



# TT015N120EQ

## 主要参数 MAIN CHARACTERISTICS

<b>I<sub>c</sub></b>	<b>15A</b>
<b>V<sub>CES</sub></b>	<b>1200V</b>
<b>V<sub>CE(SAT)-TYP</sub></b>	<b>1.60V</b>

### 用途

- 逆变器

### APPLICATIONS

- General purpose inverter

### 产品特性

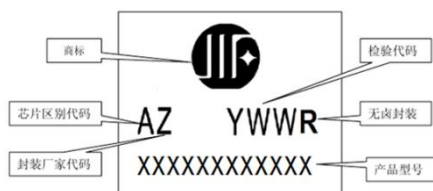
- 低栅极电荷
- Trench FS 技术
- RoHS 产品

### FEATURES

- Low gate charge
- Trench FS Technology
- RoHS product

### 印记定义

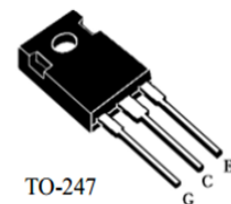
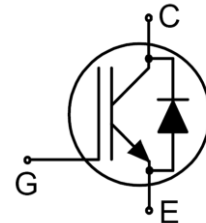
### Mark definition



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



TO-247



TO-263-2L

## 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
N/A	N/A	TT015N120EQ-SL-A	TT015N120EQ-SL-AR	TT015N120EQ	TO-263-2L



## 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	TO-263-2L	
最高集电极—发射极直流电压 Collector-Emmitter Voltage	V <sub>CES</sub>	1200		V
*连续集电极电流 Collector Current-continuous T <sub>C</sub> =25℃ T <sub>C</sub> =100℃	I <sub>C</sub>	30 15		A
最大脉冲集电极极电流（注1） Collector Current – pulse（note 1）	I <sub>CM</sub>	45		
二极管正向测试电流 Diode RMS forward current T <sub>C</sub> =25℃ T <sub>C</sub> =100℃	I <sub>F</sub>	30 15		
二极管正向脉冲电流 Diode pulse current	I <sub>FSM</sub>	45		
最高栅极发射极电压 Gate-Emmitter Voltage	V <sub>GES</sub>	±20		V
Turn-off safe area 安全工作区	-	45		A
耗散功率 Power Dissipation	P <sub>D</sub> TC=25℃	238	220	W
存储温度 Storage Temperature Range	T <sub>STG</sub>	-55~+150		℃
结温 Junction Temperature Range	T <sub>J</sub>	-40~+175		
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	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
<b>关态特性 Off –Characteristics</b>						
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°C	-	-	100.	μA
		VCE=1200V, VGE=0V, TC=175°C	-	-	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
<b>通态特性 On-Characteristics</b>						
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°C	-	1.6	2.1	
		VGE=15V IC=15A Tc=125°C	-	1.9	-	
		VGE=15V IC=15A Tc=175°C	-	2.1	-	
<b>动态特性 Dynamic Characteristics</b>						
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°C	-	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





## 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°C	-	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		-	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°C	-	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		-	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°C	-	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°C	-	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

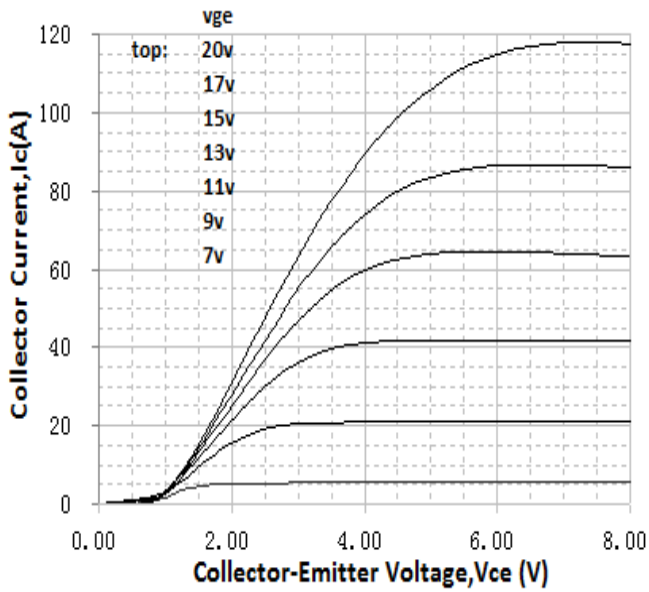
项 目 Parameter	符 号 Symbol	最大 MAX		单 位 Unit
		TO-247	TO-263-2L	
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c) IGBT	0.63	0.68	°C/W
	Rth(j-c) FWD	1.0	1.1	
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	40	62.5	



