

N-CHANNEL POWER MOSFET

SIF50N060

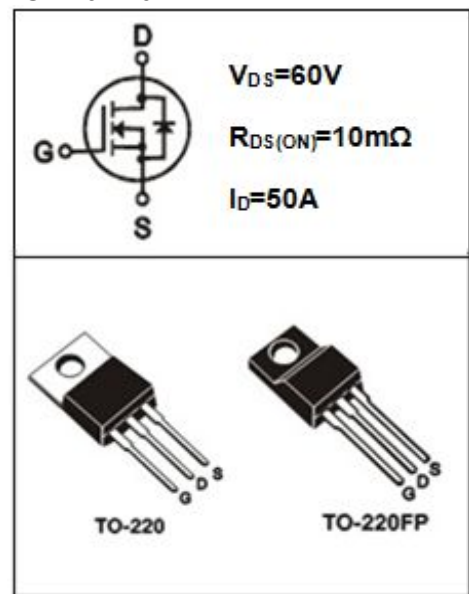
● **FEATURES:** ■ LOW THERMAL RESISTANCE ■ LOW $R_{DS(ON)}$ TO MINIMIZE CONDUCTIVE LOSS ■ LOW GATE CHARGE FOR FAST SWITCHING ■ HIGH INPUT RESISTANCE ■ RoHS COMPLIANT

● **APPLICATION:** ■ LOW VOLTAGE, HIGH FREQUENCY INVERTERS
■ SYNCHRONOUS RECTIFIER
■ PRIMARY SWITCH

● **Absolute Maximum Ratings ($T_c=25^\circ C$)**

| PARAMETER | SYMBOL | VALUE | UNIT |
|--|-----------|-------------|------------|
| Drain-source Voltage | V_{DS} | 60 | V |
| gate-source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current $T_C=25^\circ C$ ① | I_D | 50* | A |
| Total Power Dissipation ① | P_{tot} | TO-220: 120 | W |
| | | TO-220FP:40 | |
| Junction Temperature | T_j | 150 | $^\circ C$ |
| Storage Temperature | T_{STG} | -55-175 | $^\circ C$ |
| Single Pulse Avalanche Energy ② | E_{AS} | 170 | mJ |

TO-220/220FP



● **Electronic Characteristics ($T_c=25^\circ C$)**

| PARAMETER | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|-----------------------------------|--------------|--|-----|-----|-----------|---------|
| Drain-source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 60 | 68 | | V |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.8 | 2.2 | V |
| Drain-source Leakage Current | I_{DSS} | $V_{DS}=60V, V_{GS}=0V, T_j=25^\circ C$ | | | 1 | μA |
| | | $V_{DS}=60V, V_{GS}=0V, T_j=125^\circ C$ | | | 10 | μA |
| Gate-body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 100 | nA |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=9A$ | | 10 | 13 | mΩ |
| | | $V_{GS}=4.5V, I_D=6A$ | | 12 | 15 | |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=9A$ | 18 | | | S |

● **ORDERING INFORMATION:**

| PACKING | ORDERING CODE | |
|---------------------------|------------------------------------|--|
| | Normal Package Material | Halogen Free |
| TO-220&220FP TUBE PACKING | SIF50N060 TO-220-TU or TO-220FP-TU | SIF50N060 TO-220-TU-HF or TO-220FP-TU-HF |

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| PARAMETER | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|------------------------------|-----------------|--|-----|------|-----|------|
| Input Capacitance | Ciss | $V_{GS} = 0V, V_{DS} = 30V$ $F = 1.0MHz$ | | 2180 | | pF |
| Output Capacitance | Coss | | | 172 | | |
| Reverse Transfer Capacitance | Crss | | | 142 | | |
| Total Gate Charge | Qg | $I_D = 8A, V_{DS} = 30V$ $V_{GS} = 10V$ | | 58 | | nC |
| Gate-to-Source Charge | Qgs | | | 8 | | nC |
| Gate-to-Drain Charge | Qgd | | | 17 | | nC |
| Gate Charge At Threshold | Qg(th) | | | 6 | | nC |
| Turn -On Delay Time | Td(on) | $V_{DD}=30V, R_L=1\Omega$ $V_{GS} = 10V, R_{GEN}=3\Omega$ | | 8.5 | | ns |
| Turn -On Rise Time | T _r | | | 6 | | ns |
| Turn -Off Delay Time | Td(off) | | | 30 | | ns |
| Turn -Off Fall Time | T _f | | | 5 | | ns |
| Diode Forward Voltage | V _{SD} | $T_j=25^\circ C, I_F=9A$ $V_{GS} = 0V$ ③ | | 0.8 | 1.2 | V |
| Reverse Recovery Time | trr | $I_f=9A, di/dt=100A/\mu s$ $T_j=25^\circ C, \text{③}$ | | 30 | | ns |
| Reverse Recovery Charge | Qrr | | | 44 | | nC |

● Thermal Characteristics

| PARAMETER | SYMBOL | MAX | | UNIT |
|-------------------------------------|--------|--------|----------|------|
| | | TO-220 | TO-220FP | |
| Thermal Resistance Junction-case | RthJC | 0.89 | 3.13 | °C/W |
| Thermal Resistance Junction-ambient | RthJA | 62.5 | 62.5 | °C/W |

Notes:

- ① I_D & P_D base on maximum allowable junction temperature, test at T_c=25°C.
- ② Starting T_j=25°C, L=0.1mH
- ③ Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

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● TYPICAL CHARACTERISTICS

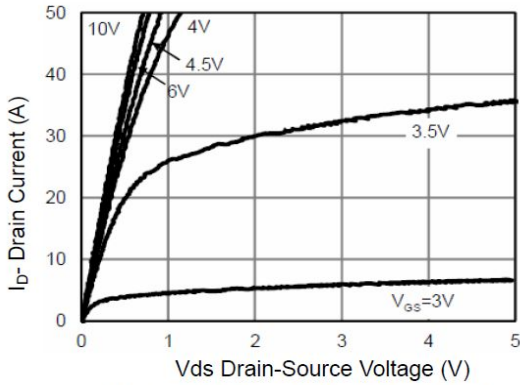


Figure 1 Output Characteristics

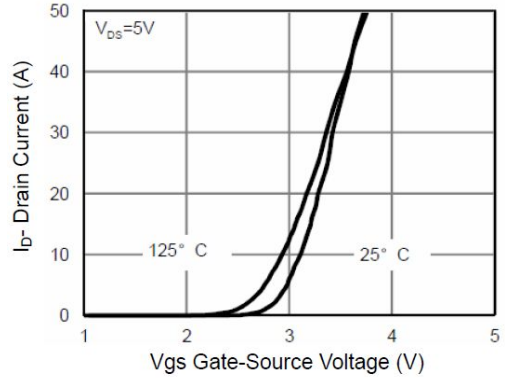


Figure 2 Transfer Characteristics

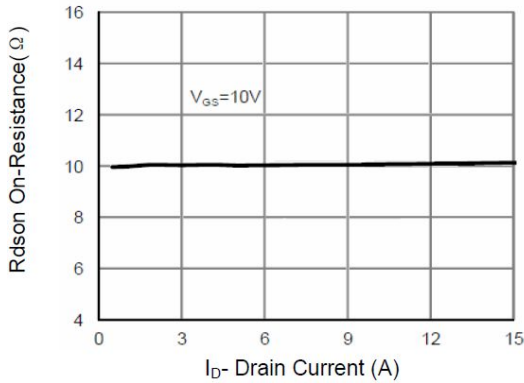


Figure 3 Rdson- Drain Current

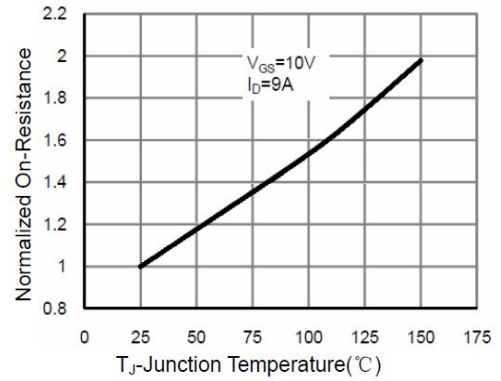


Figure 4 Rdson-Junction Temperature

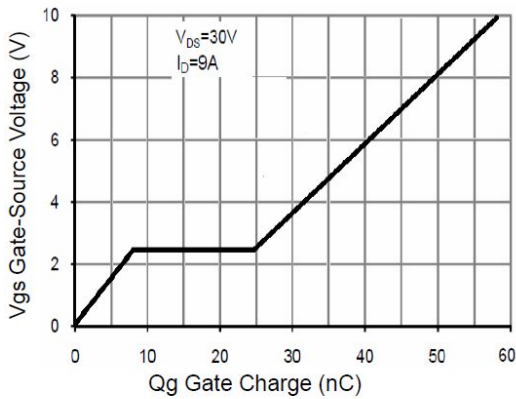


Figure 5 Gate Charge

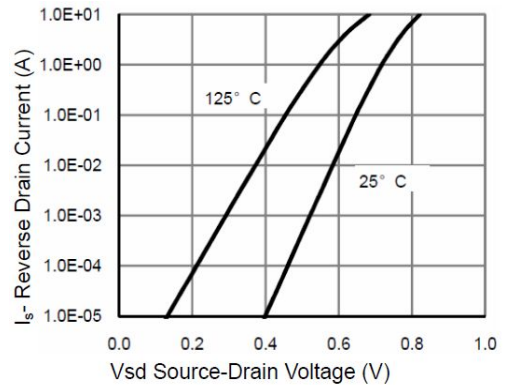


Figure 6 Source- Drain Diode Forward

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● **TYPICAL CHARACTERISTICS**

