



TP020N120CA

主要参数 MAIN CHARACTERISTICS

I_C	20 A
V_{CES}	1200 V
V_{cesat_typ} ($V_{ge}=15V$)	1.8V

用途

- 逆变器
- 电磁炉
- UPS 电源

产品特性

- 低栅极电荷
- FS 技术
- 通态压降, $V_{CE(sat)}$, $typ = 1.8V$ $I_C = 20A$ and $TC = 25^\circ C$
- RoHS 产品

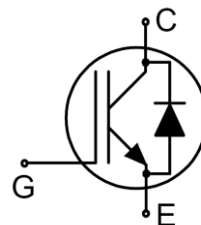
APPLICATIONS

- General purpose inverters
- Induction heating(IH)
- UPS

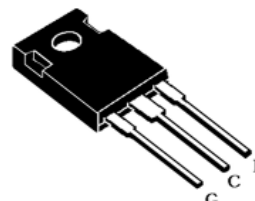
FEATURES

- Low gate charge
- FS Technology
- saturation voltage:
 $V_{CE(sat)}$, $typ = 1.8V$
 $I_C = 20A$ and $TC = 25^\circ C$
- RoHS product

封装 Package



TO-247



订货信息 ORDER MESSAGE

订货型号 Order codes				印 记 Marking	封 装 Package
有卤-条管 Halogen-Tube	无卤-条管 Halogen-Free-Tube	有卤-编带 Halogen-Reel	无卤-编带 Halogen-Free-Reel		
TP020N120CA-GE-B	TP020N120CA-GE-BR	N/A	N/A	TP020N120CA	TO-247



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
		TP020N120CA	
最高集电极—发射极直流电压 Collector-Emmitter Voltage	V_{CES}	1200	V
连续集电极极电流 Collector Current-continuous	I_C $T=25^\circ\text{C}$ $T=100^\circ\text{C}$	40	A
		20	A
最大脉冲集电极极电流 (注 1) Collector Current – pulse (note 1)	I_{CM}	60	A
栅极发射极电压 Gate-Emmitter Voltage	V_{GES}	± 20	V
安全工作区 Turn-off safe area	-	60	A
耗散功率 Power Dissipation	P_D $T_c=25^\circ\text{C}$	350	W
结温 Junction Temperature Range	T_J	$-40\sim+175$	$^\circ\text{C}$
存储温度 Storage Temperature	T_{STG}	$-55\sim+150$	$^\circ\text{C}$
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T_L	300	$^\circ\text{C}$

*漏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-Emmitter Voltage	BV_{CES}	$I_C=500\mu A, V_{GE}=0V$	1200	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{CES}/\Delta T_J$	$I_C=1mA$, referenced to $25^\circ C$	-	0.6	-	$V/^\circ C$
零栅压下集电极漏电流 Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V,$ $T_C=25^\circ C$	-	-	0.2	mA
		$T_C=125^\circ C$	-	-	1	mA
		$T_C=175^\circ C$	-	-	2	mA
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-Emmitter Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C=600\mu A$	4.5	-	6.5	V
饱和压降 Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=20A, T_C=25^\circ C$	-	1.8	2.45	V
		$V_{GE}=15V, I_C=20A, T_C=125^\circ C$	-	2.0	-	V
		$V_{GE}=15V, I_C=20A, T_C=175^\circ C$	-	2.15	-	V
短路电流（注2） Short Collector current（Note 2）	I_{SC}	$V_{GE}=15V, V_{CE}=600V$ $T_{Jstart} \leq 175^\circ C, t \leq 10\mu s$	-	150	-	A
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V,$ $V_{GE}=0V,$ $f=1.0MHz$	-	1600	2400	pF
输出电容 Output capacitance	C_{oes}		-	120	190	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	84	130	pF





电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics						
开启延迟时间 Turn-On delay time	$t_d(\text{on})$	$V_{CE}=600V, I_C=20A, R_G=10\Omega$ $T_C=25^\circ\text{C}$ Inductive Load	-	90	-	ns
上升时间 Turn-On rise time	t_r		-	80	-	ns
关断延迟时间 Turn-Off delay time	$t_d(\text{off})$		-	135	-	ns
下降时间 Turn-Off Fall time	t_f		-	100	-	ns
开启损耗 Turn-on energy	E_{on}		-	2.5	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.1	-	mJ
总开关损耗 Total switching energy	E_{total}		-	3.6	-	mJ
开启延迟时间 Turn-On delay time	$t_d(\text{on})$	$V_{CE}=600V, I_C=20A, R_G=10\Omega$ $T_C=175^\circ\text{C}$ Inductive Load	-	80	-	ns
上升时间 Turn-On rise time	t_r		-	76	-	ns
关断延迟时间 Turn-Off delay time	$t_d(\text{off})$		-	157	-	ns
下降时间 Turn-Off Fall time	t_f		-	123	-	ns
开启损耗 Turn-on energy	E_{on}		-	2.9	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.5	-	mJ
总开关损耗 Total switching energy	E_{total}		-	4.4	-	mJ
栅极电荷总量 Total Gate Charge	Q_g	$V_{CE} = 600V, I_C = 20A$ $V_{GE} = 15V$ (note 3, 4)	-	115	-	nC
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	$V_{GE}=0V, I_F=20A$	-	1.9	2.6	V
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=600V, I_F=20A$ $di_F/dt=200A/\mu s$ (note 4) $T_C=25^\circ\text{C}$	-	309	-	ns
反向恢复电荷 Reverse recovery charge	Q_{rr}		-	1.4	-	μC
反向恢复电流 Diode Reverse recovery Current	I_{RRM}		-	7.3	-	A
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_{GE}=0V, V_R=600V, I_F=20A$ $di_F/dt=200A/\mu s$ $T_C=175^\circ\text{C}$	-	539	-	ns
反向恢复电荷 Reverse recovery charge	Q_{rr}		-	4.5	-	μC
反向恢复电流 Diode Reverse recovery Current	I_{RRM}		-	15.6	-	A



**热特性 THERMAL CHARACTERISTIC**

项 目 Parameter	符 号 Symbol	最大 Max	单 位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.4	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	40	$^{\circ}C/W$

注释:

- 1: 脉冲宽度由最高结温限制
- 2: 两次短路之间的间隔大于 1 秒时, 允许短路测试的次数最大为 1000 次
- 3: 脉冲测试: 脉冲宽度 $\leq 300\mu s$, 占空比 $\leq 2\%$
- 4: 基本与工作温度无关

Notes:

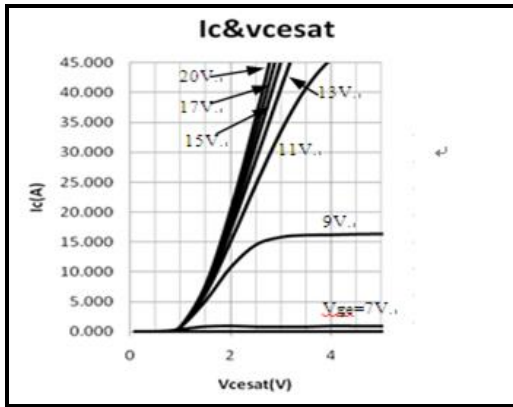
- 1: Pulse width limited by maximum junction temperature
- 2: Allowed number of short circuits: <1000; time between short circuits: >1s.
- 3: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
- 4: Essentially independent of operating temperature