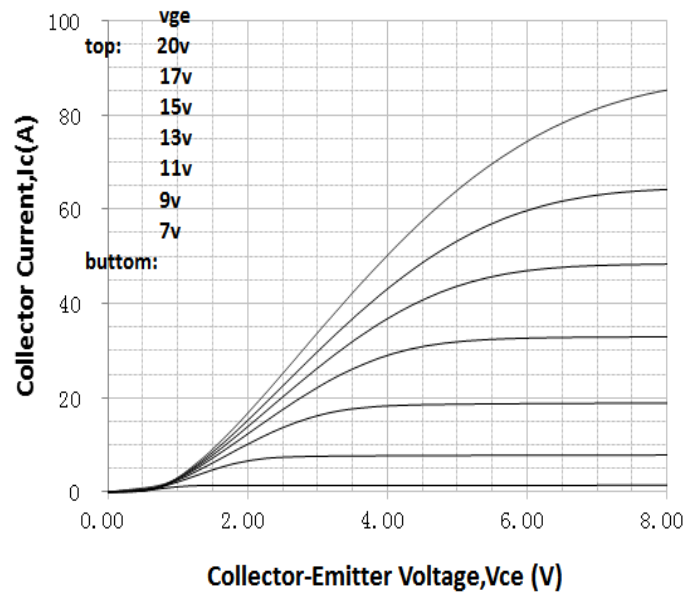


## 特征曲线 ELECTRICAL CHARACTERISTICS (curves)

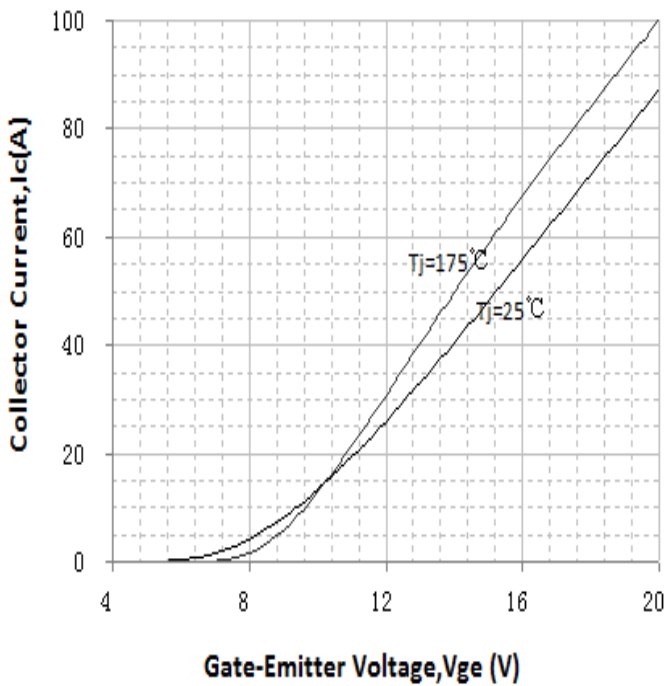
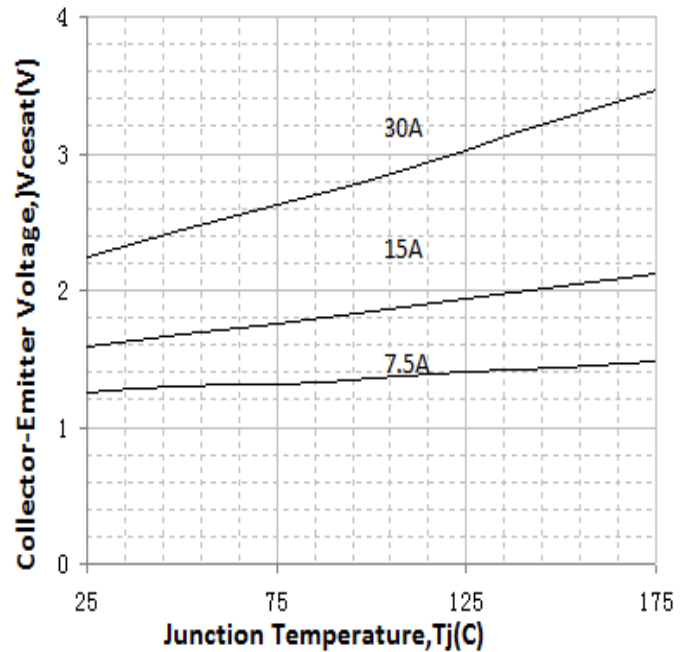
Output Characteristics (25°C)



Output Characteristics (175°C)



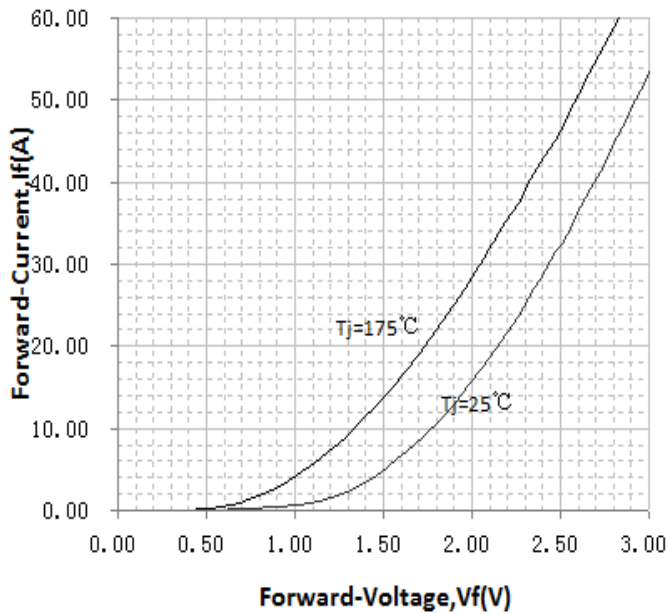
Transfer Characteristics

 $V_{ce}=20\text{ V}$  $V_{cesat}$  vs.  $T_j$  $V_{ge}=15\text{ V}$ ,  $I_c=7.5\text{ A}$ ,  $15\text{ A}$ ,  $30\text{ A}$ 



