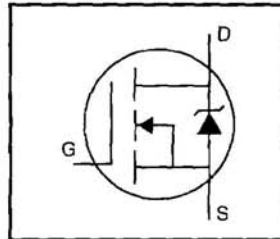


IRFI744GPbF

HEXFET® Power MOSFET

- Isolated Package
- High Voltage Isolation= 2.5KVRMS ⑤
- Sink to Lead Creepage Dist.= 4.8mm
- Dynamic dv/dt Rating
- Low Thermal Resistance
- Lead-Free



$$V_{DSS} = 450V$$

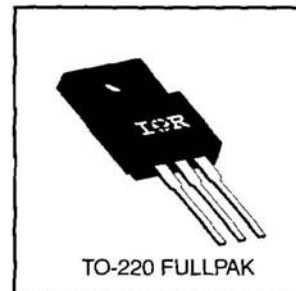
$$R_{DS(on)} = 0.63\Omega$$

$$I_D = 4.9A$$

Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 Fullpak eliminates the need for additional insulating hardware in commercial-industrial applications. The moulding compound used provides a high isolation capability and a low thermal resistance between the tab and external heatsink. This isolation is equivalent to using a 100 micron mica barrier with standard TO-220 product. The Fullpak is mounted to a heatsink using a single clip or by a single screw fixing.



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10 V$	4.9	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10 V$	3.1	
I_{DM}	Pulsed Drain Current ①	20	
$P_D @ T_C = 25^\circ C$	Power Dissipation	40	W
	Linear Derating Factor	0.32	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	130	mJ
I_{AR}	Avalanche Current ①	4.9	A
E_{AR}	Repetitive Avalanche Energy ①	4.0	mJ
dv/dt	Peak Diode Recovery dv/dt ③	3.5	V/ns
T_J	Operating Junction and	-55 to +150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1 N•m)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	3.1	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	—	65	

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	450	—	—	V	$V_{GS}=0V, I_D=250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	—	0.59	—	V/°C	Reference to $25^\circ\text{C}, I_D=1\text{mA}$
$R_{DS(on)}$	—	—	0.63	Ω	$V_{GS}=10V, I_D=2.9A$ ④
$V_{GS(th)}$	2.0	—	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
g'_s	3.3	—	—	S	$V_{DS}=50V, I_D=2.9A$ ④
I_{DSS}	—	—	25	μA	$V_{DS}=450V, V_{GS}=0V$
	—	—	250	μA	$V_{DS}=360V, V_{GS}=0V, T_J=125^\circ\text{C}$
I_{GSS}	—	—	100	nA	$V_{GS}=20V$
	—	—	-100	nA	$V_{GS}=-20V$
Q_g	—	—	80	nC	$I_D=8.8A$
Q_{gs}	—	—	12	nC	$V_{DS}=360V$
Q_{gd}	—	—	41	nC	$V_{GS}=10V$ See Fig. 6 and 13 ④
$t_{d(on)}$	—	8.7	—	ns	$V_{DD}=225V$
t_r	—	28	—	ns	$I_D=8.8A$
$t_{d(off)}$	—	58	—	ns	$R_G=9.1\Omega$
t_f	—	27	—	ns	$R_D=25\Omega$ See Figure 10 ④
L_D	—	4.5	—	nH	Between lead, 6 mm (0.25in.) from package and center of die contact
L_S	—	7.5	—	nH	
C_{iss}	—	1400	—	pF	$V_{GS}=0V$
C_{oss}	—	370	—	pF	$V_{DS}=25V$
C_{rss}	—	140	—	pF	$f=1.0\text{MHz}$ See Figure 5
C	—	12	—	pF	$f=1.0\text{MHz}$

Source-Drain Ratings and Characteristics

Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	—	—	4.9	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	—	—	20	A	
V_{SD}	—	—	2.0	V	$T_J=25^\circ\text{C}, I_S=8.8A, V_{GS}=0V$ ④
t_{rr}	—	490	740	ns	$T_J=25^\circ\text{C}, I_F=8.8A$
Q_{rr}	—	3.2	4.8	μC	$di/dt=100A/\mu s$ ④
t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature (See Figure 11)
- ② $V_{DD}=50V$, starting $T_J=25^\circ\text{C}$, $L=9.6\text{mH}$, $R_G=25\Omega$, $I_{AS}=4.9A$ (See Figure 12)
- ③ $I_{SD}\leq 8.8A$, $di/dt\leq 200A/\mu s$, $V_{DD}\leq V_{(BR)DSS}$, $T_J\leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$
- ⑤ $t=60s$, $f=60\text{Hz}$

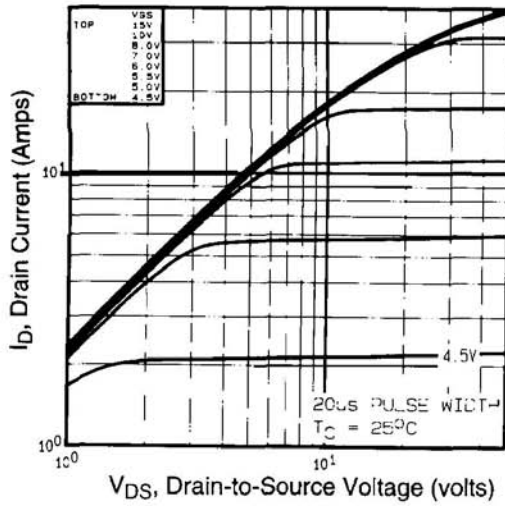


Fig 1. Typical Output Characteristics,
 $T_C=25^\circ\text{C}$

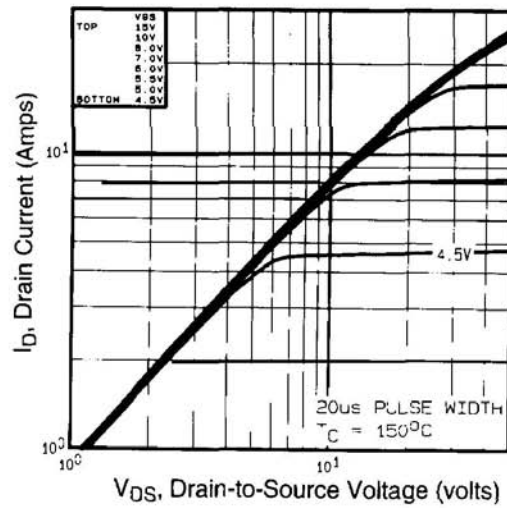


Fig 2. Typical Output Characteristics,
 $T_C=150^\circ\text{C}$

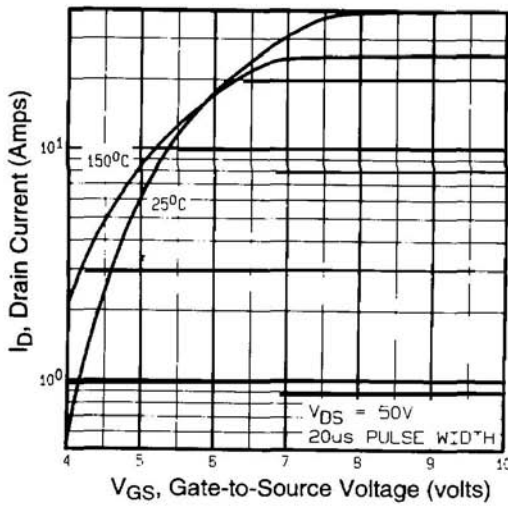


Fig 3. Typical Transfer Characteristics

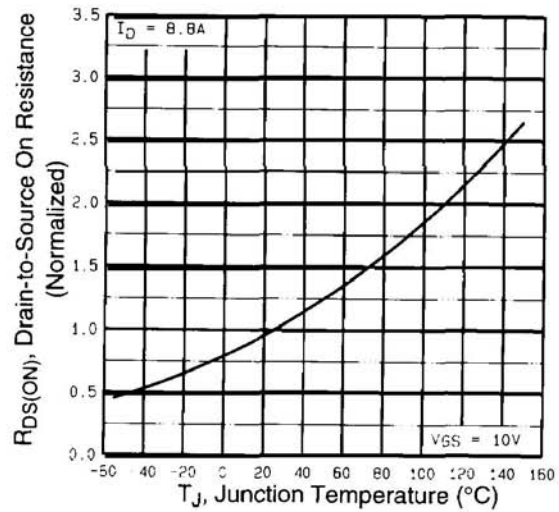


Fig 4. Normalized On-Resistance
Vs. Temperature

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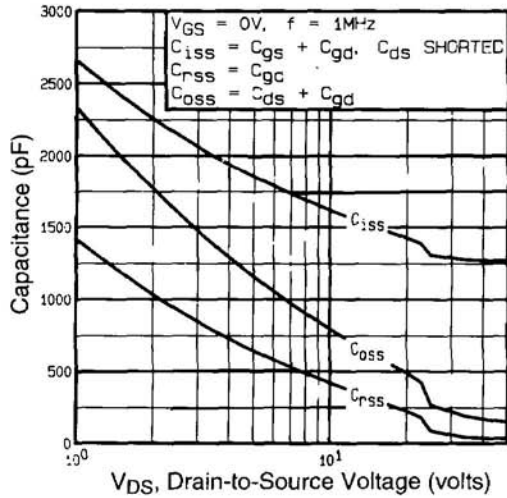


