



TT040K120EQ

主要参数 MAIN CHARACTERISTICS

Ic	40 A
VCES	1200V
Vcesat-typ(Vge=15V)	1.8V

用途

- 逆变器
- UPS 电源

APPLICATIONS

- General purpose inverters
- UPS

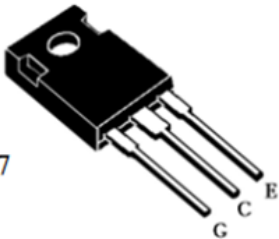
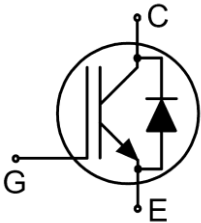
产品特性

- 低栅极电荷
- Trench FS 技术,
- 通态压降, Vce(sat), typ = 1.8V Ic = 40A and Tc = 25°C
- RoHS 产品

FEATURES

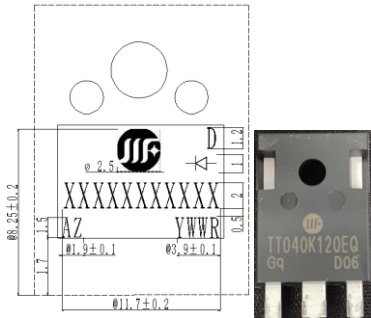
- Low gate charge
- Trench FS Technology,
- saturation voltage: Vce(sat), typ = 1.8V Ic = 40A and TC = 25°C
- RoHS product

封装 Package



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)+R (无卤标记)

产品型号说明: 产品类型+工艺平台+参数规格+工艺版本+特殊特性+预留代码

订货信息 ORDER MESSAGE

订 货 型 号 Order codes		印 记 Marking	封 装 Package
无卤-条管 Halogen-Free-Tube	无卤-编带 Halogen-Free-Reel		
TT040K120EQ-GE-BR	N/A	TT040K120EQ	T0-247



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}	1200	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
二极管正向不重复峰值电流 (浪涌电流) Surge non repetitive forward current $t_p=10\text{ ms}$ sinusoidal	I_{FSM}	160	A
栅极发射极电压 Gate-Emmitter Voltage	V_{GES}	± 20	V
瞬态栅极发射极电压 Transient Gate-emitter voltage($t_p \leq 10\mu\text{s}$, $D < 0.010$)	V_{GES}	± 25	V
安全工作区 Turn-off safe area	-	160	A
耗散功率 Power Dissipation	P_D $T_c=25^{\circ}\text{C}$	496	W
存储温度 Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$
结温 Junction Temperature Range	T_J	$-55 \sim +150$	$^{\circ}\text{C}$
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 =250μA, V _{GE} =0V	1200	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBV _{CES} /ΔT _J	I _C =0.5mA, referenced to 25℃	-	0.6	-	V/℃
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℃	-	-	0.2	mA
		V _{CE} =1200V, V _{GE} =0V, T _C =175℃	-	-	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 =250μA	4.5	-	6.5	V
饱和压降 Collector-Emmitter saturation Voltage	V _{CESAT}	V _{GE} =15V I _C =40A T _C =25℃	-	1.8	2.2	V
		V _{GE} =15V I _C =40A T _C =175℃	-	2.4	-	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C _{ies}	V _{CE} =25V, V _{GE} =0V, f=1.0MHz	4200	4604	5000	pF
输出电容 Output capacitance	C _{oes}		150	200	250	pF
反向传输电容 Reverse transfer capacitance	C _{res}		40	49	60	pF
栅极电荷总量 Total Gate Charge	Q _g	V _{CC} =960V,I _C =40A, V _{GE} =15 V T _C =25℃	150	165	180	nC
栅极-发射极电荷 Gate to emitter charge	Q _{ge}		-	46	-	
栅极-集电极电荷 Gate to collector charge	Q _{gc}		-	69	-	
栅极电阻-Gate resistance	R _g	f=1 MHz, open collector	1.2	2.6	7.5	Ω
短路电流-short current	I _{sc}	V _{GE} =15V V _{CE} =600V t _{sc} < 10μs	-	260	-	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 =40A,R _G =12Ω V _{GE} =15 V, Parasitic ductance=75nH T _C =25℃	48.8	59	74.8	ns
上升时间 Turn-On rise time	t _r		83.7	99	116.6	ns
关断延迟时间 Turn-Off delay time	t _{d(off)}		155.7	193	231	ns
下降时间 Turn-Off Fall time	t _f		108.9	196	277.2	ns
开通损耗 Turn-On energy	E _{on}		1.77	2.03	2.31	mJ
关断损耗 Turn-off energy	E _{off}		1.67	2.21	2.80	mJ
总开关损耗 Total switching energy	E _{tot}		3.52	4.25	5.01	mJ
开启延迟时间 Turn-On delay time	t _{d(on)}	V _{CC} =600V,I _c =40A,R _G =12Ω V _{GE} =15 V, Parasitic ductance=75nH T _C =175℃	44.1	55	66	ns
上升时间 Turn-On rise time	t _r		81	100	121	ns
关断延迟时间 Turn-Off delay time	t _{d(off)}		194.4	236	286	ns
下降时间 Turn-Off Fall time	t _f		272.7	358	479.6	ns
开通损耗 Turn-On energy	E _{on}		1.93	2.24	2.6	mJ
关断损耗 Turn-off energy	E _{off}		2.8	3.50	4.47	mJ
总开关损耗 Total switching energy	E _{tot}		4.8	5.74	6.95	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 _S =40A, T _C =25℃	-	1.81	2.7	V
		V _{GE} =0V, I _S =40A, T _C =175℃	-	1.45	-	V
反向恢复时间 Diode Reverse recovery time	t _{rr}	V _{GE} =0V, V _R =600V I _F =40A dl _F /dt=200A/μs T _C =25℃	-	264	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q _{rr}		-	1548	-	nC
反向恢复电流 Diode Reverse recovery Current	I _{RRM}		-	9	-	A
反向恢复时间 Diode Reverse recovery time	t _{rr}	V _{GE} =0V, V _R =600V I _F =40A dl _F /dt=200A/μs T _C =175℃	-	538	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q _{rr}		-	7309	-	nC
反向恢复电流 Diode Reverse recovery Current	I _{RRM}		-	24	-	A





