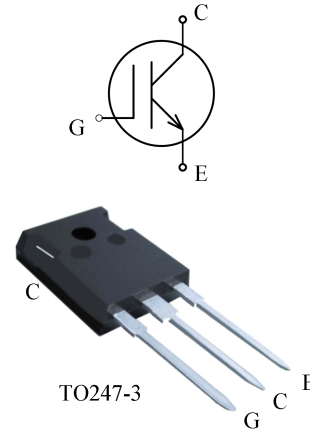


本产品符合 AEC-Q101 标准要求  
IGBT in advanced FS Technology  
具有先进 FS 技术的 IGBT

## Features:

### 特性

- 1200V planar field-stop technology  
1200V 平面栅场终止技术
- Low saturation voltage  
低饱和压降
- Positive temperature coefficient  
饱和电压正温度系数
- Short Circuit withstand time-10 $\mu$ s  
具备10 $\mu$ s短路承受能力



## Applications:

### 应用

- Electric Automotive PTC Heater  
汽车PTC加热
- Short-Circuit Protector  
短路保护器

Type 型号	V <sub>CE</sub> [V] 集电极-发射极电压	I <sub>C</sub> [A] 集电极电流	V <sub>CEsat</sub> [V] 饱和电压	T <sub>jmax</sub> [°C] 最高结温	Marking 标记	Package 封装
BGN40Q120K	1200	40	1.6	175	40Q120K	TO247-3



## Maximum Rated Values

### 最大额定参数

Parameter 参数	Symbol 符号	Value 值	Unit 单位
Collector-emitter voltage, $T_j \geq 25^\circ\text{C}$ 集电极-发射极电压, $T_j \geq 25^\circ\text{C}$	$V_{CE}$	1200	V
Collector current, $T_c = 25^\circ\text{C}$ 集电极电流, $T_c = 25^\circ\text{C}$	$I_C$	80	A
Collector current, $T_c = 100^\circ\text{C}$ 集电极电流, $T_c = 100^\circ\text{C}$	$I_C$	40	
Pulsed collector current, $t_p$ limited by $T_{j\max}$ 集电极脉冲电流, 脉宽时间受 $T_{j\max}$ 限制	$I_{C\text{puls}}$	160	
Gate-emitter voltage 栅极-发射极电压	$V_{GE}$	$\pm 20$	V
Short Circuit withstand time $V_{GE} = 15\text{V}, V_{CC} \leq 800\text{V}, T_j \leq 150^\circ\text{C}$ 短路耐受时间	$t_{sc}$	10	us
Total power dissipation, $T_c = 25^\circ\text{C}$ 总耗散功率, $T_c = 25^\circ\text{C}$	$P_{\text{tot}}$	428	W
Operating junction temperature 最高结温	$T_{j\max}$	175	°C
Operating junction temperature 工作结温	$T_{j\text{op}}$	-40...+150	
Storage temperature 储存温度	$T_{\text{stg}}$	-55...+150	
Soldering temperature, 1.6mm from case for 10s 焊接温度	$T_{\text{st}}$	260	
Mounting Torque M3 锁装力矩	Md	0.6	Nm



**Thermal Resistance**

**热阻**

Parameter 参数	Symbol 符号	Value 值	Unit 单位
IGBT Thermal resistance junction to case IGBT 结-管壳热阻	$R_{th(j-c)}$	0.35	$^{\circ}\text{C}/\text{W}$
Thermal resistance junction to ambient 结-环境热阻	$R_{th(j-a)}$	40	$^{\circ}\text{C}/\text{W}$

**Electrical Characteristic at  $T_j = 25^{\circ}\text{C}$  (unless otherwise specified)**

**$T_j=25^{\circ}\text{C}$ 时电学特性 (除非特别声明)**

Parameter 参数	Symbol 符号	Conditions 条件	Value 值			Unit 单位
			Min. 最小值	Typ. 典型值	Max. 最大值	

**Static Characteristic**

**静态特性**

Collector-emitter breakdown voltage 集电极-发射极击穿电压	$V_{(BR)CES}$	$V_{GE}=0\text{V},$ $I_C=1\text{mA}$	1200	-	-	
Collector-emitter saturation voltage 集电极-发射极饱和电压	$V_{cesat}$	$V_{GE}=15\text{V},$ $I_C=40\text{A}$	$T_j=25^{\circ}\text{C}$ -	1.6	2.0	V
			$T_j=150^{\circ}\text{C}$ -	1.8	-	
Gate-emitter threshold voltage 栅极-发射极阈值电压	$V_{GE(th)}$	$I_C=1.6\text{mA},$ $V_{CE}=V_{GE}$	5.0	5.8	7.0	
Collector-emitter cut-off current 集电极-发射极截止电流	$I_{CES}$	$V_{CE}=1200\text{V},$ $V_{GE}=0\text{V}$	-	-	100	$\mu\text{A}$
Gate-emitter leakage current 栅极-发射极漏电流	$I_{GES}$	$V_{CE}=0\text{V},$ $V_{GE}=\pm 20\text{V}$	-200	-	200	nA

