

## Small Signal Product

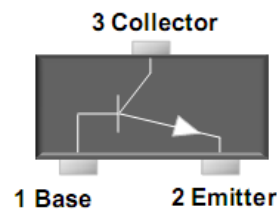
## NPN Transistor

### FEATURES

- Low reverse current, high reliability
- Surface device type mounting
- Moisture sensitivity level 1
- Matte Tin(Sn) lead finish with Nickel(Ni) underplate
- Pb free version and RoHS compliant
- Packing code with suffix "G" means green compound (halogen-free)

### MECHANICAL DATA

- Case: SOT-323 small outline plastic package
- Terminal: Matte tin plated, lead free., solderable per MIL-STD-202, Method 208 guaranteed
- High temperature soldering guaranteed : 260°C/10s
- Weight: 5 ± 0.5 mg


**SOT-323**


| MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (T <sub>A</sub> =25°C unless otherwise noted) |                                   |              |      |
|----------------------------------------------------------------------------------------------|-----------------------------------|--------------|------|
| PARAMETER                                                                                    | SYMBOL                            | VALUE        | UNIT |
| Power Dissipation                                                                            | P <sub>D</sub>                    | 200          | mW   |
| Collector-Base Voltage                                                                       | V <sub>CBO</sub>                  | 80           | V    |
|                                                                                              |                                   | 50           |      |
|                                                                                              |                                   | 30           |      |
|                                                                                              |                                   | 30           |      |
|                                                                                              |                                   | 50           |      |
| Collector-Emitter Voltage                                                                    | V <sub>CEO</sub>                  | 65           | V    |
|                                                                                              |                                   | 45           |      |
|                                                                                              |                                   | 30           |      |
|                                                                                              |                                   | 30           |      |
|                                                                                              |                                   | 45           |      |
| Emitter-Base Voltage                                                                         | V <sub>EBO</sub>                  | 6            | V    |
|                                                                                              |                                   | 6            |      |
|                                                                                              |                                   | 5            |      |
|                                                                                              |                                   | 5            |      |
|                                                                                              |                                   | 5            |      |
| Collector Current                                                                            | I <sub>C</sub>                    | 0.1          | A    |
| Peak Collector Current                                                                       | I <sub>CM</sub>                   | 0.2          | A    |
| Junction and Storage Temperature Range                                                       | T <sub>J</sub> , T <sub>STG</sub> | -55 to + 150 | °C   |

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| PARAMETER                                               |                                                | SYMBOL        | MIN  | MAX  | UNIT |
|---------------------------------------------------------|------------------------------------------------|---------------|------|------|------|
| Collector-Base Breakdown Voltage<br>at $I_C = 10 \mu A$ | BC846AW/BW/CW                                  | $V_{CBO}$     | 80   | -    | V    |
|                                                         | BC847AW/BW/CW                                  |               | 50   | -    |      |
|                                                         | BC848AW/BW/CW                                  |               | 30   | -    |      |
|                                                         | BC849AW/BW/CW                                  |               | 30   | -    |      |
|                                                         | BC850AW/BW/CW                                  |               | 50   | -    |      |
| Collector-Emitter Breakdown Voltage<br>at $I_C = 10 mA$ | BC846AW/BW/CW                                  | $V_{(BR)CEO}$ | 65   | -    | V    |
|                                                         | BC847AW/BW/CW                                  |               | 45   | -    |      |
|                                                         | BC848AW/BW/CW                                  |               | 30   | -    |      |
|                                                         | BC849AW/BW/CW                                  |               | 30   | -    |      |
|                                                         | BC850AW/BW/CW                                  |               | 45   | -    |      |
| Emitter-Base Breakdown Voltage<br>at $I_E = 1 \mu A$    | BC846AW/BW/CW                                  | $V_{EBO}$     | 6    | -    | V    |
|                                                         | BC847AW/BW/CW                                  |               | 6    | -    |      |
|                                                         | BC848AW/BW/CW                                  |               | 5    | -    |      |
|                                                         | BC849AW/BW/CW                                  |               | 5    | -    |      |
|                                                         | BC850AW/BW/CW                                  |               | 5    | -    |      |
| Collector Cut-off Current at $V_{CB} = 30 V$            |                                                | $I_{CBO}$     | -    | 15   | nA   |
| Emitter Cut-off Current at $V_{EB} = 5 V$               |                                                | $I_{EBO}$     | -    | 100  | nA   |
| DC Current Gain<br>at $V_{CE} = 5 V$ , $I_C = 2 mA$     | BC846AW - BC850AW                              | $h_{FE}$      | 110  | 220  | -    |
|                                                         | BC846BW - BC850BW                              |               | 200  | 450  | -    |
|                                                         | BC846CW - BC850CW                              |               | 420  | 800  | -    |
| Collector-Emitter Saturation Voltage                    | $I_C = 10 mA$ , $I_B = 0.5 mA$                 | $V_{CE(sat)}$ | -    | 0.25 | V    |
|                                                         | $I_C = 100 mA$ , $I_B = 5 mA$                  |               | -    | 0.60 |      |
| Transition Frequency                                    | $V_{CE} = 5 V$ , $I_C = 10 mA$ , $f = 100 MHz$ | $f_T$         | 100  | -    | MHz  |
| Base Emitter Voltage                                    | $V_{CE} = 5 V$ , $I_C = 2 mA$                  | $V_{BE}$      | 0.58 | 0.70 | V    |
|                                                         | $V_{CE} = 5 V$ , $I_C = 10 mA$                 |               | -    | 0.77 |      |
| Collector Output Capacitance                            | $V_{CB} = 10 V$ , $I_E = 0$ , $f = 1 MHz$      | $C_{ob}$      | -    | 4.50 | pF   |

