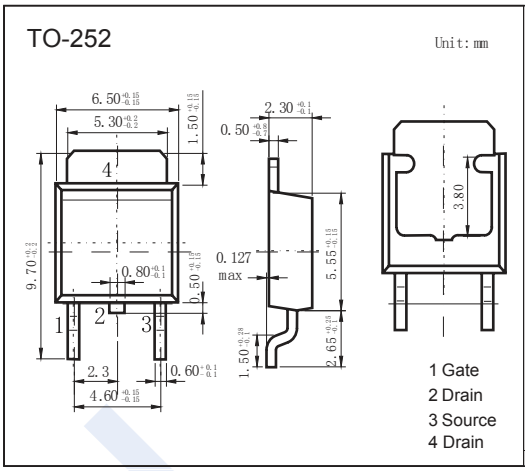
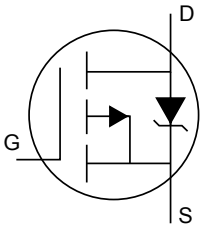
P-Channel MOSFET

FR9024N (KFR9024N)



■ Features

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



■ Absolute Maximum Ratings Ta = 25℃

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	-55	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current	Tc = 25°C	I_D	-11	A
	Tc = 100°C		-8	
Pulsed Drain Current		I_{DM}	-44	
Avalanche Current		I_{AR}	-6.6	
Power Dissipation	Tc = 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	℃/W
Thermal Resistance.Junction- to-Ambient			110	
Thermal Resistance.Junction- to-Case		R_{thJC}	3.3	
Junction Temperature		T_J	150	℃
Junction Storage Temperature Range		T_{stg}	-55 to 150	

Note.1: Starting T_J = 25°C, L = 2.8mH, R_G = 25Ω, I_{AS} = -6.6A.

Note.2: I_{SD} ≤ -6.6A, di/dt ≤ 240A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

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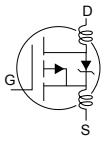
■ Electrical Characteristics Ta = 25℃

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DSS}	I_D=-250μA, V_{GS}=0V	-55			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-55V, V_{GS}=0V			-25	uA
		V_{DS}=-44V, V_{GS}=0V, T_J=150℃			-250	
Gate-Body leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} I_D=-250μA	-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_{DS}=-25V, I_D=-7.2A	2.5			S
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-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_{DS}=-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_{DS}=-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/us ,T_J = 25°C,		47	71	
Body Diode Reverse Recovery Charge	Q_{rr}			84	130	nC
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%.

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■ Typical Characterisitics

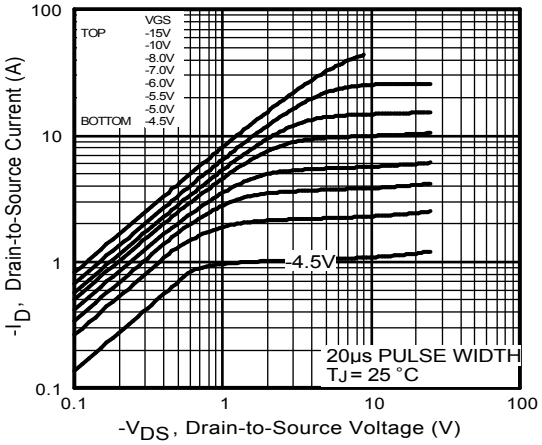

Fig 1. Typical Output Characteristics

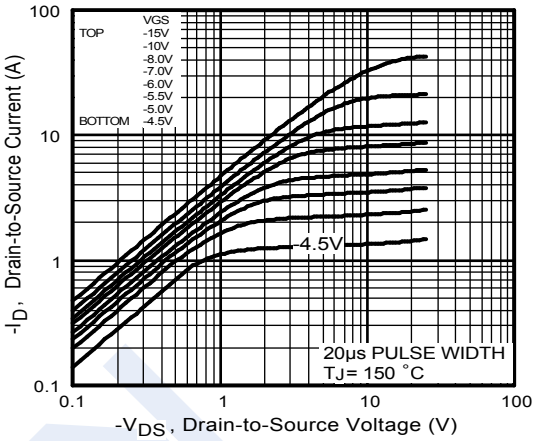

Fig 2. Typical Output Characteristics

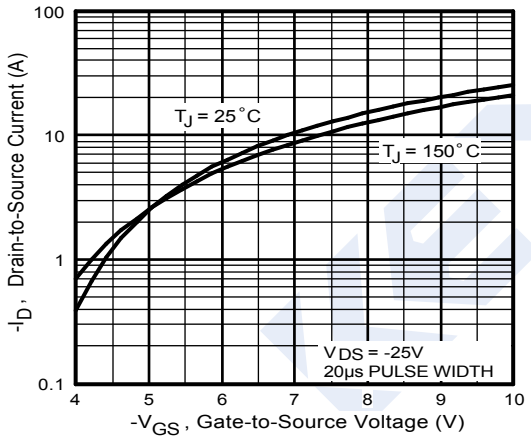

Fig 3. Typical Transfer Characteristics

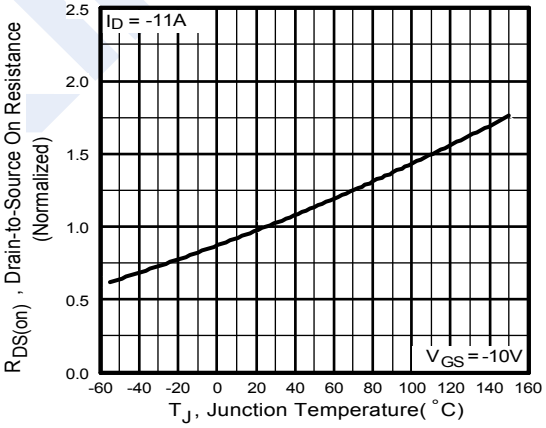

Fig 4. Normalized On-Resistance Vs. Temperature

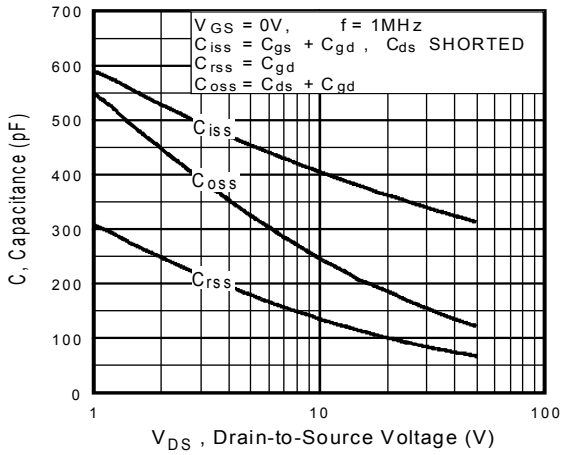

Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

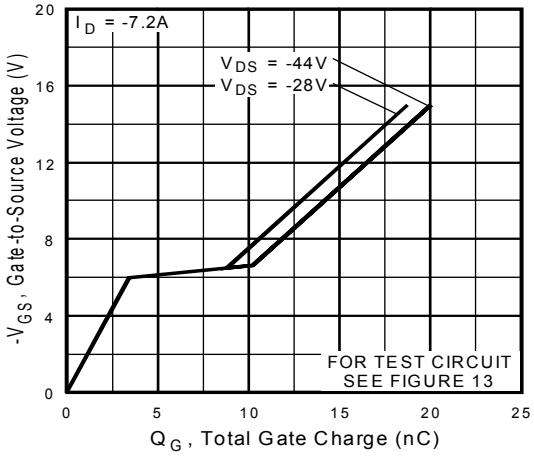

Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

P-Channel MOSFET

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■ Typical Characterisitics

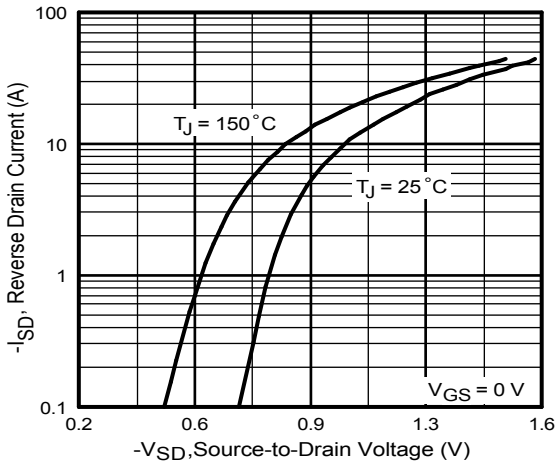

Fig 7. Typical Source-Drain Diode Forward Voltage

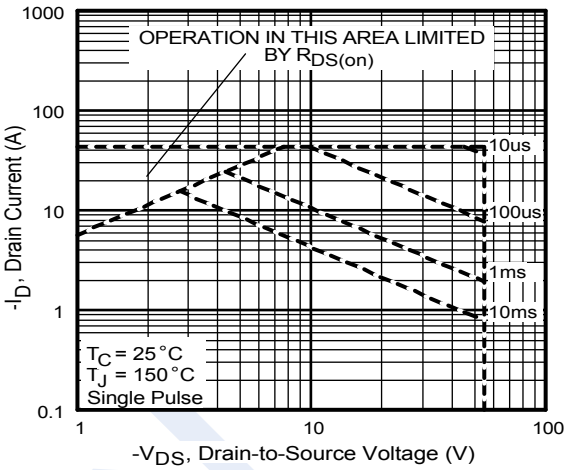

Fig 8. Maximum Safe Operating Area

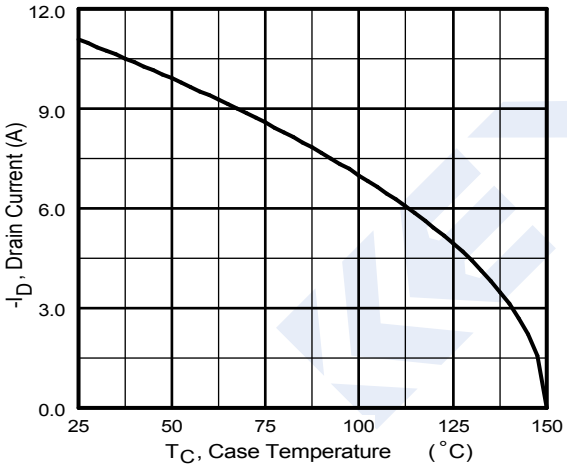

Fig 9. Maximum Drain Current Vs. Case Temperature

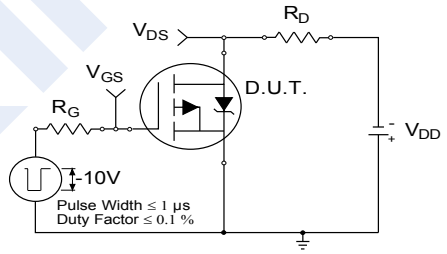

Fig 10a. Switching Time Test Circuit

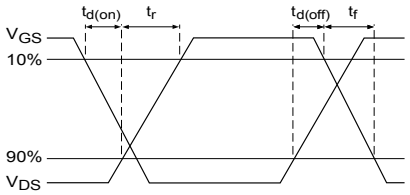

Fig 10b. Switching Time Waveforms

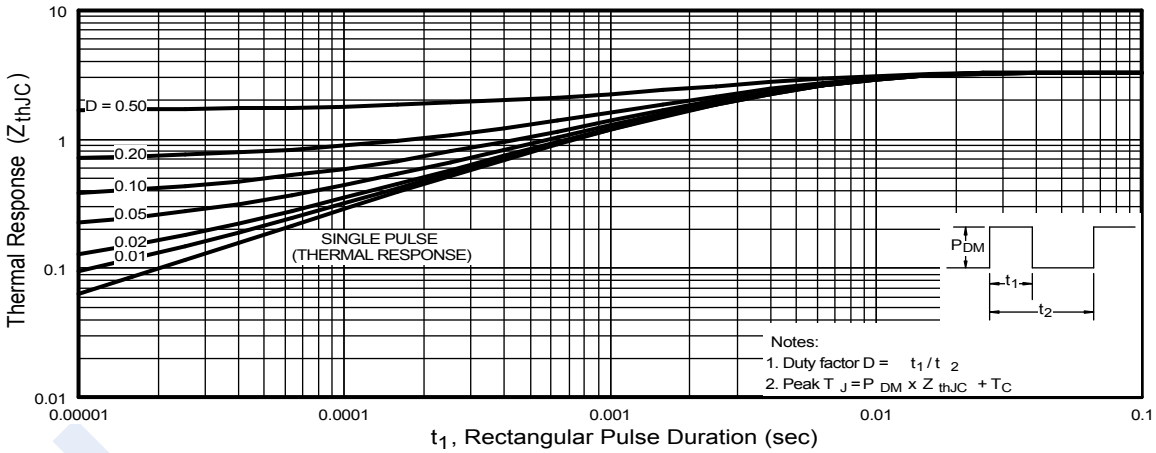

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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■ Typical Characterisitics

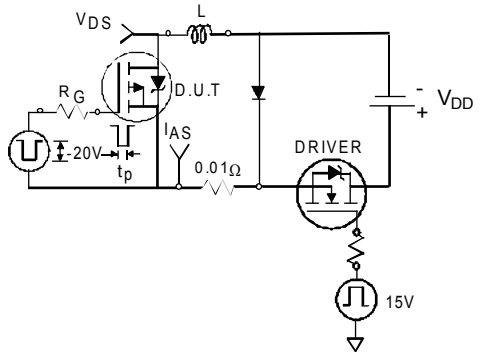

Fig 12a. Unclamped Inductive Test Circuit

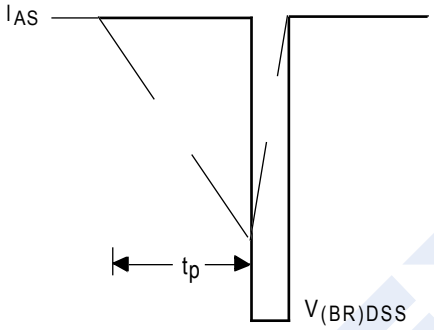

Fig 12b. Unclamped Inductive Waveforms

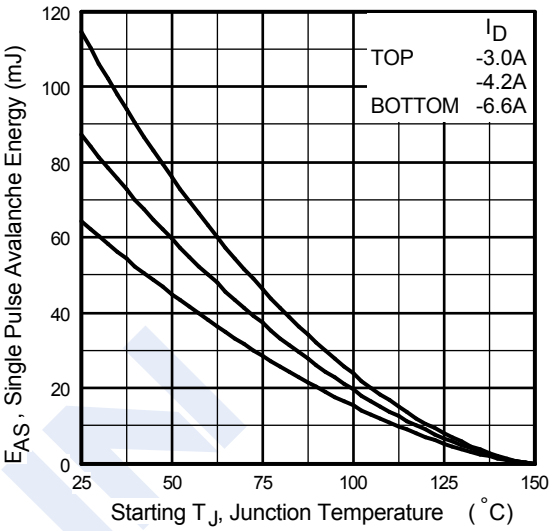

Fig 12c. Maximum Avalanche Energy Vs. Drain Current

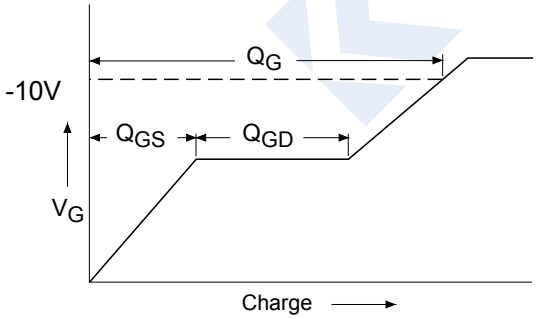

Fig 13a. Basic Gate Charge Waveform

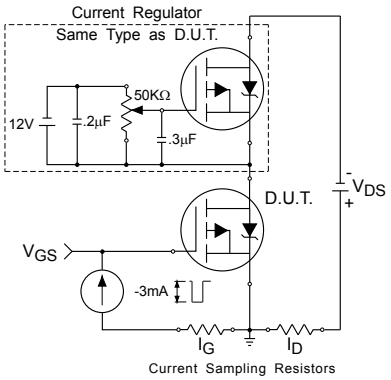

Fig 13b. Gate Charge Test Circuit

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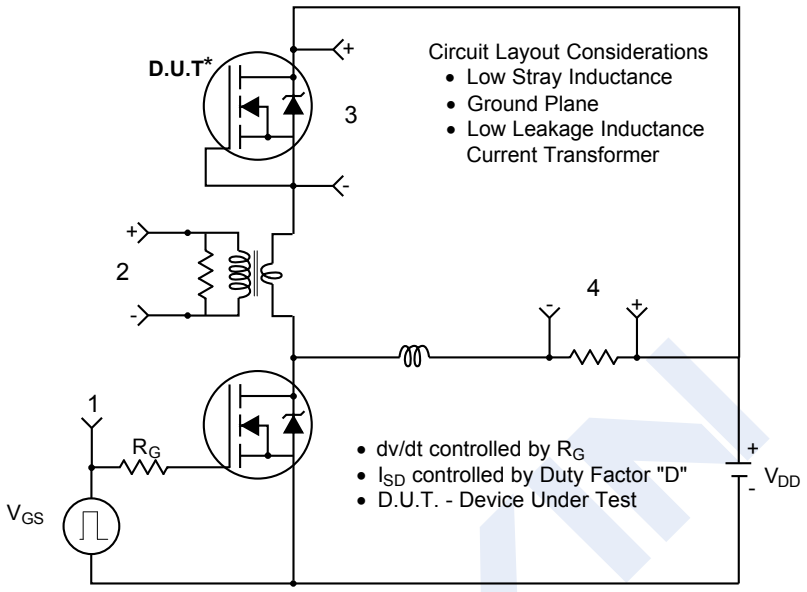
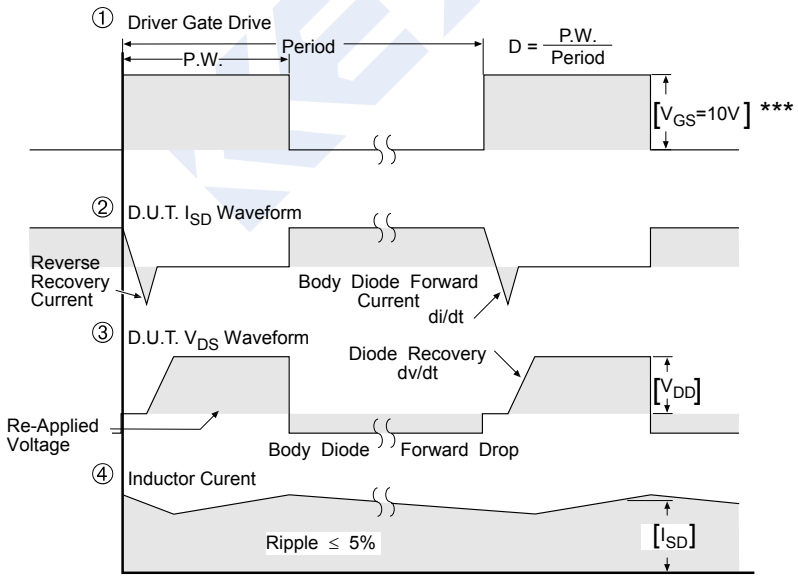
■ Typical Characterisitics

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