**Dynamic Characteristic**

**动态特性**

Input capacitance 输入电容	$C_{ies}$	$V_{CE}=25\text{V},$ $V_{GE}=0\text{V},$ $f=1\text{MHz}$	-	3825	-	pF
Output capacitance 输出电容	$C_{oes}$		-	205	-	
Reverse transfer capacitance 反向传输电容	$C_{res}$		-	110	-	
Gate charge 门极电量	$Q_G$	$V_{CC}=600\text{V}, I_C=40\text{A},$ $V_{GE}=15\text{V}$	-	142	-	nC
Internal emitter inductance 内部发射极电感	$L_E$	-	-	13	-	nH
Short circuit current 短路电流	$I_{C(sc)}$	$V_{CC}=800\text{V}, V_{GE}=15\text{V},$ $T_j=150^{\circ}\text{C}$	-	200	-	A
Reverse bias safe operating area 反偏安全工作区	RBSOA	$V_{CC}=800\text{V}, V_{GE}=20\text{V},$ $T_j \leq 150^{\circ}\text{C}$	80	-	-	



Switching Characteristic at  $T_j=25^\circ\text{C}$  (Inductive Load)

$T_j=25^\circ\text{C}$ 时开关特性 (感性负载)

Parameter 参数	Symbol 符号	Conditions 条件	Value 值			Unit 单位
			Min. 最小 值	Typ. 典型 值	Max. 最大 值	
<b>IGBT Characteristic</b> <b>IGBT 特性</b>						
Turn-on delay time 开通延迟时间	$t_{d(on)}$	$T_j=25^\circ\text{C}$ , $V_{CC}=600\text{V}$ , $I_C=40\text{A}$ , $V_{GE}=-7.5/15\text{V}$ , $R_G=10\Omega$ , Energy losses include “tail” and diode reverse recovery.	-	45	-	ns
Rise time 上升时间	$t_r$		-	90	-	
Turn-off delay time 关断延迟时间	$t_{d(off)}$		-	240	-	
Fall time 下降时间	$t_f$		-	575	-	
Turn-on energy 开通损耗	$E_{on}$		-	3.2	-	mJ
Turn-off energy 关断损耗	$E_{off}$		-	7.9	-	
Total switching energy 总开关损耗	$E_{ts}$		-	11.1	-	

Switching Characteristic at  $T_j=150^\circ\text{C}$  (Inductive Load)

$T_j=150^\circ\text{C}$ 时开关特性 (感性负载)

Parameter 参数	Symbol 符号	Conditions 条件	Value 值			Unit 单位
			Min. 最小 值	Typ. 典型 值	Max. 最大 值	
<b>IGBT Characteristic</b> <b>IGBT 特性</b>						
Turn-on delay time 开通延迟时间	$t_{d(on)}$	$T_j=150^\circ\text{C}$ , $V_{CC}=600\text{V}$ , $I_C=40\text{A}$ , $V_{GE}=-7.5/15\text{V}$ , $R_G=10\Omega$ , Energy losses include “tail” and diode reverse recovery.	-	48	-	ns
Rise time 上升时间	$t_r$		-	96	-	
Turn-off delay time 关断延迟时间	$t_{d(off)}$		-	292	-	
Fall time 下降时间	$t_f$		-	812	-	
Turn-on energy 开通损耗	$E_{on}$		-	4.8	-	mJ
Turn-off energy 关断损耗	$E_{off}$		-	9.95	-	
Total switching energy 总开关损耗	$E_{ts}$		-	14.75	-	



## ELECTRICAL CHARACTERISTICS

### 特性曲线

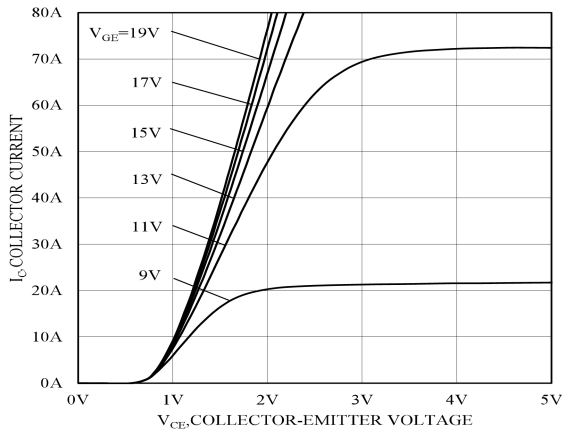


Figure 1. Typical output characteristic( $T_j=25^{\circ}\text{C}$ )

