

### General Features

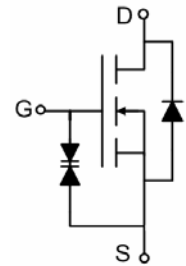
- $V_{DS} = 60V, I_D = 0.3A$   
 $R_{DS(ON)} < 3\Omega @ V_{GS}=4.5V$   
 $R_{DS(ON)} < 2.2\Omega @ V_{GS}=10V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package
- ESD Rating: HBM  $\geq 1500V$

### Application

- Direct logic-level interface: TTL/CMOS
- Drivers: relays, solenoids, lamps, hammers, display, memories, transistors, etc.
- Battery operated systems
- Solid-state relays



SOT-23-3



Schematic Diagram

### Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM2N7002K-S2	VSM2N7002K	SOT-23-3	Ø180mm	8 mm	3000 units

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		$V_{DS}$	60	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_J=150^\circ C$ )	$T_A=25^\circ C$	$I_D$	0.3	A
	$T_A=100^\circ C$		0.19	
Drain Current-Pulsed (Note 1)		$I_{DM}$	0.8	A
Maximum Power Dissipation		$P_D$	0.35	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)	$R_{\theta JA}$	350	$^\circ C/W$
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**Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	60	68	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V	-	-	±1	uA
		V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-		±10	uA
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	1.3	1.9	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.2A	-	1.95	3	Ω
		V <sub>GS</sub> =10V, I <sub>D</sub> =0.3A	-	1.8	2.2	Ω
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =0.2A	0.1	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1.0MHz	10	21	50	PF
Output Capacitance	C <sub>oss</sub>		-	11	25	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	4.2	5	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =0.2A V <sub>GS</sub> =10V, R <sub>GEN</sub> =10Ω	-	10	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	50	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	17	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	10	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =0.3A, V <sub>GS</sub> =4.5V	-	1.7	3	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =0.2A	-	-	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	0.3	A

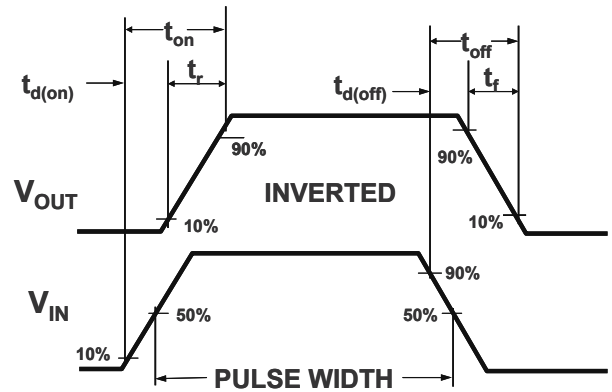
**Notes:**

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

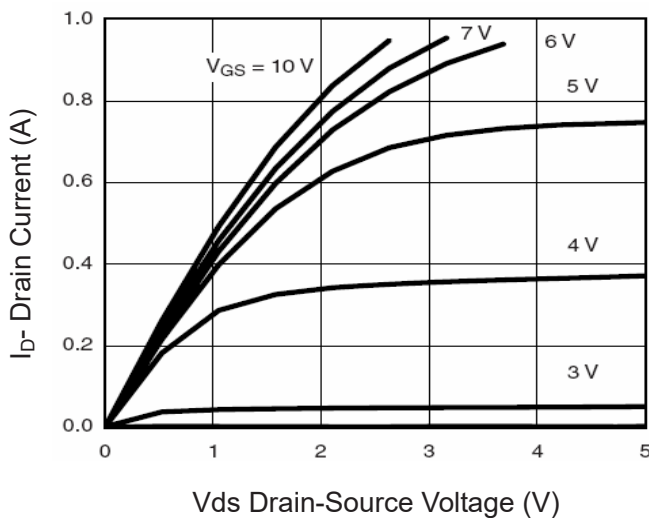
## Typical Electrical And Thermal Characteristics



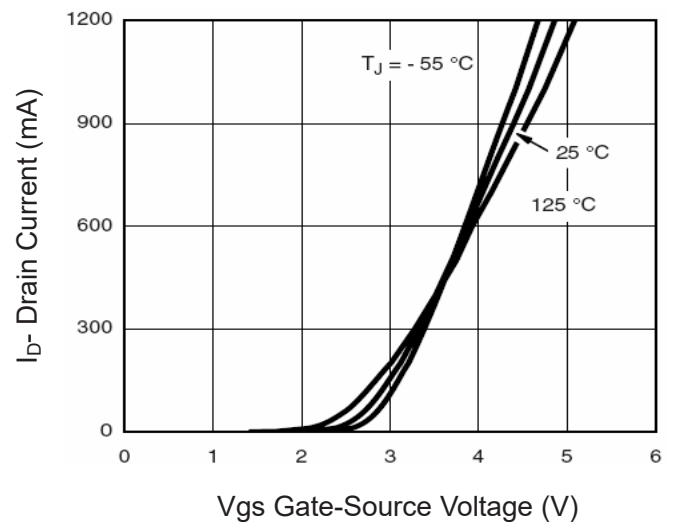
**Figure 1: Switching Test Circuit**



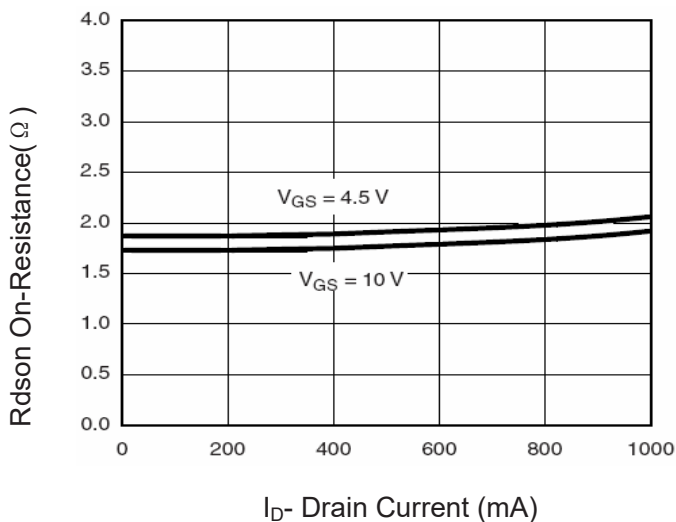
**Figure 2: Switching Waveforms**



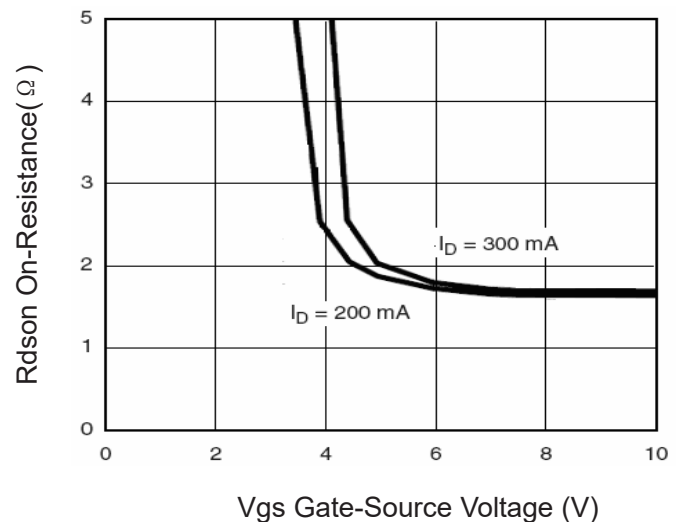
**Figure 3 Output Characteristics**



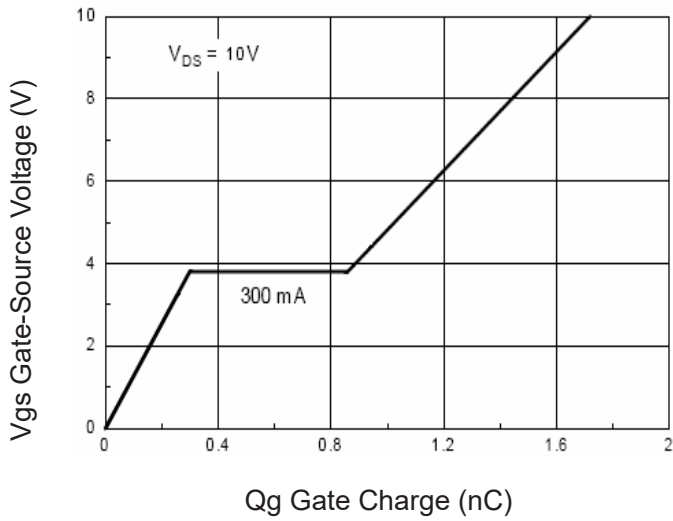
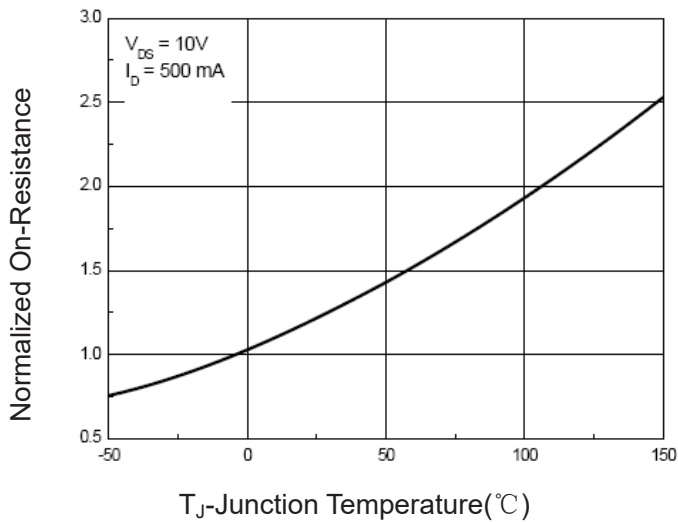
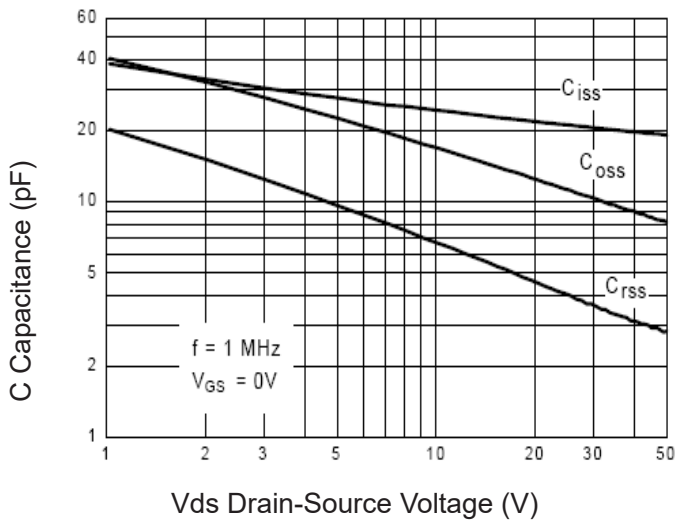
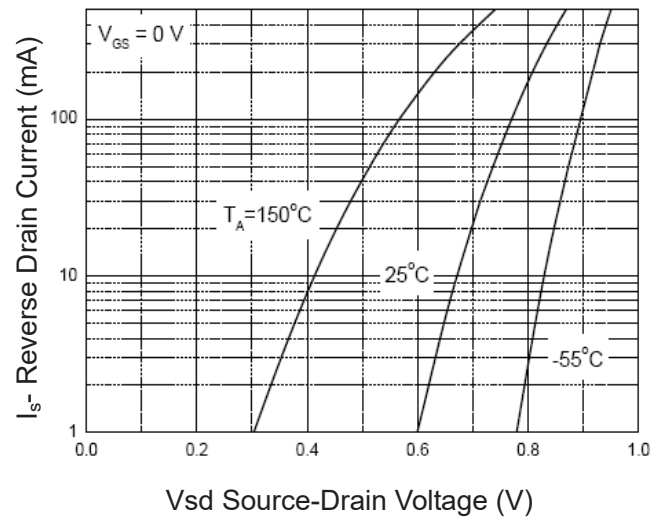
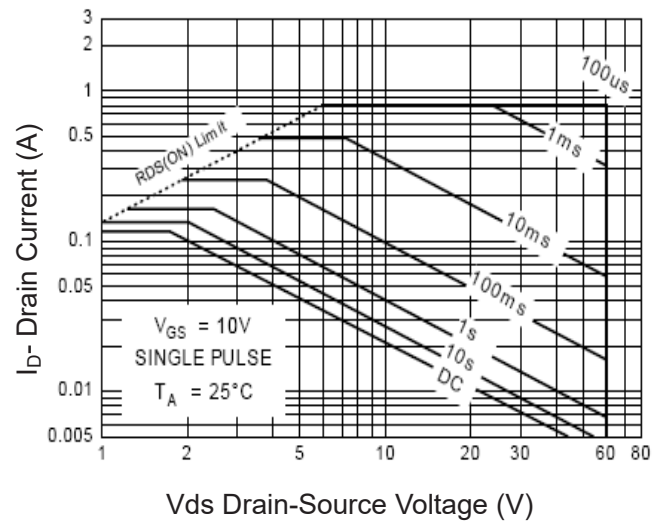
**Figure 4 Transfer Characteristics**

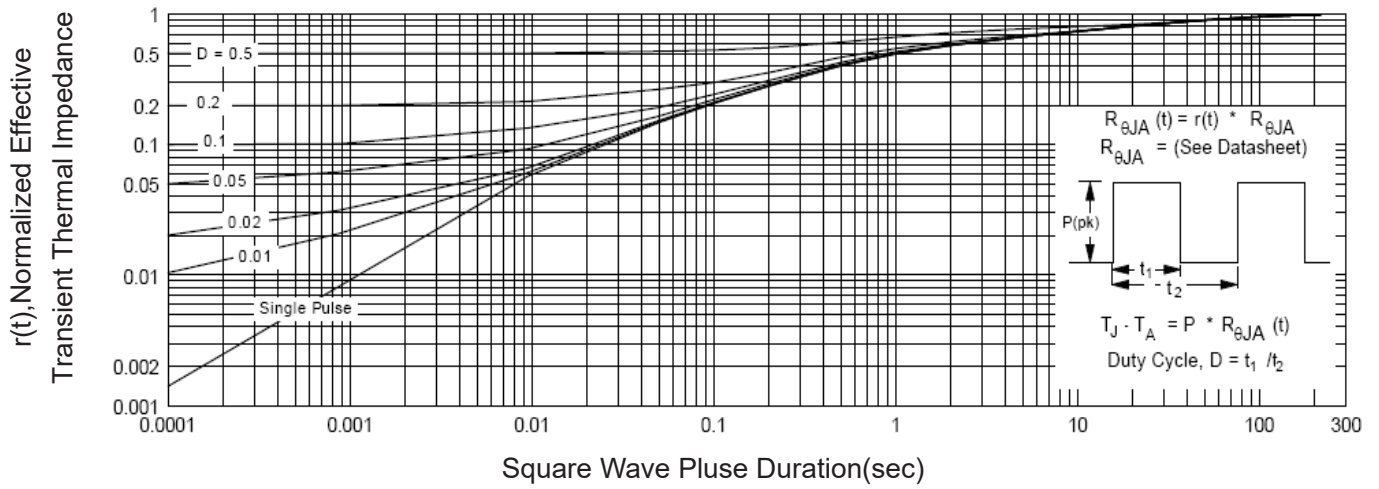


**Figure 5 Drain-Source On-Resistance**



**Figure 6 Rdson vs Vgs**


**Figure 7 Gate Charge**

**Figure 9 Drain-Source On-Resistance**

**Figure 11 Capacitance vs Vds**

**Figure 8 Source-Drain Diode Forward**

**Figure 10 Safe Operation Area**



**Figure 12 Normalized Maximum Transient Thermal Impedance**