

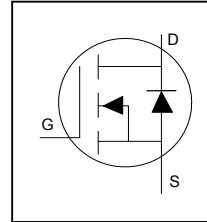
Application

- Optimized for UPS/Inverter Applications
- Low Voltage Power Tools

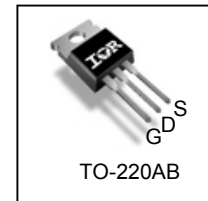
Benefits

- Best in Class Performance for UPS/Inverter Applications
- Very Low RDS(on) at 4.5V VGS
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- Lead-Free, RoHS Compliant

HEXFET® Power MOSFET



| | | |
|--|-------------|-----------|
| V_{DSS} | 30 | V |
| R_{DS(on)} max (@ V _{GS} = 10V) | 3.5 | mΩ |
| (@ V _{GS} = 4.5V) | 4.5 | |
| Q_g (typical) | 36 | nC |
| I_D (Silicon Limited) | 150④ | A |
| I_D (Package Limited) | 78A | |



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

| Base part number | Package Type | Standard Pack | | Orderable Part Number |
|------------------|--------------|---------------|----------|-----------------------|
| | | Form | Quantity | |
| IRLB4132PbF | TO-220AB | Tube | 50 | IRLB4132PbF |

Absolute Maximum Rating

| Symbol | Parameter | Max. | Units |
|---|---|---------------------|-------|
| V _{DS} | Drain-to-Source Voltage | 30 | V |
| V _{GS} | Gate-to-Source Voltage | ± 20 | V |
| I _D @ T _C = 25°C | Continuous Drain Current, V _{GS} @ 10V (Silicon Limited) | 150④ | A |
| I _D @ T _C = 100°C | Continuous Drain Current, V _{GS} @ 10V (Silicon Limited) | 100 | |
| I _D @ T _C = 25°C | Continuous Drain Current, V _{GS} @ 10V (Package Limited) | 78 | |
| I _{DM} | Pulsed Drain Current ① | 620 | |
| P _D @ T _C = 25°C | Maximum Power Dissipation ⑥ | 140 | W |
| P _D @ T _C = 100°C | Maximum Power Dissipation ⑥ | 68 | W |
| | Linear Derating Factor | 0.90 | W/°C |
| T _J | Operating Junction and | -55 to + 175 | °C |
| T _{STG} | Storage Temperature Range | | |
| | Soldering Temperature, for 10 seconds (1.6mm from case) | 300 | |
| | Mounting Torque, 6-32 or M3 Screw | 10 lbf-in (1.1 N·m) | |

Thermal Resistance

| Symbol | Parameter | Typ. | Max. | Units |
|------------------|------------------------------------|------|------|-------|
| R _{θJC} | Junction-to-Case ⑥ | — | 1.11 | °C/W |
| R _{θCS} | Case-to-Sink, Flat Greased Surface | 0.50 | — | |
| R _{θJA} | Junction-to-Ambient ⑤ | — | 62 | |

Notes ① through ⑦ are on page 8

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

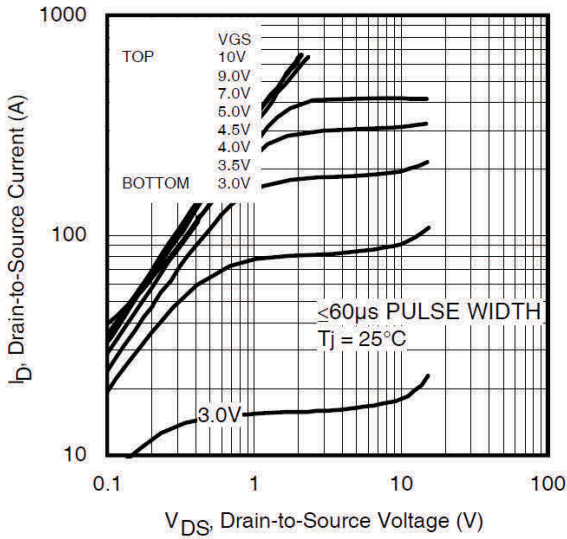
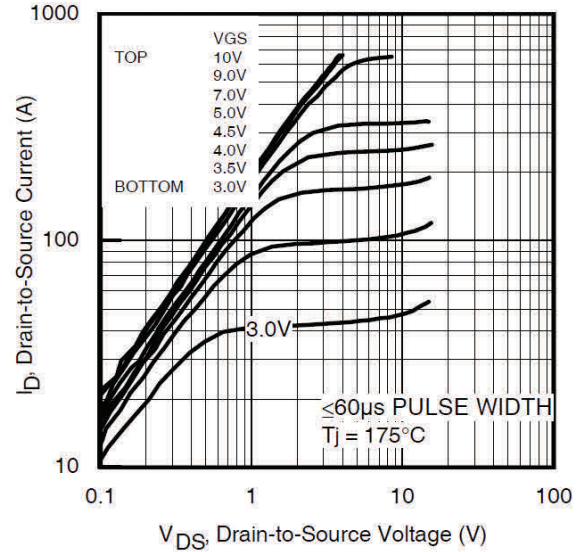
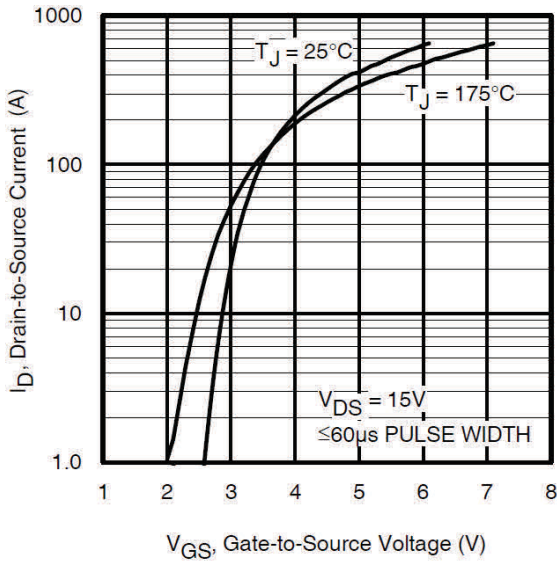
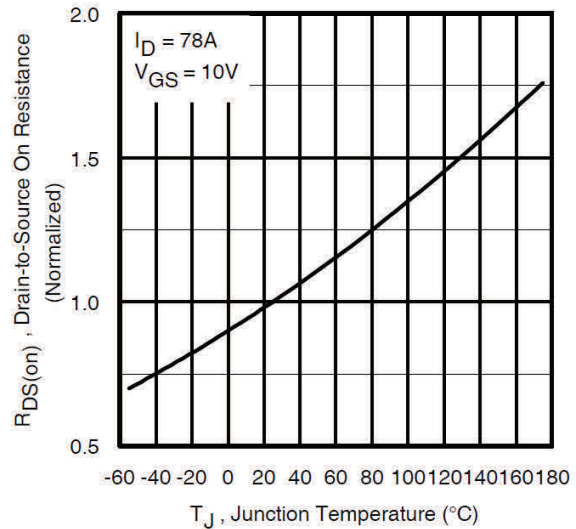
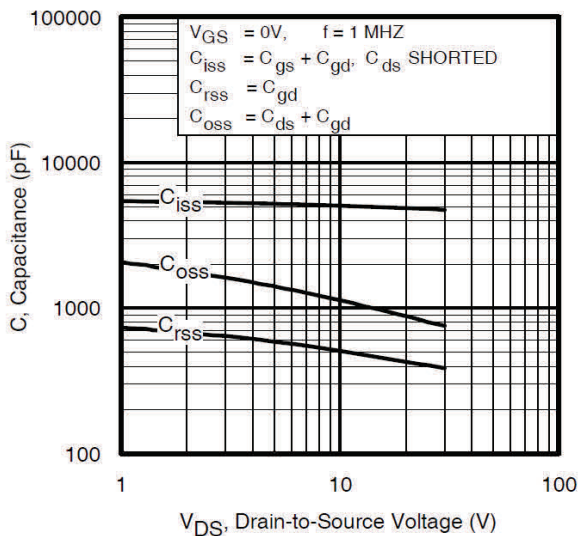
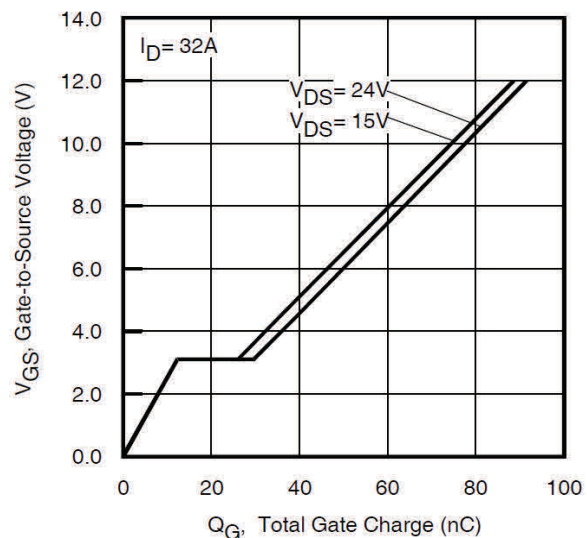
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---------------------------------------|---|------|------|------|-------|--|
| BV _{DSS} | Drain-to-Source Breakdown Voltage | 30 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| ΔBV _{DSS} /ΔT _J | Breakdown Voltage Temp. Coefficient | — | 17 | — | mV/°C | Reference to 25°C, I _D = 1mA ① |
| R _{DS(on)} | Static Drain-to-Source On-Resistance | — | 2.5 | 3.5 | mΩ | V _{GS} = 10V, I _D = 40A ③ |
| | | — | 3.5 | 4.5 | | V _{GS} = 4.5V, I _D = 32A ③ |
| V _{GS(th)} | Gate Threshold Voltage | 1.35 | 1.8 | 2.35 | V | V _{DS} = V _{GS} , I _D = 100μA |
| ΔV _{GS(th)} /ΔT _J | Gate Threshold Voltage Coefficient | — | -7.7 | — | mV/°C | |
| I _{DSS} | Drain-to-Source Leakage Current | — | — | 1.0 | μA | V _{DS} = 24V, V _{GS} = 0V |
| | | — | — | 100 | | V _{DS} = 24V, V _{GS} = 0V, T _J = 125°C |
| I _{GSS} | Gate-to-Source Forward Leakage | — | — | 100 | nA | V _{GS} = 20V |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | V _{GS} = -20V |
| g _{fs} | Forward Transconductance | 190 | — | — | S | V _{DS} = 15V, I _D = 32A |
| Q _g | Total Gate Charge | — | 36 | 54 | nC | V _{DS} = 15V V _{GS} = 4.5V I _D = 32A |
| Q _{gs1} | Pre-V _{th} Gate-to-Source Charge | — | 9.1 | — | | |
| Q _{gs2} | Post-V _{th} Gate-to-Source Charge | — | 4.2 | — | | |
| Q _{gd} | Gate-to-Drain Charge | — | 13 | — | | |
| Q _{godr} | Gate Charge Overdrive | — | 13 | — | | |
| Q _{sw} | Switch Charge (Q _{gs2} + Q _{gd}) | — | 17.2 | — | | |
| Q _{oss} | Output Charge | — | 21 | — | | |
| R _G | Gate Resistance | — | 0.85 | 1.5 | Ω | |
| t _{d(on)} | Turn-On Delay Time | — | 23 | — | ns | V _{DD} = 15V I _D = 32A R _G = 1.8Ω V _{GS} = 4.5V ③ |
| t _r | Rise Time | — | 92 | — | | |
| t _{d(off)} | Turn-Off Delay Time | — | 25 | — | | |
| t _f | Fall Time | — | 36 | — | | |
| C _{iss} | Input Capacitance | — | 5110 | — | pF | V _{GS} = 0V V _{DS} = 15V f = 1.0MHz |
| C _{oss} | Output Capacitance | — | 960 | — | | |
| C _{rss} | Reverse Transfer Capacitance | — | 440 | — | | |

