

# BRGH15N120D

Rev.A May.-2019

## 描述 / Descriptions

TO-247 塑封封装绝缘栅双极晶体管。 Insulated-Gate Bipolar Transistor in a TO-247 Plastic Package.

## 特征 / Features

低栅极电荷、正温度系数、低饱和压降、RoHS 产品。

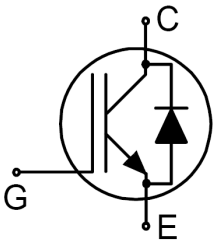
Low gate charge, Low saturation voltage, Positive temperature coefficient, RoHS product.

## 用途 / Applications

逆变器、变频器、电磁炉、不间断电源。

General purpose inverter, Frequency converters, Induction Heating(IH), 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	$V_{CES}$	1200	V
Gate-emitter voltage	$V_{GES}$	±20	V
Short circuit withstand time	$T_{SC}$	10	μs
Collector current	$I_C$	30	A
Collector current@ $T_C=100^\circ\text{C}$		15	A
Collector peak current, $T_P$ limited by $T_{JMAX}$	$I_{CM}$	45	A
Diode forward current@ $T_C=100^\circ\text{C}$	$I_F$	15	A
Diode maximum forward current	$I_{FM}$	45	A
Power dissipation( $T_C=25^\circ\text{C}$ )	$P_D$	150	W
Operating junction and storage temperature range	$T_J, T_{stg}$	-55~150	°C
Maximum temperature for soldering	$T_L$	300	°C
IGBT thermal resistance,junction-case	$R_{th(j-c)}$	0.63	°C/W
Diode thermal resistance,junction-case	$R_{th(j-c)}$	2.88	°C/W
Thermal resistance,junction-ambient	$R_{th(j-a)}$	40	°C/W

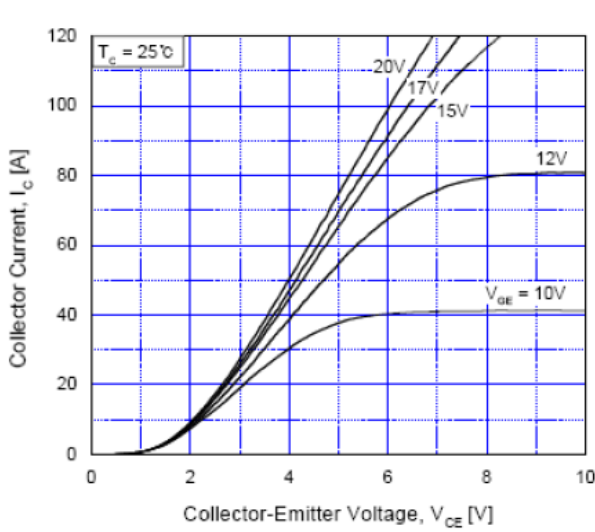
## 电性能参数 / Electrical Characteristics(Ta=25°C)

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	$V_{CES}$	$V_{GE}=0V; I_{CE}=500\mu A$	1200	-	-	V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{CES}}{\Delta T_J}$	$I_{CE}=1mA$ ;reference to 25°C		0.6		V/°C
Zero gate voltage Collector current	$I_{CES}$	$V_{GE}=0V; V_{CE}=1200V$ Tc=25°C	-	-	0.2	mA
		Tc=100°C			2	mA
		Tc=150°C			2.5	mA
Gate-body leakage current	$I_{GES}$	$V_{GE}=\pm 20V; V_{CE}=0V$	-	-	$\pm 100$	nA
Gate threshold voltage	$V_{GE(th)}$	$I_C=600\mu A; V_{CE}=V_{GE}$	4.5		6.5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=15A; V_{GE}=15V$ Tc=25°C	-	2	2.5	V
		Tc=100°C		2.2		V
		Tc=150°C		2.3		V
Forward Transconductance	$g_{fs}$	$V_{CE}=20V; I_C=15A$		10		S
Short Collector current	$I_{C(SC)}$	$V_{GE}=15V; V_{CE}=600V;$ $t_{sc} < 10\mu s$ Tc=25°C		90		A
Input capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V, f=1MHz$	-	1330	2000	pF
Output capacitance	$C_{oes}$		-	128	200	
Reverse transfer capacitance	$C_{res}$		-	88	140	

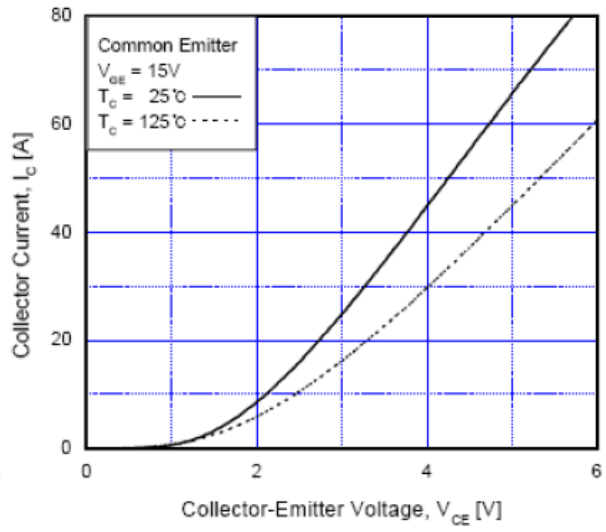
## 电性能参数 / Electrical Characteristics(Ta=25°C)

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
Turn-on delay time	$t_{d(ON)}$	$V_{CE}=600V$ $I_C=15A$ $R_G=56\Omega$ $T_c=25^\circ C$	-	70	-	ns
Rise time	$t_r$		-	150	-	
Turn-off delay time	$t_{d(OFF)}$		-	300	-	
Fall time	$t_f$		-	80	-	
Turn-On Switching Loss	$E_{on}$	$V_{CE}=600V$ $I_C=15A$ $V_{GE}=15V$	-	2.3	-	mJ
Turn-Off Switching Loss	$E_{off}$		-	1.3	-	
Total Switching Loss	$E_{ts}$		-	3.6	-	
Total gate charge	$Q_G$	$V_{CE}=600V$ $I_C=15A$ $V_{GE}=15V$	-	130	180	nC
Gate-emitter charge	$Q_{G-E}$		-	15	22	
Gate-collector charge	$Q_{G-C}$		-	50	65	
Diode forward voltage	$V_F$	$I_F=15A$	-		1.7	V
Reverse recovery time	$T_{rr}$	$V_{GE}=0V$ , $V_R=800V$ $I_F=10A$	-	150		ns
Reverse recovery charge	$Q_{rr}$	$di/dt=750A/\mu S$	-	1200		nC

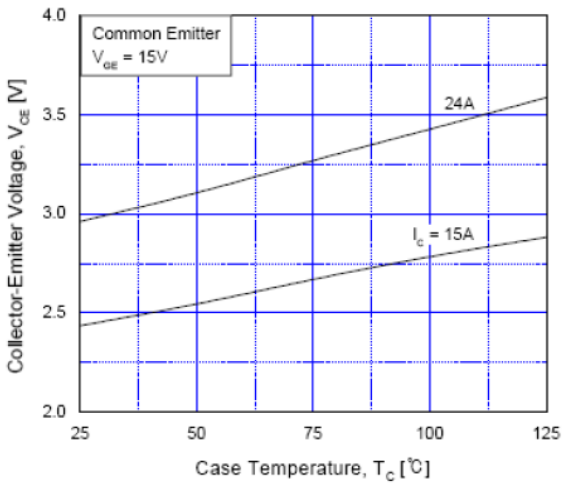
**电参数曲线图 / Electrical Characteristic Curve**



