

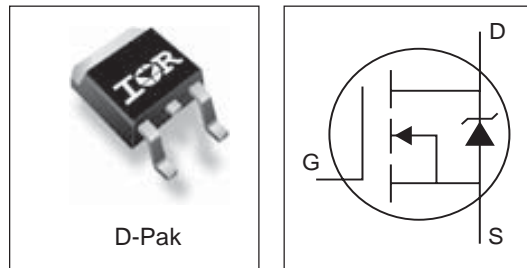
- N-Channel Application-Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- Minimizes Parallel MOSFETs for high current applications
- 100% R<sub>G</sub> Tested

**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<sub>DS(on)</sub>, gate charge and Cdv/dt-induced turn-on immunity. The IRLR8103V offers an extremely low combination of Q<sub>sw</sub> & R<sub>DS(on)</sub> 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 CHARACTERISTICS** ⑤

	<b>IRLR8103V</b>
R <sub>DS(on)</sub>	7.9 mΩ
Q <sub>G</sub>	27 nC
Q <sub>SW</sub>	12 nC
Q <sub>OSS</sub>	29nC

**Absolute Maximum Ratings**

Parameter		Symbol	IRLR8103V	Units
Drain-Source Voltage		V <sub>DS</sub>	30	V
Gate-Source Voltage		V <sub>GS</sub>	±20	
Continuous Drain or Source Current (V <sub>GS</sub> > 10V)	TC = 25°C	I <sub>D</sub>	91	A
	TC = 90°C		63	
Pulsed Drain Current ①		I <sub>DM</sub>	363	
Power Dissipation ③	TC = 25°C	P <sub>D</sub>	115	W
	TC = 90°C		60	
Junction & Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C
Continuous Source Current (Body Diode)		I <sub>S</sub>	91	A
Pulsed Source Current ①		I <sub>SM</sub>	363	

**Thermal Resistance**

Parameter	Symbol	Typ.	Max.	Units
Maximum Junction-to-Ambient ③⑥	R <sub>θJA</sub>	—	50	°C/W
Maximum Junction-to-Case ⑥	R <sub>θJC</sub>	—	1.09	

## Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Drain-to-Source Breakdown Voltage	$V_{DSS}$	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	6.9	9.0	m $\Omega$	$V_{GS} = 10V, I_D = 15A$ ②
		—	7.9	10.5		$V_{GS} = 4.5V, I_D = 15A$ ②
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Drain-to-Source Leakage Current	$I_{DSS}$	—	—	50	$\mu A$	$V_{DS} = 30V, V_{GS} = 0V$
		—	—	20	$\mu A$	$V_{DS} = 24V, V_{GS} = 0$
		—	—	100		$V_{DS} = 24V, V_{GS} = 0, T_J = 100^\circ C$
Gate-Source Leakage Current	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20V$
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	—		
Gate Resistance	$R_G$	0.8	—	3.1		$\Omega$
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	$I_S = 15A$ ②, $V_{GS} = 0V$
Reverse Recovery Charge ④	$Q_{rr}$	—	103	—	nC	$di/dt \sim 700A/\mu s$ $V_{DS} = 16V, V_{GS} = 0V, I_F = 15A$
Reverse Recovery Charge (with Parallel Schottky) ④	$Q_{rr(s)}$	—	96	—	nC	$di/dt = 700A/\mu s$ , (with 10BQ040) $V_{DS} = 16V, V_{GS} = 0V, I_F = 15A$

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Pulse width  $\leq 400 \mu s$ ; duty cycle  $\leq 2\%$ .
- 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  $V_{GS} = 5.0V$ ,  $I_F = 15A$ .

