BCF95N380M2

N-Channel Silicon Carbide Power MOSFET

950 V, 10A, 320 mΩ

bestirpower

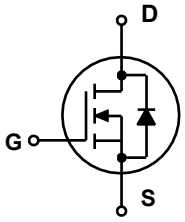
Features

- Revolutionary semiconductor material Silicon Carbide
- High blocking voltage with low on-resistance
- High-speed switching with very low switching losses
- High-speed and high robust intrinsic body diode

$BV_{DSS, Tc=25℃}$	$I_{D, Tc=25℃}$	$R_{DS(on),typ}$	$Q_{g,typ}$
950 V	10A	320 mΩ	9.0nC

Applications

- LED driver
- PD charger
- PC adapter
- Air-conditioning
- E-bike charger



RoHS compliant

HF

Absolute Maximum Ratings (T_J = 25℃ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage		950	V
V_{GS}	Gate to Source Voltage (DC)		-10 / +22	V
V_{GSop}	Recommended Operation Value		0/15	V
I_D	Drain Current	V_{GS} = 15 V, (T_C = 25℃)	10	A
		V_{GS} = 15 V,(T_C = 100℃)	7.5	
I_{DM}	Drain Current	Pulsed	18	A
P_D	Power Dissipation	(T_C = 25℃)	24	W
		Derate Above 25℃	0.16	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.	6.25	℃/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		950	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 950 V, V_{GS} = 0 V	-	0.1	20	μA
I_{GSS}	Gate-Source Leakage Current	V_{DS} = 0 V, V_{GS} = + 22 V	-	-	+250	nA
I_{SGS}	Source-Gate Leakage Current	V_{DS}= 0 V, V_{GS}= - 10 V	-	-	+250	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 10 mA, T_J = 25℃		3.7		V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 18 V, I_D = 4 A, T_J = 25℃		320	380	mΩ
		VGS = 18 V, I_D = 4 A, T_J = 175℃		336		mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 950 V, f = 1MHz	-	223	-	pF
C_{oss}	Output Capacitance		-	21	-	
C_{rss}	Reverse Capacitance		-	3.6	-	
$Q_{g(tot)}$	Total Gate Charge	V_{DS} = 400 V, I_D = 4 A, V_{GS} = 0V / 15 V	-	9	-	nC
Q_{gs}	Gate to Source Charge		-	3.6	-	
Q_{gd}	Gate to Drain “Miller” Charge		-	1.2	-	
R_G	Internal Gate Resistance	f = 1MHz,V_{AC} = 25 mV	-	26	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{GS} = 0/15 V, L=600 μH V_{DS} = 400 V, I_D = 4 A, $R_{G(on)}$ = 4.3Ω, $R_{G(off)}$ = 4.3Ω	-	6.3	-	ns
t_r	Turn-On Rise Time		-	17.4	-	
$t_{d(off)}$	Turn-Off Delay Time		-	14.3	-	
t_f	Turn-Off Fall Time		-	14.8	-	
E_{on}	Turn-On Switching Energy		-	35.1	-	μJ
E_{off}	Turn-Off Switching Energy		-	3.02	-	
Source-Drain Diode Characteristics						
V_{SD}	Body Diode Forward Voltage	V_{GS} = 0 V, I_{SD} =2A,T_C = 25℃	-	3.5	-	V
		V_{GS} = 0 V, I_{SD} =2A,T_C = 175℃	-	2.9	-	V
t_{rr}	Reverse Recovery Time	V_{DS} = 400 V, V_{GS} = 0 V, I_{SD} =4A, di/dt = 1.2 kA/μs	-	9.2	-	ns
Q_{rr}	Reverse Recovery Charge		-	25	-	nC
I_{rrm}	Peak Reverse Recovery Current		-	4.5	-	A

