



# PJN1NA50 / PJW1NA50 / PJU1NA50 / PJD1NA50

## 500V N-Channel MOSFET

**Voltage**

**500 V**

**Current**

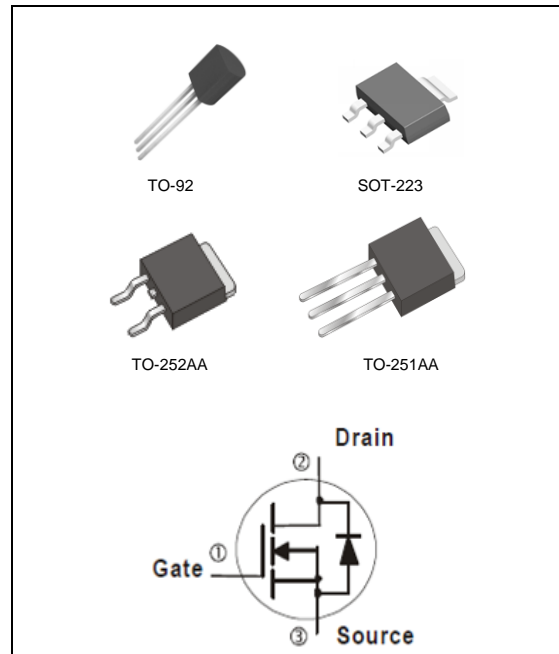
**1 A**

### 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 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case : TO-251AA, TO-252AA, SOT-223, TO-92 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- TO-251AA Approx. Weight : 0.0104 ounces, 0.297grams
- TO-252AA 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-251AA	TO-252AA	SOT-223	TO-92	UNITS
Drain-Source Voltage		$V_{DS}$	500				V
Gate-Source Voltage		$V_{GS}$	$\pm 30$				V
Continuous Drain Current		$I_D$	1		0.3		A
Pulsed Drain Current		$I_{DM}$	4		1.2		A
Single Pulse Avalanche Energy <sup>(Note 1)</sup>		$E_{AS}$	42				mJ
Power Dissipation	$T_C=25^\circ\text{C}$	$P_D$	25		3.3	3	W
	Derate above $25^\circ\text{C}$		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 <sup>(Note 4)</sup>	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
<b>Static</b>						
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	$\Omega$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=500V, V_{GS}=0V$	-	0.02	1.0	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	$\pm 20$	$\pm 100$	nA
Diode Forward Voltage	$V_{SD}$	$I_S=1A, V_{GS}=0V$	-	0.86	1.4	V
<b>Dynamic</b> (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	-	
<b>Drain-Source Diode</b>						
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	-	$\mu C$

### 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

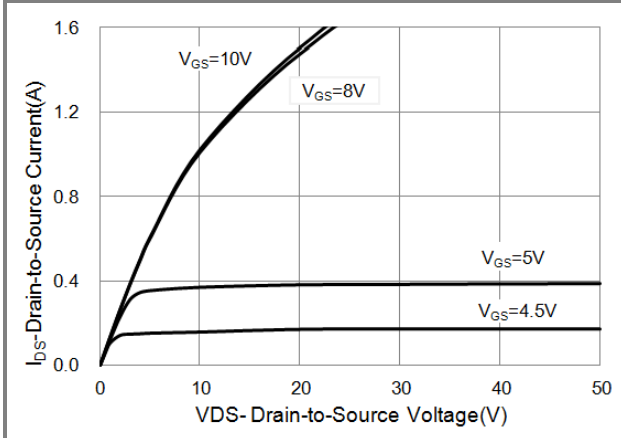


Fig.1 Output Characteristics

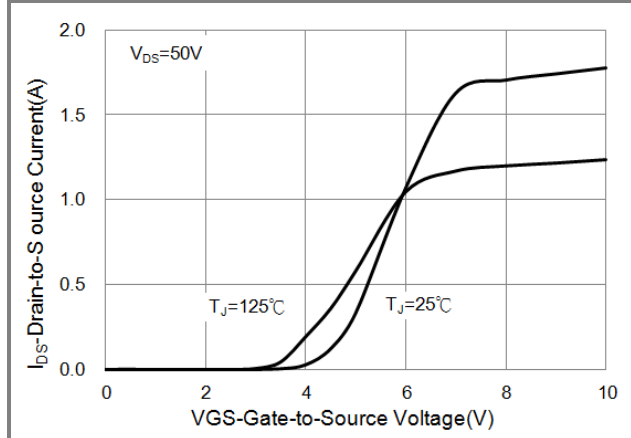


Fig.2 Transfer Characteristics

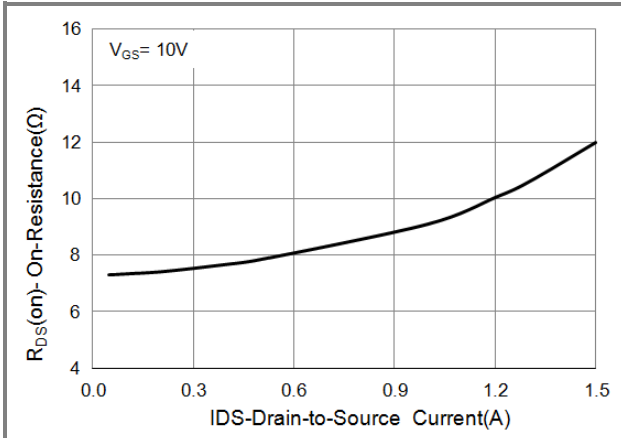


Fig.3 On-Resistance vs. Drain Current

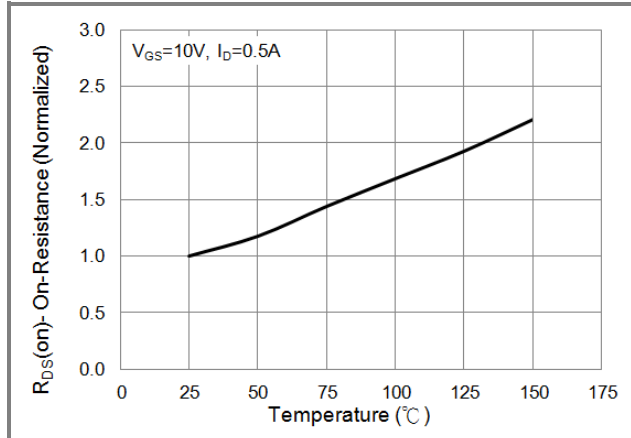


Fig.4 On-Resistance vs. Junction Temperature

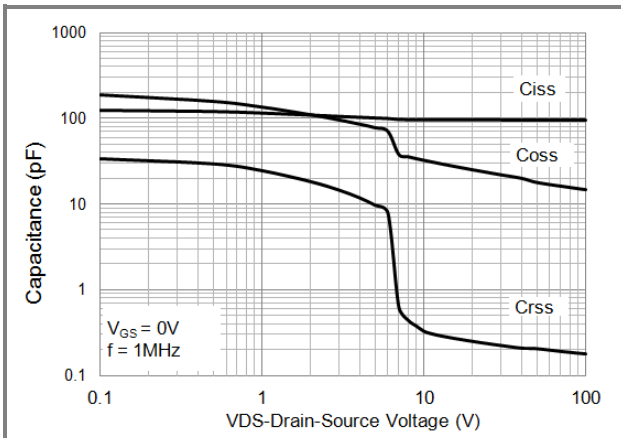


Fig.5 Capacitance vs. Drain-Source Voltage

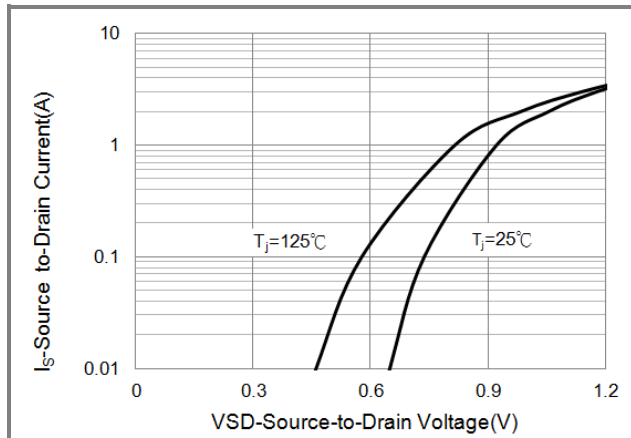


Fig.6 Source-Drain Diode Forward Voltage



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## TYPICAL CHARACTERISTIC CURVES

