BCF65N260Y1

N-Channel Silicon Carbide Power MOSFET

650 V, 14.4 A, 260 mΩ

bestirpower

Features

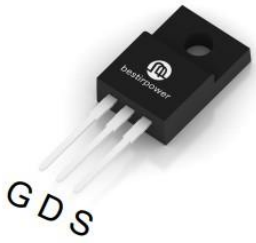
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Fast Intrinsic Diode With Low Reverse Recovery
- Low Switching Losses

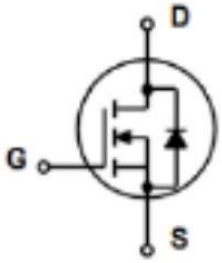
BV_{DSS}	$I_{D,\ Tc=25℃}$	$R_{DS(on),typ}$	$Q_{g,typ}$
650 V	14.4 A	260 mΩ	12.5 nC

Applications

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Uninterruptable Power Supplies
- EV Battery Chargers
- Solar/Wind Inverters

TO-220F





RoHS compliant

HF

Absolute Maximum Ratings (T_J = 25℃ 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		0/15	V
I_D	Drain Current	T_C = 25℃)	14.4	A
		T_C = 100℃	10.2	
I_{DM}	Drain Current	Pulsed	28.8	A
P_D	Power Dissipation	(T_C = 25℃)	46	W
E_{AS}	Single Pulse Avalanche Energy	V_{DD}=50V,V_{GS}=15V,L=0.5mH ,I_{AS}=10A	25	mJ
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.	3.26	℃/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 uA	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 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_{GSS}	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_{DS} = 10 mA, T_J = 25˚C	3.2	4.1	5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 12 V, I_D = 5 A	-	490	-	mΩ
		V_{GS} = 12 V, I_D = 5 A, T_J = 175℃	-	297	-	
		V_{GS} = 15 V, I_D = 5 A	-	260	300	
		V_{GS} = 15 V, I_D = 5 A, T_J = 175℃	-	222	-	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 650 V, f = 1MHz	-	294	-	pF
C_{oss}	Output Capacitance		-	25	-	
C_{rss}	Reverse Capacitance		-	4	-	
$Q_{g(tot)}$	Total Gate Charge	V_{DS} = 400 V, I_D = 5 A, V_{GS} = 0V / 15 V	-	12.5	-	nC
Q_{gs}	Gate to Source Charge		-	4.3	-	
Q_{gd}	Gate to Drain “Miller” Charge		-	1.6	-	
R_G	Internal Gate Resistance	f = 1MHz,V_{AC} = 25 mV	-	25.5	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{GS} = 0/15 V, L=600 μH V_{DS} = 400 V, I_D = 5 A, $R_{G(on)}$ = 2.2 Ω, $R_{G(off)}$ = 2.2 Ω	-	6.6	-	ns
t_r	Turn-On Rise Time		-	18.3	-	
$t_{d(off)}$	Turn-Off Delay Time		-	17.7	-	
t_f	Turn-Off Fall Time		-	32.1	-	
E_{on}	Turn-On Switching Energy		-	43.2	-	μJ
E_{off}	Turn-Off Switching Energy		-	5.5	-	
Source-Drain Diode Characteristics						
I_S	Continuous Diode Forward Current	T_C = 25˚C	-	12	-	A
		T_C = 100˚C	-	7	-	
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 2.5 A	-	3.3	-	V
t_{rr}	Reverse Recovery Time	V_{DS} = 400 V, V_{GS} = 0 V, I_{SD} =5 A, di/dt = 1600A/μs	-	9.9	-	ns
Q_{rr}	Reverse Recovery Charge		-	32.6	-	nC
I_{rrm}	Peak Reverse Recovery Current		-	5.8	-	A

Typical Performance Characteristics

Figure 1: Output Characteristics (T_J = -55℃)

