

BC856AW-Q1/BC856BW-Q1**BC857AW-Q1/BC857BW-Q1/BC857CW-Q1****BC858AW-Q1/BC858BW-Q1/BC858CW-Q1****List**

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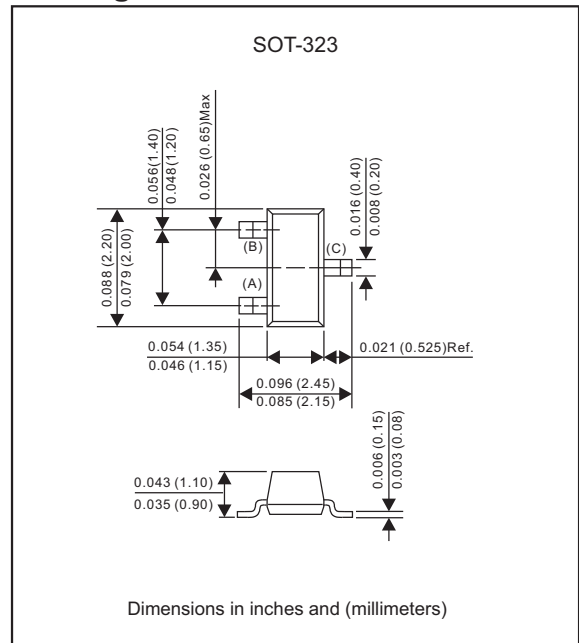
100mA Silicon PNP
General Purpose Transistor

Features

- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen-free part, ex. BC856AW-Q1-H.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-323
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.006 gram

Package outline**Maximum ratings** (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base voltage	V_{CBO}	-80	V
BC856		-50	
BC857		-30	
BC858			
Collector-Emitter voltage	V_{CEO}	-65	V
BC856		-45	
BC857		-30	
BC858			
Emitter-Base voltage	V_{EBO}	-5.0	V
BC856		-5.0	
BC857		-5.0	
BC858		-5.0	
Collector current-continuous	I_C	-100	mA

Thermal characteristics

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Total device dissipation FR-5 board (Note1)	$T_A = 25^{\circ}\text{C}$	P_D			150	mW
Thermal resistance (Note1)	Junction to ambient	$R_{\theta JA}$		833		$^{\circ}\text{C/W}$
Operating junction temperature range		T_J	-55		+150	$^{\circ}\text{C}$
Storage temperature range		T_{STG}	-55		+150	$^{\circ}\text{C}$

Note:

1.FR-5 = 1.0 X 0.75 X0.062 in.

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PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Collector-Base breakdown voltage BC856 Series BC857 Series BC858 Series	$I_C = -10\mu\text{A}$	$V_{(BR)CBO}$	-80 -50 -30			V
Collector-Emitter breakdown voltage BC856 Series BC857 Series BC858 Series	$I_C = -10\text{mA}$	$V_{(BR)CEO}$	-65 -45 -30			V
Emitter-Base breakdown voltage BC856 Series BC857 Series BC858 Series	$I_E = -1.0\mu\text{A}$	$V_{(BR)EBO}$	-5.0 -5.0 -5.0			V
Collector-Emitter breakdown voltage BC856 Series BC857 Series BC858 Series	$I_C = -10\mu\text{A}, V_{EB} = 0$	$V_{(BR)CES}$	-80 -50 -30			V
Collector cutoff current	$V_{CB} = -30\text{V}$ $V_{CB} = -30\text{V}, T_A = 150^\circ\text{C}$	I_{CBO}			-15 -4.0	nA uA

On characteristics

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
DC current gain BC856A, BC857A, BC858A BC856B, BC857B, BC858B BC857C, BC858C	$I_C = -2.0\text{mA}, V_{CE} = -5.0\text{V}$	h_{FE}	125 220 420	180 290 520	250 475 800	-
Collector-Emitter saturation voltage	$I_C = -10\text{mA}, I_B = -0.5\text{mA}$ $I_C = -100\text{mA}, I_B = -5.0\text{mA}$	$V_{CE(sat)}$			-0.3 -0.65	V
Base-Emitter saturation voltage	$I_C = -10\text{mA}, I_B = -0.5\text{mA}$ $I_C = -100\text{mA}, I_B = -5.0\text{mA}$	$V_{BE(sat)}$		-0.7 -0.9		V
Base-Emitter voltage	$I_C = -2.0\text{mA}, V_{CE} = -5.0\text{V}$ $I_C = -10\text{mA}, V_{CE} = -5.0\text{V}$	$V_{BE(on)}$	-600		-750 -820	mV

Small-signal characteristics

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current-gain-bandwidth product	$I_C = -10\text{mA}, V_{CE} = -5.0\text{V}, f = 100\text{MHz}$	f_T	100			MHz
Output capacitance	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$	C_{obo}			4.5	pF
Noise figure	$I_C = -0.2\text{mA}, V_{CE} = -5.0\text{V}, R_S = 2.0\text{K}\Omega$, $f = 1.0\text{kHz}, \text{BW} = 200\text{Hz}$	NF			10	dB

Rating and characteristic curves (BC856AW-Q1 thru BC858CW-Q1)

BC856 Series

Fig.1- DC CURRENT GAIN

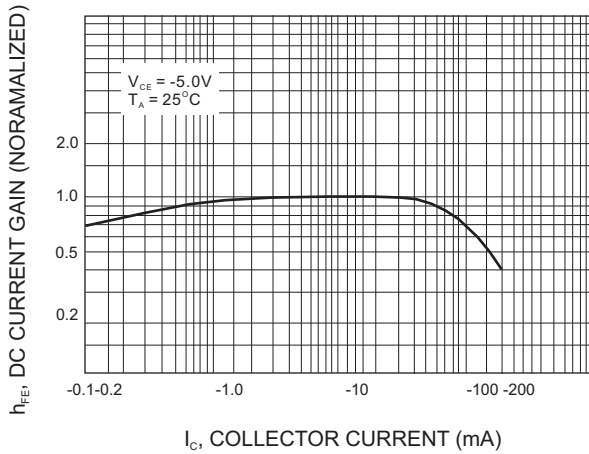


Fig. 2-"ON" VOLTAGE

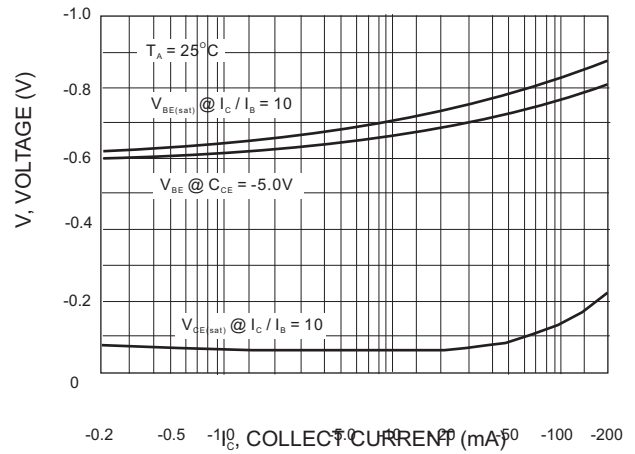


FIG.3- COLLECTOR SATURATION REGION

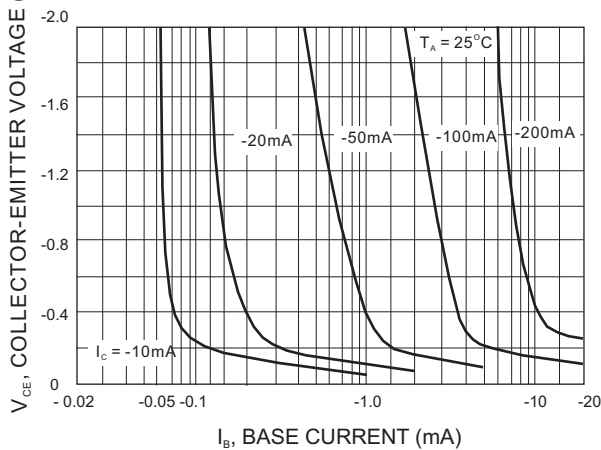


Fig. 4-BASE-EMITTER TEMPERATURE COEFFICIENT

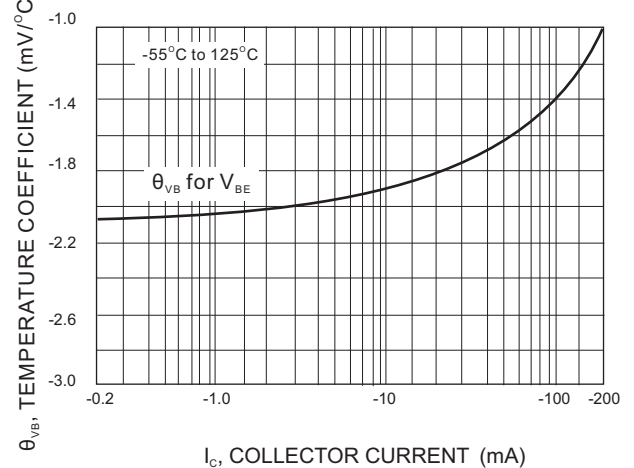


Fig. 5.-CAPACITANCE

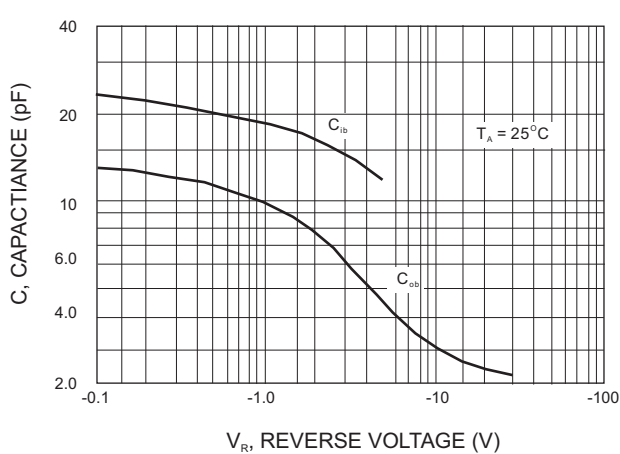
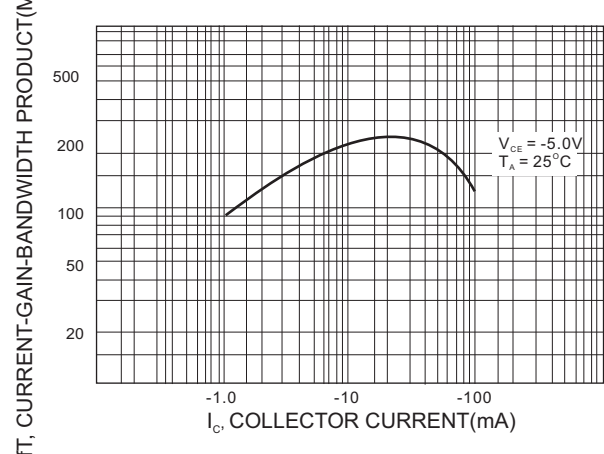


Fig. 6- CURRENT-GAIN-BANDEIDTH PRODUCT



Rating and characteristic curves (BC856AW-Q1 thru BC858CW-Q1)

