



# H9435S/H9435DS

P-Channel Enhancement-Mode MOSFET (-30V, -5.3A)

## Features

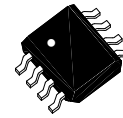
- $R_{DS(on)}=60m\Omega @ V_{GS}=-10V, I_D=-5.3A$
- $R_{DS(on)}=90m\Omega @ V_{GS}=-4.5V, I_D=-4.2A$
- Advanced Trench Process Technology
- High Density Cell Design for Ultra Low On-Resistance
- Fully Characterized Avalanche Voltage and Current
- Improved Shoot-Through FOM

## Absolute Maximum Ratings (T<sub>A</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Ratings	Units
V <sub>DS</sub>	Drain-Source Voltage	-30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current (Continuous)	-5.3	A
I <sub>DM</sub>	Drain Current (Pulsed) <sup>*1</sup>	-20	A
P <sub>D</sub>	Total Power Dissipation @T <sub>A</sub> =25°C	2.5	W
T <sub>j</sub> , T <sub>stg</sub>	Operating and Storage Temperature Range	-55 to +150	°C
R <sub>θJC</sub>	Thermal Resistance Junction to Case	30	°C/W
R <sub>θJA</sub>	Thermal Resistance Junction to Ambient (PCB mounted) <sup>*2</sup>	50	°C/W

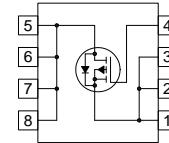
\*1: Maximum DC current limited by the package

\*2: 1-in<sup>2</sup> 2oz Cu PCB board



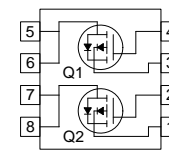
8-Lead Plastic **SO-8**  
 Package Code: S

H9435S Symbol & Pin Assignment



Pin 1 / 2 / 3: Source  
 Pin 4: Gate  
 Pin 5 / 6 / 7 / 8: Drain

H9435DS Symbol & Pin Assignment



Pin 1: Source 1  
 Pin 2: Gate 1  
 Pin 3: Source 2  
 Pin 4: Gate 2  
 Pin 5 / 6 Drain2  
 Pin 7 / 8: Drain1



### Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise noted)

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

BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	30	-	-	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.2A	-	82	90	mΩ
		V <sub>GS</sub> =-10V, I <sub>D</sub> =-5.3A	-	50	60	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1	-	-3	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V	-	-	-1	uA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-15V, I <sub>D</sub> =-5.3A	4	7	-	S

• **Dynamic**

Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-15V, I <sub>D</sub> =-5.3A, V <sub>GS</sub> =-10V	-	9.52	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	3.43	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	1.71	-	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	-	551.57	-	PF
C <sub>oss</sub>	Output Capacitance		-	90.96	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	60.79	-	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =10V, R <sub>L</sub> =15Ω, I <sub>D</sub> =-1A, V <sub>GEN</sub> =-10V, R <sub>G</sub> =6Ω	-	10.8	-	Ns
t <sub>r</sub>	Turn-on Rise Time		-	2.33	-	
t <sub>d(off)</sub>	Turn-off Delay Time		-	22.53	-	
t <sub>f</sub>	Turn-off Fall Time		-	3.87	-	

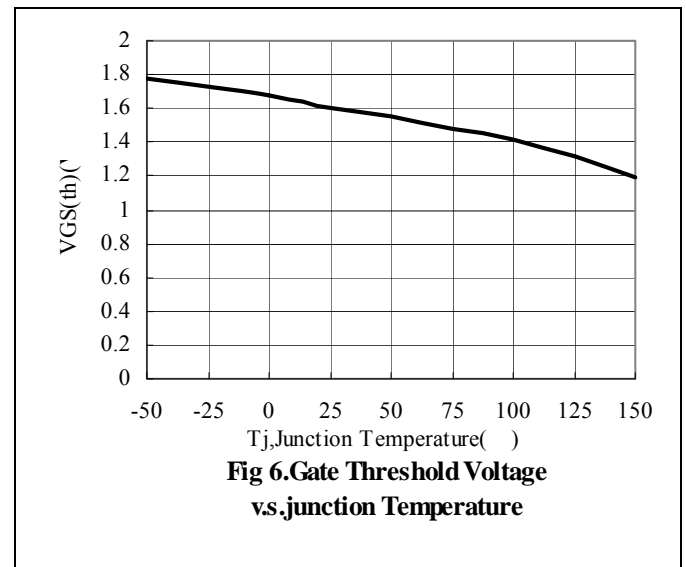
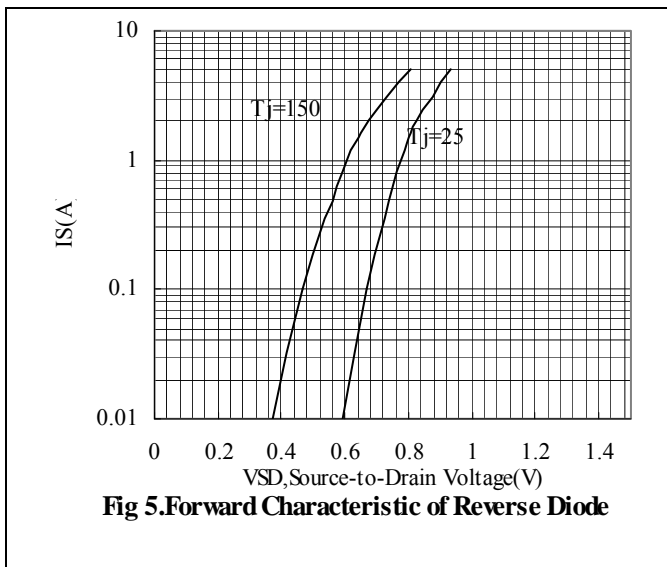
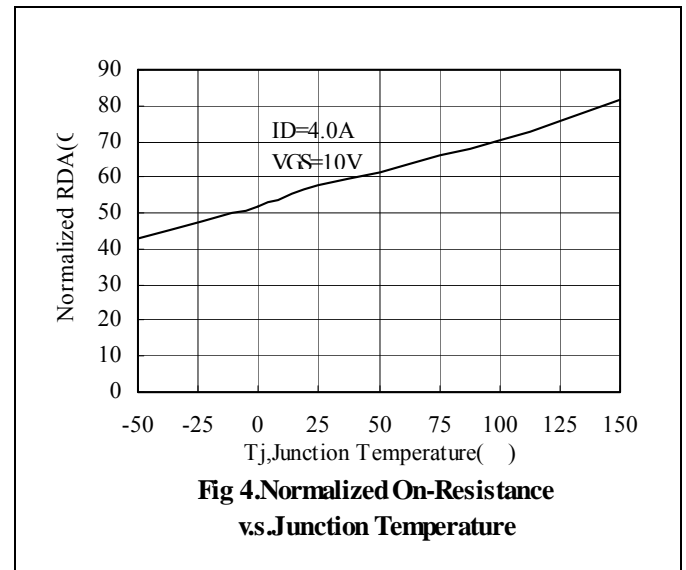
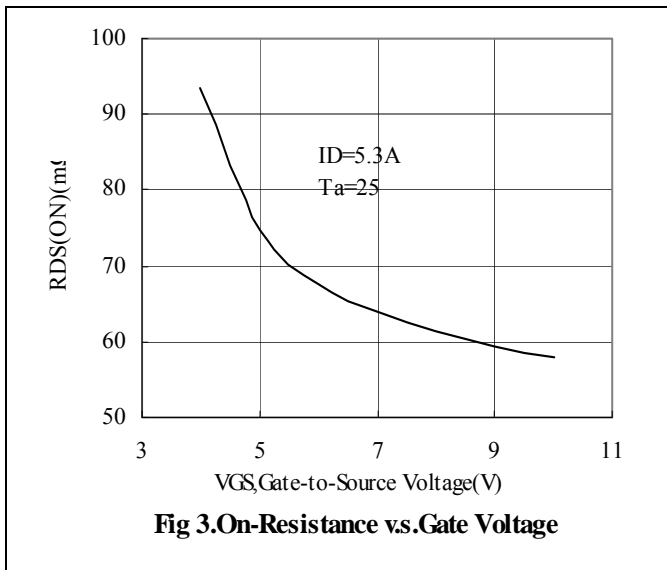
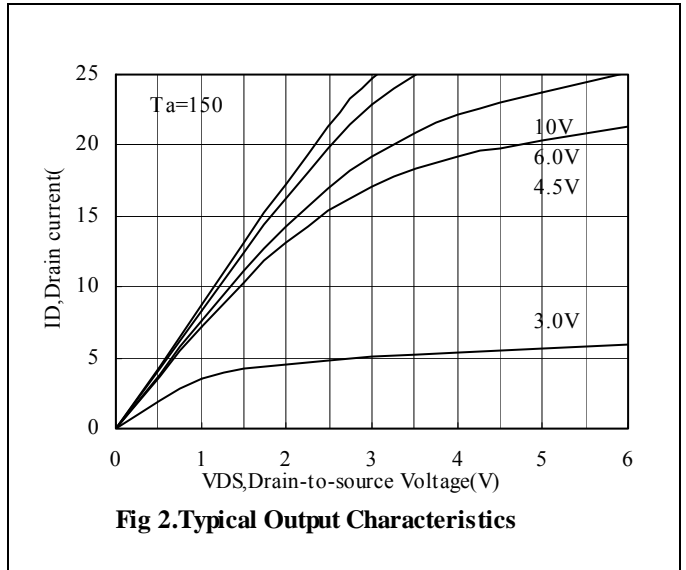
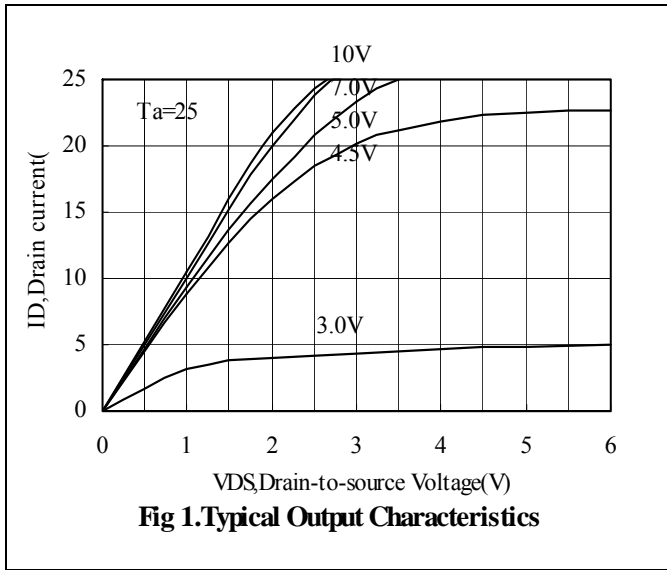
• **Drain-Source Diode Characteristics**

I <sub>S</sub>	Maximum Diode Forward Current		-	-	-1.9	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-5.3A	-	-	-1.3	V

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



### Characteristics Curve





### SO-8 Dimension

8-Lead SO-8 Plastic  
 Surface Mounted Package  
 HSMC Package Code: S

**H9435S Marking:**

Pb Free Mark  
 Pb-Free: "●" (Note)  
 Normal: None

Pin 1 Index  
 Date Code

Control Code

Pin Style: 1,2,3: Source 4: Gate 5,6,7,8: Drain

Pb Free Mark  
 Pb-Free: "●" (Note)  
 Normal: None

Pin 1 Index  
 Date Code

Control Code

Pin Style: 1.S1 2.G1 3.S2 4.G2 5 & 6 D2 7 & 8.D1

Note: Green label is used for pb-free packing

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	4.85	5.10
B	3.85	3.95
C	5.80	6.20
D	1.22	1.32
E	0.37	0.47
F	3.74	3.88
G	1.45	1.65
H	4.80	5.10
I	0.05	0.20
J	0.30	0.70
K	0.19	0.25
L	0.37	0.52
M	0.23	0.28
N	0.08	0.13
O	0.00	0.15

\*: Typical, Unit: mm

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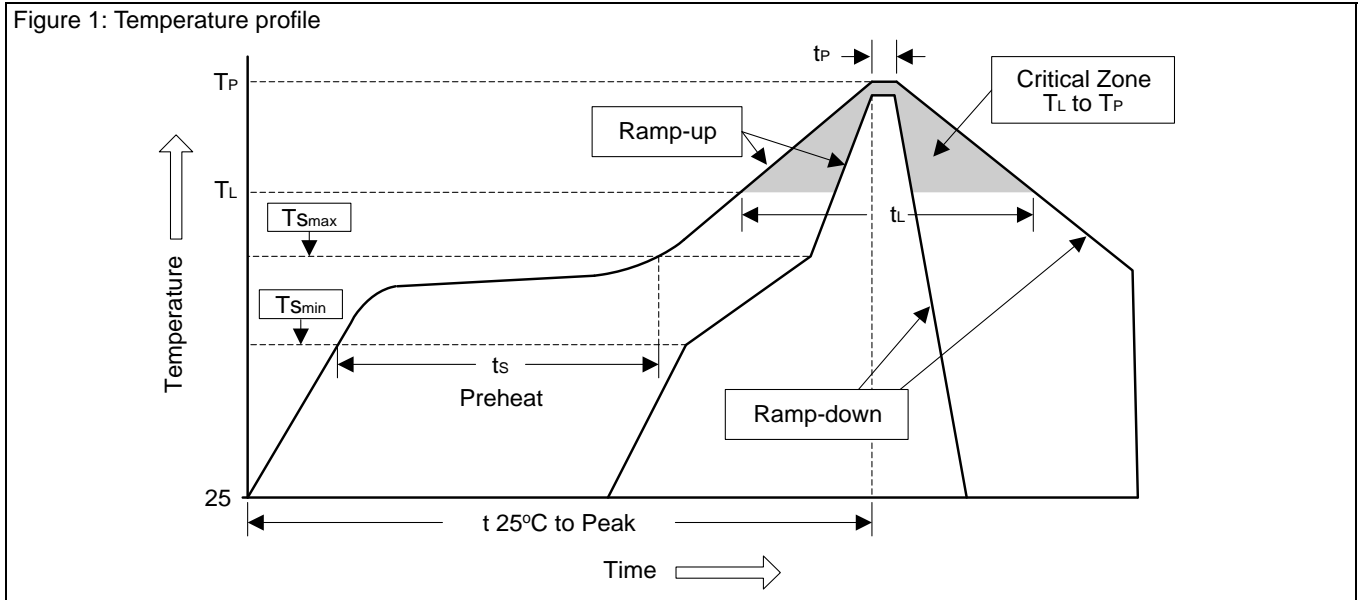
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### Soldering Methods for HSMC's Products

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	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec