650V N-Channel MOSFETs

PJF20N65

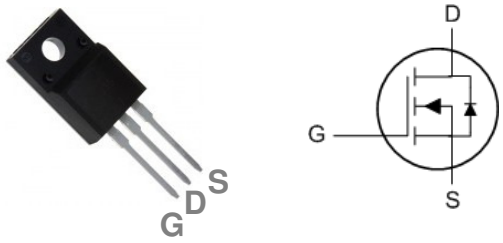
General Description

These N-Channel enhancement mode power field effect transistors are using advanced super junction technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supply

Features

- *20A,650V, RDS(ON) =0.19Ω@VGS = 10V*
- *Low gate charge (typical 52nC)*
- *Low Crss (typical 8.5 pF)*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

TO220F Pin Configuration



Applications

- *High efficient switched mode power supplies*
- *TV Power*
- *Adapter/charger*
- *Server Power*
- *PV Inverter / UPS*

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		650	V
V_{GS}	Gate-Source Voltage		±30	V
I_D	Drain Current – Continuous (T_C=25˚C)		20	A
	Drain Current – Continuous (T_C=100˚C)		12.5	A
I_{DM}	Drain Current – Pulsed	(Note 1)	80	A
EAS	Single Pulse Avalanche Energy	(Note 2)	248	mJ
IAS	Single Pulse Avalanche Current	(Note 2)	6	A
P_D	Power Dissipation (T_C=25˚C)		70	W
	Power Dissipation – Derate above 25˚C		0.56	W/˚C
T_{STG}	Storage Temperature Range		-55 to 150	˚C
T_J	Operating Junction Temperature Range		-55 to 150	˚C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	˚C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	1.8	˚C/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	650	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.6	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=600V , V_{GS}=0V , T_J=25℃	---	---	10	uA
		V_{DS}=600V , V_{GS}=0V , T_J=125℃			100	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±30V , V_{DS}=0V	---	---	±100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=10A	---	190	210	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2	3.5	5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.3	---	mV/℃

Dynamic and switching Characteristics

Q_g	Total Gate Charge (10V)	V_{DS}=480V , V_{GS}=10V , I_D=20A (Note 3,4)	---	52	---	nC
Q_{gs}	Gate-Source Charge		---	11	---	
Q_{gd}	Gate-Drain Charge		---	22	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=380V , V_{GS}=10V , R_G=3.5Ω, I_D=18A (Note 3,4)	---	16	---	ns
T_r	Rise Time		---	45	---	
$T_{d(off)}$	Turn-Off Delay Time		---	30	---	
T_f	Fall Time		---	40	---	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	1515	---	pF
C_{oss}	Output Capacitance		---	58	---	
C_{rss}	Reverse Transfer Capacitance		---	8.5	---	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	20	A
I_{SM}	Pulsed Source Current		---	---	80	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=20A , T_J=25℃	---	0.9	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS}=0V,I_S=20A , dI/dt=100A/μs , T_J=25℃ (Note 3)	---	370	---	nS
Q_{rr}	Reverse Recovery Charge		---	5	---	uC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=50V,V_{GS}=10V,L=13.8mH,I_{AS}=6A.,R_G=25Ω, Starting T_J=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

