

Description

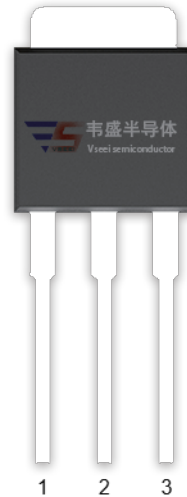
The VSM55P03 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is well suited for high current load applications.

General Features

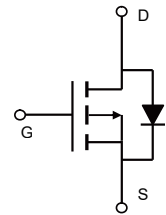
- $V_{DS} = -30V, I_D = -55A$
 $R_{DS(ON)} < 8.5m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 19m\Omega @ V_{GS} = -4.5V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation
- Pb free terminal plating
- RoHS compliant
- Halogen free

Application

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



TO-251



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM55P03	VSM55P03-T1	TO-251	-	-	-

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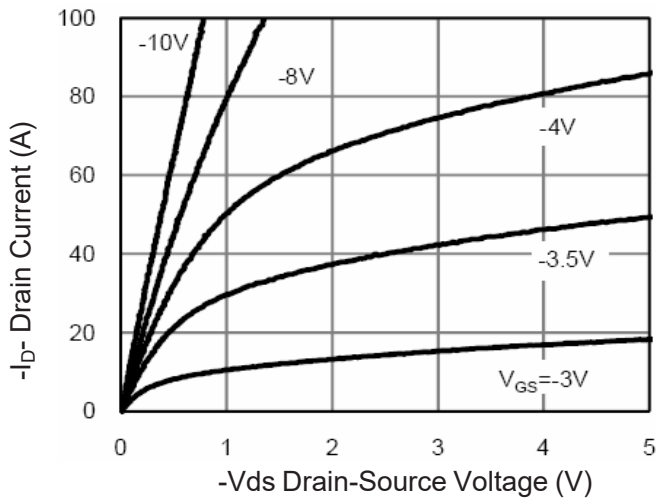
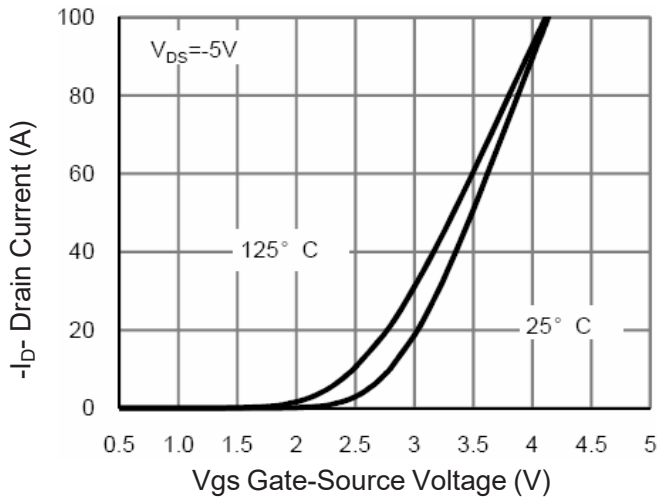
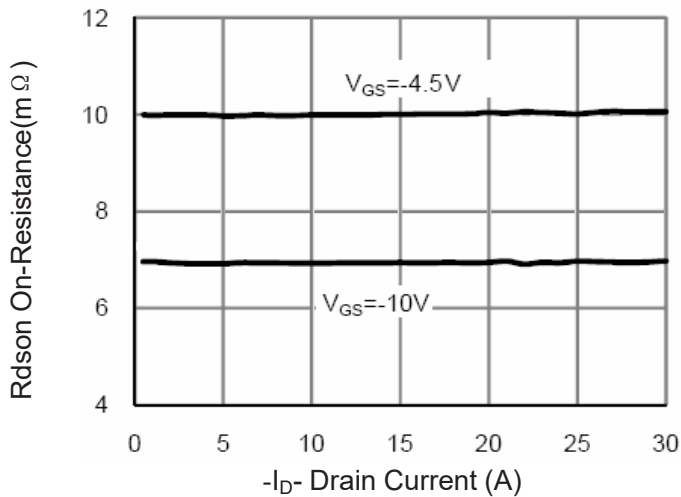
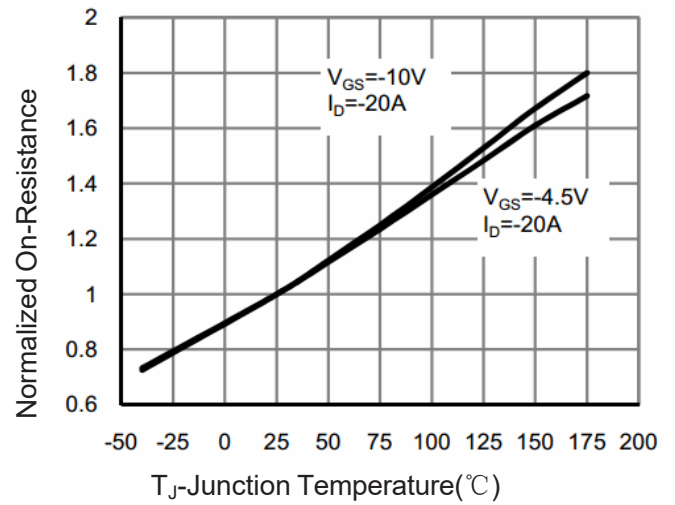
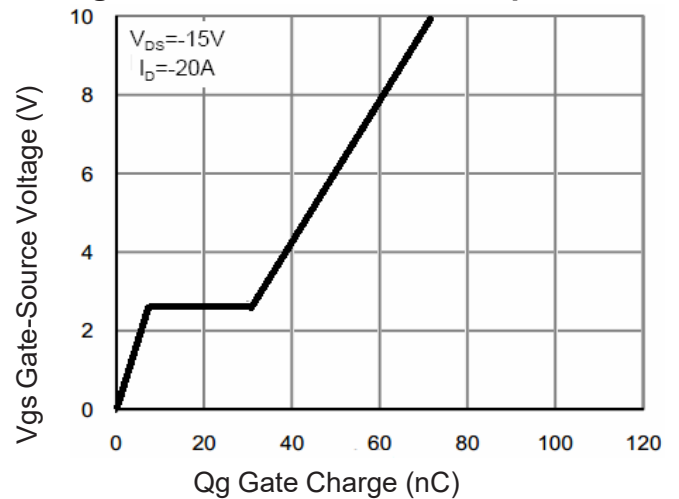
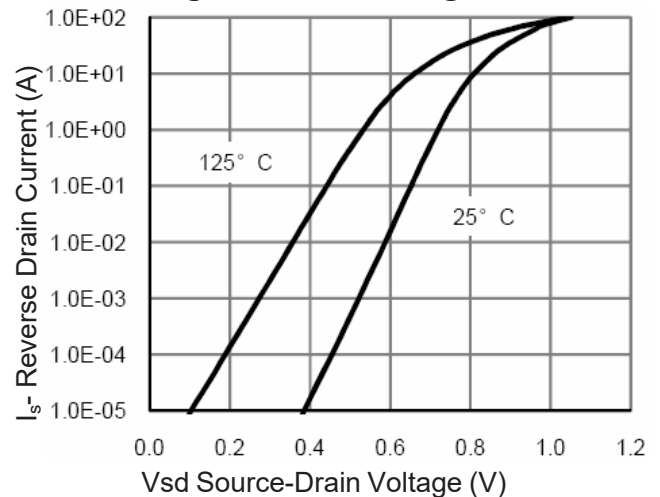
Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

