

15GU65

主要参数 Main Characteristics

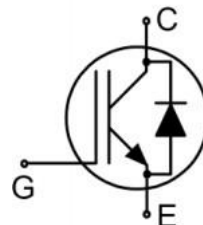
I_C	15A
V_{ces}	650 V
$V_{cesat-tp}$	1.90V

用途

- 光伏逆变器
- UPS 电源
- 电焊机
- 中高频率逆变器

Applications

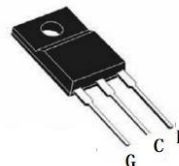
- Solar Converters
- Uninterrupted Power Supply
- Welding Converters
- Mid to High Range Switching
Frequency Converters



TO-220MF

产品特性

- 650V, 15A
- $V_{CE(sat)(typ.)} = 1.90V @ V_{GE} = 15V, I_C = 15A$
- Maximum Junction Temperature 150°C
- Pb-free Lead Plating; RoHS Compliant



产品中有毒有害物质或元素的名称及含量

部件名称 含量要求	有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
	≤0.1%	≤0.1%	≤0.01%	≤0.1%	≤0.1%	≤0.1%
引线框	○	○	○	○	○	○
塑封树脂	○	○	○	○	○	○
管 芯	○	○	○	○	○	○
内引线	○	○	○	○	○	○
焊 料	×	○	○	○	○	○
说 明	○：表示该元素的含量在 SJ/T11363-2006 标准的限量要求以下。 ×：表示该元素的含量超出 SJ/T11363-2006 标准的限量要求。 目前产品的焊料中含有铅 (Pb) 成分，但属于欧盟 RoHS 指令豁免范围。					

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}	650	V
最高栅极发射极电压 Gate-Emmitter Voltage	V_{GES}	± 20	V
连续集电极电流 Collector Current-continuous	I_C $T_C=25^{\circ}\text{C}$	30	A
	I_C $T_C=100^{\circ}\text{C}$	15	A
最大脉冲集电极极电流 (注 1) Collector Current – pulse (note 1)	I_{CM}	45	A
二极管正向电流 Diode Continuous Forward Current	I_F $T=100^{\circ}\text{C}$	15	A
二极管最大正向电流 Diode Maximum Forward Current (Note 1)	I_{FM}	45	A
短路时间 Short Circuit Withstand Time	t_{sc}	10	μs
耗散功率 Power Dissipation	P_D $T_C=25^{\circ}\text{C}$	27.5	W
	P_D $T_C=100^{\circ}\text{C}$	11.1	W
最高结温 Operating Junction Temperature	T_J	$-55 \sim +150$	$^{\circ}\text{C}$
存储温度 Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$

热特性 Electrical Characteristics

项 目 Parameter	符 号 Symbol	数 值 Value	单位 Unit
IGBT结到管壳的热阻 Thermal Resistance, Junction to case for IGBT	R_{thj-c}	4.5	$^{\circ}\text{C}/\text{W}$
FRD结到管壳的热阻 Thermal Resistance, Junction to case for Diode	R_{thj-c}	5.6	$^{\circ}\text{C}/\text{W}$
结到环境的热阻 Thermal Resistance, Junction to Ambient	R_{thj-a}	62.5	$^{\circ}\text{C}/\text{W}$

IGBT电特性 Electrical Characteristics of IGBT($T_c=25^{\circ}\text{C}$ unless otherwise noted)////

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
零栅压下集电极漏电流 Collector-Emitter Leakage Current	I_{CES}	$V_{CE}=600V, V_{GE}=0V$	-	-	100	μA
正向栅极体漏电流 Gate Leakage Current	I_{GES}	$V_{GE}=\pm 20V, V_{CE}=0V$	-	-	± 100	nA
阈值电压 Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	6.0	V
饱和压降 Collector-Emmitter saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=15A$	-	1.9	2.5	V
栅极电荷总量 Total Gate Charge	Q_g	$V_{CC}=520V$ $V_{GE}=15V$ $I_C=15A$	-	36.5	-	nC
栅极-反射极 Gate to emitter charge	Q_{ge}		-	6.5	-	nC
栅极-集电极 Gate to collector charge	Q_{gc}		-	20.3	-	nC
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=15A$ $R_G=10\Omega$ Inductive Load $T_C=25^\circ C$	-	5	-	ns
上升时间 Turn-On rise time	t_r		-	24	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	67	-	ns
下降时间 Turn-Off Fall time	t_f		-	197	-	ns
开通损耗 Turn-On energy	E_{on}		-	0.168	-	mJ
关断损耗 Turn-off energy	E_{off}		-	0.517	-	mJ
总开关损耗 Total switching energy	E_{ts}		-	0.685	-	mJ
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1MHz$	-	605	-	pF
输出电容 Output capacitance	C_{oes}		-	45	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	7.27	-	pF

二极管电特性 Electrical Characteristics of Diode ($T_C=25^\circ C$ unless otherwise noted)

正向压降 Diode Forward Voltage	V_F	$I_F=15A$	-	1.56	2.3	V
反向恢复时间 Diode Reverse Recovery Time	t_{rr}	$V_{CE}=400V$ $I_F=8A$ $dI_F/dt=200A/\mu s$	-	95		ns
反向恢复电流 Diode peak Reverse Recovery Current	I_{rr}		-	3.3		A
反向恢复电荷 Diode Reverse Recovery Charge	Q_{rr}		-	141.79		nC

Note1: Repetitive rating, pulse width limited by maximum junction temperature

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

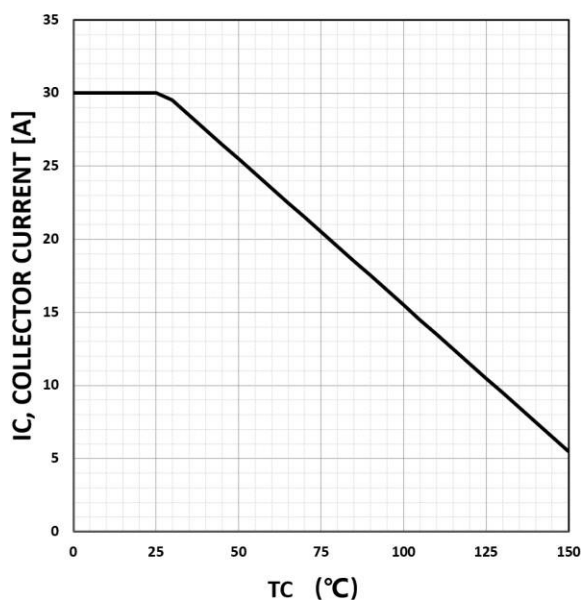
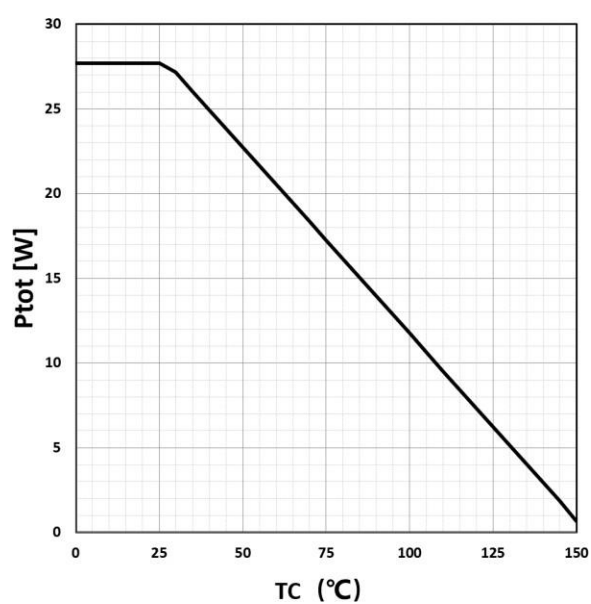
Figure1: maximum DC collector current
VS. case temprature

Figure2: power dissipation VS. case temprature

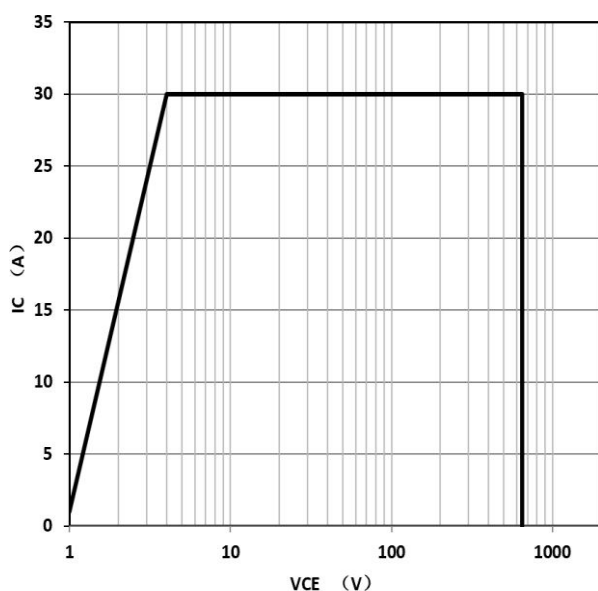
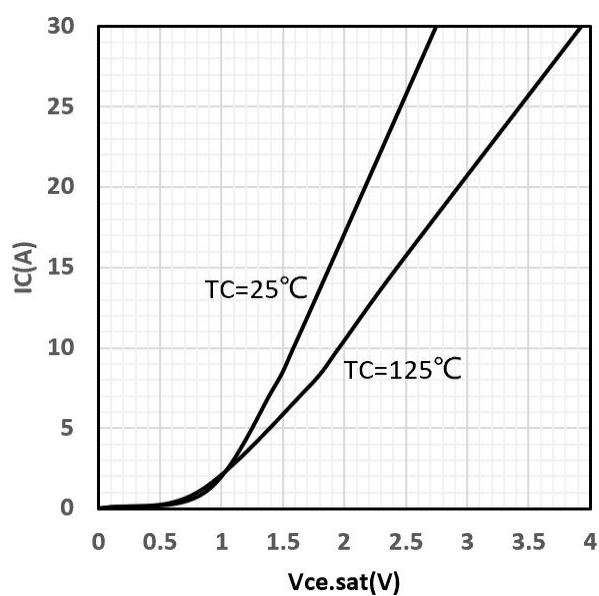
Figure3: reverse bias SOA, $T_J=150^{\circ}\text{C}$, $V_{GE}=15\text{V}$ 

Figure4: Vce.sat VS IC

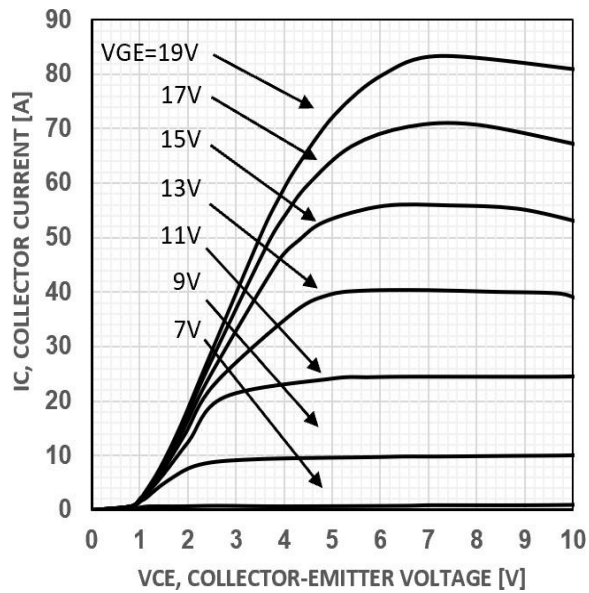


Figure5: typical IGBT output characteristics,
TC=25°C

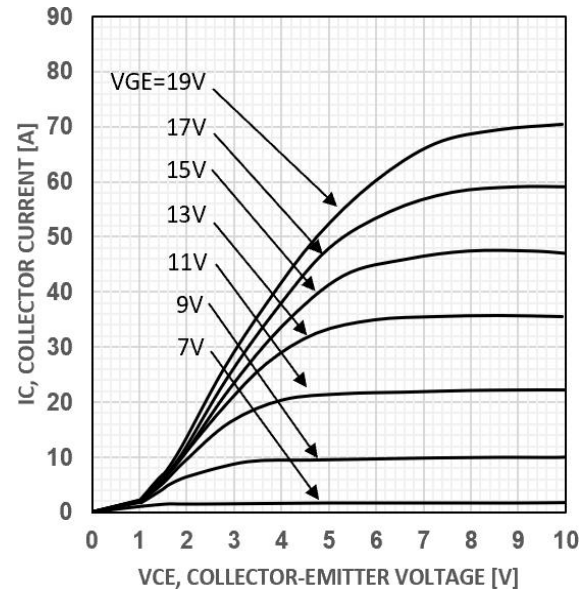


Figure6: typical IGBT output characteristics
TC=125°C

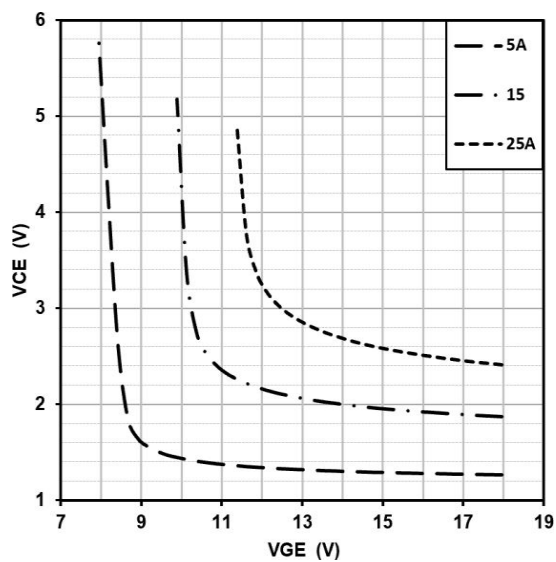


Figure7: typical VCE VS. VGE, TJ=25°C

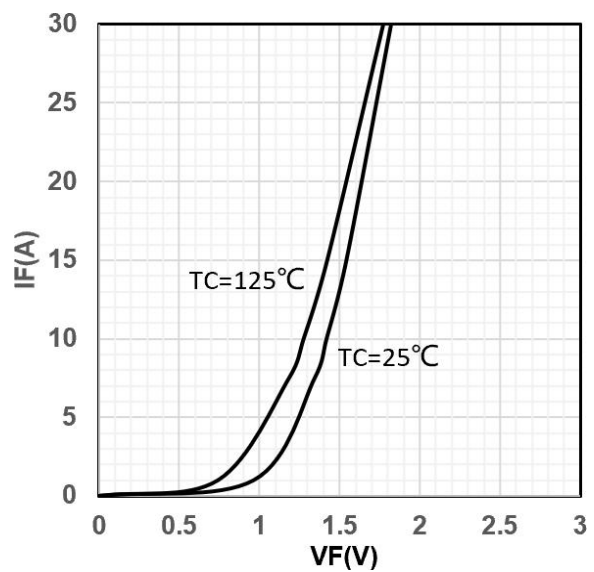


Figure8: typical diode forward characteristic

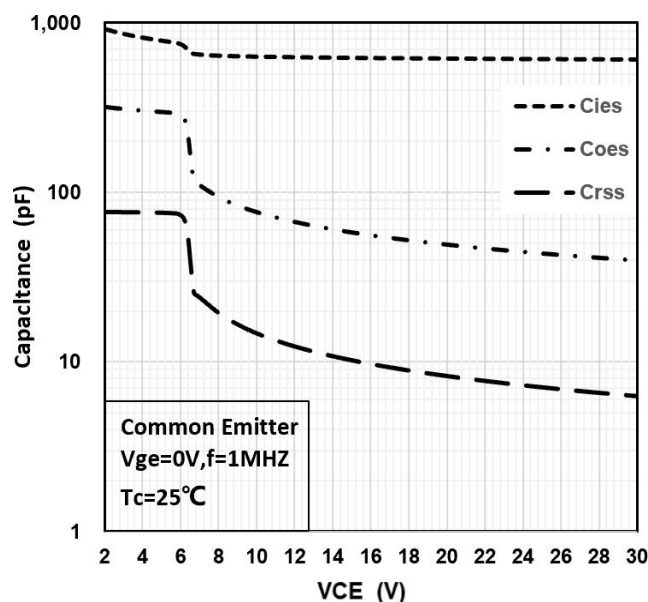


Figure9:typical capacitance VS. VCE,VGE=0V,f=100kHz

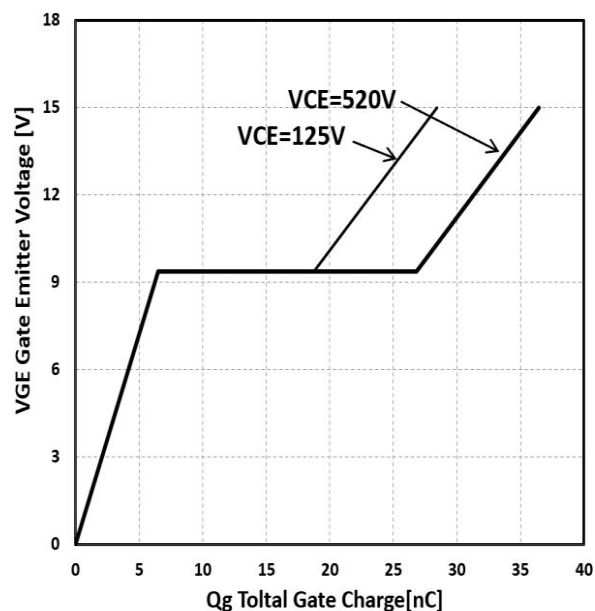


Figure10:typical gate charge VS. VGE,IC=15A

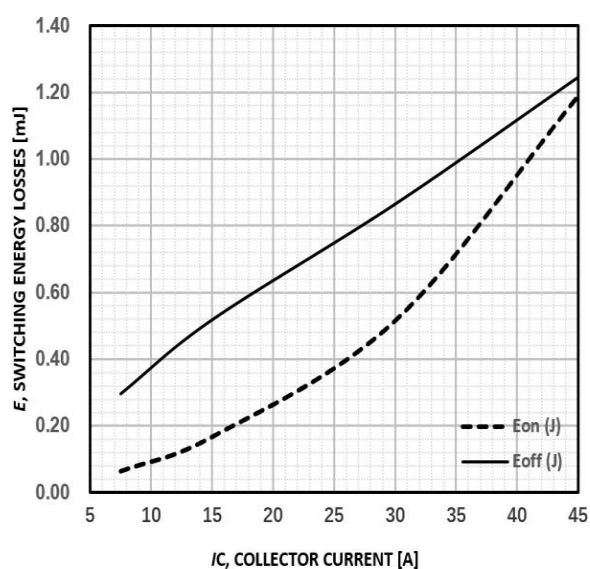


Figure11: typical energy loss VS. IC, TC=25°C,

L=500uH · VCE=400V,VGE=15V,Rg=10Ω

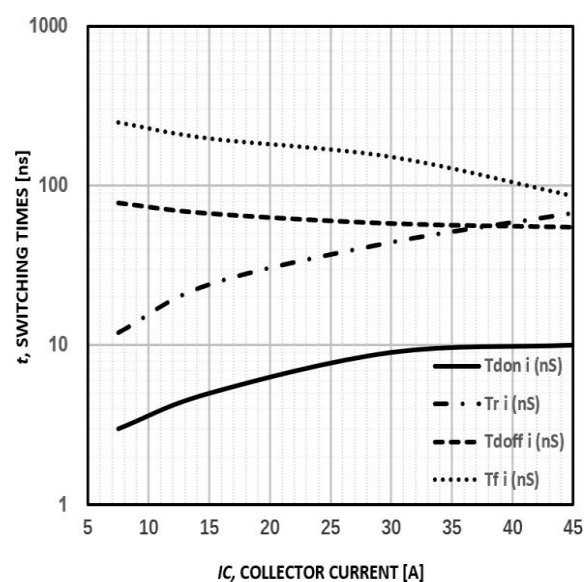


Figure12: typical switching time VS. IC, TC=25°C,

L=500uH,VCE=400V,VGE=15V,Rg=10Ω

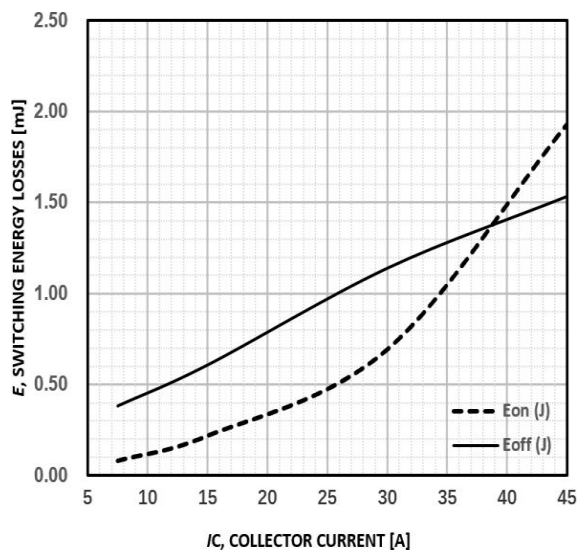


Figure13: typical energy loss VS. IC, TC=125°C,
L=500uH · VCE=400V, VGE=15V, Rg=10Ω

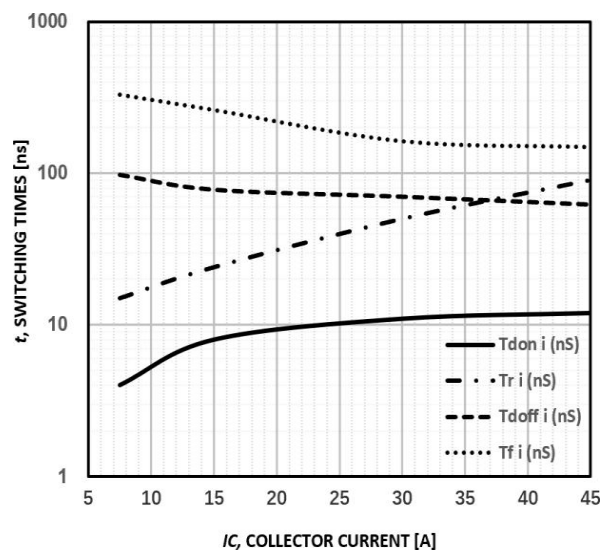


Figure14: typical switching time VS. IC, TC=125°C,
L=500uH, VCE=400V, VGE=15V, Rg=10Ω

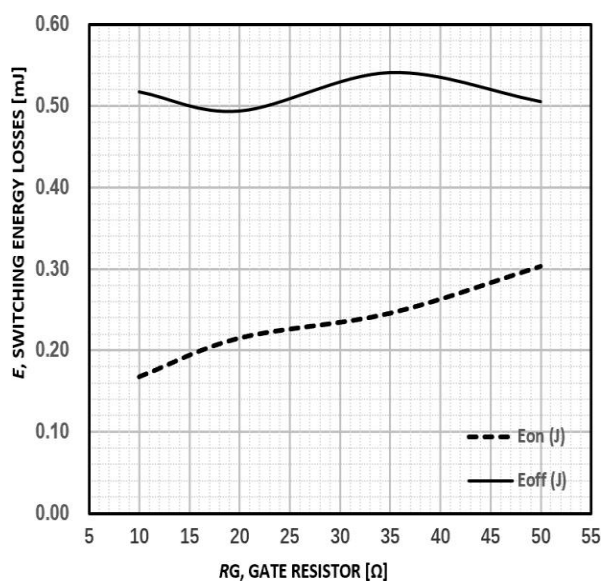


Figure15: typical energy loss VS. Rg, TC=25°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

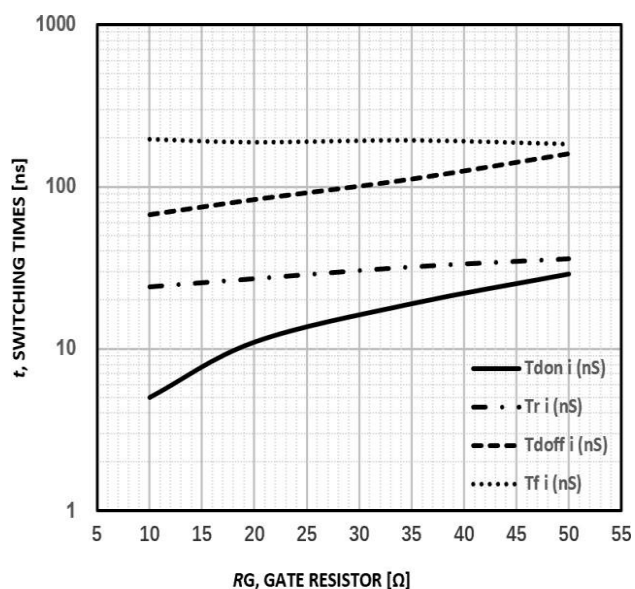


Figure16: typical switching time VS. Rg, TC=25°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

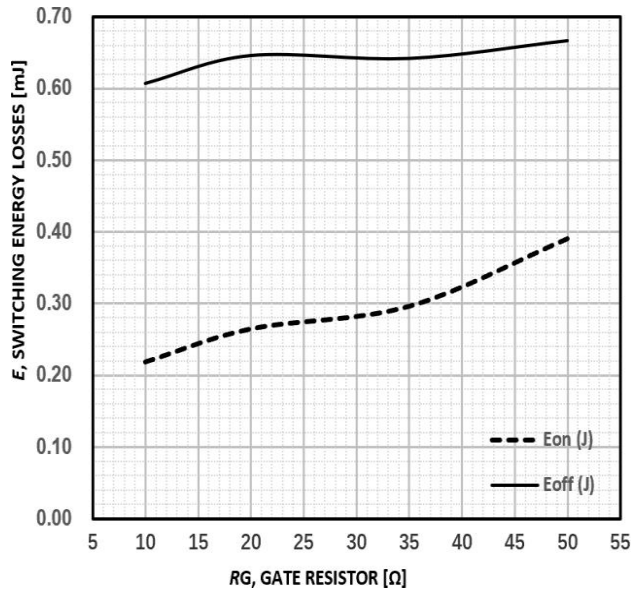


Figure17: typical energy loss VS. Rg, TC=125°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

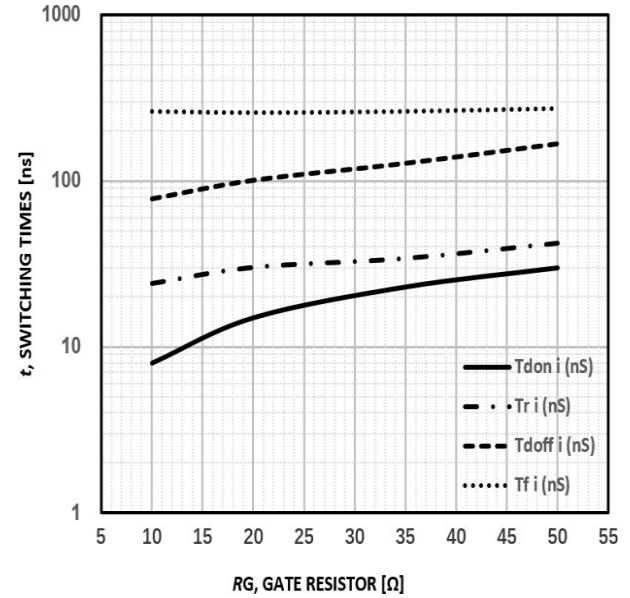


Figure18: typical switching time VS. Rg, TC=125°C,
L=500uH, VCE=400V, VGE=15V, IC=15A

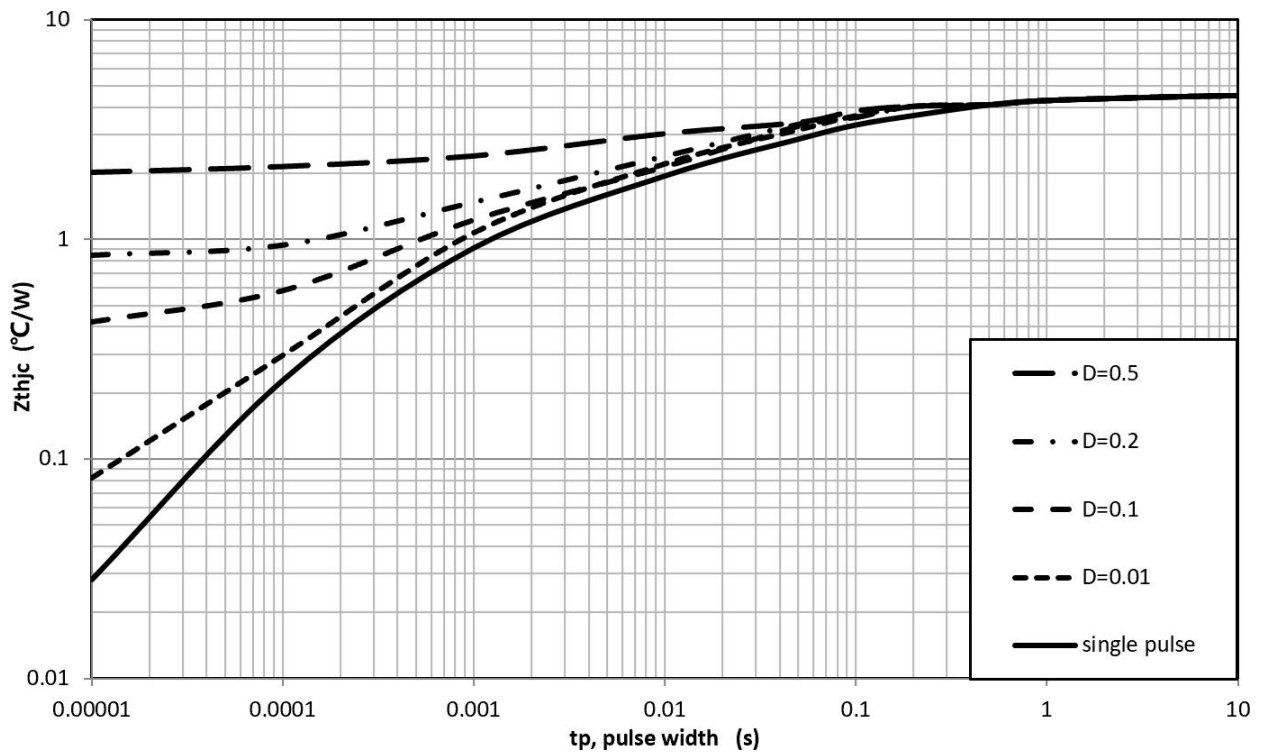
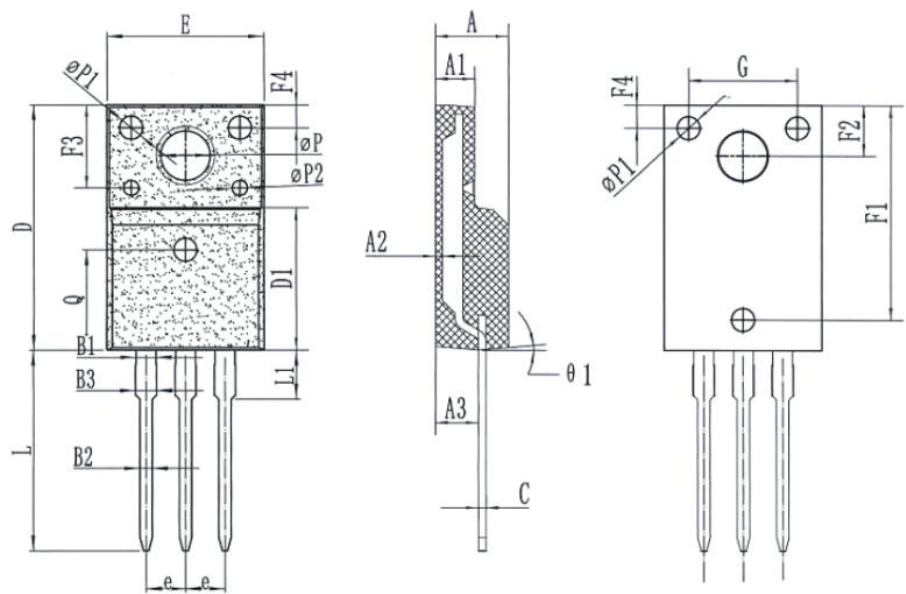


Figure19: normalized transient thermal impedance, junction-to-case

Note1: Duty factor $D = t_1/t_2$; Note2: peak $T_J = P_{DM} \times Z_{thjc} + T_C$

外形尺寸 PACKAGE MECHANICAL DATA

TO-220MF



COMMON DIMENSIONS			
SYMBOL	MM		
	MIN	NOM	MAX
A	4.60	4.70	4.80
A1	2.44	2.54	2.64
A2	0.38	0.43	0.48
A3	2.66	2.76	2.86
B1	1.24	1.29	1.34
B2	0.75	0.80	0.85
B3	1.28	1.36	1.44
C	0.45	0.50	0.55
D	15.67	15.87	16.07
D1	9.07	9.17	9.27
e	2.54BSC		
E	10.06	10.16	10.26
E1	9.92	10.02	10.12
E2	9.36	9.46	9.56
F1	13.80	13.90	14.00
F2	3.20	3.30	3.40
F3	5.30	5.40	5.50
F4	1.40	1.50	1.60
G	6.90	7.00	7.10
K	0.65	0.70	0.75
L	12.76	12.96	13.16
L1	2.73	2.93	3.13
Q	6.47REF		
φP	3.00	3.18	3.38
φP1	1.40	1.50	1.60
φP2	0.95	1.00	1.05
θ 1	3°	5°	7°