



TT040U065EQ

主要参数 MAIN CHARACTERISTICS

Ic	40 A
Vces	650V
Vcesat-typ (Vge=15V)	2. 0V

用途

- 逆变器
- UPS 电源
- PFC

APPLICATIONS

- General purpose inverters
- UPS
- PFC

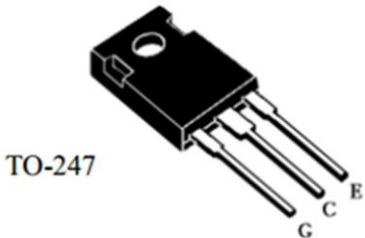
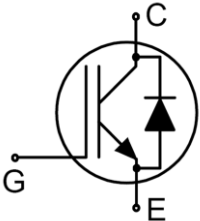
产品特性

- 低栅极电荷
- Trench FS 技术,
- RoHS 产品

FEATURES

- Low gate charge
- Trench FS Technology,
- RoHS product

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		
TT040U065EQ-GE-B	TT040U065EQ-GE-BR	N/A	N/A	TT040U065EQ	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
		TT040U065EQ	
最高集电极—发射极直流电压 Collector-Emmitter Voltage	V_{CES}	650	V
*连续集电极电流 Collector Current-continuous	I_C	80($T_C=25^{\circ}\text{C}$)	A
		40($T_C=100^{\circ}\text{C}$)	A
最大脉冲集电极极电流 (注 1) Collector Current – pulse (note 1)	I_{CM}	160	A
二极管正向测试电流 Diode RMS forward current	I_F	80($T_C=25^{\circ}\text{C}$)	A
		40($T_C=100^{\circ}\text{C}$)	A
二极管正向脉冲电流 Diode pulse current	I_{FSM}	160	A
最高栅极发射极电压 Gate-Emmitter Voltage	V_{GES}	± 20	V
Turn-off safe area	-	160	A
耗散功率 Power Dissipation	P_D $T_C=25^{\circ}\text{C}$	340	W
存储温度 Storage Temperature Range	T_{STG}	$-55\sim+150$	$^{\circ}\text{C}$
结温 Junction Temperature Range	T_J	$-55\sim+175$	$^{\circ}\text{C}$
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T_L	300	$^{\circ}\text{C}$

*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-Emmitter Voltage	BV_{CES}	$I_C=250\mu A, V_{GE}=0V$	650	-	-	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}	$V_{CE}=650V, V_{GE}=0V, T_C=25^\circ C$	-	-	40	μA
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	-	6.5	V
饱和压降 Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=40A$ $T_C=25^\circ C$ $T_C=175^\circ C$	- -	2.0 2.5	2.5 -	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V,$ $V_{GE}=0V,$ $f=1.0MHz$	-	2392	-	pF
输出电容 Output capacitance	C_{oes}		-	193	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	64.5	-	pF
栅极电荷总量 Total Gate Charge	Q_g	$V_{CC}=480V, I_C=40A, R_G=10\Omega, V_{GE}=15V$ $T_C=25^\circ C$	-	79.2	-	nC
栅极-发射极 Gate to emitter charge	Q_{ge}		-	24.6	-	
栅极-集电极 Gate to collector charge	Q_{gc}		-	34.1	-	





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	$t_{d(on)}$	$V_{CC}=400V, I_c=40A, R_G=10\Omega$ $V_{GE}=15V$ $T_C=25^\circ C$	-	26		ns
上升时间 Turn-On rise time	t_r		-	86	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	68	-	ns
下降时间 Turn-Off Fall time	t_f		-	54	-	ns
开通损耗 Turn-On energy	E_{on}		-	1.1	-	mJ
关断损耗 Turn-off energy	E_{off}		-	0.68	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	1.78	-	mJ
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=40A, R_G=10\Omega$ $V_{GE}=15V$ $T_C=175^\circ C$	-	24	-	ns
上升时间 Turn-On rise time	t_r		-	80	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	84	-	ns
下降时间 Turn-Off Fall time	t_f		-	74	-	ns
开通损耗 Turn-On energy	E_{on}		-	1.13	-	mJ
关断损耗 Turn-off energy	E_{off}		-	0.96	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	2.09	-	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	$V_{GE}=0V, I_F=40A, T_C=25^\circ C$	-	1.8	2.2	V
		$V_{GE}=0V, I_F=40A, T_C=175^\circ C$	-	1.6	-	V
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=400V, I_F=40A$	-	140	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q_{rr}	$dI_F/dt=200A/\mu s$	-	0.23	-	uC
反向恢复电流 Diode Reverse recovery Current	I_{RRM}	$T_C=25^\circ C$	-	2.6	-	A
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=400V, I_F=40A$	-	308	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q_{rr}	$dI_F/dt=200A/\mu s$	-	1.4	-	uC
反向恢复电流 Diode Reverse recovery Current	I_{RRM}	$T_C=175^\circ C$	-	7.0	-	A

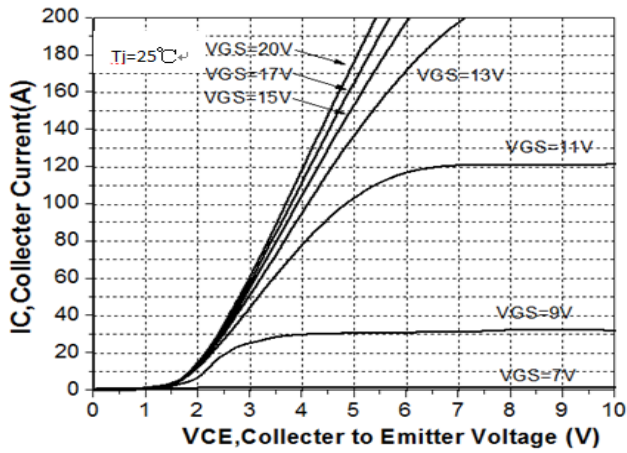
项 目 Parameter	符 号 Symbol	MAX	单 位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case IGBT	$R_{th(j-c)}$	0.44	$^\circ C/W$
结到管壳的热阻 Thermal Resistance, Junction to Case diode	$R_{th(j-c)}$	0.9	$^\circ C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	40	$^\circ C/W$



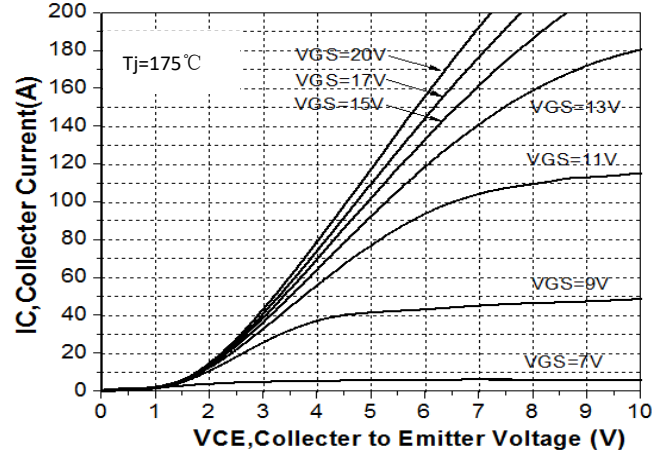
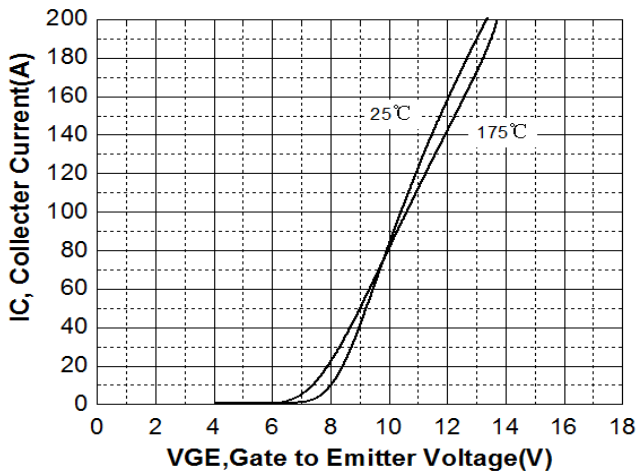


