

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

### ■ FEATURES

- Low  $R_{DS(on)}$  Provides Higher Efficiency and Extends Battery Life
- Low thermal impedance copper leadframe SOT-23 saves board space
- Fast switching speed
- High performance trench technology
- RoHS, Pb-free, Halogen free compliant

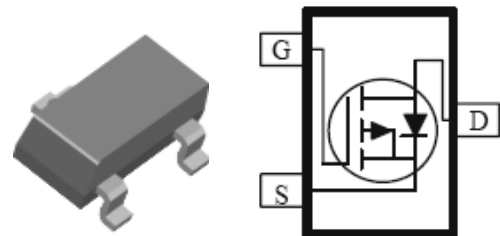
### ■ Description

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.

### ■ Product Summary

MOSFET		
$V_{DS}$	$R_{DS(on)}m(\Omega)$	$I_D$ (A)
-20 V	53@ $V_{GS} = -10$ V	-4.5
	65@ $V_{GS} = -4.5$ V	-4.2

### ■ SOT-23



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

Symbol	Parameter	Maximum	Unit
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	±12	
$I_D$	Continuous Drain Current <sup>a</sup>	$T_A=25^{\circ}C$	-4.2
		$T_A=70^{\circ}C$	-3.4
$I_{DM}$	Pulsed Drain Current <sup>b</sup>	-10	A
$P_D$	Power Dissipation <sup>a</sup>	1.38	W
	Linear Derating Factor	0.01	W/°C
$T_J, T_{stg}$	Operation Junction and Storage Temperature Range	-55 to 150	°C

### Thermal Resistance Ratings

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

#### Notes:

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

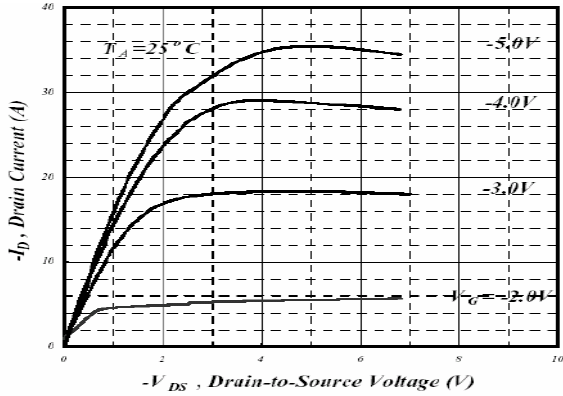
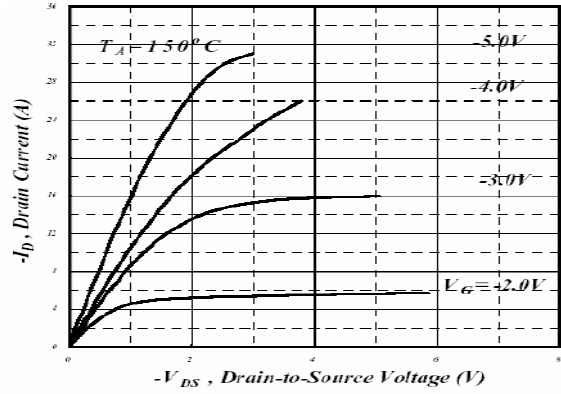
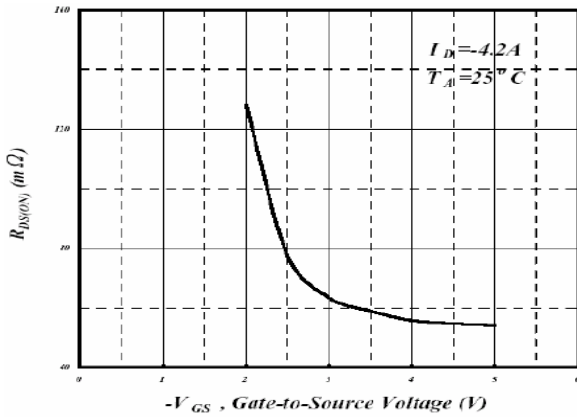
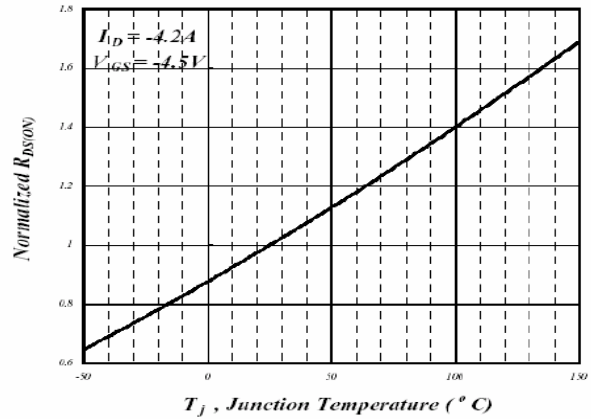
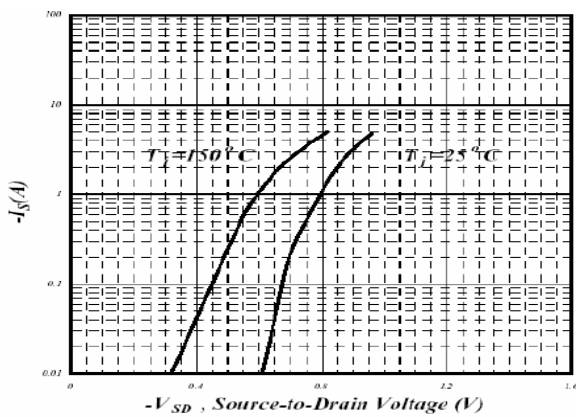
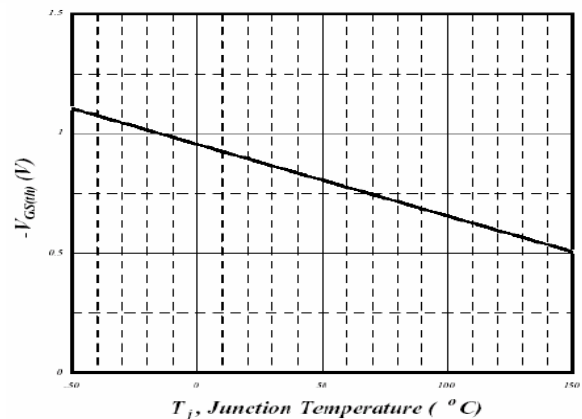
**Electrical Characteristics**

