Description

The VSM16P06 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge .This device is well suited for use as a load switch or in PWM applications.

General Features

- V_{DS} =-60V, I_D =-16A

  $R_{DS(ON)}$ <65mΩ @ V_{GS}=-10V

  $R_{DS(ON)}$ <85mΩ @ V_{GS}=-4.5V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

- Load switch
- PWM application
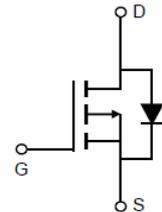
TO-252   Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM16P06-T2	VSM16P06	TO-252	-	-	-

Absolute Maximum Ratings (T_C=25℃ 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	32	W
Derating factor		0.21	W/℃
Single pulse avalanche energy [Note 5]	E_{AS}	65	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance, Junction-to-Case[Note 2]	$R_{\theta JC}$	4.68	℃/W

Electrical Characteristics (T_C=25℃ 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	-	65	85	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-8A	-	15	-	S
Dynamic Characteristics [Note4]						
Input Capacitance	C_{Iss}	V_{DS}=-30V,V_{GS}=0V, F=1.0MHz	-	1108	-	PF
Output Capacitance	C_{oss}		-	73.7	-	PF
Reverse Transfer Capacitance	C_{rss}		-	58.2	-	PF
Switching Characteristics [Note 4]						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-30V, R_L=3.75Ω, V_{GS}=-10V,R_G=3Ω	-	8	-	nS
Turn-on Rise Time	t_r		-	4	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	32	-	nS
Turn-Off Fall Time	t_f		-	7	-	nS
Total Gate Charge	Q_g	V_{DS}=-30,I_D=-8A, V_{GS}=-10V	-	23.4	-	nC
Gate-Source Charge	Q_{gs}		-	4.1	-	nC
Gate-Drain Charge	Q_{gd}		-	4.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage [Note 3]	V_{SD}	V_{GS}=0V,I_S=-16A	-		-1.2	V
Diode Forward Current [Note 2]	I_S		-	-	-16	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =- 8A di/dt = -100A/µs [Note3]	-	25		nS
Reverse Recovery Charge	Qrr		-	31		nC

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

Test Circuit

1) E$_{AS}$ Test Circuit
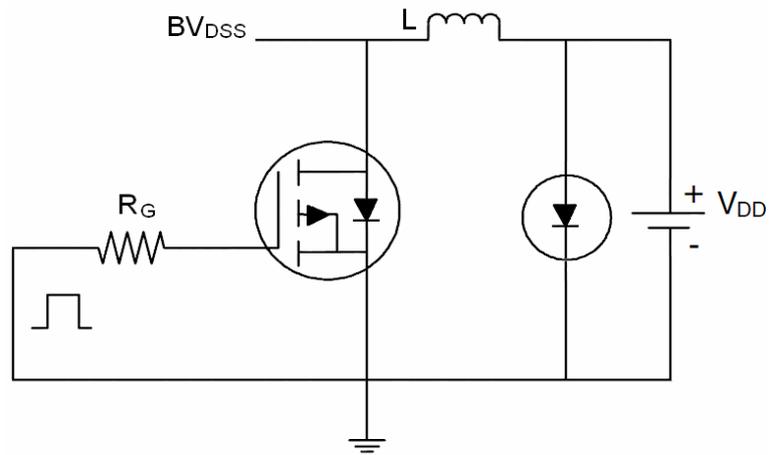
2) Gate Charge Test Circuit
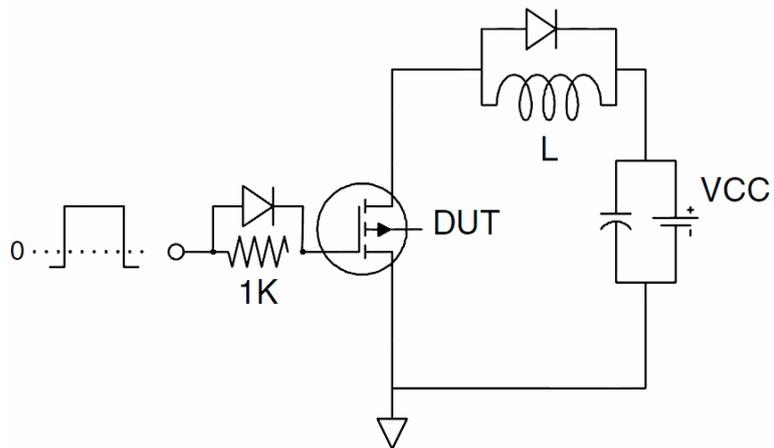
3) Switch Time Test Circuit
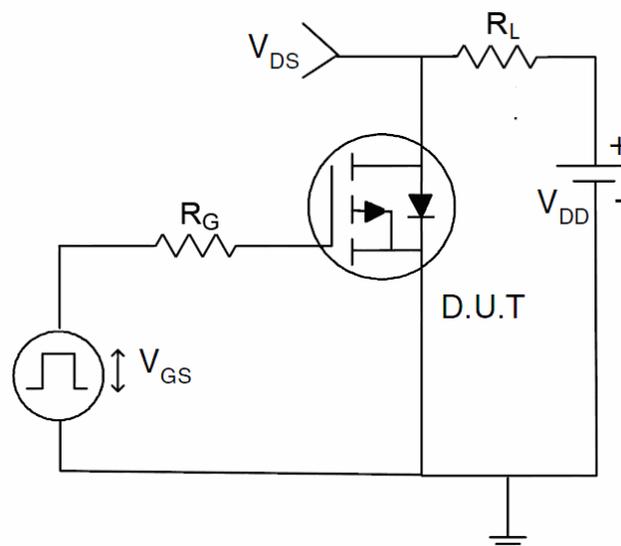
Typical Electrical and Thermal Characteristics (Curves)
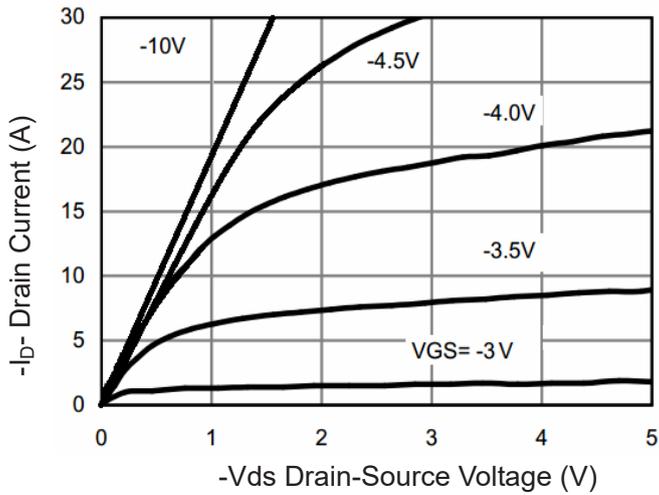
Figure 1 Output Characteristics
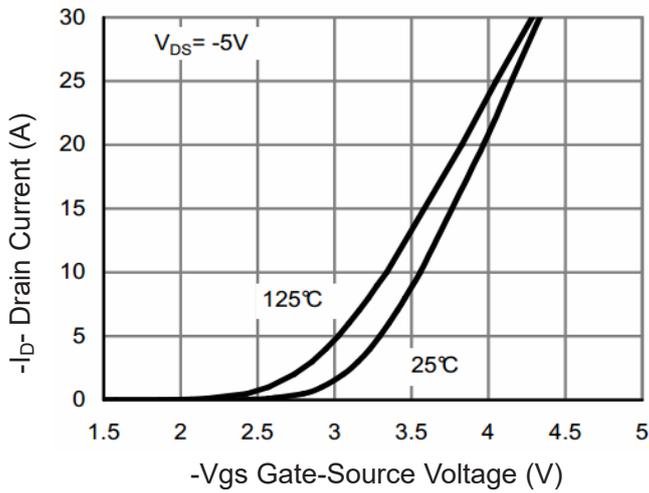
Figure 2 Transfer Characteristics
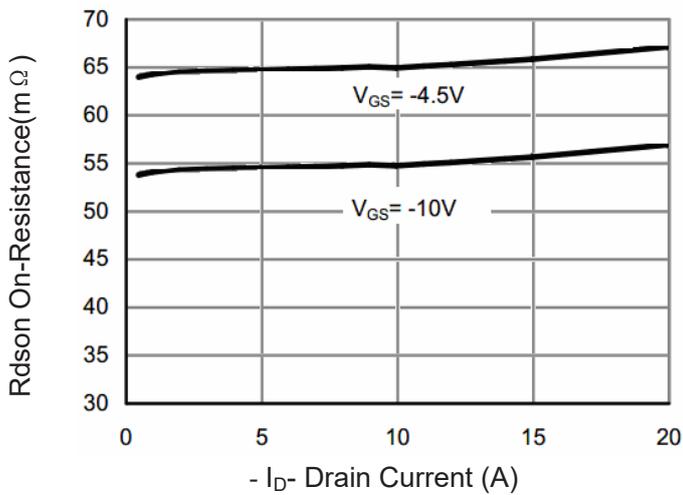
Figure 3 Rdson- Drain Current
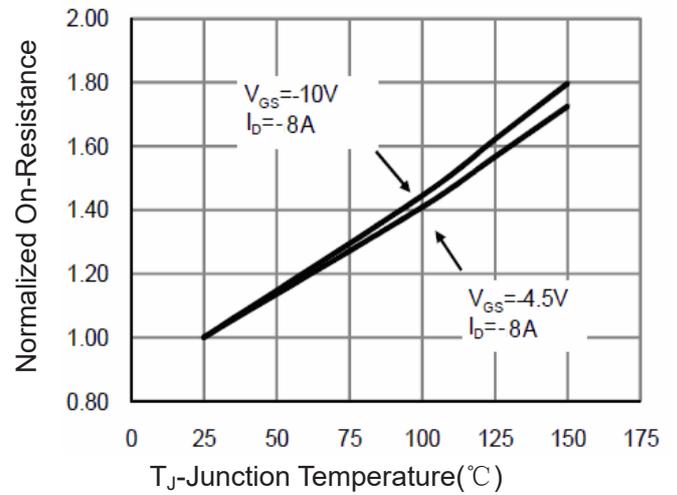
