

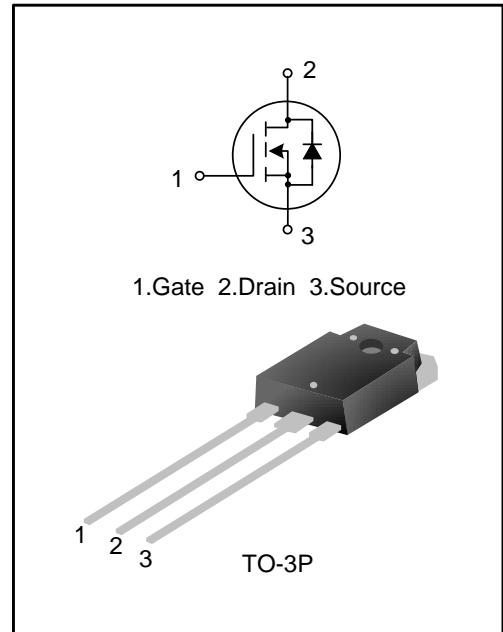
23A 500V N-CHANNEL MOSFET

GENERAL DESCRIPTION

SVF23N50PN is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ structure VDMOS 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

- ◆ 23A, 500V, $R_{DS(on)(typ)}=0.21\Omega@V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low Crss
- ◆ Fast switching
- ◆ Improved dv/dt capability



ORDERING INFORMATION

| Part No. | Package | Marking | Hazardous Substance Control | Packing Type |
|------------|---------|---------|-----------------------------|--------------|
| SVF23N50PN | TO-3P | 23N50 | Pb free | Tube |

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

| Characteristics | | Symbol | Rating | Unit |
|---|-----------------------|------------------|----------|------|
| Drain-Source Voltage | | V _{DS} | 500 | V |
| Gate-Source Voltage | | V _{GS} | ±30 | V |
| Drain Current | T _C =25°C | I _D | 23.0 | A |
| | T _C =100°C | | 14.55 | |
| Drain Current Pulsed | | I _{DM} | 92.0 | A |
| Power Dissipation(T _C =25°C) -Derate above 25°C | | P _D | 280 | W |
| | | | 2.24 | W/°C |
| Single Pulsed Avalanche Energy (Note 1) | | E _{AS} | 2044 | mJ |
| Operation Junction Temperature Range | | T _J | -55~+150 | °C |
| Storage Temperature Range | | T _{stg} | -55~+150 | °C |

THERMAL CHARACTERISTICS

| Characteristics | Symbol | Rating | Unit |
|---|------------------|--------|------|
| Thermal Resistance, Junction-to-Case | R _{θJC} | 0.45 | °C/W |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} | 50 | °C/W |

ELECTRICAL CHARACTERISTICS (T_C=25°C UNLESS OTHERWISE NOTED)

| Characteristics | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|--|---------------------|--|------|--------|------|------|
| Drain -Source Breakdown Voltage | B _{VDS} | V _{GS} =0V, I _D =250μA | 500 | -- | -- | V |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} =500V, V _{GS} =0V | -- | -- | 1.0 | μA |
| Gate-Source Leakage Current | I _{GSS} | V _{GS} =±30V, V _{DS} =0V | -- | -- | ±100 | nA |
| Gate Threshold Voltage | V _{GS(th)} | V _{GS} = V _{DS} , I _D =250μA | 2.0 | -- | 4.0 | V |
| Static Drain- Source On State Resistance | R _{DS(on)} | V _{GS} =10V, I _D =11.5A | -- | 0.21 | 0.27 | Ω |
| Input Capacitance | C _{iss} | V _{DS} =25V, V _{GS} =0V, f=1.0MHz | -- | 2595.8 | -- | pF |
| Output Capacitance | C _{oss} | | -- | 343.8 | -- | |
| Reverse Transfer Capacitance | C _{rss} | | -- | 10.1 | -- | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =250V, R _G =10Ω, I _D =23.0A (note 2, 3) | -- | 42.2 | -- | ns |
| Turn-on Rise Time | t _r | | -- | 79.0 | -- | |
| Turn-off Delay Time | t _{d(off)} | | -- | 125.7 | -- | |
| Turn-off Fall Time | t _f | | -- | 71.2 | -- | |
| Total Gate Charge | Q _g | V _{DD} =400V, V _{GS} =10V, I _D =23.0A (note 2, 3) | -- | 42.51 | -- | nC |
| Gate-Source Charge | Q _{gs} | | -- | 12.9 | -- | |
| Gate-Drain Charge | Q _{gd} | | -- | 14.34 | -- | |

