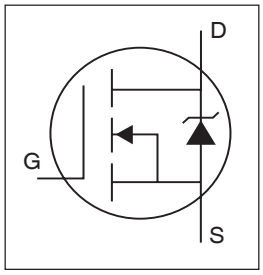
International
IOR Rectifier

PD - 95093A

# IRLR8103VPbF

- N-Channel Application-Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- Minimizes Parallel MOSFETs for high current applications
- 100% $R_G$ Tested
- Lead-Free




**Description**

This new device employs advanced HEXFET Power MOSFET technology to achieve an unprecedented balance of on-resistance and gate charge. The reduced conduction and switching losses make it ideal for high efficiency DC-DC converters that power the latest generation of microprocessors.

The IRLR8103V has been optimized for all parameters that are critical in synchronous buck converters including $R_{DS(on)}$, gate charge and Cdv/dt-induced turn-on immunity. The IRLR8103V offers an extremely low combination of $Q_{sw}$ & $R_{DS(on)}$ for reduced losses in both control and synchronous FET applications.

The package is designed for vapor phase, infra-red, convection, or wave soldering techniques. Power dissipation of greater than 2W is possible in a typical PCB mount application.

DEVICE CHARACTERISTICS⑤

| | **IRLR8103V** |
|---|---|
| $R_{DS(on)}$ | 7.9 mΩ |
| $Q_G$ | 27 nC |
| $Q_{SW}$ | 12 nC |
| $Q_{OSS}$ | 29nC |

## Absolute Maximum Ratings

| Parameter | | Symbol | IRLR8103V | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain or Source Current | TC = 25°C | $I_D$ | 91 | A |
| ($V_{GS}$ > 10V) | TC= 90°C | | 63 | |
| Pulsed Drain Current ① | | $I_{DM}$ | 363 | |
| Power Dissipation ③ | TC = 25°C | $P_D$ | 115 | W |
| | TC = 90°C | | 60 | |
| Junction & Storage Temperature Range | | $T_J$ , $T_{STG}$ | -55 to 150 | °C |
| Continuous Source Current (Body Diode) | | $I_S$ | 91 | A |
| Pulsed Source Current ① | | $I_{SM}$ | 363 | |

## Thermal Resistance

| Parameter | Symbol | Typ. | Max. | Units |
|---|---|---|---|---|
| Maximum Junction-to-Ambient ③⑥ | $R_{\theta JA}$ | — | 50 | °C/W |
| Maximum Junction-to-Case ⑥ | $R_{\theta JC}$ | — | 1.09 | |



12/0604

## Electrical Characteristics

| Parameter | Symbol | Min | Typ | Max | Units | Conditions |
|---|---|---|---|---|---|---|
| Drain-to-Source Breakdown Voltage | $BV_{DSS}$ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | 6.9 | 9.0 | mΩ | $V_{GS}$ = 10V, $I_D$ = 15A ② |
| | | — | 7.9 | 10.5 | | $V_{GS}$ = 4.5V, $I_D$ = 15A ② |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.0 | — | 3.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| Drain-to-Source Leakage Current | $I_{DSS}$ | — | — | 50 | µA | $V_{DS}$ = 30V, $V_{GS}$ = 0V |
| | | — | — | 20 | µA | $V_{DS}$ = 24V, $V_{GS}$ = 0 |
| | | — | — | 100 | | $V_{DS}$ = 24V, $V_{GS}$ = 0, $T_J$ = 100°C |
| Gate-Source Leakage Current | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ± 20V |
| Total Gate Charge, Control FET | $Q_G$ | — | 27 | — | nC | $V_{GS}$ = 5V, $I_D$ = 15A, $V_{DS}$ = 16V |
| Total Gate Charge, Synch FET | $Q_G$ | — | 23 | — | | $V_{GS}$ = 5V, $V_{DS}$ < 100mV |
| Pre-Vth Gate-Source Charge | $Q_{GS1}$ | — | 4.7 | — | | $V_{DS}$ = 16V, $I_D$ = 15A |
| Post-Vth Gate-Source Charge | $Q_{GS2}$ | — | 2.0 | — | | |
| Gate to Drain Charge | $Q_{GD}$ | — | 9.7 | — | | |
| Switch Charge ($Q_{gs2}$ + $Q_{gd}$) | $Q_{SW}$ | — | 12 | — | | |
| Output Charge | $Q_{OSS}$ | — | 29 | — | | $V_{DS}$ = 16V, $V_{GS}$ = 0 |
| Gate Resistance | $R_G$ | 0.8 | — | 3.1 | Ω | |
| Turn-On Delay Time | $t_{d(on)}$ | — | 10 | — | ns | $V_{DD}$ = 16V |
| Rise Time | $t_r$ | — | 9 | — | | $I_D$ = 15A |
| Turn-Off Delay Time | $t_{d(off)}$ | — | 24 | — | | $V_{GS}$ = 5.0V |
| Fall Time | $t_f$ | — | 18 | — | | Clamped Inductive Load |
| Input Capacitance | $C_{iss}$ | — | 2672 | — | pF | $V_{GS}$ = 16V, $V_{GS}$=0 |
| Output Capacitance | $C_{oss}$ | — | 1064 | — | | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 109 | — | | |

## Source-Drain Rating & Characteristics

| Parameter | Symbol | Min | Typ | Max | Units | Conditions |
|---|---|---|---|---|---|---|
| Diode Forward Voltage | $V_{SD}$ | — | 0.9 | 1.3 | V | IS = 15A②, $V_{GS}$ = 0V |
| Reverse Recovery Charge ④ | $Q_{rr}$ | — | 103 | — | nC | di/dt ~ 700A/µs<br>$V_{DS}$ = 16V, $V_{GS}$ = 0V, $I_F$ = 15A |
| Reverse Recovery Charge (with Parallel Schottky) ④ | $Q_{rr(s)}$ | — | 96 | — | nC | di/dt = 700A/µs , (with 10BQ040)<br>$V_{DS}$= 16V, $V_{GS}$ = 0V, $I_F$ = 15A |

**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature.
② Pulse width ≤ 400 µs; duty cycle ≤ 2%.
③ When mounted on 1 inch square copper board, t < 10 sec.
④ Typ = measured - $Q_{oss}$
⑤ Typical values of $R_{DS}$(on) measured at $V_{GS}$ = 4.5V, $Q_G$, $Q_{SW}$ and $Q_{OSS}$ measured at $V_{GS}$ = 5.0V, $I_F$ = 15A.

