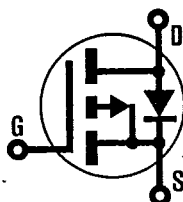


INTERNATIONAL RECTIFIER 



P-CHANNEL 200 VOLT POWER MOSFETs



IRF9243

- P-Channel Versatility
- Fast Switching
- Low Drive Current
- Ease of Paralleling
- Excellent Temperature Stability

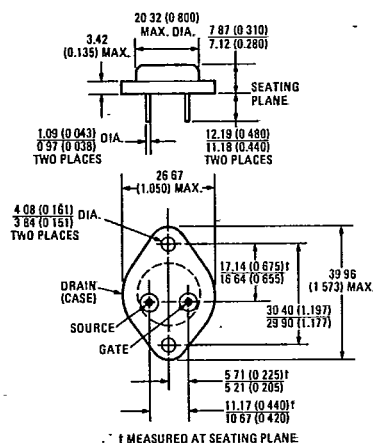
Part Number	V _{DS}	R _{DS(on)}	I _D
IRF9240	-200V	0.5Ω	-11A
IRF9241	-150V	0.5Ω	-11A
IRF9242	-200V	0.7Ω	-9.0A
IRF9243	-150V	0.7Ω	-9.0A

20.32 (0.800)
MAX. DIA.

10R

1.09 (0.043)
MAX. DIA.

39.96 (1.573)
MAX. DIA.



Conforms to JEDEC Outline TO-204AA (TO-3)
Dimensions in Millimeters and (Inches)

IRF9240, IRF9241, IRF9242, IRF9243 Devices

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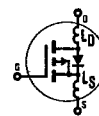
Absolute Maximum Ratings

Parameter	IRF9240	IRF9241	IRF9242	IRF9243	Units
V_{DS} Drain - Source Voltage ①	-200	-150	-200	-150	V
V_{DGR} Drain - Gate Voltage ($R_{GS} = 20\text{ k}\Omega$) ①	-200	-150	-200	-150	V
$I_D @ T_C = 25^\circ\text{C}$ Continuous Drain Current	-11	-11	-9.0	-9.0	A
$I_D @ T_C = 100^\circ\text{C}$ Continuous Drain Current	-7.0	-7.0	-6.0	-6.0	A
I_{DM} Pulsed Drain Current ③	-44	-44	-36	-36	A
V_{GS} Gate - Source Voltage	± 20				V
$P_D @ T_C = 25^\circ\text{C}$ Max. Power Dissipation	125 (See Fig. 14)				W
Linear Derating Factor	1.0 (See Fig. 14)				W/K ④
I_{LM} Inductive Current, Clamped	(See Fig. 15 and 16) $L = 100\mu\text{H}$				A
T_J Operating Junction and Storage Temperature Range	-55 to 150				$^\circ\text{C}$
T_{stg} Lead Temperature	300 (0.063 in. (1.6mm) from case for 10s)				$^\circ\text{C}$

Electrical Characteristics @ $T_C = 25^\circ\text{C}$ (Unless Otherwise Specified)

