PS03N20SA

20V Single Channel NMOSEFT

Revision : 1.0
Update Date : Apr. 2011

ProsPower Microelectronics Co., Ltd

1. General Description

The PS03N20SA uses advanced trench technology and design to provide excellent Rds(on) with low gate charge. This device is suitable for use as a load switch or in PWM applications. Standard Product PS03N20SA is Pb-free (meets ROHS & Sony 259 specifications). It is offered in the very popular SOT23 package

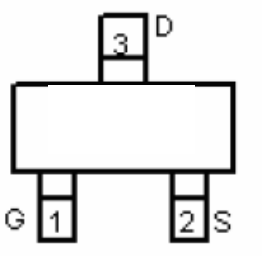
2. Applications

- PWM applications
- Load switch
- Power management
- DC-DC convert

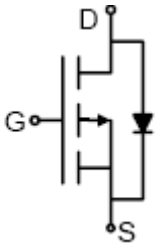
3. Features

- Vds=20V, Id=3A
- Rds(on)=29mohm (Vgs=4.5V)
- Rds(on)=36mohm (Vgs=2.5V)
- High Power and current handing capability
- Low capacitance minimizes driver loss
- Optimized gate charge minimizes switching loss

Pin Configuration



SOT23



Schematic

Pin Descriptions

Pin Name	Symbol	Function
Gate(1)	G	Device Gate terminal
Drain(3)	D	Device drain terminal
Source(2)	S	Device source terminal

Absolute Maximum Ratings

Stress greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These stress ratings only, and functional operation of the device at these or any conditions beyond those indicated under recommended Operating Conditions is not implied. Exposure to "Absolute Maximum Rating" for extended periods may affect device reliability. Use of standard ESD handling precautions is required.

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±8	V
Continuous Drain Current	I_D	3	A
Pulsed Drain Current (Note 1)	I_{DM}	15	A
Junction Temperature	T_J	150	°C
Power Dissipation T_C=25°C	P_D	0.7	W
Storage Temperature Range	T_{STG}	-65 to 150	°C

Electrical Specifications

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
STATIC PARAMETERS							
Drain-Source Breakdown Voltage	BVD_{SS}	I_D=250uA, V_{GS}=0V		20	23		V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V, V_{GS}=0V	T_J=25°C			1	uA
Gate-Body leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±8V				±0.1	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA		0.51	0.53	0.85	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=3A			29	50	mΩ
		V_{GS}=2.5V, I_D=2A			36	65	
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=3.6A			8		S
Diode Forward Voltage	V_{SD}	I_S=1.25A, V_{GS}=0V		0.4	0.7	1	V
DYNAMIC PARAMETERS							
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=10V, f=1MHz			300		pF
Output Capacitance	C_{oss}				120		pF
Reverse Transfer Capacitance	C_{rss}				80		pF
SWITCHING PARAMETERS							
Total Gate Charge	Q_g	V_{GS}=4.5V, V_{DD}=10V, I_D=3.6A (Note 3)			4	10	nC
Gate Source Charge	Q_{gs}				0.65		nC
Gate Drain Charge	Q_{gd}				1.5		nC
Turn-On Delay Time	$t_{D(on)}$	I_D=3.6A, V_{DD}=10V, V_{GEN}=4.5V, R_L=2.8Ω			8	15	ns
Turn-On Rise Time	t_r				50	80	ns

Turn-Off Delay Time	$t_{D(off)}$	R_G=6Ω(Note 3)		15	60	ns
Turn-Off Fall Time	t_f			10	25	ns

Notes

1. Pulse width limited by max. junction temperature
2. Surface mounted on 1 in^2 copper pad of FR4 board, t <= 5sec; 180°C/W when mounted on min. copper pad.
3. Pulse Width <= 300us, Duty Cycle <=2%

