

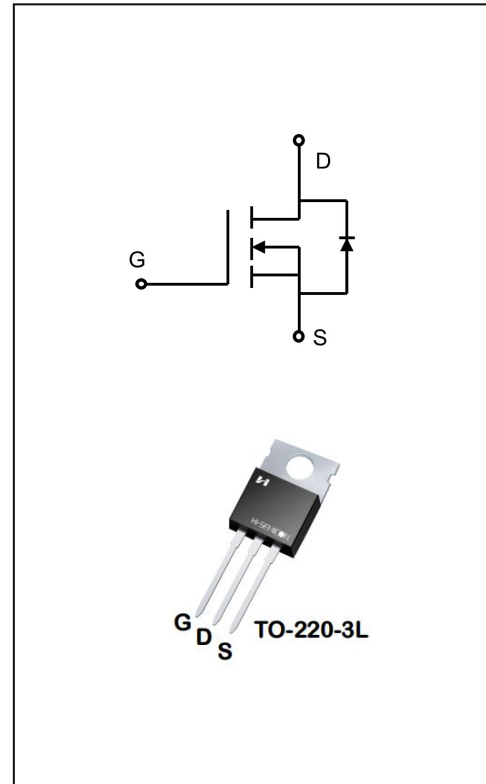
59A, 100V N-CHANNEL MOSFET

GENERAL DESCRIPTION

This power mosfet is an N-channel enhancement mode power MOS field effect transistor which is produced using Hi-semicon proprietary F-CellTM structure VDMOS technology. These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.

Features

- ◆ $V_{DS}=100V, I_D=59A$
- ◆ $R_{DS(on)}$
TYP: $18m\Omega @ V_{GS}=10V$



ORDERING INFORMATION

| Part No. | Package | Marking | Material | Packing |
|----------|-----------|----------|----------|---------|
| SFP59N10 | TO-220-3L | SFP59N10 | Pb Free | Tube |

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

| Characteristics | | Symbol | Ratings | Unit |
|---|------------------------|------------------|----------|------|
| Drain-Source Voltage | | V _{DS} | 100 | V |
| Gate-Source Voltage | | V _{GS} | ±20 | V |
| Drain Current | T _C = 25°C | I _D | 59 | A |
| | T _C = 100°C | | 40 | |
| Drain Current Pulsed(Note 1) | | I _{DM} | 230 | A |
| Power Dissipation(T _C =25°C) -Derate above 25°C | | P _D | 200 | W |
| | | | 1.3 | W/°C |
| Single Pulsed Avalanche Energy (Note 2) | | E _{AS} | 20 | mJ |
| Operation Junction Temperature Range | | T _J | -55~+150 | °C |
| Storage Temperature Range | | T _{stg} | -55~+150 | °C |
| Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | | TL | 300 | °C |

THERMAL CHARACTERISTICS

| Characteristics | Symbol | MAX | Unit |
|---|------------------|------|------|
| Thermal Resistance, Junction-to-Case | R _{θJC} | 0.75 | °C/W |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} | 62.5 | °C/W |

ELECTRICAL CHARACTERISTICS

| Characteristics | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|--|---------------------|--|------|------|------|------|
| Off Characteristics | | | | | | |
| Drain -Source Breakdown Voltage | B _{VDS} | V _{GS} =0V, I _D =250μA | 100 | -- | -- | V |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} =100V, V _{GS} =0V | -- | -- | 1.0 | uA |
| Gate-Source Leakage Current | I _{GSS} | V _{GS} =20V, V _{DS} =0V | -- | -- | 100 | nA |
| Gate-Source Leakage Current | I _{GSS} | V _{GS} =-20V, V _{DS} =0V | -- | -- | -100 | nA |
| On Characteristics | | | | | | |
| 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 =28A | -- | 18 | 23 | mΩ |
| Dynamic Characteristics | | | | | | |
| Gate Resistance | R _g | V _{GS} =0V; f=1.0MHZ | -- | 3.0 | -- | Ω |
| Input Capacitance | C _{iss} | V _{DS} =25V V _{GS} =0V f=1.0MHZ | -- | 3120 | -- | pF |
| Output Capacitance | C _{oss} | | -- | 408 | -- | |
| Reverse Transfer Capacitance | C _{rss} | | -- | 73 | -- | |
| Switching Characteristics | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =50V; V _{GS} =10V R _G =25Ω; I _D =28A (Note 3.4) | -- | 12 | -- | ns |
| Turn-on Rise Time | t _r | | -- | 60 | -- | |
| Turn-off Delay Time | t _{d(off)} | | -- | 46 | -- | |
| Turn-off Fall Time | t _f | | -- | 47 | -- | |

| | | | | | | |
|--------------------|----------|---|----|-----|----|----|
| Total Gate Charge | Q_g | $V_{DS}=80V, I_D=38A$ $V_{GS}=10V$ (Note 3.4) | -- | 130 | -- | nc |
| Gate-Source Charge | Q_{gs} | | -- | 28 | -- | |
| Gate-Drain Charge | Q_{gd} | | -- | 45 | -- | |

