



# PJU40N06A / PJD40N06A / PJP40N06A

## 60V N-Channel Enhancement Mode MOSFET

**Voltage**

**60 V**

**Current**

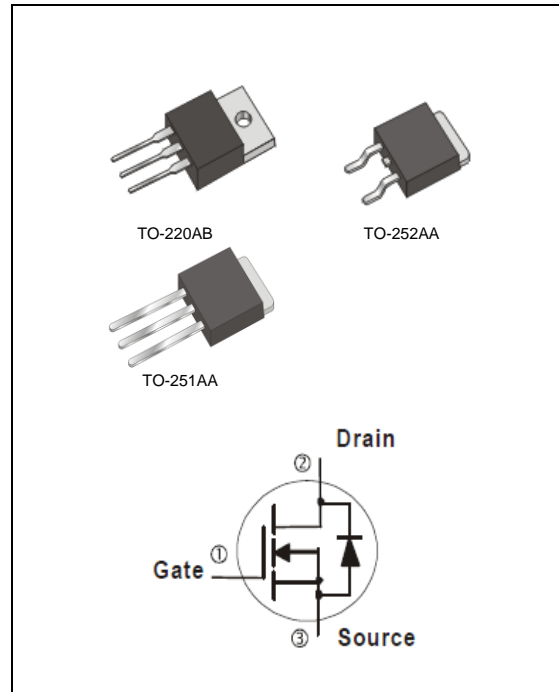
**40 A**

### Features

- $R_{DS(ON)}$ ,  $V_{GS}@10V$ ,  $I_D@20A < 17m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@4.5V$ ,  $I_D@10A < 20m\Omega$
- High switching speed
- Improved dv/dt capability
- 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, TO-220AB, 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
- TO-220AB Approx. Weight : 0.067 ounces, 2 grams



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

PARAMETER		SYMBOL	TO-251AA	TO-220AB	TO-252AA	UNITS
Drain-Source Voltage		$V_{DS}$	60			V
Gate-Source Voltage		$V_{GS}$	±20			
Continuous Drain Current	$T_C=25^\circ C$	$I_D$	40	50	40	A
	$T_C=100^\circ C$		25	32	25	
Pulsed Drain Current	$T_C=25^\circ C$	$I_{DM}$	160			
Power Dissipation	$T_C=25^\circ C$	$P_D$	60	93	60	W
	$T_C=100^\circ C$		24	37	24	
Single Pulse Avalanche Energy <sup>(Note 6)</sup>		$E_{AS}$	45			mJ
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~150			$^\circ C$
Typical Thermal Resistance						$^\circ C/W$
- Junction to Case		$R_{\theta JC}$	2.1	1.34	2.1	
- Junction to Ambient		$R_{\theta JA}$	110	62.5	110	

- 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	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.7	2.5	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	13	17	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	-	16	20	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	-	-	1.0	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>Dynamic</b> (Note 7)						
Total Gate Charge	$Q_g$	$V_{DS}=30V, I_D=10A,$ $V_{GS}=4.5V$ (Note 1,2)	-	13.5	-	nC
Gate-Source Charge	$Q_{gs}$		-	4.8	-	
Gate-Drain Charge	$Q_{gd}$		-	4.9	-	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	1574	-	pF
Output Capacitance	$C_{oss}$		-	118	-	
Reverse Transfer Capacitance	$C_{rss}$		-	77	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=15V, I_D=1A,$ $V_{GS}=10V, R_G=6\Omega$ (Note 1,2)	-	11	-	ns
Turn-On Rise Time	$t_r$		-	11	-	
Turn-Off Delay Time	$t_{d(off)}$		-	35	-	
Turn-Off Fall Time	$t_f$		-	8.1	-	
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$	---	-	-	40	A
Diode Forward Voltage	$V_{SD}$	$I_S=1A, V_{GS}=0V$	-	0.68	1	V

**NOTES :**

1. Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
2. Essentially independent of operating temperature typical characteristics.
3. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ\text{C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^\circ\text{C}$ .
4. The maximum current rating is package limited.
5.  $R_{\theta JA}$  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<sup>2</sup> with 2oz.square pad of copper.
6. The test condition is  $L=0.1\text{mH}, I_{AS}=30A, V_{DD}=25V, V_{GS}=10V$
7. Guaranteed by design, not subject to production testing.



