SGS-THOMSON MICROELECTRONICS

S G S-THOMSON

IRFZ40
IRFZ42

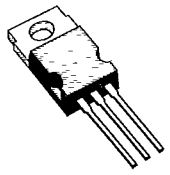
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

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

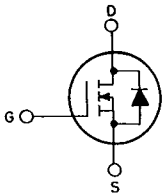
INDUSTRIAL APPLICATIONS:

- AUTOMOTIVE POWER ACTUATORS
- MOTOR CONTROLS
- INVERTERS



TO-220

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 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

ABSOLUTE MAXIMUM RATINGS		IRFZ40	IRFZ42	
V_{DS} *	Drain-source voltage (V_{GS} = 0)	50		V
V_{DGR} *	Drain-gate voltage (R_{GS} = 20 KΩ)	50		V
V_{GS}	Gate-source voltage	±20		V
I_D	Drain current (cont.) at T_c = 25°C	35	35	A
I_D	Drain current (cont.) at T_c = 100°C	32	29	A
I_{DM}(•)	Drain current (pulsed)	160	145	A
I_{DLM}	Drain inductive current, clamped (L = 100 μH)	160	145	A
P_{tot}	Total dissipation at T_c < 25°C	125		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	1.0	°C/W
$R_{thc\text{-}s}$	Thermal resistance case-sink	typ	0.5	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	max	80	°C/W
T_l	Maximum lead temperature for soldering purpose		300	°C

ELECTRICAL CHARACTERISTICS (T_{case} = 25°C unless otherwise specified)

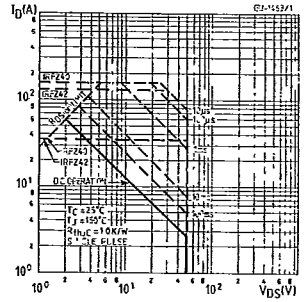
Parameters		Test Conditions	Min.	Typ.	Max.	Unit
OFF						
$V_{(BR)\ DSS}$	Drain-source breakdown voltage	I_D = 250 μA V_{GS} = 0	50			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating x 0.8 T_c = 125°C			250 1000	μA μA
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ±20 V			±500	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	35			A
$R_{DS\ (on)}$	Static drain-source on resistance	V_{GS} = 10 V I_D = 29 A for **IRFZ40** for **IRFZ42**			 0.028 0.035	 Ω Ω
DYNAMIC						
g_{fs} **	Forward transconductance	V_{DS} > $I_{D\ (on)}$ × $R_{DS\ (on)\ max}$ I_D = 29 A	17			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 1200 400	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} = 25 V I_D = 29 A Z_i = 4.7 Ω (see test circuit)			25 60 70 25	ns ns ns ns
Q_g	Total gate charge	V_{GS} = 10 V I_D = 64 A V_{DS} = Max Rating × 0.8 (see test circuit)			60	nC

ELECTRICAL CHARACTERISTICS (Continued)

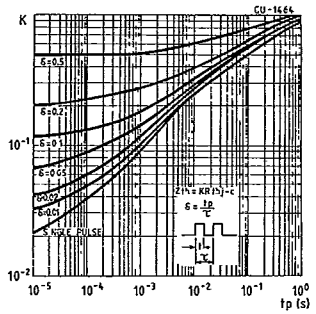
Parameters	Test Conditions	Min.	Typ.	Max.	Unit
				T-39-13	
SOURCE DRAIN DIODE					
I_{SD} Source-drain current I_{SDM} (•) Source-drain current (pulsed)	for **IRFZ40** for **IRFZ42**			35 160 145	A A A
V_{SD} ** Forward on voltage	V_{GS} = 0 for **IRFZ40** I_{SD} = 51 A for **IRFZ42** I_{SD} = 46 A			2.5 2.2	V V
t_{rr} Reverse recovery time Q_{rr} Reverse recovered charge	T_j = 150°C I_{SD} = 51 A di/dt = 100 A/μs		350 2.1		ns μC

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

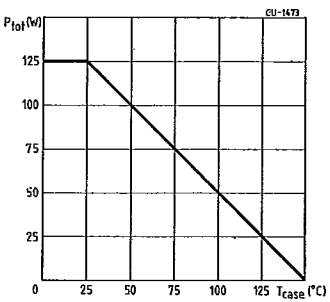
Safe operating areas



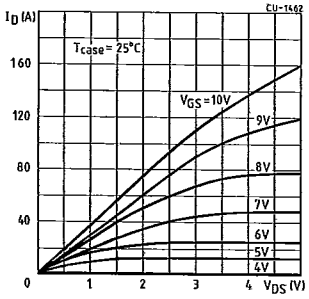
Thermal impedance



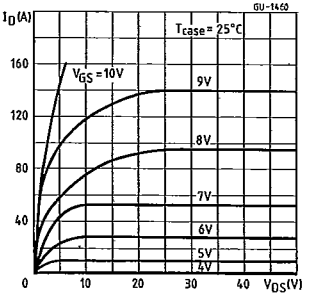
Derating curve



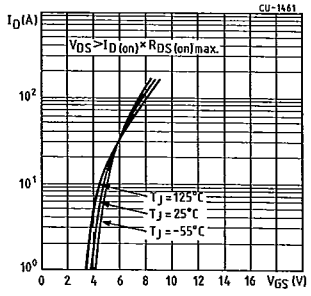
Output characteristics



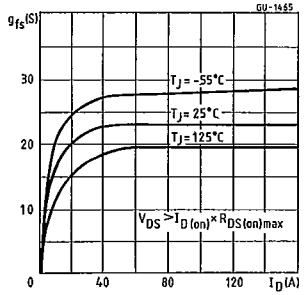
Output characteristics



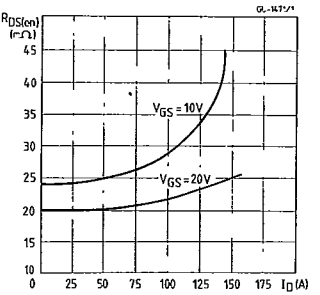
Transfer characteristics



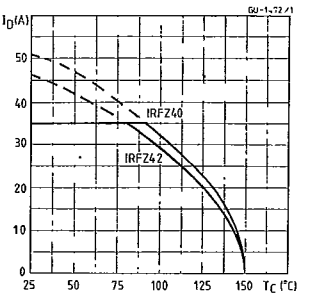
Transconductance



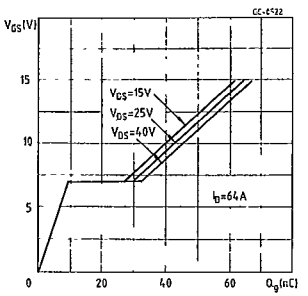
Static drain-source on resistance



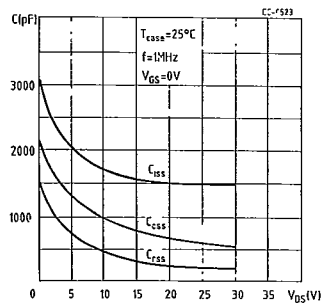
Maximum drain current vs temperature



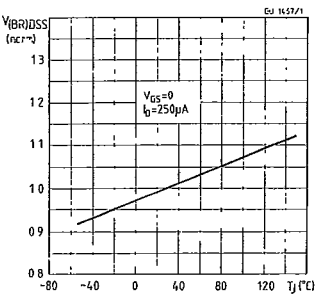
Gate charge vs gate-source voltage



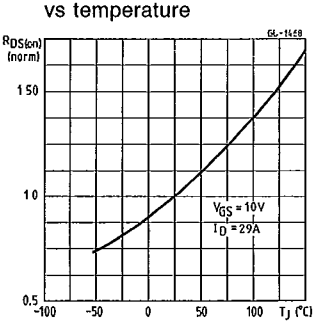
Capacitance variation



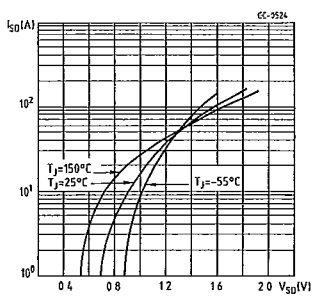
Normalized breakdown voltage vs temperature



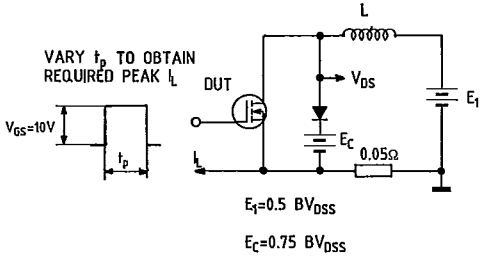
Normalized on resistance vs temperature



Source-drain diode forward characteristics



Clamped inductive test circuit



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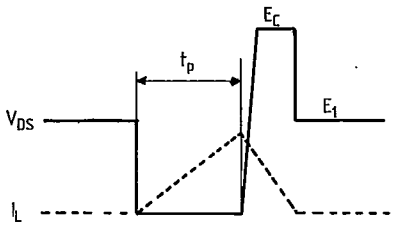
Clamped inductive waveforms



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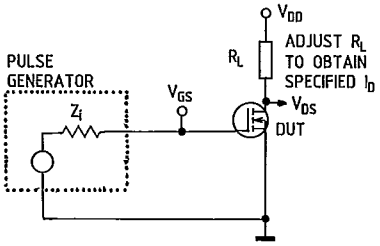
Switching times test circuit



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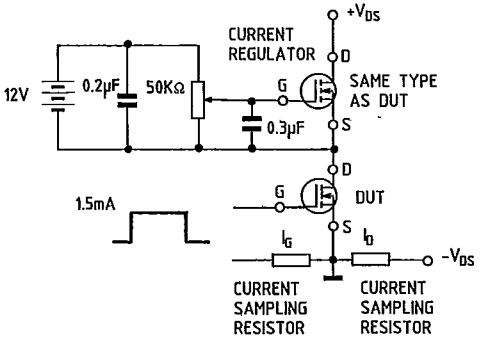
Gate charge test circuit



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