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 | -- | -- | 59 | A |
| Pulsed Source Current | I_{SM} | | -- | -- | 230 | |
| Diode Forward Voltage | V_{SD} | $I_S=28A, V_{GS}=0V$ | -- | -- | 1.2 | V |
| Reverse Recovery Time | T_{rr} | $I_F=28A, V_{GS}=0V$ $dI_F/dt=100A/\mu S$ | -- | 150 | -- | ns |
| Reverse Recovery Charge | Q_{rr} | | -- | 680 | -- | μC |

1. Pulse width limited by maximum junction temperature
2. $L=0.7mH, V_{DD}=28V, V_G=10V, R_G=25\Omega$, starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

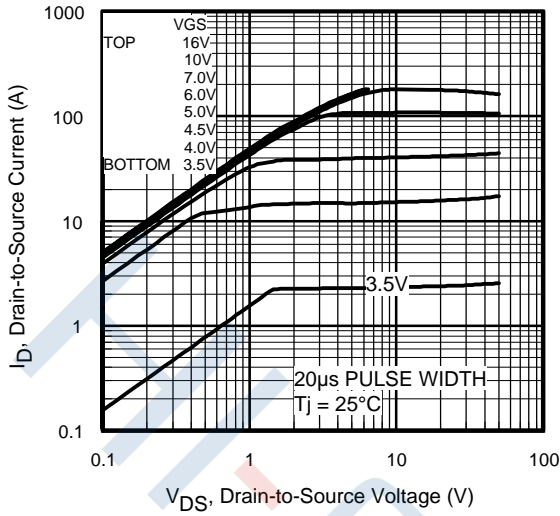


Fig 1. Typical Output Characteristics

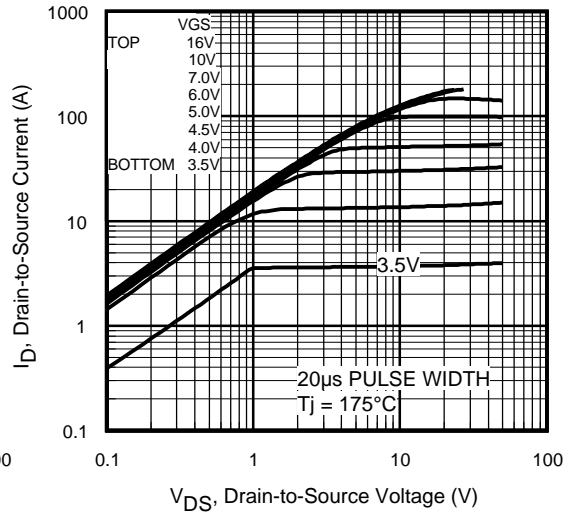


Fig 2. Typical Output Characteristics

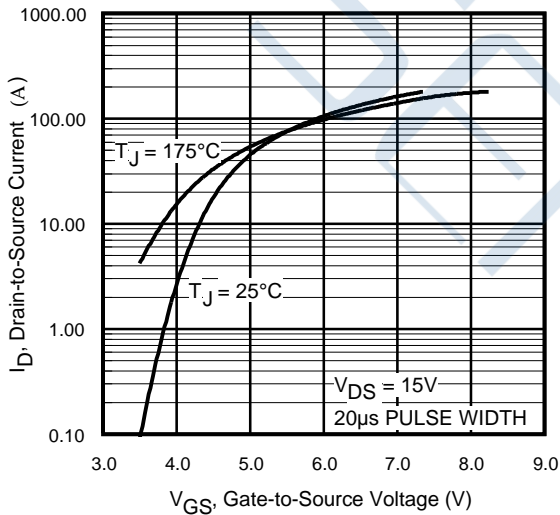


Fig 3. Typical Transfer Characteristics

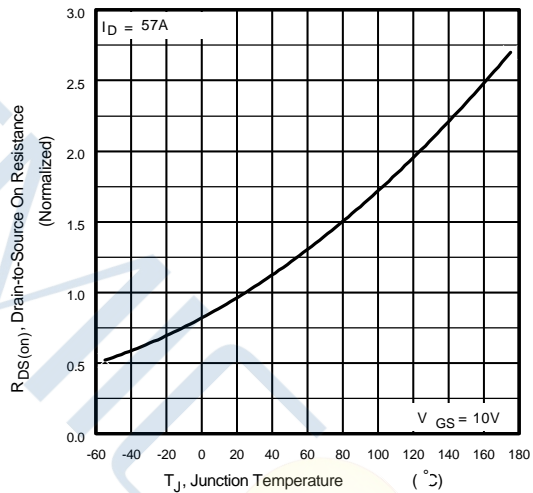


Fig 4. Normalized On-Resistance Vs. Temperature

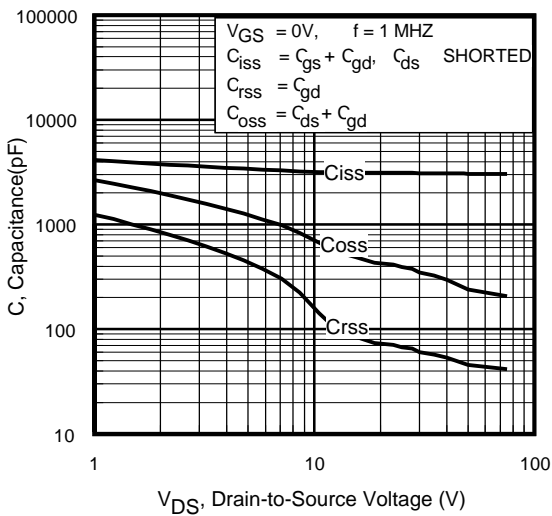


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

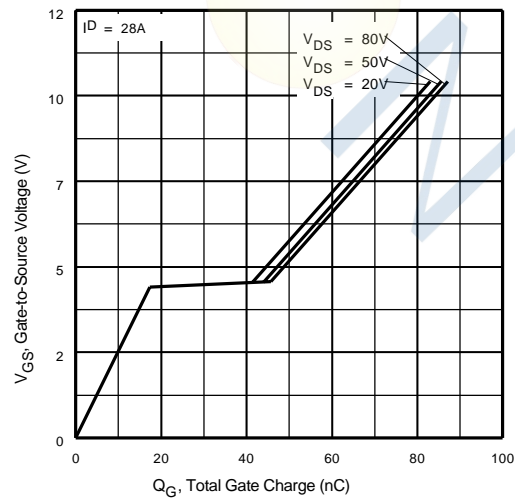


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

Typical Performance Characteristics

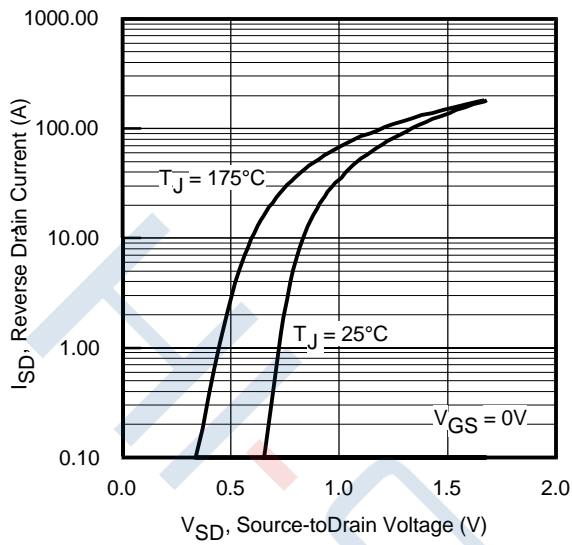


Fig 7. Typical Source-Drain Diode Forward Voltage

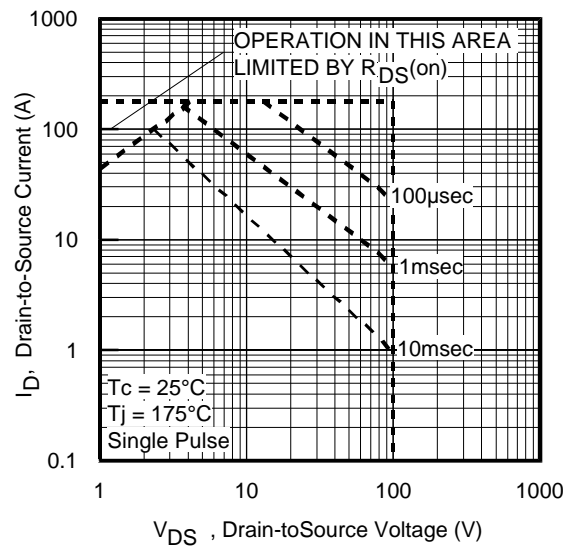


Fig 8. Maximum Safe Operating Area

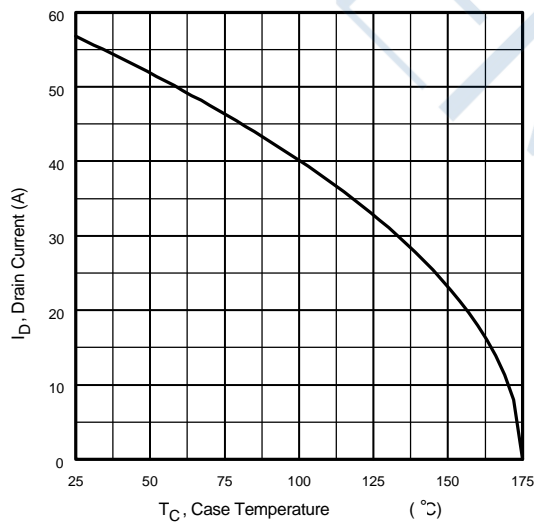
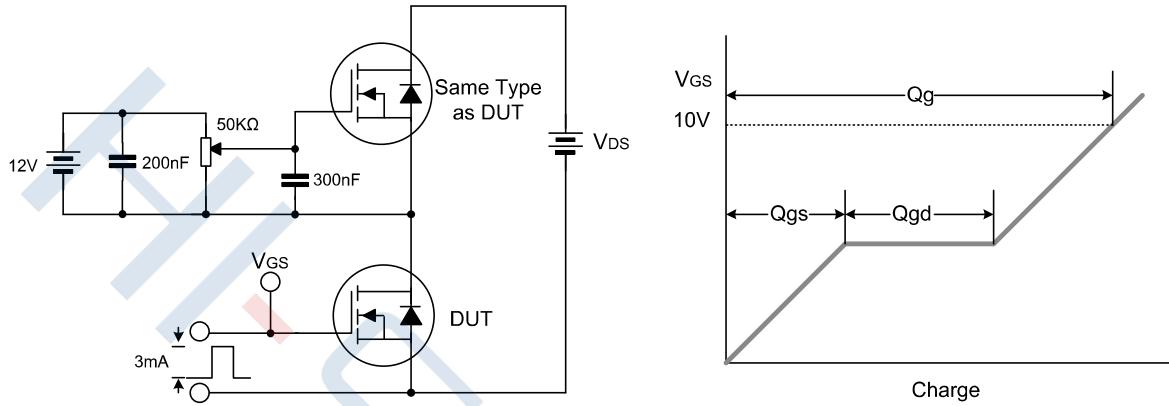


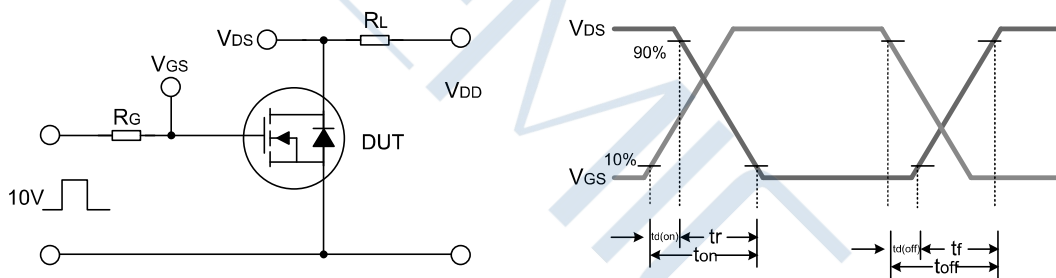
Fig 9. Maximum Drain Current Vs. Case Temperature

