

Description

The VSM3402A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

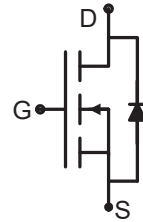
- $V_{DS} = 30V, I_D = 3A$
 $R_{DS(ON)} < 85m\Omega @ V_{GS}=2.5V$
 $R_{DS(ON)} < 70m\Omega @ V_{GS}=4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- Battery protection
- Load switch
- Power management



SOT-23-3



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM3402A-S2	VSM3402A	SOT-23-3	Ø180mm	8 mm	3000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	3	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	20	A
Maximum Power Dissipation	P_D	0.9	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	138	$^\circ\text{C/W}$
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Electrical Characteristics ($T_A=25^\circ\text{C}$ 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}	$V_{DS}=20V, V_{GS}=0V$	-	-	1	μA

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.6	0.85	1.4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =3A	-	50	60	mΩ
		V _{GS} =4.5V, I _D =3 A	-	55	70	mΩ
		V _{GS} =2.5V, I _D =2A	-	68	85	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =3A	14	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =10V, V _{GS} =0V, F=1.0MHz	-	235	-	PF
Output Capacitance	C _{OSS}		-	35	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	18	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =15V, I _D =1A V _{GS} =4.5V, R _{GEN} =6Ω	-	3.5	-	nS
Turn-on Rise Time	t _r		-	1.5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	17.5	-	nS
Turn-Off Fall Time	t _f		-	2.5	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =3A, V _{GS} =4.5V	-	4.7	-	nC
Gate-Source Charge	Q _{gs}		-	0.95	-	nC
Gate-Drain Charge	Q _{gd}		-	1.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =3A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	3	A

