

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☒ Surface-mounted package
- ☒ Super Trench
- ☒ Advanced trench cell design
- ☒ MSL1

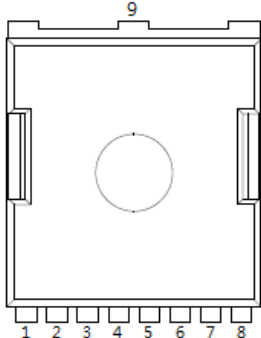
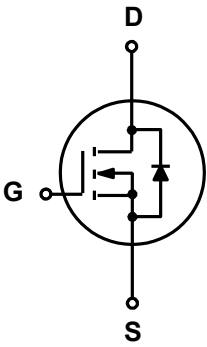
1.2 Applications

- ☒ BMS
- ☒ Drones
- ☒ High power inverter system
- ☒ Light electric vehicles

1.3 Quick reference

- ☒ $BV \geq 150\text{ V}$
- ☒ $P_{tot} \leq 500\text{ W}$
- ☒ $I_D \leq 258\text{ A}$
- ☒ $R_{DS(ON)} \leq 3.3\text{ m}\Omega @ V_{GS} = 10\text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate(G)	 Top View TOLL	
2,3,4,5,6,7,8	Source(S)		
9	Drain(D)		

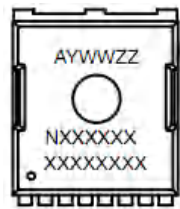
3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	150	-	V
V_{GS}	Gate-Source Voltage	$T_C = 25\text{ }^{\circ}\text{C}$	-	± 20	V
I_D^*	Drain Current (DC)	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	258	A
		$T_C = 100\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	163	A
$I_{DM}^{*,**}$	Drain Current (Pulsed)	$T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$	-	1016	A
P_{tot}	Drain power dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	-	500	W
T_{stg}	Storage Temperature		-55	150	$^{\circ}\text{C}$
T_J	Junction Temperature		-	150	$^{\circ}\text{C}$
I_S	Continuous-Source Current	$T_C = 25\text{ }^{\circ}\text{C}$	-	258	A
E_{AS}	Single Pulsed Avalanche Energy	$L=0.5\text{mH}, I_{as}=70\text{A}, \text{Start } T_J = 25^{\circ}\text{C}$	-	1225	mJ
$R_{\theta JA}^{**}$	Thermal Resistance- Junction to Ambient		-	62	$^{\circ}\text{C/W}$
$R_{\theta JC}^{**}$	Thermal Resistance- Junction to Case		-	0.3	

Notes :

- * Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- ** Surface Mounted on minimum footprint pad area.
- *** Limited by bonding wire

