

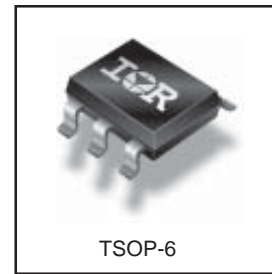
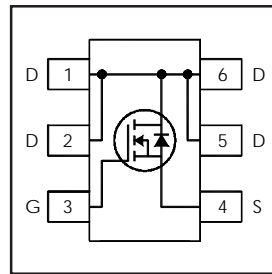
Applications

- High frequency DC-DC converters

| | | |
|------------------------|-------------------------------|----------------------|
| V_{DSS} | R_{DS(on)} max | I_D |
| 200V | 2.2Ω | 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°C | Continuous Drain Current, V _{GS} @ 10V | 0.6 | A |
| I _D @ T _A = 70°C | Continuous Drain Current, V _{GS} @ 10V | 0.48 | |
| I _{DM} | Pulsed Drain Current ① | 4.8 | |
| P _D @ T _A = 25°C | Power Dissipation | 2.0 | W |
| | Linear Derating Factor | 0.016 | W/°C |
| V _{GS} | Gate-to-Source Voltage | ± 30 | V |
| dv/dt | Peak Diode Recovery dv/dt ② | 9.6 | 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

| Symbol | Parameter | Typ. | Max. | Units |
|------------------|-----------------------|-------------|-------------|--------------|
| R _{θJA} | Junction-to-Ambient ④ | — | 62.5 | °C/W |

Notes ① through ⑥ are on page 8

www.irf.com

IRF5801

International
IR Rectifier

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/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ ③ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 2.2 | Ω | $V_{GS} = 10V, I_D = 0.36A$ 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 | μA | $V_{DS} = 200V, V_{GS} = 0V$ |
| | | — | — | 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 |

