

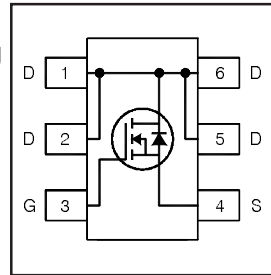
### Applications

- High frequency DC-DC converters

| $V_{DSS}$   | $R_{DS(on)} \text{ max}$                     | $I_D$       |
|-------------|----------------------------------------------|-------------|
| <b>150V</b> | <b><math>1.2\Omega @ V_{GS} = 10V</math></b> | <b>0.9A</b> |

### 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
- Lead-Free
- Halogen-Free



### Absolute Maximum Ratings

|                                | Parameter                                | Max.                   | Units |
|--------------------------------|------------------------------------------|------------------------|-------|
| $I_D @ T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V$ | 0.9                    | A     |
| $I_D @ T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V$ | 0.7                    |       |
| $I_{DM}$                       | Pulsed Drain Current ①                   | 7.0                    |       |
| $P_D @ T_A = 25^\circ\text{C}$ | Power Dissipation②                       | 2.0                    | W     |
|                                | Linear Derating Factor                   | 0.02                   | W/°C  |
| $V_{GS}$                       | Gate-to-Source Voltage                   | $\pm 30$               | V     |
| $dv/dt$                        | Peak Diode Recovery $dv/dt$ ③            | 7.1                    | 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 ) |       |

### Thermal Resistance

|                 | Parameter                    | Max. | Units |
|-----------------|------------------------------|------|-------|
| $R_{\theta JA}$ | Maximum Junction-to-Ambient④ | 62.5 | °C/W  |

Notes ① through ⑥ are on page 8

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# IRF5802PbF

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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    | 150  | —    | —    | V        | $V_{GS} = 0V, I_D = 250\mu A$                          |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.19 | —    | V/°C     | Reference to $25^\circ\text{C}$ , $I_D = 1\text{mA}$ ③ |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —    | —    | 1.2  | $\Omega$ | $V_{GS} = 10V, I_D = 0.54A$ 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   | $\mu A$  | $V_{DS} = 150V, V_{GS} = 0V$                           |
|                                 |                                      | —    | —    | 250  |          | $V_{DS} = 120V, V_{GS} = 0V, T_J = 125^\circ\text{C}$  |
| $I_{GSS}$                       | 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)

