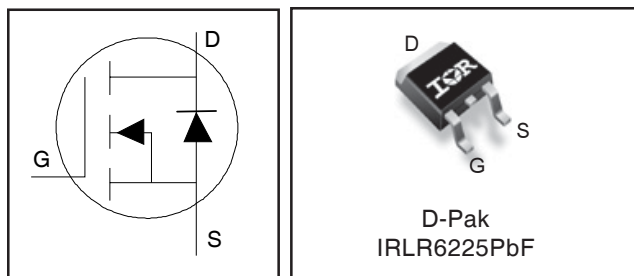


IRLR6225PbF

HEXFET® Power MOSFET

| | | |
|--|------------------------|-----------|
| V_{DS} | 20 | V |
| $R_{DS(on) max}$ (@ $V_{GS} = 4.5V$) | 4.0 | mΩ |
| $R_{DS(on) max}$ (@ $V_{GS} = 2.5V$) | 5.2 | mΩ |
| Q_g (typical) | 48 | nC |
| R_G (typical) | 2.2 | Ω |
| I_D | 42 ^⑥ | A |



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

Applications

- Battery Protection Switch

Features and Benefits

Features

| |
|--|
| Industry-Standard Pinout |
| Compatible with Existing Surface Mount Techniques |
| RoHS Compliant Containing no Lead, no Bromide and no Halogen |
| MSL1, Industrial Qualification |

results in
⇒

Benefits

| |
|----------------------------|
| Multi-Vendor Compatibility |
| Easier Manufacturing |
| Environmentally Friendlier |
| Increased Reliability |

| Orderable part number | Package Type | Standard Pack | | Note |
|-----------------------|--------------|---------------|----------|------|
| | | Form | Quantity | |
| IRLR6225PbF | D-PAK | Tube/Bulk | 75 | |
| IRLR6225TRPbF | D-PAK | Tape and Reel | 2000 | |

Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---------------------------|--|-----------------------|-------|
| V_{DS} | Drain-to-Source Voltage | 20 | V |
| V_{GS} | Gate-to-Source Voltage | ±12 | |
| $I_D @ T_C = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 100 ^⑥ | A |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 63 ^⑥ | |
| I_{DM} | Pulsed Drain Current ^① | 400 | |
| $P_D @ T_C = 25^\circ C$ | Power Dissipation ^⑤ | 63 | W |
| $P_D @ T_C = 100^\circ C$ | Power Dissipation ^⑤ | 25 | |
| | Linear Derating Factor ^⑤ | 0.5 | |
| T_J | Operating Junction and | -55 to + 150 | °C |
| T_{STG} | Storage Temperature Range | | |
| | Soldering Temperature, for 10 seconds | 300 (1.6mm from case) | |

Notes ^① through ^⑥ are on page 8

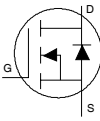
Static @ T_J = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|-------------------------------------|---|------|------|------|-------|--|
| BV _{DSS} | Drain-to-Source Breakdown Voltage | 20 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| ΔBV _{DSS} /ΔT _J | Breakdown Voltage Temp. Coefficient | — | 6.6 | — | mV/°C | Reference to 25°C, I _D = 1mA |
| R _{DS(on)} | Static Drain-to-Source On-Resistance | — | 3.2 | 4.0 | mΩ | V _{GS} = 4.5V, I _D = 21A ③ |
| | | — | 4.2 | 5.2 | | V _{GS} = 2.5V, I _D = 17A ③ |
| V _{GS(th)} | Gate Threshold Voltage | 0.5 | 0.8 | 1.1 | V | V _{DS} = V _{GS} , I _D = 50μA |
| ΔV _{GS(th)} | Gate Threshold Voltage Coefficient | — | -4.0 | — | mV/°C | |
| I _{DSS} | Drain-to-Source Leakage Current | — | — | 1.0 | μA | V _{DS} = 16V, V _{GS} = 0V |
| | | — | — | 150 | | V _{DS} = 16V, V _{GS} = 0V, T _J = 125°C |
| I _{GSS} | Gate-to-Source Forward Leakage | — | — | 100 | nA | V _{GS} = 12V |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | V _{GS} = -12V |
| g _{fs} | Forward Transconductance | 205 | — | — | S | V _{DS} = 10V, I _D = 21A |
| Q _g | Total Gate Charge | — | 48 | 72 | nC | V _{DS} = 10V V _{GS} = 4.5V I _D = 17A See Fig.17 & 18 |
| Q _{gs1} | Pre-V _{th} Gate-to-Source Charge | — | 2.6 | — | | |
| Q _{gs2} | Post-V _{th} Gate-to-Source Charge | — | 3.6 | — | | |
| Q _{gd} | Gate-to-Drain Charge | — | 19 | — | | |
| Q _{godr} | Gate Charge Overdrive | — | 23 | — | | |
| Q _{sw} | Switch Charge (Q _{gs2} + Q _{gd}) | — | 23 | — | | |
| Q _{oss} | Output Charge | — | 21 | — | nC | V _{DS} = 16V, V _{GS} = 0V |
| R _G | Gate Resistance | — | 2.2 | — | Ω | |
| t _{d(on)} | Turn-On Delay Time | — | 9.7 | — | ns | V _{DD} = 10V, V _{GS} = 4.5V I _D = 17A R _G = 1.8Ω See Fig.15 |
| t _r | Rise Time | — | 37 | — | | |
| t _{d(off)} | Turn-Off Delay Time | — | 63 | — | | |
| t _f | Fall Time | — | 52 | — | | |
| C _{iss} | Input Capacitance | — | 3770 | — | pF | V _{GS} = 0V V _{DS} = 10V f = 1.0MHz |
| C _{oss} | Output Capacitance | — | 915 | — | | |
| C _{rss} | Reverse Transfer Capacitance | — | 650 | — | | |

