N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

| TYPE	V_{DSS}	$R_{DS(on)}$	I_D
SGSP477	200 V	0.17 Ω	20 A

- HIGH SPEED SWITCHING APPLICATIONS
- HIGH CURRENT - FOR TELECOMM POWER SUPPLIES
- ULTRA FAST SWITCHING
- EASY DRIVE FOR REDUCED COST AND SIZE

INDUSTRIAL APPLICATIONS:
- SWITCHING MODE POWER SUPPLIES
- MOTOR CONTROLS FOR ROBOTICS.

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 robotics, laser diode drives, UPS, SMPS and DC/DC converters, electric vehicle drives and a DC switch for telecommunications.
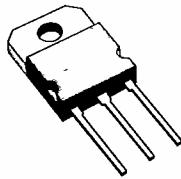
TO-218

INTERNAL SCHEMATIC DIAGRAM
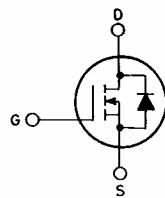
ABSOLUTE MAXIMUM RATINGS

V_{DS}	Drain-source voltage ($V_{GS} = 0$)	200	V
V_{DGR}	Drain-gate voltage ($R_{GS} = 20$ KΩ)	200	V
V_{GS}	Gate-source voltage	±20	V
I_D	Drain current (cont.) at $T_c = 25°C$	20	A
I_D	Drain current (cont.) at $T_c = 100°C$	13	A
I_{DM} (*)	Drain current (pulsed)	80	A
I_{DLM} (*)	Drain inductive current, clamped	80	A
P_{tot}	Total dissipation at $T_c < 25°C$	150	W
	Derating factor	1.2	W/°C
T_{stg}	Storage temperature	−55 to 150	°C
T_j	Max. operating junction temperature	150	°C

(*) Pulse width limited by safe operating area

June 1988

THERMAL DATA

$R_{thj \, - \, case}$	Thermal resistance junction-case	max	0.83	°C/W
T_L	Maximum lead temperature for soldering purpose		275	°C

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

Parameters	Test Conditions	Min.	Typ.	Max.	Unit

OFF

			Min.	Typ.	Max.	Unit
$V_{(BR) DSS}$	Drain-source breakdown voltage	$I_D = 250 \, \mu A$ $\quad V_{GS} = 0$	200			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} =$ Max Rating $\quad$ $V_{DS} =$ Max Rating x 0.8 $\quad T_c = 125°C$			250 1000	μA μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20$ V			± 100	nA

ON (*)

			Min.	Typ.	Max.	Unit
$V_{GS \, (th)}$	Gate threshold voltage	$V_{DS} = V_{GS} \quad\quad I_D = 250 \, \mu A$	2		4	V
$R_{DS \, (on)}$	Static drain-source on resistance	$V_{GS} = 10$ V $\quad I_D = 10$ A $\quad$ $V_{GS} = 10$ V $\quad I_D = 10$ A $\quad T_c = 100°C$			0.17 0.34	Ω Ω

DYNAMIC

			Min.	Typ.	Max.	Unit
g_{fs}	Forward transconductance	$V_{DS} = 25$ V $\quad\quad I_D = 10$ A	8			mho
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	$V_{DS} = 25$ V $\quad\quad f = 1$ MHz $V_{GS} = 0$		1900	2200 550 260	pF pF pF

SWITCHING

			Min.	Typ.	Max.	Unit
$t_{d \, (on)}$ t_r $t_{d \, (off)}$ t_f	Turn-on time Rise time Turn-off delay time Fall time	$V_{DD} = 100$ V $\quad I_D = 10$ A $V_i = 10$ V $\quad R_i = 4.7 \, \Omega$ (see test circuit)		30 50 110 35	40 65 145 45	ns ns ns ns

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ELECTRICAL CHARACTERISTICS (Continued)

