

## Description

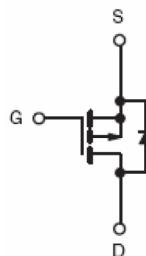
The VS10P03-S8 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a load switch or in PWM applications.

## General Features

- $V_{DS} = -30V, I_D = -10A$
- $R_{DS(ON)} < 34m\Omega @ V_{GS}=-4.5V$
- $R_{DS(ON)} < 21m\Omega @ V_{GS}=-10V$
- 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
VS10P03-S8	VS10P03-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 ( $T_C=25^\circ C$ )	$I_D$	-10	A
Drain Current-Continuous ( $T_C=100^\circ C$ )		-7.1	
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	-40	A
Maximum Power Dissipation ( $T_C=25^\circ C$ )	$P_D$	3	W
Maximum Power Dissipation ( $T_C=100^\circ C$ )		1.3	
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	231	mJ
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>	$R_{\theta JA}$	41.67	°C/W
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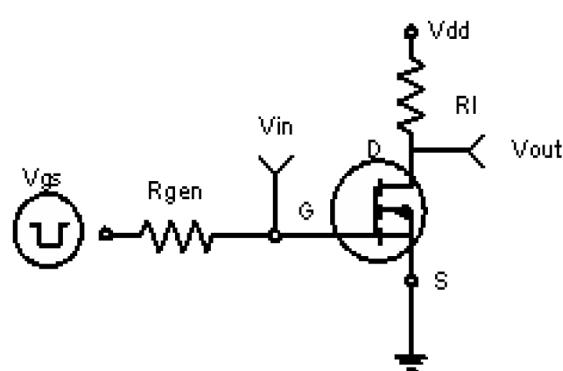
**Electrical Characteristics ( $T_A=25^\circ\text{C}$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=-250\mu\text{A}$	-30	-33	-	V
Zero Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{DS}}=-30\text{V}, V_{\text{GS}}=0\text{V}$	-	-	-1	$\mu\text{A}$
Gate-Body Leakage Current	$I_{\text{GSS}}$	$V_{\text{GS}}=\pm20\text{V}, V_{\text{DS}}=0\text{V}$	-	-	$\pm100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=-250\mu\text{A}$	-1	-1.6	-2.2	V
Drain-Source On-State Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=-10\text{V}, I_{\text{D}}=-10\text{A}$	-	17.6	21	$\text{m}\Omega$
		$V_{\text{GS}}=-4.5\text{V}, I_{\text{D}}=-10\text{A}$	-	25.5	34	$\text{m}\Omega$
Forward Transconductance	$g_{\text{FS}}$	$V_{\text{DS}}=-5\text{V}, I_{\text{D}}=-10\text{A}$	-	20	-	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}}=-15\text{V}, V_{\text{GS}}=0\text{V}, F=1.0\text{MHz}$	-	1253	-	PF
Output Capacitance	$C_{\text{oss}}$		-	181	-	PF
Reverse Transfer Capacitance	$C_{\text{rss}}$		-	158	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=-15\text{V}, I_{\text{D}}=-10\text{A}, V_{\text{GS}}=-10\text{V}, R_{\text{GEN}}=1\Omega$	-	8	-	nS
Turn-on Rise Time	$t_{\text{r}}$		-	9	-	nS
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$		-	26	-	nS
Turn-Off Fall Time	$t_{\text{f}}$		-	8	-	nS
Total Gate Charge	$Q_{\text{g}}$	$V_{\text{DS}}=-15\text{V}, I_{\text{D}}=-10\text{A}, V_{\text{GS}}=-10\text{V}$	-	24.4	-	nC
Gate-Source Charge	$Q_{\text{gs}}$		-	3.2	-	nC
Gate-Drain Charge	$Q_{\text{gd}}$		-	6.4	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Current <sup>(Note 2)</sup>	$I_{\text{s}}$		-	-	-10	A
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V}, I_{\text{s}}=-10\text{A}$	-	-	-1.2	V

