

TM120N03ANF

N-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

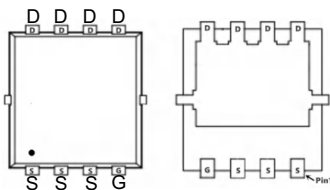
General Features

$V_{DS} = 30V$ $I_D = 120A$
 $R_{DS(ON)} = 3.2m\Omega (typ.) @ V_{GS} = 10V$

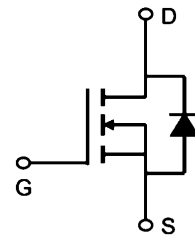
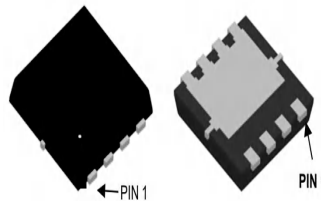
100% UIS Tested
 100% R_g Tested



NF:DFN5x6-8L



Marking:120N03A



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $-V_{GS} @ -10V^1$	120	A
$I_D @ T_c = 100^\circ C$	Continuous Drain Current, $-V_{GS} @ -10V^1$	78	A
I_{DM}	Pulsed Drain Current ²	444	A
EAS	Single Pulse Avalanche Energy ³	198	mJ
I_{AS}	Avalanche Current	53.8	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ⁴	6	W
$P_D @ T_c = 25^\circ C$	Total Power Dissipation ⁴	62.5	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	3.6	$^\circ C/W$

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Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V T _J =85°C	-	-	1 30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	0.9	1.2	1.5	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^d	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =20A V _{GS} =4.5V, I _{DS} =15A	- -	3.2 4.0	3.9 4.9	mΩ
Gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	24.6	-	S
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =20A, V _{GS} =0V	-	0.8	1.1	V
t _{rr}	Reverse Recovery Time	I _{DS} =20A, dI _{SD} /dt=100A/μs	-	35.6	-	ns
t _a	Charge Time		-	19.3	-	
t _b	Discharge Time		-	16.3	-	
Q _{rr}	Reverse Recovery Charge		-	26	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,F=1MHz	-	1	2	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz	-	2485	2971	pF
C _{oss}	Output Capacitance		-	850	-	
C _{rss}	Reverse Transfer Capacitance		-	85	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	12.4	23	ns
t _r	Turn-on Rise Time		-	9.5	18	
t _{d(OFF)}	Turn-off Delay Time		-	27.2	49	
t _f	Turn-off Fall Time		-	35.2	64	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =20A	-	20.6	28.8	nC
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =4.5V, I _{DS} =20A	-	9.8	-	
Q _{gth}	Threshold Gate Charge		-	1.8	-	
Q _{gs}	Gate-Source Charge		-	3.8	-	
Q _{gd}	Gate-Drain Charge		-	3.7	-	

Note d : Pulse test ; pulse width $\leq 300\mu s$, duty cycles $\leq 2\%$.

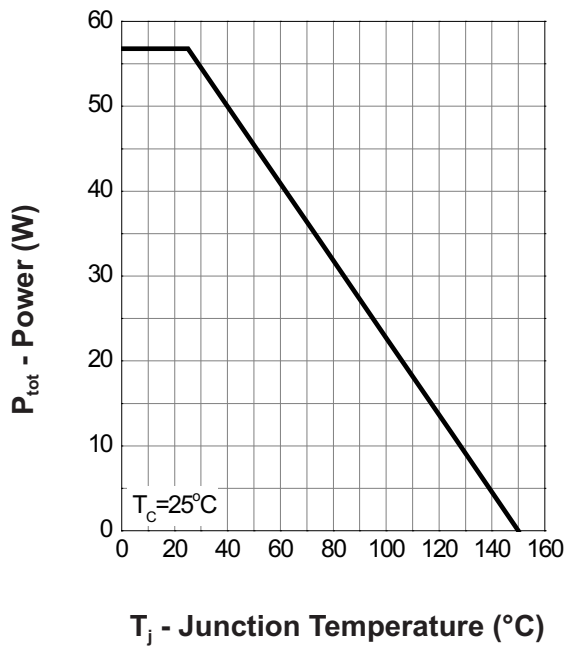
Note e : Guaranteed by design, not subject to production testing.

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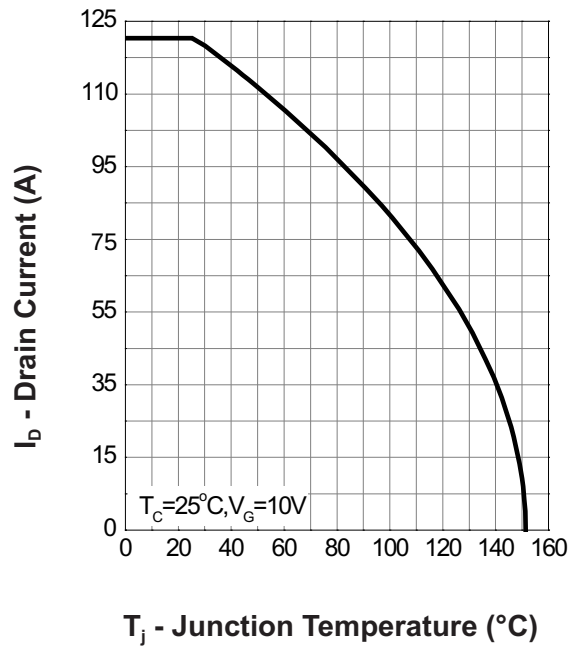
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Typical Operating Characteristics

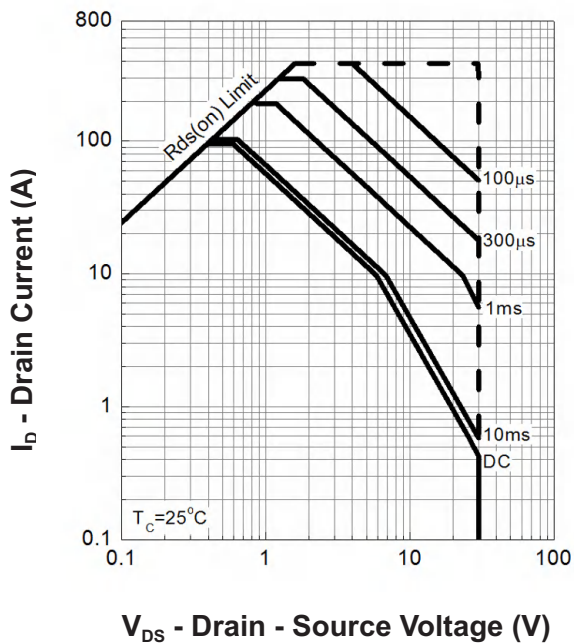
Power Dissipation



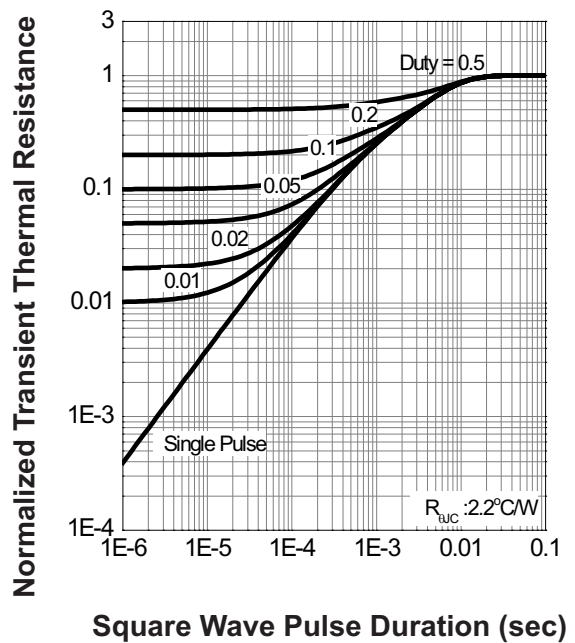
Drain Current



Safe Operation Area



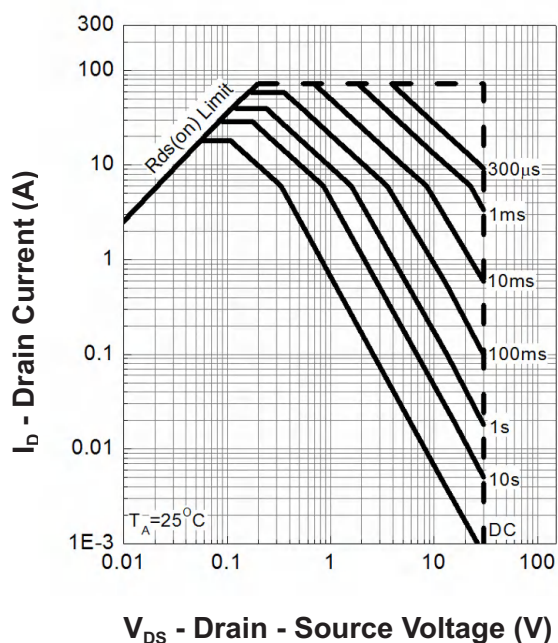
Thermal Transient Impedance



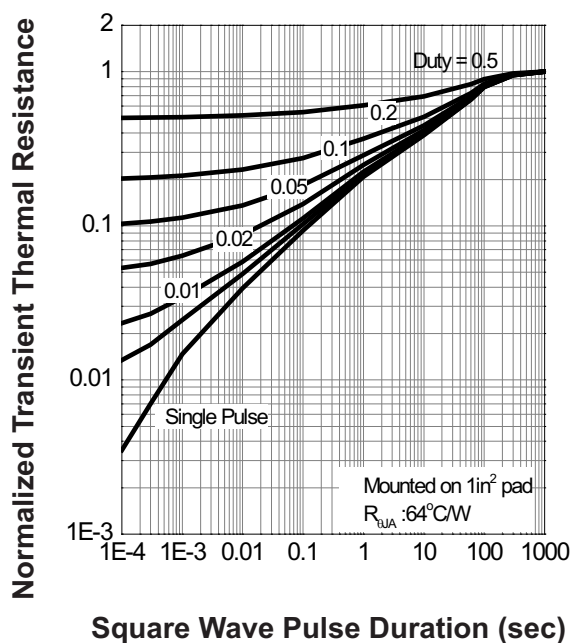
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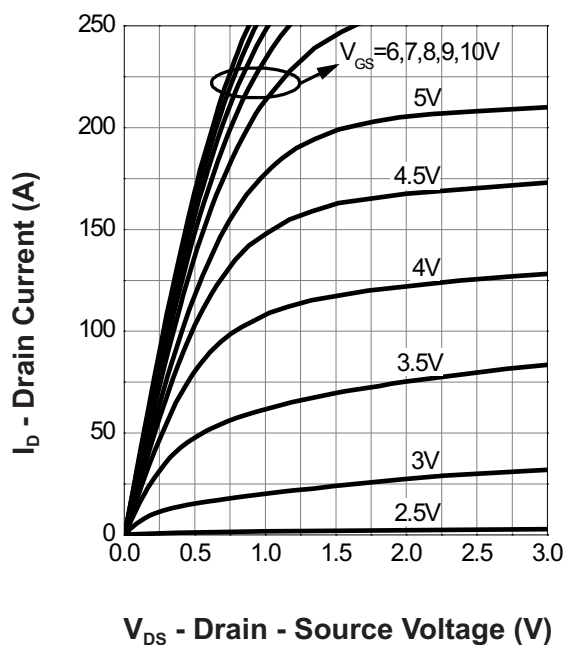
Safe Operation Area



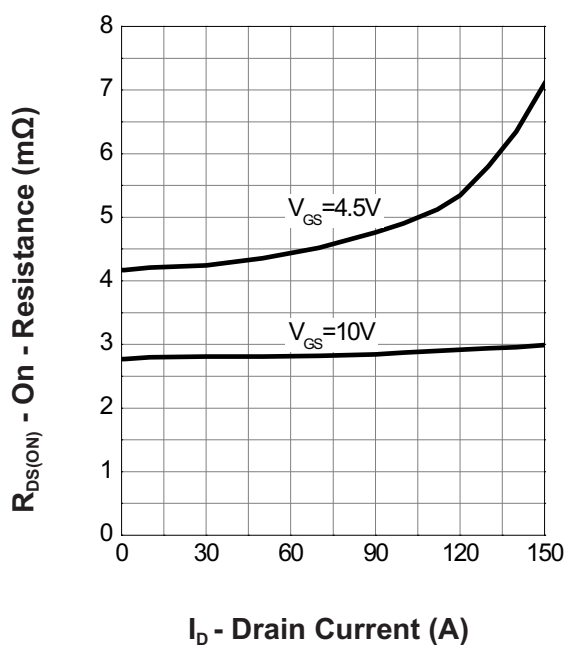
Thermal Transient Impedance



Output Characteristics



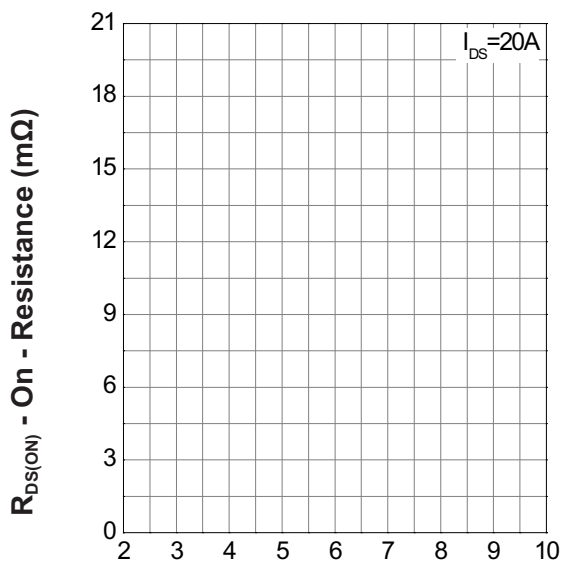
Drain-Source On Resistance



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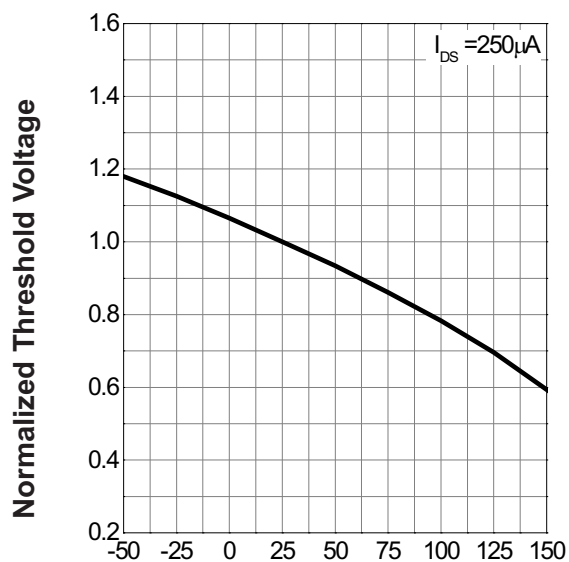
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Gate-Source On Resistance



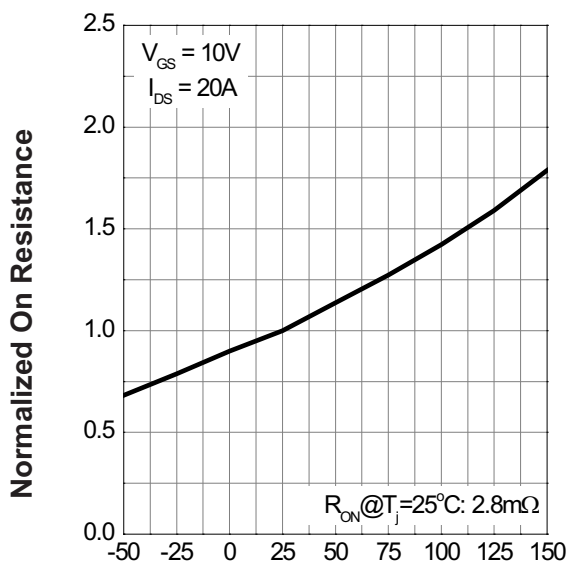
V_{GS} - Gate - Source Voltage (V)

Gate Threshold Voltage



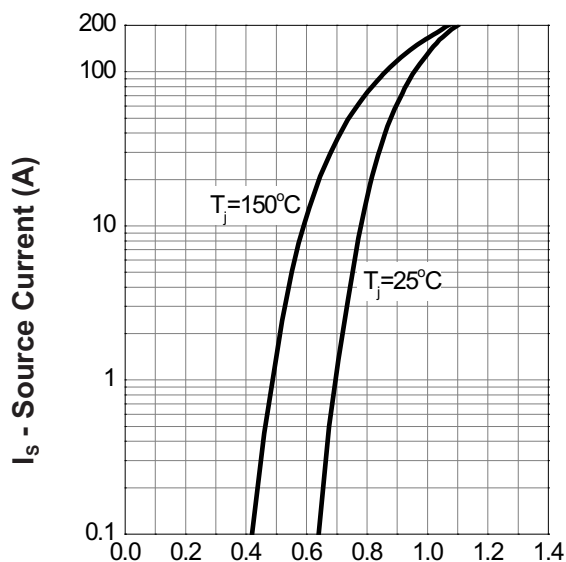
T_J - Junction Temperature (°C)

