

BCW120N80M1

N-Channel Silicon Carbide Power MOSFET

1200 V, 34 A , 80 mΩ

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

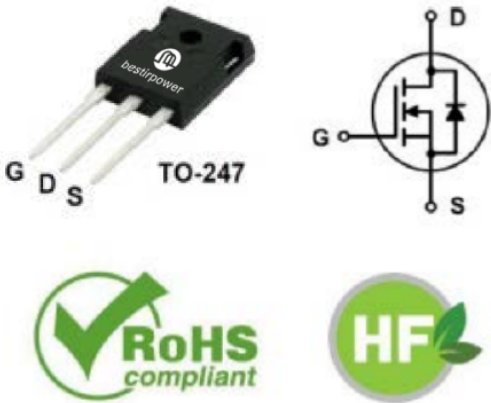
$BV_{DSS}, T_c=25^{\circ}C$	$I_D, T_c=25^{\circ}C$	$R_{DS(on), typ}$	$Q_{g, typ}$
1200 V	34 A	80 mΩ	50 nC

Benefits

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

Applications

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



Absolute Maximum Ratings (T_J = 25°C unless otherwise noted)

Symbol	Parameter		Value	Unit
V _{DSS}	Drain to Source Voltage		1200	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°C)	34	A
		V _{GS} = 18 V, (T _C = 100°C)	24	
I _{DM}	Drain Current	Pulsed (Note1)	80	A
P _D	Power Dissipation	(T _C = 25°C)	150	W
		Derate Above 25°C	1.00	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to 175	°C
T _L	Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds		260	°C

※Note 1 : Limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Value	Unit
R _{θJC}	Thermal Resistance, Junction to Case, Max.	1	°C/W
R _{θJA}	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
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	1200	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}$	-	1	100	μA
		$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}, T_J = 175^\circ\text{C}$	-	5	-	
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	$V_{GS} = V_{DS}, I_D = 5.0\text{ mA}$ (tested after $V_{GS} = 22\text{ V}, 1\text{ ms pulse}$)	2.0	3.0	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 18\text{ V}, I_D = 15\text{ A}$	-	80	110	mΩ
		$V_{GS} = 18\text{ V}, I_D = 15\text{ A}, T_J = 175^\circ\text{C}$	-	128	-	
g_{fs}	Transconductance	$V_{DS} = 20\text{ V}, I_D = 15\text{ A}$	-	11.4	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, f = 250\text{ kHz}$	-	885	-	pF
C_{oss}	Output Capacitance		-	65	-	
C_{rss}	Reverse Capacitance		-	5	-	
E_{oss}	Stored Energy in Output Capacitance	$V_{DS} = 0\text{ V to } 800\text{ V}, V_{GS} = 0\text{ V}$	-	26	-	μJ
$C_{o(er)}$	Energy Related Output Capacitance		-	81	-	pF
$C_{o(tr)}$	Time Related Output Capacitance		-	142	-	
$Q_{g(tot)}$	Total Gate Charge	$V_{DS} = 800\text{ V}, I_D = 15\text{ A},$ $V_{GS} = -5\text{ V} / 18\text{ V},$ Inductive load	-	50	-	nC
Q_{gs}	Gate to Source Charge		-	13	-	
Q_{gd}	Gate to Drain "Miller" Charge		-	17	-	
R_G	Internal Gate Resistance	$f = 1\text{ MHz}$ open drain	-	4.0	-	Ω

