



# PJP13N50 / PJF13N50

## 500V N-Channel Enhancement Mode MOSFET

TO-220AB / ITO-220AB

### FEATURES

- 13A , 500V,  $R_{DS(ON)}=0.52\Omega@V_{GS}=10V, I_D=6.5A$
- Low ON Resistance
- Fast Switching
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- Specially Designed for AC Adapter, Battery Charge and SMPS
- In compliance with EU RoHs 2002/95/EC Directives

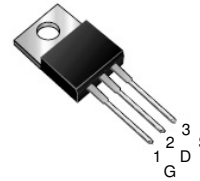
### MECHANICAL DATA

- Case: TO-220AB / ITO-220AB Molded Plastic
- Terminals : Solderable per MIL-STD-750,Method 2026

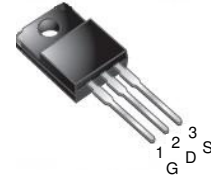
### ORDERING INFORMATION

TYPE	MARKING	PACKAGE	PACKING
PJP13N50	P13N50	TO-220AB	50PCS/TUBE
PJF13N50	F13N50	ITO-220AB	50PCS/TUBE

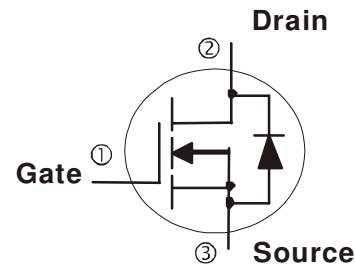
TO-220AB



ITO-220AB



INTERNAL SCHEMATIC DIAGRAM



### Maximum RATINGS and Thermal Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted )

PARAMETER	Symbol	PJP13N50	PJF13N50	Units
Drain-Source Voltage	$V_{DS}$	500		V
Gate-Source Voltage	$V_{GS}$	$\pm 30$		V
Continuous Drain Current	$I_D$	13	13	A
Pulsed Drain Current <sup>1)</sup>	$I_{DM}$	52	52	A
Maximum Power Dissipation Derating Factor	$P_D$	175 1.4	52 0.42	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150		$^\circ\text{C}$
Avalanche Energy with Single Pulse $I_{AS}=12.5A, V_{DD}=50V, L=10mH$	$E_{AS}$	780		mJ
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	0.7	2.4	$^\circ\text{C/W}$
Junction-to Ambient Thermal Resistance	$R_{\theta JA}$	62.5	100	$^\circ\text{C/W}$

Note: 1. Maximum DC current limited by the package

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## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
<b>Static</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	500	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2.0	-	4.0	V
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =6.5A	-	0.36	0.52	Ω
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	-	-	1	uA
Gate Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =400V, I <sub>D</sub> =12A V <sub>GS</sub> =10V	-	58.6	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	11.8	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	18.6	-	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =250V, I <sub>D</sub> =6A V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω	-	19.6	32	ns
Turn-On Rise Time	t <sub>r</sub>		-	42	85	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	80.4	150	
Turn-Off Fall Time	t <sub>f</sub>		-	52	90	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V f=1.0MHz	-	2000	2450	pF
Output Capacitance	C <sub>oss</sub>		-	205	250	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	16	22	
<b>Source-Drain Diode</b>						
Max. Diode Forward Current	I <sub>S</sub>	-	-	-	13	A
Max.Pulsed Source Current	I <sub>SM</sub>	-	-	-	52	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =13A, V <sub>GS</sub> =0V	-	-	1.4	V
Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =12A di/dt=100A/us	-	450	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	5.0	-	uC

**NOTE** : Plus Test : Pluse Width ≤ 300us, Duty Cycle ≤ 2%.



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Typical Characteristics Curves ( Ta=25°C, unless otherwise noted)

