



# PJP9NA90 / PJF9NA90 / PJZ9NA90

## 900V N-Channel MOSFET

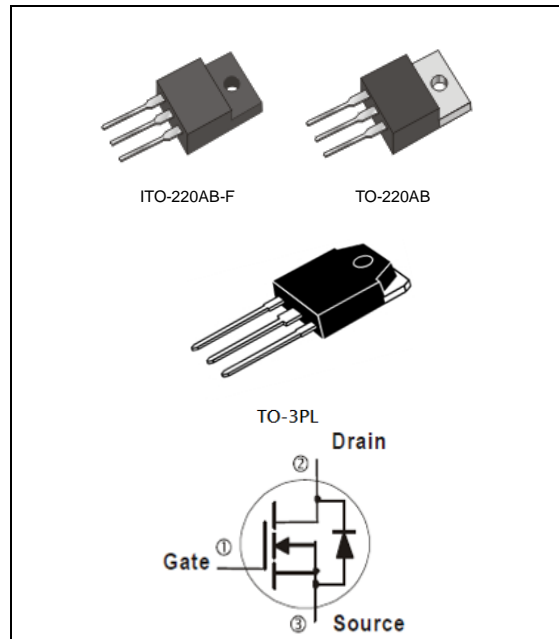
<b>Voltage</b>	<b>900 V</b>	<b>Current</b>	<b>9 A</b>
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### Features

- $R_{DS(ON)}$ ,  $V_{GS}@10V, I_D@4.5A < 1.4\Omega$
- 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, TO-3PL Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- TO-220AB Approx. Weight : 0.065 ounces, 1.859 grams
- ITO-220AB-F Approx. Weight : 0.068 ounces, 1.945 grams
- TO-3PL Approx. Weight : 0.182 ounces, 5.174grams



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

PARAMETER		SYMBOL	TO-220AB	ITO-220AB-F	TO-3PL	UNITS
Drain-Source Voltage		$V_{DS}$	900			V
Gate-Source Voltage		$V_{GS}$	$\pm 30$			V
Continuous Drain Current		$I_D$	9			A
Pulsed Drain Current		$I_{DM}$	36			A
Single Pulse Avalanche Energy <sup>(Note 1)</sup>		$E_{AS}$	823			mJ
Power Dissipation	$T_C=25^\circ\text{C}$	$P_D$	205	68	240	W
	Derate above $25^\circ\text{C}$		1.64	0.54	1.92	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		$R_{\theta JC}$	0.61	1.84	0.52	$^\circ\text{C}/\text{W}$
- Junction to Ambient		$R_{\theta JA}$	62.5	120	50	

- 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
<b>Static</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	900	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=4.5A$	-	1.1	1.4	$\Omega$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=900V, V_{GS}=0V$	-	0.03	1.0	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	$\pm 10$	$\pm 100$	nA
Diode Forward Voltage	$V_{SD}$	$I_S=9A, V_{GS}=0V$	-	-	1.4	V
<b>Dynamic</b> (Note 4)						
Total Gate Charge	$Q_g$	$V_{DS}=720V, I_D=9A,$ $V_{GS}=10V$ (Note 2,3)	-	31	-	nC
Gate-Source Charge	$Q_{gs}$		-	8	-	
Gate-Drain Charge	$Q_{gd}$		-	12	-	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	1634	-	pF
Output Capacitance	$C_{oss}$		-	143	-	
Reverse Transfer Capacitance	$C_{rss}$		-	7.1	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=450V, I_D=9A,$ $R_G=25\Omega$ (Note 2,3)	-	22	-	ns
Turn-On Rise Time	$t_r$		-	31	-	
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	
Turn-Off Fall Time	$t_f$		-	31	-	
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$	---	-	-	9	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$	---	-	-	36	A
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_S=9A$	-	657	-	ns
Reverse Recovery Charge	$Q_{rr}$	$di_F/dt=100A/\mu s$ (Note 2)	-	5.6	-	$\mu C$

