SGS-THOMSON MICROELECTRONICS

IRF 450 - 451
IRF 452 - 453

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

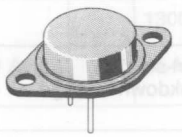
TYPE	V_{DSS}	$R_{DS(on)}$	I_D
IRF450	500 V	0.4 Ω	13 A
IRF451	450 V	0.4 Ω	13 A
IRF452	500 V	0.5 Ω	11 A
IRF453	450 V	0.5 Ω	11 A

- 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:

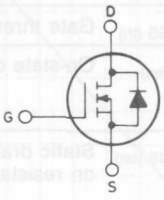
- SWITCHING POWER SUPPLIES
- MOTOR CONTROLS

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	IRF 451	IRF 452	IRF 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

$R_{thj\text{ - }case}$	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)

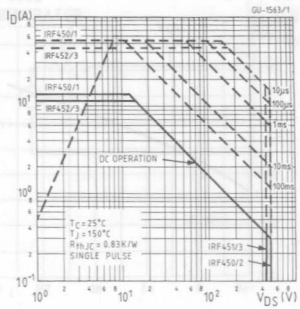
Parameters		Test Conditions	Min.	Typ.	Max.	Unit
OFF						
$V_{(BR)\ DSS}$	Drain-source breakdown voltage	I_D = 250 μA V_{GS} = 0 for **IRF450/IRF452** for **IRF451/IRF453**	 500 450			 V V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating x 0.8 T_c = 125°C			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 **IRF450/IRF451** for **IRF452/IRF453**	 13 11			 A A
$R_{DS\ (on)}$	Static drain-source on resistance	V_{GS} = 10 V I_D = 7.2 A for **IRF450/IRF451** for **IRF452/IRF453**			 0.4 0.5	 Ω Ω
DYNAMIC						
g_{fs} **	Forward transconductance	V_{DS} > $I_{D\ (on)}$ × $R_{DS\ (on)\ max}$ I_D = 7.2 A	8.7			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 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 V I_D = 7.0 A R_i = 4.7 Ω (see test circuit)			35 50 150 70	ns ns ns ns
Q_g	Total Gate Charge	V_{GS} = 10 V I_D = 13 A V_{DS} = Max Rating × 0.8 (see test circuit)			120	nC

ELECTRICAL CHARACTERISTICS (Continued)

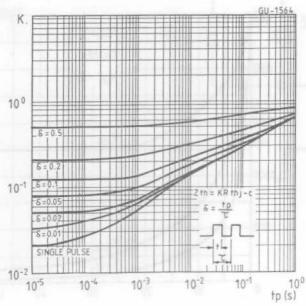
Parameters		Test Conditions		Min.	Typ.	Max.	Unit
SOURCE DRAIN DIODE							
I_{SD}	Source-drain current					13	A
I_{SDM} (•)	Source-drain current (pulsed)					52	A
V_{SD} **	Forward on voltage	I_{SD} = 13 A	V_{GS} = 0			1.4	V
t_{rr}	Reverse recovery time	T_j = 150°C			1300		ns
Q_{rr}	Reverse recovered charge	I_{SD} = 13 A	di/dt = 100 A/µs		7.4		µC

** Pulsed: Pulse duration ⩽ 300 µs, duty cycle ⩽ 1.5%
(•) Repetitive Rating: Pulse width limited by max junction temperature

