



PJP13NA50 / PJF13NA50

500V N-Channel MOSFET

Voltage

500 V

Current

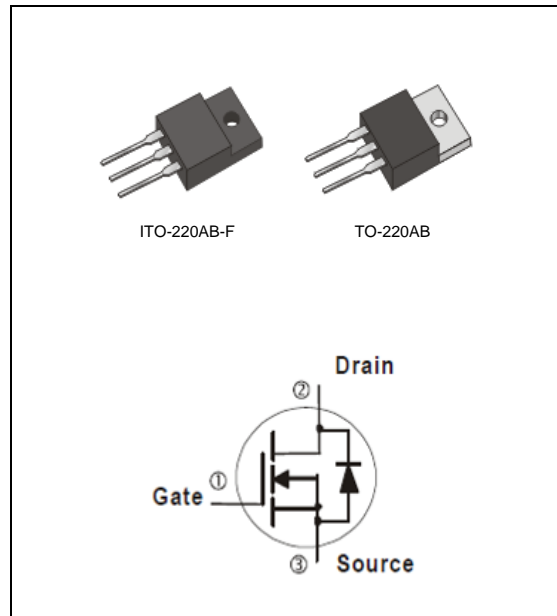
13 A

Features

- $R_{DS(ON)}$, $V_{GS}@10V, I_D@6.5A < 0.52\Omega$
- High switching speed
- Improved dv/dt capability
- Low Gate Charge
- Low reverse transfer capacitance
- Lead free in compliance with EU RoHS 2011/65/EU directive.
- Green molding compound as per IEC61249 Std. (Halogen Free)

Mechanical Data

- Case : TO-220AB, ITO-220AB-F Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- TO-220AB Approx. Weight : 0.067 ounces, 1.9 grams
- ITO-220AB-F Approx. Weight : 0.068 ounces, 2 grams



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

PARAMETER		SYMBOL	TO-220AB	ITO-220AB-F	UNITS
Drain-Source Voltage		V_{DS}	500		V
Gate-Source Voltage		V_{GS}	± 30		V
Continuous Drain Current		I_D	13		A
Pulsed Drain Current		I_{DM}	52		A
Single Pulse Avalanche Energy ^(Note 1)		E_{AS}	824		mJ
Power Dissipation	$T_C=25^\circ\text{C}$	P_D	190	51	W
	Derate above 25°C		1.52	0.41	W/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~150		$^\circ\text{C}$
Typical Thermal resistance					
- Junction to Case		$R_{\theta JC}$	0.66	2.45	$^\circ\text{C}/\text{W}$
- Junction to Ambient		$R_{\theta JA}$	62.5	120	

- Limited only By Maximum Junction Temperature



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Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	500	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3.1	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=6.5A$	-	0.44	0.52	Ω
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$	-	0.02	1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	-	± 10	± 100	nA
Diode Forward Voltage	V_{SD}	$I_S=13A, V_{GS}=0V$	-	0.9	1.4	V
Dynamic (Note 4)						
Total Gate Charge	Q_g	$V_{DS}=400V, I_D=13A,$ $V_{GS}=10V$ (Note 2,3)	-	28	-	nC
Gate-Source Charge	Q_{gs}		-	8.2	-	
Gate-Drain Charge	Q_{gd}		-	9.6	-	
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	1435	-	pF
Output Capacitance	C_{oss}		-	180	-	
Reverse Transfer Capacitance	C_{rss}		-	5	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=250V, I_D=13A,$ $R_G=25\Omega$ (Note 2,3)	-	14	-	ns
Turn-On Rise Time	t_r		-	30	-	
Turn-Off Delay Time	$t_{d(off)}$		-	36	-	
Turn-Off Fall Time	t_f		-	29	-	
Drain-Source Diode						
Maximum Continuous Drain-Source Diode Forward Current	I_S	---	-	-	13	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	-	-	52	A
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_S=13A$	-	537	-	ns
Reverse Recovery Charge	Q_{rr}	$di_F/dt=100A/\mu s$ (Note 2)	-	5.3	-	μC

NOTES :

1. $L=30\text{mH}, I_{AS}=7.15A, V_{DD}=50V, R_G=25\text{ohm}$, Starting $T_J=25^\circ\text{C}$
2. Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
3. Essentially independent of operating temperature typical characteristics.
4. Guaranteed by design, not subject to production testing



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TYPICAL CHARACTERISTIC CURVES

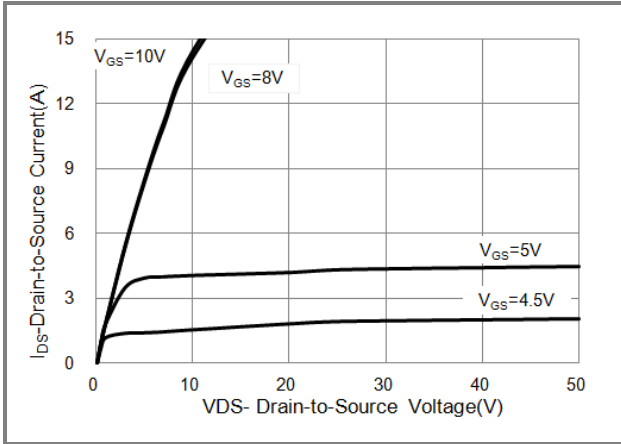


Fig.1 Output Characteristics

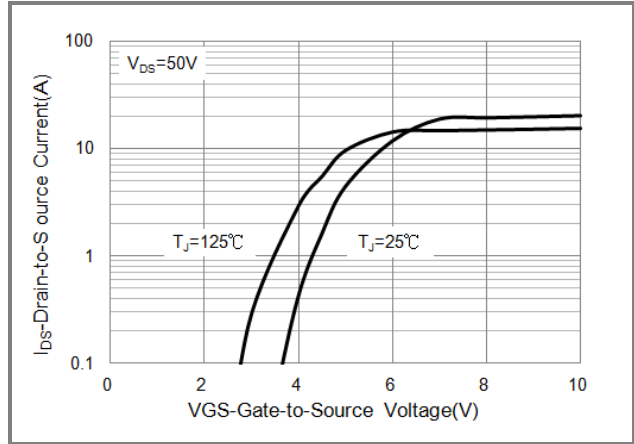


Fig.2 Transfer Characteristics

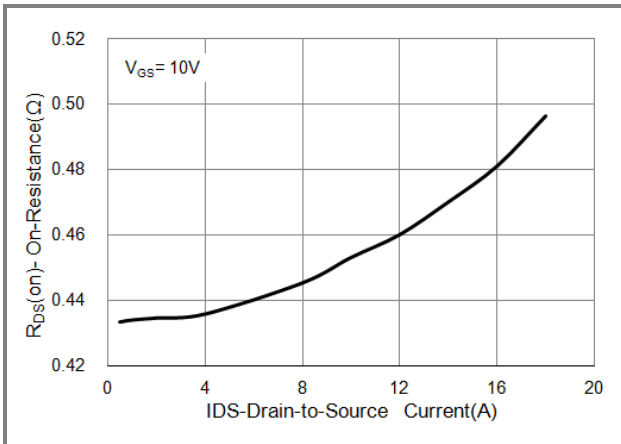


Fig.3 On-Resistance vs. Drain Current

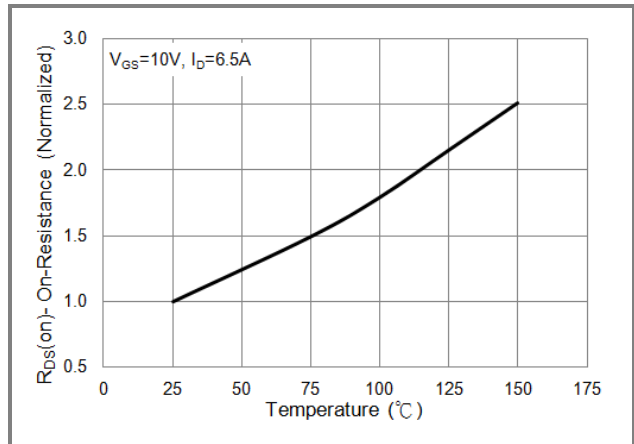


Fig.4 On-Resistance vs. Junction temperature

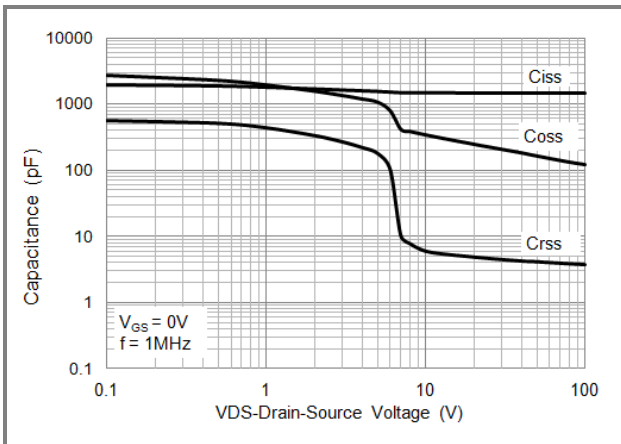


Fig.5 Capacitance vs. Drain-Source Voltage

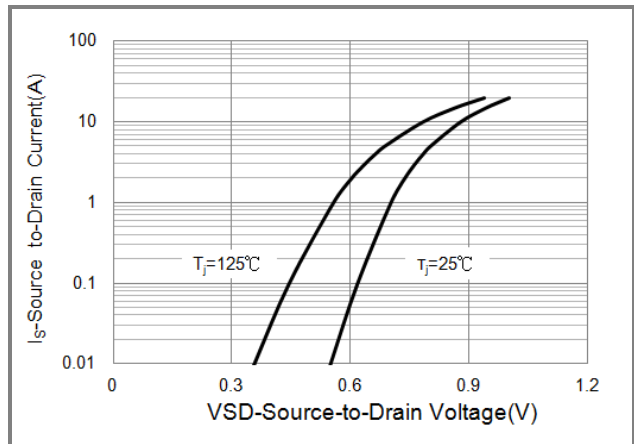


Fig.6 Body Diode Characteristics



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TYPICAL CHARACTERISTIC CURVES

