

描述 / Descriptions

TO-3P 塑封封装绝缘栅双极晶体管。Insulated-Gate Bipolar Transistor in a TO-3P Plastic Package.

特征 / Features

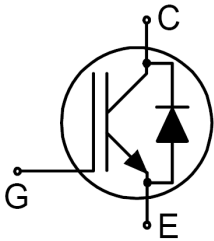
内置快恢复二极管, 饱和压降为正温度系数, 高可靠性及热稳定性, 良好的参数一致性, RoHS 产品。
Built in fast recovery diode, Saturation voltage positive temperature coefficient, High reliability and thermal stability parameters, good agreement, RoHS product.

用途 / Applications

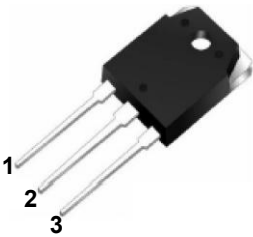
逆变器, 变频器, 不间断电源。

General purpose inverter, Frequency converters, Uninterrupted Power Supply(UPS).

内部等效电路 / Equivalent Circuit



引脚排列 / Pinning



PIN1 : Gate PIN 2 : Collector PIN 3 : Emitter

放大及印章代码 / h_{FE} Classifications & Marking

见印章说明。See Marking Instructions.

极限参数 / Absolute Maximum Ratings(Ta=25°C)

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Collector-emitter voltage	V_{CES}	650	V
Gate-emitter voltage	V_{GES}	±20	V
Collector current@T _C =25°C	I_C	120	A
Collector current@T _C =100°C		60	A
Collector peak current, T _P limited by T _{JMAX}	I_{CM}	180	A
Diode forward current@T _C =100°C	I_F	30	A
Diode maximum forward current	I_{FM}	60	A
Power dissipation(T _C =25°C)	P_D	310	W
Power dissipation(T _C =100°C)		125	W
Operating junction and storage temperature range	T _J , T _{stg}	-55~155	°C
Maximum temperature for soldering	T _L	260	°C
IGBT thermal resistance,junction-case	$R_{th(j-c)}$	0.4	°C/W
Diode thermal resistance,junction-case	$R_{th(j-c)}$	1.2	°C/W
Thermal resistance,junction-ambient	$R_{th(j-a)}$	40	°C/W

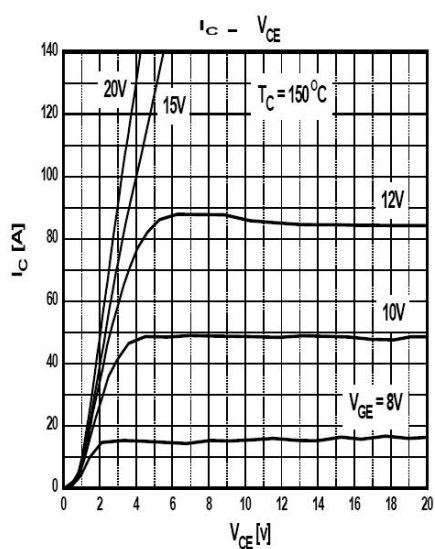
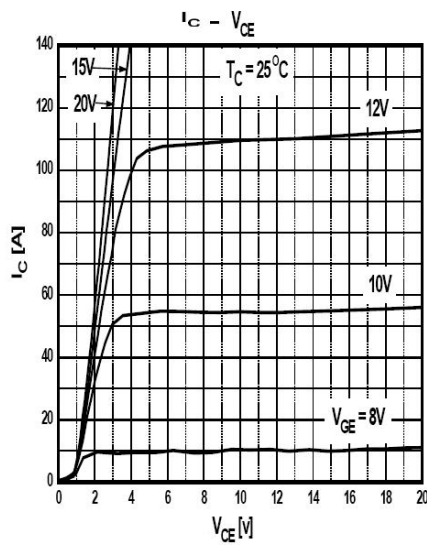
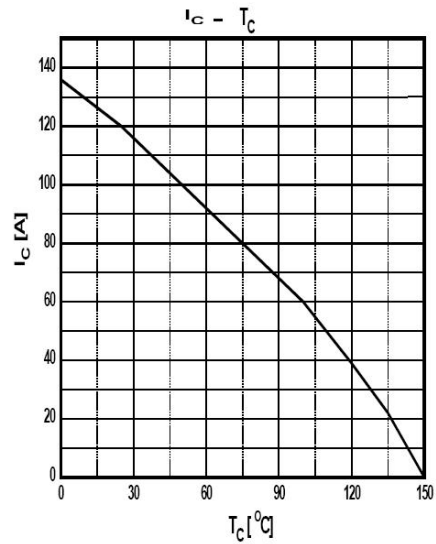
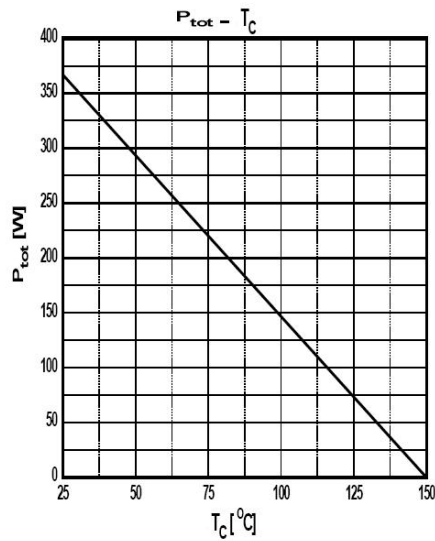
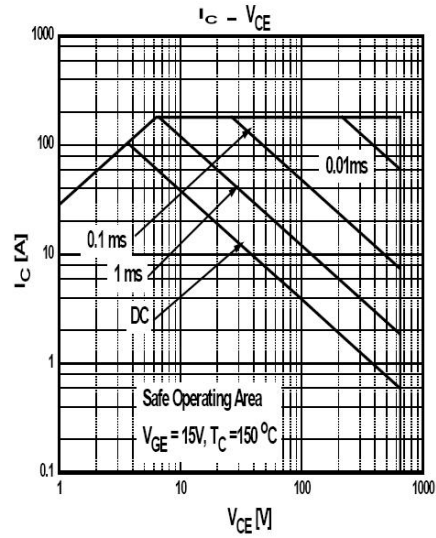
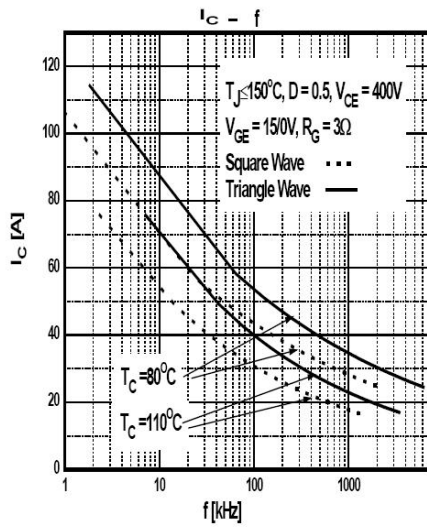
电性能参数 / Electrical Characteristics(Ta=25°C)

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	V_{CES}	$V_{GE}=0V$ $I_{CE}=1.0mA$	650	-	-	V
Zero gate voltage Collector current	I_{CES}	$V_{GE}=0V$ $V_{CE}=650V$	-	-	4	µA
Gate-body leakage current	I_{GES}	$V_{GE}=±20V$ $V_{CE}=0V$	-	-	±100	nA
Gate threshold voltage	$V_{GE(th)}$	$I_C=0.8mA$ $V_{CE}=V_{GE}$	5.3	5.7	6.3	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=60A$ $V_{GE}=15V$	-	2.2	-	V
Input capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1MHz$	-	5150	-	pF
Output capacitance	C_{oes}		-	300	-	
Reverse transfer capacitance	C_{res}		-	65	-	

