

NCE N-Channel Super Trench Power MOSFET

Description

The NCEP30T21GU 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.

Application

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

General Features

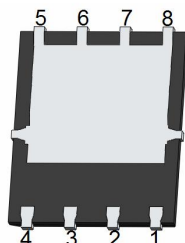
- $V_{DS} = 30V, I_D = 210A$
 - $R_{DS(ON)} = 0.72m\Omega$ (typical) @ $V_{GS} = 10V$
 - $R_{DS(ON)} = 0.85m\Omega$ (typical) @ $V_{GS} = 4.5V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150°C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔV_{ds} TESTED!

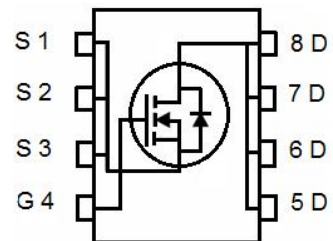
PDFN 5X6-8L



Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
P30T21GU	P30T21GU	DFN5X6-8L	Ø330mm	12mm	5000units

Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	210	A
Drain Current-Continuous($T_c = 100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	160	A
Pulsed Drain Current	I_{DM}	840	A
Maximum Power Dissipation	P_D	180	W
Derating factor		1.44	W/°C
Single pulse avalanche energy ^(Note1)	E_{AS}	1800	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.69	°C/W
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Electrical Characteristics (T_c=25°C unless otherwise noted)

Parameter	Symbol		Condition	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage	BV _{DSS}		V _{GS} =0V I _D =250μA	30		-	V
Zero Gate Voltage Drain Current	I _{DSS}	T _J =25°C	V _{DS} =30V, V _{GS} =0V	-	-	1	μA
		T _J =60°C		-	-	2	μA
		T _J =125°C		-	-	10	μA
Gate-Body Leakage Current	I _{GSS}		V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics							
Gate Threshold Voltage	V _{GS(th)}		V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.0	V
Drain-Source On-State Resistance	R _{DS(ON)}		V _{GS} =10V, I _D =100A	-	0.72	0.85	mΩ
			V _{GS} =4.5V, I _D =100A	-	0.85	1.1	mΩ
Forward Transconductance	g _{FS}		V _{DS} =5V, I _D =100A		90	-	S
Dynamic Characteristics							
Input Capacitance	C _{iss}		V _{DS} =15V, V _{GS} =0V, F=1.0MHz	-	8085	-	PF
Output Capacitance	C _{oss}			-	2123	-	PF
Reverse Transfer Capacitance	C _{rss}			-	121	-	PF
Switching Characteristics <small>(Note 2)</small>							
Turn-on Delay Time	t _{d(on)}		V _{DD} =15V, I _D =100A V _{GS} =10V, R _G =1.6Ω	-	13	-	nS
Turn-on Rise Time	t _r			-	8	-	nS
Turn-Off Delay Time	t _{d(off)}			-	55	-	nS
Turn-Off Fall Time	t _f			-	10	-	nS
Total Gate Charge	Q _g		V _{DS} =15V, I _D =100A, V _{GS} =10V	-	137	-	nC
Gate-Source Charge	Q _{gs}			-	19		nC
Gate-Drain Charge	Q _{gd}			-	14		nC
Drain-Source Diode Characteristics							
Diode Forward Voltage	V _{SD}		V _{GS} =0V, I _S =100A	-		1.2	V
Diode Forward Current	I _S			-	-	210	A
Reverse Recovery Time	t _{rr}		T _J = 25°C, I _F = I _S	-	35	-	nS
Reverse Recovery Charge	Q _{rr}		di/dt = 100A/μs	-	120	-	nC

Notes:

1. EAS condition : T_J=25°C, V_{DD}=15V, V_G=10V, L=0.5mH, R_G=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

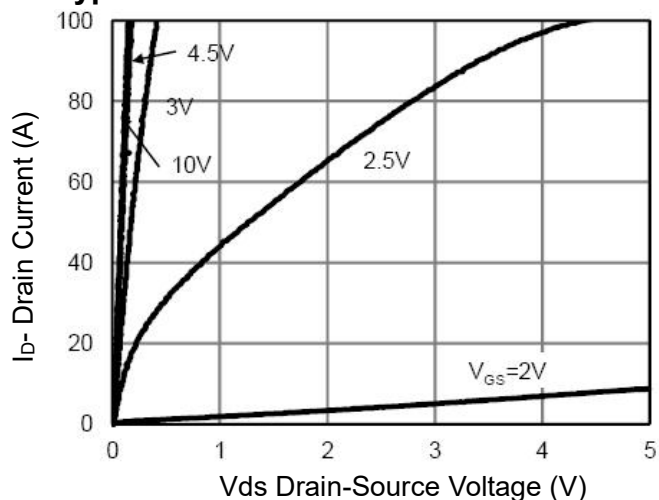


Figure 1 Output Characteristics

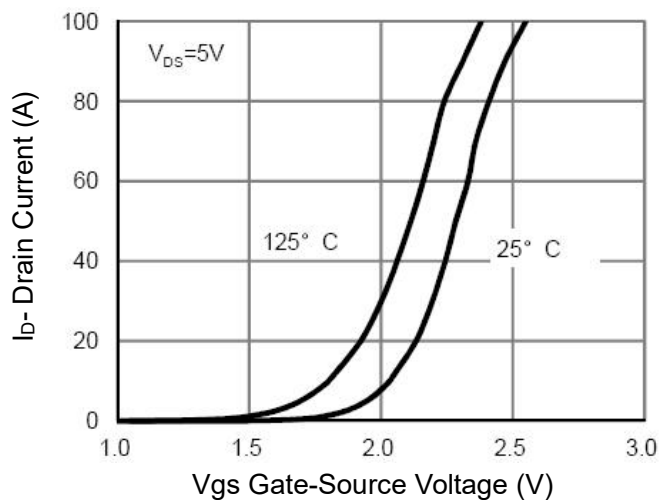


Figure 2 Transfer Characteristics

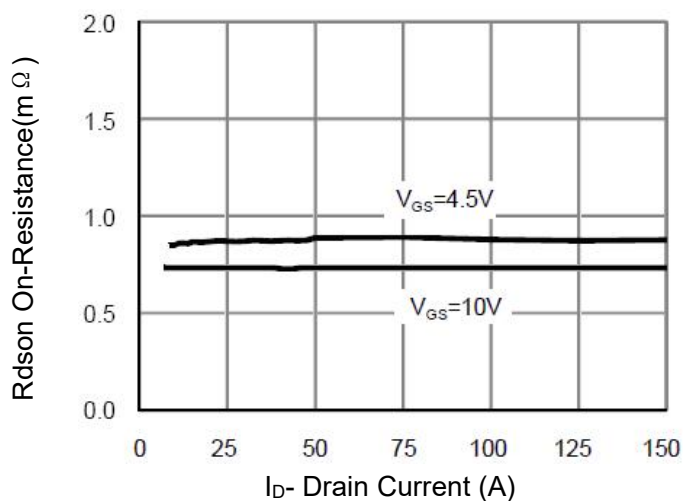


Figure 3 $R_{DS(on)}$ - Drain Current

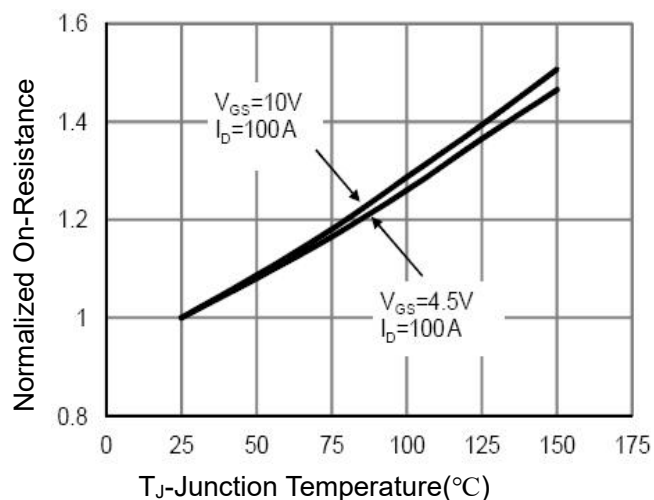


Figure 4 $R_{DS(on)}$ -Junction Temperature

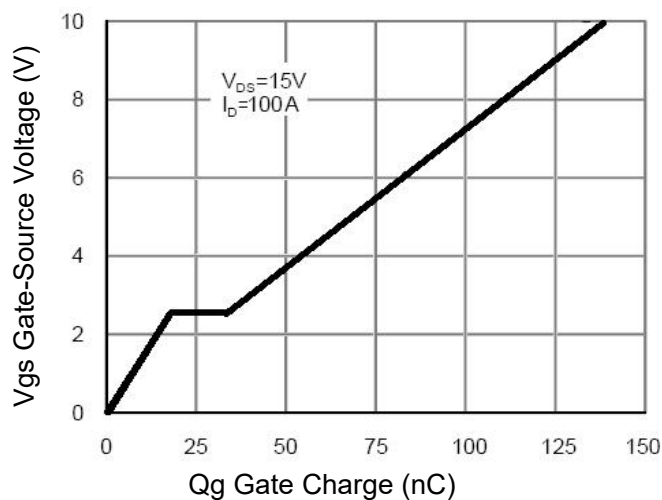


Figure 5 Gate Charge

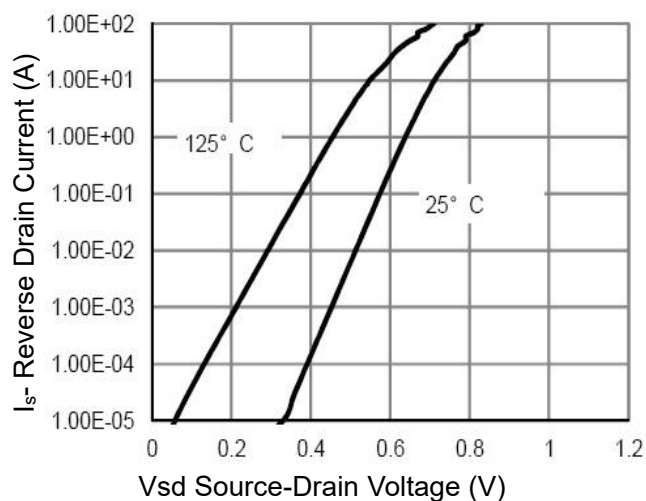


Figure 6 Source- Drain Diode Forward

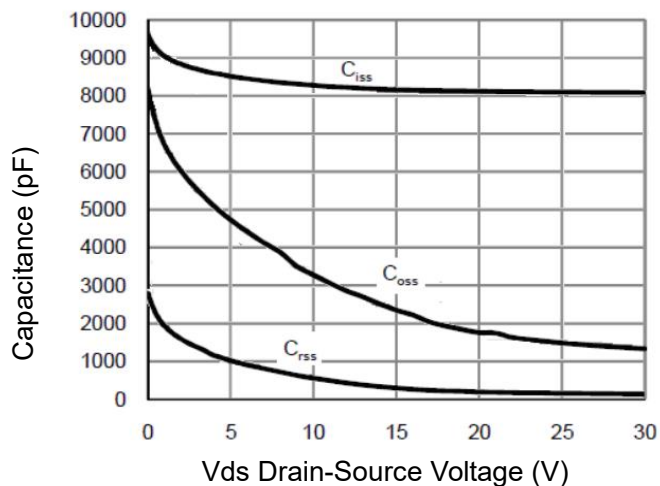


Figure 7 Capacitance vs Vds

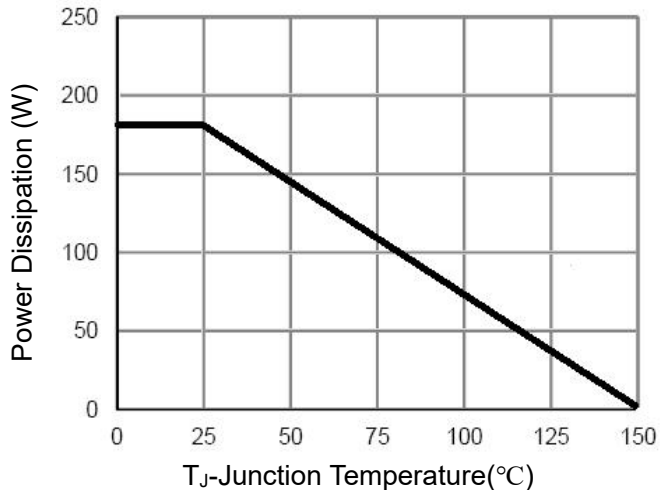


Figure 9 Power De-rating

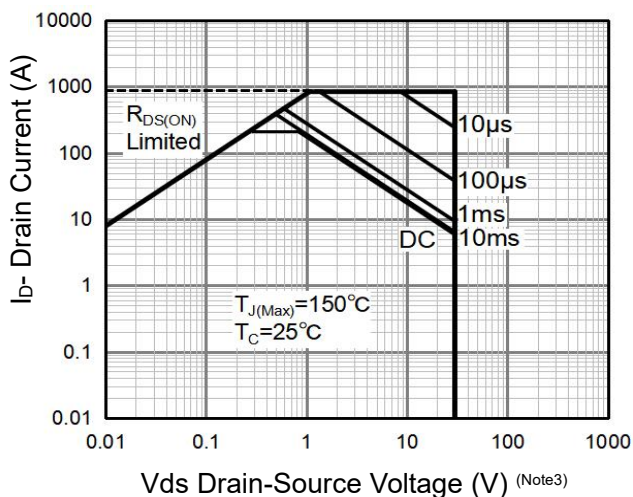


Figure 8 Safe Operation Area

