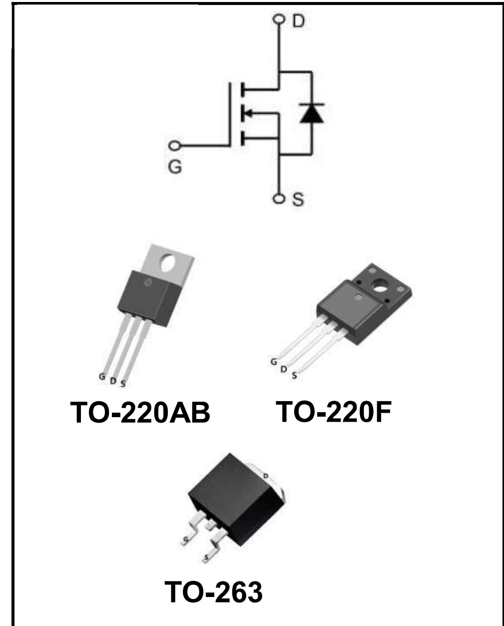
650V N-CHANNEL ENHANCEMENT MODE MOSFET

MAIN CHARACTERISTICS

I_D	50A
V_{DSS}	650V(Type:740V)
R_{DSON}-typ(@V_{GS}=10V)	< 190mΩ(Type:150mΩ)



Features

♦Is CoolFET II MOSFET

Application

♦Uninterruptible Power Supply(UPS)
♦Power Factor Correction (PFC)

Product Specification Classification

Part Number	Package	Marking	Pack
YFWJ50N65AT	TO-220AB	YFW 50N65AT XXXXX	1000PCS/Box
YFWJ50N65AF	TO-220F	YFW 50N65AF XXXXX	1000PCS/Box
YFWJ50N65AS	TO-263	YFW 50N65AS XXXXX	800PCS/Tape

Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Symbols	Value	Units
Drain-Source Voltage (V_{GS} = 0V)	V_{DS}	650	V
Continuous Drain Current	I_D	21	A
Pulsed Drain Current(note1)	I_{DM}	50	A
Gate - Source Voltage	V_{GS}	±30	V
Single Pulse Avalanche Energy(note2)	E_{AS}	500	mJ
Power Dissipation(T_C=25℃)	P_D	151	W
Operating Junction and Storage Temperature Range	T_J ,T_{STG}	-55 to +150	°C
Thermal Resistance, Junction-to-case	$R_{θJC}$	0.82	°C/W
Thermal Resistance, Junction ambient	$R_{θJA}$	62	°C/W

Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	**BV_{DSS}**	650	740	-	**V**
Breakdown voltage temperature coefficient	Reference to 25℃ , I_D=250μA	**$\triangle BV_{DSS/\triangle TJ}$**	-	0.7	-	**V/°C**
Drain -Source Leakage Current	V_{DS}=650V , V_{GS}=0V	**I_{DSS}**	-	-	1	**μA**
	V_{DS}=520V , T_C=125℃		-	-	50	
Gate to source leakage current, forward	V_{GS}=30V, V_{DS}=0V	**I_{GSS}**	-	-	100	**nA**
Gate to source leakage current, reverse	V_{GS}=-30V, V_{DS}=0V		-	-	-100	
Gate- Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	**$V_{GS(th)}$**	2.5	3.3	4.5	**V**
Drain to source on state resistance	V_{GS}=10V, I_D=3.2A	**$R_{DS(ON)}$**	-	150	190	**mΩ**
Input Capacitance	V_{DS}=100V V_{GS}=0V f=1MHz	**C_{iss}**	-	1510	-	**pF**
Output Capacitance		**C_{oss}**	-	65	-	
Reverse Transfer Capacitance		**C_{rss}**	-	2.4	-	
Turn-on delay time	V_{DS}=400V I_D=13A R_G=4.7Ω V_{GS}=13V	**$t_{d(on)}$**	-	10	-	**nS**
Rising time		**T_r**	-	19.8	-	
Turn-Off Delay Time		**$t_{d(OFF)}$**	-	45.4	-	
Fall Time		**t_f**	-	41.4	-	
Total Gate Charge	V_{DS}=480V I_D=11A V_{GS}=10V	**Q_g**	-	7.27	-	**nC**
Gate-Source Charge		**Q_{gs}**	-	17.4	-	
Gate-Drain Charge		**Q_{gd}**	-	43.9	-	
Continuous source current	Integral reverse p-n Junction diode in the MOSFET	**I_S**	-	-	21	**A**
Pulsed source curren		**I_{SM}**	-	-	63	
Diode forward voltage drop	I_S = 7.3A, V_{GS} = 0V	**V_{SD}**	-	0.812	1.5	**V**
Reverse Recovery Time	V_{GS} = 0V,I_S = 11A, V_{DD}=400V diF/dt =100A /μs	**t_{rr}**	-	288	-	**nS**
Reverse Recovery Charge		**Q_{rr}**	-	3.66	-	**uC**

Note :

1、The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

2、The EAS data shows Max. rating . L=0.5mH, IAS =7A, VDD =50V, RG=25Ω

3、The test condition is Pulse Test: ISD ≤ ID, di/dt = 100A/us, VDD≤ BVDSS, Starting at TJ =25℃

4、The power dissipation is limited by 150℃ junction temperature

5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

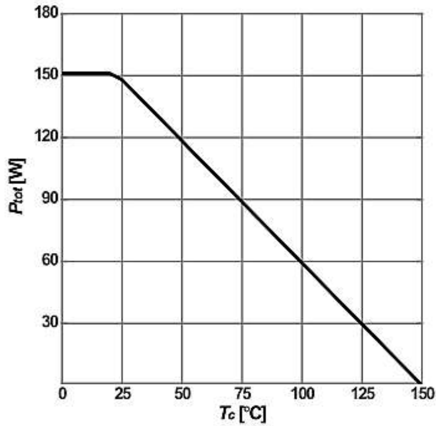


Figure1: Power dissipation (Non FullPAK)

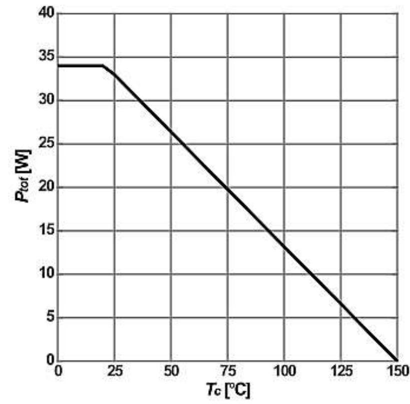


Figure2: Power dissipation (FullPAK)

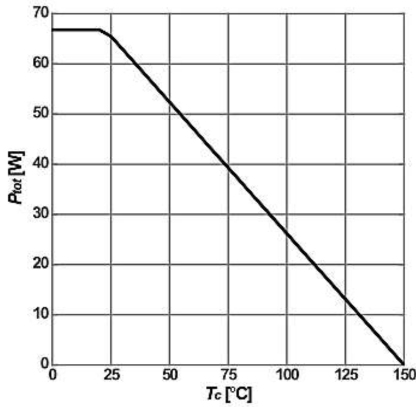


Figure3: Power dissipation

P_{tot}=f(T_C)

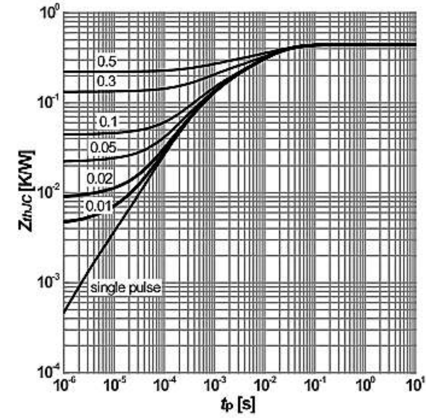


Figure4:Max. transient thermal impedance

Z_{thJC}=f(t_p); parameter: D= t_p/T

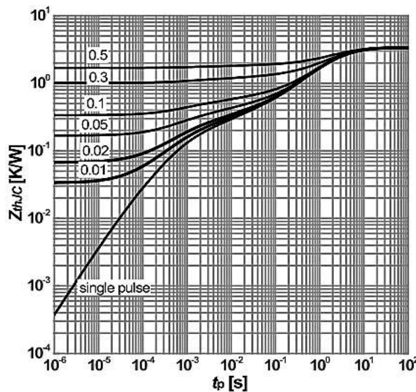


Figure5: Max. transient thermal impedance

Z_{thJC}=f(t_p); parameter: D= t_p/T

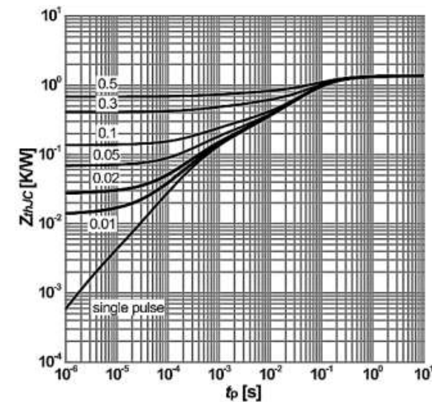


Figure6: Max. transient thermal impedance

Z_{thJC}=f(t_p); parameter: D= t_p/T

Ratings and Characteristic Curves

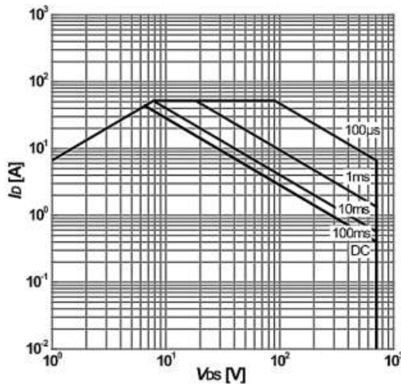


Figure 7: Safe operating area (Non FullPAK)