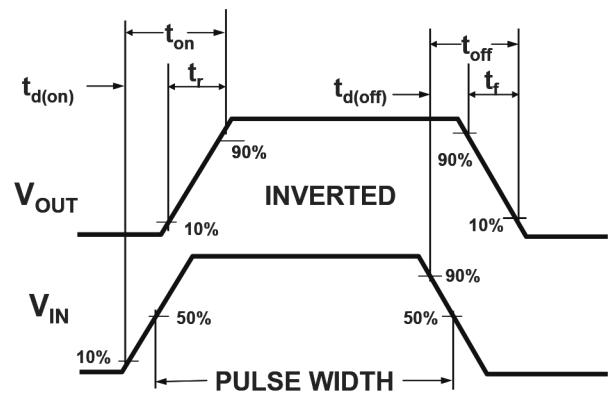
**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5.  $E_{\text{AS}}$  condition:  $T_j=25^\circ\text{C}, V_{\text{DD}}=-15\text{V}, V_{\text{G}}=10\text{V}, L=0.5\text{mH}, R_g=25\Omega$

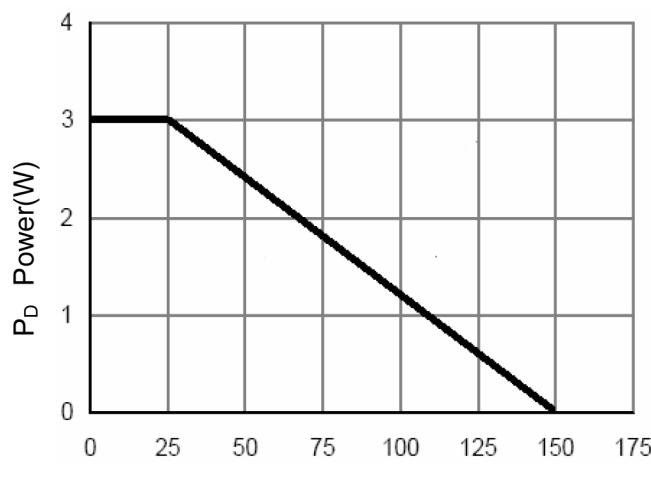
### Typical Electrical and Thermal Characteristics



