



H2301N

P-Channel Enhancement-Mode MOSFET (-20V, -2.2A)

Features

- $R_{DS(on)} < 100m\Omega @ V_{GS} = -4.5V, I_D = -2.8A$
- $R_{DS(on)} < 150m\Omega @ V_{GS} = -2.5V, I_D = -2A$
- Advanced Trench Process Technology
- High Density Cell Design for Ultra Low On-Resistance
- Improved Shoot-Through FOM

Absolute Maximum Ratings $(T_A = 25^\circ C, \text{ unless otherwise noted})$

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 8	V
I_D	Drain Current (Continuous)	-2.2	A
I_{DM}	Drain Current (Pulsed) ^{*1}	-8	A
P_D	Total Power Dissipation @ $T_A = 25^\circ C$	0.9	W
	Total Power Dissipation @ $T_A = 75^\circ C$	0.57	W
T_j, T_{stg}	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (PCB mounted) ^{*2}	140	$^\circ C/W$

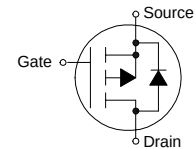
*1: Repetitive Rating: Pulse width limited by the maximum junction temperature.

*2: 1-in² 2oz Cu PCB board

H2301N Pin Assignment & Symbol



3-Lead Plastic **SOT-23**
Package Code: N
Pin 1: Gate 2: Source 3: Drain





Electrical Characteristics (T_A=25°C, unless otherwise noted)

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
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• Static

BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-20	-	-	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _D =-2.8A	-	69	100	mΩ
		V _{GS} =-2.5V, I _D =-2A	-	83	150	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250uA	-0.45	-	-0.95	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-9.6V, V _{GS} =0V	-	-	-1	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±8V, V _{DS} =0V	-	-	±100	nA
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-4A	-	6.5	-	S

• Dynamic

Q _g	Total Gate Charge	V _{DS} =-6V, I _D =-2.8A, V _{GS} =-4.5V	-	15.23	-	nC
Q _{gs}	Gate-Source Charge		-	5.49	-	
Q _{gd}	Gate-Drain Charge		-	2.74	-	
C _{iss}	Input Capacitance	V _{DS} =-6V, V _{GS} =0V, f=1MHz	-	882.51	-	PF
C _{oss}	Output Capacitance		-	145.54	-	
C _{rss}	Reverse Transfer Capacitance		-	97.26	-	
t _{d(on)}	Turn-on Delay Time	V _{DD} =-6V, R _L =6Ω, I _D =-1A, V _{GEN} =-4.5V, R _G =6Ω	-	17.28	-	nS
t _r	Turn-on Rise Time		-	3.73	-	
t _{d(off)}	Turn-off Delay Time		-	36.05	-	
t _f	Turn-off Fall Time		-	6.19	-	

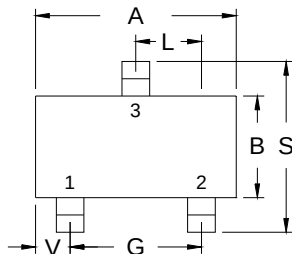
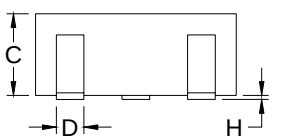
• Drain-Source Diode Characteristics

I _S	Maximum Diode Forward Current		-	-	-2.4	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} =0V, I _S =-0.75A	-	-0.8	-1.2	V

Note: Pulse Test: Pulse Width ≤300us, Duty Cycle≤2%

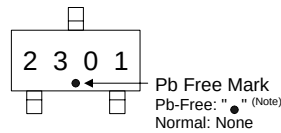


SOT-23 Dimension



3-Lead SOT-23 Plastic
Surface Mounted Package
HSMC Package Code: N

Marking:



Note: Pb-free product can distinguish by the green label or the extra description on the right side of the label.

Pin Style: 1.Gate 2.Source 3.Drain

Material:

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	2.80	3.04
B	1.20	1.60
C	0.89	1.30
D	0.30	0.50
G	1.70	2.30
H	0.013	0.10
J	0.085	0.177
K	0.32	0.67
L	0.85	1.15
S	2.10	2.75
V	0.25	0.65

*: Typical, Unit: mm

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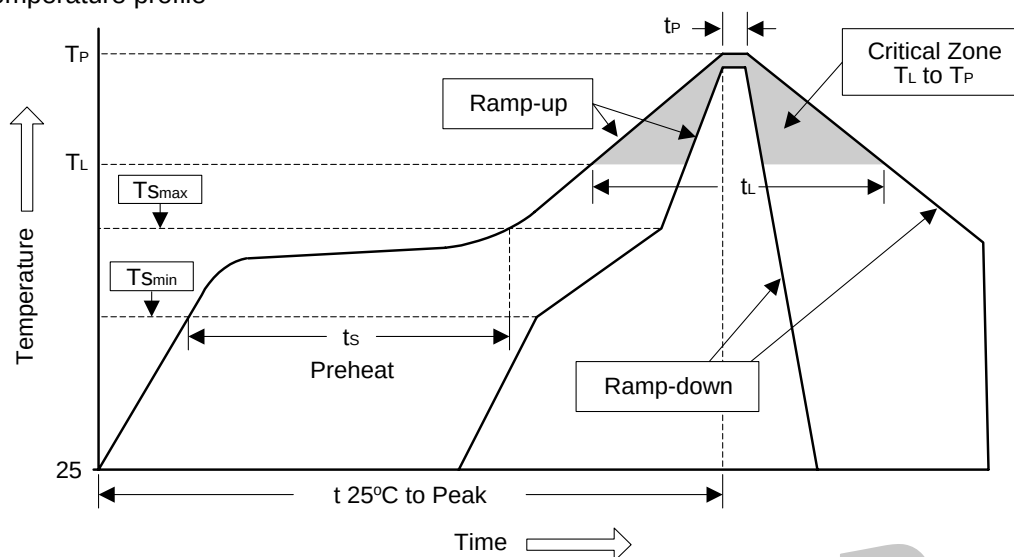
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Soldering Methods for HSMC's Products

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

Figure 1: 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	150°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)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	10sec ±1sec
Pb-Free devices.	260°C ±5°C	10sec ±1sec