N-Channel Enhancement-Mode Vertical DMOS FETs

Ordering Information

BV_{DSS} / BV_{DGS}	$R_{DS(ON)}$ (max)	$I_{D(ON)}$ (min)	Order Number / Package
			TO-236AB*
60V	7.5Ω	0.5A	2N7002

*Same as SOT-23. All units shipped on 3,000 piece carrier tape reels.

Product marking for TO-236AB:

702❋

where ❋ = 2-week alpha date code

Features

- ☐ Free from secondary breakdown
- ☐ Low power drive requirement
- ☐ Ease of paralleling
- ☐ Low C_{ISS} and fast switching speeds
- ☐ Excellent thermal stability
- ☐ Integral Source-Drain diode
- ☐ High input impedance and high gain
- ☐ Complementary N- and P-channel devices

Applications

- ☐ Motor controls
- ☐ Converters
- ☐ Amplifiers
- ☐ Switches
- ☐ Power supply circuits
- ☐ Driver (relays, hammers, solenoids, lamps, memories, displays, bipolar transistors, etc.)

Absolute Maximum Ratings

Drain-to-Source Voltage	BV_{DSS}
Drain-to-Gate Voltage	BV_{DGS}
Gate-to-Source Voltage	± 30V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

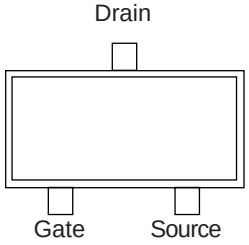
* Distance of 1.6 mm from case for 10 seconds.

Advanced DMOS Technology

These 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 high breakdown voltage, high input impedance, low input capacitance, and fast switching speeds are desired.

Package Options



TO-236AB

(SOT-23)

top view

Note: See Package Outline section for dimensions.

Thermal Characteristics

Package	I_D (continuous)*	I_D (pulsed)	Power Dissipation @ T_A = 25°C	θ_{jc} °C/W	θ_{ja} °C/W	I_{DR}*	I_{DRM}
TO-236AB	115mA	800mA	0.36W	200	350	115mA	800mA

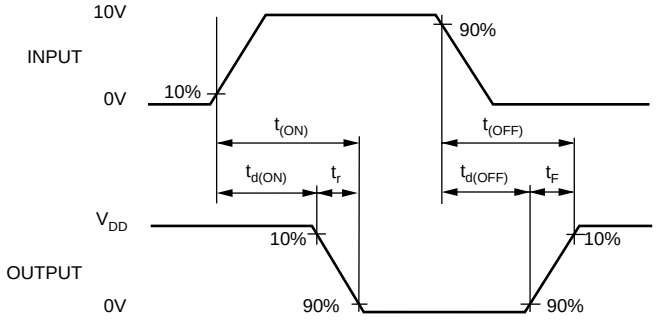
* I_D (continuous) is limited by max rated T_j.

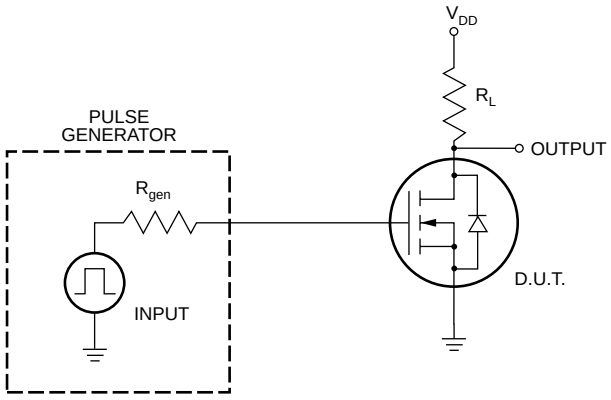
Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	60			V	I_D = 10µA, V_{GS} = 0V
$V_{GS(th)}$	Gate Threshold Voltage	1.0		2.5	V	V_{GS} = V_{DS}, I_D = 250µA
$\Delta V_{GS(th)}$	Change in $V_{GS(th)}$ with Temperature			-5.5	mV/°C	I_D = 250µA, V_{GS} = V_{DS}
I_{GSS}	Gate Body Leakage			±100	nA	V_{GS} = ±20V, V_{DS} = 0V
I_{DSS}	Zero Gate Voltage Drain Current			1	µA	V_{GS} = 0V, V_{DS} = Max Rating
				500	µA	V_{GS} = 0V, V_{DS} = 0.8 Max Rating, T_A = 125°C
$I_{D(ON)}$	ON-State Drain Current	500			mA	V_{GS} = 10V, V_{DS} = 25V
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			7.5	Ω	V_{GS} = 5V, I_D = 50mA
				7.5	Ω	V_{GS} = 10V, I_D = 0.5A
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with Temperature			1.0	%/°C	V_{GS} = 10V, I_D = 0.5A
G_{FS}	Forward Transconductance	80			m℧	V_{DS} = 25V, I_D = 0.5A
C_{ISS}	Input Capacitance			50	pF	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz
C_{OSS}	Common Source Output Capacitance			25		
C_{RSS}	Reverse Transfer Capacitance			5		
$t_{(ON)}$	Turn-ON Time			20	ns	V_{DD} = 30V, I_D = 0.2A, R_{GEN} = 25Ω
$t_{(OFF)}$	Turn-OFF Time			20		
V_{SD}	Diode Forward Voltage Drop		1.2		V	I_{SD} = 0.2A, V_{GS} = 0V
t_{rr}	Reverse Recovery Time		400		ns	I_{SD} = 0.8A, V_{GS} = 0V

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.

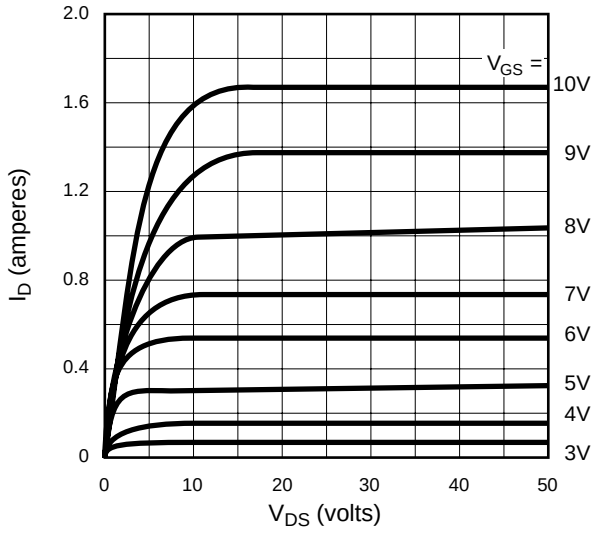
Switching Waveforms and Test Circuit



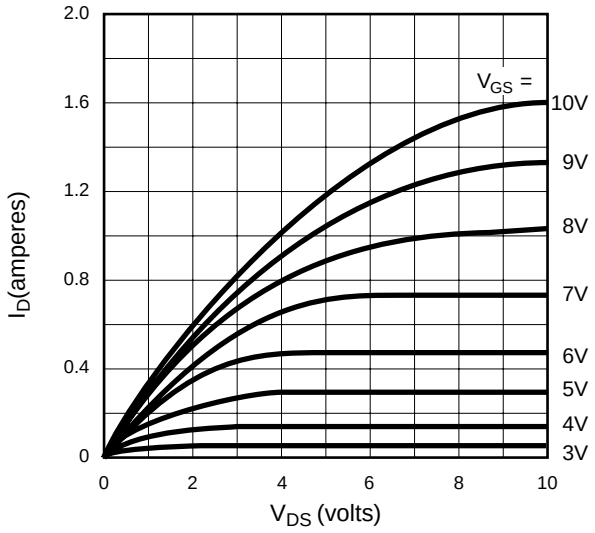


Typical Performance Curves

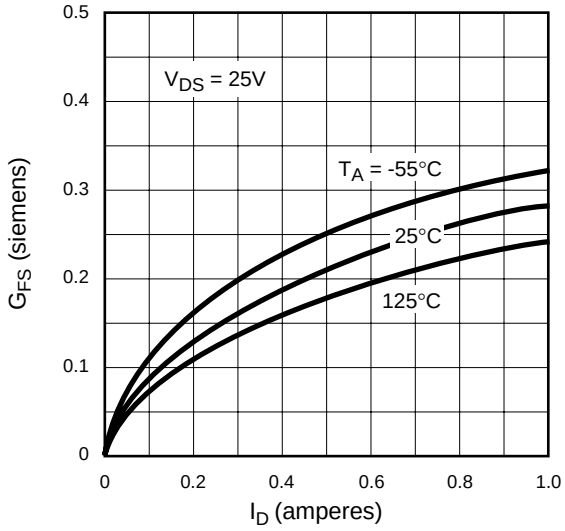
Output Characteristics



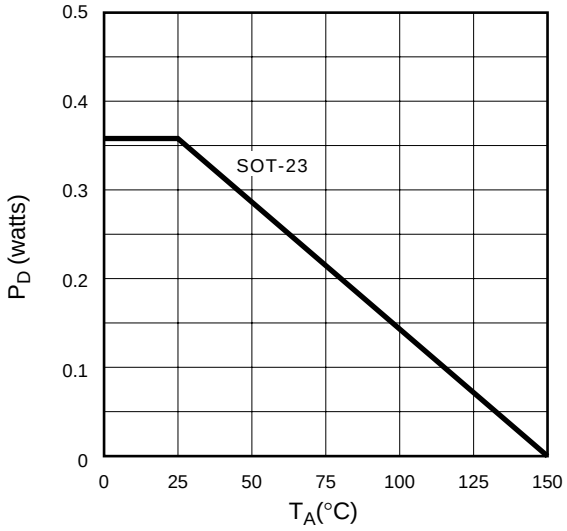
Saturation Characteristics



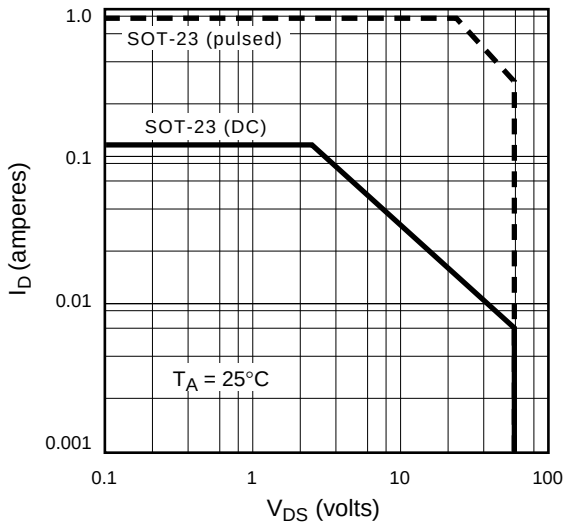
Transconductance vs. Drain Current



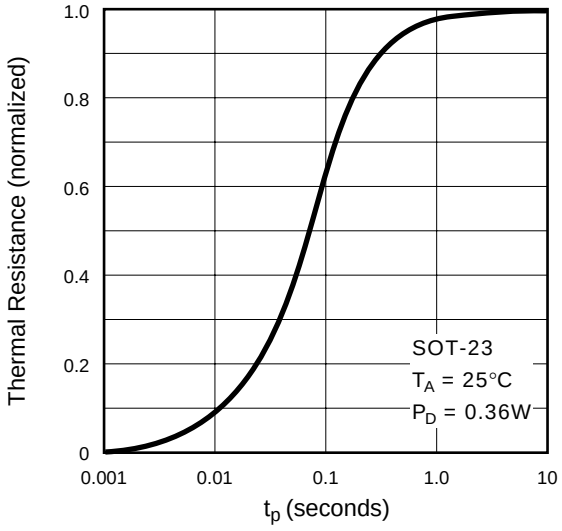
Power Dissipation vs. Temperature



Maximum Rated Safe Operating Area

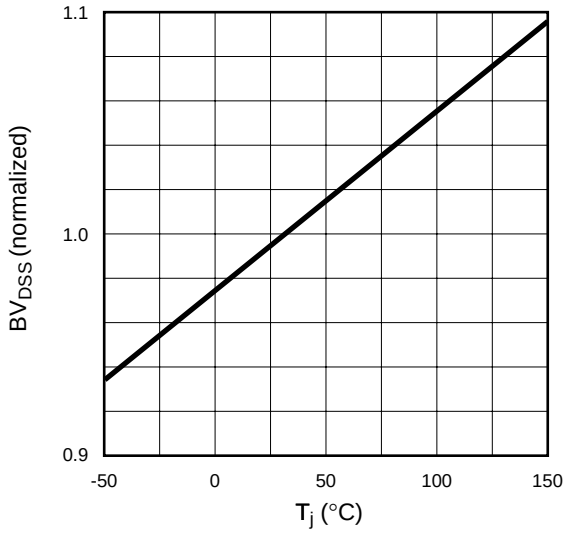


Thermal Response Characteristics

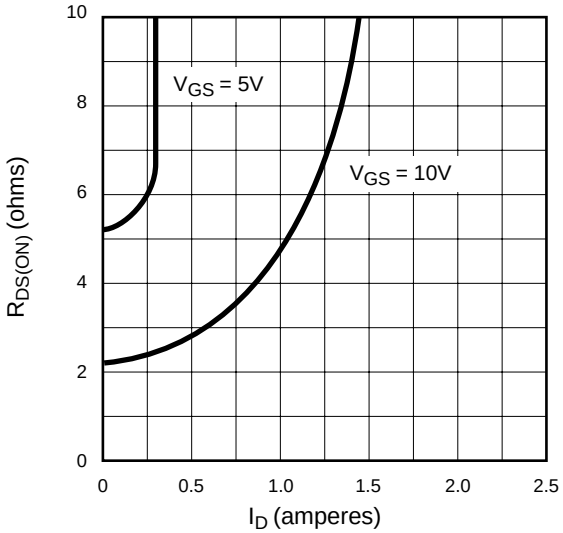


Typical Performance Curves

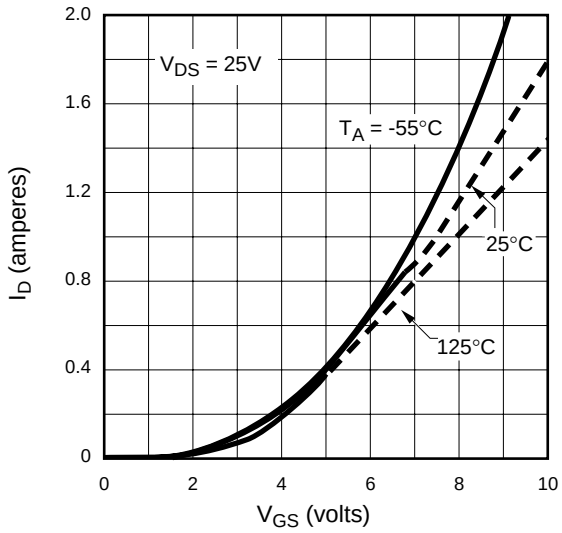
BV_{DSS} Variation with Temperature



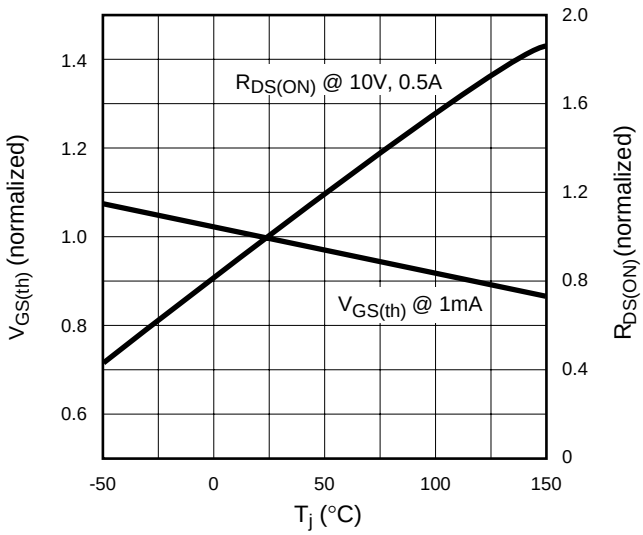
On-Resistance vs. Drain Current



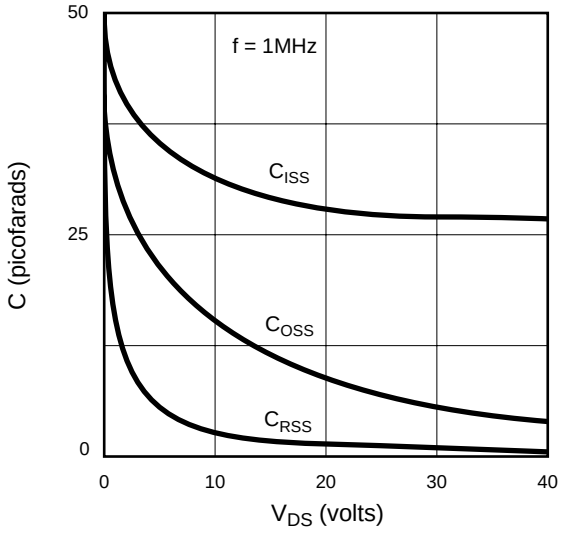
Transfer Characteristics



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



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics