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[International Rectifier \(Infineon Technologies Americas Corp.\)
IRF5851TRPBF](#)

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PD-95341A

IRF5851PbF

HEXFET® Power MOSFET

- Ultra Low On-Resistance
- Dual N and P Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- Low Gate Charge
- Lead-Free
- Halogen-Free

	N-Ch	P-Ch
V_{DS}	20V	-20V
$R_{DS(on)}$	0.090Ω	0.135Ω

Description

These N and P channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve the extremely low on-resistance per silicon area. This benefit provides the designer with an extremely efficient device for use in battery and load management applications.

This Dual TSOP-6 package is ideal for applications where printed circuit board space is at a premium and where maximum functionality is required. With two die per package, the IRF5851 can provide the functionality of two SOT-23 packages in a smaller footprint. Its unique thermal design and $R_{DS(on)}$ reduction enables an increase in current-handling capability.



TSOP-6

Absolute Maximum Ratings

	Parameter	Max.		Units
		N-Channel	P-Channel	
V _{DS}	Drain-to-Source Voltage	20	-20	A
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ 10V	2.7	-2.2	
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V	2.2	-1.7	
I _{DM}	Pulsed Drain Current ①	11	-9.0	
P _D @T _A = 25°C	Power Dissipation ③	0.96		W
P _D @T _A = 70°C	Power Dissipation ③	0.62		
	Linear Derating Factor	7.7		mW/°C
V _{GS}	Gate-to-Source Voltage	± 12		V
T _J , T _{STG}	Junction and Storage Temperature Range	-55 to + 150		°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ③	—	130	°C/W

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

	Parameter		Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	N-Ch	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
		P-Ch	-20	—	—		$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	N-Ch	—	0.016	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
		P-Ch	—	-0.011	—		Reference to 25°C , $I_D = -1\text{mA}$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	N-Ch	—	—	0.090	Ω	$V_{GS} = 4.5V, I_D = 2.7A$ ②
			—	—	0.120		$V_{GS} = 2.5V, I_D = 2.2A$ ②
		P-Ch	—	—	0.135		$V_{GS} = -4.5V, I_D = -2.2A$ ②
			—	—	0.220		$V_{GS} = -2.5V, I_D = -1.7A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	N-Ch	0.60	—	1.25	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		P-Ch	-0.45	—	-1.2		$V_{DS} = V_{GS}, I_D = -250\mu A$
g_{fs}	Forward Transconductance	N-Ch	5.2	—	—	S	$V_{DS} = 10V, I_D = 2.7A$ ②
		P-Ch	3.5	—	—		$V_{DS} = -10V, I_D = -2.2A$ ②
I_{DSS}	Drain-to-Source Leakage Current	N-Ch	—	—	1.0	μA	$V_{DS} = 16V, V_{GS} = 0V$
		P-Ch	—	—	-1.0		$V_{DS} = -16V, V_{GS} = 0V$
		N-Ch	—	—	25		$V_{DS} = 16V, V_{GS} = 0V, T_J = 70^\circ\text{C}$
		P-Ch	—	—	-25		$V_{DS} = -16V, V_{GS} = 0V, T_J = 70^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	N-P	—	—	± 100		$V_{GS} = \pm 12V$
Q_g	Total Gate Charge	N-Ch	—	4.0	6.0		N-Channel
		P-Ch	—	3.6	5.4		$I_D = 2.7A, V_{DS} = 10V, V_{GS} = 4.5V$ ②
Q_{gs}	Gate-to-Source Charge	N-Ch	—	0.95	—	nC	
		P-Ch	—	0.66	—		P-Channel
Q_{gd}	Gate-to-Drain ("Miller") Charge	N-Ch	—	0.83	—		$I_D = -2.2A, V_{DS} = -10V, V_{GS} = -4.5V$
		P-Ch	—	5.7	—		
$t_{d(on)}$	Turn-On Delay Time	N-Ch	—	6.6	—		N-Channel
		P-Ch	—	8.3	—		$V_{DD} = 10V, I_D = 1.0A, R_G = 6.2\Omega, V_{GS} = 4.5V$ ②
t_r	Rise Time	N-Ch	—	1.2	—	ns	
		P-Ch	—	14	—		
$t_{d(off)}$	Turn-Off Delay Time	N-Ch	—	15	—		P-Channel
		P-Ch	—	31	—		$V_{DD} = -10V, I_D = -1.0A, R_G = 6.0\Omega, V_{GS} = -4.5V$
t_f	Fall Time	N-Ch	—	2.4	—		
		P-Ch	—	28	—		
C_{iss}	Input Capacitance	N-Ch	—	400	—		N-Channel
		P-Ch	—	320	—		$V_{GS} = 0V, V_{DS} = 15V, f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	N-Ch	—	48	—	pF	
		P-Ch	—	56	—		P-Channel
C_{rss}	Reverse Transfer Capacitance	N-Ch	—	32	—		$V_{GS} = 0V, V_{DS} = -15V, f = 1.0\text{MHz}$
		P-Ch	—	40	—		

Source-Drain Ratings and Characteristics

	Parameter		Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	N-Ch	—	—	0.96	A	
		P-Ch	—	—	-0.96		
I_{SM}	Pulsed Source Current (Body Diode) ①	N-Ch	—	—	11		
		P-Ch	—	—	-9.0		
V_{SD}	Diode Forward Voltage	N-Ch	—	—	1.2	V	$T_J = 25^\circ\text{C}, I_S = 0.96A, V_{GS} = 0V$ ②
		P-Ch	—	—	-1.2		$T_J = 25^\circ\text{C}, I_S = -0.96A, V_{GS} = 0V$ ②
t_{rr}	Reverse Recovery Time	N-Ch	—	25	38	ns	N-Channel
		P-Ch	—	23	35		$T_J = 25^\circ\text{C}, I_F = 0.96A, di/dt = 100A/\mu s$ ②
Q_{rr}	Reverse Recovery Charge	N-Ch	—	6.5	9.8	nC	P-Channel
		P-Ch	—	7.7	12		$T_J = 25^\circ\text{C}, I_F = -0.96A, di/dt = -100A/\mu s$

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 10 & 26)
 ② Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.

