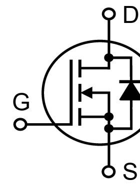
IXYS

X4-Class Power MOSFET

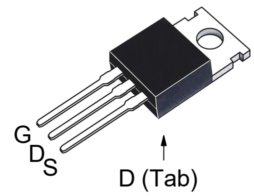
IXTP120N20X4

V_{DSS} = 200V
I_{D25} = 120A
$R_{DS(on)}$ ≤ 9.5mΩ

N-Channel Enhancement Mode
Avalanche Rated



TO-220
(IXTP)



G = Gate D = Drain
S = Source Tab = Drain

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 175°C	200	V
V_{DGR}	T_J = 25°C to 175°C, R_{GS} = 1MΩ	200	V
V_{GSS}	Continuous	±20	V
V_{GSM}	Transient	±30	V
I_{D25}	T_C = 25°C	120	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	240	A
I_A	T_C = 25°C	60	A
E_{AS}	T_C = 25°C	1	J
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	20	V/ns
P_D	T_C = 25°C	417	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering 1.6 mm (0.062 in.) from Case for 10s	300	°C
M_d	Mounting Torque	1.13 / 10	Nm/lb.in
Weight		3	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 250μA	200			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5		4.5	V
I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
I_{DSS}	V_{DS} = V_{DSS}, V_{GS} = 0V			25	μA
	T_J = 150°C			500	μA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.5 • I_{D25}, Note 1			9.5	mΩ

Features

- International Standard Package
- Low $R_{DS(ON)}$ and Q_G
- Avalanche Rated
- Low Package Inductance

Advantages

- High Power Density
- Easy to Mount
- Space Savings

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

Symbol	Test Conditions	Characteristic Values Min.	Typ.	Max	
$(T_J = 25°C$, Unless Otherwise Specified)					
g_{fs}	$V_{DS} = 10V$, $I_D = 0.5 \bullet I_{D25}$, Note 1	72	120		S
R_{Gi}	Gate Input Resistance		6		Ω
C_{iss}	$V_{GS} = 0V$, $V_{DS} = 25V$, f = 1MHz		6100		pF
C_{oss}			865		pF
C_{rss}			1.8		pF
	Effective Output Capacitance				
$C_{o(er)}$	Energy related $V_{GS} = 0V$		510		pF
$C_{o(tr)}$	Time related $V_{DS} = 0.8 \bullet V_{DSS}$		2000		pF
$t_{d(on)}$	**Resistive Switching Times**		13		ns
t_r	$V_{GS} = 10V$, $V_{DS} = 0.5 \bullet V_{DSS}$, $I_D = 0.5 \bullet I_{D25}$		24		ns
$t_{d(off)}$	$R_G = 2\Omega$ (External)		100		ns
t_f			12		ns
$Q_{g(on)}$	$V_{GS} = 10V$, $V_{DS} = 0.5 \bullet V_{DSS}$, $I_D = 0.5 \bullet I_{D25}$		108		nC
Q_{gs}			27		nC
Q_{gd}			27		nC
R_{thJC}				0.36	°C/W
R_{thCS}			0.50		°C/W

Source-Drain Diode

Symbol	Test Conditions	Characteristic Values Min.	Typ.	Max	
$(T_J = 25°C$, Unless Otherwise Specified)					
I_S	$V_{GS} = 0V$			120	A
I_{SM}	Repetitive, pulse Width Limited by T_{JM}			480	A
V_{SD}	$I_F = 100A$, $V_{GS} = 0V$, Note 1			1.4	V
t_{rr}	$I_F = 60A$, -di/dt = 200A/μs		190		ns
Q_{RM}	$V_R = 100V$		3.2		μC
I_{RM}			33.7		A

