N-Channel Depletion-Mode Vertical DMOS FETs

Ordering Information

BV _{DSX} /	R _{DS(ON)}	I _{DSS} (min)	Order Number / Package				
BV _{DGX}	(max)		TO-92	TO-220	TO-243AA*		
350V	25Ω	150mA	DN2535N3	DN2535N5	—		
400V	25Ω	150mA	DN2540N3	DN2540N5	DN2540N8		

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

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 _{DSX}			
Drain-to-Gate Voltage	BV_{DGX}			
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.

12/13/01

Product marking for TO-243AA: DN5D* Where * = 2-week alpha date code

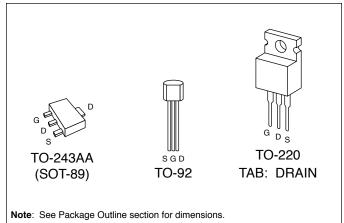
Advanced DMOS Technology

Not recommended for new designs. For products in TO-92 (N3) package and TO-243AA(N8) package, please use DN3535 or DN3545 instead.

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 Options



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. Downloaded from Elcodis.com electronic components distributor

Thermal Characteristics

Package	I _D (continuous)*	l _D (pulsed)	Power Dissipation @ T _C = 25°C	θ _{jc} °C/W	θ _{ja} °C/W	I _{DR} *	I _{DRM}
TO-92	120mA	500mA	1.0W	125	170	120mA	500mA
TO-220	500mA	500mA	15.0W	8.3	70	500mA	500mA
TO-243AA	170mA	500mA	1.6W (T _A = 25°) [†]	15	78 [†]	170mA	500mA

* I_{D} (continuous) is limited by max rated T_i.

⁺ Mounted on FR5 board, 25mm x 25mm x 1.57mm. Significant P_{D} increase possible on ceramic substrate. $T_{A} = 25^{\circ}C$

Electrical Characteristics (@ 25°C unless otherwise specified)

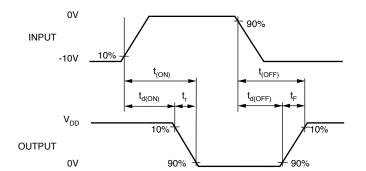
Symbol	Parameter		Min	Min Typ	Max	Unit	Conditions
BV _{DSX}	Drain-to-Source	DN2540	400			V	$V_{GS} = -5V, I_{D} = 100 \mu A$
	Breakdown Voltage	DN2535	350				
V _{GS(OFF)}	Gate-to-Source OFF Voltage		-1.5		-3.5	V	$V_{DS} = 25V, I_{D} = 10\mu A$
$\Delta V_{GS(OFF)}$	Change in V _{GS(OFF)} with Temperature				4.5	mV/°C	V _{DS} = 25V, I _D = 10μA
I _{GSS}	Gate Body Leakage Current				100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
I _{D(OFF)}	D(OFF) Drain-to-Source Leakage Current				10	μA	V_{GS} = -10V, V_{DS} = Max Rating
					1	mA	$V_{GS} = -10V$, $V_{DS} = 0.8$ Max Rating $T_A = 125^{\circ}C$
I _{DSS}	Saturated Drain-to-Source Current		150			mA	$V_{GS} = 0V, V_{DS} = 25V$
R _{DS(ON)}	Static Drain-to-Source ON-State Resistance			17	25	Ω	$V_{GS} = 0V, I_D = 120mA$
$\Delta R_{DS(ON)}$	Change in R _{DS(ON)} with Temperature				1.1	%/°C	$V_{GS} = 0V, I_{D} = 120mA$
G _{FS}	Forward Transconductance			325		mប	I _D = 100mA, V _{DS} = 10V
C _{ISS}	Input Capacitance			200	300		$V_{GS} = -10V, V_{DS} = 25V$
C _{OSS}	Common Source Output Capacitance			12	30	pF	f = 1 MHz
C _{RSS}	Reverse Transfer Capacitance			1	5		
t _{d(ON)}	Turn-ON Delay Time				10		V _{DD} = 25V,
t _r	Rise Time				15	ns	I _D = 150mA,
$t_{d(OFF)}$	Turn-OFF Delay Time				15		$R_{GEN} = 25\Omega$
t _f	Fall Time				20		
V_{SD}	Diode Forward Voltage Drop				1.8	V	$V_{GS} = -10V, I_{SD} = 120mA$
t _{rr}	Reverse Recovery Time			800		ns	V _{GS} = -10V, I _{SD} = 1A

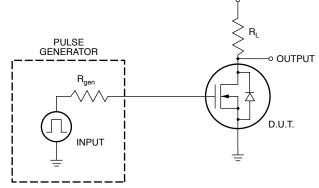
Notes:

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.

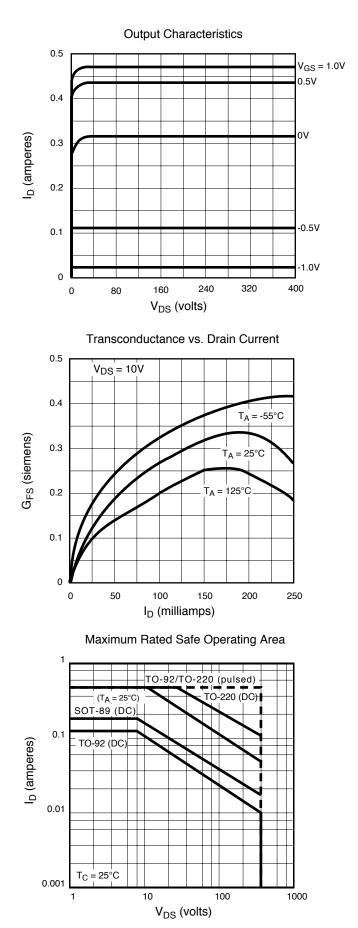
Switching Waveforms and Test Circuit

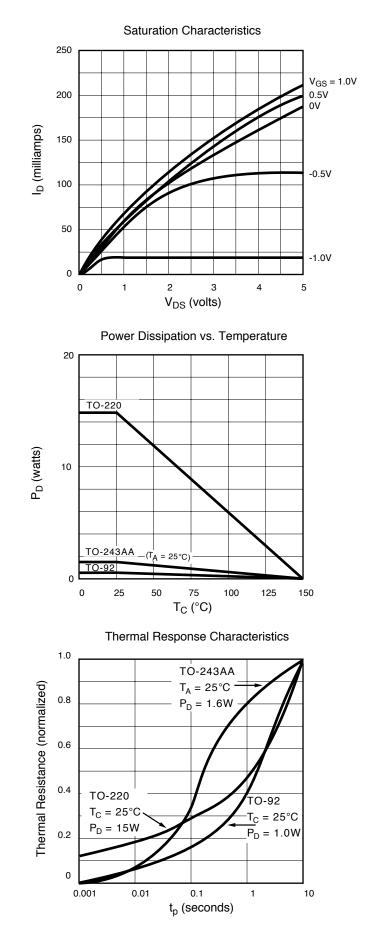




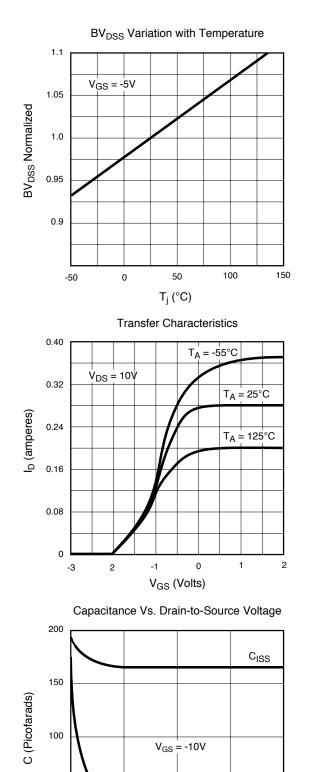
V_{DD}

Typical Performance Curves





Typical Performance Curves



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10

20

V_{DS} (Volts)

C_{RSS}

Coss

40

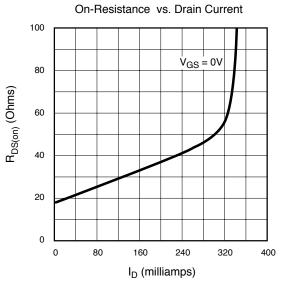
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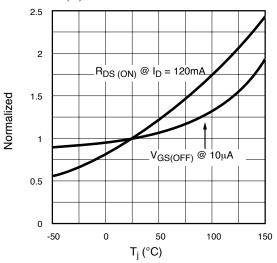
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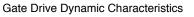
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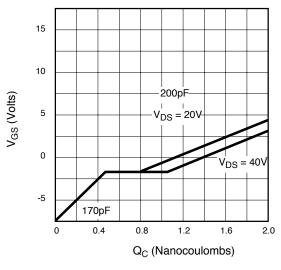
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 $V_{GS(off)}$ and R_{DS} Variation with Temperature







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