



ProsPower

PS04P30SA

30V Single Channel PMOSEFT

Revision : 1.0
Update Date : Apr. 2011

ProsPower Microelectronics Co., Ltd

1. General Description

The PS04P30SA uses advanced trench technology and design to provide excellent $R_{ds(on)}$ with low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. Standard Product PS04P30SA is Pb-free (meets ROHS & Sony 259 specifications). It is offered in the very popular SOT23 package

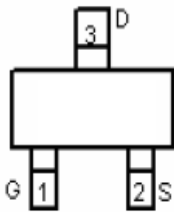
2. Applications

- PWM applications
- Load switch
- Power management

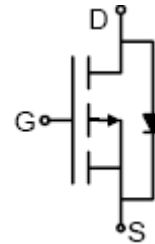
3. Features

- $V_{ds} = -30V$, $I_d = -4.2A$
- $R_{ds(on)} = 62m\Omega$ ($V_{gs} = -4.5V$)
- $R_{ds(on)} = 72m\Omega$ ($V_{gs} = -2.5V$)
- High Power and current handling 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}	-30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	I_D	-4.2	A
Pulsed Drain Current (Note 1)	I_{DM}	-30	A
Power Dissipation $T_C=25^\circ\text{C}$	P_D	1.4	W
Junction and Storage Temperature Range	T_J, T_{STG}	-65 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ.	Units
Maximum Junction-to-Ambient (Note2)	$R_{\theta JA}$	125	$^\circ\text{C/W}$

Electrical Specifications

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BVD_{SS}	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-30	-35		V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-24\text{V}, V_{GS}=0\text{V}, T_J=25^\circ\text{C}$			-0.1	μA
Gate-Body leakage current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$			± 0.1	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-0.7	-1.0	-1.3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-4.5\text{V}, I_D=-4\text{A}$		62	65	m Ω
		$V_{GS}=-2.5\text{V}, I_D=-2.5\text{A}$		72	90	
Maximum Body-Diode Continuous Current	I_S				-2.2	A
Diode Forward Voltage	V_{SD}	$I_S=-1\text{A}, V_{GS}=0\text{V}$		-0.8	-1.0	V
Forward Transconductance	g_{FS}	$V_{DS}=-5\text{V}, I_D=-2.8\text{A}$	7	11		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}, V_{DS}=-15\text{V}, f=1\text{MHz}$		954		pF
Output Capacitance	C_{oss}			115		pF
Reverse Transfer Capacitance	C_{rss}			77		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_g	$V_{GS}=-4.5\text{V}, V_{DD}=-15\text{V},$		9.5		nC

Gate Source Charge	Q_{gs}	$I_D = -4A$ (Note 3)		2		nC
Gate Drain Charge	Q_{gd}			3		nC
Turn-On Delay Time	$t_{D(on)}$	$I_D = -1A, V_{DD} = -15V,$ $V_{GEN} = -10V, R_L = 3.6\Omega$ $R_G = 6\Omega$ (Note 3)		6.5		ns
Turn-On Rise Time	t_r			3.5		ns
Turn-Off Delay Time	$t_{D(off)}$			38		ns
Turn-Off Fall Time	t_f			12		ns

Notes

1. Pulse width limited by max. junction temperature
2. Surface mounted on 1 in² copper pad of FR4 board, $t \leq 5\text{sec}$; 180°C/W when mounted on min. copper pad.
3. Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

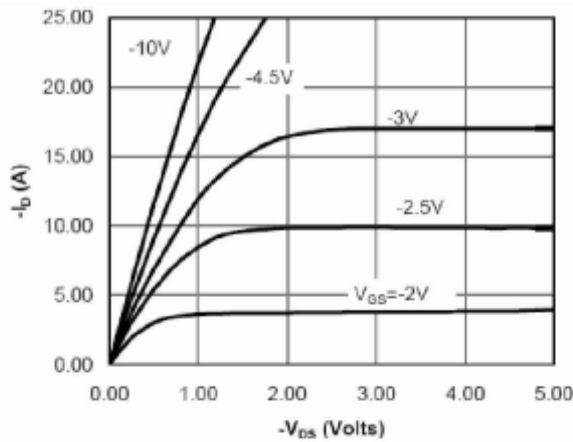


Fig 1: On-Region Characteristics

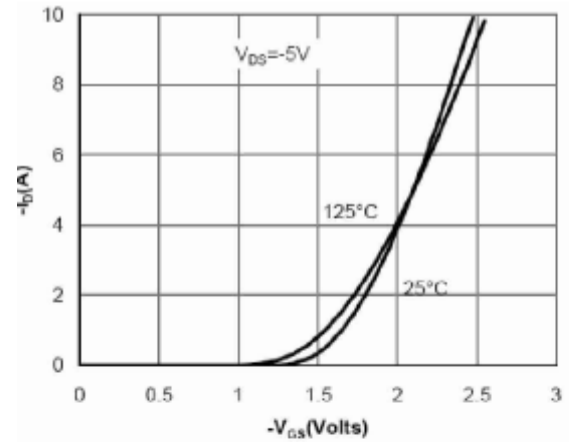


Figure 2: Transfer Characteristics

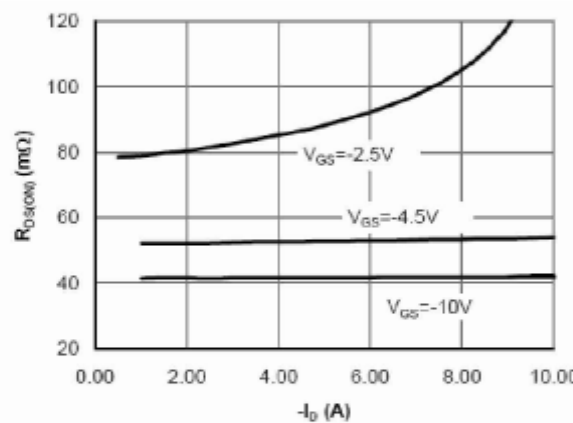


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

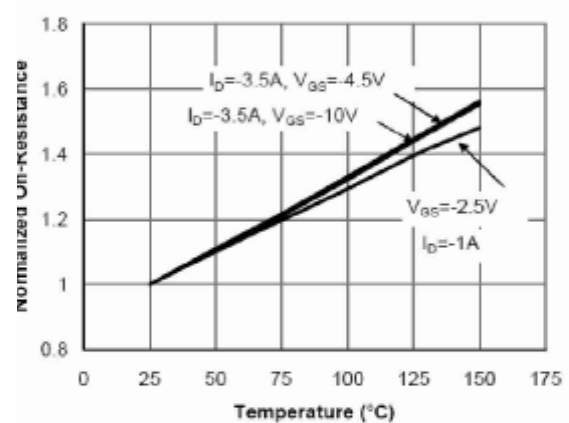


Figure 4: On-Resistance vs. Junction Temperature

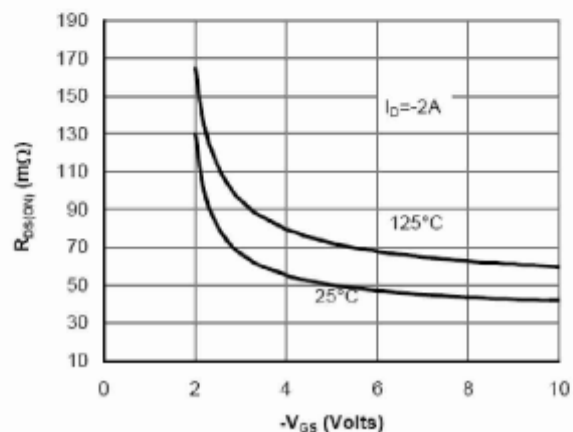


Figure 5: On-Resistance vs. Gate-Source Voltage

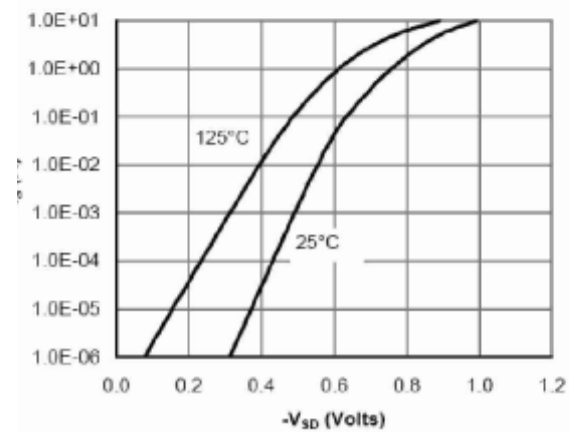


Figure 6: Body-Diode Characteristics

Typical Performance Characteristics (contd.)

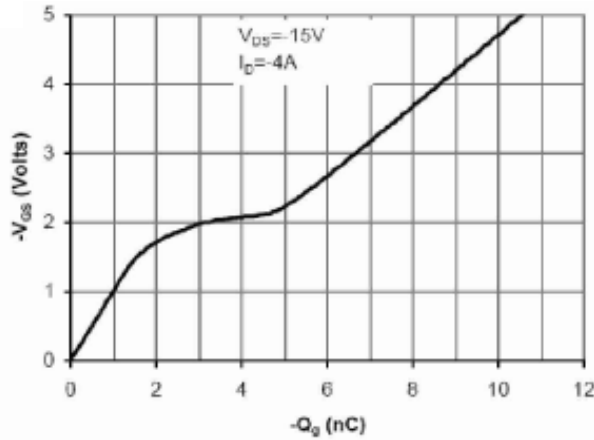


Figure 7: Gate-Charge Characteristics

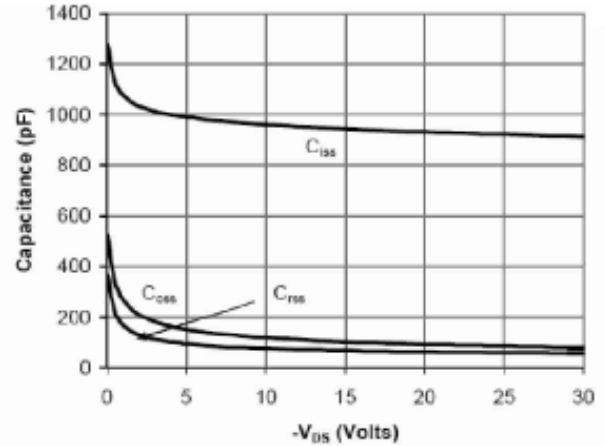


Figure 8: Capacitance Characteristics

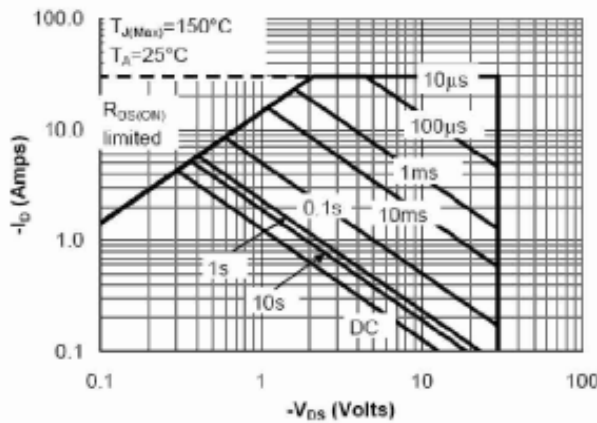


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

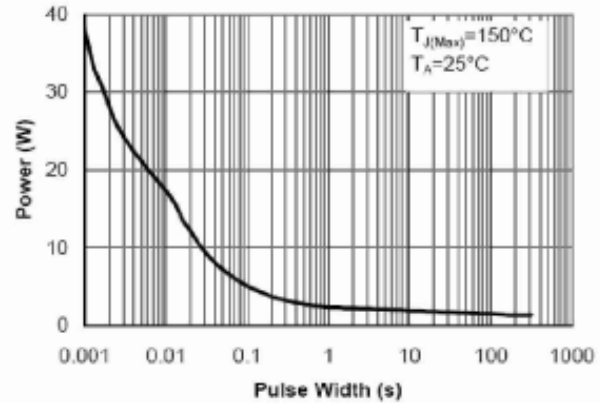


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

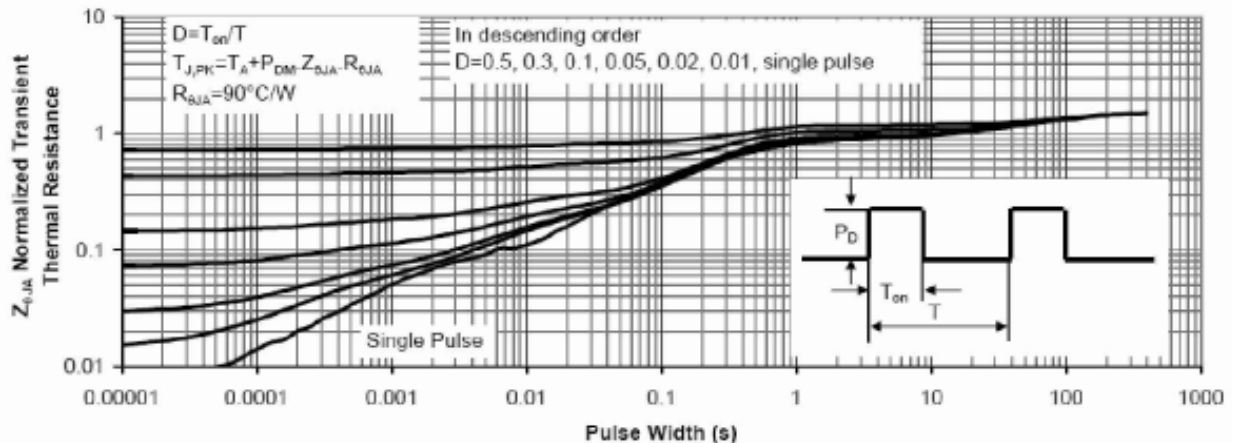
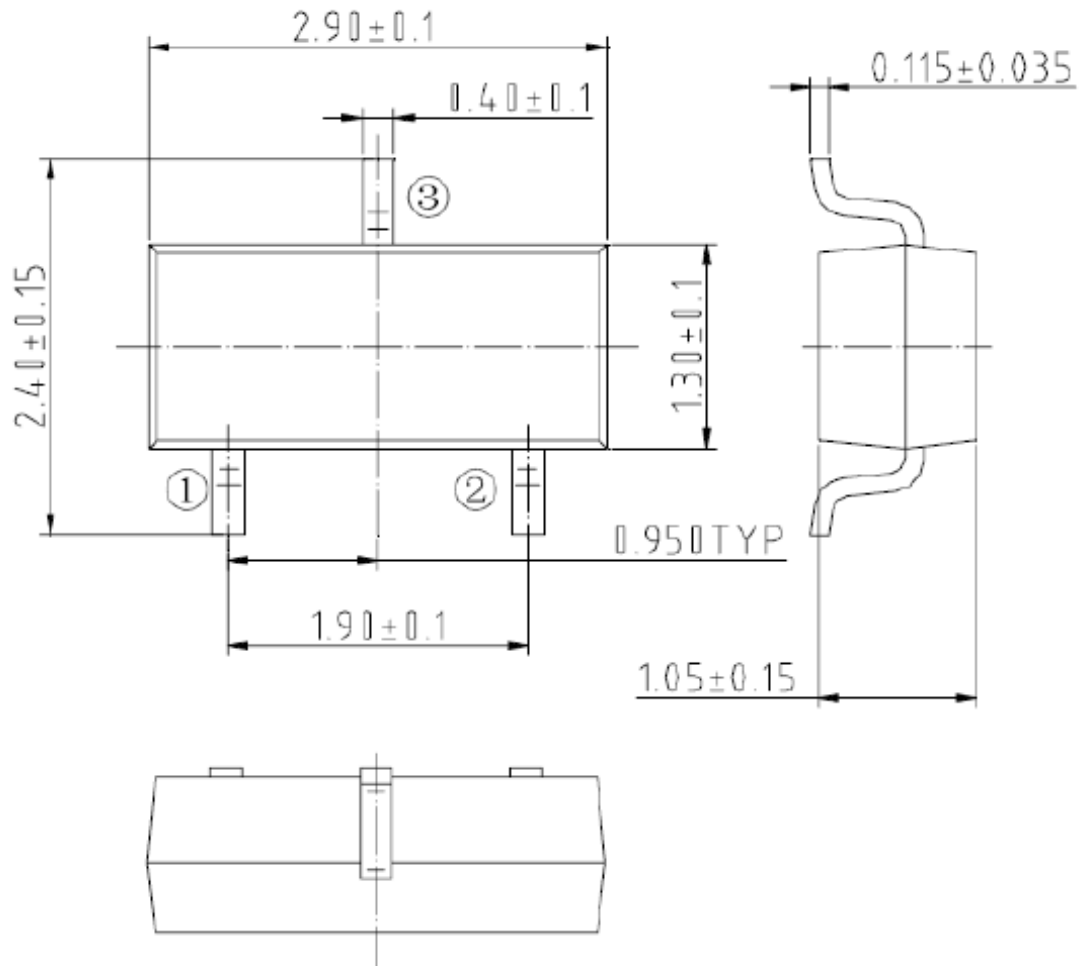


Figure 11: Normalized Maximum Transient Thermal Impedance

Package Dimensions
SOT23



Ordering Information

Device	Operating T _j	PKG Type	Wrap	Order Number
PS04P30SA	-65C° ≤ 150C°	SOT23	T&R	PS04P30SA-S2-TL

Note: Lead Free and RoHS compliant.

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