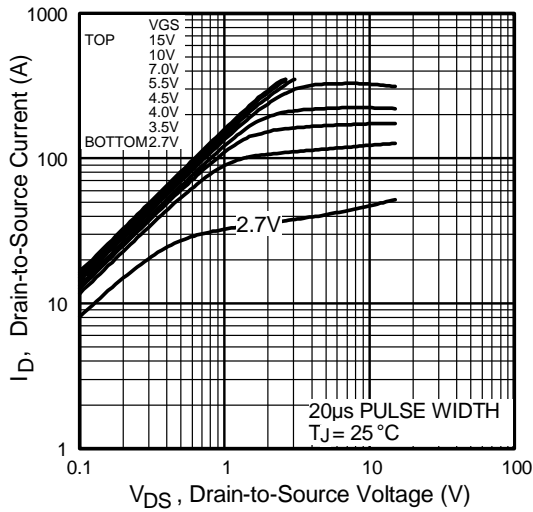


Fig 1. Typical Output Characteristics

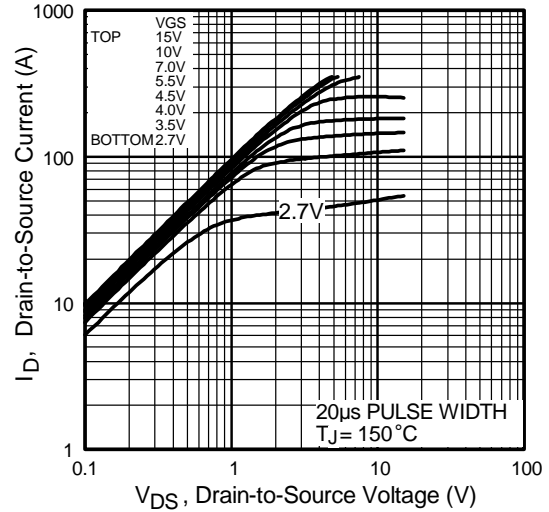


Fig 2. Typical Output Characteristics

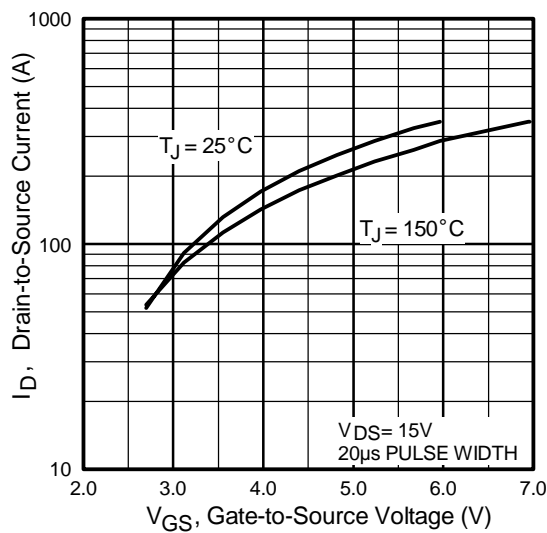


Fig 3. Typical Transfer Characteristics

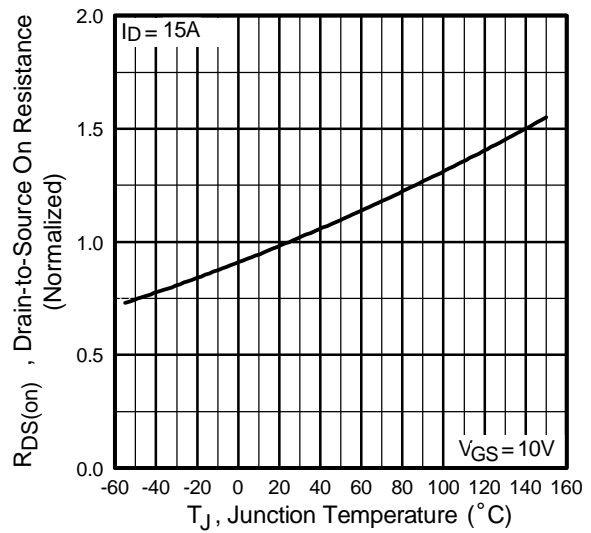
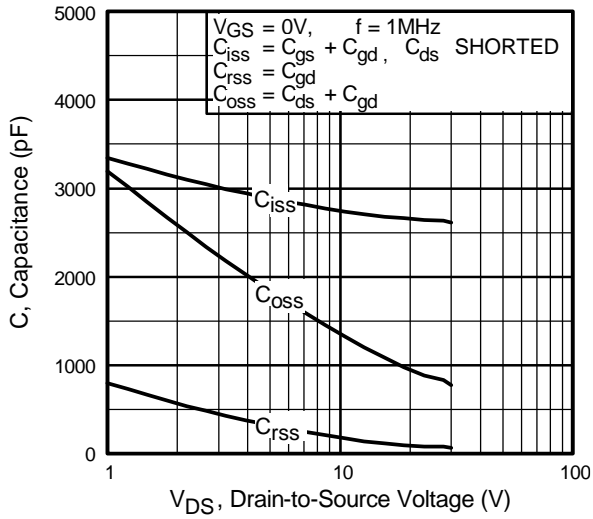
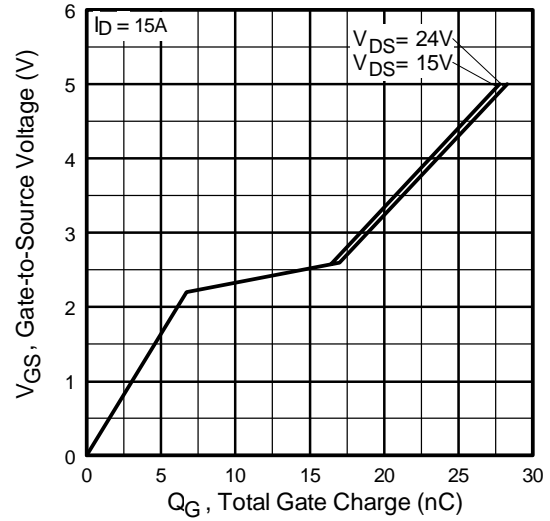


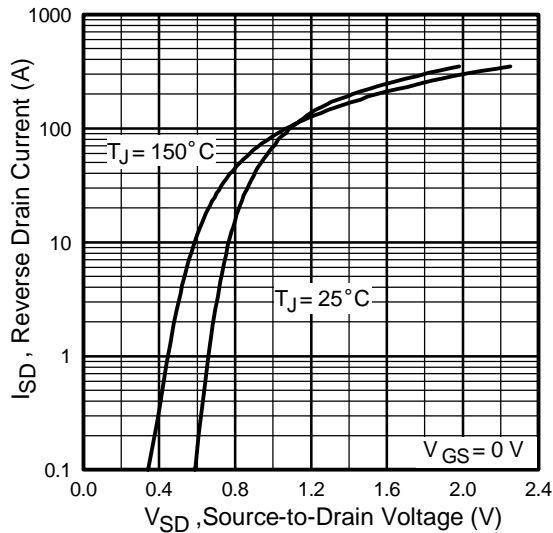
Fig 4. Normalized On-Resistance Vs. Temperature



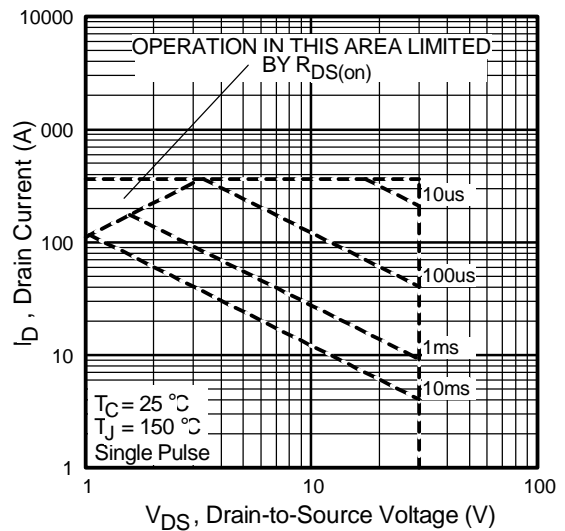
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



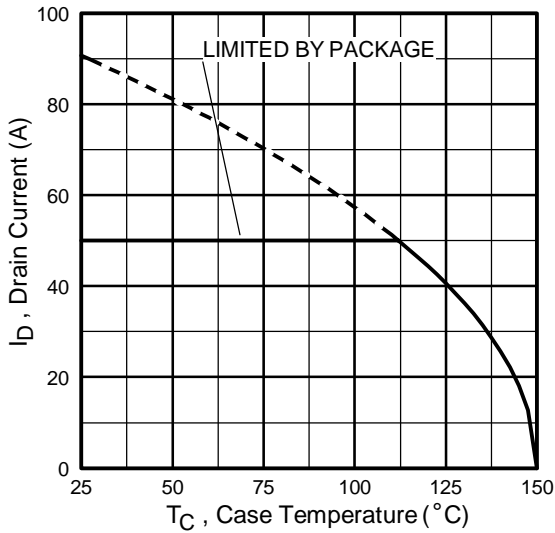
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



