

BCF65N190Y1

N-Channel Silicon Carbide Power MOSFET

650 V, 18 A, 190 mΩ



bestirpower

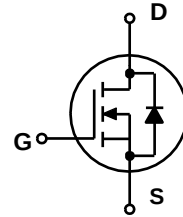
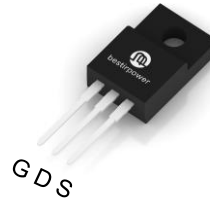
Features

- 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}	$I_D, T_C=25^{\circ}\text{C}$	$R_{DS(on),typ}$	$Q_{g,typ}$
650 V	18A	190 mΩ	15.3 nC

Applications

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



Absolute Maximum Ratings ($T_J = 25^{\circ}\text{C}$ 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		0/15	V
I_D	Drain Current	$V_{GS} = 15\text{ V}, (T_C = 25^{\circ}\text{C})$	18	A
		$V_{GS} = 15\text{ V}, (T_C = 100^{\circ}\text{C})$	12.8	
I_{DM}	Drain Current	Pulsed	36	A
P_D	Power Dissipation	$(T_C = 25^{\circ}\text{C})$	54	W
E_{AS}	Single Pulse Avalanche Energy	$V_{DD}=50\text{V}, V_{GS}=15\text{V}, L=0.5\text{mH}, I_{AS}=11.5\text{A}$	33.4	mJ
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 175	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.98	$^{\circ}\text{C/W}$
T_{sold}	Soldering temperature, wave soldering only allowed at leads	260	$^{\circ}\text{C}$

Electrical Characteristics (T_J = 25°C 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	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	-	3.9	-	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 12 V, I _D = 7 A	-	350	-	mΩ
		V _{GS} = 12 V, I _D = 7 A, T _J = 175°C	-	218	-	
		V _{GS} = 15 V, I _D = 7 A	-	190	215	
		V _{GS} = 15 V, I _D = 7 A, T _J = 175°C	-	163	-	

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 650 V, f = 1MHz	-	431	-	pF
C _{oss}	Output Capacitance		-	30	-	
C _{rss}	Reverse Capacitance		-	3	-	
Q _{g(tot)}	Total Gate Charge	V _{DS} = 400 V, I _D = 7 A, V _{GS} = 0V / 15 V	-	15.3	-	nC
Q _{gs}	Gate to Source Charge		-	5.5	-	
Q _{gd}	Gate to Drain "Miller" Charge		-	2.6	-	
R _G	Internal Gate Resistance	f = 1MHz, V _{AC} = 25 mV	-	36	-	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{GS} = 0/15 V, L=600 μH V _{DS} = 400 V, I _D = 7 A, R _{G(on)} = 2.2 Ω, R _{G(off)} = 2.2 Ω	-	29.2	-	ns
t _r	Turn-On Rise Time		-	11.7	-	
t _{d(off)}	Turn-Off Delay Time		-	46.1	-	
t _f	Turn-Off Fall Time		-	16.5	-	
E _{on}	Turn-On Switching Energy		-	67.8	-	μJ
E _{off}	Turn-Off Switching Energy		-	15	-	

Source-Drain Diode Characteristics

I _S	Continuous Diode Forward Current	T _C = 25°C	-	13.5	-	A
		T _C = 100°C	-	7.7	-	
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 3.5 A	-	3.3	-	V
t _{rr}	Reverse Recovery Time	V _{DS} = 400 V, V _{GS} = 0 V, I _{SD} = 7 A, di/dt = 2000A/μs	-	26	-	ns
Q _{rr}	Reverse Recovery Charge		-	68	-	nC
I _{rrm}	Peak Reverse Recovery Current		-	6.9	-	A