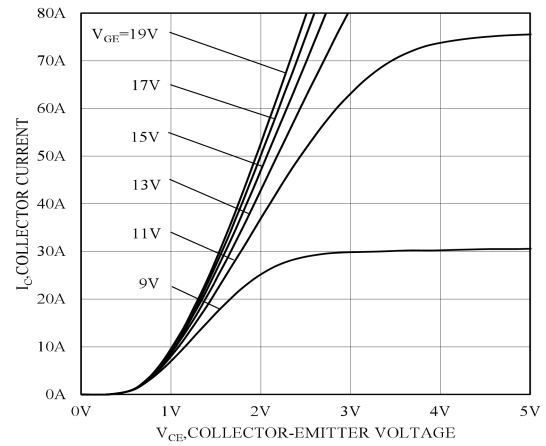


Figure 2. Typical output characteristic( $T_j=150^{\circ}\text{C}$ )

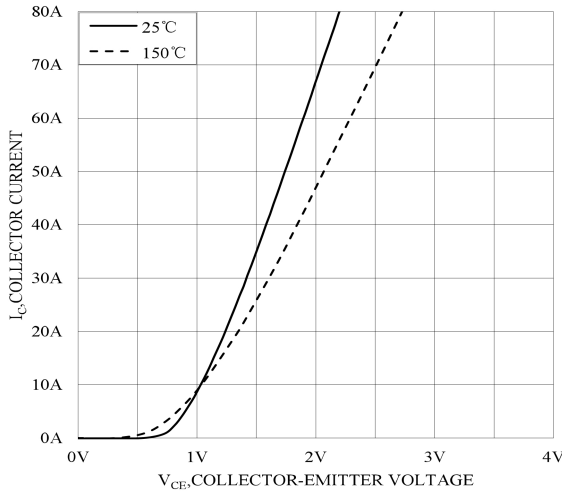


Figure 3. Typical on-state Characteristic( $V_{GE}=15\text{V}$ )

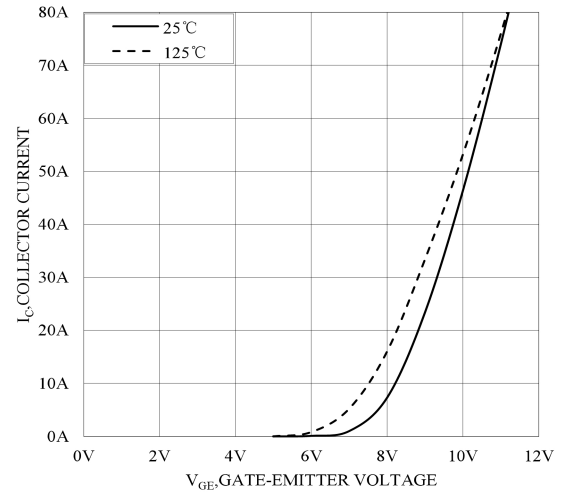


Figure 4. Typical transfer voltage( $V_{CE}=20\text{V}$ )

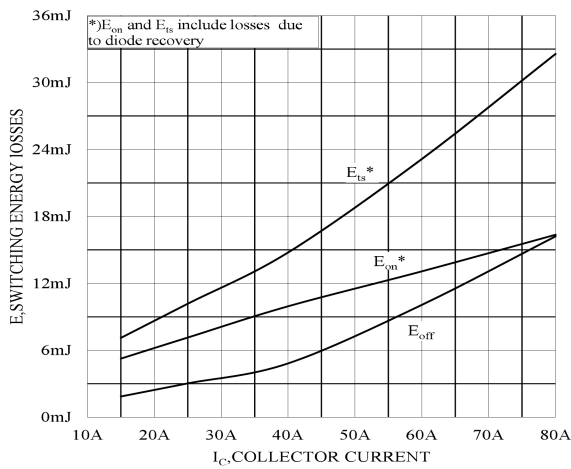


Figure 5. Switching energy losses as  $I_C$   
( $T_j=150^{\circ}\text{C}, V_{CC}=600\text{V}, V_{GE}=-7.5/15\text{V}, R_G=10\Omega$ )

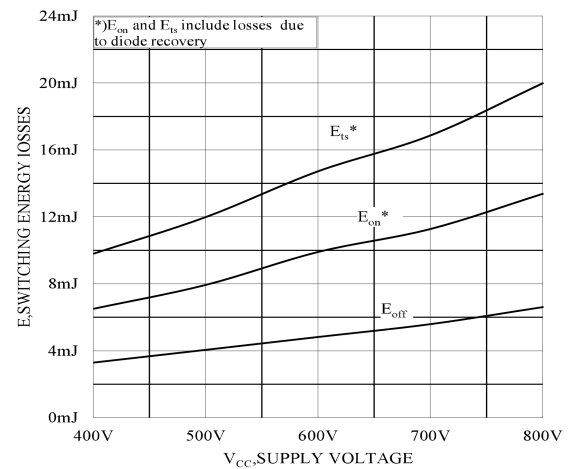
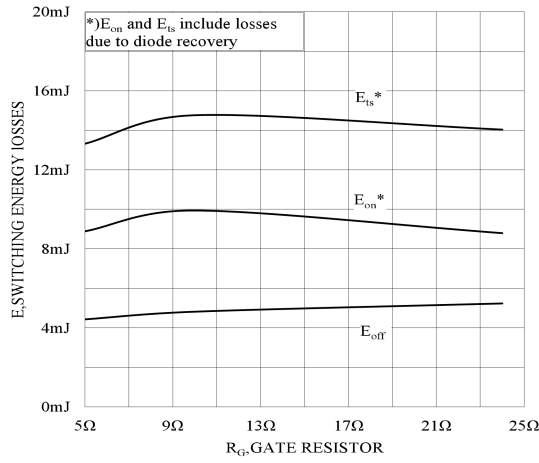
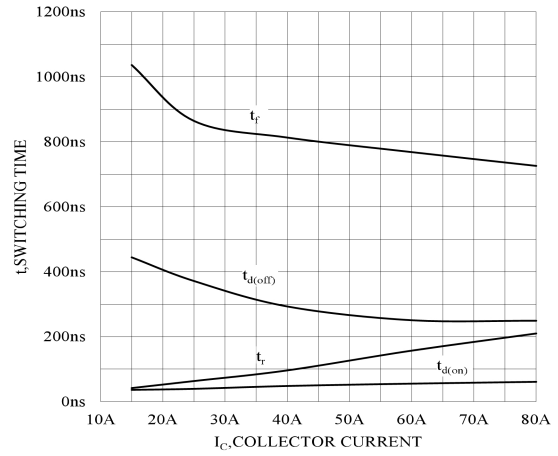


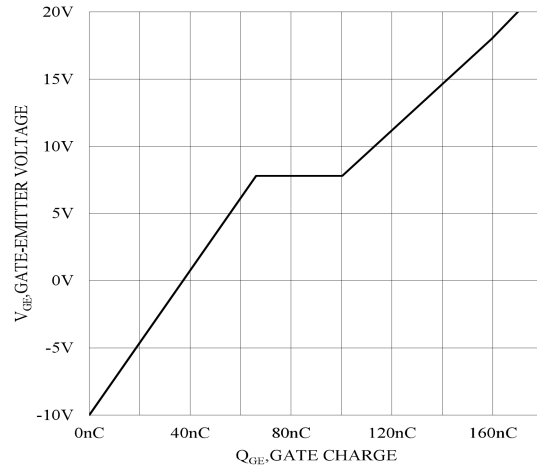
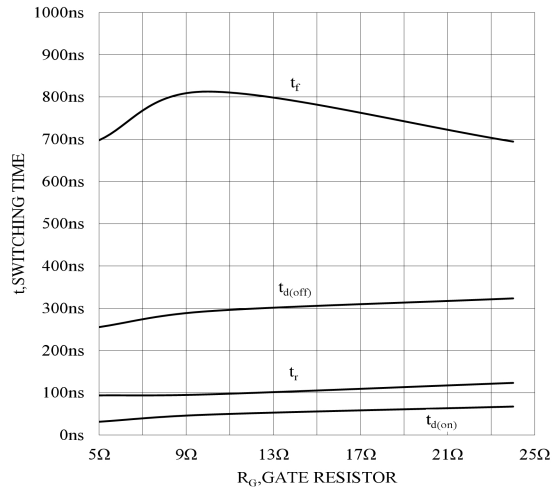
Figure 6. Switching energy losses as  $V_{CC}$   
( $T_j=150^{\circ}\text{C}, V_{GE}=-7.5/15\text{V}, I_C=40\text{A}, R_G=10\Omega$ )



