

## Description

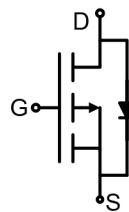
The VS5P03-S8 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a load switch or in PWM applications.

## General Features

- $V_{DS} = -30V, I_D = -5.3A$
- $R_{DS(ON)} < 85m\Omega @ V_{GS}=-4.5V$
- $R_{DS(ON)} < 49m\Omega @ V_{GS}=-10V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

## Application

- PWM applications
- Load switch
- Power management



Schematic diagram



## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VS5P03-S8	VS5P03-S8	SOP-8	Ø330mm	12mm	

## Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	-5.3	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	-20	A
Maximum Power Dissipation	$P_D$	2.6	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

## Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	48	°C/W
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## Electrical Characteristics ( $T_A=25^\circ C$ unless otherwise noted)

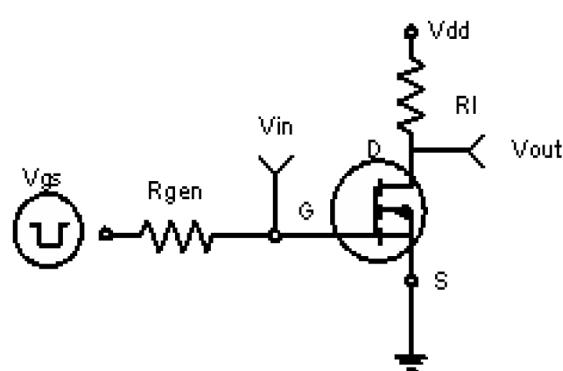
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	$\mu A$

Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.1	-1.6	-2.1	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-5.3A	-	37	49	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.2A	-	60	85	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.5A	4	7	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, F=1.0MHz	-	1040	-	PF
Output Capacitance	C <sub>oss</sub>		-	420	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	150	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-15V, ID=-1A, V <sub>GS</sub> =-10V, R <sub>GEN</sub> =6Ω	-	15	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	13	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	58	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	21	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-5.3A, V <sub>GS</sub> =-10V	-	12	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	2.2	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	3	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1.7A	-	-	-1.2	V

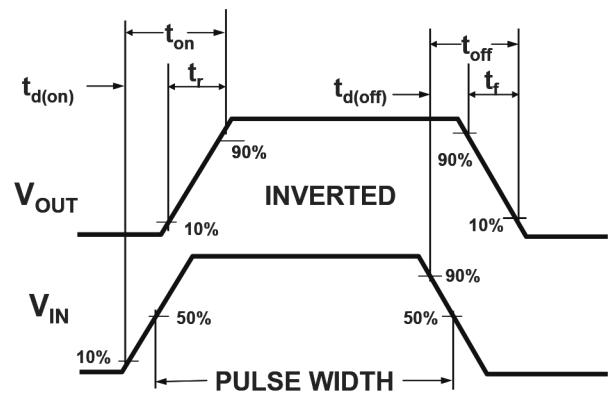
### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

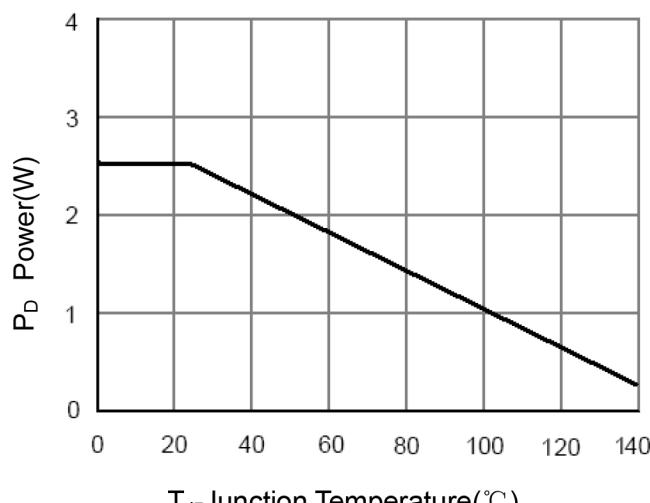
### Typical Electrical and Thermal Characteristics



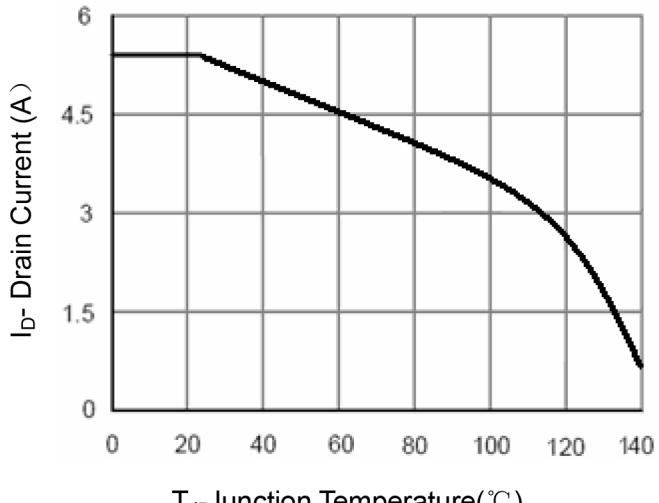
**Figure 1:Switching Test Circuit**



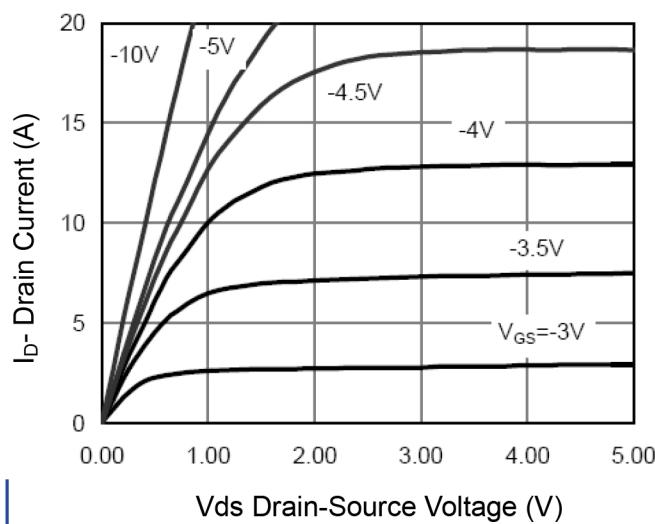
**Figure 2:Switching Waveforms**



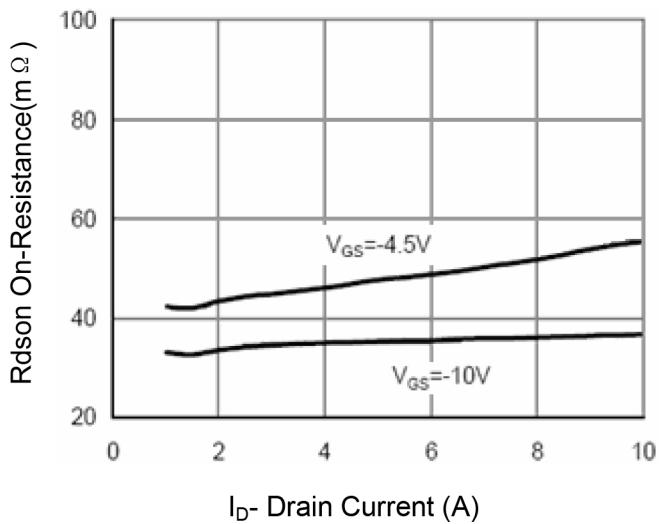
**Figure 3 Power Dissipation**



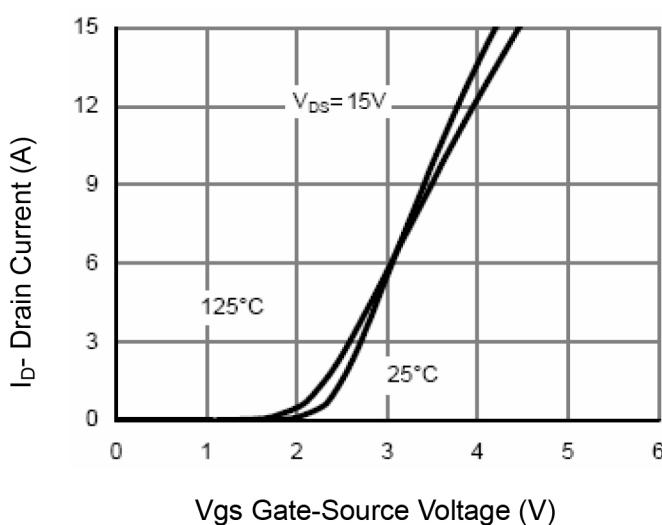