Typical Performance Characteristics

**Figure 1: Safe Operating Area
(Single Pulse, $T_{vj}=25^{\circ}\text{C}$)**

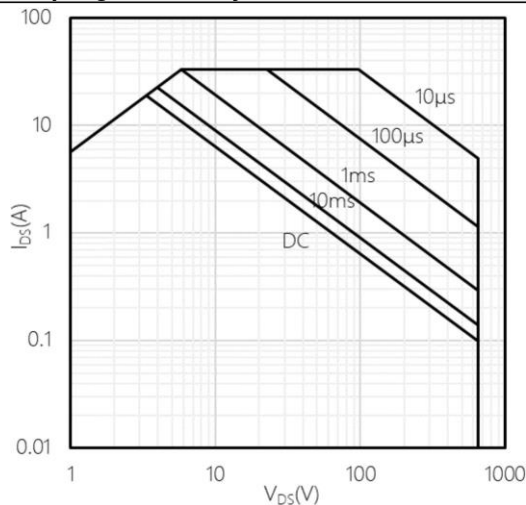


Figure 2: Power Dissipation as a Function of Case Temperature Limited by Bond Wire

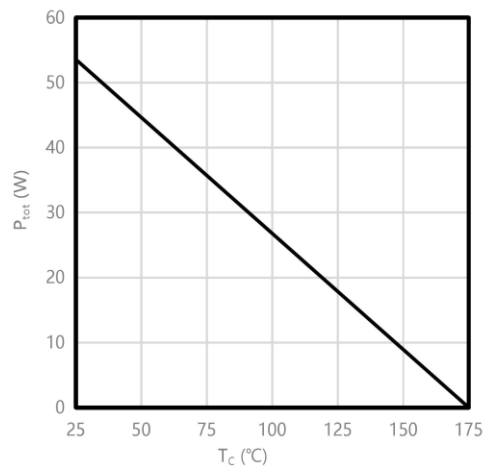


Figure 3 Typical Output Characteristic, V_{GS} as Parameter $T_v=-55^{\circ}\text{C}$

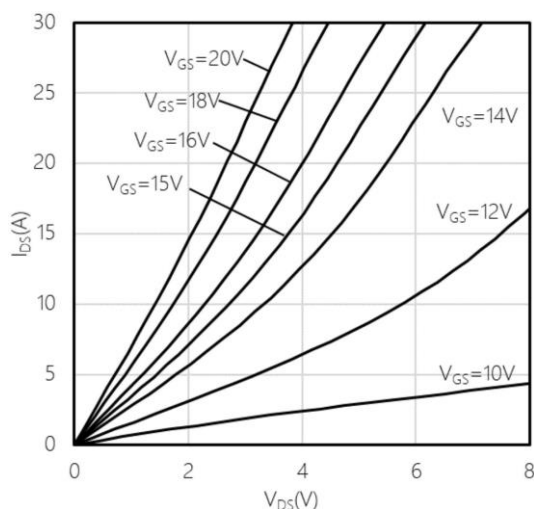


Figure 4 Typical Output Characteristic, V_{GS} as Parameter $T_v=25^{\circ}\text{C}$

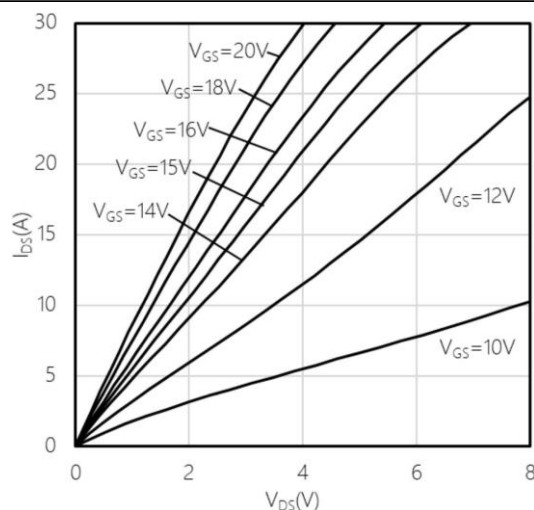


Figure 5 Typical Output Characteristic, V_{GS} as Parameter $T_v=175^{\circ}\text{C}$

