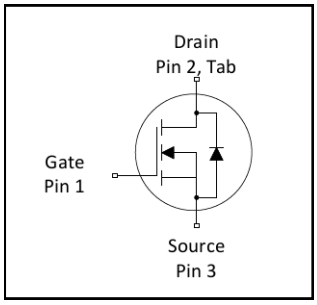
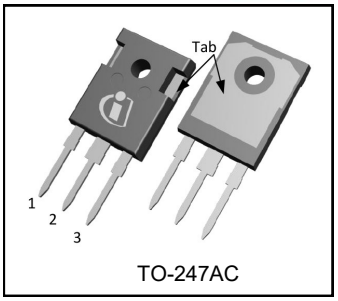
# IRFP150NPbF

| | |
|---|---|
| $V_{(BR)DSS}$ | 100V |
| $R_{DS(on)}$ max. | 0.036Ω |
| $I_D$ | 42A |



TO-247AC

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

**Features**

- Advanced Process Technology
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Lead-Free

**Description**

Fifth Generation HEXFET Power MOSFETs utilizes advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of other applications.

The TO-247AC package is preferred for commercial-industrial applications where higher power levels preclude th use of TO-220 devices. The TO-247AC is similar but superior to the earlier TO-218 package because of its isolated mounting hole.

| Base part number | Package Type | Standard Pack | | Orderable Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| IRFP150NPbF | TO-247AC | Tube | 25 | IRFP150NPbF |

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ $T_C$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 42 | A |
| $I_D$ @ $T_C$ = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V | 30 | |
| $I_{DM}$ | Pulsed Drain Current ①⑤ | 140 | |
| $P_D$ @$T_C$ = 25°C | Maximum Power Dissipation | 160 | W |
| | Linear Derating Factor | 1.1 | W/°C |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy ②⑤ | 420 | mJ |
| $I_{AR}$ | Avalanche Current ① | 22 | A |
| $E_{AR}$ | Repetitive Avalanche Energy ① | 16 | mJ |
| dv/dt | Peak Diode Recovery dv/dt③⑤ | 5.0 | 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 | |
| | Mounting torque, 6-32 or M3 screw | 10 lbf•in (1.1N•m) | |

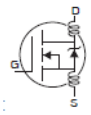
**Thermal Resistance**

| Symbol | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | — | 0.95 | °C/W |
| $R_{\theta CS}$ | Case-to-Sink, Flat, Greased Surface | 0.24 | — | |
| $R_{\theta JA}$ | Junction-to-Ambient | — | 40 | |

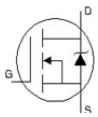
**Static @ $T_J$ = 25°C (unless otherwise specified)**

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 100 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.11 | — | V/°C | Reference to 25°C, $I_D$ = 1mA ⑤ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 0.036 | Ω | $V_{GS}$ = 10V, $I_D$ = 23A ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.0 | — | 4.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| gfs | Forward Trans conductance | 14 | — | — | S | $V_{DS}$ = 25V, $I_D$ = 22A⑤ |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | 25 | µA | $V_{DS}$ = 100V, $V_{GS}$ = 0V |
| | | — | — | 250 | | $V_{DS}$ = 80V,$V_{GS}$ = 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 Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)**

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | — | — | 110 | nC | $I_D$ = 22A |
| $Q_{gs}$ | Gate-to-Source Charge | — | — | 15 | | $V_{DS}$ = 80V |
| $Q_{gd}$ | Gate-to-Drain Charge | — | — | 58 | | $V_{GS}$ = 10V, See Fig.6 and 13 ④⑤ |
| $t_{d(on)}$ | Turn-On Delay Time | — | 11 | — | ns | $V_{DD}$ = 50V |
| $t_r$ | Rise Time | — | 56 | — | | $I_D$ = 22A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 45 | — | | $R_G$= 3.6Ω |
| $t_f$ | Fall Time | — | 40 | — | | $R_D$= 2.9Ω , See Fig.10④⑤ |
| $L_D$ | Internal Drain Inductance | — | 5.0 | — | nH | Between lead, 6mm (0.25in.) from package and center of die contact  |
| $L_S$ | Internal Source Inductance | — | 13 | — | | |
| $C_{iss}$ | Input Capacitance | — | 1900 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 450 | — | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 230 | — | | $f$ = 1.0MHz, See Fig.5⑤ |

**Diode Characteristics**

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 42 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | 140 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | 1.3 | V | $T_J$ = 25°C,$I_S$ = 23A,$V_{GS}$ = 0V ④ |
| $t_{rr}$ | Reverse Recovery Time | — | 180 | 270 | ns | $T_J$ = 25°C ,$I_F$ = 22A |
| $Q_{rr}$ | Reverse Recovery Charge | — | 1.2 | 1.8 | µC | di/dt = 100A/µs ④⑤ |

**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).

② $V_{DD}$ = 25V, $T_J$ = 25°C, L = 1.7mH, $R_G$ = 25Ω, $I_{AS}$ = 22A.(See fig. 12).

③ $I_{SD}$ ≤ 22A, di/dt ≤ 180A/µs, $V_{DD}$ ≤ $V_{(BR)DSS}$, $T_J$ ≤ 175°C.

④ Pulse width ≤ 300µs; duty cycle ≤ 2%.

⑤ Uses IRF1310N data and test conditions

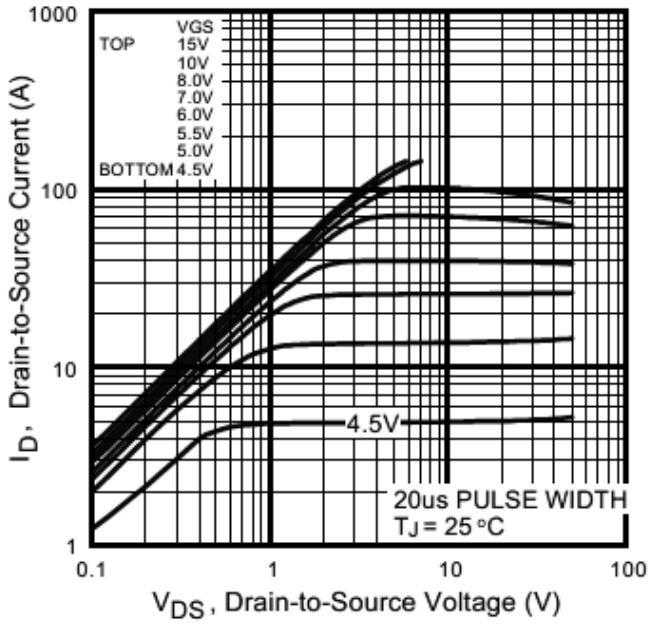



**Fig. 1** Typical Output Characteristics

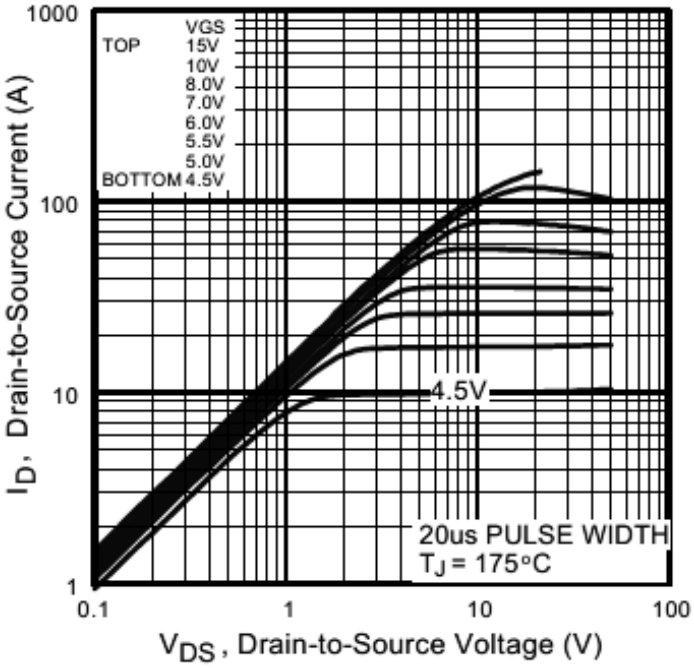



