

FEATURES

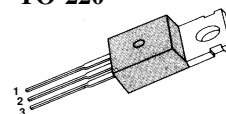
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 25 μ A (Max.) @ $V_{DS} = 900$ V
- Low $R_{DS(ON)}$: 4.181 Ω (Typ.)

$$BV_{DSS} = 900 \text{ V}$$

$$R_{DS(on)} = 5.0 \Omega$$

$$I_D = 4 \text{ A}$$

TO-220



1.Gate 2. Drain 3. Source

Absolute Maximum Ratings

| Symbol | Characteristic | Value | Units |
|----------------|---|--------------|------------------|
| V_{DSS} | Drain-to-Source Voltage | 900 | V |
| I_D | Continuous Drain Current ($T_C=25^\circ\text{C}$) | 4 | A |
| | Continuous Drain Current ($T_C=100^\circ\text{C}$) | 2.5 | |
| I_{DM} | Drain Current-Pulsed ① | 16 | A |
| V_{GS} | Gate-to-Source Voltage | ± 30 | V |
| E_{AS} | Single Pulsed Avalanche Energy ② | 424 | mJ |
| I_{AR} | Avalanche Current ① | 4 | A |
| E_{AR} | Repetitive Avalanche Energy ① | 12 | mJ |
| dv/dt | Peak Diode Recovery dv/dt ③ | 1.5 | V/ns |
| P_D | Total Power Dissipation ($T_C=25^\circ\text{C}$) | 120 | W |
| | Linear Derating Factor | 0.96 | |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | - 55 to +150 | $^\circ\text{C}$ |
| T_L | Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5-seconds | 300 | |

Thermal Resistance

| Symbol | Characteristic | Typ. | Max. | Units |
|-------------------|---------------------|------|------|-----------------------------|
| $R_{\theta_{JC}}$ | Junction-to-Case | -- | 1.04 | $^\circ\text{C} / \text{W}$ |
| $R_{\theta_{CS}}$ | Case-to-Sink | 0.5 | -- | |
| $R_{\theta_{JA}}$ | Junction-to-Ambient | -- | 62.5 | |

Electrical Characteristics (T_C=25 °C unless otherwise specified)

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|---------------------|---|------|------|------|-------|--|
| BV _{DSS} | Drain-Source Breakdown Voltage | 900 | -- | -- | V | V _{GS} =0V, I _D =250μA |
| ΔBV/ΔT _J | Breakdown Voltage Temp. Coeff. | -- | 1.14 | -- | V/ °C | I _D =250μA See Fig 7 |
| V _{GS(th)} | Gate Threshold Voltage | 2.0 | -- | 3.5 | V | V _{DS} =5V, I _D =250μA |
| I _{GSS} | Gate-Source Leakage , Forward | -- | -- | 100 | nA | V _{GS} =30V |
| | Gate-Source Leakage , Reverse | -- | -- | -100 | | V _{GS} =-30V |
| I _{DSS} | Drain-to-Source Leakage Current | -- | -- | 25 | μA | V _{DS} =900V |
| | | -- | -- | 250 | | V _{DS} =720V, T _C =125 °C |
| R _{DS(on)} | Static Drain-Source On-State Resistance | -- | -- | 5.0 | Ω | V _{GS} =10V, I _D =2A ④* |
| g _{fs} | Forward Transconductance | -- | 2.85 | -- | Ω | V _{DS} =50V, I _D =2A ④ |
| C _{iss} | Input Capacitance | -- | 730 | 950 | pF | V _{GS} =0V, V _{DS} =25V, f =1MHz See Fig 5 |
| C _{oss} | Output Capacitance | -- | 65 | 75 | | |
| C _{rfs} | Reverse Transfer Capacitance | -- | 24 | 30 | | |
| t _{d(on)} | Turn-On Delay Time | -- | 18 | 45 | ns | V _{DD} =450V, I _D =4A, R _G =13.6 Ω See Fig 13 ④ ⑤ |
| t _r | Rise Time | -- | 29 | 70 | | |
| t _{d(off)} | Turn-Off Delay Time | -- | 51 | 110 | | |
| t _f | Fall Time | -- | 28 | 65 | | |
| Q _g | Total Gate Charge | -- | 35 | 46 | nC | V _{DS} =720V, V _{GS} =10V, I _D =4A See Fig 6 & Fig 12 ④ ⑤ |
| Q _{gs} | Gate-Source Charge | -- | 6.6 | -- | | |
| Q _{gd} | Gate-Drain("Miller") Charge | -- | 15.0 | -- | | |

Source-Drain Diode Ratings and Characteristics

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|-----------------|--------------------------------|------|------|------|-------|--|
| I _S | Continuous Source Current | -- | -- | 4 | A | Integral reverse pn-diode in the MOSFET |
| I _{SM} | Pulsed-Source Current ① | -- | -- | 16 | | |
| V _{SD} | Diode Forward Voltage ④ | -- | -- | 1.4 | V | T _J =25 °C, I _S =4A, V _{GS} =0V |
| t _{rr} | Reverse Recovery Time | -- | 430 | -- | ns | T _J =25 °C, I _F =4A |
| Q _{rr} | Reverse Recovery Charge | -- | 2.9 | -- | μC | di _F /dt=100A/μs ④ |

Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=50mH, I_{AS}=4A, V_{DD}=50V, R_G=27Ω, Starting T_J=25 °C
- ③ I_{SD} ≤ 4A, di/dt ≤ 100A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J=25 °C
- ④ Pulse Test : Pulse Width = 250 μs, Duty Cycle ≤ 2%
- ⑤ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

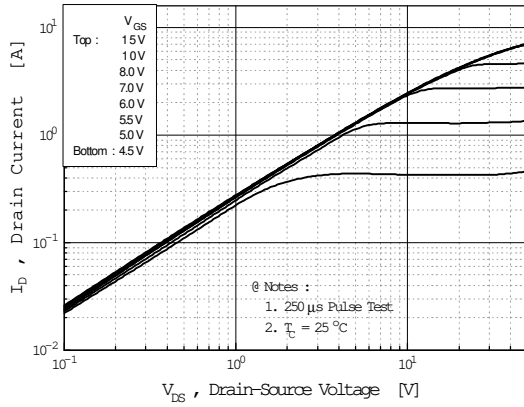


Fig 2. Transfer Characteristics

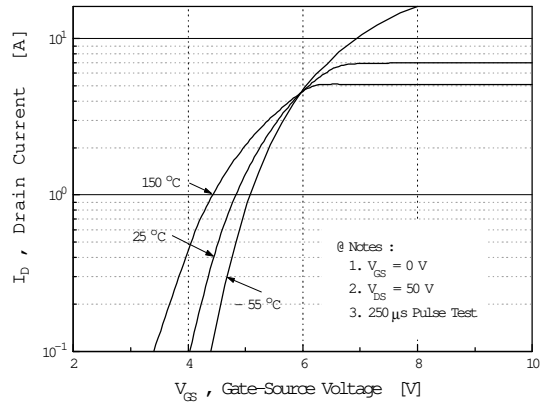


Fig 3. On-Resistance vs. Drain Current

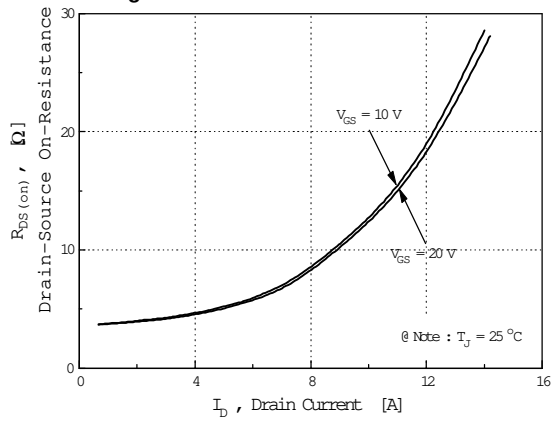


Fig 4. Source-Drain Diode Forward Voltage

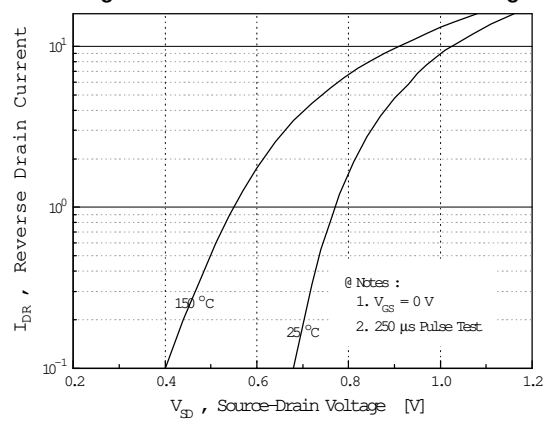


Fig 5. Capacitance vs. Drain-Source Voltage

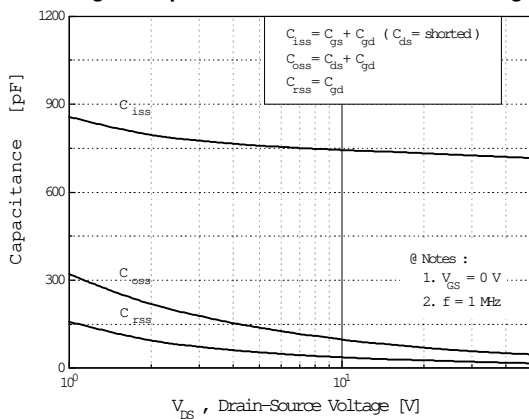
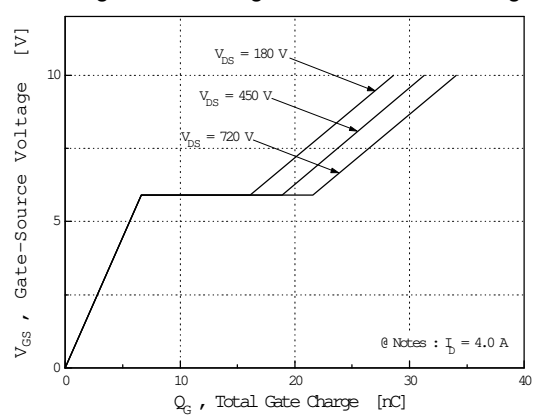


Fig 6. Gate Charge vs. Gate-Source Voltage



SSP4N90A

N-CHANNEL POWER MOSFET

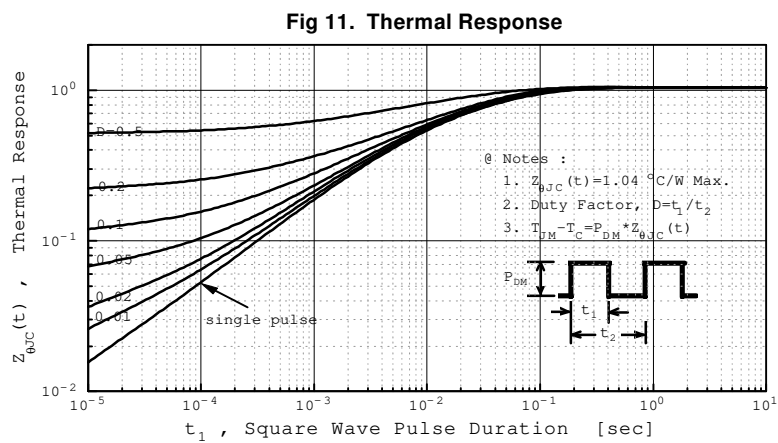
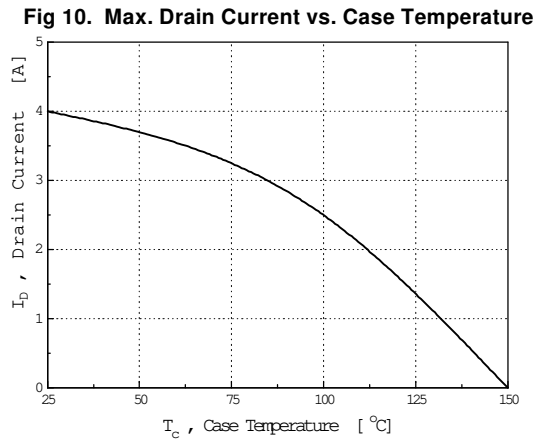
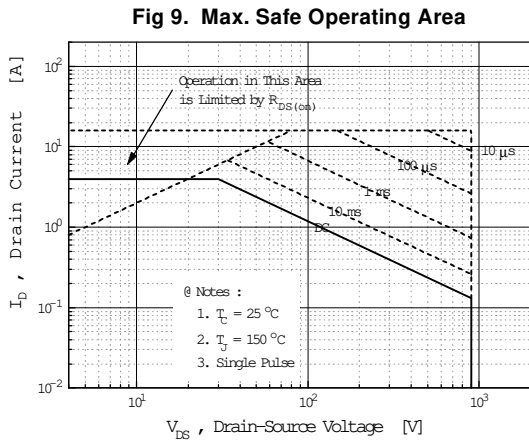
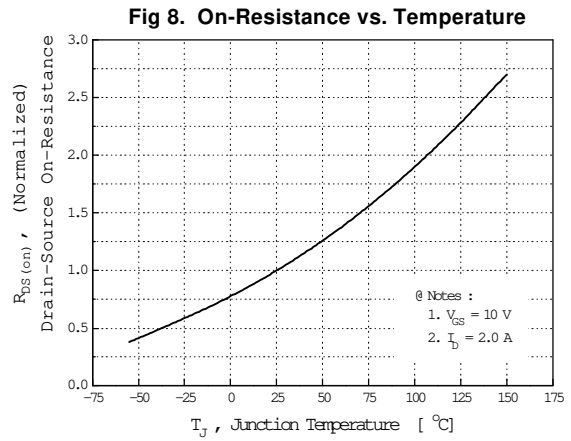
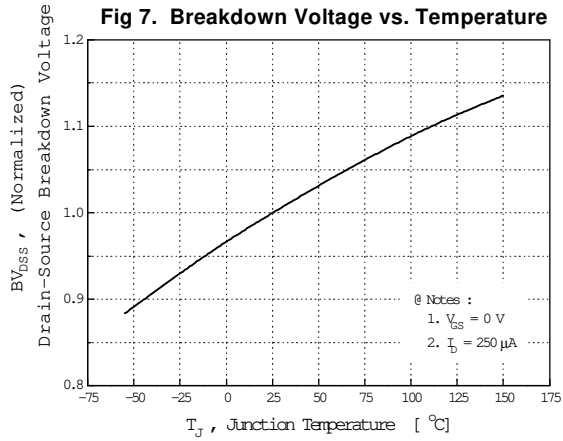


Fig 12. Gate Charge Test Circuit & Waveform

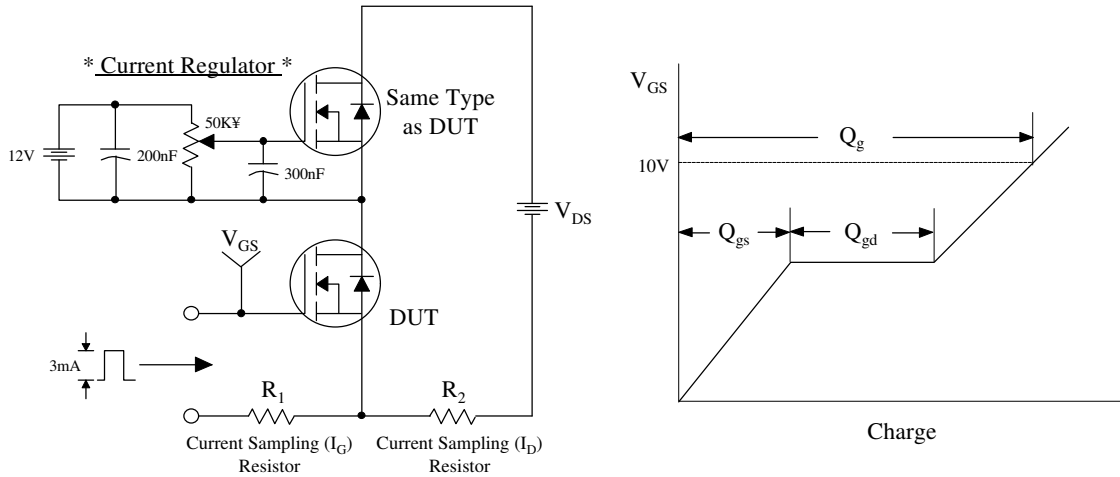


Fig 13. Resistive Switching Test Circuit & Waveforms

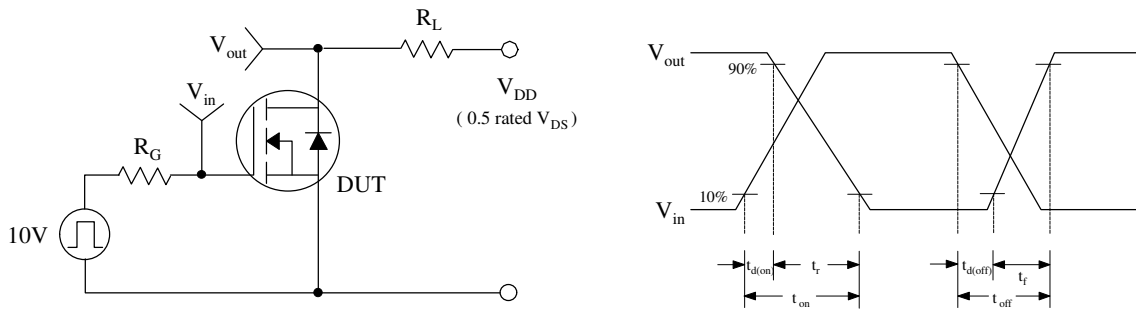


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

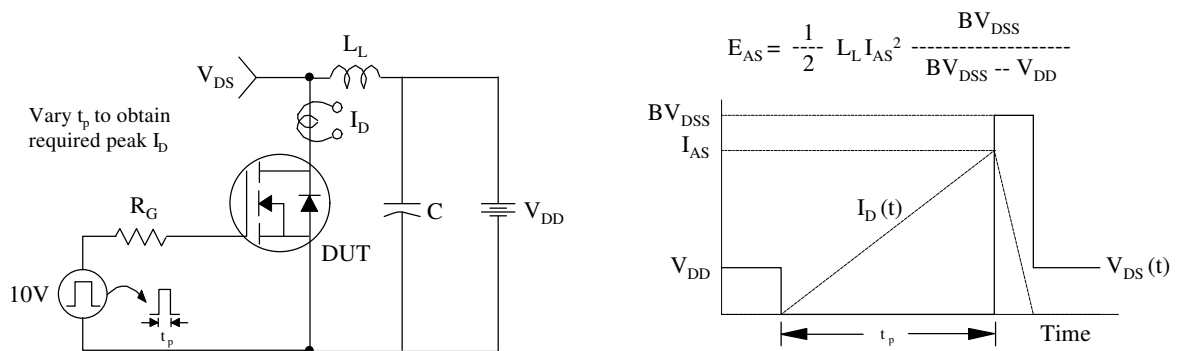
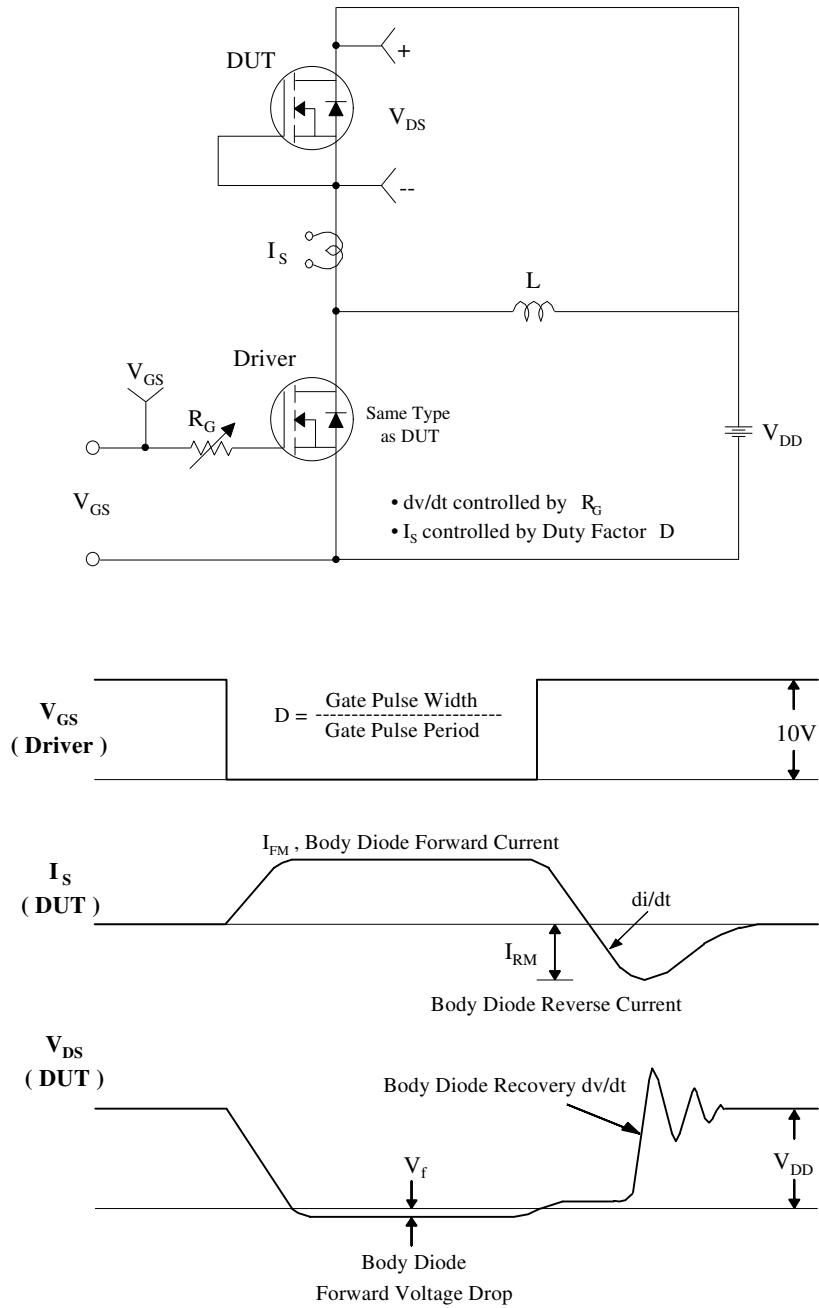


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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