TT040K120EQ

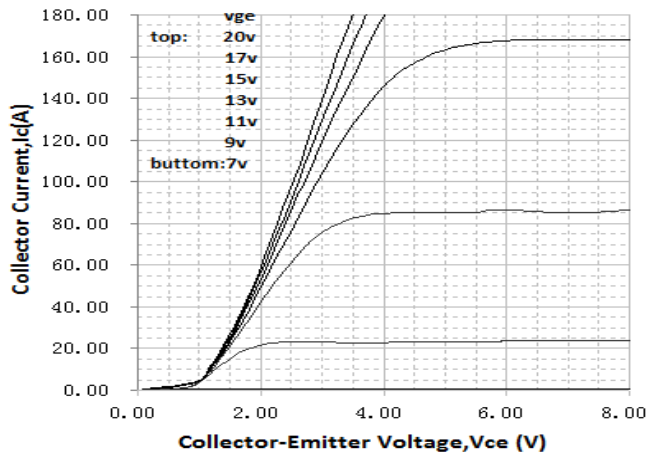
项 目 Parameter	符 号 Symbol	典型 Typ	最大值 MAX	单 位
		TT040K120EQ		Unit
结到管壳的热阻 IGBT Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.185	0.252	°C/W
结到管壳的热阻 FRD Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.476	0.612	°C/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$		40.0	°C/W



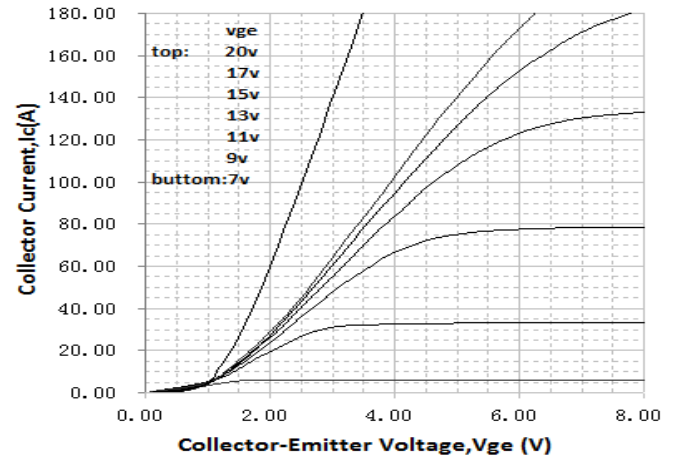


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

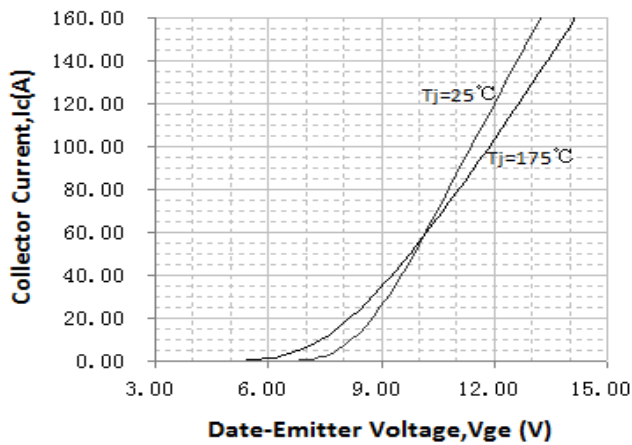
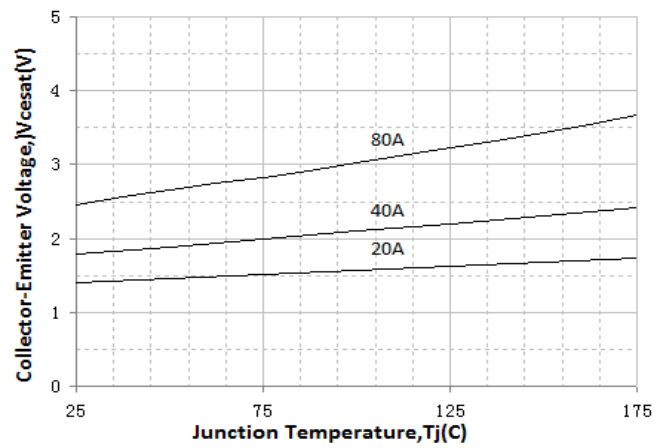
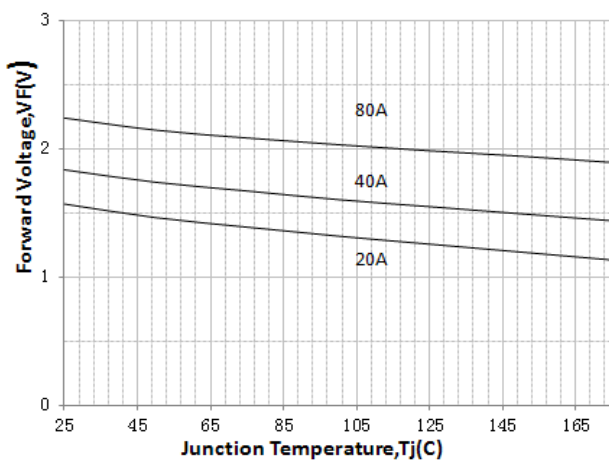
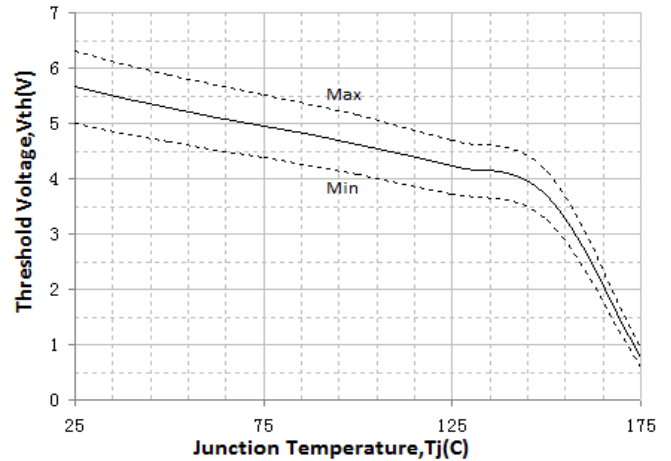
Output Characteristics (25°C)



Output Characteristics (175°C)



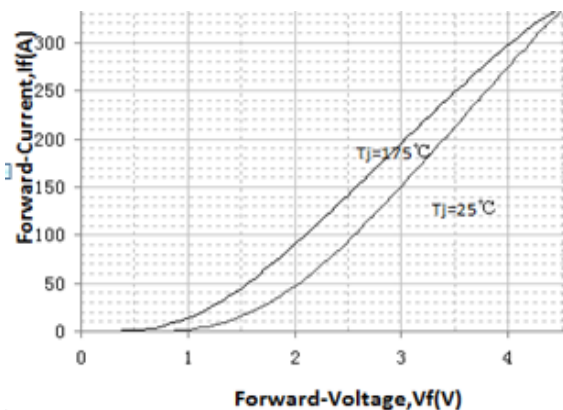
Transfer Characteristics

 V_{cesat} vs. T_j  V_F vs. T_j  V_{th} vs. T_j 

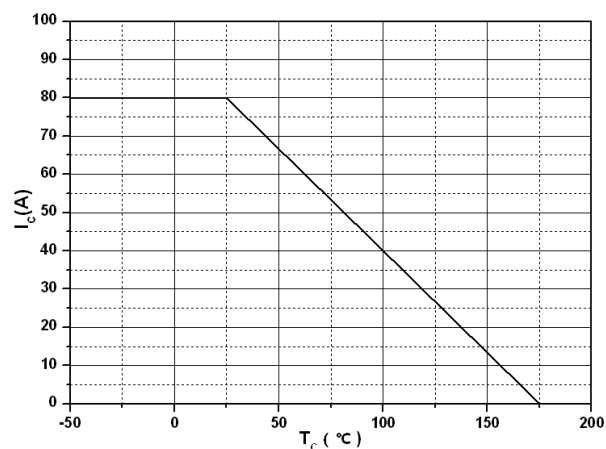


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

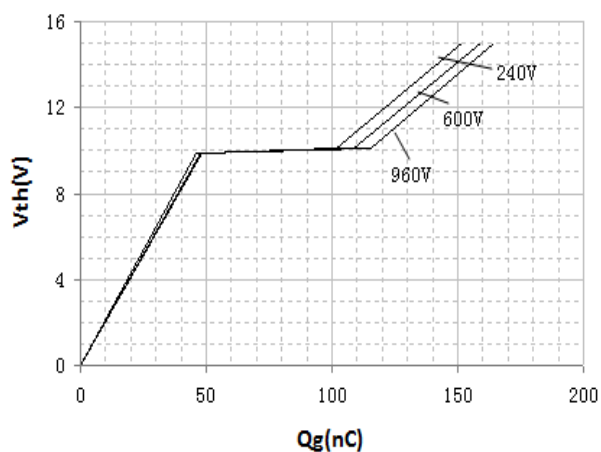
Diode Characteristic



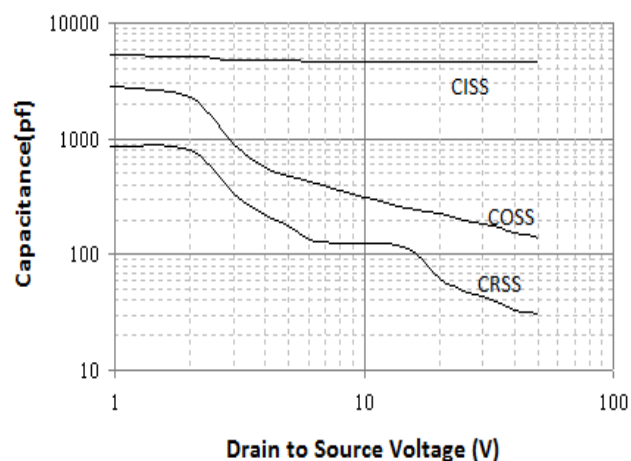
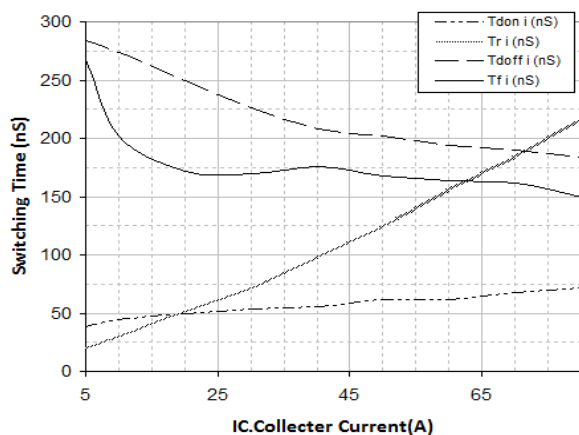
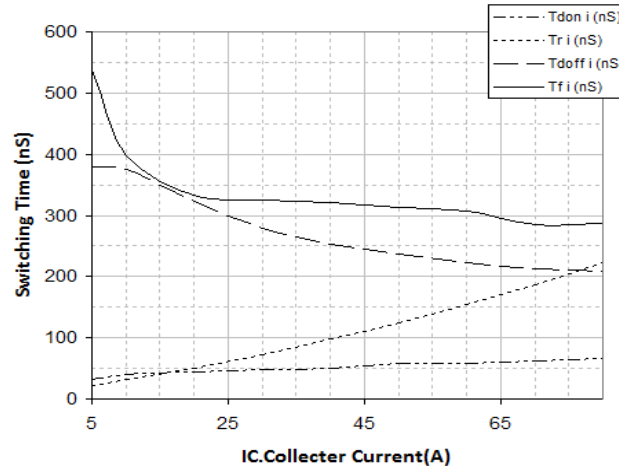
Collector current vs.case temperature

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

Gate Charge Characteristics

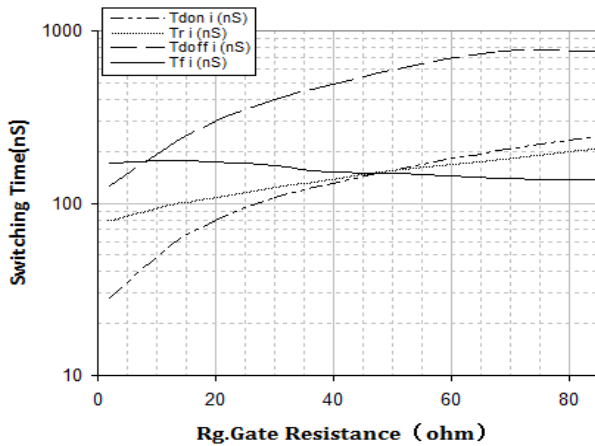
 $V_{GE} = 15\text{V}$, $I_c = 40\text{A}$ 

Capacitance Characteristic

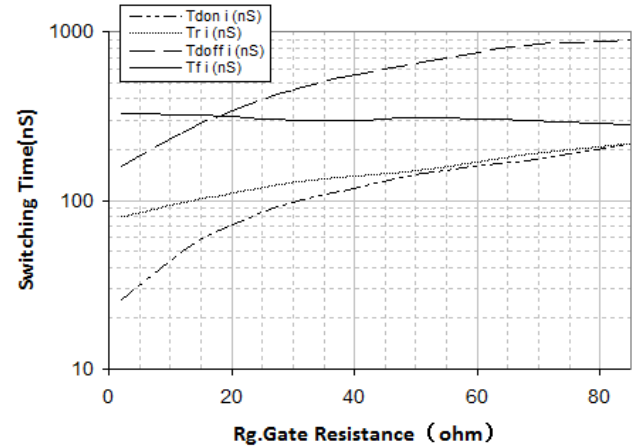
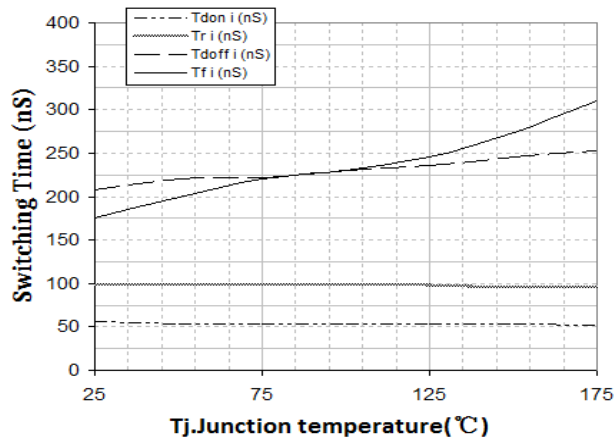
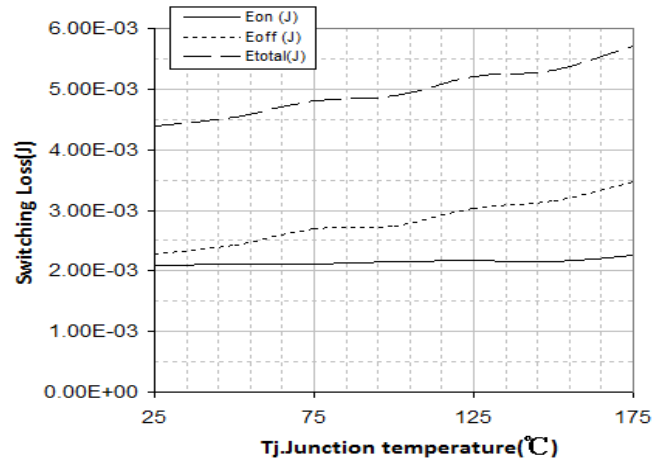
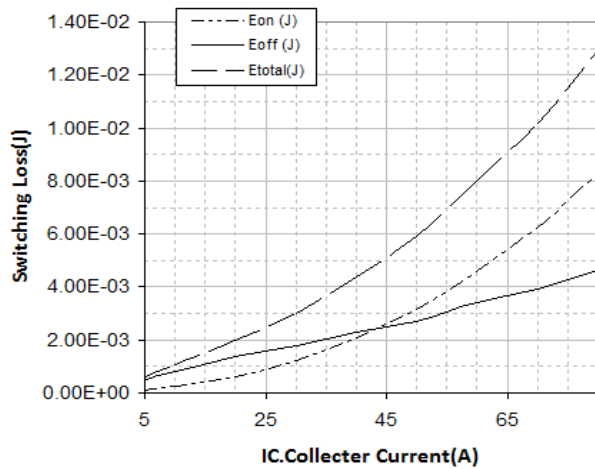
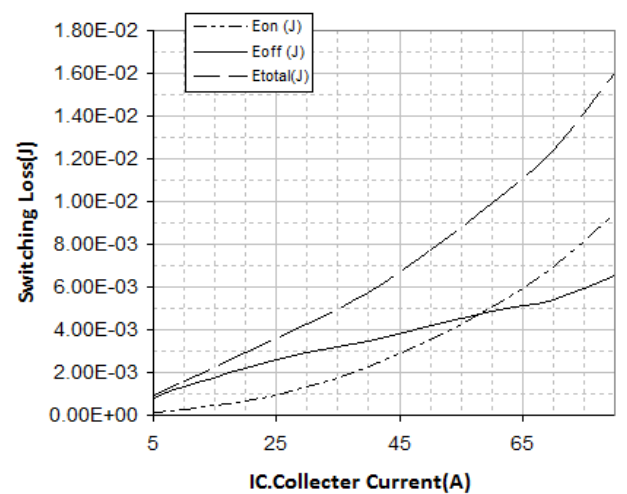
 $V_{ce} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1.0\text{MHz}$ Switching Time vs. I_c (25 $^\circ\text{C}$)Switching Time vs. I_c (175 $^\circ\text{C}$)

**Switching Time vs. $R_g(25^{\circ}\text{C})$**

VGE=15V, VCE=600V, IC=40A

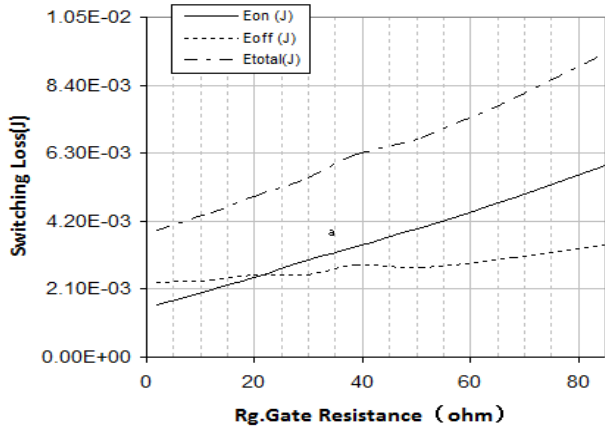
**Switching Time vs. $R_g(175^{\circ}\text{C})$**

VGE=15V, VCE=600V, IC=40A

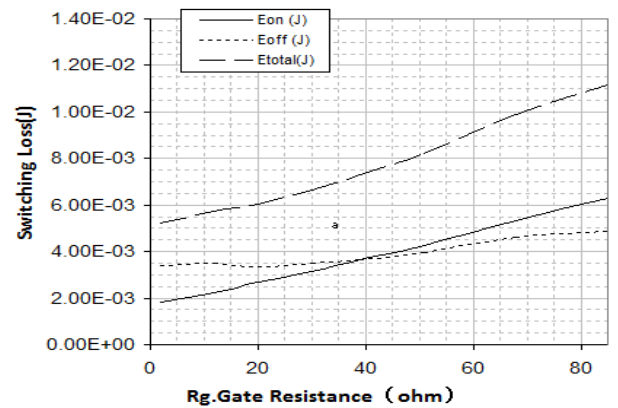
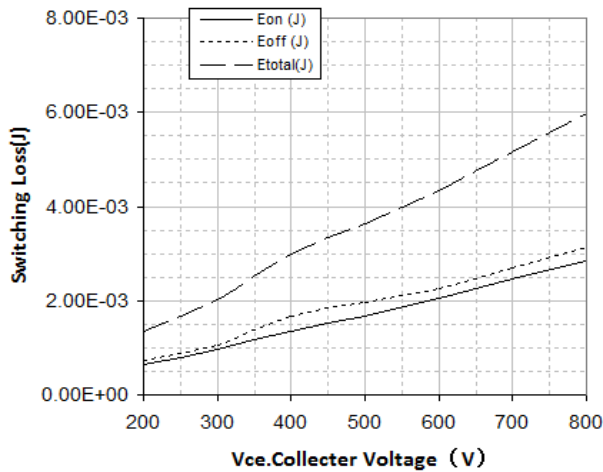
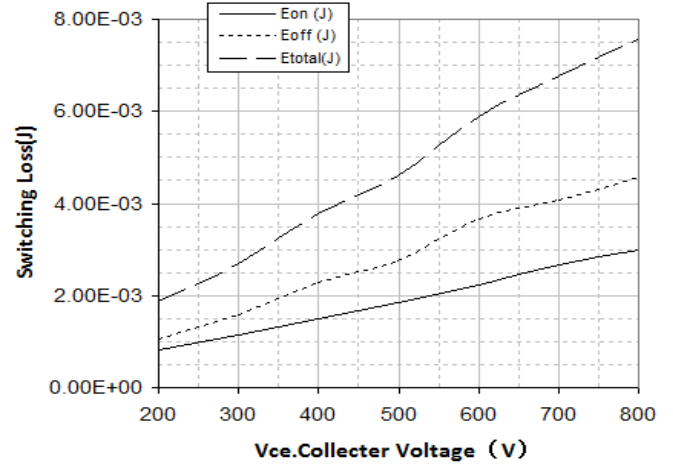
**Switching Time vs. T_j** VGE=15V, VCE=600V, IC=40A, $R_g=12\Omega$ **Switching Loss vs. T_j** VGE=15V, VCE=600V, IC=40A, $R_g=12\Omega$ **Switching Loss vs. IC(25°C)**VGE=15V, VCE=600V, $R_g=12\Omega$ **Switching Loss vs. IC(175°C)**VGE=15V, VCE=600V, $R_g=12\Omega$ 

Switching Loss vs. $R_g(25^{\circ}\text{C})$

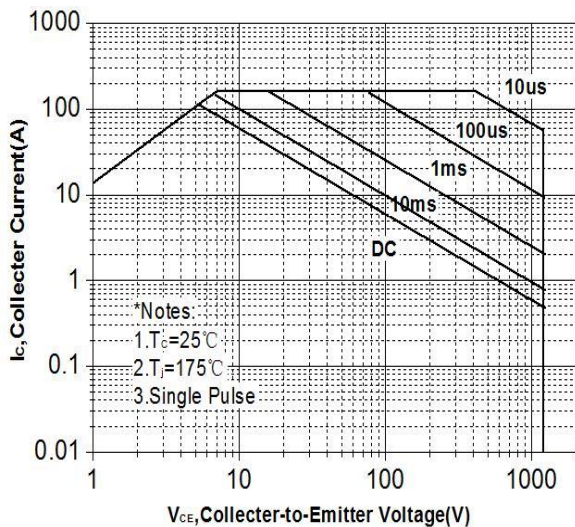
VGE=15V, VCE=600V, IC=40A

Switching Loss vs. $R_g(175^{\circ}\text{C})$

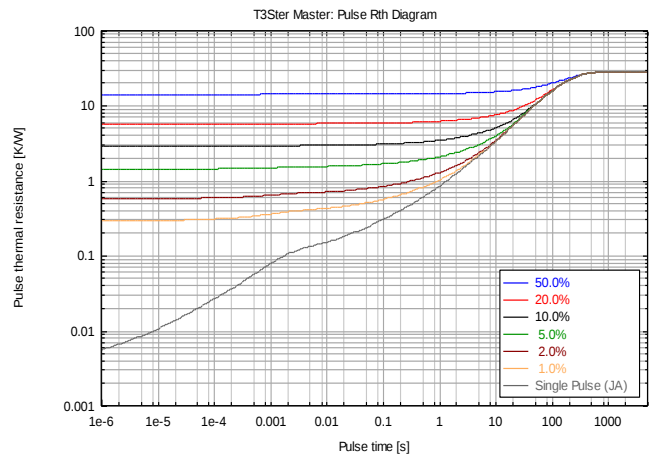
VGE=15V, VCE=600V, IC=40A

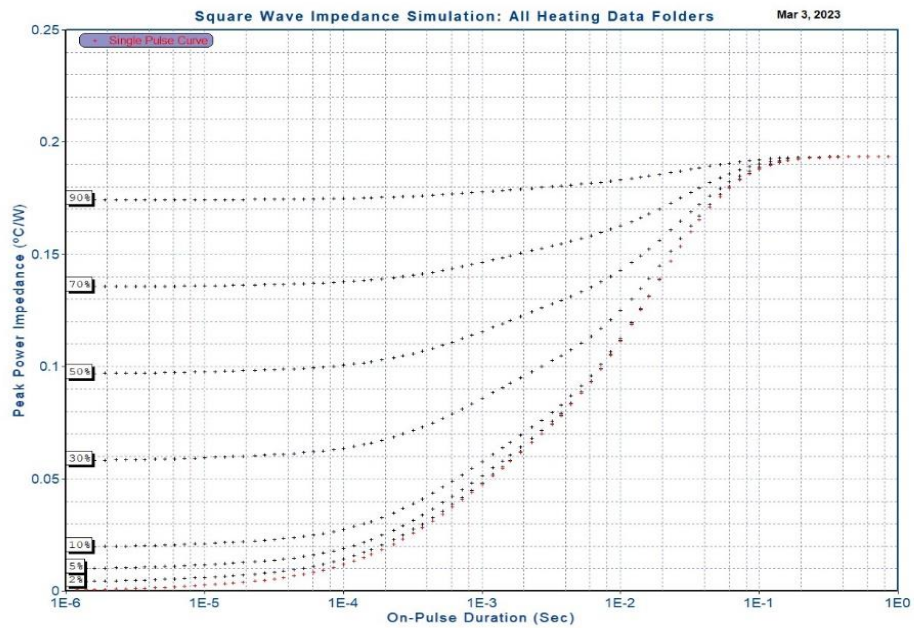
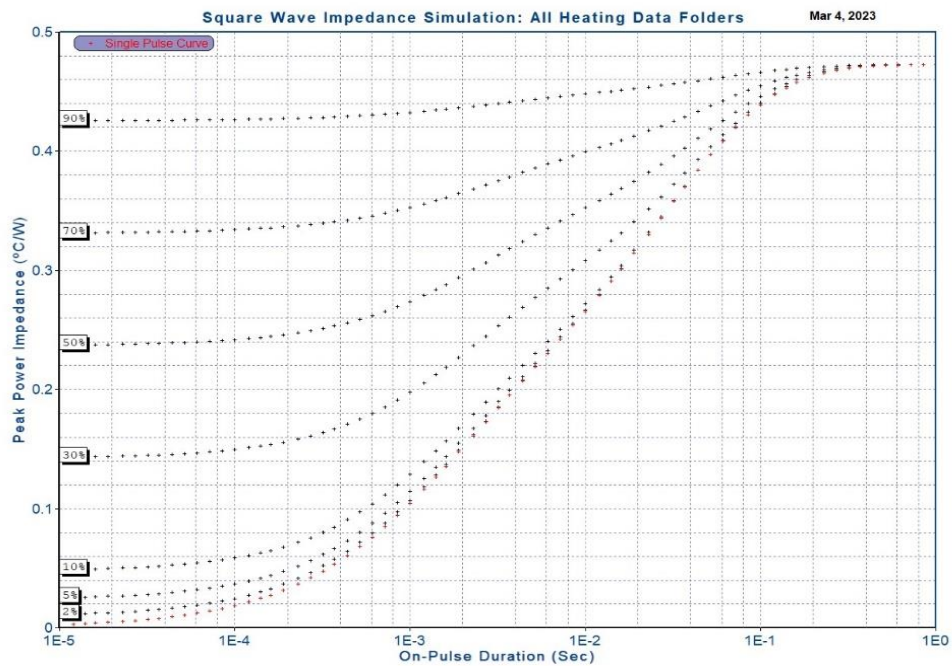
Switching Loss vs. VCE(25°C)VGE=15V, IC=40A, $R_g=12\ \Omega$ Switching Loss vs. VCE(175°C)VGE=15V, IC=40A, $R_g=12\ \Omega$ 

Forward Bias SOA

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

Normalized Maximum Transient Thermal Impedance for IGBT(RJA)

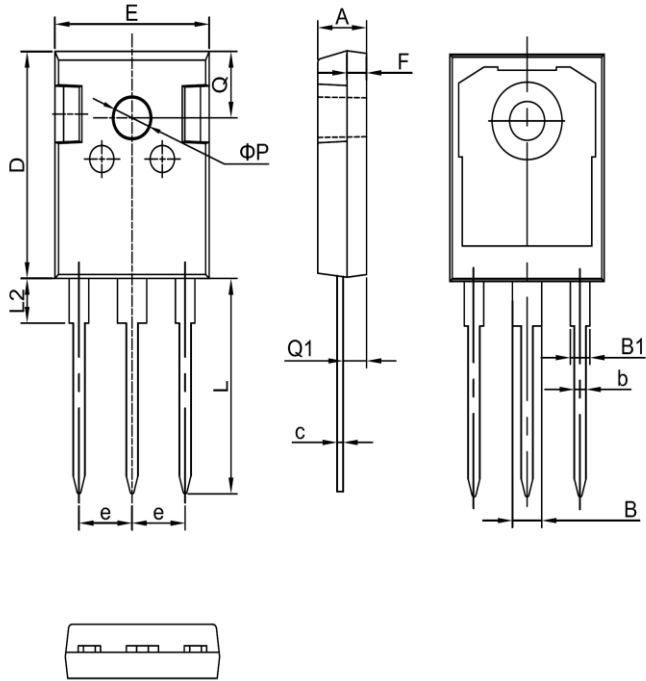


**Normalized TYP Transient Thermal Impedance for IGBT(RJC)****Normalized TYP Transient Thermal Impedance for FRD(RJC)**



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





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.

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

