



BCZ170N80W1

N-Channel Silicon Carbide Power MOSFET

1700 V, 29 A , 80 mΩ

bestirpower

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

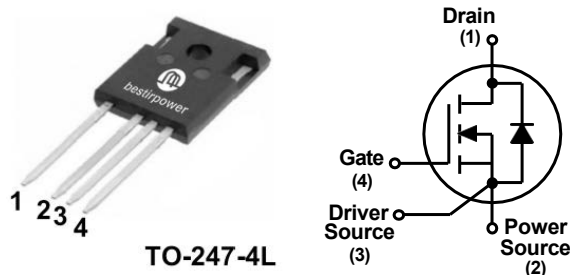
$BV_{DSS, T_C=25^\circ C}$	$I_D, T_C=25^\circ C$	$R_{DS(on), typ}$	$Q_{g, typ}$
1700 V	29 A	80 mΩ	72 nC

Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications



Absolute Maximum Ratings ($T_J = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain to Source Voltage	1700	V
V_{GSmax}	Gate to Source Voltage	-10 / +22	V
V_{GSop}	Recommended Operation Value	-5 / +18	V
I_D	Drain Current	$T_C = 25^\circ C$ (Note1)	29
		$T_C = 100^\circ C$	21
I_{DM}	Drain Current	Pulsed (Note2)	89
P_D	Power Dissipation ($T_C = 25^\circ C$)	215	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 175	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.7	$^\circ C/W$
T_{sold}	Soldering temperature, wave soldering only allowed at leads	260	$^\circ C$

※Note 1 : I_D is limited by package.

※Note 2 : Pulse width is limited by Safe Operating Area (SOA).

Electrical Characteristics (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV _{DSS}	Drain to Source Breakdown Voltage	V _{GS} = 0 V, I _D = 100 μA	1700	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 1700 V, V _{GS} = 0 V	-	1	100	μA
I _{GSS}	Gate-Source Leakage Current	V _{GS} = +22V	-	-	100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 5 mA, T _J = 25°C	2.2	3.2	4.2	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 18 V, I _D = 20A, T _J = 25°C	-	80	105	mΩ
		V _{GS} = 18 V, I _D = 20A, T _J = 175°C	-	184	-	

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 1200 V f = 1.0 MHz	-	1442	-	pF
C _{oss}	Output Capacitance		-	46	-	
C _{rss}	Reverse Capacitance		-	3.9	-	
Q _{g(tot)}	Total Gate Charge	V _{DS} = 1200 V, I _D = 20 A V _{GS} = -5/18 V	-	72	-	nC
Q _{gs}	Gate to Source Charge		-	22	-	
Q _{gd}	Gate to Drain "Miller" Charge		-	11	-	
R _G	Internal Gate Resistance	f = 1 MHz, I _D = 0 A	-	4.7	-	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{DD} = 1200 V, I _D = 20 A, R _G = 5.1 Ω, V _{GS} = -5/18 V	-	9	-	ns
t _r	Turn-On Rise Time		-	12	-	
t _{d(off)}	Turn-Off Delay Time		-	20	-	
t _f	Turn-Off Fall Time		-	11	-	
E _{on}	Turn-on Switching Energy		-	249	-	μJ
E _{off}	Turn-off Switching Energy		-	129	-	

Source-Drain Diode Characteristics

I _S	Maximum Continuous Diode Forward Current	-	-	48	A	
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 10 A	-	3.7	-	V
I _{rrm}	Peak Reverse Recovery Current	I _{SD} = 20 A, di/dt = 1200 A/μs, V _{DD} = 1200 V, V _{GS} = -5 V	-	7.3	-	A
t _{rr}	Reverse Recovery Time		-	14	-	ns
Q _{rr}	Reverse Recovery Charge		-	54	-	nC