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## TYPICAL CHARACTERISTIC CURVES

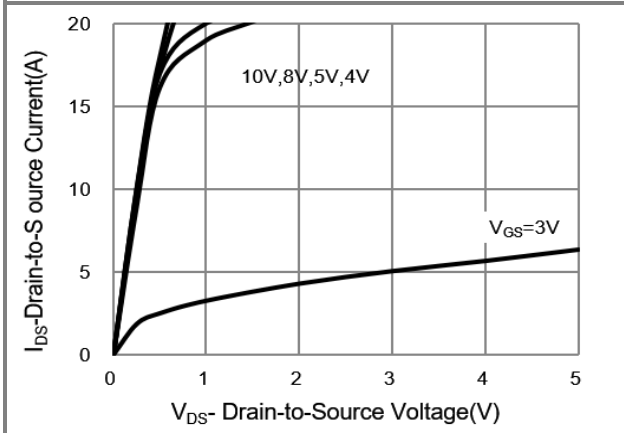


Fig.1 Output Characteristics

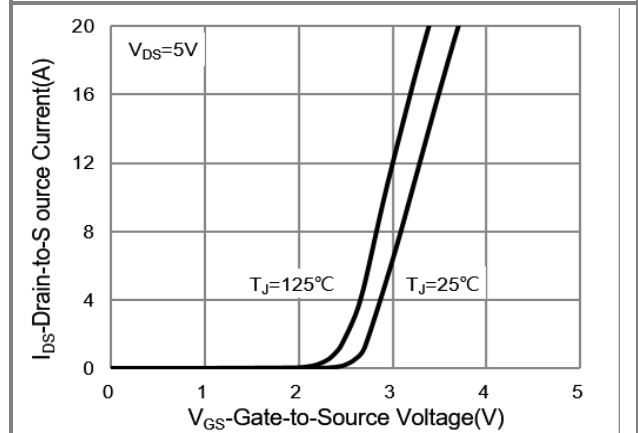


Fig.2 Transfer Characteristics

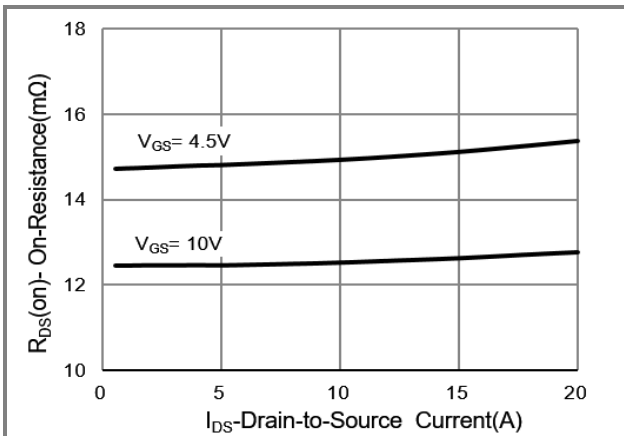


Fig.3 On-Resistance vs. Drain Current

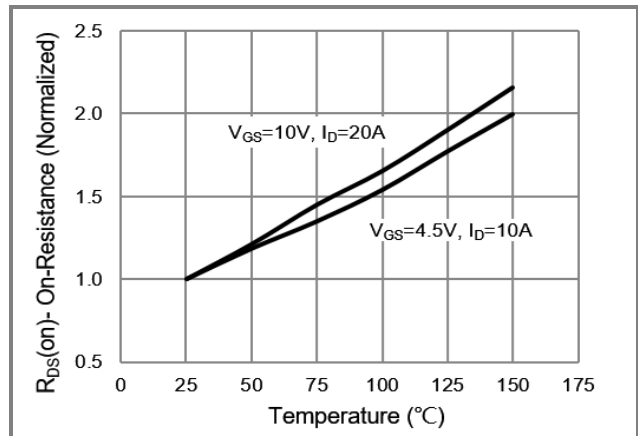


Fig.4 On-Resistance vs. Junction temperature

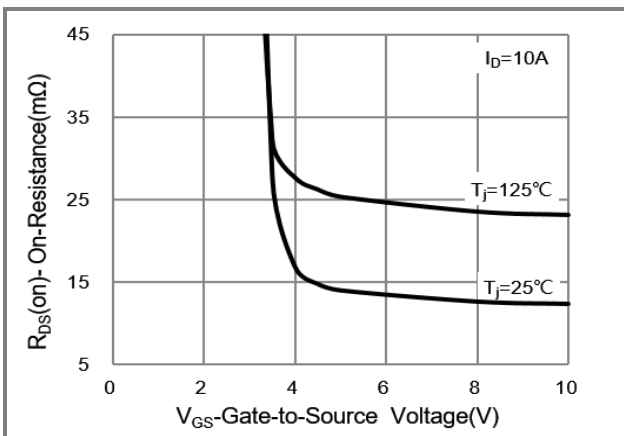


Fig.5 On-Resistance Variation with  $V_{GS}$

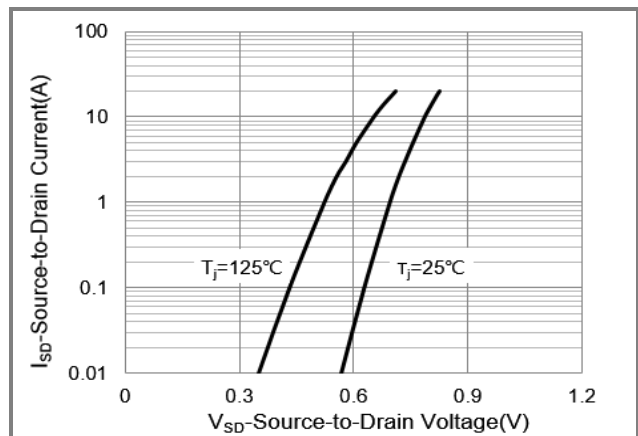


Fig.6 Source-Drain Diode Forward Voltage



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## TYPICAL CHARACTERISTIC CURVES

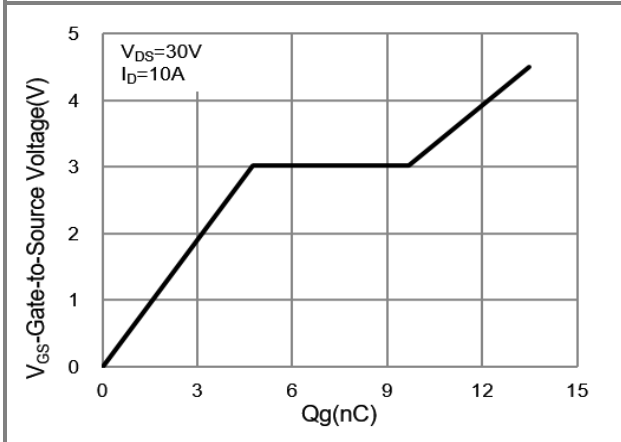


Fig.7 Gate-Charge Characteristics

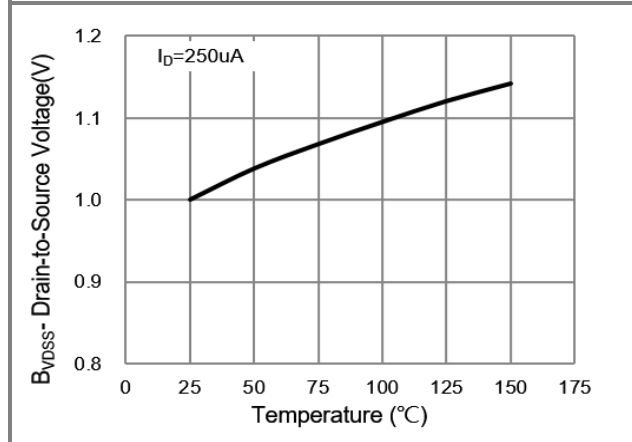


Fig.8 Breakdown Voltage Variation vs. Temperature

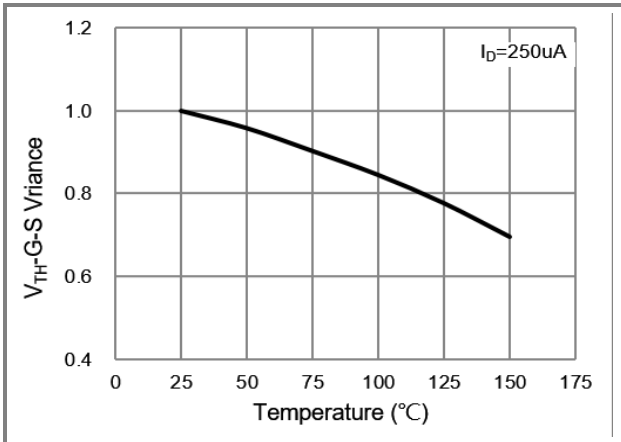


