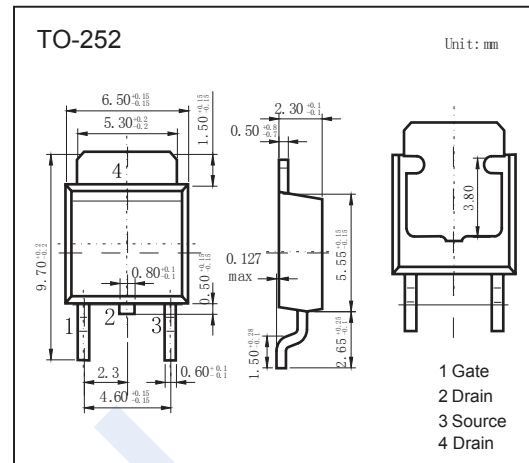
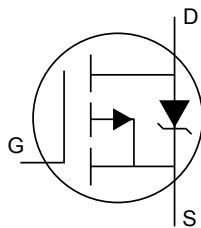


P-Channel MOSFET

FR9024N (KFR9024N)

■ Features

- $V_{DS} (V) \approx -55V$
- $I_D \approx -11 A$ ($V_{GS} \approx -10V$)
- $R_{DS(ON)} < 175m\Omega$ ($V_{GS} \approx -10V$)
- Fast Switching
- Fully Avalanche Rated



■ Absolute Maximum Ratings $T_a = 25^\circ C$

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V _{DS}	-55	V
Gate-Source Voltage		V _{GS}	±20	
Continuous Drain Current	T _c = 25°C	I _D	-11	A
	T _c = 100°C		-8	
Pulsed Drain Current		I _{DM}	-44	
Avalanche Current		I _{AR}	-6.6	
Power Dissipation	T _c = 25°C	P _D	38	W
Single Pulse Avalanche Energy (Note.1)		E _{AS}	62	mJ
Repetitive Avalanche Energy		E _{AR}	3.8	
Peak Diode Recovery dv/dt (Note.2)		dv/dt	-10	V/ns
Thermal Resistance.Junction- to-Ambient (PCB mount)		R _{thJA}	50	°C/W
Thermal Resistance.Junction- to-Ambient			110	
Thermal Resistance.Junction- to-Case		R _{thJC}	3.3	
Junction Temperature		T _J	150	°C
Junction Storage Temperature Range		T _{stg}	-55 to 150	

Note.1: Starting $T_J = 25^\circ C$, $L = 2.8mH$, $R_G = 25\Omega$, $I_{AS} = -6.6A$.

Note.2: $I_{SD} \leq -6.6A$, $di/dt \leq 240A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^\circ C$

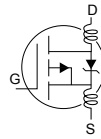
P-Channel MOSFET

FR9024N (KFR9024N)

■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{DSS}	I _D =-250 μA, V _{GS} =0V	-55			V
Zero Gate Voltage Drain Current	I _{DSS}	V _D =-55V, V _{GS} =0V			-25	μA
		V _D =-44V, V _{GS} =0V, T _J =150°C			-250	
Gate-Body leakage current	I _{GSS}	V _D =0V, V _{GS} =±20V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _D =V _{GS} I _D =-250 μA	-2		-4	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-6.6A			175	mΩ
Forward Transconductance	g _{FS}	V _D =-25V, I _D =-7.2A	2.5			S
Input Capacitance	C _{iss}	V _{GS} =0V, V _D =-25V, f=1MHz		350		pF
Output Capacitance	C _{oss}			170		
Reverse Transfer Capacitance	C _{rss}			92		
Total Gate Charge	Q _g	V _{GS} =-10V, V _D =-44V, I _D =-7.2A (Note.1)			19	nC
Gate Source Charge	Q _{gs}				5.1	
Gate Drain Charge	Q _{gd}				10	
Internal Drain Inductance	L _D	Between lead, 6mm (0.25in.) from package and center of die contact		4.5		nH
Internal Source Inductance	L _S			7.5		
Turn-On DelayTime	t _{d(on)}	V _D =-28V, I _D =-7.2A, R _G =24Ω, R _D =3.7Ω (Note.1)		13		ns
Turn-On Rise Time	t _r			55		
Turn-Off DelayTime	t _{d(off)}			23		
Turn-Off Fall Time	t _f			37		
Body Diode Reverse Recovery Time	t _{rr}	I _F =-7.2A, di/dt=100A/μs, T _J =25°C,		47	71	nC
Body Diode Reverse Recovery Charge	Q _{rr}			84	130	
Maximum Body-Diode Continuous Current	I _S				-11	A
Pulsed Source Current	I _{SM}				-44	
Diode Forward Voltage	V _{SD}	I _S =-7.2 A, V _{GS} =0V, T _J =25°C, (Note.1)			-1.6	V

Note.1: Pulse width ≤ 300μs; duty cycle ≤ 2%.



P-Channel MOSFET

FR9024N (KFR9024N)

■ Typical Characteristics

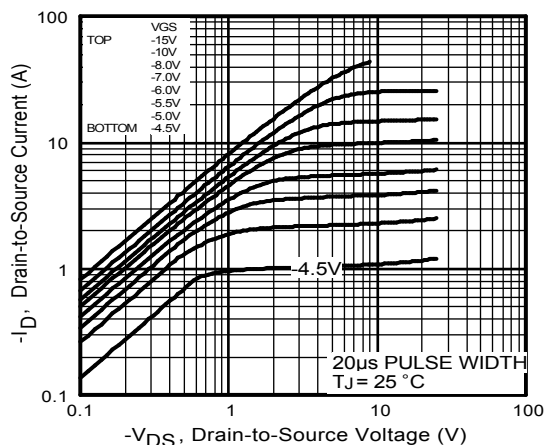


Fig 1. Typical Output Characteristics

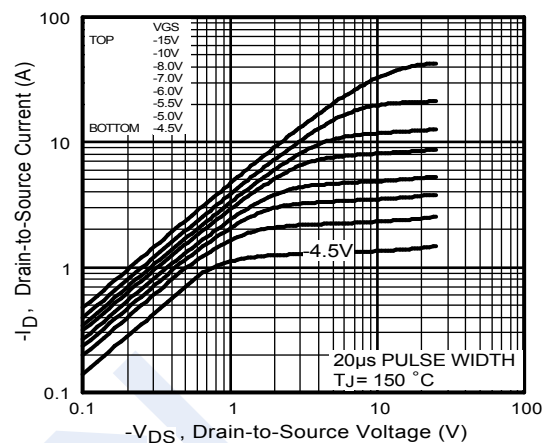


Fig 2. Typical Output Characteristics

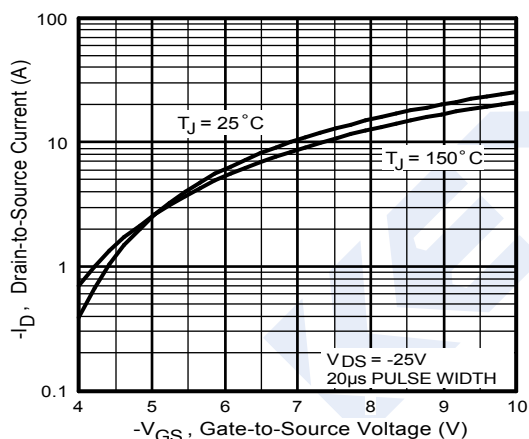


Fig 3. Typical Transfer Characteristics

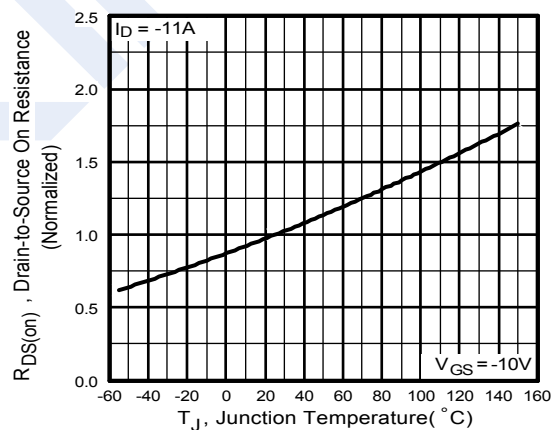


Fig 4. Normalized On-Resistance Vs. Temperature

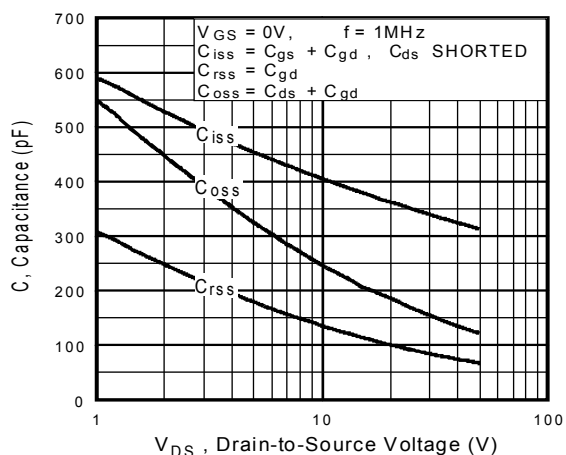


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

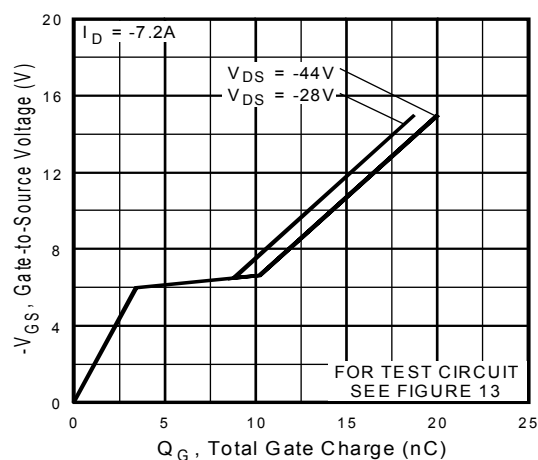


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

P-Channel MOSFET

FR9024N (KFR9024N)

Typical Characteristics

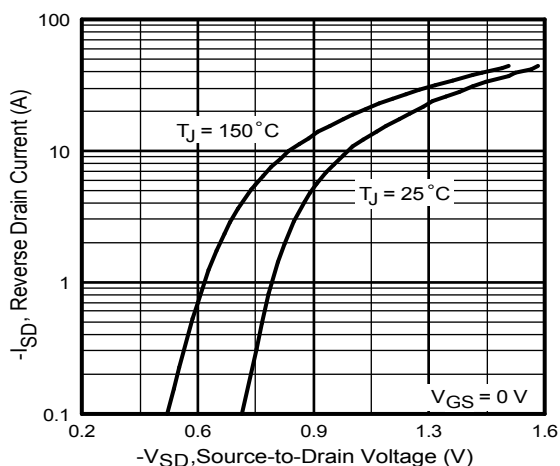


Fig 7. Typical Source-Drain Diode Forward Voltage

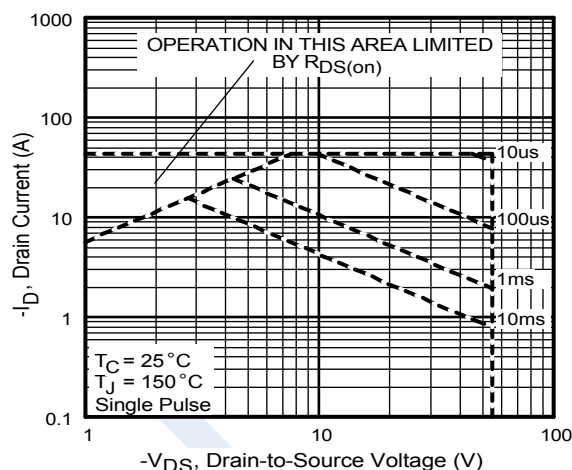


Fig 8. Maximum Safe Operating Area

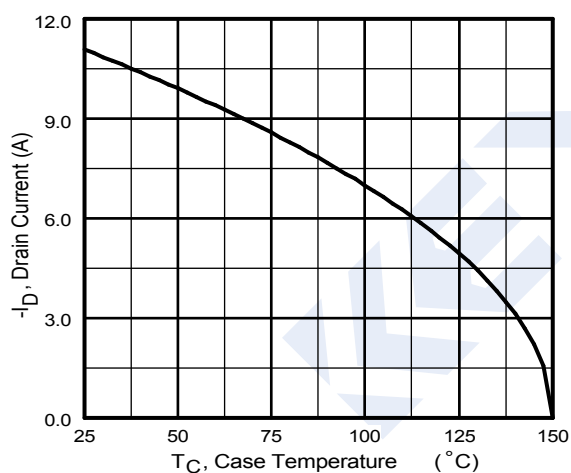


Fig 9. Maximum Drain Current Vs. Case Temperature

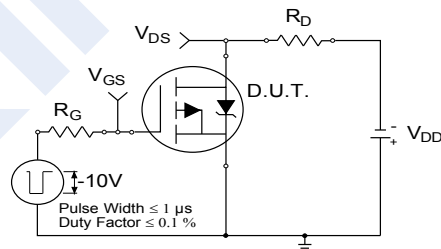


Fig 10a. Switching Time Test Circuit

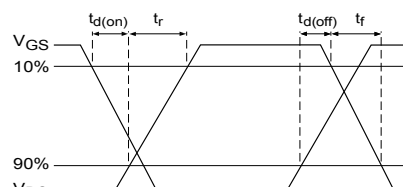


Fig 10b. Switching Time Waveforms

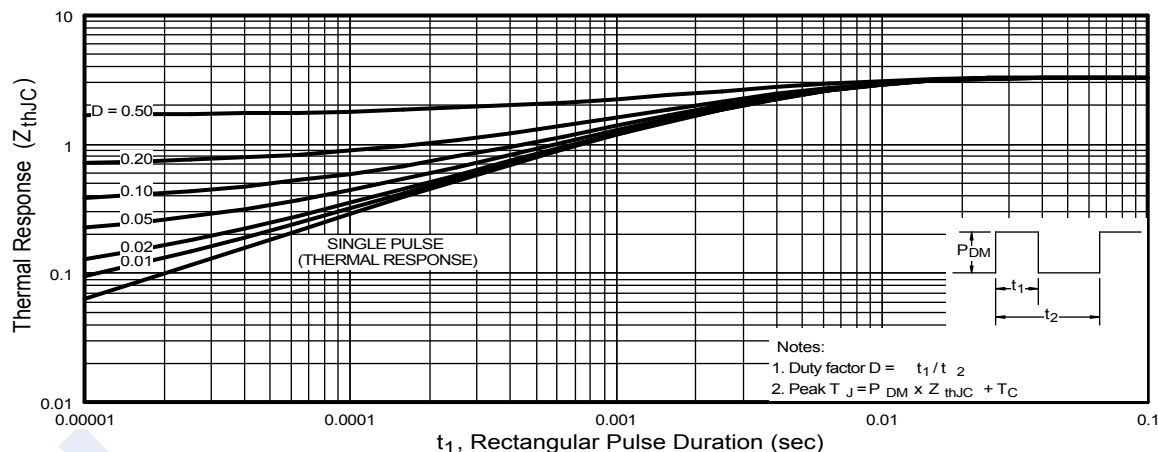


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

P-Channel MOSFET

FR9024N (KFR9024N)

■ Typical Characteristics

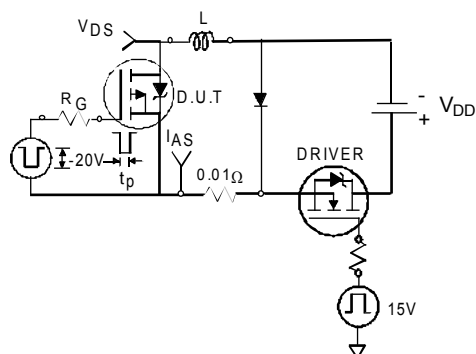


Fig 12a. Unclamped Inductive Test Circuit

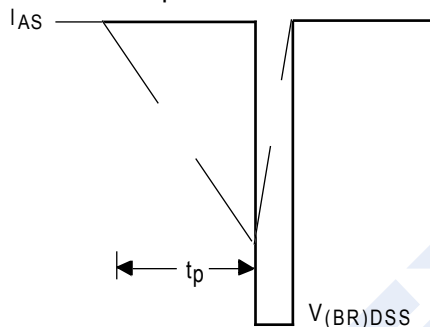


Fig 12b. Unclamped Inductive Waveforms

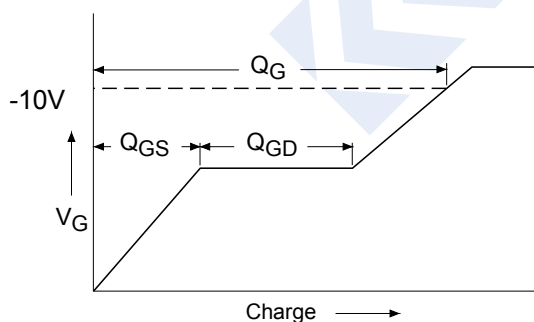


Fig 13a. Basic Gate Charge Waveform

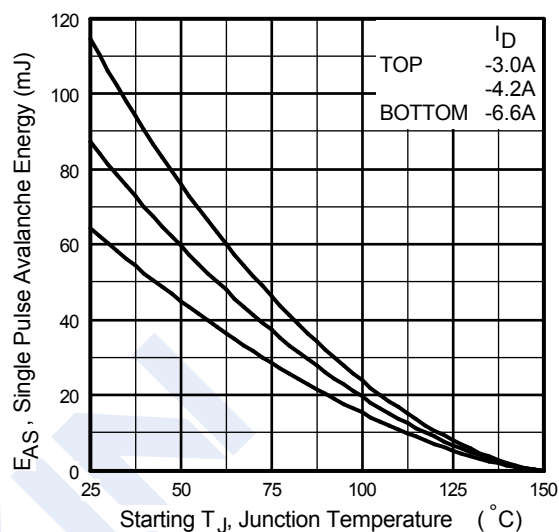


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

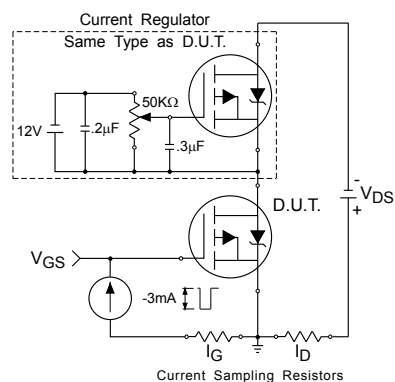


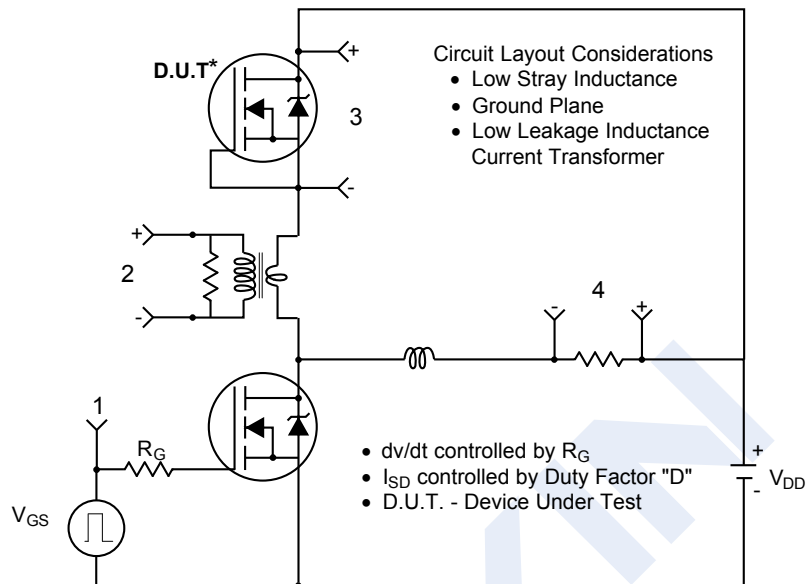
Fig 13b. Gate Charge Test Circuit

P-Channel MOSFET

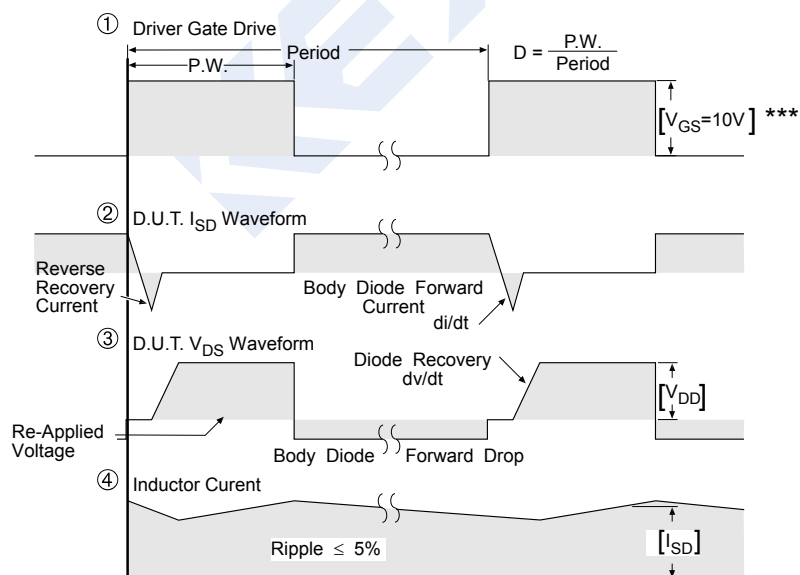
FR9024N (KFR9024N)

■ Typical Characteristics

Peak Diode Recovery dv/dt Test Circuit



* Reverse Polarity of D.U.T for P-Channel



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

Fig 14. For P-Channel HEXFETS