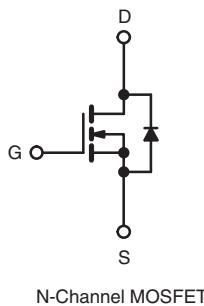




## Power MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	50	
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 10$ V	0.20
$Q_g$ (Max.) (nC)	10	
$Q_{gs}$ (nC)	2.6	
$Q_{gd}$ (nC)	4.8	
Configuration	Single	



## FEATURES

- Low Drive Current
- Surface Mount
- Fast Switching
- Ease of Parallelizing
- Excellent Temperature Stability
- Compliant to RoHS Directive 2002/95/EC



RoHS\*

COMPLIANT

## DESCRIPTION

The Power MOSFET technology is the key to Vishay's advanced line of Power MOSFET transistors. The efficient geometry and unique processing of this latest "State of the Art" design achieves: very low on-state resistance combined with high transconductance; superior reverse energy and diode recovery dV/dt capability.

The Power MOSFET transistors also feature all of the well established advantages of MOSFET'S such as voltage control, very fast switching, ease of parallelizing and temperature stability of the electrical parameters.

Surface mount packages enhance circuit performance by reducing stray inductances and capacitance. The DPAK (TO-252) surface mount package brings the advantages of Power MOSFET's to high volume applications where PC Board surface mounting is desirable. The surface mount option IRFR9012, SiHFR9012 is provided on 16 mm tape. The straight lead option IRFU9012, SiHFU9012 of the device is called the IPAK (TO-251).

They are well suited for applications where limited heat dissipation is required such as, computers and peripherals, telecommunication equipment, dc-to-dc converters, and a wide range of consumer products.

ORDERING INFORMATION			
Package		DPAK (TO-252)	
Lead (Pb)-free		IRFR010PbF	
SnPb		SiHFR010-E3	
IRFR010		IRFR010	
SiHFR010		SiHFR010	

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$  °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	50	
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$V_{GS}$ at 10 V	8.2	A
		5.2	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	33	
Avalanche Current <sup>b</sup>	$I_{AS}$	1.5	
Linear Derating Factor		0.20	W/°C
Maximum Power Dissipation	$P_D$	25	W
Peak Diode Recovery dV/dt <sup>c</sup>	dV/dt	2.0	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	
Soldering Recommendations (Peak Temperature)	for 10 s	300 <sup>d</sup>	°C

## Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 25$  V, starting  $T_J = 25$  °C,  $L = 100 \mu\text{H}$ ,  $R_g = 25 \Omega$ .
- $I_{SD} \leq 8.2$  A,  $dI/dt \leq 130$  A/ $\mu\text{s}$ ,  $V_{DD} \leq 40$  V,  $T_J \leq 150$  °C.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).

<b>THERMAL RESISTANCE RATINGS</b>					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	-	110	°C/W
Case-to-Sink	$R_{thCS}$	-	1.7	-	
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	-	5.0	

<b>SPECIFICATIONS</b> ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)									
PARAMETER	SYMBOL	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT	
<b>Static</b>									
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$		50	-	-	V		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$		2.0	-	4.0	V		
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}$		-	-	$\pm 500$	nA		
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 50 \text{ V}$ , $V_{GS} = 0 \text{ V}$		-	-	250	$\mu\text{A}$		
		$V_{DS} = 40 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$		-	-	1000			
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$	$I_D = 4.6 \text{ A}^b$	-	0.16	0.20	$\Omega$		
Forward Transconductance	$g_{fs}$	$V_{DS} \geq 50 \text{ V}$ , $I_D = 3.6 \text{ A}$		2.1	3.1	-	S		
<b>Dynamic</b>									
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1.0 \text{ MHz}$ , see fig. 10			-	250	-	pF	
Output Capacitance	$C_{oss}$				-	150	-		
Reverse Transfer Capacitance	$C_{rss}$				-	29	-		
Total Gate Charge	$Q_g$	$V_{GS} = 10 \text{ V}$	$I_D = 7.3 \text{ A}$ , $V_{DS} = 40 \text{ V}$ , see fig. 6 and 13 <sup>b</sup>	-	6.7	10	nC		
Gate-Source Charge	$Q_{gs}$			-	1.8	2.6			
Gate-Drain Charge	$Q_{gd}$			-	3.2	4.8			
Turn-On Delay Time	$t_{d(on)}$			-	11	17			
Rise Time	$t_r$	$V_{DD} = 25 \text{ V}$ , $I_D = 7.3 \text{ A}$ , $R_g = 24 \Omega$ , $R_D = 3.3 \Omega$ , see fig. 10 <sup>b</sup>				33	50	ns	
Turn-Off Delay Time	$t_{d(off)}$	-		12	18				
Fall Time	$t_f$	-		23	35				
Internal Drain Inductance	$L_D$	-		4.5	-	nH			
Internal Source Inductance	$L_S$	Between lead, 6 mm (0.25") from package and center of die contact <sup>c</sup>					-	7.5	
<b>Drain-Source Body Diode Characteristics</b>									
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode			-	-	8.2	A	
Pulsed Diode Forward Current <sup>a</sup>	$I_{SM}$				-	-	33		
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}$ , $I_S = 8.2 \text{ A}$ , $V_{GS} = 0 \text{ V}^b$			-	-	1.6	V	
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ\text{C}$ , $I_F = 7.3 \text{ A}$ , $dI/dt = 100 \text{ A}/\mu\text{s}^b$		41	86	190	ns		
Body Diode Reverse Recovery Charge	$Q_{rr}$			0.15	0.33	0.78	$\mu\text{C}$		
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$ and $L_D$ )							

**Notes**

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).  
b. Pulse width  $\leq 300 \mu\text{s}$ ; duty cycle  $\leq 2 \%$ .



KERSEMI

## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

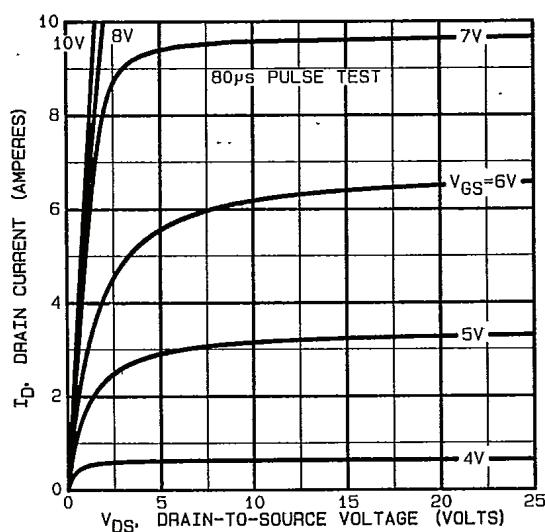


Fig. 1 - Typical Output Characteristics

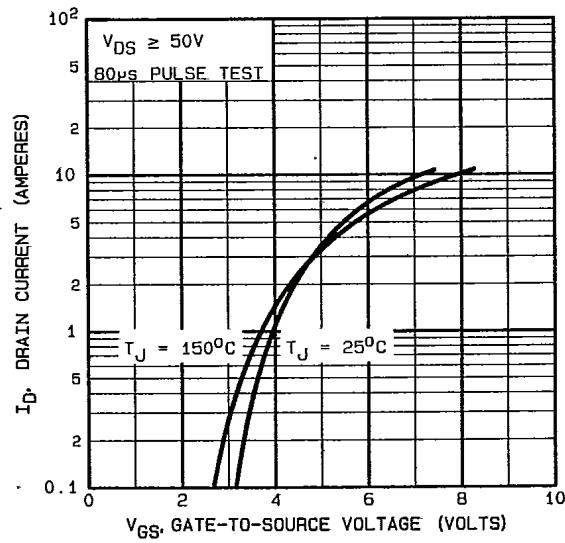


Fig. 3 - Typical Transfer Characteristics

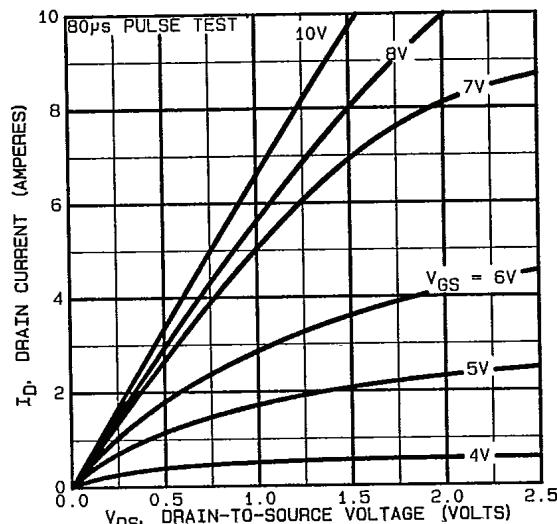


Fig. 2 - Typical Output Characteristics

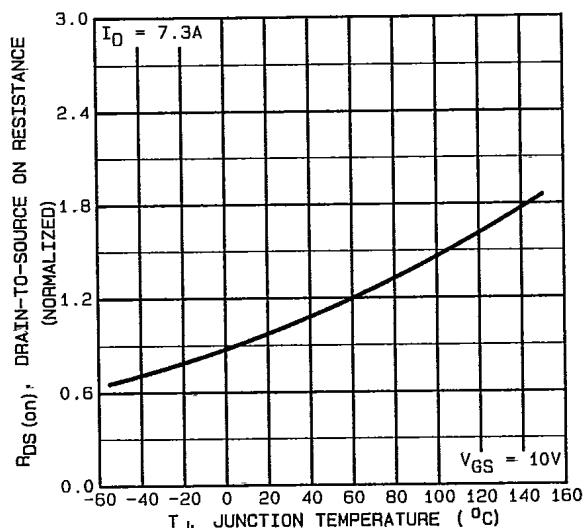


Fig. 4 - Normalized On-Resistance vs. Temperature

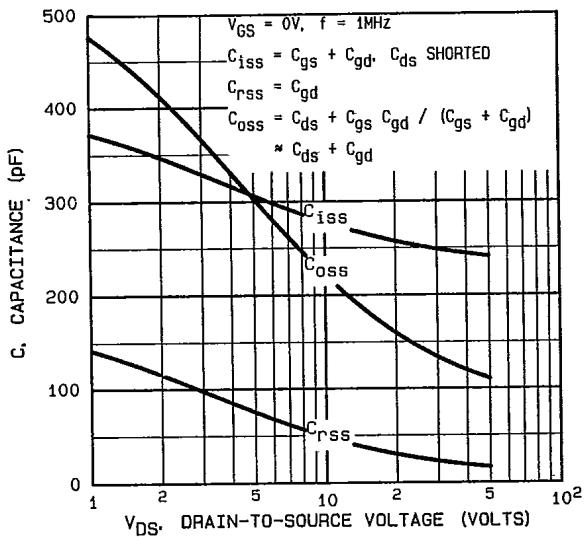


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

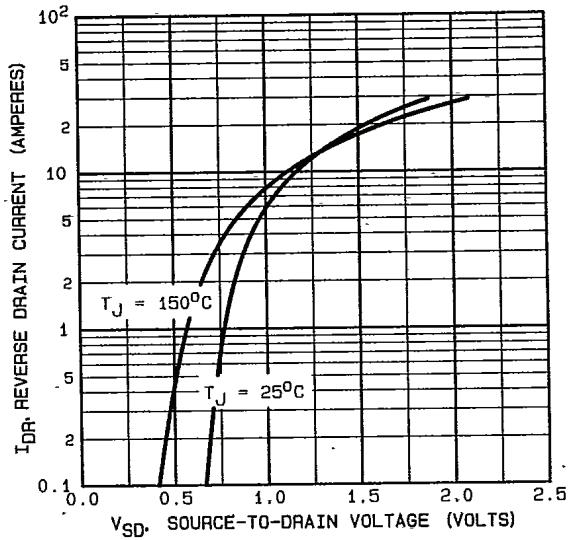


Fig. 7 - Typical Source-Drain Diode Forward Voltage

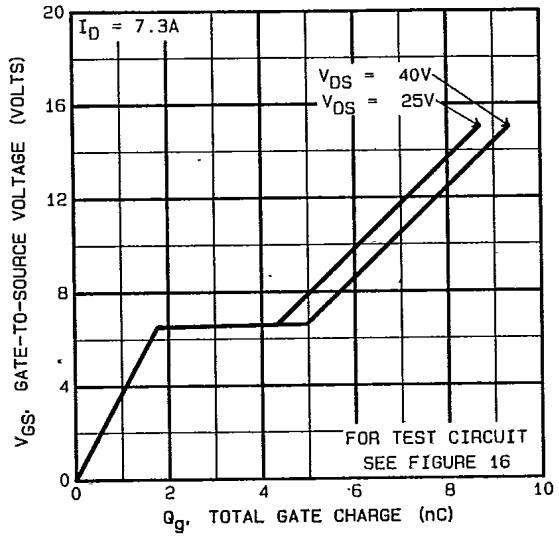


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

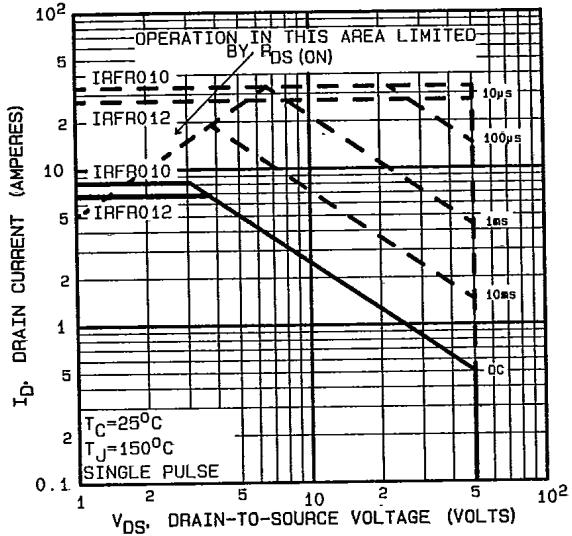


Fig. 8 - Maximum Safe Operating Area



KERSEMI

IRFR010, SiHFR010

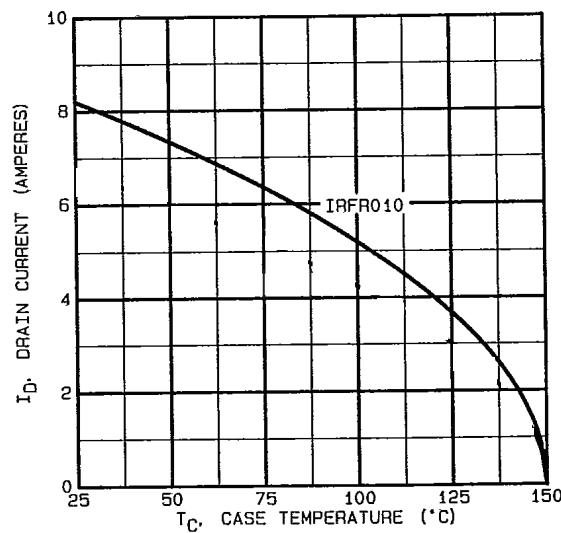


Fig. 9 - Maximum Drain Current vs. Case Temperature

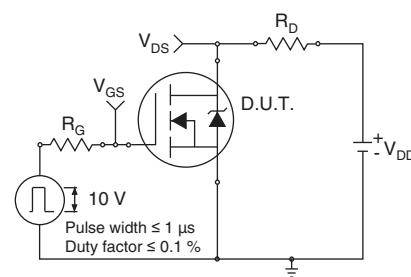


Fig. 10a - Switching Time Test Circuit

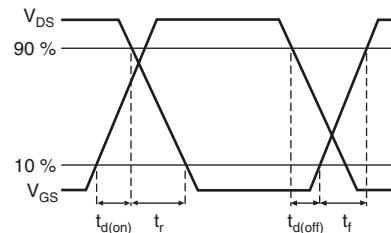


Fig. 10b - Switching Time Waveforms

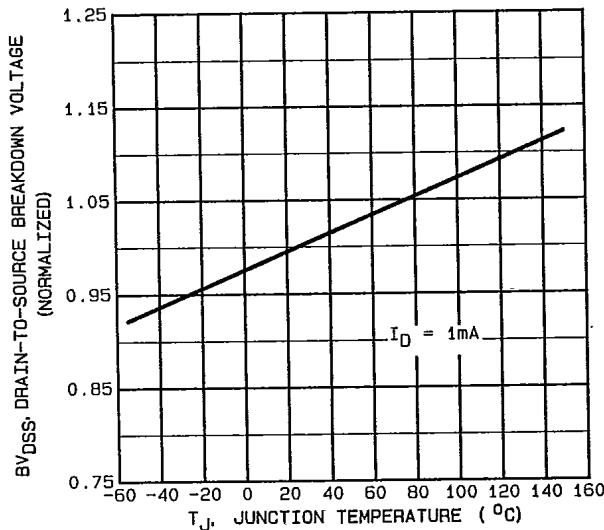


Fig. 10 - Breakdown Voltage vs. Temperature

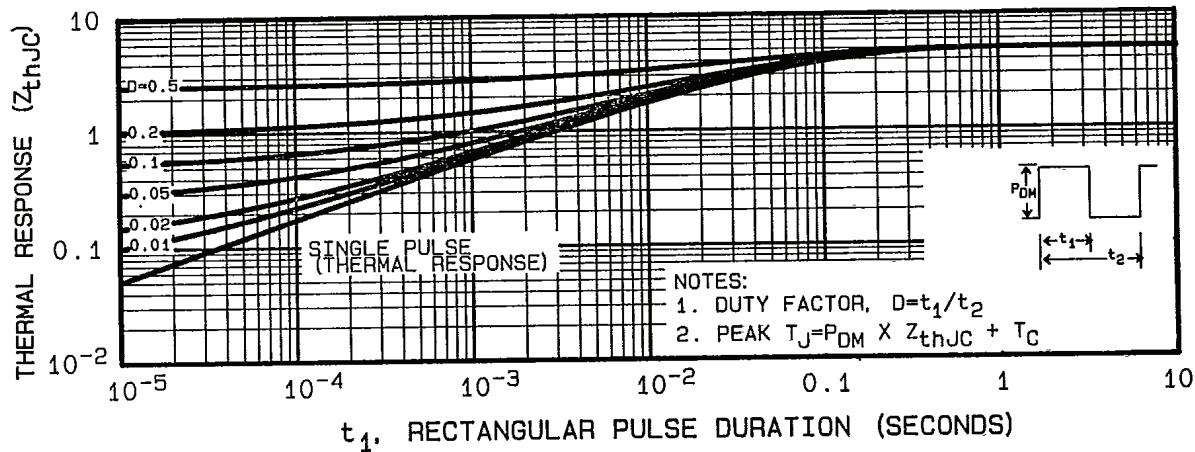


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

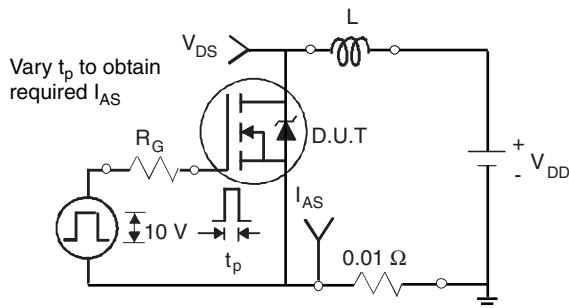


Fig. 12a - Unclamped Inductive Test Circuit

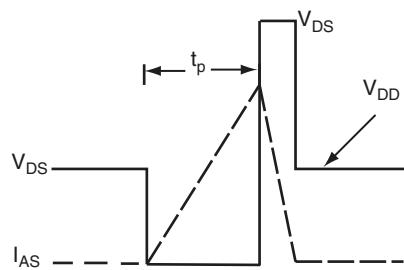


Fig. 12b - Unclamped Inductive Waveforms

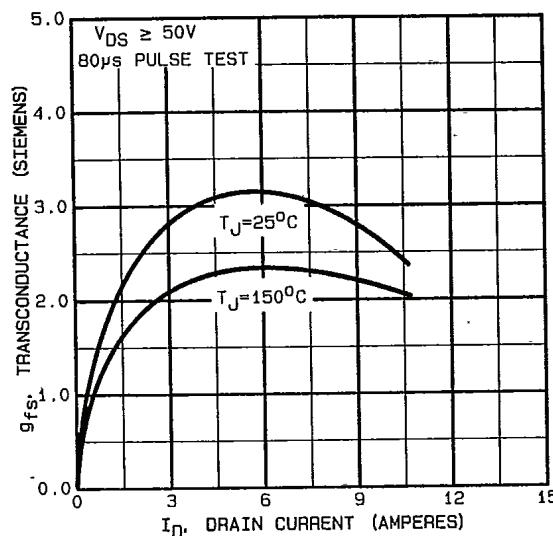


Fig. 12c - Typical Transconductance vs. Drain Current

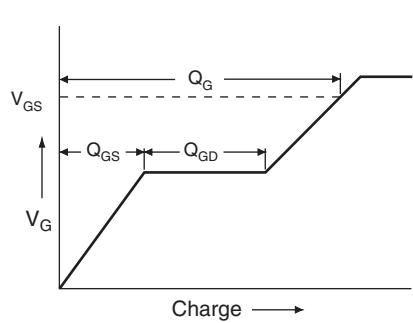


Fig. 13a - Basic Gate Charge Waveform

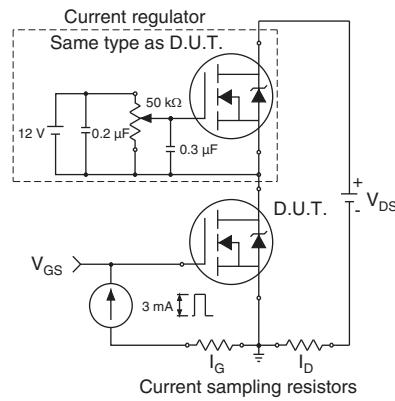


Fig. 13b - Gate Charge Test Circuit

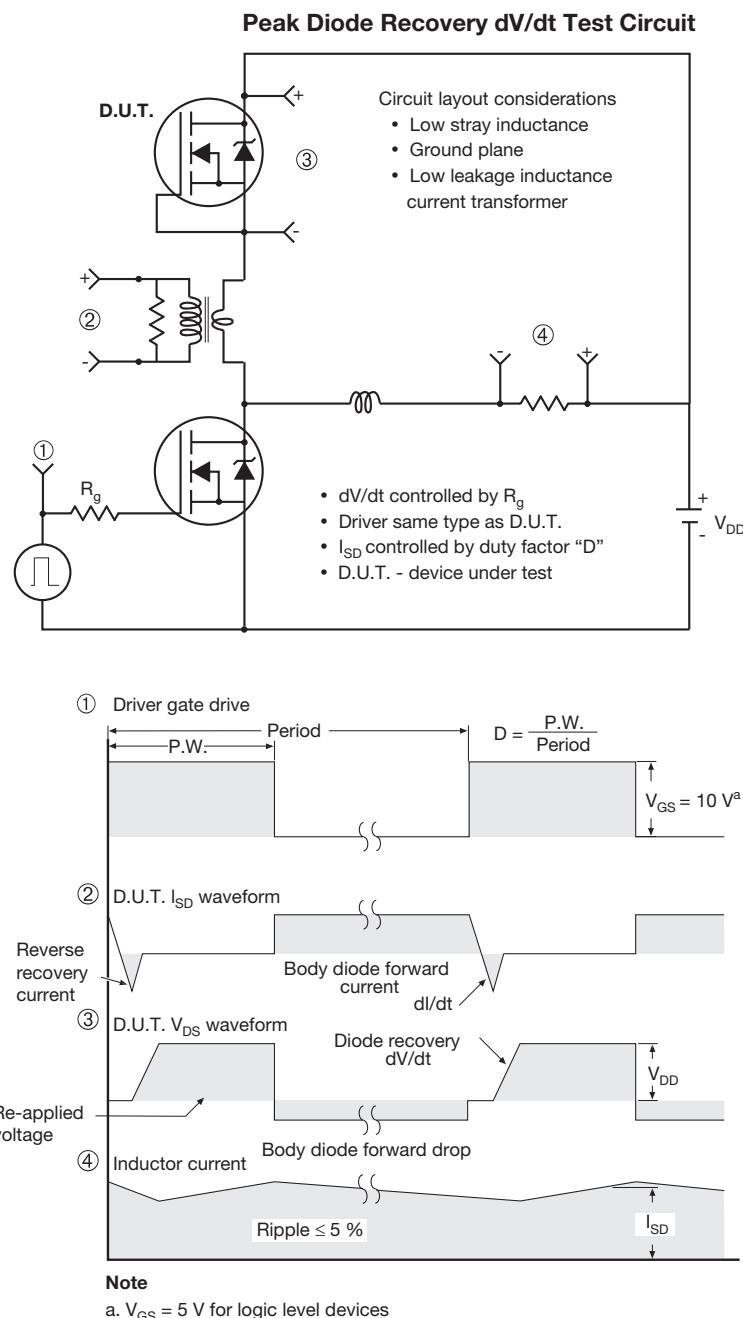


Fig. 14 - For N-Channel



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

#### Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помошь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помошь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: [org@eplast1.ru](mailto:org@eplast1.ru)

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.