

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

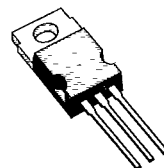
TYPE	V _{DSS}	R _{DS(on)}	I _D
IRFZ40	50 V	0.028 Ω	35 A
IRFZ42	50 V	0.035 Ω	35 A

- VERY LOW R_{DS(on)}
- LOW DRIVE ENERGY FOR EASY DRIVE
- HIGH TRANSCONDUCTANCE /C_{rss} RATIO

INDUSTRIAL APPLICATIONS:

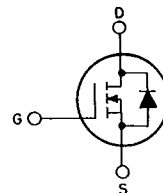
- AUTOMOTIVE POWER ACTUATORS
- MOTOR CONTROLS
- INVERTERS

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 circuits applications such as power actuators driving, motor drive including brushless motor, hydraulic actuators and many other in automotive and automatic guided vehicle applications. They also find use DC/DC converters and uninterruptible power supplies



TO-220

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

	IRFZ40	IRFZ42	
V _{DS} *	50		V
V _{DGR} *	50		V
V _{GS}	±20		V
I _D	35	35	A
I _D	32	29	A
I _{DM} (*)	160	145	A
I _{DLM}	160	145	A
P _{tot}	125		W
	1.2		W/°C
T _{stg}	-55 to 150		°C
T _j	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	1.0	°C/W
R_{thc-s}	Thermal resistance case-sink	typ	0.5	°C/W
$R_{thj-amb}$	Thermal resistance junction-ambient	max	80	°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
------------	-----------------	------	------	------	------

OFF

$V_{(BR) DSS}$	Drain-source breakdown voltage	$I_D = 250 \mu\text{A}$ $V_{GS} = 0$	50			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 ($V_{DS} = 0$)	$V_{GS} = \pm 20 \text{ V}$			± 500	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	$V_{DS} > I_{D(on)} \times R_{DS(on) \text{ max}}$ $V_{GS} = 10 \text{ V}$	35			A
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10 \text{ V}$ for IRFZ40 for IRFZ42 $I_D = 29 \text{ A}$			0.028 0.035	Ω Ω

DYNAMIC

g_{fs}^{**}	Forward transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on) \text{ max}}$ $I_D = 29 \text{ A}$	17			mho
C_{iss}	Input capacitance	$V_{DS} = 25 \text{ V}$ $f = 1 \text{ MHz}$ $V_{GS} = 0$			3000	pF
C_{oss}	Output capacitance				1200	pF
C_{rss}	Reverse transfer capacitance				400	pF

SWITCHING

$t_{d(on)}$	Turn-on time	$V_{DD} = 25 \text{ V}$ $I_D = 29 \text{ A}$ $Z_l = 4.7 \Omega$ (see test circuit)			25	ns
t_r	Rise time				60	ns
$t_{d(off)}$	Turn-off delay time				70	ns
t_f	Fall time				25	ns
Q_g	Total gate charge	$V_{GS} = 10 \text{ V}$ $I_D = 64 \text{ A}$ $V_{DS} = \text{Max Rating} \times 0.8$ (see test circuit)			60	nC

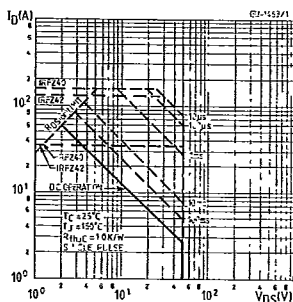
ELECTRICAL CHARACTERISTICS (Continued)

Parameters	Test Conditions	Min.	Typ.	Max.	Unit
T-39-13					
I_{SD} Source-drain current	for IRFZ40 for IRFZ42			35	A
$I_{SDM}^{(*)}$ Source-drain current (pulsed)				160 145	A A
V_{SD}^{**} Forward on voltage	$V_{GS} = 0$ for IRFZ40 for IRFZ42			2.5 2.2	V V
t_{rr} Reverse recovery time	$T_J = 150^\circ\text{C}$		350		ns
Q_{rr} Reverse recovered charge	$I_{SD} = 51\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$		2.1		μC

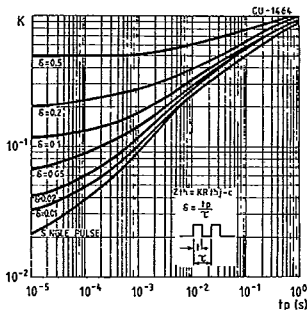
** Pulsed: Pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 1.5\%$

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

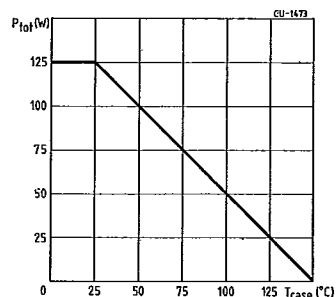
Safe operating areas



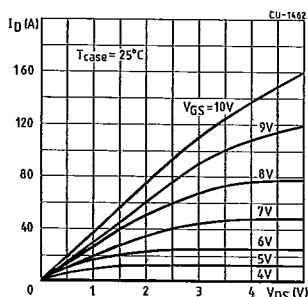
Thermal impedance



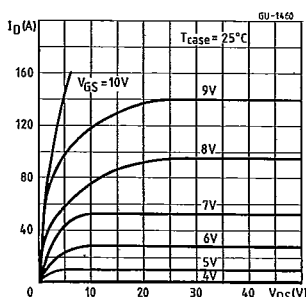
Derating curve



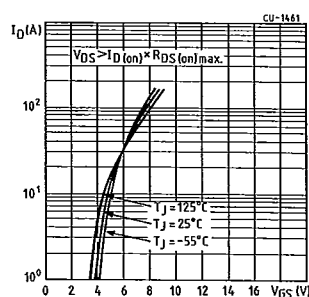
Output characteristics



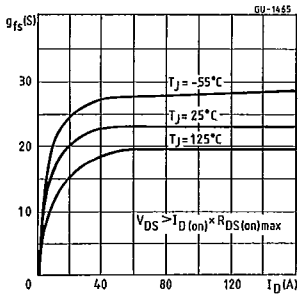
Output characteristics



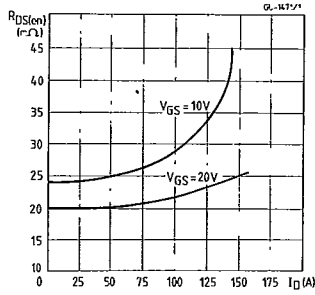
Transfer characteristics



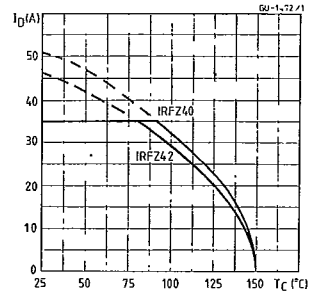
Transconductance



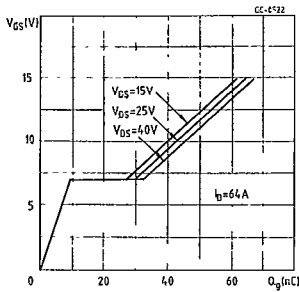
Static drain-source on resistance



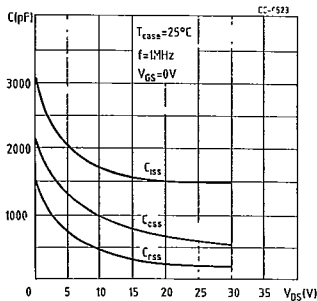
Maximum drain current vs temperature



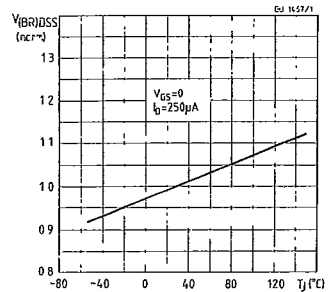
Gate charge vs gate-source voltage



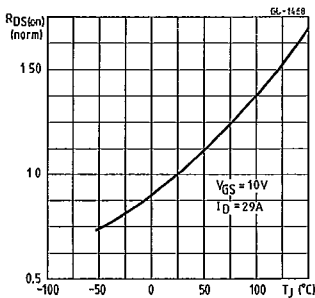
Capacitance variation



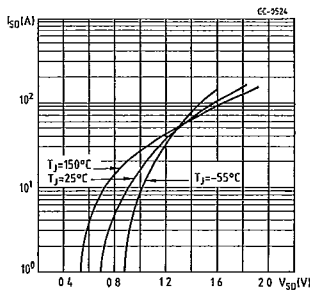
Normalized breakdown voltage vs temperature



Normalized on resistance vs temperature

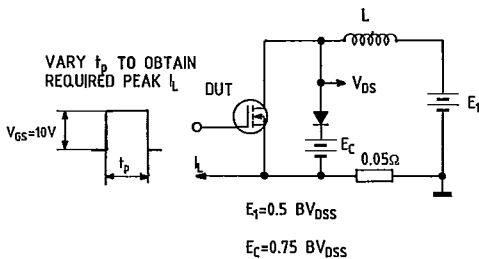


Source-drain diode forward characteristics

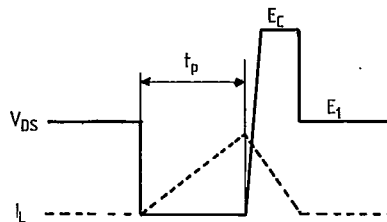


Clamped inductive test circuit

Clamped inductive waveforms



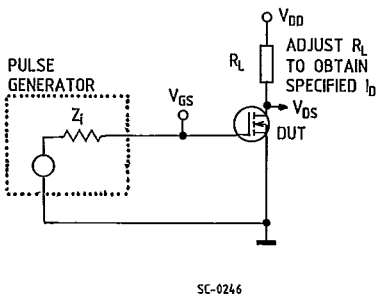
SC-0242



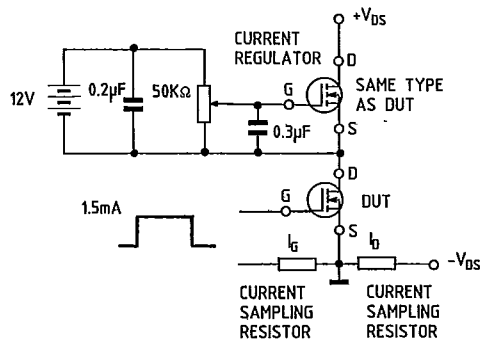
SC-0243

Switching times test circuit

Gate charge test circuit



SC-0246



SC-0244