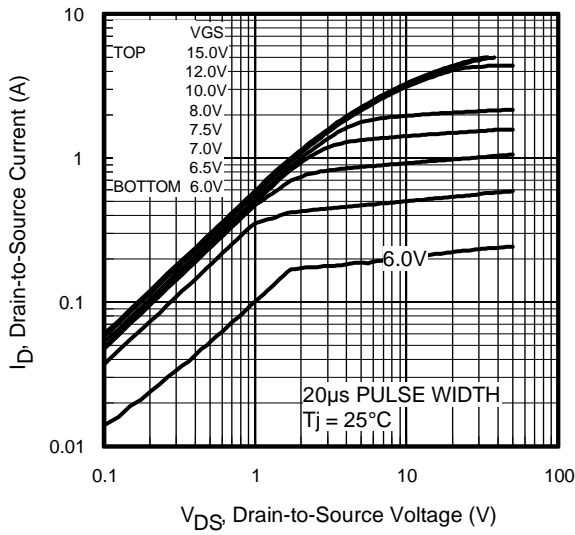


Fig 1. Typical Output Characteristics

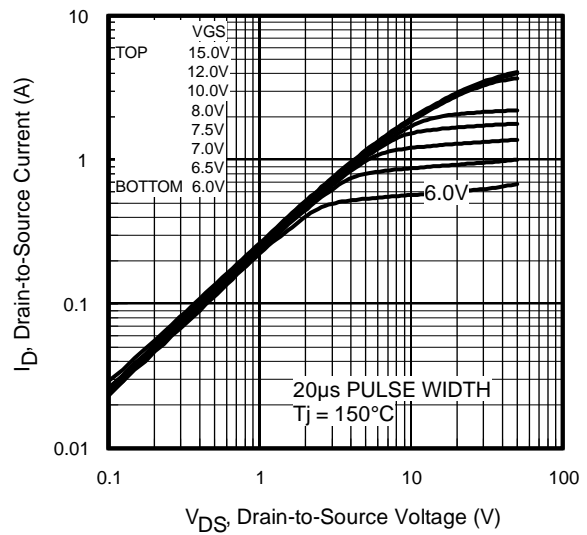


Fig 2. Typical Output Characteristics

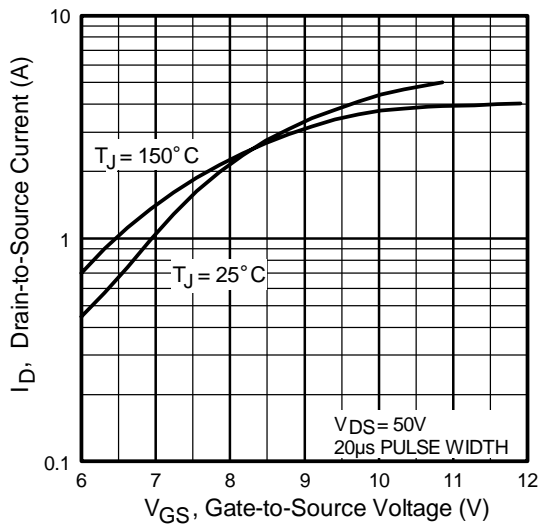


Fig 3. Typical Transfer Characteristics

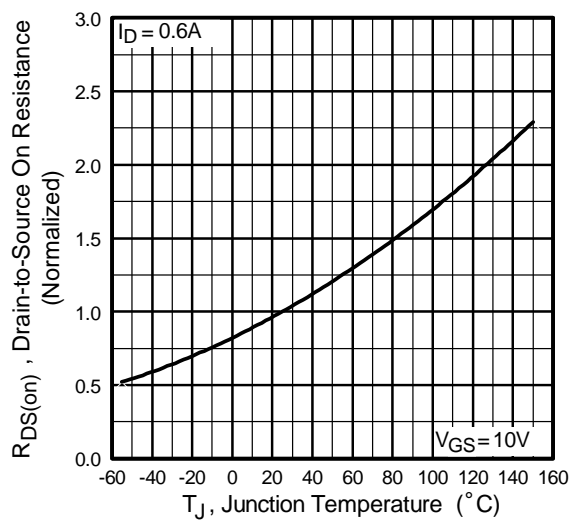


Fig 4. Normalized On-Resistance Vs. Temperature

IRF5801

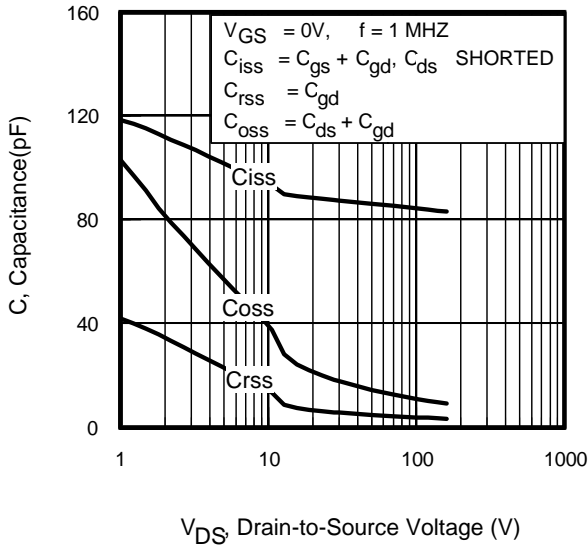


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

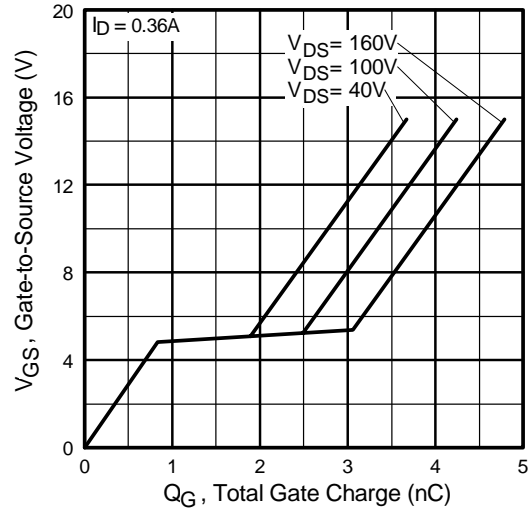


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

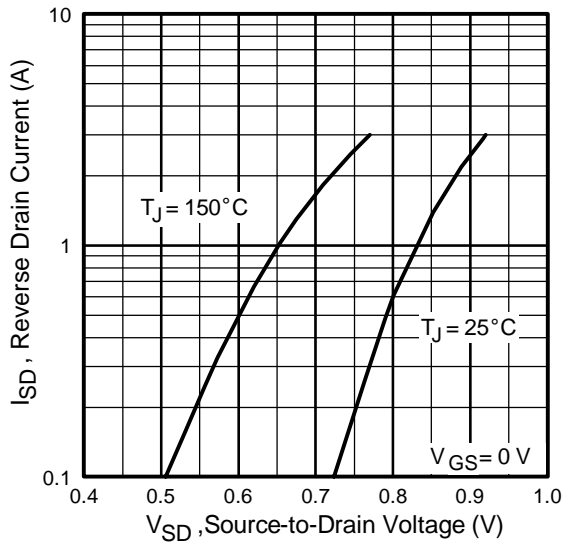


