

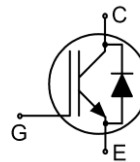


TT010N120EQ

主要参数 MAIN CHARACTERISTICS

I_C	10 A
V_{CES}	1200V
$V_{cesat-typ}(V_{ge}=15V)$	1.6V

封装 Package



TO-247

用途

- 逆变器

APPLICATIONS

- General purpose inverters

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

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		
N/A	TT010N120EQ-GE-BR	N/A	N/A	TT010N120EQ	TO-247
TT010N120EQ-GE-B	N/A	N/A	N/A	TT010N120EQ	TO-247

绝对最大额定值 ABSOLUTE RATINGS (T_c=25°C)

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-Emitter Voltage	V _{ce}	1200	V
*连续集电极电流 Collector Current-continuous	I _c T=25°C	20	A
	I _c T=100°C	10	A
最大脉冲集电极极电流（注 1） Collector Current – pulse (note 1)	I _{CM}	20	A
二极管正向电流 Diode RMS forward current	I _F T=25°C	20	A
	I _F T=100°C	10	A
二极管正向不重复峰值电流（浪涌电流） Surge non repetitive forward current tp= 10 ms sinusoidal	I _{FSM}	20	A
栅极发射极电压 Gate-Emitter Voltage	V _{GE}	±20	V
耗散功率 Power Dissipation	P _D T _C =25°C	176	W
结温 Junction Temperature Range	T _{vj}	-40~+175	°C
存储温度 Storage Temperature Range	T _{STG}	-55~+150	°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T _L	260	°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
关态特性 Off –Characteristics						
集电极-发射极击穿电压 Collector-Emitter Voltage	BV_{CES}	$I_C=250\mu A, V_{GE}=0V$	1200	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{CES}/\Delta T_J$	$I_C=0.5mA$, referenced to $25^\circ C$	-	0.6	-	$V/^\circ C$
零栅压下集电极漏电流 Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_C=25^\circ C$	-	-	0.2	mA
		$V_{CE}=1200V, V_{GE}=0V, T_C=175^\circ C$	-	2	-	mA
正向栅极体漏电流 Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=20V$	-	-	200	nA
反向栅极体漏电流 Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-20V$	-	-	-200	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C=250\mu A$	4.5	5.5	6.5	V
饱和压降 Collector-Emitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=10A, T_C=25^\circ C$	-	1.6	2.1	V
		$V_{GE}=15V, I_C=10A, T_C=175^\circ C$	-	1.9	-	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz$	-	900	-	pF
输出电容 Output capacitance	C_{oes}		-	60	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	30	-	pF
栅极电荷总量 Total Gate Charge	Q_g	$V_{CC}=600V, I_C=10A, V_{GE}=15V, T_C=25^\circ C$	-	80	-	nC
栅极-发射极 Gate to emitter charge	Q_{ge}		-	6	-	
栅极-集电极 Gate to collector charge	Q_{gc}		-	60	-	
栅极电阻-Gate resistance	R_g	$f=1 MHz$, open collector	-	2	-	Ω
短路电流-short current	I_{sc}	$V_{GE}=15V, V_{CE}=600V, t_{sc} < 10\mu s$	-	41.3	-	A

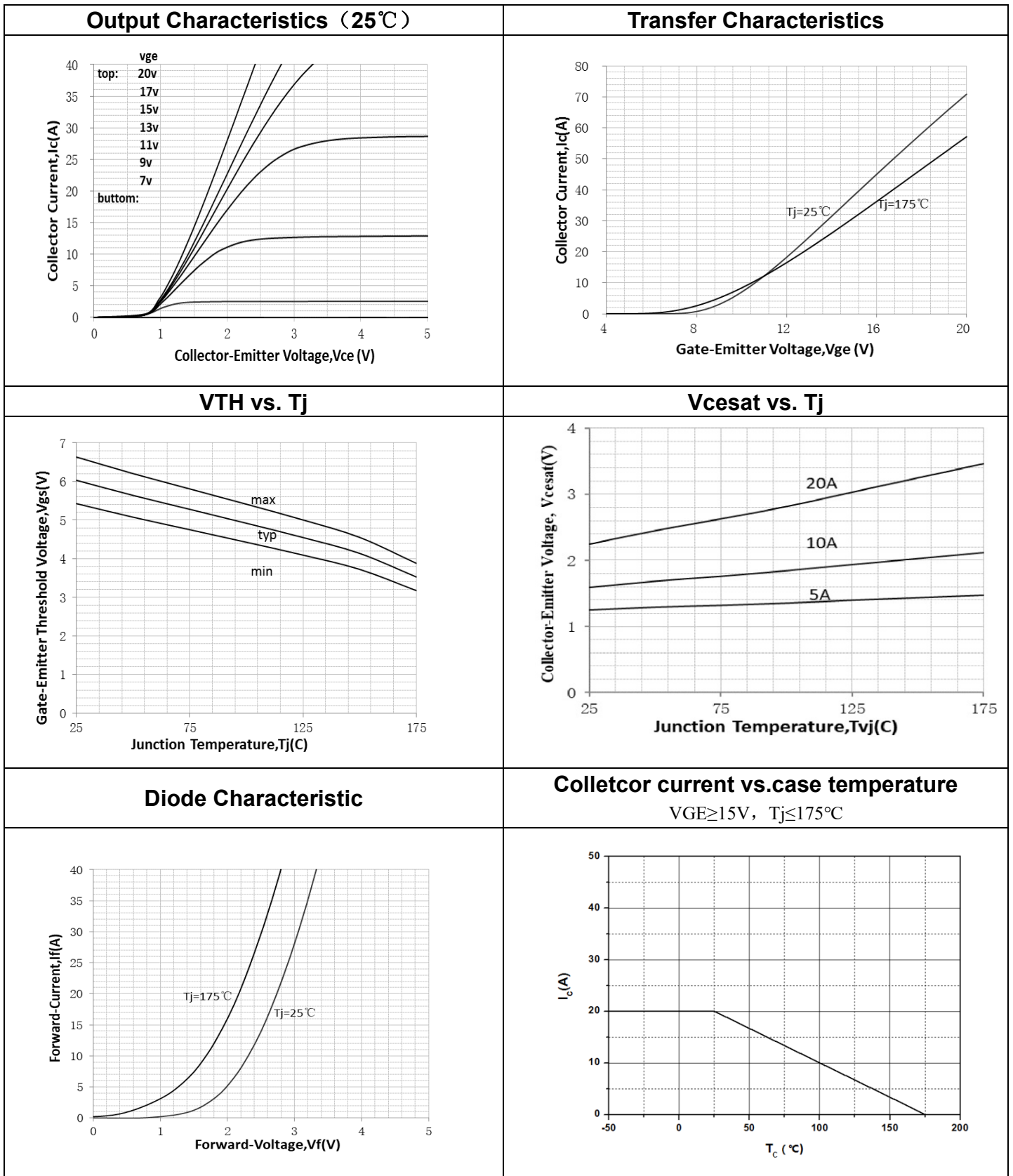
电特性 ELECTRICAL CHARACTERISTICS

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	$t_{d(on)}$	$V_{CC}=600V, I_c=10A, R_G=10\Omega$ $V_{GE}=15V, T_C=25^\circ C$	-	17.5	-	ns
上升时间 Turn-on rise time	t_r		-	18.7	-	ns
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	109	-	ns
下降时间 Turn-off Fall time	t_f		-	340	-	ns
开通损耗 Turn-on energy	E_{on}		-	0.24	-	mJ
关断损耗 Turn-off energy	E_{off}		-	0.93	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	1.17	-	mJ
开启延迟时间 Turn-on delay time	$t_{d(on)}$	$V_{CC}=600V, I_c=10A, R_G=10\Omega$ $V_{GE}=15V, T_C=175^\circ C$	-	17	-	ns
上升时间 Turn-on rise time	t_r		-	22	-	ns
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	131	-	ns
下降时间 Turn-off Fall time	t_f		-	537	-	ns
开通损耗 Turn-on energy	E_{on}		-	0.46	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.38	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	1.84	-	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	V_F	$V_{GE}=0V, I_F=10A$	-	2.4	2.8	V
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_{CE}=600V, I_F=10A,$ $di_F/dt=200A/\mu s, T_C=25^\circ C$	-	208	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q_{rr}		-	735	-	nC
反向恢复电流 Diode Reverse recovery Current	I_{RRM}		-	7.8	-	A
反向恢复能量 Diode Reverse recovery Energy	E_{rec}			0.32		mJ
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_{CE}=600V,$ $I_F=10A, di_F/dt=200A/\mu s$ $T_C=175^\circ C$	-	420	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q_{rr}		-	2898	-	nC
反向恢复电流 Diode Reverse recovery Current	I_{RRM}		-	15.6	-	A
反向恢复能量 Diode Reverse recovery Energy	E_{rec}			2.1		mJ

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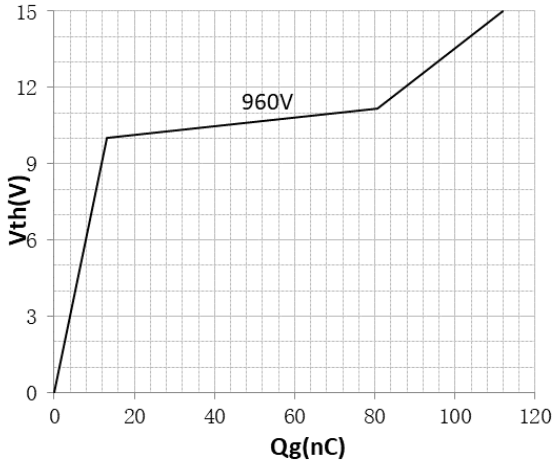
项 目 Parameter	符 号 Symbol	最大值 MAX	单 位 Unit
		TO-247	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$ IGBT	0.85	$^{\circ}\text{C}/\text{W}$
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$ FRD	2.2	$^{\circ}\text{C}/\text{W}$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	40	$^{\circ}\text{C}/\text{W}$

特征曲线 ELECTRICAL CHARACTERISTICS (curves)



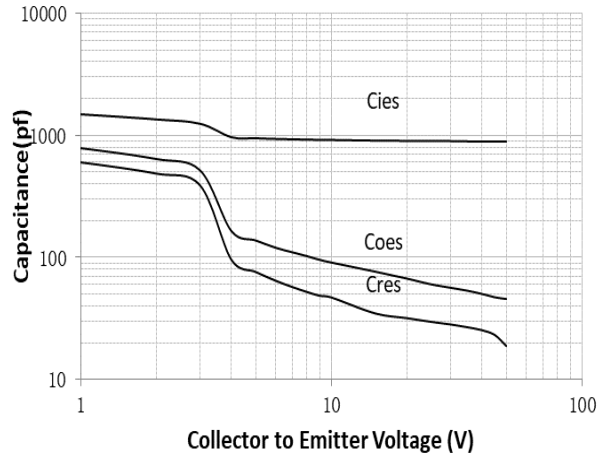
Gate Charge Characteristics

VGE=15V, IC=25A



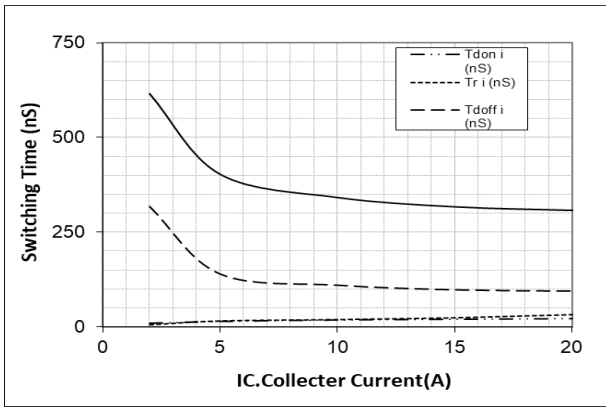
Capacitance Characteristic

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



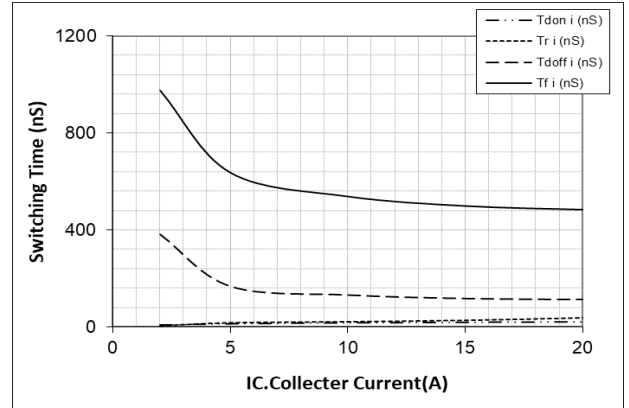
Switching Time vs. IC(25°C)