Typical Performance Characteristics

Figure 1. Typical output characteristic, VGS as parameter

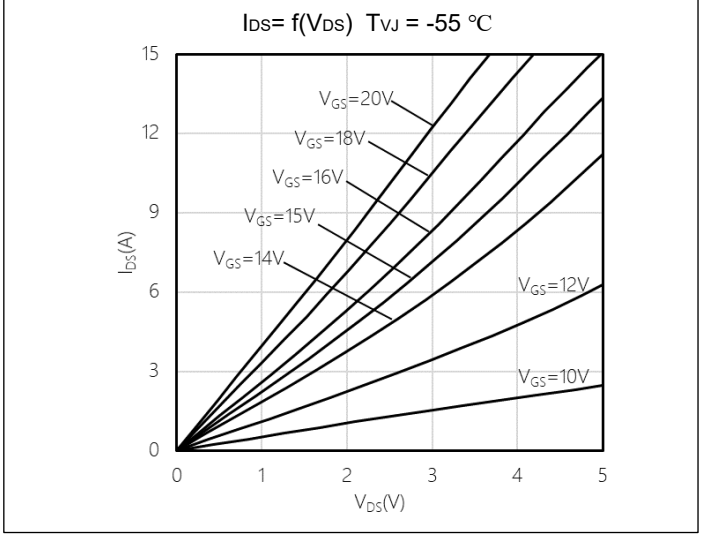


Figure 2. Typical output characteristic, VGS as parameter

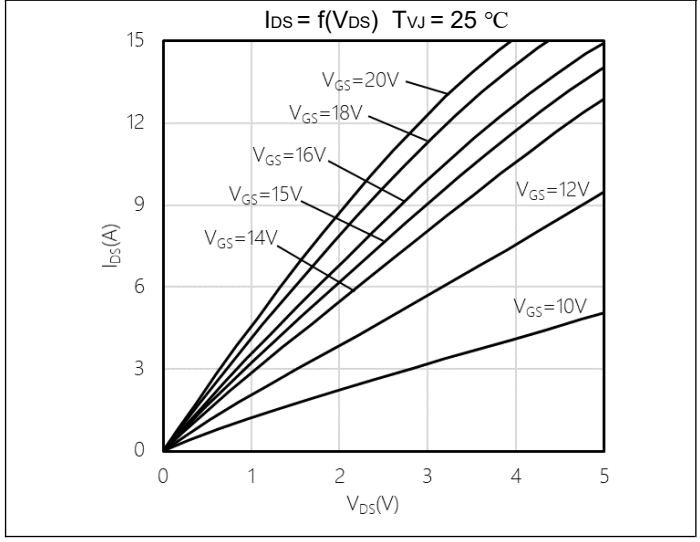


Figure 3. Typical output characteristic, VGS as parameter

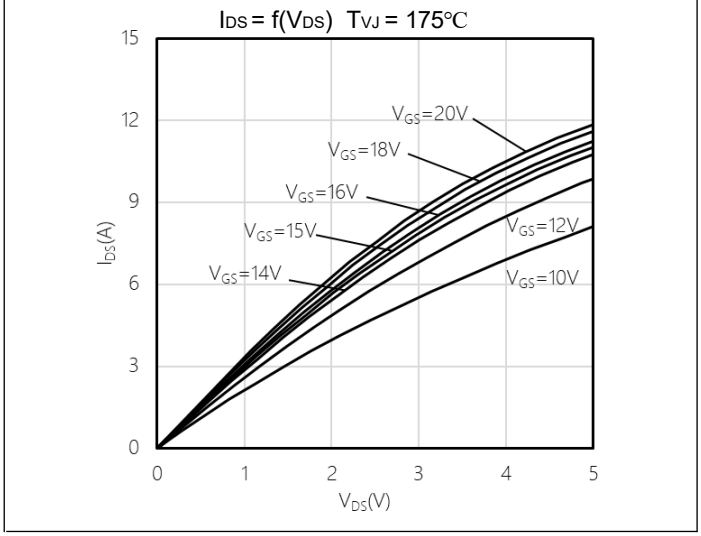


Figure 4. Typical capacitance as a function of drain-source voltage

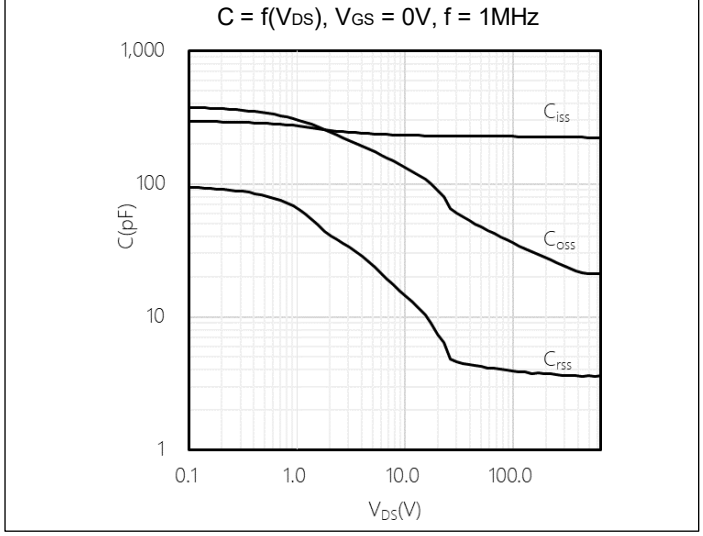