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### RATINGS AND CHARACTERISTICS CURVES

( $T_A=25^\circ\text{C}$  unless otherwise noted)

Fig.1 Normalized DC Current Gain

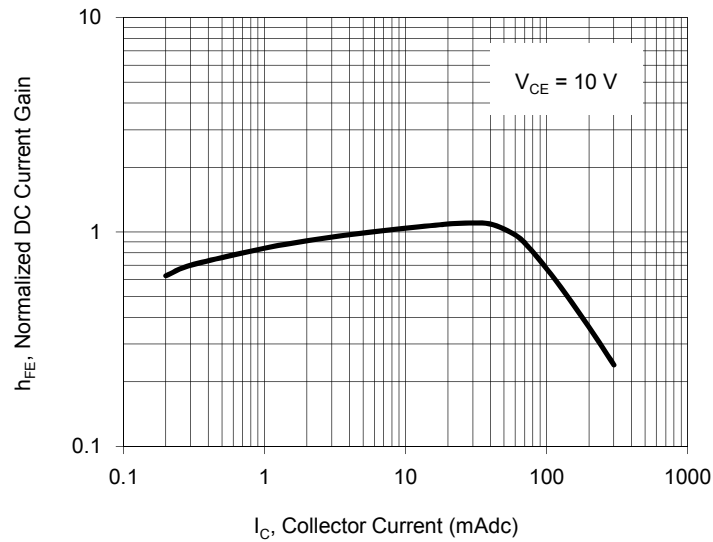


Fig.2 "Saturation" and "On" Voltages