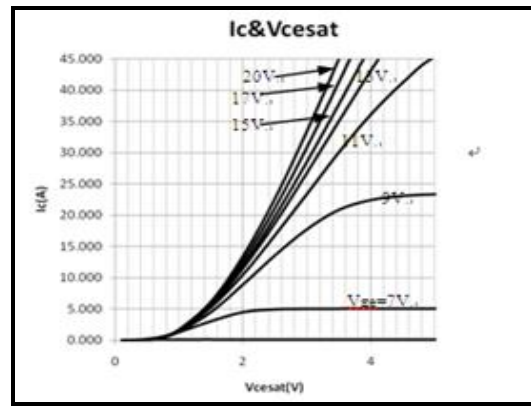


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

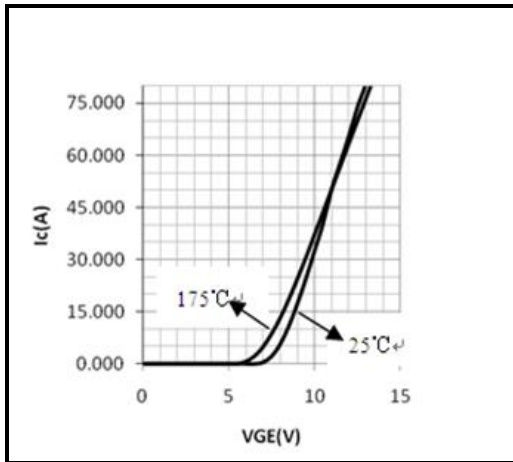
Output Characteristics (25°C)



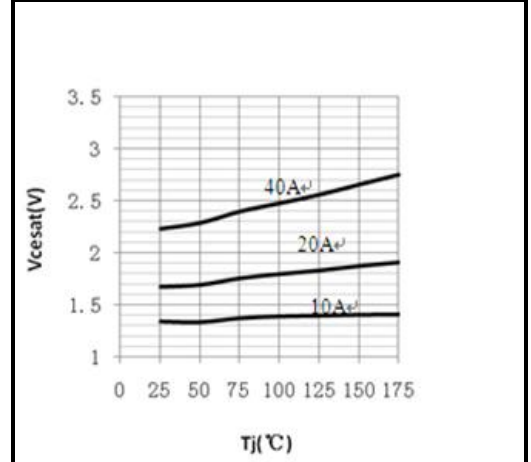
Output Characteristics (175°C)



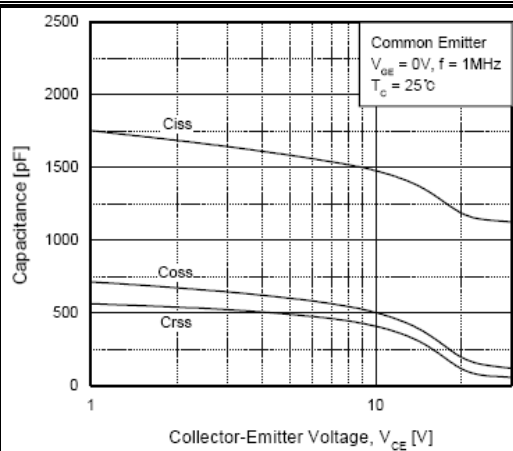
Transfer Characteristics



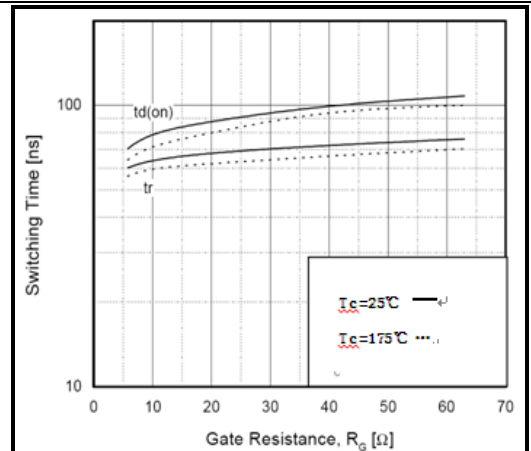
Vcesat vs. Tj



Capacitance Characteristics



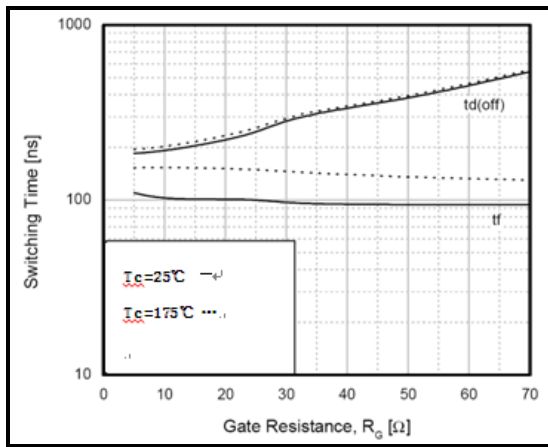
Turn-On Characteristics vs. Gate Resistance



