



20GU65N

主要参数 Main Characteristics

I_C	20A
V_{ces}	650 V
$V_{cesat-typ}$	1.85V

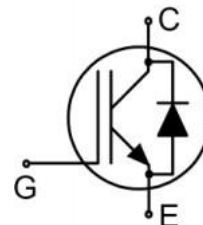
用途

- 光伏逆变器
- UPS 电源
- 电焊机
- 中高频率逆变器

Applications

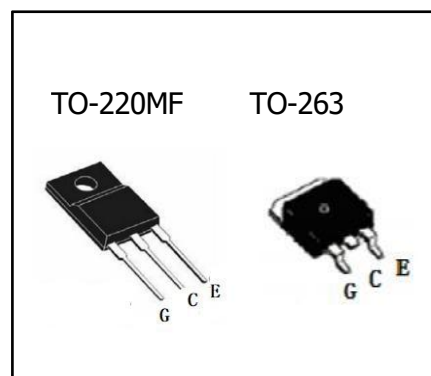
- Solar Converters
- Uninterrupted Power Supply
- Welding Converters
- Mid to High Range Switching

Frequency Converters



产品特性

- 650V, 20A
- $V_{CE(sat)(typ.)} = 1.85V @ V_{GE} = 15V, I_C = 20A$
- 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	Vces		650	V
最高栅极发射极电压 Gate-Emmitter Voltage	V _{GES}		±30	V
连续集电极电流 Collector Current-continuous	I _C T _C =25℃		40	A
	I _C T _C =100℃		20	A
最大脉冲集电极极电流（注 1） Collector Current – pulse （note 1）	I _{CM}		60	A
二极管正向电流 Diode Continuous Forward Current	I _F T _C =100℃		20	A
二极管最大正向电流 Diode Maximum Forward Current (Note 1)	I _{FM}		60	A
短路时间 Short Circuit Withstand Time	tsc		10	us
耗散功率 Power Dissipation	P _D T _C =25℃	TO-263	140	W
		TO-220MF	40	W
	P _D T _C =100℃	TO-263	56	W
		TO-220MF	16	W
最高结温 Operating Junction Temperature	T _J		-55～+150	℃
存储温度 Storage Temperature Range	T _{STG}		-55～+150	℃

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 _{th j-c}	TO-263	0.9	℃/W
		TO-220MF	3.125	
FRD结到管壳的热阻 Thermal Resistance, Junction to case for Diode	R _{th j-c}	TO-263	1.6	℃/ W
		TO-220MF	3.8	
结到环境的热阻 Thermal Resistance, Junction to Ambient	R _{th j-a}	62.5		℃/ 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}	$V_{CE}=650V, V_{GE}=0V$	-	-	100	μA
正向栅极体漏电流 Gate Leakage Current	I_{GES}	$V_{GE}=\pm 30V, V_{CE}=0V$	-	-	± 100	nA
阈值电压 Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	6.5	V
饱和压降 Collector-Emmitter saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=20A$	-	1.85	2.5	V
栅极电荷总量 Total Gate Charge	Q_g	$V_{CC}=480V$ $V_{GE}=15V$ $I_C=20A$	-	39.7	-	nC
栅极-反射极 Gate to emitter charge	Q_{ge}		-	7.0	-	nC
栅极-集电极 Gate to collector charge	Q_{gc}		-	21.9	-	nC
开启延迟时间 Turn-On delay time	$t_{d(on)}$		-	18	-	ns
上升时间 Turn-On rise time	t_r	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=20A$ $R_G=15\Omega$ Inductive Load $T_c=25^\circ\text{C}$	-	26	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	98	-	ns
下降时间 Turn-Off Fall time	t_f		-	89	-	ns
开通损耗 Turn-On energy	E_{on}		-	0.42	-	mJ
关断损耗 Turn-off energy	E_{off}		-	0.88	-	mJ
总开关损耗 Total switching energy	E_{ts}		-	1.3	-	mJ
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1\text{MHz}$	-	717	-	pF
输出电容 Output capacitance	C_{oes}		-	39.5	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	23.2	-	pF
栅极电阻 Integrated gate resistor	R_{Gint}			2.14		Ω

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

正向压降 Diode Forward Voltage	V_F	$I_F=20A$	-	1.9	2.5	V
反向恢复时间 Diode Reverse Recovery Time	t_{rr}	$V_{CE}=400V$ $I_F=20A$ $R_g=15$	-	60		ns
反向恢复电流 Diode peak Reverse Recovery Current	I_{rr}		-	13.75		A
反向恢复电荷 Diode Reverse Recovery Charge	Q_{rr}			459		nC

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

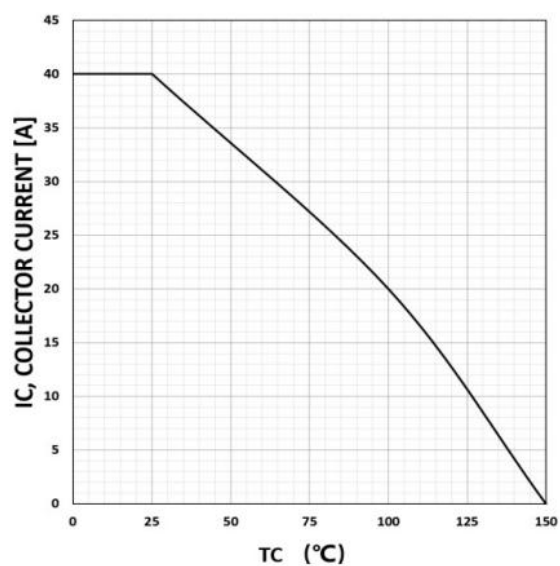


Figure 1. Maximum DC collector current
VS. case temperature

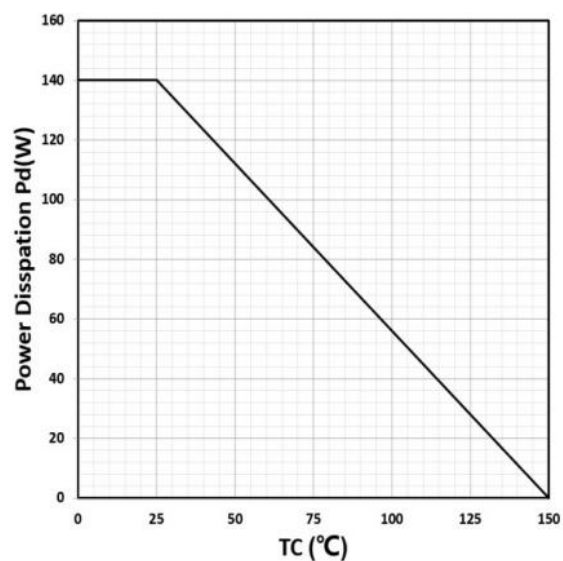


Figure 2. Power dissipation VS. case temperature

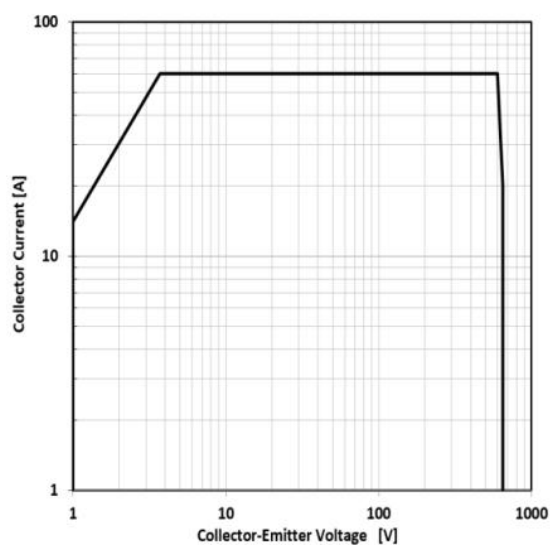


Figure 3. Reverse bias SOA, $T_j=125^{\circ}\text{C}$, $V_{ge}=15\text{V}$

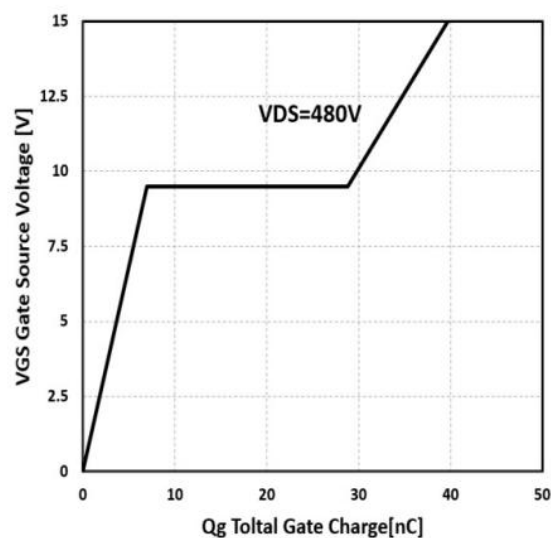


Figure 4: Typical gate charge VS. V_{GE} , $I_C=20\text{A}$

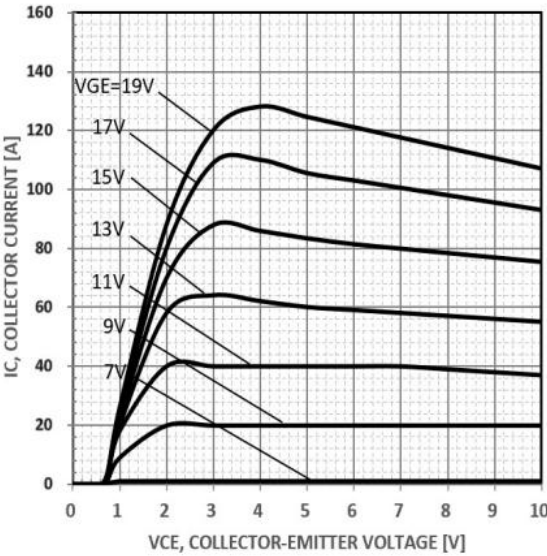


Figure 5. Typical output characteristics
 $t_p=300\mu\text{s}$ $T_c=25^\circ\text{C}$

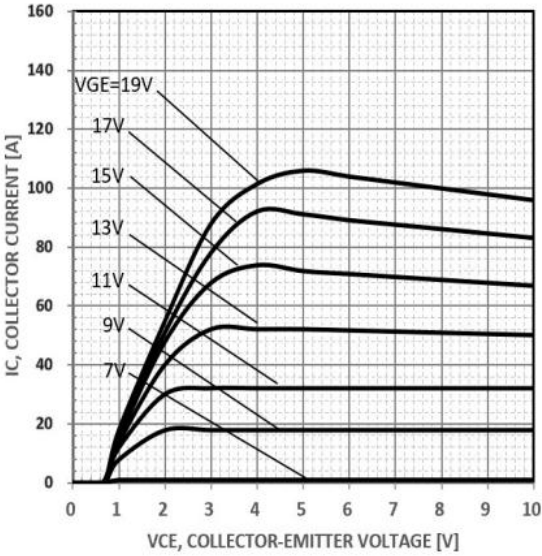


Figure 6. Typical output characteristics
 $t_p=300\mu\text{s}$ $T_c=150^\circ\text{C}$

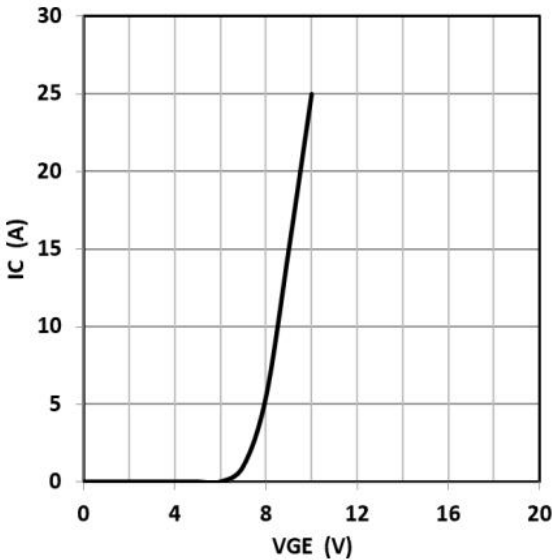


Figure 7. Typical gate threshold voltage

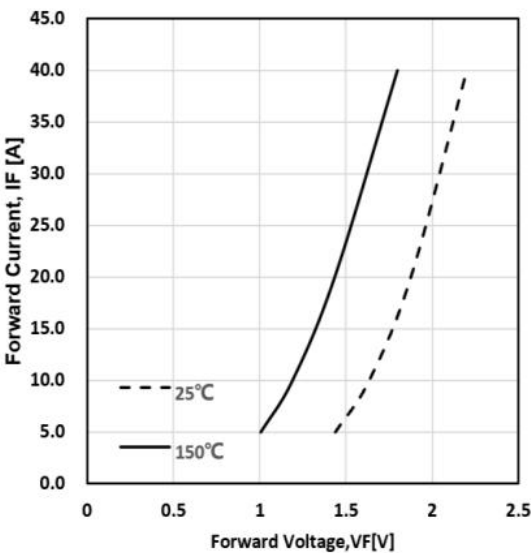


Figure 8. Typical forward voltage vs I_F

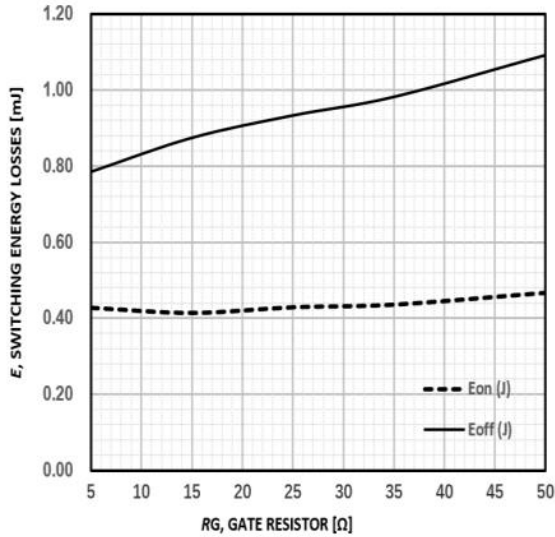


Figure9: Typical energy loss VS. R_g , $T_C=25^{\circ}\text{C}$,
 $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $I_C=20\text{A}$

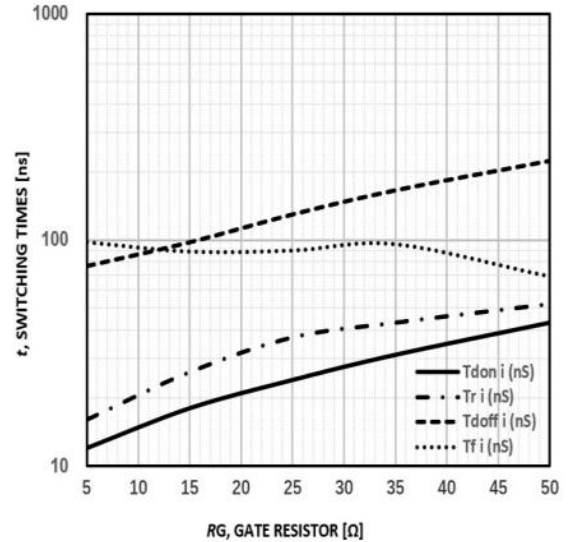


Figure10: Typical switching time VS. R_g , $T_C=25^{\circ}\text{C}$,
 $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $I_C=20\text{A}$

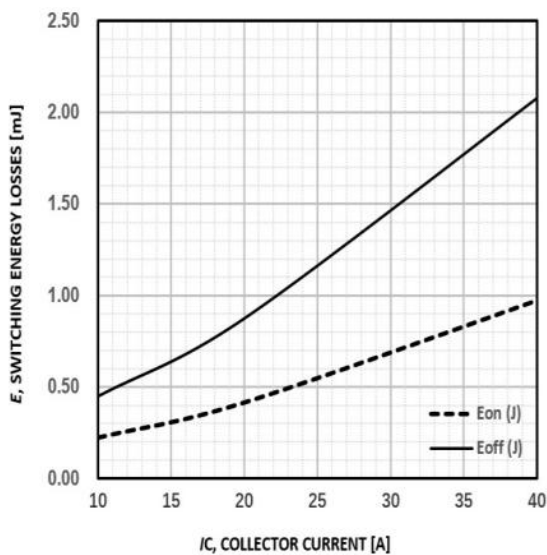


Figure11: Typical energy loss VS. I_C , $T_C=25^{\circ}\text{C}$,
 $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $R_G=15\Omega$

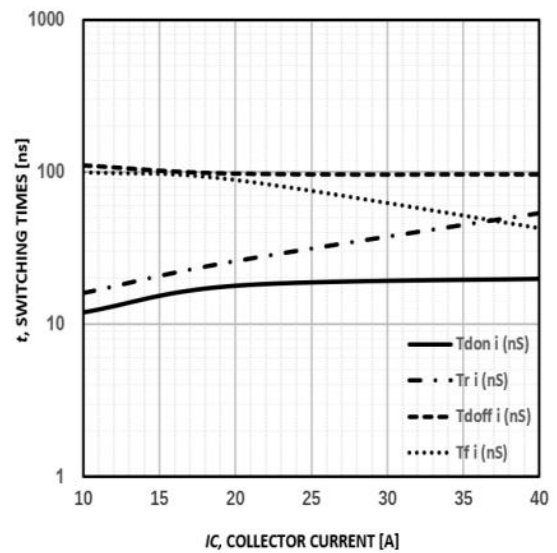


Figure12: Typical switching time VS. I_C , $T_C=25^{\circ}\text{C}$,
 $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $R_G=15\Omega$

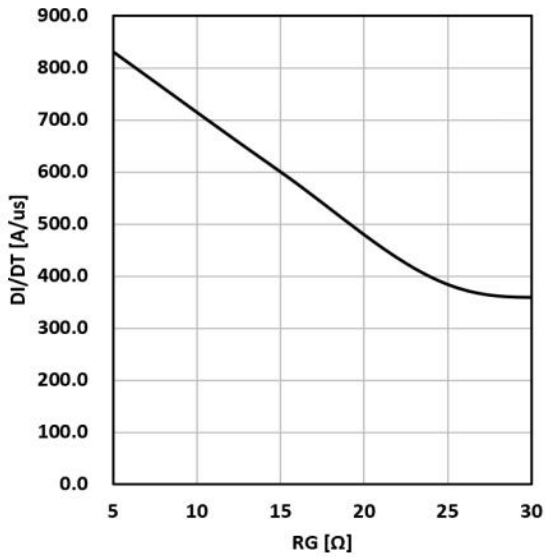


Figure 13. Typical diode di/dt vs rg Tc=25℃
VCE=400V VGE=15V IF=20A

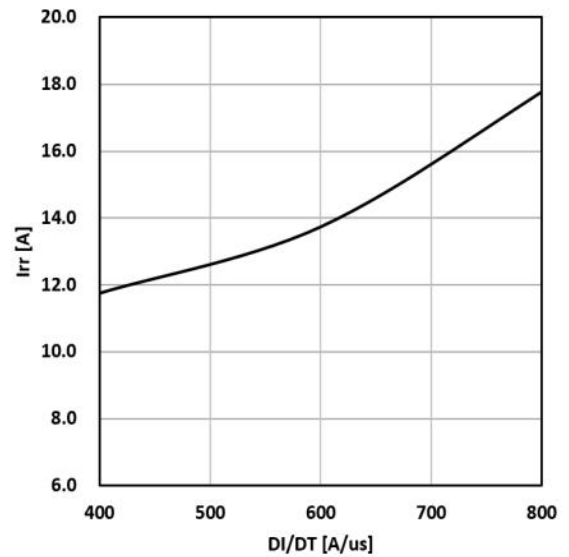


Figure 14. Typical diode irr vs di/dt Tc=25℃
VCE=400V VGE=15V IF=20A

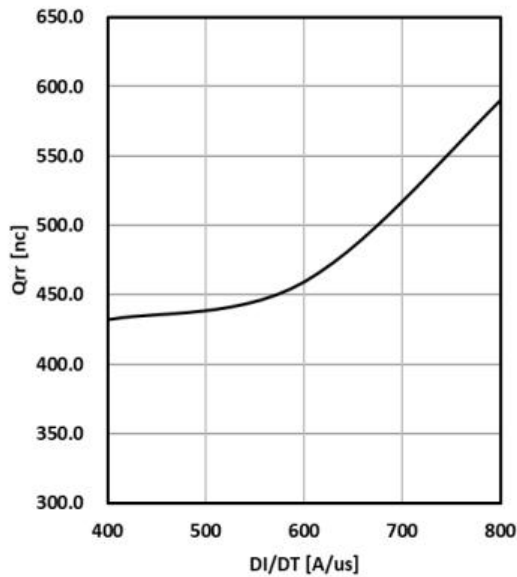


Figure 15. Typical diode Qrr vs di/dt Tc=25℃
VCE=400V VGE=15V IF=20A

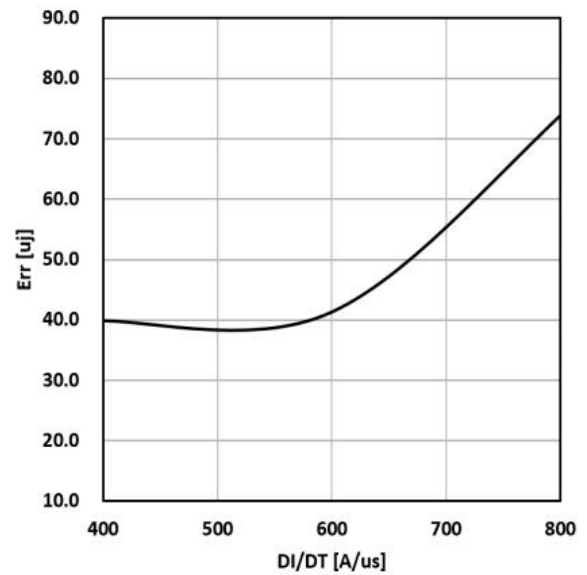
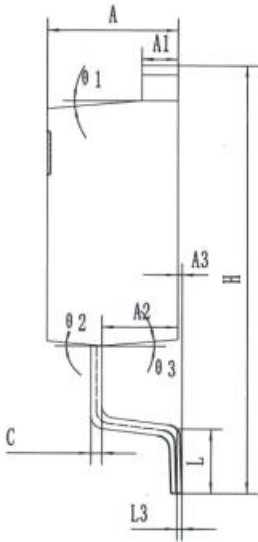
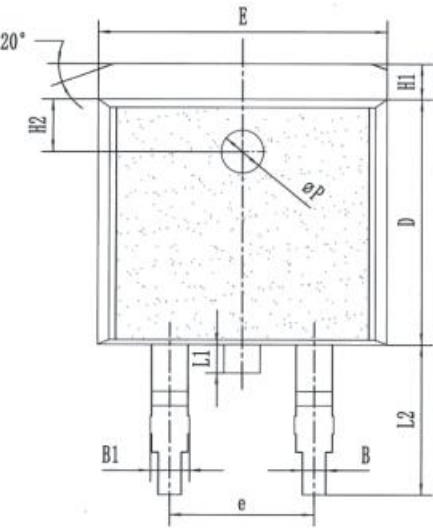


Figure 16. Typical diode Err vs di/dt Tc=25℃
VCE=400V VGE=15V IF=20A

外形尺寸 PACKAGE MECHANICAL DATA

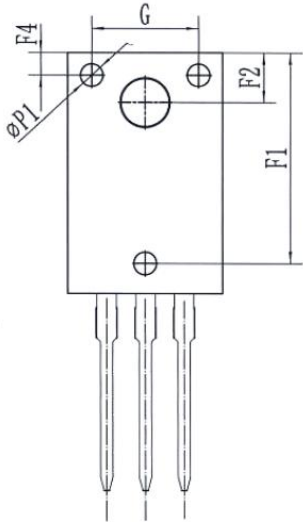
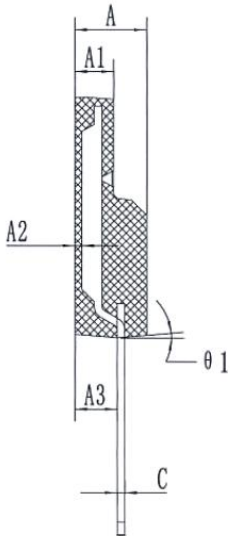
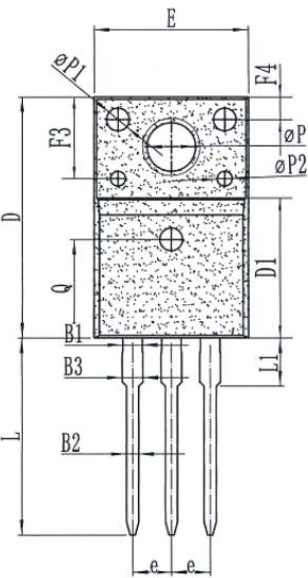
TO-263



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.50	4.60	4.70
A1	1.22	1.27	1.32
A2	2.57	2.67	2.77
A3	0.00		0.15
B	0.76	0.81	0.87
B1	1.32	1.37	1.42
C	0.33	0.38	0.43
D	8.55	8.65	8.75
e	5.08 BSC		
E	10.06	10.16	10.26
H	14.80	15.00	15.20
H1	1.17	1.27	1.37
H2	1.85 REF		
L	2.09	2.39	2.69
L1	0.80	1.00	1.20
L2	4.88	5.08	5.28
L3	0.25 REF		
ΦP	1.40	1.50	1.60
θ 1	3°	5°	7°
θ 2	3°	5°	7°
θ 3	3°	5°	7°
θ 4	3°	5°	7°

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
F2	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°