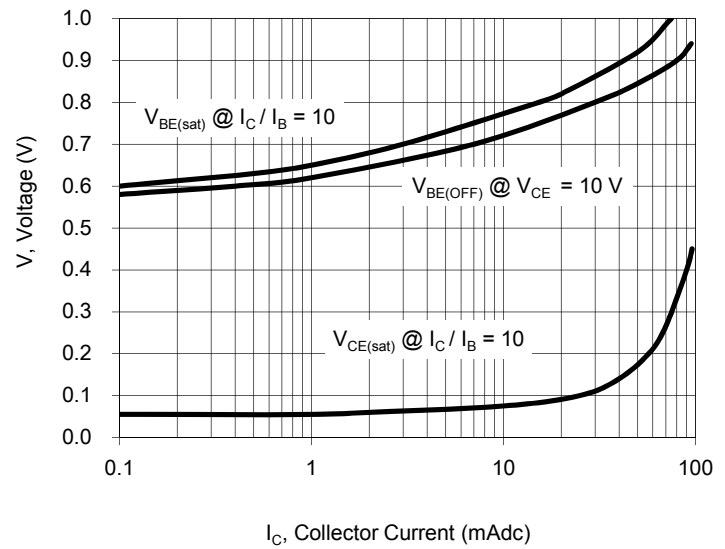


Fig.3 Collector Saturation Region

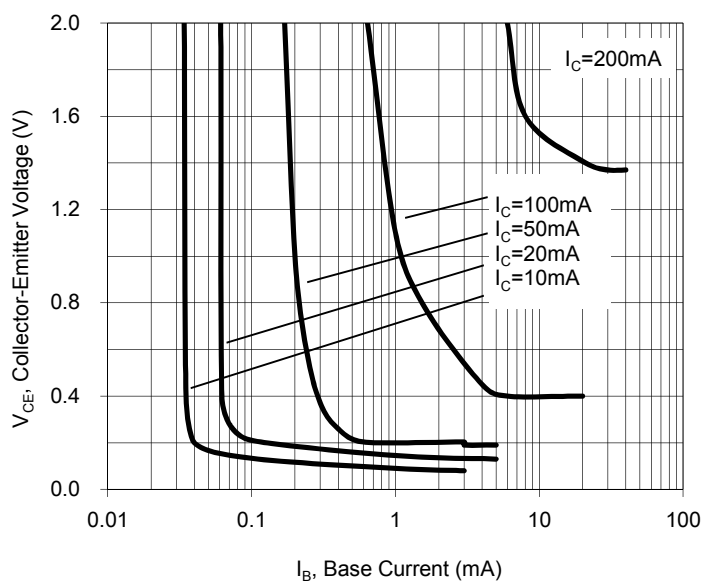


Fig.4 Base-Emitter Current (mA)

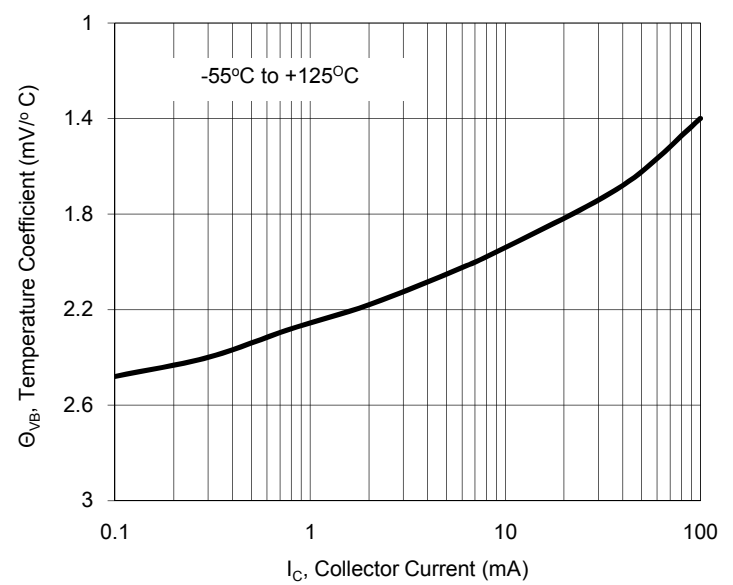


Fig.5 Capacitances

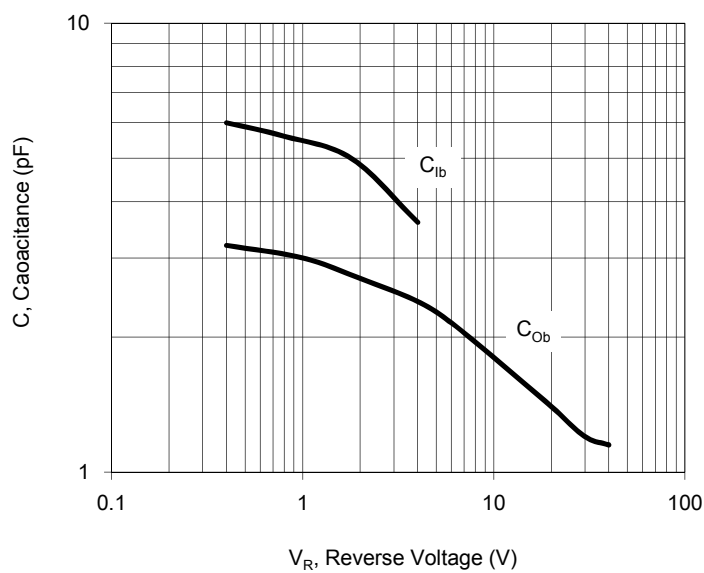
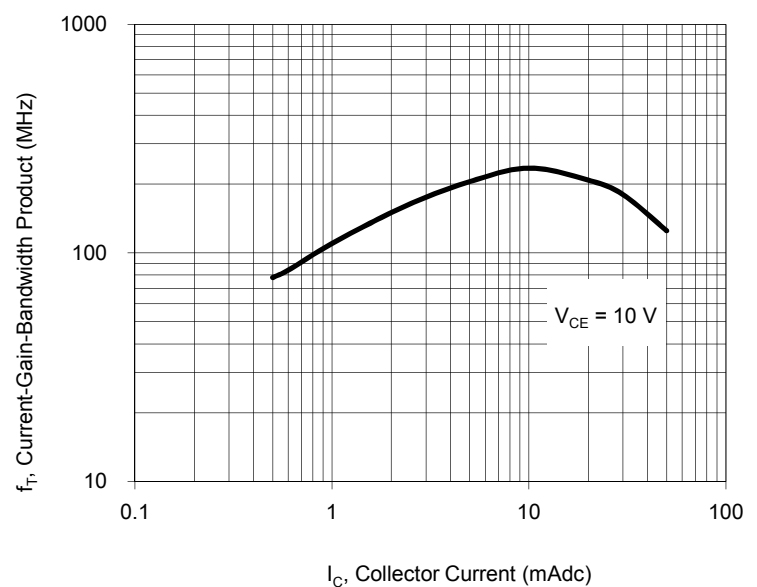


