

# PJA3409E

## 30V P-Channel Enhancement Mode MOSFET– ESD Protected

**Voltage**

**-30 V**

**Current**

**-3.0 A**

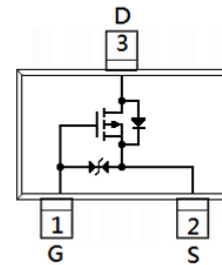
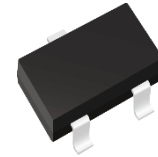
### Features

- $R_{DS(ON)}$ ,  $V_{GS}@-10V$ ,  $I_D@-2.6A < 95m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@-4.5V$ ,  $I_D@-1.5A < 155m\Omega$
- ESD Protected
- Advanced Trench Process Technology
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case : SOT-23 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.0003 ounces, 0.0084 grams

SOT-23



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

PARAMETER		SYMBOL	LIMIT	UNITS
Drain-Source Voltage		$V_{DS}$	-30	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>(Note 4)</sup>	$T_A=25^\circ C$	$I_D$	-3.0	A
	$T_A=70^\circ C$		-2.4	
Pulsed Drain Current <sup>(Note 1)</sup>	$T_A=25^\circ C$	$I_{DM}$	-12	
Power Dissipation	$T_A=25^\circ C$	$P_D$	1.25	W
	Derate above $25^\circ C$		10	mW/ $^\circ C$
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~150	$^\circ C$
Typical Thermal Resistance - Junction to Ambient <sup>(Note 5)</sup>		$R_{\theta JA}$	100	$^\circ C/W$

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

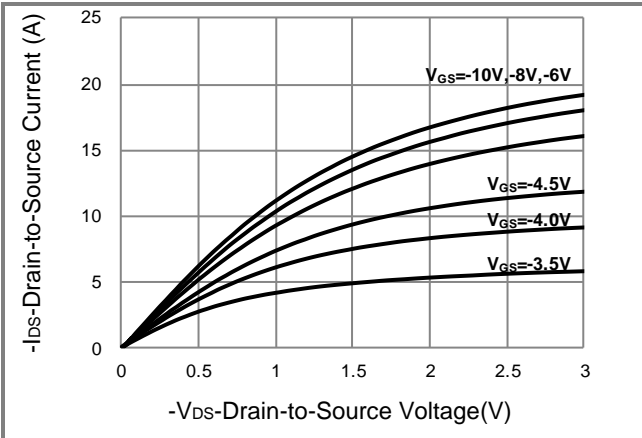
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
<b>Static</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-30	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1.3	-1.8	-2.3	
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-2.6A	-	74	95	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1.5A	-	110	155	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V	-	-	-1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±10	uA
<b>Dynamic</b> <sup>(Note 6)</sup>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-24V, I <sub>D</sub> =-2.6A, V <sub>GS</sub> =-10V <sup>(Note 2,3)</sup>	-	6.3	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	0.9	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	1.7	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, f=1MHZ	-	214	-	pF
Output Capacitance	C <sub>oss</sub>		-	39	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	21	-	
Gate resistance	R <sub>g</sub>	f=1.0MHZ	-	6.8	-	Ω
Turn-On Delay Time	td <sub>(on)</sub>	V <sub>DS</sub> =-24V, I <sub>D</sub> =-2.6A, V <sub>GS</sub> =-10V, R <sub>G</sub> =3Ω <sup>(Note 2,3)</sup>	-	2	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	23	-	
Turn-Off Delay Time	td <sub>(off)</sub>		-	10	-	
Turn-Off Fall Time	t <sub>f</sub>		-	21	-	
<b>Drain-Source Diode</b>						
Diode Forward Current	I <sub>s</sub>	T <sub>A</sub> =25°C	-	-	-3	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>s</sub> =-1A, V <sub>GS</sub> =0V	-	-0.85	-1	V
Reverse Recovery Time	T <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>s</sub> =-2.6A	-	132	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>	di <sub>s</sub> /dt=100A/us <sup>(Note 2,3)</sup>	-	259	-	nC

Note :

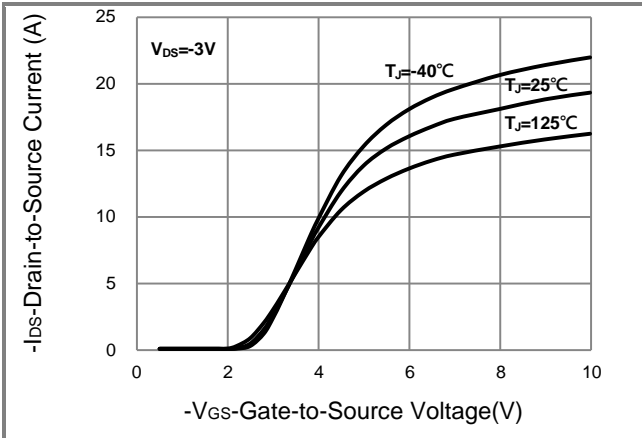
1. Pulse width ≤ 300us, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature typical characteristics.
3. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub> = 25°C.
4. 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. Guaranteed by design, not subject to production testing.

