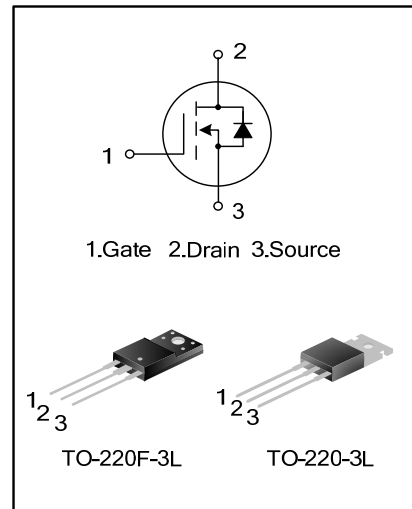


12A, 600V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVD12N60T/F is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary S-Rin™ structure DMOS technology. The improved planar stripe cell and the improved guarding 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.

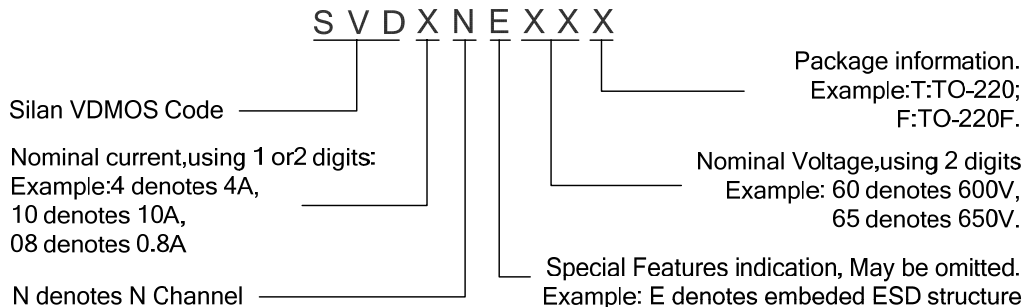
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.



FEATURES

- * 12A,600V, $R_{DS(on)(typ)}=0.58\Omega@V_{GS}=10V$
- * Low gate charge
- * Low Crss
- * Fast switching
- * Improved dv/dt capability

NOMENCLATURE



ORDERING SPECIFICATIONS

| Part No. | Package | Marking | Material | Packing |
|-----------|------------|-----------|----------|---------|
| SVD12N60T | TO-220-3L | SVD12N60T | Pb free | Tube |
| SVD12N60F | TO-220F-3L | SVD12N60F | Pb free | Tube |

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

| Parameter | Symbol | Rating | | Unit |
|---|-----------|-----------|-----------|-----------------------|
| | | SVD12N60T | SVD12N60F | |
| Drain-Source Voltage | V_{DS} | 600 | | V |
| Gate-Source Voltage | V_{GS} | ± 30 | | V |
| Drain Current | I_D | 12 | | A |
| Drain Current Pulsed | I_{DM} | 48 | | A |
| Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C | P_D | 225 | 51 | W |
| | | 1.8 | 0.41 | W/ $^{\circ}\text{C}$ |
| Single Pulsed Avalanche Energy (Note 1) | E_{AS} | 1206 | | mJ |
| Operation Junction Temperature | T_J | 150 | | $^{\circ}\text{C}$ |
| Storage Temperature | T_{stg} | -55~+150 | | $^{\circ}\text{C}$ |

THERMAL CHARACTERISTICS

| Parameter | Symbol | Rating | | Unit |
|---|-----------------|-----------|-----------|-----------------------------|
| | | SVD12N60T | SVD12N60F | |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.56 | 2.44 | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 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 | $B_{V_{DS}}$ | $V_{GS}=0\text{V}, I_D=250\mu\text{A}$ | 600 | -- | -- | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=600\text{V}, V_{GS}=0\text{V}$ | -- | -- | 10 | 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 | $R_{DS(on)}$ | $V_{GS}=10\text{V}, I_D=6.0\text{A}$ | -- | 0.58 | 0.8 | Ω |
| Input Capacitance | C_{iss} | $V_{DS}=25\text{V}, V_{GS}=0\text{V},$ $f=1.0\text{MHz}$ | -- | 1876 | -- | pF |
| Output Capacitance | C_{oss} | | -- | 167 | -- | |
| Reverse Transfer Capacitance | C_{rss} | | -- | 20 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=300\text{V}, I_D=12\text{A},$ $R_G=25\Omega$ (Note 2,3) | -- | 30 | -- | ns |
| Turn-on Rise Time | t_r | | -- | 79 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 150 | -- | |
| Turn-off Fall Time | t_f | | -- | 89 | -- | |
| Total Gate Charge | Q_g | $V_{DS}=480\text{V}, I_D=12\text{A},$ $V_{GS}=10\text{V}$ (Note 2,3) | -- | 51.7 | -- | nC |
| Gate-Source Charge | Q_{gs} | | -- | 9.6 | -- | |
| Gate-Drain Charge | Q_{gd} | | -- | 18.6 | -- | |

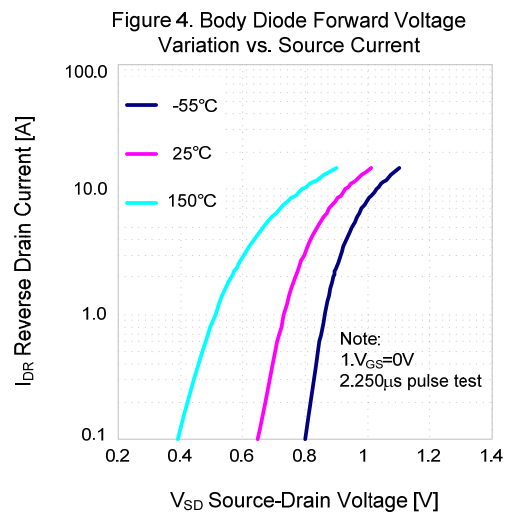
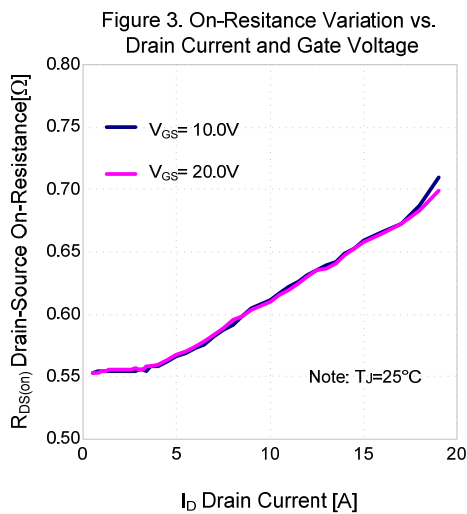
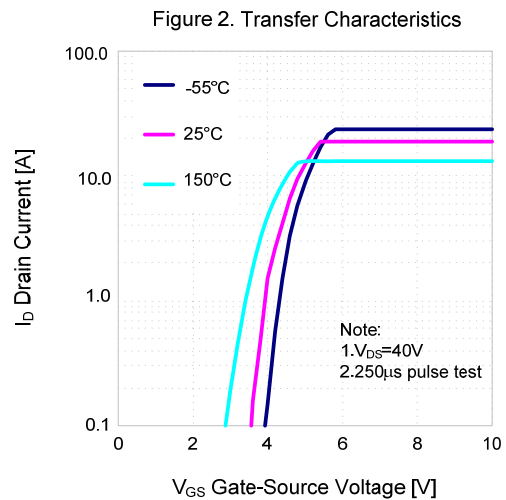
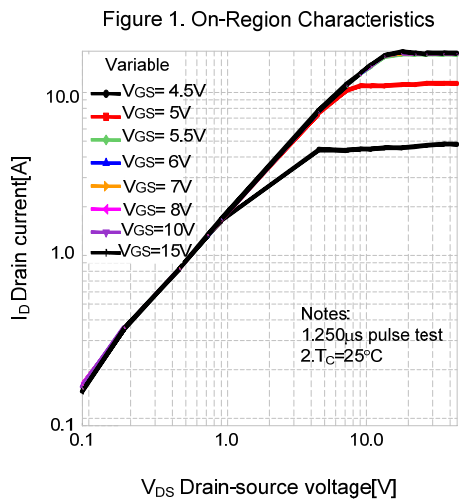
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Parameter | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---------------------------|----------|-------------------------------|------|------|------|---------|
| Continuous Source Current | I_S | Integral Reverse p-n | -- | -- | 12 | A |
| Pulsed Source Current | I_{SM} | Junction Diode in the MOSFET | -- | -- | 48 | |
| Diode Forward Voltage | V_{SD} | $I_S=12A, V_{GS}=0V$ | -- | -- | 1.4 | V |
| Reverse Recovery Time | T_{rr} | $I_S=12A, V_{GS}=0V,$ | -- | 420 | -- | ns |
| Reverse Recovery Charge | Q_{rr} | $di_f/dt=100A/\mu S$ (Note 2) | -- | 4.9 | -- | μC |

