SMPS MOSFET

# IRF6218SPbF

HEXFET® Power MOSFET

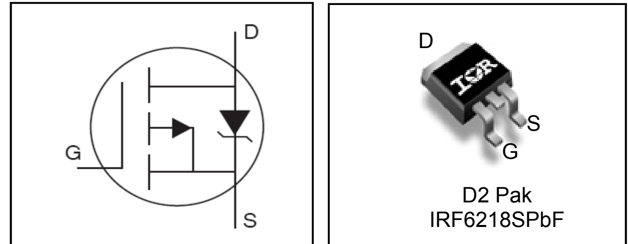
## Applications

- Reset Switch for Active Clamp Reset DC-DC converters

| $V_{DSS}$ | $R_{DS(on)}$ (max) | $I_D$ |
|---|---|---|
| - 150V | 150mΩ @ $V_{GS}$ = -10V | -27A |

## 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




| G | D | S |
|---|---|---|
| Gate | Drain | Source |

| Base part number | Package Type | Standard Pack | | Orderable Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| IRF6218SPbF | D2-Pak | Tube | 50 | IRF6218SPbF |
| | | Tape and Reel Left | 800 | IRF6218STRLPbF |

### Absolute Maximum Ratings

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-to-Source Voltage | -150 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | |
| $I_D$ @ $T_C$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | - 27 | A |
| $I_D$ @ $T_C$ = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V | -19 | |
| $I_{DM}$ | Pulsed Drain Current ① | - 110 | |
| $P_D$ @$T_C$ = 25°C | Maximum Power Dissipation | 250 | W |
| | Linear Derating Factor | 1.6 | W/°C |
| dv/dt | Peak Diode Recovery dv/dt③ | 8.2 | V/ns |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | -55 to + 175 | °C |
| | Soldering Temperature, for 10 seconds (1.6mm from case) | 300 | |

### Thermal Resistance

| Symbol | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case ⑤ | —— | 0.61 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient ( PCB Mount, steady state) ⑥ | —— | 40 | |

Notes ① through ⑥ are on page 2

### Static @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | -150 | —— | —— | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | —— | -0.17 | —— | V/°C | Reference to 25°C, $I_D$ = -1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | —— | 120 | 150 | mΩ | $V_{GS}$ = -10V, $I_D$ = -16A ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | -3.0 | —— | - 5.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | —— | —— | -25 | µA | $V_{DS}$ = -120V, $V_{GS}$ = 0V |
| | | —— | —— | -250 | | $V_{DS}$ = -120V,$V_{GS}$ = 0V,$T_J$ = 150°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | —— | —— | -100 | nA | $V_{GS}$ = -20V |
| | Gate-to-Source Reverse Leakage | —— | —— | 100 | | $V_{GS}$ = 20V |

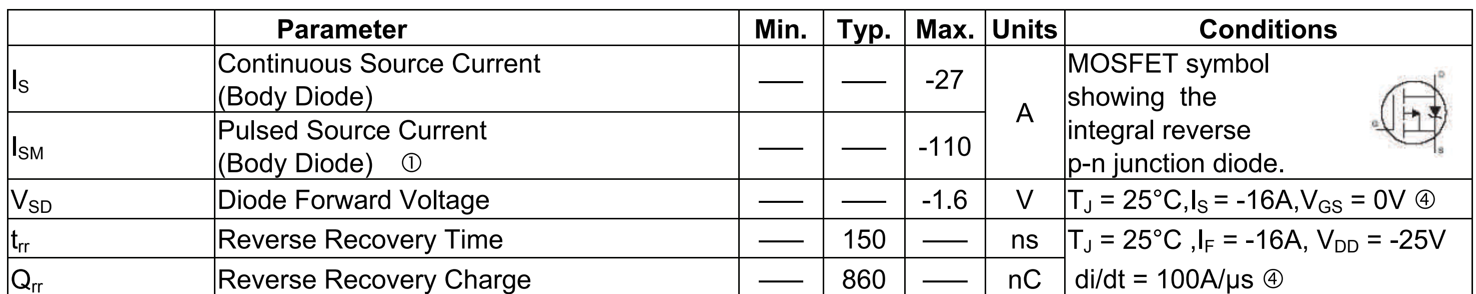
### Dynamic @ $T_J$ = 25°C (unless otherwise specified)

