SGS-THOMSON MICROELECTRONICS

IRF 140 - 141
IRF 142 - 143

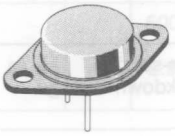
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
IRF140	100 V	0.077 Ω	28 A
IRF141	80 V	0.077 Ω	28 A
IRF142	100 V	0.100 Ω	25 A
IRF143	80 V	0.100 Ω	25 A

- 80-100 VOLTS - FOR DC/DC CONVERTERS
- HIGH CURRENT
- ULTRA FAST SWITCHING
- EASY DRIVE- FOR REDUCED COST AND SIZE

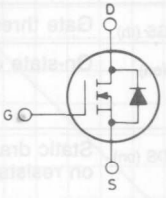
INDUSTRIAL APPLICATIONS:

- UINTERRUPTIBLE POWER SUPPLIES
- MOTOR CONTROLS



TO-3

INTERNAL SCHEMATIC DIAGRAM



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.

ABSOLUTE MAXIMUM RATINGS

		IRF 140	IRF 141	IRF 142	IRF 143	
V_{DS} *	Drain-source voltage ($V_{GS}=0$)	100	80	100	80	V
V_{DGR} *	Drain-gate voltage ($R_{GS}=20$ KΩ)	100	80	100	80	V
V_{GS}	Gate-source voltage	±20				V
I_D	Drain current (cont.) at $T_c=25°C$	28	28	25	25	A
I_D	Drain current (cont.) at $T_c=100°C$	20	20	17	17	A
I_{DM}(•)	Drain current (pulsed)	110	110	100	100	A
I_{DLM}	Drain inductive current, clamped (L= 100 μH)	110	110	100	100	A
P_{tot}	Total dissipation at $T_c<25°C$	125				W
	Derating factor	1				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	1	°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)

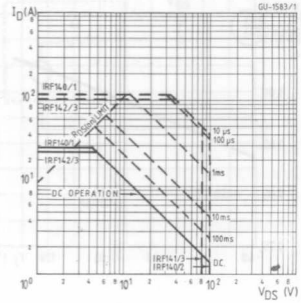
Parameters		Test Conditions	Min.	Typ.	Max.	Unit
OFF						
$V_{(BR)\ DSS}$	Drain-source breakdown voltage	I_D = 250 μA V_{GS} = 0 for **IRF140/IRF142** for **IRF141/IRF143**	100 80			V V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating x 0.8 T_c = 125°C			250 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} > $I_{D\ (on)}$ x $R_{DS(on)\ max}$ V_{GS} = 10 V for **IRF140/IRF141** for **IRF142/IRF143**	 28 25			 A A
$R_{DS\ (on)}$	Static drain-source on resistance	V_{GS} = 10 V I_D = 17 A for **IRF140/IRF141** for **IRF142/IRF143**			0.077 0.100	Ω Ω
DYNAMIC						
g_{fs} **	Forward transconductance	V_{DS} > $I_{D\ (on)}$ x $R_{DS\ (on)\ max}$ I_D = 17 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			1600 800 300	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} = 30 V I_D = 15 A R_i = 4.7 Ω (see test circuit)			30 60 80 30	ns ns ns ns
Q_g	Total gate charge	V_{GS} = 10 V I_D = 28 A V_{DS} = Max Rating x 0.8 (see test circuit)			59	nC

ELECTRICAL CHARACTERISTICS (Continued)

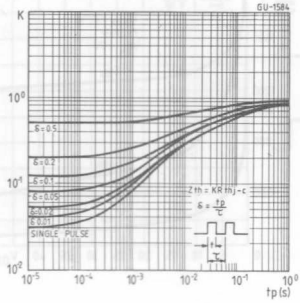
Parameters	Test Conditions	Min.	Typ.	Max.	Unit
SOURCE DRAIN DIODE					
I_{SD} Source-drain current I_{SDM} (•) Source-drain current (pulsed)				28 110	A A
V_{SD} ** Forward on voltage	I_{SD} = 28 A V_{GS} = 0			2.5	V
t_{rr} Reverse recovery time	T_j = 150°C		500		ns
Q_{rr} Reverse recovered charge	I_{SD} = 28 A di/dt = 100 A/µs		2.9		µC

** Pulsed: Pulse duration ⩽ 300 µs, duty cycle ⩽ 2%
(•) Repetitive Rating: Pulse width limited by max junction temperature

