



# PJQ4416EP

## 20V N-Channel Enhancement Mode MOSFET

**Voltage**

**20 V**

**Current**

**30 A**

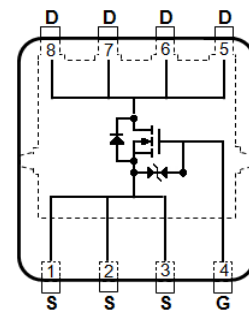
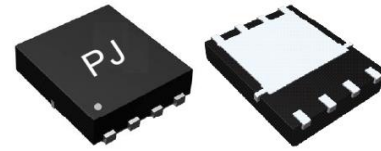
### Features

- $R_{DS(ON)}$ ,  $V_{GS}@4.5V$ ,  $I_D@10A < 11m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@2.5V$ ,  $I_D@9A < 13m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@1.8V$ ,  $I_D@8A < 17m\Omega$
- Advanced Trench Process Technology
- High density cell design for ultralow on-resistance
- 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 : 0.001 ounces, 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		$V_{DS}$	20	V
Gate-Source Voltage		$V_{GS}$	$\pm 10$	
Continuous Drain Current <sup>(Note 4)</sup>	$T_C=25^\circ C$	$I_D$	30	A
	$T_C=100^\circ C$		19	
Pulsed Drain Current <sup>(Note 1)</sup>	$T_C=25^\circ C$	$I_{DM}$	120	
Power Dissipation	$T_C=25^\circ C$	$P_D$	26	W
	$T_C=100^\circ C$		10.4	
Continuous Drain Current <sup>(Note 4)</sup>	$T_A=25^\circ C$	$I_D$	11	A
	$T_A=70^\circ C$		8	
Power Dissipation	$T_A=25^\circ C$	$P_D$	2	W
	$T_A=70^\circ C$		1.3	
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~150	$^\circ C$
Typical Thermal Resistance <sup>(Note 4,5)</sup>	Junction to Case	$R_{\theta JC}$	4.8	$^\circ C/W$
	Junction to Ambient	$R_{\theta JA}$	62.5	

- 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	20	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	0.3	0.6	1	
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	-	9.3	11	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =9A	-	11	13	
		V <sub>GS</sub> =1.8V, I <sub>D</sub> =8A	-	14.5	17	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V	-	-	1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V	-	-	±10	uA
<b>Dynamic</b> (Note 6)						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =9A, V <sub>GS</sub> =4.5V (Note 2,3)	-	16	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	1.3	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	1.6	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHZ	-	1177	-	pF
Output Capacitance	C <sub>oss</sub>		-	157	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	134	-	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =10V, I <sub>D</sub> =1A, V <sub>GS</sub> =4.5V, R <sub>G</sub> =25Ω (Note 2,3)	-	16	-	ns
Turn-On Rise Time	t <sub>r</sub>		-	25	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	124	-	
Turn-Off Fall Time	t <sub>f</sub>		-	101	-	
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>	---	-	-	30	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =1A, V <sub>GS</sub> =0V	-	0.73	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. Guaranteed by design, not subject to production testing.



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## TYPICAL CHARACTERISTIC CURVES

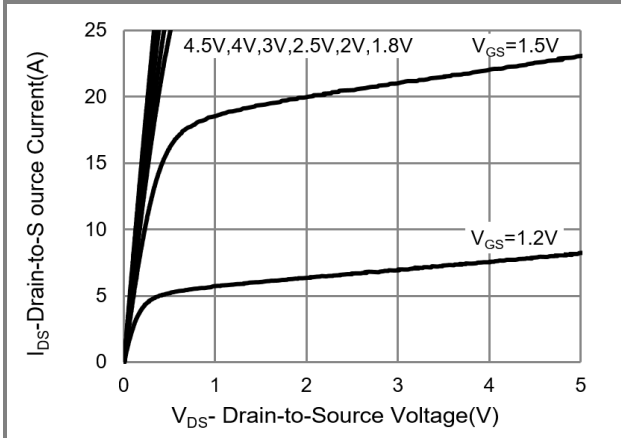


Fig.1 On-Region Characteristics

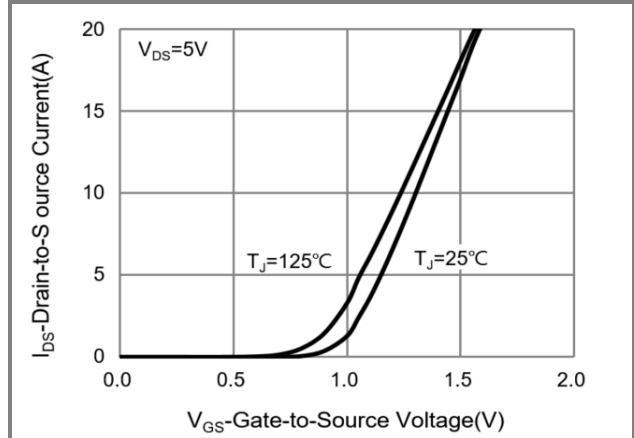


Fig.2 Transfer Characteristics

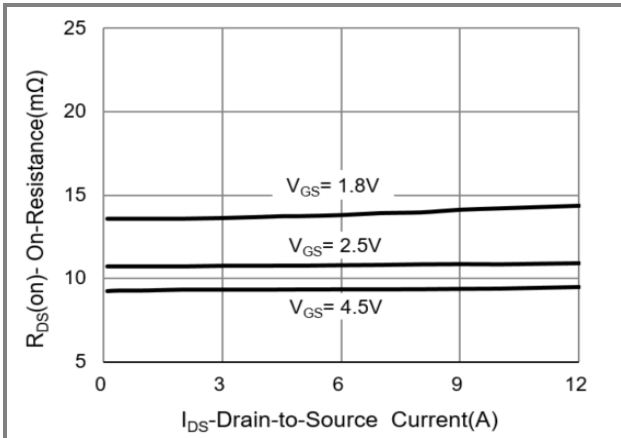


Fig.3 On-Resistance vs. Drain Current

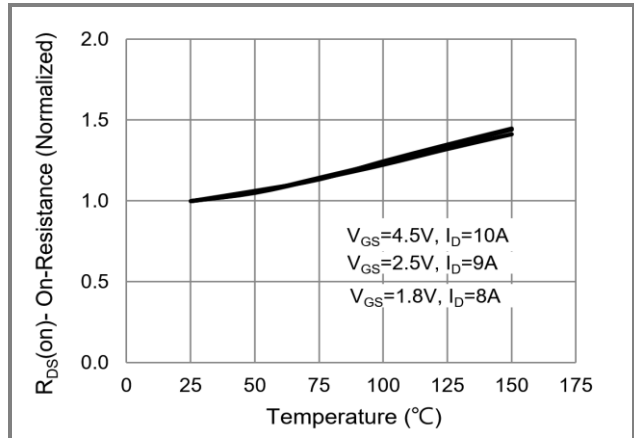


Fig.4 On-Resistance vs. Junction temperature

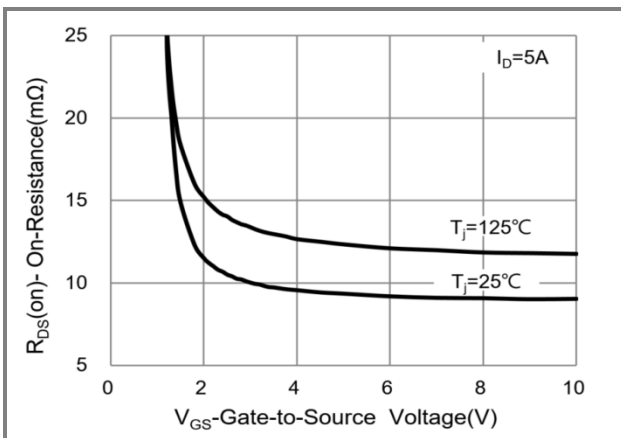


Fig.5 On-Resistance Variation with  $V_{GS}$

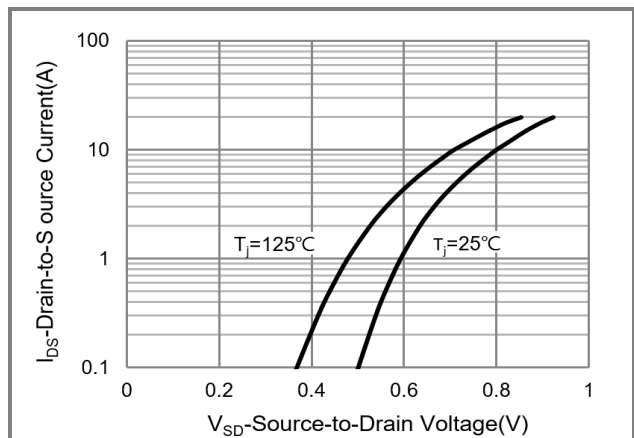


Fig.6 Source-Drain Diode Forward Voltage



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## TYPICAL CHARACTERISTIC CURVES

