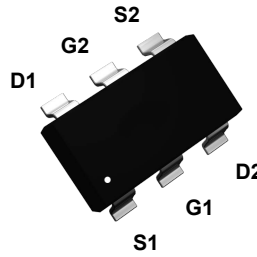
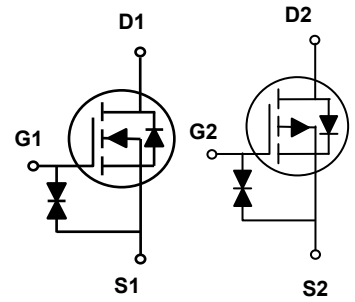


### Main Product Characteristics

$V_{(BR)DSS}$	20V	-20V
$R_{DS(ON)}$	300mΩ	600mΩ
$I_D$	800mA	-400mA



SOT-363



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for notebook, load switch, networking and hand-held devices
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The SSF9120 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value		Unit
Drain-Source Voltage	$V_{DS}$	20	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	$\pm 8$	V
Drain Current – Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$	800	-400	mA
Drain Current – Continuous ( $T_C=100^\circ\text{C}$ )		510	-250	mA
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	3.2	-1.6	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	275	275	mW
Power Dissipation – Derate above $25^\circ\text{C}$	$P_D$	2.2	2.2	mW/ $^\circ\text{C}$
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	Typ.	Max.	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	---	450	$^\circ\text{C}/\text{W}$

### N-Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20	---	---	V
BV <sub>DSS</sub> Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =1mA	---	-0.01	---	V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>Ds</sub> =20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	μA
		V <sub>Ds</sub> =16V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	10	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±6V, V <sub>DS</sub> =0V	---	---	±20	μA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	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	
		V <sub>GS</sub> =1.8V, I <sub>D</sub> =0.2A	---	295	550	
		V <sub>GS</sub> =1.5V, I <sub>D</sub> =0.1A	---	365	800	
		V <sub>GS</sub> =1.2V, I <sub>D</sub> =0.1A	---	600	1500	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	0.3	0.6	1.0	V
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub>		---	3	---	mV/°C
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2, 3</sup>	Q <sub>g</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.5A	---	1	2	nC
Gate-Source Charge <sup>2, 3</sup>	Q <sub>gs</sub>		---	0.26	0.5	
Gate-Drain Charge <sup>2, 3</sup>	Q <sub>gd</sub>		---	0.2	0.4	
Turn-On Delay Time <sup>2, 3</sup>	T <sub>d(on)</sub>	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
Rise Time <sup>2, 3</sup>	T <sub>r</sub>		---	3.5	7	
Turn-Off Delay Time <sup>2, 3</sup>	T <sub>d(off)</sub>		---	14	28	
Fall Time <sup>2, 3</sup>	T <sub>f</sub>		---	6	12	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, F=1MHz	---	38.2	75	pF
Output Capacitance	C <sub>oss</sub>		---	14.4	28	
Reverse Transfer Capacitance	C <sub>rss</sub>		---	6	12	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	I <sub>S</sub>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	0.8	A
Pulsed Source Current	I <sub>SM</sub>		---	---	1.6	A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =0.2A, T <sub>J</sub> =25°C	---	---	1	V