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

Typical Electrical and Thermal Characteristics

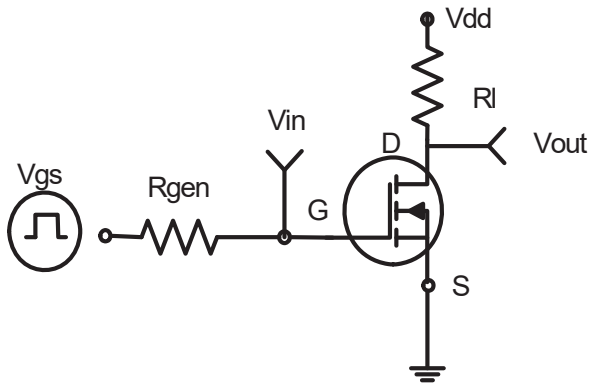


Figure 1: Switching Test Circuit

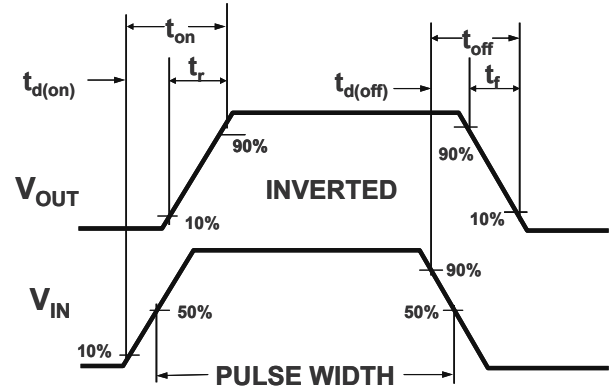


Figure 2: Switching Waveforms

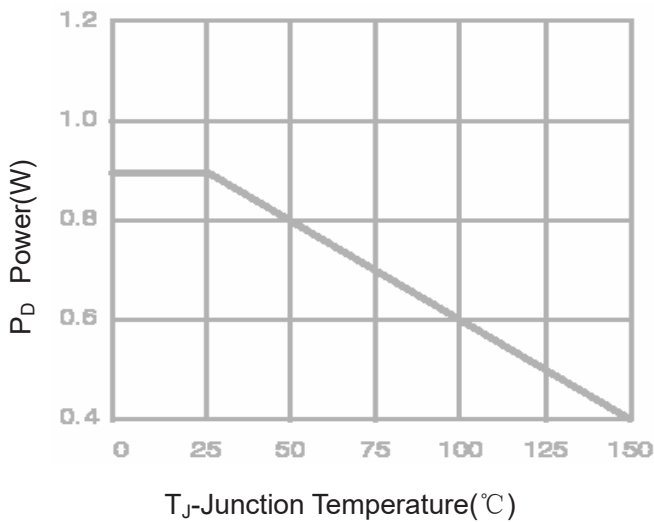


Figure 3 Power Dissipation

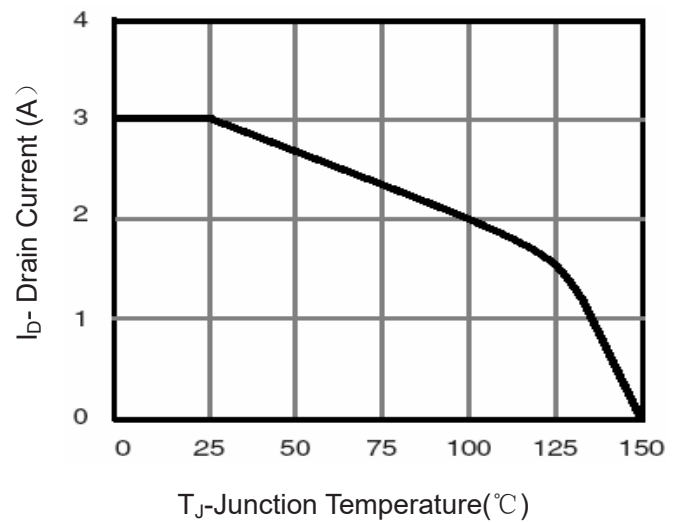


Figure 4 Drain Current

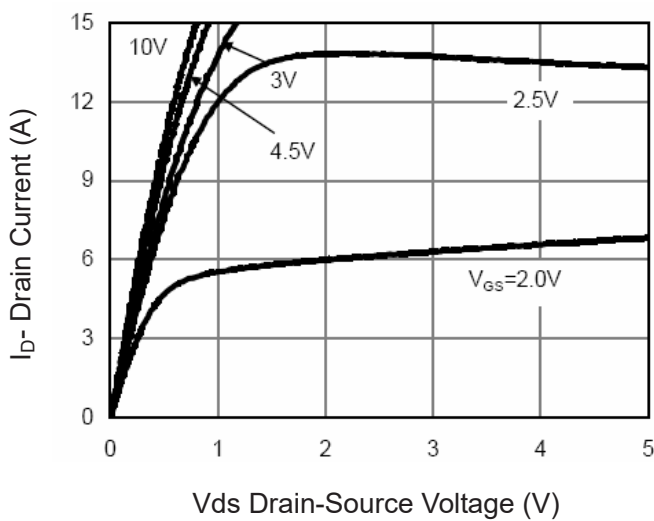


Figure 5 Output Characteristics

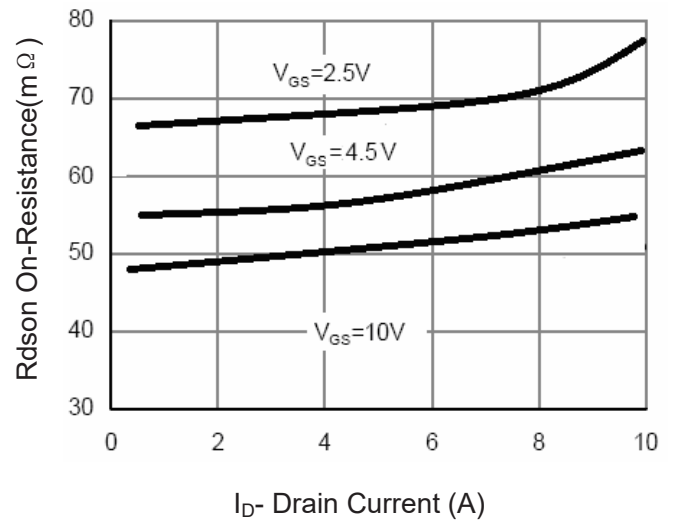
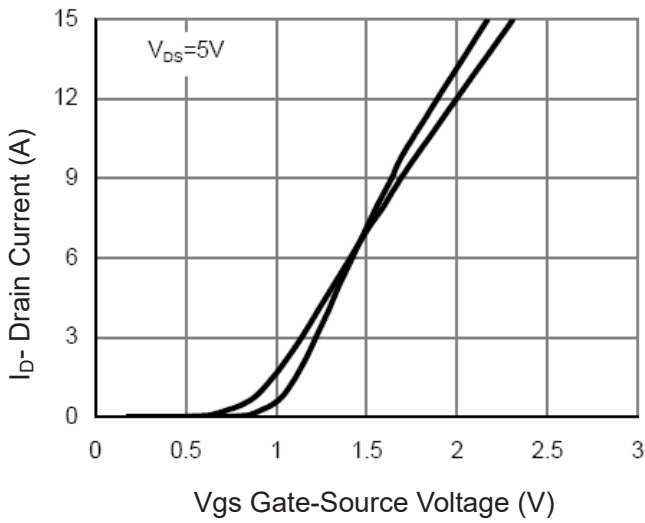
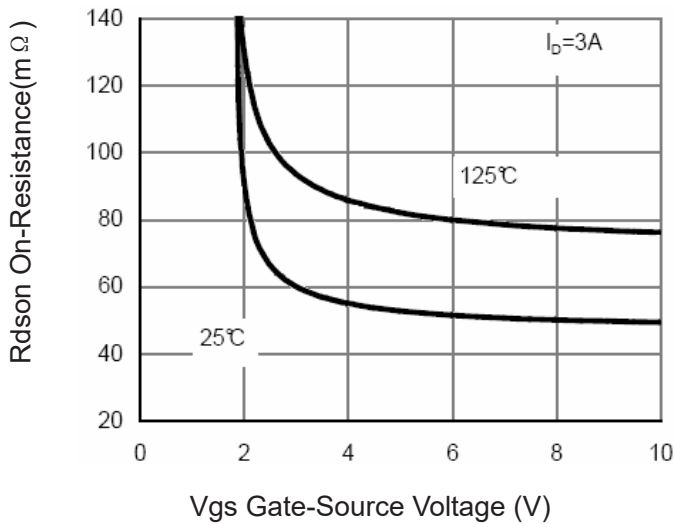
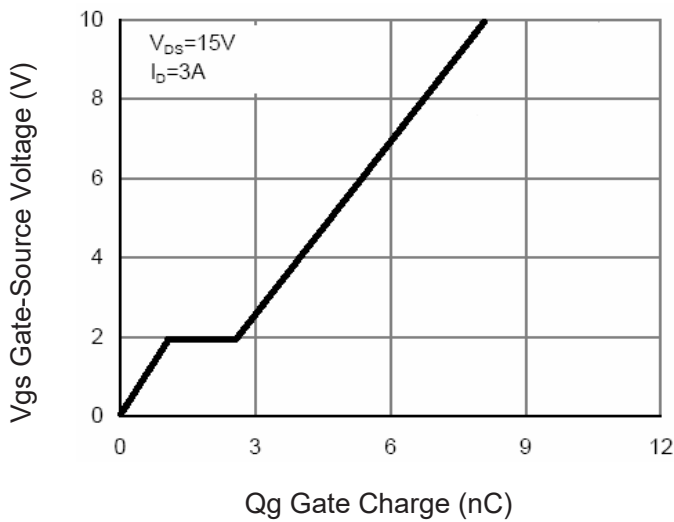
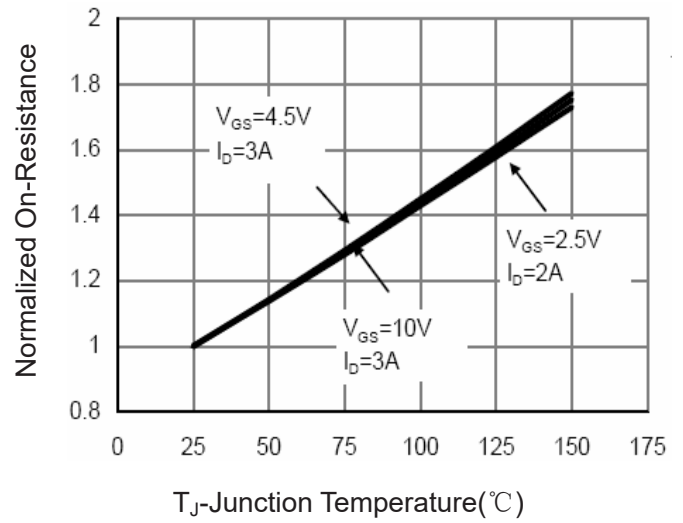
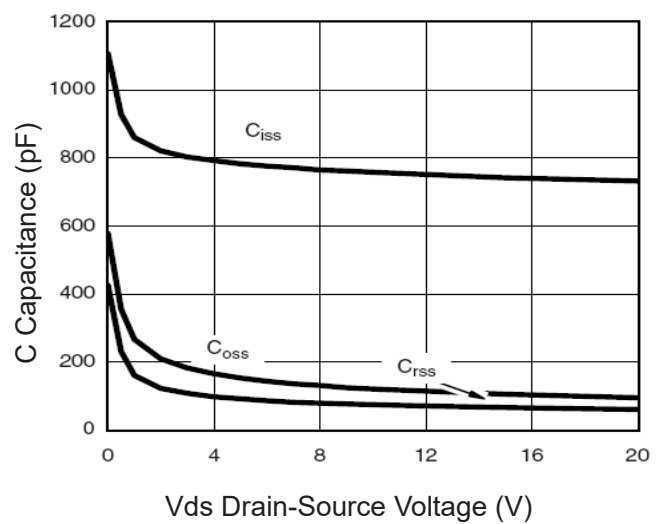
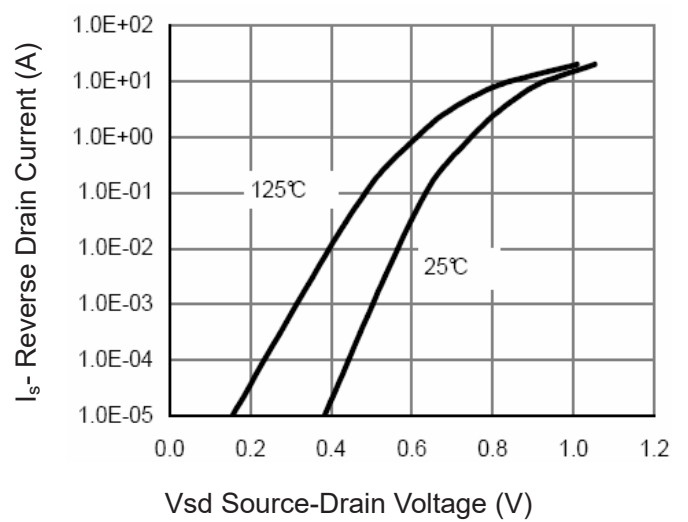
