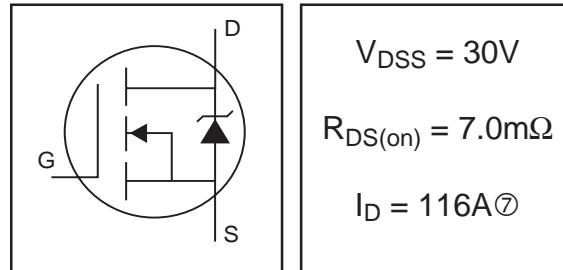


IRL2203NSPbF
IRL2203NLPbF

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- 100% R_G Tested
- Lead-Free

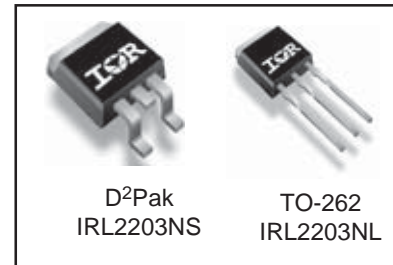
HEXFET® Power MOSFET



Description

Advanced HEXFET® Power MOSFETs from International Rectifier utilize 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 applications.

The D²Pak is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D²Pak is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0W in a typical surface mount application. The through-hole version (IRL2203NL) is available for low-profile applications.



Absolute Maximum Ratings

| Symbol | Parameter | Max | Units |
|---|--|-----------------------|-------|
| I _D @ T _C = 25°C | Continuous Drain Current, V _{GS} @ 10V | 116 Ⓣ | A |
| I _D @ T _C = 100°C | Continuous Drain Current, V _{GS} @ 10V | 82 | |
| I _{DM} | Pulsed Drain Current ① | 400 | |
| P _D @ T _A = 25°C | Power Dissipation | 3.8 | W |
| P _D @ T _C = 25°C | Power Dissipation | 180 | W |
| | Linear Derating Factor | 1.2 | W/°C |
| V _{GS} | Gate-to-Source Voltage | ± 16 | V |
| I _{AR} | Avalanche Current ① | 60 | A |
| E _{AR} | Repetitive Avalanche Energy ① | 18 | mJ |
| dv/dt | Peak Diode Recovery dv/dt ③ | 5.0 | V/ns |
| T _J | Operating Junction and Storage Temperature Range | -55 to + 175 | °C |
| T _{STG} | Soldering Temperature, for 10 seconds | 300 (1.6mm from case) | |

Thermal Resistance

| Symbol | Parameter | Typ | Max | Units |
|------------------|--|-----|------|-------|
| R _{θJC} | Junction-to-Case ② | — | 0.85 | °C/W |
| R _{θJA} | Junction-to-Ambient (PCB mount, steady state) ②③ | — | 40 | |

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Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

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| Symbol | Parameter | Min | Typ | Max | Units | Conditions |
|--|--------------------------------------|-----|--------|-------|-------|---|
| V _{(BR)DSS} | Drain-to-Source Breakdown Voltage | 30 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| ΔV _{(BR)DSS} /ΔT _J | Breakdown Voltage Temp. Coefficient | — | 0.029 | — | V/°C | Reference to 25°C, I _D = 1mA |
| R _{DS(on)} | Static Drain-to-Source On-Resistance | — | — | 7.0 | | V _{GS} = 10V, I _D = 60A ④ |
| | | — | — | 10 | | V _{GS} = 4.5V, I _D = 48A ④ |
| V _{GS(th)} | Gate Threshold Voltage | 1.0 | — | 3.0 | V | V _{DS} = V _{GS} , I _D = 250μA |
| g _{fs} | Forward Transconductance | 73 | — | — | S | V _{DS} = 25V, I _D = 60A ④ |
| I _{DSS} | Drain-to-Source Leakage Current | — | — | 25 | μA | V _{DS} = 30V, V _{GS} = 0V |
| | | — | — | 250 | | V _{DS} = 24V, V _{GS} = 0V, T _J = 125°C |
| I _{GSS} | Gate-to-Source Forward Leakage | — | — | 100 | nA | V _{GS} = 16V |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | V _{GS} = -16V |
| Q _g | Total Gate Charge | — | — | 60 | nC | I _D = 60A |
| Q _{gs} | Gate-to-Source Charge | — | — | 14 | | V _{DS} = 24V |
| Q _{gd} | Gate-to-Drain ("Miller") Charge | — | — | 33 | | V _{GS} = 4.5V, See Fig. 6 and 13 |
| R _G | Gate Resistance | 0.2 | — | 3.0 | Ω | |
| t _{d(on)} | Turn-On Delay Time | — | 11 | — | | V _{DD} = 15V |
| t _r | Rise Time | — | 160 | — | | I _D = 60A |
| t _{d(off)} | Turn-Off Delay Time | — | 23 | — | | R _G = 1.8Ω |
| t _f | Fall Time | — | 66 | — | | V _{GS} = 4.5V, See Fig. 10 ④ |
| 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 | — | | |
| C _{iss} | Input Capacitance | — | 3290 | — | pF | V _{GS} = 0V |
| C _{oss} | Output Capacitance | — | 1270 | — | | V _{DS} = 25V |
| C _{rss} | Reverse Transfer Capacitance | — | 170 | — | | f = 1.0MHz, See Fig. 5 |
| E _{AS} | Single Pulse Avalanche Energy ② | — | 1320 ⑤ | 290 ⑥ | mJ | I _{AS} = 60A, L = 0.16mH |

Source-Drain Ratings and Characteristics

| Symbol | Parameter | Min | Typ | Max | Units | Conditions |
|-----------------|---|--|-----|-------|-------|---|
| I _S | Continuous Source Current (Body Diode) | — | — | 116 ⑦ | 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 = 60A, V _{GS} = 0V ④ |
| t _{rr} | Reverse Recovery Time | — | 56 | 84 | ns | T _J = 25°C, I _F = 60A |
| Q _{rr} | Reverse Recovery Charge | — | 110 | 170 | nC | di/dt = 100A/μs ④ |
| t _{on} | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② Starting T_J = 25°C, L = 0.16mH R_G = 25Ω, I_{AS} = 60A, V_{GS} = 10V (See Figure 12)
- ③ I_{SD} ≤ 60A, di/dt ≤ 110A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 175°C
- ④ Pulse width ≤ 400μs; duty cycle ≤ 2%.

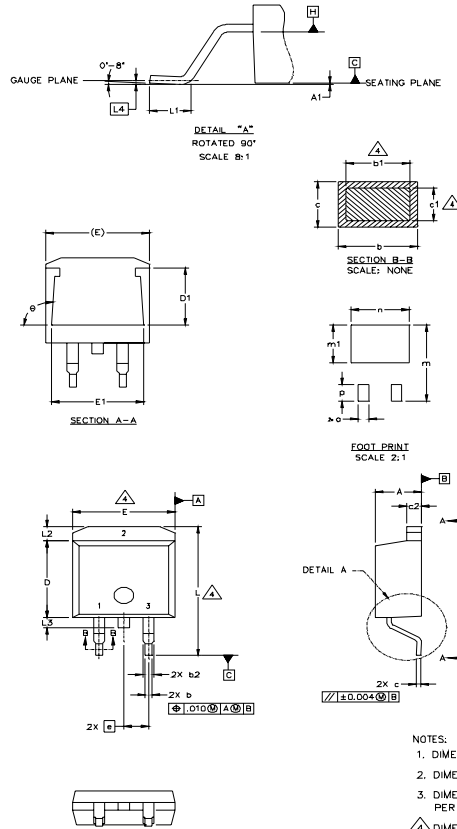
- ⑤ This is a typical value at device destruction and represents operation outside rated limits.
- ⑥ This is a calculated value limited to T_J = 175°C .
- ⑦ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ⑧ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.
- ⑨ R_θ is measured at T_J approximately 90°C

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D²Pak Package Outline

Dimensions are shown in millimeters (inches)



| SYMBOL | DIMENSIONS | | | | NOTES |
|--------|-------------|-------|--------|------|-------|
| | MILLIMETERS | | INCHES | | |
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | .160 | .190 | |
| A1 | | 0.127 | | .005 | |
| b | 0.51 | 0.99 | .020 | .039 | 4 |
| b1 | 0.51 | 0.89 | .020 | .035 | |
| b2 | 1.14 | 1.40 | .045 | .055 | 4 |
| c | 0.43 | 0.63 | .017 | .025 | |
| c1 | 0.38 | 0.74 | .015 | .029 | 4 |
| c2 | 1.14 | 1.40 | .045 | .055 | |
| D | 8.51 | 9.65 | .335 | .380 | 3 |
| D1 | 5.33 | | .210 | | 3 |
| E | 9.65 | 10.67 | .380 | .420 | |
| E1 | 6.22 | | .245 | | |
| e | 2.54 | BSC | .100 | BSC | |
| L | 14.61 | 15.88 | .575 | .625 | |
| L1 | 1.78 | 2.79 | .070 | .110 | |
| L2 | | 1.65 | | .065 | |
| L3 | 1.27 | 1.78 | .050 | .070 | |
| L4 | 0.25 | BSC | .010 | BSC | |
| m | 17.78 | | .700 | | |
| m1 | 8.89 | | .350 | | |
| n | 11.43 | | .450 | | |
| o | 2.08 | | .082 | | |
| p | 3.81 | | .150 | | |
| theta | 90° | 93° | 90° | 93° | |

LEAD ASSIGNMENTS

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

* PART DEPENDENT.

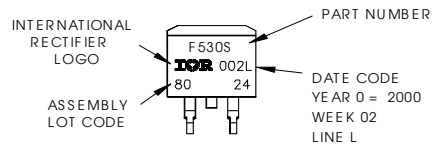
NOTES:

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 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
5. CONTROLLING DIMENSION: INCH.

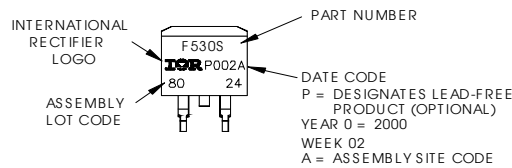
D²Pak Part Marking Information (Lead-Free)

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

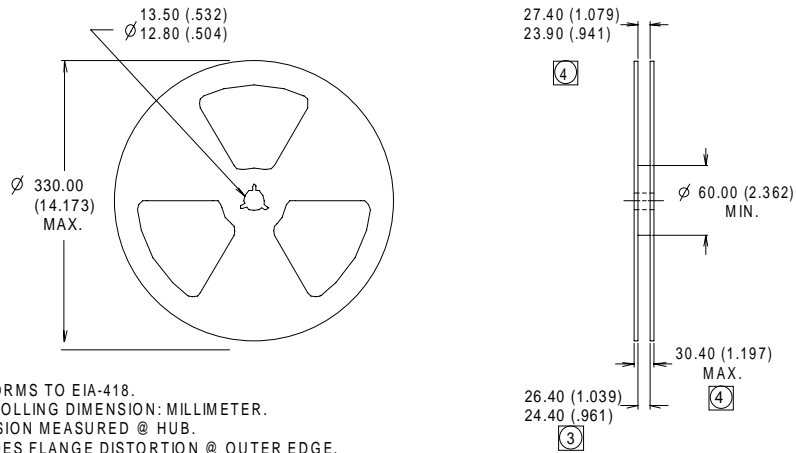
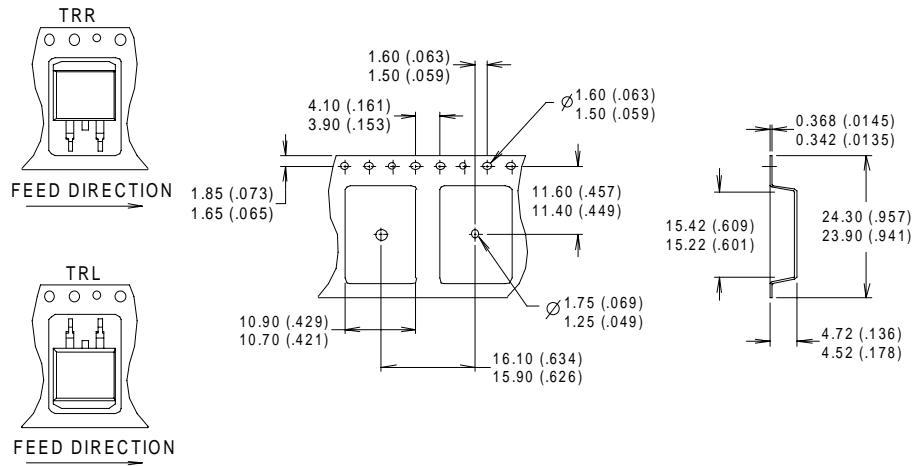


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D²Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)



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

Data and specifications subject to change without notice.
This product has been designed and qualified for the Automotive [Q101] market.

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