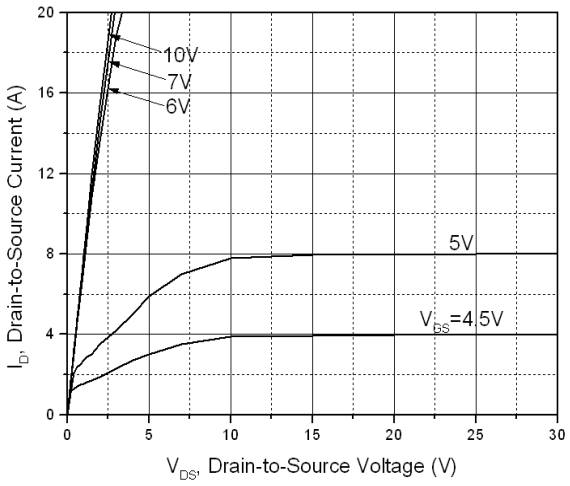


Fig.1 Typical Output Characteristics

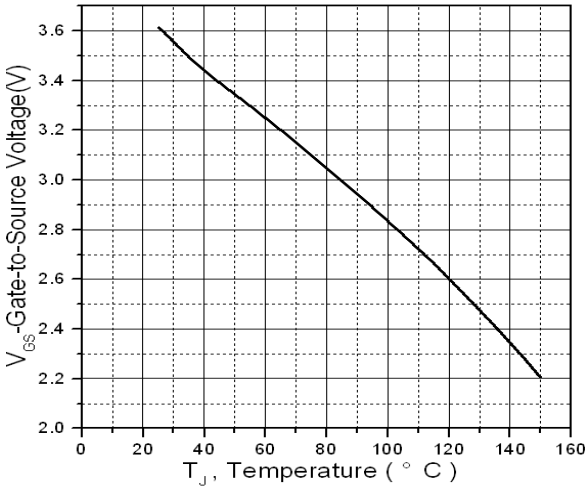


Fig.2 $V_{GS(th)}$ vs. Junction Temperature

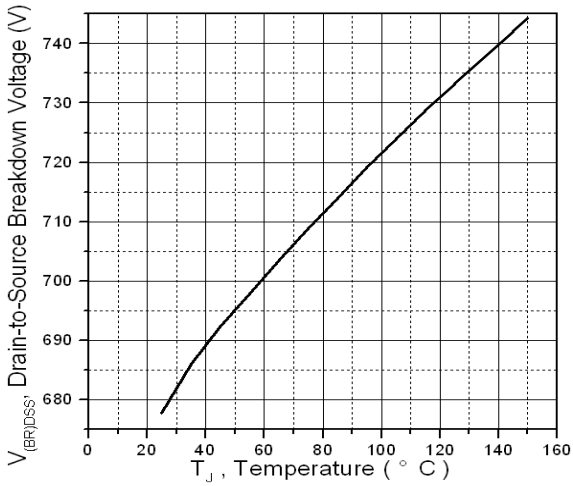


Fig.3 BVDSS vs. Junction Temperature

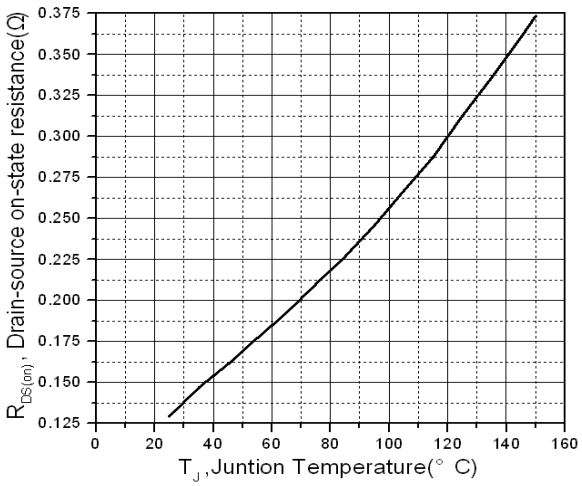


Fig.4 RDSON vs. Junction Temperature

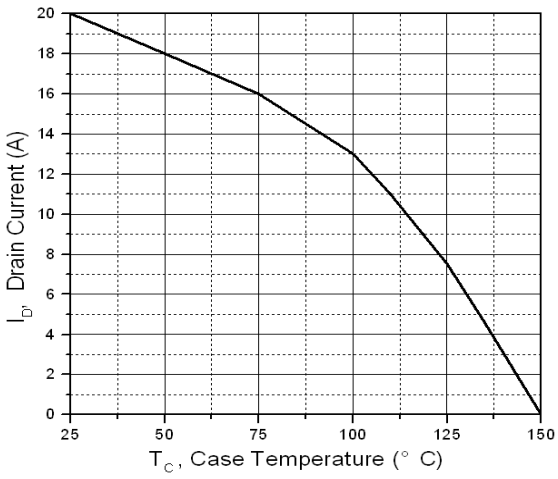


Fig.5 ID vs. Case Temperature

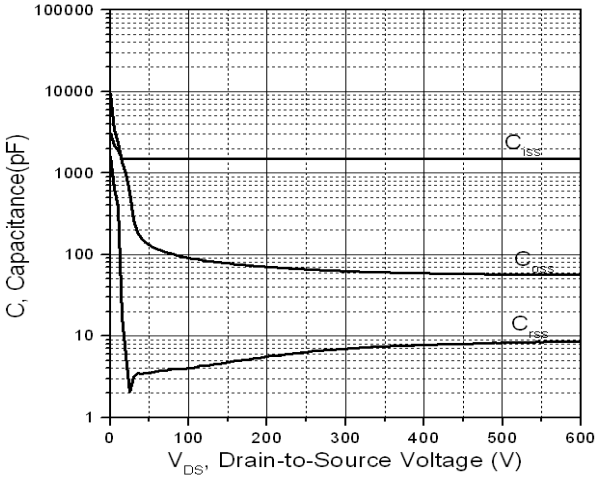


Fig.6 Typical Capacitance vs. V_{DS}

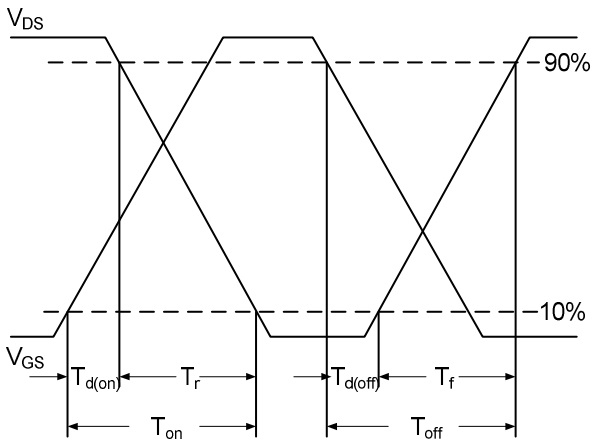


Fig.7 Switching Time Waveform

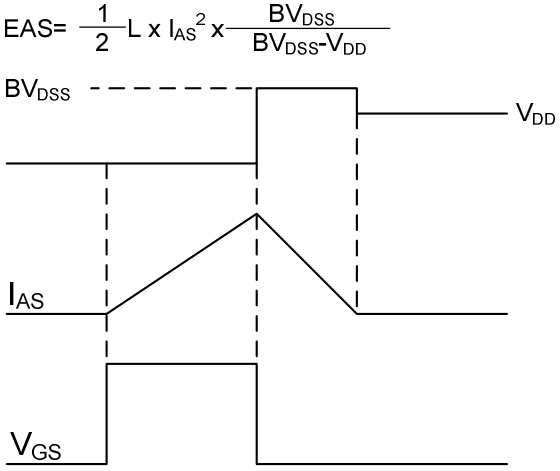
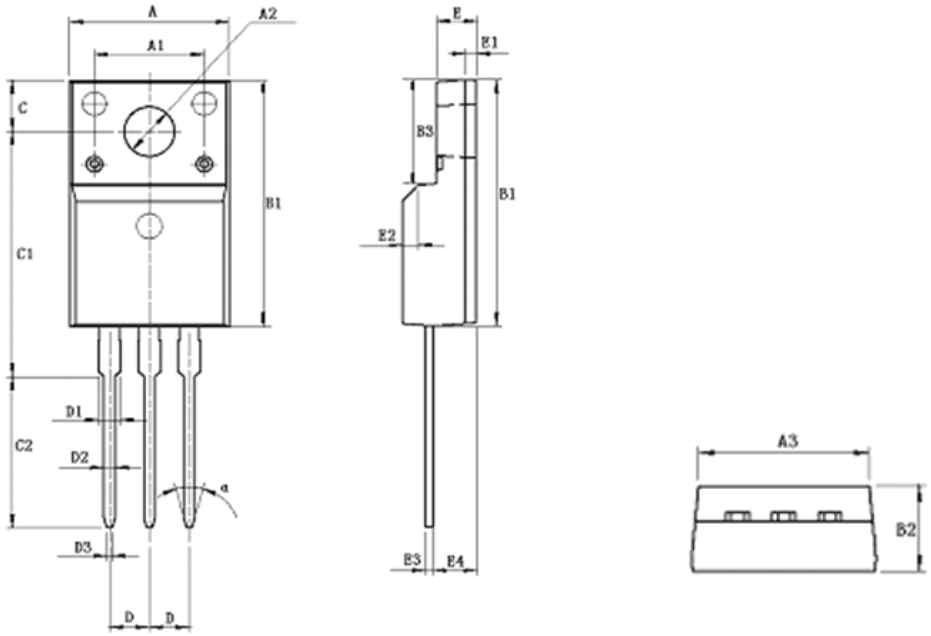


Fig.8 EAS Waveform

TO220F PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	9.960	10.160	10.360	0.392	0.400	0.408
A1		7.000		0.276	0.000	0.000
A2	3.080	3.180	3.280	0.121	0.125	0.129
A3	9.260	9.460	9.660	0.365	0.372	0.380
B1	15.670	15.870	16.070	0.617	0.625	0.633
B2	4.500	4.700	4.900	0.177	0.185	0.193
B3	6.480	6.680	6.880	0.255	0.263	0.271
C	3.200	3.300	3.400	0.126	0.130	0.134
C1	15.600	15.800	16.000	0.614	0.622	0.630
C2	9.550	9.750	9.950	0.376	0.384	0.392
D		2.54 (TYP)			1.00 (TYP)	
D1	-	-	1.470	-	-	0.058
D2	0.700	0.800	0.900	0.028	0.031	0.035
D3	0.250	0.350	0.450	0.010	0.014	0.018
E	2.340	2.540	2.740	0.092	0.100	0.108
E1		0.700			0.028	
E2		$1.0*45^0$			$1.0*45^0$	
E3	0.450	0.500	0.600	0.018	0.020	0.024
E4	2.560	2.760	2.960	0.101	0.109	0.117
Θ		30^0			30^0	