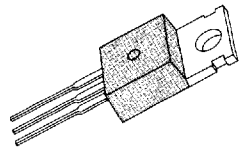
IRF830/831/832/833
IRFP430/431/432/433

N-CHANNEL POWER MOSFETS

FEATURES

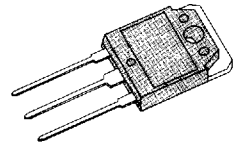
- Lower $R_{DS\ (ON)}$
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Lower input capacitance
- Extended safe operating area
- Improved high temperature reliability

TO-220



IRF830/831/832/833

TO-3P



IRFP430/431/432/433

PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRF830/IRFP430	500V	1.5Ω	4.5A
IRF831/IRFP431	450V	1.5Ω	4.5A
IRF832/IRFP432	500V	2.0Ω	4.0A
IRF833/IRFP433	450V	2.0Ω	4.0A

MAXIMUM RATINGS

Characteristics	Symbol	IRF830 IRFP430	IRF831 IRFP431	IRF832 IRFP432	IRF833 IRFP433	Unit
Drain-Source Voltage (1)	V_{DSS}	500	450	500	450	Vdc
Drain-Gate Voltage (R_{GS}=1.0MΩ)(1)	V_{DGR}	500	450	500	450	Vdc
Gate-Source Voltage	V_{GS}	±20				Vdc
Continuous Drain Current T_C=25°C	I_D	4.5	4.5	4.0	4.0	Adc
Continuous Drain Current T_C=100°C	I_D	3.0	3.0	2.5	2.5	Adc
Drain Current—Pulsed (3)	I_{DM}	18	18	16	16	Adc
Gate Current—Pulsed	I_{GM}	±1.5				Adc
Single Pulsed Avalanche Energy(4)	E_{AS}	280				mJ
Avalanche Current	I_{AS}	4.5				A
Total Power Dissipation @ T_C=25°C Derate above 25°C	P_D	75 0.6				Watts W/°C
Operating and Storage Junction to Case	T_J, Tstg	−55 to 150				°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T_L	300				°C

Notes: (1) T_J=25°C to 150°C
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse with limited by max. junction temperature
(4) L=25 mH, V_{dd}=50V, R_G=25Ω, Starting T_j=25°C

IRF830/831/832/833
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N-CHANNEL POWER MOSFETS

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

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage IRF830/IRFP430 IRF832/IRFP432	500	—	—	V	V_{GS}=0V I_D=250μA
	IRF831/IRFP431 IRF833/IRFP433	450	—	—	V	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}$, I_D=250μA
I_{GSS}	Gate-Source Leakage Forward	—	—	100	nA	V_{GS}=20V
I_{GSS}	Gate-Source Leakage Reverse	—	—	−100	nA	V_{GS}=−20V
I_{DSS}	Zero Gate Voltage Drain Current	—	—	250	μA	V_{DS}=Max. Rating, V_{GS}=0V
		—	—	1000	μA	V_{DS}=Max. Rating×0.8, V_{GS}=0V, T_C=125°C
$I_{D(on)}$	On-State Drain-Source Current (2) IRF830/IRFP430 IRF831/IRFP431	4.5	—	—	A	$V_{DS}\geq 9V$, V_{GS}=10V
	IRF832/IRFP432 IRF833/IRFP433	4.0	—	—	A	
$R_{DS(on)}$	Static Drain-Source On-State Resistance (2) IRF830/IRFP430 IRF831/IRFP431	—	0.95	1.5	Ω	V_{GS}=10V, I_D=2.5A
	IRF832/IRFP432 IRF833/IRFP433	—	1.4	2.0	Ω	
g_{fs}	Forward Transconductance (2)	2.5	3.2	—	℧	$V_{DS}\geq 50V$, I_D=2.5A
C_{iss}	Input Capacitance	—	780	—	pF	V_{GS}=0V, V_{DS}=25V, f=1.0MHz
C_{oss}	Output Capacitance	—	86	—	pF	
C_{rss}	Reverse Transfer Capacitance	—	38	—	pF	
$t_{d(on)}$	Turn-On Delay Time	—	11	17	ns	$V_{DD}=0.5BV_{DSS}$, I_D=4.5A, Z_O=12Ω (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	—	15	23	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	35	53	ns	
t_f	Fall Time	—	15	23	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	21	32	nC	V_{GS}=10V, I_D=4.5A, V_{DS}=0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Q_{gs}	Gate-Source Charge	—	3.2	4.8	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	—	11	17	nC	

THERMAL RESISTANCE

Symbol	Characteristic		IRF830-3	IRFP430-3	Unit	
R_{thJC}	Junction-to-Case	MAX.	1.67	1.67	K/W	
R_{thCS}	Case-to-Sink	TYP	0.50	0.24	K/W	Mounting surface flat, smooth, and greased
R_{thJA}	Junction-to-Ambient	MAX	80	40	K/W	Free Air Operation

Notes: (1) T_J=25°C to 150°C
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse width limited by max. junction temperature

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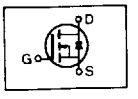
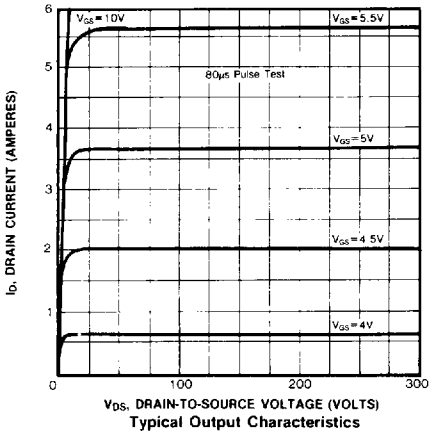
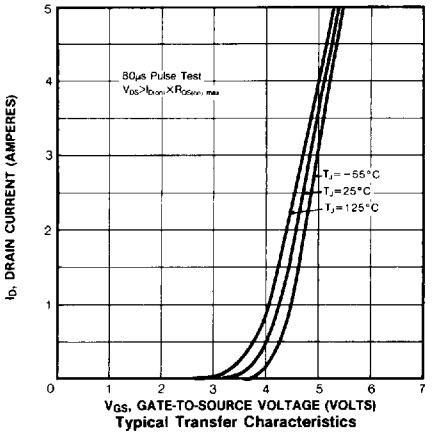
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode) IRF830/IRFP430 IRF831/IRFP431	—	—	4.5	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
	IRF832/IRFP432 IRF833/IRFP433	—	—	4.0	A	
I_{SM}	Pulse Source Current(Body Diode)(3) IRF830/IRFP430 IRF831/IRFP431	—	—	18	A	
	IRF832/IRFP432 IRF833/IRFP433	—	—	16	A	
V_{SD}	Diode Forward Voltage (2) IRF830/IRFP430 IRF831/IRFP431	—	—	1.6	V	T_C=25°C, I_S=4.5A, V_{GS}=0V
	IRF832/IRFP432 IRF833/IRFP433	—	—	1.5	V	T_C=25°C, I_S=4.0A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	370	760	ns	T_j=25°C, I_F=4.5A, dI_F/dt=100A/μS

Notes: (1) T_J=25°C to 150°C (2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse with limited by max. junction temperature



