



# PJA138L

## 60V N-Channel Enhancement Mode MOSFET

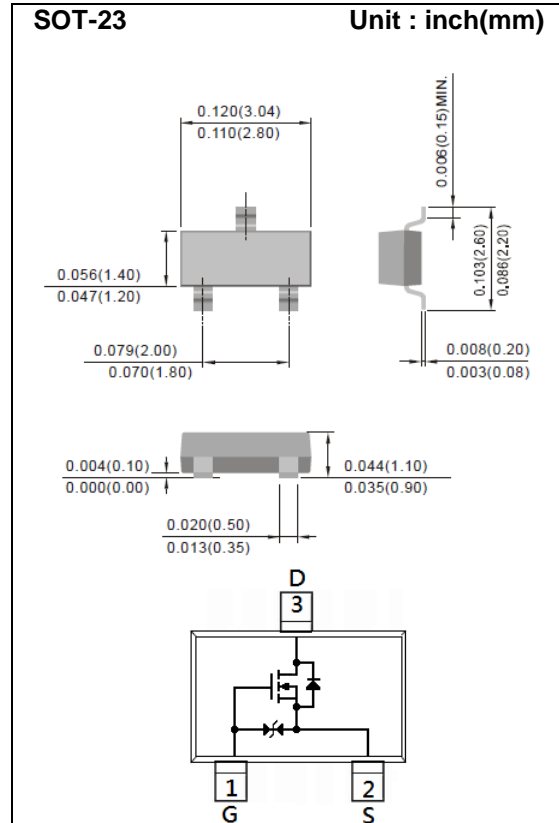
**Voltage** 60 V **Current** 250mA

### Features

- $R_{DS(ON)}$  ,  $V_{GS}@10V$  ,  $I_D@250mA < 4.2\Omega$
- $R_{DS(ON)}$  ,  $V_{GS}@4.5V$  ,  $I_D@100mA < 5\Omega$
- $R_{DS(ON)}$  ,  $V_{GS}@2.5V$  ,  $I_D@50mA < 7\Omega$
- Advanced Trench Process Technology
- ESD Protected
- Specially Designed for Relay driver, Speed line drive, etc.
- 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
- Marking: A8L



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

PARAMETER	SYMBOL	LIMIT	UNITS	
Drain-Source Voltage	$V_{DS}$	60	V	
Gate-Source Voltage	$V_{GS}$	+20	V	
Continuous Drain Current	$I_D$	250	mA	
Pulsed Drain Current	$I_{DM}$	1000	mA	
Power Dissipation	$P_D$	$T_A=25^\circ\text{C}$	500	mW
		Derate above $25^\circ\text{C}$	4	mW/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~150	$^\circ\text{C}$	
Typical Thermal resistance	$R_{\theta JA}$	250	$^\circ\text{C/W}$	
- Junction to Ambient <sup>(Note 3)</sup>				



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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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.8	1.2	1.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=250mA$	-	2.5	4.2	$\Omega$
		$V_{GS}=4.5V, I_D=100mA$	-	2.8	5	
		$V_{GS}=2.5V, I_D=50mA$	-	3.7	7	
		$V_{GS}=1.8V, I_D=10mA$	-	12	-	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	-	0.01	1	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	$\pm 1.0$	$\pm 10$	$\mu A$
<b>Dynamic</b> (Note 4)						
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=250mA,$ $V_{GS}=4.5V$ (Note 1,2)	-	0.7	-	nC
Gate-Source Charge	$Q_{gs}$		-	0.33	-	
Gate-Drain Charge	$Q_{gd}$		-	0.2	-	
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $f=1.0MHz$	-	15	-	pF
Output Capacitance	$C_{oss}$		-	8.4	-	
Reverse Transfer Capacitance	$C_{rss}$		-	4.2	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=250mA,$ $V_{GS}=10V,$ $R_G=6\Omega$ (Note 1,2)	-	7	-	ns
Turn-On Rise Time	$t_r$		-	22	-	
Turn-Off Delay Time	$t_{d(off)}$		-	21	-	
Turn-Off Fall Time	$t_f$		-	25	-	
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$	---	-	-	250	mA
Diode Forward Voltage	$V_{SD}$	$I_S=250mA, V_{GS}=0V$	-	0.8	1.1	V

**NOTES :**

1. Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
2. Essentially independent of operating temperature typical characteristics.
3.  $R_{\theta JA}$  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 square pad of copper
4. Guaranteed by design, not subject to production testing.



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## TYPICAL CHARACTERISTIC CURVES

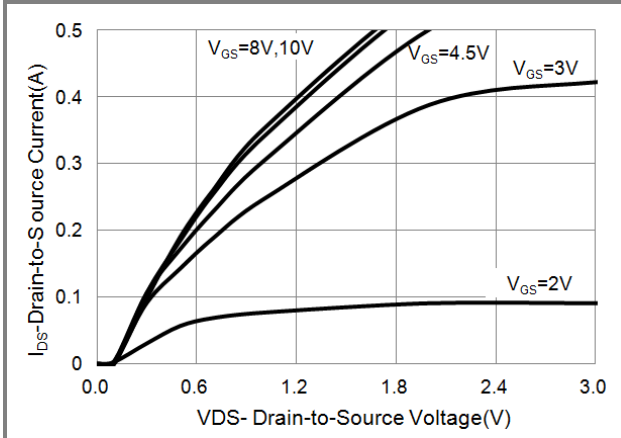


Fig.1 On-Region Characteristics

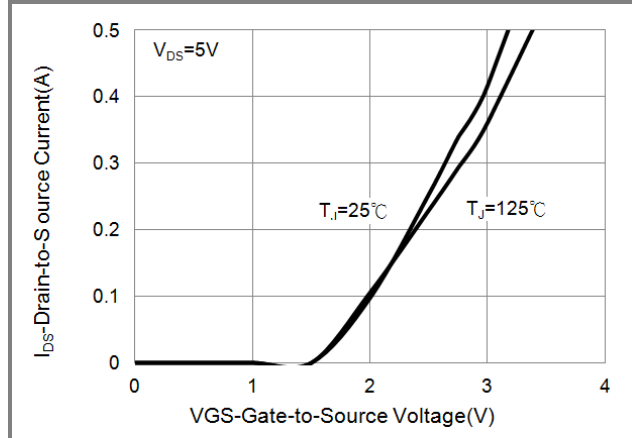


Fig.2 Transfer Characteristics

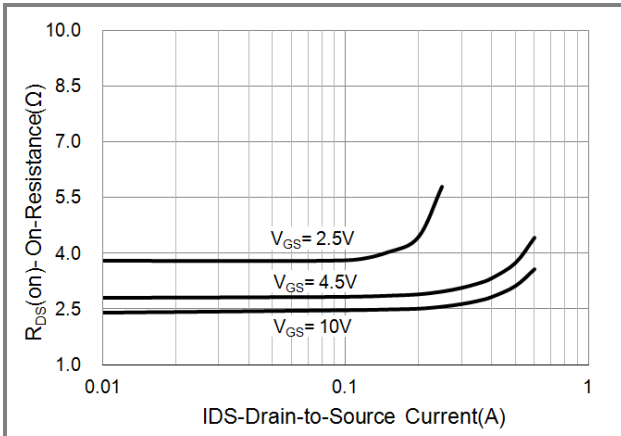


Fig.3 On-Resistance vs. Drain Current

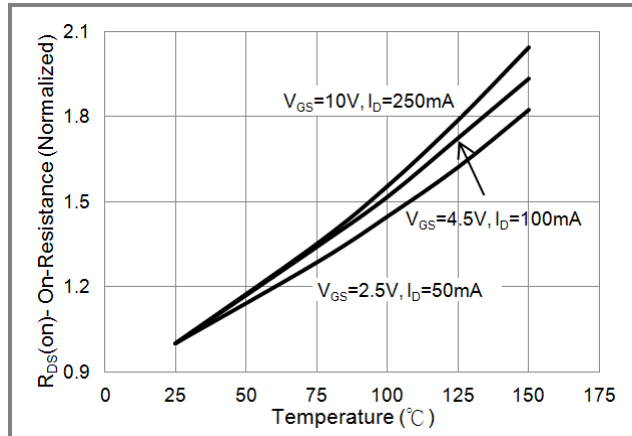


Fig.4 On-Resistance vs. Junction temperature

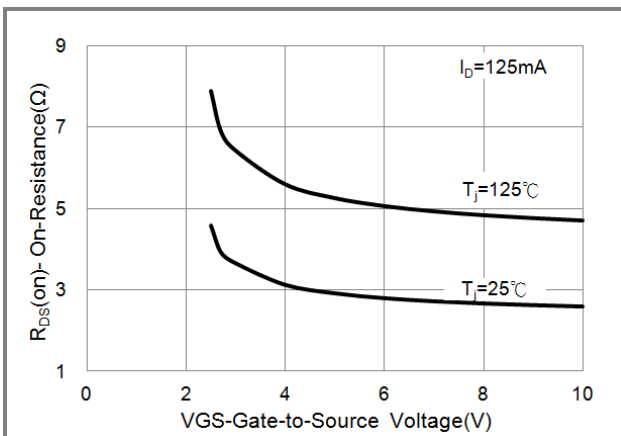


Fig.5 On-Resistance Variation with VGS.