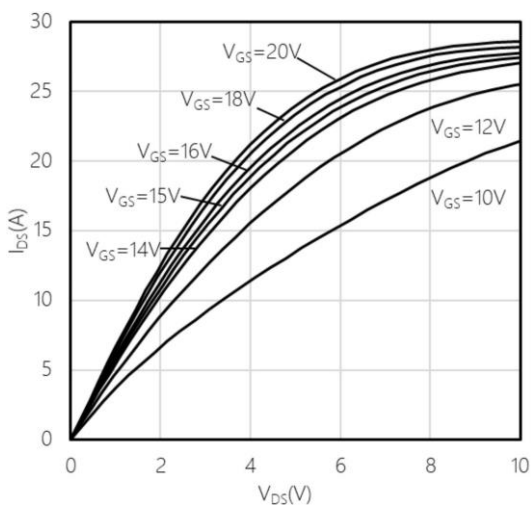
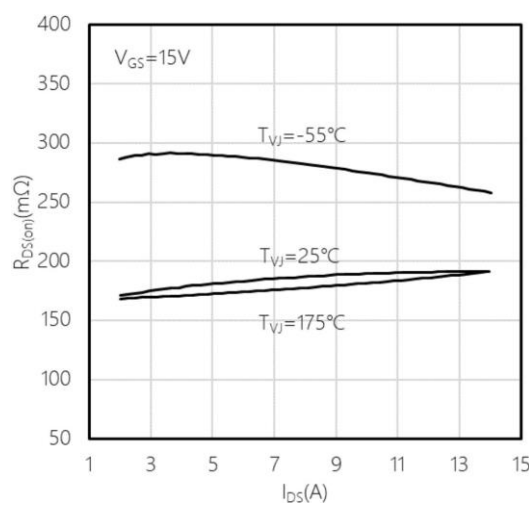


Figure 6: Typical on-state Resistance as a Function of Drain Current ($V_{GS}=15\text{V}$)



Typical Performance Characteristics

Figure 7: Typical on-state Resistance as a Function of Temperature ($I_{DS}=7A$)

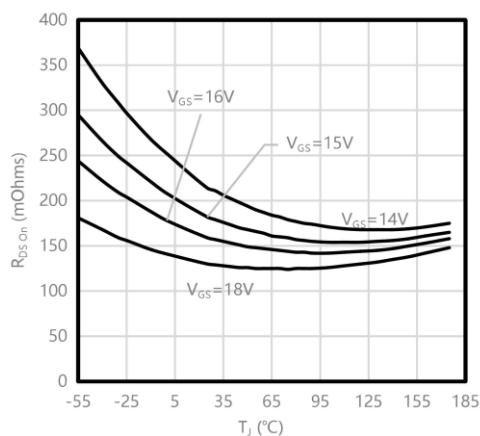


Figure 8: Typical on-state Resistance as a Function of V_{GS} ($I_{DS}=7A$)

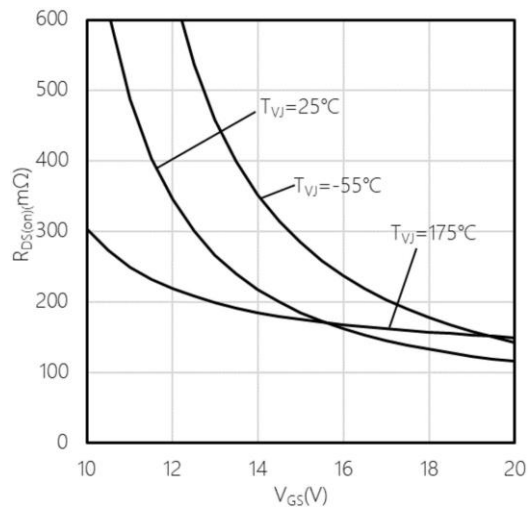


Figure 9: Typical Transfer Characteristic ($V_{DS}=20V$)

