

IRF840/841/842/843 IRFP440/441/442/443 IRF440/441/442/443

N-CHANNEL POWER MOSFETS

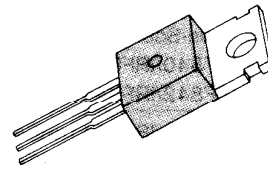
FEATURES

- 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

PRODUCT SUMMARY

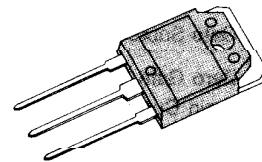
Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRF840/IRFP440/IRF440	500V	0.85 Ω	8.0A
IRF841/IRFP441/IRF441	450V	0.85 Ω	8.0A
IRF842/IRFP442/IRF442	500V	1.10 Ω	7.0A
IRF843/IRFP443/IRF443	450V	1.10 Ω	7.0A

TO-220



IRF840/841/842/843

TO-3P



IRFP440/441/442/443

MAXIMUM RATINGS

Characteristics	Symbol	IRF840 IRFP440 IRF440	IRF841 IRFP441 IRF441	IRF842 IRFP442 IRF442	IRF843 IRFP443 IRF443	Unit
Drain-Source Voltage (1)	V_{DSS}	500	450	500	450	Vdc
Drain-Gate Voltage ($R_{GS}=1.0M\Omega$)(1)	V_{DGR}	500	450	500	450	Vdc
Gate-Source Voltage	V_{GS}	± 20				Vdc
Continuous Drain Current $T_C=25^\circ C$	I_D	8.0	8.0	7.0	7.0	Adc
Continuous Drain Current $T_C=100^\circ C$	I_D	5.0	5.0	4.0	4.0	Adc
Drain Current—Pulsed (3)	I_{DM}	32	32	28	28	Adc
Gate Current—Pulsed	I_{GM}	± 1.5				Adc
Single Pulsed Avalanche Energy (4)	E_{AS}	510				mJ
Avalanche Current	I_{AS}	8.0				A
Total Power Dissipation @ $T_C=25^\circ C$ Derate above $25^\circ C$	P_D	125 1.0				Watts W/ $^\circ C$
Operating and Storage Junction to Case	T_J, T_{stg}	-55 to 150				$^\circ C$
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T_L	300				$^\circ C$

- Notes:** (1) $T_J=25^\circ C$ to $150^\circ C$
 (2) Pulse test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
 (3) Repetitive rating: Pulse with limited by max. junction temperature
 (4) $L=1.4$ mH, $V_{dd}=50V$, $R_G=25\Omega$, Starting $T_J=25^\circ C$

ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV _{DSS}	Drain-Source Breakdown Voltage IRF840/IRFP440/IRF440 IRF842/IRFP442/IRF442	500	—	—	V	V _{GS} =0V I _D =250μA
	IRF841/IRFP441/IRF441 IRF843/IRFP443/IRF443	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) IRF840/IRFP440/IRF440 IRF841/IRFP441/IRF441	8.0	—	—	A	V _{DS} ≥8.8V, V _{GS} =10V
	IRF842/IRFP442/IRF442 IRF843/IRFP443/IRF443	7.0	—	—	A	
R _{DS(on)}	Static Drain-Source On-State Resistance (2) IRF840/IRFP440/IRF440 IRF841/IRFP441/IRF441	—	0.76	0.85	Ω	V _{GS} =10V, I _D =4.0A
	IRF842/IRFP442/IRF442 IRF843/IRFP443/IRF443	—	0.85	1.1	Ω	
g _{fs}	Forward Transconductance (2)	4.0	6.5	—	Ω	V _{DS} ≥50V, I _D =4.0A
C _{iss}	Input Capacitance	—	1510	—	pF	V _{GS} =0V, V _{DS} =25V, f=1.0MHz
C _{oss}	Output Capacitance	—	154	—	pF	
C _{rss}	Reverse Transfer Capacitance	—	66	—	pF	
t _{d(on)}	Turn-On Delay Time	—	14	21	ns	V _{DD} =0.5BV _{DSS} , I _D =8.0A, Z _O =19Ω (MOSFET switching times are essentially independent of operating temperature)
t _r	Rise Time	—	23	35	ns	
t _{d(off)}	Turn-Off Delay Time	—	49	74	ns	
t _f	Fall Time	—	20	30	ns	
Q _g	Total Gate Charge (Gate-Source Plus Gate-Drain)	—	42	63	nC	V _{GS} =10V, I _D =8.0A, V _{DS} =0.8 Max. Rating (Gate charge is essentially independent of operating temperature.)
Q _{gs}	Gate-Source Charge	—	6.2	9.3	nC	
Q _{gd}	Gate-Drain ("Miller") Charge	—	22	32	nC	

THERMAL RESISTANCE

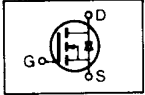
Symbol	Characteristic		IRF840-3	IRFP440-3	IRF440-3	Unit	
R _{thJC}	Junction-to-Case	MAX	1.0	1.0	1.0	K/W	
R _{thCS}	Case-to-Sink	TYP	0.5	0.24	0.12	K/W	Mounting surface flat, smooth, and greased
R _{thJA}	Junction-to-Ambient	MAX	80	40	30	K/W	Free Air Operation

Notes: (1) T_J=25°C to 150°C

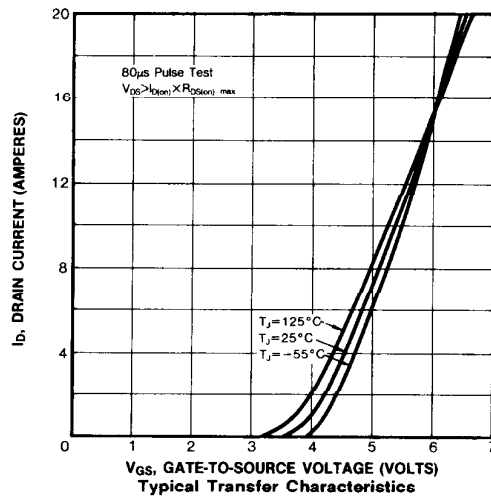
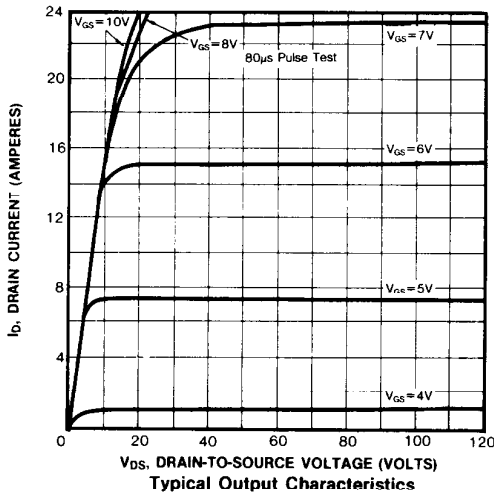
(2) Pulse test: Pulse width≤300μs, Duty Cycle≤2%

