

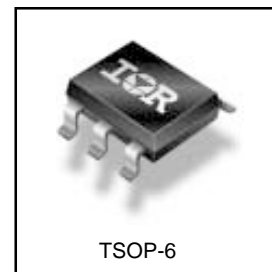
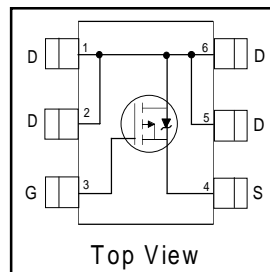
**Applications**

- High frequency DC-DC converters

$V_{DSS}$	$R_{DS(on) \text{ max}}$	$I_D$
200V	2.2 $\Omega$	0.6A

**Benefits**

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective  $C_{OSS}$  to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current



**Absolute Maximum Ratings**

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	0.6	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	0.48	
$I_{DM}$	Pulsed Drain Current ①	4.8	
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation	2.0	W
	Linear Derating Factor	0.016	W/ $^\circ\text{C}$
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
dv/dt	Peak Diode Recovery dv/dt ②	9.6	V/ns
$T_J$	Operating Junction and	-55 to + 150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case )	

**Thermal Resistance**

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient ④	—	62.5	$^\circ\text{C}/\text{W}$

Notes ① through ④ are on page 8  
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# IRF5801

International  
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## Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	200	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.26	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ ③
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	2.2	$\Omega$	$V_{GS} = 10V, I_D = 0.36A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	3.0	—	5.5	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	25	$\mu A$	$V_{DS} = 200V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 160V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 30V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -30V$

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$g_{fs}$	Forward Transconductance	0.44	—	—	S	$V_{DS} = 50V, I_D = 0.36A$
$Q_g$	Total Gate Charge	—	3.9	—	nC	$I_D = 0.36A$ $V_{DS} = 160V$ $V_{GS} = 10V$
$Q_{gs}$	Gate-to-Source Charge	—	0.8	—		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	2.2	—		
$t_{d(on)}$	Turn-On Delay Time	—	6.5	—	ns	$V_{DD} = 100V$ $I_D = 0.36A$ $R_G = 53\Omega$ $V_{GS} = 10V$ ③
$t_r$	Rise Time	—	8.0	—		
$t_{d(off)}$	Turn-Off Delay Time	—	8.8	—		
$t_f$	Fall Time	—	19	—		
$C_{iss}$	Input Capacitance	—	88	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	18	—		
$C_{rss}$	Reverse Transfer Capacitance	—	6.3	—		
$C_{oss}$	Output Capacitance	—	102	—		
$C_{oss}$	Output Capacitance	—	8.4	—		
$C_{oss \text{ eff.}}$	Effective Output Capacitance	—	26	—		

## Avalanche Characteristics

	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy②	—	9.9	mJ
$I_{AR}$	Avalanche Current①	—	0.6	A

## Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	1.8	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	4.8		
$V_{SD}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 0.36A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	45	—	ns	$T_J = 25^\circ\text{C}, I_F = 0.36A$
$Q_{rr}$	Reverse Recovery Charge	—	54	—	nC	$di/dt = 100A/\mu s$ ③

