



HI-SINCERITY MICROELECTRONICS CORP.


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H6968CTS

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

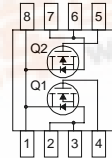
Features

- $R_{DS(on)} < 32m\Omega @ V_{GS}=2.5V, I_D=5.5A$
- $R_{DS(on)} < 24m\Omega @ V_{GS}=4.5V, I_D=6.5A$
- 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 Applications
- 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

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 _{θJA} | 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-in² 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 |

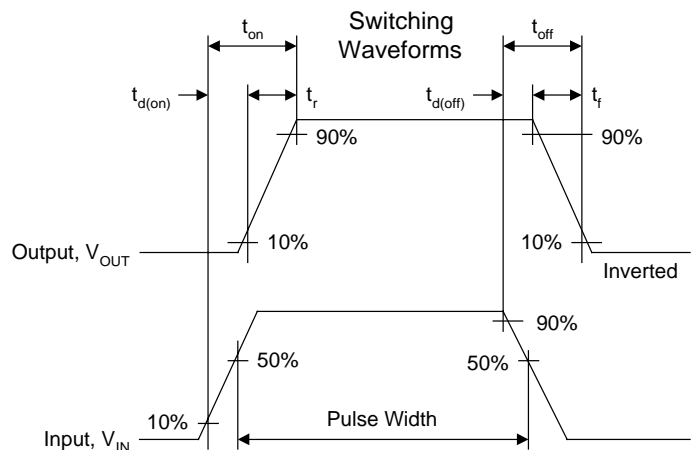
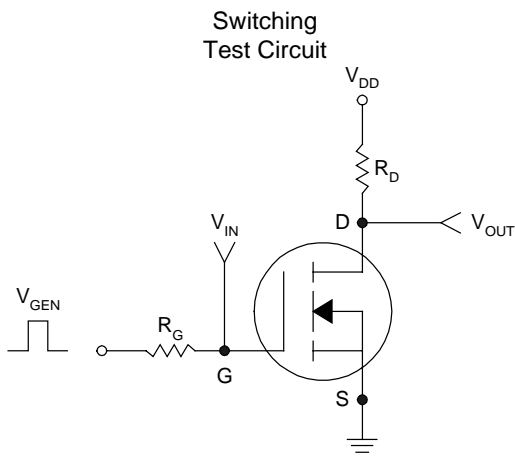
• Dynamic

| | | | | | | |
|---------------------|------------------------------|---|---|------|---|----|
| 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%





TSSOP-8 Dimension

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

H6968CTS Marking:

Pb Free Mark
 Pb-Free: "●" (Note)
 Normal: None
 Control Code
 Data Code
 Pin 1 Index

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° | 8° |

*: Typical, Unit: mm

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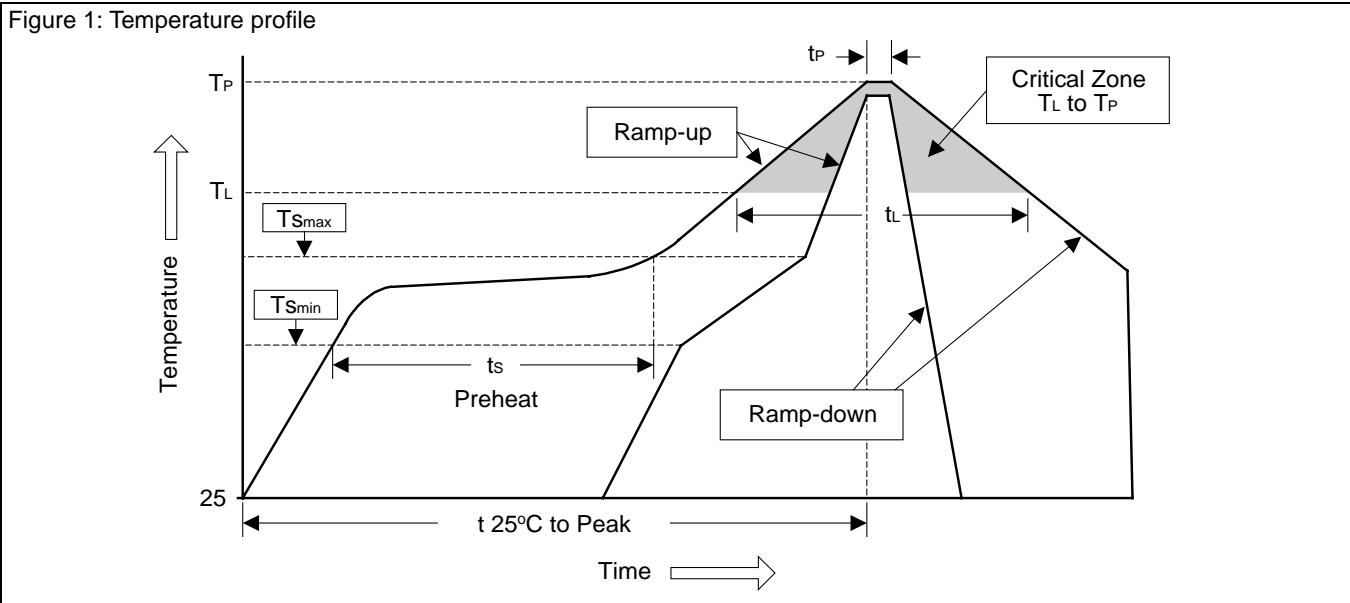
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Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices



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