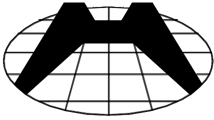
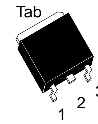


HI-SINCERITY
MICROELECTRONICS CORP.

H50N03J

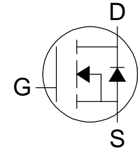
N-Channel Enhancement-Mode MOSFET (25V, 50A)

H50N03J Pin Assignment



3-Lead Plastic **TO-252**
Package Code: J
Pin 1: Gate
Pin 2 & Tab: Drain
Pin 3: Source

Internal Schematic Diagram



Features

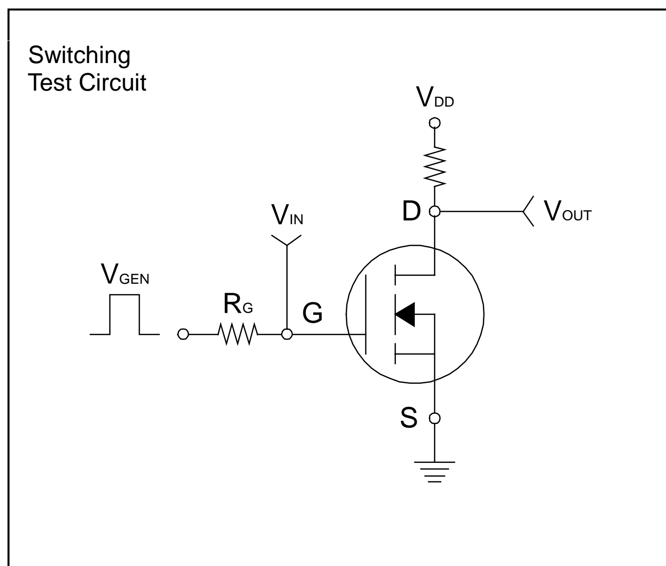
- $R_{DS(on)}$=6mΩ@V_{GS}=10V, I_D=30A
- $R_{DS(on)}$=9mΩ@V_{GS}=4.5V, I_D=30A
- Advanced trench process technology
- High Density Cell Design for Ultra Low On-Resistance
- Specially Designed for DC/DC Converters and Motor Drivers
- Fully Characterized Avalanche Voltage and Current
- Improved Shoot-Through FOM

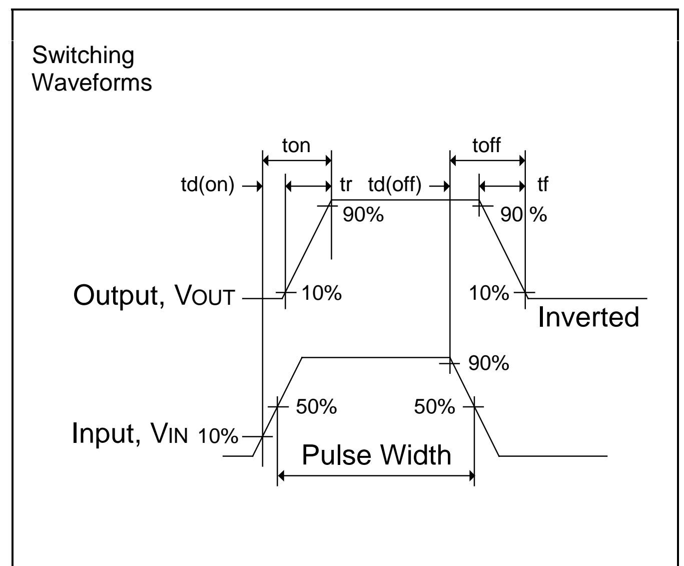
Maximum Ratings & Thermal Characteristics

(T_A=25ºC unless otherwise noted)

Parameter		Symbol	Value	Units
Drain-Source Voltage		V_{DS}	25	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current		I_D	50	A
Pulsed Drain Current [*1]		I_{DM}	350	A
Maximum Power Dissipation	T_A=25ºC	P_D	70	W
	T_A=75ºC		42	W
Operating Junction and Storage Temperature Range		T_J,T_{stg}	-55 to 150	ºC
Avalanche Energy with Single Pulse I_D=50A, V_{DD}=25V, L=0.1mH		E_{AS}	300	mJ
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	1.8	ºC/W
Junction-to-Ambient Thermal Resistance(PCB mounted)[*2]		$R_{\theta JA}$	40	ºC/W

*1: Maximum DC current limited by the package.
*2: 1-in^2 2oz Cu PCB board



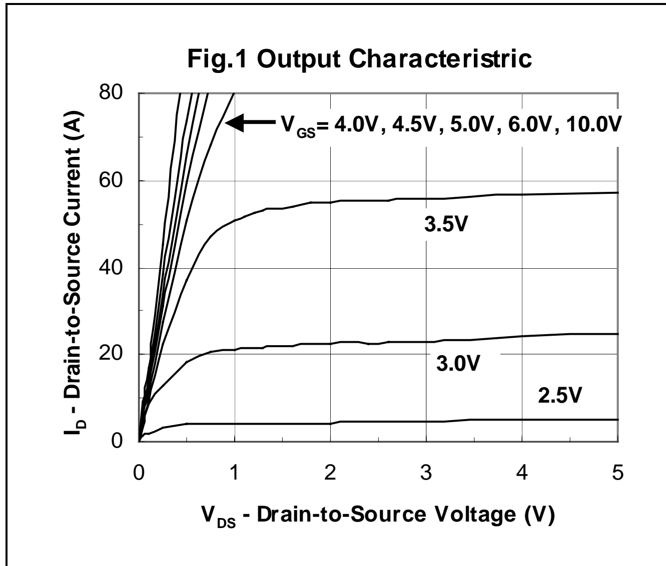


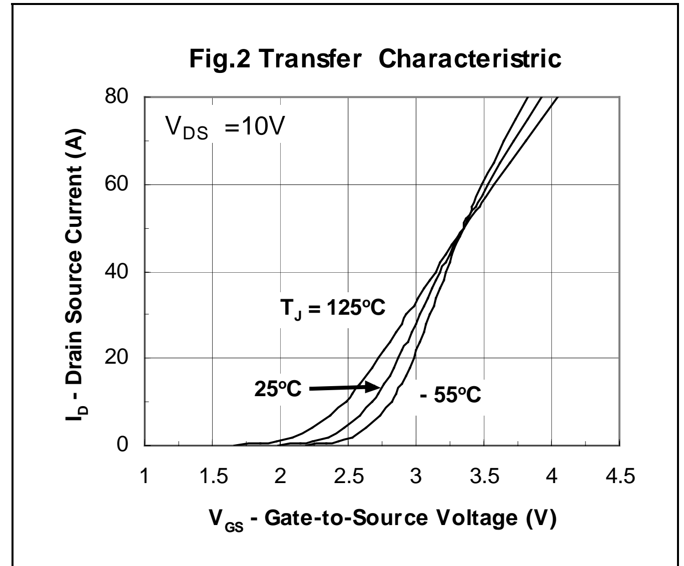
ELectrical Characteristics

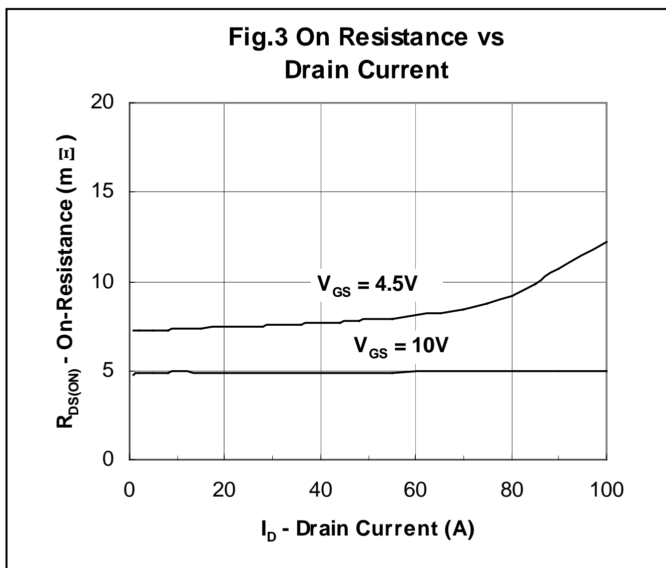
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	25	-	-	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=4.5V, I_D=30A	-	7.5	9	mΩ
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=30A	-	4.5	6	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	1.3	1.9	3	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=25V, V_{GS}=0V	-	-	1	uA
Gate Body Leakage	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Gate Resistance	R_g	V_{DS}=0V, V_{GS}=1V at 1MHz	-	3	-	Ω
Forward Transconductance	g_{fs}	V_{DS}=15V, I_D=15A	-	50	-	S
Dynamic						
Total Gate Charge	Q_g	V_{DS}=15V, I_D=20A, V_{GS}=5V	-	16.8	-	nC
Gate-Source Charge	Q_{gs}		-	6.08	-	
Gate-Drain Charge	Q_{gd}		-	4.93	-	
Turn-On Delay Time	td(on)	V_{DD}=15V, R_L=15Ω, I_D=1A V_{GEN}=10V, R_G=6Ω	-	15.3	-	nS
Turn-On Rise Time	tr		-	4	-	
Turn-Off Delay Time	td(off)		-	45.27	-	
Turn-Off Fall Time	tf		-	7.6	-	
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, f=1MHz	-	2325.9	-	pF
Output Capacitance	C_{oss}		-	330.55	-	
Reverse Transfer Capacitance	C_{rss}		-	173.91	-	
Source-Drain Diode						
Max. Diode Forward Current	I_S		-	-	50	A
Diode Forward Voltage	V_{SD}	I_S=20A, V_{GS}=0V	-	0.85	1.3	V

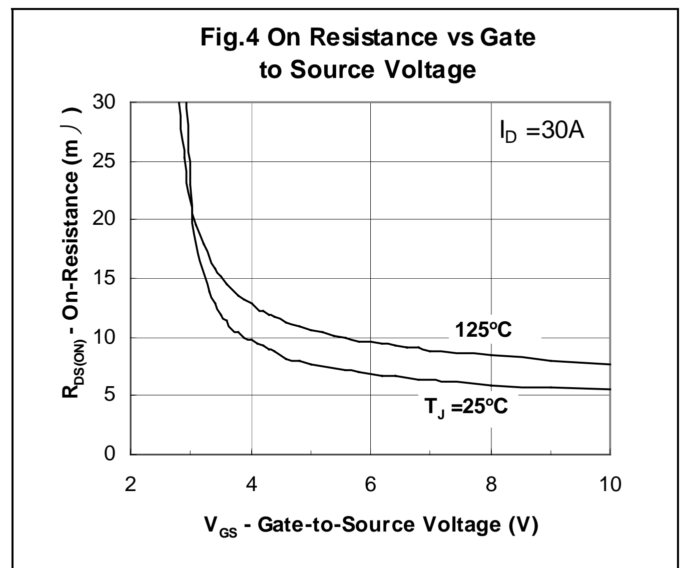
NOTE: Pulse Test: Pulse Width ≤300us, Duty Cycle≤2%

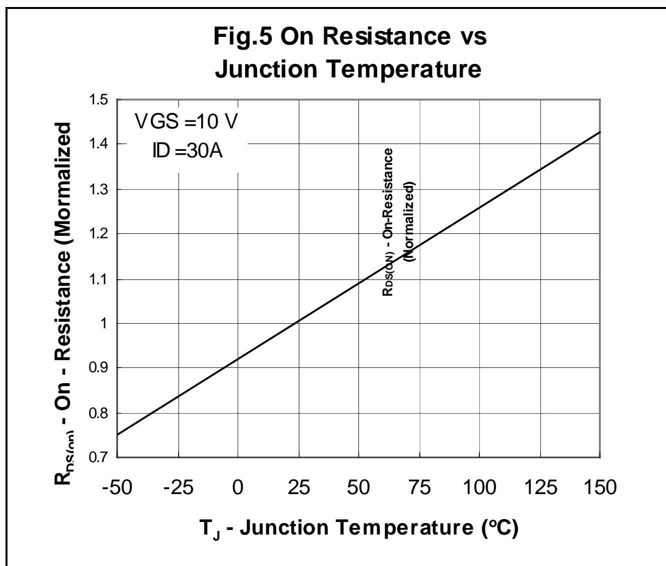
Characteristics Curve

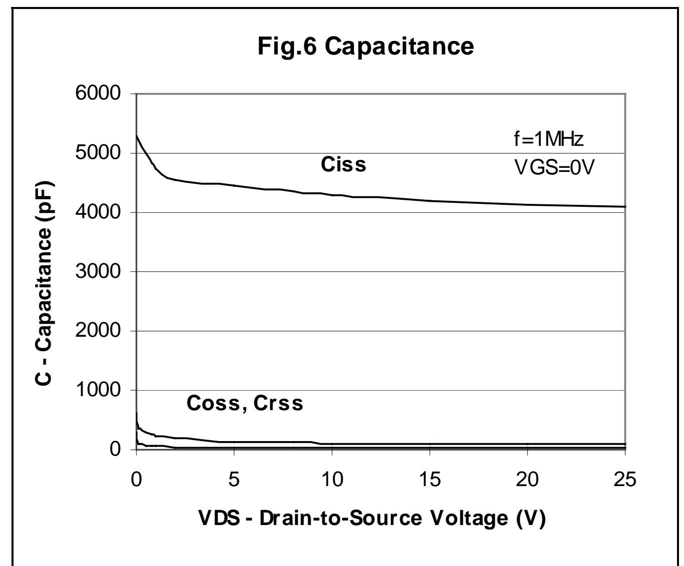












TO-252 Dimension

3-Lead TO-252 Plastic
Surface Mount Package
HSMC Package Code: J

Marking:

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

H J
5 0 N 0 3

Date Code
Control Code

Note: Green label is used for pb-free packing

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

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	6.35	6.80
C	4.80	5.50
F	1.30	1.70
G	5.40	6.25
H	2.20	3.00
L	0.40	0.90
M	2.20	2.40
N	0.90	1.50
a1	0.40	0.65
a2	-	*2.30
a5	0.65	1.05

*: Typical, Unit: mm

3-Lead TO-252 Plastic
Surface Mount Package
HSMC Package Code: J

Marking:

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

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5 0 N 0 3

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- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	6.40	6.80
B	-	6.00
C	5.04	5.64
D	-	*4.34
E	0.40	0.80
F	0.50	0.90
G	5.90	6.30
H	2.50	2.90
I	9.20	9.80
J	0.60	1.00
K	-	0.96
L	0.66	0.86
M	2.20	2.40
N	0.70	1.10
O	0.82	1.22
a1	0.40	0.60
a2	2.10	2.50
y1	-	5°
y2	-	3°

*: Typical, Unit: mm

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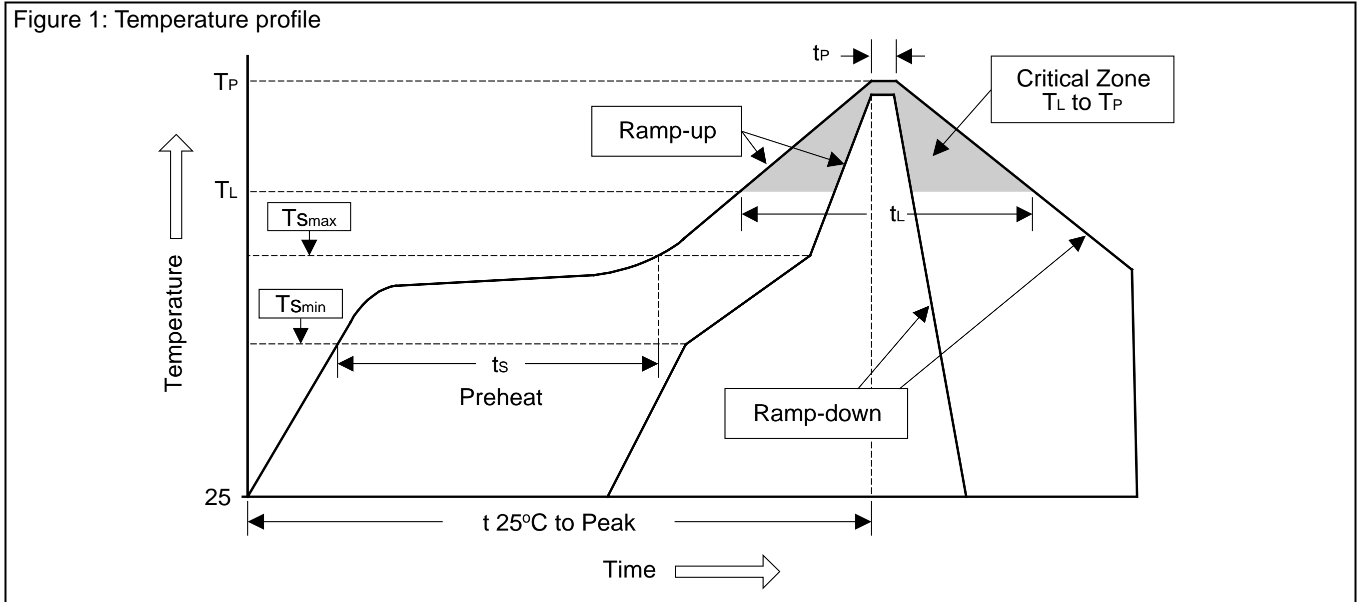
Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10ºC~35ºC 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)	<3ºC/sec	<3ºC/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100ºC 150ºC 60~120 sec	 150ºC 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)

Products	Peak temperature	Dipping time
Pb devices.	245ºC ±5ºC	5sec ±1sec
Pb-Free devices.	260ºC +0/-5ºC	5sec ±1sec