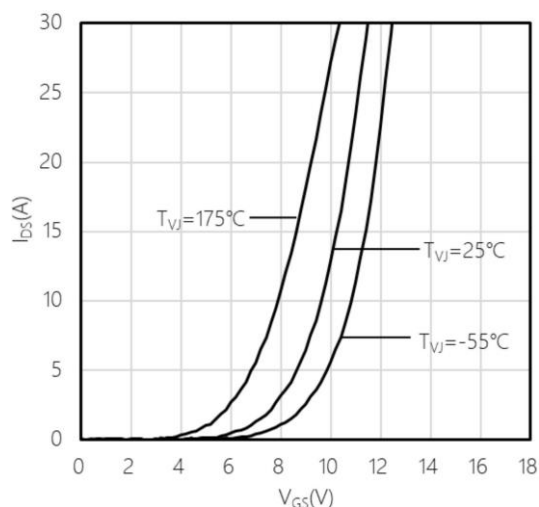


Figure 10: Threshold Voltage vs Temperature ($I_{DS}=10mA$)

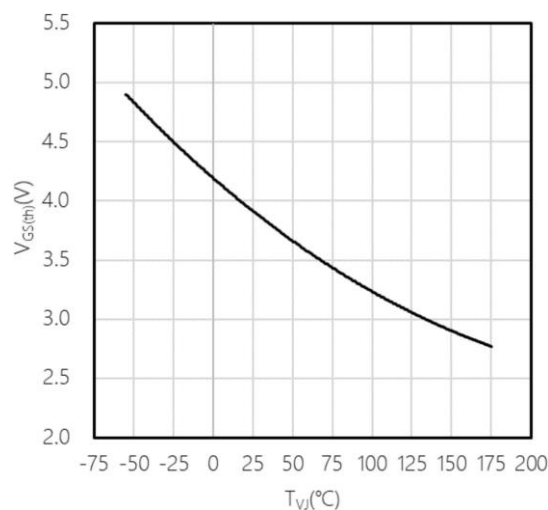


Figure 11 Typical Reverse Drain Current as Function of Reverse Drain Voltage, V_{GS} as Parameter $T_v=-55\text{ }^{\circ}\text{C}$

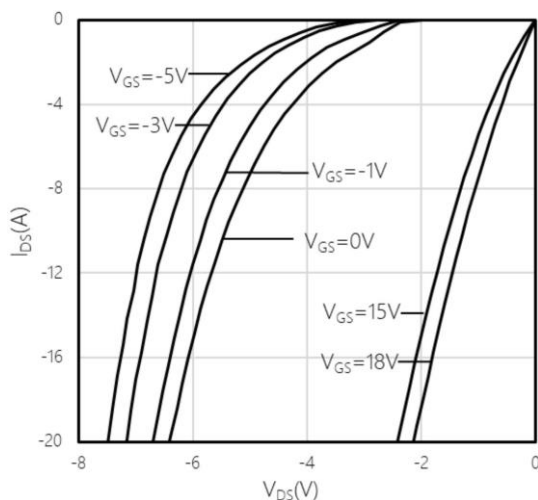
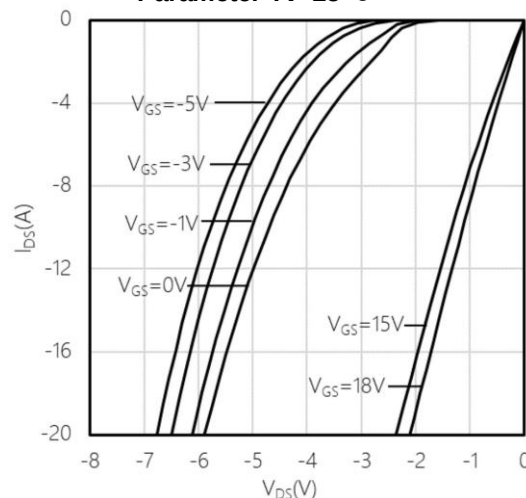


Figure 12 Typical Reverse Drain Current as Function of Reverse Drain Voltage, V_{GS} as Parameter $T_v=25\text{ }^{\circ}\text{C}$



