Description

The VSM2006Y uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

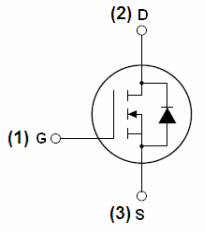
General Features

- V_{DS} =20V,I_D =6A
  $R_{DS(ON)}$ <13mΩ @ V_{GS}=4.5V (Typ:10.5mΩ)
  $R_{DS(ON)}$ <18mΩ @ V_{GS}=2.5V (Typ:15mΩ)
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

- Power switching application
- Load switching
- Uninterruptible power supply

SOT-23-3



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM2006Y-S2	VSM2006Y	SOT-23-3	Ø180mm	8mm	3000 units

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	6	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	4.2	A
Pulsed Drain Current	I_{DM}	24	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient(Note 2)	$R_{\theta JA}$	83.3	℃/W

Electrical Characteristics (T_A=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	20	-	-	V

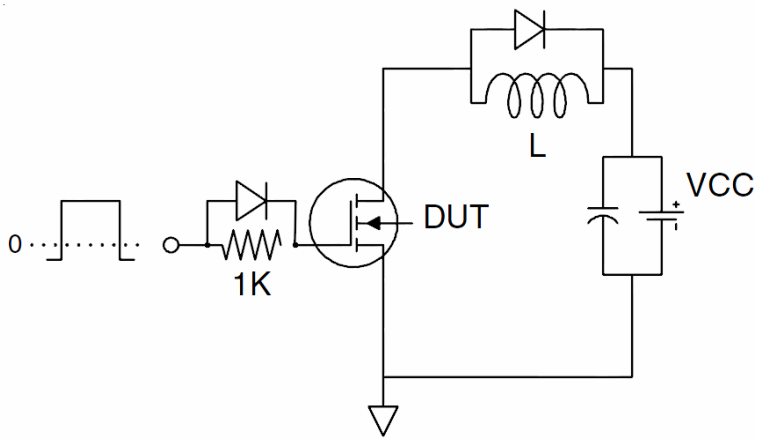
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±12V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	0.5	0.7	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=6A	-	10.5	13	mΩ
		V_{GS}=2.5V, I_D=5A		15	18	
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=10V,V_{GS}=0V, F=1.0MHz		620		PF
Output Capacitance	C_{oss}			125		PF
Reverse Transfer Capacitance	C_{rss}			64		PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=10V,V_{DS}=10V R_L=0. 5Ω ,R_G=3Ω	-	4.5	-	nS
Turn-on Rise Time	t_r		-	9.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	18.7	-	nS
Turn-Off Fall Time	t_f		-	3.3	-	nS
Total Gate Charge	Q_g	V_{GS}=10V,V_{DS}=10V,I_D=6A		15		nC
Gate-Source Charge	Q_{gs}			1.8		nC
Gate-Drain Charge	Q_{gd}			2.8		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=6A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S	-	-	-	6	A

Notes:

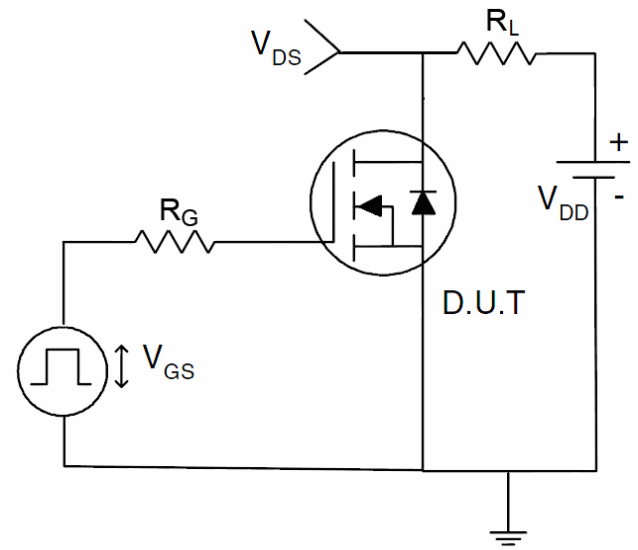
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Test circuit

1) Gate charge test Circuit:



2) Switch Time Test Circuit:



Typical Electrical and Thermal Characteristics (Curves)

