

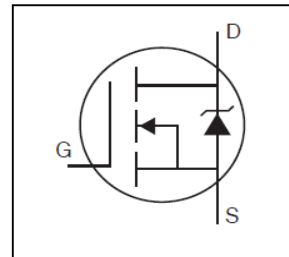
Features

- Advanced Process Technology
- Key Parameters Optimized for PDP Sustain, Energy Recovery and Pass Switch Applications
- Low E_{PULSE} Rating to Reduce Power Dissipation in PDP Sustain, Energy Recovery and Pass Switch Applications
- Low Q_G for Fast Response
- High Repetitive Peak Current Capability for Reliable Operation
- Short Fall & Rise Times for Fast Switching
- 150°C Operating Junction Temperature for Improved Ruggedness
- Repetitive Avalanche Capability for Robustness and Reliability

HEXFET® Power MOSFET

Key Parameters

| | | |
|--|-----|----|
| V_{DS} max | 200 | V |
| V_{DS} (Avalanche) typ. | 240 | V |
| $R_{DS(ON)}$ typ. @ 10V | 21 | mΩ |
| I_{RP} max @ $T_C = 100^\circ\text{C}$ | 47 | A |
| T_J max | 150 | °C |



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

Description

This HEXFET® Power MOSFET is specifically designed for Sustain; Energy Recovery & Pass switch applications in Plasma Display Panels. This MOSFET utilizes the latest processing techniques to achieve low on-resistance per silicon area and low EPULSE rating. Additional features of this MOSFET are 150°C operating junction temperature and high repetitive peak current capability. These features combine to make this MOSFET a highly efficient, robust and reliable device for PDP driving applications

| Base Part Number | Package Type | Standard Pack | | Orderable Part Number |
|------------------|-----------------|---------------|----------|-----------------------|
| | | Form | Quantity | |
| IRFI4227PbF | TO-220 Full-Pak | Tube | 50 | IRFI4227PbF |

Absolute Maximum Ratings

| Symbol | Parameter | Max. | Units |
|--------------------------------------|---|--------------------|-------|
| V_{GS} | Gate-to-Source Voltage | ± 30 | V |
| I_D @ $T_C = 25^\circ\text{C}$ | Continuous Drain Current, V_{GS} @ 10V | 26 | A |
| I_D @ $T_C = 100^\circ\text{C}$ | Continuous Drain Current, V_{GS} @ 10V | 17 | |
| I_{DM} | Pulsed Drain Current ① | 100 | |
| I_{RP} @ $T_C = 100^\circ\text{C}$ | Repetitive Peak Current ⑤ | 47 | W |
| P_D @ $T_C = 25^\circ\text{C}$ | Maximum Power Dissipation | 46 | |
| P_D @ $T_C = 100^\circ\text{C}$ | Maximum Power Dissipation | 18 | W/°C |
| | Linear Derating Factor | 0.37 | |
| T_J | Operating Junction and | -40 to + 150 | °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 (1.1N•m) | |

Thermal Resistance

| Symbol | Parameter | Typ. | Max. | Units |
|-----------------|---------------------|------|------|-------|
| $R_{\theta JC}$ | Junction-to-Case ④ | — | 2.73 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient | — | 65 | |

Electrical Characteristics @ T_J = 25°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 = 250μA |
| ΔV _{(BR)DSS} /ΔT _J | Breakdown Voltage Temp. Coefficient | — | 240 | — | mV/°C | Reference to 25°C, I _D = 1mA |
| R _{DS(on)} | Static Drain-to-Source On-Resistance | — | 21 | 25 | mΩ | V _{GS} = 10V, I _D = 17A |
| V _{GS(th)} | Gate Threshold Voltage | 3.0 | — | 5.0 | V | V _{DS} = V _{GS} , I _D = 250μA |
| ΔV _{GS(th)} /ΔT _J | Gate Threshold Voltage Temp. Coefficient | — | -11 | — | mV/°C | |
| I _{DSS} | Drain-to-Source Leakage Current | — | — | 20 | μA | V _{DS} = 200V, V _{GS} = 0V |
| | | — | — | 1.0 | mA | V _{DS} = 200V, 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 |
| g _{fs} | Forward Trans conductance | 47 | — | — | S | V _{DS} = 25V, I _D = 17A |
| Q _g | Total Gate Charge | — | 73 | 110 | nC | I _D = 17A, V _{DS} = 100V |
| Q _{gd} | Gate-to-Drain Charge | — | 21 | — | | V _{GS} = 10V |
| t _{d(on)} | Turn-On Delay Time | — | 17 | — | ns | V _{DD} = 100V, V _{GS} = 10V |
| t _r | Rise Time | — | 19 | — | | I _D = 17A |
| t _{d(off)} | Turn-Off Delay Time | — | 11 | — | | R _G = 2.5Ω |
| t _f | Fall Time | — | 29 | — | | See Fig. 22 |
| t _{st} | Shoot Through Blocking Time | 100 | — | — | ns | V _{DD} = 160V, V _{GS} = 15V, R _G = 4.7Ω |
| E _{PULSE} | Energy per Pulse | — | 570 | — | μJ | L = 220nH, C = 0.4μF, V _{GS} = 15V V _{DD} = 160V, R _G = 4.7Ω, T _J = 25°C |
| | | — | 910 | — | | L = 220nH, C = 0.4μF, V _{GS} = 15V V _{DD} = 160V, R _G = 4.7Ω, T _J = 100°C |
| C _{iSS} | Input Capacitance | — | 4600 | — | pF | V _{GS} = 0V |
| C _{oSS} | Output Capacitance | — | 460 | — | | V _{DS} = 25V |
| C _{rSS} | Reverse Transfer Capacitance | — | 91 | — | | f = 1.0MHz |
| C _{oSS eff.} | Effective Output Capacitance | — | 360 | — | | V _{GS} = 0V, V _{DS} = 20V to 160V |
| L _D | Internal Drain Inductance | — | 4.5 | — | nH | Between lead, 6mm (0.25in.) from package and center of die contact |
| L _S | Internal Source Inductance | — | 7.5 | — | | |


Avalanche Characteristics

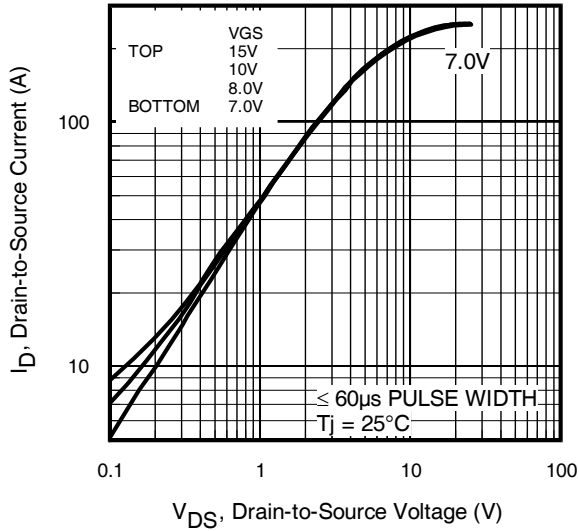
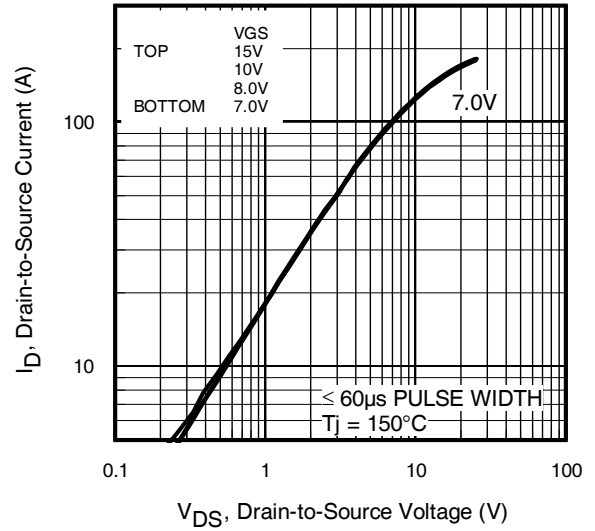
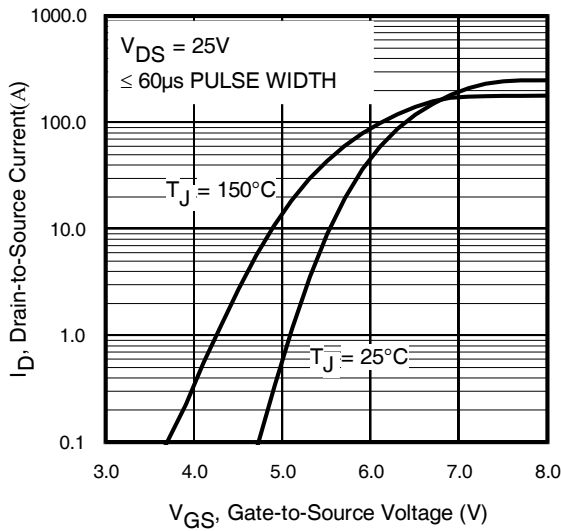
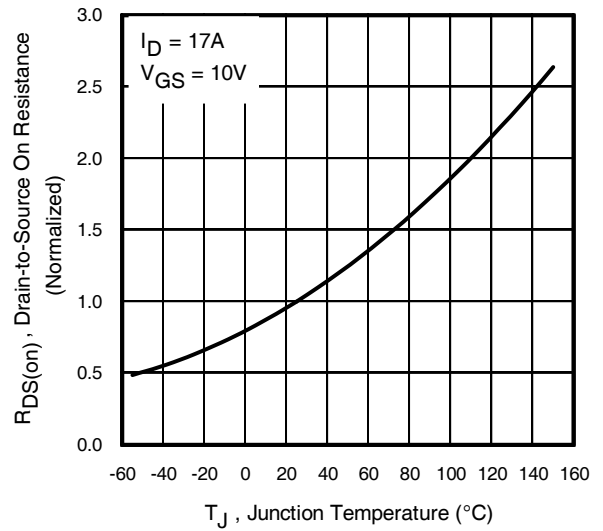
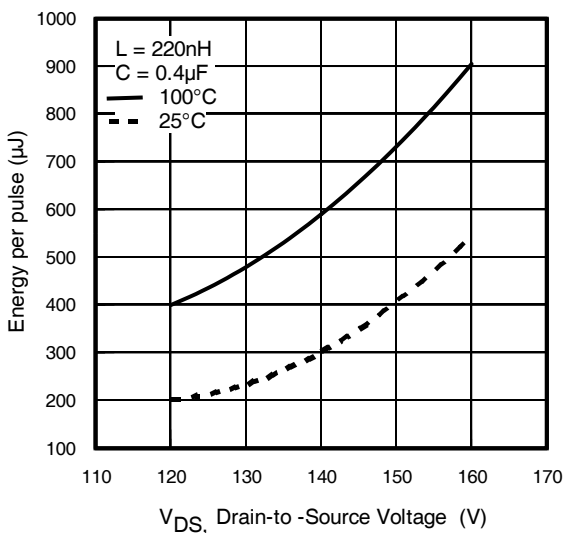
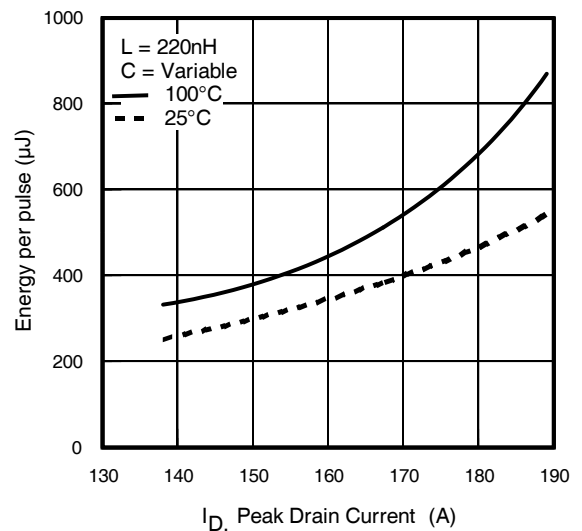
| | Parameter | Typ. | Max. | Units |
|----------------------------|---------------------------------|------|------|-------|
| E _{AS} | Single Pulse Avalanche Energy ② | — | 54 | mJ |
| E _{AR} | Repetitive Avalanche Energy ① | — | 4.6 | |
| V _{DS(Avalanche)} | Repetitive Avalanche Voltage ① | 240 | — | V |
| I _{AS} | Avalanche Current ② | — | 16 | A |

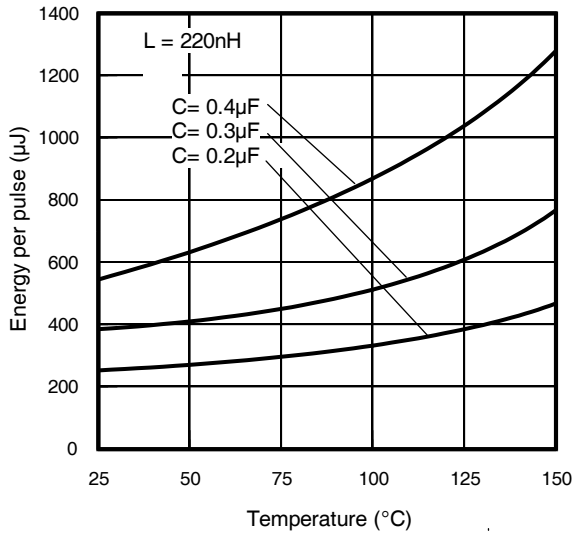
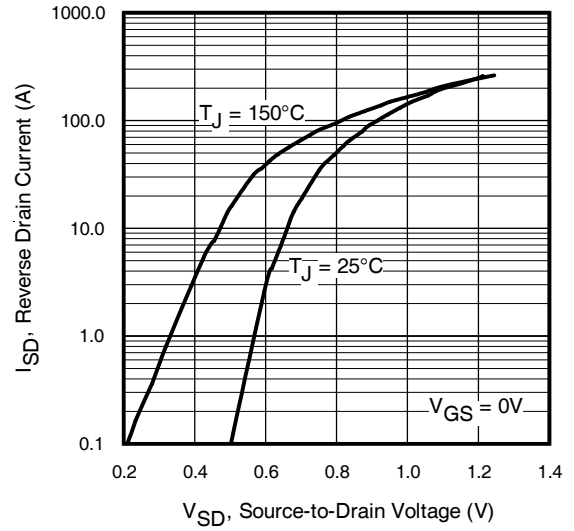
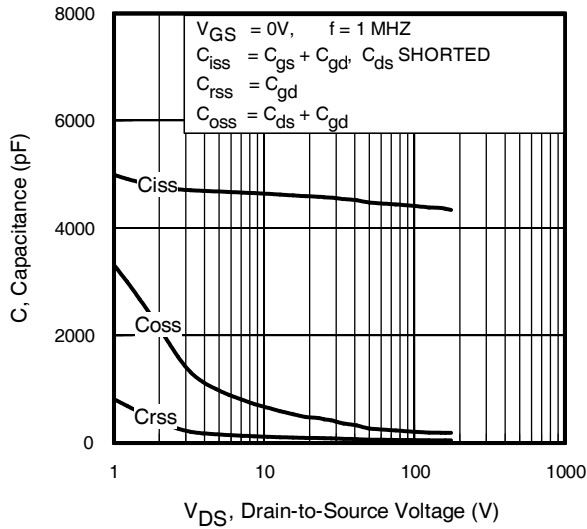
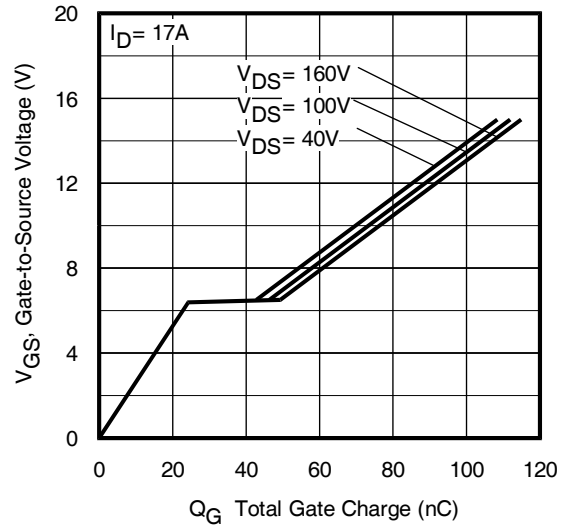
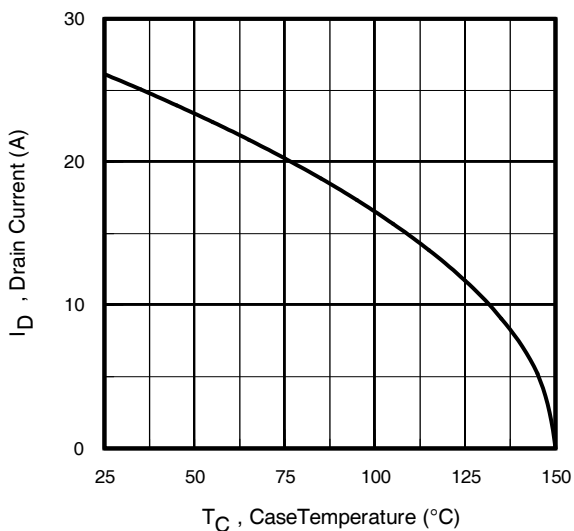
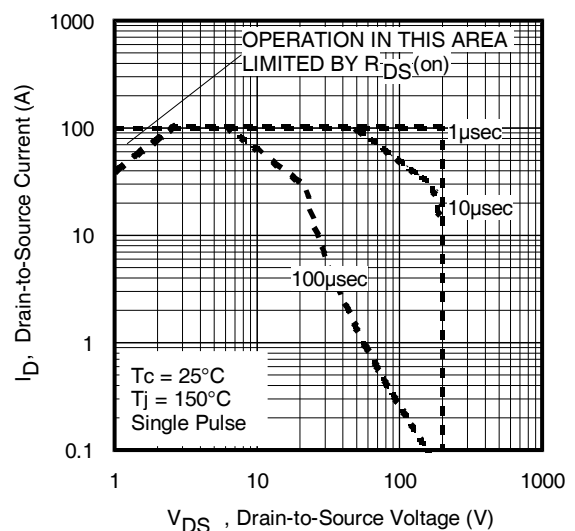
Diode Characteristics

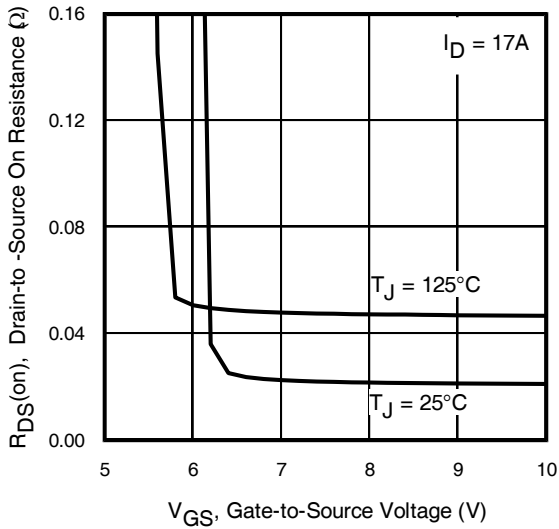
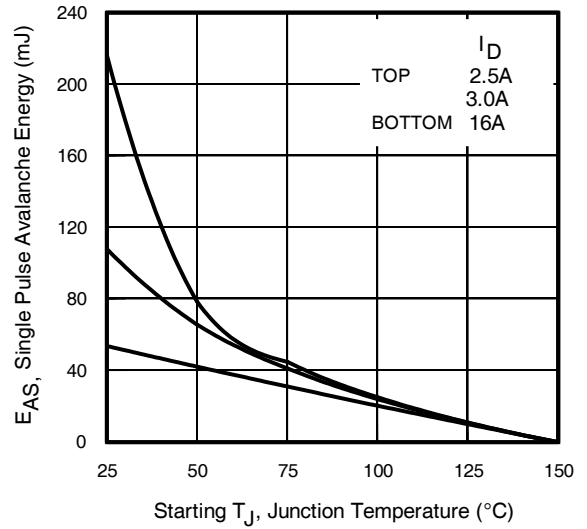
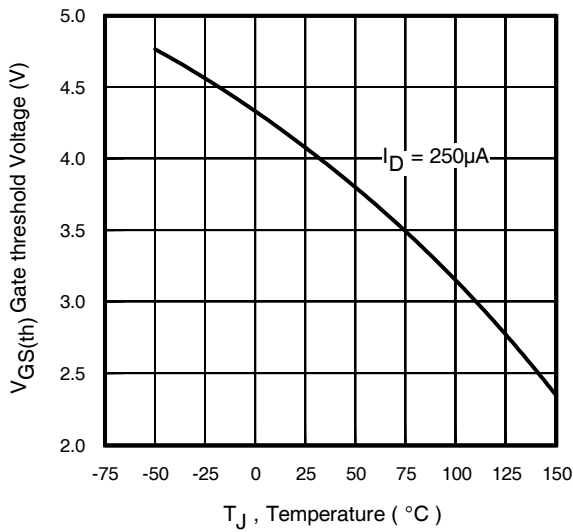
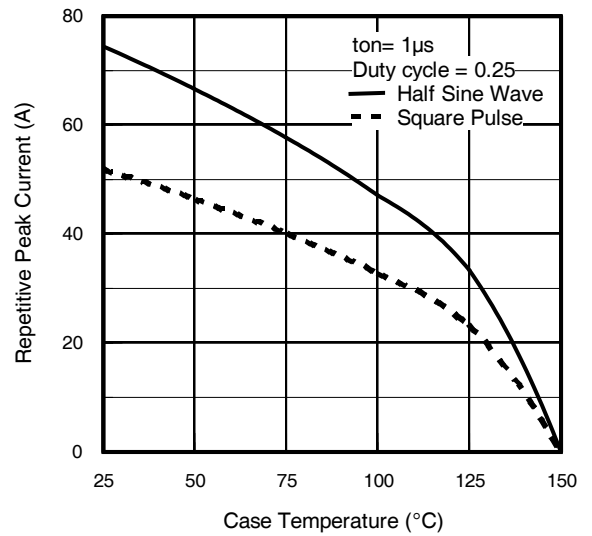
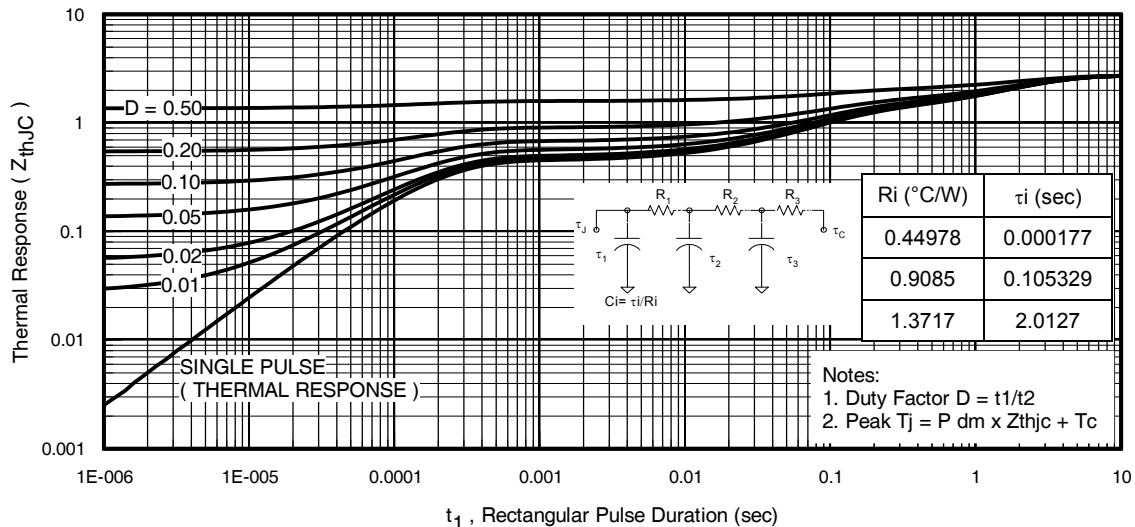
| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|--|--|------|------|------|-------|---|
| I _S @ T _C = 25°C | Continuous Source Current (Body Diode) | — | — | 26 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| I _{SM} | Pulsed Source Current (Body Diode) ① | — | — | 100 | | |
| V _{SD} | Diode Forward Voltage | — | — | 1.3 | V | T _J = 25°C, I _S = 17A, V _{GS} = 0V ③ |
| t _{rr} | Reverse Recovery Time | — | 93 | 140 | ns | T _J = 25°C, I _F = 17A, V _{DD} = 50V |
| Q _{rr} | Reverse Recovery Charge | — | 350 | 520 | nC | di/dt = 100A/μs ③ |

