

Description

The VSM35N03 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

Application

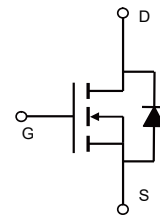
- DC/DC Converter
- High-frequency switching

General Features

- $V_{DS} = 30V, I_D = 35A$
 $R_{DS(ON)} = 3.5m\Omega$ (typical) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 6.2m\Omega$ (typical) @ $V_{GS} = 4.5V$
- High density cell design for ultra low R_{dson}
- Good stability and uniformity with high E_{AS}
- 150 °C operating temperature
- Pb-free lead plating



DFN5x6



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM35N03	VSM35N03-D56	DFN5x6	Ø330mm	12mm	5000units

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	35	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	35	A
Pulsed Drain Current	I_{DM}	140	A
Maximum Power Dissipation	P_D	40	W
De-rating factor		0.32	W/ $^\circ C$
Single pulse avalanche energy ^(Note 1)	E_{AS}	219	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.13	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	50	$^{\circ}\text{C/W}$

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

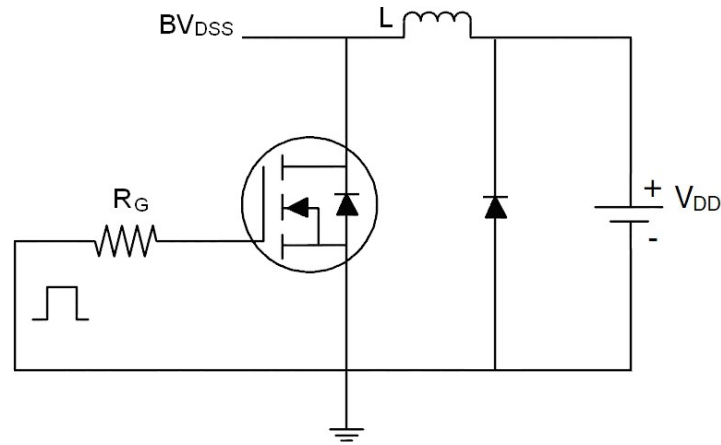
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	30	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.6	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =15A	-	3.5	4.6	mΩ
		V _{GS} =4.5V, I _D =10A	-	6.2	8.1	
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =15A	30	-	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, F=1.0MHz	-	1784	-	pF
Output Capacitance	C _{oss}		-	266	-	pF
Reverse Transfer Capacitance	C _{rss}		-	212	-	pF
Switching Characteristics (Note 3)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =15V, I _D =15A V _{GS} =10V, R _{GEN} =6Ω	-	7	-	nS
Turn-on Rise Time	t _r		-	6	-	nS
Turn-Off Delay Time	t _{d(off)}		-	30	-	nS
Turn-Off Fall Time	t _f		-	8	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =20A, V _{GS} =10V	-	38.4	-	nC
Gate-Source Charge	Q _{gs}		-	5.8	-	nC
Gate-Drain Charge	Q _{gd}		-	7.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	-	-	1.2	V
Diode Forward Current	I _S		-	-	35	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 15A di/dt = 100A/μs	-	-	47	nS
Reverse Recovery Charge	Q _{rr}		-	-	25	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

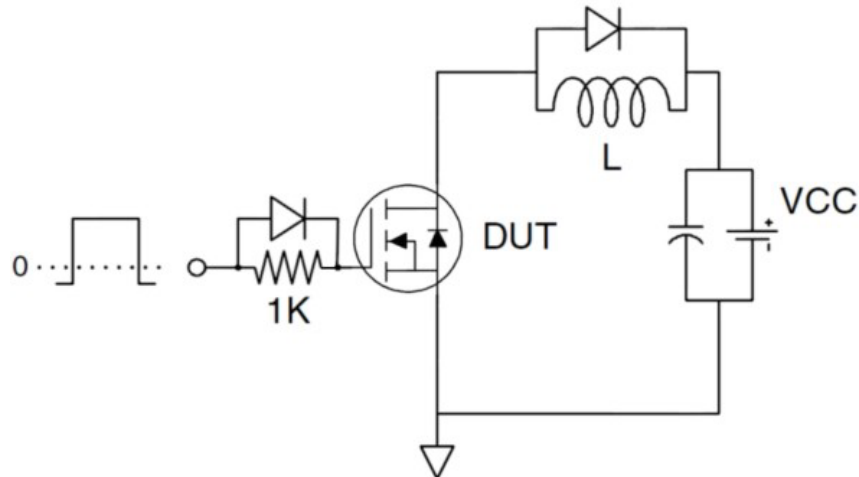
- EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=25V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega$.
- The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^{\circ}\text{C}$. The maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.
- Guaranteed by design, not subject to production.
- 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 $T_{J(MAX)}=150^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