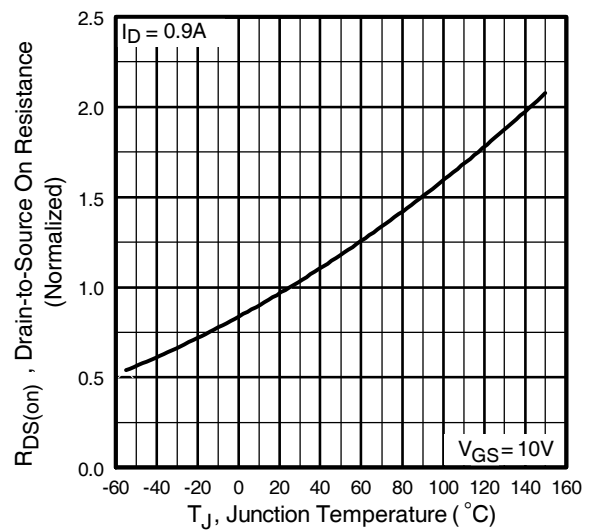
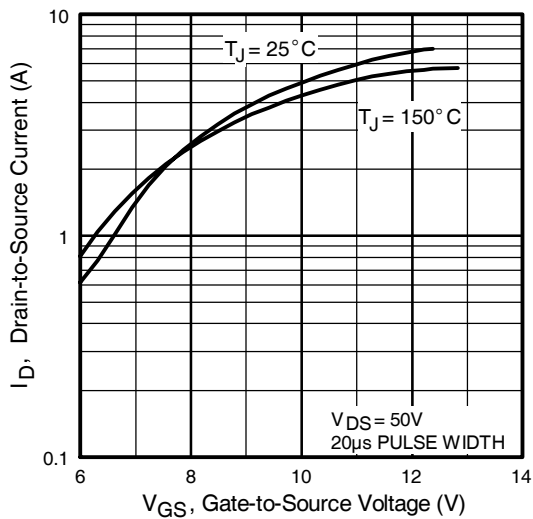
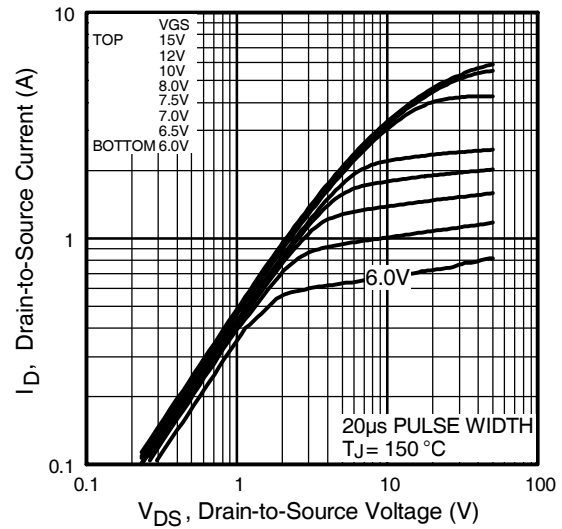
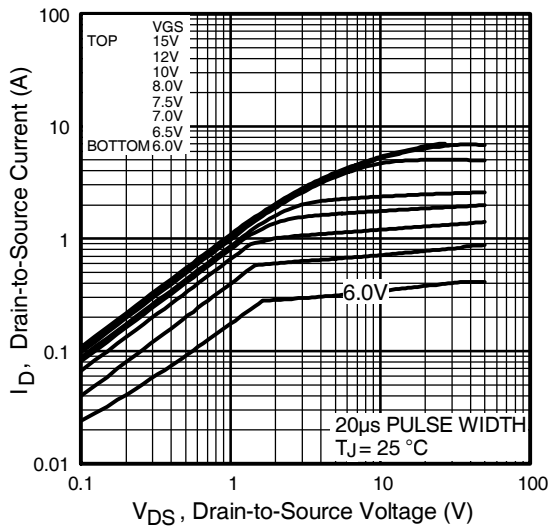
|                        | Parameter                       | Min. | Typ. | Max. | Units | Conditions                                      |
|------------------------|---------------------------------|------|------|------|-------|-------------------------------------------------|
| $g_{fs}$               | Forward Transconductance        | 0.55 | —    | —    | S     | $V_{DS} = 50V, I_D = 0.54A$                     |
| $Q_g$                  | Total Gate Charge               | —    | 4.5  | 6.8  | nC    | $I_D = 0.54A$                                   |
| $Q_{gs}$               | Gate-to-Source Charge           | —    | 1.0  | 1.5  |       | $V_{DS} = 120V$                                 |
| $Q_{gd}$               | Gate-to-Drain ("Miller") Charge | —    | 2.4  | 3.6  |       | $V_{GS} = 10V,$                                 |
| $t_{d(on)}$            | Turn-On Delay Time              | —    | 6.0  | —    | ns    | $V_{DD} = 75V$                                  |
| $t_r$                  | Rise Time                       | —    | 1.6  | —    |       | $I_D = 0.54A$                                   |
| $t_{d(off)}$           | Turn-Off Delay Time             | —    | 7.5  | —    |       | $R_G = 6.0\Omega$                               |
| $t_f$                  | Fall Time                       | —    | 9.2  | —    |       | $V_{GS} = 10V$ ③                                |
| $C_{iss}$              | Input Capacitance               | —    | 88   | —    | pF    | $V_{GS} = 0V$                                   |
| $C_{oss}$              | Output Capacitance              | —    | 26   | —    |       | $V_{DS} = 25V$                                  |
| $C_{rss}$              | Reverse Transfer Capacitance    | —    | 7.7  | —    |       | $f = 1.0\text{MHz}$                             |
| $C_{oss}$              | Output Capacitance              | —    | 110  | —    |       | $V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$ |
| $C_{oss}$              | Output Capacitance              | —    | 14   | —    |       | $V_{GS} = 0V, V_{DS} = 120V, f = 1.0\text{MHz}$ |
| $C_{oss \text{ eff.}}$ | Effective Output Capacitance    | —    | 3.0  | —    |       | $V_{GS} = 0V, V_{DS} = 0V \text{ to } 120V$ ③   |

