5	22	ZP <sub>9</sub>
ZK <sub>A</sub> 1800-**	1855	3000-3500	24.5	3000	2.80	150	0.0124	0.004	7.0	45	ZP <sub>A</sub>
ZK <sub>X</sub> 2200-**	2228	3000-3500	29.4	4000	2.80	150	0.01	0.003	7.0	56	ZP <sub>X</sub>
电压至4500V (Up to 4500V)											
ZK <sub>8</sub> 500-**	530	4000-4500	7.1	1500	3.50	150	0.035	0.008	7.0	15	ZP <sub>B</sub>
ZK <sub>9</sub> 900-**	925	4000-4500	12.2	2000	3.50	150	0.02	0.005	7.0	22	ZP <sub>9</sub>
ZK <sub>A</sub> 1800-**	1820	4000-4500	24.1	3000	3.20	150	0.0124	0.004	7.5	45	ZP <sub>A</sub>
ZK <sub>X</sub> 2000-**	2032	4000-4500	26.8	4000	3.20	150	0.01	0.003	7.5	56	ZP <sub>X</sub>

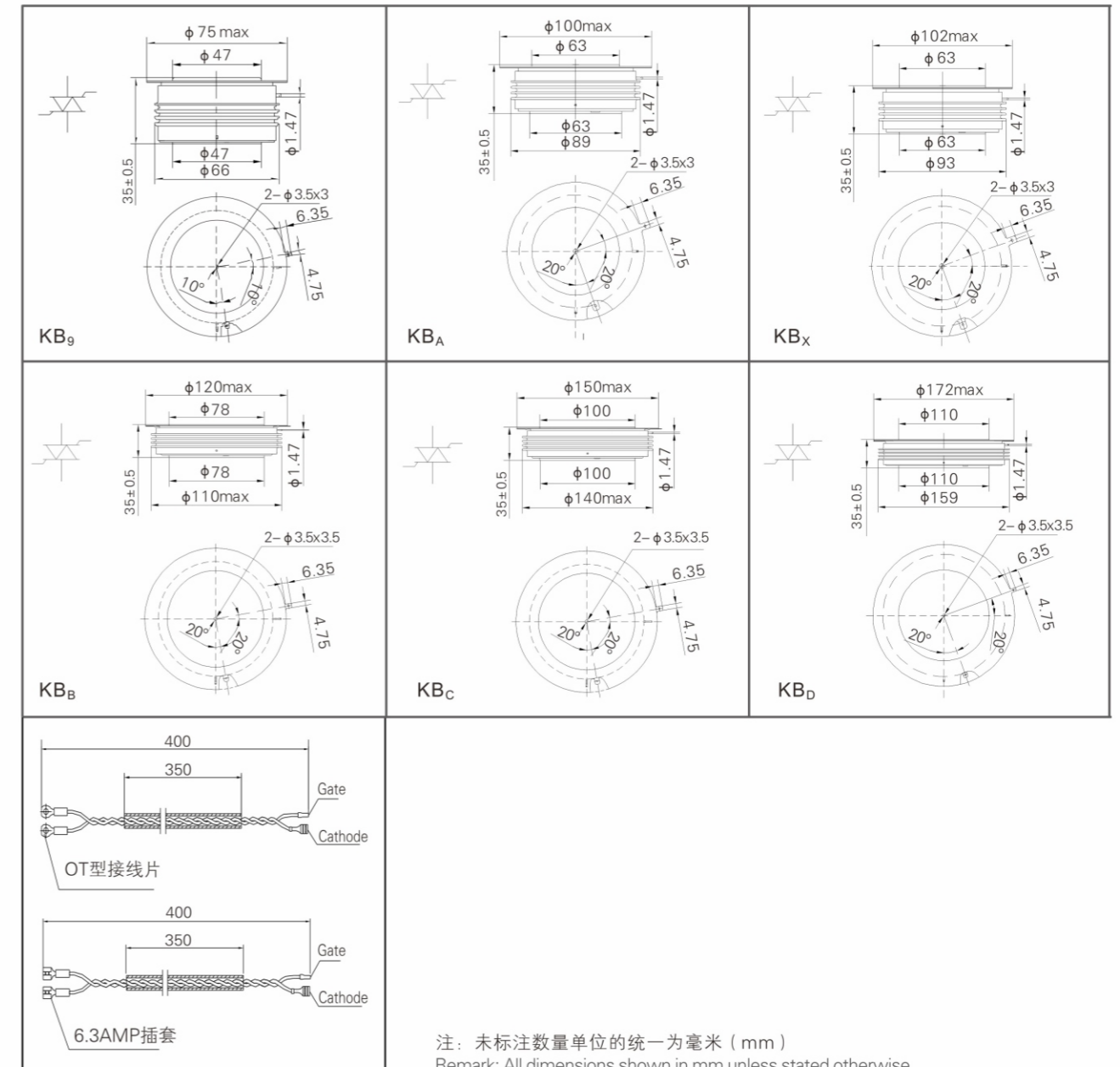


注：未标注数量单位的统一为毫米 ( mm )  
Remark: All dimensions shown in mm unless stated otherwise.

# 双向晶闸管 | Bi-Directional Control Thyristors

型号 TYPE -**= $V_{RRM}/100$	$I_{T(AV)}$	$I_{T(RMS)F}$	$V_{DSM}$	$V_{DRM}$	$I_{TSM}$	$V_{TM}$	$V_{T0}$	$r_T$	$T_{VJM}$	$R_{thJC}$	$R_{thCH}$	$F$	外形 Outline	
	@ $T_C = 70^\circ\text{C}$		$V_{RSM}$	$V_{RRM}$	@ $T_{VJM}$ & 10ms	@ $I_{TM}$ & $T_C = T_{VJM}$	@ $T_{VJM}$	@ $T_{VJM}$	$^\circ\text{C}$	K/W	K/W	$\pm 10\%$		
电压至2800V (Up to 2800V)														
KB <sub>C</sub> 5200-**-**	2360	5240	2200-2800	2200-2800	38.0	3000	1.47	0.99	0.16	125	0.011	0.003	90	KB <sub>C</sub>
电压至4200V (Up to 4200V)														
KB <sub>9</sub> 1000-**-**	460	1020	3600-4200	3600-4200	6.0	1000	2.25	1.15	1.000	125	0.045	0.008	22	KB <sub>9</sub>
KB <sub>A</sub> 1800-**-**	840	1850	3600-4200	3600-4200	12.0	1000	1.65	1.05	0.600	125	0.026	0.005	50	KB <sub>A</sub>
KB <sub>X</sub> 2200-**-**	1000	2219	3600-4200	3600-4200	15.0	1000	1.55	1.05	0.500	125	0.022	0.005	50	KB <sub>X</sub>
KB <sub>B</sub> 2900-**-**	1310	2912	3600-4200	3600-4200	23.0	1500	1.65	1.02	0.420	125	0.016	0.004	70	KB <sub>B</sub>
KB <sub>C</sub> 4400-**-**	1980	4400	3600-4200	3600-4200	32.5	2000	1.52	1.00	0.260	125	0.011	0.003	90	KB <sub>C</sub>
KB <sub>D</sub> 5600-**-**	2560	5680	3600-4200	3600-4200	40.0	3000	1.50	0.90	0.200	125	0.009	0.002	120	KB <sub>D</sub>
电压至6500V (Up to 6500V)														
KB <sub>9</sub> 700-**-**	350	770	5400-6500	4500-5600	4.5	1000	3.50	1.20	2.300	125	0.045	0.008	22	KB <sub>9</sub>
KB <sub>A</sub> 1300-**-**	610	1360	5400-6500	4500-5600	11.0	1000	2.50	1.30	1.200	125	0.026	0.005	50	KB <sub>A</sub>
KB <sub>X</sub> 1600-**-**	740	1640	5400-6500	4500-5600	11.8	1000	2.25	1.25	1.000	125	0.022	0.005	50	KB <sub>X</sub>
KB <sub>B</sub> 2300-**-**	1060	2347	5400-6500	4500-5600	14.0	1500	2.25	1.18	0.680	125	0.016	0.004	70	KB <sub>B</sub>
KB <sub>C</sub> 3100-**-**	1410	3124	5400-6500	4500-5600	22.5	3000	2.95	1.30	0.540	125	0.011	0.003	90	KB <sub>C</sub>
KB <sub>D</sub> 4200-**-**	1910	4242	5400-6500	4500-5600	32.0	3000	2.25	1.11	0.380	125	0.009	0.002	120	KB <sub>D</sub>

# 双向晶闸管 | Bi-Directional Control Thyristors

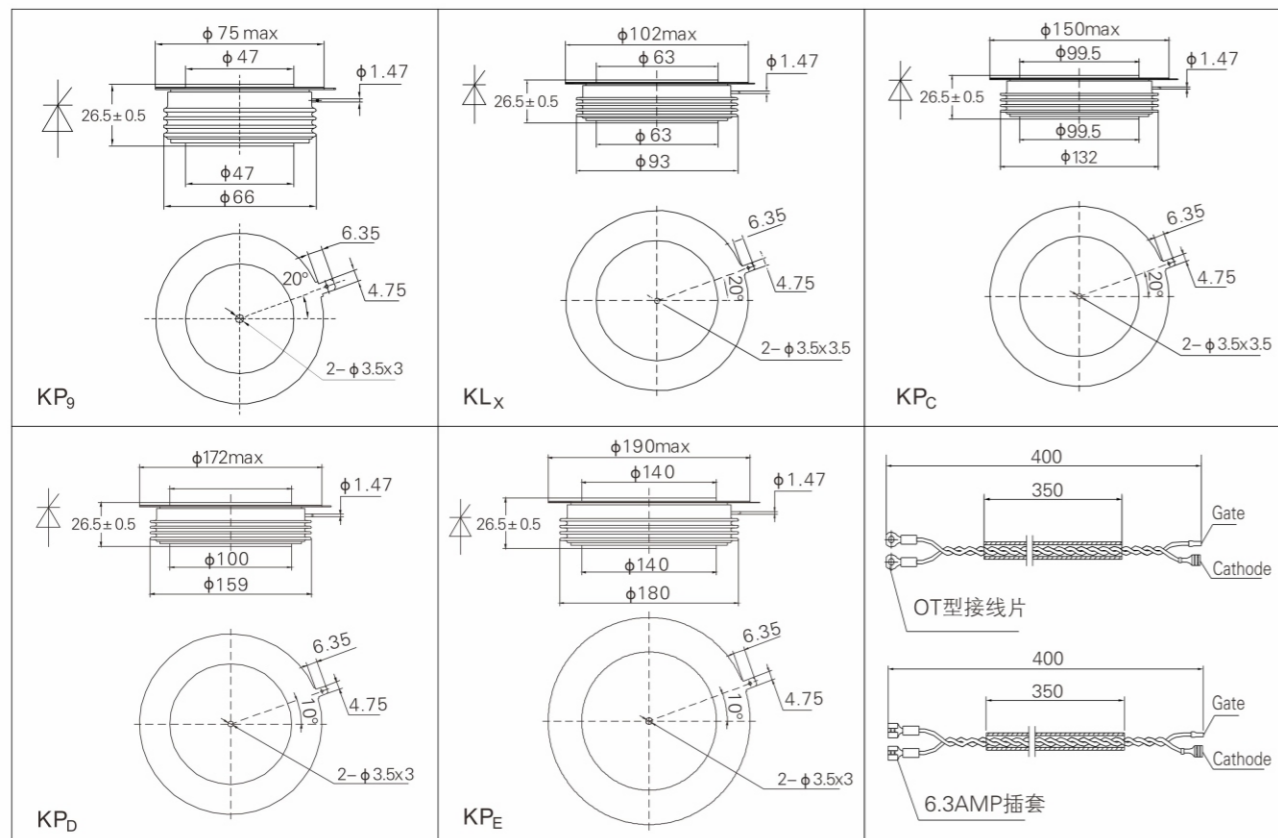




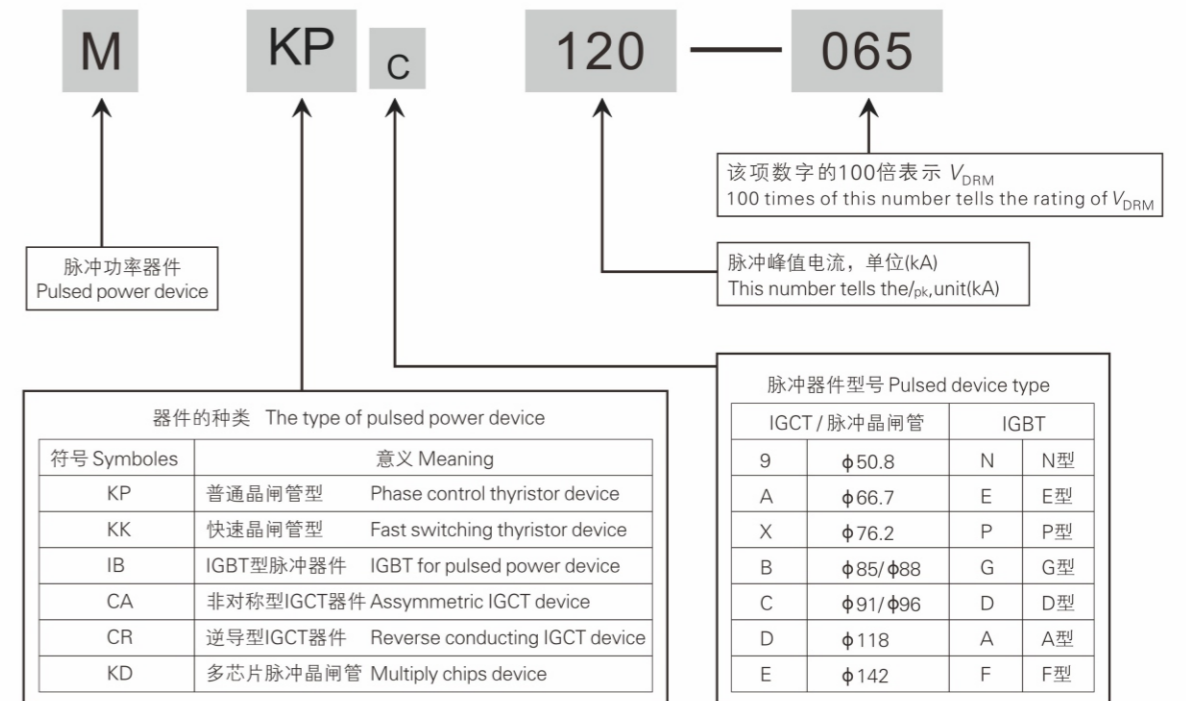


符号 Symbols	参数名称	Characteristics
F	安装力	Mounting force
$I_{F(AV)}$	正向平均电流	Mean forward current
$I_{FM}$	正向峰值电流	Peak forward current
$I_{FSM}$	正向浪涌电流	Surge forward current
$I_{T(AV)}$	通态平均电流	Mean on-state current
$I_{T(RMS)}$	通态方均根电流	Rms on-state current
$I_{TM}$	通态峰值电流	Peak on-state current
$I_{TSM}$	通态浪涌电流	Surge(non-repetitive)on-state current
$R_{thCH}$	接触热阻	Thermal resistance, case to heatsink
$R_{thJC}$	结壳热阻	Thermal resistance, junction to case
$t_q$	电路换向关断时间	Circuit commutated turn-off time
$T_c$	壳温	Case temperature
$T_{VJM}$	最高(高效)结温	Max.(vital) junction temperature
$V_{DSM}$	断态不重复峰值电压	Non-repetitive peak off-state voltage
$V_{RSM}$	反向不重复峰值电压	Non-repetitive peak reverse voltage
$V_{DRM}$	断态重复峰值电压	Repetitive peak off-state voltage
$V_{RRM}$	反向重复峰值电压	Repetitive peak reverse voltage
$V_{FM}$	正向峰值电压	Peak forward voltage
$V_{TM}$	通态峰值电压	Peak on-state voltage
$V_{T0}$	通态门槛电压	On-state threshold voltage
$r_T$	通态斜率电阻	On-state slope voltage
$V_{F0}$	正向门槛电压	Forward threshold voltage
$r_F$	正向斜率电阻	Forward slope voltage