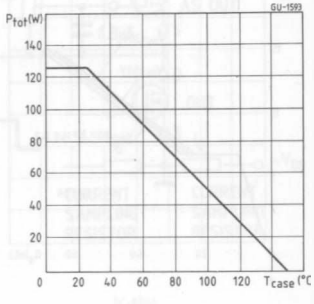
Safe operating areas



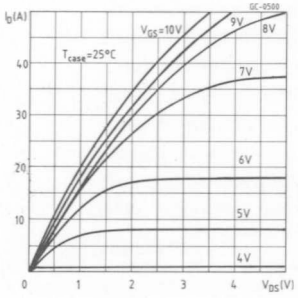
Thermal impedance



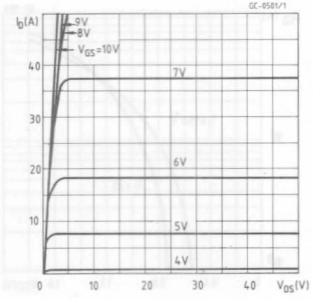
Derating curve



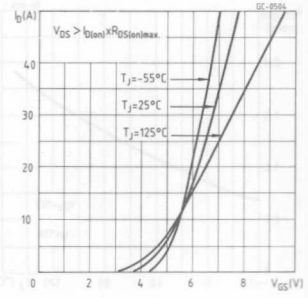
Output characteristics



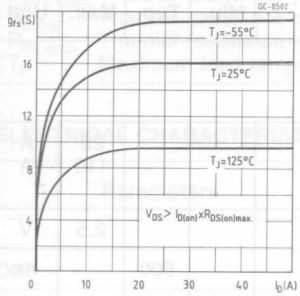
Output characteristics



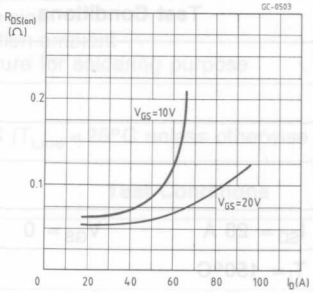
Transfer characteristics



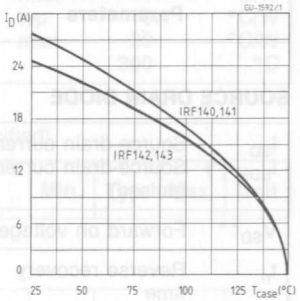
Transconductance



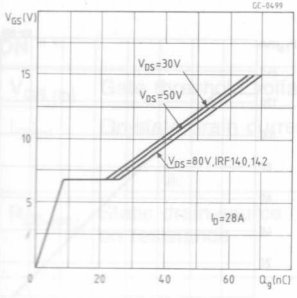
Static drain-source on resistance



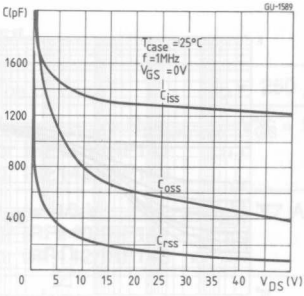
Maximum drain current vs temperature



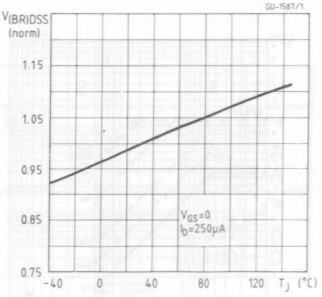
Gate charge vs gate-source voltage



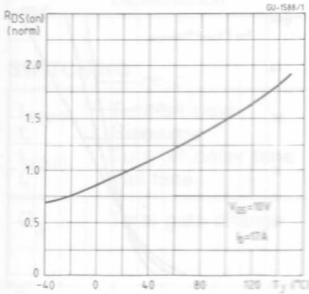
Capacitance variation



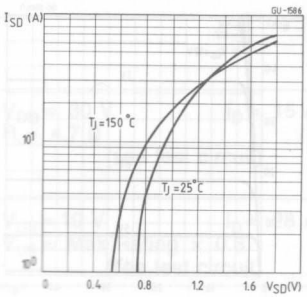
Normalized breakdown voltage vs temperature



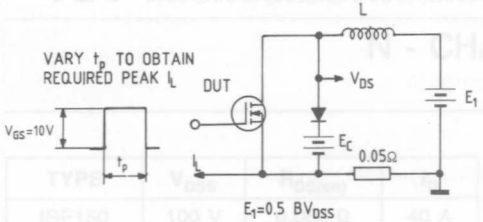
Normalized on resistance vs temperature



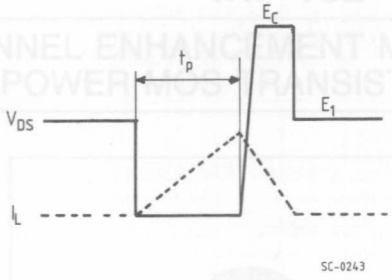
Source-drain diode forward characteristics



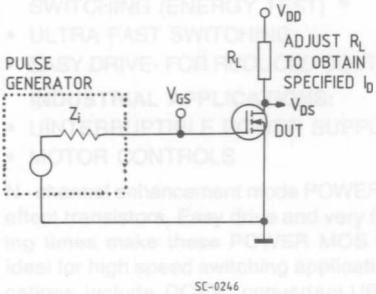
Clamped inductive test circuit



Clamped inductive waveforms



Switching times test circuit



Gate charge test circuit