

Description

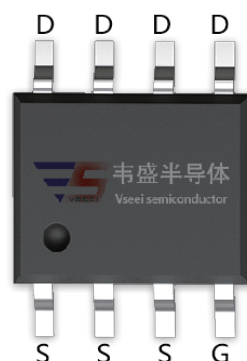
The VSM10P04 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

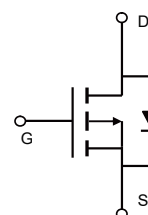
- $V_{DS} = -40V, I_D = -10A$
 $R_{DS(ON)} = 11.5m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} = 15.5m\Omega @ V_{GS} = -4.5V$
ESD Rating: 3000V HBM
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard switched and high frequency circuits
- DC-DC converter



SOP-8



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM10P04	VSM10P04-S8	SOP-8	Ø330mm	12mm	4000 units

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-10	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	-6.5	A
Pulsed Drain Current	I_{DM}	-40	A
Maximum Power Dissipation	P_D	2.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

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

Electrical Characteristics (T_A=25°C unless otherwise noted)

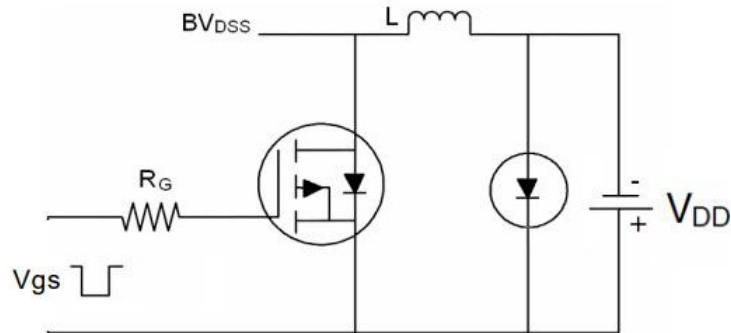
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±10	uA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.2	-1.8	-2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-10A	-	11.5	13.5	mΩ
		V _{GS} =-4.5V, I _D =-8A	-	15.5	20.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-10A	-	28	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-20V, V _{GS} =0V, F=1.0MHz	-	2840	-	PF
Output Capacitance	C _{oss}		-	222	-	PF
Reverse Transfer Capacitance	C _{rss}		-	196	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-20V, , R _L =2Ω V _{GS} =-10V, R _{GEN} =6Ω	-	10	-	nS
Turn-on Rise Time	t _r		-	35	-	nS
Turn-Off Delay Time	t _{d(off)}		-	84	-	nS
Turn-Off Fall Time	t _f		-	32	-	nS
Total Gate Charge	Q _g	V _{DS} =-20V, I _D =-10A, V _{GS} =-10V	-	59.2	-	nC
Gate-Source Charge	Q _{gs}		-	6.4	-	nC
Gate-Drain Charge	Q _{gd}		-	11.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-10A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S	-	-	-	-10	A

Notes:

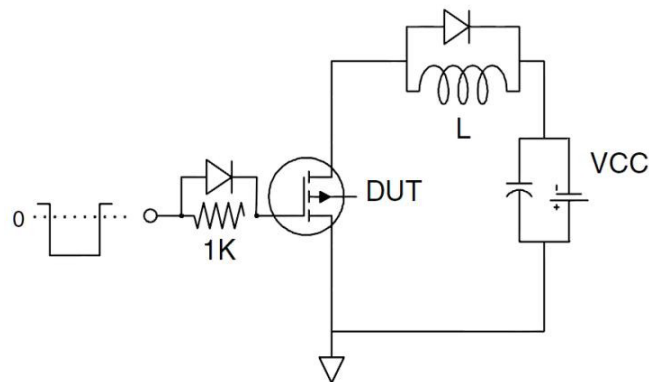
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Test Circuit

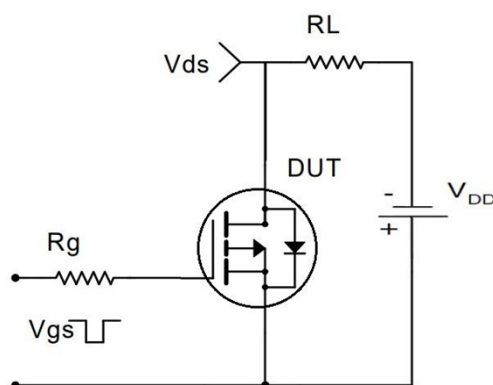
1) E_{AS} test Circuit



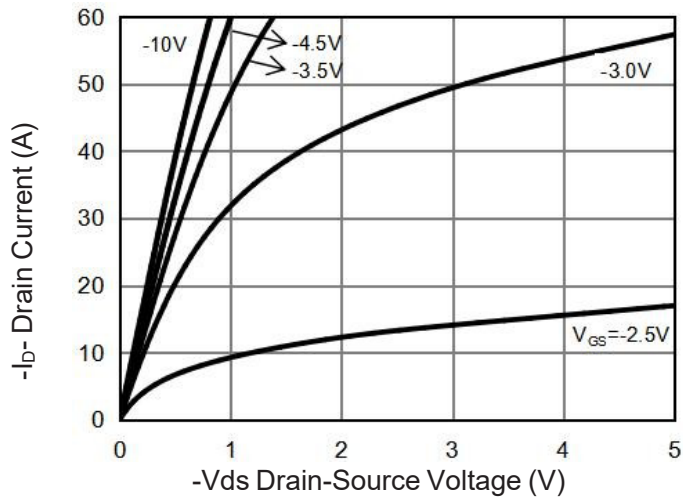
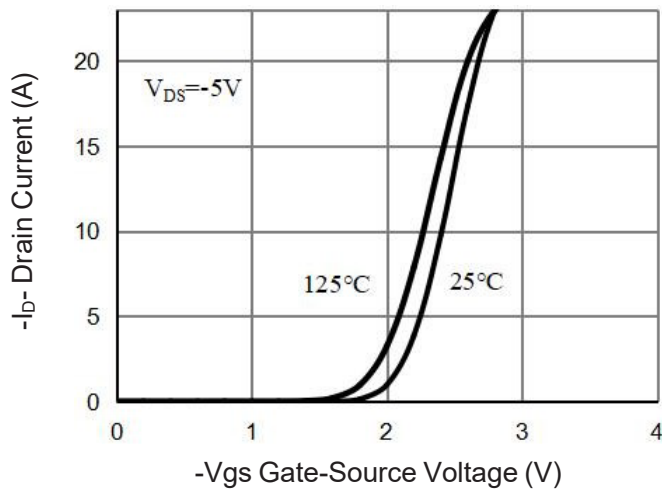
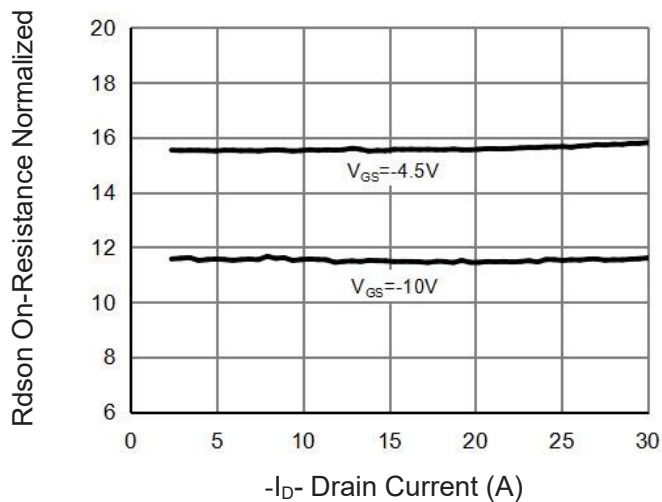
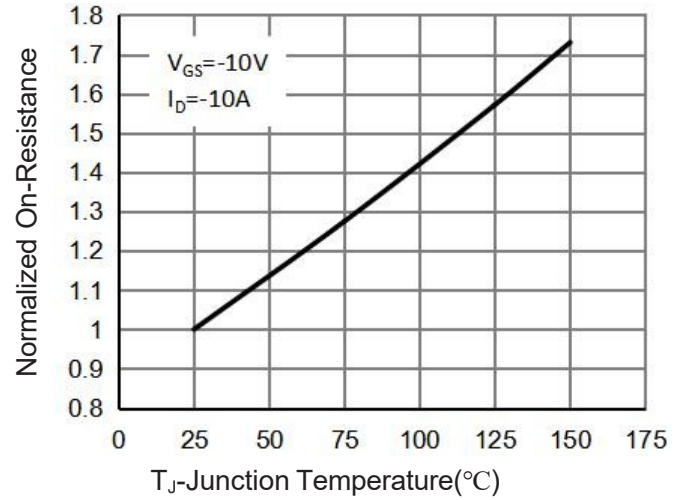
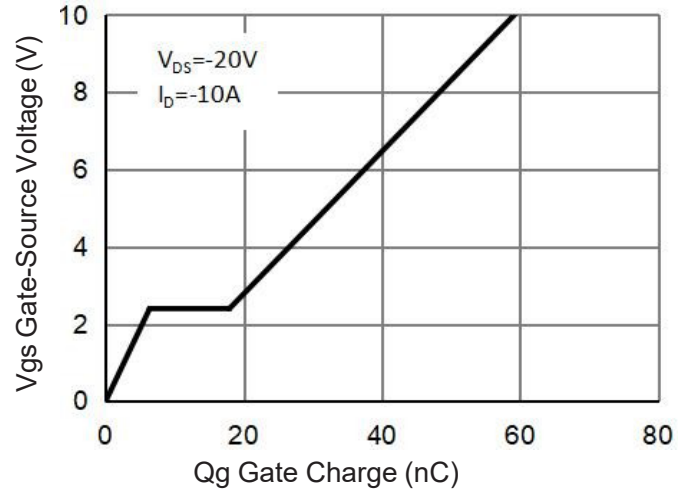
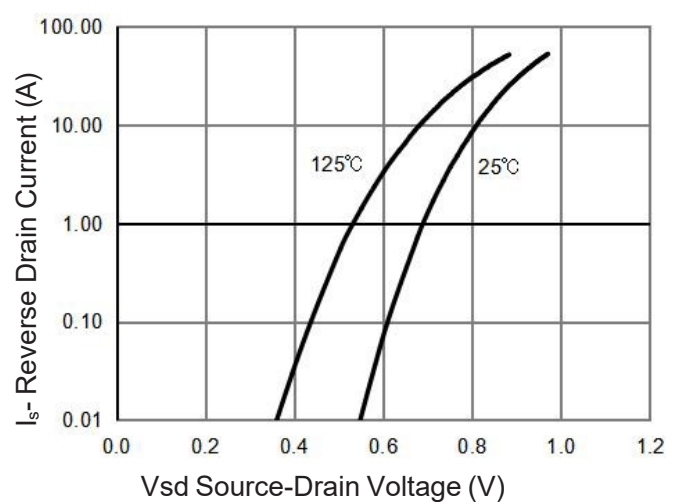
2) Gate charge test Circuit

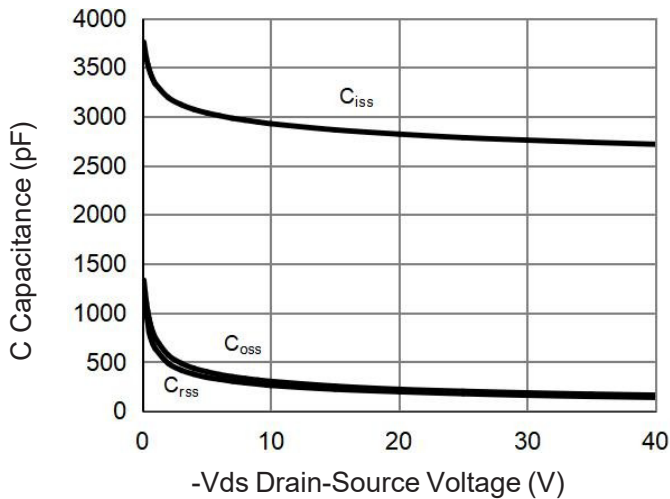
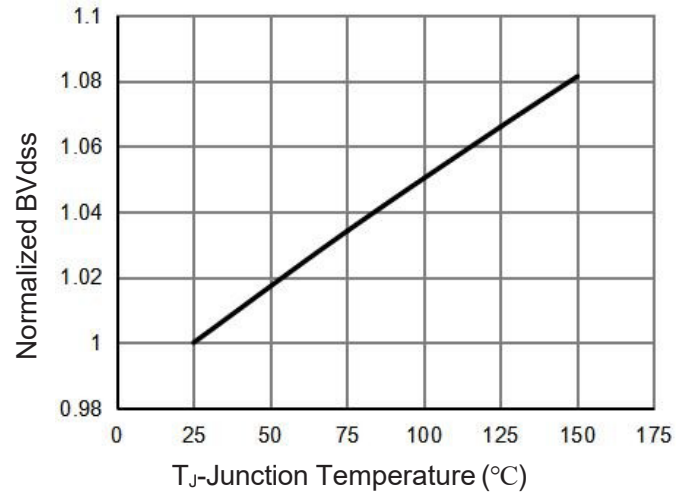
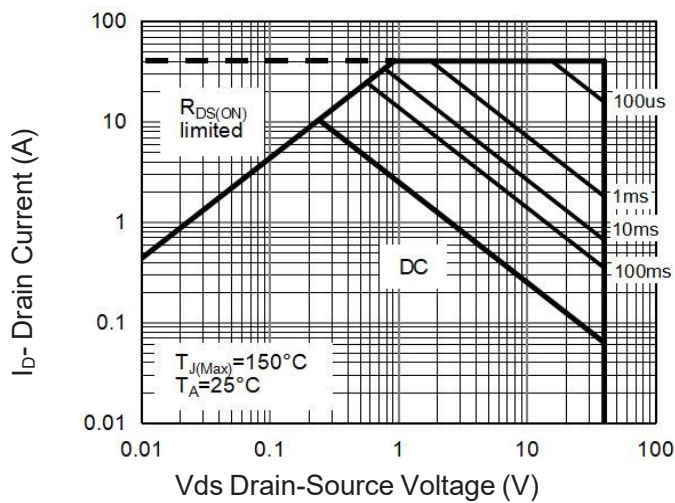
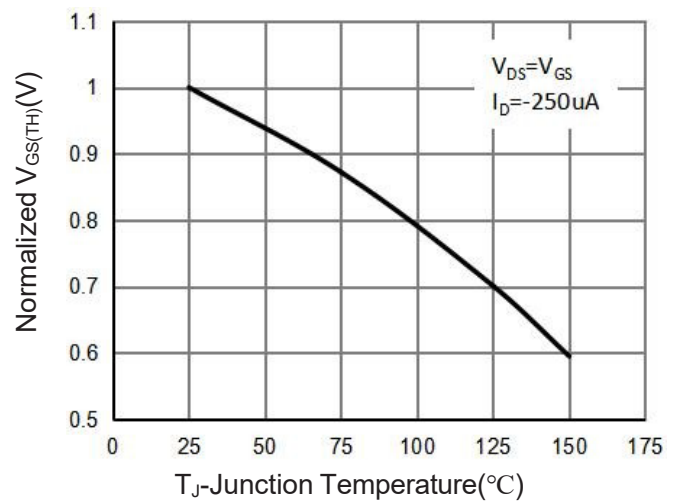
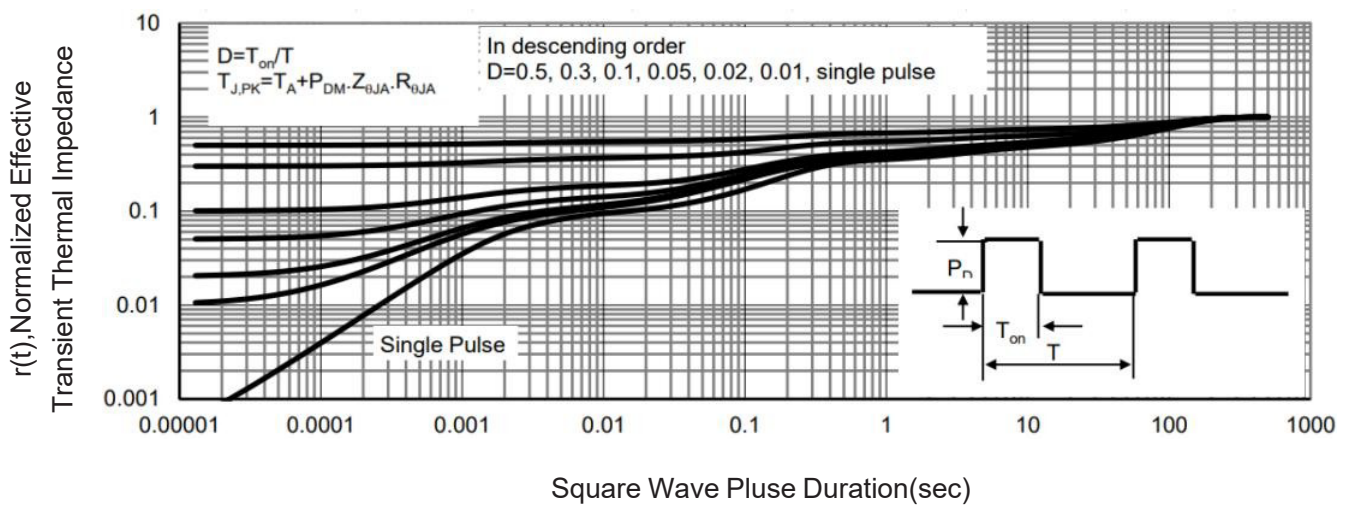


3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)


Figure 1 Output Characteristics

Figure 2 Transfer Characteristics

Figure 3 Rdson- Drain Current

Figure 4 Rdson-Junction Temperature

Figure 5 Gate Charge

Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 BV_{dss} vs Junction Temperature

Figure 8 Safe Operation Area

Figure 10 $V_{GS(th)}$ vs Junction Temperature

Figure 11 Normalized Maximum Transient Thermal Impedance