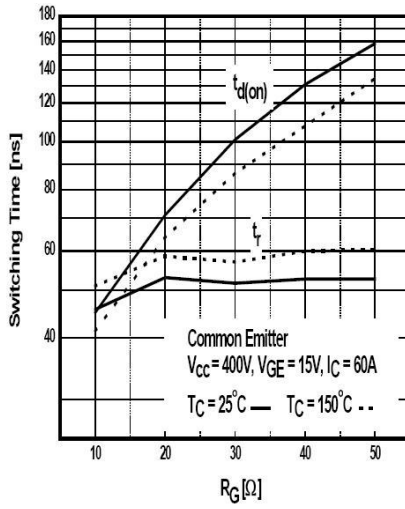
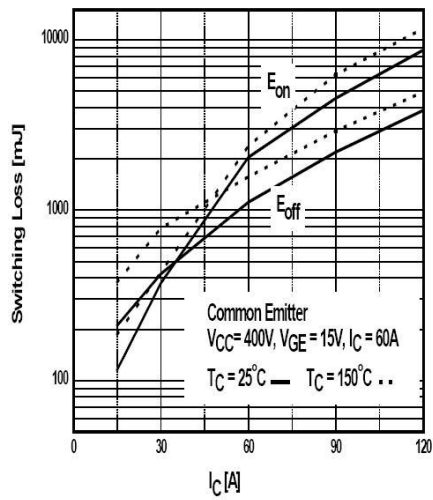
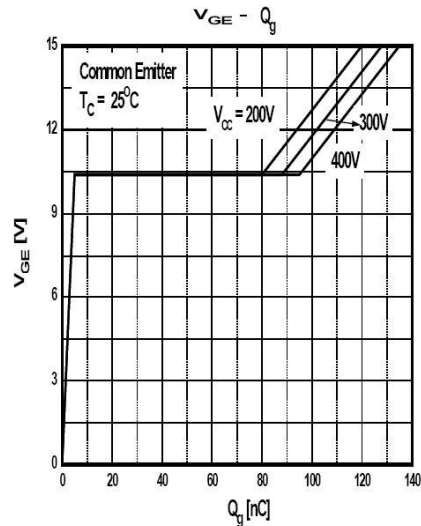
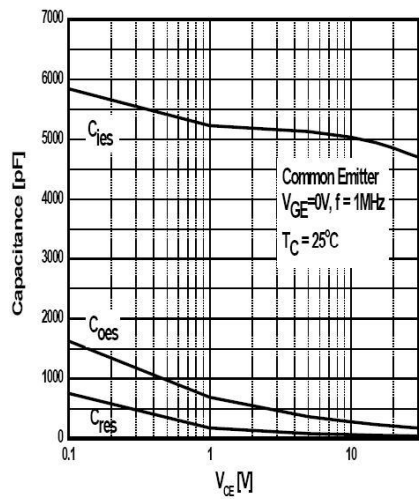
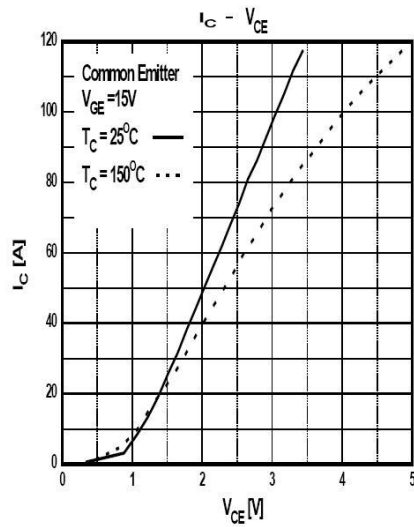
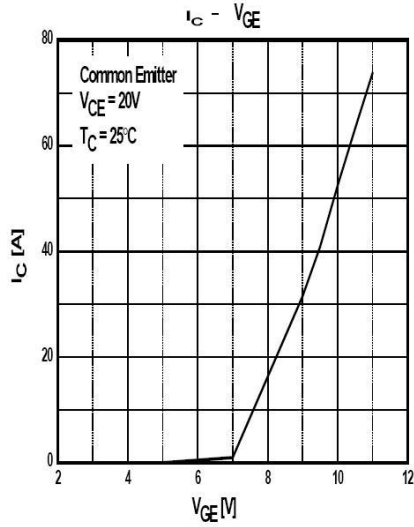
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Input capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1MHz$	-	5150	-	pF
Output capacitance	C_{oes}		-	300	-	
Reverse transfer capacitance	C_{res}		-	65	-	
Turn-on delay time	$t_{d(ON)}$	$V_{CE}=400V$ $I_C=60A,$ $R_G=3\Omega$ $V_{GE}=0/15V$ Inductive Load	-	35	-	ns
Rise time	t_r		-	35	-	
Turn-off delay time	$t_{d(OFF)}$		-	107	-	
Fall time	t_f		-	36	-	
Turn-On Switching Loss	E_{on}		-	2.05		mJ
Turn-Off Switching Loss	E_{off}		-	1.11		
Total Switching Loss	E_{ts}		-	3.16		
Total gate charge	Q_G	$V_{CE}=480V$ $I_C=60A$ $V_{GE}=15V$	-	135	-	nC
Diode forward voltage	V_F	$I_F=60A$	-	2.54		V
Reverse recovery time	T_{rr}	$VR=400V$ $I_F=30A$ $di/dt=500A/\mu S$	-	60		ns
Diode Peak Reverse Recovery Current	I_{rr}		-	12		A
Reverse recovery charge	Q_{rr}		-	0.4		uC

