



JT020N065SED/CED/WED/FED

主要参数 MAIN CHARACTERISTICS

I_C	20 A
BV_{CES}	650V
$V_{CESAT-typ}$ ($V_{GE}=15V$)	1.6V

用途

- 逆变器
- UPS 电源

APPLICATIONS

- General purpose inverters
- UPS

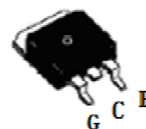
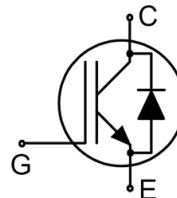
产品特性

- 低栅极电荷
- Trench FS 技术
- RoHS 产品

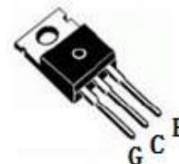
FEATURES

- Low gate charge
- Trench FS Technology
- RoHS product

封装 Package



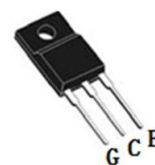
TO-263



TO-220C



TO-247



TO-220MF

订货型号 Order codes		印 记 Marking	封 装 Package
无卤-条管 None Halogen-Tube	无卤-编带 Halogen-Free-Reel		
JT020N065SED-S-BR	JT020N065SED-S-AR	JT020N065SED	TO-263
JT020N065CED-C-BR	N/A	JT020N065CED	TO-220C
JT020N065WED-GE-BR	N/A	JT020N065WED	TO-247
JT020N065FED-F-BR	N/A	JT020N065FED	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
		JT020N065SED/ JT020N065CED	JT020N065WED	JT020N065FED	
最高集电极—发射极直流电压 Collector-Emitter Voltage	V _{CE}	650	650	650	V
*连续集电极电流 Collector Current-continuous	I _C	40 (T _C =25℃)	40 (T _C =25℃)	40 (T _C =25℃)	A
		20(T _C =100℃)	20(T _C =100℃)	20(T _C =100℃)	A
最大脉冲集电极极电流 (注 1) Collector Current – pulse (note 1)	I _{CM}	80	80	80	A
二极管正向测试电流 Diode RMS forward current	I _F	40(T _C =25℃)	40(T _C =25℃)	40(T _C =25℃)	A
	I _F	20(T _C =100℃)	20(T _C =100℃)	20(T _C =100℃)	A
二极管正向不重复峰值电流（浪涌电流） Surge non repetitive forward current tp= 10 ms sinusoidal	I _{FSM}	80	80	80	A
最高栅极发射极电压 Gate-Emitter Voltage	V _{GE}	±20	±20	±20	V
最高瞬态栅极发射极电压 Transient Gate-Emitter Voltage(tp≤10us, D<0.010)	V _{GES}	±25	±25	±25	V
安全工作区 Turn-off safe area	-	80	80	80	A
耗散功率 Power Dissipation	P _D T _C =25℃	187	194	42	W
存储温度 Storage Temperature Range	T _{STG}	-55～+150	-55～+150	-55～+150	℃
结温 Operating Temperature Range	T _{VJ}	-55～+175	-55～+175	-55～+175	℃
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T _L	300	300	300	℃

*连续集电极电流由最高结温限制

*Collector current 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-Emitter Voltage	BV _{CES}	I _C =500μA, V _{GE} =0V	650	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBV _{CES} /ΔT _J	I _C =1mA, referenced to 25°C	-	0.5	-	V/°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°C	-	-	10	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 =250μA	5.5	-	6.5	V
饱和压降 Collector-Emitter saturation Voltage	V _{CESAT}	V _{GE} =15V,I _C =20A, T _c =25°C	-	1.6	2.0	V
		V _{GE} =15V,I _C =20A, T _c =125°C		1.75	2.15	V
		V _{GE} =15V,I _C =20A, T _c =175°C		1.9	2.3	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C _{ies}	V _{CE} =25V,V _{GE} =0V, f=1.0MHz,T _C =25°C	-	1500	-	pF
输出电容 Output capacitance	C _{oes}		-	128	-	pF
反向传输电容 Reverse transfer capacitance	C _{res}		-	28.7	-	pF
栅极电荷总量 Total Gate Charge	Qg	V _{CC} =400V,I _C =20A,R _G =10Ω,V _{GE} =15V,T _C =25°C	-	43.9	-	nC
栅极-发射极 Gate to emitter charge	Qge		-	10.0	-	
栅极-集电极 Gate to collector charge	Qgc		-	18.9	-	
栅极电阻- Gate resistance	Rg	f=1MHz,open collector	-	1.8	-	Ω
短路电流- Short current	Isc	V _{GE} =15V,V _{CE} =360V, T _{Jstart} ≤175°C,tsc≤10μs	-	106	-	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	td(on)	V _{CC} =400V,I _{CC} =20A, R _G =10Ω, V _{GE} =15V, T _C =25℃	-	16	-	ns
上升时间 Turn-On rise time	tr		-	56	-	ns
关断延迟时间 Turn-Off delay time	td(off)		-	52	-	ns
下降时间 Turn-Off Fall time	tf		-	82	-	ns
开通损耗 Turn-On energy	Eon		-	0.79	-	mJ
关断损耗 Turn-Off energy	Eoff		-	0.3	-	mJ
总开关损耗 Total switching energy	Etot		-	1.09	-	mJ
开启延迟时间 Turn-On delay time	td(on)	V _{CC} =400V,I _C =20A, R _G =10Ω,V _{GE} =15V, T _C =175℃	-	14.0	-	ns
上升时间 Turn-On rise time	tr		-	54.0	-	ns
关断延迟时间 Turn-Off delay time	td(off)		-	76.0	-	ns
下降时间 Turn-Off Fall time	tf		-	146.0	-	ns
开通损耗 Turn-On energy	Eon		-	0.8	-	mJ
关断损耗 Turn-Off energy	Eoff		-	0.49	-	mJ
总开关损耗 Total switching energy	Etot		-	1.3	-	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 Diode Forward Voltage	V _F	V _{GE} =0V, I _F =20A,T _C =25℃	-	1.6	2.2	V
		V _{GE} =0V, I _F =20A,T _C =125℃	-	1.4	2.1	V
		V _{GE} =0V, I _F =20A,T _C =175℃	-	1.3	2.0	V
反向恢复时间 Diode Reverse recovery time	t _{rr}	T _C =25℃,I _F =20A, V _{GE} =0V,d _i /d _t =100A/us	-	254	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q _{rr}		-	347	-	nC
反向恢复电流 Diode Reverse recovery Current	I _{rrm}		-	2.7	-	A
反向恢复时间 Diode Reverse recovery time	t _{rr}	T _C =175℃, I _F =20A, V _{GE} =0V,d _i /d _t =100A/us	-	429	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q _{rr}		-	1010	-	nC
反向恢复电流 Diode Reverse recovery Current	I _{rrm}		-	4	-	A





