

Description

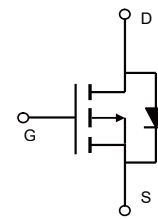
The VSM70P06 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- $V_{DS} = -60V, I_D = -70A$
 $R_{DS(ON)} < 18m\Omega @ V_{GS} = -10V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

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



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM70P06	VSM70P06-T3	TO-263	-	-	-

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	-70	A
Drain Current-Continuous($T_c=100^{\circ}C$)	$I_D(100^{\circ}C)$	-49.5	A
Pulsed Drain Current	I_{DM}	280	A
Maximum Power Dissipation	P_D	160	W
Derating factor		1.07	W/ $^{\circ}C$
Single pulse avalanche energy (Note 5)	E_{AS}	420	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^{\circ}C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	0.94	$^{\circ}C/W$
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Electrical Characteristics (T_c=25°C unless otherwise noted)

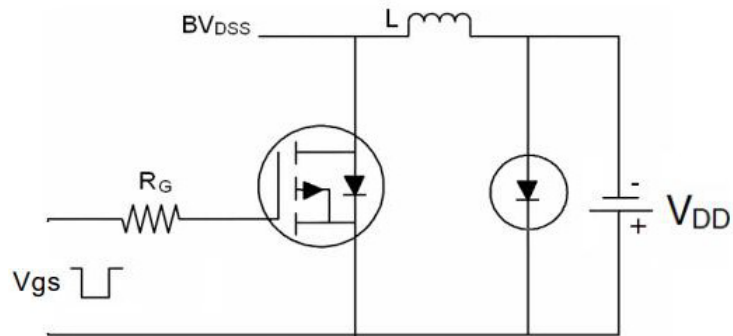
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-2.0	-2.6	-3.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-20A	-	15	18	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-40A	-	50	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-30V, V _{GS} =0V, F=1.0MHz	-	4177	-	PF
Output Capacitance	C _{oss}		-	235	-	PF
Reverse Transfer Capacitance	C _{rss}		-	178	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-30V, I _D =-20A V _{GS} =-10V, R _{GEN} =3Ω	-	16	-	nS
Turn-on Rise Time	t _r		-	19	-	nS
Turn-Off Delay Time	t _{d(off)}		-	70	-	nS
Turn-Off Fall Time	t _f		-	30	-	nS
Total Gate Charge	Q _g	V _{DS} =-30V, I _D =-20A, V _{GS} =-10V	-	78	-	nC
Gate-Source Charge	Q _{gs}		-	16	-	nC
Gate-Drain Charge	Q _{gd}		-	17	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-20A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-70	A
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = -20A	-	48	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs(Note3)	-	70	-	nC

Notes:

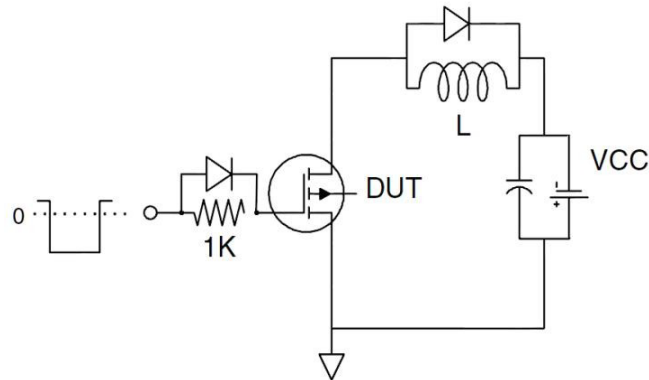
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: T_J=25°C, V_{DD}=-30V, V_G=-10V, L=0.5mH, R_g=25Ω

Test Circuit

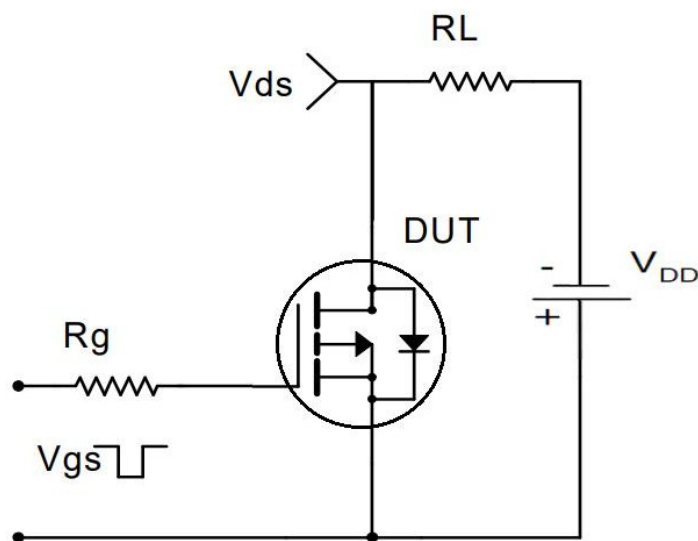
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

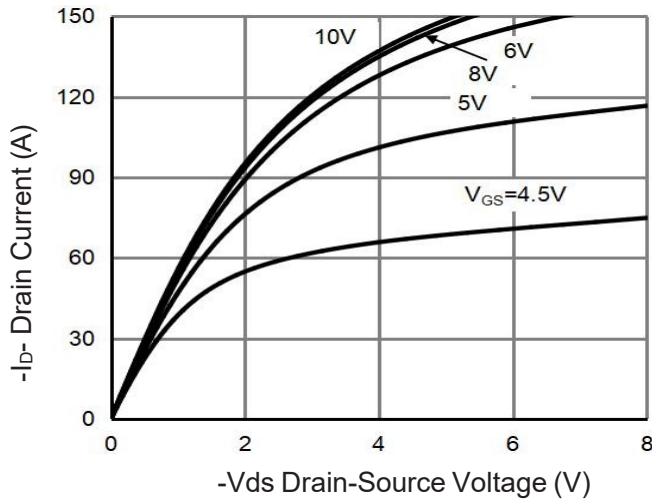


Figure 1 Output Characteristics

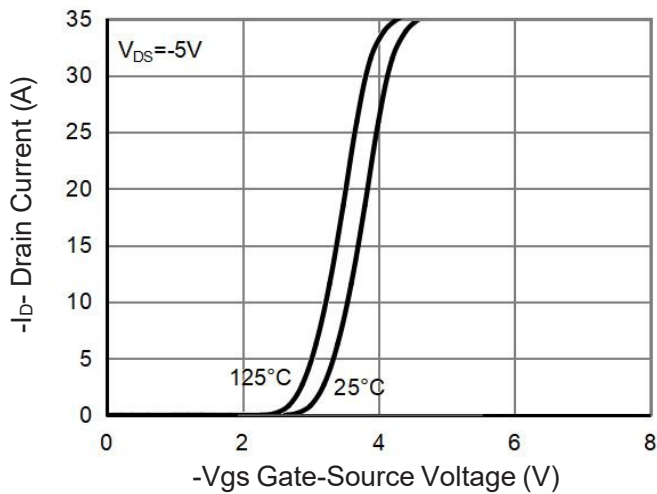


Figure 2 Transfer Characteristics

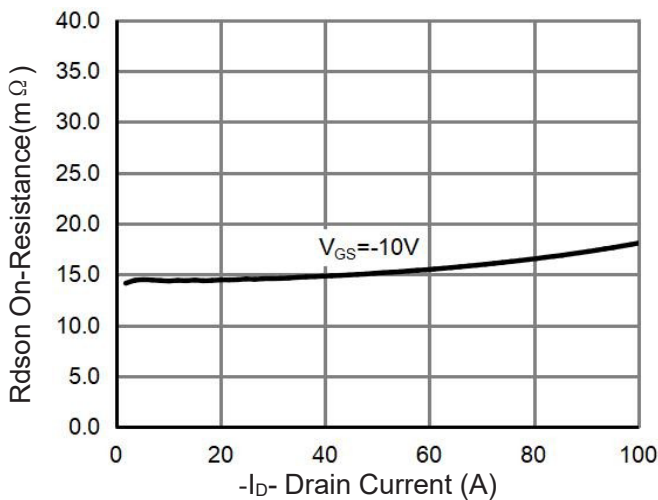


Figure 3 Rdson- Drain Current

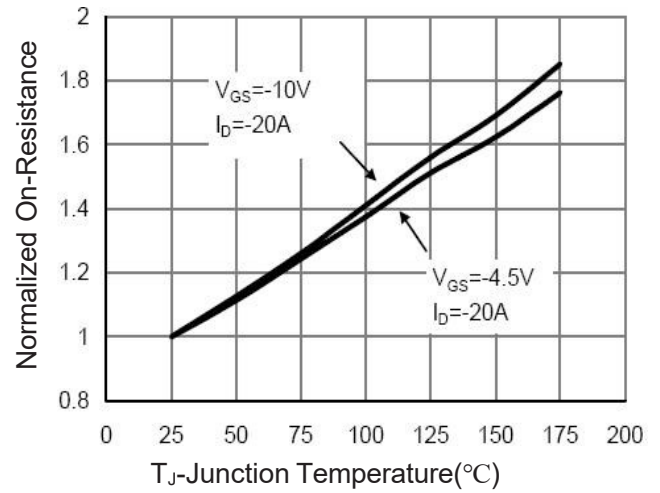


