

BRGB40L65AHA

Rev.A Dec.-2025

/ Descriptions

TO-247

Insulated-Gate Bipolar Transistor in a TO-247 Plastic Package.

/ Features

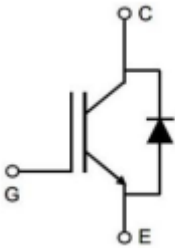
$V_{CES} = 650V$ $I_C (T_C=100^\circ C) = 40A$

$V_{CE(SAT)} = 2.35 V(\text{typ.}) @ V_{GE} = 15V, I_C = 40A$

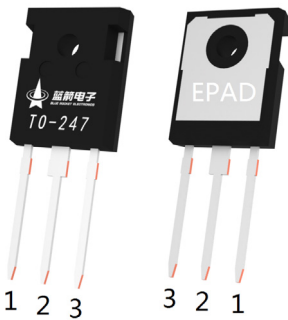
/ Applications

Solar Converters, Uninterrupted Power Supply, Welding Converters, Mid to High Range Switching Frequency Converters.

/ Equivalent Circuit



/ Pinning



PIN1 G

PIN 2 EPAD C

PIN 3 E

/ Marking

See Marking Instructions.

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Parameter	Symbol	Rating	Unit	
Collector-Emitter Voltage	V_{CES}	650	V	
Gate-Emitter Voltage	V_{GES}	± 20	V	
Continuous Collector Current	I_C	$T_C=25^\circ\text{C}$	80	A
		$T_C=100^\circ\text{C}$	40	A
Pulsed Collector Current , Limited by T_{Jmax}	I_{CM}	160	A	
Continuous Diode Forward Current	I_F	$T_C=25^\circ\text{C}$	80	A
		$T_C=100^\circ\text{C}$	40	A
Diode Maximum Forward Current	I_{FM}	160	A	
Power Dissipation	P_D	$T_C=25^\circ\text{C}$	125	W
		$T_C=100^\circ\text{C}$	63	W
Operating Junction Temperature Range	T_J	-40 to +175	$^\circ\text{C}$	
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$	
Maximum IGBT Junction-to-Case	R_{jc1}	1.2	$^\circ\text{C}/\text{W}$	
Maximum Diode Junction-to-Case	R_{jc2}	2.4	$^\circ\text{C}/\text{W}$	

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Collector-Emitter Breakdown Voltage	BV_{CES}	$I_C=200\mu\text{A}, V_{GE}=0\text{V}$	650			V	
Zero Gate Voltage Collector current	I_{CES}	$V_{CE}=650\text{V}, V_{GE}=0\text{V}$			40	μA	
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0\text{V}, V_{GE}=\pm 20$			± 100	nA	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=150\mu\text{A}$	4	5	6	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15\text{V}, I_C=40\text{A}$	$T_J=25^\circ\text{C}$		2.4	2.9	V
			$T_J=125^\circ\text{C}$		2.9		

Total Gate Charge Q

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Turn-On Delay Time	$t_{d(on)}$	$V_{GE}=\pm 15V$ $V_{CC}=400V$ $I_C=40A$ $R_G=39$ Inductive Load $T_C=25^\circ C$		40		ns	
Turn-On Rise Time	t_r			46		ns	
Turn-Off Delay Time	$t_{d(off)}$			57		ns	
Turn-Off Fall Time	t_f			17.5		ns	
Turn-On Energy	E_{on}				1.4		mJ
Turn-Off Energy	E_{off}				0.7		mJ
Total Switching Energy	E_{ts}				2.0		mJ
Input Capacitance	C_{ies}	$V_{GE}=0V,$ $V_{CE}=25V$ $f=1MHz$		1040		pF	
Output Capacitance	C_{oes}			72		pF	
Reverse Transfer Capacitance	C_{res}			10		pF	
Short Circuit Safe Operation Area	SCSOA	$V_{GE}=15V, V_{CC}\leq 400V,$ $T_{J,start}\leq 25^\circ C$	6			μs	
Diode Forward Voltage	V_F	$I_F=40A$	$T_J=25^\circ C$	1.9	2.7	V	
			$T_J=150^\circ C$	1.7	2.5		
Diode Reverse Recovery Time	T_{rr}	$V_R=400V,$ $I_F=40A$ $di_F/dt=300A/us$ $T_C=25^\circ C$		90		ns	
Diode Reverse Recovery Charge	Q_{rr}			450		nC	
Diode Peak Reverse Recovery Current	I_{rm}				8		A

