

XNS50N60T

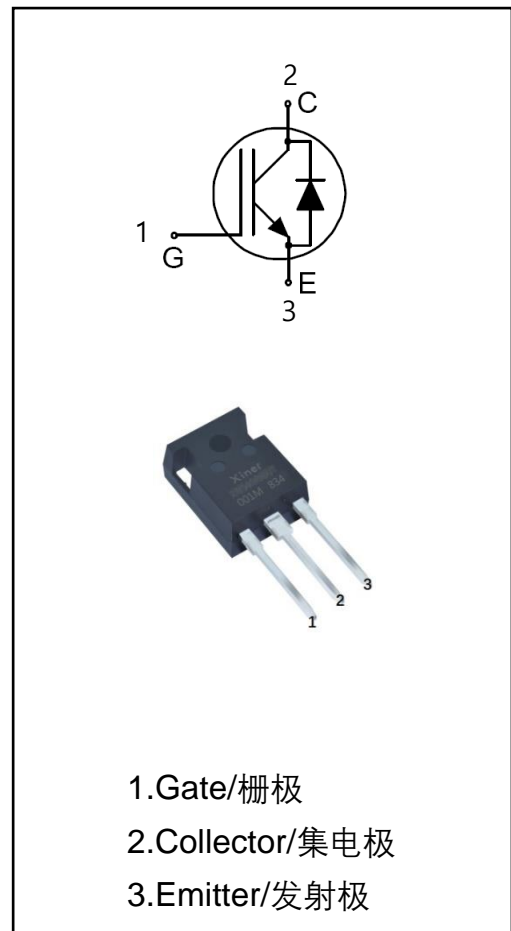
600V/50A 沟槽栅场截止型 IGBT

产品特点/PRODUCT FEATURES

- 先进的沟槽栅+场截止技术
Advanced Trench+FS IGBT technology
- 超低饱和压降
Low Collector-Emitter Saturation voltage
- 反并快恢复二极管
With anti-parallel fast recovery diode
- 最高结温 $T_J = 175\text{ }^\circ\text{C}$
Maximum junction temperature: $T_J = 175\text{ }^\circ\text{C}$

应用领域/APPLICATIONS

- 电机控制器
Motor control



关键性能和封装信息/Key Performance and Package Parameters

Type	V_{CE}	I_C	$V_{CEsat}, T_{vj}=25^\circ\text{C}$	T_{vjmax}	Package
XNS50N65T	600V	50A	1.9V	175°C	TO-247-3

额定值、热阻 Ratings & Thermal Resistance

最大额定值/ Maximum Ratings

符号/Symbol	参数/Parameter	条件/Condition	值/Value	单位/Unit
V_{CES}	集电极-发射极电压 Collector-to-emitter voltage	$T_{vj}=25^{\circ}\text{C}$	600	V
I_C	集电极连续直流电流 DC Collector current	$T_C = 25^{\circ}\text{C}$ ^①	90	A
		$T_C = 100^{\circ}\text{C}$	50	
I_{CRM} ^②	集电极可重复脉冲电流 Pulsed drain current	$T_{vj} \leq 175^{\circ}\text{C}$	200	A
I_F	二极管连续直流电流 Diode continuous forward current	$T_C = 25^{\circ}\text{C}$ ^①	90	A
		$T_C = 100^{\circ}\text{C}$	50	
I_{FRM} ^②	二极管可重复脉冲电流 Diode pulsed current	$T_{vj} \leq 175^{\circ}\text{C}$	200	A
V_{GES}	栅极-发射极峰值电压 Gate to emitter voltage	$T_{vj}=25^{\circ}\text{C}$	± 30	V
t_{sc}	短路耐量 Short circuit withstand time	$V_{GE}=15\text{V}, V_{CC} \leq 400\text{V}$ $T_{vj}=25^{\circ}\text{C}$	10	μs
P_{tot}	总耗散功率 Power dissipation	$T_C = 25^{\circ}\text{C}$	265	W
T_{vj}	可工作结温 Operating Junction Temperature		-40~+ 175	$^{\circ}\text{C}$
T_{stg}	储存温度 Storage Temperature Range		-50~ + 150	$^{\circ}\text{C}$

① 25°C的值受限于键合线/value limited by bondwire

② 脉宽受限于最高结温/Pulse width limited by T_{vjmax}

热阻/Thermal Resistance

符号/Symbol	参数/Parameter	最大值/Max.Value	单位/Unit
$R_{th(J-C)}$	IGBT 芯片到底板热阻 IGBT thermal resistance Junction-to-Case	0.56	K/W
$R_{th(J-C)}$	二极管芯片到底板热阻 FRD thermal resistance Maximum Junction-to-Case	0.7	K/W
$R_{th(J-A)}$	结到环境热阻 Thermal resistance Junction-to-Ambient	40	K/W

电气特性 Electrical Characteristic

静态电气特性/Static Electrical Characteristic

符号 Symbol	参数 Parameter	测试条件 Test conditions	Value值			单位 Units
			Min	Typ	Max	
$V_{(BR)CES}$	集电极-发射极击穿电压 Collector - Emitter breakdown voltage	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	600	—	—	V
$V_{CE(sat)}$	集电极-发射极饱和压降 Collector-Emitter Saturation voltage	$V_{GE}=15V, I_C=50A, T_{vj}=25^{\circ}C$	—	1.9	2.3	V
		$V_{GE}=15V, I_C=50A, T_{vj}=175^{\circ}C$	—	2.2	—	
$V_{GE(th)}$	门极开启阈值电压 Gate threshold voltage	$V_{GE}=V_{CE}, I_C=5mA, T_{vj}=25^{\circ}C$	4.8	5.5	6	V
V_F	二极管正向导通压降 Diode Forward Voltage	$V_{GE}=0V, I_F=50A, T_{vj}=25^{\circ}C$	1.2	1.5	1.8	V
		$V_{GE}=0V, I_F=50A, T_{vj}=175^{\circ}C$	—	1.3	—	
I_{GES}	门极-发射极漏电流 Gate to Emitter Leakage current	$V_{GE}=20V, V_{CE}=0V, T_{vj}=175^{\circ}C$	—	—	100	nA
I_{CES}	集电极-发射极漏电流 Zero gate voltage collector current	$V_{CE}=600V, V_{GE}=0V, T_{vj}=175^{\circ}C$	—	—	300	μA
R_{Gin}	内部门极电阻 Integrated gate resistor	—	—	0	—	Ω

动态电气特性/Dynamic Electrical Characteristic

符号 Symbol	参数 Parameter	测试条件 Test conditions	Value值			单位 Units
			Min	Typ	Max	
C_{ies}	输入电容 Input capacitance	$V_{GE}=0V, V_{CE}=25V,$ $f=1MHz, T_{vj}=25^{\circ}C$	—	3010	—	pF
C_{oes}	输出电容 Output capacitance		—	251	—	
C_{res}	反向传输电容 Reverse transfer capacitance		—	137	—	
Q_g	门极电量 Total gate charge	$I_C=50A, V_{CE}=480V,$ $V_{GE}=15V, T_{vj}=25^{\circ}C$	—	222	—	nC
Q_{ge}	门极-发射极电量 Gate to emitter charge		—	30	—	
Q_{gc}	门极-集电极电量 Gate to collector charge		—	146	—	
I_{sc}	短路电流 Short circuit collector current	$T_{vj}=25^{\circ}C, V_{CC}=400V,$ $V_{GE}=15V$	—	170	—	A