JT020N065SED/CED/WED/FED

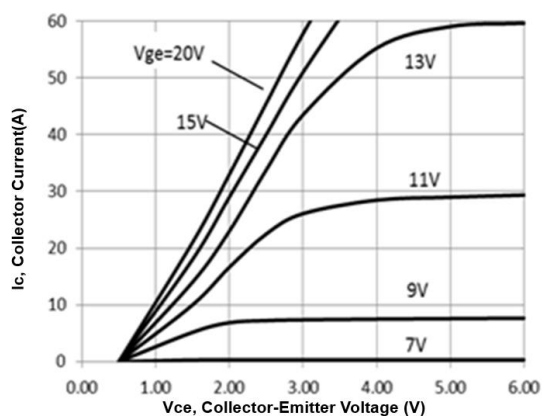
项目 Parameter	符号 Symbol	最大 (max)			单位 Unit
		JT020N065SED/ JT020N065CED	JT020N065WED	JT020N065FED	
结到管壳的热阻 (IGBT) Thermal Resistance, Junction to Case	$R_{th(J-C)}$	0.8	0.77	3.57	°C/W
结到管壳的热阻 (FRD) Thermal Resistance, Junction to Case	$R_{th(J-C)}$	2.13	2.05	7.7	°C/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(J-A)}$	62.5	40	62.5	°C/W



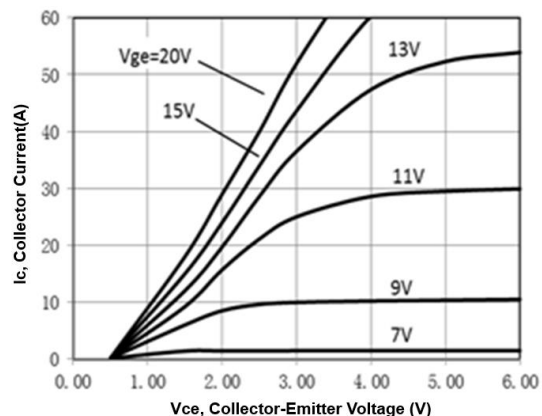


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

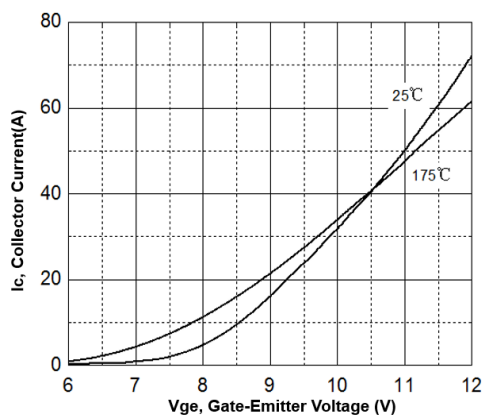
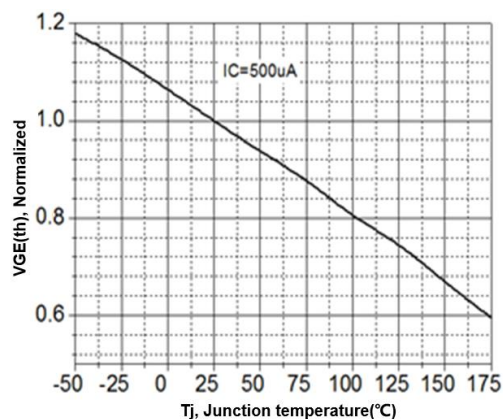
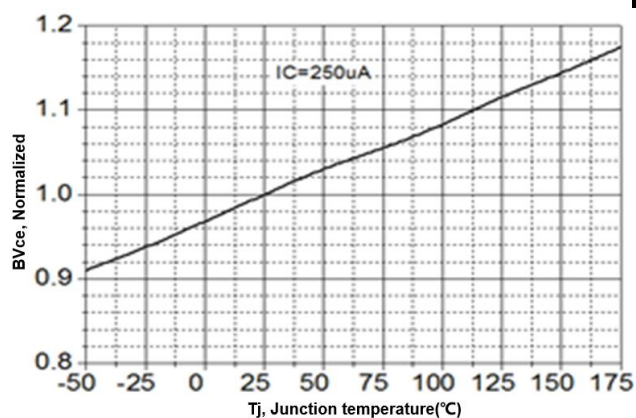
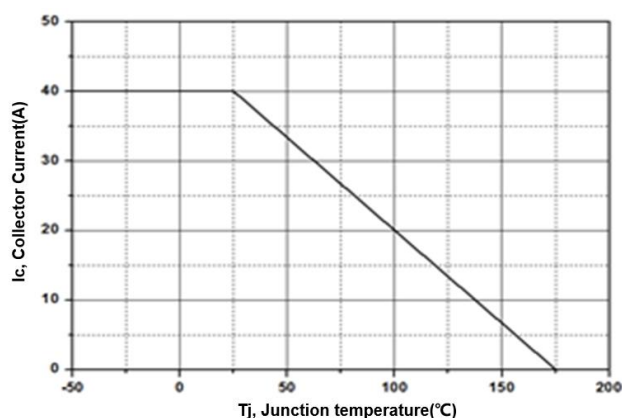
Output Characteristics

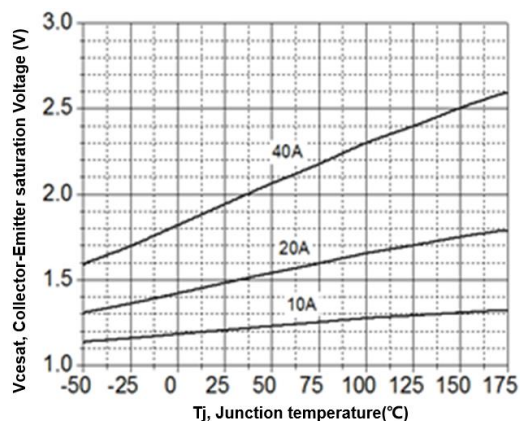
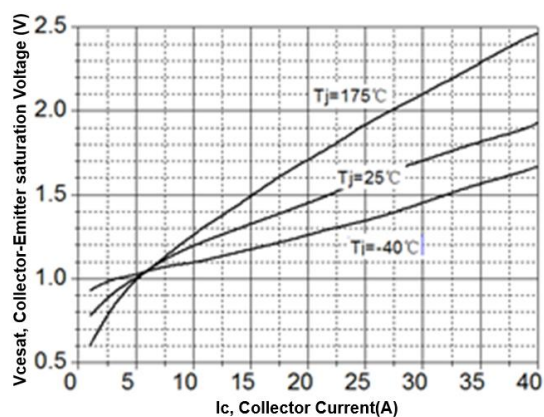
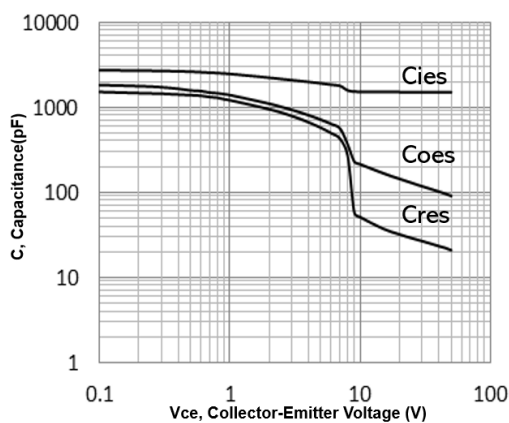
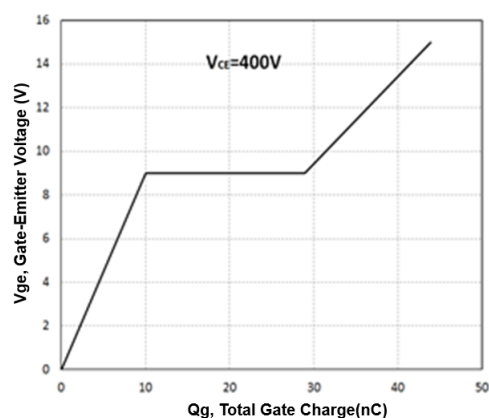
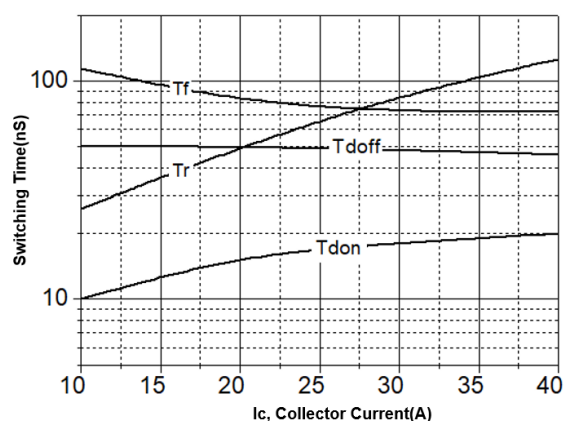
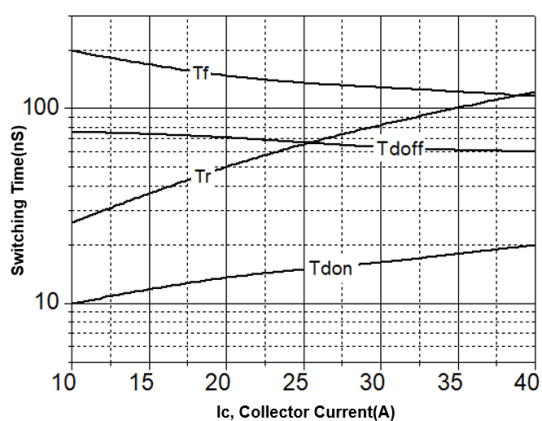
 $T_j = 25^\circ\text{C}$ 

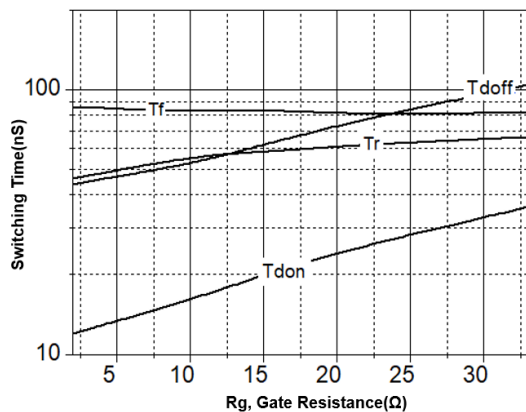
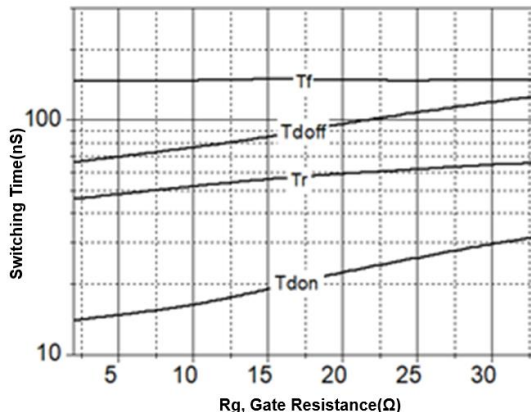
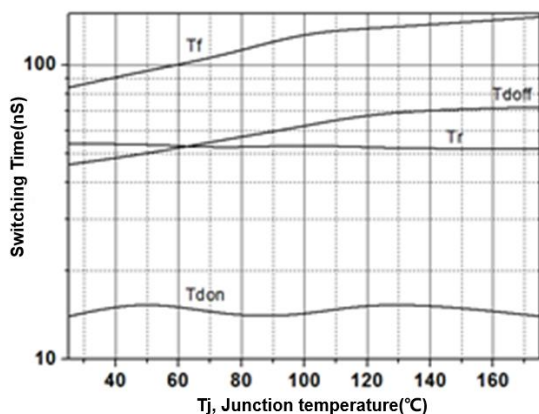
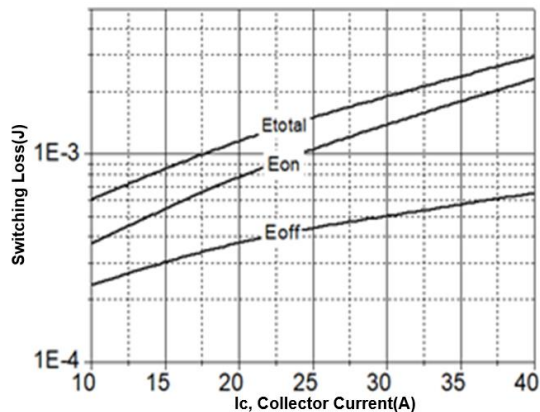
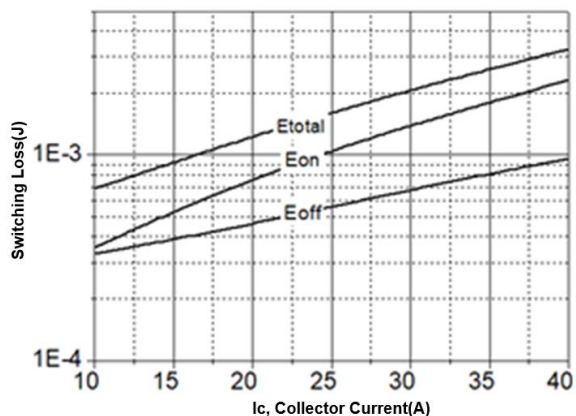
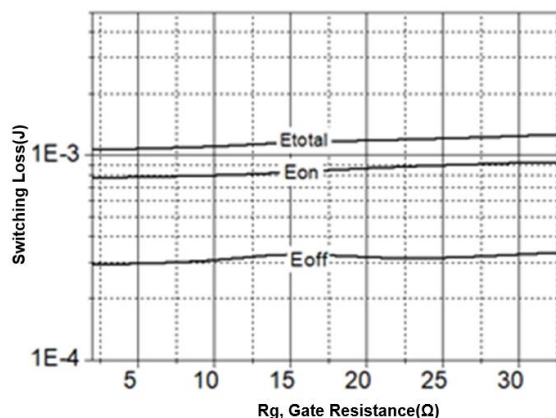
Output Characteristics