Note 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

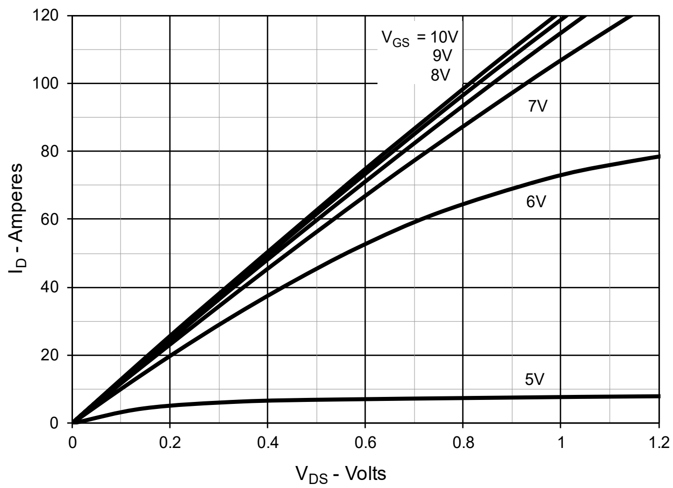


Fig. 1. Output Characteristics @ $T_J = 25^oC$

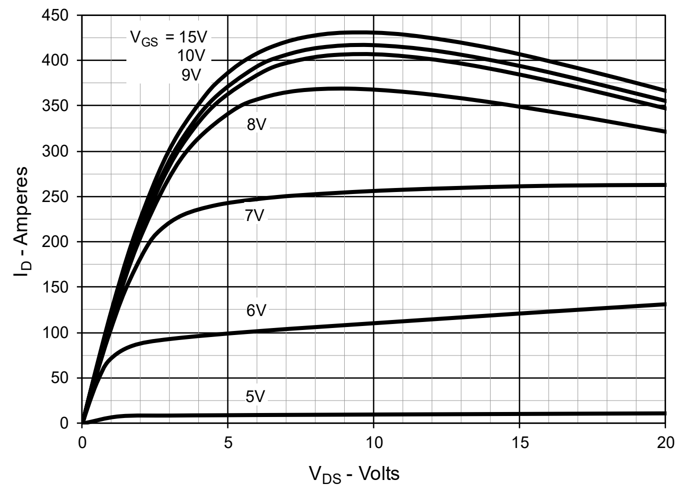


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

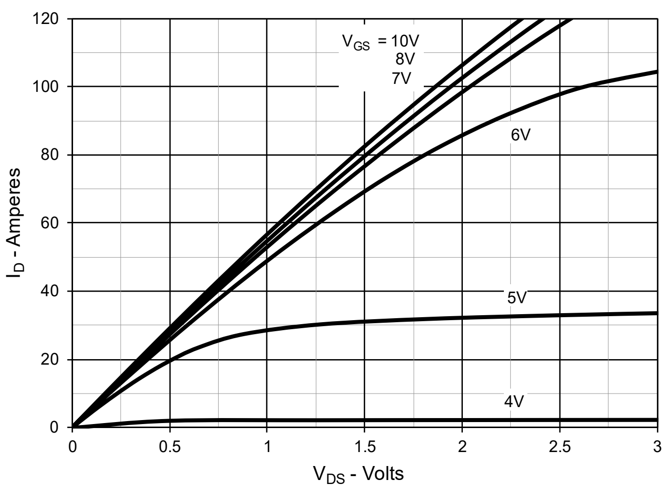


Fig. 3. Output Characteristics @ $T_J = 150^oC$

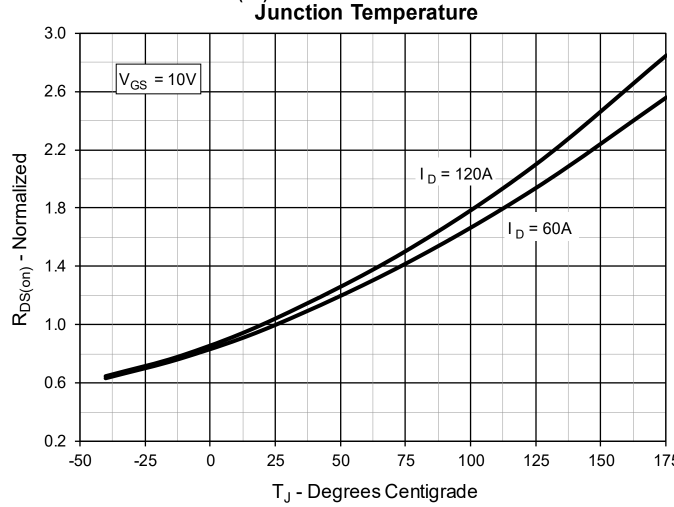


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 60A Value vs. Junction Temperature

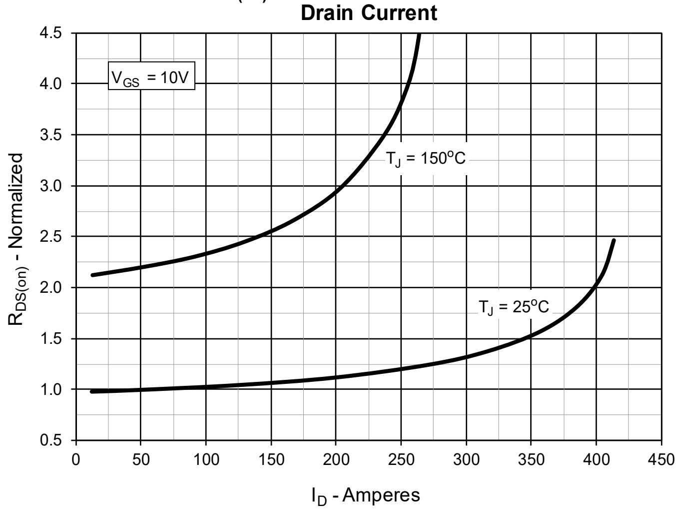


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 60A Value vs. Drain Current

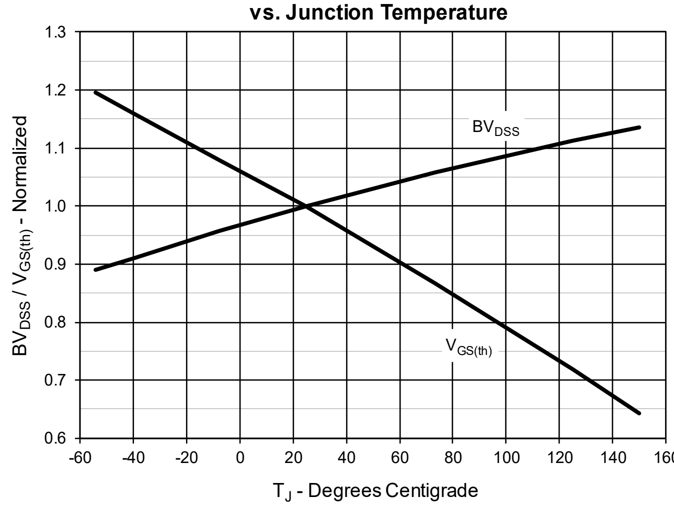


Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature

Fig. 7. Maximum Drain Current vs. Case Temperature

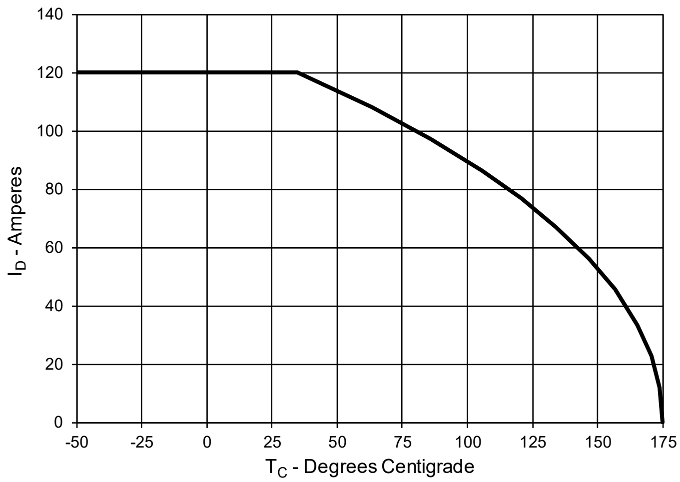


Fig. 8. Input Admittance

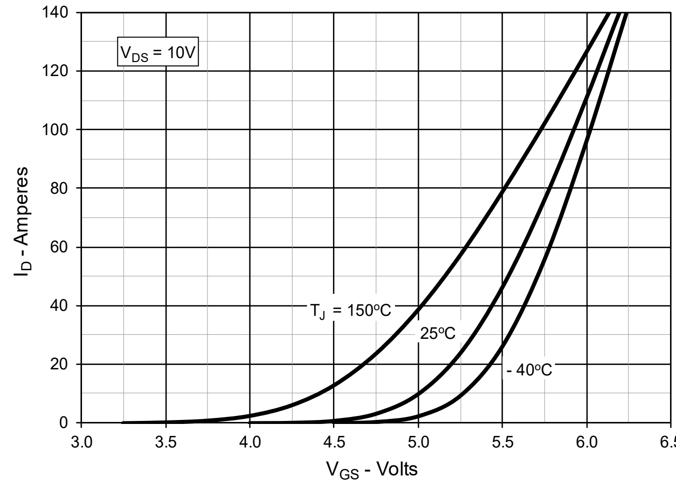