Fig.6 Current-Gain-Bandwidth Product



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Fig.7 DC Collector Current (mA)

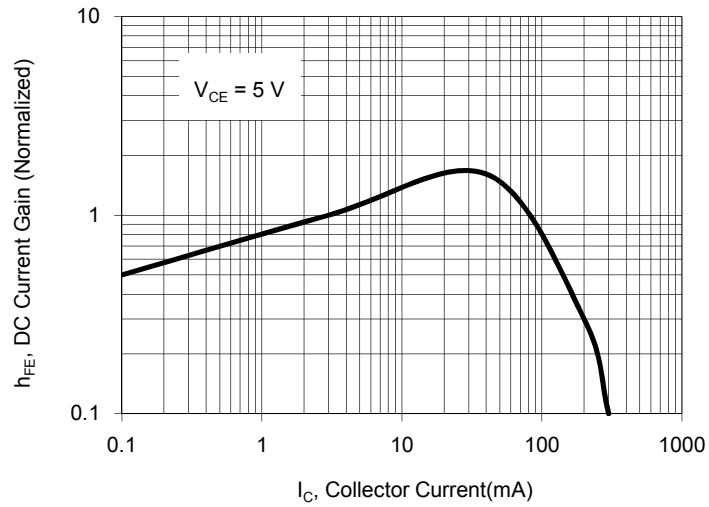


Fig. 8 "On" Voltage

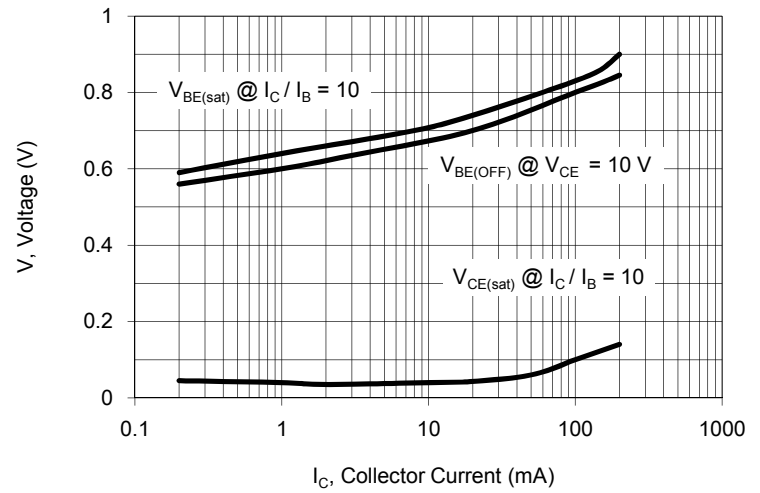


