

Description

The VSM40P03 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. This device is suitable for use as a load switch or in PWM applications.

Application

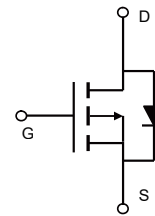
- PWM applications
- Load switch
- Power management

General Features

- $V_{DS} = -30V, I_D = -40A$
 $R_{DS(ON)} = 5.2m\Omega @ V_{GS} = -10V(Typ)$
 $R_{DS(ON)} = 8.3m\Omega @ V_{GS} = -4.5V(Typ)$
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package
- 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
VSM40P03	VSM40P03-D56	DFN5x6	Ø330mm	12mm	5000 units

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}	± 25	V
Drain Current-Continuous	I_D	-40	A
Drain Current-Pulsed (Note 1)	I_{DM}	-160	A
Maximum Power Dissipation	P_D	41	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.05	$^{\circ}C/W$
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Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
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} =±25V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =-250μA	-1.0	-1.7	-2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-20A	-	5.2	6.2	mΩ
		V _{GS} =-4.5V, I _D =-15A	-	8.3	11	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V,I _D =-15A	-	35	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-15V,V _{GS} =0V, F=1.0MHz	-	2517	-	pF
Output Capacitance	C _{oss}		-	348	-	pF
Reverse Transfer Capacitance	C _{rss}		-	318	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-15V, I _D =-20A, V _{GS} =-10V,R _{GEN} =3Ω	-	11	-	nS
Turn-on Rise Time	t _r		-	16	-	nS
Turn-Off Delay Time	t _{d(off)}		-	75	-	nS
Turn-Off Fall Time	t _f		-	55	-	nS
Total Gate Charge	Q _g	V _{DS} =-15V,I _D =-20A,V _{GS} =-10V	-	55.4	-	nC
Gate-Source Charge	Q _{gs}		-	6.0	-	nC
Gate-Drain Charge	Q _{gd}		-	15.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _S =-20A	-	-	-1.2	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

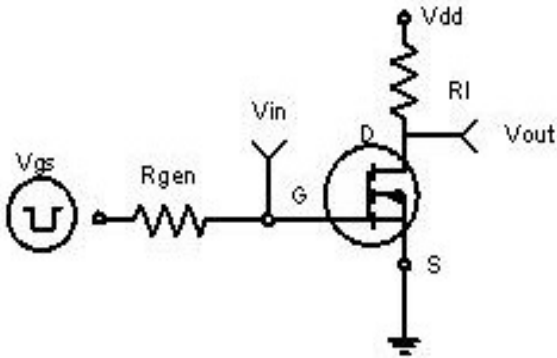


Figure 1: Switching Test Circuit

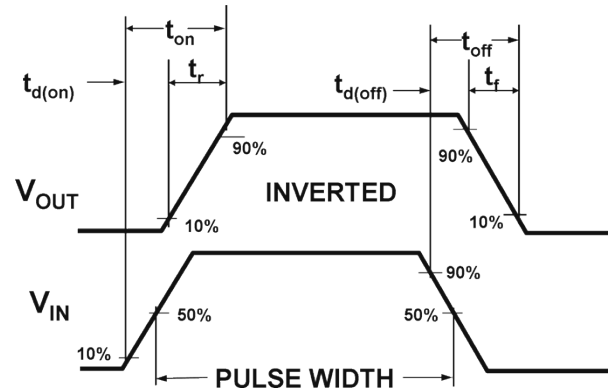


Figure 2: Switching Waveforms

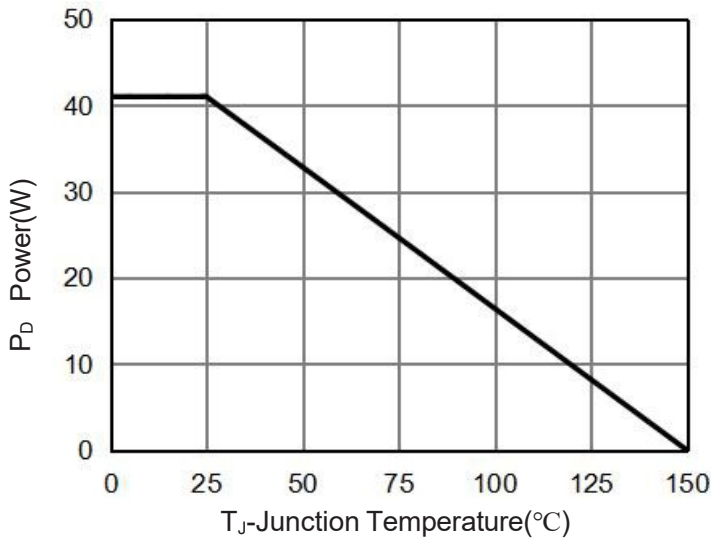


Figure 3 Power Dissipation

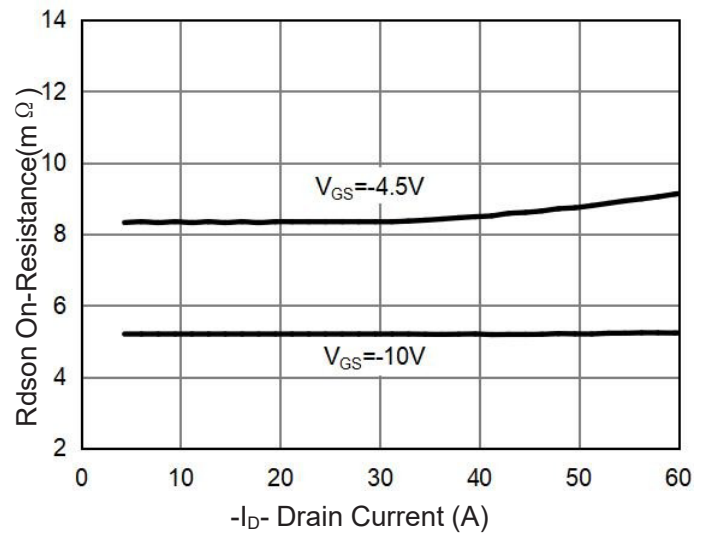


Figure 4 Drain-Source On-Resistance

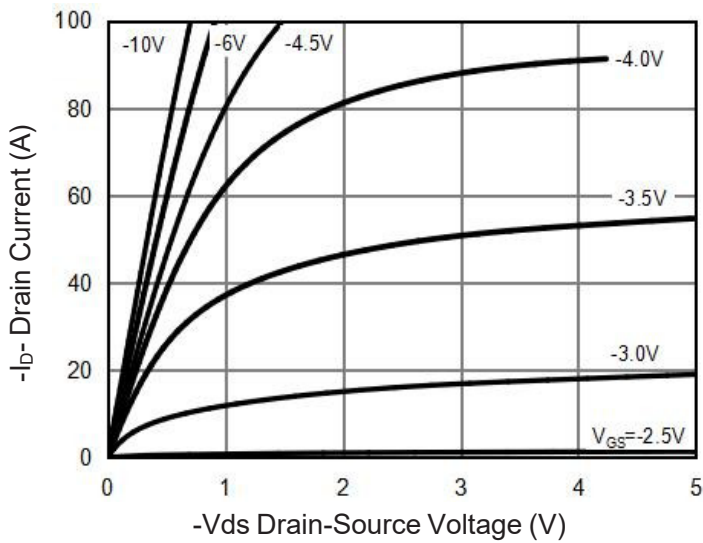


Figure 5 Output Characteristics

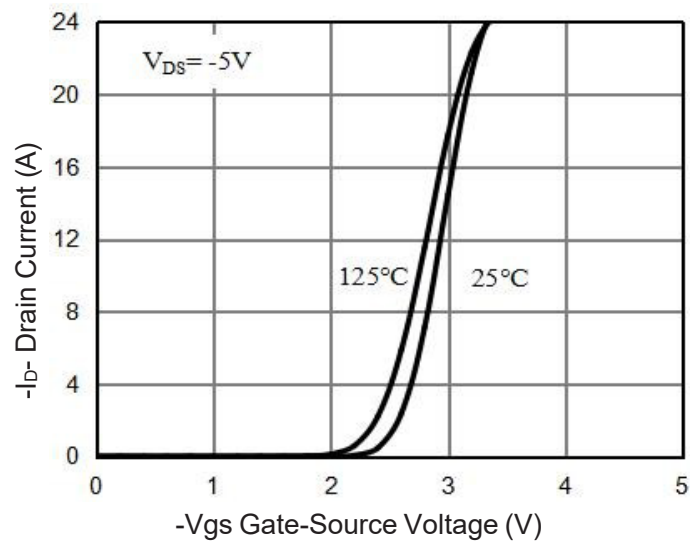
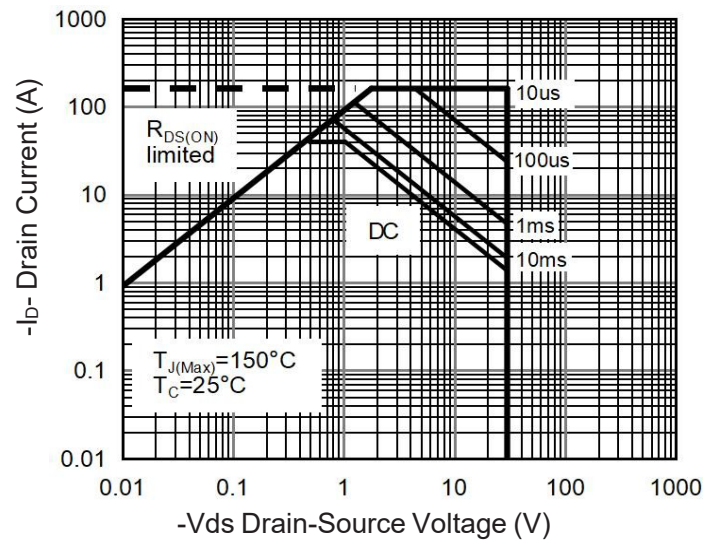
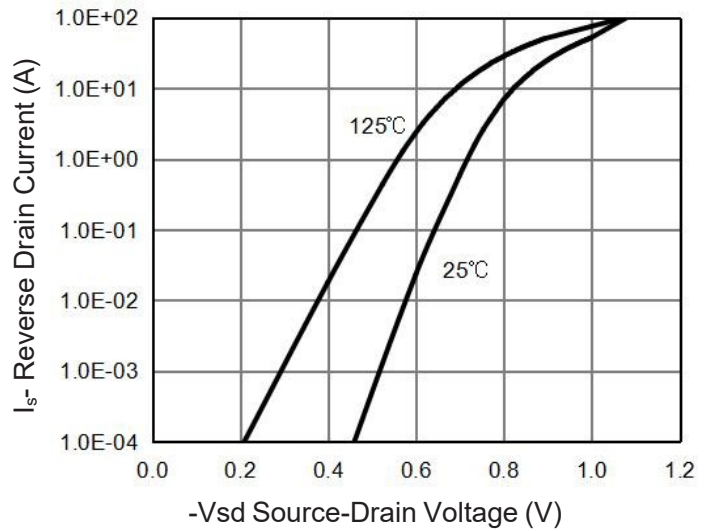
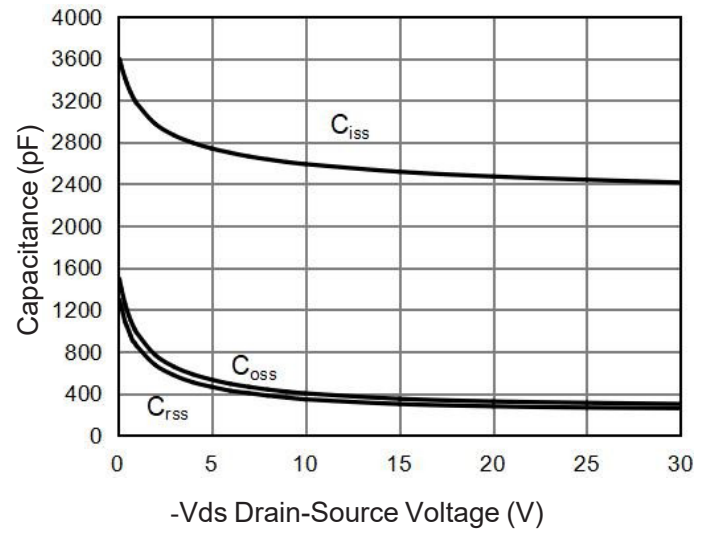
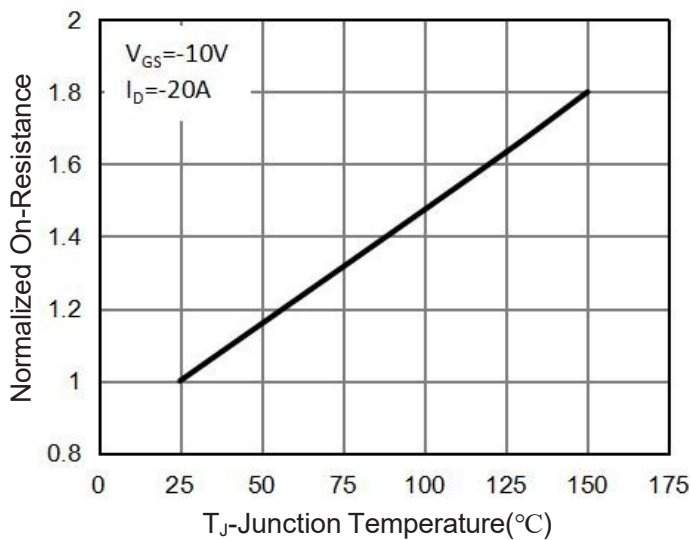
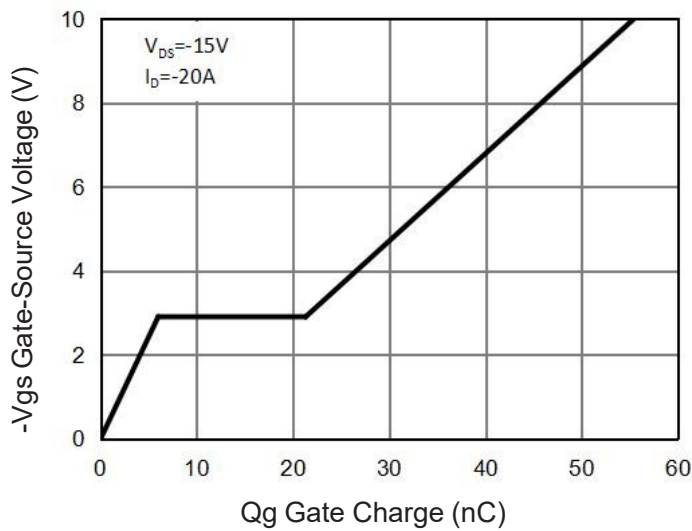
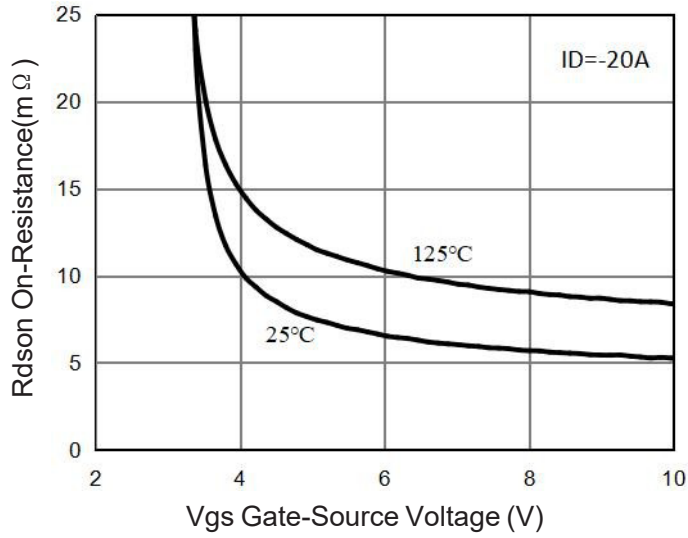


Figure 6 Transfer Characteristics



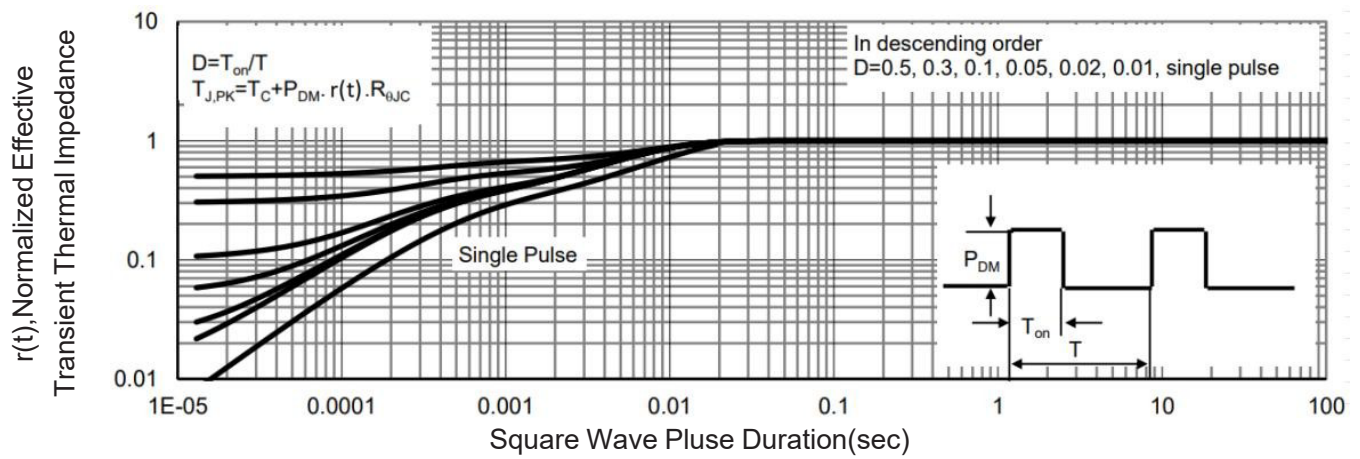


Figure 13 Normalized Maximum Transient Thermal Impedance