Parameters		Test Conditions	Min.	Typ.	Max.	Unit
SOURCE DRAIN DIODE						
I_{SD}	Source-drain current				20	A
I_{SDM} (*)	Source-drain current (pulsed)				80	A
V_{SD}	Forward on voltage	$I_{SD} = 20$ A $\qquad V_{GS} = 0$			1.3	V
t_{rr}	Reverse recovery time	$I_{SD} = 20$ A $\qquad V_{GS} = 0$ di/dt $= \cdot 100$ A/μs		320		ns

(*) Pulsed: Pulse duration = 300 μs, duty cycle 1.5%
(•) Pulse width limited by safe operating area
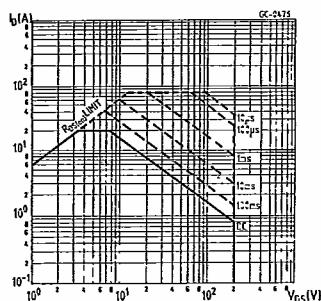
Safe operating areas	Thermal impedance	Derating curve
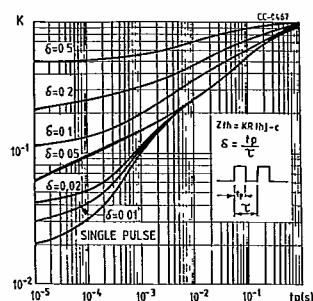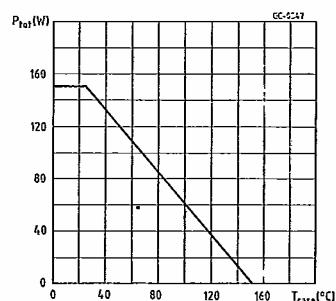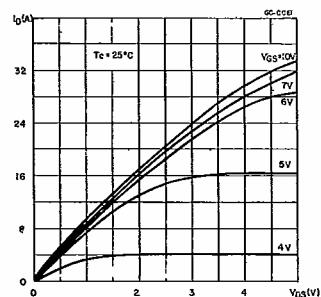
Output characteristics	Output characteristics	Transfer characteristics
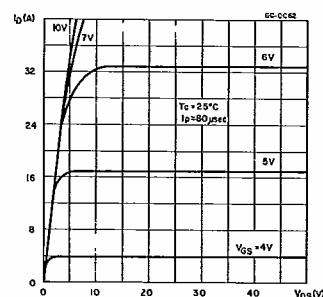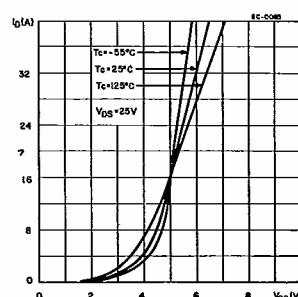
Transconductance
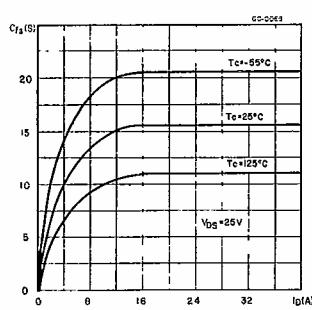
Static drain-source on resistance
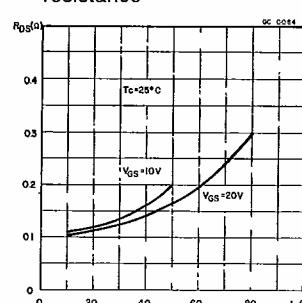

Gate charge vs gate-source voltage
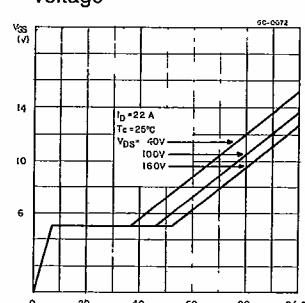
Capacitance variation
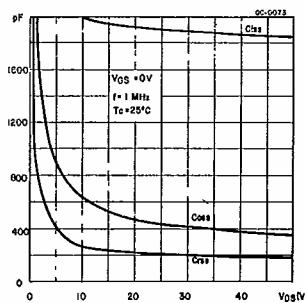

Normalized gate threshold voltage vs temperature
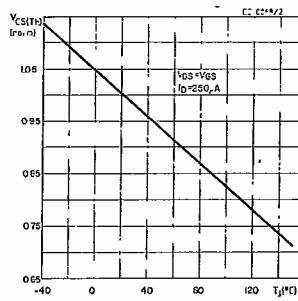
Normalized breakdown voltage vs temperature
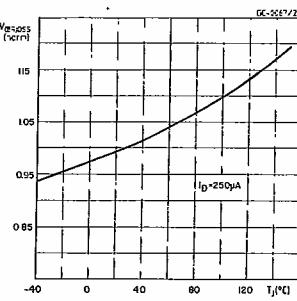
Normalized on resistance vs temperature
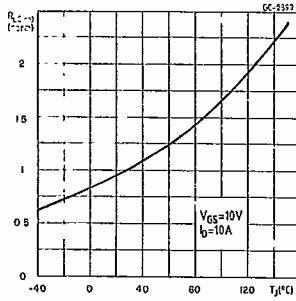

Source-drain diode forward characteristics

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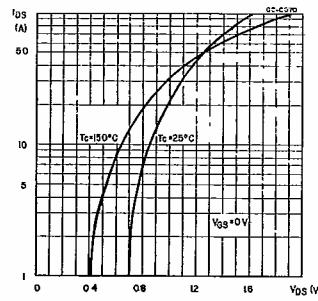
Switching times test circuit for resistive load

Pulse width ⩽ 100 μs
Duty cycle ⩽ 2%

SC-0008/1
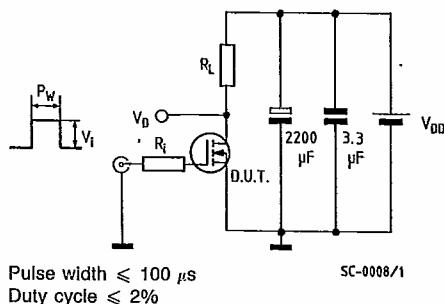
## Switching time waveforms for resistive load


S-6059
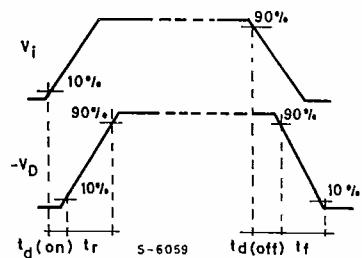
T-39-13

Clamped inductive load test circuit

SC-0310
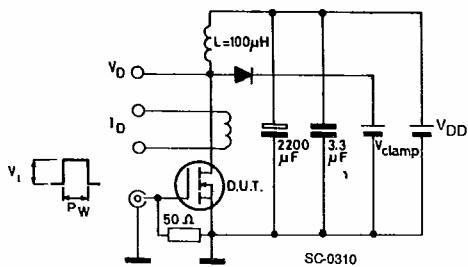
$V_i = 12$ V - Pulse width: adjusted to obtain
specified I_{DM}, $V_{clamp} = 0.75$ $V_{(BR)}$ DSS.

Clamped inductive waveforms

SC-0311
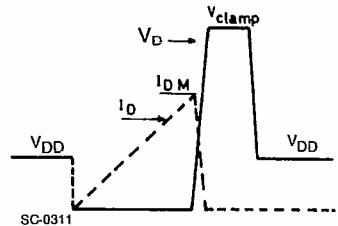
Gate charge test circuit

$V_i = 20V = V_{GHAX}$

$I_G = const$

PW adjusted to obtain required V_G

SC-0305
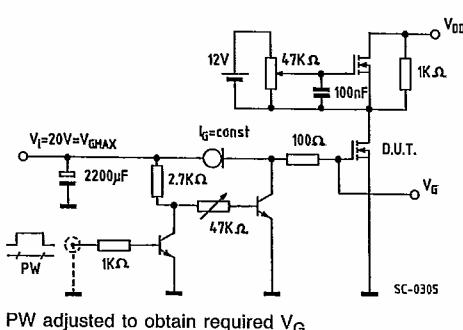
Body-drain diode t_{rr} measurement
Jedec test circuit

S-6916