



N-Channel Depletion-Mode Vertical DMOS FETs

Ordering Information

$BV_{DSX} /$ BV_{DGX}	$R_{DS(ON)}$ (max)	I_{DSS} (min)	Order Number / Package
			Die*
250V	20 Ω	200mA	DN3125NW

* Die in wafer form.

Features

- ☐ High input impedance
- ☐ Low input capacitance
- ☐ Fast switching speeds
- ☐ Low on resistance
- ☐ Free from secondary breakdown
- ☐ Low input and output leakage

Applications

- ☐ Normally-on switches
- ☐ Solid state relays
- ☐ Converters
- ☐ Linear amplifiers
- ☐ Constant current sources
- ☐ Power supply circuits
- ☐ Telecom

Advanced DMOS Technology

These low threshold depletion-mode (normally-on) transistors utilize an advanced vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces devices with the power handling capabilities of bipolar transistors and with the high input impedance and positive temperature coefficient inherent in MOS devices. Characteristic of all MOS structures, these devices are free from thermal runaway and thermally-induced secondary breakdown.

Supertex's vertical DMOS FETs are ideally suited to a wide range of switching and amplifying applications where high breakdown voltage, high input impedance, low input capacitance, and fast switching speeds are desired.

Absolute Maximum Ratings

Drain-to-Source Voltage	BV_{DSX}
Drain-to-Gate Voltage	BV_{DGX}
Gate-to-Source Voltage	$\pm 20V$
Operating and Storage Temperature	-55°C to +150°C

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Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV_{DSX}	Drain-to-Source Breakdown Voltage	250			V	$V_{GS} = -5.0V, I_D = 100\mu A$
$V_{GS(OFF)}$	Gate-to-Source OFF Voltage	-1.5		-3.5	V	$V_{DS} = 15V, I_D = 10\mu A$
$\Delta V_{GS(OFF)}$	Change in $V_{GS(OFF)}$ with Temperature			4.5	mV/°C	$V_{DS} = 15V, I_D = 10\mu A$
I_{GSS}	Gate Body Leakage Current			100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
$I_{D(OFF)}$	Drain-to-Source Leakage Current			1.0	μA	$V_{GS} = -5.0V, V_{DS} = \text{Max Rating}$
				1.0	mA	$V_{GS} = -5.0V, V_{DS} = 0.8 \text{ Max Rating}$ $T_A = 125^\circ C$
I_{DSS}	Saturated Drain-to-Source Current	200			mA	$V_{GS} = 0V, V_{DS} = 15V$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			20	Ω	$V_{GS} = 0V, I_D = 150mA$
				20		$V_{GS} = -0.8V, I_D = 50mA$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature			1.1	%/°C	$V_{GS} = 0V, I_D = 150mA$
G_{FS}	Forward Transconductance	150			mS	$I_D = 100mA, V_{DS} = 10V$
C_{ISS}	Input Capacitance		60	120	pF	$V_{GS} = -5.0V, V_{DS} = 25V,$ $f = 1.0MHz$
C_{OSS}	Common Source Output Capacitance		6.0	15		
C_{RSS}	Reverse Transfer Capacitance		3.0	10		
$t_{d(ON)}$	Turn-ON Delay Time			10	ns	$V_{DD} = 25V,$ $I_D = 150mA,$ $R_{GEN} = 25\Omega,$ $V_{GS} = 0V \text{ to } -10V$
t_r	Rise Time			15		
$t_{d(OFF)}$	Turn-OFF Delay Time			15		
t_f	Fall Time			20		
V_{SD}	Diode Forward Voltage Drop			1.8	V	$V_{GS} = -5.0V, I_{SD} = 150mA$
t_{rr}	Reverse Recovery Time		800		ns	$V_{GS} = -5.0V, I_{SD} = 150mA$

Notes:

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

Switching Waveforms and Test Circuit

