



N-Channel Depletion-Mode Vertical DMOS FET in Single and Dual Options

Features

- ▶ Very low gate threshold voltage
- ▶ Designed to be source-driven
- ▶ Low switching losses
- ▶ Low effective output capacitance
- ▶ Designed for inductive loads
- ▶ Well matched for low second harmonic when driven by Supertex MD2130

Applications

- ▶ Medical ultrasound beamforming
- ▶ Ultrasonic array focusing transmitter
- ▶ Piezoelectric transducer waveform drivers
- ▶ High speed arbitrary waveform generator
- ▶ Normally-on switches
- ▶ Solid state relays
- ▶ Constant current sources
- ▶ Power supply circuits

General Description

The Supertex DN2625 is a low threshold depletion-mode (normally-on) transistor utilizing 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.

The DN2625DK6-G contains two MOSFETs in an 8-lead, dual pad DFN package. The DN2625K6-G in the 14-lead QFN package is not recommended for new designs, but may continue to be purchased for existing designs.

Ordering Information

Part Number	Package Option	Packing
DN2625K4-G	TO-252 D-PAK	1000/Bag
DN2625DK6-G	8-Lead DFN	490/Tray
DN2625DK6-G M932	8-Lead DFN	2500/Reel
DN2625K6-G*	14-Lead QFN	490/Tray

-G denotes a lead (Pb)-free / RoHS compliant package.

Contact factory for Wafer / Die availability.

Devices in Wafer / Die form are lead (Pb)-free / RoHS compliant.

* This package obsolete. For single MOSFETs use the TO-252 D-PAK (K4), for dual MOSFETs use the 8-Lead DFN (K6) (dual pad).

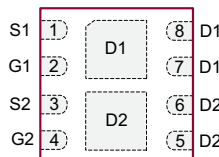
Product Summary

BV_{DSX}/BV_{DGX}	$V_{GS(Off)} (max)$	$I_{DS} (pulsed)$ ($V_{GS} = 0.9V$) (min)
250V	-2.1V	3.3A

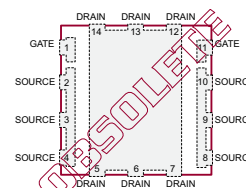
Pin Configuration



TO-252 D-PAK



8-Lead DFN (dual pad)
(top view)



14-Lead QFN
(top view)

Absolute Maximum Ratings

Parameter	Value
Drain-to-source voltage	250V
Drain-to-gate voltage	250V
Gate-to-source voltage	±20V
Operating and storage temperature	-55°C to +150°C
Soldering temperature*	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.

* Distance of 1.6mm from case for 10 seconds.

Typical Thermal Resistance

Package	θ_{ja}
TO-252 D-PAK ¹	81°C/W
8-Lead DFN (dual pad) ²	29°C/W
14-Lead QFN ²	23°C/W

1. 4-layer, 1oz, 3x4inch PCB, with 20-via for drain pad.
2. 4-layer, 1oz, 3x4inch PCB, with 12-via for drain pad.

Product Marking

Packages may or may not include the following marks: Si or 

Si YYWW
DN2625
LLLLLL

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

TO-252 D-PAK

D2625D
LLLLLL
YYWW
AAACCC

L = Lot Number
YY = Year Sealed
WW = Week Sealed
A = Assembler ID
C = Country of Origin
= "Green" Packaging

8-Lead DFN (dual pad)

DN2625
LLLLLL
YYWW
AAACCC

L = Lot Number
YY = Year Sealed
WW = Week Sealed
A = Assembler ID
C = Country of Origin
= "Green" Packaging

14-Lead QFN

This package is not recommended
for new designs.

Thermal Characteristics

Package	I_D (continuous) ¹	I_D (pulsed)	I_{DR}^1	I_{DRM}
TO-252 D-PAK	1.1A	3.3A	1.1A	3.3A
8-Lead DFN (dual pad)	1.1A	3.3A	1.1A	3.3A
14-Lead QFN	1.1A	3.3A	1.1A	3.3A

