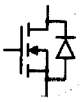
VN0109



N-Channel Enhancement-Mode Vertical DMOS FET

Features

- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low C_{ISS} and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain

Applications

- Motor controls
- Converters
- Amplifiers
- Switches
- Power supply circuits
- Drivers (relays, hammers, solenoids, lamps, memories, displays, bipolar transistors, etc.)

Ordering Information

Device	Package	Wafer / Die Options		
	TO-92	NW (Die in wafer form)	NJ (Die on adhesive tape)	ND (Die in waffle pack)
VN0109	VN0109N3-	VN1509NW	VN1509NJ	VN1509ND

Product Summary

BV_{DSS}/BV_{DGS} (V)	$R_{DS(ON)}$ (max) (Ω)	$I_{D(ON)}$ (min) (A)
90	3.0	2.0

Pin Configuration

DRAIN

SOURCE

GATE

TO-92 (N3)

Absolute Maximum Ratings

Parameter	Value
Drain-to-source voltage	BV_{DSS}
Drain-to-gate voltage	BV_{DGS}
Gate-to-source voltage	±20V
Operating and storage temperature	-55°C to +150°C

Thermal Characteristics

Package	I_D (continuous)† (mA)	I_D (pulsed) (A)	Power Dissipation @T_C = 25°C (W)	θ_{jc} (°C/W)	θ_{ja} (°C/W)	I_{DR}† (mA)	I_{DRM} (A)
TO-92	350	2.0	1.0	125	170	350	2.0

Notes:

† *I_D (continuous) is limited by max rated T_j.*

Electrical Characteristics *(T_A = 25°C unless otherwise specified)*

Sym	Parameter	Min	Typ	Max	Units	Conditions
BV_{DSS}	Drain-to-source breakdown voltage	90	-	-	V	V_{GS} = 0V, I_D = 1.0mA
$V_{GS(th)}$	Gate threshold voltage	0.8	-	2.4	V	V_{GS} = V_{DS}, I_D= 1.0mA
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with temperature	-	-3.8	-5.5	mV/°C	V_{GS} = V_{DS}, I_D= 1.0mA
I_{GSS}	Gate body leakage	-	-	100	nA	V_{GS} = ± 20V, V_{DS} = 0V
I_{DSS}	Zero gate voltage drain current	-	-	1.0	μA	V_{GS} = 0V, V_{DS} = Max Rating
		-	-	100		V_{DS} = 0.8 Max Rating, V_{GS} = 0V, T_A = 125°C
$I_{D(ON)}$	On-state drain current	0.5	1.0	-	A	V_{GS} = 5.0V, V_{DS} = 25V
		2.0	2.5	-		V_{GS} = 10V, V_{DS} = 25V
$R_{DS(ON)}$	Static drain-to-source on-state resistance	-	3.0	5.0	Ω	V_{GS} = 5.0V, I_D = 250mA
		-	2.5	3.0		V_{GS} = 10V, I_D = 1.0A
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with temperature	-	0.70	1.0	%/°C	V_{GS} = 10V, I_D = 1.0A
G_{FS}	Forward transductance	300	450	-	mmho	V_{DS} = 25V, I_D = 500mA
C_{ISS}	Input capacitance	-	55	65	pF	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz
C_{OSS}	Common source output capacitance	-	20	25		
C_{RSS}	Reverse transfer capacitance	-	5.0	8.0		
$t_{d(ON)}$	Turn-on delay time	-	3.0	5.0	ns	V_{DD} = 25V, I_D = 1.0A, R_{GEN} = 25Ω
t_r	Rise time	-	5.0	8.0		
$t_{d(OFF)}$	Turn-off delay time	-	6.0	9.0		
t_f	Fall time	-	5.0	8.0		
V_{SD}	Diode forward voltage drop	-	1.2	1.8	V	V_{GS} = 0V, I_{SD} = 1.0A
t_{rr}	Reverse recovery time	-	400	-	ns	V_{GS} = 0V, I_{SD} = 1.0A

Notes:

1. *All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300μs pulse, 2% duty cycle.)*
2. *All A.C. parameters sample tested.*

Switching Waveforms and Test Circuit