

Description

The VSM30P15 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.

Application

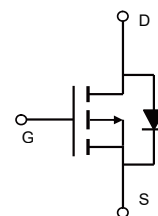
- Portable equipment and battery powered systems

General Features

- $V_{DS} = -150V, I_D = -30A$
 $R_{DS(ON)} < 88m\Omega @ V_{GS} = -10V$ (Typ: 78m Ω)
 $R_{DS(ON)} < 95m\Omega @ V_{GS} = -4.5V$ (Typ: 81.5m Ω)
- Super high dense cell design
- Advanced trench process technology
- Reliable and rugged
- High density cell design for ultra low On-Resistance
- 150 °C operating temperature



DFN5x6



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM30P15	VSM30P15-D56	DFN5x6	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-150	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-30	A
Drain Current-Continuous($T_c = 100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	-21.2	A
Pulsed Drain Current	I_{DM}	-120	A
Maximum Power Dissipation	P_D	158	W
Single pulse avalanche energy (Note 1)	E_{AS}	338	mJ
Derating factor		1.2	W/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.79	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient (Note 4)	$R_{\theta JA}$	50	$^\circ\text{C/W}$

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

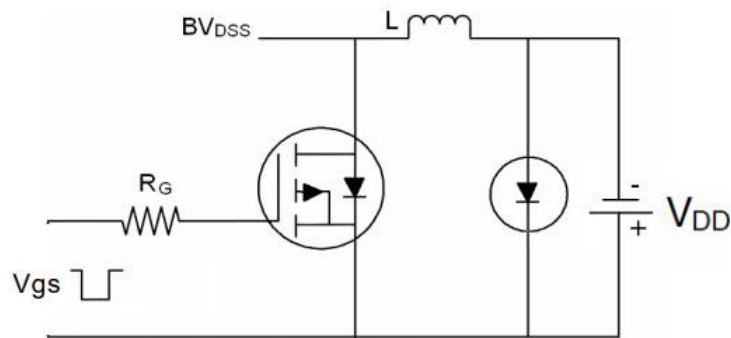
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-150	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-150V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.3	-1.8	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-20A$	-	78	88	m Ω
		$V_{GS}=-4.5V, I_D=-20A$	-	81.5	95	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-10V, I_D=-20A$	-	50	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=-75V, V_{GS}=0V,$ $F=1.0MHz$	-	6015	-	pF
Output Capacitance	C_{oss}		-	117	-	pF
Reverse Transfer Capacitance	C_{rss}		-	85	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-75V, I_D=-20A$ $V_{GS}=-10V, R_{GEN}=9.1\Omega$	-	17	-	nS
Turn-on Rise Time	t_r		-	80	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	45	-	nS
Turn-Off Fall Time	t_f		-	65	-	nS
Total Gate Charge	Q_g	$V_{DS}=-75V, I_D=-20A,$ $V_{GS}=-10V$	-	124	-	nC
Gate-Source Charge	Q_{gs}		-	20	-	nC
Gate-Drain Charge	Q_{gd}		-	28	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-20A$	-	-	-1.2	V
Diode Forward Current	I_S	-	-	-	-30	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}C, I_F = -20A$ $di/dt = 100A/\mu s$	-	90	-	nS
Reverse Recovery Charge	Q_{rr}		-	145	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

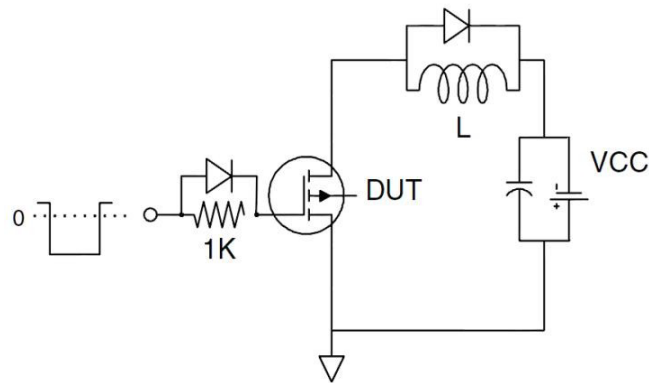
1. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=-50V, V_G=-10V, L=0.5mH, R_g=25\Omega$
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=150^{\circ}\text{C}$. The SOA curve provides a single pulse rating.
4. 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.

Test Circuit

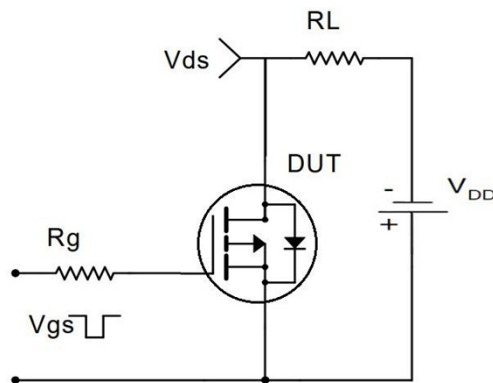
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

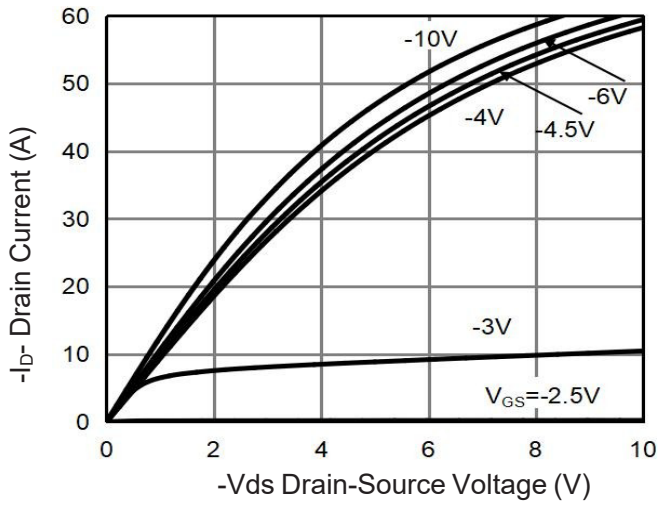


Figure 1 Output Characteristics

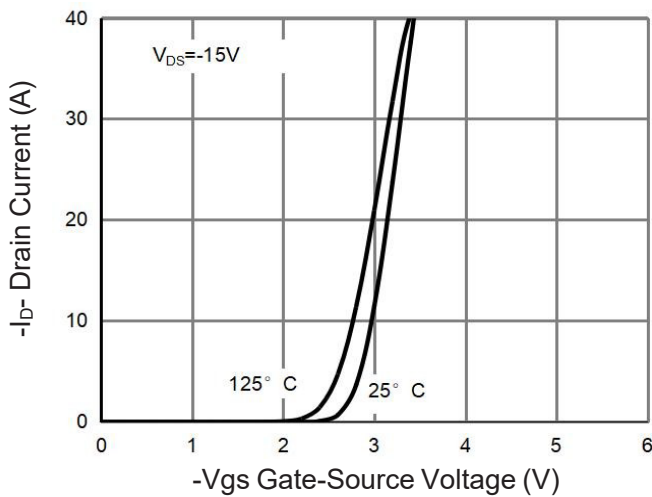


Figure 2 Transfer Characteristics

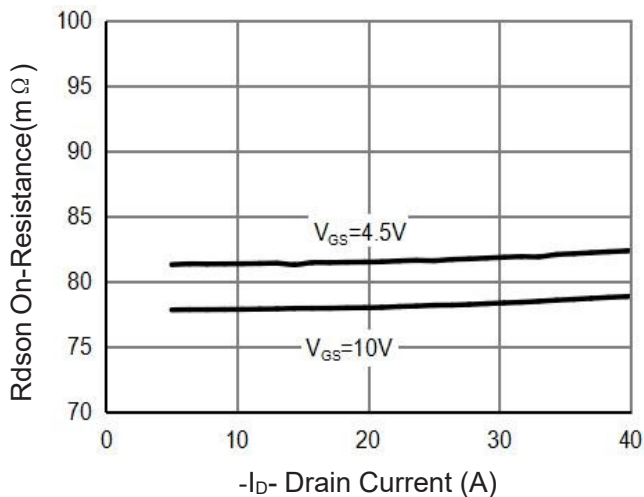


Figure 3 Rdson- Drain Current

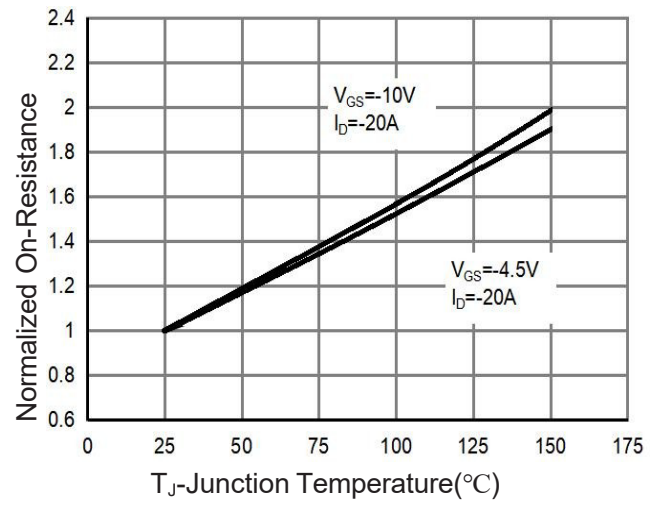


Figure 4 Rdson-Junction Temperature

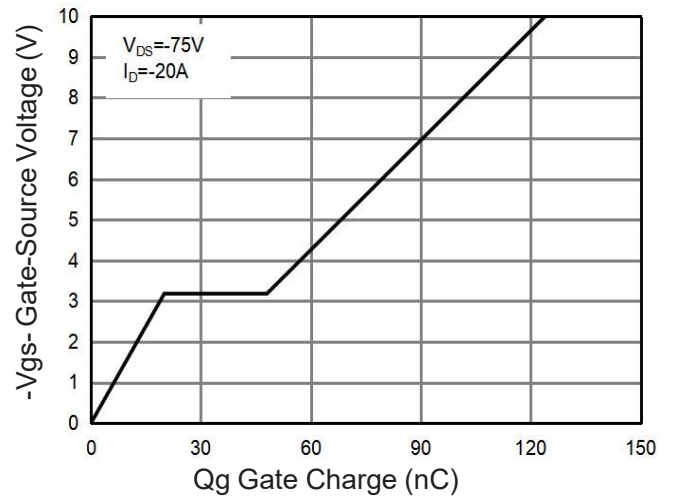


Figure 5 Gate Charge

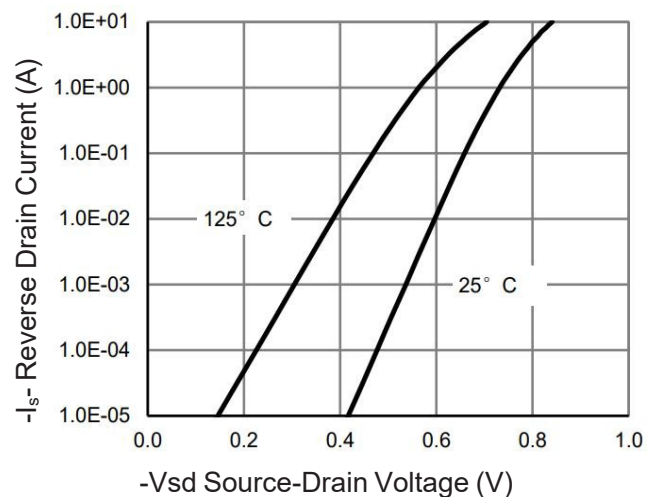
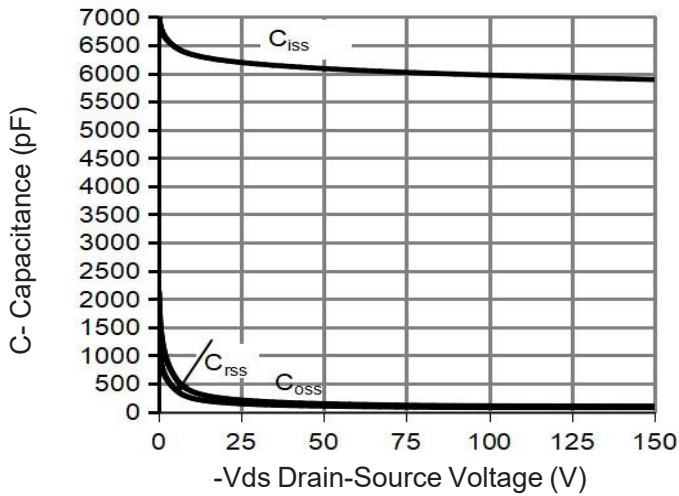
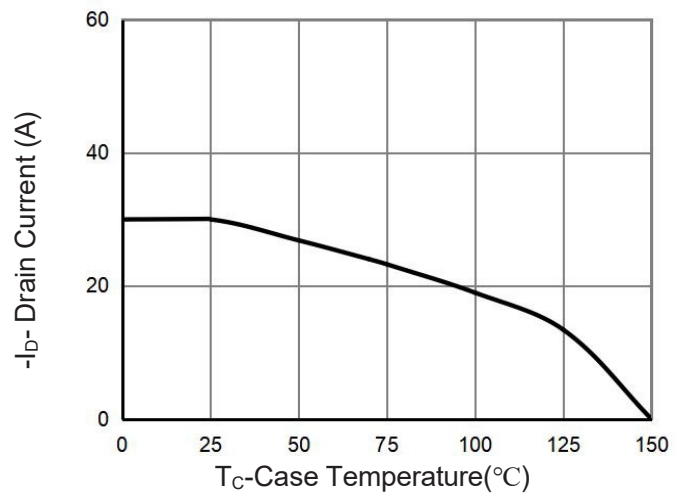
