Description

The VSM30P03 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge .This device is well suited for high current load applications.

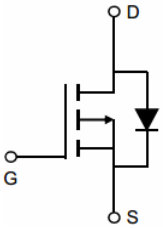
General Features

- V_{DS} =-30V,I_D =-30A
  $R_{DS(ON)}$ <8.5mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ <17mΩ @ 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

- High side switch for full bridge converter
- DC/DC converter for LCD display

TO-220F



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM30P03-TF	VSM30P03	TO-220F	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	-30	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	-21.2	A
Drain Current-Pulsed (Note 1)	I_{DM}	-120	A
Maximum Power Dissipation	P_D	40	W
Single pulse avalanche energy (Note 5)	E_{AS}	380	mJ
Derating factor		0.27	W/℃
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to- Case (Note 2)	$R_{\theta JC}$	3.75	℃/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	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,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=-15A	-	6.7	8.5	mΩ
		V_{GS}=-4.5V, I_D=-15A	-	9.5	17	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-15A	-	30	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-15V,V_{GS}=0V, F=1.0MHz	-	3736	-	PF
Output Capacitance	C_{oss}		-	485	-	PF
Reverse Transfer Capacitance	C_{rss}		-	439	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, I_D=-15A, V_{GS}=-10V,R_{GEN}=3Ω	-	16	-	nS
Turn-on Rise Time	t_r		-	12	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	46	-	nS
Turn-Off Fall Time	t_f		-	22	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-15A,V_{GS}=-10V	-	70.7	-	nC
Gate-Source Charge	Q_{gs}		-	8	-	nC
Gate-Drain Charge	Q_{gd}		-	17.4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-15A	-	-	-1.2	V

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: Tj=25℃,V_{DD}=-15V,V_G=-10V,L=0.5mH,Rg=25Ω

Typical Electrical and Thermal Characteristics (Curves)

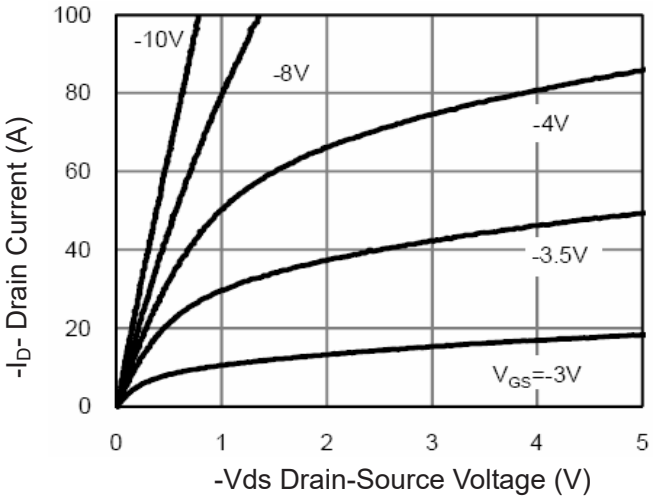


Figure 1 Output Characteristics

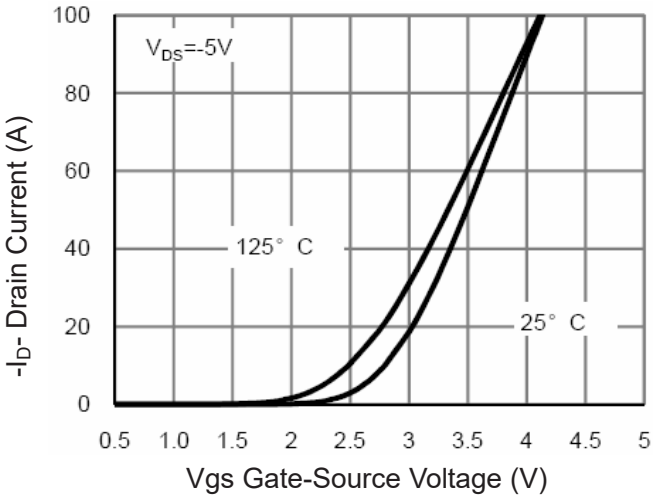


Figure 2 Transfer Characteristics

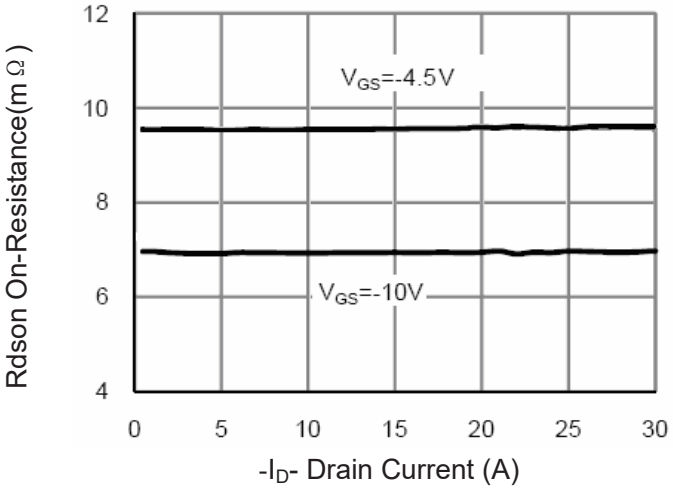


Figure 3 Rdson- Drain Current

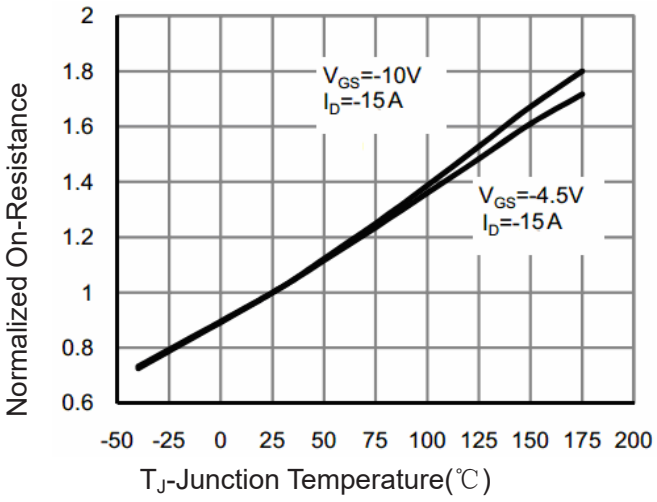


Figure 4 Rdson-Junction Temperature

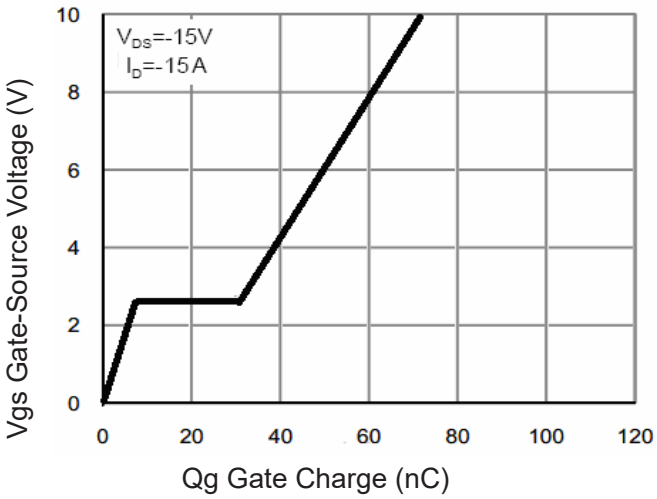


Figure 5 Gate Charge

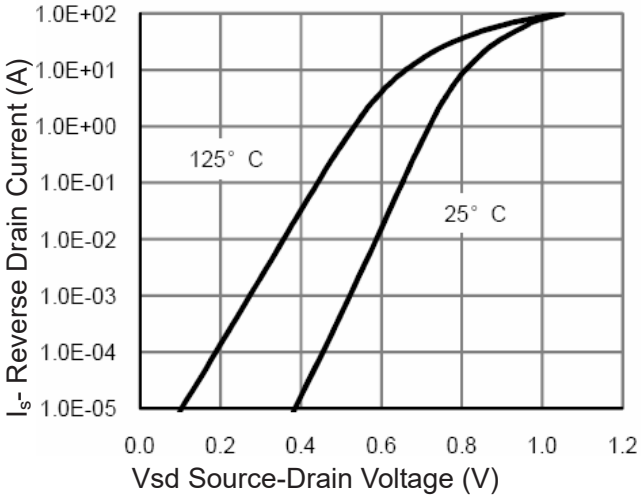


Figure 6 Source- Drain Diode Forward

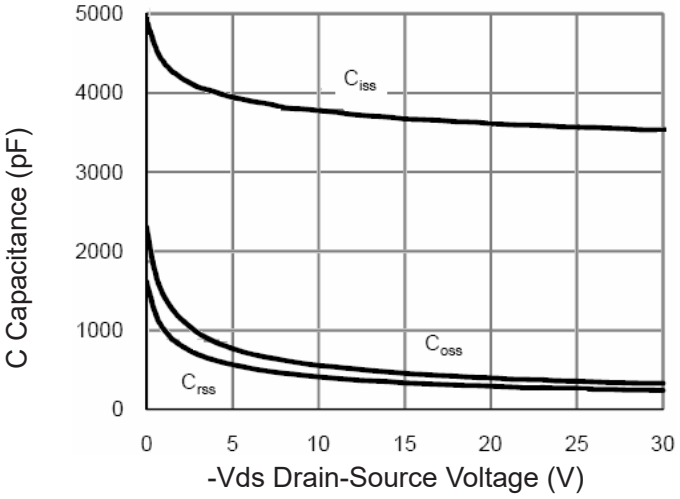


Figure 7 Capacitance vs Vds

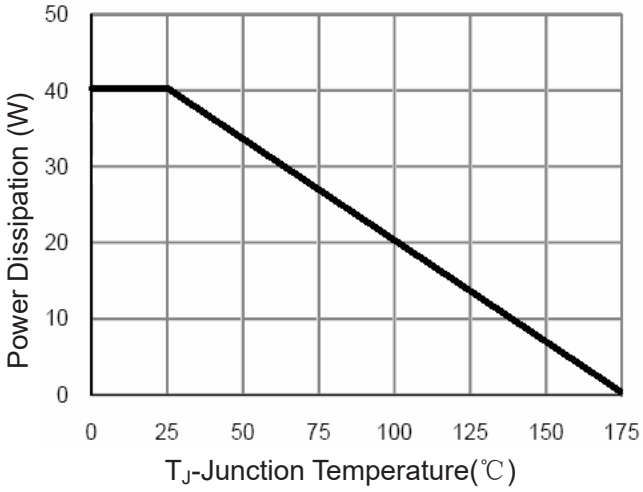


Figure 9 Power De-rating

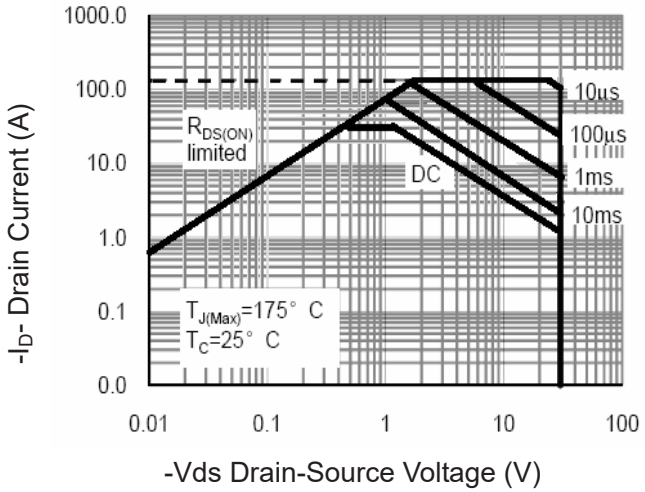


Figure 8 Safe Operation Area

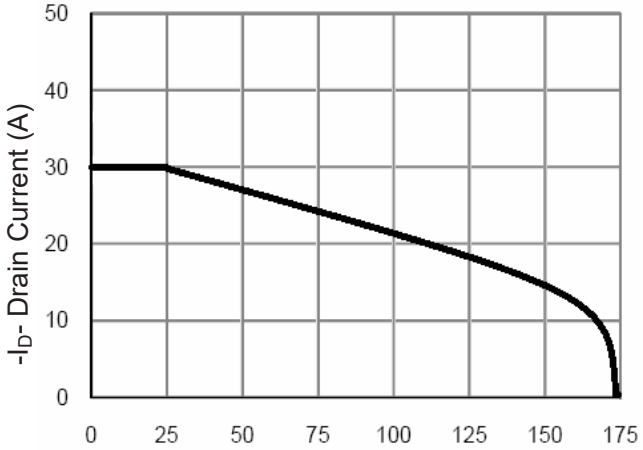


Figure 10 ID Current Derating

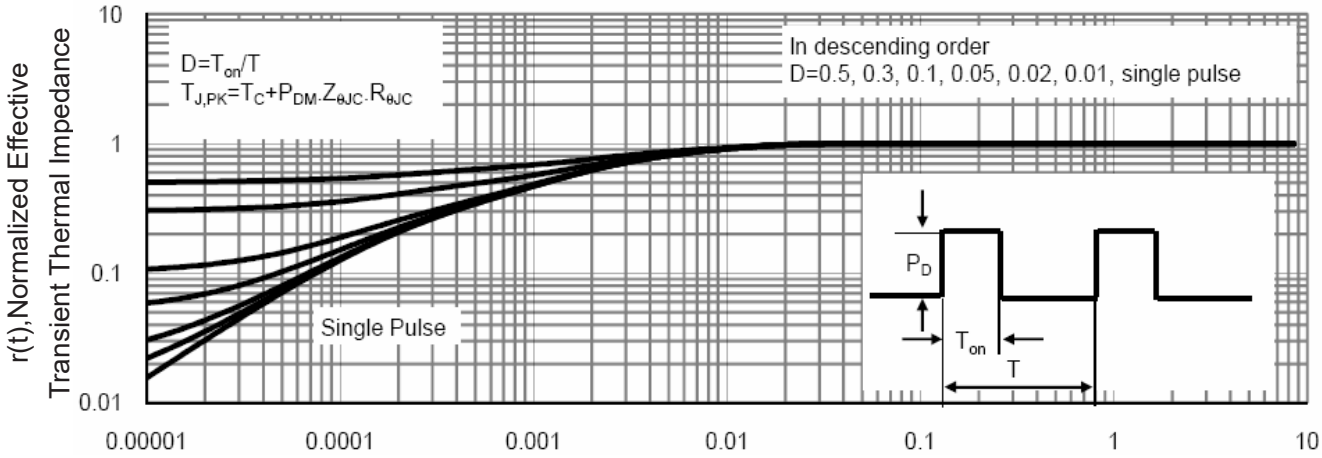


Figure 11 Normalized Maximum Transient Thermal Impedance