



# PJU40N06A / PJD40N06A / PJP40N06A

## 60V N-Channel Enhancement Mode MOSFET

**Voltage**

**60 V**

**Current**

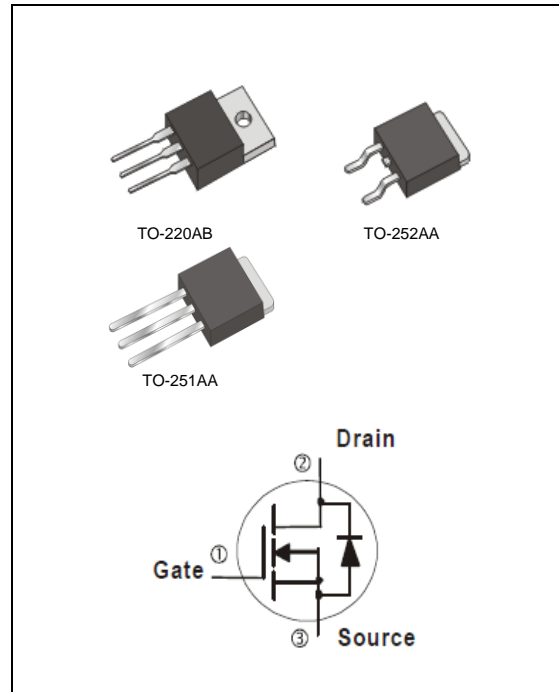
**40 A**

### 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						
- Junction to Case		$R_{\theta JC}$	2.1	1.34	2.1	$^\circ C/W$
- Junction to Ambient		$R_{\theta JA}$	110	62.5	110	

- Limited only By Maximum Junction Temperature



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### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
<b>Static</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	60	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	1.0	1.7	2.5	
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	13	17	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	-	16	20	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	-	-	1.0	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>Dynamic</b> (Note 7)						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =30V, I <sub>D</sub> =10A, V <sub>GS</sub> =4.5V (Note 1,2)	-	13.5	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	4.8	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	4.9	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHZ	-	1574	-	pF
Output Capacitance	C <sub>oss</sub>		-	118	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	77	-	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω (Note 1,2)	-	11	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	11	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	35	-	
Turn-Off Fall Time	t <sub>f</sub>		-	8.1	-	
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>	---	-	-	40	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =1A, V <sub>GS</sub> =0V	-	0.68	1	V

**NOTES :**

1. Pulse width ≤ 300us, Duty cycle ≤ 2%
2. Essentially independent of operating temperature typical characteristics.
3. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub> = 25°C.
4. The maximum current rating is package limited.
5. R<sub>θJA</sub> 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=0.1mH, I<sub>AS</sub>=30A, V<sub>DD</sub>=25V, V<sub>GS</sub>=10V
7. Guaranteed by design, not subject to production testing.



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## TYPICAL CHARACTERISTIC CURVES