Test Circuit

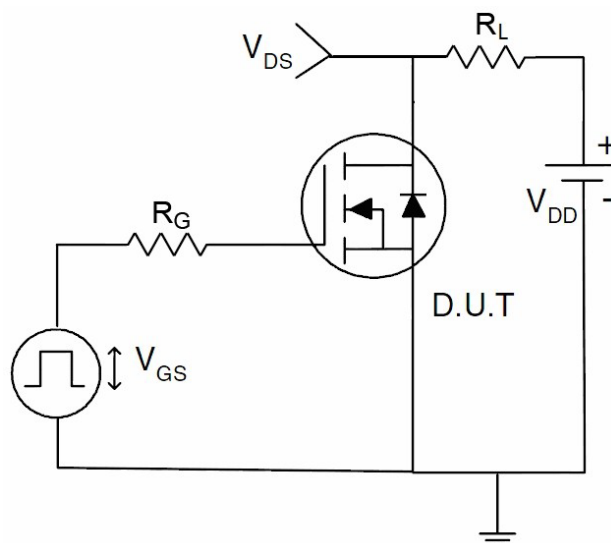
1) E_{AS} Test Circuits



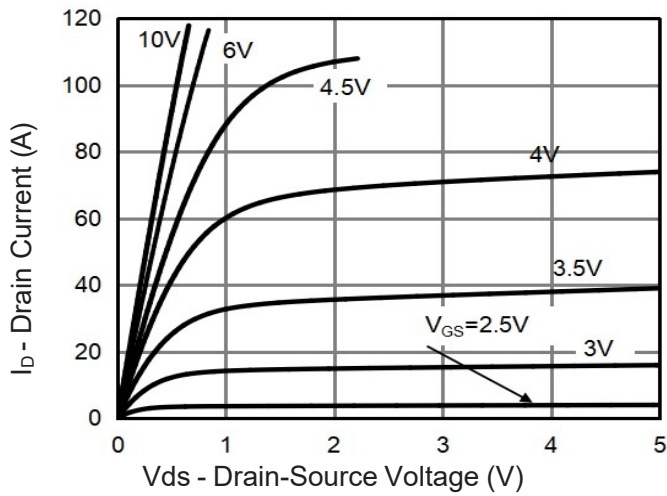
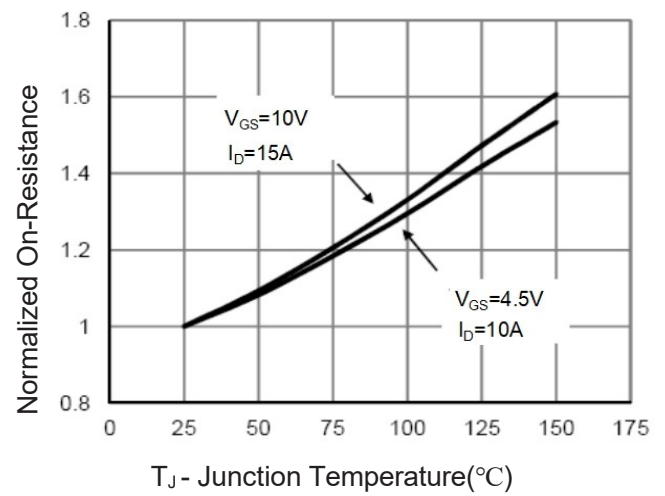