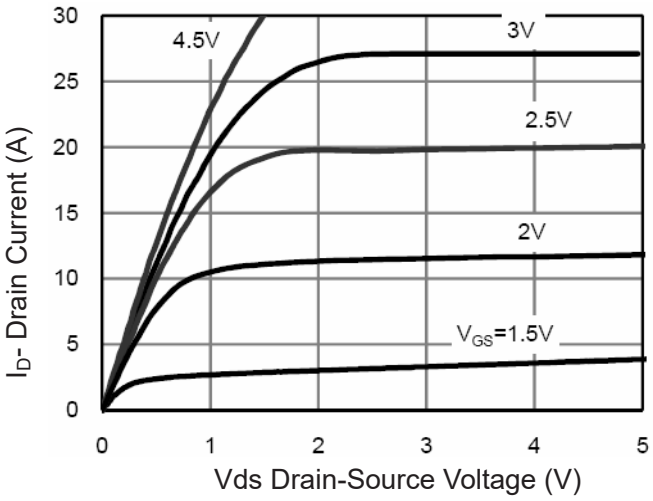


Figure 1 Output Characteristics

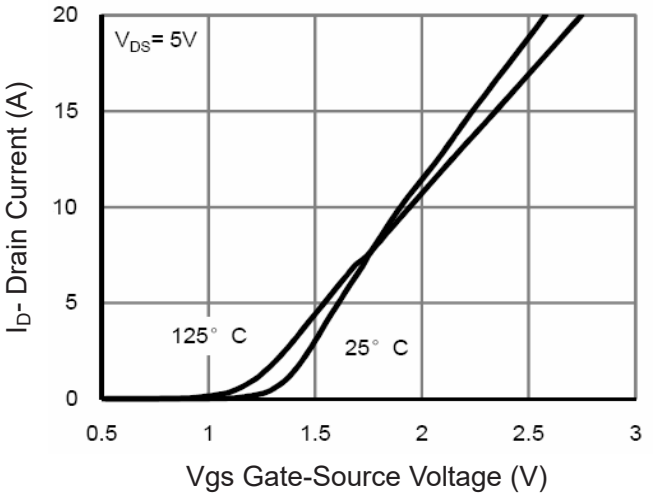


Figure 2 Transfer Characteristics

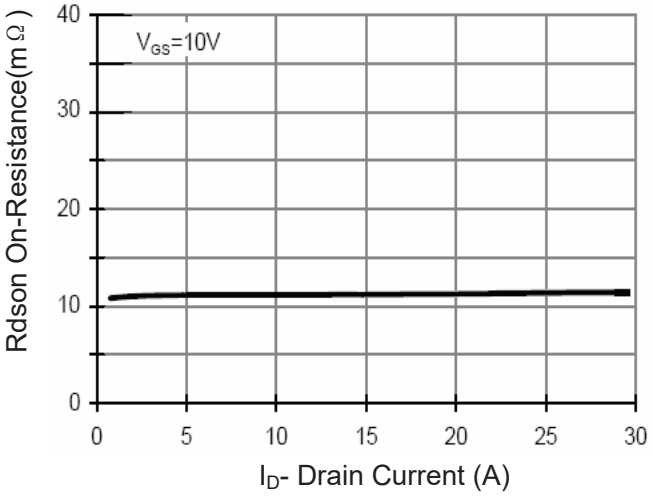


Figure 3 Rdson- Drain Current

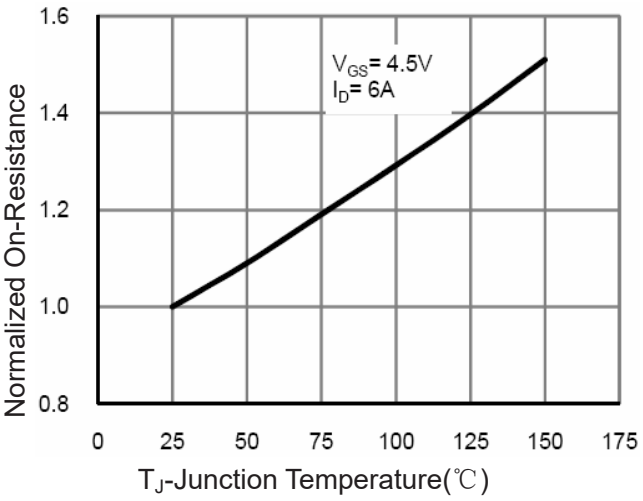