| | | | | | | |
|---|---|---|---|---|---|---|
| gfs | Forward Trans conductance | 11 | —— | —— | S | $V_{DS}$ = -50V, $I_D$ = -16A |
| $Q_g$ | Total Gate Charge | —— | 71 | 110 | nC | $I_D$ = -16A |
| $Q_{gs}$ | Gate-to-Source Charge | —— | 21 | —— | | $V_{DS}$ = -120V |
| $Q_{gd}$ | Gate-to-Drain ('Miller') Charge | —— | 32 | —— | | $V_{GS}$ = -10V ④ |
| $t_{d(on)}$ | Turn-On Delay Time | —— | 21 | —— | ns | $V_{DD}$ = -75V |
| $t_r$ | Rise Time | —— | 70 | —— | | $I_D$ = -16A |
| $t_{d(off)}$ | Turn-Off Delay Time | —— | 35 | —— | | $R_G$ = 3.9Ω |
| $t_f$ | Fall Time | —— | 30 | —— | | $V_{GS}$ = -10V ④ |
| $C_{iss}$ | Input Capacitance | —— | 2210 | —— | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | —— | 370 | —— | | $V_{DS}$ = -25V |
| $C_{rss}$ | Reverse Transfer Capacitance | —— | 89 | —— | | $f$ = 1.0MHz |
| $C_{oss}$ | Output Capacitance | —— | 2220 | —— | | $V_{GS}$ = 0V, $V_{DS}$ = -1.0V, $f$ = 1.0MHz |
| $C_{oss}$ | Output Capacitance | —— | 170 | —— | | $V_{GS}$ = 0V, $V_{DS}$ = -120V, $f$ = 1.0MHz |
| $C_{oss\ eff.}$ | Effective Output Capacitance | —— | 340 | —— | | $V_{GS}$ = 0V, $V_{DS}$ = 0V to -120V |

### Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $E_{AS}$ | Single Pulse Avalanche Energy ② | —— | 210 | mJ |
| $I_{AR}$ | Avalanche Current ① | —— | -16 | A |

### Diode Characteristics



| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | —— | —— | -27 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | —— | —— | -110 | | |
| $V_{SD}$ | Diode Forward Voltage | —— | —— | -1.6 | V | $T_J$ = 25°C,$I_S$ = -16A,$V_{GS}$ = 0V ④ |
| $t_{rr}$ | Reverse Recovery Time | —— | 150 | —— | ns | $T_J$ = 25°C ,$I_F$ = -16A, $V_{DD}$ = -25V |
| $Q_{rr}$ | Reverse Recovery Charge | —— | 860 | —— | nC | di/dt = 100A/µs ④ |

**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature.
② starting $T_J$ = 25°C, L = 1.6mH, $R_G$ = 25Ω, $I_{AS}$ = -17A
③ $I_{SD} \leq$ -17A, di/dt $\leq$ -520A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C.
④ Pulse width $\leq$ 300µs; duty cycle $\leq$ 2%.
⑤ $R_\theta$ is measured at $T_J$ of approximately 90°C.
⑥ When mounted on 1" square PCB ( FR-4 or G-10 Material ). For recommended footprint and soldering techniques refer to application note #AN-994.

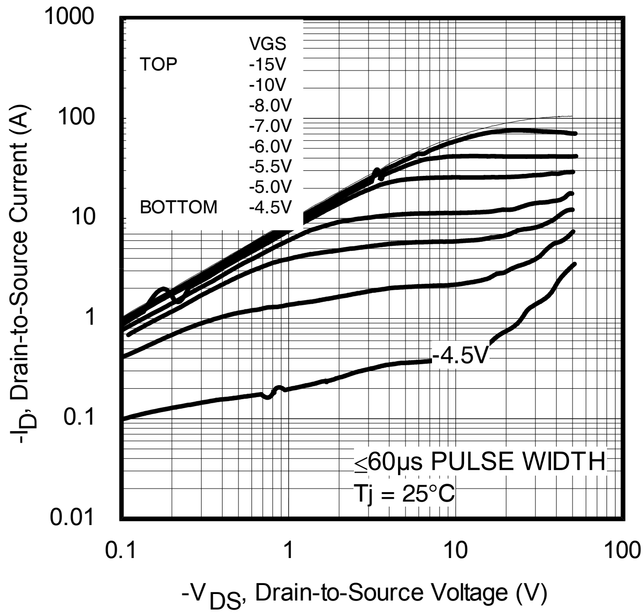



**Fig. 1** Typical Output Characteristics

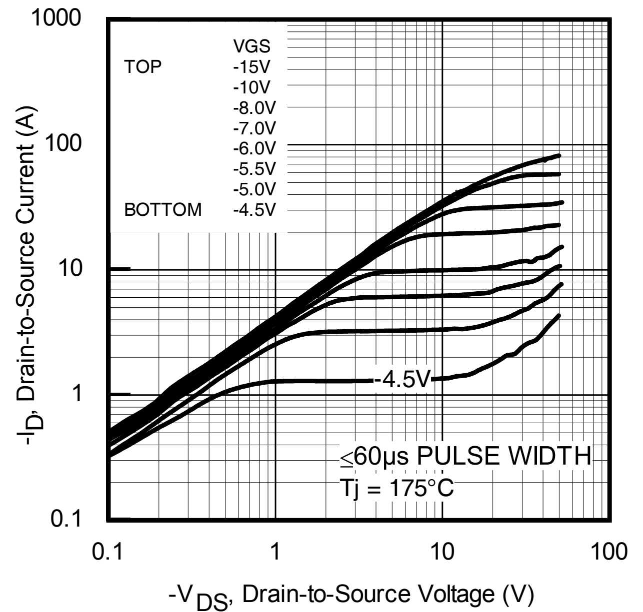



**Fig. 2** Typical Output Characteristics

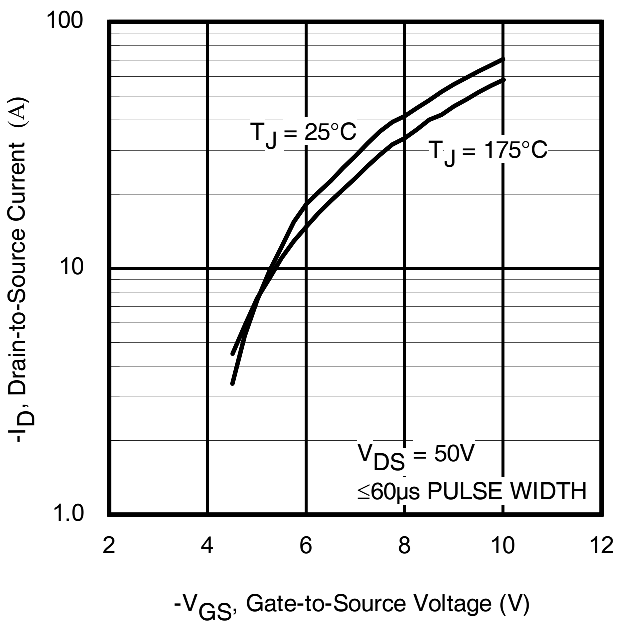



**Fig. 3** Typical Transfer Characteristics

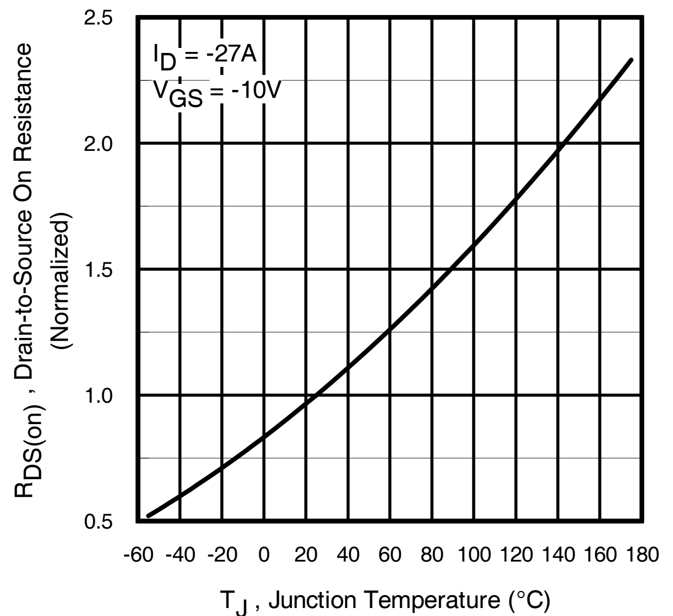



**Fig. 4** Normalized On-Resistance vs. Temperature

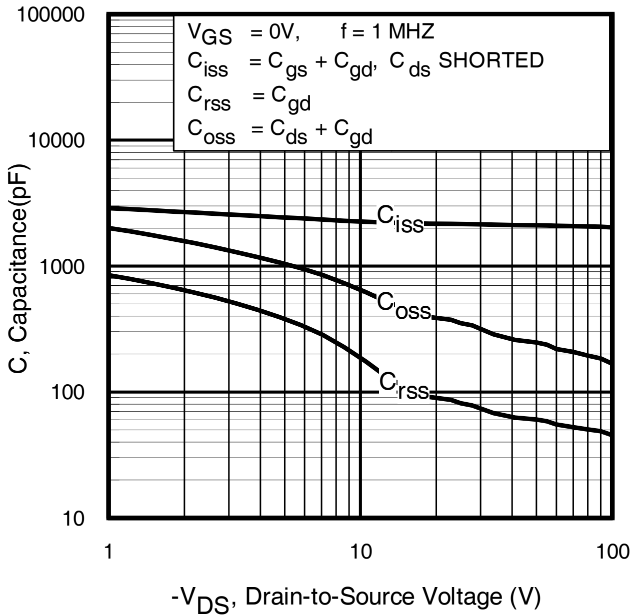



**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

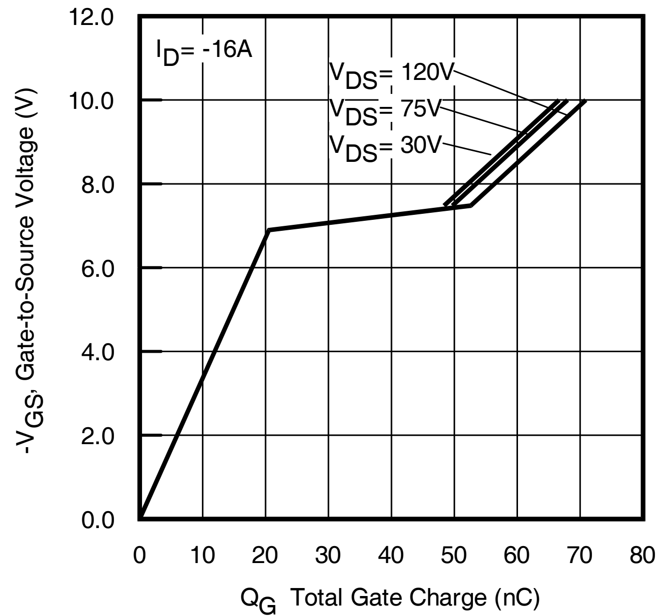



**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage

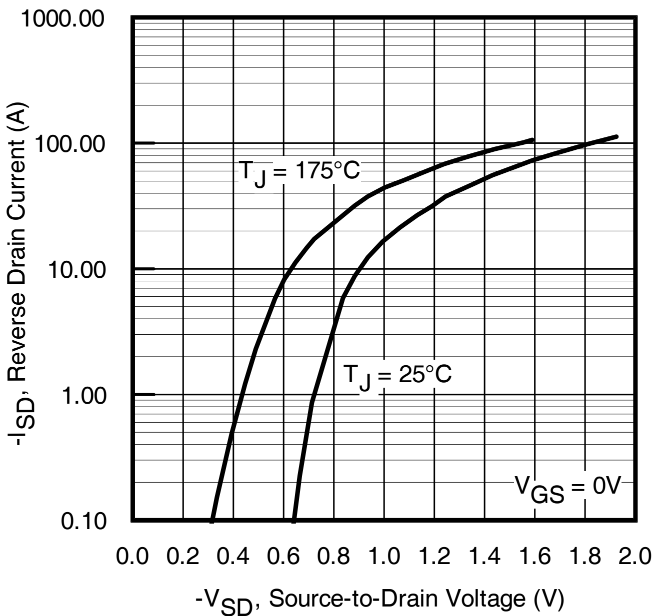



**Fig. 7** Typical Source-to-Drain Diode Forward Voltage

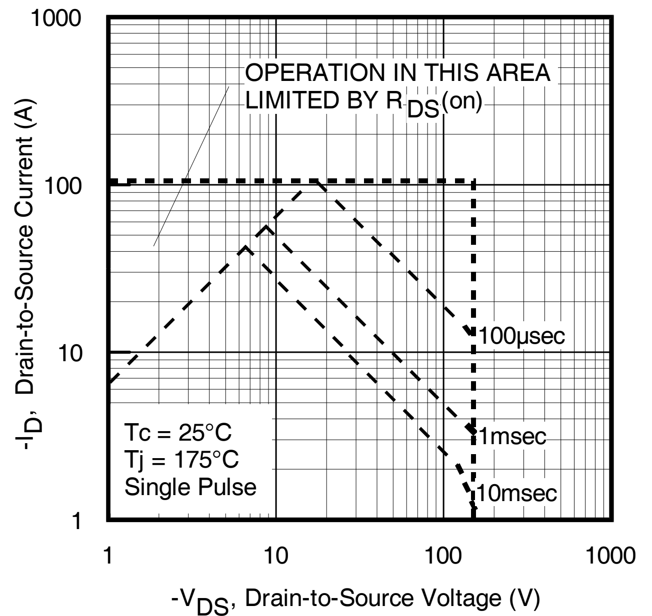



**Fig 8.** Maximum Safe Operating Area

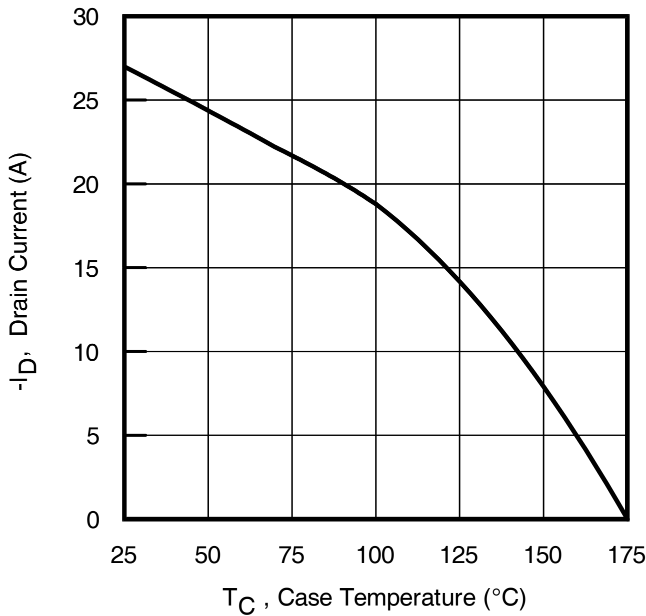



