



ProsPower

PS05N20DA

20V Dual Channel NMOSFET

Revision : 1.0
Update Date : Apr. 2011

ProsPower Microelectronics Co., Ltd

1. General Description

The PS05N20DA uses advanced trench technology and design to provide excellent $R_{ds(on)}$ with low gate charge. This device is suitable for use in high efficiency switching applications, DC/DC conversion, CPU power delivery and Synchronous rectification. Standard Product PS05N20DA is Pb-free (meets ROHS & Sony 259 specifications). It is offered in the very popular TSSOP8 or SOP-8 package

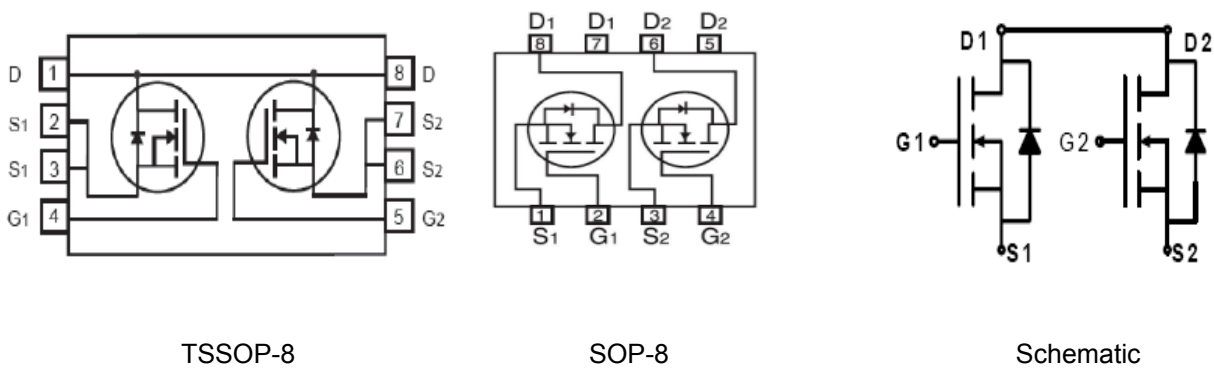
2. Applications

- Battery management
- Power management
- DC-DC converter
- Load switch
- LCD adapter

3. Features

- $V_{ds}=20V, I_d=5A$
- $R_{ds(on)} < 23m\Omega$ ($V_{gs}=4.5V$)
- Low capacitance minimizes driver loss
- Optimized gate charge minimizes switching loss

Pin Configuration



Pin Descriptions

For TSSOP-8

Pin Name	Symbol	Function
Gate(4,5)	G1/G2	Device Gate terminal
Drain(1,8)	D1/D2	Device drain terminal
Source(2,3,6,7)	S1/S2	Device source terminal

For SOP-8

Pin Name	Symbol	Function
Gate(2,4)	G1/G2	Device Gate terminal
Drain(5,6,7,8)	D1/D2	Device drain terminal
Source(1,3)	S1/S2	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}	± 12	V
Continuous Drain Current	$T_C=25^\circ\text{C}$ (Note 3)	I_D	5	A
Pulsed Drain Current (Note 1)		I_{DM}	30	A
Power Dissipation	$T_C=25^\circ\text{C}$	P_D	1.5	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)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

Electrical Specifications

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BVD_{SS}	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	20	23		V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=16\text{V}, V_{GS}=0\text{V}, T_J=25^\circ\text{C}$			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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.5	0.72	1	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{V}, I_D=6\text{A}$			23	m Ω
		$V_{GS}=2.5\text{V}, I_D=4\text{A}$			35	
Forward Transconductance	g_{FS}	$V_{DS}=10\text{V}, I_D=6\text{A}$	6	20		S
Diode Forward Voltage	V_{SD}	$I_S=1.5\text{A}, V_{GS}=0\text{V}$		0.8	1	V
DYNAMIC PARAMETERS						
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}, V_{DS}=8\text{V}, f=1\text{MHz}$		1120	1500	pF
Output Capacitance	C_{oss}			480	630	pF
Reverse Transfer Capacitance	C_{rss}			110	160	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_g	$V_{GS}=4.5\text{V}, V_{DD}=10\text{V}, I_D=6\text{A}$ (Note 2)		47	60	nC
Gate Source Charge	Q_{gs}			6		nC

