**Initial Release**

# P-Channel Enhancement-Mode Vertical DMOS FET

## Features

- Low threshold, -2.4V max.
- High input impedance
- Low input capacitance, 110pFmax.
- Fast switching speeds
- Low on resistance
- Free from secondary breakdown
- Low input and output leakage
- Complementary N- and P-channel devices

## Application

- Logic level interfaces-ideal for TTL and CMOS
- Battery operated systems
- Photo voltaic devices
- 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 |

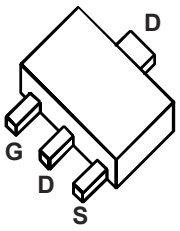
*****Distance of 1.6mm from case for 10 seconds.*

## General Description

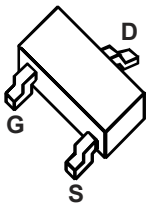
These low threshold enhancement-mode (normally-off) transistors utilize an advanced vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces devices with the power handling capabilities of bipolar transistors and with the high input impedance and 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 very low threshold voltage, high breakdown voltage, high input impedance, low input capacitance, and fast switching speeds are desired.

## Package Options




**TO-243AA (SOT-89)***




**TO-236AB (SOT-23)***

** "Green" Certified Package*

## Ordering Information

| Order Number / Package | | $BV_{DSS}$ / $BV_{DGS}$ | $R_{DS(ON)}$ (max) | $V_{GS(th)}$ (max) | $I_{D(ON)}$ (min) |
|---|---|---|---|---|---|
| **TO-243AA**** | **TO-236AB***** | | | | |
| TP5322N8 | TP5322K1 | -220V | 12Ω | -2.4V | -0.7A |
| TP5322N8-G* | TP5322K1-G* | -220V | 12Ω | -2.4V | -0.7A |

***Same as SOT-89. Product supplied on 2000 piece carrier tape reels.*
****Same as SOT-23. Products supplied on 3000 piece carrier tape reels.*

Product Marking for SOT-89

TP3C✶

Where ✶=2-week alpha date code

Product Marking for SOT-23

P3C✶

Where ✶=2-week alpha date code

A042005

## Thermal Characteristics

| Package | $I_D$ (continuous) | $I_D$ (pulsed) | Power Dissipation @ $T_A$ = 25°C | $\theta_{JC}$ °C/W | $\theta_{JA}$ °C/W | $I_{DR}$* | $I_{DRM}$ |
|---|---|---|---|---|---|---|---|
| TO-243AA | -0.26A | -0.90A | 1.6W | 15 | 78** | -0.26A | -0.9A |
| TO-236AB | -0.12A | -0.70A | 0.36W | 200 | 350 | -0.12A | -0.7A |

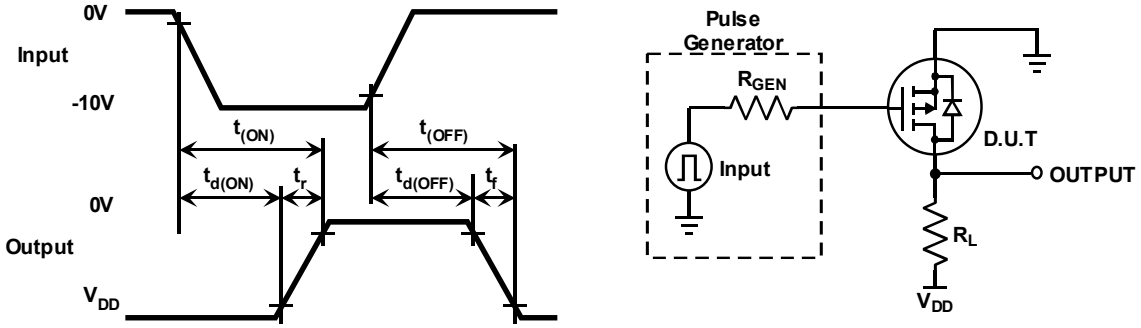
*$I_D$(continous) is limited by max rated Tj.*
***Mounted on FR4 board, 25mm x 25mm x 1.57mm. Significant PD increase possible on ceramic substate.*

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

| Symbol | Parameter | Min | Typ | Max | Units | Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | -220 | | | V | $V_{GS}$ = 0V, $I_D$ = -2mA |
| $V_{GS(th)}$ | Gate Threshold Voltage | -1.0 | | -2.4 | V | $V_{GS}$ = $V_{DS}$, $I_D$ = -1mA |
| $\Delta V_{GS(th)}$ | Change in $V_{GS(th)}$ with Temperature | | | 4.5 | mV/°C | $V_{GS}$ = $V_{DS}$, $I_D$ = -1mA |
| $I_{GSS}$ | Gate Body Leakage | | | -100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | | | -10 | µA | $V_{GS}$ = 0V, $V_{DS}$ = Max Rating |
| | | | | -1.0 | mA | $V_{GS}$ = 0V, $V_{DS}$ = 0.8 Max Rating, $T_A$ = 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 $R_{GEN}$ = 25 Ω |
| $t_r$ | 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 DC parameters 100% tested at 25°C unless otherwise stated. (Pulsed test: 300µs pulse at 2% duty cycle.)*
*2) All AC parameters sample tested.*

## Switching Waveforms and Test Circuit





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