Notes:

1. $L=30mH, I_{AS}=7.5A, V_{DD}=245V, R_G=25\Omega,$ starting $T_J=25^\circ C;$
2. Pulse Test: Pulse width $\leq 300\mu s,$ Duty cycles $\leq 2\%;$
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (continued)

Figure 5. Breakdown Voltage Variation vs. Temperature

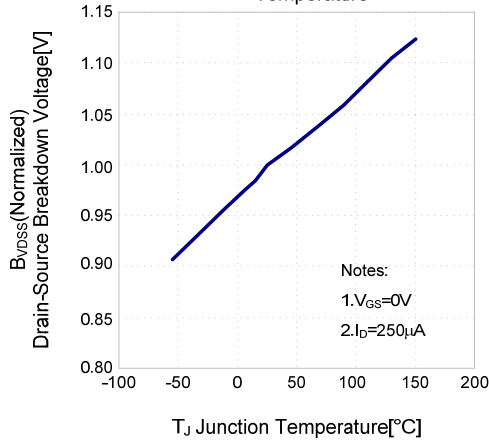


Figure 6. On-resistance Variation vs Temperature

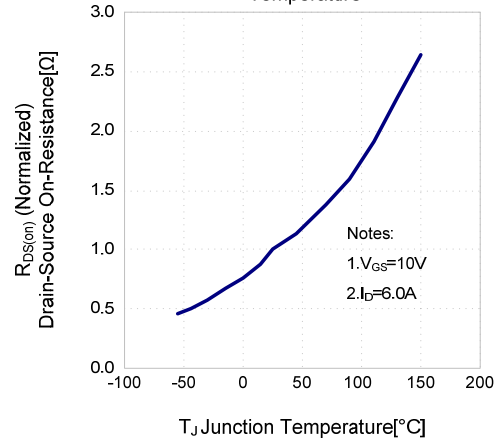


Figure 7 Capacitance Characteristics

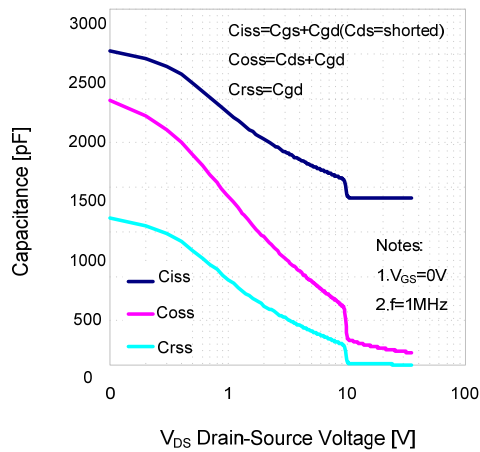


Figure 8-1. Max. Safe Operating Area(SVD12N60T)

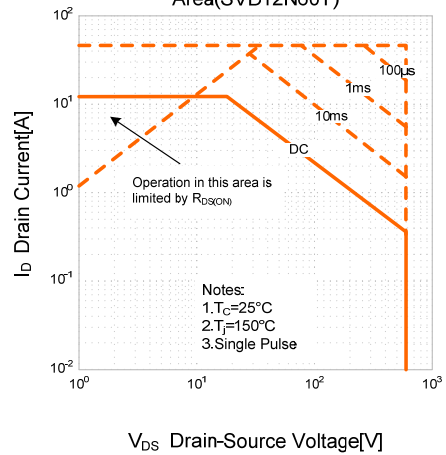


Figure 8-2. Max. Safe Operating Area(SVD12N60F)

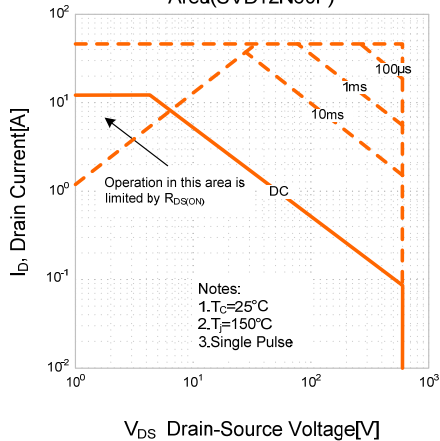
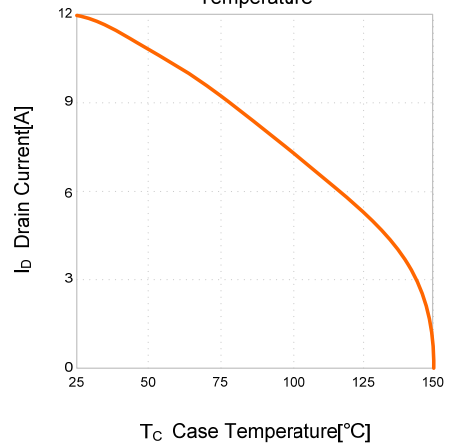
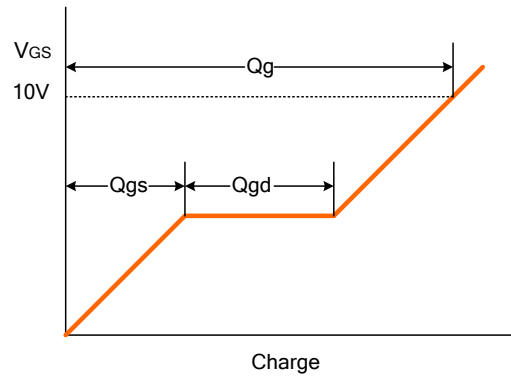
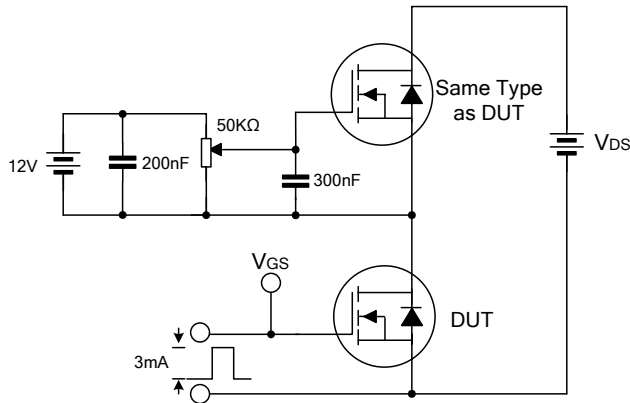


Figure 9. Max. Drain Current vs. Case Temperature

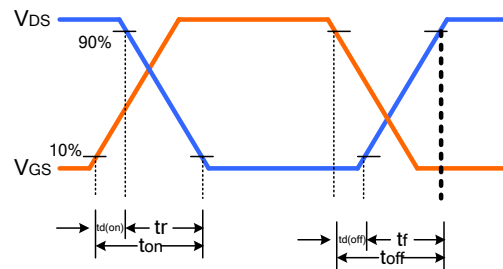
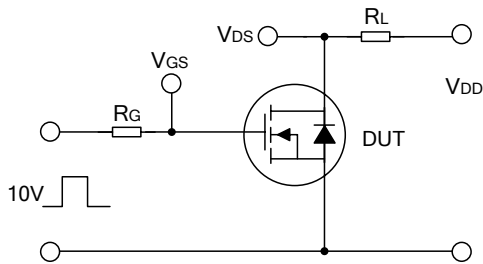


TYPICAL TEST CIRCUIT

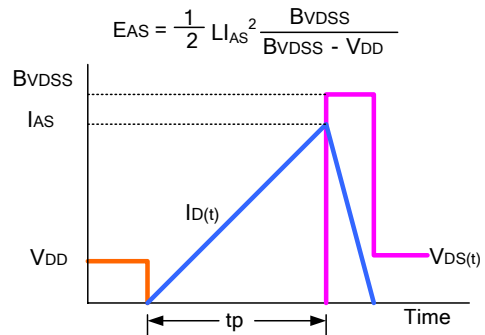
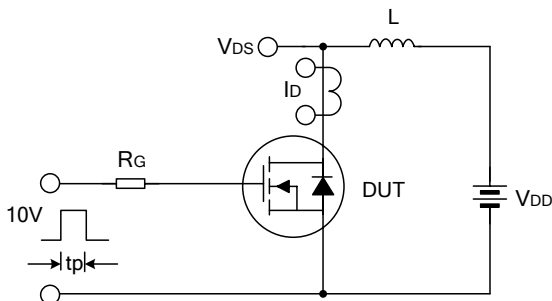
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



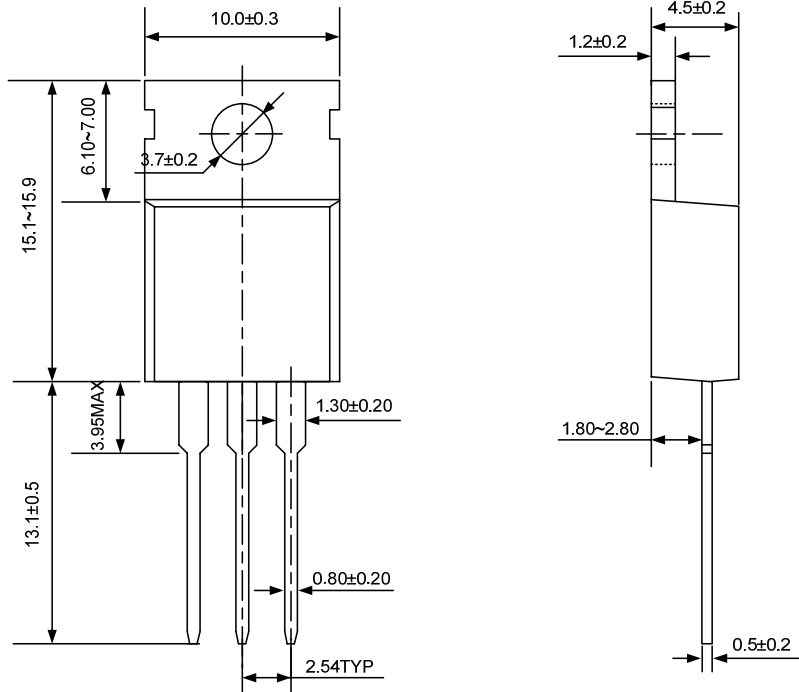
Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE

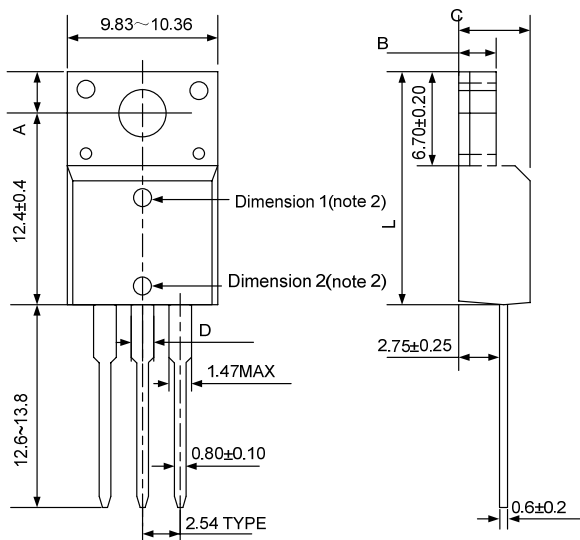
TO-220-3L

UNIT: mm



TO-220F-3L

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 | 1.47 MAX | 1.75 MAX |
| 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.



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- Silan will supply the best possible product for customers!



ATTACHMENT

Revision History

| Date | REV | Description | Page |
|------------|-----|---|------|
| 2010.05.25 | 1.0 | Original | |
| 2010.09.20 | 1.1 | Modify" ABSOLUTE MAXIMUM RATINGS"; "THERMAL CHARACTERISTICS", Add SOA and ID-TC | |
| 2010.10.21 | 1.2 | Modify" TYPICAL CHARACTERISTICS", the template of Datasheet | |