开关特性、感性负载 Switching Characteristic Inductive Load

IGBT 特性\IGBT Characteristic

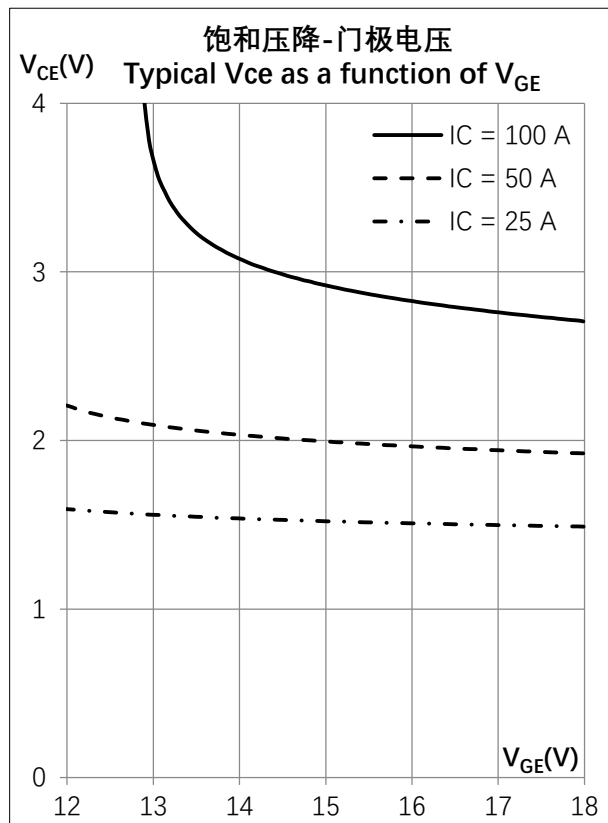
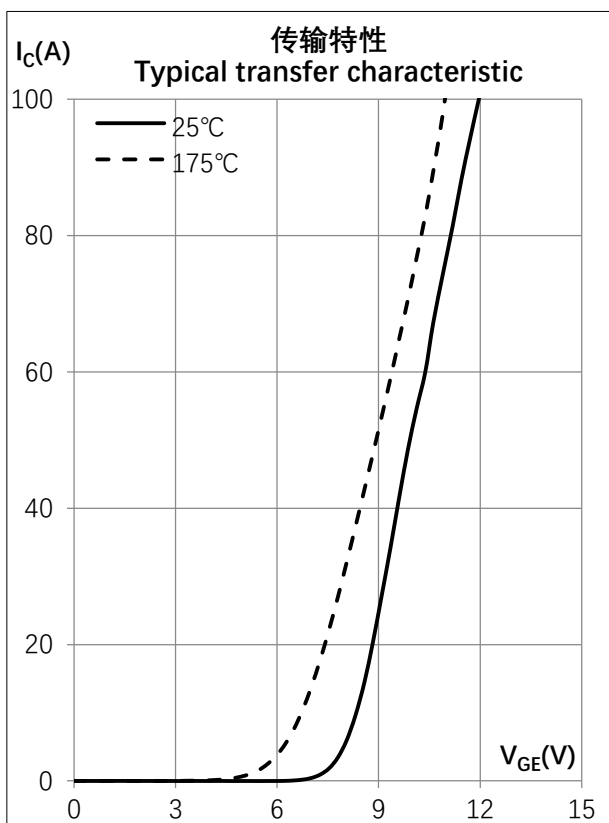
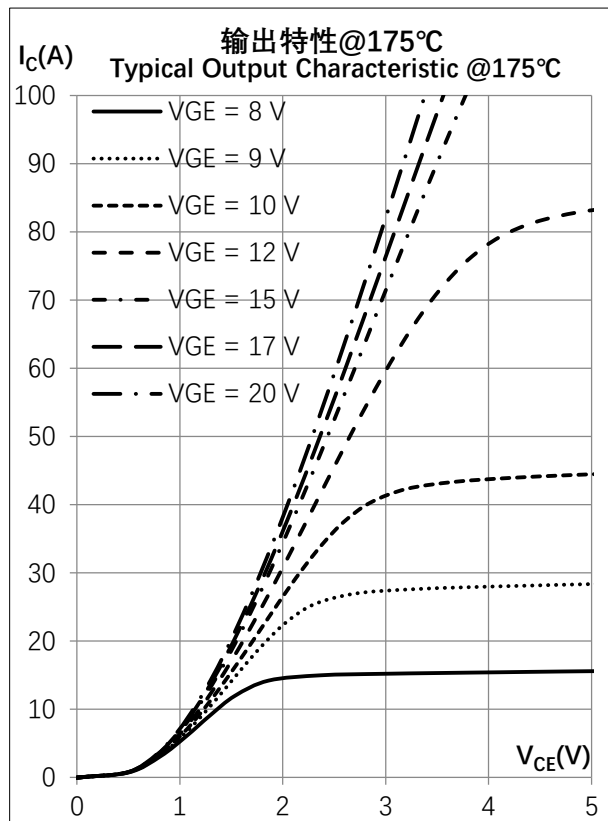
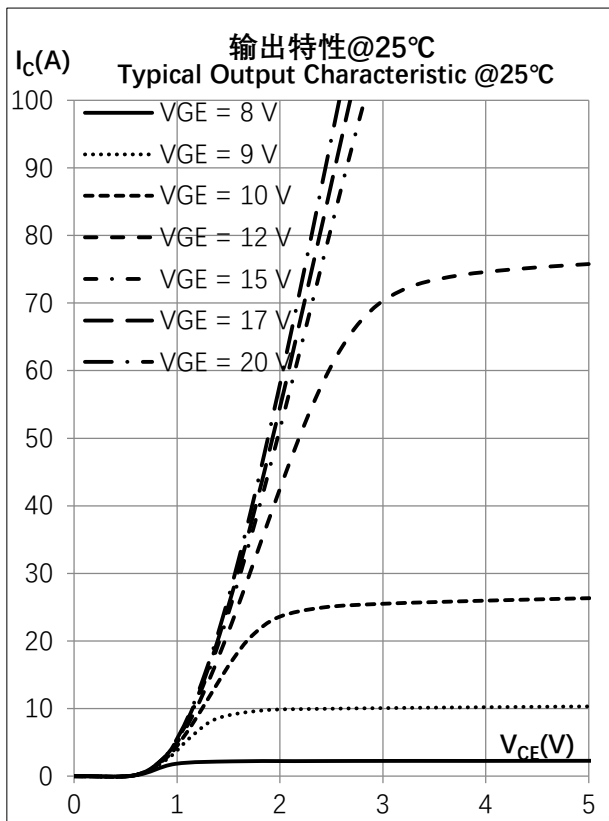
符号 Symbol	参数 Parameter	测试条件 Test conditions	值Value			单位 Units	
			Min	Typ	Max		
$T_{d(on)}$	开启延迟时间 Turn-On Delay Time	$V_{CC}=400V$ $I_C=50A$ $R_{G(on)}=10\Omega$ $R_{G(off)}=10\Omega$ $C=0nF$ $V_{GE}=15V$ $L_{load}=150\mu H$	$T_{vj}=25^\circ C$	—	128	—	ns
			$T_{vj}=175^\circ C$	—	150	—	
T_r	上升时间 Rise time		$T_{vj}=25^\circ C$	—	46	—	ns
			$T_{vj}=175^\circ C$	—	67	—	
$T_{d(off)}$	关闭延迟时间 Turn-Off Delay Time		$T_{vj}=25^\circ C$	—	379	—	ns
			$T_{vj}=175^\circ C$	—	469	—	
t_f	下降时间 Turn-Off Fall Time		$T_{vj}=25^\circ C$	—	39	—	ns
			$T_{vj}=175^\circ C$	—	52	—	
E_{on}	单次开启损耗 Turn-on switch loss		$T_{vj}=25^\circ C$	—	2.2	—	mJ
			$T_{vj}=175^\circ C$	—	2.6	—	
E_{off}	单次关闭损耗 Turn-off switch loss	$T_{vj}=25^\circ C$	—	1.1	—	mJ	
		$T_{vj}=175^\circ C$	—	1.4	—		

二极管特性\Diode Characteristic

符号 Symbol	参数 Parameter	测试条件 Test conditions	值Value			单位 Units	
			Min	Typ	Max		
t_{rr}	二极管反向恢复时间 Diode Reverse Recovery Time	$I_F = 50A$ $V_R=400V$ $di_F/dt=-400A/\mu s$	$T_{vj}=25^\circ C$	—	85	—	ns
			$T_{vj}=175^\circ C$	—	110	—	
Q_{rr}	二极管反向恢复电量 Diode Reverse Recovery Charge		$T_{vj}=25^\circ C$	—	0.6	—	μC
			$T_{vj}=175^\circ C$	—	2.3	—	
I_{rrm}	反向恢复峰值电流 Peak reverse recovery current		$T_{vj}=25^\circ C$	—	12	—	A
			$T_{vj}=175^\circ C$	—	20	—	
di_{rr}/dt	恢复下降电流最大电流变化率 Peak rate of i_{rr}		$T_{vj}=25^\circ C$	—	274	—	A/ μs
			$T_{vj}=175^\circ C$	—	310	—	
E_{rec}	二极管反向恢复损耗 Diode Reverse Recovery loss		$T_{vj}=25^\circ C$	—	0.9	—	mJ
			$T_{vj}=175^\circ C$	—	1.4	—	

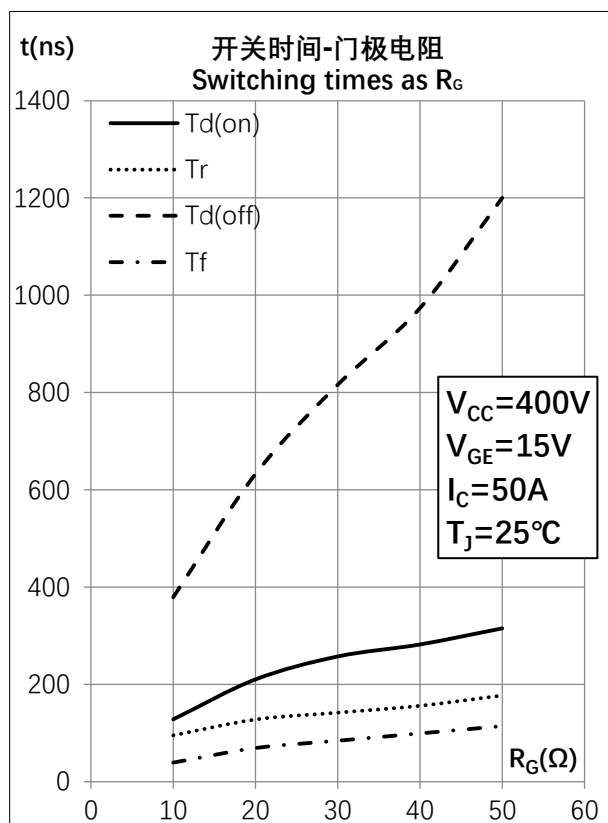
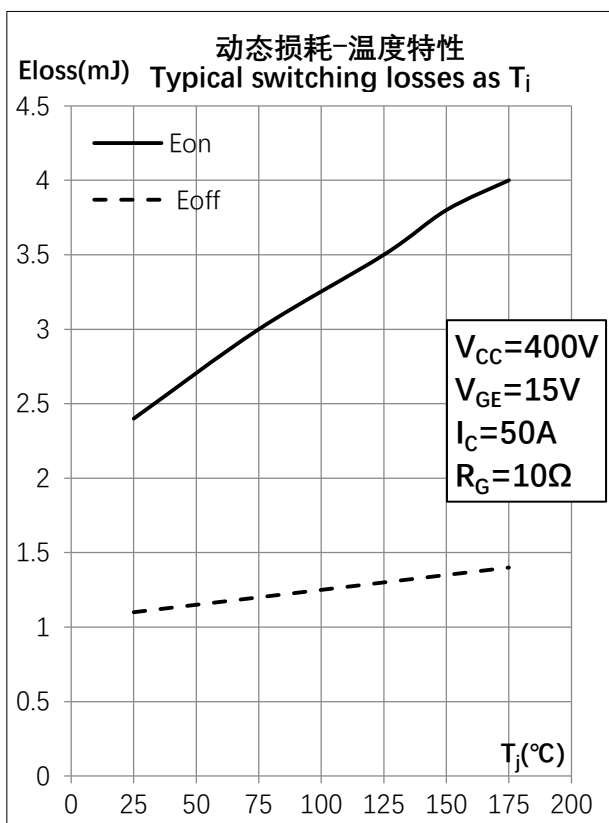
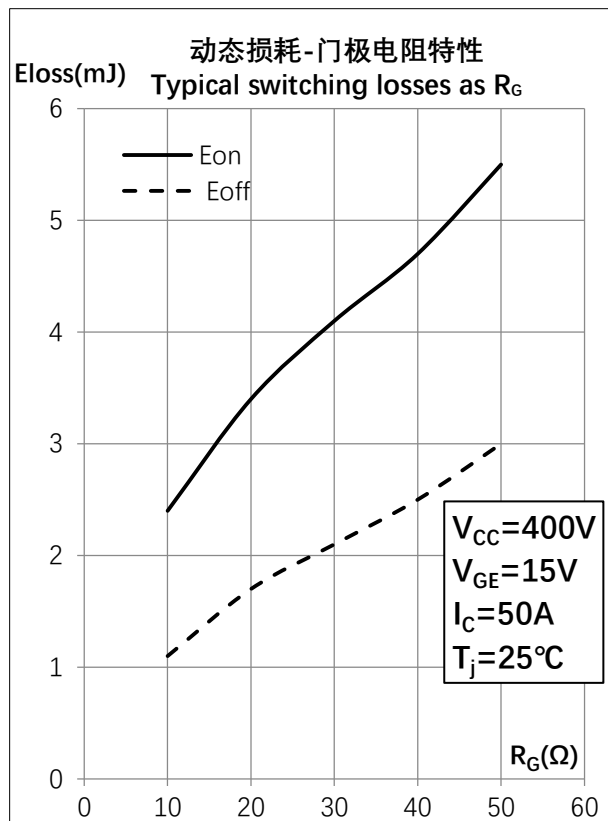
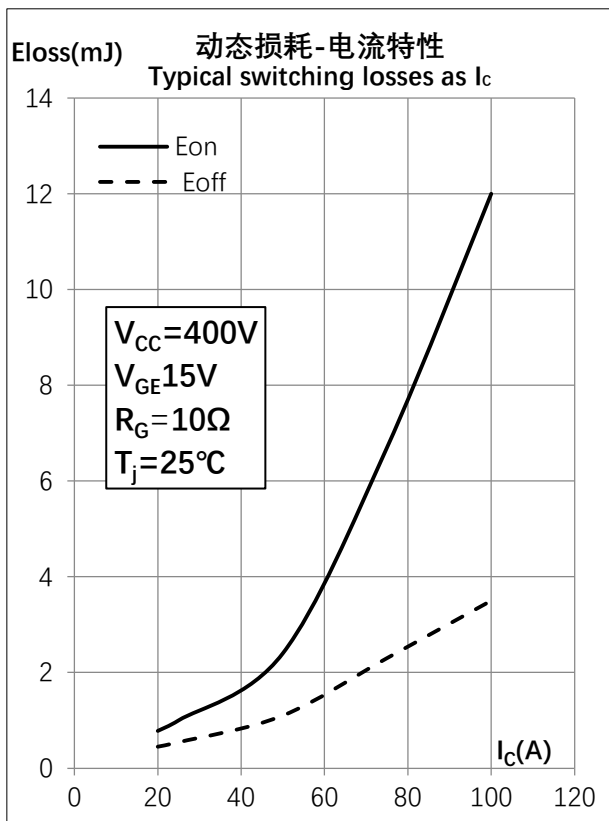
特征曲线

Characteristic Curve

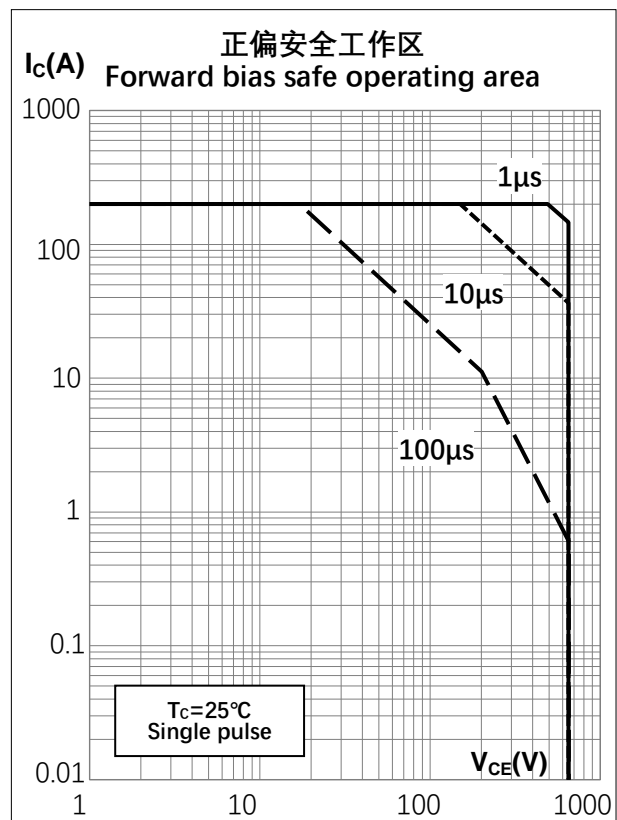
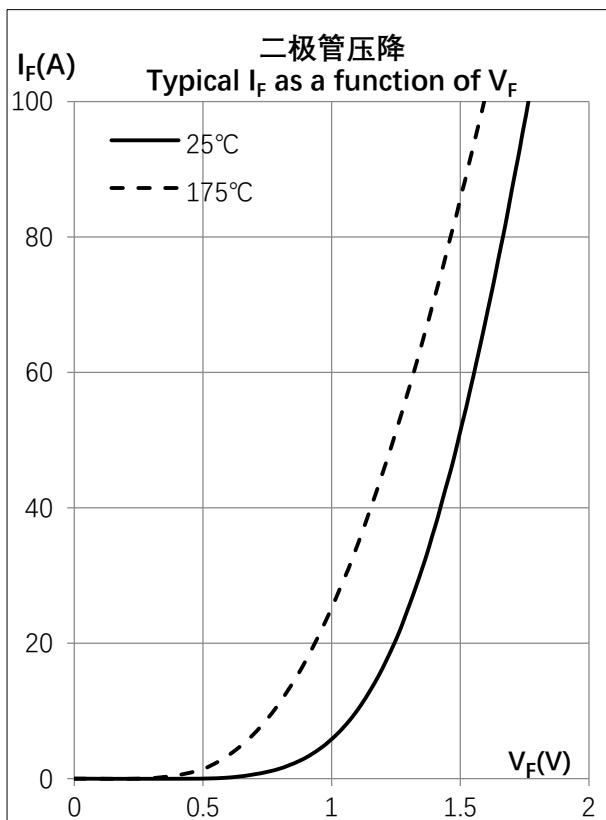
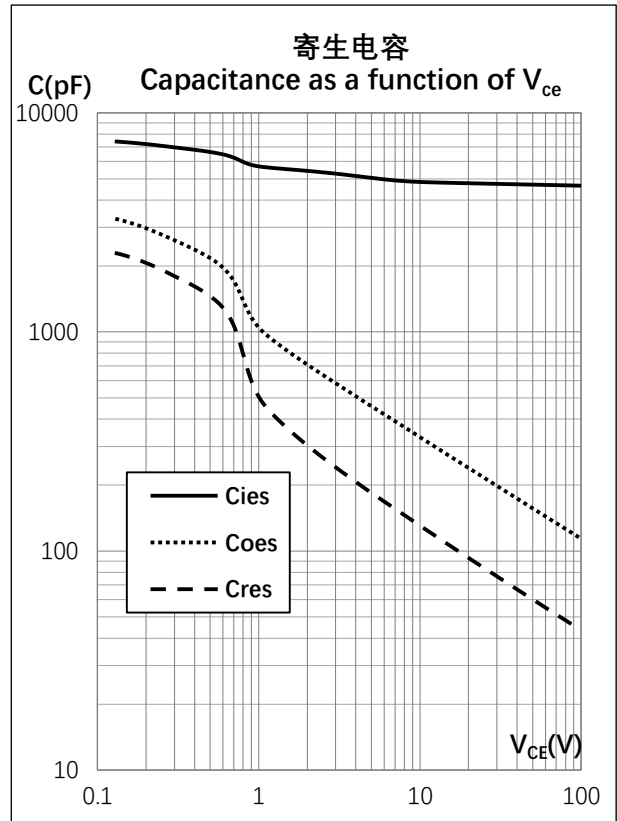
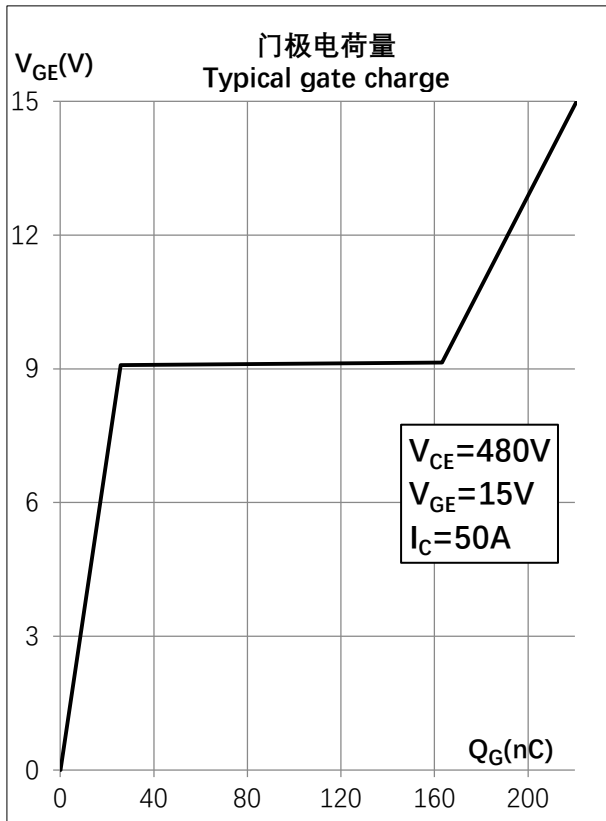


