

Description

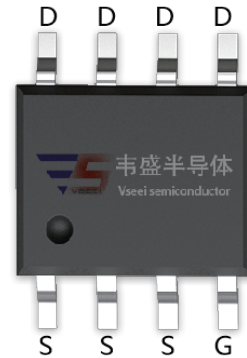
The VSM12P03 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a load switch or in PWM applications.

General Features

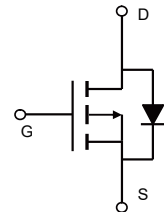
- $V_{DS} = -30V, I_D = -12A$
 $R_{DS(ON)} < 11m\Omega @ V_{GS} = -4.5V$
 $R_{DS(ON)} < 16m\Omega @ V_{GS} = -10V$
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- PWM applications
- Load switch
- Power management



SOP-8



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM12P03	VSM12P03-S8	SOP-8	Ø330mm	12mm	4000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous ($T_A = 25^\circ\text{C}$)	I_D	-12	A
Drain Current-Continuous ($T_A = 100^\circ\text{C}$)		-8.4	
Drain Current-Pulsed (Note 1)	I_{DM}	-48	A
Maximum Power Dissipation ($T_A = 25^\circ\text{C}$)	P_D	3	W
Maximum Power Dissipation ($T_A = 100^\circ\text{C}$)		1.3	
Single pulse avalanche energy (Note 5)	E_{AS}	125	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	41.67	$^\circ\text{C/W}$
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Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-30V,V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =-250μA	-1	-1.6	-2.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-10A	-	9	11	mΩ
		V _{GS} =-4.5V, I _D =-7A	-	12.2	16	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-10V,I _D =-10A	-	20	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-15V,V _{GS} =0V, F=1.0MHz	-	2151	-	PF
Output Capacitance	C _{oss}		-	217	-	PF
Reverse Transfer Capacitance	C _{rss}		-	187	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-15V, ID=-10A, V _{GS} =-10V,R _{GEN} =1Ω	-	12	-	nS
Turn-on Rise Time	t _r		-	10	-	nS
Turn-Off Delay Time	t _{d(off)}		-	25	-	nS
Turn-Off Fall Time	t _f		-	13	-	nS
Total Gate Charge	Q _g	V _{DS} =-15V,I _D =-10A,V _{GS} =-10V	-	41.5	-	nC
Gate-Source Charge	Q _{gs}		-	5.5	-	nC
Gate-Drain Charge	Q _{gd}		-	8.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Current (Note 2)	I _s		-	-	-12	A
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _s =-10A	-	-	-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 $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: $T_J=25^\circ C, V_{DD}=-15V, V_G=10V, L=0.5mH, R_g=25\Omega$

Typical Electrical and Thermal Characteristics

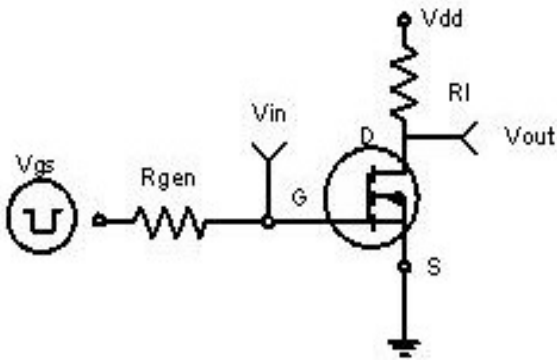


Figure 1: Switching Test Circuit

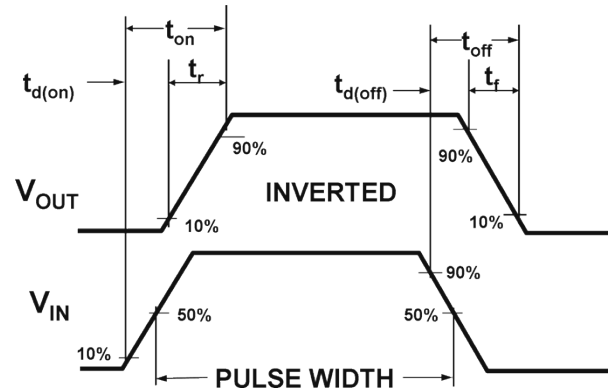


Figure 2: Switching Waveforms

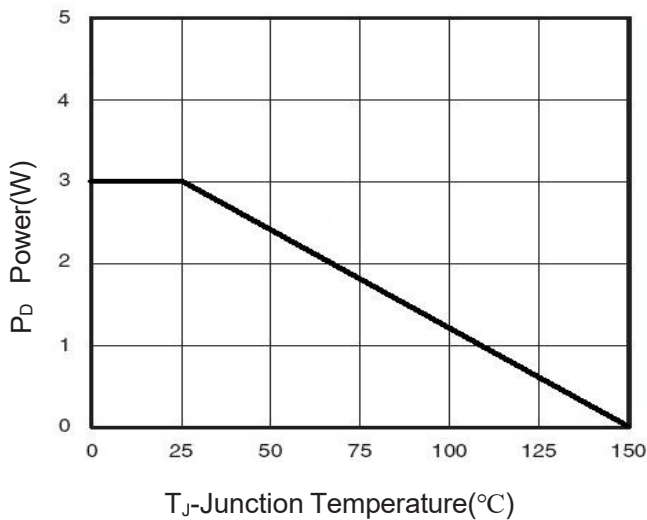