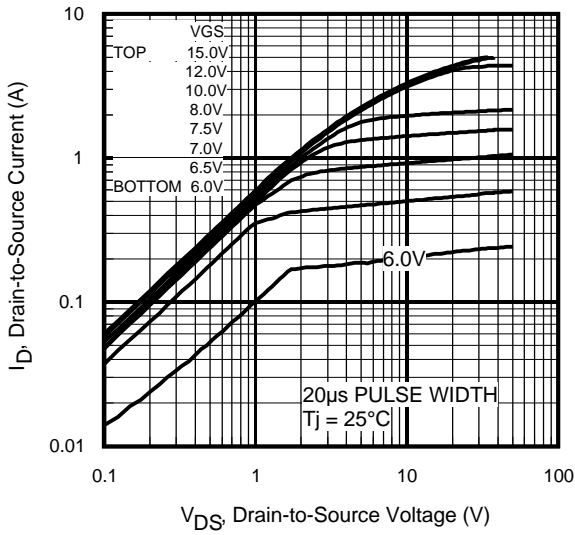


Fig 1. Typical Output Characteristics

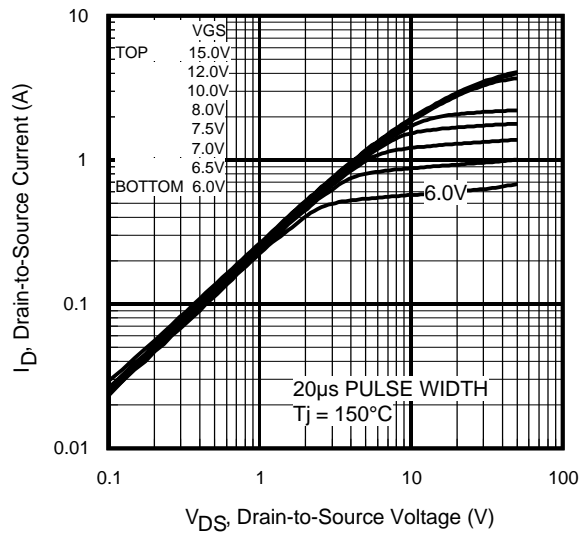


Fig 2. Typical Output Characteristics

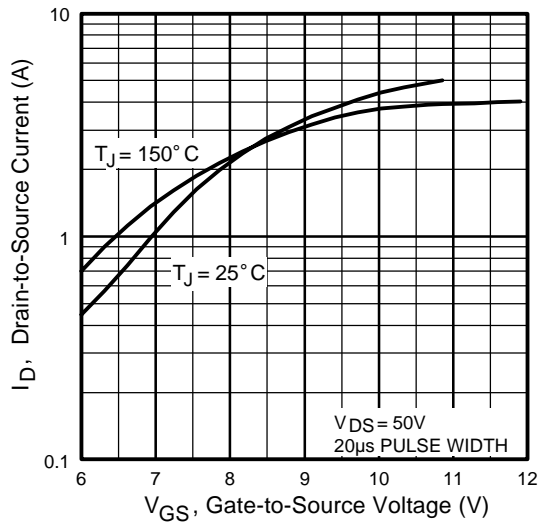


Fig 3. Typical Transfer Characteristics

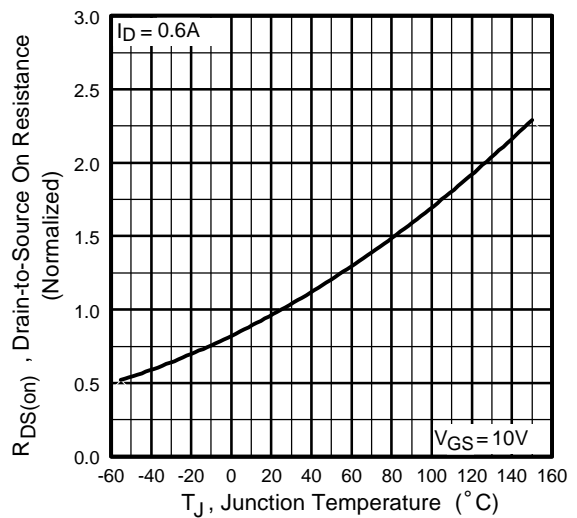
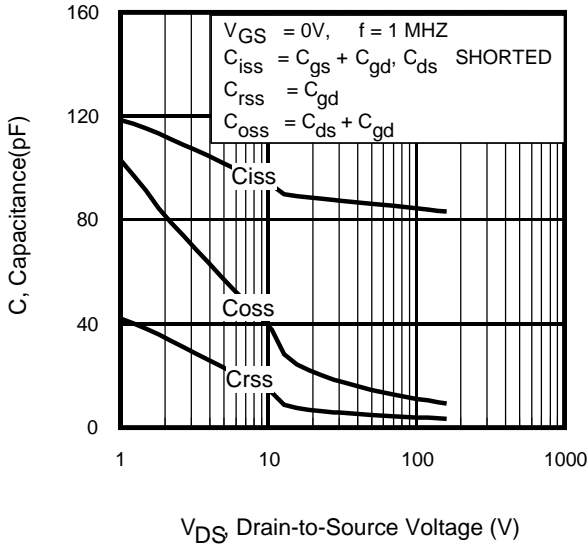
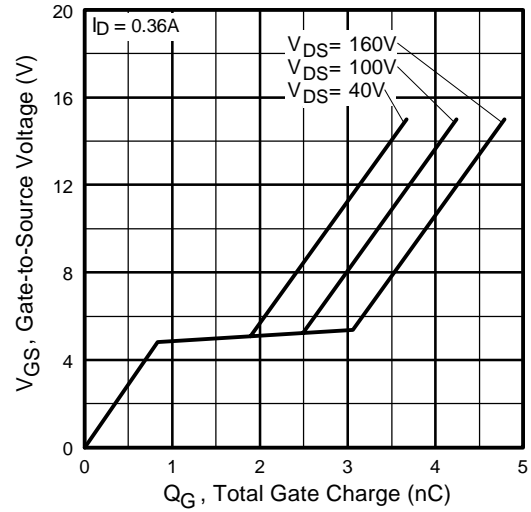