Figure 5. Typical switching energy losses as a function of V_{DS}

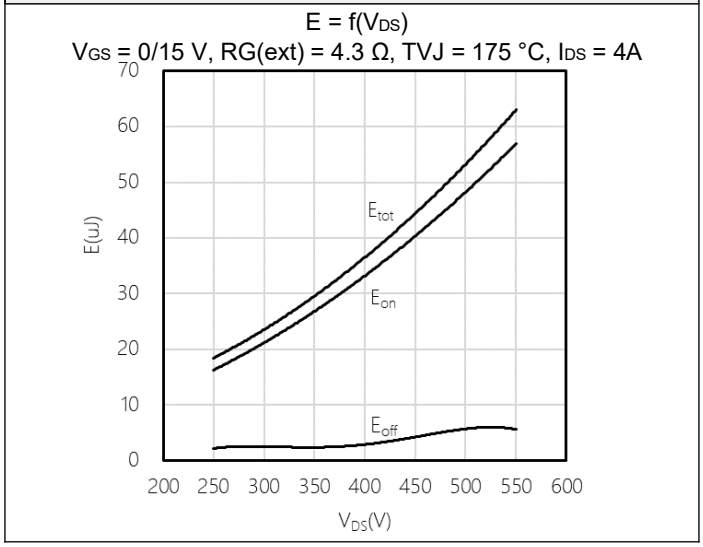
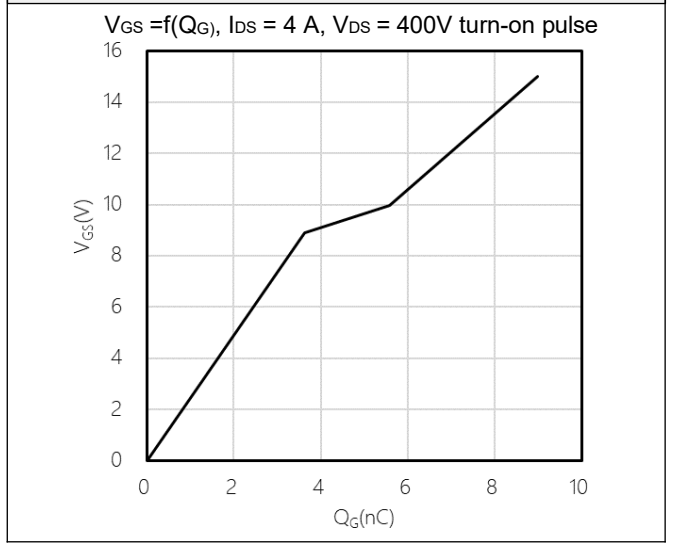


Figure 6. Typical gate charge



Typical Performance Characteristics

Figure 7. Typical transfer characteristic

$I_{DS} = f(V_{GS})$ V_{DS}= 20 V

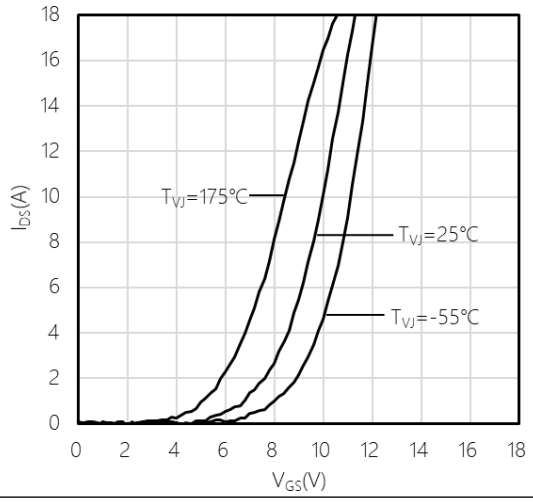


Figure 8. Typical gate-source threshold voltage as a function of junction temperature

