BCBF170N1000P1

N-Channel Silicon Carbide Power MOSFET

1700 V, 5 A , 1000 mΩ

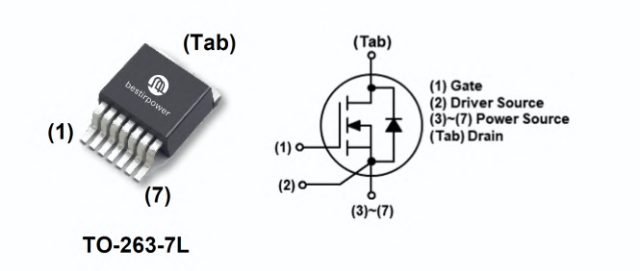
Features

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

$BV_{DSS,\ Tc=25℃}$	$I_{D,\ Tc=25℃}$	$R_{DS(on),typ}$	$Q_{g,typ}$
1700 V	**5 A**	**1000 mΩ**	**16.2 nC**

Applications

- LED Lighting Power Supplies
- High Voltage DC/DC Converters
- Industrial Power Supplies
- HVAC



TO-263-7L

Absolute Maximum Ratings (T_J = 25℃ unless otherwisenoted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		1700	V
V_{GSmax}	Gate to Source Voltage (AC f>1Hz)		-10 / +25	V
V_{GSop}	Recommended Operation Value		-5 / +20	V
I_D	Drain Current	V_{GS}=15V, (T_C = 25℃)	5	A
		V_{GS}=15V, (T_C = 100℃)	3.5	
		V_{GS}=20V, (T_C = 25℃)	8.6	
I_{DM}	Drain Current	Pulse Width tp Limited by TJmax	9.9	A
P_D	Power Dissipation	(T_C = 25℃), ,T_J=175℃	51	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 175	℃

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	2.94	℃/W
Tsold	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 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} = +20 V	-	-	250	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 0.5 mA	2	3.1	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 20 V, I_D = 2 A	-	1000	1200	mΩ
		V_{GS} = 20 V, I_D = 2 A	-	2100	-	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 1200 V *f* = 1.0 MHz ,V_{AC} = 25 mV	-	182	-	pF
C_{oss}	Output Capacitance		-	11.2	-	
C_{rss}	Reverse Capacitance		-	1.8	-	
E_{oss}	Stored Energy in Output Capacitance		-	9.3	-	μJ
$Q_{g(tot)}$	Total Gate Charge	V_{DS} = 1200 V, I_D = 2 A V_{GS} = -5 V / +20 V	-	16.2	-	nC
Q_{gs}	Gate to Source Charge		-	2.6	-	
Q_{gd}	Gate to Drain “Miller” Charge		-	12.7	-	
R_G	Internal Gate Resistance	*f* = 1.0 MHz, V_{AC} = 25 mV	-	5	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 1200 V I_D = 2 A V_{GS} = -5 V / +20V , $R_{G\ (ext)}$ = 2.2 Ω L = 10 mH	-	17	-	ns
t_r	Turn-On Rise Time		-	15	-	
$t_{d(off)}$	Turn-Off Delay Time		-	16	-	
t_f	Turn-Off Fall Time		-	94	-	
E_{on}	Turn-on Switching Energy		-	58.4	-	μJ
E_{off}	Turn-off Switching Energy		-	1.7	-	
Source-Drain Diode Characteristics						
I_S	Maximum Continuous Diode Forward Current		-	5	-	A
V_{SD}	Diode Forward Voltage	V_{GS} = -5 V, I_S = 1 A	-	3.8	-	V
I_{rrm}	Peak Reverse Recovery Current	V_{DS} = 1200 V, I_S = 2 A, V_{GS}=-5V, dif/dt = 235 A/μs	-	4.6	-	A
t_{rr}	Reverse Recovery Time		-	15.1	-	ns
Q_{rr}	Reverse Recovery Charge		-	37.4	-	nC

Typical Performance Characteristics

Figure 1: Output Characteristics TJ = -55℃

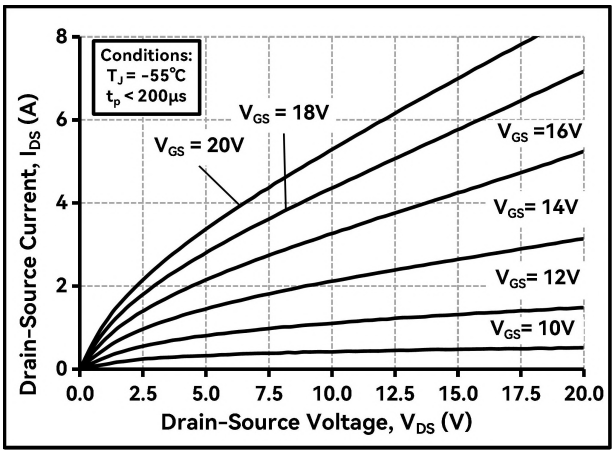


Figure 2: Output Characteristics TJ = 25℃

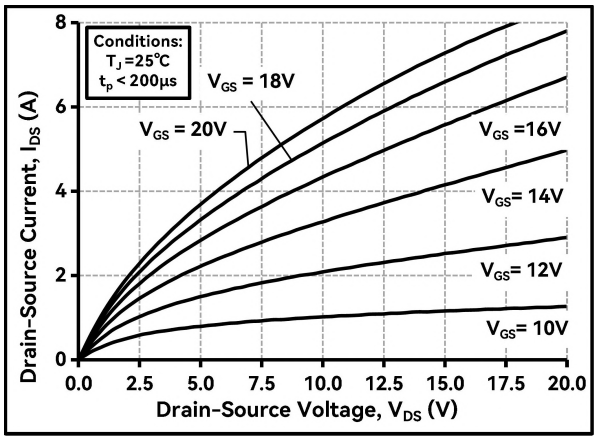


Figure 3: Output Characteristics TJ = 175℃

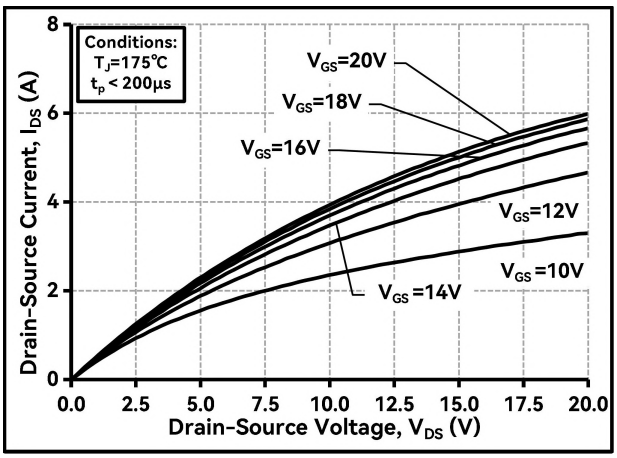


Figure 4: Normalized On-Resistance vs Temperature

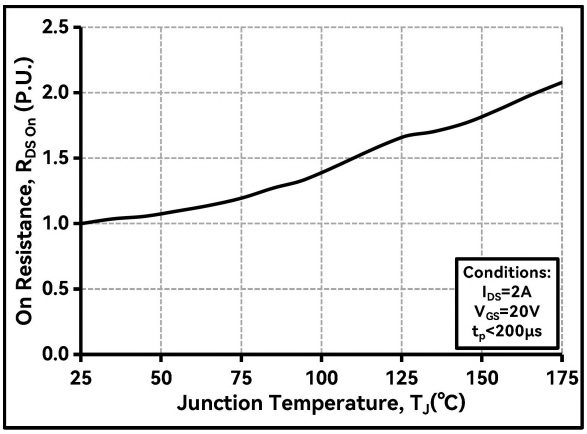


Figure 5: On-Resistance vs Drain Current For Various Temperatures

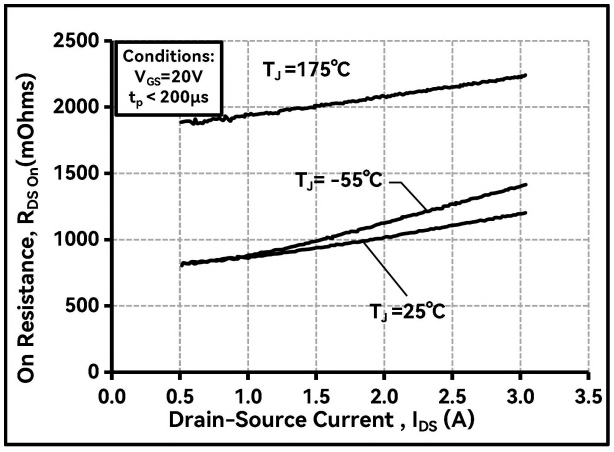
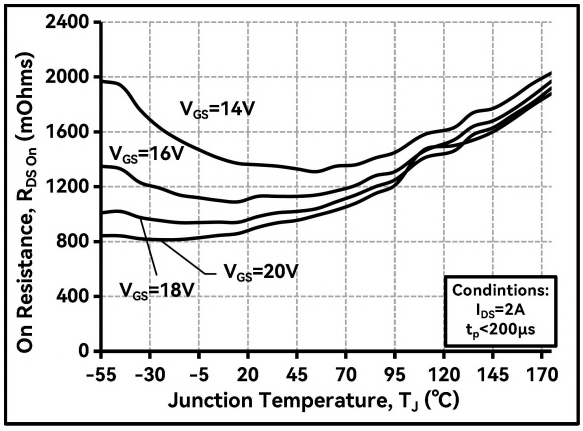


Figure 6: On-Resistance vs Temperature For Various Gate Voltage



Typical Performance Characteristics

Figure 7: Transfer Characteristic for Various Junction Temperatures

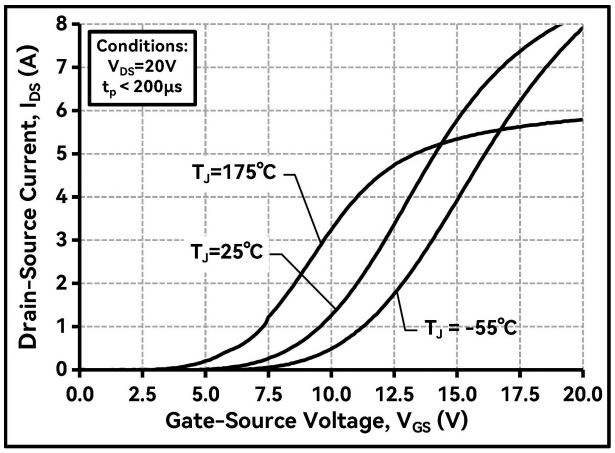


Figure 8: Body Diode Characteristic at -55℃

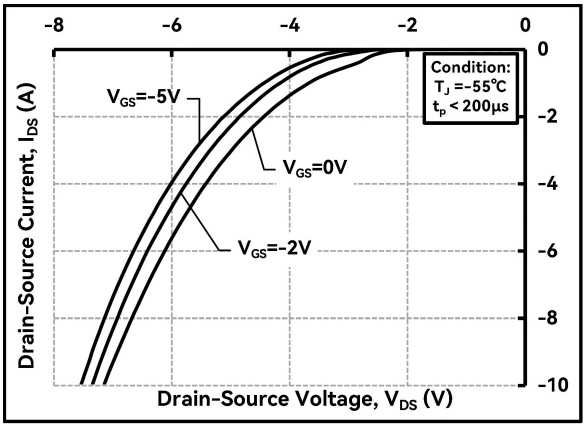


Figure 9: Body Diode Characteristic at 25℃

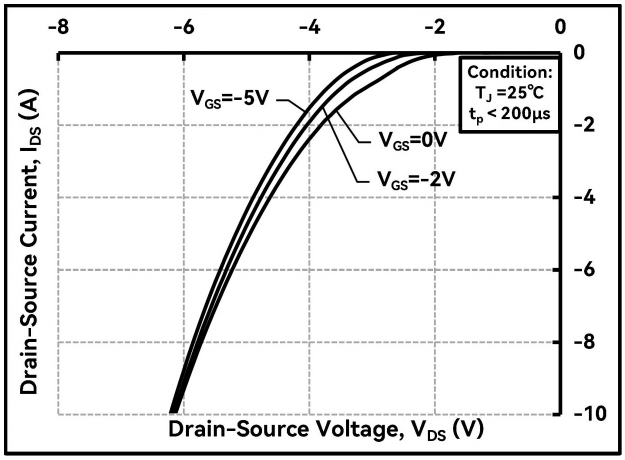


Figure 10: Body Diode Characteristic at 175℃

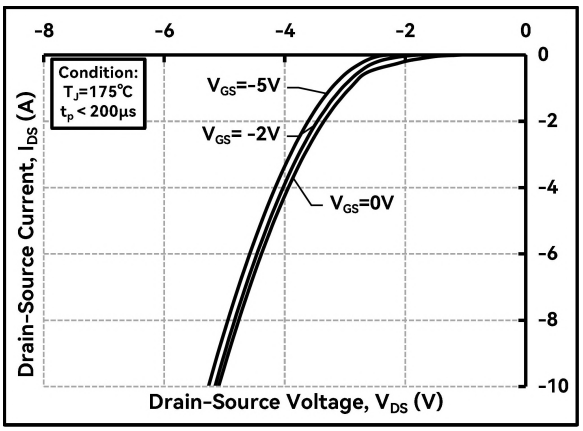


Figure 11: Threshold Voltage vs Temperature

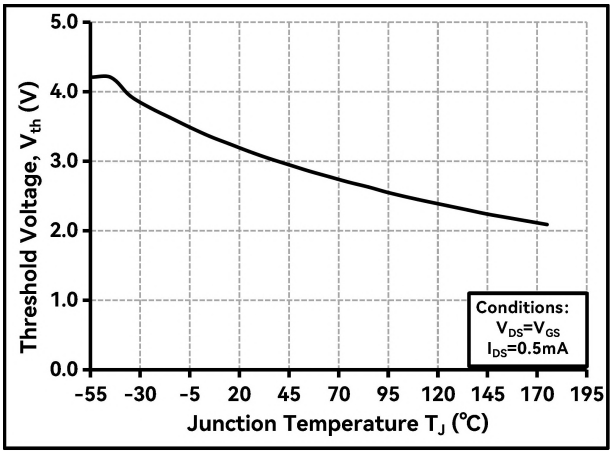
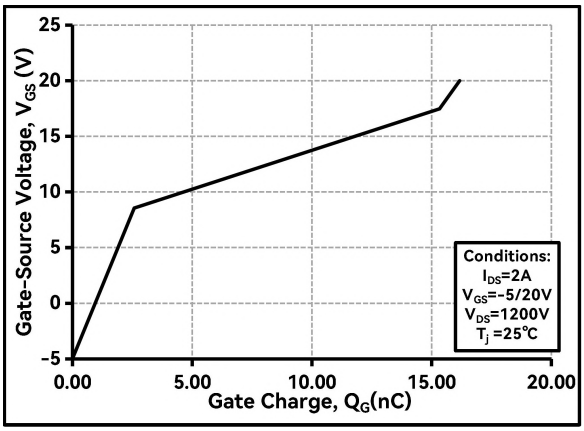