- ③ Surface mounted on FR-4 board, $t \leq 10\text{sec}$.

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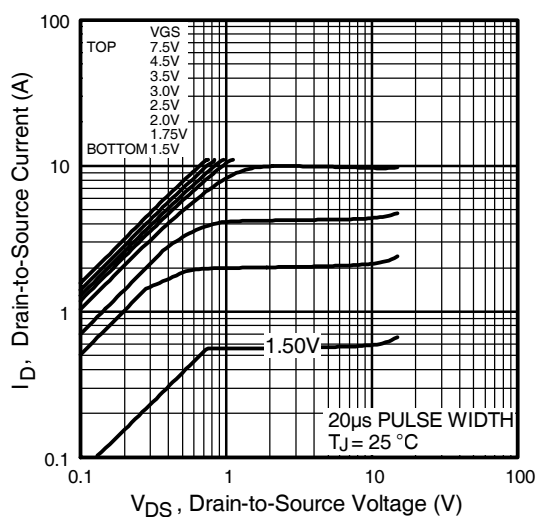


Fig 1. Typical Output Characteristics

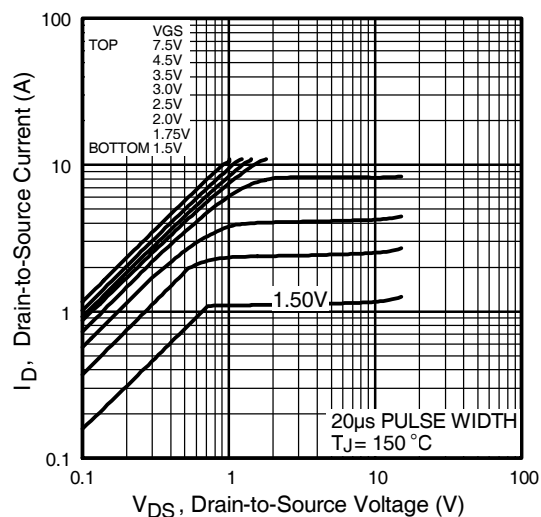


Fig 2. Typical Output Characteristics

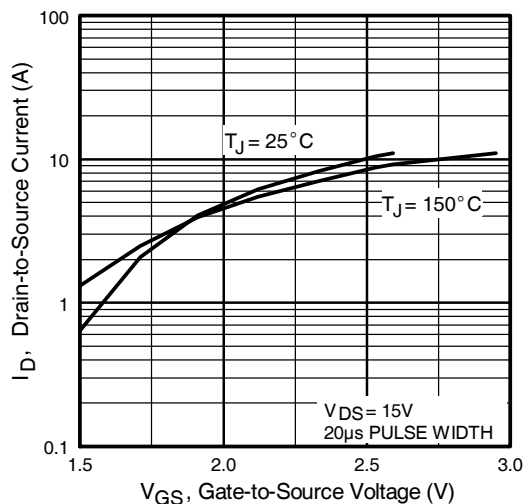


Fig 3. Typical Transfer Characteristics

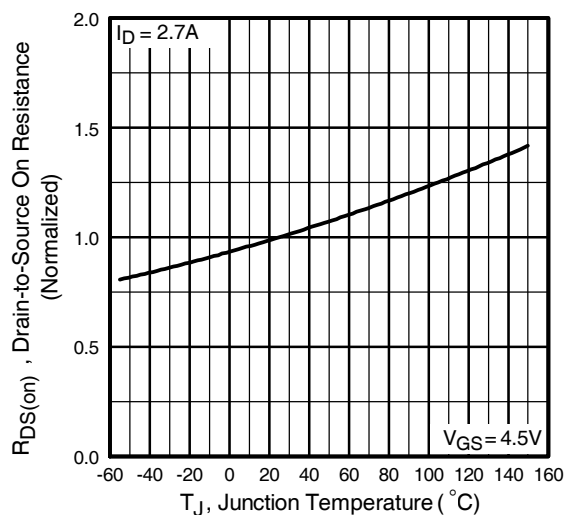


Fig 4. Normalized On-Resistance
Vs. Temperature

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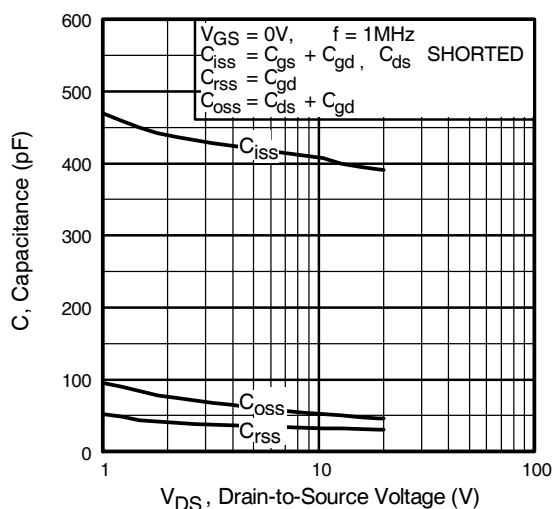


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

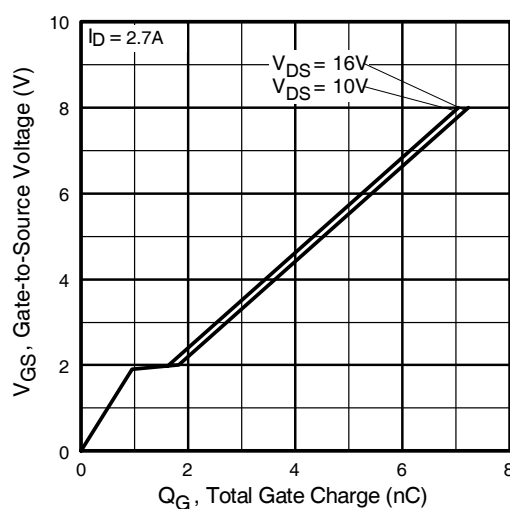


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

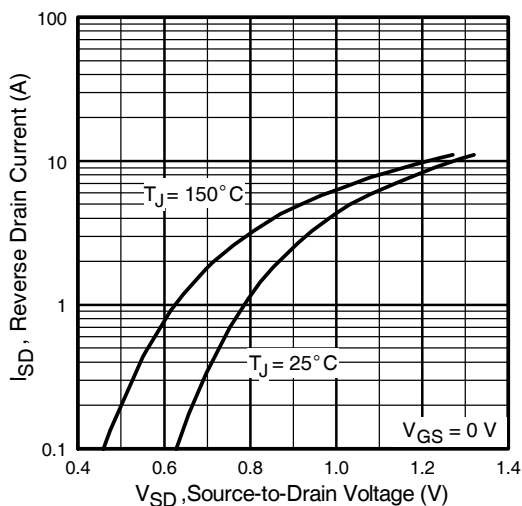


Fig 7. Typical Source-Drain Diode Forward Voltage

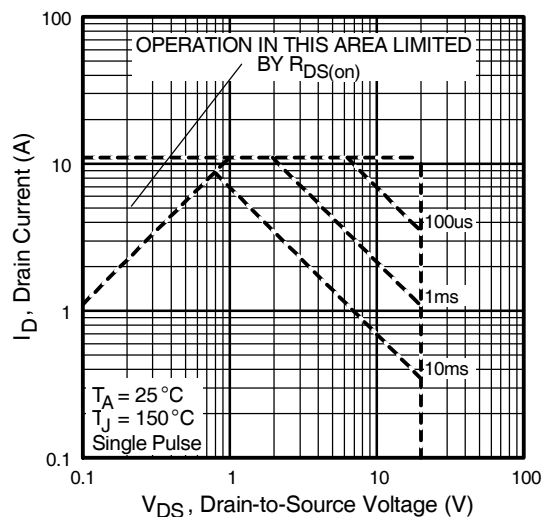


Fig 8. Maximum Safe Operating Area

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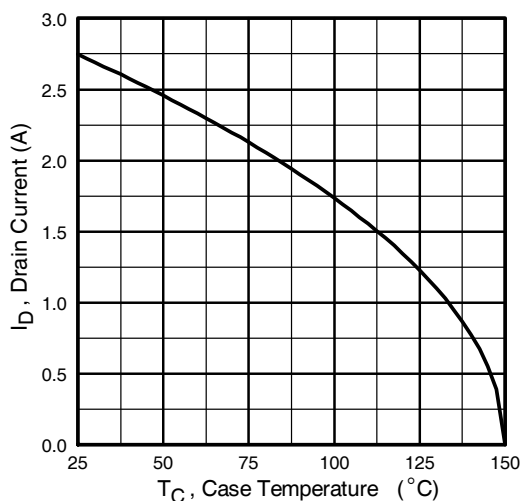


Fig 9. Maximum Drain Current Vs. Case Temperature

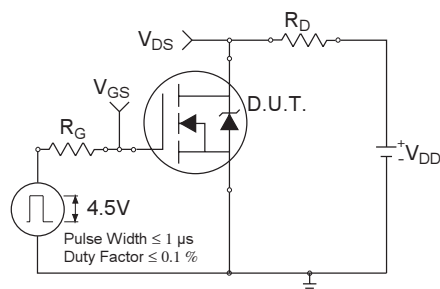


Fig 10a. Switching Time Test Circuit

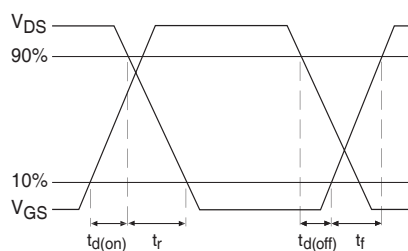


Fig 10b. Switching Time Waveforms

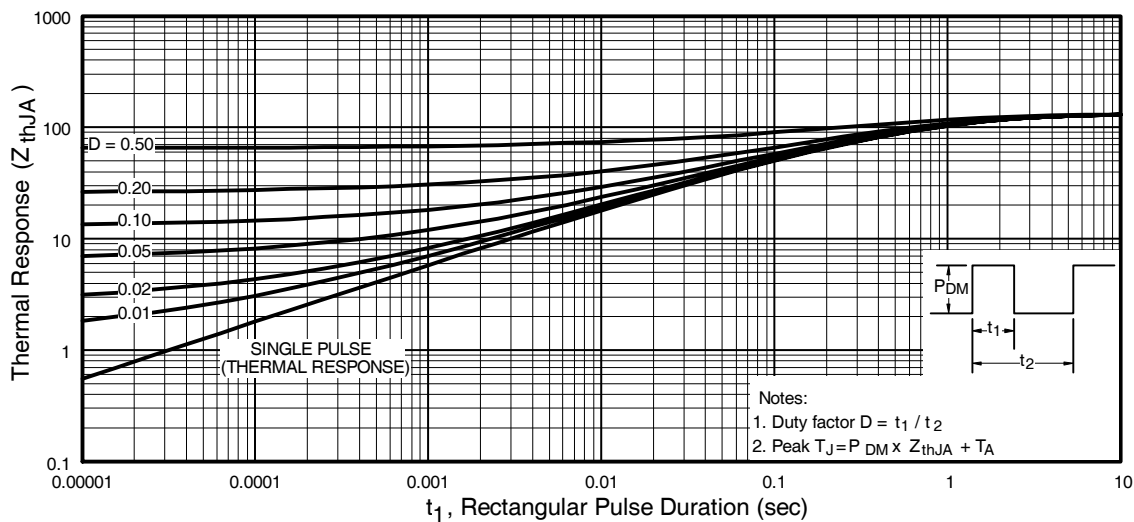


Fig 10. Typical Effective Transient Thermal Impedance, Junction-to-Ambient

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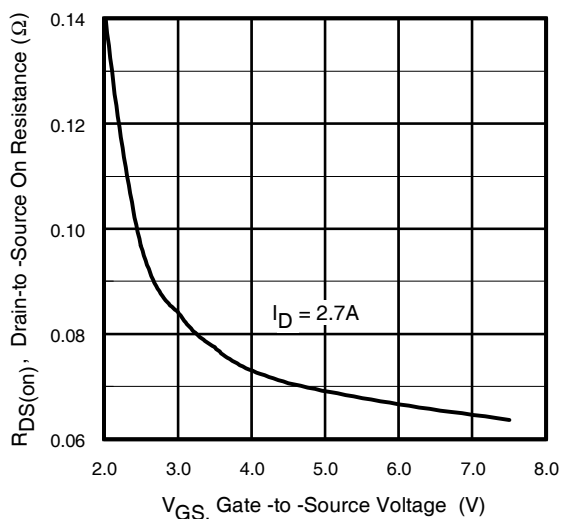


Fig 11. Typical On-Resistance Vs. Gate Voltage

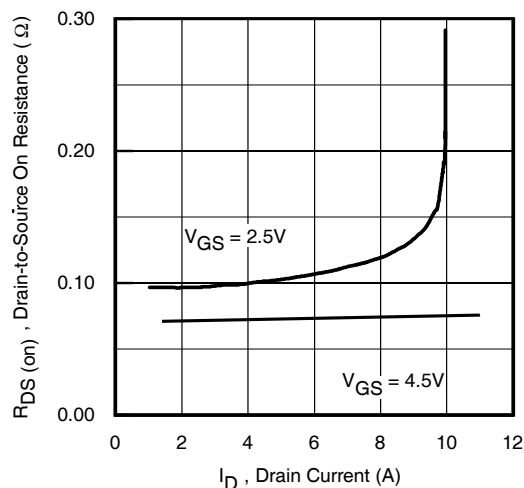


Fig 12. Typical On-Resistance Vs. Drain Current

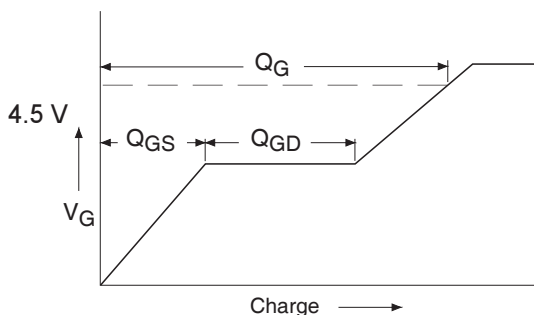


Fig 13a. Basic Gate Charge Waveform

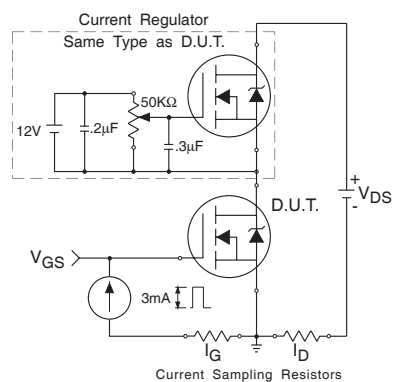


Fig 13b. Gate Charge Test Circuit

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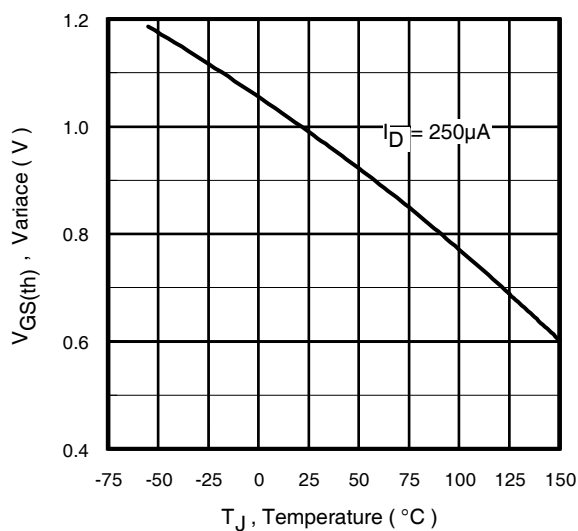


