

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

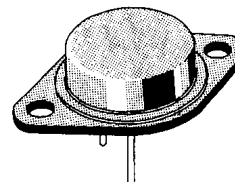
TYPE	V _{DSS}	R _{DS(on)}	I _D
IRF450	500 V	0.4 Ω	13 A
IRF451	450 V	0.4 Ω	13 A
IRF452	500 V	0.5 Ω	11 A
IRF453	450 V	0.5 Ω	11 A

- HIGH VOLTAGE - 450V FOR OFF LINE SMPS
- HIGH CURRENT - 11A FOR UP TO 350W SMPS
- ULTRA FAST SWITCHING - FOR OPERATION AT > 100 KHz
- EASY DRIVE - REDUCES COST AND SIZE
- HERMETIC PACKAGE TO-3

INDUSTRIAL APPLICATIONS:

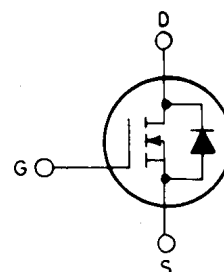
- SWITCHING POWER SUPPLIES
- MOTOR CONTROLS

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. Typical applications include switched mode power supplies, uninterruptable power supplies and motor speed control.



TO-3

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

		IRF			
		450	451	452	453
V _{DS} *	Drain-source voltage (V _{GS} = 0)	500	450	500	450 V
V _{DGR} *	Drain-gate voltage (R _{GS} = 20 KΩ)	500	450	500	450 V
V _{GS}	Gate-source voltage			± 20	V
I _D	Drain current (cont.) at T _c = 25°C	13	13	11	11 A
I _D	Drain current (cont.) at T _c = 100°C	8.1	8.1	7.2	7.2 A
I _{DM} (*)	Drain current (pulsed)	52	52	44	44 A
I _{DLM}	Drain inductive current, clamped (L = 100 μH)	52	52	44	44 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

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 IRF450/IRF452 for IRF451/IRF453	$V_{GS} = 0$	500 450		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	$V_{DS} > I_{D(on)} \times R_{DS(on) \text{ max}}$ for IRF450/IRF451 for IRF452/IRF453	$V_{GS} = 10 \text{ V}$	13 11			A A
$R_{DS (on)}$	Static drain-source on resistance	$V_{GS} = 10 \text{ V}$ for IRF450/IRF451 for IRF452/IRF453	$I_D = 7.2 \text{ A}$			0.4 0.5	Ω Ω

DYNAMIC

g_{fs}^{**}	Forward transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on) \text{ max}}$ $I_D = 7.2 \text{ A}$		8.7			mho
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	$V_{DS} = 25 \text{ V}$ $V_{GS} = 0$	$f = 1 \text{ MHz}$			3000 600 200	pF pF pF

SWITCHING

$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on time Rise time Turn-off delay time Fall time	$V_{DD} = 210 \text{ V}$ $R_i = 4.7 \Omega$ (see test circuit)	$I_D = 7.0 \text{ A}$			35 50 150 70	ns ns ns ns
Q_g	Total Gate Charge	$V_{GS} = 10 \text{ V}$ $V_{DS} = \text{Max Rating} \times 0.8$ (see test circuit)	$I_D = 13 \text{ A}$			120	nC

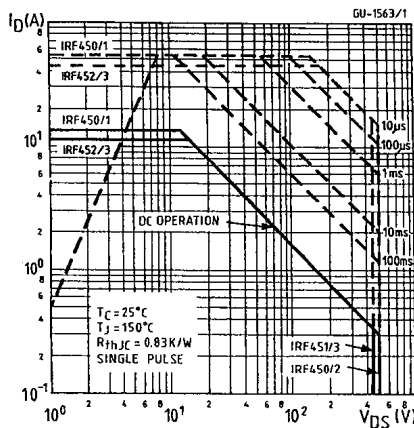
ELECTRICAL CHARACTERISTICS (Continued)

Parameters	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (*)	Source-drain current Source-drain current (pulsed)			13 52	A A
V_{SD}^{**}	Forward on voltage	$I_{SD} = 13\text{ A}$ $V_{GS} = 0$		1.4	V
t_{rr} Q_{rr}	Reverse recovery time Reverse recovered charge	$T_J = 150^\circ\text{C}$ $I_{SD} = 13\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$	1300 7.4		ns μC

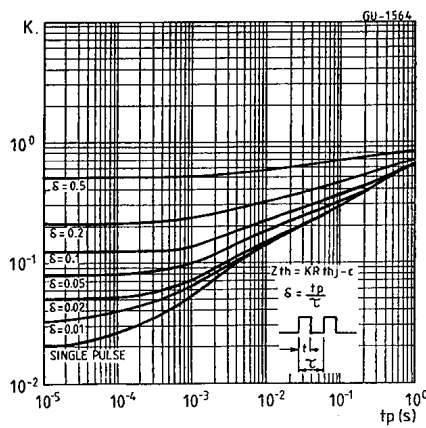
** Pulsed: Pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 1.5\%$

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

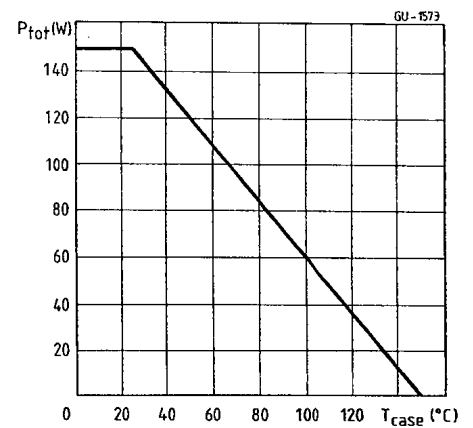
Safe operating areas



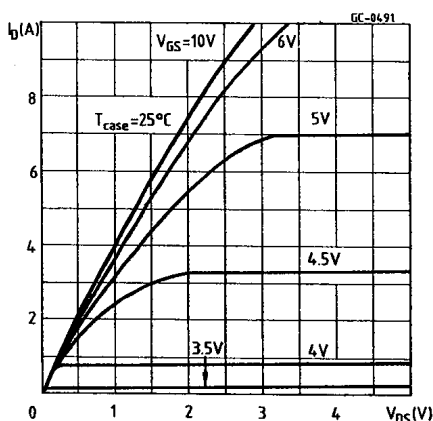
Thermal impedance



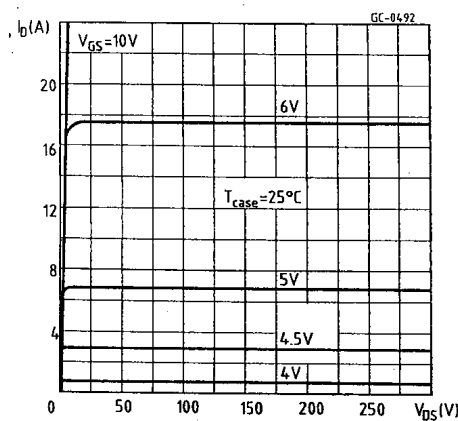
Derating curve



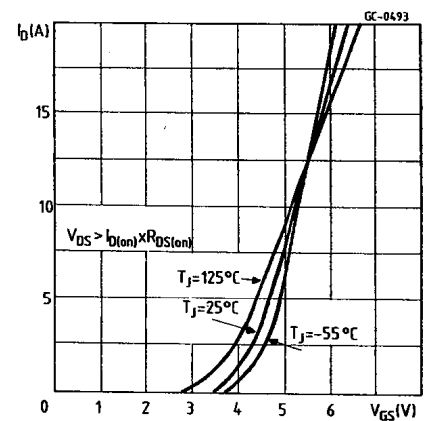
Output characteristics



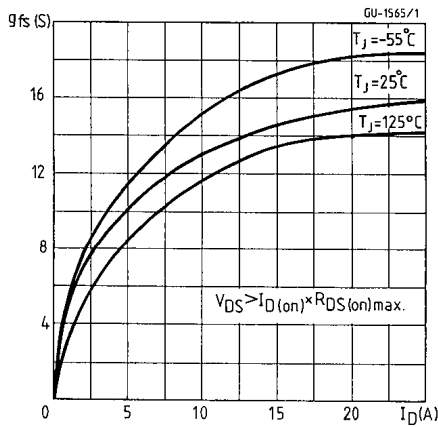
Output characteristics



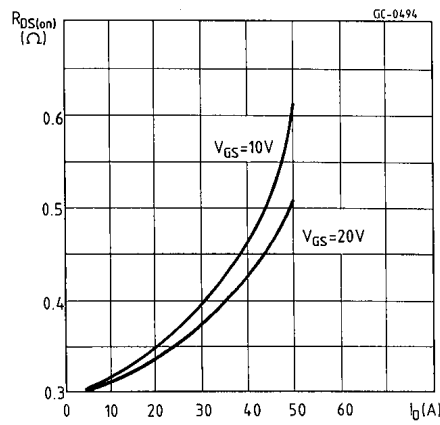