**Fig 9.** Maximum Drain Current vs. Case Temperature

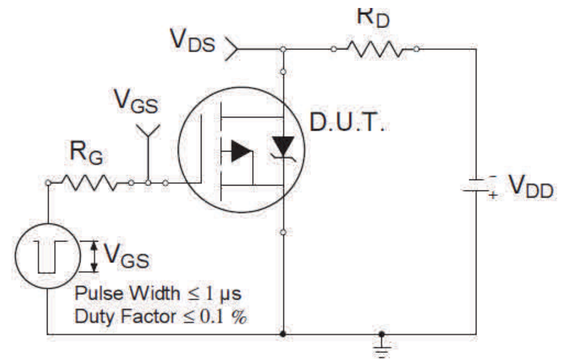



**Fig 10a.** Switching Time Test Circuit

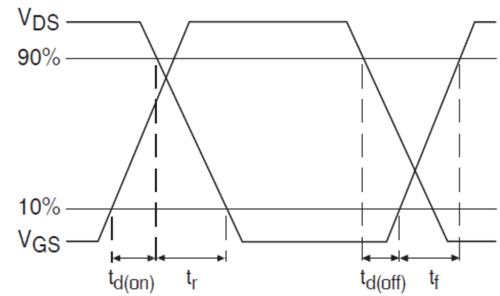
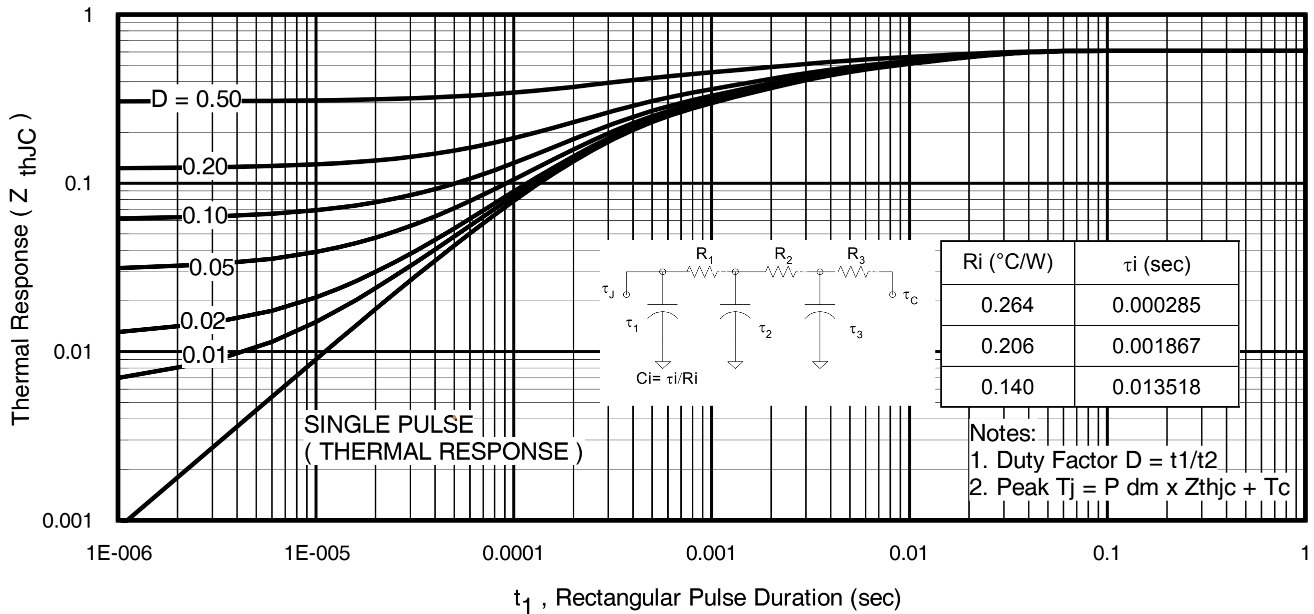



**Fig 10b.** Switching Time Waveforms




| Ri (°C/W) | τi (sec) |
|---|---|
| 0.264 | 0.000285 |
| 0.206 | 0.001867 |
| 0.140 | 0.013518 |

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

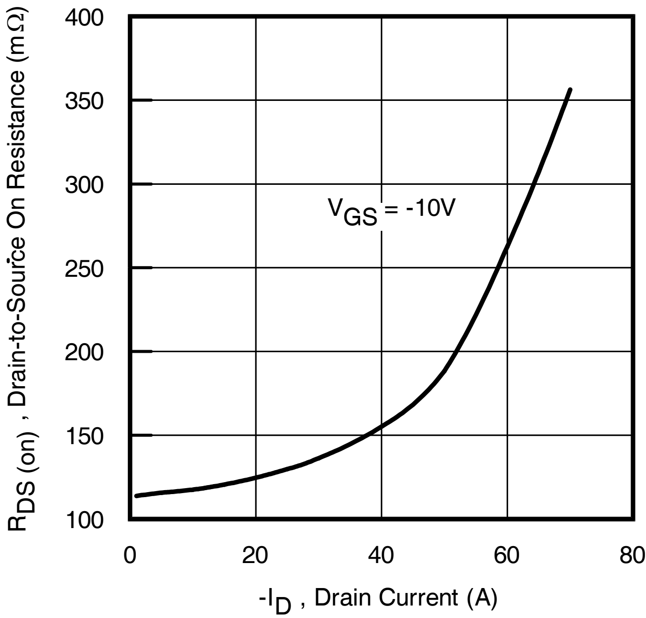



**Fig 12.** On-Resistance vs. Drain Current

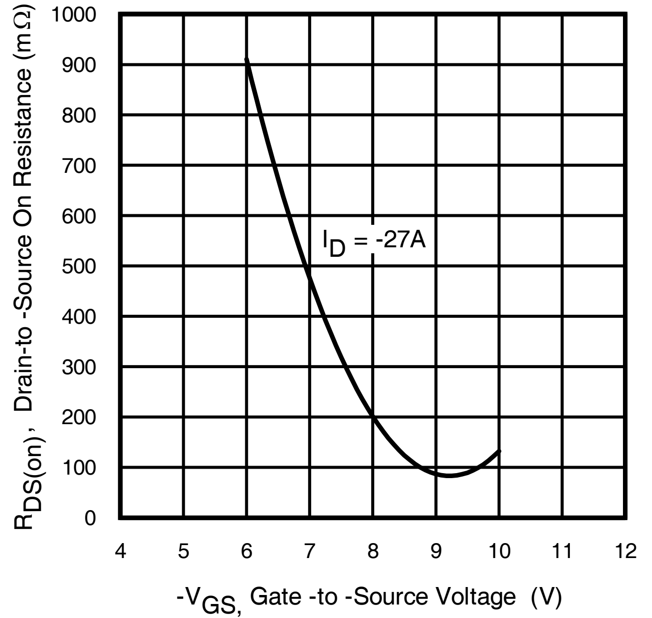



**Fig 13.** On-Resistance vs. Gate Voltage

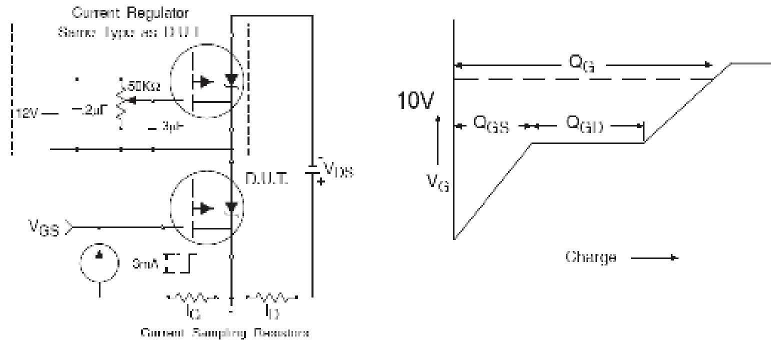



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform

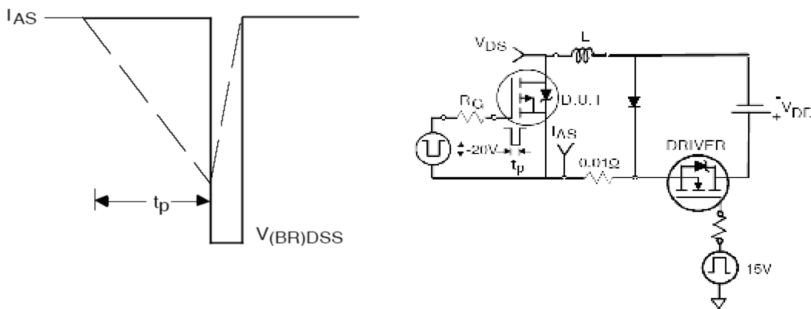



**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms

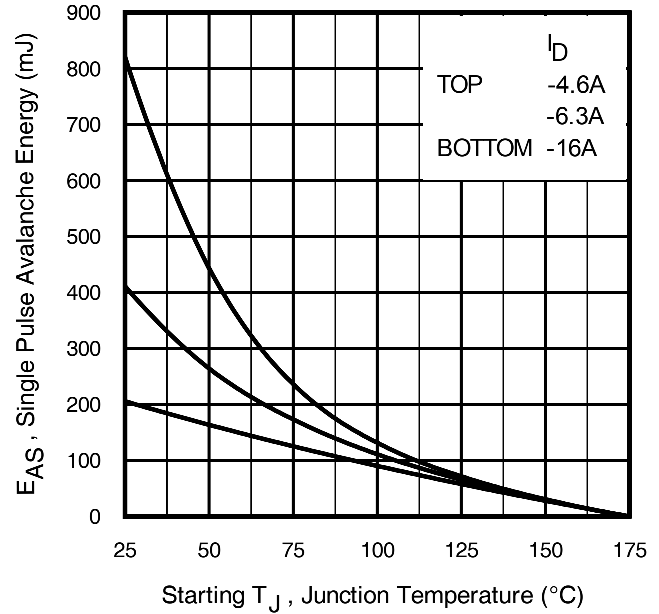
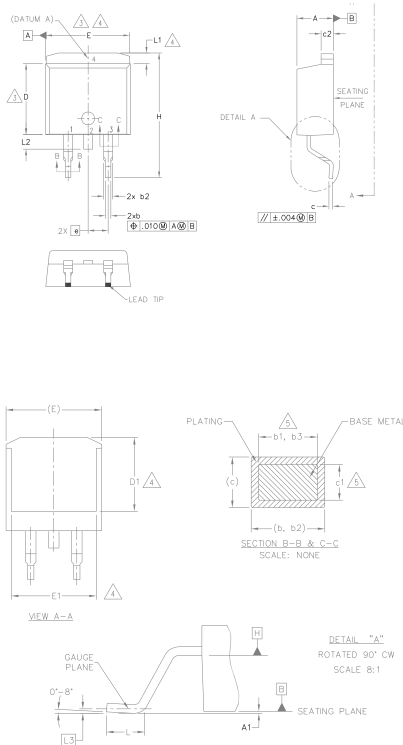