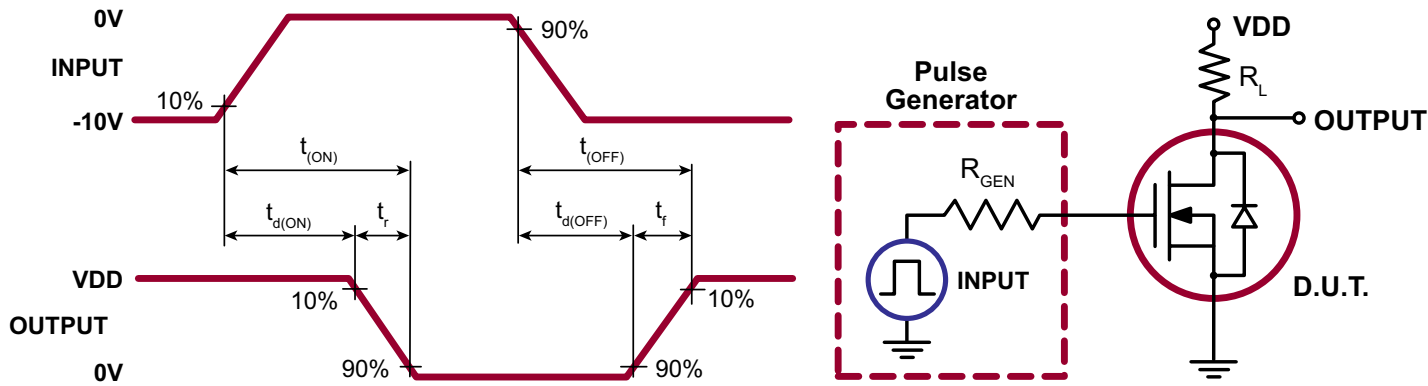
Notes:

- I_D (Continuous) is limited by max. T_r

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

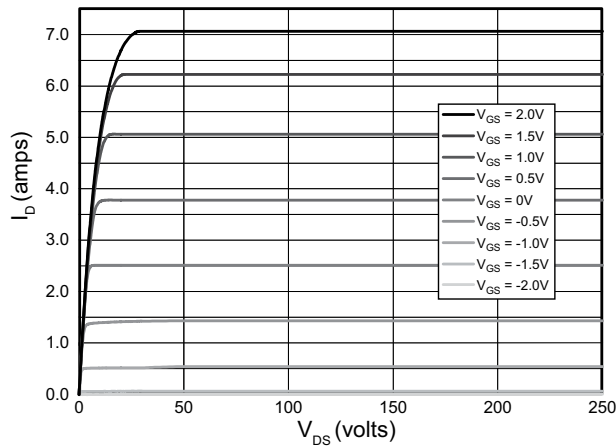
Sym	Parameter	Min	Typ	Max	Units	Conditions
BV_{DSX}	Drain-to-source breakdown voltage	250	-	-	V	$V_{GS} = -2.5\text{V}$, $I_D = 50\mu\text{A}$
BV_{DGX}	Drain-to-gate breakdown voltage	250	-	-	V	$V_{GS} = -2.5\text{V}$, $I_D = 50\mu\text{A}$
$V_{GS(OFF)}$	Gate-to-source off voltage	-1.5	-	-2.1	V	$V_{DS} = 15\text{V}$, $I_D = 100\mu\text{A}$
$\Delta V_{GS(OFF)}$	Change in $V_{GS(OFF)}$ with temperature	-	-	-4.5	mV/ $^\circ\text{C}$	$V_{DS} = 15\text{V}$, $I_D = 100\mu\text{A}$
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	-	-	1.0	μA	$V_{DS} = 250\text{V}$, $V_{GS} = -5.0\text{V}$
		-	-	200		$V_{DS} = 250\text{V}$, $V_{GS} = -5.0\text{V}$, $T_A = 125^\circ\text{C}$
I_{DSS}	Saturated drain-to-source current	1.1	-	-	A	$V_{GS} = 0\text{V}$, $V_{DS} = 15\text{V}$
$I_{DS(PULSE)}$	Pulsed drain-to-source current	3.1	3.3	-	A	$V_{GS} = 0.9\text{V}$, $V_{DS} = 15\text{V}$ (with duty cycle of 1%)
$R_{DS(ON)}$	Static drain-to-source on-resistance	-	-	3.5	Ω	$V_{GS} = 0\text{V}$, $I_D = 1.0\text{A}$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with temperature	-	-	1.1	%/ $^\circ\text{C}$	$V_{GS} = 0\text{V}$, $I_D = 200\text{mA}$
G_{FS}	Forward transconductance	100	-	-	mmho	$V_{DS} = 10\text{V}$, $I_D = 150\text{mA}$
C_{ISS}	Input capacitance	-	800	1000	pF	$V_{GS} = -2.5\text{V}$, $V_{DS} = 25\text{V}$, $f = 1.0\text{MHz}$
C_{OSS}	Common source output capacitance	-	70	210		
C_{RSS}	Reverse transfer capacitance	-	18	70		
$t_{d(ON)}$	Turn-on delay time	-	-	10	ns	$V_{DD} = 25\text{V}$, $I_D = 150\text{mA}$, $R_{GEN} = 3.0\Omega$, $V_{GS} = 0\text{V to } -10\text{V}$
t_r	Rise time	-	-	20		
$t_{d(OFF)}$	Turn-off delay time	-	-	10		
t_f	Fall time	-	-	20		
V_{SD}	Diode forward voltage drop	-	-	1.8	V	$V_{GS} = -2.5\text{V}$, $I_{SD} = 150\text{mA}$
Q_G	Total gate charge	-	-	7.04	nC	$I_D = 3.5\text{A}$, $V_{DS} = 100\text{V}$, $V_{GS} = 1.5\text{V}$
Q_{GS}	Gate-to-source charge	-	-	0.783		
Q_{GD}	Gate-to-drain charge	-	-	3.73		

Switching Waveforms and Test Circuit

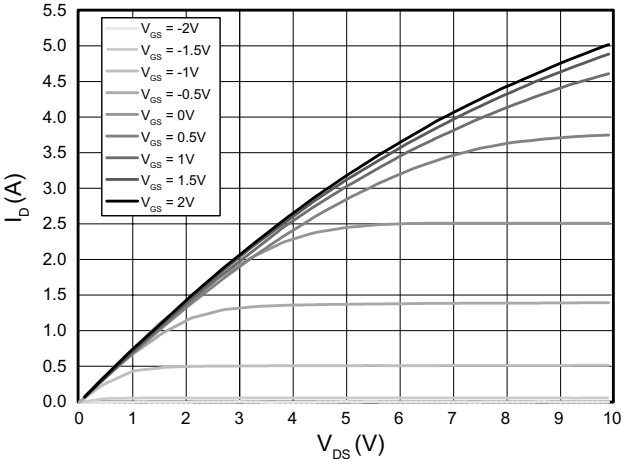


Typical Performance Curves

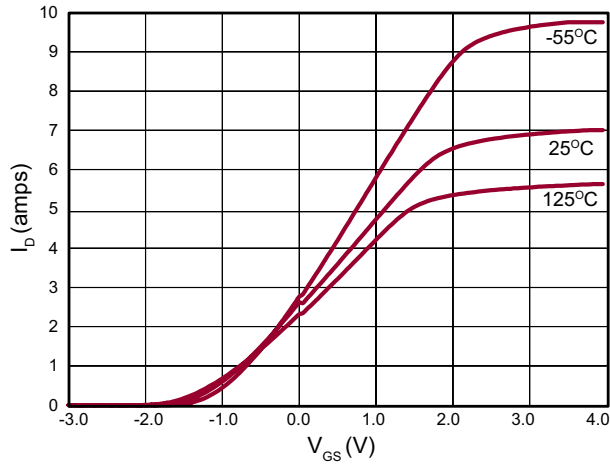
Output Characteristics



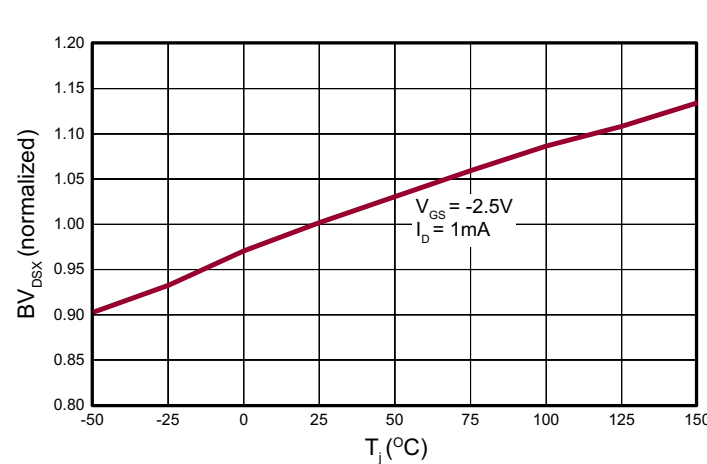
Saturation Characteristics



Transfer Characteristics

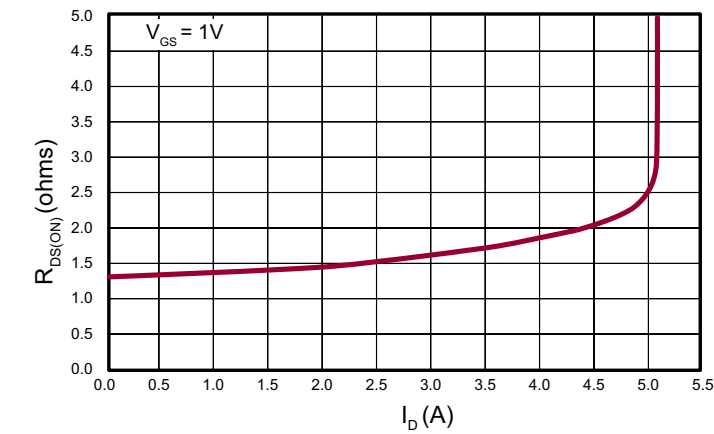


BV_{DSX} Variation With Temperature

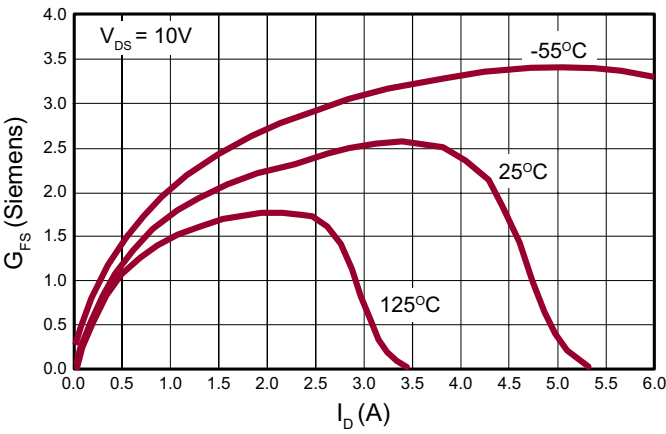


Typical Performance Curves (cont.)

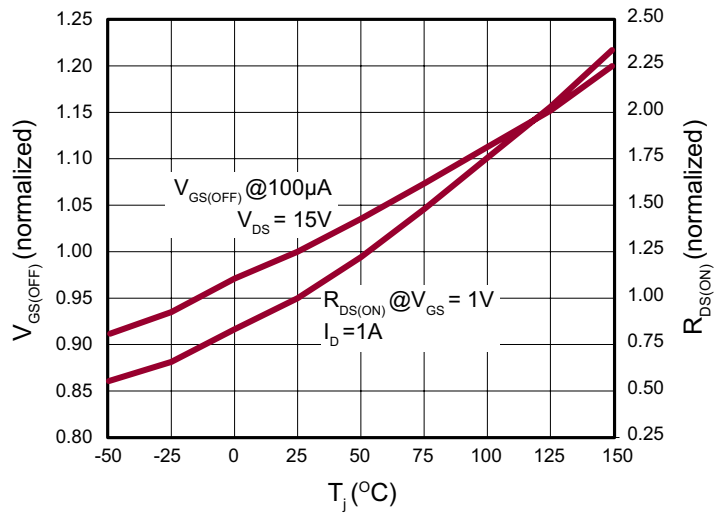
On-Resistance vs Drain Current



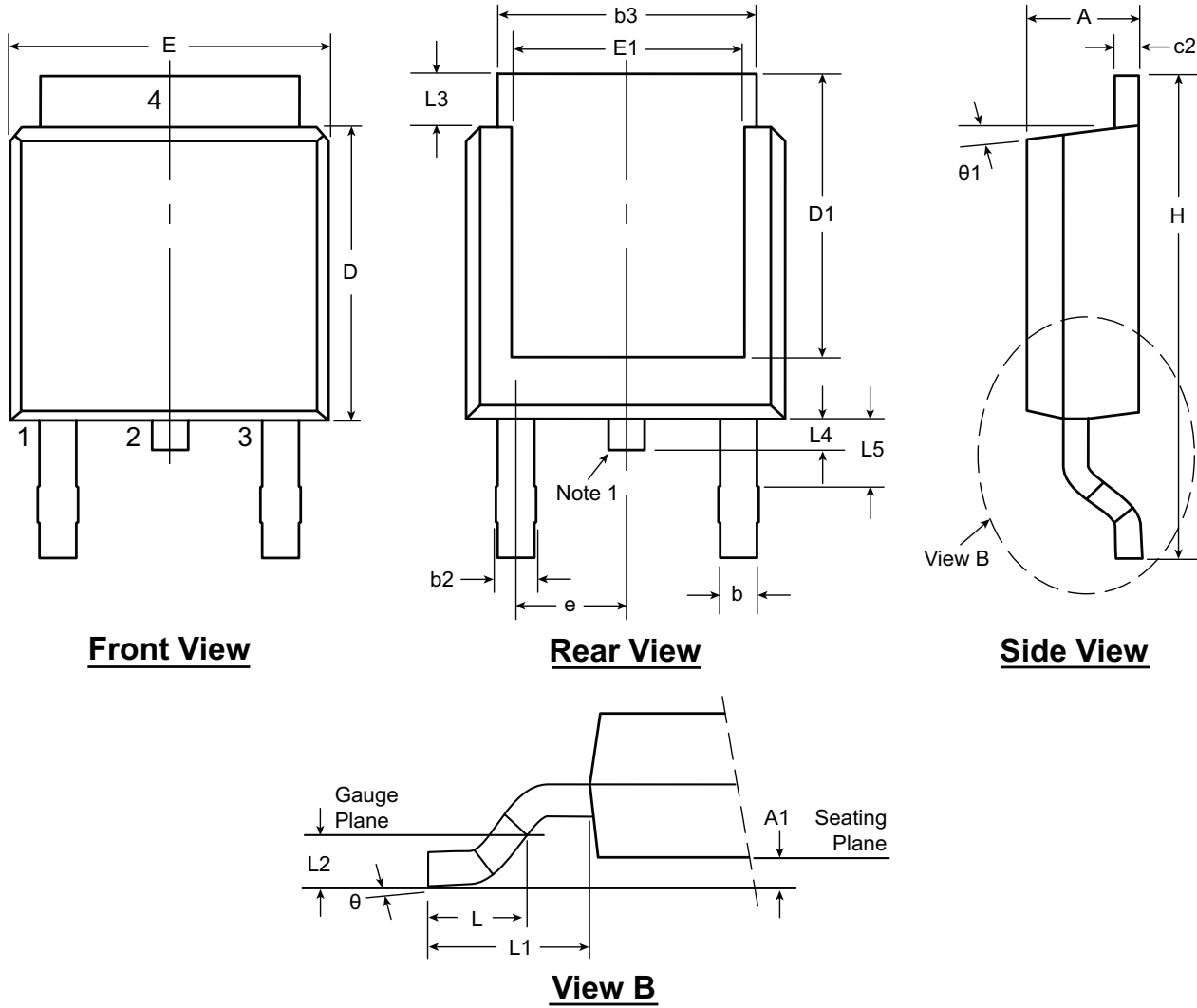
Transconductance vs Drain Current



$V_{GS(OFF)}$ and $R_{DS(ON)}$ Variation With Temperature



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



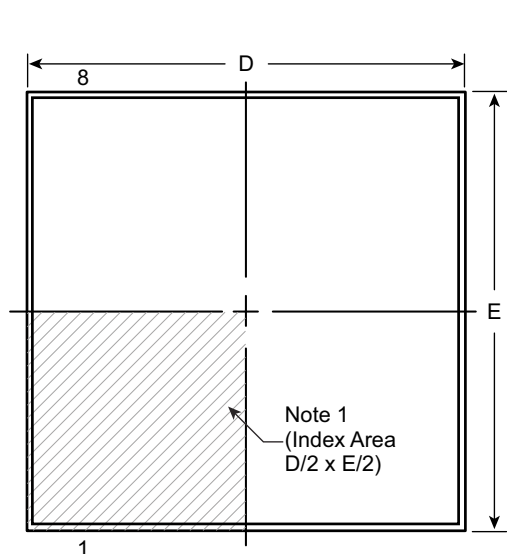
Note:
1. Although 4 terminal locations are shown, only 3 are functional. Lead number 2 was removed.

Symbol		A	A1	b	b2	b3	c2	D	D1	E	E1	e	H	L	L1	L2	L3	L4	L5	θ	θ1
Dimension (inches)	MIN	.086	.000*	.025	.030	.195	.018	.235	.205	.250	.170	.090 BSC	.370	.055	.108 REF	.020 BSC	.035	.025*	.045	0°	0°
	NOM	-	-	-	-	-	-	.240	-	-	-		-	.060			-	-	-	-	-
	MAX	.094	.005	.035	.045	.215	.035	.245	.217*	.265	.182*		.410	.070			.050	.040	.060	10°	15°

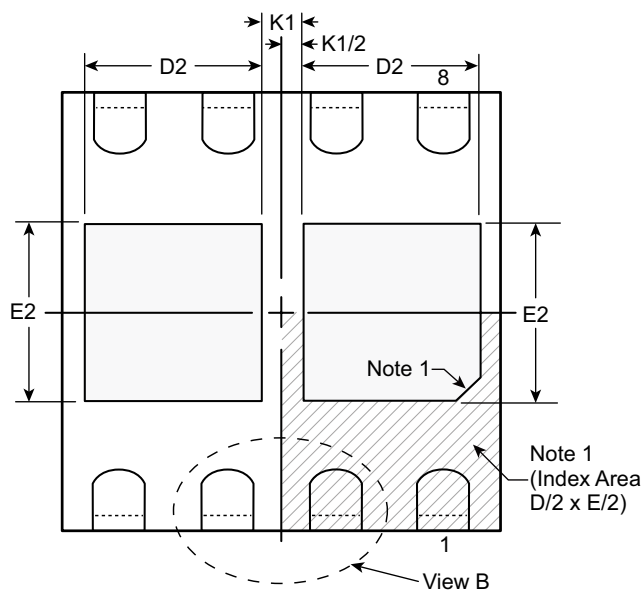
JEDEC Registration TO-252, Variation AA, Issue E, June 2004.
* This dimension is not specified in the JEDEC drawing.
Drawings not to scale.
Supertex Doc. #: DSPD-3TO252K4, Version E041309.

8-Lead DFN Package Outline (K6)

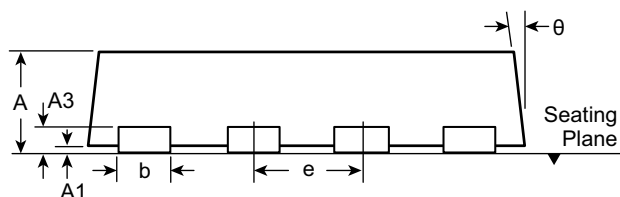
5.00x5.00mm body, 0.90mm height (max), 1.27mm pitch (dual pad)



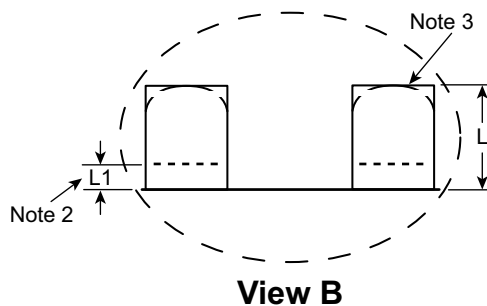
Top View



Bottom View



Side View



View B

Notes:

1. A Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/identifier; an embedded metal marker; or a printed indicator.
2. Depending on the method of manufacturing, a maximum of 0.15mm pullback (L1) may be present.
3. The inner tip of the lead may be either rounded or square.

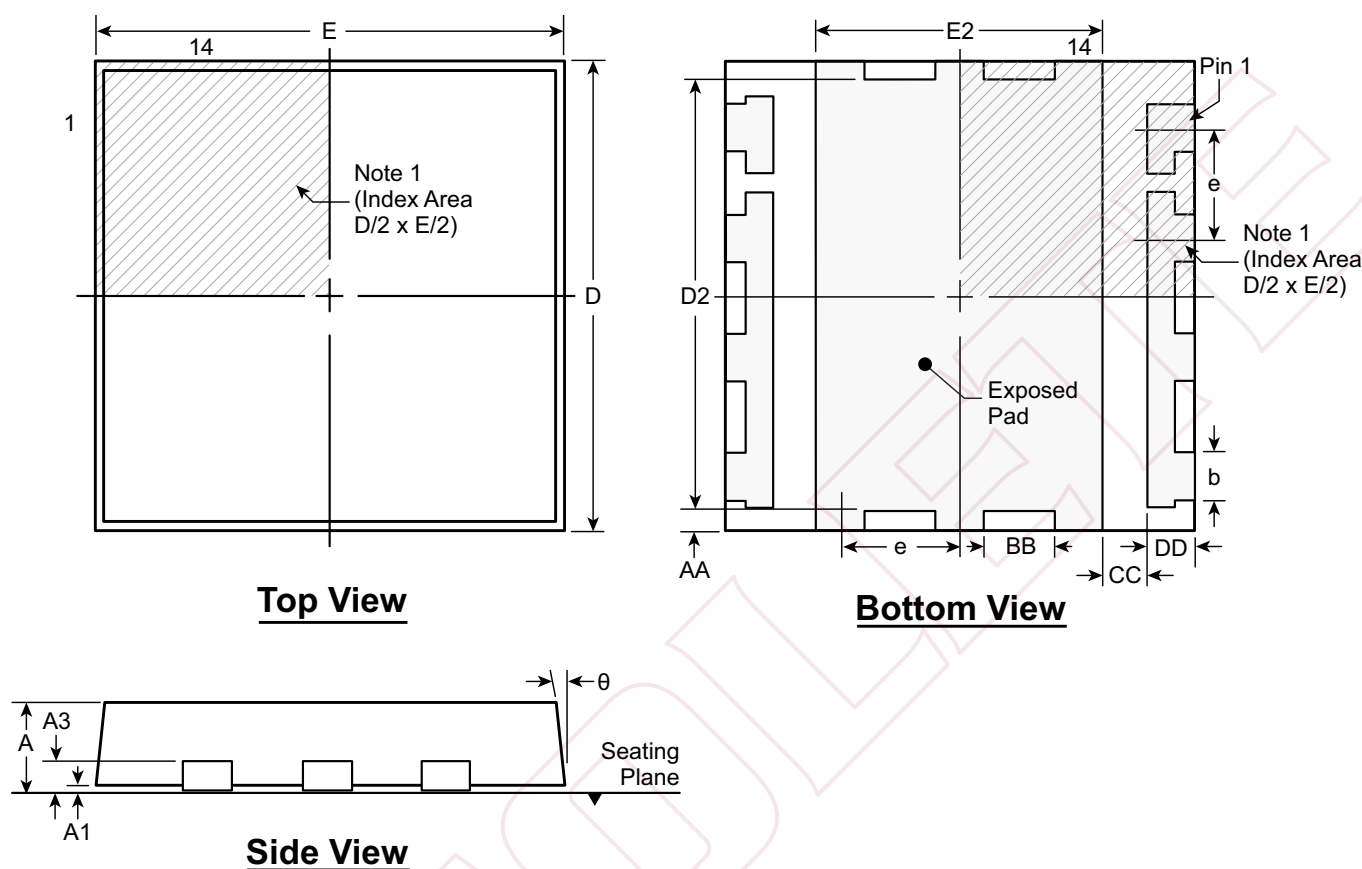
Symbol		A	A1	A3	b	D	D2	E	E2	e	K1	L	L1	θ
Dimension (mm)	MIN	0.80	0.00	0.20 REF	0.35	4.90	1.93	4.90	1.90	1.27 BSC	0.40 REF	0.40	0.00	0°
	NOM	0.85	-		0.40	5.00	2.03	5.00	2.00			0.50	-	-
	MAX	0.90	0.05		0.45	5.10	2.13	5.10	2.10			0.60	0.15	14°

Drawings not to scale

Supertex Doc. #: DSPD-8DFNK65x5P127, Version A040209

14-Lead QFN Package Outline (K6)

5.00x5.00mm body, 1.00mm height (max), 1.27mm pitch



Notes:

1. A Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/identifier; an embedded metal marker; or a printed indicator.

Symbol		A	A1	A3	b	D	D2	E	E2	e	AA	BB	CC	DD	θ
Dimension (mm)	MIN	0.80	0.00	0.20 REF	0.46	4.85	4.45	4.85	2.52	1.27 BSC	0.152	0.473	0.66	0.456	0°
	NOM	0.90	0.02		0.51	5.00	4.50	5.00	2.57		0.252	0.523	0.71	0.506	-
	MAX	1.00	0.05		0.58	5.15	4.55	5.15	2.62		0.352	0.583	0.77	0.566	14°

Drawings not to scale.

Supertex Doc. #: DSPD-14QFNK65X5P127, Version B090808.

(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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