BC857 Series & BC858 Series

Fig.7- DC CURRENT GAIN

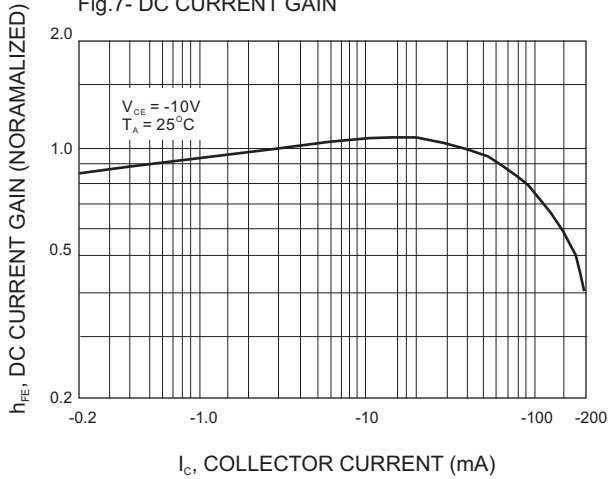


Fig. 8-"ON" VOLTAGE

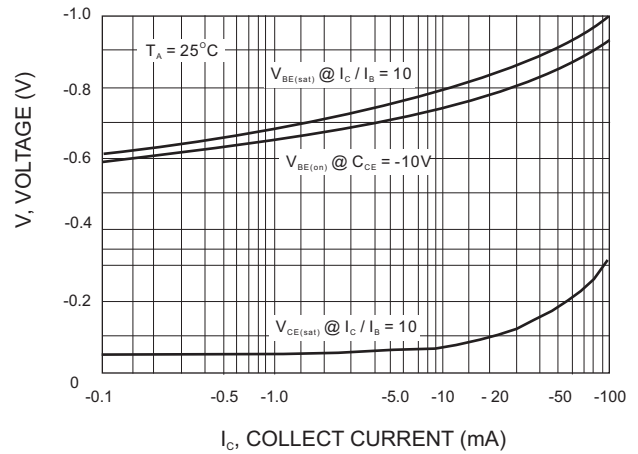


FIG.9- COLLECTOR SATURATION REGION

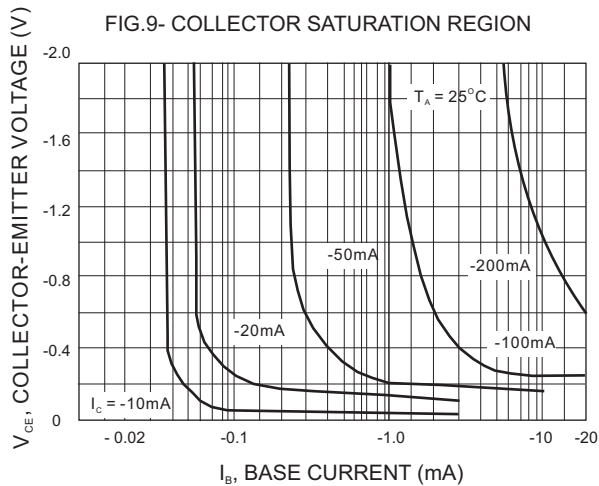


Fig. 10-BASE-EMITTER TEMPERATURE COEFFICIENT

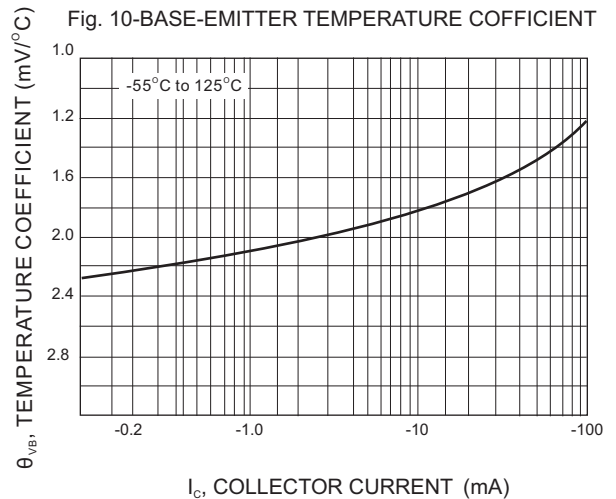


Fig. 11.-CAPACITANCE