VCE=600V, VGE=15V, RG=10Ω



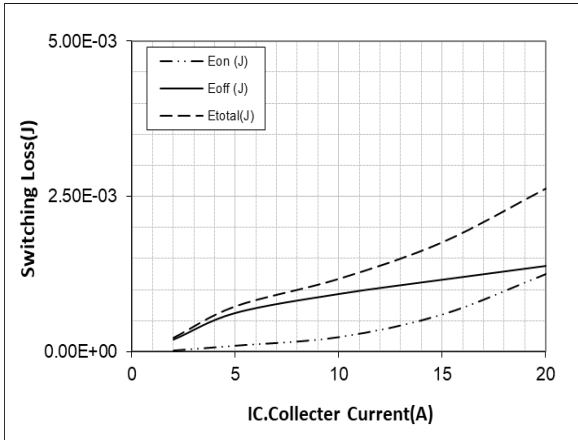
Switching Time vs. IC(175°C)

VCE=600V, VGE=15V, RG=10Ω



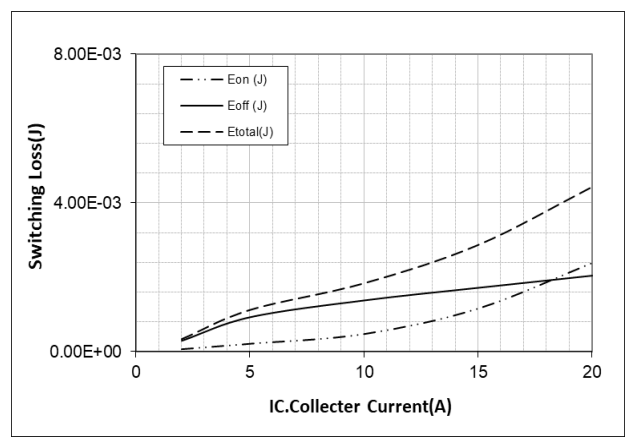
Switching Loss vs. IC(25°C)

VGE=15V, VCE=600V, Rg=10Ω

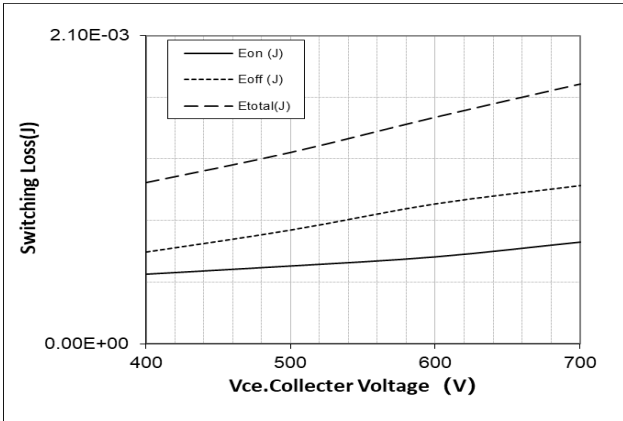


Switching Loss vs. IC(175°C)

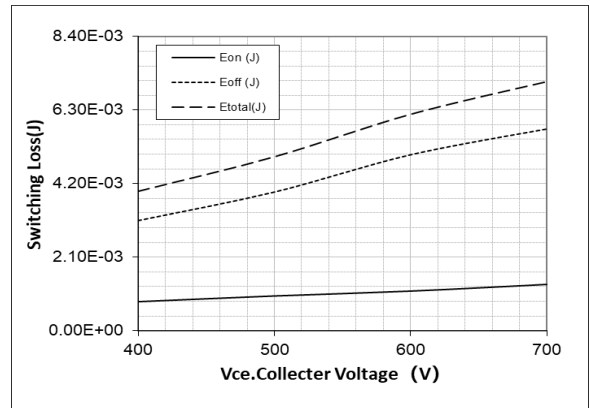
VGE=15V, VCE=600V, Rg=10Ω



Switching Loss vs. VCE(25°C)

