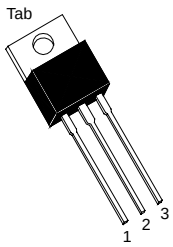
H45N03E

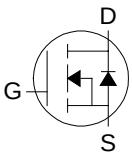
N-Channel Enhancement-Mode MOSFET (25V, 45A)

H45N03E Pin Assignment



3-Lead Plastic **TO-220AB**
Package Code: E
Pin 1: Gate
Pin 2 & Tab: Drain
Pin 3: Source

Internal Schematic Diagram



Features

- $R_{DS(on)}$=15mΩ@V_{GS}=10V, I_D=25A
- $R_{DS(on)}$=20mΩ@V_{GS}=4.5V, I_D=25A
- 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

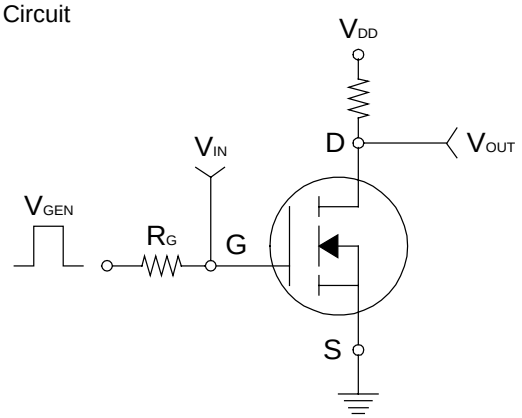
Maximum Ratings & Thermal Characteristics

(T_A=25°C unless otherwise noted)

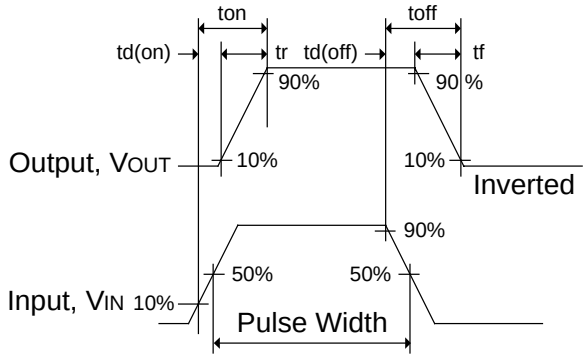
Parameter	Symbol	Value	Units
Drain-Source Voltage	V_{DS}	25	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	45	A
Pulsed Drain Current *1	I_{DM}	180	A
Maximum Power Dissipation @ T_C=25°C	P_D	60	W
Operating Junction and Storage Temperature Range	T_J,T_{stg}	-55 to 150	°C
Avalanche Energy with Single Pulse I_D=35A, V_{DD}=20V, L=0.14mH	E_{AS}	300	mJ
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	2.1	°C/W
Junction-to-Ambient Thermal Resistance(PCB mounted)*2	$R_{\theta JA}$	55	°C/W

*1: Maximum DC current limited by the package.
*2: 1-in² 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=25A	-	-	20	mΩ
		V_{GS}=10V, I_D=25A	-	-	15	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	1	1.6	3	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=24V, 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	-	1	-	Ω
Forward Transconductance	g_{fs}	V_{DS}=10V, I_D=35A	-	6	-	S
Dynamic						
Total Gate Charge	Q_g	V_{DS}=15V, I_D=35A, V_{GS}=10V	-	18.4	-	nC
Gate-Source Charge	Q_{gs}		-	3.57	-	
Gate-Drain Charge	Q_{gd}		-	2.9	-	
Turn-On Delay Time	td(on)	V_{DD}=15V, R_L=15Ω, I_D=1A V_{GEN}=10V, R_G=24Ω	-	11.7	-	nS
Turn-On Rise Time	tr		-	3.87	-	
Turn-Off Delay Time	td(off)		-	32.13	-	
Turn-Off Fall Time	tf		-	5.4	-	
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, f=1MHz	-	1176.3	-	pF
Output Capacitance	C_{oss}		-	268.43	-	
Reverse Transfer Capacitance	C_{rss}		-	142.67	-	
Source-Drain Diode						
Max. Diode Forward Current	I_S		-	-	35	A
Diode Forward Voltage	V_{SD}	I_S=20A, V_{GS}=0V	-	0.87	1.5	V