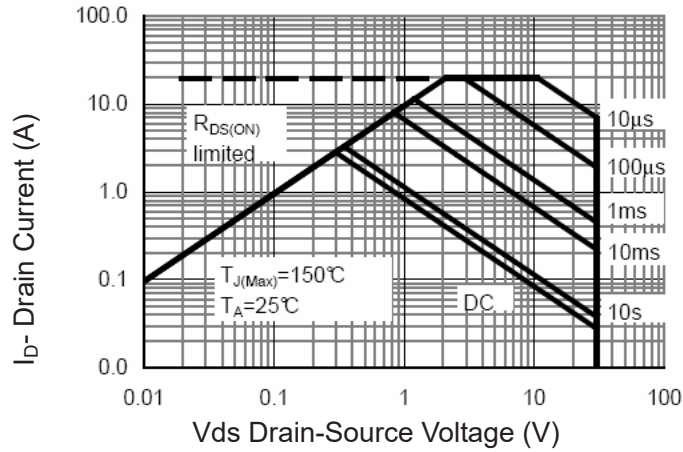
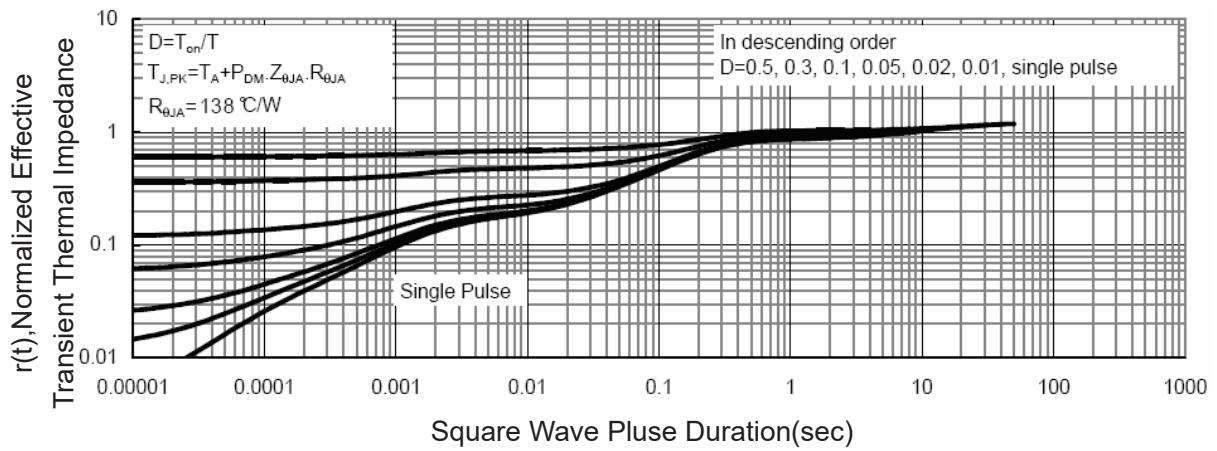


Figure 6 Drain-Source On-Resistance


Figure 7 Transfer Characteristics

Figure 9 Rdson vs Vgs

Figure 11 Gate Charge

Figure 8 Drain-Source On-Resistance

Figure 10 Capacitance vs Vds

Figure 12 Source- Drain Diode Forward


Figure 13 Safe Operation Area

Figure 14 Normalized Maximum Transient Thermal Impedance