

XNS40N180TR

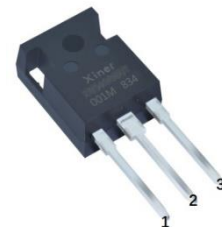
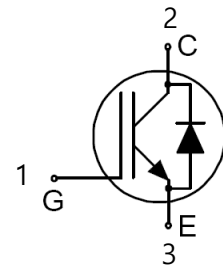
1800V/40A 逆导型 IGBT

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
- 具有体二极管的逆导型 IGBT
Reverse-Conducting IGBT with body 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

- 谐振逆变器
Voltage - resonance Inverter
- 交流开关
AC Switches



1. Gate/栅极
2. Collector/集电极
3. Emitter/发射极

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
XNS40N180TR	1800V	40A	2.1V	175 $^{\circ}\text{C}$	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	$T_{vj}=25^{\circ}\text{C}$	1800	V
I_C	集电极连续直流电流 DC Collector current	$T_C = 25^{\circ}\text{C}$	80	A
		$T_C = 100^{\circ}\text{C}$	40	
$I_{CRM}^{①}$	集电极可重复脉冲电流 Pulsed Collector current,	$T_{vj} \leq 175^{\circ}\text{C}$	120	A
I_F	二极管连续直流电流 Diode continuous forward current	$T_C = 25^{\circ}\text{C}$	80	A
		$T_C = 100^{\circ}\text{C}$	40	
$I_{FRM}^{①}$	二极管可重复脉冲电流 Diode pulsed current	$T_{vj} \leq 175^{\circ}\text{C}$	80	A
V_{GES}	栅极-发射极峰值电压 Gate to emitter voltage	$T_{vj}=25^{\circ}\text{C}$	± 30	V
P_{tot}	总耗散功率 Power dissipation	$T_C = 25^{\circ}\text{C}$	535	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	-	-55~ + 150	$^{\circ}\text{C}$

①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	0.28	K/W
$R_{th(J-C)}$	二极管芯片到底板热阻 FRD thermal resistance Maximum Junction-to-Case	0.28	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	$V_{GE}=0V, I_C=0.2mA, T_{vj}=25^{\circ}C$	1800	—	—	V
$V_{CE(sat)}$	集电极-发射极饱和压降 Collector-Emitter Saturation voltage	$V_{GE}=15V, I_C=40A, T_{vj}=25^{\circ}C$	—	2.1	2.5	V
		$V_{GE}=15V, I_C=40A, T_{vj}=175^{\circ}C$	—	2.8	—	
$V_{GE(th)}$	门极开启阈值电压 Gate threshold voltage	$V_{GE}=V_{CE}, I_C=4mA, T_{vj}=25^{\circ}C$	4.6	5.2	6	V
V_F	二极管正向导通压降 Diode Forward Voltage	$V_{GE}=0V, I_F=40A, T_{vj}=25^{\circ}C$	1.2	1.7	2.1	V
		$V_{GE}=0V, I_F=40A, T_{vj}=175^{\circ}C$	—	2.3	—	
I_{GES}	门极-发射极漏电流 Gate to Emitter Leakage current	$V_{GE}=30V, V_{CE}=0V, T_{vj}=25^{\circ}C$	—	—	100	nA
I_{CES}	集电极-发射极漏电流 Zero gate voltage collector current	$V_{CE}=1800V, V_{GE}=0V, T_{vj}=25^{\circ}C$	—	—	20	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	$V_{GE}=0V, V_{CE}=25V,$ $f=100kHz, T_{vj}=25^{\circ}C$	—	9350	—	pF
C_{oes}	输出电容 Output capacitance		—	125	—	
C_{res}	反向传输电容 Reverse transfer capacitance		—	106	—	
Q_g	门极电量 Total gate charge	$I_C=40A, V_{CE}=1440V,$ $V_{GE}=15V, T_{vj}=25^{\circ}C$	—	510	—	nC
Q_{ge}	门极-发射极电量 Gate to emitter charge		—	64	—	
Q_{gc}	门极-集电极电量 Gate to collector charge		—	219	—	

开关特性、感性负载

Switching Characteristic Inductive Load

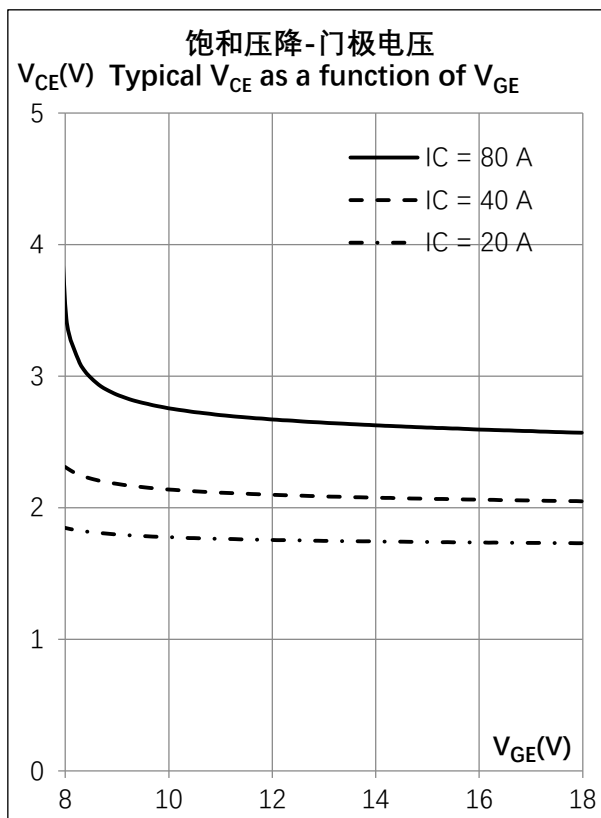
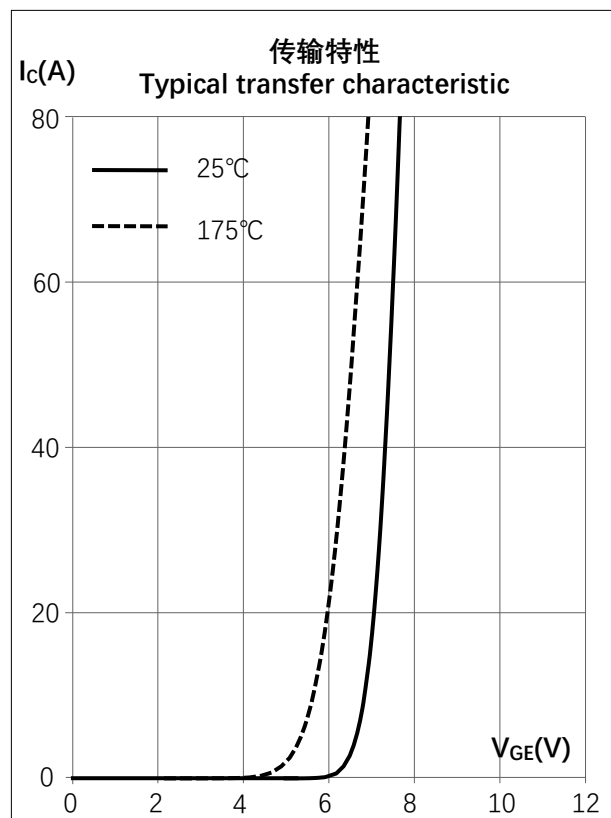
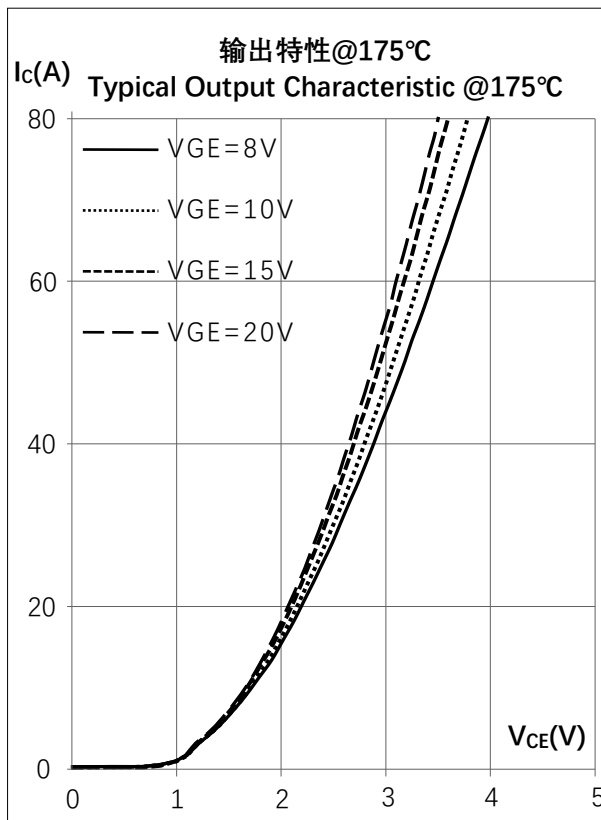
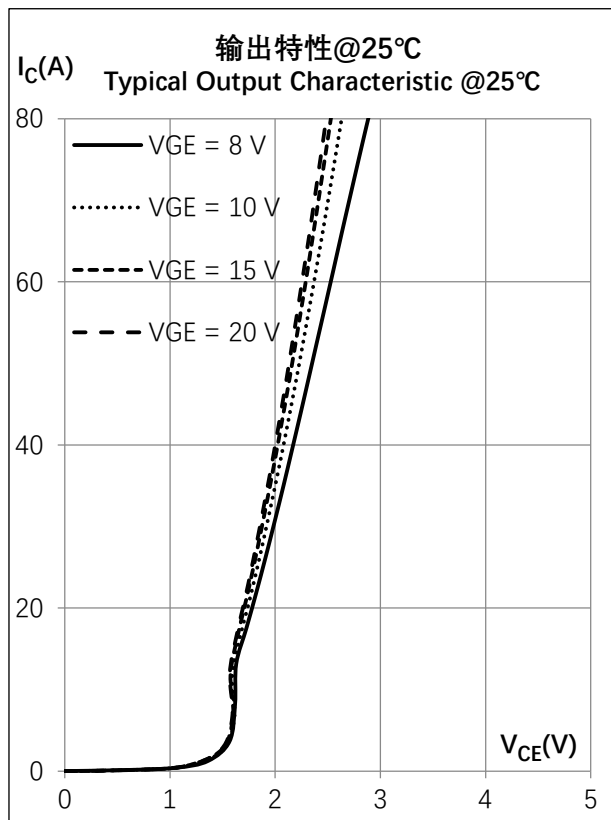
IGBT 特性/IGBT Characteristic

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} =800V I _C =40A R _{G(on)} =10Ω R _{G(off)} =10Ω C=0nF V _{GE} =15V L _{load} =150μH	T _{vj} =25℃	—	125	—	ns
			T _{vj} =175℃	—	111	—	
T _r	上升时间 Rise time		T _{vj} =25℃	—	47	—	ns
			T _{vj} =175℃	—	49	—	
T _{d(off)}	关闭延迟时间 Turn-Off Delay Time		T _{vj} =25℃	—	586	—	ns
			T _{vj} =175℃	—	654	—	
t _f	下降时间 Turn-Off Fall Time		T _{vj} =25℃	—	65	—	ns
			T _{vj} =175℃	—	67	—	
E _{on}	单次开启损耗 Turn-on switch loss		T _{vj} =25℃	—	8	—	mJ
			T _{vj} =175℃	—	10	—	
E _{off}	单次关闭损耗 Turn-off switch loss	T _{vj} =25℃	—	3.2	—	mJ	
		T _{vj} =175℃	—	4.5	—		

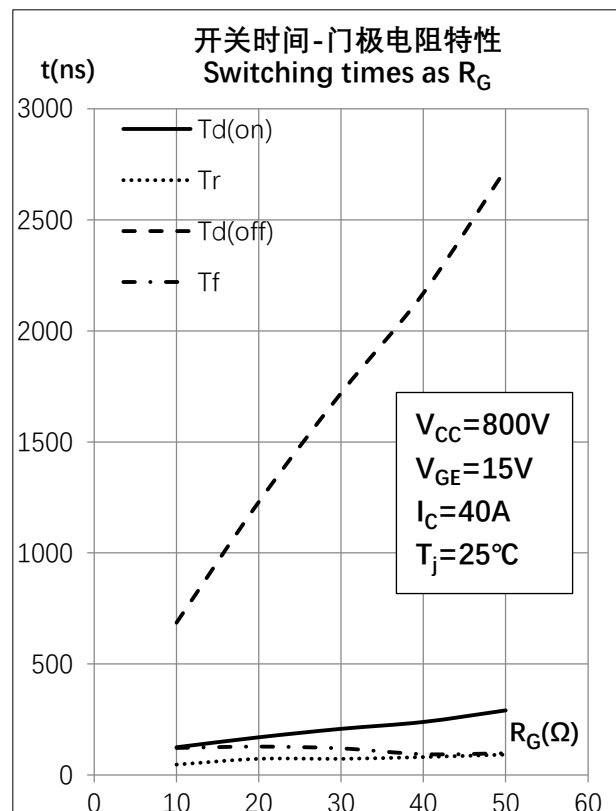
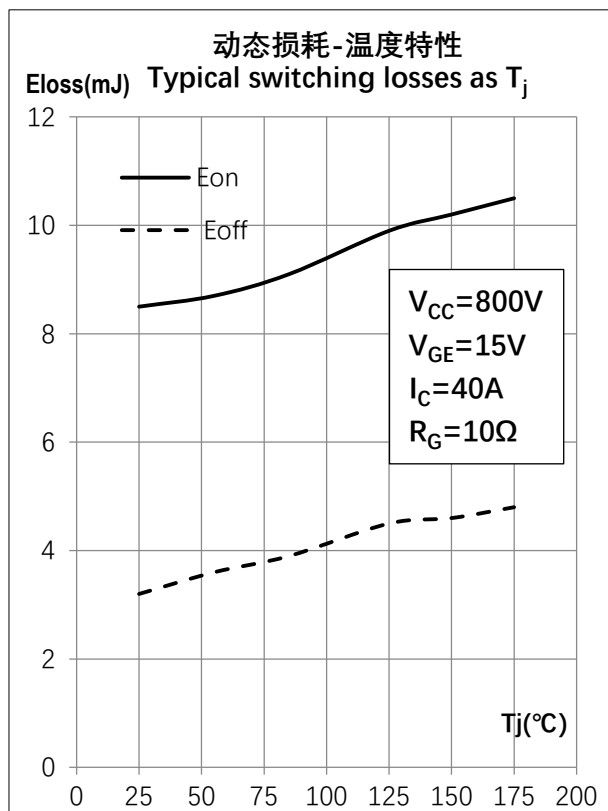
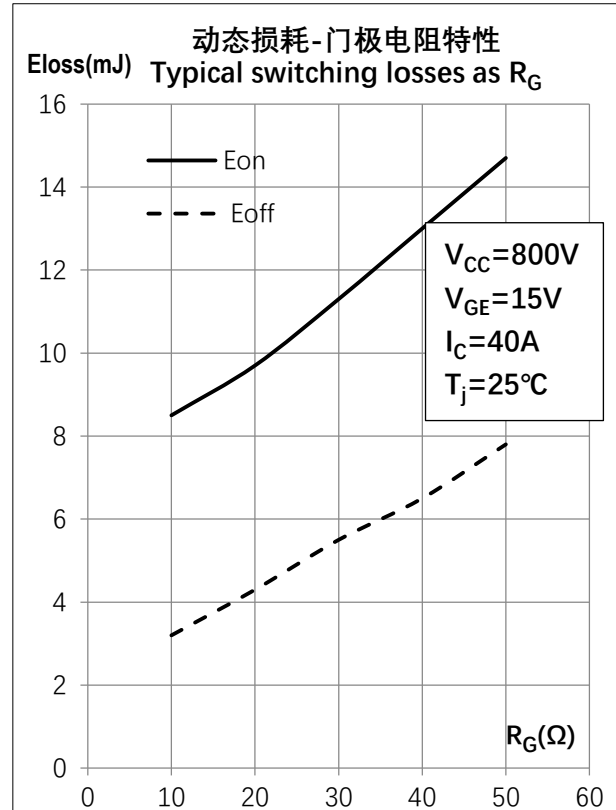
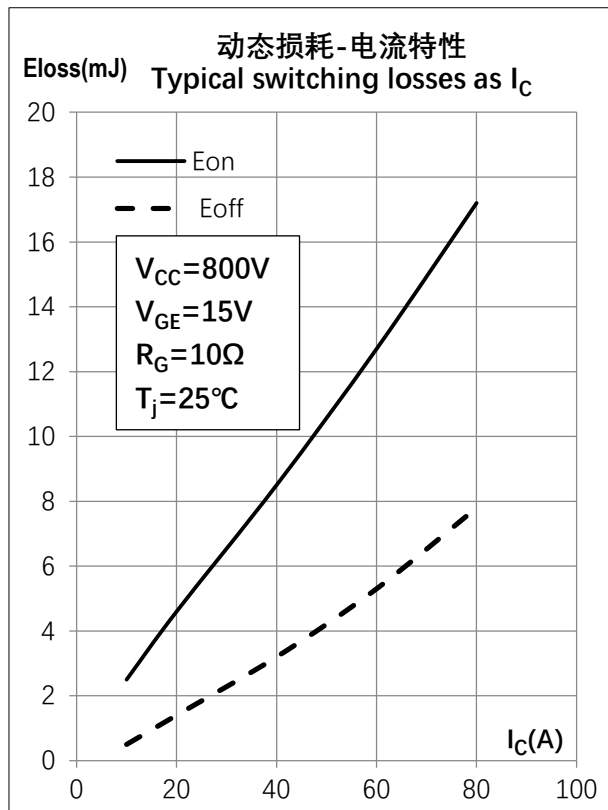
二极管特性/Diode Characteristic

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 = 40A V _R =800V di _F /dt=-500A/μs	T _{vj} =25℃	—	0.65	—	μs	
			T _{vj} =175℃	—	1	—		
Q _{rr}	二极管反向恢复电量 Diode Reverse Recovery Charge		T _{vj} =25℃	—	17	—	μC	
			T _{vj} =175℃	—	23	—		
I _{rrm}	反向恢复峰值电流 Peak reverse recovery current		T _{vj} =25℃	—	70	—	A	
			T _{vj} =175℃	—	82	—		
di _{rr} /dt	恢复下降电流最大电流变化率 Peak rate of i _{rr}		T _{vj} =25℃	—	307	—	A/μs	
			T _{vj} =175℃	—	220	—		
E _{rec}	二极管反向恢复损耗 Diode Reverse Recovery loss		T _{vj} =25℃	—	6.2	—	mJ	
			T _{vj} =175℃	—	8.5	—		

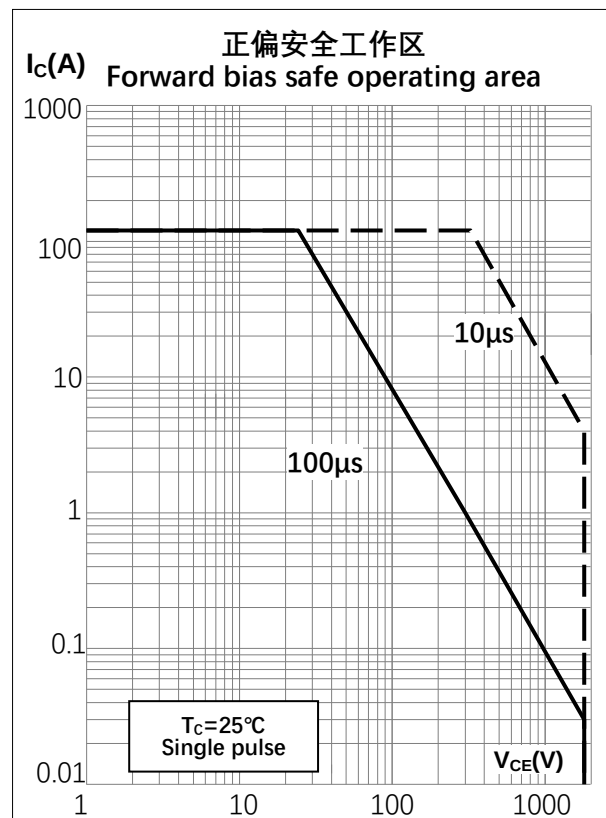
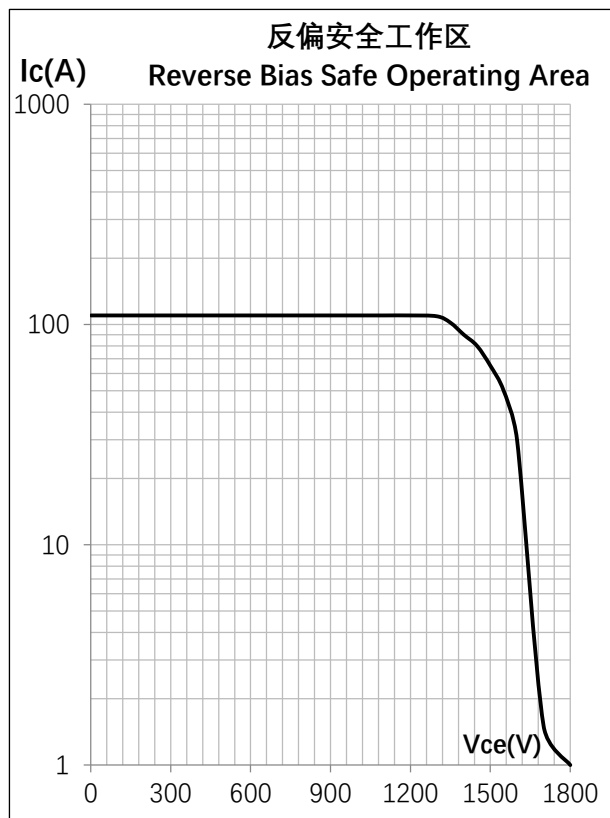
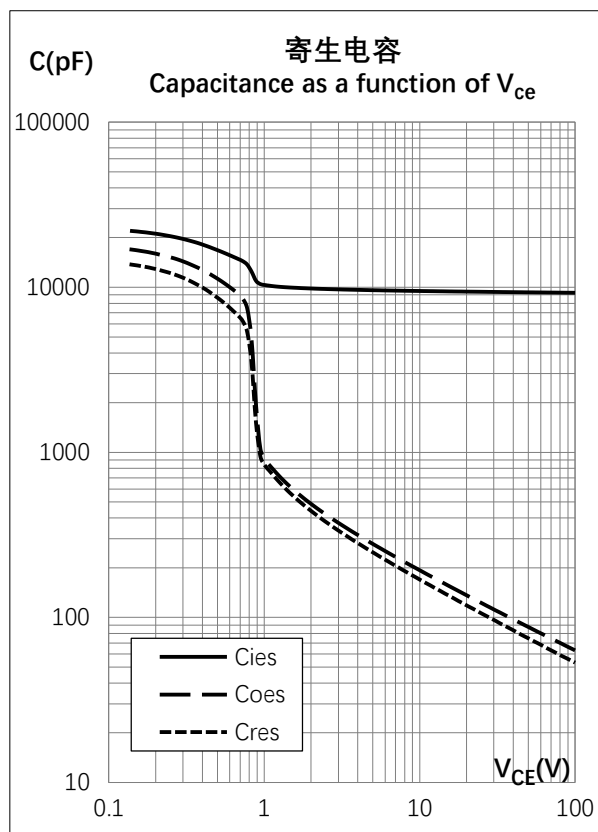
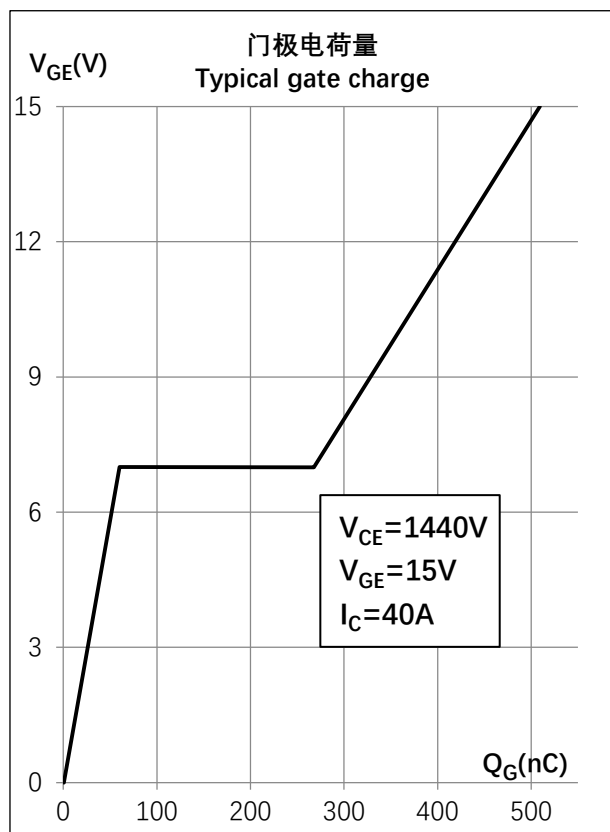
特征曲线 Characteristic Curve

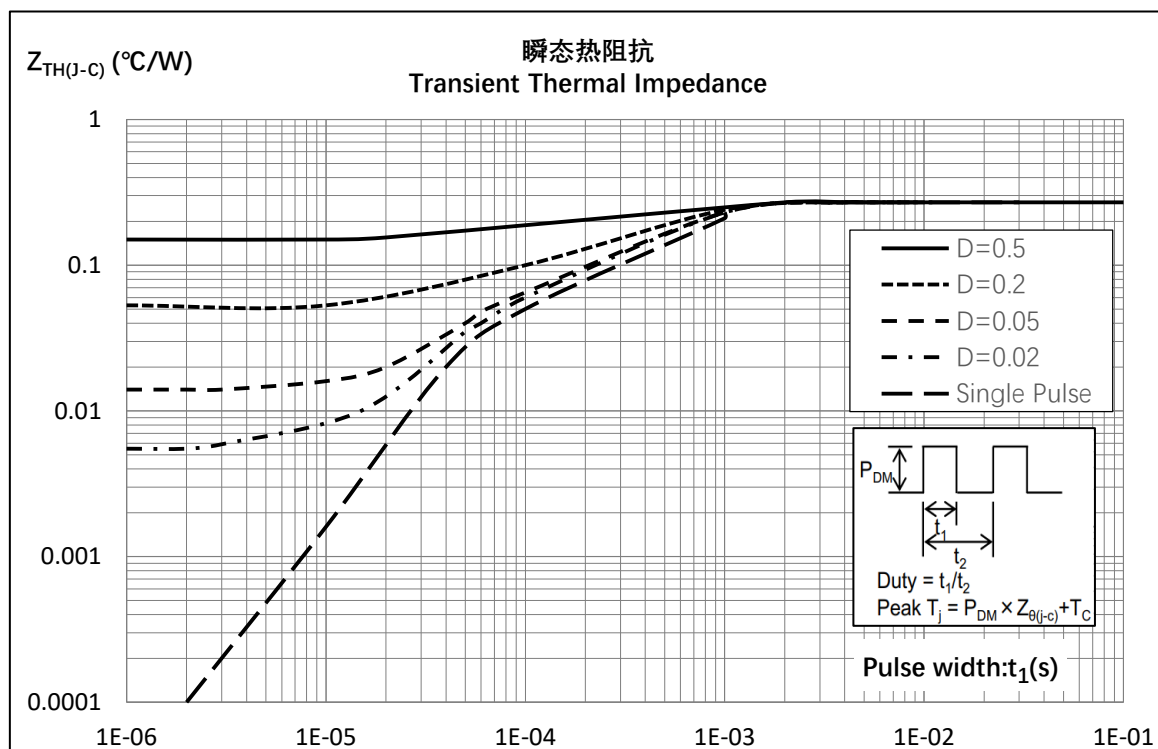


特征曲线 Characteristic Curve



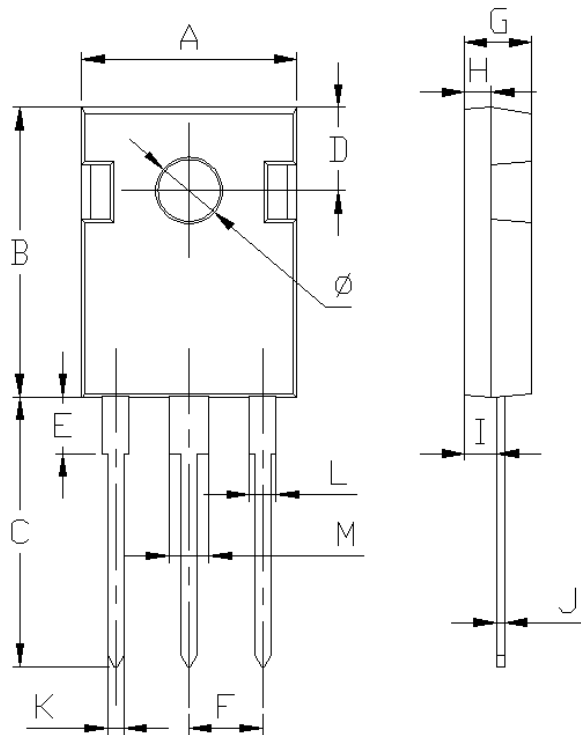
特征曲线 Characteristic Curve





TO-247-3 封装数据

TO-247-3 Package Data



DIM	MILLIMETERS	
	MIN	MAX
A	15.75	15.85
B	20.9	21.05
C	19.85	20.05
D	5.75	5.85
E	4.15	4.25
F	5.44BSC.	
G	4.95	5.05
H	1.97	2.03
I	2.35	2.45
J	0.6	0.65
K	1.17	1.25
L	1.95	2.05
M	2.85	3.11
φ	3.5	3.7

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