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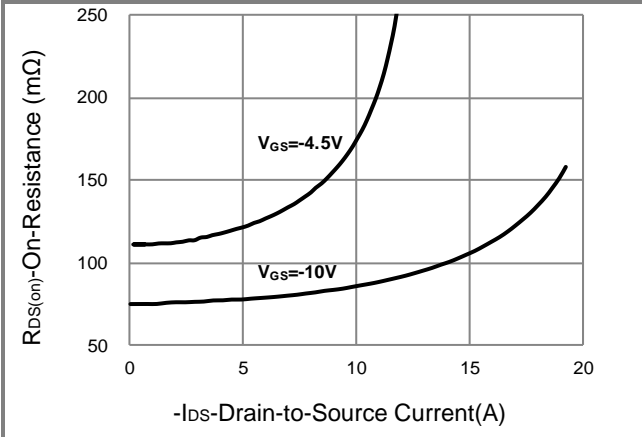
## TYPICAL CHARACTERISTIC CURVES



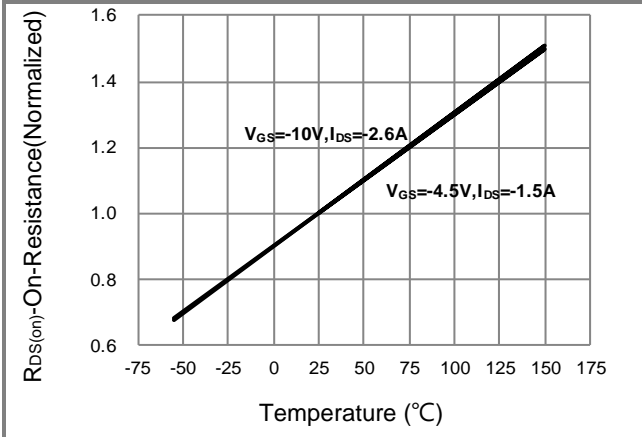
**Fig.1 Output Characteristics**



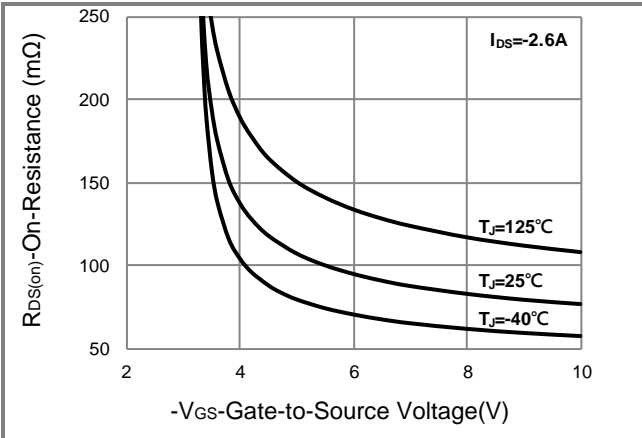
**Fig.2 Transfer Characteristics**



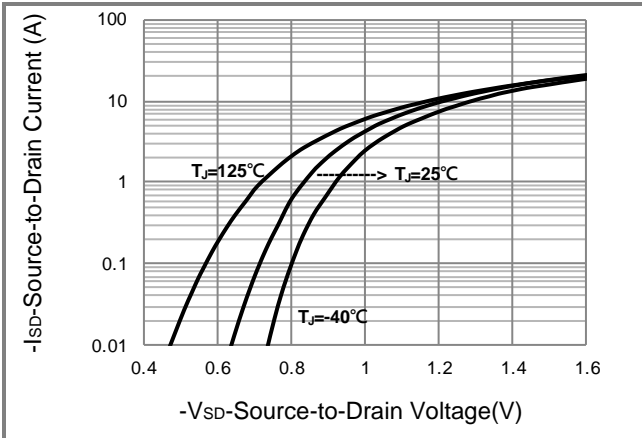
**Fig.3 On-Resistance vs. Drain Current**



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



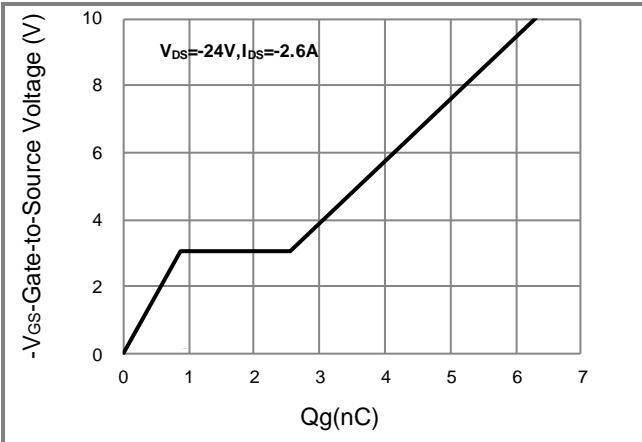
**Fig.5 On-Resistance Variation with V\_GS**



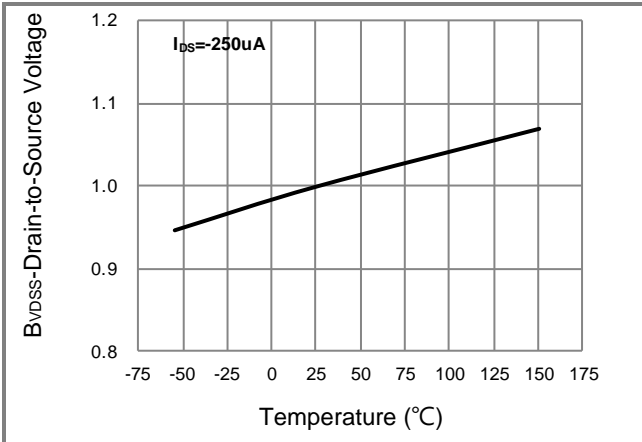
**Fig.6 Source-Drain Diode Forward Voltage**

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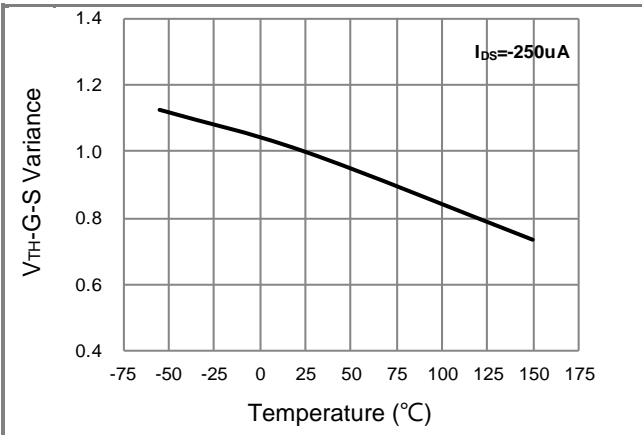
## TYPICAL CHARACTERISTIC CURVES



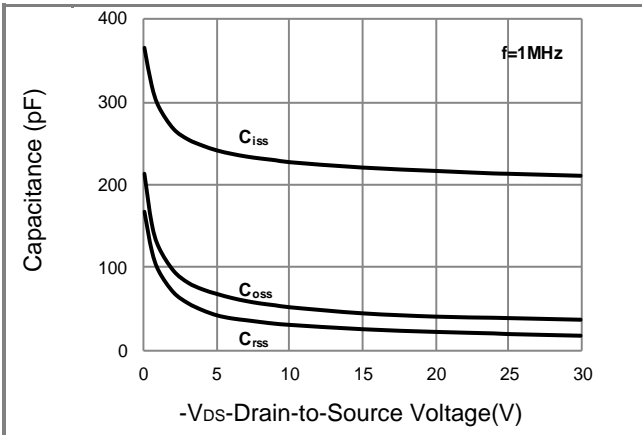
**Fig.7 Gate-Charge Characteristics**



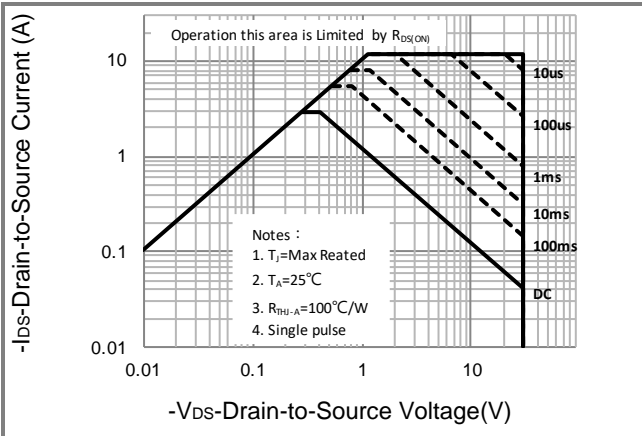
**Fig.8 Breakdown Voltage Variation vs. Temperature**



