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

Device	Package Options			BV_{DSX}/ BV_{DGX} (V)	$V_{GS(OFF)}$ (max) (V)	I_{DS} (pulsed) (V_{GS} = 0.9V) (min) (A)
	TO-252 (D-PAK)	8-Lead DFN *5.00x5.00mm body 0.90mm height (max) 1.27mm pitch (dual pad)*	14-Lead QFN* *5.00x5.00mm body 1.00mm height (max) 1.27mm pitch*			
DN2625	DN2625K4-G	DN2625DK6-G	DN2625K6-G	250	-2.1	3.3

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

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

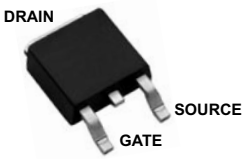
Absolute Maximum Ratings

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

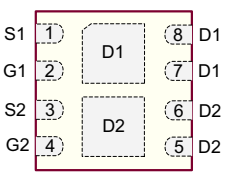
Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

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

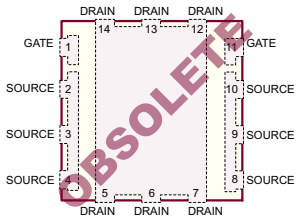
Pin Configurations



TO-252 D-PAK (K4)



8-Lead DFN (K6) (dual pad)
(top view)



14-Lead QFN (K6)
(top view)
This package is not recommended for new designs.

Product Marking

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

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

TO-252 D-PAK (K4)

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

8-Lead DFN (K6) (dual pad)

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

14-Lead QFN (K6)

This package is not recommended for new designs.

OBSOLETE

Thermal Characteristics

Package	I_D (continuous)[1] (A)	I_D (pulsed) (A)	$R_{\theta ja}$ (°C/W)	$R_{\theta jc}$ (°C/W)	I_{DR}[1] (A)	I_{DRM} (A)
D-PAK	1.1	3.3	50[2]	5.5	1.1	3.3
8-Lead DFN (dual pad)	1.1	3.3	32[3]	3.2	1.1	3.3
14-Lead QFN	1.1	3.3	22[3]	2.0[4]	1.1	3.3

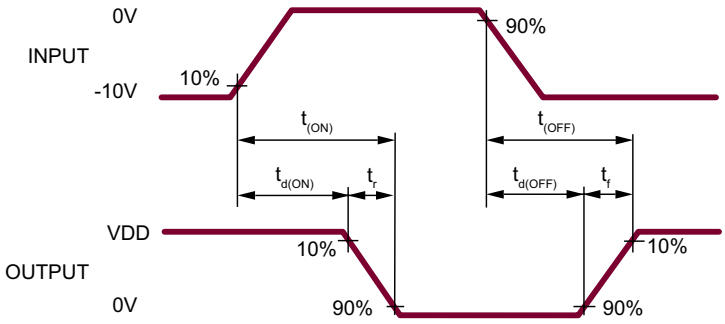
Notes:

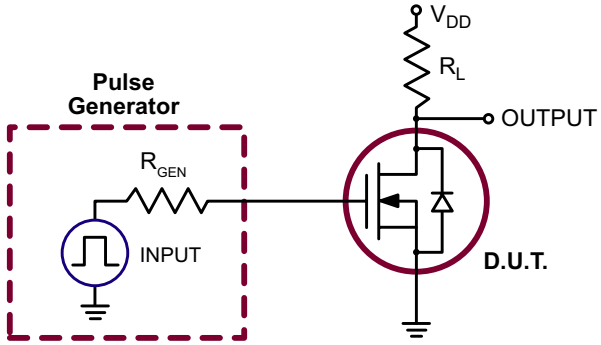
1. *I_D (Continuous) is limited by max. T_j.*
2. *4-layer, 1oz, 3x4inch PCB, with 20-via for drain pad.*
3. *4-layer, 1oz, 3x4inch PCB, with 12-via for drain pad.*
4. *Junction to the DFN thermal pad.*

