

## P-Channel 20-V (D-S) MOSFET

### ■ FEATURES

- Low  $R_{DS(on)}$  Provides Higher Efficiency and Extends Battery Life
- Low thermal impedance copper leadframe SOT23 saves board space
- Fast switching speed
- High performance trench technology
- ROHS compliant
- MSL: 3

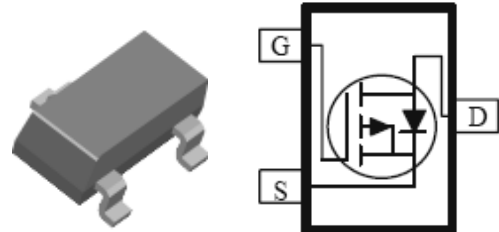
### ■ Product Summary

MOSFET		
$V_{DS}$	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
-20 V	100 @ $V_{GS} = -4.5$ V	-2.8
	150 @ $V_{GS} = -2.8$ V	-2.0
	170 @ $V_{GS} = -1.8$ V	-2.0

### ■ Description

These miniature surface mount MOSFETs utilize High Cell Density process. Low  $R_{DS(on)}$  assures minimal power loss and conserves energy, making this device ideal for use in power management circuitry. Typical applications are lower voltage application, power management in portable and battery-powered products such as computers, printers, and PCMCIA cards, cellular and cordless telephones.

### ■ SOT23



### Maximum Ratings (TA = 25 °C UNLESS OTHERWISE NOTED)

Symbol	Parameter	Maximum	Unit
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	
$I_D$	Continuous Drain Current <sup>a</sup>	$T_A=25^\circ\text{C}$	-2.8
		$T_A=70^\circ\text{C}$	-2.1
$I_{DM}$	Pulsed Drain Current <sup>b</sup>	-10	A
$I_S$	Continuous Source Current (Diode Conduction) <sup>a</sup>	-1	A
$P_D$	Power Dissipation <sup>a</sup>	$T_A=25^\circ\text{C}$	1.38
	Linear Derating Factor		0.01
$T_J, T_{stg}$	Operation Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Resistance Ratings

Symbol	Parameter	Ratings	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient <sup>a</sup>	90	$^\circ\text{C/W}$

#### Notes:

- (a) Surface Mounted on 1" x 1" FR4 Board.
- (b) Pulse width limited by maximum junction temperature



### Electrical Characteristics

SPECIFICATIONS (TA = 25°C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Limits			Unit
			Min	Typ	Max	
<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	-0.5	-0.8	-1.5	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12V			±100	nA
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = -20 V, V <sub>GS</sub> = 0 V T <sub>J</sub> = 25°C			-1	uA
		V <sub>DS</sub> = -16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C			-10	
Drain-Source On-Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.8 A			100	mΩ
		V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -2.0 A			150	
		V <sub>GS</sub> = -1.8 V, I <sub>D</sub> = -2.0 A			170	
Diode Forward On Voltage	V <sub>SD</sub>	I <sub>S</sub> = -1.6 A, V <sub>GS</sub> = 0 V			-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -6V, V <sub>GS</sub> = -5V I <sub>D</sub> = -2.8A		6.396		nC
Gate-Source Charge	Q <sub>gs</sub>			2.24		
Gate-Drain Charge	Q <sub>gd</sub>			1.05		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =-15V, R <sub>D</sub> =15Ω, R <sub>G</sub> = 6Ω, V <sub>GS</sub> = -10V		7.05		ns
Turn-On Rise Time	t <sub>r</sub>			9.836		
Turn-Off Delay Time	t <sub>d(off)</sub>			23.396		
Turn-Off Fall Time	t <sub>f</sub>			7.692		
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-6V, f = 1.0MHz		660.8		pF
Output Capacitance	C <sub>oss</sub>			110.4		
Reverse Transfer Capacitance	C <sub>rss</sub>			37.6		

**Notes:**

(a) Pulse width ≤ 300us, duty cycle ≤ 2%

(b) Pulse width limited by Max. Junction temperature.



