

Description

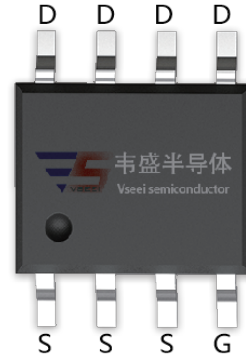
The VSM10P03 uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

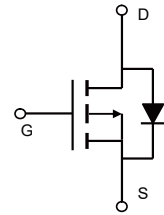
- $V_{DS} = -30\text{ V}$, $I_D = -8\text{ A}$
 $R_{DS(on)} < 23\text{ m}\Omega$ @ $V_{GS} = -10\text{ V}$
 $R_{DS(on)} < 37\text{ m}\Omega$ @ $V_{GS} = -4.5\text{ V}$
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

- Power switching applications
- Hard switched and high frequency circuits
- Uninterruptible power supply



SOP-8



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM10P03	VSM10P03-S8	SOP-8	Ø330mm	12mm	4000units

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	$T_C = 25^\circ\text{C}$	I_D	-10.7	A
	$T_C = 75^\circ\text{C}$		-8.3	A
	$T_A = 25^\circ\text{C}$		-8	A
	$T_A = 75^\circ\text{C}$		-7	A
Pulsed Drain Current ($T_A = 25^\circ\text{C}$)		I_{DM}	-32	A
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	4.2	W
	$T_C = 75^\circ\text{C}$		2.5	W
	$T_A = 25^\circ\text{C}$		3	W
	$T_A = 75^\circ\text{C}$		1.8	W
Single pulse avalanche energy ^(Note 1)		E_{AS}	49	mJ
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	30	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	42	$^{\circ}\text{C/W}$

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

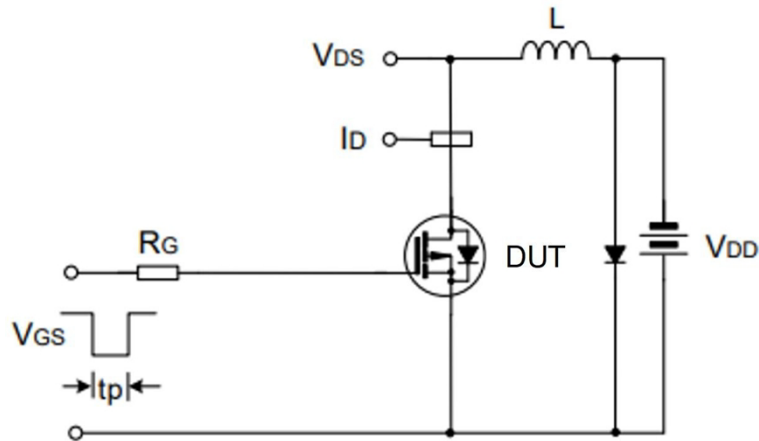
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V	-	-	-1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.2	-1.8	-2.4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-7A	-	16.4	23	mΩ
		V _{GS} =-4.5V, I _D =-5A	-	28	37	
Forward Transconductance	g _{FS}	V _{DS} =-10V, I _D =-8A	-	19	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =-15V, V _{GS} =0V, F=1.0MHz	-	694.8	-	pF
Output Capacitance	C _{oss}		-	114.8	-	pF
Reverse Transfer Capacitance	C _{rss}		-	103.8	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-15V, R _L =0.5Ω, V _{GS} =-10V, R _{GEN} =3Ω	-	9	-	nS
Turn-on Rise Time	t _r		-	23	-	nS
Turn-off Delay Time	t _{d(off)}		-	19	-	nS
Turn-off Fall Time	t _f		-	9	-	nS
Total Gate Charge	Q _g	V _{DS} =-15V, I _D =-5A, V _{GS} =-10V	-	15.3	-	nC
Gate-Source Charge	Q _{gs}		-	2	-	nC
Gate-Drain Charge	Q _{gd}		-	3.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-7A	-	-	-1.2	V
Diode Forward Current	I _S		-	-	-8	A

Notes:

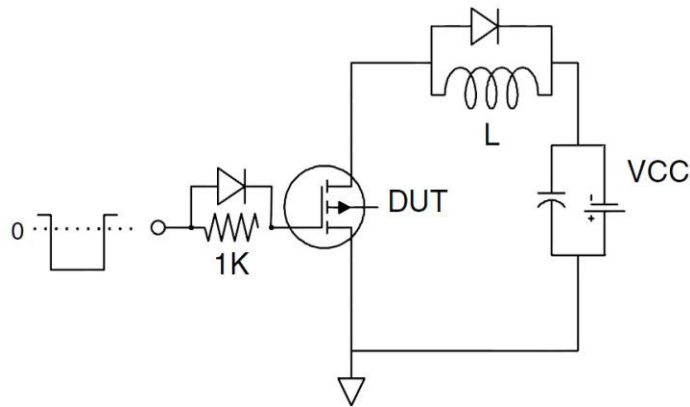
1. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=-30V, V_G=-10V, L=0.5\text{mH}, R_g=25\Omega$.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$. The maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.
3. Guaranteed by design, not subject to production.
4. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}=150^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

Test Circuit

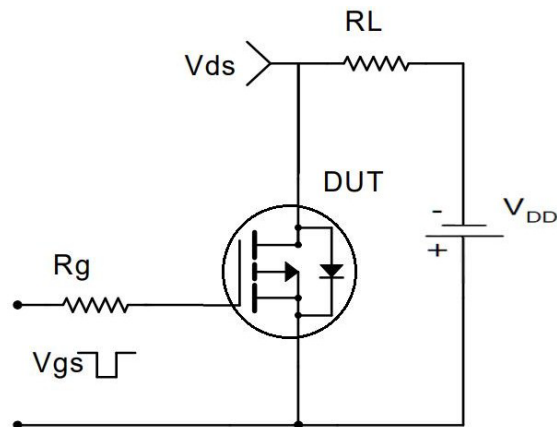
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

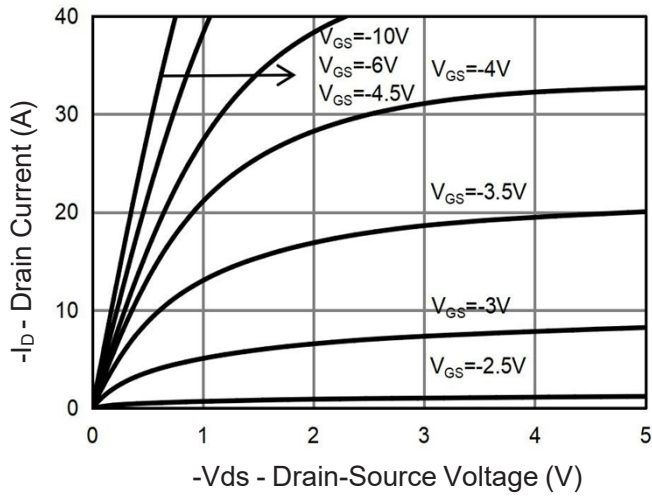


Figure 1 Output Characteristics

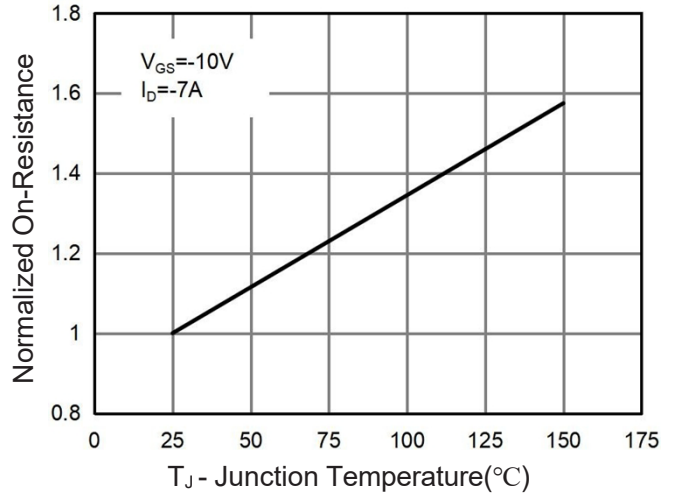


Figure 4 R_{DS(on)} vs Junction Temperature

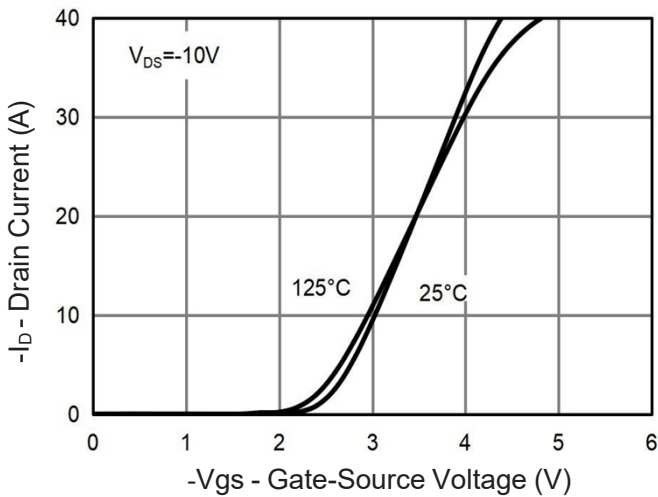


Figure 2 Transfer Characteristics

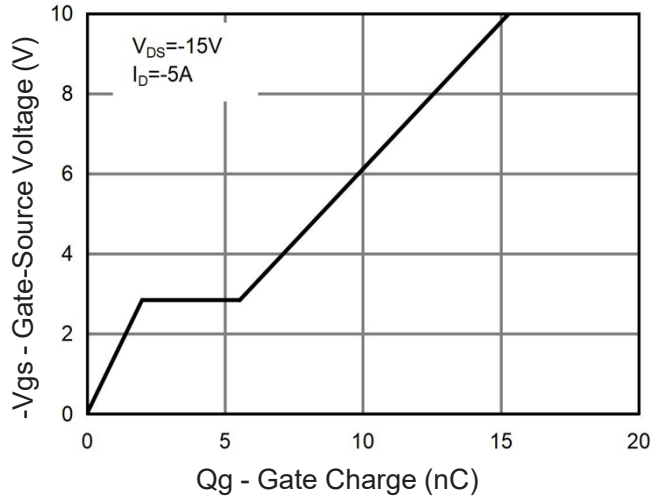


