

# General Purpose Transistor

## NPN Silicon

### BCW65ALT1G, BCW65CLT1G

#### Features

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS

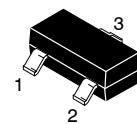
Symbol	Rating	Value	Unit
$V_{CEO}$	Collector – Emitter Voltage	32	Vdc
$V_{CBO}$	Collector – Base Voltage	60	Vdc
$V_{EBO}$	Emitter – Base Voltage	5.0	Vdc
$I_C$	Collector Current – Continuous	800	mAdc

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

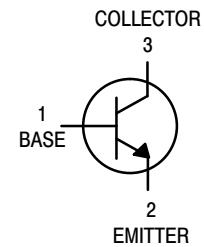
#### THERMAL CHARACTERISTICS

Symbol	Characteristic	Max	Unit
$P_D$	Total Device Dissipation FR-5 Board (Note 1), $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	225 1.8	mW mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	556	$^\circ\text{C}/\text{W}$
$P_D$	Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	300 2.4	mW mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	417	$^\circ\text{C}/\text{W}$
$T_J, T_{stg}$	Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$

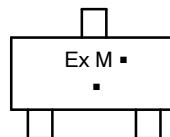
- FR-5 =  $1.0 \times 0.75 \times 0.062$  in.
- Alumina =  $0.4 \times 0.3 \times 0.024$  in 99.5% alumina.



SOT-23  
CASE 318  
STYLE 6



#### MARKING DIAGRAMS



Ex = Device Code  
x = A or C  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
BCW65ALT1G	SOT-23 (Pb-Free)	3,000/Tape & Reel
BCW65CLT1G	SOT-23 (Pb-Free)	3,000/Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

# BCW65ALT1G, BCW65CLT1G

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

Symbol	Characteristic	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
$V_{(\text{BR})\text{CEO}}$	Collector – Emitter Breakdown Voltage ( $I_C = 10 \text{ mA}_\text{dc}$ , $I_B = 0$ )	32	–	–	Vdc
$V_{(\text{BR})\text{CES}}$	Collector – Emitter Breakdown Voltage ( $I_C = 10 \mu\text{A}_\text{dc}$ , $V_{EB} = 0$ )	60	–	–	Vdc
$V_{(\text{BR})\text{EBO}}$	Emitter – Base Breakdown Voltage ( $I_E = 10 \mu\text{A}_\text{dc}$ , $I_C = 0$ )	5.0	–	–	Vdc
$I_{\text{CES}}$	Collector Cutoff Current ( $V_{CE} = 32 \text{ Vdc}$ , $I_E = 0$ ) ( $V_{CE} = 32 \text{ Vdc}$ , $I_E = 0$ , $T_A = 150^\circ\text{C}$ )	– –	– –	20 20	$\text{nA}_\text{dc}$ $\mu\text{A}_\text{dc}$
$I_{\text{EBO}}$	Emitter Cutoff Current ( $V_{EB} = 4.0 \text{ Vdc}$ , $I_C = 0$ )	–	–	20	$\text{nA}_\text{dc}$

## ON CHARACTERISTICS

$\text{h}_{\text{FE}}$	DC Current Gain ( $I_C = 100 \mu\text{A}_\text{dc}$ , $V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 10 \text{ mA}_\text{dc}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 100 \text{ mA}_\text{dc}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 500 \text{ mA}_\text{dc}$ , $V_{CE} = 2.0 \text{ Vdc}$ )	BCW65ALT1	35 75 100 35	– – – –	– – 250 –	–
$\text{h}_{\text{FE}}$	DC Current Gain ( $I_C = 100 \mu\text{A}_\text{dc}$ , $V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 10 \text{ mA}_\text{dc}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 100 \text{ mA}_\text{dc}$ , $V_{CE} = 1.0 \text{ Vdc}$ ) ( $I_C = 500 \text{ mA}_\text{dc}$ , $V_{CE} = 2.0 \text{ Vdc}$ )	BCW65CLT1	80 180 250 100	– – – –	– – 630 –	–
$V_{CE(\text{sat})}$	Collector – Emitter Saturation Voltage ( $I_C = 500 \text{ mA}_\text{dc}$ , $I_B = 50 \text{ mA}_\text{dc}$ ) ( $I_C = 100 \text{ mA}_\text{dc}$ , $I_B = 10 \text{ mA}_\text{dc}$ )		– –	0.7 0.3	– –	Vdc
$V_{BE(\text{sat})}$	Base – Emitter Saturation Voltage ( $I_C = 500 \text{ mA}_\text{dc}$ , $I_B = 50 \text{ mA}_\text{dc}$ )		–	–	2.0	Vdc

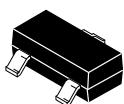
## SMALL-SIGNAL CHARACTERISTICS

$f_T$	Current – Gain — Bandwidth Product ( $I_C = 20 \text{ mA}_\text{dc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )	100	–	–	MHz
$C_{\text{obo}}$	Output Capacitance ( $V_{CB} = 10 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	–	–	12	pF
$C_{\text{ibo}}$	Input Capacitance ( $V_{EB} = 0.5 \text{ Vdc}$ , $I_C = 0$ , $f = 1.0 \text{ MHz}$ )	–	–	80	pF
NF	Noise Figure ( $V_{CE} = 5.0 \text{ Vdc}$ , $I_C = 0.2 \text{ mA}_\text{dc}$ , $R_S = 1.0 \text{ k}\Omega$ , $f = 1.0 \text{ kHz}$ , $BW = 200 \text{ Hz}$ )	–	–	10	dB

## SWITCHING CHARACTERISTICS

$t_{\text{on}}$	Turn-On Time ( $I_{B1} = I_{B2} = 15 \text{ mA}_\text{dc}$ )	–	–	100	ns
$t_{\text{off}}$	Turn-Off Time ( $I_C = 150 \text{ mA}_\text{dc}$ , $R_L = 150 \Omega$ )	–	–	400	ns

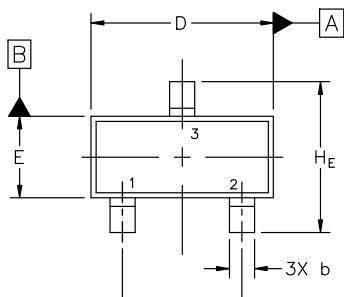
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P  
CASE 318  
ISSUE AU

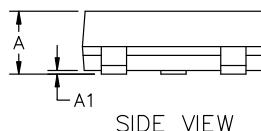
DATE 14 AUG 2024



TOP VIEW

DETAIL "A"

Scale 3:1

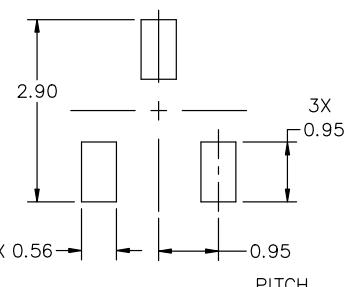
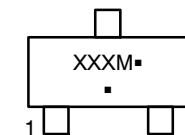


SIDE VIEW

DETAIL "A"

END VIEW

SEATING PLANE

GENERIC  
MARKING DIAGRAM\*

XXX = Specific Device Code  
M = Date Code  
■ = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
HE	2.10	2.40	2.64
T	0°	---	10°

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

RECOMMENDED  
MOUNTING FOOTPRINT

\* For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## STYLES ON PAGE 2

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**SOT-23 (TO-236) 2.90x1.30x1.00 1.90P**

CASE 318

ISSUE AU

DATE 14 AUG 2024

STYLE 1 THRU 5:  
CANCELLEDSTYLE 6:  
PIN 1. BASE  
2. Emitter  
3. CollectorSTYLE 7:  
PIN 1. Emitter  
2. Base  
3. CollectorSTYLE 8:  
PIN 1. Anode  
2. No Connection  
3. CathodeSTYLE 9:  
PIN 1. Anode  
2. Anode  
3. CathodeSTYLE 10:  
PIN 1. Drain  
2. Source  
3. GateSTYLE 11:  
PIN 1. Anode  
2. Cathode  
3. Cathode-AnodeSTYLE 12:  
PIN 1. Cathode  
2. Cathode  
3. AnodeSTYLE 13:  
PIN 1. Source  
2. Drain  
3. GateSTYLE 14:  
PIN 1. Cathode  
2. Gate  
3. AnodeSTYLE 15:  
PIN 1. Gate  
2. Cathode  
3. AnodeSTYLE 16:  
PIN 1. Anode  
2. Cathode  
3. CathodeSTYLE 17:  
PIN 1. No Connection  
2. Anode  
3. CathodeSTYLE 18:  
PIN 1. No Connection  
2. Cathode  
3. AnodeSTYLE 19:  
PIN 1. Cathode  
2. Anode  
3. Cathode-AnodeSTYLE 20:  
PIN 1. Cathode  
2. Anode  
3. GateSTYLE 21:  
PIN 1. Gate  
2. Source  
3. DrainSTYLE 22:  
PIN 1. Return  
2. Output  
3. InputSTYLE 23:  
PIN 1. Anode  
2. Anode  
3. CathodeSTYLE 24:  
PIN 1. Gate  
2. Drain  
3. SourceSTYLE 25:  
PIN 1. Anode  
2. Cathode  
3. GateSTYLE 26:  
PIN 1. Cathode  
2. Anode  
3. No ConnectionSTYLE 27:  
PIN 1. Cathode  
2. Cathode  
3. CathodeSTYLE 28:  
PIN 1. Anode  
2. Anode  
3. Anode

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