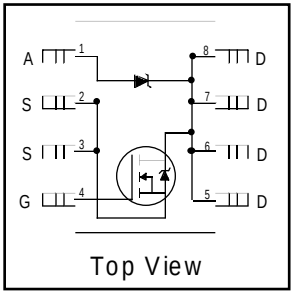
International
IOR Rectifier

PRELIMINARY

IRF7421D1

FETKY™ MOSFET & Schottky Diode

- Co-packaged HEXFET® Power MOSFET and Schottky Diode
- Ideal For Synchronous Regulator Applications
- Generation V Technology
- SO-8 Footprint



Top View

V_{DSS} = 30V

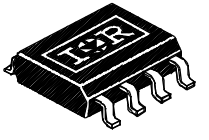
$R_{DS(on)}$ = 0.035Ω

Schottky Vf = 0.42V

Description

The **FETKY**™ family of co-packaged HEXFETs and Schottky diodes offer the designer an innovative board space saving solution for switching regulator applications. Generation 5 HEXFETs utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. Combining this technology with International Rectifier's low forward drop Schottky rectifiers results in an extremely efficient device suitable for use in a wide variety of portable electronics applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics. The SO-8 package is designed for vapor phrase, infra red or wave soldering techniques.


SO-8

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V**	6.4	A
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V*	4.1	
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V*	3.3	
I_{DM}	Pulsed Drain Current ①	33	
P_D @T_A = 25°C	Power Dissipation (PCB Mount)**	2.5	W
P_D @T_A = 25°C	Power Dissipation (PCB Mount)*	1.0	W
	Linear Derating Factor (PCB Mount)*	8.0	mW/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Amb. (PCB Mount, steady state)*	100	125	°C/W
$R_{\theta JA}$	Junction-to-Amb. (PCB Mount, steady state)**	40	50	
$R_{\theta JA}$	Junction-to-Amb. _Schottky *	100	125	

Notes:

① Repetitive rating – pulse width limited by max. junction temperature (see fig. 11)

② $I_{SD} \le 4.1A$, di/dt ≤ 110A/µs, $V_{DD} \le V_{(BR)DSS}$, $T_J \le 150°C$

③ Pulse width ≤ 300µs – duty cycle ≤ 2%

* When mounted on FR-4 board using minimum recommended footprint.

** When mounted on 1 inch square copper board, for comparison with other SMD devices.

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	——	——	V	V_{GS} = 0V, I_D = 250µA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.035	Ω	V_{GS} = 10V, I_D = 4.1A ③
		——	——	0.060		V_{GS} = 4.5V, I_D = 2.1A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0	——	——	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	4.6	——	——	S	V_{DS} = 15V, I_D = 2.1A
I_{DSS}	Drain-to-Source Leakage Current	——	——	1.0	µA	V_{DS} = 24V, V_{GS} = 0V
		——	——	25		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	-100	nA	V_{GS} = -20V
	Gate-to-Source Reverse Leakage	——	——	100		V_{GS} = 20V
Q_g	Total Gate Charge	——	18	27	nC	I_D = 4.1A
Q_{gs}	Gate-to-Source Charge	——	2.2	3.3		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	5.9	8.9		V_{GS} = 10V, See Fig. 6 and 9 ③
$t_{d(on)}$	Turn-On Delay Time	——	6.7	——	ns	V_{DD} = 15V
t_r	Rise Time	——	27	——		I_D = 4.1A
$t_{d(off)}$	Turn-Off Delay Time	——	20	——		R_G = 6.2Ω
t_f	Fall Time	——	16	——		R_D = 3.7Ω, See Fig. 10 ③
C_{iss}	Input Capacitance	——	510	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	200	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	84	——		f = 1.0MHz, See Fig. 5

MOSFET Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current(Body Diode)	——	——	1.3	A	
I_{SM}	Pulsed Source Current (Body Diode)	——	——	33		
V_{SD}	Body Diode Forward Voltage	——	——	1.0	V	T_J = 25°C, I_S = 4.1A, V_{GS} = 0V
t_{rr}	Reverse Recovery Time (Body Diode)	——	57	86	ns	T_J = 25°C, I_F = 4.1A
Q_{rr}	Reverse RecoveryCharge	——	93	140	nC	di/dt = 100A/µs ③

Schottky Diode Maximum Ratings

	Parameter	Max.	Units.	Conditions	
If (av)	Max. Average Forward Current	2.0	A	50% Duty Cycle. Rectangular Wave, Tc = 132°C	
		4.0		50% Duty Cycle. Rectangular Wave, Tc = 117°C	
I_{SM}	Max. peak one cycle Non-repetitive	150	A	5µs sine or 3µs Rect. pulse	Following any rated
	Surge current	15		10ms sine or 6ms Rect. pulse	load condition & with Vrrm applied

Schottky Diode Electrical Specifications

	Parameter	Max.	Units	Conditions	
Vfm	Max. Forward voltage drop	0.50	V	If = 1.0, Tj = 25°C	
		0.60		If = 2.0, Tj = 25°C	
		0.42		If = 1.0, Tj = 125°C	
		0.55		If = 2.0, Tj = 125°C .	
Irm	Max. Reverse Leakage current	0.10	mA	Vr = 30V	Tj = 25°C
		15			Tj = 125°C
Ct	Max. Junction Capacitance	100	pF	Vr = 5Vdc (100kHz to 1 MHz) 25°C	
dv/dt	Max. Voltage Rate of Charge	5200	V/ µs	Rated Vr	

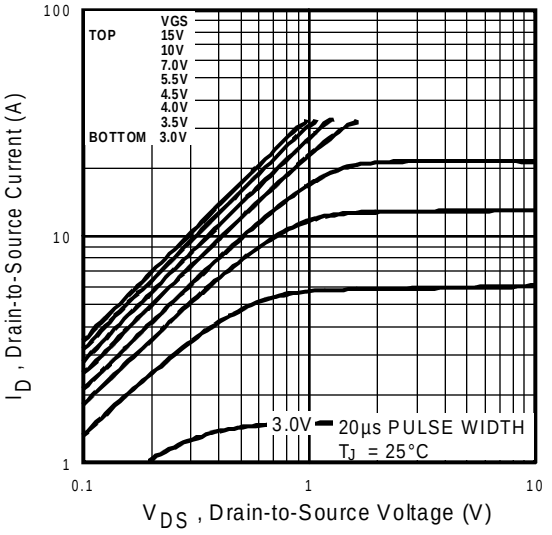


Fig 1. Typical Output Characteristics, $T_J = 25^oC$

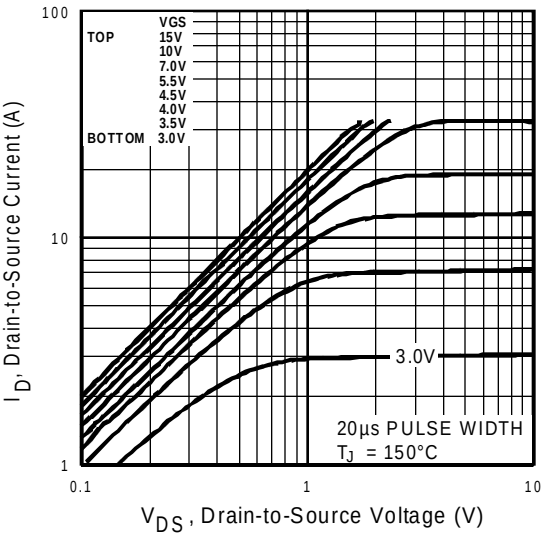


Fig 2. Typical Output Characteristics, $T_J = 150^oC$

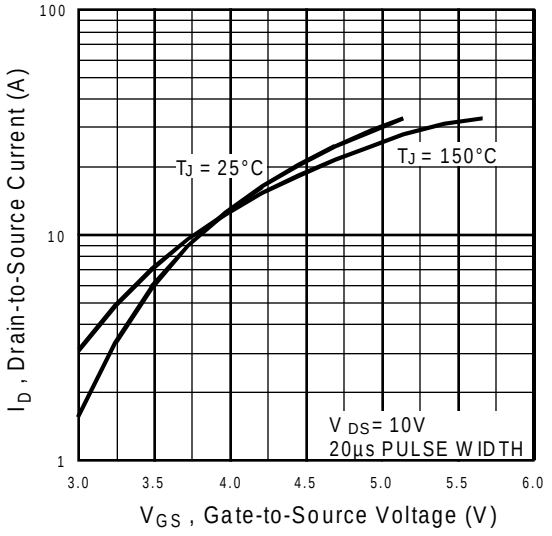


Fig 3. Typical Transfer Characteristics

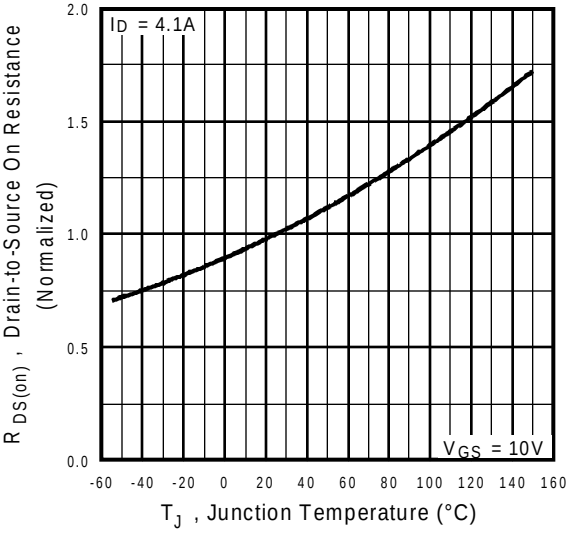


Fig 4. Normalized On-Resistance Vs. Temperature

