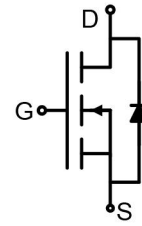


## Description

The **VS3400-S3** 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

- $V_{DS} = 30V, I_D = 5.8A$   
 $R_{DS(ON)} < 57m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)} < 41m\Omega @ V_{GS}=4.5V$   
 $R_{DS(ON)} < 35m\Omega @ V_{GS}=10V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package
- PWM applications
- Load switch
- Power management



Schematic diagram



## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
<b>VS3400-S3</b>	<b>VS3400-S3</b>	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	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	5.8	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	30	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 <sup>(Note 2)</sup>	$R_{\theta JA}$	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
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$

Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.7	0.9	1.2	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =2.5V, I <sub>D</sub> =4A	-	28	57	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A	-	24	41	mΩ
		V <sub>GS</sub> =10V, I <sub>D</sub> =5.8A	-	22	35	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =5A	10	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1.0MHz	-	820	-	PF
Output Capacitance	C <sub>OSS</sub>		-	99	-	PF
Reverse Transfer Capacitance	C <sub>rSS</sub>		-	77	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, R <sub>L</sub> =2.7Ω V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω	-	3.3	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	4.8	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	26	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	4	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =5.8A, V <sub>GS</sub> =4.5V	-	9.5	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	1.5	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =5.8A	-	-	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	5.8	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

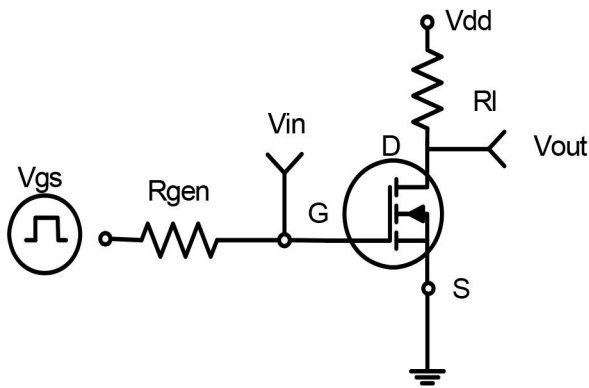


Figure 1: Switching Test Circuit

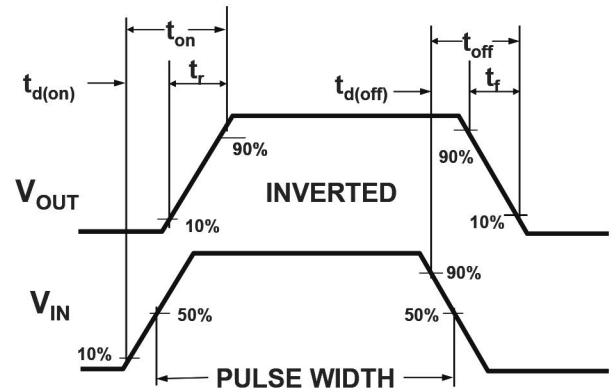


Figure 2: Switching Waveforms

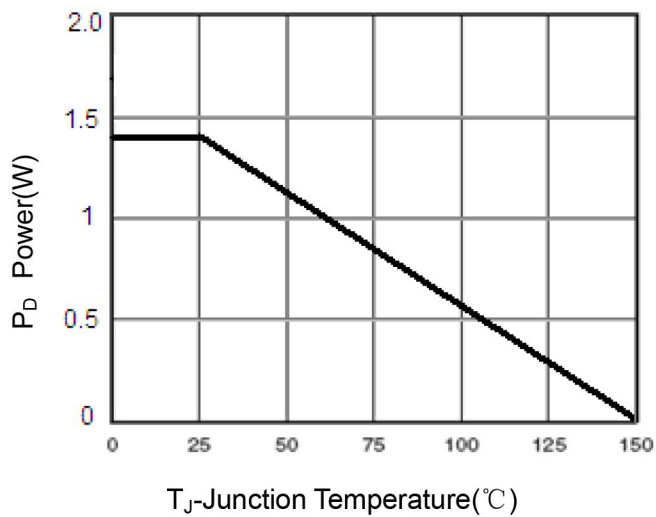


Figure 3 Power Dissipation

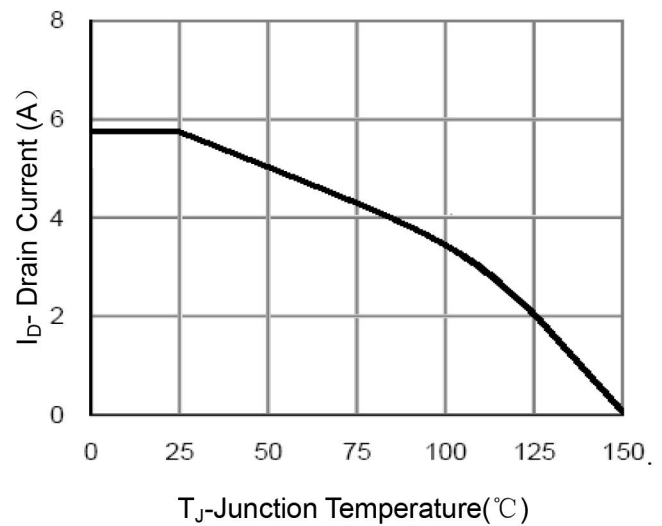


Figure 4 Drain Current

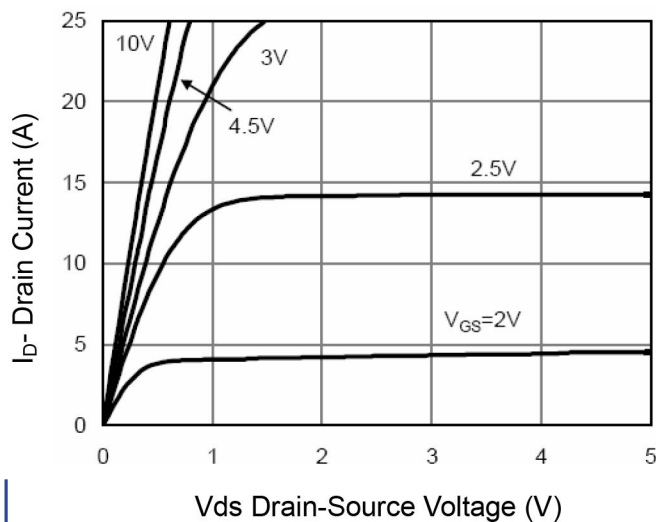


Figure 5 Output Characteristics

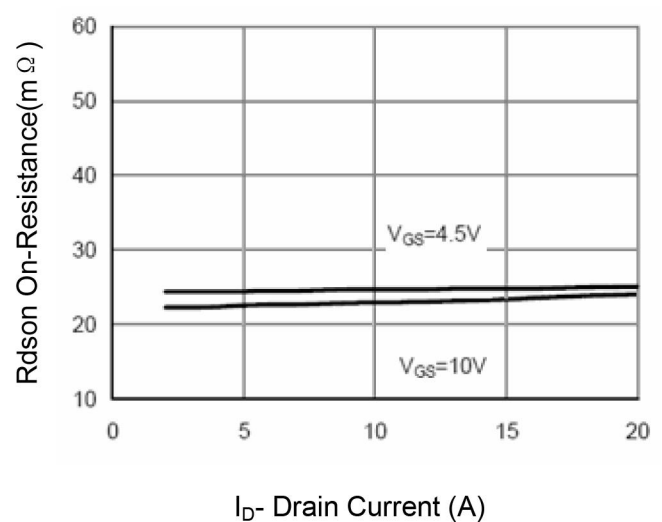
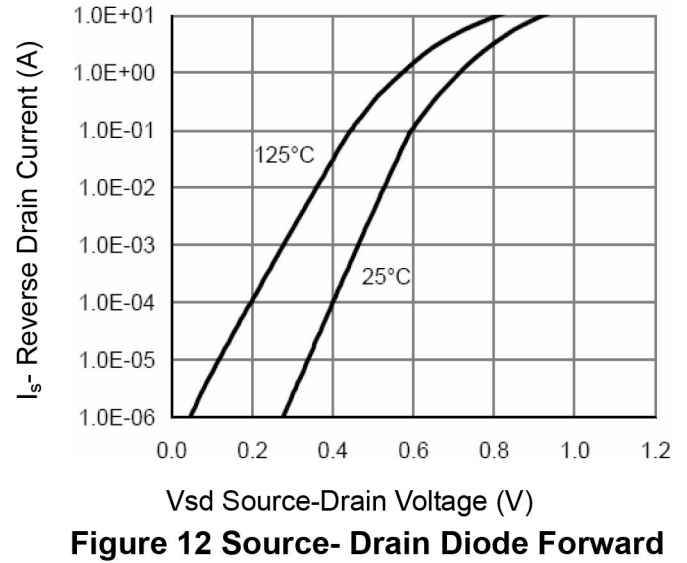
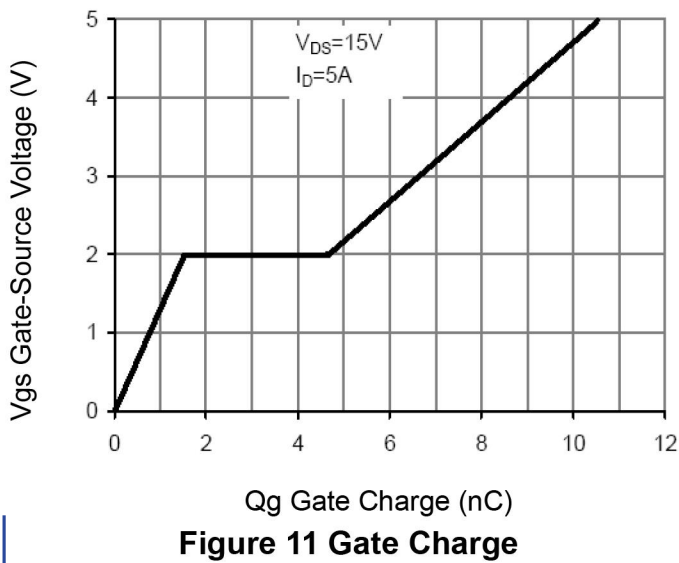
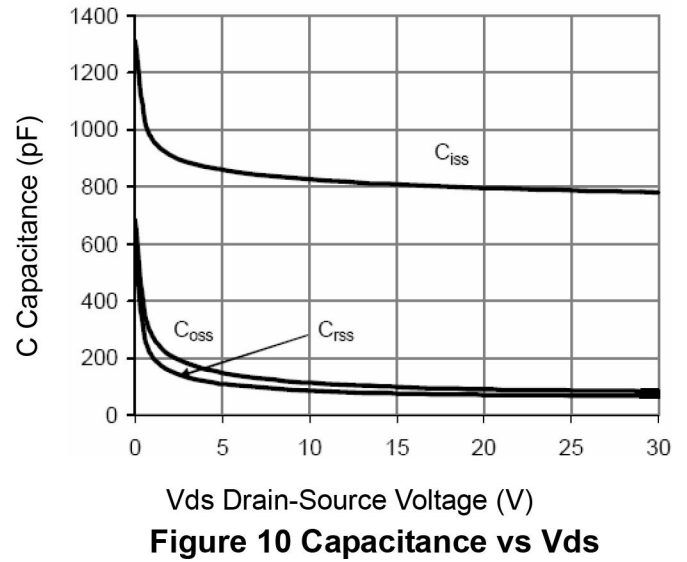
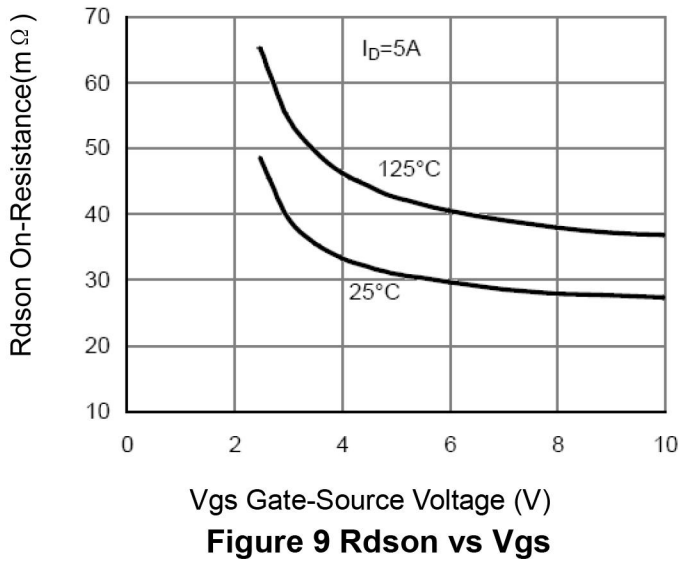
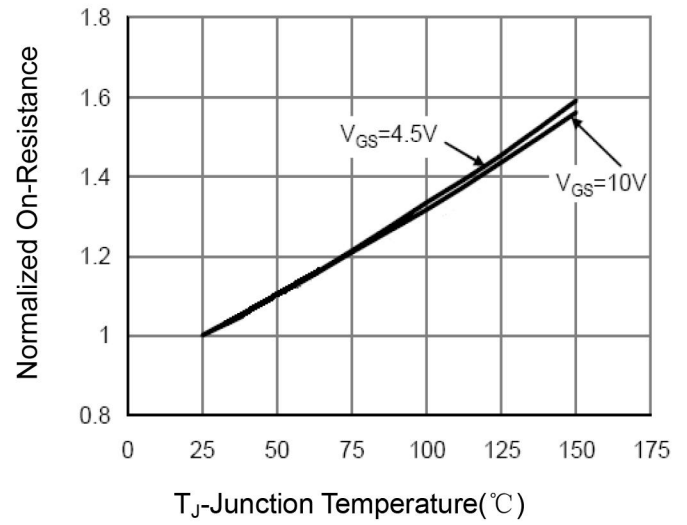
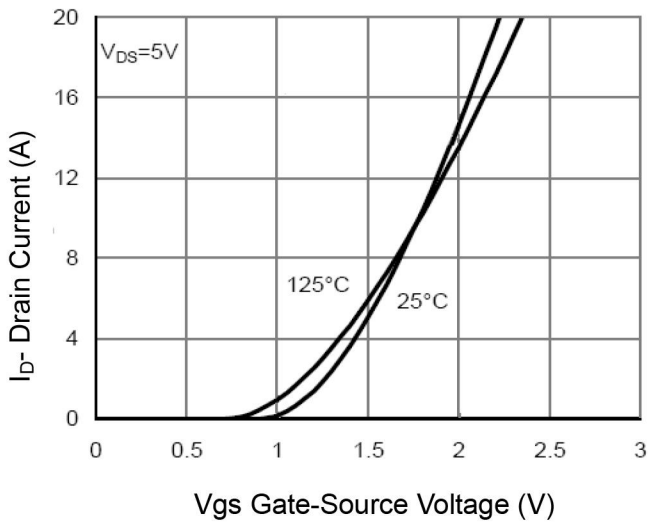
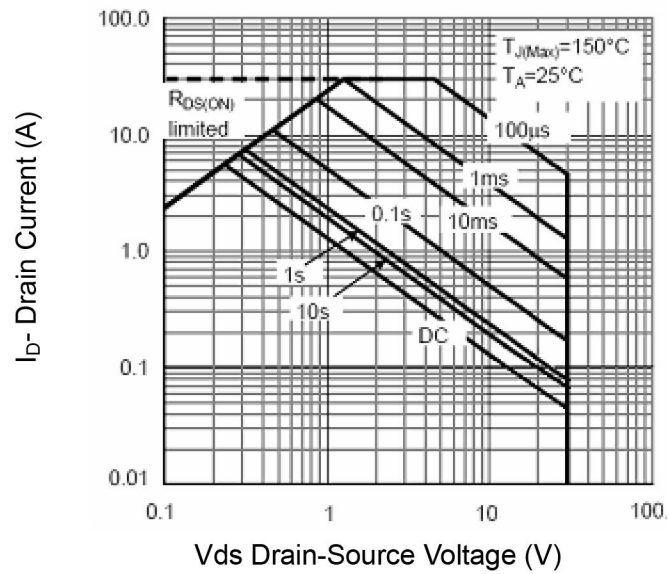
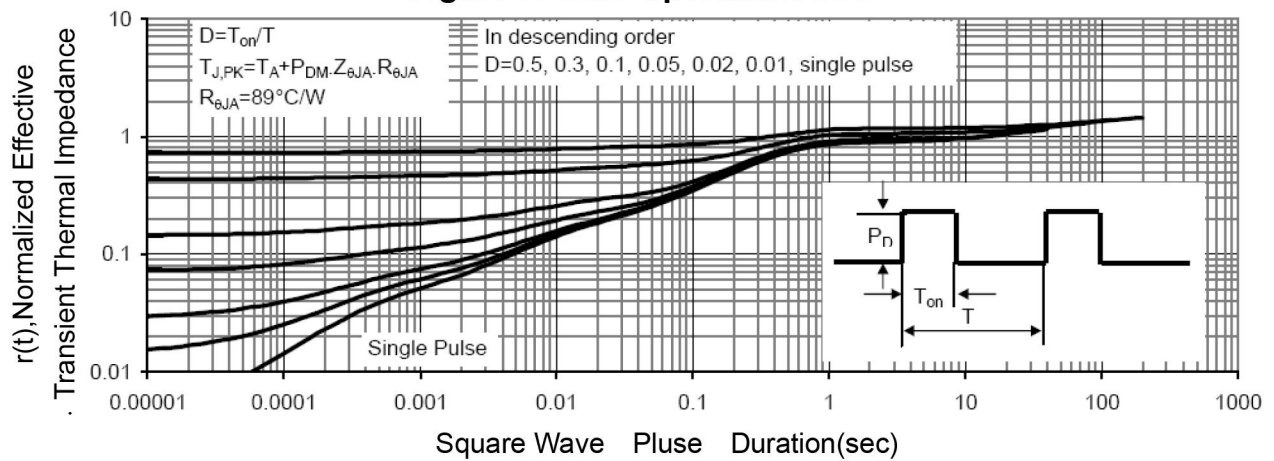


Figure 6 Drain-Source On-Resistance





**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**