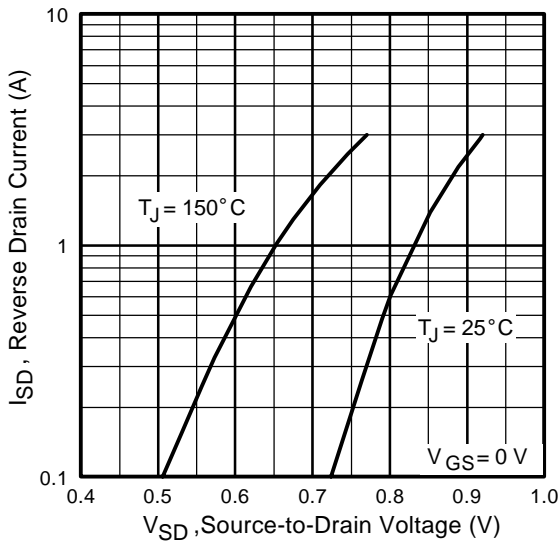
Fig 4. Normalized On-Resistance Vs. Temperature



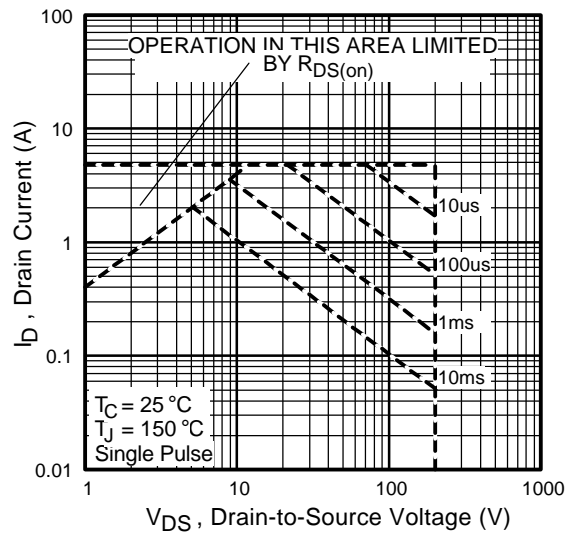
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



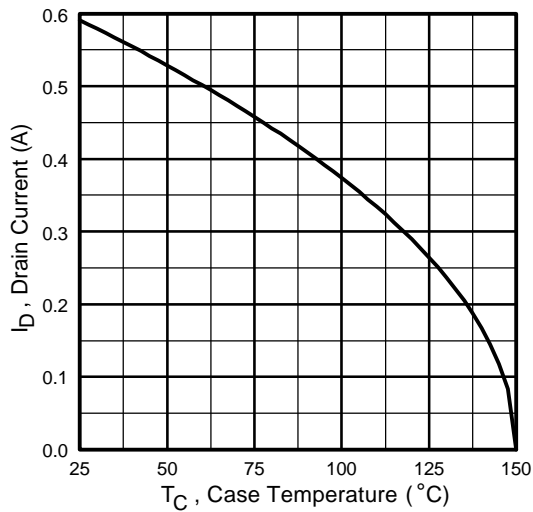
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



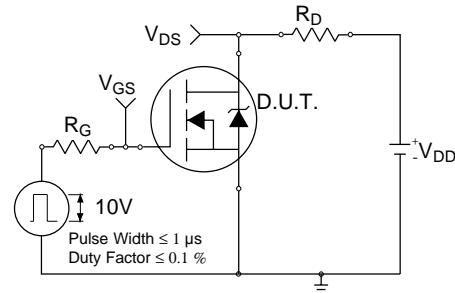
**Fig 7.** Typical Source-Drain Diode Forward Voltage



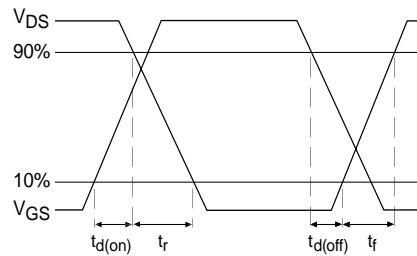
**Fig 8.** Maximum Safe Operating Area



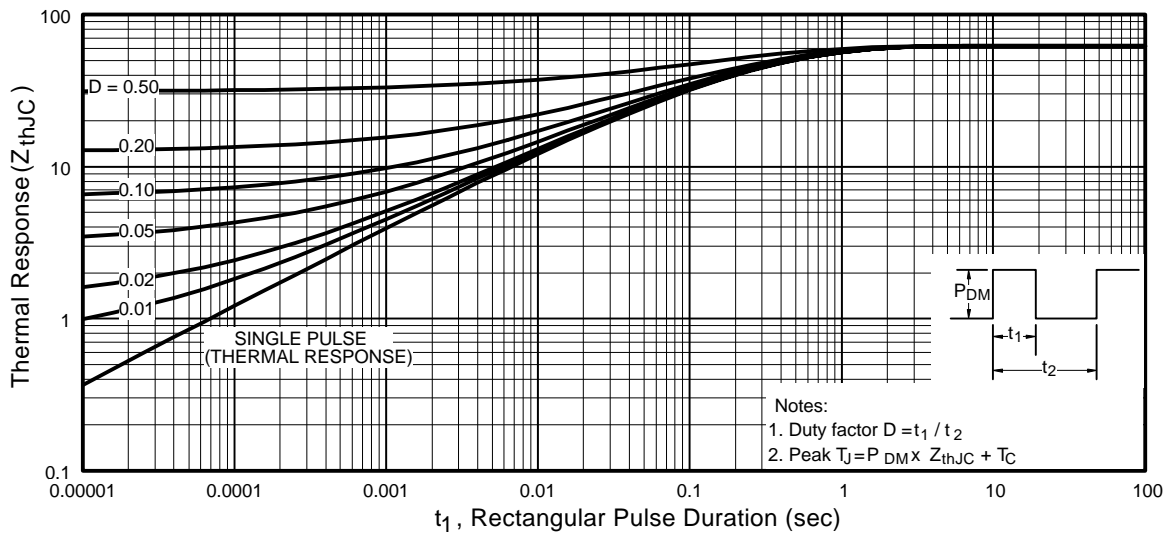
**Fig 9.** Maximum Drain Current Vs. Case Temperature



