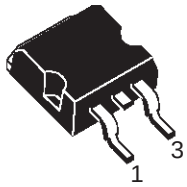
IRF630S

N - CHANNEL 200V - 0.35Ω - 9A - D^2PAK MESH OVERLAY™ MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
IRF630S	200 V	< 0.40 Ω	9 A

- TYPICAL $R_{DS(on)}$ = 0.35 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED
- FOR THROUGH-HOLE VERSION CONTACT SALES OFFICE



D^2PAK
TO-263
(suffix "T4")

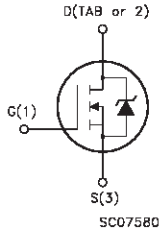
DESCRIPTION

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

APPLICATIONS

- HIGH CURRENT SWITCHING
- UNINTERRUPTIBLE POWER SUPPLY (UPS)
- DC/DC COVERTERS FOR TELECOM, INDUSTRIAL, AND LIGHTING EQUIPMENT.

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	200	V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	200	V
V_{GS}	Gate-source Voltage	± 20	V
I_D	Drain Current (continuous) at T_c = 25 °C	9	A
I_D	Drain Current (continuous) at T_c = 100 °C	5.7	A
I_{DM}(•)	Drain Current (pulsed)	36	A
P_{tot}	Total Dissipation at T_c = 25 °C	70	W
	Derating Factor	0.56	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	5	V/ns
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area

(1) I_{SD} ≤ 9A, di/dt ≤ 300 A/µs, V_{DD} ≤ $V_{(BR)DSS}$, Tj ≤ T_{JMAX}

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.47	$^oC/W$
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	oC/W
$R_{thc\text{-}sink}$	Thermal Resistance Case-sink	Typ	0.5	$^oC/W$
T_l	Maximum Lead Temperature For Soldering Purpose		300	^oC

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	9	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 ^oC, $I_D = I_{AR}$, V_{DD} = 50 V)	100	mJ

ELECTRICAL CHARACTERISTICS (T_{case} = 25 ^oC unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 250 µA V_{GS} = 0	200			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0) V_{DS} = Max Rating V_{DS} = Max Rating T_c = 125 ^oC				1 50	µA µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 30 V			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = 250 µA	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V I_D = 5 A		0.35	0.40	Ω
$I_{D(on)}$	On State Drain Current	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$ V_{GS} = 10 V	10			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$ I_D = 5 A	3	4		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0		540 90 35	700 120 50	pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	V_{DD} = 100 V I_D = 4.5 A R_G = 4.7 Ω V_{GS} = 10 V (see test circuit, figure 3)		10 15	14 20	ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 160 V I_D = 9 A V_{GS} = 10 V		31 7.5 9	45	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	V_{DD} = 160 V I_D = 9 A R_G = 4.7 Ω V_{GS} = 10 V (see test circuit, figure 5)		12 12 25	17 17 35	ns ns ns

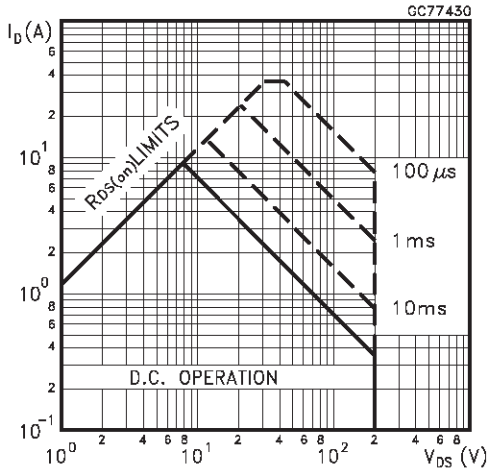
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(•)	Source-drain Current Source-drain Current (pulsed)				9 36	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 9 A V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 9 A di/dt = 100 A/µs V_{DD} = 50 V T_j = 150 °C (see test circuit, figure 5)		170 0.95 11		ns µC A

