

Description

The VSM16P03 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. This device is suitable for use as a load switch or in PWM applications.

General Features

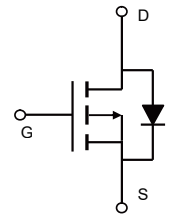
- $V_{DS} = -30V, I_D = -16A$
 $R_{DS(ON)} < 30m\Omega @ V_{GS} = -4.5V$
 $R_{DS(ON)} < 18m\Omega @ V_{GS} = -10V$
- High Power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- PWM applications
- Load switch
- Power management



DFN3x3



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM16P03	VSM16P03-D33	DFN3x3	Ø330mm	12mm	2500 units

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}	± 20	V
Drain Current-Continuous	I_D	-16	A
Drain Current-Continuous ($T_C = 100^\circ C$)	$I_D (100^\circ C)$	-11.3	A
Drain Current-Pulsed (Note 1)	I_{DM}	-64	A
Maximum Power Dissipation	P_D	30	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	4.2	$^\circ C/W$
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ 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	-1.2	-1.6	-2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-10A	-	13	18	mΩ
		V _{GS} =-4.5V, I _D =-10A	-	22	30	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-10A	-	20	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-15V, V _{GS} =0V, F=1.0MHz	-	1363	-	PF
Output Capacitance	C _{oss}		-	250	-	PF
Reverse Transfer Capacitance	C _{rss}		-	210	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-30V, R _L =3Ω, V _{GS} =-10V, R _G =2.5Ω	-	9	-	nS
Turn-on Rise Time	t _r		-	10	-	nS
Turn-Off Delay Time	t _{d(off)}		-	25	-	nS
Turn-Off Fall Time	t _f		-	10	-	nS
Total Gate Charge	Q _g	V _{DS} =-15, I _D =-10A, V _{GS} =-10V	-	31.2		nC
Gate-Source Charge	Q _{gs}		-	3.2		nC
Gate-Drain Charge	Q _{gd}		-	9.2		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-10A	-		-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-16	A
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF =- 10A	-	24		nS
Reverse Recovery Charge	Q _{rr}	di/dt = -100A/μs(Note3)	-	16		nC

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: $T_J=25^{\circ}\text{C}, V_{DD}=-15V, V_G=-10V, L=0.5mH, R_g=25\Omega$

Typical Electrical and Thermal Characteristics (Curves)

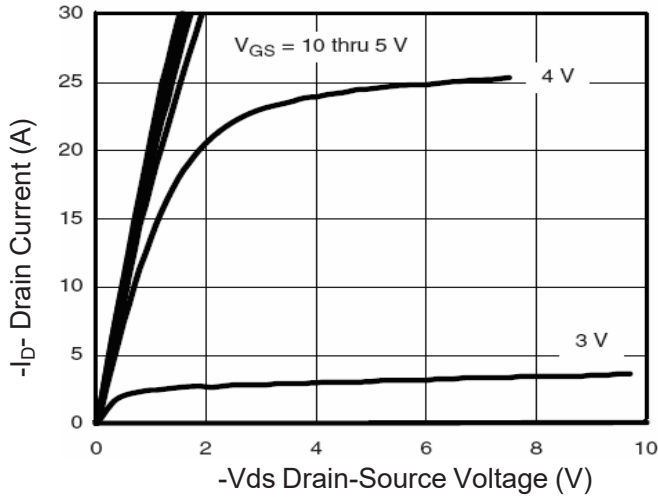


Figure 1 Output Characteristics

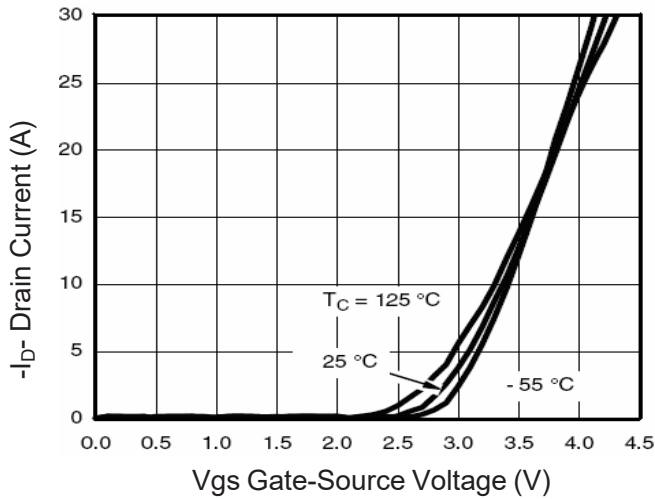


Figure 2 Transfer Characteristics

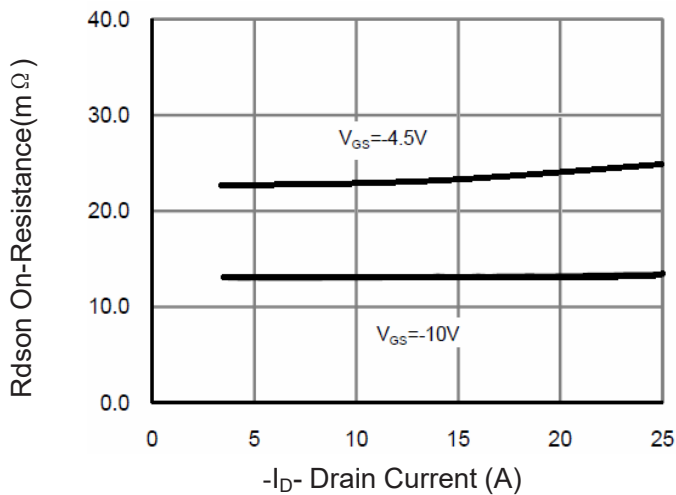


Figure 3 $R_{ds(on)}$ - Drain Current

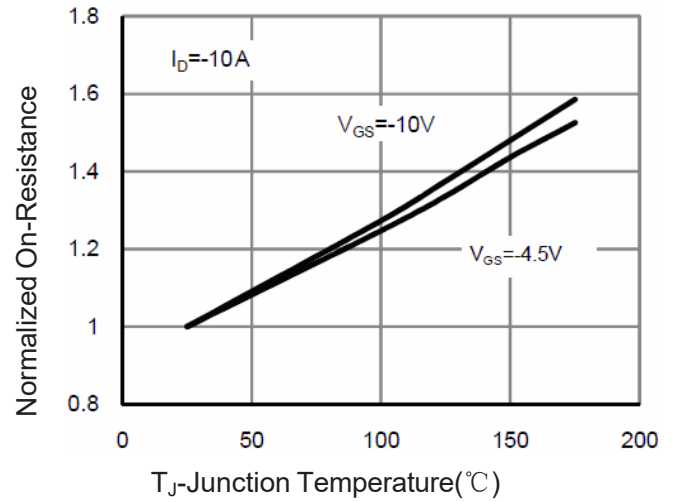


Figure 4 $R_{ds(on)}$ -Junction Temperature

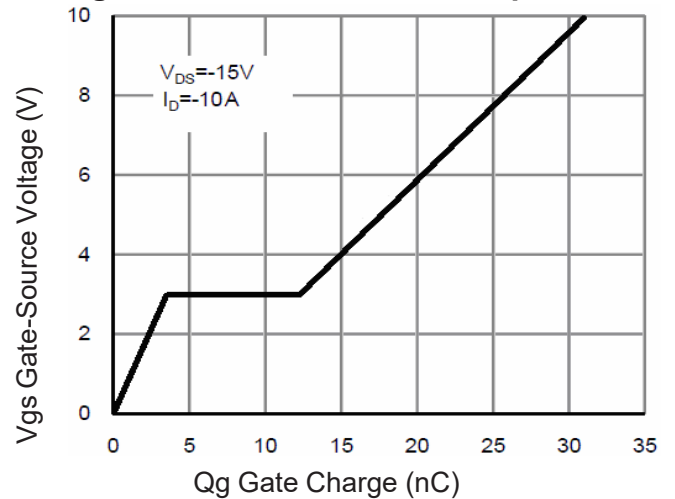


Figure 5 Gate Charge

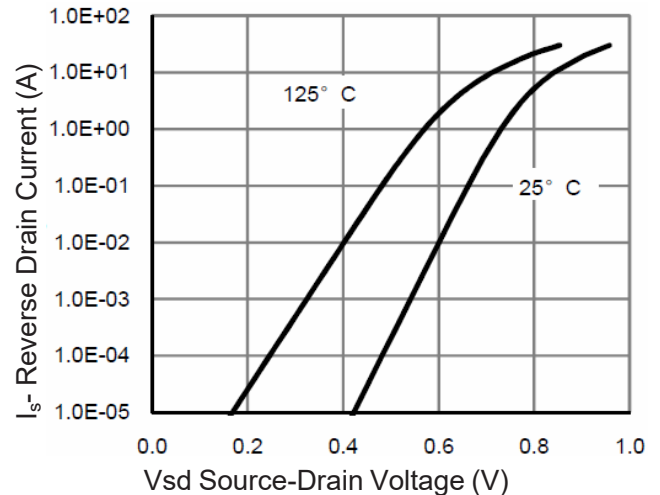
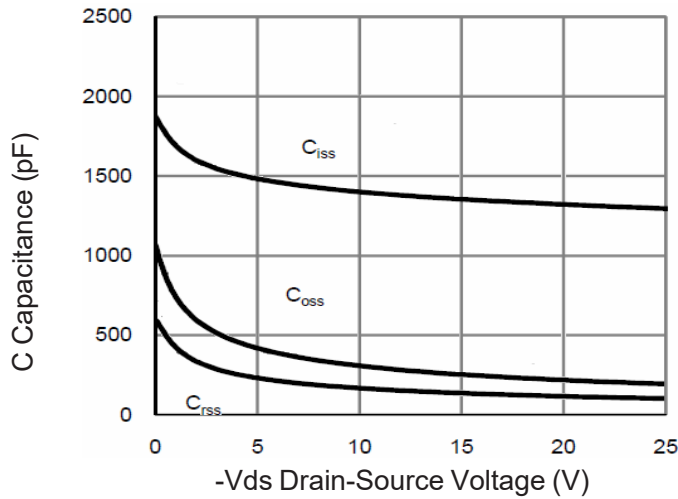
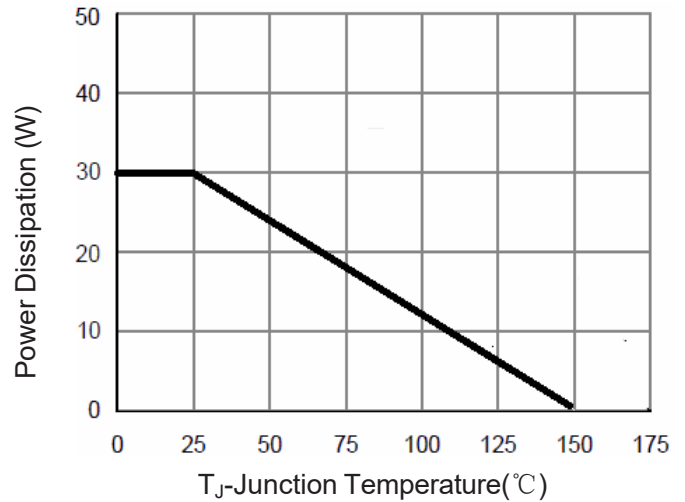
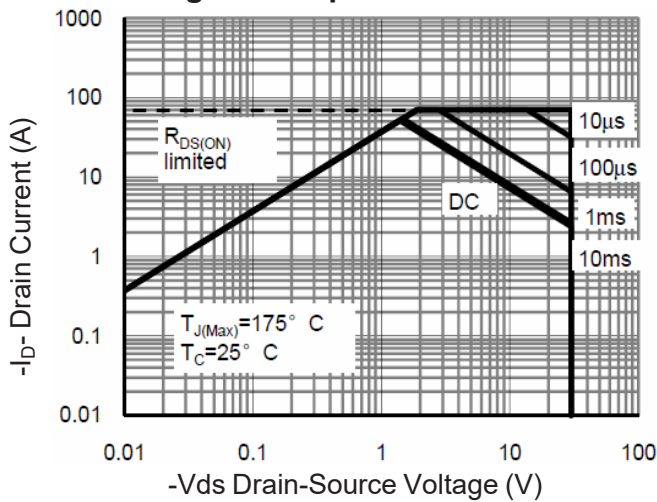
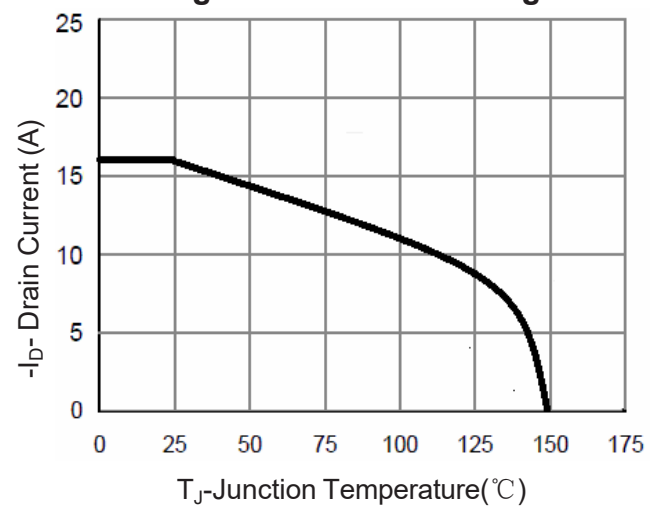
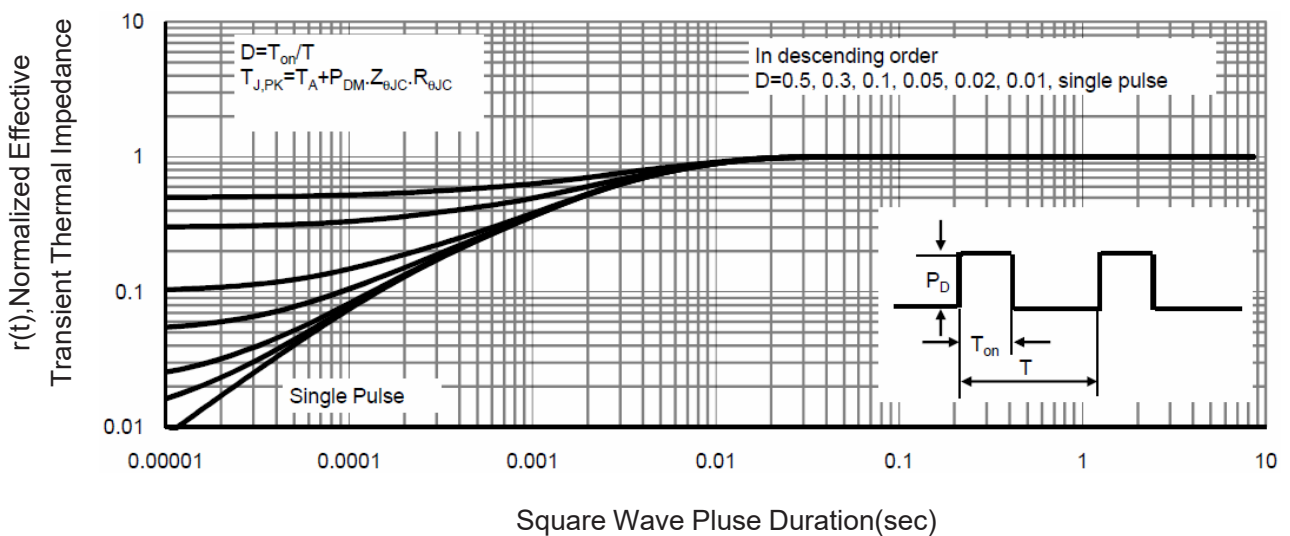


Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 Power De-rating

Figure 8 Safe Operation Area

Figure 10 ID Current Derating

Figure 11 Normalized Maximum Transient Thermal Impedance