



TT020N135ED

主要参数 MAIN CHARACTERISTICS

I _c	20 A
V _{CES}	1350V
V _{CESAT-TYP} (V _{GE} =15V)	1.7V

用途

- IH 感应加热
- 逆变式微波炉
- 软交换应用
- 逆导 IGBT

APPLICATIONS

- Induction heating(IH)
- Inverterized microwave ovens
- Soft switching applications
- RC-IGBT

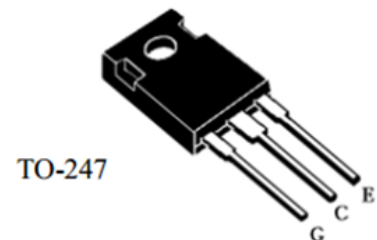
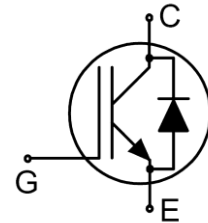
产品特性

- 低栅极电荷
- Trench FS 技术,
- 通态压降:
- RoHS 产品

FEATURES

- Low gate charge
- Trench FS Technology,
- Saturation voltage:
- RoHS product

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		
TT020N135ED-GE-B	TT020N135ED-GE-BR	N/A	N/A	TT020N135ED	TO-247



绝对最大额定值 ABSOLUTE RATINGS ($T_c=25^{\circ}\text{C}$)

项 目 Parameter	符 号 Symbol	数 值 Value	单 位 Unit
最高集电极—发射极直流电压 Collector-Emmitter Voltage	V_{CES}	1350	V
*连续集电极电流 Collector Current-continuous	I_C $T=25^{\circ}\text{C}$	40	A
	I_C $T=100^{\circ}\text{C}$	20	A
最大脉冲集电极极电流 Collector Current – pulse (note 1)	I_{CM}	60	A
二极管正向电流(内置) Diode forward current	I_F $T=25^{\circ}\text{C}$	40	A
	I_F $T=100^{\circ}\text{C}$	20	A
二极管正向脉冲电流(内置) Diode pulse current	I_{FSM}	60	A
最高栅极发射极电压 Gate-Emmitter Voltage	V_{GES}	± 25	V
安全工作区 Turn-off safe operating area	-	60	A
耗散功率 Power Dissipation	P_D $T_c=25^{\circ}\text{C}$	378.8	W
	P_D $T_c=100^{\circ}\text{C}$	151.5	W
结温 Operating junction temperature	T_{VJ}	$-40 \sim +150$	$^{\circ}\text{C}$
存储温度 Storage Temperature	T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T_L	300	$^{\circ}\text{C}$





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	BV _{CES}	I _C =250uA, V _{GE} =0V	1350	-	-	V
零栅压下集电极漏电流 Zero Gate Voltage Collector Current	I _{CES}	V _{CE} =1350V, V _{GE} =0V, T _C =25℃	-	-	100	uA
		V _{CE} =1350V, V _{GE} =0V, T _C =175℃	-	-	2.5	mA
正向栅极体漏电流 Gate-body leakage current, forward	I _{GESF}	V _{CE} =0V, V _{GE} =20V	-	-	100	nA
反向栅极体漏电流 Gate-body leakage current, reverse	I _{GESR}	V _{CE} =0V, V _{GE} =-20V	-	-	-100	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	V _{GE(th)}	V _{CE} = V _{GE} , I _C =250uA	4.5	-	6.5	V
饱和压降 Collector-Emmitter saturation Voltage	V _{CESAT}	V _{GE} =15V I _C =20A T _C =25℃	-	1.8	2.4	V
		V _{GE} =15V I _C =20A T _C =125℃	-	2.2	-	V
		V _{GE} =15V I _C =20A T _C =175℃		2.6	-	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C _{ies}	V _{CE} =25V, V _{GE} =0V, f=1.0MH _Z	-	3365	-	pF
输出电容 Output capacitance	C _{oes}		-	82	-	pF
反向传输电容 Reverse transfer capacitance	C _{res}		-	42	-	pF
栅极电荷总量 Total Gate Charge	Qg	V _{CC} =880V,I _c =20A, V _{GE} =15 V T _C =25℃	-	130	-	nC
栅极-反射极 Gate to emitter charge	Qge		-	30	-	
栅极-集电极 Gate to collector charge	Qgc		-	55	-	





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	$t_{d(on)}$	$V_{CC}=600V, I_c=20A, R_G=10\Omega$ $V_{GE}=15V, T_C=25^\circ C$	-	30	-	ns
上升时间 Turn-On rise time	t_r		-	44	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	128	-	ns
下降时间 Turn-Off Fall time	t_f		-	164	-	ns
开通损耗 Turn-On energy	E_{on}		-	0.57	-	mJ
关断损耗 Turn-off energy	E_{off}		-	0.88	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	1.45	-	mJ
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=600V, I_c=20A, R_G=10\Omega$ $V_{GE}=15V, T_C=175^\circ C$	-	26	-	ns
上升时间 Turn-On rise time	t_r		-	46	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	156	-	ns
下降时间 Turn-Off Fall time	t_f		-	238	-	ns
开通损耗 Turn-On energy	E_{on}		-	0.78	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.08	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	1.86	-	mJ

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	V_F	$V_{GE}=0V, I_F=20A, T_C=25^\circ C$	-	1.8	2.5	V
		$V_{GE}=0V, I_F=20A, T_C=175^\circ C$		2.4		V
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=600V, I_F=20A$ $dI_F/dt=200A/\mu s$	-	427		ns
反向恢复电荷 Diode Reverse recovery charge	Q_{rr}	$T_C=25^\circ C$	-	4877		nC

热特性 THERMAL CHARACTERISTIC

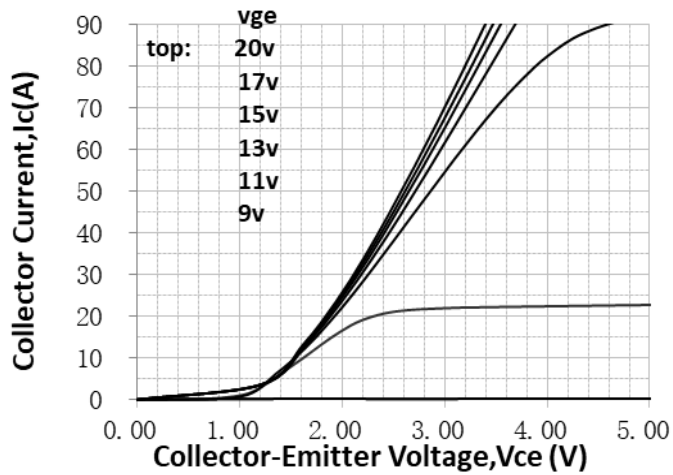
项 目 Parameter	符 号 Symbol	MAX	单 位 Unit
		IGBT/ Diode	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.33	$^\circ C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	36.5	$^\circ C/W$



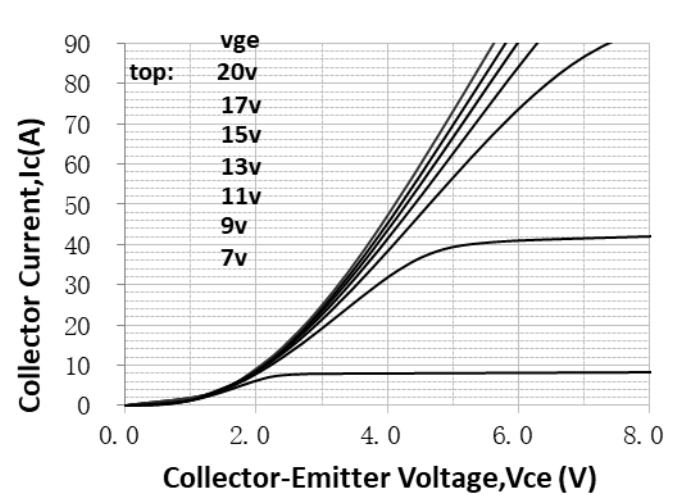


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

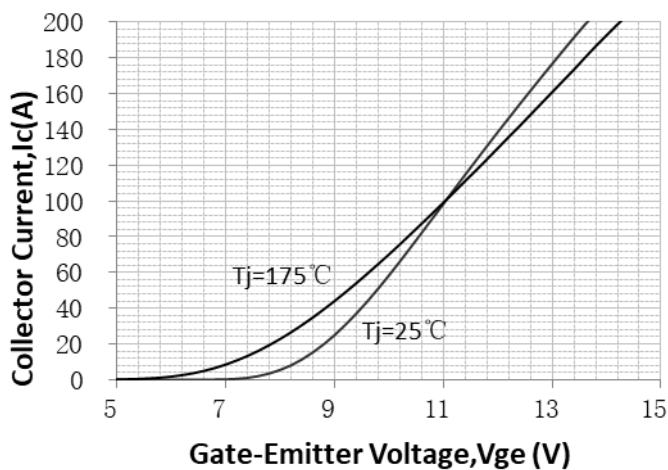
Output Characteristics (25°C)



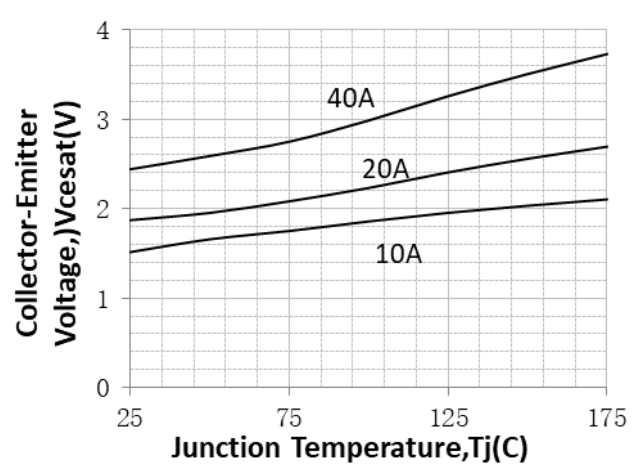
Output Characteristics (175°C)



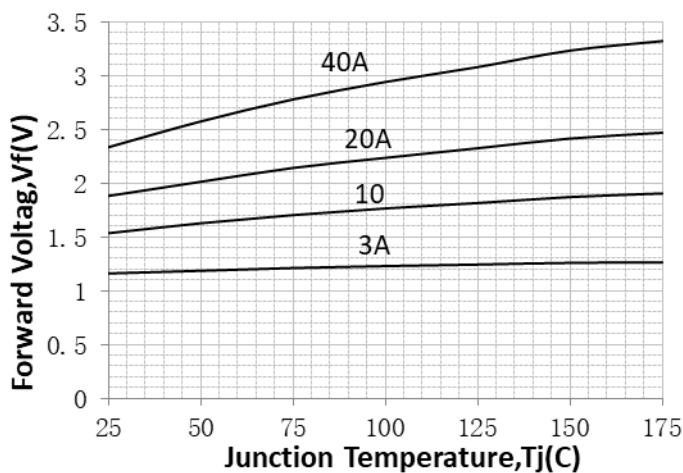
Transfer Characteristics



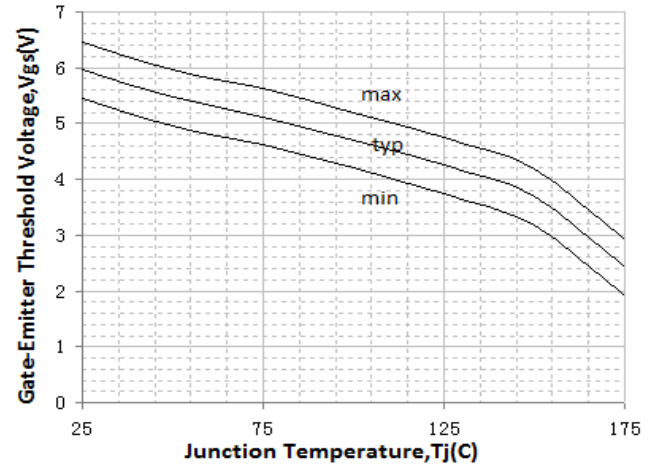
Vcesat vs. Tj



VF vs. Tj

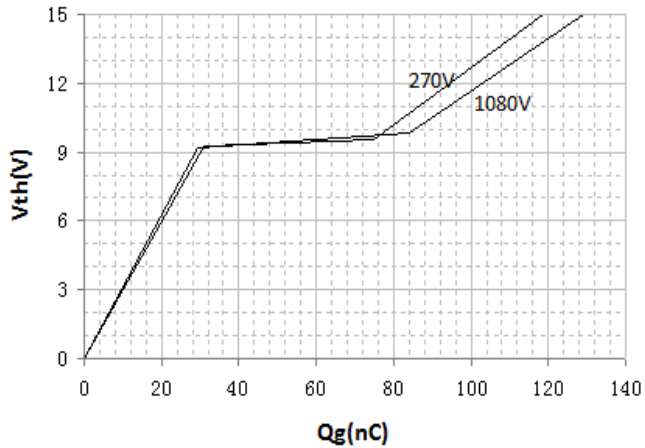


VTH vs. Tj

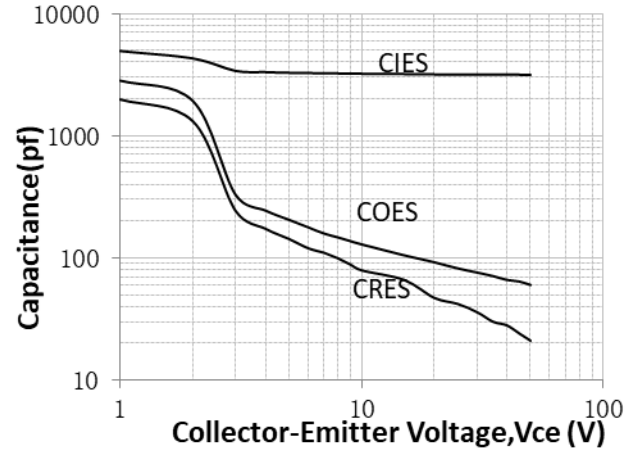


**Gate Charge Characteristics**

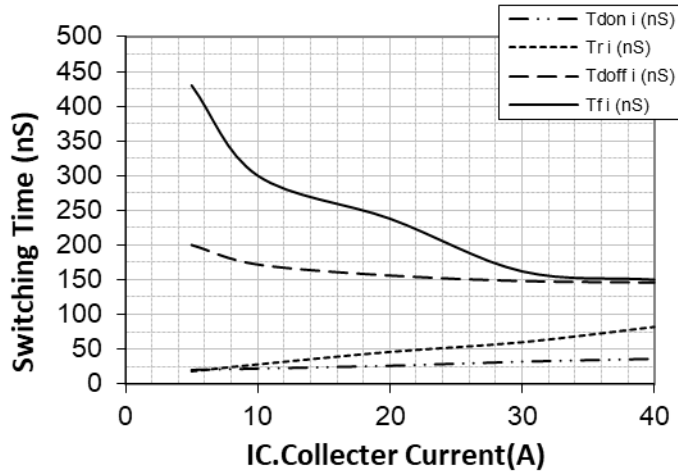
VGE=15V, IC=20A

**Capacitance Characteristic**

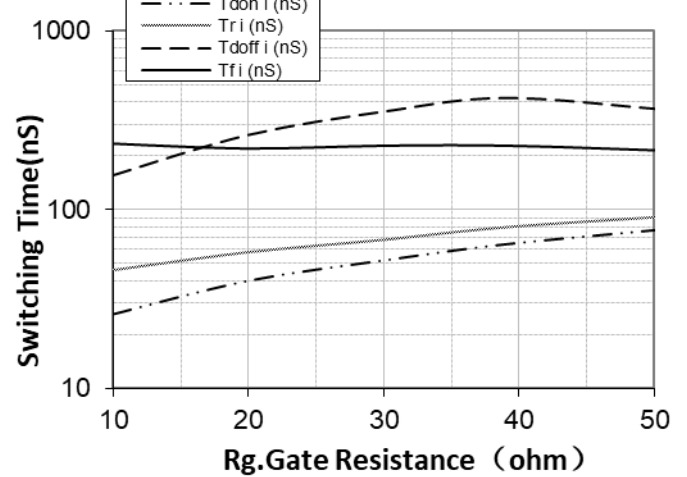
Vce=25V, VGE=0V, f=1.0MHz

**Switching Time vs. IC(175°C)**

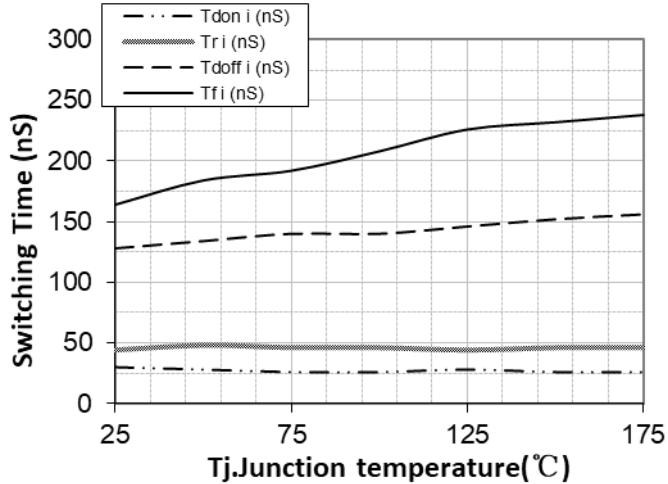
VCE=600V, VGE=15V, RG=10Ω

**Switching Time vs. Rg(175°C)**

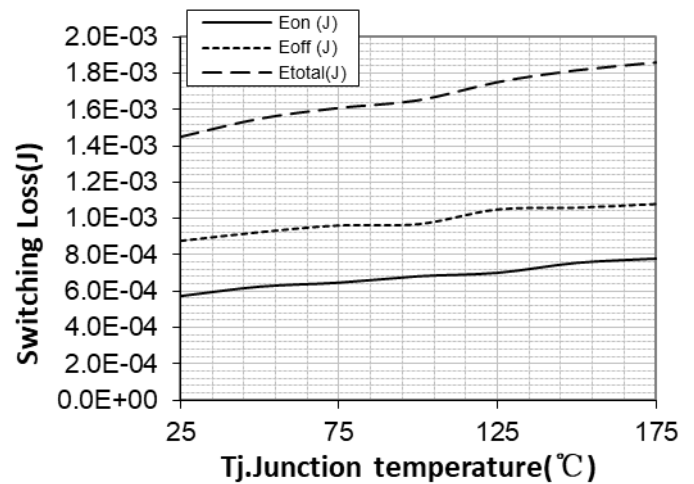
VGE=15V, VCE=600V, IC=20A

**Switching Time vs. Tj**

VGE=15V, VCE=600V, IC=20A, Rg=10Ω

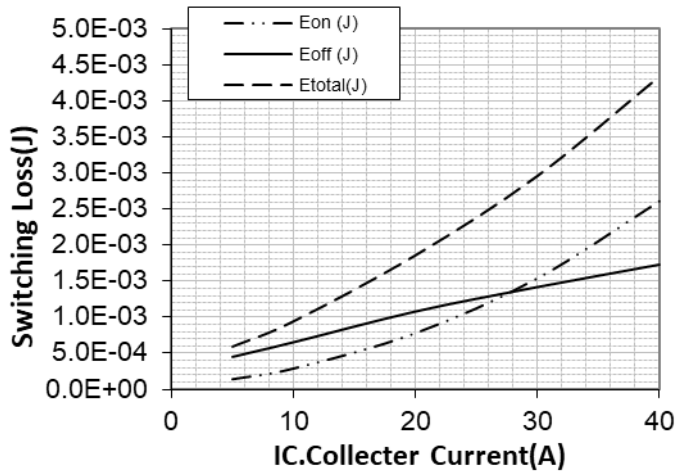
**Switching Loss vs. Tj**

VGE=15V, VCE=600V, IC=20A, Rg=10Ω



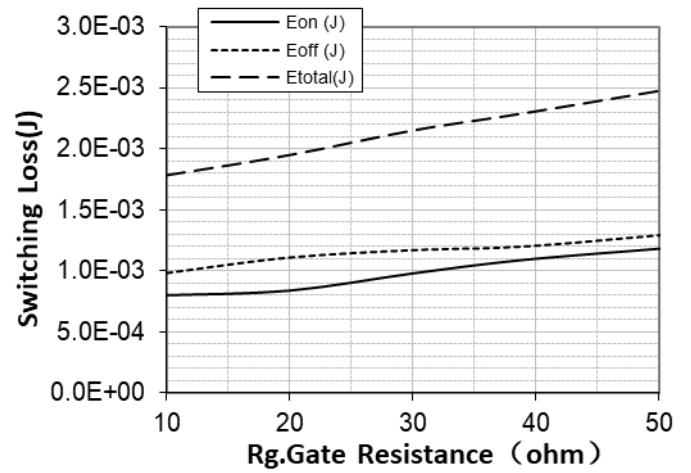
Switching Loss vs. I_C (175°C)

VGE=15V, VCE=600V, Rg=10Ω

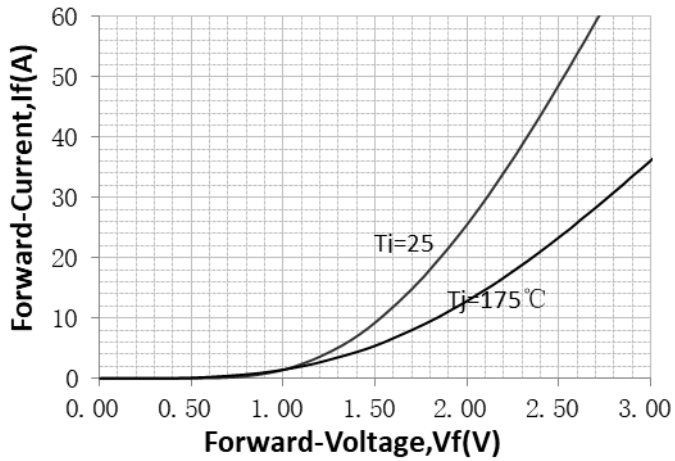


Switching Loss vs. Rg(175°C)

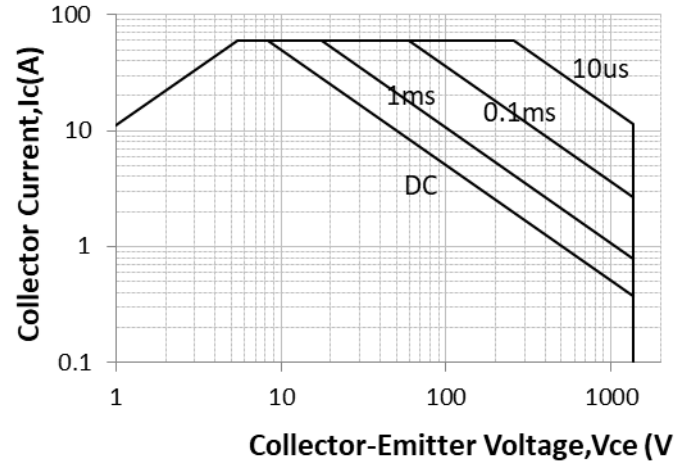
VGE=15V, VCE=600V, IC=20A



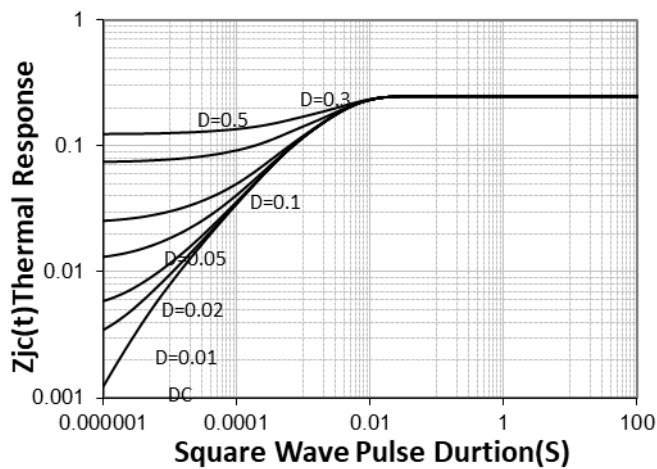
Diode Characteristic



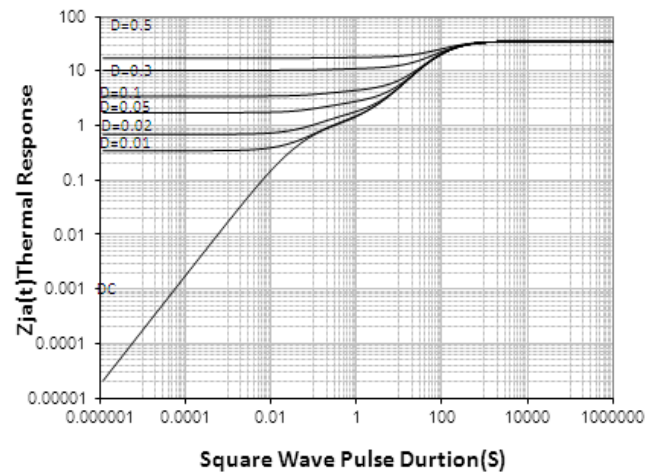
Forward Bias SOA



Normalized Maximum Transient Thermal Impedance for IGBT(RJC)



Normalized Maximum Transient Thermal Impedance for IGBT(RJA)

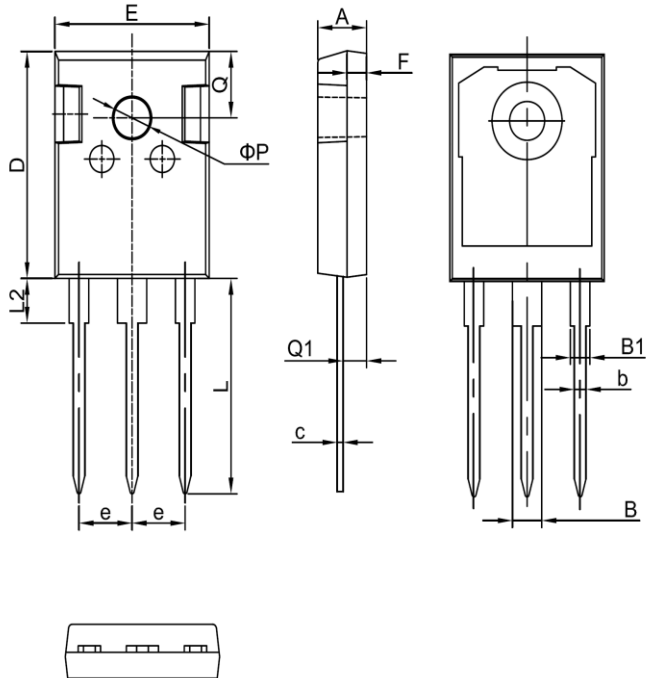




外形尺寸 PACKAGE MECHANICAL DATA

TO-247

单位 Unit : mm



符号 symbol	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



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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