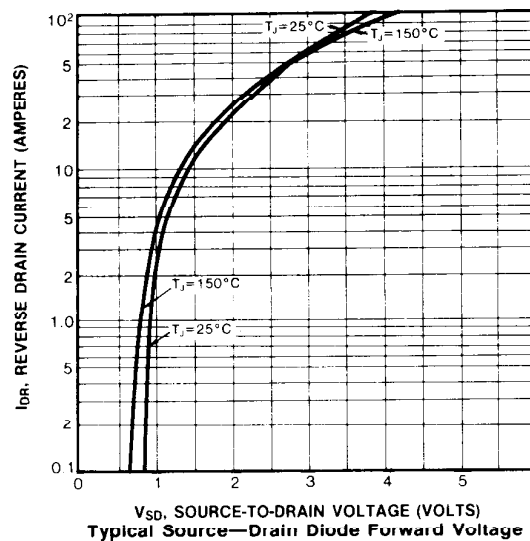
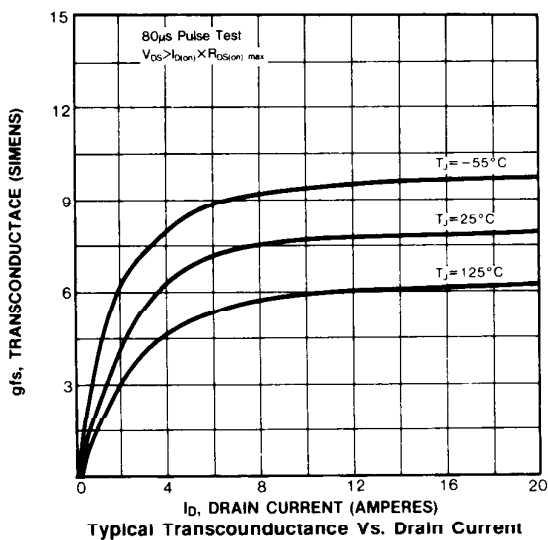
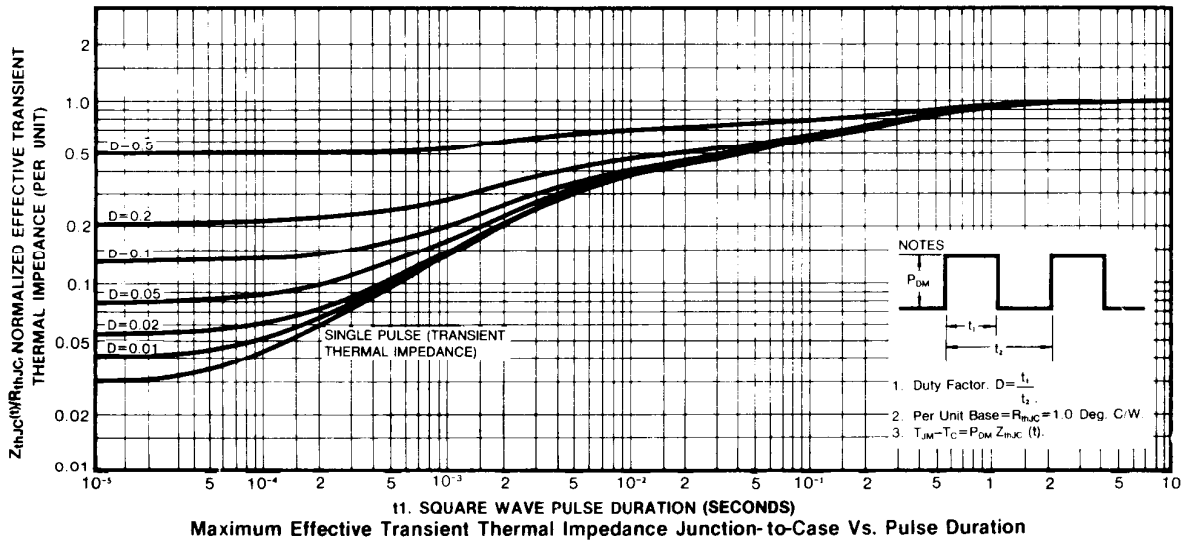
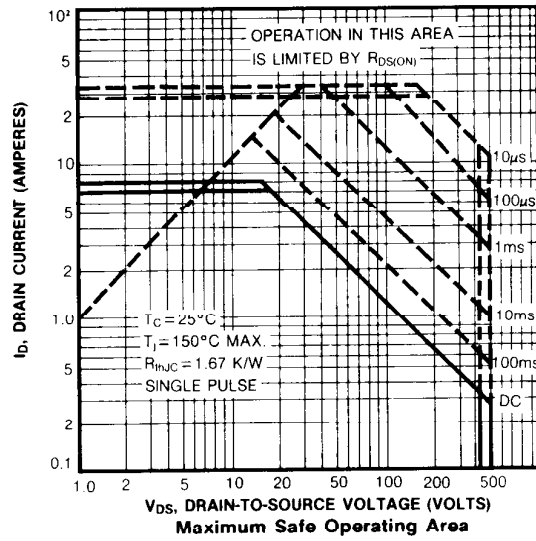
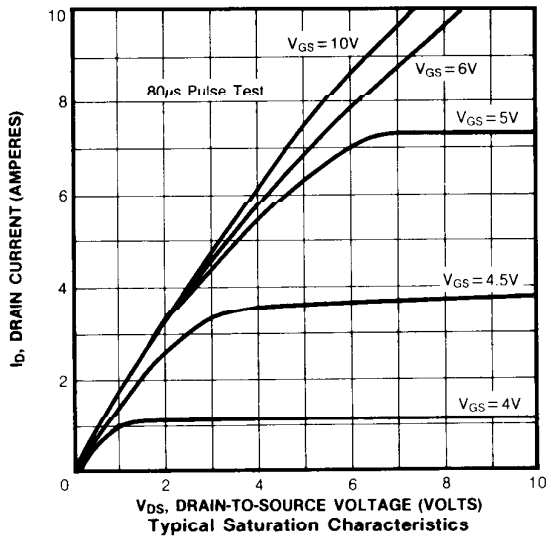
(3) Repetitive rating: Pulse width limited by max. junction temperature

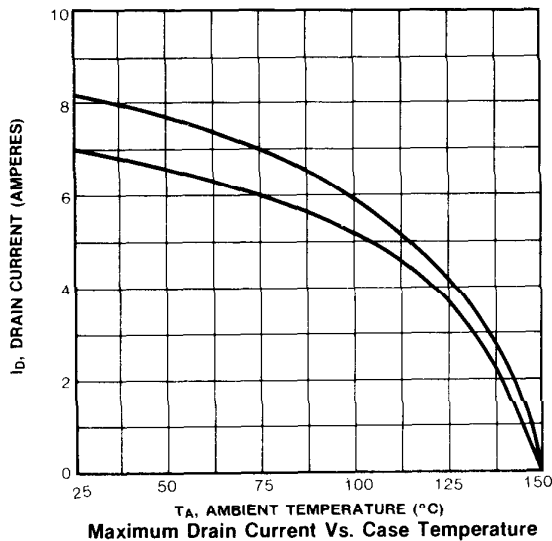
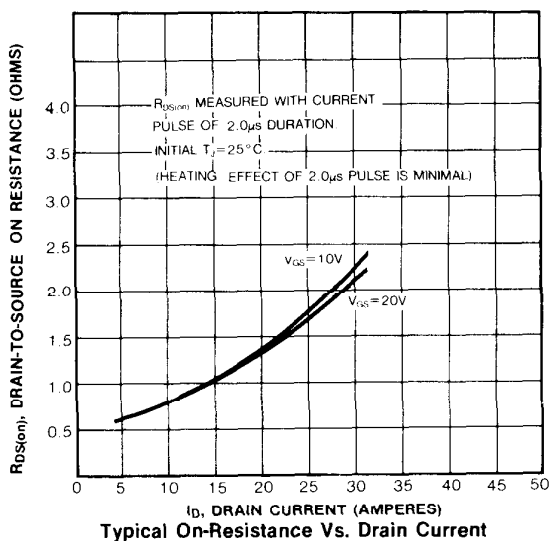
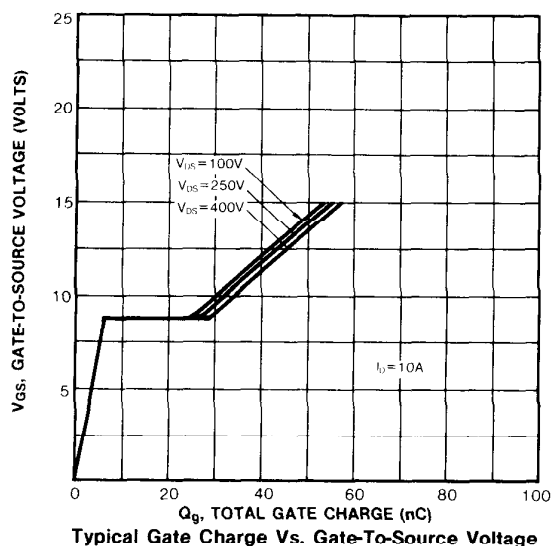
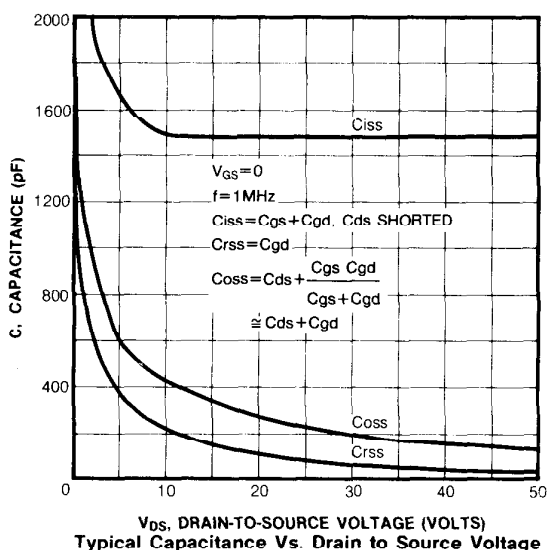
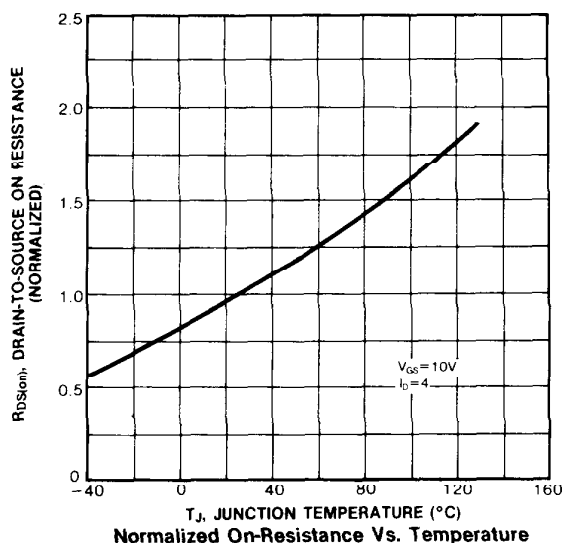
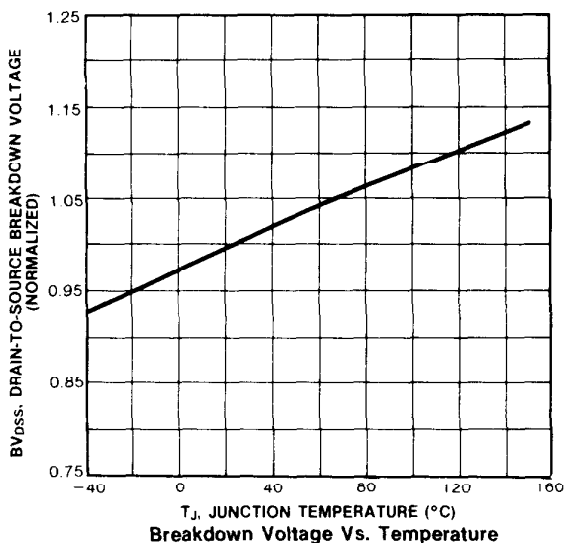
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I _S	Continuous Source Current (Body Diode) IRF840/IRFP440/IRF440 IRF841/IRFP441/IRF441	—	—	8.0	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
	IRF842/IRFP442/IRF442 IRF843/IRFP443/IRF443	—	—	7.0	A	
I _{SM}	Pulse Source Current(Body Diode)(3) IRF840/IRFP440/IRF440 IRF841/IRFP441/IRF441	—	—	32	A	
	IRF842/IRFP442/IRF442 IRF843/IRFP443/IRF443	—	—	28	A	
V _{SD}	Diode Forward Voltage (2) IRF840/IRFP440/IRF440 IRF841/IRFP441/IRF441	—	—	2.0	V	T _C =25°C, I _S =8.0A, V _{GS} =0V
	IRF842/IRFP442/IRF442 IRF843/IRFP443/IRF443	—	—	1.9	V	T _C =25°C, I _S =7.0A, V _{GS} =0V
t _{rr}	Reverse Recovery Time	—	460	970	ns	T _J =25°C, I _F =8.0A, 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







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