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS} Drain - Source Breakdown Voltage	IRF9240	-200	—	—	V	$V_{GS} = 0\text{V}$
	IRF9242	—	—	—	V	
	IRF9241 IRF9243	-150	—	—	V	$I_D = -250\mu\text{A}$
$V_{GS(th)}$ Gate Threshold Voltage	ALL	-2.0	—	-4.0	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
I_{GSS} Gate - Source Leakage Forward	ALL	—	—	-100	nA	$V_{GS} = -20\text{V}$
I_{GSS} Gate - Source Leakage Reverse	ALL	—	—	100	nA	$V_{GS} = 20\text{V}$
I_{DSS} Zero Gate Voltage Drain Current	ALL	—	—	-250	μA	$V_{DS} = \text{Max. Rating}, V_{GS} = 0\text{V}$
		—	—	-1000	μA	$V_{DS} = \text{Max. Rating} \times 0.8, V_{GS} = 0\text{V}, T_C = 125^\circ\text{C}$
$I_{D(on)}$ On-State Drain Current ②	IRF9240	-11	—	—	A	$V_{DS} > I_{D(on)} \times R_{DS(on)max.}, V_{GS} = -10\text{V}$
	IRF9241	—	—	—	A	
	IRF9242 IRF9243	-9.0	—	—	A	
$R_{DS(on)}$ Static Drain-Source On-State Resistance ②	IRF9240	—	0.35	0.5	Ω	$V_{GS} = -10\text{V}, I_D = -6.0\text{A}$
	IRF9241	—	—	—	Ω	
	IRF9242 IRF9243	—	0.55	0.7	Ω	
g_{fs} Forward Transconductance ②	ALL	4.0	6.0	—	S (①)	$V_{DS} > I_{D(on)} \times R_{DS(on)max.}, I_D = -6.0\text{A}$
C_{iss} Input Capacitance	ALL	—	1100	1300	pF	$V_{GS} = 0\text{V}, V_{DS} = -25\text{V}, f = 1.0\text{ MHz}$
C_{oss} Output Capacitance	ALL	—	375	450	pF	See Fig. 10
C_{rss} Reverse Transfer Capacitance	ALL	—	150	250	pF	
$t_{d(on)}$ Turn-On Delay Time	ALL	—	20	30	ns	$V_{DD} = 0.5 BV_{DSS}, I_D = -6.0\text{A}, Z_\theta = 4.7\Omega$ See Fig. 17 (MOSFET switching times are essentially independent of operating temperature.)
t_r Rise Time	ALL	—	10	15	ns	
$t_{d(off)}$ Turn-Off Delay Time	ALL	—	12	18	ns	
t_f Fall Time	ALL	—	8.0	12	ns	
Q_g Total Gate Charge (Gate-Source Plus Gate-Drain)	ALL	—	70	90	nC	$V_{GS} = -15\text{V}, I_D = -22\text{A}, V_{DS} = 0.8 \text{ Max. Rating.}$ See Fig. 18 for test circuit. (Gate charge is essentially independent of operating temperature.)
Q_{gs} Gate-Source Charge	ALL	—	55	—	nC	
Q_{gd} Gate-Drain ("Miller") Charge	ALL	—	15	—	nC	
L_D Internal Drain Inductance	ALL	—	5.0	—	nH	Measured between the contact screw on header that is closer to source and gate pins and center of die.
L_S Internal Source Inductance	ALL	—	12.5	—	nH	Measured from the source pin, 6 mm (0.25 in.) from header and source bonding pad.

Modified MOSFET symbol showing the internal device inductances.



Thermal Resistance

R_{thJC} Junction-to-Case	ALL	—	—	1.0	K/W ④	
R_{thCS} Case-to-Sink	ALL	—	0.1	—	K/W ④	Mounting surface flat, smooth, and greased.
R_{thJA} Junction-to-Ambient	ALL	—	—	30	K/W ④	Typical socket mount

IRF9240, IRF9241, IRF9242, IRF9243 Devices

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Source-Drain Diode Ratings and Characteristics

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I_S	Continuous Source Current (Body Diode)	IRF9240	—	—	-11	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier.
		IRF9241	—	—	-9.0	A	
I_{SM}	Pulse Source Current (Body Diode) ③	IRF9240	—	—	-44	A	
		IRF9241	—	—	-36	A	
V_{SD}	Diode Forward Voltage ②	IRF9240	—	—	-4.6	V	$T_C = 25^\circ\text{C}$, $I_S = -11\text{A}$, $V_{GS} = 0\text{V}$
		IRF9241	—	—	-4.4	V	$T_C = 25^\circ\text{C}$, $I_S = -9.0\text{A}$, $V_{GS} = 0\text{V}$
t_{rr}	Reverse Recovery Time	ALL	—	270	—	ns	$T_J = 150^\circ\text{C}$, $I_F = -11\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$
Q_{RR}	Reverse Recovered Charge	ALL	—	2.0	—	μC	$T_J = 150^\circ\text{C}$, $I_F = -11\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$
t_{on}	Forward Turn-on Time	ALL	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by $L_S + L_D$.				

① $T_J = 25^\circ\text{C}$ to 150°C . ② Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

③ Repetitive Rating: Pulse width limited by max. junction temperature. See Transient Thermal Impedance Curve (Fig. 5).

④ $\text{K/W} = \frac{^\circ\text{C/W}}{\text{W/K}}$

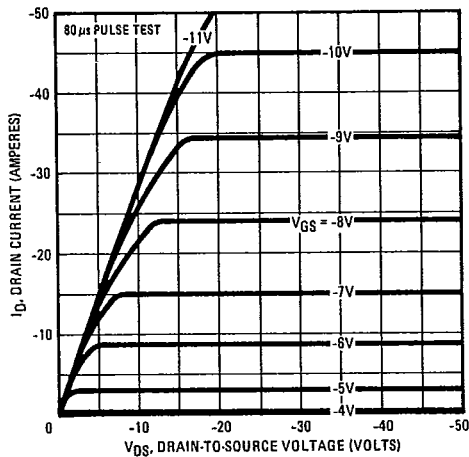


Fig. 1 - Typical Output Characteristics

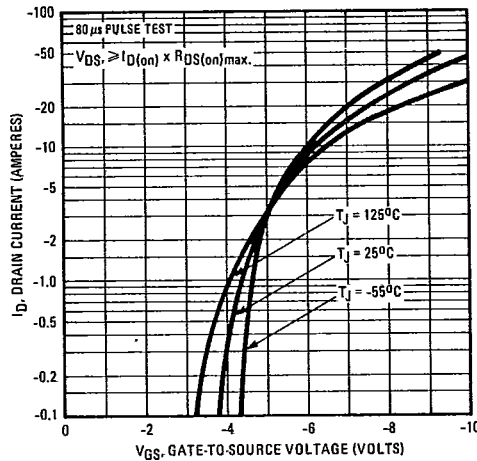


Fig. 2 - Typical Transfer Characteristics

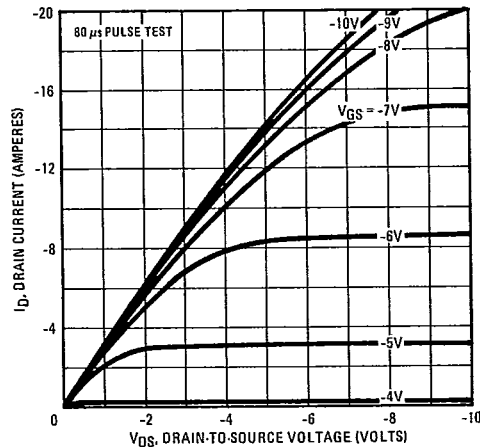


Fig. 3 - Typical Saturation Characteristics

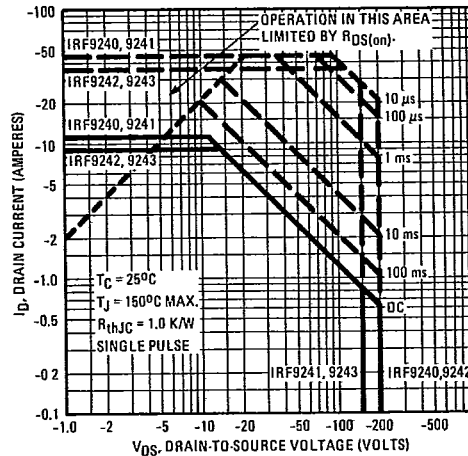


Fig. 4 - Maximum Safe Operating Area

IRF9240, IRF9241, IRF9242, IRF9243 Devices

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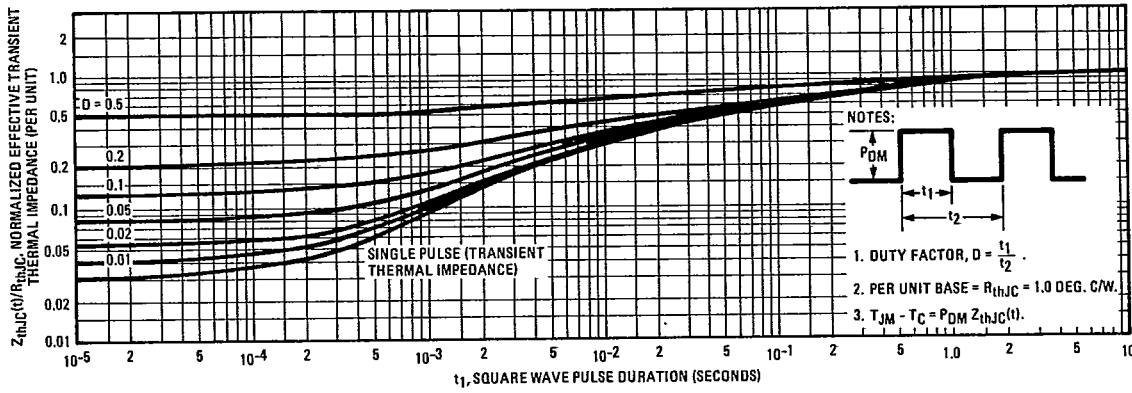


Fig. 5 — Maximum Effective Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration

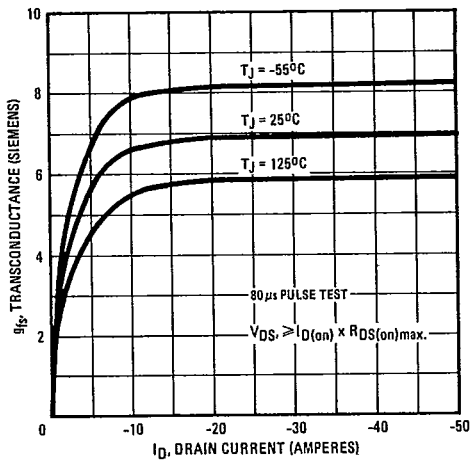


Fig. 6 — Typical Transconductance Vs. Drain Current

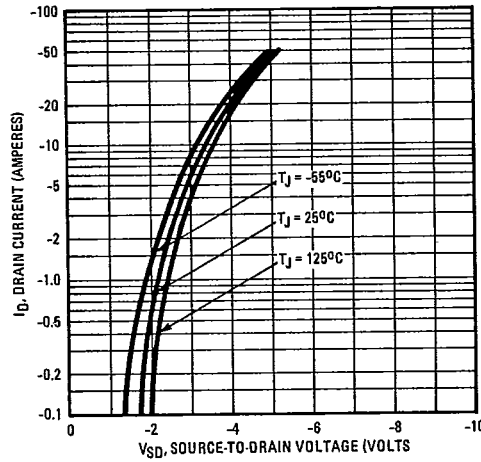


Fig. 7 — Typical Source-Drain Diode Forward Voltage

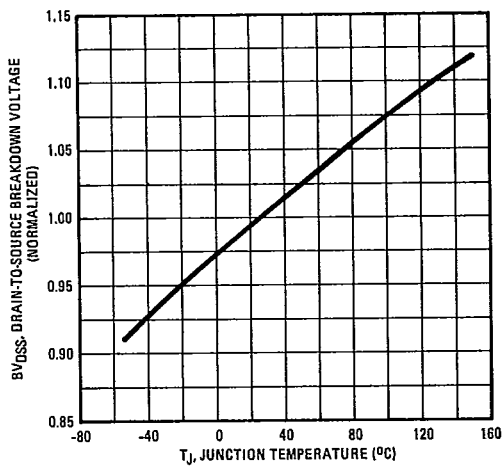


Fig. 8 — Breakdown Voltage Vs. Temperature

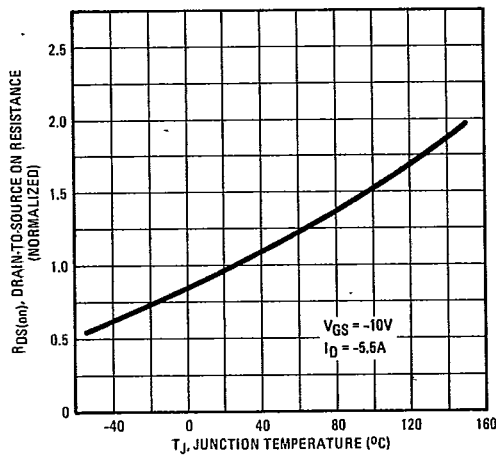
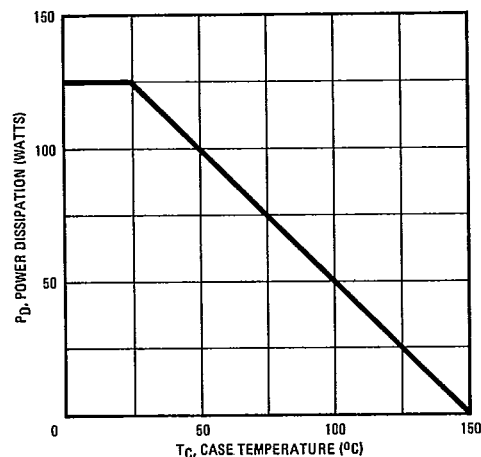
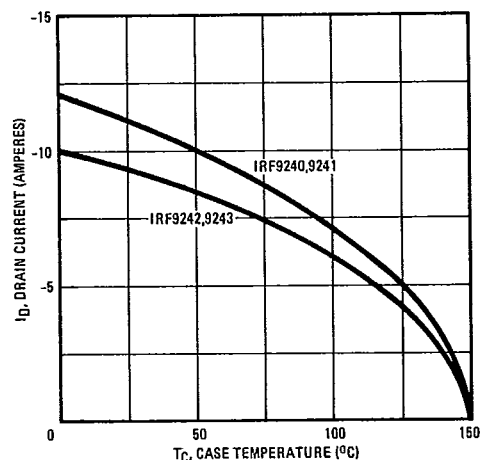
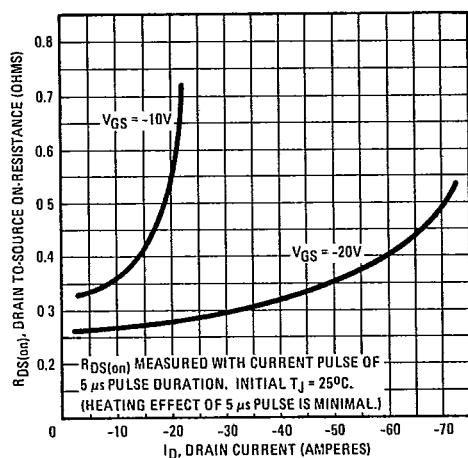
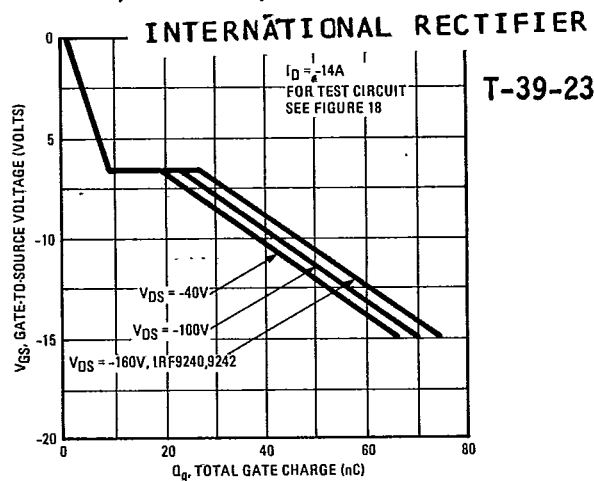
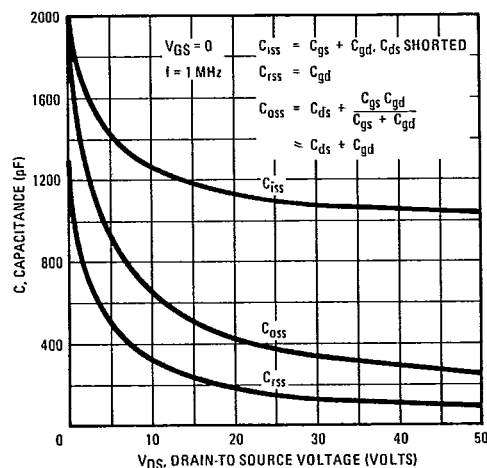


Fig. 9 — Normalized On-Resistance Vs. Temperature



IRF9240, IRF9241, IRF9242, IRF9243 Devices

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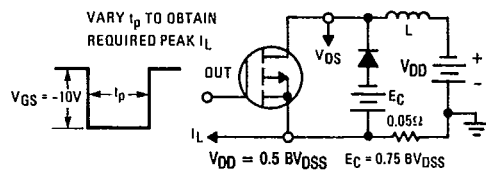


Fig. 15 - Clamped Inductive Test Circuit

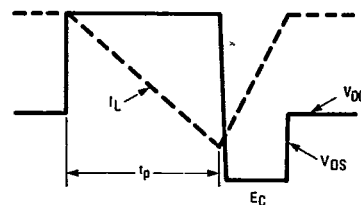


Fig. 16 - Clamped Inductive Waveforms

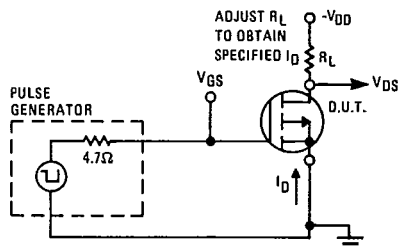


Fig. 17 - Switching Time Test Circuit

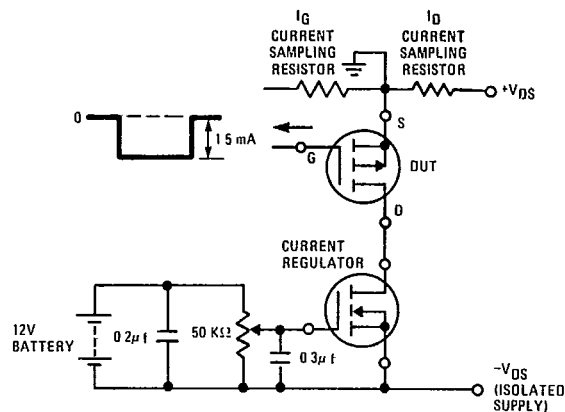


Fig. 18 - Gate Charge Test Circuit

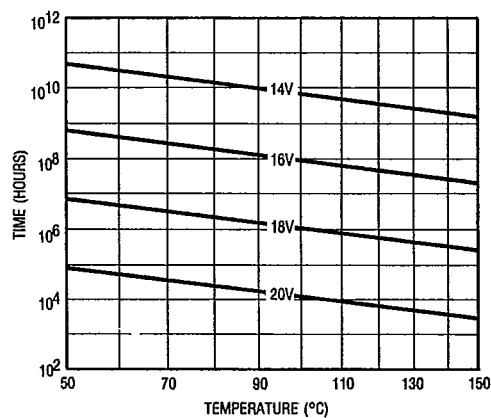


Fig. 19 - Typical Time to Accumulated 1% Failure

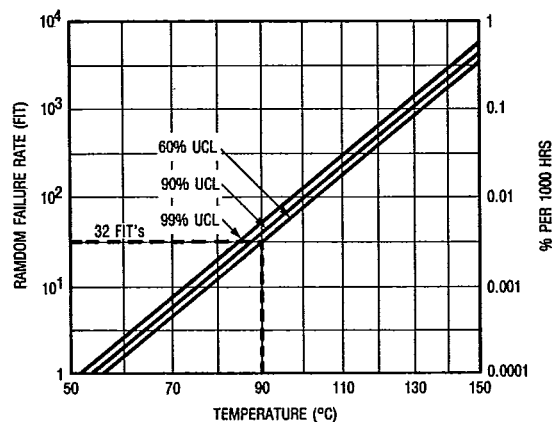


Fig. 20 - Typical High Temperature Reverse Bias (HTRB) Failure Rate

*The data shown is correct as of April 15, 1987. This information is updated on a quarterly basis; for the latest reliability data, please contact your local IR field office.