

Description

The VSM55P03 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

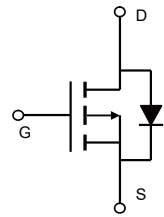
- $V_{DS} = -30V, I_D = -55A$
 $R_{DS(ON)} < 8.0m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 17m\Omega @ V_{GS} = -4.5V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation
- Pb free terminal plating
- RoHS compliant
- Halogen free

Application

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



TO-252



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM55P03	VSM55P03-T2	TO-252	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-55	A
Drain Current-Continuous ($T_c = 100^\circ C$)	$I_D (100^\circ C)$	-38.9	A
Drain Current-Pulsed (Note 1)	I_{DM}	-200	A
Maximum Power Dissipation	P_D	110	W
Single pulse avalanche energy (Note 5)	E_{AS}	450	mJ
Derating factor		0.73	W/ $^\circ C$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to- Case (Note 2)	$R_{\theta JC}$	1.34	$^\circ C/W$
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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	-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 =-20A	-	6.8	8.0	mΩ
		V _{GS} =-4.5V, I _D =-20A	-	10	17	mΩ
Gate resistance	R _G	V _{DS} =0V, V _{GS} =0V, F=1.0MHz	-	5.5	-	Ω
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-20A	-	30	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	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 =-20A, 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 =-20A, 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 =-55A	-	-	-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: T_j=25°C, V_{DD}=-15V, V_G=-10V, L=0.5mH, R_g=25Ω

Typical Electrical and Thermal Characteristics (Curves)

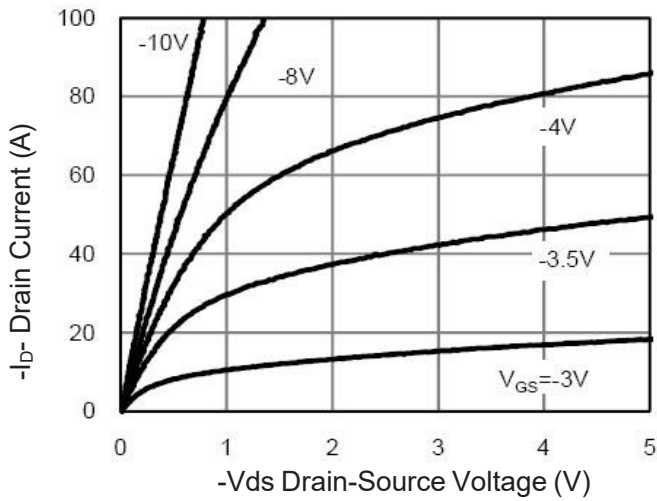


Figure 1 Output Characteristics

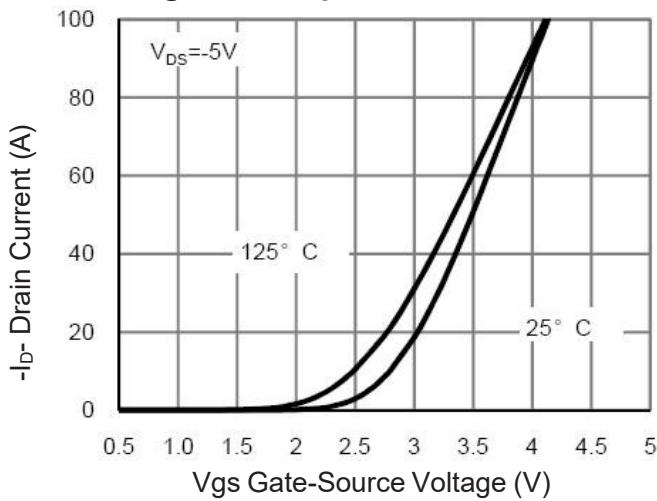


Figure 2 Transfer Characteristics

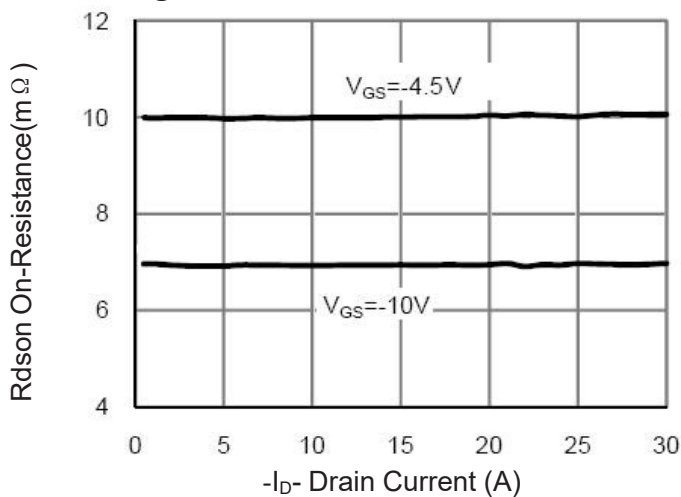


Figure 3 Rdson- Drain Current

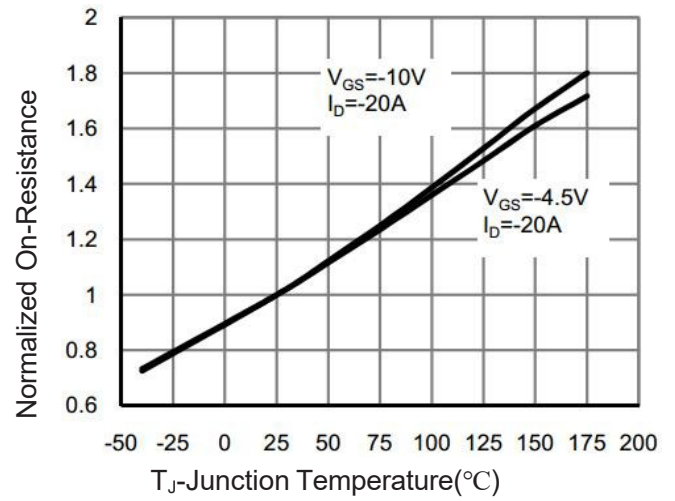


Figure 4 Rdson-Junction Temperature

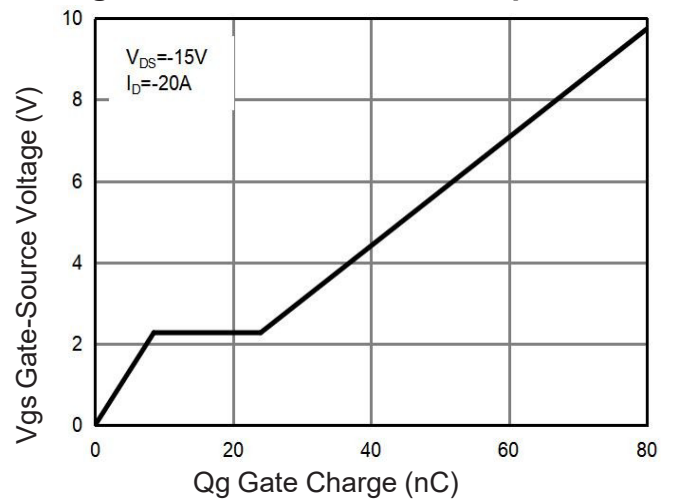


Figure 5 Gate Charge

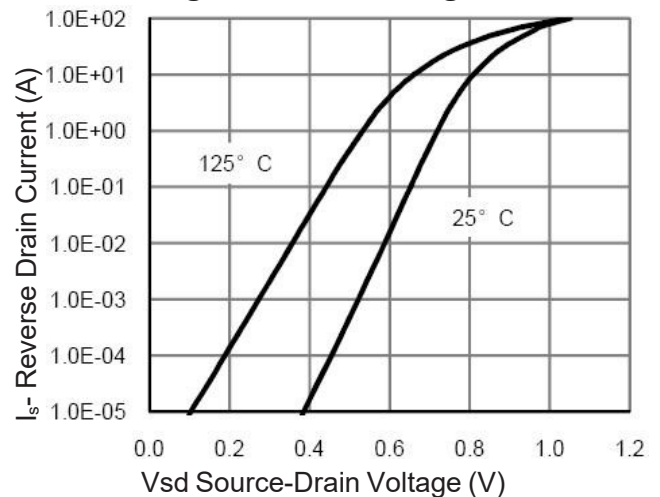
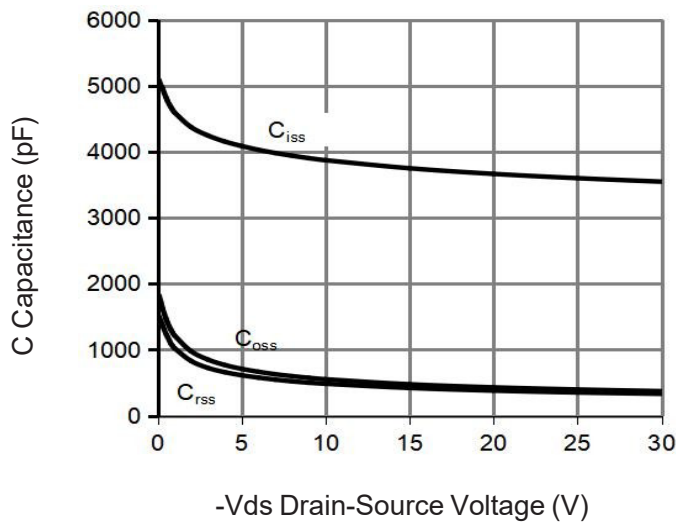