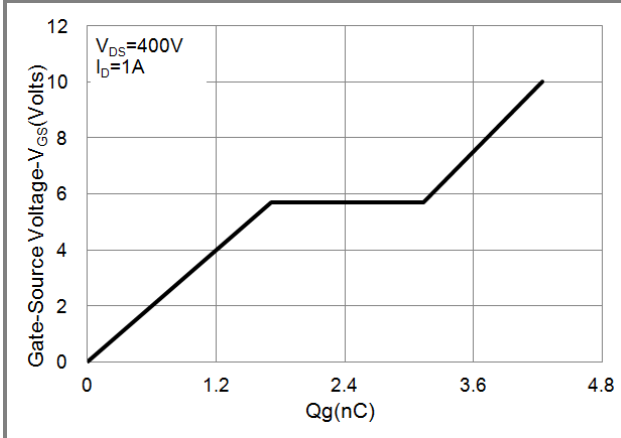


Fig.7 Gate Charge

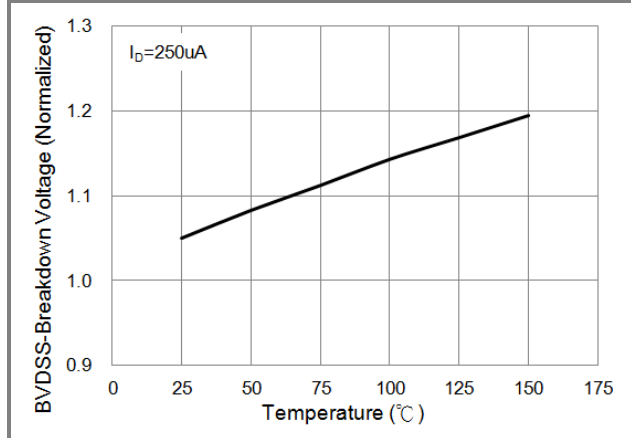


Fig.8  $B_{V_{DS}}$  vs. Junction Temperature

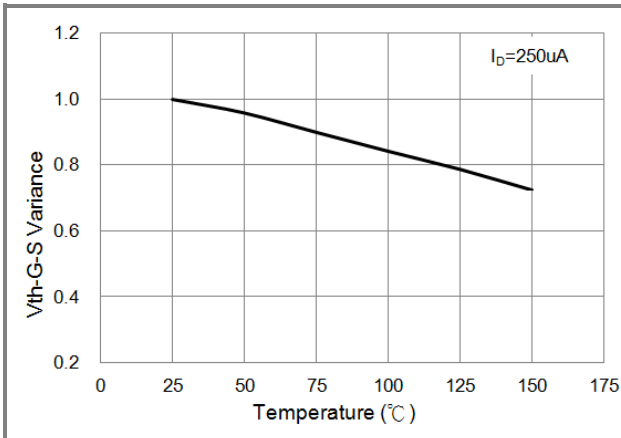


Fig.9 Threshold Voltage Variation with Temperature

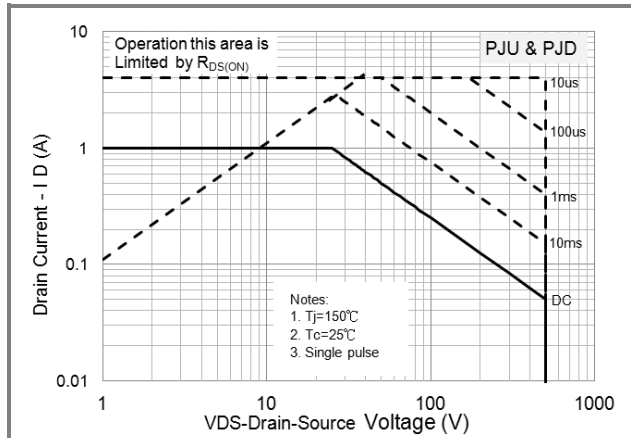


Fig.10 Maximum Safe Operating Area

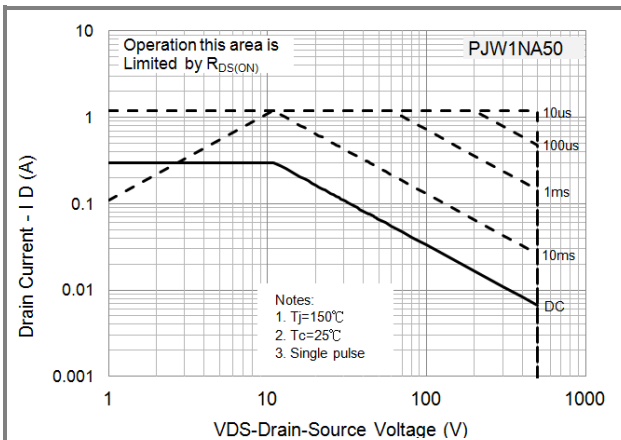


Fig.11 Maximum Safe Operating Area

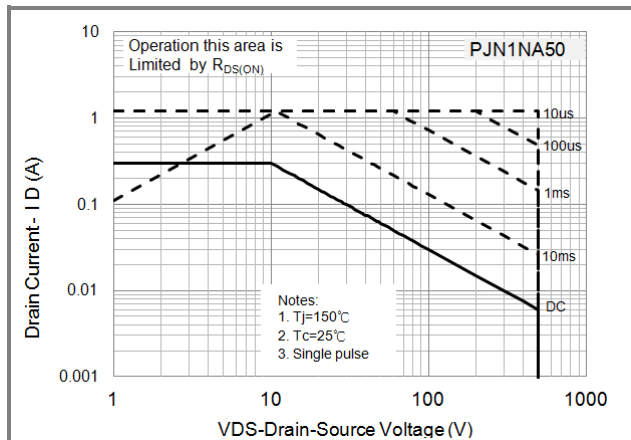


Fig.12 Maximum Safe Operating Area



# PJN1NA50 / PJW1NA50 / PJU1NA50 / PJD1NA50

## TYPICAL CHARACTERISTIC CURVES

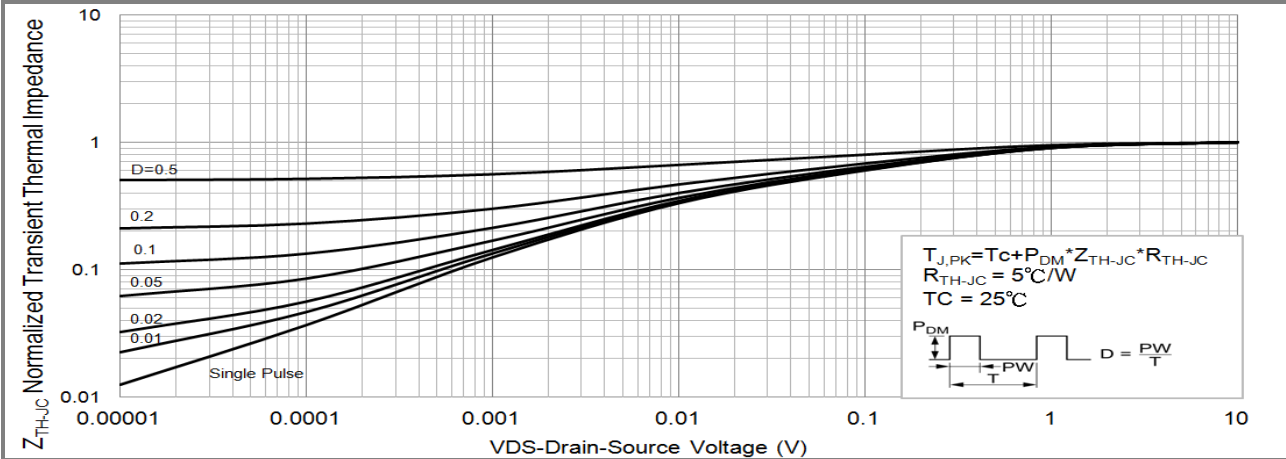


Fig.13 PJU/PJD Normalized Transient Thermal Impedance vs. Pulse Width

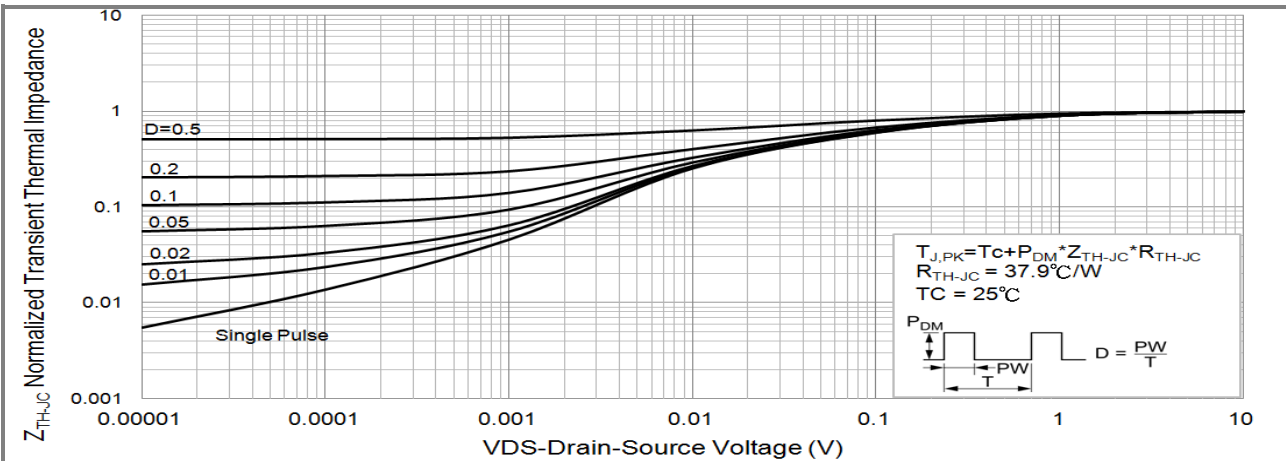


Fig.14 PJW1NA50 Normalized Transient Thermal Impedance vs. Pulse Width

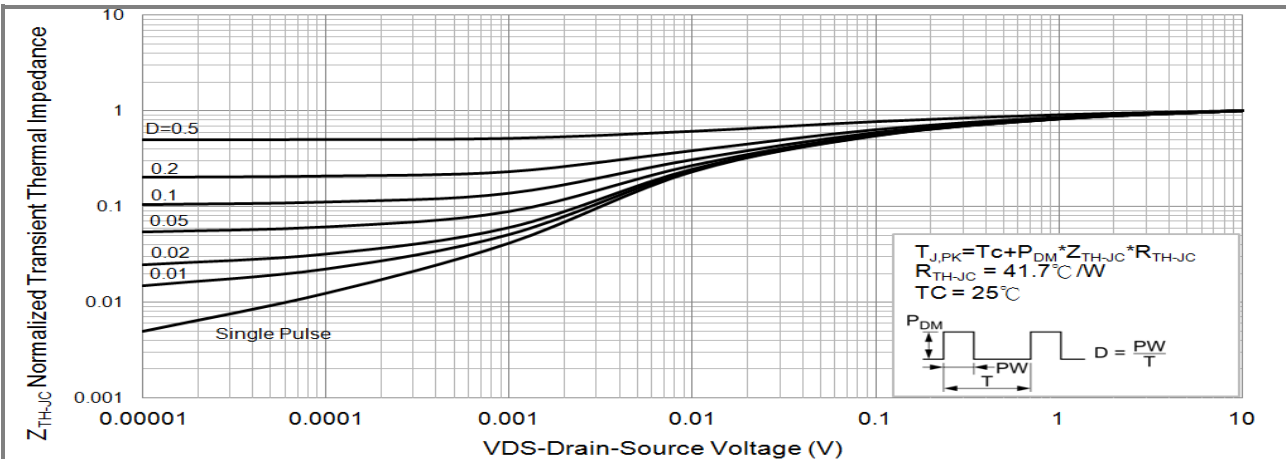
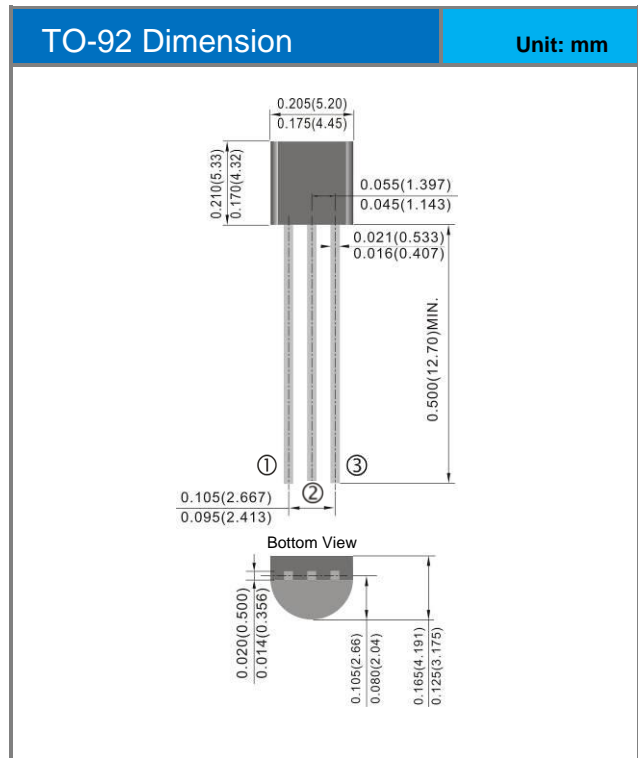