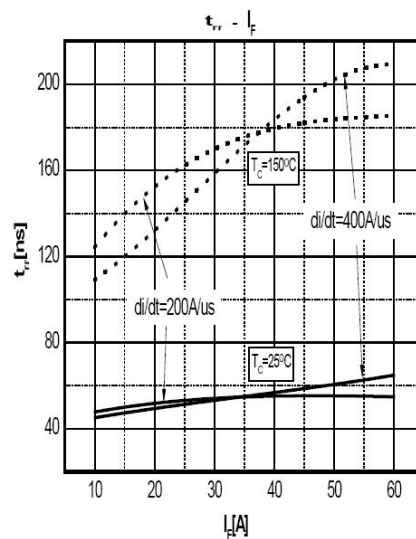
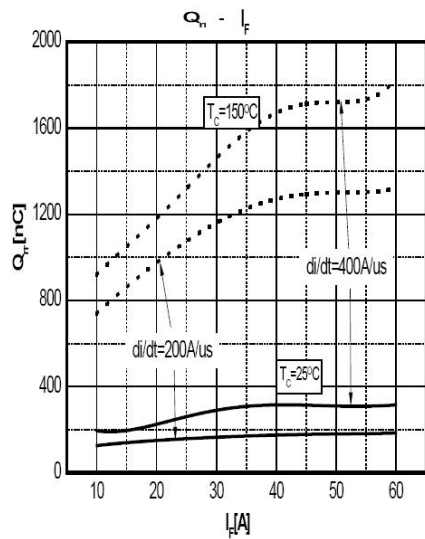
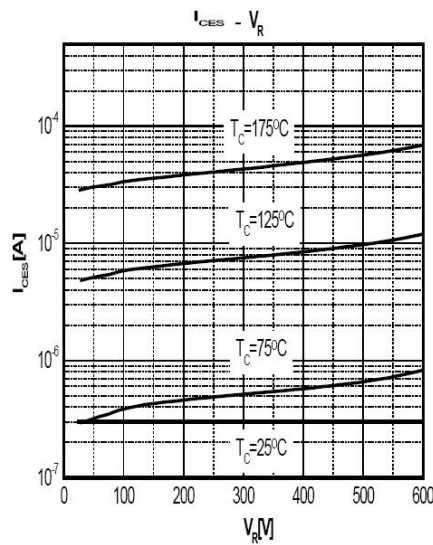
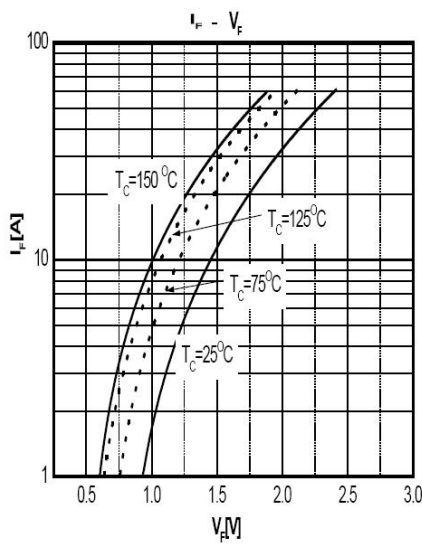
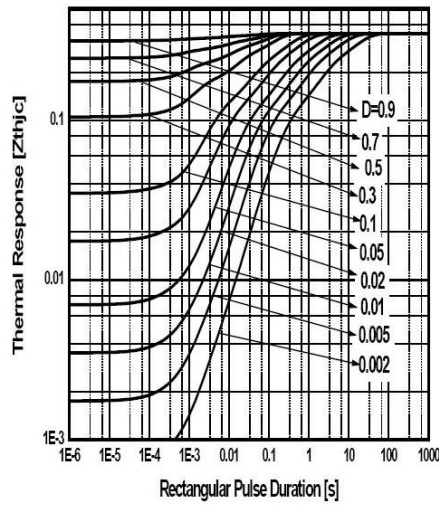
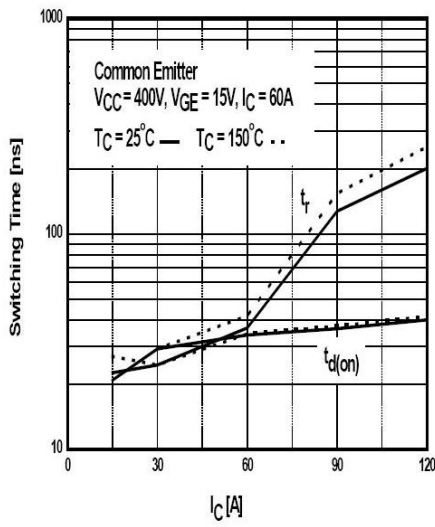
电参数曲线图 / Electrical Characteristic Curve



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电参数曲线图 / Electrical Characteristic Curve



波形图 / Wave curve

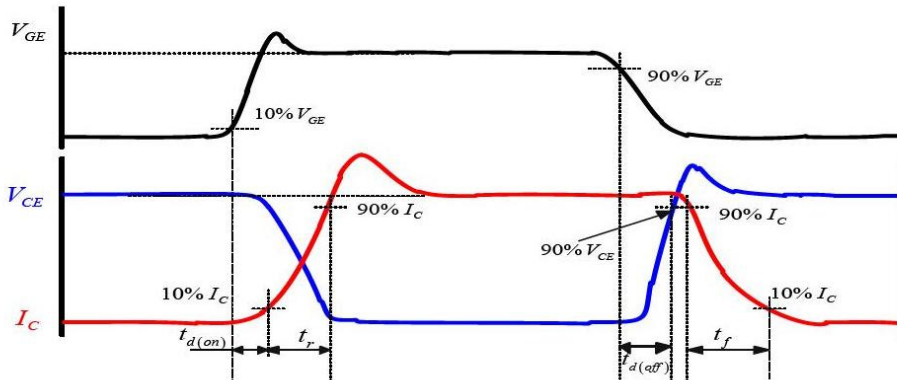


Figure A. Definition of switching times

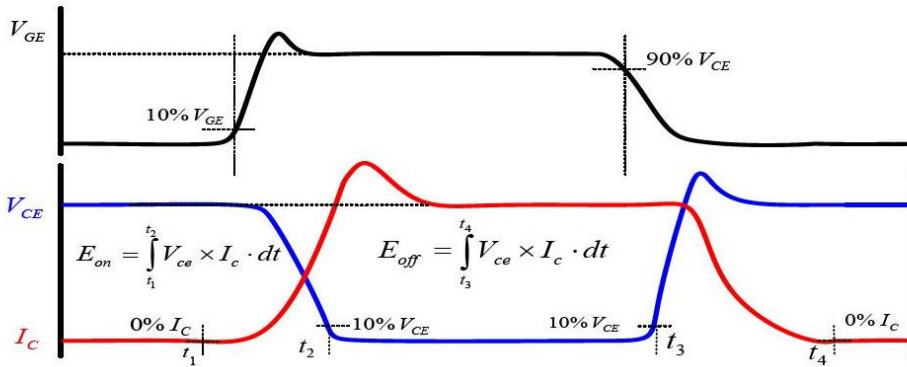