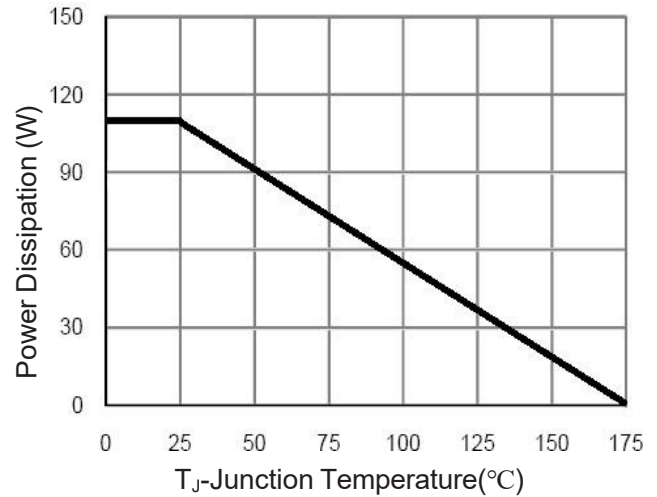
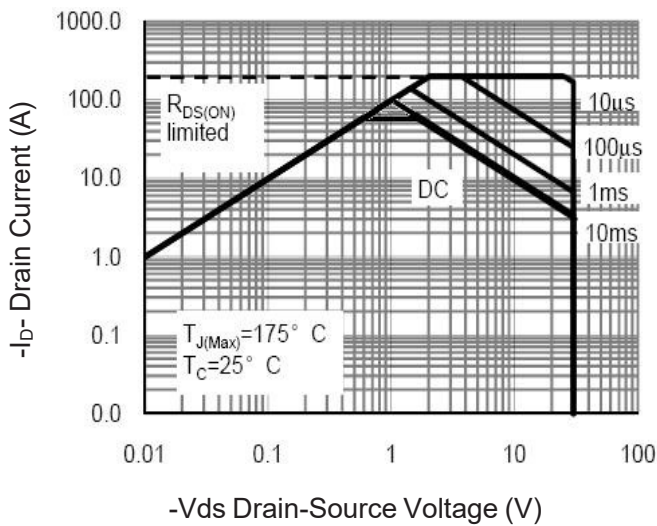
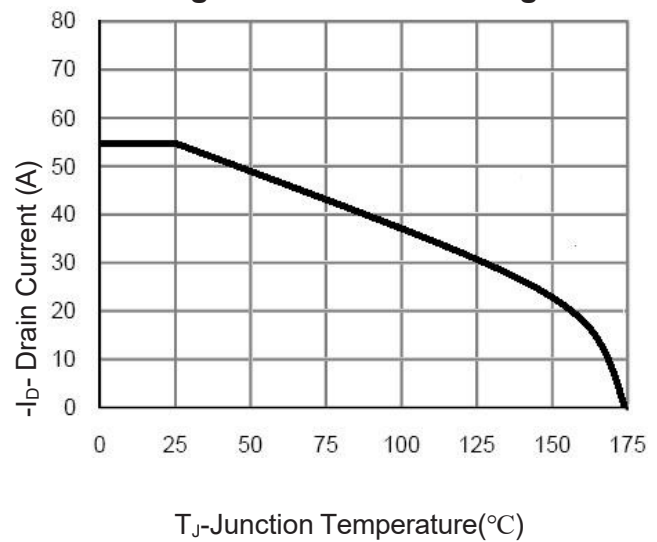
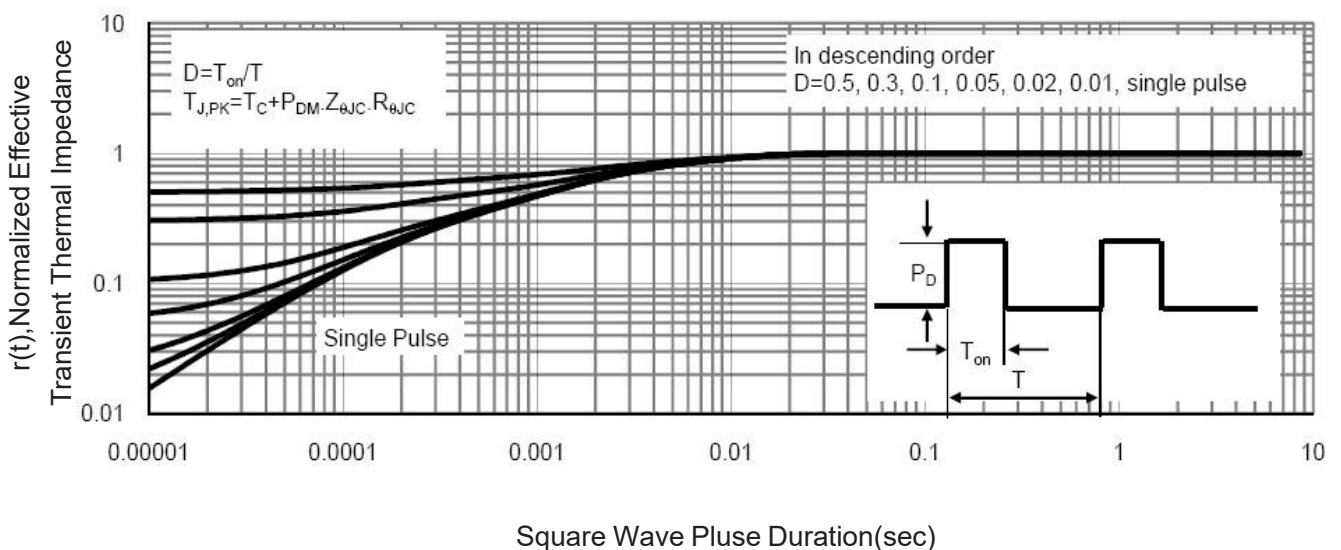


Figure 6 Source- Drain Diode Forward


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