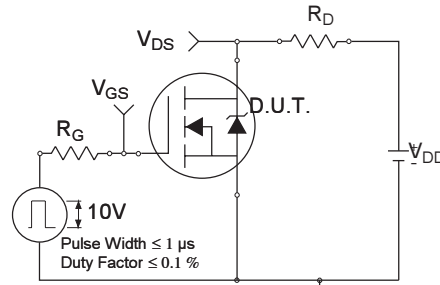
**Fig 7.** Typical Source-Drain Diode Forward Voltage



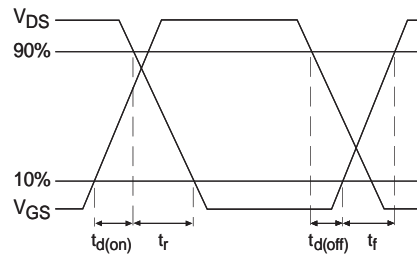
**Fig 8.** Maximum Safe Operating Area



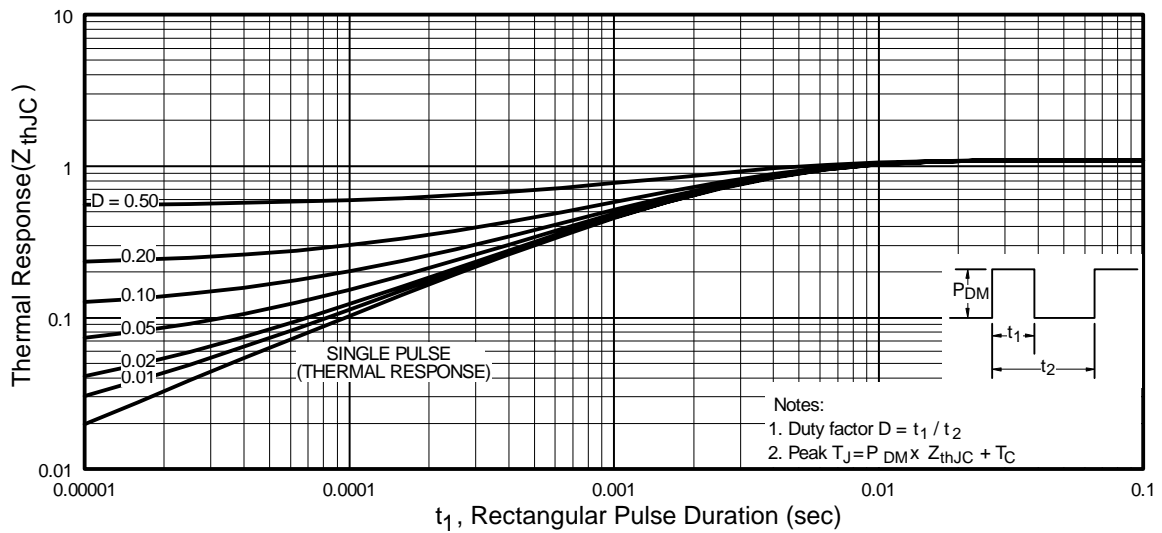
**Fig 9. Maximum Drain Current Vs. Case Temperature**



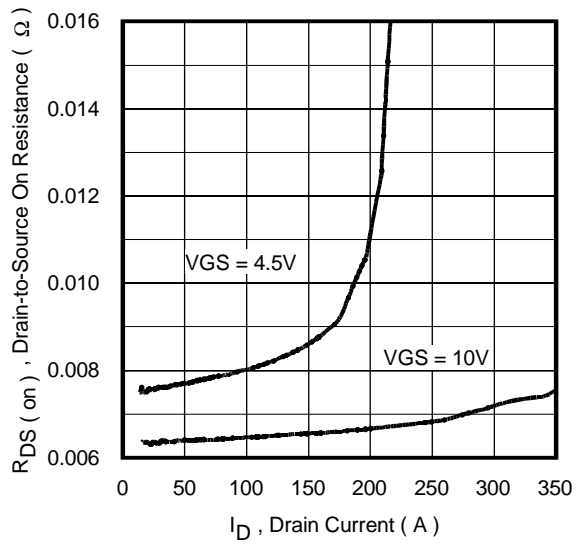
**Fig 10a. Switching Time Test Circuit**



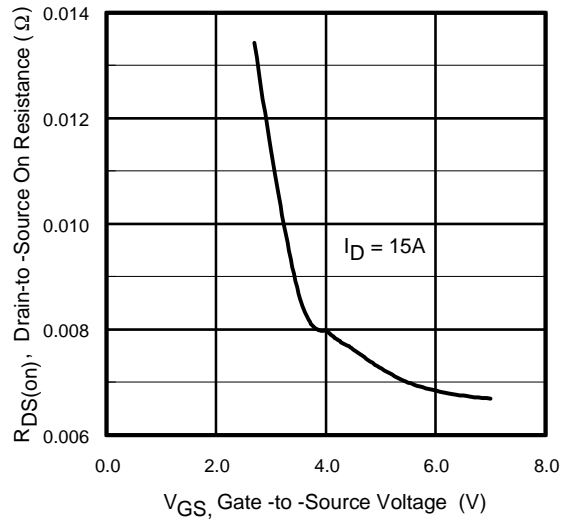
**Fig 10b. Switching Time Waveforms**



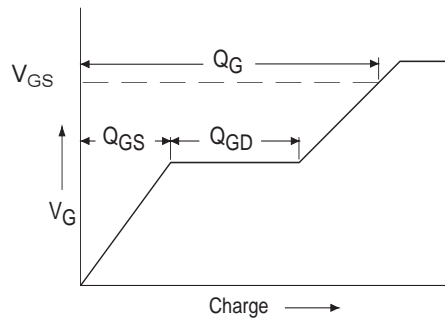
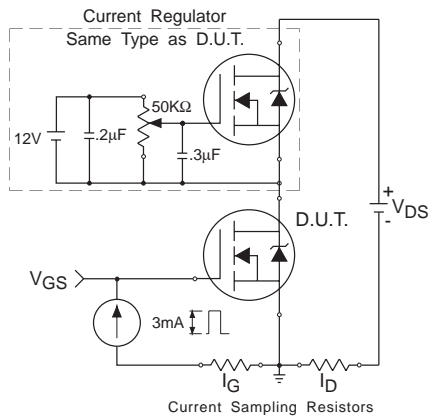
**Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case**



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



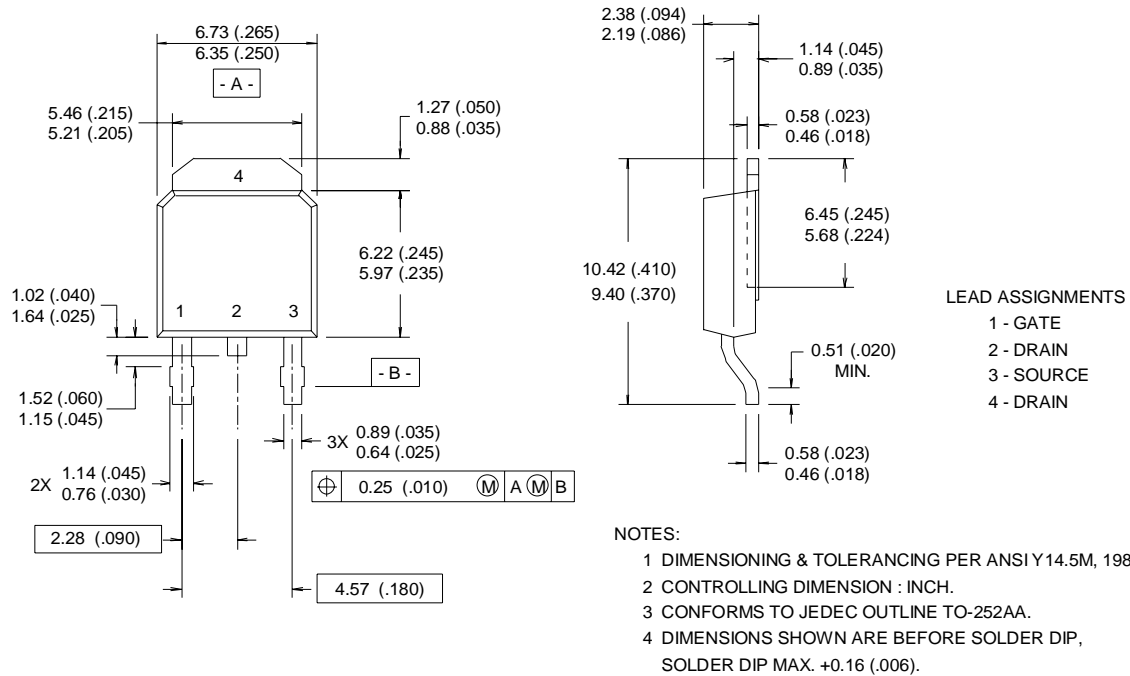
**Fig 13.** On-Resistance Vs. Gate Voltage