I_D=f(V_{DS}); T_j=25°C; D=0; parameter: t_p

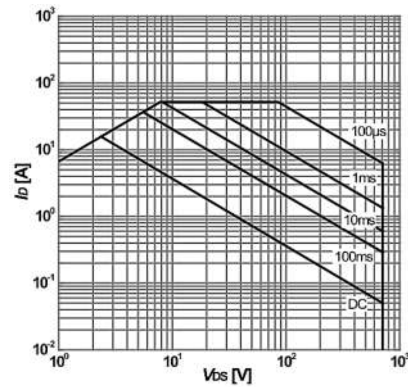


Figure8 : Safe operating area (Non FullPAK)

I_D=f(V_{DS}); T_j=25°C; D=0; parameter: t_p

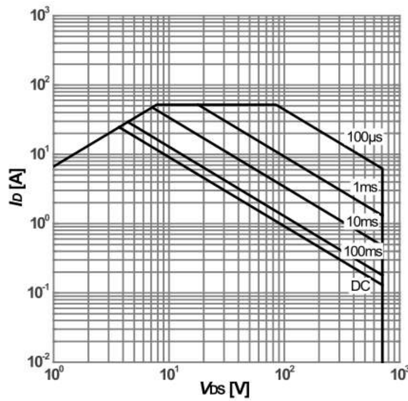


Figure9 : TSafe operating area (FullPAK-TO220A)

R_{DS}(on)=f(I_D); T_j=25°C; parameter: V_{GS}

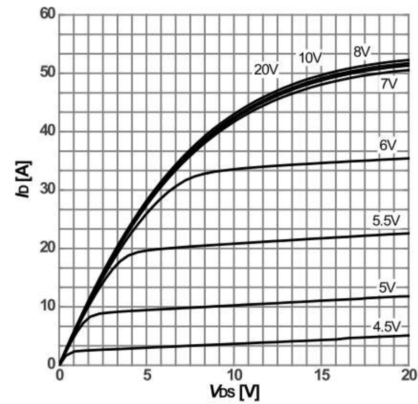


Figure 10: Typ. output characteristics

R_{DS}(on)=f(T_j); I_D=3.2A; V_{GS}=10V

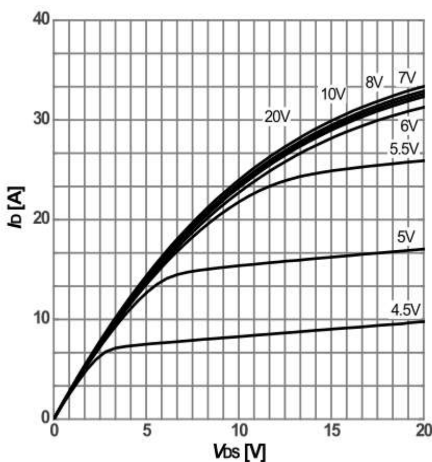


Figure 11: Typ. output characteristics

I_D=f(V_{DS}); T_j=125°C; parameter: V_{GS}

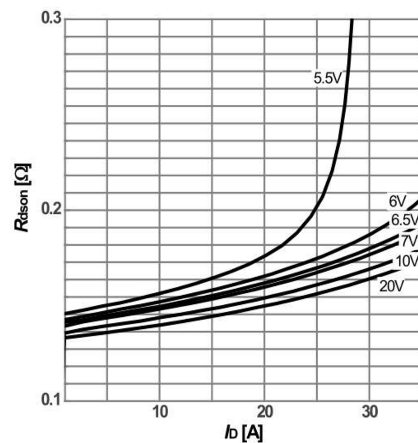


Figure 12: Type. gate charge

R_{DS}(on)=f(I_D); T_j=25°C; parameter: V_{GS}

Package Outline Dimensions Millimeters

TO-220AB

Dim.	Min.	Max.
A	10.15	10.35
B	2.65	2.95
C	3.70	3.90
D	28.5	29.5
E	1.30	1.45
F	6.35	6.55
G	2.9	3.3
H	15.0	16.0
I	0.38	0.42
J	4.45	4.55
K	1.25	1.35
L	Typ 5.08	
M	Typ 2.54	
N	3.1	3.3
O	0.76	0.84
All Dimensions in millimeter		

TO-220F

Dim.	Min.	Max.
A	9.95	10.25
B	2.95	3.25
C	1.25	1.45
D	12.95	13.25
E	0.50	0.65
F	3.1	3.3
G	1.30	1.45
H	Typ 2.54	
I	Typ 5.08	
J	4.60	4.75
K	2.50	2.65
L	6.35	6.55
M	15.4	16.0
N	2.75	3.05
O	0.48	0.52
P	0.76	0.84
All Dimensions in millimeter		

Package Outline Dimensions Millimeters

TO-263

Dim.	Min.	Max.
A	10.1	10.2
B	7.4	7.6
C	1.3	1.5
D	0.55	0.75
E	5.0	6.0
F	1.4	1.6
G	0.78	0.86
H	1.2	1.3
I	Typ2.54	
J	8.4	8.6
K	4.45	4.55
L	1.25	1.35
M	0.02	0.1
N	2.4	2.8
O	0.36	0.40
All Dimensions in millimeter		