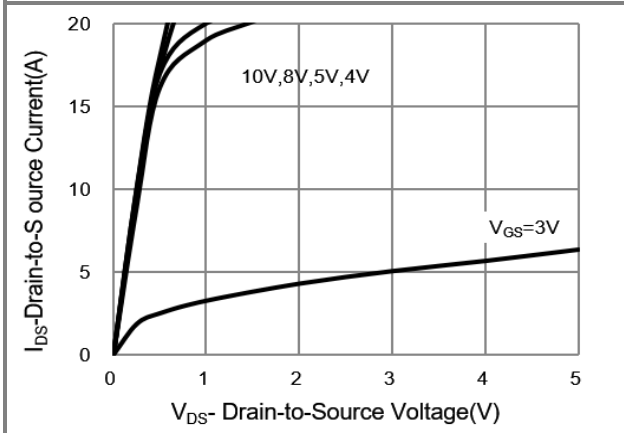


Fig.1 Output Characteristics

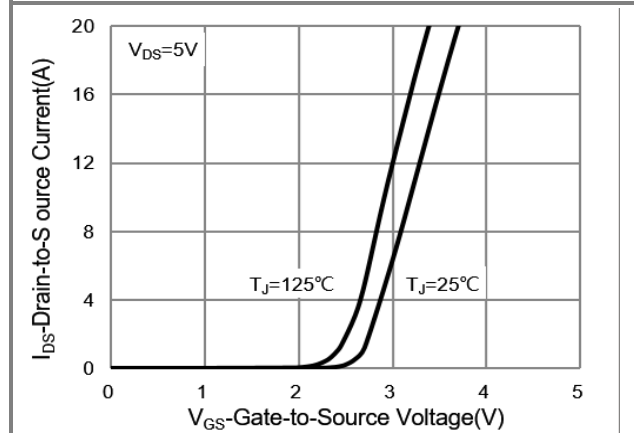


Fig.2 Transfer Characteristics

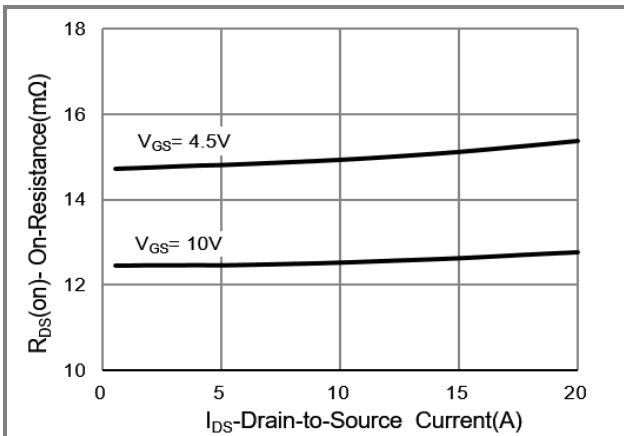


Fig.3 On-Resistance vs. Drain Current

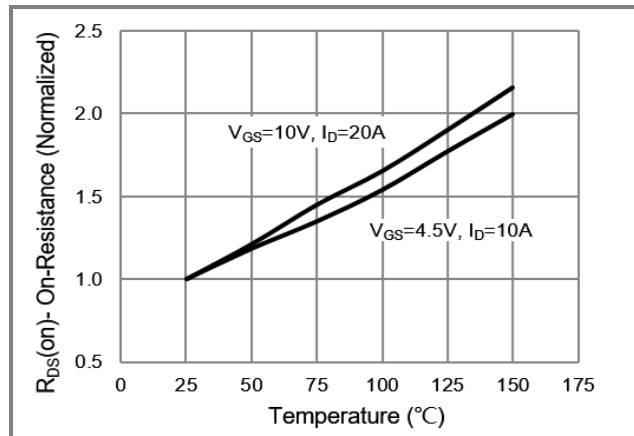


Fig.4 On-Resistance vs. Junction temperature

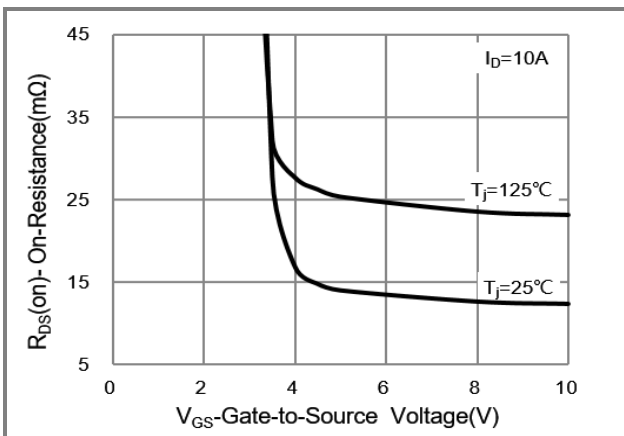


Fig.5 On-Resistance Variation with  $V_{GS}$

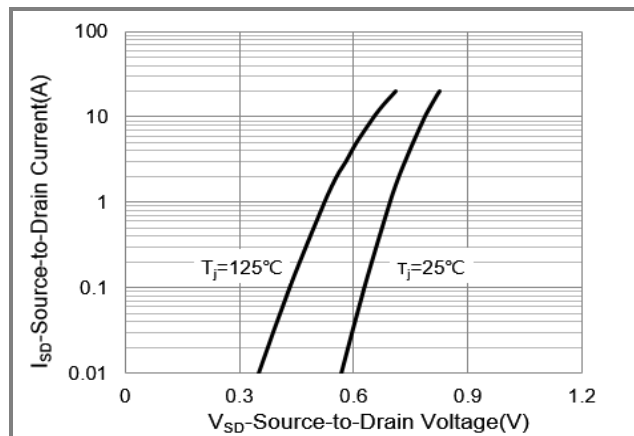


Fig.6 Source-Drain Diode Forward Voltage



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## TYPICAL CHARACTERISTIC CURVES

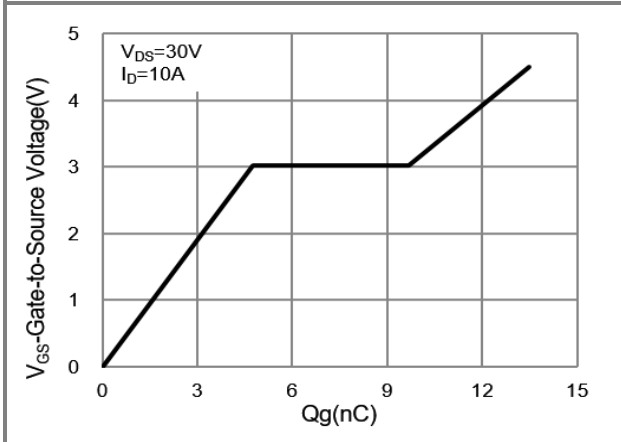


Fig.7 Gate-Charge Characteristics

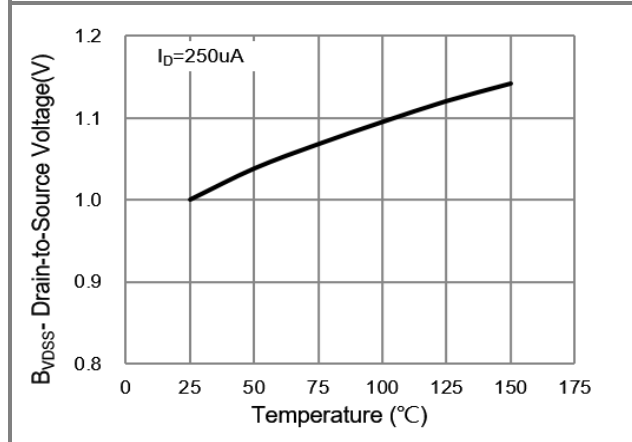


Fig.8 Breakdown Voltage Variation vs. Temperature

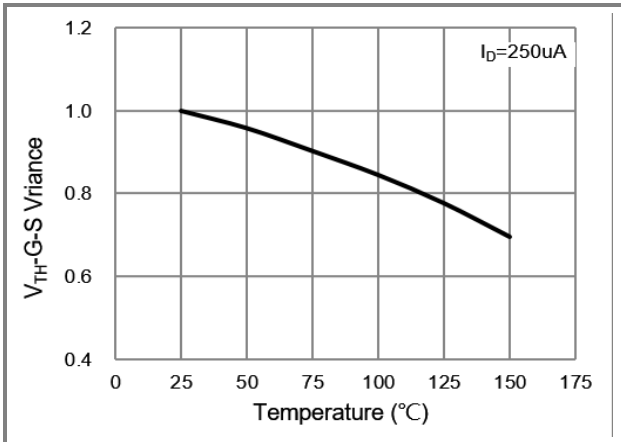


Fig.9 Threshold Voltage Variation with Temperature

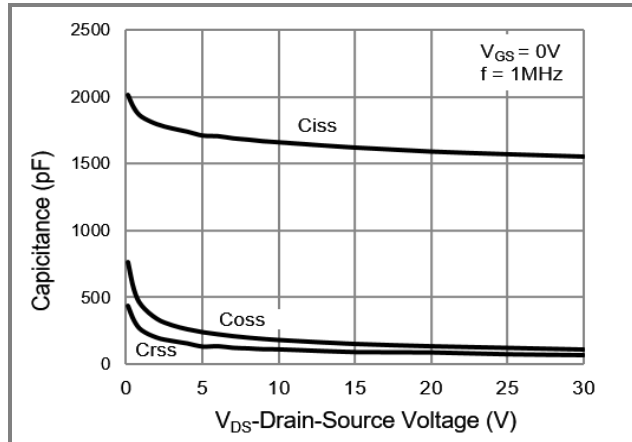


Fig.10 Capacitance vs. Drain-Source Voltage

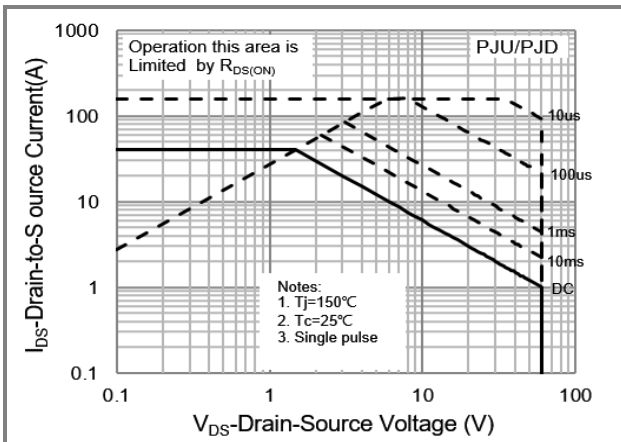


Fig.11 Maximum Safe Operating Area

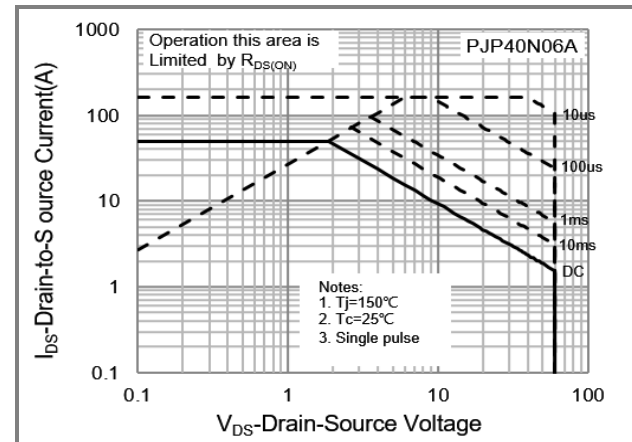


Fig.12 Maximum Safe Operating Area



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## TYPICAL CHARACTERISTIC CURVES