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

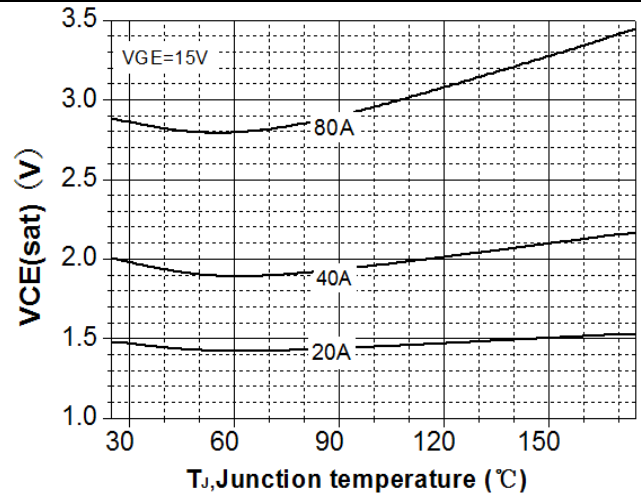
Output Characteristics (25°C)



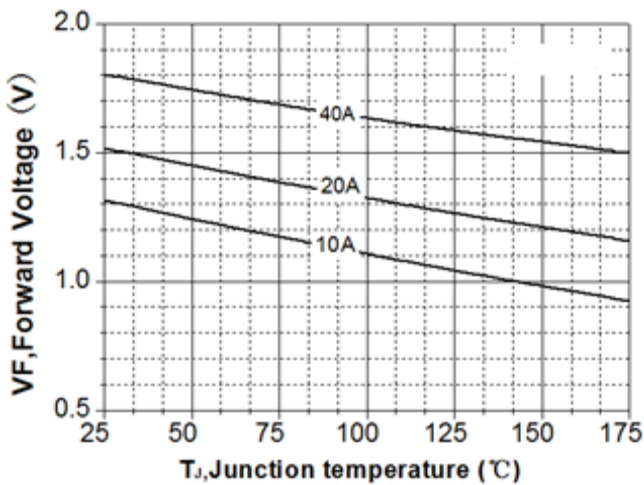
Output Characteristics (175°C)

