HI-SINCERITY
MICROELECTRONICS CORP.

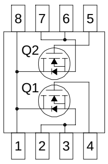
Spec. No. : MOS200610
Issued Date : 2006.06.01
Revised Date : 2006.06.28
Page No. : 1/4

H6968CTS

Dual N-Channel Enhancement-Mode MOSFET (20V, 6.5A)
(Battery Switch, ESD Protected)

8-Lead Plastic **TSSOP-8**
Package Code: TS

H6968CTS Symbol & Pin Assignment



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

Features

- $R_{DS(on)}<32m\Omega@V_{GS}=2.5V, I_D=5.5A$
- $R_{DS(on)}<24m\Omega@V_{GS}=4.5V, I_D=6.5A$
- Advanced Trench Process Technology
- High Density Cell Design for Ultra Low On-Resistance
- Specially Designed for Li ion Battery Packs Use
- Designed for Battery Switch Appliactions
- ESD Protected

Absolute Maximum Ratings (T_A=25°C, unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D	Drain Current (Continuous)	6.5	A
I_{DM}	Drain Current (Pulsed) [*1]	30	A
P_D	Total Power Dissipation @T_A=25°C	1.5	W
	Total Power Dissipation @T_A=75°C	0.96	W
T_j, T_{stg}	Operating and Storage Temperature Range	-55 to +150	°C
$R_{\theta JA}$	Thermal Resistance Junction to Ambient (PCB mounted) [*2]	83	°C/W
ESD	ESD Protect on Gate and Source	2000	V

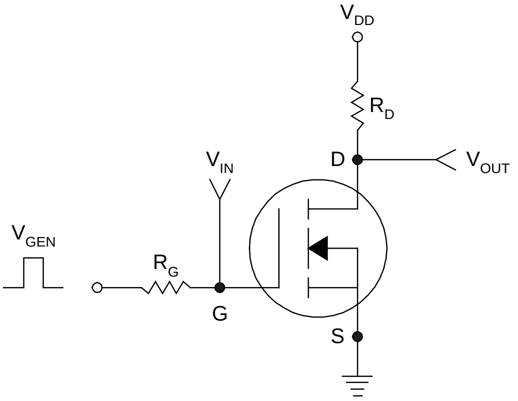
*1: Maximum DC current limited by the package under the ambient condition at room temperature.
*2: 1-in^2 2oz Cu PCB board

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

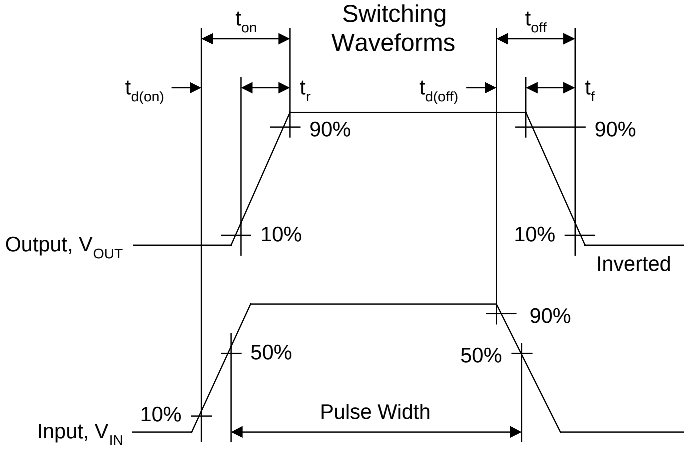
Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
• Static						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	20	-	-	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=2.5V, I_D=5.5A	-	24	32	mΩ
		V_{GS}=4.5V, I_D=6.5A	-	20	24	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	0.6	-	1.6	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=16V, V_{GS}=0V	-	-	1	uA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±4.5V, V_{DS}=0V	-	-	±200	nA
g_{FS}	Forward Transconductance	V_{DS}=10V, I_D=6.5A	-	30	-	S
• Dynamic						
Q_g	Total Gate Charge	V_{DS}=10V, I_D=6A, V_{GS}=4.5V	-	9	-	nC
Q_{gs}	Gate-Source Charge		-	2.4	-	
Q_{gd}	Gate-Drain Charge		-	3.6	-	
C_{iss}	Input Capacitance	V_{DS}=10V, V_{GS}=0V, f=1MHz	-	476	-	pF
C_{oss}	Output Capacitance		-	65.1	-	
C_{rss}	Reverse Transfer Capacitance		-	49	-	
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=10V, I_D=1A, V_{GS}=4.5V R_{GEN}=6Ω	-	50	-	ns
t_r	Turn-on Rise Time		-	100	-	
$t_{d(off)}$	Turn-off Delay Time		-	500	-	
t_f	Turn-off Fall Time		-	200	-	
• Drain-Source Diode Characteristics						
I_S	Maximum Diode Forward Current		-	-	1.7	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS}=0V, I_S=1.5A	-	0.61	1.2	V

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

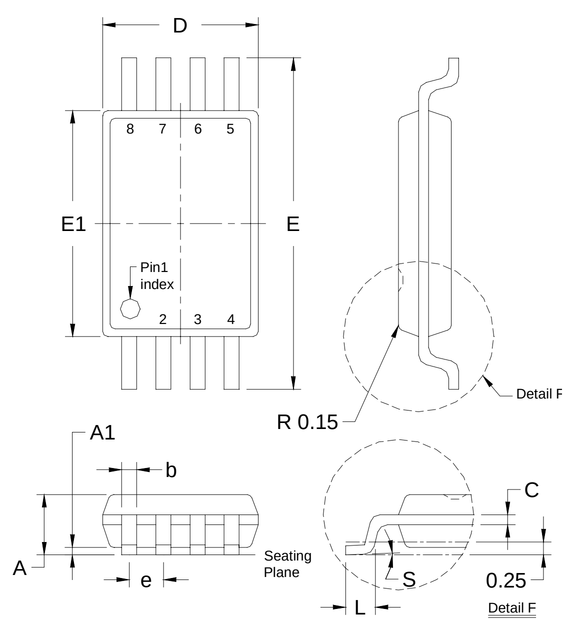
Switching
Test Circuit



Switching
Waveforms

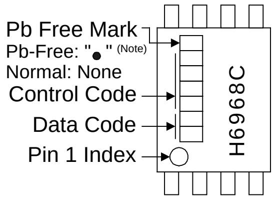


TSSOP-8 Dimension



8-Lead TSSOP-8 Plastic
Surface Mounted Package
HSMC Package Code: TS

H6968CTS Marking:



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

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	-	1.20
A1	0.05	0.15
b	0.19	0.3
C	0.09	0.20
D	2.90	3.10
E	6.20	6.60
E1	4.30	4.50
e	0.65 BSC	
L	0.45	0.75
S	0^o	8^o

*: Typical, Unit: mm

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of HSMC.
- HSMC reserves the right to make changes to its products without notice.
- ***HSMC semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.***
- HSMC assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.

Head Office And Factory:

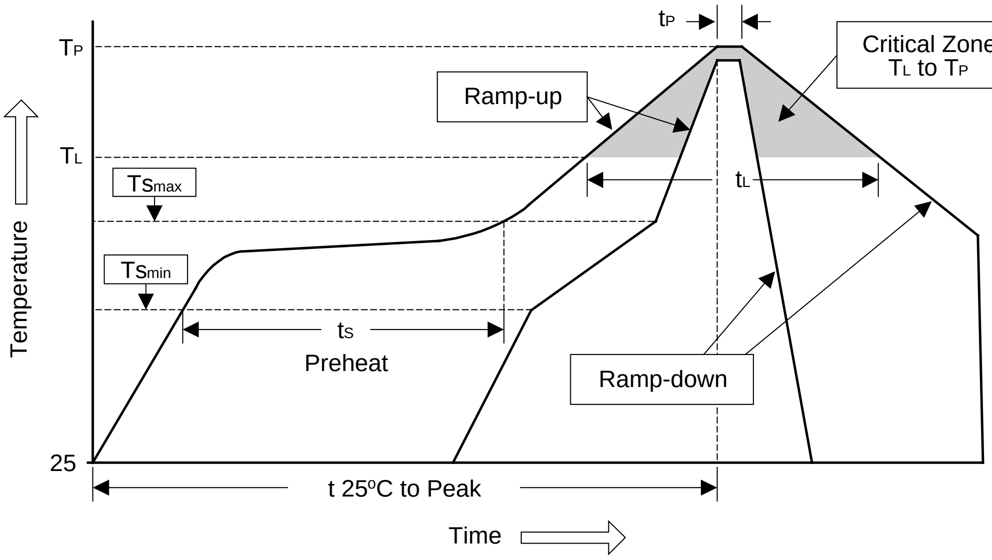
- **Head Office** (Hi-Sincerity Microelectronics Corp.): 10F.,No. 61, Sec. 2, Chung-Shan N. Rd. Taipei Taiwan R.O.C.
  Tel: 886-2-25212056 Fax: 886-2-25632712, 25368454
- **Factory 1:** No. 38, Kuang Fu S. Rd., Fu-Kou Hsin-Chu Industrial Park Hsin-Chu Taiwan. R.O.C
  Tel: 886-3-5983621~5 Fax: 886-3-5982931

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	10sec ±1sec
Pb-Free devices.	260°C ±5°C	10sec ±1sec