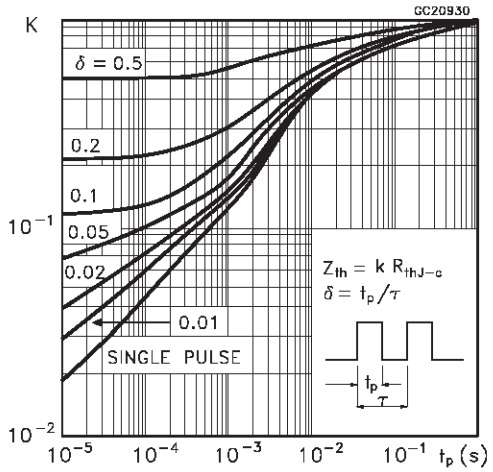
(*) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

(•) Pulse width limited by safe operating area

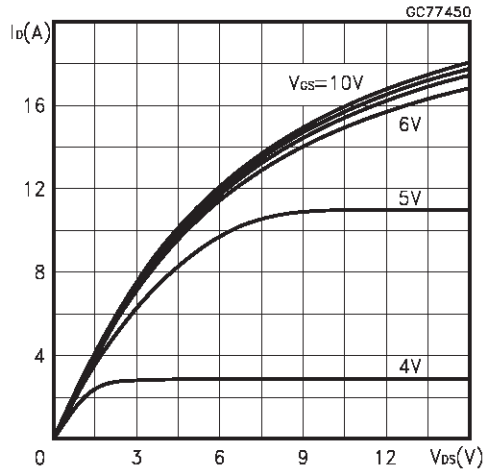
Safe Operating Area



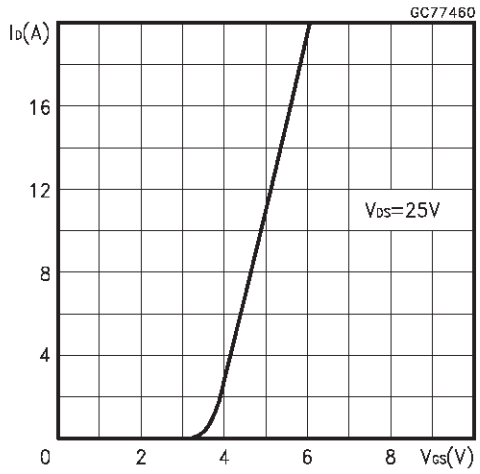
Thermal Impedance



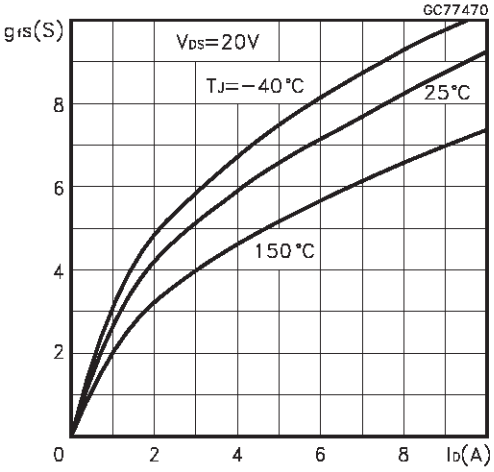
Output Characteristics



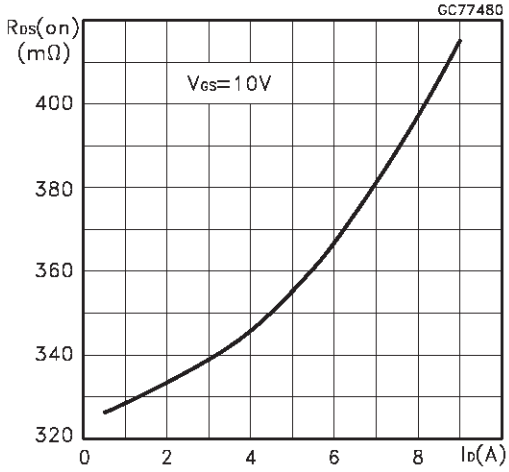
Transfer Characteristics



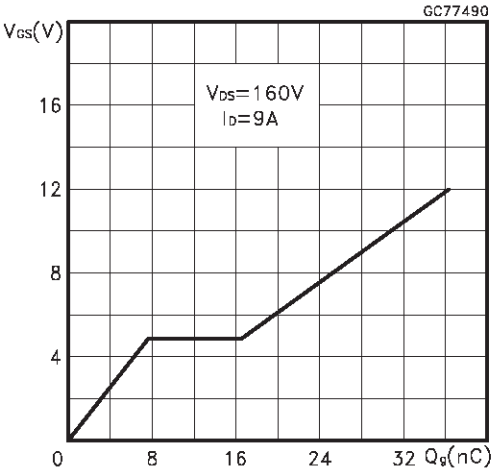
Transconductance



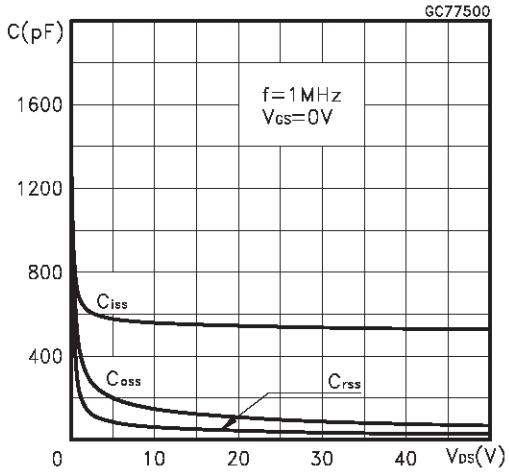
Static Drain-source On Resistance



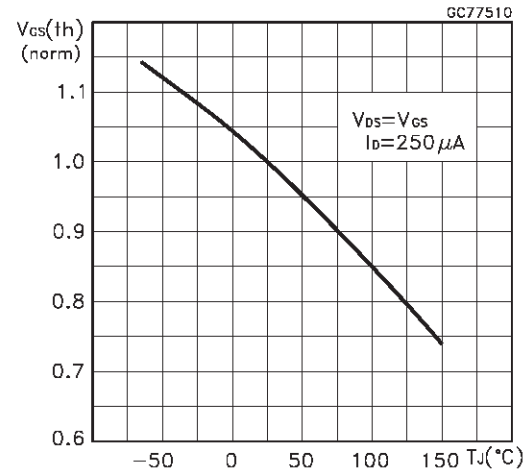
Gate Charge vs Gate-source Voltage



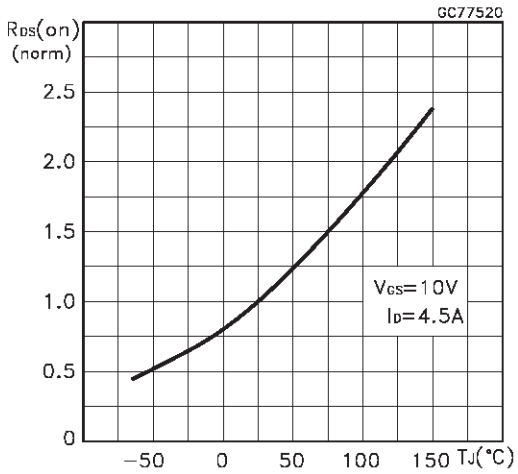
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

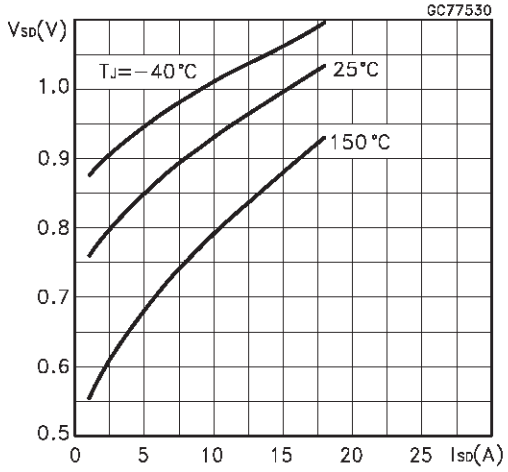


Fig. 1: Unclamped Inductive Load Test Circuit

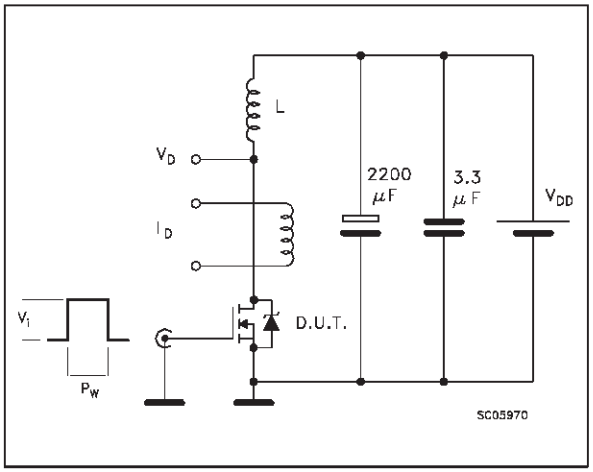


Fig. 1: Unclamped Inductive Waveform

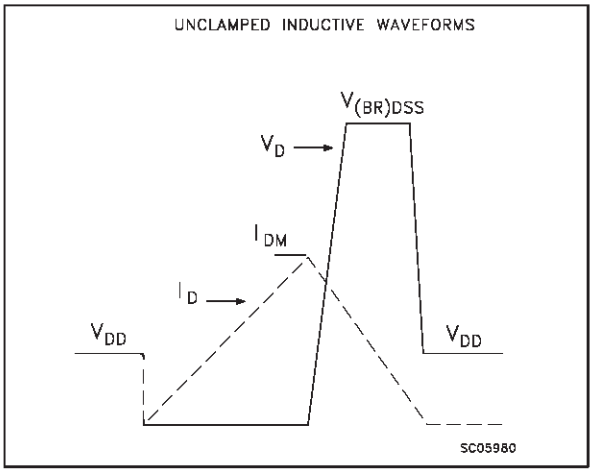


Fig. 3: Switching Times Test Circuits For Resistive Load

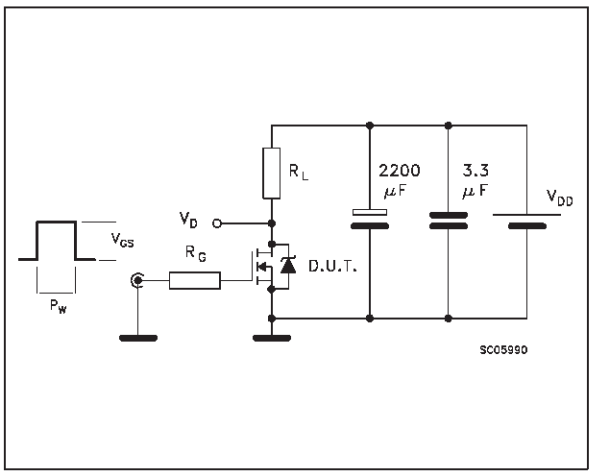


Fig. 4: Gate Charge test Circuit

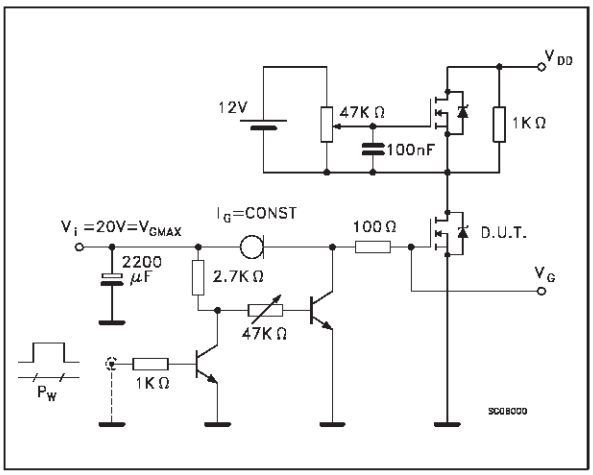
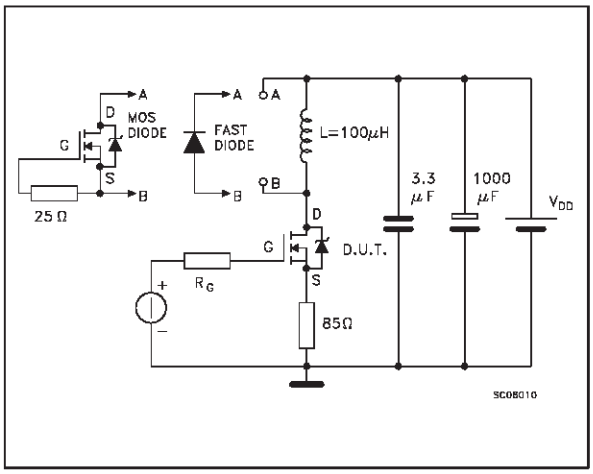
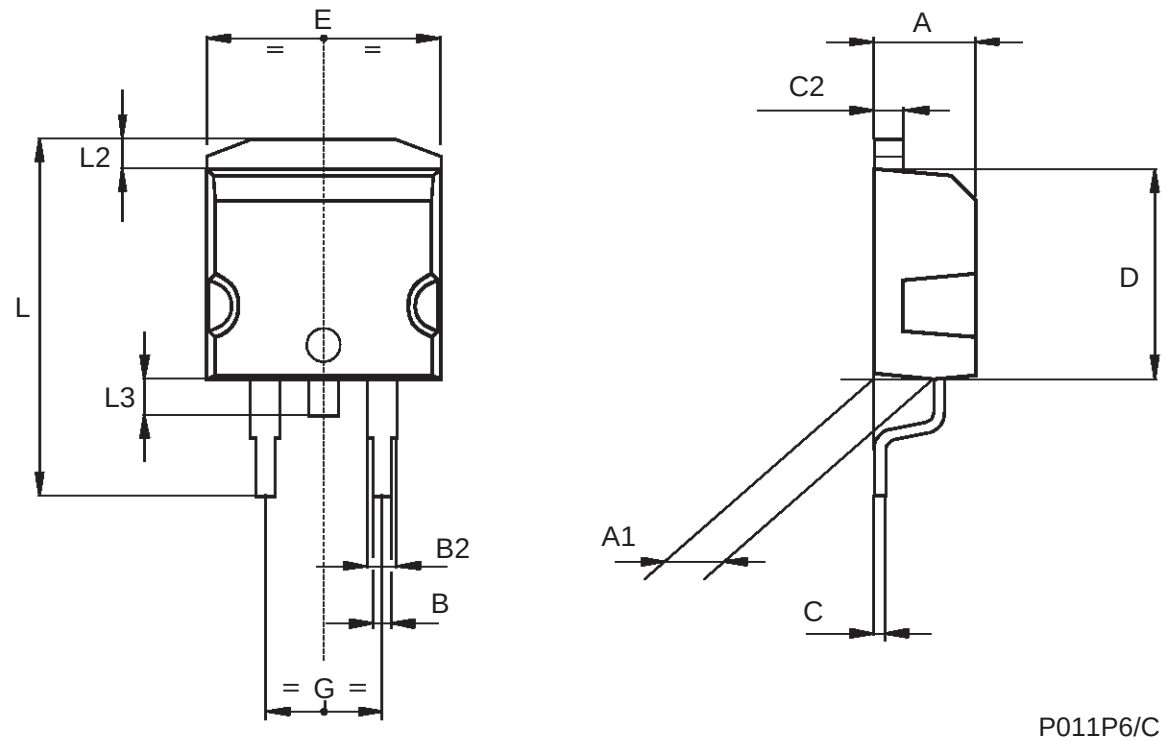


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-263 (D^2PAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.3		4.6	0.169		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.25		1.4	0.049		0.055
C	0.45		0.6	0.017		0.023
C2	1.21		1.36	0.047		0.053
D	8.95		9.35	0.352		0.368
E	10		10.28	0.393		0.404
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068



P011P6/C