SGS-THOMSON MICROELECTRONICS

SGSP316
SGSP317

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

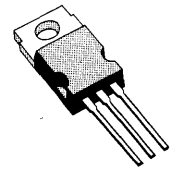
TYPE	V_{DSS}	$R_{DS(on)}$	I_D
SGSP316	250 V	1.2 Ω	5 A
SGSP317	200 V	0.75 Ω	6 A

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

INDUSTRIAL APPLICATIONS:

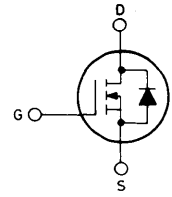
- SWITCHING POWER SUPPLIES
- DC SWITCH

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

$R_{thj\text{-}case}$	Thermal resistance junction-case	max	1.67	°C/W
T_L	Maximum lead temperature for soldering purpose		275	°C

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

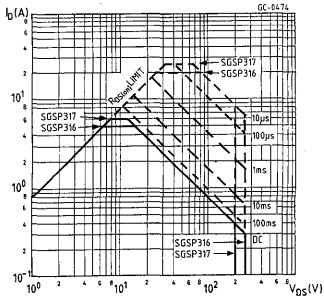
Parameters		Test Conditions	Min.	Typ.	Max.	Unit
OFF						
$V_{(BR)\ DSS}$	Drain-source breakdown voltage	I_D = 250 μA V_{GS} = 0 for **SGSP316** for **SGSP317**	 250 200			 V V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating x 0.8 T_c = 125°C			250 1000	μA 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 I_D = 2.5 A for **SGSP316** I_D = 3 A for **SGSP317** V_{GS} = 10 V T_c = 100°C I_D = 2.5 A for **SGSP316** I_D = 3 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 V L = 100 μH starting T_j = 25°C for **SGSP316** for **SGSP317**	 5 6			 A A
DYNAMIC						
g_{fs}	Forward transconductance	V_{DS} = 25 V I_D = 3 A	1.5			mho
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0		380	500 130 65	pF pF pF

ELECTRICAL CHARACTERISTICS (Continued)

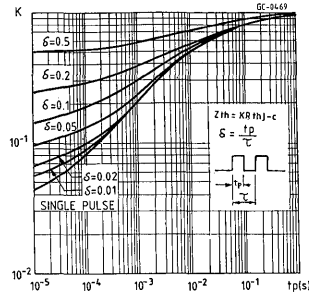
Parameters		Test Conditions	Min.	Typ.	Max.	Unit
SWITCHING						
$t_{d\ (on)}$	Turn-on time	V_{DD} = 100 V I_D = 3 A		15	20	ns
t_r	Rise time	V_i = 10 V R_i = 4.7 Ω		30	40	ns
$t_{d\ (off)}$	Turn-off delay time	(see test circuit)		45	60	ns
t_f	Fall time			15	20	ns
SOURCE DRAIN DIODE						
I_{SD}	Source-drain current	for **SGSP316**			5	A
		for **SGSP317**			6	A
I_{SDM} (•)	Source-drain current (pulsed)	for **SGSP316**			20	A
		for **SGSP317**			24	A
V_{SD}	Forward on voltage	V_{GS} = 0				
		I_{SD} = 6 A for **SGSP316**			1.3	V
		I_{SD} = 5 A for **SGSP317**			1.3	V
t_{rr}	Reverse recovery time	I_{SD} = 6 A V_{GS} = 0 di/dt = 100 A/μs		180		ns

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

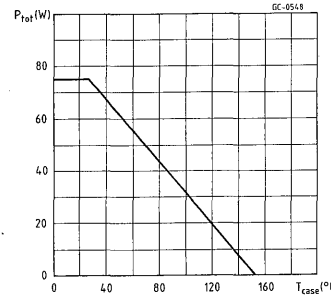
Safe operating areas



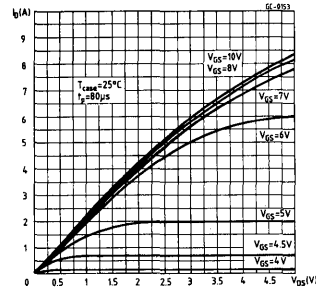
Thermal impedance



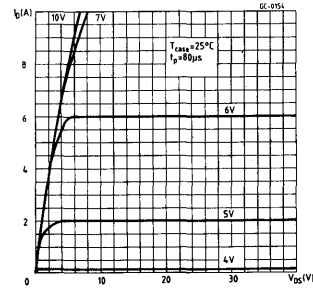
Derating curve



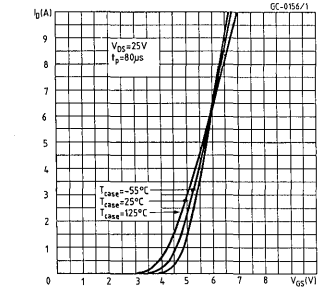
Output characteristics



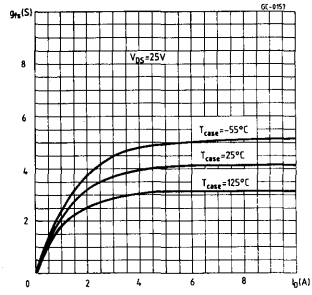
Output characteristics



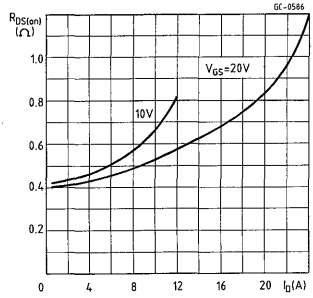
Transfer characteristics



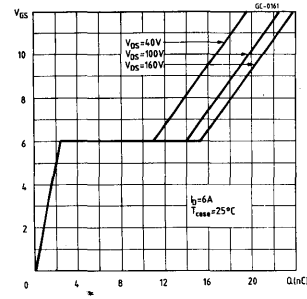
Transconductance



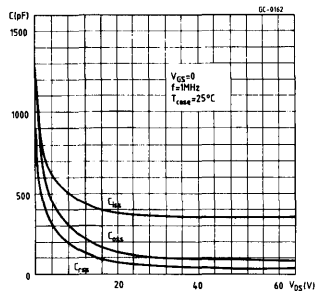
Static drain-source on resistance



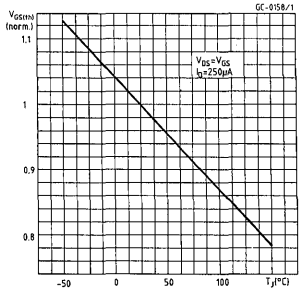
Gate charge vs gate-source voltage



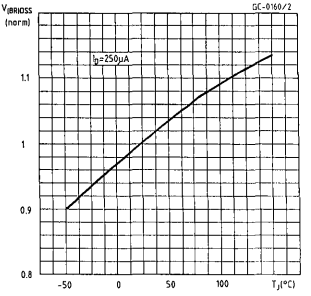
Capacitance variation



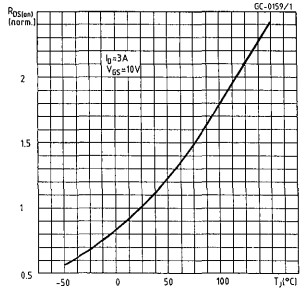
Normalized gate threshold voltage vs temperature



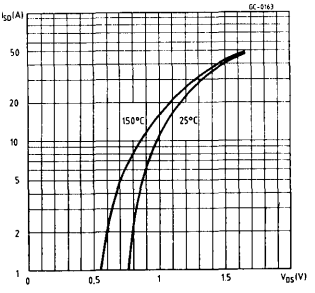
Normalized breakdown voltage vs temperature



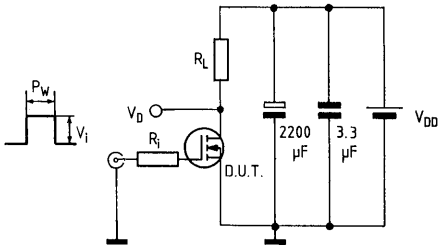
Normalized on resistance vs temperature



Source-drain diode forward characteristics

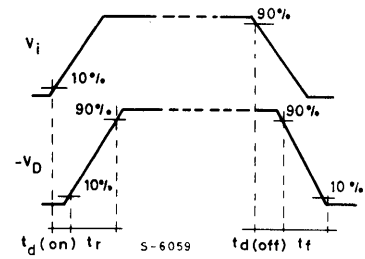


Switching times test circuit for resistive load

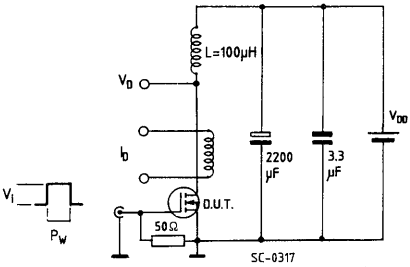


Pulse width ⩽ 100 µs
Duty cycle ⩽ 2%

Switching time waveforms for resistive load

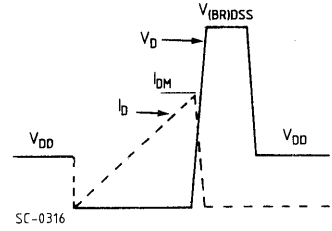


Unclamped inductive load test circuit

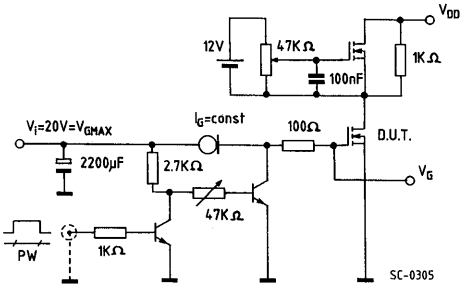


V_i = 12 V - Pulse width: adjusted to obtain specified I_{DM}

Unclamped inductive waveforms



Gate charge test circuit



PW adjusted to obtain required V_G

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