Fig.9 Threshold Voltage Variation with Temperature

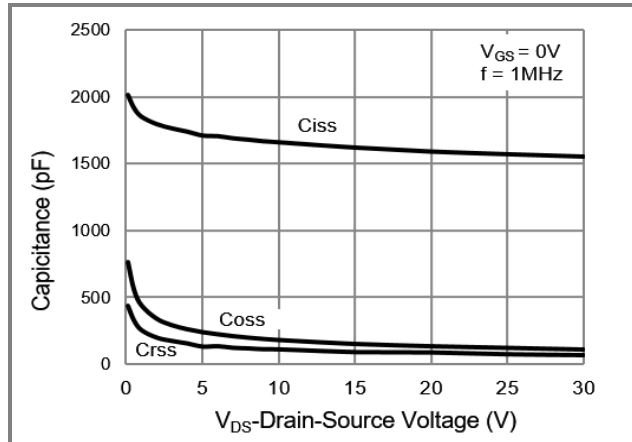


Fig.10 Capacitance vs. Drain-Source Voltage

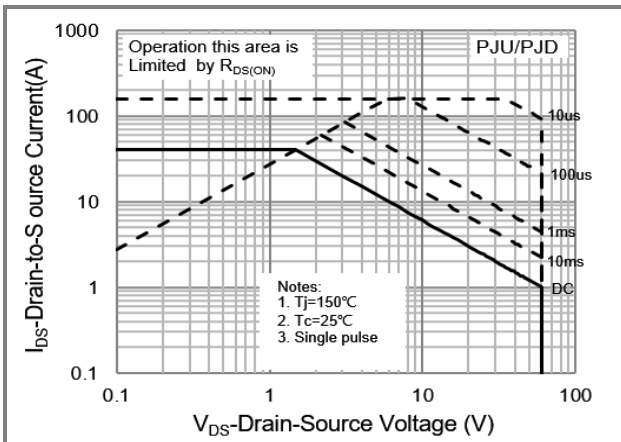


Fig.11 Maximum Safe Operating Area

