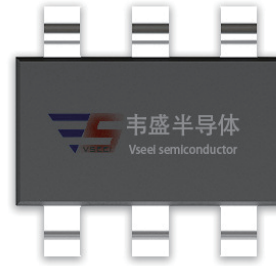


Description

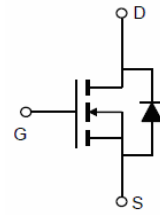
The VSM3406N uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

- $V_{DS} = 30V, I_D = 6A$
 $R_{DS(ON)} < 50m\Omega @ V_{GS}=2.5V$
 $R_{DS(ON)} < 32m\Omega @ V_{GS}=4.5V$
 $R_{DS(ON)} < 28m\Omega @ V_{GS}=10V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package
- PWM applications
- Load switch
- Power management



SOT-23-6



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM3406N-S6	VSM3406N	SOT-23-6	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	6	A
Drain Current-Pulsed (Note 1)	I_{DM}	30	A
Maximum Power Dissipation	P_D	2.0	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)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
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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	33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	± 100	nA

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.7	0.9	1.4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =2.5V, I _D =4A	-	27	50	mΩ
		V _{GS} =4.5V, I _D =5A	-	24	32	mΩ
		V _{GS} =10V, I _D =6A	-	20.5	28	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =6A	10	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =15V, V _{GS} =0V, F=1.0MHz	-	820	-	PF
Output Capacitance	C _{OSS}		-	99	-	PF
Reverse Transfer Capacitance	C _{rSS}		-	77	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =15V, R _L =2.5Ω V _{GS} =10V, R _{GEN} =3Ω	-	3.3	-	nS
Turn-on Rise Time	t _r		-	4.8	-	nS
Turn-Off Delay Time	t _{d(off)}		-	26	-	nS
Turn-Off Fall Time	t _f		-	4	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =6A, V _{GS} =4.5V	-	9.5	-	nC
Gate-Source Charge	Q _{gs}		-	1.5	-	nC
Gate-Drain Charge	Q _{gd}		-	3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =6A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	6	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

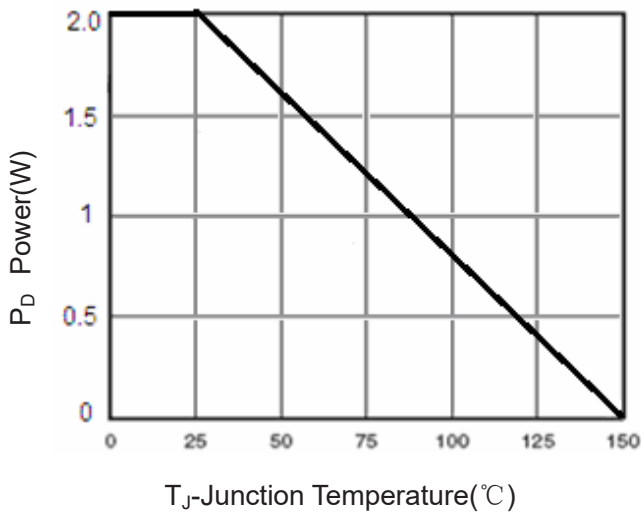


Figure 3 Power Dissipation

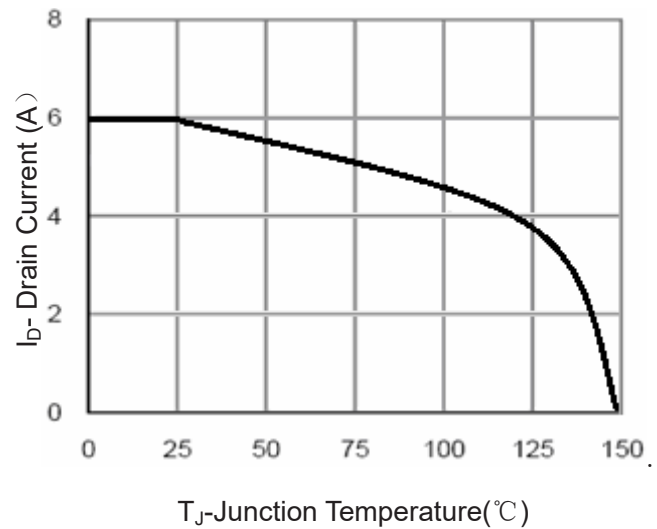


Figure 4 Drain Current

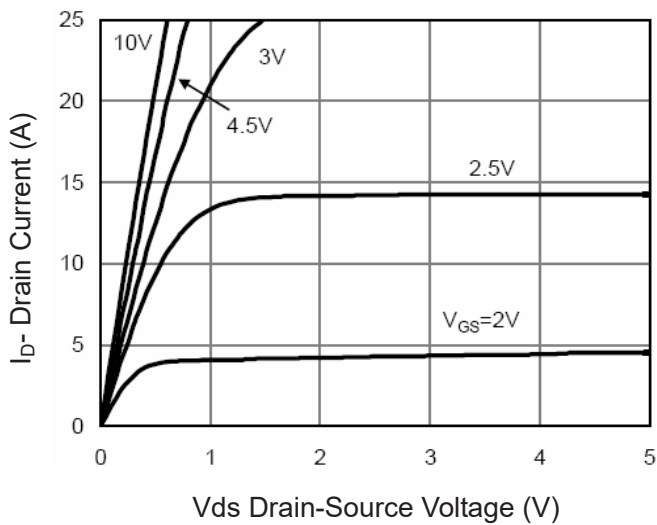


Figure 5 Output Characteristics

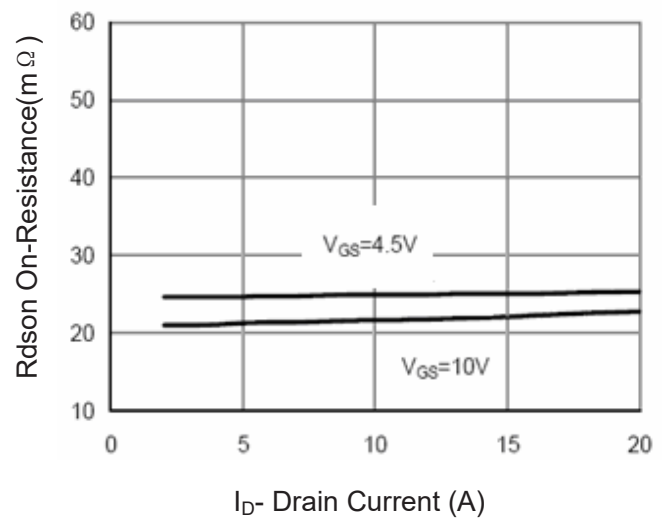
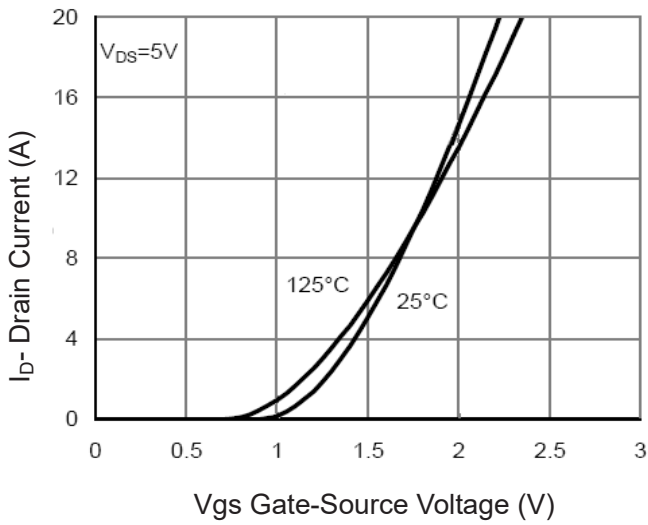
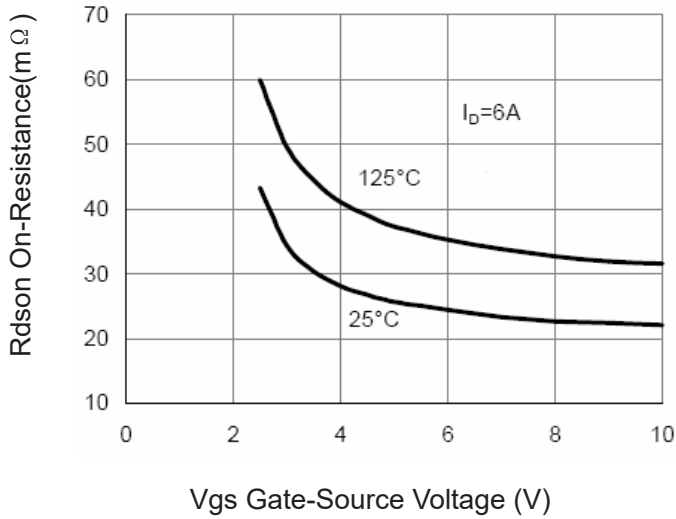
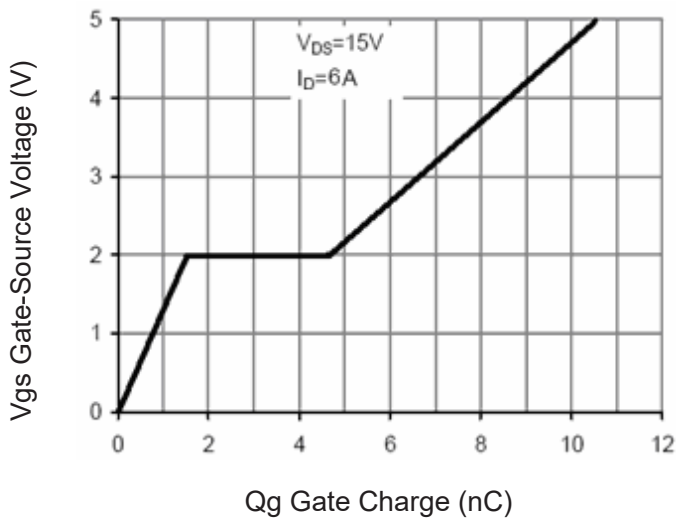
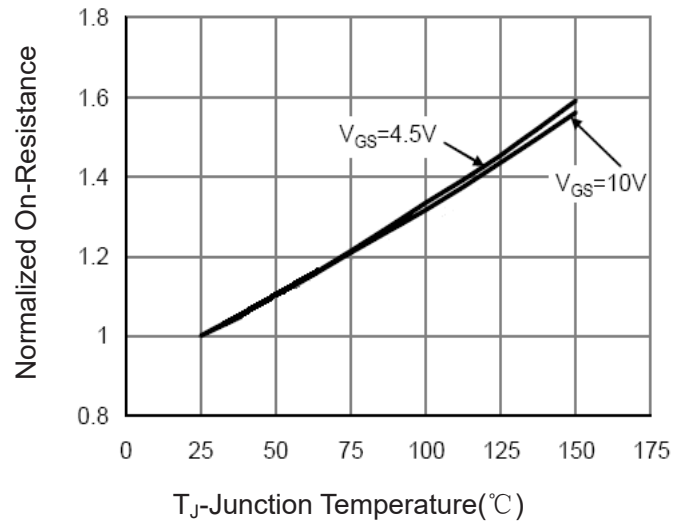
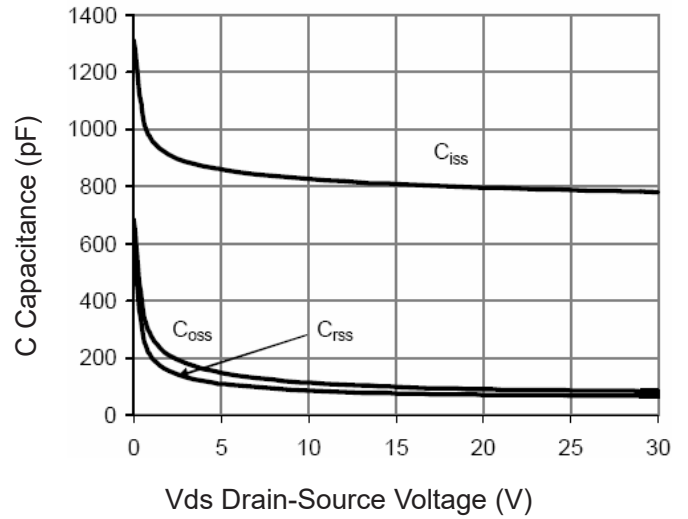
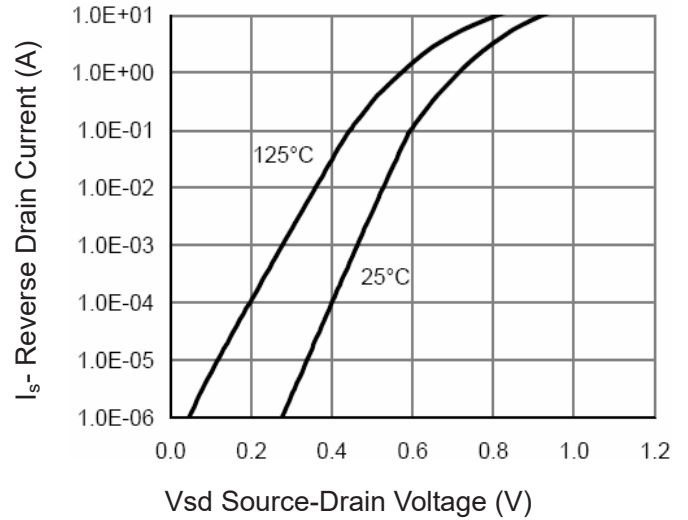
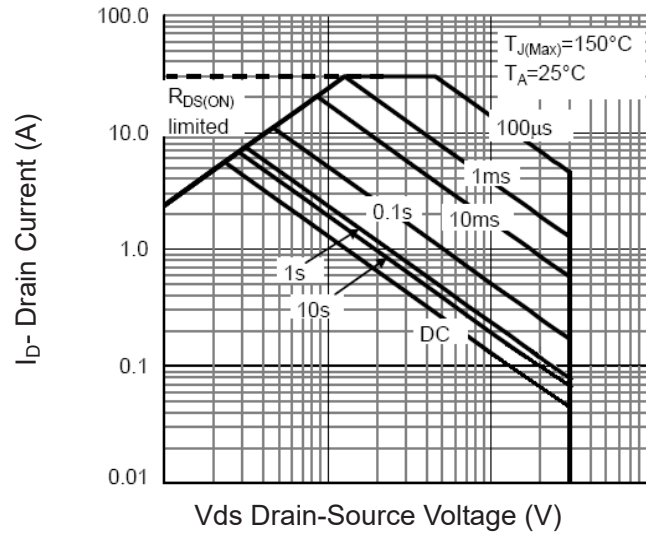
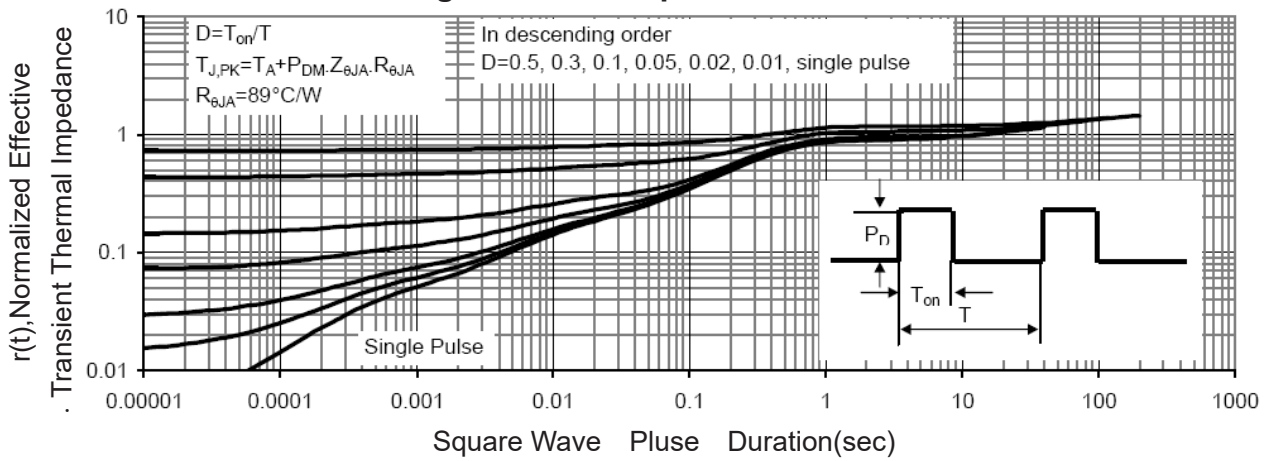
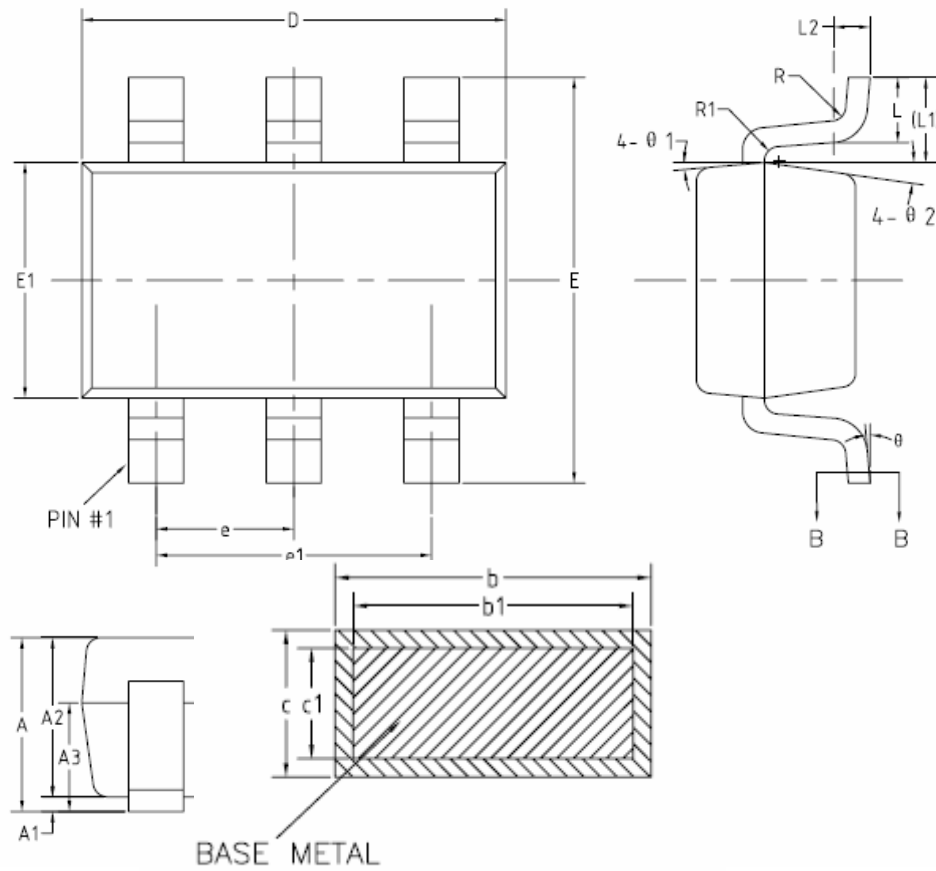


Figure 6 Drain-Source On-Resistance


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

SOT23-6L Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	—	—	1.45
A1	0	—	0.15
A2	0.90	1.10	1.30
A3	0.60	0.65	0.70
b	0.39	—	0.49
b1	0.38	0.40	0.45
c	0.12	—	0.19
c1	0.11	0.13	0.15
D	2.85	2.95	3.05
E	2.60	2.80	3.00
E1	1.55	1.65	1.75
e	0.85	0.95	1.05
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59REF		
L2	0.25BSC		
R	0.05	—	—
R1	0.05	—	0.20
θ	0°	—	8°
θ 1	8°	10°	12°
θ 2	8°	10°	12°