Electrical Characteristics *(T_A = 25°C unless otherwise specified)*

Sym	Parameter	Min	Typ	Max	Units	Conditions
BV_{DSX}	Drain-to-source breakdown voltage	250	-	-	V	V_{GS} = -2.5V, I_D = 50µA
BV_{DGX}	Drain-to-gate breakdown voltage	250	-	-	V	V_{GS} = -2.5V, I_D = 50µA
$V_{GS(OFF)}$	Gate-to-source off voltage	-1.5	-	-2.1	V	V_{DS} = 15V, I_D = 100µA
$\Delta V_{GS(OFF)}$	Change in $V_{GS(OFF)}$ with temperature	-	-	-4.5	mV/°C	V_{DS} = 15V, I_D = 100µA
I_{GSS}	Gate body leakage current	-	-	100	nA	V_{GS} = ±20V, V_{DS} = 0V
$I_{D(OFF)}$	Drain-to-source leakage current	-	-	1.0	µA	V_{DS} = 250V, V_{GS} = -5.0V
		-	-	200		V_{DS} = 250V, V_{GS} = -5.0V, T_A = 125°C
I_{DSS}	Saturated drain-to-source current	1.1	-	-	A	V_{GS} = 0V, V_{DS} = 15V
$I_{DS(PULSE)}$	Pulsed drain-to-source current	3.1	3.3	-	A	V_{GS} = 0.9V, V_{DS} = 15V (with duty cycle of 1%)
$R_{DS(ON)}$	Static drain-to-source on-resistance	-	-	3.5	Ω	V_{GS} = 0V, I_D = 1.0A
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with temperature	-	-	1.1	%/°C	V_{GS} = 0V, I_D = 200mA
G_{FS}	Forward transconductance	100	-	-	mmho	V_{DS} = 10V, I_D = 150mA
C_{ISS}	Input capacitance	-	800	1000	pF	V_{GS} = -2.5V, V_{DS} = 25V, f = 1.0MHz
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} = 25V, I_D = 150mA, R_{GEN} = 3.0Ω, V_{GS} = 0v to -10V
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} = -2.5V, I_{SD} = 150mA
Q_G	Total gate charge	-	-	7.04	nC	I_D = 3.5A, V_{DS} = 100V, V_{GS} = 1.5V
Q_{GS}	Gate-to-source charge	-	-	0.783		
Q_{GD}	Gate-to-drain charge	-	-	3.73		