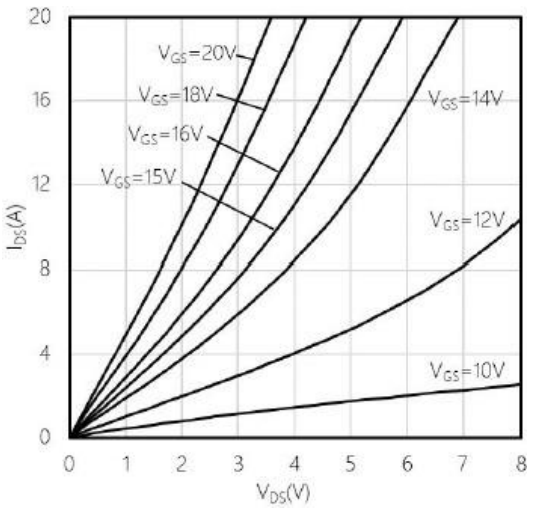


Figure 2: Output Cha racteristics (T_J = 25℃)

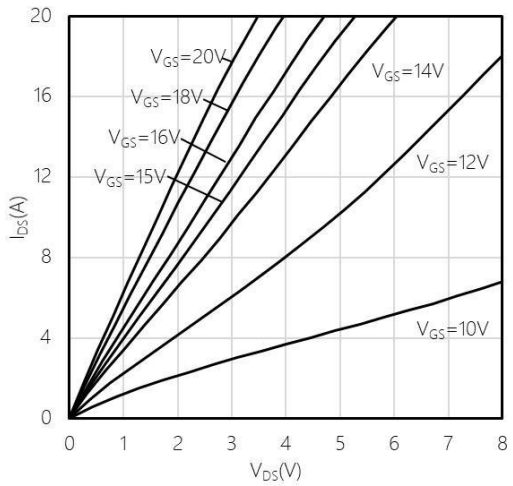


Figure 3: Output Characteristics (T_J = 175 ℃)

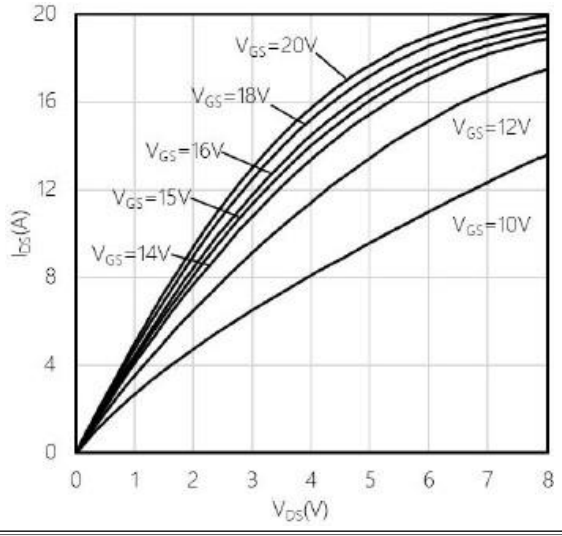


Figure 4:Typical on-state Resistance as a Function of Drain Current(V_{GS}= 15V)

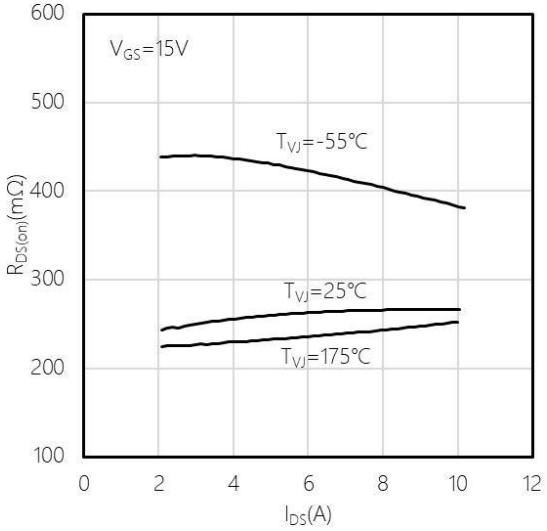


Figure 5 :Typical on-state Resistance as a Function of Temperature(I_{DS}=5A)