**Fig. 2** Typical Output Characteristics

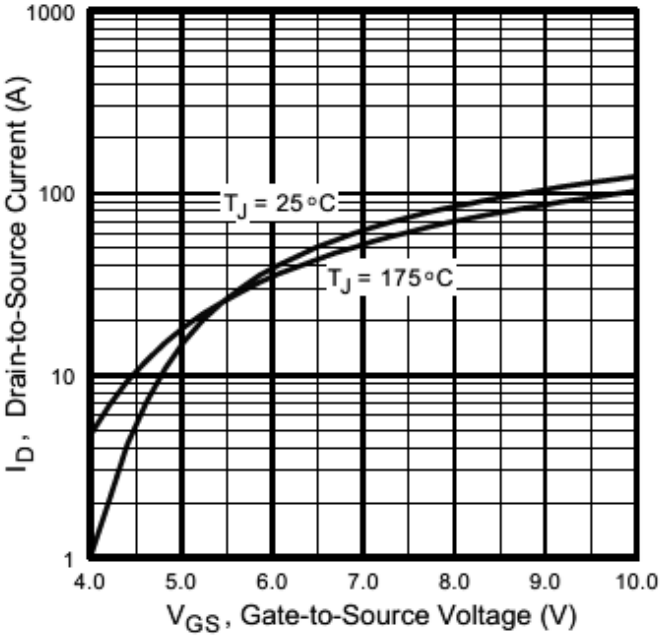



**Fig. 3** Typical Transfer Characteristics

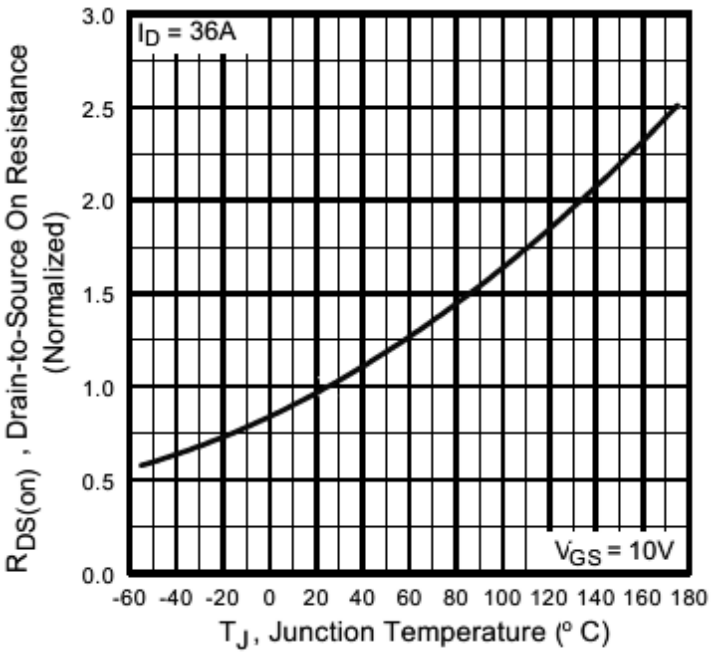



**Fig. 4** Normalized On-Resistance vs. Temperature

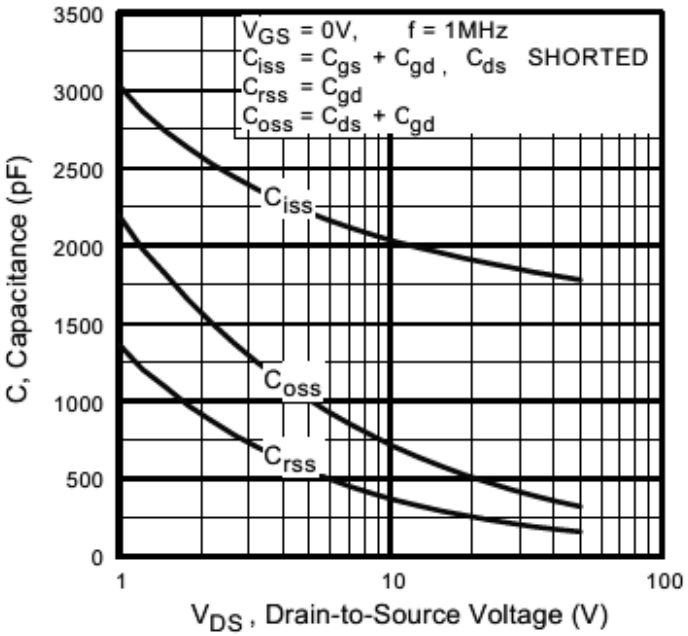



**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

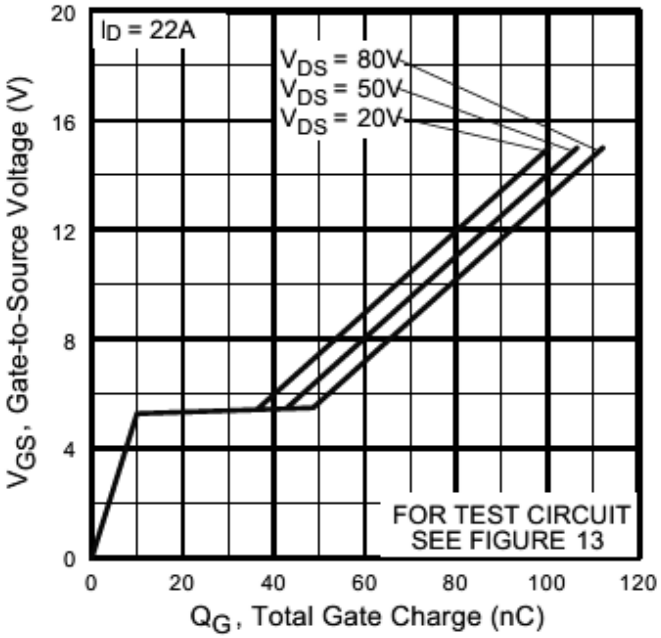



**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage

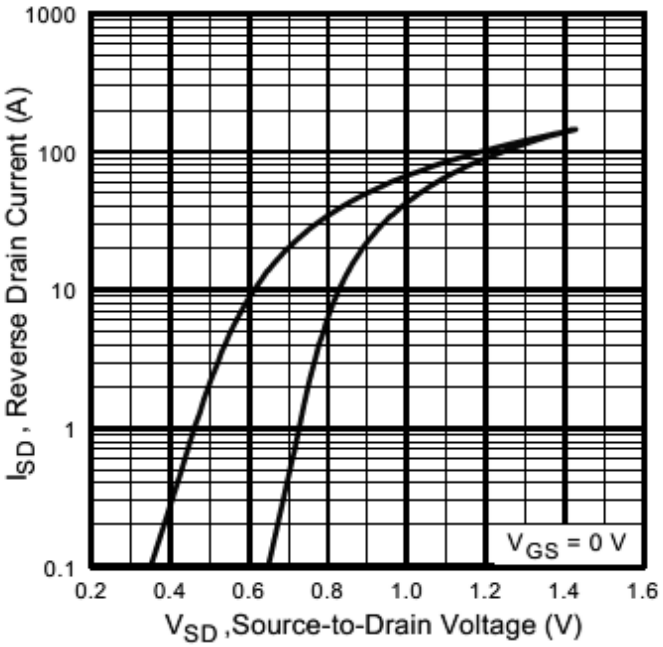



**Fig. 7** Typical Source-to-Drain Diode Forward Voltage

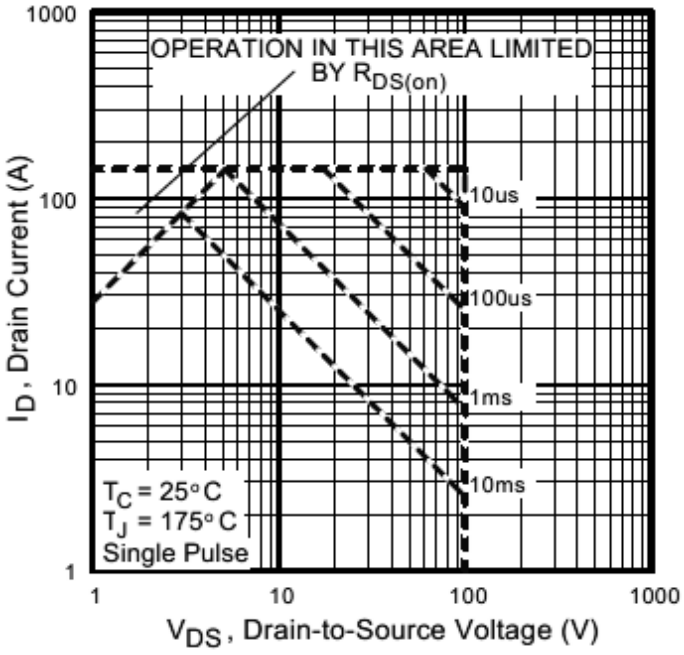