Avalanche Characteristics

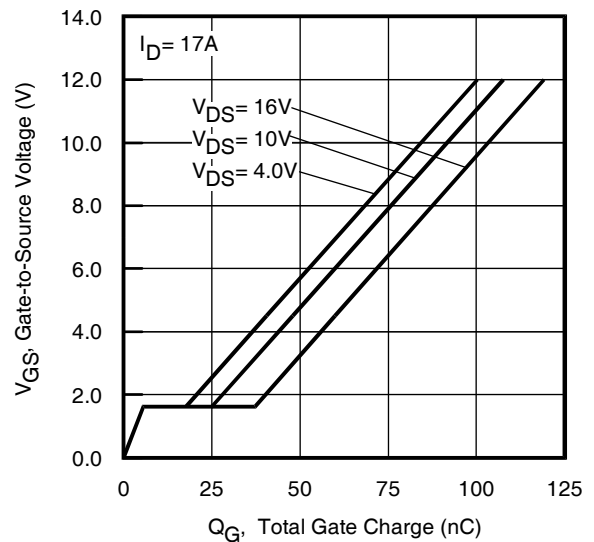
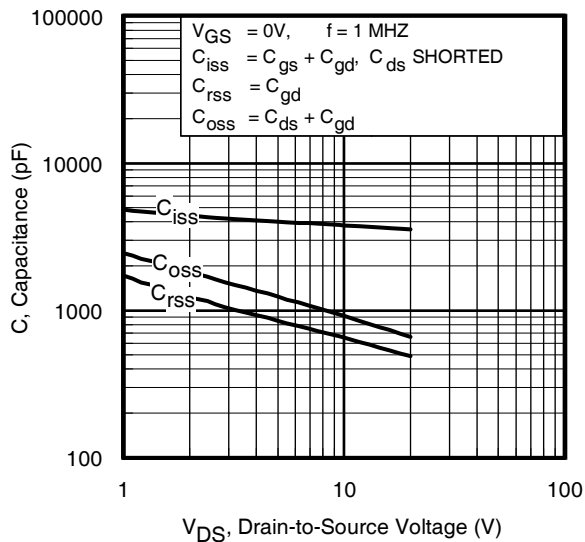
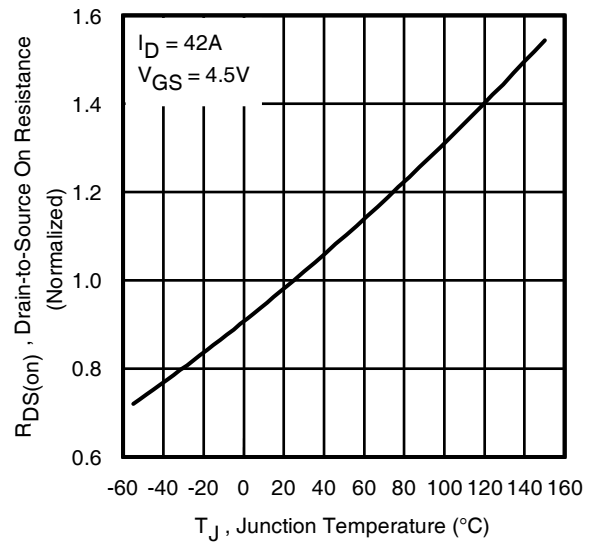
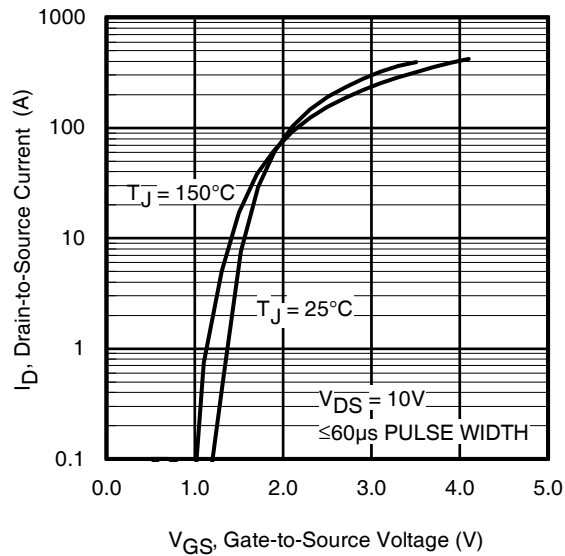
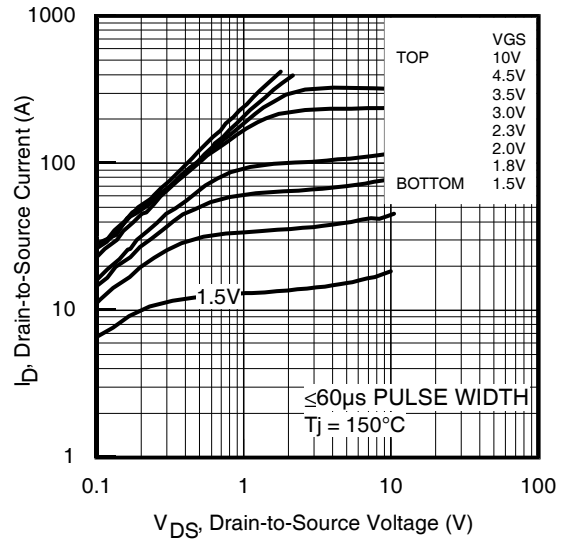
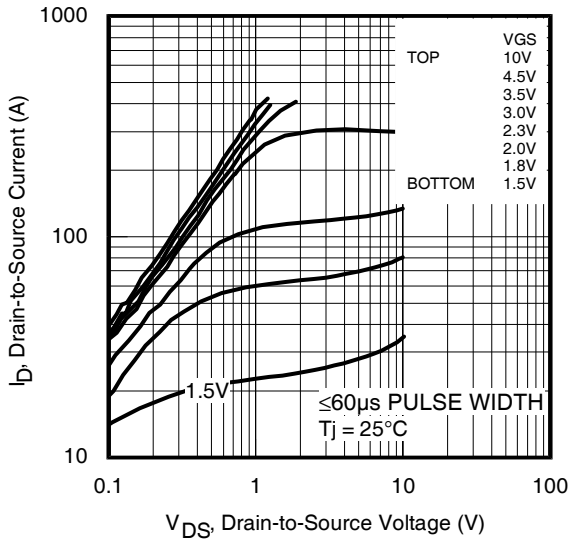
| | Parameter | Typ. | Max. | Units |
|-----------------|---------------------------------|------|------|-------|
| E _{AS} | Single Pulse Avalanche Energy ② | — | 170 | mJ |
| I _{AR} | Avalanche Current ① | — | 17 | A |
| E _{AR} | Repetitive Avalanche Energy ① | — | 6.3 | mJ |

Diode Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|-----------------|--|---|------|------|-------|--|
| I _S | Continuous Source Current (Body Diode) ⑥ | — | — | 100⑥ | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I _{SM} | Pulsed Source Current (Body Diode) ① | — | — | 400 | | |
| V _{SD} | Diode Forward Voltage | — | — | 1.2 | V | T _J = 25°C, I _S = 17A, V _{GS} = 0V ③ |
| t _{rr} | Reverse Recovery Time | — | 35 | 53 | ns | T _J = 25°C, I _F = 17A, V _{DD} = 10V |
| Q _{rr} | Reverse Recovery Charge | — | 57 | 86 | nC | di/dt = 200A/μs ③ |
| t _{on} | Forward Turn-On Time | Time is dominated by parasitic inductance | | | | |

Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|------------------|-----------------------------------|------|------|-------|
| R _{θJC} | Junction-to-Case ④ | — | 2.0 | °C/W |
| R _{θJA} | Junction-to-Ambient (PCB Mount) ⑤ | — | 50 | |
| R _{θJA} | Junction-to-Ambient ⑤ | — | 110 | |



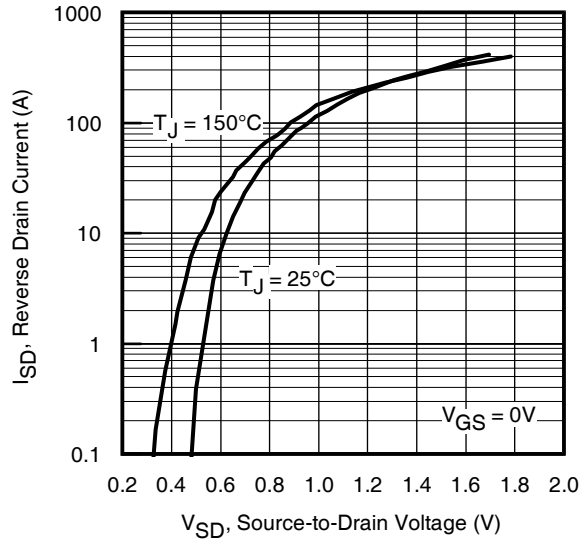


Fig 7. Typical Source-Drain Diode Forward Voltage

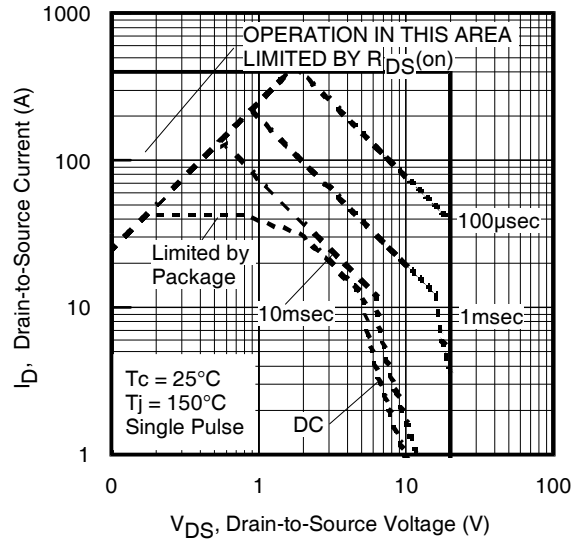


Fig 8. Maximum Safe Operating Area

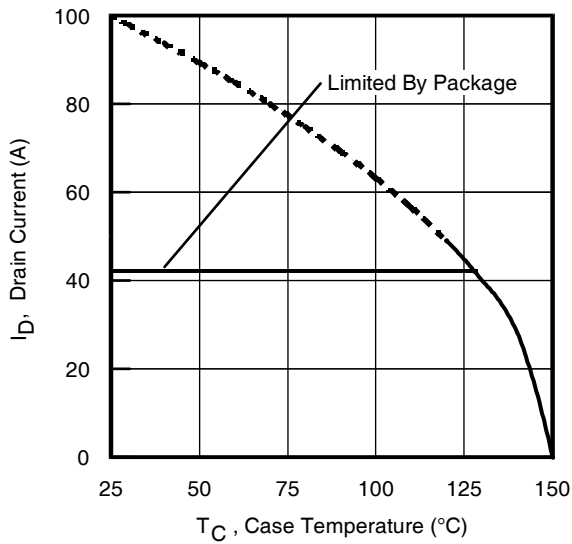


Fig 9. Maximum Drain Current vs. Case (Bottom) Temperature

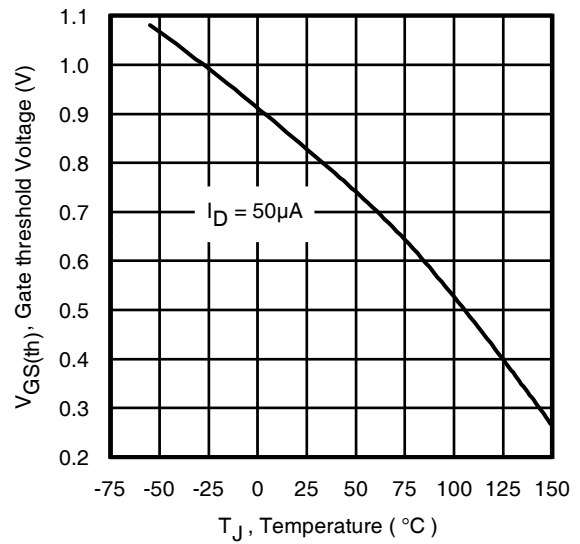


Fig 10. Threshold Voltage vs. Temperature

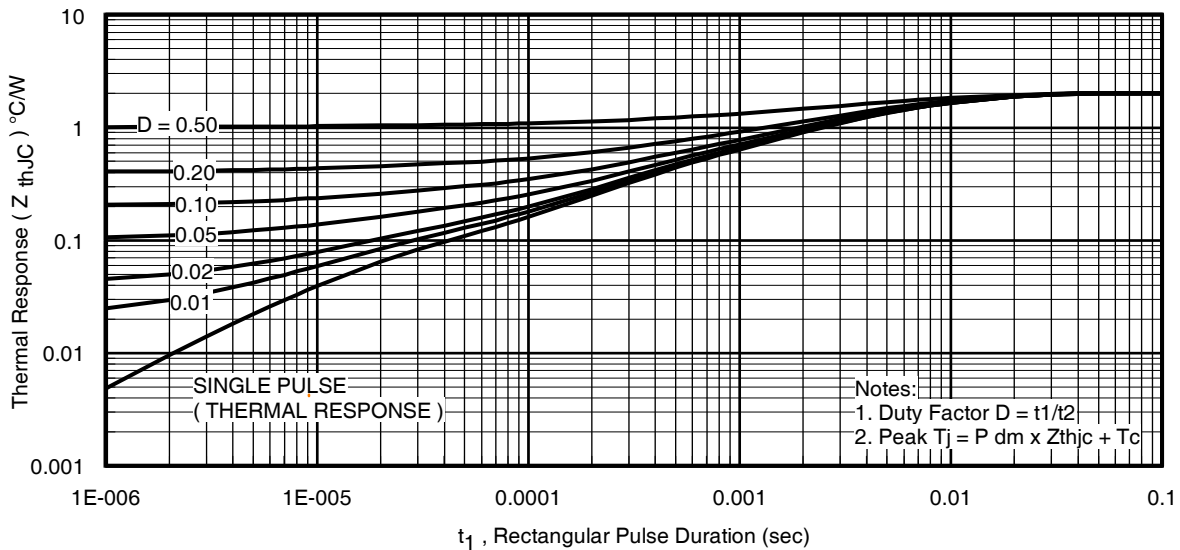


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

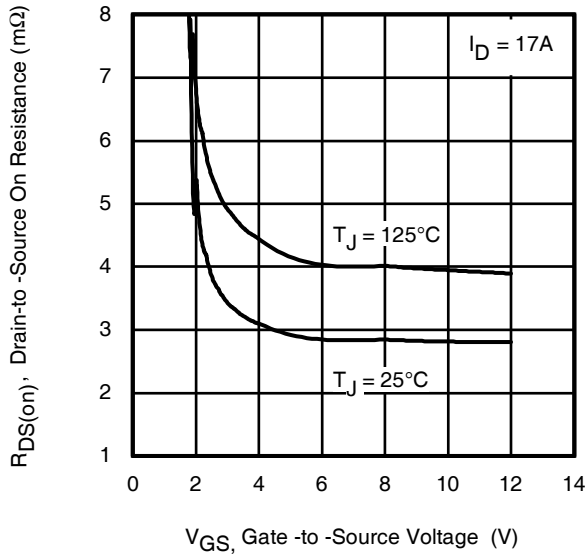


Fig 12. On-Resistance vs. Gate Voltage

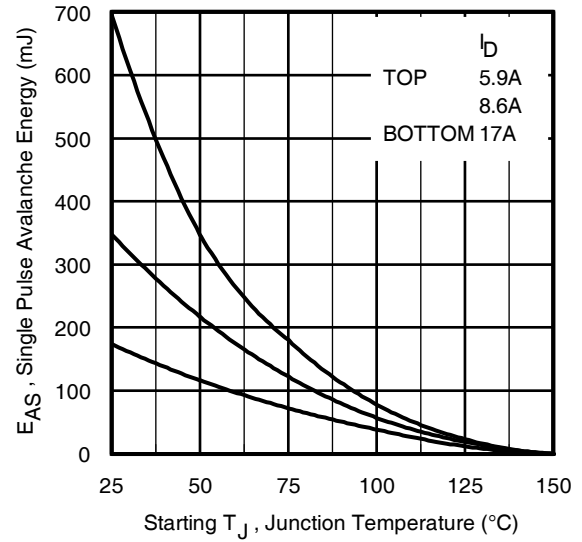


Fig 13. Maximum Avalanche Energy vs. Drain Current

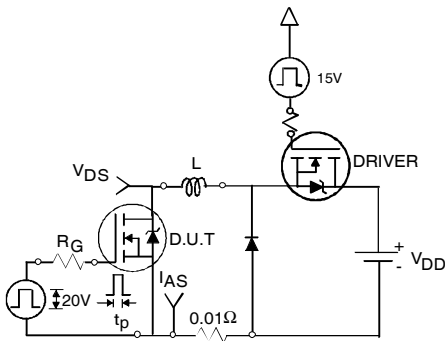


Fig 14a. Unclamped Inductive Test Circuit

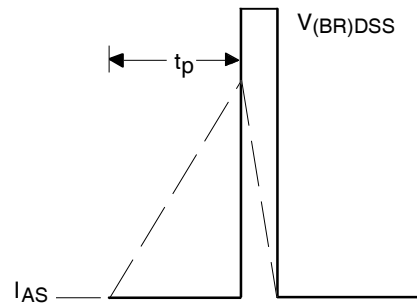