Figure 5 Gate Charge

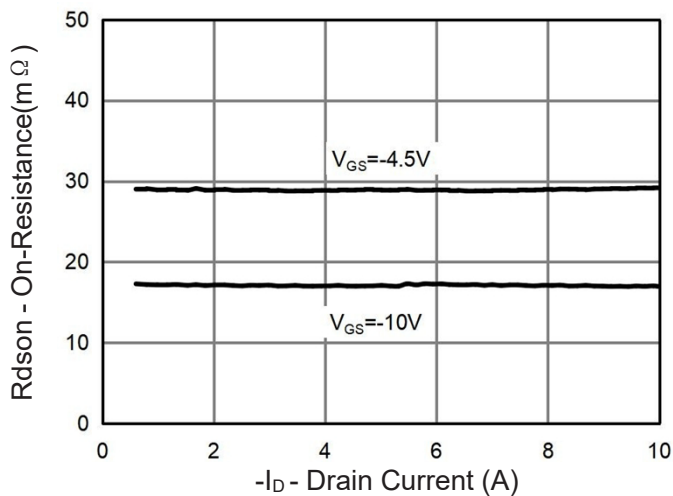


Figure 3 R_{DS(on)} vs Drain Current

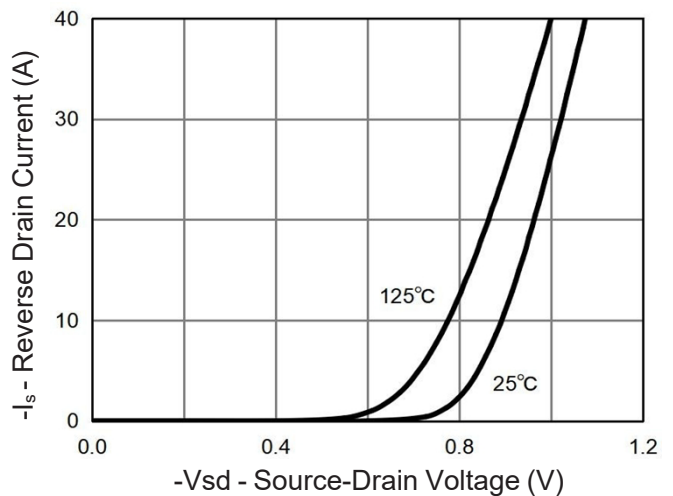
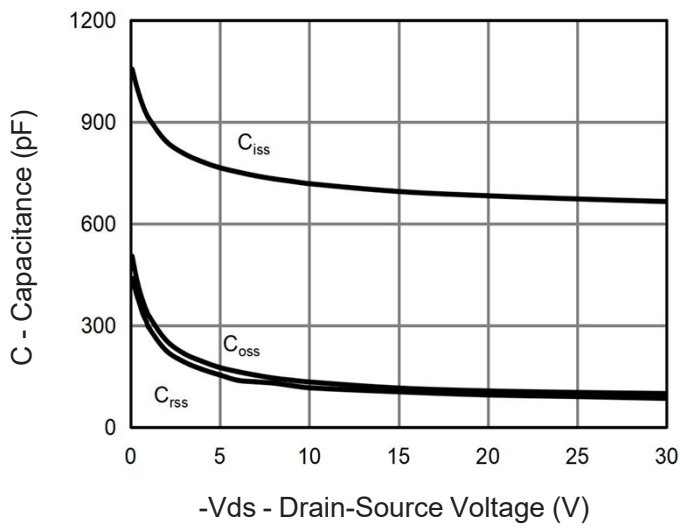
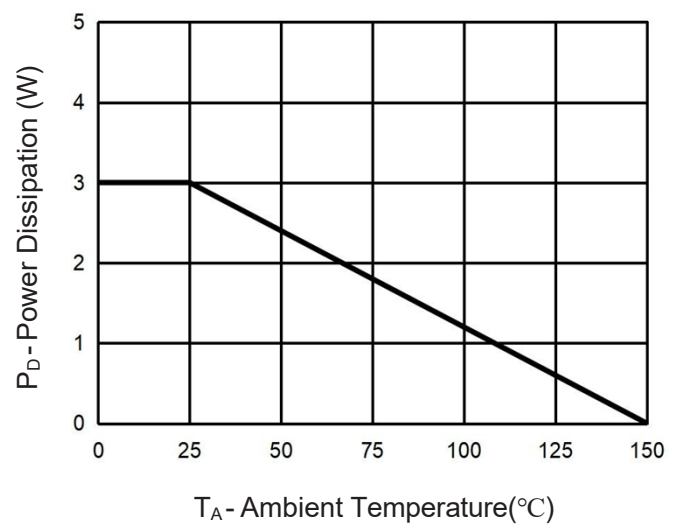
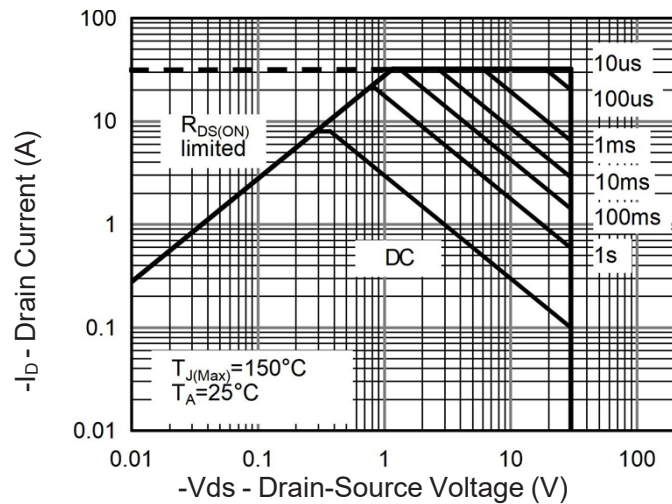
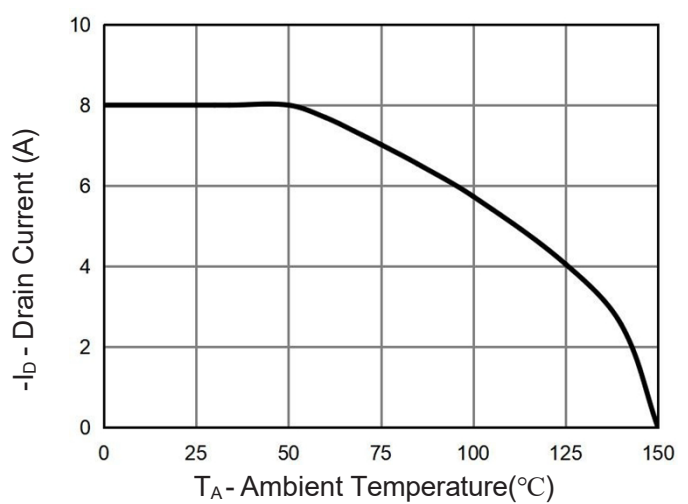
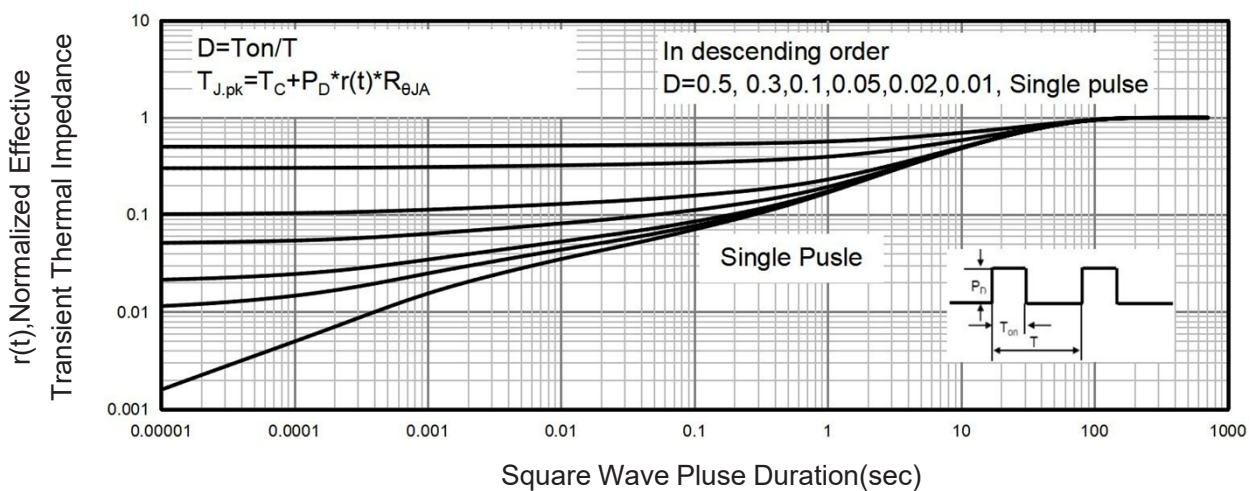


Figure 6 Source-Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 Power De-rating

Figure 8 Safe Operation Area(Note 3)

Figure 10 Drain Current De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance