



# PJ2301

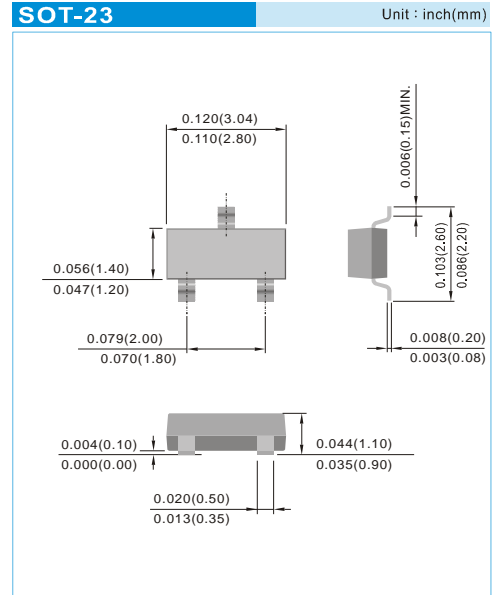
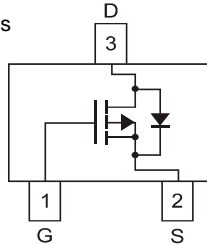
## 20V P-Channel Enhancement Mode MOSFET

### FEATURES

- $R_{DS(ON)}$ ,  $V_{GS}$  @ -1.8V,  $I_D$  @ -1.5A=200m $\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}$  @ -4.5V,  $I_D$  @ -2.2A=105m $\Omega$
- Advanced Trench Process Technology
- High Density Cell Design For Ultra Low On-Resistance
- Specially Designed for DC/DC converters
- Low gate charge
- Lead free in compliance with EU RoHS 2011/65/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
- Approx. Weight: 0.0003 ounces, 0.0084 grams
- Marking : 01



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

PARAMETER		Symbol	Limit	Units
Drain-Source Voltage		$V_{DS}$	-20	V
Gate-Source Voltage		$V_{GS}$	$\pm 8$	V
Continuous Drain Current (Notes 1)	Steady-State	$I_D$	$T_A=25^\circ\text{C}$	-1.75
	Steady-State		$T_A=70^\circ\text{C}$	-1.4
	$t \leq 5\text{s}$		$T_A=25^\circ\text{C}$	-2
Pulsed Drain Current (Notes 1)		$I_{DM}$	10	A
Power Dissipation (Notes 2)		$P_D$	$T_A=25^\circ\text{C}$	700
			$T_A=70^\circ\text{C}$	450
Typical Thermal Resistance (Notes 1)		$R_{\theta JA}$	175	$^\circ\text{C/W}$
Typical Thermal Resistance (Notes 1)		$R_{\theta JL}$	65	$^\circ\text{C/W}$
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55 to + 150	$^\circ\text{C}$

#### NOTES:

1. Mounted on minimum pad layout.
2. Mounted on 48cm<sup>2</sup> FR-4 PCB board.



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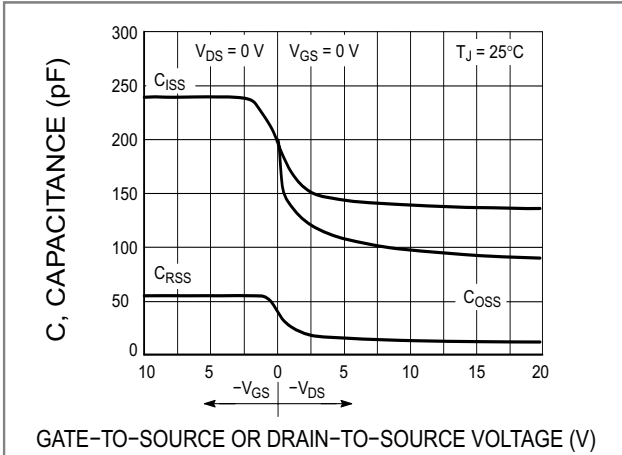
## ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
Static						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D = -250\mu A$	-20	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D = -250\mu A$	-0.5	-0.7	-0.9	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -2.2A$	-	90	105	mΩ
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = -2.5V, I_D = -1.7A$	-	120	140	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = -1.8V, I_D = -1.5A$	-	170	200	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16V, V_{GS}=0V$	-	-	-1	μA
Gate Body Leakage	$I_{GSS}$	$V_{GS} = \pm 8V, V_{DS}=0V$	-	-	±100	nA
Dynamic						
Forward Transconductance	$g_{FS}$	$V_{DS} = -10V, I_D = -1.7A$	4	6	-	S
Total Gate Charge	$Q_g$	$V_{DS} = -10V, I_D = -2.2A$ $V_{GS} = -4.5V$	-	4	-	nC
Gate-Source Charge	$Q_{gs}$		-	0.5	-	
Gate-Drain Charge	$Q_{gd}$		-	1	-	
Turn-On Time	$t_{on}$	$V_{DD} = -16V,$ $I_D = -2.2A, V_{GS} = -4.5V$ $R_{GEN} = 2.5\Omega$	-	8	-	ns
Turn-Off Time	$t_{off}$		-	35	-	
Turn-On Rise Time	$t_r$		-	15	-	
Turn-Off Fall Time	$t_f$		-	25	-	
Input Capacitance	$C_{iss}$	$V_{DS} = -10V, V_{GS}=0V$ $f=1.0MHz$	-	200	300	pF
Output Capacitance	$C_{oss}$		-	90	140	
Reverse Transfer Capacitance	$C_{rss}$		-	40	60	
Gate Resistance	$R_g$	$V_{DS}=0V, V_{GS}=0V$ $f=1.0MHz$	-	12	-	Ω
Source-Drain Diode						
Max. Diode Forward Current	$I_s$	-	-	-	-2	A
Diode Forward Voltage	$V_{SD}$	$I_s = -1A, V_{GS}=0V$	-	-0.79	-1	V
Body-Diode Reverse Recovery Time	$t_{rr}$	$I_s = -2.1A, di/dt=100A/\mu s$	-	30	-	ns
Body-Diode Reverse Recovery Charge	$Q_{rr}$		-	12	-	nC

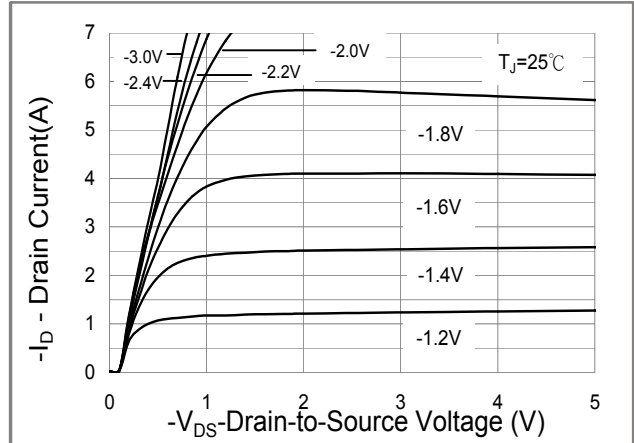


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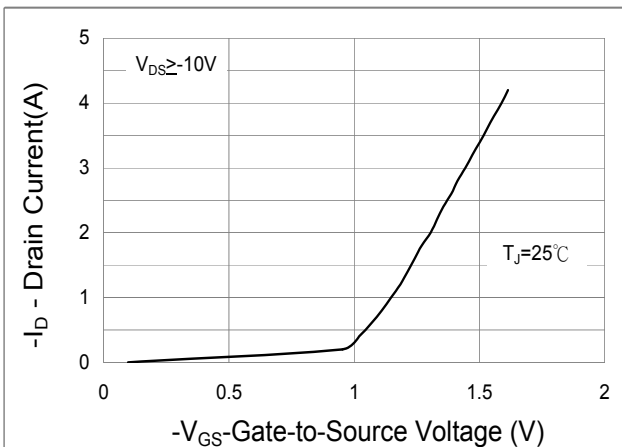
## CHARACTERISTIC CURVES



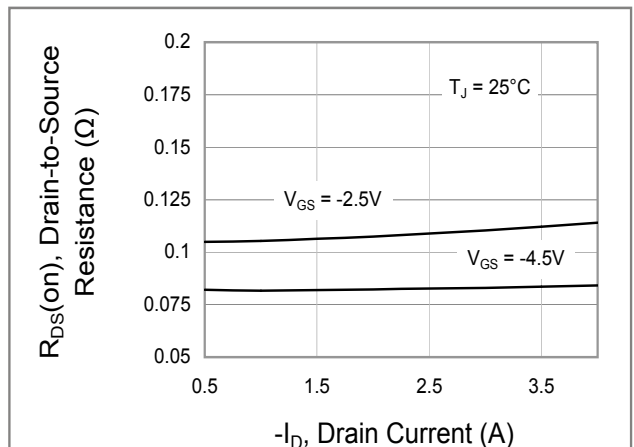
**Fig.1 Capacitance Variation**



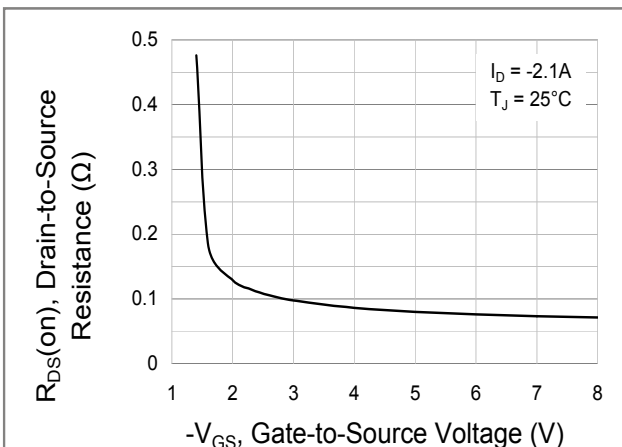
**Fig.2 On-Region Characteristics**



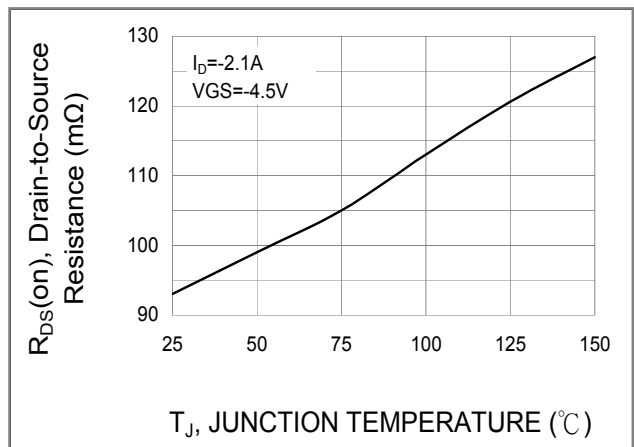
**Fig.3 Transfer Characteristics**



**Fig.4 On-Resistance vs. Drain Current and Gate Voltage**



**Fig.5 On-Resistance vs. Gate-Source Voltage**



**Fig.6 On-Resistance Variation with Temperature**



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## CHARACTERISTIC CURVES

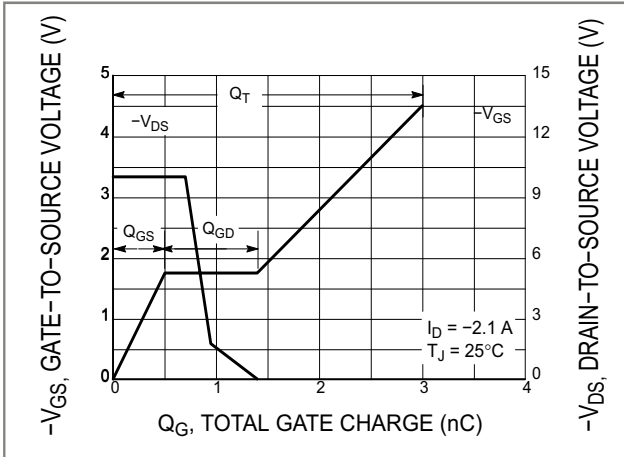


Fig.7 Gate-to-Source and Drain-to-Source vs. Total Charge

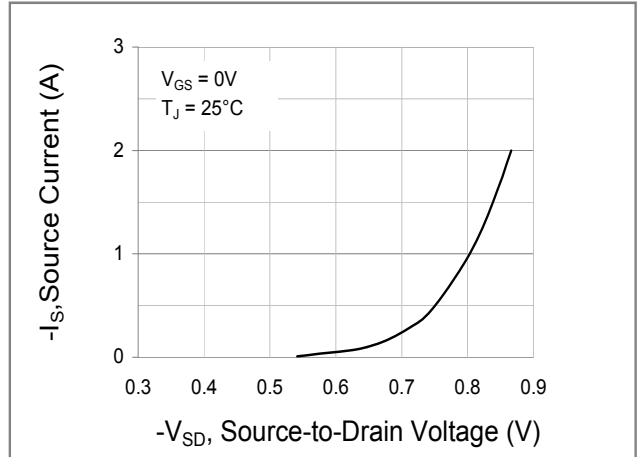


Fig.8 Diode Forward Voltage vs. Current

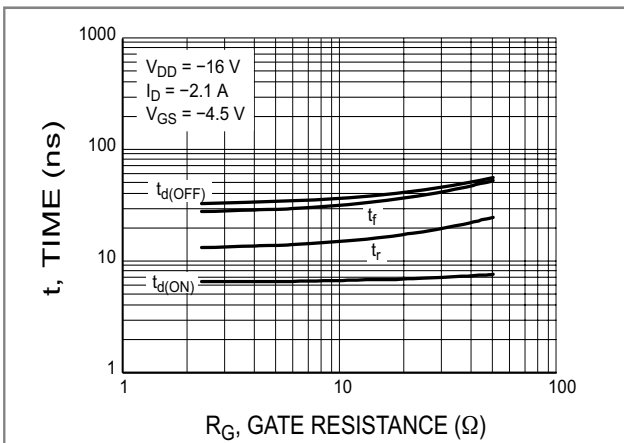


Fig.9 Resistive Switching Time Variation vs. Gate Resistance

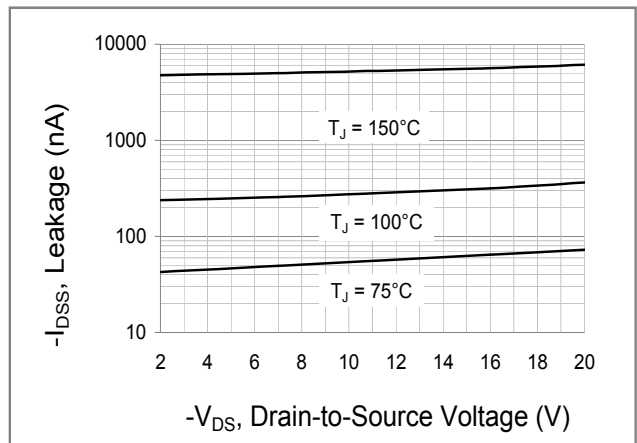


Fig.10 Drain-to-Source Leakage Current vs. Voltage

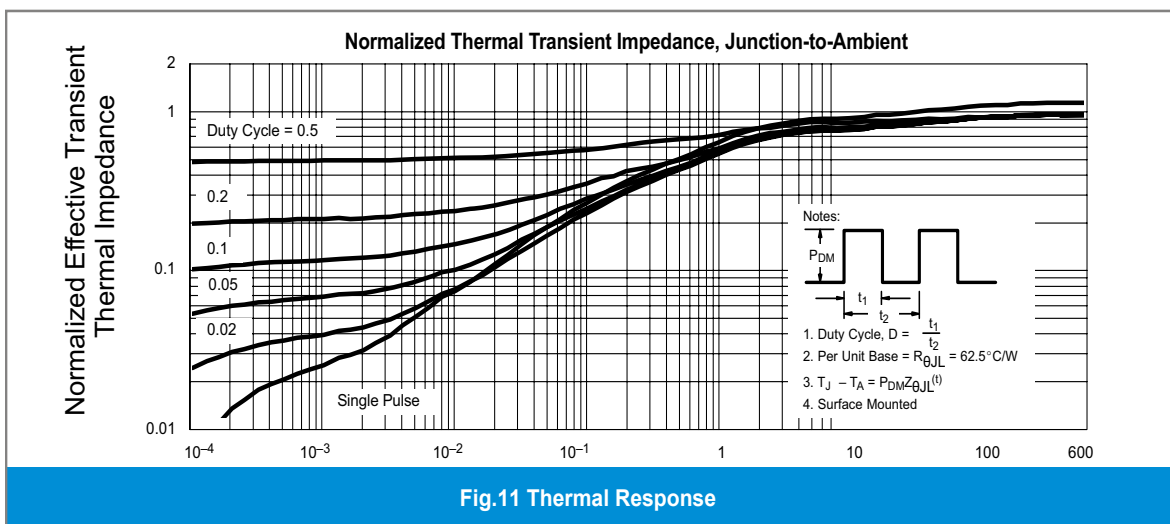


Fig.11 Thermal Response

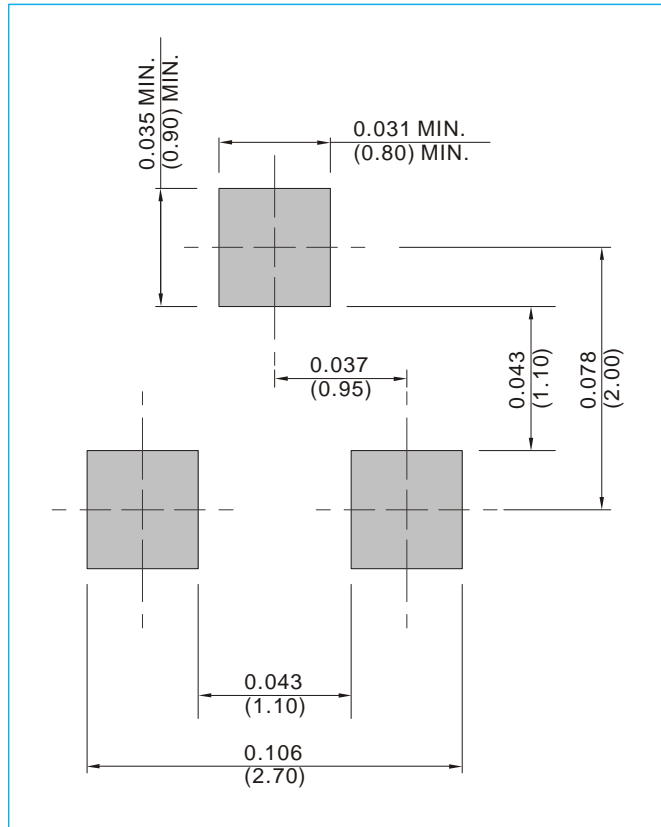


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## MOUNTING PAD LAYOUT

**SOT-23**

Unit : inch(mm)



## ORDER INFORMATION

- Packing information
  - T/R - 12K per 13" plastic Reel
  - T/R - 3K per 7" plastic Reel



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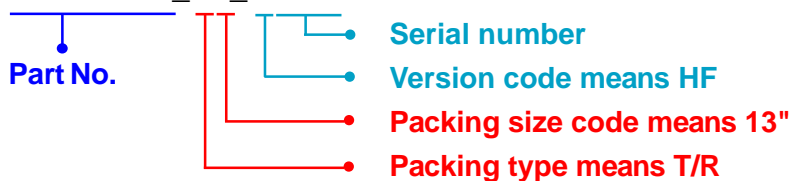
## Part No\_packing code\_Version

PJ2301\_R1\_00001

PJ2301\_R2\_00001

For example :

**RB500V-40\_R2\_00001**



Packing Code <b>XX</b>				Version Code <b>XXXXX</b>		
Packing type	1 <sup>st</sup> Code	Packing size code	2 <sup>nd</sup> Code	HF or RoHS	1 <sup>st</sup> Code	2 <sup>nd</sup> -5 <sup>th</sup> Code
Tape and Ammunition Box (T/B)	A	N/A	0	HF	0	serial number
Tape and Reel (T/R)	R	7"	1	RoHS	1	serial number
Bulk Packing (B/P)	B	13"	2			
Tube Packing (T/P)	T	26mm	X			
Tape and Reel (Right Oriented) (TRR)	S	52mm	Y			
Tape and Reel (Left Oriented) (TRL)	L	PANASERT T/B CATHODE UP (PBCU)	U			
FORMING	F	PANASERT T/B CATHODE DOWN (PBCD)	D			



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