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) (Ω)	$I_{D(ON)}$ (min) (A)
2N6660	TO-39	60	3.0	1.5
2N6661	TO-39	90	4.0	1.5

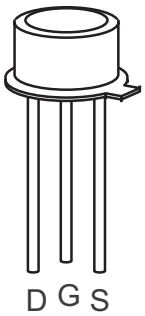
Absolute Maximum Ratings

Parameter	Value
Drain to source voltage	BV_{DSS}
Drain to gate voltage	BV_{DGS}
Gate to source voltage	±20V
Operating and storage temperature	-55°C to +150°C
Soldering temperature[1]	+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.

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

Pin Configuration



TO-39

Case: DRAIN

Electrical Characteristics (T_C = 25°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 = 10µA
		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} = ±20V, V_{DS} = 0V
I_{DSS}	Zero gate voltage drain current		-	-	10	µA	V_{GS} = 0V, V_{DS} = Max rating
			-	-	500		V_{DS} = 0.8 Max Rating, V_{GS} = 0V, T_A = 125°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	Ω	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} = 25Ω
$t_{(OFF)}$	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:

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.

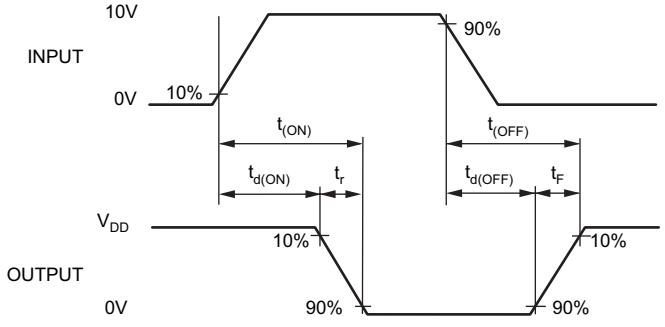
Thermal Characteristics

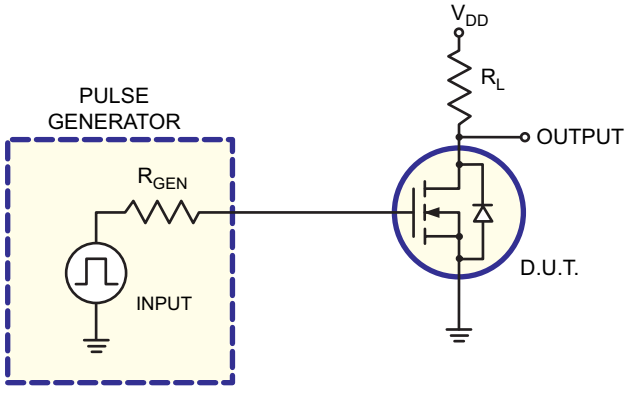
Device	Package	I_D (continuous)* (mA)	I_D (pulsed) (A)	Power Dissipation @T_C = 25°C (W)	θ_{jc} (°C/W)	θ_{ja} (°C/W)	I_{DR}* (mA)	I_{DRM} (A)
2N6660	TO-39	410	3.0	6.25	20	125	410	3.0
2N6661	TO-39	350	3.0	6.25	20	125	350	3.0

Notes:

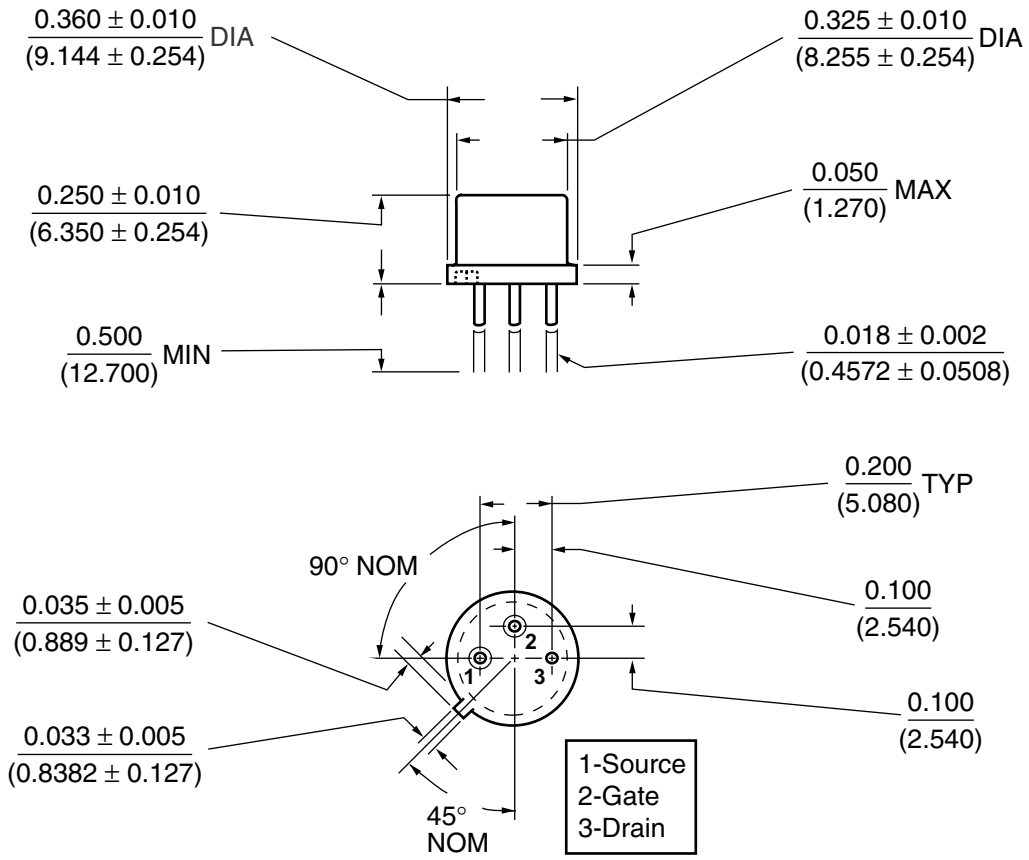
** I_D (continuous) is limited by max rated T_J.*

Switching Waveforms and Test Circuit





TO-39 Package Outline



Measurement Legend = Dimensions in Inches / (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.)

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