SGS-THOMSON MICROELECTRONICS

# SGSP361
# SGSP362

## N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

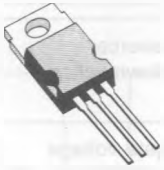
| TYPE | $V_{DSS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| SGSP361 | 100 V | 0.15 Ω | 18 A |
| SGSP362 | 80 V | 0.1 Ω | 22 A |

- HIGH SPEED SWITCHING APPLICATIONS
- 80 - 100 VOLTS - FOR UPS APPLICATIONS
- ULTRA FAST SWITCHING
- RATED FOR UNCLAMPED INDUCTIVE SWITCHING (ENERGY TEST) ◆
- EASY DRIVE FOR REDUCED SIZE AND COST

**INDUSTRIAL APPLICATIONS:**

- UNINTERRUPTIBLE POWER SUPPLIES
- MOTOR CONTROLS

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. Typical applications include UPS, battery chargers, printer hammer drivers, solenoid drivers and motor control.



TO-220

**INTERNAL SCHEMATIC DIAGRAM**


| ABSOLUTE MAXIMUM RATINGS | | SGSP361 | SGSP362 | |
|---|---|---|---|---|
| $V_{DS}$ | Drain-source voltage ($V_{GS}=0$) | 100 | 80 | V |
| $V_{DGR}$ | Drain-gate voltage ($R_{GS}=20$ KΩ) | 100 | 80 | V |
| $V_{GS}$ | Gate-source voltage | ±20 | | V |
| $I_D$ | Drain current (cont.) at $T_c=25°C$ | 18 | 22 | A |
| $I_D$ | Drain current (cont.) at $T_c=100°C$ | 11 | 14 | A |
| $I_{DM}$ (•) | Drain current (pulsed) | 72 | 88 | A |
| $P_{tot}$ | Total dissipation at $T_c<25°C$ | 100 | | W |
| | Derating factor | 0.8 | | 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
◆ Introduced in 1988 week 44

## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal resistance junction-case | max | 1.25 | °C/W |
| $T_L$ | Maximum lead temperature for soldering purpose | | 275 | °C |

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25°C unless otherwise specified)

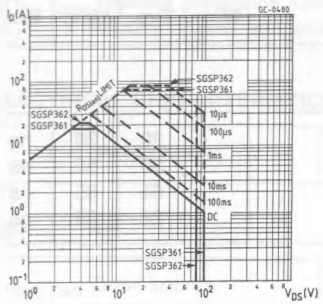
| Parameters | | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **OFF** | | | | | | |
| $V_{(BR)\ DSS}$ | Drain-source breakdown voltage | $I_D$ = 250 μA $V_{GS}$ = 0<br>for **SGSP361**<br>for **SGSP362** | <br>100<br>80 | | | <br>V<br>V |
| $I_{DSS}$ | Zero gate voltage drain current ($V_{GS}$ = 0) | $V_{DS}$ = Max Rating<br>$V_{DS}$ = Max Rating x 0.8 $T_c$ = 125°C | | | 250<br>1000 | μA<br>μA |
| $I_{GSS}$ | Gate-body leakage current ($V_{DS}$ = 0) | $V_{GS}$ = ±20 V | | | ±100 | nA |
| **ON (*)** | | | | | | |
| $V_{GS\ (th)}$ | Gate threshold voltage | $V_{DS}$ = $V_{GS}$ $I_D$ = 250 μA | 2 | | 4 | V |
| $R_{DS\ (on)}$ | Static drain-source on resistance | $V_{GS}$ = 10 V<br>$I_D$ = 9 A for **SGSP361**<br>$I_D$ = 11 A for **SGSP362**<br>$V_{GS}$ = 10 V $T_c$ = 100°C<br>$I_D$ = 9 A for **SGSP361**<br>$I_D$ = 11 A for **SGSP362** | | | <br>0.15<br>0.1<br><br>0.3<br>0.2 | <br>Ω<br>Ω<br><br>Ω<br>Ω |
| **ENERGY TEST** | | | | | | |
| $I_{UIS}$ | Unclamped inductive switching current (single pulse) | $V_{DD}$ = 30 V $L$ = 100 μH<br>starting $T_j$ = 25°C<br>for **SGSP361**<br>for **SGSP362** | <br><br>18<br>22 | | | <br><br>A<br>A |
| **DYNAMIC** | | | | | | |
| $g_{fs}$ | Forward transconductance | $V_{DS}$ = 25 V $I_D$ = 9 A | 4.5 | | | mho |
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$ | Input capacitance<br>Output capacitance<br>Reverse transfer capacitance | $V_{DS}$ = 25 V f = 1 MHz<br>$V_{GS}$ = 0 | | 950 | 1200<br>480<br>230 | pF<br>pF<br>pF |

**ELECTRICAL CHARACTERISTICS** (Continued)

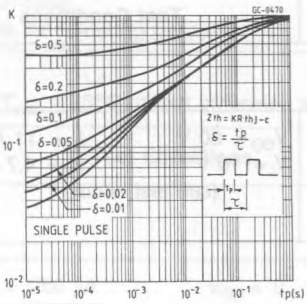
| Parameters | | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **SWITCHING** | | | | | | |
| $t_{d\ (on)}$ | Turn-on time | $V_{DD}$ = 50 V $I_D$ = 11 A | | 20 | 30 | ns |
| $t_r$ | Rise time | $V_i$ = 10 V $R_i$ = 4.7 Ω | | 50 | 65 | ns |
| $t_{d\ (off)}$ | Turn-off delay time | (see test circuit) | | 65 | 85 | ns |
| $t_f$ | Fall time | | | 25 | 35 | ns |
| **SOURCE DRAIN DIODE** | | | | | | |
| $I_{SD}$ | Source-drain current | for **SGSP361** | | | 18 | A |
| | | for **SGSP362** | | | 22 | A |
| $I_{SDM}$ (*) | Source-drain current (pulsed) | for **SGSP361** | | | 72 | A |
| | | for **SGSP362** | | | 88 | A |
| $V_{SD}$ | Forward on voltage | $V_{GS}$ = 0 | | | | |
| | | $I_{SD}$ = 18 A for **SGSP361** | | | 1.35 | V |
| | | $I_{SD}$ = 22 A for **SGSP362** | | | 1.35 | V |
| $t_{rr}$ | Reverse recovery time | $I_{SD}$ = 22 A $V_{GS}$ = 0 di/dt = 25 A/μs | | 180 | | ns |

(*) Pulsed: Pulse duration = 300 μs, duty cycle 1.5%
(*) Pulse width limited by safe operating area

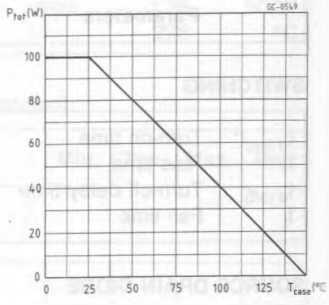
## Safe operating areas



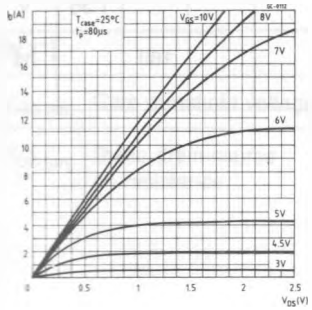

## Thermal impedance



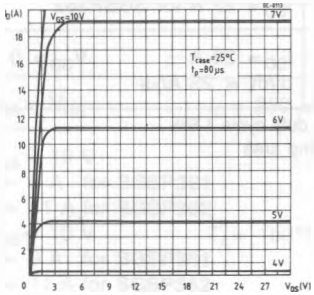

## Derating curve



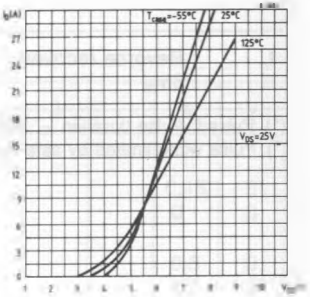

## Output characteristics



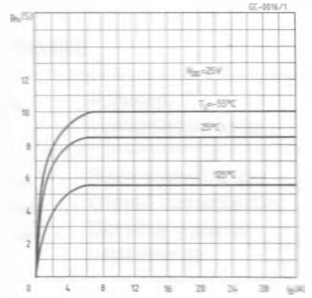

## Output characteristics



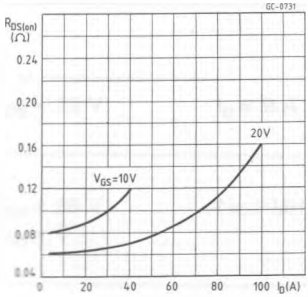

## Transfer characteristics



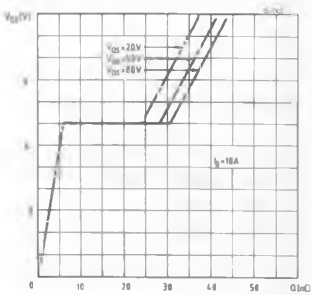

## Transconductance



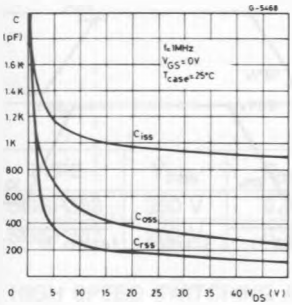

## Static drain-source on resistance



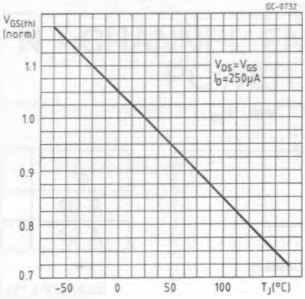

## Gate charge vs gate-source voltage



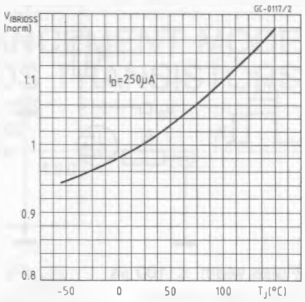
Capacitance variation



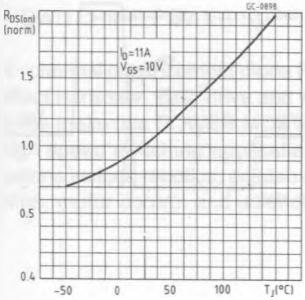

Normalized gate threshold voltage vs temperature



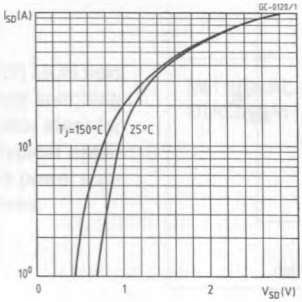

Normalized breakdown voltage vs temperature



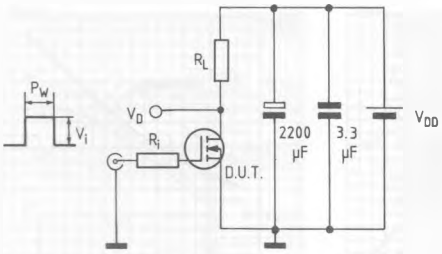

Normalized on resistance vs temperature




Source-drain diode forward characteristics

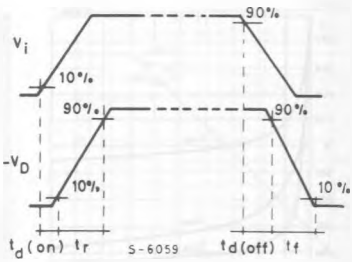


Switching times test circuit for resistive load

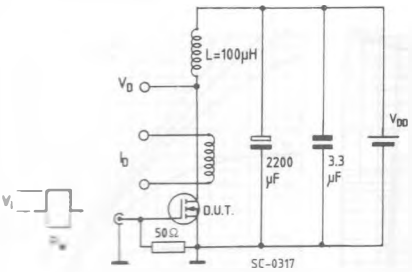



Pulse width ⩽ 100 µs
Duty cycle ⩽ 2%

Switching time waveforms for resistive load

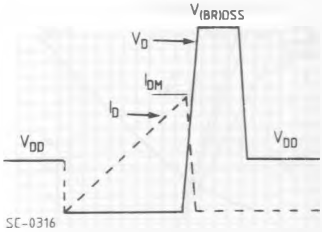



Unclamped inductive load test circuit

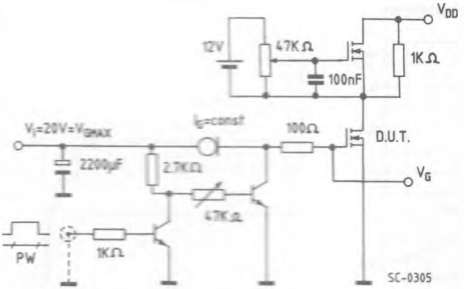



$V_i$ = 12 V - Pulse width: adjusted to obtain specified $I_{DM}$

Unclamped inductive waveforms




Gate charge test circuit




PW adjusted to obtain required $V_G$

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