**Fig 15c.** Maximum Avalanche Energy vs. Drain Current

## **D2-Pak (TO-263AB) Package Outline** (Dimensions are shown in millimeters (inches))



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1, b3 AND c1 APPLY TO BASE METAL ONLY.
6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
7. CONTROLLING DIMENSION: INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263AB.

| SYMBOL | DIMENSIONS | | | | NOTES |
|---|---|---|---|---|---|
| | MILLIMETERS | | INCHES | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | .160 | .190 | |
| A1 | 0.00 | 0.254 | .000 | .010 | |
| b | 0.51 | 0.99 | .020 | .039 | |
| b1 | 0.51 | 0.89 | .020 | .035 | 5 |
| b2 | 1.14 | 1.78 | .045 | .070 | |
| b3 | 1.14 | 1.73 | .045 | .068 | 5 |
| c | 0.38 | 0.74 | .015 | .029 | |
| c1 | 0.38 | 0.58 | .015 | .023 | 5 |
| c2 | 1.14 | 1.65 | .045 | .065 | |
| D | 8.38 | 9.65 | .330 | .380 | 3 |
| D1 | 6.86 | - | .270 | - | 4 |
| E | 9.65 | 10.67 | .380 | .420 | 3,4 |
| E1 | 6.22 | - | .245 | - | 4 |
| e | 2.54 BSC | | .100 BSC | | |
| H | 14.61 | 15.88 | .575 | .625 | |
| L | 1.78 | 2.79 | .070 | .110 | |
| L1 | - | 1.68 | - | .066 | 4 |
| L2 | - | 1.78 | - | .070 | |
| L3 | 0.25 BSC | | .010 BSC | | |

LEAD ASSIGNMENTS

DIODES
1.- ANODE (TWO DIE) / OPEN (ONE DIE)
2, 4.- CATHODE
3.- ANODE

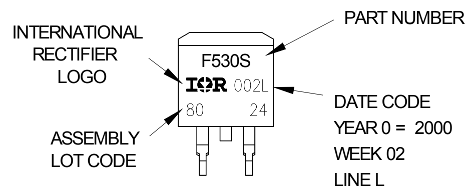
HEXFET
1.- GATE
2, 4.- DRAIN
3.- SOURCE

IGBTs, CoPACK
1.- GATE
2, 4.- COLLECTOR
3.- EMITTER

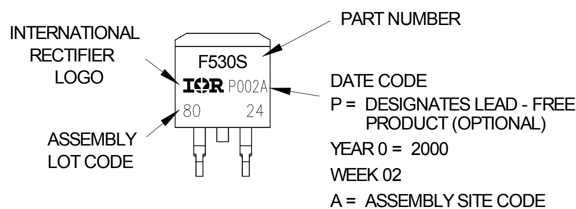
## **D2-Pak (TO-263AB) Part Marking Information**

EXAMPLE: THIS IS AN IRF530S WITH LOT CODE 8024
ASSEMBLED ON WW 02, 2000
IN THE ASSEMBLY LINE "L"

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

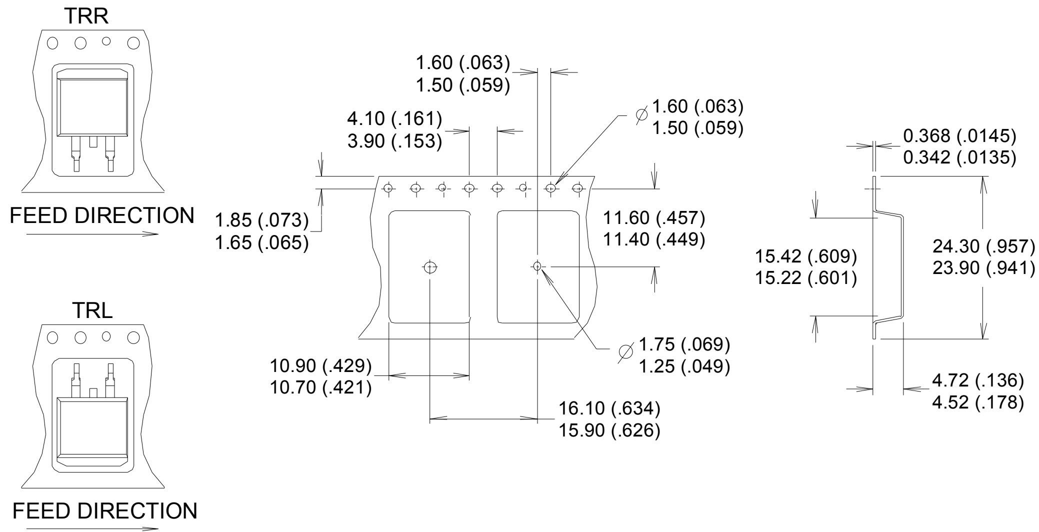


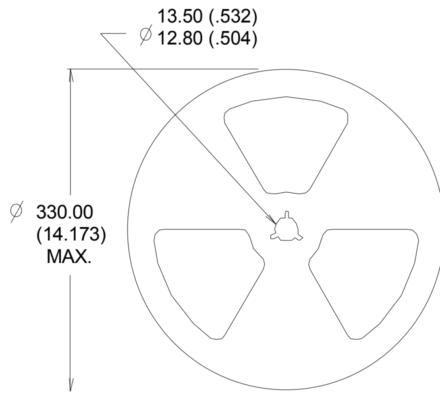

OR

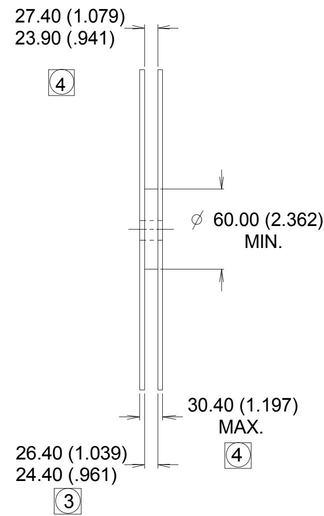



Note: For the most current drawing please refer to Infineon's web site www.infineon.com

**D2-Pak (TO-263AB) Tape & Reel Information** (Dimensions are shown in millimeters (inches))




NOTES :
1. COMFORMS TO EIA-418.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION MEASURED @ HUB.
4. INCLUDES FLANGE DISTORTION @ OUTER EDGE.

Note: For the most current drawing please refer to Infineon's web site www.infineon.com

**Qualification Information†**

| | | |
|---|---|---|
| **Qualification Level** | Industrial (per JEDEC JESD47F) †† | |
| **Moisture Sensitivity Level** | D2-Pak | MSL1 (per JEDEC J-STD-020D) †† |
| **RoHS Compliant** | Yes | |

† Qualification standards can be found at Infineon's web site www.infineon.com

†† Applicable version of JEDEC standard at the time of product release.

**Revision History**

| Date | Comments |
|---|---|
| 3/25/2015 | • Updated datasheet based on IR corporate template.<br>• Updated package outline and part marking on page 7.<br>• Removed TO-262 Pak (IRF6218LPbF) from datasheet-all pages |
| 5/26/2016 | • Updated datasheet with corporate template.<br>• Added disclaimer on last page. |

**Trademarks of Infineon Technologies AG**
µHVIC™, µIPM™, µPFC™, AU-ConvertIR™, AURIX™, C166™, CanPAK™, CIPOS™, CIPURSE™, CoolDP™, CoolGaN™, COOLiR™, CoolMOS™, CoolSET™, CoolSiC™, DAVE™, DI-POL™, DirectFET™, DrBlade™, EasyPIM™, EconoBRIDGE™, EconoDUAL™, EconoPACK™, EconoPIM™, EiceDRIVER™, eupec™, FCOS™, GaNpowIR™, HEXFET™, HITFET™, HybridPACK™, iMOTION™, IRAM™, ISOFACE™, IsoPACK™, LEDrivIR™, LITIX™, MIPAQ™, ModSTACK™, my-d™, NovalithIC™, OPTIGA™, OptiMOS™, ORIGA™, PowIRaudio™, PowIRStage™, PrimePACK™, PrimeSTACK™, PROFET™, PRO-SIL™, RASIC™, REAL3™, SmartLEWIS™, SOLID FLASH™, SPOC™, StrongIRFET™, SupIRBuck™, TEMPFET™, TRENCHSTOP™, TriCore™, UHVIC™, XHP™, XMC™

Trademarks updated November 2015

**Other Trademarks**
All referenced product or service names and trademarks are the property of their respective owners.

**Edition 2016-04-19**

**Published by**

**Infineon Technologies AG**

**81726 Munich, Germany**

**© 2016 Infineon Technologies AG.**
**All Rights Reserved.**

**Do you have a question about this document?**
**Email:** erratum@infineon.com

**Document reference**

**ifx1**

**IMPORTANT NOTICE**
The information given in this document shall in no event be regarded as a guarantee of conditions or **characteristics ("Beschaffenheitsgarantie") .**

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document **is subject to customer's compliance with its** obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in **customer's applications.**

The data contained in this document is exclusively intended for technically trained staff. It is the **responsibility of customer's technical departments** to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

Please note that this product is not qualified according to the AEC Q100 or AEC Q101 documents of the Automotive Electronics Council.

**WARNINGS**
Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, **Infineon Technologies' products may** not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.