# Supertex inc.

# DN3145

#### **Initial Release**



**N-Channel Depletion-Mode Vertical DMOS FETs** 

#### 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
- Constant current sources
- Power supply circuits
- □ Telecom

## **Absolute Maximum Ratings**

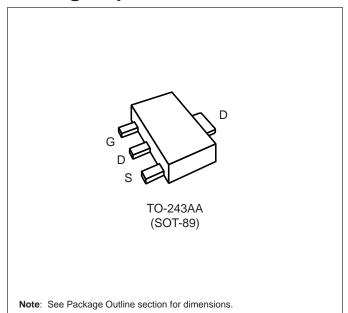
Drain-to-Source Voltage	BV <sub>DSX</sub>
Drain-to-Gate Voltage	BV <sub>DGX</sub>
Gate-to-Source Voltage	± 20V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C
* Distance of 1.6 mm from case for 10 seconds.	

### Advanced DMOS Technology

These 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.

#### **Package Options**



Product marking for TO-243AA:

DN1M\* Where \* = 2-week alpha date code

#### **Ordering Information**

BV <sub>DSX</sub> /	R <sub>DS(ON)</sub>	I <sub>DSS</sub>	Order Number / Package
BV <sub>DGX</sub>	(max)	(min)	TO-243AA*
450V	60Ω	120mA	DN3145N8

\* Same as SOT-89. Product shipped on 2000 piece carrier tape reels.

#### 08/22/02

Supertex Inc. does not recommend the use of its products in life support applications and will not knowingly sell its products for use in such applications unless it receives an adequate "products liability indemnification insurance agreement." Supertex does not assume responsibility for use of devices described and limits its liability to the replacement of devices determined to be defective due to workmanship. No responsibility is assumed for possible omissions or inaccuracies. Circuitry and specifications are subject to change without notice. For the latest product specifications, refer to the Supertex website: http://www.supertex.com. For complete liability information on all Supertex products, refer to the most current databook or to the Legal/Disclaimer page on the Supertex website.

# **Thermal Characteristics**

Package	I <sub>D</sub> (continuous)*	l <sub>D</sub> (pulsed)	Power Dissipation @ T <sub>A</sub> = 25°C	θ <sub>jc</sub> °C/W	θ <sub>ja</sub> °C/W	I <sub>DR</sub> *	I <sub>DRM</sub>
TO-243AA	100mA	300mA	1.3W <sup>†</sup>	34	97†	100mA	300mA

\*  $I_{D}$  (continuous) is limited by max rated  $T_{i}$ .

<sup>†</sup> Mounted on FR4 board, 25mm x 25mm x 1.57mm. Significant P<sub>D</sub> increase possible on ceramic substrate.

# Electrical Characteristics (@ 25°C unless otherwise specified)

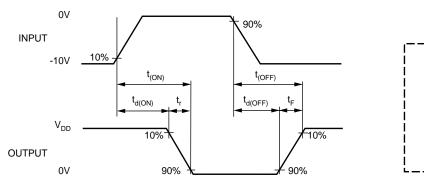
Symbol	Parameter	Min	Тур	Max	Unit	Conditions
$BV_{DSX}$	Drain-to-Source Breakdown Voltage	450			V	$V_{GS} = -5V, I_D = 100 \mu A$
V <sub>GS(OFF)</sub>	Gate-to-Source OFF Voltage	-1.5		-3.5	V	$V_{DS} = 15V, I_{D} = 10\mu A$
$\Delta V_{GS(OFF)}$	Change in $V_{GS(OFF)}$ with Temperature			4.5	mV/°C	$V_{DS} = 15V, I_{D} = 10\mu A$
I <sub>GSS</sub>	Gate Body Leakage Current			100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
I <sub>D(OFF)</sub>	Drain-to-Source Leakage Current			1.0	μΑ	$V_{GS}$ = -5.0V, $V_{DS}$ = Max Rating
				1.0	mA	$V_{GS}$ = -5.0V, $V_{DS}$ = 0.8 Max Rating $T_A$ = 125°C
I <sub>DSS</sub>	Saturated Drain-to-Source Current	120			mA	$V_{GS} = 0V, V_{DS} = 15V$
R <sub>DS(ON)</sub>	Static Drain-to-Source ON-State Resistance			60	Ω	V <sub>GS</sub> = 0V, I <sub>D</sub> = 100mA
$\Delta R_{DS(ON)}$	Change in R <sub>DS(ON)</sub> with Temperature			1.1	%/°C	$V_{GS} = 0V, I_{D} = 100mA$
G <sub>FS</sub>	Forward Transconductance	140			mΩ	I <sub>D</sub> = 100mA, V <sub>DS</sub> = 10V
C <sub>ISS</sub>	Input Capacitance			120		$V_{GS} = -5.0V, V_{DS} = 25V$
C <sub>OSS</sub>	Common Source Output Capacitance			15	pF	f = 1.0 MHz
C <sub>RSS</sub>	Reverse Transfer Capacitance			10	-	
t <sub>d(ON)</sub>	Turn-ON Delay Time			10		V <sub>DD</sub> = 25V,
t <sub>r</sub>	Rise Time			15	ns	I <sub>D</sub> = 100mA,
t <sub>d(OFF)</sub>	Turn-OFF Delay Time			20	1	$R_{GEN} = 25\Omega$
t <sub>f</sub>	Fall Time			35	1	
V <sub>SD</sub>	Diode Forward Voltage Drop			1.8	V	V <sub>GS</sub> = -5.0V, I <sub>SD</sub> = 100mA
t <sub>rr</sub>	Reverse Recovery Time		800		ns	V <sub>GS</sub> = -5.0V, I <sub>SD</sub> = 100mA

Notes:

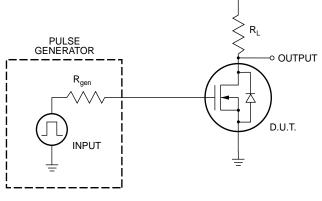
1. All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300µs pulse, 2% duty cycle.)

2. All A.C. parameters sample tested.

# **Switching Waveforms and Test Circuit**







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 $V_{DD}$ 

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