

2A, 600V N-CHANNEL MOSFET

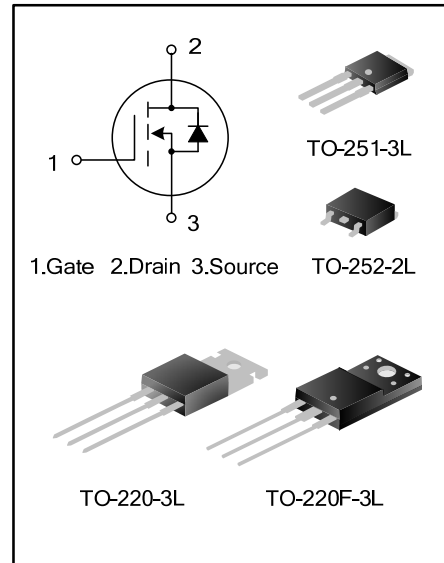
GENERAL DESCRIPTION

SVF2N60M/F/T/D is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-cell™ structure DMOS technology. The improved planar stripe cell and the improved guard ring terminal have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

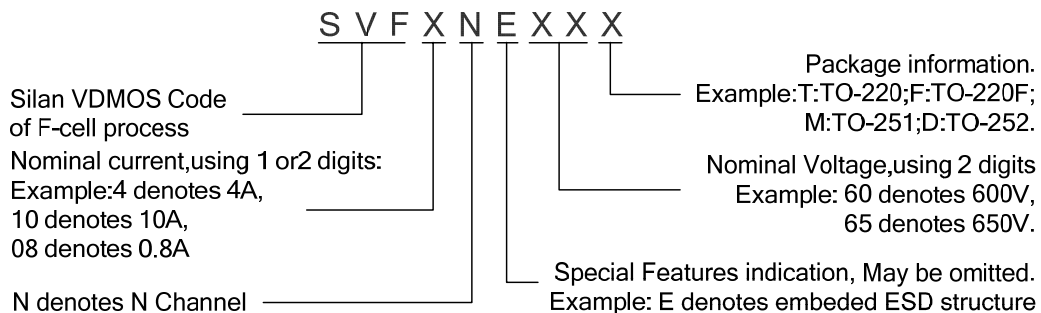
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.

FEATURES

- * 2A,600V, $R_{DS(on)(typ.)}=3.7\Omega@V_{GS}=10V$
- * Low gate charge
- * Low Crss
- * Fast switching
- * Improved dv/dt capability



NOMENCLATURE



ORDERING SPECIFICATIONS

| Part No. | Package Type | Marking | Material | Packing |
|------------|--------------|----------|----------|-------------|
| SVF2N60M | TO-251-3L | SVF2N60M | Pb free | Tube |
| SVF2N60F | TO-220F-3L | SVF2N60F | Pb free | Tube |
| SVF2N60T | TO-220-3L | SVF2N60T | Pb free | Tube |
| SVF2N60D | TO-252-2L | SVF2N60D | Pb free | Tube |
| SVF2N60DTR | TO-252-2L | SVF2N60D | Pb free | Tape & Reel |

ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Rating | | | Unit |
|---|-----------|-----------------|----------|----------|-----------------------|
| | | SVF2N60M/D | SVF2N60T | SVF2N60F | |
| Drain-Source Voltage | V_{DS} | 600 | | | V |
| Gate-Source Voltage | V_{GS} | ± 30 | | | V |
| Drain Current | I_D | 2.0 | | | A |
| Drain Current Pulsed | I_{DM} | 8 | | | A |
| Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C | P_D | 34 | 44 | 23 | W |
| | | 0.27 | 0.35 | 0.18 | W/ $^{\circ}\text{C}$ |
| Single Pulsed Avalanche Energy (Note 1) | E_{AS} | 115 | | | mJ |
| Operation Junction Temperature | T_J | $-55 \sim +150$ | | | $^{\circ}\text{C}$ |
| Storage Temperature | T_{stg} | $-55 \sim +150$ | | | $^{\circ}\text{C}$ |

THERMAL CHARACTERISTICS

| Parameter | Symbol | Rating | | | Unit |
|---|-----------------|------------|----------|----------|-----------------------------|
| | | SVF2N60M/D | SVF2N60T | SVF2N60F | |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 3.7 | 2.86 | 5.56 | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 110 | 62.5 | 120 | $^{\circ}\text{C}/\text{W}$ |

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|--|--------------|---|------|-------|-----------|---------------|
| Drain -Source Breakdown Voltage | B_{VDSS} | $V_{GS}=0\text{V}, I_D=250\mu\text{A}$ | 600 | -- | -- | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=600\text{V}, V_{GS}=0\text{V}$ | -- | -- | 1.0 | μA |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 30\text{V}, V_{DS}=0\text{V}$ | -- | -- | ± 100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=250\mu\text{A}$ | 2.0 | -- | 4.0 | V |
| Static Drain- Source On State Resistance | $R_{DS(on)}$ | $V_{GS}=10\text{V}, I_D=1.0\text{A}$ | -- | 3.7 | 4.2 | Ω |
| Input Capacitance | C_{iss} | $V_{DS}=25\text{V}, V_{GS}=0\text{V},$ $f=1.0\text{MHZ}$ | -- | 250.1 | -- | pF |
| Output Capacitance | C_{oss} | | -- | 35.7 | -- | |
| Reverse Transfer Capacitance | C_{rss} | | -- | 1.1 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=300\text{V}, I_D=2.0\text{A},$ $R_G=25\Omega$ (Note 2,3) | -- | 9.2 | -- | ns |
| Turn-on Rise Time | t_r | | -- | 23.4 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 15.3 | -- | |
| Turn-off Fall Time | t_f | | -- | 20.1 | -- | |
| Total Gate Charge | Q_g | $V_{DS}=480\text{V}, I_D=2.0\text{A},$ $V_{GS}=10\text{V}$ (Note 2,3) | -- | 5.67 | -- | nC |
| Gate-Source Charge | Q_{gs} | | -- | 1.74 | -- | |
| Gate-Drain Charge | Q_{gd} | | -- | 1.99 | -- | |

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Parameter | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---------------------------|----------|---|------|------|------|---------|
| Continuous Source Current | I_S | Integral Reverse P-N Junction Diode in the MOSFET | -- | -- | 2.0 | A |
| Pulsed Source Current | I_{SM} | | -- | -- | 8.0 | |
| Diode Forward Voltage | V_{SD} | $I_S=2.0A, V_{GS}=0V$ | -- | -- | 1.4 | V |
| Reverse Recovery Time | T_{rr} | $I_S=2.0A, V_{GS}=0V,$ $dI_F/dt=100A/\mu S$ | -- | 230 | -- | ns |
| Reverse Recovery Charge | Q_{rr} | | -- | 1.0 | -- | μC |

Notes:

1. $L=30mH, I_{AS}=2.52A, V_{DD}=145V, R_G=25\Omega,$ starting $T_J=25^\circ C;$
2. Pulse Test: Pulse width $\leq 300\mu s,$ Duty cycle $\leq 2\%;$
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

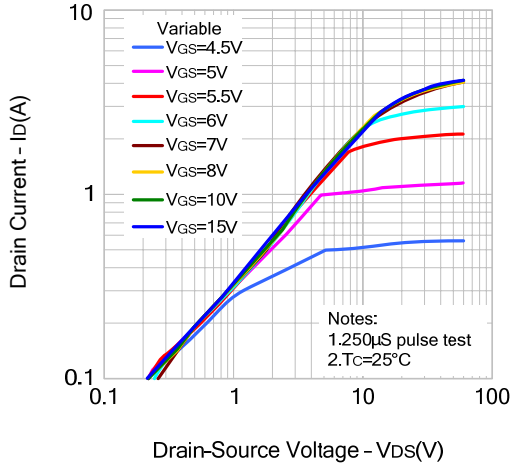


Figure 2. Transfer Characteristics

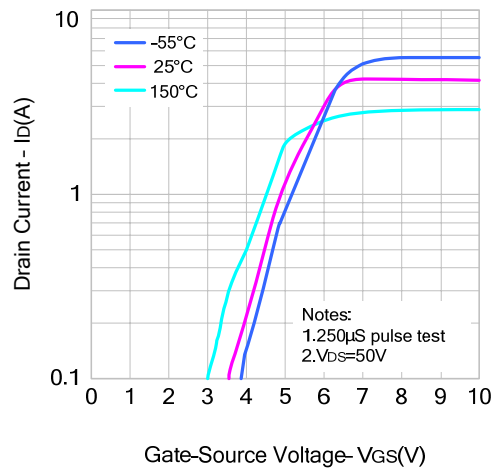


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

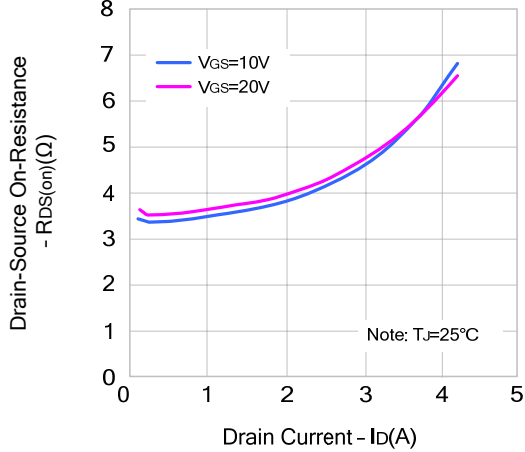


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

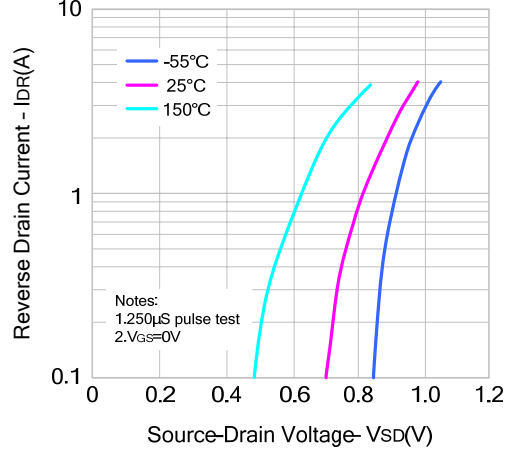


Figure 5. Capacitance Characteristics

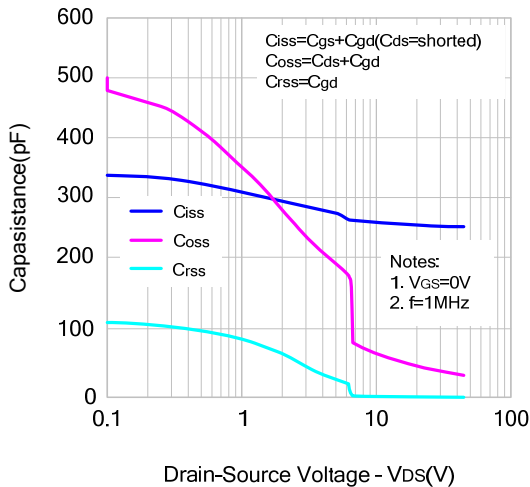
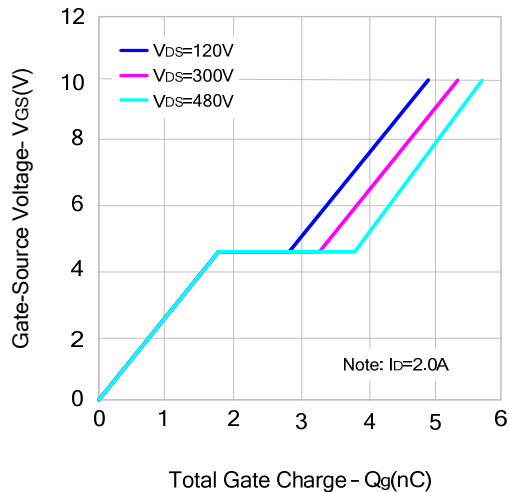


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Breakdown Voltage Variation vs. Temperature

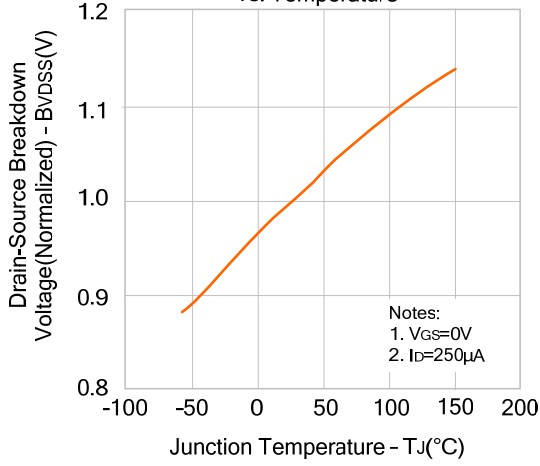


Figure 8. On-resistance Variation vs. Temperature

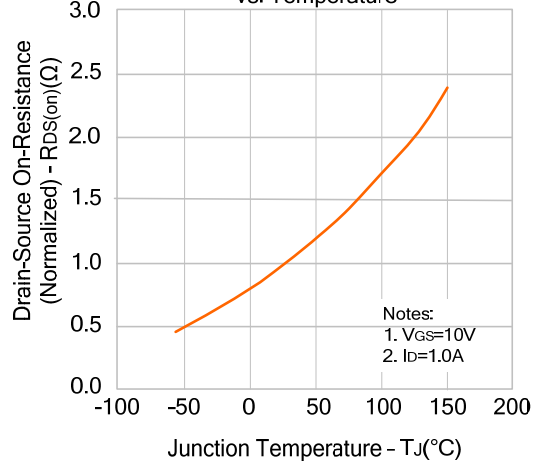


Figure 9-1. Max. Safe Operating Area(SVF2N60MD)

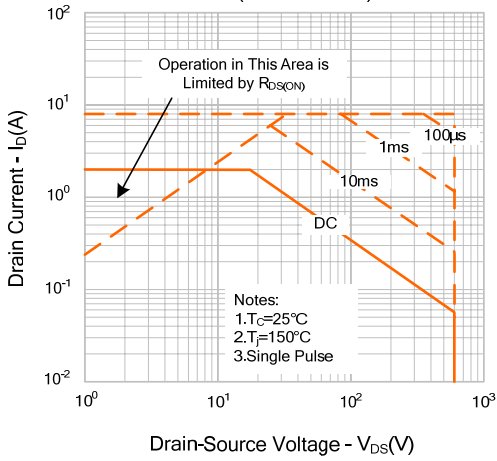


Figure 9-2. Max. Safe Operating Area(SVF2N60T)

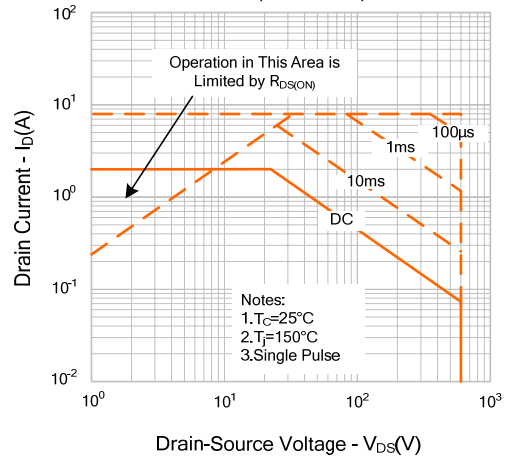


Figure 9-3. Max. Safe Operating Area(SVF2N60F)

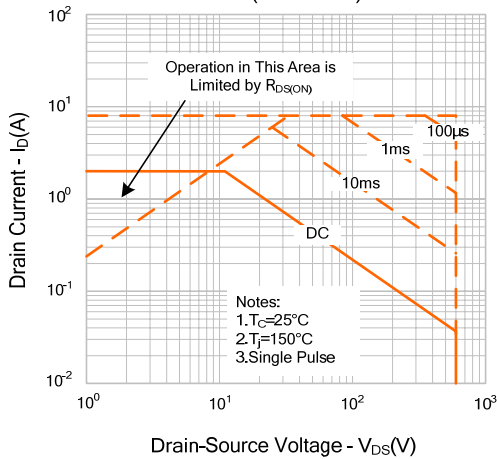
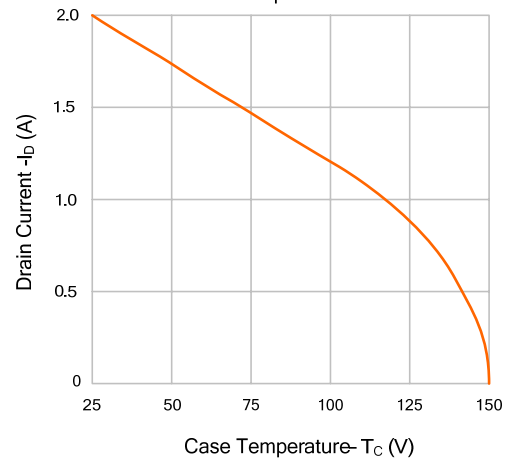
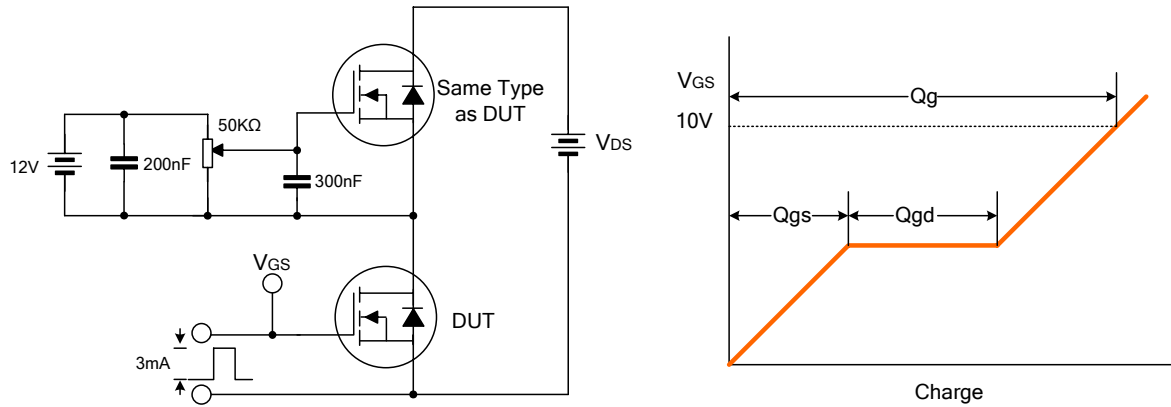


Figure 10. Max. Drain Current vs. Case Temperature

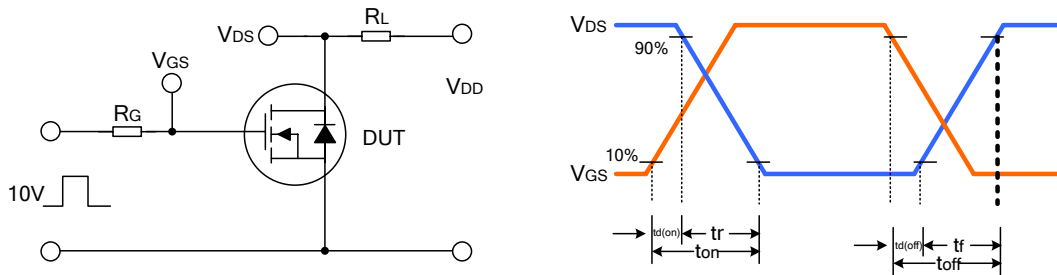


TYPICAL TEST CIRCUIT

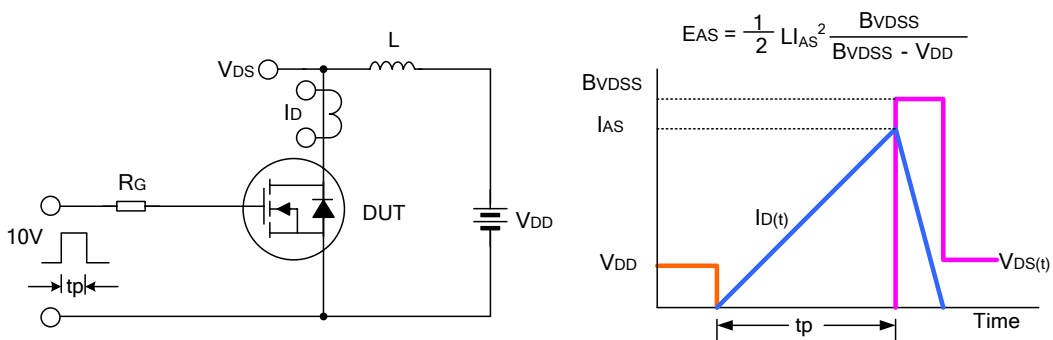
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



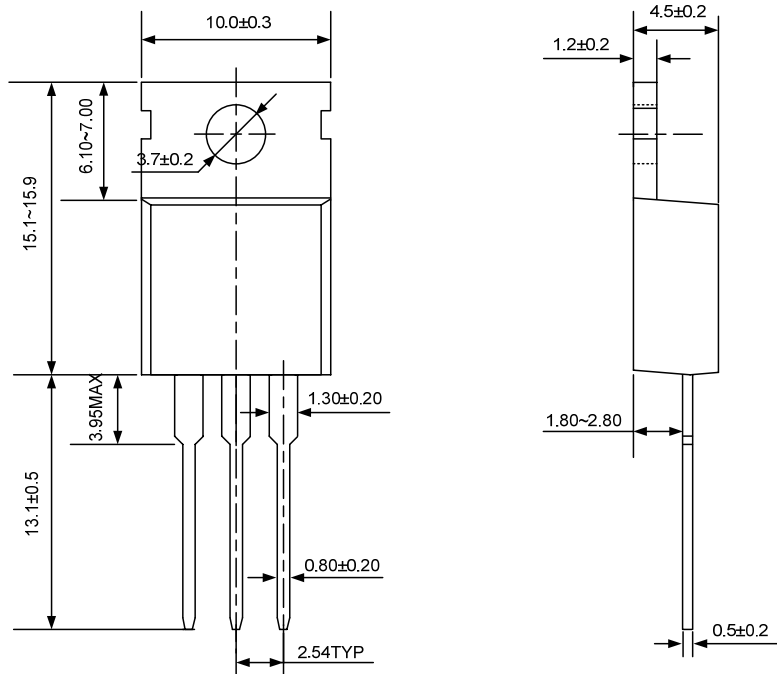
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

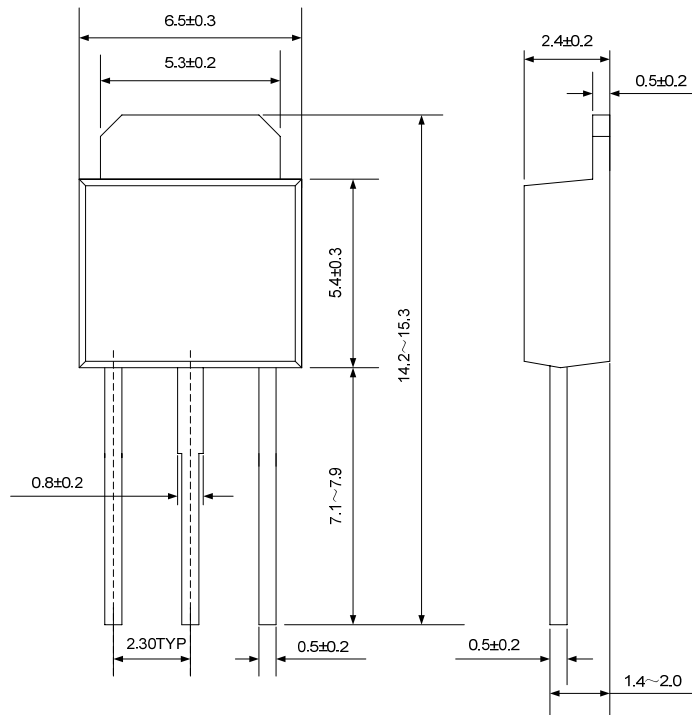
TO-220-3L

UNIT: mm



TO-251-3L

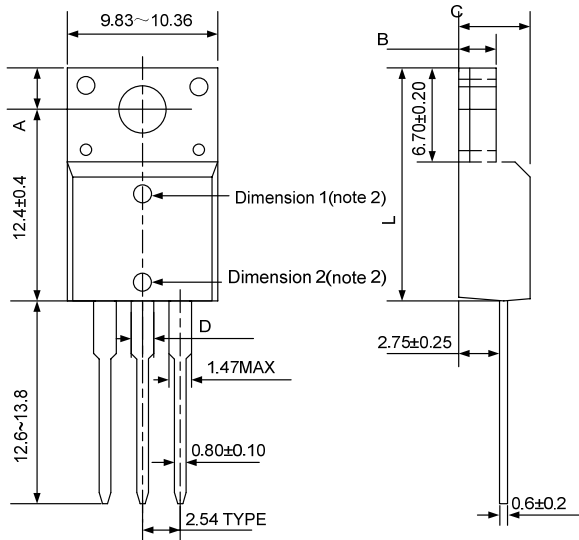
UNIT: mm



PACKAGE OUTLINE (continued)

TO-220F-3L(One)

UNIT: mm



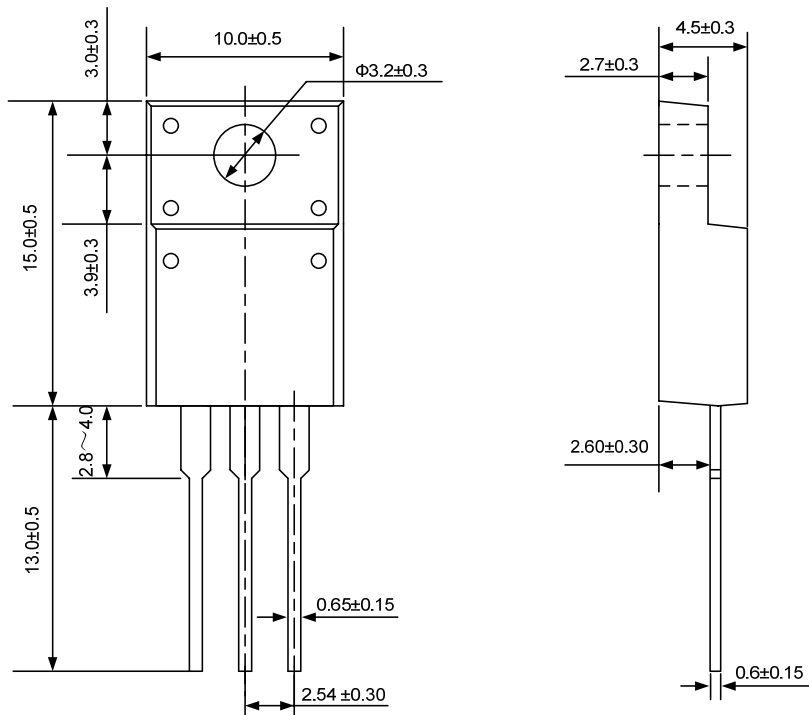
| Symbol(note1) | Dimension1 | Dimension2 |
|---------------|------------|------------|
| A | 3.30±0.15 | 2.70±0.15 |
| B | 2.55±0.20 | 3.0±0.20 |
| C | 4.72±0.2 | 4.50±0.20 |
| D | 1.47MAX | 1.75MAX |
| L | 15.75±0.30 | 15.00±0.30 |

Note1: There may be two values for some products due to different plastic mould machine, so two dimensions of the same position are listed;