Fig.9 Collector Saturation Region

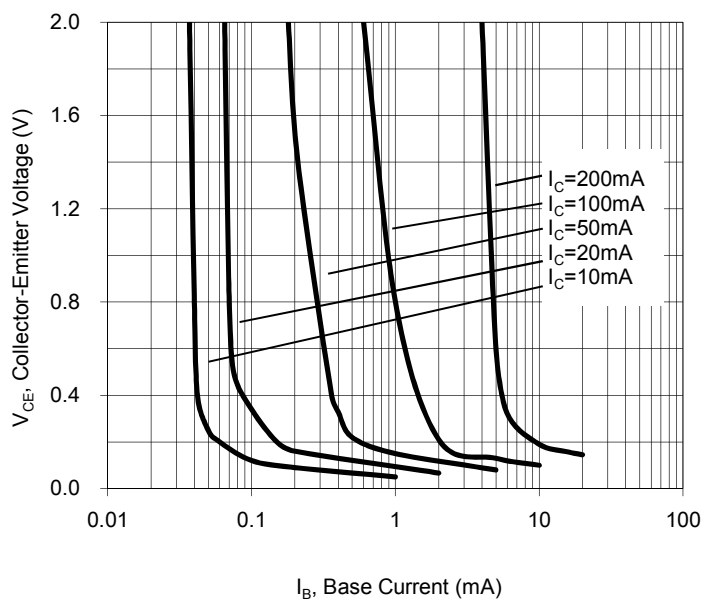


Fig.4 Bae-Emitter Temperature Coefficient

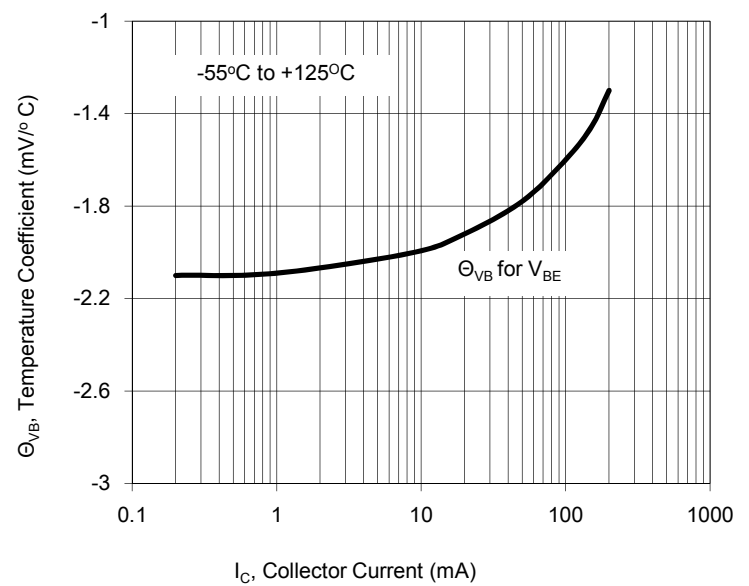


Fig.11 Capacitance

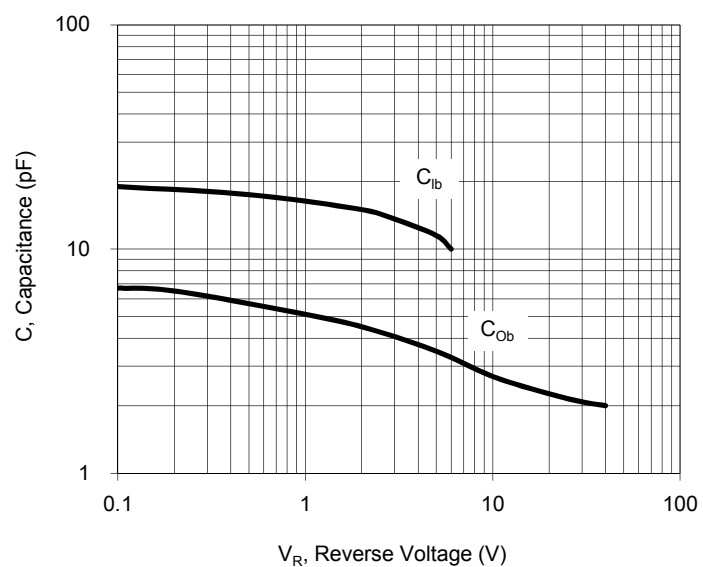
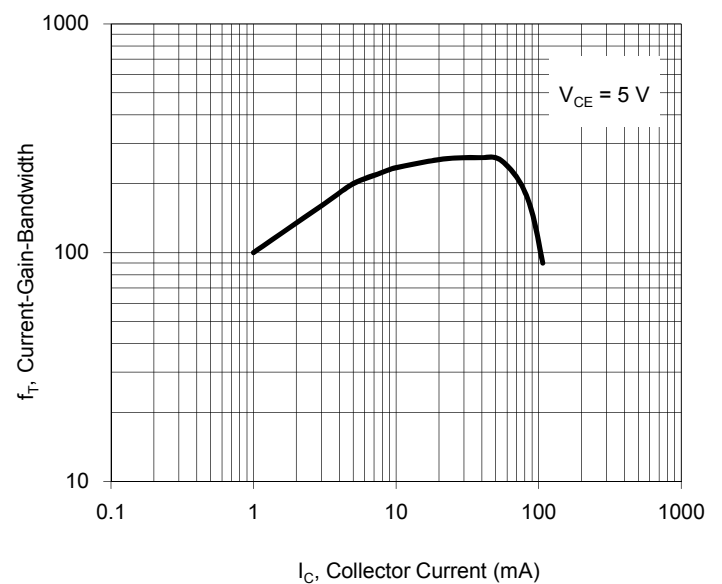


