



TT015N120EQ

主要参数 MAIN CHARACTERISTICS

I _C	15A
V _{CES}	1200V
V _{CE(SAT)} -TYP	1.60V

用途

- 逆变器

APPLICATIONS

- General purpose inverter

产品特性

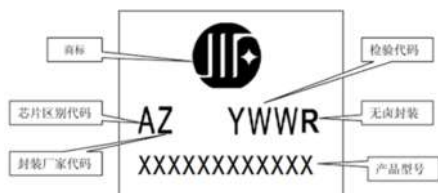
- 低栅极电荷
- Trench FS 技术
- RoHS 产品

FEATURES

- Low gate charge
- Trench FS Technology
- RoHS product

印记定义

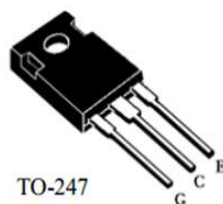
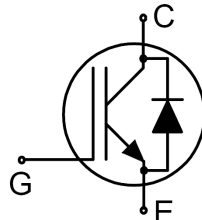
Mark definition



检验代码说明: Y(年代码, 执行内部定义)+WW (周代码)

产品型号说明: 产品类型+工艺平台+电流+沟道类型+电压+工艺版本+特殊特性。

封装 Package



订货信息 ORDER MESSAGE

订 货 型 号 Order codes				印 记 Marking	封 装 Package
有卤-条管 Halogen-Tube	无卤-条管 Halogen-Free-Tube	有卤-编带 Halogen-Reel	无卤-编带 Halogen-Free-Reel		
TT015N120EQ-GE-B	TT015N120EQ -GE-BR	N/A	N/A	TT015N120EQ	TO-247





绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

项 目 Parameter	符 号 Symbol	数 值 Value	单 位 Unit
		TO-247	
最高集电极—发射极直流电压 Collector-Emmitter Voltage	V _{CES}	1200	V
*连续集电极电流 Collector Current-continuous T _C =25℃ T _C =100℃	I _C	30 15	A
最大脉冲集电极极电流（注 1） Collector Current – pulse（note 1）	I _{CM}	45	
二极管正向测试电流 Diode RMS forward current T _C =25℃ T _C =100℃	I _F	30 15	
二极管正向脉冲电流 Diode pulse current	I _{FSM}	45	
最高栅极发射极电压 Gate-Emmitter Voltage	V _{GES}	±20	V
Turn-off safe area 安全工作区	-	45	A
耗散功率 Power Dissipation	P _D TC=25℃	238	W
存储温度 Storage Temperature Range	T _{STG}	-55~+150	℃
结温 Junction Temperature Range	T _J	-40~+175	
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T _L	300	

*连续集电极电流由最高结温限制

*Collector current limited by maximum junction temperature

注释:

1: 脉冲宽度由最高结温限制

Notes:

1: Pulse width limited by maximum junction temperature





电特性 ELECTRICAL CHARACTERISTICS

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
关态特性 Off –Characteristics						
集电极—发射极击穿电压 Collector-Emmitter Voltage	BVCES	IC=250μA, VGE=0V	1200	-	-	V
零栅压下集电极漏电流 Zero Gate Voltage Collector Current	ICES	VCE=1200V, VGE=0V, TC=25℃	-	-	100.	μA
		VCE=1200V, VGE=0V, TC=175℃	-	-	2	mA
正向栅极体漏电流 Gate-body leakage current,forward	IGESF	VCE=0V, VGE =20V	-	-	150	nA
反向栅极体漏电流 Gate-body leakage current,reverse	IGESR	VCE=0V, VGE =-20V	-	-	-150	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	VGE(th)	VCE = VGE , IC=250μA	4.5	-	6.5	V
饱和压降 Collector-Emmitter saturation Voltage	VCESAT	VGE=15V IC=15A Tc=25℃	-	1.6	2.1	
		VGE=15V IC=15A Tc=125℃	-	1.9	-	
		VGE=15V IC=15A Tc=175℃	-	2.1	-	
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	Cies	VCE=25V, VGE=0V, f=1.0MHZ	-	1260	-	pF
输出电容 Output capacitance	Coes		-	78	-	
反向传输电容 Reverse transfer capacitance	Cres		-	41	-	
栅极电荷总量 Total Gate Charge	Qg	VCC=960V,Ic=15A,VGE=15 V TC=25℃	-	112	-	nC
栅极-反射极 Gate to emitter charge	Qge		-	8.8	-	
栅极-集电极 Gate to collector charge	Qgc		-	80.7	-	
栅极电阻-Gate resistance	Rg	f=1 MHz, open collector	-	0.5	-	Ω
短路电流-short current	Isc	Vge=15V, Vce=600V, t≤10us		75		A





电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
开启延迟时间 Turn-On delay time	td(on)	VCC=600V, Ic=15A, Rg=10Ω VGE=15 V TC=25℃	-	10	-	ns
上升时间 Turn-On rise time	tr		-	34	-	
关断延迟时间 Turn-Off delay time	td(off)		-	52	-	
下降时间 Turn-Off Fall time	tf		-	174	-	
开通损耗 Turn-On energy	Eon	TC=25℃	-	0.38	-	mJ
关断损耗 Turn-off energy	Eoff		-	0.67	-	
总开关损耗 Total switching energy	Etot		-	1.05	-	
开启延迟时间 Turn-On delay time	td(on)	VCC=600V, Ic=15A, Rg=10Ω VGE=15 V TC=175℃	-	10	-	ns
上升时间 Turn-On rise time	tr		-	36	-	
关断延迟时间 Turn-Off delay time	td(off)		-	74	-	
下降时间 Turn-Off Fall time	tf		-	304	-	
开通损耗 Turn-On energy	Eon	TC=175℃		0.47		mJ
关断损耗 Turn-off energy	Eoff			1.05		
总开关损耗 Total switching energy	Etot			1.52		