Fig 14. Threshold Voltage Vs. Temperature

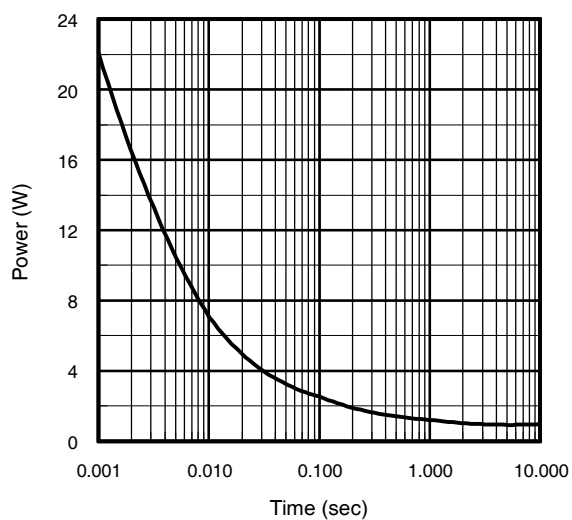


Fig 15. Typical Power Vs. Time

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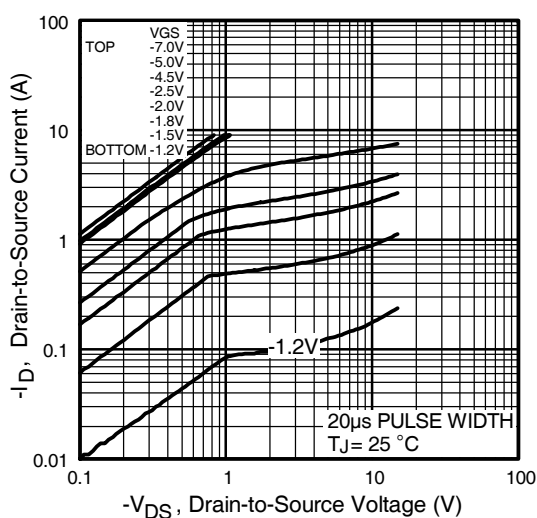


Fig 16. Typical Output Characteristics

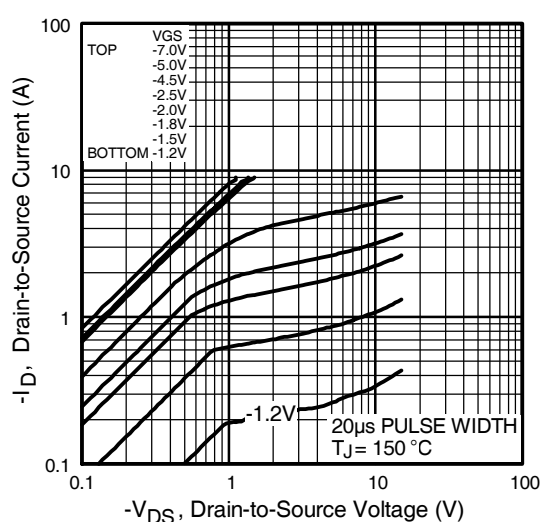


Fig 17. Typical Output Characteristics

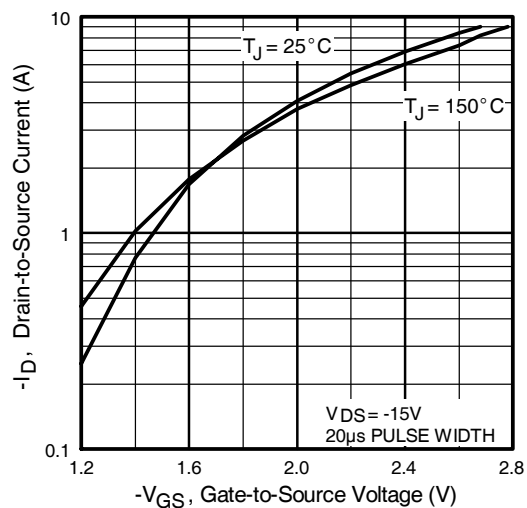


Fig 18. Typical Transfer Characteristics

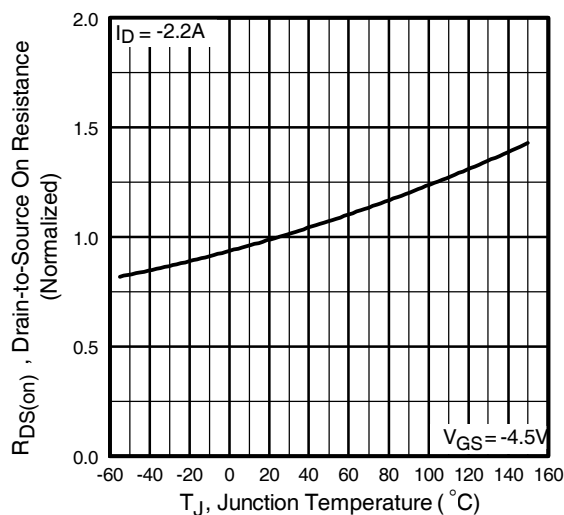


Fig 19. Normalized On-Resistance
Vs. Temperature

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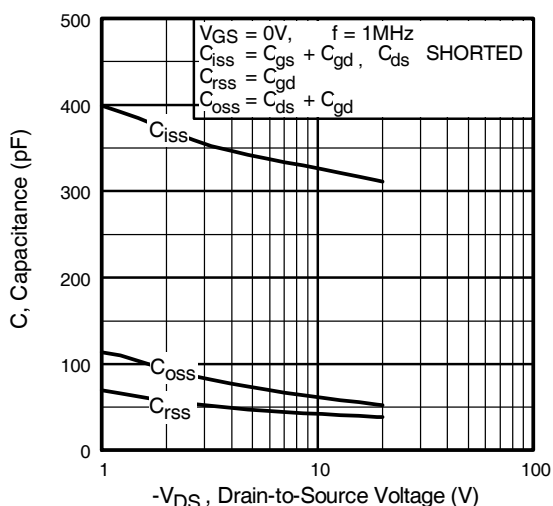


