

BCZ65N45M1

N-Channel Silicon Carbide Power MOSFET

650 V, 42 A, 45 mΩ



bestirpower

Features

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

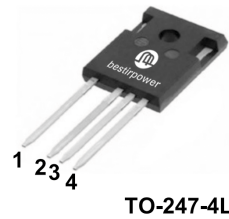
$BV_{DSS, T_C=25^\circ C}$	$I_D, T_C=25^\circ C$	$R_{DS(on), typ}$	$Q_{g, typ}$
650 V	44 A	45 mΩ	55 nC

Benefits

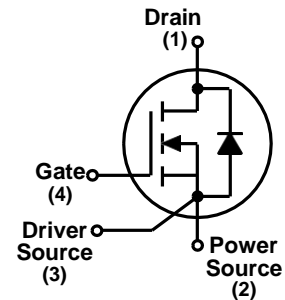
- System efficiency improvement
- Higher frequency applicability
- Increased power density
- Reduced cooling effort

Applications

- Solar inverter / ESS / UPS
- EV charging station
- Server & Telecom power
- Industrial power supply



TO-247-4L



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

Symbol	Parameter	Value	Unit	
V_{DSS}	Drain to Source Voltage	650	V	
V_{GS}	Gate to Source Voltage (DC)	-10 / +22	V	
V_{GSop}	Recommended Operation Value	-5 / +18	V	
I_D	Drain Current	$V_{GS} = 18 V, (T_C = 25^\circ C)$	44	A
		$V_{GS} = 18 V, (T_C = 100^\circ C)$	31	
I_{DM}	Drain Current	Pulsed (Note1)	117	A
P_D	Power Dissipation	$(T_C = 25^\circ C)$	150	W
		Derate Above 25°C	1.0	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 175	°C	

※Note 1 : Limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	40	
T_{sold}	Soldering temperature, wave soldering only allowed at leads	260	°C

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	-	1	100	μA
		$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}, T_J = 175^\circ\text{C}$	-	10	-	
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = +22\text{ V}, V_{DS} = 0\text{ V}$	-	-	+100	nA
		$V_{GS} = -10\text{ V}, V_{DS} = 0\text{ V}$	-	-	-100	

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 7\text{ mA}$	1.8	2.8	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 18\text{ V}, I_D = 20\text{ A}$	-	45	63	$\text{m}\Omega$
		$V_{GS} = 18\text{ V}, I_D = 20\text{ A}, T_J = 175^\circ\text{C}$	-	59	-	
g_{fs}	Transconductance	$V_{DS} = 20\text{ V}, I_D = 20\text{ A}$	-	13.4	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	1048	-	pF
C_{oss}	Output Capacitance		-	131	-	
C_{rss}	Reverse Capacitance		-	9.1	-	
E_{oss}	Stored Energy in Output Capacitance	$V_{DS} = 0\text{ V to } 400\text{ V}, V_{GS} = 0\text{ V}$	-	13.0	-	μJ
$C_{o(er)}$	Energy Related Output Capacitance		-	162.0	-	pF
$C_{o(tr)}$	Time Related Output Capacitance		-	236	-	
$Q_{g(tot)}$	Total Gate Charge	$V_{DS} = 400\text{ V}, I_D = 20\text{ A},$ $V_{GS} = -5\text{ V} / 18\text{ V},$ Inductive load	-	56	-	nC
Q_{gs}	Gate to Source Charge		-	14	-	
Q_{gd}	Gate to Drain "Miller" Charge		-	15	-	
R_G	Internal Gate Resistance	$f = 1\text{ MHz}, V_{AC} = 30\text{ mV}$ open drain	-	4.0	-	Ω