Figure 12: Gate Charge Characteristics



Typical Performance Characteristics

Figure 13: 3rd Quadrant Characteristic at -55℃

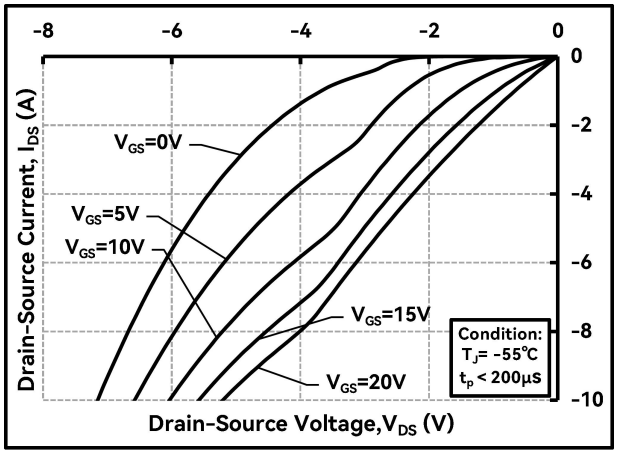


Figure 14: 3rd Quadrant Characteristic at 25℃

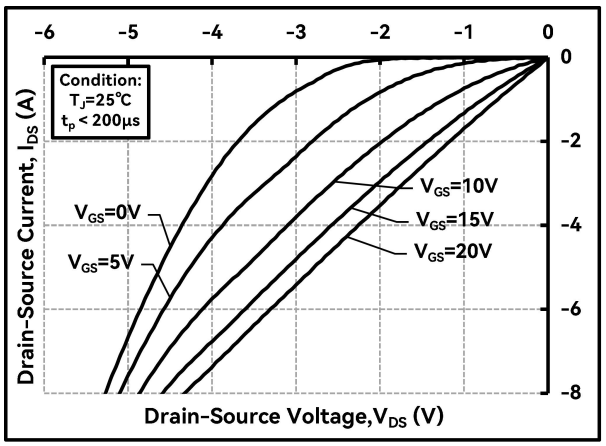


Figure 15: 3rd Quadrant Characteristic at 175℃

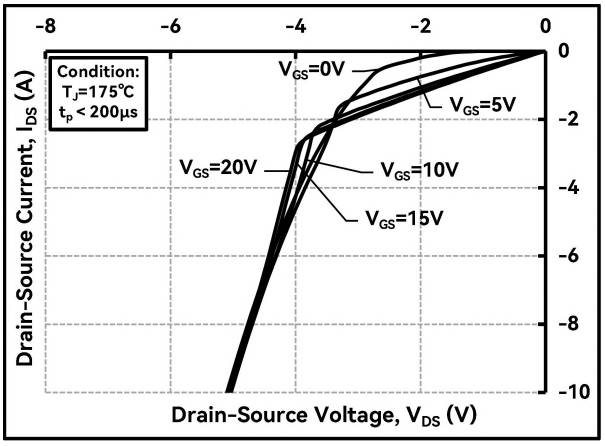


Figure 16: Output Capacitor Stored Energy

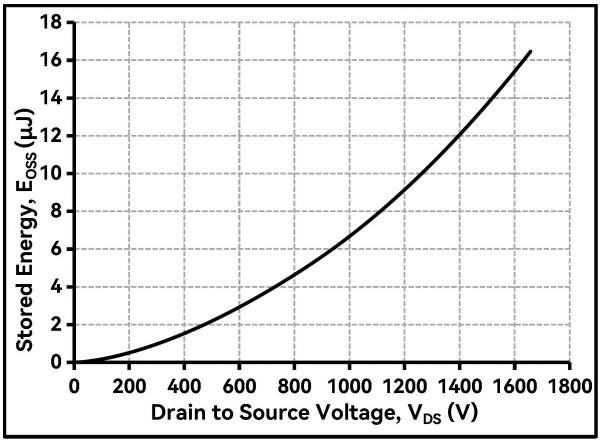


Figure 17: Capacitance vs Drain-Source Voltage (0-200 V)

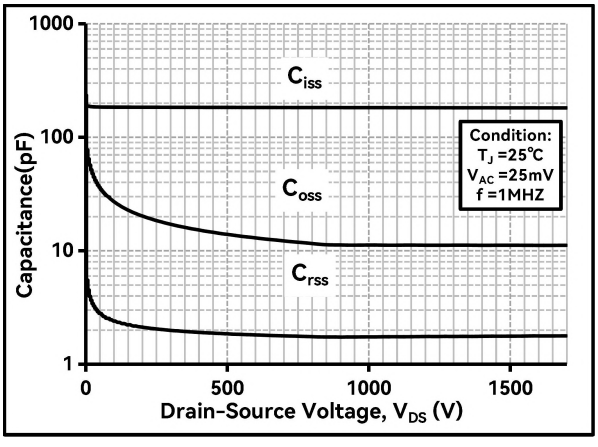
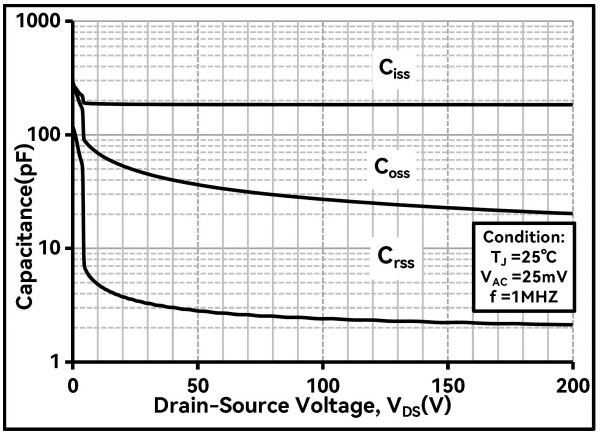


Figure 18: Capacitance vs Drain-Source Voltage (0-1700 V)



Typical Performance Characteristics

Figure 19: Continuous Drain Current Derating vs Case Temperature

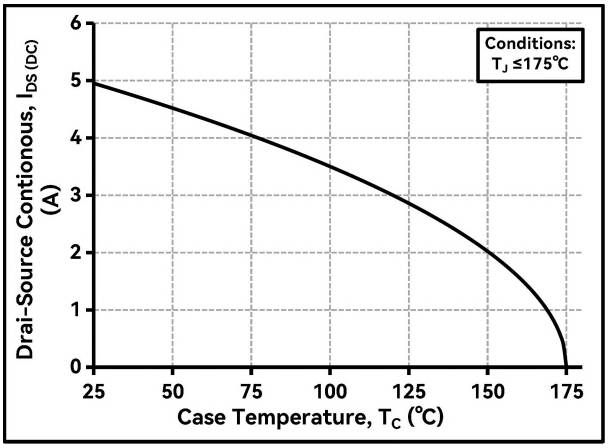


Figure 20: Maximum Power Dissipation Derating vs Case Temperature

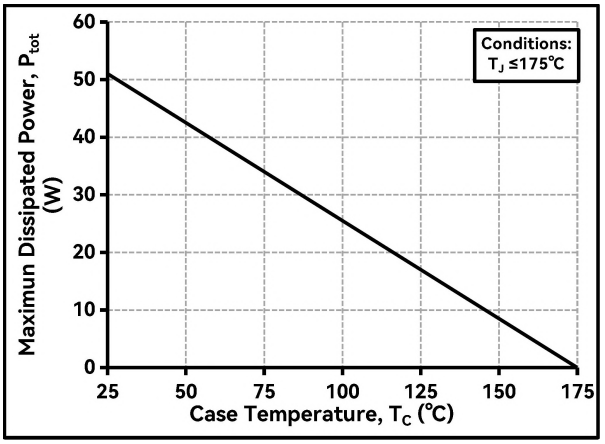


Figure 21: Transient Thermal Impedance (Junction - Case)

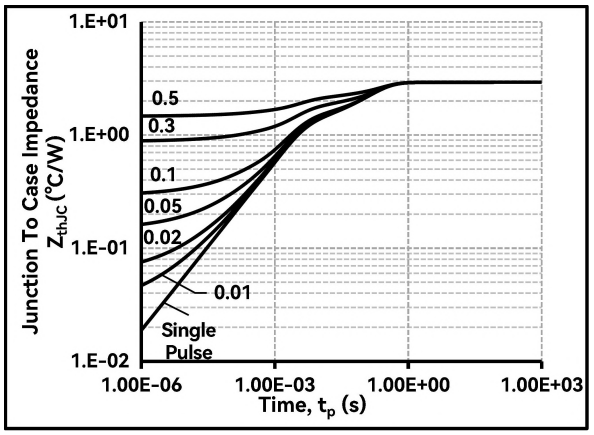


Figure 22: Safe Operating Area

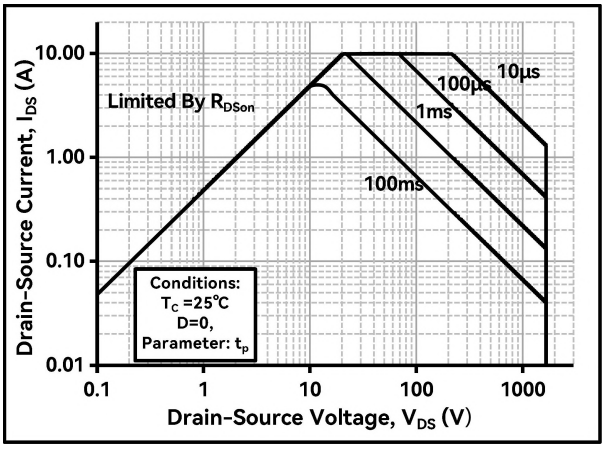


Figure 23: Clamped Inductive Switching Energy vs Drain Current

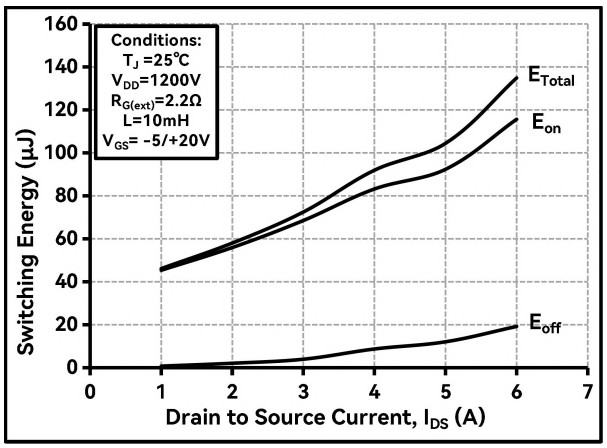
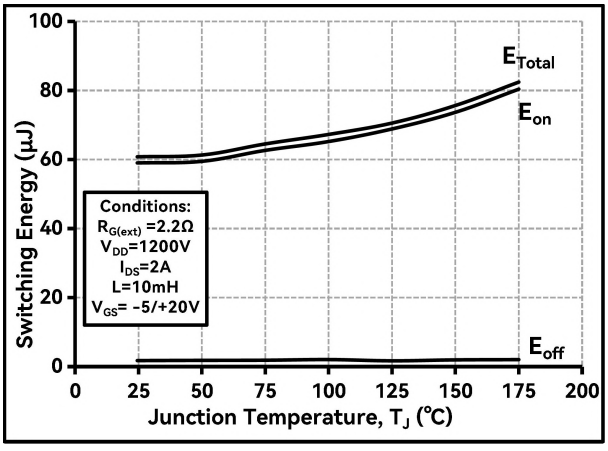


Figure 24: Clamped Inductive Switching Energy vs Temperature



Typical Performance Characteristics

Figure 25: Clamped Inductive Switching Energy vs RG(ext)

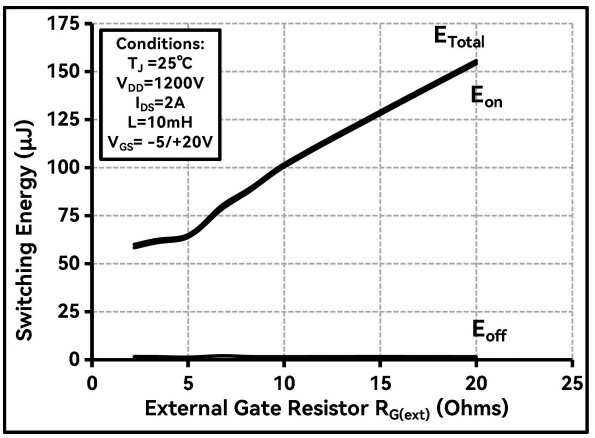
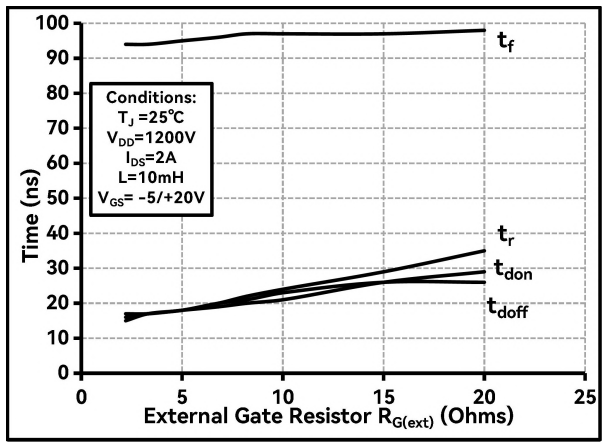
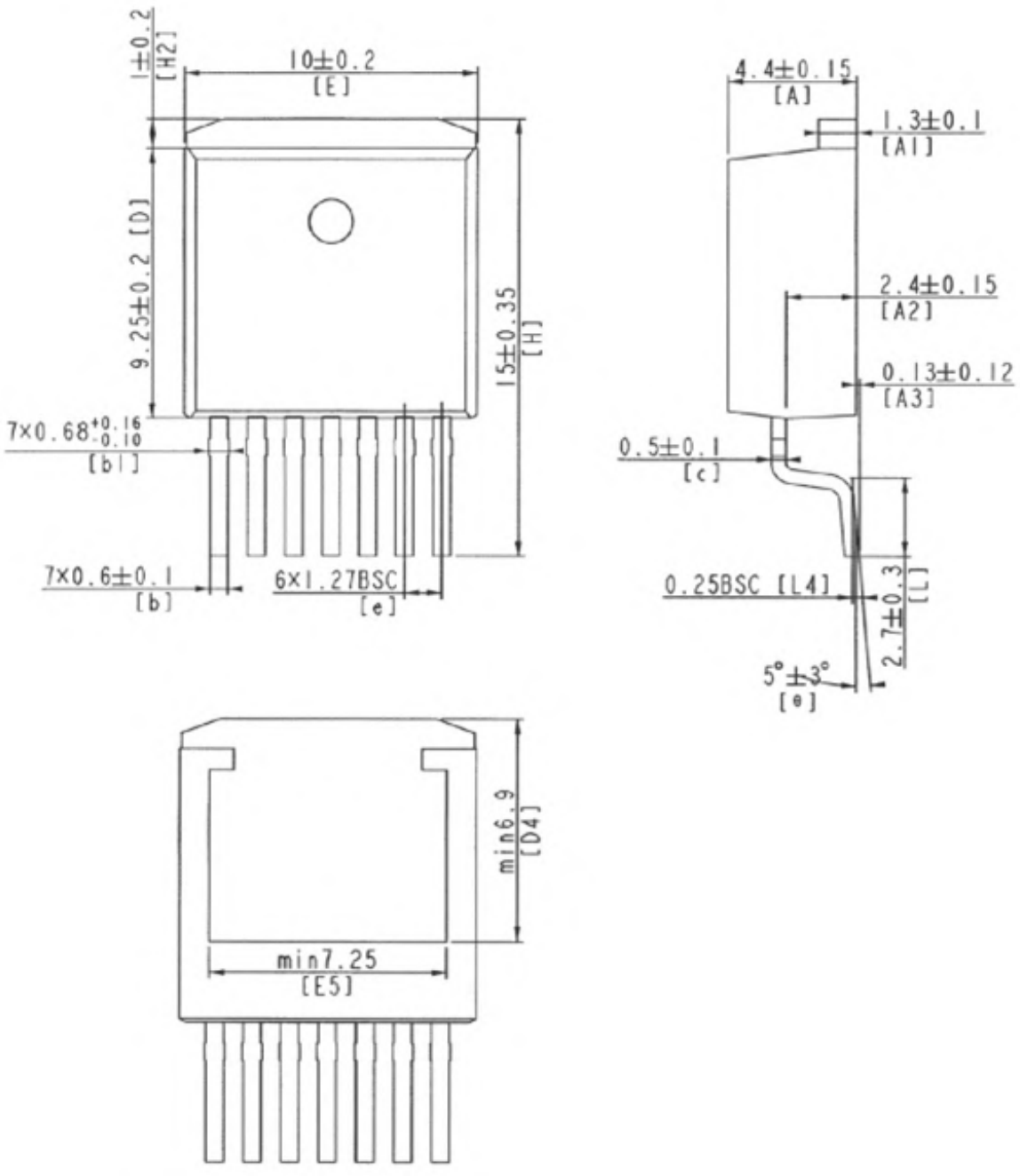


Figure 26: Switching Times vs RG(ext)



Package Outlines

TO263-7



* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BCBF170N1000P1	BCBF170N1000P1	TO263-7	Tape & Reel	800 units

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