**Fig 8.** Maximum Safe Operating Area

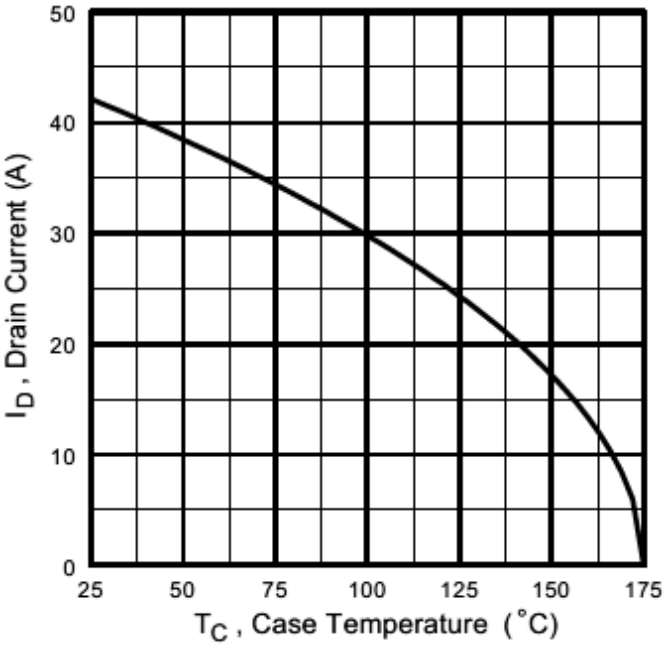



**Fig 9.** Maximum Drain Current vs. Case Temperature

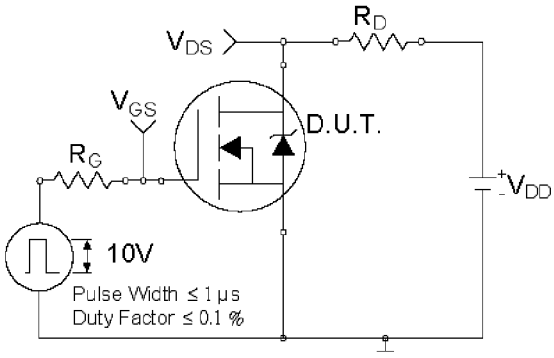



**Fig 10a.** Switching Time Test Circuit

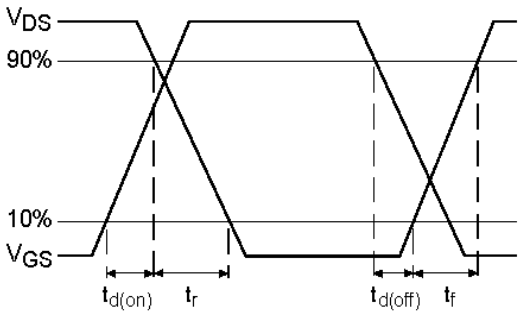



**Fig 10a.** Switching Time Waveforms

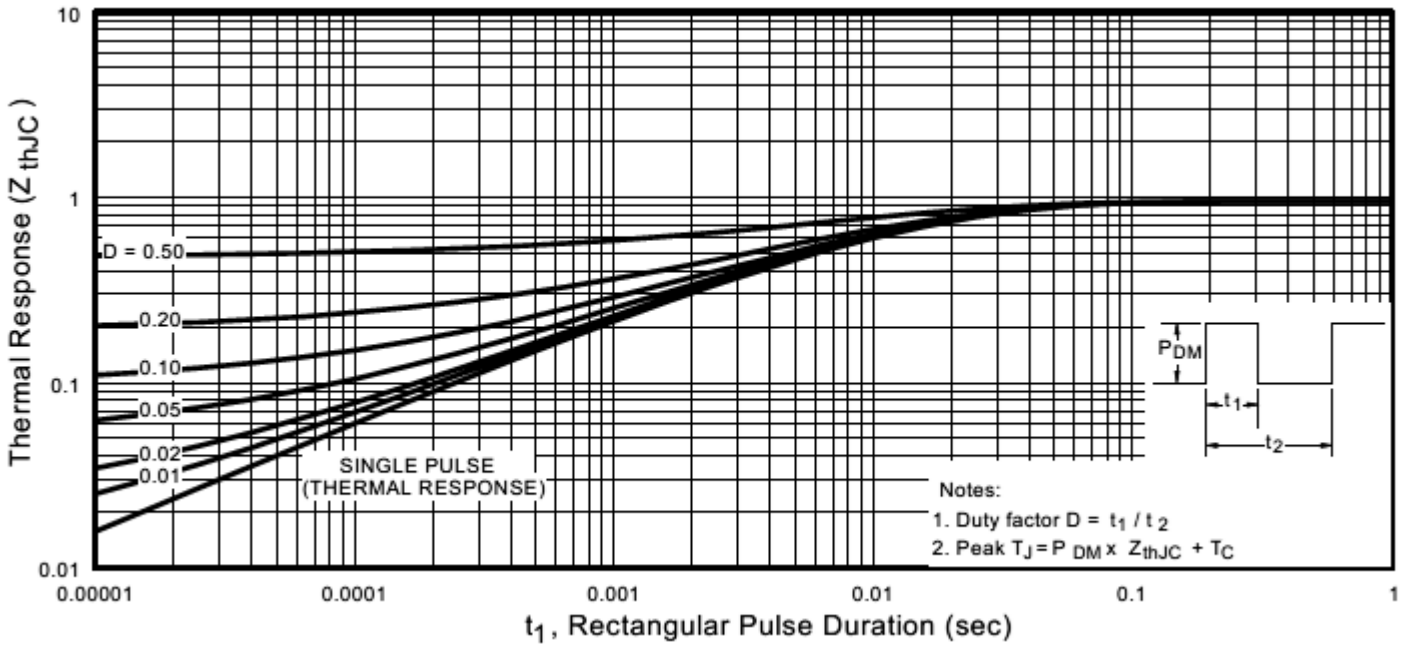