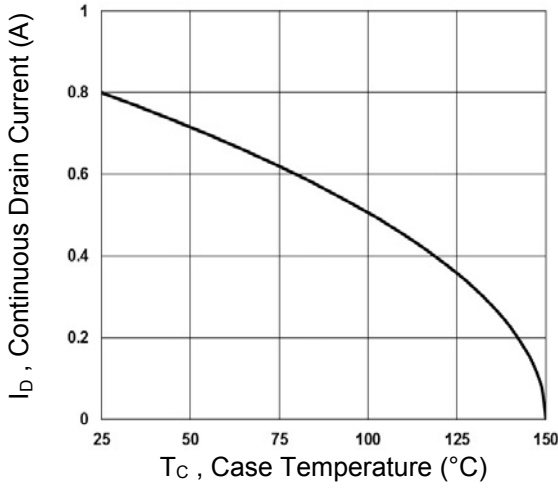
### P-Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-20	---	---	V
BV <sub>DSS</sub> Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.01	---	V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	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
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V	---	---	±20	uA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.3A	---	440	600	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.2A	---	610	850	
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-0.1A	---	810	1200	
		V <sub>GS</sub> =-1.5V, I <sub>D</sub> =-0.1A	---	1020	1600	
		V <sub>GS</sub> =-1.2V, I <sub>D</sub> =-0.1A	---	1800	3000	
Gate Threshold Voltage	V <sub>GS(th)</sub>		-0.3	-0.6	-1.0	V
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	---	3	---	mV/°C
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2, 3</sup>	Q <sub>g</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.2A	---	1	2	nC
Gate-Source Charge <sup>2, 3</sup>	Q <sub>gs</sub>		---	0.28	0.5	
Gate-Drain Charge <sup>2, 3</sup>	Q <sub>gd</sub>		---	0.18	0.4	
Turn-On Delay Time <sup>2, 3</sup>	T <sub>d(on)</sub>	V <sub>DD</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =10Ω I <sub>D</sub> =-0.2A	---	8	16	nS
Rise Time <sup>2, 3</sup>	T <sub>r</sub>		---	5.2	10	
Turn-Off Delay Time <sup>2, 3</sup>	T <sub>d(off)</sub>		---	30	60	
Fall Time <sup>2, 3</sup>	T <sub>f</sub>		---	18	36	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, F=1MHz	---	40	78	pF
Output Capacitance	C <sub>oss</sub>		---	15	30	
Reverse Transfer Capacitance	C <sub>rss</sub>		---	6.5	13	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	I <sub>s</sub>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-0.4	A
Pulsed Source Current	I <sub>SM</sub>		---	---	-0.8	A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>s</sub> =-0.2A, T <sub>J</sub> =25°C	---	---	-1	V

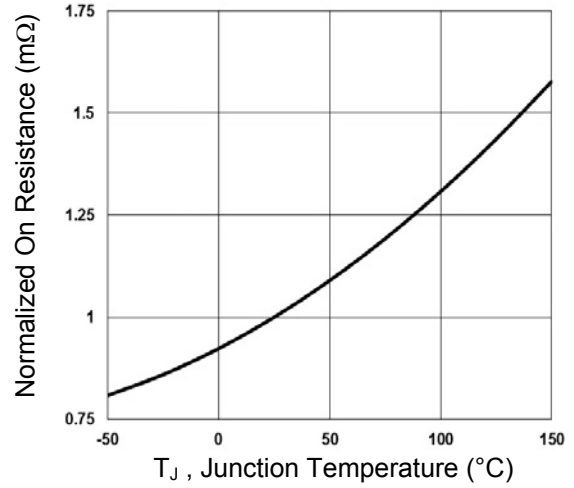
**Notes:**

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.

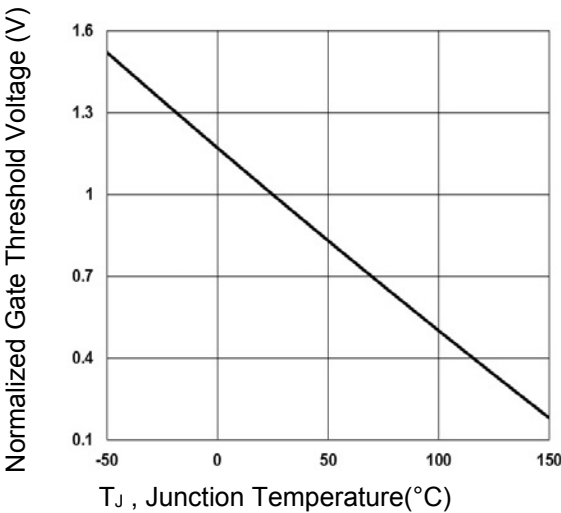
**N-Channel Typical Electrical and Thermal Characteristic Curves**