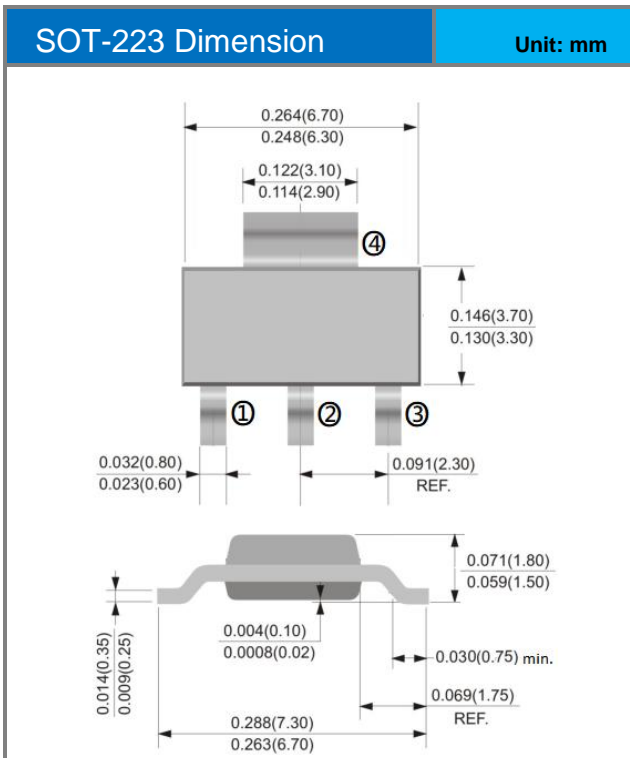
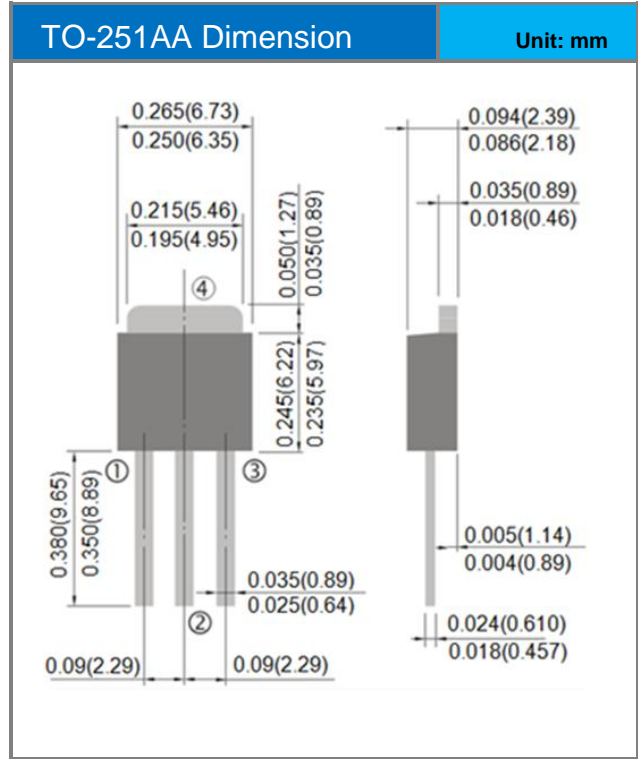
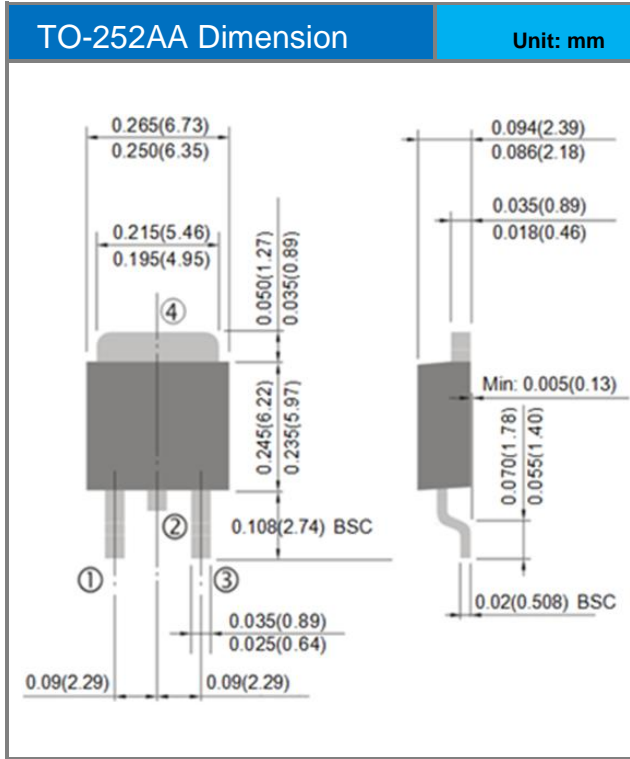


Fig.15 PJN1NA50 Normalized Transient Thermal Impedance vs. Pulse Width



# PJN1NA50 / PJW1NA50 / PJU1NA50 / PJD1NA50

## Packaging Information





## PJN1NA50 / PJW1NA50 / PJU1NA50 / PJD1NA50

### PART NO PACKING CODE VERSION

Part No Packing Code	Package Type	Packing type	Marking	Version
PJU1NA50_T0_00001	TO-251AA	80pcs / Tube	U1NA50	Halogen free
PJD1NA50_L2_00001	TO-252AA	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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