

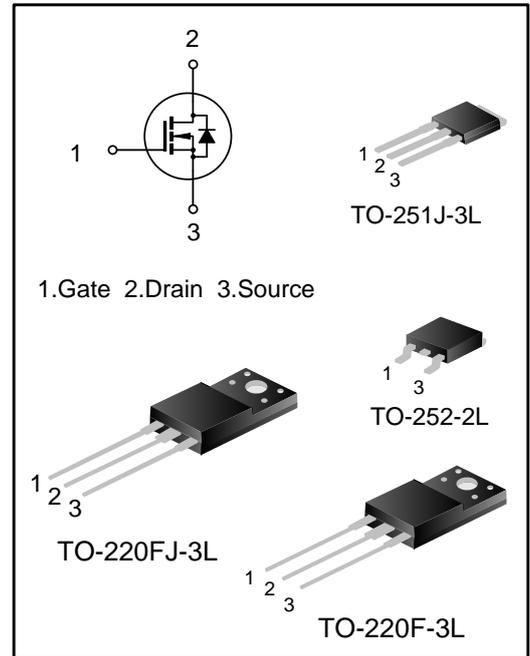
7A, 650V SUPER JUNCTION MOS POWER TRANSISTOR

DESCRIPTION

SVS7N65D(F)(MJ)(FJ)D2 is an N-channel enhancement mode high voltage power MOSFETs produced using Silan's super junction MOS technology. It achieves low conduction loss and switching losses. It leads the design engineers to their power converters with high efficiency, high power density, and superior thermal behavior. Furthermore, it's universal applicable, for example, it is suitable for hard and soft switching topologies, Lighting, Adapters, etc.

FEATURES

- ◆ 7A,650V, $R_{DS(on)(typ.)}=0.55\Omega@V_{GS}=10V$
- ◆ New revolutionary high voltage technology
- ◆ Ultra low gate charge
- ◆ Enhanced avalanche capability
- ◆ Extreme dv/dt rated
- ◆ High peak current capability



ORDERING INFORMATION

| Part No. | Package | Marking | Hazardous substance control | Packing Type |
|--------------|-------------|------------|-----------------------------|--------------|
| SVS7N65DD2TR | TO-252-2L | SVS7N65DD2 | Halogen free | Tape & Reel |
| SVS7N65FD2 | TO-220F-3L | SVS7N65FD2 | Halogen free | Tube |
| SVS7N65MJD2 | TO-251J-3L | 7N65MJD2 | Halogen free | Tube |
| SVS7N65FJD2 | TO-220FJ-3L | 7N65FJD2 | Halogen free | Tube |

ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED, T_A=25°C)

| Characteristics | Symbol | Ratings | | Unit |
|---|------------------|-----------------------|-----------------|------|
| | | SVS7N65DD2/MJD2 | SVS7N65FD2/FJD2 | |
| Drain-Source Voltage | V _{DS} | 650 | | V |
| Gate-Source Voltage | V _{GS} | ±30 | | V |
| Drain Current | I _D | T _C =25°C | | 7.0 |
| | | T _C =100°C | | 4.4 |
| Drain Current Pulsed | I _{DM} | 28 | | A |
| Power Dissipation (T _C =25°C) - Derate above 25°C | P _D | 60 | 30 | W |
| | | 0.48 | 0.24 | W/°C |
| Single Pulsed Avalanche Energy (Note 1) | E _{AS} | 261 | | mJ |
| Reverse diode dv/dt (Note 2) | dv/dt | 15 | | V/ns |
| MOSFET dv/dt ruggedness (Note 3) | dv/dt | 50 | | V/ns |
| Operation Junction Temperature Range | T _J | -55~+150 | | °C |
| Storage Temperature Range | T _{stg} | -55~+150 | | °C |

THERMAL CHARACTERISTICS

| Characteristics | Symbol | Ratings | | Unit |
|---|------------------|-----------------|-----------------|------|
| | | SVS7N65DD2/MJD2 | SVS7N65FD2/FJD2 | |
| Thermal Resistance, Junction-to-Case | R _{θJC} | 2.08 | 4.17 | °C/W |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} | 62.0 | 62.5 | °C/W |

ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE NOTED, $T_C=25^\circ\text{C}$)

| Characteristics | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|--|--------------|---|------|------|-----------|----------|
| Drain -Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 650 | -- | -- | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=650V, V_{GS}=0V$ | -- | -- | 1.0 | μA |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 30V, V_{DS}=0V$ | -- | -- | ± 100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$ | 2.0 | -- | 4.0 | V |
| Static Drain- Source on State Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=3.5A$ | -- | 0.55 | 0.64 | Ω |
| Gate resistance | R_g | $f=1\text{MHz}$ | -- | 7.0 | -- | Ω |
| Input Capacitance | C_{iss} | $V_{DS}=100V, V_{GS}=0V, f=1.0\text{MHz}$ | -- | 423 | -- | pF |
| Output Capacitance | C_{oss} | | -- | 27 | -- | |
| Reverse Transfer Capacitance | C_{rss} | | -- | 1.9 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=325V, I_D=7.0A, V_{GS}=10V, R_G=24\Omega$ (Note 4,5) | -- | 10 | -- | ns |
| Turn-on Rise Time | t_r | | -- | 29 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 44 | -- | |
| Turn-off Fall Time | t_f | | -- | 26 | -- | |
| Total Gate Charge | Q_g | $V_{DS}=520V, I_D=7.0A, V_{GS}=10V$ (Note 4,5) | -- | 16 | -- | nC |
| Gate-Source Charge | Q_{gs} | | -- | 3.6 | -- | |
| Gate-Drain Charge | Q_{gd} | | -- | 8.3 | -- | |

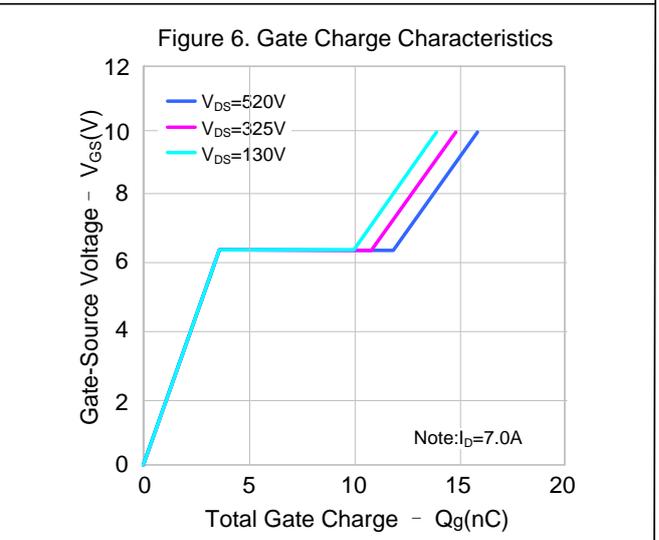
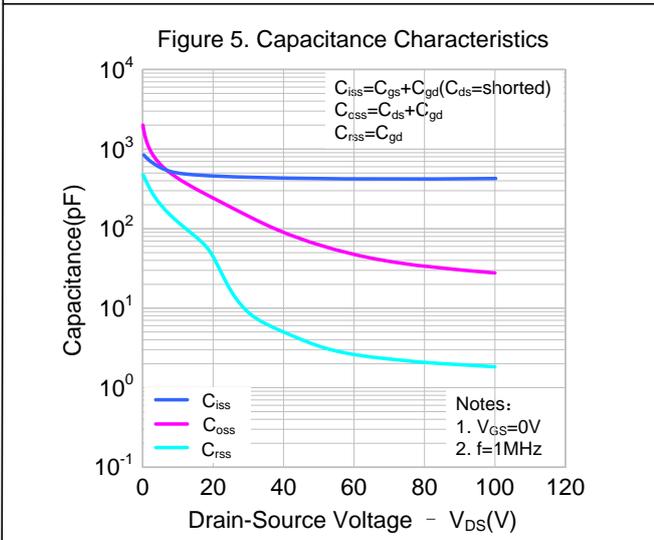
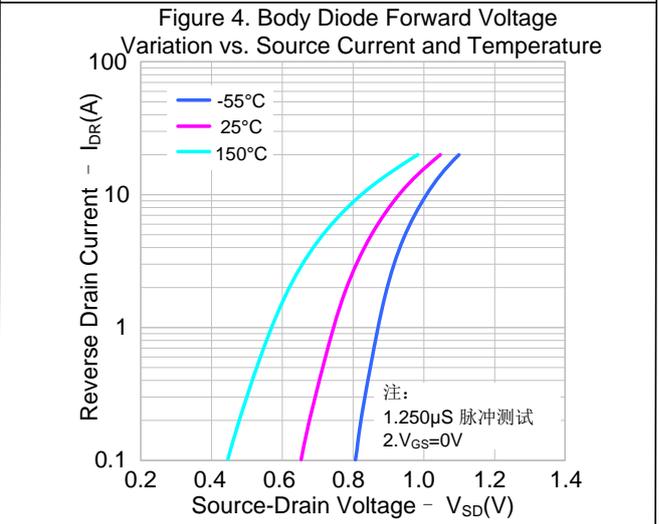
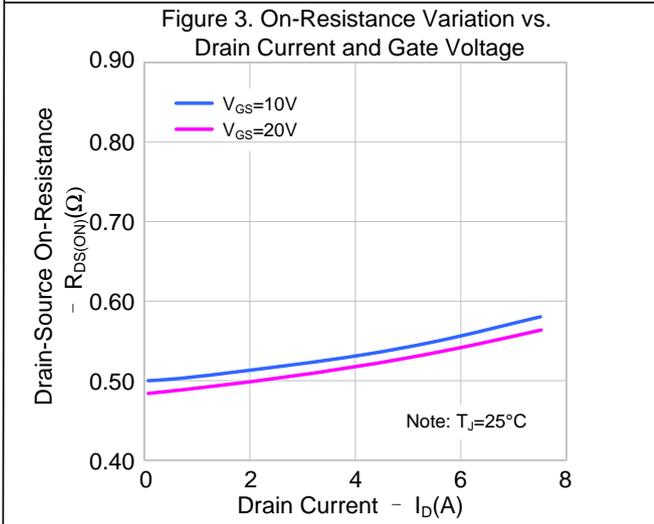
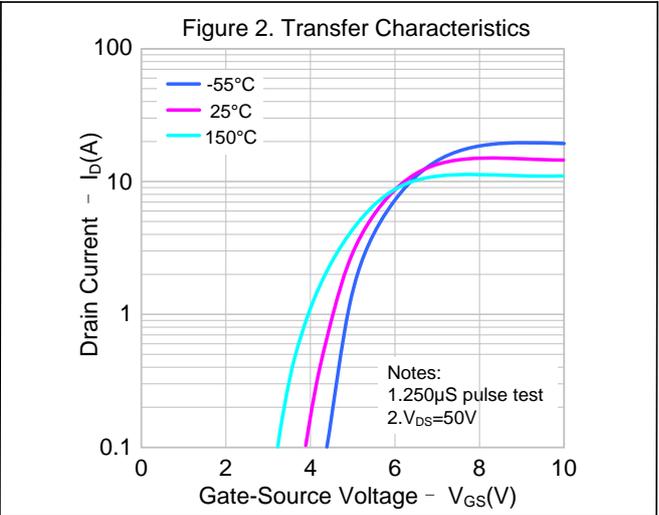
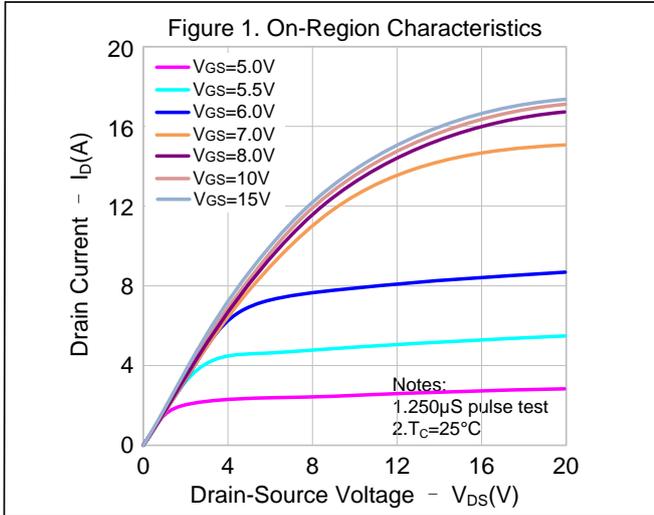
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Characteristics | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---------------------------|----------|---|------|------|------|---------|
| Continuous Source Current | I_S | Integral Reverse P-N Junction Diode in the MOSFET | -- | -- | 7.0 | A |
| Pulsed Source Current | I_{SM} | | -- | -- | 28 | |
| Diode Forward Voltage | V_{SD} | $I_S=7.0A, V_{GS}=0V$ | -- | -- | 1.4 | V |
| Reverse Recovery Time | T_{rr} | $I_S=7.0A, V_{GS}=0V, dI_F/dt=100A/\mu s$ (Note 4) | -- | 346 | -- | ns |
| Reverse Recovery Charge | Q_{rr} | | -- | 2.5 | -- | μC |