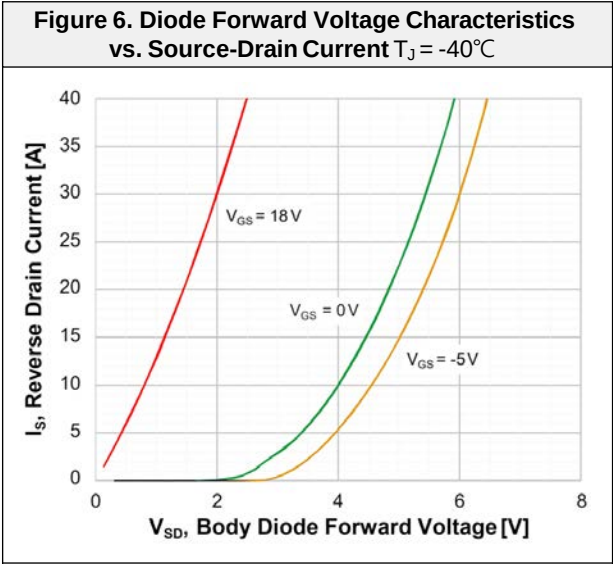
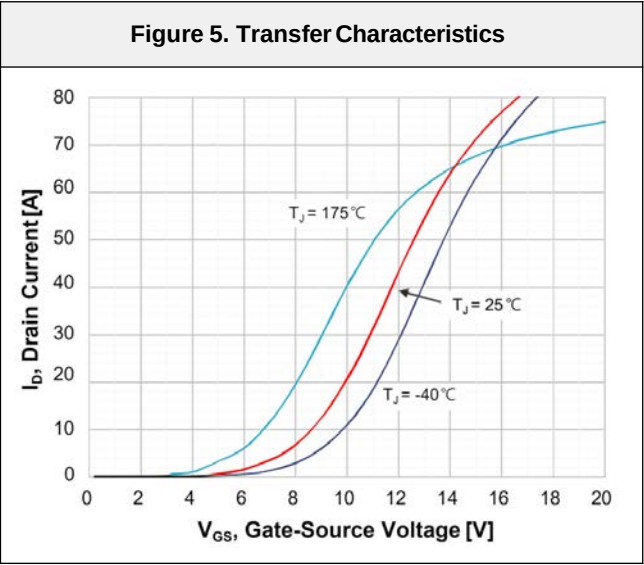
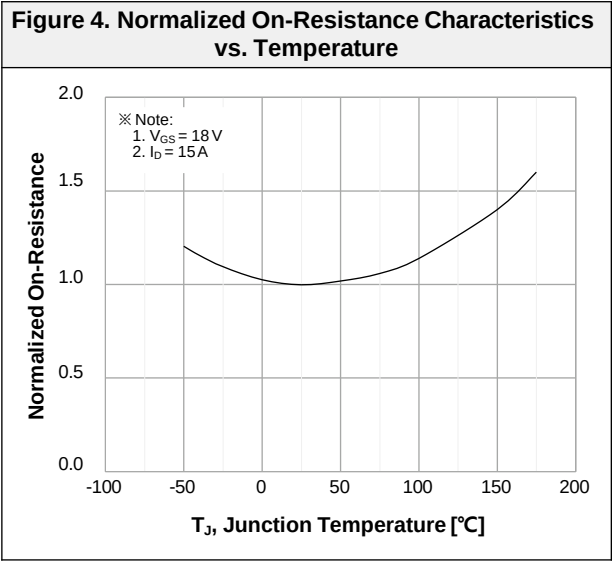
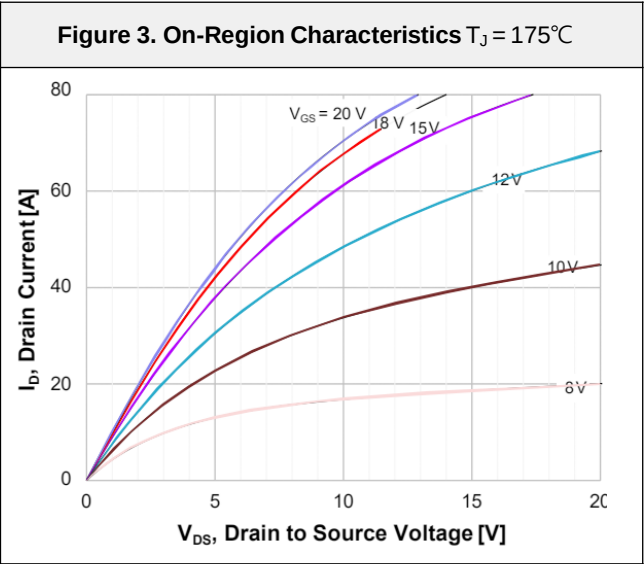
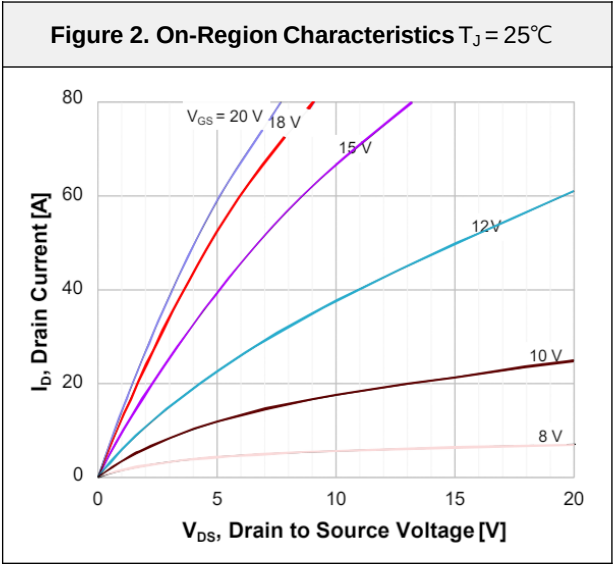
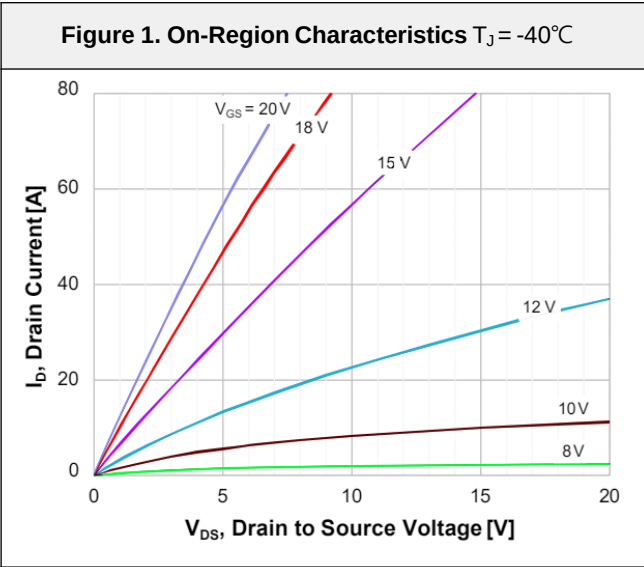
Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 800\text{ V}, I_D = 15\text{ A},$ $V_{GS} = -5\text{ V} / 18\text{ V}, R_G = 2\text{ }\Omega,$ FWD : BCH120S010D1, Inductive load	-	14	-	ns
t_r	Turn-On Rise Time		-	21	-	
$t_{d(off)}$	Turn-Off Delay Time		-	24	-	
t_f	Turn-Off Fall Time		-	9	-	
E_{on}	Turn-on Switching Energy		-	183	-	μJ
E_{off}	Turn-off Switching Energy		-	42	-	
E_{tot}	Total Switching Energy		-	225	-	

