



## N-Channel Depletion-Mode Vertical DMOS FETs

### Ordering Information

BV <sub>DSX</sub> / BV <sub>DGX</sub>	R <sub>DS(ON)</sub> (max)	I <sub>DSS</sub> (min)	Order Number / Package	
			TO-243AA*	Die
350V	10Ω	200mA	DN3535N8	DN3535NW

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

\*\*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

### 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

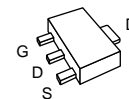
\* Distance of 1.6 mm from case for 10 seconds.

### Advanced DMOS Technology

These 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.

### Package Option



TO-243AA  
(SOT-89)

# 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	230mA	500mA	1.6W †	15	78†	230mA	500mA

\* I<sub>D</sub> (continuous) is limited by max rated T<sub>j</sub>.

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

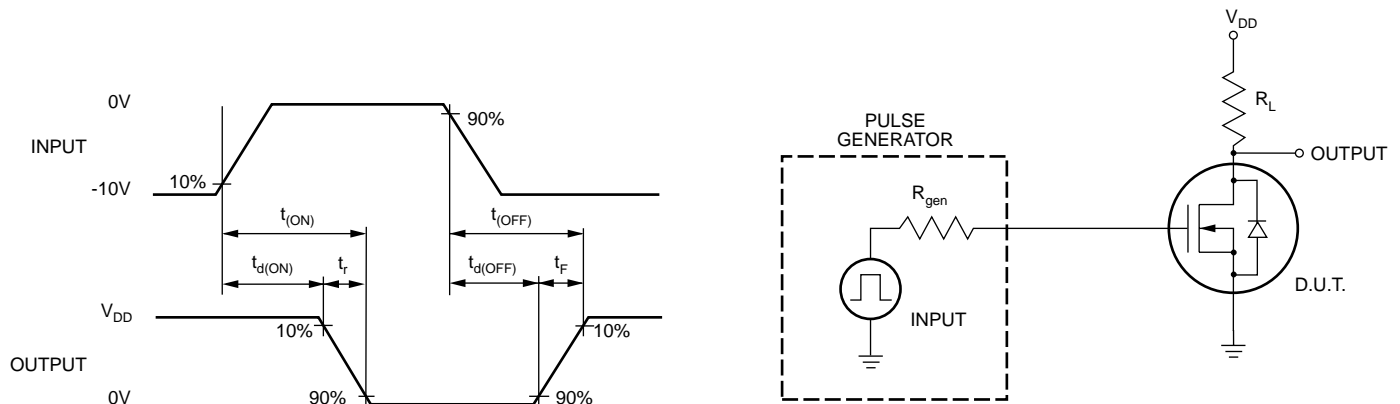
# Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV <sub>DSX</sub>	Drain-to-Source Breakdown Voltage	350			V	V <sub>GS</sub> = -5.0V, I <sub>D</sub> = 1.0μA
V <sub>GS(OFF)</sub>	Gate-to-Source OFF Voltage	-1.5		-3.5	V	V <sub>DS</sub> = 15V, I <sub>D</sub> = 10μA
ΔV <sub>GS(OFF)</sub>	Change in V <sub>GS(OFF)</sub> with Temperature			4.5	mV/°C	V <sub>DS</sub> = 15V, I <sub>D</sub> = 10μA
I <sub>GSS</sub>	Gate Body Leakage Current			100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
I <sub>D(OFF)</sub>	Drain-to-Source Leakage Current			1.0	μA	V <sub>GS</sub> = -5.0V, V <sub>DS</sub> = Max Rating
				1.0	mA	V <sub>GS</sub> = -5.0V, V <sub>DS</sub> = 0.8 Max Rating T <sub>A</sub> = 125°C
I <sub>DSS</sub>	Saturated Drain-to-Source Current	200			mA	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V
R <sub>DS(ON)</sub>	Static Drain-to-Source ON-State Resistance			10	Ω	V <sub>GS</sub> = 0V, I <sub>D</sub> = 150mA
ΔR <sub>DS(ON)</sub>	Change in R <sub>DS(ON)</sub> with Temperature			1.1	%/°C	V <sub>GS</sub> = 0V, I <sub>D</sub> = 150mA
G <sub>FS</sub>	Forward Transconductance	200			mS	I <sub>D</sub> = 100mA, V <sub>DS</sub> = 10V
C <sub>ISS</sub>	Input Capacitance			360	pF	V <sub>GS</sub> = -5.0V, V <sub>DS</sub> = 25V, f = 1.0Mhz
C <sub>OSS</sub>	Common Source Output Capacitance			40		
C <sub>RSS</sub>	Reverse Transfer Capacitance			10		
t <sub>d(ON)</sub>	Turn-ON Delay Time			15	ns	V <sub>DD</sub> = 25V, I <sub>D</sub> = 150mA, R <sub>GEN</sub> = 25Ω, V <sub>GS</sub> = 0V to -10V
t <sub>r</sub>	Rise Time			20		
t <sub>d(OFF)</sub>	Turn-OFF Delay Time			20		
t <sub>f</sub>	Fall Time			30		
V <sub>SD</sub>	Diode Forward Voltage Drop			1.8	V	V <sub>GS</sub> = -5.0V, I <sub>SD</sub> = 150mA
t <sub>rr</sub>	Reverse Recovery Time		800		ns	V <sub>GS</sub> = -5.0V, I <sub>SD</sub> = 150mA

**Notes:**

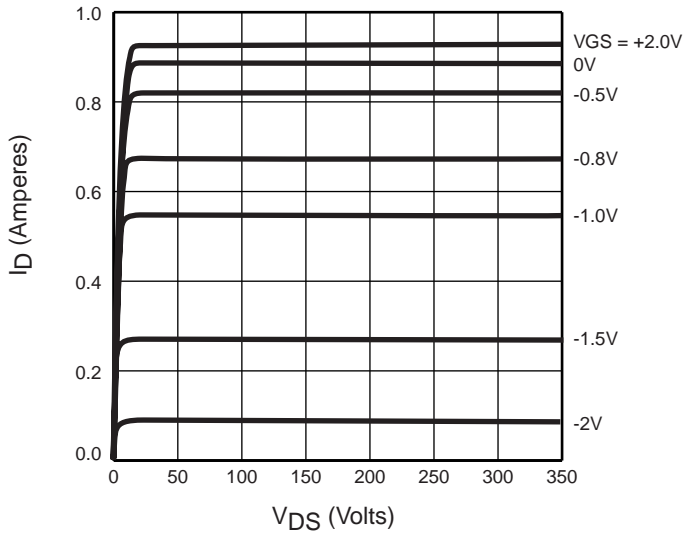
1. All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300μs pulse, 2% duty cycle.)
2. All A.C. parameters sample tested.

# Switching Waveforms and Test Circuit

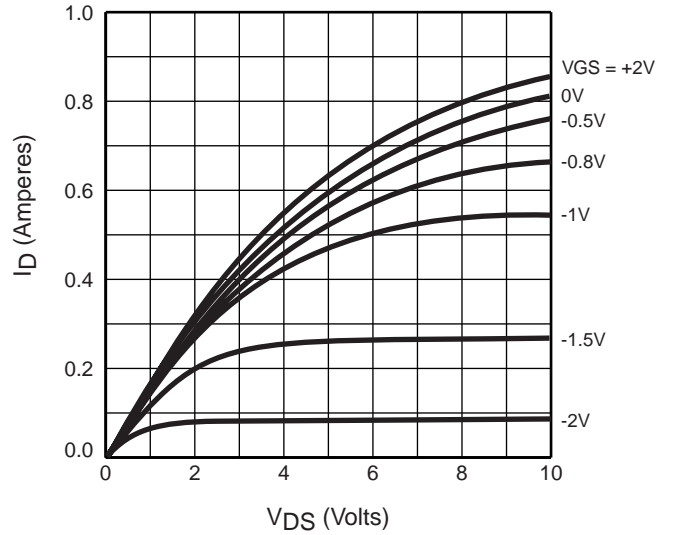


# Typical Performance Curves

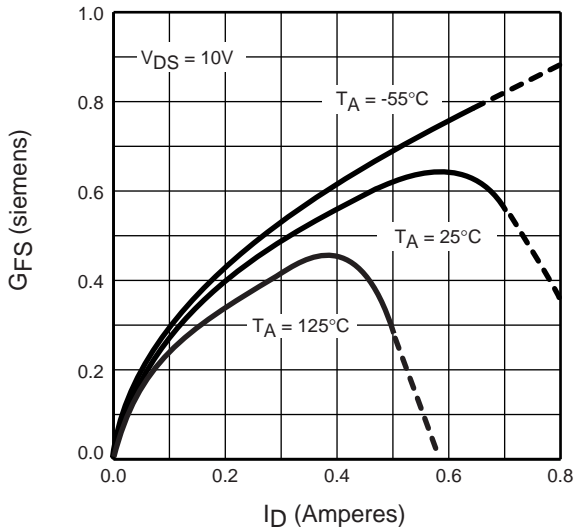
Output Characteristics



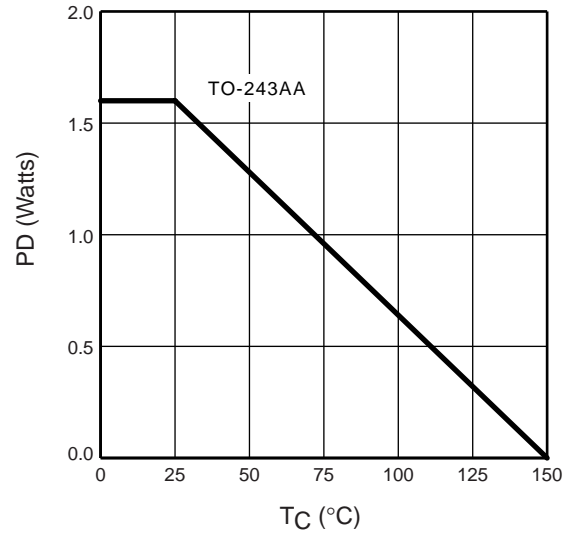
Saturation Characteristics



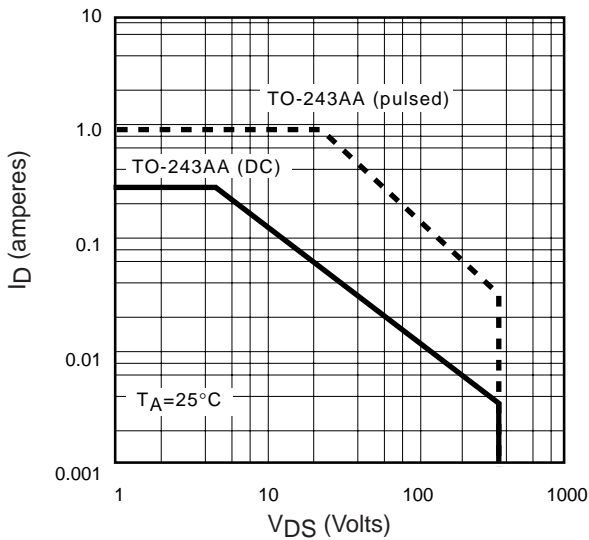
Transconductance vs. Drain Current



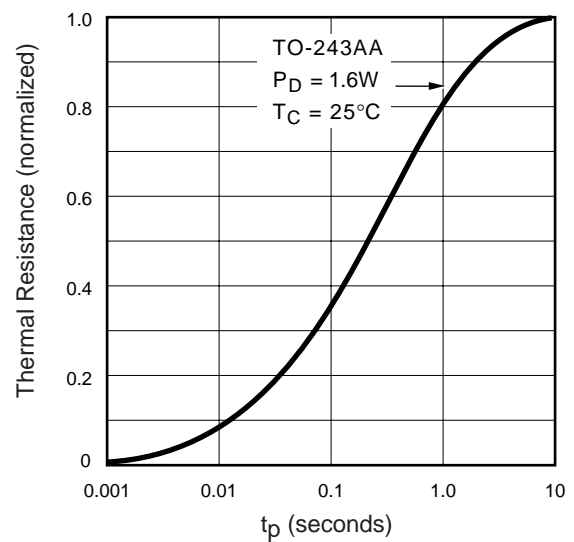
Power Dissipation vs. Case Temperature



Maximum Rated Safe Operating Area

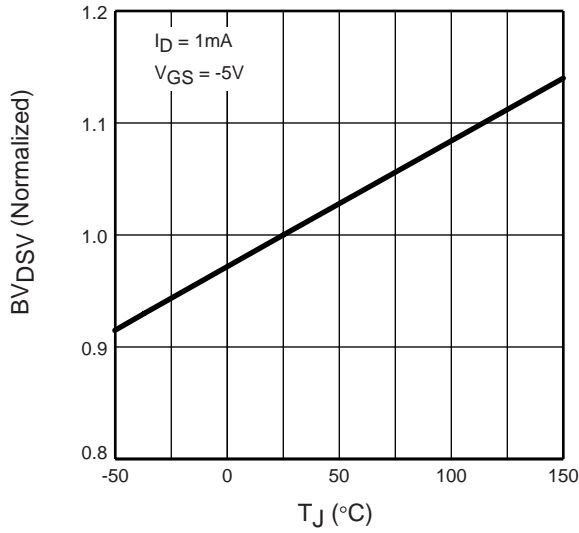


Thermal Response Characteristics

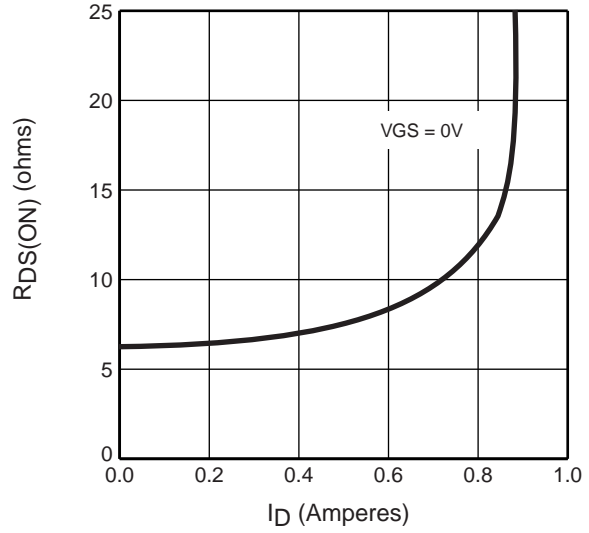


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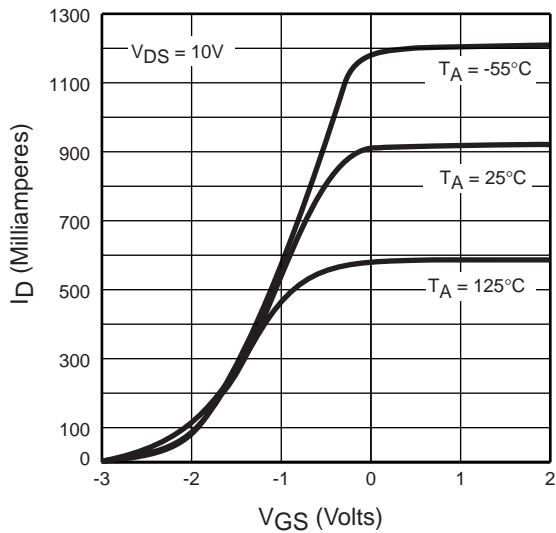
BV<sub>DSV</sub> Variation with Temperature



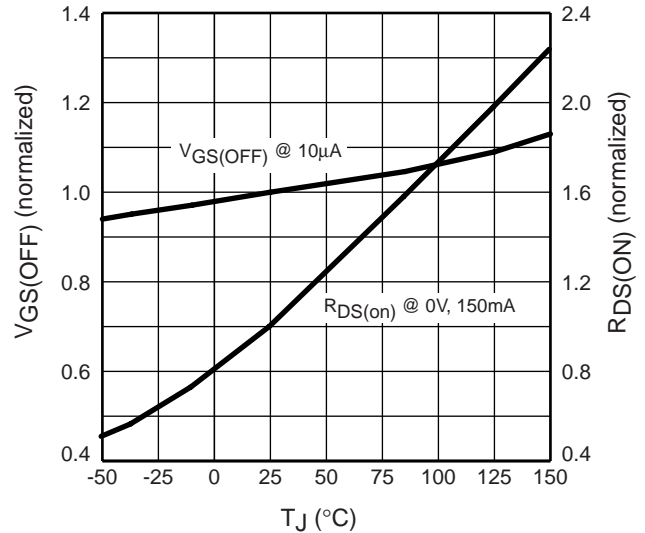
On Resistance vs. Drain Current



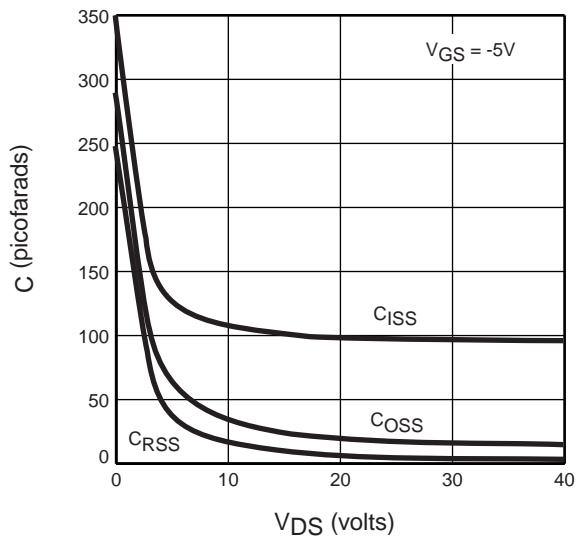
Transfer Characteristics



V<sub>GS(OFF)</sub> and R<sub>DS(ON)</sub> w/ Temperature



Capacitance vs. Drain Source Voltage



Gate Drive Dynamic Characteristics