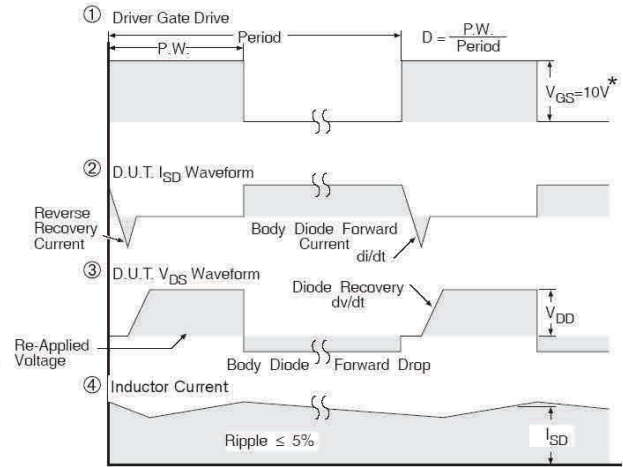
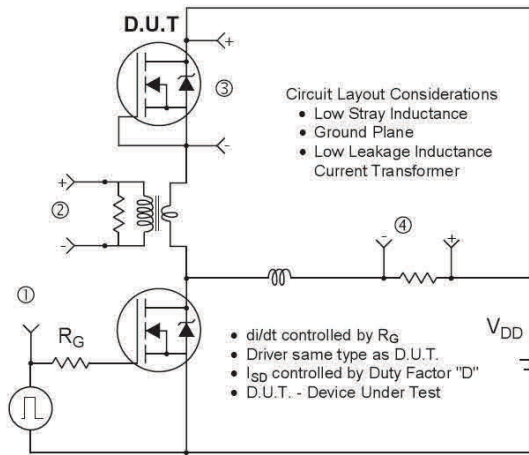
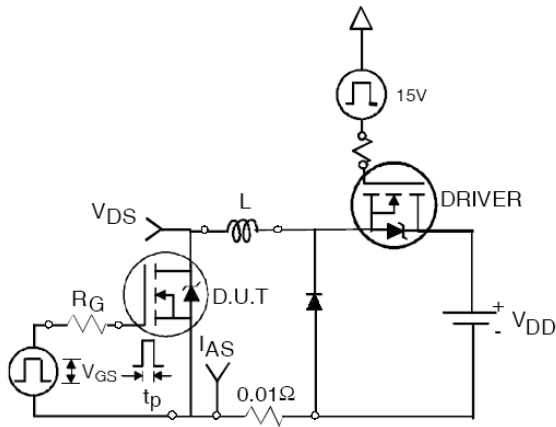
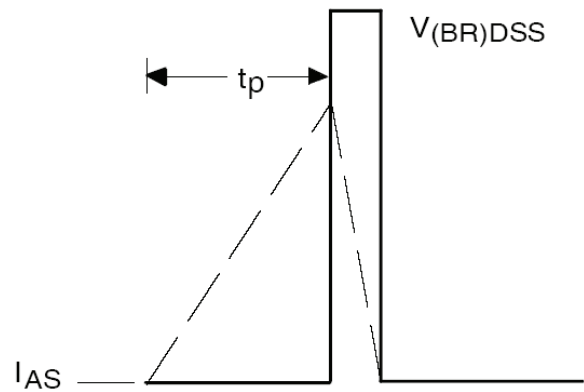
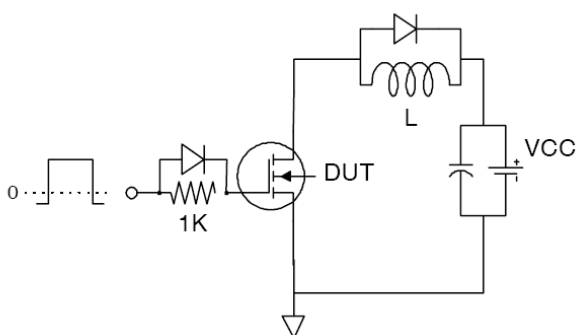
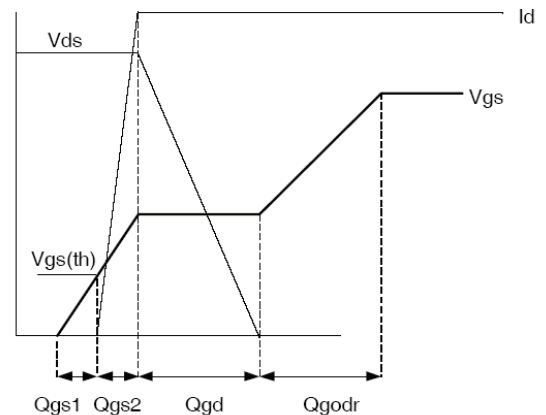
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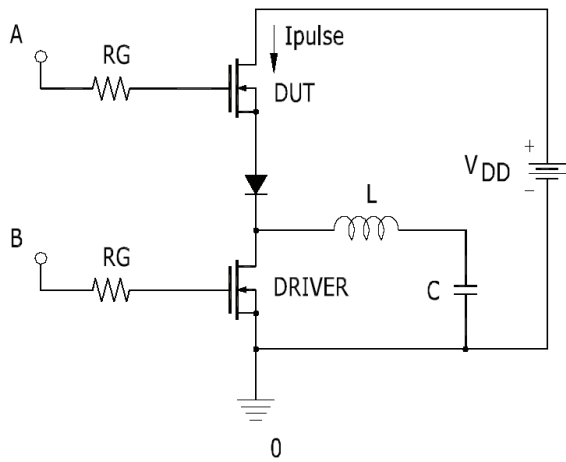
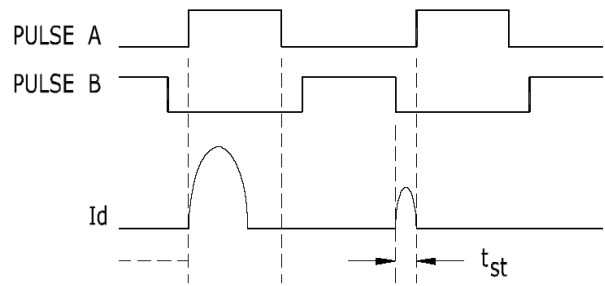
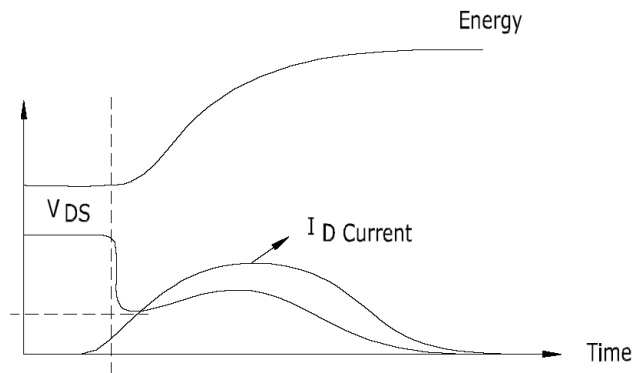
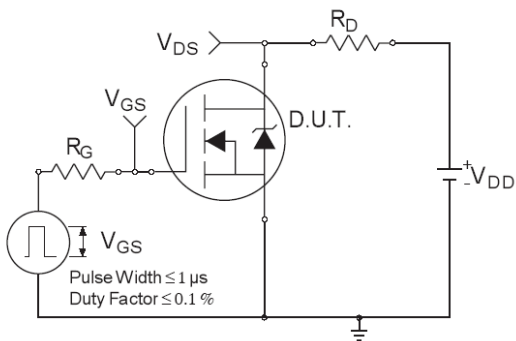
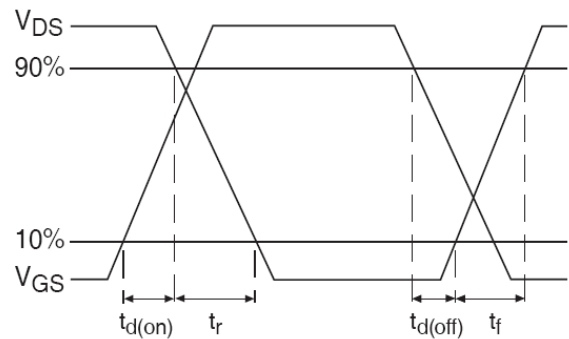
- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② starting T_J = 25°C, L = 0.44mH, R_G = 25Ω, I_{AS} = 16A.
- ③ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ④ R_θ is measured at T_J of approximately 90°C.
- ⑤ Half sine wave with duty cycle = 0.25, ton = 1μsec.

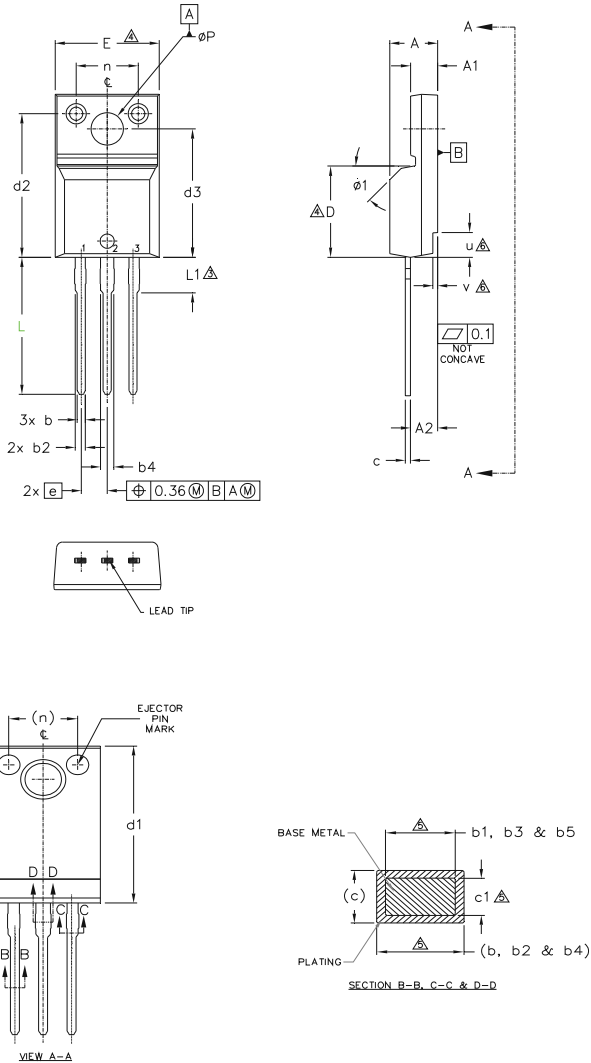

Fig. 1. Typical Output Characteristics

Fig. 2. Typical Output Characteristics

Fig. 3. Typical Transfer Characteristics

Fig. 4. Normalized On-Resistance vs. Temperature

Fig 5. Typical E_{PULSE} vs. Drain-to-Source Voltage

Fig 6. Typical E_{PULSE} vs. Drain Current


Fig. 7. Typical E_{PULSE} vs. Temperature

Fig. 8. Typical Source-Drain Diode Forward Voltage

Fig. 9. Typical Capacitance vs. Drain-to-Source Voltage

Fig. 10. Typical Gate Charge vs. Gate-to-Source Voltage

Fig. 11. Maximum Drain Current vs. Case Temperature

Fig. 12. Maximum Safe Operating Area


Fig. 13. On-Resistance Vs. Gate Voltage

Fig. 14. Maximum Avalanche Energy Vs. Temperature

Fig. 15. Threshold Voltage vs. Temperature

Fig. 16. Typical Repetitive peak Current vs. Case temperature

Fig 17. Maximum Effective Transient Thermal Impedance, Junction-to-Case


Fig 18. Diode Reverse Recovery Test Circuit for N-Channel HEXFET® Power MOSFETs

Fig 19a. Unclamped Inductive Test Circuit

Fig 19b. Unclamped Inductive Waveforms

Fig 20a. Gate Charge Test Circuit

Fig 20b. Gate Charge Waveform


Fig 21a. t_{st} and E_{PULSE} Test Circuit

Fig 21b. t_{st} Test Waveforms

Fig 21c. E_{PULSE} Test Waveforms

Fig 22a. Switching Time Test Circuit

Fig 22b. Switching Time Waveforms

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

NOTES:

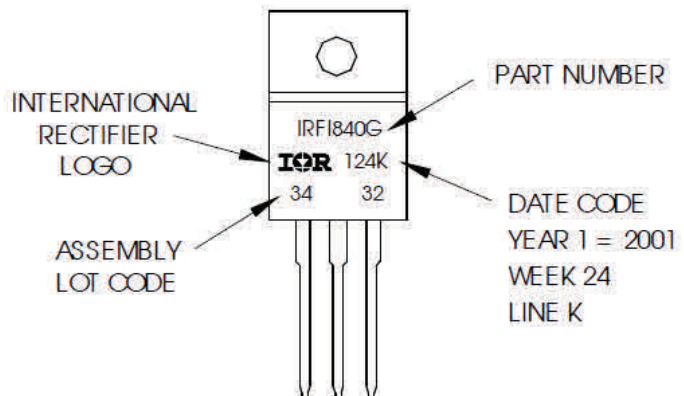
- 1.0 DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
- 2.0 DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
- 3.0 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
- 4.0 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTER MOST EXTREMES OF THE PLASTIC BODY.
- 5.0 DIMENSION b1, b3, b5 & c1 APPLY TO BASE METAL ONLY.
- 6.0 STEP OPTIONAL ON PLASTIC BODY DEFINED BY DIMENSIONS u & v.
- 7.0 CONTROLLING DIMENSION : INCHES.

| SYMBOL | DIMENSIONS | | | | NOTES | |
|--------|-------------|-------|----------|------|---|---|
| | MILLIMETERS | | INCHES | | | |
| | MIN. | MAX. | MIN. | MAX. | | |
| A | 4.57 | 4.83 | .180 | .190 | LEAD ASSIGNMENTS HEXFET 1.- GATE 2.- DRAIN 3.- SOURCE | |
| A1 | 2.57 | 2.82 | .101 | .111 | | |
| A2 | 2.51 | 2.92 | .099 | .115 | | |
| b | 0.61 | 0.94 | .024 | .037 | | |
| b1 | 0.61 | 0.89 | .024 | .035 | | |
| b2 | 0.76 | 1.27 | .030 | .050 | | |
| b3 | 0.76 | 1.22 | .030 | .048 | | |
| b4 | 1.02 | 1.52 | .040 | .060 | | |
| b5 | 1.02 | 1.47 | .040 | .058 | | |
| c | 0.33 | 0.63 | .013 | .025 | | |
| c1 | 0.33 | 0.58 | .013 | .023 | 5 | |
| D | 8.66 | 9.80 | .341 | .386 | 4 | |
| d1 | 15.80 | 16.13 | .622 | .635 | IGBTs, CoPACK 1.- GATE 2.- COLLECTOR 3.- EMITTER | |
| d2 | 13.97 | 14.22 | .550 | .560 | | |
| d3 | 12.29 | 12.93 | .484 | .509 | | |
| E | 9.63 | 10.74 | .379 | .423 | | |
| e | 2.54 BSC | | .100 BSC | | | |
| L | 13.21 | 13.72 | .520 | .540 | | 3 |
| L1 | 3.10 | 3.68 | .122 | .145 | | |
| n | 6.05 | 6.60 | .238 | .260 | | 6 |
| phi P | 3.05 | 3.45 | .120 | .136 | | |
| u | 2.39 | 2.49 | .094 | .098 | | 6 |
| v | 0.41 | 0.51 | .016 | .020 | 6 | |
| phi 1 | - | 45° | - | 45° | | |

TO-220 Full-Pak Part Marking Information

EXAMPLE: THIS IS AN IRFI840G
WITH ASSEMBLY
LOT CODE 3432
ASSEMBLED ON WW 24, 2001
IN THE ASSEMBLY LINE "K"

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



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

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

Qualification Information

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

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

Revision History

| Date | Comments |
|------------|---|
| 04/27/2017 | <ul style="list-style-type: none"> Changed datasheet with Infineon logo - all pages. Corrected Package Outline on page 8. Added disclaimer on last page. |

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