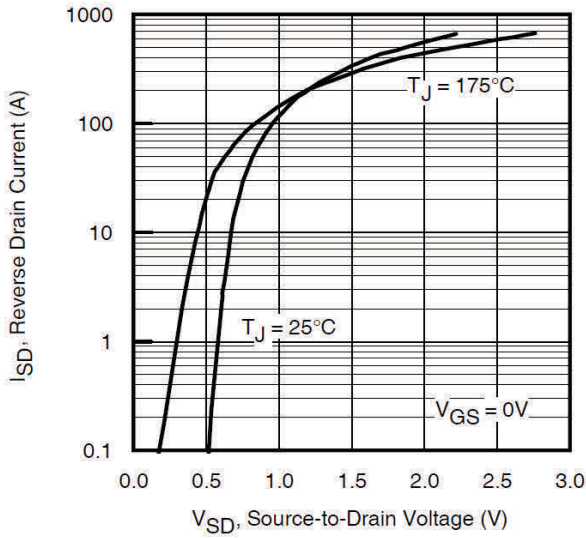
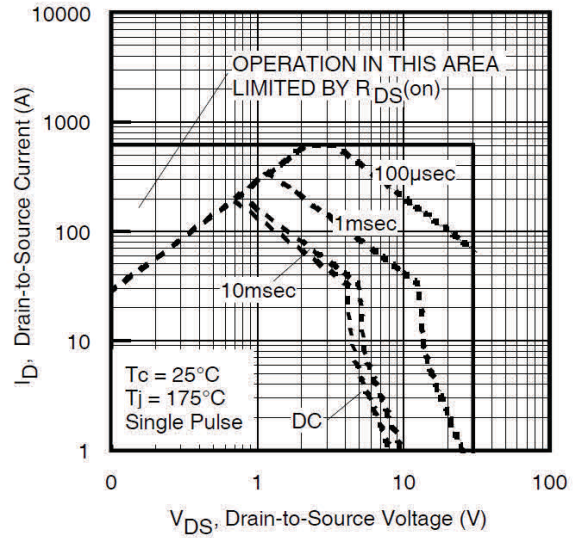
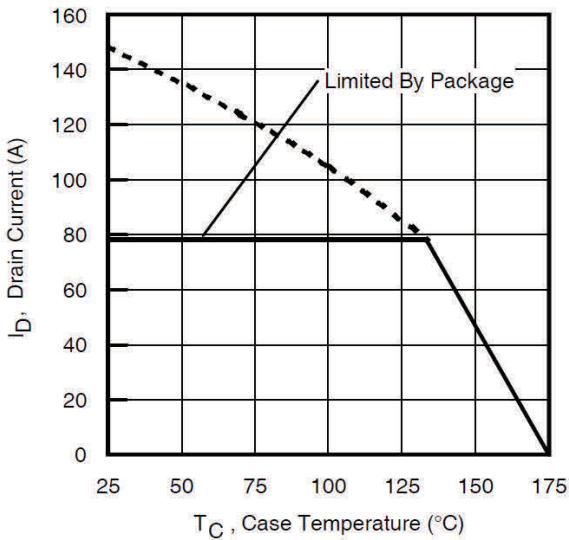