Typical Output Characteristics



Typical Transfer Characteristics

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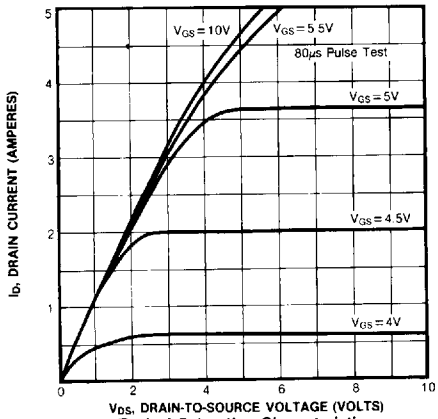
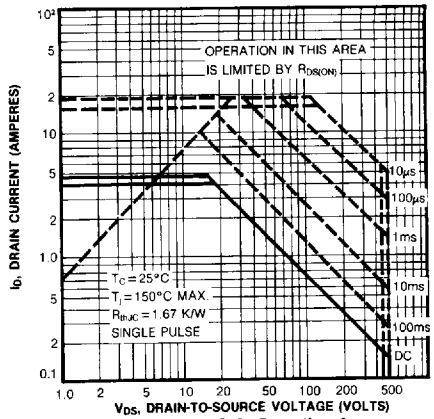
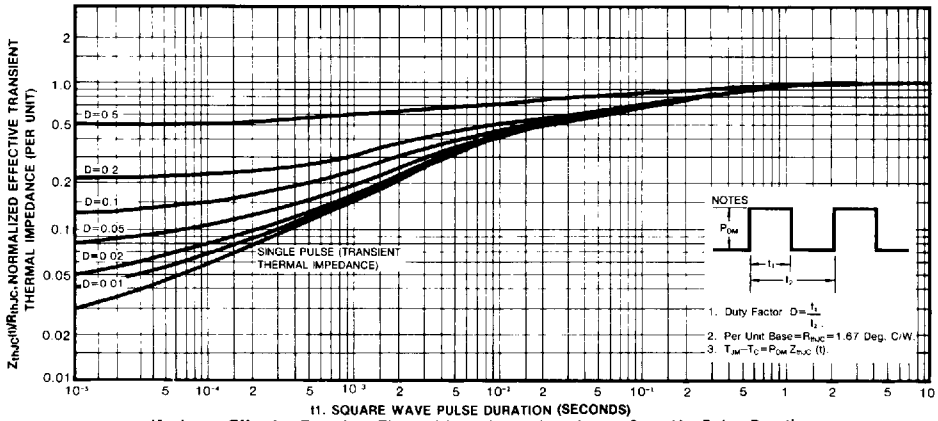


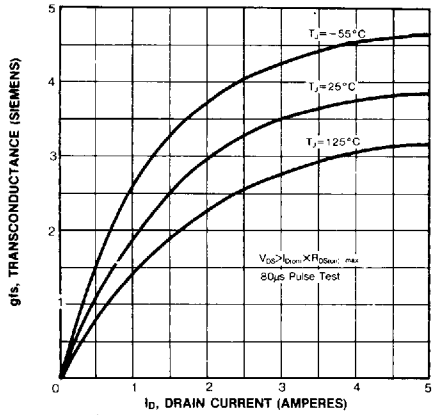
Typical Saturation Characteristics



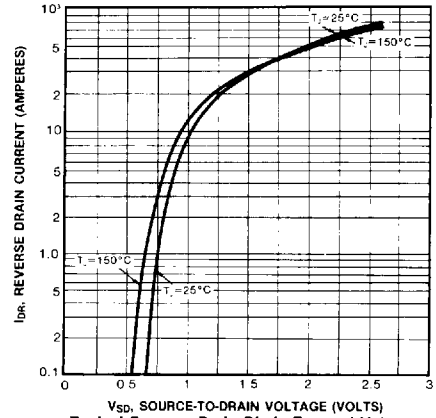
Maximum Safe Operating Area



Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



Typical Transcounductance Vs. Drain Current



Typical Source—Drain Diode Forward Voltage

4

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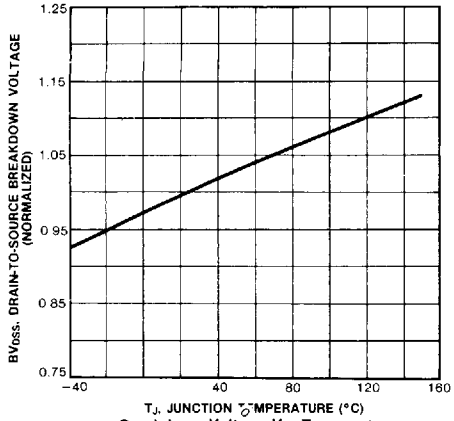
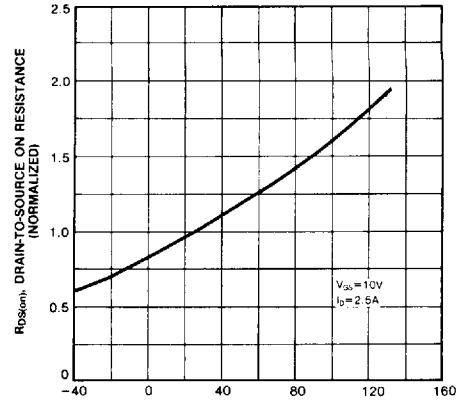
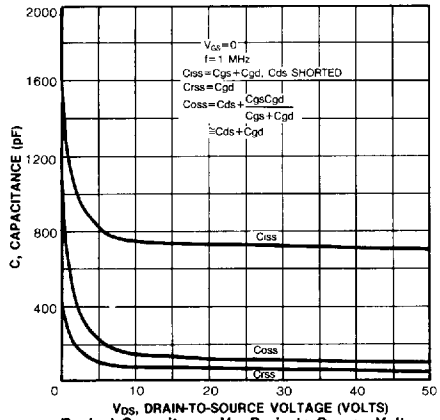
N-CHANNEL POWER MOSFETS



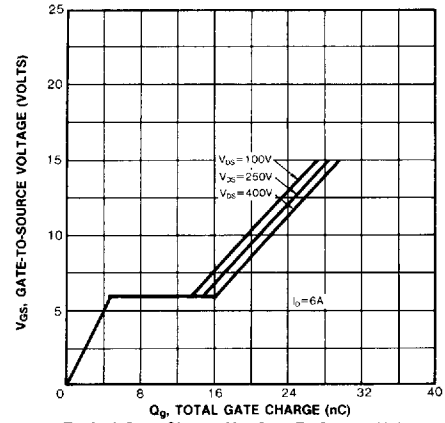
Breakdown Voltage Vs. Temperature



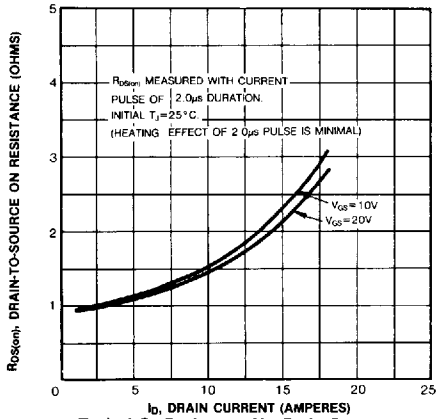
Normalized On-Resistance Vs. Temperature



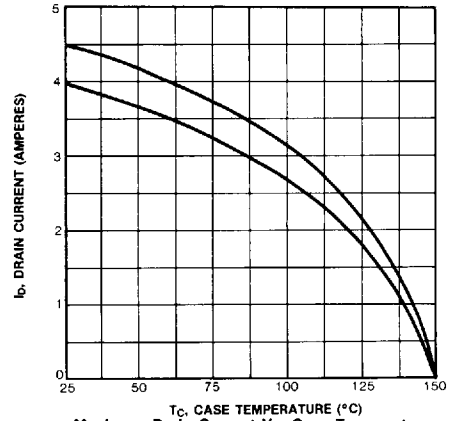
Typical Capacitance Vs. Drain to Source Voltage



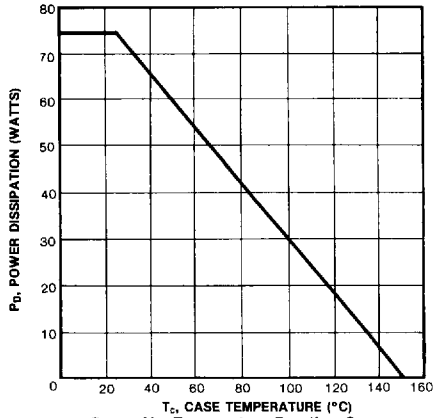
Typical Gate Charge Vs. Gate-To-Source Voltage



Typical On-Resistance Vs. Drain Current



Maximum Drain Current Vs. Case Temperature



Power Vs. Temperature Derating Curve