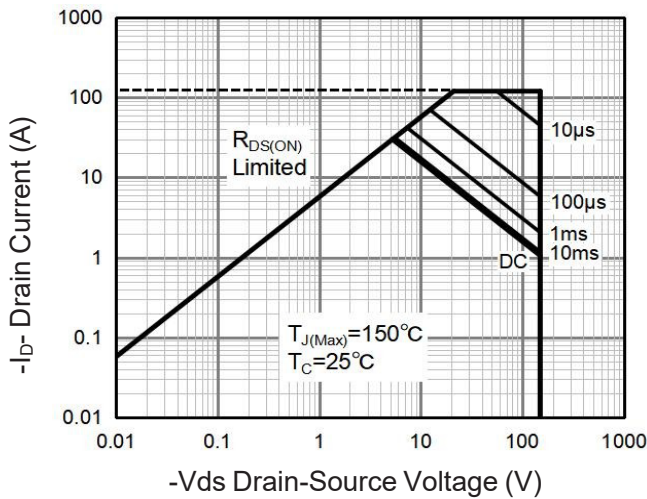
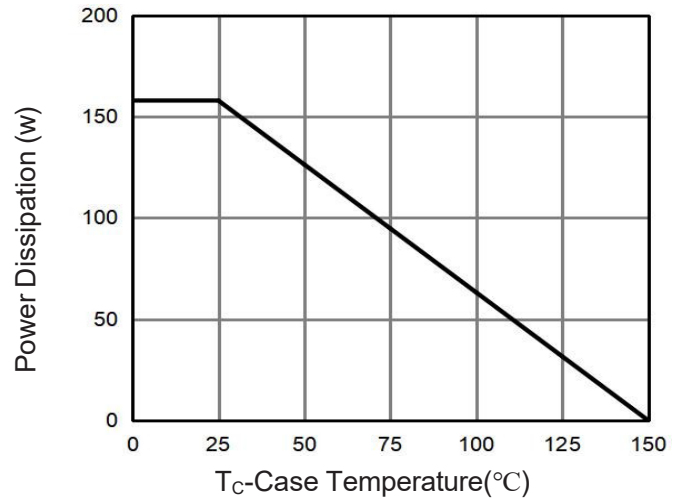
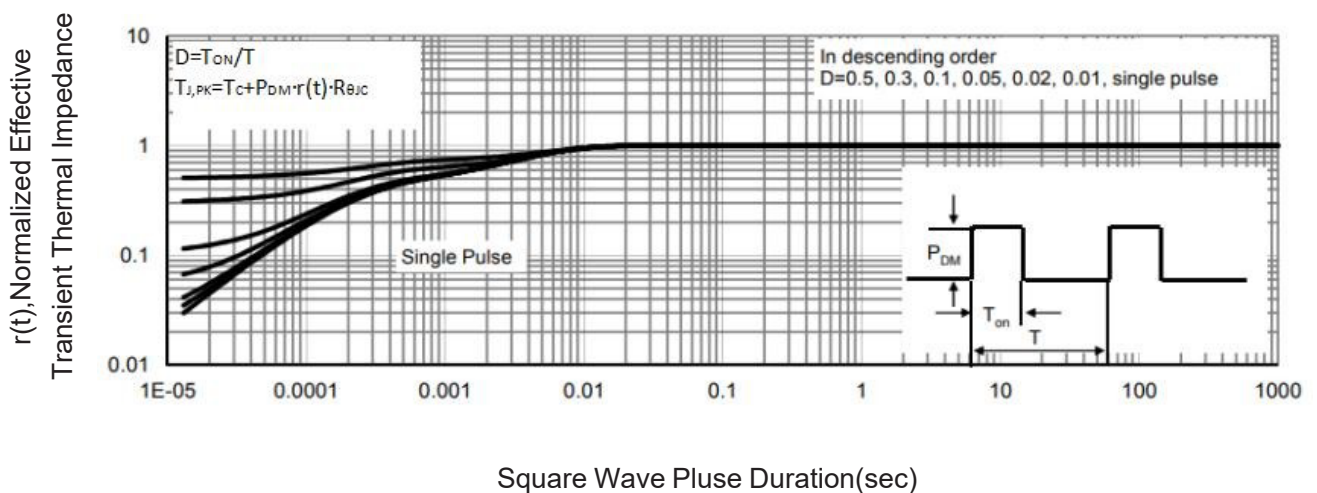


Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 Drain Current vs Case Temperature

Figure 8 Safe Operation Area (Note3)

Figure 10 Power De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance