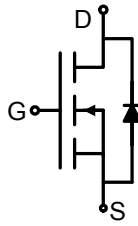
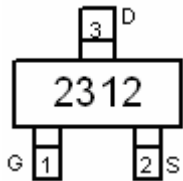



<p>Description</p> <p>The 2312 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a battery protection or in other switching application.</p> <p>General Features</p> <ul style="list-style-type: none"> ● $V_{DS} = 20V, I_D = 6.8A$ ● $R_{DS(ON)} = 18m\Omega$ (TYP) @ $V_{GS} = 2.5V$ ● $R_{DS(ON)} = 15m\Omega$ (TYP) @ $V_{GS} = 4.5V$ ● High power and current handling capability ● Lead free product is acquired ● Surface mount package <p>Application</p> <ul style="list-style-type: none"> ● Battery protection ● Load switch ● Power management 	<div style="text-align: center;">  <p>Schematic diagram</p>  <p>Marking and pin assignment</p>  <p>SOT-23 top view</p> </div>
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Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 10	V
Continuous Drain Current	I_D	$T_A = 25^\circ C$	6.8
		$T_A = 70^\circ C$	5.4
Drain Current-Pulsed (Note 1)	I_{DM}	20	A
Maximum Power Dissipation	P_D	1.25	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)	$R_{\theta JA}$	100	$^\circ C/W$
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Electrical Characteristics ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	20	22	-	V

Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$	-	-	0.3	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.65	0.9	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=2.5V, I_D=4.0 A$	-	18	30	m Ω
		$V_{GS}=4.5V, I_D=4.5A$	-	15	21	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=4A$	-	10	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{iss}	$V_{DS}=8V, V_{GS}=0V,$ $F=1.0MHz$	-	500	-	PF
Output Capacitance	C_{oss}		-	300	-	PF
Reverse Transfer Capacitance	C_{rss}		-	140	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=1A$ $V_{GS}=4.5V, R_{GEN}=6\Omega$	-	20	40	nS
Turn-on Rise Time	t_r		-	18	40	nS
Turn-Off Delay Time	$t_{d(off)}$		-	60	108	nS
Turn-Off Fall Time	t_f		-	28	56	nS
Total Gate Charge	Q_g	$V_{DS}=10V, I_D=3A, V_{GS}=4.5V$	-	10	15	nC
Gate-Source Charge	Q_{gs}		-	2.3	-	nC
Gate-Drain Charge	Q_{gd}		-	2.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	1	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

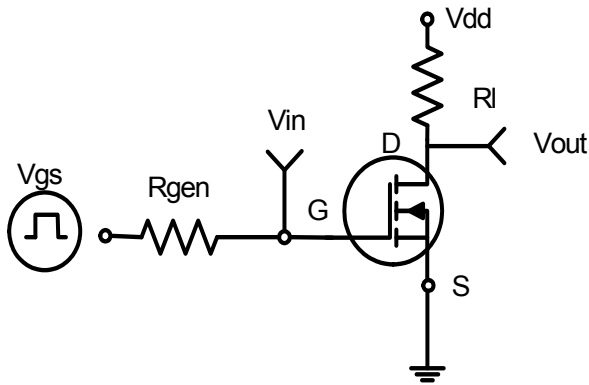


Figure 1: Switching Test Circuit

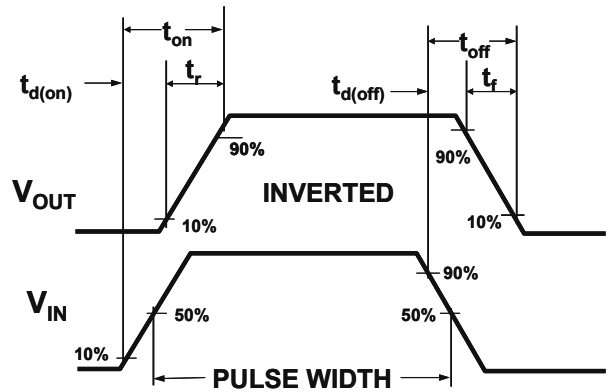


Figure 2: Switching Waveforms

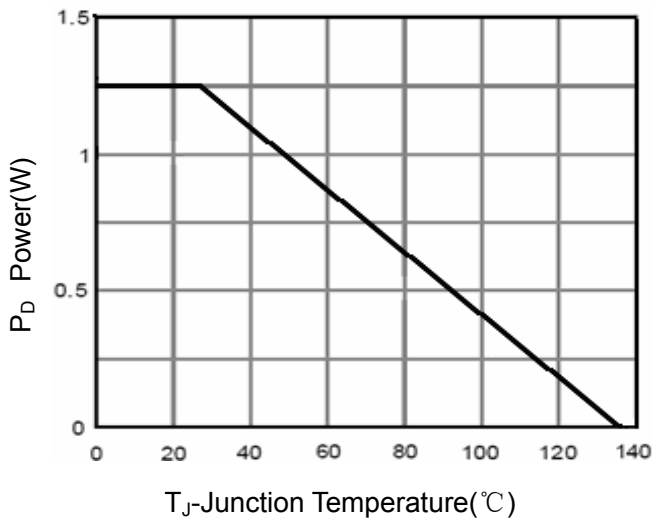


Figure 3 Power Dissipation

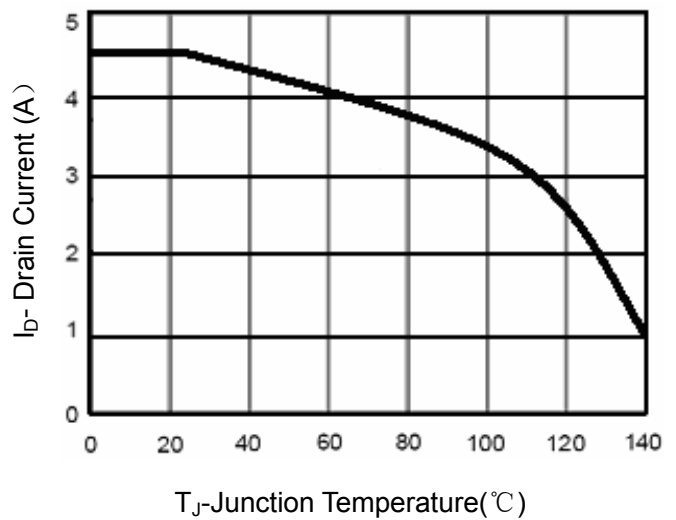