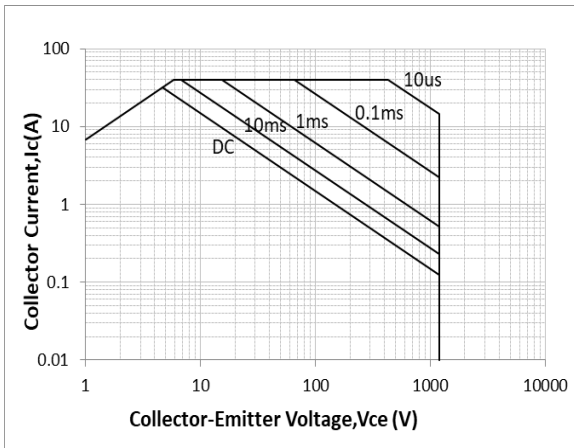


Switching Loss vs. VCE(175°C)

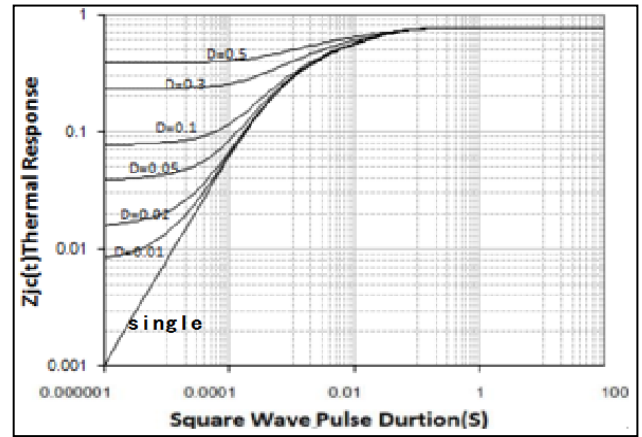


Forward Bias SOA

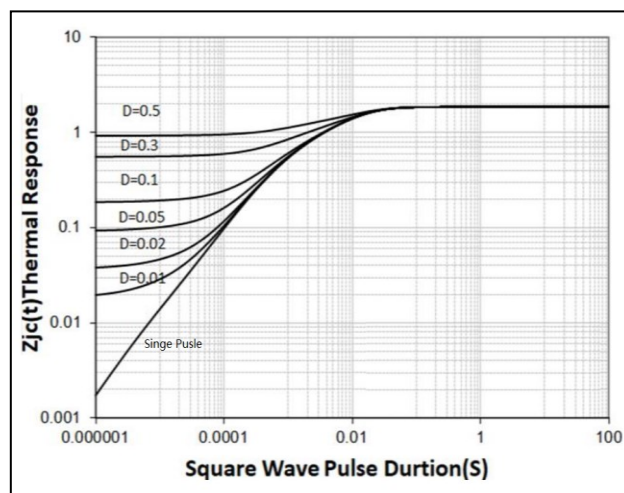
$T_c=25^\circ\text{C}$, $V_{GE}=15\text{V}$, $T_j \leq 175^\circ\text{C}$



Normalized Maximum Transient Thermal Impedance for IGBT(RJC)-TO-247



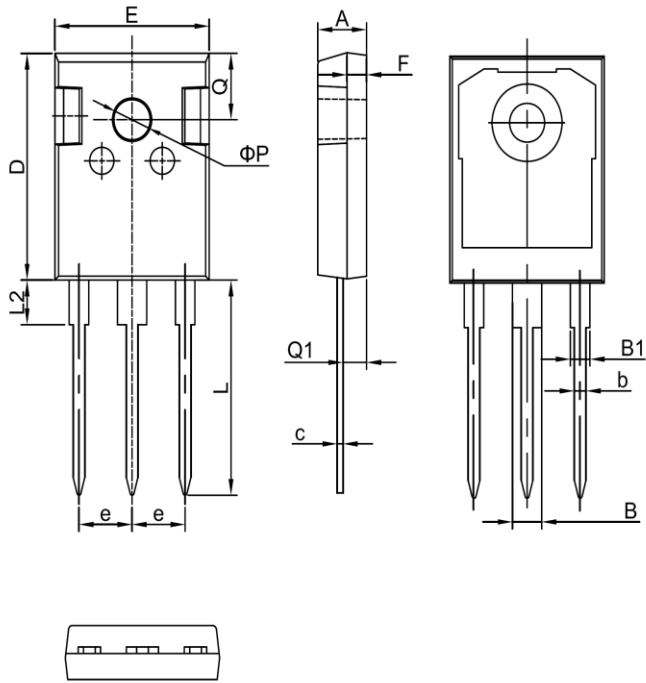
Impedance for FRD(RJC) -TO-247



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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