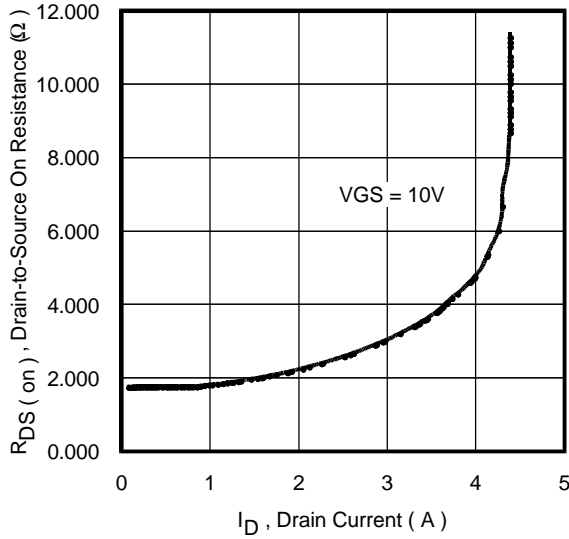
**Fig 10a.** Switching Time Test Circuit



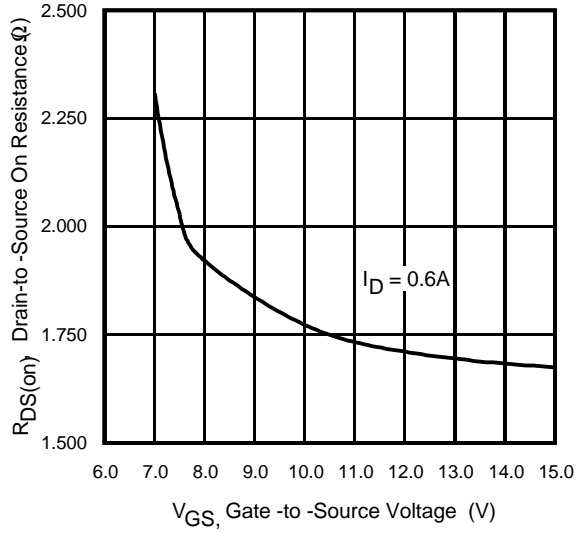
**Fig 10b.** Switching Time Waveforms



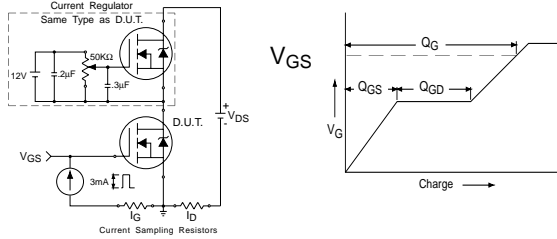
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



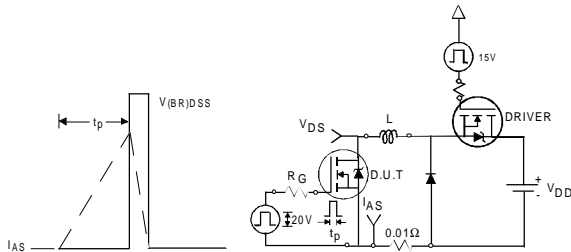
**Fig 12.** On-Resistance Vs. Drain Current



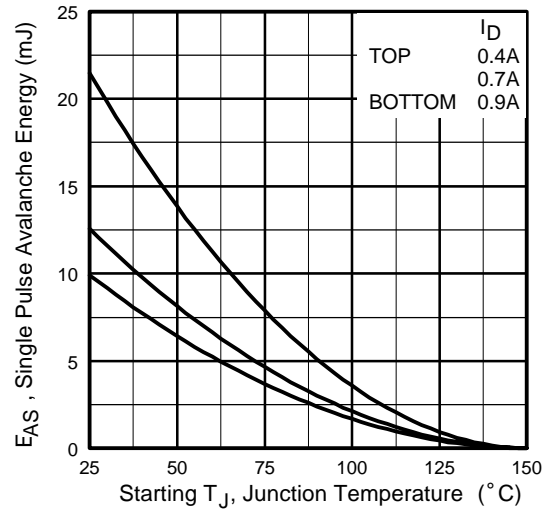
**Fig 13.** On-Resistance Vs. Gate Voltage