Figure 4 Drain Current

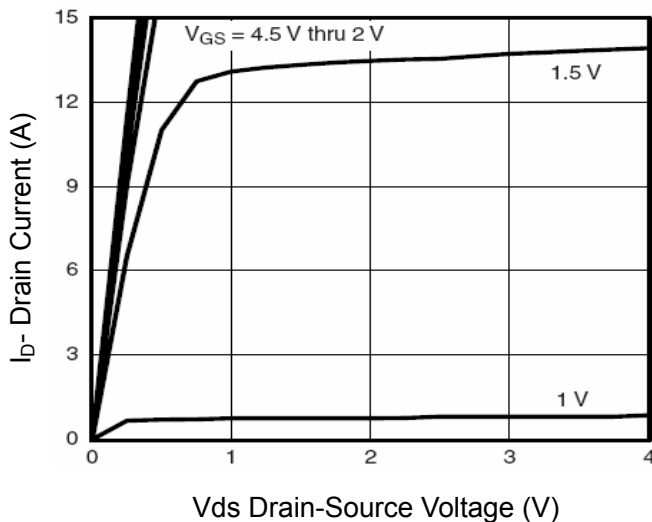


Figure 5 Output CHARACTERISTICS

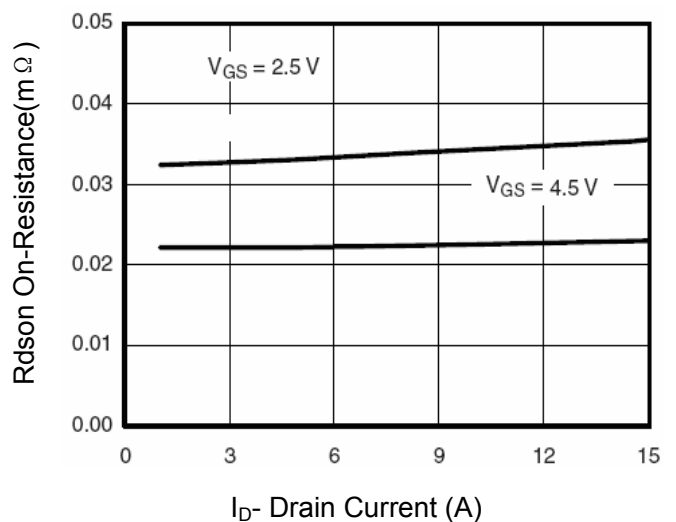
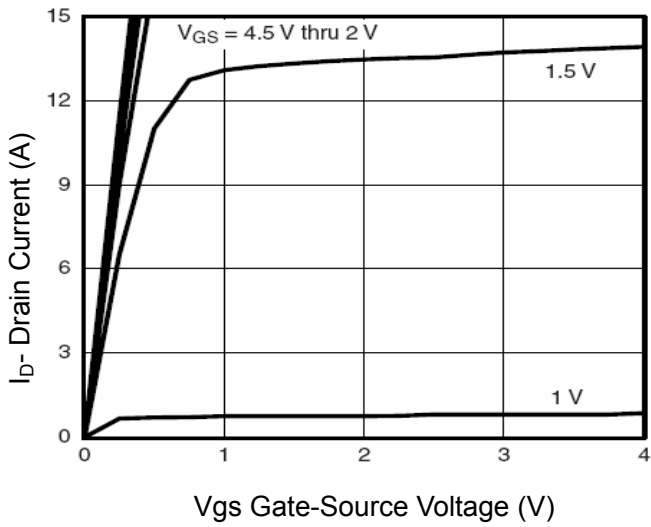
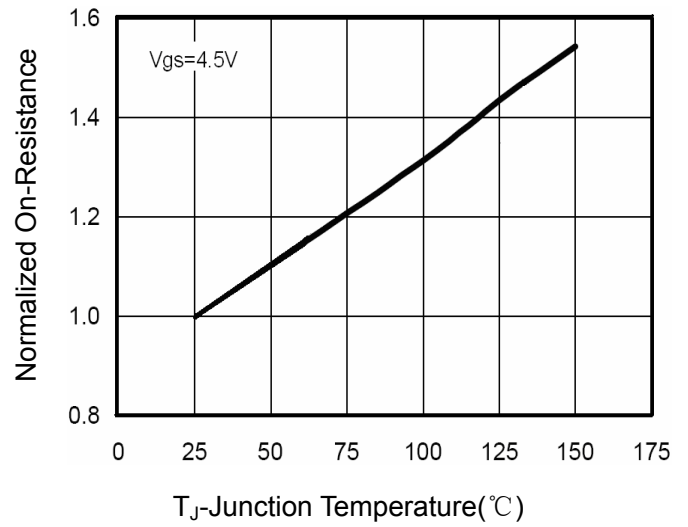


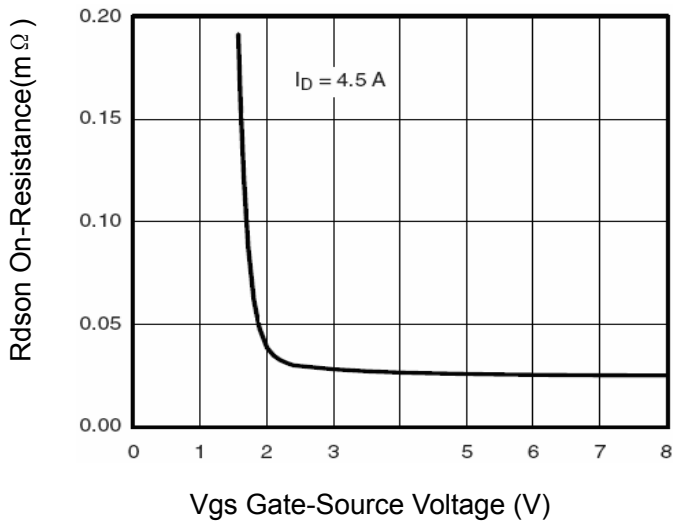
Figure 6 Drain-Source On-Resistance



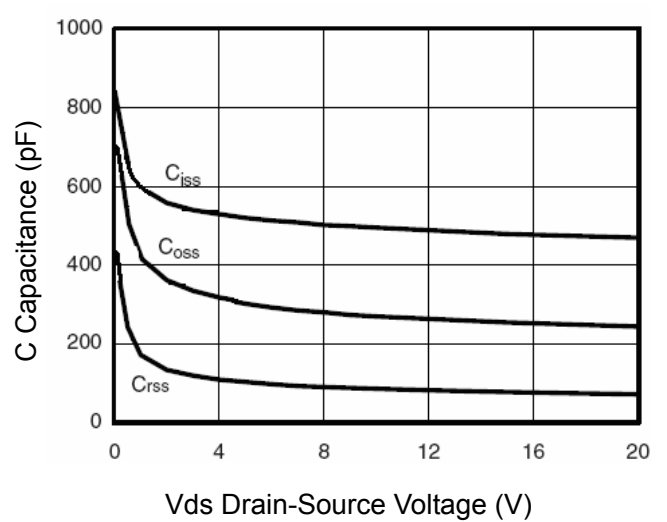
Vgs Gate-Source Voltage (V)
Figure 7 Transfer Characteristics



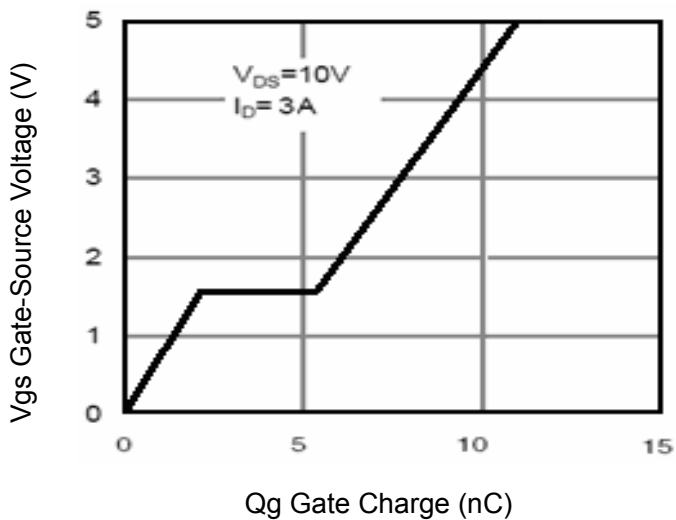
T_J-Junction Temperature(°C)
Figure 8 Drain-Source On-Resistance



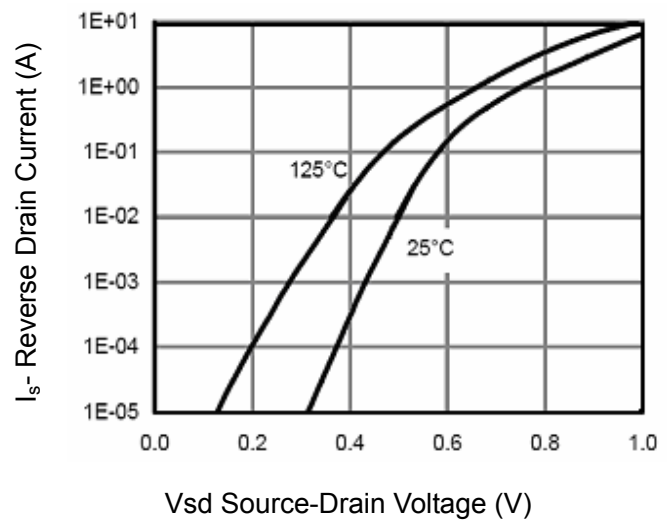
Vgs Gate-Source Voltage (V)
Figure 9 Rdson vs Vgs



Vds Drain-Source Voltage (V)
Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)
Figure 11 Gate Charge



Vsd Source-Drain Voltage (V)
Figure 12 Source- Drain Diode Forward

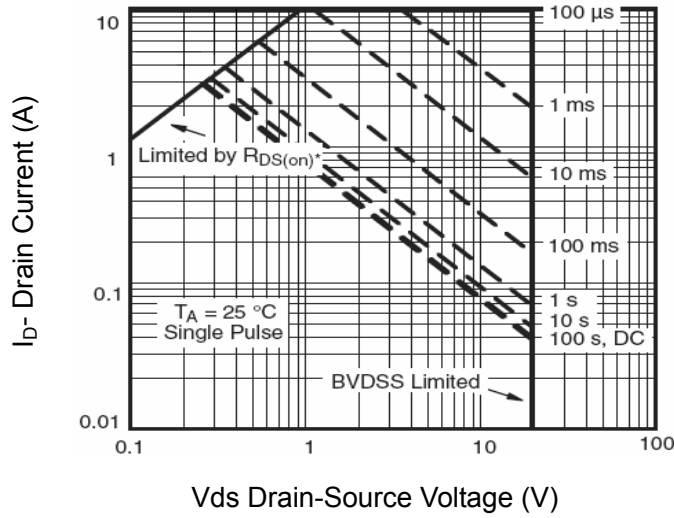


Figure 13 Safe Operation Area

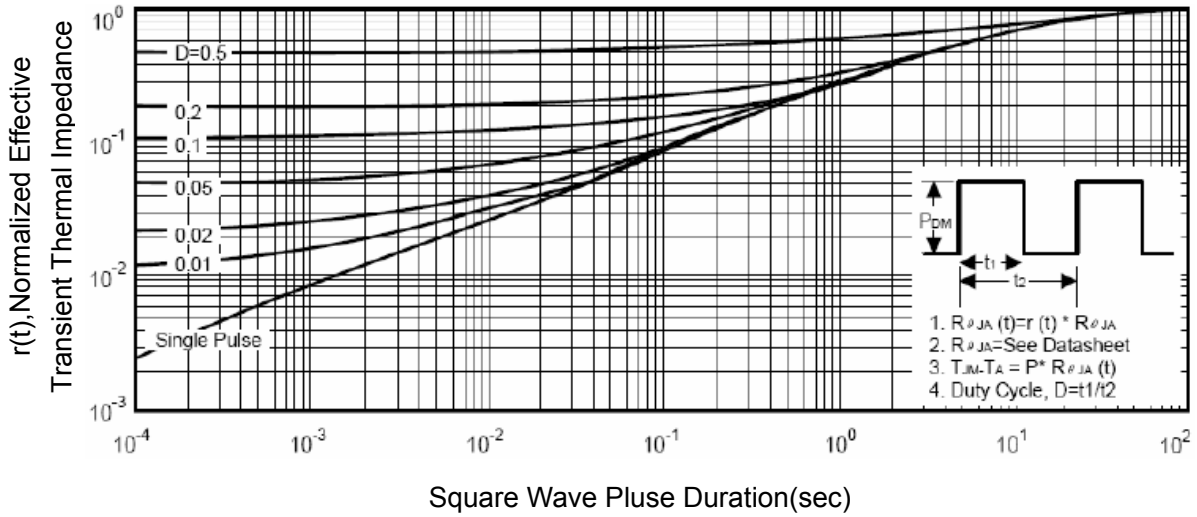


Figure 14 Normalized Maximum Transient Thermal Impedance

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