Fig. 9. Transconductance

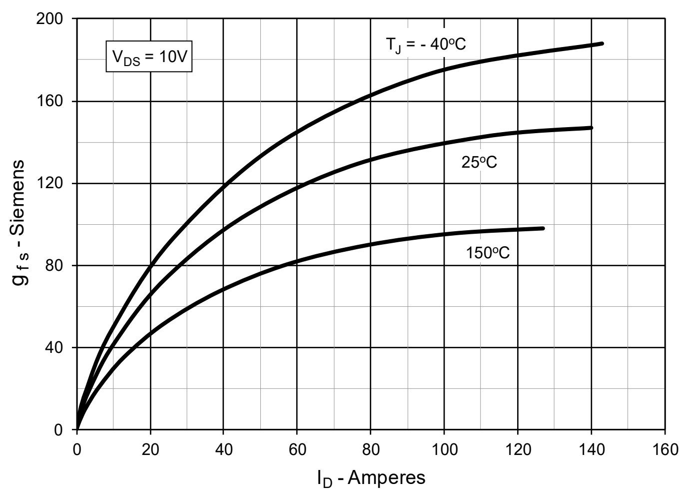


Fig. 10. Forward Voltage Drop of Intrinsic Diode

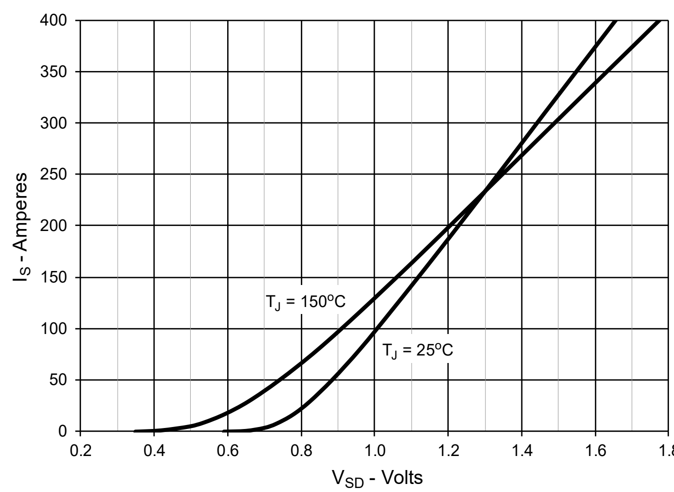


Fig. 11. Gate Charge

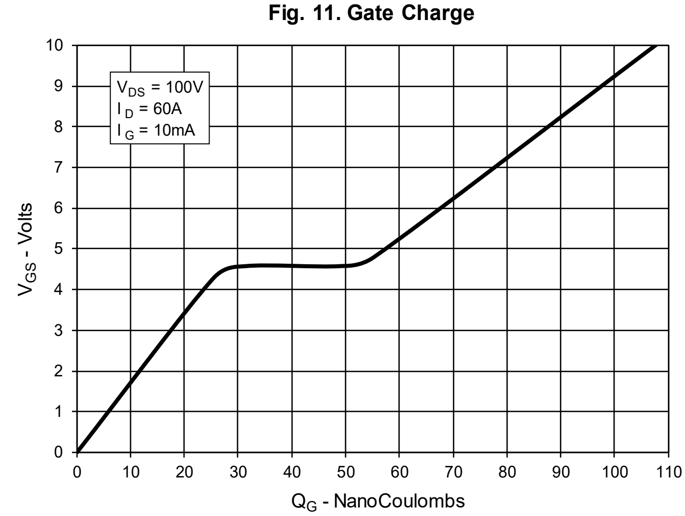


Fig. 12. Capacitance

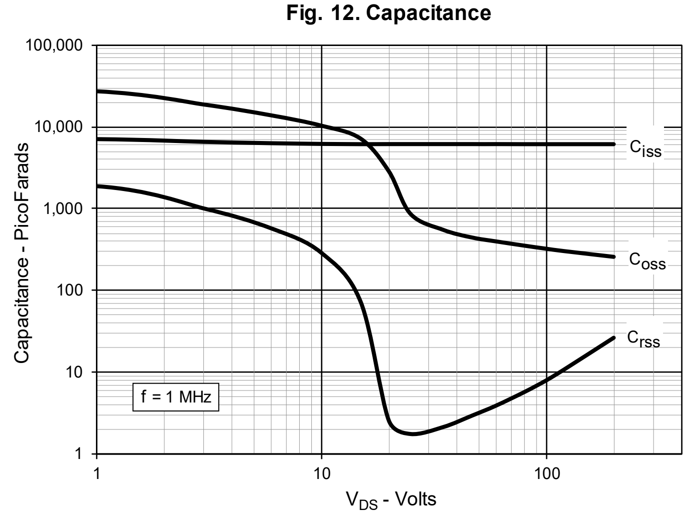


Fig. 13. Output Capacitance Stored Energy

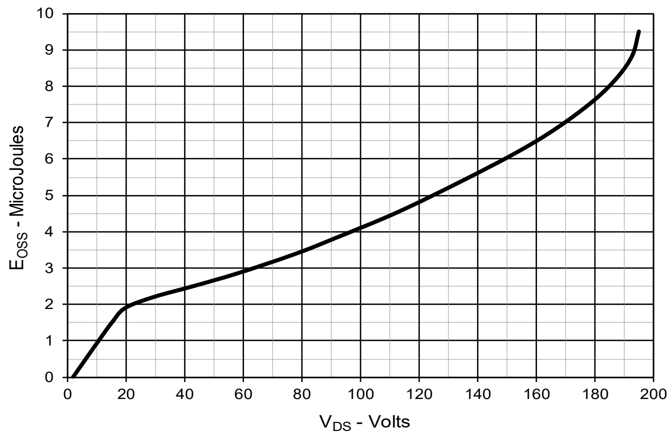