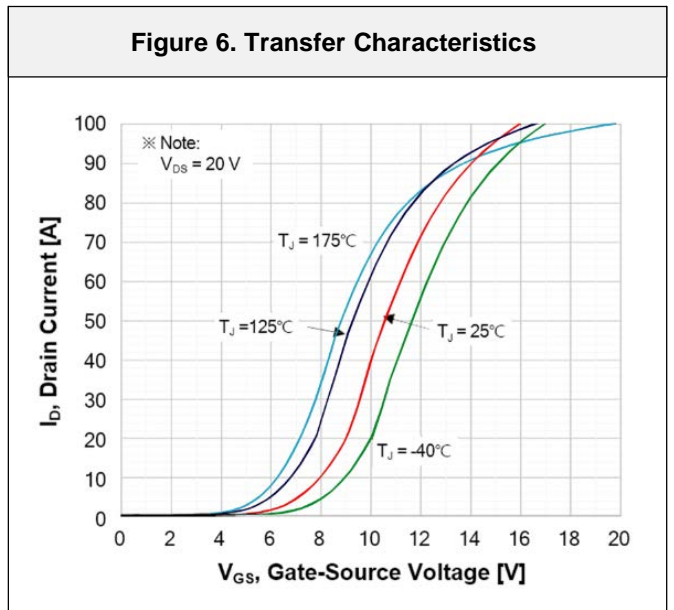
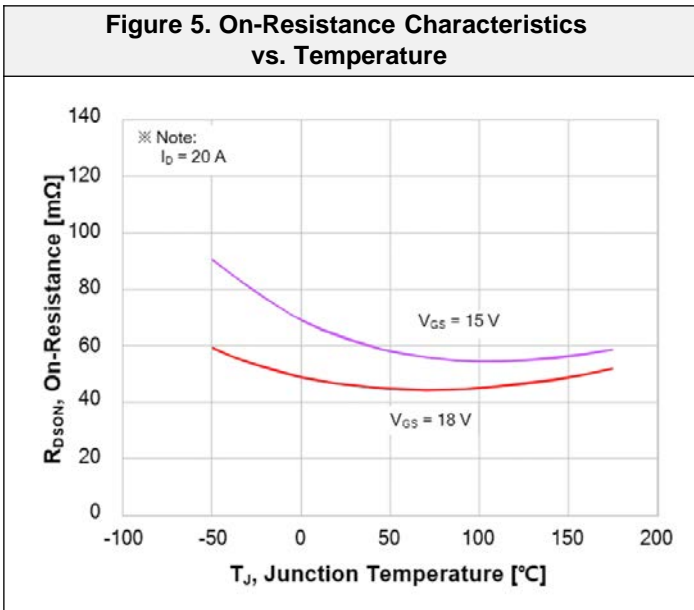
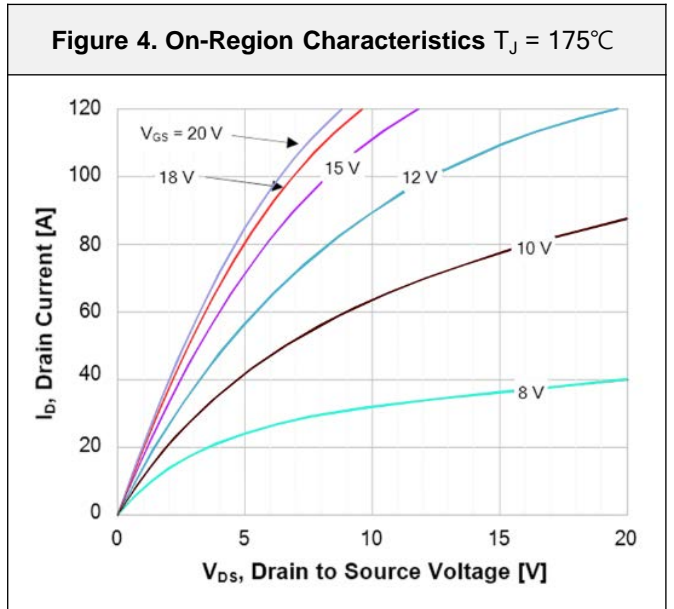
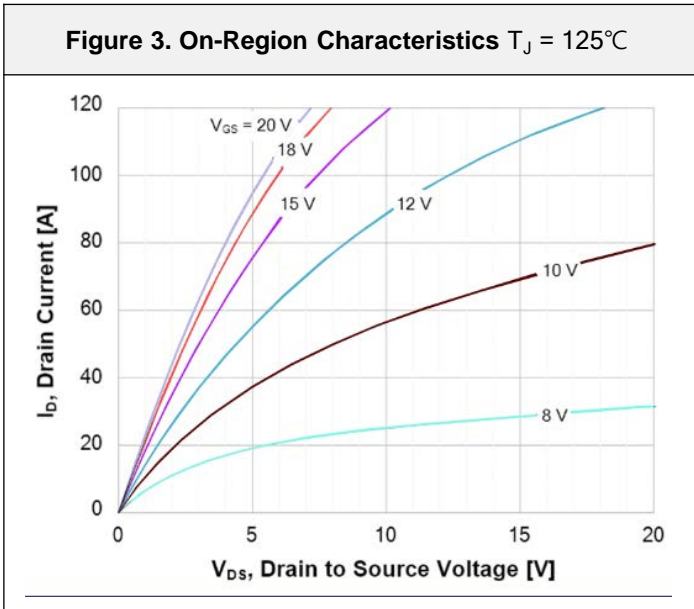
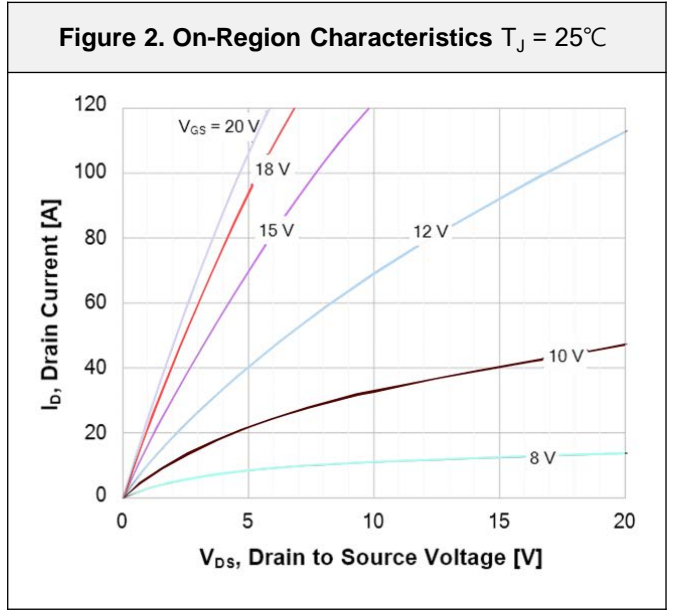
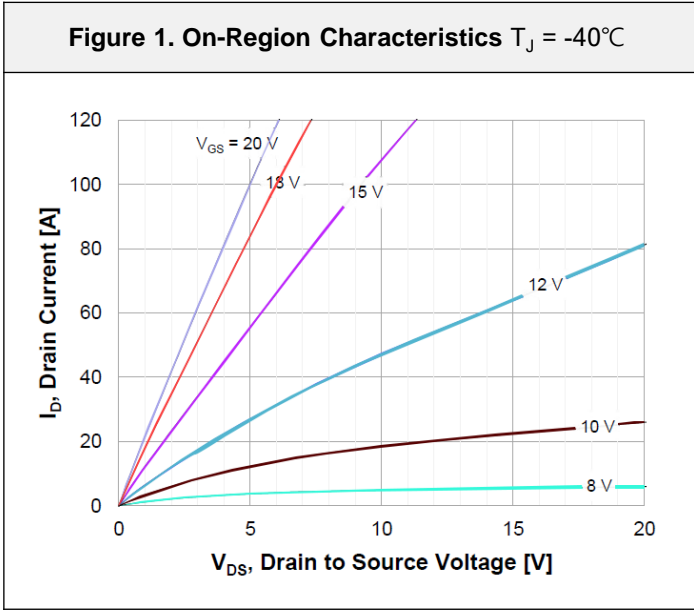
Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 400\text{ V}, I_D = 20\text{ A},$ $V_{GS} = -5\text{ V} / 18\text{ V}, R_G = 2\ \Omega,$ FWD : BCH65S012D1, Inductive load	-	13	-	ns
t_r	Turn-On Rise Time		-	10	-	
$t_{d(off)}$	Turn-Off Delay Time		-	26	-	
t_f	Turn-Off Fall Time		-	5	-	
E_{on}	Turn-on Switching Energy		-	27	-	μJ
E_{off}	Turn-off Switching Energy		-	18	-	
E_{tot}	Total Switching Energy		-	45	-	

