

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

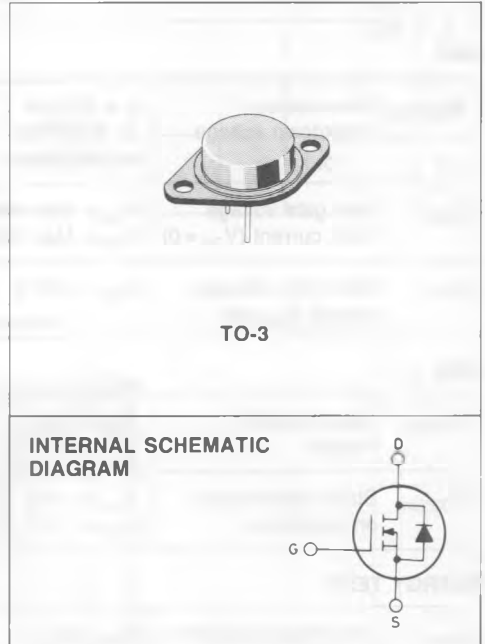
TYPE	V _{DSS}	R _{DS(on)}	I _D
SGSP591	60 V	0.033 Ω	40 A
SGSP592	50 V	0.033 Ω	40 A

- HIGH SPEED SWITCHING APPLICATIONS
- 50 - 60 VOLTS FOR INVERTERS AND UPS
- HIGH CURRENT - V_{DS(on)} ≤ 1V at 20A
- RATED FOR UNCLAMPED INDUCTIVE SWITCHING (ENERGY TEST) ♦
- EASY DRIVE - REDUCES SIZE AND COST

INDUSTRIAL APPLICATIONS:

- DC/DC CONVERTERS
- MOTOR CONTROLS

N - channel enhancement mode POWER MOS field effect transistors. Easy drive and very fast switching times make these POWER MOS transistors ideal for high speed switching circuits applications such as DC/DC converters, UPS, inverters, battery chargers and solar power converters.



ABSOLUTE MAXIMUM RATINGS

	SGSP591	SGSP592	
V _{DS}	60	50	V
V _{DGR}	60	50	V
V _{GS}		±20	V
I _D	40		A
I _D	25		A
I _{DM} (*)	160		A
P _{tot}	150		W
	1.2		W/°C
T _{stg}	-65 to 150		°C
T _j	150		°C

(*) Pulse width limited by safe operating area
 ♦ Introduced in 1988 week 44

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 SGSP591 for SGSP592	$V_{GS} = 0$	60 50		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	μA 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	$V_{GS} = 10\ \text{V}$ $V_{GS} = 10\ \text{V}$	$I_D = 20\ \text{A}$ $I_D = 20\ \text{A}$			33 66	m Ω m Ω

ENERGY TEST

I_{UIS}	Unclamped inductive switching current (single pulse)	$V_{DD} = 30\ \text{V}$ starting $T_j = 25^\circ\text{C}$	$L = 100\ \mu\text{H}$	40			A
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DYNAMIC

g_{fs}	Forward transconductance	$V_{DS} = 25\ \text{V}$	$I_D = 20\ \text{A}$	10			mho	
C_{iss}	Input capacitance	$V_{DS} = 25\ \text{V}$ $V_{GS} = 0$	$f = 1\ \text{MHz}$		1900	2800	pF	
C_{oss}	Output capacitance					1500		pF
C_{rss}	Reverse transfer capacitance						850	

SWITCHING

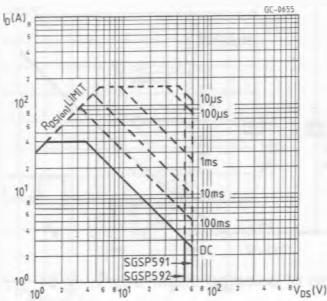
$t_{d(on)}$	Turn-on time	$V_{DD} = 25\ \text{V}$	$I_D = 20\ \text{A}$		35	45	ns
t_r	Rise time	$V_i = 10\ \text{V}$	$R_i = 4.7\ \Omega$		110	145	ns
$t_{d(off)}$	Turn-off delay time	(see test circuit)			90	120	ns
t_f	Fall time				55	70	ns

ELECTRICAL CHARACTERISTICS (Continued)

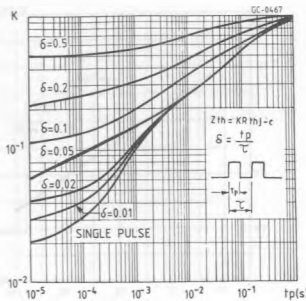
Parameters	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} Source-drain current $I_{SDM} (*)$ Source-drain current (pulsed)				40 160	A A
V_{SD} Forward on voltage	$I_{SD} = 40\text{ A}$ $V_{GS} = 0$			1.4	V
t_{rr} Reverse recovery time	$I_{SD} = 40\text{ A}$ $V_{GS} = 0$ $di/dt = 25\text{ A}/\mu\text{s}$		140		ns

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

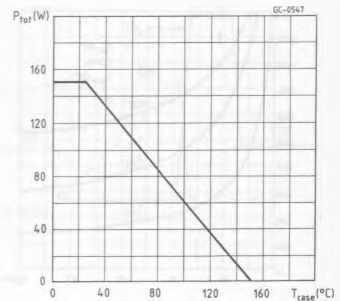
Safe operating areas



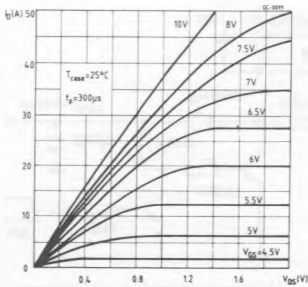
Thermal impedance



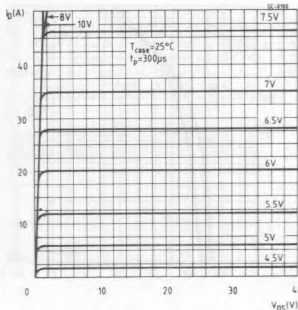
Derating curve



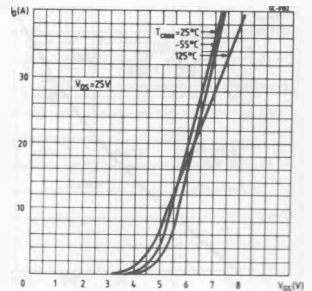
Output characteristics



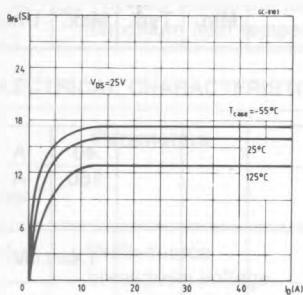
Output characteristics



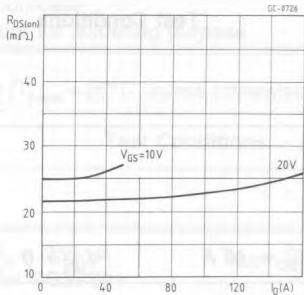
Transfer characteristics



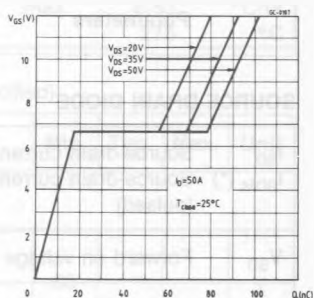
Transconductance



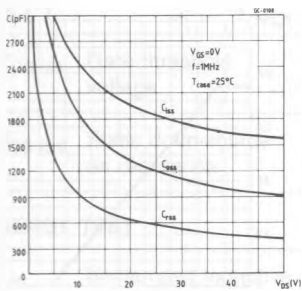
Static drain-source on resistance



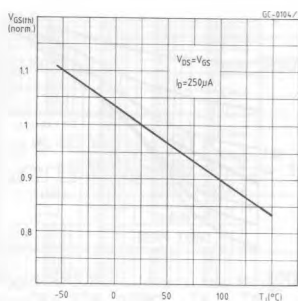
Gate charge vs gate-source voltage



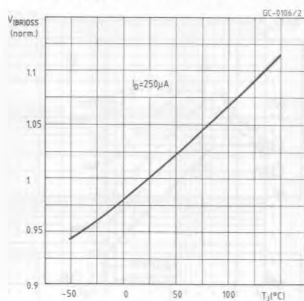
Capacitance variation



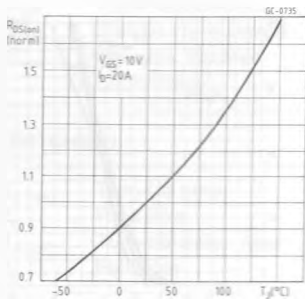
Normalized gate threshold voltage vs temperature



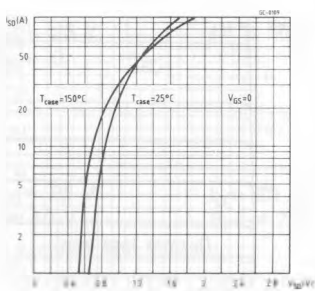
Normalized breakdown voltage vs temperature



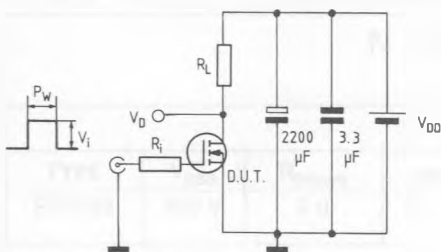
Normalized on resistance vs temperature



Source-drain diode forward characteristics



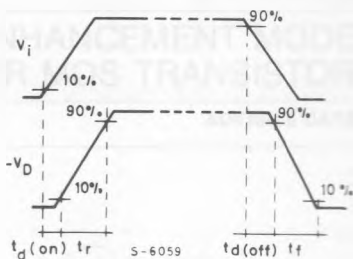
Switching times test circuit for resistive load



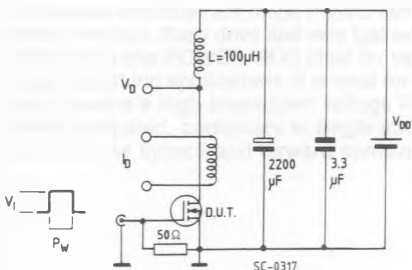
Pulse width $\leq 100 \mu\text{s}$
 Duty cycle $\leq 2\%$

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Switching time waveforms for resistive load



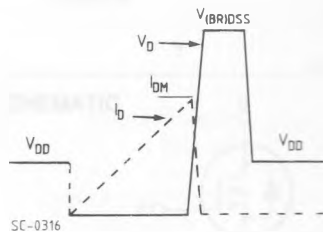
Unclamped inductive load test circuit



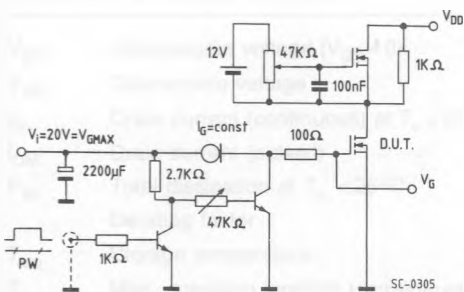
$V_i = 12 \text{ V}$ - Pulse width: adjusted to obtain specified I_{DM}

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Unclamped inductive waveforms



Gate charge test circuit



PW adjusted to obtain required V_G

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