4. Marking Information

Product Name	Marking
UP033N15T	

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
UP033N15T	TOLL-8L			2000	

6. Electrical Characteristics ($T_A=25^\circ$ Unless Otherwise Noted)

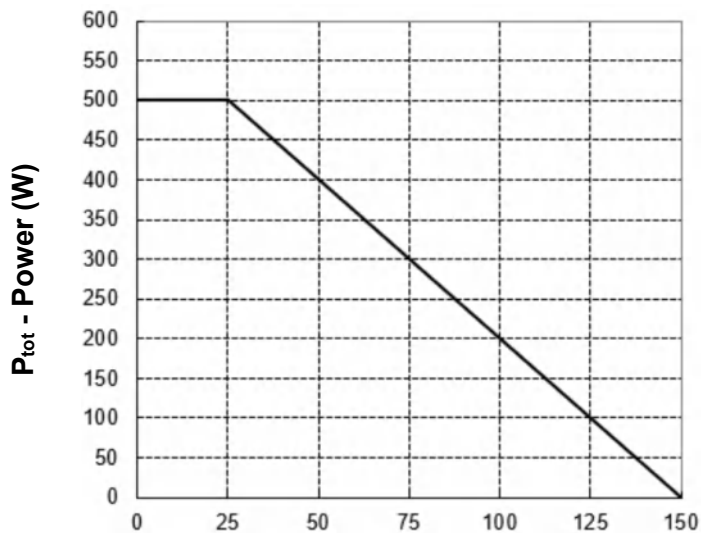
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _{DS} = 250 μA	150	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	2	-	4	V
I _{DSS}	Drain Leakage Current	V _{DS} = 120 V, V _{GS} = 0 V	-	-	1	μA
I _{GSS}	Gate Leakage Current	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	±100	nA
R _{DS(ON)} ^{Note1}	On-State Resistance	V _{GS} = 10 V, I _{DS} = 50 A	-	2.8	3.3	mΩ
Diode Characteristics						
V _{SD} ^{Note1}	Diode Forward Voltage	I _{SD} =50 A, V _{GS} = 0 V	0.5	-	1.2	V
t _{rr}	Reverse Recovery Time	I _{DS} = 50 A, V _{GS} = 0 V dI _{SD} /dt = 100 A/μs	-	110	-	nS
Q _{rr}	Reverse Recovery Charge		-	395	-	nC
Dynamic Characteristics ^{Note2}						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 75 V Frequency = 1 MHz	-	12580	-	pF
C _{oss}	Output Capacitance		-	850	-	
C _{rss}	Reverse Transfer Capacitance		-	145	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 75 V, V _{GEN} = 10 V, R _G = 3.0 Ω, I _{DS} = 50 A	-	22	-	nS
t _r	Turn-on Rise Time		-	106	-	
t _{d(off)}	Turn-off Delay Time		-	60	-	
t _f	Turn-off Fall Time		-	100	-	
Gate Charge Characteristics ^{Note2}						
Q _g	Total Gate Charge	V _{DS} = 75 V, V _{GS} = 10 V, I _{DS} = 50 A	-	160	-	nC
Q _{gs}	Gate-Source Charge		-	51	-	
Q _{gd}	Gate-Drain Charge		-	21	-	

Note 1: Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

Note 2: Guaranteed by design, not subject to production testing.

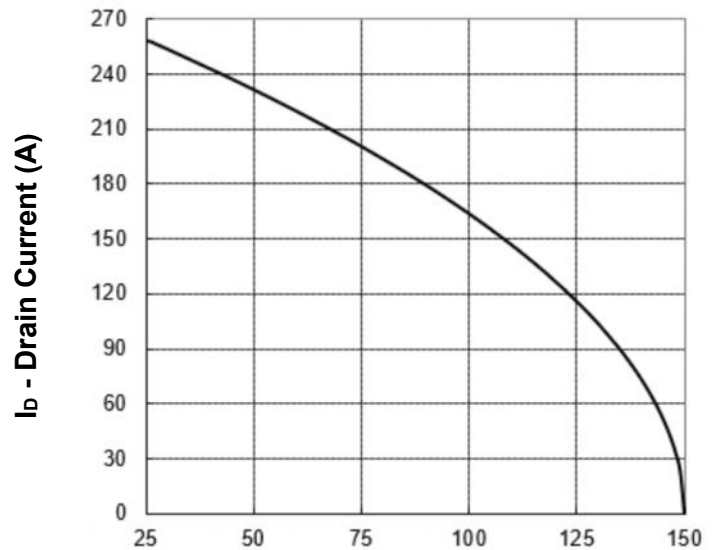
7. Typical Characteristics

Power Capability



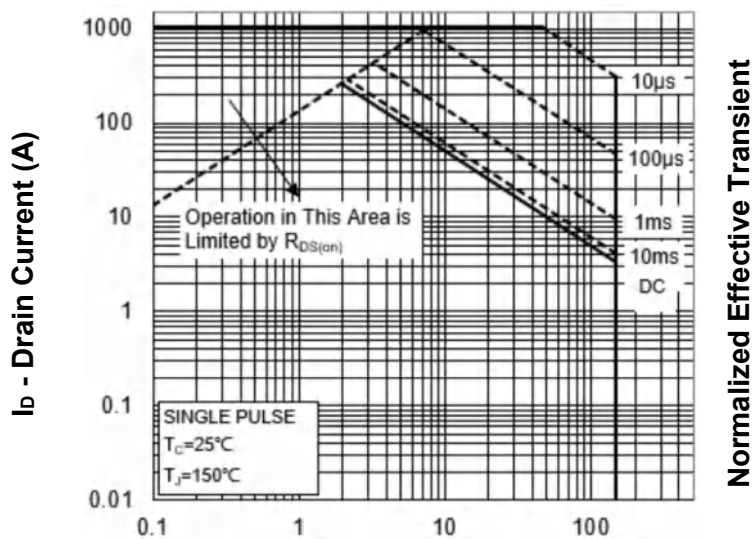
T_c - Case Temperature (°C)

Current Capability



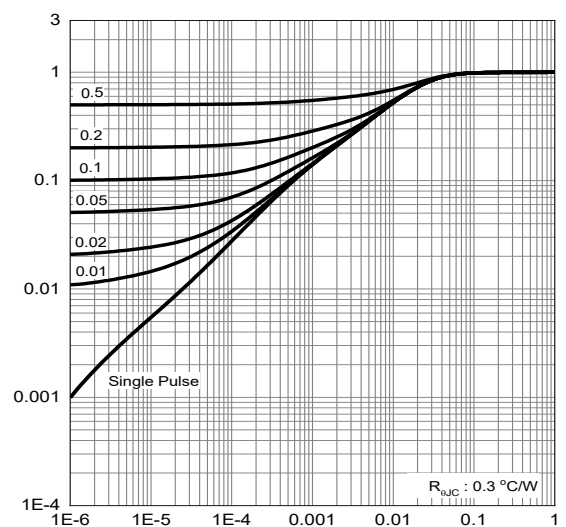
T_c - Case Temperature (°C)

Safe Operating Area



V_{DS} - Drain-Source Voltage (V)

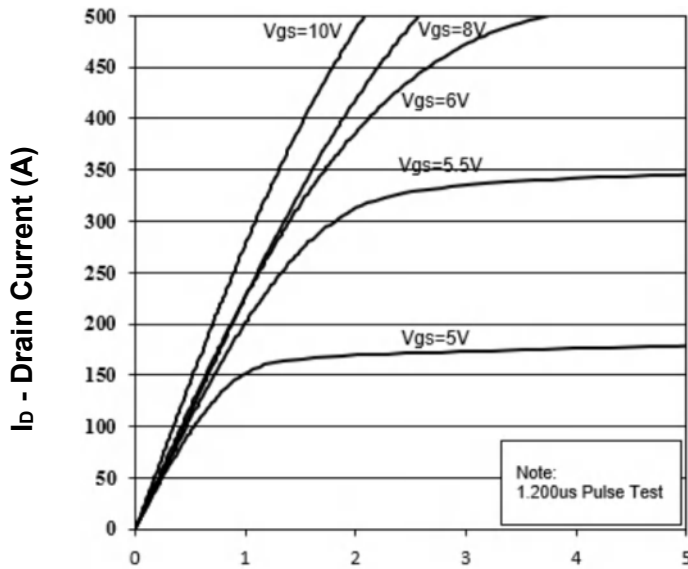
Transient Thermal Impedance



Square Wave Pulse Duration (sec)

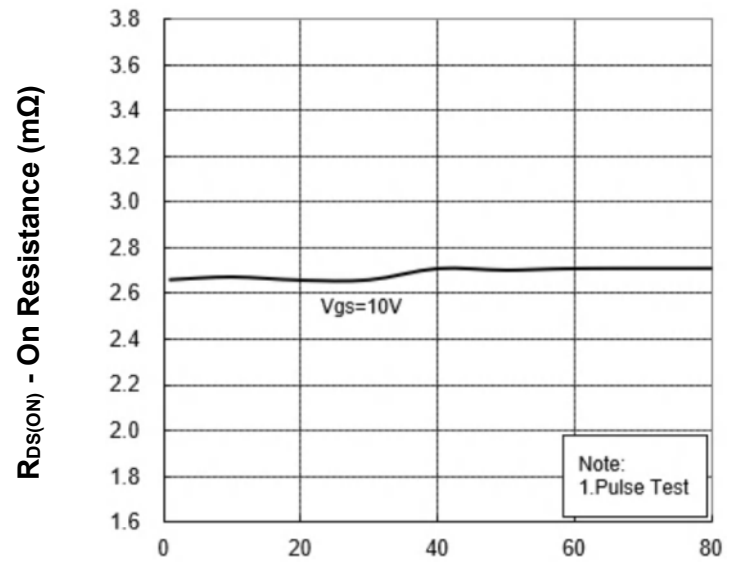
7. Typical Characteristics (cont.)

Output Characteristics



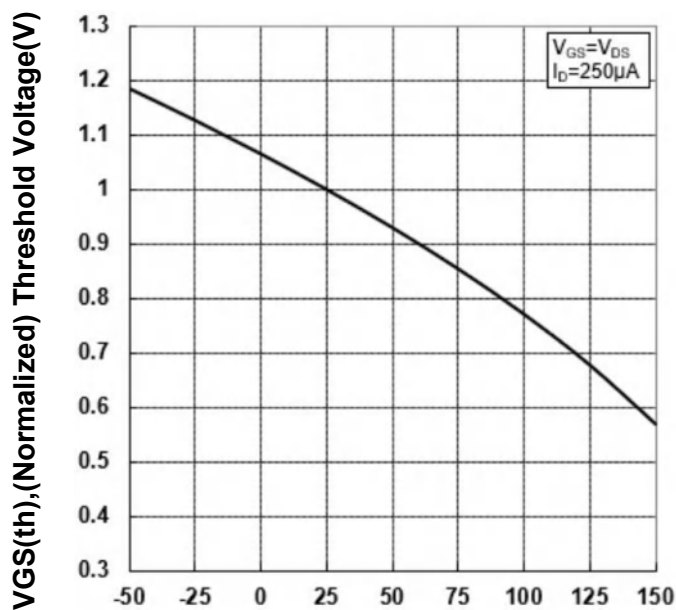
V_{DS} - Drain-Source Voltage (V)

On Resistance



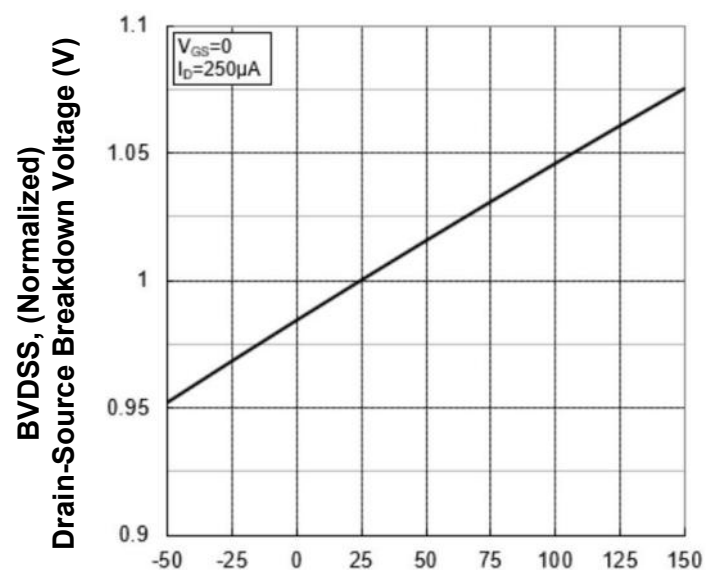
I_D - Drain Current (A)

Normalized Threshold Voltage vs Junction Temperature



T_J - Junction Temperature ($^{\circ}C$)

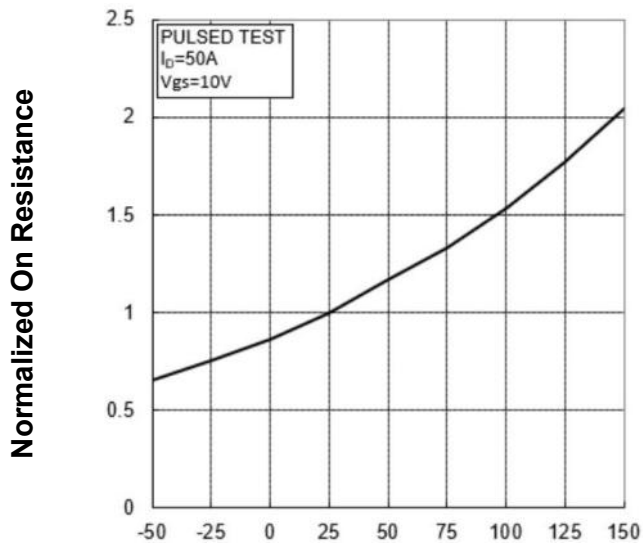
Normalized Breakdown Voltage vs Junction Temperature



T_J - Junction Temperature ($^{\circ}C$)

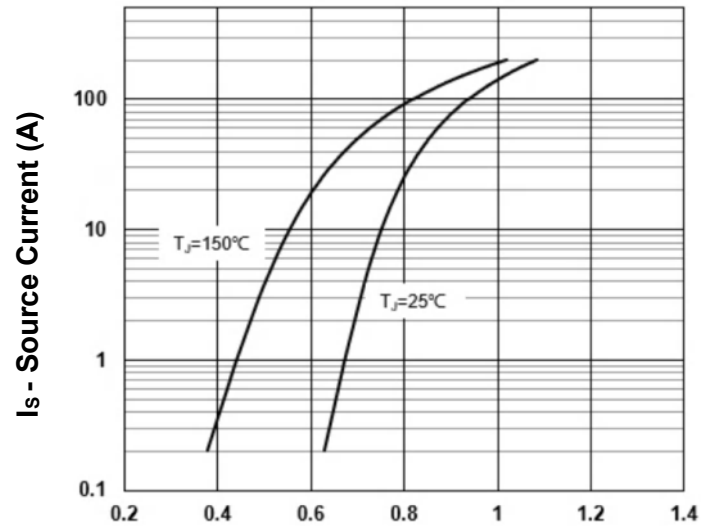
7. Typical Characteristics (cont.)

Normalized On Resistance



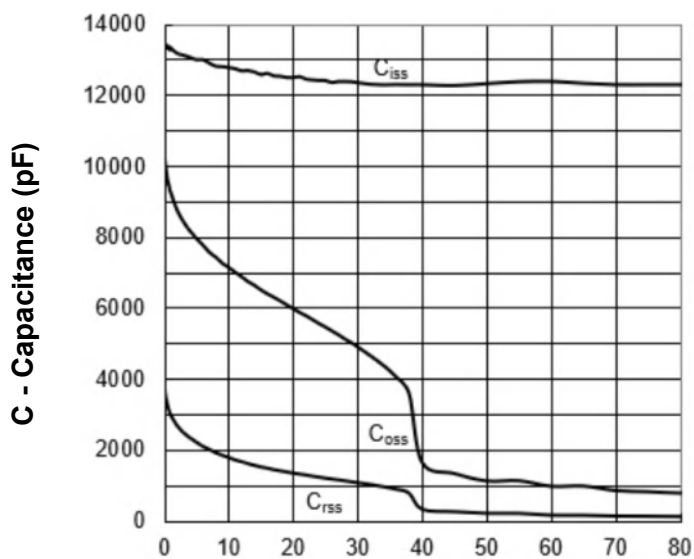
T_J - Junction Temperature ($^{\circ}\text{C}$)

Diode Forward Current



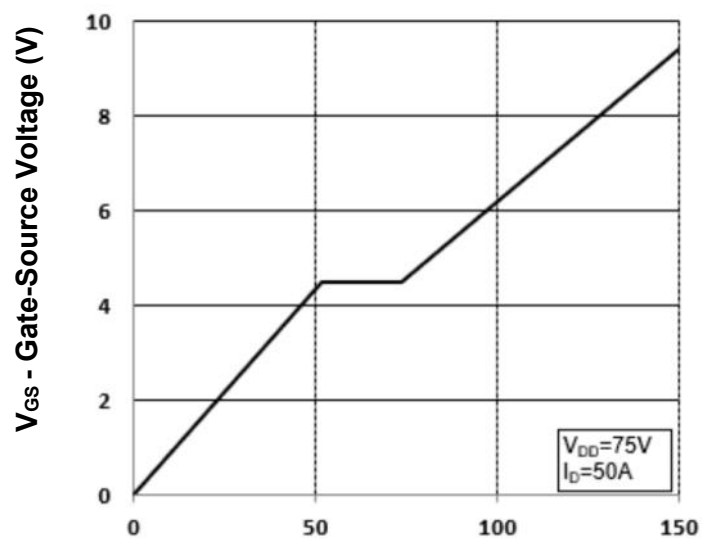
V_{SD} - Source-Drain Voltage (V)

Capacitance



V_{DS} - Drain-Source Voltage (V)

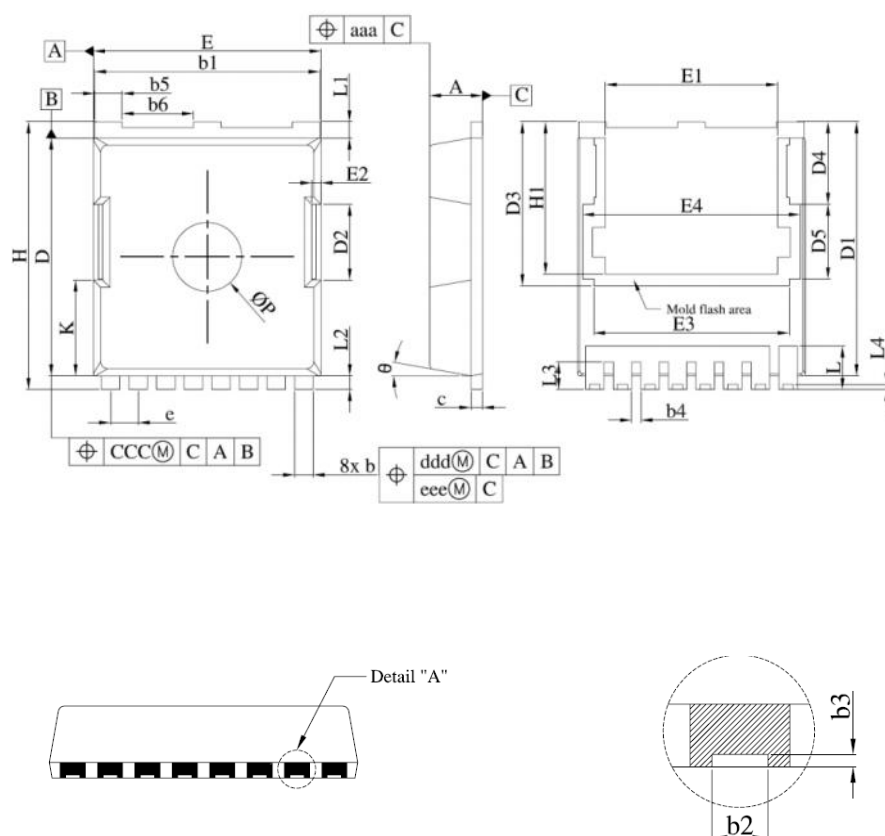
Gate Charge



Q_G - Gate Charge (nC)

8. Package Dimensions

TOLL-8L Package



Symbol	Dimensions In Millimeters		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.36	0.45	0.55
b3	0.05	0.10	/
b4	0.30	0.40	0.50
b5	1.10	1.20	1.30
b6	3.00	3.10	3.20
c	0.40	0.50	0.60
D	10.28	10.38	10.55
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3	7.15		
D4	3.59		
D5	3.26		
e	1.10	1.20	1.30
E	9.80	9.90	10.00
E1	7.40	7.50	7.60
E2	0.30	0.40	0.50
E3	8.50		
E4	9.46		
H	11.50	11.68	11.85
H1	6.55	6.65	6.75
K	4.08	4.18	4.28
L	1.60	1.90	2.10
L1	0.50	0.70	0.90
L2	0.50	0.60	0.70
L3	1.00	1.20	1.30
L4	0.13	0.23	0.33
p	2.85	3.00	3.15
θ	10°REF		
aaa	0.20		
ccc	0.20		
ddd	0.25		
eee	0.20		