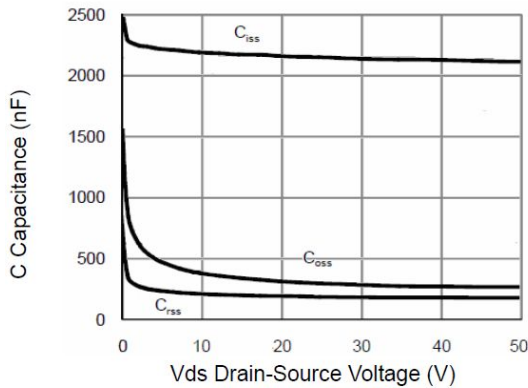


Figure 7 Capacitance vs Vds

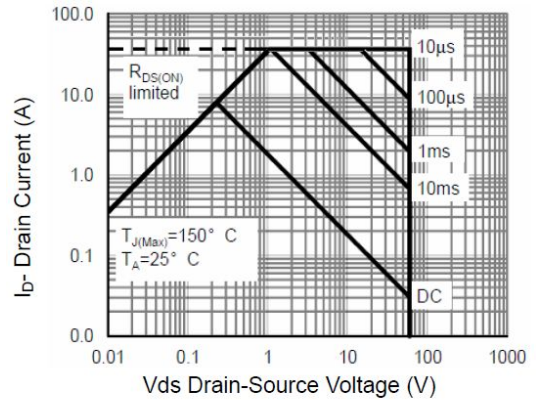


Figure 8 Safe Operation Area

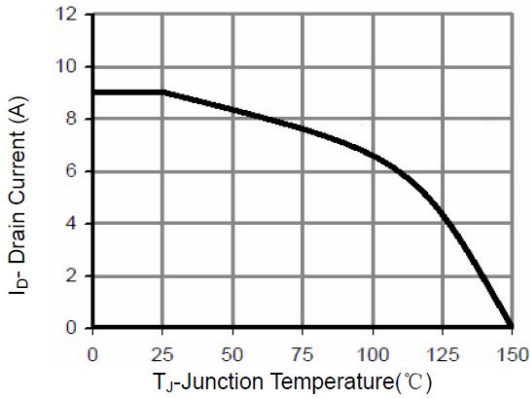


Figure 9 Current De-rating

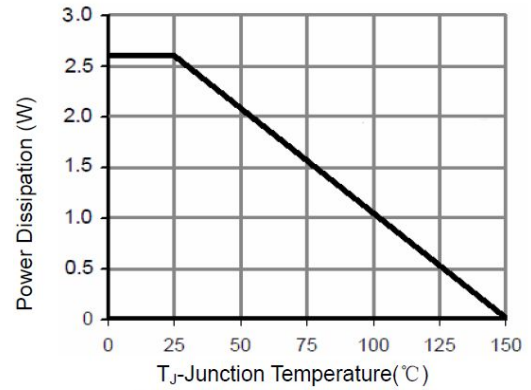


Figure 10 Power De-rating

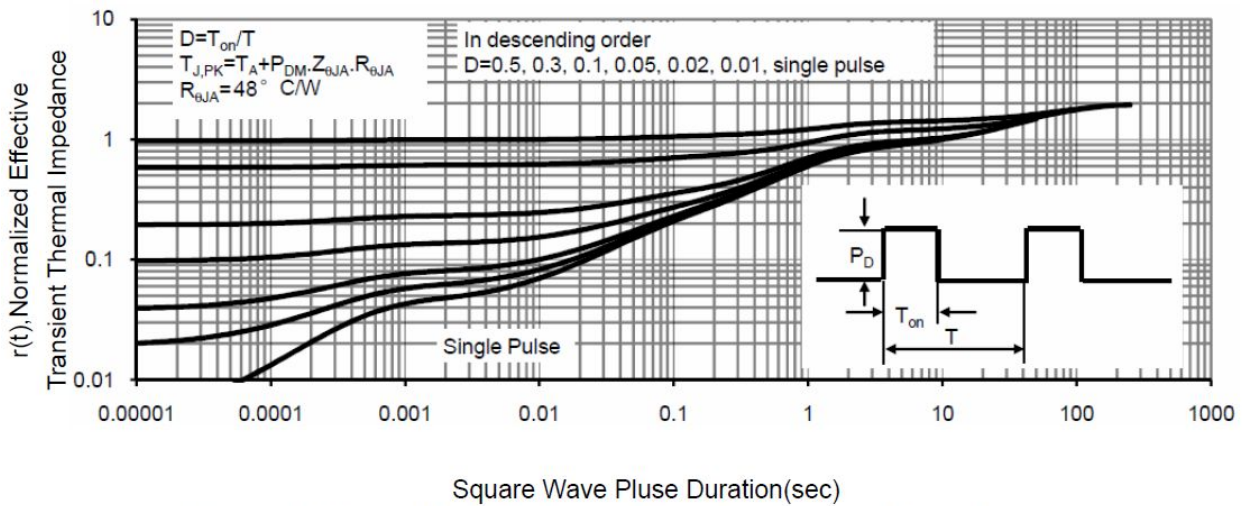
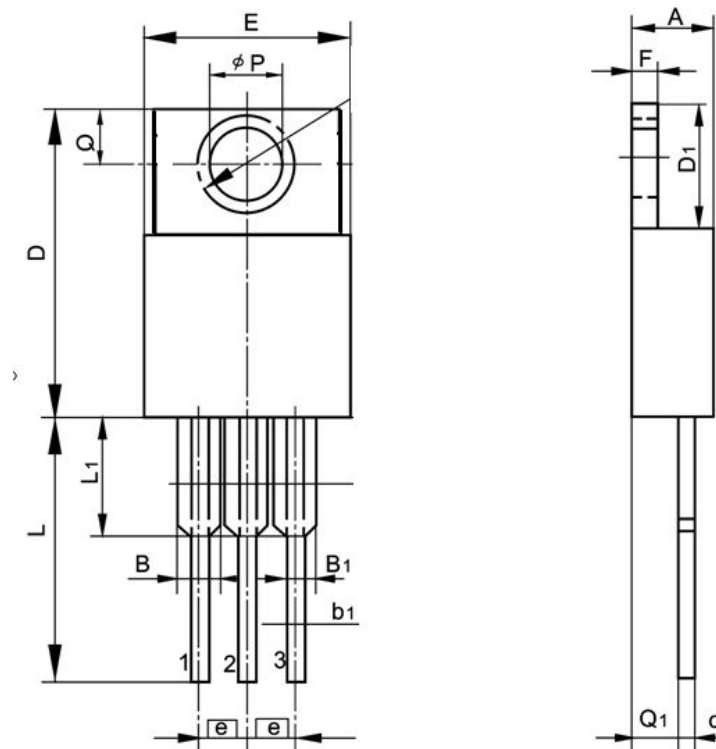


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220 MECHANICAL DATA

UNIT: mm

| SYMBOL | min | nom | max | SYMBOL | min | nom | max |
|--------|-------|-----|-------|--------|-------|------|-------|
| A | 4.00 | | 4.80 | E | 9.90 | | 10.70 |
| B | 1.20 | | 1.50 | e | | 2.54 | |
| B1 | 1.00 | | 1.40 | F | 1.10 | | 1.45 |
| b1 | 0.65 | | 1.00 | L | 12.50 | | 14.50 |
| c | 0.35 | | 0.75 | L1 | 3.00 | 3.50 | 4.00 |
| D | 15.00 | | 16.50 | Q | 2.50 | | 3.00 |
| D1 | 5.90 | | 6.90 | Q1 | 2.00 | | 3.00 |
| | | | | φ P | 3.60 | | 3.90 |



TO-220FP MECHANICAL DATA

单位:毫米/UNIT: mm

| 符号 SYMBOL | 最小值 min | 典型值 nom | 最大值 max | 符号 SYMBOL | 最小值 min | 典型值 nom | 最大值 max |
|----------------|-------------|------------|-------------|----------------------|--------------|------------|--------------|
| A | 4.40 | | 4.95 | E | 9.60 | | 10.30 |
| A ₁ | 2.30 | | 2.90 | e | | 2.54 | |
| b | 0.70 | | 0.90 | L | 12.40 | | 14.00 |
| b ₁ | 1.18 | | 1.45 | L₂ | 2.30 | | 2.60 |
| c | 0.40 | | 0.70 | L ₃ | 3.00 | | 4.00 |
| D | 14.50 | | 17.00 | øp | 3.00 | | 3.50 |
| D1 | 6.10 | | 9.00 | Q | 2.30 | | 2.80 |