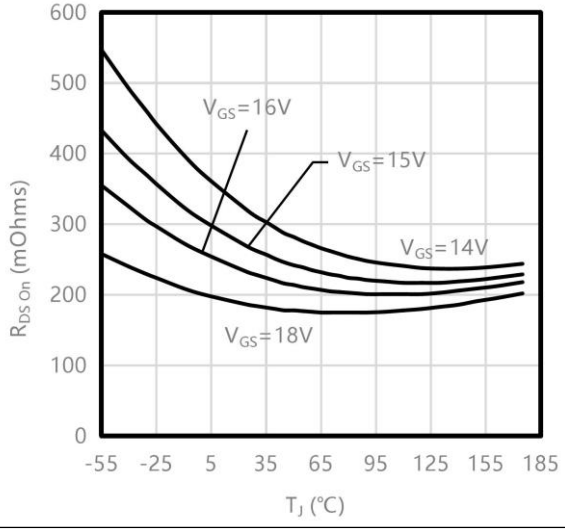
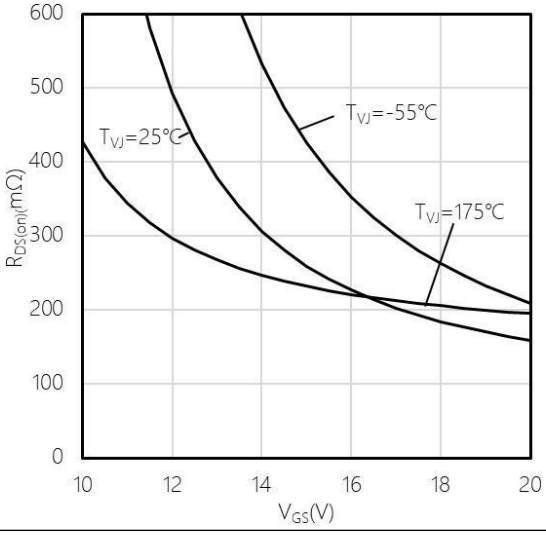


Figure 6: Typical on-state Resistance as a Function of VGS (I_{DS}=5A)



Typical Performance Characteristics

Figure 7: Typical transfer characteristic(V_{DS}= 20 V)

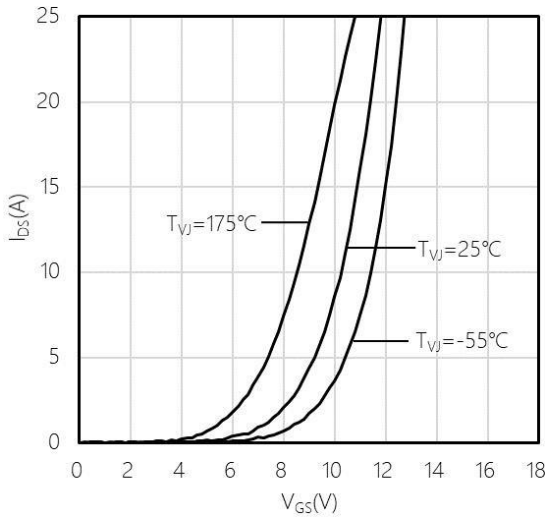


Figure 8: Typical Gate-Source Threshold Voltage as a Function of T_J (I_{DS}= 10mA)

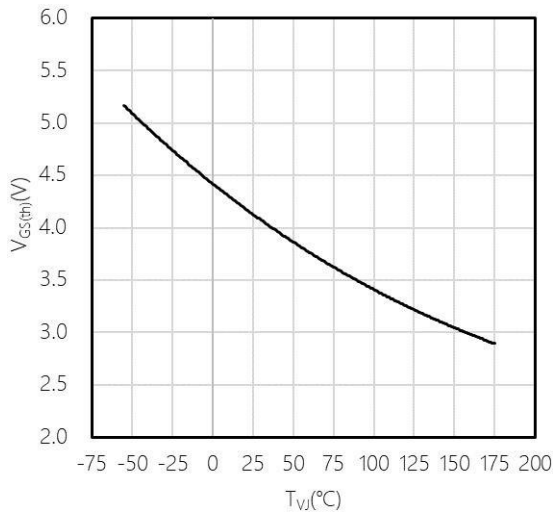


Figure 9:Typical Reverse Drain Current as Function of V_{DS}, V_{GS} as Parameter(T_J = -55℃)

