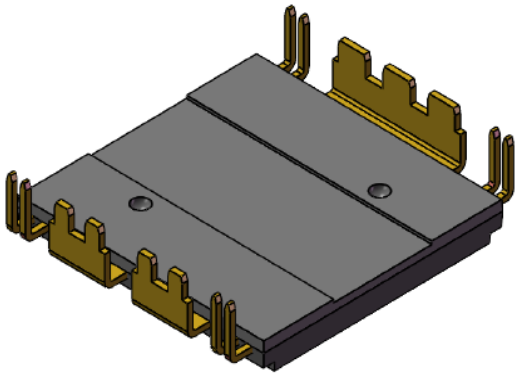
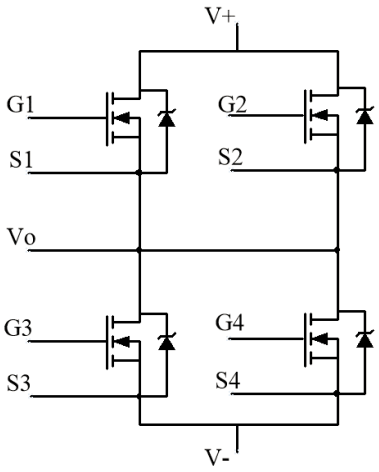
SLC500MM15SHN2

车规级150V N沟道MOSFET，
500A半桥功率模块。

Automotive 150 V N-Channel MOSFET,
500A Half-Bridge Power Module.





V_{DSS}=150V
$I_{D\ nom}$=500A
$R_{DS(ON)\ typ}$=1.2mΩ

特性
- 低导通阻抗
- 高电流密度
- 高可靠性
- 半桥，易并联

Features
- Low Rdson
- High current density
- High Ruggedness
- Halfbridge, Easy paralleling

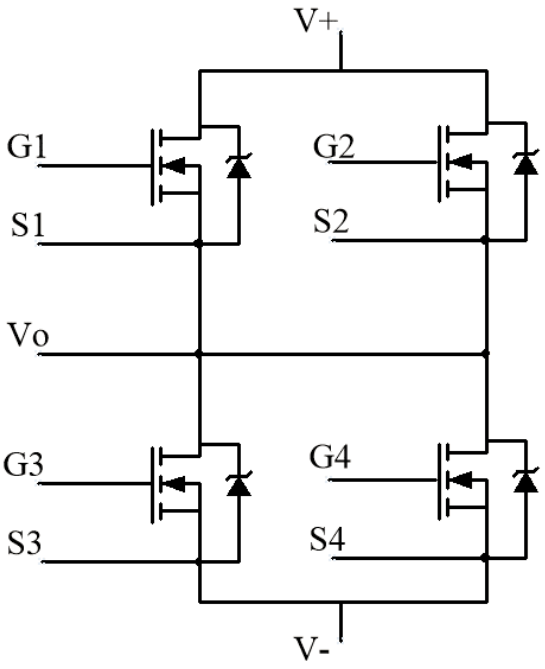
应用场景
- DC/DC转换器
- UPS系统
- 交流电机控制
- 太阳能应用

Application scenarios
- DC/DC converter
- UPS systems
- AC Motor control
- Solar applications

RoHS

Type / Ordering Code	Package	Marking	Related Links
SLC500MM15SHN2	N2		

Revision	Date	Subjects (major changes since last revision)
V1.0	2022-3-3	New version release



引脚功能描述/Pin Function Descriptions

Pin No.	Pin Name	Pin Functional Description
1	S1	上桥 MOSFET 源极 / High Side MOSFET Source
2	G1	上桥 MOSFET 栅极 / High Side MOSFET Gate
3	Vo	相线输出 / Phase Output
4	G3	下桥 MOSFET 栅极 / Low Side MOSFET Gate
5	S3	下桥 MOSFET 源极 / Low Side MOSFET Source
6	S2	上桥 MOSFET 源极 / High Side MOSFET Source
7	G2	上桥 MOSFET 栅极 / High Side MOSFET Gate
8	V+	正电源端子 / Positive Power Terminal
9	V-	负电源端子 / Negative Power Terminal
10	G4	下桥 MOSFET 栅极 / Low Side MOSFET Gate
11	S4	下桥 MOSFET 源极 / Low Side MOSFET Source

