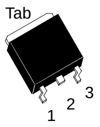
H50N03J

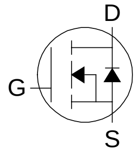
N-Channel Enhancement-Mode MOSFET (25V, 50A)

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

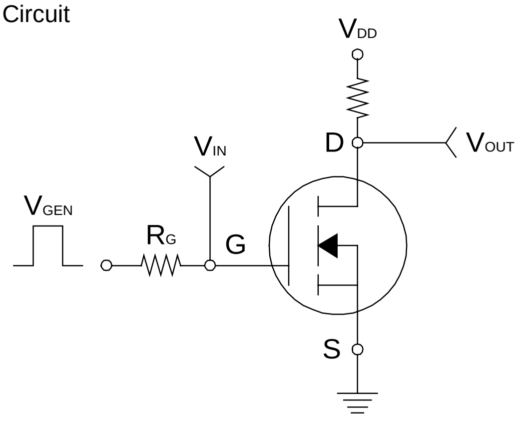
Maximum Ratings & Thermal Characteristics

(T_A=25°C unless otherwise noted)

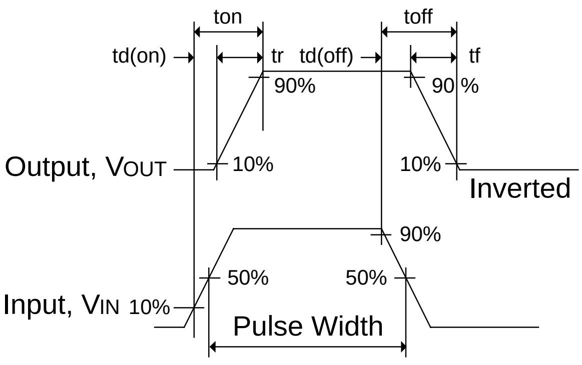
Parameter		Symbol	Value	Units
Drain-Source Voltage		V_{DS}	25	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current		I_D	50	A
Pulsed Drain Current [*1]		I_{DM}	350	A
Maximum Power Dissipation	T_A=25°C	P_D	70	W
	T_A=75°C		42	W
Operating Junction and Storage Temperature Range		T_J,T_{stg}	-55 to 150	°C
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	°C/W
Junction-to-Ambient Thermal Resistance(PCB mounted)[*2]		$R_{\theta JA}$	40	°C/W

