

## NCE N-Channel Super Trench Power MOSFET

### Description

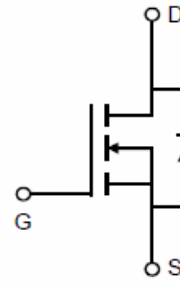
The NCEP85T10G uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of  $R_{DS(ON)}$  and  $Q_g$ . This device is ideal for high-frequency switching and synchronous rectification.

### General Features

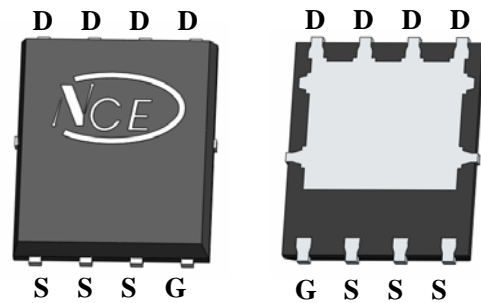
- $V_{DS} = 85V, I_D = 100A$   
 $R_{DS(ON)} < 5.3m\Omega @ V_{GS} = 10V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 150C operating temperature
- Pb-free lead plating
- 100% UIS tested

### Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification



Schematic Diagram



Top View

Bottom View

**100% UIS TESTED!**  
**100% ΔVds TESTED!**

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP85T10G	NCEP85T10G	DFN5X6-8L	-	-	-

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	85	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	100	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	70.7	A
Pulsed Drain Current	$I_{DM}$	380	A
Maximum Power Dissipation	$P_D$	90	W
Derating factor		0.72	W/ $^\circ C$
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	784	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	1.4	$^\circ C/W$
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## Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

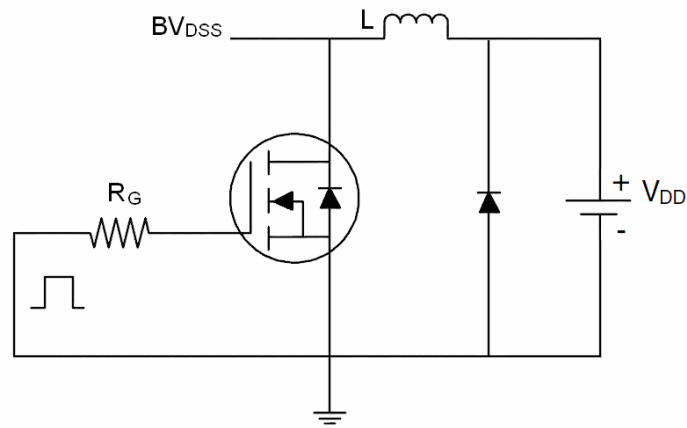
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	85		-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =85V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.5	-	4.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =50A	-	4.5	5.3	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =50A	40	-	-	S
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, F=1.0MHz	-	4300	-	PF
Output Capacitance	C <sub>oss</sub>		-	648	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	44	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =40V, I <sub>D</sub> =50A V <sub>GS</sub> =10V, R <sub>G</sub> =4.7Ω	-	13.5	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	12.5	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	38	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	13.5	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =40V, I <sub>D</sub> =50A, V <sub>GS</sub> =10V	-	55		nC
Gate-Source Charge	Q <sub>gs</sub>		-	21		nC
Gate-Drain Charge	Q <sub>gd</sub>		-	11		nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =100A	-		1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	100	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = I <sub>S</sub> di/dt = 100A/μs (Note3)	-	74		nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	156		nC

### Notes:

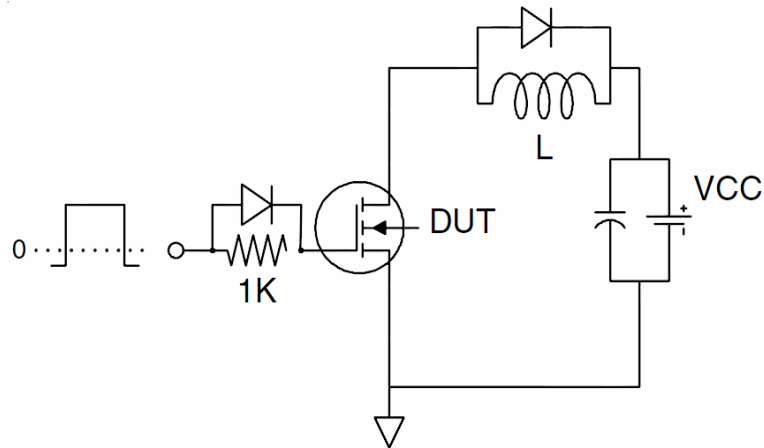
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=42.5V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω

## Test Circuit

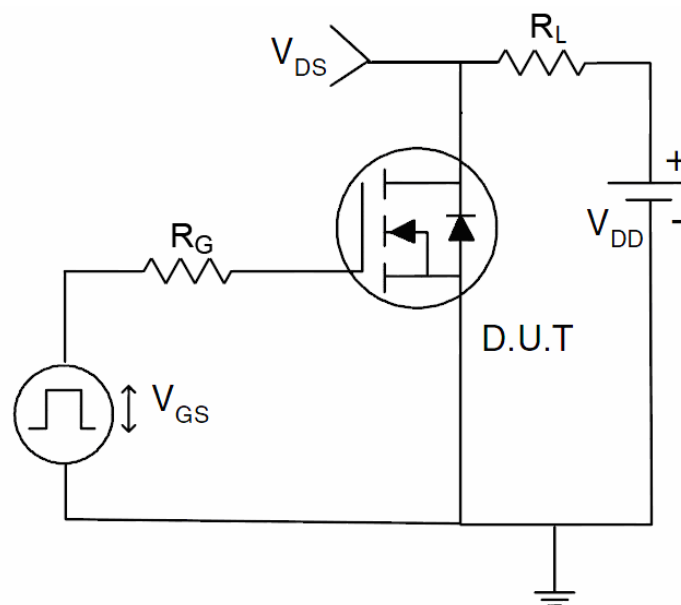
### 1) $E_{AS}$ test Circuit



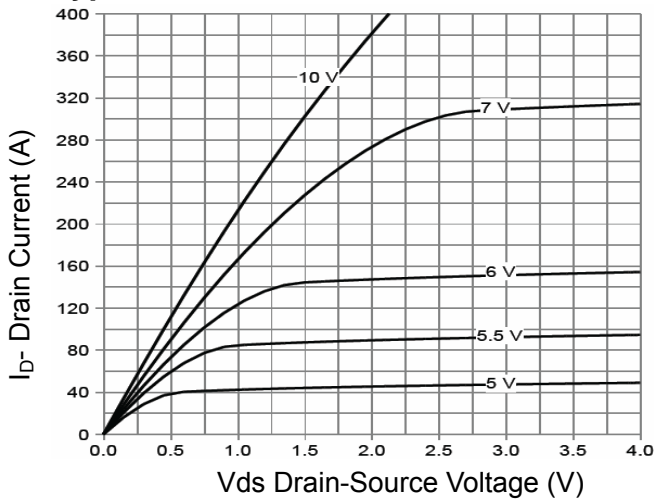
### 2) Gate charge test Circuit



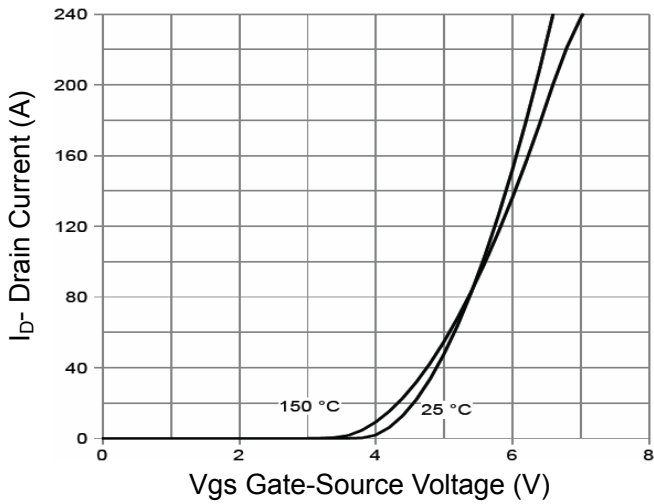
### 3) Switch Time Test Circuit



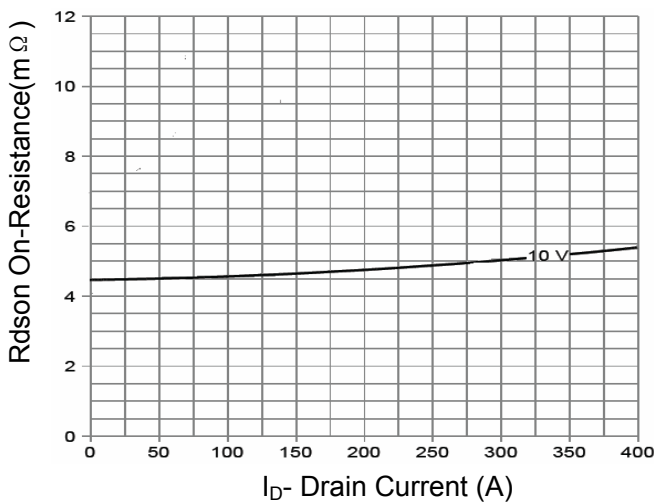
## Typical Electrical and Thermal Characteristics