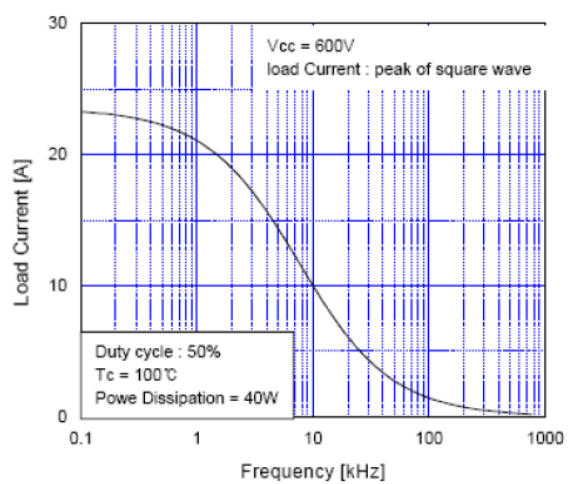
1. Typical Output Characteristics



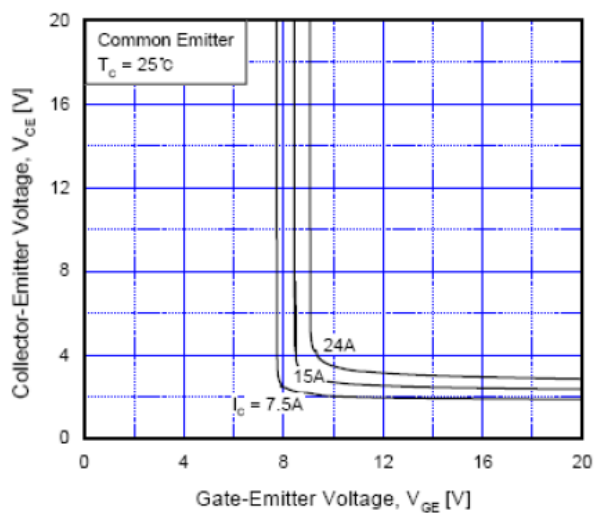
2. Typical Saturation Voltage Characteristics



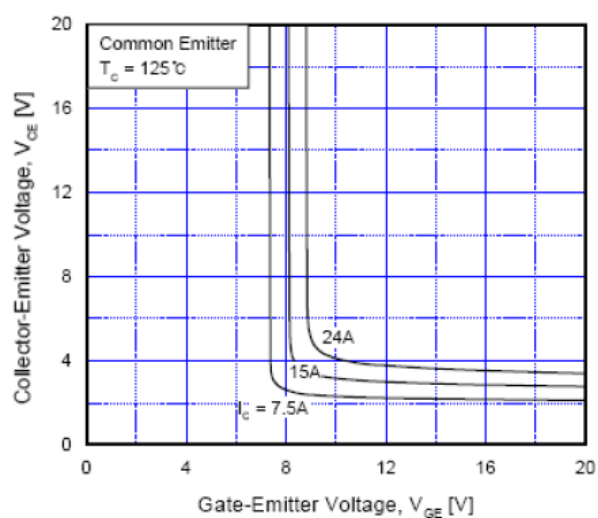
3. Saturation Voltage vs. Case Temperature at Variant Current Level



4. Load Current vs. Frequency

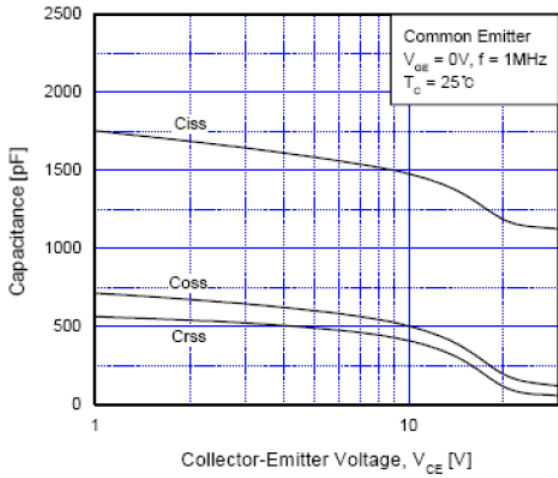


5. Saturation Voltage vs.  $V_{GE}$

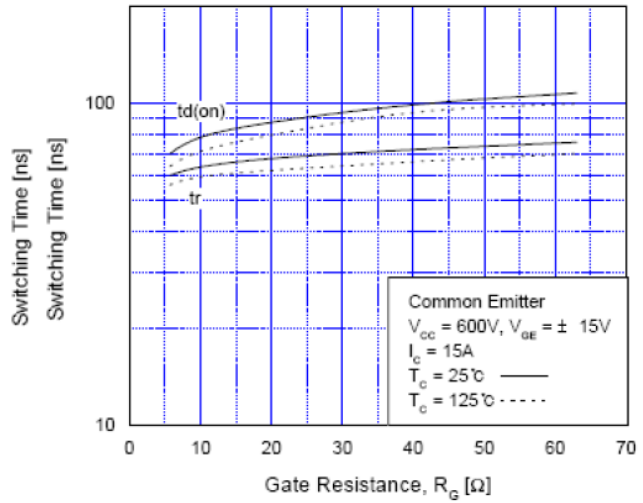


6. Saturation Voltage vs.  $V_{GE}$

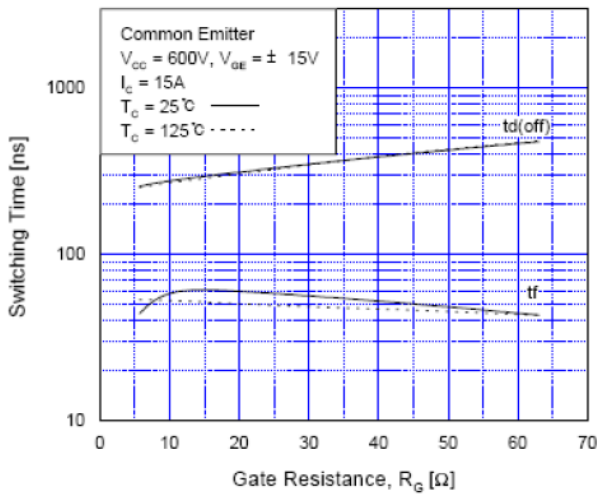
电参数曲线图 / Electrical Characteristic Curve