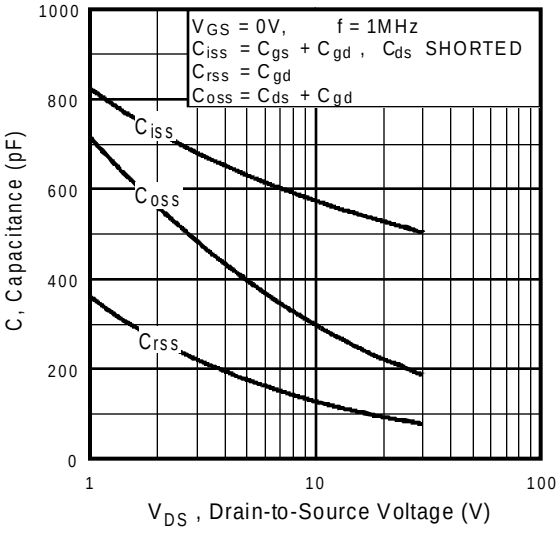


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

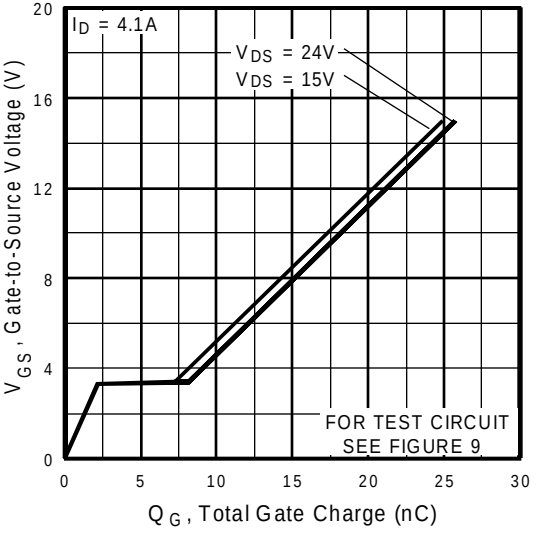


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

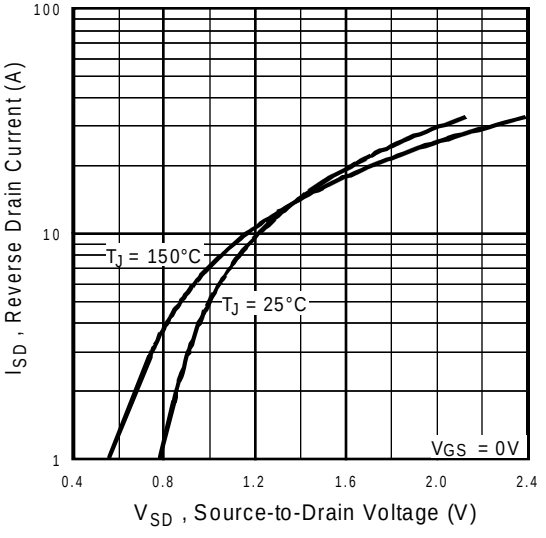


Fig 7. Typical Source-Drain Diode Forward Voltage

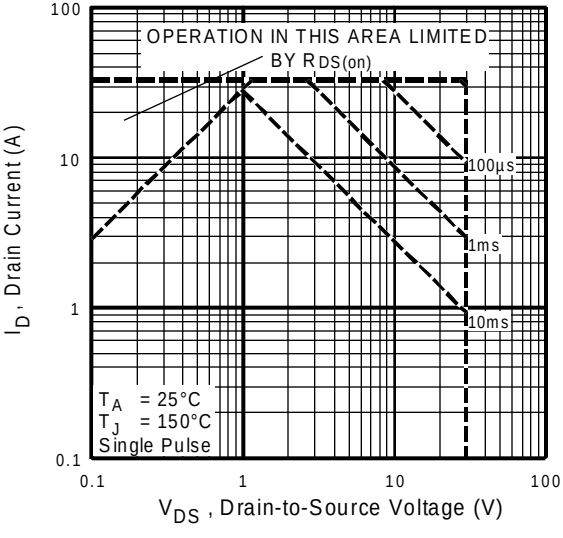


Fig 8. Maximum Safe Operating Area

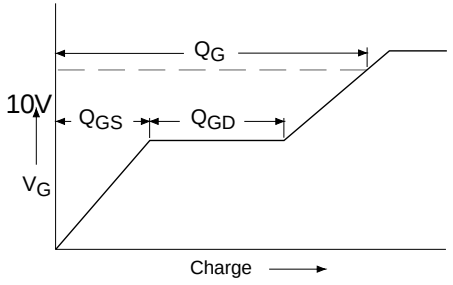


Fig 9a. Basic Gate Charge Waveform

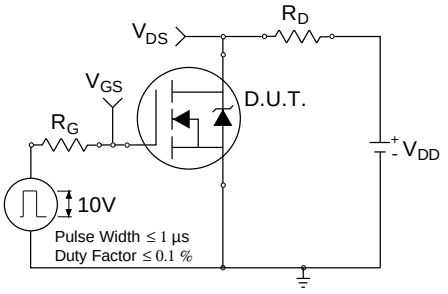


Fig 10a. Switching Time Test Circuit

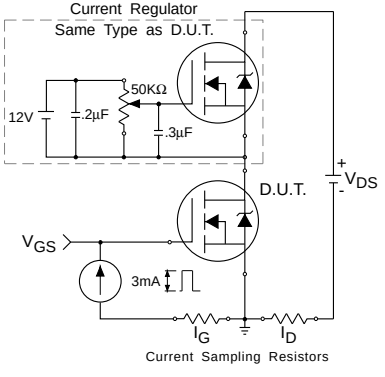


Fig 9b. Gate Charge Test Circuit

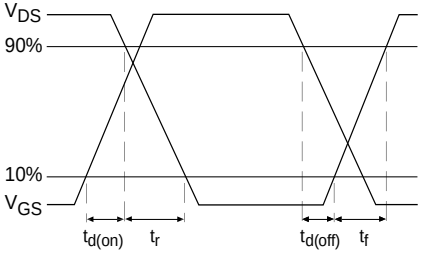


Fig 10b. Switching Time Waveforms

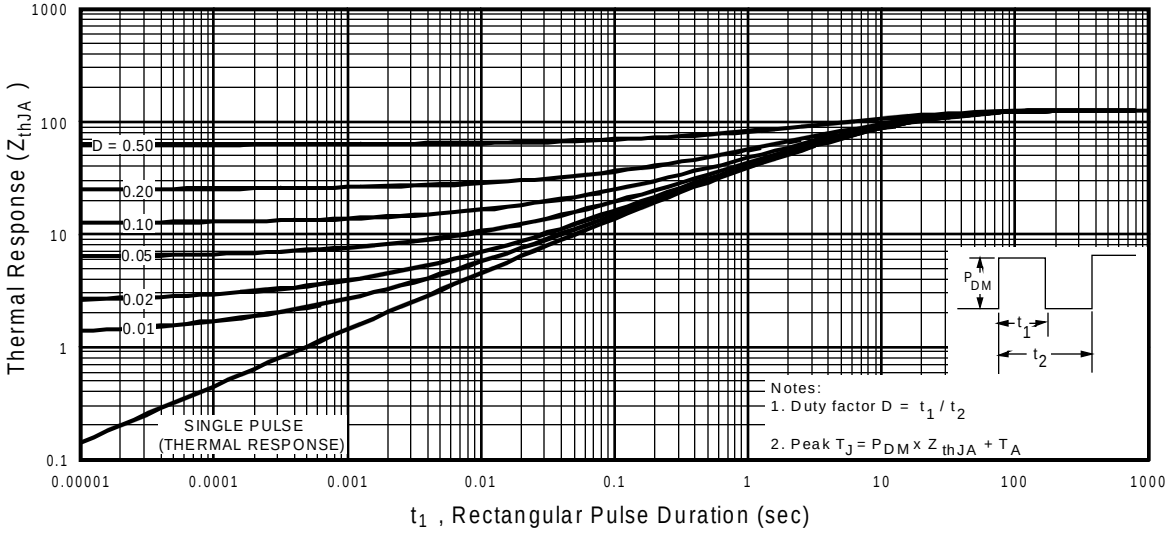


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

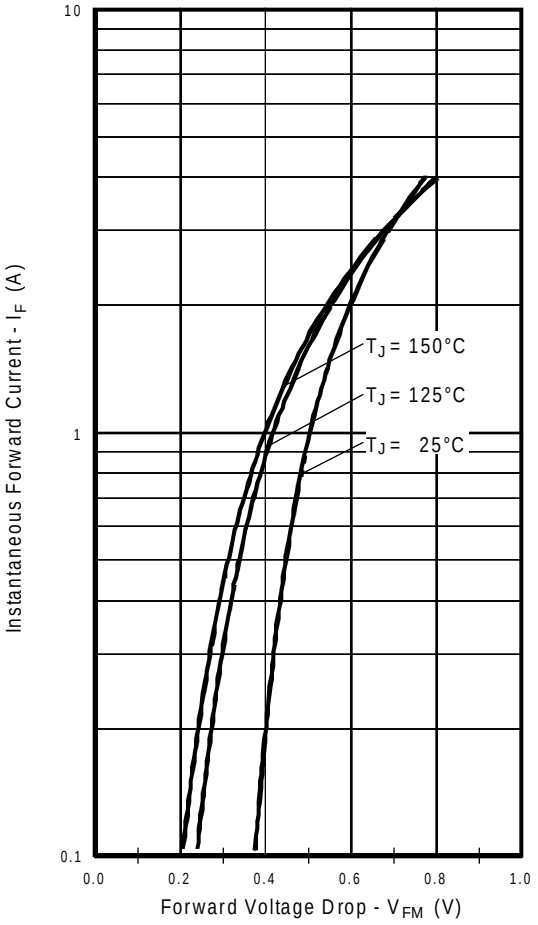


Fig. 12 - Max. Forward Voltage Drop Characteristics

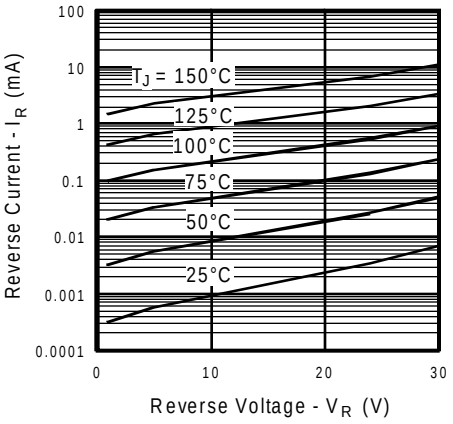


Fig. 13 - Typical Values of Reverse Current Vs. Reverse Voltage

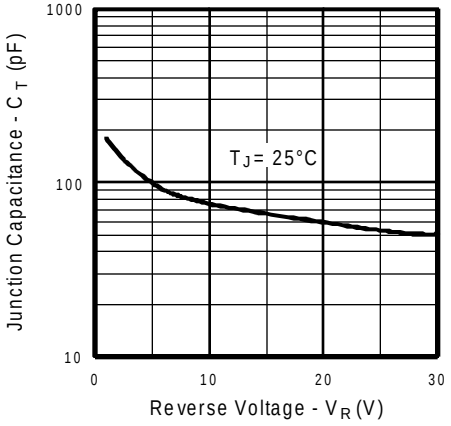
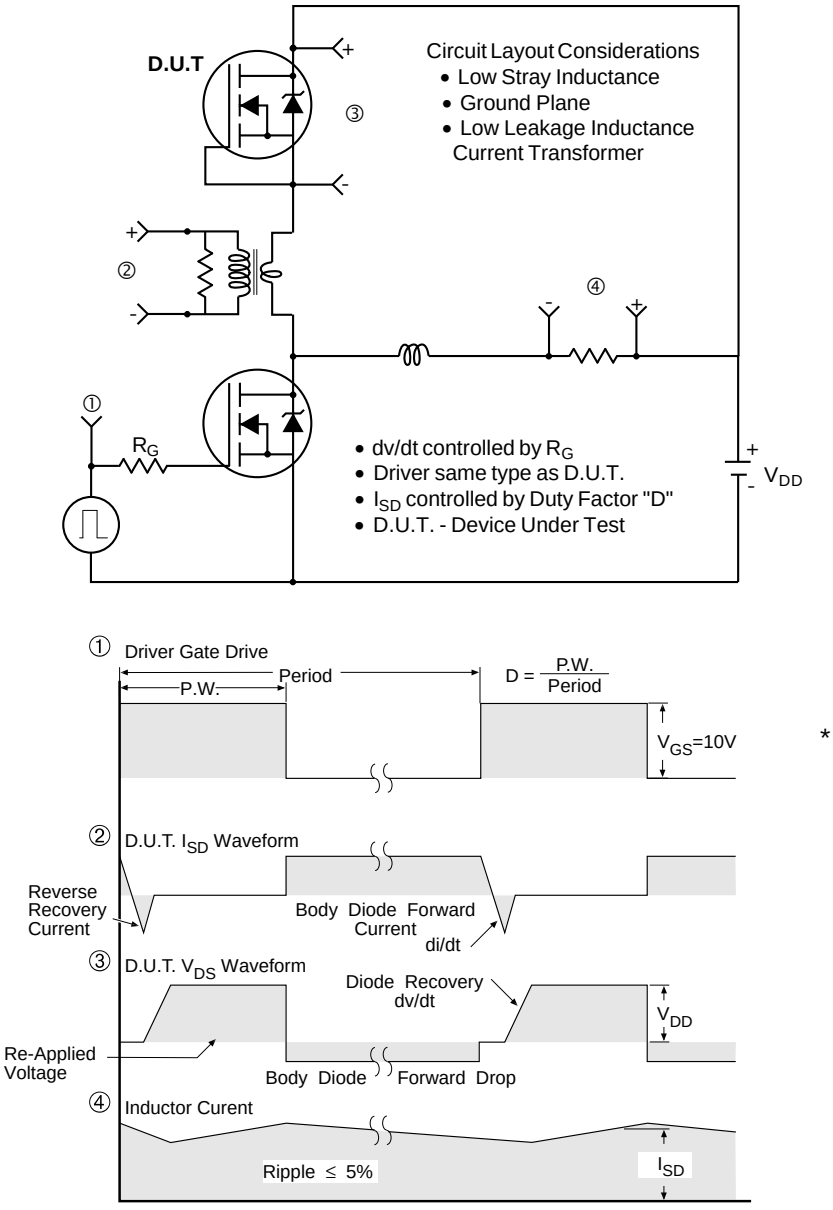


Fig. 14 - Typical Junction Capacitance Vs. Reverse Voltage

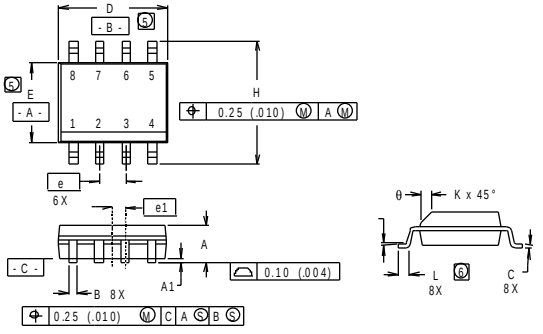
Peak Diode Recovery dv/dt Test Circuit



* V_{GS} = 5V for Logic Level Devices

Fig 20. For N-Channel HEXFETS

SO-8 Package Details

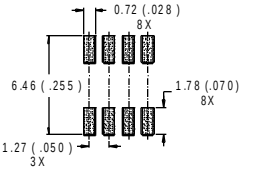


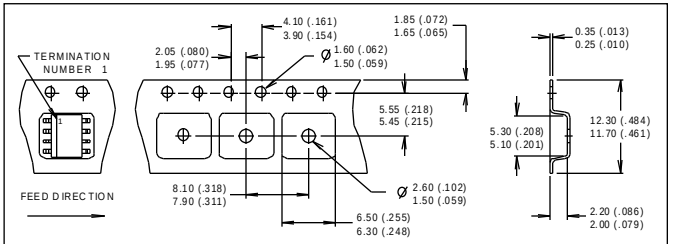
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
B	.014	.018	0.36	0.46
C	.0075	.0098	0.19	0.25
D	.189	.196	4.80	4.98
E	.150	.157	3.81	3.99
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.011	.019	0.28	0.48
L	0.16	.050	0.41	1.27
θ	0°	8°	0°	8°

NOTES:

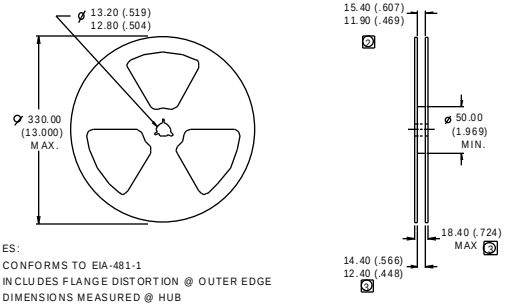
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.006).
6. DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..

RECOMMENDED FOOTPRINT





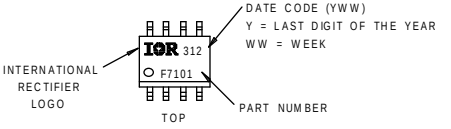
Tape and Reel

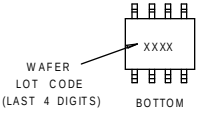


NOTES:

1 CONFORMS TO EIA-481-1
2 INCLUDES FLANGE DISTORTION @ OUTER EDGE
3 DIMENSIONS MEASURED @ HUB
4 CONTROLLING DIMENSION : METRIC

Part Marking (IRF7101 example)





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