

Description

The VSM3401D uses advanced trench technology to provide excellent $R_{DS(ON)}$. This device is suitable for use as a load switch or in PWM applications.

General Features

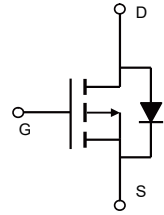
- $V_{DS} = -30V, I_D = -4.0A$
 - $R_{DS(ON)} < 55m\Omega @ V_{GS} = -10V$
 - $R_{DS(ON)} < 66m\Omega @ V_{GS} = -4.5V$
 - $R_{DS(ON)} < 100m\Omega @ V_{GS} = -2.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- PWM applications
- Load switch
- Power management



SOT-23



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM3401D	VSM3401D-S2	SOT-23	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings ($T_A = 25^\circ C$ 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	-4.0	A
	$I_D (T_A = 100^\circ C)$	-2.5	A
Pulsed Drain Current	I_{DM}	-20	A
Maximum Power Dissipation	P_D	1.4	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 3)	$R_{\theta JA}$	89	$^\circ C/W$
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Electrical Characteristics ($T_A = 25^\circ C$ 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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.6	-0.9	-1.3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-4A	-	40	55	mΩ
		V _{GS} =-4.5V, I _D =-3A	-	47	66	mΩ
		V _{GS} =-2.5V, I _D =-1A	-	63	100	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-3A	-	8	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =-15V, V _{GS} =0V, F=1.0MHz	-	628	-	pF
Output Capacitance	C _{oss}		-	51	-	pF
Reverse Transfer Capacitance	C _{rss}		-	40	-	pF
Switching Characteristics (Note 1)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-15V, R _L =5Ω V _{GS} =-4.5V, R _{GEN} =2Ω	-	9	-	nS
Turn-on Rise Time	t _r		-	8	-	nS
Turn-Off Delay Time	t _{d(off)}		-	20	-	nS
Turn-Off Fall Time	t _f		-	7	-	nS
Total Gate Charge	Q _g	V _{DS} =-15V, I _D =-3A, V _{GS} =-4.5V	-	7.2	-	nC
Gate-Source Charge	Q _{gs}		-	1.6	-	nC
Gate-Drain Charge	Q _{gd}		-	2.0	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-3A	-	-	-1.2	V

Notes:

1. Guaranteed by design, not subject to production
2. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=150^{\circ}C$. The SOA curve provides a single pulse rating.
3. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}C$. The maximum allowed junction temperature of $150^{\circ}C$. The value in any given application depends on the user's specific board design.

Typical Electrical and Thermal Characteristics

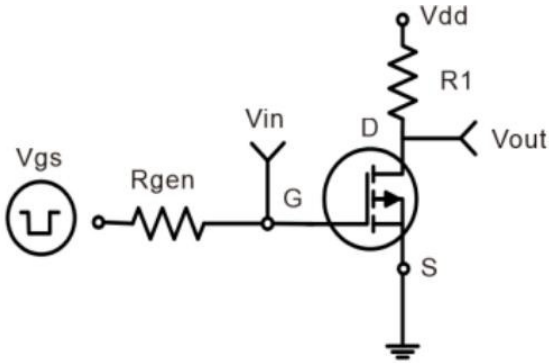


Figure 1: Switching Test Circuit

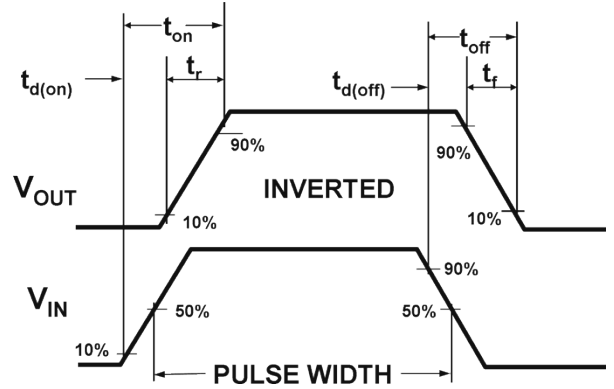


Figure 2: Switching Waveforms

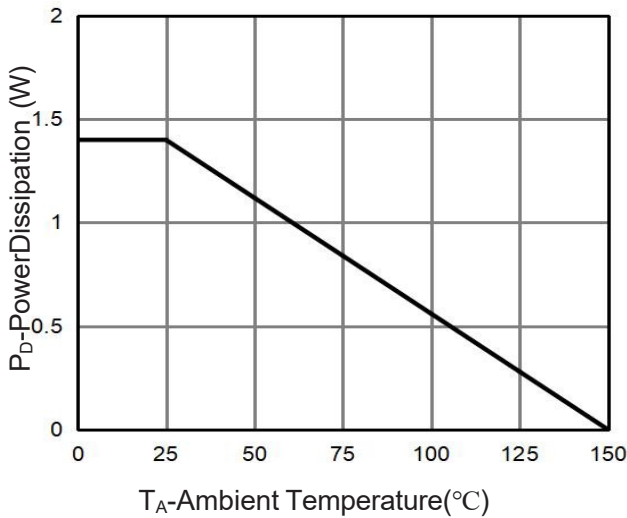


Figure 3 Power Dissipation

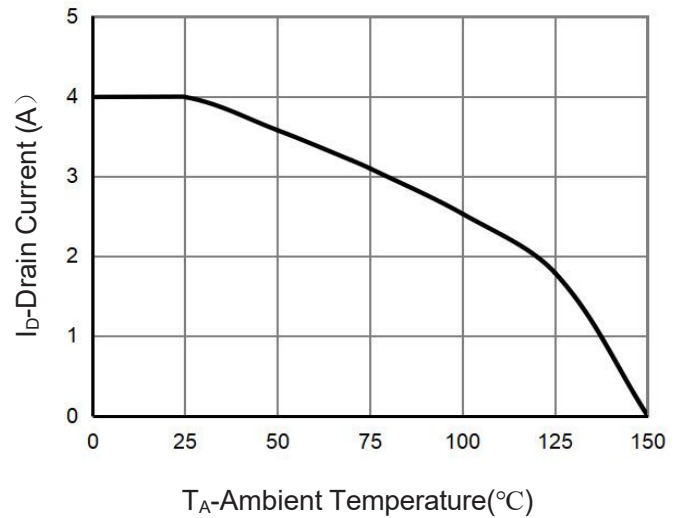


Figure 4 Drain Current

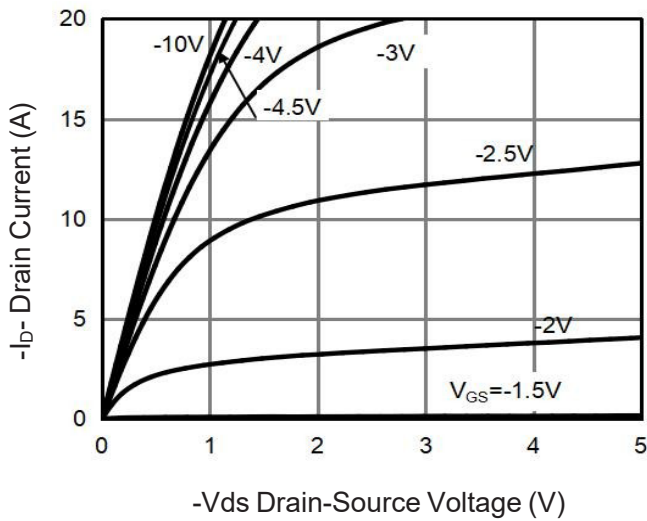


Figure 5 Output Characteristics

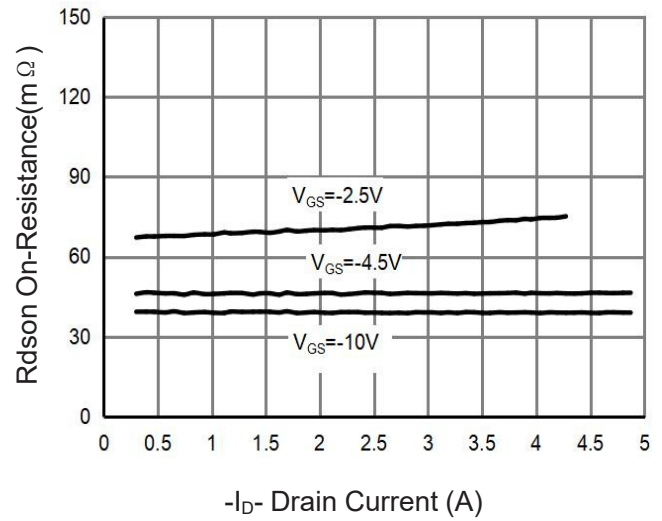
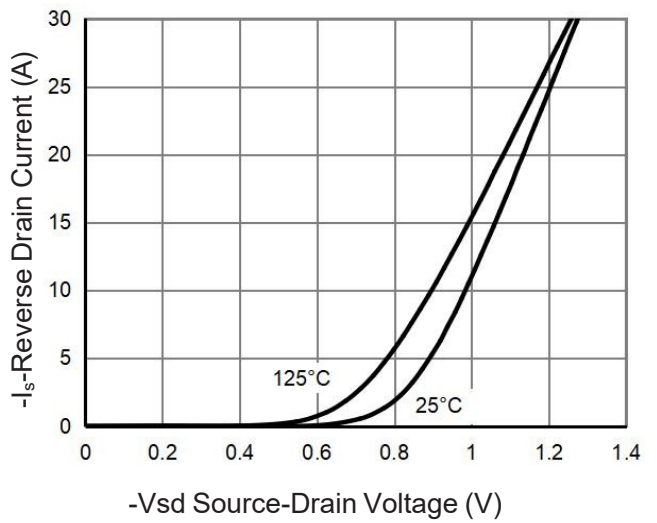
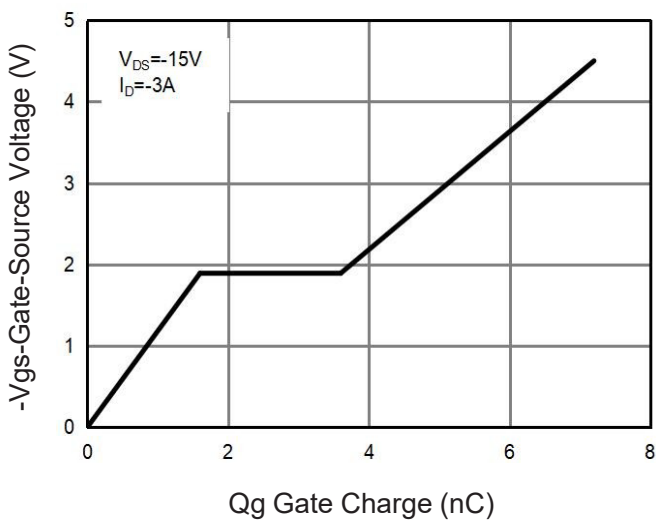
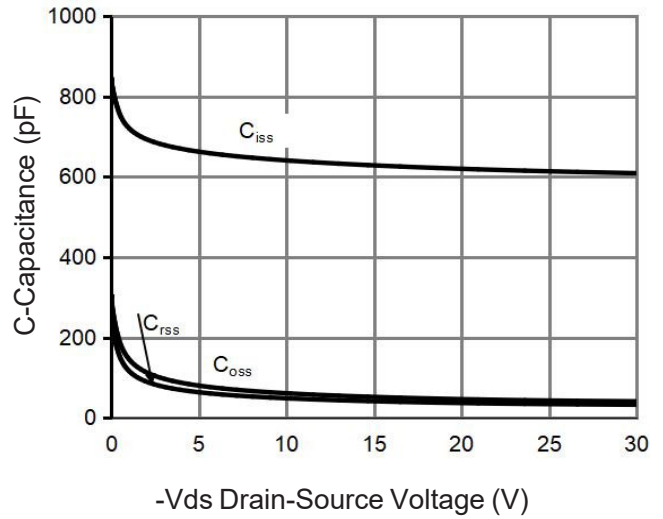
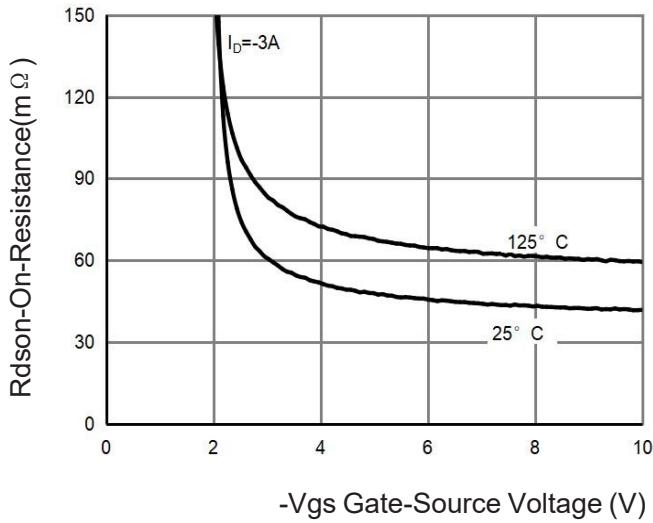
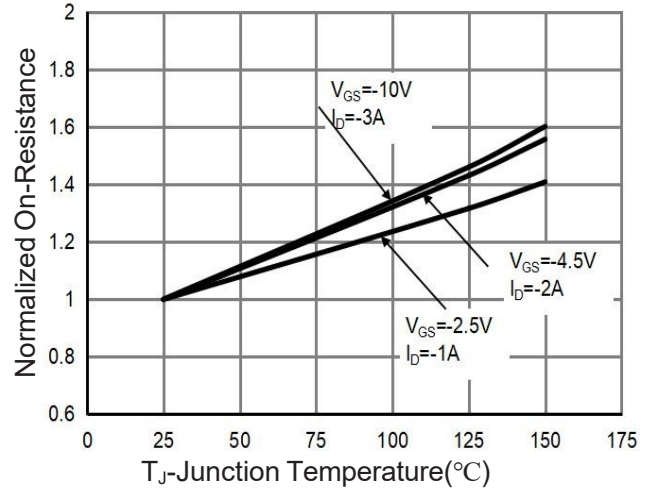
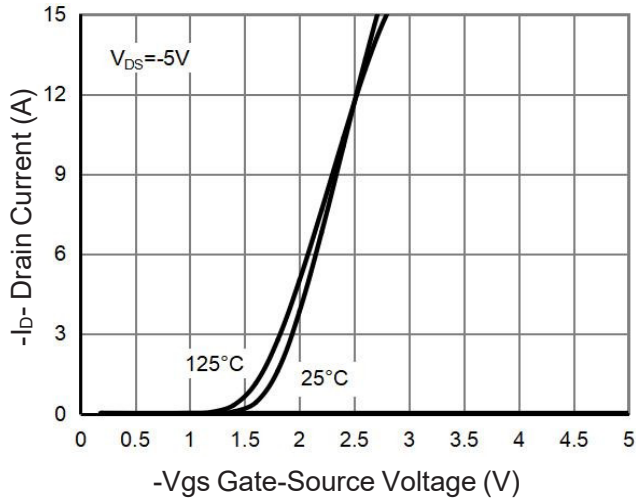


Figure 6 Drain-Source On-Resistance



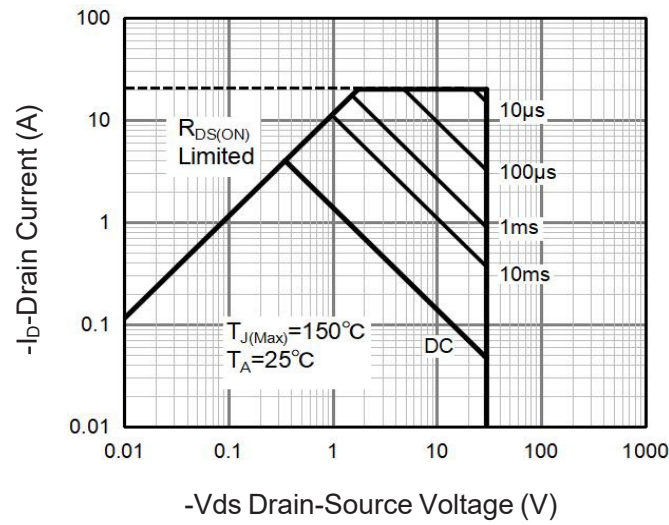


Figure 13 Safe Operation Area (Note 2)

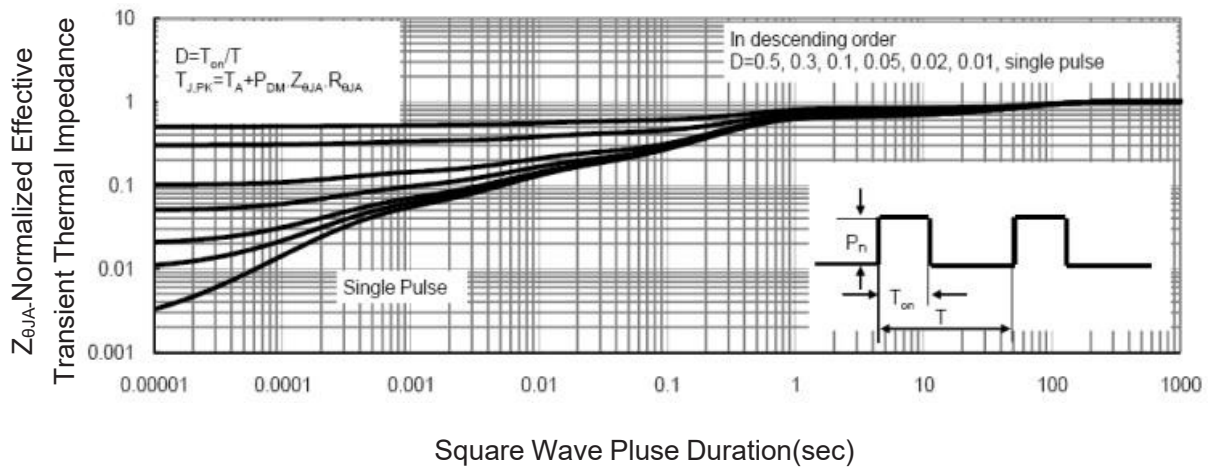


Figure 14 Normalized Maximum Transient Thermal Impedance