Typical Performance Characteristics

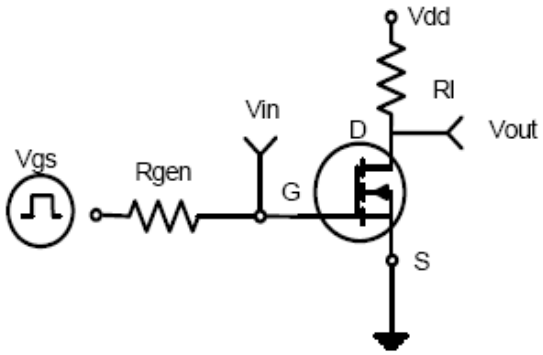


Figure 1:Switching Test Circuit

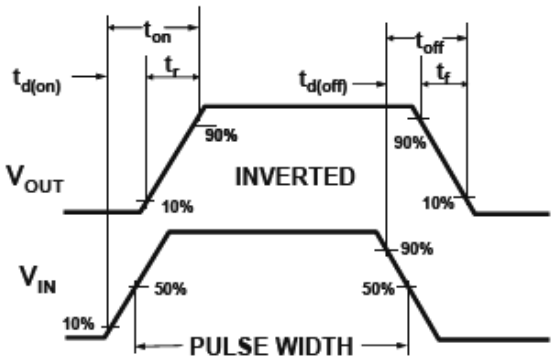


Figure 2:Switching Waveforms

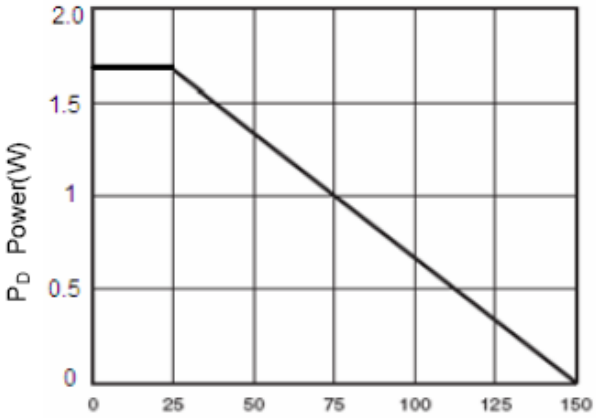


Figure 3 Power Dissipation

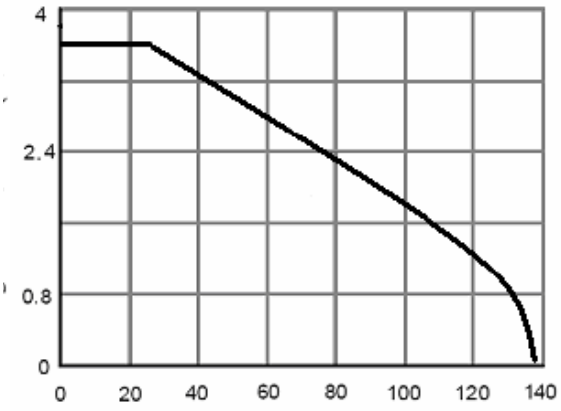


Figure 4 Drain Current

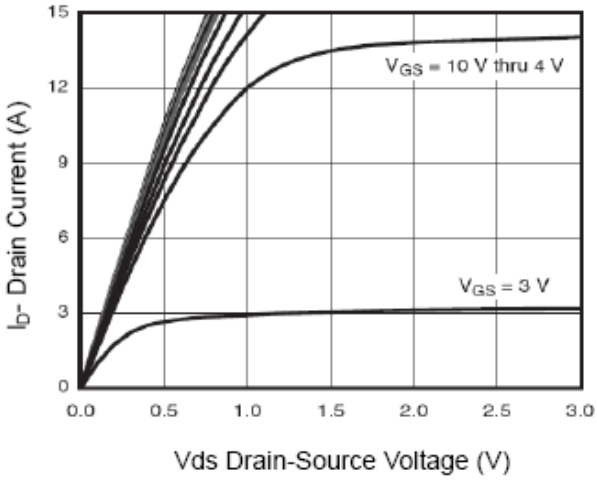


Figure 5 Output CHARACTERISTICS

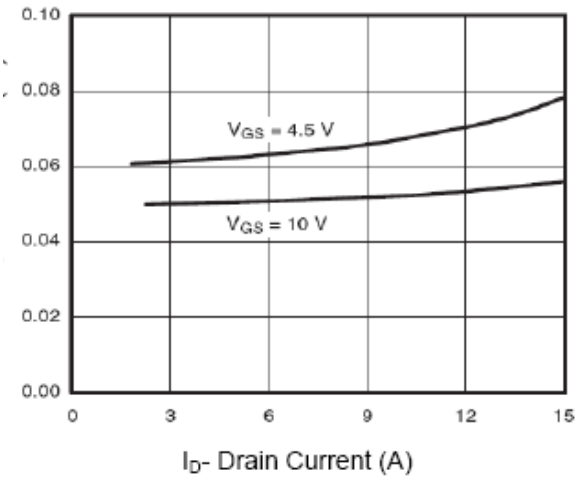


Figure 6 Drain-Source On-Resistance

Typical Performance Characteristics (contd.)

