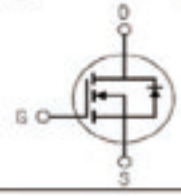
Silicon N-Channel Power MOSFET

V_{DSS}	20	V
I_D	4.0	A
P_D	1.0	W
$R_{DS(ON)typ}$	30	mΩ

Inner Equivalent Principium Chart



General Description:

The 2302 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications. The package form is SOT-23, which accords with the RoHS standard.

Features:

- **Fast Switching**
- **Low Gate Charge and Rdson**
- **Low Reverse transfer capacitances**
- **100% Single Pulse avalanche energy Test**

Applications:

PWM applications

Load switch

Power management

Absolute (Tc= 25℃ unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	30	V
I_D	Continuous Drain Current	4.0	A
	Continuous Drain Current T_C = 70 °C	3.2	A
I_{DM} a1	Pulsed Drain Current	10	A
V_{GS}	Gate-to-Source Voltage	±12	V
dv/dt a3	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	1.0	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	℃
T_L	MaximumTemperature for Soldering	300	℃

Electrical Characteristics (Tc= 25℃ unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Unit s
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	20	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	ID=-250uA,Reference25℃	--	0.1	--	V/℃
I_{DSS}	Drain to Source Leakage Current	V_{DS} = 20, V_{GS}= 0V, T_J = 25℃	--	--	1	μA
		V_{DS} =16V, V_{GS}= 0V, T_J = 125℃	--	--	250	
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+20V	--	--	1	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-20V	--	--	-1	μA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=4.5V,I_D=3.0A	--	30	45	mΩ
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=2.5V,I_D=3.0A	--	37	60	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.5	0.85	1.2	V
Pulse width tp≤380μs, δ ≤2%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	V_{DS}=5V, I_D =3.0A	8	--	--	S
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 10V f = 1.0MHz	--	300	--	pF
C_{oss}	Output Capacitance		--	120	--	
C_{rss}	Reverse Transfer Capacitance		--	80	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D =3.0A V_{DD} = 10V V_{GS} =10V R_G = 6.0Ω	--	10	--	ns
tr	Rise Time		--	50	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	17	--	
t_f	Fall Time		--	10	--	
Q_g	Total Gate Charge	I_D =3.0A V_{DD} =10V V_{GS} = 4.5V	--	4.0	--	nC
Q_{gs}	Gate to Source Charge		--	0.7	--	
Q_{gd}	Gate to Drain ("Miller")Charge		--	1.5	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	4.0	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	10.0	A
V_{SD}	Diode Forward Voltage	I_S=4.0A,V_{GS}=0V	--	--	1.5	V
trr	Reverse Recovery Time	I_S=4.0A,T_j = 25° C	--	25	--	ns
Qrr	Reverse Recovery Charge	dI_F/dt=100A/us, V_{GS}=0V	--	60	--	nC
Pulse width tp≤380μs, δ ≤2%						

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Ambient	125	℃/W

*1 Repetitive rating; pulse width limited by maximum junction temperature
*3 I_{SD} =4.0A,di/dt ≤100A/us,V_{DD}≤BV_{DS}, Start T_j=25℃