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

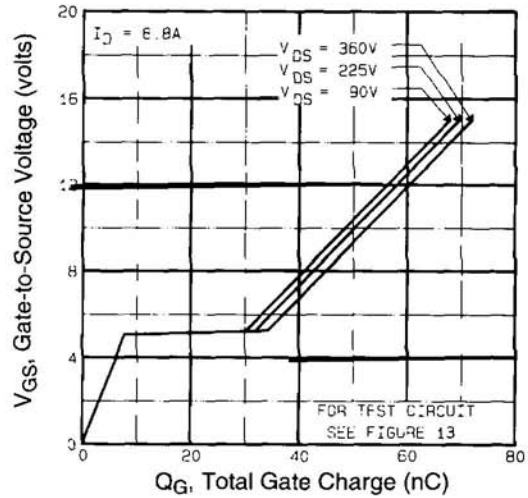


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

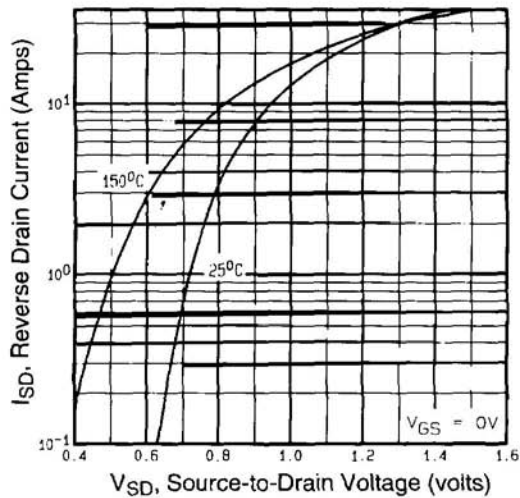


Fig 7. Typical Source-Drain Diode Forward Voltage

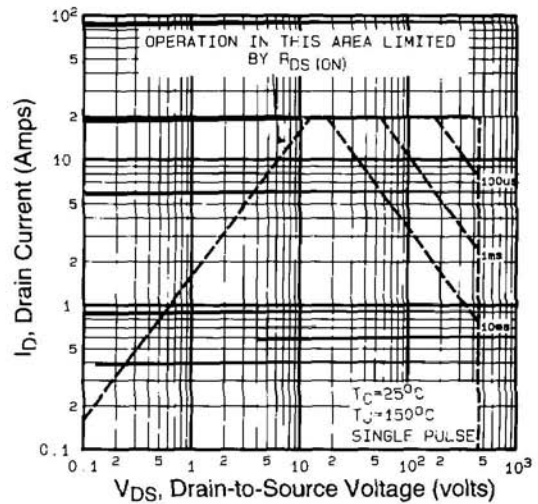


Fig 8. Maximum Safe Operating Area

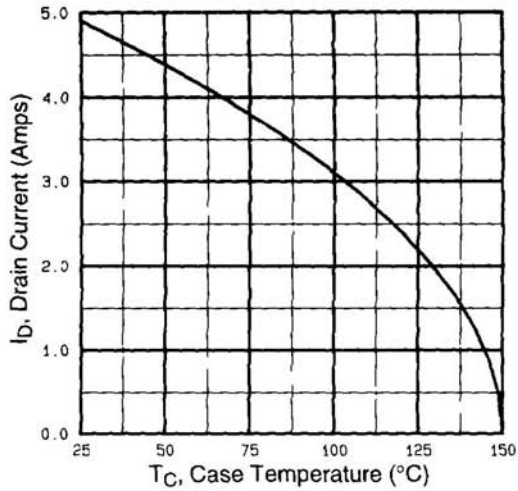