Transfer Characteristics
VCE=20V

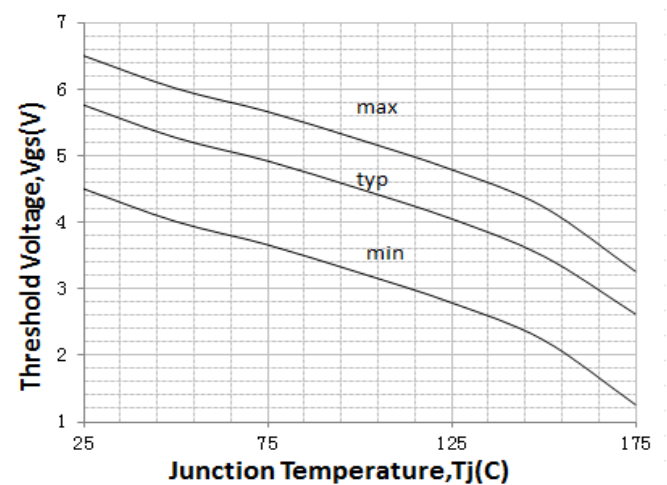
Vcesat vs. Tj

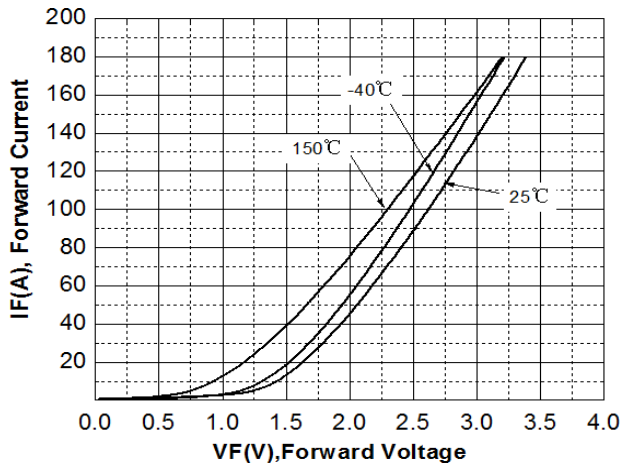
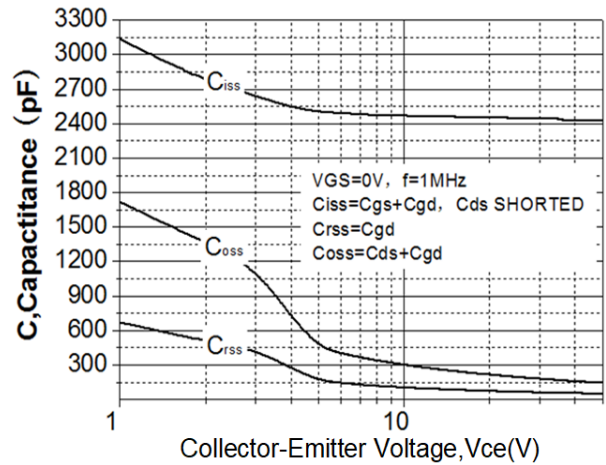
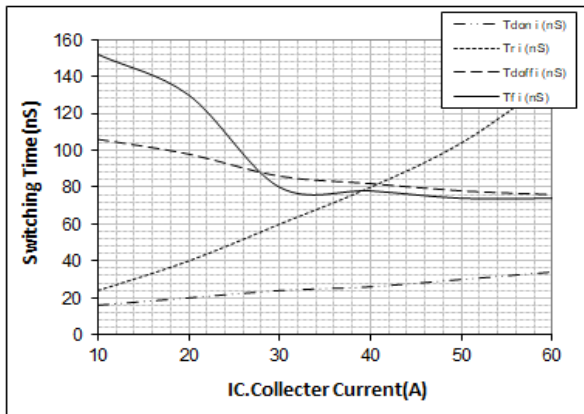
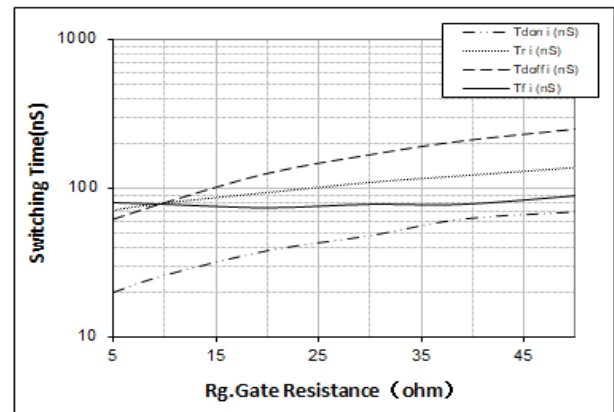
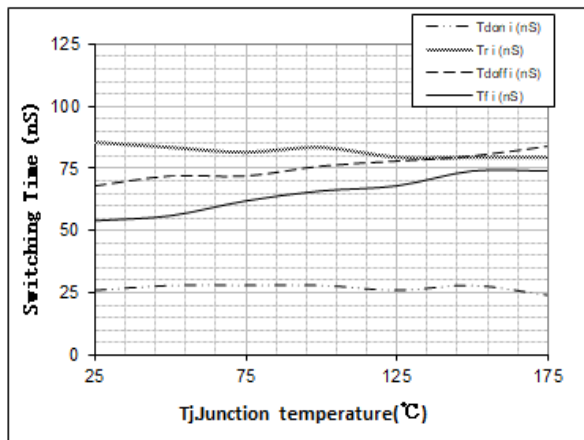
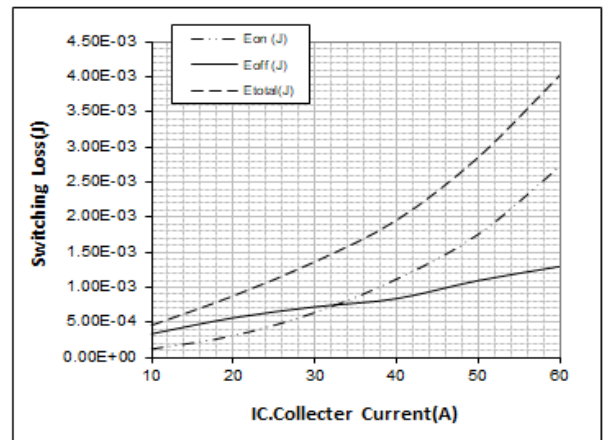