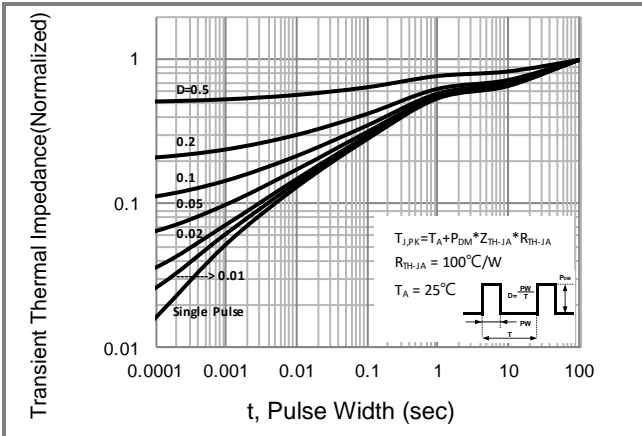
**Fig.9 Threshold Voltage Variation with Temperature**



**Fig.10 Capacitance vs. Drain-Source Voltage**



**Fig.11 Maximum Safe Operating Area**



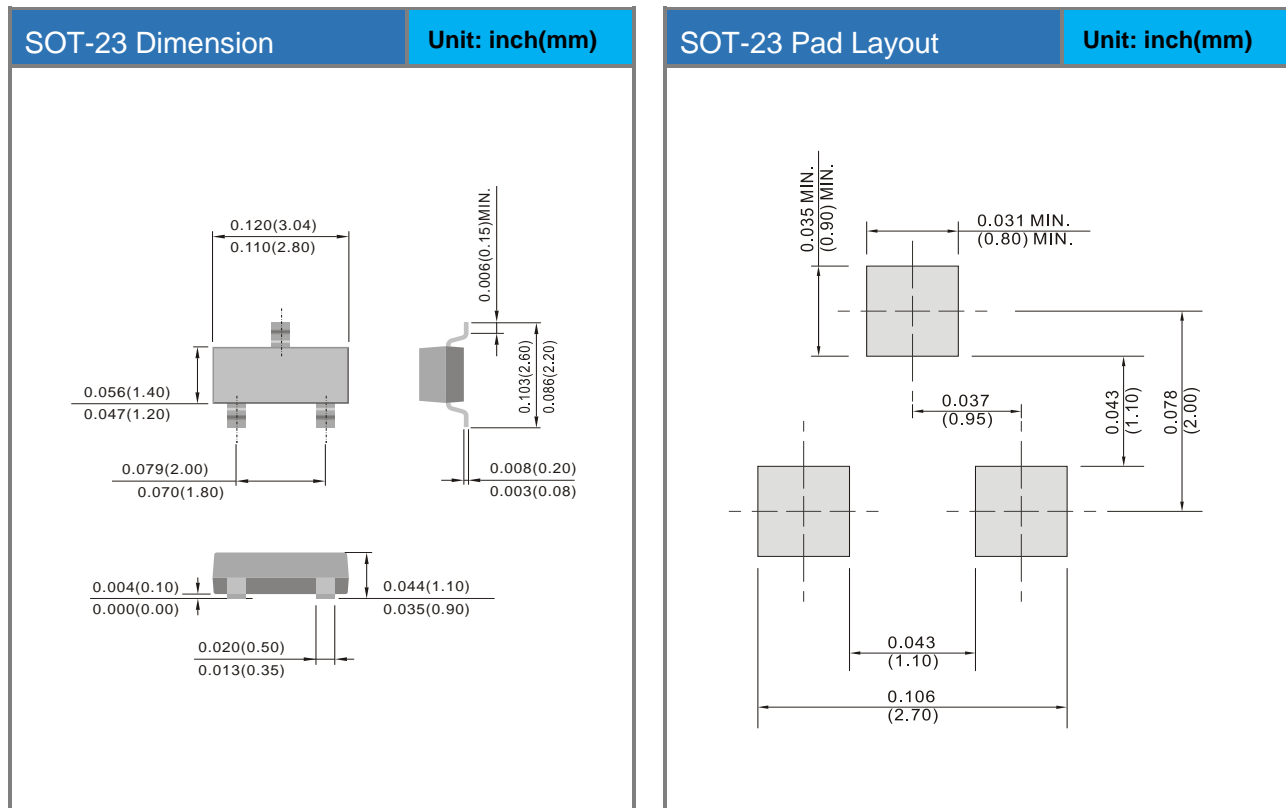
**Fig.12 Normalized Transient Thermal Impedance**

# PJA3409E

## Product and Packing Information

Part No.	Package Type	Packing Type	Marking
PJA3409E	SOT-23	3K pcs / 7" reel	09E

## Packaging Information & Mounting Pad Layout



## PJA3409E

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