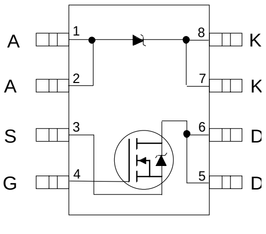
International
IOR Rectifier

PD- 95434

IRF7523D1PbF

FETKY™ MOSFET / Schottky Diode

- Co-packaged HEXFET® Power MOSFET and Schottky Diode
- N-Channel HEXFET
- Low V_F Schottky Rectifier
- Generation 5 Technology
- Micro8™ Footprint
- Lead-Free

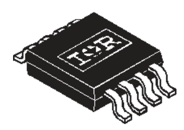


Top View

V_{DSS} = 30V

$R_{DS(on)}$ = 0.11Ω

Schottky Vf = 0.39V



Micro8™

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 like cell phone, PDA, etc.

The new Micro8™ package, with half the footprint area of the standard SO-8, provides the smallest footprint available in an SOIC outline. This makes the Micro8™ an ideal device for applications where printed circuit board space is at a premium. The low profile (<1.1mm) of the Micro8™ will allow it to fit easily into extremely thin application environments such as portable electronics and PCMCIA cards.

Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

Parameter		Maximum	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS}@10V ④	2.7	A
I_D @ T_A = 70°C		2.1	
I_{DM}	Pulsed Drain Current ①	21	
P_D @T_A = 25°C	Power Dissipation ④	1.25	W
P_D @T_A = 70°C		0.8	
	Linear Derating Factor	10	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ②	6.2	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	°C

Thermal Resistance Ratings

Parameter		Maximum	Units
$R_{\theta JA}$	Junction-to-Ambient ④	100	°C/W

Notes:

① Repetitive rating; pulse width limited by maximum junction temperature (see figure 11)

② $I_{SD} \leq 1.7A$, $di/dt \leq 120A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150°C$

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

④ When mounted on 1 inch square copper board to approximate typical multi-layer PCB thermal resistance

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	—	0.090	0.130	Ω	V_{GS} = 10V, I_D = 1.7A ③
		—	0.140	0.190		V_{GS} = 4.5V, I_D = 0.85A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	—	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	1.9	—	—	S	V_{DS} = 10V, I_D = 0.85A
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	—	7.8	12	nC	I_D = 1.7A
Q_{gs}	Gate-to-Source Charge	—	1.2	1.8		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	2.5	3.8		V_{GS} = 10V (see figure 10) ③
$t_{d(on)}$	Turn-On Delay Time	—	4.7	—	ns	V_{DD} = 15V
t_r	Rise Time	—	10	—		I_D = 1.7A
$t_{d(off)}$	Turn-Off Delay Time	—	12	—		R_G = 6.1Ω
t_f	Fall Time	—	5.3	—		R_D = 8.7Ω ③
C_{iss}	Input Capacitance	—	210	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	80	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	32	—		f = 1.0MHz (see figure 9)

MOSFET Source-Drain Ratings and Characteristics

Parameter		Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	1.25	A	
I_{SM}	Pulsed Source Current (Body Diode)	—	—	21		
V_{SD}	Body Diode Forward Voltage	—	—	1.2	V	T_J = 25°C, I_S = 1.7A, V_{GS} = 0V
t_{rr}	Reverse Recovery Time (Body Diode)	—	40	60	ns	T_J = 25°C, I_F = 1.7A
Q_{rr}	Reverse Recovery Charge	—	48	72	nC	di/dt = 100A/µs ③

Schottky Diode Maximum Ratings

	Parameter	Max.	Units.	Conditions	
$I_{F(av)}$	Max. Average Forward Current	1.9	A	50% Duty Cycle. Rectangular Wave, T_A = 25°C	
		1.3		See Fig.14 T_A = 70°C	
I_{SM}	Max. peak one cycle Non-repetitive Surge current	120	A	5µs sine or 3µs Rect. pulse	Following any rated load condition & with V_{RRM} applied
		11		10ms sine or 6ms Rect. pulse	