反并联二极管特性及最大额定值 Anti-Parallel Diode Characteristics and Maximum Ratings

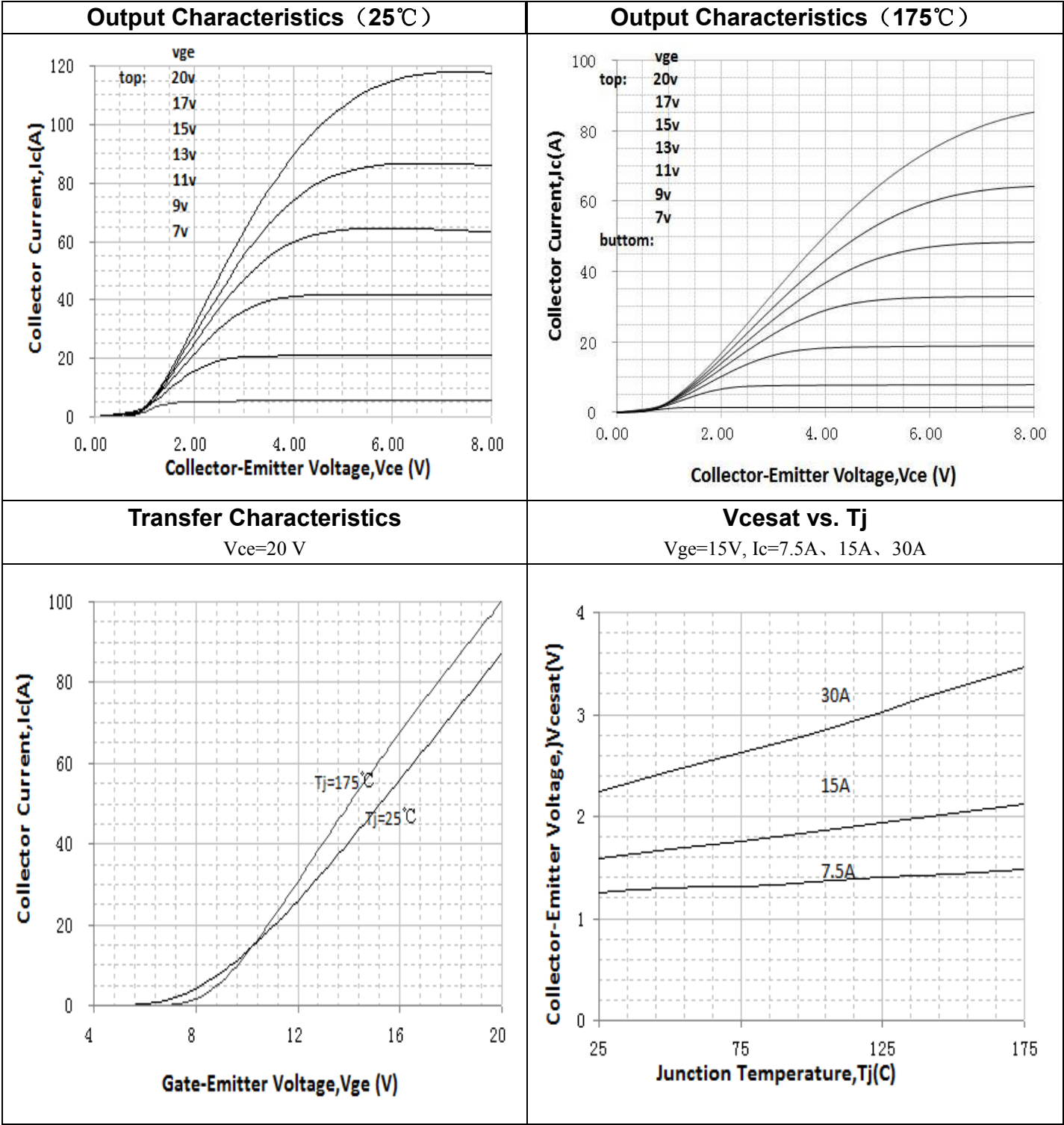
正向压降 Drain-Source Diode Forward Voltage	VF	VGE=0V, IS=15A	-	1.85	2.2	V
反向恢复时间 Diode Reverse recovery time	trr	VGE=0V, VR=600V IF=15A dIF/dt=450A/μs TC=25℃	-	283.8	-	ns
反向恢复电荷 Diode Reverse recovery charge	Qrr		-	1181	-	nC
反向恢复电流 Diode Reverse recovery Current	Irrm		-	9.8	-	A
反向恢复时间 Diode Reverse recovery time	trr	VGE=0V, VR=600V IF=15A dIF/dt=450A/μs TC=175℃	-	412.9	-	ns
反向恢复电荷 Diode Reverse recovery charge	Qrr		-	3710	-	nC
反向恢复电流 Diode Reverse recovery Current	Irrm		-	20	-	A