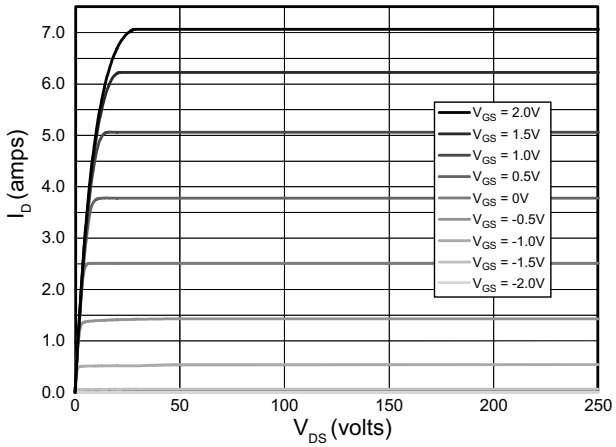
Switching Waveforms and Test Circuit



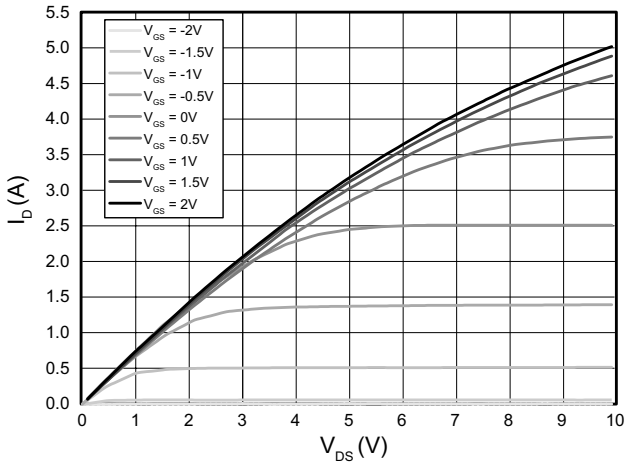


Typical Performance Curves

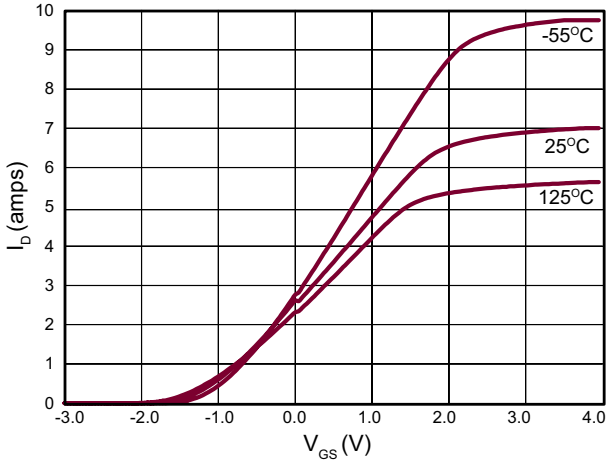
Output Characteristics



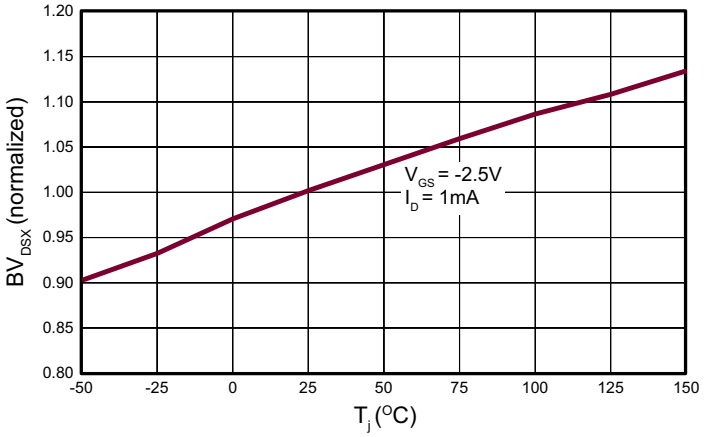
Saturation Characteristics



Transfer Characteristics

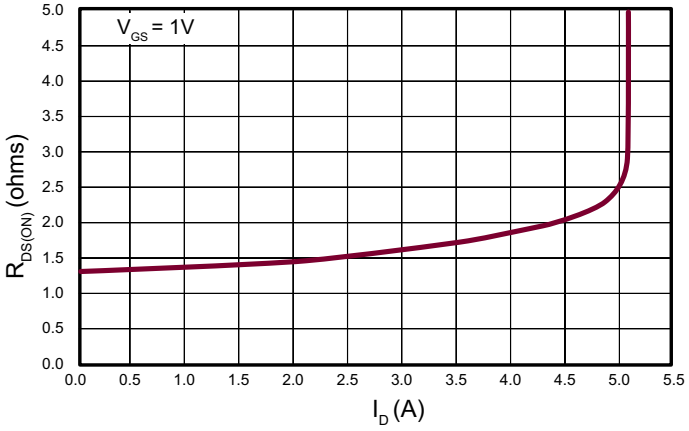


BVDSX Variation With Temperature

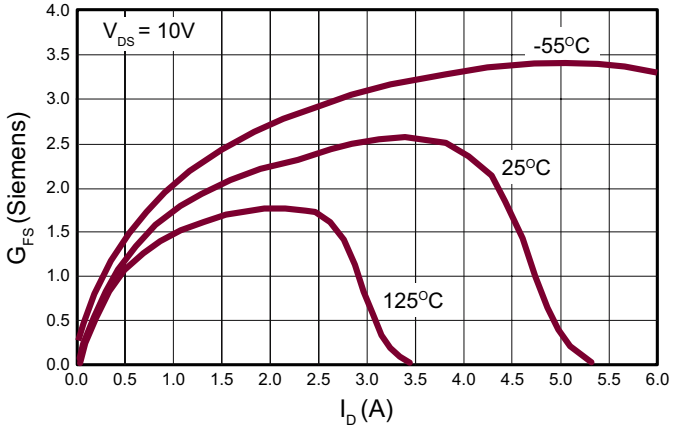


Typical Performance Curves *(cont.)*

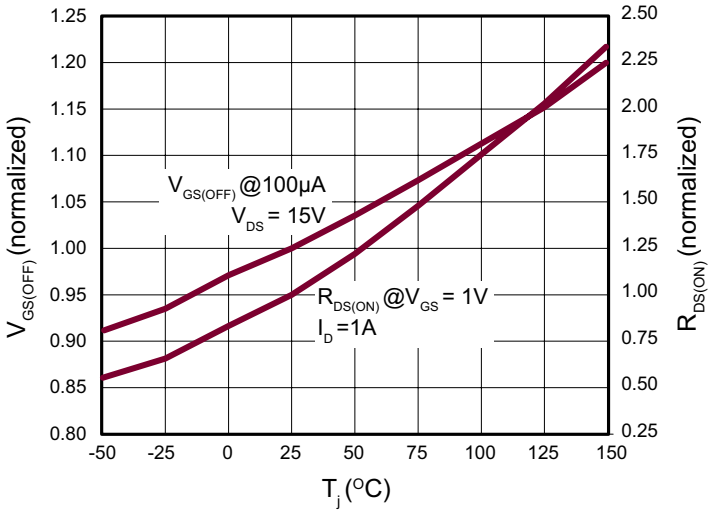
On-Resistance vs Drain Current



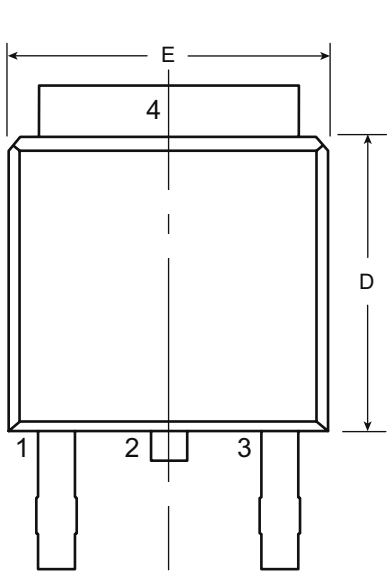
Transconductance vs Drain Current



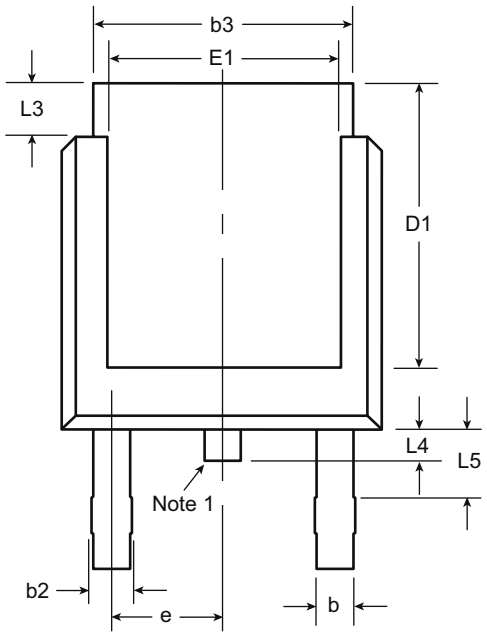
$V_{GS(OFF)}$ and $R_{DS(ON)}$ Variation With Temperature



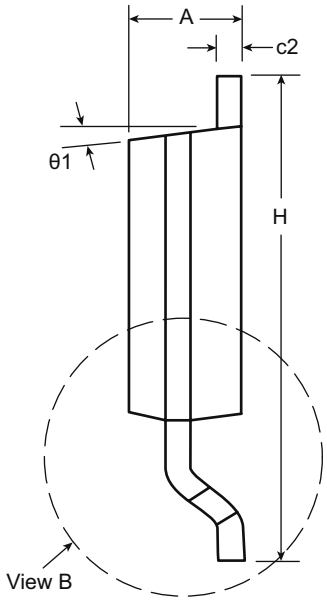
3-Lead TO-252 D-PAK Package Outline (K4)



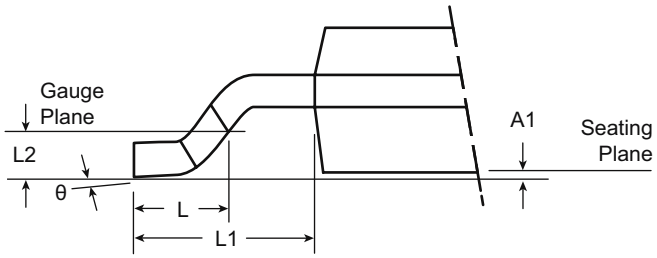
Front View



Rear View



Side View



View B

Note:

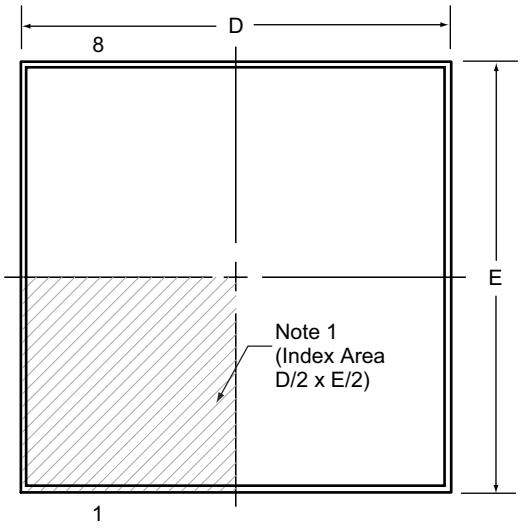
1. *Although 4 terminal locations are shown, only 3 are functional. Lead number 2 was removed.*

Symbol		A	A1	b	b2	b3	c2	D	D1	E	E1	e	H	L	L1	L2	L3	L4	L5	θ	θ1
Dimen-sion (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	0^0
	NOM	-	-	-	-	-	-	.240	-	-	-		-	.060			-	-	-	-	-
	MAX	.094	.005	.035	.045	.215	.035	.245	.217*	.265	.182*		.410	.070			.050	.040	.060	10^0	15^0

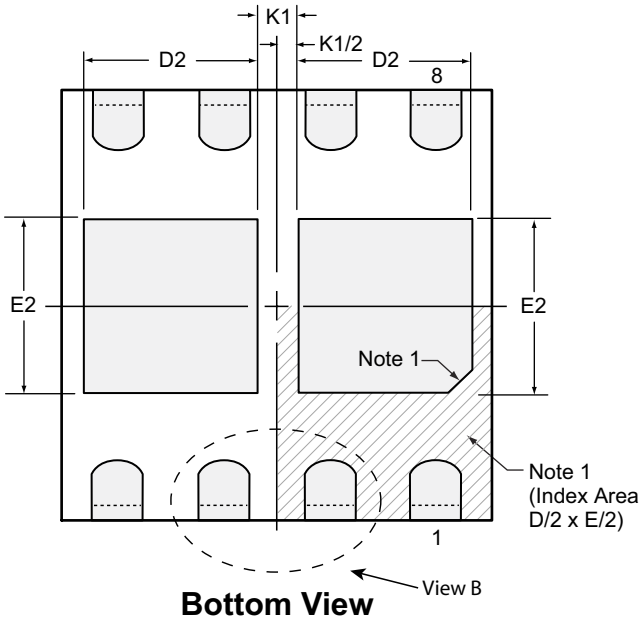
JEDEC Registration TO-252, Variation AA, Issue E, June 2004.
** This dimension is not specified in the JEDEC drawing.*
Drawings not to scale.
Supertex Doc. #: *DSPD-3TO252K4, Version E041309.*

8-Lead DFN Package Outline (K6)

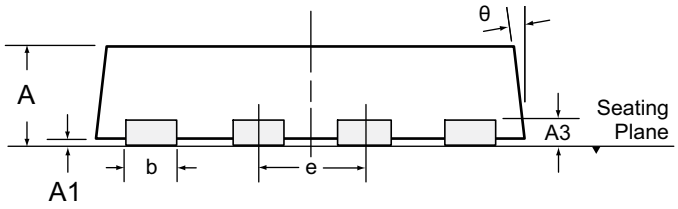
5.00x5.00mm body, 0.90mm height (max), 1.27mm pitch (dual pad)



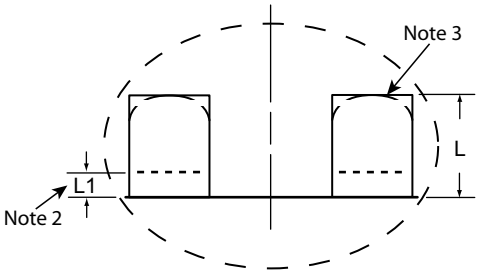
Top View



Bottom View



Side View



View B

Notes:

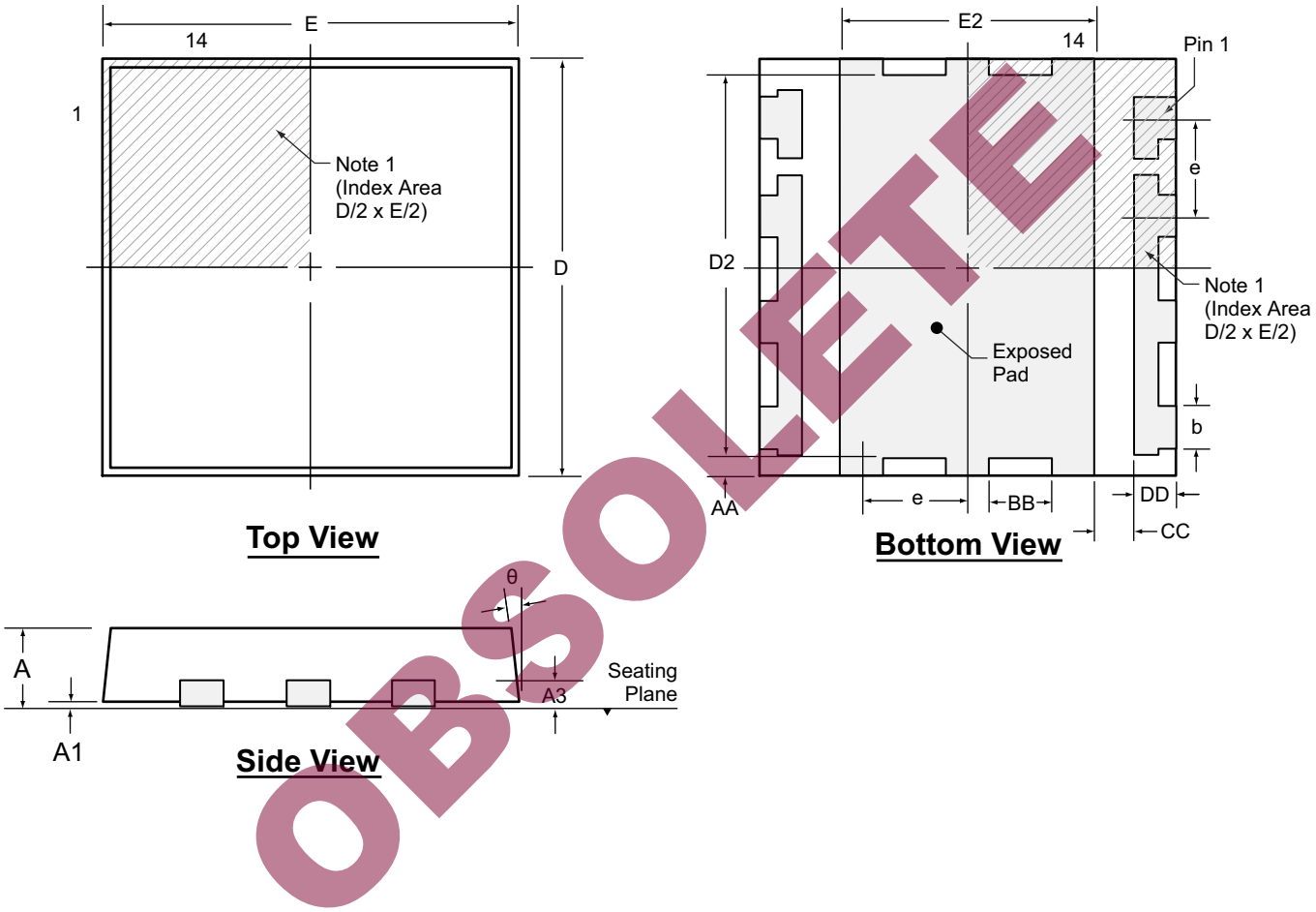
1. *A Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/identifier; an embedded metal marker; or a printed indicator.*
2. *Depending on the method of manufacturing, a maximum of 0.15mm pullback (L1) may be present.*
3. *The inner tip of the lead 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	0º
	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	14º

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.)

Supertex inc.
1235 Bordeaux Drive, Sunnyvale, CA 94089
Tel: 408-222-8888
www.supertex.com