



# PJQ4451EP-AU

## 40V P-Channel Enhancement Mode MOSFET

**Voltage**

**-40 V**

**Current**

**-60 A**

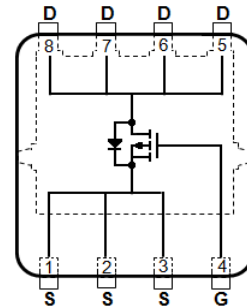
### Features

- $R_{DS(ON)}$ ,  $V_{GS}@-10V$ ,  $I_D@-10A < 9.8m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@-4.5V$ ,  $I_D@-6A < 14.7m\Omega$
- 100% UIS tested
- Reliable and Rugged
- AEC-Q101 qualified
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case : DFN3333-8L Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.03 grams

DFN3333-8L



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

PARAMETER		SYMBOL	LIMIT	UNITS
Drain-Source Voltage		$V_{DS}$	-40	V
Gate-Source Voltage		$V_{GS}$	$\pm 25$	V
Continuous Drain Current <sup>(Note 3)</sup>	$T_C=25^\circ C$	$I_D$	-60	A
	$T_C=100^\circ C$		-42	
Pulsed Drain Current <sup>(Note 1)</sup>	$T_C=25^\circ C$	$I_{DM}$	-211	A
Power Dissipation	$T_C=25^\circ C$	$P_D$	63	W
	$T_C=100^\circ C$		31	
Continuous Drain Current <sup>(Note 4)</sup>	$T_A=25^\circ C$	$I_D$	-12	A
	$T_A=70^\circ C$		-10	
Power Dissipation	$T_A=25^\circ C$	$P_D$	2.5	W
	$T_A=70^\circ C$		1.8	
Single Pulse Avalanche Energy <sup>(Note 5)</sup>		$E_{AS}$	121	mJ
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~175	$^\circ C$
Thermal Resistance <sup>(Note 4)</sup>	Junction to Case	$R_{\theta JC}$	2.4	$^\circ C/W$
	Junction to Ambient	$R_{\theta JA}$	60	



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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	-40	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1	-1.9	-2.5	
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A	-	7.8	9.8	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A	-	11.3	14.7	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V	-	-	-1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±25V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>Dynamic</b> (Note 6)						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-32V, I <sub>D</sub> =-10A, V <sub>GS</sub> =-10V	-	59	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	9	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	20	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1MHz	-	3300	-	pF
Output Capacitance	C <sub>oss</sub>		-	380	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	240	-	
Gate resistance	R <sub>g</sub>	f=1MHz	-	4	-	Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =-32V, I <sub>D</sub> =-10A, V <sub>GS</sub> =-10V, R <sub>G</sub> =3Ω (Note 2)	-	13	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	16	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	54	-	
Turn-Off Fall Time	t <sub>f</sub>		-	33	-	
<b>Drain-Source Diode</b>						
Diode Forward Current	I <sub>S</sub>	T <sub>C</sub> =25°C	-	-	-60	A
Pulsed Diode Forward Current	I <sub>SM</sub>		-	-	-211	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-20A, V <sub>GS</sub> =0V	-	-0.85	-1.3	V
Reverse Recovery Time	T <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-20A	-	23	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>S</sub> /dt=100A/us	-	11	-	nC

**NOTES :**

1. Pulse width ≤ 300us, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature typical characteristics.
3. The maximum current rating is package limited.
4. 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.
5. The test condition is L=0.5mH, I<sub>AS</sub>=-22A, V<sub>DD</sub>=-30V, V<sub>GS</sub>=-10V, Starting T<sub>J</sub>=25°C.
6. Guaranteed by design, not subject to production testing.



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## TYPICAL CHARACTERISTIC CURVES

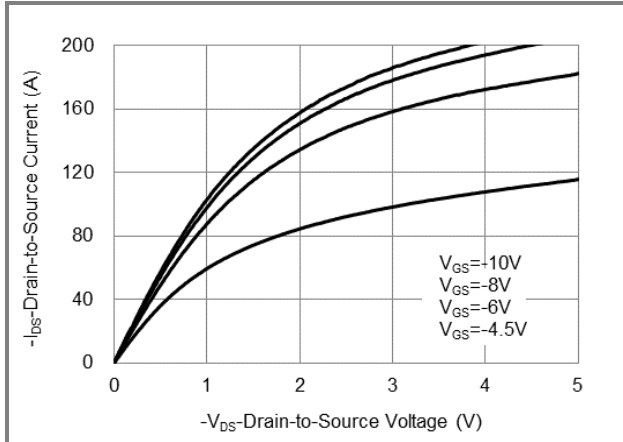


Fig.1 On-Region Characteristics

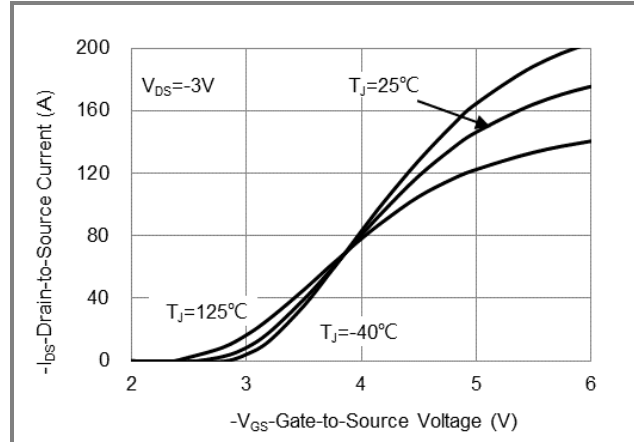


Fig.2 Transfer Characteristics

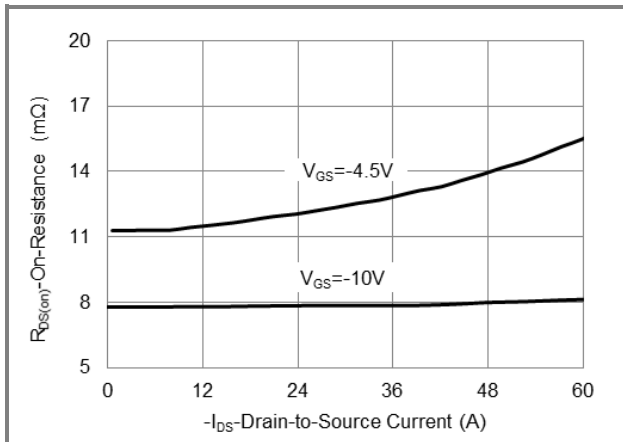


Fig.3 On-Resistance vs. Drain Current

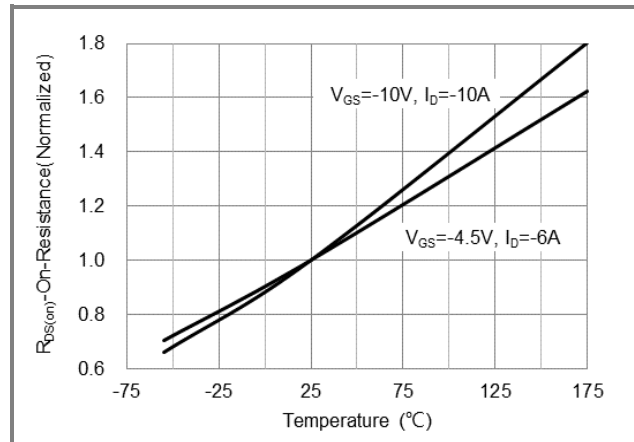


Fig.4 On-Resistance vs. Junction temperature

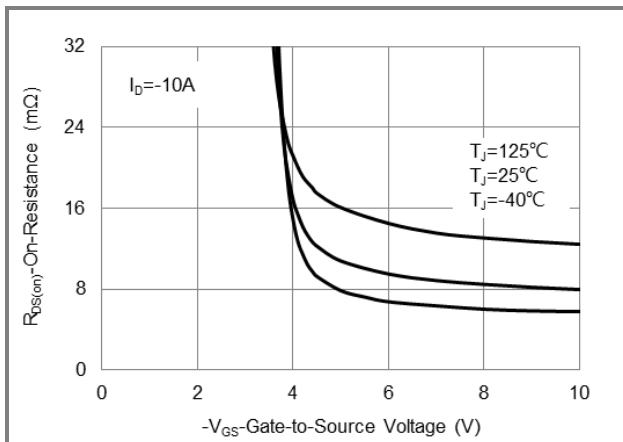


Fig.5 On-Resistance Variation with  $V_{GS}$

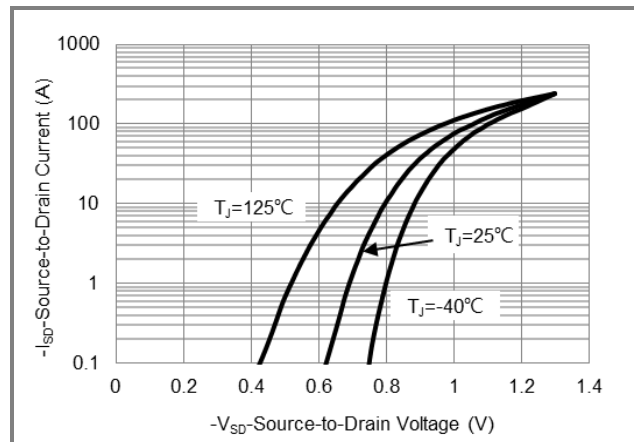


Fig.6 Source-Drain Diode Forward Voltage



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## TYPICAL CHARACTERISTIC CURVES

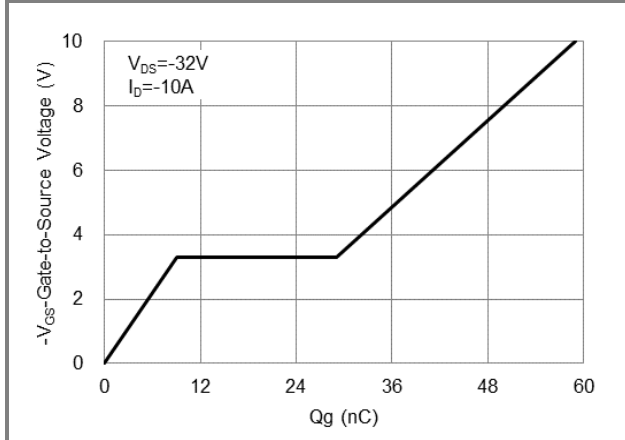


Fig.7 Gate-Charge Characteristics

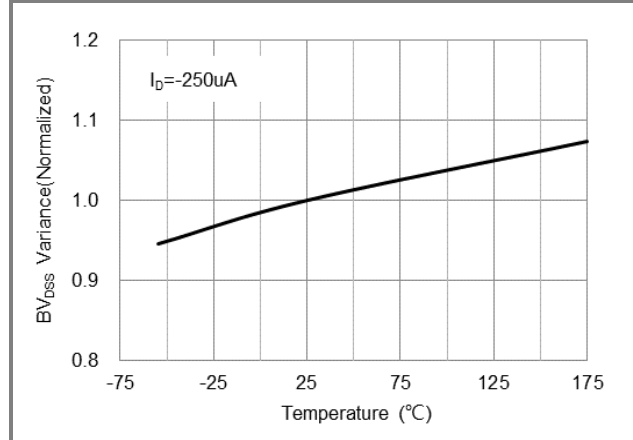


Fig.8 Breakdown Voltage Variation vs. Temperature

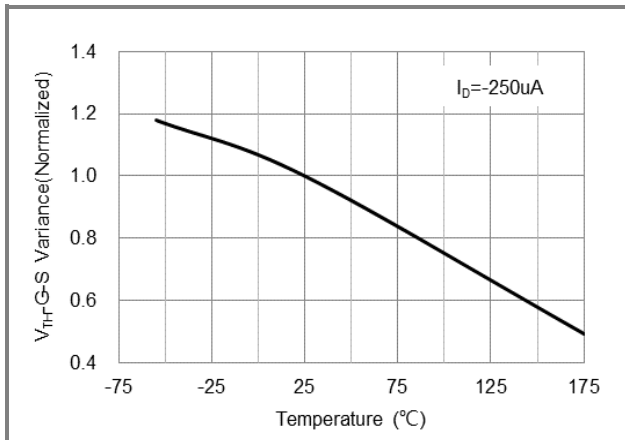


Fig.9 Threshold Voltage Variation with Temperature

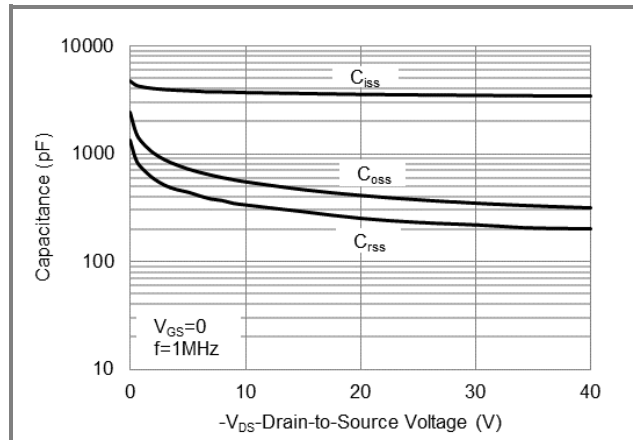


Fig.10 Capacitance vs. Drain-Source Voltage

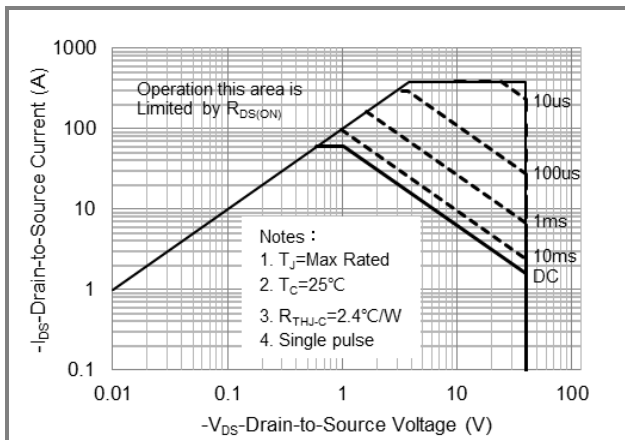


Fig.11 Maximum Safe Operating Area