Schottky Diode Electrical Specifications

	Parameter	Max.	Units	Conditions	
V_{FM}	Max. Forward voltage drop	0.50	V	I_F = 1.0A, T_J = 25°C	
		0.62		I_F = 2.0A, T_J = 25°C	
		0.39		I_F = 1.0A, T_J = 125°C	
		0.57		I_F = 2.0A, T_J = 125°C .	
I_{RM}	Max. Reverse Leakage current	0.06	mA	V_R = 30V	T_J = 25°C
		16			T_J = 125°C
C_t	Max. Junction Capacitance	92	pF	V_R = 5Vdc (100kHz to 1 MHz) 25°C	
dv/dt	Max. Voltage Rate of Charge	3600	V/ µs	Rated V_R	

Power Mosfet Characteristics

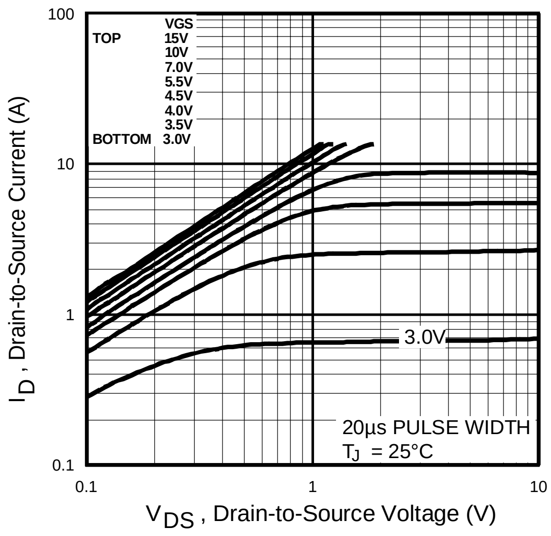


Fig 1. Typical Output Characteristics

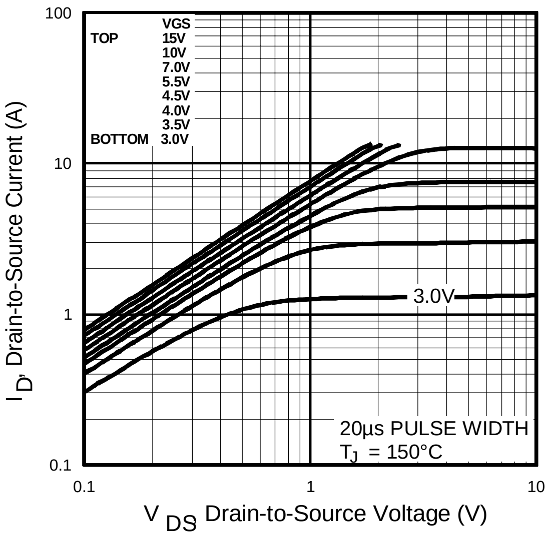


Fig 2. Typical Output Characteristics

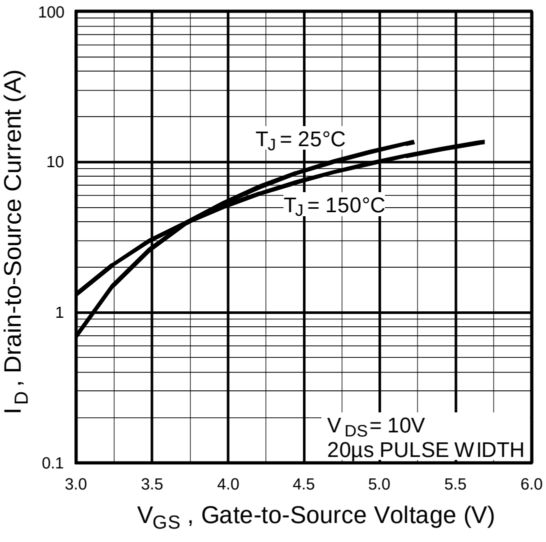


Fig 3. Typical Transfer Characteristics

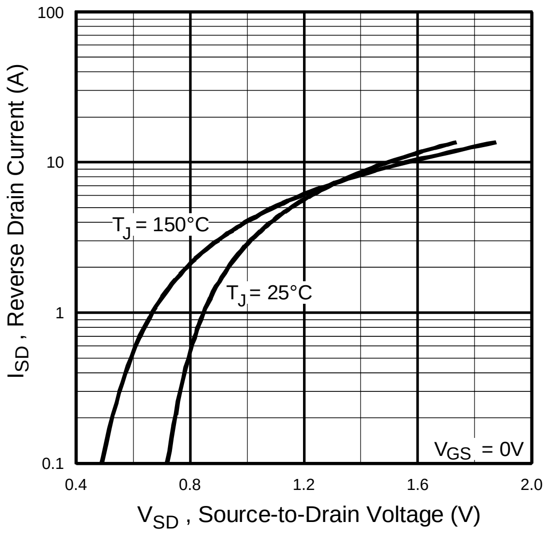


Fig 4. Typical Source-Drain Diode Forward Voltage

Power Mosfet Characteristics

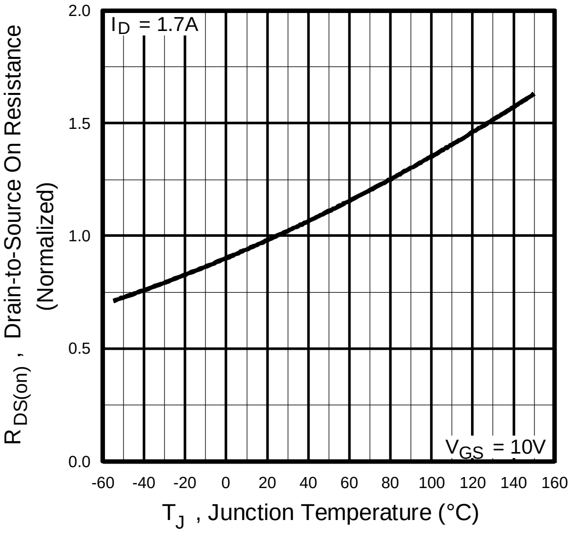


Fig 5. Normalized On-Resistance Vs. Temperature

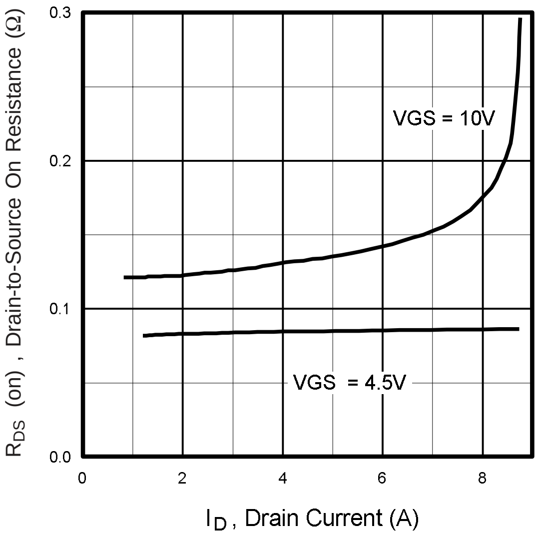


Fig 6. Typical On-Resistance Vs. Drain Current

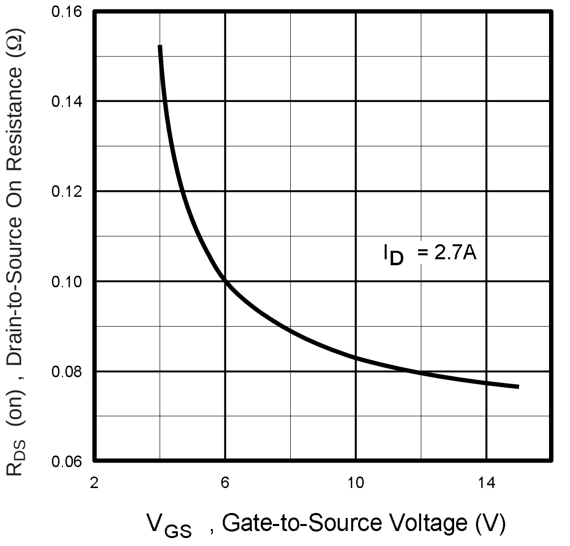


Fig 7. Typical On-Resistance Vs. Gate Voltage

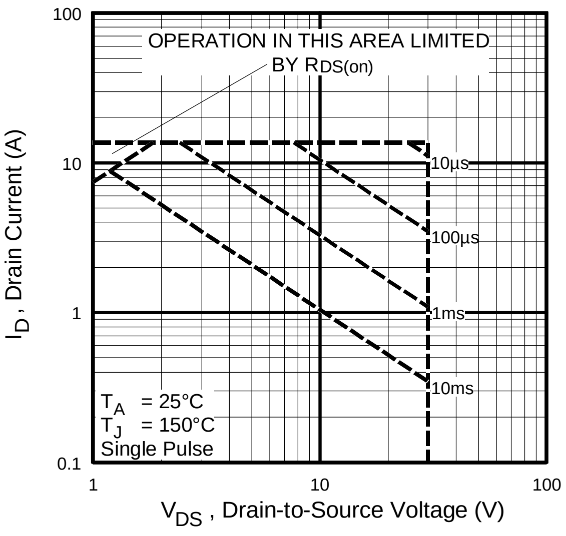


Fig 8. Maximum Safe Operating Area

Power Mosfet Characteristics

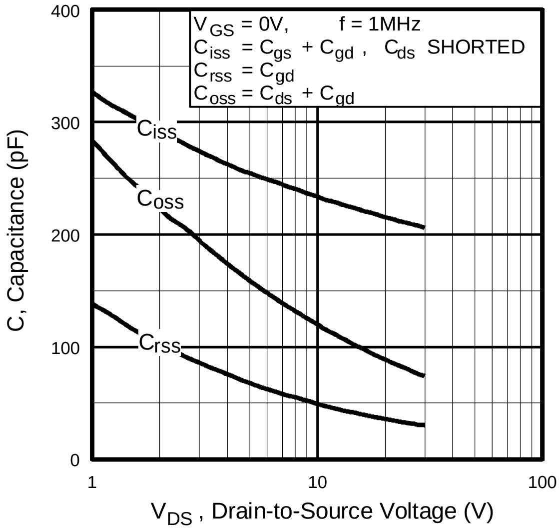


Fig 9. Typical Capacitance Vs.
Drain-to-Source Voltage

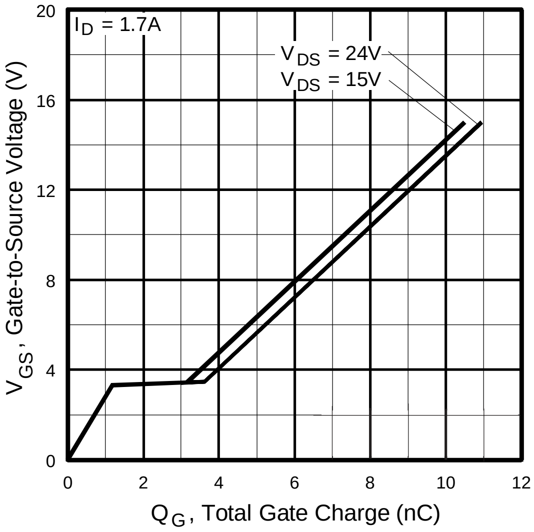