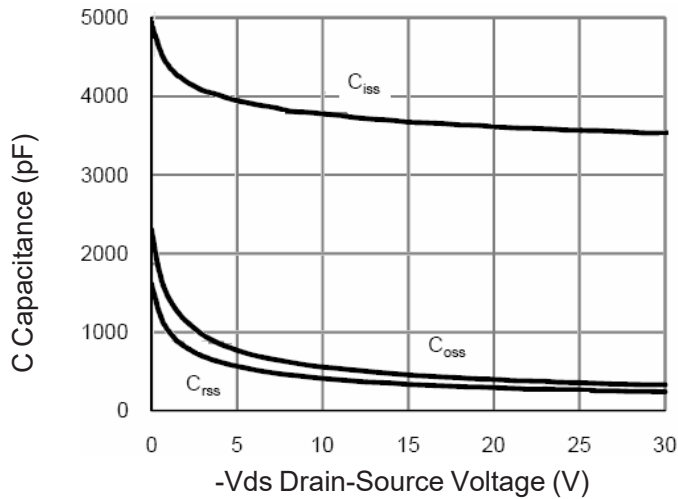
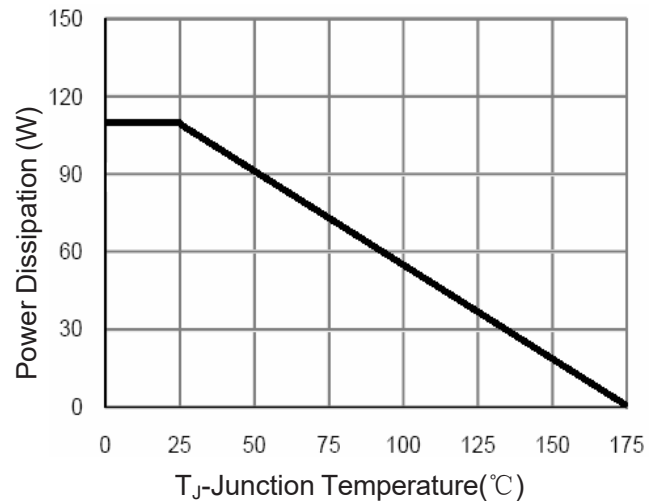
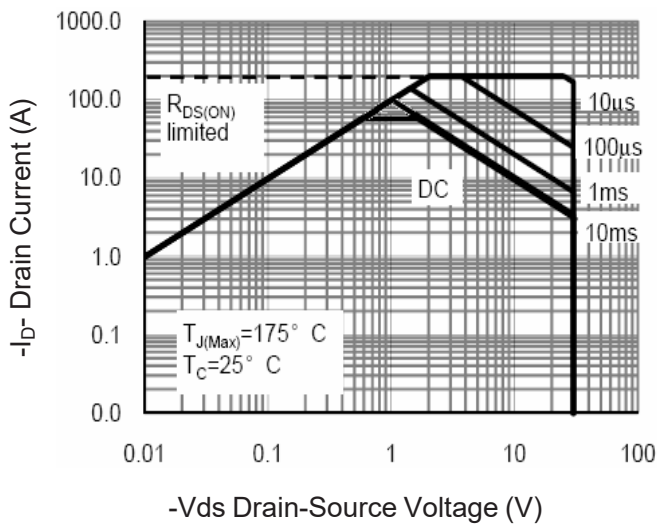
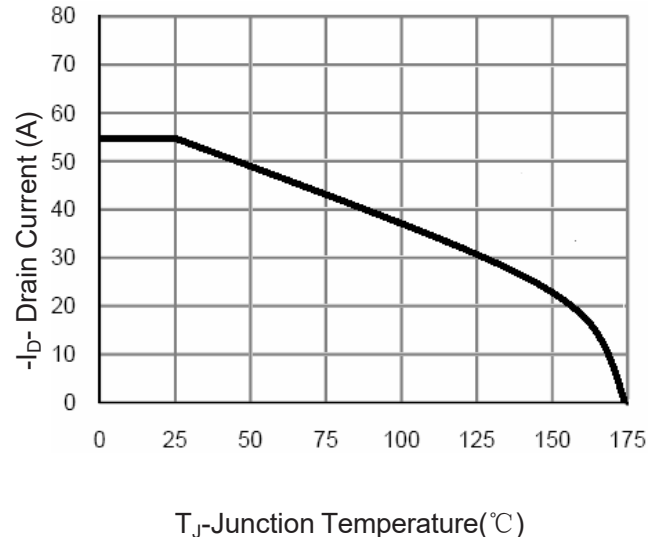
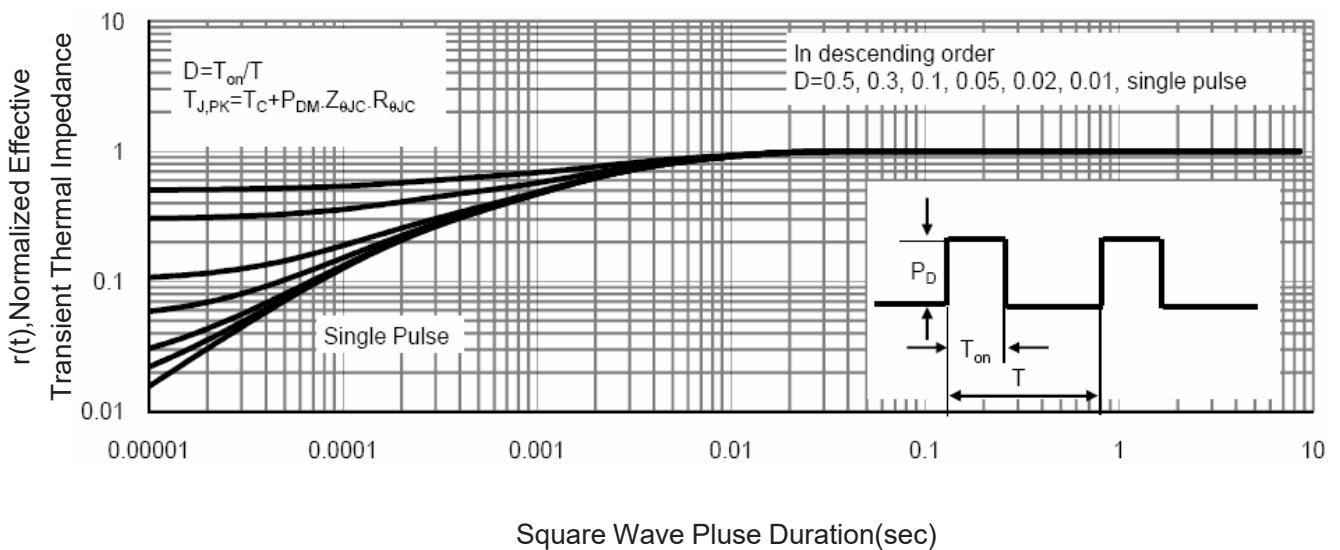
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-20A$	-	6.8	8.5	m Ω
		$V_{GS}=-4.5V, I_D=-20A$	-	10	19	m 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	$t_{d(on)}$	$V_{DD}=-15V, I_D=-20A,$ $V_{GS}=-10V, R_{GEN}=3\Omega$	-	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, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: $T_J=25^{\circ}\text{C}$, $V_{DD}=-15V$, $V_G=-10V$, $L=0.5mH$, $R_g=25\Omega$

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