

FNK9931

Complementary N-P Channel Trench MOSFET

General Description

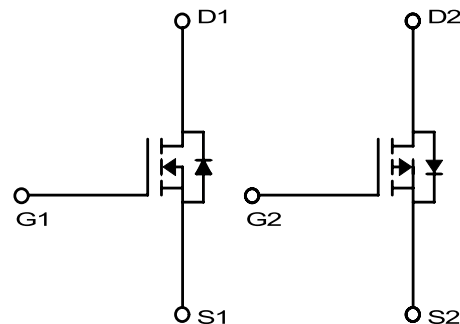
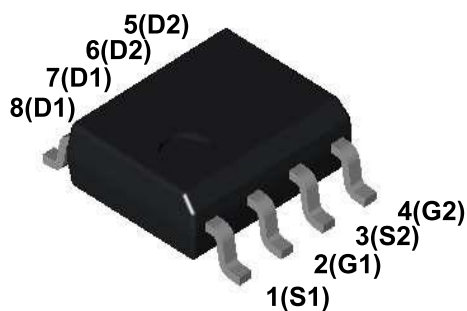
The FNK9931 uses advanced FNK's MOSFET Technology to provide low on-state resistance, high switching performance and excellent reliability

Features

- | | |
|---|--|
| N-Channel <ul style="list-style-type: none"> $V_{DS} = 20V$ $I_D = 6.9A$ @ $V_{GS} = 4.5V$ $R_{DS(ON)} < 19m\Omega$ @ $V_{GS} = 4.5V$ $< 28m\Omega$ @ $V_{GS} = 2.5V$ | P-Channel <ul style="list-style-type: none"> $V_{DS} = -20V$ $I_D = -6.5A$ @ $V_{GS} = -4.5V$ $R_{DS(ON)} < 28m\Omega$ @ $V_{GS} = -4.5V$ $< 40m\Omega$ @ $V_{GS} = -2.5V$ |
|---|--|

Applications

- Inverters
- General purpose applications



Absolute Maximum Ratings ($T_a = 25^\circ C$ unless otherwise noted)

Characteristics		Symbol	Rating		Unit
			N-Ch	P-Ch	
Drain-Source Voltage		V_{DSS}	20	-20	V
Gate-Source Voltage		V_{GSS}	± 12	± 12	V
Continuous Drain Current	$T_a = 25^\circ C$	I_D	6.9	-6.5	A
	$T_a = 100^\circ C$		4.3	-4.1	A
Pulsed Drain Current		I_{DM}	30	-30	A
Power Dissipation ⁽¹⁾	$T_a = 25^\circ C$	P_D	2	2	W
	$T_a = 100^\circ C$		0.8	0.8	
Single Pulse Avalanche Energy ⁽²⁾		E_{AS}	20	40	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150		$^\circ C$

Thermal Characteristics

Characteristics	Device	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient(Steady-State) ⁽¹⁾	N-Ch	$R_{\theta JA}$	62.5	$^\circ C/W$
Thermal Resistance, Junction-to-Case	N-Ch	$R_{\theta JC}$	60	
Thermal Resistance, Junction-to-Ambient(Steady-State) ⁽¹⁾	P-Ch	$R_{\theta JA}$	62.5	
Thermal Resistance, Junction-to-Case	P-Ch	$R_{\theta JC}$	40	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
FNK9931	-55~150°C	SOP-8	Tape & Reel	Halogen Free

N-channel Electrical Characteristics (T_a = 25°C unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D = 250μA, V _{GS} = 0V	20	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	0.5	0.7	1.2	
Drain Cut-Off Current	I _{DSS}	V _{DS} = 24V, V _{GS} = 0V	-		1.0	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	0.1	
Drain-Source ON Resistance	R _{DS(ON)}	V _{GS} = 4.5V, I _D = 6.9A	-	13	19	mΩ
		V _{GS} = 2.5V, I _D = 5.0A	-	21.5	28	
Forward Transconductance	g _{FS}	V _{DS} = 5V, I _D = 6.9A	-	15.4	-	S
Dynamic Characteristics						
Total Gate Charge	Q _g	V _{DS} = 15V, I _D = 6.9A, V _{GS} = 10V	-	6.94	-	nC
Gate-Source Charge	Q _{gs}		-	1.54	-	
Gate-Drain Charge	Q _{gd}		-	1.96	-	
Input Capacitance	C _{iSS}	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz	-	334	-	pF
Reverse Transfer Capacitance	C _{rSS}		-	48	-	
Output Capacitance	C _{oSS}		-	83	-	
Turn-On Delay Time	t _{d(on)}	V _{GS} = 10V, V _{DS} = 15V, R _L = 2.2Ω, R _{GEN} = 3Ω	-	3.5	-	ns
Turn-On Rise Time	t _r		-	25.4	-	
Turn-Off Delay Time	t _{d(off)}		-	14.2	-	
Turn-Off Fall Time	t _f		-	10.5	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V _{SD}	I _S = 1A, V _{GS} = 0V	-	0.75	1.0	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 6.9A, di/dt = 100A/μs	-	16.5	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	7.8	-	nC

Note :

1. Surface mounted RF4 board with 2oz. Copper.
2. Starting T_J = 25°C, L = 1mH, I_{AS} = 7A, V_{DD} = 15V, V_{GS} = 10V

P-channel Electrical Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = -250\mu A, V_{GS} = 0V$	-20	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.55	-0.75	-1.0	
Drain Cut-Off Current	I_{DSS}	$V_{DS} = -24V, V_{GS} = 0V$	-		-1.0	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 0.1	
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = -4.5V, I_D = -6.5A$	-	21	28	m Ω
		$V_{GS} = -2.5V, I_D = -5.0A$	-	28	40	
Forward Transconductance	g_{FS}	$V_{DS} = -5V, I_D = -6.5A$	-	13	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	$V_{DS} = -15V, I_D = -6.5A, V_{GS} = -10V$	-	18.4	-	nC
Gate-Source Charge	Q_{gs}		-	3.1	-	
Gate-Drain Charge	Q_{gd}		-	3.6	-	
Input Capacitance	C_{iss}	$V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz$	-	874	-	pF
Reverse Transfer Capacitance	C_{rss}		-	103	-	
Output Capacitance	C_{oss}		-	166	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -10V, V_{DS} = -15V, R_L = 2.7\Omega, R_{GEN} = 3\Omega$	-	9.8	-	ns
Turn-On Rise Time	t_r		-	29.8	-	
Turn-Off Delay Time	$t_{d(off)}$		-	26.3	-	
Turn-Off Fall Time	t_f		-	8.6	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	$I_S = -1A, V_{GS} = 0V$	-	-0.75	-1.0	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -6.5A, di/dt = 100A/\mu s$	-	20	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	12.3	-	nC

Note :

1. Surface mounted RF4 board with 2oz. Copper.
2. Starting $T_J = 25^\circ\text{C}$, $L = 1\text{mH}$, $I_{AS} = -9\text{A}$, $V_{DD} = -15\text{V}$, $V_{GS} = -10\text{V}$