型号 TYPE	$I_{PK}$	$V_{DRM}$	$V_{RRM}$	di/dt能力		dv/dt	$T_{VJM}$	F ± 10%	频率 Frequency	外形 Outline
	tp ≤ 500 μs			di/dt	$I_{PK}$					
	kA	V	V	A/μs	kA	V/μs	°C	kN	Hz	mm
电压至4200V (Up to 4200V)										
MKP <sub>9</sub> 030-042	30	4200	4200	3000	30	2000	110	22	单脉冲/Single pulse	KP <sub>9</sub>
MKP <sub>C</sub> 180-042	180	4200	4200	3000	180	2000	110	90		KP <sub>C</sub>
MKP <sub>D</sub> 260-042	260	4200	4200	3000	260	2000	110	120		KP <sub>D</sub>
电压至5200V (Up to 5200V)										
MKP <sub>C</sub> 150-052	150	5200	5200	3000	150	2000	110	90	单脉冲/Single pulse	KP <sub>C</sub>
MKP <sub>D</sub> 230-052	230	5200	5200	3000	230	2000	110	120		KP <sub>D</sub>
MKP <sub>E</sub> 330-052	330	5200	5200	3000	330	2000	110	180		KP <sub>E</sub>
电压至6500V (Up to 6500V)										
MKP <sub>X</sub> 050-065	50	6500	6500	3000	50	2000	110	56	单脉冲/Single pulse	KL <sub>X</sub>
MKP <sub>C</sub> 120-065	120	6500	6500	3000	120	2000	110	90		KP <sub>C</sub>
MKP <sub>D</sub> 200-065	200	6500	6500	3000	200	2000	110	120		KP <sub>D</sub>
MKP <sub>E</sub> 300-065	300	6500	6500	3000	300	2000	110	180		KP <sub>E</sub>
MKP <sub>9</sub> 050-085	15	8500	8500	3000	15	2000	110	22		KP <sub>9</sub>



注：未标注的数量单位的统一为毫米 (mm)。  
Remark: All dimensions shown in mm unless stated otherwise.



符号 Symbols	参数名称	Characteristics
di/dt	通态电流临界上升率	Critical Rate of Rise of On-state Current
dv/dt	断态电压临界上升率	Critical Rate of Rise of Off-state Voltage
F	紧固力	Mounting Force
$I_{DRM}$	断态重复峰值电流	Repetitive Peak Off-state Current
$I_{RRM}$	反向重复峰值电流	Repetitive Peak Reverse Current
$V_{DRM}$	断态重复峰值电压	Repetitive Peak Off-state Voltage
$V_{RRM}$	反向重复峰值电压	Repetitive Peak Reverse Voltage
$I_{pk}$	脉冲峰值电流	Peak Pulsed Current
$T_c$	壳温	Case Temperature
$T_{VJM}$	最高(等效)结温	Max.(Virtual)Junction Temperature
$t_d$	门极控制延迟时间	Gate Controlled delay Time
φ	管芯直径	Diameter of Chip
$T_{stg}$	贮存温度	Storage Temperature
$V_{TM}$	通态峰值电压	Peak On-state Voltage
$V_{GT}$	门极触发电压	Gate Trigger Voltage
$I_{GT}$	门极触发电流	Gate Trigger Current
$I_H$	维持电流	Holding Current
$I_L$	擎住电流	Latching Current
$t_q$	电路换向关断时间	Circuit Commucated Turn-off Time
$Q_r$	恢复电荷	Recovered Charge

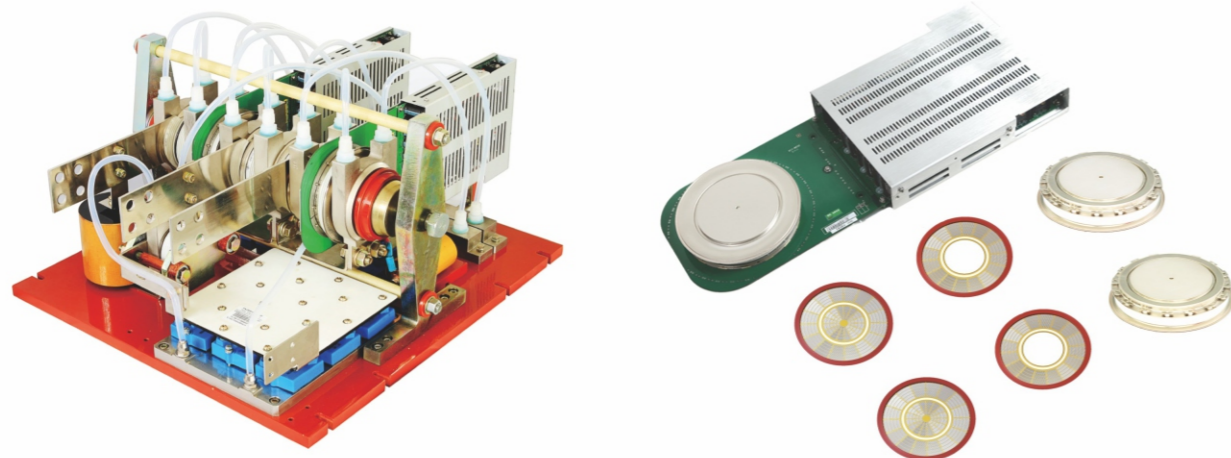


# 03

## IGCTS及配套FRDS

### IGCTS & FRDS

主要产品：集成门极换流晶闸管（IGCTs）、快恢复二极管（FRDs）  
Main products: Integrated gate commutated thyristors(IGCTs), Fast recovery diodes(FRDS)



## 产品特点 Features

集成门极换流晶闸管:	IGCTs
具有自关断能力	With Self Turn-off Capacity
适合于串联应用	Be Fit For Application In Series
浪涌能力强	High Surge Current Capability
快恢复二极管:	FRDs
高-di/dt能力	High -di/dt Capability
双面散热	Double-side Cooling

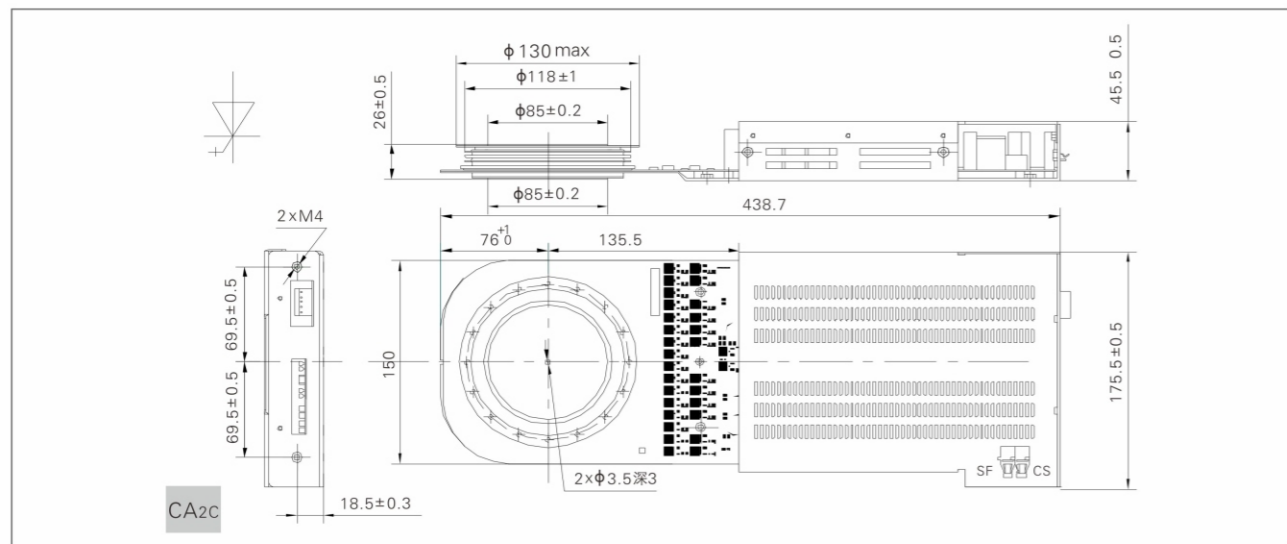
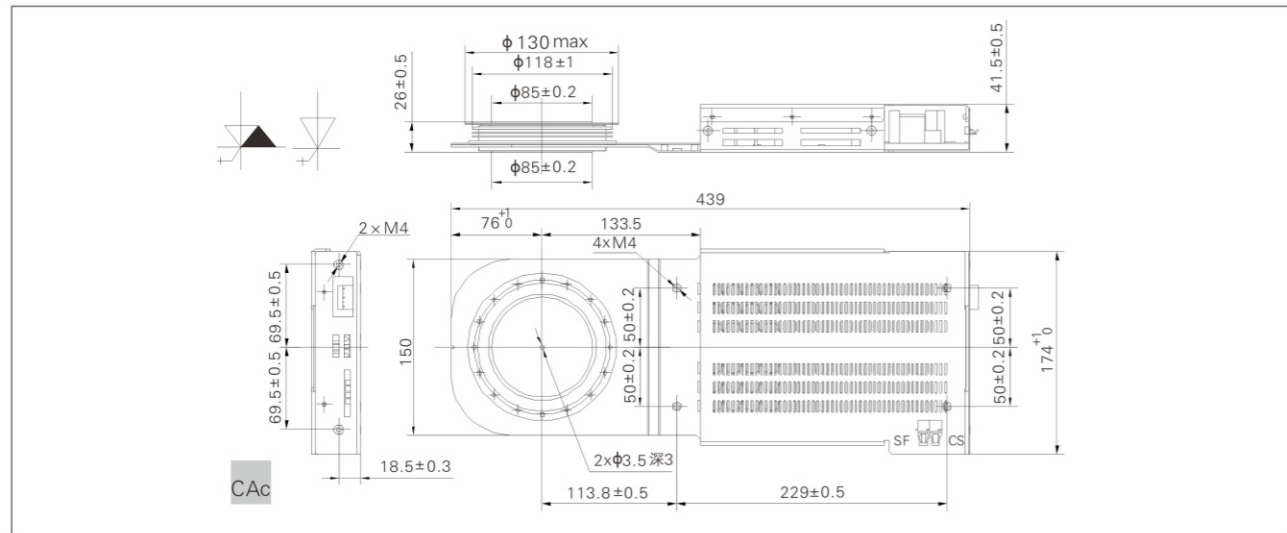
## 主要应用领域 Main Applications

中压驱动	Medium Voltage Drives
风力发电	Wind Power
智能电网	Smart Power Grids
舰船驱动	Marine Drives
功率电源	Power supply

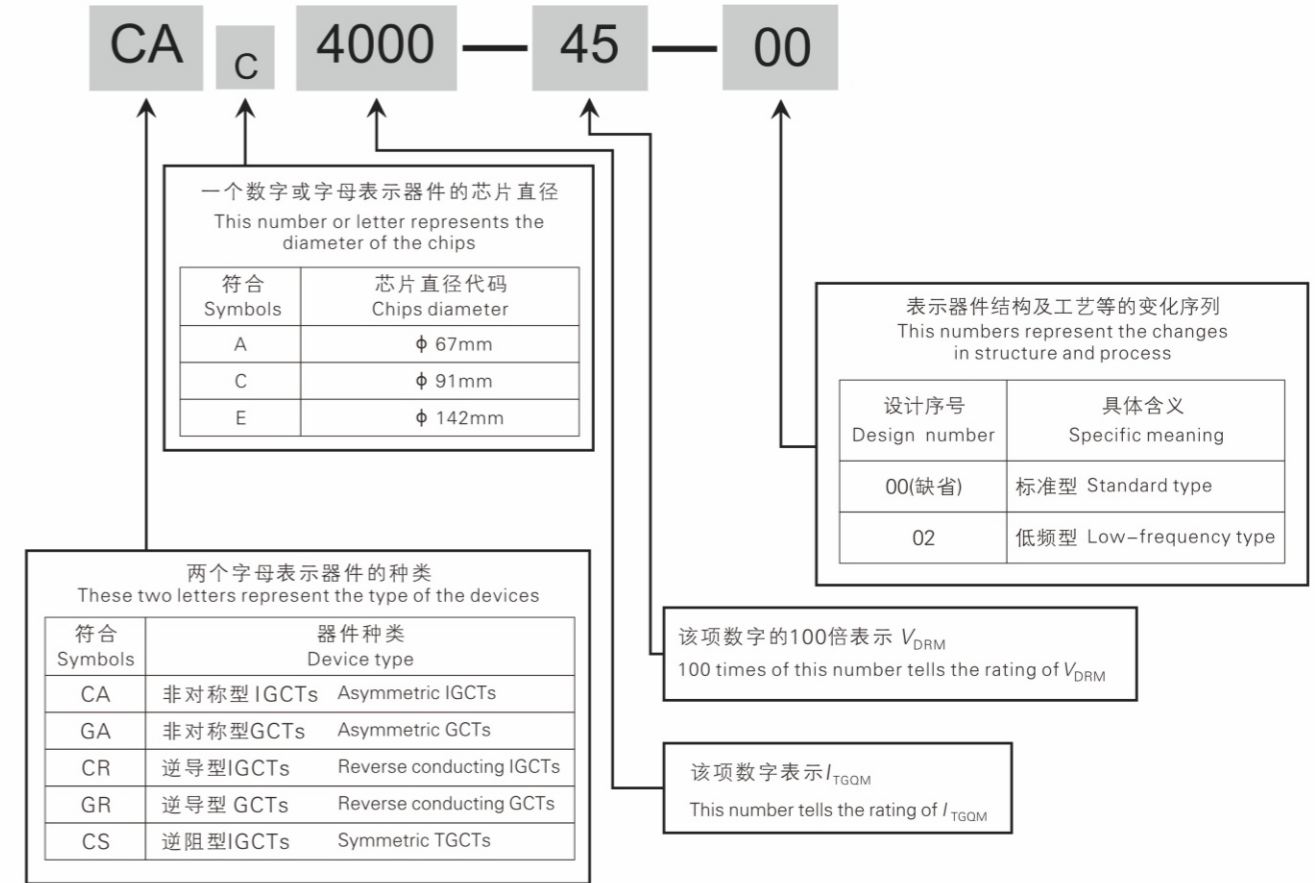
非对称型号 A <sub>S</sub> TYPE	I <sub>TGQM</sub>	I <sub>T(AV)</sub>	V <sub>DRM</sub>	I <sub>DRM</sub>	V <sub>GK</sub>	I <sub>TSM</sub>	V <sub>TM</sub> @I <sub>TM</sub>	φ	T <sub>VJM</sub>	R <sub>thJC</sub>	R <sub>thCH</sub>	V <sub>T0</sub>	r <sub>T</sub>	F	外形 Outline	
	T <sub>VJM</sub>	T <sub>C</sub> = 85°C	T <sub>VJM</sub>	T <sub>VJM</sub>	T <sub>VJM</sub>	T <sub>VJM</sub>	T <sub>VJM</sub>			DC	T <sub>VJM</sub>			min. max.		
	A	A	V	mA	V	kA	V			A	mm	°C	K/W	V		mΩ
CA <sub>C</sub> 4000-45	4000	1700	4500	50	17	32	2.70	4000	91	125	0.0085	0.003	1.40	0.325	36-44	CA <sub>C</sub>
CA <sub>C</sub> 4000-45-02	4000	2150	4500	50	17	35	1.90	4000	91	125	0.0085	0.003	1.05	0.213	36-44	CA <sub>C</sub>
CA <sub>C</sub> 3000-60	3000	1300	6000	50	17	27.5	3.40	3000	91	125	0.0085	0.003	1.50	0.650	36-44	CA <sub>C</sub>
CA <sub>C</sub> 5000-45	5000	1910	4500	50	17	33	2.25	4000	91	125	0.0085	0.003	1.13	0.280	36-44	CA <sub>2C</sub>
CA <sub>E</sub> 8000-45*	8000	待定	4500	200	17	待定	2.30	8000	142	125	0.0046	待定	1.54	0.097	100-116	CA <sub>E</sub>

逆导型号* R <sub>C</sub> TYPE	I <sub>TGQM</sub>	I <sub>T(AV)</sub>	V <sub>DRM</sub>	I <sub>DRM</sub>	V <sub>GK</sub>	I <sub>TSM</sub>	V <sub>TM</sub> @I <sub>TM</sub>	φ	T <sub>VJM</sub>	R <sub>thJC</sub>	R <sub>thCH</sub>	V <sub>T0</sub>	r <sub>T</sub>	F	外形 Outline		
	T <sub>VJM</sub>	T <sub>C</sub> = 85°C	T <sub>VJM</sub>	T <sub>VJM</sub>	T <sub>VJ</sub> = 25°C	T <sub>VJM</sub>	T <sub>VJM</sub>			DC	T <sub>VJM</sub>			min. max.			
	A	A	V	mA	V	kA	V			A	mm	°C	K/W	V		mΩ	kN
CR <sub>C</sub> 2200-45	GCT	2200	1130	4500	50	17	20	2.24	2200	91	125	0.0126	0.0042	1.31	0.373	36-44	CA <sub>C</sub>
	FRD	/	405	/	/	/	11	3.93	2200								

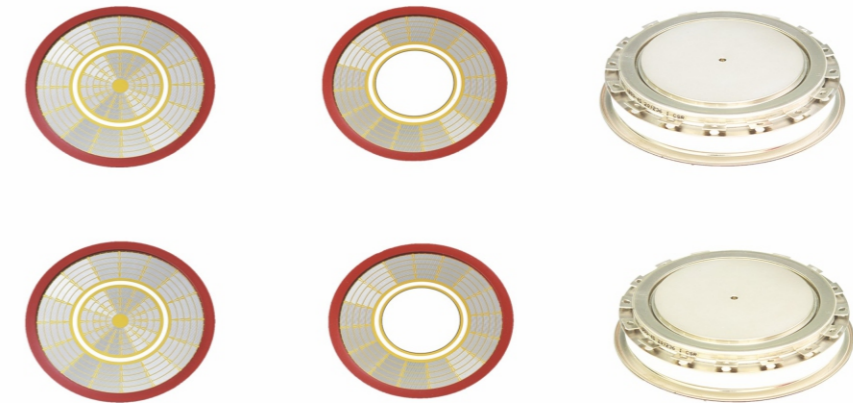
备注: 1)\*表示缺省产品类型及产品特征代码 Product type and characteristic codes by default; 2)★表示研发中 Under development.



注: 未标注数量单位的统一为毫米 (mm) Remarks: All dimensions shown in mm unless stated otherwise



备注: 该器件型号编制引用企标 Q/ZS 36-2012 及 Q/TEG 157-2016。



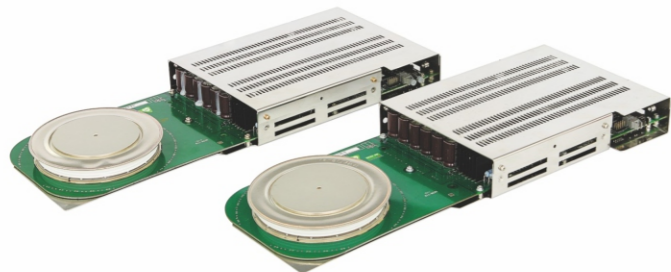


## IGCT器件符号说明 | IGCT's Symbols

符号 Symbols	参数名称	Characteristics
$F$	紧固力	Mounting Force
$I_{DRM}$	断态重复峰值电流	Repetitive Peak Off-state Current
$I_{T(AV)}$	GCT通态平均电流	Average On-state Current
$I_{TGOM}$	可关断通态峰值电流	Maximum Controllable Peak On-state Current
$I_{TM}$	GCT通态峰值电流	Peak On-state Current
$I_{TSM}$	GCT通态不重复浪涌电流	Surge (Non-repetitive) On-state Current
$r_T$	GCT斜率电阻	Slope Resistance for GCT
$T_C$	壳温	Case Temperature
$T_{VJM}$	最高(等效)结温	Max. Junction Operating Temperature
$V_{DRM}$	断态重复峰值电压	Repetitive Peak Off-state Voltage
$V_{GK}$	门阴极反向耐压	Peak Reverse Voltage of Gate-Cathode
$V_{TM}$	通态峰值电压	Peak On-state Voltage
$V_{TO}$	GCT门槛电压	Threshold Voltage for GCT
$\phi$	管芯直径	Diameter of Chip
$CS$	控制信号接收器	Receiver for Command Signal
$SF$	状态反馈发送器	Transmitter for Status Feedback

## 逆导IGCT器件二极管部分符号说明 | FRD Part's Symbols Of RCIGCT

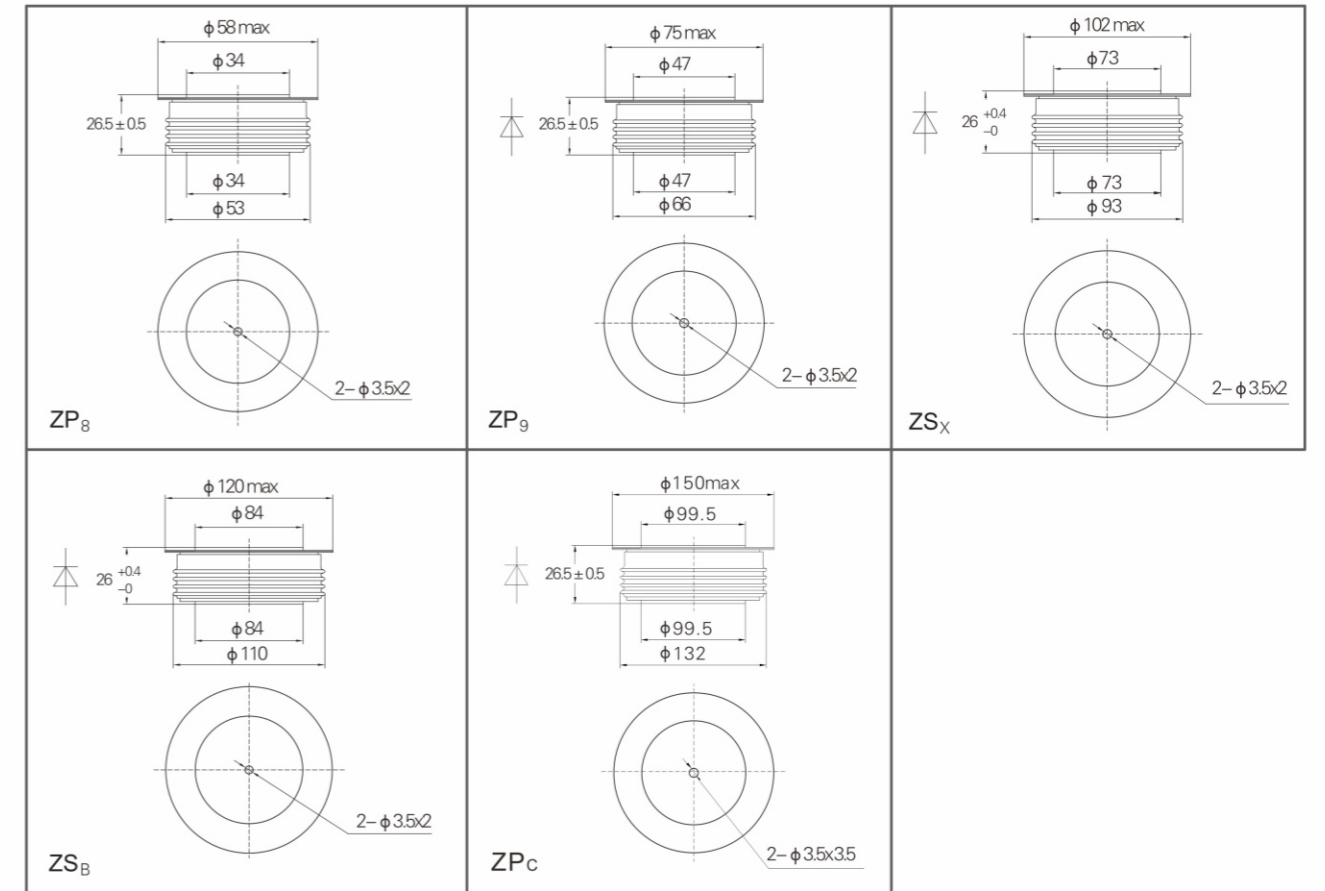
符号 Symbols	参数名称	Characteristics
$I_{F(AV)}$	FRD正向平均电流	Mean Forward Current
$I_{FM}$	FRD正向峰值电流	Peak Forward Current
$I_{FSM}$	FRD通态不重复浪涌电流	Surge (Non-repetitive) Current
$r_F$	FRD斜率电阻	Slope Resistance for FRD
$R_{thJC}$	结壳热阻	Thermal Resistance, Junction to Case
$V_{FM}$	正向峰值电压	Peak Forward Voltage
$V_{FO}$	FRD门槛电压	Threshold Voltage for FRD



## 快恢复二极管 | Fast Recovery Diodes

IGCT配套应用FRD ( FRD For IGCT Applications )

型号 TYPE	$I_{F(AV)}$	$V_{RRM}$	$I_{FSM}$	$V_{FM}$		$T_{VJM}$	$R_{thJC}$	$R_{thCH}$	$I_{rr}$	$Q_{rr}$	$F$	外形 Outline
	@ $T_C=70^\circ\text{C}$	V	@ $T_{VJM}$ &10ms	@ $I_{FM}$	@ $T_C=T_{VJM}$	$^\circ\text{C}$	K/W	K/W	A	$\mu\text{C}$	$\pm 10\%$ kN	
FY <sub>9</sub> 1100-25	1150	2500	18	4500	2.8	125	0.020	0.005	150	650	22	ZP <sub>9</sub>
FY <sub>8</sub> 400-45	400	4500	5	1000	2.9	115	0.035	0.008	355	930	15	ZP <sub>8</sub>
FY <sub>9</sub> 600-45	630	4500	16	2000	3.8	115	0.020	0.005	610	1800	22	ZP <sub>9</sub>
FY <sub>X</sub> 900-45	900	4500	20	2000	4.5	115	0.010	0.003	1150	2200	40	ZS <sub>X</sub>
FY <sub>X</sub> 1100-45	1184	4500	20	2500	3.6	125	0.010	0.003	1500	5500	40	ZS <sub>X</sub>
FY <sub>B</sub> 2000-45	2000	4500	25	2500	3.6	125	0.007	0.002	1600	4000	40	ZS <sub>B</sub>
FY <sub>B</sub> 2000-45-02	2620	4500	40	2500	2.0	125	0.007	0.002	3200	10000	40-70	ZS <sub>B</sub>
FY <sub>9</sub> 400-60	360	6000	10	900	5.2	115	0.020	0.005	600	2000	22	ZP <sub>9</sub>
FY <sub>X</sub> 800-60	800	6000	18	1800	4.8	115	0.010	0.003	900	2500	40	ZS <sub>X</sub>
FY <sub>B</sub> 1100-60	1100	6000	20	2500	5.0	115	0.007	0.002	1000	3200	40	ZS <sub>B</sub>
FY <sub>C</sub> 1700-60	1696	6000	24	2500	4.6	125	0.005	0.002	1200	2500	60	ZP <sub>C</sub>



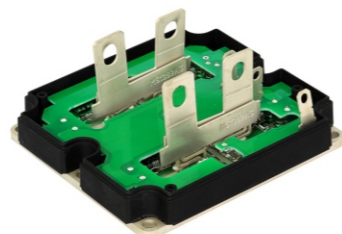
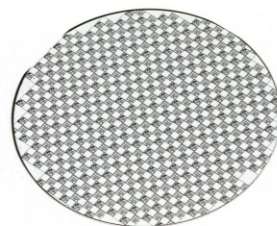
注：未标注的数量单位的统一为毫米 ( mm ) 。  
Remark: All dimensions shown in mm unless stated otherwise.

# 04

## 碳化硅器件 SiC DEVICES

主要产品：肖特基二极管器件、MOSFET器件、功率模块

Main Products：SBDs , MOSFETs , Power Modules



### 产品特点 Features

几乎无反向恢复电流

Zero Reverse Recovery Current

较快的开关速度

High-speed Switching

更高的工作频率

High-frequency Operation

正温度系数

Positive Temperature Coefficient

### 主要应用领域 Main Applications

电动汽车

Electric Vehicle

不间断电源

Uninterruptible Power Sour(UPS)

新能源

New Energy

轨道交通

Rail Transit

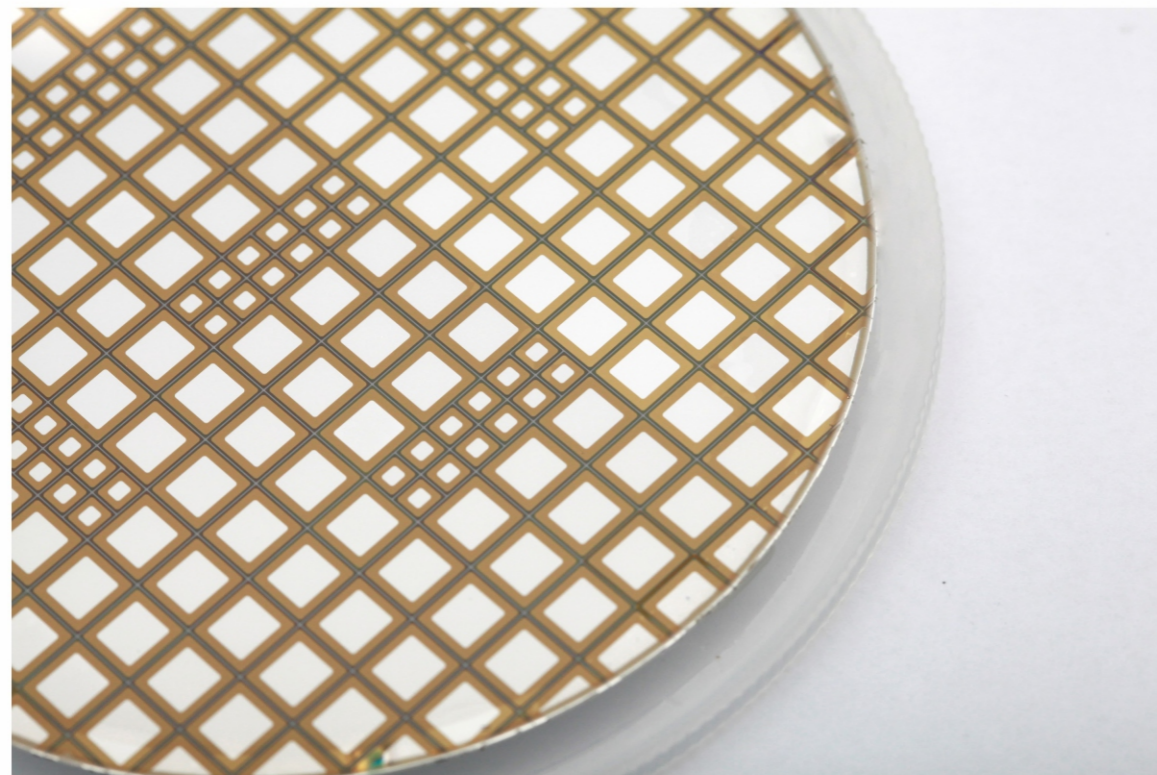
智能电网

Smart Power Grid



## 肖特基二极管 | SiC Schottky Barrier Diodes

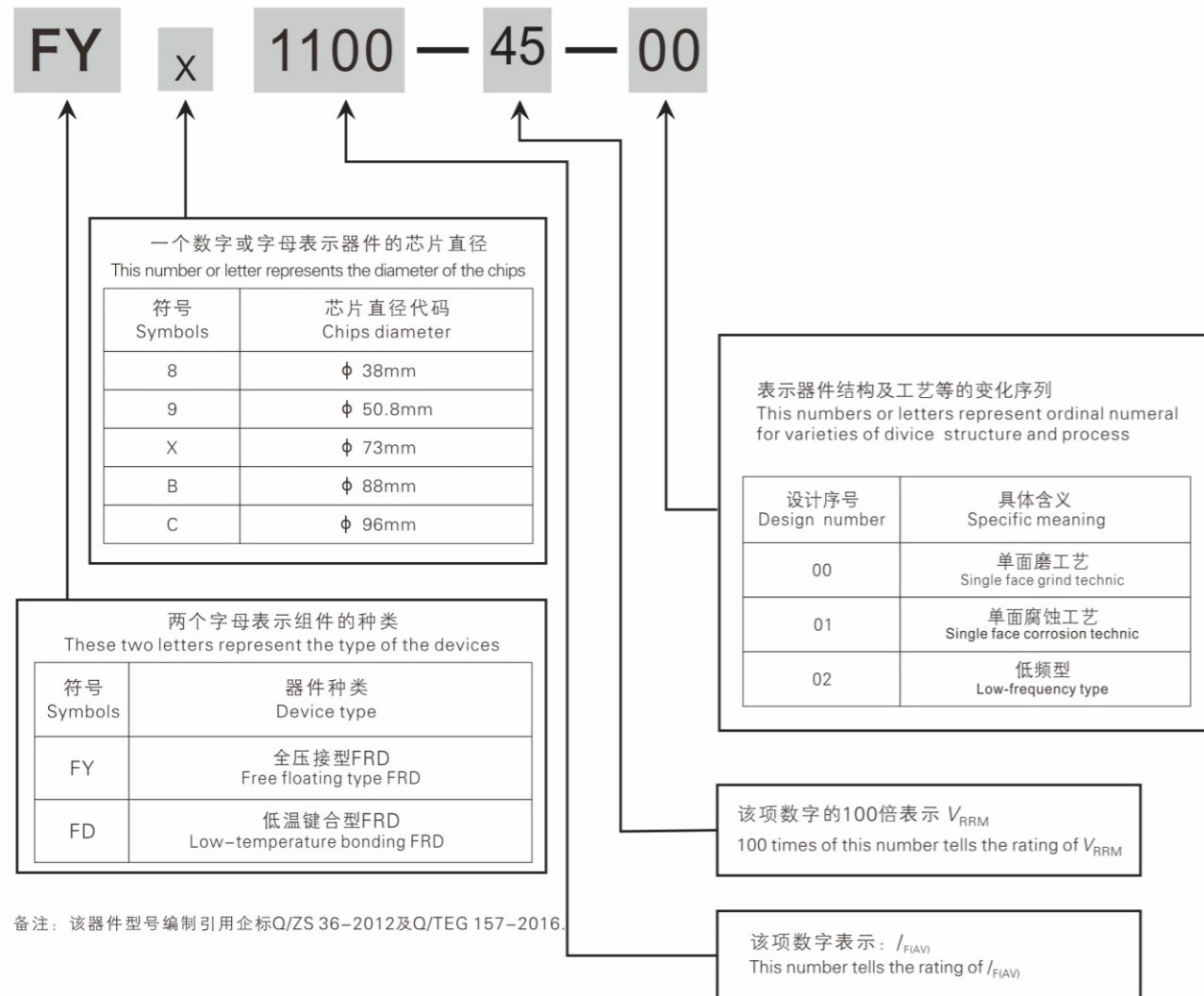
型号 Type	$V_{DC}$ V	$V_{RRM}$ V	$V_{RSM}$ V	$I_{FAVG}$ A	$T_J$ °C	$T_{stg}$ °C	$V_F$		$I_R$ μA
							$T_J=25^\circ\text{C}$ V	$T_J=150^\circ\text{C}$ V	
TS120PFS20E01	1200	1200	1200	20	-40 ~ +150	-40 ~ +150	1.54	1.86	43
TS170PFS25E01	1700	1700	1700	25	-40 ~ +150	-40 ~ +150	1.72	2.39	29
TS330PFS32E01	3300	3300	3300	32	-40 ~ +150	-40 ~ +150	1.94	3.65	15



## 金属-氧化物-半导体场效应晶体管 | SiC MOSFETs

型号 Type	$V_{DSS}$ V	$I_D$ A	$T_J$ °C	$T_{stg}$ °C	$R_{DS(on)} @ V_{GS} = 20V$		$I_{DSS}$ μA
					$T_J=25^\circ\text{C}$ mΩ	$T_J=150^\circ\text{C}$ mΩ	
TM120PES20E01	1200	20	-40 ~ +150	-40 ~ +150	80	120	100



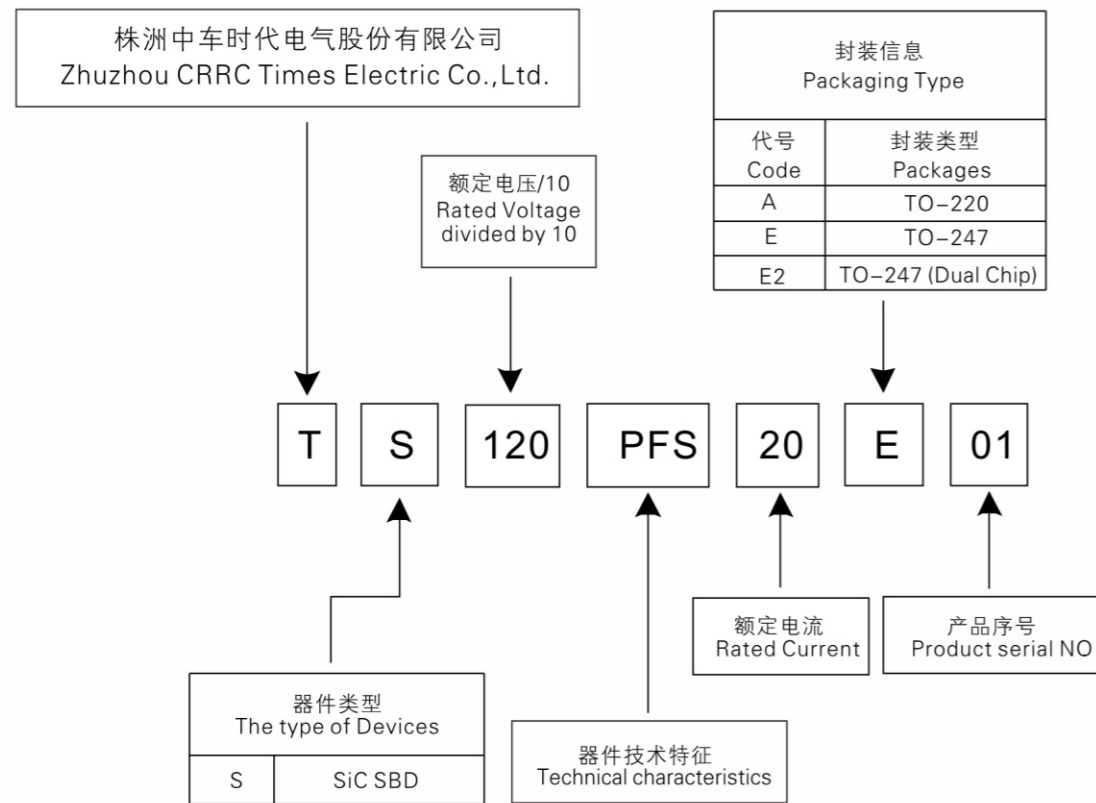


符号 Symbols	参数名称	Characteristics
$F$	紧固力	Mounting Force
$I_{F(AV)}$	正向平均电流	Mean Forward Current
$I_{FM}$	正向峰值电流	Peak Forward Current
$I_{FSM}$	浪涌电流	Surge (Non-repetitive) Current
$I_{rr}$	反向恢复电流	Reverse Recovery Current
$R_{thCH}$	接触热阻	Thermal Resistance, Case to Heatsink
$R_{thJC}$	结壳热阻	Thermal Resistance, Junction to Case
$Q_{rr}$	反向恢复电荷	Reverse Recovery Charge
$T_C$	壳温	Case Temperature
$T_{VJM}$	最高(等效)结温	Max.Virtual Junction Temperature
$V_{FM}$	正向峰值电压	Peak Forward Voltage
$V_{RRM}$	反向重复峰值电压	Repetitive Peak Reverse Voltage

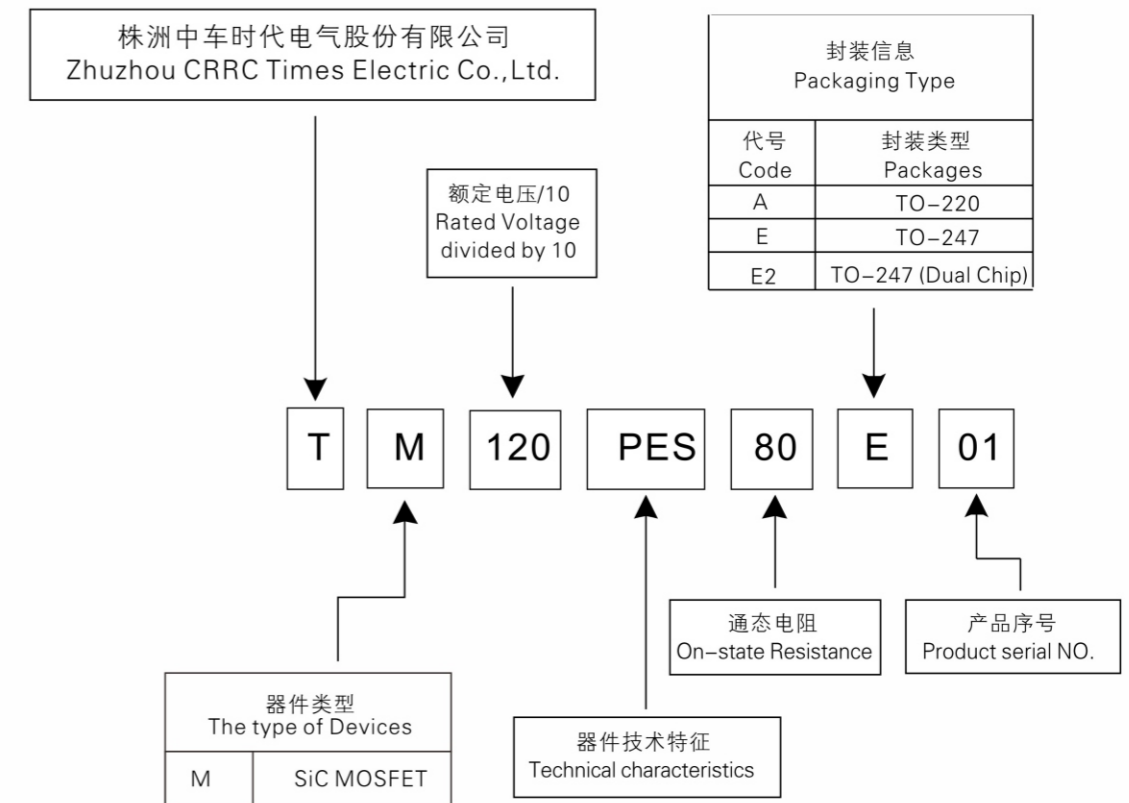




## SiC SBD器件型号说明 | SiC Device Types



## SiC MOSFET器件型号说明 | SiC Device Types



## SiC器件参数符号说明 | SiC Device Symbols

肖特基二极管 (SiC SBDs)

符号 Symbols	参数名称	Parameters
$V_{RRM}$	反向重复峰值电压	Repetitive Peak Reverse Voltage
$V_{RSM}$	反向非重复峰值电压	Surge Peak Reverse Voltage
$V_{DC}$	直流阻断电压	DC Peak Reverse Voltage
$I_F$	正向电流	Continuous Forward Current
$I_{FRM}$	正向重复峰值电流	Repetitive Peak Forward Current
$I_{FSM}$	正向浪涌电流	Non-repetitive Surge Forward Current
$P_{Tot}$	总耗散功率	Total Power Dissipation
$T_J, T_{stg}$	运行结温及存储温度	Operating Junction Temperature Range / Storage Temperature Range
$V_F$	正向压降	Forward Voltage
$I_R$	反向电流	Reverse Current
$Q_C$	总电容电荷	Total Capacitive Charge
C	总电容	Total Capacitance

## SiC器件参数符号说明 | SiC Device Symbols

金属-氧化物-半导体场效应晶体管 (SiC MOSFETs)

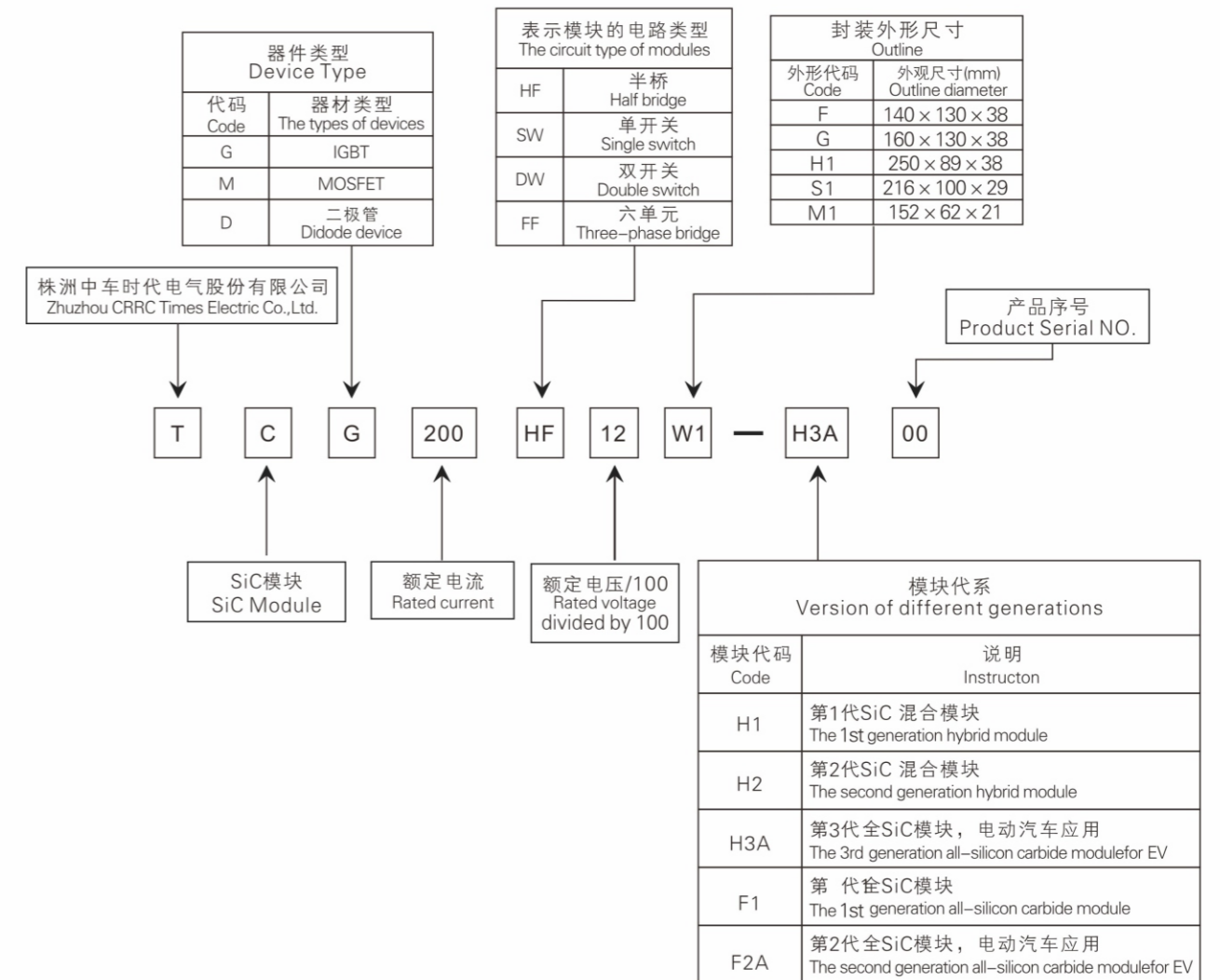
符号 Symbols	参数名称	Parameters
$V_{(BR)DSS}$	击穿电压	Drain-Source Breakdown Voltage
$I_D$	正向电流	Continuous Forward Current
$R_{DS(on)}$	通态电阻	Drain-Source On-State Resistance
$V_{GS(th)}$	阈值电压	Gate Threshold Voltage
$P_{Tot}$	总耗散功率	Total Power Dissipation
$T_J, T_{stg}$	运行结温及存储温度	Operating Junction Temperature Range / Storage Temperature Range
$I_{DSS}$	漏极截止电流	Zero Gate Voltage Drain Current

## SiC功率模块 | SiC Power Modules

型号 Type	$I_c$		$V_{CES}$	$I_{CRM}$	$V_{CE(SAT)}$ @ $I_c$ & $T_c=25^\circ\text{C}$	$E_{SW}$ @ $T_{VJM}$	$T_{VJM}$	$R_{thJC}$	封装外形 Assembly Outline		
	A	@ $T_c$							代码 Code	尺寸 Dimensions mm	基板材料 Base Material
电压等级: 1200V											
TCG200HF12W1-H100	200	90	1200	400	1.6	30	150	0.1	W1	108 × 62 × 31	Cu
TCM600HF12M1-F100	600	90	1200	1200	1.7	140	150	0.05	M1	152 × 62 × 21	Cu
电压等级: 1700V											
TCG1600S17F-H100	1600	85	1700	3200	2.5	960	125	0.009	F	140 × 130 × 38	AlSiC
电压等级: 3300V											
TCG500D33G-H100	500	85	3300	1000	2.1	1900	150	0.021	G	160 × 130 × 38	AlSiC



## SiC功率模块型号说明 | SiC Power Module Types



## SiC功率模块参数符号说明 | SiC Power Module Symbols

符号 Symbols	参数名称	Parameters
$V_{CES}$	集电极-发射极电压	Collector-Emitter Voltage
$I_c$	集电极直流电流	DC Collector Current
$I_{CRM}$	集电极重复峰值电流	Repetitive Peak Collector Current
$R_{thJC}$	结壳热阻	Thermal Resistance Junction to Case
$T_{VJM}$	最高(等效)结温	Max.(Virtual) Junction Temperature
$V_{CE(SAT)}$	集电极-发射极饱和电压	Collector-Emitter Saturation Voltage
$E_{SW}$	总开关损耗	Total switching energy ( $E_{on}+E_{off}$ )

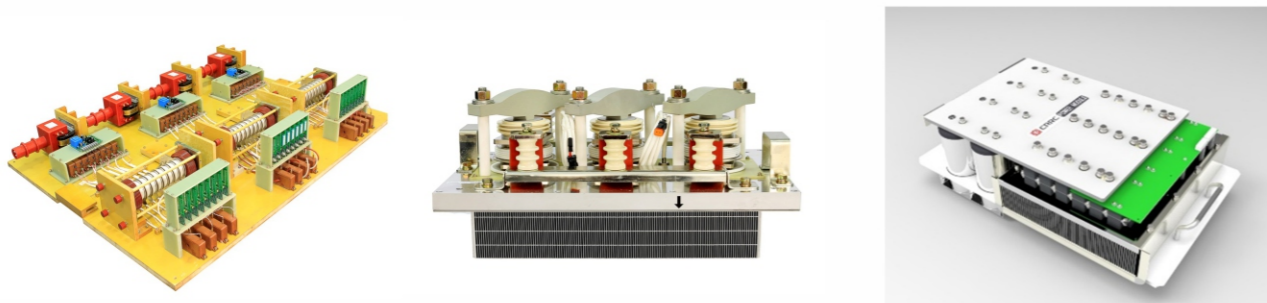


# 05

## 功率组件 POWER ASSEMBLIES

主要产品：双极功率组件、脉冲功率组件、IGBT功率组件

Main Products : Bipolar assemblies , Pulsed power assemblies , IGBT power assemblies



### 产品特点 Features

双极功率组件：	Bipolar Assemblies
高直流稳定性	High DC Stability
高短路能力	High Short Circuit Capability
正温度系数的低饱和电压	Low Vce(sat) With Positive Temperature Coefficient
高功率循环与热循环能力	High Power And Thermal Cycling Capability
IGBT功率组件：	IGBT Power Assemblies
先进驱动研发	Advanced Driver Design
高效散热	High Efficient Cooling
低感电连接	Low Inductance Connection
智能检测控制	Intelligent Detection And Control
ns级故障记录及分析	ns Fault Recording And Analysis

### 主要应用领域 Main Applications

双极功率组件：	Bipolar Assemblies
工业变流	Industrial Converter
新能源	New Energy
电网输配电	Power Transmission And Distribution
电能治理	Electric Energy Management
IGBT功率组件：	IGBT Power Assemblies
电机驱动	Motor Drive
风力发电	Wind Power
柔性输电	Flexible Power Transmission
电力牵引	Electric Traction
功率电源	Power Supply
感应加热	Induction Heating
静止无功补偿	Static Var Compensator

## 风冷双极功率组件 | Air-cooling Bipolar Power Assemblies

型号 Type	散热器型号 Heatsink Type	元件数量 The Number of Devices	适应最大元件 Applicable Devices	冷却方式 Cooling Method	外形尺寸/mm Outline Dimension			风速 Air Speed $m \cdot s^{-1}$	重量(单个散热器) Weight (Heatsink) kg	热阻Rsa Thermal Resistance $K \cdot W^{-1}$	重量 Weight kg	散热器材质 Heatsink Material	外形图 Outline
					L	D	H						
tPower-SA.KP(ZP)****F	Sf12(国标)	1	KP <sub>B</sub> 、ZP <sub>B</sub>	自冷或风冷 Nature-cooling or Air-cooling	200	110	125	4	2.6	≤0.090	2.6	铝型材 Aluminium Heatsink	Fig.1
	Sf13(国标)	1	KP <sub>9</sub> 、ZP <sub>9</sub>	自冷或风冷 Nature-cooling or Air-cooling	220	120	130	4	3.5	≤0.071	3.5	铝型材 Aluminium Heatsink	
	Sf14(国标)	1	KP <sub>9</sub> 、ZP <sub>9</sub>	自冷或风冷 Nature-cooling or Air-cooling	250	140	145	4	4.9	≤0.055	4.9	铝型材 Aluminium Heatsink	
	Sf15(国标)	1	KP <sub>9</sub> 、ZP <sub>9</sub>	自冷或风冷 Nature-cooling or Air-cooling	280	140	165	4	6	≤0.048	6	铝型材 Aluminium Heatsink	Fig.2
	Sf16(国标)	1	KP <sub>A</sub> 、ZP <sub>A</sub>	自冷或风冷 Nature-cooling or Air-cooling	280	180	200	4	9.5	≤0.037	9.5	铝型材 Aluminium Heatsink	
	Sf17(国标)	1	KP <sub>B</sub> 、ZP <sub>B</sub>	自冷或风冷 Nature-cooling or Air-cooling	300	200	215	4	13.5	≤0.030	13.5	铝型材 Aluminium Heatsink	
	Sf17A(国标)	1	KP <sub>B</sub> 、ZP <sub>B</sub>	自冷或风冷 Nature-cooling or Air-cooling	300	200	224	4	13.5	≤0.030	13.5	铝型材 Aluminium Heatsink	