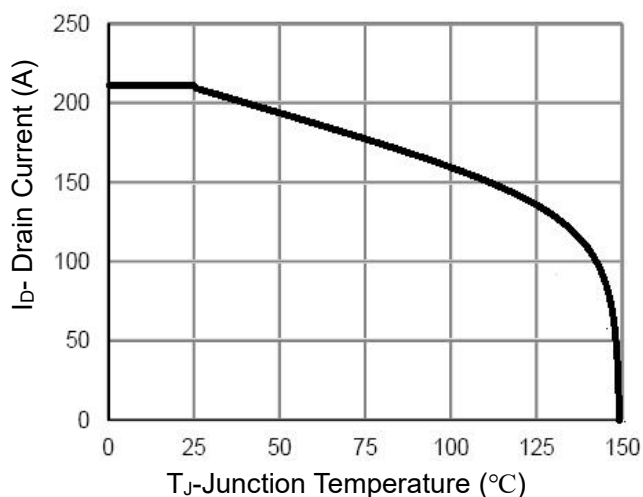


Figure 10 Current De-rating

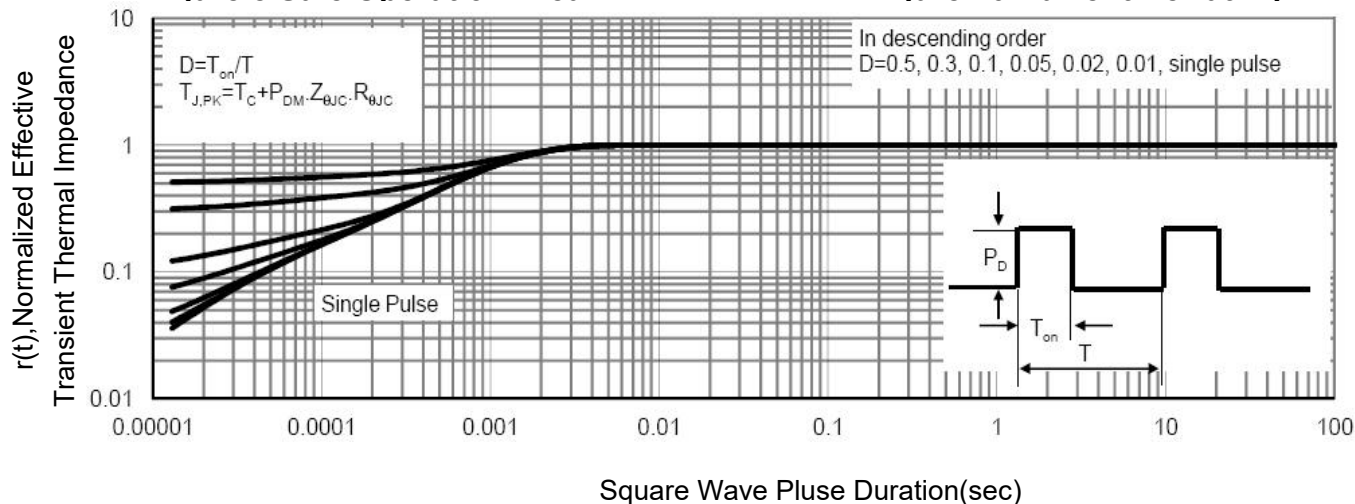
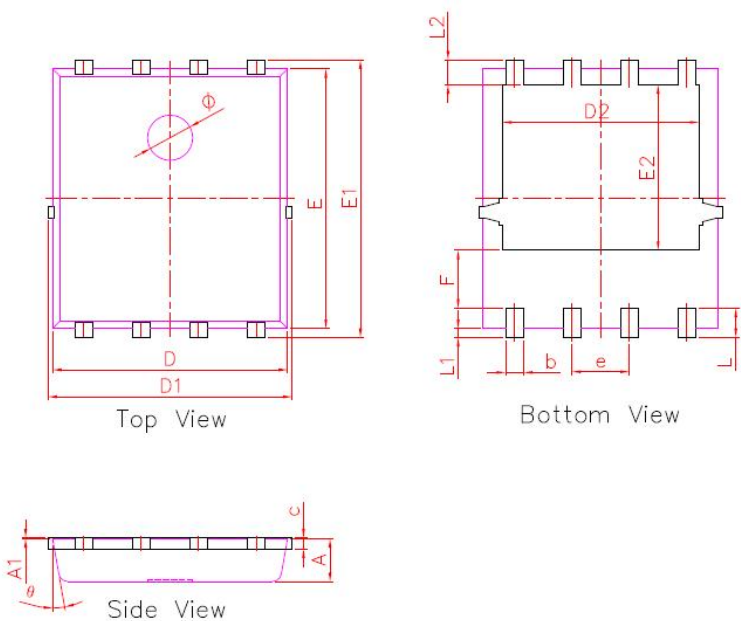


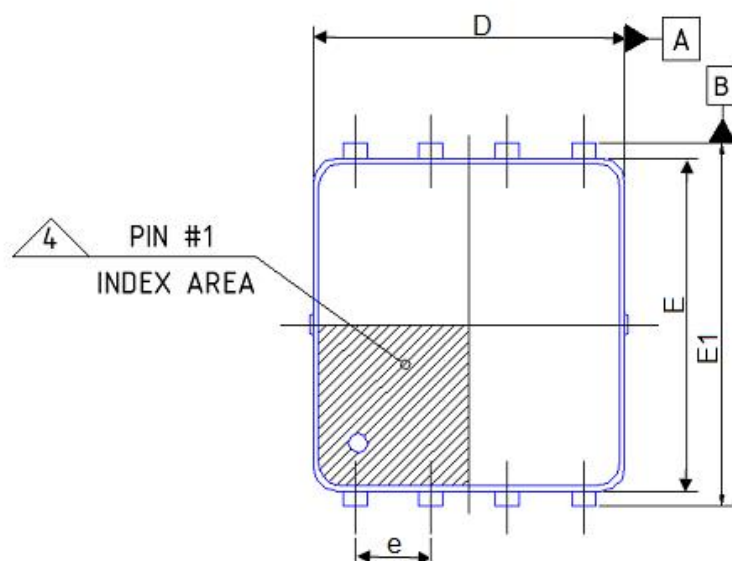
Figure 11 Normalized Maximum Transient Thermal Impedance

PDFN5X6-8L(E) Package Information

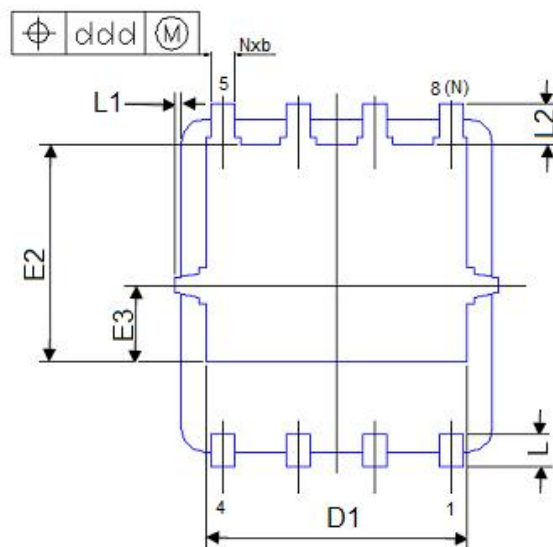


PDFN5X6-8L			
DIM.	MIN.	NOM.	MAX.
A	0.90	0.95	1.00
A1	0.00	0.02	0.05
b	0.35	0.40	0.50
c	0.20	0.25	0.30
D	5.10	5.20	5.30
D1	5.10	5.40	5.50
D2	4.25	4.35	4.45
e	1.27 BSC		
E	5.70	5.75	5.80
E1	6.00	6.15	6.30
E2	3.57	3.67	3.77
F	1.18	1.28	1.38
L	0.55	0.65	0.75
L1	0.15	0.20	0.25
L2	0.45	0.55	0.65
Φ	0.90	1.00	1.10
Θ	8°	10°	12°
All dimensions in millimeters			

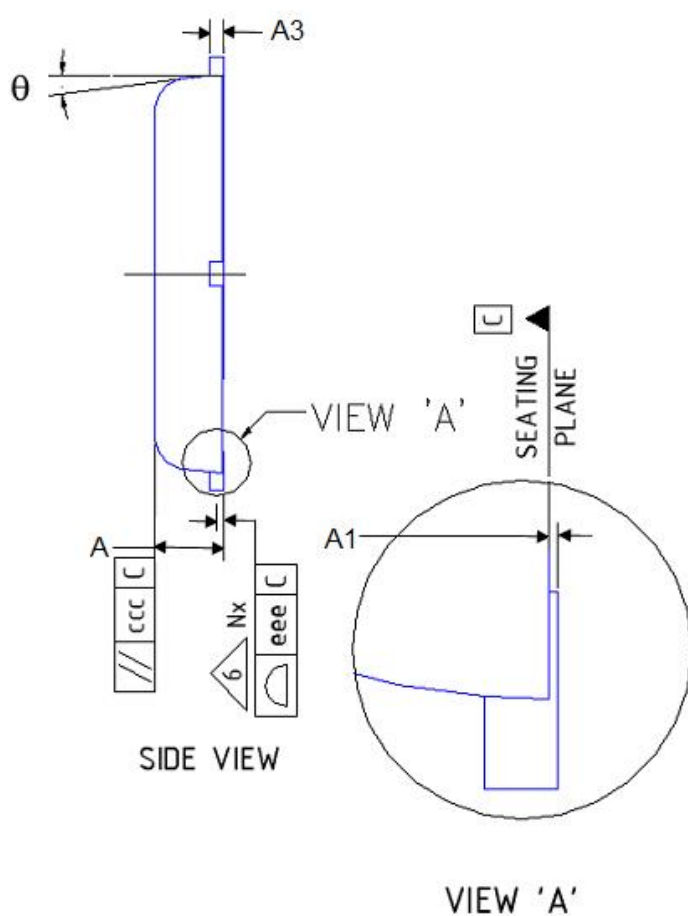
PDFN5X6-8L(f) Package Information



TOP VIEW



BOTTOM VIEW



Dimension Table				
Thickness Symbol	V			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	0.85	0.95	1.00	
A1	0.00	---	0.05	
A3	---	0.2 Ref	---	
b	0.30	0.40	0.50	
D	5.10	5.20	5.30	
E	5.45	5.55	5.65	
e	1.27 BSC			
D1	4.25	4.35	4.45	
E1	5.95	6.05	6.15	
E2	3.525	3.625	3.725	
E3	1.175	1.275	1.375	
L	0.45	0.55	0.65	
L1	0	---	0.15	
L2	0.68 REF			
θ	0°	---	10°	
aaa	0.05			
bbb	0.10			
ccc	0.10			
ddd	0.05			
eee	0.08			
N	8			
ND	4			
NOTES	1,2			

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