

# N-Channel Enhancement-Mode Vertical DMOS FETs

**Ordering Information** 

BV <sub>DSS</sub> /	R <sub>DS(ON)</sub>	V <sub>GS(th)</sub>	I <sub>D(ON)</sub>	Order Number / Package			
BV <sub>DGS</sub>	(max)	(max)	(min)	TO-243AA*	Die <sup>†</sup>		
240V	6.0Ω	2.0V	1.0A	TN2524N8	TN2524ND		

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

#### **Features**

- □ Low threshold 2.0V max.
- High input impedance
- Low input capacitance 125pF max.
- Fast switching speeds
- Low on resistance
- Free from secondary breakdown
- Low input and output leakage
- Complementary N- and P-channel devices

## **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	$BV_{DSS}$
Drain-to-Gate Voltage	$BV_{DGS}$
Gate-to-Source Voltage	± 20V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

<sup>\*</sup> Distance of 1.6 mm from case for 10 seconds.

# Product marking for TO-243AA

TN5C\*

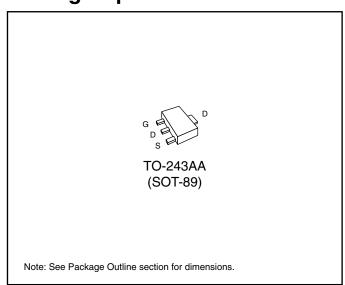
Where \*=2-week alpha date code

## **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 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**



11/12/01

<sup>†</sup> MIL visual screening available.

### **Thermal Characteristics**

Package	I <sub>D</sub> (continuous)*	I <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	0.36A	2.0A	1.6W <sup>†</sup>	15	78 <sup>†</sup>	0.36A	2.0A

<sup>\*</sup>  $I_D$  (continuous) is limited by max rated  $T_i$ .

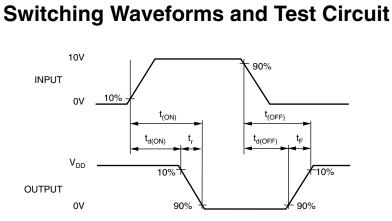
## Electrical Characteristics (@ 25°C unless otherwise specified)

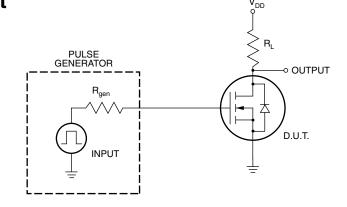
Symbol	Parameter	Min	Тур	Max	Unit	Conditions	
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	240			V	$V_{GS} = 0V$ , $I_D = 2mA$	
V <sub>GS(th)</sub>	Gate Threshold Voltage	0.6		2.0	V	$V_{GS} = V_{DS}, I_{D} = 1 \text{mA}$	
$\Delta V_{GS(th)}$	Change in V <sub>GS(th)</sub> with Temperature			-5.0	mV/°C	$V_{GS} = V_{DS}$ , $I_D = 1 \text{mA}$	
I <sub>GSS</sub>	Gate Body Leakage			100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
I <sub>DSS</sub>	Zero Gate Voltage Drain Current			10	μΑ	$V_{GS} = 0V$ , $V_{DS} = Max$ Rating	
				1.0	mA	$V_{GS} = 0V$ , $V_{DS} = 0.8$ Max Rating $T_A = 125$ °C	
I <sub>D(ON)</sub>	ON-State Drain Current	0.5	1.9		Α	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 25V	
		1.0	2.8			$V_{GS} = 10V, V_{DS} = 25V$	
R <sub>DS(ON)</sub>	Static Drain-to-Source		4.0	6.0	Ω	$V_{GS} = 4.5V, I_D = 250mA$	
	ON-State Resistance		4.0	6.0		$V_{GS} = 10V, I_D = 0.5A$	
$\Delta R_{DS(ON)}$	Change in R <sub>DS(ON)</sub> with Temperature			1.4	%/°C	$V_{GS} = 10V, I_D = 0.5A$	
$G_FS$	Forward Transconductance	300	600		m&	$V_{DS} = 25V, I_{D} = 0.5A$	
C <sub>ISS</sub>	Input Capacitance		65	125		V 0V V 05V	
C <sub>OSS</sub>	Common Source Output Capacitance		35	70	pF	$V_{GS} = 0V$ , $V_{DS} = 25V$ f = 1 MHz	
C <sub>RSS</sub>	Reverse Transfer Capacitance		10	25			
t <sub>d(ON)</sub>	Turn-ON Delay Time			10		V 05V	
t <sub>r</sub>	Rise Time			10	ns	$V_{DD} = 25V,$ $I_{D} = 1.0A,$	
t <sub>d(OFF)</sub>	Turn-OFF Delay Time			20	113	$R_{GEN} = 25\Omega$	
t <sub>f</sub>	Fall Time			20		GLIY	
V <sub>SD</sub>	Diode Forward Voltage Drop			1.8	V	$V_{GS} = 0V, I_{SD} = 1.0A$	
t <sub>rr</sub>	Reverse Recovery Time		300		ns	V <sub>GS</sub> = 0V, I <sub>SD</sub> = 1.0A	

#### Notes:

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

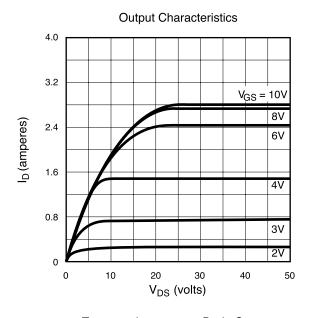
2.All A.C. parameters sample tested.

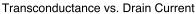


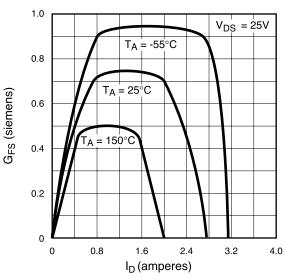


 $<sup>^{\</sup>dagger}$  Mounted on FR5 board, 25mm x 25mm x 1.57mm. Significant  $P_{_{D}}$  increase possible on ceramic substrate.

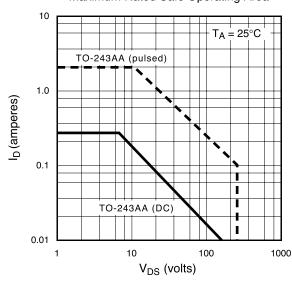
# **Typical Performance Curves**



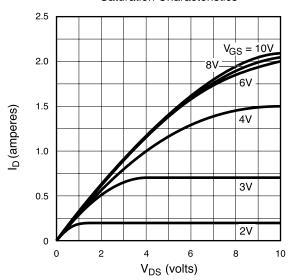




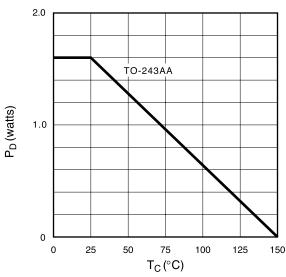
#### Maximum Rated Safe Operating Area



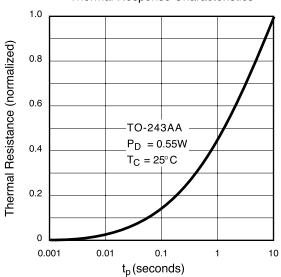
#### Saturation Characteristics



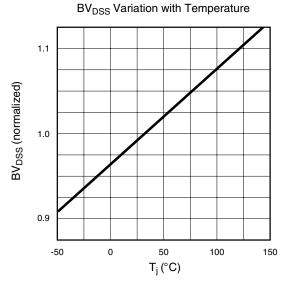
#### Power Dissipation vs. AmbientTemperature

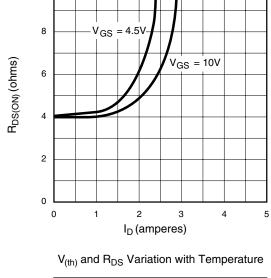


#### Thermal Response Characteristics



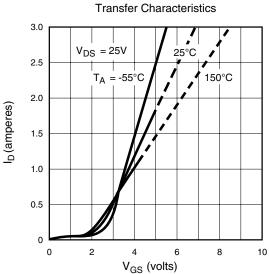
# **Typical Performance Curves**

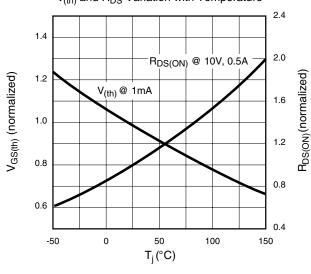


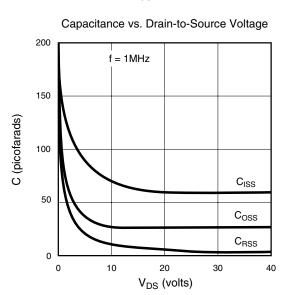


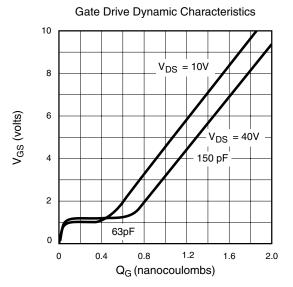
On-Resistance vs. Drain Current

10









11/12/01