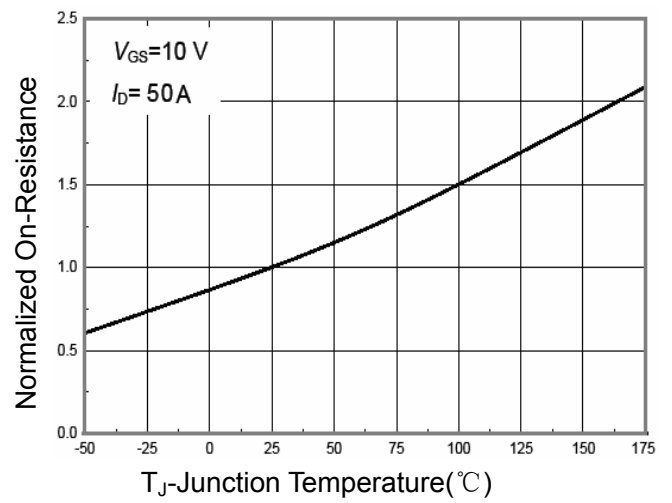
**Figure 1 Output Characteristics**



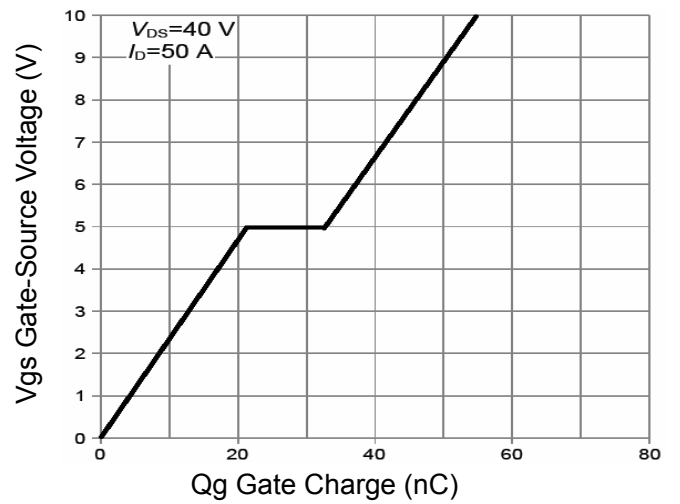
**Figure 2 Transfer Characteristics**



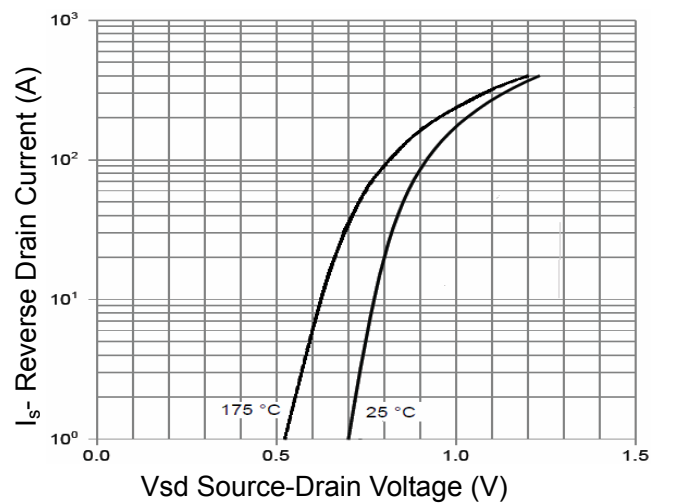
**Figure 3  $R_{dson}$ - Drain Current**