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform

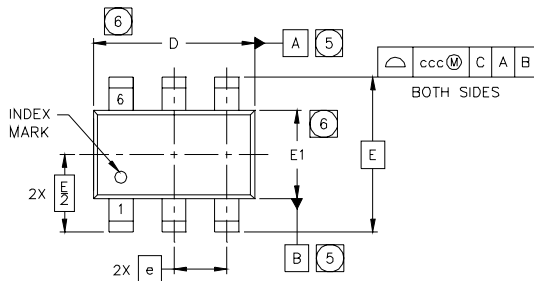


**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms

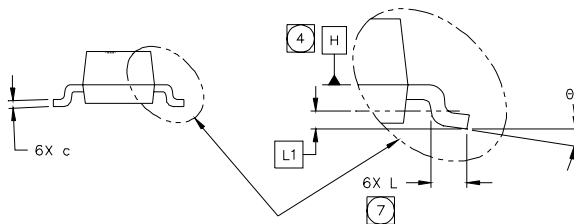
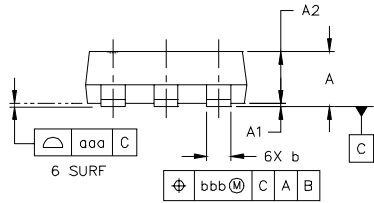


**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current

TSOP-6 Package Outline



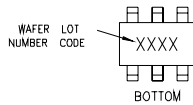
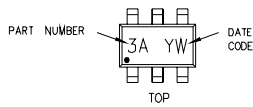
SYMBOL	M0-193AA DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	.0433
A1	0.01	---	0.10	.0004	---	.0039
A2	0.80	0.90	1.00	.0315	.0354	.0393
b	0.25	---	0.50	.0099	---	.0196
c	0.10	---	0.26	.004	---	.010
D	2.90	3.00	3.10	.115	.118	.122
E	2.75 BSC			.108 BSC		
E1	1.30	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

EXAMPLE: THIS IS AN SI34430V

WW = (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		
1996	6		
1997	7		
1998	8		
1999	9		
2000	0	24	X
		25	Y
		26	Z

PART NUMBER EXAMPLES:

3A = SI34430V

DATE CODE EXAMPLES:

YW = 9603 = 6C

YW = 9632 = FF

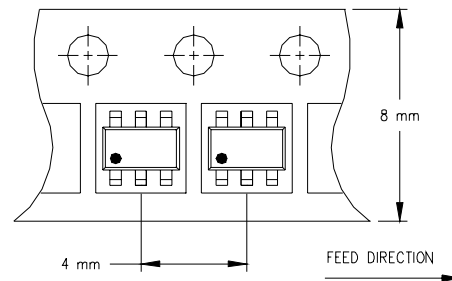
WW = (27-52) IF PRECEDED BY A LETTER

YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
2004	D	30	D
2005	E		
1996	F		
1997	G		
1998	H		
1999	J		
2000	K	50	X
		51	Y
		52	Z

# IRF5801

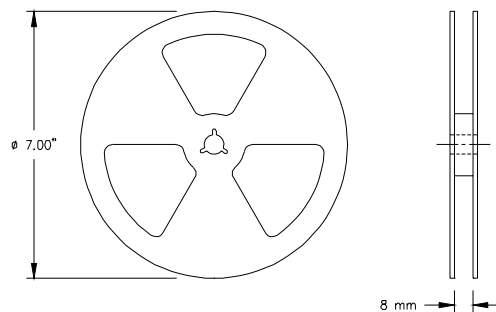
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## TSOP-6 Tape & Reel Information



NOTES:

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



NOTES:

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

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 27\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 0.36\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board,  $t < 10\text{sec}$ .
- ⑤  $C_{OSS}$  eff. is a fixed capacitance that gives the same charging time as  $C_{OSS}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$ .
- ⑥  $I_{SD} \leq 0.36\text{A}$ ,  $di/dt \leq 93\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$ .

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

International  
**IR** Rectifier

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