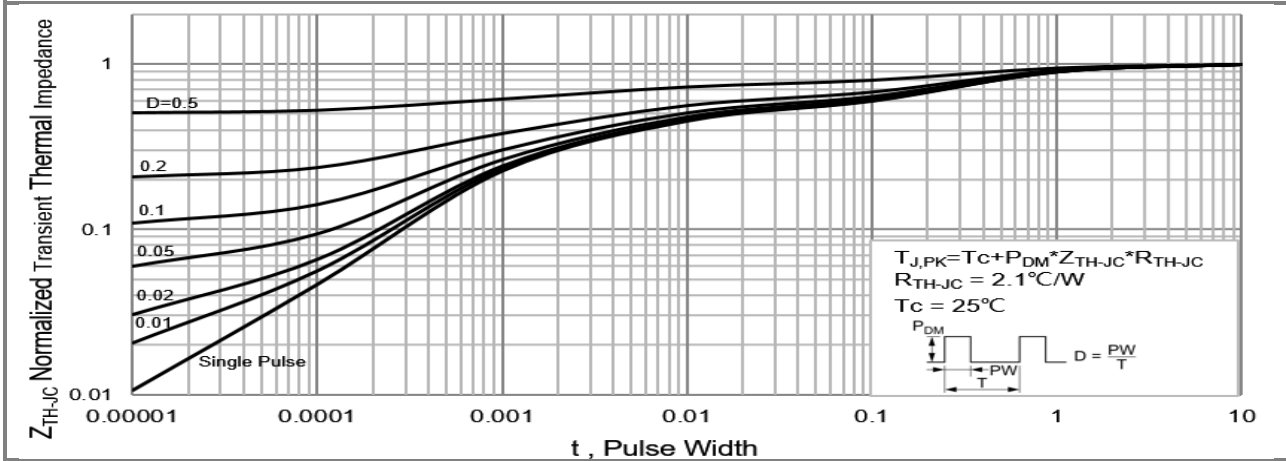


Fig.13 PJD/PJU Normalized Transient Thermal Impedance vs. Pulse Width

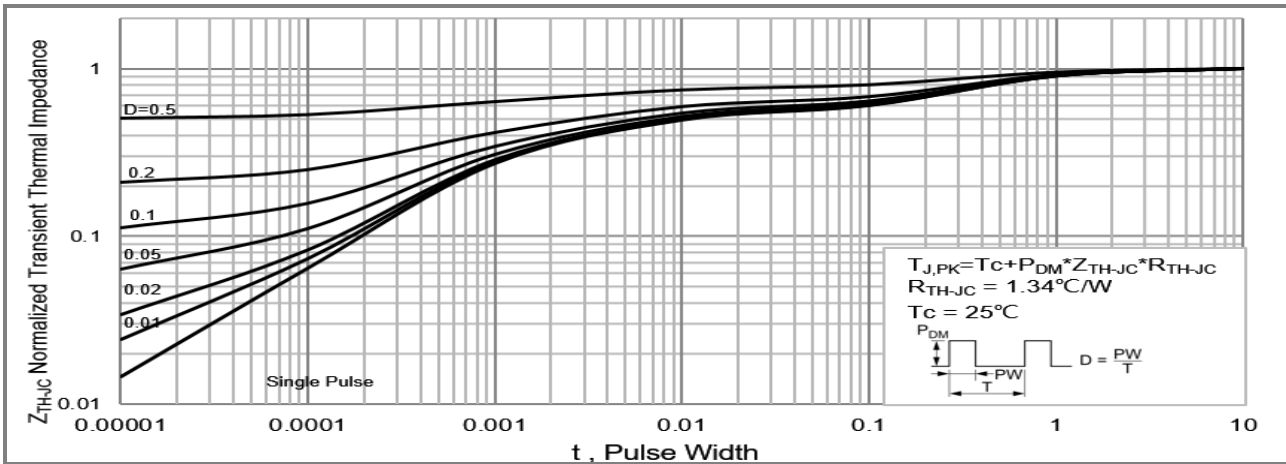