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

Switching
Test Circuit



Switching
Waveforms



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

Fig.1 Output Characteristric

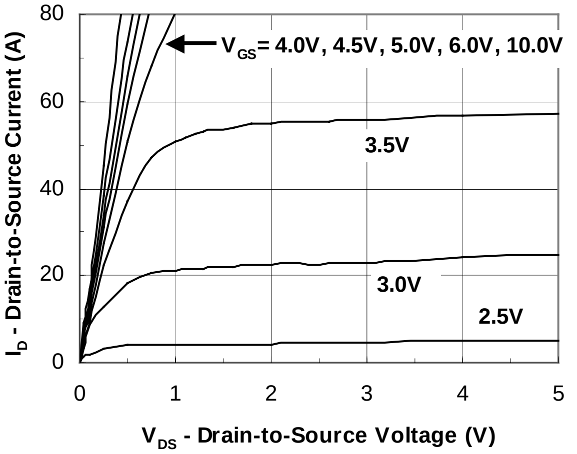


Fig.2 Transfer Characteristic

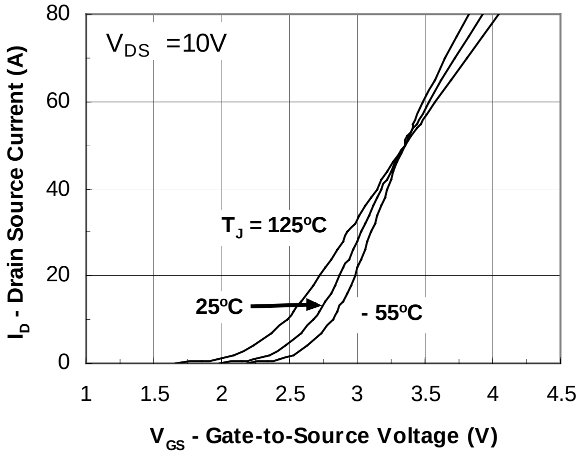


Fig.3 On Resistance vs Drain Current

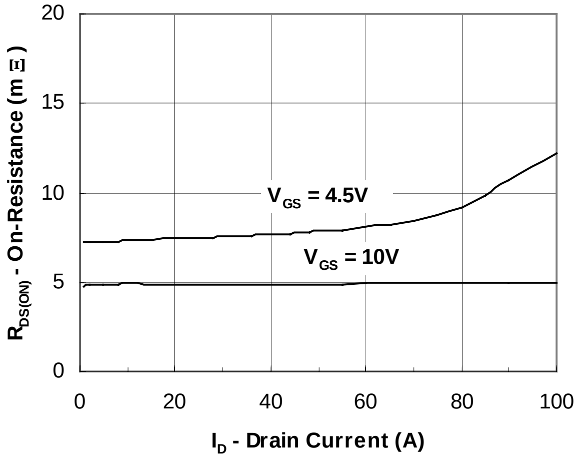


Fig.4 On Resistance vs Gate to Source Voltage

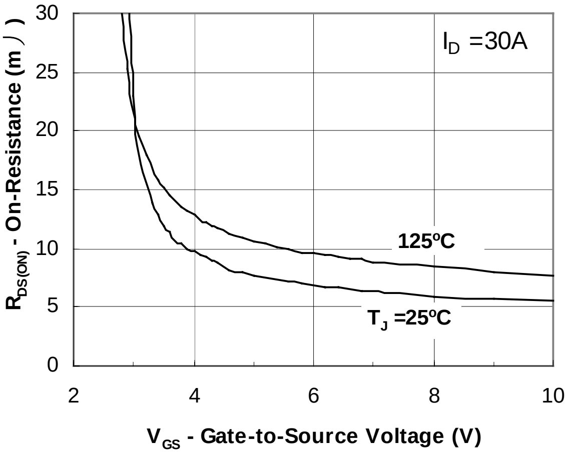


Fig.5 On Resistance vs Junction Temperature

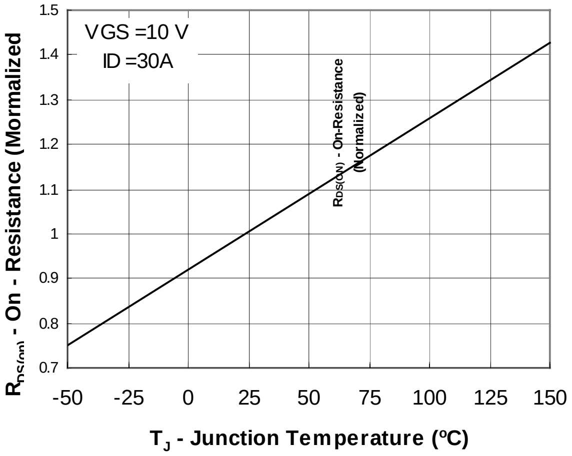
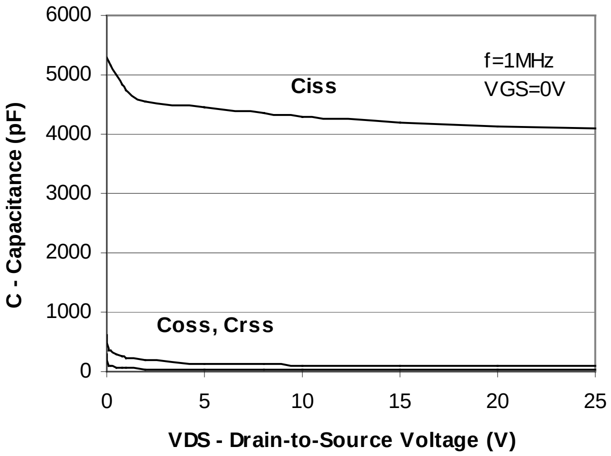
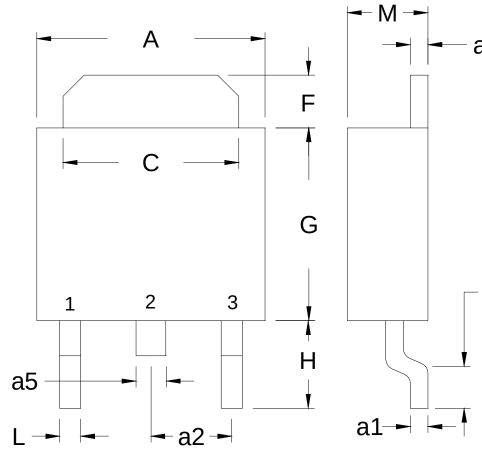


Fig.6 Capacitance

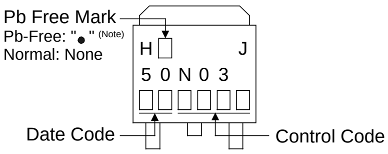


TO-252 Dimension



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

Marking:



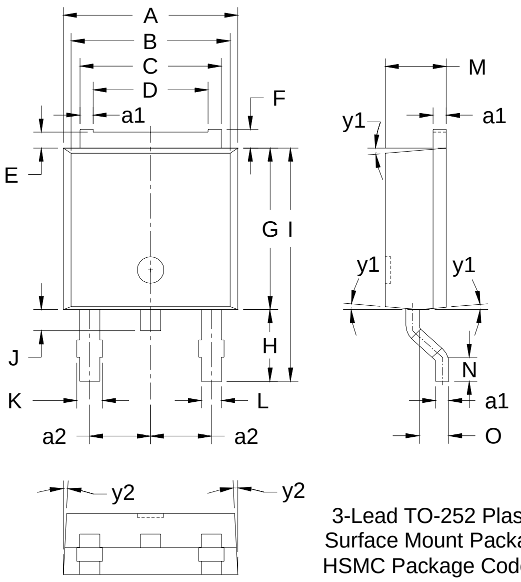
Note: Green label is used for pb-free packing

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



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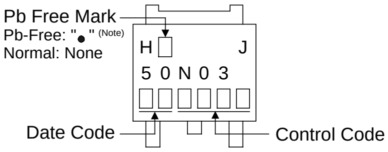

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Pin Style: 1.Gate 2.Drain 3.Source

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	6.40	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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Head Office And Factory:

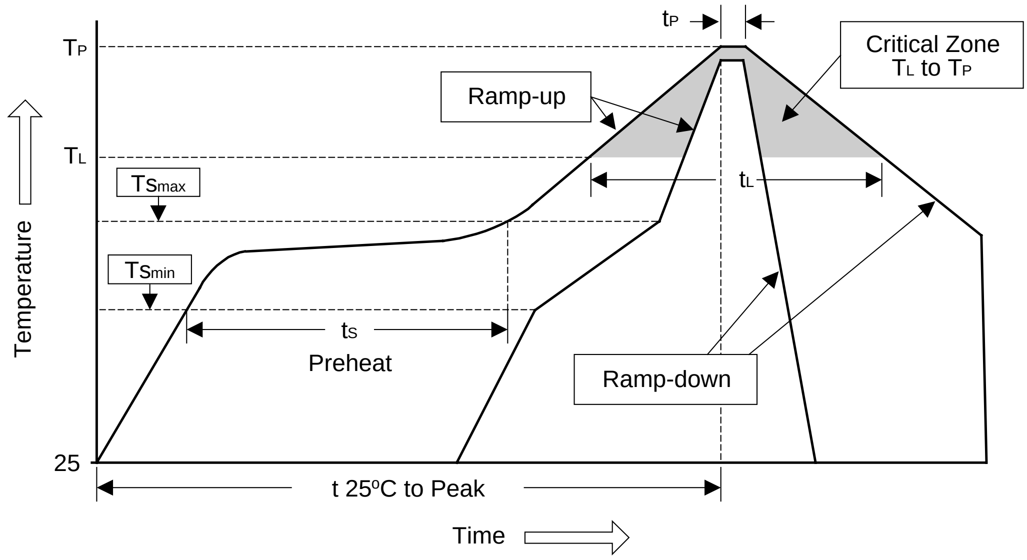
- **Head Office** (Hi-Sincerity Microelectronics Corp.): 10F.,No. 61, Sec. 2, Chung-Shan N. Rd. Taipei Taiwan R.O.C.
  Tel: 886-2-25212056 Fax: 886-2-25632712, 25368454
- **Factory 1:** No. 38, Kuang Fu S. Rd., Fu-Kou Hsin-Chu Industrial Park Hsin-Chu Taiwan. R.O.C
  Tel: 886-3-5983621~5 Fax: 886-3-5982931

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 (Ts_{min})	100°C	150°C
- Temperature Max (Ts_{max})	150°C	200°C
- Time (min to max) (ts)	60~120 sec	60~180 sec
Tsmax 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