Gate Drain Charge	Q_{gd}			8		nC
Turn-On Delay Time	$t_{D(on)}$	$I_D=1A, V_{DD}=10V,$ $V_{GEN}=4.5V, R_L=10\Omega$ $R_G=6\Omega(\text{Note 2})$		25	60	ns
Turn-On Rise Time	t_r			60	140	ns
Turn-Off Delay Time	$t_{D(off)}$			60	140	ns
Turn-Off Fall Time	t_f			50	60	ns

Notes

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



Typical Performance Characteristics

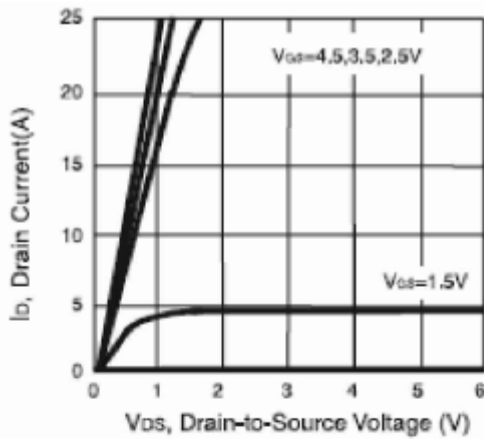


Figure 1. Output Characteristics

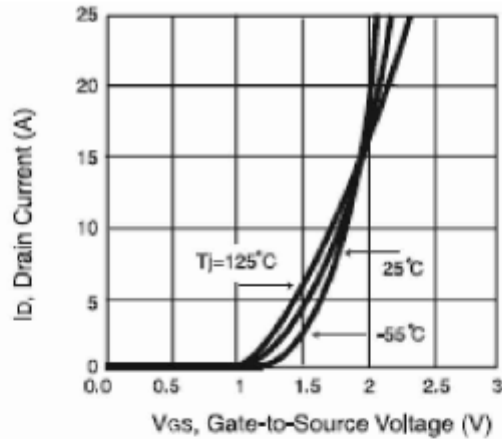


Figure 2. Transfer Characteristics

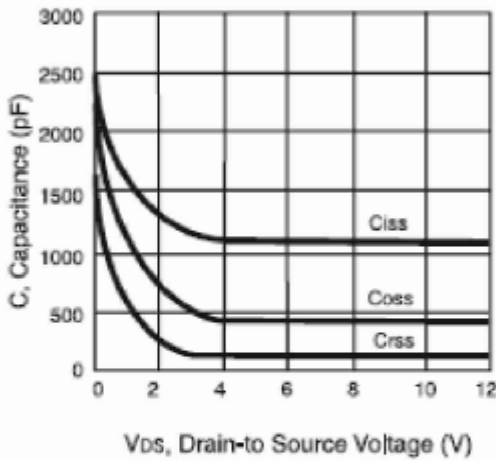


Figure 3. Capacitance

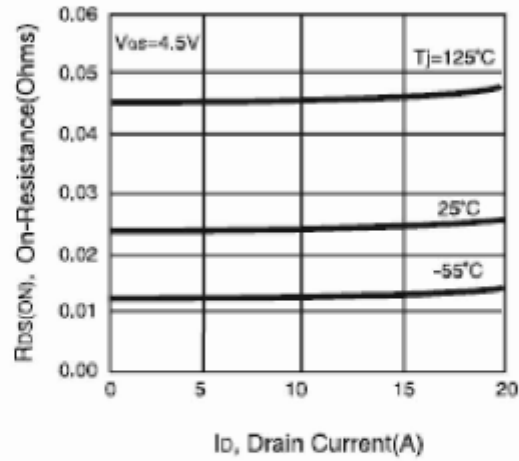


Figure 4. On-Resistance Variation with Drain Current and Temperature

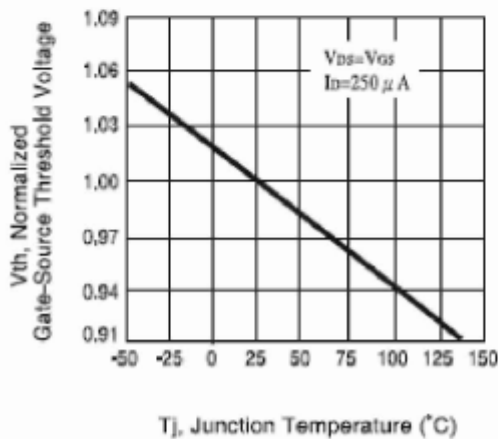


Figure 5. Gate Threshold Variation with Temperature

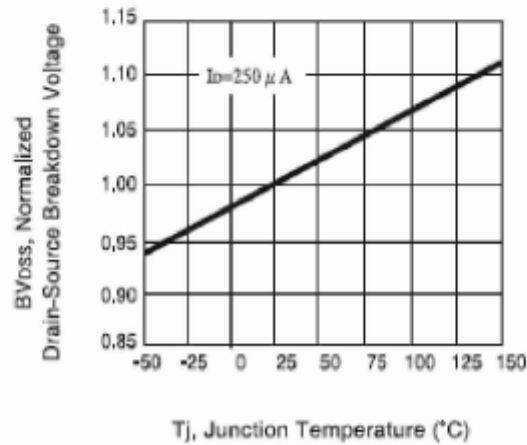


Figure 6. Breakdown Voltage Variation with Temperature

Typical Performance Characteristics (contd.)

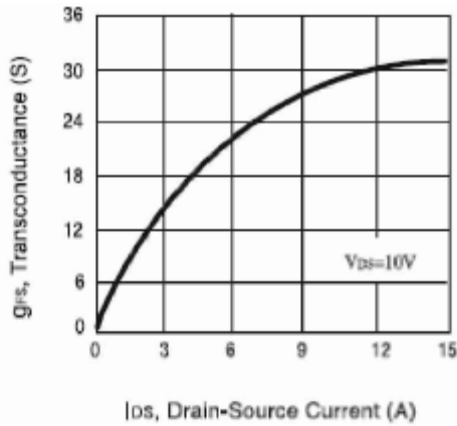


Figure 7. Transconductance Variation with Drain Current

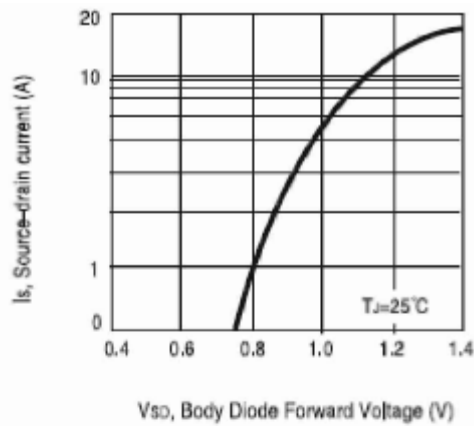


Figure 8. Body Diode Forward Voltage Variation with Source Current

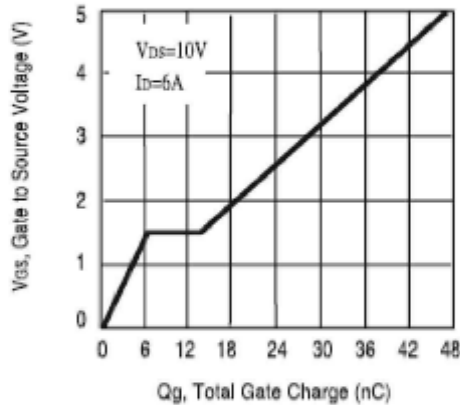


Figure 9. Gate Charge

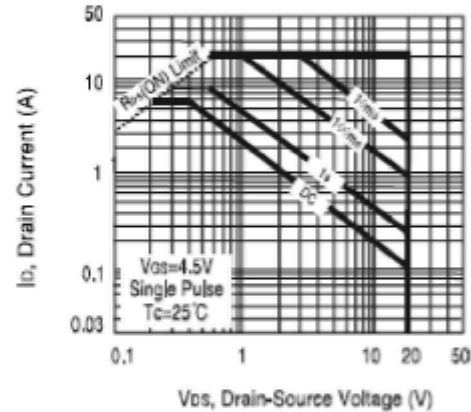


Figure 10. Maximum Safe Operating Area

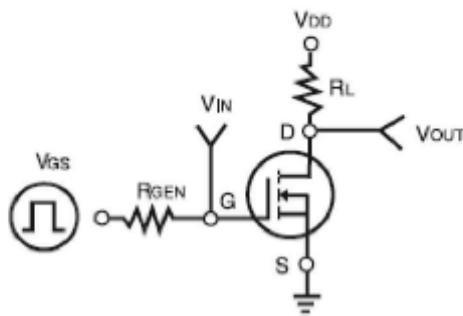


Figure 11. Switching Test Circuit

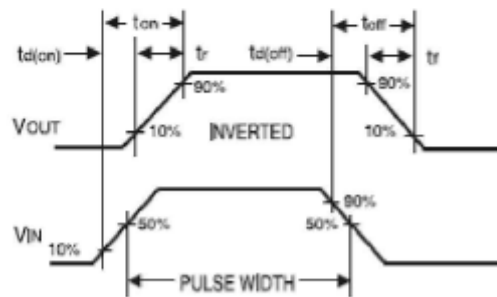
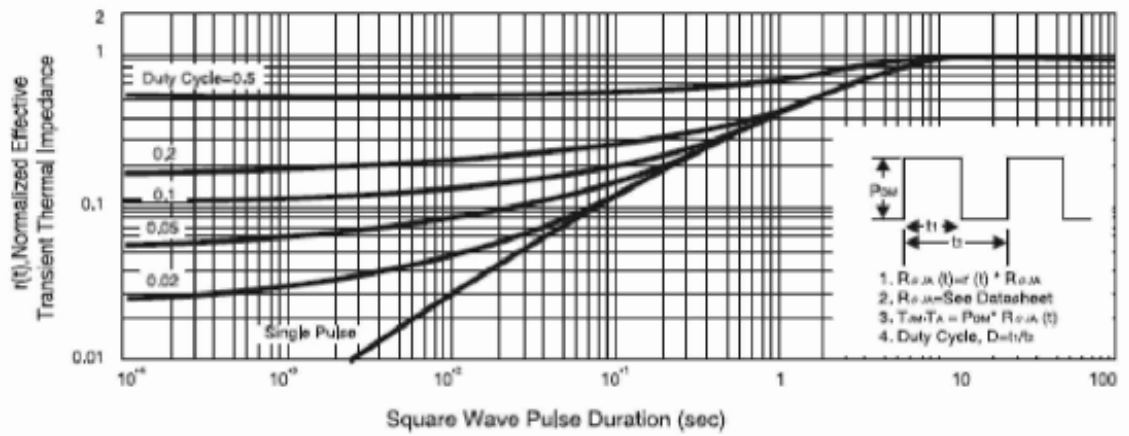


Figure 12. Switching Waveforms

Typical Performance Characteristics (contd.)