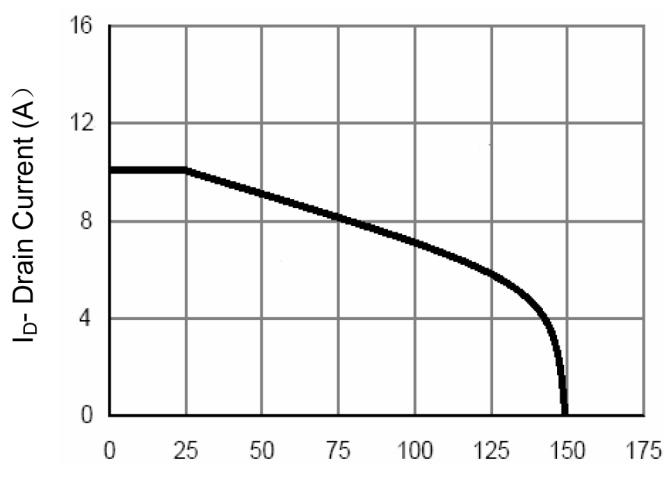
**Figure 1:Switching Test Circuit**



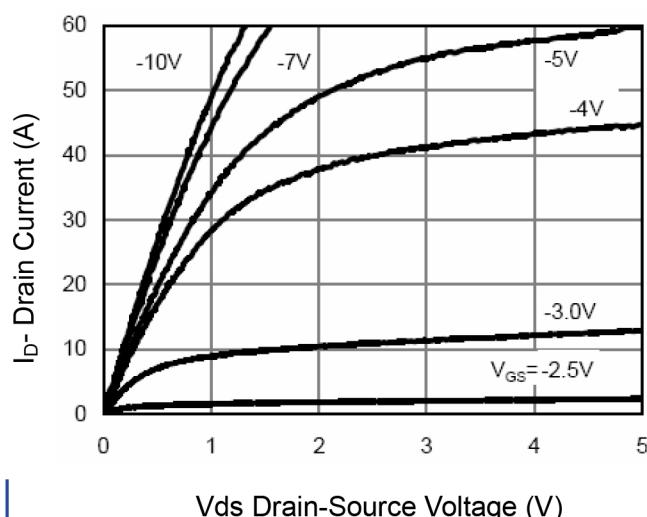
**Figure 2:Switching Waveforms**



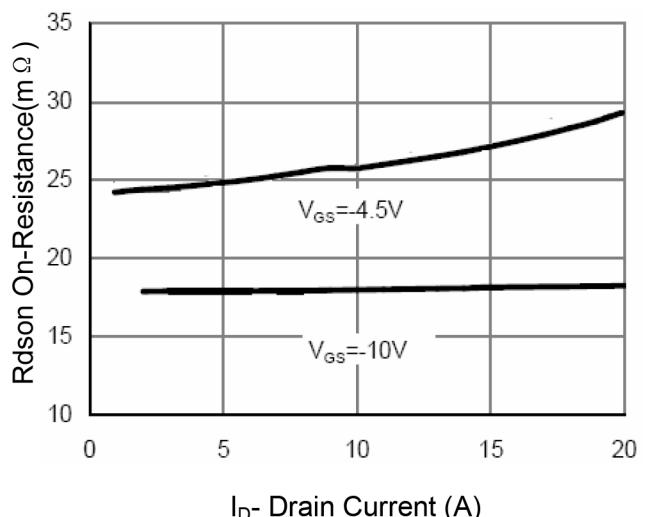
**Figure 3 Power Dissipation**



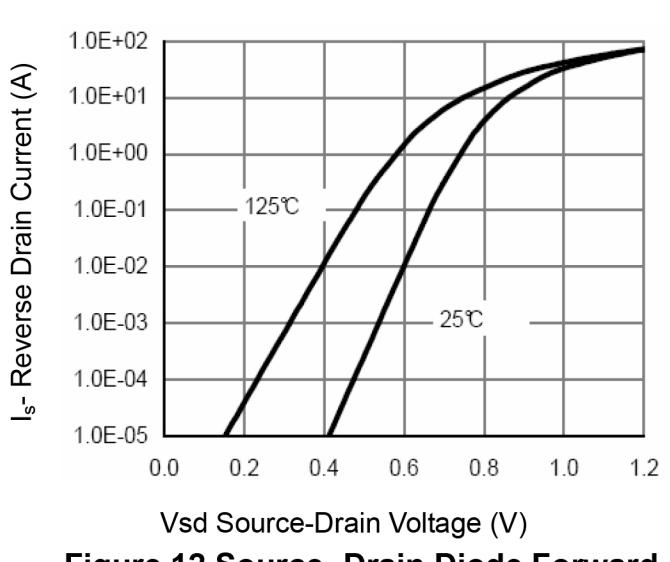
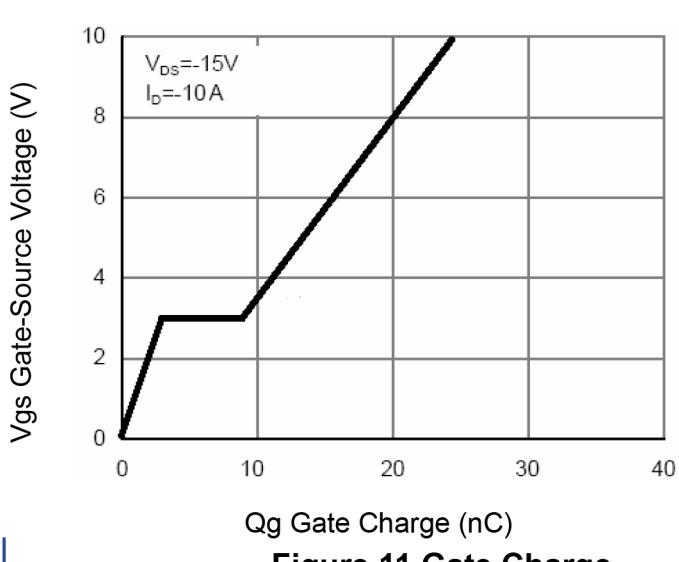
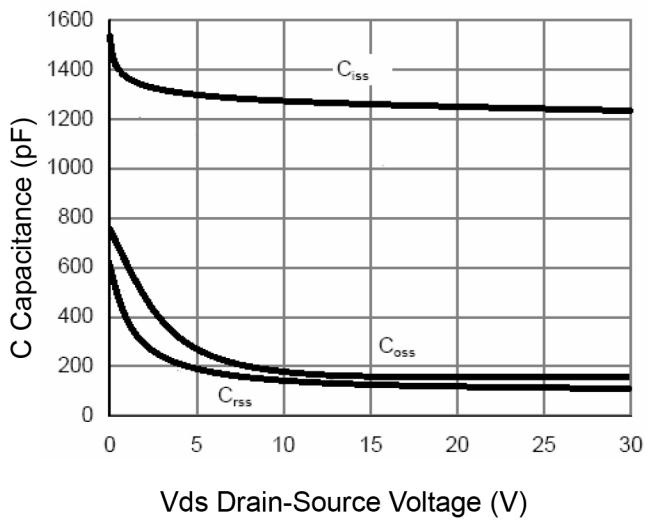
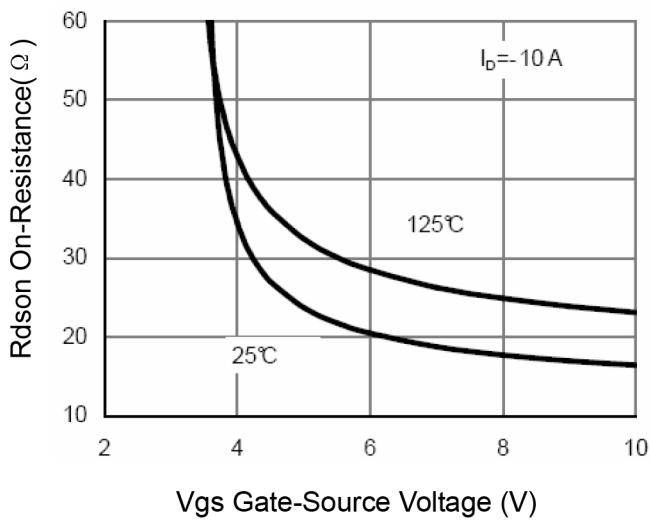
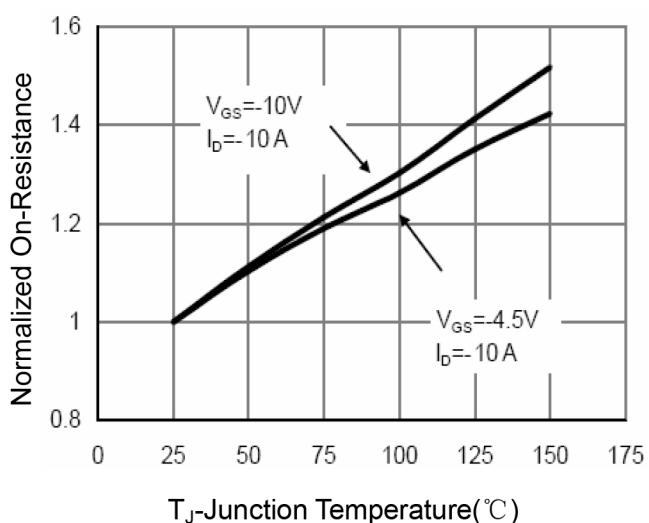
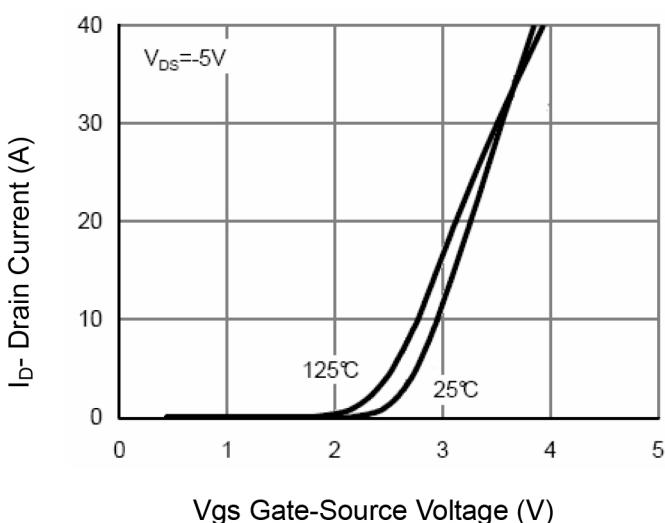
**Figure 4 Drain Current**

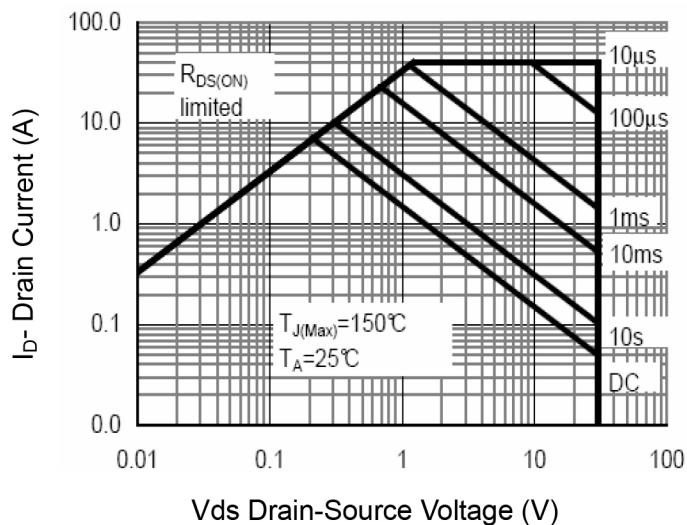


**Figure 5 Output Characteristics**

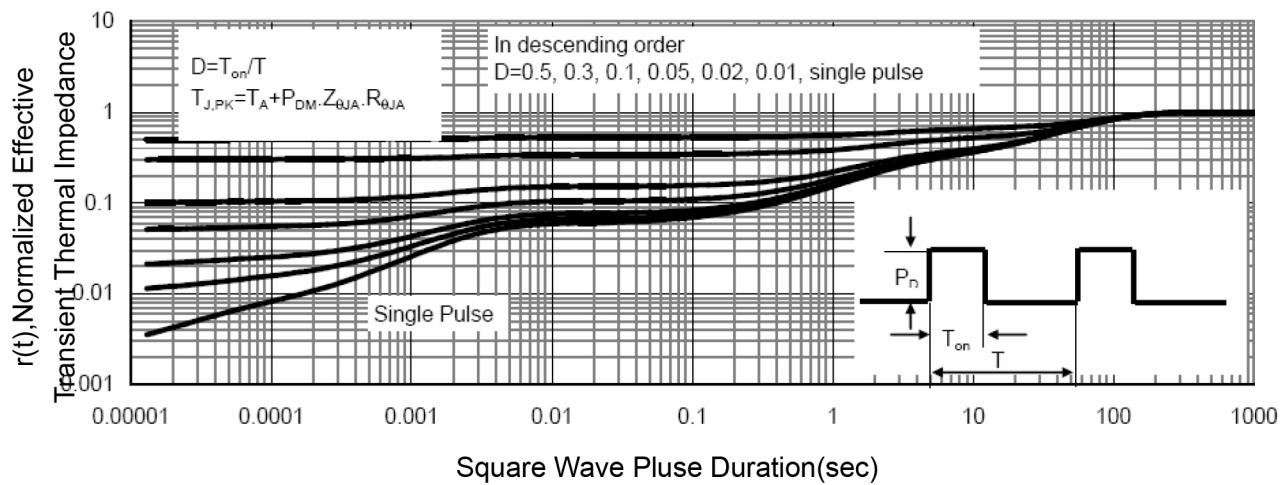


**Figure 6 Drain-Source On-Resistance**





**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**