



## N-Channel Enhancement-Mode Vertical DMOS FETs

### Ordering Information

BV <sub>DSS</sub> / BV <sub>DGS</sub>	R <sub>DS(ON)</sub> (max)	I <sub>D(ON)</sub> (min)	V <sub>GS(th)</sub> (max)	Order Number /Package	
				TO-243AA*	Die†
18V	2.5Ω	250mA	1.0V	TN2501N8	TN2501ND

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

†MIL visual screening available.

### Features

- Low threshold
- High input impedance
- Low input capacitance — 110pF max.
- Fast switching speeds
- Low on resistance
- Free from secondary breakdown
- Low input and output leakage

### Applications

- Logic level interfaces – ideal for TTL and CMOS
- Solid state relays
- Battery operated systems
- Photo voltaic drives
- Analog switches
- General purpose line drivers
- Telecom switches

### Absolute Maximum Ratings

Drain-to-Source Voltage	BV <sub>DSS</sub>
Drain-to-Gate Voltage	BV <sub>DGS</sub>
Gate-to-Source Voltage	± 15V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

\*Distance of 1.6 mm from case for 10 seconds.

#### Product marking for TO-243AA:

**TN5U\***

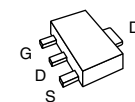
Where \* = 2-week alpha date code

### Low Threshold DMOS Technology

These low threshold enhancement-mode (normally-off) 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 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 very low threshold voltage, high breakdown voltage, high input impedance, low input capacitance, and fast switching speeds are desired.

### Package Option



TO-243AA  
(SOT-89)

Note: See Package Outline section for dimensions.

## Thermal Characteristics

Package	$I_D$ (continuous)*	$I_D$ (pulsed)	Power Dissipation @ $T_A = 25^\circ\text{C}$	$\theta_{jc}$ $^\circ\text{C/W}$	$\theta_{ja}$ $^\circ\text{C/W}$	$I_{DR}^*$	$I_{DRM}$
TO-243AA	400mA	560mA	1.6W†	15	78†	560mA	750mA

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

† Mounted on FR5 board, 25mm x 25mm x 1.57mm. Significant  $P_D$  increase possible on ceramic substrate.

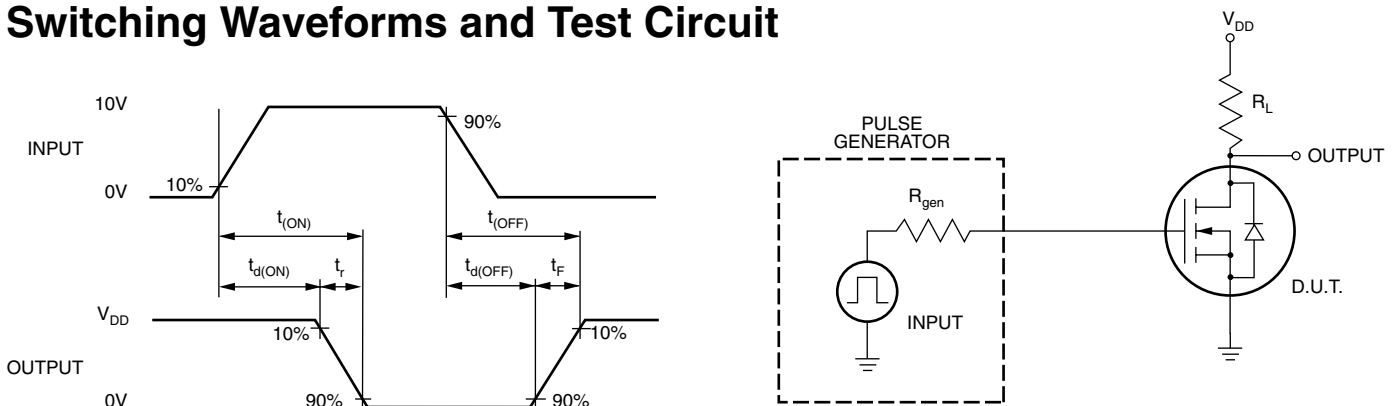
## Electrical Characteristics (@ $25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	18			V	$V_{GS} = 0V, I_D = 1.0mA$
$V_{GS(th)}$	Gate Threshold Voltage	0.3		1.0	V	$V_{GS} = V_{DS}, I_D = 1.0mA$
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature			-4.0	mV/ $^\circ\text{C}$	$V_{GS} = V_{DS}, I_D = 1.0mA$
$I_{GSS}$	Gate Body Leakage			100	nA	$V_{GS} = \pm 15V, V_{DS} = 0V$
$I_{DSS}$	Zero Gate Voltage Drain Current			10	$\mu\text{A}$	$V_{GS} = 0V, V_{DS} = \text{Max Rating}$
				1.0	mA	$V_{GS} = 0V, V_{DS} = 0.8 \text{ Max Rating}$ $T_A = 125^\circ\text{C}$
$I_{D(ON)}$	ON-State Drain Current	250	600		mA	$V_{GS} = V_{DS} = 3.0V$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			25	$\Omega$	$V_{GS} = 1.2V, I_D = 3.0mA$
				3.5		$V_{GS} = 2.0V, I_D = 50mA$
				2.5		$V_{GS} = 3.0V, I_D = 200mA$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature			0.75	%/ $^\circ\text{C}$	$V_{GS} = 3.0V, I_D = 200mA$
$G_{FS}$	Forward Transconductance	0.15	0.3		$\bar{\sigma}$	$V_{DS} = 3.0V, I_D = 200mA$
$C_{ISS}$	Input Capacitance			110	pF	$V_{GS} = 0V, V_{DS} = 15V$ $f = 1 \text{ MHz}$
$C_{OSS}$	Common Source Output Capacitance			60		
$C_{RSS}$	Reverse Transfer Capacitance			35		
$t_{d(ON)}$	Turn-ON Delay Time			5.0	ns	$V_{DD} = 15V,$ $I_D = 250mA,$ $R_{GEN} = 25\Omega$
$t_r$	Rise Time			15		
$t_{d(OFF)}$	Turn-OFF Delay Time			15		
$t_f$	Fall Time			8.0		
$V_{SD}$	Diode Forward Voltage Drop		1.1	1.8	V	$V_{GS} = 0V, I_{SD} = 200mA$
$t_{rr}$	Reverse Recovery Time		100		ns	$V_{GS} = 0V, I_{SD} = 200mA$

### Notes:

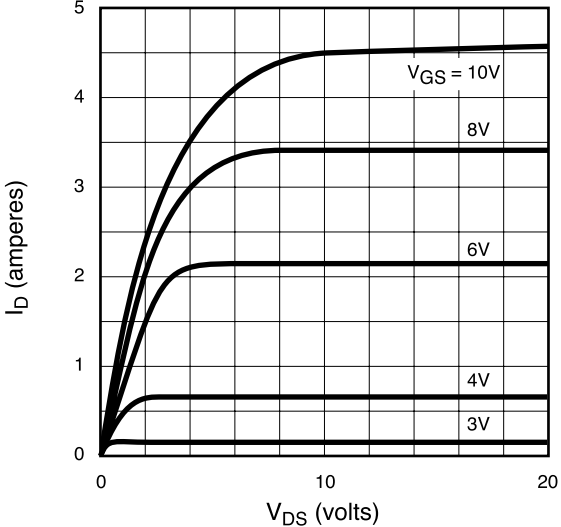
- All D.C. parameters 100% tested at  $25^\circ\text{C}$  unless otherwise stated. (Pulse test: 300 $\mu\text{sec}$  pulse, 2% duty cycle.)
- All A.C. parameters sample tested.

## Switching Waveforms and Test Circuit

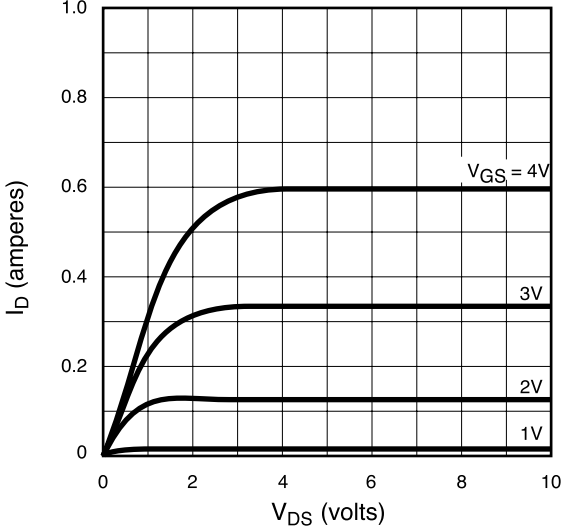


# Typical Performance Curves

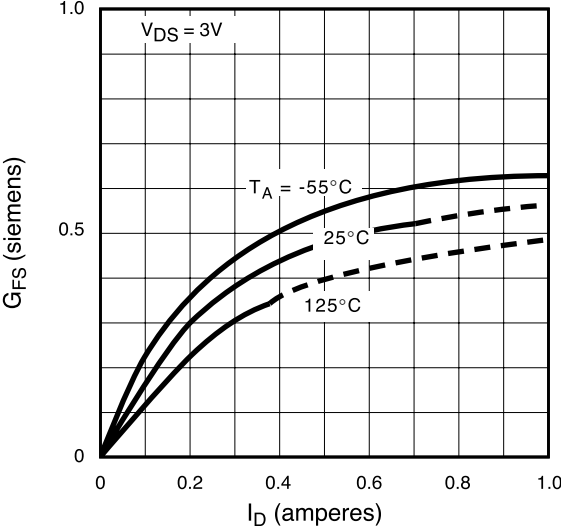
Output Characteristics



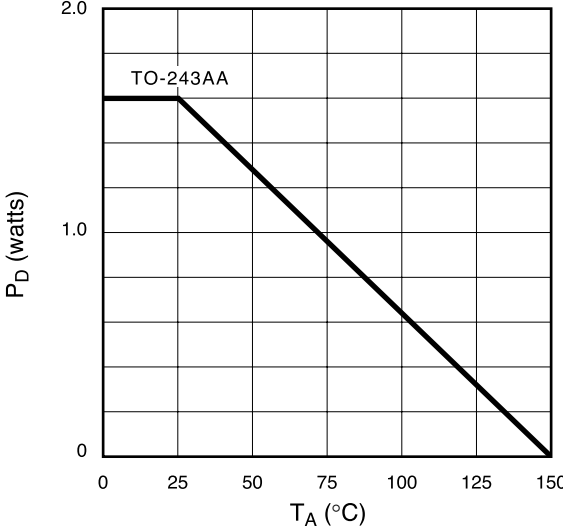
Saturation Characteristics



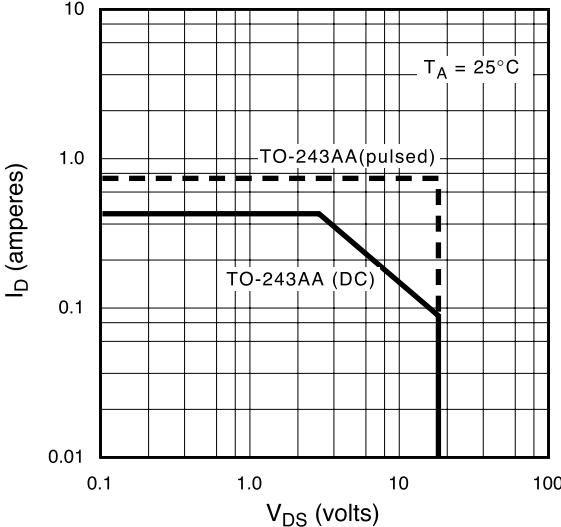
Transconductance vs. Drain Current



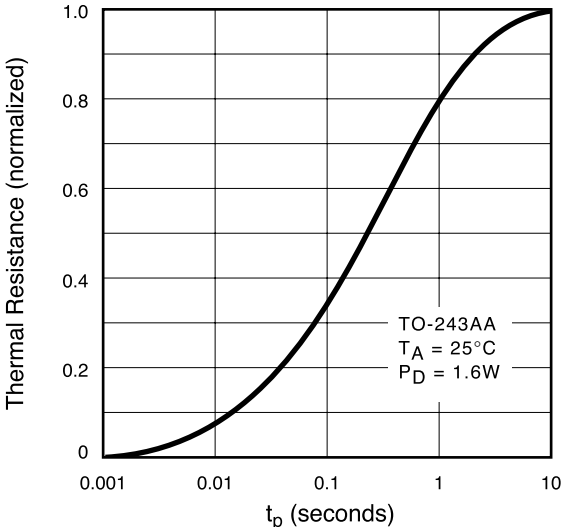
Power Dissipation vs. Ambient Temperature



Maximum Rated Safe Operating Area



Thermal Response Characteristics



# Typical Performance Curves