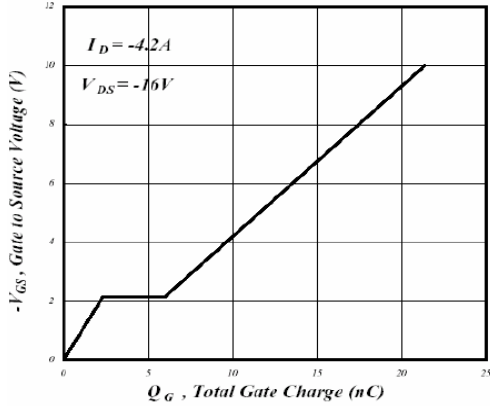
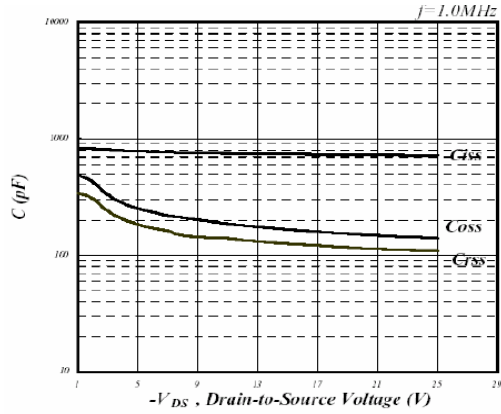
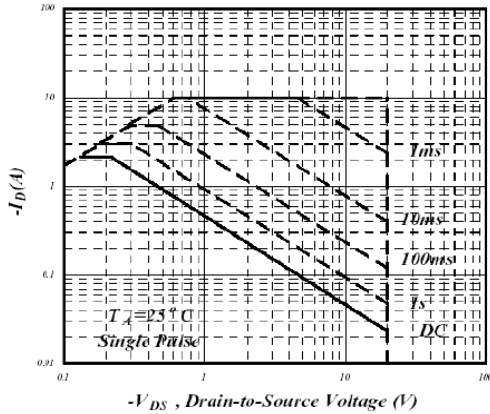
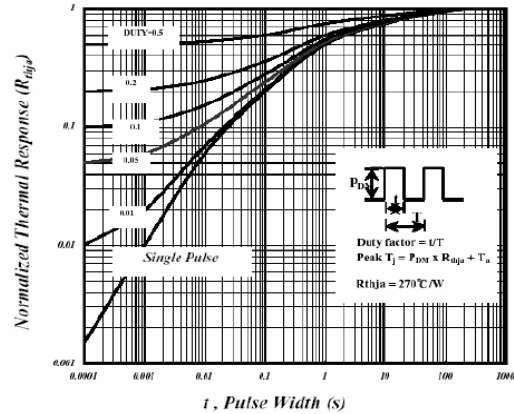
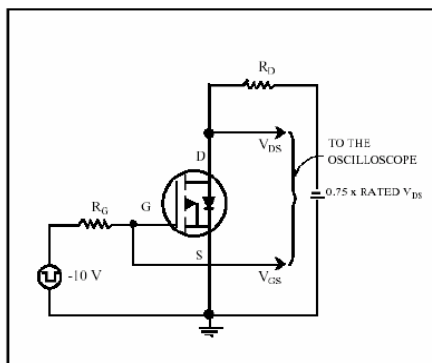
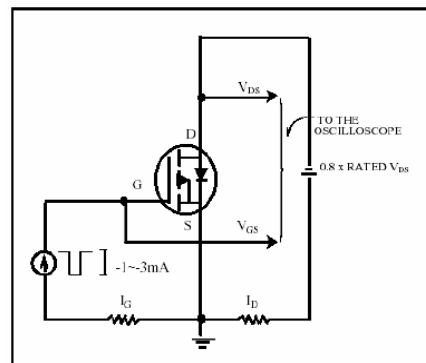
SPECIFICATIONS (TA = 25°C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Limits			Unit
			Min	Typ	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-20			V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250uA	-0.5			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> = -10 V, I <sub>D</sub> = -4.5 A			53	mΩ
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -4.2 A			65	
		V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -2.0 A			100	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -5.0V, I <sub>D</sub> = -2.8A		9		S
Diode Forward On Voltage	V <sub>SD</sub>	I <sub>S</sub> = -1.2 A, V <sub>GS</sub> = 0 V			-1.2	V
Reverse Recovery Time <sub>2</sub>	T <sub>rr</sub>	I <sub>S</sub> =-4.2A, V <sub>GS</sub> =0V dI/dt=100A/us		27.7		ns
Reverse Recovery Charge	Q <sub>rr</sub>			22		nC
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -16V, V <sub>GS</sub> = -4.5V I <sub>D</sub> = -4.2A		10.6		nC
Gate-Source Charge	Q <sub>gs</sub>			2.32		
Gate-Drain Charge	Q <sub>gd</sub>			3.68		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =-15V, R <sub>D</sub> =3.6Ω, I <sub>D</sub> =-4.2A R <sub>G</sub> = 6Ω, V <sub>GS</sub> = -10V		5.9		ns
Turn-On Rise Time	t <sub>r</sub>			3.6		
Turn-Off Delay Time	t <sub>d(off)</sub>			32.4		
Turn-Off Fall Time	t <sub>f</sub>			2.6		
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1.0MHz		740		pF
Output Capacitance	C <sub>oss</sub>			167		
Reverse Transfer Capacitance	C <sub>rss</sub>			126		

**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 v.s. Junction Temperature**

**Fig 5. Forward Characteristic of Reverse Diode**

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

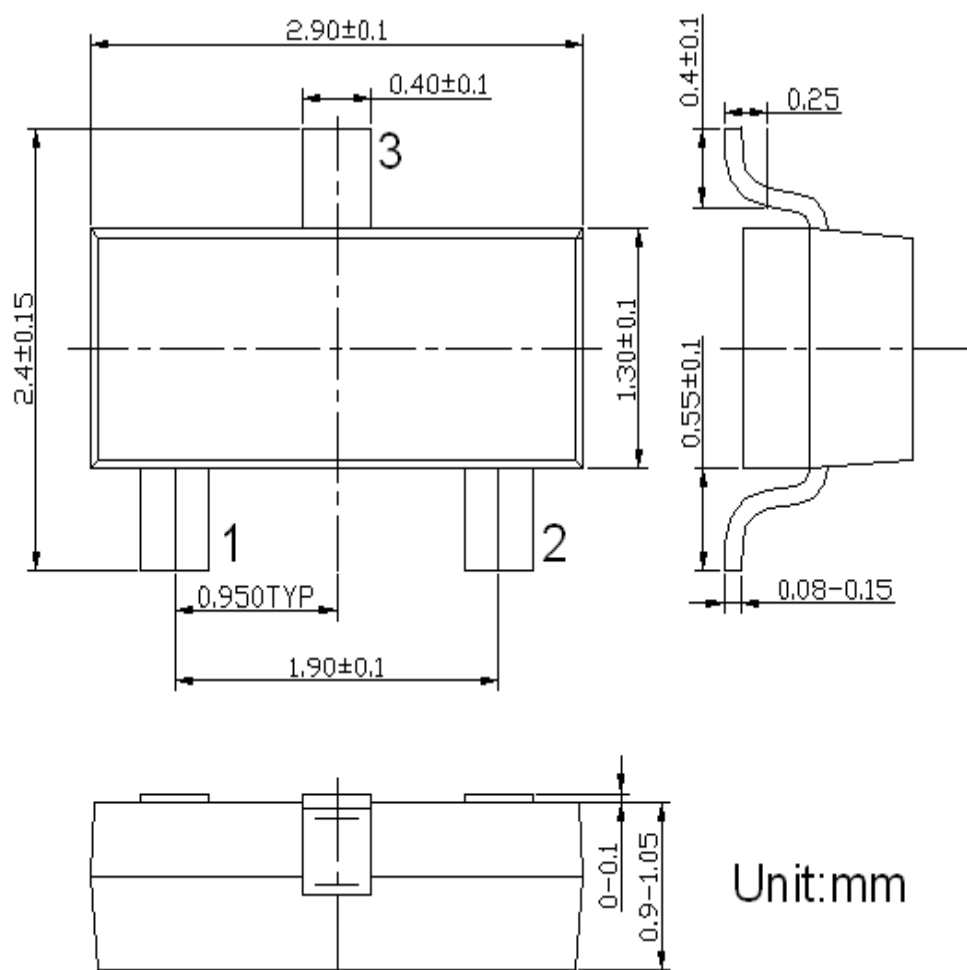
**Typical Electrical Characteristics**

**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 Circuit**

**Fig 12. Gate Charge Circuit**

**Ordering Information**

Part number	Marking	package	Quantity per reel
JY2305X	2305	SOT-23	3000

**Package Information**

- SOT-23 package
- MSL-3 Level



### Carrier Dimensions

PKG TYPE	W	P	E	F	D	D1	Po	Po10	P2
SOT-23	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