Typical Performance Characteristics

Figure 1. Safe Operating Area

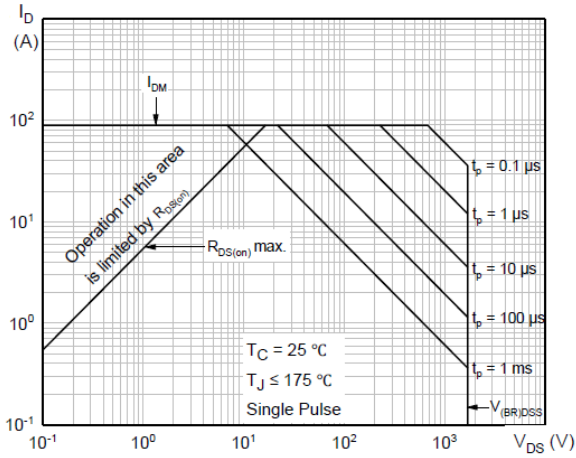


Figure 2. Maximum Transient Thermal Impedance

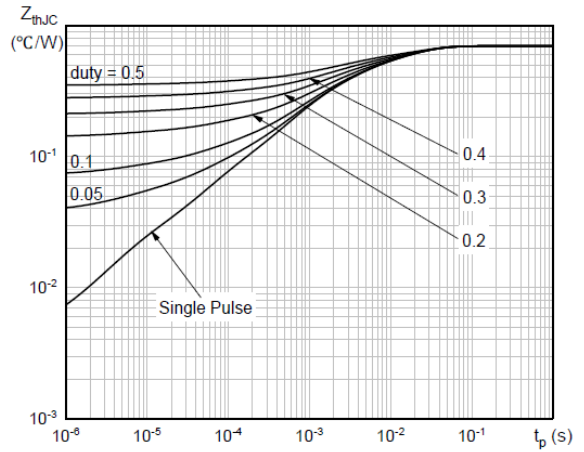


Figure 3. Typical Output Characteristics, TJ = 25°C

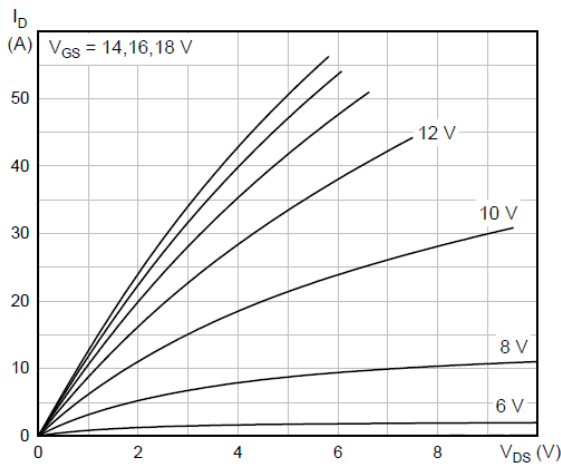


Figure 4. Typical Output Characteristics, TJ = 175°C

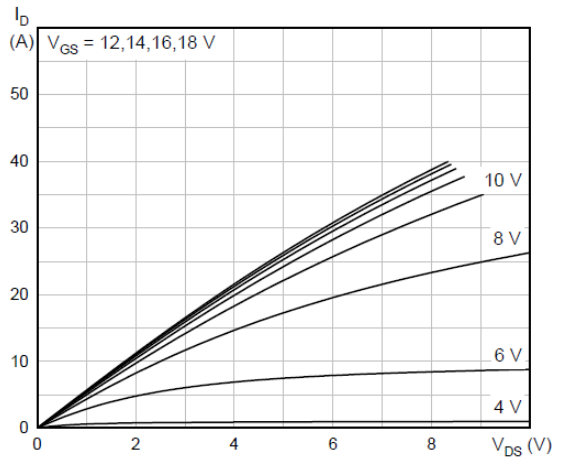


Figure 5. Typical Transfer Characteristics

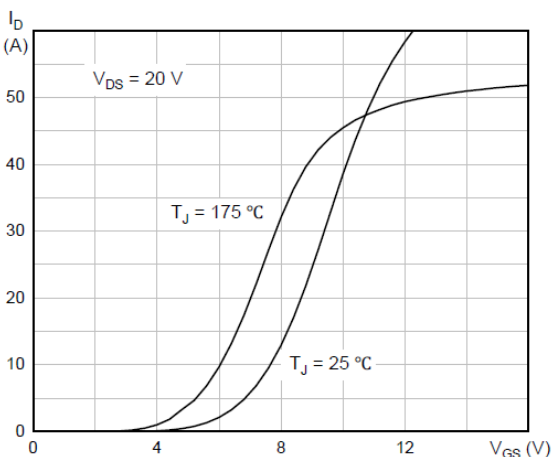
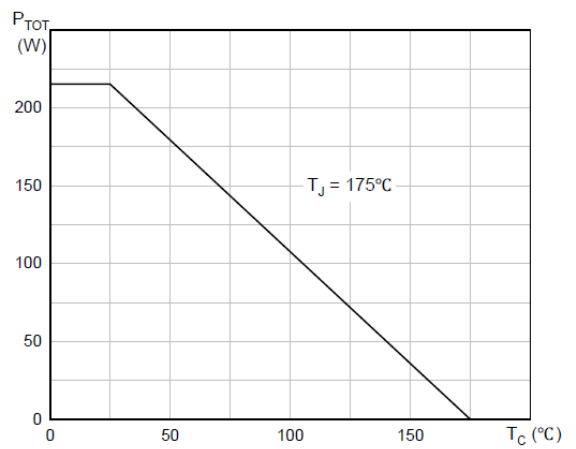


Figure 6. Total Power Dissipation



Typical Performance Characteristics

Figure 7. Typical Gate Charge Characteristics

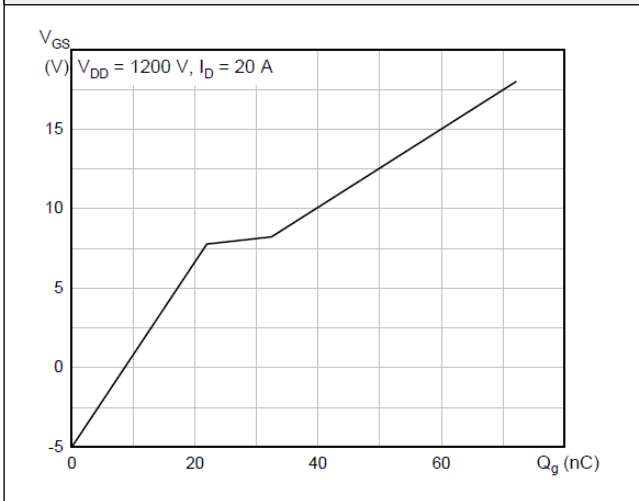


Figure 8. Typical Capacitance Characteristics

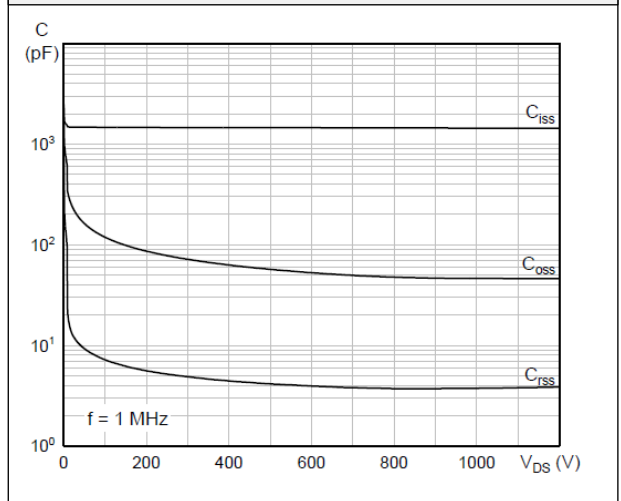


Figure 9. Typical Switching Energy vs. Supply Voltage

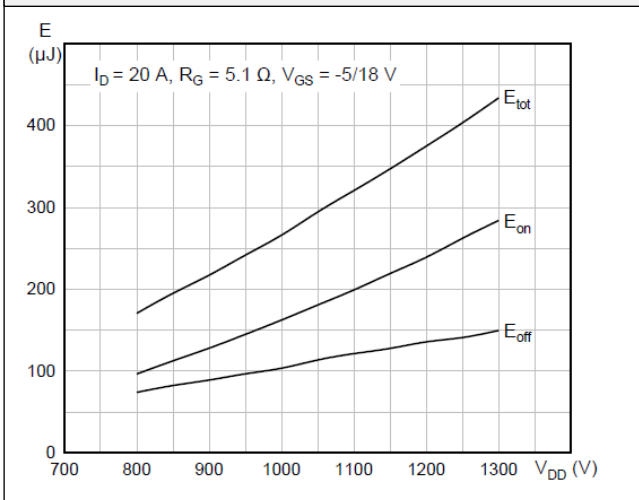


Figure 10. Typical Switching Energy vs. Drain Current

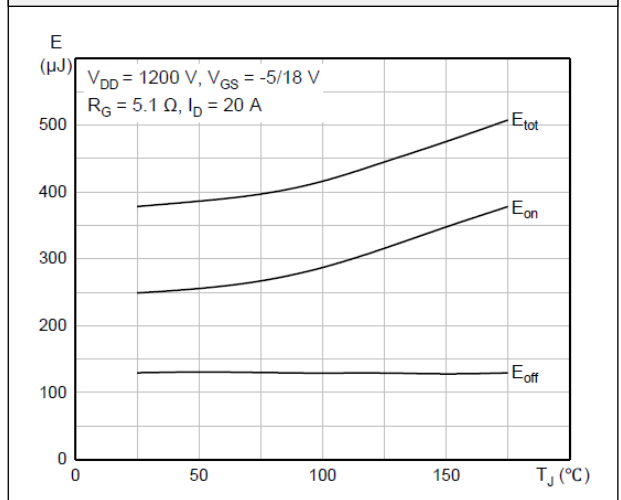


Figure 11. Typical Switching Energy vs. Gate Resistance

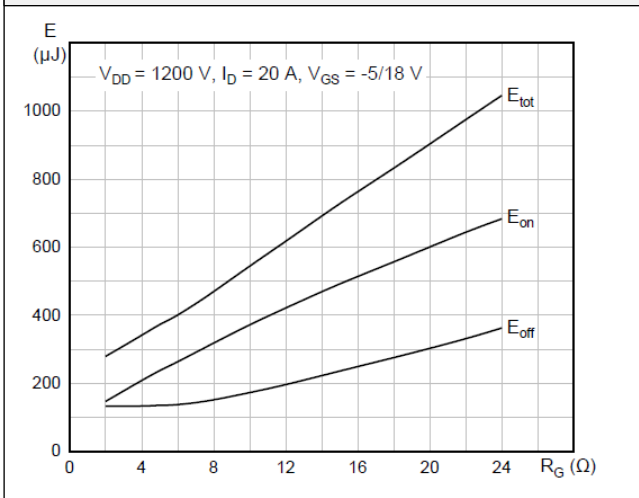
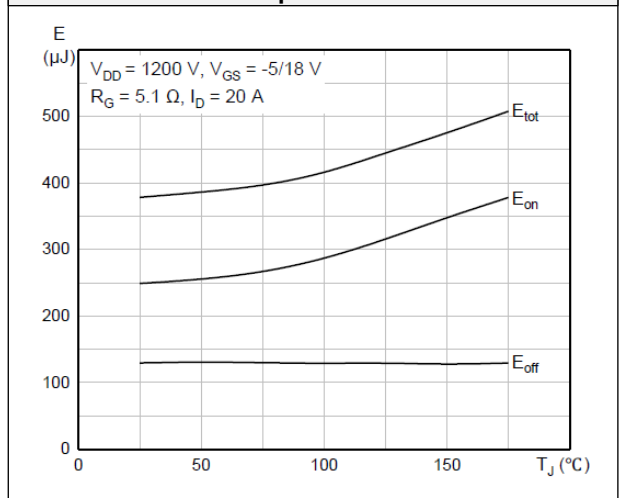


Figure 12. Typical Switching Energy vs. Temperature



Typical Performance Characteristics

Figure 13. Breakdown Voltage vs. Temperature

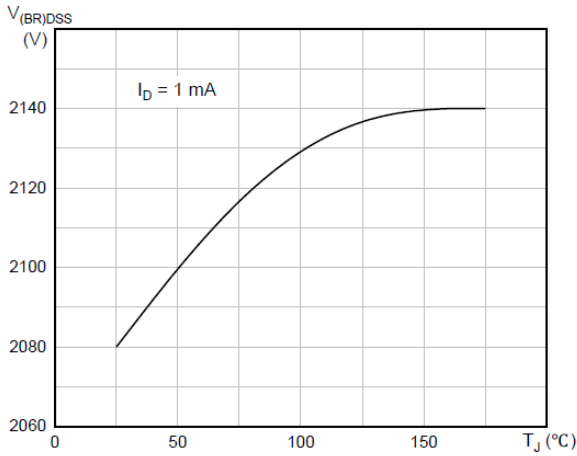


Figure 14. Gate Threshold vs. Temperature

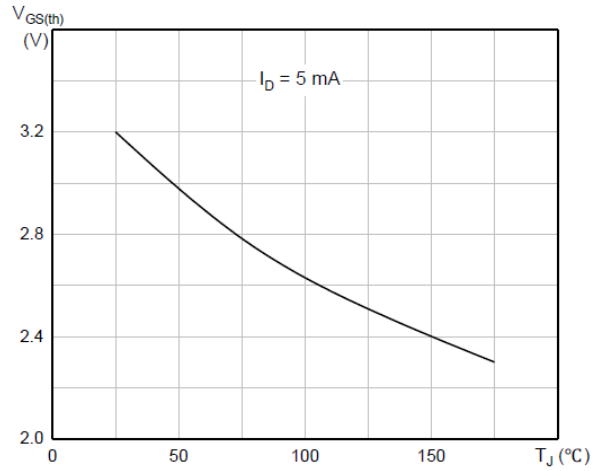


Figure 15. On-Resistance vs. Temperature

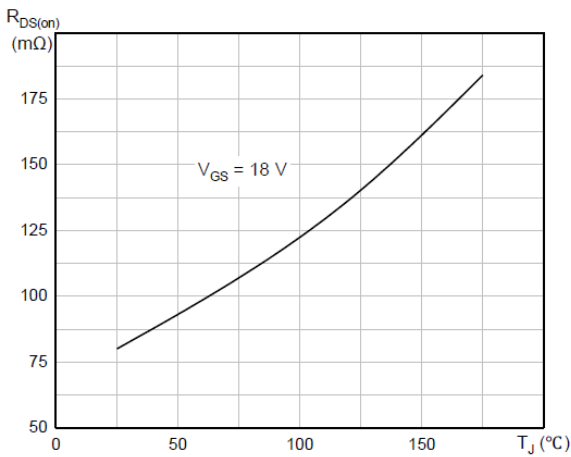


Figure 16. Body Diode Characteristics, TJ = 25°C

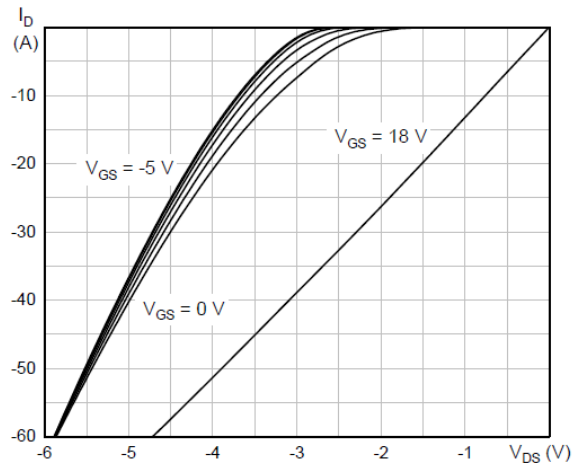
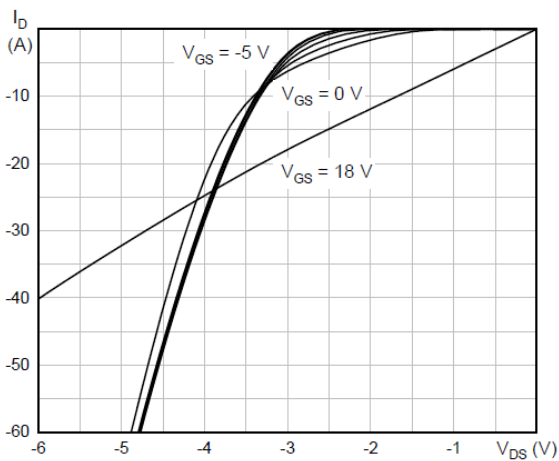
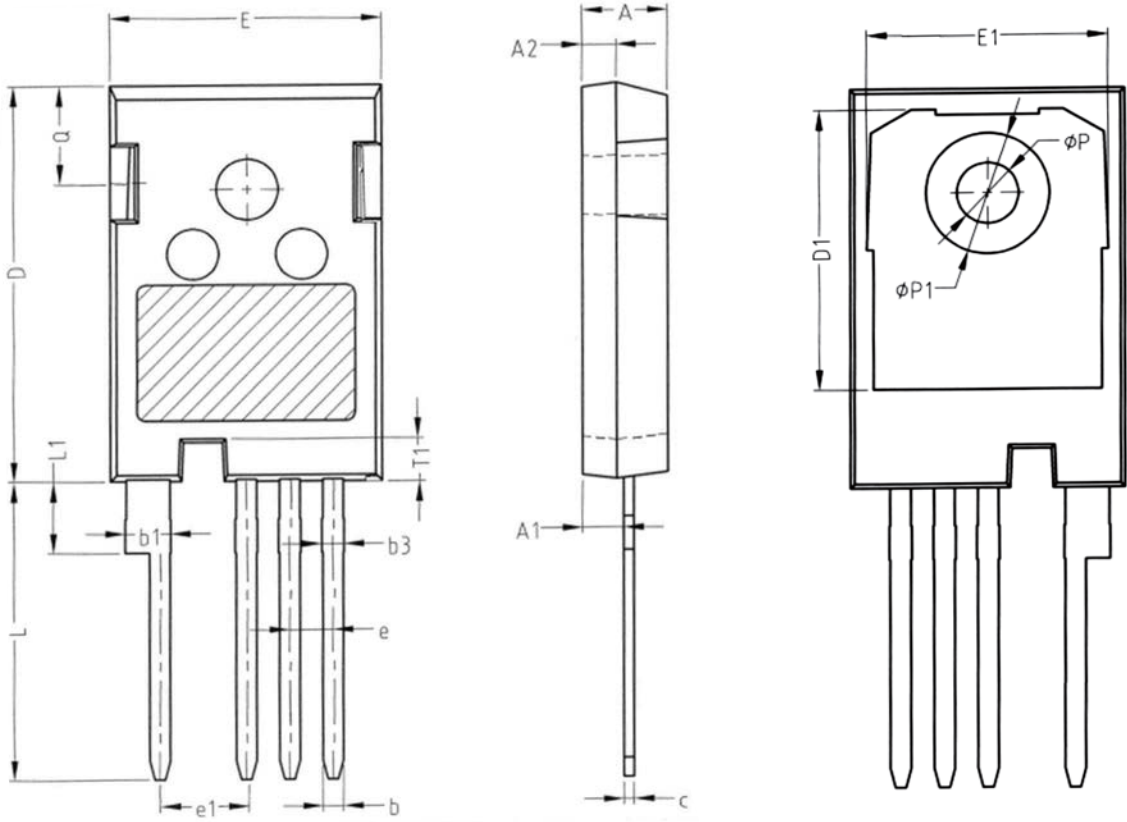


Figure 17. Body Diode Characteristics, TJ = 175°C



Package Outlines

TO247-4



SYMBOL	NM		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b3	1.07	1.30	1.60
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	16.85
E	15.74	15.94	16.14
E1	13.72	14.02	14.32
T1	2.35	2.50	2.65
e	2.54 BSC		
e1	5.08 BSC		
Q	5.49	5.79	6.09
L	17.27	17.57	17.87
L1	3.99	4.19	4.39
Φp	3.40	3.60	3.80
$\Phi p1$	7.19 REF		

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BCZ170N80W1	BCZ170N80W1	TO247-4	Tube	30 units

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