



TT015N060EQ

主要参数 MAIN CHARACTERISTICS

I _C	15 A
V _{CES}	600V
V _{cesat-typ} (V _{ge} =15V)	1.8V

用途

- 逆变器
- 电机控制

APPLICATIONS

- General purpose inverters
- Motor Control

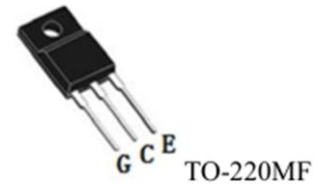
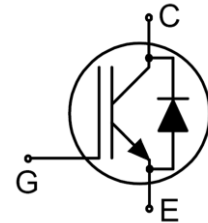
产品特性

- 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		
TT015N060EQ-F-B	TT015N060EQ-F-BR	N/A	N/A	TT015N060EQ	TO-220MF

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}	600	V
*连续集电极电流 Collector Current-continuous	I_C $T=25^\circ\text{C}$	30	A
	I_C $T=100^\circ\text{C}$	15	A
最大脉冲集电极极电流 (注1) Collector Current – pulse (note 1)	I_{CM}	45	A
二极管正向测试电流 Diode RMS forward current	I_F $T=25^\circ\text{C}$	30	A
	I_F $T=100^\circ\text{C}$	15	A
二极管正向脉冲电流 Diode pulse current	I_{FSM}	45	A
最高栅极发射极电压 Gate-Emmitter Voltage	V_{GES}	± 20	V
安全工作区 Turn-off safe area	-	45	A
耗散功率 Power Dissipation	P_D $T_c=25^\circ\text{C}$	36.7	W
最高结温及存储温度 Operating and Storage Temperature Range	T_J, 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	$^\circ\text{C}$

*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}	$I_C=250\mu A, V_{GE}=0V$	600	-	-	V
零栅压下集电极漏电流 Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=600V, V_{GE}=0V$	-	-	25	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}	$V_{GE}=15V, I_C=15A, T_C=25^\circ C$	-	1.8	2.2	V
		$V_{GE}=15V, I_C=15A, T_C=150^\circ C$	-	2.1	-	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz$	-	652	-	pF
输出电容 Output capacitance	C_{oes}		-	64	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	23	-	pF
栅极电荷总量 Total Gate Charge	Q_g	$V_{CC}=400V, I_C=15A, V_{GE}=15V, T_C=25^\circ C$	-	24.8	-	nC
栅极-反射极 Gate to emitter charge	Q_{ge}		-	9.2	-	
栅极-集电极 Gate to collector charge	Q_{gc}		-	10.4	-	

项 目 Parameter	符 号 Symbol	MAX	单 位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case IGBT	$R_{th(j-c)}$	3.4	$^\circ C/W$
结到管壳的热阻 Thermal Resistance, Junction to Case diode	$R_{th(j-c)}$	4.5	$^\circ C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	62.5	$^\circ C/W$



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	$t_{d(on)}$	$V_{CC}=400V, I_C=15A, R_G=10\Omega$ $V_{GE}=15V, T_C=25^\circ C$	-	4	-	ns
上升时间 Turn-On rise time	t_r		-	26	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	26	-	ns
下降时间 Turn-Off Fall time	t_f		-	80	-	ns
开通损耗 Turn-On energy	Eon		-	0.18	-	mJ
关断损耗 Turn-off energy	Eoff		-	0.27	-	mJ
总开关损耗 Total switching energy	Etot		-	0.45	-	mJ
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V, I_C=15A, R_G=10\Omega$ $V_{GE}=15V, T_C=150^\circ C$	-	6	-	ns
上升时间 Turn-On rise time	t_r		-	28	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	28	-	ns
下降时间 Turn-Off Fall time	t_f		-	134	-	ns
开通损耗 Turn-On energy	Eon		-	0.2	-	mJ
关断损耗 Turn-off energy	Eoff		-	0.4	-	mJ
总开关损耗 Total switching energy	Etot		-	0.6	-	mJ

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

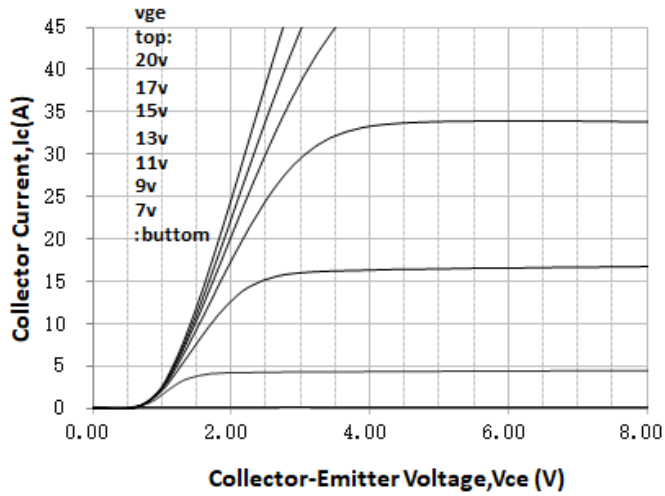
正向压降 Drain-Source Diode Forward Voltage	V_F	$V_{GE}=0V, I_F=15A, T_C=25^\circ C$	-	1.8	2.1	V
		$V_{GE}=0V, I_F=15A, T_C=150^\circ C$	-	1.6	-	V
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=400V, I_F=15A$ $dl_F/dt=200A/\mu s$ $T_C=25^\circ C$	-	40	-	ns
反向恢复电荷 Diode Reverse recovery charge	Qrr		-	22	-	nC
反向恢复电流 Diode Reverse recovery Current	I_{RRM}		-	0.98	-	A
反向恢复时间 Diode Reverse recovery time	t_{rr}		$V_{GE}=0V, V_R=400V, I_F=15A$ $dl_F/dt=200A/\mu s$ $T_C=150^\circ C$	-	182	-
反向恢复电荷 Diode Reverse recovery charge	Qrr	-		256	-	nC
反向恢复电流 Diode Reverse recovery Current	I_{RRM}	-		2.5	-	A



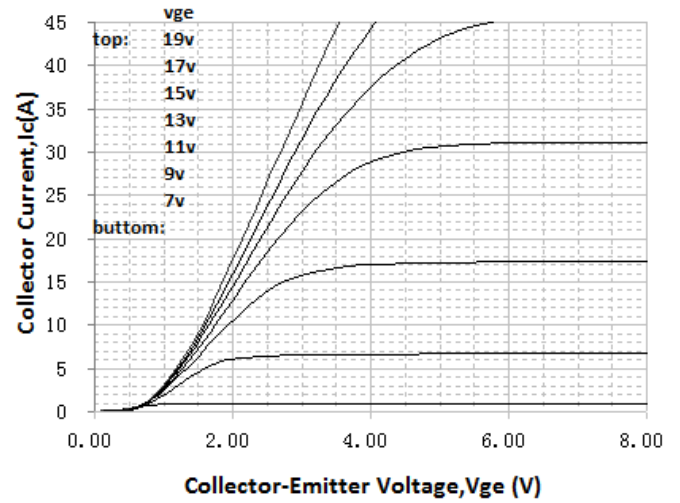


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

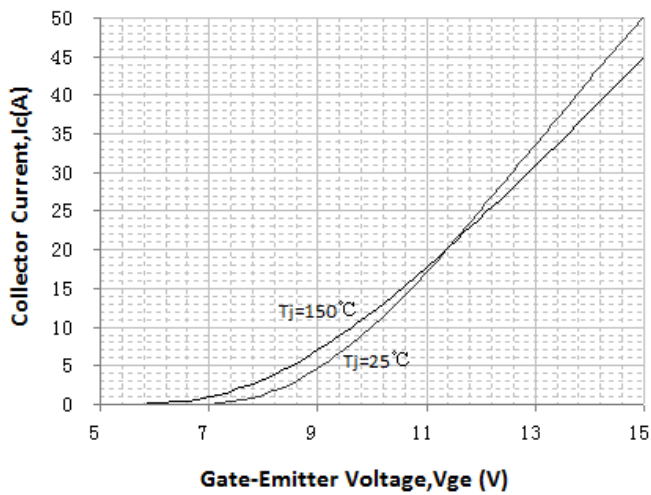
Output Characteristics (25°C)



