Preliminary

# N-Channel Depletion-Mode Vertical DMOS FETs

## Ordering Information

| $BV_{DSX}$ / $BV_{DGX}$ | $R_{DS(ON)}$ (max) | $I_{DSS}$ (min) | Order Number / Package | |
|---|---|---|---|---|
| | | | TO-92 | Die |
| 400V | 6.0Ω | 300mA | DN2640N3 | DN2640ND |

## 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 |

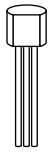
* Distance of 1.6 mm from case for 10 seconds.

## Advanced DMOS Technology

These 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




TO-92

**Note**: See Package Outline section for dimensions.

# Thermal Characteristics

| Package | $I_D$ (continuous)* | $I_D$ (pulsed) | Power Dissipation @ $T_C$ = 25°C | $\theta_{jc}$ °C/W | $\theta_{ja}$ °C/W | $I_{DR}$* | $I_{DRM}$ |
|---|---|---|---|---|---|---|---|
| TO-92 | 250mA | 600mA | 1.0W | 125 | 170 | 250mA | 600mA |

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

– OBSOLETE –

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

| Symbol | Parameter | Min | Typ | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSX}$ | Drain-to-Source Breakdown Voltage | 400 | | | V | $V_{GS}$ = -5V, $I_D$ = 1.0mA |
| $V_{GS(OFF)}$ | Gate-to-Source OFF Voltage | –1.0 | | –3.5 | V | $V_{DS}$ = 25V, $I_D$= 10μA |
| $\Delta V_{GS(OFF)}$ | 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 | $V_{GS}$ = ± 20V, $V_{DS}$ = 0V |
| $I_{D(OFF)}$ | Drain-to-Source Leakage Current | | | 10 | μA | $V_{GS}$ = -10V, $V_{DS}$ = Max Rating |
| | | | | 1.0 | mA | $V_{GS}$ = -10V, $V_{DS}$ = 0.8 Max Rating $T_A$ = 125°C |
| $I_{DSS}$ | Saturated Drain-to-Source Current | 300 | | | mA | $V_{GS}$ = 0V, $V_{DS}$ = 25V |
| $R_{DS(ON)}$ | Static Drain-to-Source ON-State Resistance | | | 6.0 | Ω | $V_{GS}$ = 0V, $I_D$ = 150mA |
| $\Delta R_{DS(ON)}$ | Change in $R_{DS(ON)}$ with Temperature | | | 1.1 | %/°C | $V_{GS}$ = 0V, $I_D$ = 150mA |
| $G_{FS}$ | Forward Transconductance | 300 | | | m℧ | $I_D$ = 200mA, $V_{DS}$ = 10V |
| $C_{ISS}$ | Input Capacitance | | | 750 | pF | $V_{GS}$ = -10V, $V_{DS}$ = 25V f = 1 MHz |
| $C_{OSS}$ | Common Source Output Capacitance | | | 75 | | |
| $C_{RSS}$ | Reverse Transfer Capacitance | | | 15 | | |
| $t_{d(ON)}$ | Turn-ON Delay Time | | | 15 | ns | $V_{DD}$ = 25V, $I_D$ = 200mA, $R_{GEN}$ = 10Ω |
| $t_r$ | Rise Time | | | 20 | | |
| $t_{d(OFF)}$ | Turn-OFF Delay Time | | | 25 | | |
| $t_f$ | Fall Time | | | 25 | | |
| $V_{SD}$ | Diode Forward Voltage Drop | | | 1.8 | V | $V_{GS}$ = -10V, $I_{SD}$ = 200mA |
| $t_{rr}$ | Reverse Recovery Time | | 800 | | ns | $V_{GS}$ = -10V, $I_{SD}$ = 1.0A |

**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