



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

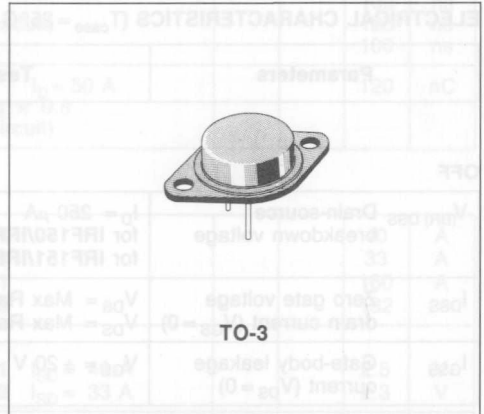
TYPE	V _{DSS}	R _{DS(on)}	I _D
IRF150	100 V	0.055 Ω	40 A
IRF151	60 V	0.055 Ω	40 A
IRF152	100 V	0.08 Ω	33 A
IRF153	60 V	0.08 Ω	33 A

- 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:

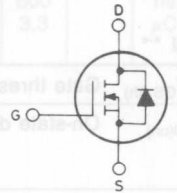
- UNINTERRUPTIBLE POWER SUPPLIES
- MOTOR CONTROLS

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.



TO-3

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_i = 25°C to 125°C

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

♦ Introduced in 1988 week 44

THERMAL DATA

$R_{thj-case}$	Thermal resistance junction-case	max	0.83	°C/W
R_{thc-s}	Thermal resistance case-sink	typ	0.1	°C/W
$R_{thj-amb}$	Thermal resistance junction-ambient	max	30	°C/W
T_l	Maximum lead temperature for soldering purpose		300	°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 IRF150/IRF152 for IRF151/IRF153	$V_{GS} = 0$	100 60	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
$I_{D(on)}$	On-state drain current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ for IRF150/IRF151 for IRF152/IRF153	$V_{GS} = 10 \text{ V}$	40 33		A A
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10 \text{ V}$ for IRF150/IRF151 for IRF152/IRF153	$I_D = 20 \text{ A}$		0.055 0.08	Ω Ω

ENERGY TEST

I_{UIS}	Unclamped inductive switching current (single pulse)	$V_{DD} = 30 \text{ V}$ starting $T_l = 25^\circ\text{C}$ for IRF150/IRF151 for IRF152/IRF153	$L = 100 \mu\text{H}$	40 33		A A
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DYNAMIC

g_{fs}^{**}	Forward transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 20 \text{ A}$		9		mho
C_{iss}	Input capacitance				3000	pF
C_{oss}	Output capacitance	$V_{DS} = 25 \text{ V}$	$f = 1 \text{ MHz}$		1500	pF
C_{rss}	Reverse transfer capacitance	$V_{GS} = 0$			500	pF

ELECTRICAL CHARACTERISTICS (Continued)

Parameters		Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on time	$V_{DD} = 24\text{ V}$ $I_D = 20\text{ A}$ $R_{i1} = 4.7\ \Omega$ (see test circuit)			35	ns
t_r	Rise time				100	ns
$t_{d(off)}$	Turn-off delay time				125	ns
t_f	Fall time				100	ns
Q_g	Total Gate Charge	$V_{GS} = 10\text{ V}$ $I_D = 50\text{ A}$ $V_{DS} = \text{Max Rating} \times 0.8$ (see test circuit)			120	nC

SOURCE DRAIN DIODE

I_{SD}	Source-drain current	for IRF150/IRF151 for IRF152/IRF153			40	A
$I_{SDM}^{(*)}$	Source-drain current (pulsed)	for IRF150/IRF151 for IRF152/IRF153			160 132	A
V_{SD}^{**}	Forward on voltage	$V_{GS} = 0$ for IRF150/IRF151 $I_{SD} = 40\text{ A}$ for IRF152/IRF153 $I_{SD} = 33\text{ A}$			2.5 2.3	V
t_{rr}	Reverse recovery time	$T_J = 150^\circ\text{C}$ $I_{SD} = 40\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$			600	ns
Q_{rr}	Reverse recovered charge				3.3	μC

** Pulsed: Pulse duration $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$

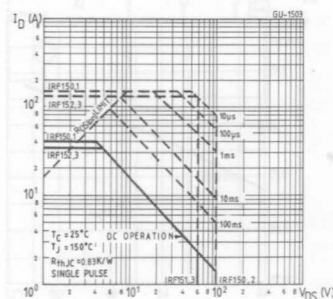
(*) Repetitive Rating: Pulse width limited by max junction temperature



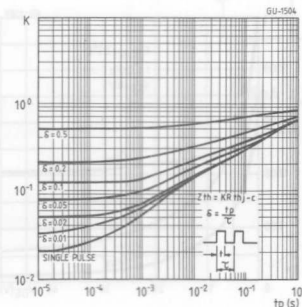
Switching times test circuit

Gate charge test circuit

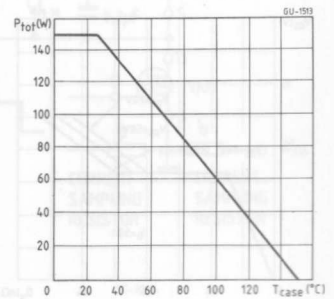
Safe operating areas



Thermal impedance



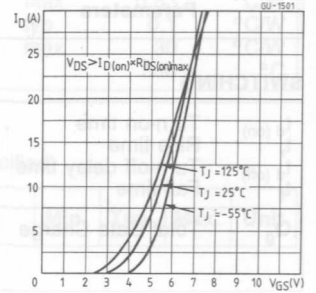
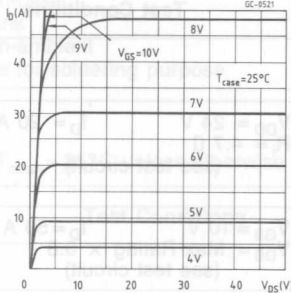
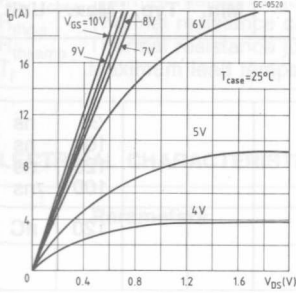
Derating curve



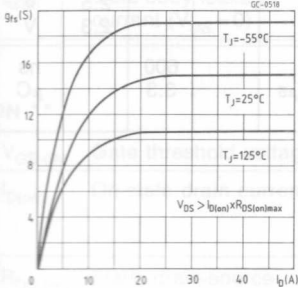
Output characteristics

Output characteristics

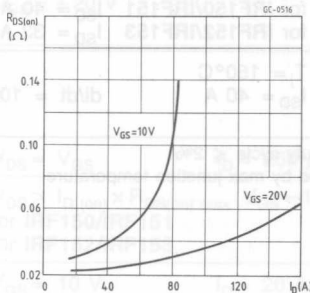
Transfer characteristics



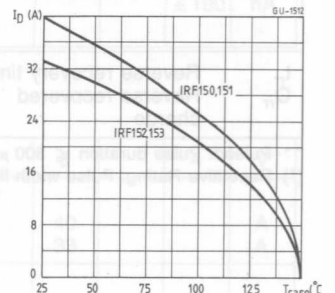
Transconductance



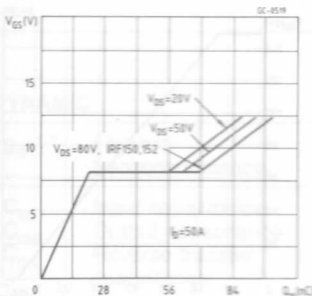
Static drain-source on resistance



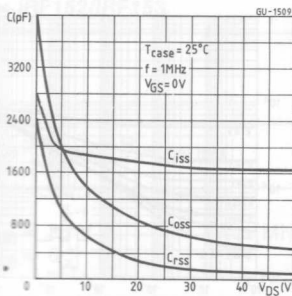
Maximum drain current vs temperature



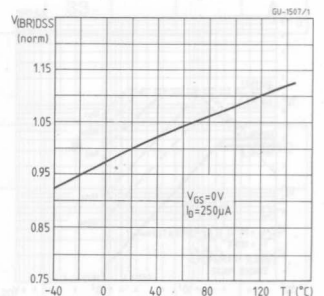
Gate charge vs gate-source voltage



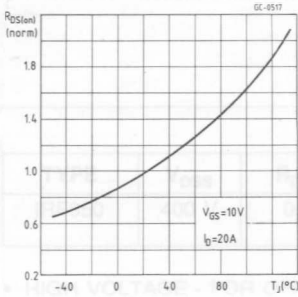
Capacitance variation



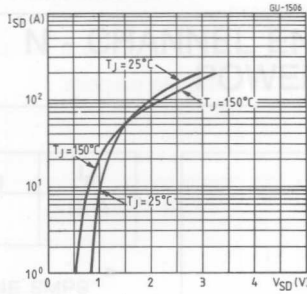
Normalized breakdown voltage vs temperature



Normalized on resistance vs temperature

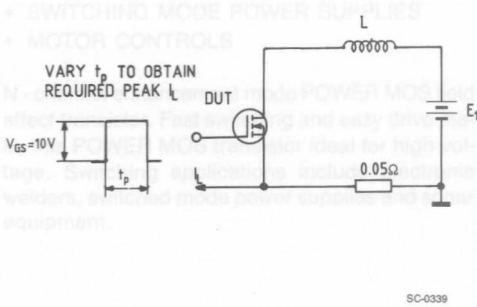


Source-drain diode forward characteristics

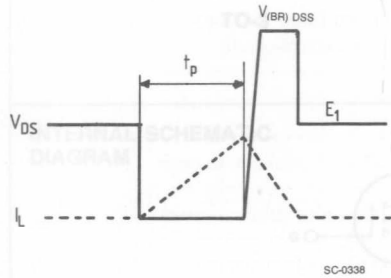


- HIGH CURRENT - FOR SMPS UP TO 250W
- ULTRA FAST SWITCHING - FOR OPERATION AT > 100KHZ
- EASY DRIVE - REDUCES SIZE AND COST

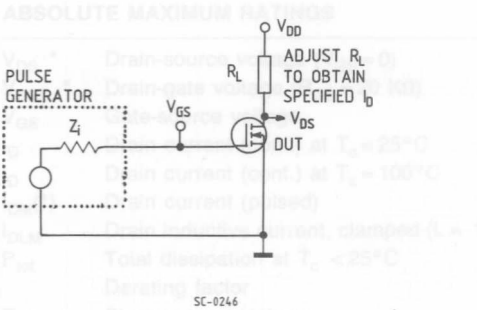
Unclamped inductive test circuit



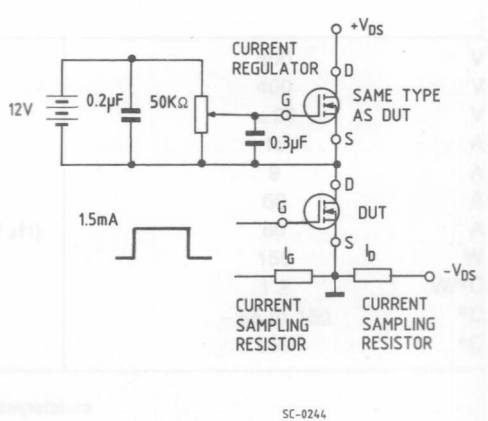
Unclamped inductive waveforms



Switching times test circuit



Gate charge test circuit



• $T_J = 25^\circ\text{C}$ to 125°C
 (*) Repetitive Rating: Pulse width limited by Max. Junction temperature