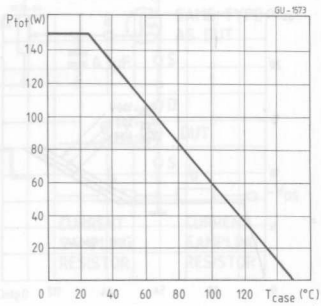
Safe operating areas



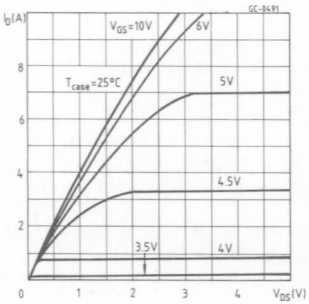
Thermal impedance



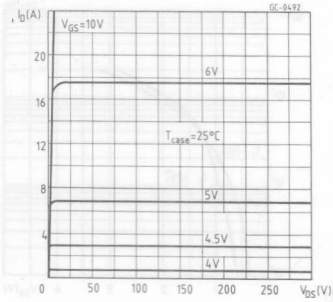
Derating curve



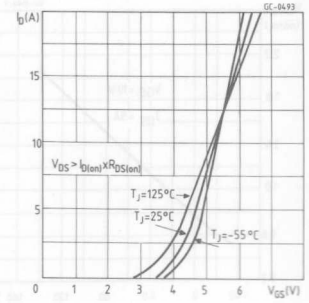
Output characteristics



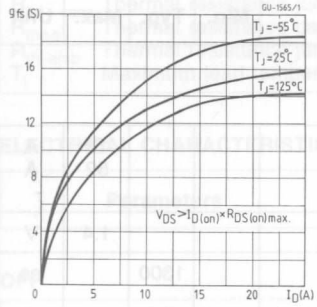
Output characteristics



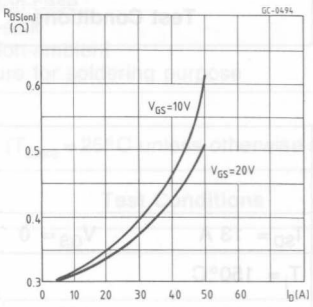
Transfer characteristics



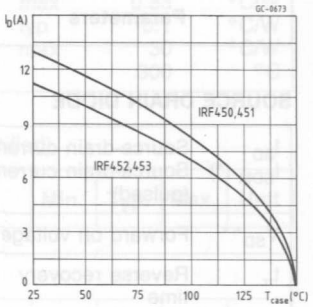
Transconductance



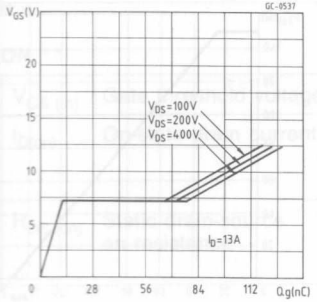
Static drain-source on resistance



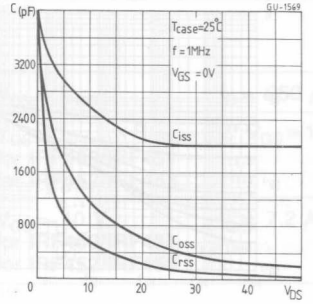
Maximum drain current vs temperature



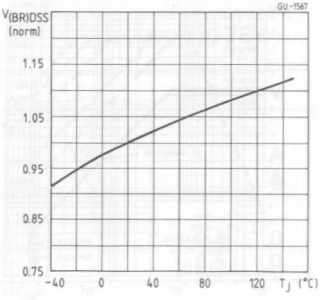
Gate charge vs gate-source voltage



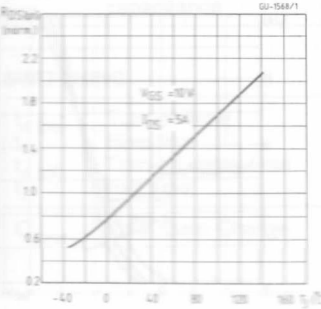
Capacitance variation



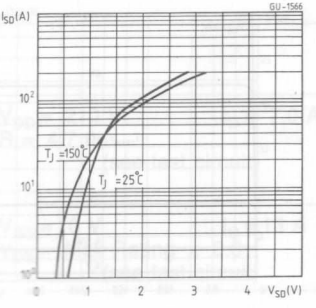
Normalized breakdown voltage vs temperature



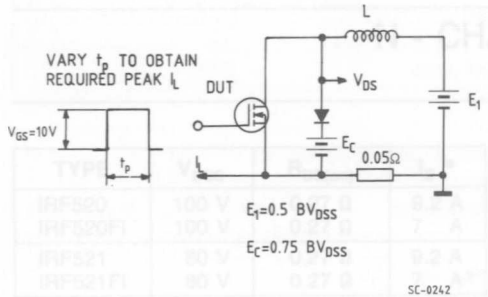
Normalized on resistance vs temperature



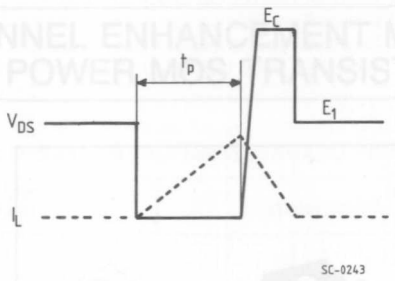
Source-drain diode forward characteristics



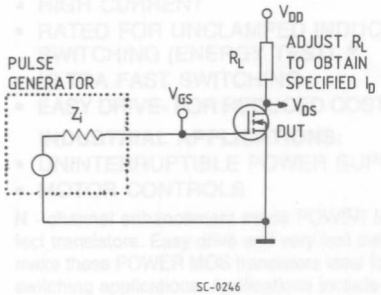
Clamped inductive test circuit



Clamped inductive waveforms



Switching times test circuit



Gate charge test circuit