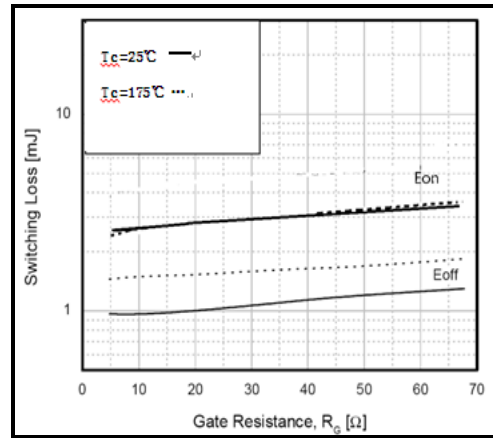


Switching Time vs. Rg

VGE=15V, VCE=600V, IC=20A

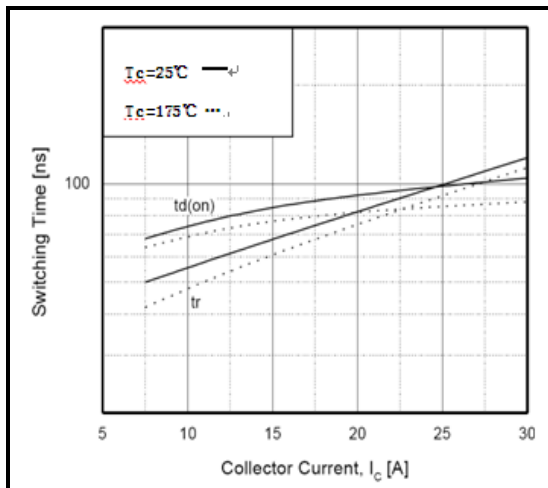


Switching Loss vs. Gate Resistance

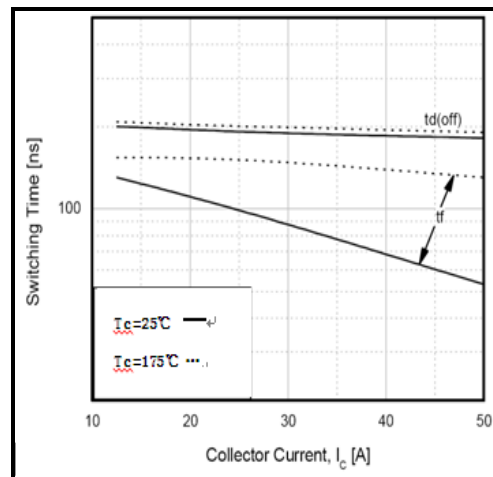


Turn-On Characteristics vs Ic

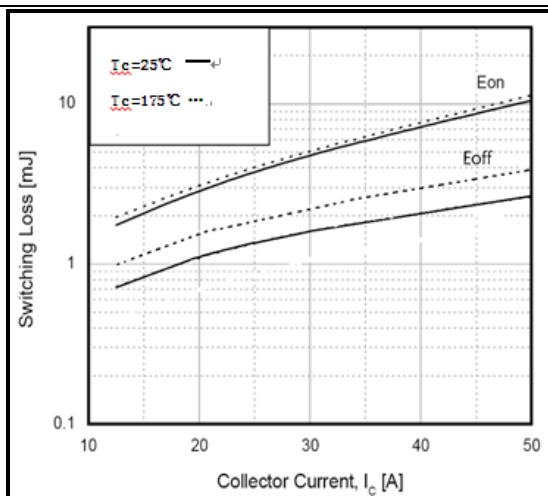
VCE=600V, VGE=15V, RG=10Ω



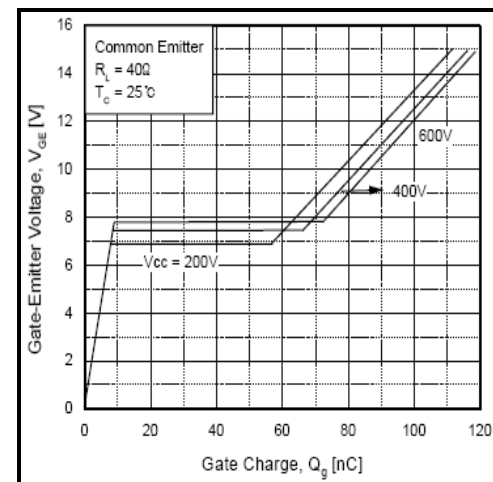
Turn-Off Characteristics vs Ic



Switching Loss vs Ic

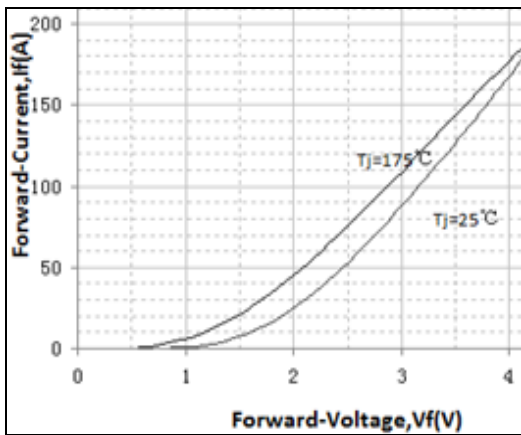


Gate Charge Characteristics

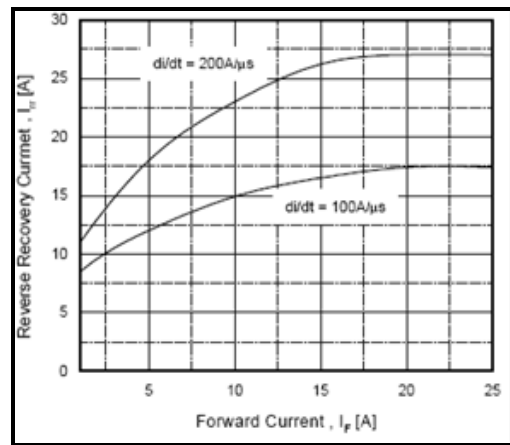




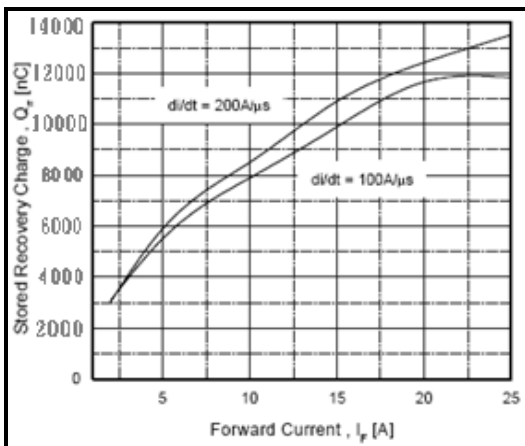
Forward Characteristics



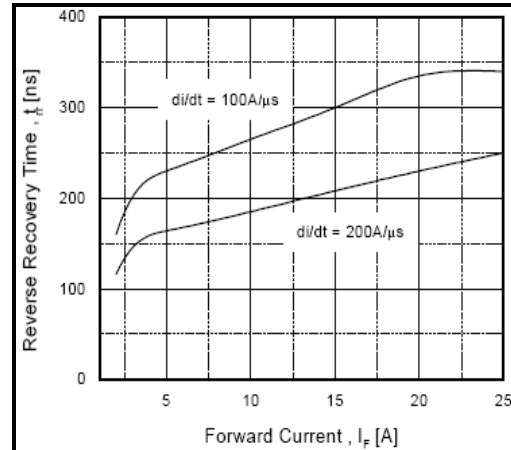
Reverse Recovery Current



Stored Charge

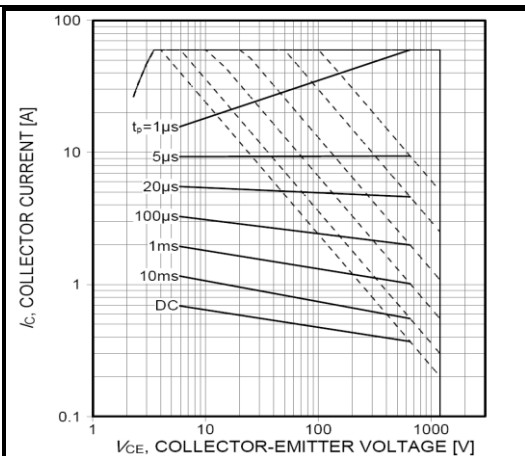


Reverse Recovery Time

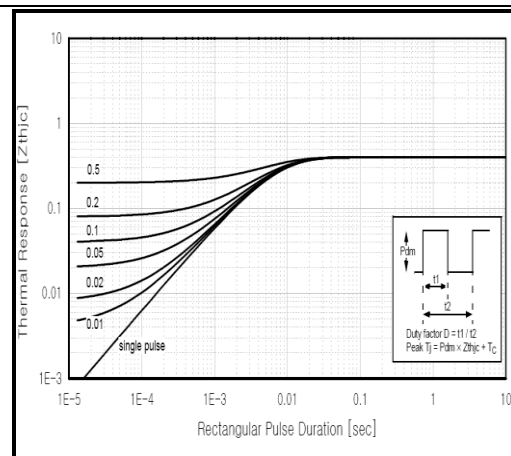


Forward Bias SOA

$T_c = 25^\circ\text{C}$, $V_{GE} = 15\text{V}$, $T_j \leq 175^\circ\text{C}$



Transient Thermal Impedance

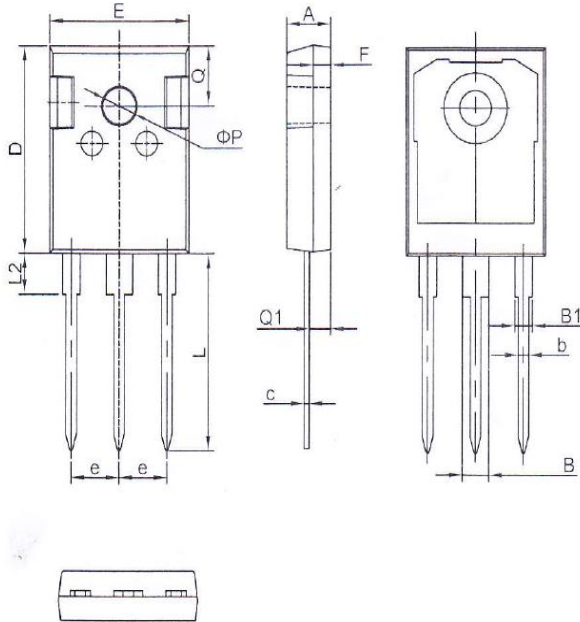




外形尺寸 PACKAGE MECHANICAL DATA

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



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- 3.在电路设计时请不要超过器件的绝对最大额定值，否则会影响整机的可靠性。
- 4.本说明书如有版本变更不另外告知

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3. Please do not exceed the absolute maximum ratings of the device when circuit designing.
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