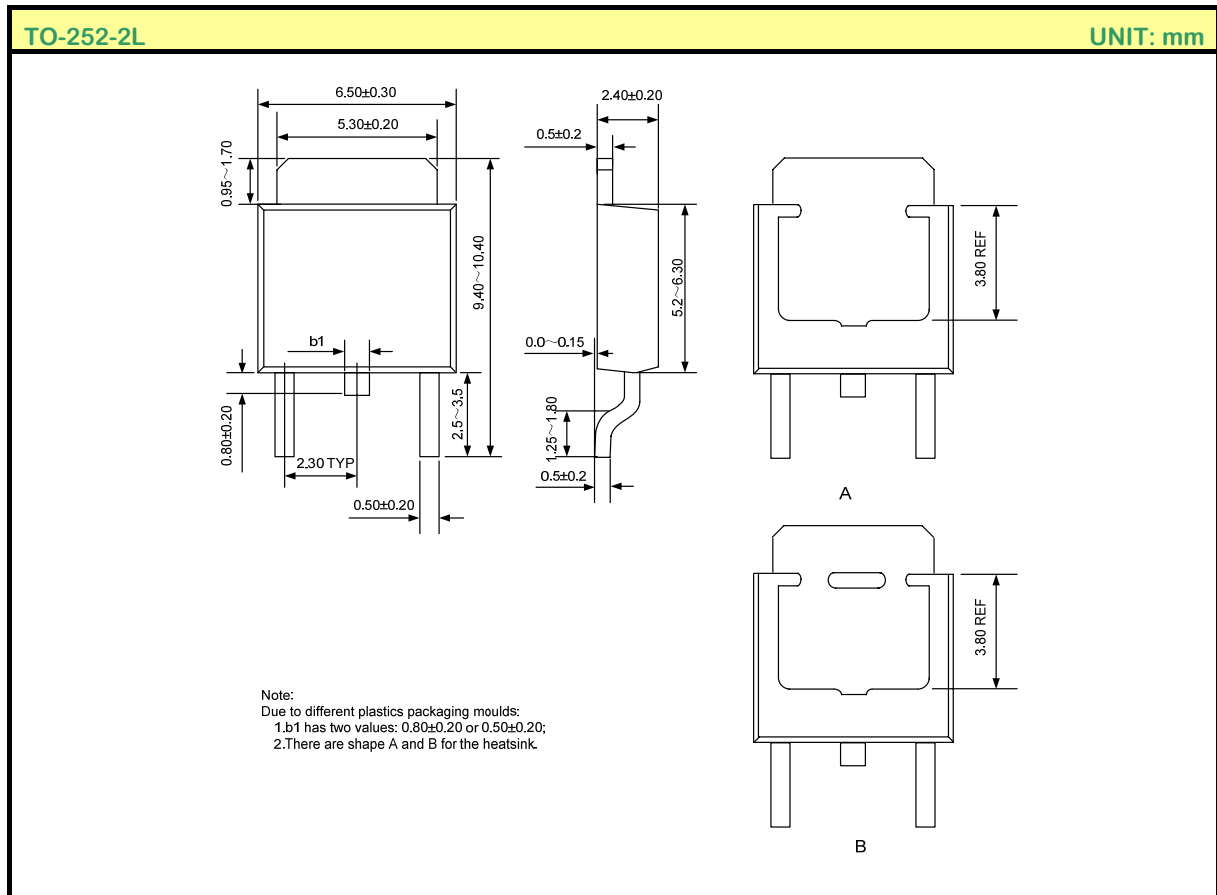
Note2: When the product size is Dimension1, the thimble hole is on top of the surface; when the size is Dimension2, the center hole is on bottom of the surface.

TO-220F-3L(Two)

UNIT: mm



PACKAGE OUTLINE (continued)



Disclaimer:

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using Silan products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- Silan will supply the best possible product for customers!



ATTACHMENT

Revision History

| Date | REV | Description | Page |
|------------|-----|--|------|
| 2010.09.20 | 1.0 | Original | |
| 2010.10.21 | 1.1 | Modify "TYPICAL CHARACTERISTICS", "PACKAGE OUTLINE", the template of Datasheet | |