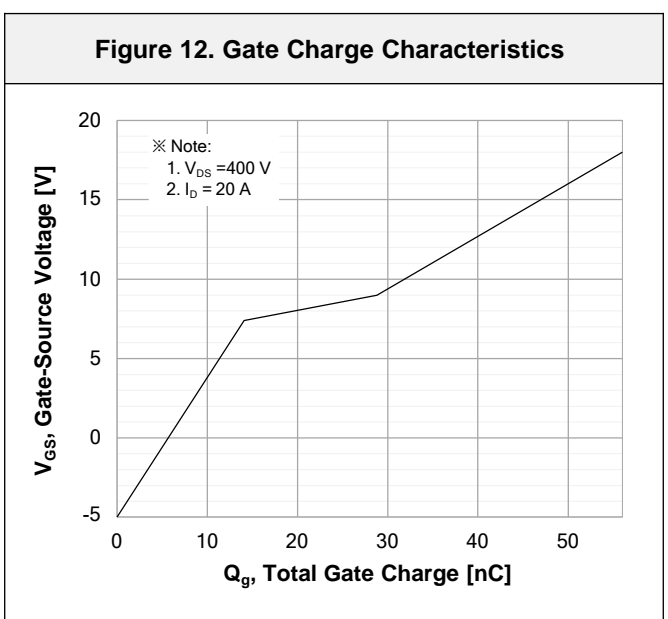
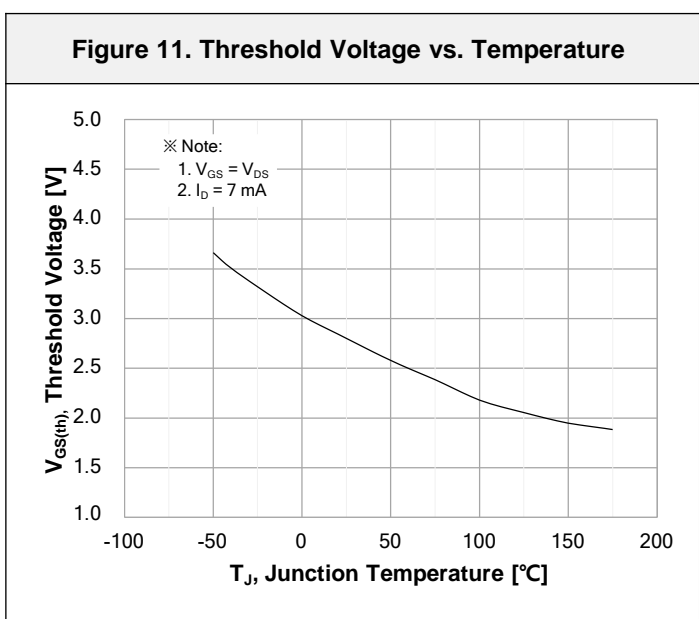
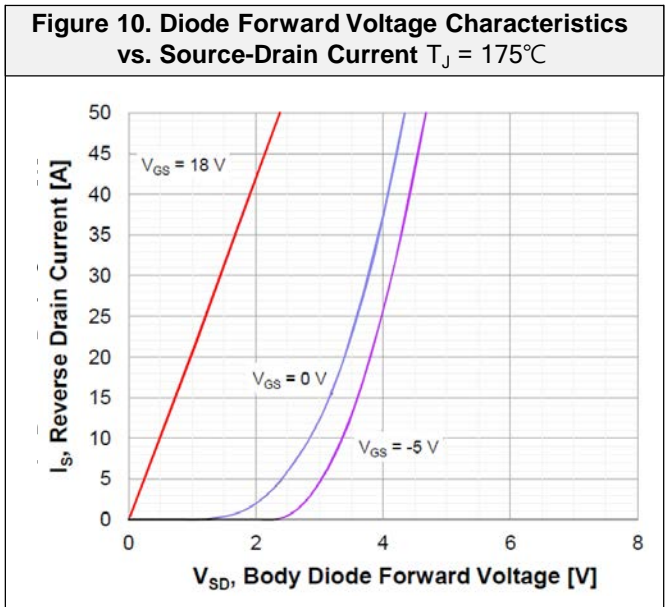
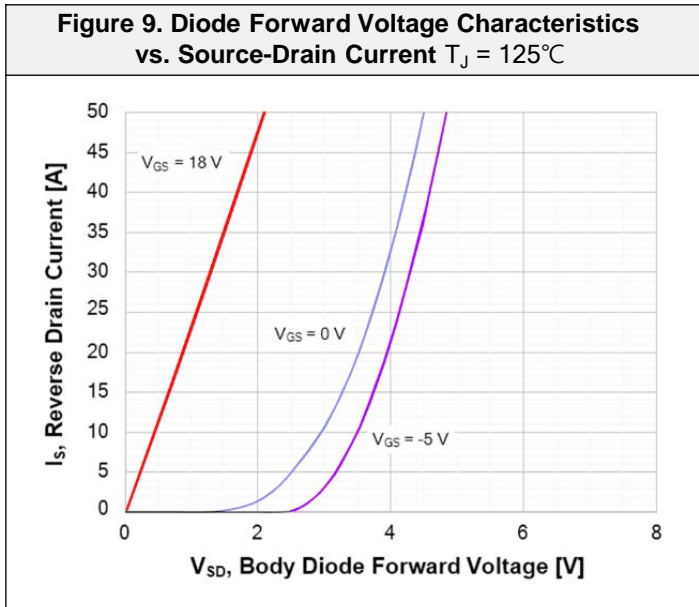
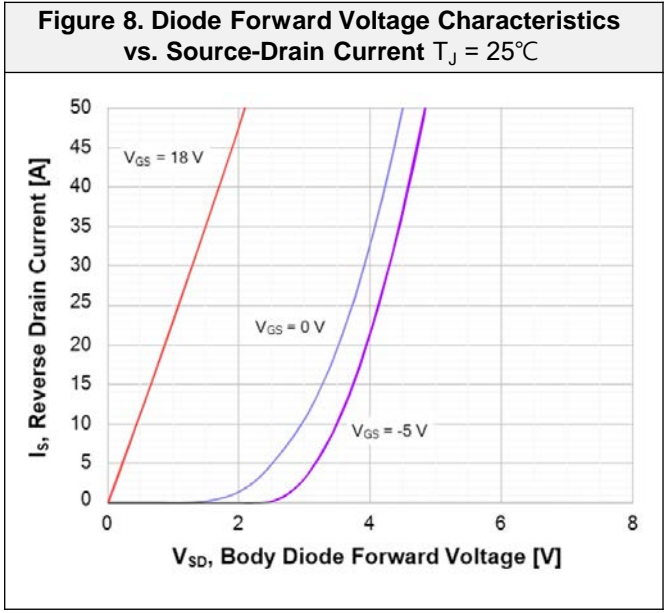
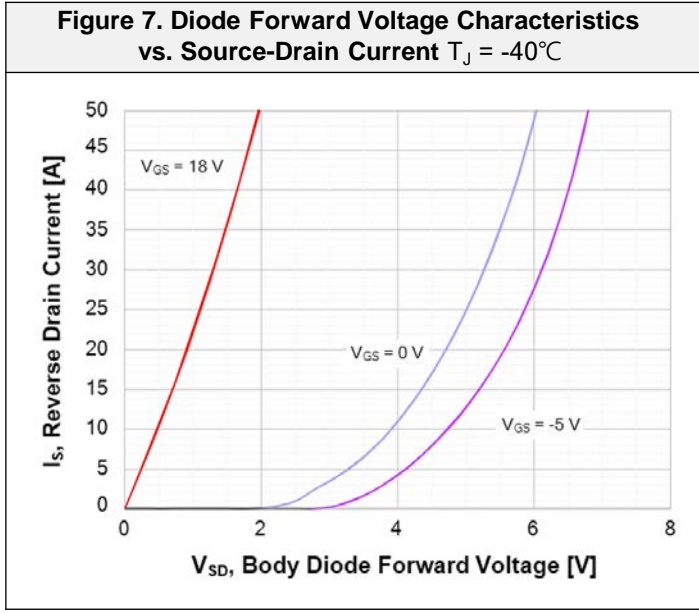
Source-Drain Diode Characteristics

I_S	Maximum Continuous Diode Forward Current	-	-	42	A	
I_{SM}	Maximum Pulsed Diode Forward Current	-	-	117		
V_{SD}	Diode Forward Voltage	$V_{GS} = -5\text{ V}, I_{SD} = 20\text{ A}$	-	4.2	-	V
t_{rr}	Reverse Recovery Time	$V_{DD} = 400\text{ V}, I_{SD} = 20\text{ A},$ $di_f/dt = 1000\text{ A}/\mu\text{s}$, Includes Q_{OSS}	-	17	-	ns
Q_{rr}	Reverse Recovery Charge		-	104	-	nC
I_{rrm}	Peak Reverse Recovery Current		-	10	-	A

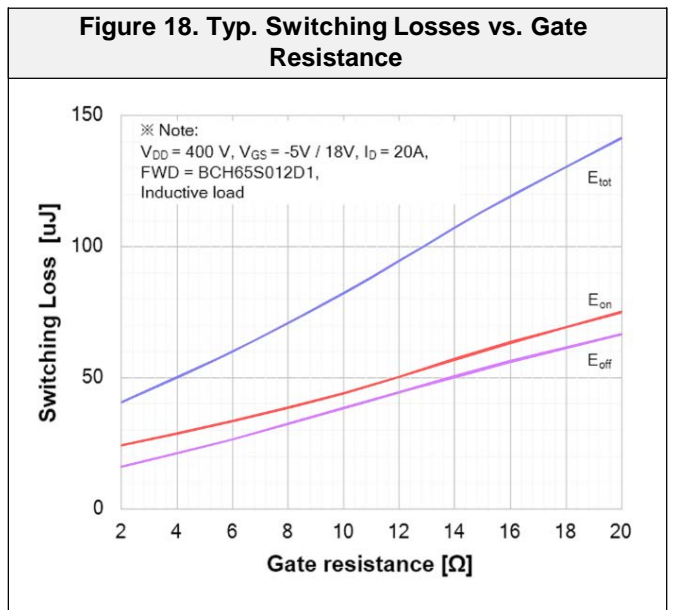
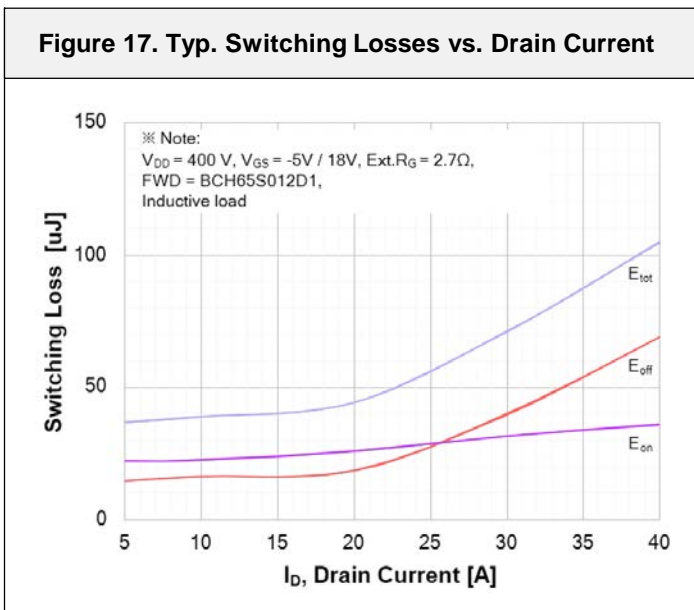
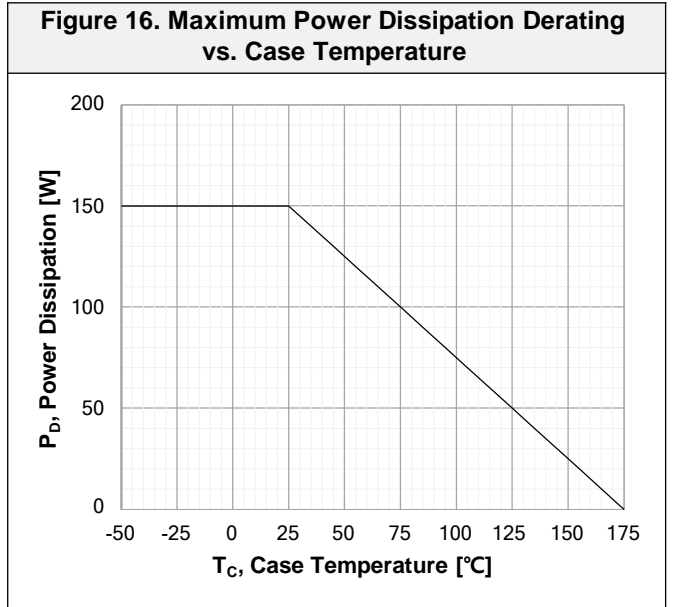
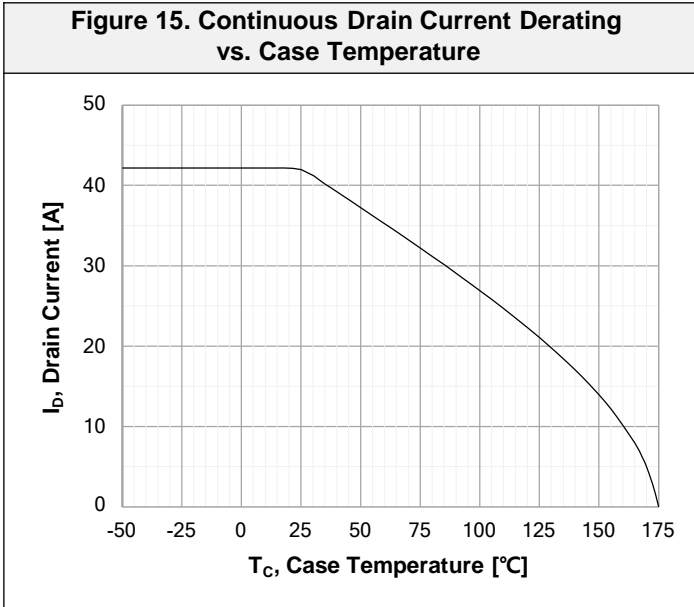
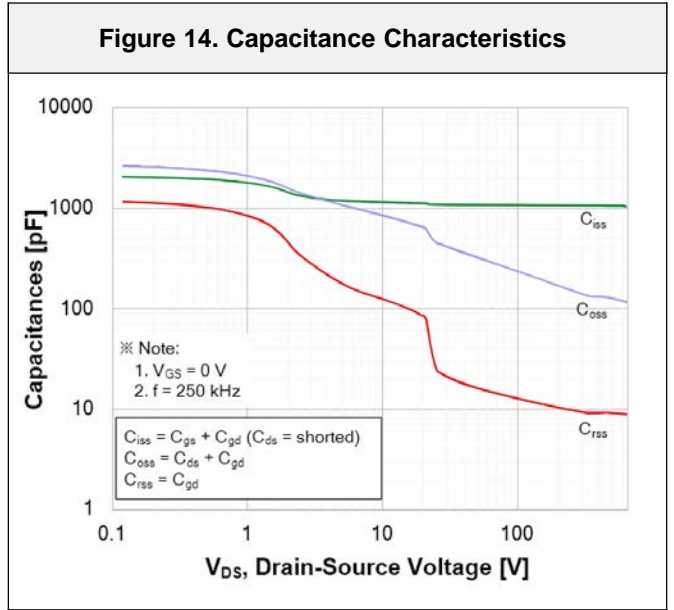
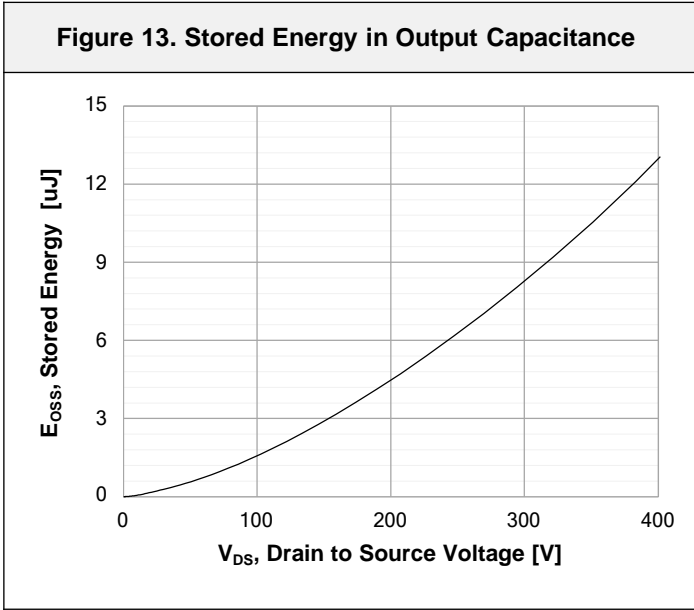
Typical Performance Characteristics



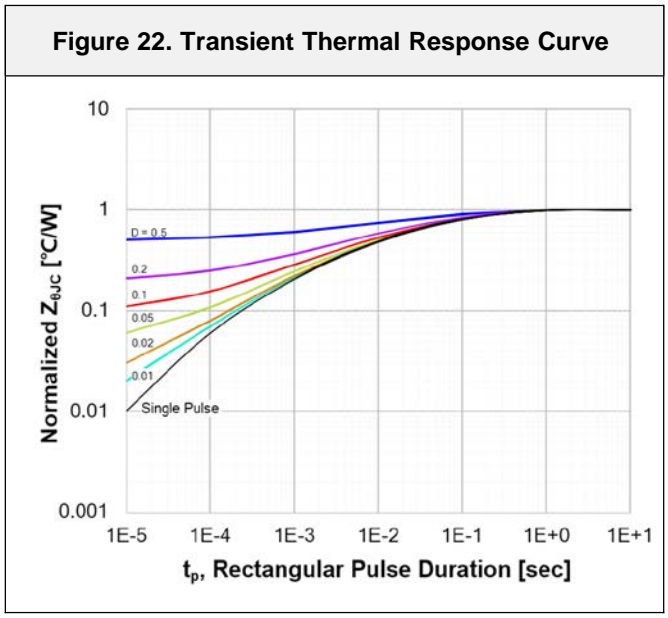
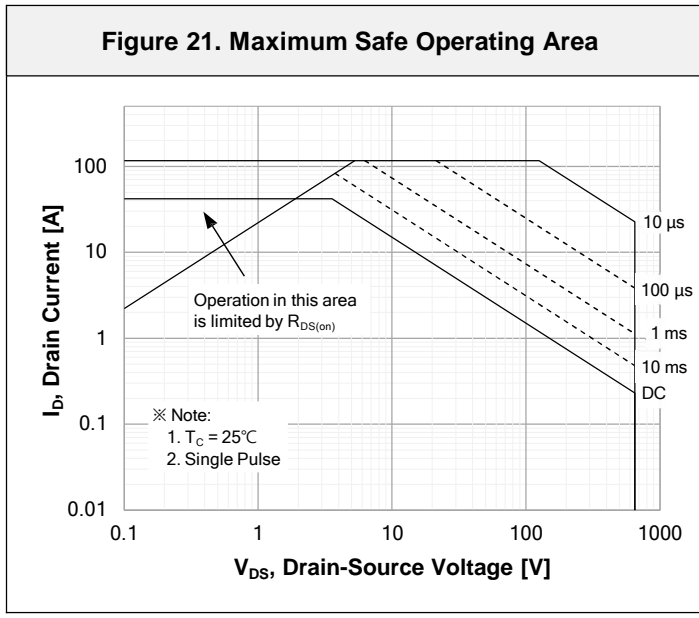
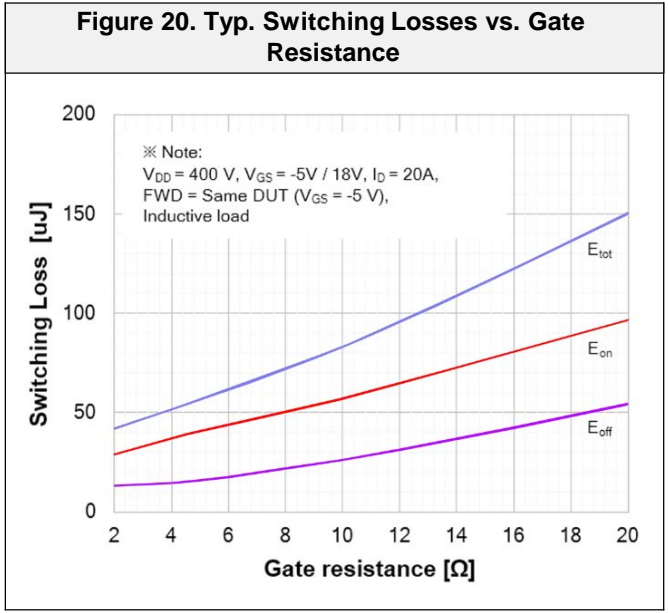
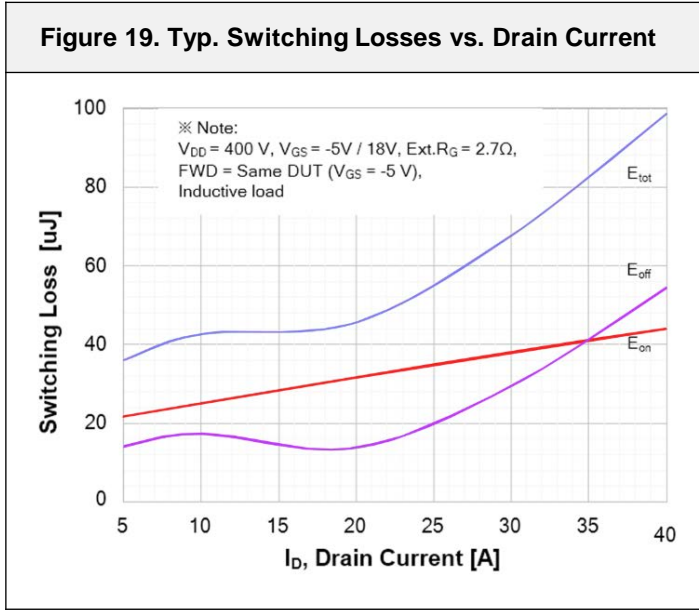
Typical Performance Characteristics



Typical Performance Characteristics



Typical Performance Characteristics



Typical Performance Characteristics

Figure 21. Inductive Load Switching Test Circuit and Waveforms

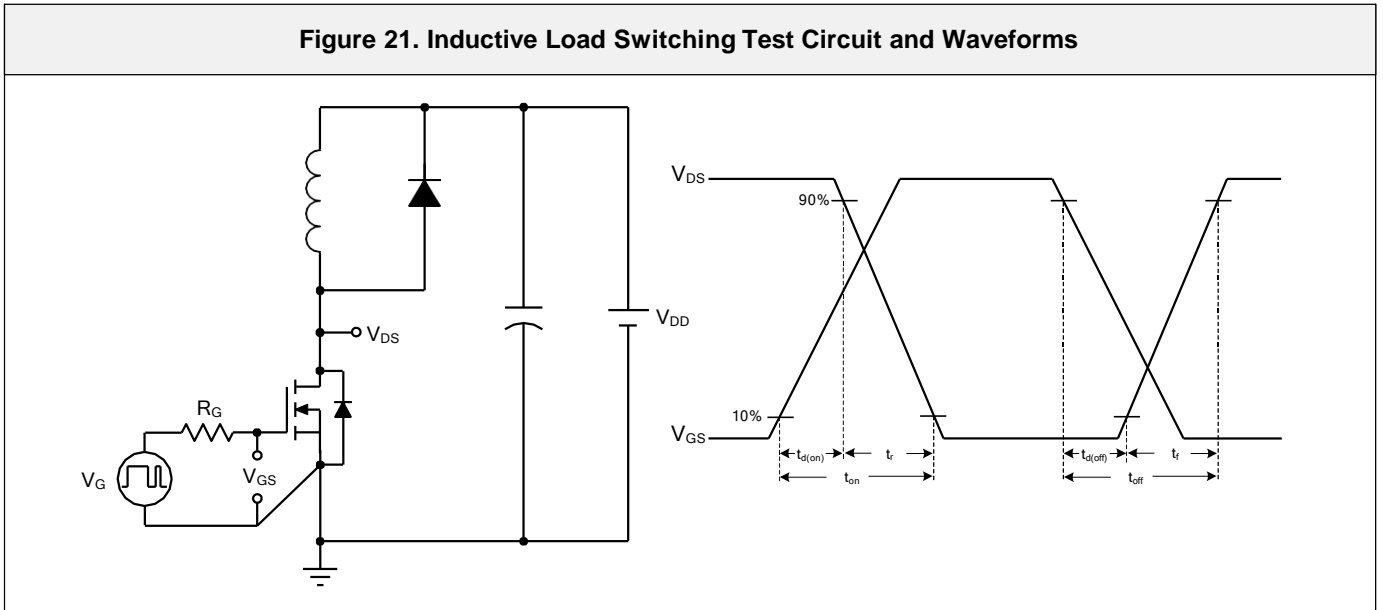
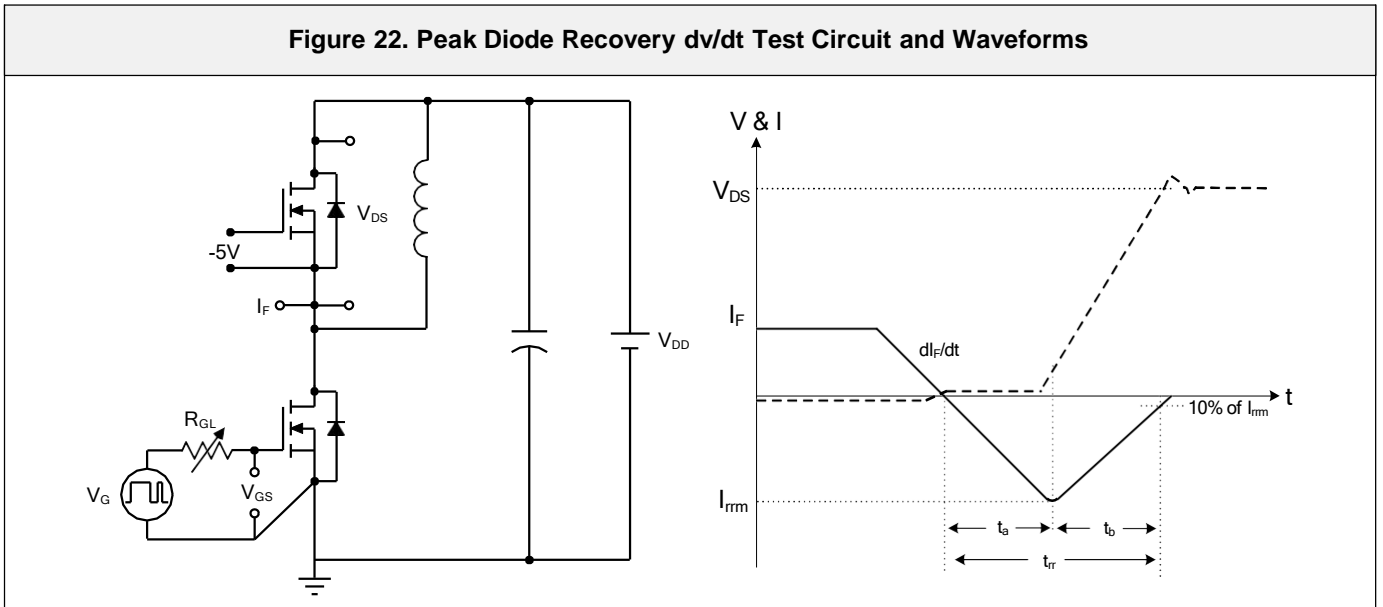
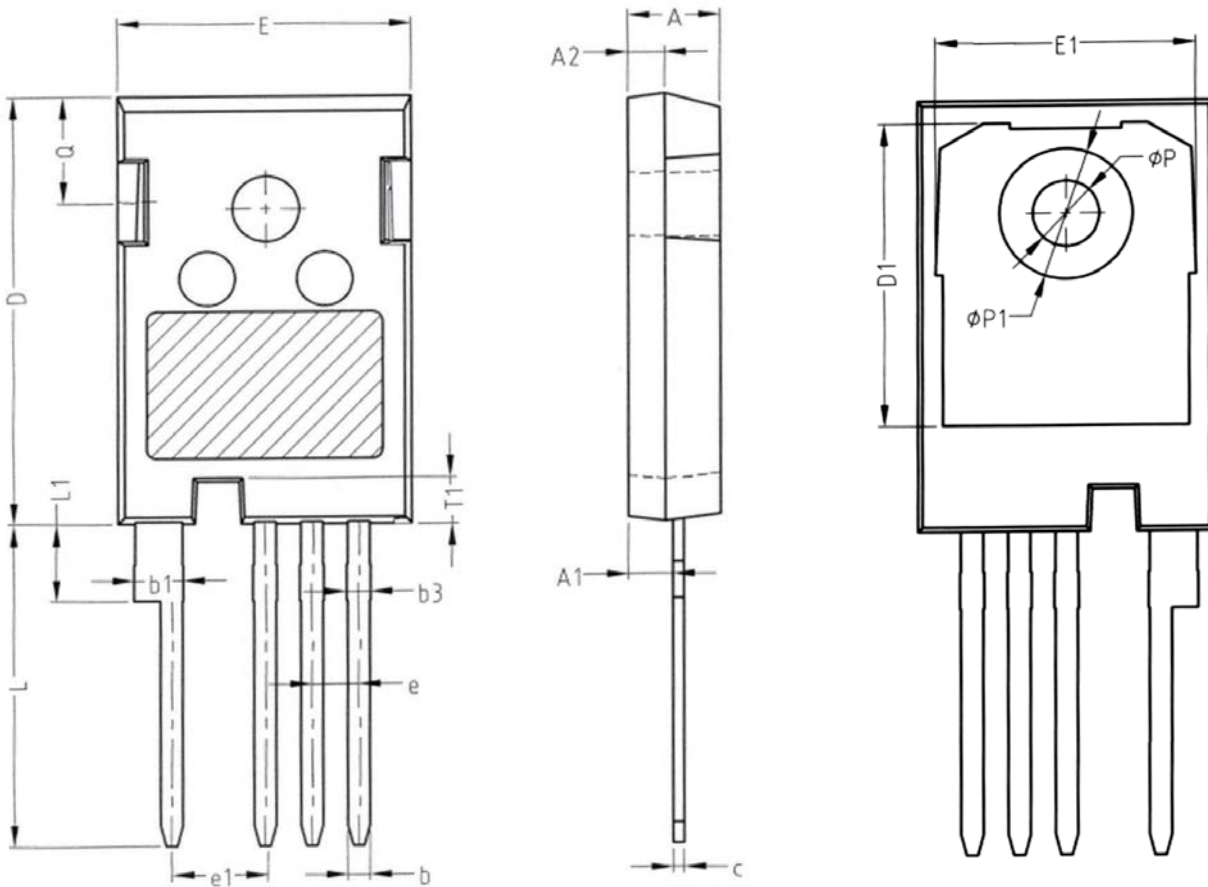


Figure 22. Peak Diode Recovery dv/dt Test Circuit and Waveforms



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
BCZ65N45M1	BCZ65N45M1	TO-247-4L	Tube	30 units

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