



YEA SHIN TECHNOLOGY CO., LTD

YSE2120AYVB

## N+P-Channel Enhancement MOSFET



N-ch: VDS= 20V, ID= 0.8A / P-ch: VDS= -20V, ID= -0.4A

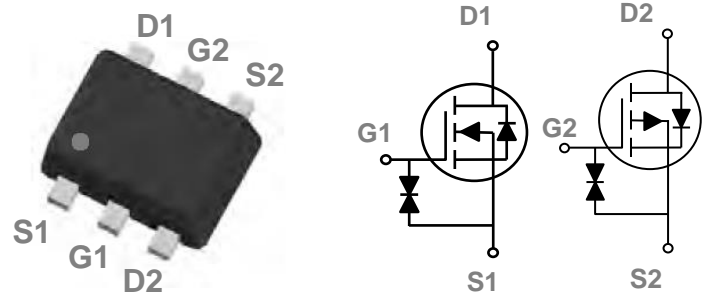
### Features

- Fast switching
- Green Device Available
- Suit for 1.5V Gate Drive Applications

### Applications

- Notebook
- Load Switch
- Networking
- Hand-held Instruments

### SOT-563 Dual Pin Configuration



### Absolute Maximum Rating $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating		Units
V <sub>DS</sub>	Drain-Source Voltage	20	-20	V
V <sub>GS</sub>	Gate-Source Voltage	±12	±12	V
I <sub>D</sub>	Drain Current – Continuous ( $T_c=25^\circ\text{C}$ )	0.8	-0.4	A
	Drain Current – Continuous ( $T_c=100^\circ\text{C}$ )	0.51	-0.25	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	3.2	-1.6	A
P <sub>D</sub>	Power Dissipation ( $T_c=25^\circ\text{C}$ )	0.312	0.312	W
	Power Dissipation – Derate above 25°C	2.5	2.5	mW/°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	400	°C/W

# DEVICE CHARACTERISTICS

## YSE2120AYVB

**N-CH Electrical Characteristics** (T<sub>J</sub>=25°C, unless otherwise)

### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	20	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	-0.01	---	V/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =16V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V	---	---	±20	uA

### On Characteristics

R <sub>DS(ON)</sub>	Static Drain-source On-Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.5A	---	200	300	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =0.4A	---	235	400	mΩ
		V <sub>GS</sub> =1.8V, I <sub>D</sub> =0.2A	---	295	550	mΩ
		V <sub>GS</sub> =1.5V, I <sub>D</sub> =0.1A	---	365	800	mΩ
		V <sub>GS</sub> =1.2V, I <sub>D</sub> =0.1A	---	600	---	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	0.3	0.6	1	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	3	---	mV/°C

### Dynamic and Switching Characteristics

Q <sub>g</sub>	Total Gate Charge <sup>2,3</sup>	V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.5A	---	1	2	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>2,3</sup>		---	0.26	0.5	
Q <sub>gd</sub>	Gate-Drain Charge <sup>2,3</sup>		---	0.2	0.4	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>2,3</sup>	V <sub>DD</sub> =10V, V <sub>GS</sub> =4.5V, R <sub>G</sub> =10Ω, I <sub>D</sub> =0.5A	---	5	10	ns
T <sub>r</sub>	Rise Time <sup>2,3</sup>		---	3.5	7	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>2,3</sup>		---	14	28	
T <sub>f</sub>	Fall Time <sup>2,3</sup>		---	6	12	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHz	---	38.2	75	pF
C <sub>oss</sub>	Output Capacitance		---	14.4	28	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	6	12	

### Drain-Source Diode Characteristics and Maximum Ratings

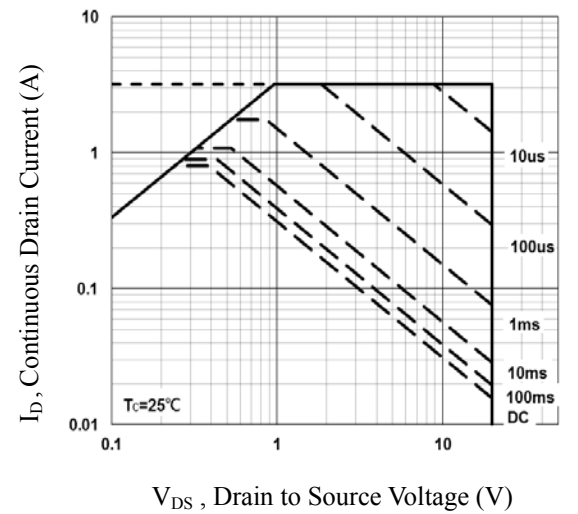
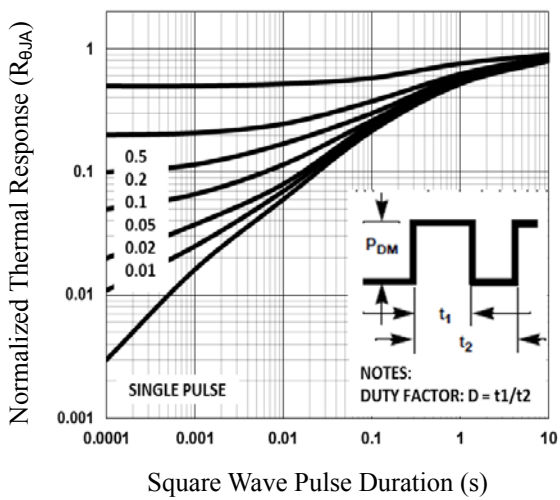
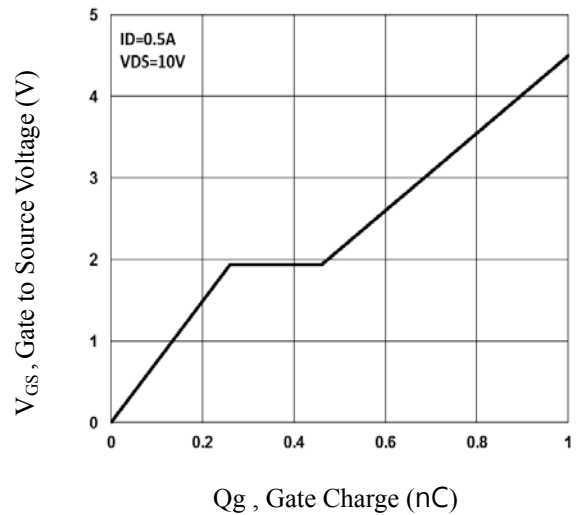
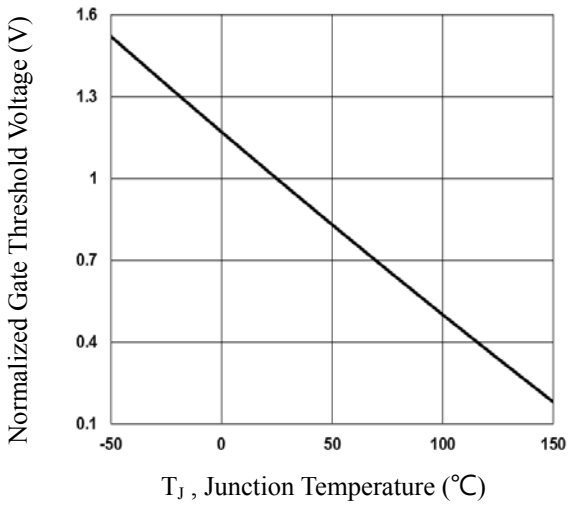
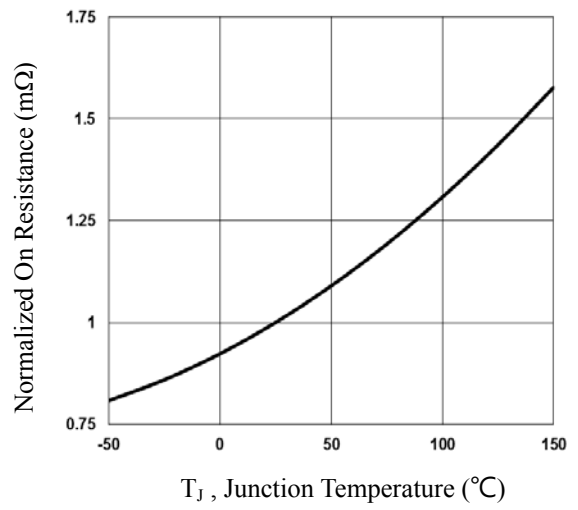
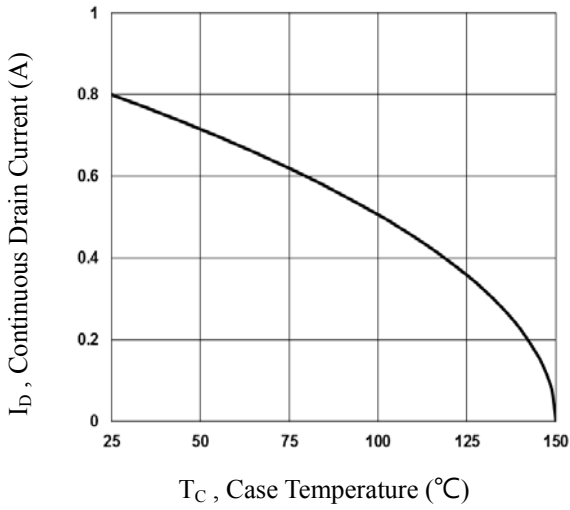
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	0.8	A
I <sub>SM</sub>	Pulsed Source Current		---	---	1.6	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =0.2A, T <sub>J</sub> =25°C	---	---	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

# DEVICE CHARACTERISTICS

## YSE2120AYVB



# DEVICE CHARACTERISTICS

## YSE2120AYVB

**P-CH Electrical Characteristics** ( $T_J=25^\circ\text{C}$ , unless otherwise)

### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1mA$	---	-0.01	---	$V/^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu A$
		$V_{DS}=-16V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 8V, V_{DS}=0V$	---	---	$\pm 20$	$\mu A$

### On Characteristics

$R_{DS(ON)}$	Static Drain-source On-Resistance	$V_{GS}=-4.5V, I_D=-0.3A$	---	440	600	$m\Omega$
		$V_{GS}=-2.5V, I_D=-0.2A$	---	610	850	$m\Omega$
		$V_{GS}=-1.8V, I_D=-0.1A$	---	810	1200	$m\Omega$
		$V_{GS}=-1.5V, I_D=-0.1A$	---	1020	1600	$m\Omega$
		$V_{GS}=-1.2V, I_D=-0.1A$	---	1800	---	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.3	-0.6	-1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	$mV/^\circ\text{C}$

### Dynamic and Switching Characteristics

$Q_g$	Total Gate Charge <sup>2,3</sup>	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-0.2A$	---	1	2	nC
$Q_{gs}$	Gate-Source Charge <sup>2,3</sup>		---	0.28	0.5	
$Q_{gd}$	Gate-Drain Charge <sup>2,3</sup>		---	0.18	0.4	
$T_{d(on)}$	Turn-On Delay Time <sup>2,3</sup>	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=10\Omega, I_D=-0.2A$	---	8	16	ns
$T_r$	Rise Time <sup>2,3</sup>		---	5.2	10	
$T_{d(off)}$	Turn-Off Delay Time <sup>2,3</sup>		---	30	60	
$T_f$	Fall Time <sup>2,3</sup>		---	18	36	
$C_{iss}$	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$	---	40	78	pF
$C_{oss}$	Output Capacitance		---	15	30	
$C_{rss}$	Reverse Transfer Capacitance		---	6.5	13	

### Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	-0.4	A
$I_{SM}$	Pulsed Source Current		---	---	-0.8	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-0.2A, T_J=25^\circ\text{C}$	---	---	-1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

# DEVICE CHARACTERISTICS

## YSE2120AYVB

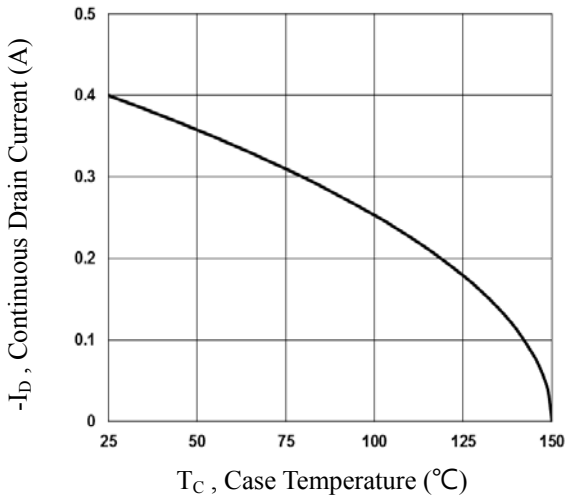


Fig.7 Continuous Drain Current vs.  $T_c$

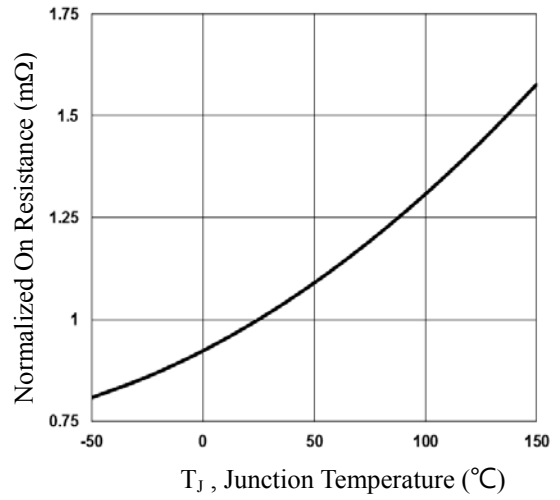


Fig.8 Normalized  $R_{DS(on)}$  vs.  $T_j$

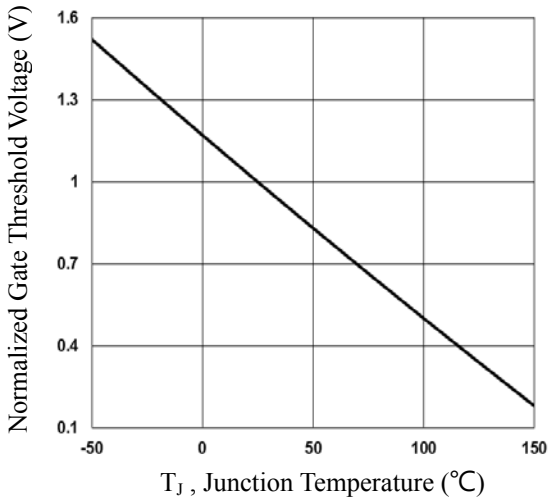


Fig.9 Normalized  $V_{th}$  vs.  $T_j$

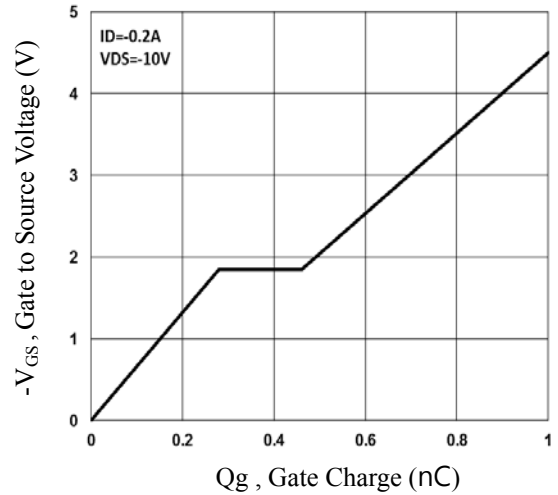


Fig.10 Gate Charge Waveform

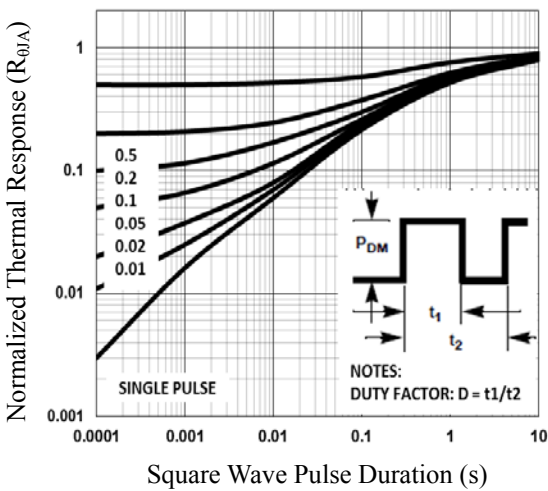


Fig.11 Normalized Transient Impedance

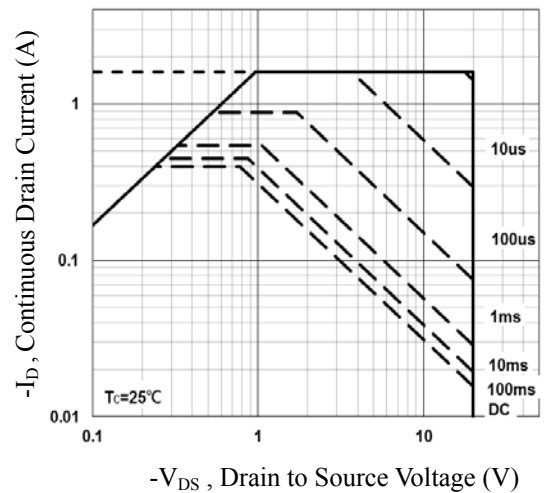
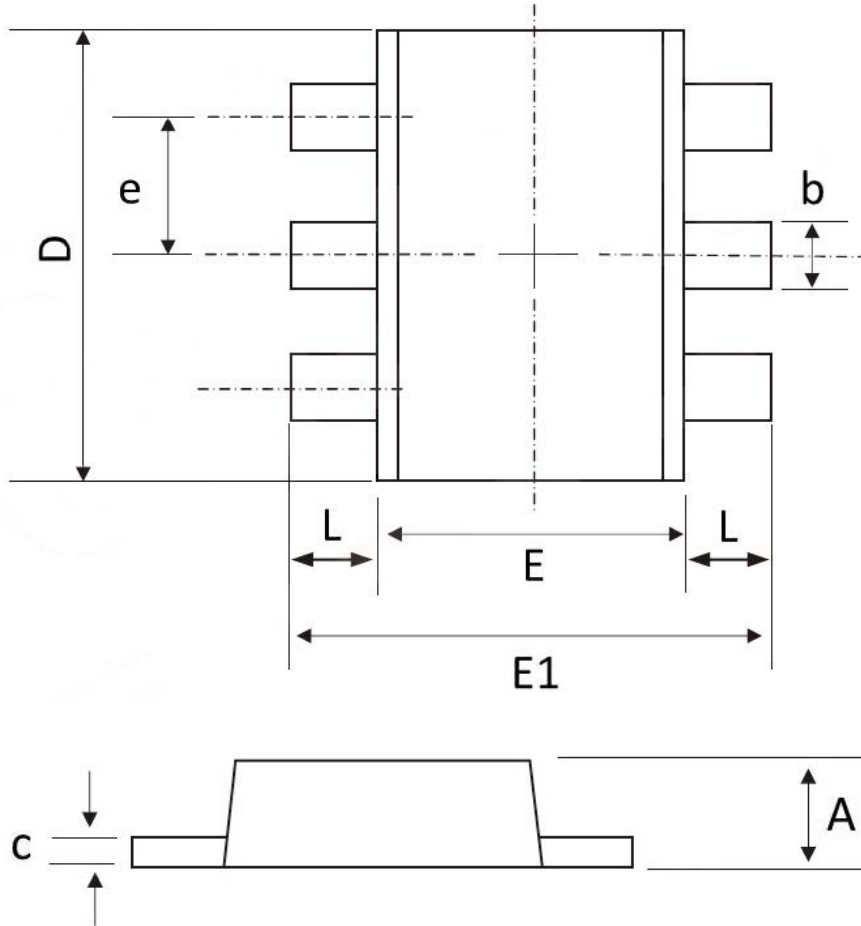


Fig.12 Maximum Safe Operation Area

# PACKAGE OUTLINE & DIMENSIONS

YSE2120AYVB

## SOT-563 Dual PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.600	0.500	0.024	0.020
b	0.300	0.150	0.012	0.006
c	0.180	0.100	0.007	0.004
D	1.700	1.500	0.067	0.059
E	1.250	1.100	0.049	0.043
E1	1.700	1.550	0.067	0.061
e	0.5BSC		0.02BSC	
L	0.300	0.100	0.012	0.004