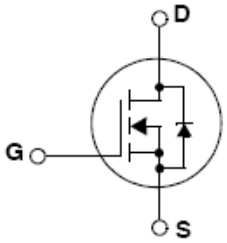
BYD Microelectronics Co., Ltd.

BF91404

40V N-Channel MOSFET

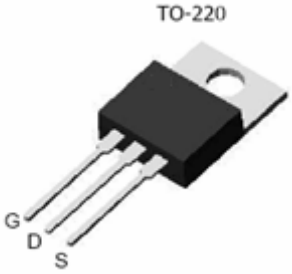
General Description

This Power MOSFET device has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency, high-frequency isolated DC-DC converters for Telecom and Computer applications. It is also intended for any applications with low gate drive requirements.



Features

- V_{DS} =40V
- I_D =100A
- Typical $R_{DS(ON)}$ =2.5m Ω (V_{GS}=10V,I_D=50A)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	40	V
I_D	Drain Current(continuous)at Tc=25℃	100	A
	Drain Current(continuous)at Tc=100℃	90	A
I_{DM}	Drain Current (package limited) （Note1）	400	A
V_{GS}	Gate-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy （Note2）	1300	mJ
I_{AR}	Avalanche Current （Note1）	40	A
E_{AR}	Repetitive Avalanche Energy （Note1）	25	mJ
P_D	Power Dissipation (T_C = 25°C)	400	W
	Power Dissipation (T_C =100°C)	220	W
T_J,Tstg	Operating junction and Storage Temperature Range	-55 to +175	℃
T_L	Maximum Lead Temperature for Soldering Purpose	300	℃

Ordering Information

Part Number	Package	Packaging
BF91404	TO-220	Tube

Thermal Data

Symbol	Parameter	Max.	Unit
Rthj-Case	Thermal Resistance Junction-Case	0.3	℃/W
Rthj-Amb	Thermal Resistance Junction-Ambient	55.0	℃/W

Electrical Characteristics(T_c = 25℃)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D=250uA, V_{GS}=0V	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V,Tc=25℃			1	uA
		V_{DS}=40V,V_{GS}=0V ,Tc=125℃			10	uA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V ,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} ,I_D=250uA	2		4	V
$R_{DS(on)}$	Static Drain-Source On Resistance	V_{GS}=10V ,I_D=50A		2.5	4	mΩ
C_{iss}	Input Capacitance	V_{DS}=20V,f=1MHZ,V_{GS}=0V		9100		pF
C_{oss}	Output Capacitance			823		pF
C_{rss}	Reverse Transfer Capacitance			152		pF
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=20V,V_{GS}=10V ,R_G=7Ω （Note3，4）		54		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-Off Delay Time			150		ns
t_f	Fall Time			73		ns
Q_g	Total Gate Charge	V_{DD}=32V, I_D=100A V_{GS}=10V （Note3，4）		98		nC
Q_{gs}	Gate-Source Charge			28		nC
Q_{gd}	Gate-Drain Charge			40		nC
V_{SD}(*)	Forward On Voltage	I_{SD}=80A ,V_{GS}=0V			1.5	V
T_{rr}	Reverse Recovery Time	V_{DD}=20V,I_F=100A,di/dt=100A/us （Note3）		28		ns

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. V_{DD} = 20V, R_G = 25Ω, Starting T_J = 25°C
3. Pulse Test : Pulse width ≤ 300μs, duty cycle ≤ 2%
4. Essentially independent of operating temperature
(*)Pulsed:Pulse duration

Typical characteristics (25℃ unless noted)

Figure 1 Output Characteristics

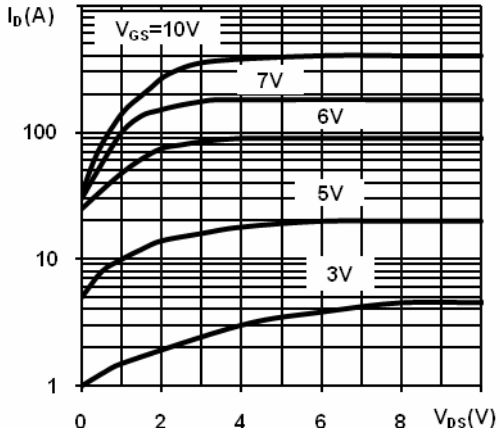


Figure 2 Transfer Characteristics

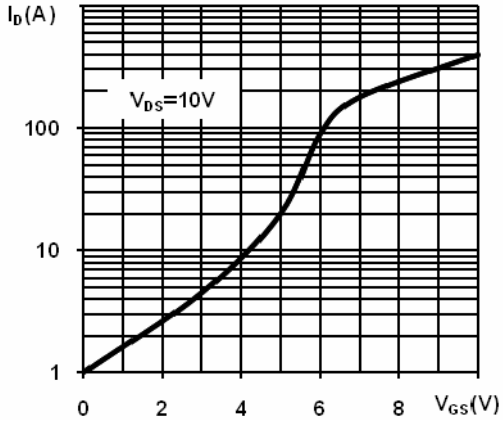


Figure 3 Normalized Threshold Voltage vs.Temperature

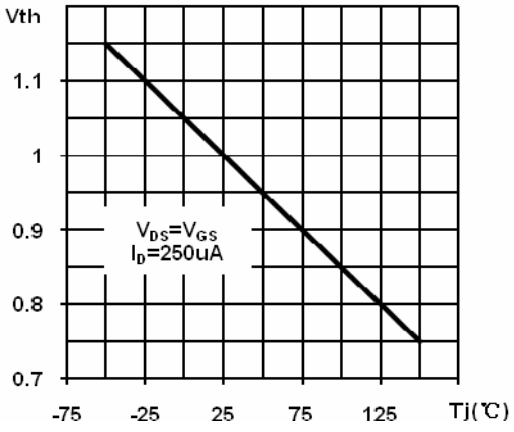


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Figure 4 Normalized BV_{DSS} vs.Temperature

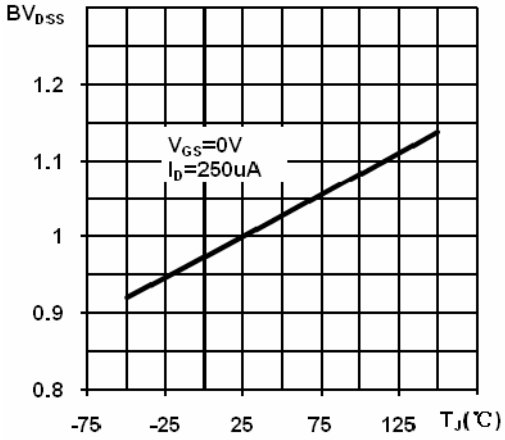


Figure 5 Normalized on Resistance vs Temperature

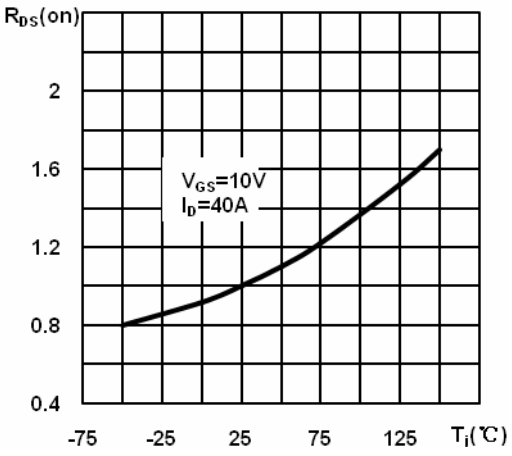


Figure 6 Source-Drain Diode Forward Characteristics

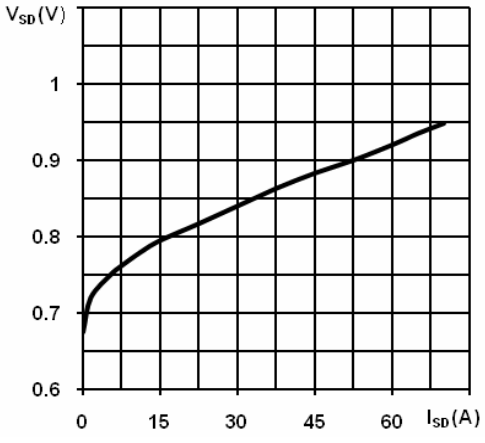


Figure 7 Capacitance

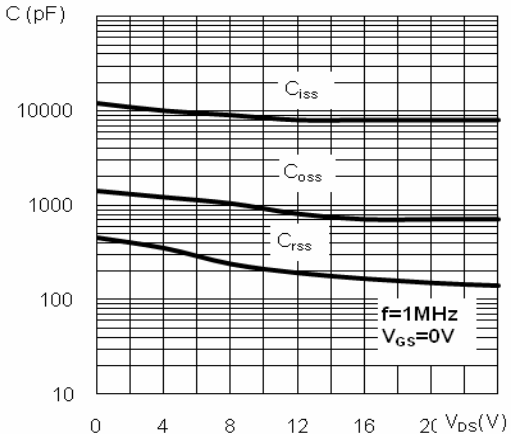


Figure 8 Gate Charge

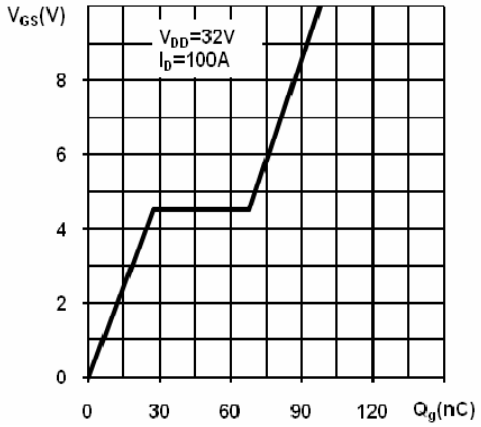


Figure 9 Safe Operating Area

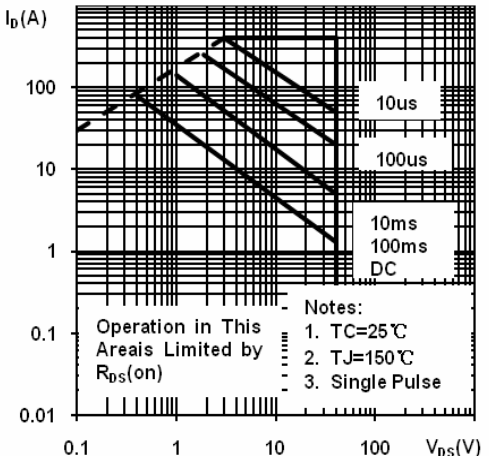


Figure 10 Maximum Drain Current vs Case Temperature

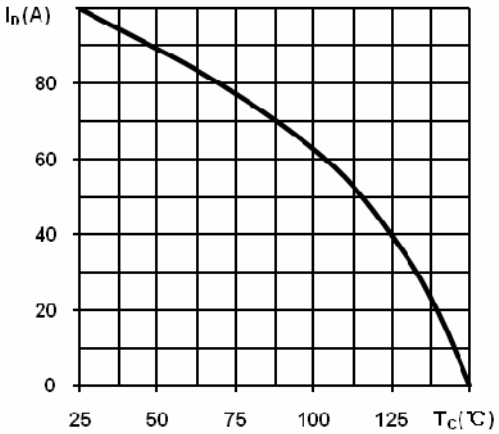
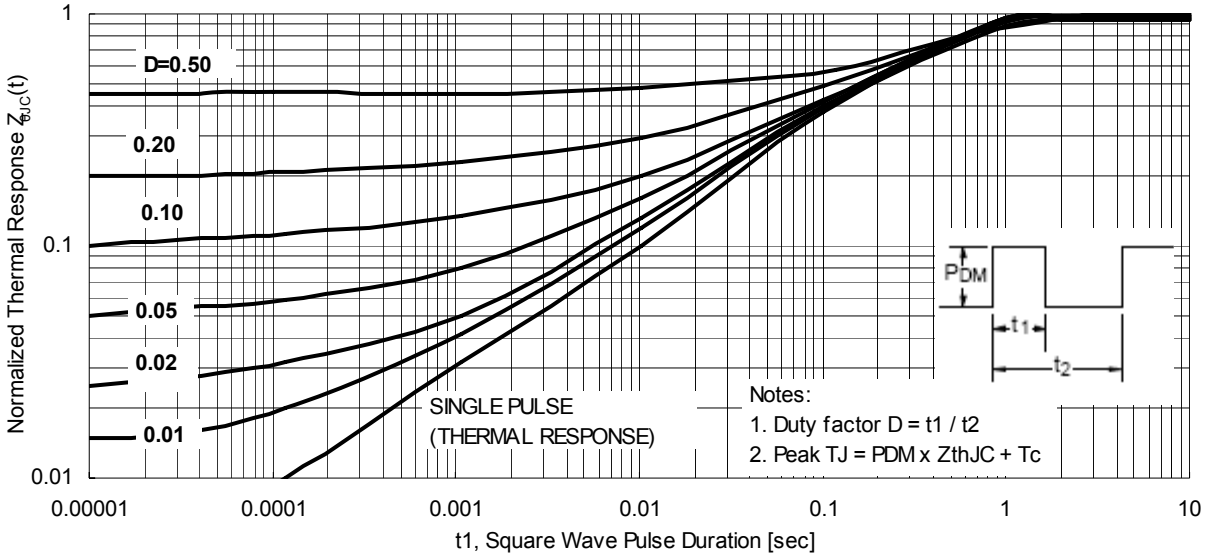
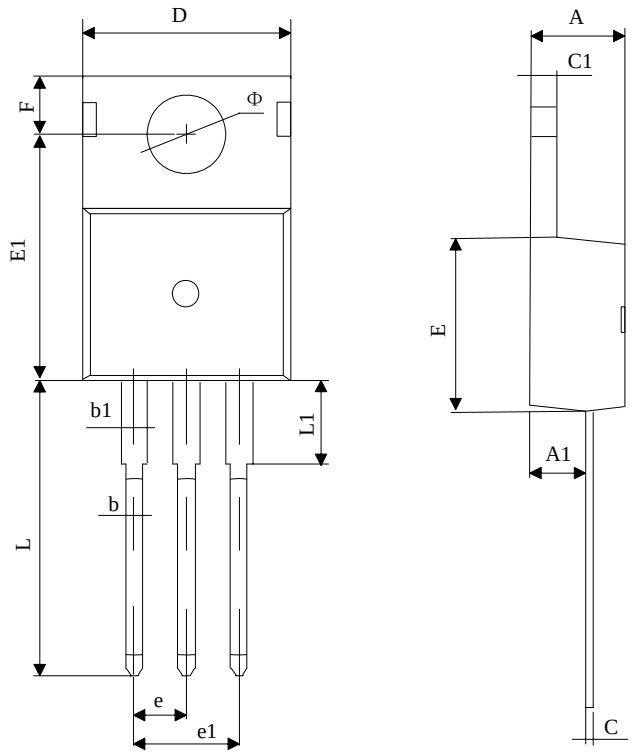


Figure 11 Normalized Maximum Transient Thermal Impedance



Package Drawing



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.45	4.55	0.175	0.179
A1	2.38	2.42	0.093	0.095
b	0.70	0.90	0.028	0.035
b1	1.42	1.62	0.056	0.064
c	0.45	0.55	0.018	0.022
c1	1.25	1.35	0.049	0.053
D	9.85	9.95	0.388	0.392
E	9.11	9.29	0.359	0.366
E1	12.85	12.95	0.506	0.510
e	2.540TYP		0.100TYP	
e1	5.04	5.12	0.198	0.202
F	2.77	2.83	0.109	0.111
L	12.98	13.18	0.511	0.519
L1	2.97	3.03	0.117	0.119
Φ	3.58	3.62	0.141	0.143

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