BRGB20N65FL

Rev.A Mar.-2026

描述 / Descriptions

TO-220FL 塑封封装绝缘栅双极晶体管。

Insulated-Gate Bipolar Transistor in a TO-220FL Plastic Package.

特征 / Features

650V/20A $V_{CE(SAT)}$= 1.45V(typ.) @I_C= 20A

低栅极电荷 Low gate charge

Trench FS 技术 Trench FS Technology

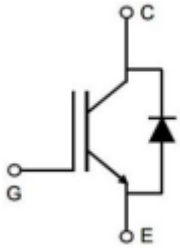
RoHS 产品 RoHS product

用途 / Applications

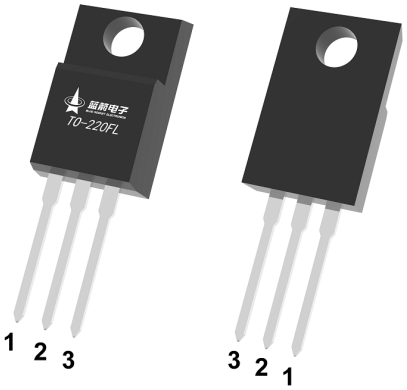
逆变器，UPS电源。

General purpose inverters,UPS.

内部等效电路 / Equivalent Circuit



引脚排列 / Pinning



PIN1：G PIN 2：C PIN 3：E

印章代码 / Marking

见印章说明。

See Marking Instructions.

极限参数 / Absolute Maximum Ratings(T_a=25℃)

参数 Parameter		符号 Symbol	数值 Rating	单位 Unit
Collector-Emitter Voltage		V_{CES}	650	V
Continuous Collector Current	T_C=+25℃	I_C	40	A
	T_C=+100℃		20	A
Pulsed Collector Current , Limited by T_{Jmax}		I_{CM}	80	A
Continuous Diode Forward Current	T_C=+25℃	I_F	40	A
	T_C=+100℃		20	A
Surge non repetitive forward current tp= 8.3 ms sinusoidal		I_{FSM}	120	A
Gate-Emitter Voltage		V_{GE}	±30	V
Power Dissipation	T_C=+25℃	P_D	48	W
Operating and Storage Temperature Range		T_{STG}	-55 to +175	℃
Operating Temperature Range		T_J	-55 to +175	℃
Maximum Junction-to-Ambient		$R_{\theta JA}$	78	℃/W
Maximum IGBT Junction-to-Case		$R_{\theta JC}$	3.10	℃/W
Maximum Diode Junction-to-Case		$R_{\theta JC}$	4.12	℃/W

电性能参数 / Electrical Characteristics(Ta=25℃)

参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
Collector-Emitter Breakdown Voltage	BV_{CES}	I_C=250uA, V_{GE}=0V	650			V
Zero Gate Voltage Collector current	I_{CES}	V_{CE}=650V, V_{GE}=0V T_J=25℃			35	uA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}=0V, V_{GE}= ±20V			±200	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{CE}=V_{GE} I_C=250uA	4.5	5.2	6.5	V

电性能参数 / Electrical Characteristics(Ta=25℃)

Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=20A	T_J=25℃		1.45	1.82	V
			T_J=125℃		1.68		
			T_J=175℃		1.93		
Diode Forward Voltage	V_F	V_{GE}=0V, I_F=20A	T_J=25℃		1.40	1.84	V
			T_J=125℃		1.24		
			T_J=175℃		1.14		
Input Capacitance	C_{ies}	V_{GE}=0V, V_{CE}=25V, f=1MHz,T_J=25℃			1420		pF
Output Capacitance	C_{oes}				72		pF
Reverse Transfer Capacitance	C_{res}				18		pF
Total Gate Charge	Q_g	V_{CC}=400V,I_C=20A,R_G=10Ω,V_{GE}=15V,T_C=25℃			60		nC
Gate to Emitter Charge	Q_{ge}				15		nC
Gate to Collector Charge	Q_{gc}				9.5		nC
Gate resistance	Rg	f=1MHz,open collector			2.1		Ω
Turn-On Delay Time	$t_{d(on)}$	T_J=25℃, V_{GE}=15V,V_{CC}=400V, I_C=20A, R_G=10Ω Inductive Load			28		ns
Turn-On Rise Time	t_r				30		ns
Turn-Off Delay Time	$t_{d(off)}$				95		ns
Turn-Off Fall Time	t_f				11		ns
Turn-On Energy	E_{on}				0.60		mJ
Turn-Off Energy	E_{off}				0.31		mJ
Total Switching Energy	E_{ts}				0.91		mJ
Turn-On Delay Time	$t_{d(on)}$	T_J=175℃, V_{GE}=15V,V_{CC}=400V, I_C=20A, R_G=10Ω Inductive Load			27		ns
Turn-On Rise Time	t_r				26		ns
Turn-Off Delay Time	$t_{d(off)}$				115		ns
Turn-Off Fall Time	t_f				17		ns
Turn-On Energy	E_{on}				0.65		mJ
Turn-Off Energy	E_{off}				0.38		mJ
Total Switching Energy	E_{ts}				1.03		mJ
Diode Reverse Recovery Time	T_{rr}	T_J=25℃,I_F=20A, di/dt=100A/us			85		ns
Diode Reverse Recovery Charge	Q_{rr}				0.15		uC
Diode Peak Reverse Recovery Current	I_{rm}				2.0		A
Diode Reverse Recovery Time	T_{rr}	T_J=175℃,I_F=20A, di/dt=100A/us			155		ns
Diode Reverse Recovery Charge	Q_{rr}				0.5		uC
Diode Peak Reverse Recovery Current	I_{rm}				3.9		A

