



PJN1NA50 / PJW1NA50 / PJU1NA50 / PJD1NA50

500V N-Channel MOSFET

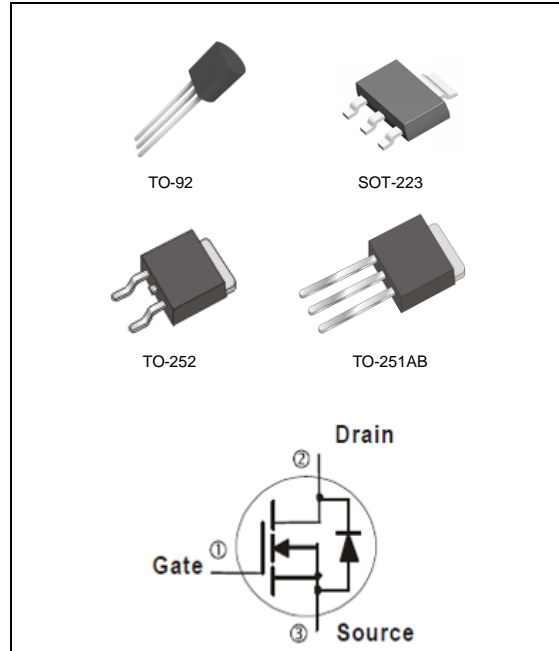
Voltage 500 V **Current** 1 A

Features

- $R_{DS(ON)}$, $V_{GS}@10V, I_D@0.5A < 9\Omega$
- 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-251AB, TO-252, SOT-223, TO-92 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- TO-251AB Approx. Weight : 0.0104 ounces, 0.297grams
- TO-252 Approx. Weight : 0.0104 ounces, 0.297grams
- SOT-223 Approx. Weight : 0.043 ounces, 0.123grams
- TO-92 Approx. Weight : 0.007 ounces, 0.196grams



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

PARAMETER	SYMBOL	TO-251AB	TO-252	SOT-223	TO-92	UNITS
Drain-Source Voltage	V_{DS}	500				V
Gate-Source Voltage	V_{GS}	± 30				V
Continuous Drain Current	I_D	1		0.3		A
Pulsed Drain Current	I_{DM}	4		1.2		A
Single Pulse Avalanche Energy ^(Note 1)	E_{AS}	42				mJ
Power Dissipation	$T_C=25^\circ\text{C}$	25		3.3	3	W
	Derate above 25°C	0.2		0.026	0.024	W/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~150				$^\circ\text{C}$
Typical Thermal resistance						$^\circ\text{C/W}$
- Junction to Case	$R_{\theta JC}$	5		-	-	
- Junction to Ambient	$R_{\theta JA}$	110		37.9 ^(Note 4)	140	

- 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	3.02	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=0.5A$	-	7.6	9	Ω
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$	-	0.02	1.0	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	-	± 20	± 100	nA
Diode Forward Voltage	V_{SD}	$I_S=1A, V_{GS}=0V$	-	0.86	1.4	V
Dynamic (Note 5)						
Total Gate Charge	Q_g	$V_{DS}=400V, I_D=1A,$ $V_{GS}=10V$ (Note 2,3)	-	4.2	-	nC
Gate-Source Charge	Q_{gs}		-	1.7	-	
Gate-Drain Charge	Q_{gd}		-	1.4	-	
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	95	-	pF
Output Capacitance	C_{oss}		-	23	-	
Reverse Transfer Capacitance	C_{rss}		-	0.3	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=250V, I_D=1A,$ $R_G=25\Omega$ (Note 2,3)	-	5	-	ns
Turn-On Rise Time	t_r		-	20	-	
Turn-Off Delay Time	$t_{d(off)}$		-	8	-	
Turn-Off Fall Time	t_f		-	24	-	
Drain-Source Diode						
Maximum Continuous Drain-Source Diode Forward Current	I_S	---	-	-	1	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	-	-	4	A
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_S=1A$	-	155	-	ns
Reverse Recovery Charge	Q_{rr}	$di_F/dt=100A/\mu s$ (Note 2)	-	0.53	-	μC

NOTES :

1. $L=30\text{mH}, I_{AS}=1.6A, V_{DD}=50V, R_G=25\text{ohm},$ 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. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins mounted on a 1 inch FR-4 with 2oz. square pad of copper.
5. Guaranteed by design, not subject to production testing