Fig 20. Typical Capacitance Vs.
Drain-to-Source Voltage

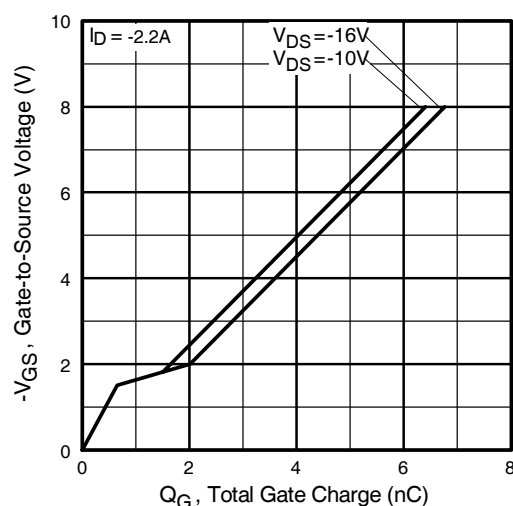


Fig 21. Typical Gate Charge Vs.
Gate-to-Source Voltage

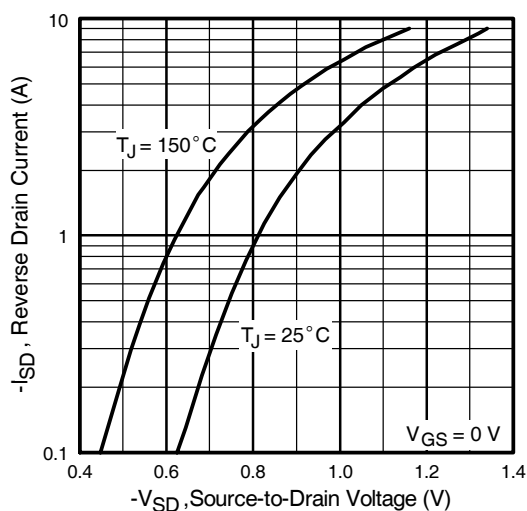


Fig 22. Typical Source-Drain Diode
Forward Voltage

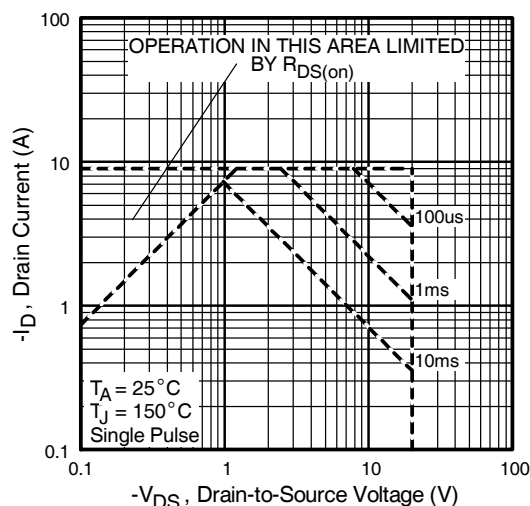


Fig 23. Maximum Safe Operating Area

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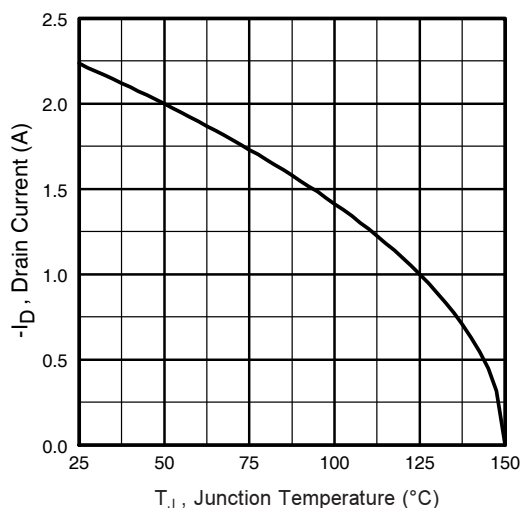


Fig 24. Maximum Drain Current Vs. Junction Temperature

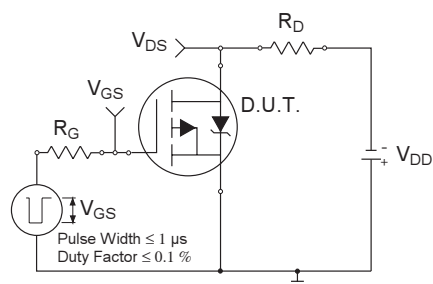


Fig 25a. Switching Time Test Circuit

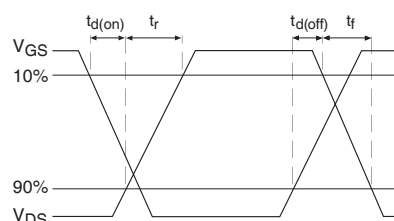


Fig 25b. Switching Time Waveforms

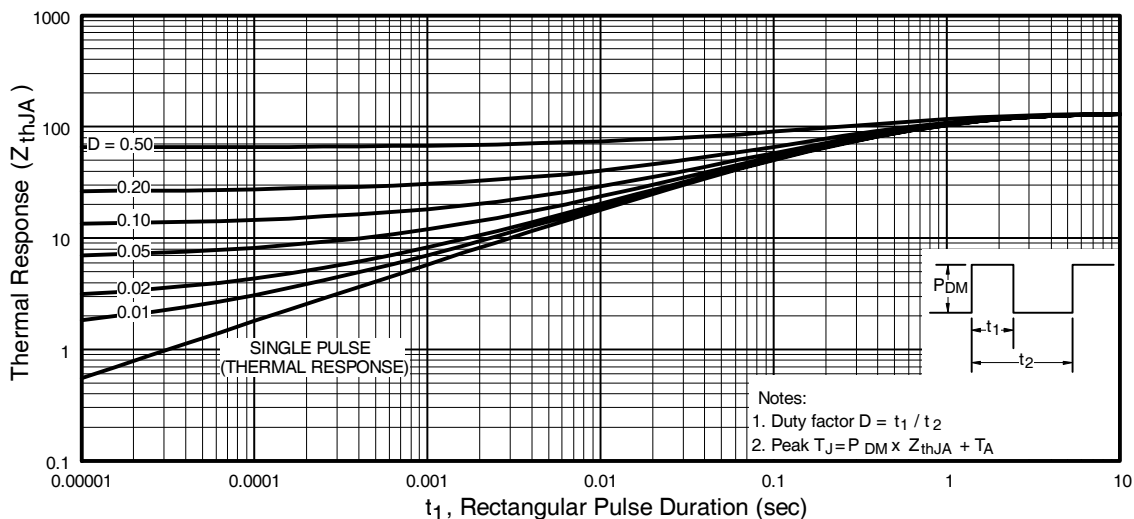


Fig 26. Typical Effective Transient Thermal Impedance, Junction-to-Ambient

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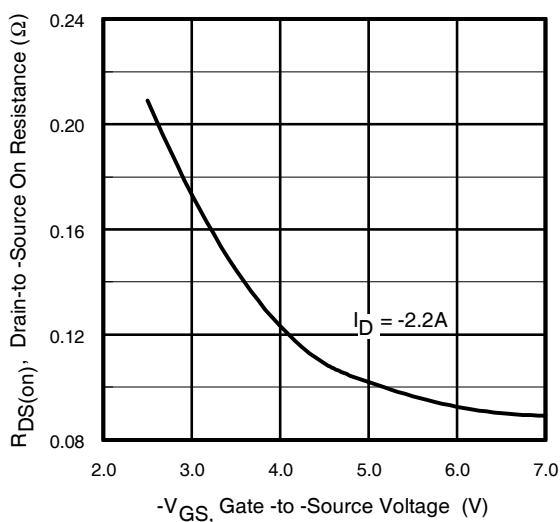


Fig 27. Typical On-Resistance Vs. Gate Voltage

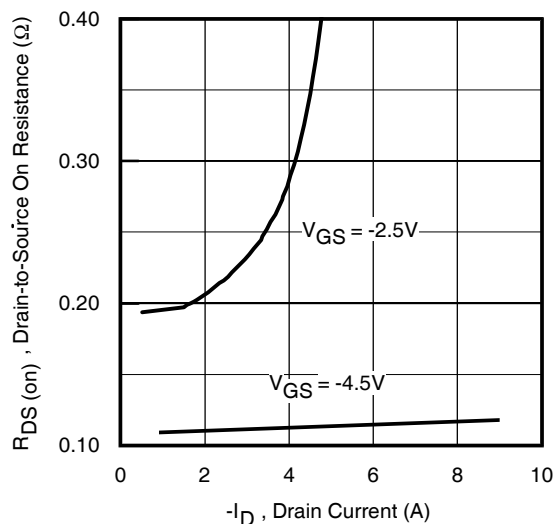


Fig 28. Typical On-Resistance Vs. Drain Current

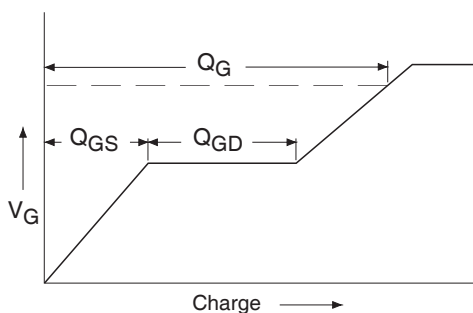


Fig 29a. Basic Gate Charge Waveform

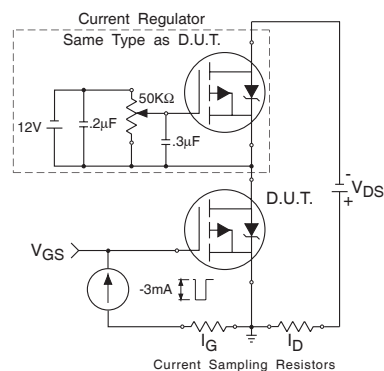


Fig 29b. Gate Charge Test Circuit

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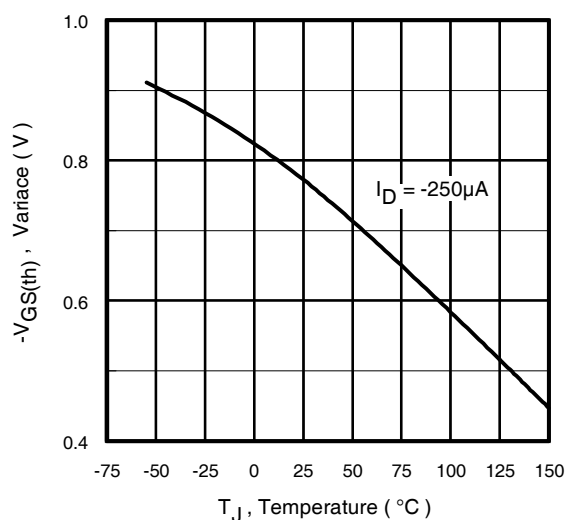