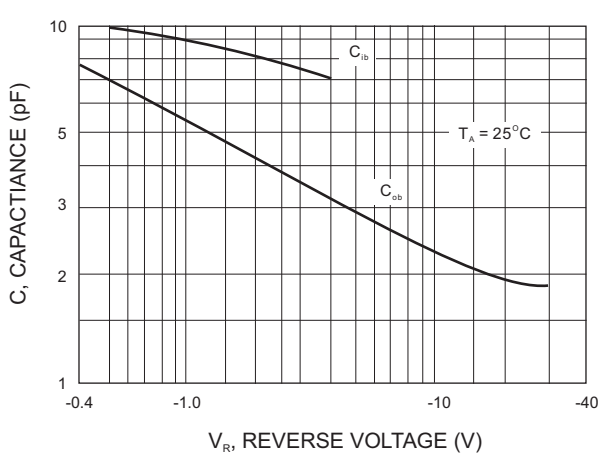
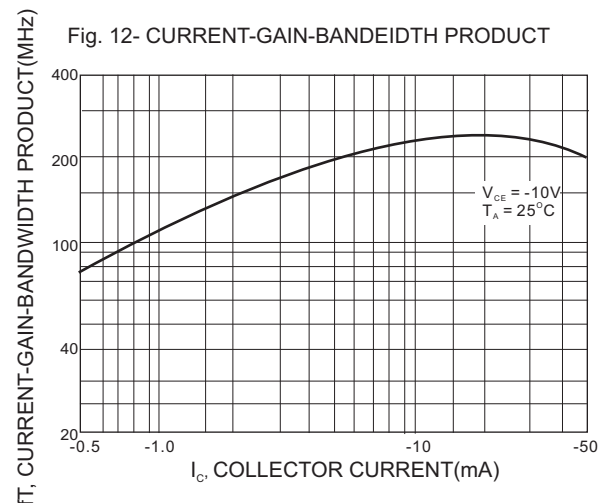
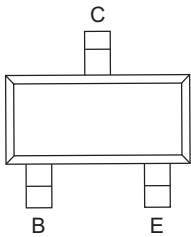
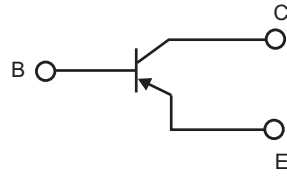


Fig. 12- CURRENT-GAIN-BANDEIDTH PRODUCT

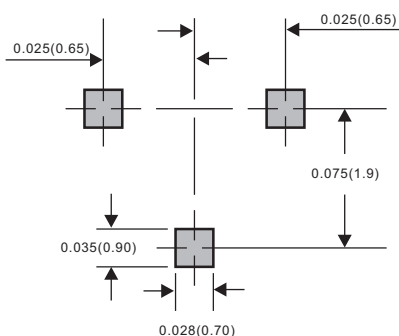


BC856AW-Q1/BC856BW-Q1**BC857AW-Q1/BC857BW-Q1/BC857CW-Q1****BC858AW-Q1/BC858BW-Q1/BC858CW-Q1****Pinning information**

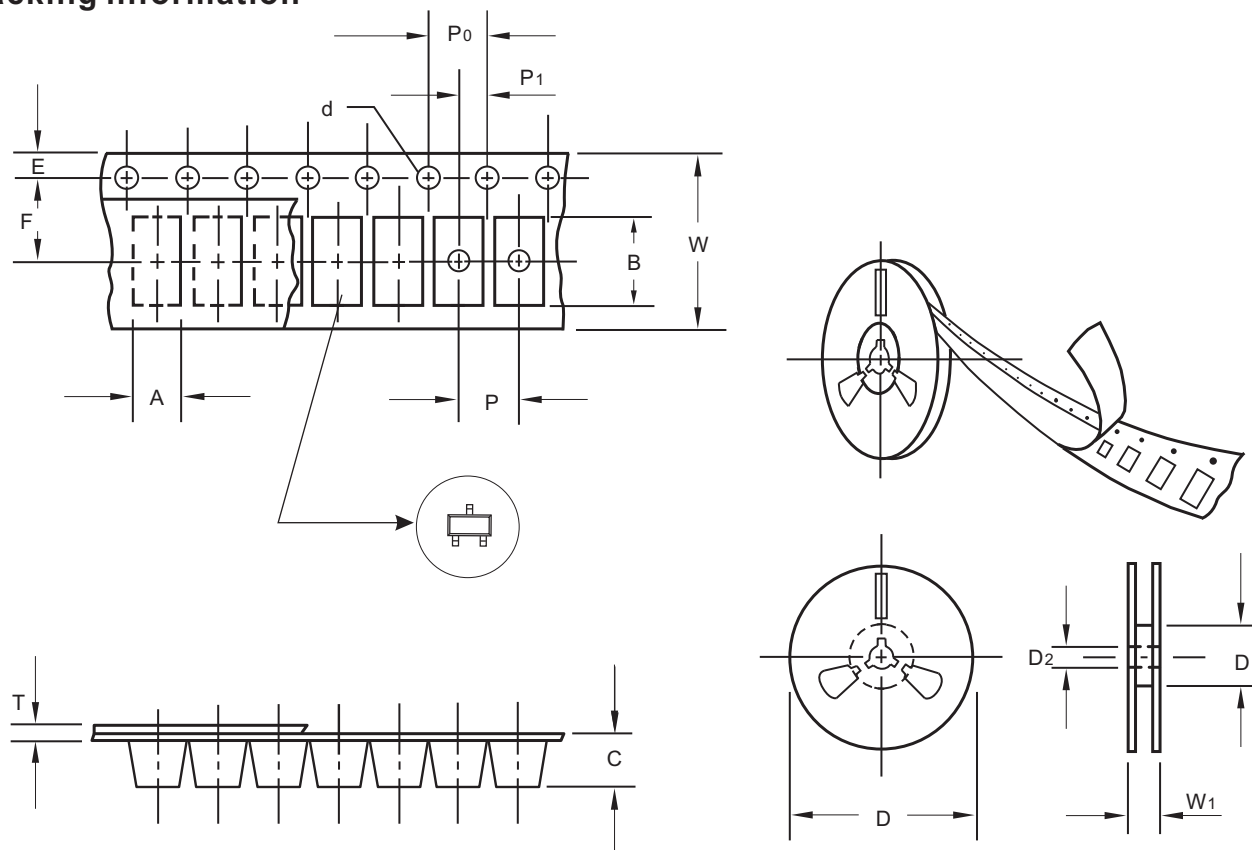
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
BC856AW-Q1	3A
BC856BW-Q1	3B
BC857AW-Q1	3E
BC857BW-Q1	3F
BC857CW-Q1	3G
BC858AW-Q1	3J
BC858BW-Q1	3K
BC858CW-Q1	3L

Suggested solder pad layout**SOT-323**

Dimensions in inches and (millimeters)

BC856AW-Q1/BC856BW-Q1**BC857AW-Q1/BC857BW-Q1/BC857CW-Q1****BC858AW-Q1/BC858BW-Q1/BC858CW-Q1****Packing information**

unit:mm

Item	Symbol	Tolerance	SOT-323
Carrier width	A	0.1	1.47
Carrier length	B	0.1	2.95
Carrier depth	C	0.1	1.15
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	62.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	11.40

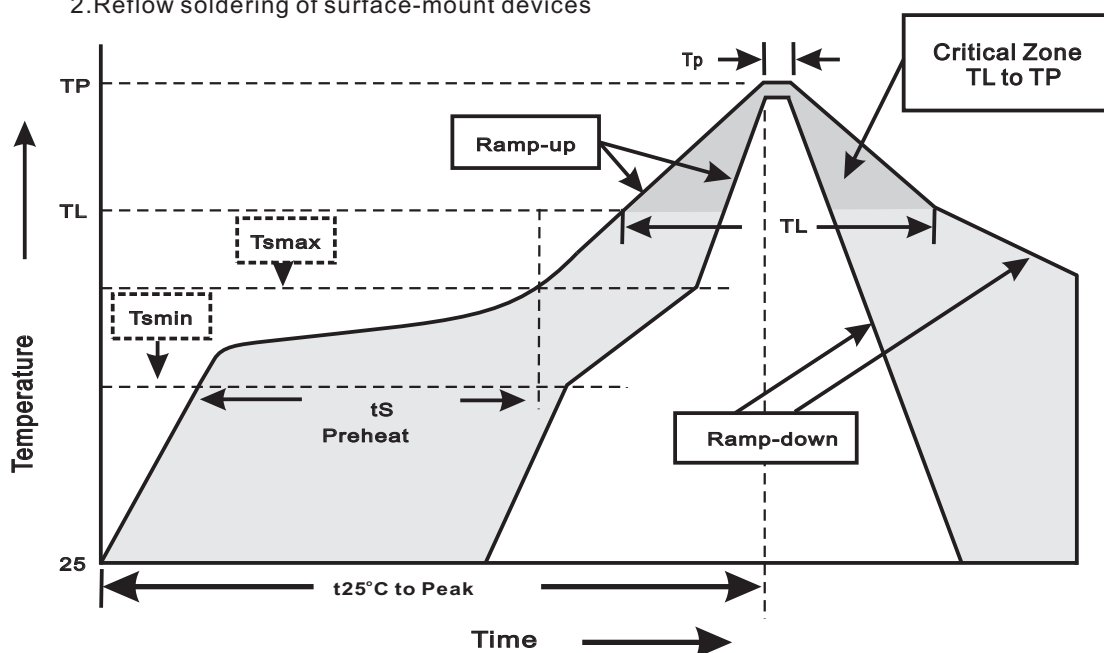
Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

BC856AW-Q1/BC856BW-Q1**BC857AW-Q1/BC857BW-Q1/BC857CW-Q1****BC858AW-Q1/BC858BW-Q1/BC858CW-Q1****Reel packing**

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA. (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-323	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000	9.50

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices

**3.Reflow soldering**

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	$< 3^\circ\text{C/sec}$
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(min to max)(t_s)	150°C 200°C 60~120sec
T_{smax} to T_L -Ramp-upRate	$< 3^\circ\text{C/sec}$
Time maintained above: -Temperature(T_L) -Time(t_L)	217°C 60~260sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	$< 6^\circ\text{C/sec}$
Time 25°C to Peak Temperature	$< 6\text{minutes}$

BC856AW-Q1/BC856BW-Q1**BC857AW-Q1/BC857BW-Q1/BC857CW-Q1****BC858AW-Q1/BC858BW-Q1/BC858CW-Q1****High reliability test capabilities**

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Intermittent Operating Life	Ta=25°C, ΔTj≥100°C On/Off=2min Test Duration:1000hrs	MIL-STD-750E METHOD 1037
3. High Temperature Reverse Bias	VCE=80%BVCEO (Tj=150°C)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125°C Test Duration: 1000hrs	JESD22 A-103
5. Temperature Cycle	-55°C (15min) to 150°C (15min)Test Cycles: 1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs	JESD22 A-102
7. Solderability	245±5°C for 5sec	J-STD-002
8. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, VCE=80%BVCEO Test Duration:1000hrs	JESD22-A101