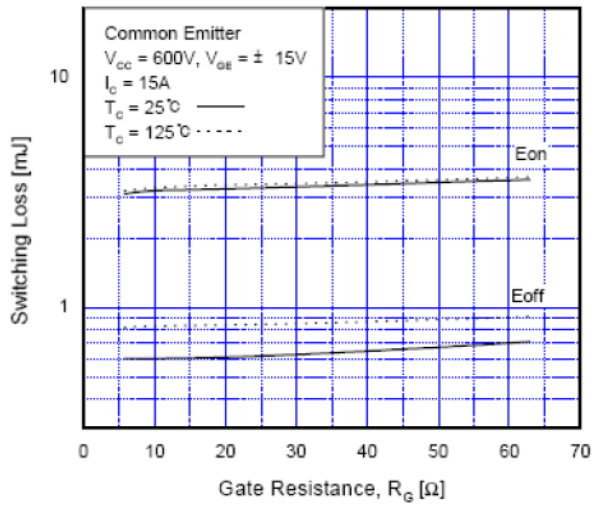
7.Capacitance Characteristics



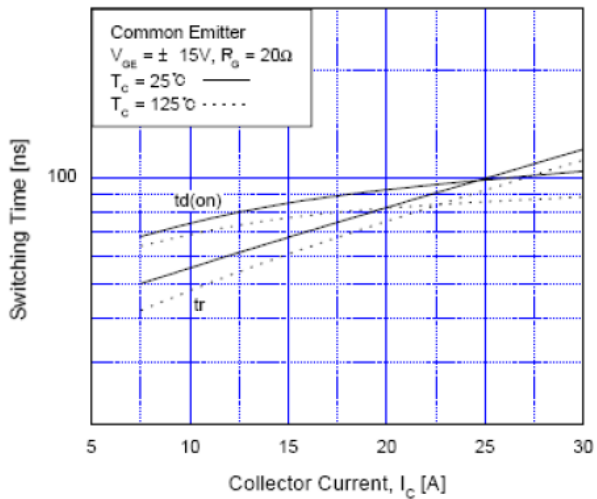
8.Turn-On Characteristics vs. Gate Resistance



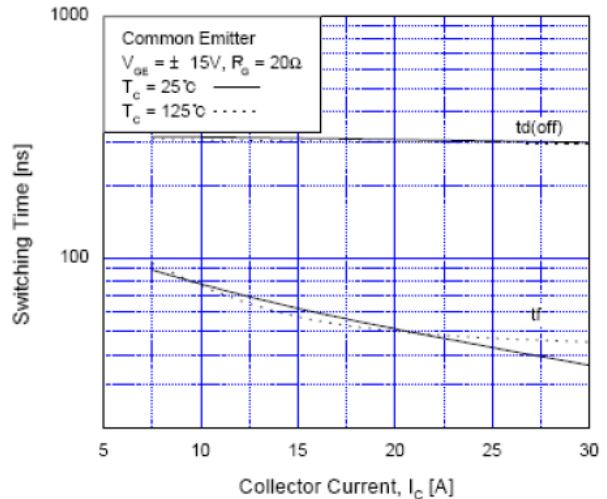
9.Turn-Off Characteristics vs. Gate Resistance



