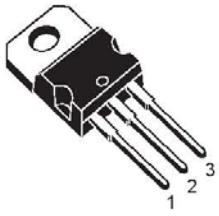
IRF830

N-Channel 500V-1.35 Ω - 4.5A – TO-220 PowerMESH™ MOSFET

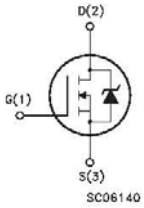
TYPE	V_{DSS}	$R_{DS(on)}$	I_D
IRF830	500V	<1.5 Ω	4.5A

- Typical RDS(on)=1.35 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERYLOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED

TO-220



INTERNAL SCHEMATIC DIAGRAM



DESCRIPTION

This power MOSFET is designed using the company's consolidated strip layout-based MESH OVERLAY TM process. This technology matches and improves the performances compared with standard parts from varous sources.

APPLICATIONS

- High current, high speed switching
- Swith mode power supplies (SMPS)
- DC-AC converters for welding equipment and uninterrup tible power supplies and motot driver

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS}=0)	500	V
V_{DGR}	Drain- gate Voltage (R_{GS}=20k)	500	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current (continuous) at Tc=25°C	4.5	A
I_D	Drain Current (continuous) at Tc=100°C	2.9	A
I_{DM}(•)	Drain Current (pulsed)	18	A
Ptot	Total Dissipation at Tc=25°C	100	W
	Derating Factor	0.8	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	3.5	V/ns
Tstg	Storage Temperature	-65 to 150	°C
Tj	Max. Operating Junction Temperature	150	°C

(•)Pulse width limited by safe operating area (1) I_{SD}≤4.5A, di/dt ≤75A/μs, V_{DD}≤$V_{(BR)DSS}$, T_J≤T_{JMAX}

First Digit of the Datecode Being Z or K Identifies Silicon Characterized in this Datasheet.

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case	Max	1.25	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max	62.5	°C/W
Rthc-sink	Thermal Resistance Case-sink	Typ	0.5	°C/W
Tl	Maximum Lead Temperature For Soldering Purpose		300	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	MAX Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by Tj max)	4.5	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j=25°C, I_D=I_{AR}, V_{DD}=50V)	290	mJ

ELECTRICAL CHARACTERISTICS (Tcase =25°C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D=250µA V_{GS}=0	500			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS})=0	V_{DS}=Max Rating V_{DS}=Max Rating Tc=125°C			1 50	µA µA
I_{GSS}	Gate-body Leakage Current (V_{DS}=0)	V_{GS}=±20V			±100	nA

ON(*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	2	3	4	V
$R_{DS(on)}$	Static Drain-source on Resistance	V_{GS}=10V I_D=2.7A		1.35	1.5	Ω
$I_{D(on)}$	On State Drain Current	V_{DS}>$I_{D(on)}$ x $R_{DS(on)max}$ V_{GS}=10V	4.5			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
gfs(*)	Forward Transconductance	V_{DS}>$I_{D(on)}$ x $R_{DS(on)max}$ I_D=2.7A	2.5			s
Ciss Coss Crss	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS}=25V f=1MHz V_{GS}=0		610 120 10		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
td(on) tr	Turn-on Time Rise Time	V_{DD}=250V I_D=2.9A R_G=4.7 Ω V_{GS}=10V (see test circuit, figure 3)		11.5 8		ns ns
Qg Qgs Qgd	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD}=400V I_D=3A V_{GS}=10V		22 7.2 8	30	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
tr(Voff) tf tc	Off-voltage Rise Time Fall Time Cross-over Time	V_{DD}=400V I_D=4.5A R_G=4.7 Ω V_{GS}=10V (see test circuit, figure 5)		7 5 15		ns ns ns

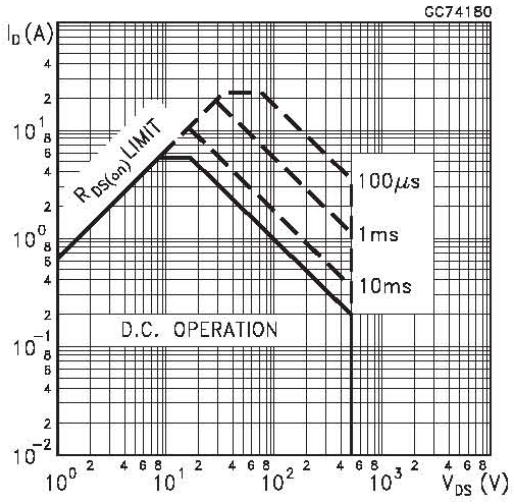
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM(•)}$	Source-drain Current Source-drain Current (pulsed)				4.5 18	A A
$V_{SD(*)}$	Forward On Voltage	I_{SD}=4.5A V_{GS}=0			1.6	V
trr Qrr I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD}=4.5A di/dt =100A/µs V_{DD}=100v Tj=150°C (See test circuit, figure 5)		435 3.3 15		ns µC A

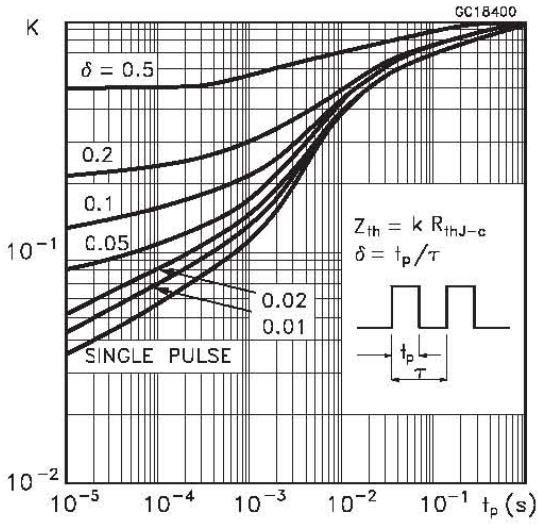
(*) Pulsed: pulse duration=300µs, duty cycle 1.5%

(•) Pulse width limited by safe operating area

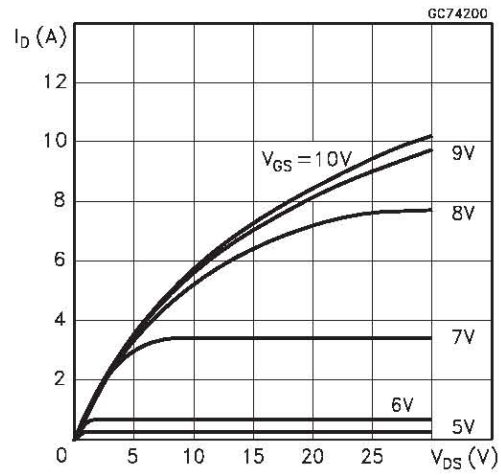
Safe Operating Area



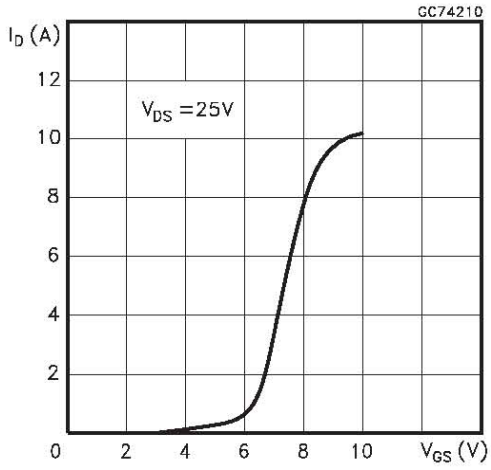
Thermal Impedance



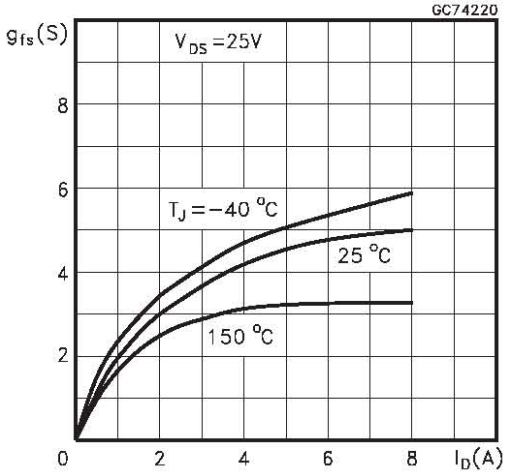
Output Characteristics



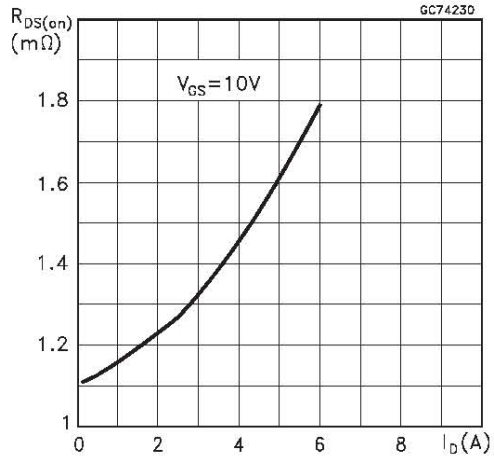
Transfer Characteristics



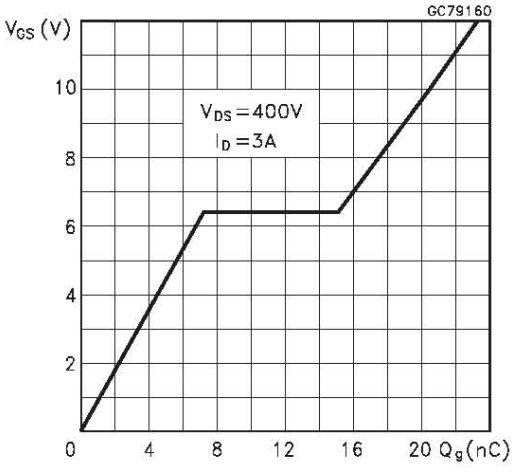
Transconductance



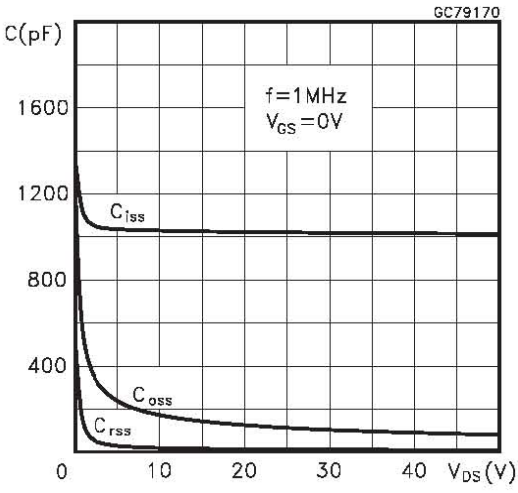
Static Drain-source On Resistance



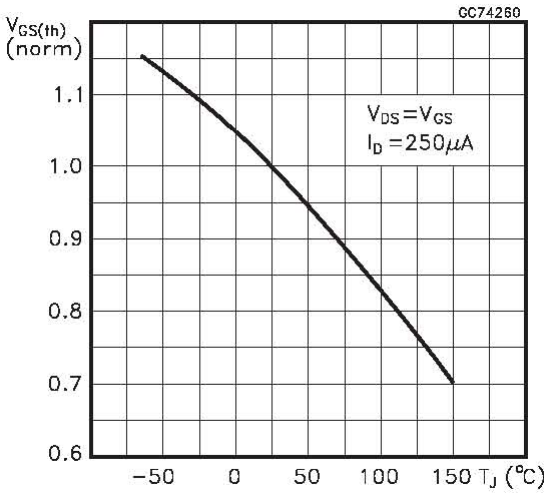
Gate Charge vs Gate-Source Voltage



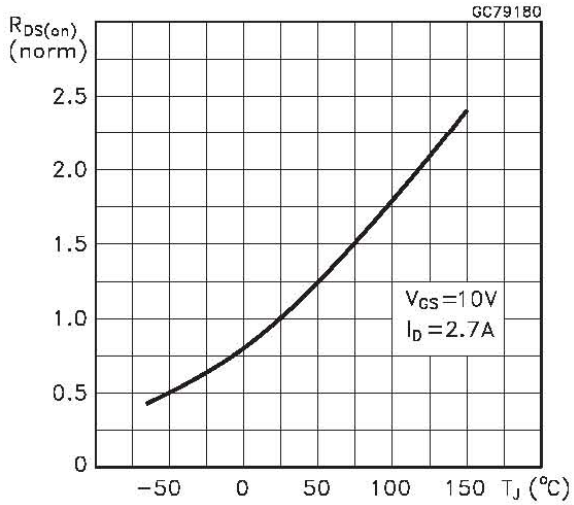
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

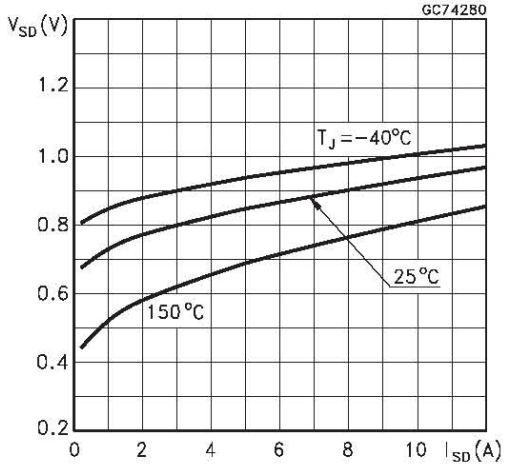


Fig. 1: Unclamped Inductive Load Test Circuit

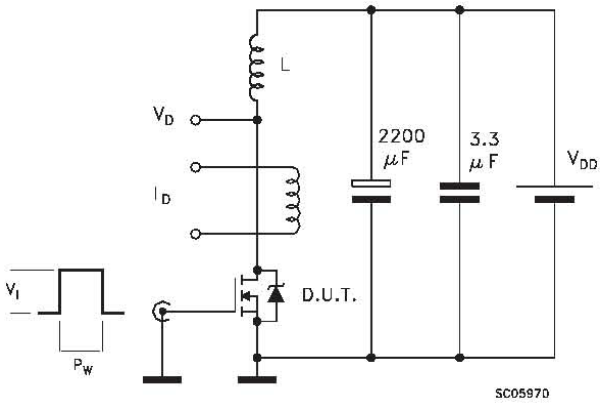


Fig. 1: Unclamped Inductive Waveform

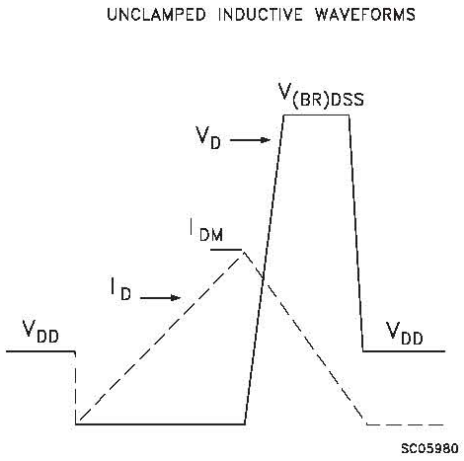


Fig. 3: Switching Times Test Circuit For Resistive Load

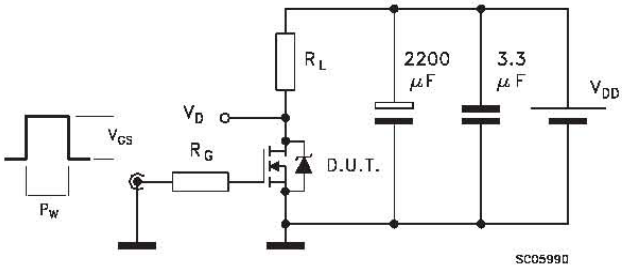


Fig. 4: Gate Charge test Circuit

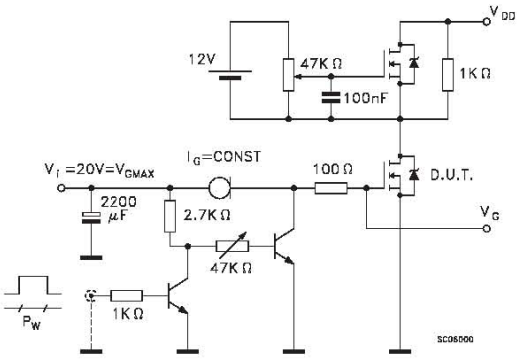
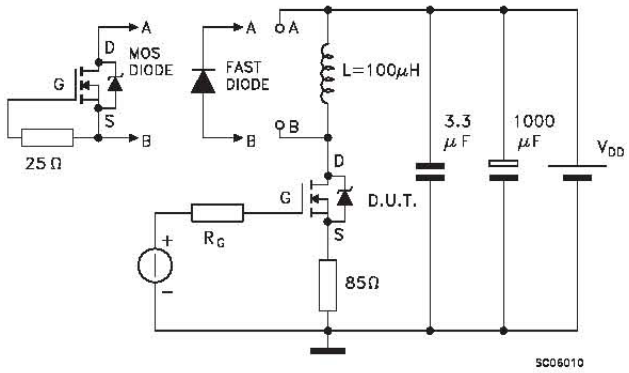


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0137		0.154
DIA.	3.75		3.85	0.147		0.151