



N-Channel Enhancement-Mode Vertical DMOS FET

Ordering Information

BV_{DSS} / BV_{DGS}	$R_{DS(ON)}$ (max)	$I_{D(ON)}$ (min)	Order Number / Package
			TO-92
60V	5.0Ω	75mA	2N7000

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

Advanced DMOS Technology

These enhancement-mode (normally-off) transistors utilize 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 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.

Applications

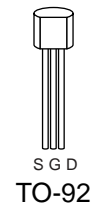
- Motor controls
- Converters
- Amplifiers
- Switches
- Power supply circuits
- Drivers (relays, hammers, solenoids, lamps, memories, displays, bipolar transistors, etc.)

Absolute Maximum Ratings

Drain-to-Source Voltage	BV_{DSS}
Drain-to-Gate Voltage	BV_{DGS}
Gate-to-Source Voltage	± 30V
Operating and Storage Temperature	-55°C to +150°C
Soldering Temperature*	300°C

* Distance of 1.6 mm from case for 10 seconds.

Package Option



Note: See Package Outline section for dimensions.

Thermal Characteristics

Package	I_D (continuous)*	I_D (pulsed)	Power Dissipation @ $T_C = 25^\circ\text{C}$	θ_{jc} $^\circ\text{C/W}$	θ_{ja} $^\circ\text{C/W}$	I_{DR}^*	I_{DRM}
TO-92	200mA	500mA	1W	125	170	200mA	500mA

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

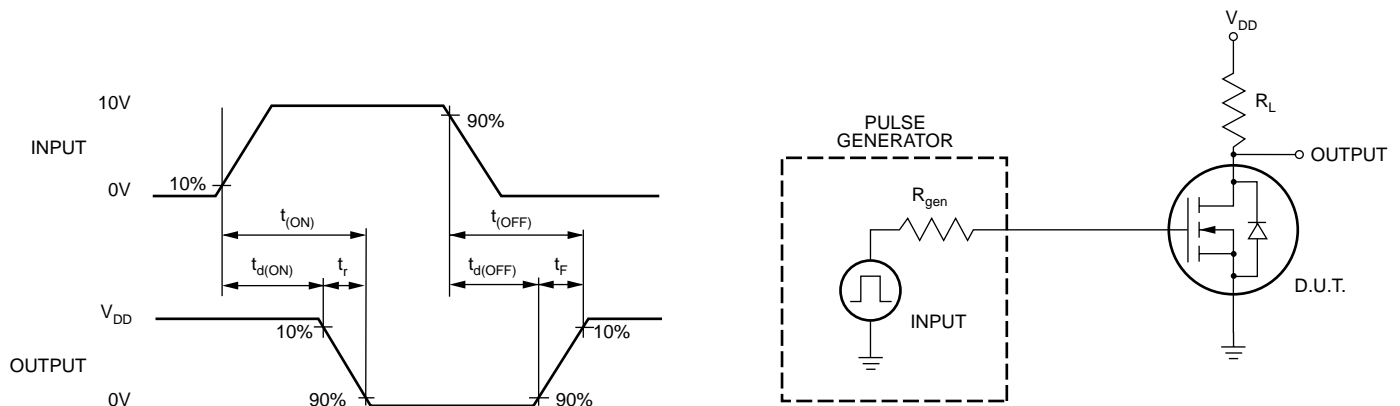
Electrical Characteristics (@ 25°C unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	60			V	$I_D = 10\mu\text{A}$, $V_{GS} = 0\text{V}$
$V_{GS(th)}$	Gate Threshold Voltage	0.8		3.0	V	$V_{GS} = V_{DS}$, $I_D = 1\text{mA}$
I_{GSS}	Gate Body Leakage			10	nA	$V_{GS} = \pm 15\text{V}$, $V_{DS} = 0\text{V}$
I_{DSS}	Zero Gate Voltage Drain Current			1	μA	$V_{GS} = 0\text{V}$, $V_{DS} = 48\text{V}$
				1	mA	$V_{GS} = 0\text{V}$, $V_{DS} = 48\text{V}$ $T_A = 125^\circ\text{C}$
$I_{D(ON)}$	ON-State Drain Current	75			mA	$V_{GS} = 4.5\text{V}$, $V_{DS} = 10\text{V}$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			5.3	Ω	$V_{GS} = 4.5\text{V}$, $I_D = 75\text{mA}$
$R_{DS(ON)}$	Static Drain-to-Source ON-State Resistance			5.0	Ω	$V_{GS} = 10\text{V}$, $I_D = 0.5\text{A}$
G_{FS}	Forward Transconductance	100			$\text{m}\bar{\sigma}$	$V_{DS} = 10\text{V}$, $I_D = 0.2\text{A}$
C_{ISS}	Input Capacitance			60	pF	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$ $f = 1\text{MHz}$
C_{OSS}	Common Source Output Capacitance			25		
C_{RSS}	Reverse Transfer Capacitance			5		
$t_{(ON)}$	Turn-ON Time			10	ns	$V_{DD} = 15\text{V}$, $I_D = 0.5\text{A}$, $R_{GEN} = 25\Omega$
$t_{(OFF)}$	Turn-OFF Time			10		
V_{SD}	Diode Forward Voltage Drop		0.85		V	$I_{SD} = 0.2\text{A}$, $V_{GS} = 0\text{V}$

Notes:

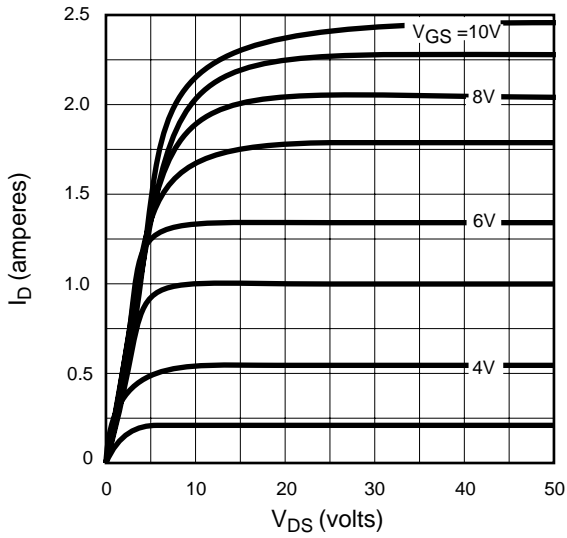
- All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300 μs pulse, 2% duty cycle.)
- All A.C. parameters sample tested.

Switching Waveforms and Test Circuit

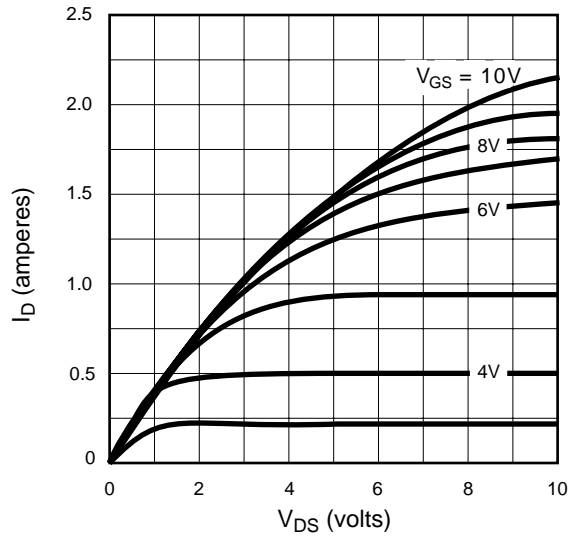


Typical Performance Curves

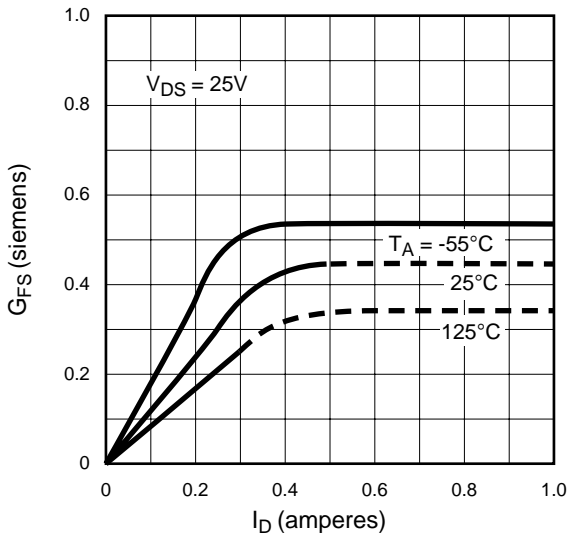
Output Characteristics



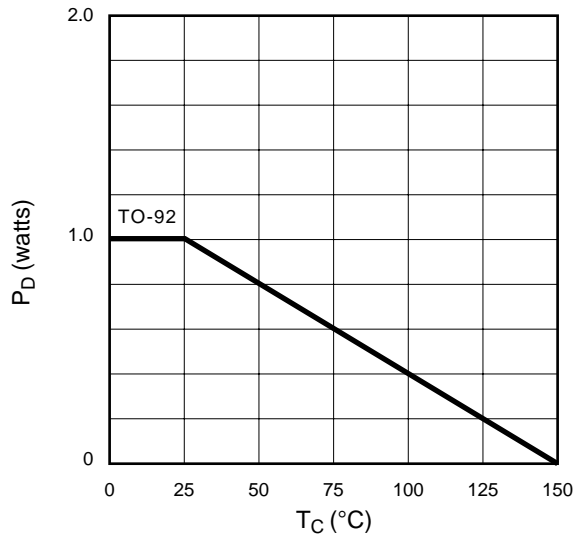
Saturation Characteristics



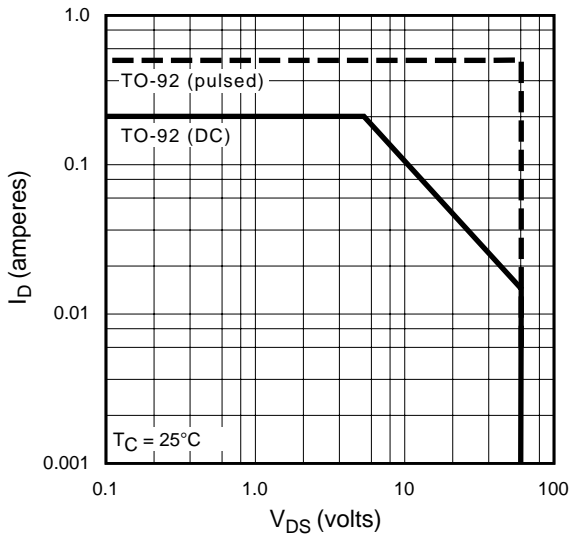
Transconductance vs. Drain Current



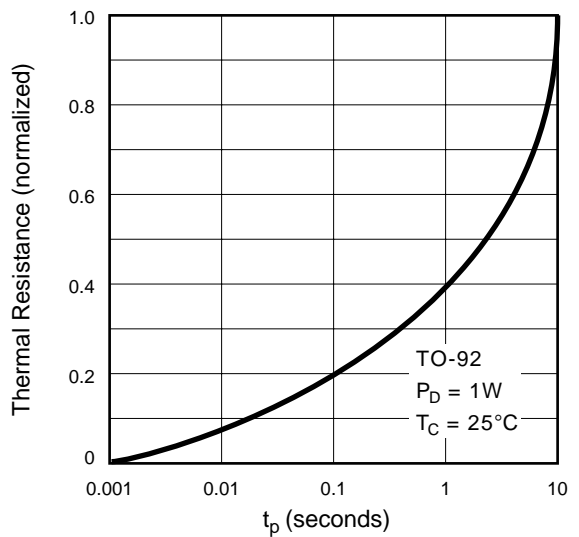
Power Dissipation vs. Case Temperature



Maximum Rated Safe Operating Area

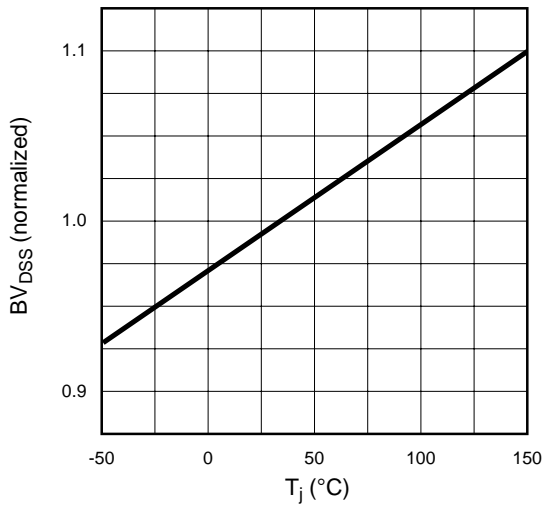


Thermal Response Characteristics

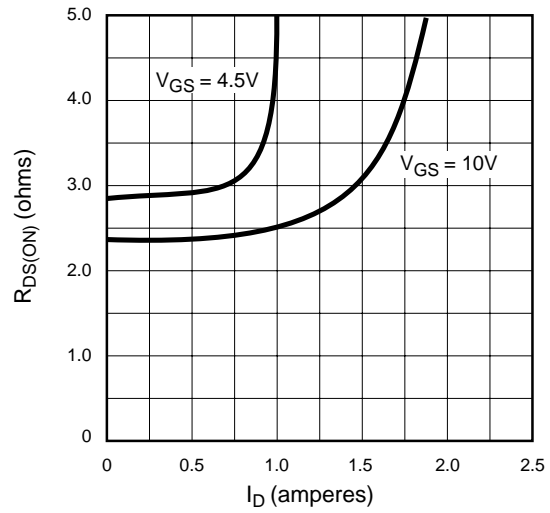


Typical Performance Curves

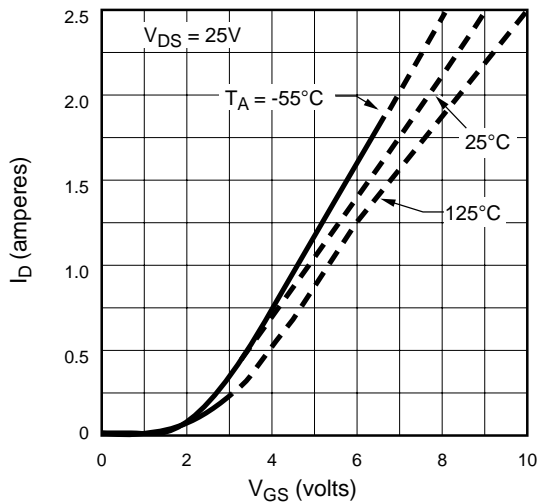
BV_{DSS} Variation with Temperature



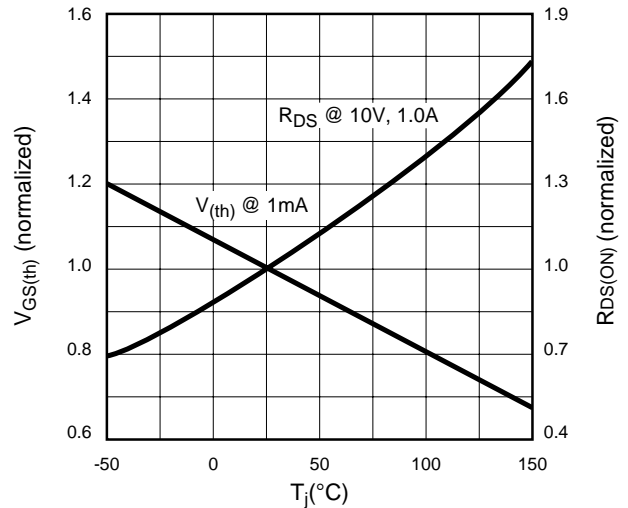
On-Resistance vs. Drain Current



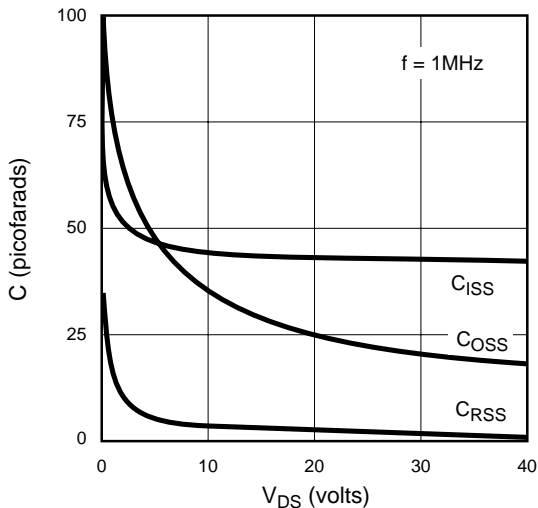
Transfer Characteristics



V_(th) and R_{DS} Variation with Temperature



Capacitance vs. Drain-to-Source Voltage



Gate Drive Dynamic Characteristics