### Typical Electrical Characteristics

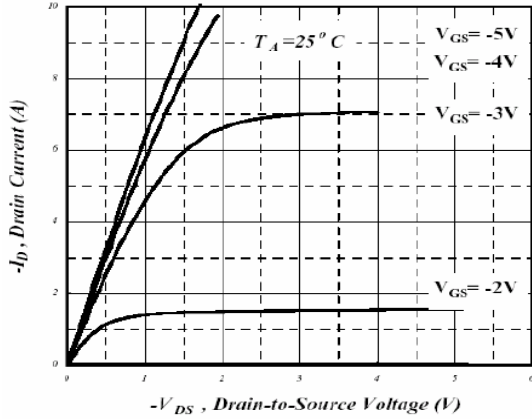


Fig 1. Typical Output Characteristics

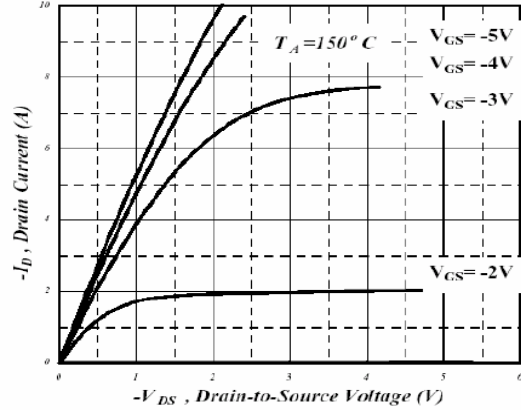


Fig 2. Typical Output Characteristics

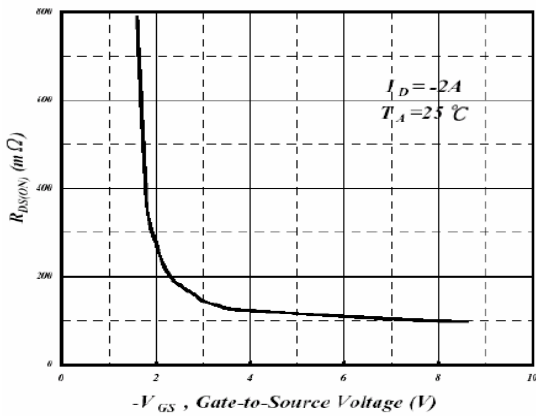


Fig 3. On-Resistance v.s. Gate Voltage

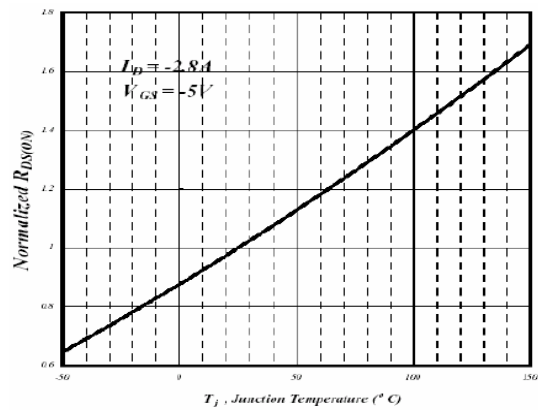


Fig 4. Normalized On-Resistance

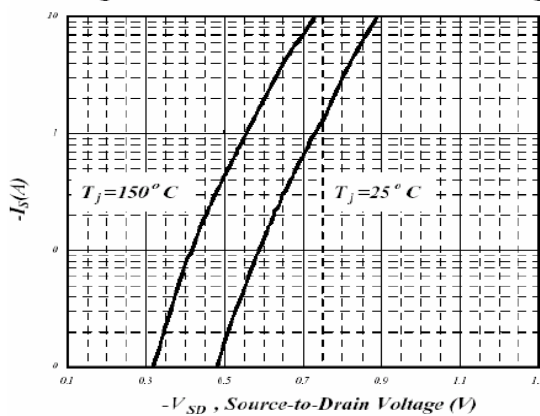


Fig 5. Forward Characteristic of Reverse Diode

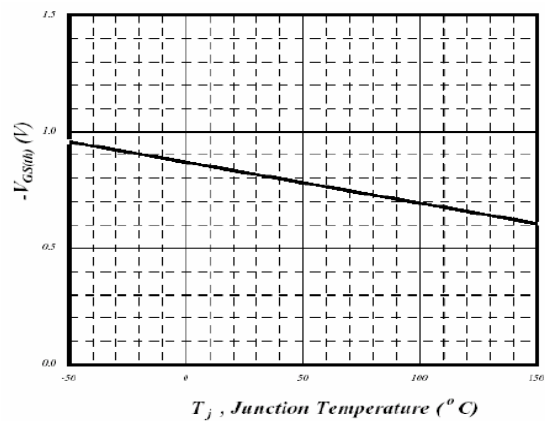
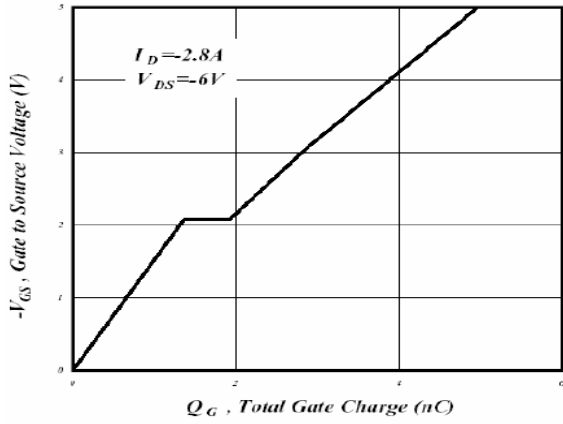
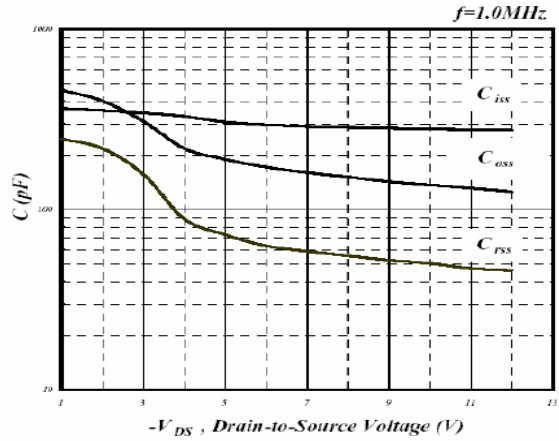
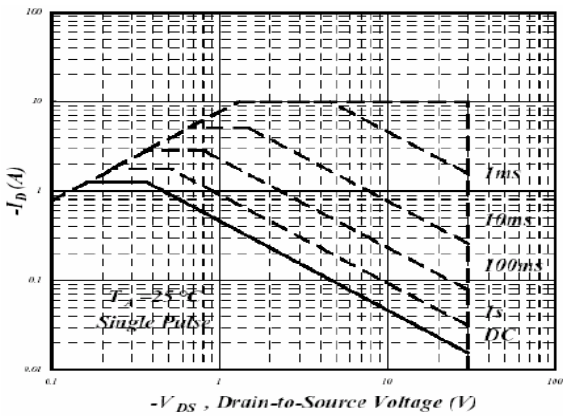
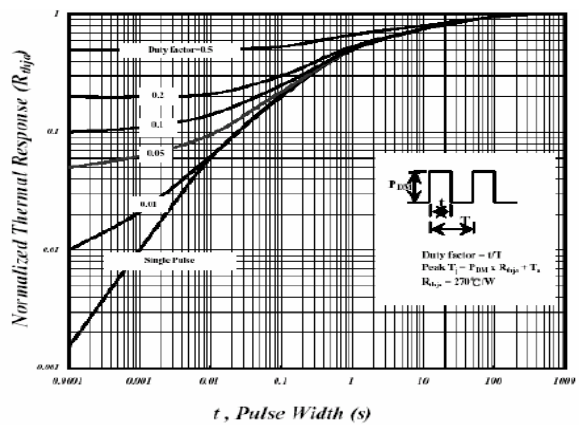
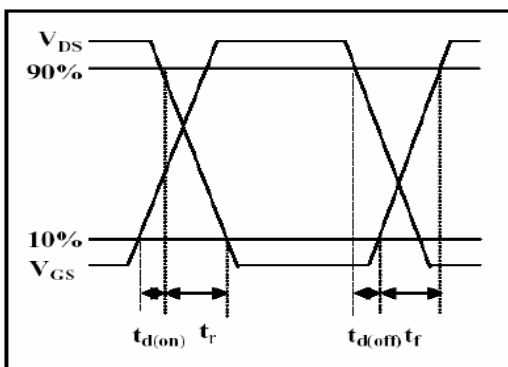
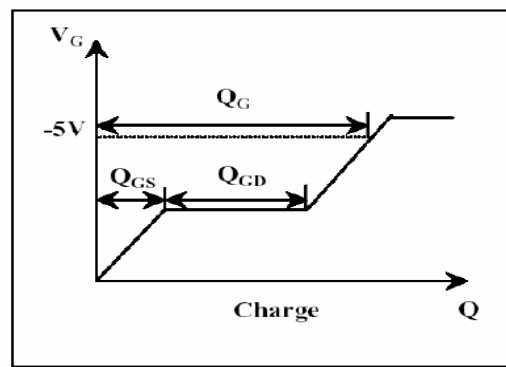