Drain-Source On Resistance



T_J - Junction Temperature (°C)

Source-Drain Diode Forward

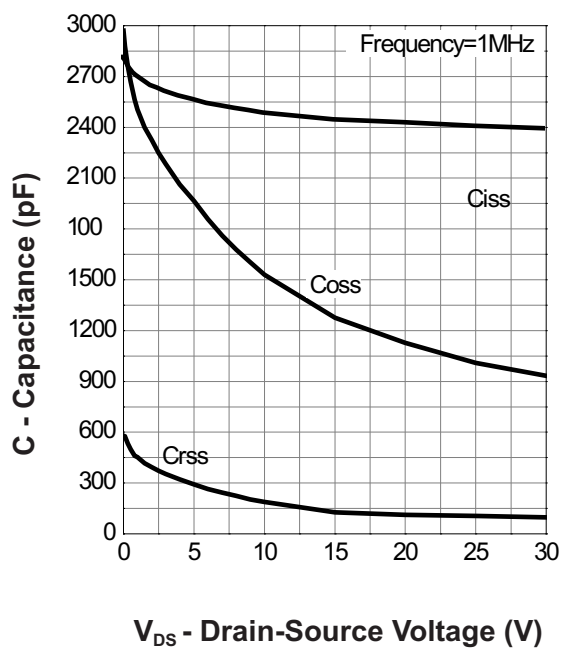


V_{SD} - Source - Drain Voltage (V)

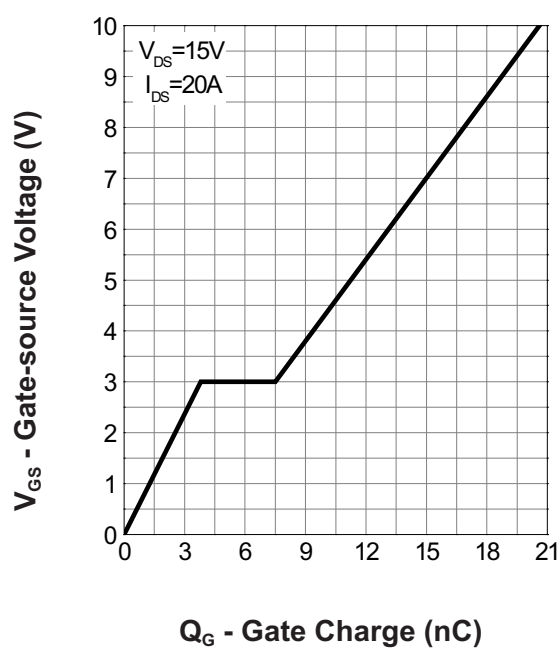
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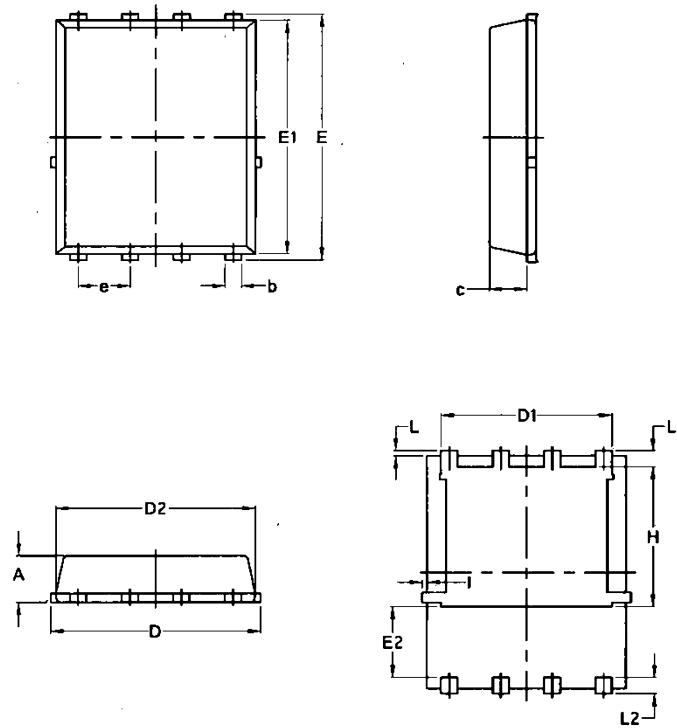
Capacitance



Gate Charge



Package Mechanical Data:DFN5x6-8L



Symbol	Common			
	mm		Inch	
	Mim	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070