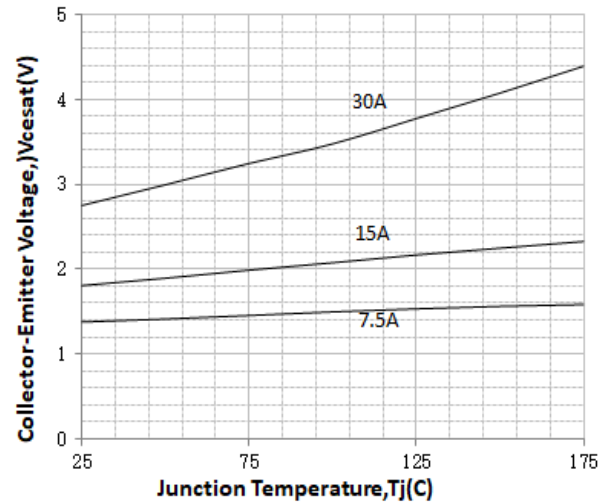
Output Characteristics (175°C)



Transfer Characteristics

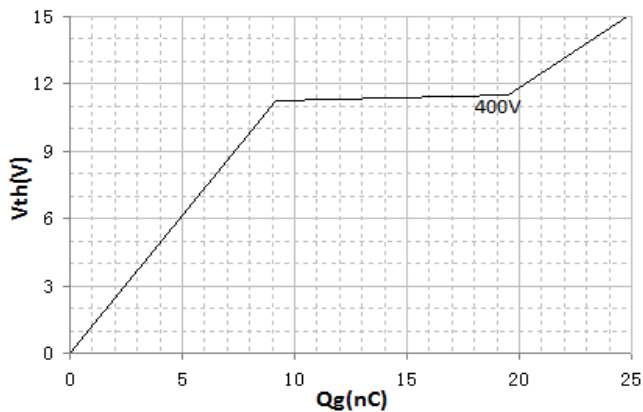


Vcesat vs. Tj



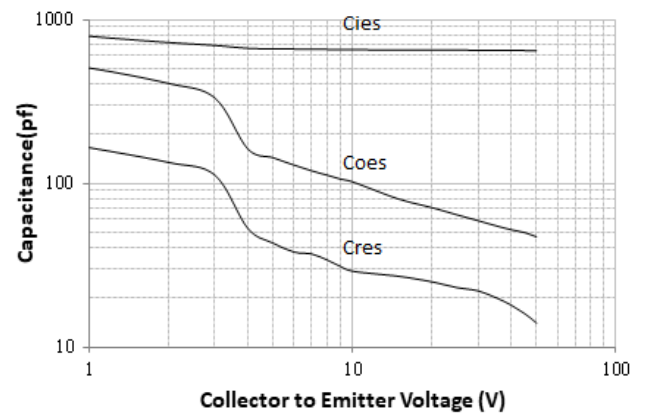
Gate Charge Characteristics

$V_{GE} = 15\text{V}$, $V_{CC} = 400\text{V}$, $I_C = 15\text{A}$



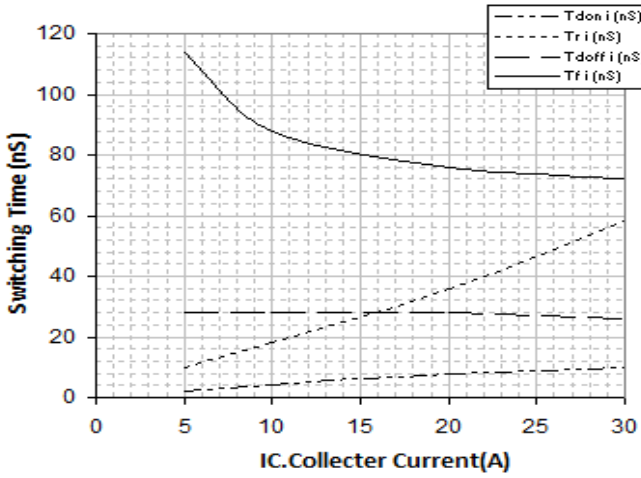
Capacitance Characteristic

$V_{GE} = 0\text{V}$, $f = 1.0\text{MHz}$

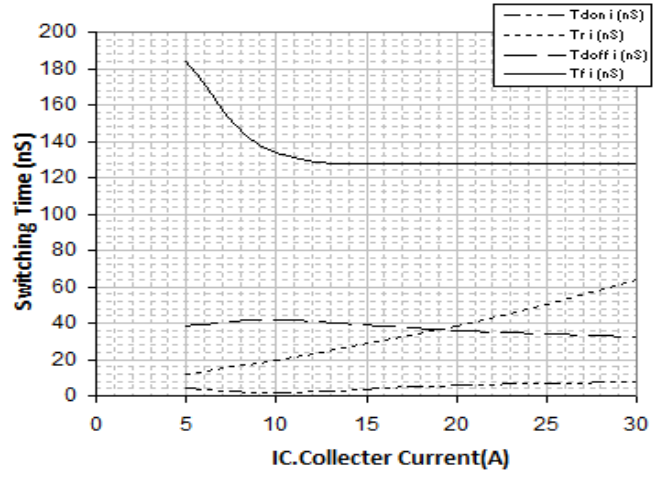




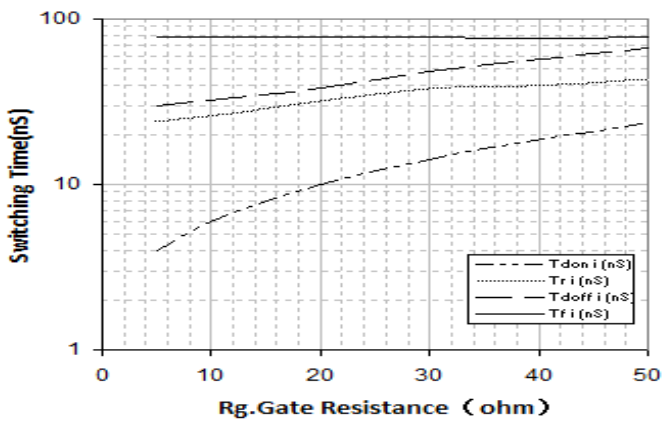
Switching Time vs. IC(25°C)
VCE=400V, VGE=15V, Rg=10Ω



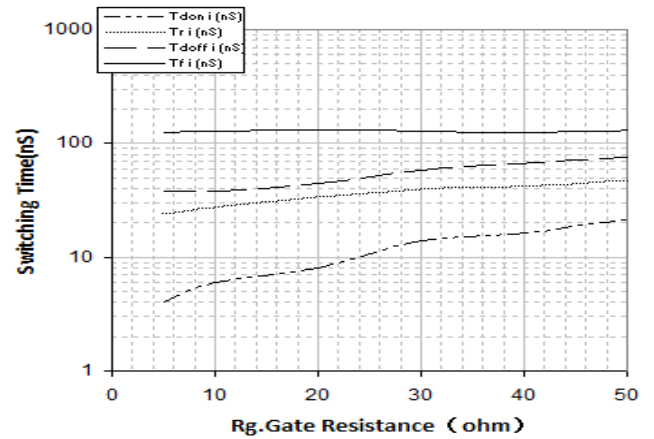
Switching Time vs. IC(150°C)
VCE=400V, VGE=15V, Rg=10Ω



Switching Time vs. Rg(25°C)
VGE=15V, VCE=400V, IC=15A

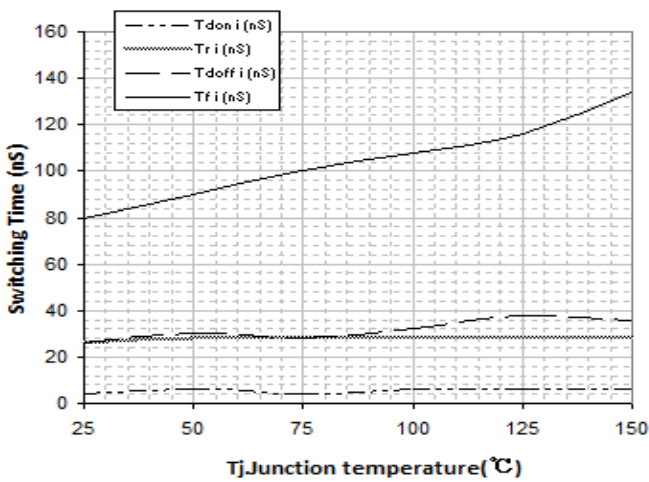


Switching Time vs. Rg(150°C)
VGE=15V, VCE=400V, IC=15A



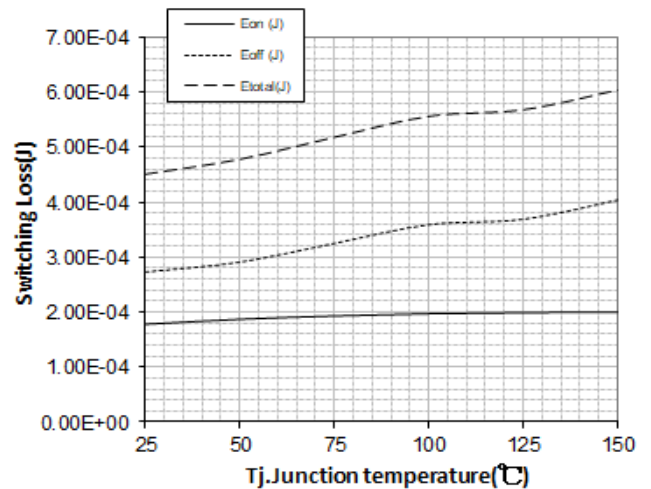
Switching Time vs. Tj

VGE=15V, VCE=400V, IC=15A, Rg=10Ω



Switching Loss vs. Tj

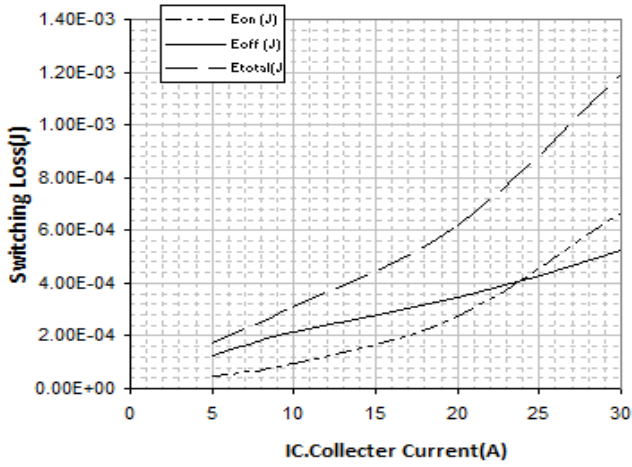
VGE=15V, VCE=400V, IC=15A, Rg=10Ω





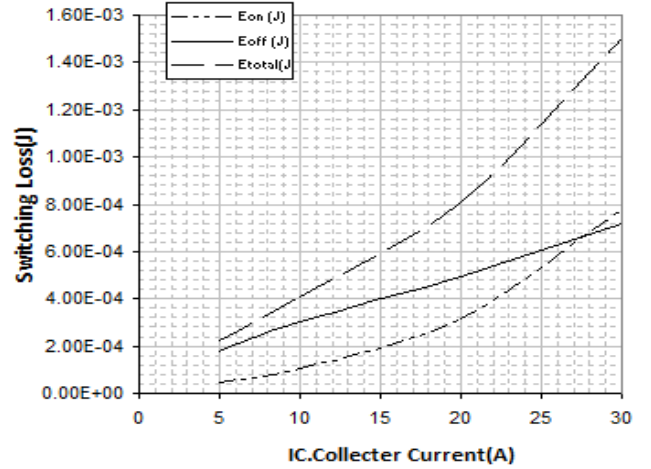
Switching Loss vs. IC(25°C)

VGE=15V, VCE=400V, Rg=10Ω



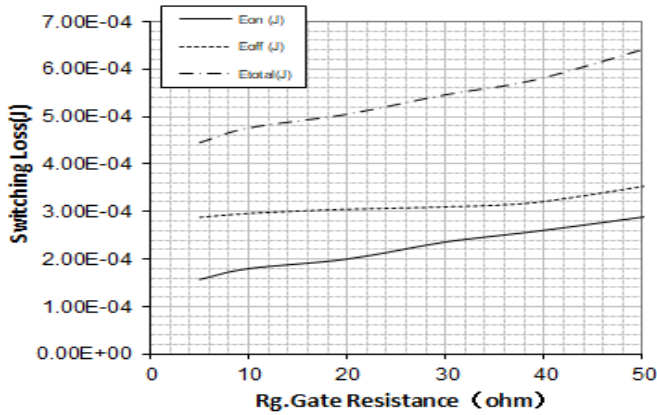
Switching Loss vs. IC(150°C)

VGE=15V, VCE=400V, Rg=10Ω



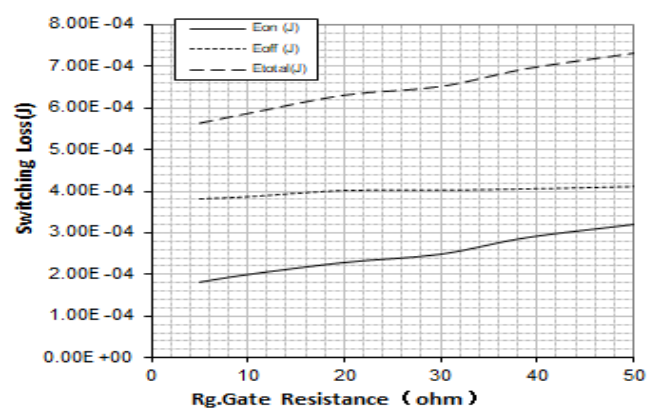
Switching Loss vs. Rg(25°C)

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

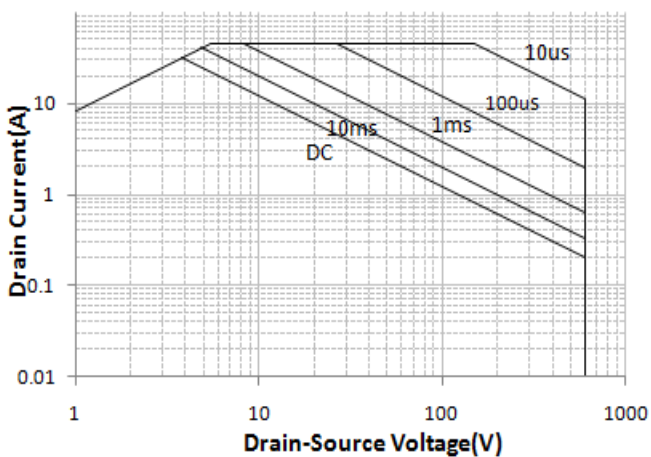


Switching Loss vs. Rg(150°C)

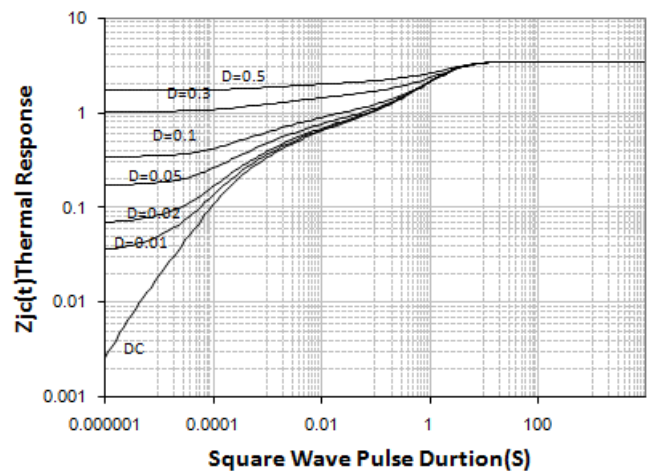
VGE=15V, VCE=400V, IC=15A



Forward Bias SOA



Normalized Maximum Transient Thermal Impedance for IGBT(RJC)

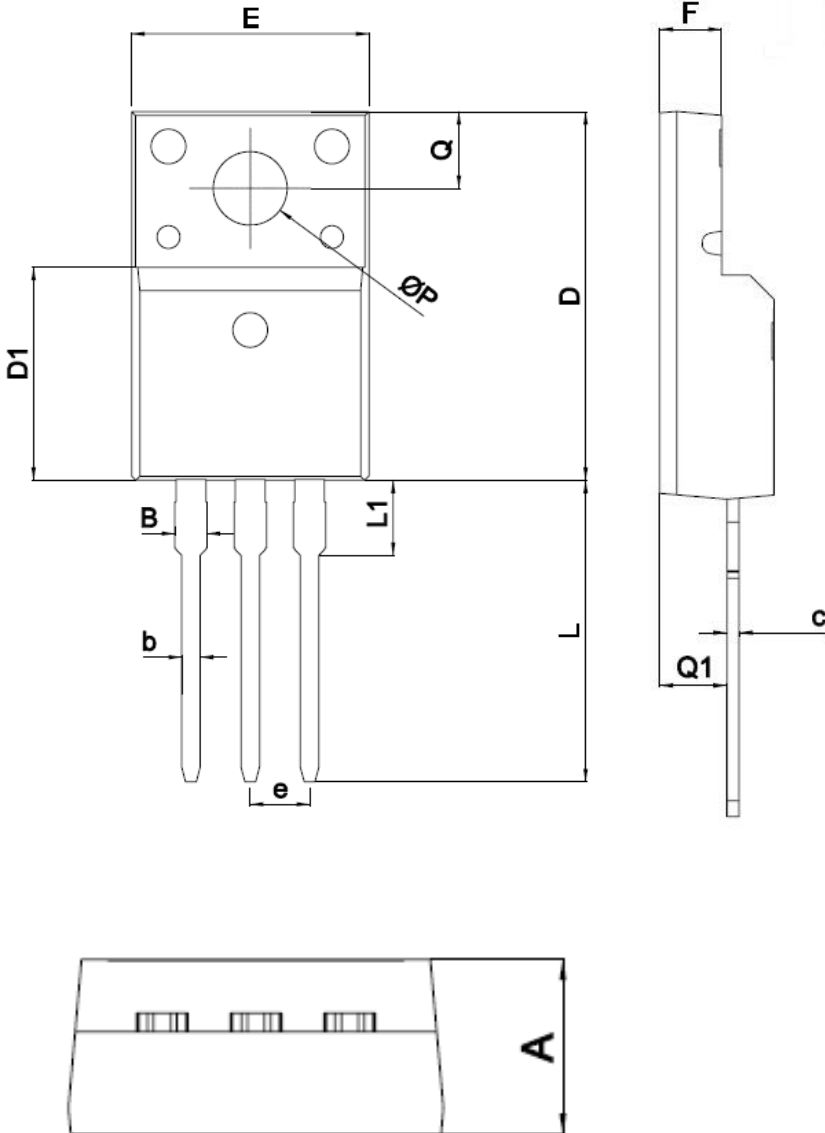




外形尺寸 PACKAGE MECHANICAL DATA

TO-220MF

单位 UNIT:mm



SYMBOL	mm	
	MIN	MAX
A	4.5	4.9
B		1.47
b	0.7	0.9
c	0.45	0.60
D	15.67	16.07
D1	9.04	9.20
e	2.54TYPE	
E	9.96	10.36
F	2.34	2.74
L	12.58	13.38
L1	3.13	3.33
Q	3.2	3.4
Q1	2.56	2.96
ΦP	3.08	3.28



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