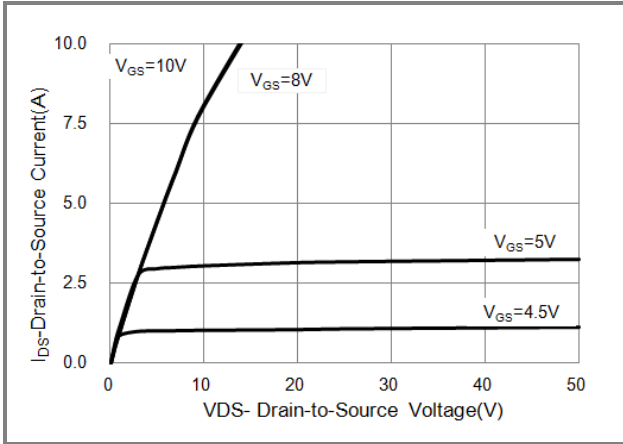
NOTES :

1.  $L=30\text{mH}, I_{AS}=7.1A, V_{DD}=50V, R_G=25\text{ohm},$  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

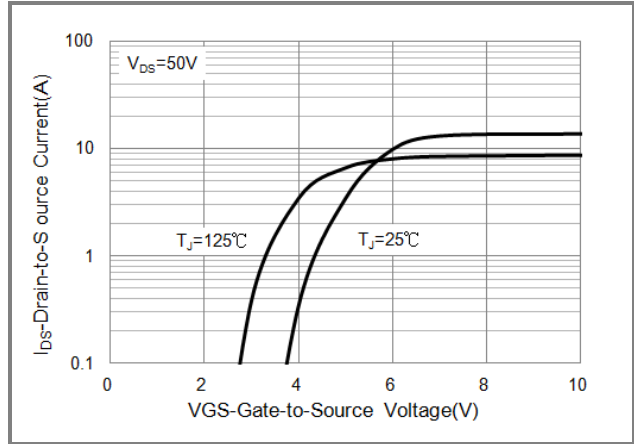


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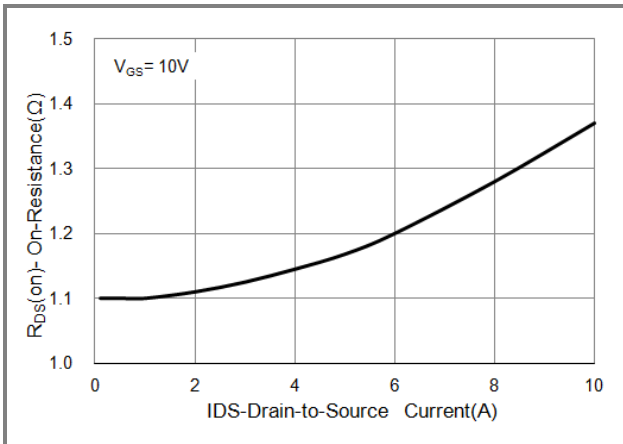
## TYPICAL CHARACTERISTIC CURVES



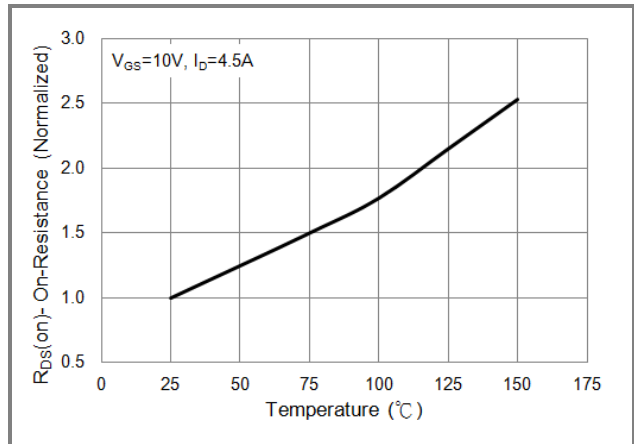
**Fig.1 Output Characteristics**



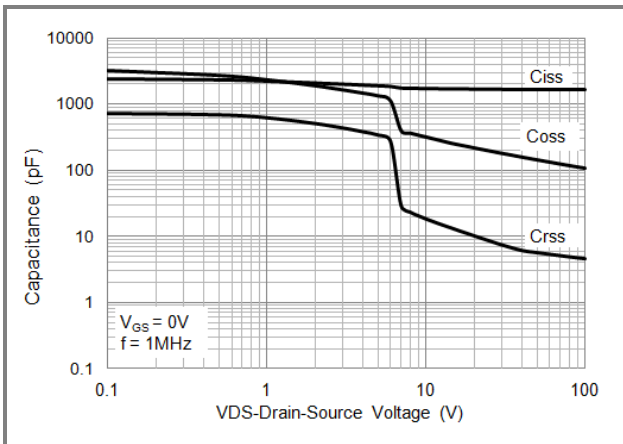
**Fig.2 Transfer Characteristics**



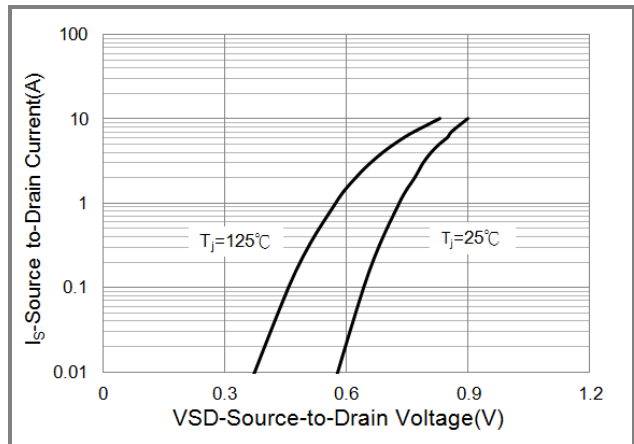
**Fig.3 On-Resistance vs. Drain Current**



**Fig.4 On-Resistance vs. Junction Temperature**



**Fig.5 Capacitance vs. Drain-Source Voltage**



**Fig.6 Source-Drain Diode Forward Voltage**



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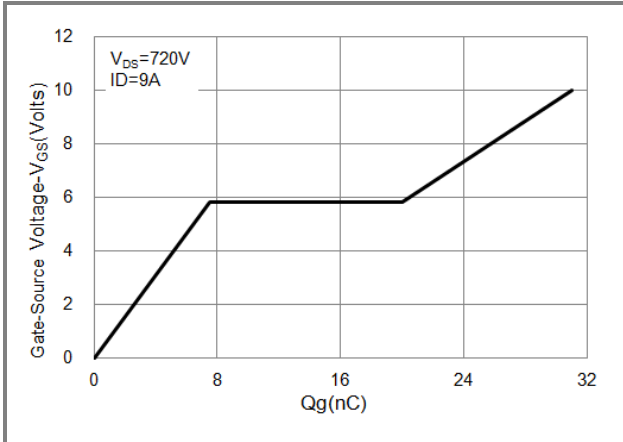


Fig.7 Gate Charge

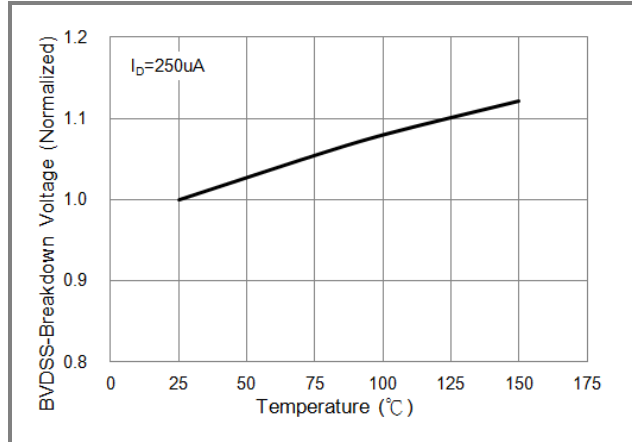


Fig.8 BV<sub>DSS</sub> vs. Junction Temperature

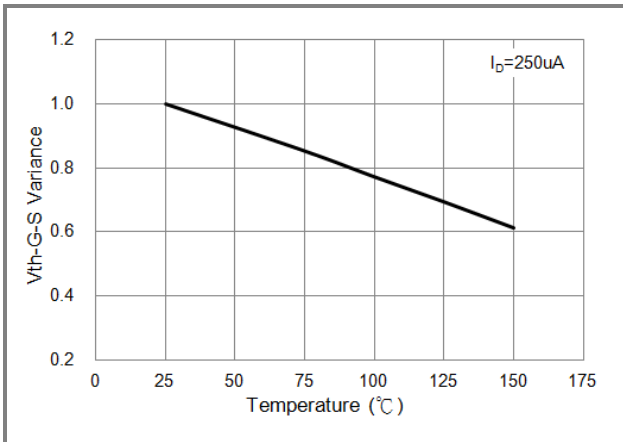


Fig.9 Threshold Voltage Variation with Temperature

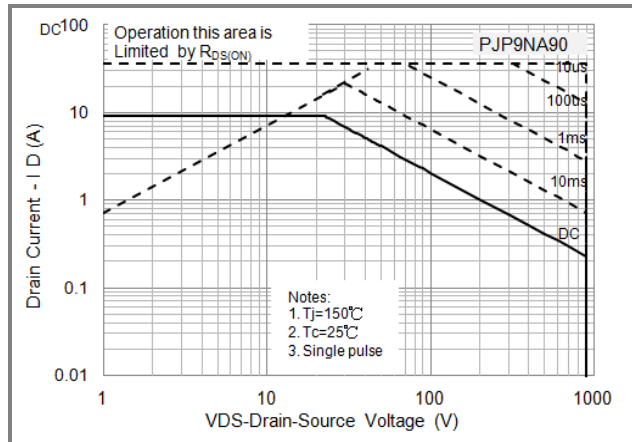


Fig.10 Maximum Safe Operating Area

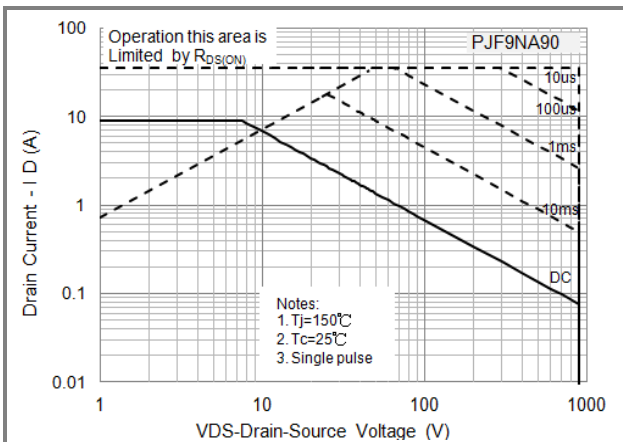


Fig.11 Maximum Safe Operating Area

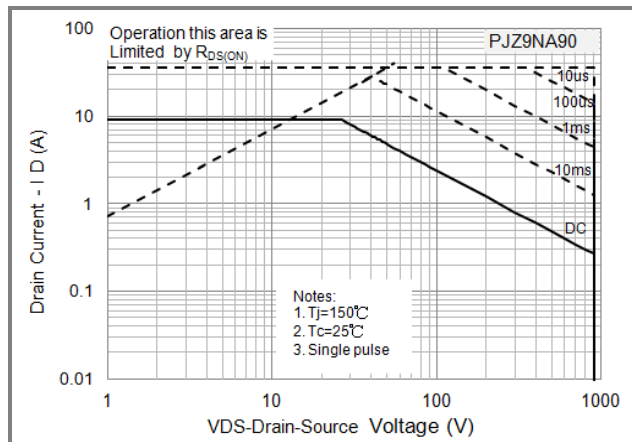


Fig.12 Maximum Safe Operating Area



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## TYPICAL CHARACTERISTIC CURVES

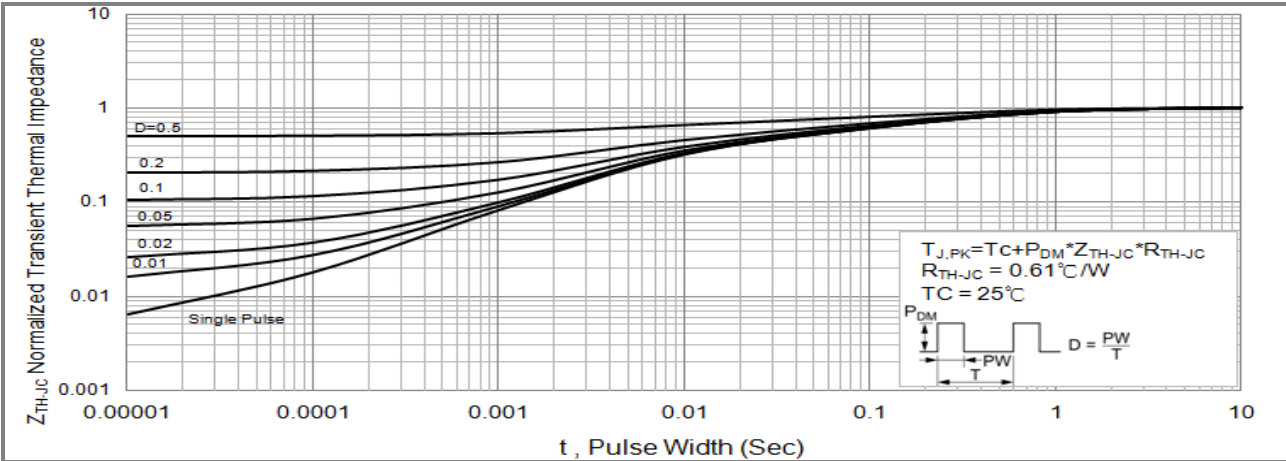


Fig.13 PJP9NA90 Normalized Transient Thermal Impedance vs. Pulse Width

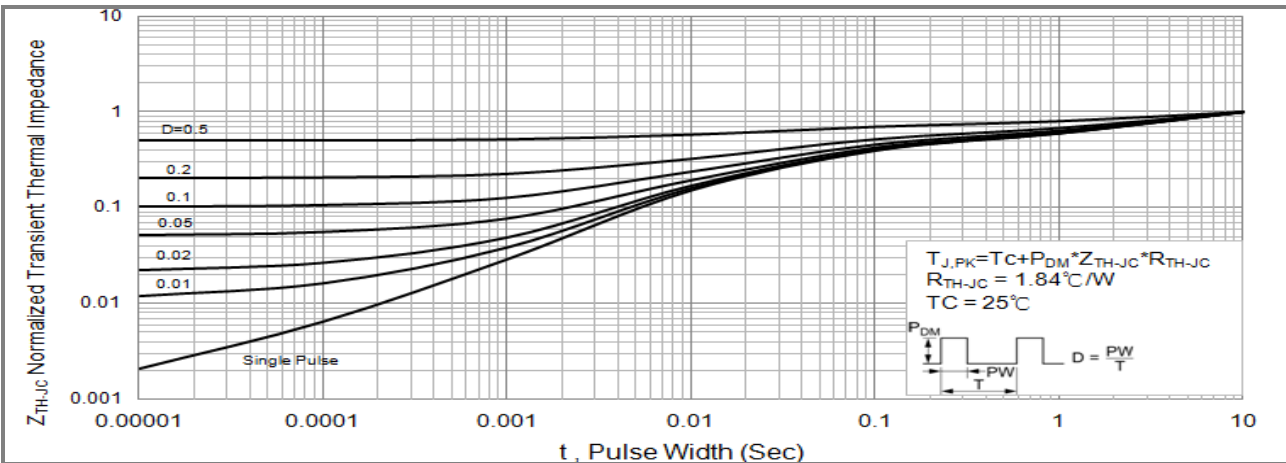


Fig.14 PJF9NA90 Normalized Transient Thermal Impedance vs. Pulse Width

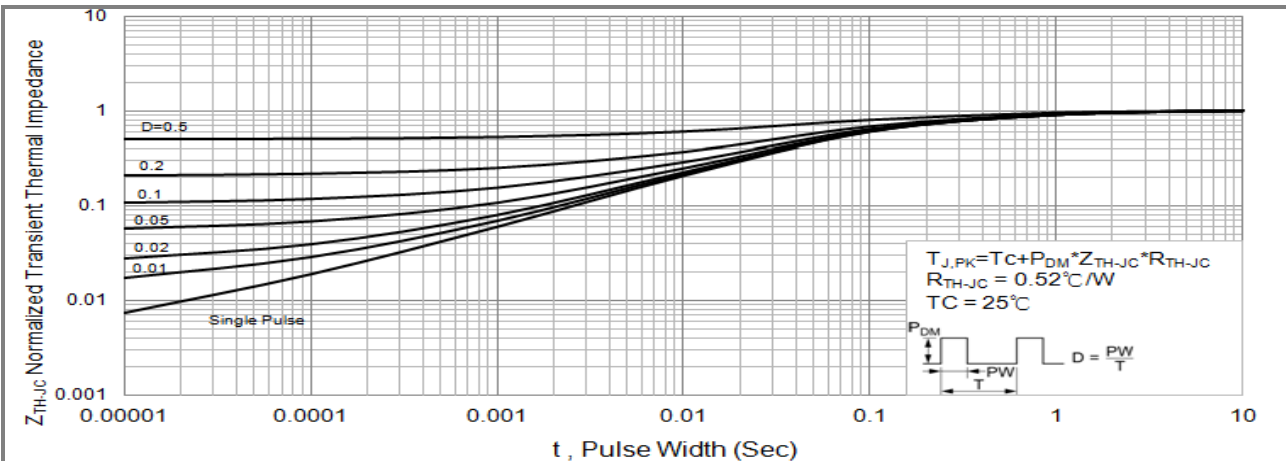
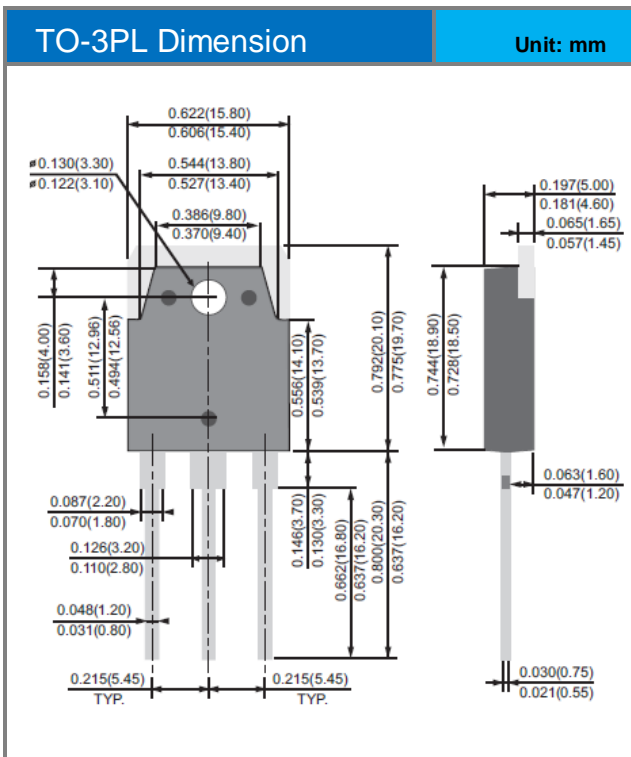
