

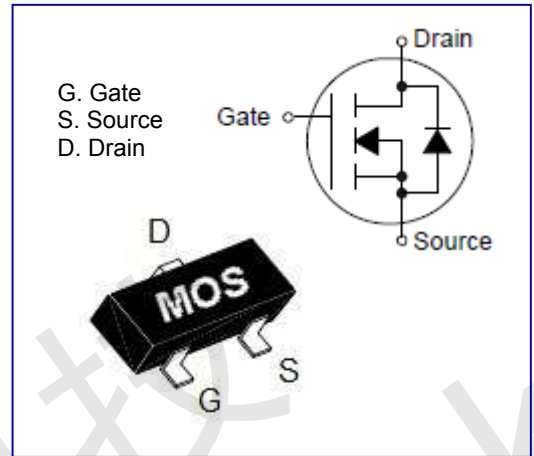


# CST2300X

# 20V\* N-Channel Enhancement-Mode MOSFET

## General Description

- $I_D=3.2A$
- $R_{DS(on)}=48m\Omega(Typ.)@V_{GS}=4.5V$
- $R_{DS(on)}=65m\Omega(Typ.)@V_{GS}=2.5V$
- $R_{DS(on)}=90m\Omega(Typ.)@V_{GS}=1.8V$
- Low Gate charge
- Fast switching speed
- High density cell design for ultra low On-Resistance
- Application:
  - Switching applications
  - Power management
- Lead free and green devices available
- Package: SOT23



## 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	$V_{GS}$	$\pm 12$	V
Drain Current <sup>a</sup>	$I_D$	$T_C=25^\circ C$	3.2
		$T_C=70^\circ C$	1.5
Drain Current –Pulsed <sup>a</sup>	$I_{DM}$	9.6	A
Power Dissipation ( $T_C=25^\circ C$ )	$P_D$	0.90	W
Power Dissipation ( $T_C=75^\circ C$ )		0.50	
Storage Temperature Range	$T_{STG}$	-55 ~ +150	$^\circ C$
Operating Junction Temperature Range	$T_J$	-55 ~ +150	$^\circ C$
Thermal Resistance, Junction-to-Ambient <sup>1</sup>	$R_{\theta JA}$	125	$^\circ C/W$

## Electrical Characteristics ( $T_A=25^\circ C$ unless otherwise noted)

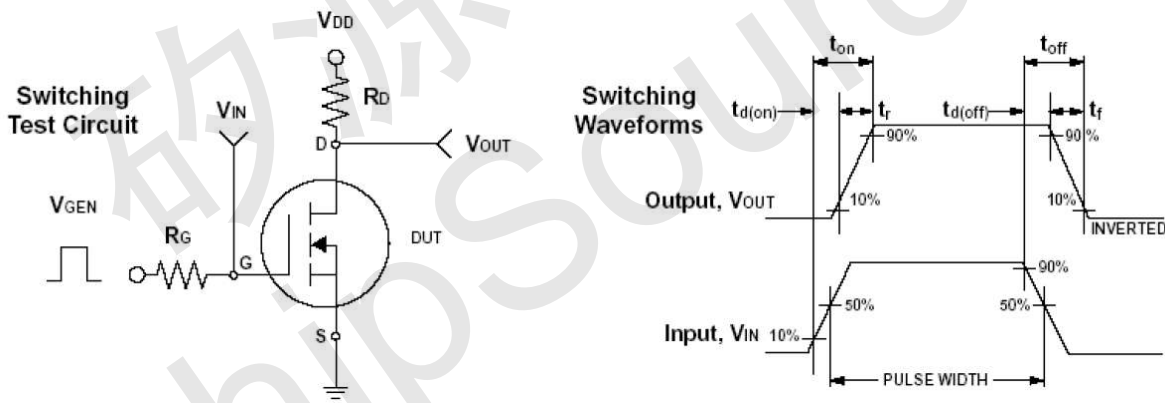
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$		20		V
Zero Gate Voltage Drain Current	$I_{DSS}$	$T_J=25^\circ C, V_{DS}=16V, V_{GS}=0V$			1	$\mu A$
Gate-Body Leakage	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$			$\pm 100$	nA
<b>On Characteristics <sup>a</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.3		1.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=2.4A$		48	60	$m\Omega$
		$V_{GS}=2.5V, I_D=2.0A$		65	85	$m\Omega$
		$V_{GS}=1.8V, I_D=1.0A$		90	125	$m\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=1A$				S



Drain-Source Diode Characteristics <sup>a</sup>						
Continuous Source Current	$I_S$	$V_G=V_D=0V$ , Force Current	---	---	2.4	A
Pulsed Source Current	$I_{SM}$		---	---	9.6	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V$ , $I_S=1A$	---	---	1.3	V
Dynamic Characteristics <sup>b</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V$ , $V_{GS}=0V$ , $F=1.0MHz$	---			pF
Output Capacitance	$C_{oss}$		---			pF
Reverse Transfer Capacitance	$C_{rss}$		---			pF
Switching Characteristics <sup>b</sup>						
Total Gate Charge	$Q_g$	$V_{DS}=10V$ , $V_{GS}=4.5V$ , $I_D=2.0A$	---			nC
Gate-Source Charge	$Q_{gs}$		---			nC
Gate-Drain Charge	$Q_{gd}$		---			nC
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=10V$ , $I_D=1.0A$ , $V_{GEN}=4.5V$ , $R_G=6\Omega$	---			ns
Rise Time	$T_r$		---			ns
Turn-Off Delay Time	$T_{d(off)}$		---			ns
Fall Time	$T_f$		---			ns

Notes: a. Repetitive Rating: Pulsed width limited by maximum junction temperature.  
b. Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ . Essential independent of operating temperature.  
c. Guaranteed by design, not subject to production testing.

### Switching Time Test Circuit and Waveforms





### Soldering Methods For Products

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

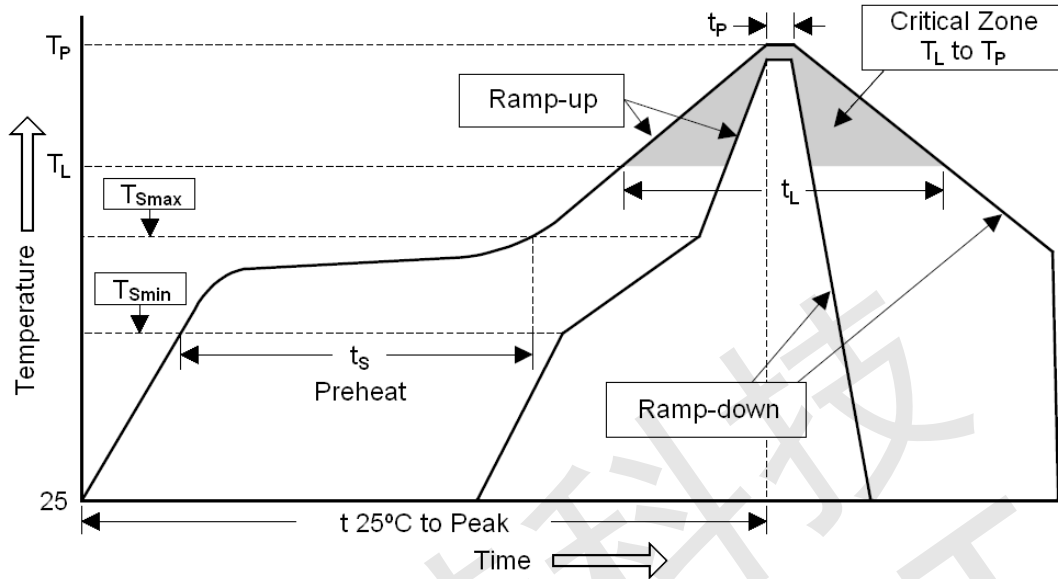


Figure : Temperature Profile

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	< 3°C/sec	< 3°C/sec
Preheat		
- Temperature Min ( $T_{Smin}$ )	100°C	100°C
- Temperature Max ( $T_{Smax}$ )	150°C	200°C
- Time (Min to Max) ( $t_s$ )	60 ~ 120 sec	60 ~ 180 sec
$T_{Smax}$ to $T_L$		
- Ramp-up rate	< 3°C/sec	< 3°C/sec
Time maintained above:		
- Temperature ( $T_L$ )	183°C	217°C
- Time ( $t_L$ )	60 ~ 150 sec	60 ~ 150 sec
Peak Temperature ( $T_P$ )	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature ( $t_p$ )	10 ~ 30 sec	20 ~ 40 sec
Ramp-down rate	< 6°C/sec	< 6°C/sec
Time 25°C to Peak Temperature	< 6 minutes	< 8 minutes

### 3. Flow (wave) soldering (solder dipping)

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

### Notices:

- 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 度。