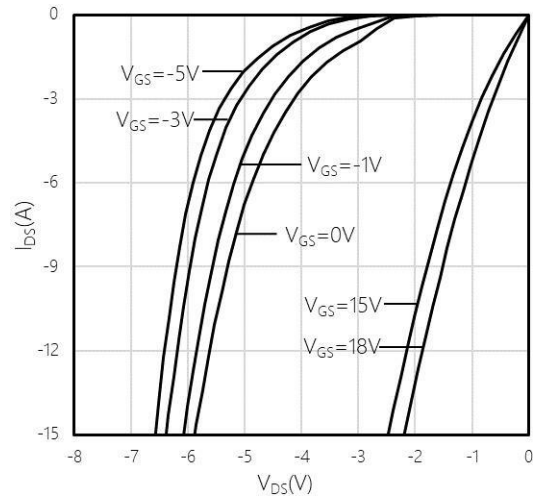


Figure 10: Typical Reverse Drain Current as Function of V_{DS}, V_{GS} as Parameter(T_J = 25℃)

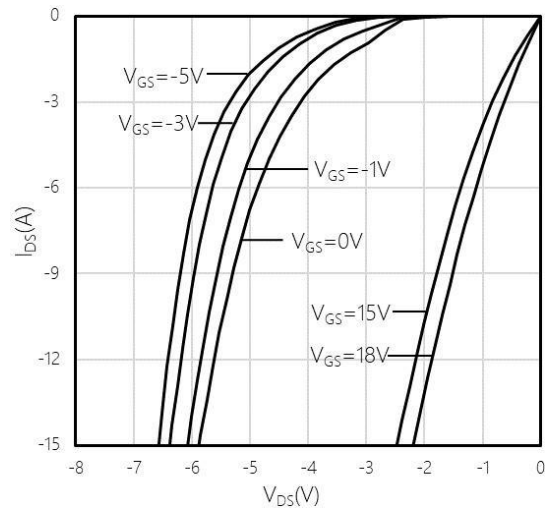


Figure 11::Typical Reverse Drain Current as Functionof V_{DS}, V_{GS} as Parameter(T_J = 175℃))

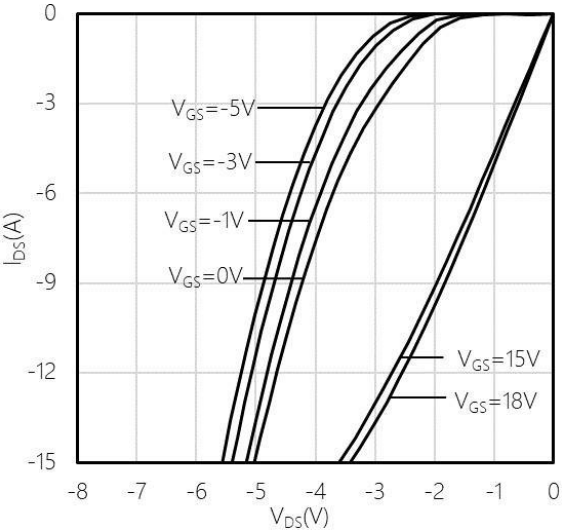
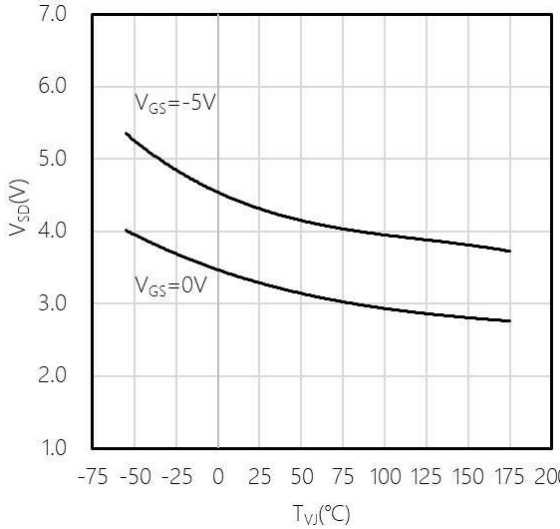


Figure 12 :Typical Reverse Drain Voltage as Function of T_J (I_{SD}= 2.5A)



Typical Performance Characteristics

Figure 13: Power Dissipation as a Function of Case Temperature Limited by Bond Wire

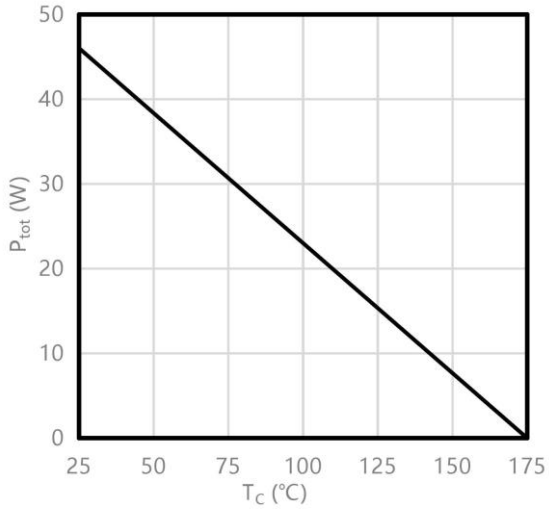


Figure 14: Typical gate charge (I_{DS}= 5A,V_{DS}= 400V)

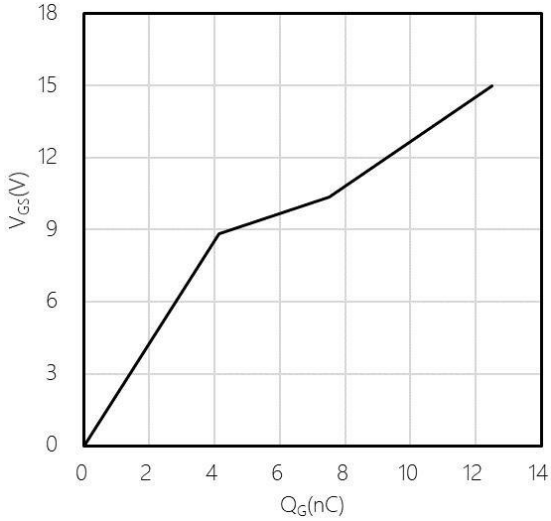


Figure 15: Switching Energy as a Function of T_J (V_{DS}=400V,$R_{G(ext)}$=2.2Ω,V_{GS}=0/15V,I_{DS}=5A)

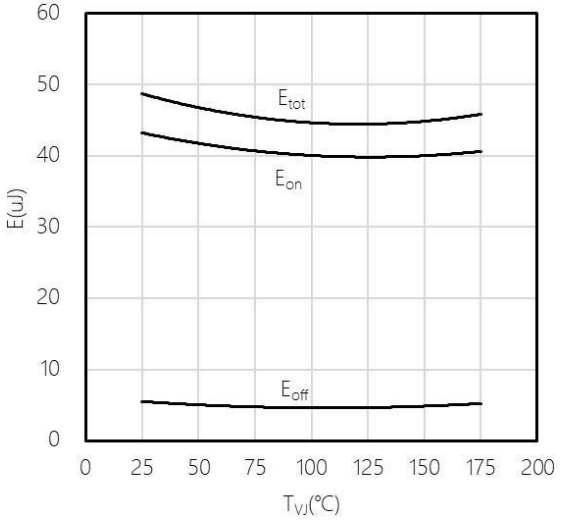


Figure 16: Switching Energy as a Function of R_G (V_{DS}=400V,T_J=25℃,V_{GS}=0/15V,I_{DS}=5A)