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TYPICAL CHARACTERISTIC CURVES

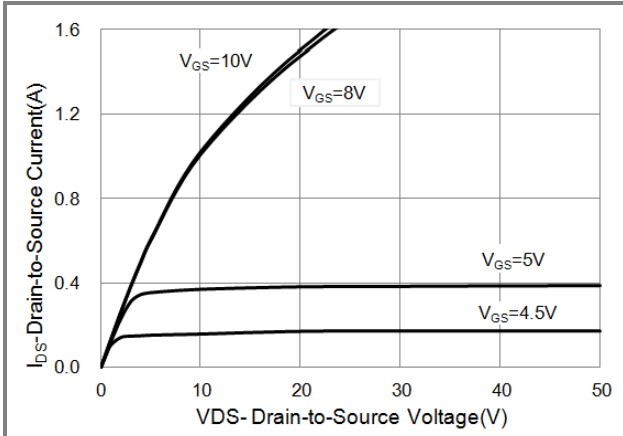


Fig.1 Output Characteristics

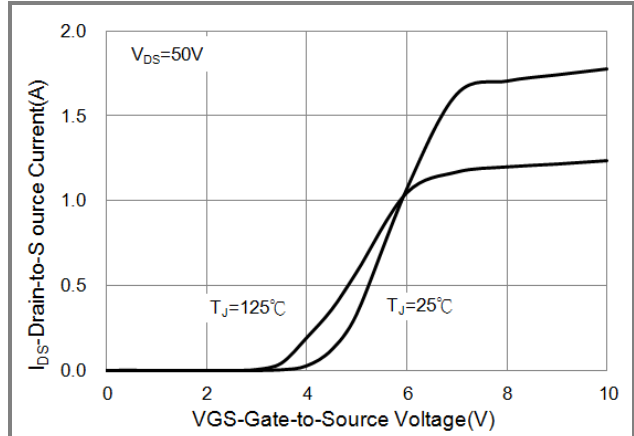


Fig.2 Transfer Characteristics

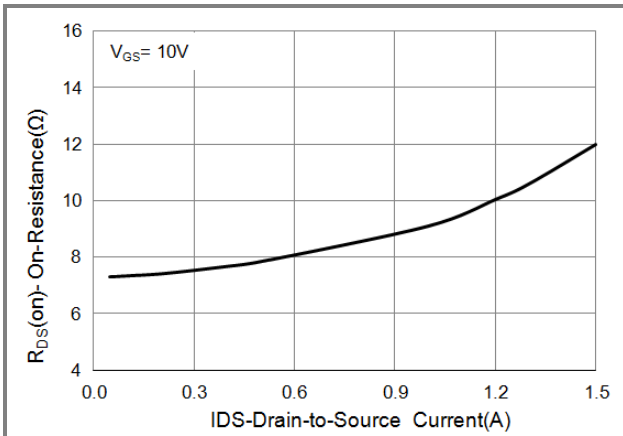


Fig.3 On-Resistance vs. Drain Current

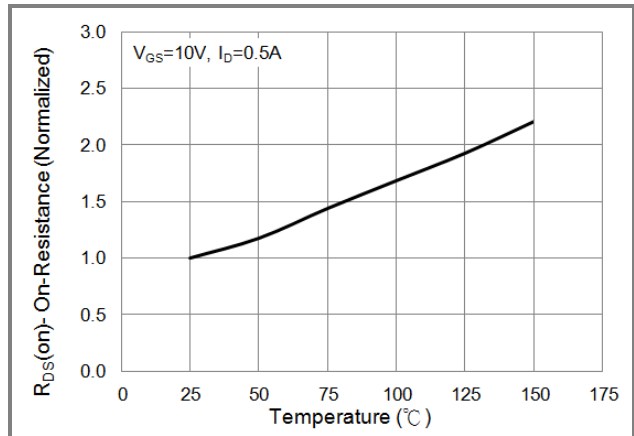


Fig.4 On-Resistance vs. Junction Temperature

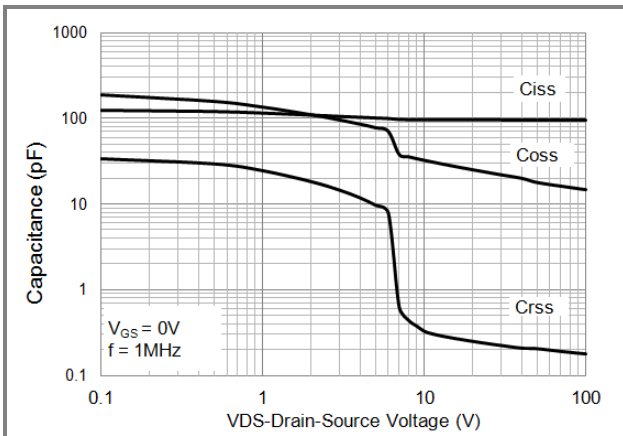


Fig.5 Capacitance vs. Drain-Source Voltage

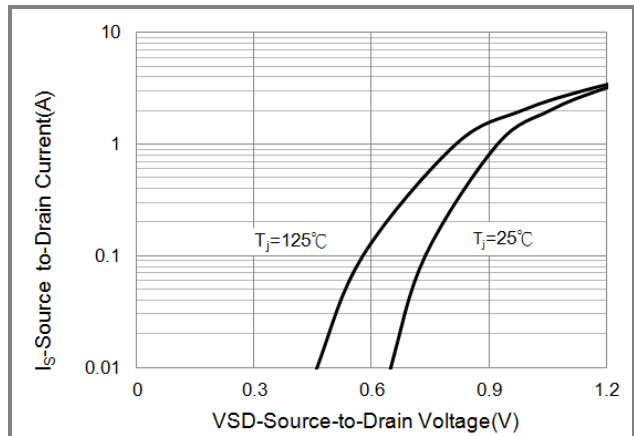


Fig.6 Source-Drain Diode Forward Voltage



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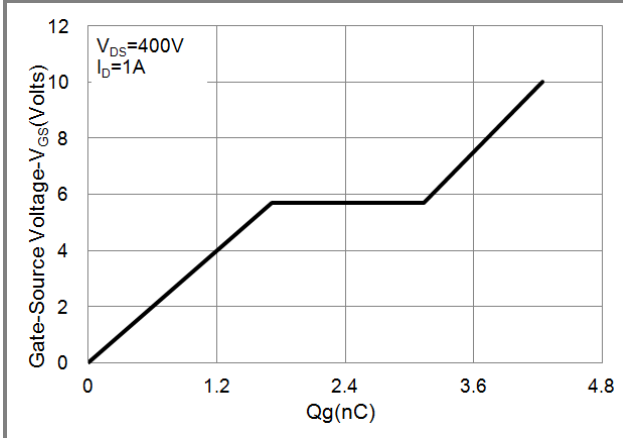


Fig.7 Gate Charge

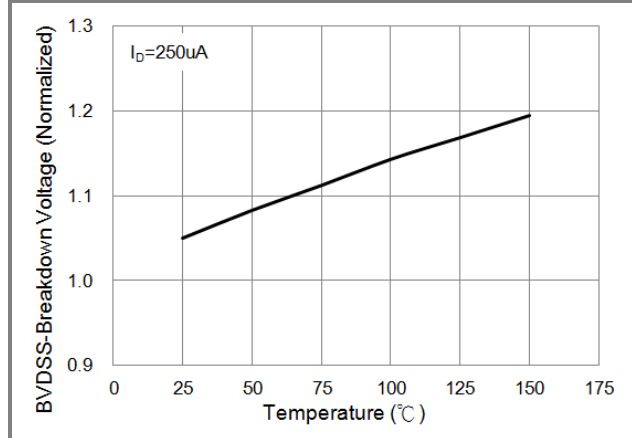


Fig.8 BV_{DSS} vs. Junction Temperature

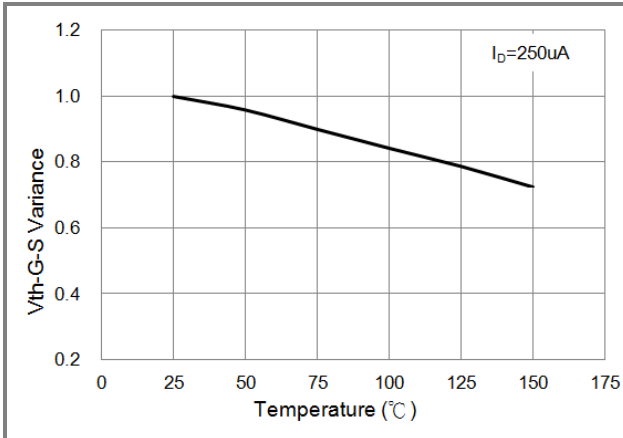


Fig.9 Threshold Voltage Variation with Temperature

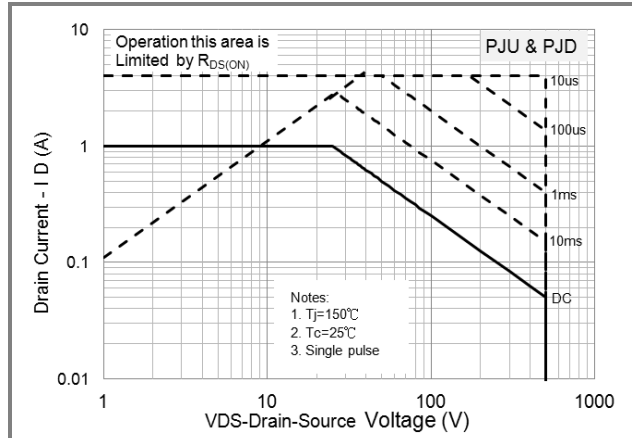


Fig.10 Maximum Safe Operating Area

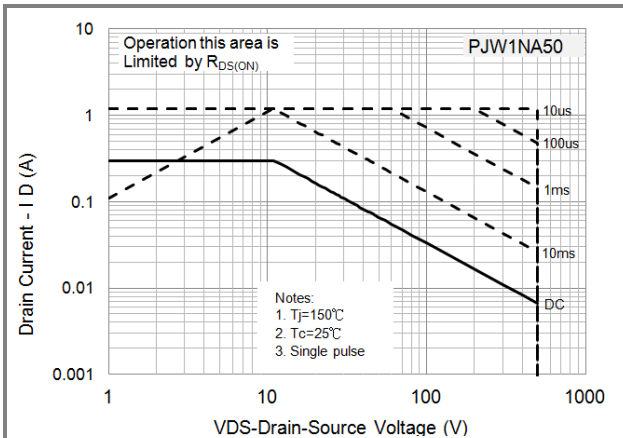


Fig.11 Maximum Safe Operating Area

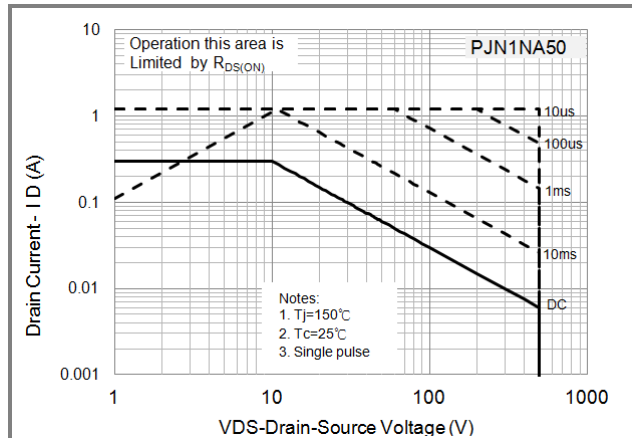


Fig.12 Maximum Safe Operating Area



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TYPICAL CHARACTERISTIC CURVES

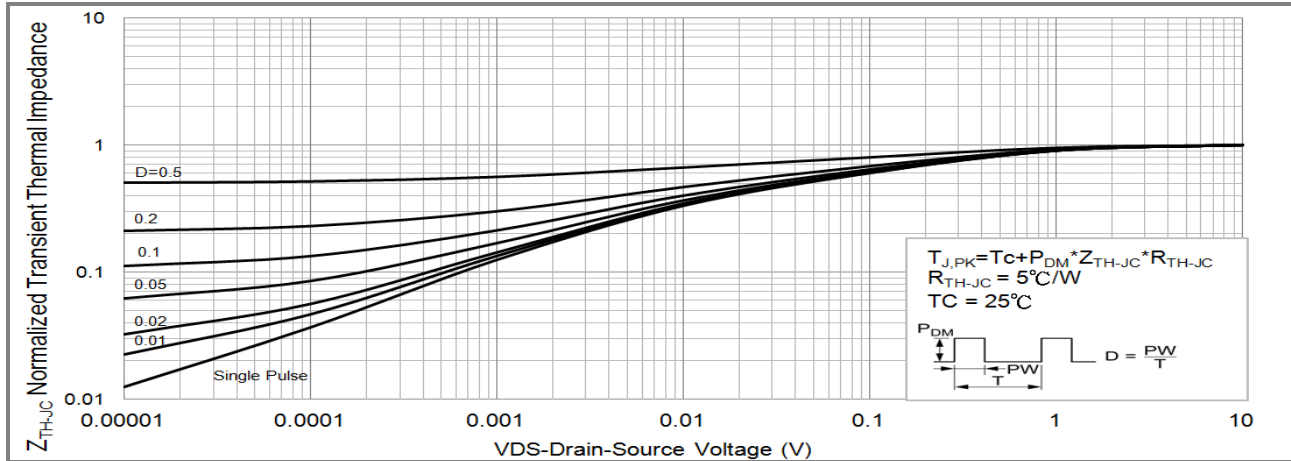


Fig.13 PJU/PJD Normalized Transient Thermal Impedance vs. Pulse Width

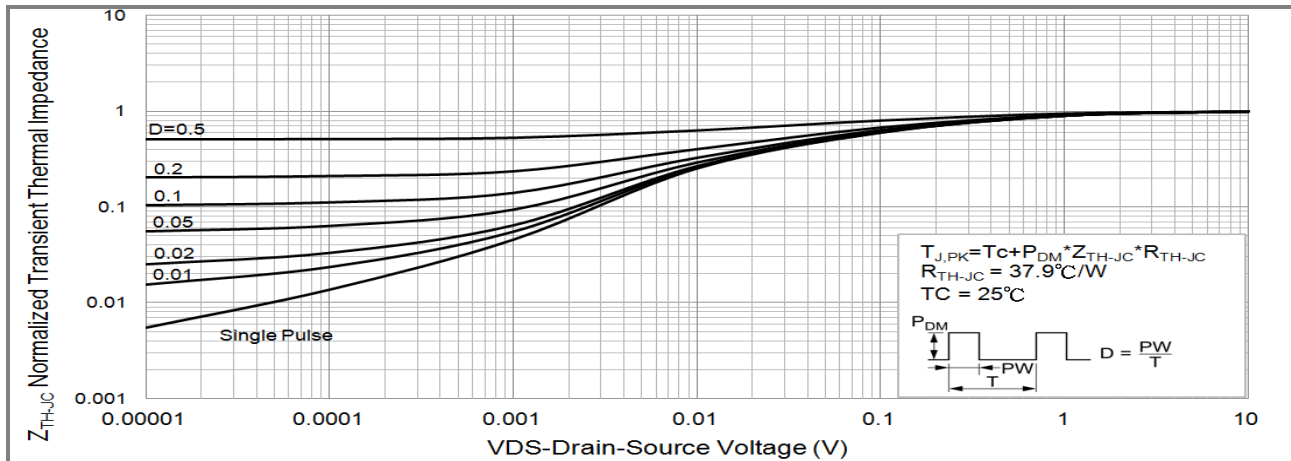


Fig.14 PJW1NA50 Normalized Transient Thermal Impedance vs. Pulse Width

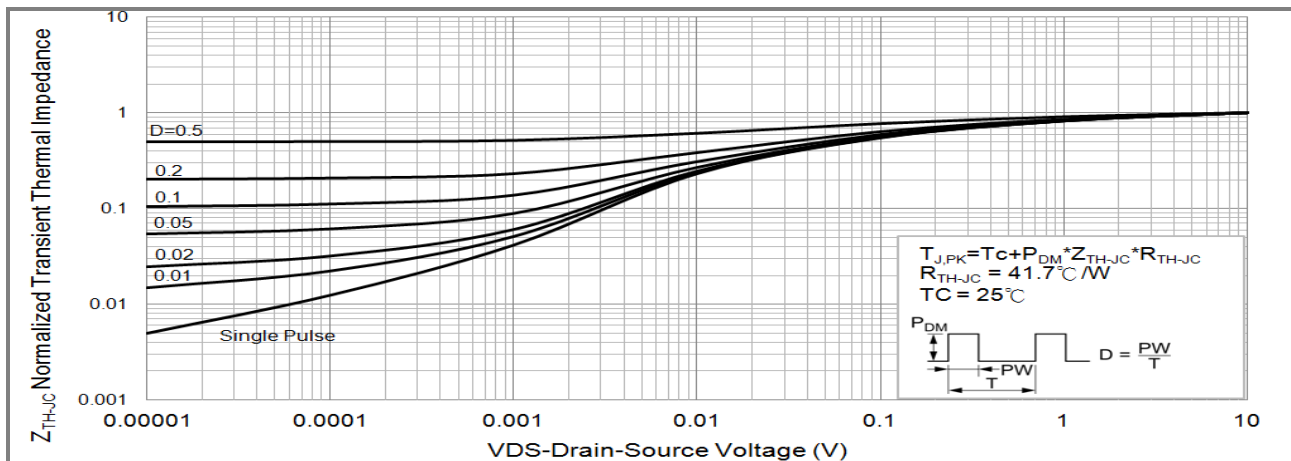
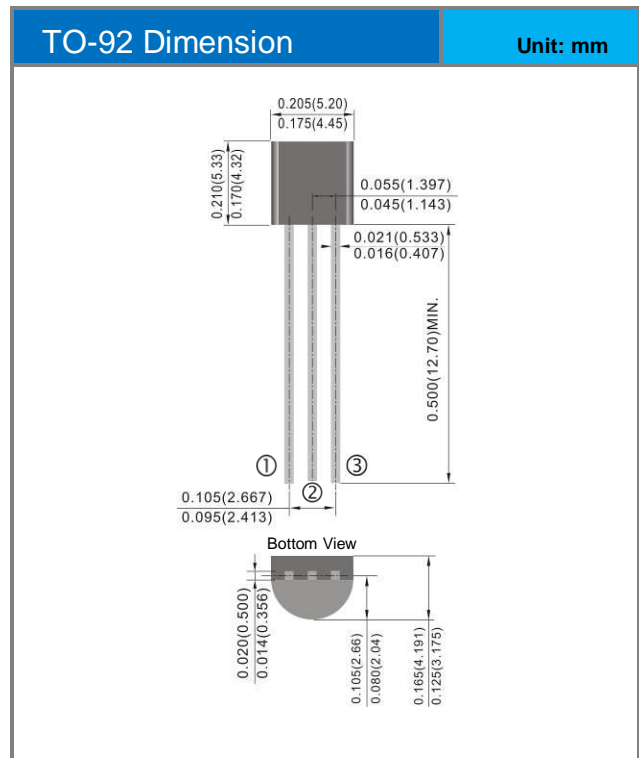
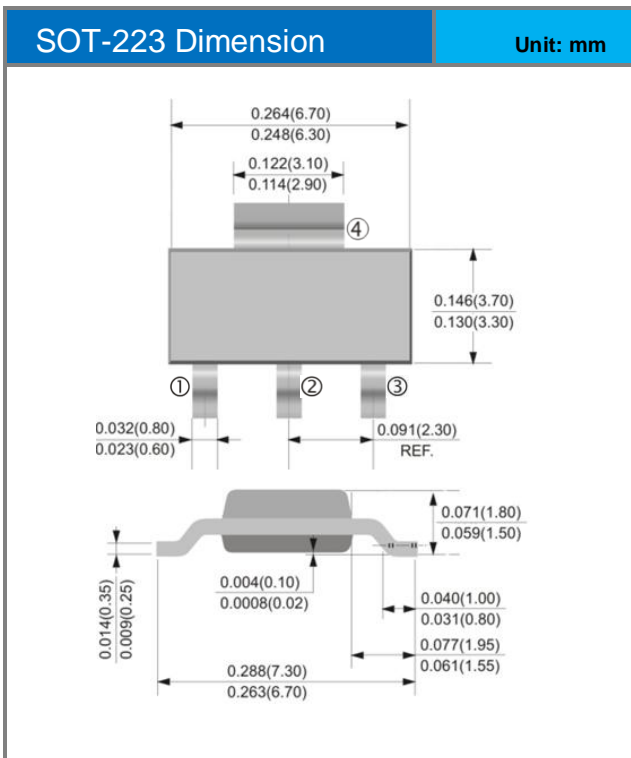
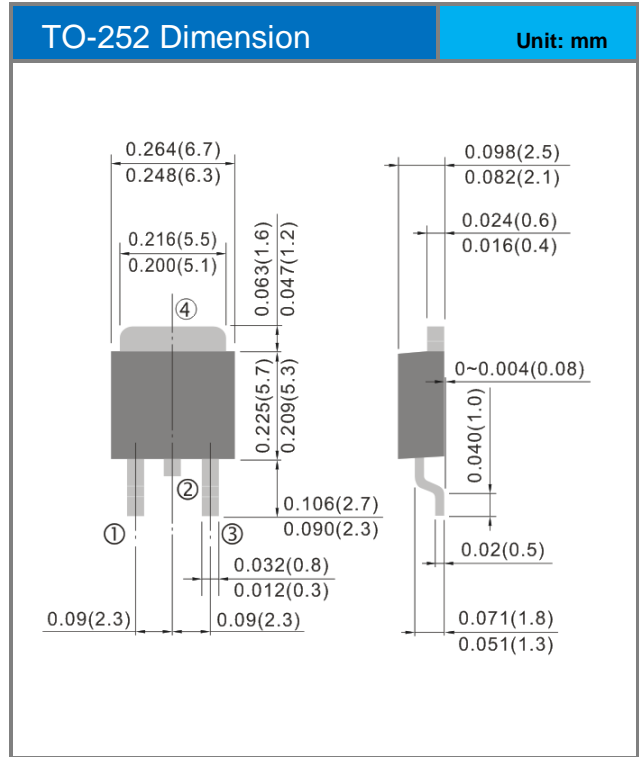
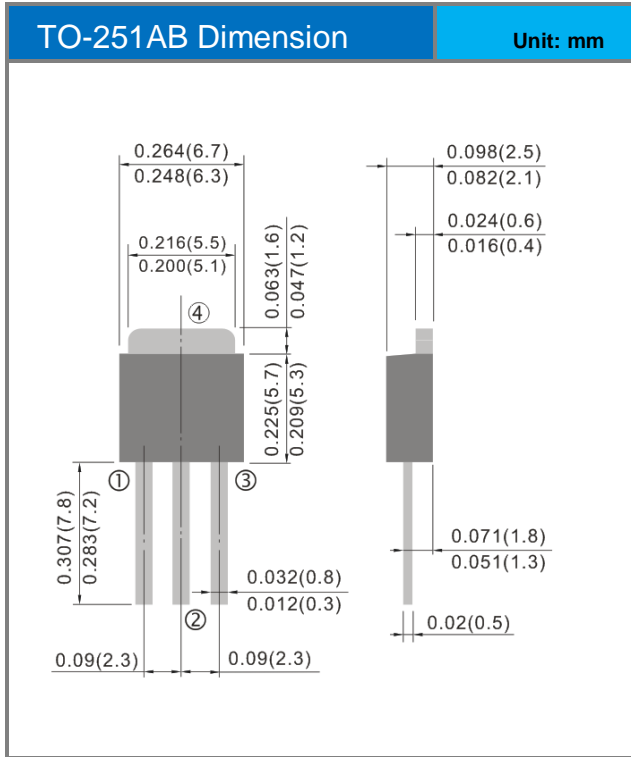


Fig.15 PJN1NA50 Normalized Transient Thermal Impedance vs. Pulse Width



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Packaging Information





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PART NO PACKING CODE VERSION

Part No Packing Code	Package Type	Packing type	Marking	Version
PJU1NA50_T0_00001	TO-251AB	80pcs / Tube	U1NA50	Halogen free
PJD1NA50_L2_00001	TO-252	3,000pcs / 13" reel	D1NA50	Halogen free
PJW1NA50_R2_00001	SOT-223	2,500pcs / 13" reel	1NA50	Halogen free
PJN1NA50_B0_00001	TO-92	1000pcs / bag	1NA50	Halogen free
PJN1NA50_A0_00001	TO-92 AMMO	2000pcs / box	1NA50	Halogen free



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