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

Characteristics Curve

Fig.1 Output Characteristic

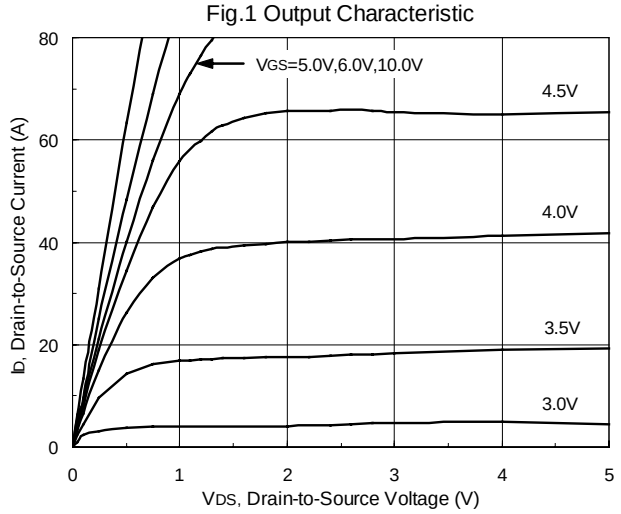


Fig.2 Transfer Characteristic

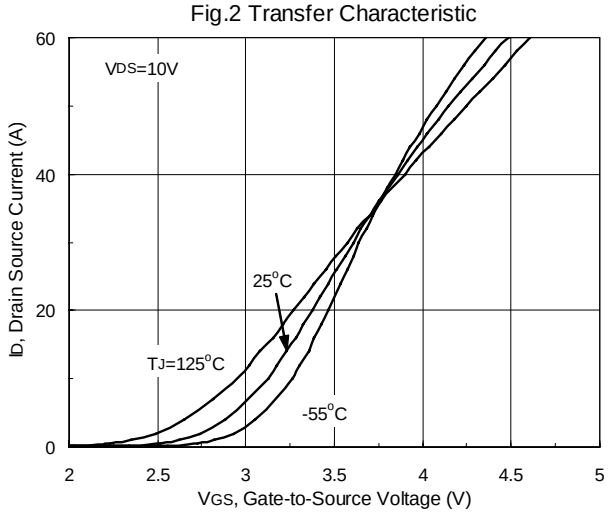


Fig.3 On Resistance & Drain Current

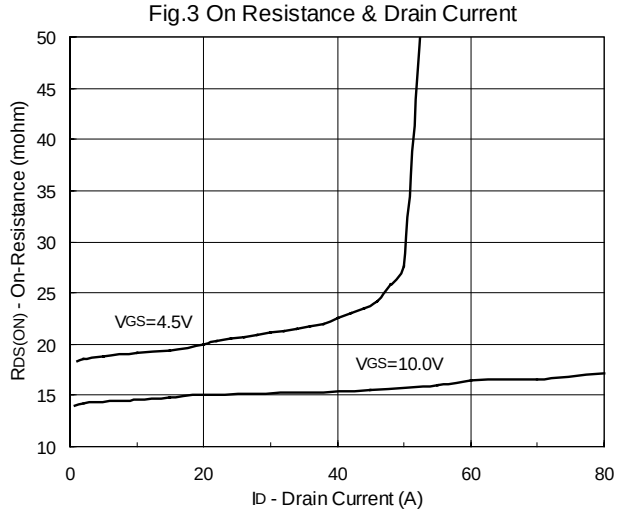


Fig.4 On Resistance & Gate to Source Voltage

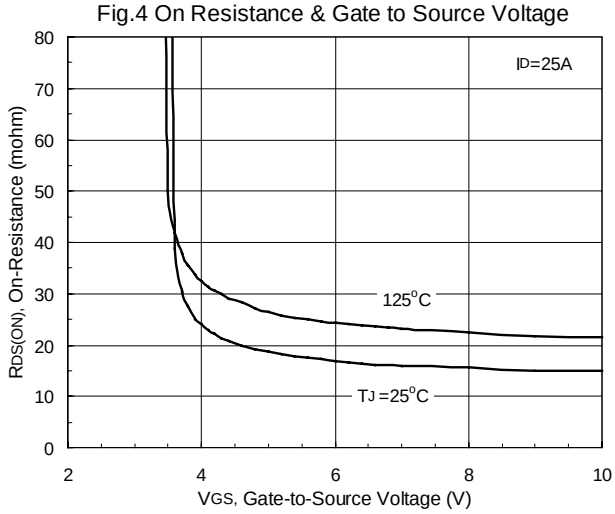


Fig.5 On Resistance & Junction Temperature

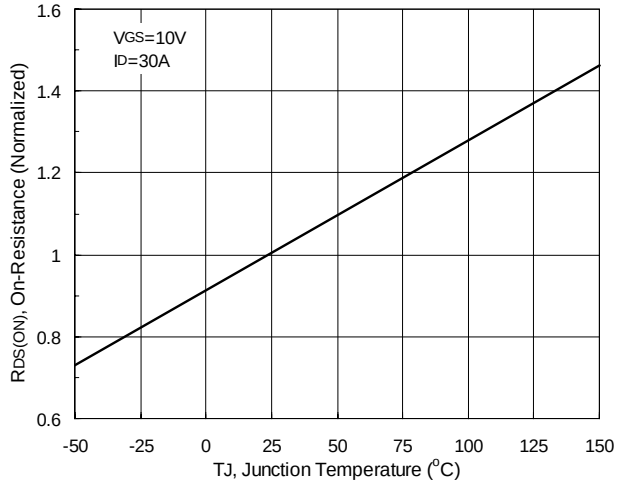
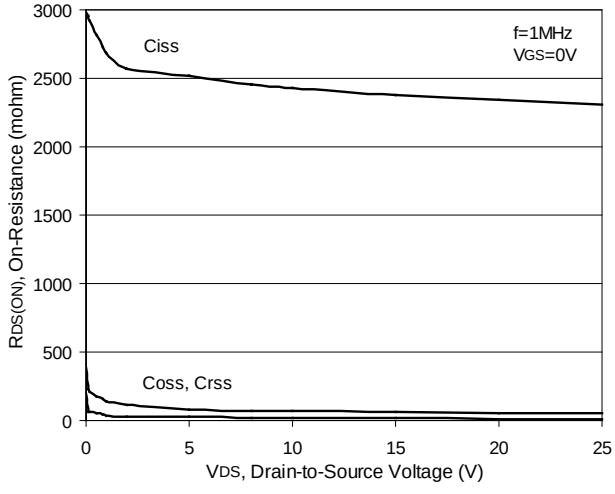
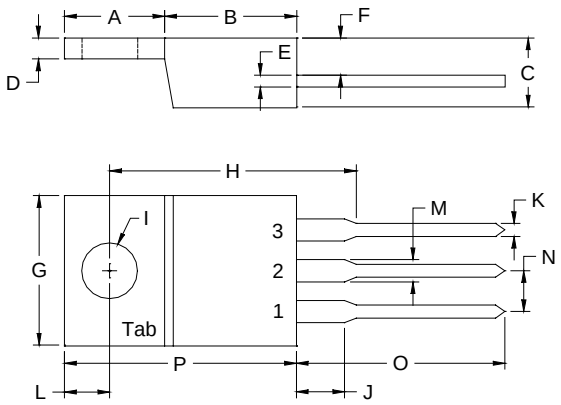


Fig.6 Capacitance

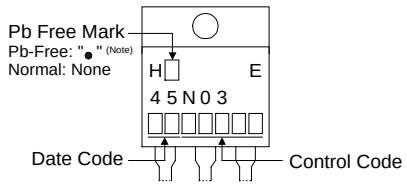


TO-220AB Dimension



3-Lead TO-220AB
Plastic Package
HSMC Package Code: E

Marking:



Note: Green label is used for pb-free packing

Pin Style: 1.Gate 2 & Tab.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	5.58	7.49
B	8.38	8.90
C	4.40	4.70
D	1.15	1.39
E	0.35	0.60
F	2.03	2.92
G	9.66	10.28
H	-	*16.25
I	-	*3.83
J	3.00	4.00
K	0.75	0.95
L	2.54	3.42
M	1.14	1.40
N	-	*2.54
O	12.70	14.27
P	14.48	15.87

*: Typical, Unit: mm

Head Office And Factory:

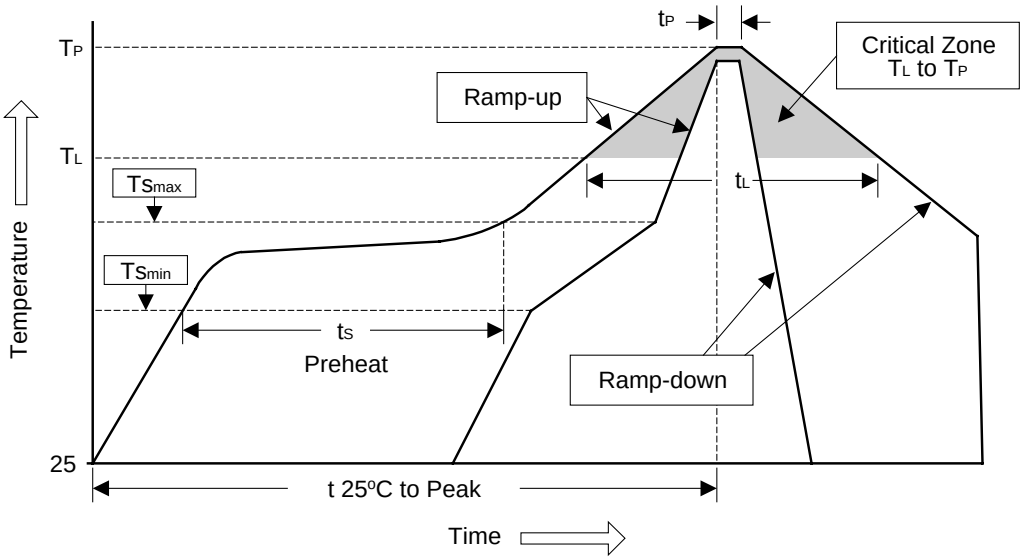
- **Head Office** (Hi-Sincerity Microelectronics Corp.): 10F.,No. 61, Sec. 2, Chung-Shan N. Rd. Taipei Taiwan R.O.C.
  Tel: 886-2-25212056 Fax: 886-2-25632712, 25368454
- **Factory 1:** No. 38, Kuang Fu S. Rd., Fu-Kou Hsin-Chu Industrial Park Hsin-Chu Taiwan. R.O.C
  Tel: 886-3-5983621~5 Fax: 886-3-5982931

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}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60~120 sec	 150°C 200°C 60~180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60~150 sec	 217°C 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