



## N-Channel Enhancement-Mode Vertical DMOS FETs

### 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
- ▶ Drivers (relays, hammers, solenoids, lamps, memories, displays, bipolar transistors, etc.)

### General Description

The Supertex 2N6660 and 2N6661 are enhancement-mode (normally-off) transistors that utilizes 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 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.

### Ordering Information

Device	Package	$BV_{DSS}/BV_{DGS}$ (V)	$R_{DS(ON)}$ (max) ( $\Omega$ )	$I_{D(ON)}$ (min) (A)
2N6660	TO-39	60	3.0	1.5
2N6661	TO-39	90	4.0	1.5

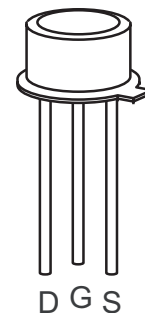
### Absolute Maximum Ratings

Parameter	Value
Drain to source voltage	$BV_{DSS}$
Drain to gate voltage	$BV_{DGS}$
Gate to source voltage	$\pm 20V$
Operating and storage temperature	$-55^{\circ}C$ to $+150^{\circ}C$
Soldering temperature <sup>1</sup>	$+300^{\circ}C$

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.

**Note 1.** Distance of 1.6mm from case for 10 seconds.

### Pin Configuration



**TO-39**

Case: DRAIN

## Electrical Characteristics ( $T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter		Min	Typ	Max	Units	Conditions
$BV_{DSS}$	Drain-to-source break-down voltage	2N6660	60	-	-	V	$V_{GS} = 0V, I_D = 10\mu A$
		2N6661	90	-	-		
$V_{GS(th)}$	Gate threshold voltage		0.8	-	2.0	V	$V_{GS} = V_{DS}, I_D = 1.0mA$
$\Delta V_{GS(th)}$	$V_{GS(th)}$ change with temperature		-	-3.8	-5.5	mV/°C	$V_{GS} = V_{DS}, I_D = 1.0mA$
$I_{GSS}$	Gate body leakage current		-	-	100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
$I_{DSS}$	Zero gate voltage drain current		-	-	10	$\mu A$	$V_{GS} = 0V, V_{DS} = \text{Max rating}$
			-	-	500		$V_{DS} = 0.8 \text{ Max Rating}, V_{GS} = 0V, T_A = 125^\circ\text{C}$
$I_{D(ON)}$	ON-state drain current		1.5	-	-	A	$V_{GS} = 10V, V_{DS} = 10V$
$R_{DS(ON)}$	Static drain-to-source ON-state resistance	All	-	-	5.0	$\Omega$	$V_{GS} = 5.0V, I_D = 0.3A$
		2N6660	-	-	3.0		$V_{GS} = 10V, I_D = 1.0A$
		2N6661	-	-	4.0		$V_{GS} = 10V, I_D = 1.0A$
$G_{FS}$	Forward transconductance		170	-	-	mmho	$V_{DS} = 25V, I_D = 0.5A$
$C_{ISS}$	Input capacitance		-	-	50	pF	$V_{GS} = 0V, V_{DS} = 24V, f = 1.0MHz$
$C_{OSS}$	Common source output capacitance		-	-	40		
$C_{RSS}$	Reverse transfer capacitance		-	-	10		
$t_{(ON)}$	Turn-ON time		-	-	10	ns	$V_{DD} = 25V, I_D = 1.0A, R_{GEN} = 25\Omega$
$t_{(OFF)}$	Turn-OFF time		-	-	10		
$V_{SD}$	Diode forward voltage drop		-	1.2	-	V	$V_{GS} = 0V, I_{SD} = 1.0A$
$t_{rr}$	Reverse recovery time		-	350	-	ns	$V_{GS} = 0V, I_{SD} = 1.0A$

### Notes:

- All D.C. parameters 100% tested at  $25^\circ\text{C}$  unless otherwise stated. (Pulse test: 300 $\mu\text{s}$  pulse, 2% duty cycle.)
- All A.C. parameters sample tested.

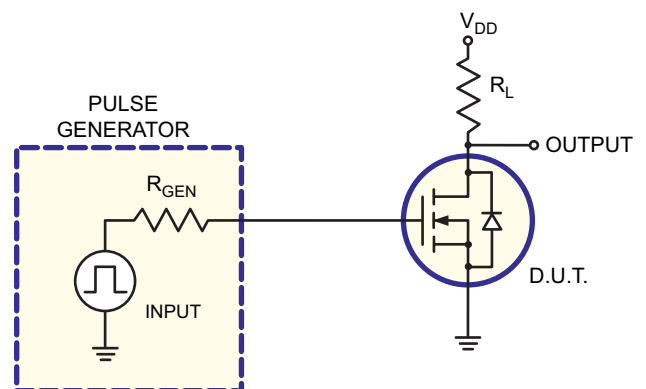
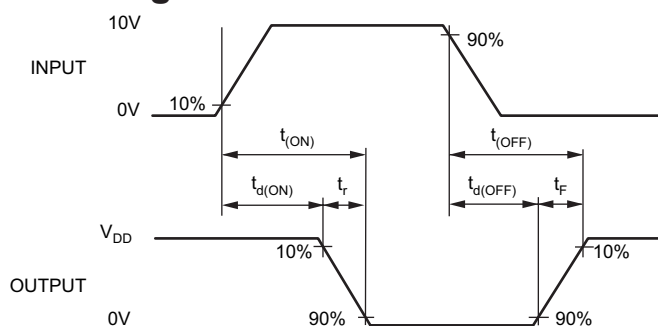
## Thermal Characteristics

Device	Package	$I_D$ (continuous) (mA)	$I_D$ (pulsed) (A)	Power Dissipation @ $T_c = 25^\circ\text{C}$ (W)	$\theta_{jc}$ ( $^\circ\text{C}/\text{W}$ )	$\theta_{ja}$ ( $^\circ\text{C}/\text{W}$ )	$I_{DR}$ (mA)	$I_{DRM}$ (A)
2N6660	TO-39	410	3.0	6.25	20	125	410	3.0
2N6661	TO-39	350	3.0	6.25	20	125	350	3.0

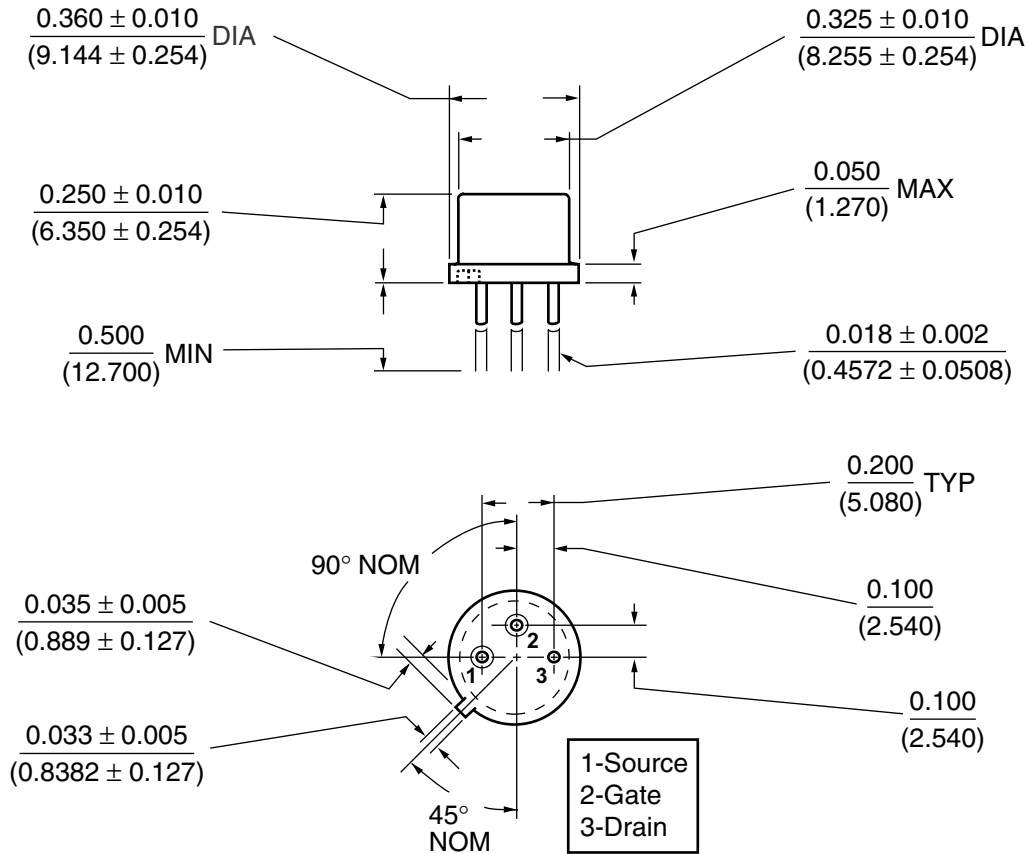
### Notes:

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

## Switching Waveforms and Test Circuit



TO-39 Package Outline



Measurement Legend =  $\frac{\text{Dimensions in Inches}}{\text{(Dimensions in Millimeters)}}$

(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>.)

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