10.Switching Loss vs. Gate Resistance

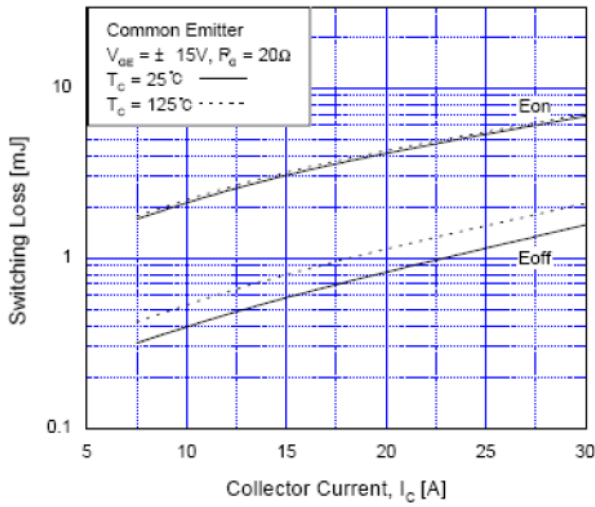


11.Turn-On Characteristics vs. Collector Current

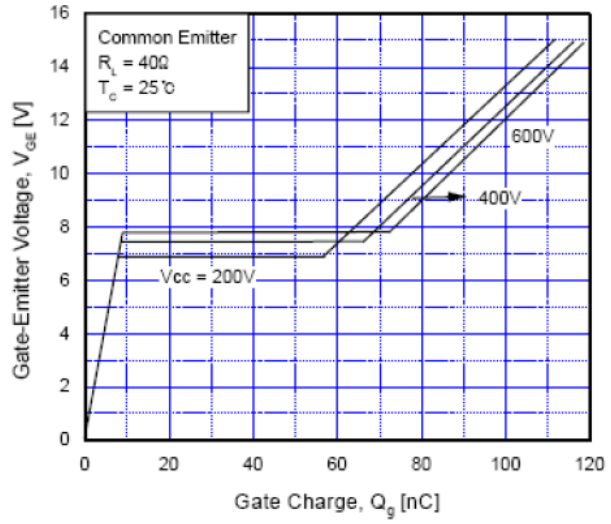


12.Turn-Off Characteristics vs. Collector Current

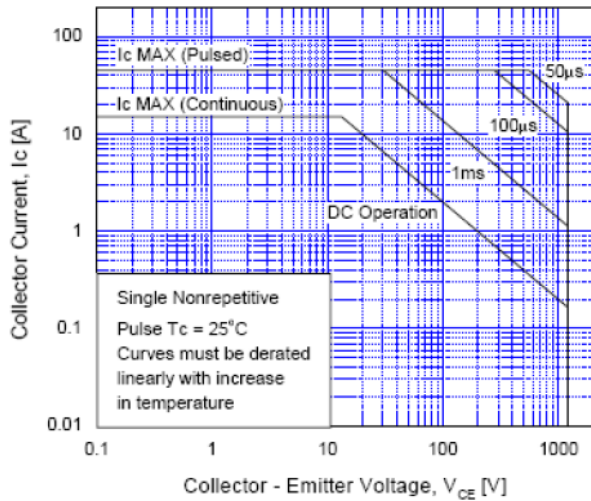
电参数曲线图 / Electrical Characteristic Curve