电参数曲线图 / Electrical Characteristic Curve

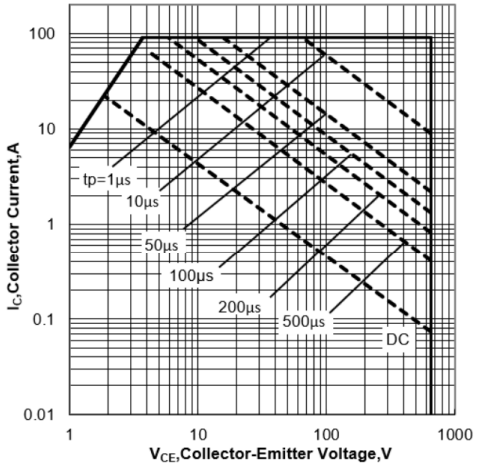


Figure 1. Forward Bias Safe Operating Area

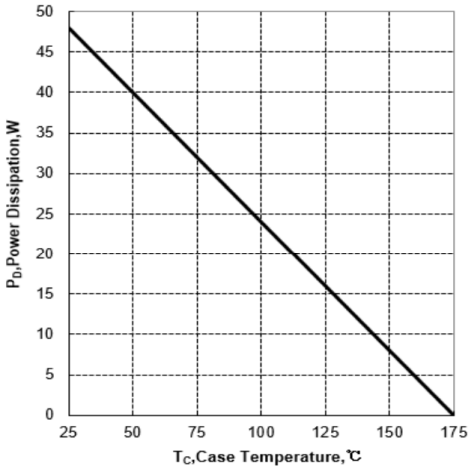


Figure 2. Power Dissipation vs Case Temperature

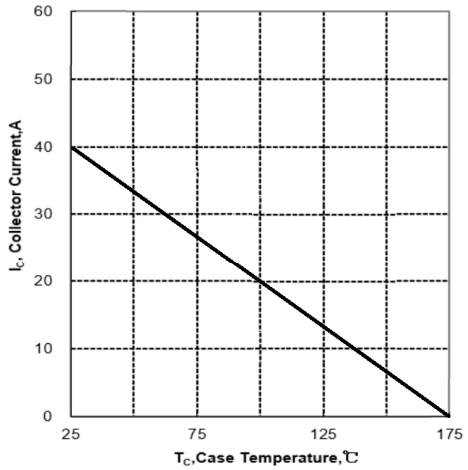


Figure 3. Collector Current vs Case Temperature

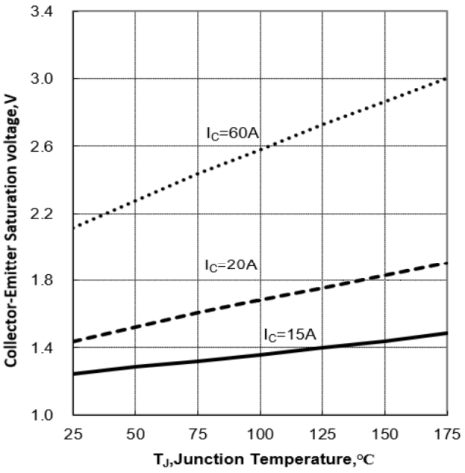


Figure 4. Typical Collect-Emitter Saturation Voltage vs Junction Temperature

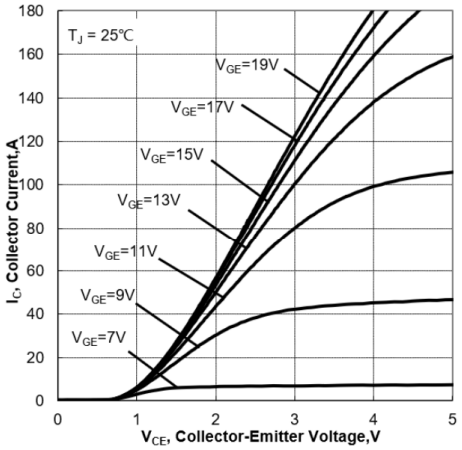


Figure 5. Typical Output Characteristics (TJ=25℃)

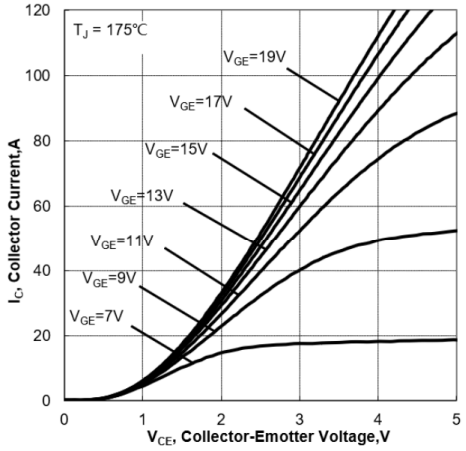


Figure 6. Typical Output Characteristics (TJ=175℃)

电参数曲线图 / Electrical Characteristic Curve

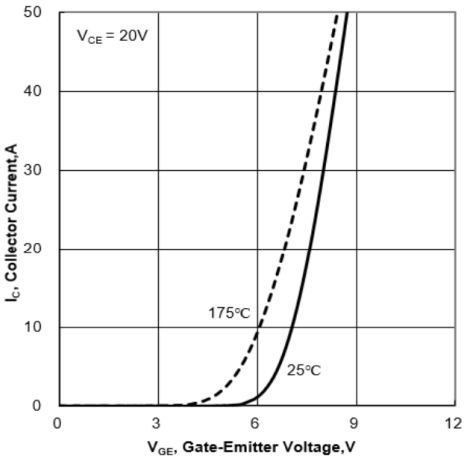


Figure 7. Typical Transfer Characteristics

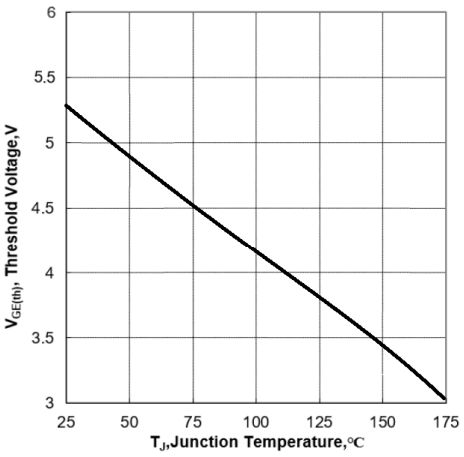


Figure 8. Typical Gate-Emitter Threshold Voltage vs Junction Temperature

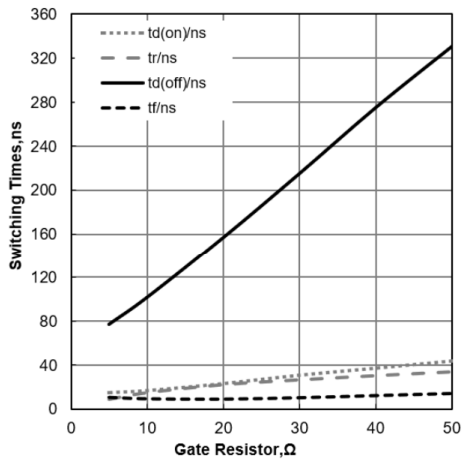


Figure 9. Typical Switching Times vs Gate Resistor (TJ=25℃, VCE=400V, VGE=15/0V, IC=20A)

