

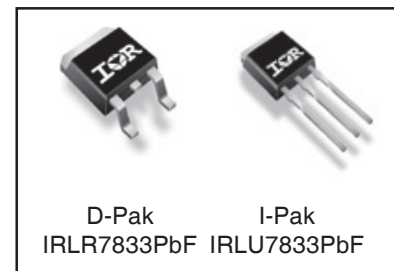
Applications

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

Benefits

- Very Low RDS(on) at 4.5V V_{GS}
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current

V _{DSS}	R _{DS(on)} max	Qg
30V	4.5mΩ	33nC



Absolute Maximum Ratings

	Parameter	Max.	Units
V _{DS}	Drain-to-Source Voltage	30	V
V _{GS}	Gate-to-Source Voltage	± 20	
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	140 ^④	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	99 ^④	
I _{DM}	Pulsed Drain Current ^①	560	
P _D @ T _C = 25°C	Maximum Power Dissipation ^⑤	140	W
P _D @ T _C = 100°C	Maximum Power Dissipation ^⑤	71	
	Linear Derating Factor	0.95	W/°C
T _J	Operating Junction and	-55 to + 175	°C
T _{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting torque, 6-32 or M3 screw	10 lbf·in (1.1N·m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	1.05	°C/W
R _{θJA}	Junction-to-Ambient (PCB Mount) ^⑥	—	50	
R _{θJA}	Junction-to-Ambient	—	110	

Notes ^① through ^⑥ are on page 11

Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	19	—	mV/°C	Reference to $25^\circ\text{C}, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.6	4.5	mΩ	$V_{GS} = 10V, I_D = 15A$ ④
		—	4.4	5.5		$V_{GS} = 4.5V, I_D = 12A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	1.4	—	2.3	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	—	-6.0	—	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
g_{fs}	Forward Transconductance	66	—	—	S	$V_{DS} = 15V, I_D = 12A$
Q_g	Total Gate Charge	—	33	50	nC	$V_{DS} = 16V$ $V_{GS} = 4.5V$ $I_D = 12A$ See Fig. 16
Q_{gs1}	Pre-V _{th} Gate-to-Source Charge	—	8.7	—		
Q_{gs2}	Post-V _{th} Gate-to-Source Charge	—	2.1	—		
Q_{gd}	Gate-to-Drain Charge	—	13	—		
Q_{godr}	Gate Charge Overdrive	—	9.9	—		
Q_{sw}	Switch Charge ($Q_{gs2} + Q_{gd}$)	—	15	—		
Q_{oss}	Output Charge	—	22	—	nC	$V_{DS} = 16V, V_{GS} = 0V$
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 15V, V_{GS} = 4.5V$ ④ $I_D = 12A$ Clamped Inductive Load
t_r	Rise Time	—	6.9	—		
$t_{d(off)}$	Turn-Off Delay Time	—	23	—		
t_f	Fall Time	—	15	—		
C_{iss}	Input Capacitance	—	4010	—	pF	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1.0MHz$
C_{oss}	Output Capacitance	—	950	—		
C_{rss}	Reverse Transfer Capacitance	—	470	—		

Avalanche Characteristics

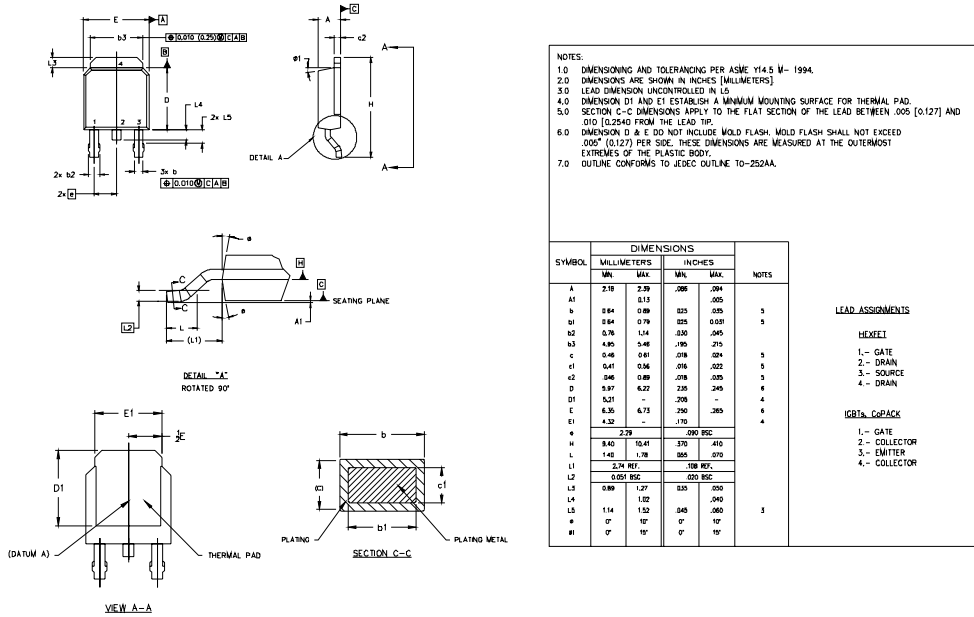
	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	530	mJ
I_{AR}	Avalanche Current ①	—	20	A
E_{AR}	Repetitive Avalanche Energy ①	—	14	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	140 ④	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①⑥	—	—	560		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 12A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	39	58	ns	$T_J = 25^\circ\text{C}, I_F = 12A, V_{DD} = 15V$
Q_{rr}	Reverse Recovery Charge	—	37	55	nC	$di/dt = 100A/\mu s$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

D-Pak (TO-252AA) Package Outline

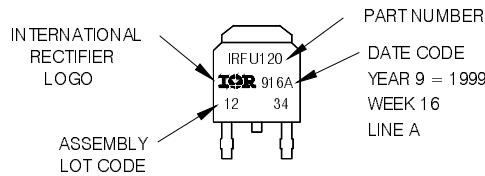
Dimensions are shown in millimeters (inches)



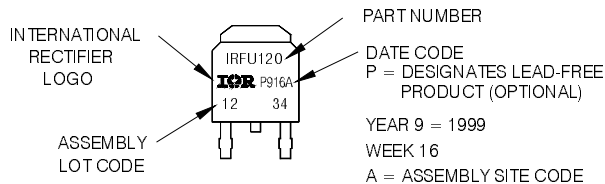
D-Pak (TO-252AA) Part Marking Information

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'

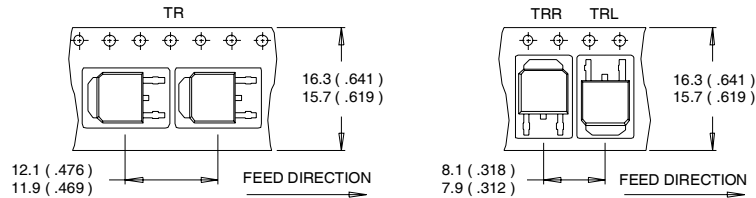


OR

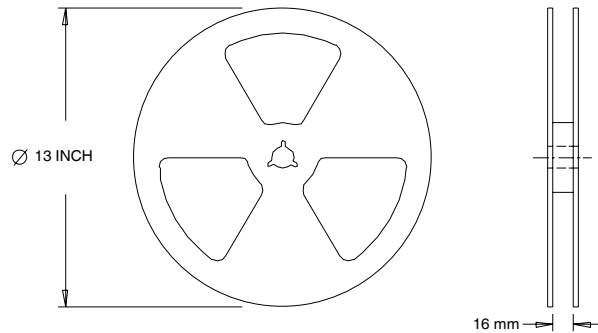


D-Pak (TO-252AA) Tape & Reel Information

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.

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 2.6\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 20\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 30A.
- ⑤ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

Data and specifications subject to change without notice.
 This product has been designed and qualified for the Industrial market.