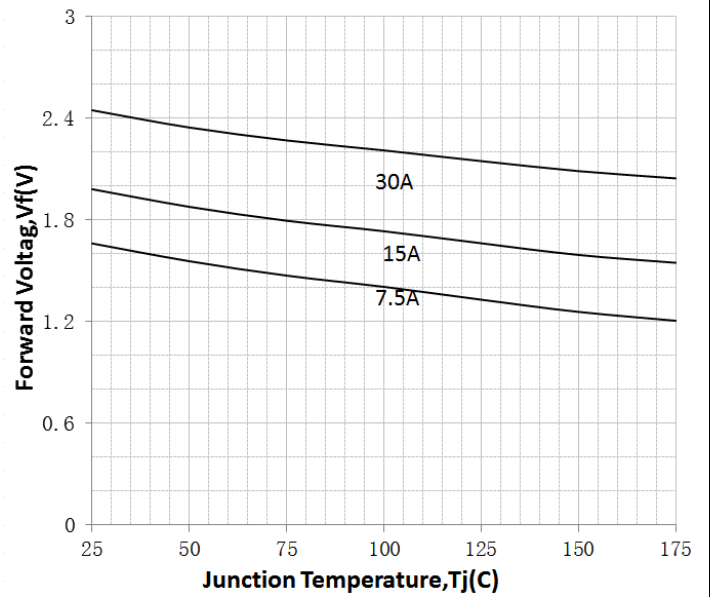
**Diode Characteristic**

$T_j=25^{\circ}\text{C}$ 、 $175^{\circ}\text{C}$



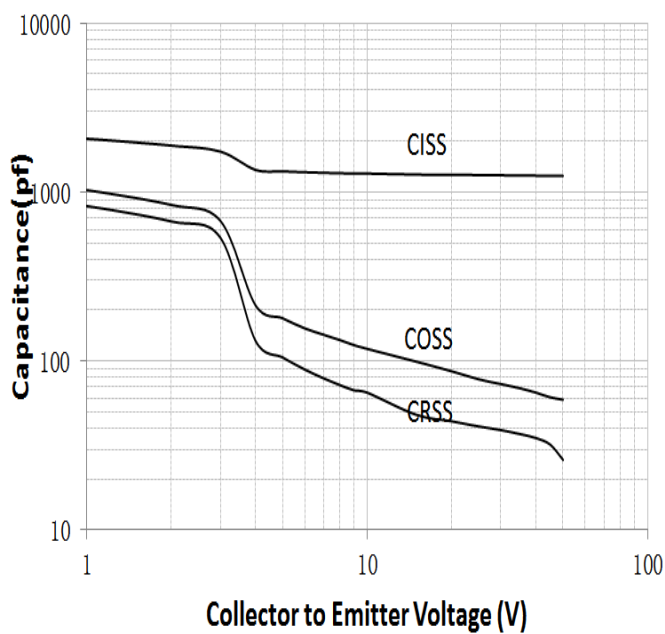
**$V_f$  vs.  $T_j$**

$I_c=7.5\text{A}$ 、 $15\text{A}$ 、 $30\text{A}$



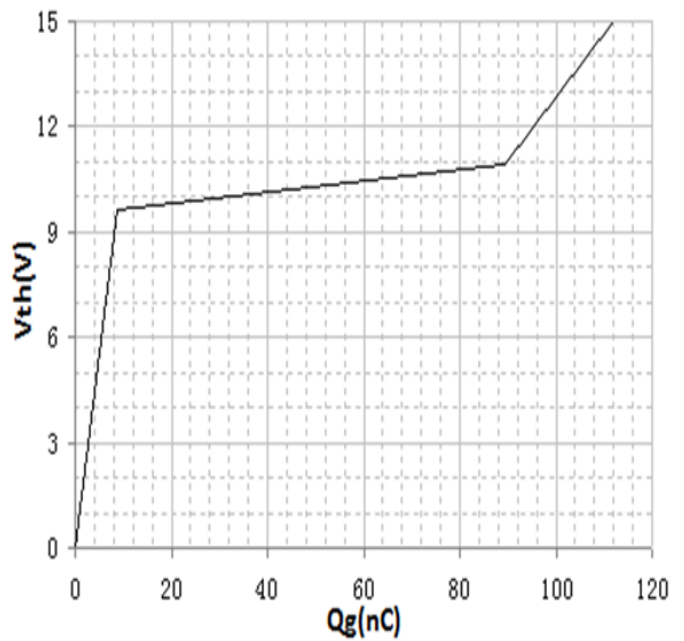
**Capacitance Characteristic**

$f=1.0\text{MHz}$



**Gate Charge Characteristics**

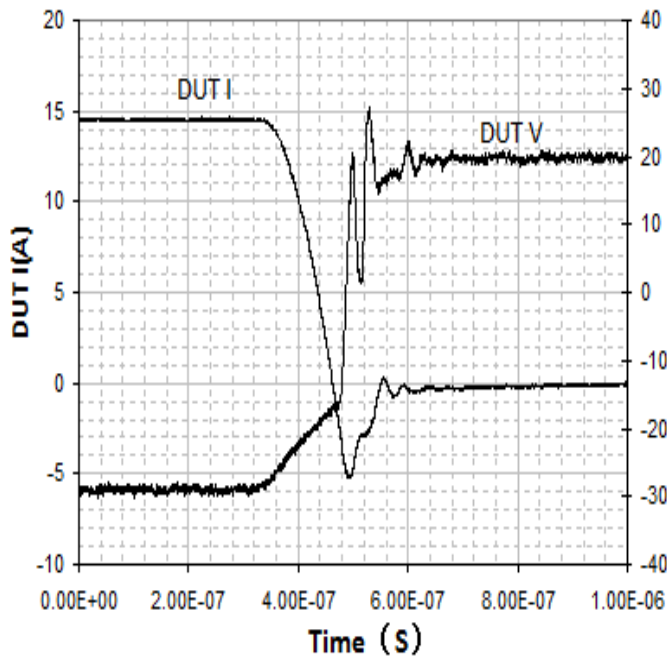
$V_{GE}=15\text{V}$ 、 $I_C=15\text{A}$ 、 $V_{CE}=960\text{V}$





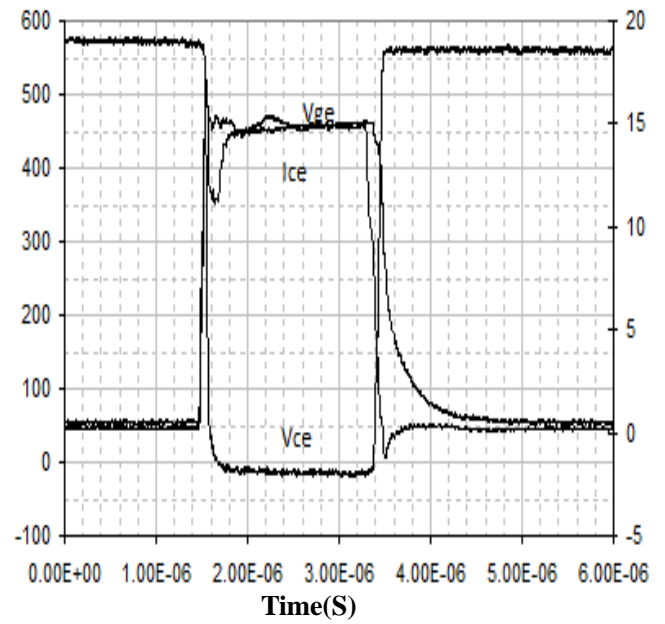
**Diode Peak Reverse Recovery Current**

IF=15A Tj=25°C



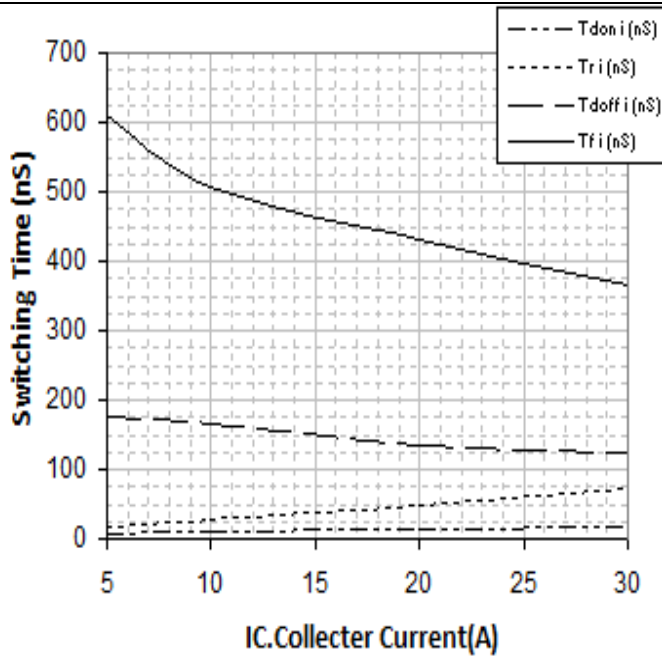
**IGBT Switch**

VGE=15V, IC=15A, VCE=600V, Tj=25°C



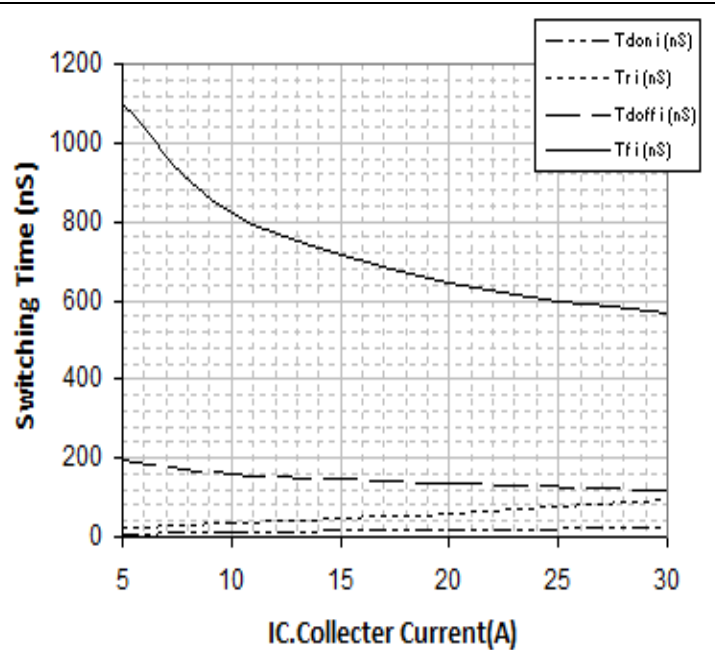
**Switching Time vs. IC(25°C)**

VCE=600V, VGE=15V, RG=10Ω



**Switching Time vs. IC(175°C)**

VCE=600V, VGE=15V, RG=10Ω

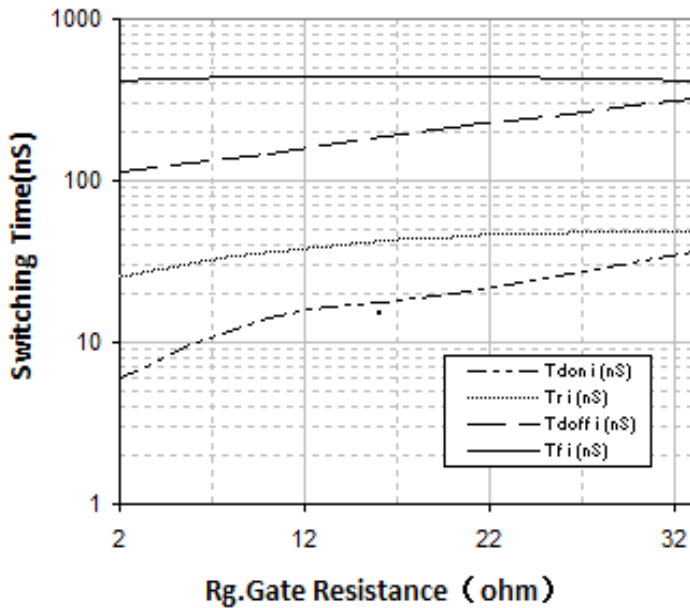






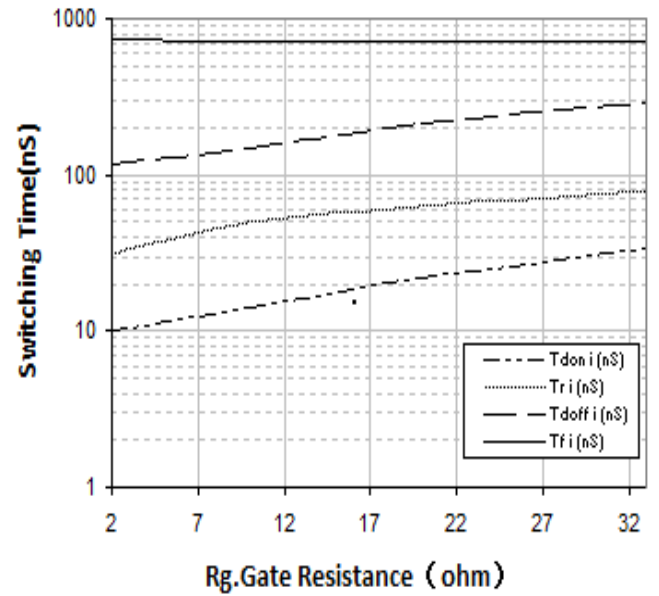
**Switching Time vs. Rg(25°C)**

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



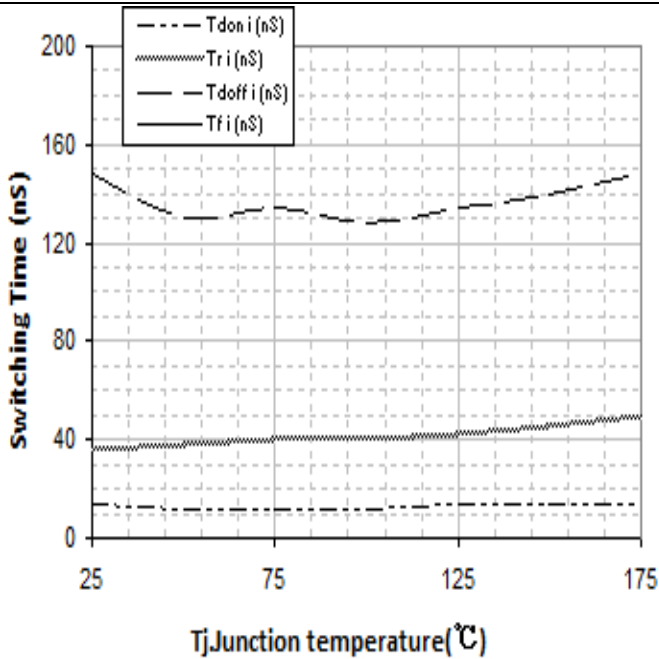
**Switching Time vs. Rg(175°C)**

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



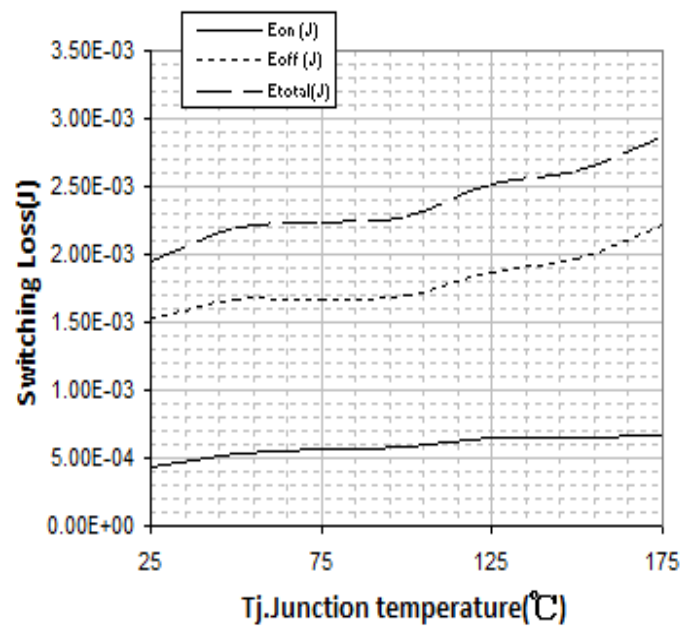
**Switching Time vs. Tj**

VGE=15V, VCE=600V, IC=15A, Rg=10Ω



**Switching Loss vs. Tj**

VGE=15V, VCE=600V, IC=15A, Rg=10Ω

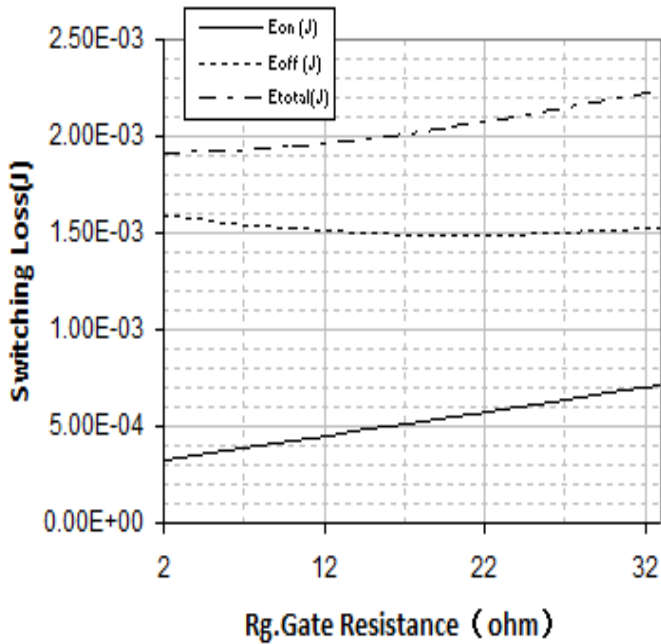






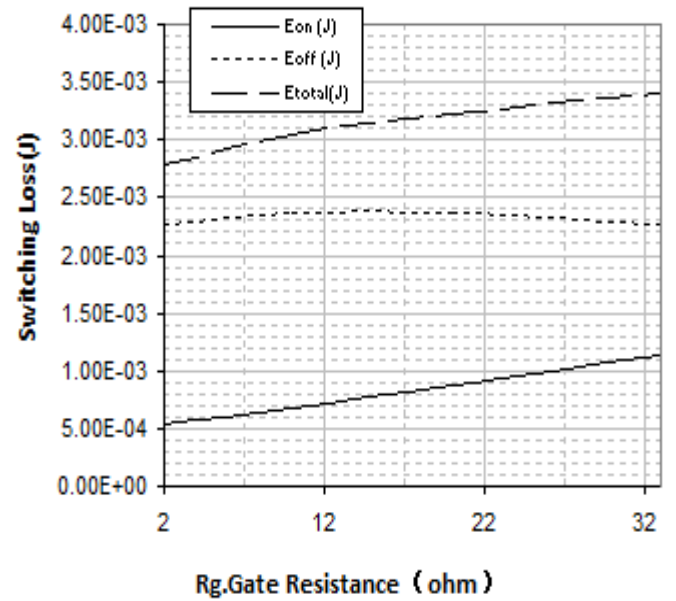
