

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK3304 is N-Channel MOS FET device that features a Low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply.

FEATURES

- Low gate charge :
Q_G = 44 nC TYP. (V_{DD} = 450 V, V_{GS} = 10 V, I_D = 7.0 A)
- Gate voltage rating : ±30 V
- Low on-state resistance :
R_{DS(on)} = 2.0 Ω MAX. (V_{GS} = 10 V, I_D = 4.0 A)
- Avalanche capability ratings

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

| | | | |
|---|-----------------------|--------------|----|
| Drain to Source Voltage | V _{DSS} | 900 | V |
| Gate to Source Voltage | V _{GS(AC)} | ±30 | V |
| Drain Current (DC) | I _{D(DC)} | ±7 | A |
| Drain Current (Pulse) ^{Note1} | I _{D(pulse)} | ±21 | A |
| Total Power Dissipation (T _C = 25°C) | P _T | 130 | W |
| Total Power Dissipation (T _A = 25°C) | P _T | 3.0 | W |
| Storage Temperature | T _{stg} | -55 to + 150 | °C |
| Single Avalanche Current ^{Note2} | I _{AS} | 7 | A |
| Single Avalanche Energy ^{Note2} | E _{AS} | 147 | mJ |

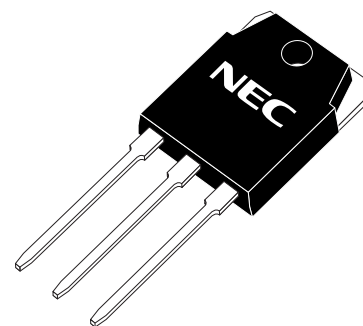
Notes 1. PW ≤ 10 μs, Duty cycle ≤ 1 %

2. Starting T_{ch} = 25°C, V_{DD} = 150 V, R_G = 25 Ω, V_{GS} = 20 V → 0 V

ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|-------------|---------|
| 2SK3304 | TO-3P |

(TO-3P)

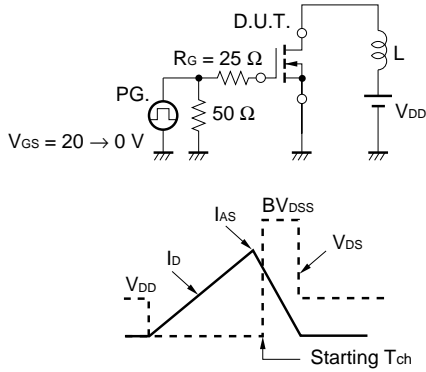


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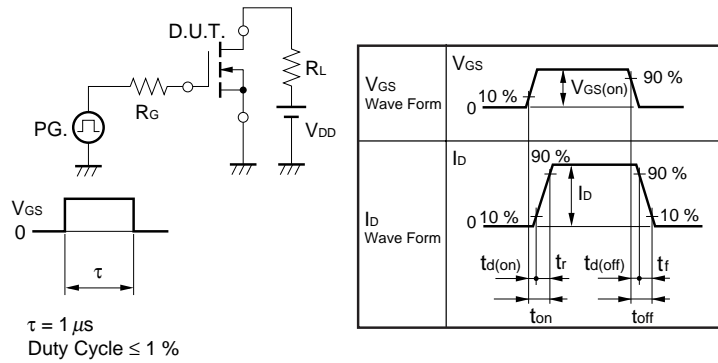
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------|----------------------|---|------|------|------|------|
| Drain Leakage Current | I _{DSS} | V _{DS} = 900 V, V _{GS} = 0 V | | | 100 | μA |
| Gate to Source Leakage Current | I _{GSS} | V _{GS} = ±30 V, V _{DS} = 0 V | | | ±100 | nA |
| Gate to Source Cut-off Voltage | V _{GS(off)} | V _{DS} = 10 V, I _D = 1.0 mA | 2.5 | | 3.5 | V |
| Forward Transfer Admittance | y _{fs} | V _{DS} = 20 V, I _D = 4.0 A | 2.5 | 4.7 | | S |
| Drain to Source On-state Resistance | R _{DS(on)} | V _{GS} = 10 V, I _D = 4.0 A | | 1.6 | 2.0 | Ω |
| Input Capacitance | C _{iss} | V _{DS} = 10 V | | 1300 | | pF |
| Output Capacitance | C _{oss} | V _{GS} = 0 V | | 240 | | pF |
| Reverse Transfer Capacitance | C _{rss} | f = 1 MHz | | 55 | | pF |
| Turn-on Delay Time | t _{d(on)} | V _{DD} = 150 V | | 20 | | ns |
| Rise Time | t _r | I _D = 4.0 A | | 44 | | ns |
| Turn-off Delay Time | t _{d(off)} | V _{GS(on)} = 10 V | | 73 | | ns |
| Fall Time | t _f | R _G = 10 Ω, R _L ≅ 36 Ω | | 45 | | ns |
| Total Gate Charge | Q _G | V _{DD} = 450 V | | 44 | | nC |
| Gate to Source Charge | Q _{GS} | V _{GS} = 10 V | | 6 | | nC |
| Gate to Drain Charge | Q _{GD} | I _D = 7.0 A | | 28 | | nC |
| Body Diode Forward Voltage | V _{F(S-D)} | I _F = 7.0 A, V _{GS} = 0 V | | 1.0 | | V |
| Reverse Recovery Time | t _{rr} | I _F = 7.0 A, V _{GS} = 0 V | | 2.4 | | μs |
| Reverse Recovery Charge | Q _{rr} | di/dt = 50 A/μs | | 13.5 | | μC |

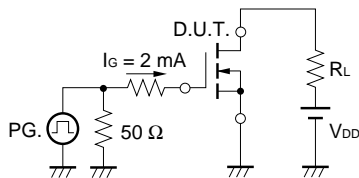
TEST CIRCUIT 1 AVALANCHE CAPABILITY



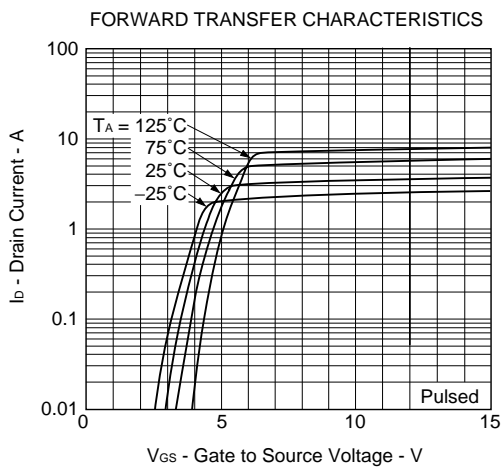
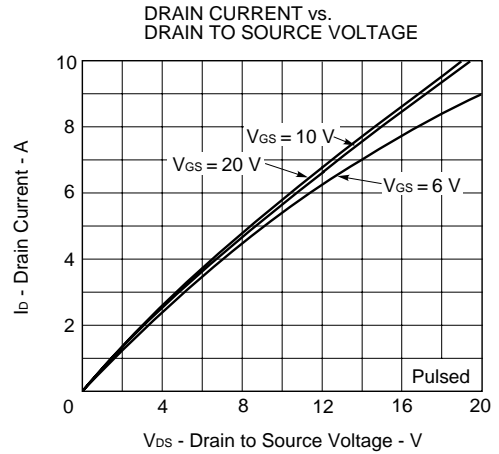
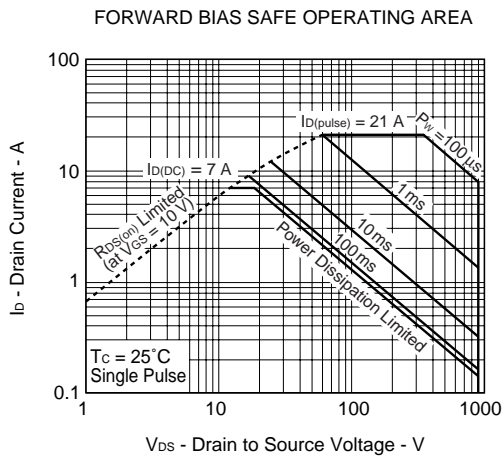
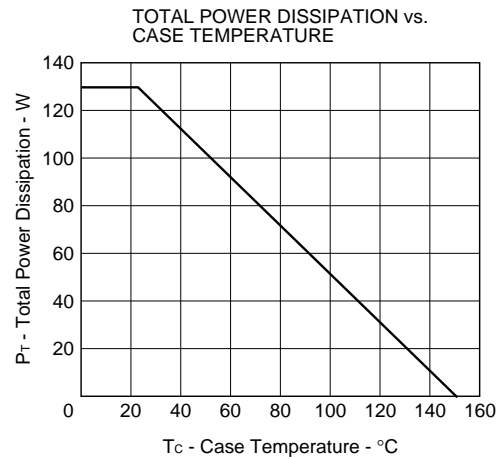
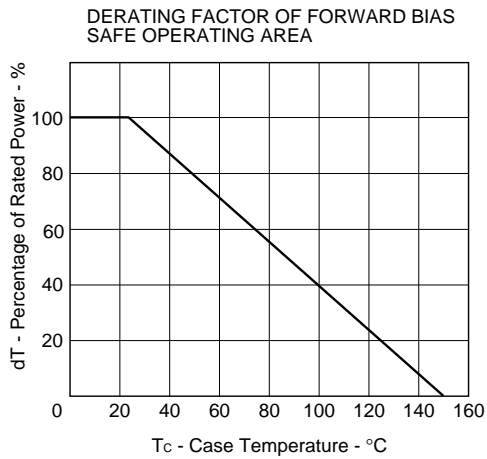
TEST CIRCUIT 2 SWITCHING TIME



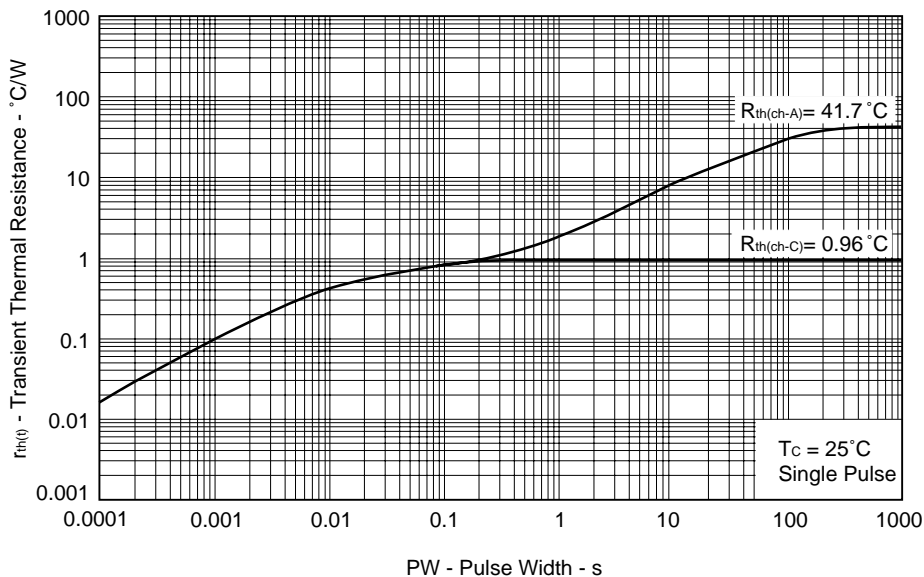
TEST CIRCUIT 3 GATE CHARGE



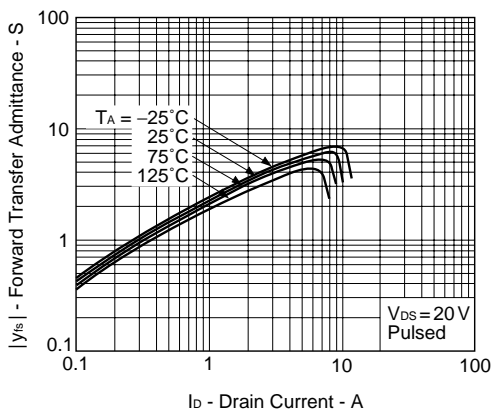
TYPICAL CHARACTERISTICS (T_A = 25 °C)



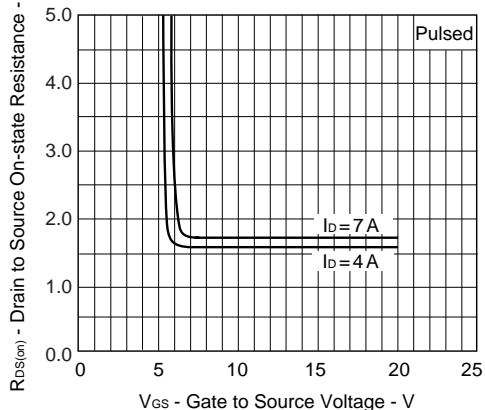
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



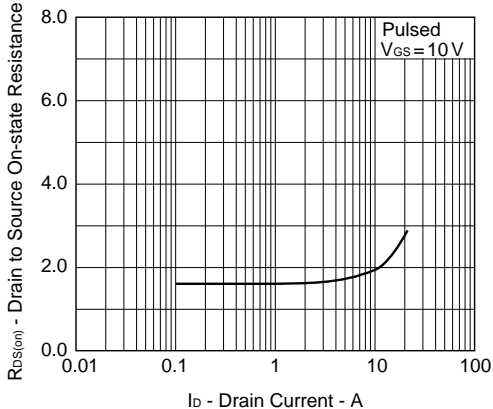
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



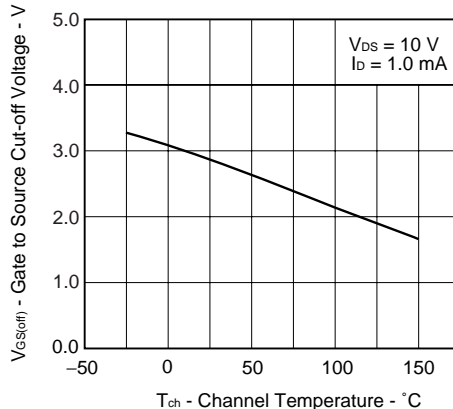
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



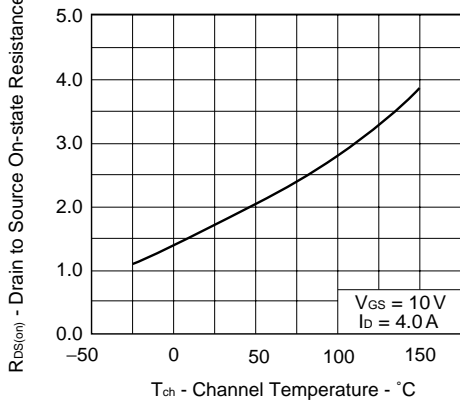
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



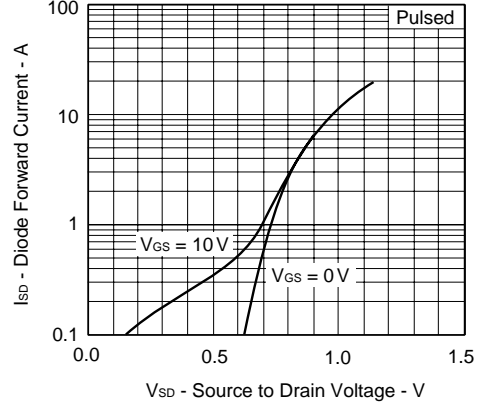
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



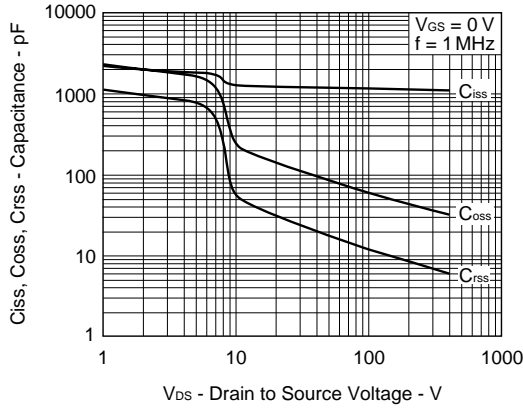
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



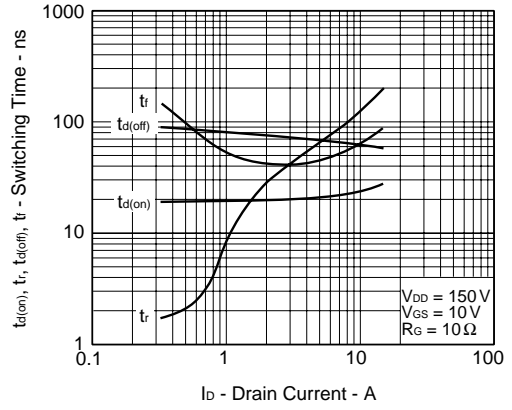
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



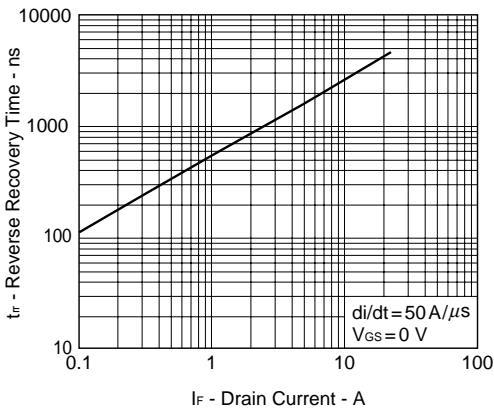
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



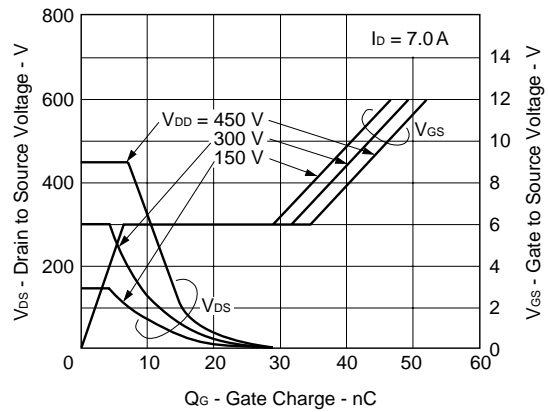
SWITCHING CHARACTERISTICS

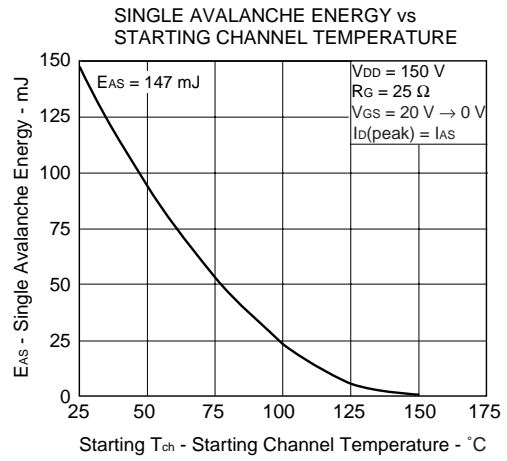
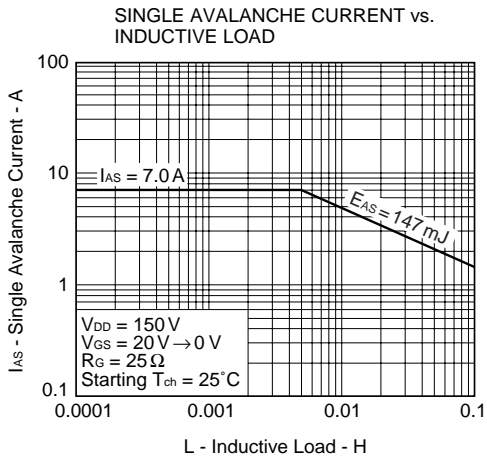


REVERSE RECOVERY TIME vs. DRAIN CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS





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