

Applications

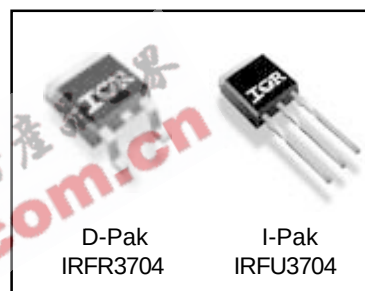
- High Frequency DC-DC Isolated Converters with Synchronous Rectification for Telecom and Industrial use
- High Frequency Buck Converters for Computer Processor Power

HEXFET® Power MOSFET

V_{DS}	$R_{DS(on)}$ max	I_D
20V	9.5mΩ	75A ^④

Benefits

- Ultra-Low $R_{DS(on)}$
- Very Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	75 ^④	A
I_D @ $T_C = 70^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	63 ^④	
I_{DM}	Pulsed Drain Current ^①	300	
P_D @ $T_C = 25^\circ\text{C}$	Maximum Power Dissipation ^③	90	W
P_D @ $T_C = 70^\circ\text{C}$	Maximum Power Dissipation ^③	62	W
	Linear Derating Factor	0.58	mW/°C
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.7	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount)*	—	50	
$R_{\theta JA}$	Junction-to-Ambient	—	110	

* When mounted on 1" square PCB (FR-4 or G-10 Material) .
For recommended footprint and soldering techniques refer to application note #AN-994

Notes ① through ④ are on page 9

IRFR/U3704

International
IR Rectifier

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	20	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.021	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	7.3	9.5	mΩ	V _{GS} = 10V, I _D = 15A ③
		—	11	14		V _{GS} = 4.5V, I _D = 12A ③
V _{GS(th)}	Gate Threshold Voltage	1.0	—	3.0	V	V _{DS} = V _{GS} , I _D = 250μA
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 16V, V _{GS} = 0V
		—	—	100		V _{DS} = 16V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V _{GS} = 16V
	Gate-to-Source Reverse Leakage	—	—	-200		V _{GS} = -16V

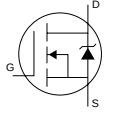
Dynamic @ T_J = 25°C (unless otherwise specified)