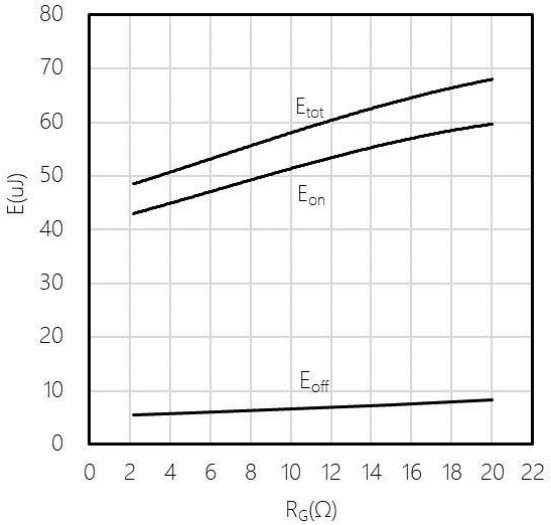


Figure 17: Switching Energy as a Function of R_G (V_{DS}=400V,T_J=175℃,V_{GS}=0/15V,I_{DS}=5A)

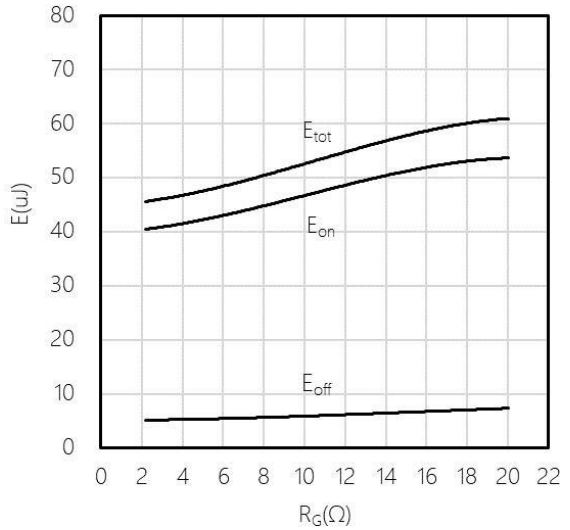
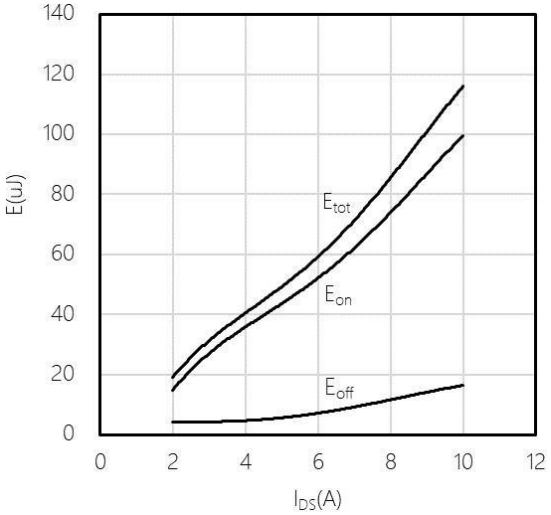


Figure 18: Switching Energy as a Function of I_{DS} (V_{DS}=400V,$R_{G(ext)}$=2.2Ω,V_{GS}=0/15V,T_J=25℃)



Typical Performance Characteristics

Figure19: Switching Energy as a Function of I_{DS} (V_{DS}=400V,$R_{G(ext)}$=2.2Ω,V_{GS}=0/15V,T_J=175℃)

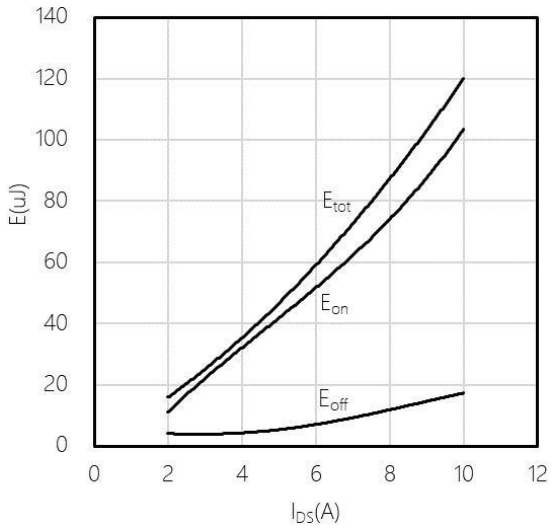


Figure 20: Switching Energy as a Function of V_{DS} (I_{DS}=5A,$R_{G(ext)}$=2.2Ω,V_{GS}=0/15V,T_J=25℃)

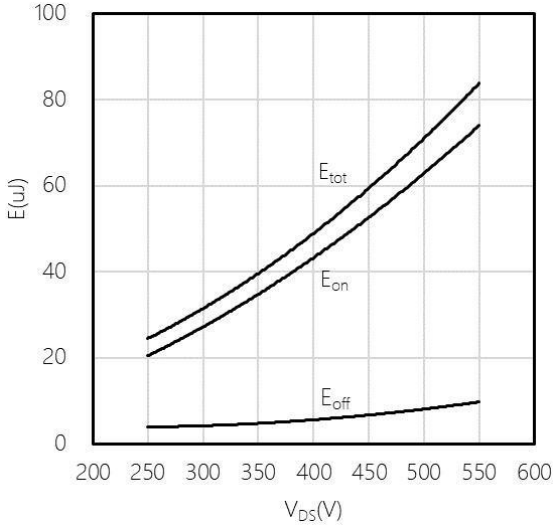


Figure 21: Switching Energy as a Function of V_{DS}(I_{DS}=5A,$R_{G(ext)}$=2.2Ω,V_{GS}=0/15V,T_J=175℃)

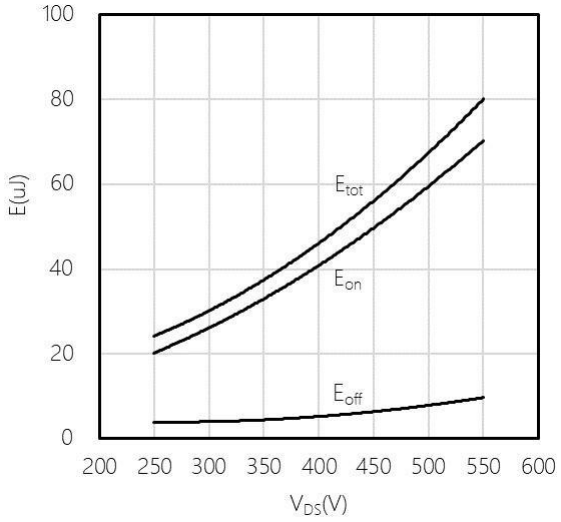


Figure 22: Typical Capacitance as a Function of V_{DS} （V_{GS}= 0V, f = 1MHz）

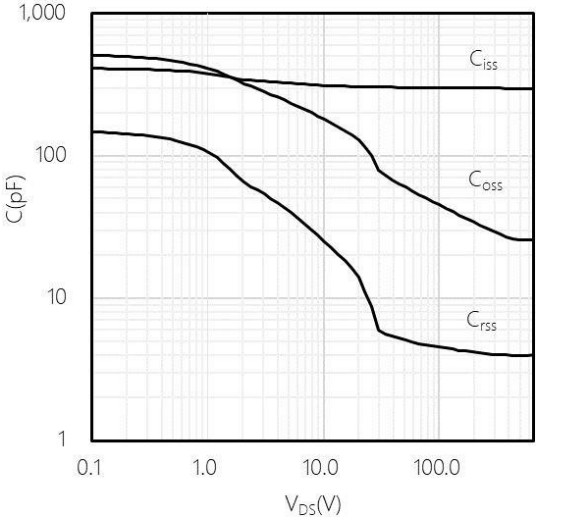


Figure 23: Safe Operating Area

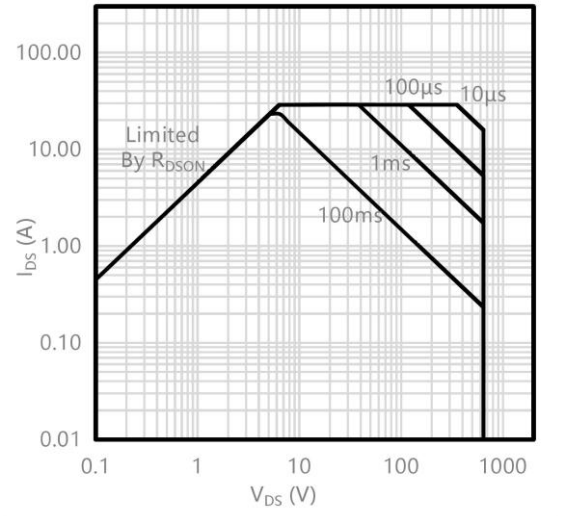
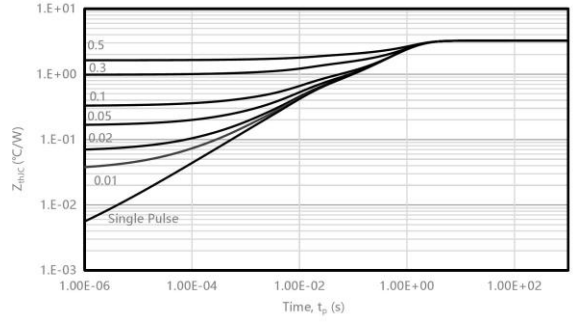
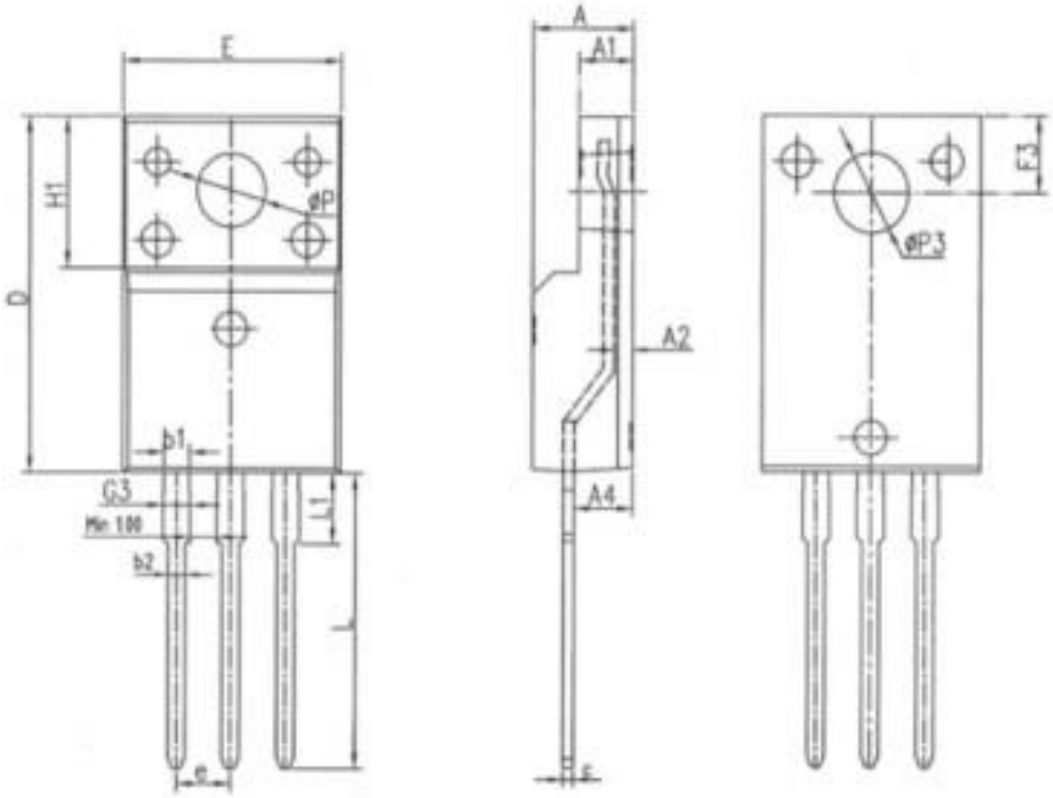


Figure 24：Transient Thermal Resistance (Parameter D = t_p/T)



Package Outlines

TO-220F



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
BCF65N260Y1	BCF65N260Y1	TO220F	Tube	50 units

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