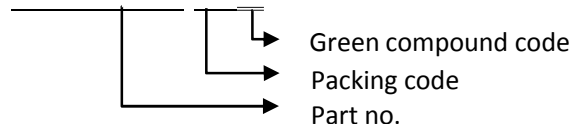
Fig.12 Current-Gain-Bandwidth Product



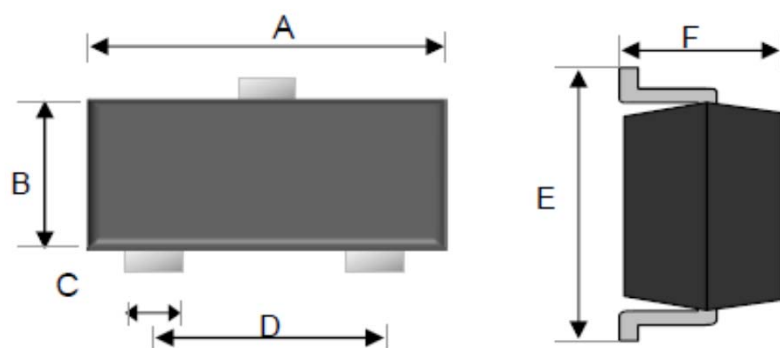
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**ORDER INFORMATION (EXAMPLE)**

BC846AW RFG

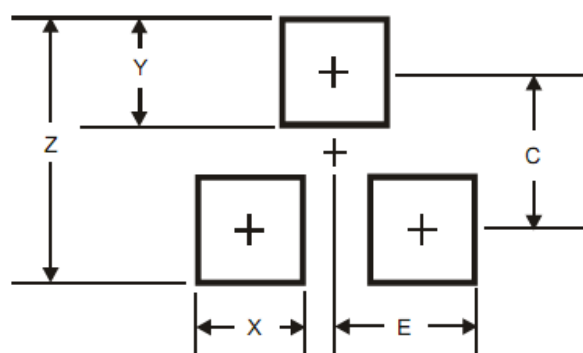


**PACKAGE OUTLINE DIMENSIONS**  
**SOT-323**



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min       | Max  | Min         | Max   |
| A    | 1.80      | 2.20 | 0.071       | 0.087 |
| B    | 1.15      | 1.35 | 0.045       | 0.053 |
| C    | 0.15      | 0.40 | 0.006       | 0.016 |
| D    | 1.20      | 1.40 | 0.047       | 0.055 |
| E    | 2.00      | 2.45 | 0.079       | 0.096 |
| F    | 0.80      | 1.10 | 0.031       | 0.043 |

**SUGGEST PAD LAYOUT**



| DIM. | Unit (mm) | Unit (inch) |
|------|-----------|-------------|
|      | Typ.      | Typ.        |
| Z    | 2.80      | 0.110       |
| X    | 0.70      | 0.028       |
| Y    | 0.90      | 0.035       |
| C    | 1.90      | 0.075       |
| E    | 1.00      | 0.039       |

**MARKING**

| Part No. | Marking |
|----------|---------|
| BC846AW  | 1A      |
| BC847AW  | 1E      |
| BC848AW  | 1E      |
| BC849AW  | 1E      |
| BC850AW  | 1E      |

| Part No. | Marking |
|----------|---------|
| BC846BW  | 1B      |
| BC847BW  | 1F      |
| BC848BW  | 1F      |
| BC849BW  | 1F      |
| BC850BW  | 1F      |

| Part No. | Marking |
|----------|---------|
| BC846CW  | 1C      |
| BC847CW  | 1G      |
| BC848CW  | 1G      |
| BC849CW  | 1G      |
| BC850CW  | 1G      |

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