Fig 9. Maximum Drain Current Vs. Case Temperature

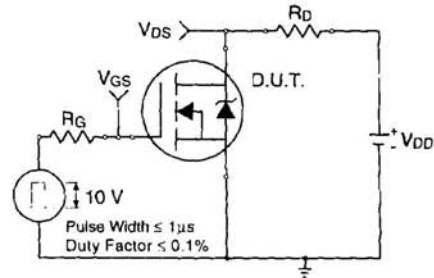


Fig 10a. Switching Time Test Circuit

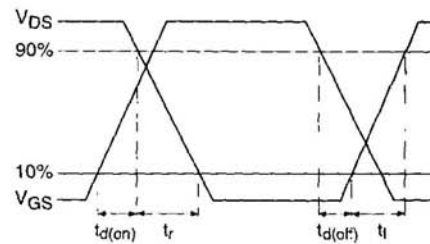


Fig 10b. Switching Time Waveforms

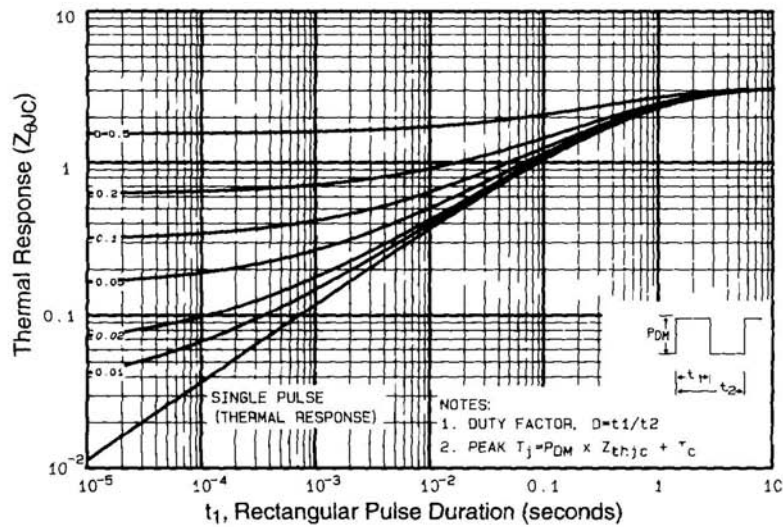


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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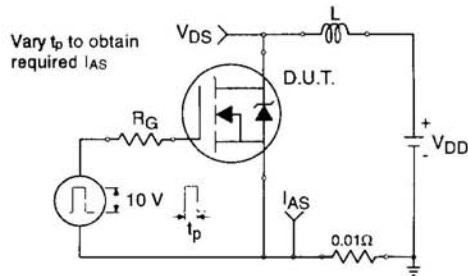


Fig 12a. Unclamped Inductive Test Circuit

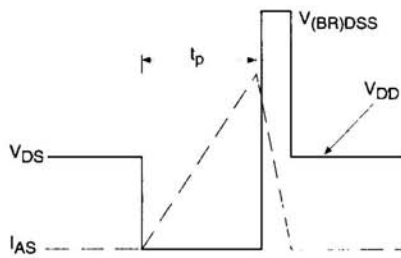


Fig 12b. Unclamped Inductive Waveforms

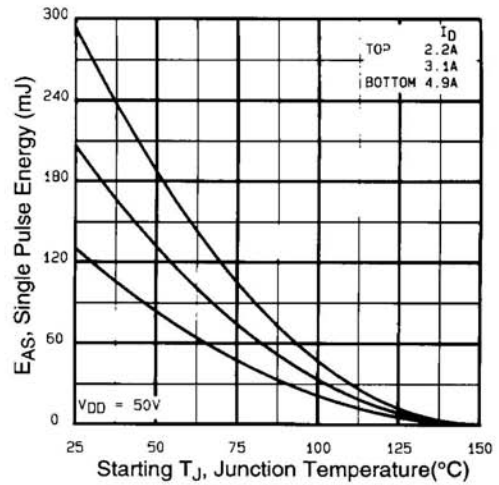


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

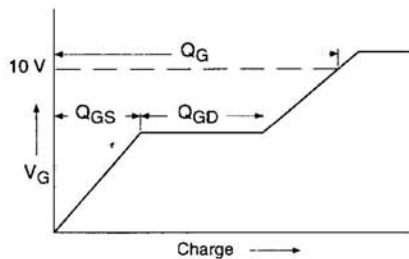


Fig 13a. Basic Gate Charge Waveform

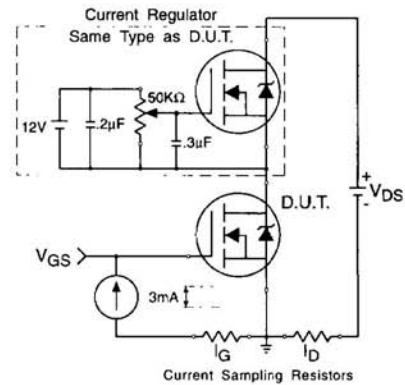


Fig 13b. Gate Charge Test Circuit

Appendix A: Figure 14, Peak Diode Recovery dv/dt Test Circuit

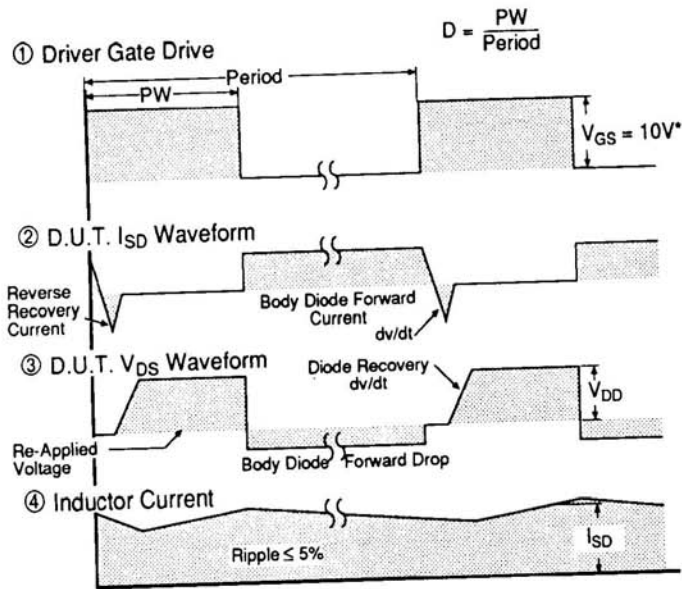
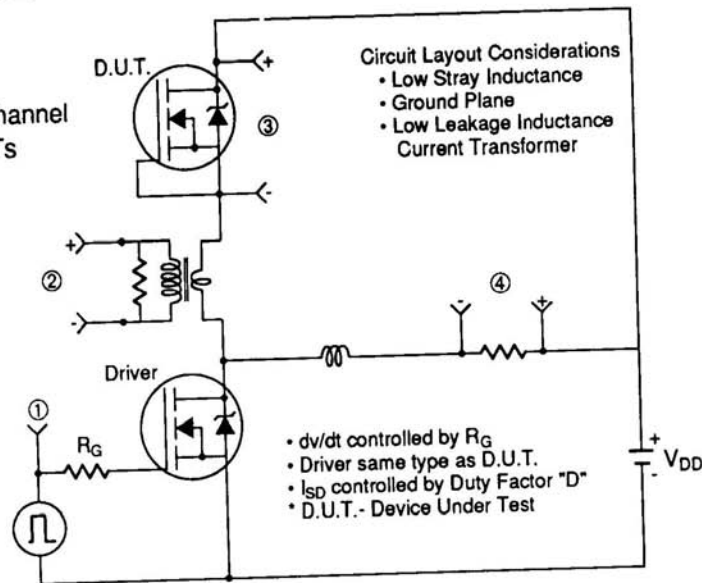
Appendix B: Package Outline Mechanical Drawing

Appendix C: Part Marking Information

Appendix A

Peak Diode Recovery dv/dt Test Circuit