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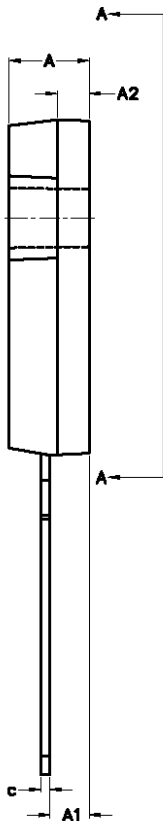
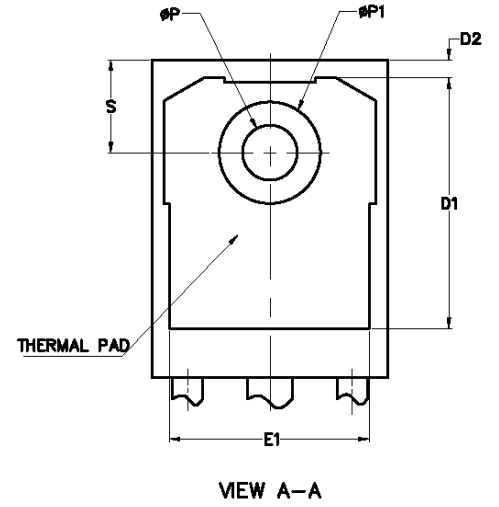
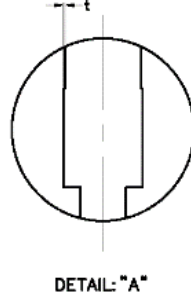
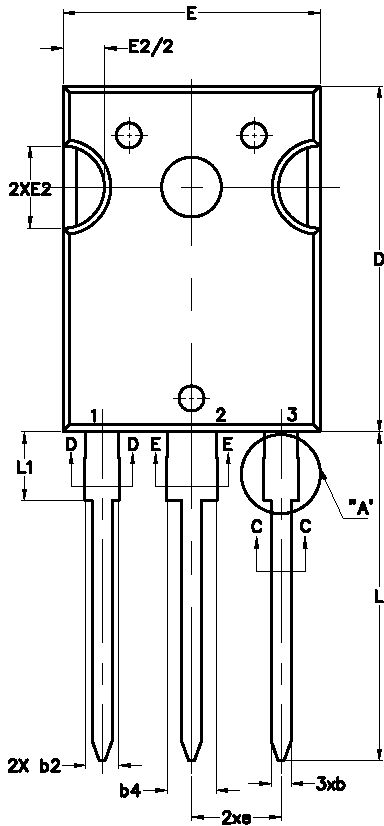
Characteristic Curve



特征曲线 Characteristic Curve



TO-247-3 封装数据 TO-247-3 Package Data



DIM	MILLIMETERS(mm)		MILLIMETERS(inch)	
	MIN	MAX	MIN	MAX
A	4.9	5.1	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.9	2.1	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.15	1.22	0.045	0.048
b2	1.96	2.06	0.077	0.081
b3	1.95	2.02	0.077	0.080
b4	2.96	3.06	0.117	0.120
b5	2.95	3.02	0.116	0.119
c	0.59	0.66	0.023	0.026
c1	0.58	0.62	0.023	0.024
D	20.90	21.10	0.823	0.831
D1	16.25	16.85	0.640	0.663
D2	1.05	1.35	0.041	0.053
E	15.75	15.90	0.620	0.626
E1	13.26	—	0.552	—
E2	4.90	5.10	0.193	0.201
e	5.44BSC		0.214BSC	
L	19.80	20.10	0.780	0.791
L1	—	4.30	—	0.169
ΦP	3.50	3.70	0.138	0.146
ΦP1	—	7.40	—	0.291
S	6.05	6.25	0.238	0.246
t	0.00	0.15	0.000	0.006

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