Figure 3 Power Dissipation

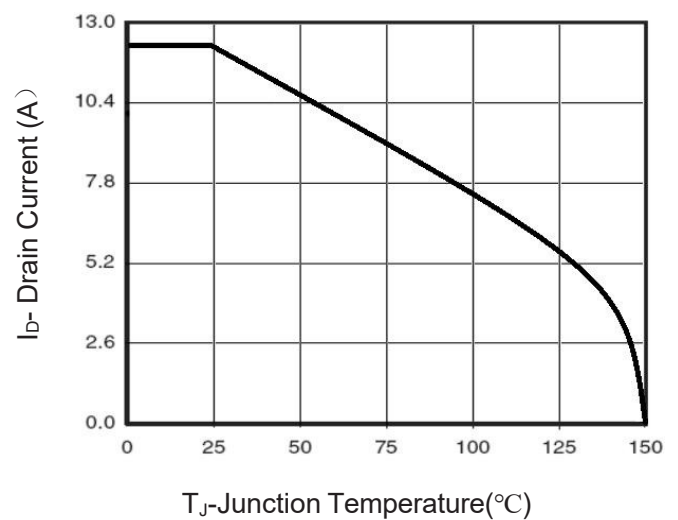


Figure 4 Drain Current

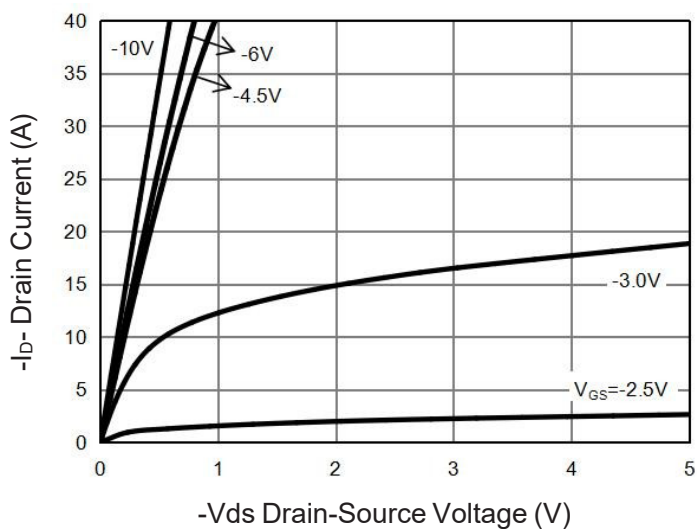


Figure 5 Output Characteristics

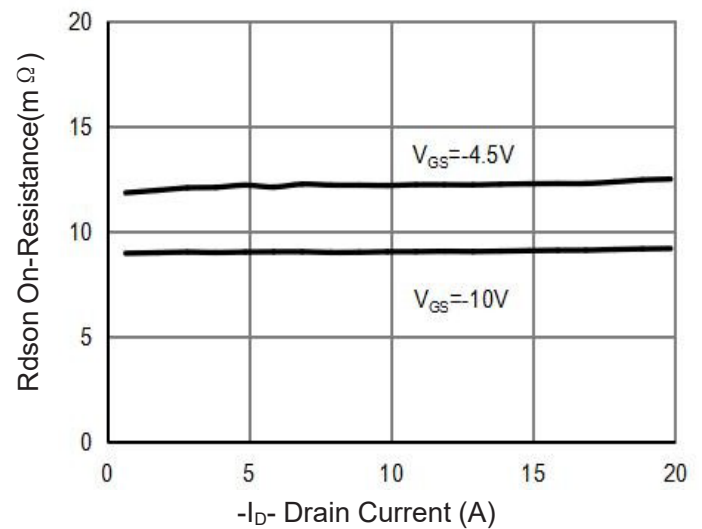
