



N-Channel Depletion-Mode Vertical DMOS FET

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
- ▶ Telecom

General Description

This depletion-mode (normally-on) transistor utilizes an advanced vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces a device 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, this device is 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.

Ordering Information

Device	Package Option	BV _{DSX} / BV _{DGX} (V)	R _{DS(ON)} (max) (Ω)	I _{DSS} (min) (mA)
	TO-252 (D-PAK)			
DN3765	DN3765K4-G	650	8.0	200

-G indicates package is RoHS compliant ('Green')



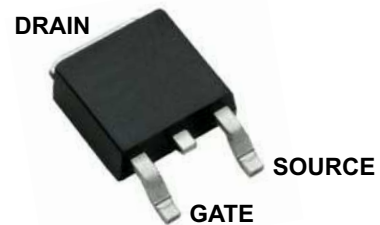
Absolute Maximum Ratings

Parameter	Value
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
Maximum junction temperature*	150°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.

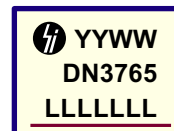
* Distance of 1.6mm from case for 10 seconds.

Pin Configuration



TO-252 (D-PAK) (K4)

Product Marking



YY = Year Sealed
 WW = Week Sealed
 L = Lot Number
 _____ = "Green" Packaging

TO-252 (D-PAK) (K4)

Thermal Characteristics

Package	I_D (continuous) [†] (A)	I_D (pulsed) (A)	Power Dissipation [‡] @ $T_A = 25^\circ\text{C}$ (W)	θ_{jc} ($^\circ\text{C}/\text{W}$)	θ_{ja} ($^\circ\text{C}/\text{W}$)	I_{DR}^\dagger (A)	I_{DRM} (A)
TO-252 (D-PAK)	0.30	0.50	2.5	6.25	50	0.30	0.50

Notes:

- † I_D (continuous) is limited by max rated T_j of 150°C .
- ‡ Mounted on FR4 board, 25mm x 25mm x 1.57mm.

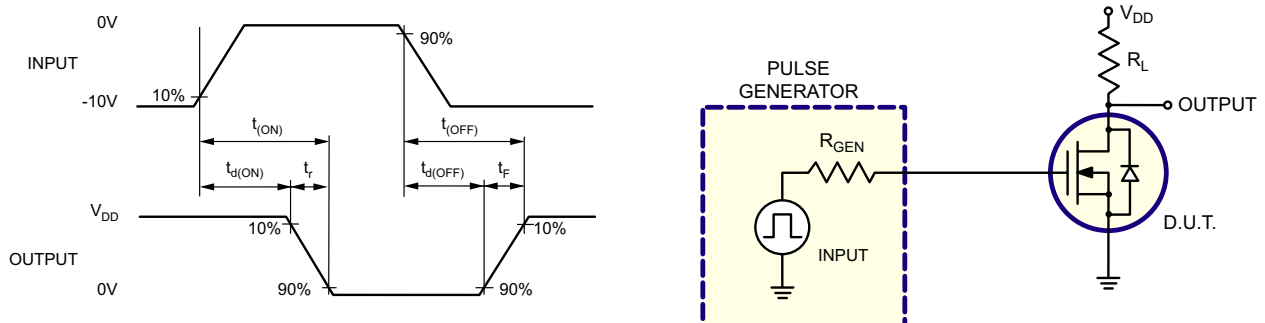
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise specified)

Sym	Parameter	Min	Typ	Max	Units	Conditions
BV_{DSX}	Drain-to-source breakdown voltage	650	-	-	V	$V_{GS} = -5.0\text{V}$, $I_D = 100\mu\text{A}$
$V_{GS(OFF)}$	Gate-to-source off voltage	-1.5	-	-3.5	V	$V_{DS} = 25\text{V}$, $I_D = 10\mu\text{A}$
$\Delta V_{GS(OFF)}$	Change in $V_{GS(OFF)}$ with temperature	-	-	-4.5	mV/ $^\circ\text{C}$	$V_{DS} = 25\text{V}$, $I_D = 10\mu\text{A}$
I_{GSS}	Gate body leakage current	-	-	100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
$I_{D(OFF)}$	Drain-to-source leakage current	-	-	10	μA	$V_{GS} = -10\text{V}$, $V_{DS} = \text{Max Rating}$
		-	-	1.0	mA	$V_{GS} = -10\text{V}$, $V_{DS} = 0.8 \text{ Max Rating}$, $T_A = 125^\circ\text{C}$
I_{DSS}	Saturated drain-to-source current	200	-	-	mA	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$
$R_{DS(ON)}$	Static drain-to-source on-state resistance	-	-	8.0	Ω	$V_{GS} = 0\text{V}$, $I_D = 150\text{mA}$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with temperature	-	-	1.1	%/ $^\circ\text{C}$	$V_{GS} = 0\text{V}$, $I_D = 150\text{mA}$
G_{FS}	Forward transductance	100	-	-	mmho	$I_D = 100\text{mA}$, $V_{DS} = 10\text{V}$
C_{ISS}	Input capacitance	-	-	825	pF	$V_{GS} = -10\text{V}$, $V_{DS} = 25\text{V}$, $f = 1.0\text{MHz}$
C_{OSS}	Common source output capacitance	-	-	190		
C_{RSS}	Reverse transfer capacitance	-	-	110		
$t_{d(ON)}$	Turn-on delay time	-	-	50	ns	$V_{DD} = 25\text{V}$, $I_D = 150\text{mA}$, $R_{GEN} = 25\Omega$
t_r	Rise time	-	-	75		
$t_{d(OFF)}$	Turn-off delay time	-	-	75		
t_f	Fall time	-	-	100		
V_{SD}	Diode forward voltage drop	-	-	1.8	V	$V_{GS} = -5.0\text{V}$, $I_{SD} = 200\text{mA}$
t_{rr}	Reverse recovery time	-	800	-	ns	$V_{GS} = -5.0\text{V}$, $I_{SD} = 200\text{mA}$

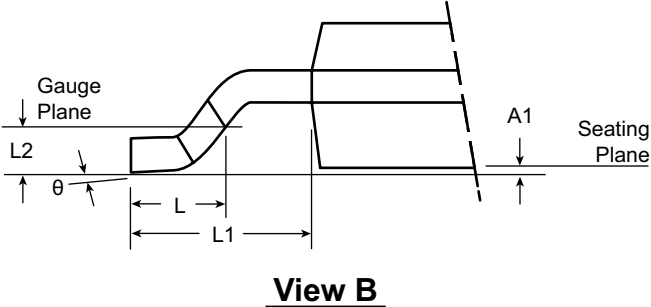
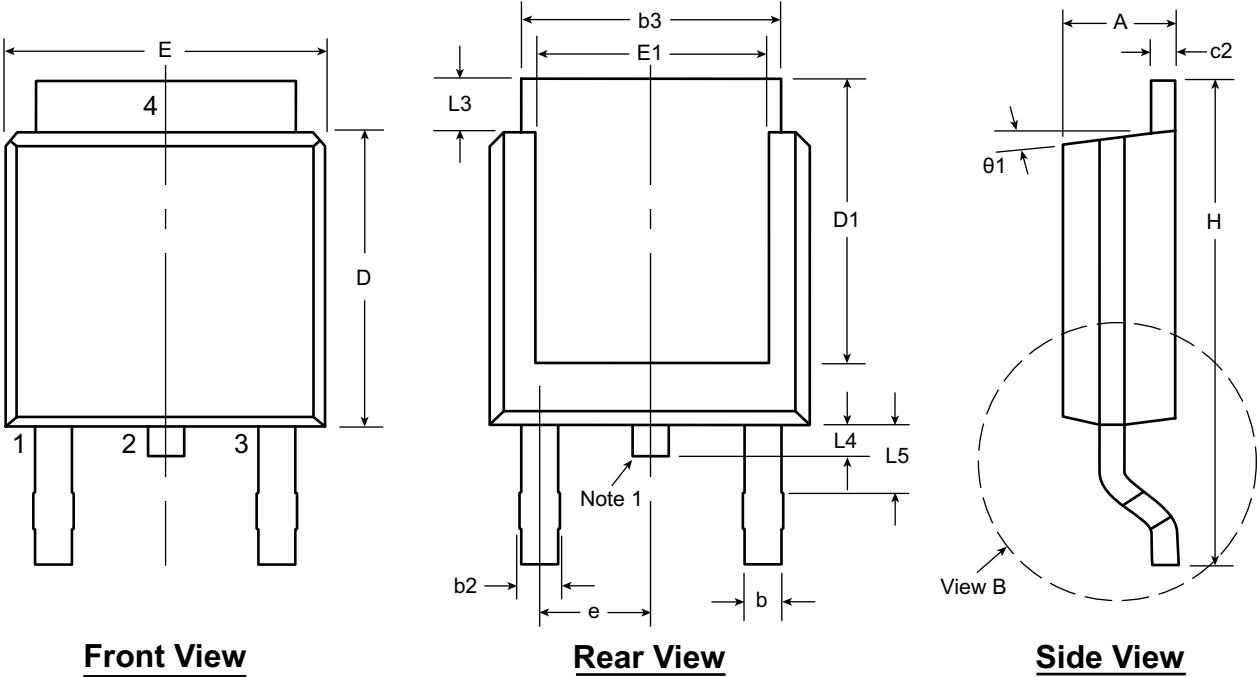
Notes:

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

Switching Waveforms and Test Circuit



3-Lead TO-252 D-PAK Package Outline (K4)



Note:
 1. Although 4 terminal locations are shown, only 3 are functional. Lead number 2 was removed.

Symbol	A	A1	b	b2	b3	c2	D	D1	E	E1	e	H	L	L1	L2	L3	L4	L5	θ	$\theta1$
Dimension (inches)	MIN	.086	.000*	.025	.030	.195	.018	.235	.205	.250	.170	.370	.055	.108 REF	.020 BSC	.035	.025*	.045	0°	0°
	NOM	-	-	-	-	-	.240	-	-	-	.090 BSC	-	.060	-	-	-	-	-	-	-
	MAX	.094	.005	.035	.045	.215	.035	.245	.217*	.265	.182*	.410	.070	-	-	.050	.040	.060	10°	15°

JEDEC Registration TO-252, Variation AA, Issue E, June 2004.
 * This dimension is not specified in the original JEDEC drawing. The value listed is for reference only.
Drawings not to scale.
Supertex Doc. #: DSPD-3TO252K4, Version D081408.

(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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