**Figure 7. Switching energy losses as  $R_G$**   
( $T_j=150^\circ\text{C}$ ,  $V_{CC}=600\text{V}$ ,  $V_{GE}=-7.5/15\text{V}$ ,  $I_C=40\text{A}$ )



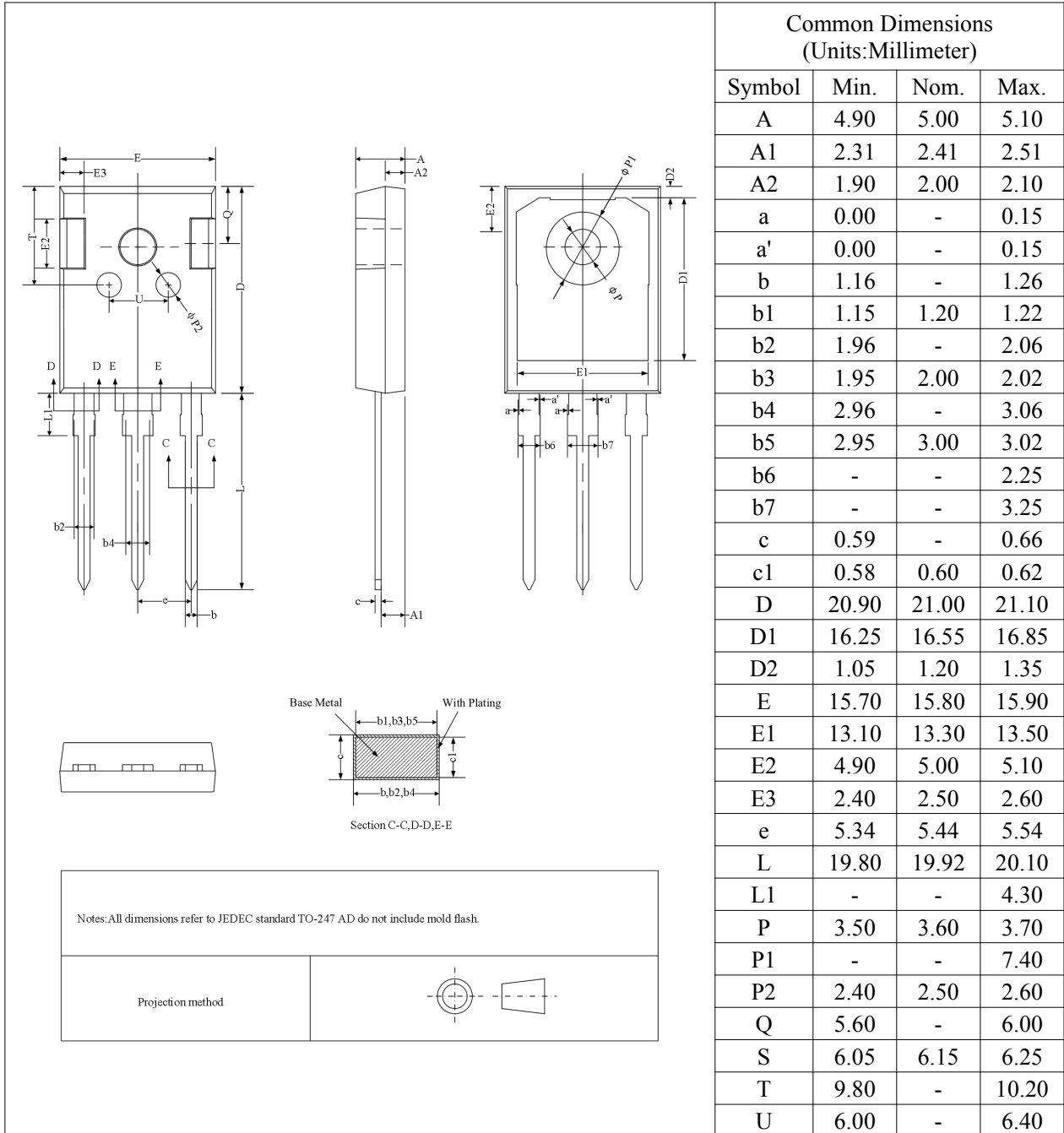
**Figure 8. Switching times as  $I_C$**   
( $T_j=150^\circ\text{C}$ ,  $V_{CC}=600\text{V}$ ,  $V_{GE}=-7.5/15\text{V}$ ,  $R_G=10\Omega$ )





TO247-3 Outline Dimensions:

TO247-3 外形尺寸



Packing

包装

Packing	pcs/tube	tube/ inner box	inner box/ carton	pcs/carton
Tube	30	12	6	2160



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