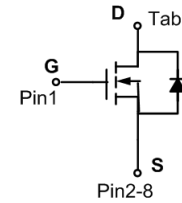




100V N-Channel PowerTrench MOSFET

Description

These N-Channel enhancement mode power field effect transistors are using **shielded gate trench DMOS** technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

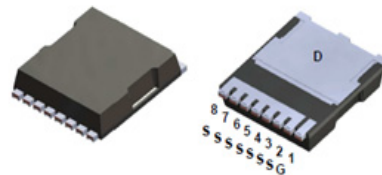


Product Summary

V_{DSS}	100V
$R_{DS(on),typ}@ V_{GS}=10V$	1.96m Ω
I_D	275A

Applications

- Motor Drives
- UPS
- DC-DC Converter
- Energy Storage



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	100	V
Continuous drain current ($T_C = 25^\circ\text{C}$)	I_D	275	A
($T_C = 100^\circ\text{C}$)		174	A
Pulsed drain current ¹⁾	I_{DM}	1100	A
Gate-Source voltage	V_{GSS}	± 20	V
Avalanche energy ²⁾	E_{AS}	1682	mJ
Power Dissipation	P_D	321	W
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.39	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient ³⁾	$R_{\theta JA}$	49	$^\circ\text{C/W}$
Soldering temperature, wavesoldering only allowed at leads.	T_{sold}	260	$^\circ\text{C}$



Package Marking and Ordering Information

Device	Device Package	Marking
WLE022R10	TOLL	WLE022R10

Electrical Characteristics

T_J = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	100	---	---	V
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	2	---	4	V
Drain-source leakage current	I _{DSS}	V _{DS} =100V, V _{GS} =0V, T _J = 25°C	---	---	1	μA
		V _{DS} =100V, V _{GS} =0V, T _J = 150°C	---	---	10	mA
Gate leakage current, Forward	I _{GSSF}	V _{GS} =20V, V _{DS} =0V	---	---	100	nA
Gate leakage current, Reverse	I _{GSSR}	V _{GS} =-20V, V _{DS} =0V	---	---	-100	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10V, I _D =50A, T _J = 25°C	---	1.96	2.25	mΩ
		T _J = 150°C	---	3.70	---	
Forward transconductance	g _{fs}	V _{DS} =5V , I _D =50A	---	95	---	S
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 50V, V _{GS} = 0V, f = 250kHz	---	11654	---	pF
Output capacitance	C _{oss}		---	1586	---	
Reverse transfer capacitance	C _{rss}		---	11.7	---	
Turn-on delay time	t _{d(on)}	V _{DD} = 50V, V _{GS} =10V, I _D =50A, R _g =10Ω	---	112.4	---	ns
Rise time	t _r		---	60.5	---	
Turn-off delay time	t _{d(off)}		---	158.4	---	
Fall time	t _f		---	89.7	---	
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHz	---	1.65	---	Ω
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DS} =50V, I _D =50A, V _{GS} =10V	---	56.0	---	nC
Gate to drain charge	Q _{gd}		---	54.3	---	
Gate charge total	Q _g		---	188.5	---	
Gate plateau voltage	V _{plateau}		---	5	---	V
Output Charge	Q _{oss}	V _{DS} =50V, V _{GS} = 0V	---	216	---	nC
Drain-Source diode characteristics and Maximum Ratings						
Continuous Source Current	I _S		---	---	275	A
Pulsed Source Current	I _{SM}		---	---	1100	A
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =50A, T _J =25°C	---	---	1.1	V
Reverse Recovery Time	t _{rr}	I _S =50A, di/dt=200A/us, T _J =25°C	---	61.5	---	ns
Reverse Recovery Charge	Q _{rr}		---	230.9	---	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. I_{AS}=58A, L=1mH, V_{DD}=70V, Starting T_j= 25°C.
3. The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.



Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

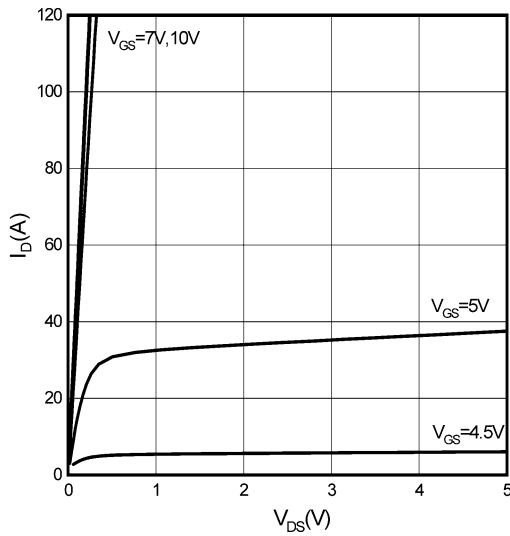


Figure 2. Transfer Characteristics

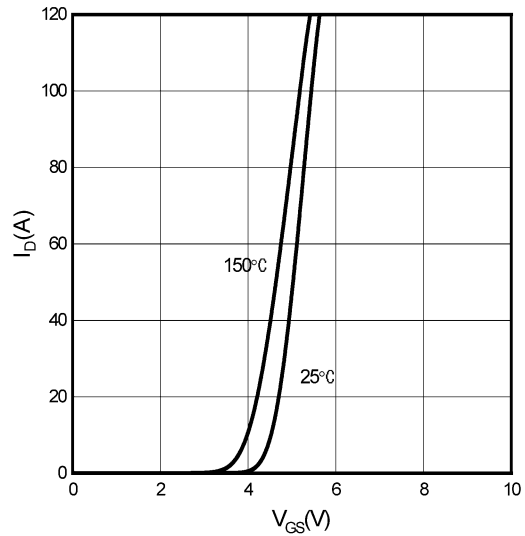


Figure 3. On-Resistance vs. Drain Current

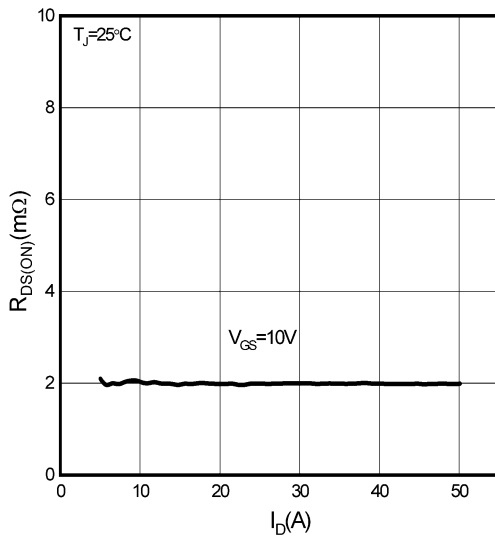


Figure 4. On-Resistance vs. Temperature

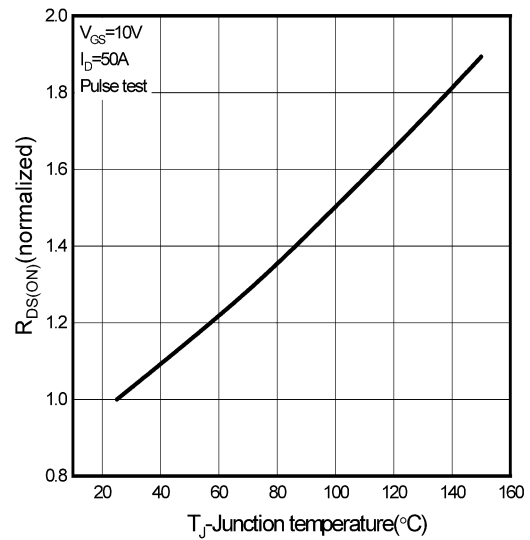


Figure 5. Breakdown Voltage vs. Temperature

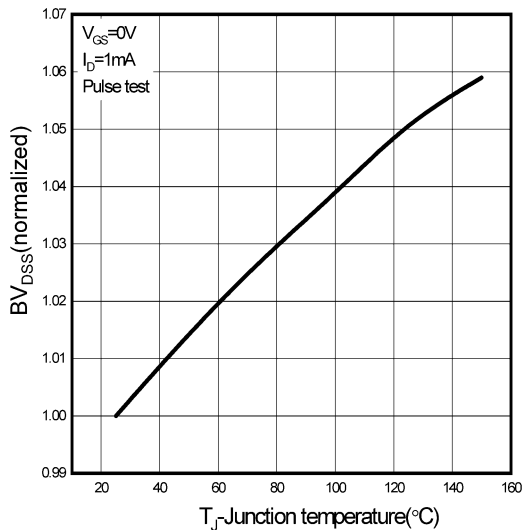
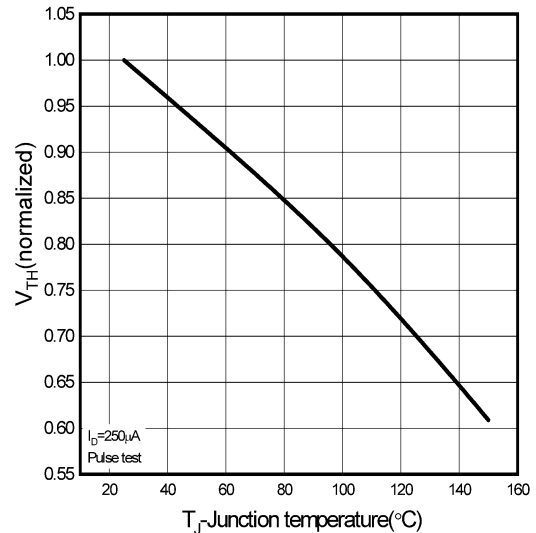


Figure 6. Threshold Voltage vs. Temperature





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Figure 7. R_{DS(on)} vs. Gate Voltage

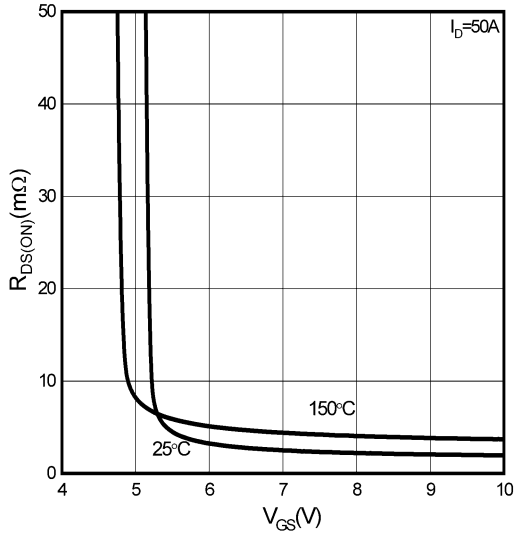


Figure 8. Body-Diode Characteristics

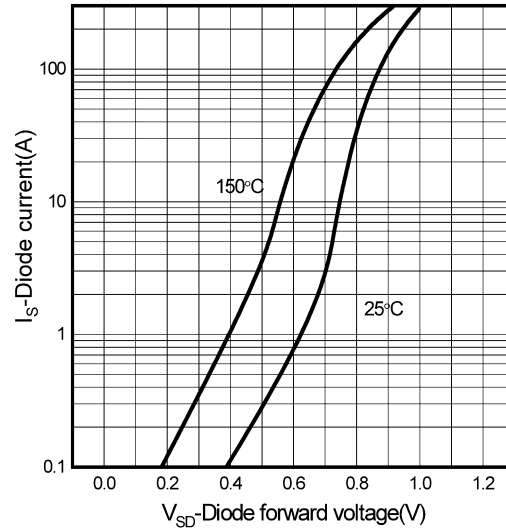


Figure 9. Capacitance Characteristics

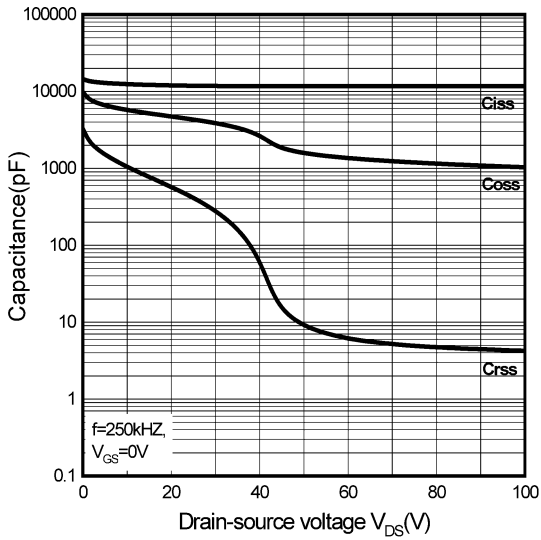


Figure 10. Gate Charge Characteristics

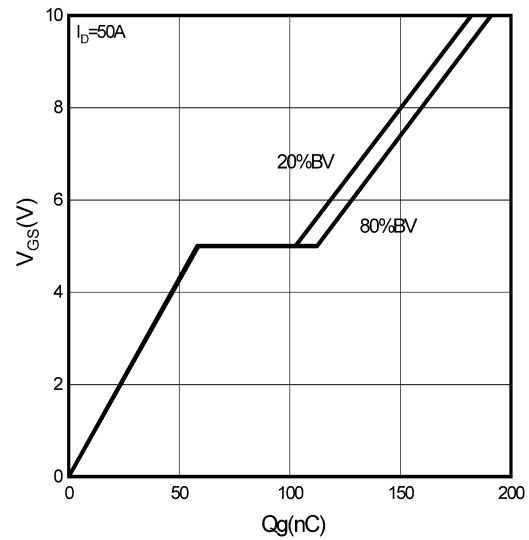


Figure 11. Drain Current Derating

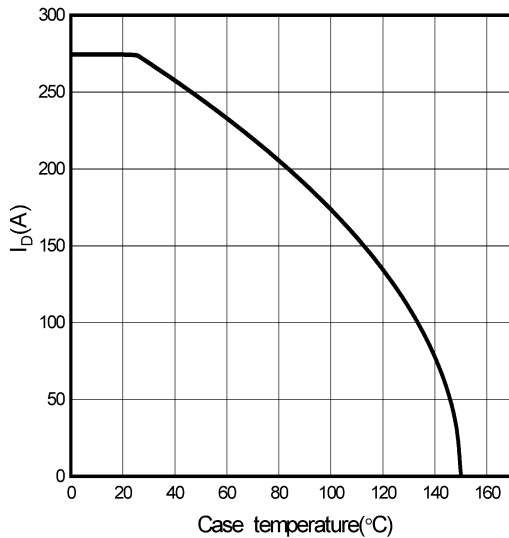
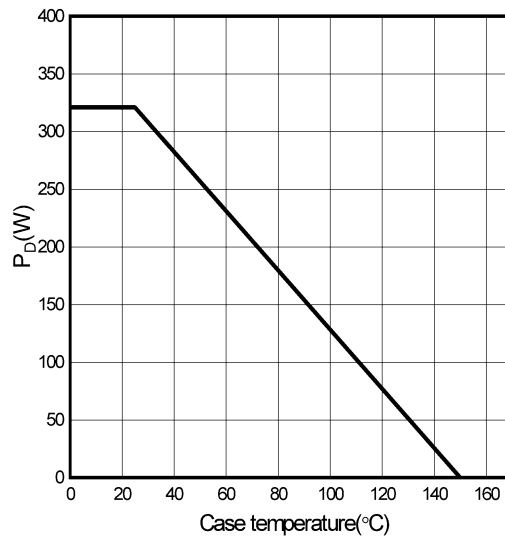


Figure 12. Power Dissipation vs. Temperature





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Figure 13. Safe Operating Area

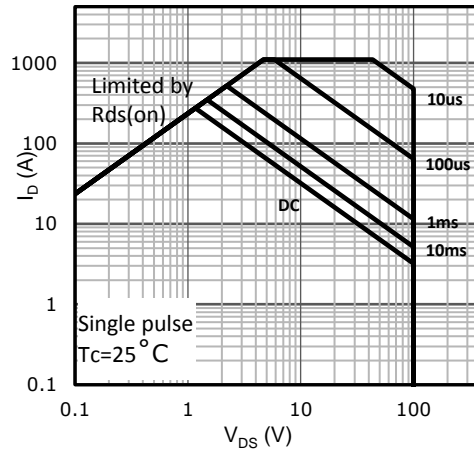
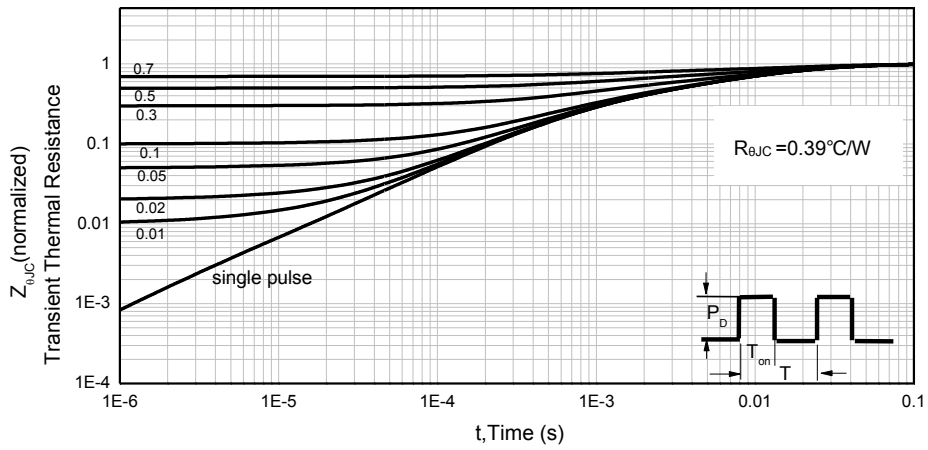
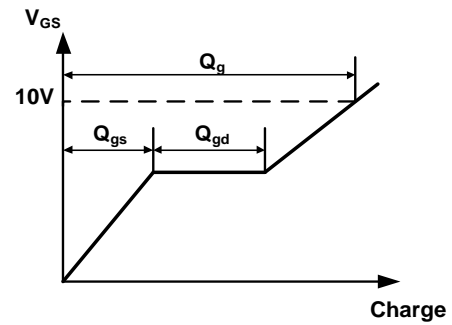
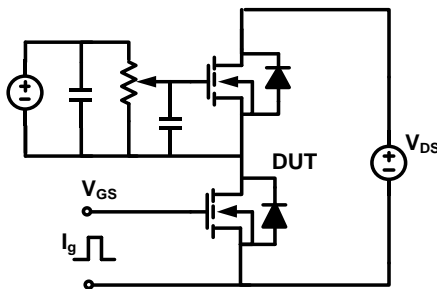


Figure 14. Normalized Maximum Transient Thermal Impedance (RthJC)

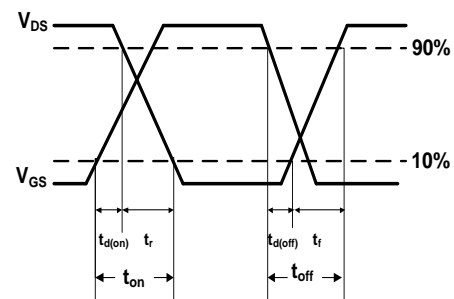
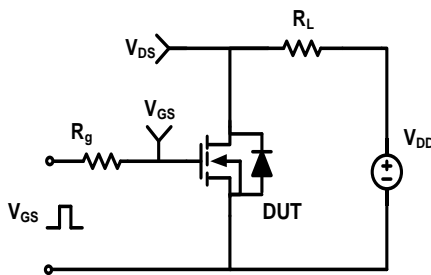




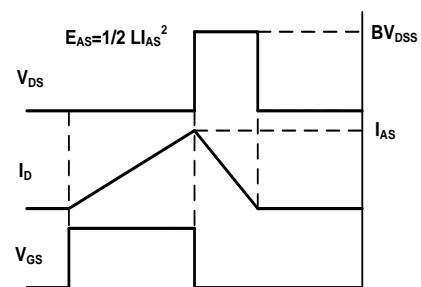
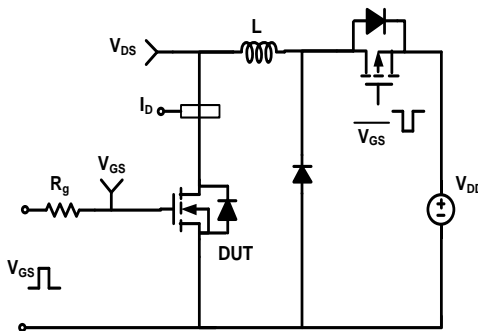
Gate Charge Test Circuit & Waveform



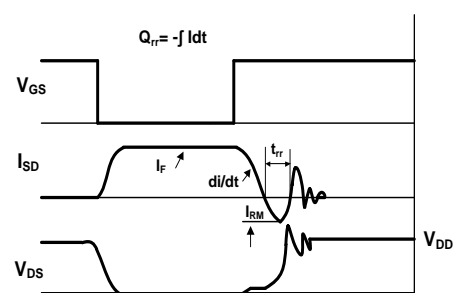
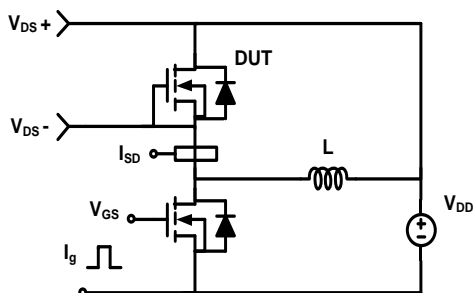
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform

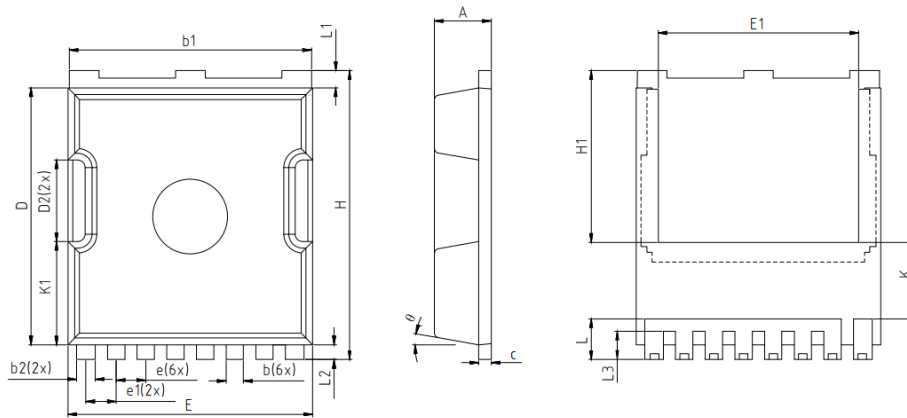


Diode Recovery Test Circuit & Waveform





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DIMENSIONS IN MILLIMETERS		
SYMBOL	MIN	MAX
A	2.20	2.40
b	0.60	0.80
b1	9.70	9.90
b2	0.65	0.85
c	0.40	0.60
D	10.28	10.58
D2	3.15	3.45
E	9.70	10.10
E1	7.90	8.30
e	1.20 BSC	
e1	1.225 BSC	
H	11.48	11.88
H1	6.95 BSC	
K	3.10 BSC	
K1	4.08	4.28
L	1.40	1.80
L1	0.60	0.80
L2	0.50	0.70
L3	1.00	1.30
θ	10° REF	