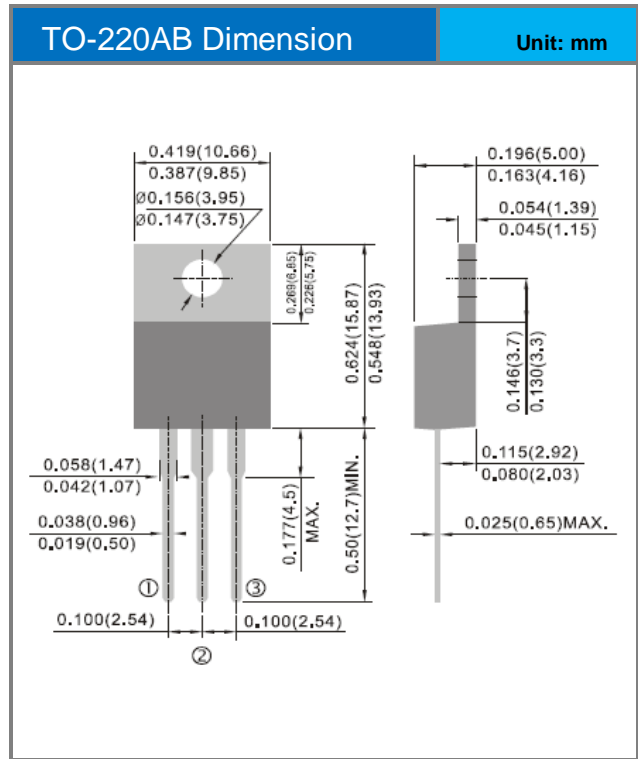
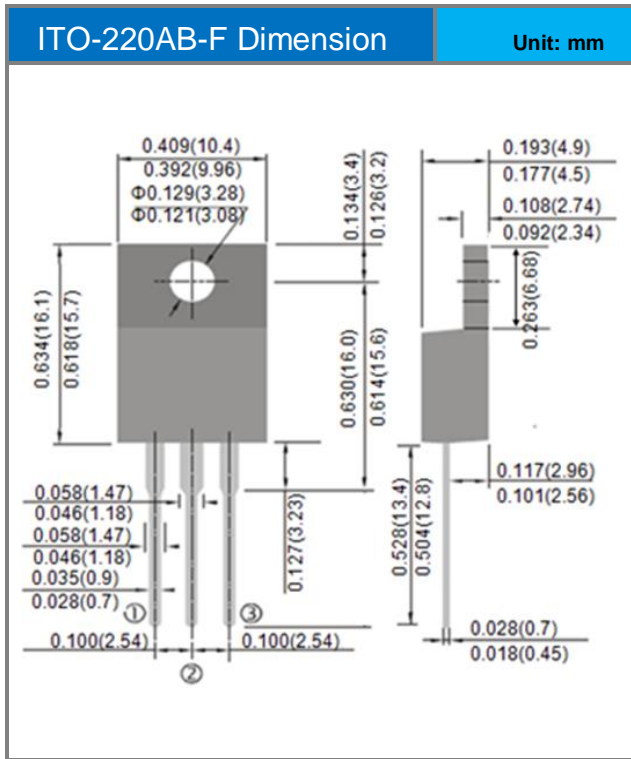


Fig.15 PJZ9NA90 Normalized Transient Thermal Impedance vs. Pulse Width



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## Packaging Information





## PJP9NA90 / PJF9NA90 / PJZ9NA90

### PART NO PACKING CODE VERSION

Part No Packing Code	Package Type	Packing type	Marking	Version
PJP9NA90_TO_00001	TO-220AB	50pcs / Tube	P9NA90	Halogen free
PJF9NA90_TO_00001	ITO-220AB-F	50pcs / Tube	F9NA90	Halogen free
PJZ9NA90_TO_10001	TO-3PL	30pcs / Tube	Z9NA90	Rohs



## **PJP9NA90 / PJF9NA90 / PJZ9NA90**

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