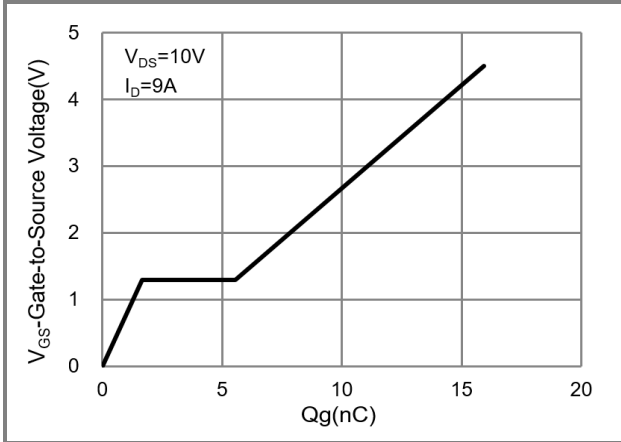


Fig.7 Gate-Charge Characteristics

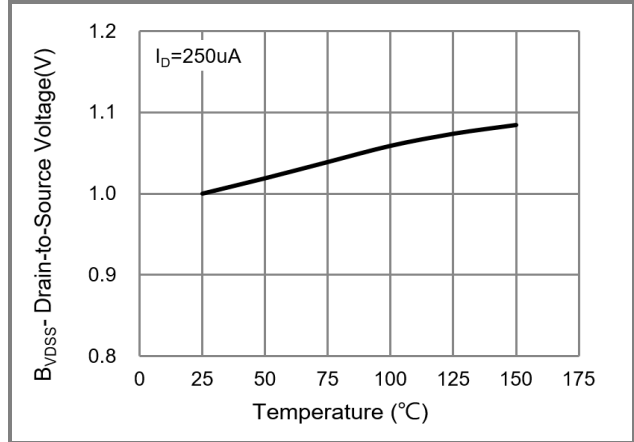


Fig.8 Breakdown Voltage Variation vs. Temperature

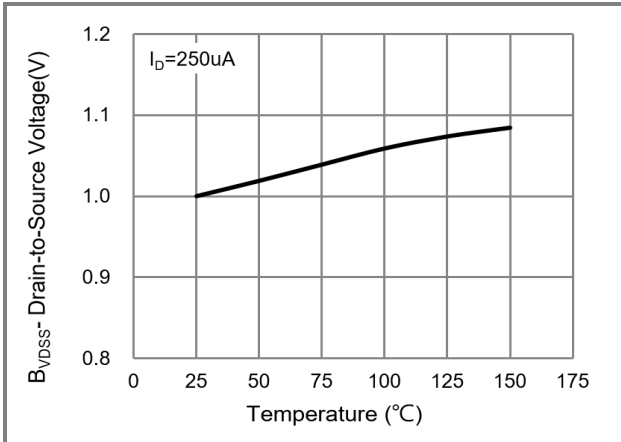


Fig.9 Threshold Voltage Variation with Temperature

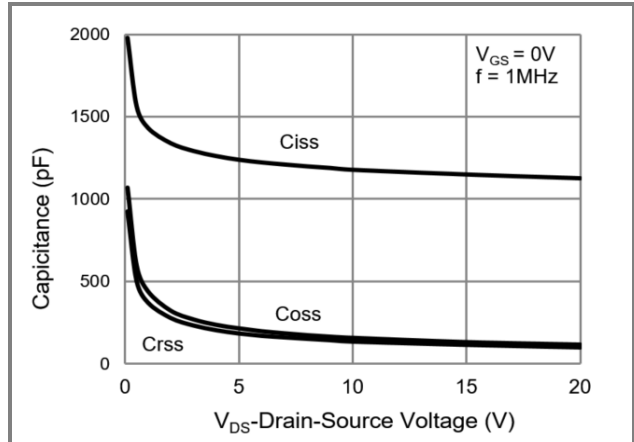


Fig.10 Capacitance vs. Drain-Source Voltage

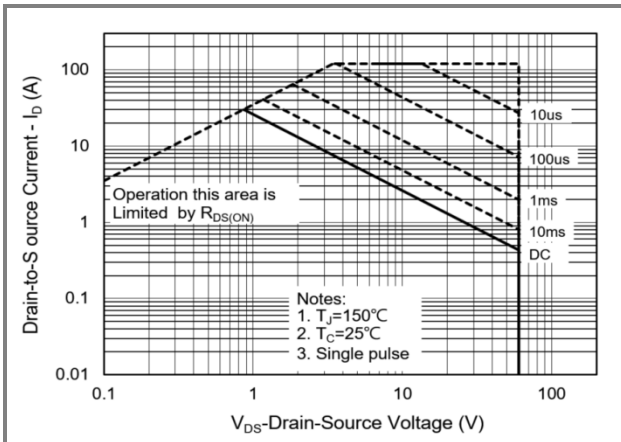


Fig.11 Maximum Safe Operating Area

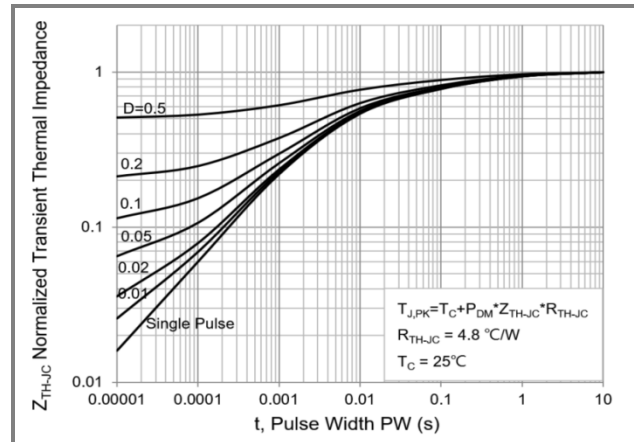


Fig.12 Normalized Transient Thermal Impedance

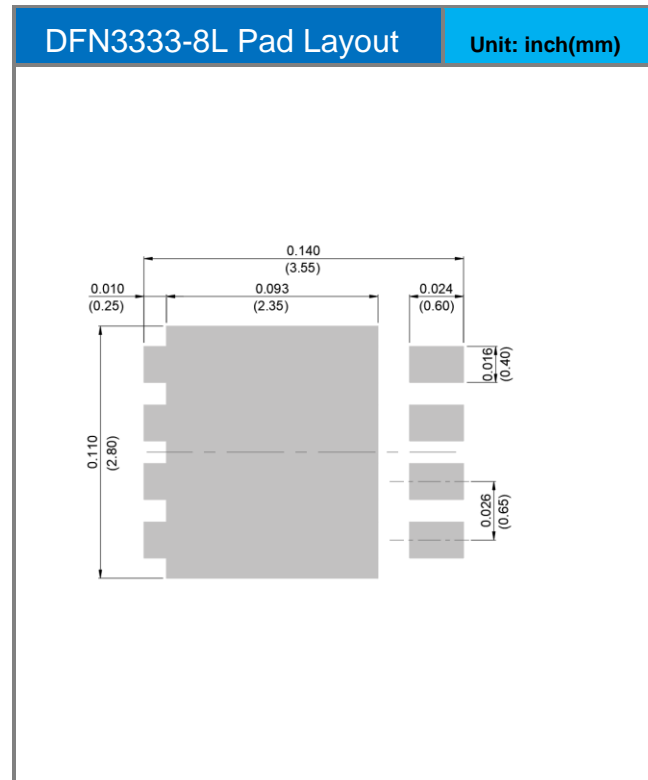
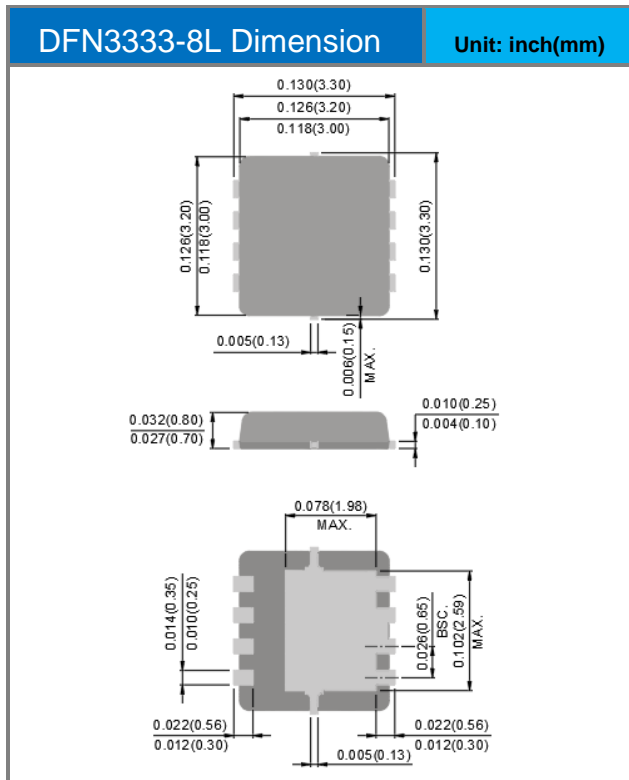


# PJQ4416EP

Part No. Packing Code Version

Part No. Packing Code	Package Type	Packing Type	Marking	Version
PJQ4416EP_R2_00001	DFN3333-8L	5K pcs / 13" reel	416E	Halogen free RoHS compliant

## Packaging Information & Mounting Pad Layout





## PJQ4416EP

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