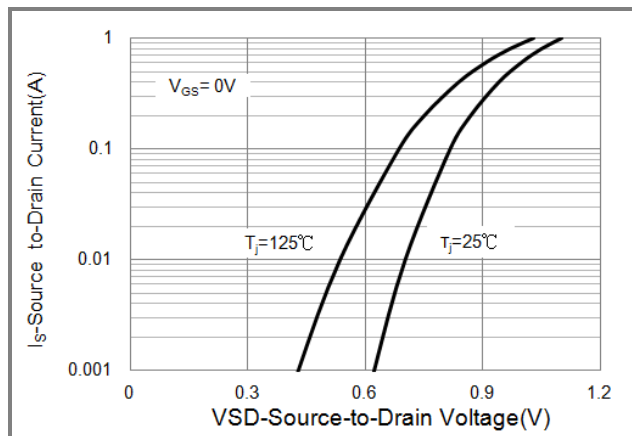


Fig.6 Body Diode Characteristics



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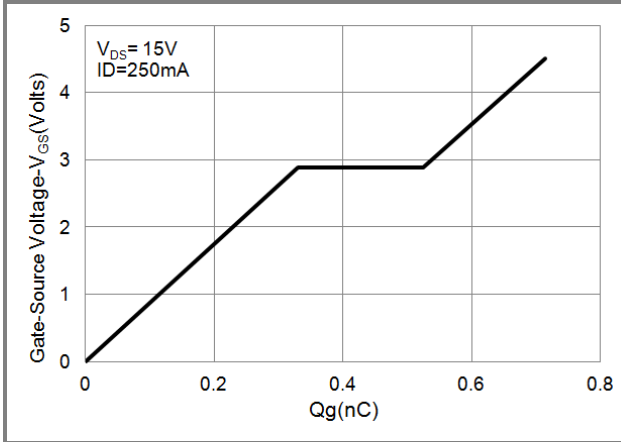


Fig.7 Gate-Charge Characteristics

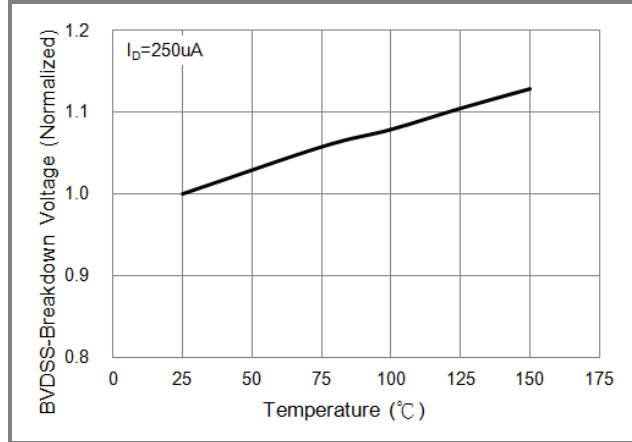


Fig.8 Breakdown Voltage Variation vs. Temperature

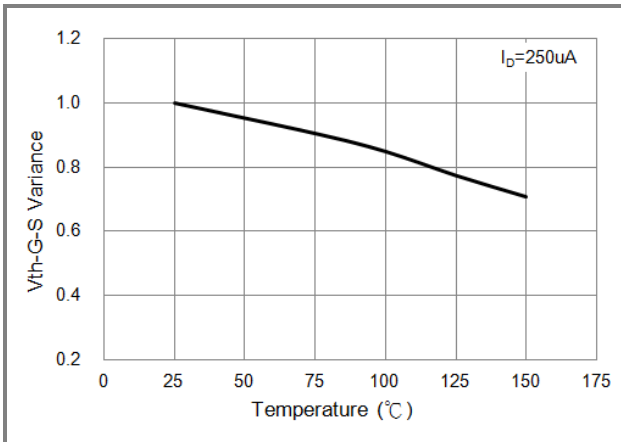


Fig.9 Threshold Voltage Variation with Temperature.

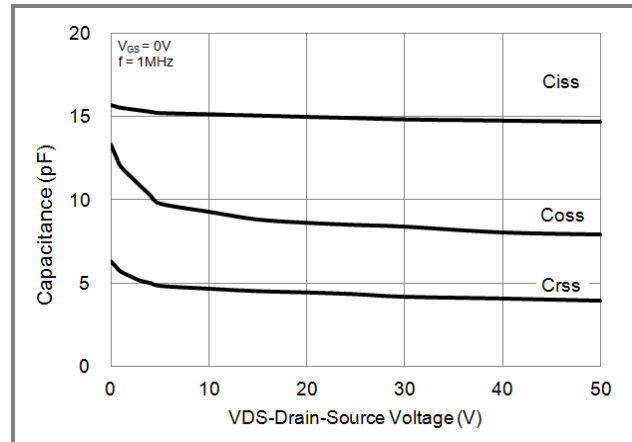


Fig.10 Capacitance vs. Drain-Source Voltage.



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## PART NO PACKING CODE VERSION

Part No Packing Code	Package Type	Packing type	Marking	Version
PJA138L_R1_00001	SOT-23	3K pcs / 7" reel	A8L	Halogen free
PJA138L_R2_00001	SOT-23	12K pcs / 13" reel	A8L	Halogen free

## MOUNTING PAD LAYOUT

