

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

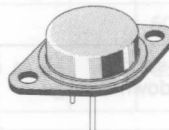
TYPE	V _{DSS}	R _{DS(on)}	I _D
IRF140	100 V	0.077 Ω	28 A
IRF141	80 V	0.077 Ω	28 A
IRF142	100 V	0.100 Ω	25 A
IRF143	80 V	0.100 Ω	25 A

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

INDUSTRIAL APPLICATIONS:

- 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			
		140	141	142	143
V _{DS} *	Drain-source voltage (V _{GS} = 0)	100	80	100	80
V _{DGR} *	Drain-gate voltage (R _{GS} = 20 KΩ)	100	80	100	80
V _{GS}	Gate-source voltage			±20	
I _D	Drain current (cont.) at T _c = 25°C	28	28	25	25
I _D	Drain current (cont.) at T _c = 100°C	20	20	17	17
I _{DM} (*)	Drain current (pulsed)	110	110	100	100
I _{DLM}	Drain inductive current, clamped (L = 100 μH)	110	110	100	100
P _{tot}	Total dissipation at T _c < 25°C			125	
	Derating factor			1	
T _{stg}	Storage temperature		-55 to 150		
T _j	Max. operating junction temperature		150		

* 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	1	°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 IRF140/IRF142 for IRF141/IRF143	$V_{GS} = 0$	100 80	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 IRF140/IRF141 for IRF142/IRF143	$V_{GS} = 10 \text{ V}$	28 25		A A
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10 \text{ V}$ for IRF140/IRF141 for IRF142/IRF143	$I_D = 17 \text{ A}$		0.077 0.100	Ω Ω

DYNAMIC

g_{fs}^{**}	Forward transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on) \text{ max}}$ $I_D = 17 \text{ A}$	8.7			mho
C_{iss}	Input capacitance	$V_{DS} = 25 \text{ V}$ $V_{GS} = 0$			1600	pF
C_{oss}	Output capacitance	$f = 1 \text{ MHz}$			800	pF
C_{rss}	Reverse transfer capacitance				300	pF

SWITCHING

$t_{d(on)}$	Turn-on time	$V_{DD} = 30 \text{ V}$ $R_l = 4.7 \Omega$	$I_D = 15 \text{ A}$	30 60	ns ns
t_r	Rise time	(see test circuit)		80	ns
$t_{d(off)}$	Turn-off delay time			30	ns
t_f	Fall time				
Q_g	Total gate charge	$V_{GS} = 10 \text{ V}$ $V_{DS} = \text{Max Rating} \times 0.8$ (see test circuit)	$I_D = 28 \text{ A}$	59	nC

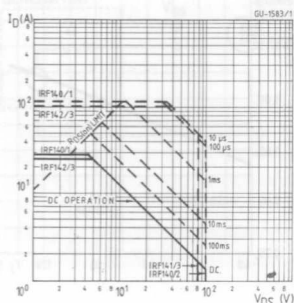
ELECTRICAL CHARACTERISTICS (Continued)

Parameters	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} Source-drain current				28	A
$I_{SDM}^{(*)}$ Source-drain current (pulsed)				110	A
V_{SD}^{**} Forward on voltage	$I_{SD} = 28\text{ A}$ $V_{GS} = 0$			2.5	V
t_{rr} Reverse recovery time	$T_J = 150^\circ\text{C}$		500		ns
Q_{rr} Reverse recovered charge	$I_{SD} = 28\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$		2.9		μC

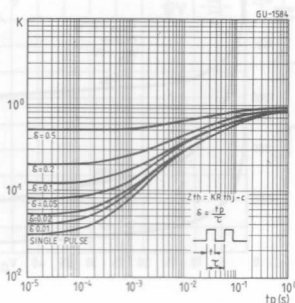
** Pulsed: Pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