Fig 7. Typical Source-Drain Diode Forward Voltage

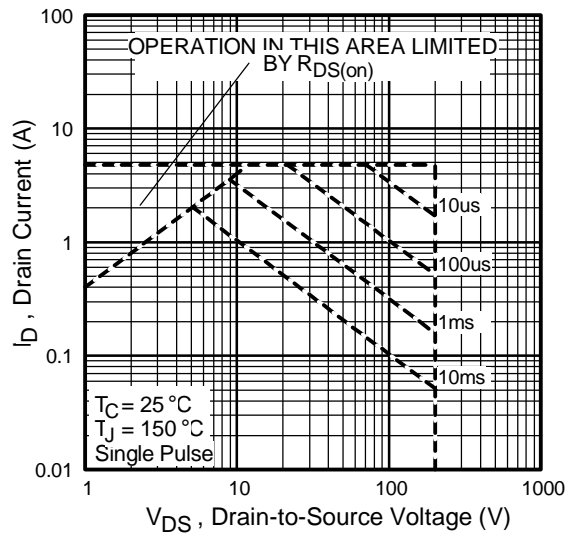


Fig 8. Maximum Safe Operating Area

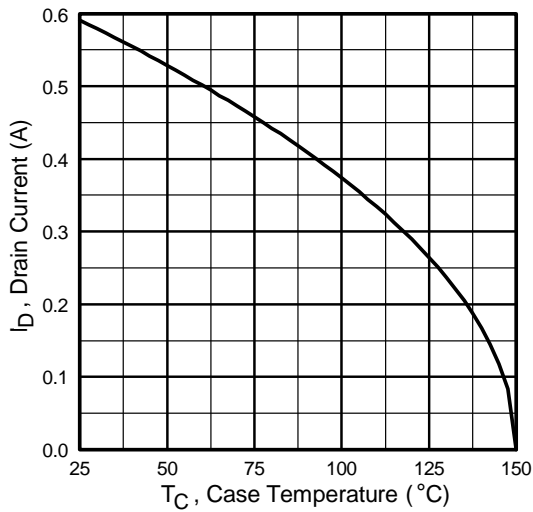


Fig 9. Maximum Drain Current Vs. Case Temperature

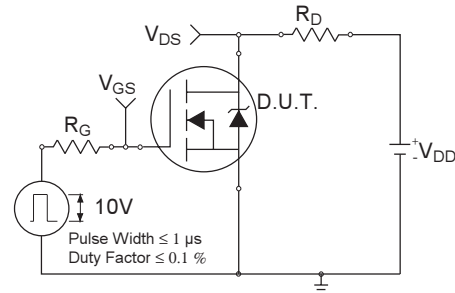


Fig 10a. Switching Time Test Circuit

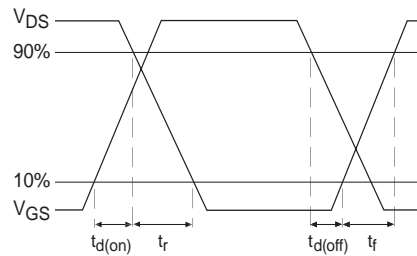


Fig 10b. Switching Time Waveforms

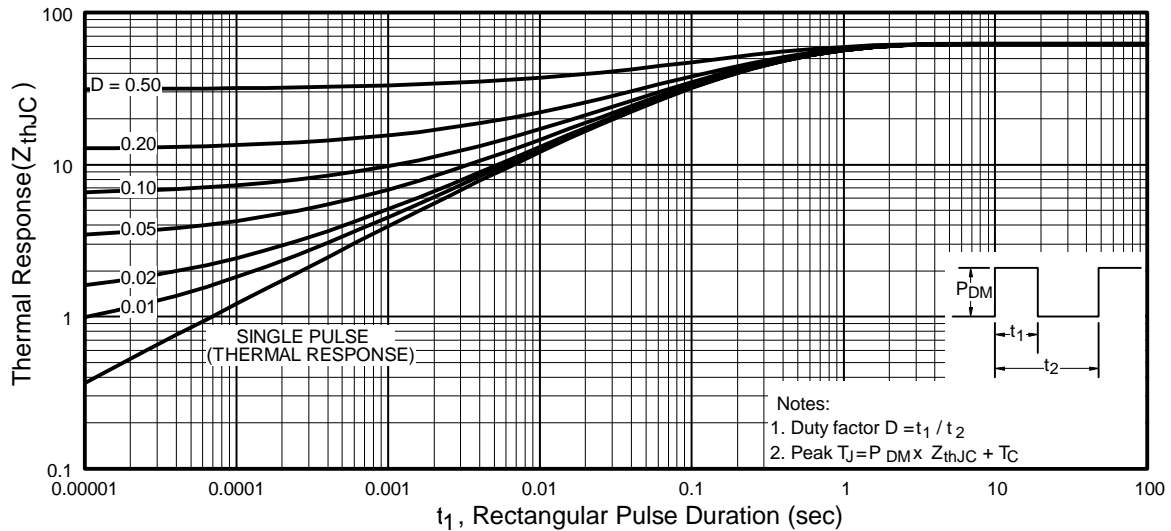


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

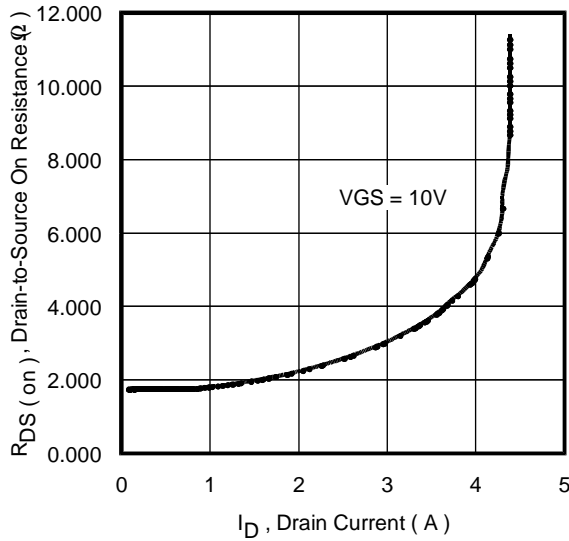


Fig 12. On-Resistance Vs. Drain Current

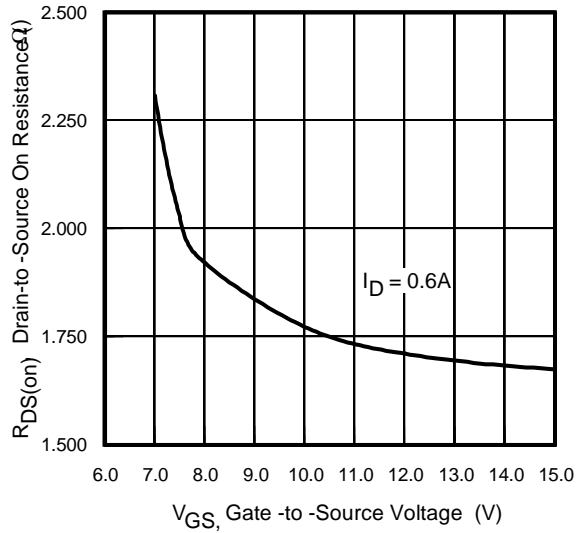


Fig 13. On-Resistance Vs. Gate Voltage

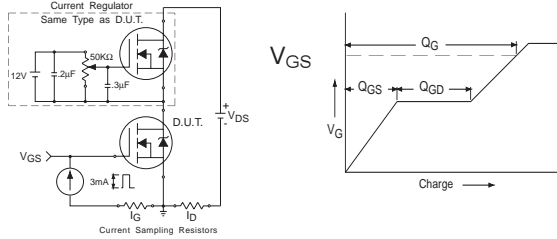


Fig 14a&b. Basic Gate Charge Test Circuit and Waveform

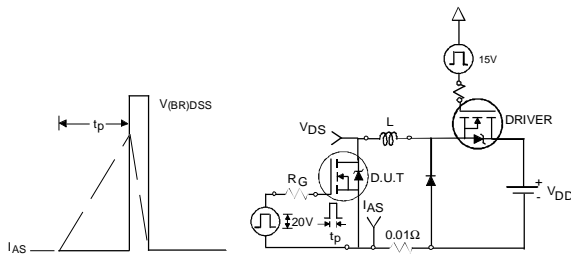


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

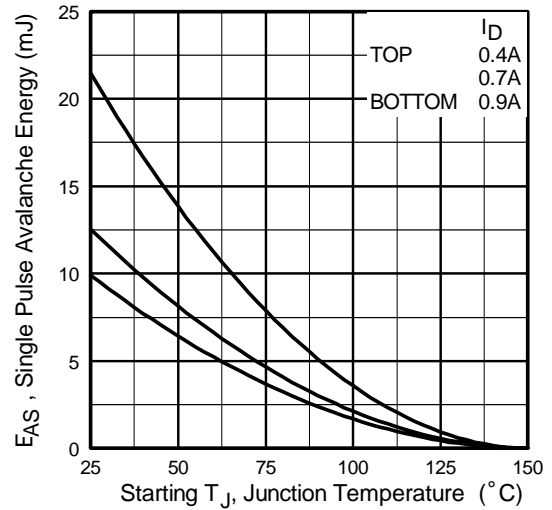
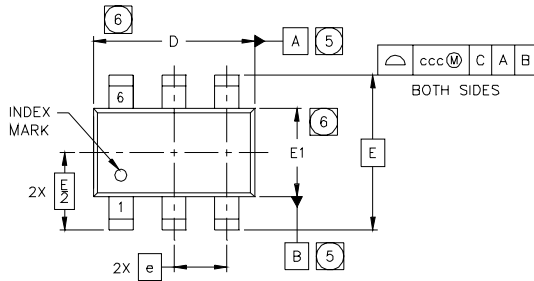
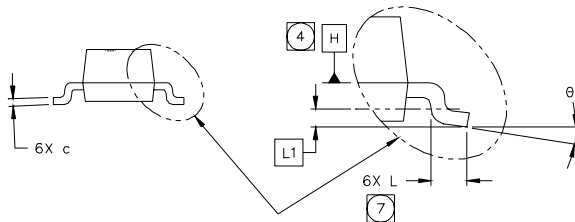
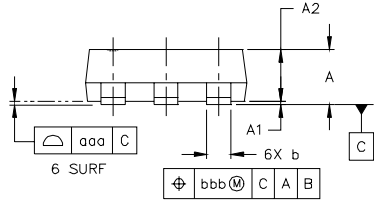


Fig 15c. Maximum Avalanche Energy Vs. Drain Current

TSOP-6 Package Outline



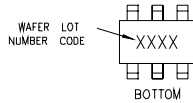
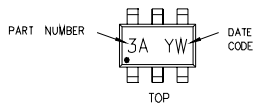
| SYMBOL | M0-193AA DIMENSIONS | | | | | |
|--------|---------------------|------|------|-----------|-------|-------|
| | MILLIMETERS | | | INCHES | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | --- | --- | 1.10 | --- | --- | .0433 |
| A1 | 0.01 | --- | 0.10 | .0004 | --- | .0039 |
| A2 | 0.80 | 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

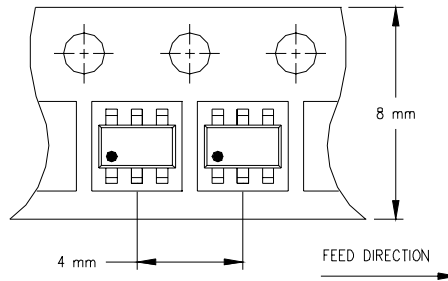
WW = (27-52) IF PRECEDED BY A LETTER

| 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

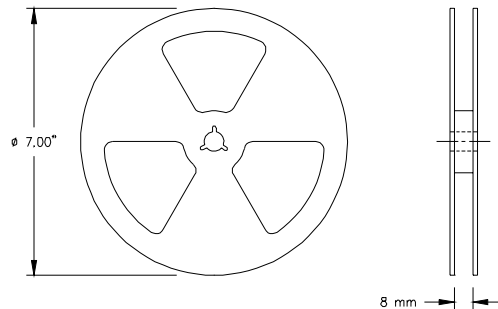
International
IR Rectifier

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

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.7/02

www.irf.com