/ Electrical Characteristic Curve

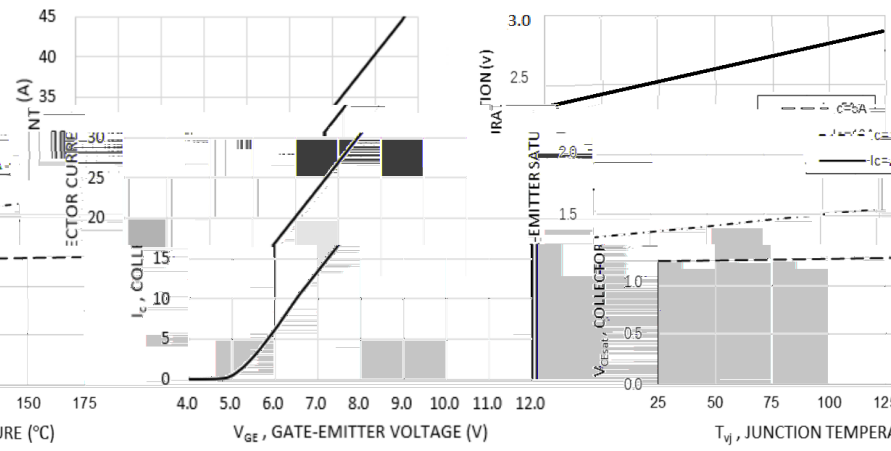
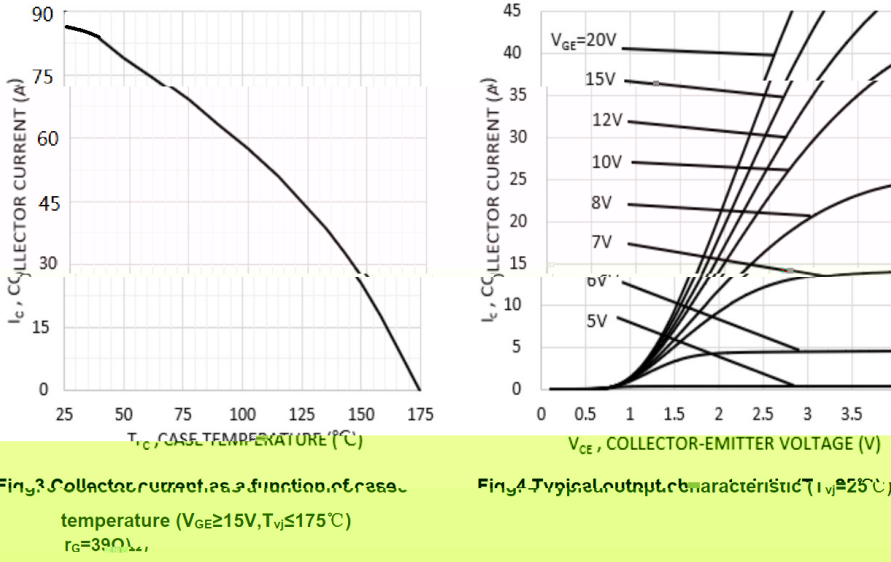
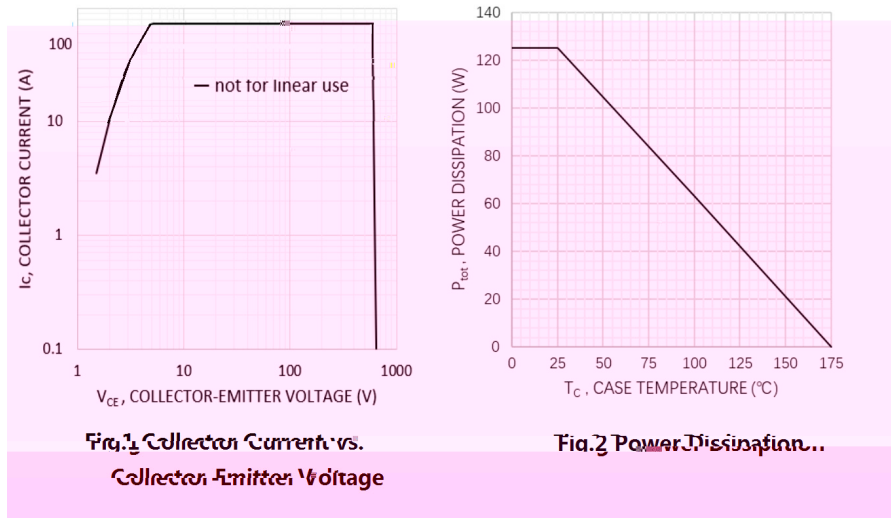
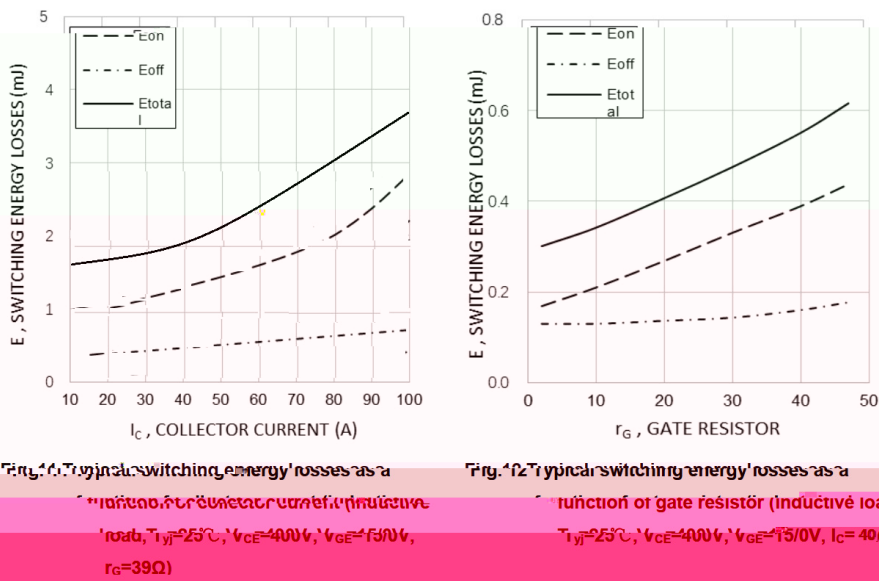
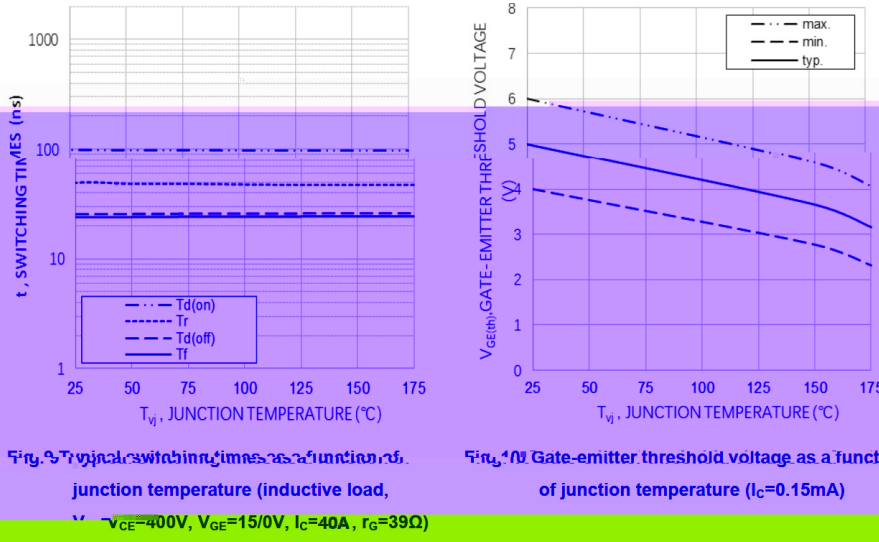
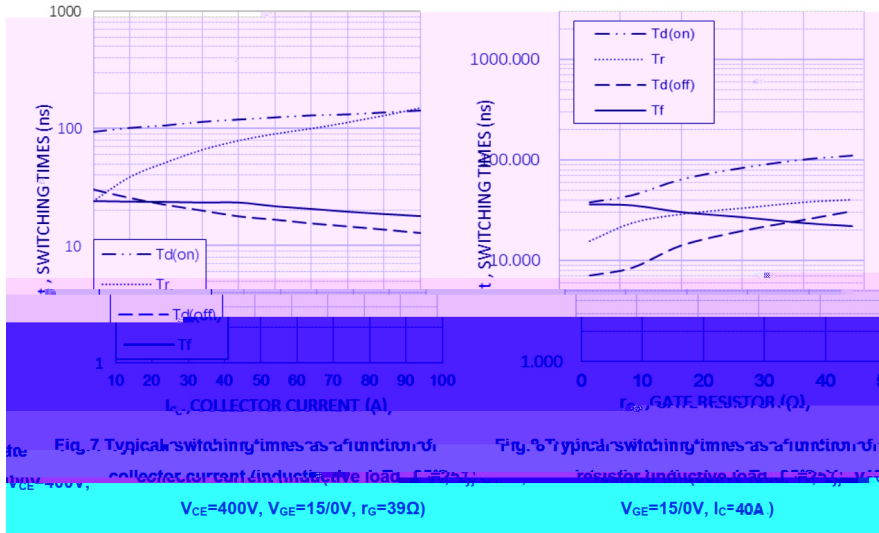


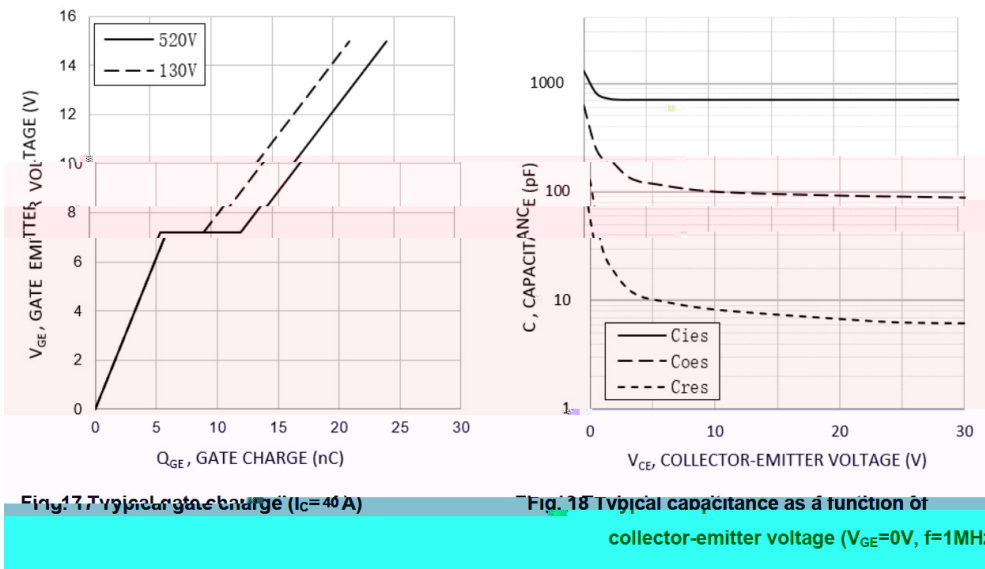
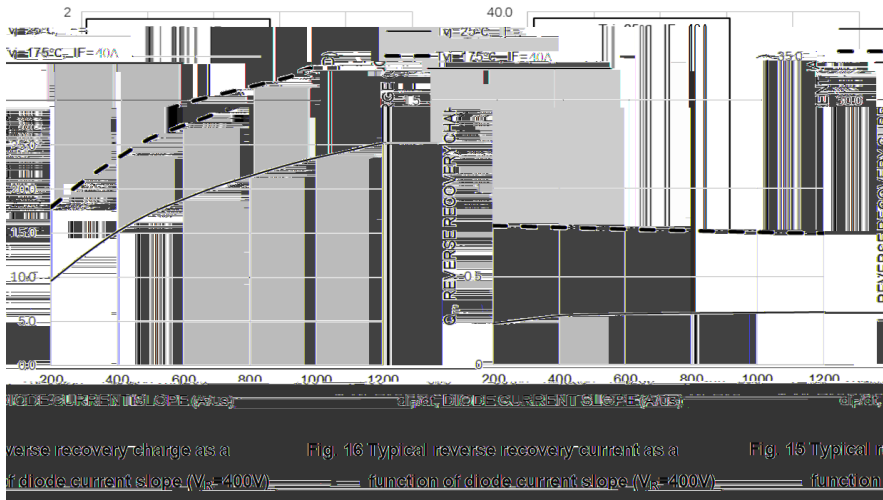
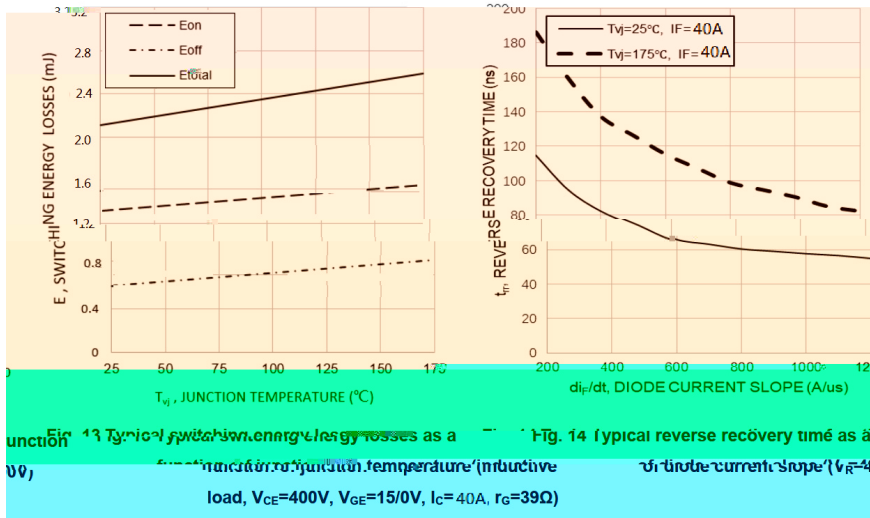
Fig. 5 Typical transfer characteristics ($V_{CE}=20V$)

Fig. 6 Typical collector-emitter saturation as a function of junction temperature ($V_{GE}=15V$)

/ Electrical Characteristic Curve



/ Electrical Characteristic Curve



/ Electrical Characteristic Curve

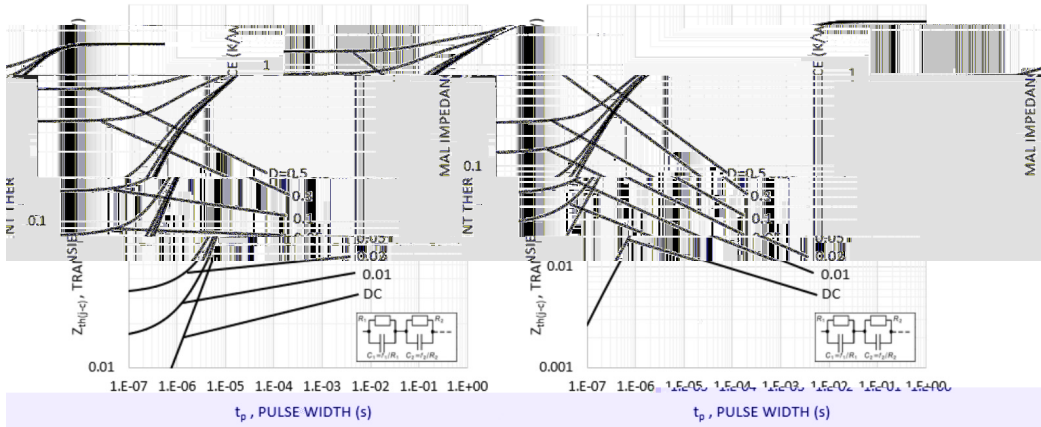
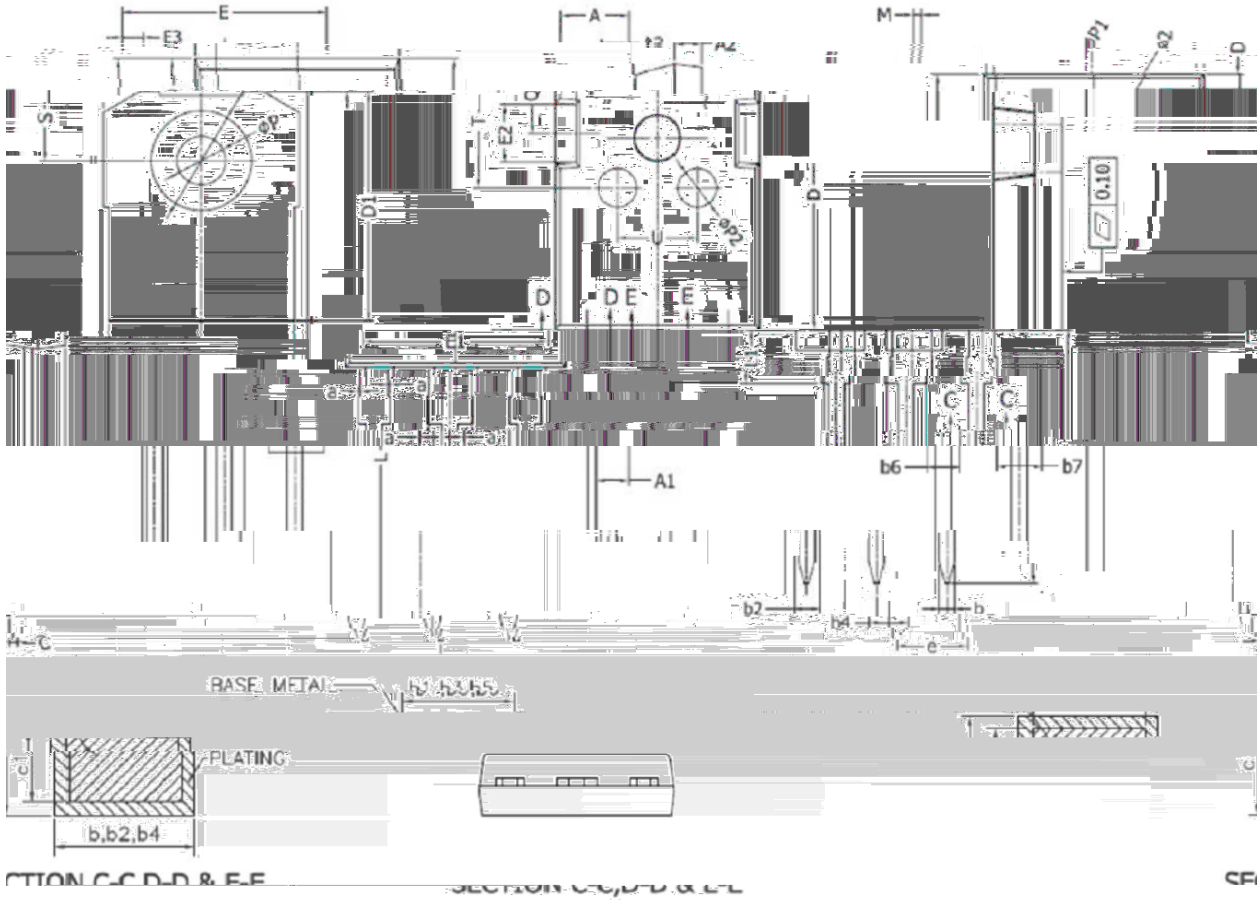


Fig. 19 JGBT transient thermal impedance ($D=t_p/T$) Fig. 20 Diode transient thermal impedance as a function of pulse width ($D=t_p/T$)