Figure 4 Rdson-Junction Temperature

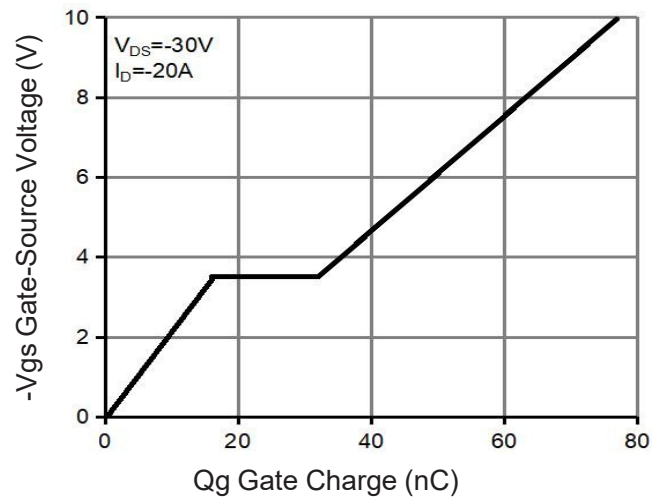


Figure 5 Gate Charge

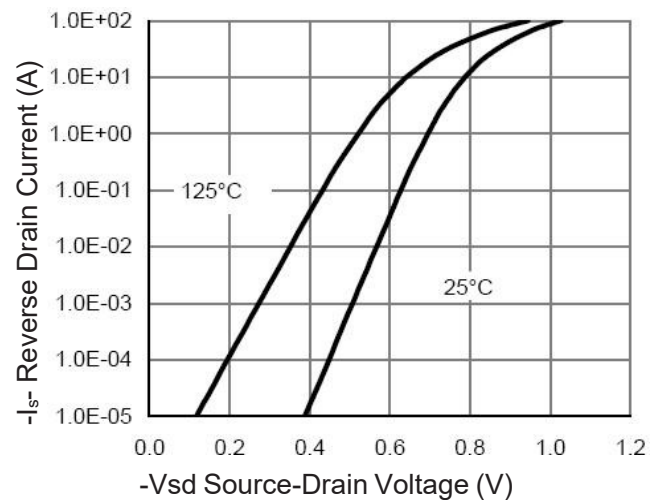
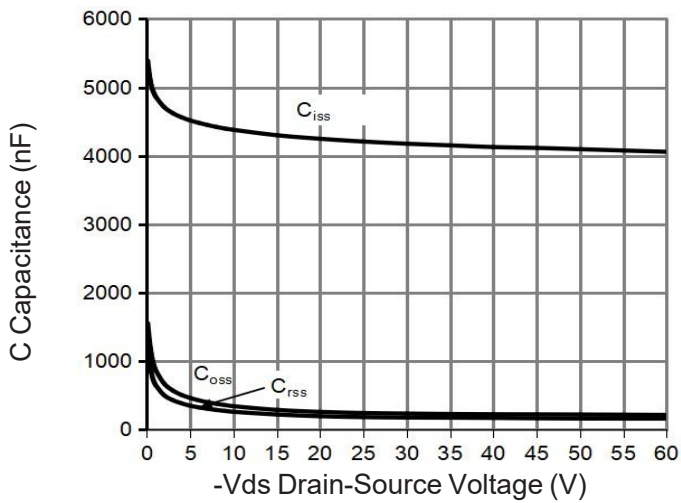
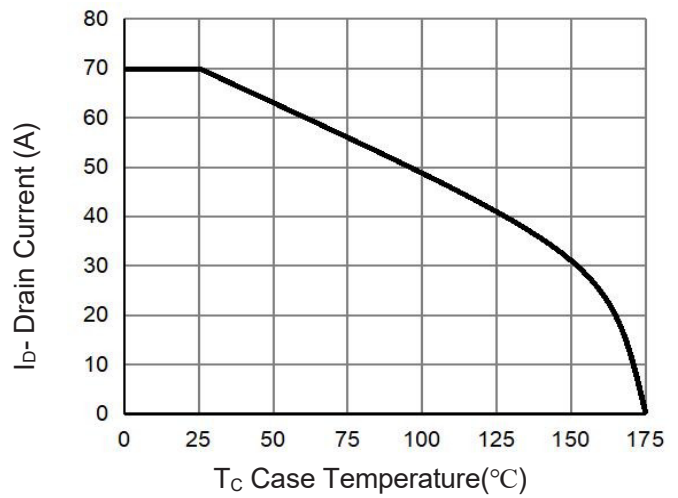
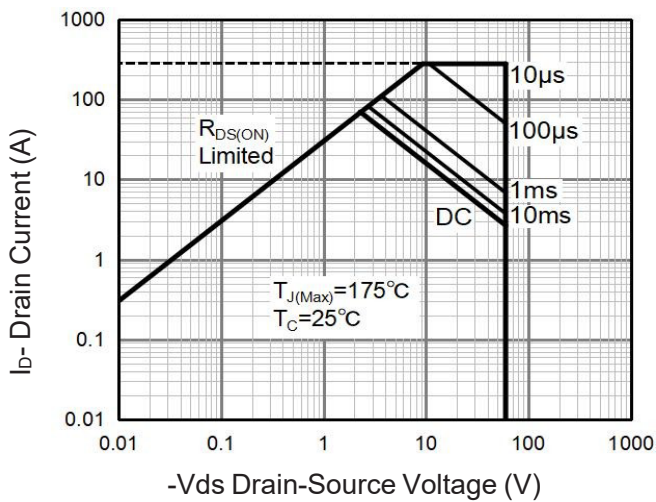
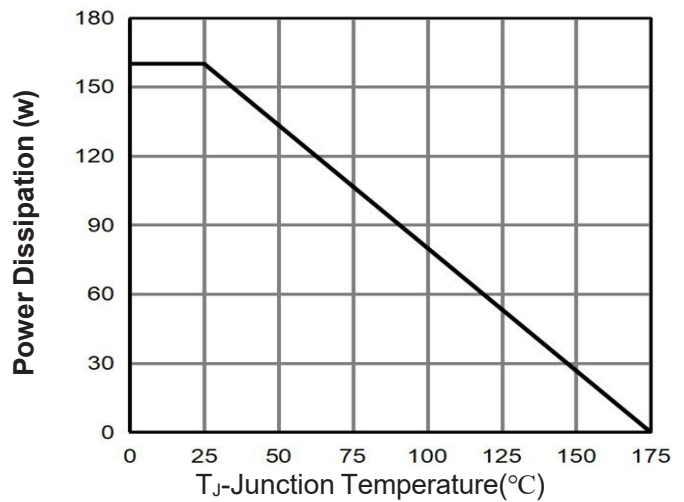
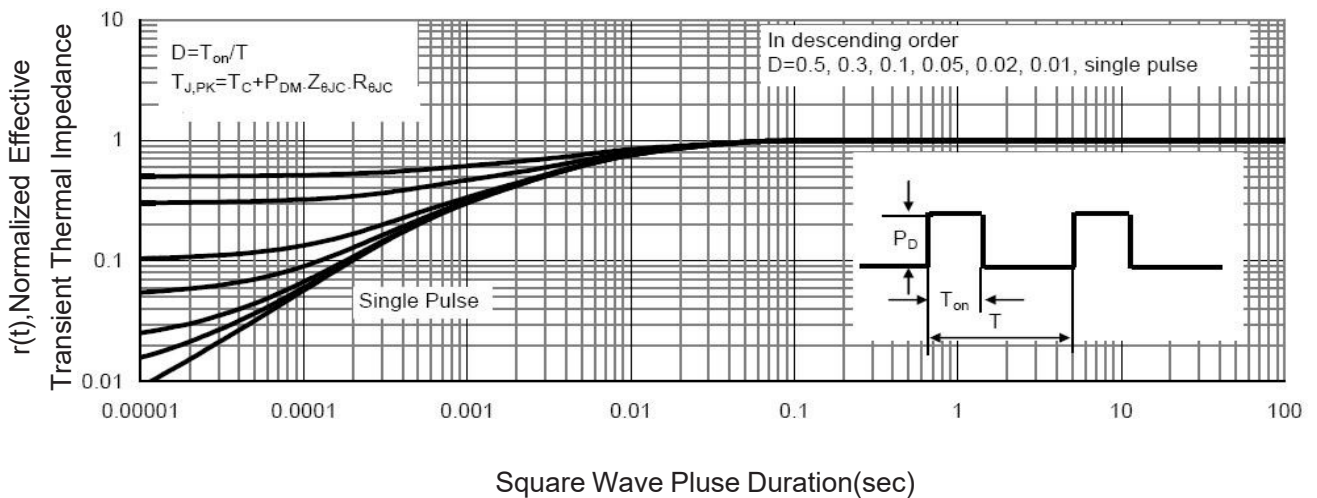


Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 Drain Current vs Case Temperature

Figure 8 Safe Operation Area

Figure 10 Power De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance