



# TT010N060EQW

## 主要参数 MAIN CHARACTERISTICS

<b>I<sub>C</sub></b>	<b>10 A</b>
<b>V<sub>CE</sub></b>	<b>600V</b>
<b>V<sub>CE(SAT)-TYP</sub></b>	<b>1.52V</b>

### 用途

- 逆变器
- UPS 电源

### APPLICATIONS

- General purpose inverters
- UPS

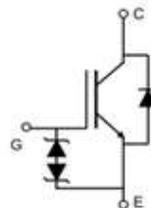
### 产品特性

- 低栅极电荷
- Trench FS 技术
- RoHS 产品
- ESD 人体模式 Class2

### FEATURES

- Low gate charge
- Trench FS Technology
- RoHS product
- ESD HBM Class2

## 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		
TT010N060EQW-S-B	TT010N060EQW-S-BR	TT010N060EQW-S-A	TT010N060EQW-S-AR	TT010N060EQW	TO-263





## 绝对最大额定值 ABSOLUTE RATINGS (Tc=25°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-emitter voltage	V <sub>CE</sub>	600	V
*连续集电极电流 Collector current-continuous T <sub>C</sub> =25°C T <sub>C</sub> =100°C	I <sub>C</sub>	20 10	A
最大脉冲集电极极电流（注1） Collector current – pulse（note 1）	I <sub>CM</sub>	40	A
二极管正向测试电流 Diode RMS forward current T <sub>C</sub> =25°C T <sub>C</sub> =100°C	I <sub>F</sub>	20 10	A
二极管正向脉冲电流 Diode pulse current	I <sub>FSM</sub>	40	A
最高栅极发射极电压 Gate-emitter voltage	V <sub>GE</sub>	±20	V
Turn-off safe area 安全工作区	-	40	A
耗散功率 Power dissipation	P <sub>D</sub> TC=25°C	104.2	W
存储温度 Storage temperature range	T <sub>STG</sub>	-55~+150	°C
结温 Junction temperature range	T <sub>J</sub>	-55~+150	°C
引线最高焊接温度 Maximum lead temperature for soldering purposes	T <sub>L</sub>	300	°C

\*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-emitter voltage	BVCES	IC=250μA, VGE=0V	600	-	-	V
零栅压下集电极漏电流 Zero gate voltage collector current	ICES	VCE=600V, VGE=0V, TC=25°C	-	-	20	μA
		VCE=600V, VGE=0V, TC=125°C	-	-	2	mA
正向栅极体漏电流 Gate-body leakage current,forward	IGESF	VCE=0V, VGE =20V, Tj=25°C	-	-	150	uA
反向栅极体漏电流 Gate-body leakage current,reverse	IGESR	VCE=0V, VGE =-20V, Tj=25°C	-	-	-150	uA
<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-emitter saturation voltage	VCESAT	VGE=15V IC=10A Tc=25°C	-	1.52	2.0	V
		VGE=15V IC=10A Tc=125°C	-	1.71	-	V
<b>动态特性 Dynamic Characteristics</b>						
输入电容 Input capacitance	Cies	VCE=25V, VGE=0V, f=1.0MHZ	-	619.5	-	pF
输出电容 Output capacitance	Coes		-	55	-	pF
反向传输电容 Reverse transfer capacitance	Cres		-	15.8	-	pF
栅极电荷总量 Total gate charge	Qg		VCC=520V,Ic=10A, ,VGE=15 V TC=25°C	-	25.8	-
栅极-反射极 Gate to emitter charge	Qge	-		7.8	-	
栅极-集电极 Gate to collector charge	Qgc	-		11.2	-	
栅极电阻-Gate resistance	Rg	f=1 MHz, open collector	-	2.8	-	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=400V, Ic=10A, RG=5Ω VGE=15 V TC=25°C	-	10.0	-	ns	
上升时间 Turn-on rise time	tr		-	22.0	-	ns	
关断延迟时间 Turn-off delay time	td(off)		-	20.0	-	ns	
下降时间 Turn-off fall time	tf		-	104.0	-	ns	
开通损耗 Turn-on energy	Eon		-	0.16	-	mJ	
关断损耗 Turn-off energy	Eoff		-	0.28	-	mJ	
总开关损耗 Total switching energy	Etot		-	0.44	-	mJ	
开启延迟时间 Turn-on delay time	td(on)		VCC=400V, Ic=10A, RG=5Ω VGE=15 V TC=150°C	-	27.0	-	ns
上升时间 Turn-on rise time	tr			-	22.0	-	ns
关断延迟时间 Turn-off delay time	td(off)			-	26.0	-	ns
下降时间 Turn-off fall time	tf			-	172.0	-	ns
开通损耗 Turn-on energy	Eon				0.17		mJ
关断损耗 Turn-off energy	Eoff			0.32		mJ	
总开关损耗 Total switching energy	Etot			0.49		mJ	

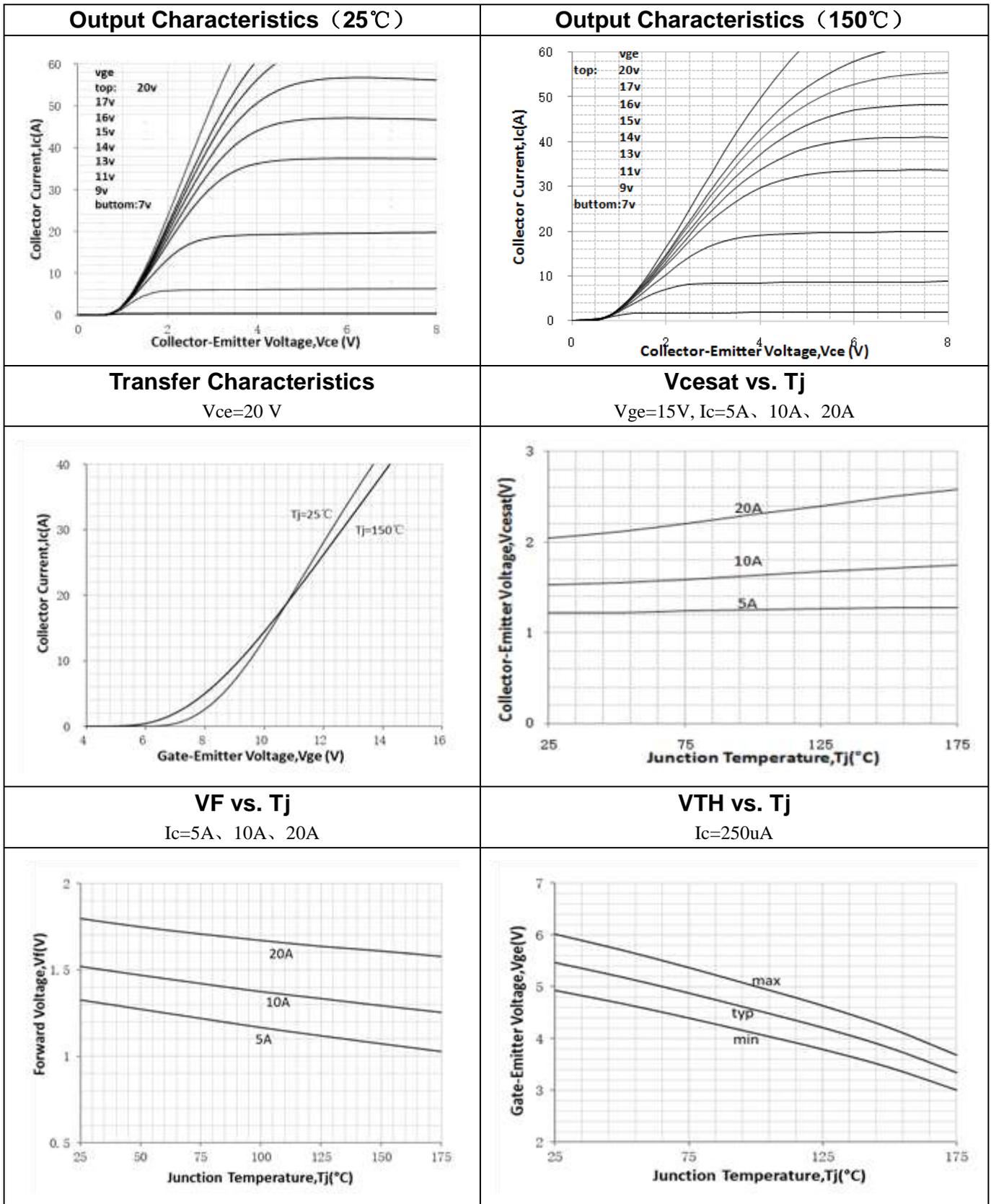
## 反并联二极管特性及最大额定值 Anti-Parallel Diode Characteristics and Maximum Ratings

正向压降 Diode forward voltage	Vf	VGE=0V, IS=10A, Tvj =25°C	-	1.53	2.2	V
反向恢复时间 Diode reverse recovery time	trr	VGE=0V, VR=400V IF=10A dIF/dt=200A/μs TC=25°C	-	146.6	-	ns
反向恢复电荷 Diode reverse recovery charge	Qrr		-	116.4	-	nC
反向恢复电流 Diode reverse recovery current	Irrm		-	2.2	-	A
反向恢复时间 Diode reverse recovery time	trr	VGE=0V, VR=400V IF=10A dIF/dt=200A/μs TC=150°C	-	201.5	-	ns
反向恢复电荷 Diode reverse recovery charge	Qrr		-	424.4	-	nC
反向恢复电流 Diode reverse recovery current	Irrm		-	4.6	-	A

项 目 Parameter	符 号 Symbol	最大 MAX	单 位 Unit
结到管壳的热阻 (IGBT) Thermal resistance, junction to case(IGBT)	Rth(j-c)	1.2	°C/W
结到环境的热阻 Thermal resistance, junction to ambient	Rth(j-A)	60	°C/W



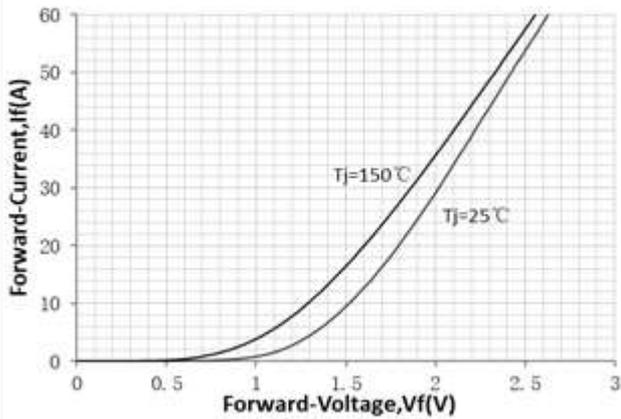
特征曲线 ELECTRICAL CHARACTERISTICS (curves)





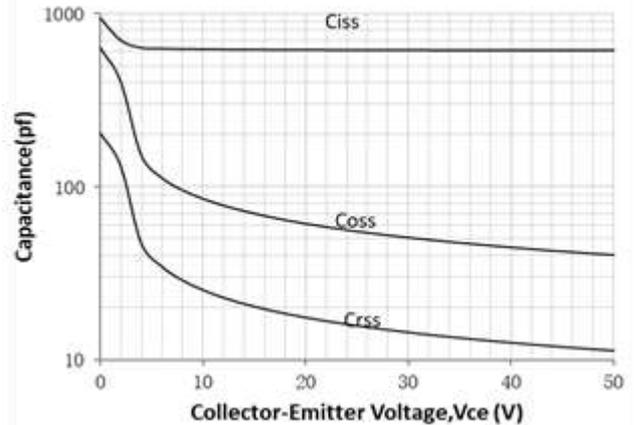
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## Diode Characteristic

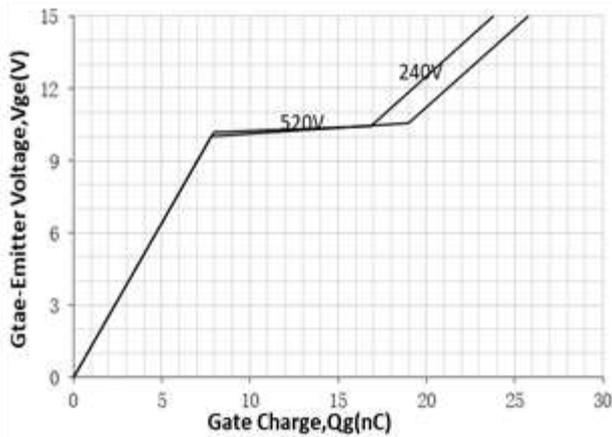


## Capacitance Characteristic

$V_{ce}=25\text{V}, V_{GE}=0\text{V}, f=1.0\text{MHZ}$

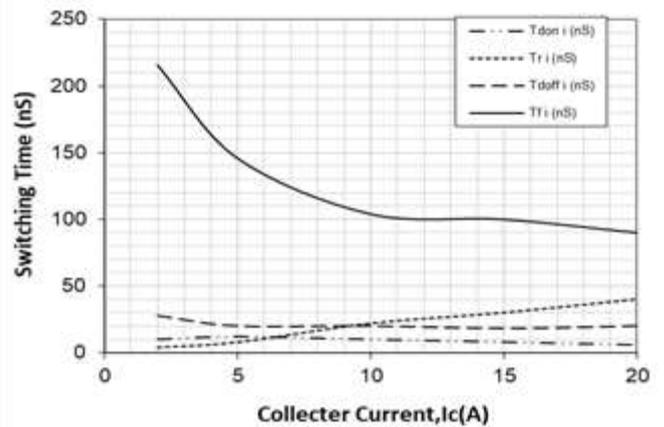


## QG vs. $v_{th}$



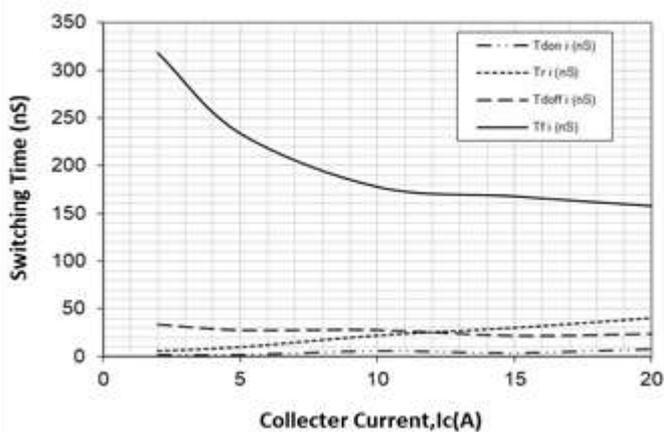
## Switching Time vs. $I_C(25^\circ\text{C})$

$V_{CE}=400\text{V}, V_{GE}=15\text{V}, R_G=5\Omega$



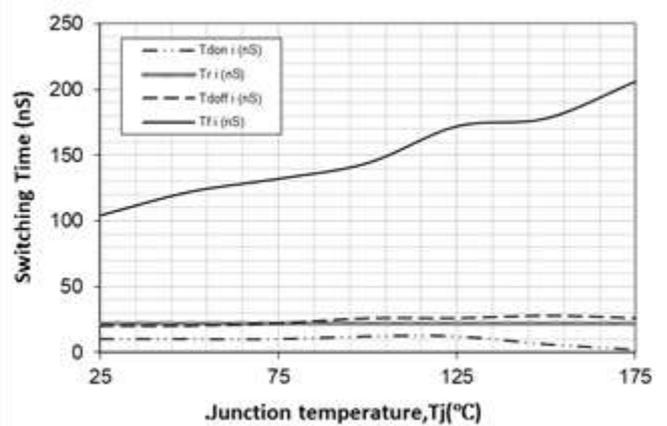
## Switching Time vs. $I_C(150^\circ\text{C})$

$V_{CE}=400\text{V}, V_{GE}=15\text{V}, R_G=5\Omega$



## Switching Time vs. $T_j$

$V_{GE}=15\text{V}, V_{CE}=400\text{V}, I_C=10\text{A}, R_G=5\Omega$

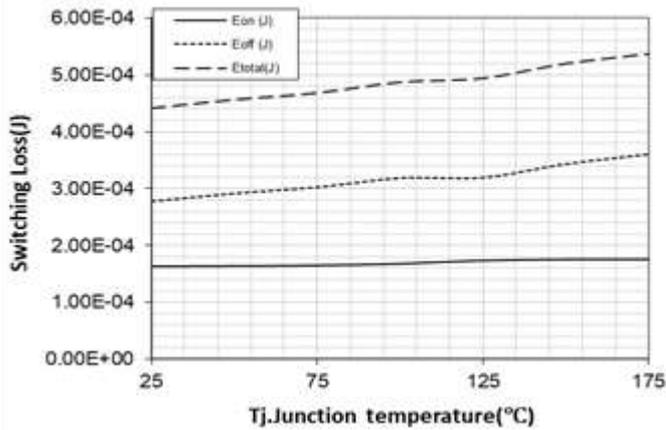




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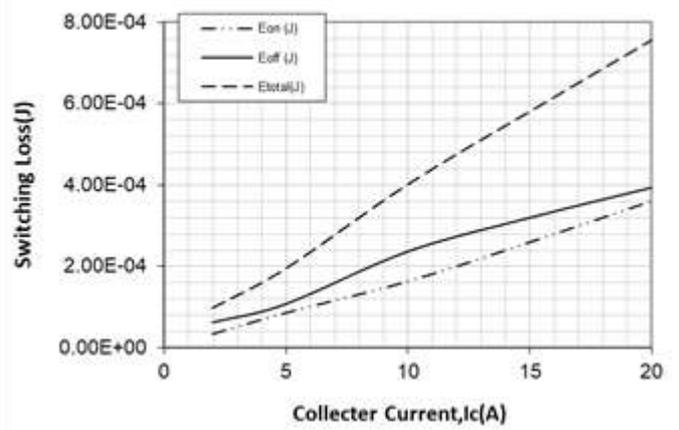
## Switching Loss vs. Tj

VGE=15V, VCE=400V, IC=10A, Rg=5Ω



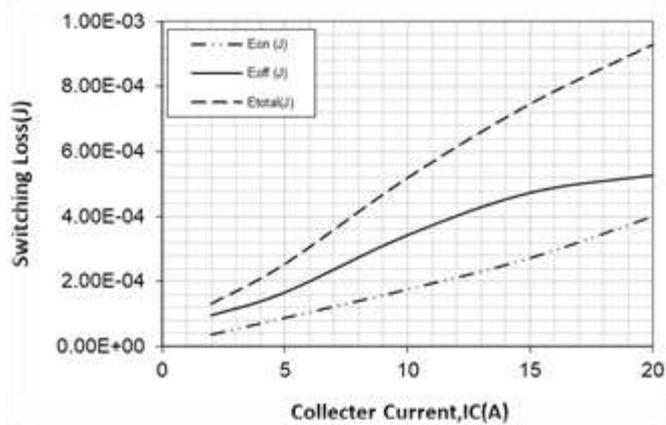
## Switching Loss vs. IC(25°C)

VGE=15V, VCE=400V, Rg=5Ω



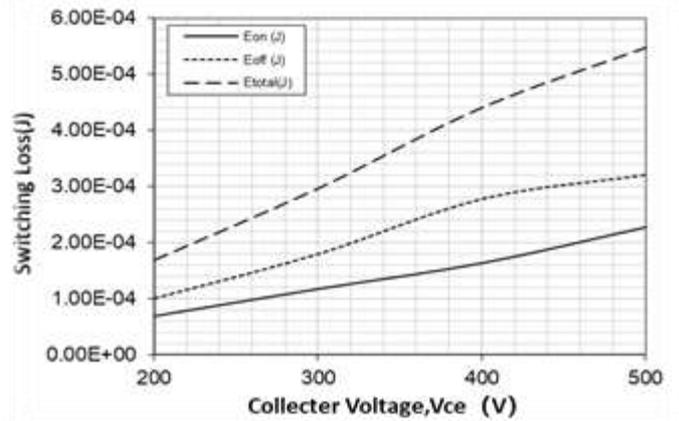
## Switching Loss vs. IC(150°C)

VGE=15V, VCE=400V, Rg=5Ω

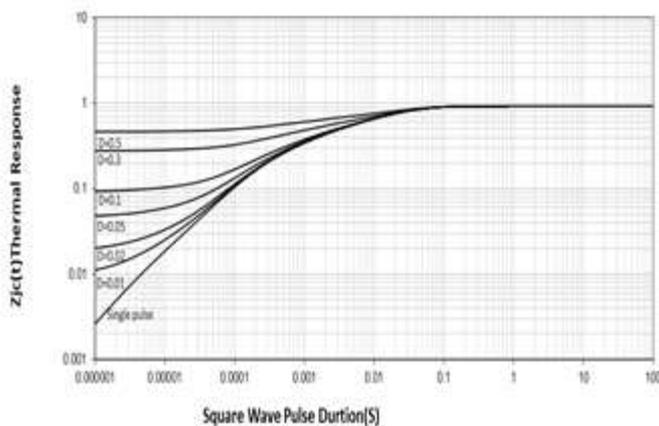


## Switching Loss vs. VCE(25°C)

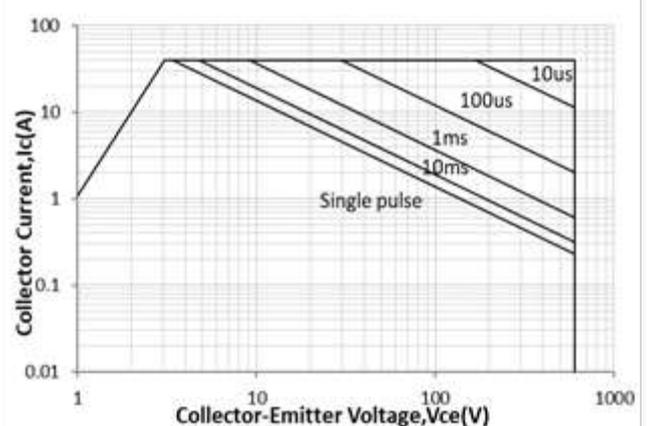
VGE=15V, IC=10A, Rg=5Ω



## Transient Thermal Impedance (IGBT) for TO-263



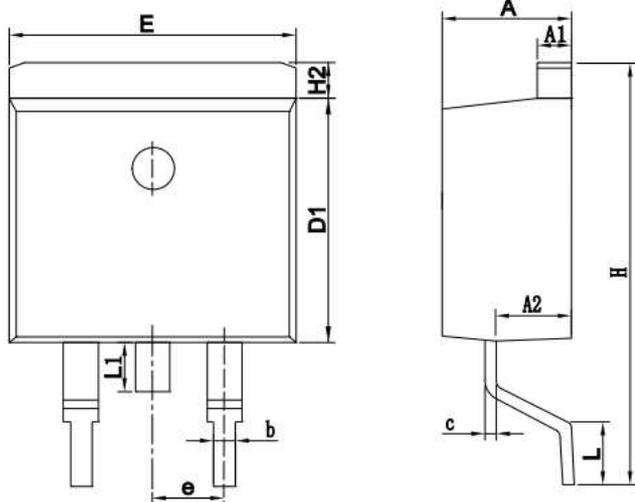
## Safe Operating Area For TO-263





TO-263

单位 Unit:mm



SYMBOL	MIN	MAX
A	4.30	4.80
A1	1.12	1.42
A2	2.54	2.84
b	0.67	1.00
c	0.29	0.52
D1	8.40	9.00
E	9.80	10.46
e	2.54 BSC	
H	14.50	15.50
H2	1.12	1.45
L	1.50	2.80
L1	1.45	1.70

重点尺寸: b、e、A、D1、E。



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