VF vs. Tj



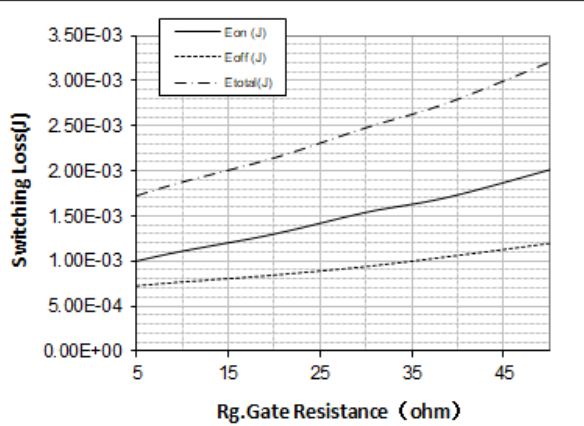
VTH vs. Tj



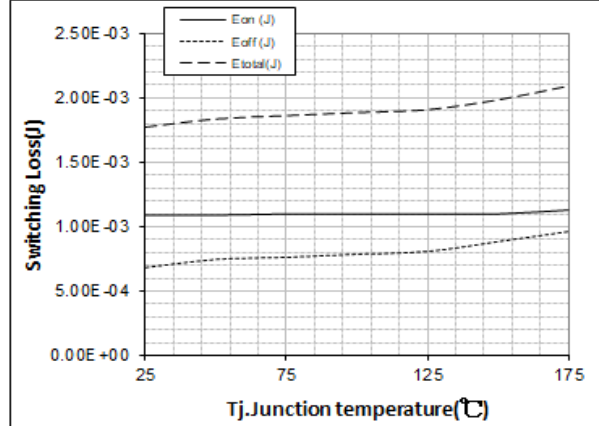
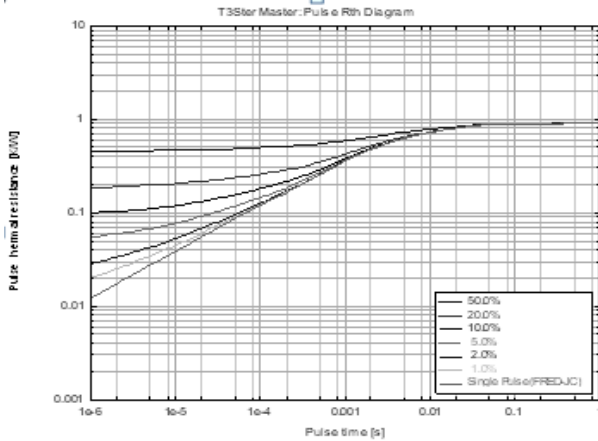
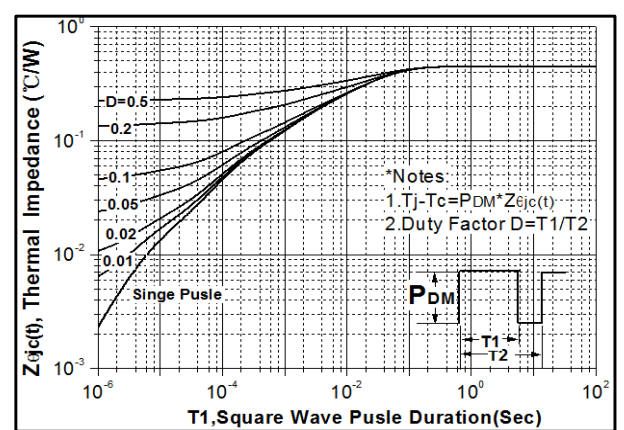
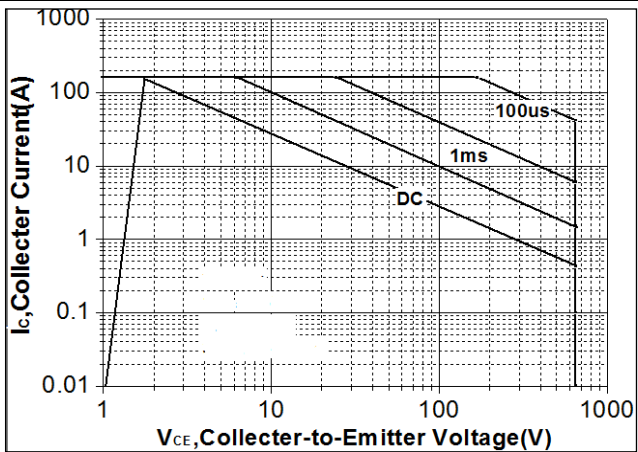
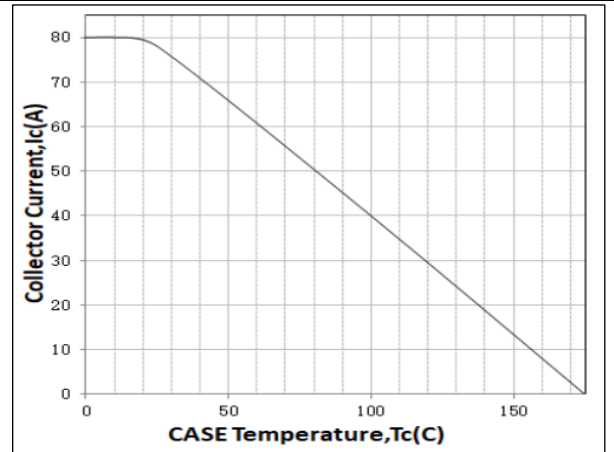
**Diode Characteristic****Capacitance Characteristic** $V_{GE} = 0\text{V}$, $f = 1.0\text{MHz}$ **Switching Time vs. I_C (175°C)** $V_{GE} = 15\text{V}$, $V_{CE} = 400\text{V}$, $R_g = 10\Omega$ **Switching Time vs. R_g (175°C)** $V_{GE} = 15\text{V}$, $V_{CE} = 400\text{V}$, $I_C = 40\text{A}$ **Switching Time vs. T_j** $V_{GE} = 15\text{V}$, $V_{CE} = 400\text{V}$, $I_C = 40\text{A}$, $R_g = 10\Omega$ **Switching Loss vs. I_C (175°C)** $V_{GE} = 15\text{V}$, $V_{CE} = 400\text{V}$, $R_g = 10\Omega$ 