Test Circuit

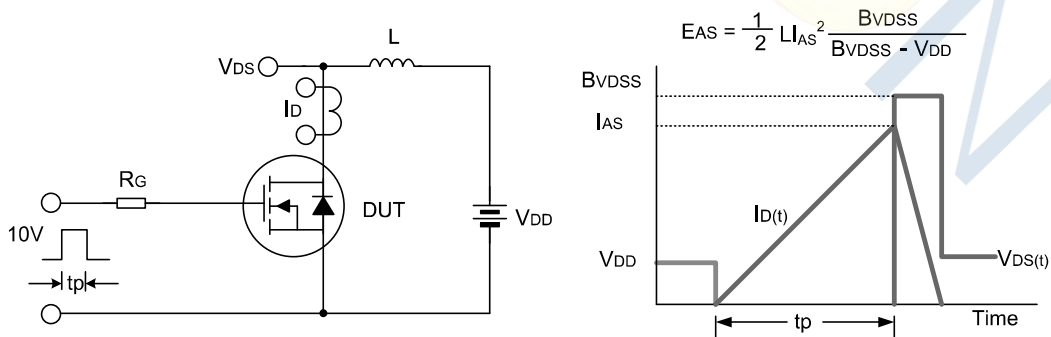
Gate Charge Test Circuit & Waveform



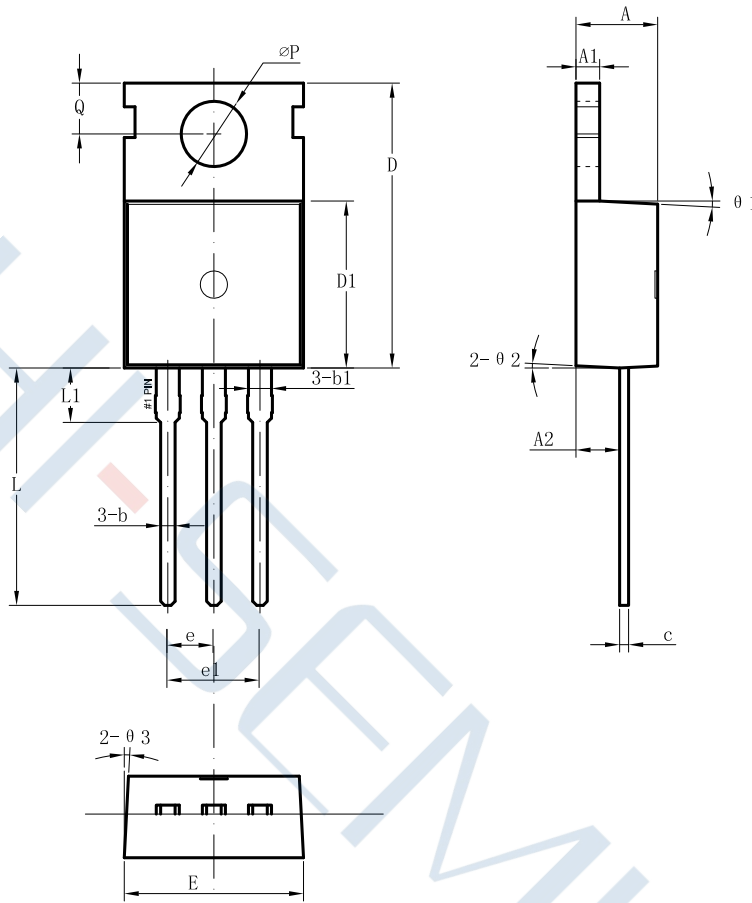
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of TO-220-3L



| 符号 | 机械尺寸/mm | | |
|------------|---------|-------|-------|
| | 最小值 | 典型值 | 最大值 |
| A | 4.30 | 4.50 | 4.70 |
| A1 | 1.25 | 1.30 | 1.40 |
| A2 | 2.20 | 2.40 | 2.60 |
| b | 0.70 | 0.80 | 0.95 |
| b1 | | 1.27 | |
| c | 0.40 | 0.50 | 0.65 |
| D | 15.20 | 15.70 | 16.20 |
| D1 | 9.00 | 9.20 | 9.40 |
| E | 9.70 | 10.0 | 10.10 |
| e | | 2.54 | |
| e1 | | 5.08 | |
| L | 12.60 | 13.08 | 13.60 |
| L1 | | 3.00 | |
| ϕP | 3.50 | 3.60 | 3.80 |
| Q | 2.60 | 2.80 | 3.00 |
| $\theta 1$ | | 3° | |
| $\theta 2$ | | 3° | |
| $\theta 3$ | | 3° | |

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