N-Channel Enhancement-Mode Vertical DMOS Power FETs

Ordering Information

BV_{DSS} / BV_{DGS}	$R_{DS(ON)}$ (max)	$I_{D(ON)}$ (min)	Order Number / Package		
			TO-39	TO-92	TO-220
170V	6Ω	1.0A	VN1706B	VN1706L	VN1706D
170V	10Ω	1.0A	VN1710B	VN1710L	VN1710D

Features

- ☐ Freedom 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
- ☐ Complementary N- and P-Channel devices

Advanced DMOS Technology

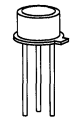
These enhancement-mode (normally-off) power transistors utilize a vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces devices with the power handling capabilities of bipolar transistors and with the high input impedance and negative temperature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

Supertex Vertical DMOS Power 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.

Applications

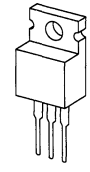
- ☐ Motor control
- ☐ Converters
- ☐ Amplifiers
- ☐ Switches
- ☐ Power supply circuits
- ☐ Drivers (Relays, Hammers, Solenoids, Lamps, Memories, Displays, Bipolar Transistors, etc.)

Package Options (Note 1)



TO-39

TO-92



TO-220

Note 1: See Package Outline section for discrete pinouts.

Absolute Maximum Ratings

Drain-to-Source Voltage	BV_{DSS}
Drain-to-Gate Voltage	BV_{DGS}
Gate-to-Source Voltage	± 40V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

*Distance of 1.6 mm from case for 10 seconds.

Thermal Characteristics

Package	I_D (continuous)*	I_D (pulsed)	Power Dissipation	θ_{ja} °C/W	θ_{jc} °C/W
TO-39	0.63A	3.0A	6.25W	170	20
TO-92	0.158A	0.6A	0.4W	312.5	21.3
TO-220	0.7A	3A	20W	80	6.25

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

Electrical Characteristics (@ 25°C unless otherwise specified)

(Notes 1 and 2)

Symbol	Parameter		Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage		170			V	I_D = 100μA, V_{GS} = 0
$V_{GS(th)}$	Gate Threshold Voltage		.8		2	V	V_{GS} = V_{DS}, I_D = 1mA
I_{GSS}	Gate Body Leakage				100	nA	V_{GS} = 15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current				10	μA	V_{GS} = 0V, V_{DS} = 120V
					500		V_{GS} = 0V, V_{DS} = 120V, T_A = 125°C
$I_{D(ON)}$	ON-State Drain Current		1.0			A	V_{GS} = −10V, V_{DS} ≥ 2 $V_{DS(ON)}$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance	ALL			10	Ω	V_{GS} = 2.5V, I_D = 0.1A
		VN1710			10		V_{GS} = 10V, I_D = 0.5A
		VN1706			6		I_D = 0.5A V_{GS} = 10V
G_{FS}	Forward Transconductance		300			m℧	V_{DS} ≥ 2 $V_{DS(ON)}$, I_D = 0.5A
C_{ISS}	Input Capacitance				125	pF	V_{GS} = 0, V_{DS} = 25V, f = 1MHz
C_{OSS}	Common Source Output Capacitance				50		
C_{RSS}	Reverse Transfer Capacitance				20		
$t_{(ON)}$	Turn-ON Time				8	ns	V_{DD} = 60V, I_D = 0.1A, R_S = 50Ω
$t_{(OFF)}$	Turn-OFF Time				17		
V_{SD}	Diode Forward Voltage Drop	VN1710		−1.2		V	I_{SD} = −0.19, V_{GS} = 0
		VN1706		−1.2			I_{SD} = −1.4A, V_{GS} = 0

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

Switching Waveforms and Test Circuit