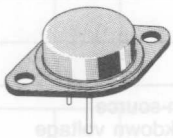
SGS-THOMSON MICROELECTRONICS

IRF 150 - 151
IRF 152 - 153

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
IRF150	100 V	0.055 Ω	40 A
IRF151	60 V	0.055 Ω	40 A
IRF152	100 V	0.08 Ω	33 A
IRF153	60 V	0.08 Ω	33 A



TO-3

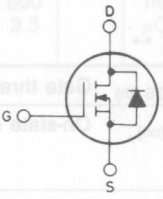
- 60-100 VOLTS - FOR DC/DC CONVERTERS
- HIGH CURRENT
- RATED FOR UNCLAMPED INDUCTIVE SWITCHING (ENERGY TEST) ♦
- ULTRA FAST SWITCHING
- EASY DRIVE - FOR REDUCED COST AND SIZE

INDUSTRIAL APPLICATIONS:

- UINTERRUPTIBLE POWER SUPPLIES
- 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 applications. Applications include DC/DC converters,UPS, battery chargers, secondary regulators, servo control, power audio amplifiers and robotics.

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

		IRF 150	151	152	153	
V_{DS} *	Drain-source voltage ($V_{GS}=0$)	100	60	100	60	V
V_{DGR} *	Drain-gate voltage ($R_{GS}=20$ KΩ)	100	60	100	60	V
V_{GS}	Gate-source voltage		±20			V
I_D	Drain current (cont.) at $T_c=25°C$	40	40	33	33	A
I_D	Drain current (cont.) at $T_c=100°C$	25	25	20	20	A
I_{DM}(•)	Drain current (pulsed)	160	160	132	132	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

* T_j = 25°C to 125°C
(•) Repetitive Rating: Pulse width limited by max junction temperature
♦ Introduced in 1988 week 44

THERMAL DATA

$R_{thj\text{ - }case}$	Thermal resistance junction-case	max	0.83	°C/W
$R_{thc\text{-}s}$	Thermal resistance case-sink	typ	0.1	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	max	30	°C/W
T_l	Maximum lead temperature for soldering purpose		300	°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 **IRF150/IRF152** for **IRF151/IRF153**	 100 60			 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
$I_{D(on)}$	On-state drain current	V_{DS} > $I_{D\ (on)}$ × $R_{DS(on)\ max}$ V_{GS} = 10 V for **IRF150/IRF151** for **IRF152/IRF153**	 40 33			 A A
$R_{DS\ (on)}$	Static drain-source on resistance	V_{GS} = 10 V I_D = 20 A for **IRF150/IRF151** for **IRF152/IRF153**			 0.055 0.08	 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 **IRF150/IRF151** for **IRF152/IRF153**	 40 33			 A A
DYNAMIC						
g_{fs} **	Forward transconductance	V_{DS} > $I_{D\ (on)}$ × $R_{DS\ (on)\ max}$ I_D = 20 A	9			mho
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0			3000 1500 500	pF pF pF

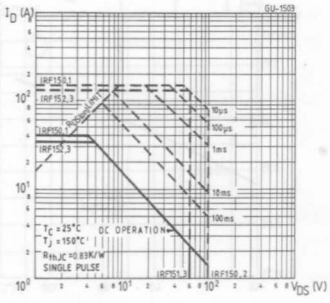
ELECTRICAL CHARACTERISTICS (Continued)

Parameters		Test Conditions	Min.	Typ.	Max.	Unit
SWITCHING						
$t_{d\ (on)}$	Turn-on time	V_{DD} = 24 V I_D = 20 A			35	ns
t_r	Rise time	R_i = 4.7 Ω			100	ns
$t_{d\ (off)}$	Turn-off delay time	(see test circuit)			125	ns
t_f	Fall time				100	ns
Q_g	Total Gate Charge	V_{GS} = 10 V I_D = 50 A V_{DS} = Max Rating × 0.8 (see test circuit)			120	nC
SOURCE DRAIN DIODE						
I_{SD}	Source-drain current	for **IRF150/IRF151**			40	A
		for **IRF152/IRF153**			33	A
I_{SDM} (•)	Source-drain current (pulsed)	for **IRF150/IRF151**			160	A
		for **IRF152/IRF153**			132	
V_{SD} **	Forward on voltage	V_{GS} = 0				
		for **IRF150/IRF151** I_{SD} = 40 A			2.5	V
		for **IRF152/IRF153** I_{SD} = 33 A			2.3	V
t_{rr}	Reverse recovery time	T_j = 150°C		600		ns
Q_{rr}	Reverse recovered charge	I_{SD} = 40 A di/dt = 100 A/μs		3.3		μC

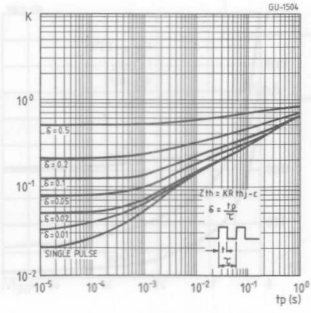
** Pulsed: Pulse duration ⩽ 300 μs, duty cycle ⩽ 2%

(•) Repetitive Rating: Pulse width limited by max junction temperature

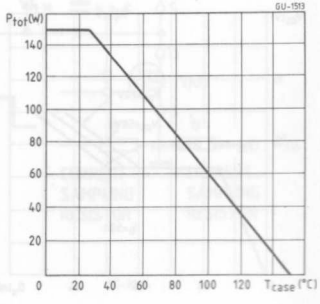
Safe operating areas



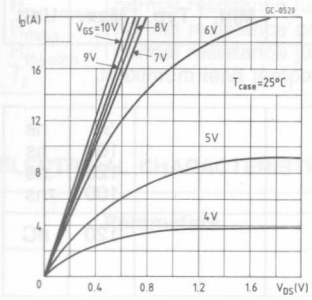
Thermal impedance



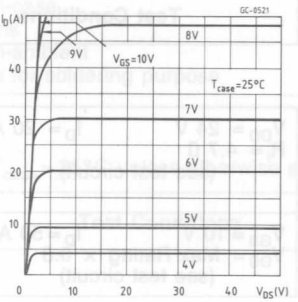
Derating curve



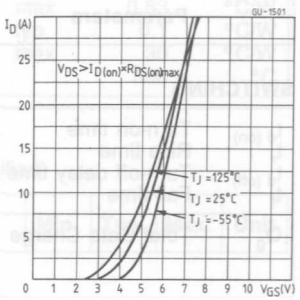
Output characteristics



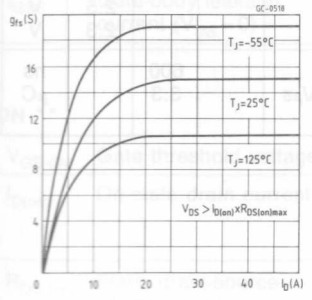
Output characteristics



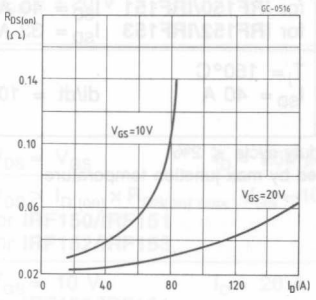
Transfer characteristics



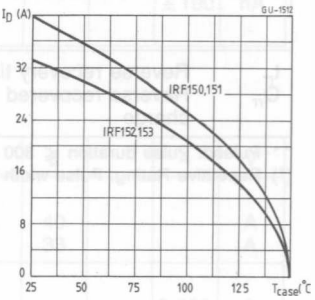
Transconductance



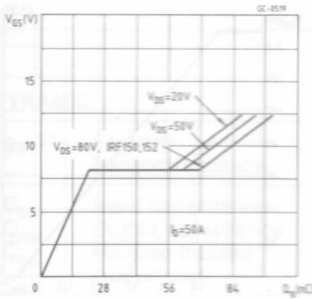
Static drain-source on resistance



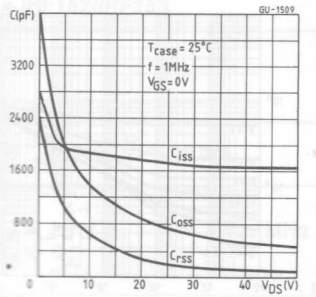
Maximum drain current vs temperature



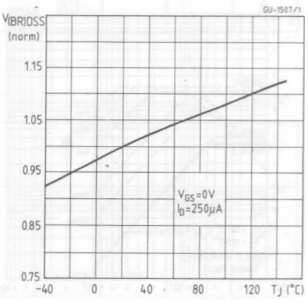
Gate charge vs gate-source voltage



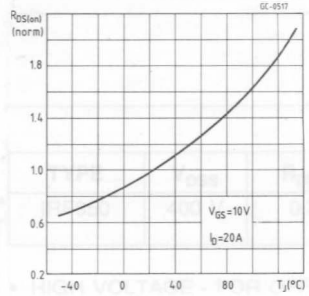
Capacitance variation



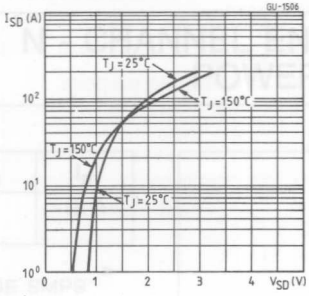
Normalized breakdown voltage vs temperature



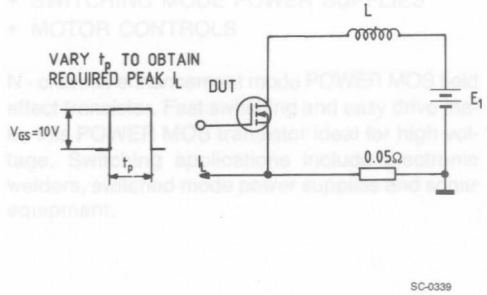
Normalized on resistance vs temperature



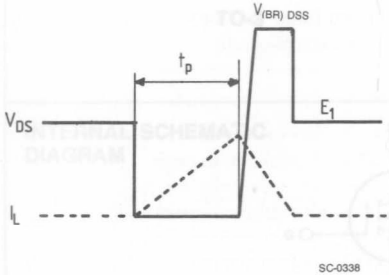
Source-drain diode forward characteristics



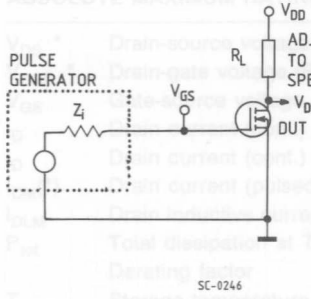
Unclamped inductive test circuit



Unclamped inductive waveforms



Switching times test circuit



Gate charge test circuit