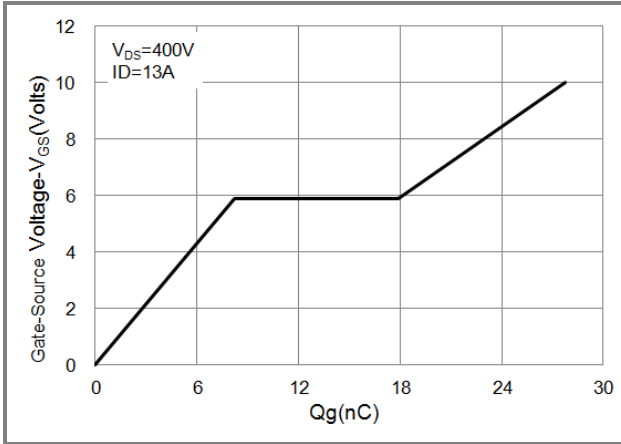


Fig.7 Gate-Charge Characteristics

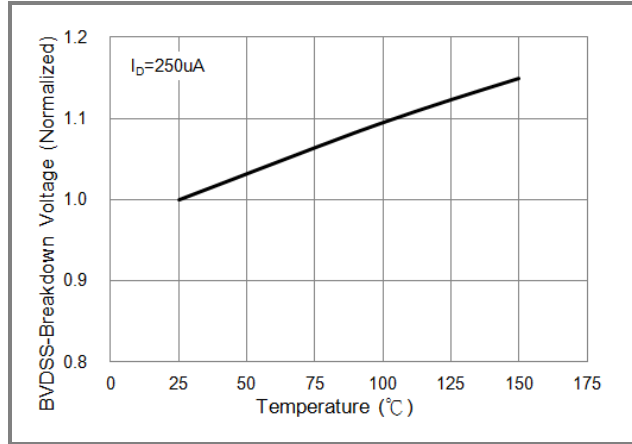


Fig.8 Breakdown Voltage Variation vs. Temperature

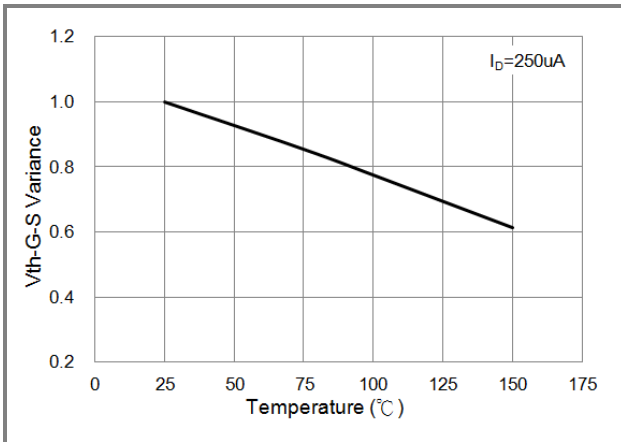


Fig.9 Threshold Voltage Variation with Temperature

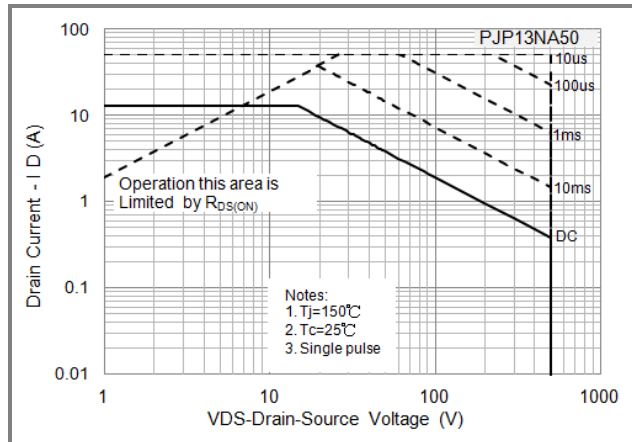


Fig.10 Maximum Safe Operating Area

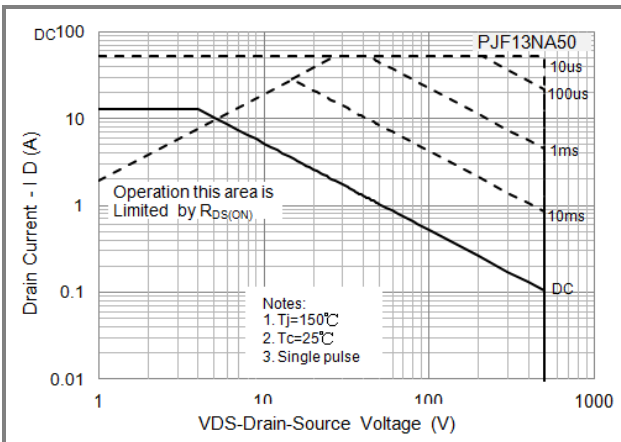


Fig.11 Maximum Safe Operating Area



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TYPICAL CHARACTERISTIC CURVES

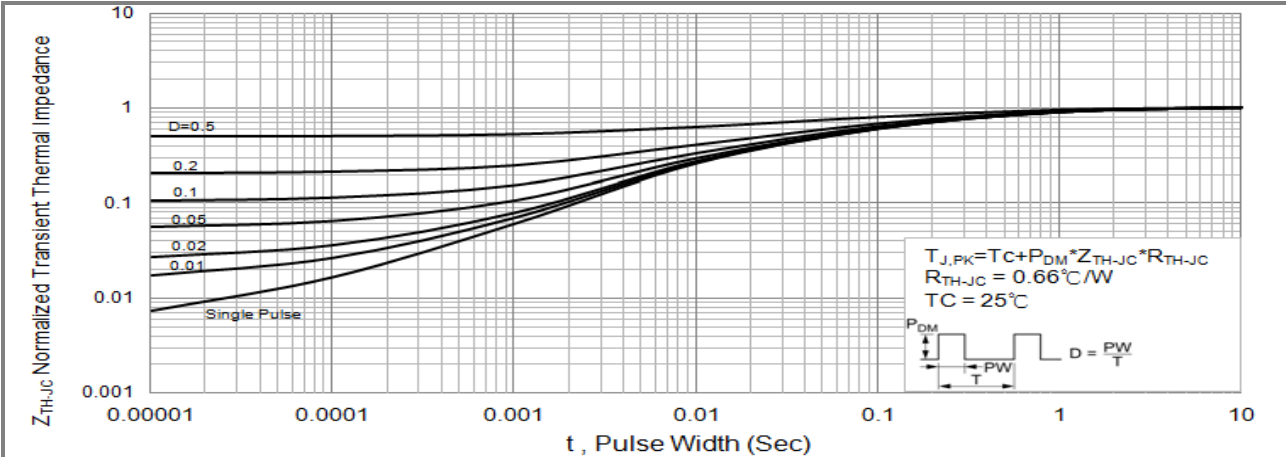


Fig.13 PJP13NA50 Normalized Transient Thermal Impedance vs. Pulse Width

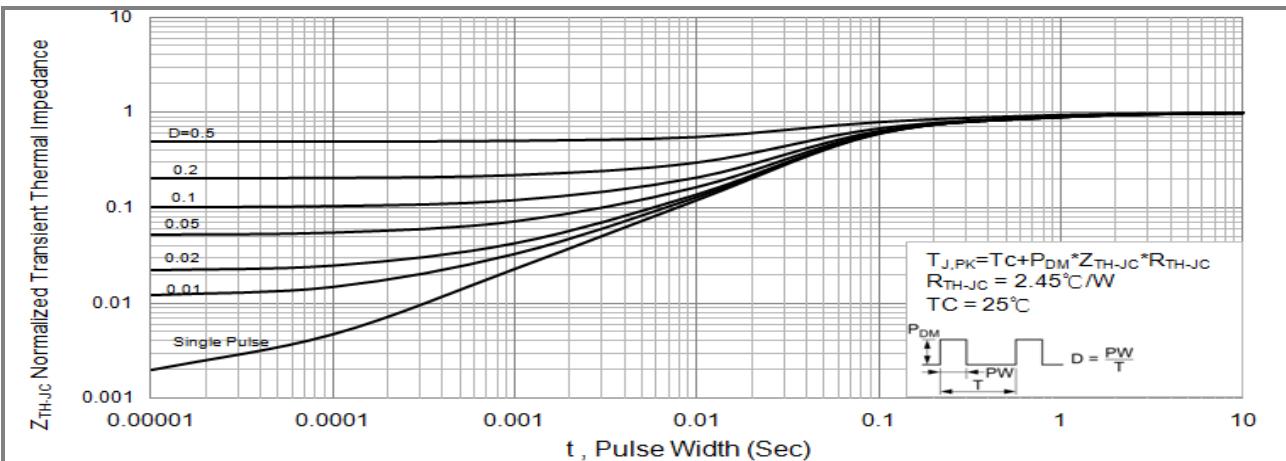
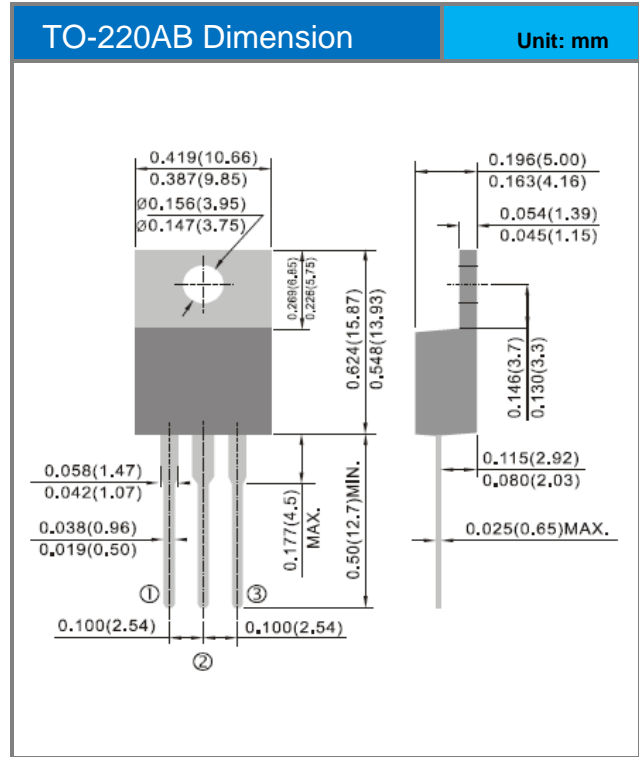
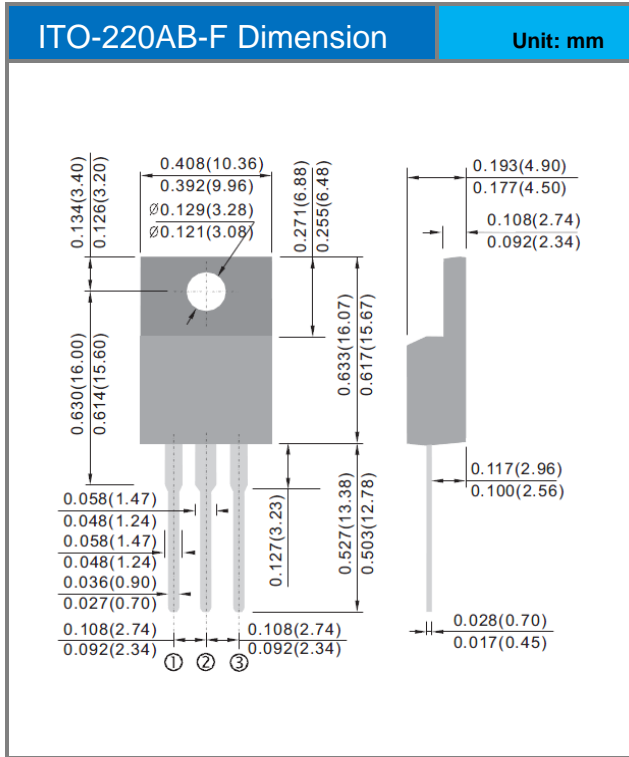


Fig.14 PJF13NA50 Normalized Transient Thermal Impedance vs. Pulse Width



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Packaging Information





PJP13NA50 / PJF13NA50

PART NO PACKING CODE VERSION

Part No Packing Code	Package Type	Packing type	Marking	Version
PJP13NA50_T0_00001	TO-220AB	50pcs / Tube	P13NA50	Halogen free
PJF13NA50_T0_00001	ITO-220AB-F	50pcs / Tube	F13NA50	Halogen free



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