

# PJA138K

## 50V N-Channel Enhancement Mode MOSFET – ESD Protected

**Voltage**

**50 V**

**Current**

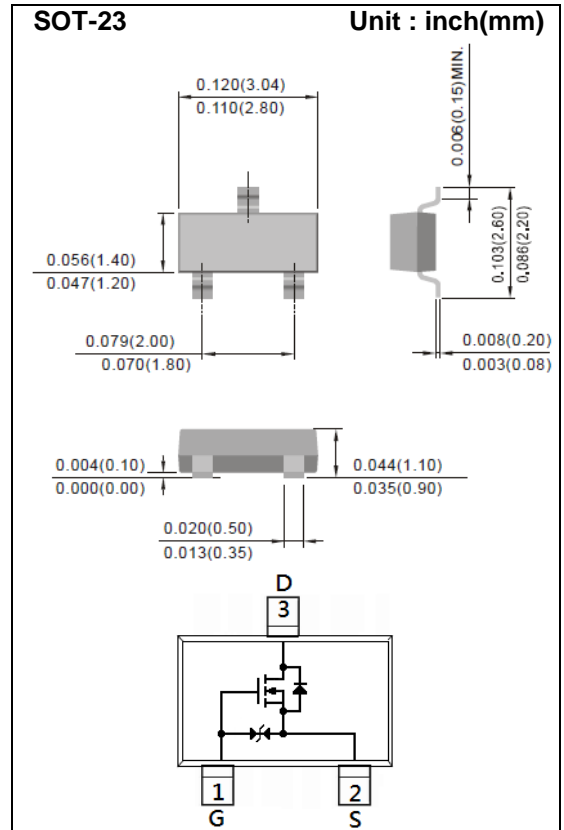
**500mA**

### Features

- RDS(ON) , V<sub>GS</sub>@10V, I<sub>D</sub>@500mA<1.6Ω
- RDS(ON) , V<sub>GS</sub>@4.5V, I<sub>D</sub>@200mA<2.5Ω
- RDS(ON) , V<sub>GS</sub>@2.5V, I<sub>D</sub>@100mA<4.5Ω
- Advanced Trench Process Technology.
- Specially Designed for Battery Operated Systems, Solid-State Relays Drivers: Relay, Displays, Memories, etc.
- ESD Protected 2KV HBM
- Lead free in compliance with EU RoHS2.0 (2011/65/EU & 2015/865/EU directive)
- Green molding compound as per IEC61249 Std..(Halogen Free)

### Mechanical Data

- Case: SOT-23 Package
- Terminals: Solderable per MIL-STD-750, Method 2026



### Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNITS	
Drain-Source Voltage	V <sub>DS</sub>	50	V	
Gate-Source Voltage	V <sub>GS</sub>	+20	V	
Continuous Drain Current	I <sub>D</sub>	500	mA	
Pulsed Drain Current	I <sub>DM</sub>	1200	mA	
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	500	mW
		Derate above 25°C	4	mW/°C
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~150	°C	
Typical Thermal Resistance	R <sub>θJA</sub>	250	°C/W	
- Junction to Ambient (Note 3)				

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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	50	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	0.8	1.0	1.5	
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =500mA	-	0.96	1.6	Ω
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =200mA	-	1.25	2.5	
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =100mA	-	2.73	4.5	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V	-	0.01	1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	±3.0	±10	
<b>Dynamic</b> (Note 4)						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =25V, I <sub>D</sub> =250mA, V <sub>GS</sub> =4.5V (Note 1,2)	-	0.63	1	nC
Gate-Source Charge	Q <sub>gs</sub>		-	0.2	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	0.23	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHZ	-	25	50	pF
Output Capacitance	C <sub>oss</sub>		-	9.5	20	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	2.1	5	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =25V, I <sub>D</sub> =500mA, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω (Note 1,2)	-	2.2	5	ns
Turn-On Rise Time	t <sub>r</sub>		-	19.2	38	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	6.2	12	
Turn-Off Fall Time	t <sub>f</sub>		-	23	50	
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>s</sub>	---	-	-	500	mA
Diode Forward Voltage	V <sub>SD</sub>	I <sub>s</sub> =500mA, V <sub>GS</sub> =0V	-	0.86	1.5	V

**NOTES :**

1. Pulse width ≤ 300us, Duty cycle ≤ 2%
2. Essentially independent of operating temperature typical characteristics.
3. 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 square pad of copper
4. Guaranteed by design, not subject to production testing.

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## TYPICAL CHARACTERISTIC CURVES

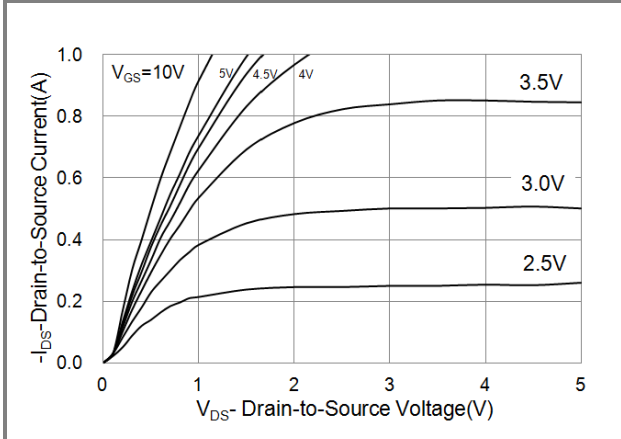


Fig.1 On-Region Characteristics

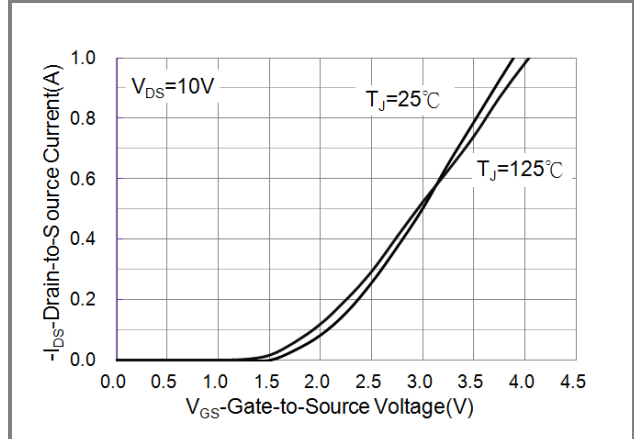


Fig.2 Transfer Characteristics

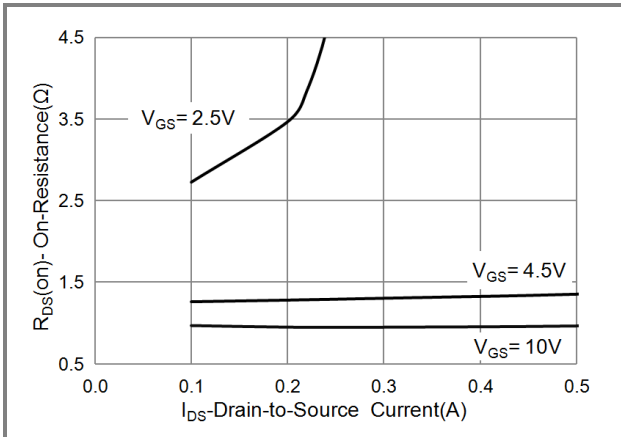


Fig.3 On-Resistance vs. Drain Current

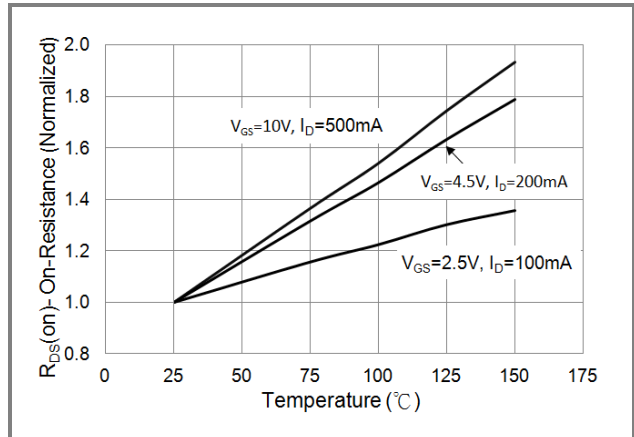


Fig.4 On-Resistance vs. Junction temperature

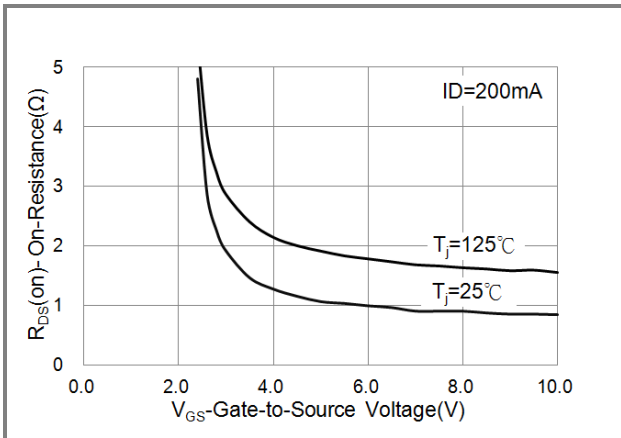


Fig.5 On-Resistance Variation with VGS.

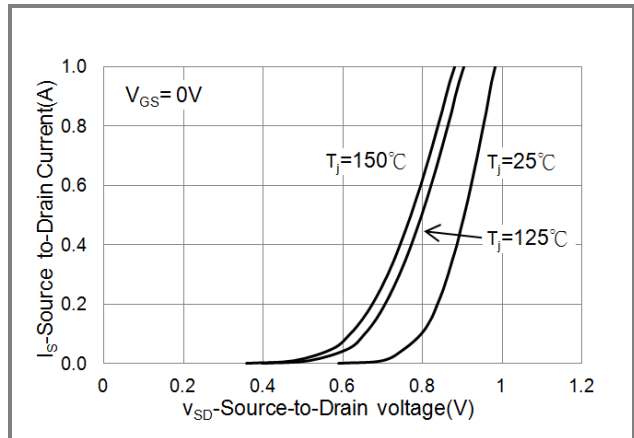


Fig.6 Body Diode Characteristics

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## TYPICAL CHARACTERISTIC CURVES

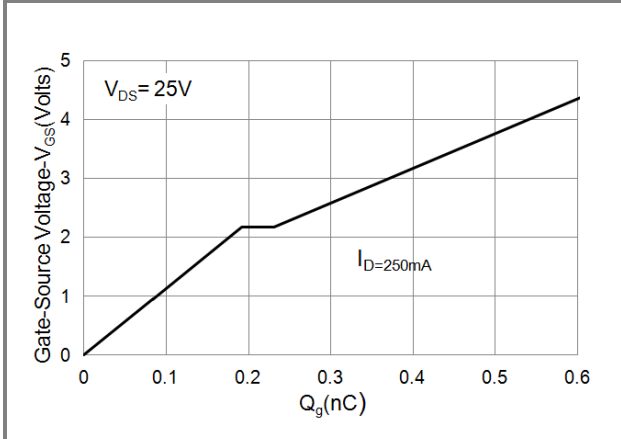


Fig.7 Gate-Charge Characteristics

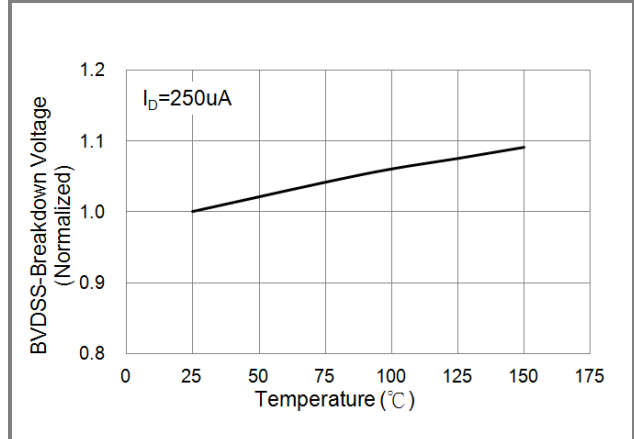


Fig.8 Breakdown Voltage Variation vs. Temperature

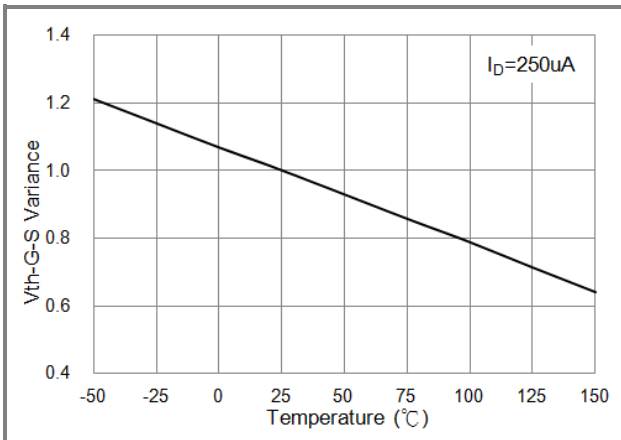


Fig.9 Threshold Voltage Variation with Temperature.

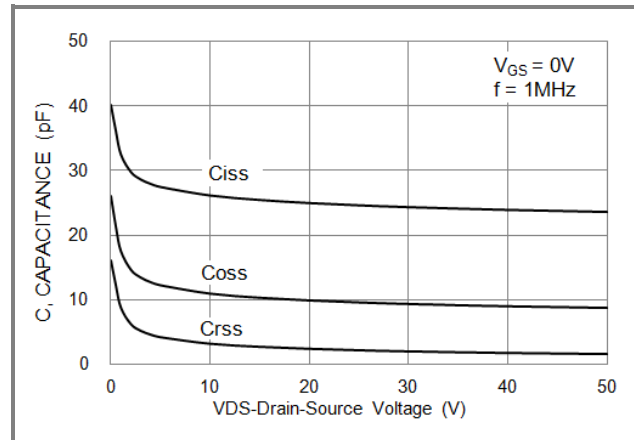


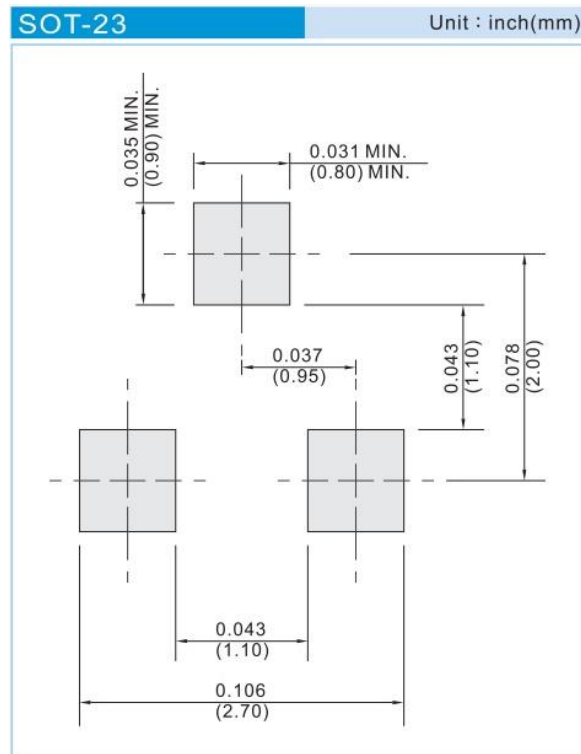
Fig.10 Capacitance vs. Drain-Source Voltage.

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## Product and Packing Information

Part No.	Package Type	Packing Type	Marking
PJA138K	SOT-23	3K pcs / 7" reel	8K3
PJA138K	SOT-23	12K pcs / 13" reel	8K3

## Mounting Pad Layout



## PJA138K

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