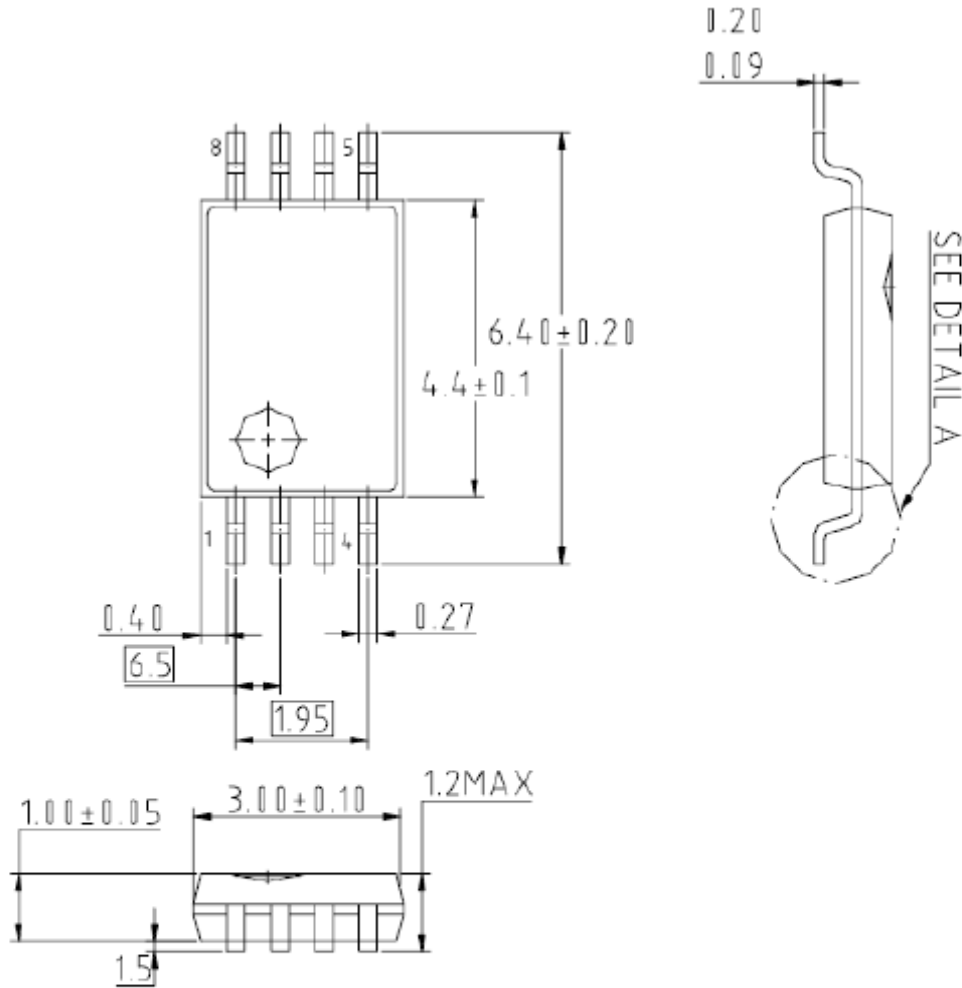


ProsPower

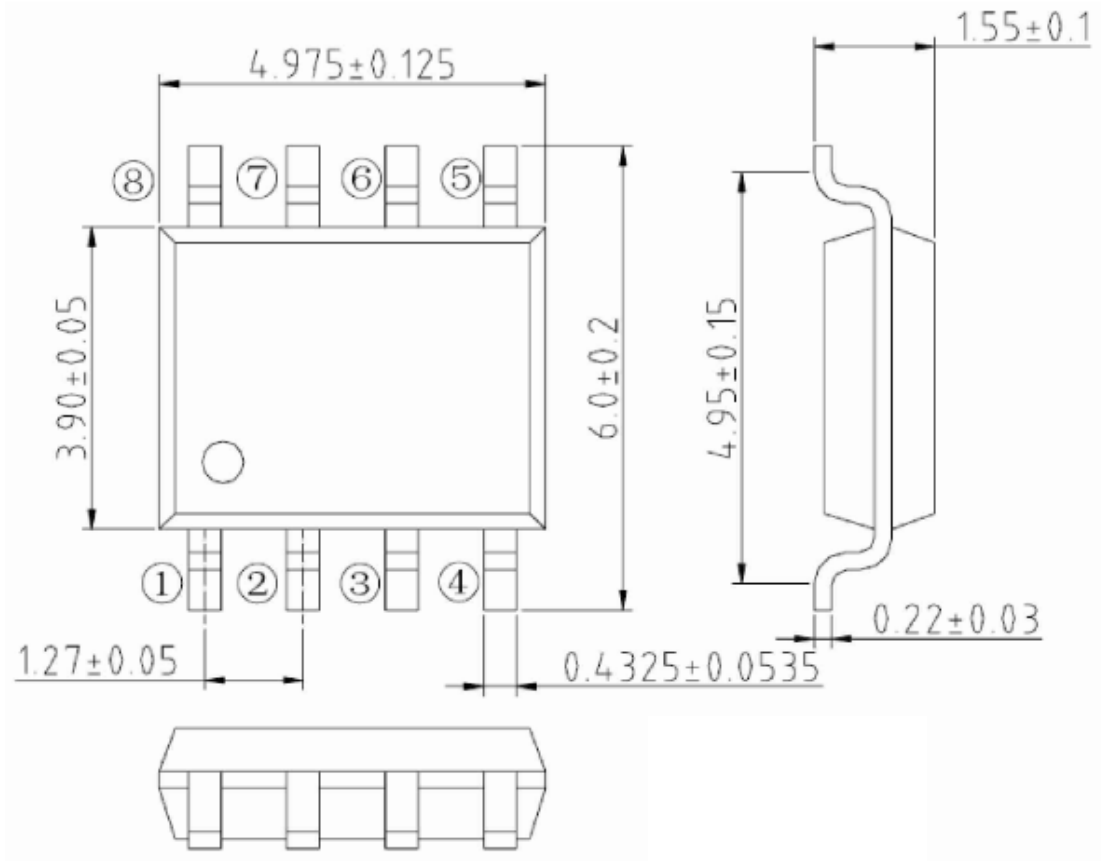
PS05N20DA

20V Dual Channel NMOSFET

Package Dimensions
TSSOP-8



SOP-8



Ordering Information

Device	Operating T _j	PKG Type	Wrap	Order Number
PS05N20DA	-65C° ≤ 150C°	TSSOP-8	T&R	PS05N20DA-T8-TL
PS05N20DA	-65C° ≤ 150C°	SOP-8	T&R	PS05N20DA-S8-TL

Note: Lead Free and RoHS compliant.

Warranty and Use

PROSPOWER MICROELECTRONICS MAKES NO WARRANTY, REPRESENTATION OR GUARANTEE, EXPRESS OR IMPLIED, REGARDING THE SUITABILITY OF ITS PRODUCTS FOR ANY PARTICULAR PURPOSE, NOR THAT THE USE OF ITS PRODUCTS WILL NOT INFRINGE ITS INTELLECTUAL PROPERTY RIGHTS OR THE RIGHTS OF THIRD PARTIES WITH RESPECT TO ANY PARTICULAR USE OR APPLICATION AND SPECIFICALLY DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF ANY SUCH USE OR APPLICATION, INCLUDING BUT NOT LIMITED TO, CONSEQUENTIAL OR INCIDENTAL DAMAGES.

ProsPower Microelectronics products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the ProsPower Microelectronics product could create a situation where personal injury or death may occur.

ProsPower Microelectronics reserves the right to make changes to or discontinue any product or service described herein without notice. Products with data sheets labeled "Advance Information" or "Preliminary" and other products described herein may not be in production or offered for sale.

ProsPower Microelectronics advises customers to obtain the current version of the relevant product information before placing orders. Circuit diagrams illustrate typical semiconductor applications and may not be complete.