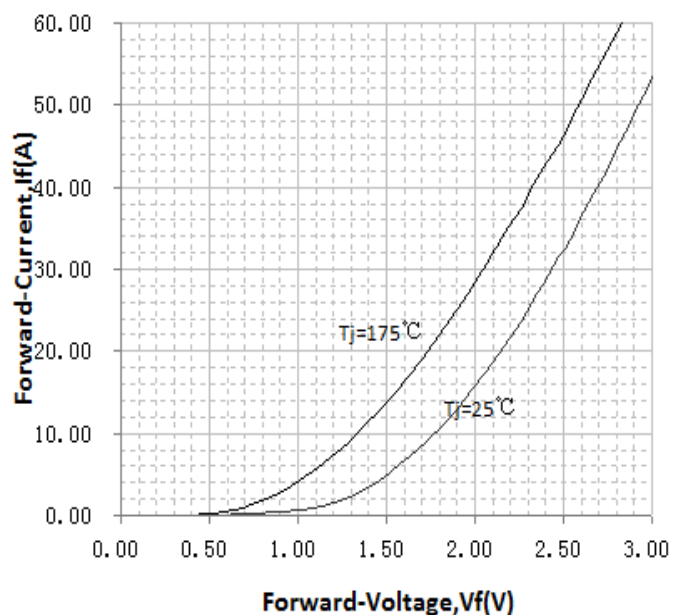
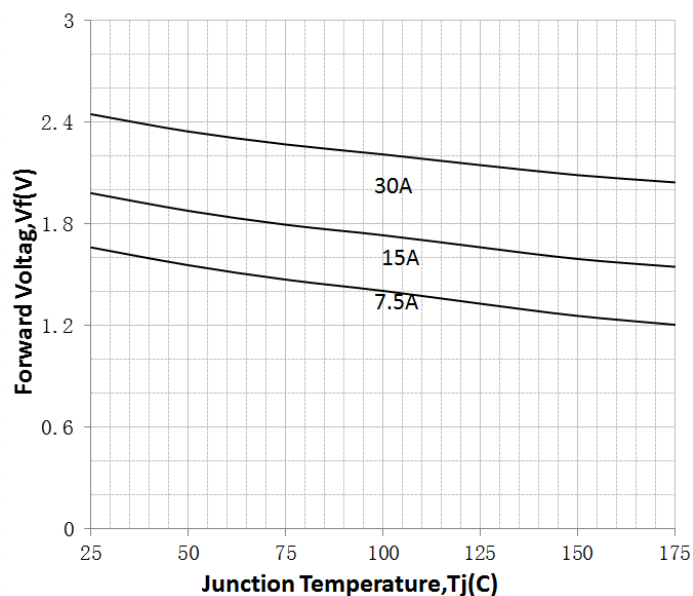
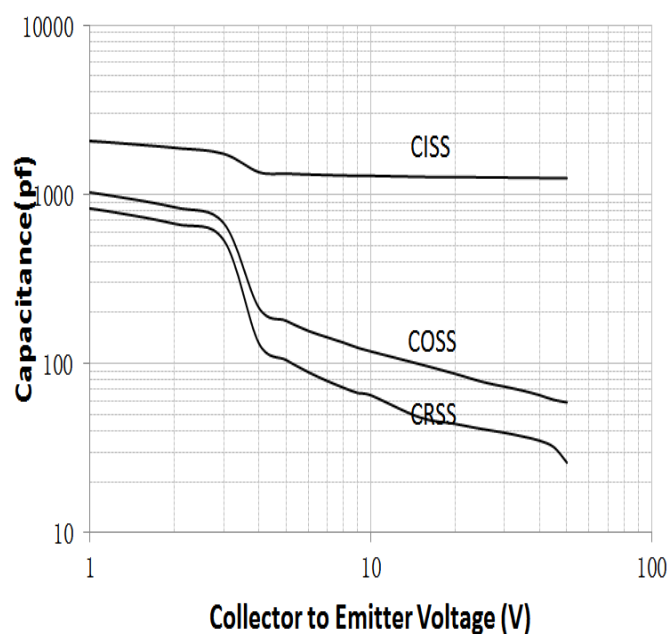
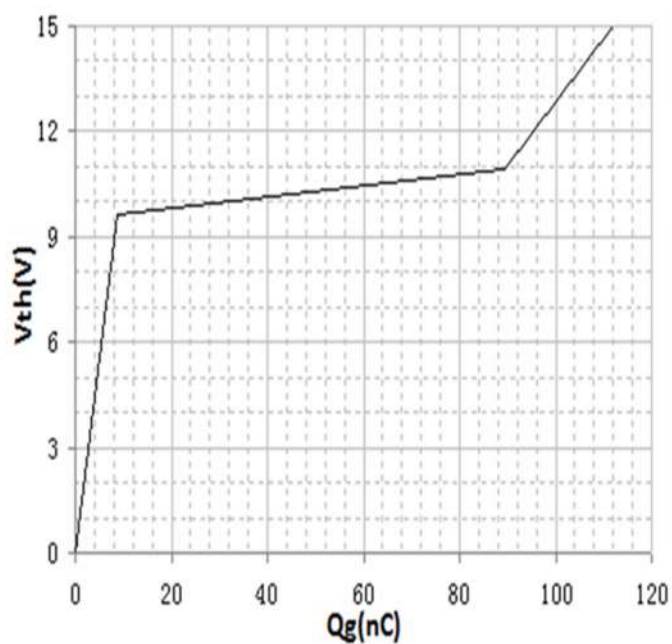
项 目 Parameter	符 号 Symbol	最大 MAX	单 位 Unit
		TO-247	
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c) IGBT	0.63	℃/W
	Rth(j-c) FWD	1.0	
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	40	





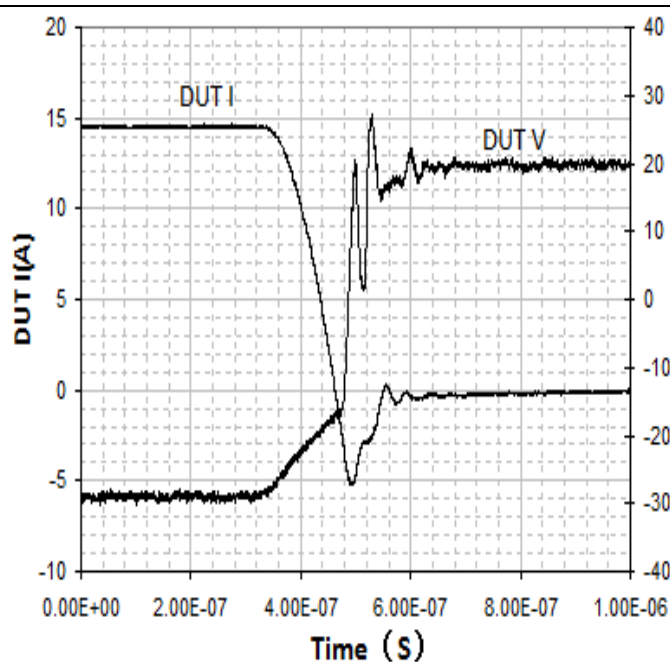
特征曲线 ELECTRICAL CHARACTERISTICS (curves)



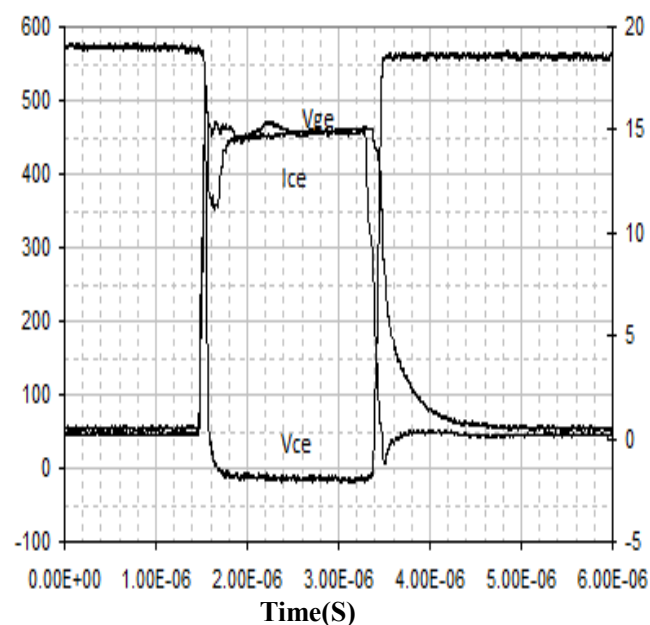
**Diode Characteristic** $T_j=25^{\circ}\text{C}$ 、 175°C  **V_f vs. T_j** $I_c=7.5\text{A}$ 、 15A 、 30A **Capacitance Characteristic** $f=1.0\text{MHz}$ **Gate Charge Characteristics** $V_{GE}=15\text{V}$ 、 $I_C=15\text{A}$ 、 $V_{CE}=960\text{V}$ 

**Diode Peak Reverse Recovery Current**

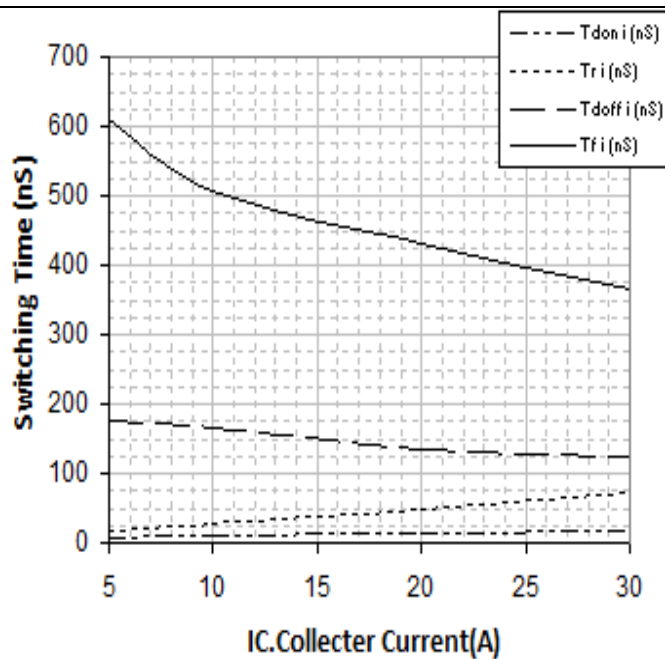
IF=15A Tj=25°C

**IGBT Switch**

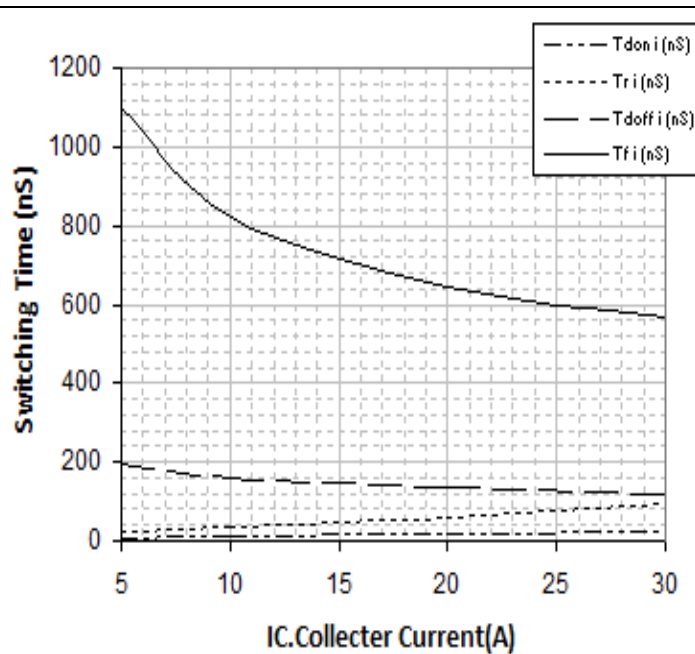
VGE=15V, IC=15A, VCE=600V, Tj=25°C

**Switching Time vs. IC(25°C)**

VCE=600V, VGE=15V, RG=10Ω

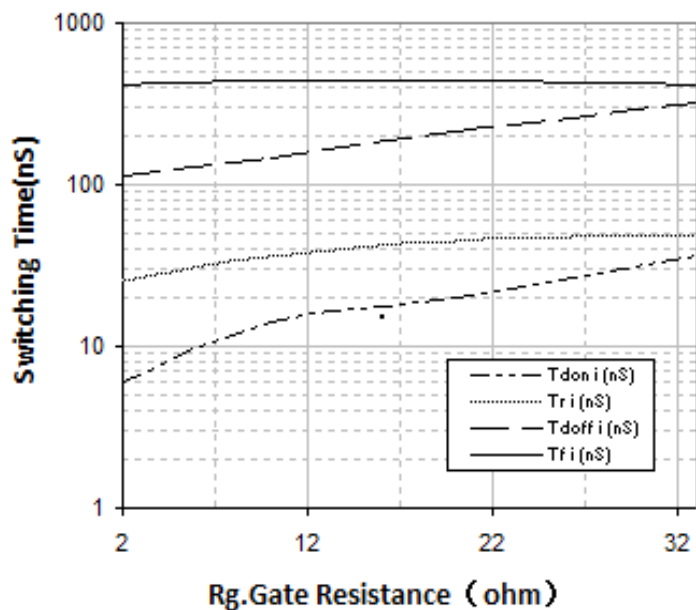
**Switching Time vs. IC(175°C)**

VCE=600V, VGE=15V, RG=10Ω

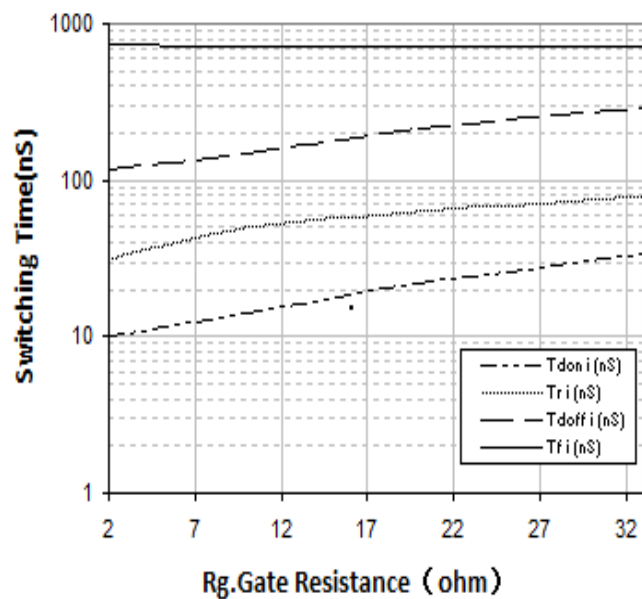


**Switching Time vs. Rg(25°C)**

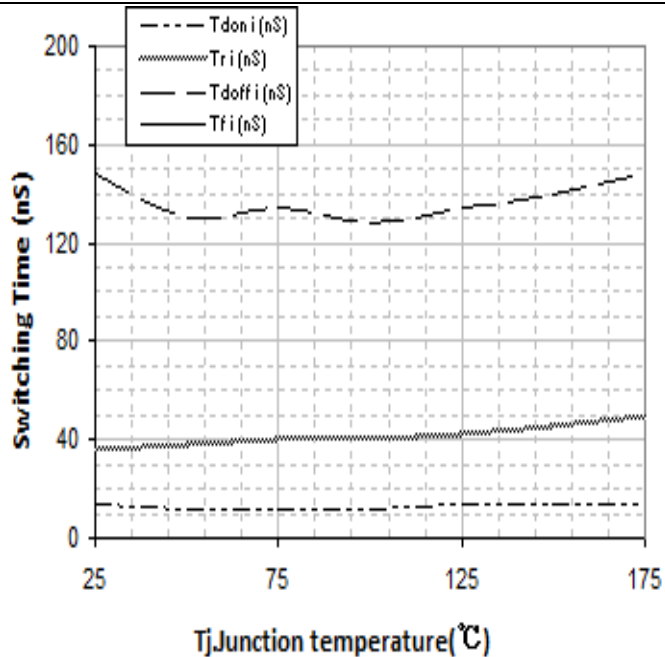
VGE=15V, VCE=600V, IC=15A

**Switching Time vs. Rg(175°C)**

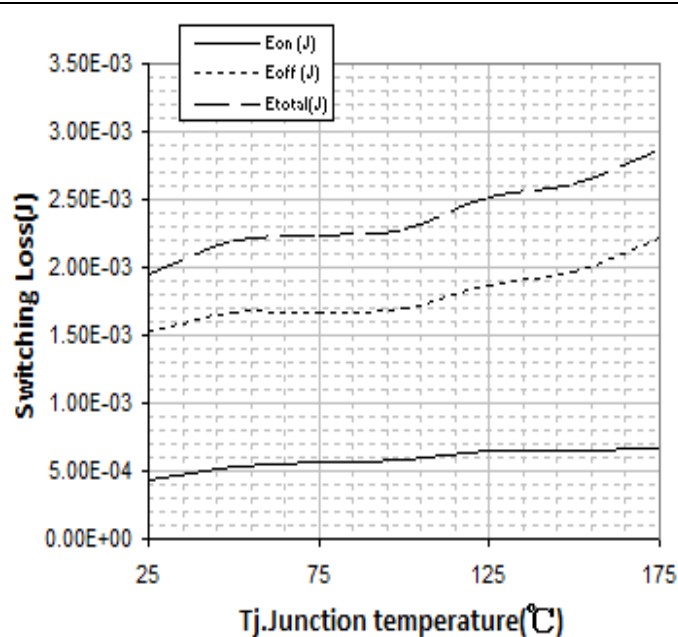
VGE=15V, VCE=600V, IC=15A

**Switching Time vs. Tj**

VGE=15V, VCE=600V, IC=15A, Rg=10Ω

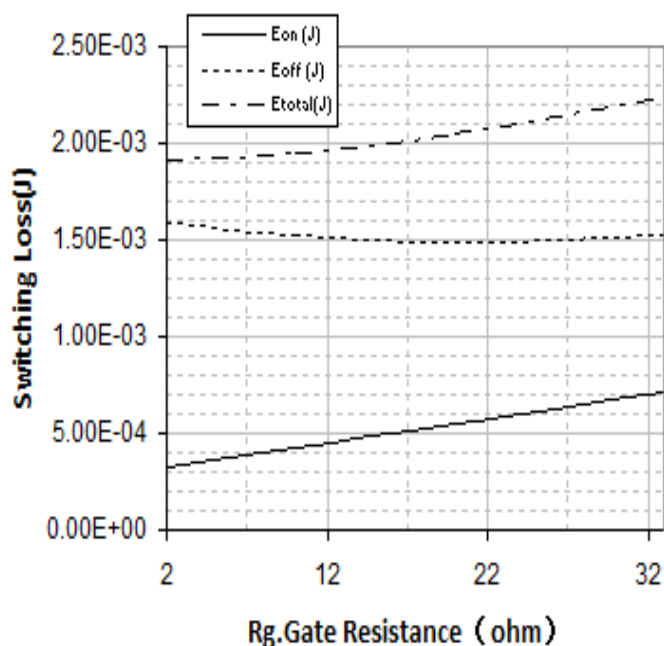
**Switching Loss vs. Tj**

VGE=15V, VCE=600V, IC=15A, Rg=10Ω

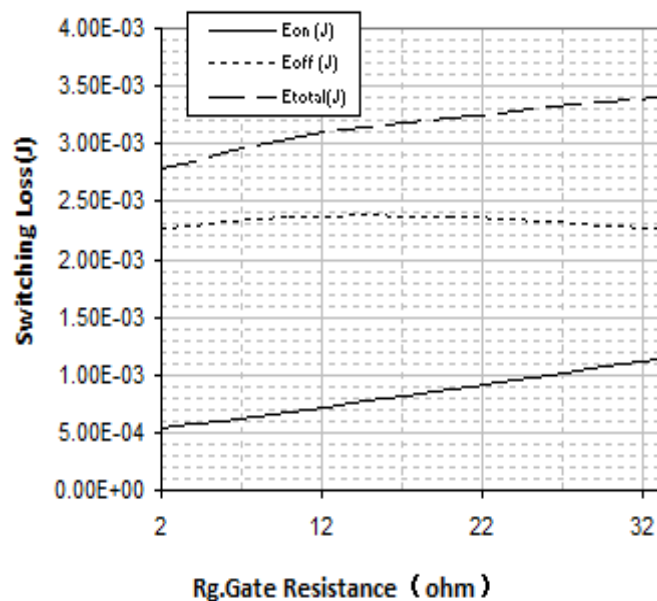


**Switching Loss vs. Rg(25°C)**

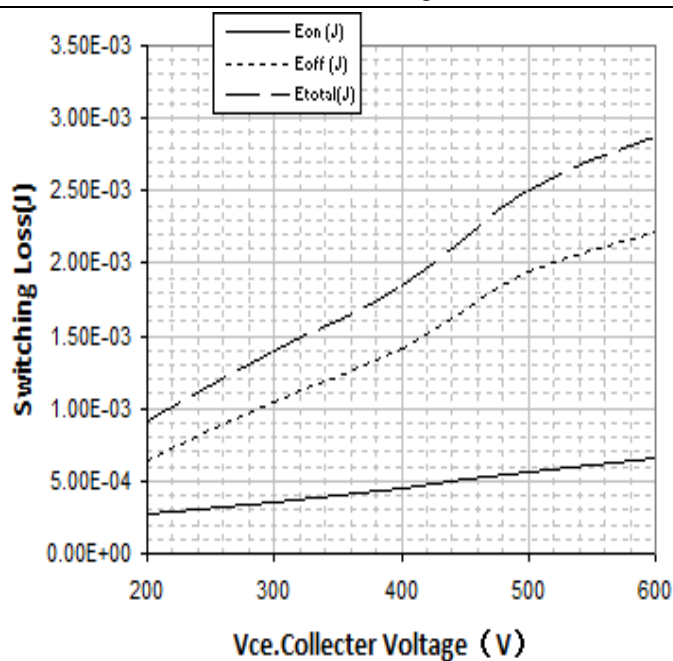
VGE=15V, VCE=600V, IC:15A

**Switching Loss vs. Rg(175°C)**

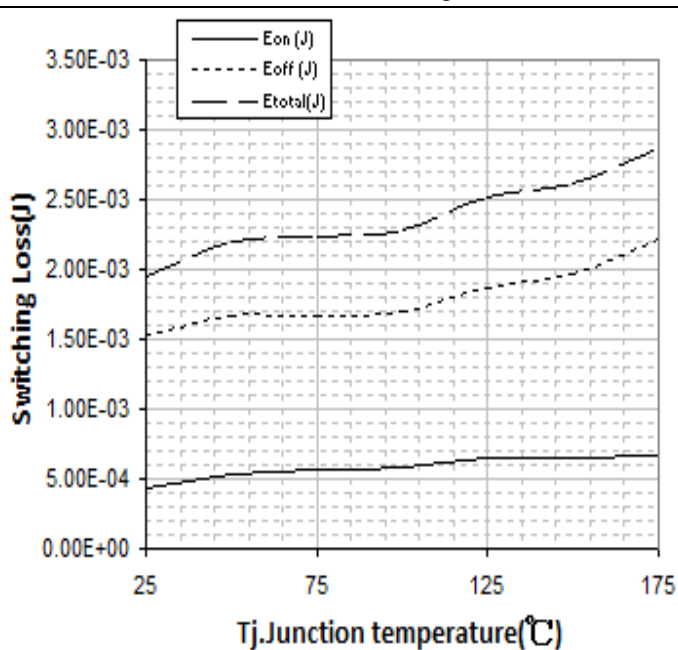
VGE=15V, VCE=600V, IC:15A

**Switching Loss vs. VCE(175°C)**

VGE=15V, IC:15A, Rg=10Ω

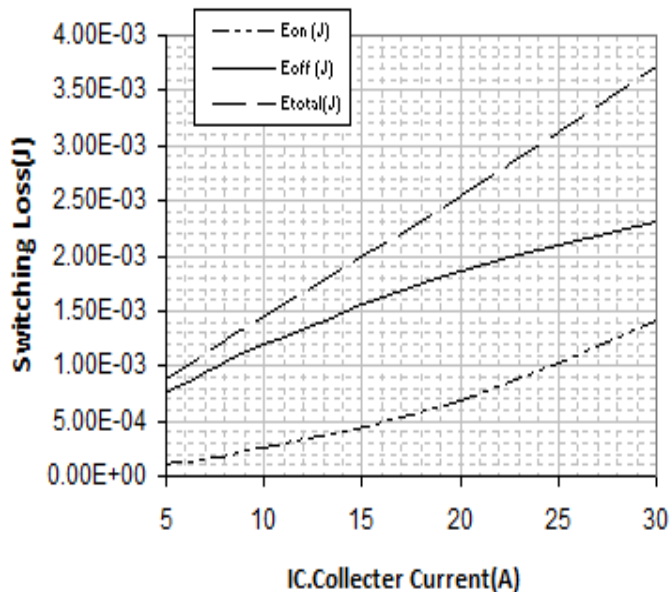
**Switching Loss vs. Tj**

VGE=15V, VCE=600V, Rg=10Ω

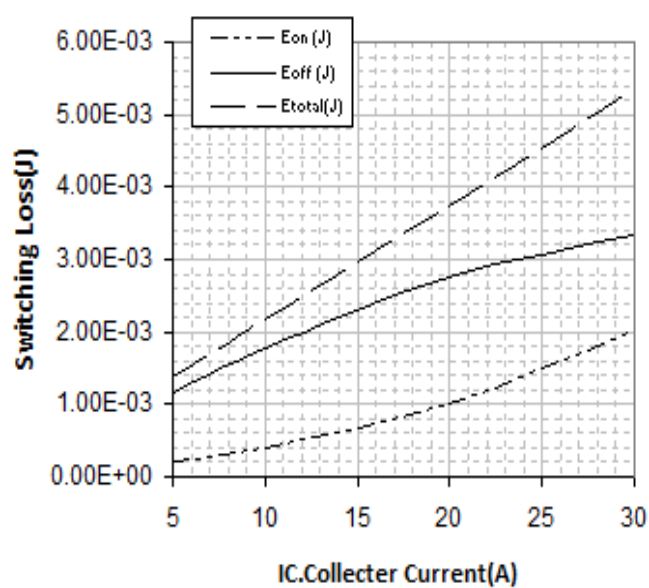
**Switching Loss vs. IC(25°C)****Switching Loss vs. IC(175°C)**