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

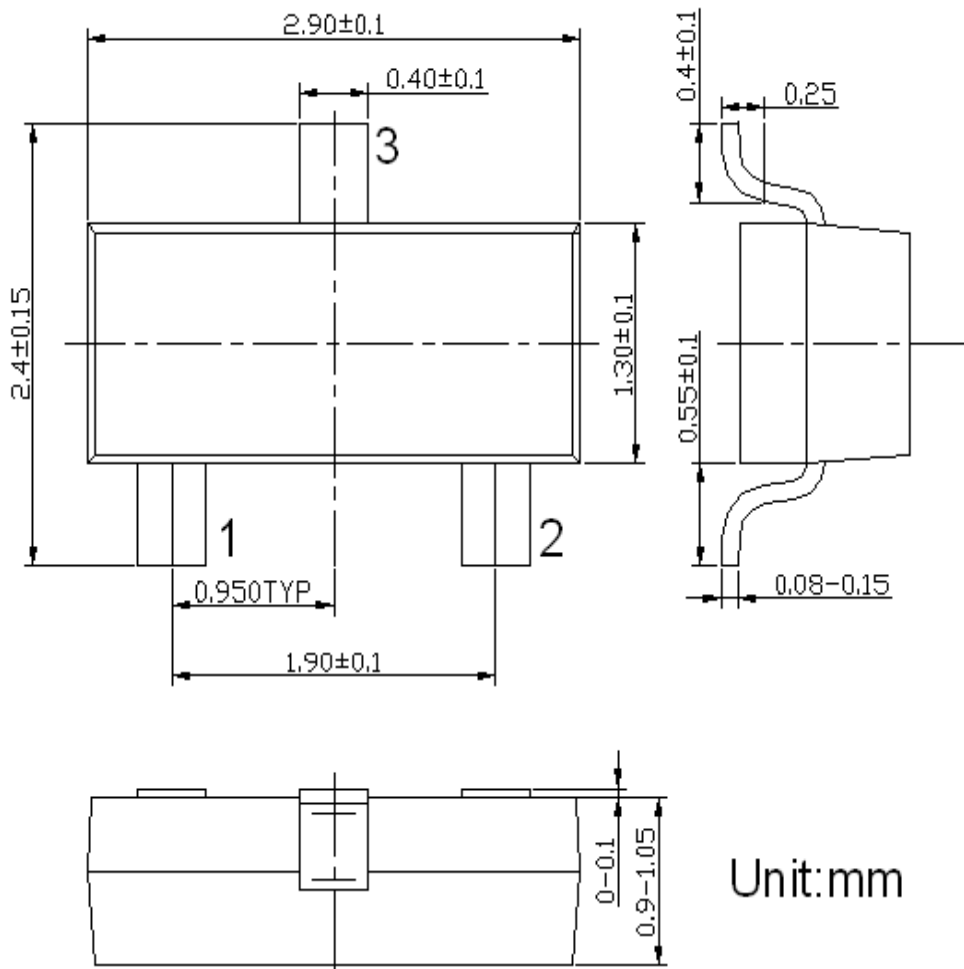
**Typical Electrical Characteristics**

**Fig 7. Gate Charge Characteristics**

**Fig 8. Typical Capacitance Characteristics**

**Fig 9. Maximum Safe Operating Area**

**Fig 10. Effective Transient Thermal Impedance**

**Fig 11. Switching Time Waveform**

**Fig 12. Gate Charge Waveform**

**Ordering Information**

Part number	Marking	package	Quantity per reel
JY2301X	2301	SOT23	3000

**Package Information**

( SOT23 )



Unit:mm

**Carrier Dimensions**

PKG TYPE	W	P	E	F	D	D1	Po	Po10	P2
SOT23	8.00	4.00	1.75	3.50	1.50	1.00	4.00	40.00	2.00
Tolerance	+0.3/-0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.05

A0	B0	K0	T
3.15	2.77	1.22	0.20
±0.1	±0.1	±0.1	±0.02