Figure 4 Rdson-Junction Temperature
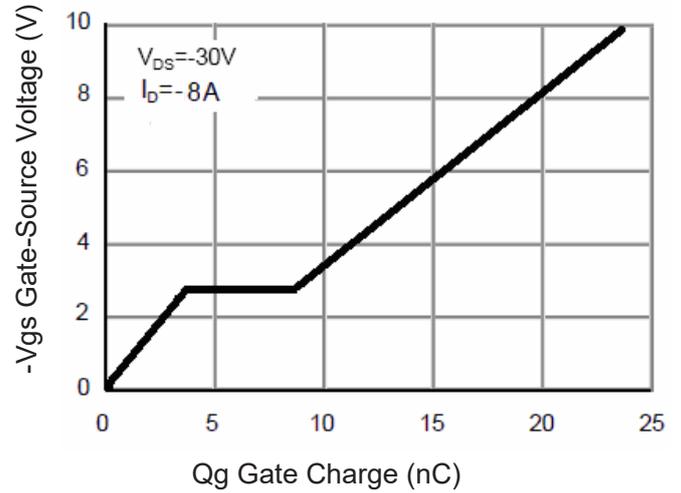
Figure 5 Gate Charge
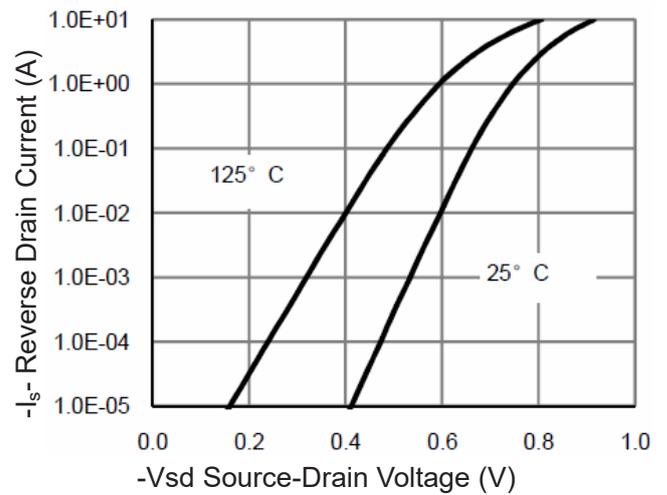
Figure 6 Source- Drain Diode Forward
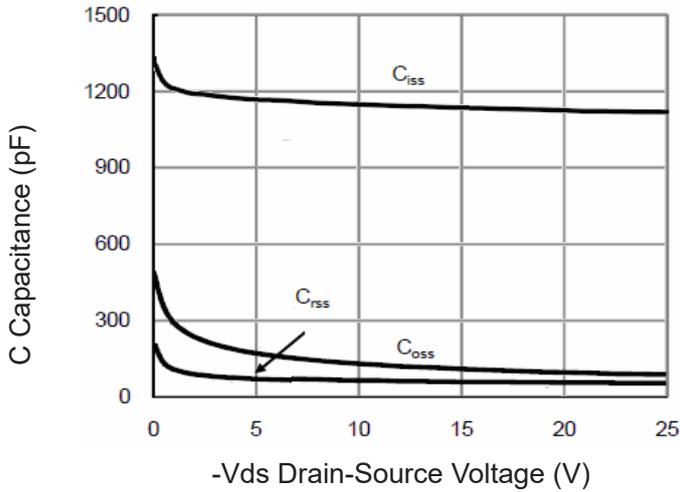
Figure 7 Capacitance vs Vds
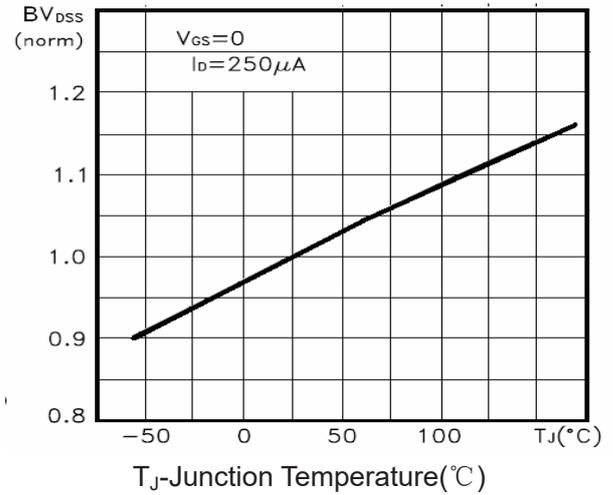
Figure 9 BV$_{DSS}$ vs Junction Temperature
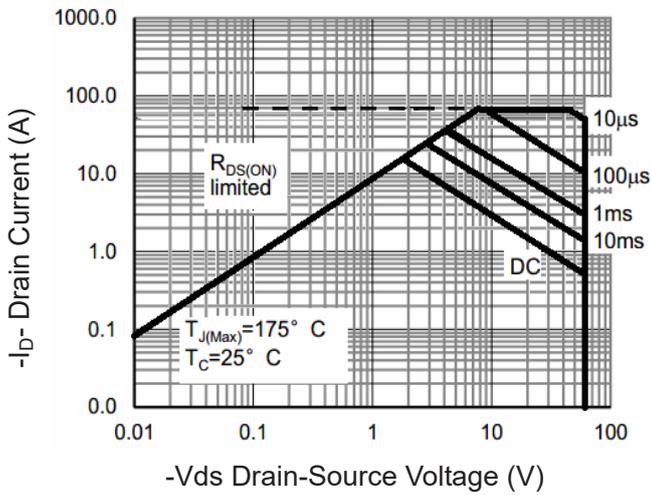
Figure 8 Safe Operation Area
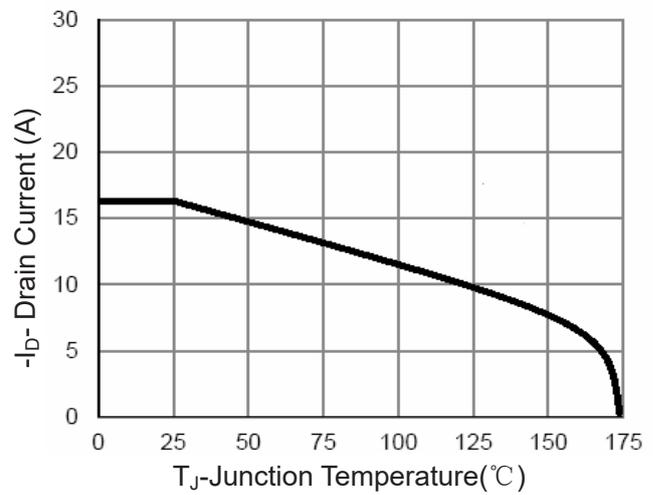
Figure 10 ID Current De-rating
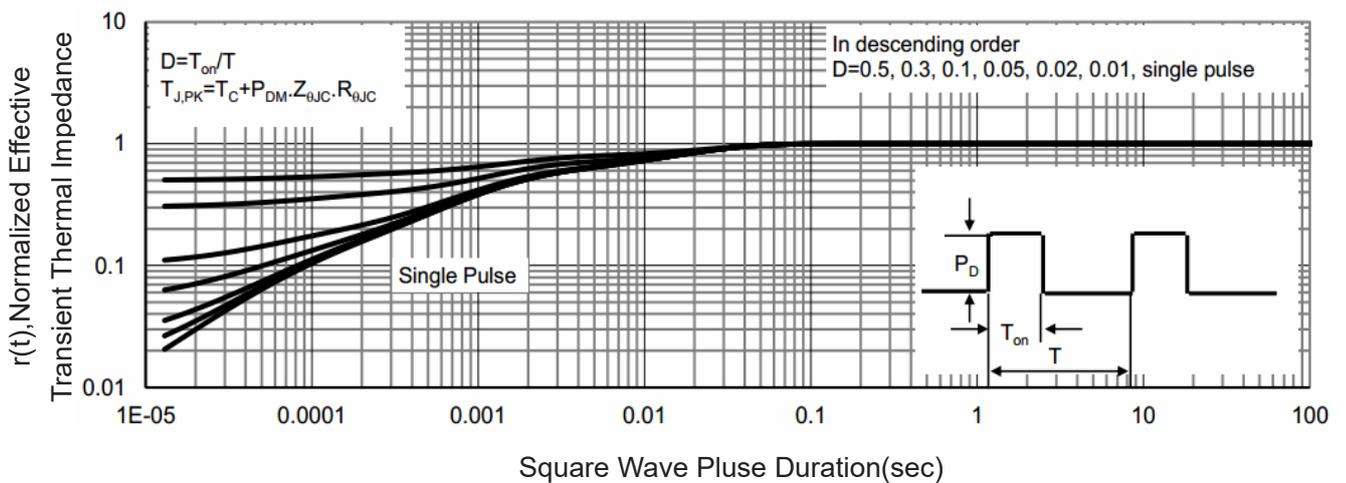
Figure 11 Normalized Maximum Transient Thermal Impedance