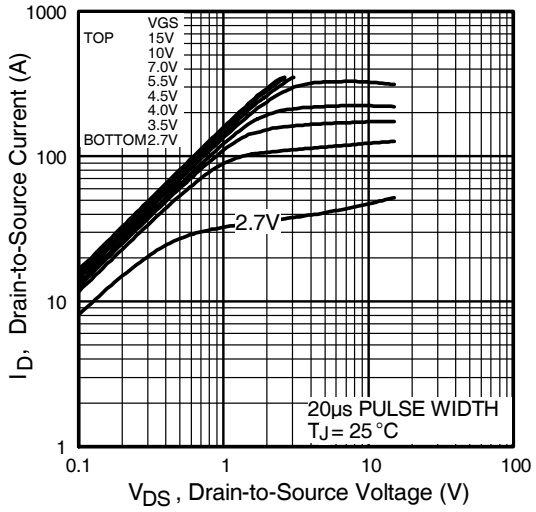



**Fig 1.** Typical Output Characteristics

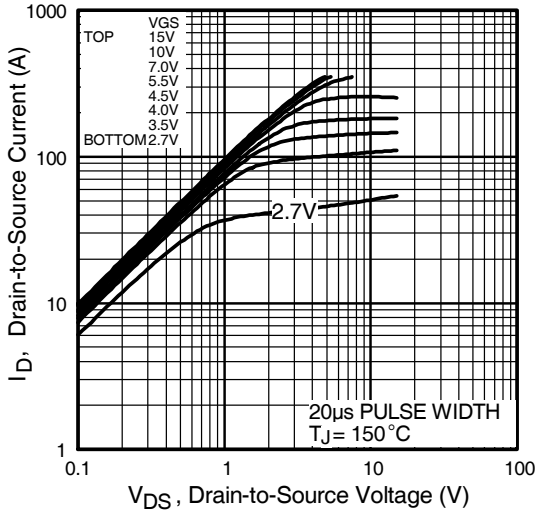



**Fig 2.** Typical Output Characteristics

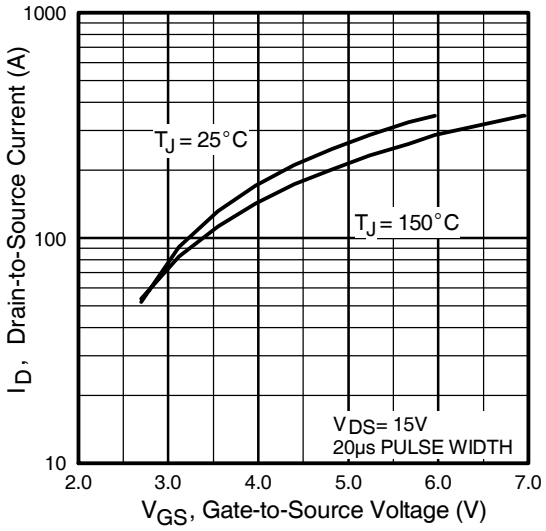



**Fig 3.** Typical Transfer Characteristics

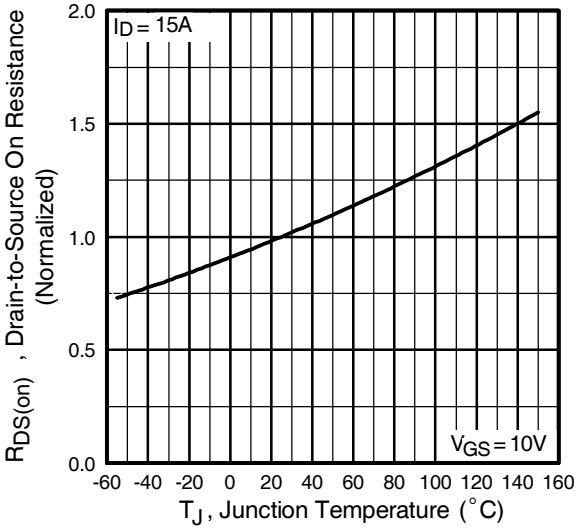



**Fig 4.** Normalized On-Resistance Vs. Temperature

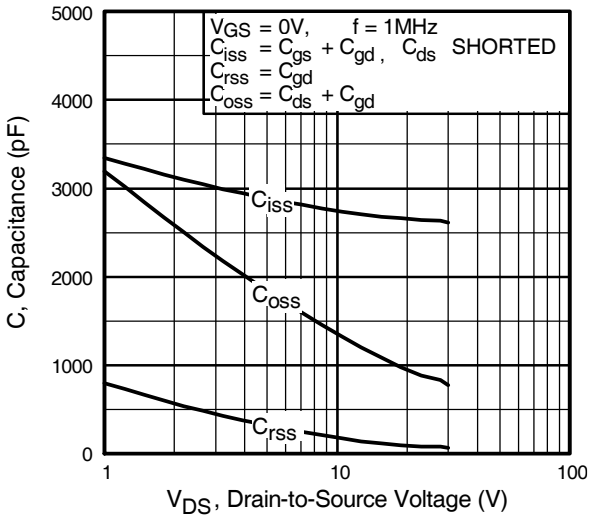



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

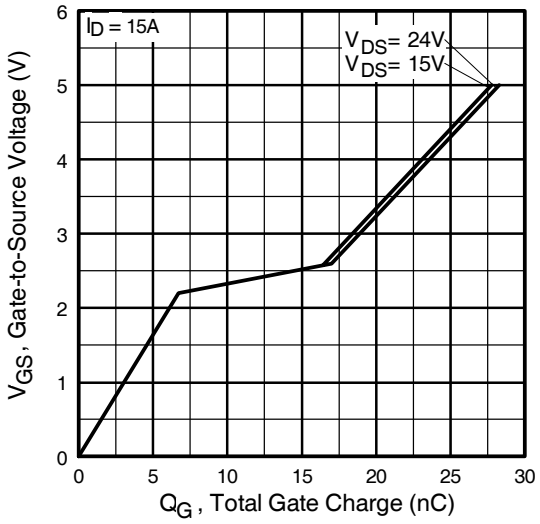



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

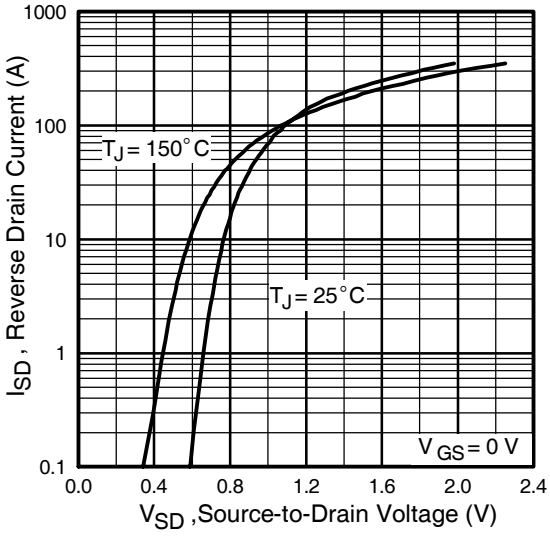



**Fig 7. Typical Source-Drain Diode Forward Voltage**

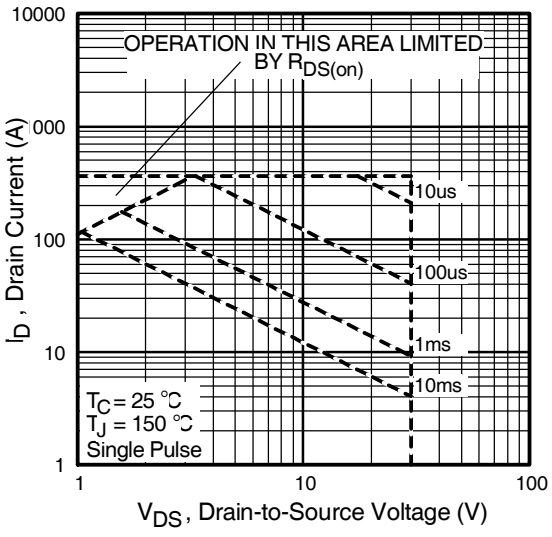



**Fig 8.** Maximum Safe Operating Area

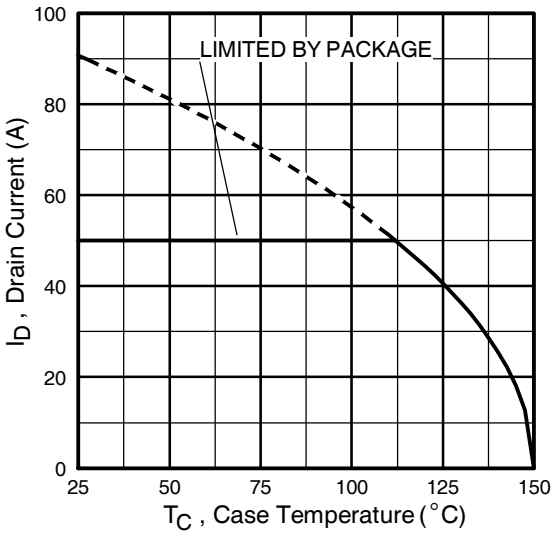



**Fig 9.** Maximum Drain Current Vs. Case Temperature

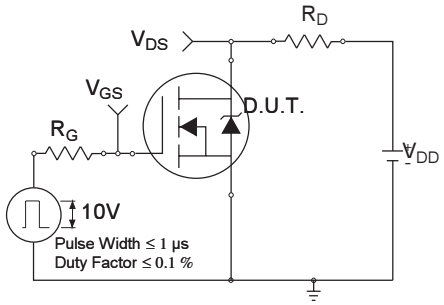



**Fig 10a.** Switching Time Test Circuit

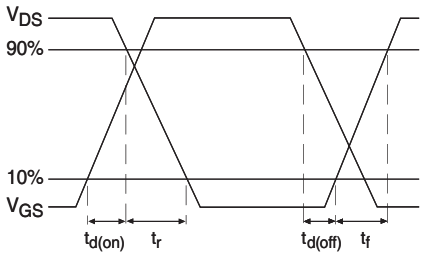



**Fig 10b.** Switching Time Waveforms

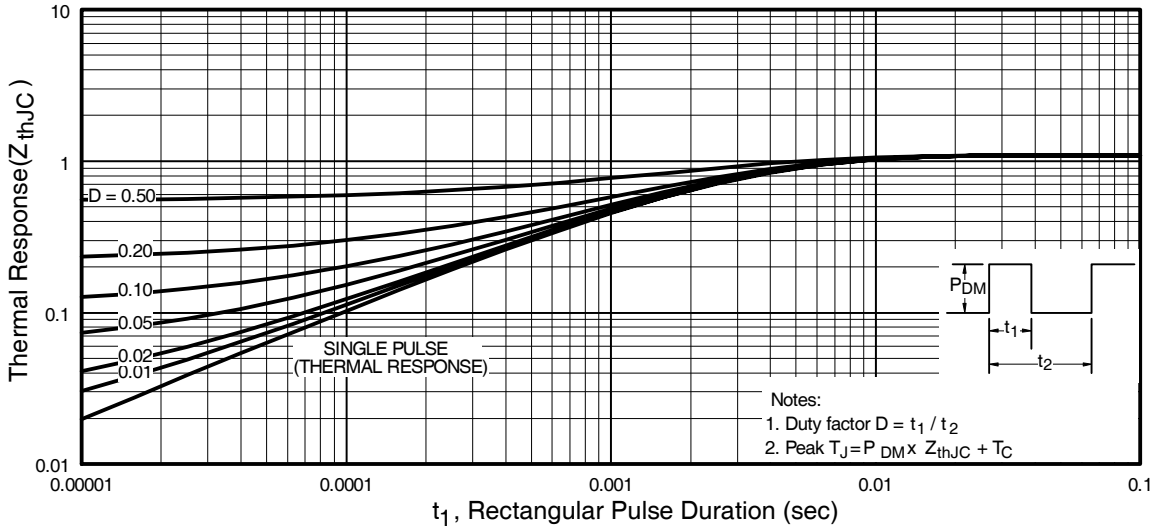



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

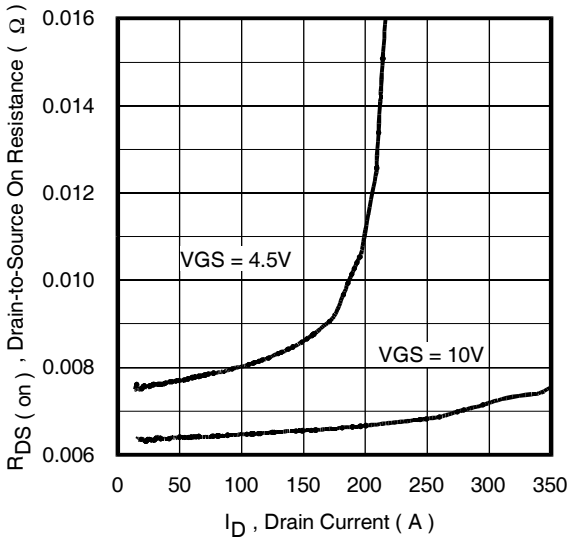



**Fig 12.** On-Resistance Vs. Drain Current

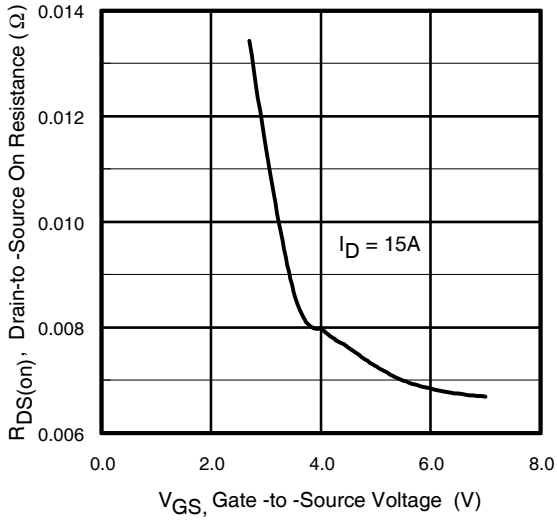
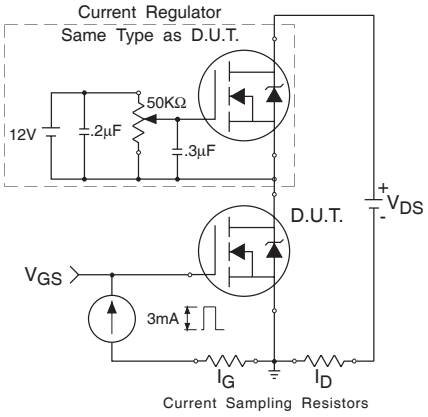



**Fig 13.** On-Resistance Vs. Gate Voltage



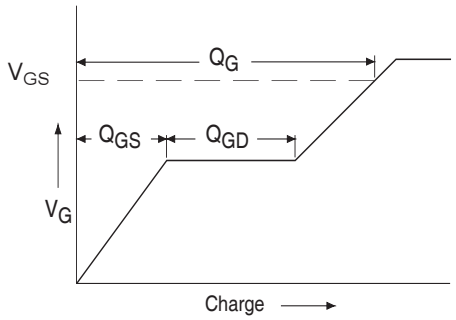
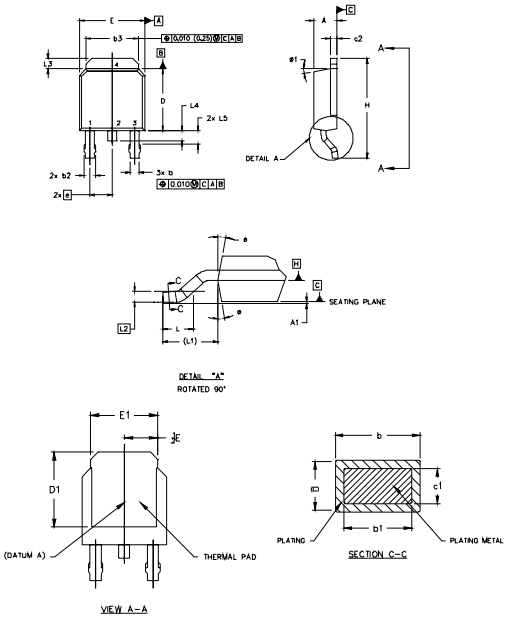




**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform

## D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)




NOTES:
1.0 DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
2.0 DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
3.0 LEAD DIMENSION UNCONTROLLED IN L5.
4.0 DIMENSION D1 AND E1 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.
5.0 SECTION C-C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 [0.127] AND .010 [0.2540] FROM THE LEAD TIP.
6.0 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
7.0 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 | 5 |
| b1 | 0.64 | 0.79 | .025 | 0.031 | 5 |
| b2 | 0.76 | 1.14 | .030 | .045 | |
| b3 | 4.95 | 5.46 | .195 | .215 | |
| c | 0.48 | 0.61 | .018 | .024 | 5 |
| c1 | 0.41 | 0.56 | .016 | .022 | 5 |
| c2 | .046 | 0.89 | .018 | .035 | 5 |
| 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 | | .090 BSC | | |
| H | 9.40 | 10.41 | .370 | .410 | |
| L | 1.40 | 1.78 | .055 | .070 | |
| L1 | 2.74 REF. | | .108 REF. | | |
| L2 | 0.051 BSC | | .020 BSC | | |
| L3 | 0.89 | 1.27 | .035 | .050 | |
| L4 | | 1.02 | | .040 | |
| L5 | 1.14 | 1.52 | .045 | .060 | 3 |
| ø | 0° | 10° | 0° | 10° | |
| ø1 | 0° | 15° | 0° | 15° | |

