

Description

The VSM16P06 uses advanced trench technology to provide excellent $R_{DS(ON)}$. This device is suitable for use as a load switch or power management.

Application

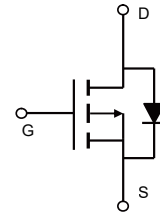
- Power management
- Load switch

General Features

- $V_{DS} = -60V, I_D = -16A$
 $R_{DS(ON)} < 65m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 85m\Omega @ V_{GS} = -4.5V$
- High power and current handing capability
- Lead free product is acquired
- Surface mount package



DFN3x3



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM16P06	VSM16P06-D33	DFN3x3	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-16	A
Pulsed Drain Current	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)	$R_{\theta JA}$	4.2	$^{\circ}C/W$
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

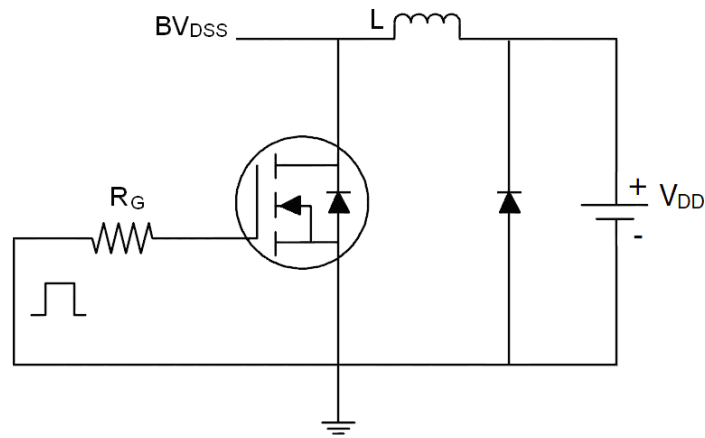
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.0	-1.5	-2.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-8A	-	55	65	mΩ
		V _{GS} =-4.5V, I _D =-8A	-	70	85	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-8A	-	10	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-30V, V _{GS} =0V, F=1.0MHz	-	1153	-	PF
Output Capacitance	C _{oss}		-	93.7	-	PF
Reverse Transfer Capacitance	C _{rss}		-	77.7	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-30V, R _L =6Ω, V _{GS} =-10V, R _G =3Ω	-	8	-	nS
Turn-on Rise Time	t _r		-	5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	32	-	nS
Turn-Off Fall Time	t _f		-	8	-	nS
Total Gate Charge	Q _g	V _{DS} =-30, I _D =-8A, V _{GS} =-10V	-	15.8	-	nC
Gate-Source Charge	Q _{gs}		-	2.7	-	nC
Gate-Drain Charge	Q _{gd}		-	3.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-8A	-		-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-16	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =- 8A	-	27		nS
Reverse Recovery Charge	Q _{rr}	di/dt = -100A/μs ^(Note3)	-	32		nC

Notes:

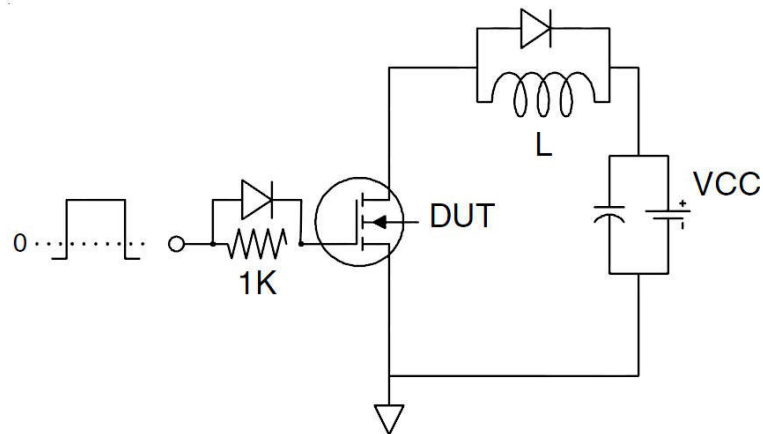
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuit

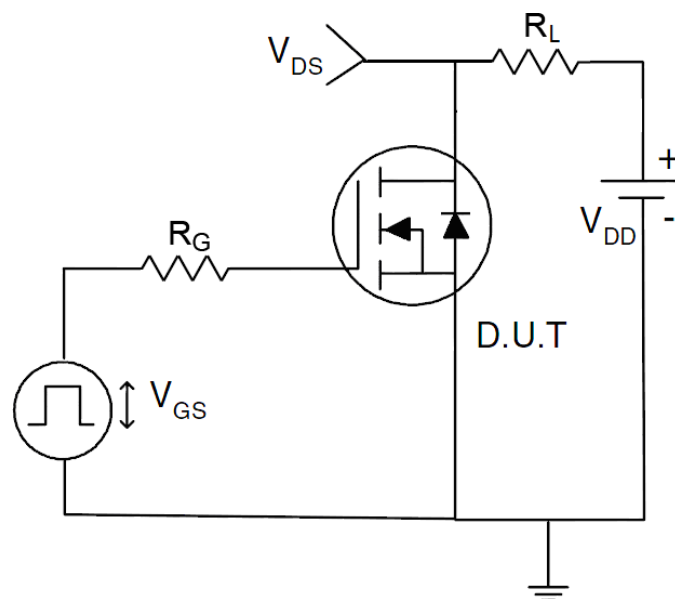
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

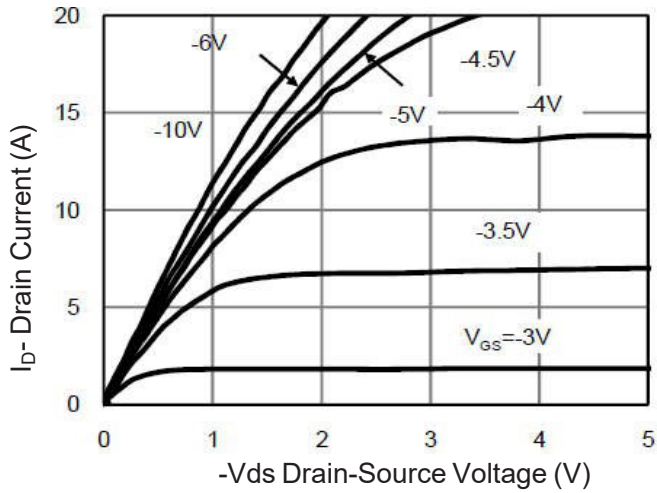


Figure 1 Output Characteristics

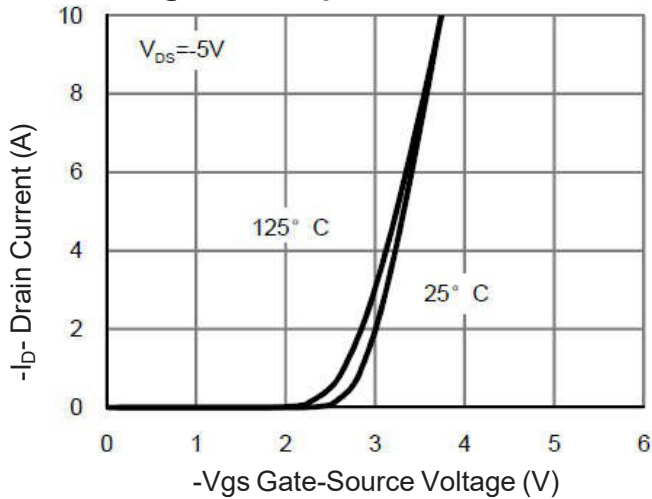


Figure 2 Transfer Characteristics

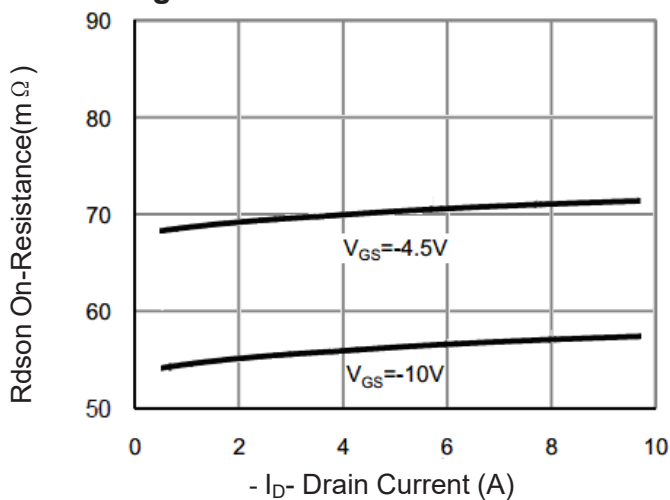


Figure 3 $R_{DS(on)}$ - Drain Current

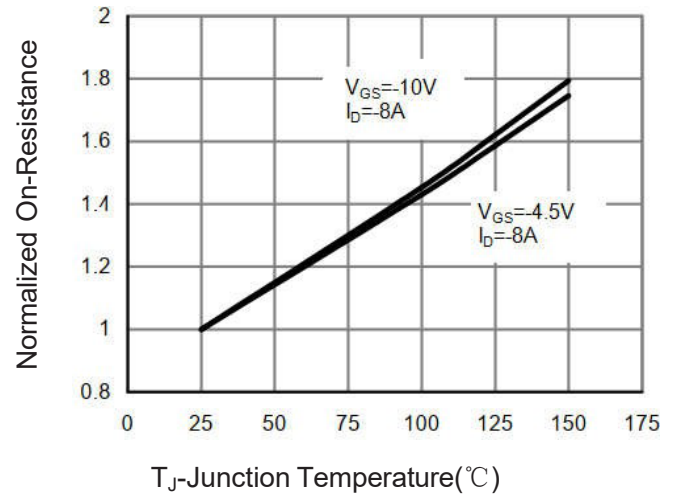


Figure 4 $R_{DS(on)}$ -Junction Temperature

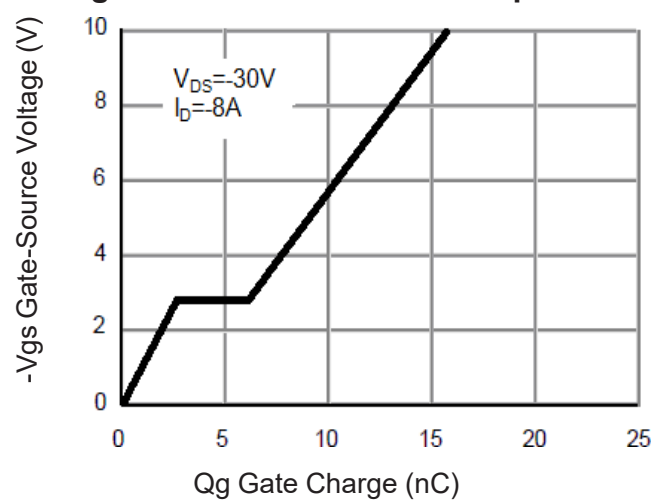


Figure 5 Gate Charge

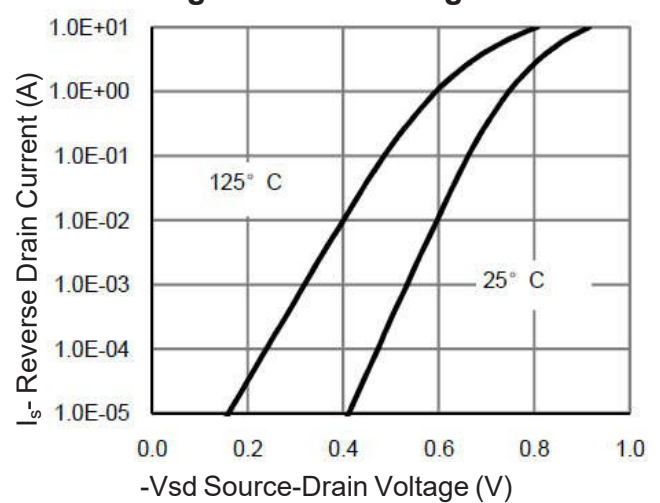
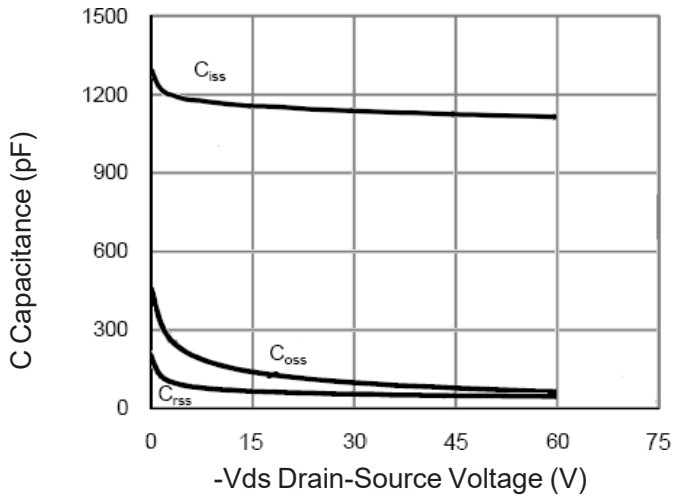
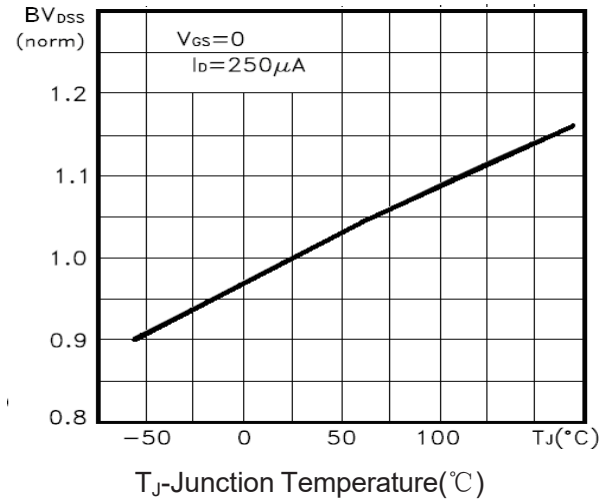
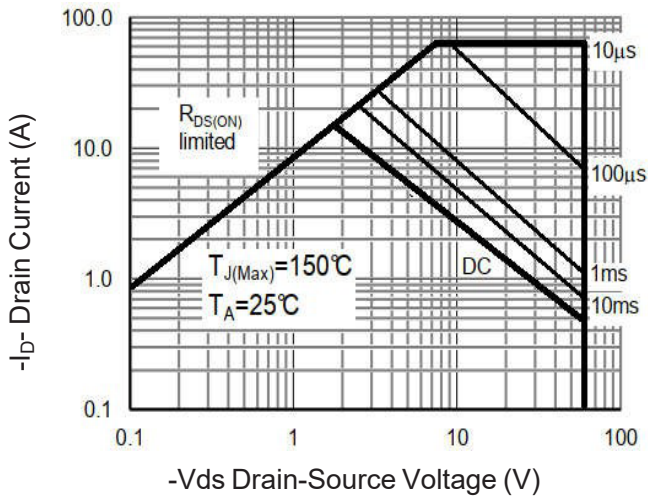
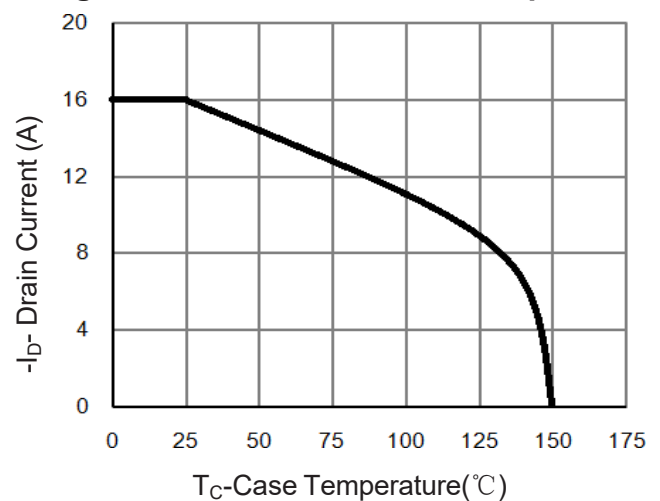
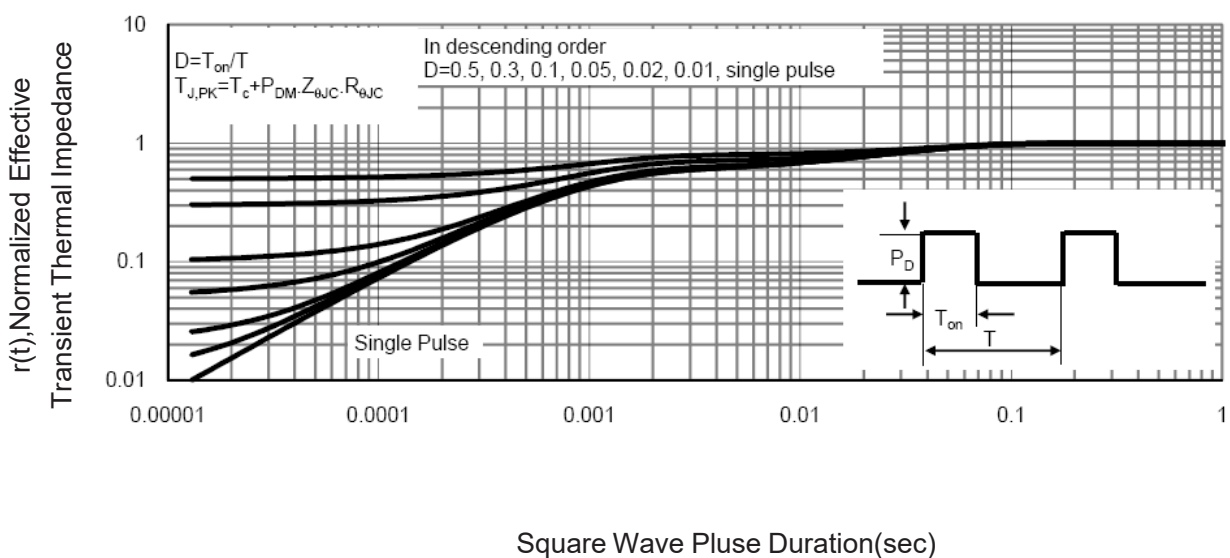


Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 BV_{DSS} vs Junction Temperature

Figure 8 Safe Operation Area

Figure 10 I_D Current De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance