

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

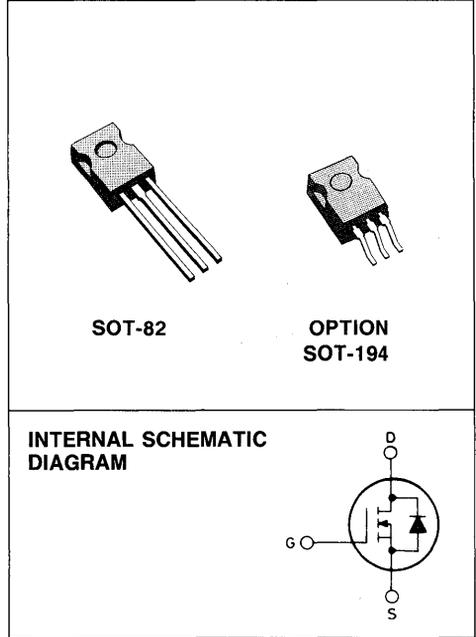
| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|---------|------------------|---------------------|----------------|
| SGSP239 | 500 V | 8.5 Ω | 1.2 A |

- HIGH SPEED SWITCHING APPLICATIONS
- ULTRA FAST SWITCHING
- EASY DRIVE FOR REDUCED COST AND SIZE

INDUSTRIAL APPLICATIONS:

- SWITCHING MODE POWER SUPPLIES

N - channel enhancement mode POWER MOS field effect transistor. Easy drive and very fast switching times make this POWER MOS transistor ideal for high speed switching applications. These include switching power supplies, solenoid drivers and drive circuits for power bipolar transistors.


ABSOLUTE MAXIMUM RATINGS

| | | | |
|----------------------|---|------------|------|
| V _{DS} | Drain-source voltage (V _{GS} = 0) | 500 | V |
| V _{DGR} | Drain-gate voltage (R _{GS} = 20 KΩ) | 500 | V |
| V _{GS} | Gate-source voltage | ±20 | V |
| I _D | Drain current (cont.) at T _c = 25°C | 1.2 | A |
| I _D | Drain current (cont.) at T _c = 100°C | 0.8 | A |
| I _{DM} (*) | Drain current (pulsed) | 4.8 | A |
| I _{DLM} (*) | Drain inductive current, clamped | 4.8 | A |
| P _{tot} | Total dissipation at T _c < 25°C | 40 | W |
| | Derating factor | 0.32 | W/°C |
| T _{stg} | Storage temperature | -65 to 150 | °C |
| T _j | Max. operating junction temperature | 150 | °C |

(*) Pulse width limited by safe operating area

THERMAL DATA

| | | | | |
|------------------|--|-----|------|------|
| $R_{thj - case}$ | Thermal resistance junction-case | max | 3.12 | °C/W |
| T_L | Maximum lead temperature for soldering purpose | | 275 | °C |

ELECTRICAL CHARACTERISTICS ($T_{case} = 25^\circ\text{C}$ unless otherwise specified)

| Parameters | Test Conditions | Min. | Typ. | Max. | Unit |
|------------|-----------------|------|------|------|------|
|------------|-----------------|------|------|------|------|

OFF

| | | | | | | |
|----------------|--|---|--------------|-----|--|---|
| $V_{(BR) DSS}$ | Drain-source breakdown voltage | $I_D = 250 \mu\text{A}$ | $V_{GS} = 0$ | 500 | | V |
| I_{DSS} | Zero gate voltage drain current ($V_{GS} = 0$) | $V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating} \times 0.8$ | | | | 250 μA 1000 μA |
| I_{GSS} | Gate-body leakage current ($V_{DS} = 0$) | $V_{GS} = \pm 20 \text{ V}$ | | | | ± 100 nA |

ON (*)

| | | | | | | |
|---------------|-----------------------------------|--|-------------------------|---|--|-----------------------------|
| $V_{GS (th)}$ | Gate threshold voltage | $V_{DS} = V_{GS}$ | $I_D = 250 \mu\text{A}$ | 2 | | 4 V |
| $R_{DS (on)}$ | Static drain-source on resistance | $V_{GS} = 10 \text{ V}$ $I_D = 0.6 \text{ A}$ $V_{GS} = 10 \text{ V}$ $I_D = 0.6 \text{ A}$ $T_c = 100^\circ\text{C}$ | | | | 8.5 Ω 17 Ω |

DYNAMIC

| | | | | | | | |
|-----------|------------------------------|---|-----------------------|------|-----|--------|-------|
| g_{fs} | Forward transconductance | $V_{DS} = 25 \text{ V}$ | $I_D = 0.6 \text{ A}$ | 0.65 | | mho | |
| C_{iss} | Input capacitance | $V_{DS} = 25 \text{ V}$ $f = 1 \text{ MHz}$ $V_{GS} = 0$ | | | 260 | 300 pF | |
| C_{oss} | Output capacitance | | | | | | 80 pF |
| C_{rss} | Reverse transfer capacitance | | | | | | 40 pF |

SWITCHING

| | | | | | | | |
|---------------|---------------------|--------------------------|-----------------------|--|----|----|----|
| $t_{d (on)}$ | Turn-on time | $V_{DD} = 250 \text{ V}$ | $I_D = 0.6 \text{ A}$ | | 15 | 20 | ns |
| t_r | Rise time | $V_i = 10 \text{ V}$ | $R_i = 4.7 \Omega$ | | 15 | 30 | ns |
| $t_{d (off)}$ | Turn-off delay time | (see test circuit) | | | 30 | 60 | ns |
| t_f | Fall time | | | | 20 | 45 | ns |

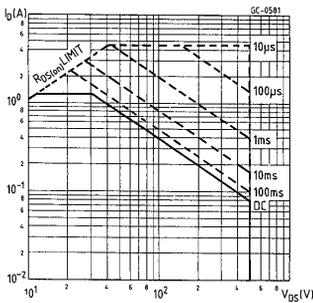
ELECTRICAL CHARACTERISTICS (Continued)

| Parameters | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|--|--|--------------|------------|--------|
| I_{SD} $I_{SDM} (*)$ | Source-drain current Source-drain current (pulsed) | | | 1.2 4.8 | A A |
| V_{SD} | Forward on voltage | $I_{SD} = 1.2 A$ | $V_{GS} = 0$ | 1.15 | V |
| t_{rr} | Reverse recovery time | $I_{SD} = 1.2 A$ $di/dt = 25 A/\mu s$ | $V_{GS} = 0$ | 350 | ns |

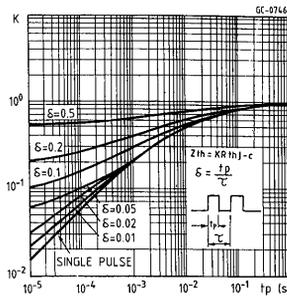
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5%

(*) Pulse width limited by safe operating area

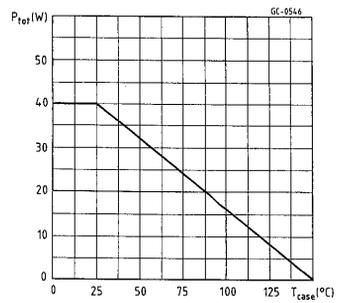
Safe operating areas



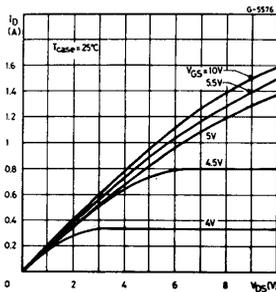
Thermal impedance



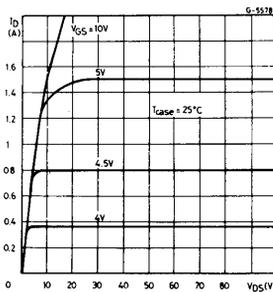
Derating curve



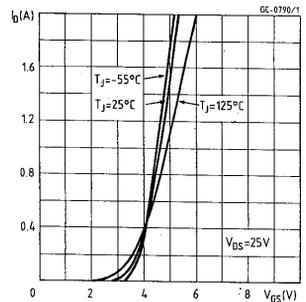
Output characteristics



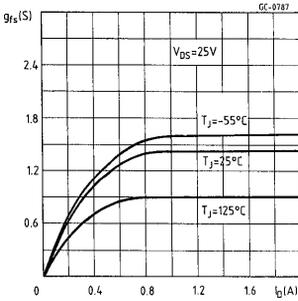
Output characteristics



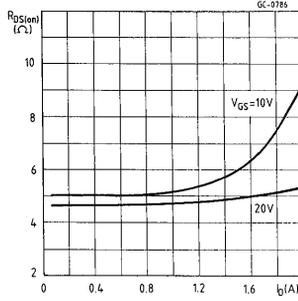
Transfer characteristics



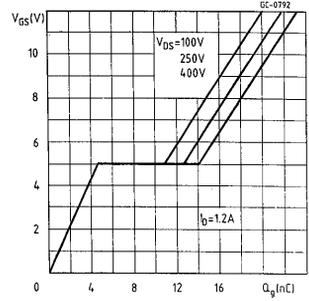
Transconductance



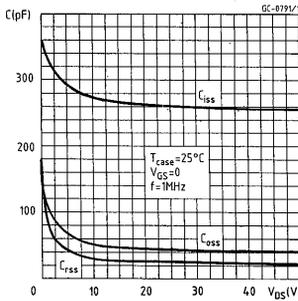
Static drain-source on resistance



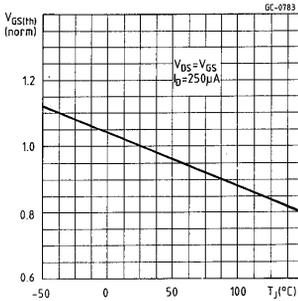
Gate charge vs gate-source voltage



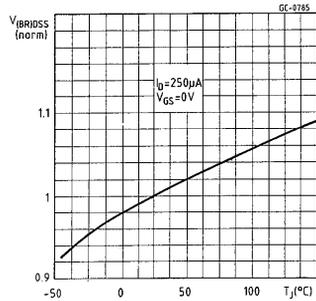
Capacitance variation



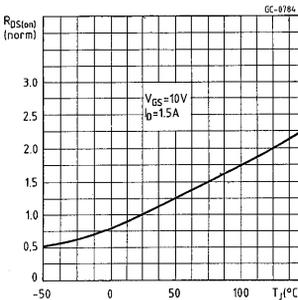
Normalized gate threshold voltage vs temperature



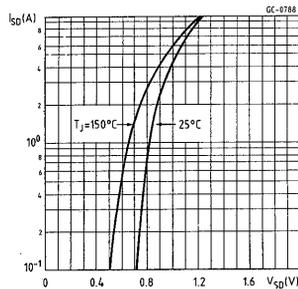
Normalized breakdown voltage vs temperature



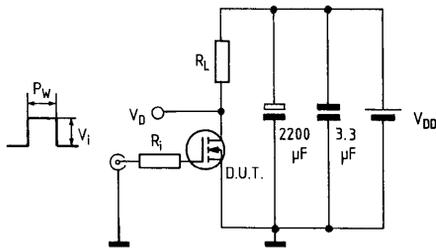
Normalized on resistance vs temperature



Source-drain diode forward characteristics



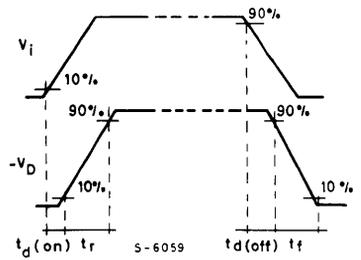
Switching times test circuit for resistive load



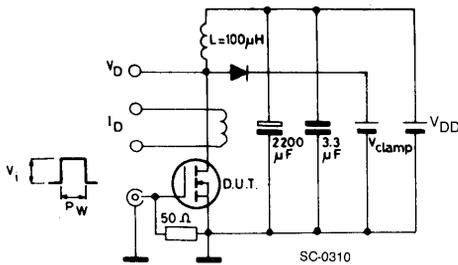
Pulse width $\leq 100 \mu\text{s}$
 Duty cycle $\leq 2\%$

SC-0008/1

Switching time waveforms for resistive load



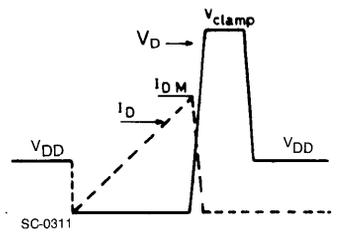
Clamped inductive load test circuit



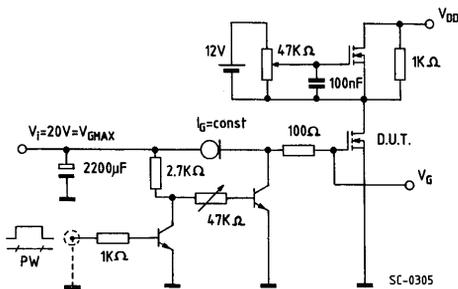
$V_i = 12 \text{ V}$ - Pulse width: adjusted to obtain specified I_{DM} . $V_{\text{clamp}} = 0.75 V_{(BR)} \text{ DSS}$.

SC-0310

Clamped inductive waveforms



Gate charge test circuit



PW adjusted to obtain required V_G

Body-drain diode t_{rr} measurement
 Jedec test circuit