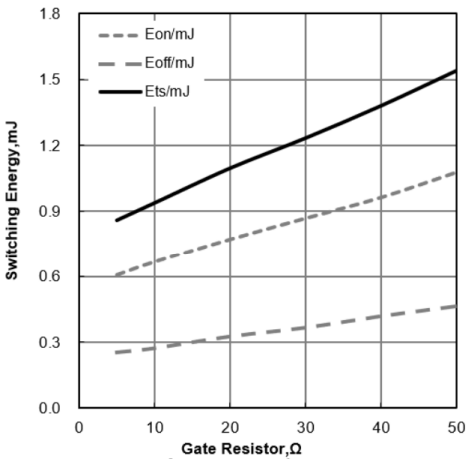


Figure 10. Typical Switching Energy vs Gate Resistor (TJ=25℃, VCE=400V, VGE=15/0V, IC=20A)

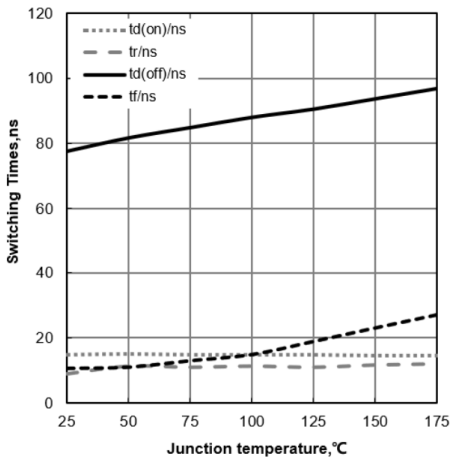


Figure 11. Typical Switching Times vs Junction Temperature (VCE=400V, VGE=15/0V, IC=20A)

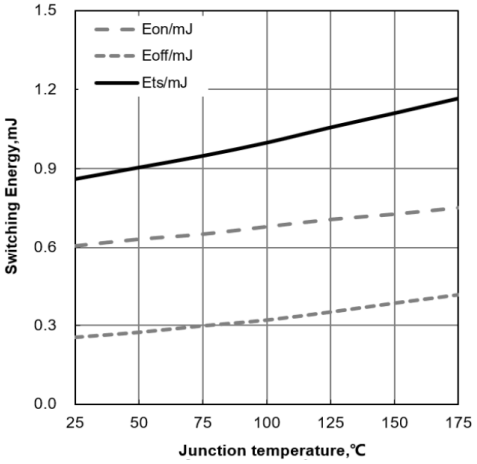


Figure 12. Typical Switching Energy vs Junction Temperature (VCE=400V, VGE=15/0V, IC=20A)

电参数曲线图 / Electrical Characteristic Curve

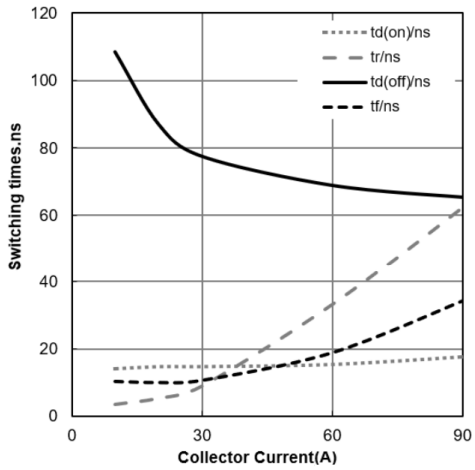


Figure 13. Typical Switching Times vs Collector Current (TJ=25℃, VCE=400V, VGE=15/0V)

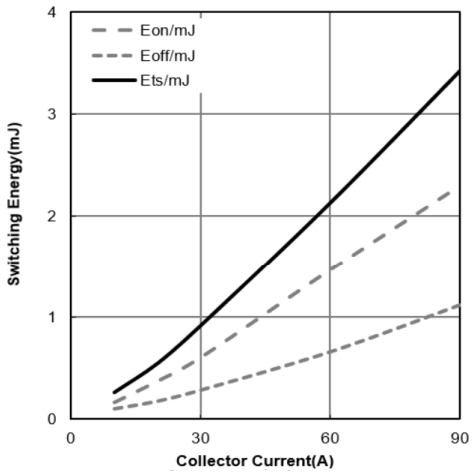


Figure 14. Typical Switching Energy vs Collector Current (TJ=25℃, VCE=400V, VGE=15/0V)

