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

650V，40A

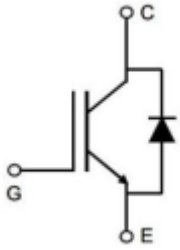
$V_{CE(SAT)}$= 1.30V(typ.) @V_{GE}=15V,I_C= 40A

用途 / Applications

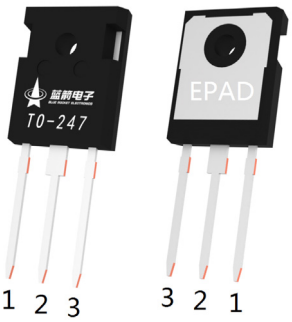
电机驱动器、不间断电源、增压器、便携式电源站。

Motor driver, Uninterrupted Power Supply, Boost, Portable power station.

内部等效电路 / Equivalent Circuit



引脚排列 / Pinning



PIN1：G　　PIN 2、EPAD：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
Gate-Emitter Voltage		V_{GES}	±30	V
Continuous Collector Current	T_C=25℃	I_C	80	A
	T_C=100℃		40	A
Pulsed Collector Current , Limited by T_{Jmax}		I_{CM}	160	A
Continuous Diode Forward Current	T_C=25℃	I_F	80	A
	T_C=100℃		40	A
Diode Repetitive Peak Forward Current		I_{FRM}	160	A
Short circuit withstand time		t_{sc}	9	us
Power Dissipation	T_C=25℃	P_D	395	W
Storage Temperature Range		T_{STG}	-55 to +175	℃
Maximum Temperature for Soldering		T_L	260	℃
Maximum Junction-to-Ambient		$R_{\theta JA}$	40	℃/W
Maximum IGBT Junction-to-Case		$R_{\theta JC}$	0.38	℃/W

电性能参数 / Electrical Characteristics(Tc=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=1mA V_{GE}=0V		650			V
Zero Gate Voltage Collector current	I_{CES}	V_{CE}=650V, V_{GE}=0V				10	uA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}=0V, V_{GE}= ±20V				±200	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{GE}=0V , I_C=1mA		4.3	5.3	6.3	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=40A	T_J=25℃		1.30	1.60	V
			T_J=125℃		1.50		
			T_J=175℃		1.68		
Total Gate Charge	Q_g	V_{GE}=15V, V_{CC}=520V I_C=40A			320		nC
Gate to Emitter Charge	Q_{ge}				30		
Gate to Collector Charge	Q_{gc}				35		

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
Turn-On Delay Time	$t_{d(on)}$	V_{GE}=15V, V_{CE}=400V I_C=40A, R_G=5Ω Inductive Load	T_C=25℃		32		ns
			T_C=175℃		30		
Turn-On Rise Time	t_r		T_C=25℃		25		ns
			T_C=175℃		27		
Turn-Off Delay Time	$t_{d(off)}$		T_C=25℃		187		ns
			T_C=175℃		202		
Turn-Off Fall Time	t_f		T_C=25℃		15		ns
			T_C=175℃		18		
Turn-On Energy	E_{on}		T_C=25℃		0.95		mJ
			T_C=175℃		1.45		
Turn-Off Energy	E_{off}		T_C=25℃		0.65		mJ
			T_C=175℃		1.20		
Total Switching Energy	E_{ts}		T_C=25℃		1.60		mJ
			T_C=175℃		2.65		
Input Capacitance	C_{ies}	V_{GE}=0V, V_{CE}=25V f=1MHz			5660		pF
Output Capacitance	C_{oes}				260		pF
Reverse Transfer Capacitance	C_{res}				154		pF
Diode Forward Voltage	V_F	I_F=40A	T_J=25℃		1.30	1.60	V
			T_J=150℃		1.18		
			T_C=175℃		1.10		
Diode Reverse Recovery Time	T_{rr}	VR=400V, I_F=40A dI_F/dt=200A/us T_C=25℃			140		ns
Diode Reverse Recovery Charge	Q_{rr}				580		nC
Diode Peak Reverse Recovery Current	I_{rm}				6		A

电参数曲线图 / Electrical Characteristic Curve

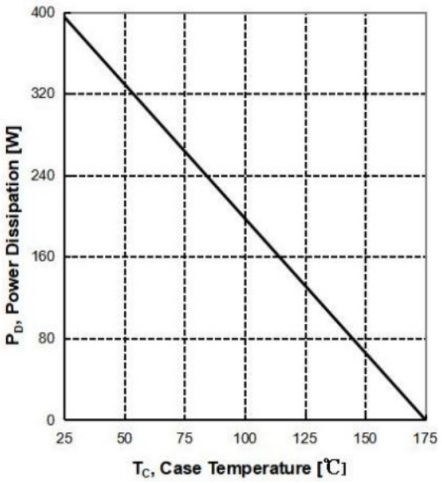


Fig. 1 TYP.Power Dissipation

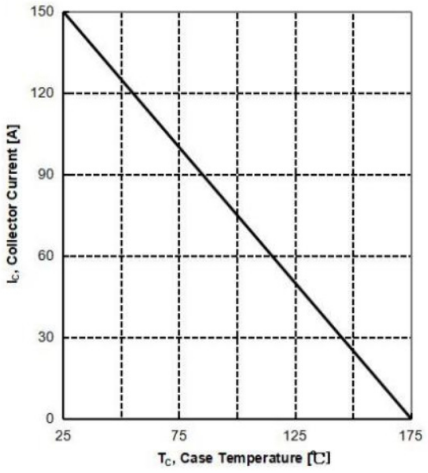


Fig. 2 Collector Current vs. Case Temperature

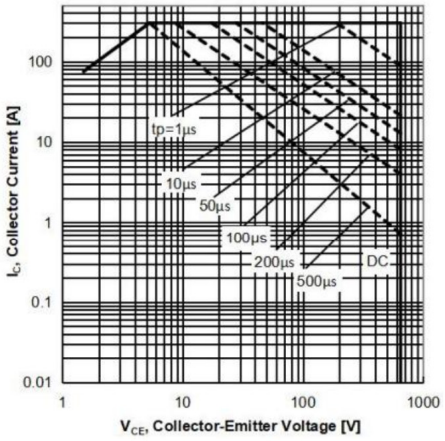


Fig. 3 Safe Operation Area

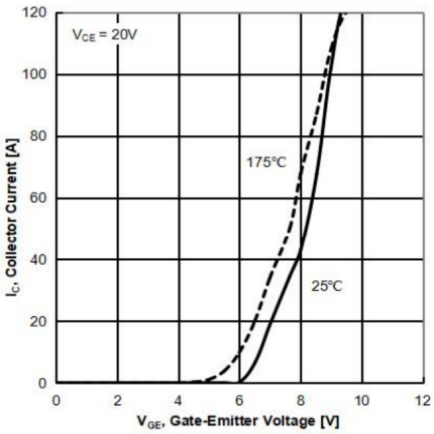


Fig. 4 TYP. Transfer Characteristics

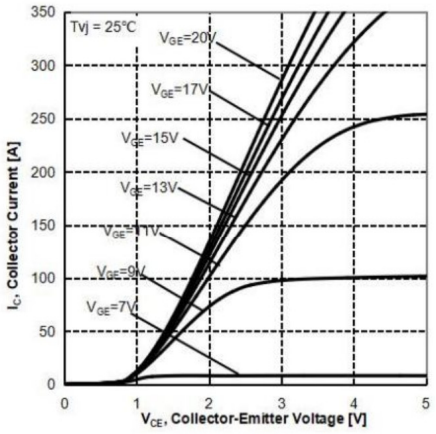


Fig. 5 TYP. Out put Characteristics

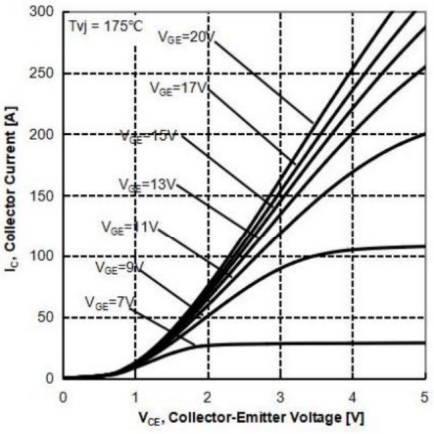


Fig. 6 Output Characteristics

电参数曲线图 / Electrical Characteristic Curve

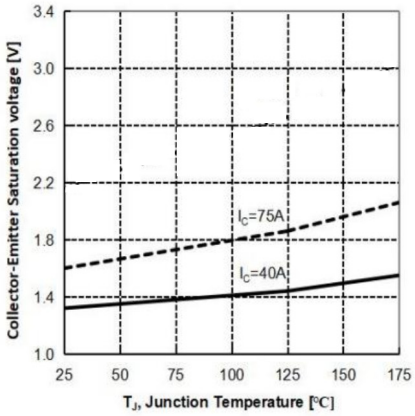


Fig. 7 Typical Collector-Emitter Saturation Voltage vs. Junction Tempertature

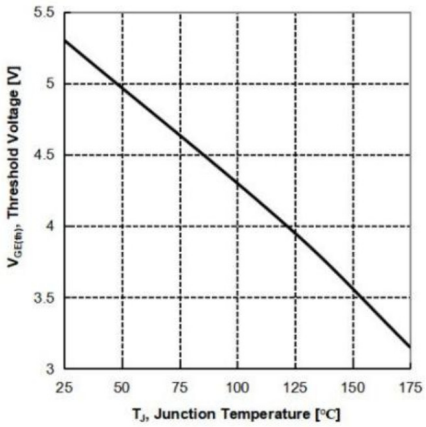


Fig. 8 Typical Gate-Emitter Threshold Voltage vs. Junction Temperature

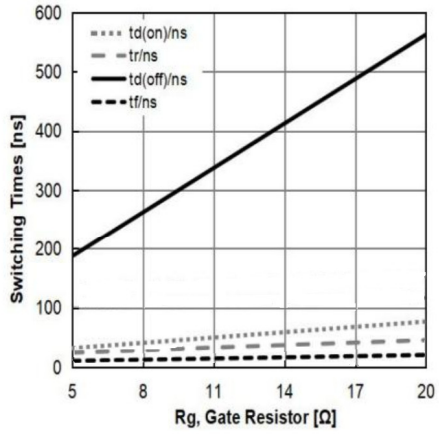


Fig. 9 TYP. Switching Times vs. Gate Resistor
(T_j=25℃,V_{CE}=400V,V_{GE}=15V,I_C=40A)

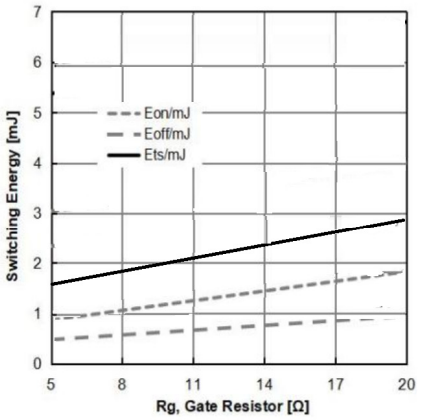


Fig. 10 TYP. Switching Energy vs. Gate Resistor
(T_j=25℃,V_{CE}=400V,V_{GE}=15V,I_C=40A)

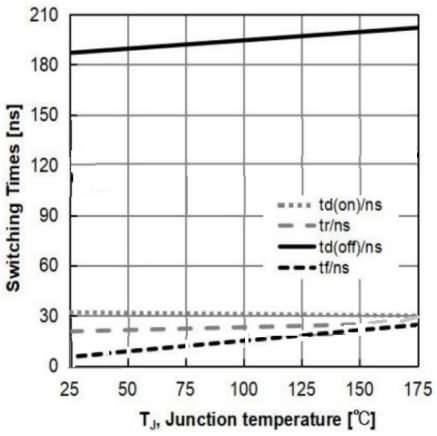


Fig. 11 TYP. Switching Times vs. Junction Temperature
(V_{CE}=400V,V_{GE}=15V,I_C=40A , R_g=5Ω)

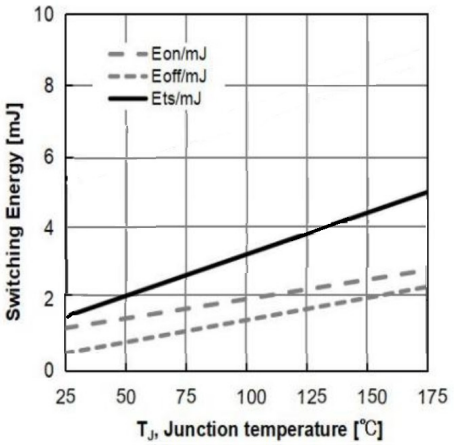


Fig. 12 TYP. Switching Energy vs. Junction Temperature
(V_{CE}=400V,V_{GE}=15V,I_C=40A , R_g=5Ω)

电参数曲线图 / Electrical Characteristic Curve

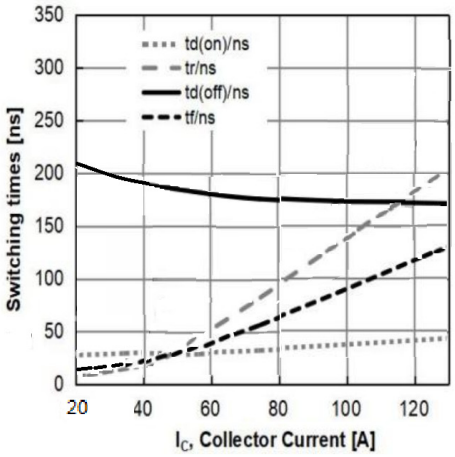


Fig. 13 TYP. Switching Times vs. Collector current
(R_g=5Ω,V_{CE}=400V,V_{GE}=15V, T_j=25℃)

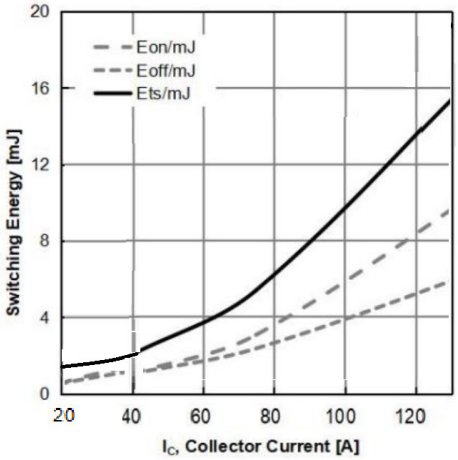


Fig. 14 TYP. Switching Energy vs. Collector current
(R_g=5Ω,V_{CE}=400V,V_{GE}=15V, T_j=25℃)

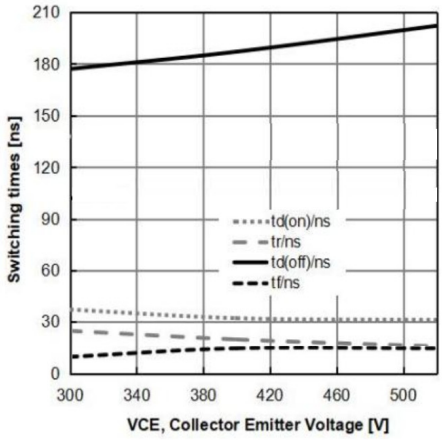


Fig. 15 TYP. Switching Times vs. VCE
(T_j=25℃, I_C= 40A ,V_{GE}=15V,R_g=5Ω)

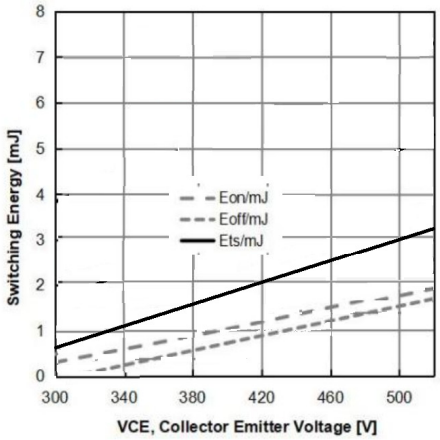


Fig. 16 TYP. Switching Energy vs. VCE
(T_j=25℃, I_C= 40A,V_{GE}=15V, R_g=5Ω)

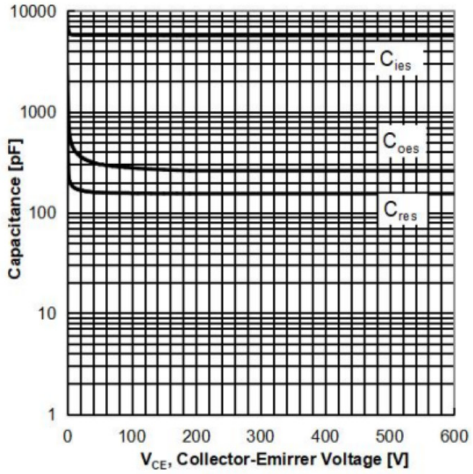


Fig. 17 TYP. Capacitance vs. Collector-Emitter Voltage

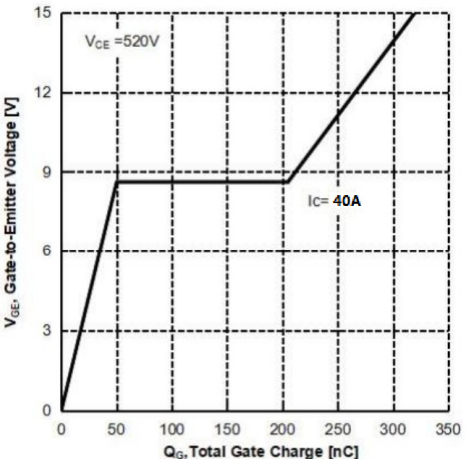


Fig. 18 TYP. Gate Charge

电参数曲线图 / Electrical Characteristic Curve

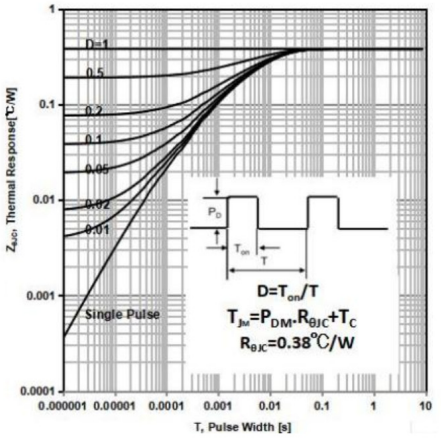
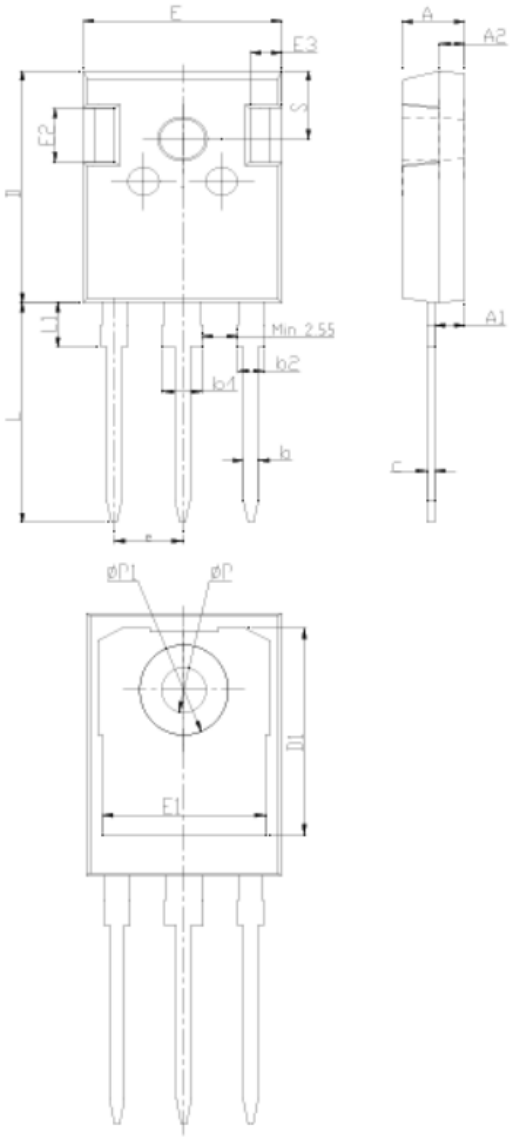


Fig. 19 TYP. Gate Charge

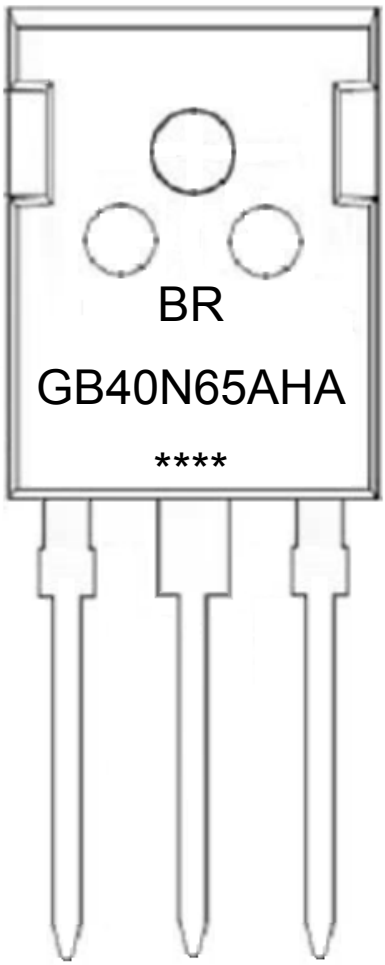
外形尺寸图 / Package Dimensions



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

印章说明 / Marking Instructions



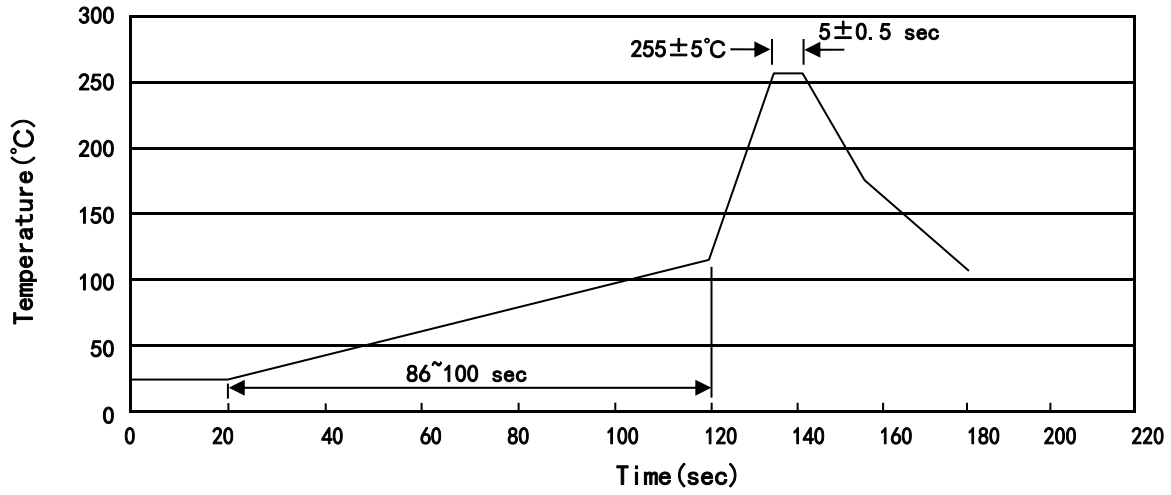
说明：

BR：	为公司代码
GB40N65AHA：	为型号代码
****：	为生产批号代码，随生产批号变化

Note:

BR:	Company Code
GB40N65AHA:	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-247	30	15	450	5	2250	520×44×6	580×158×55	595×300×178

使用说明 / Notices

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