LEAD ASSIGNMENTS

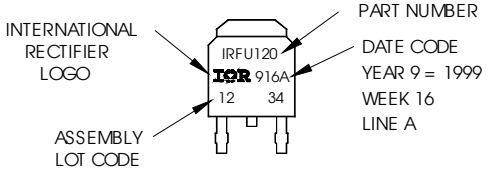
HEXFET
1.- GATE
2.- DRAIN
3.- SOURCE
4.- DRAIN

IGBTs, CoPACK
1.- GATE
2.- COLLECTOR
3.- EMITTER
4.- COLLECTOR

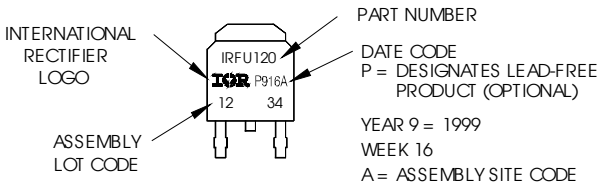
## D-Pak (TO-252AA) Part Marking Information

EXAMPLE: THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 1234
ASSEMBLED ON WW 16, 1999
IN THE ASSEMBLY LINE "A"

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

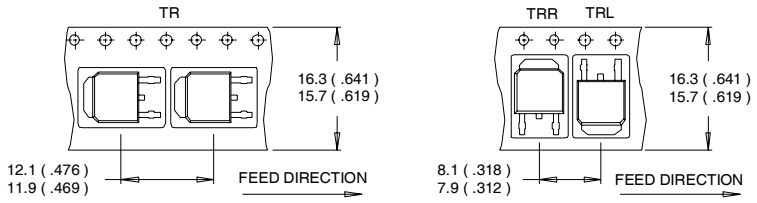



OR

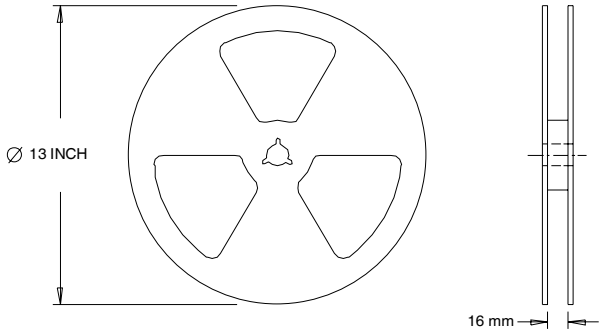


## D-Pak (TO-252AA) Tape & Reel Information

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.

Data and specifications subject to change without notice.



**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information.12/04

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

## IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie") .

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (**www.infineon.com**).

## WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

# X-ON Electronics

Largest Supplier of Electrical and Electronic Components

***Click to view similar products for*** MOSFET ***category:***

***Click to view products by*** Infineon ***manufacturer:***

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C BUK954R8-60E GROUP A 5962-8877003PA NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI DMN1017UCP3-7 EFC2J004NUZTDG ECH8691-TL-W FCAB21350L1 P85W28HP2F-7071 DMN1053UCP4-7 NTE221 NTE222 NTE2384 NTE2903 NTE2941 NTE2945 NTE2946 NTE2960 NTE2967 NTE2969 NTE2976 NTE6400A NTE2910 NTE2916 NTE2956 NTE2911 DMN2080UCB4-7 TK10A80W,S4X(S SSM6P69NU,LF DMP22D4UFO-7B DMN1006UCA6-7