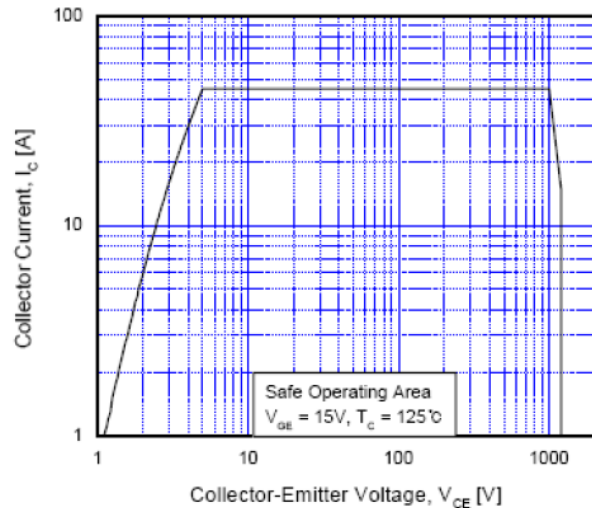
13.Switching Loss vs. Collector Current



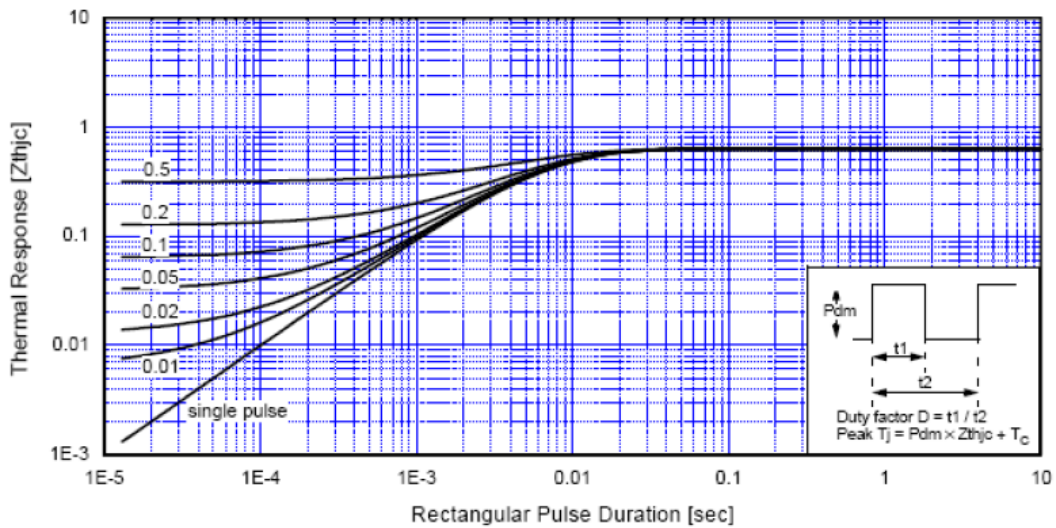
14.Gate Charge Characteristics



15.SOA Characteristics

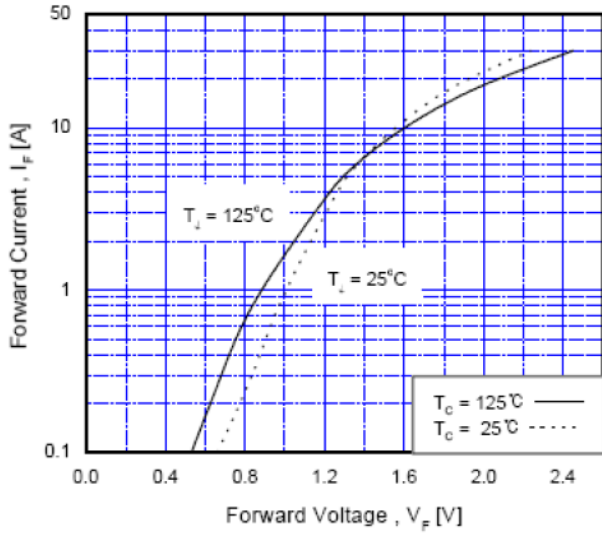


16.Turn-Off SOA

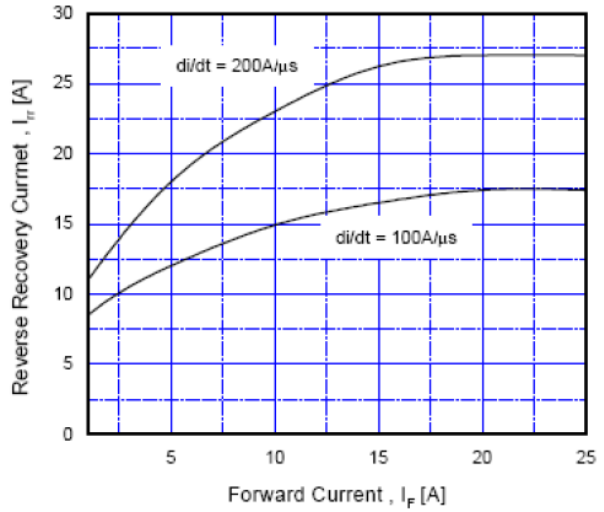


17.Transient Thermal Impedance

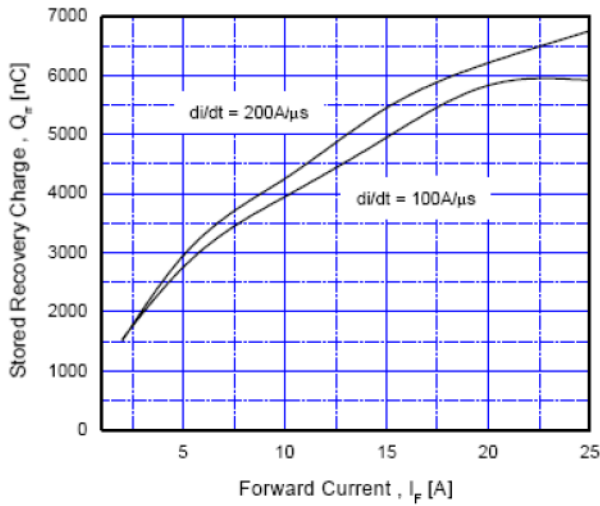
电参数曲线图 / Electrical Characteristic Curve



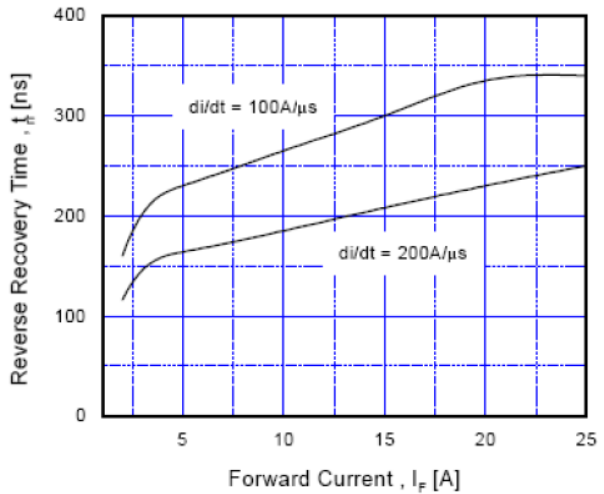
18.Forward Characteristics



19.Reverse Recovery Current



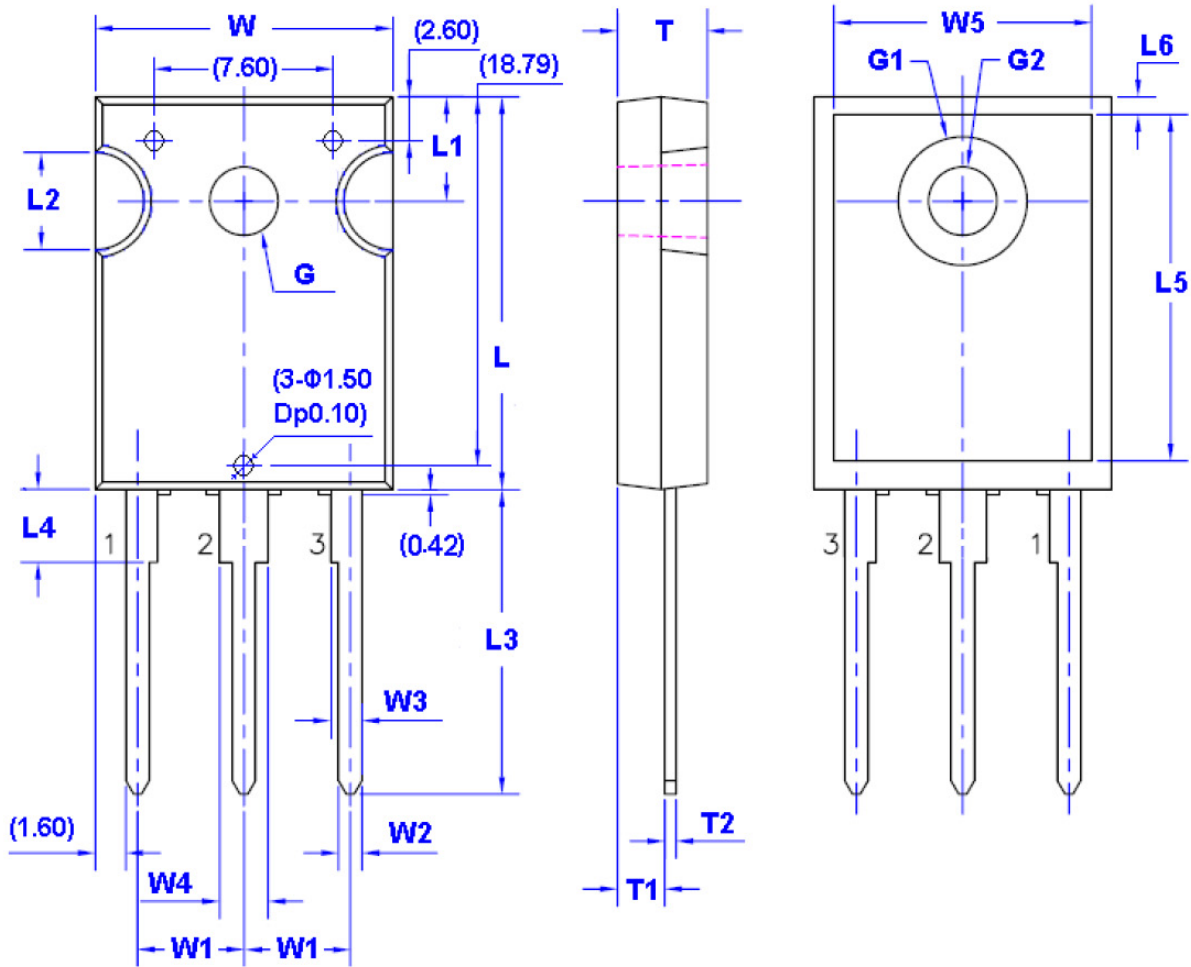
20.Stored Charge



21.Reverse Recovery Time



外形尺寸图 / Package Dimensions

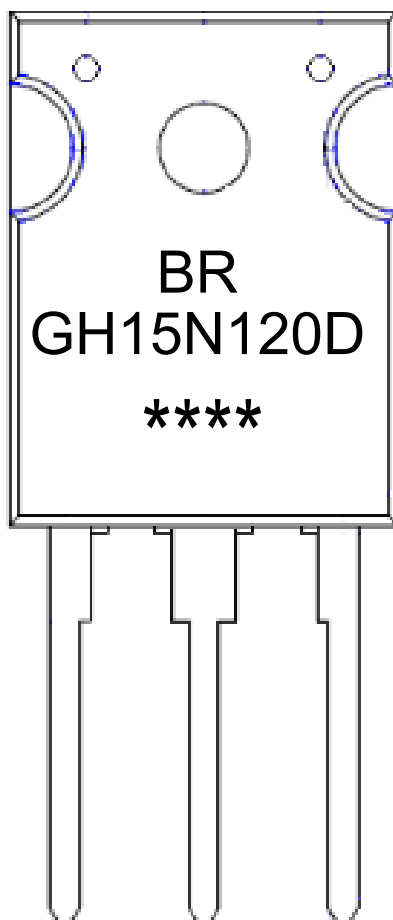


(单位: mm)

符号	尺寸		符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max		Min	Max
W	15.37	15.87	W5	12.81	--	L4	3.69	3.93	T2	0.51	0.71
W1	5.56 (TYP)		L	20.32	20.82	L5	13.08	--	G(Φ)	3.51	3.65
W2	1.17	1.35	L1	5.34	5.58	L6	0.51	1.35	G1(Φ)	6.61	6.85