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Characteristics | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---------------------------|----------|-------------------------------|------|--------|------|---------|
| Continuous Source Current | I_S | Integral Reverse P-N Junction | -- | -- | 23.0 | A |
| Pulsed Source Current | I_{SM} | Diode in the MOSFET | -- | -- | 92.0 | |
| Diode Forward Voltage | V_{SD} | $I_S=23.0A, V_{GS}=0V$ | -- | -- | 1.4 | V |
| Reverse Recovery Time | T_{rr} | $I_S=23.0A, V_{GS}=0V,$ | -- | 578.21 | -- | ns |
| Reverse Recovery Charge | Q_{rr} | $di_F/dt=100A/\mu s$ (Note 2) | -- | 7.89 | -- | μC |

Notes:

1. $L=30mH, I_{AS}=10.65A, V_{DD}=100V, R_G=25\Omega$, 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

Figure 1. On-Region Characteristics

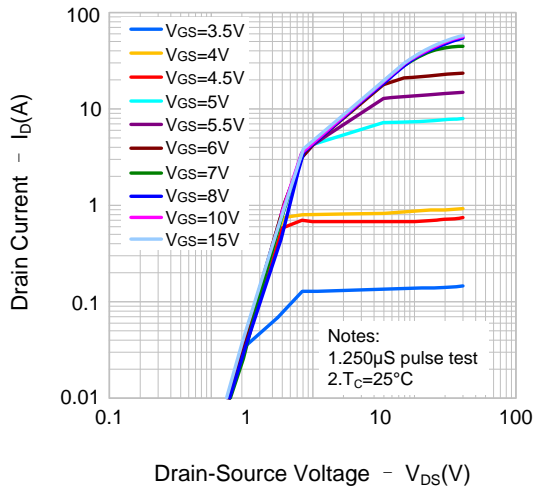


Figure 2. Transfer Characteristics

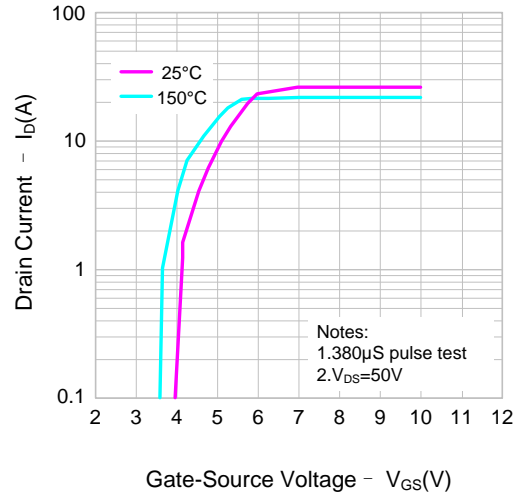


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

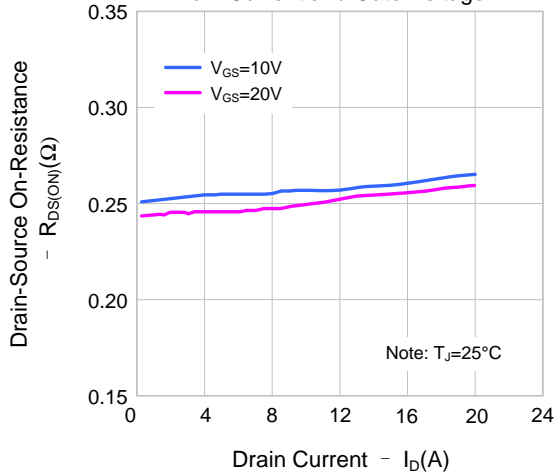
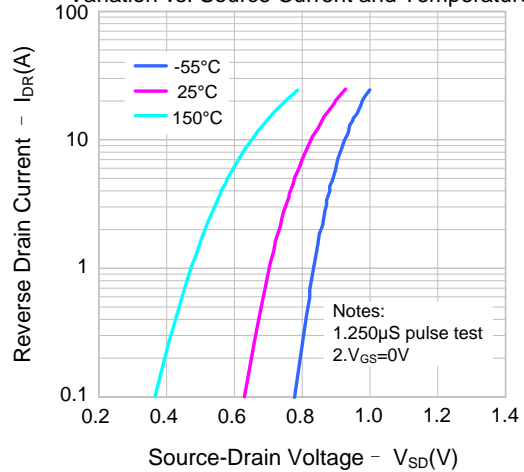


