



**N - CHANNEL ENHANCEMENT MODE
POWER MOS TRANSISTORS**

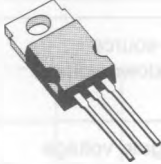
TYPE	V _{DSS}	R _{DS(on)}	I _D
SGSP316	250 V	1.2 Ω	5 A
SGSP317	200 V	0.75 Ω	6 A

- HIGH SPEED SWITCHING APPLICATIONS
- ULTRA FAST SWITCHING
- RATED FOR UNCLAMPED INDUCTIVE SWITCHING (ENERGY TEST) ♦
- EASY DRIVE - REDUCED COST AND SIZE

INDUSTRIAL APPLICATIONS:

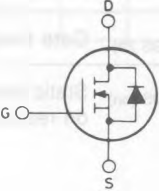
- SWITCHING POWER SUPPLIES
- DC SWITCH

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 applications. Typical uses are in telecommunications, switching power supplies and as a DC switch.



TO-220

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

		SGSP316	SGSP317	
V _{DS}	Drain-source voltage (V _{GS} = 0)	250	200	V
V _{DGR}	Drain-gate voltage (R _{GS} = 20 KΩ)	250	200	V
V _{GS}	Gate-source voltage		± 20	V
I _D	Drain current (cont.) at T _c = 25°C	5	6	A
I _D	Drain current (cont.) at T _c = 100°C	3.1	3.7	A
I _{DM} (*)	Drain current (pulsed)	20	24	A
P _{tot}	Total dissipation at T _c < 25°C		75	W
	Derating factor		0.6	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

$R_{thj-case}$	Thermal resistance junction-case	max	1.67	°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 SGSP316 $V_{GS} = 0$ for SGSP317	250 200		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	$V_{GS} = 10 \text{ V}$ $I_D = 2.5 \text{ A}$ for SGSP316 $I_D = 3 \text{ A}$ for SGSP317 $V_{GS} = 10 \text{ V}$ $T_c = 100^\circ\text{C}$ $I_D = 2.5 \text{ A}$ for SGSP316 $I_D = 3 \text{ A}$ for SGSP317			1.2 0.75 2.4 1.5	Ω Ω Ω Ω

ENERGY TEST

I_{UIS}	Unclamped inductive switching current (single pulse)	$V_{DD} = 30 \text{ V}$ starting $T_j = 25^\circ\text{C}$ for SGSP316 for SGSP317	$L = 100 \mu\text{H}$	5 6		A A
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DYNAMIC

g_{fs}	Forward transconductance	$V_{DS} = 25 \text{ V}$ $I_D = 3 \text{ A}$	1.5			mho
C_{iss}	Input capacitance	$V_{DS} = 25 \text{ V}$ $V_{GS} = 0$ $f = 1 \text{ MHz}$		380	500	pF
C_{oss}	Output capacitance				130	pF
C_{rss}	Reverse transfer capacitance				65	pF

ELECTRICAL CHARACTERISTICS (Continued)

Parameters	Test Conditions	Min.	Typ.	Max.	Unit
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SWITCHING

t_d (on)	Turn-on time	$V_{DD} = 100\text{ V}$ $V_i = 10\text{ V}$ (see test circuit)	$I_D = 3\text{ A}$ $R_{\theta} = 4.7\ \Omega$		15	20	ns
t_r	Rise time				30	40	ns
t_d (off)	Turn-off delay time				45	60	ns
t_f	Fall time				15	20	ns

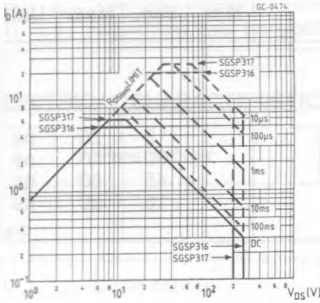
SOURCE DRAIN DIODE

I_{SD}	Source-drain current	for SGSP316 for SGSP317			5 6	A A
I_{SDM} (*)	Source-drain current (pulsed)	for SGSP316 for SGSP317			20 24	A A
V_{SD}	Forward on voltage	$V_{GS} = 0$ $I_{SD} = 6\text{ A}$ for SGSP316 $I_{SD} = 5\text{ A}$ for SGSP317			1.3 1.3	V V
t_{rr}	Reverse recovery time	$I_{SD} = 6\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$	$V_{GS} = 0$		180	ns

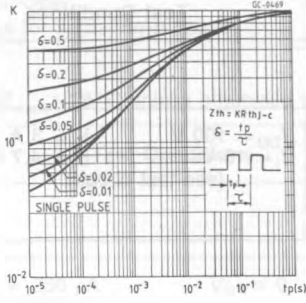
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5%

