P-Channel Enhancement-Mode Vertical DMOS FETs

Features

- High input impedance
- Low threshold
- Low input capacitance
- Fast switching speeds
- Low on resistance
- Low input and output leakage
- Free from secondary breakdown
- Complementary N- and P-channel devices

General Description

The Supertex TP5322 is a low threshold enhancement-mode (normally-off) transistor utilizing an advanced vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces a device 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, this device is 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.

Applications

- Logic level interfaces - ideal for TTL and CMOS
- Battery operated systems
- Photo voltaic devices
- Analog switches
- General purpose line drivers
- Telecom switches

Ordering Information

Package Options		BV_{DSS}/BV_{DGS}	$R_{DS(ON)}$ (max)	$V_{GS(TH)}$ (max)	$I_{D(ON)}$ (min)
TO-236AB[1]	TO-243AA[2]				
TP5322K1	TP5322N8	-220V	12Ω	-2.4V	-0.7A
TP5322K1-G	TP5322N8-G				

-G indicates package is RoHS compliant ('Green')
Notes: *[1]Same as SOT-23, [2]Same as SOT-89.*

Product marking for TO-236AB:
P3C✻
where ✻ = 2-week alpha date code

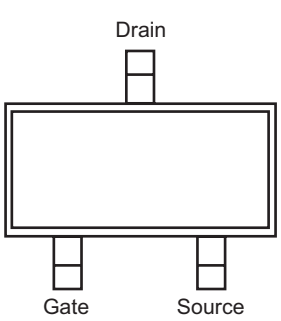
Product marking for TO-243AA:
TP3C✻
where ✻ = 2-week alpha date code

Absolute Maximum Ratings

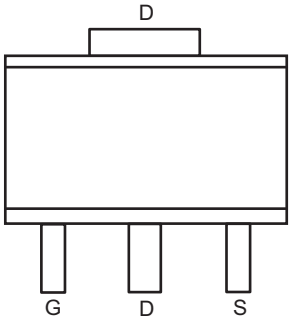
Parameter	Value
Drain-to-source voltage	BV_{DSS}
Drain-to-gate voltage	BV_{DGS}
Gate-to-source voltage	±20V
Operating and storage temperature	-55°C to +150°C
Soldering temperature[3]	300°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.
[3]Distance of 1.6mm from case for 10 seconds.

Pin Configurations



TO-236AB
(Top View)



TO-243AA
(top view)

Thermal Characteristics

Package	I_D (continuous)[1]	I_D (pulsed)	Power Dissipation @T_C = 25°C	Θ_{ja} (°C/W)	Θ_{jc} (°C/W)	I_{DR}[1]	I_{DRM}
TO-236AB	-0.12A	-0.70A	0.36W	200	350	-0.12A	-0.7A
TO-243AA	-0.26A	-0.90A	1.6W[2]	15	78[2]	-0.26A	-0.9A

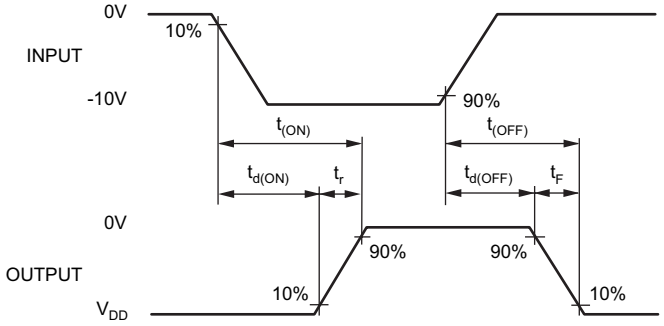
Notes:
1. I_D (continuous) is limited by max rated T_j.
2. Mounted on FR4 board, 25mm x 25mm x 1.57mm. Significant P_D increase possible on ceramic substrate.