Fig 14b. Unclamped Inductive Waveforms

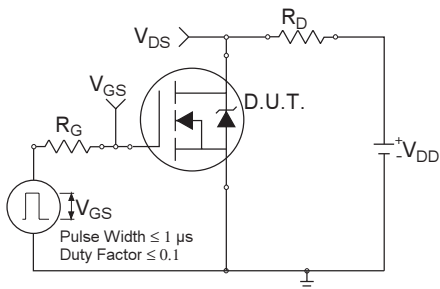


Fig 15a. Switching Time Test Circuit

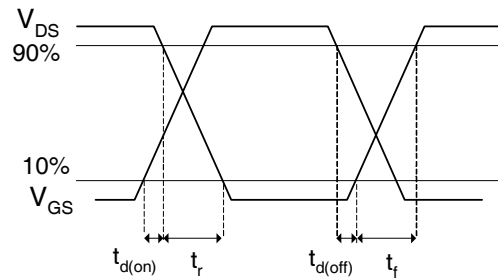


Fig 15b. Switching Time Waveforms

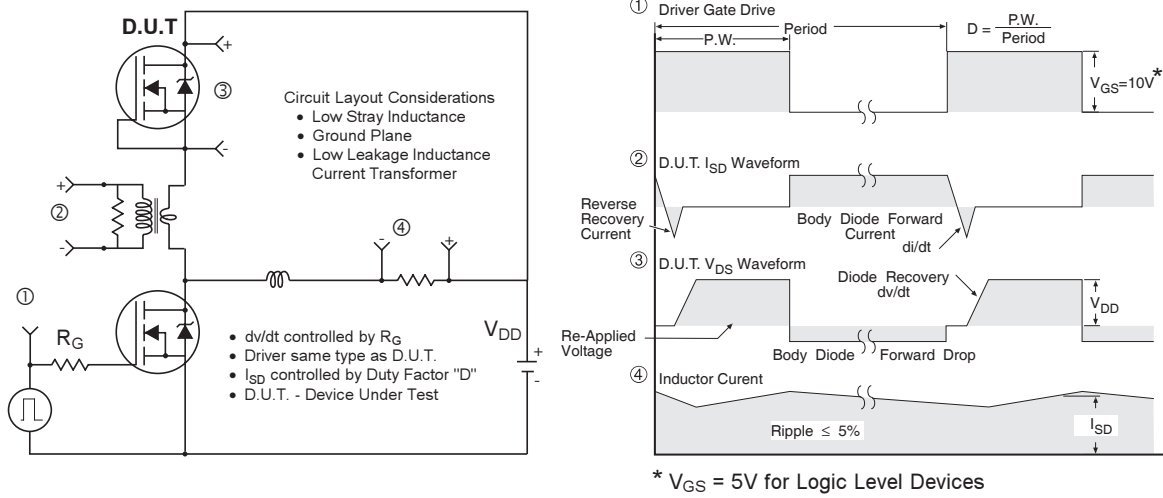


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET[®] Power MOSFETs

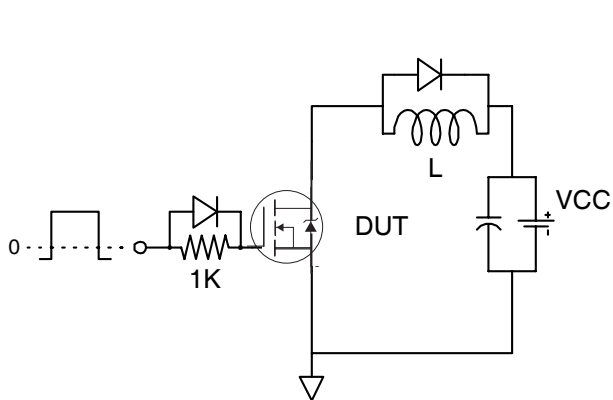


Fig 17. Gate Charge Test Circuit

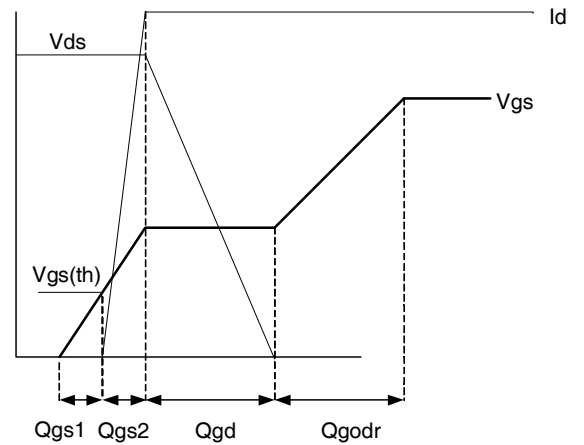
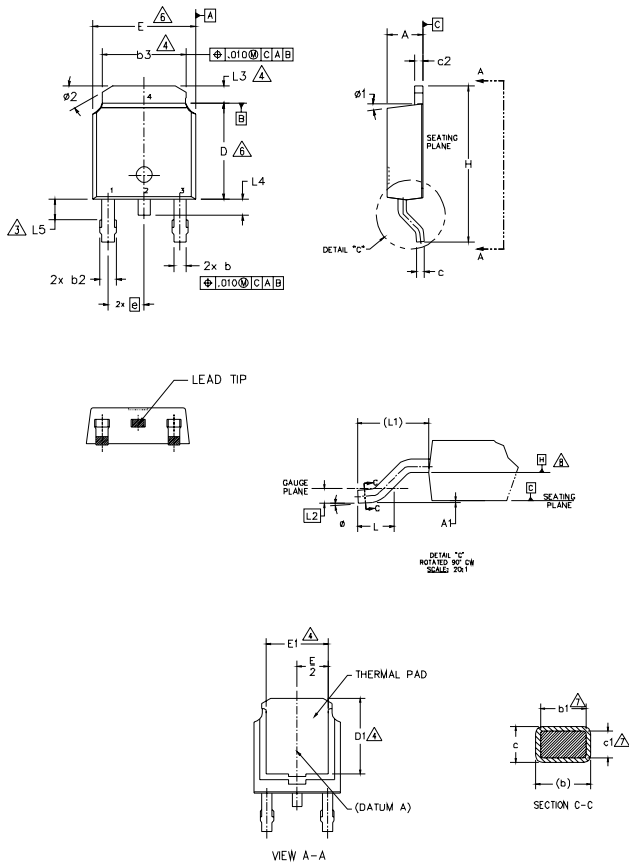


Fig 18. Gate Charge Waveform

D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

- 1.- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- 2.- DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
- 3.- LEAD DIMENSION UNCONTROLLED IN L5.
- 4.- DIMENSION D1, E1, L3 & b3 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.
- 5.- SECTION C-C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 AND 0.10 [0.13 AND 0.25] FROM THE LEAD TIP.
- 6.- DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005 [0.13] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
- 7.- DIMENSION b1 & c1 APPLIED TO BASE METAL ONLY.
- 8.- DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
- 9.- OUTLINE CONFORMS TO JEDEC OUTLINE TO-252AA.

| SYMBOL | DIMENSIONS | | | | NOTES |
|--------|-------------|-------|-----------|------|-------|
| | MILLIMETERS | | INCHES | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | 2.18 | 2.39 | .086 | .094 | |
| A1 | - | 0.13 | - | .005 | |
| b | 0.64 | 0.89 | .025 | .035 | |
| b1 | 0.65 | 0.79 | .025 | .031 | 7 |
| b2 | 0.76 | 1.14 | .030 | .045 | |
| b3 | 4.95 | 5.46 | .195 | .215 | 4 |
| c | 0.46 | 0.61 | .018 | .024 | |
| c1 | 0.41 | 0.56 | .016 | .022 | 7 |
| c2 | 0.46 | 0.89 | .018 | .035 | |
| D | 5.97 | 6.22 | .235 | .245 | 6 |
| D1 | 5.21 | - | .205 | - | 4 |
| E | 6.35 | 6.73 | .250 | .265 | 6 |
| E1 | 4.32 | - | .170 | - | 4 |
| e | 2.29 BSC | | .090 BSC | | |
| H | 9.40 | 10.41 | .370 | .410 | |
| L | 1.40 | 1.78 | .055 | .070 | |
| L1 | 2.74 BSC | | .108 REF. | | |
| L2 | 0.51 BSC | | .020 BSC | | |
| L3 | 0.89 | 1.27 | .035 | .050 | 4 |
| L4 | - | 1.02 | - | .040 | |
| L5 | 1.14 | 1.52 | .045 | .060 | 3 |
| phi | 0" | 10" | 0" | 10" | |
| phi1 | 0" | 15" | 0" | 15" | |
| phi2 | 25" | 35" | 25" | 35" | |

LEAD ASSIGNMENTS

HEXFET

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

IGBT & CoPAK

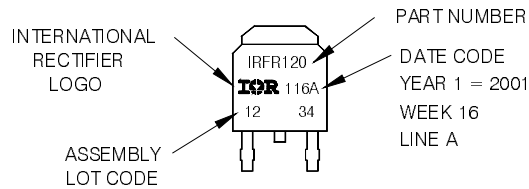
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

D-Pak (TO-252AA) Part Marking Information

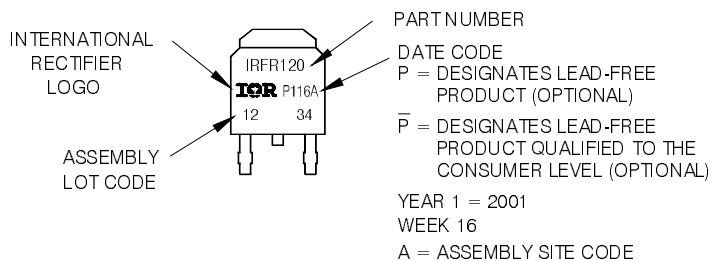
EXAMPLE: THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 1234
ASSEMBLED ON WW 16, 2001
IN THE ASSEMBLY LINE "A"

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

"P" in assembly line position indicates
"Lead-Free" qualification to the consumer-level



OR

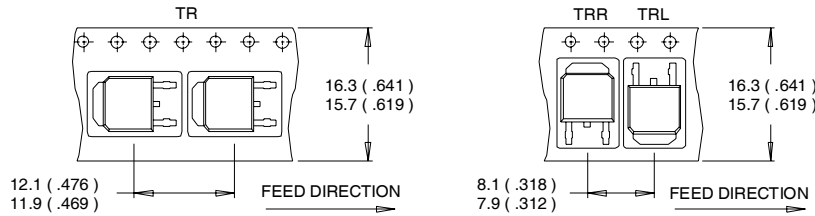


Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

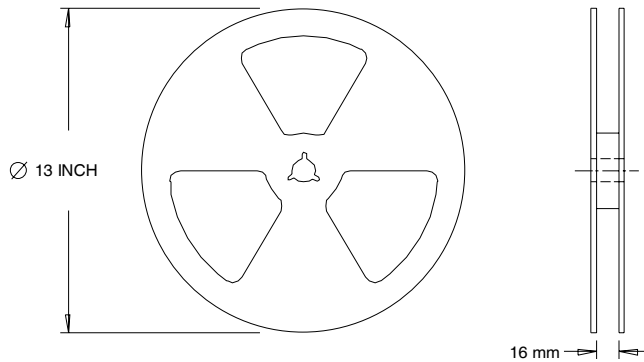
IRLR6225PbF

D-Pak (TO-252AA) Tape & Reel Information

Dimensions are shown in millimeters (inches)



- NOTES:
1. CONTROLLING DIMENSION : MILLIMETER.
 2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
 3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



- NOTES:
1. OUTLINE CONFORMS TO EIA-481.

Qualification information[†]

| | | |
|----------------------------|---|--|
| Qualification level | Industrial ^{††} (per JEDEC JESD47F ^{†††} guidelines) | |
| Moisture Sensitivity Level | D-PAK | MSL1 (per JEDEC J-STD-020D ^{†††}) |
| RoHS compliant | Yes | |

[†] Qualification standards can be found at International Rectifier's web site

<http://www.irf.com/product-info/reliability>

^{††} Higher qualification ratings may be available should the user have such requirements.

Please contact your International Rectifier sales representative for further information:

<http://www.irf.com/whoto-call/salesrep/>

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

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 1.2\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 17\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ R_θ is measured at T_J of approximately 90°C .
- ⑤ When mounted on 1 inch square 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.
- ⑥ Calculated continuous current based on maximum allowable junction temperature. Package is limited to 42A by production test capability.

Data and specifications subject to change without notice.

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