N-Channel Enhancement Mode Power MOSFET

Description

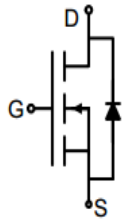
The 2302 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

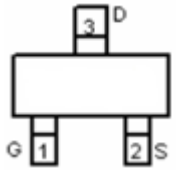
- V_{DS} 20V
- I_D (at V_{GS} = 10V) 4.3A
- $R_{DS(ON)}$ (at V_{GS} = 4.5V) < 27mΩ
- $R_{DS(ON)}$ (at V_{GS} = 2.5V) < 44mΩ
- 100% Avalanche Tested
- RoHS Compliant

Application

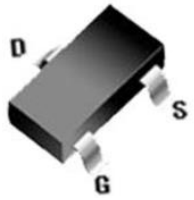
- Power switch
- DC/DC converters



Schematic diagram



Marking and pin assignment



SOT-23

Device	Package	Marking	Packaging
2302	SOT-23	2302	3000pcs/Reel

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Continuous Drain Current	I_D	4.3	A
Pulsed Drain Current (note1)	I_{DM}	10	A
Gate-Source Voltage	V_{GS}	±10	V
Power Dissipation	P_D	1	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	ºC

Thermal Resistance

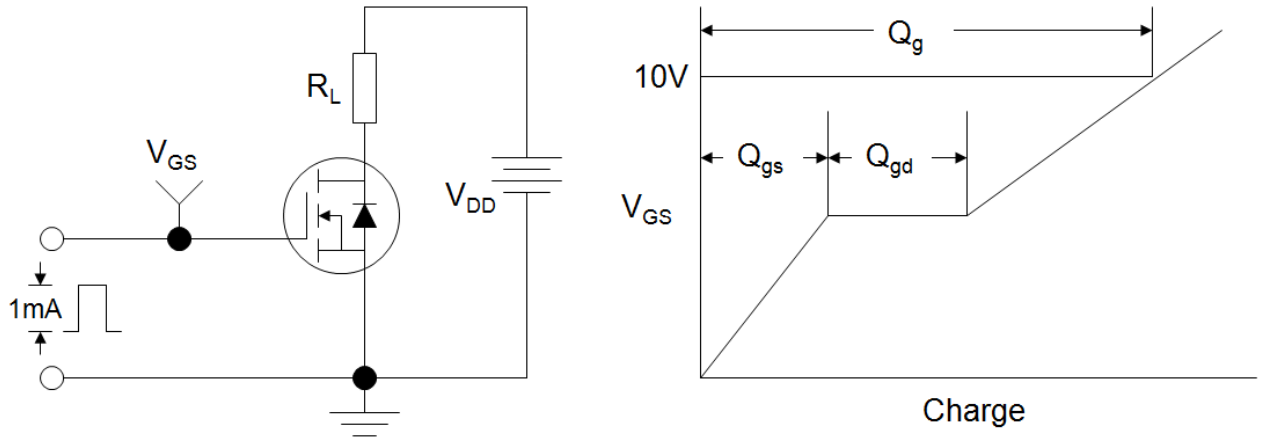
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	125	ºC/W

Specifications T_J = 25ºC, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	20	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V	--	--	1	uA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±10V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	0.6	0.7	1.1	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 4.5V, I_D = 2.2A	--	21	27	mΩ
		V_{GS} = 2.5V, I_D = 2.2A	--	28	44	
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 10V, f = 1.0MHz	--	356	--	pF
Output Capacitance	C_{oss}		--	77	--	
Reverse Transfer Capacitance	C_{rss}		--	70	--	
Total Gate Charge	Q_g	V_{DD} = 10V, I_D = 2A, V_{GS} = 4.5V	--	4	--	nC
Gate-Source Charge	Q_{gs}		--	0.7	--	
Gate-Drain Charge	Q_{gd}		--	1.2	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 10V, I_D = 2A, R_G = 6Ω	--	10	--	ns
Turn-on Rise Time	t_r		--	50	--	
Turn-off Delay Time	$t_{d(off)}$		--	17	--	
Turn-off Fall Time	t_f		--	10	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	4.3	A
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 1A, V_{GS} = 0V	--	--	1.2	V

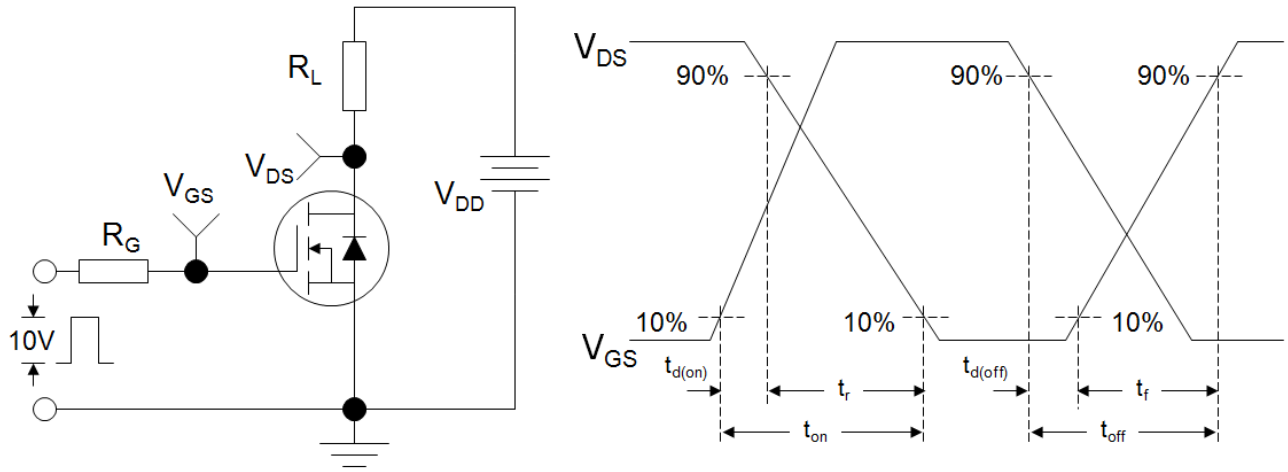
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical R_G

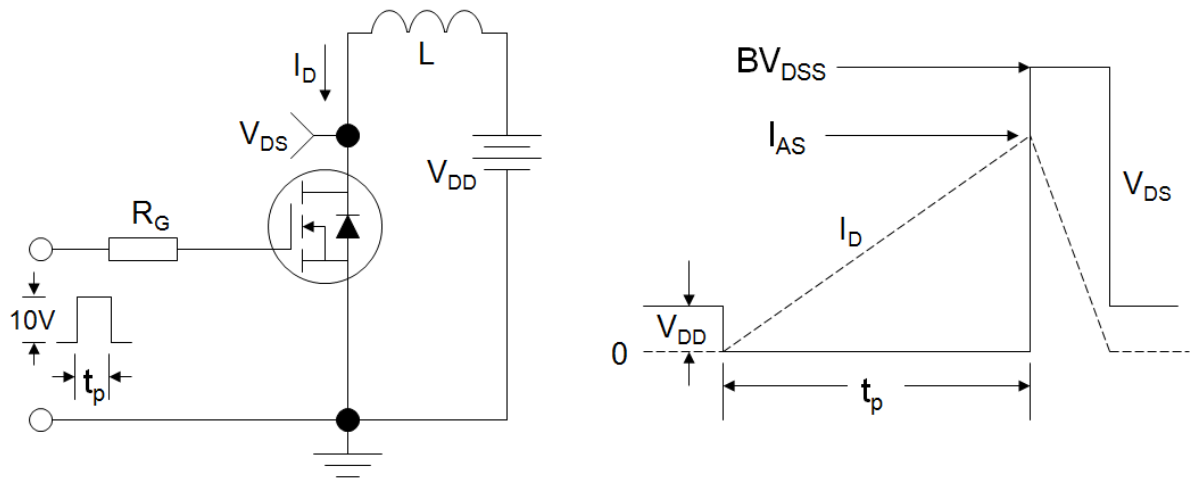
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