$V_{GS(th)} = f(T_{VJ})$,I_{DS} = 10 mA

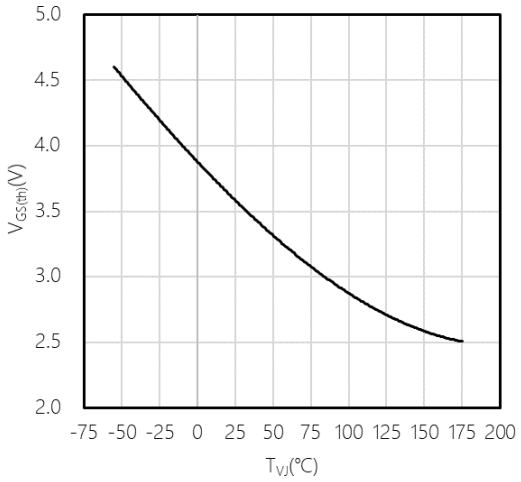


Figure 9. Typical reverse drain current as function of reverse drain voltage, VGS as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} =-55°C

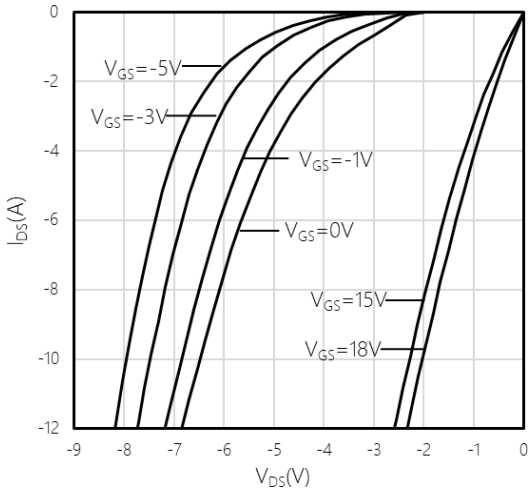


Figure 10. Typical reverse drain current as function of reverse drain voltage, VGS as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} = 25°C

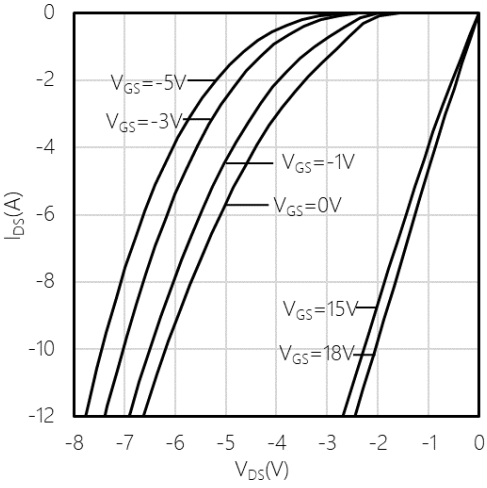


Figure 11.Typical reverse drain current as function of reverse drain voltage, VGS as parameter

$I_{DS} = f(V_{DS})$, T_{VJ} = 175°C

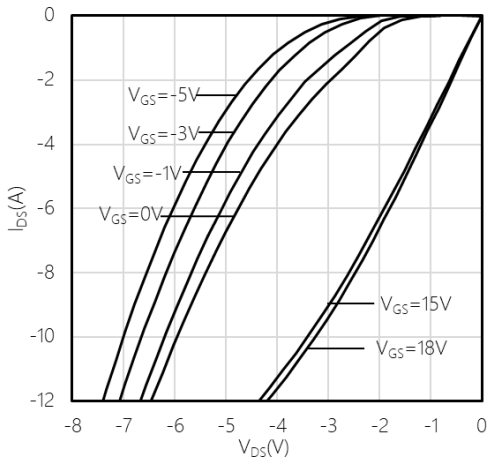
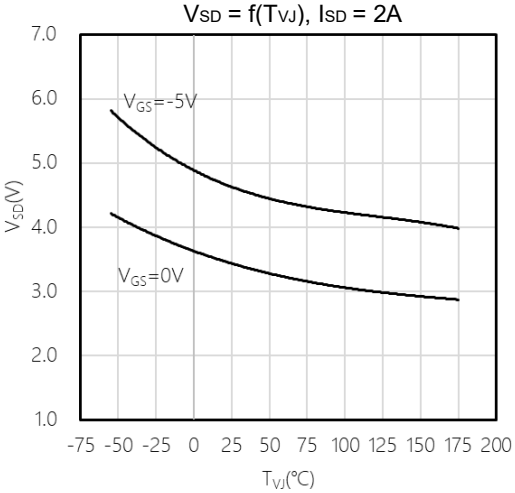


Figure 12. Typical reverse drain voltage as function of junction temperature

$V_{SD} = f(T_{VJ})$, I_{SD} = 2A



Typical Performance Characteristics

Figure 13. Typical switching energy as a function of junction temperature

E = f(T_{VJ})
V_{DS} = 400 V, $R_{G(ext)}$ = 4.3 Ω, V_{GS} = 0/15 V, I_{DS} = 4 A

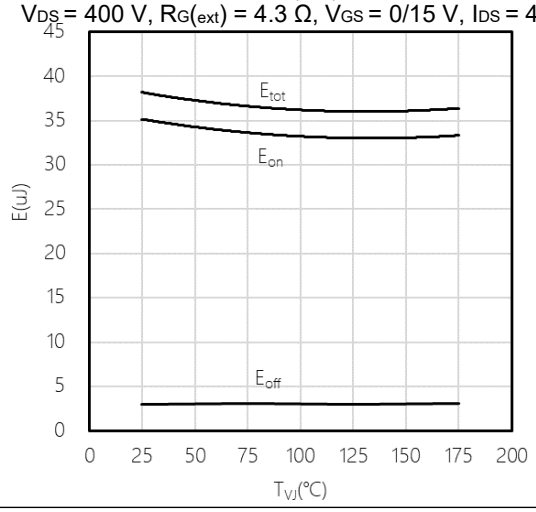


Figure 14. Typical switching energy losses as a function of gate resistance

E = f($R_{G(ext)}$)
V_{GS} = 0/15 V, I_{DS} = 4A, T_{VJ} = 25 °C, V_{DS} = 400 V

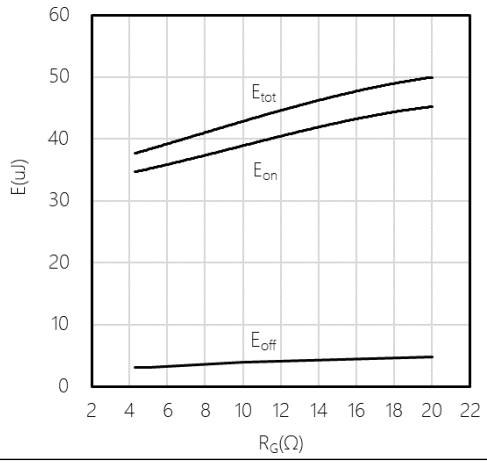


Figure 15. Typical switching energy losses as a function of gate resistance

E = f(RG(ext))
V_{GS} = 0/15 V, I_{DS} = 4 A, T_{VJ} = 175 °C, V_{DS} = 400 V

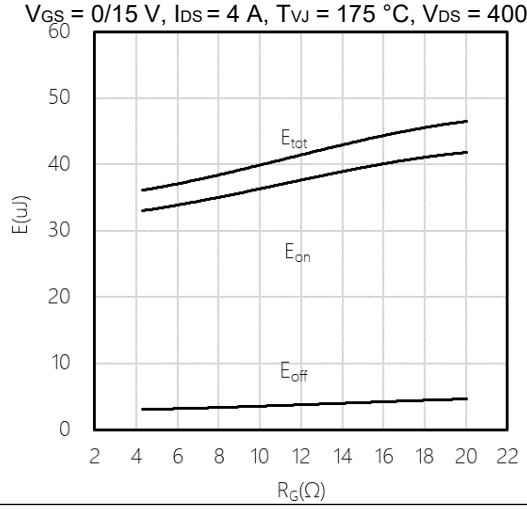


Figure 16. Typical switching energy losses as a function of I_{DS}

E = f(I_{DS})
V_{GS} = 0/15 V, R_G(ext) = 4.3 Ω, T_{VJ} = 25 °C, V_{DS} = 400 V

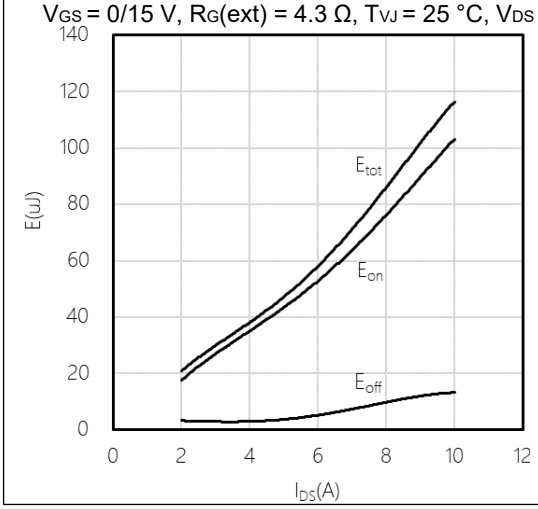


Figure 17.Typical switching energy losses as a function of I_{DS}

E = f(I_{DS})
V_{GS} = 0/15 V, R_G(ext) = 4.3 Ω, T_{VJ} = 175 °C, V_{DS} = 400 V

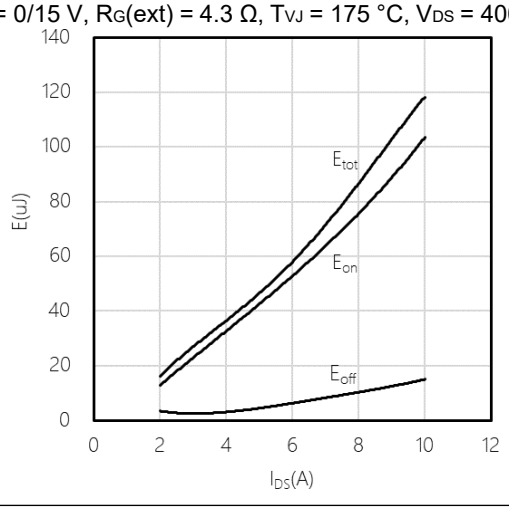
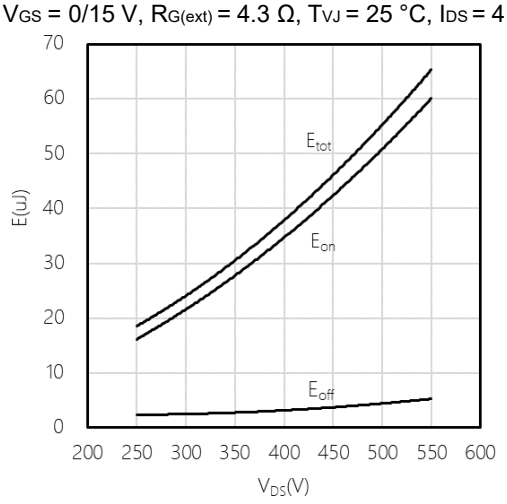


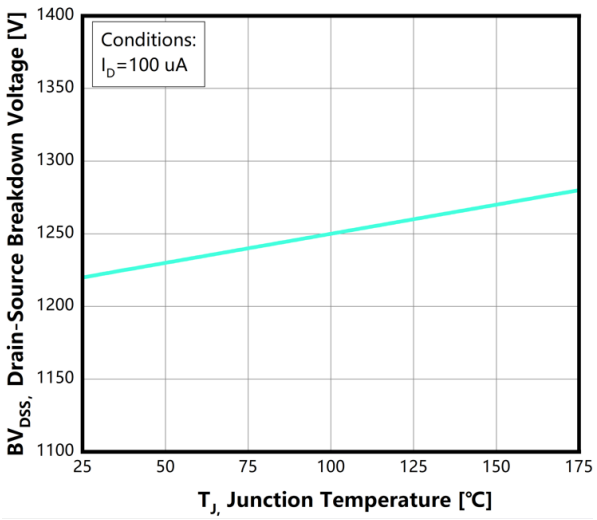
Figure 18. Typical switching energy losses as a function of V_{DS}