**Switching Loss vs. Rg(175°C)**

VGE=15V, VCE=400V, IC=40A

**Switching Loss vs. Tj**

VGE=15V, VCE=400V, IC=40A, Rg=10Ω

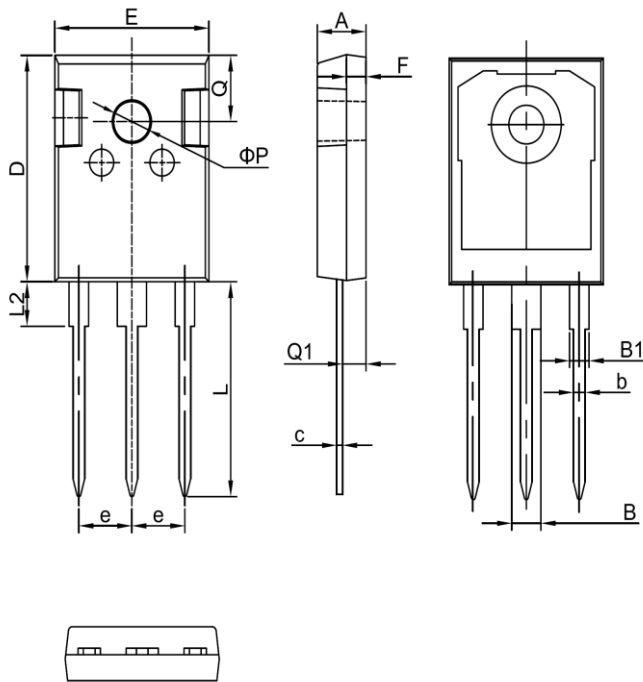
**Transient Thermal Impedance for Diode****Transient Thermal Impedance for IGBT****Forward Bias SOA****Ic vs. Tc**



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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