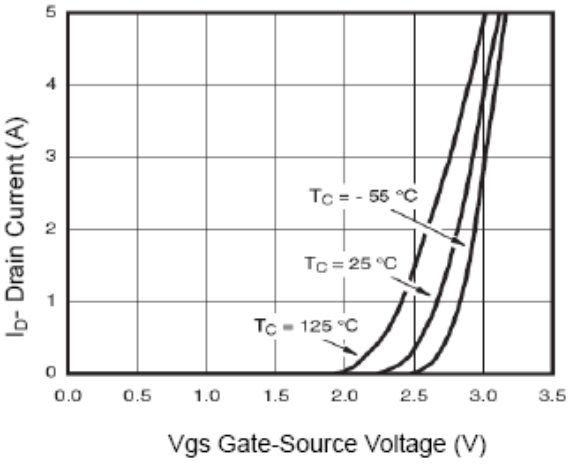


Figure 7 Transfer Characteristics

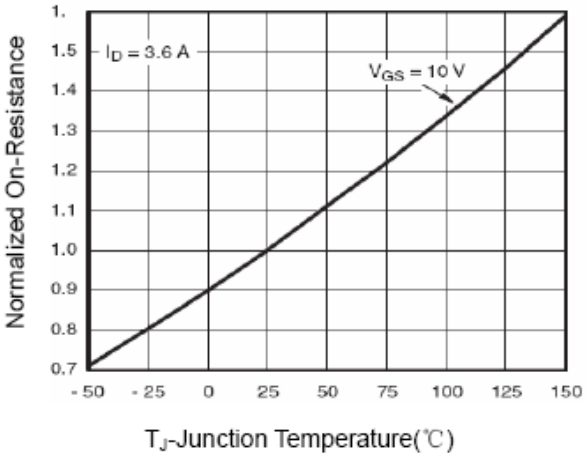


Figure 8 Drain-Source On-Resistance

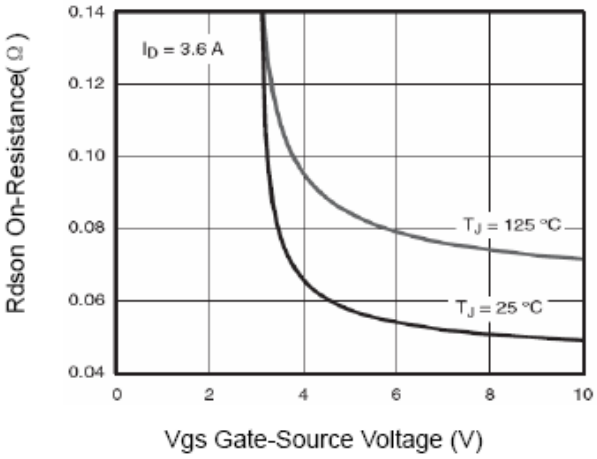


Figure 9 Rdson vs Vgs

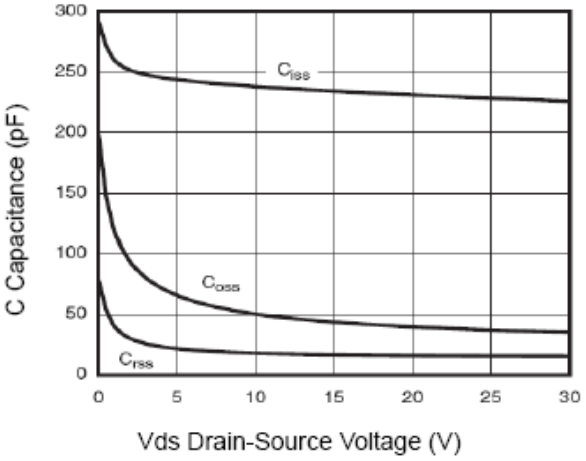


Figure 10 Capacitance vs Vds

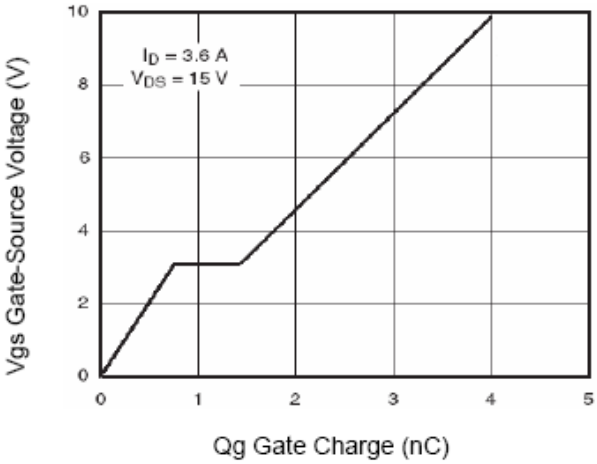


Figure 11 Gate Charge

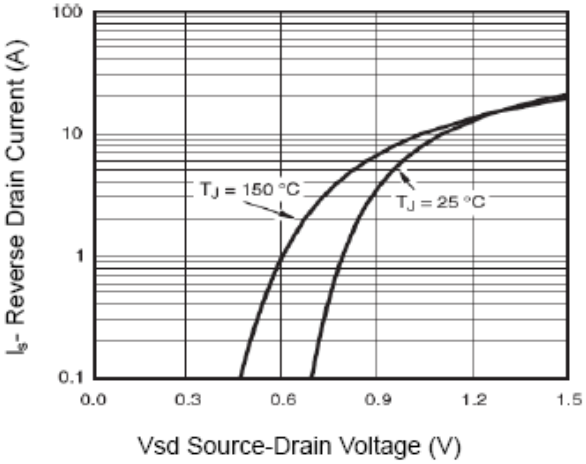


Figure 12 Source- Drain Diode Forward

Typical Performance Characteristics (contd.)

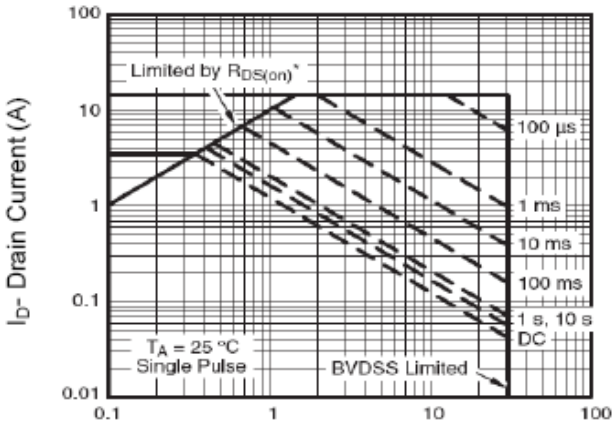


Figure 13 Safe Operation Area

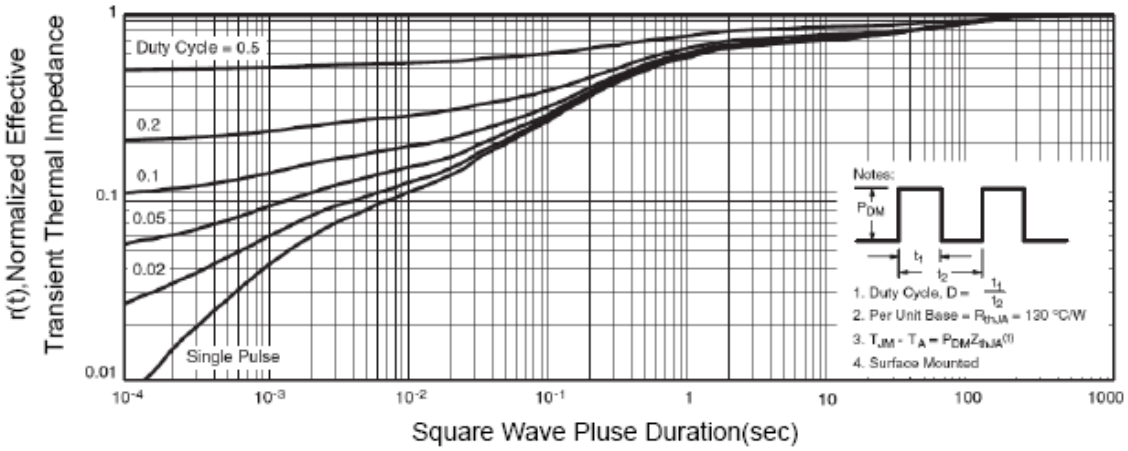
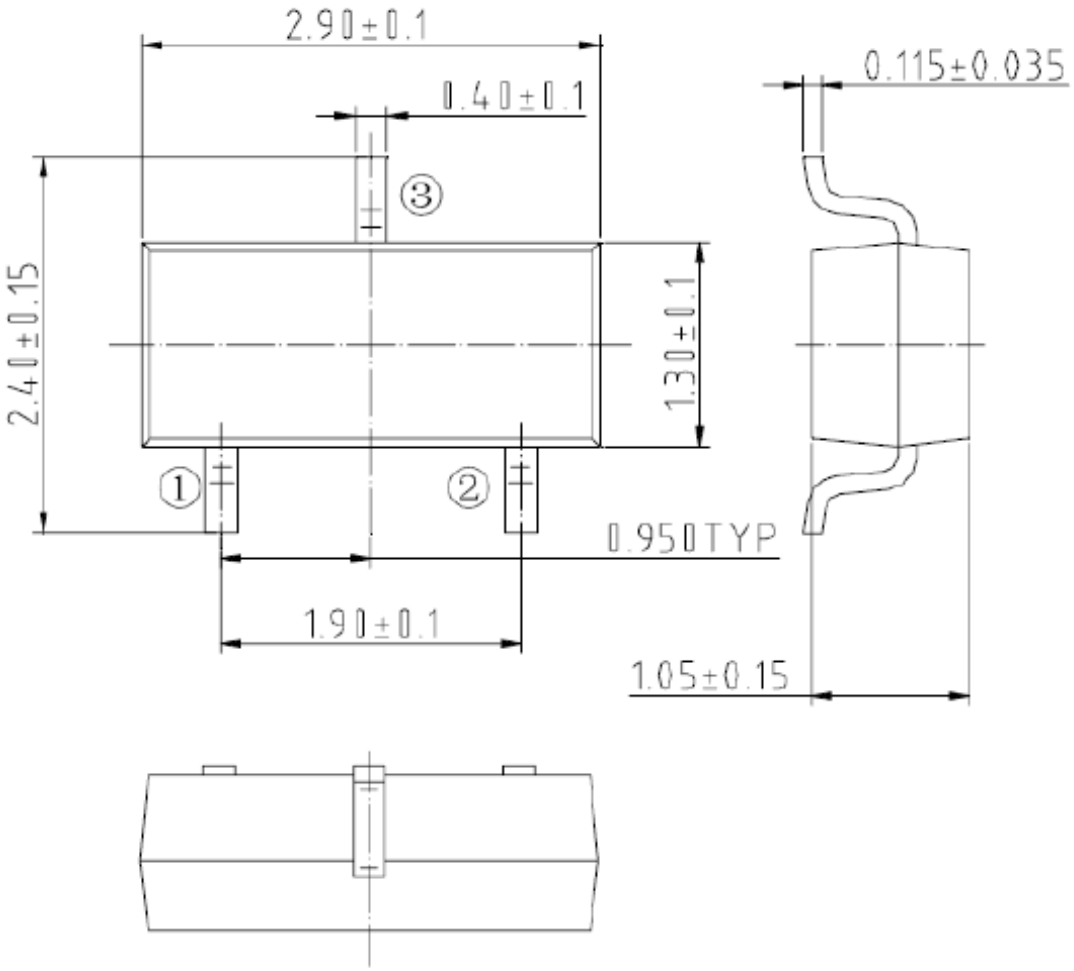


Figure 14 Normalized Maximum Transient Thermal Impedance

Package Dimensions
SOT23



Ordering Information

Device	Operating T_j	PKG Type	Wrap	Order Number
PS03N20SA	-65C° ≤150C°	SOT23	T&R	PS03N20SA-S2-TL

Note: Lead Free and RoHS compliant.