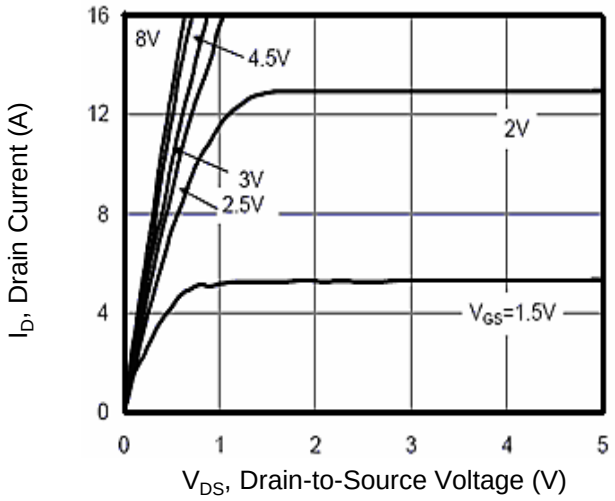


Figure 2. Transfer Characteristics

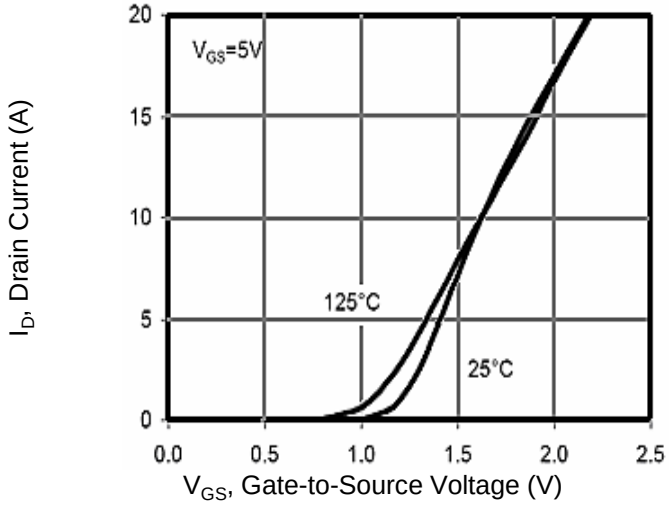


Figure 3. Gate Charge

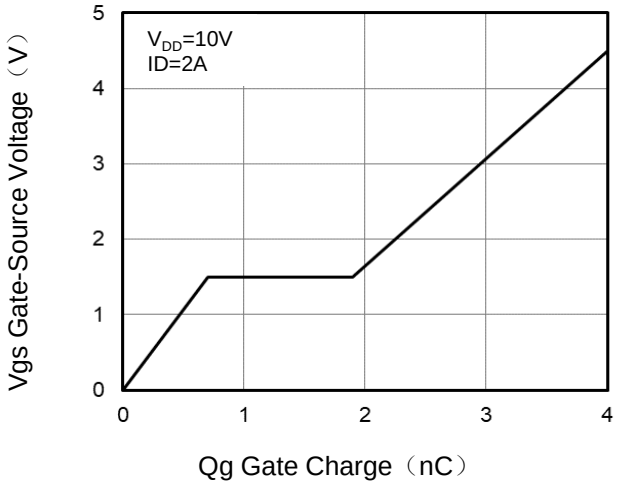


Figure 4. Drain Source On Resistance

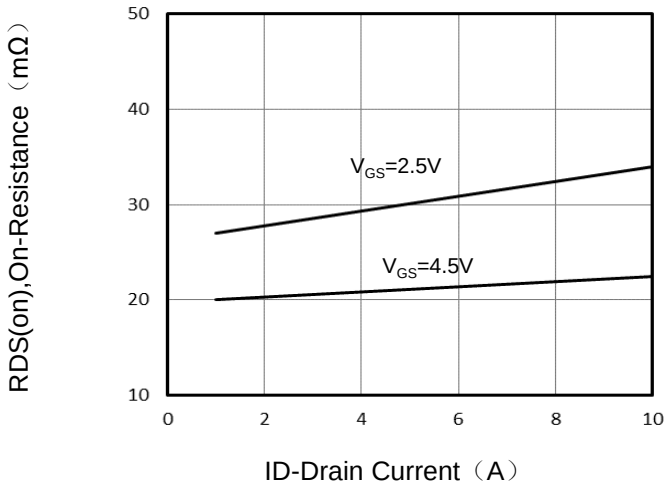


Figure 5. Capacitance

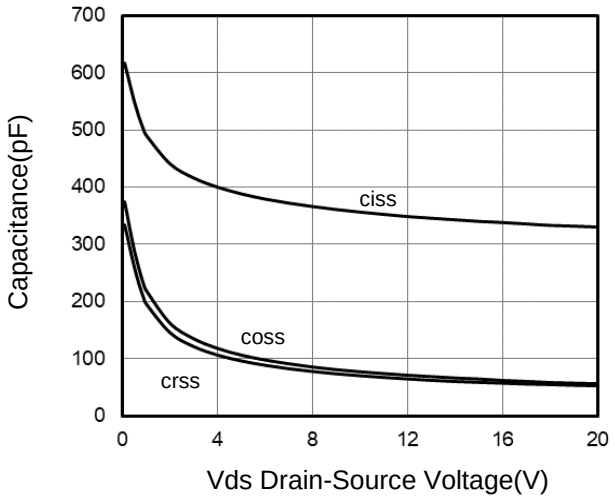
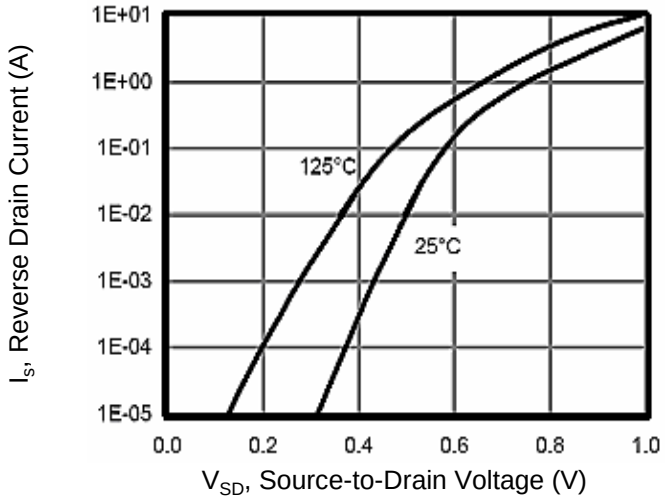


Figure 6. Source-Drain Diode Forward



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Drain-Source On-Resistance

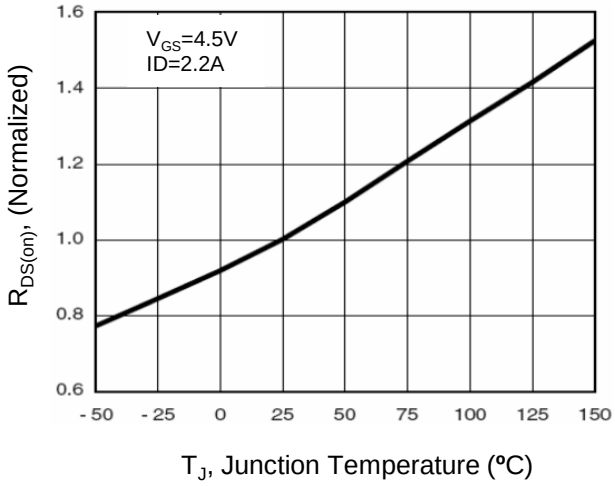


Figure 8. Safe Operation Area

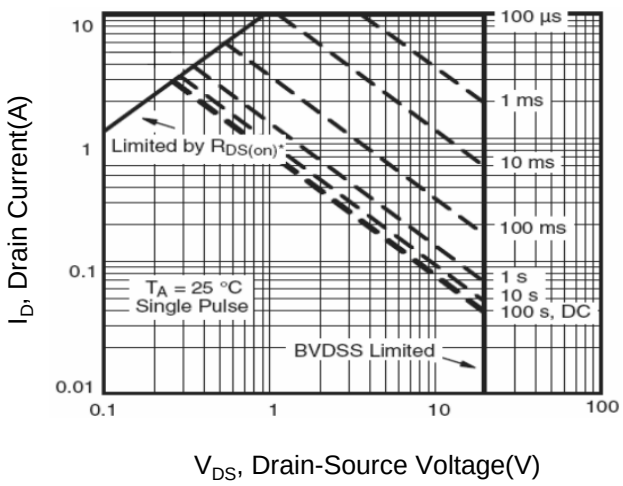
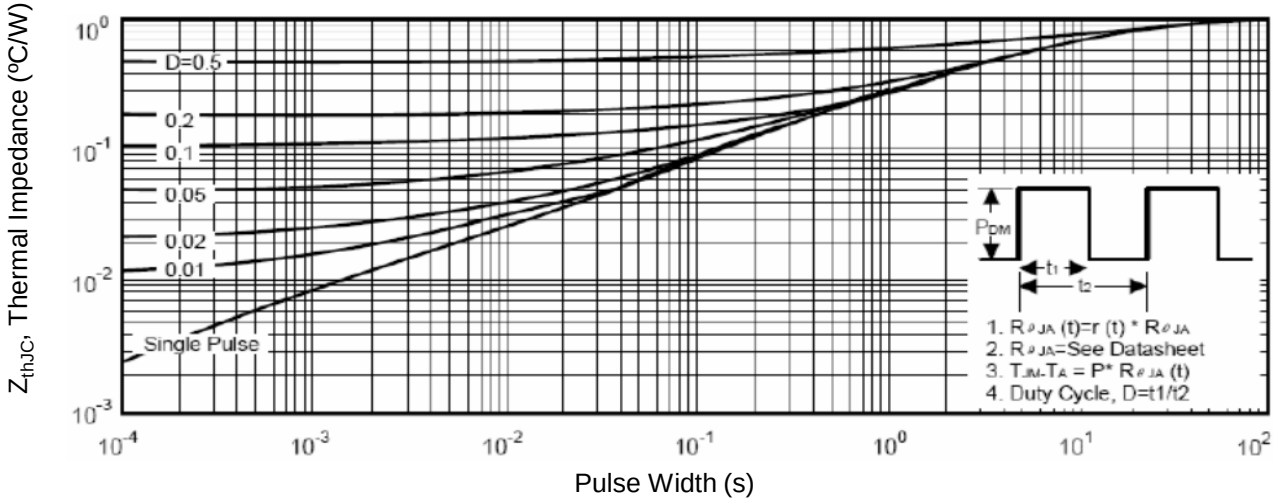
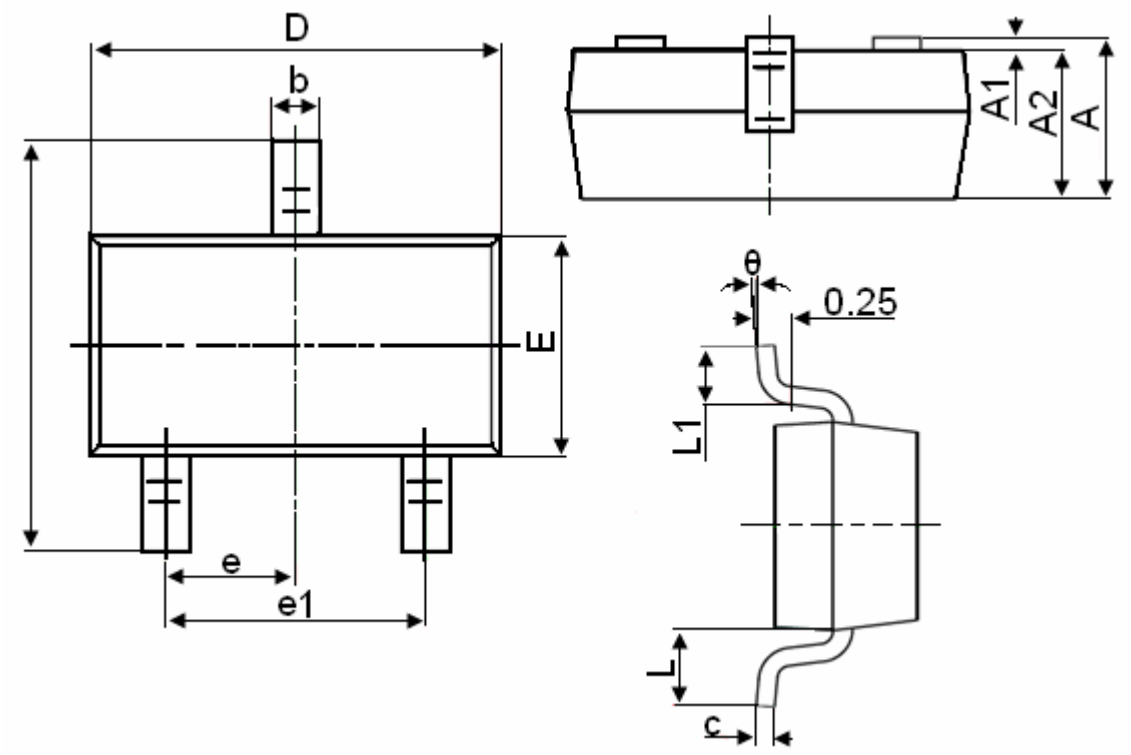


Figure 9. Normalized Maximum Transient Thermal Impedance



SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°