Figure B. Definition of switching losses

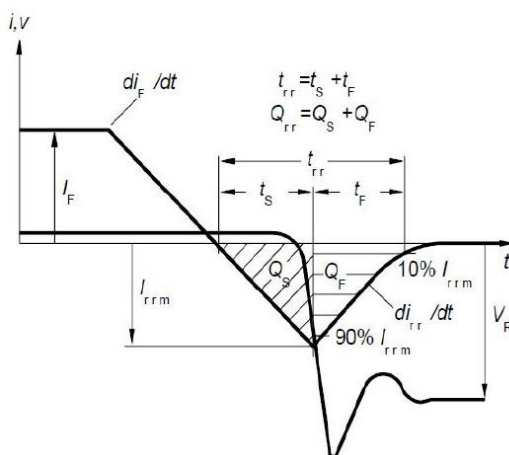


Figure C. Definition of diodes switching characteristics

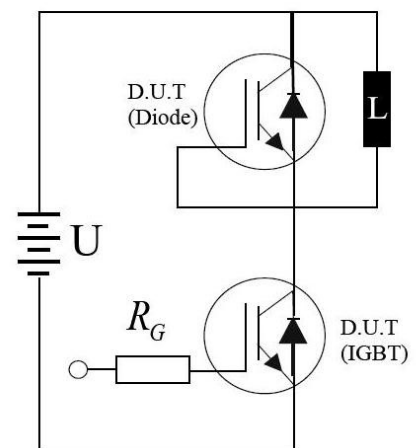
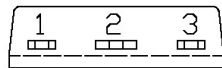
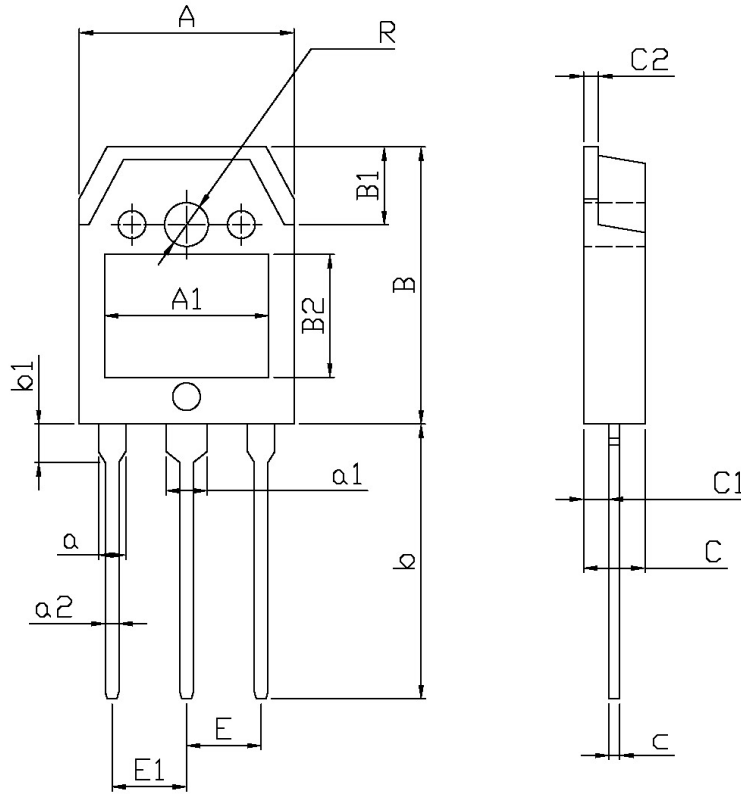


Figure D. Dynamic test circuit

外形尺寸图 / Package Dimensions

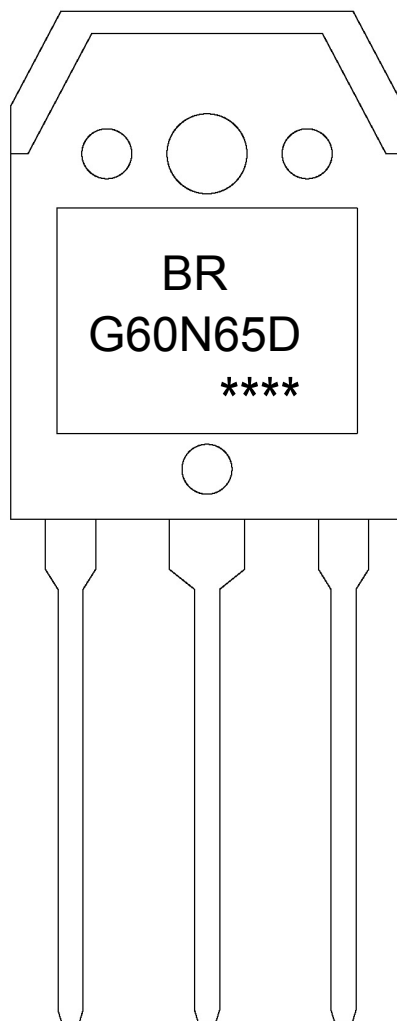
TO-3P

单位: mm



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	15.4	16.0	a2	0.8	1.2
R	3.1	3.5	E	5.45	
B	19.8	20.8	E1	5.45	
B1	5.5	5.9	C	4.3	4.7
B2	9.0		C1	1.2	1.6
A1	12.0		C2	1.4	1.6
b	19.6	20.6	c	0.5	0.7
b1	3.0	3.4			
a	1.8	2.2			
a1	2.8	3.2			

印章说明 / Marking Instructions



说明：

BR: 为公司代码

G60N65D： 为产品型号

****： 为生产批号代码，随生产批号变化。

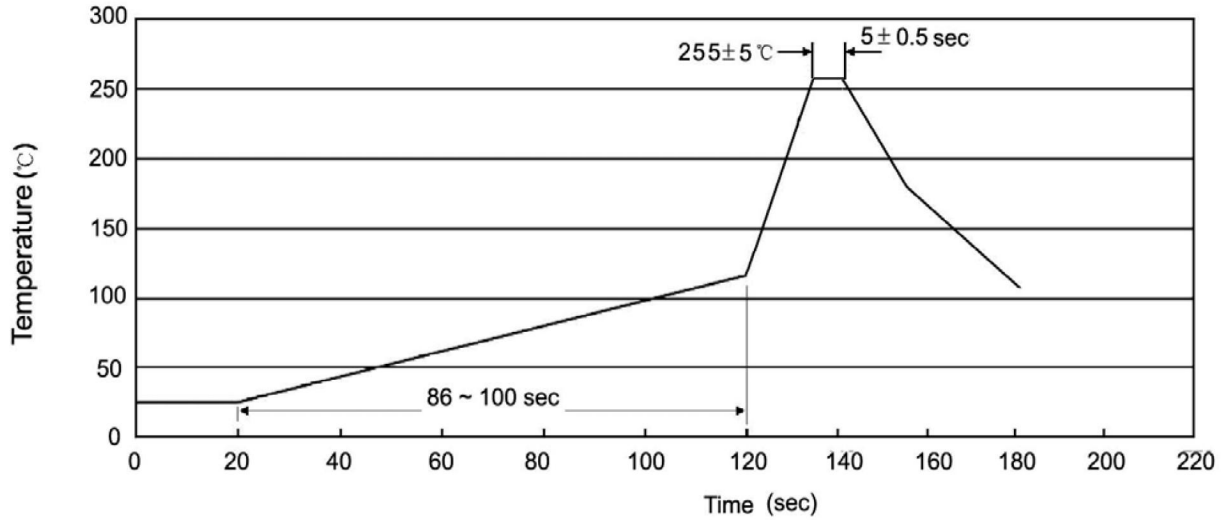
Note:

BR: Company Code.

G60N65D: Product Type.

****: 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°C，时间 60~90sec;
- 2、峰值温度 255±5°C，时间持续为 5±0.5sec;
- 3、焊接制程冷却速度为 2~10°C/sec.

Note:

- 1.Preheating:25~150°C, Time:60~90sec.
- 2.Peak Temp.:255±5°C, Duration:5±0.5sec.
3. Cooling Speed: 2~10°C/sec.

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

温度：270±5°C 时间：10±1 sec. Temp.:270±5°C 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: mm ³)		
	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-3P	30	15	450	5	2250	497.5×46×8	555×164×50	575×290×180

使用说明 / Notices