Fig. 14. Forward-Bias Safe Operating Area

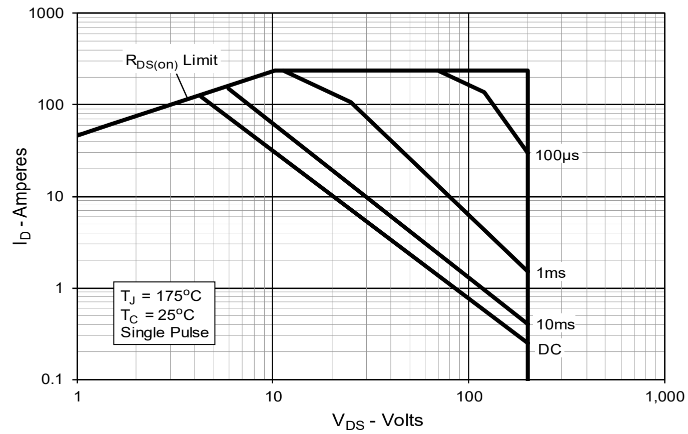
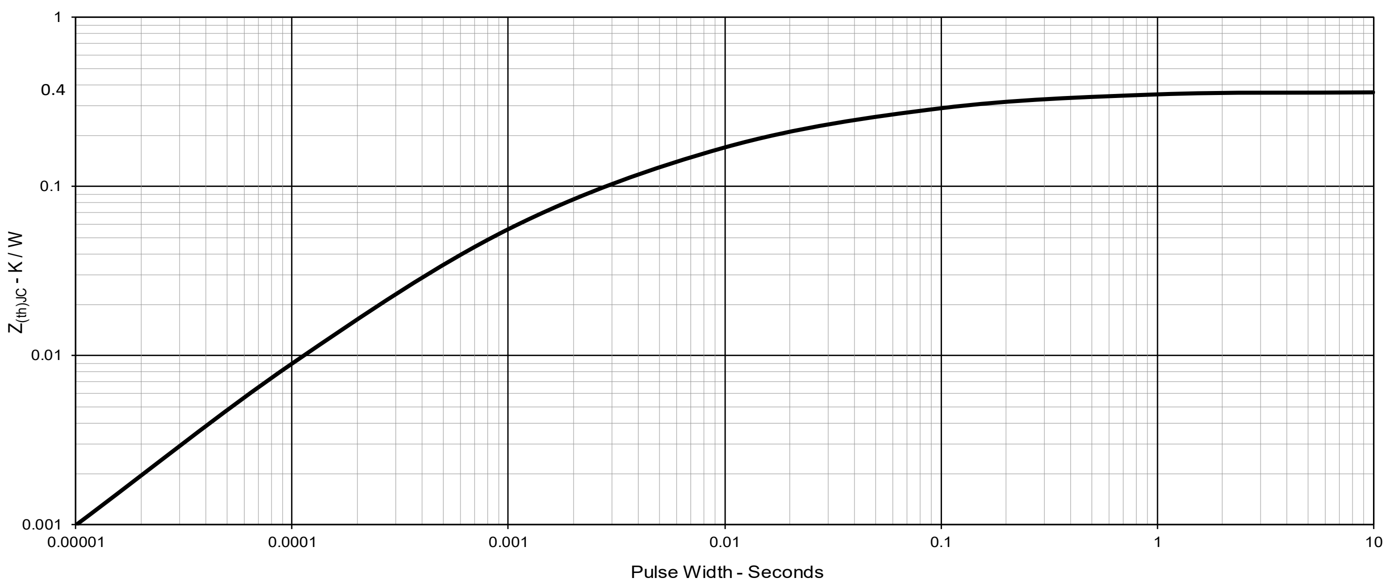
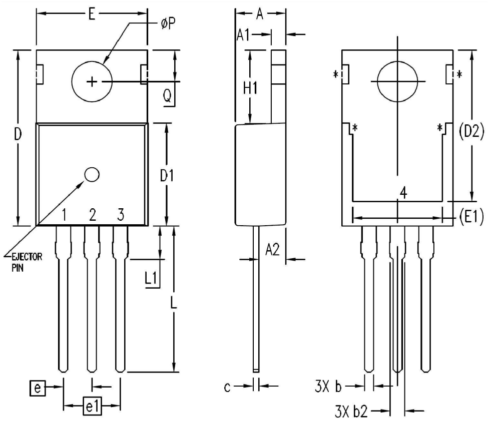
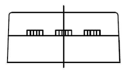


Fig. 15. Maximum Transient Thermal Impedance



TO-220 Outline





1 - Gate
2,4 - Drain
3 - Source

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A1	.047	.055	1.20	1.40
A2	.079	.106	2.00	2.70
b	.024	.039	0.60	1.00
b2	.045	.057	1.15	1.45
c	.014	.026	0.35	0.65
D	.587	.626	14.90	15.90
D1	.335	.370	8.50	9.40
(D2)	.500	.531	12.70	13.50
E	.382	.406	9.70	10.30
(E1)	.283	.323	7.20	8.20
e	.100 BSC		2.54 BSC	
e1	.200 BSC		5.08 BSC	
H1	.244	.268	6.20	6.80
L	.492	.547	12.50	13.90
L1	.110	.154	2.80	3.90
ØP	.134	.150	3.40	3.80
Q	.106	.126	2.70	3.20

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