Fig 30. Threshold Voltage Vs. Temperature

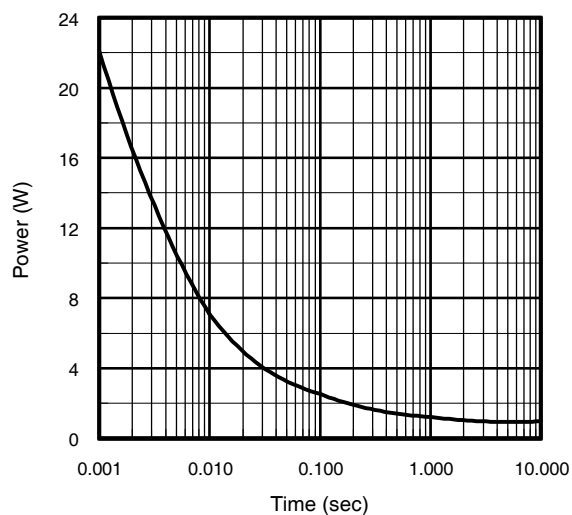
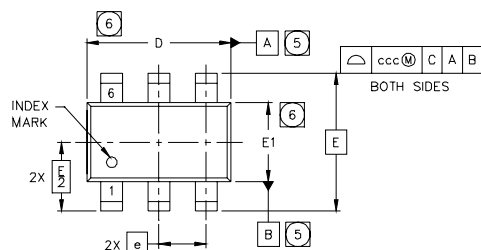


Fig 31. Typical Power Vs. Time

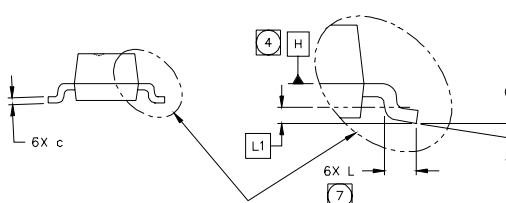
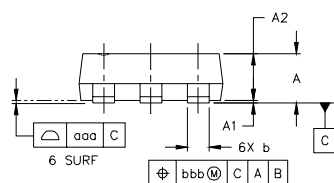
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TSOP-6 Package Outline

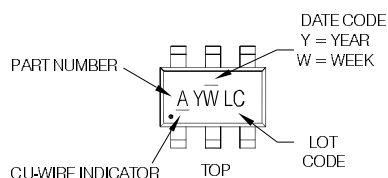
IRF5851PbF



SYMBOL	MO-193AA DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	.0433
A1	0.01	---	0.10	.0004	---	.0039
A2	0.80	0.90	1.00	.0315	.0354	.0393
b	0.25	---	0.50	.0099	---	.0196
c	0.10	---	0.26	.004	---	.010
D	2.90	3.00	3.10	.115	.118	.122
E	2.75 BSC			.108 BSC		
E1	1.30	1.50	1.70	.052	.059	.066
e	1.00 BSC			.039 BSC		
L	0.20	0.40	0.60	.0079	.0157	.0236
L1	0.30 BSC			.0118 BSC		
θ	0°	---	8°	0°	---	8°
aaa	0.10			.004		
bbb	0.15			.006		
ccc	0.25			.010		



TSOP-6 Part Marking Information



PART NUMBER CODE REFERENCE:

A = SI3443DV K = IRF5810
B = IRF5800 L = IRF5804
C = IRF5850 M = IRF5803
D = IRF5851 N = IRF5802
E = IRF5852
F = IRF5801
I = IRF5805
J = IRF5806

Notes:

-A line above the work week (as shown here) indicates Lead-Free
-A line below the part number (as shown here) indicates Cu-wire

W = (1-26) IF PRECEDED BY LAST DIGIT OF CALENDAR YEAR

YEAR	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
2004	4	04	D
2005	5		
2006	6		
2007	7		
2008	8		
2009	9		
2010	0	24	X
		25	Y
		26	Z

W = (27-52) IF PRECEDED BY A LETTER

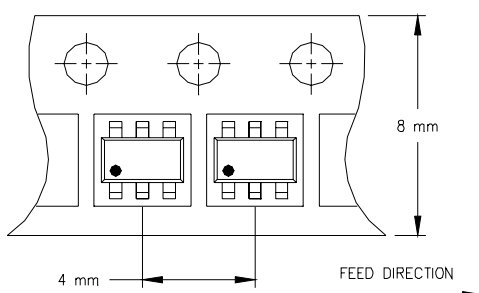
YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
2004	D	30	D
2005	E		
2006	F		
2007	G		
2008	H		
2009	J		
2010	K	50	X
		51	Y
		52	Z

Note: For the most current drawing please refer to IR website at: <http://www.irf.com/package/>

IRF5851PbF

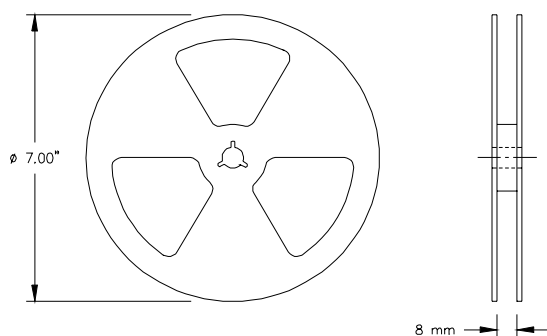
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TSOP-6 Tape & Reel Information



NOTES:

1. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES:

1. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Data and specifications subject to change without notice.
This product has been designed and qualified for the Consumer market.
Qualifications Standards can be found on IR's Web site.

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TAC Fax: (310) 252-7903

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