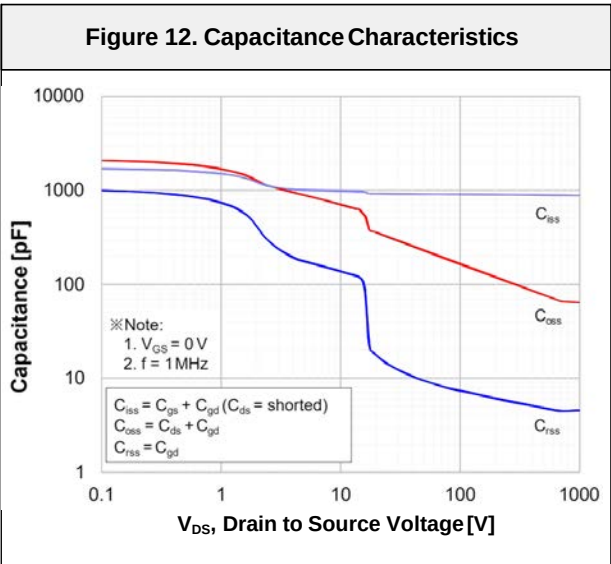
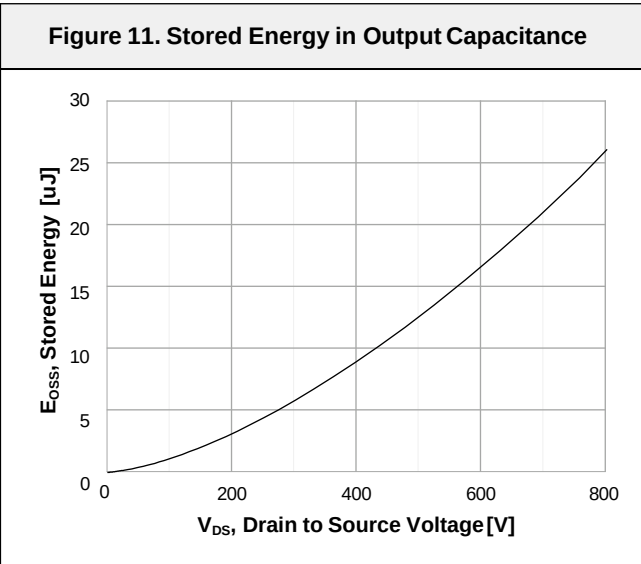
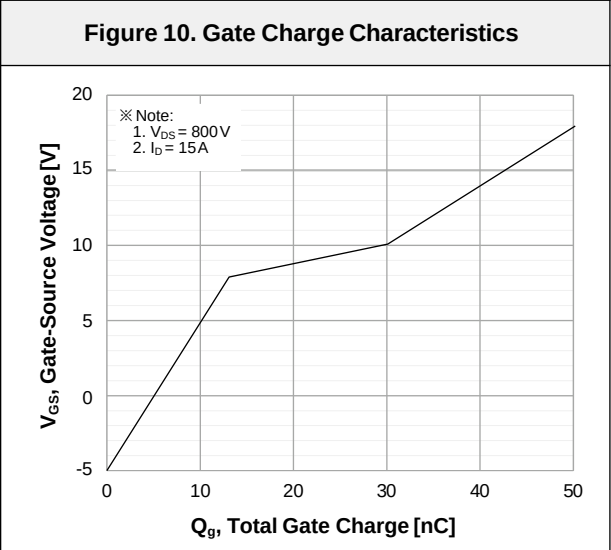
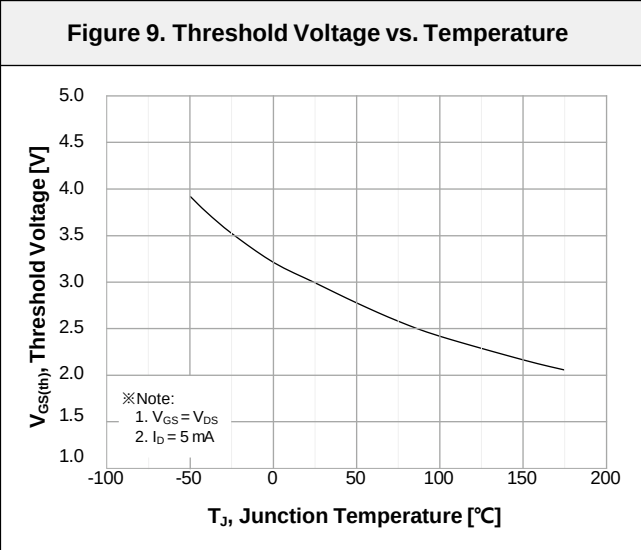
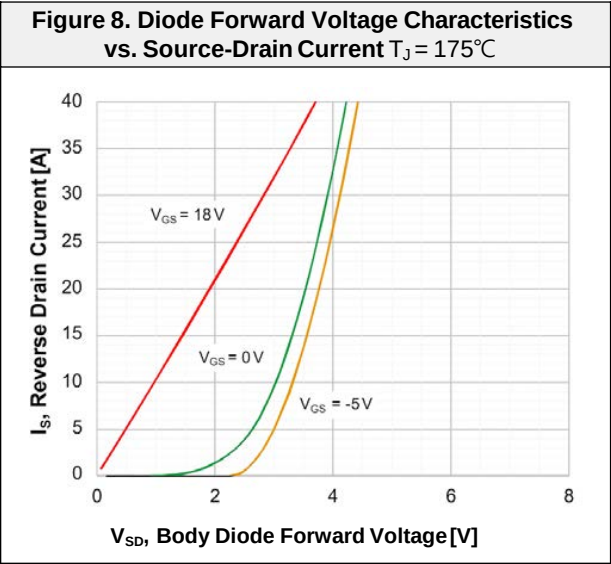
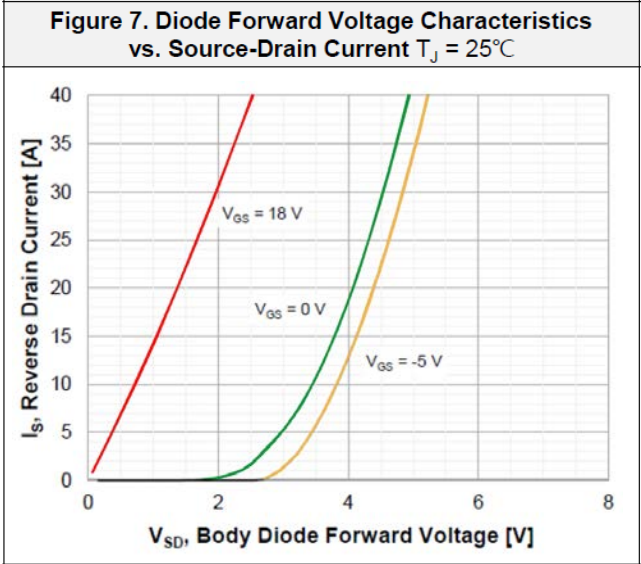
Source-Drain Diode Characteristics

I_S	Maximum Continuous Diode Forward Current		-	-	30	A
I_{SM}	Maximum Pulsed Diode Forward Current		-	-	80	
V_{SD}	Diode Forward Voltage	$V_{GS} = -5\text{ V}, I_{SD} = 15\text{ A}$	-	4.1	-	V
t_{rr}	Reverse Recovery Time	$V_{DD} = 800\text{ V}, I_{SD} = 15\text{ A},$ $di_F/dt = 3000\text{ A}/\mu\text{s},$ Includes Q_{oss}	-	34	-	ns
Q_{rr}	Reverse Recovery Charge		-	112	-	nC

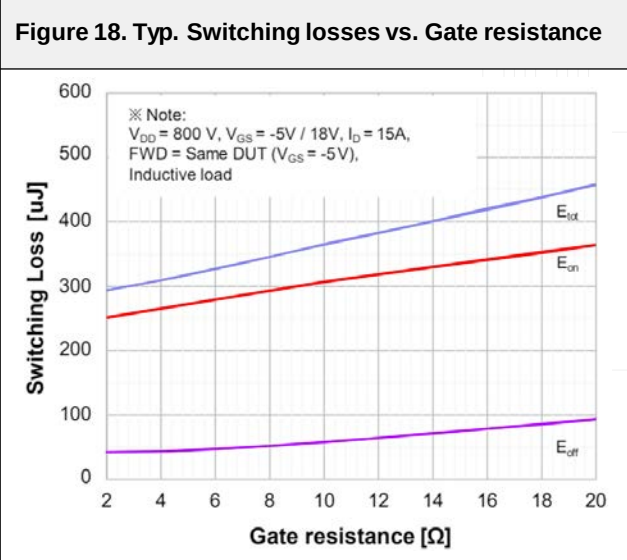
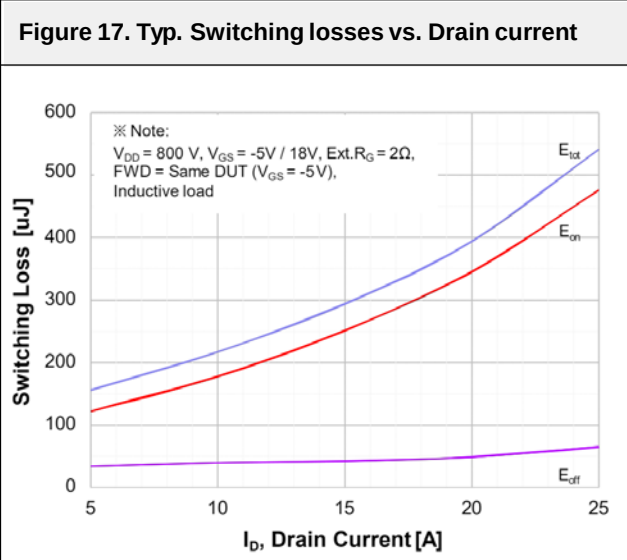
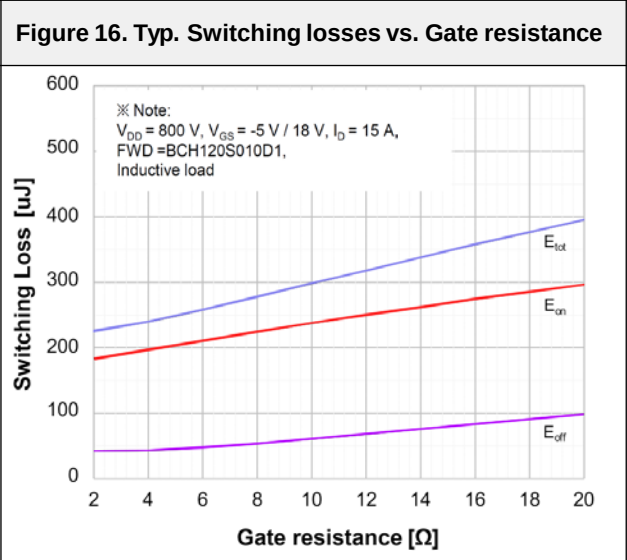
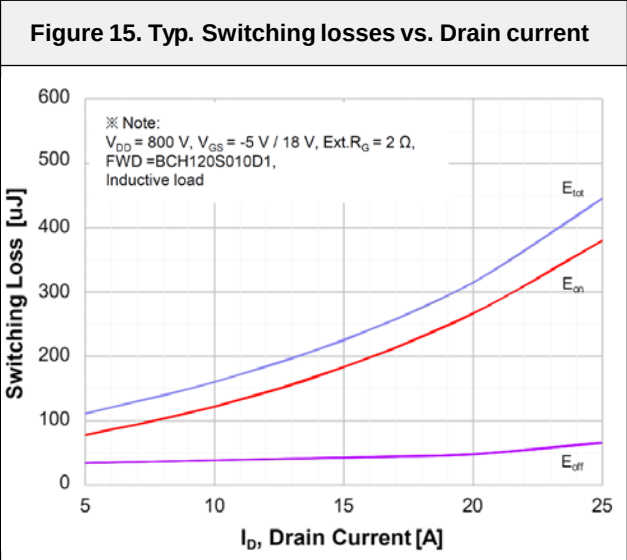
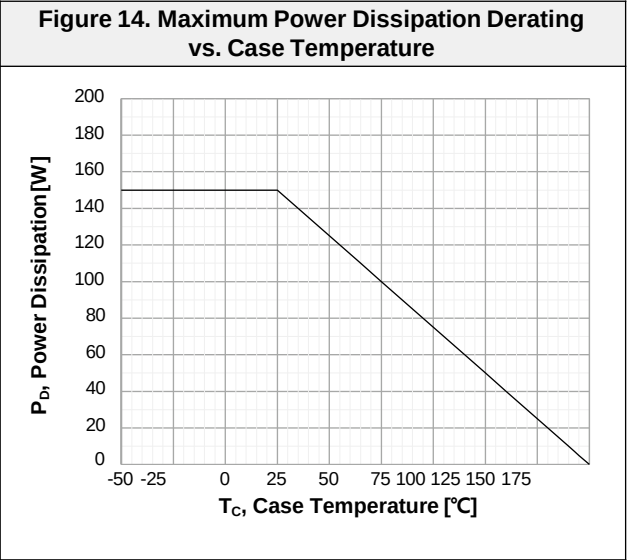
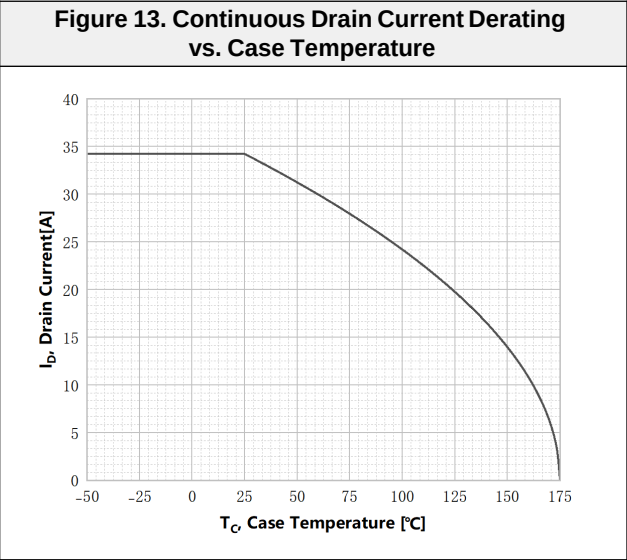
Typical Performance Characteristics



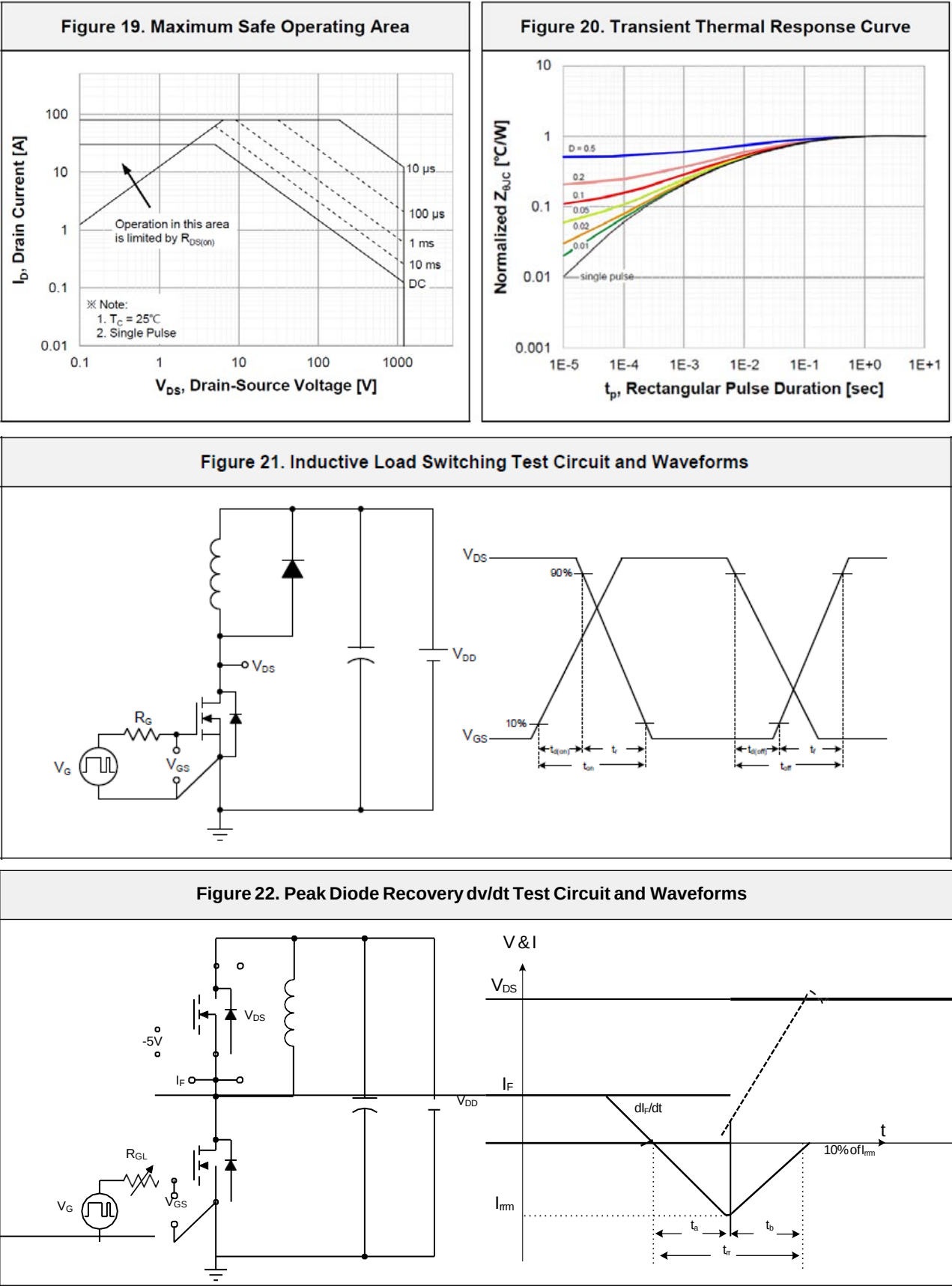
Typical Performance Characteristics



Typical Performance Characteristics

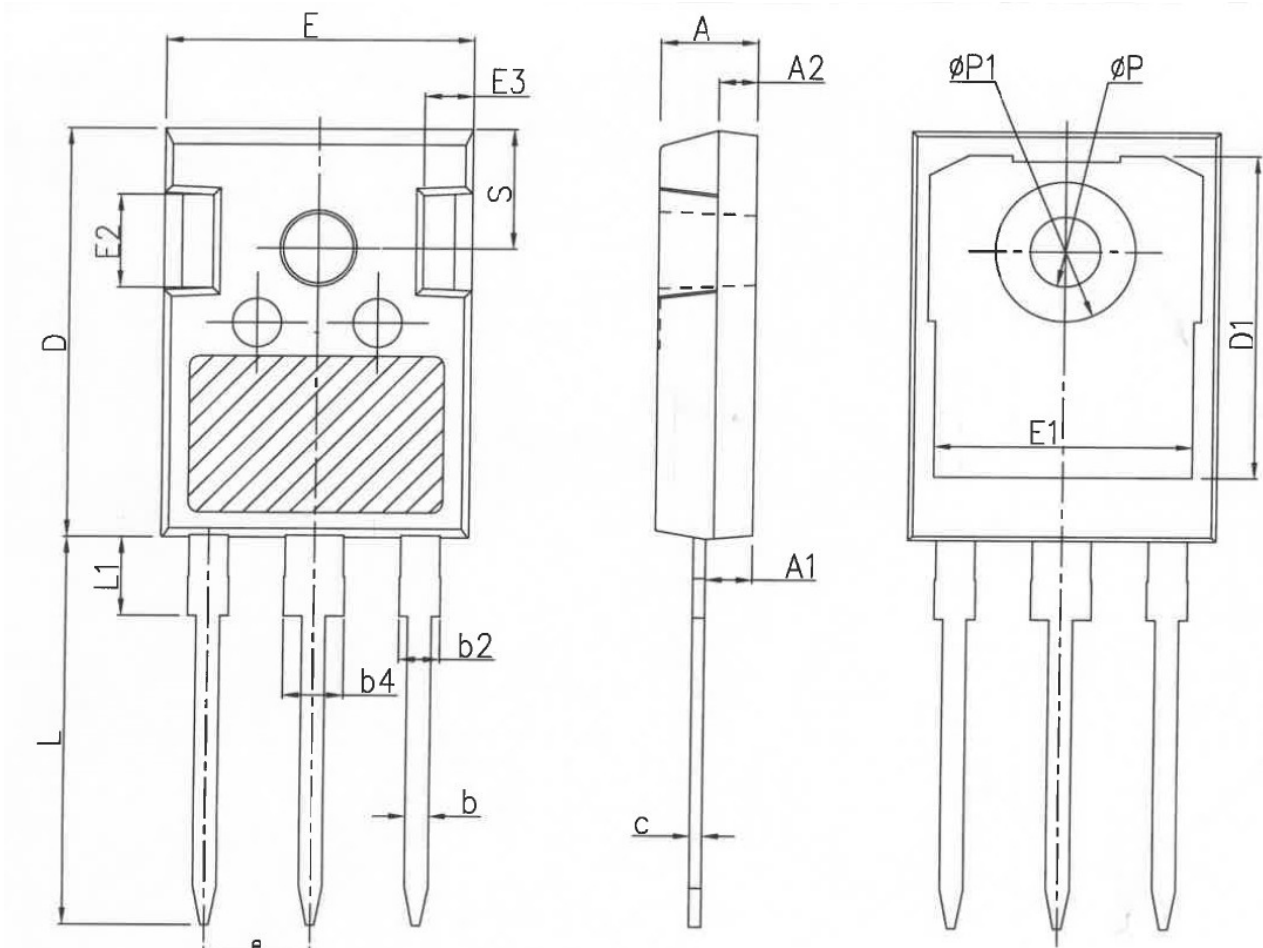


Typical Performance Characteristics



Package Outlines

TO247-3



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	—	—	4.30
ΦP	3.40	3.60	3.80
ΦP1	—	—	7.30
S	6.15BSC		

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BCW120N80M1	BCW120N80M1	TO247-3	Tube	30 units

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