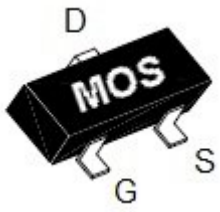
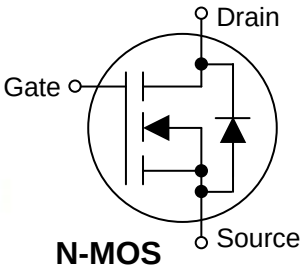
2302

20V N-Channel Enhancement-Mode MOSFET

Product Summary

B_{VDSS}	$R_{DS(ON)}$(mΩ) (Typ.)	I_D
20V	45mΩ at V_{GS}=4.5V	2.3A





G. Gate
S. Source
D. Drain

General Description

- *I_D=2.3A@V_{GS}=4.5V*
- *$R_{DS(on)}$=45mΩ(Typ.)@V_{GS}=4.5V*
- *$R_{DS(on)}$=60mΩ(Typ.)@V_{GS}=2.5V*
- *Advanced high cell density trench technology*
- *Excellent CdV / dt effect decline*
- *Super Low Gate Charge*
- *Application:*
  - *Hand Held Instruments*
  - *Small power switching for MB/NB/UMPC/VGA*
  - *Networking DC-DC Power System*
  - *Load Switch*
- *Pb-Free and Green Devices are Available*
- *Package: SOT23, SOT23-3L*

Green Available

Absolute Maximum Ratings (T_A = 25ºC unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±10	V
Drain Current [a]	T_C=25ºC	I_D	2.3	A
	T_C=25ºC, t ≤ 5s		2.8	
	T_C=70ºC		1.38	
Drain Current –Pulsed [a]		I_{DM}	9.2	A
Power Dissipation (T_C=25ºC)		P_D	1.56	W
Power Dissipation – Derate above 25ºC			0.012	W/ºC
Storage Temperature Range		T_{STG}	-55 ~ +150	ºC
Operating Junction Temperature Range		T_J	-55 ~ +150	ºC
Thermal Resistance, Junction-to-Ambient1		$R_{\theta JA}$	100	ºC/W

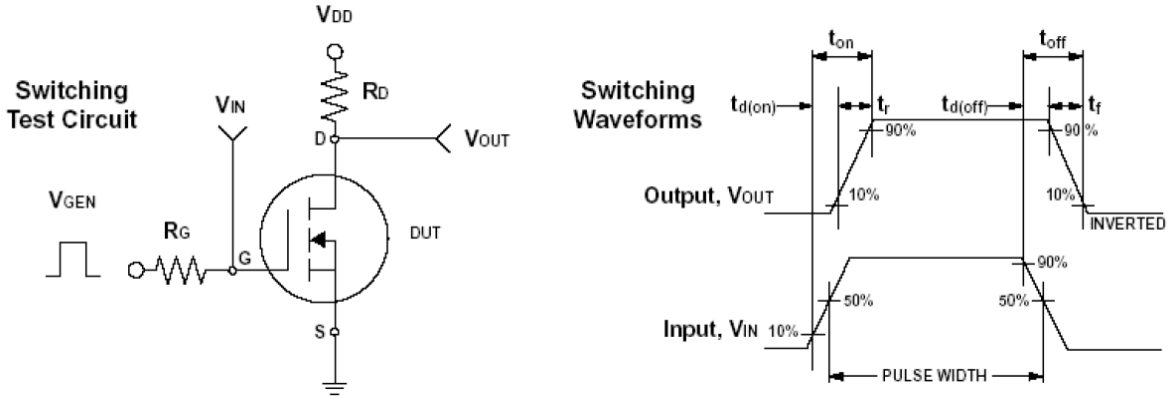
Electrical Characteristics (T_J=25ºC unless otherwise noted)

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA		20*	---	V
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS}=16V, V_{GS}=0V	---	---	1	μA
Gate-Body Leakage		I_{GSS}	V_{GS}=±10V, V_{DS}=0V	---	---	±100	nA
On Characteristics [a]							
Gate Threshold Voltage		$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	0.3	---	1.0	V
Drain-Source On-State Resistance		$R_{DS(on)}$	V_{GS}=4.5V, I_D=2.8A	---	45	65	mΩ
			V_{GS}=2.5V, I_D=2.0A	---	60	85	

		V_{GS}=1.8V, I_D=1.0A	---	80	120	
Forward Transconductance	gfs	V_{DS}=10V, I_D=2A	---	4.4	---	S
Drain-Source Diode Characteristics [a]						
Continuous Source Current	I_S	V_G=V_D=0V, Force Current	---	---	2.3	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=1A	---	---	1.3	V
Dynamic Characteristics [b]						
Input Capacitance	Ciss	V_{DS}=15V, V_{GS}=0V, F=1MHz	---	180	360	pF
Output Capacitance	Coss		---	32	64	
Reverse Transfer Capacitance	Crss		---	26	52	
Switching Characteristics [b]						
Total Gate Charge	Qg	V_{DS}=10V, V_{GS}=4.5V, I_D=2.3A	---	3.6	7.2	nC
Gate-Source Charge	Qgs		---	0.38	0.76	
Gate-Drain Charge	Qgd		---	0.6	1.2	
Turn-On Delay Time	Td(on)	V_{DD}=10V, V_{GS}=4.5V, R_G=25Ω, I_D=1A	---	1.8	5	ns
Rise Time	Tr		---	5.6	12	
Turn-Off Delay Time	Td(off)		---	11.3	24	
Fall Time	Tf		---	3.2	7	

Notes: a. Repetitive Rating: Pulsed width limited by maximum junction temperature.
b. Pulse test: pulse width ≤ 300us, duty cycle ≤ 2%.
c. Guaranteed by design, not subject to production testing.

Switching Time Test Circuit and Waveforms



Soldering Methods For Products

1. Storage environment : Temperature=10ºC~35ºC, Humidity=65%±15%
2. Reflow soldering of surface mount devices

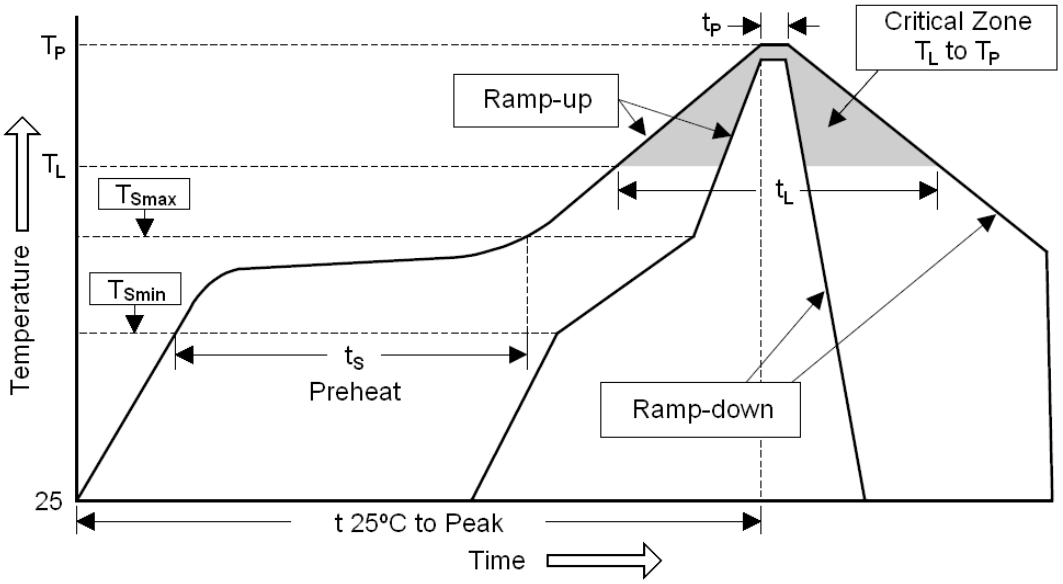


Figure : Temperature Profile

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	< 3ºC/sec	< 3ºC/sec
Preheat - Temperature Min (TSmin) - Temperature Max (TSmax) - Time (Min to Max) (ts)	 100ºC 150ºC 60 ~ 120 sec	 100ºC 200ºC 60 ~ 180 sec
TSmax to T_L - Ramp-up rate	 < 3ºC/sec	 < 3ºC/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183ºC 60 ~ 150 sec	 217ºC 60 ~ 150 sec
Peak Temperature (T_P)	240ºC +0/-5ºC	260ºC +0/-5ºC
Time within 5ºC of actual Peak Temperature (t_P)	10 ~ 30 sec	20 ~ 40 sec
Ramp-down rate	< 6ºC/sec	< 6ºC/sec
Time 25ºC to Peak Temperature	< 6 minutes	< 8 minutes

3. Flow (wave) soldering (solder dipping)

Product	Peak Temperature	Dipping Time
Pb devices	245ºC ±5ºC	5sec ±1sec
Pb-Free devices	260ºC +0/-5ºC	5sec ±1sec

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- MOS 管电路是静电敏感元器件，且对生产环境要求较严，建议在存放、运输及生产操作时一定要避免静电干扰。
- 经锡炉或回焊炉的温度切勿超过 260 ºC。