Transfer characteristics



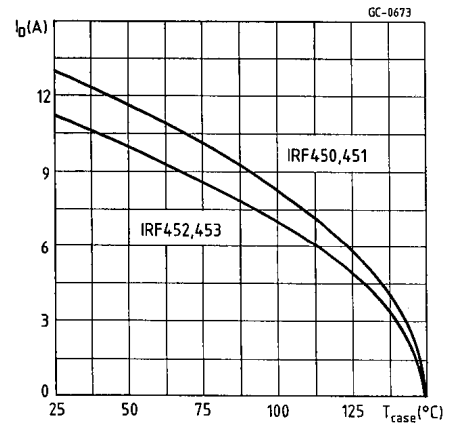
Transconductance



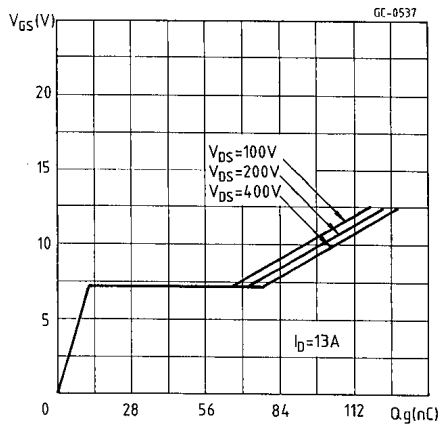
Static drain-source on resistance



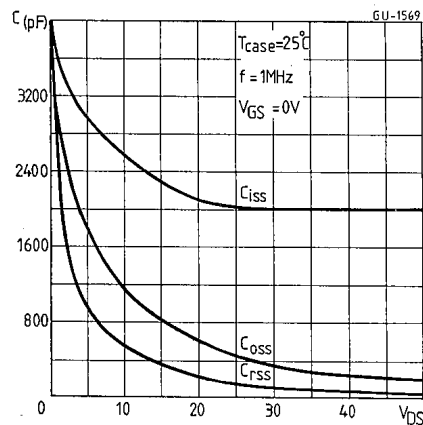
Maximum drain current vs temperature



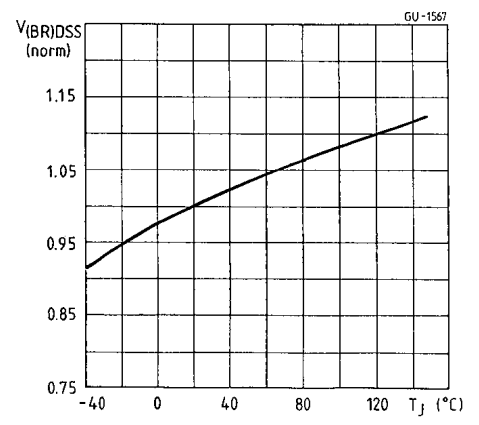
Gate charge vs gate-source voltage



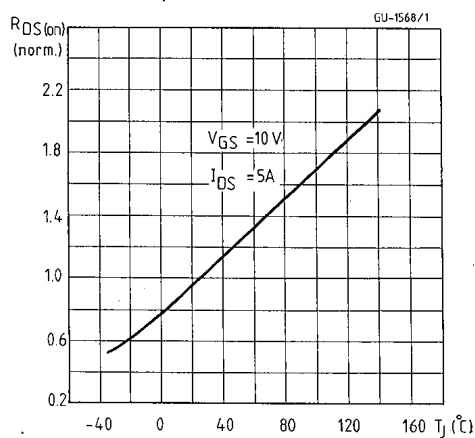
Capacitance variation



Normalized breakdown voltage vs temperature



Normalized on resistance vs temperature



Source-drain diode forward characteristics