最大额定值 / Maximum Rated Values

Tvj = 25℃，除非另有说明/Tvj = 25℃,Unless Otherwise Specified

Parameter	symbol	Condition	Rating	Unit
漏源极电压 Drain-source voltage	V_{DS}	VGS=0, ID=1mA, Tj=25℃	150	V
直流漏极电流 DC drain current	$I_{D\ nom}$	VGS=10V, TC=25℃, RthJH=0.157K/W	500	A
		VGS=10V, TC=100℃, RthJH=0.157K/W	350	
脉冲漏极电流 Pulsed drain current	$I_{D,pulse}$	tp limited by Tvjmax	1500	A
雪崩能量，单脉冲 Avalanche energy, single pulse	E_{AS}	L=2mH, Rg=25Ω	2880	mJ
栅源峰值电压 Gate-source voltage	V_{GS}	-	+20/-20	V
总耗散功率 Power dissipation	P_{tot}	TvjMAX=175℃， TC=25℃, RthJH=0.157K/W	955	W

电气特征值 / Electrical Characteristic Values

Tvj = 25℃，除非另有说明/Tvj = 25℃,Unless Otherwise Specified

静态特性/Static Characteristic

Parameter	symbol	Condition		Value			Unit
				Min	Typ	Max	
漏源击穿电压 Drain-source breakdowm voltage	$V_{(BR)DSS}$	VGS=0, ID=1mA, Tj=25℃		150	-	-	V
栅极阈值电压 Gate threshold voltage	$V_{GS(th)}$	VDS=VGS ID=250uA	Tj=25℃	2	3	4	V
			Tj=100℃	-	TBD	-	
			Tj=125℃	-	TBD	-	
零栅电压漏极电流 Zero gate voltage drain current	I_{DSS}	VDS=150V VGS=0V	Tj=25℃	-	-	5	uA
			Tj=100℃	-	-	400	
			Tj=125℃	-	-	TBD	
栅极漏电流 Gate-source leakage current	I_{GSS}	VDS=0V, VGS=±20V, Tj=25℃		-	-	±400	nA
漏源通态电阻 Drain-source on-state resistance	$R_{DS(ON)}$	VGS=10V ID=100A	Tj=25℃	-	1.2	1.7	mΩ
			Tj=100℃	-	TBD	-	
			Tj=125℃	-	TBD	-	
内部栅极电阻 Internal gate resistor	R_G	VGS=0, VDS=0, f=1MHz		-	1	-	Ω
跨导 Transconductance	g_{fs}	VDS=10V, ID=300A		-	762	-	S

动态特性/Dynamic Characteristic

Parameter	symbol	Condition	Value			Unit
			Min	Typ	Max	
输入电容 Input Capacitance	C_{iss}	V_{GS}=0 V_{DS}=40V f=1.0MHz Tj=25℃	-	20	-	nF
输出电容 Output capacitance	C_{oss}		-	26	-	nF
反向传输电容 Reverse transfer capacitance	C_{rss}		-	120	-	pF
开通延迟时间(电感负载) Turn on delay time, inductive load	$t_{d(on)}$	V_{DS}=96V V_{GS}=15V I_D=530A $R_{G,ext}$=10Ω Tj=25℃	-	520	-	ns
上升时间(电感负载) Rise time, inductive load	t_r		-	280	-	
关断延迟时间(电感负载) Turn off delay time, inductive load	$t_{d(off)}$		-	1000	-	
下降时间(电感负载) Fall time, inductive load	t_f		-	240	-	
开通损耗 (每脉冲) Turn-on energy loss per pulse	E_{on}		-	TBD	-	mJ
关断损耗 (每脉冲) Turn-off energy loss per pulse	E_{off}		-	TBD	-	mJ
总的栅极电荷 Total gate charge	Q_G	V_{DS}=40V, I_D=100A, V_{GS}=10V	-	524	-	nC

体二极管特性/Body Diode Characteristic

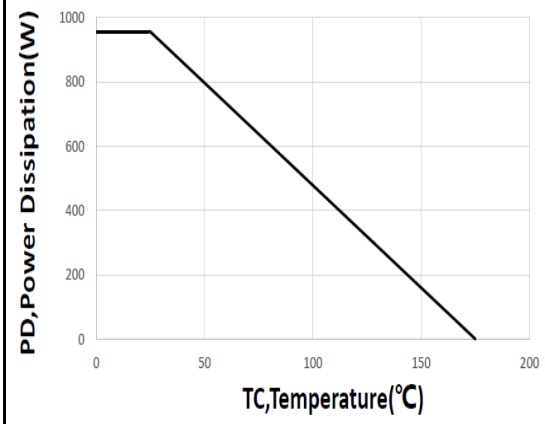
Parameter	symbol	Condition	Value			Unit
			Min	Typ	Max	
正向电压 Forward voltage	V_{SD}	V_{GS}=0, I_S=50A, Tj=25℃	-	0.79	1.2	V
二极管正向持续电流 Diode continuous forward current	I_S	Tj=25℃	-	500	-	A
二极管正向脉冲电流 Diode pulse forward current	$I_{S,pulse}$	Tj=25℃	-	1500	-	A
反向恢复时间 Reverse recovery time	trr	V_R=50V I_S=50A di/dt=200A/us	-	173	-	ns
反向恢复电荷 Reverse recovery charge	Qrr		-	1538	-	nC

模块特性 / Module Features

Parameter	symbol	Condition	Rating	Unit
结一散热器热阻 Thermal resistance, junction to heatsink	R_{thJH}	Junction to heat dissipation copper plate	0.157	K/W
测试机热阻测试 DELTA VDS	DVDS	V_{DS}=10V, I_D=20A Pt=50ms, delay=70us Im=10mA	TBD	mV
绝缘测试电压 Isolation test voltage	V_{ISOL}	RMS, f=50Hz, t=0.3s	TBD	kV
杂散电感,模块 Stray inductance module	L_{sDS}	T_j=25℃	20	nH
重量 Weight	G	-	36.5	g
模块基板材料 Material of module baseplate			Cu	
内部绝缘 Internal isolation			Al2O3	
爬电距离 Creepage distance		端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal	TBD	mm
电气间隙 Clearance		端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal	TBD	mm
相对电痕指数 Comperative tracking index	CTI		TBD	
模块引线电阻,端子-芯片 Module lead resistance, terminals - chip	$R_{CC'+EE'}$	TH = 25° C, 每个开关 / per switch	TBD	mΩ
在开关状态下温度 Temperature under switching conditions	$T_{vj\ op}$		-40/150	℃
储存温度 Storage temperature	T_{stg}		-55/175	℃
最高基板工作温度 Maximum baseplate operation temperature	T_{BPmax}		100	℃

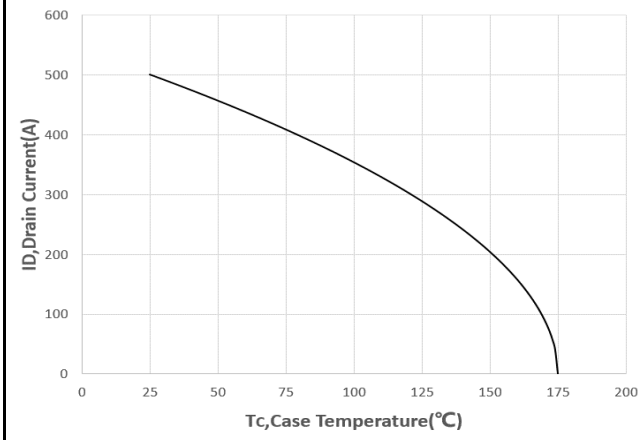
电气特性图/Electrical characteristics diagrams