E = f(V_{DS})
V_{GS} = 0/15 V, $R_{G(ext)}$ = 4.3 Ω, T_{VJ} = 25 °C, I_{DS} = 4 A



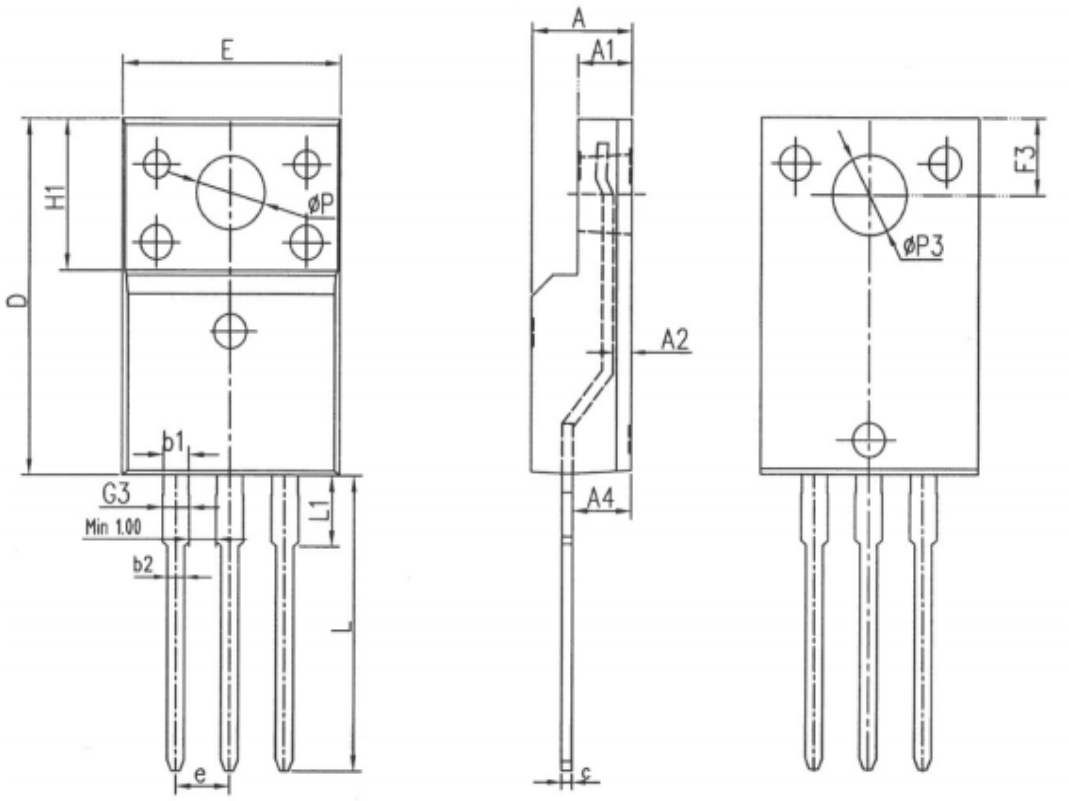
Typical Performance Characteristics

Figure 19. Drain-source breakdown voltage



Package Outlines

TO220F



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
E	10.00	10.20	10.40
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.65	0.85	1.30
A4	2.55	2.75	2.95
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
ΦP	3.183REF		
L	12.68	12.98	13.28
L1	3.25	3.45	3.65
ΦP3	3.45REF		
F3	3.10	3.30	3.50
G3	1.10	1.30	1.50
b1	1.05	1.20	1.35
b2	0.70	0.80	0.92

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BCF95N380M2	BCF95N380M2	TO220F-3	Tape & Reel	50 units

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