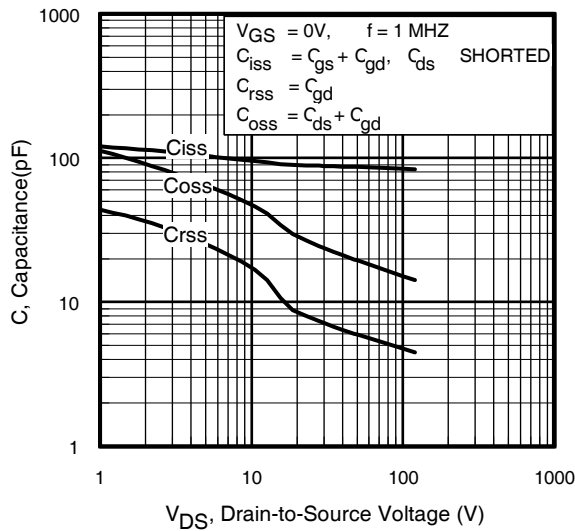
## Avalanche Characteristics

|          | Parameter                      | Typ. | Max. | Units |
|----------|--------------------------------|------|------|-------|
| $E_{AS}$ | Single Pulse Avalanche Energy② | —    | 9.5  | mJ    |
| $I_{AR}$ | Avalanche Current①             | —    | 0.9  | A     |

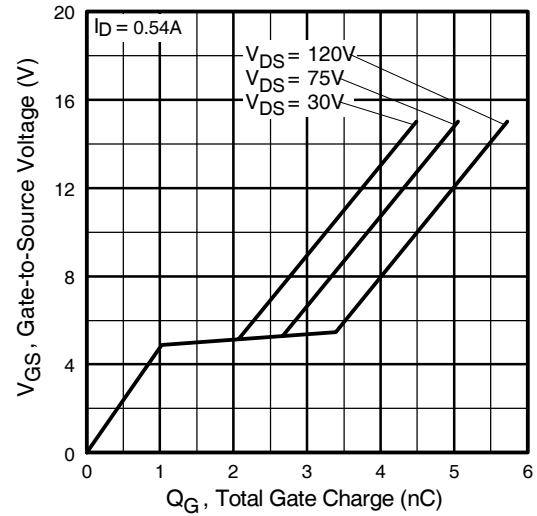
## Diode Characteristics

|          | 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   | —    | —    | 18   |       |                                                                |
| $V_{SD}$ | Diode Forward Voltage                  | —    | —    | 1.3  | V     | $T_J = 25^\circ\text{C}, I_S = 0.54A, V_{GS} = 0V$ ③           |
| $t_{rr}$ | Reverse Recovery Time                  | —    | 46   | 69   | ns    | $T_J = 25^\circ\text{C}, I_F = 0.54A$                          |
| $Q_{rr}$ | Reverse Recovery Charge                | —    | 55   | 83   | nC    | $di/dt = 100A/\mu s$ ③                                         |