Notes:

- $L=79\text{mH}, I_{AS}=2.4A, V_{DD}=100V, R_G=25\Omega$, starting temperature $T_J=25^\circ\text{C}$;
- $V_{DS}=0\sim 400V, I_{SD}\leq 7.0A, T_J=25^\circ\text{C}$;
- $V_{DS}=0\sim 480V$;
- Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;
- Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Breakdown Voltage Variation vs. Temperature

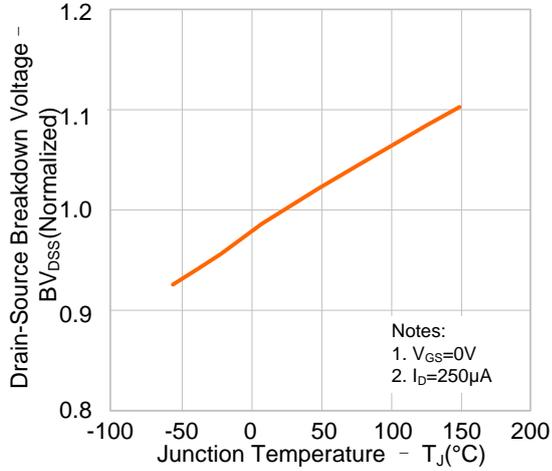


Figure 8. On-resistance Variation vs. Temperature

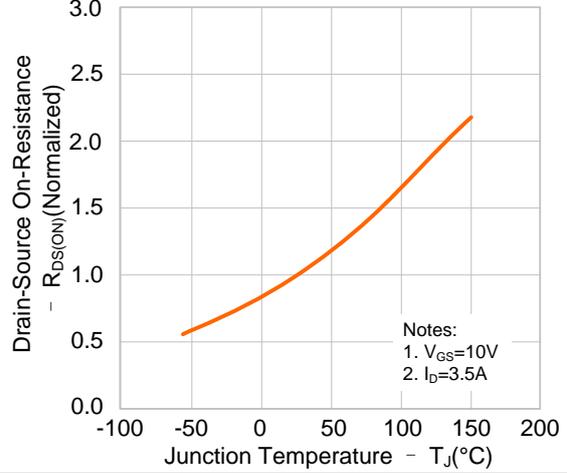


Figure 9-1. Max. Safe Operating Area (SVS7N65DD2/MJD2)

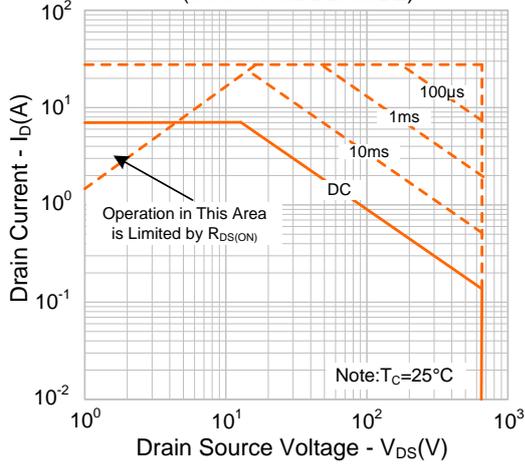
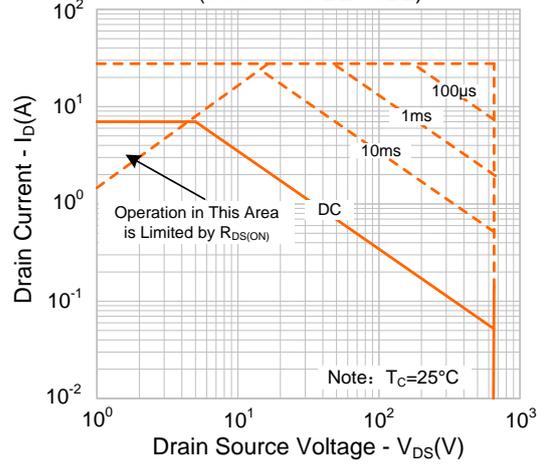
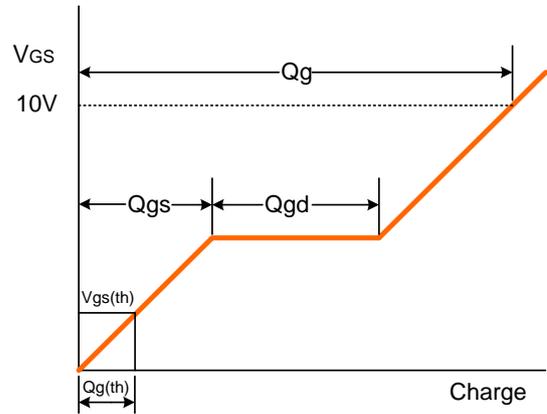
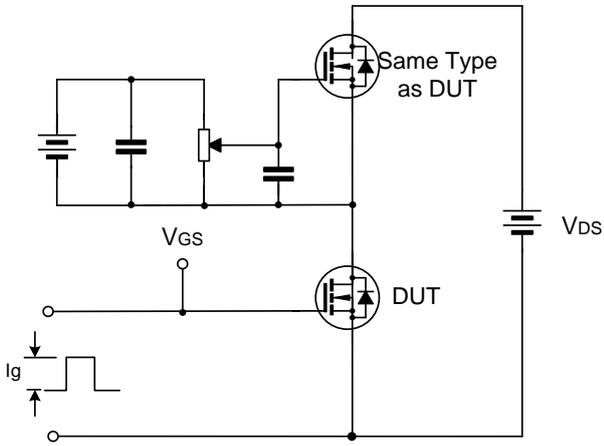


Figure 9-2. Max. Safe Operating Area (SVS7N65FD2/FJD2)

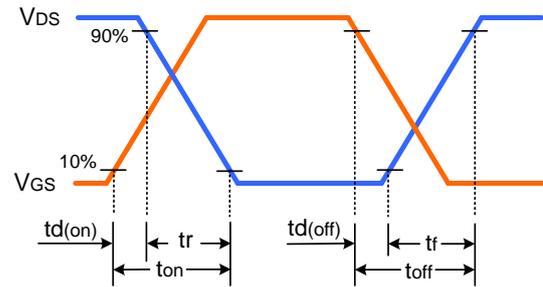
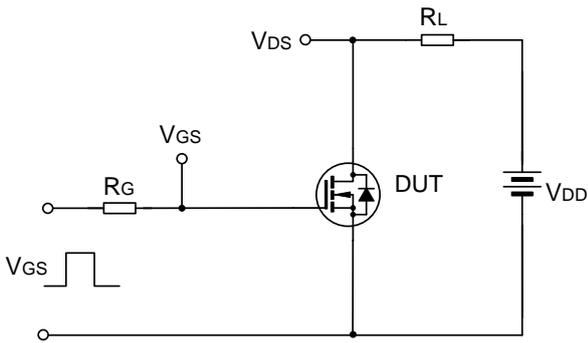


TYPICAL TEST CIRCUIT

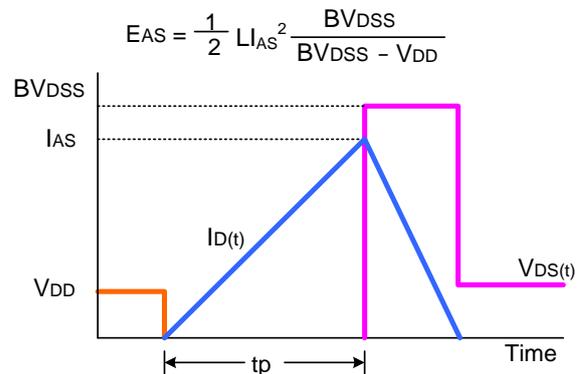
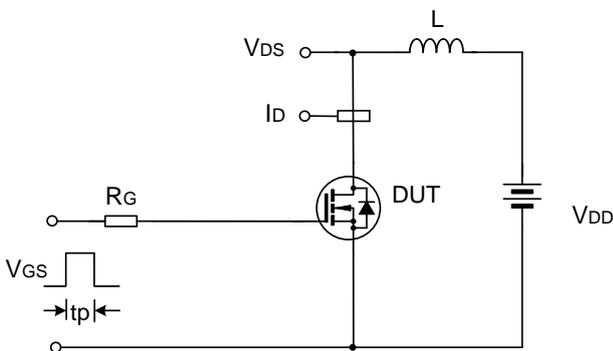
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

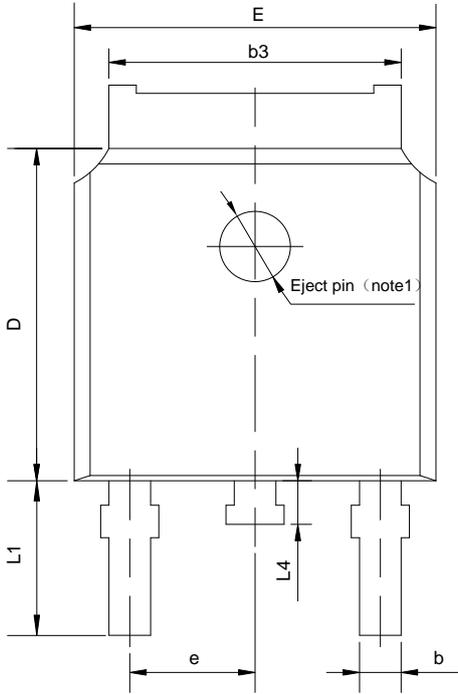


Unclamped Inductive Switching Test Circuit & Waveform



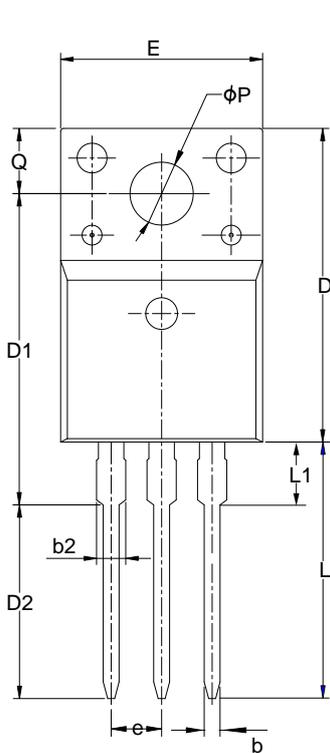
PACKAGE OUTLINE

TO-252-2L UNIT: mm



| SYMBOL | MILLIMETER | | |
|--------|------------|-------|-------|
| | MIN | NOM | MAX |
| A | 2.10 | 2.30 | 2.50 |
| A1 | 0 | — | 0.127 |
| b | 0.66 | 0.76 | 0.89 |
| b3 | 5.10 | 5.33 | 5.46 |
| c | 0.45 | — | 0.65 |
| c2 | 0.45 | — | 0.65 |
| D | 5.80 | 6.10 | 6.40 |
| E | 6.30 | 6.60 | 6.90 |
| e | 2.30TYP | | |
| H | 9.60 | 10.10 | 10.60 |
| L | 1.40 | 1.50 | 1.70 |
| L1 | 2.90REF | | |
| L4 | 0.60 | 0.80 | 1.00 |

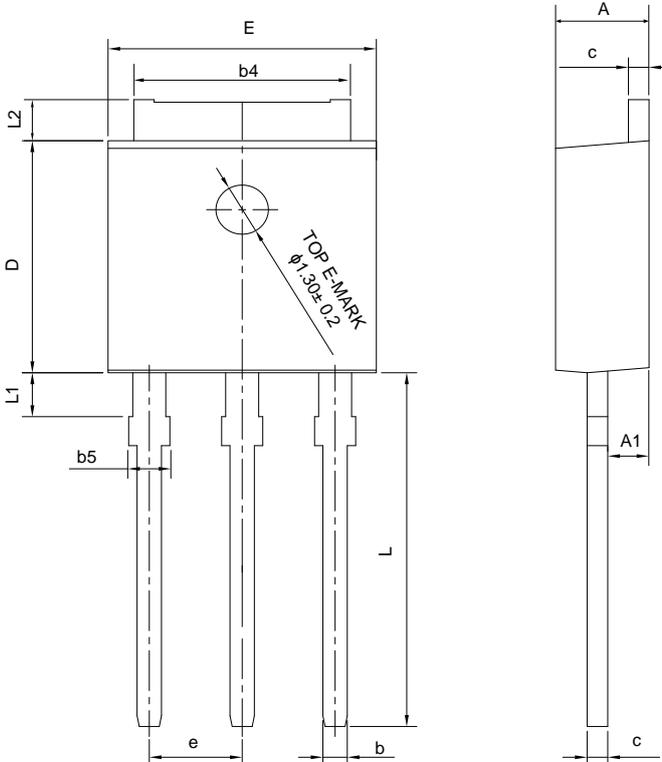
TO-220F-3L UNIT: mm



| SYMBOL | MILLIMETER | | |
|--------|------------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.42 | 4.70 | 5.02 |
| A1 | 2.30 | 2.54 | 2.80 |
| A3 | 2.50 | 2.76 | 3.10 |
| b | 0.70 | 0.80 | 0.90 |
| b2 | — | — | 1.47 |
| c | 0.35 | 0.50 | 0.65 |
| D | 15.25 | 15.87 | 16.25 |
| D1 | 15.30 | 15.75 | 16.30 |
| D2 | 9.30 | 9.80 | 10.30 |
| E | 9.73 | 10.16 | 10.36 |
| e | 2.54BSC | | |
| H1 | 6.40 | 6.68 | 7.00 |
| L | 12.48 | 12.98 | 13.48 |
| L1 | — | — | 3.50 |
| ΦP | 3.00 | 3.18 | 3.40 |
| Q | 3.05 | 3.30 | 3.55 |

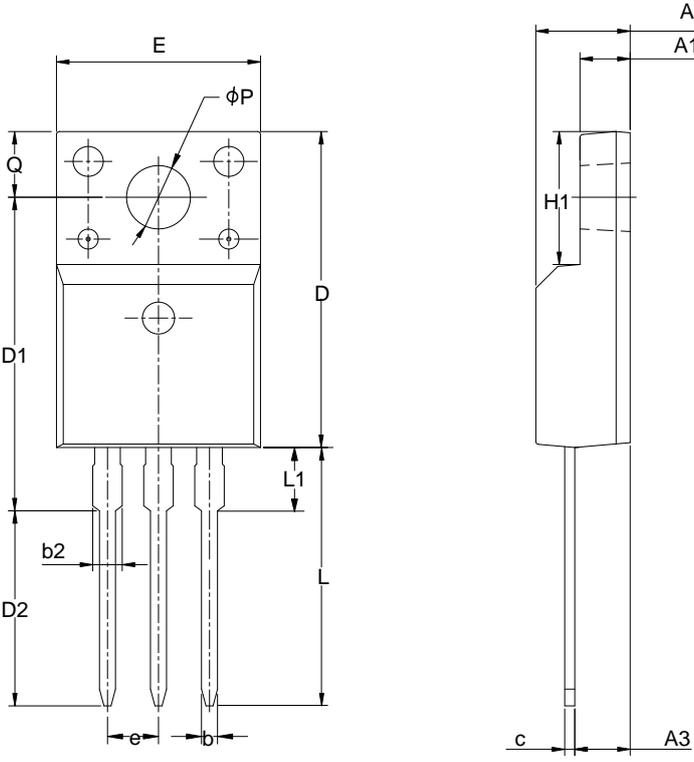
PACKAGE OUTLINE(CONTINUED)

TO-251J-3L **UNIT: mm**



| SYMBOL | MILLIMETER | | |
|--------|------------|------|------|
| | MIN | NOM | MAX |
| A | 2.18 | 2.30 | 2.39 |
| A1 | 0.89 | 1.00 | 1.14 |
| b | 0.56 | — | 0.89 |
| b4 | 4.95 | 5.33 | 5.46 |
| b5 | — | — | 1.05 |
| c | 0.46 | — | 0.61 |
| D | 5.97 | 6.10 | 6.27 |
| E | 6.35 | 6.60 | 6.73 |
| e | 2.29 BCS | | |
| L | 8.89 | 9.30 | 9.65 |
| L1 | 0.95 | — | 1.50 |
| L2 | 0.89 | — | 1.27 |

TO-220FJ-3L **UNIT: mm**



| SYMBOL | MILLIMETER | | |
|--------|------------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.42 | 4.70 | 5.02 |
| A1 | 2.30 | 2.54 | 2.80 |
| A3 | 2.50 | 2.76 | 3.10 |
| b | 0.55 | 0.70 | 0.85 |
| b2 | — | — | 1.29 |
| c | 0.35 | 0.50 | 0.65 |
| D | 15.25 | 15.87 | 16.25 |
| D1 | 13.97 | 14.47 | 14.97 |
| D2 | 10.58 | 11.08 | 11.58 |
| E | 9.73 | 10.16 | 10.36 |
| e | 2.54BSC | | |
| H1 | 6.40 | 6.68 | 7.00 |
| L | 12.48 | 12.98 | 13.48 |
| L1 | — | — | 2.00 |
| phi P | 3.00 | 3.18 | 3.40 |
| Q | 3.05 | 3.30 | 3.55 |

Important notice :

- The instructions are subject to change without notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- Our products are consumer electronic products, and / or civil electronic products.
- When using our products, please do not exceed the maximum rating of the products, otherwise the reliability of the whole machine will be affected. There is a certain possibility of failure or malfunction of any semiconductor product under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design, sample and whole machine manufacturing, so as to avoid potential failure risk that may cause personal injury or property loss.
- It is strongly recommended to identify the trademark when buying our products. Please contact us if there is any question.
- When exporting, using and reselling our products, buyer must comply with the international export control laws and regulations of China, the United States, the United Kingdom, the European Union and other countries & regions.
- Product promotion is endless, our company will wholeheartedly provide customers with better products!
- Website: <http://www.silan.com.cn>

| | | | |
|------------|---|----------------|---|
| Part No.: | SVS7N65D(F)(MJ)(FJ)D2 | Document Type: | Datasheet |
| Copyright: | HANGZHOU SILAN MICROELECTRONICS CO.,LTD | Website: | http://www.silan.com.cn |

Rev.: 1.6

Revision History:

1. Update Electrical schematic and Typical Test circuit
2. Add R_G
3. Update the template of the datasheet

Rev.: 1.5

Revision History:

1. Modify THERMAL CHARACTERISTICS
2. Add dv/dt of ABSOLUTE MAXIMUM RATINGS

Rev.: 1.4

Revision History:

1. Add the package outline of TO-220FJ-3L
2. Modify Electrical characteristics
3. Modify Ordering information

Rev.: 1.3

Revision History:

1. Add the package outline of TO-251J-3L

Rev.: 1.2

Revision History:

1. Modify characteristics of value Q
2. Update Fig 5 and 6

Rev.: 1.1

Revision History:

1. Add package outline of TO-220F-3L
2. Add Figure9-2

Rev.: 1.0

Revision History:



1. First release