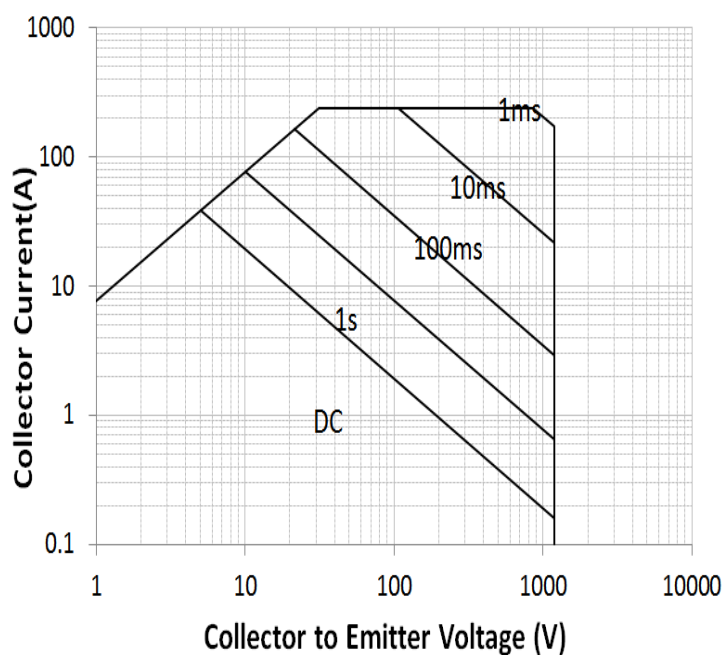
VGE=15V, VCE=600V, Rg=10Ω



VGE=15V, VCE=600V, Rg=10Ω

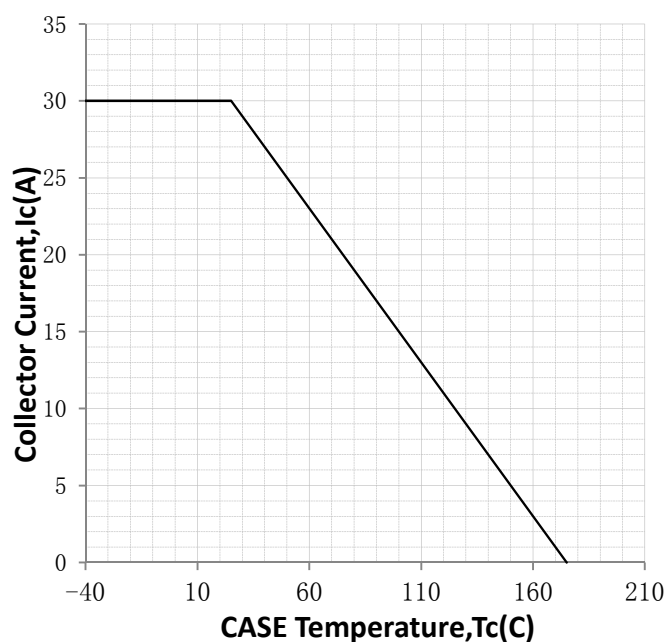


Safe Operating Area



Collector current vs. case temperature

VGE ≥ 15V, Tj ≤ 175°C



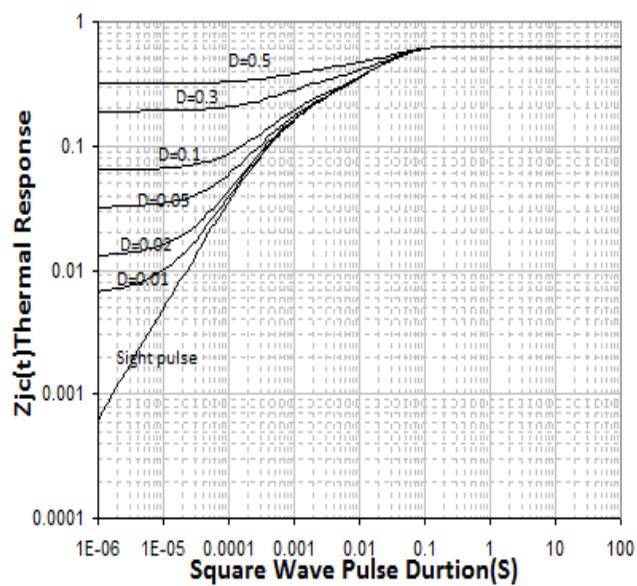
Normalized Transient Thermal Impedance for

Normalized Transient Thermal Impedance

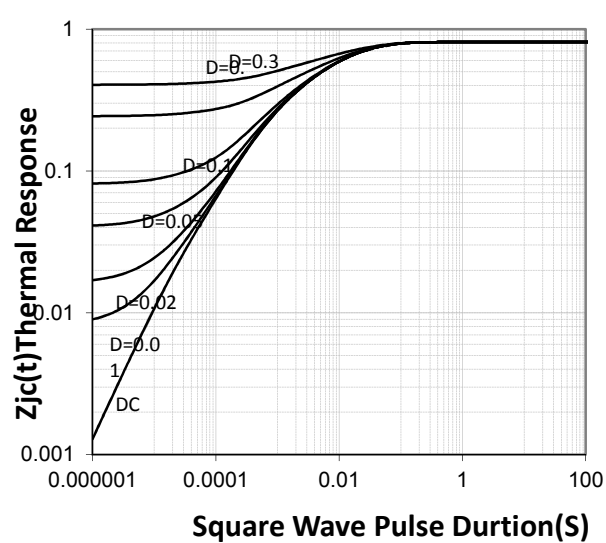




IGBT (TO-247)



for FRD (TO-247)



外形尺寸 PACKAGE MECHANICAL DATA

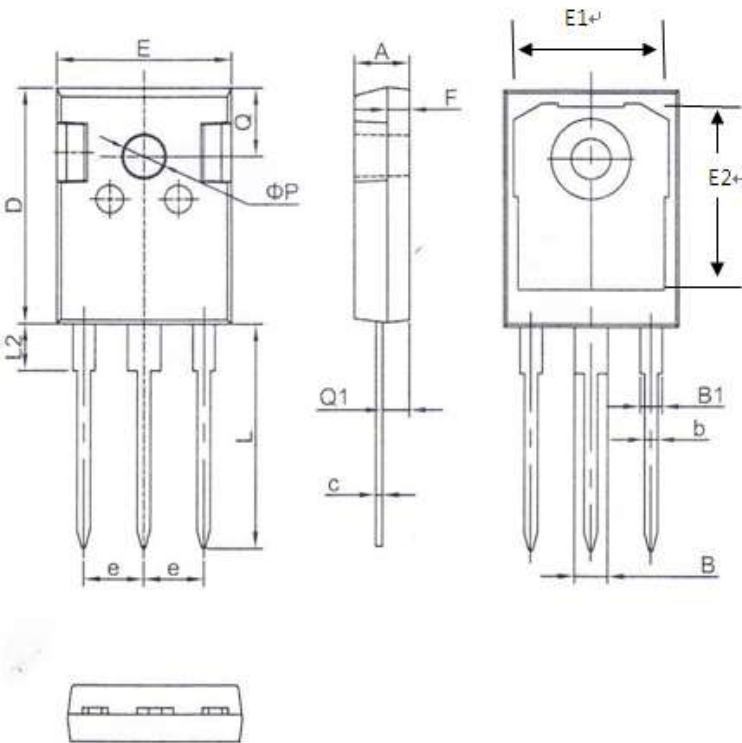




TO-247

重点尺寸：b、e、A、D、E。

单位 Unit : mm



符号 SYMBOL	mm	
	MIN	MAX
A	4.90	5.10
B	2.95	3.35
B1	1.95	2.35
b	1.15	1.35
c	0.50	0.70
D	20.90	21.10
E	15.70	15.90
e	5.34	5.54
F	1.90	2.10
L	19.40	20.40
L2	4.03	4.23
Q	6.00	6.40
Q1	2.30	2.50
P	3.50	3.70
E1	13.82	14.22
E2	16.35	16.75





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联系方式

吉林华微电子股份有限公司

公司地址：吉林省吉林市深圳街 99 号

邮编：132013

总机：86-432-64678411

传真：86-432-64665812

网址：www.hwdz.com.cn

CONTACT

JILIN SINO-MICROELECTRONICS CO., LTD.

ADD: No.99 Shenzhen Street, Jilin City, Jilin Province, China.

Post Code: 132013

Tel: 86-432-64678411

Fax: 86-432-64665812

Web Site: www.hwdz.com.cn