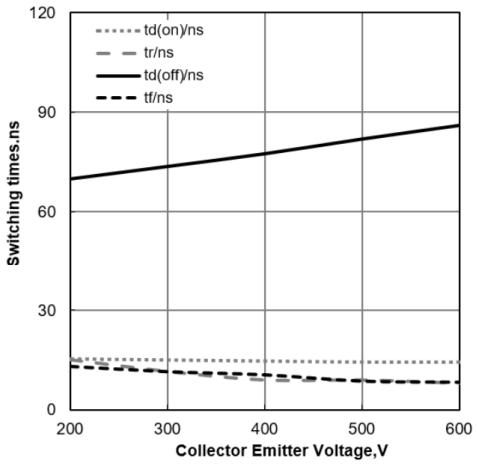


Figure 15. Typical Switching Times vs VCE (TJ=25℃,VGE=15/0V, IC=20A)

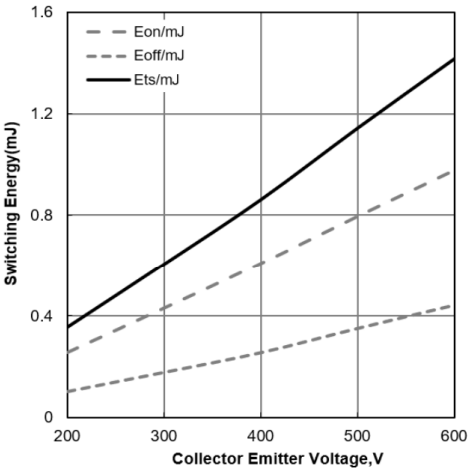


Figure 16. Typical Switching Energy vs VCE (TJ=25℃, VGE=15/0V, IC=20A)

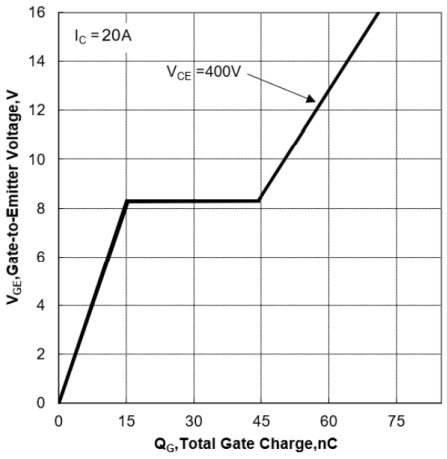


Figure 17. Typical Gate Charge

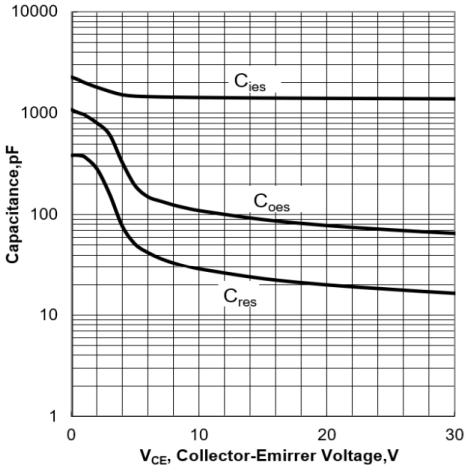


Figure 18. Typical Capacitance vs CollectorEmitter Voltage

电参数曲线图 / Electrical Characteristic Curve

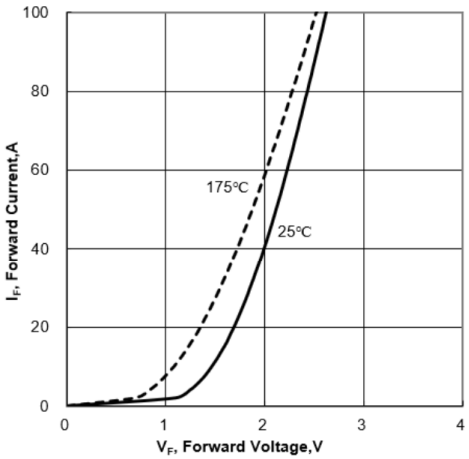
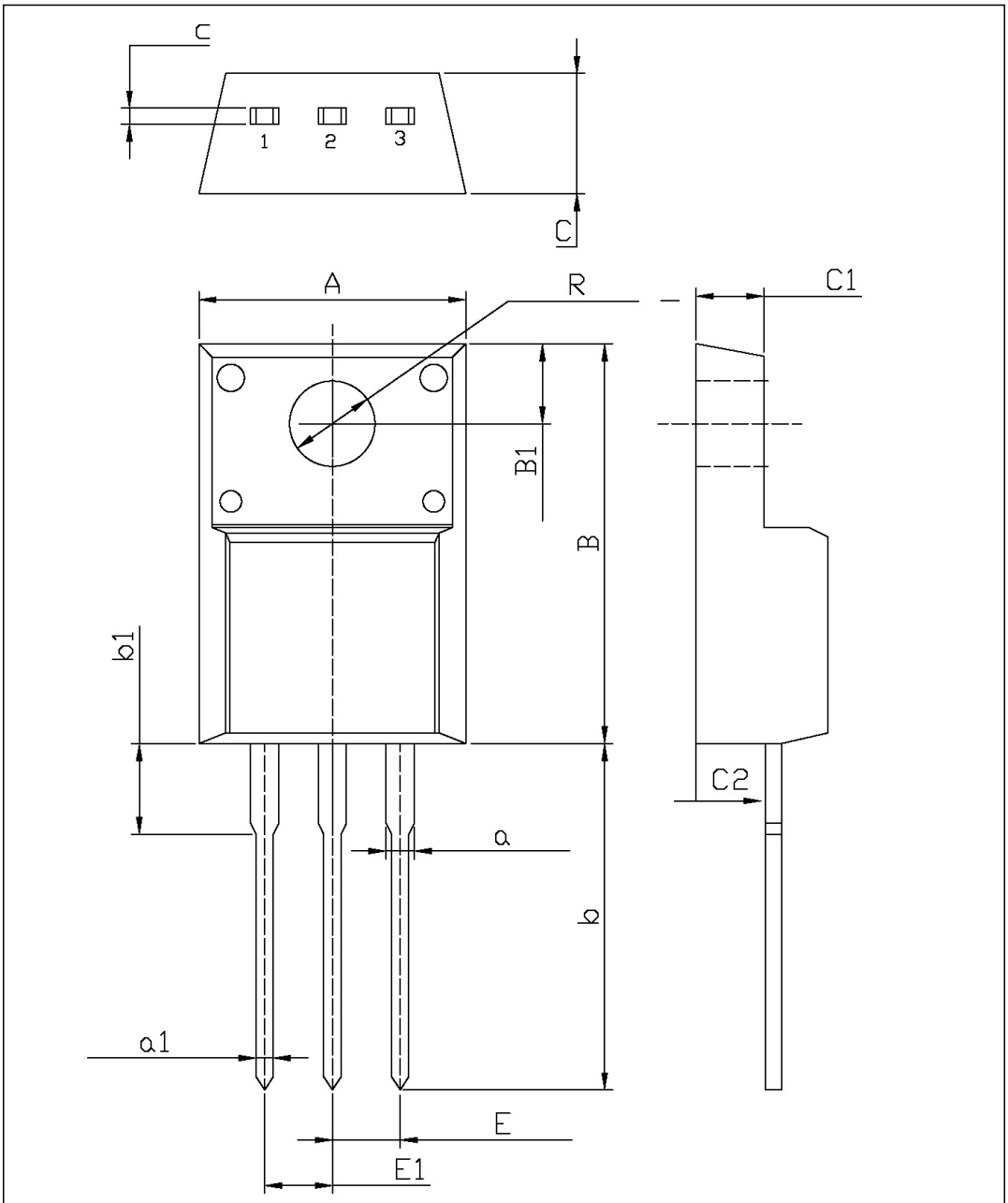