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

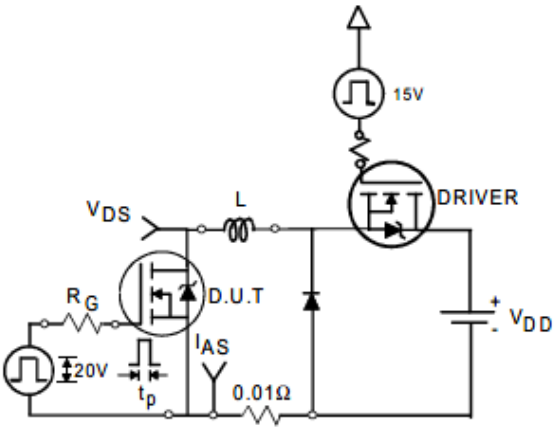



**Fig. 12a.** Unclamped Inductive Test Circuit

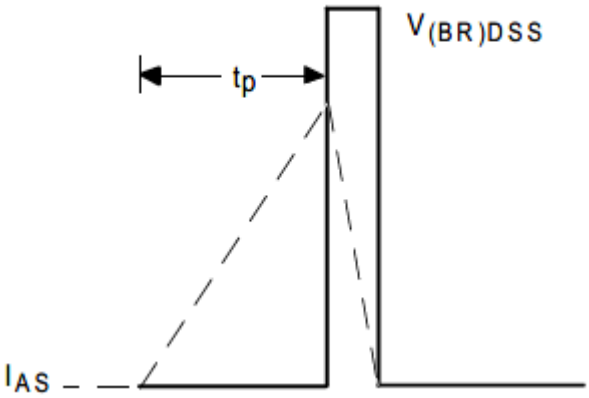



**Fig. 12b.** Unclamped Inductive Waveforms

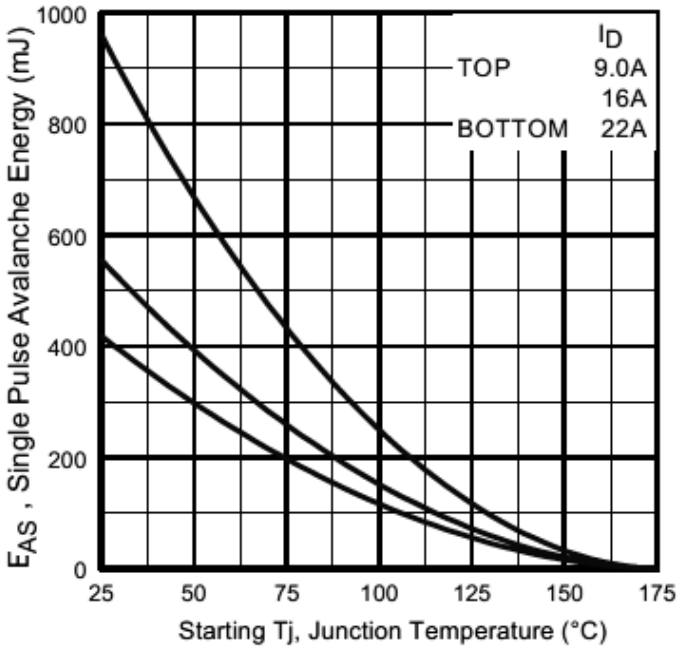



**Fig 12c.** Maximum Avalanche Energy vs. Drain Current

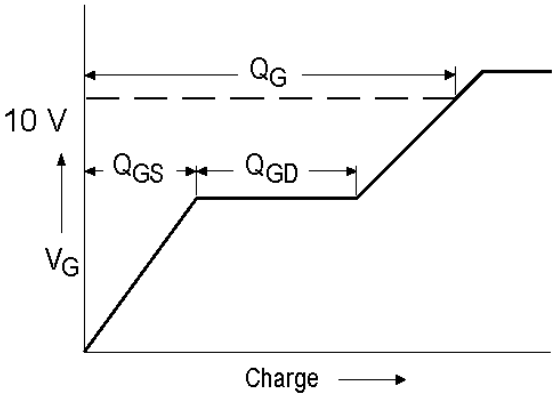



**Fig 13a.** Basic Gate Charge Waveform

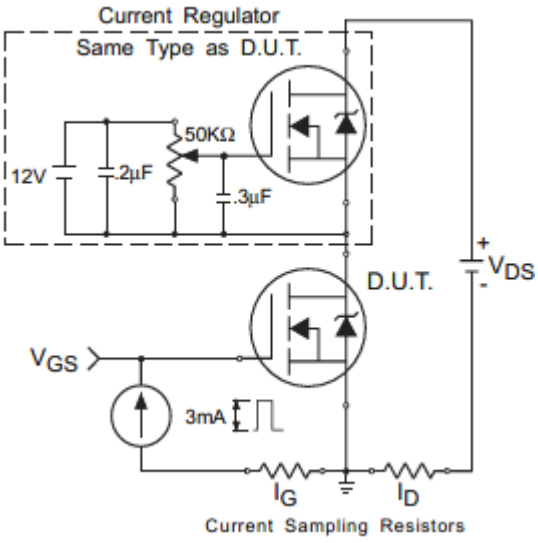



**Fig 13b.** Gate Charge Test Circuit

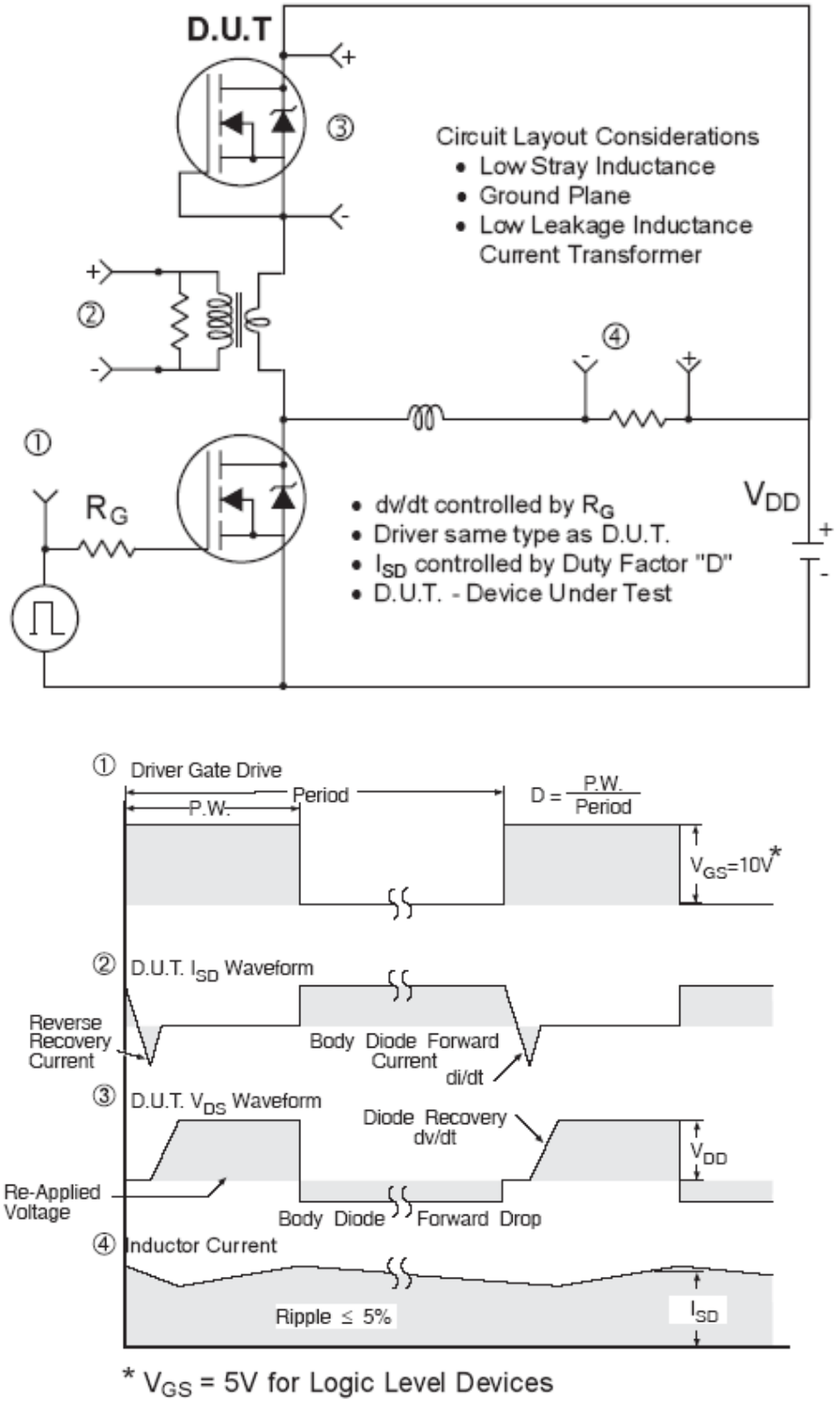
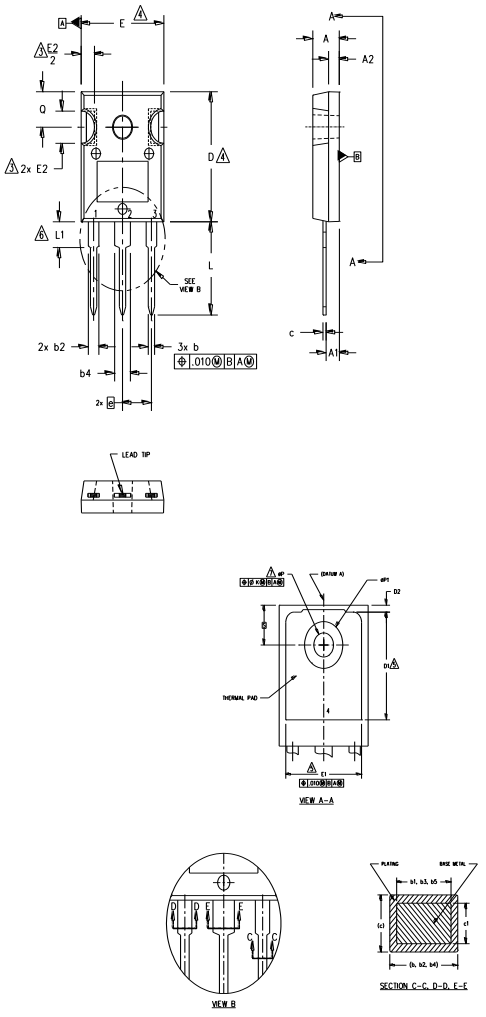



**Fig 14.** Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

**TO-247AC Package Outline** (Dimensions are




NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M 1994.
2. DIMENSIONS ARE SHOWN IN INCHES.
3. CONTOUR OF SLOT OPTIONAL.
4. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS D1 & E1.
6. LEAD FINISH UNCONTROLLED IN L1.
7. øP TO HAVE A MAXIMUM DRAFT ANGLE OF 1.5 ° TO THE TOP OF THE PART WITH A MAXIMUM HOLE DIAMETER OF .154 INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-247AC .

| SYMBOL | DIMENSIONS | | | | NOTES |
|---|---|---|---|---|---|
| | INCHES | | MILLIMETERS | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | .183 | .209 | 4.65 | 5.31 | |
| A1 | .087 | .102 | 2.21 | 2.59 | |
| A2 | .059 | .098 | 1.50 | 2.49 | |
| b | .039 | .055 | 0.99 | 1.40 | |
| b1 | .039 | .053 | 0.99 | 1.35 | |
| b2 | .065 | .094 | 1.65 | 2.39 | |
| b3 | .065 | .092 | 1.65 | 2.34 | |
| b4 | .102 | .135 | 2.59 | 3.43 | |
| b5 | .102 | .133 | 2.59 | 3.38 | |
| c | .015 | .035 | 0.38 | 0.89 | |
| c1 | .015 | .033 | 0.38 | 0.84 | |
| D | .776 | .815 | 19.71 | 20.70 | 4 |
| D1 | .515 | – | 13.08 | – | 5 |
| D2 | .020 | .053 | 0.51 | 1.35 | |
| E | .602 | .625 | 15.29 | 15.87 | 4 |
| E1 | .530 | – | 13.46 | – | |
| E2 | .178 | .216 | 4.52 | 5.49 | |
| e | .215 BSC | | 5.46 BSC | | |
| øk | .010 | | 0.25 | | |
| L | .559 | .634 | 14.20 | 16.10 | |
| L1 | .146 | .169 | 3.71 | 4.29 | |
| øP | .140 | .144 | 3.56 | 3.66 | |
| øP1 | – | .291 | – | 7.39 | |
| Q | .209 | .224 | 5.31 | 5.69 | |
| S | .217 BSC | | 5.51 BSC | | |

LEAD ASSIGNMENTS

HEXFET

1.– GATE
2.– DRAIN
3.– SOURCE
4.– DRAIN

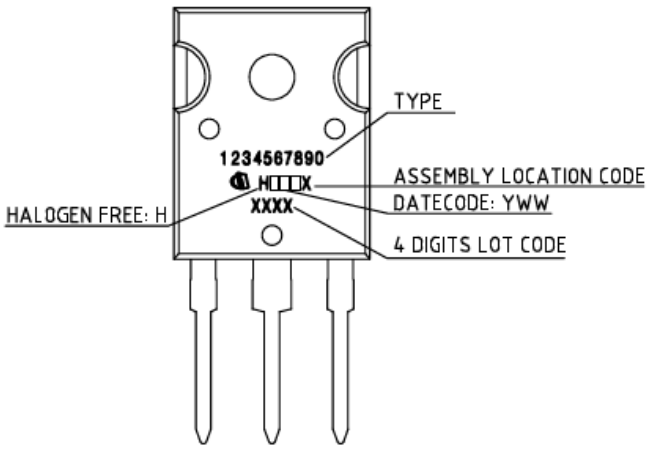
IGBTs, CoPACK

1.– GATE
2.– COLLECTOR
3.– EMITTER
4.– COLLECTOR

DIODES

1.– ANODE/OPEN
2.– CATHODE
3.– ANODE

**TO-247AC Part Marking Information**




TO-247AC package is not recommended for Surface Mount Application.

## Revision History

| Date | Rev. | Comments |
|---|---|---|
| 2024-10-03 | 2.1 | • Update datasheet to Infineon format<br>• Updated Part marking –page 8<br>• Added disclaimer on last page. |

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