**Switching Loss vs. Rg(25°C)**

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



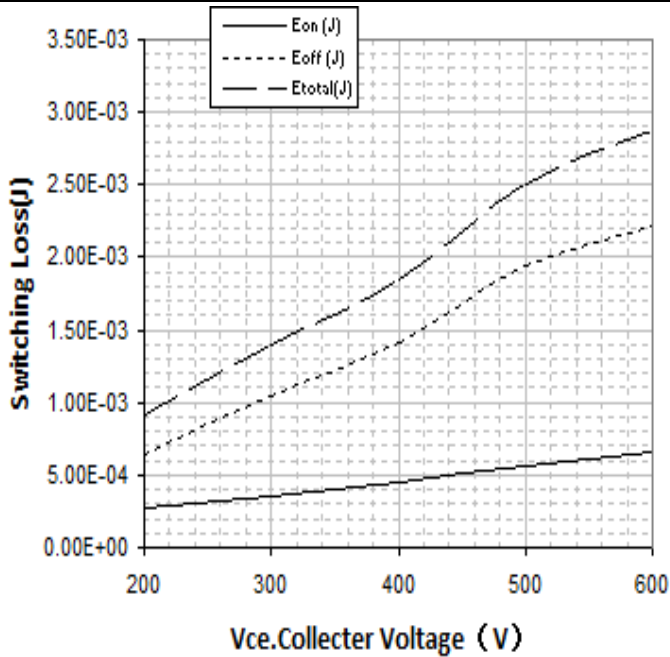
**Switching Loss vs. Rg(175°C)**

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



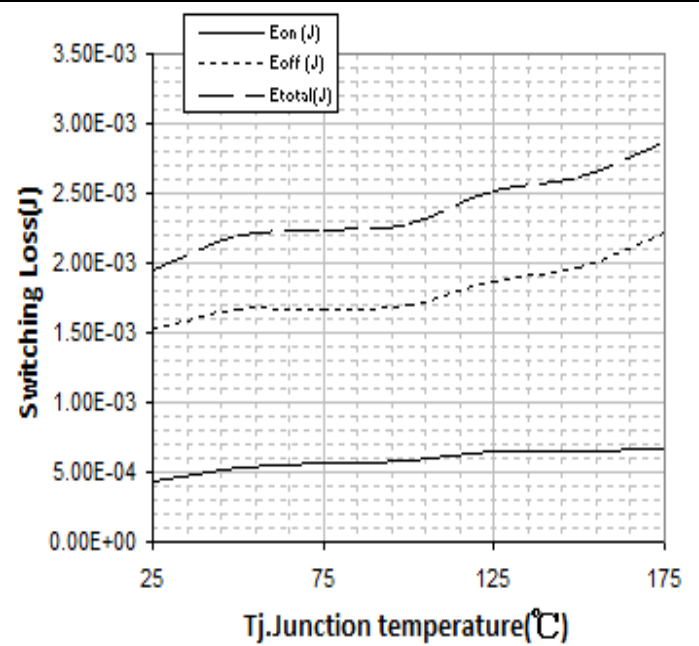
**Switching Loss vs. VCE(175°C)**

VGE=15V, IC:15A, Rg=10Ω



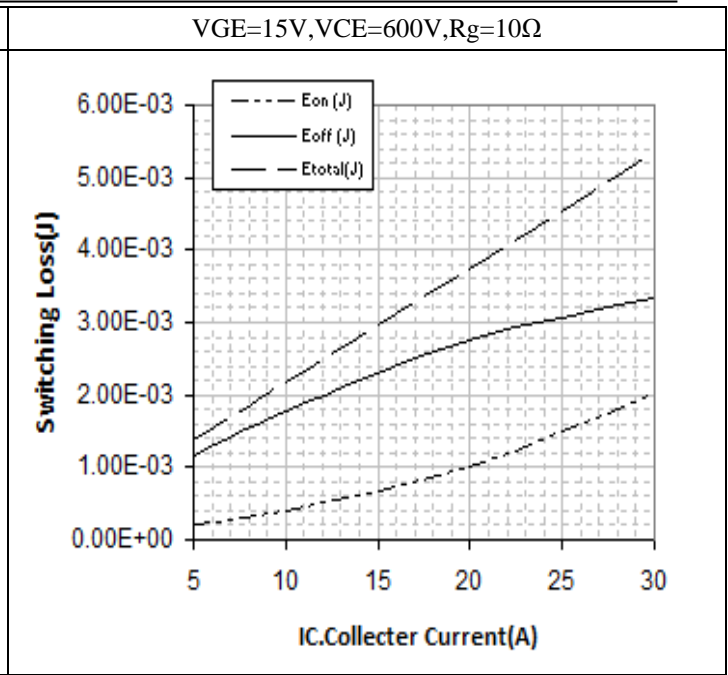
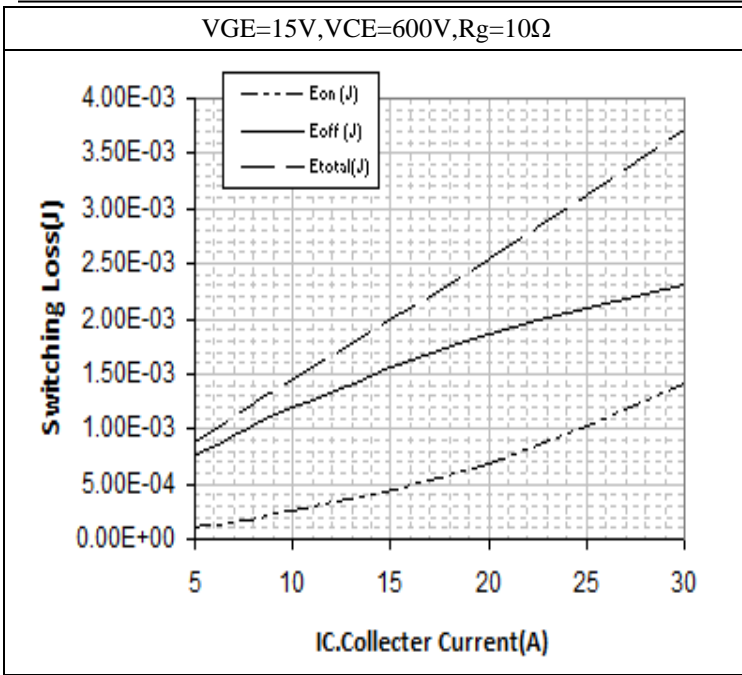
**Switching Loss vs. Tj**

VGE=15V, VCE=600V, Rg=10Ω



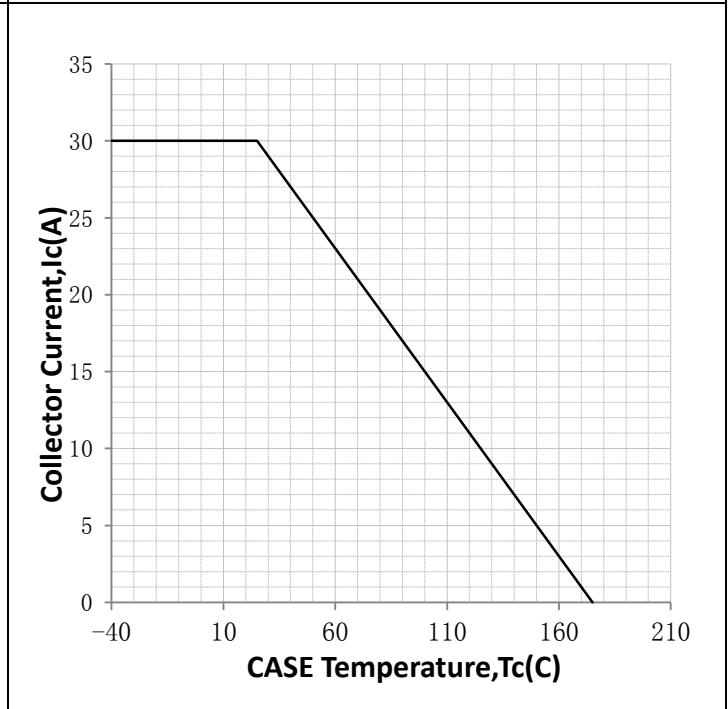
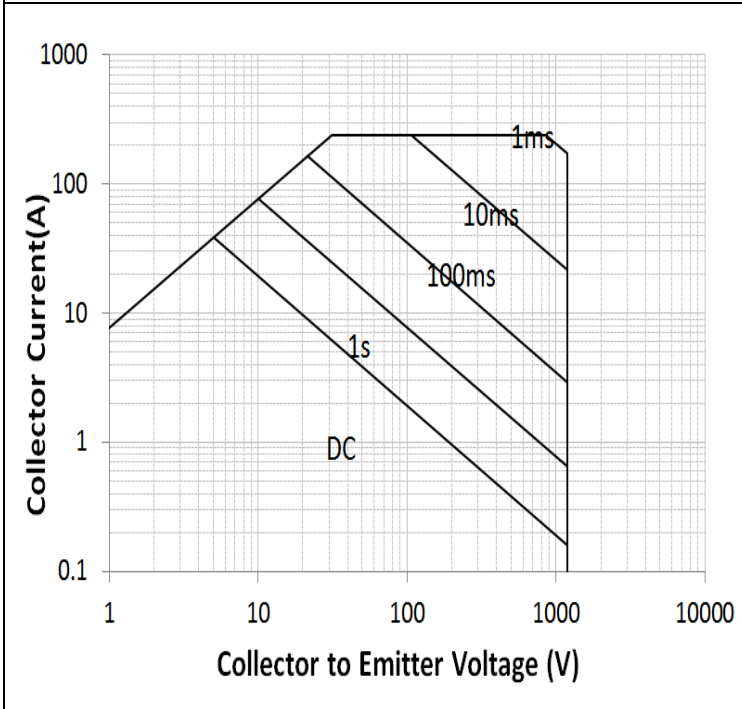
**Switching Loss vs. IC(25°C)**

**Switching Loss vs. IC(175°C)**



**Safe Operating Area**

**Collector current vs. case temperature**  
VGE ≥ 15V, Tj ≤ 175°C



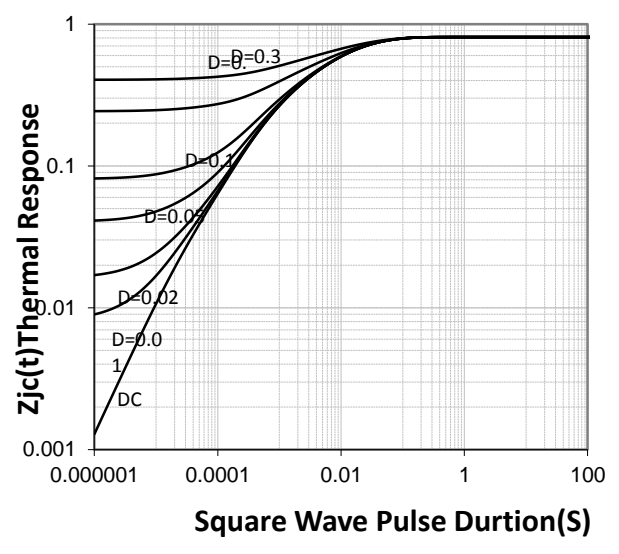
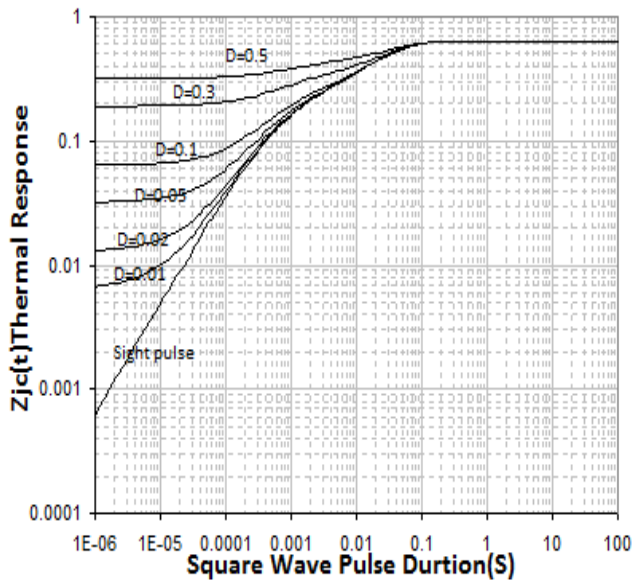
**Normalized Transient Thermal Impedance for**

**Normalized Transient Thermal Impedance**



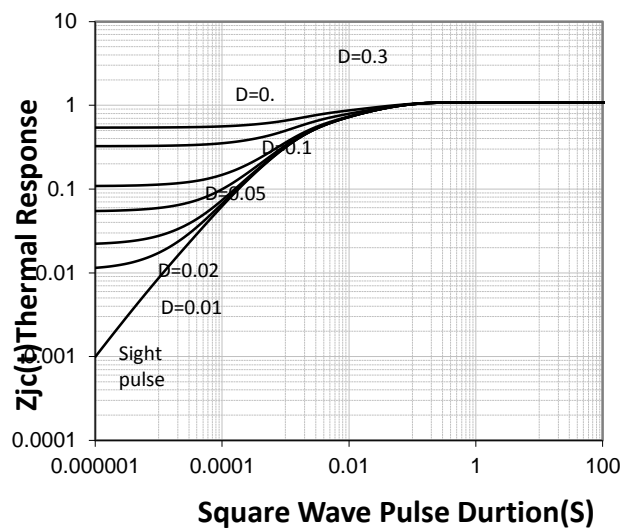
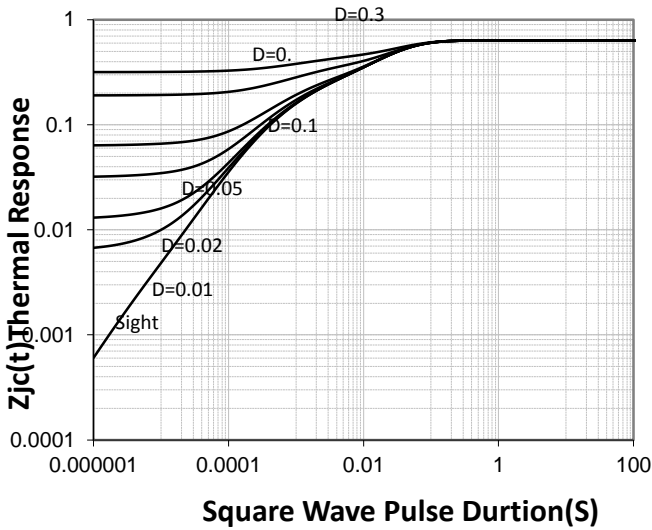
IGBT (TO-247)

for FRD (TO-247)



Normalized Transient Thermal Impedance for IGBT (TO-263-2L)

Normalized Transient Thermal Impedance for FRD (TO-263-2L)



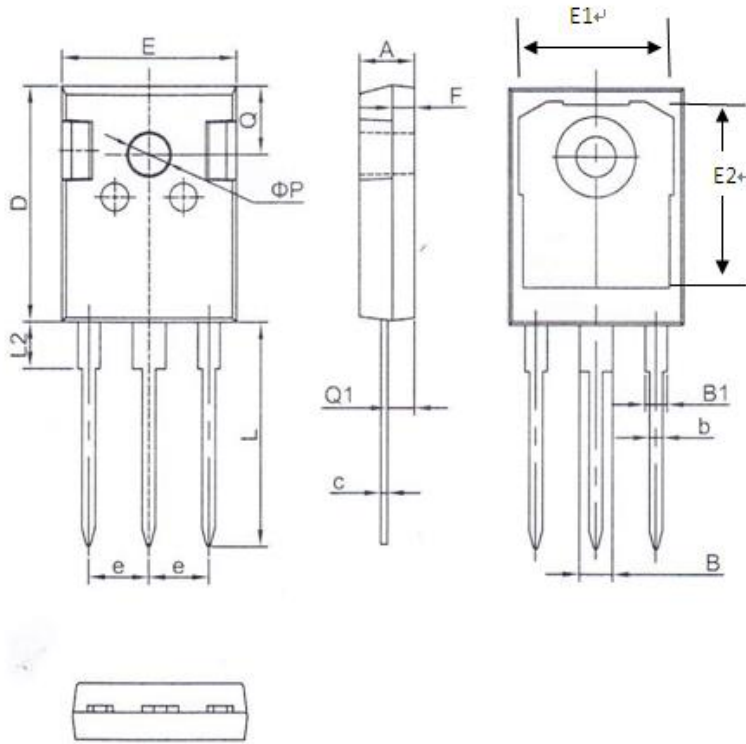
外形尺寸 PACKAGE MECHANICAL DATA



TO-247

重点尺寸: b、e、A、D、E。

单位 Unit : mm

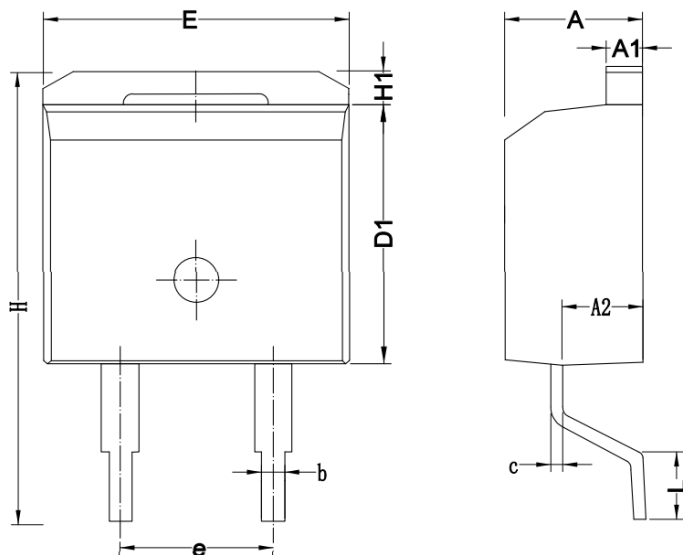


符号 SYMBOL	mm	
	MIN	MAX
A	4.90	5.10
B	2.95	3.35
B1	1.95	2.35
b	1.15	1.35
c	0.50	0.70
D	20.90	21.10
E	15.70	15.90
e	5.34	5.54
F	1.90	2.10
L	19.40	20.40
L2	4.03	4.23
Q	6.00	6.40
Q1	2.30	2.50
P	3.50	3.70
E1	13.82	14.22
E2	16.35	16.75

TO-263-2L

重点尺寸: b、e、A、D1、E。

单位 Unit : mm



SYMBOL	MM	
	MIN	MAX
A	4.18	4.68
A1	1.10	1.50
A2	2.40	2.80
b	0.63	1.00
c	0.35	0.70
D1	8.80	9.40
E	9.88	10.48
e	5.08 BSC	
H	14.50	16.50
H1	0.95	1.45
L	1.70	2.70



## 注意事项

1. 吉林华微电子股份有限公司的产品销售分为直销和销售代理，无论哪种方式，订货时请与公司核实。
2. 购买时请认清公司商标，如有疑问请与公司本部联系。
3. 在电路设计时请不要超过器件的绝对最大额定值，否则会影响整机的可靠性。
4. 本说明书如有版本变更不另外告知。

## NOTE

1. Jilin Sino-microelectronics co., Ltd sales its product either through direct sales or sales agent , thus, for customers, when ordering , please check with our company.
2. We strongly recommend customers check carefully on the trademark when buying our product, if there is any question, please don't be hesitate to contact us.
3. Please do not exceed the absolute maximum ratings of the device when circuit designing.
4. Jilin Sino-microelectronics co., Ltd reserves the right to make changes in this. specification sheet and is subject to change without prior notice.

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