/ Package Dimensions

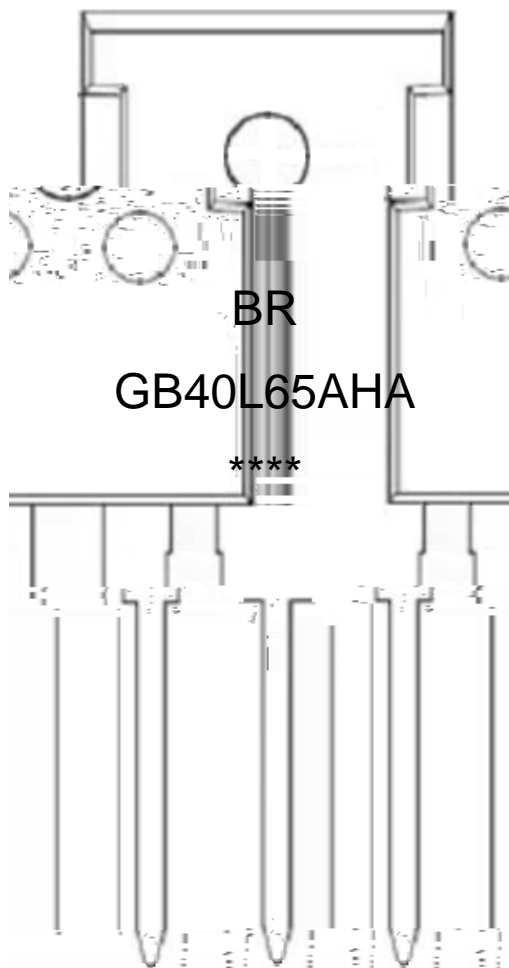


Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	4.90	5.00	5.10	E	15.70	15.80	15.90
A1	2.31	2.41	2.51	E1	13.10	13.30	13.50
A2	1.90	2.00	2.10	E2	4.40	4.50	4.60
a	0.00	-	0.15	E3	1.50	1.60	1.70
a'	0.00	-	0.15	e	5.436 BSC		
b	1.16	-	1.26	L	19.80	19.92	20.10
b1	1.15	1.20	1.22	L1	-	-	4.30
b2	1.96	-	2.06	M	0.35	-	0.95
b3	1.95	2.00	2.02	P	3.40	3.50	3.60
b4	2.96	-	3.06	P1	7.00	-	7.40
b5	2.96	3.00	3.02	P2	2.40	2.50	2.60
b6	-	-	2.25	Q	5.60	-	6.00
b7	-	-	3.25	S	6.05	6.15	6.25
c	0.59	-	0.66	T	9.80	-	10.20
c1	0.58	0.60	0.62	U	6.00	-	6.40
D	20.90	21.00	21.10				
D1	16.25	16.55	16.85				
D2	1.05	1.17	1.35				

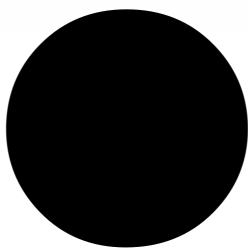
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Rev.A Dec.-2025

/ Marking Instructions



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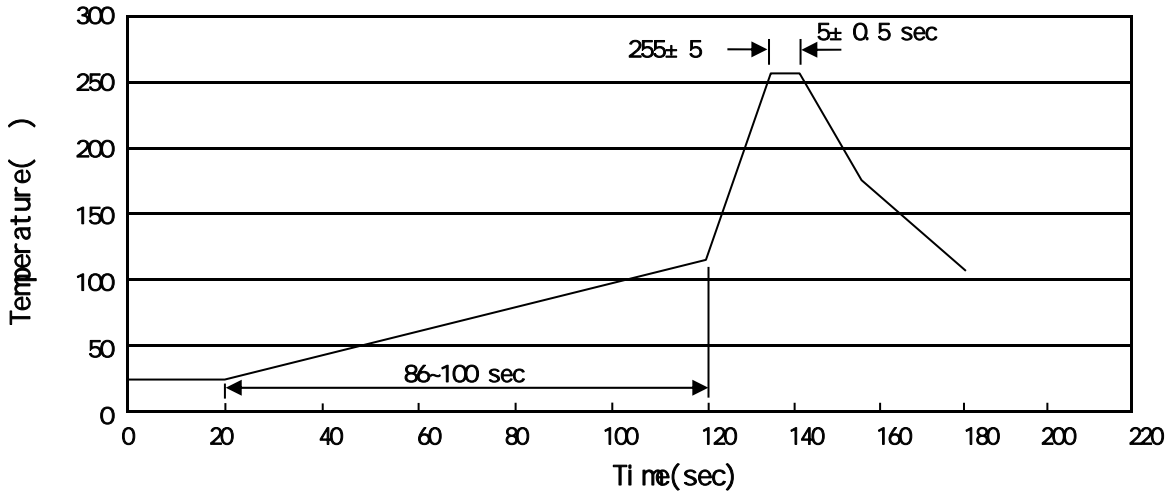
Note:

BR: Company Code

GB40L65AHA: Product Type Code

****: Lot No. Code, code change with Lot No.

() / Temperature Profile for Dip Soldering(Pb-Free)



Note:

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

/ Resistance to Soldering Heat Test Conditions

270 5 10 1 sec. Temp.:270±5°C Time:10±1 sec

/ Packaging SPEC.

/ TUBE

Package Type	Units					Dimension (unit mm ³)		
	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Outer Box	Units/Outer Box	Tube	Inner Box	Outer Box
TO-247	30	15	450	5	2250	520×44×6	580×158×55	595 300 178

/ Notices

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