

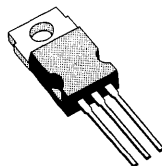
**N - CHANNEL ENHANCEMENT MODE
 POWER MOS TRANSISTOR**

PRELIMINARY DATA

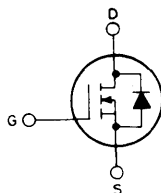
TYPE	V _{DS}	R _{DS(on)}	I _D
STVHD90	50 V	0.023 Ω	52 A

- VERY HIGH DENSITY
- VERY LOW R_{DS(on)}
- VERY HIGH CURRENT
- HIGH TRANSCONDUCTANCE/C_{rss} RATIO
- LOW DRIVE ENERGY
- ULTRA FAST SWITCHING

N - channel enhancement mode very high density POWER MOS transistors. Easy drive and low on voltage make this device ideal for automotive and industrial applications requiring high current and low on-losses. Typical uses are actuators lamp and motor control in the automotive and industrial environments. It can also be used in DC/DC converters.



TO-220

**INTERNAL SCHEMATIC
 DIAGRAM**

ABSOLUTE MAXIMUM RATINGS

V _{DS}	Drain-source voltage (V _{GS} = 0)	50	V
V _{GS}	Gate-source voltage	± 20	V
I _D	Drain current (cont.) at T _c = 25°C	52	A
I _D	Drain current (cont.) at T _c = 125°C	32	A
I _{DM} (*)	Drain current (pulsed)	200	A
I _{DLM}	Drain inductive current clamped	200	A
P _{tot}	Total dissipation at T _c < 25°C	125	W
	Derating factor	1	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

THERMAL DATA

$R_{thj - case}$	Thermal resistance junction-case	max	1	°C/W
T_L	Maximum lead temperature for soldering purpose		275	°C

ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}C$ unless otherwise specified)

Parameters	Test Conditions	Min.	Typ.	Max.	Unit
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OFF

$V_{(BR) DSS}$	Drain-source breakdown voltage	$I_D = 250 \mu A$	$V_{GS} = 0$	50		V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating} \times 0.8$	$T_c = 125^{\circ}C$		250 1000	μA μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20 V$			100	nA

ON (*)

$V_{GS (th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$	$I_D = 250 \mu A$	2	4	V
$R_{DS (on)}$	Static drain-source on resistance	$V_{GS} = 10 V$	$I_D = 30 A$		23	m Ω

DYNAMIC

g_{fs}	Forward transconductance	$V_{DS} = 25 V$	$I_D = 30 A$		30	mho	
C_{iss}	Input capacitance	$V_{DS} = 25 V$ $V_{GS} = 0$	$f = 1 \text{ MHz}$		2500	pF	
C_{oss}	Output capacitance				850	1000	pF
C_{rss}	Reverse transfer capacitance				120	150	pF

SWITCHING

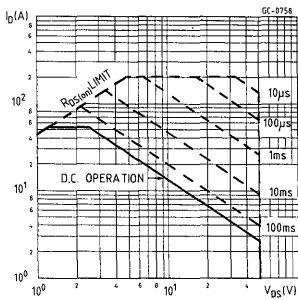
$t_{d (on)}$	Turn-on time	$V_{DD} = 40 V$	$I_D = 25 A$		40	ns
t_r	Rise time	$V_i = 50 V$	$R_i = 50 \Omega$		100	ns
$t_{d (off)}$	Turn-off delay time	(see test circuit)			250	ns
t_f	Fall time				170	ns
Q_g	Total Gate Charge	$V_{DD} = 25 V$ $V_{GS} = 10 V$	$I_D = 30 A$		56	nC

ELECTRICAL CHARACTERISTICS (Continued)

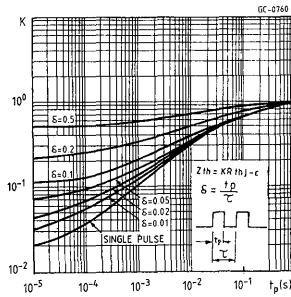
Parameters	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (*)	Source-drain current Source-drain current (pulsed)			52 200	A A
V_{SD}	Forward on voltage	$I_{SD} = 52\text{ A}$	$V_{GS} = 0$	1.5	V
t_{rr} Q_{rr}	Reverse recovery time Reverse recovery charge	$I_{SD} = 52\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$	$V_{GS} = 0$	70 110	ns μC

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

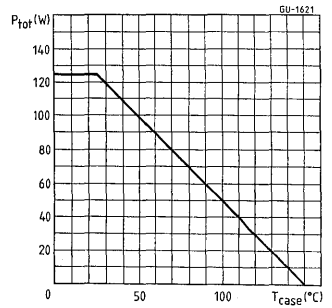
Safe operating areas



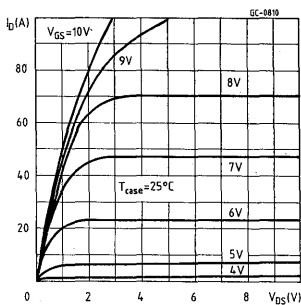
Thermal impedance



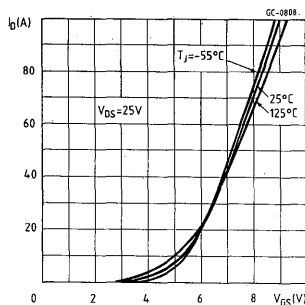
Derating curve



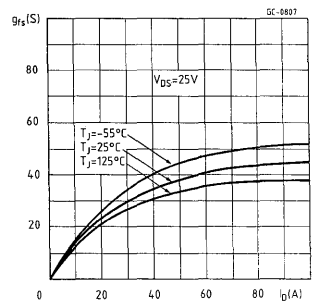
Output characteristics



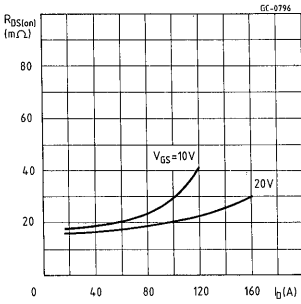
Transfer characteristics



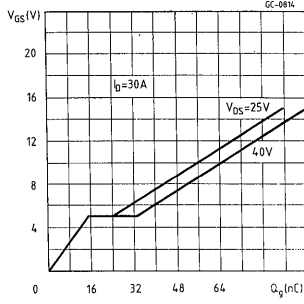
Transconductance



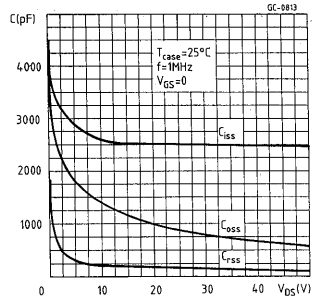
Static drain-source on resistance



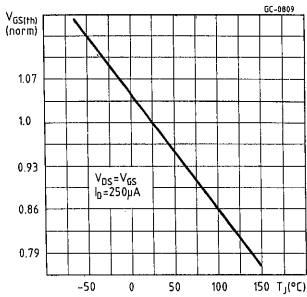
Gate charge vs gate-source voltage



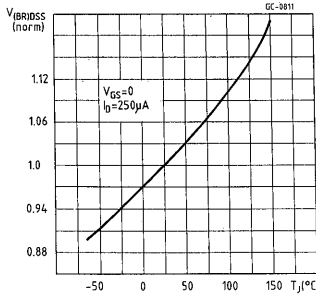
Capacitance variation



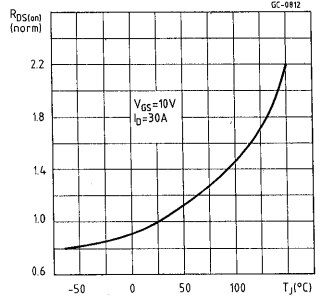
Normalized gate threshold voltage vs temperature



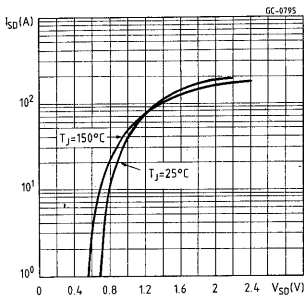
Normalized breakdown voltage vs temperature



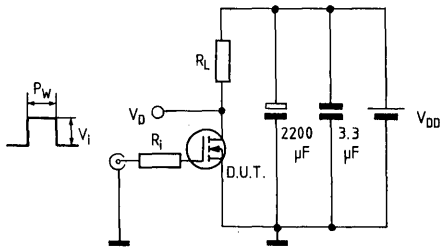
Normalized on resistance vs temperature



Static drain diode forward characteristics



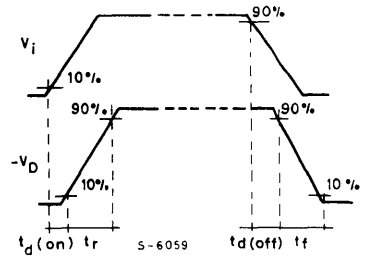
Switching times test circuit for resistive load



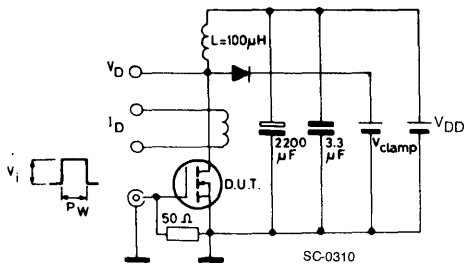
Pulse width $\leq 100 \mu\text{s}$
Duty cycle $\leq 2\%$

SC-0008/1

Switching time waveforms for resistive load



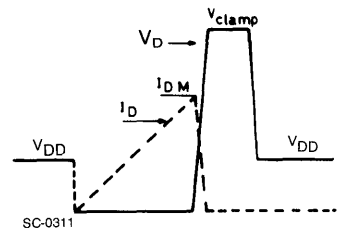
Clamped inductive load test circuit



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

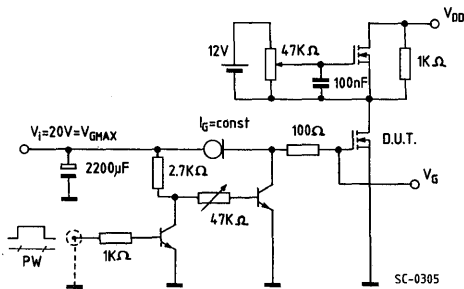
SC-0310

Clamped inductive waveforms



SC-0311

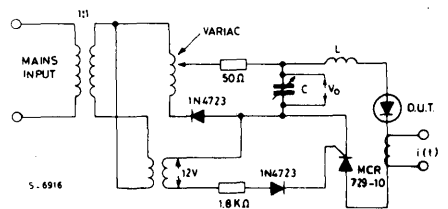
Gate charge test circuit



PW adjusted to obtain required V_G

SC-0305

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



S-6916