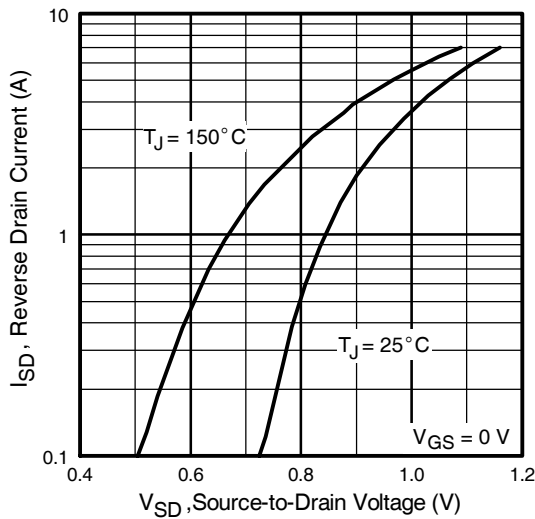




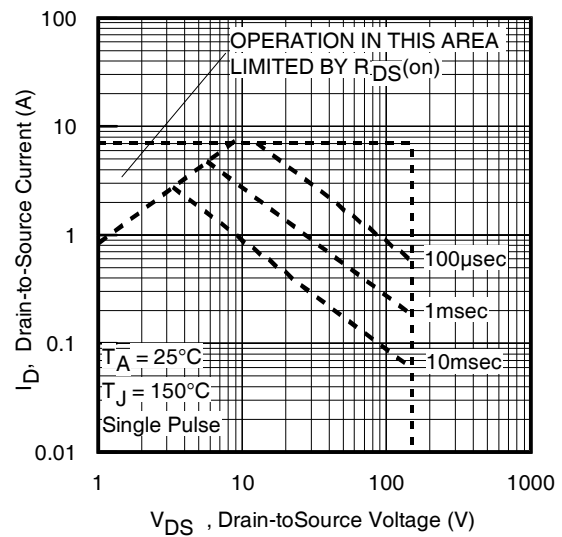
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



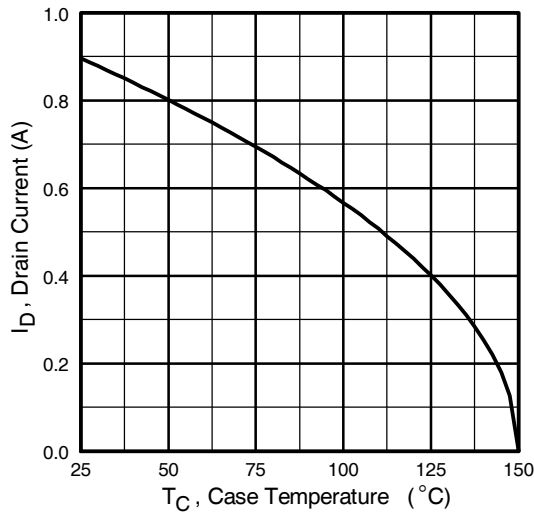
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



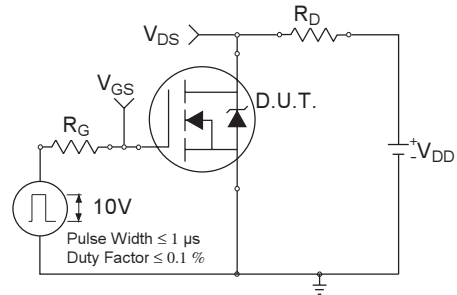
**Fig 7.** Typical Source-Drain Diode Forward Voltage



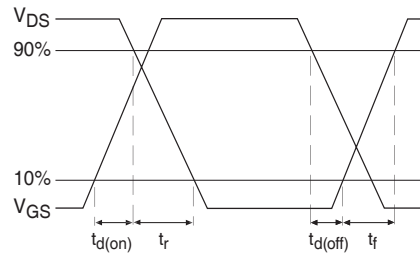
**Fig 8.** Maximum Safe Operating Area



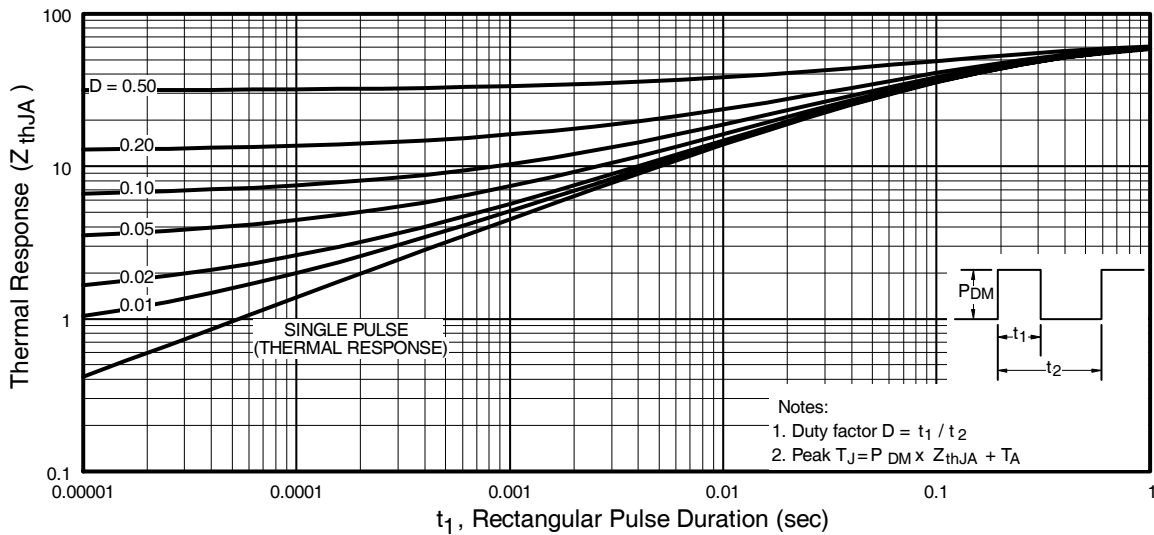
**Fig 9.** Maximum Drain Current Vs. Case Temperature



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



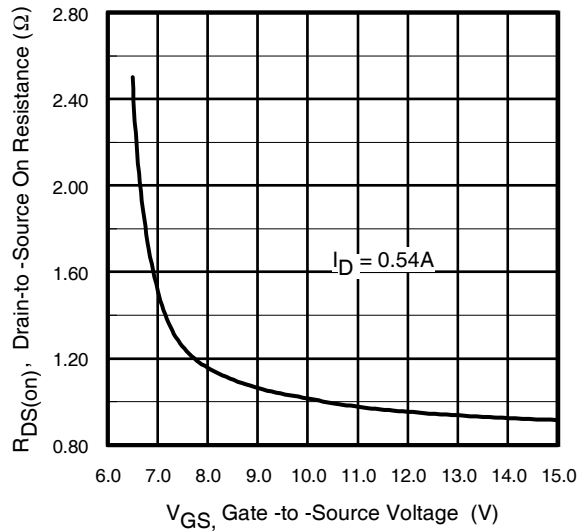
**Fig 10b.** Switching Time Waveforms



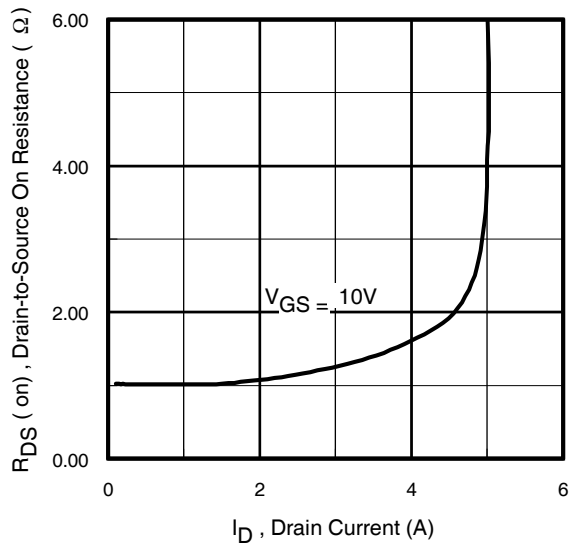
**Fig 11.** Typical Effective Transient Thermal Impedance, Junction-to-Ambient

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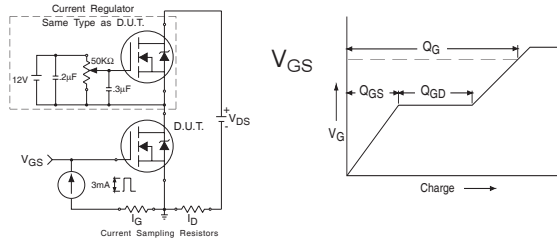
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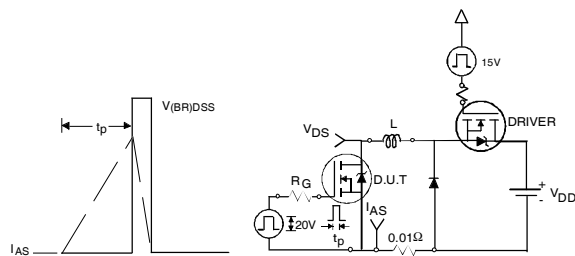
**Fig 12.** Typical On-Resistance Vs. Gate Voltage



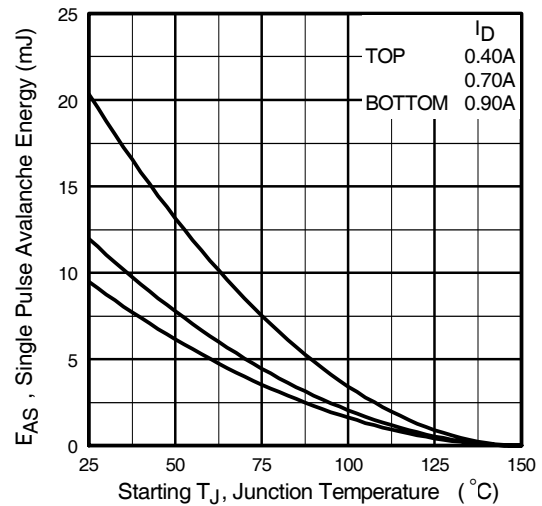
**Fig 13.** Typical On-Resistance Vs. Drain Current



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



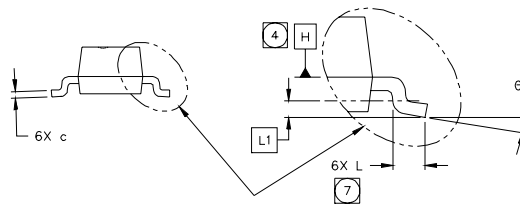
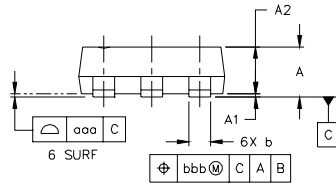
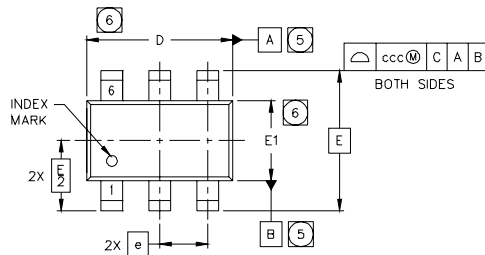
**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms



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

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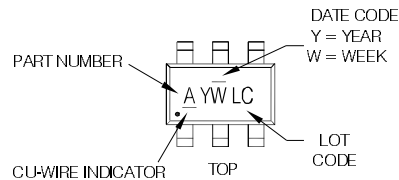
## TSOP-6 Package Outline



| 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 |       |       |
| Ø      | 0"                  | ---  | 8"   | 0"        | ---   | 8"    |
| aaa    | 0.10                |      |      | .004      |       |       |
| bbb    | 0.15                |      |      | .006      |       |       |
| ccc    | 0.25                |      |      | .010      |       |       |

## TSOP-6 Part Marking Information

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



### 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

| 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 |

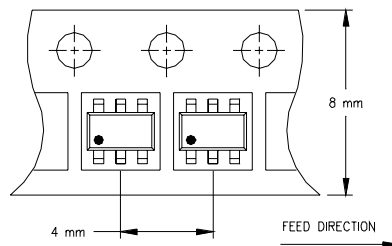
**Note:** For the most current drawing please refer to IR website at: <http://www.irf.com/package/>

[www.irf.com](http://www.irf.com)

# IRF5802PbF

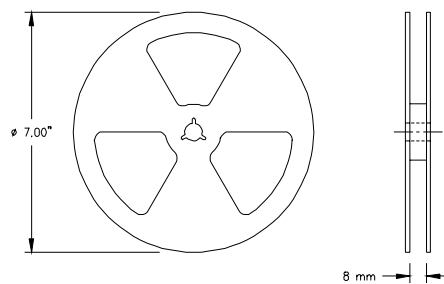
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## TSOP-6 Tape & Reel Information



### 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  $T_J = 25^\circ\text{C}$ ,  $L = 23\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 0.54\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board
- 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  $I_{SD} \leq 0.54\text{A}$ ,  $di/dt \leq 89\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  
 $T_J \leq 150^\circ\text{C}$

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

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