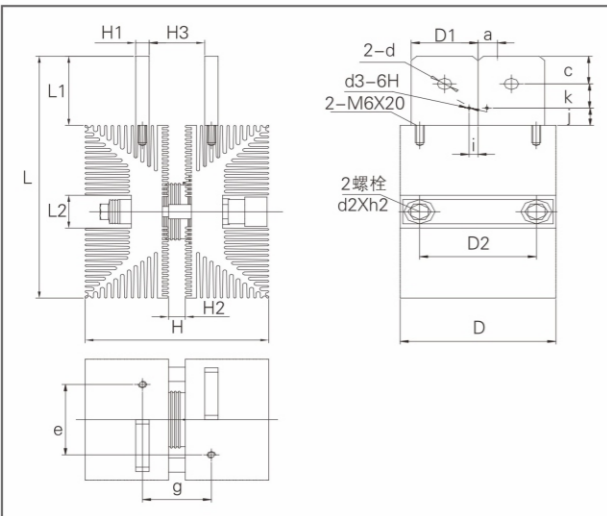


Fig.1 SF12,SF13 组件  
Fig.1 SF12,SF13 Assemblies

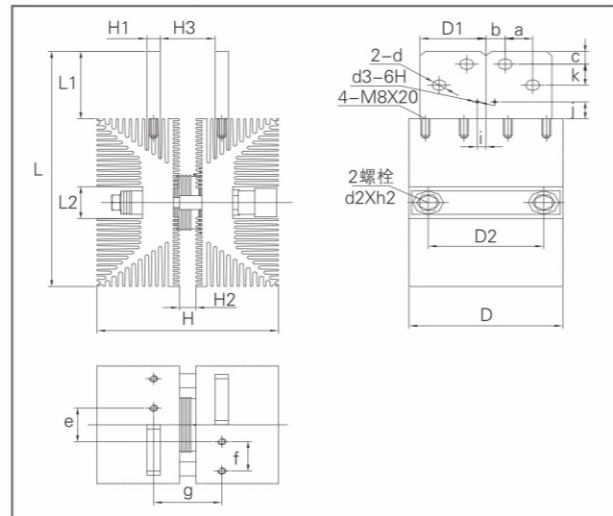


Fig.2 SF14,SF15,SF16 组件  
Fig.2 SF14,SF15,SF16 Assemblies

## 风冷双极功率组件 | Air-cooling Bipolar Power Assemblies

型号 Type	散热器型号 Heatsink Type	元件数量 The Number of Devices	适应最大元件 Applicable Devices	冷却方式 Cooling Method	外形尺寸/mm Outline Dimension	风速 Air Speed $m \cdot s^{-1}$	热阻Rsa Thermal Resistance $K \cdot W^{-1}$	重量 单个散热器 Weight kg	散热器材质 Heatsink Material	外形图 Outline
	XF12-15	≤3	KP <sub>B</sub> 、ZP <sub>B</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	4	≤0.1	6-38.5	铝型材 Aluminium Heatsink	
	DXC615	≤2	KP <sub>C</sub> 、ZP <sub>C</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	4	≤0.027	17-31	铝型材 Aluminium Heatsink	
	XSF19	≤2	KP <sub>D</sub> 、ZP <sub>D</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	4	≤0.021	50	铝型材 Aluminium Heatsink	

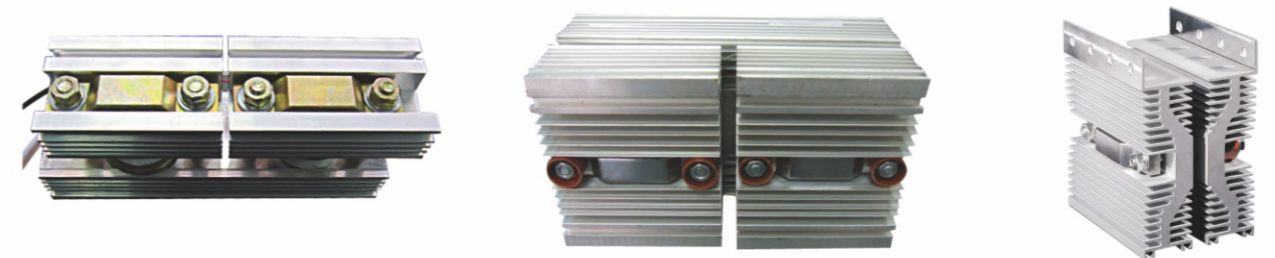
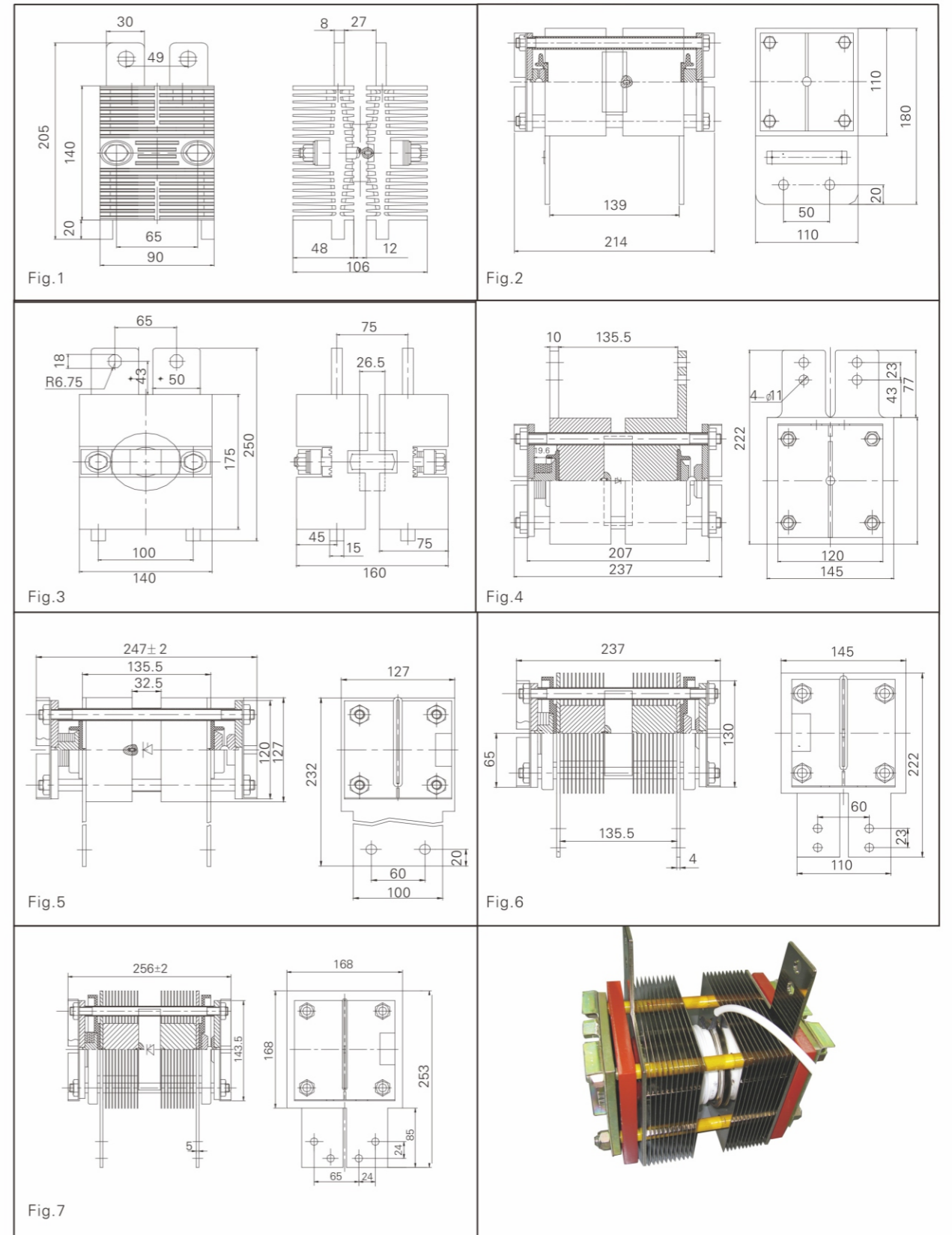


Fig.3 铝型材组件  
Fig.3 Aluminium Heatsink Assemblies



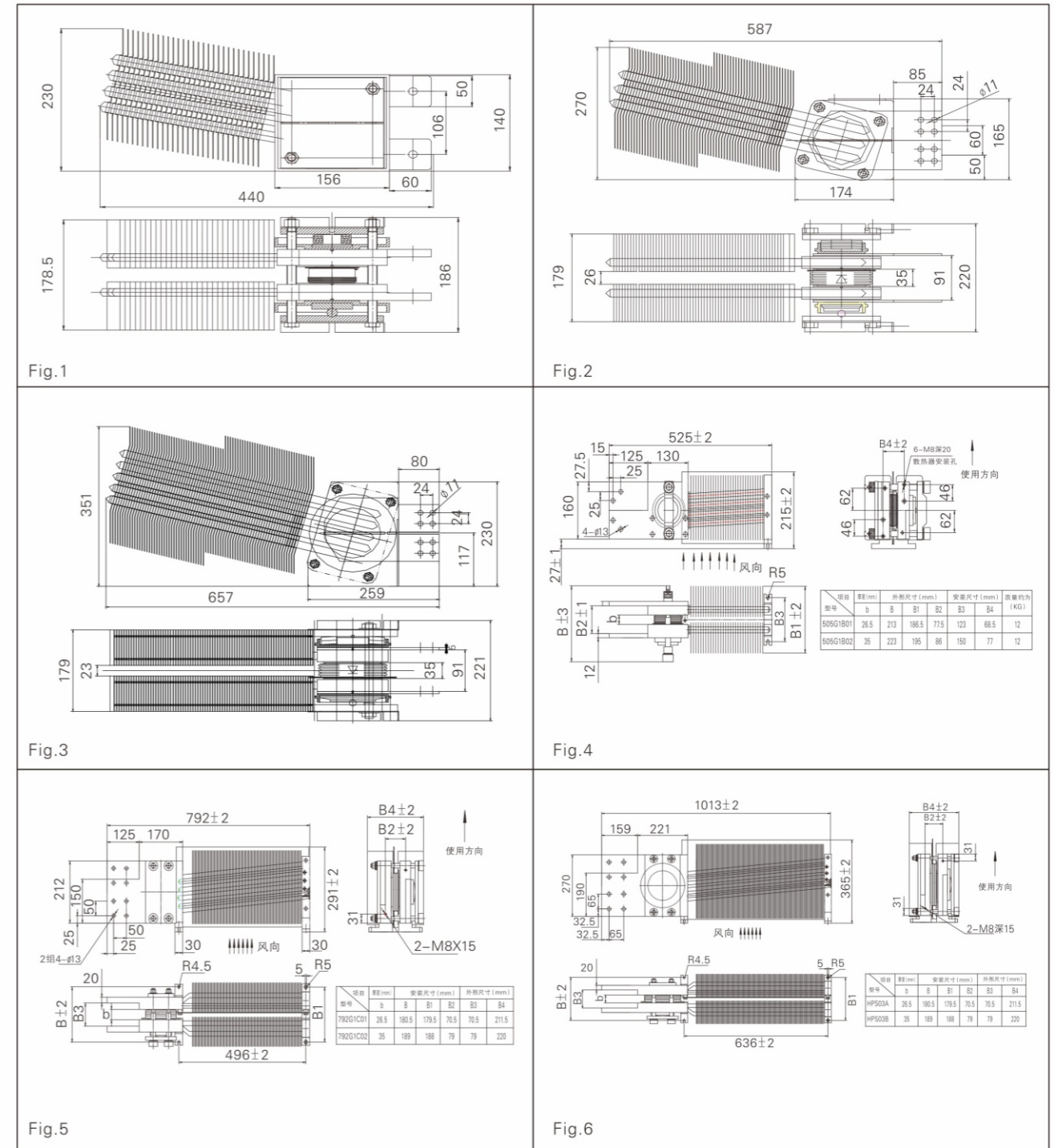
型号 Type	散热器型号 Heatsink Type	元件数量 The Number of Devices	适应最大元件 Applicable Devices	冷却方式 Cooling Method	外形尺寸 /mm Outline Dimension	风速 Air Speed	热阻Rsa Thermal Resistance	重量 单个散热器 Weight	散热器材质 Heatsink Material	外形图 Outline
						m · s <sup>-1</sup>	K · W <sup>-1</sup>	kg		
tPower- SA.KP(ZP) *****F	LSP6	≤5	KP <sub>7</sub> , ZP <sub>7</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	6	≤0.8	2.2	纯铝 Aluminium	Fig.1
	LSF8	≤5	KP <sub>8</sub> , ZP <sub>8</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	6	≤0.09	4.5	纯铝 Aluminium	Fig.2
	LSF9	≤5	KP <sub>9</sub> , ZP <sub>9</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	6	≤0.046	6.6	纯铝 Aluminium	Fig.3
	LSFA	≤5	KP <sub>x</sub> , ZP <sub>x</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	6	≤0.045	8.5	纯铝 Aluminium	Fig.4
	TSFA-1	≤5	KP <sub>A</sub> , ZP <sub>A</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	6	≤0.05	12	铜 Copper	Fig.5
	TSFA-3	≤5	KP <sub>A</sub> , ZP <sub>A</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	6	≤0.044	13	铜 Copper	Fig.6
	Zs331	≤5	KP <sub>x</sub> , ZP <sub>x</sub>	自冷或风冷 Nature-cooling or Air-cooling	见图纸	6	≤0.026	18	铜 Copper	Fig.7



# 热管双极功率组件 | Heat Pipe Bipolar Power Assemblies

型号 Type	散热器型号 Heatsink Type	元件数量 The Number of Devices	适应最大元件 Applicable Devices	冷却方式 Cooling Method	外形尺寸/mm Outline Dimension			风速 Air Speed $m \cdot s^{-1}$	热阻Rsa Thermal Resistance $K \cdot W^{-1}$	重量 Weight kg	安装方式 Assembly Method	外形图 Outline
					L	D	H					
tPower -SA.KP (ZP) *****F	ZS757(热管)	1	KP <sub>A</sub> , ZP <sub>A</sub>	自冷或风冷 Nature-cooling or Air-cooling	440	230	178.5	-	≤0.095	8.5	水平 Horizontal	Fig.1
	ZS803(热管)	1	KP <sub>B</sub> , ZP <sub>B</sub>	自冷或风冷 Nature-cooling or Air-cooling	587	270	221	-	≤0.053	15	水平 Horizontal	Fig.2
	ZS891(热管)	1	KP <sub>D</sub> , ZP <sub>D</sub>	自冷或风冷 Nature-cooling or Air-cooling	657	351	221	-	≤0.040	33	水平 Horizontal	Fig.3
	ZB291(热管)	1	KP <sub>X</sub> , ZP <sub>X</sub>	自冷或风冷 Nature-cooling or Air-cooling	525	251	213	-	≤0.1	12	水平 Horizontal	Fig.4
	ZB292(热管)	1	KP <sub>C</sub> , ZP <sub>C</sub>	自冷或风冷 Nature-cooling or Air-cooling	792	291	211.5	-	≤0.027	20	水平 Horizontal	Fig.5
	ZB293(热管)	1	KP <sub>E</sub> , ZP <sub>E</sub>	自冷或风冷 Nature-cooling or Air-cooling	1013	365	211.5	-	≤0.019	25	水平 Horizontal	Fig.6

# 热管双极功率组件 | Heat Pipe Bipolar Power Assemblies

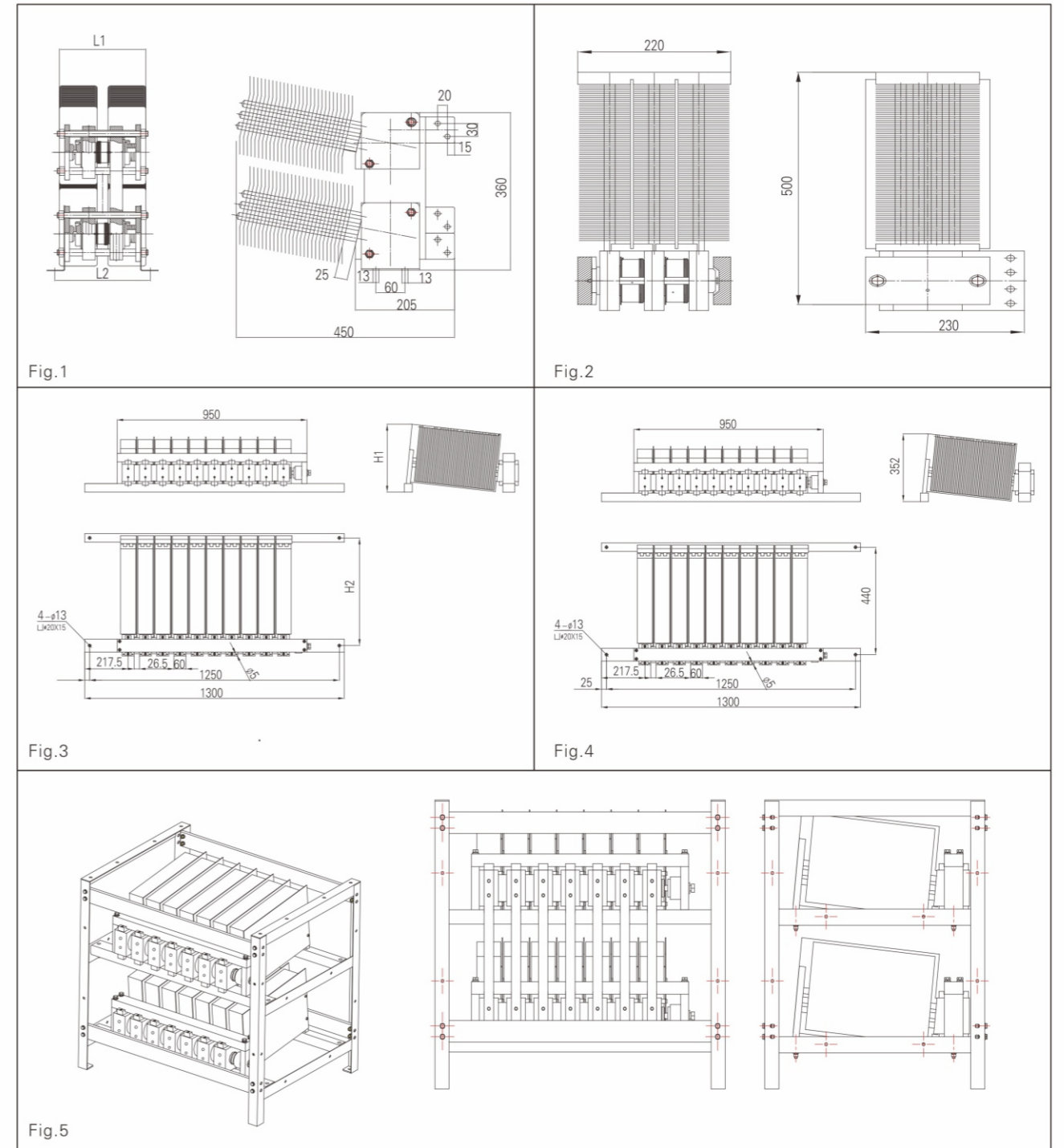




## 热管双极功率组件 | Heat Pipe Bipolar Power Assemblies

型号 Type	散热器型号 Heatsink Type	元件数量 The Number of Devices	适应最大元件 Applicable Devices	冷却方式 Cooling Method	外形尺寸/mm Outline Dimension		风速 Air Speed $m \cdot s^{-1}$	热阻Rsa Thermal Resistance $K \cdot W^{-1}$	重量 Weight kg	安装方式 Assembly Method	外形图 Outline
					L	D					
tPower -SA.KP (ZP) *****F	SH507-450D2X	≤2	KP <sub>X</sub> , ZP <sub>X</sub>	自冷或风冷 Nature-cooling or Air-cooling	450	360	-	≤0.02	8	垂直 uprightness	Fig.1
	SH507-500G2B	≤2	KP <sub>B</sub> , ZP <sub>B</sub>	自冷或风冷 Nature-cooling or Air-cooling	500	230	-	≤0.02	10	垂直 uprightness	Fig.2
	SH512-330D99	≤9	KP <sub>9</sub> , ZP <sub>9</sub>	自冷或风冷 Nature-cooling or Air-cooling	590	330	-	≤0.05	65	垂直 uprightness	Fig.3
	SH513-352G7C	≤7	KP <sub>C</sub> , ZP <sub>C</sub>	自冷或风冷 Nature-cooling or Air-cooling	440	352	-	≤0.05	70	垂直 uprightness	Fig.4
	SH509-318G149	≤14	KP <sub>9</sub> , ZP <sub>9</sub>	自冷或风冷 Nature-cooling or Air-cooling	502	318	-	≤0.05	110	垂直 uprightness	Fig.5

## 热管双极功率组件 | Heat Pipe Bipolar Power Assemblies



## 液冷双极功率组件 | Liquid-cooling Bipolar Power Assemblies

型号 Type	散热器型号 Heatsink Type	元件数量 The Number of Devices	适应最大元件 Applicable Devices	冷却方式 Cooling Method	外形尺寸/mm Outline Dimension			流量 flow L·min <sup>-1</sup>	热阻Rsa Thermal Resistance K·W <sup>-1</sup>	重量 单个散热器 Weight kg	示意图 Sketch
					L	D	H				
tPower -SA.KP (ZP) *****S	SS11	≤6	KP <sub>B</sub> 、ZP <sub>B</sub>	液冷 Liquid-cooling	140	135	146	4	≤0.026	0.7	Fig.1
	SS12	≤6	KP <sub>9</sub> 、ZP <sub>9</sub>	液冷 Liquid-cooling	190	160	152	4	≤0.018	1.1	
	SS13	≤6	KP <sub>A</sub> 、ZP <sub>A</sub>	液冷 Liquid-cooling	190	160	152	4	≤0.015	1.6	
	SS14	≤6	KP <sub>B</sub> 、ZP <sub>B</sub>	液冷 Liquid-cooling	220	195	188	4	≤0.013	2.2	
	SS15	≤6	KP <sub>C</sub> 、ZP <sub>C</sub>	液冷 Liquid-cooling	235	195	190	4	≤0.010	4.4	
	SS16	≤6	KP <sub>D</sub> 、ZP <sub>D</sub>	液冷 Liquid-cooling	288	260	230	4	≤0.008	5	

## 液冷双极功率组件 | Liquid-cooling Bipolar Power Assemblies

型号 Type	散热器型号 Heatsink Type	元件数量 The Number of Devices	适应最大元件 Applicable Devices	冷却方式 Cooling Method	外形尺寸/mm Outline Dimension	流量 flow L·min <sup>-1</sup>	热阻Rsa Thermal Resistance K·W <sup>-1</sup>	重量 Weight kg	示意图 Sketch
tPower -SA.KP (ZP) *****S	SS402-1740G4C	≤4	KP <sub>C</sub> 、ZP <sub>C</sub>	液冷 Liquid-cooling	见图纸	4	≤0.018	≤25	Fig.2
	SS403-780D10X	≤10	KP <sub>X</sub> 、ZP <sub>X</sub>	液冷 Liquid-cooling	见图纸	4	≤0.02	≤55	Fig.3
	SS404-142G6C	≤6	KP <sub>C</sub> 、ZP <sub>C</sub>	液冷 Liquid-cooling	见图纸	4	≤0.03	≤35	Fig.4

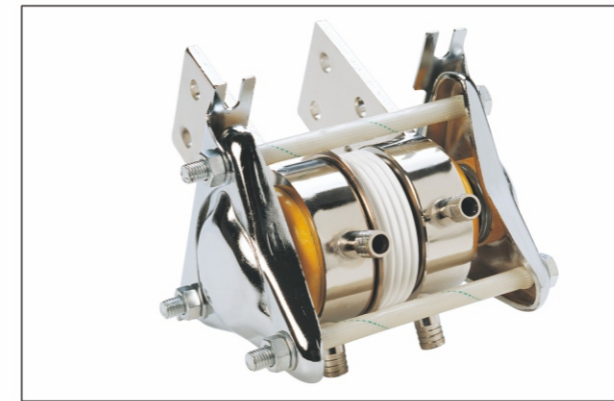


Fig.1 SS11-16 组件  
Fig.1 SS11-16 Assemblies

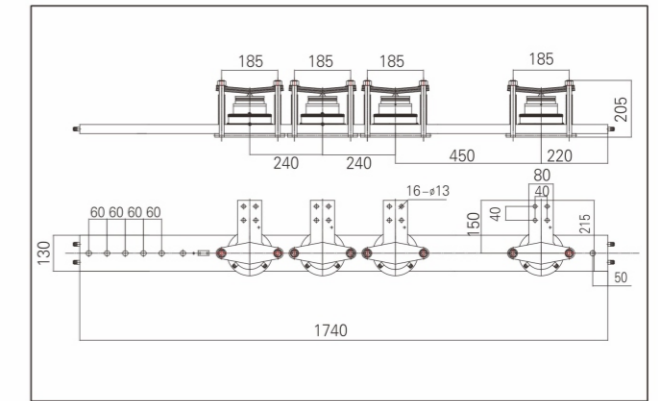


Fig.2 SS402-1740G4C 组件  
Fig.2 SS402-1740G4C Assemblies

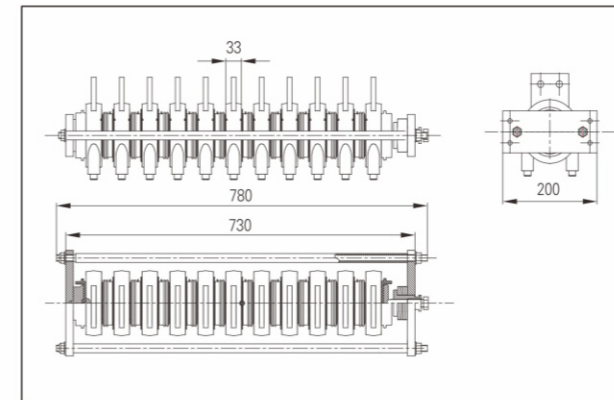


Fig.3 SS403-780D10X 组件  
Fig.3 SS403-780D10X Assemblies

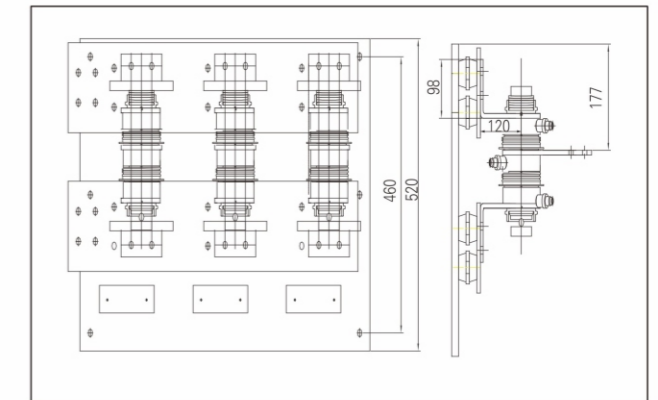


Fig.4 SS404-142G6C 组件  
Fig.4 SS404-142G6C Assemblies



## 定制式双极功率组件 | Custom Bipolar Power Assemblies

型号 TYPE	散热器 型号 Heatsink Type	元件数量 The Number of Devices	适用元件 Applicable Devices	冷却方式 cooling	输出电流	$V_{DRM}/V_{RRM}$	触发接口 trigger interface	频率	外形 Outline
					/rms			Frequency	
					A	kV		Hz	mm
tPower-SA.KP (ZP)****F	定制	≤6	相控晶闸管及整流管 PCT&Rectifier Diodes	风冷 Air-cooling	≤1500	≤25	-	-	Fig.1
tPower-SA.KK (KP)****S	定制	≤8	相控晶闸管及整流管 PCT&Rectifier Diodes	液冷 Liquid-cooling	≤3000	≤35	-	-	Fig.2
tPower-SA.KS****F	定制	≤5	双向晶闸管 BCT	风冷 Air-cooling	≤1000	≤15	光纤 optical fiber	≤100	Fig.3
tPower-SA.CF****S	定制	≤6	集成门极换流晶闸管 IGCT	液冷 Liquid-cooling	≤3000	≤25	光纤 optical fiber	≤1000	Fig.4

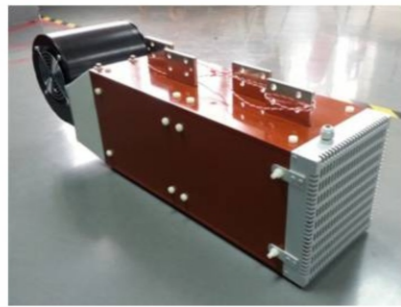


Fig.1 风冷式组件  
Fig.1 Air-cooling Assemblies

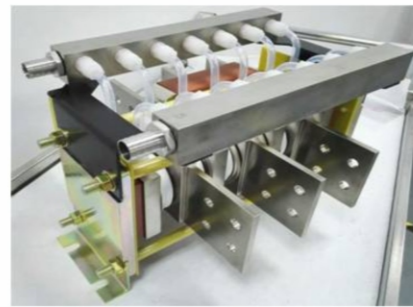


Fig.2 液冷式组件  
Fig.2 Liquid-cooling Assemblies



Fig.3 双向晶闸管组件  
Fig.3 BCT Assemblies

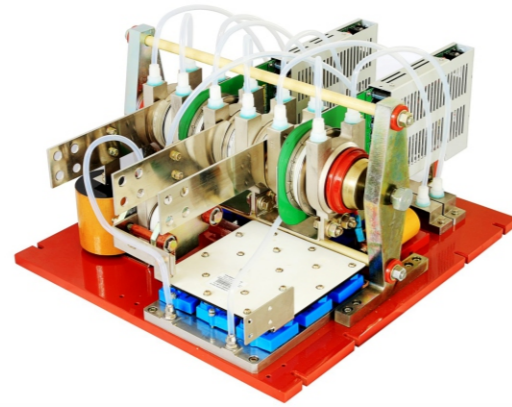


Fig.4 IGCT组件  
Fig.4 IGCT Assemblies

## 脉冲功率组件 | Pulsed Power Assemblies

型号 TYPE	散热器 型号 Heatsink Type	元件数量 The Number of Devices	适用元件 Applicable Devices	冷却方式 cooling	$I_{PK}$	$V_{DRM}/V_{RRM}$	$di/dt$		$dv/dt$	触发接口 trigger interface	频率	外形 Outline
					$t_p \leq 500$		$di/dt$	$I_{PK}$			Frequency	
					$\mu s$		A/ $\mu s$	kA			Hz	
					kA	kV	V/ $\mu s$			mm		
tPower-SP. KM*****N	-	≤16	全系列脉冲器件 all	自冷 Nature-cooling	≤400	≤50	3000	≤400	2000	光纤 Optical fiber	单脉冲 Single pulse	Fig.1
tPower-SP. KM*****F	定制	≤6	全系列脉冲器件 all	风冷 Air-cooling	≤400	≤20	3000	≤400	2000	光纤 Optical fiber	≤1Hz	Fig.2
tPower-SP. KM*****S	定制	≤8	全系列脉冲器件 all	液冷 Liquid cooling	≤400	≤35	3000	≤400	2000	光纤 Optical fiber	≤1Hz	定制 Custom

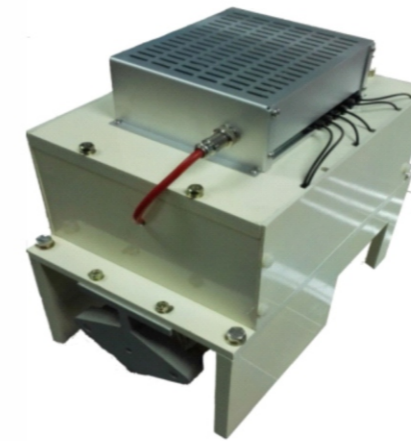
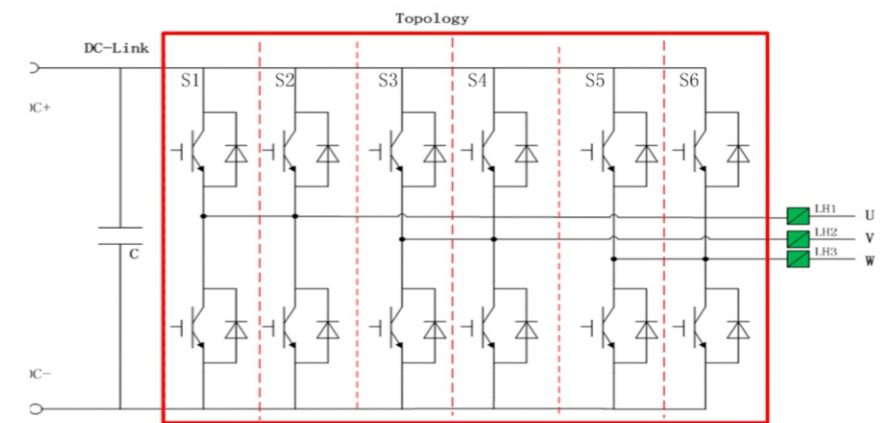
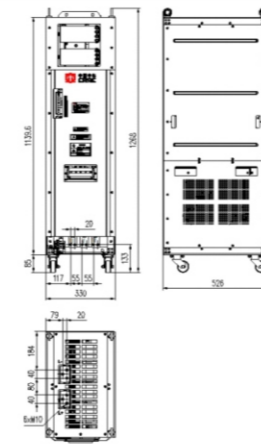


Fig.1 自冷脉冲功率组件  
Fig.1 Nature-cooling Assemblies

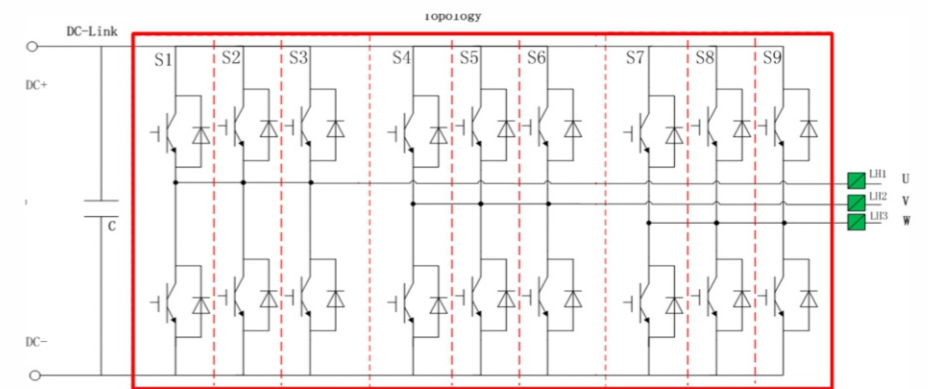
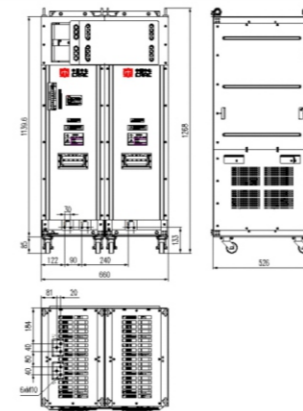


Fig.2 风冷脉冲功率组件  
Fig.2 Air-cooling Pulsed Power Assemblies

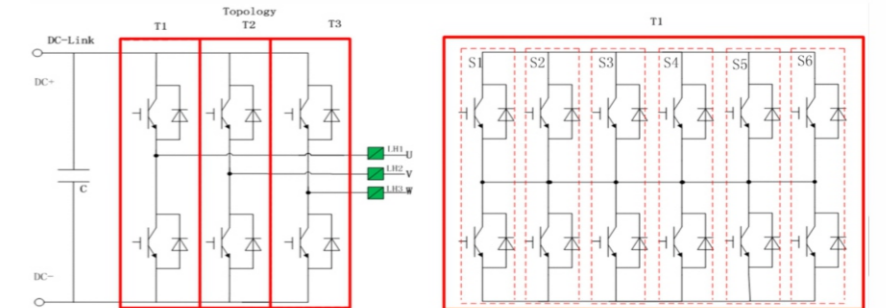
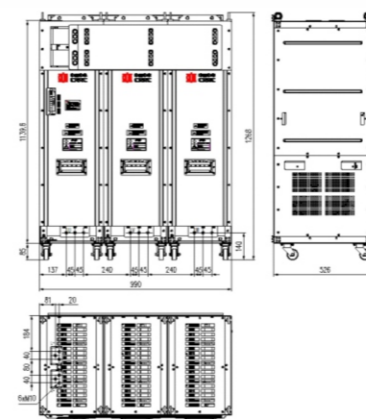
型号 TYPE	应用领域 Applications	电路拓扑 Topology	冷却方式 Cooling	输出电流	输出电压	直流母线	重量 Weight	外形	控制接口 Control interface	供电方式 Power supply
				Iac,rms A	Uac,rms V	额定 Udc V		Outline mm		
tPower-SA.GS06Q12F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	270	400	700	96	526 × 330 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS09Q12F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	405	400	700	96	526 × 330 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS14Q12F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	608	400	700	178	526 × 660 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS18Q12F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	810	400	700	260	526 × 990 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS27Q12F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	1215	400	700	260	526 × 990 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS06Q17F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	210	690	1050	96	526 × 330 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS09Q17F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	315	690	1100	96	526 × 330 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS14Q17F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	473	690	1100	178	526 × 660 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS18Q17F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	630	690	1100	260	526 × 990 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS27Q17F1	工业传动 Industrial Drive	三相全桥 3-phase -bridge	风冷 Air cooling	945	690	1100	260	526 × 990 × 1268	光纤 Optical fiber	自取能 Self supply
tPower-SA.GS14ML12S1	光伏逆变器 Photovoltaic Converter	三电平半桥 Half-bridge (3-level)	风冷 Air cooling	700	1080	1500	48	640 × 402 × 2135	光纤 Optical fiber	外部 External supply
tPower-SA.GS40B17S1	风电变频器、感应加热 Wind Power, Induction Heating	半桥 Half-bridge	液冷 Liquid cooling	2000	690	1050	45	720 × 540 × 148	电 Electric	外部 External supply



tPower-SA.GS06Q12F1/tPower-SA.GS09Q12F1/tPower-SA.GS06Q17F1/tPower-SA.GS09Q17F1



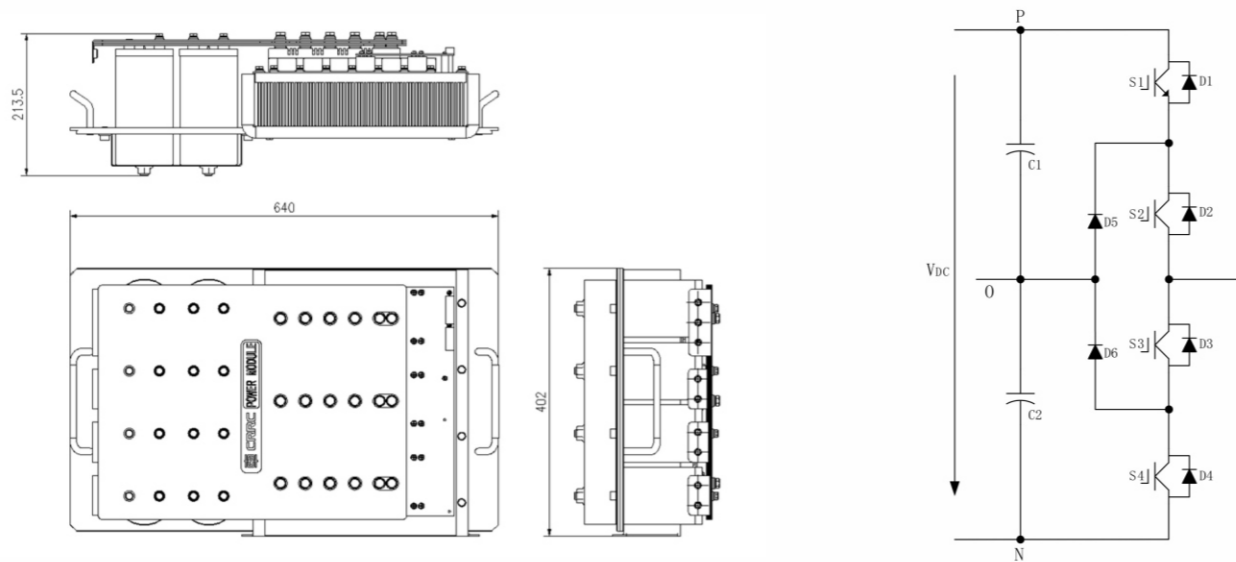
tPower-SA.GS14Q12F1/tPower-SA.GS14Q17F1



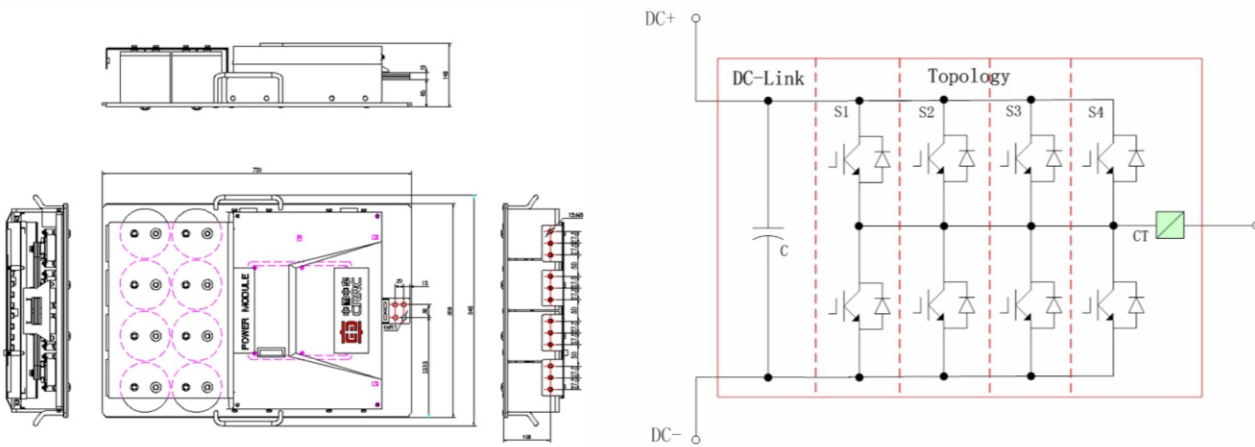
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tPower-SA.GS14ML12S1



tPower-SA.GS40B17S1

功率组件型号由产品类型与产品编码两部分构成。