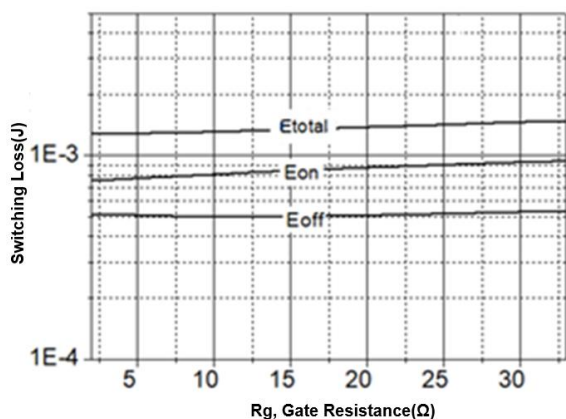
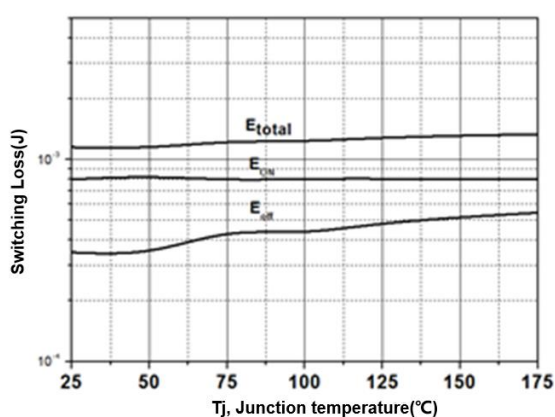
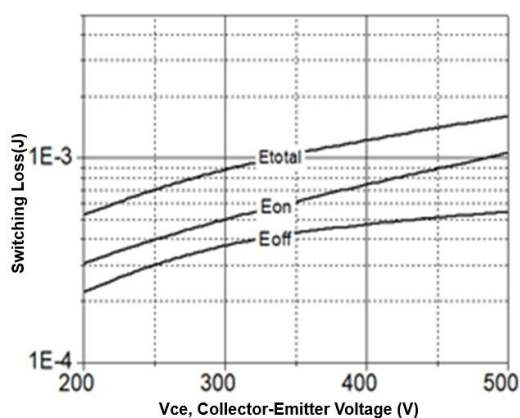
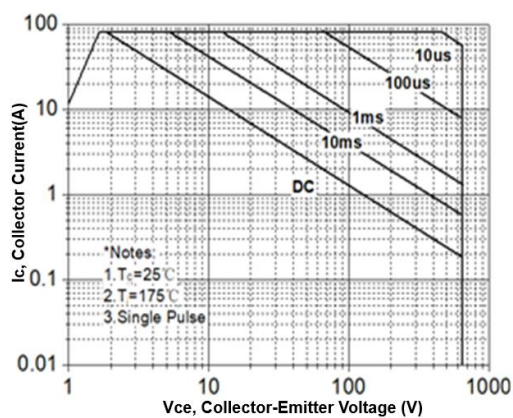
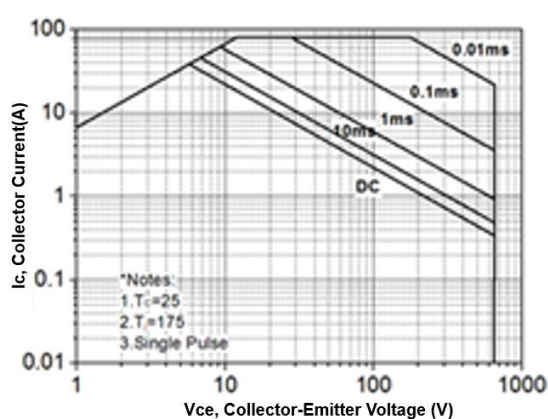
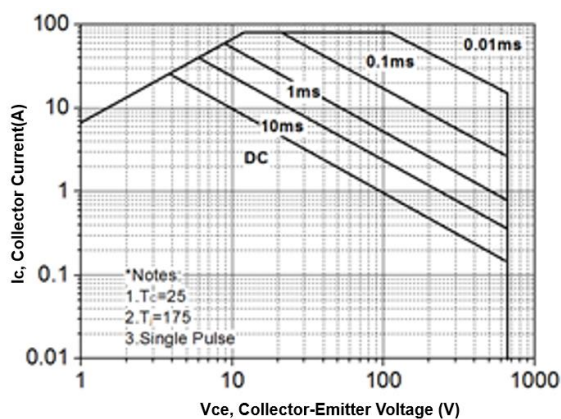
 $T_j = 175^\circ\text{C}$ 

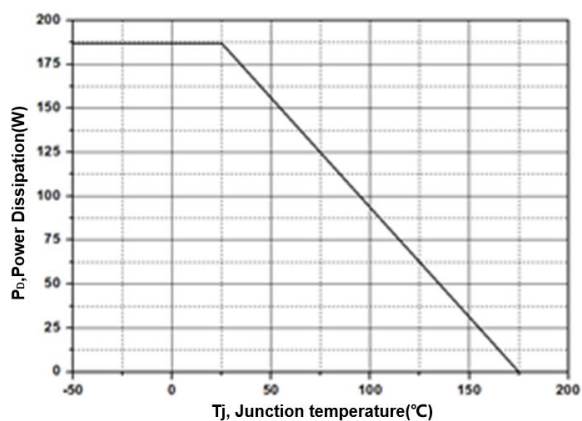
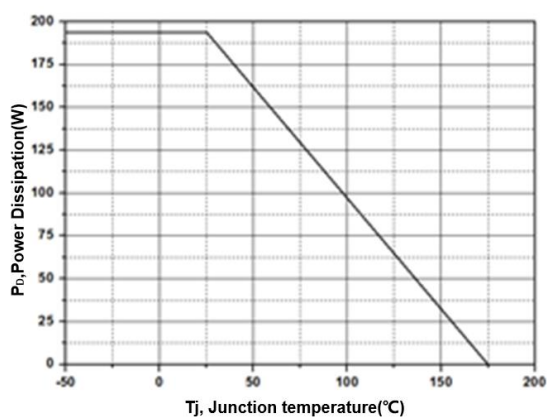
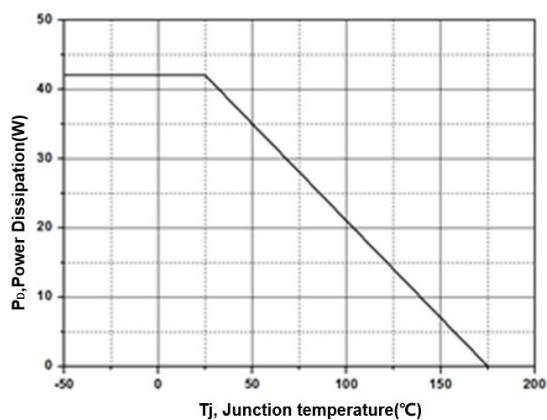
Transfer characteristics

 $V_{ce} = 6\text{V}$ 归一化的 V_{ge} 与 T_j 关系曲线归一化的 BV_{ce} 与 T_j 关系曲线 I_c VS T_j 

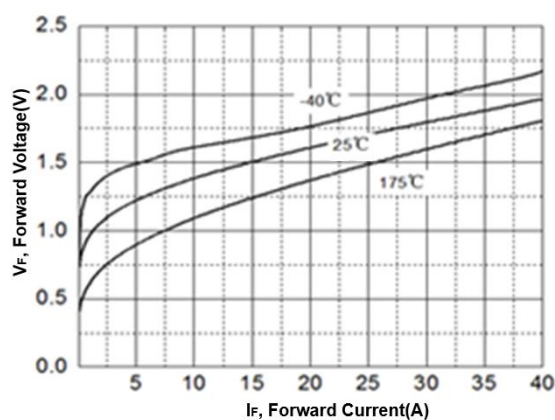
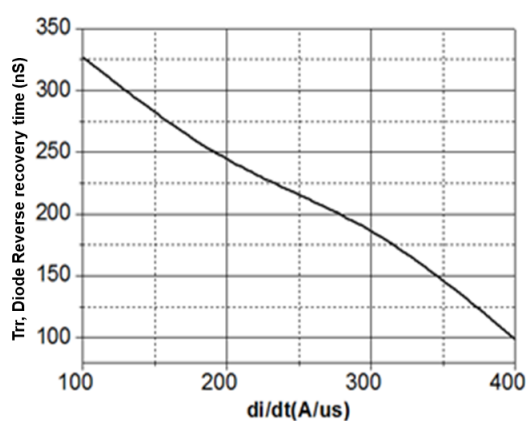
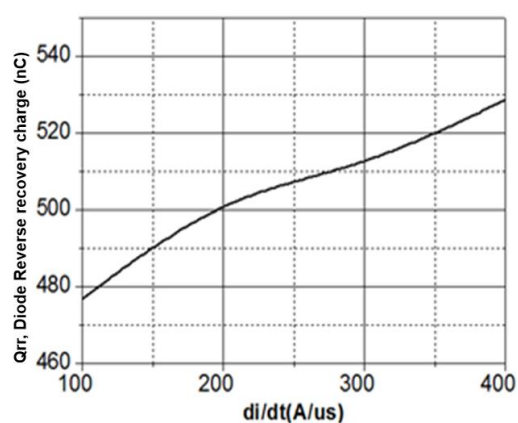
**Vcesat vs T_J** **Vcesat vs I_C** **Capacitance Characteristic** $V_{ge}=0V, f=1.0\text{MHz}$ **Qg VS V_{ge}** **SwitchingTime vs. I_C** $T_J=25^\circ\text{C}, V_{ge}=15V, V_{ce}=400V, R_g=10\Omega$ **SwitchingTime vs. I_C** $T_J=175^\circ\text{C}, V_{ge}=15V, V_{ce}=400V, R_g=10\Omega$ 

**Switching Time vs. R_g** $T_j = 25\text{ }^{\circ}\text{C}$, $V_{ge} = 15\text{V}$, $V_{ce} = 400\text{V}$, $I_c = 20\text{A}$ **Switching Time vs. R_g** $T_j = 175\text{ }^{\circ}\text{C}$, $V_{ge} = 15\text{V}$, $V_{ce} = 400\text{V}$, $I_c = 20\text{A}$ **Switching Time vs. T_j** **Switching Loss vs. I_c** $T_j = 25\text{ }^{\circ}\text{C}$, $V_{ge} = 15\text{V}$, $V_{ce} = 400\text{V}$, $R_g = 10\Omega$ **Switching Loss vs. I_c** $T_j = 175\text{ }^{\circ}\text{C}$, $V_{ge} = 15\text{V}$, $V_{ce} = 400\text{V}$, $R_g = 10\Omega$ **Switching Loss vs. R_g** $T_j = 25\text{ }^{\circ}\text{C}$, $V_{ge} = 15\text{V}$, $V_{ce} = 400\text{V}$, $I_c = 20\text{A}$ 

**Switching Loss vs. R_g** $T_j=175^\circ\text{C}, V_{ge}=15\text{V}, V_{ce}=400\text{V}, I_c=20\text{A}$ **Switching Loss vs. T_j** $V_{ge}=15\text{V}, V_{ce}=400\text{V}, I_c=20\text{A}, R_g=10\Omega$ **Switching Loss vs. V_{ce}** $T_j=175^\circ\text{C}, V_{ge}=15\text{V}, I_c=20\text{A}, R_g=10\Omega$ **Safe Operating Area TO-247****Safe Operating Area TO-263/TO-220C****Safe Operating Area TO-220MF**

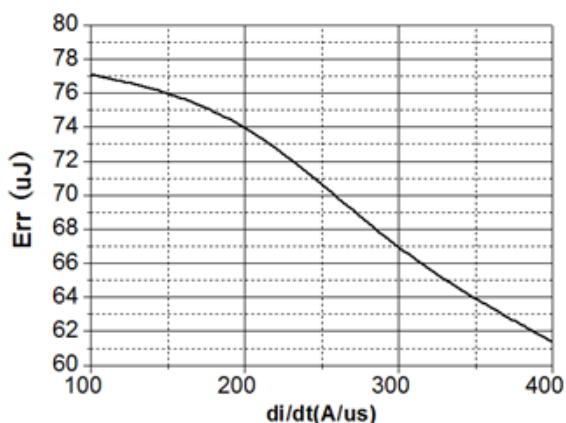
 P_D VS temperature (TO-263/TO-220C) P_D VS temperature (TO-247) P_D VS temperature (TO-220MF)

Diode Characteristic

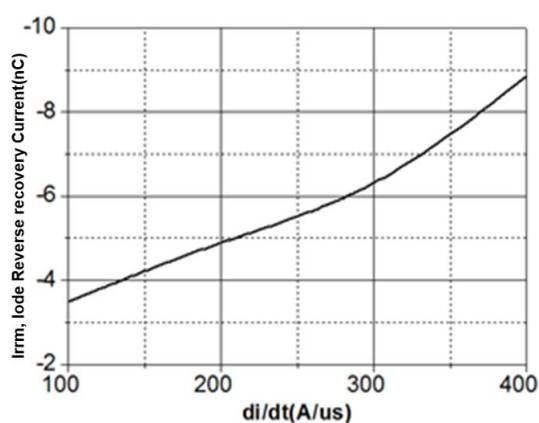
 T_{rr} 与 di/dt 关系曲线 Q_{rr} 与 di/dt 关系曲线



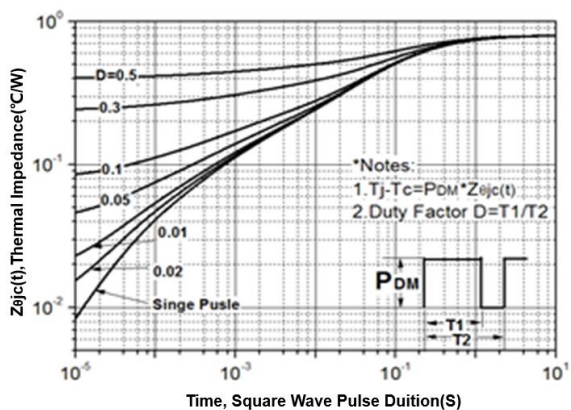
Err与di/dt关系曲线



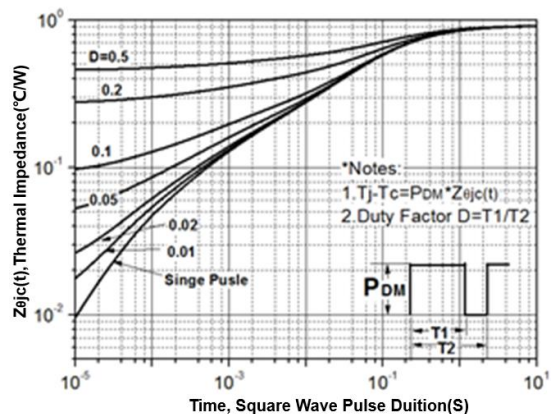
Irrm与di/dt关系曲线



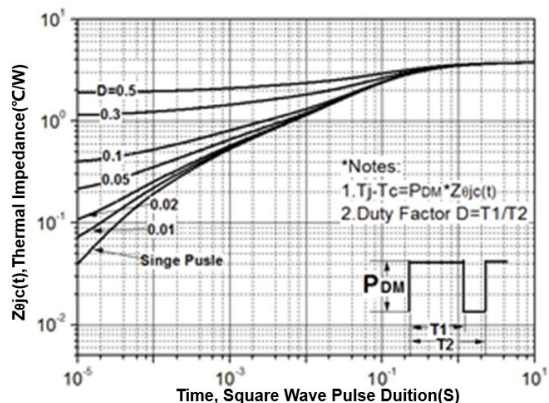
Normalized Maximum Transient Thermal Impedance for IGBT(TO-247)



Normalized Maximum Transient Thermal Impedance for IGBT(TO-263/TO-220C)



Normalized Maximum Transient Thermal Impedance for IGBT(TO-220MF)

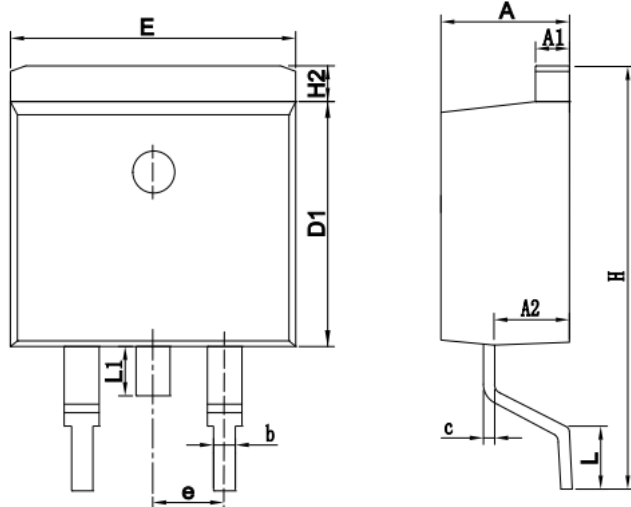




外形尺寸PACKAGE MECHANICAL DATA

TO-263

单位 UNIT:mm



SYMBOL	MM	
	MIN	MAX
A	4.30	4.80
A1	1.12	1.42
A2	2.54	2.84
b	0.67	1.00
c	0.29	0.52
D1	8.40	9.00
E	9.80	10.46
e	2.54BSC	
H	14.00	16.00
H2	1.12	1.45
L	1.50	3.10
L1	1.45	1.70

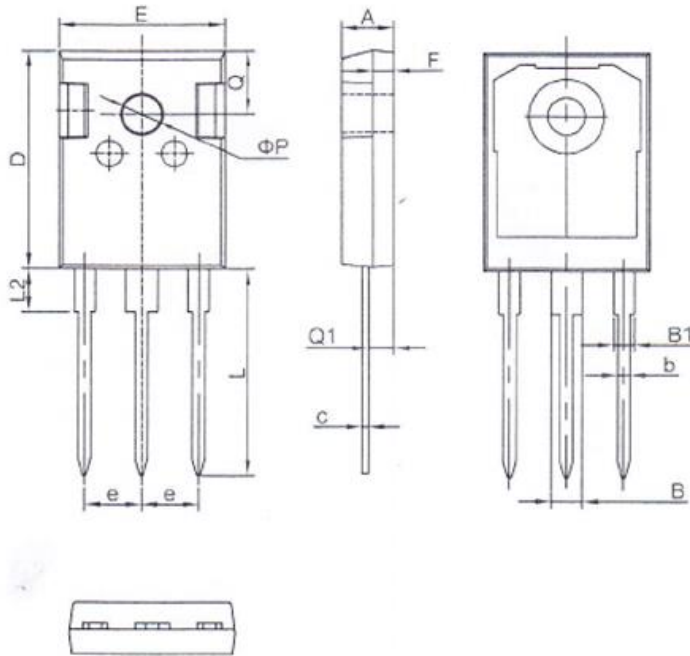




外形尺寸PACKAGE MECHANICAL DATA

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

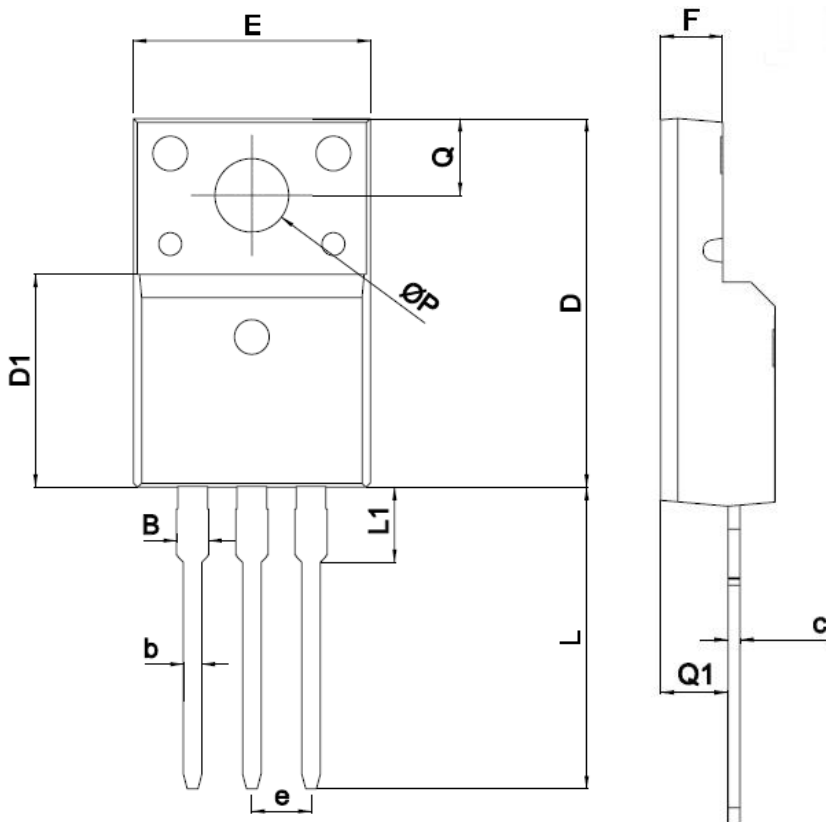




外形尺寸PACKAGE MECHANICAL DATA

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

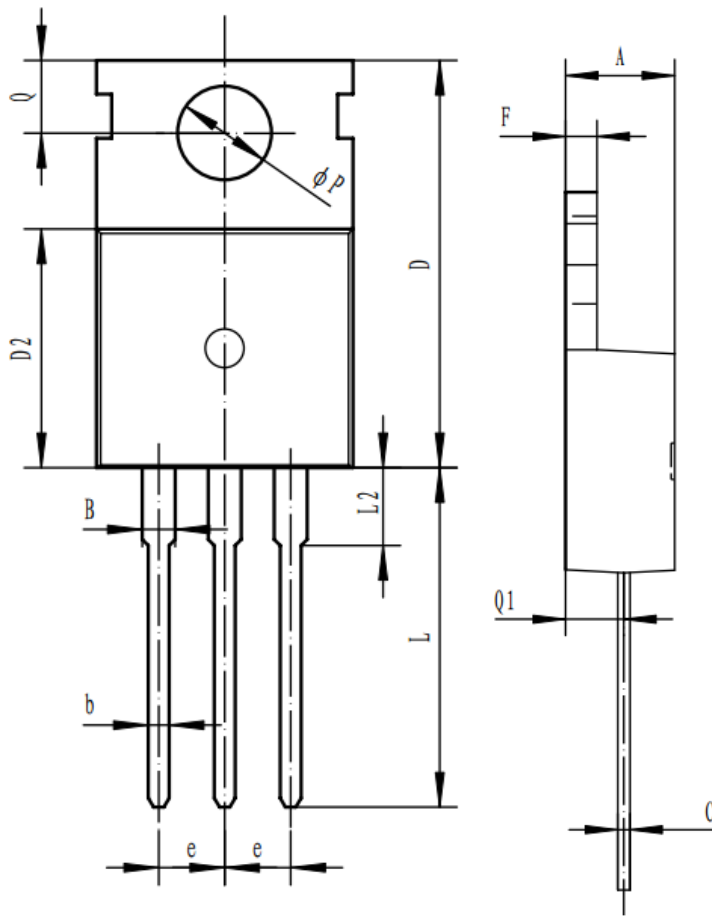




外形尺寸PACKAGE MECHANICAL DATA

TO-220C

单位 UNIT:mm



符号 symbol	MIN	MAX
A	4.30	4.70
B	1.22	1.40
b	0.70	0.95
c	0.40	0.65
D	15.20	16.20
D2	9.00	9.40
E	9.70	10.10
e	2.39	2.69
F	1.25	1.40
L	12.60	13.60
L2	2.80	3.20
Q	2.60	3.00
Q1	2.20	2.60
P	3.50	3.80