W3	1.53	1.77	L2	4.96	5.20	T	4.58	4.82	G2(Φ)	3.51	3.65
W4	2.42	2.66	L3	15.75	16.25	T1	2.29	2.66			

注: ( ) 内数值为参考值。尺寸不包含毛刺及模具溢料。

印章说明 / Marking Instructions



说明：

BR: 为公司代码

G15N120D : 为产品型号

\*\*\*\* : 为生产批号代码，随生产批号变化。

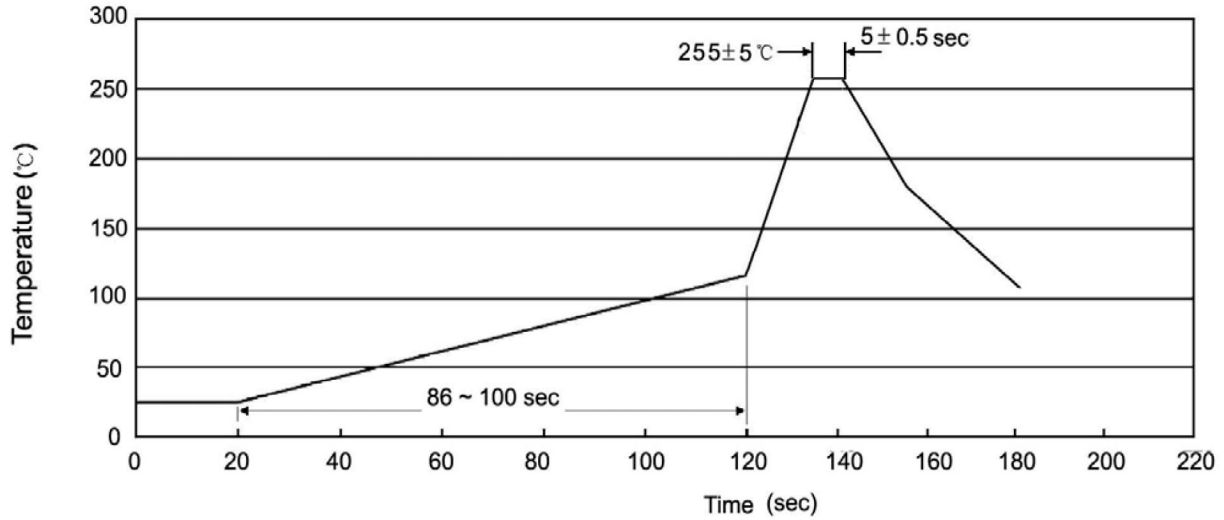
Note:

BR: Company Code.

G15N120D: 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 <sup>3</sup> )		
	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-247	30	15	450	5	2250	497.5×46×8	555×164×50	575×290×180

**使用说明 / Notices**