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

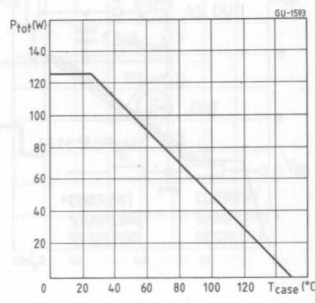
Safe operating areas



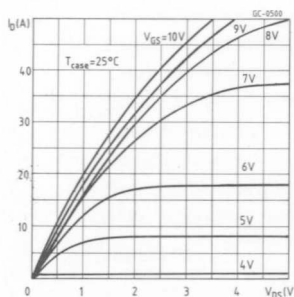
Thermal impedance



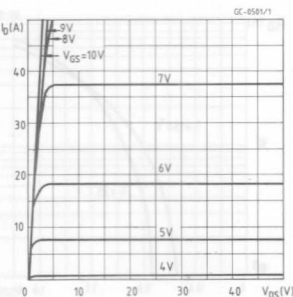
Derating curve



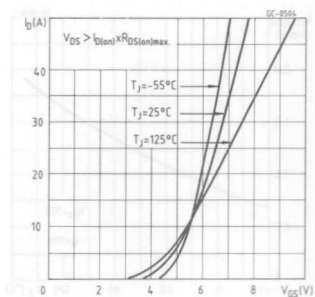
Output characteristics



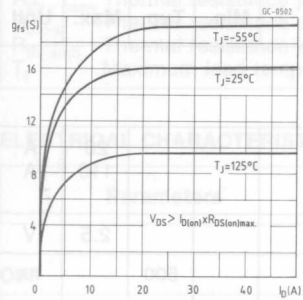
Output characteristics



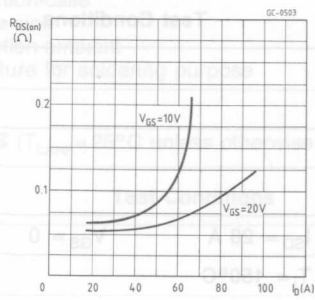
Transfer characteristics



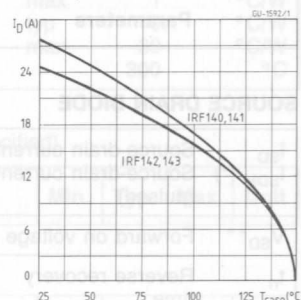
Transconductance



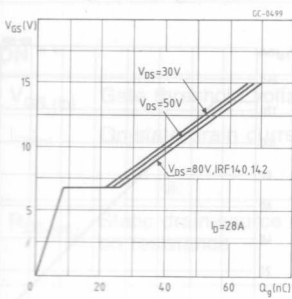
Static drain-source on resistance



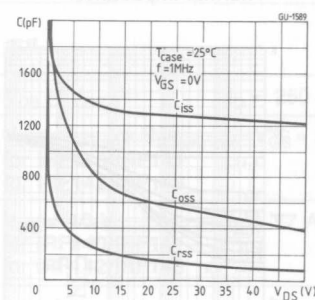
Maximum drain current vs temperature



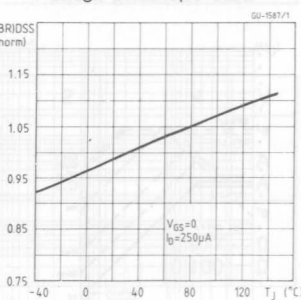
Gate charge vs gate-source voltage



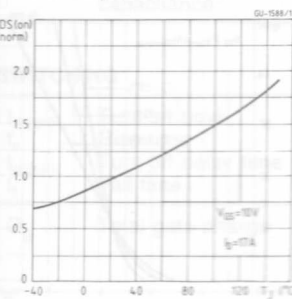
Capacitance variation



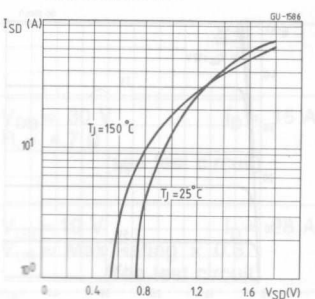
Normalized breakdown voltage vs temperature



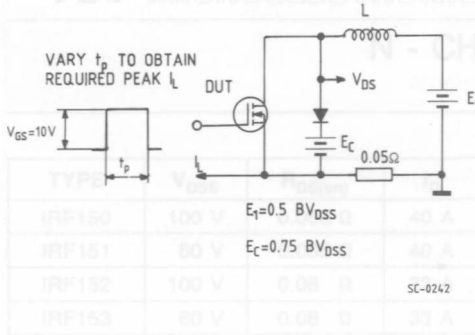
Normalized on resistance vs temperature



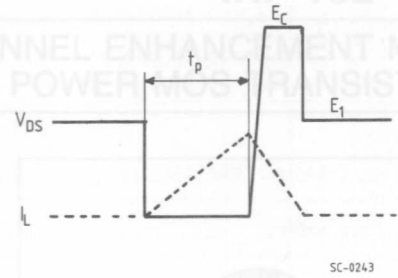
Source-drain diode forward characteristics



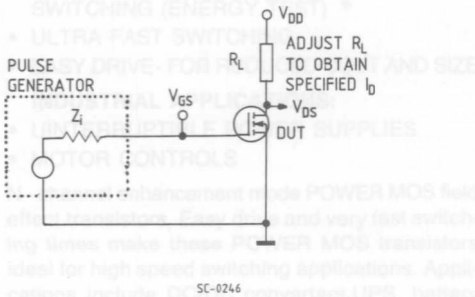
Clamped inductive test circuit



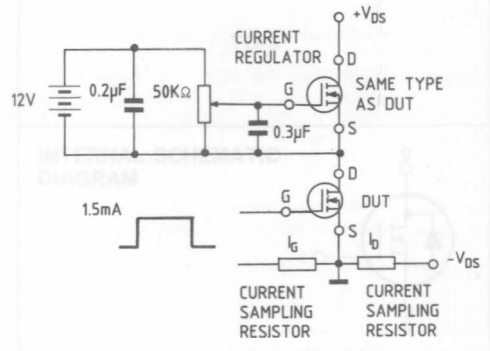
Clamped inductive waveforms



Switching times test circuit



Gate charge test circuit



ABSOLUTE MAXIMUM RATINGS

V_{DS}	Drain-source voltage ($I_{DSS} = 0$)
V_{DSR}	Drain-gate voltage ($R_{DS(on)} = 75 K\Omega$)
V_{GS}	Gate-source voltage
I_D	Drain current (cont.) at $T_J = 25^\circ C$
I_D	Drain current (puls.) at $T_J = 100^\circ C$
I_{DSM}	Drain current (puls.)
P_{tot}	Total dissipation at $T_J < 25^\circ C$
λ	Dwelling factor
T_{stg}	Storage temperature
T_J	Max. operating junction temperature

* $T_J = 25^\circ C$ to $125^\circ C$

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

* Introduced in 1995 week 44

	140	151	152	153
V_{DS}	100	80	100	80
V_{DSR}	100	80	100	80
V_{GS}			± 20	
I_D	40	40	33	33
I_D	25	25	20	20
I_{DSM}	160	160	132	132
P_{tot}		150		
λ		1.2		
T_{stg}		-55 to 150		
T_J		150		