(*) Pulse width limited by safe operating area

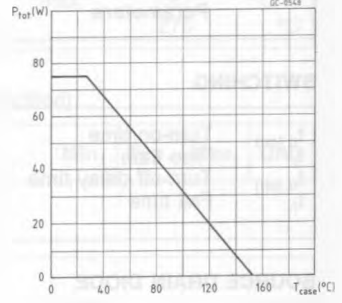
Safe operating areas



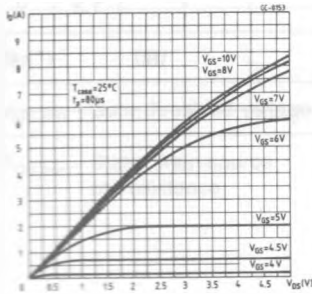
Thermal impedance



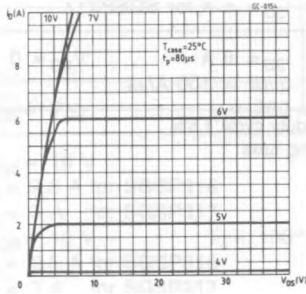
Derating curve



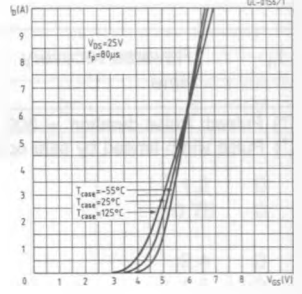
Output characteristics



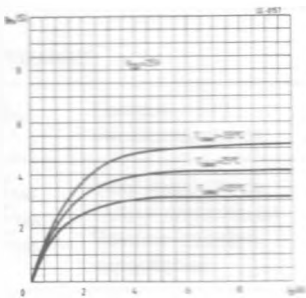
Output characteristics



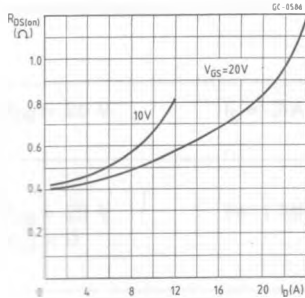
Transfer characteristics



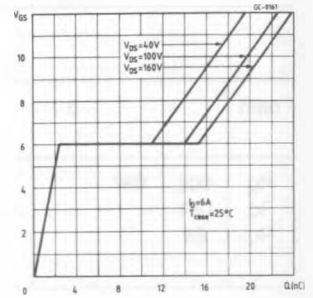
Transconductance



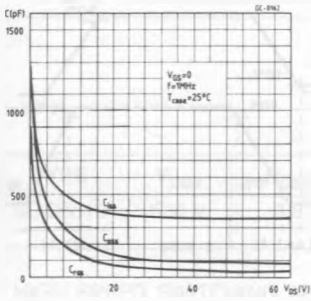
Static drain-source on resistance



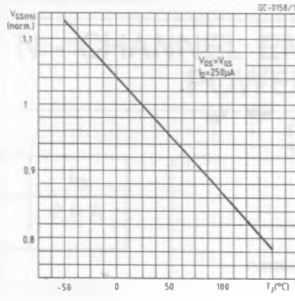
Gate charge vs gate-source voltage



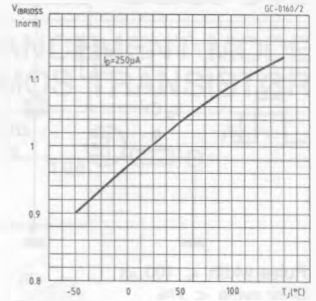
Capacitance variation



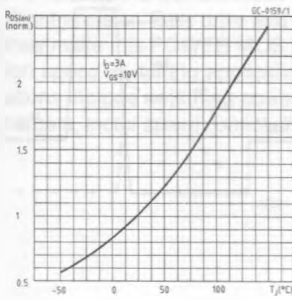
Normalized gate threshold voltage vs temperature



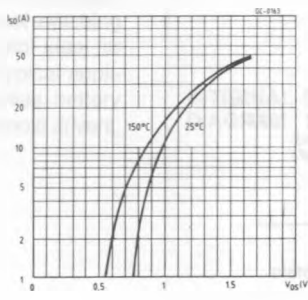
Normalized breakdown voltage vs temperature



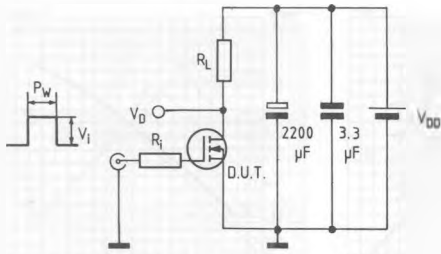
Normalized on resistance vs temperature



Source-drain diode forward characteristics



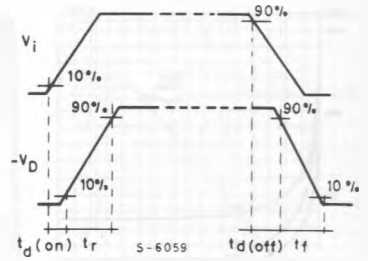
Switching times test circuit for resistive load



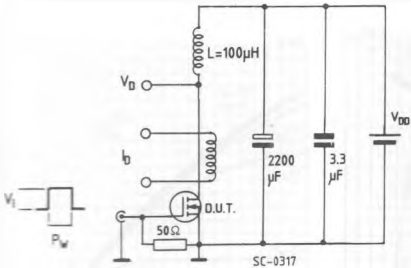
Pulse width $\leq 100 \mu\text{s}$
Duty cycle $\leq 2\%$

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Switching time waveforms for resistive load



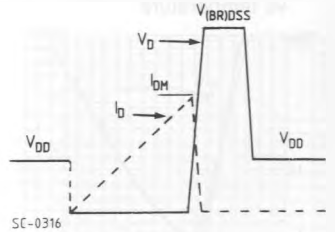
Unclamped inductive load test circuit



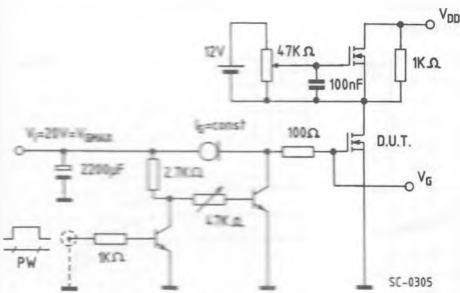
$V_i = 12 \text{ V}$ - Pulse width: adjusted to obtain specified I_{DM}

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Unclamped inductive waveforms



Gate charge test circuit



PW adjusted to obtain required V_G

SC-0305

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