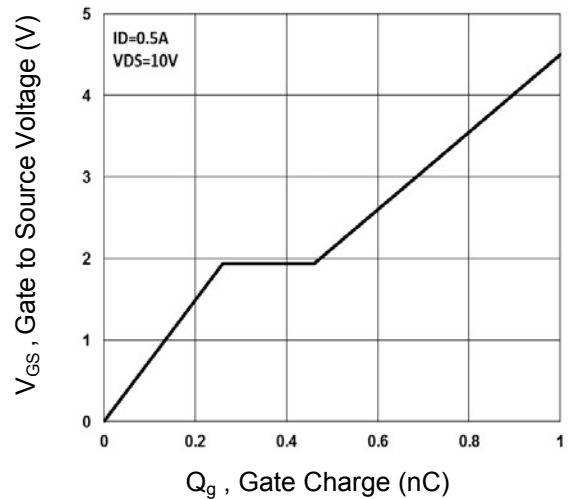
**Fig.1 Continuous Drain Current vs.  $T_c$**



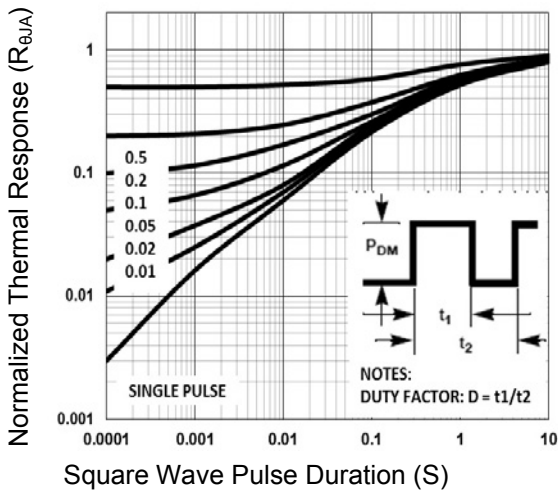
**Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_j$**



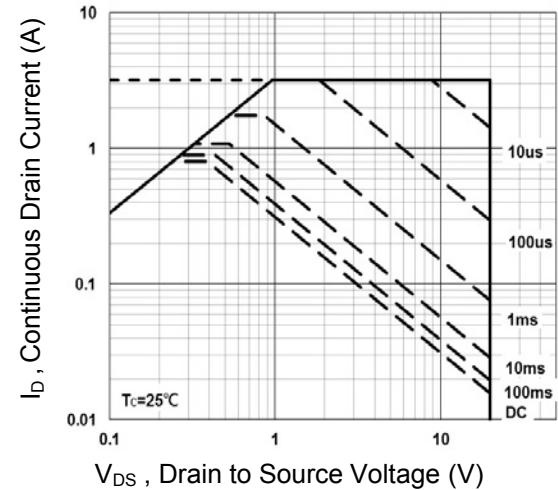
**Fig.3 Normalized  $V_{th}$  vs  $T_j$**



**Fig.4 Gate Charge Waveform**

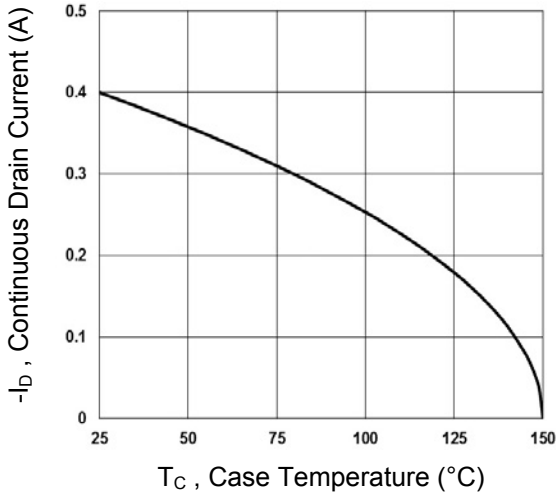


**Fig.5 Normalized Transient Impedance**

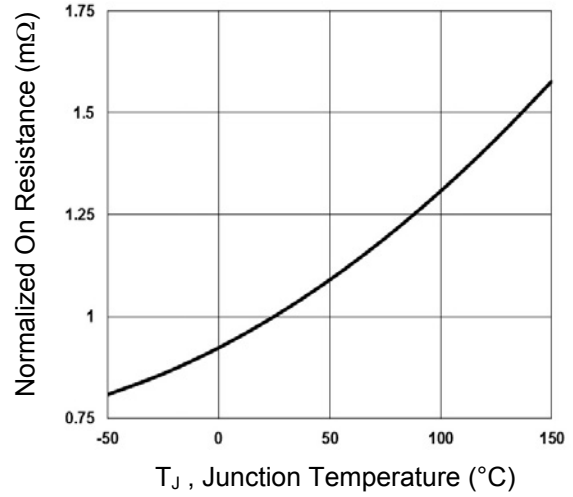


**Fig.6 Maximum Safe Operation Area**

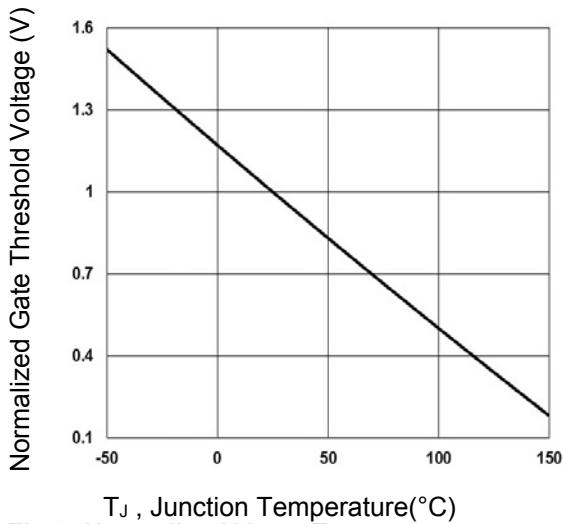
**P-Channel Typical Electrical and Thermal Characteristic Curves**



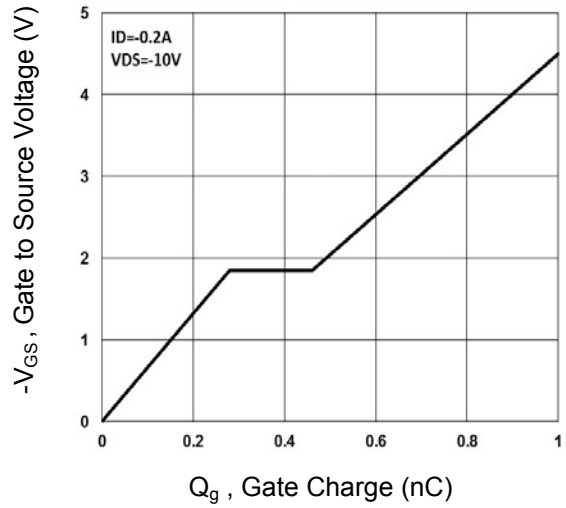
**Fig.7 Continuous Drain Current vs.  $T_c$**



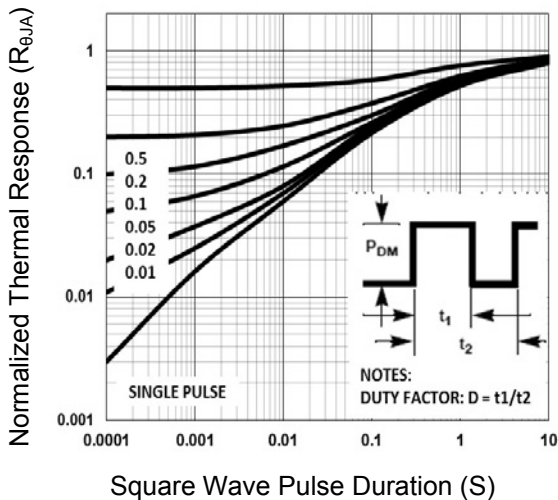
**Fig.8 Normalized  $R_{DS(ON)}$  vs.  $T_j$**



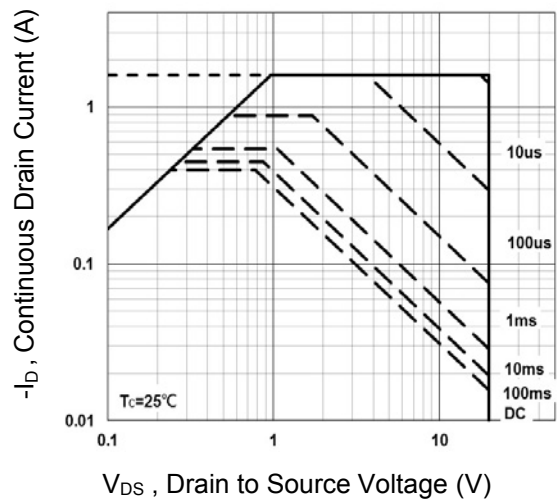
**Fig.9 Normalized  $V_{th}$  vs  $T_j$**



**Fig.10 Gate Charge Waveform**



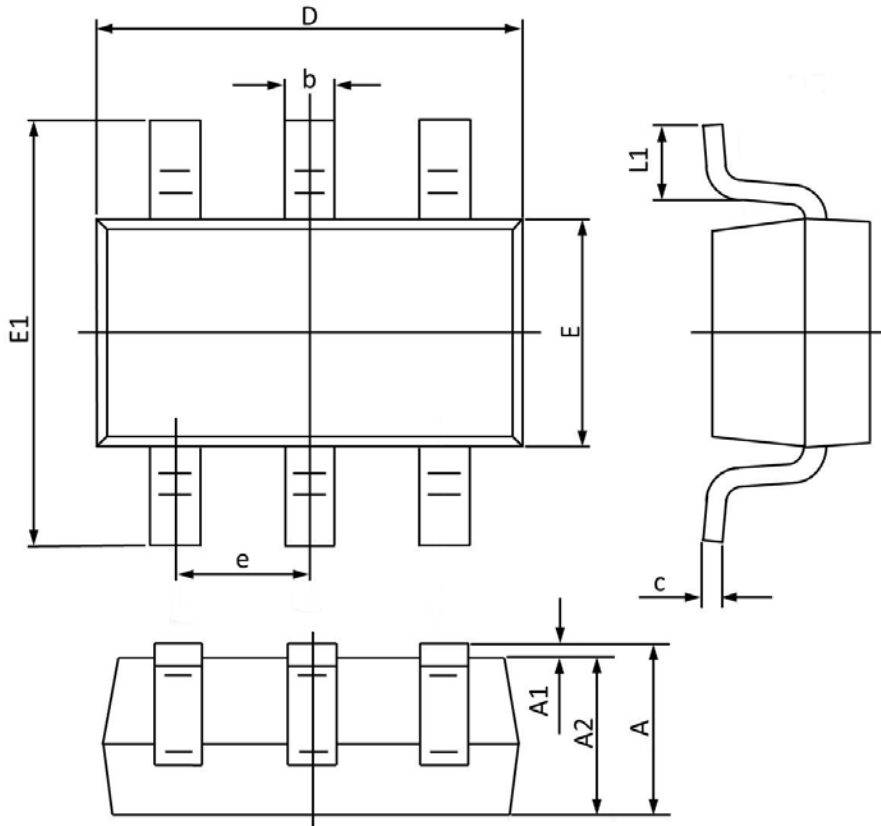
**Fig.11 Normalized Transient Impedance**



**Fig.12 Maximum Safe Operation Area**

## Package Outline Dimensions

SOT-363



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	0.800	0.043	0.031
A1	0.100	0.000	0.004	0.000
A2	1.000	0.800	0.039	0.031
b	0.330	0.100	0.013	0.004
c	0.250	0.100	0.010	0.004
D	2.200	1.800	0.087	0.071
E	1.350	1.150	0.053	0.045
E1	2.400	1.800	0.094	0.071
e	0.65BSC		0.026BSC	
L1	0.350	0.100	0.014	0.004