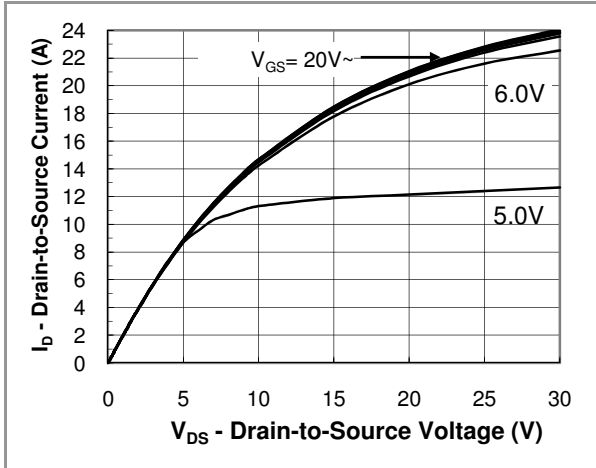


Fig.1 Output Characteristic

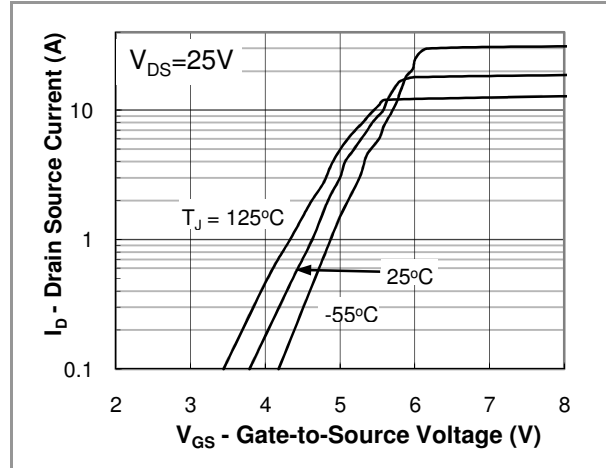


Fig.2 Transfer Characteristic

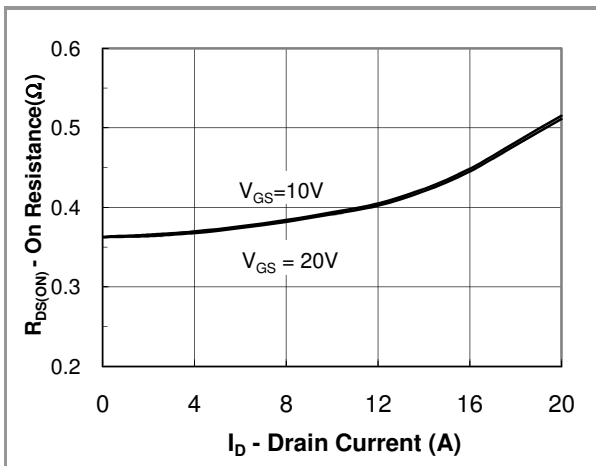


Fig.3 On Resistance vs Drain Current

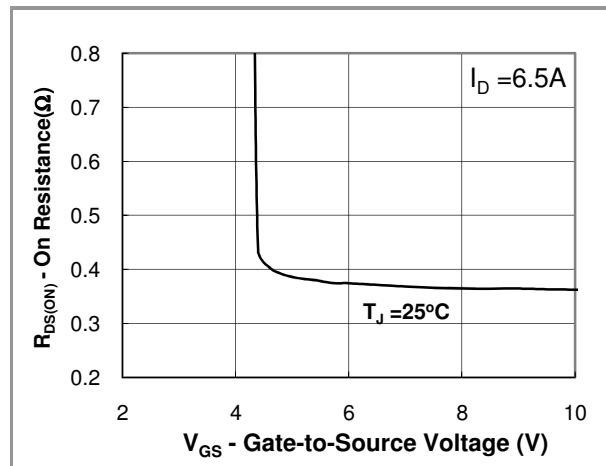


Fig.4 On Resistance vs Gate to Source Voltage

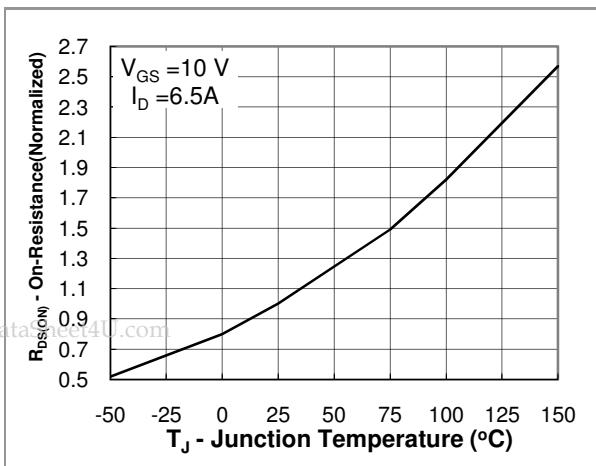


Fig.5 On Resistance vs Junction Temperature

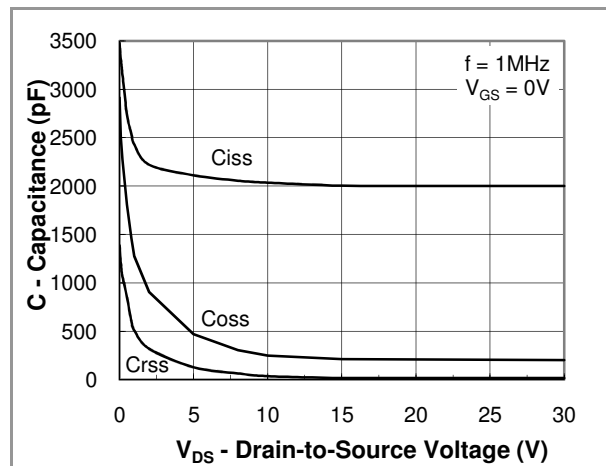


Fig.6 Capacitance



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Typical Characteristics Curves (  $T_a=25^\circ\text{C}$ , unless otherwise noted)

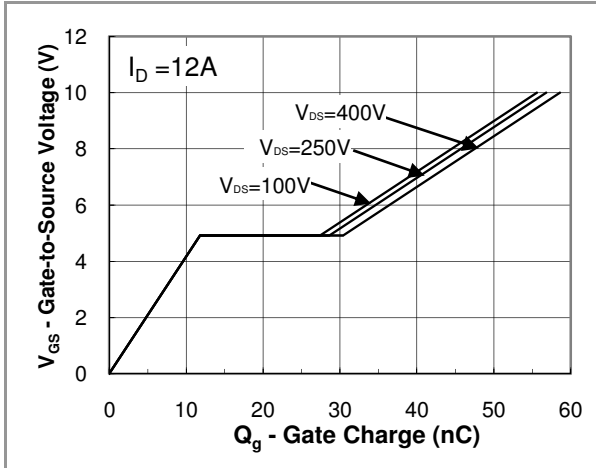


Fig. 7 Gate Charge Waveform

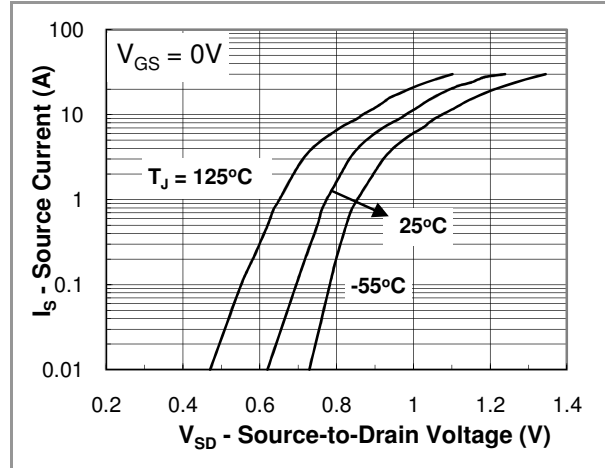


Fig.8 Source-Drain Diode Forward Voltage

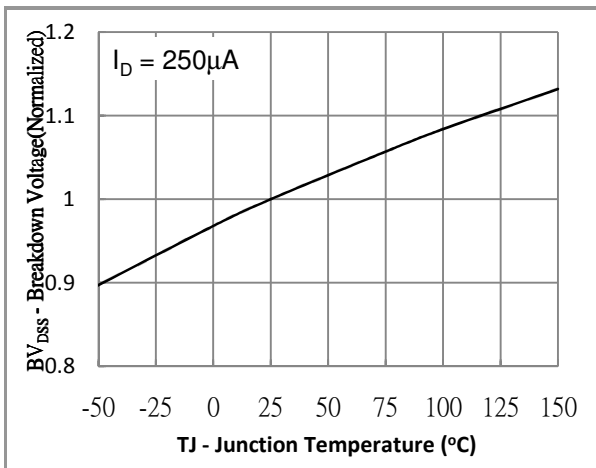


Fig.9 Breakdown Voltage vs Junction Temperature



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## LEGAL STATEMENT

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