

AUTOMOTIVE MOSFET

IRLR3705ZPbF
IRLU3705ZPbF

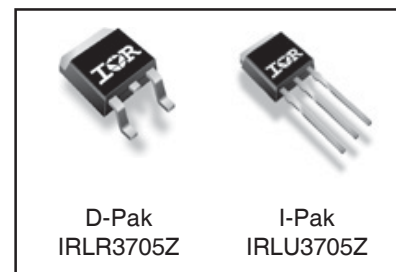
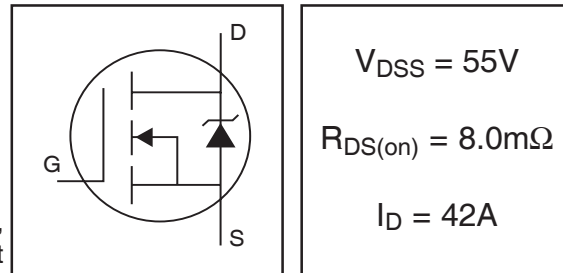
Features

- Logic Level
- Advanced Process Technology
- Ultra Low On-Resistance
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free

Description

Specifically designed for Automotive applications, this HEXFET® Power MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications.

HEXFET® Power MOSFET



Absolute Maximum Ratings

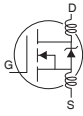
	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (Silicon Limited)	89	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	63	
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (Package Limited)	42	
I_{DM}	Pulsed Drain Current ①	360	
$P_D @ T_C = 25^\circ C$	Power Dissipation	130	W
	Linear Derating Factor	0.88	W/°C
V_{GS}	Gate-to-Source Voltage	± 16	V
E_{AS} (Thermally limited)	Single Pulse Avalanche Energy ②	110	mJ
E_{AS} (Tested)	Single Pulse Avalanche Energy Tested Value ③	190	
I_{AR}	Avalanche Current ①	See Fig.12a, 12b, 15, 16	A
E_{AR}	Repetitive Avalanche Energy ⑤		mJ
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑥	---	1.14	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount) ⑦ ⑧	---	40	
$R_{\theta JA}$	Junction-to-Ambient ⑧	---	110	

HEXFET® is a registered trademark of International Rectifier.

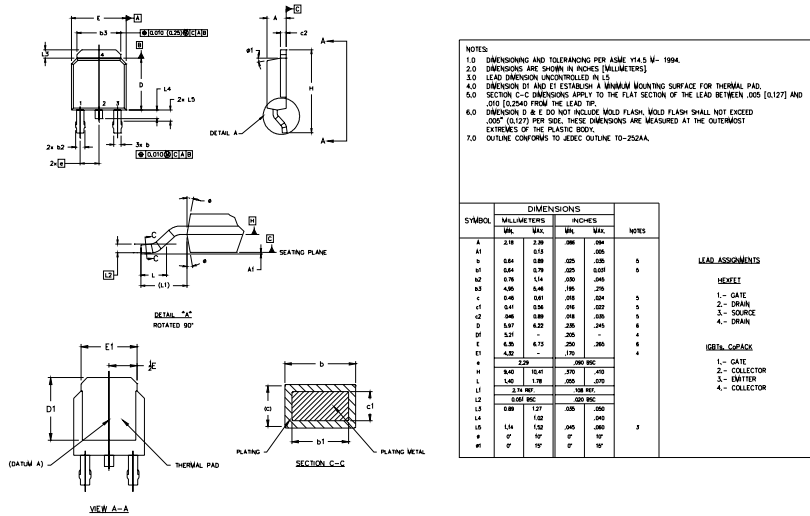
Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	55	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.053	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	6.5	8.0	mΩ	V _{GS} = 10V, I _D = 42A ③
		—	—	11		V _{GS} = 5.0V, I _D = 34A ③
		—	—	12		V _{GS} = 4.5V, I _D = 21A ③
V _{GS(th)}	Gate Threshold Voltage	1.0	—	3.0	V	V _{DS} = V _{GS} , I _D = 250μA
g _{fs}	Forward Transconductance	89	—	—	S	V _{DS} = 25V, I _D = 42A
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 55V, V _{GS} = 0V
		—	—	250		V _{DS} = 55V, 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
Q _g	Total Gate Charge	—	44	66	nC	I _D = 42A
Q _{gs}	Gate-to-Source Charge	—	13	—		V _{DS} = 44V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	22	—		V _{GS} = 5.0V ③
t _{d(on)}	Turn-On Delay Time	—	17	—	ns	V _{DD} = 28V
t _r	Rise Time	—	150	—		I _D = 42A
t _{d(off)}	Turn-Off Delay Time	—	33	—		R _G = 4.2 Ω
t _f	Fall Time	—	70	—		V _{GS} = 5.0V ③
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	—	2900	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	420	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	230	—		f = 1.0MHz
C _{oss}	Output Capacitance	—	1550	—		V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{oss}	Output Capacitance	—	320	—		V _{GS} = 0V, V _{DS} = 44V, f = 1.0MHz
C _{oss eff.}	Effective Output Capacitance	—	500	—		V _{GS} = 0V, V _{DS} = 0V to 44V ④

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	42	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	360		
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 42A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	21	42	ns	T _J = 25°C, I _F = 42A, V _{DD} = 28V
Q _{rr}	Reverse Recovery Charge	—	14	28	nC	di/dt = 100A/μs ③
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

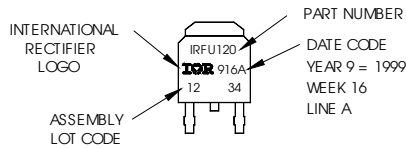
D-Pak (TO-252AA) Package Outline



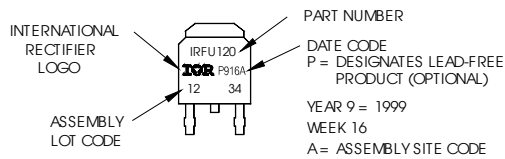
D-Pak (TO-252AA) Part Marking Information

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"

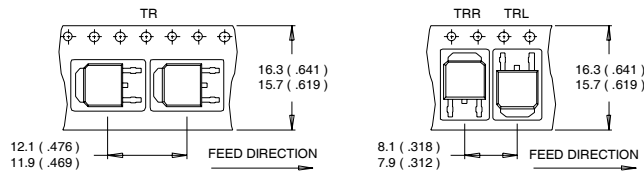


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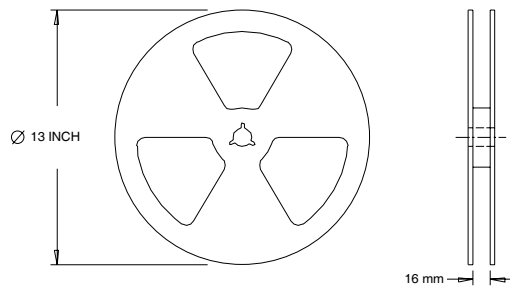


D-Pak (TO-252AA) Tape & Reel Information

Dimensions are shown in millimeters



- 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. (See fig. 11).
- ② Limited by T_{Jmax} , starting $T_J = 25^\circ\text{C}$, $L = 0.12\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 42\text{A}$, $V_{GS} = 10\text{V}$. Part not recommended for use above this value.
- ③ Pulse width $\leq 1.0\text{ms}$; duty cycle $\leq 2\%$.
- ④ C_{OSS} eff. is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 80% V_{DSS} .
- ⑤ Limited by T_{Jmax} , see Fig.12a, 12b, 15, 16 for typical repetitive avalanche performance.
- ⑥ This value determined from sample failure population. 100% tested to this value in production.
- ⑦ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994
- ⑧ R_θ is measured at T_J approximately 90°C

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