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 5. Capacitance Characteristics

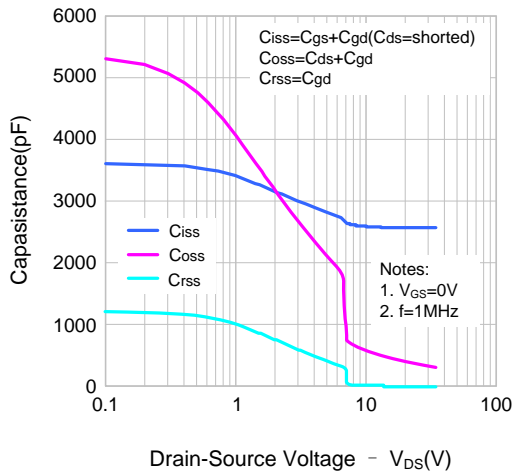


Figure 6. Gate Charge Characteristics

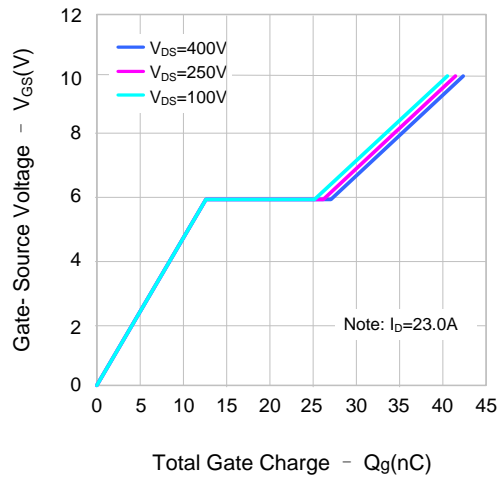


Figure 7. Breakdown Voltage Variation vs. Temperature

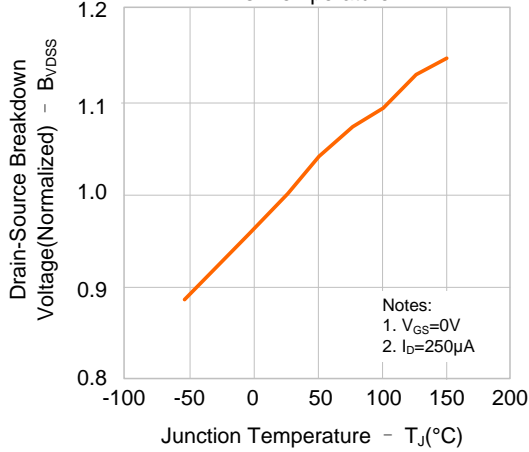


Figure 8. On-resistance Variation vs. Temperature

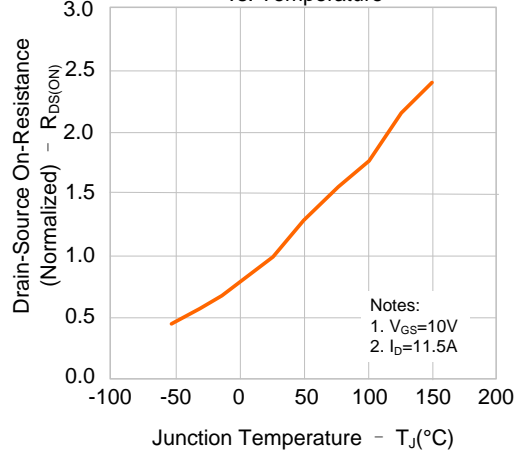


Figure 9. Max. Safe Operating Area

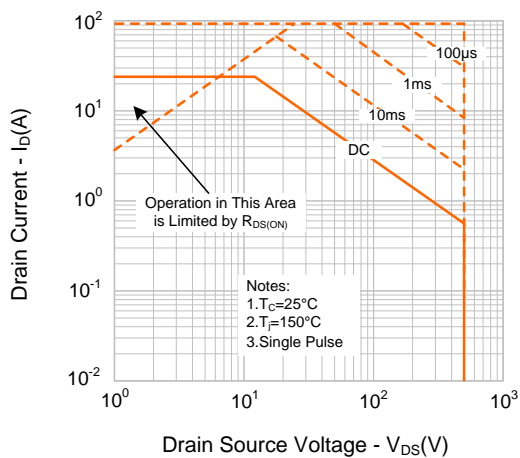
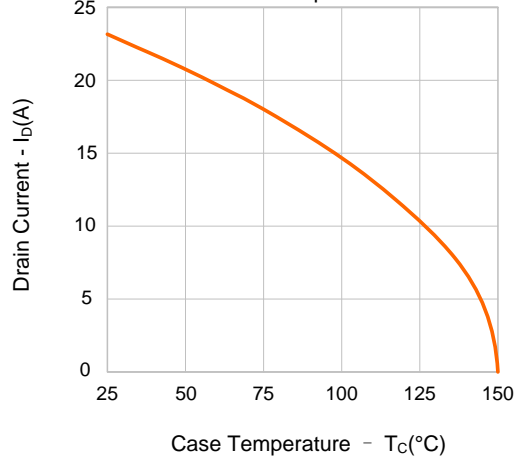
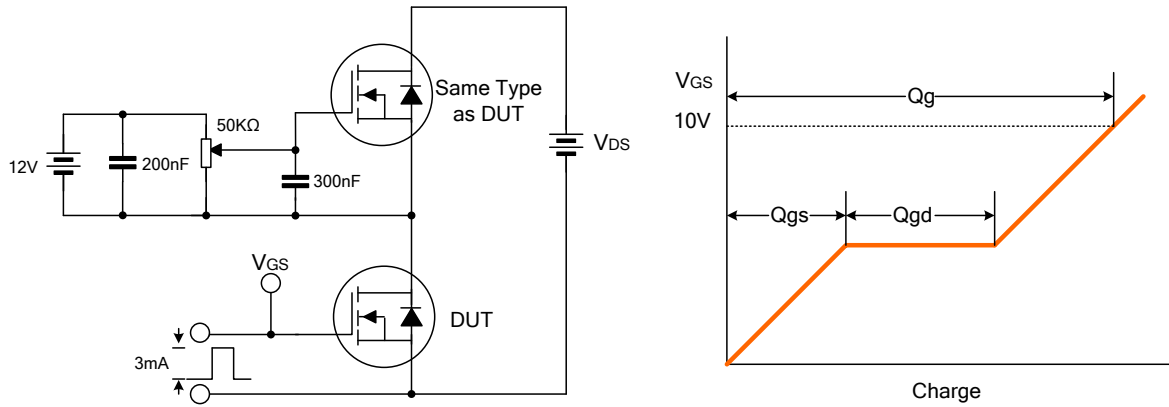


Figure 10. Maximum Drain Current vs. Case Temperature

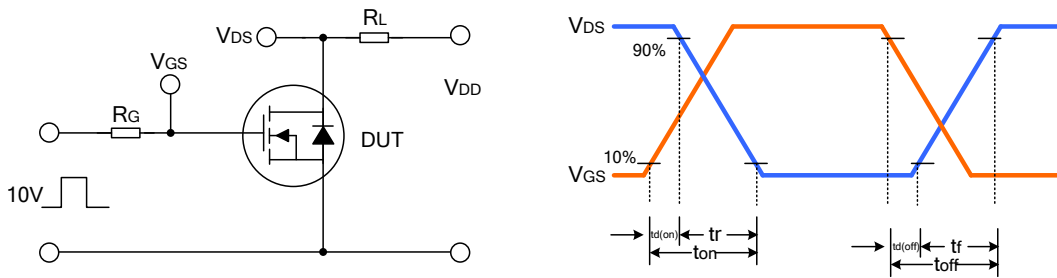


TYPICAL TEST CIRCUIT

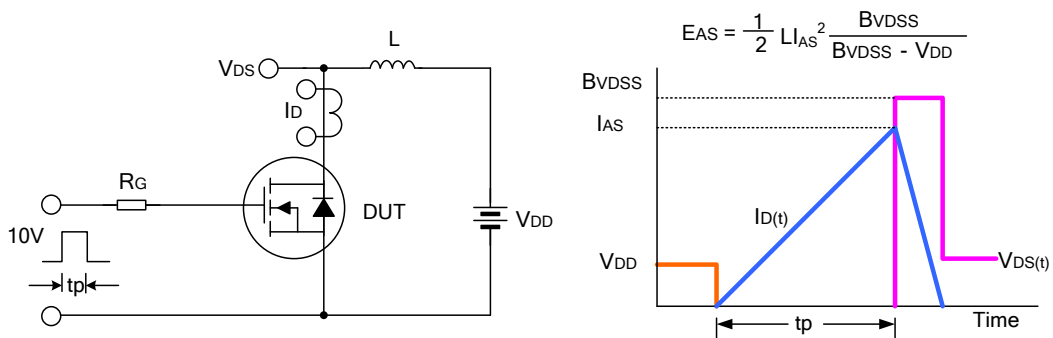
Gate Charge Test Circuit & Waveform



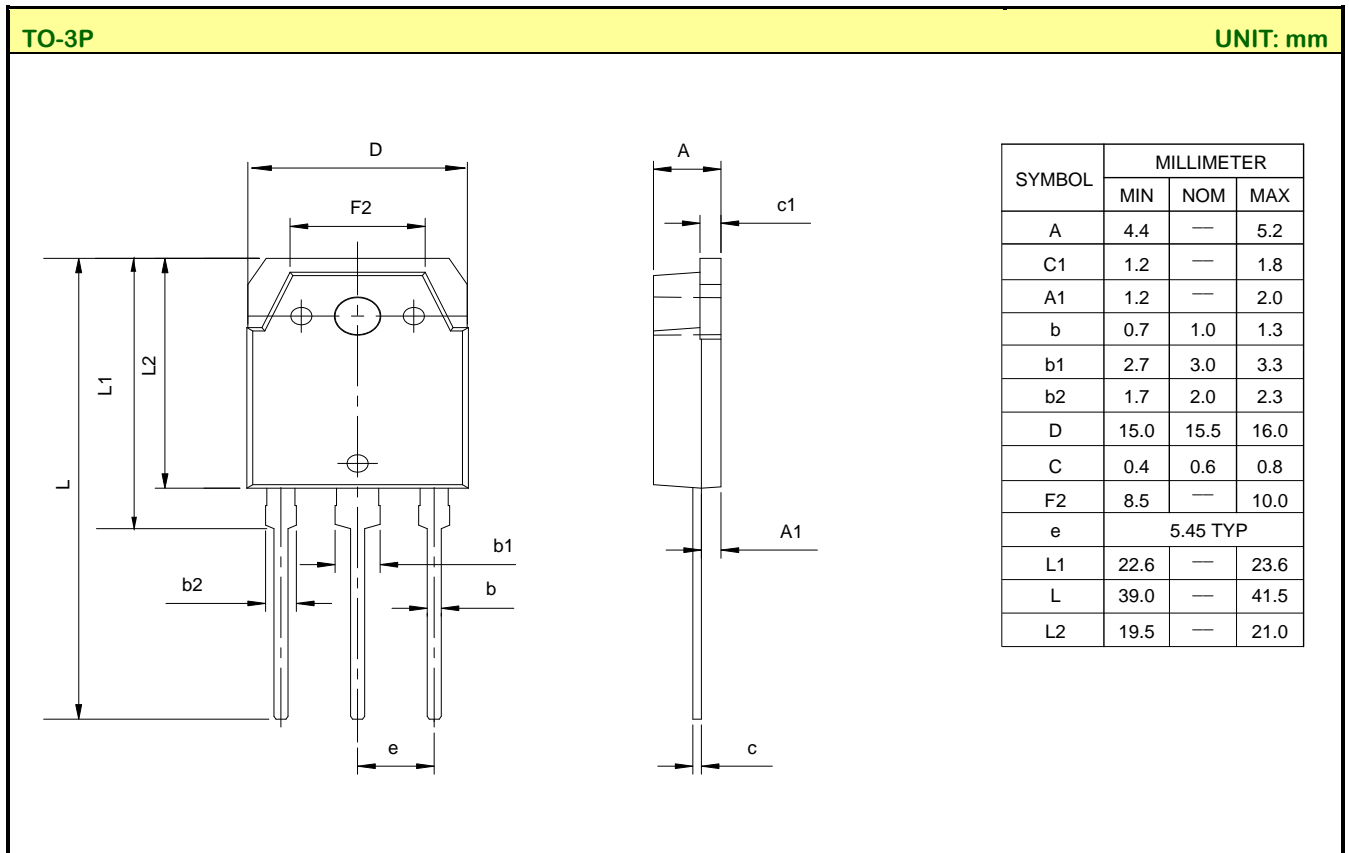
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE



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>

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Rev.: 1.2

Revision History:

1. Deleted NOMENCLATURE
 2. Modify Important notice
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Rev.: 1.1

Revision History:

1. Modify ordering information
 2. Modify Part No.
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Rev.: 1.0

Revision History:

1. First release
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