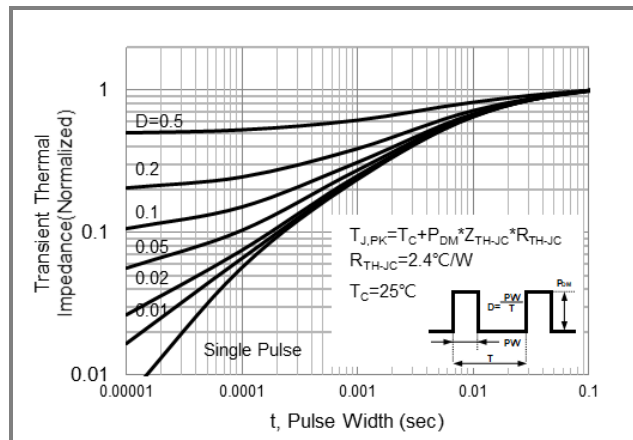


Fig.12 Normalized Transient Thermal Impedance

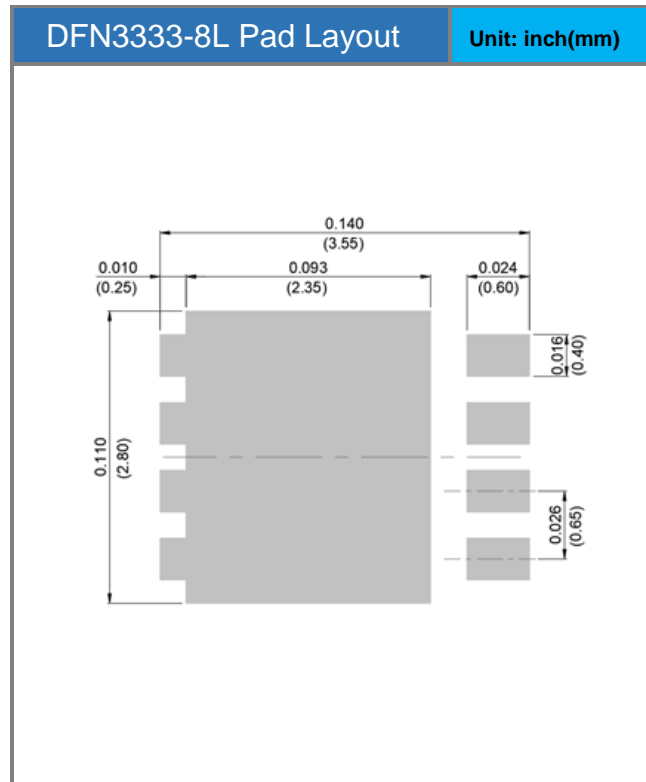
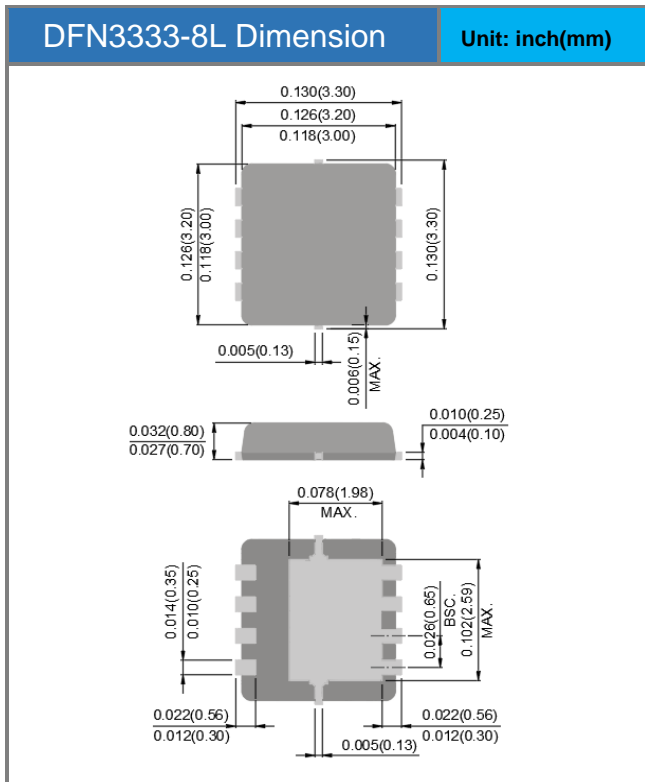


# PJQ4451EP-AU

## Product and Packing Information

Part No.	Package Type	Packing Type	Marking
PJQ4451EP-AU	DFN3333-8L	5K pcs / 13" reel	451E

## Packaging Information & Mounting Pad Layout





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