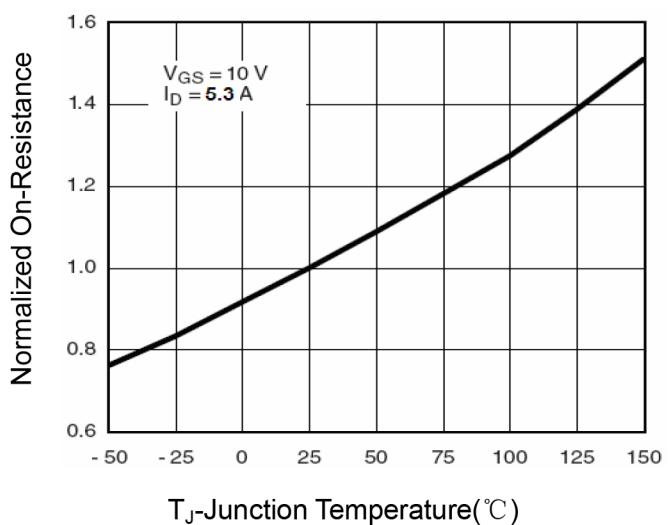
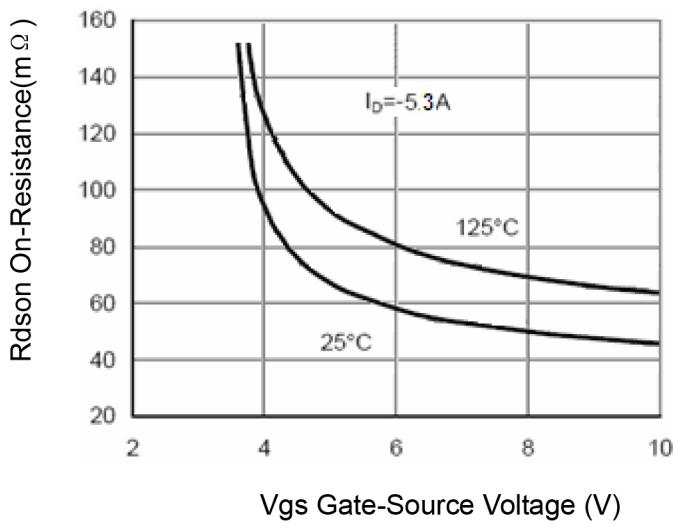
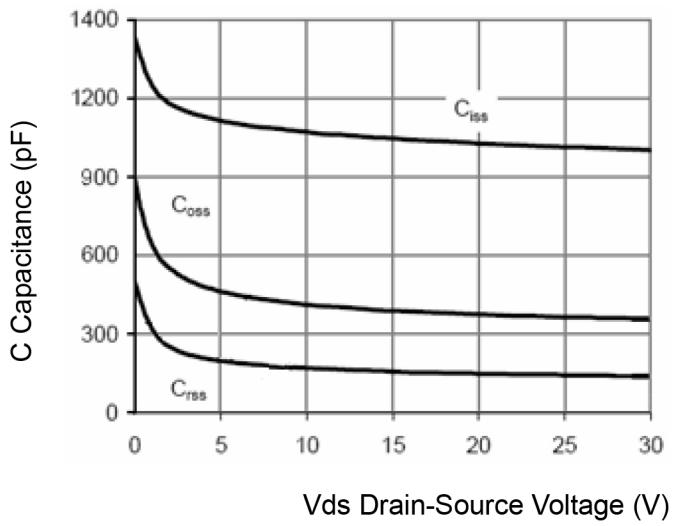
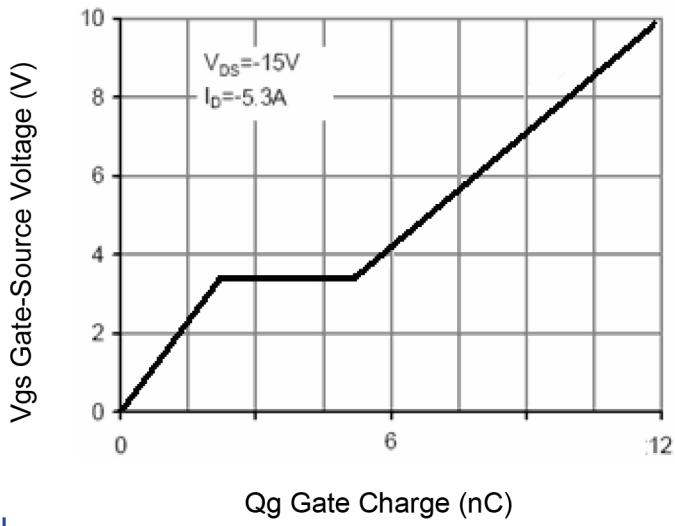
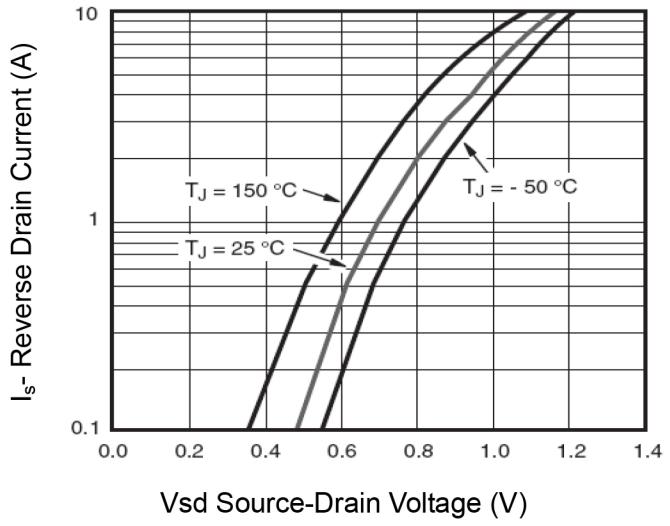
**Figure 4 Drain Current**

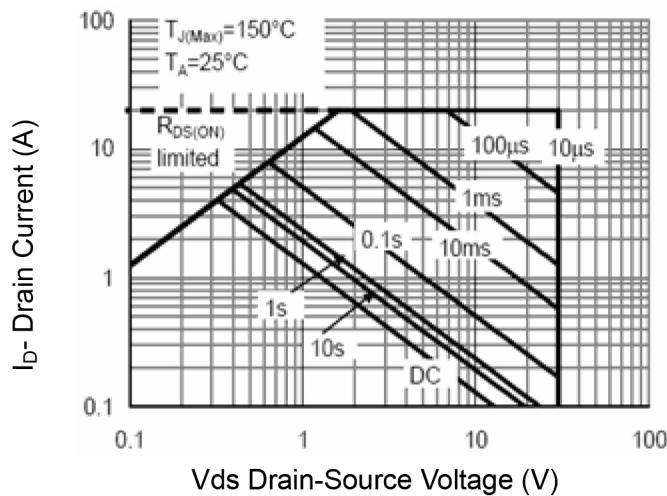


**Figure 5 Output Characteristics**

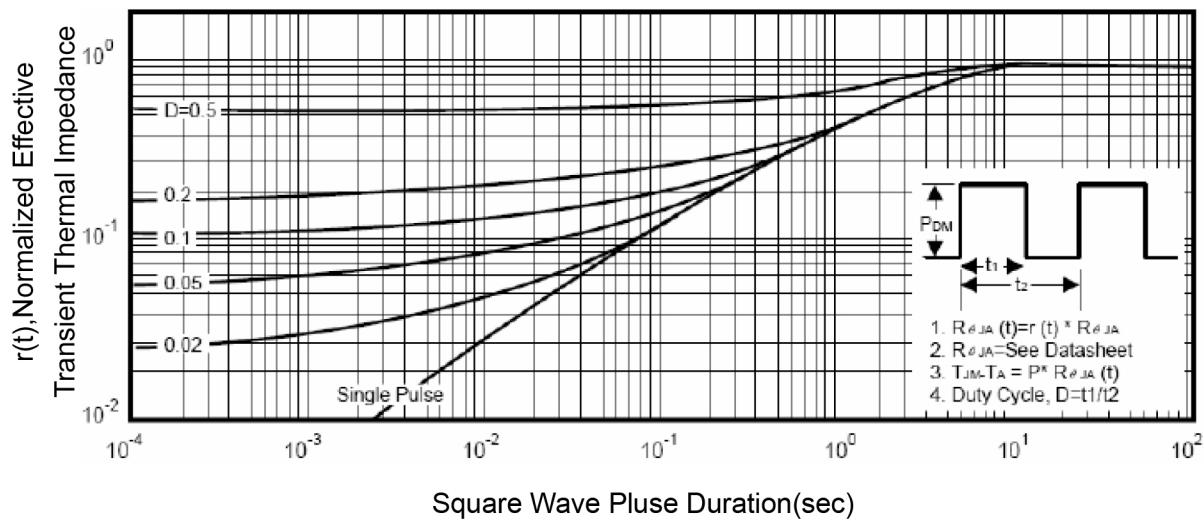


**Figure 6 Drain-Source On-Resistance**


**Figure 7 Transfer Characteristics**

**Figure 8 Drain-Source On-Resistance**

**Figure 9  $R_{DSON}$  vs  $V_{GS}$** 

**Figure 10 Capacitance vs  $V_{DS}$** 

**Figure 11 Gate Charge**

**Figure 12 Source- Drain Diode Forward**



**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**