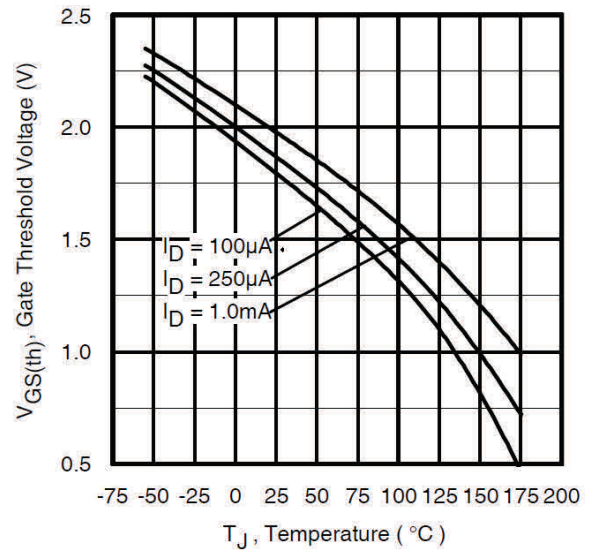
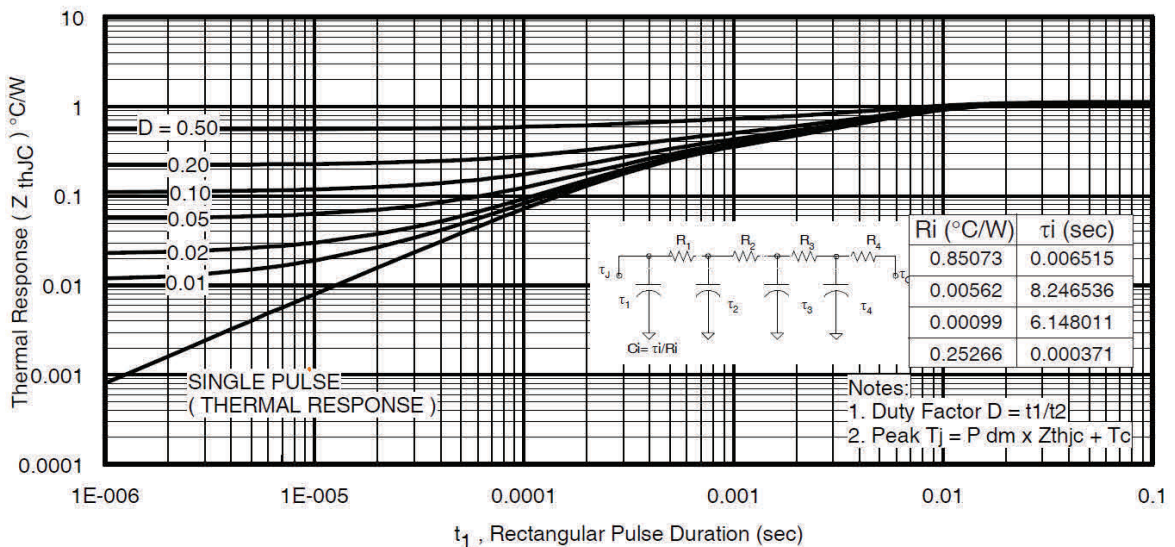
Avalanche Characteristics

| | | | |
|-------------------------------------|--|-----|----|
| E _{AS} (Thermally limited) | Single Pulse Avalanche Energy ② | 310 | mJ |
| E _{AS} (tested) | Single Pulse Avalanche Energy Tested Value ⑦ | 900 | |
| I _{AR} | Avalanche Current ① | 32 | A |
| E _{AR} | Repetitive Avalanche Energy ① | 14 | mJ |

Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|-----------------|--|------|------|-------|-------|---|
| I _S | Continuous Source Current (Body Diode) ① | — | — | 150 ④ | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| I _{SM} | Pulsed Source Current (Body Diode) ① | — | — | 620 | | |
| V _{SD} | Diode Forward Voltage | — | — | 1.0 | V | T _J = 25°C, I _S = 32A, V _{GS} = 0V ③ |
| t _{rr} | Reverse Recovery Time | — | 29 | 44 | ns | T _J = 25°C I _F = 32A, V _{DD} = 15V |
| Q _{rr} | Reverse Recovery Charge | — | 49 | 74 | nC | di/dt = 200A/μs 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 10. Threshold Voltage vs. Temperature

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

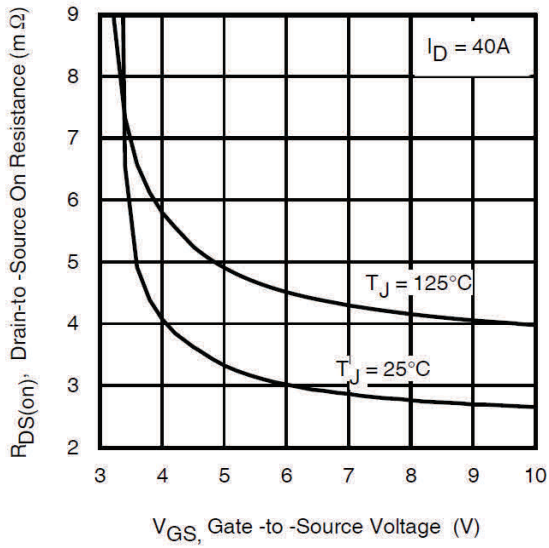


Fig 12. Typical On-Resistance vs. Gate Voltage

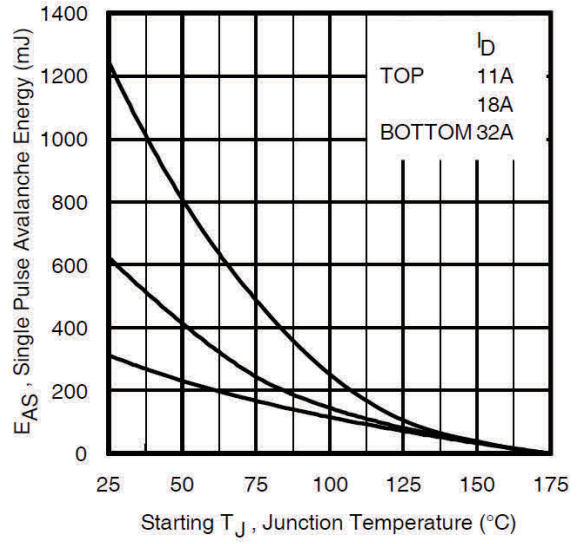


Fig 13. Maximum Avalanche Energy vs. Drain Current

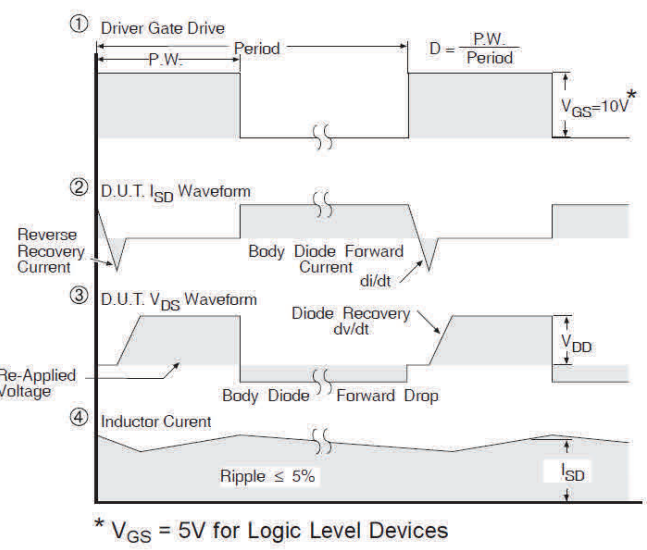
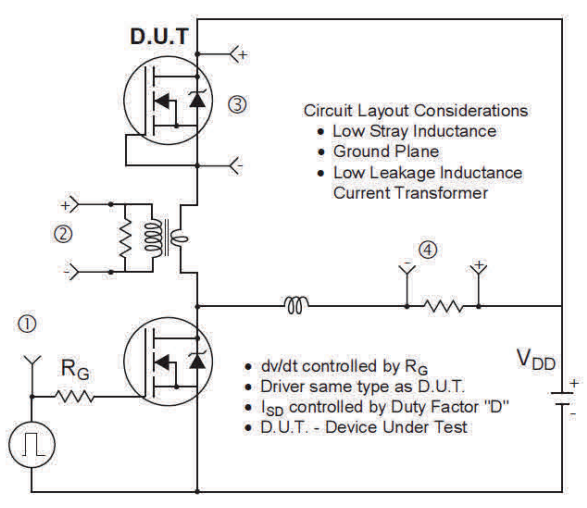


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

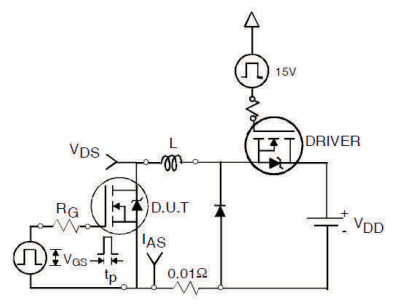


Fig 15a. Unclamped Inductive Test Circuit

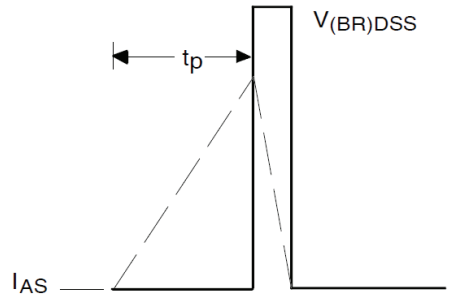


Fig 15b. Unclamped Inductive Waveforms

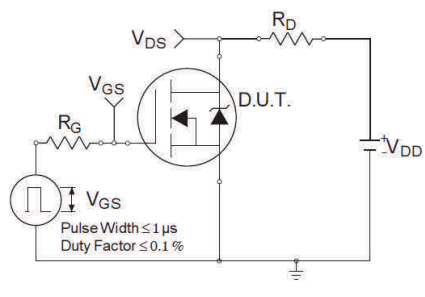


Fig 16a. Switching Time Test Circuit

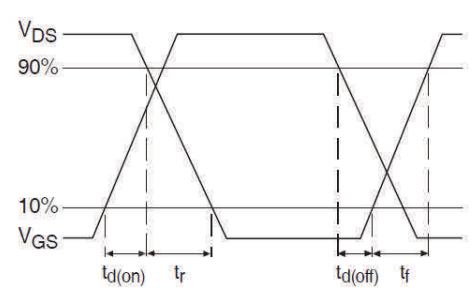


Fig 16b. Switching Time Waveforms

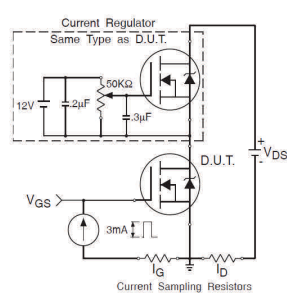


Fig 17a. Gate Charge Test Circuit

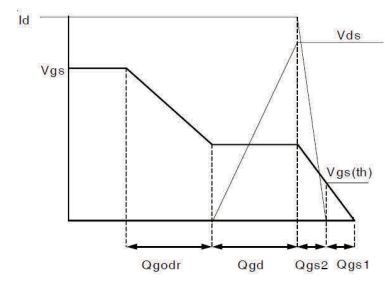
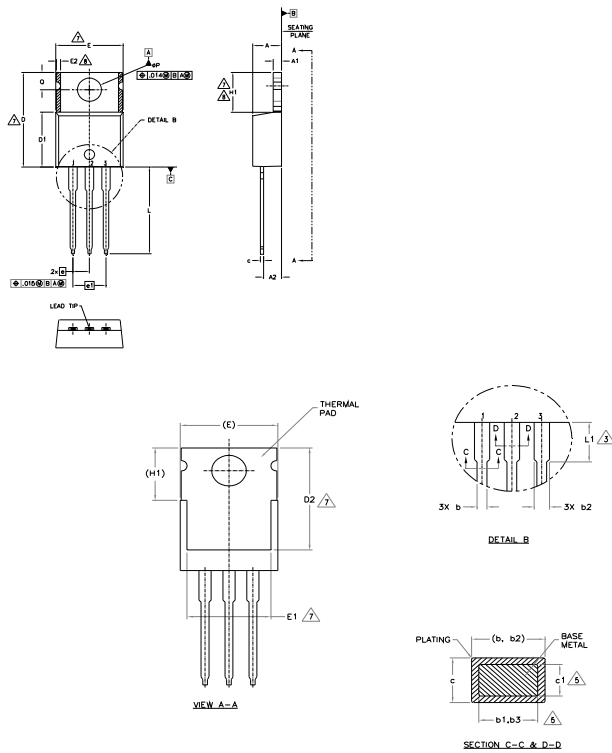


Fig 17b. Gate Charge Waveform

TO-220AB Package Outline (Dimensions are shown in millimeters (inches))

NOTES:

- 1.- DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
- 2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
- 3.- LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
- 4.- DIMENSION D, D1 & 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.- DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
- 6.- CONTROLLING DIMENSION : INCHES.
- 7.- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
- 8.- DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
- 9.- OUTLINE CONFORMS TO JEDEC TO-220, EXCEPT A2 (max.) AND D2 (min.) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

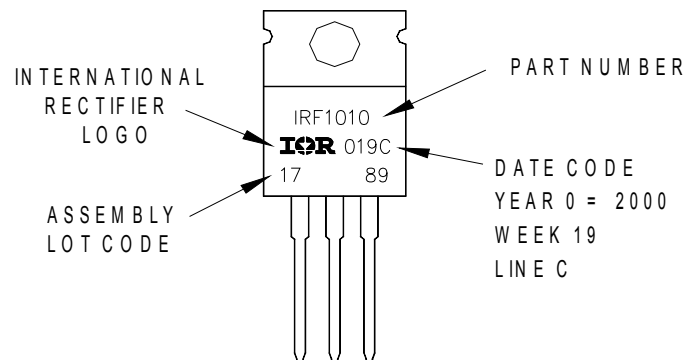
| SYMBOL | DIMENSIONS | | | | NOTES |
|--------|-------------|-------|----------|------|-------|
| | MILLIMETERS | | INCHES | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | 3.56 | 4.83 | .140 | .190 | |
| A1 | 0.51 | 1.40 | .020 | .055 | |
| A2 | 2.03 | 2.92 | .080 | .115 | |
| b | 0.38 | 1.01 | .015 | .040 | |
| b1 | 0.38 | 0.97 | .015 | .038 | 5 |
| b2 | 1.14 | 1.78 | .045 | .070 | |
| b3 | 1.14 | 1.73 | .045 | .068 | 5 |
| c | 0.36 | 0.61 | .014 | .024 | |
| c1 | 0.36 | 0.56 | .014 | .022 | 5 |
| D | 14.22 | 16.51 | .560 | .650 | 4 |
| D1 | 8.38 | 9.02 | .330 | .355 | |
| D2 | 11.68 | 12.88 | .460 | .507 | 7 |
| E | 9.65 | 10.67 | .380 | .420 | 4,7 |
| E1 | 6.86 | 8.89 | .270 | .350 | 7 |
| E2 | - | 0.76 | - | .030 | 8 |
| e | 2.54 BSC | | .100 BSC | | |
| e1 | 5.08 BSC | | .200 BSC | | |
| H1 | 5.84 | 6.86 | .230 | .270 | 7,8 |
| L | 12.70 | 14.73 | .500 | .580 | |
| L1 | 3.56 | 4.06 | .140 | .160 | 3 |
| øP | 3.54 | 4.08 | .139 | .161 | |
| Q | 2.54 | 3.42 | .100 | .135 | |

- LEAD ASSIGNMENTS**
- HEXFET**
- 1.- GATE
 - 2.- DRAIN
 - 3.- SOURCE
- IGBTs, CoPACK**
- 1.- GATE
 - 2.- COLLECTOR
 - 3.- EMITTER
- DIODES**
- 1.- ANODE
 - 2.- CATHODE
 - 3.- ANODE

TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
 LOT CODE 1789
 ASSEMBLED ON WW 19, 2000
 IN THE ASSEMBLY LINE "C"

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



TO-220AB packages are not recommended for Surface Mount Application.

Qualification Information

| | | |
|-----------------------------------|-------------------------------------|-----|
| Qualification Level | Industrial (per JEDEC JESD47F) † | |
| Moisture Sensitivity Level | TO-220AB | N/A |
| RoHS Compliant | Yes | |

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

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{Jmax} , starting $T_J = 25^{\circ}C$, $L = 0.61mH$, $R_G = 25\Omega$, $I_{AS} = 32A$.
- ③ Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- ④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 78A.
- ⑤ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques Refer to application note #AN-994.
- ⑥ R_{θ} is measured at T_J approximately $90^{\circ}C$.
- ⑦ Starting $T_J = 25^{\circ}C$, $L = 0.50mH$, $R_G = 25\Omega$, $I_{AS} = 60A$, $V_{DD} = 25V$. (Statistical Limit)

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Edition 2016-04-19

Published by
Infineon Technologies AG
81726 Munich, Germany

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