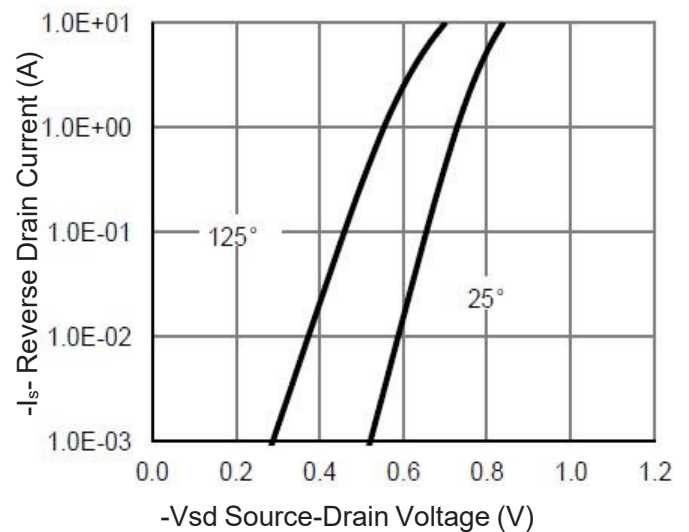
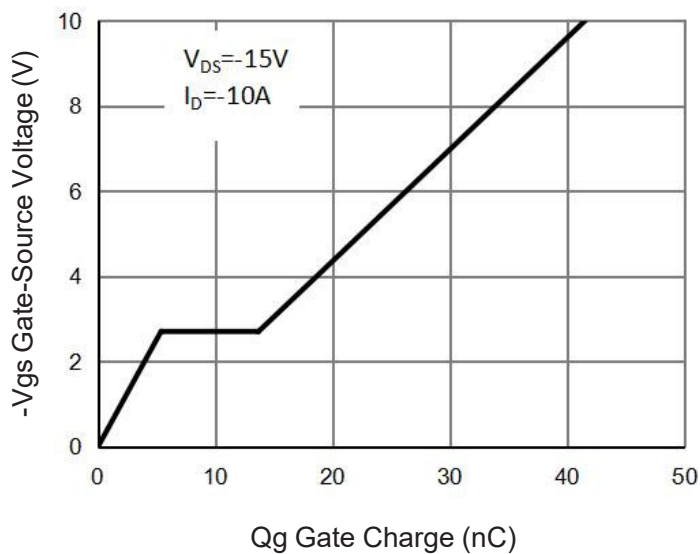
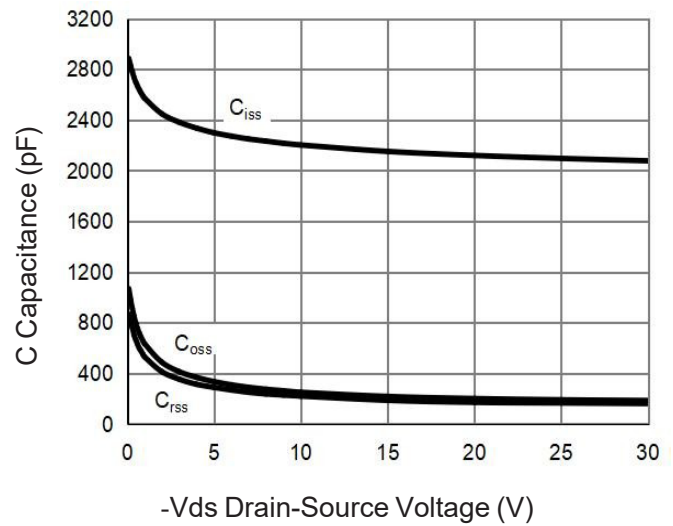
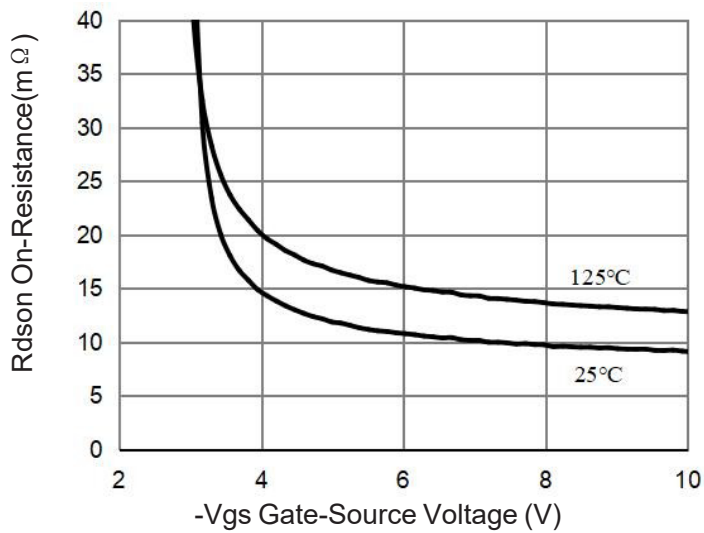
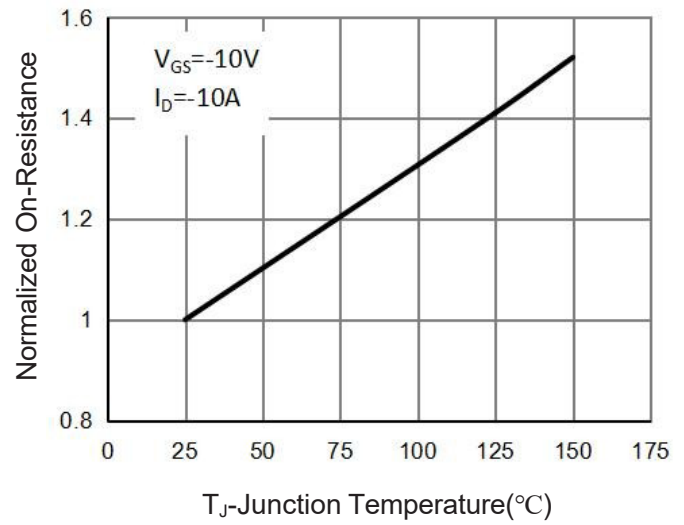
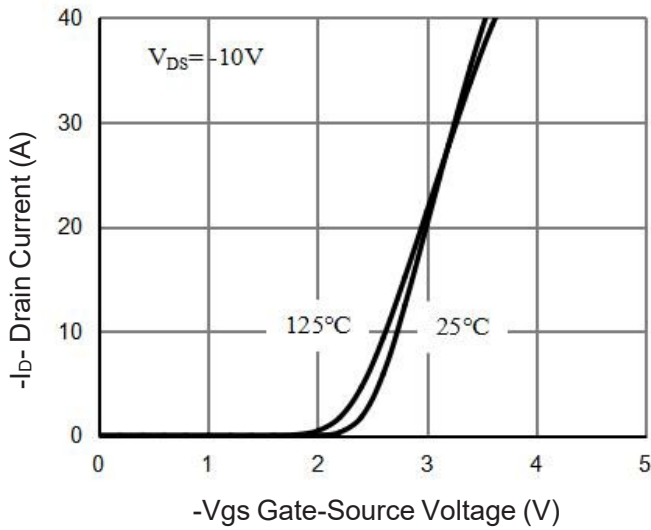


Figure 6 Drain-Source On-Resistance



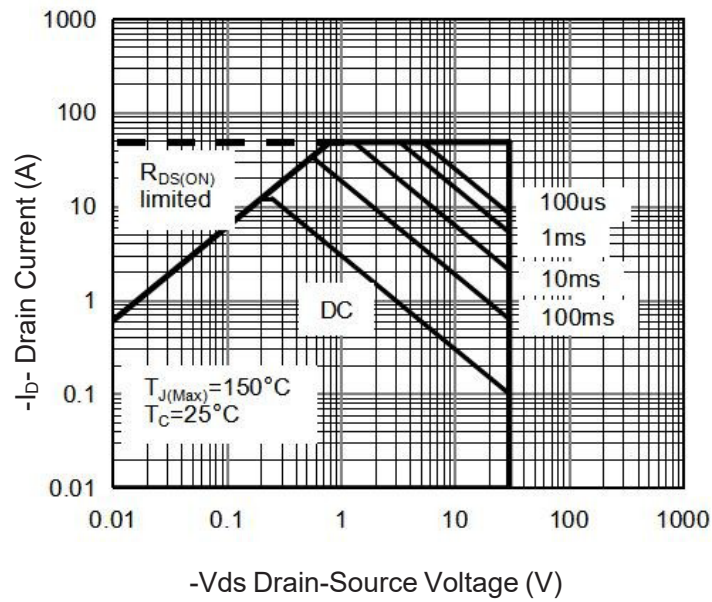


Figure 13 Safe Operation Area

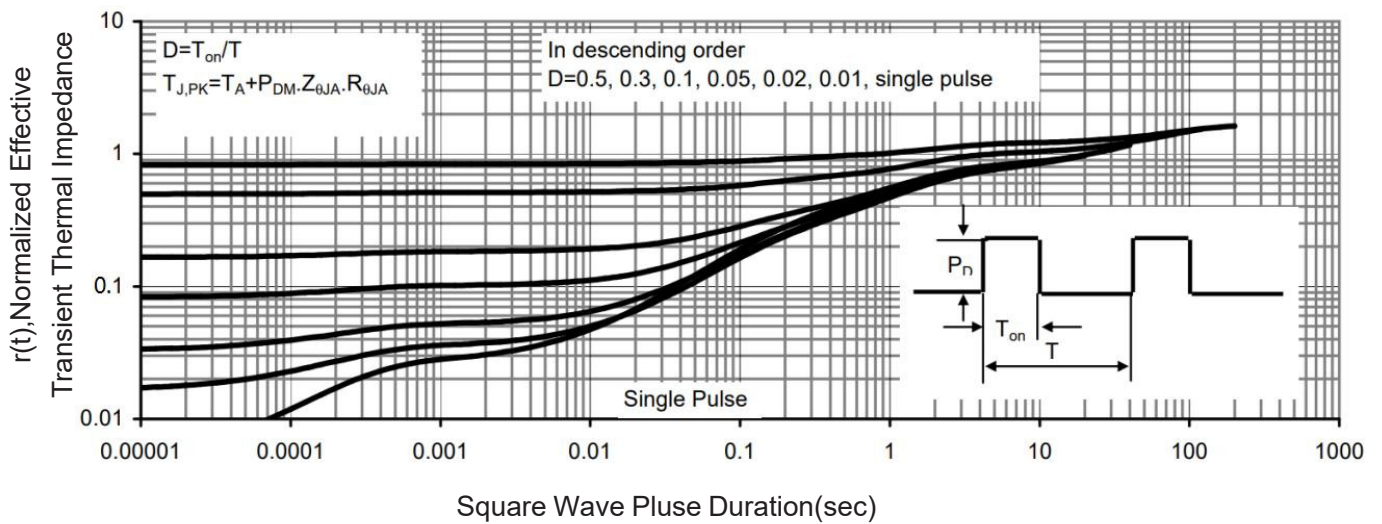


Figure 14 Normalized Maximum Transient Thermal Impedance