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

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

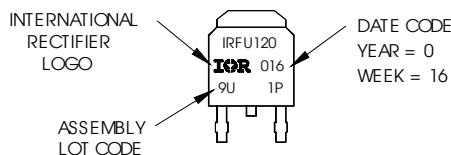
Dimensions are shown in millimeters (inches)



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

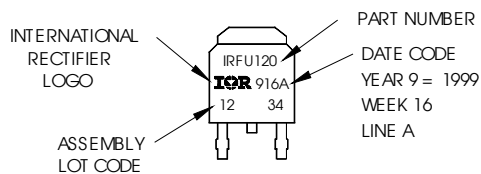
Notes: This part marking information applies to devices produced before 02/26/2001

EXAMPLE: THIS IS AN IRFR120  
WITH ASSEMBLY  
LOT CODE 9U1P



Notes: This part marking information applies to devices produced after 02/26/2001

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

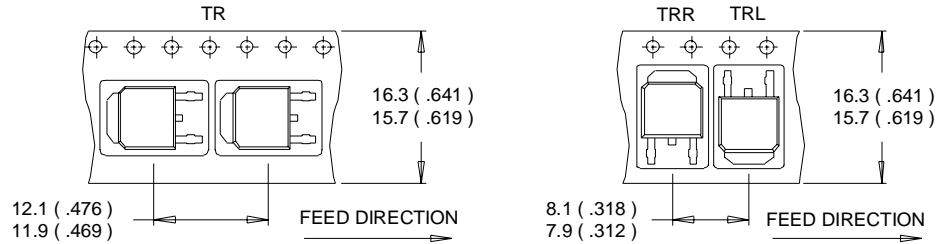


# IRLR8103V

International  
**IR** Rectifier

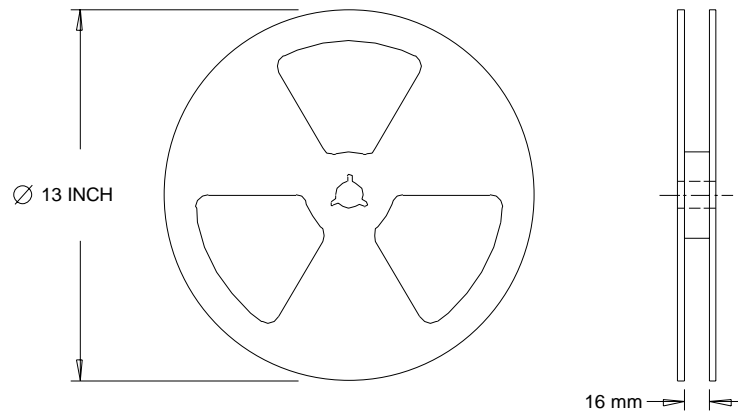
## D-Pak (TO-252AA) Tape & Reel Information

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.

International  
**IR** Rectifier

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TAC Fax: (310) 252-7903

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