Diagram 1: Power dissipation



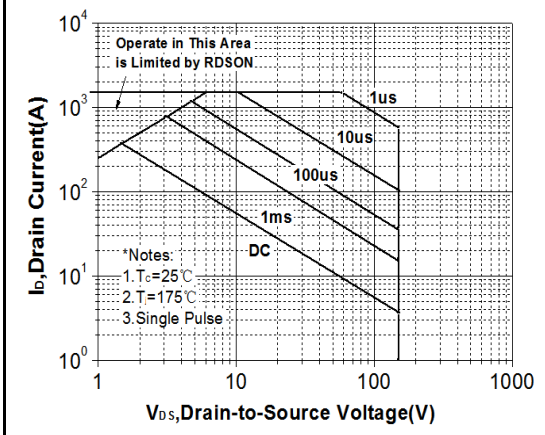
$P_{tot}=f(T_C)$

Diagram 2: Drain current



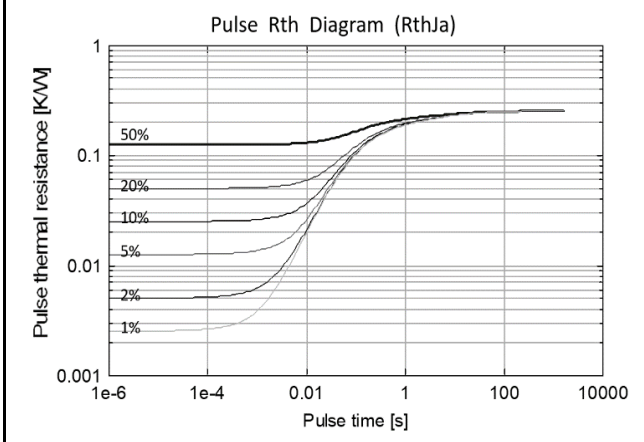
$I_D=f(T_C)$

Diagram 3: Safe operating area



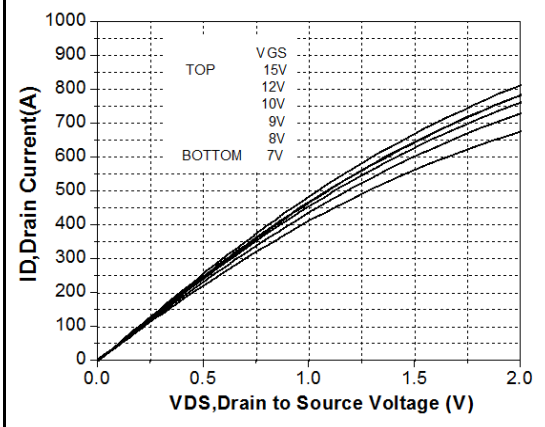
$I_D=f(V_{DS})$

Diagram 4: Pulse thermal resistance



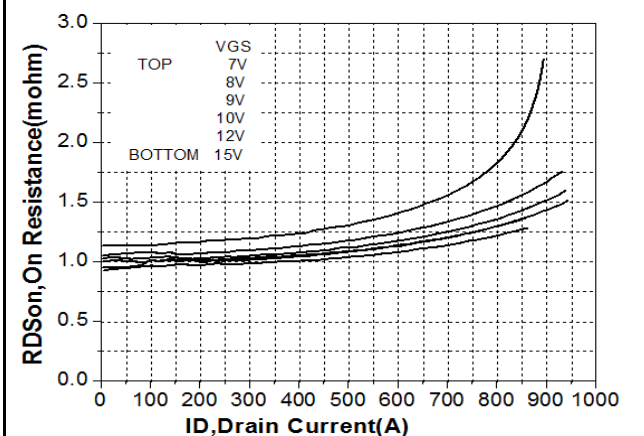
Pulse $R_{th}=f(T*D)$; D=Duty cycle; T=cycle

Diagram 5: Typ. output characteristics



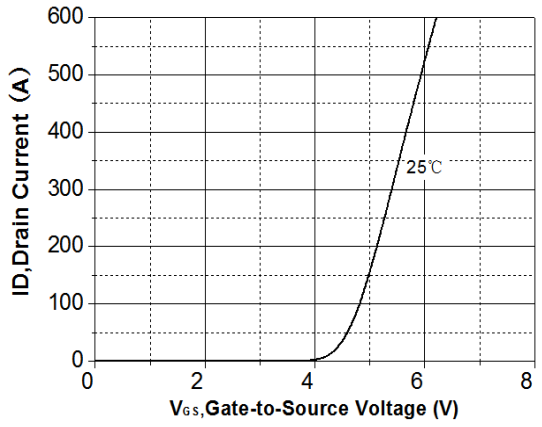
$I_D=f(V_{DS})$; T_j=25℃; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



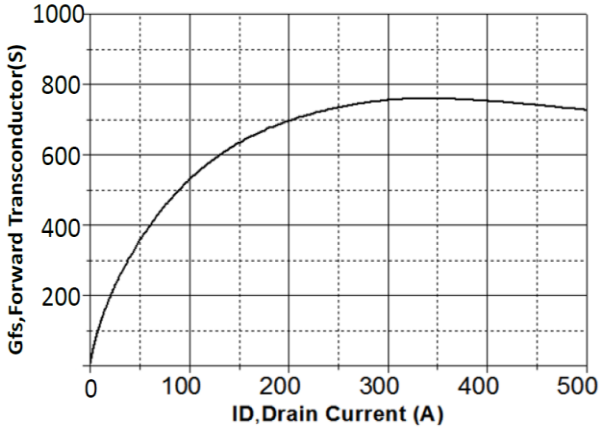
$R_{DS(on)}=f(I_D)$; T_j=25℃; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



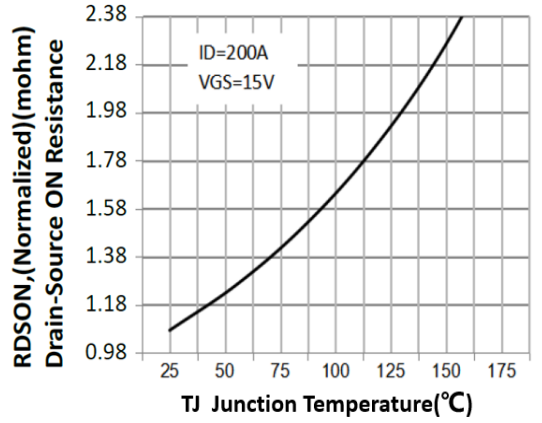
$I_D=f(V_{GS})$；Tj=25℃

Diagram 8: Typ. forward transconductance



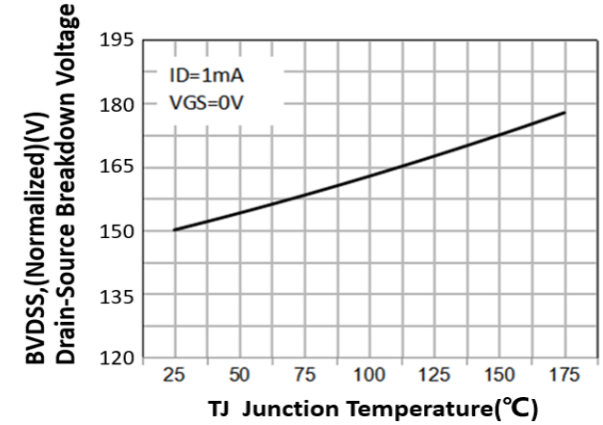
$g_{fs}=f(I_D)$；T_j=25℃

Diagram 9: Drain-source on-state resistance



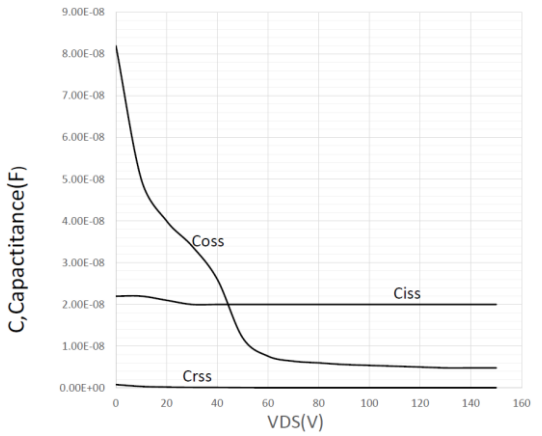
$R_{DS(on)}=f(T_j)$；I_D=200A；V_{GS}=15V

Diagram 10: Drain-source breakdown voltage



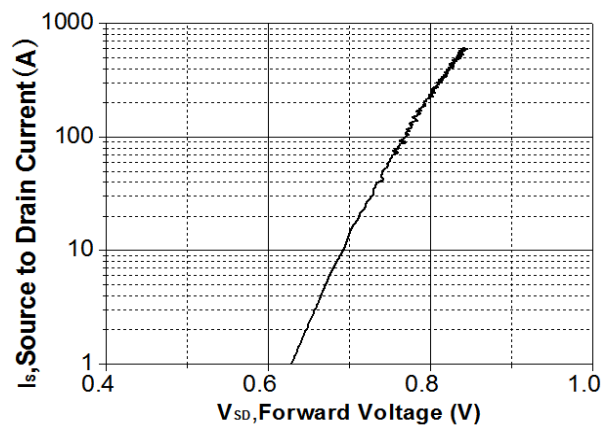
$V_{BR(DSS)}=f(T_j)$；I_D=1mA；VGS=0V

Diagram 11: Typ. Capacitances



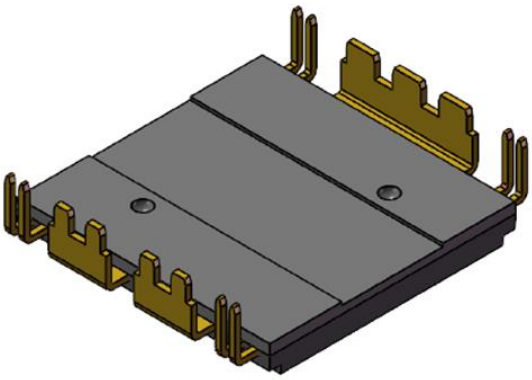
$C=f(V_{DS})$；V_{GS}=0V；f=1MHz

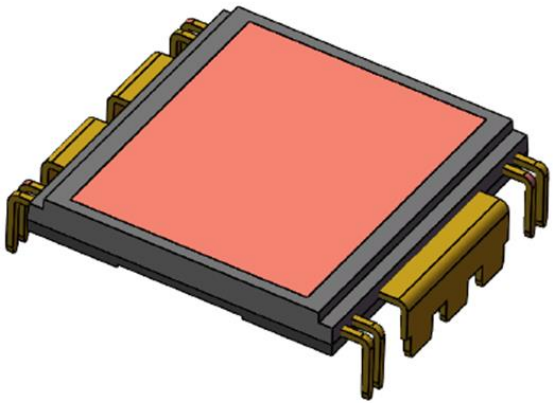
Diagram 12:Forward voltage of reverse diode