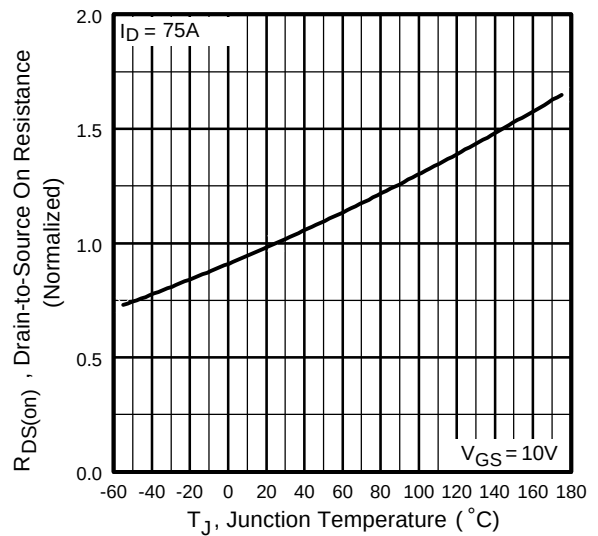
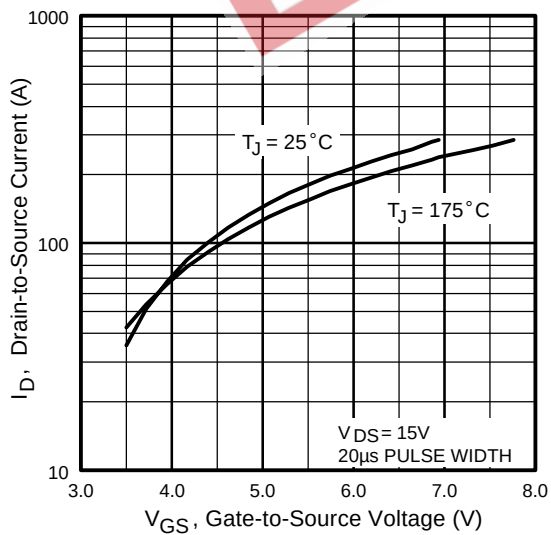
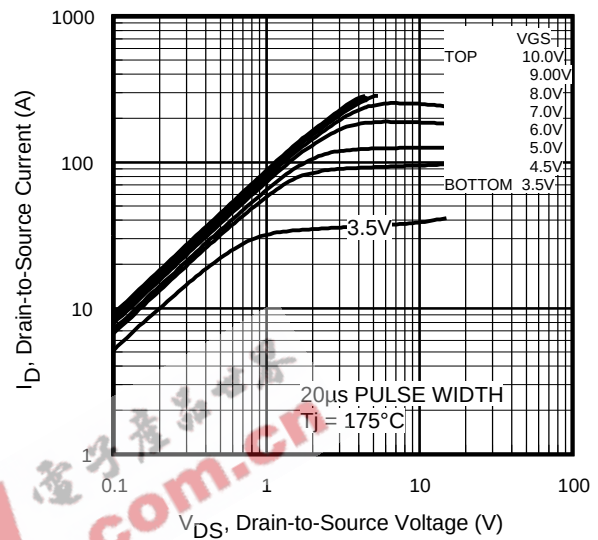
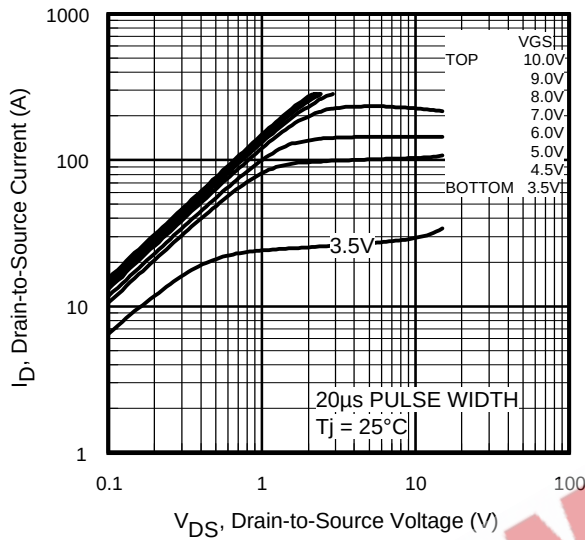
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	42	—	—	S	V _{DS} = 10V, I _D = 57A
Q _g	Total Gate Charge	—	19	—	nC	I _D = 28.4A
Q _{gs}	Gate-to-Source Charge	—	8.1	—		V _{DS} = 10V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	6.4	—		V _{GS} = 4.5V ③
Q _{oss}	Output Gate Charge	—	16	24		V _{GS} = 0V, V _{DS} = 10V
t _{d(on)}	Turn-On Delay Time	—	8.4	—	ns	V _{DD} = 10V
t _r	Rise Time	—	98	—		I _D = 28.4A
t _{d(off)}	Turn-Off Delay Time	—	12	—		R _G = 1.8Ω
t _f	Fall Time	—	5.0	—		V _{GS} = 4.5V ③
C _{iss}	Input Capacitance	—	1996	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	1085	—		V _{DS} = 10V
C _{rss}	Reverse Transfer Capacitance	—	155	—		f = 1.0MHz

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②	—	216	mJ
I _{AR}	Avalanche Current①	—	71	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	75④	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	300		
V _{SD}	Diode Forward Voltage	—	0.88	1.3	V	T _J = 25°C, I _S = 35.5A, V _{GS} = 0V ③
		—	0.82	—		T _J = 125°C, I _S = 35.5A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	38	57	ns	T _J = 25°C, I _F = 35.5A, V _R = 20V
Q _{rr}	Reverse Recovery Charge	—	45	68	nC	di/dt = 100A/μs ③
t _{rr}	Reverse Recovery Time	—	41	62	ns	T _J = 125°C, I _F = 35.5A, V _R = 20V
Q _{rr}	Reverse Recovery Charge	—	50	75	nC	di/dt = 100A/μs ③



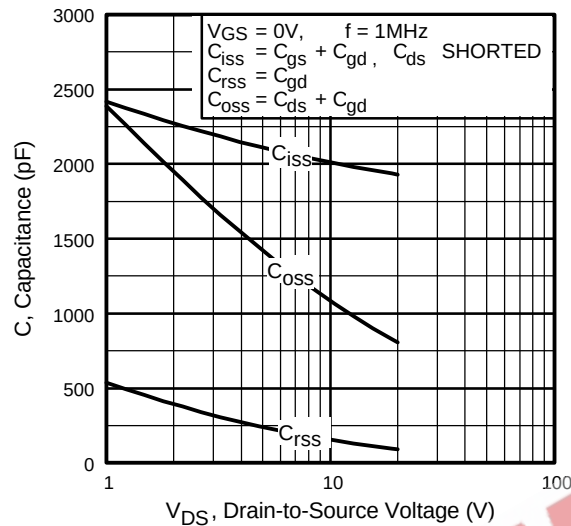


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

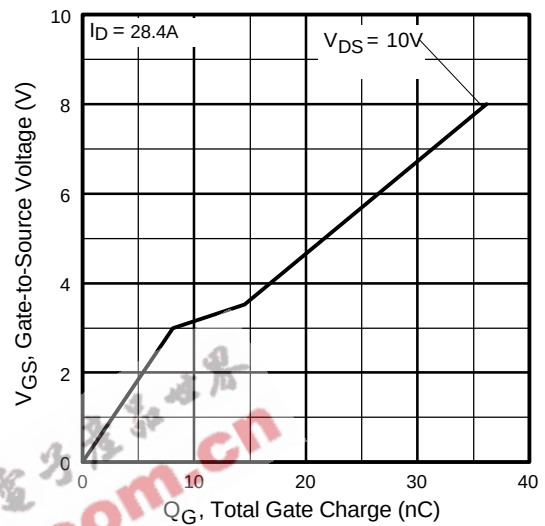


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

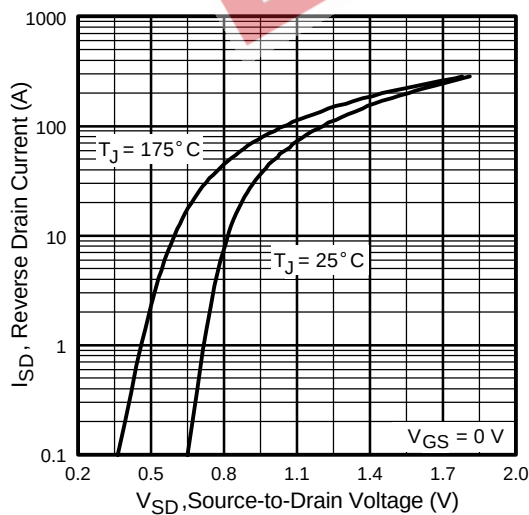


Fig 7. Typical Source-Drain Diode Forward Voltage

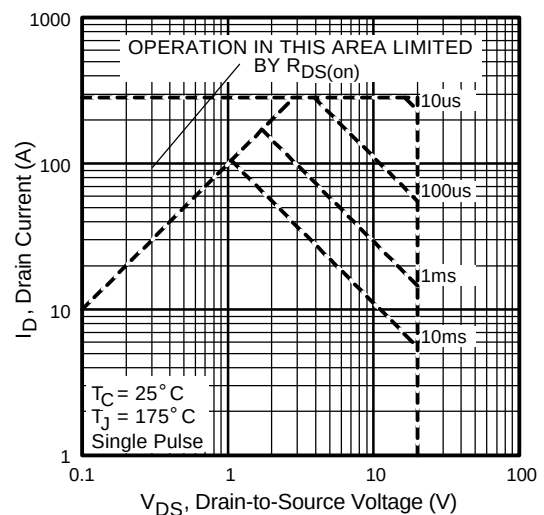


Fig 8. Maximum Safe Operating Area

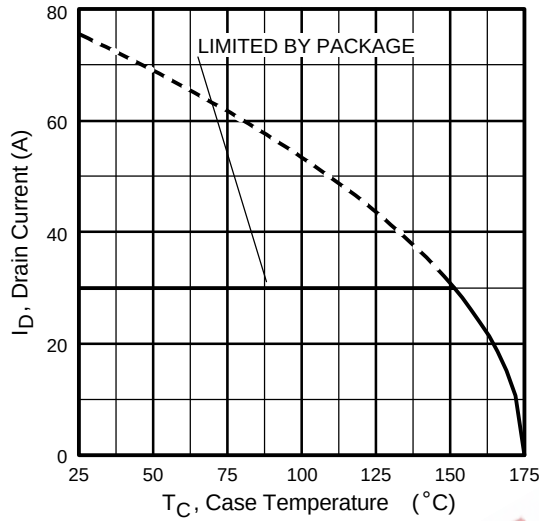


Fig 9. Maximum Drain Current Vs. Case Temperature

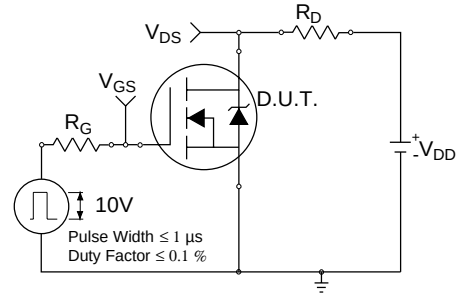


Fig 10a. Switching Time Test Circuit

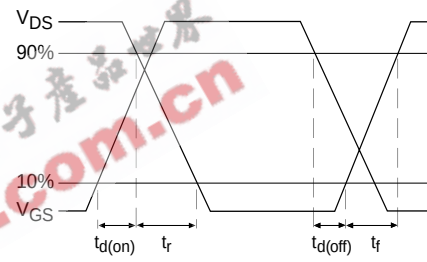


Fig 10b. Switching Time Waveforms

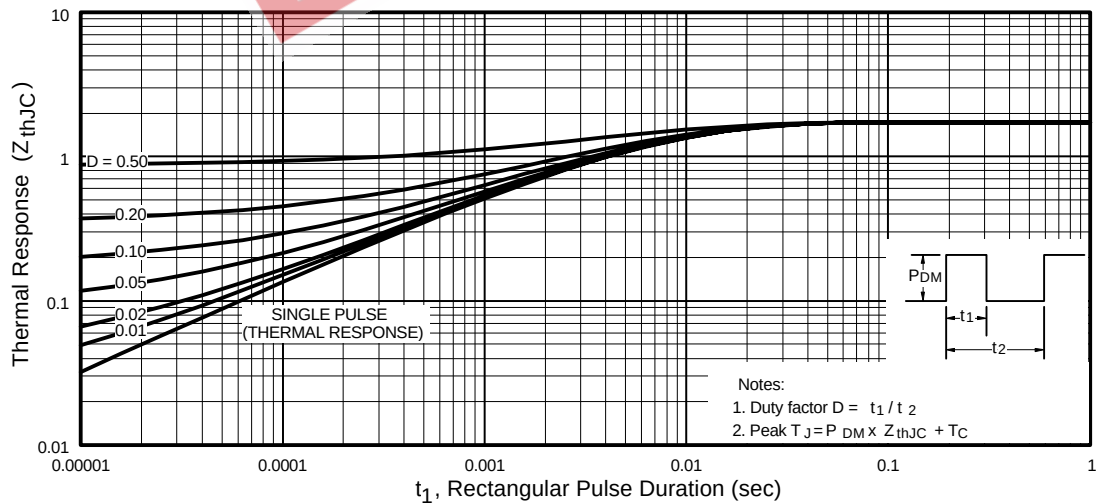


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

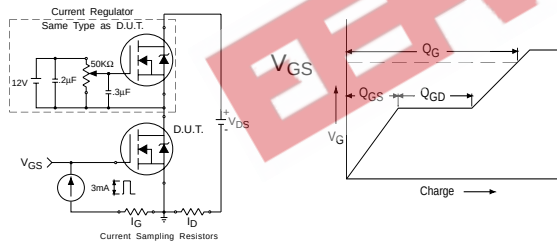
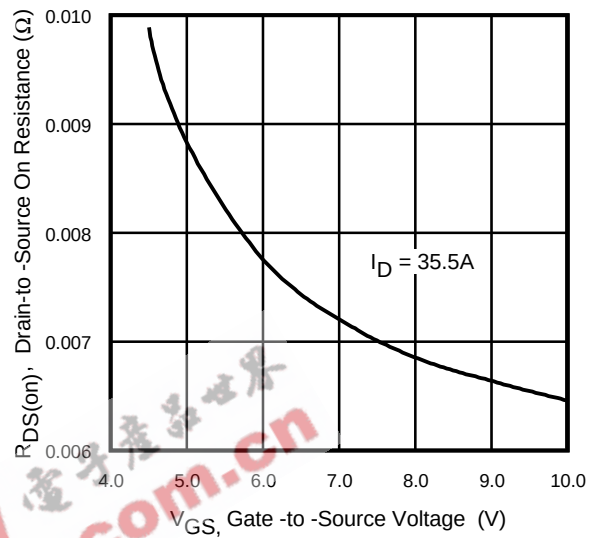
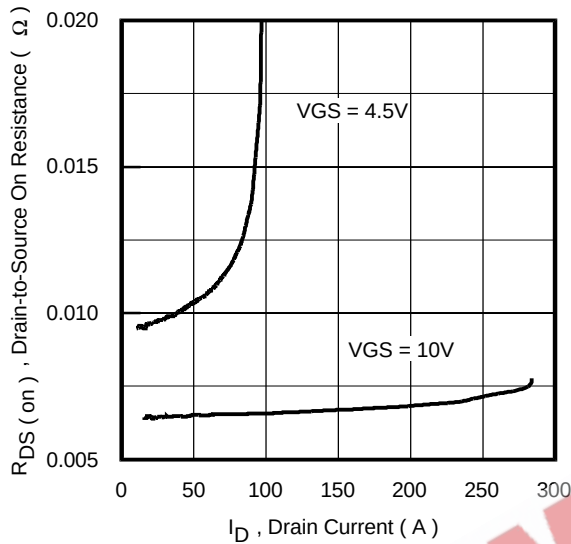


Fig 14a&b. Basic Gate Charge Test Circuit and Waveforms

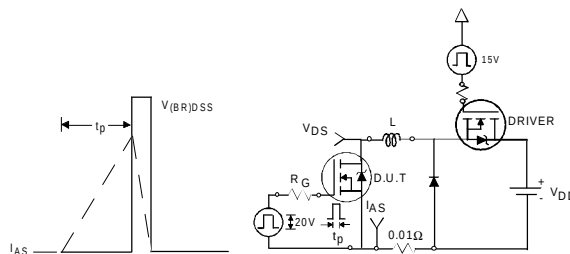


Fig 15a&b. Unclamped Inductive Test Circuit and Waveforms

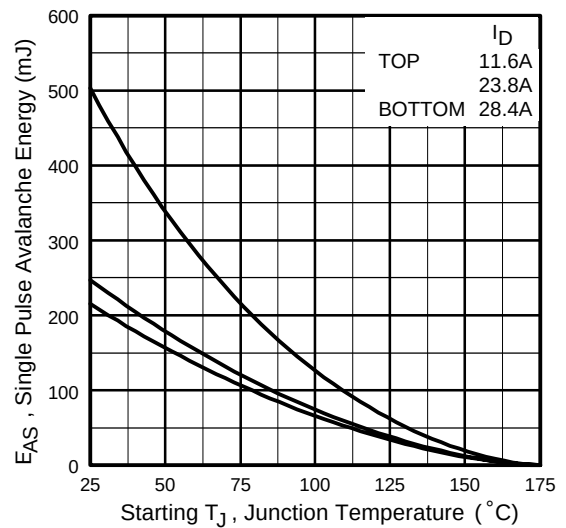
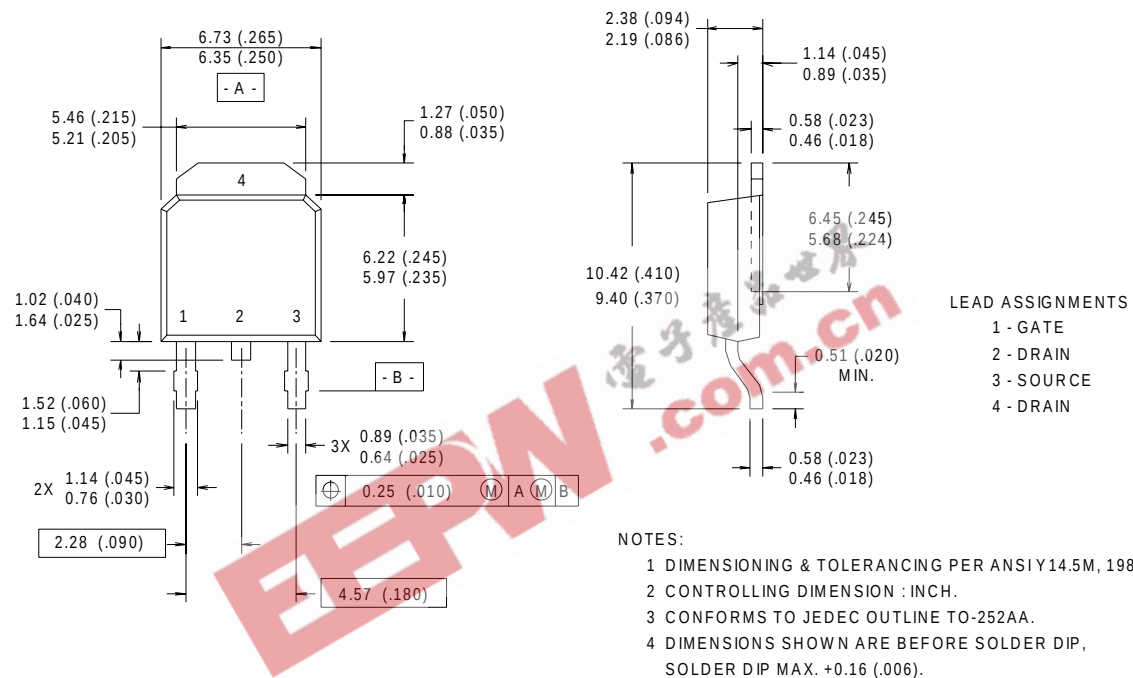


Fig 15c. Maximum Avalanche Energy Vs. Drain Current

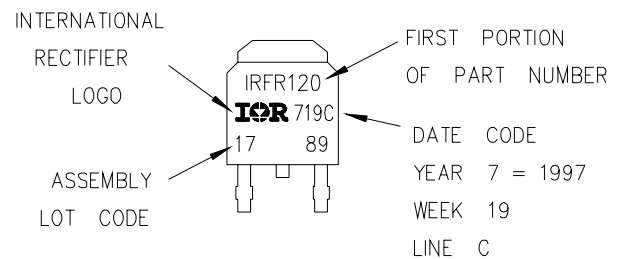
D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



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

EXAMPLE: THIS IS AN IRFR120
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"



International
IOR Rectifier

Dimensions are shown in millimeters (inches)

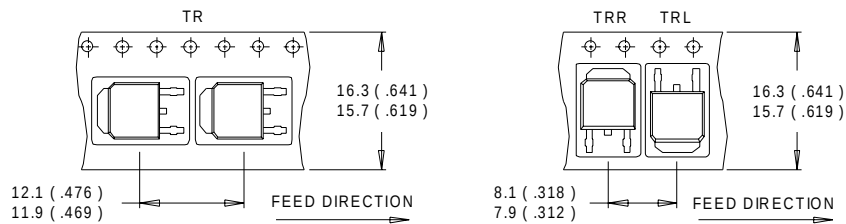


Diagram illustrating the markings on a MOSFET package (IRFU120) and their corresponding labels:

- INTERNATIONAL RECTIFIER LOGO**: Points to the **IR** logo on the package.
- FIRST PORTION OF PART NUMBER**: Points to the **IRFU120** marking.
- DATE CODE**: Points to the **719C** marking.
- ASSEMBLY LOT CODE**: Points to the **17** marking.
- YEAR 7 = 1997**: Points to the **7** in the date code.
- WEEK 19**: Points to the **19** in the date code.
- LINE C**: Points to the **C** in the date code.

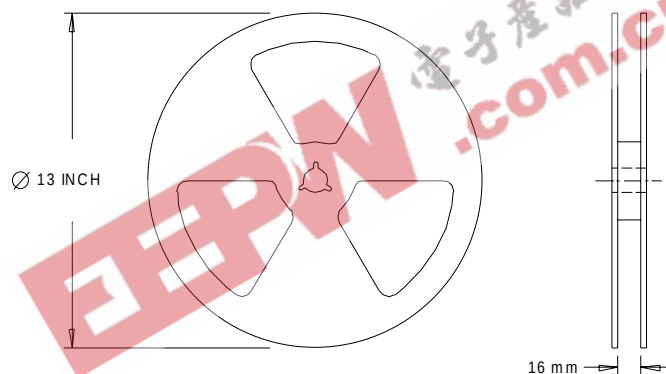
D-Pak (TO-252AA) Tape & Reel Information

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.

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 0.5 \text{ mH}$
 $R_G = 25\Omega$, $I_{AS} = 28.4 \text{ A}$.
- ③ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 30A