Figure 4 Rdson-Junction Temperature

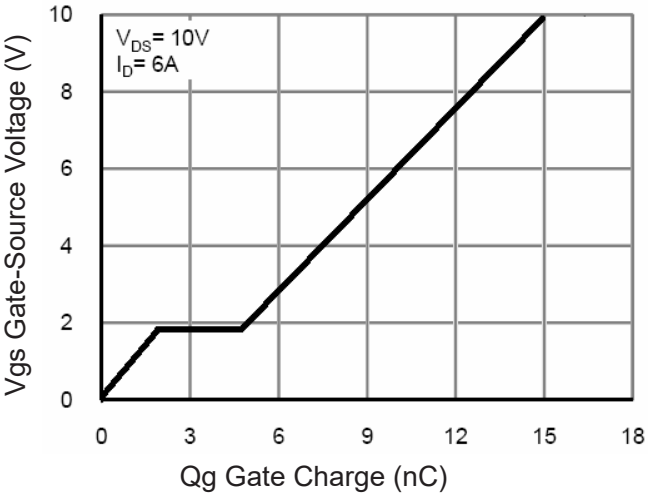


Figure 5 Gate Charge

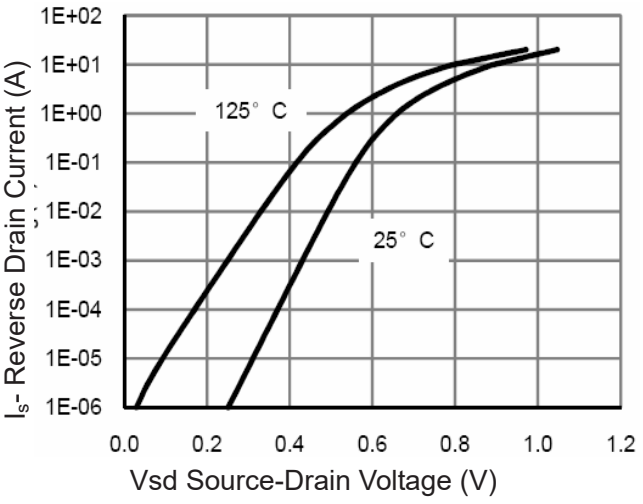


Figure 6 Source- Drain Diode Forward

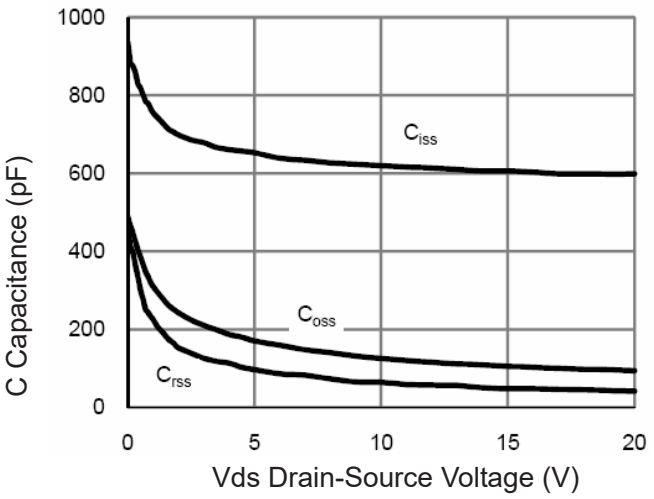


Figure 7 Capacitance vs Vds

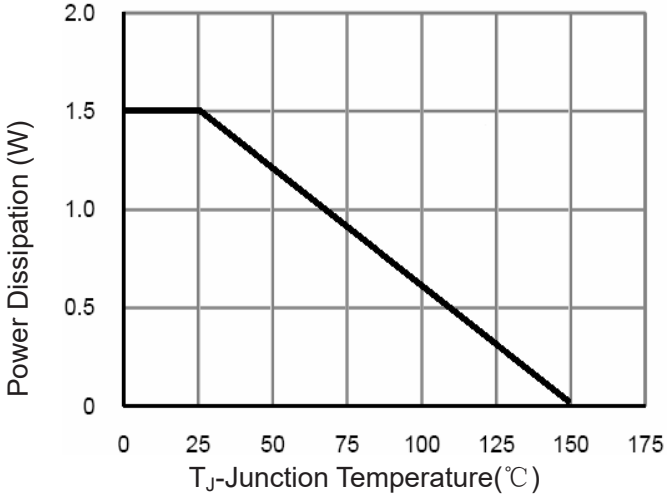


Figure 9 Power De-rating

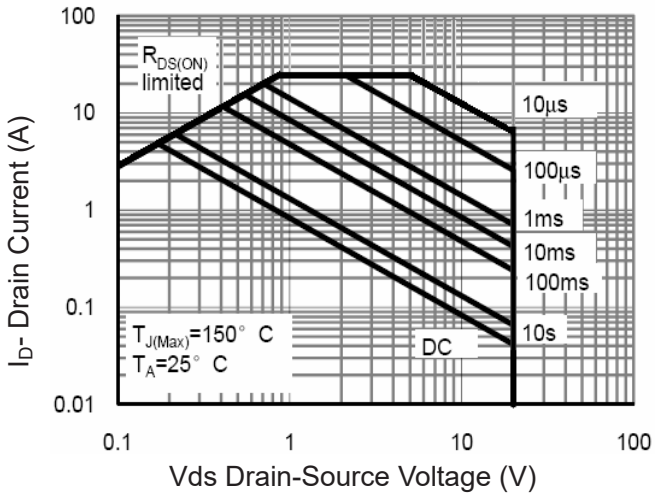


Figure 8 Safe Operation Area

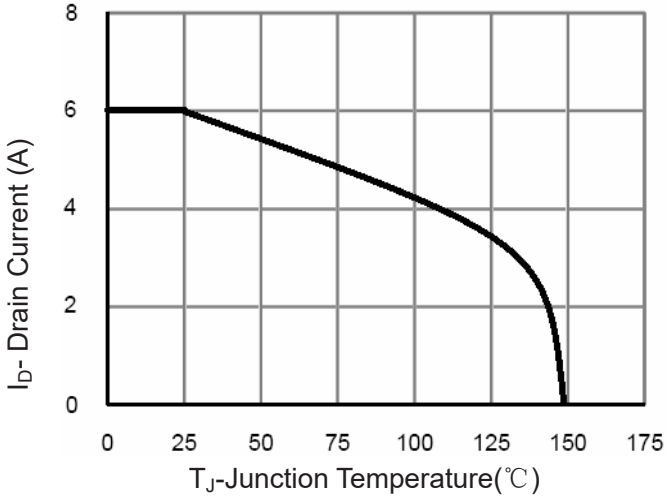


Figure 10 Current De-rating

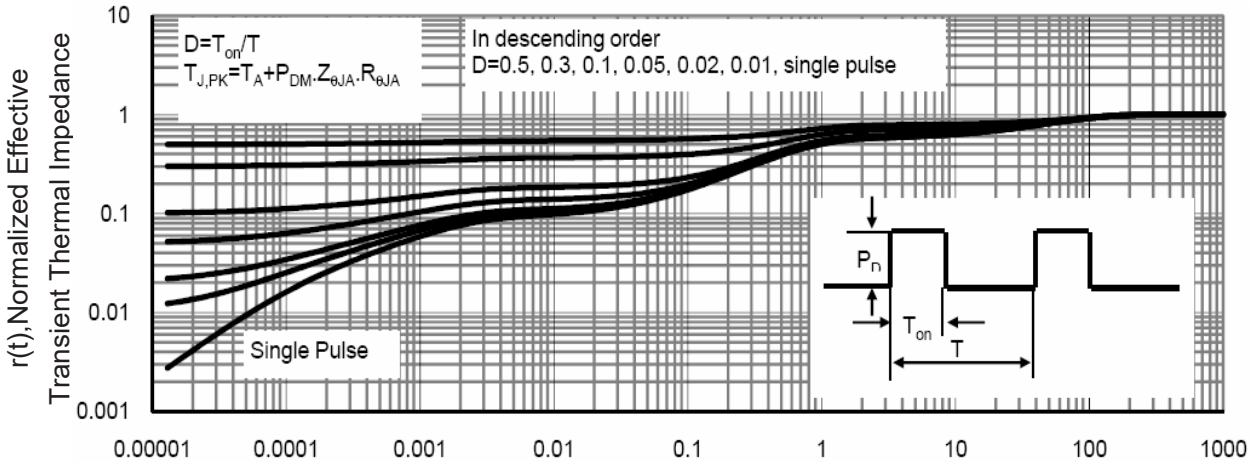


Figure 11 Normalized Maximum Transient Thermal Impedance