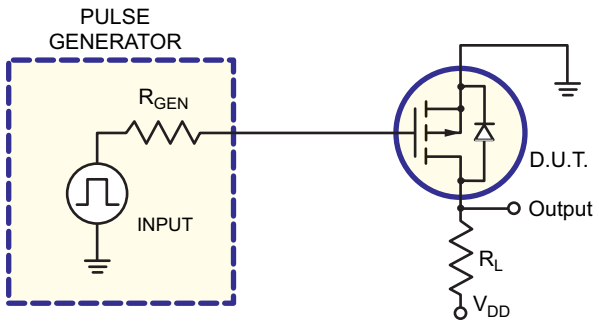
Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Units	Conditions
BV_{DSS}	Drain-to-source breakdown voltage	-220	-	-	V	V_{GS} = 0V, I_D = -2.0mA
$V_{GS(TH)}$	Gate threshold voltage	-1.0	-	-2.4	V	V_{GS} = V_{DS}, I_D = -1.0mA
$\Delta V_{GS(TH)}$	Change in $V_{GS(TH)}$ with temperature	-	-	4.5	mV/°C	V_{GS} = V_{DS}, I_D = -1.0mA
I_{GSS}	Gate body leakage current	-	-	-100	nA	V_{GS} = ±20V, V_{DS} = 0V
$I_{D(SS)}$	Zero gate voltage drain current	-	-	-10	µA	V_{DS} = Max rating, V_{GS} = 0V
		-	-	-1.0	mA	V_{DS} = 0.8 Max Rating, V_{GS} = 0V, T_A = 125°C
$I_{D(ON)}$	ON-state drain current	-0.7	-0.95	-	A	V_{GS} = -10V, V_{DS} = -25V
$R_{DS(ON)}$	Static drain-to-source ON-state resistance	-	10	15	Ω	V_{GS} = -4.5V, I_D = -100mA
			8.0	12		V_{GS} = -10V, I_D = -200mA
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with temperature	-	-	1.7	%/°C	V_{GS} = -10V, I_D = -200mA
G_{FS}	Forward transconductance	100	250	-	mmho	V_{DS} = -25V, I_D = -200mA
C_{ISS}	Input capacitance	-		110	pF	V_{GS} = 0V, V_{DS} = -25V, f = 1MHz
C_{OSS}	Common source output capacitance	-		45		
C_{RSS}	Reverse transfer capacitance	-		20		
$t_{d(ON)}$	Turn-ON delay time	-	-	10	ns	V_{DD} = -25V, I_D = -0.7A, R_{GEN} = 25Ω,
t_r	Rise time	-	-	15		
$t_{d(OFF)}$	Turn-OFF delay time	-	-	20		
t_f	Fall time	-	-	15		
V_{SD}	Diode forward voltage drop	-	-	-1.8	V	V_{GS} = 0V, I_{SD} = -0.5A
t_{rr}	Reverse recovery time	-	300	-	ns	V_{GS} = 0V, I_{SD} = -0.5A

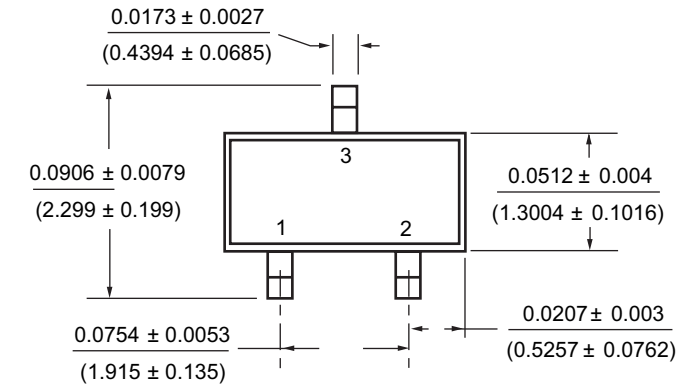
Notes: *1.All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300µs pulse, 2% duty cycle.)*
2.All A.C. parameters sample tested.

Switching Waveforms and Test Circuit



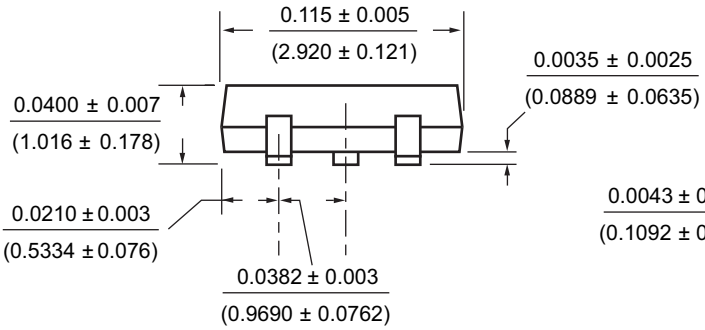


3-Lead TO-236AB (SOT-23) Package Outline (K1)

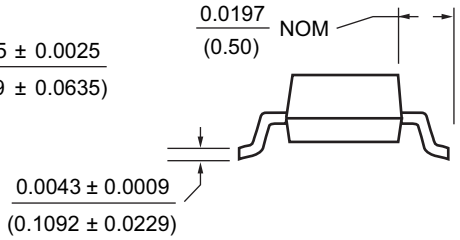


Top View

Measurement Legend = Dimensions in Inches / (Dimensions in Millimeters)

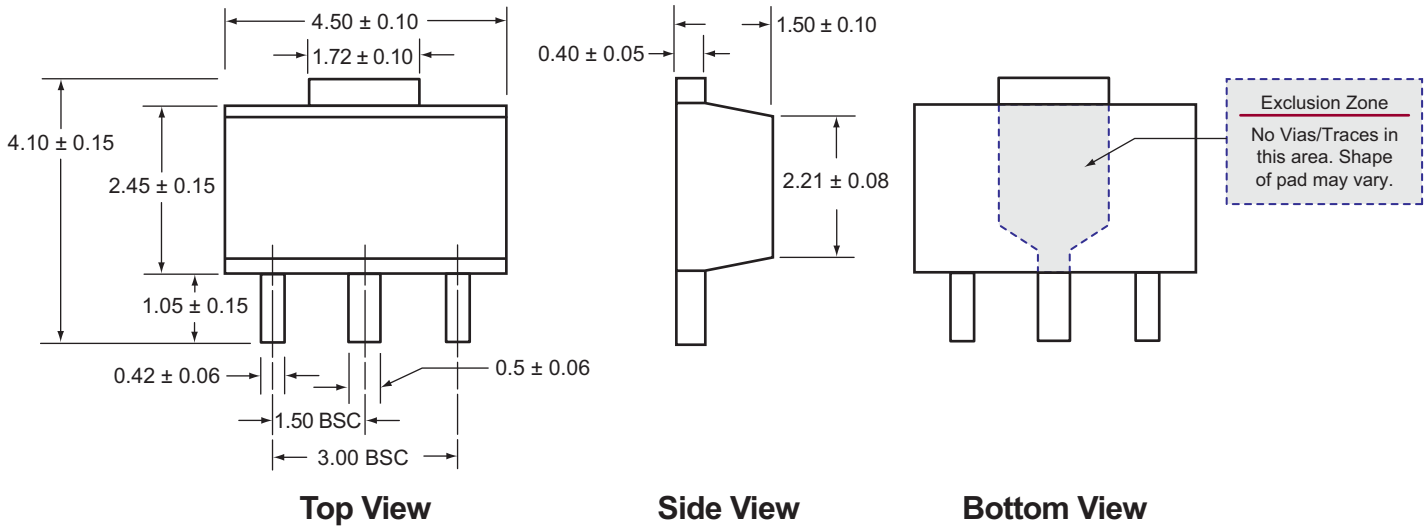


Side View



End View

3-Lead TO-243AA (SOT-89) Surface Mount Package (N8)



Notes:
All dimensions are in millimeters; all angles in degrees.

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to http://www.supertex.com/packaging.html.)

Supertex inc.
1235 Bordeaux Drive, Sunnyvale, CA 94089
TEL: (408) 222-8888 / FAX: (408) 222-4895
www.supertex.com