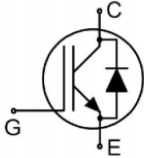


●Features

- Low Gate Charge
- Low Power Loss & High Efficiency
- Guard Ring & Environmental Protection
- High Temperature Application
- Green Molding Compound

●Application

- DC-DC Inverters
- UPS
- Industrial Heating

	$V_{CES}: 650V$ $I_C: 15A$ $V_{CE(SAT)}: 1.7V$
 TO-220 LHG15T65TLD	■ RoHS COMPLIANT TO-220F  LHG15T65FLD

●Ordering Information:

Part Number	LHG15T65TLD	LHG15T65FLD
Package	TO-220	TO-220F
Basic Ordering Unit (pcs)	1000	1000
Normal Package Material Ordering Code	LHG15T65TLD-TO220-TU	LHG15T65FLD-TO220F-TU
Halogen Free Ordering Code	LHG15T65TLD-TO220-TU-HF	LHG15T65FLD-TO220F-TU-HF

●Absolute Maximum Ratings (Ta=25℃)

Symbol	Parameter	Rating	Unit
Common Ratings (Ta=25℃ Unless Otherwise Noted)			
V _{CES}	Collector- Emitter Voltage (MIN.)	650	V
V _{GES}	Gate-Emitter Voltage	±20	
I _C	Continuous Collector Current	T _C = 25℃	A
		T _C = 100℃	
I _{CM}	Collector Current Continuous (Note 1.)	60.0	A
I _F	Diode Continuous Forward(TC=100℃)	15.0	A
P _D	Maximum Power Dissipation (T _C =25℃)	TO-220:126	W
T _J	Maximum Junction Temperature	-40 to 175	℃
T _{STG}	Storage Temperature Range	-50 to 150	℃
T _L	Maximum Lead Temperature for Soldering Purposes	275	℃

Notes : ¹⁾ Collector current limited by maximum junction temperature.

● Thermal Resistance

Symbol	Parameter	Values		Unit
		TO-220	TO-220F	
R _{thJC}	Thermal Resistance, Junction - Case	1.19	5.0	℃/W
R _{thJA}	Thermal Resistance, Junction - Ambient	62.5	62.5	℃/W

● Electrical Characteristics (T_J=25℃ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	Values			Unit
			Min.	Typ.	Max.	
Off Characteristics						
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GS} =0V, I _C =250uA	650	-	-	V
I _{CES}	Zero Gate Voltage Drain Current	V _{CE} = 600V, V _{GE} = 0V, T _C =25°C	-	-	1.0	mA
I _{GESF}	Gate-body Leakage Current (Forward)	V _{CE} =0V, V _{GE} =20V	-	-	250	nA
I _{GESR}	Gate-body Leakage Current (Reverse)	V _{CE} =0V, V _{GE} =-20V	-	-	-250	nA
ΔBV _{CES} /ΔT _j	Breakdown Voltage Temperature Coefficient.	I _C =1mA, Reference to 25°C	-	0.6	-	V/°C

• Electrical Characteristics ($T_J=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	Values			Unit
			Min.	Typ.	Max.	
On Characteristics						
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C =250uA	4.5	5.5	7.0	V
V _{CE(SAT)}	Collector- Emitter Saturation Voltage	V _{GE} =15V , I _C =15A T _C = 25°C	-	1.7	2.4	V

• Electrical Characteristics ($T_J=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	Values			Unit
			Min.	Typ.	Max.	
Switching Characteristics						
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V, Frequency=1.0MHz	-	1020	-	pF
C _{oes}	Output Capacitance		-	59	-	
C _{res}	Reverse Transfer Capacitance		-	33	-	
t _{d(ON)}	Turn-on Delay Time	V _{CE} = 400V, I _C = 15A, R _G = 10Ω V _{GE} = 15V T _C =25°C	-	31	-	nS
t _r	Turn-on Rise Time		-	36	-	
t _{d(OFF)}	Turn-off Delay Time		-	45	-	
t _f	Turn-off Fall Time		-	30	-	
E _{on}	Turn-on Energy		-	0.62	-	mJ
E _{off}	Turn-off Energy	-	0.18	-		
E _{total}	Total Switching Energy	-	0.8	-		
Q _g	Total Gate Charge	V _{CE} =400V, V _{GE} =15V, I _C =15A	-	53	-	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
V _F	Emitter-Collector Diode Forward Voltage	V _{GS} =0V, I _s =15A	-	1.40	1.7	V
t _{rr}	Reverse Recovery Time	I _S =15A, V _{GE} =0V, VR=400 V dI _F /dt=100A/s (Note 4)	-	45	-	nS
Q _{rr}	Reverse Recovery Charge		-	155	-	nC
I _{RRM}	Diode Reverse Recovery Current		-	15	-	A

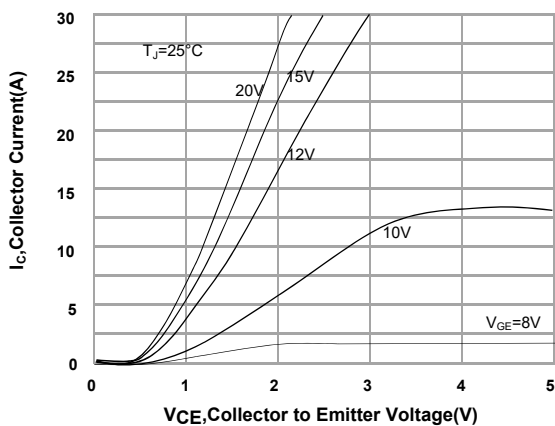
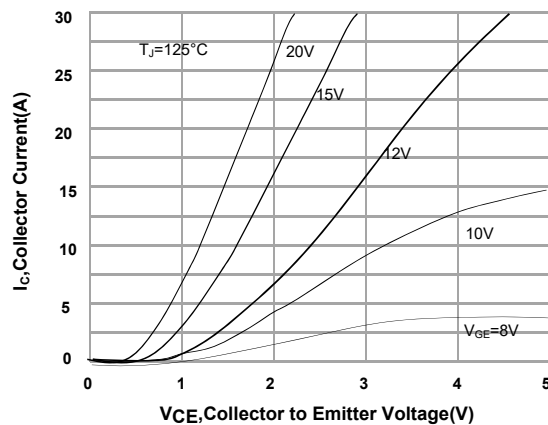
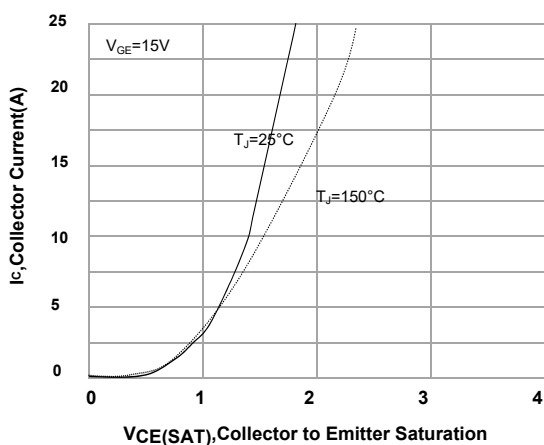
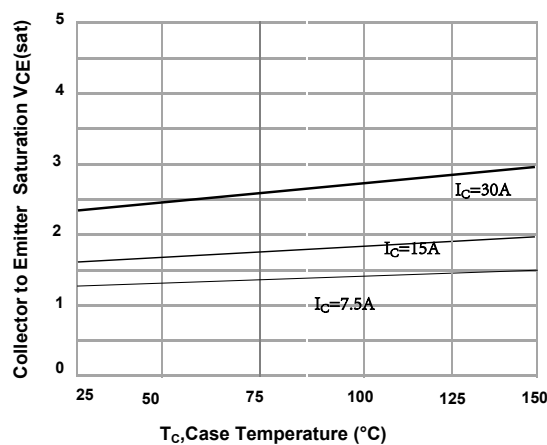
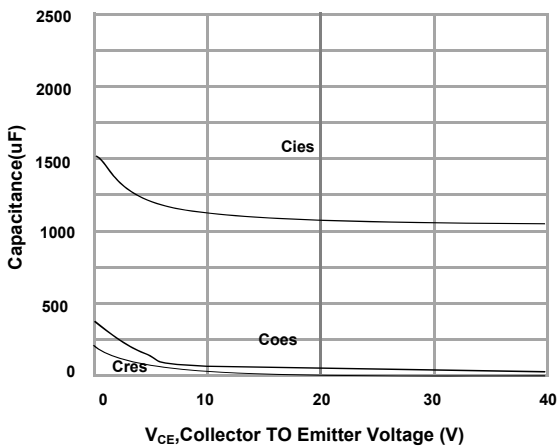
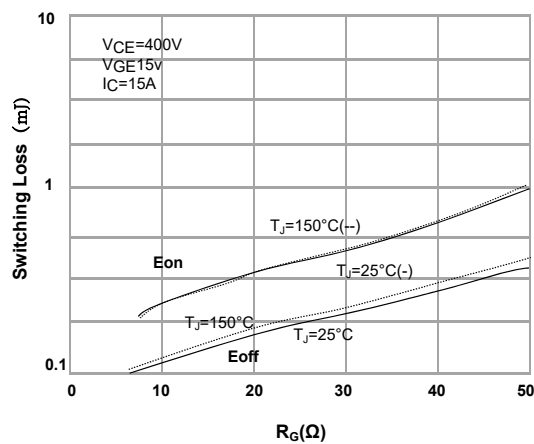
Note 1 : Pulse width limited by maximum junction temperature.

Note 2 : Allowed number of short circuits: < 1000 Time between short circuit: >1s.

Note 3 : Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

Note 4 : Essentially independent of operating temperature.

● Electrical Characteristic Curves

Fig. 1 Typical Output Characteristics

Fig. 2 Typical Output Characteristic

Fig. 3 $V_{CE(SAT)}$ vs. I_C Characteristics

Fig. 4 $V_{CE(SAT)}$ vs. T_C

Fig. 5 Capacitance Characteristics

Fig. 6 Switching Energy Loss Characteristics


Electrical Characteristic Curves

Fig. 7 R_g vs. Switching Time

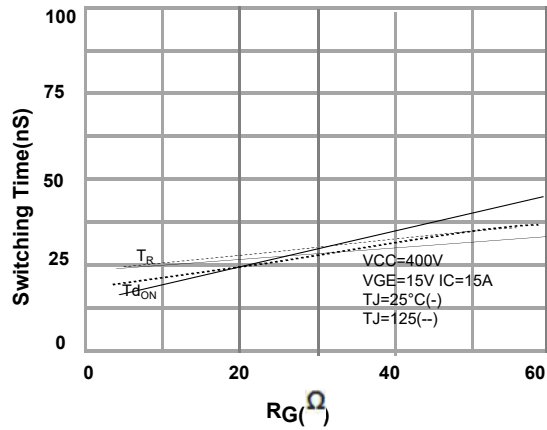


Fig. 8 R_g vs. Switching Time

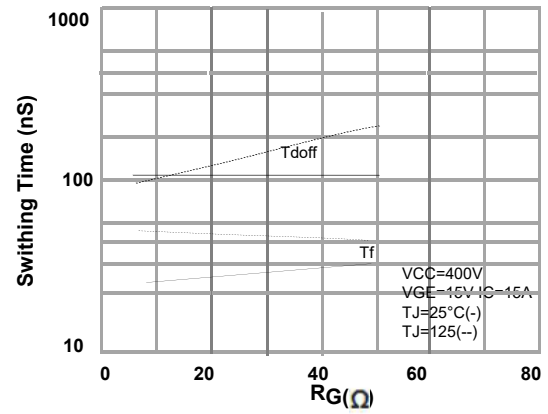


Fig. 9 I_C vs. Switching Loss

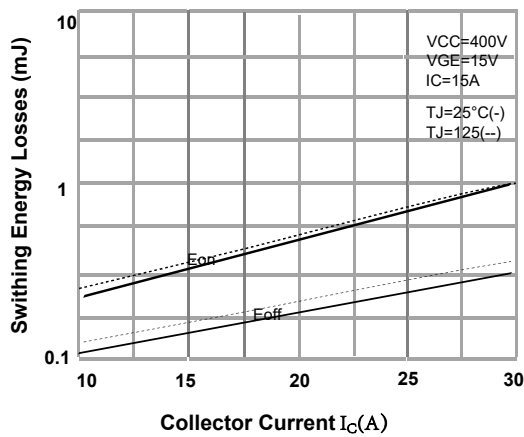


Fig. 10 I_C vs. Switching Time

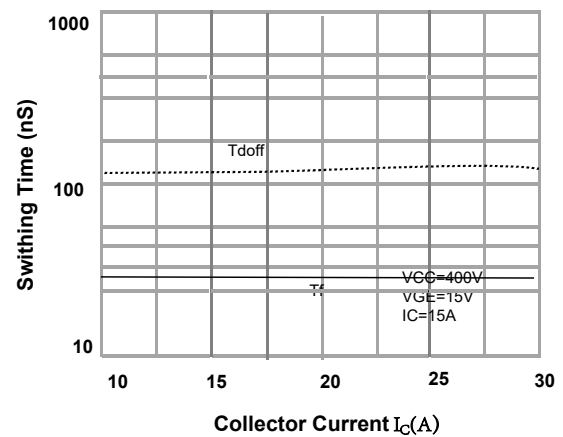
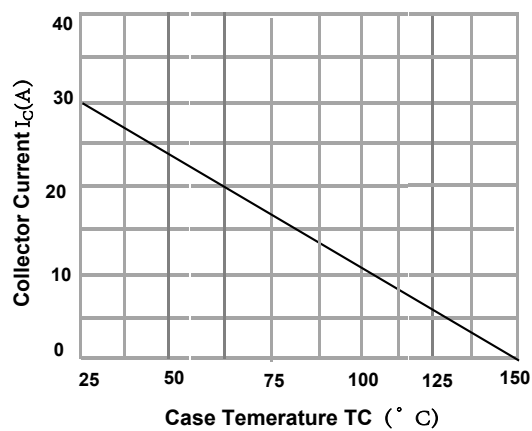


Fig. 11 T_C vs. I_C Current (A)



● **Electrical Characteristic Curves**

Fig. 12 P_{TOT} vs. T_C (TO-220)

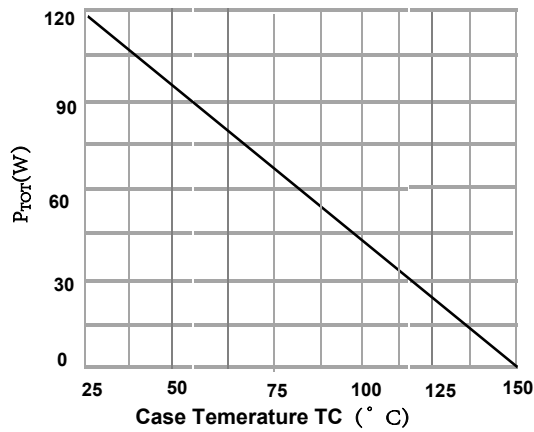


Fig. 13 P_{TOT} vs. T_C (TO-220F)

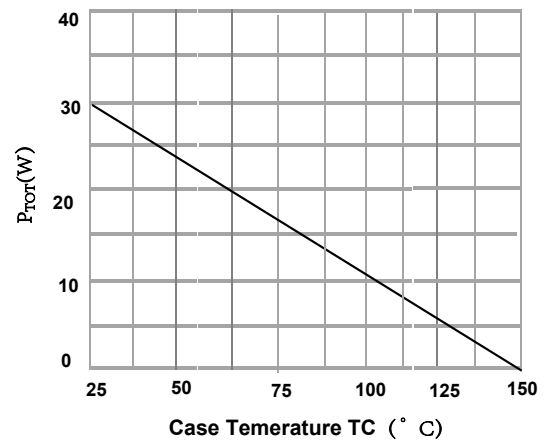


Fig. 14 Forward Safe Operating Area (TO-220)

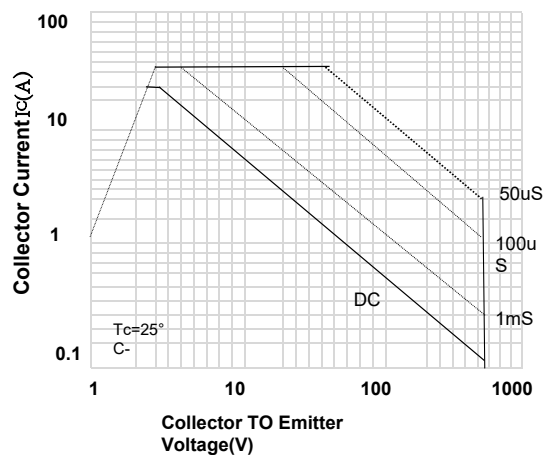


Fig. 15 Forward Safe Operating Area (TO-220F)

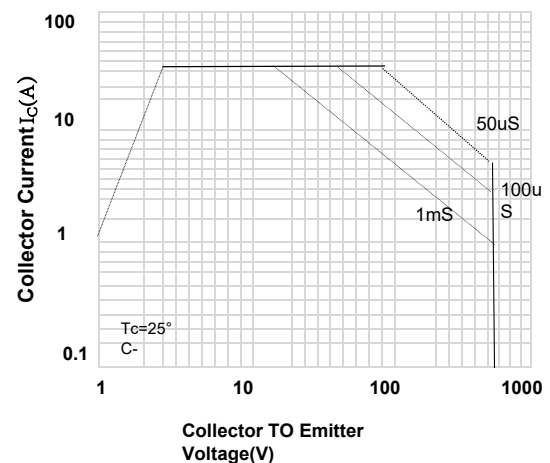
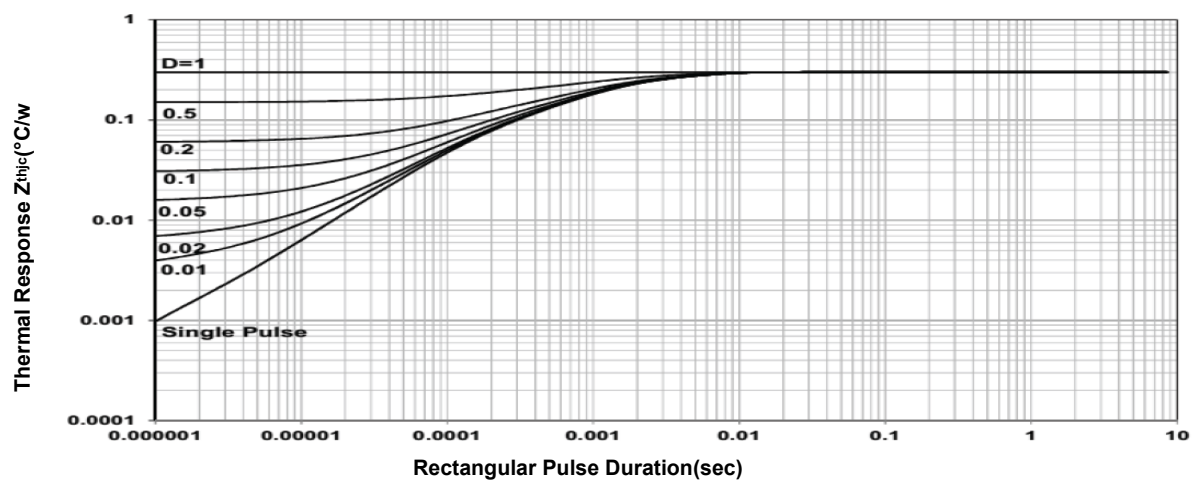


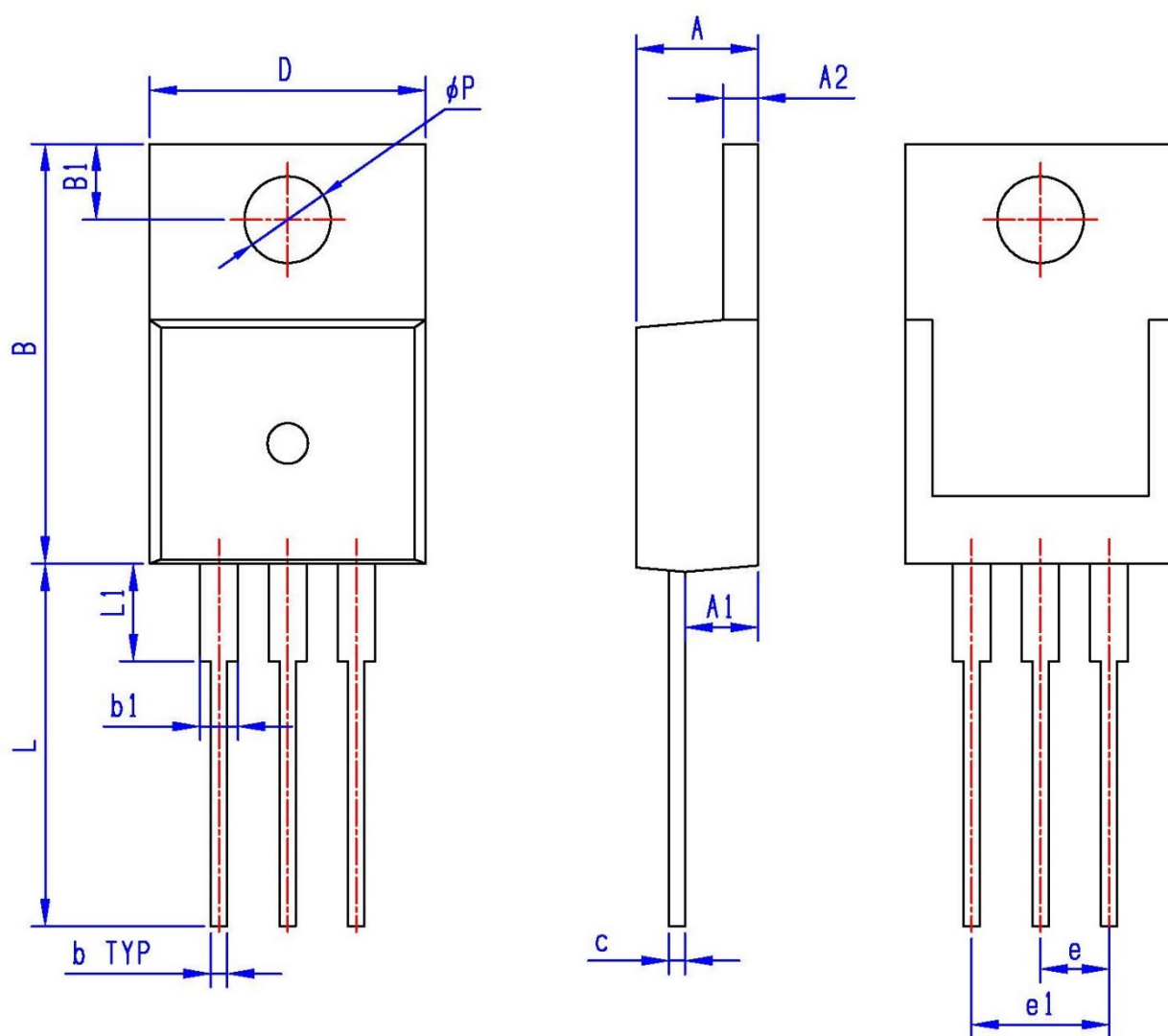
Fig. 16 Transient Thermal Impedance for IGBT



•Dimensions (TO-220)

UNIT:mm

SYMBOL	min	max	SYMBOL	min	max
A	4.25	4.85	B1	2.60	3.00
A1	2.30	3.00	e	2.40	2.70
A2	1.20	1.40	e1	4.95	5.25
b	0.60	0.90	L	12.60	14.40
b1	1.10	1.70	L1	2.40	4.00
c	0.40	0.70	∅P	3.50	3.90
D	9.80	10.60			
B	15.20	16.20			



●Dimensions (TO-220F)

UNIT:mm

SYMBOL	min	max	SYMBOL	min	max
A	4.20	4.80	E1	8.30	8.70
A1	2.50	2.90	e	2.40	2.70
A2	2.90	3.30	e1	4.95	5.25
b	0.40	0.80	F	2.50	2.90
b1	1.10	1.50	L	13.00	14.00
c	0.50	0.70	L1	3.00	4.00
D	9.80	10.60	∅P	2.90	3.50
E	14.60	15.60			