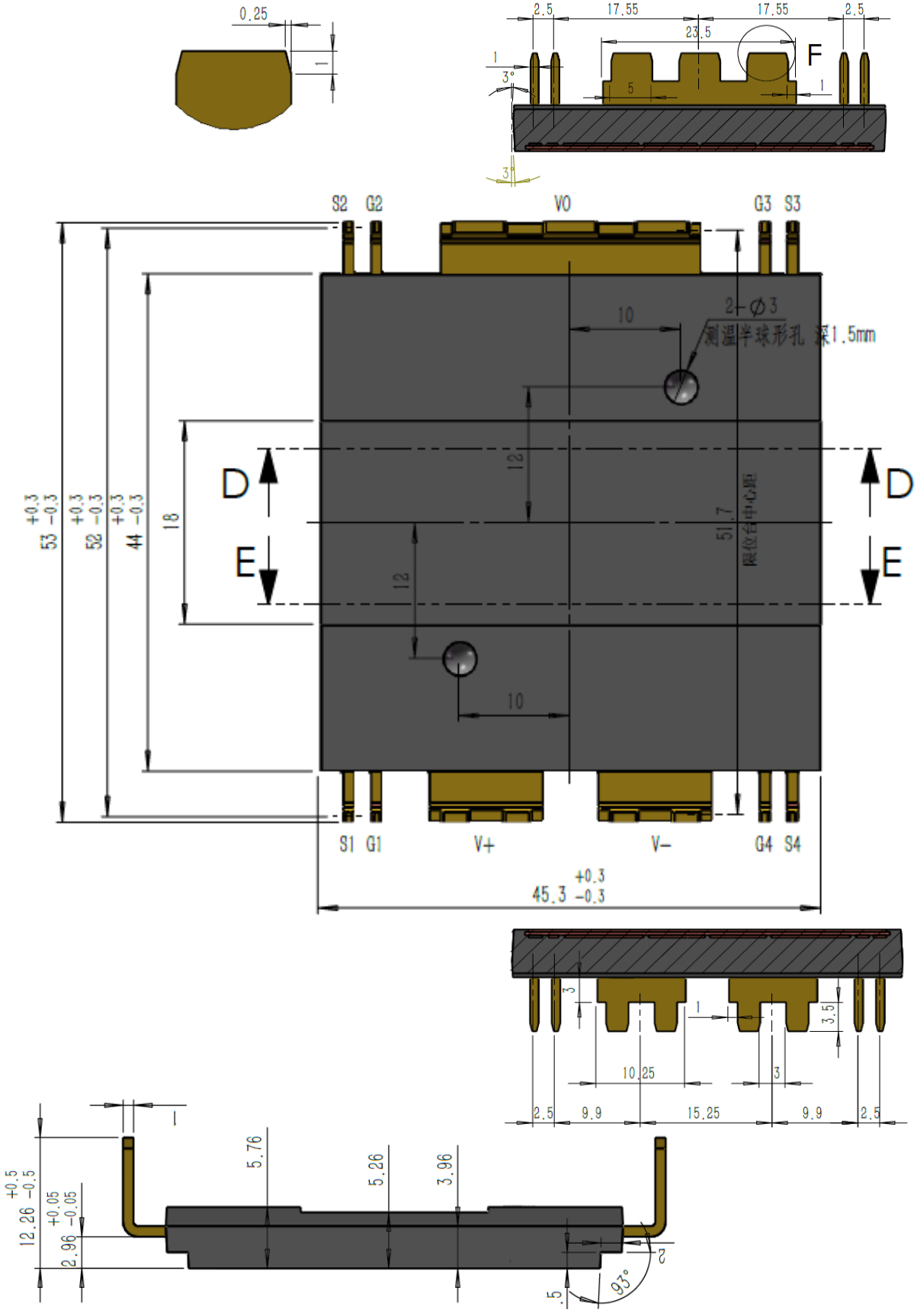


$I_S=f(V_{SD})$

封装外形（单位：mm）/ Package Outlines (Unit:mm)






0.25
2.5
17.55
17.55
2.5
23.5
F
3°
S2 G2 VO G3 S3
2-Φ3
测温半球形孔 深1.5mm
10
D
E
12
18
51.7
限位台中心距
S1 G1 V+ V- G4 S4
45.3 +0.3 -0.3
10.25
9.9
15.25
9.9
5.76
5.26
3.96
12.26 +0.5 -0.5
2.96 +0.05 -0.05
93°