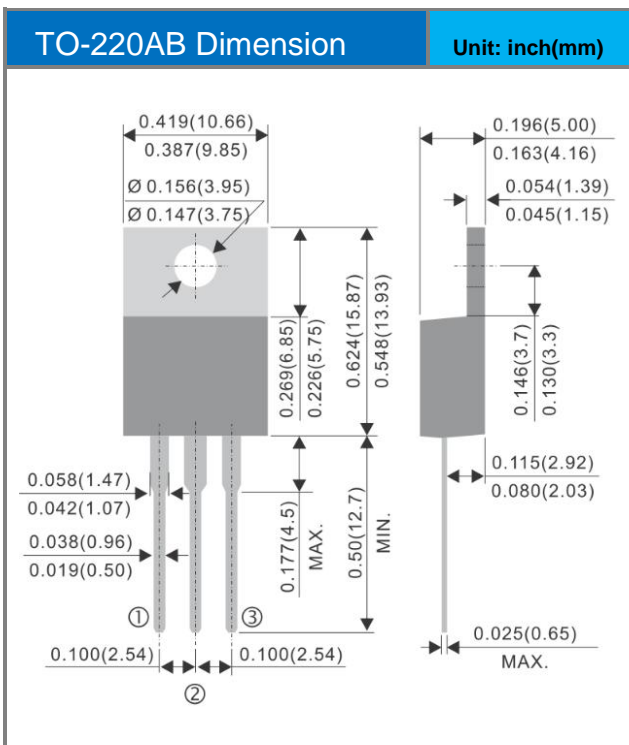
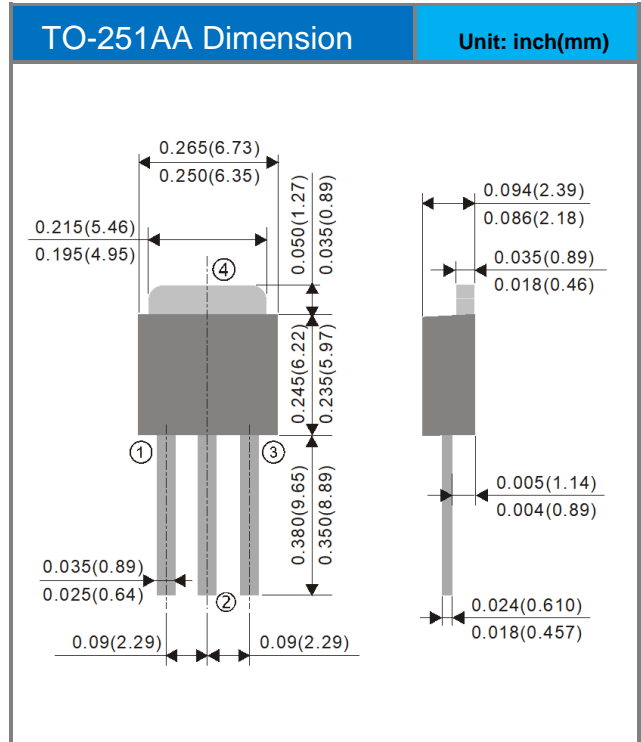
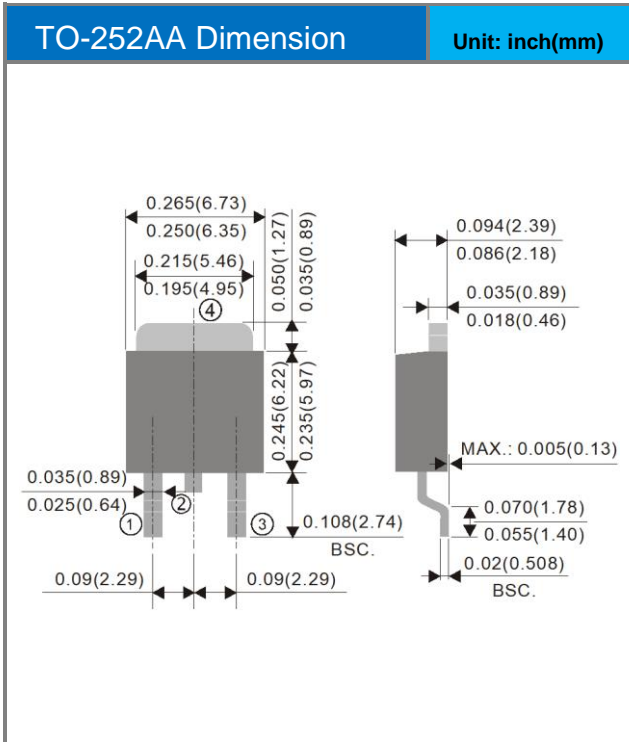


Fig.14 PJP40N06A Normalized Transient Thermal Impedance vs. Pulse Width



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## Packaging Information



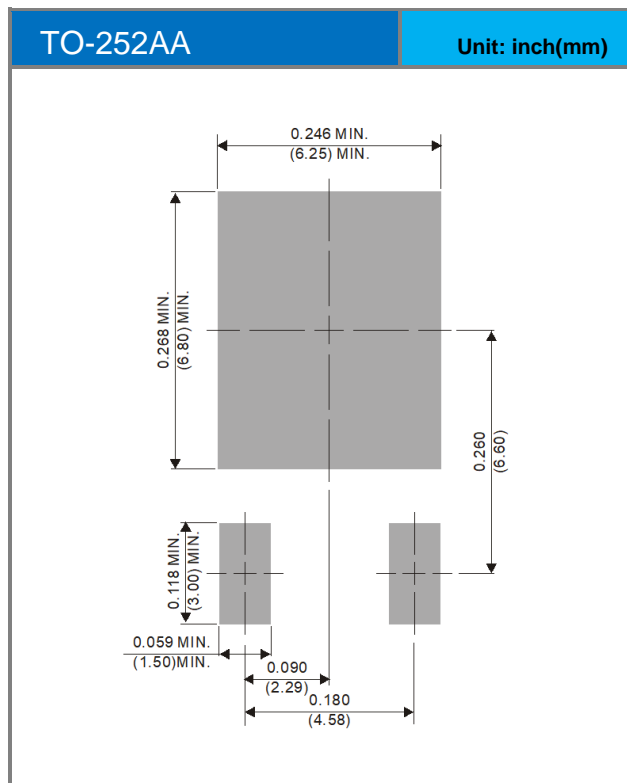


## PJU40N06A / PJD40N06A / PJP40N06A

### 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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