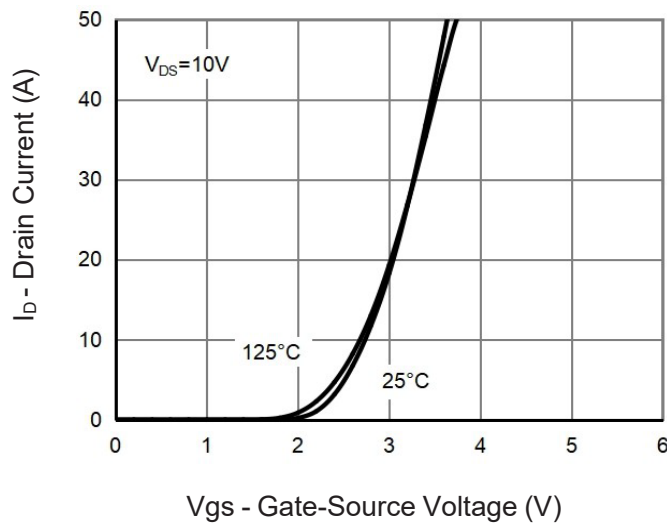
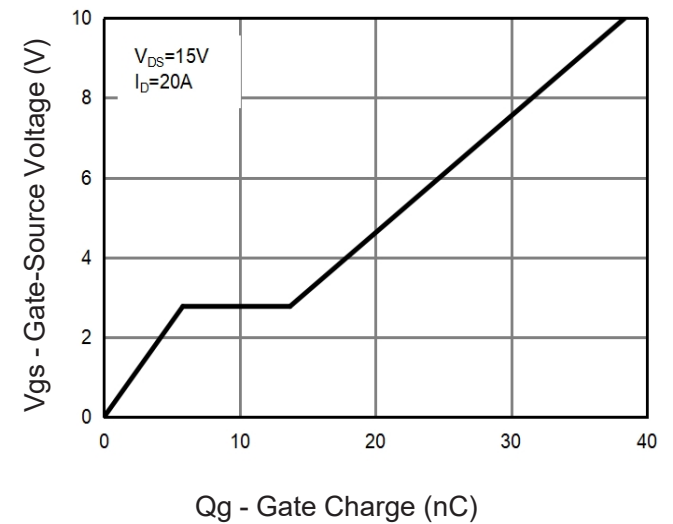
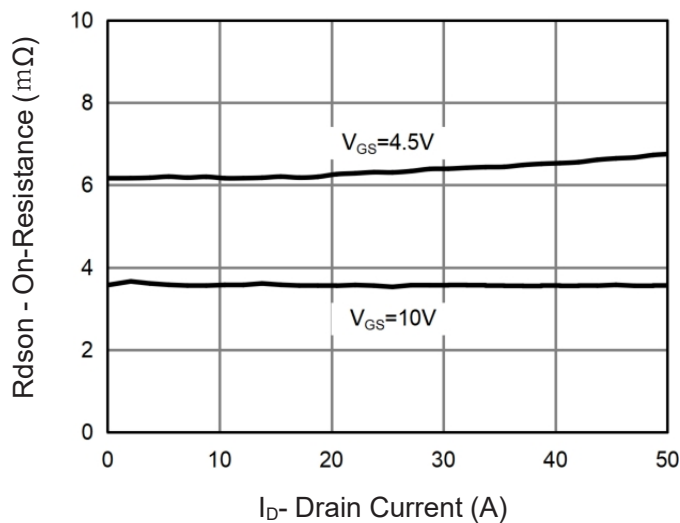
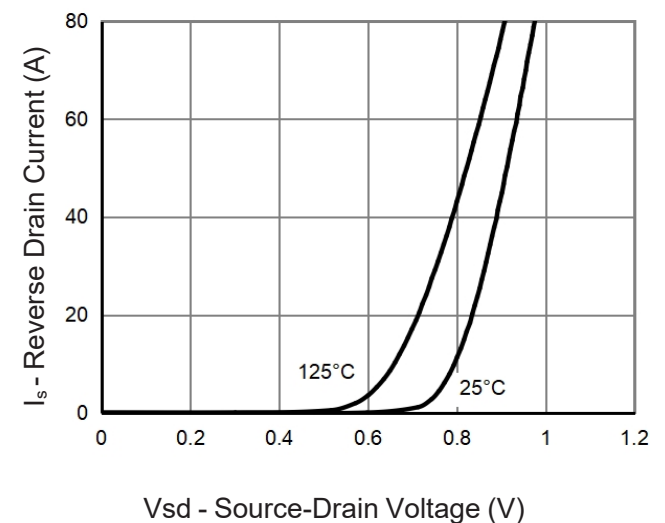
2) Gate Charge Test Circuit