Figure 19. Typical Diode Forward Current vs Forward Voltage

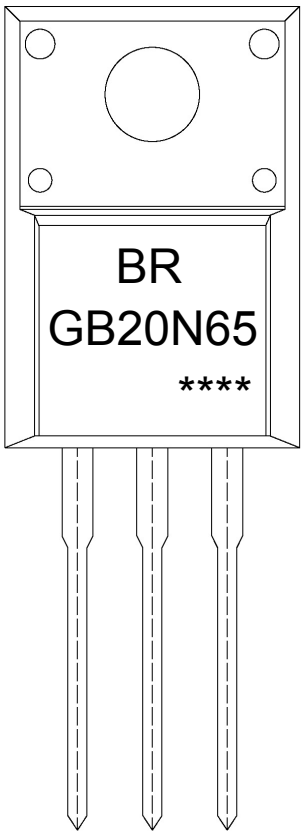
外形尺寸图 / Package Dimensions

TO-220FL 单位：mm



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
C	4.5	4.9	b1	2.90	3.90
c	0.4	0.6	a	1.08	1.48
A	9.96	10.36	a1	0.70	0.90
B	15.67	16.07	E	2.34	2.74
B1	3.30	3.50	E1	2.34	2.74
R	3.08	3.28	C1	2.34	2.74
b	12.48	13.48	C2	2.56	2.96

印章说明 / Marking Instructions



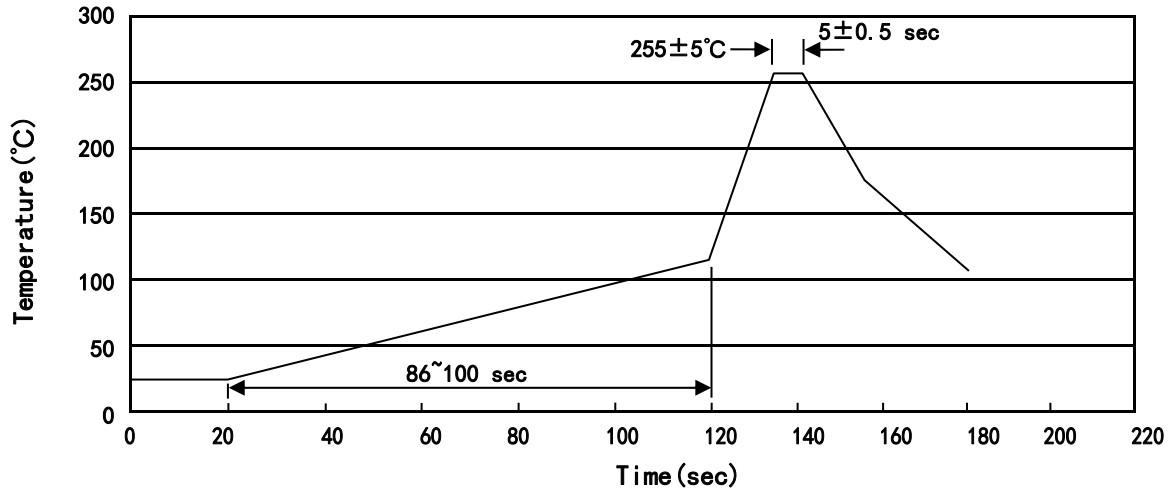
说明：

BR：	为公司代码
GB20N65：	为型号代码
****：	为生产批号代码，随生产批号变化

Note:

BR:	Company Code
GB20N65:	Product Type Code
****:	Lot No. Code, code change with Lot No.

波峰焊温度曲线图(无铅) / Temperature Profile for Dip Soldering(Pb-Free)



说明：

1、预热温度 25～150℃，时间 60～90sec;

2、峰值温度 255±5℃，时间持续为 5±0.5sec;

3、焊接制程冷却速度为 2～10℃/sec.

Note:

1.Preheating:25~150℃, Time:60~90sec.

2.Peak Temp.:255±5℃, Duration:5±0.5sec.

3. Cooling Speed: 2~10℃/sec.

耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions

温度：270±5℃ 时间：10±1 sec. Temp.:270±5℃ Time:10±1 sec

包装规格 / Packaging SPEC.

套管包装 / TUBE

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit：mm³)		
	Units/Tube 只/套管	Tubes/Inner Box 套管/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Tube 套管	Inner Box 盒	Outer Box 箱
TO-220FL	50	20	1,000	5	5,000	532×33×7.0	555×164×50	575×290×180

使用说明 / Notices

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