

## N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

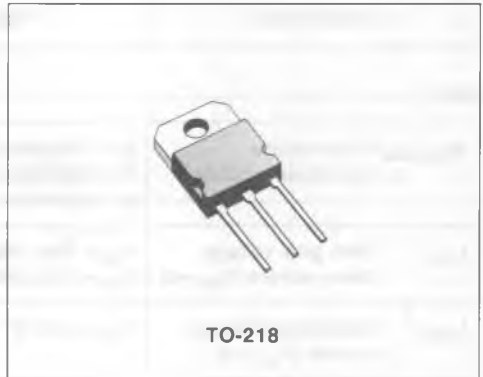
TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
SGSP474	450 V	0.7 Ω	9 A
SGSP475	400 V	0.55 Ω	10 A

- HIGH SPEED SWITCHING APPLICATIONS
- HIGH VOLTAGE - FOR OFF-LINE SMPS
- HIGH CURRENT - FOR SMPS UP TO 350W
- ULTRA FAST SWITCHING - FOR OPERATION AT > 100kHz
- EASY DRIVE FOR REDUCED SIZE AND COST

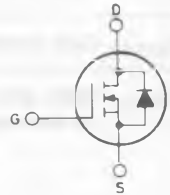
### INDUSTRIAL APPLICATIONS:

- SWITCHING MODE POWER SUPPLIES
- MOTOR CONTROLS

N - channel enhancement mode POWER MOS field effect transistors. Fast switching and easy drive make these POWER MOS transistors ideal for high voltage switching applications. These applications include electronic welders, switched mode power supplies and sonar equipment.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

	SGSP474	SGSP475	
V <sub>DS</sub>	450	400	V
V <sub>DGR</sub>	450	400	V
V <sub>GS</sub>		±20	V
I <sub>D</sub>	9	10	A
I <sub>D</sub>	5.6	6.3	A
I <sub>DM</sub> (*)	40	40	A
I <sub>DLM</sub> (*)	40	40	A
P <sub>tot</sub>		150	W
		1.2	W/°C
T <sub>stg</sub>	-65 to 150		°C
T <sub>j</sub>	150		°C

(\*) Pulse width limited by safe operating area

**THERMAL DATA**

$R_{thj - case}$	Thermal resistance junction-case	max	0.83	°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
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**OFF**

$V_{(BR) DSS}$	Drain-source breakdown voltage	$I_D = 250 \mu\text{A}$ for <b>SGSP474</b> for <b>SGSP475</b>	$V_{GS} = 0$	450 400		V V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating} \times 0.8$	$T_c = 125^\circ\text{C}$		250 1000	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20 \text{ V}$			$\pm 100$	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	$V_{GS} = 10 \text{ V}$ $I_D = 4.5 \text{ A}$ for <b>SGSP474</b> $I_D = 5 \text{ A}$ for <b>SGSP475</b> $V_{GS} = 10 \text{ V}$ $T_c = 100^\circ\text{C}$ $I_D = 4.5 \text{ A}$ for <b>SGSP474</b> $I_D = 5 \text{ A}$ for <b>SGSP475</b>				0.7 0.55 1.4 1.1	$\Omega$ $\Omega$ $\Omega$ $\Omega$

**DYNAMIC**

$g_{fs}$	Forward transconductance	$V_{DS} = 25 \text{ V}$	$I_D = 5 \text{ A}$	6			mho
$C_{iss}$	Input capacitance	$V_{DS} = 25 \text{ V}$ $V_{GS} = 0$	$f = 1 \text{ MHz}$		1600	2100	pF
$C_{oss}$	Output capacitance					390	pF
$C_{rss}$	Reverse transfer capacitance					260	pF

**SWITCHING**

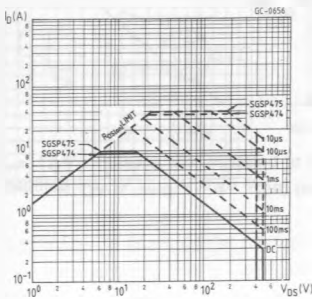
$t_{d (on)}$	Turn-on time	$V_{DD} = 225 \text{ V}$ $V_I = 10 \text{ V}$ (see test circuit)	$I_D = 5 \text{ A}$ $R_I = 4.7 \Omega$		30	40	ns		
$t_r$	Rise time						45	60	ns
$t_{d (off)}$	Turn-off delay time						125	165	ns
$t_f$	Fall time						30	40	ns

ELECTRICAL CHARACTERISTICS (Continued)

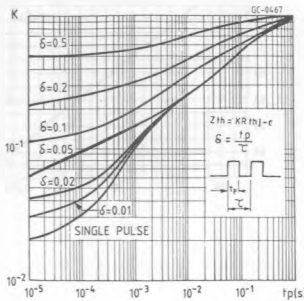
Parameters		Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current	for <b>SGSP474</b> for <b>SGSP475</b>			9 10 40	A A A
$I_{SDM}$ (*)	Source-drain current (pulsed)					
$V_{SD}$	Forward on voltage	$V_{GS} = 0$ $I_{SD} = 9\text{ A}$ for <b>SGSP474</b> $I_{SD} = 10\text{ A}$ for <b>SGSP475</b>			1.2 1.2	V V
$t_{rr}$	Reverse recovery time	$I_{SD} = 10\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{GS} = 0$		420		ns

(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%  
 (\*) Pulse width limited by safe operating area

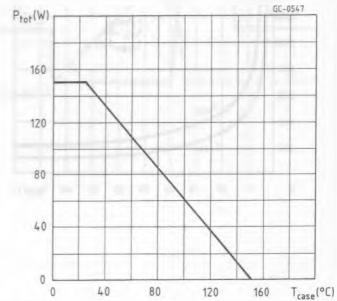
Safe operating areas



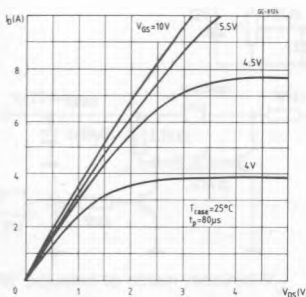
Thermal impedance



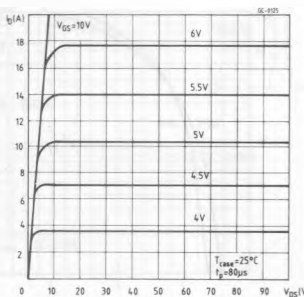
Derating curve



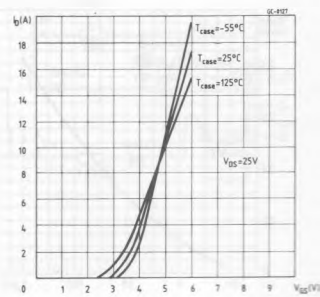
Output characteristics



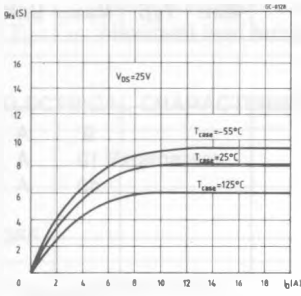
Output characteristics



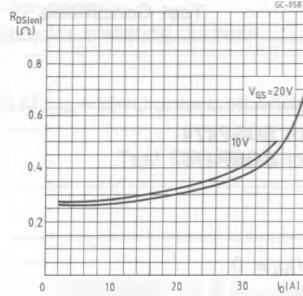
Transfer characteristics



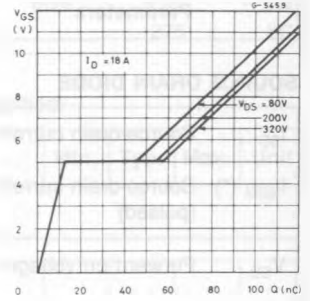
Transconductance



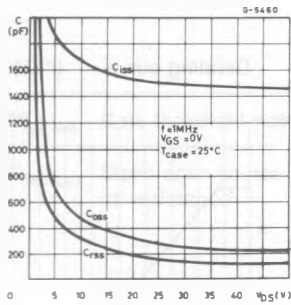
Static drain-source on resistance



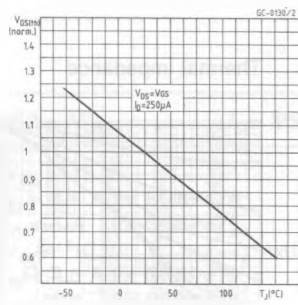
Gate charge vs gate-source voltage



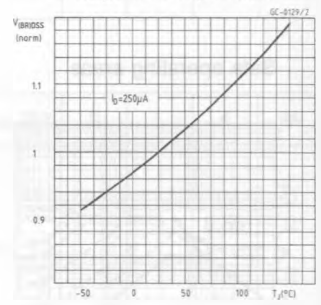
Capacitance variation



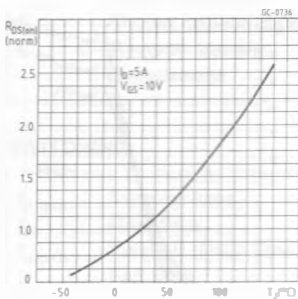
Normalized gate threshold voltage vs temperature



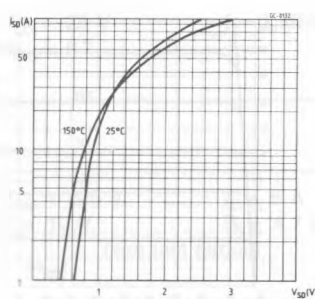
Normalized breakdown voltage vs temperature



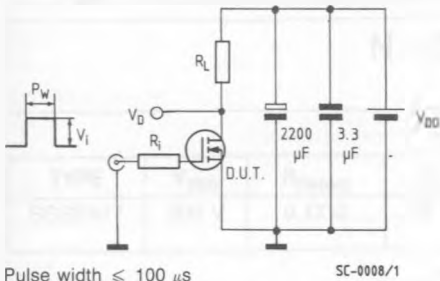
Normalized on resistance vs temperature



Source-drain diode forward characteristics

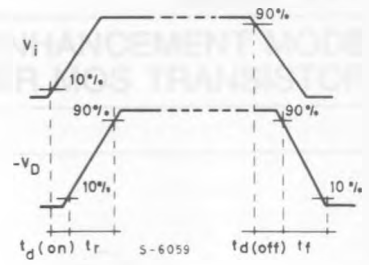


Switching times test circuit for resistive load

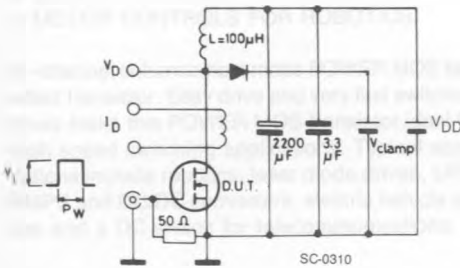


Pulse width  $\leq 100 \mu\text{s}$   
Duty cycle  $\leq 2\%$

Switching time waveforms for resistive load

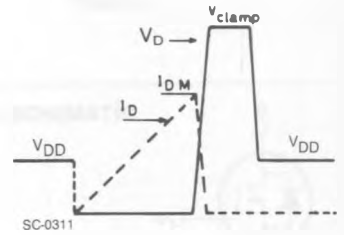


Clamped inductive load test circuit

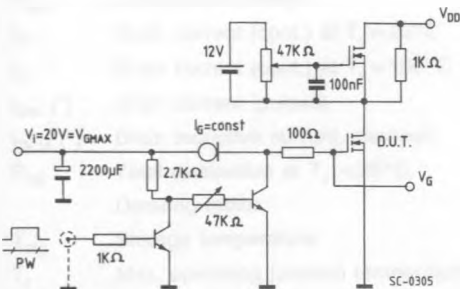


$V_i = 12 \text{ V}$  - Pulse width: adjusted to obtain specified  $I_{DM}$ .  $V_{\text{clamp}} = 0.75 V_{(BR)}$  DSS.

Clamped inductive waveforms



Gate charge test circuit



PW adjusted to obtain required  $V_G$

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