Typical Electrical and Thermal Characteristics

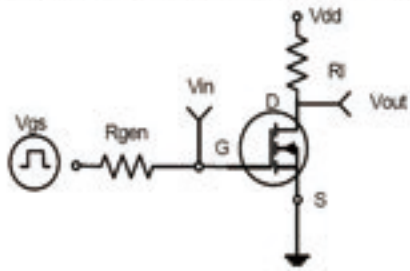


Figure 1:Switching Test Circuit

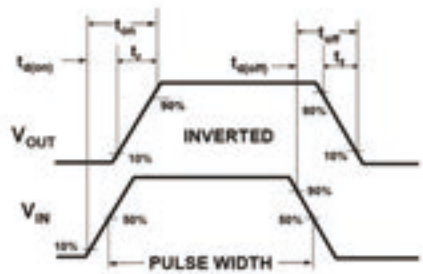


Figure 2:Switching Waveforms

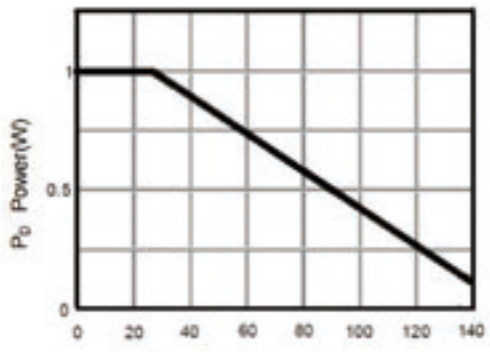


Figure 3 Power Dissipation

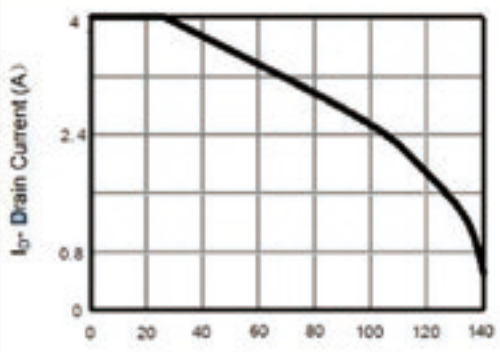


Figure 4 Drain Current

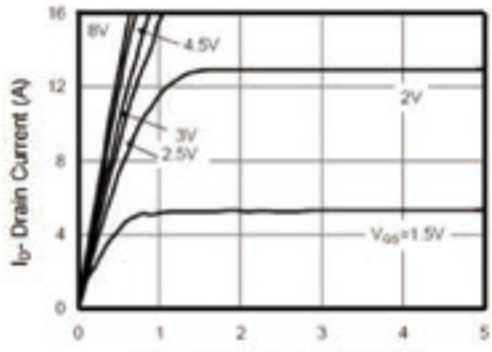


Figure 5 Output Characteristics

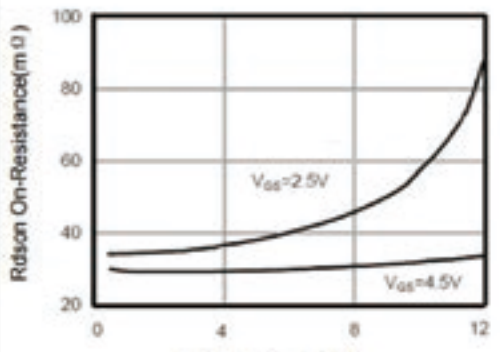


Figure 6 Drain-Source On-Resistance

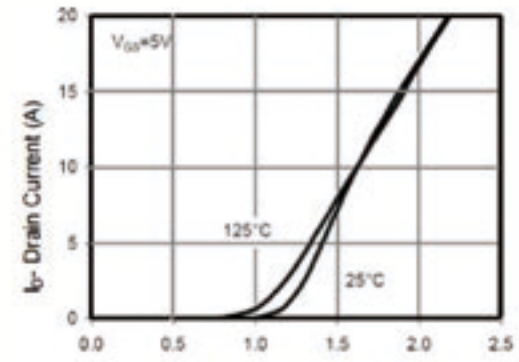


Figure 7 Transfer Characteristics

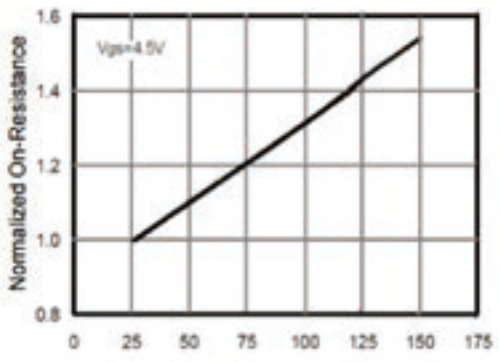


Figure 8 Drain-Source On-Resistance

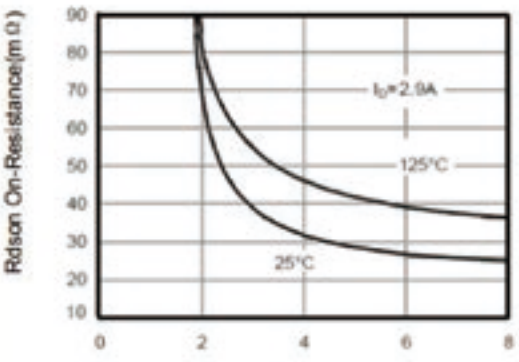


Figure 9 Rdson vs Vgs

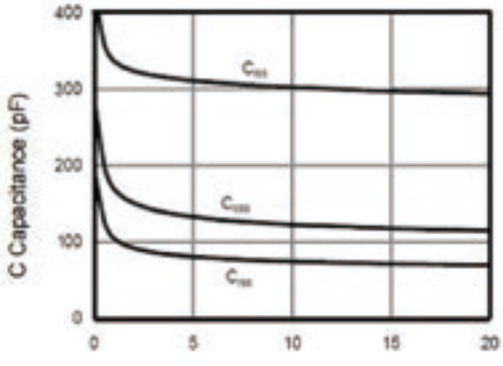


Figure 10 Capacitance vs Vds

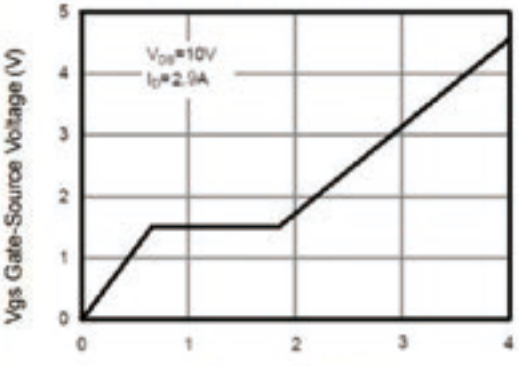


Figure 11 Gate Charge

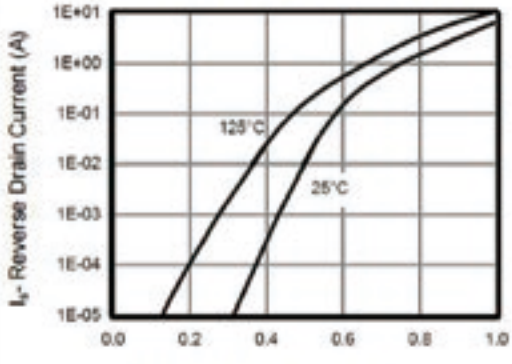


Figure 12 Source- Drain Diode Forward

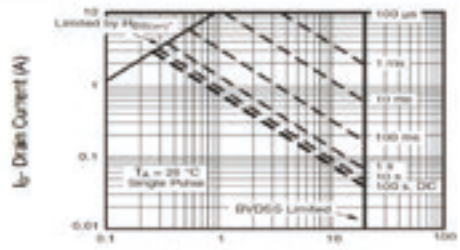


Figure 13 Safe Operation Area

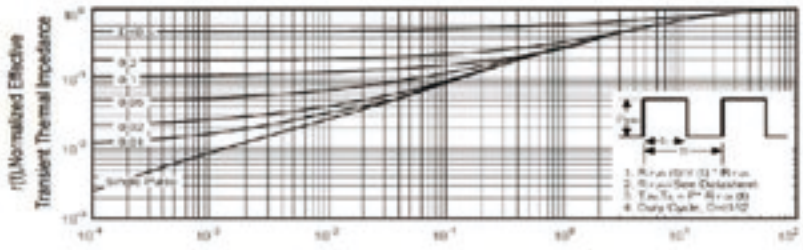


Figure 14 Normalized Maximum Transient Thermal Impedance

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