Typical Performance Characteristics

Figure 13: Typical Reverse Drain Current as Function of Reverse Drain Voltage, VGS as Parameter

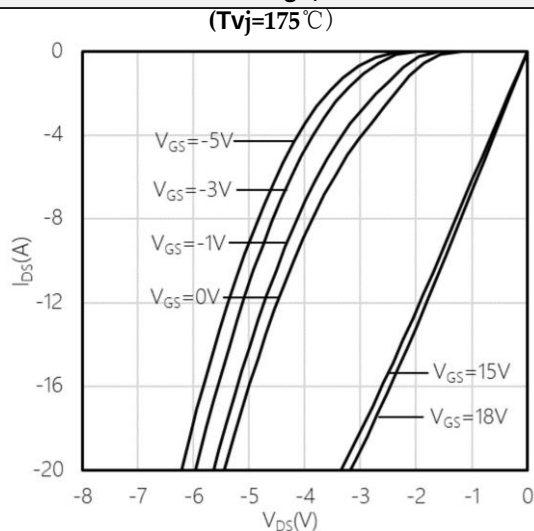


Figure 14: Typical Reverse Drain Voltage as Function of Junction Temperature

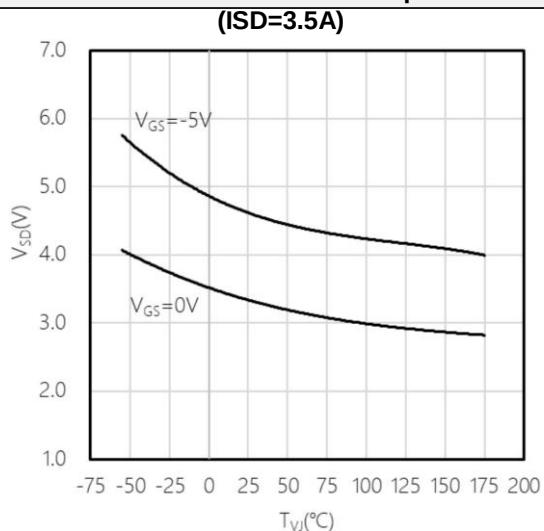


Figure 15: Typical Switching Energy as a Function of Junction Temperature

($V_{GS}=0/15\text{V}, V_{DS}=400\text{V}, R_{G(\text{ext})}=2.2\Omega, I_{DS}=7\text{A}$)

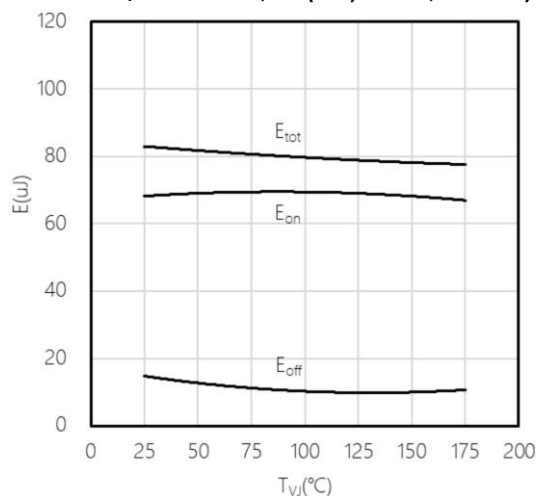


Figure 16: Typical Switching Energy as a Function of Junction Temperature

($V_{GS}=0/15\text{V}, V_{DS}=400\text{V}, T_{vj}=25^{\circ}\text{C}, I_{DS}=7\text{A}$)

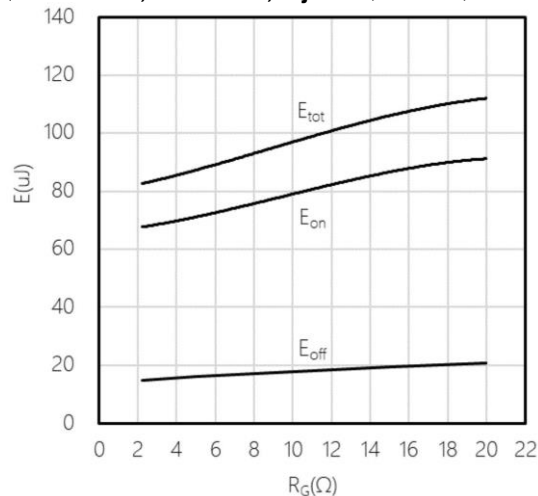


Figure 17: Typical Switching Energy Losses as a Function of Gate Resistance

($V_{GS}=0/15\text{V}, V_{DS}=400\text{V}, T_{vj}=175^{\circ}\text{C}, I_{DS}=7\text{A}$)

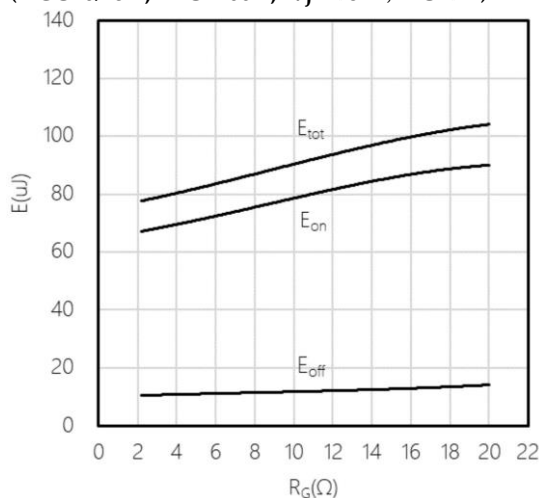
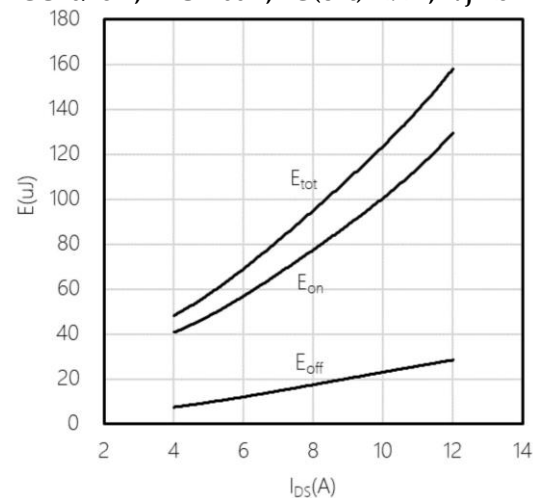


Figure 18: Typical Switching Energy Losses as a Function of IDS

($V_{GS}=0/15\text{V}, V_{DS}=400\text{V}, R_{G(\text{ext})}=2.2\Omega, T_{vj}=25^{\circ}\text{C}$)



Typical Performance Characteristics

Figure19: Typical Switching Energy Losses as a Function of I_{DS}

($V_{GS}=0/15V, V_{DS}=400V, T_{vj}=175^{\circ}C, R_G(\text{ext})=2.2\Omega$)

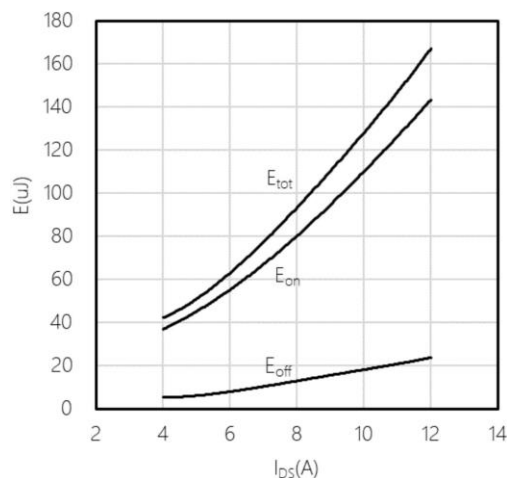


Figure 20: Typical switching energy losses as a function of V_{DS}

($V_{GS}=0/15V, T_{vj}=25^{\circ}C, R_G(\text{ext})=2.2\Omega, I_{DS}=7A$)

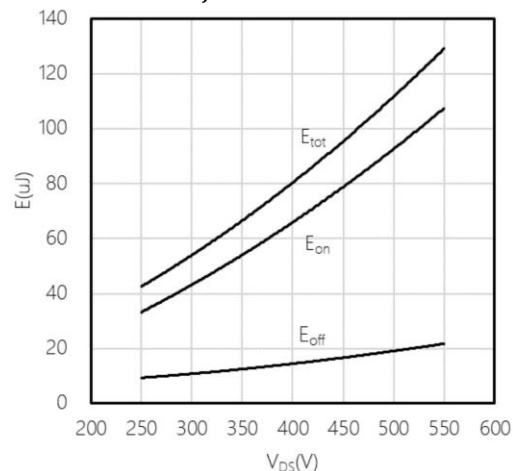


Figure 21: Typical Switching Energy Losses as a Function of V_{DS}

($V_{GS}=0/15V, T_{vj}=175^{\circ}C, R_G(\text{ext})=2.2\Omega, I_{DS}=7A$)

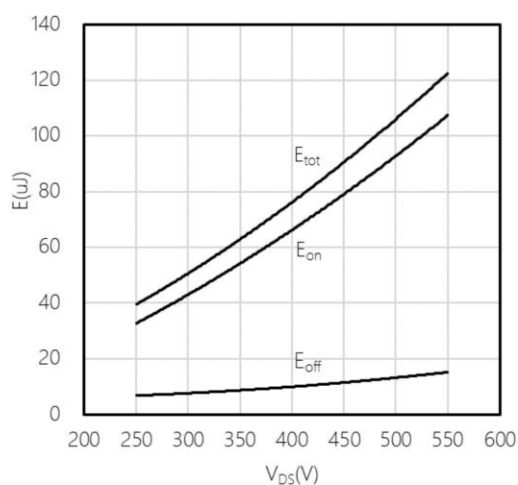


Figure 22: Typical Gate Charge ($V_{DS}=400V, I_{DS}=7A$)

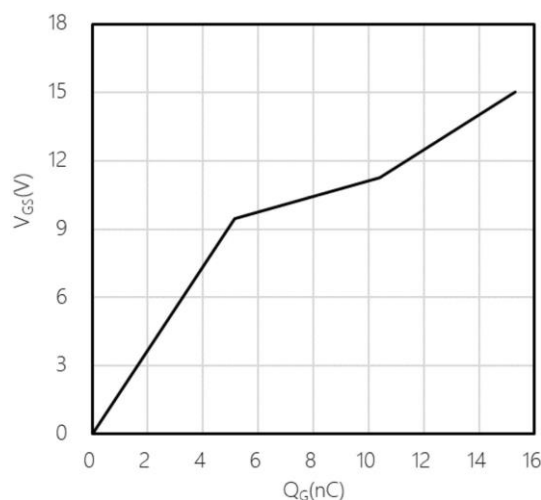
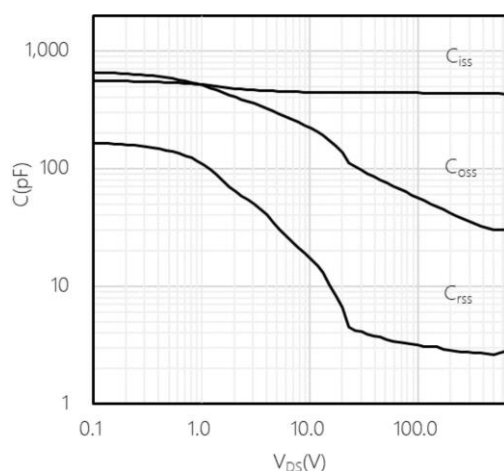


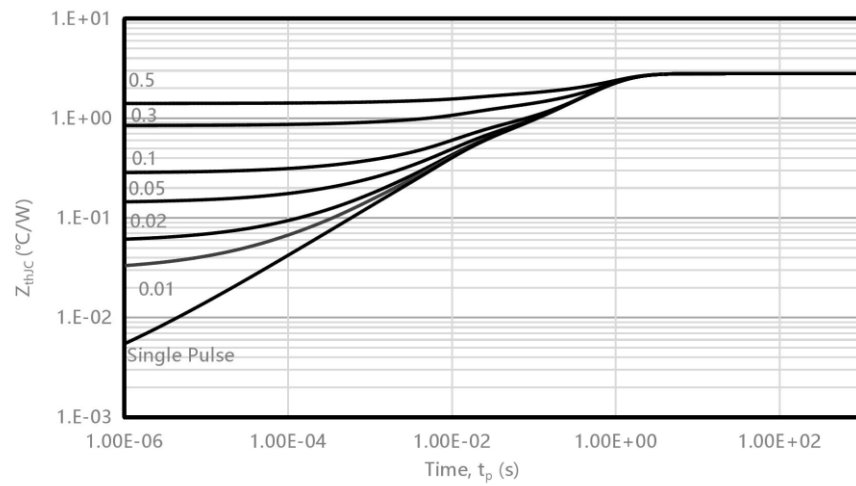
Figure 23: Typical Capacitance as a Function of Drain-Source Voltage

($V_{GS}=0V, f=1MHz$)



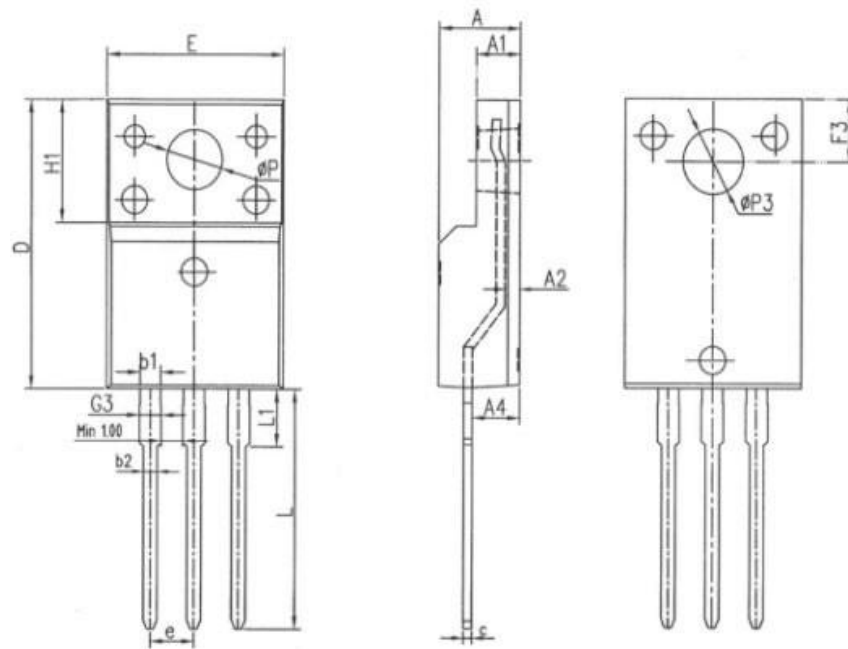
Typical Performance Characteristics

Figure 25: Transient thermal resistance (MOSFET)



Package Outlines

TO-220F



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
BCF65N190Y1	BCF65N190Y1	TO-220F	Tube	50 units

Disclaimer

Bestirpower reserve the right to make changes, corrections, enhancements, modifications, and improvements to Bestirpower products and/or to this document at any time without notice.

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. Bestirpower does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Products or technical information described in this document.

This document is the property of Bestirpower Co., LTD., and not allowed to copy or transformed to other format if not under the authority approval.

© 2026 Bestirpower – All rights reserved