BCZ120N40P1

N-Channel Silicon Carbide Power MOSFET

1200 V, 71 A, 40 mΩ

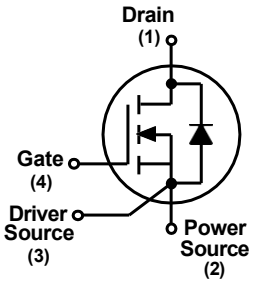
bestirpower

Features

- High switching speed with a low gate charge
- Fast intrinsic diode with low reverse recovery
- Robust Avalanche Capability
- 100% Avalanche Tested
- Pb-free, Halogen Free, and RoHS Compliant

$BV_{DSS,\ Tc=25℃}$	$I_{D,\ Tc=25℃}$	$R_{DS(on),typ}$	$Q_{g,typ}$
1200 V	**71 A**	**40 mΩ**	**151.5 nC**

TO-247-4L



Benefits

- System efficiency improvement
- Higher frequency applicability
- Increased power density
- Reduced cooling effort

Applications

- Solar inverter
- EV charging station
- UPS
- Industrial power supply

RoHS compliant

HF

Absolute Maximum R atings (T_J = 25℃ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		1200	V
V_{GS}	Gate to Source Voltage (DC)		-8 / +22	V
V_{GSop}	Recommended Operation Value		-5 / +20	V
I_D	Drain Current	V_{GS} = 20 V, (T_C = 25℃)	71	A
		V_{GS} = 20 V, (T_C = 100℃)	50.5	
I_{DM}	Drain Current	Pulsed (Note1)	143	A
P_D	Power Dissipation	(T_C = 25℃)	357	W
		Derate Above 25℃	2.38	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 175	℃

※Note 1 : Limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.42	℃/W
T_{sold}	Soldering temperature, wave soldering only allowed at leads	260	℃

Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0 V, I_D = 100 uA	1200	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 1200 V, V_{GS} = 0 V	-	1	100	μA
		V_{DS} = 1200 V, V_{GS} = 0 V, T_J = 175℃	-	5	-	
I_{GSS}	Gate-Source Leakage Current	V_{GS} = 20 V, V_{DS} = 0 V	-	-	250	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 9.0 mA	2.0	2.3	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 20 V, I_D = 30 A	-	40	60	mΩ
		V_{GS} = 20 V, I_D = 30 A, T_J = 175℃	-	70	-	
g_{fs}	Transconductance	V_{DS} = 20 V, I_D = 30 A	-	14.8	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 1000 V, V_{GS} = 0V, f = 100 kHz	-	3235	-	pF
C_{oss}	Output Capacitance		-	145	-	
C_{rss}	Reverse Capacitance		-	14.4	-	
E_{oss}	Stored Energy in Output Capacitance	V_{DS} = 0 V to 1000 V, V_{GS} = 0 V	-	163	-	μJ
$Q_{g(tot)}$	Total Gate Charge	V_{DS} = 800 V, I_D = 30 A, V_{GS} = -5 V / 20 V, Inductive load	-	151.5	-	nC
Q_{gs}	Gate to Source Charge		-	35.5	-	
Q_{gd}	Gate to Drain “Miller” Charge		-	63.6	-	
R_G	Internal Gate Resistance	f = 1 MHz open drain	-	2.5	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 800 V, I_D = 30 A, V_{GS} = -5 V / 20 V, R_G = 2.2 Ω, Inductive load	-	10.6	-	ns
t_r	Turn-On Rise Time		-	13.4	-	
$t_{d(off)}$	Turn-Off Delay Time		-	24.6	-	
t_f	Turn-Off Fall Time		-	10.9	-	
E_{on}	Turn-on Switching Energy		-	302.6	-	μJ
E_{off}	Turn-off Switching Energy		-	16.8	-	
E_{tot}	Total Switching Energy		-	319.4	-	
Source-Drain Diode Characteristics						
I_S	Maximum Continuous Diode Forward Current		-	-	71	A
I_{SM}	Maximum Pulsed Diode Forward Current		-	-	143	
V_{SD}	Diode Forward Voltage	V_{GS} = -5 V, I_{SD} = 15 A	-	4.2	-	V
t_{rr}	Reverse Recovery Time	V_{DD} = 800 V, I_{SD} = 30 A, dI_F/dt = 6940 A/μs, Includes Q_{oss}	-	18.1	-	ns
Q_{rr}	Reverse Recovery Charge		-	1283	-	nC

Typical Performance Characteristics

Figure 1. On-Region Characteristics TJ = 25℃

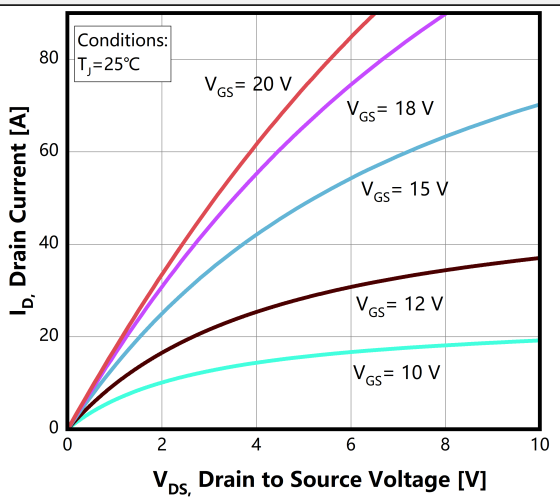


Figure 2. On-Region Characteristics TJ = 175℃

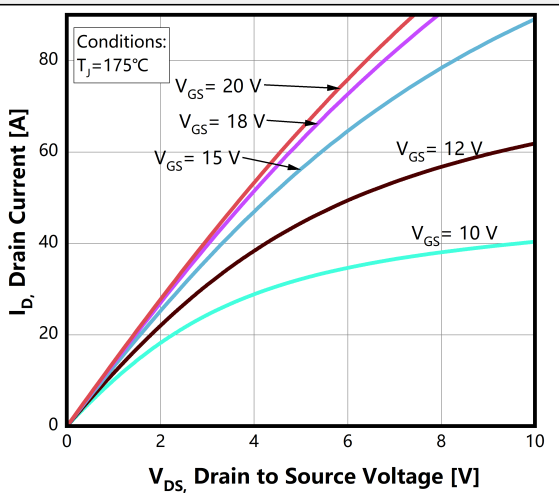


Figure 3. On-Resistance Characteristics vs. Temperature

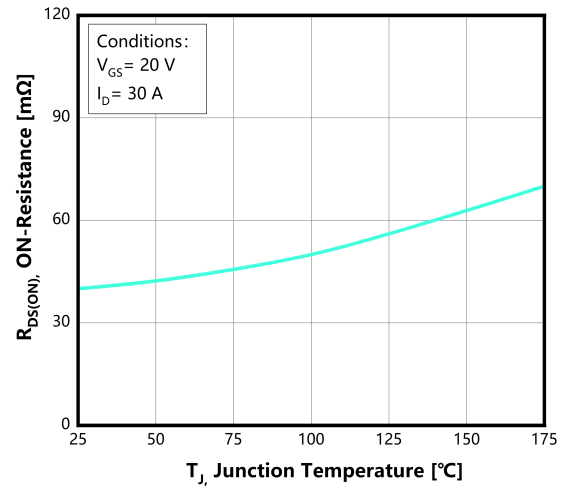


Figure 4. Transfer Characteristics

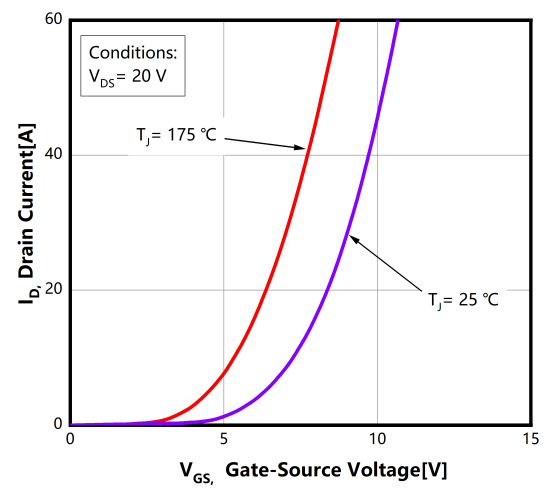


Figure 5. Diode Forward Voltage Characteristics vs. Source-Drain Current TJ = 25℃

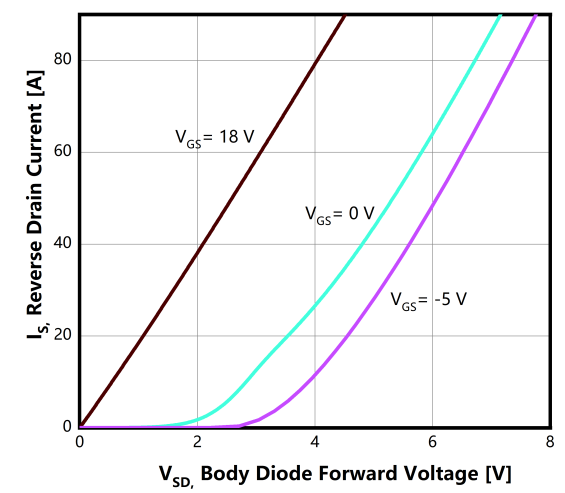
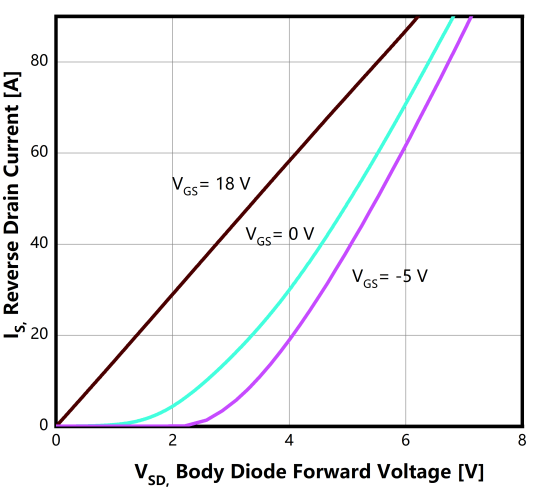


Figure 6. Diode Forward Voltage Characteristics vs. Source-Drain Current T_J = 175℃



Typical Performance Characteristics

Figure 7. Threshold Voltage vs. Temperature

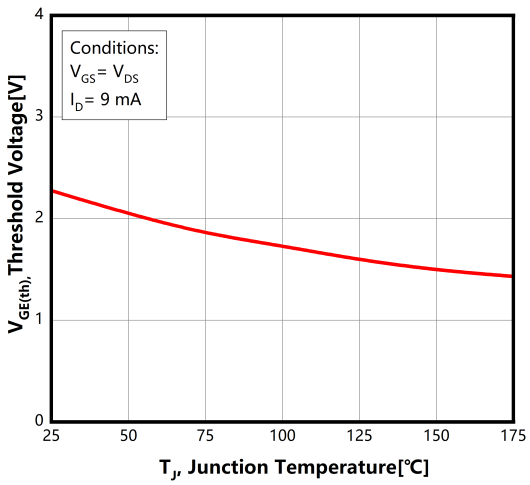


Figure 8. Gate Charge Characteristics

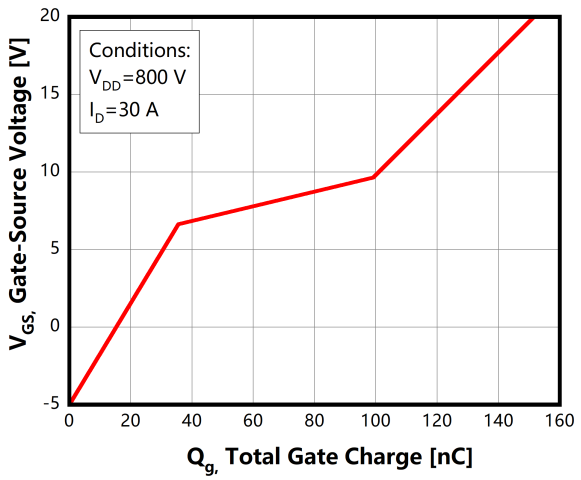


Figure 9. Stored Energy in Output Capacitance

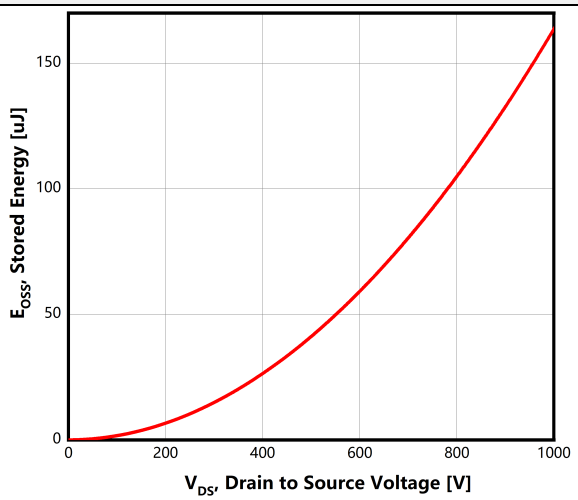


Figure 10. Capacitance Characteristics

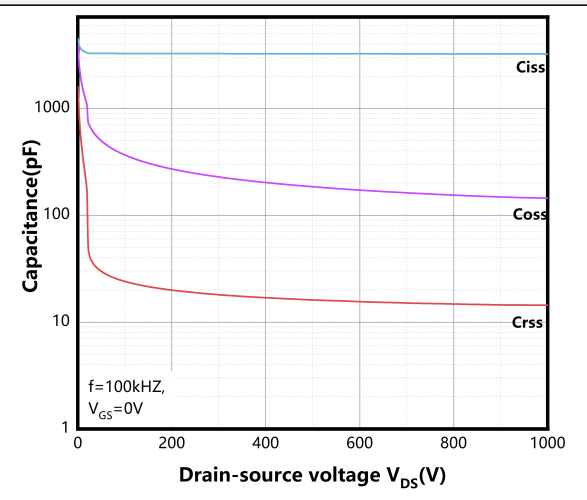


Figure 11. Continuous Drain Current Derating vs. Case Temperature

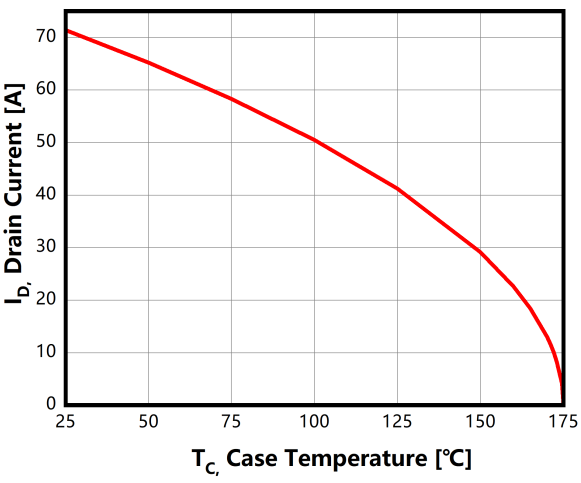
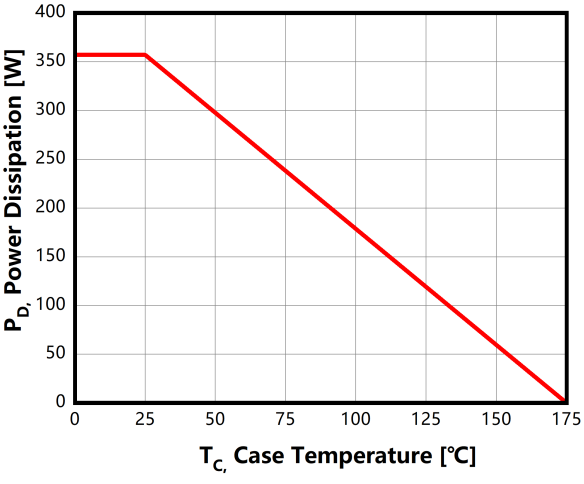


Figure 12. Maximum Power Dissipation Derating vs. Case Temperature



Typical Performance Characteristics

Figure 13. Maximum Safe Operating Area

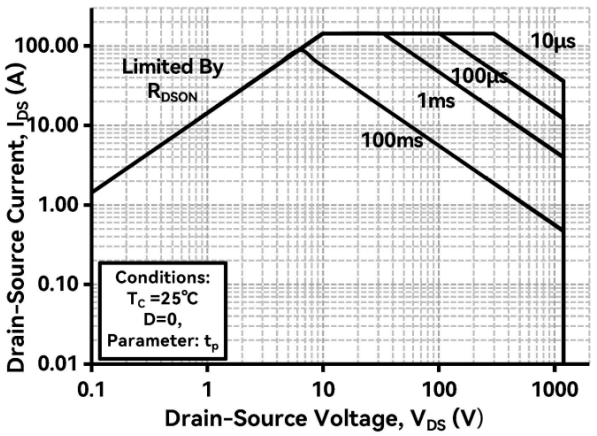


Figure 14. Transient Thermal Response Curve

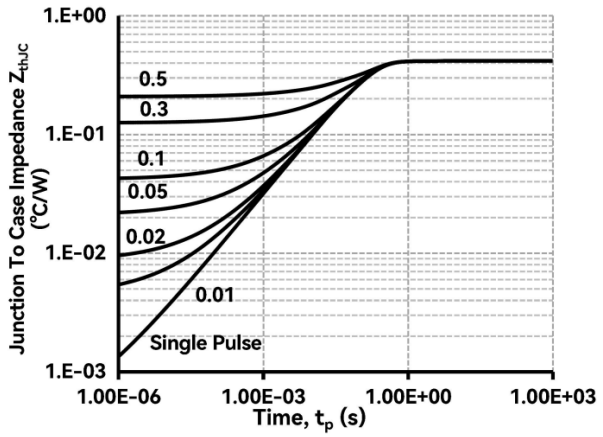


Figure 15. Inductive Load Switching Test Circuit and Waveforms

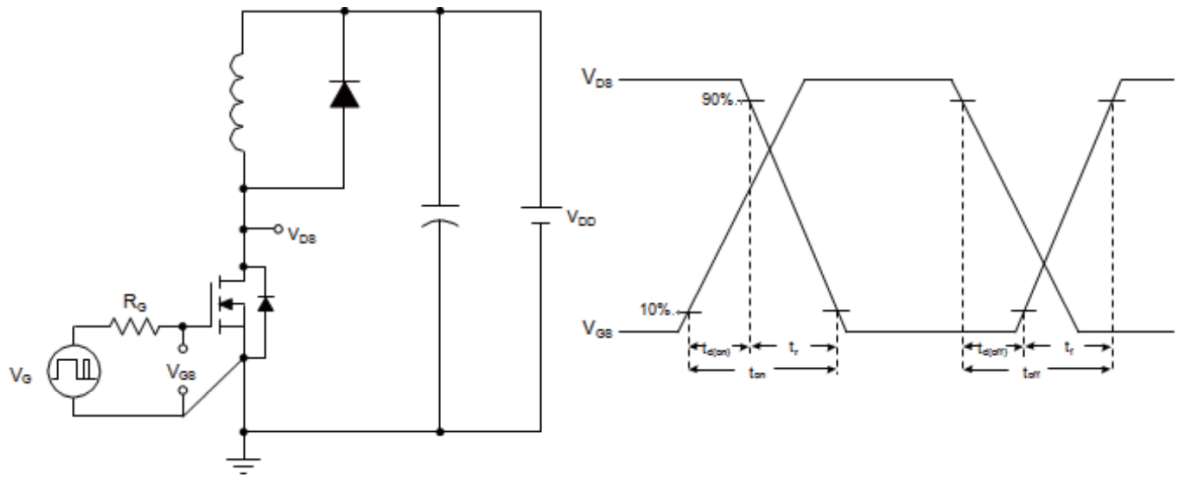
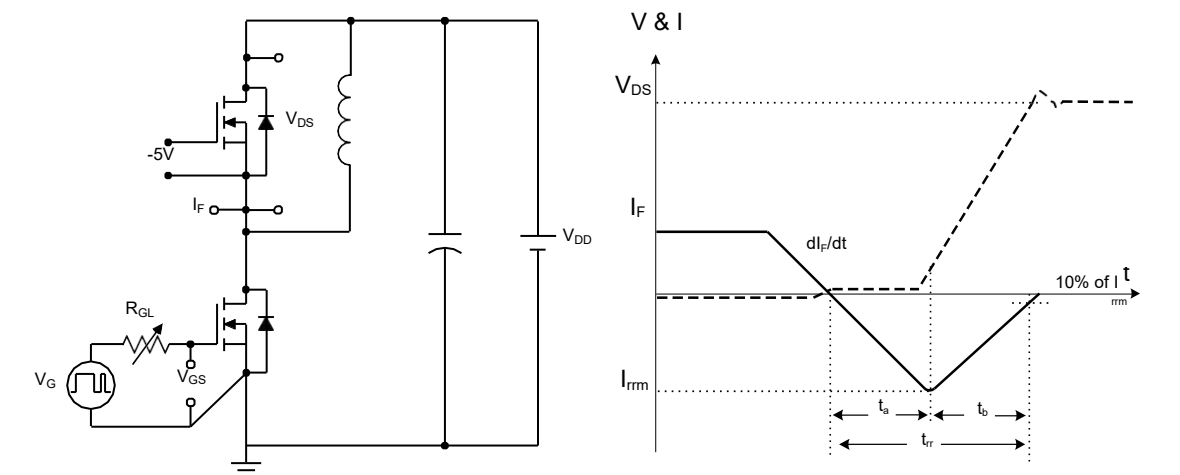
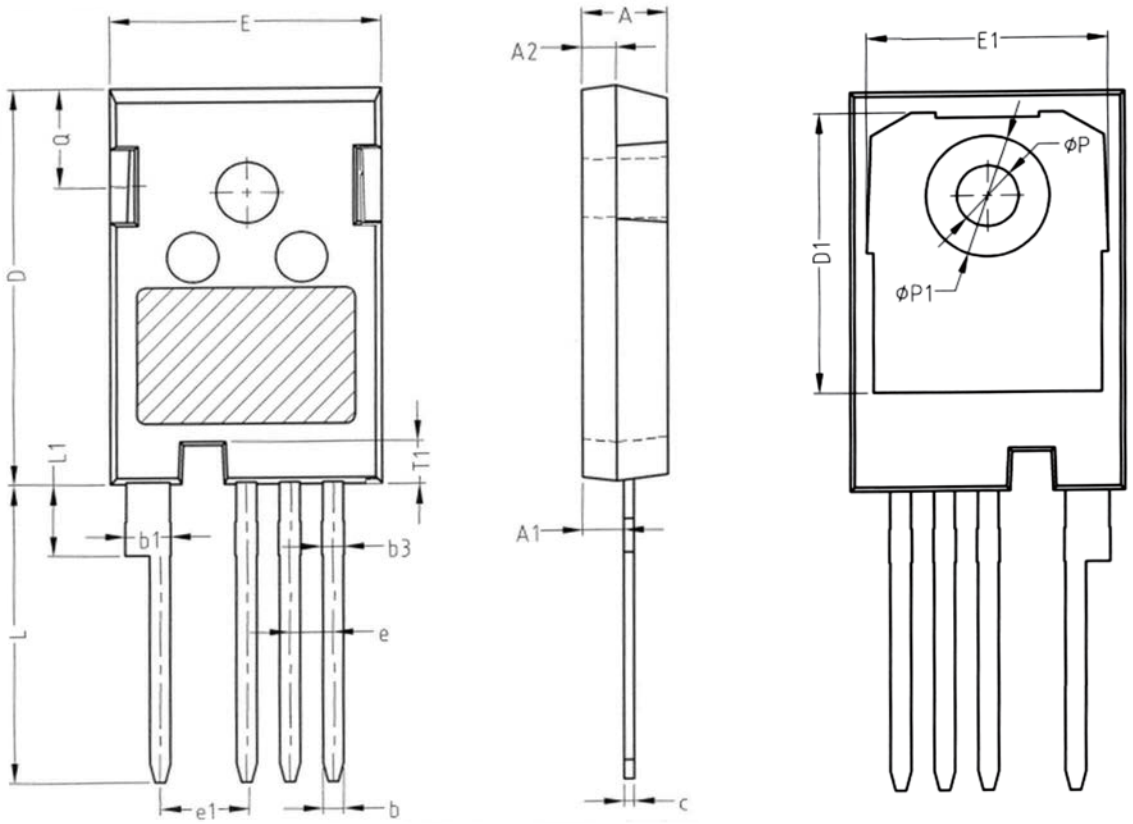


Figure 16. Peak Diode Recovery dv/dt Test Circuit and Waveforms



Package Outlines

TO247-4L



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
Φp1	7.19 REF		

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BCZ120N40P1	BCZ120N40P1	TO247-4L	Tube	30 units

Disclaimer

Bestirpower reserve the right to make changes, corrections, enhancements, modifications, and improvements to Bestirpower products and/or to this document at any time without notice.

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. Bestirpower does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Products or technical information described in this document.

This document is the property of Bestirpower Co,. LTD., and not allowed to copy or transformed to other format if not under the authority approval.

© 2025 Bestirpower – All rights reserved