Fig 10. Typical Gate Charge Vs.
Gate-to-Source Voltage

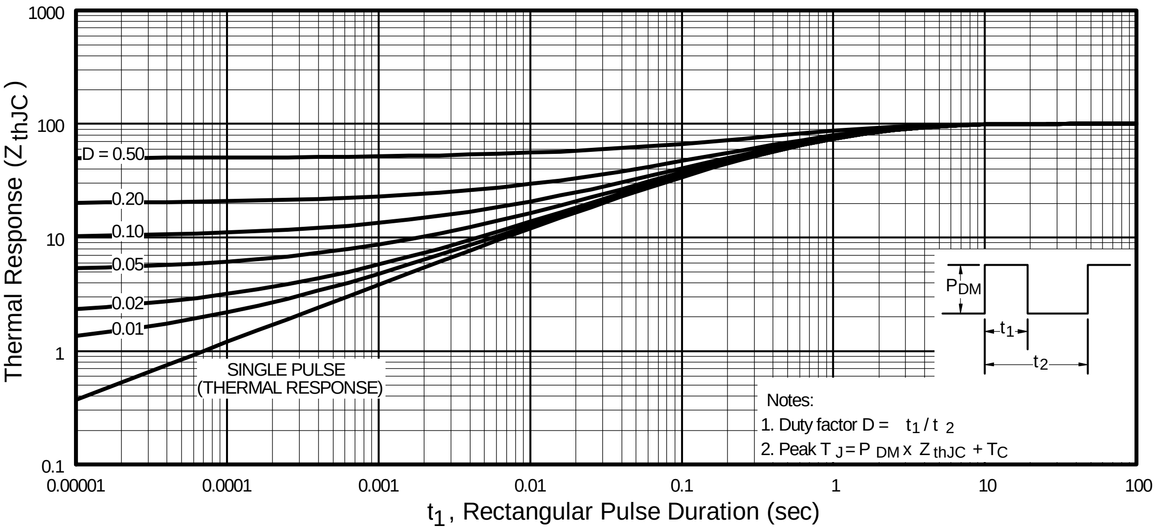


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

Schottky Diode Characteristics

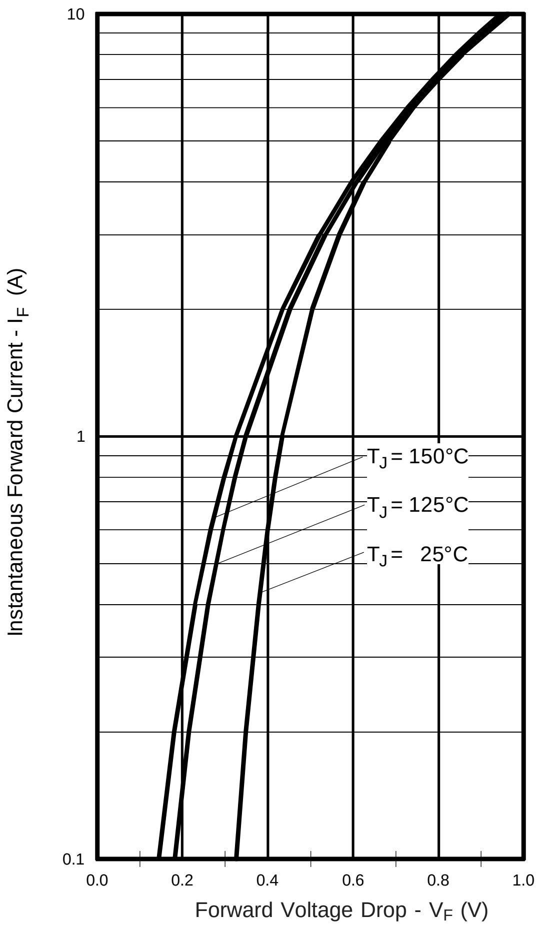


Fig. 12 -Typical Forward Voltage Drop Characteristics

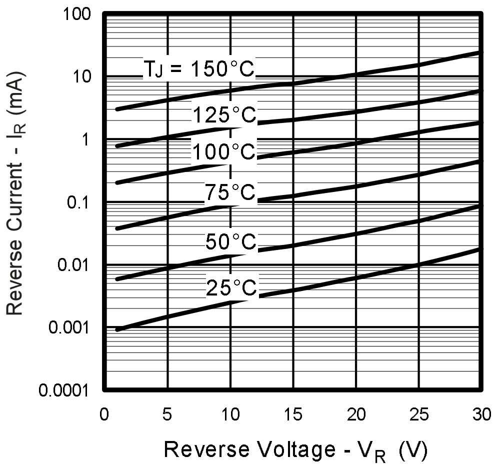


Fig. 13 - Typical Values of Reverse Current Vs. Reverse Voltage

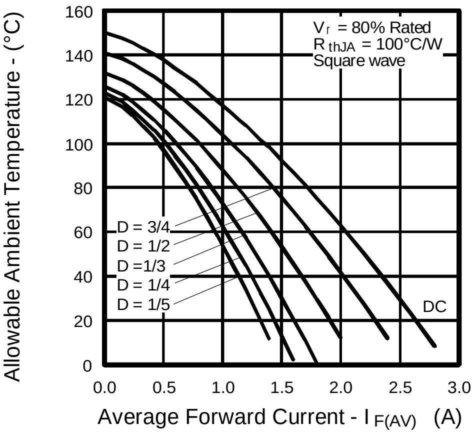


Fig.14 - Maximum Allowable Ambient Temp. Vs. Forward Current

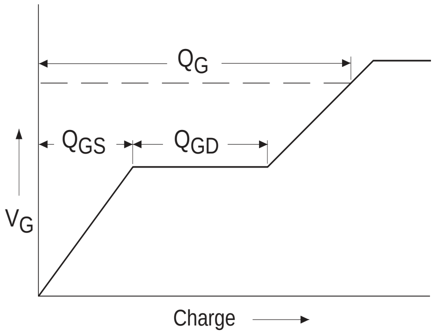


Fig 15a. Basic Gate Charge Waveform

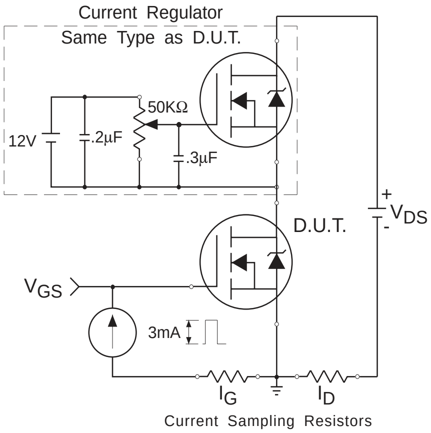


Fig 15b. Gate Charge Test Circuit

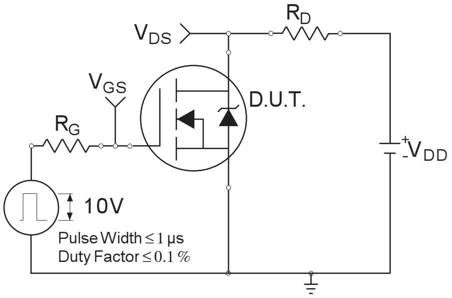


Fig 16a. Switching Time Test Circuit

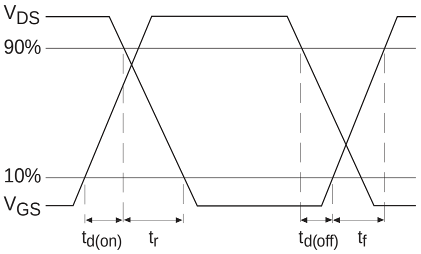
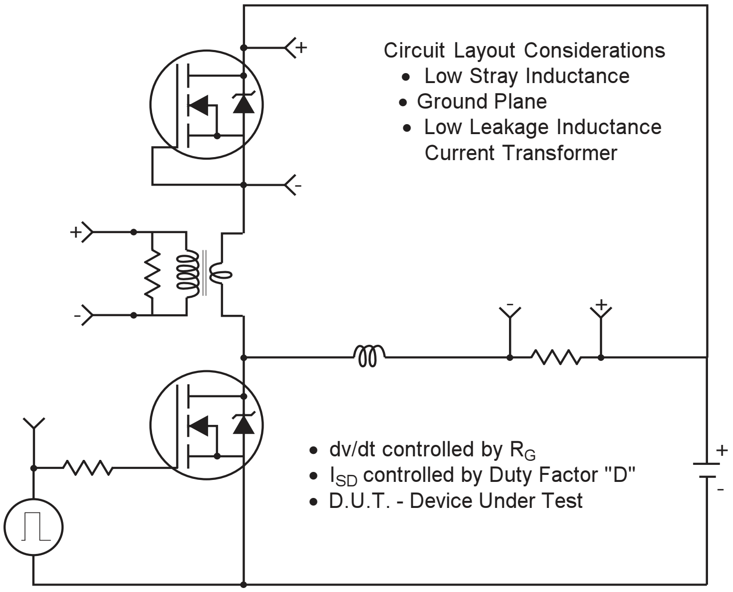


Fig 16b. Switching Time Waveforms

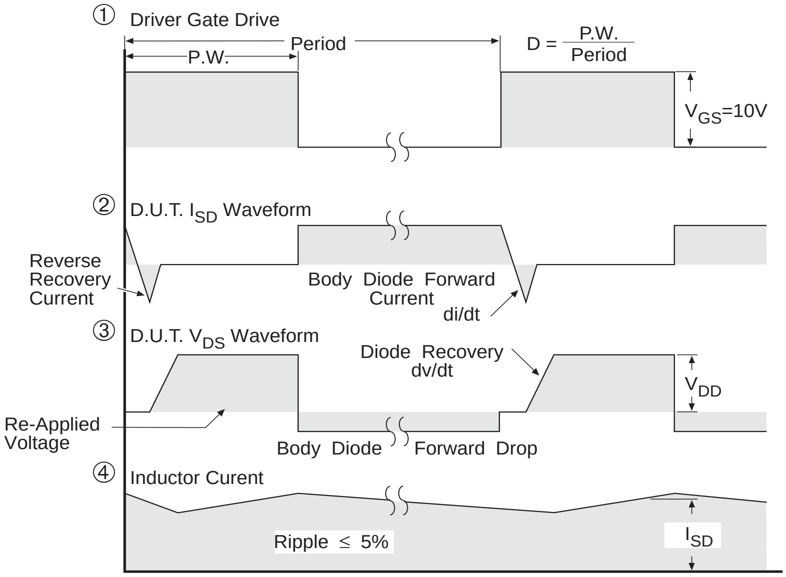
Peak Diode Recovery dv/dt Test Circuit



Circuit Layout Considerations
- Low Stray Inductance
- Ground Plane
- Low Leakage Inductance Current Transformer

- dv/dt controlled by R_G
- I_{SD} controlled by Duty Factor "D"
- D.U.T. - Device Under Test

* Reverse Polarity for P-Channel
** Use P-Channel Driver for P-Channel Measurements

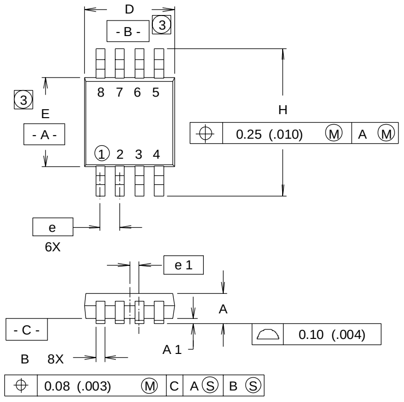


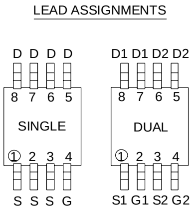
*** V_{GS} = 5.0V for Logic Level and 3V Drive Devices

Fig 17 For N Channel HEXFETS

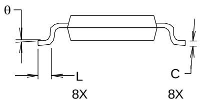
Micro8 Package Outline

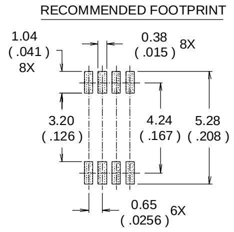
Dimensions are shown in milimeters (inches)





DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.036	.044	0.91	1.11
A1	.004	.008	0.10	0.20
B	.010	.014	0.25	0.36
C	.005	.007	0.13	0.18
D	.116	.120	2.95	3.05
e	.0256 BASIC		0.65 BASIC	
e1	.0128 BASIC		0.33 BASIC	
E	.116	.120	2.95	3.05
H	.188	.198	4.78	5.03
L	.016	.026	0.41	0.66
θ	0°	6°	0°	6°



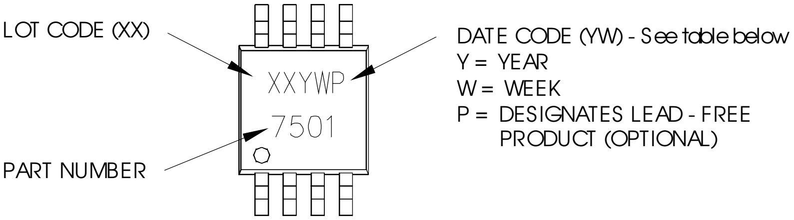


NOTES:

1 DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2 CONTROLLING DIMENSION : INCH.
③ DIMENSIONS DO NOT INCLUDE MOLD FLASH.

Micro8 Part Marking Information

EXAMPLE: THIS IS AN IRF7501



WW = (1-26) IF PRECEDED BY LAST DIGIT OF CALENDAR YEAR

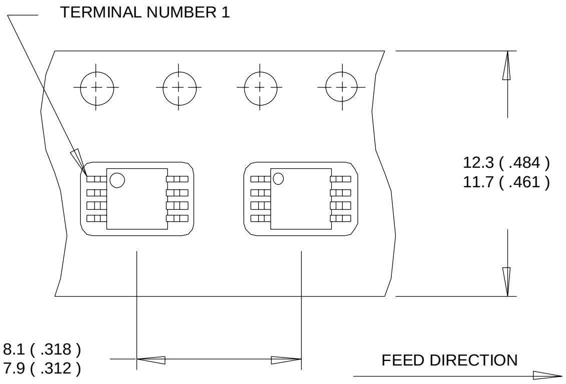
YEAR	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
2004	4	04	D
2005	5		
2006	6		
2007	7		
2008	8		
2009	9	↓	↓
2010	0	24	X
		25	Y
		26	Z

WW = (27-52) IF PRECEDED BY A LETTER

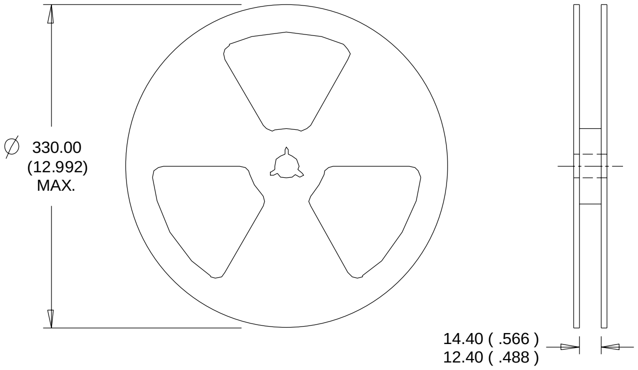
YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
2004	D	30	D
2005	E		
2006	F		
2007	G		
2008	H		
2009	J	↓	↓
2010	K	50	X
		51	Y
		52	Z

Micro8 Tape & Reel Information

Dimensions are shown in millimeters (inches)



NOTES:
1. OUTLINE CONFORMS TO EIA-481 & EIA-541.
2. CONTROLLING DIMENSION : MILLIMETER.



NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Data and specifications subject to change without notice.
This product has been designed and qualified for the Consumer market.
Qualifications Standards can be found on IR's Web site.

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