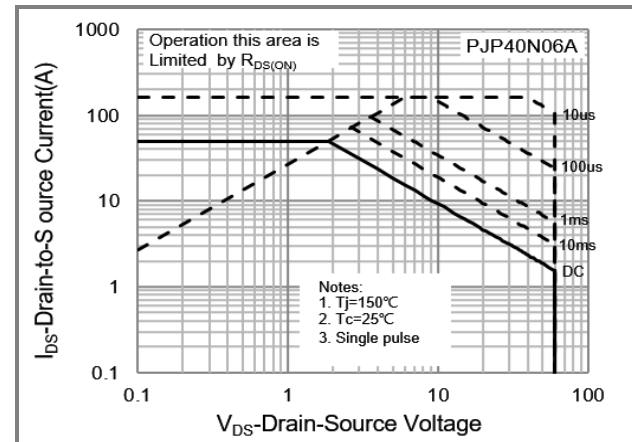


Fig.12 Maximum Safe Operating Area



# PJU40N06A / PJD40N06A / PJP40N06A

## TYPICAL CHARACTERISTIC CURVES

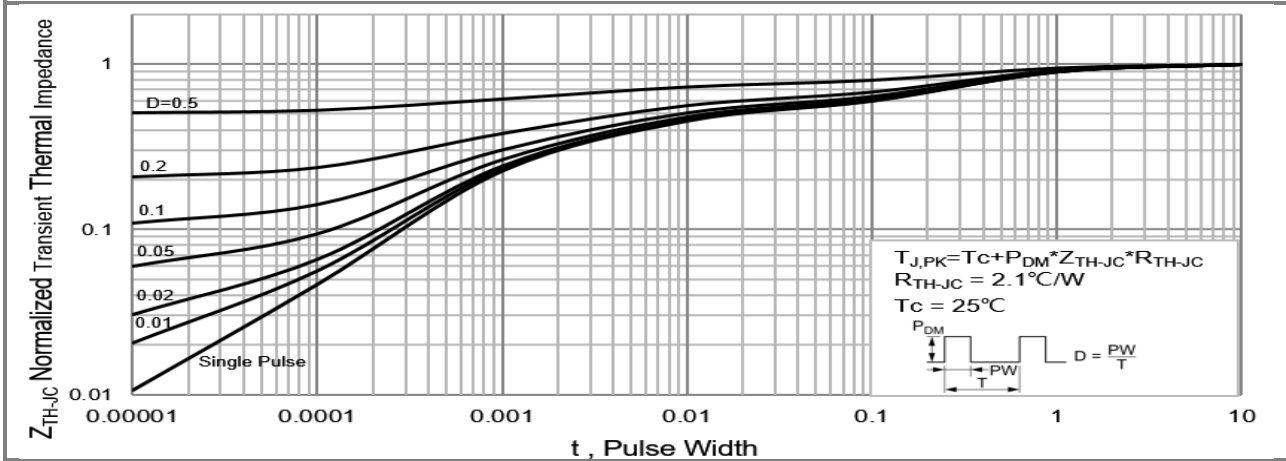


Fig.13 PJD/PJU Normalized Transient Thermal Impedance vs. Pulse Width

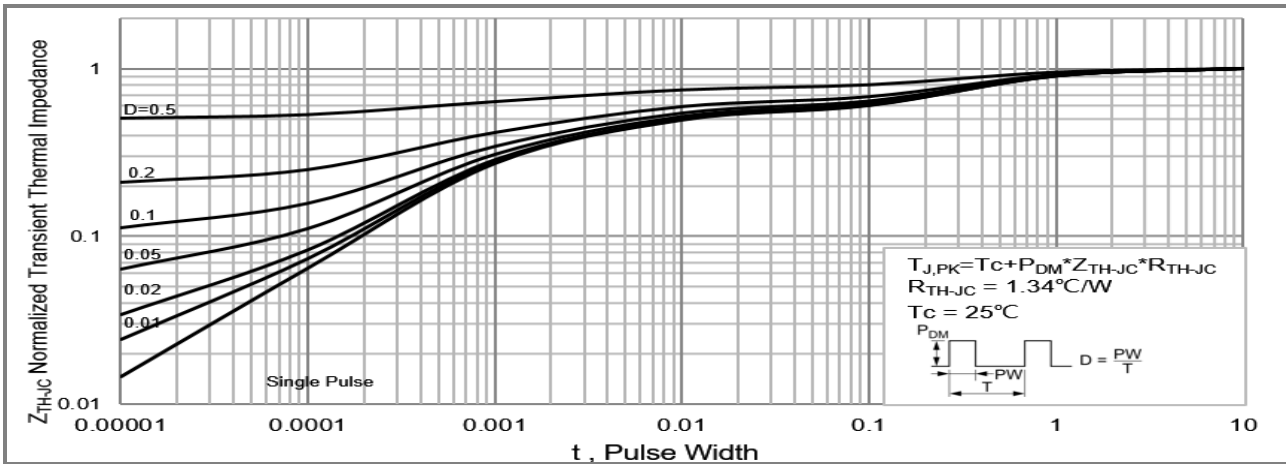
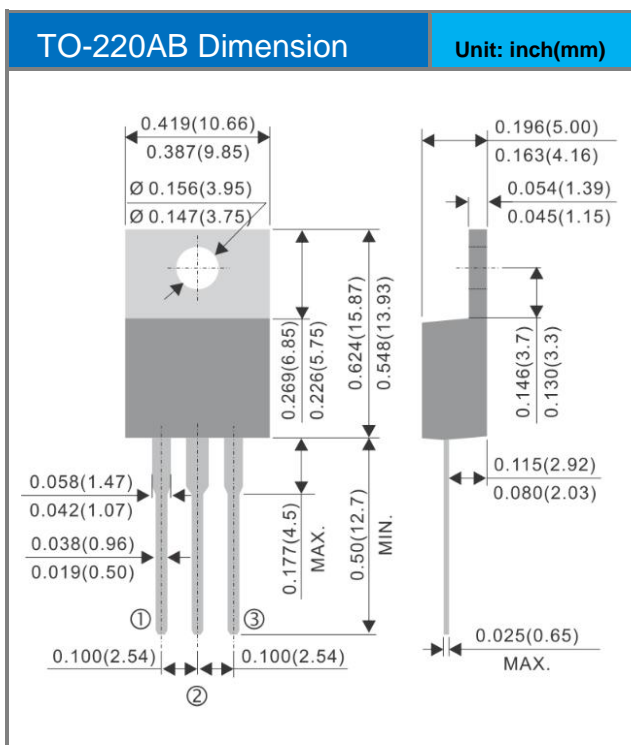
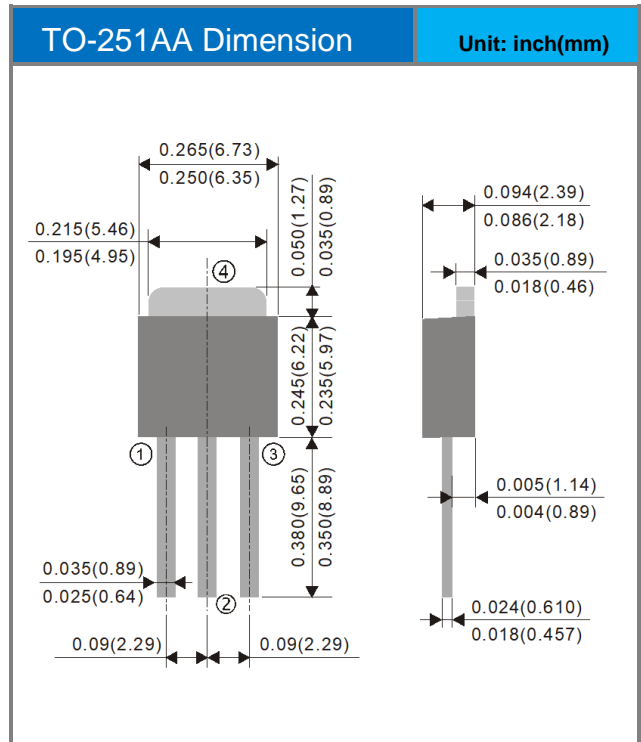
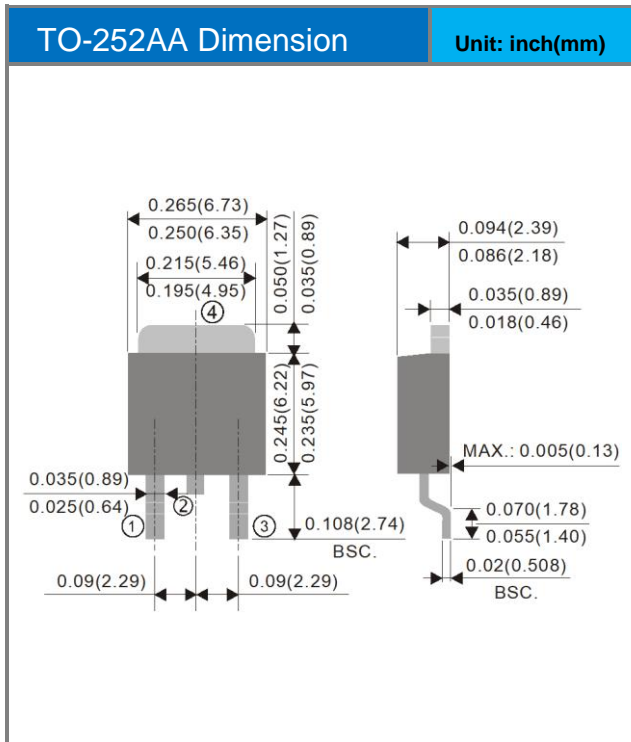


Fig.14 PJP40N06A Normalized Transient Thermal Impedance vs. Pulse Width



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## Packaging Information



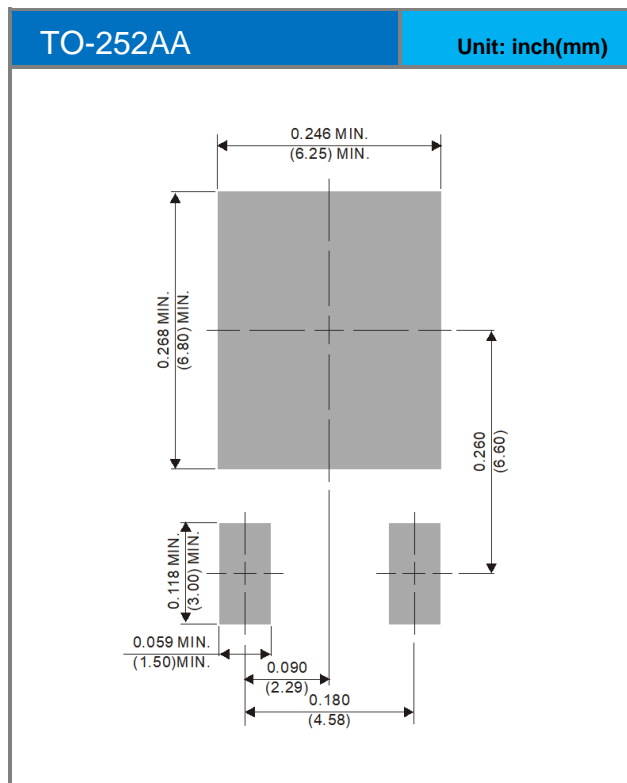


## PJU40N06A / PJD40N06A / PJP40N06A

### Part No Packing Code Version

Part No Packing Code	Package Type	Packing Type	Marking	Version
PJU40N06A_TO_00001	TO-251AA	80pcs / Tube	U40N06A	Halogen free
PJD40N06A_L2_00001	TO-252AA	3,000pcs / 13" reel	D40N06A	Halogen free
PJP40N06A_TO_00001	TO-220AB	50pcs / Tube	P40N06A	Halogen free

### Mounting Pad Layout





## **PJU40N06A / PJD40N06A / PJP40N06A**

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