**Figure 4  $R_{dson}$ -Junction Temperature**



**Figure 5 Gate Charge**



**Figure 6 Source- Drain Diode Forward**

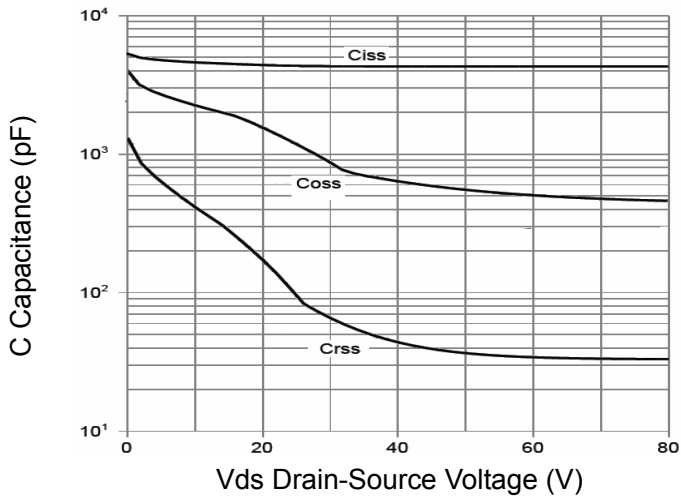


Figure 7 Capacitance vs Vds

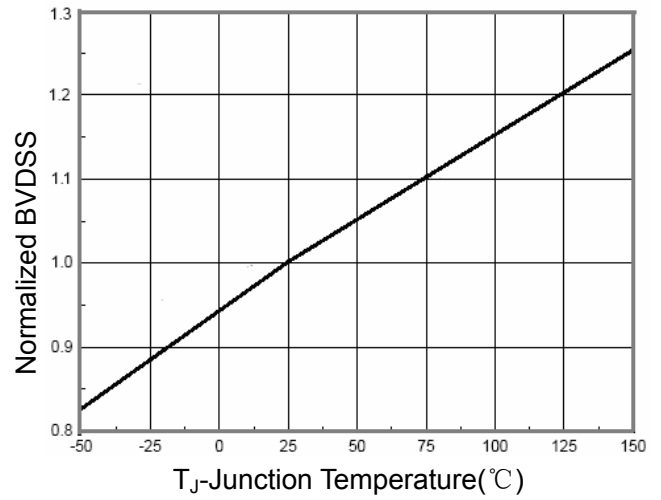


Figure 9  $BV_{DSS}$  vs Junction Temperature

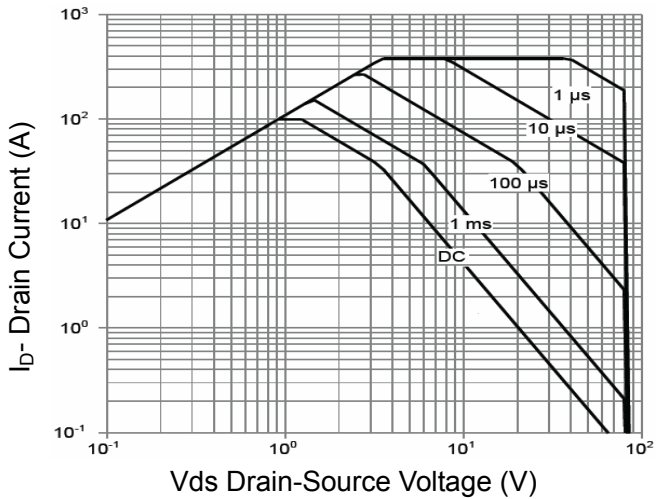


Figure 8 Safe Operation Area

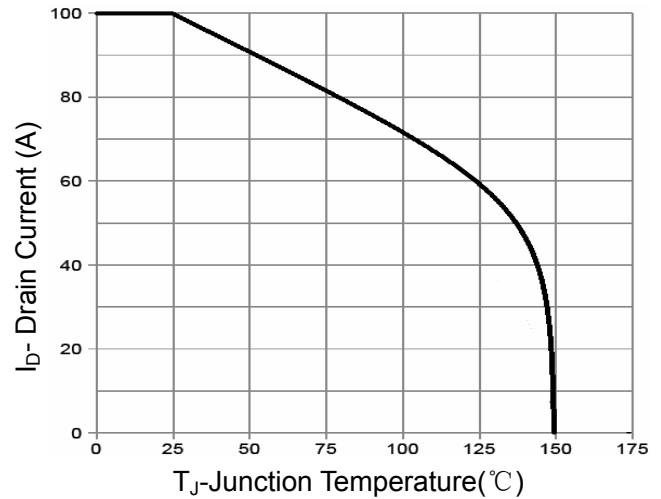


Figure 10 Current De-rating

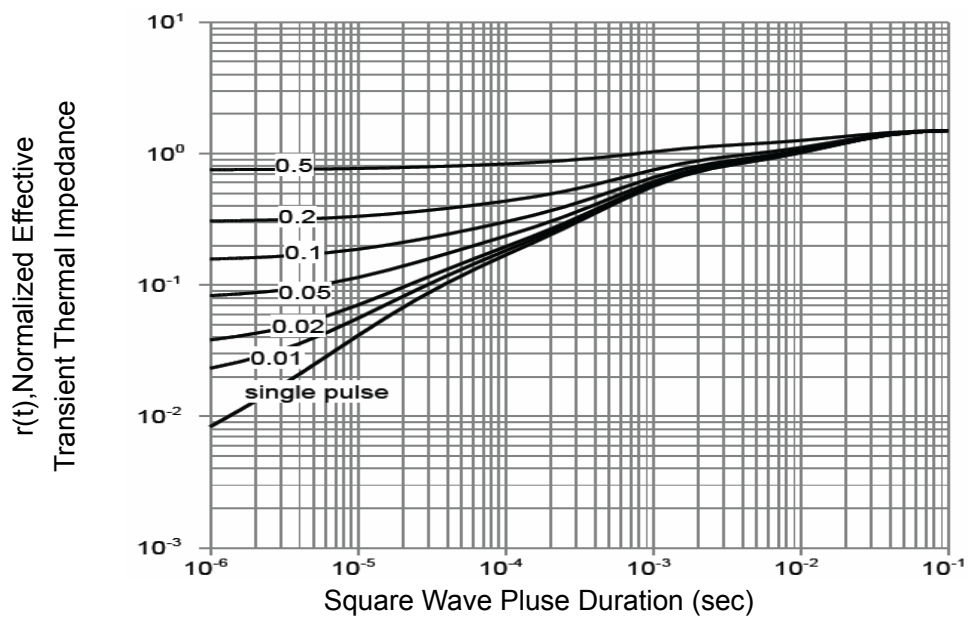
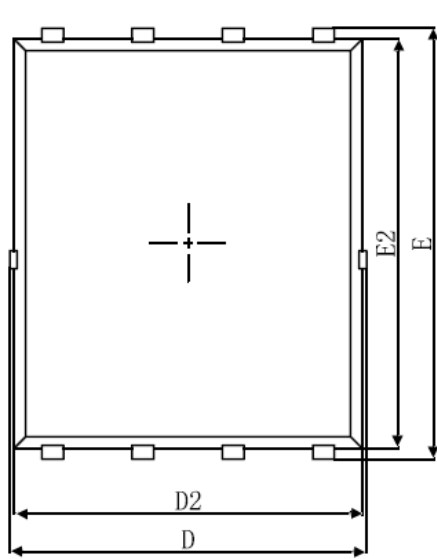
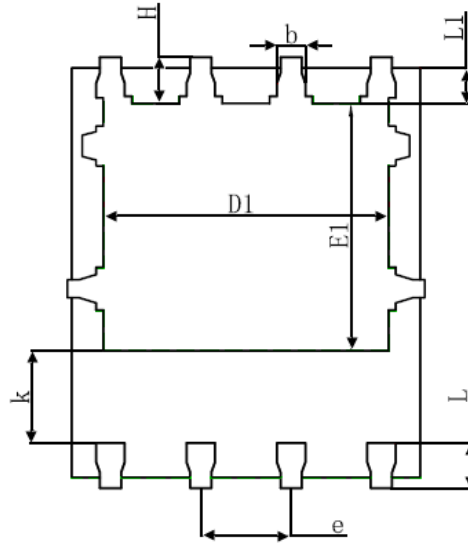


Figure 11 Normalized Maximum Transient Thermal Impedance

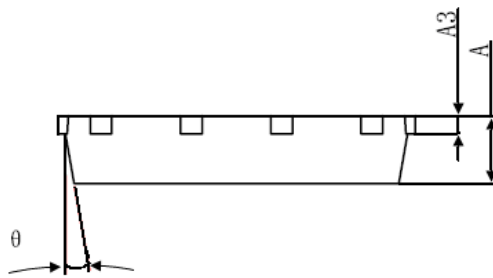
DFN5X6-8L Package Information



Top View  
[顶视图]



Bottom View  
[背视图]



Side View  
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	8°	12°	8°	12°

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