Fig 14. For N-Channel HEXFETs



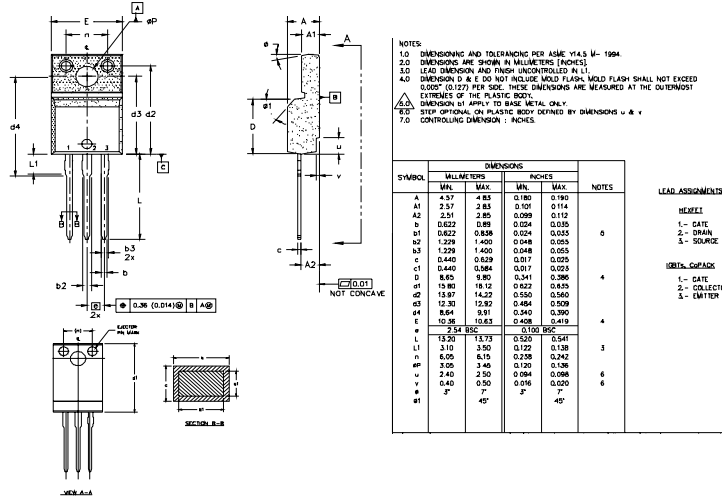
* $V_{GS} = 5V$ for Logic Level Devices

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TO-220 Full-Pak Package Outline

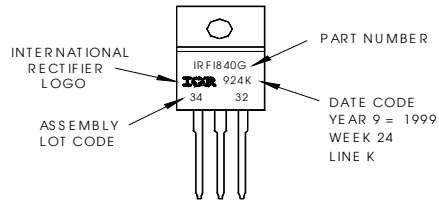
Dimensions are shown in millimeters (inches)



TO-220 Full-Pak Part Marking Information

EXAMPLE: THIS IS AN IRFI840G
 WITH ASSEMBLY
 LOT CODE 3432
 ASSEMBLED ON WW 24 1999
 IN THE ASSEMBLY LINE "K"

Note: "P" in assembly line position indicates "Lead-Free"



Data and specifications subject to change without notice.

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 TAC Fax: (310) 252-7903

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