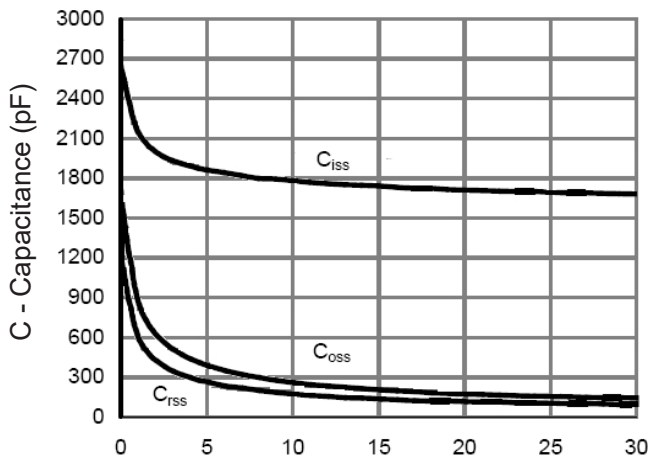


3) Switch Time Test Circuit

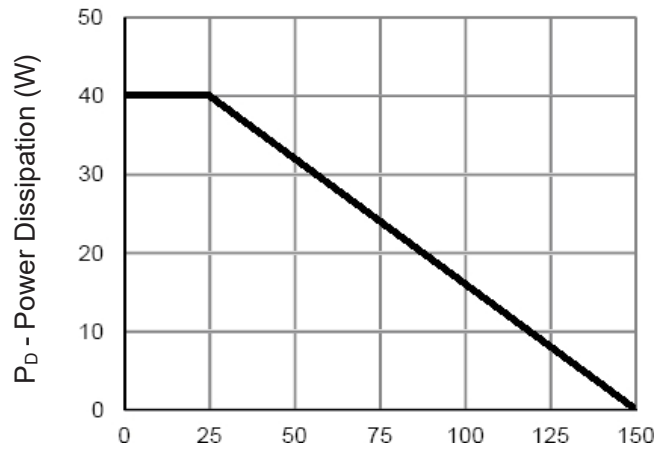


Typical Electrical and Thermal Characteristics (Curves)


Figure 1 Output Characteristics

Figure 4 Rdson vs Junction Temperature

Figure 2 Transfer Characteristics

Figure 5 Gate Charge

Figure 3 Rdson vs Drain Current

Figure 6 Source-Drain Diode Forward



V_{ds} - Drain-Source Voltage (V)
Figure 7 Capacitance vs V_{ds}



T_C - Case Temperature(°C)
Figure 9 Power De-rating

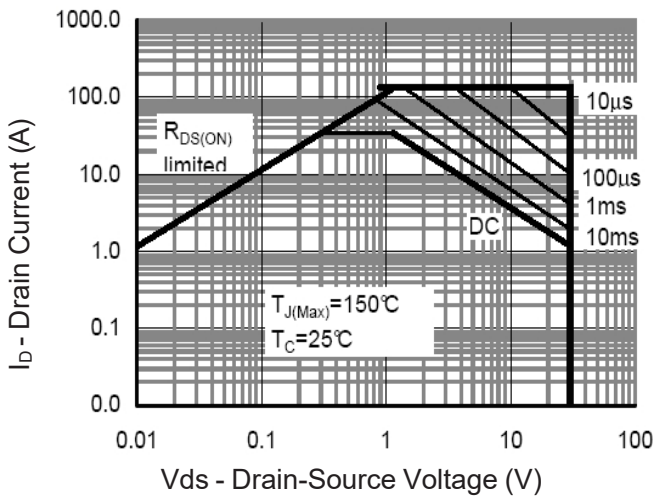


Figure 8 Safe Operation Area (Note 4)

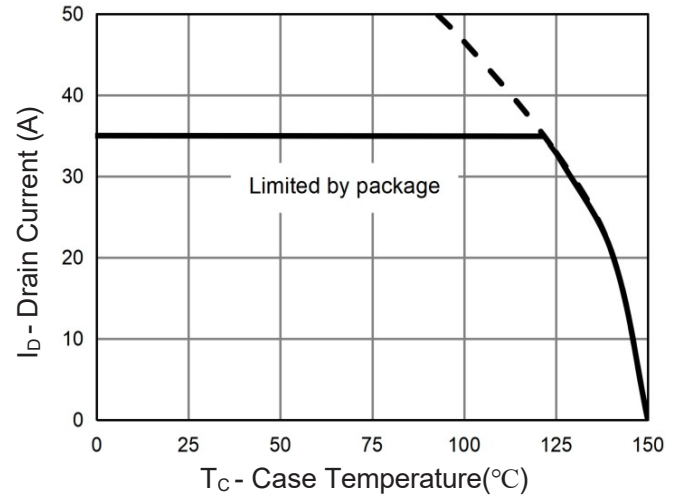


Figure 10 Drain Current De-rating

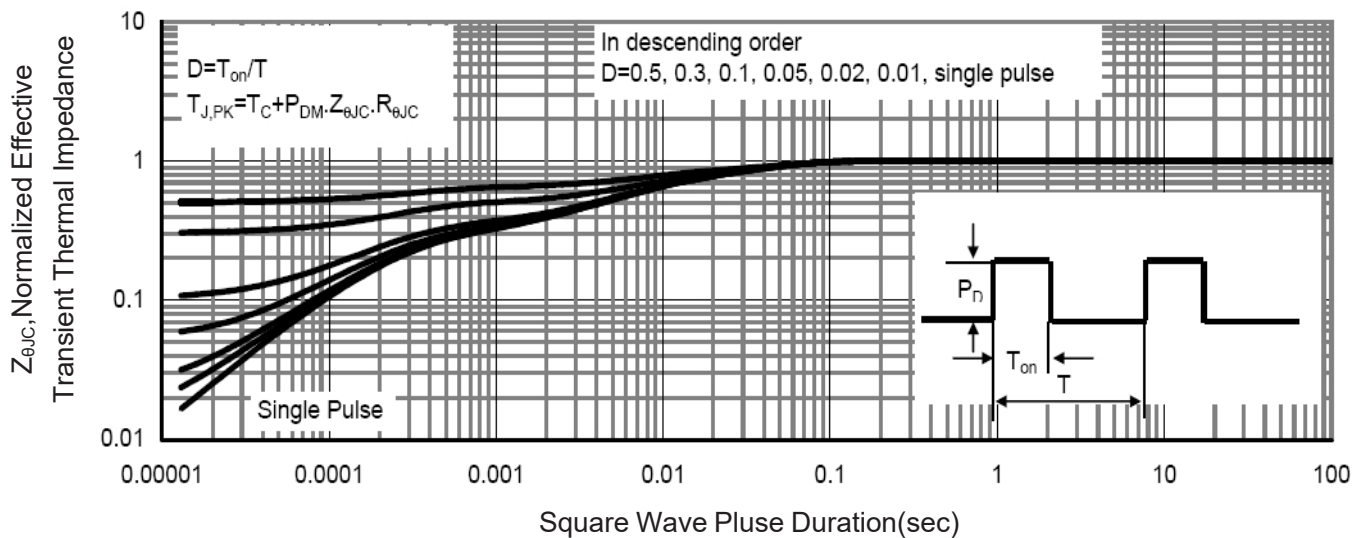


Figure 11 Normalized Maximum Transient Thermal Impedance