FH3210PS

N-Channel SGT Power MOSFET

◆ General Description

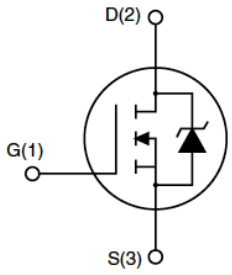
This N channel SGT MOSFET has been designed to very low on-state resistance and superior E_{AS} performance, especially for BMS and Motor driving applications.

◆ Features

- $R_{DS(ON)}$ ≦5.4mΩ@V_{GS}=10V
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability

◆ Applications

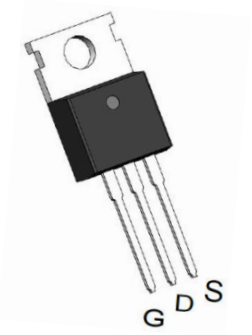
- Power Management
- DC/DC Converter
- Load Switch



Schematic diagram

TO-220

Marking and pin assignment



TO-220 top view

Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	100	V
I_D	Drain Current - Continuous (T_C = 25°C) (Note 1)	120	A
	Drain Current - Continuous (T_C = 100°C)	84	A
I_{DM}	Drain Current - Pulsed (Note 2)	440	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	225	mJ
P_D	Power Dissipation (T_C = 25°C)	192	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	0.65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State (Note 4)	55	°C/W

Electrical Characteristics (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	100			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100 V, V_{GS} = 0 V,			1	μA
I_{GSS}	Gate Leakage Current	V_{GS} = ± 20 V, V_{DS} = 0 V			±100	nA
$V_{GS(TH)}$	Gate Threshold voltage	V_{DS} = V_{GS}, I_D = 250 μA	2	3	4	V
$R_{DS(ON)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 20 A		4.5	5.4	mΩ
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, F = 1 MHz		3244		pF
C_{OSS}	Output Capacitance			1077		pF
C_{RSS}	Reverse Transfer Capacitance			52		pF
R_G	Gate Resistance	F = 1 MHz		3.5		Ω
Switching Characteristics						
$T_{D(ON)}$	Turn On Delay Time	V_{DD} = 50 V , R_L = 2.5 Ω, V_{GS} = 10 V, R_G = 6 Ω		22		nS
T_R	Rise Time			36		nS
$T_{D(OFF)}$	Turn Off Delay Time			49		nS
T_F	Fall Time			31.5		nS
Q_G	Total Gate Charge	V_{DD} = 50 V , I_D = 20 A, V_{GS} = 10 V		51.3		nC
Q_{GS}	Gate-Source Charge			15.2		nC
Q_{GD}	Gate-Drain Charge			13.1		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Body-Diode Forward Current				120	A
I_{SM}	Maximum Pulsed Body-Diode Forward Current (NOTE 1)				440	A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_S = 1 A		0.7	1	V
T_{RR}	Reverse recovery time	V_{DD} = 50 V, I_D = 15 A, di/dt = 100 A/μS		58		ns
Q_{RR}	Reverse recovery charge			90.0		nC
I_{RRM}	Peak Reverse Recovery Current			2.6		A

Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.5 mH, V_{DD} = 50V, I_{AS} = 30 A, R_G = 25 Ω, Starting T_J = 25 °C
4. Mount on minimum PCB layout

Electrical Characteristics Diagrams

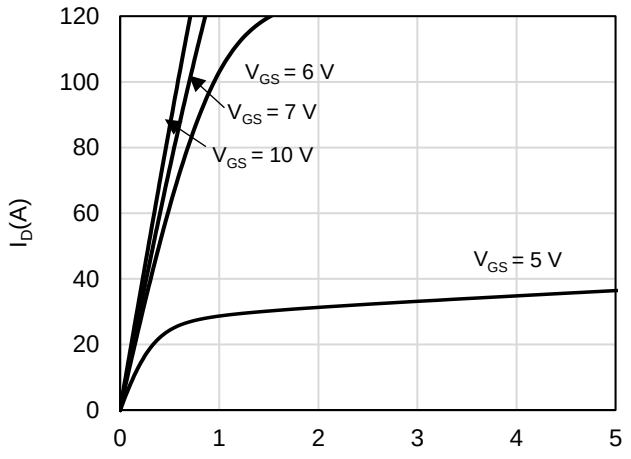


Figure 1: On-Region Characteristics

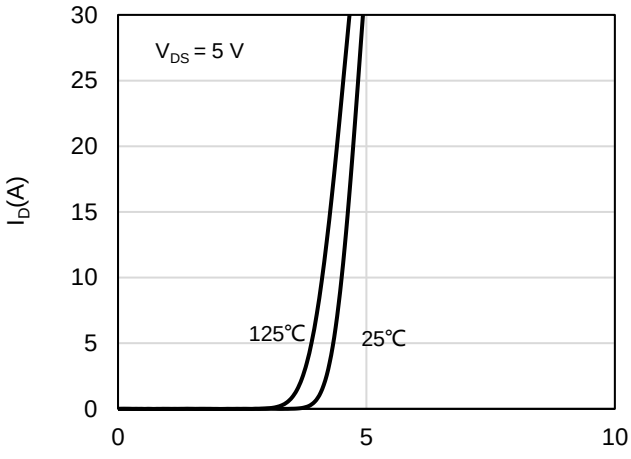


Figure 2: Transfer Characteristics

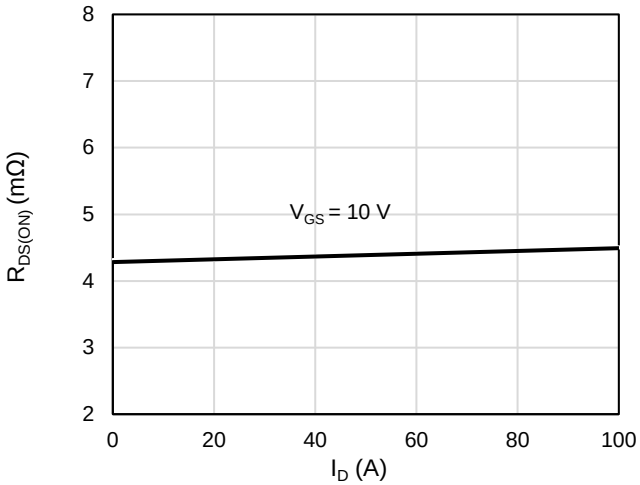


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

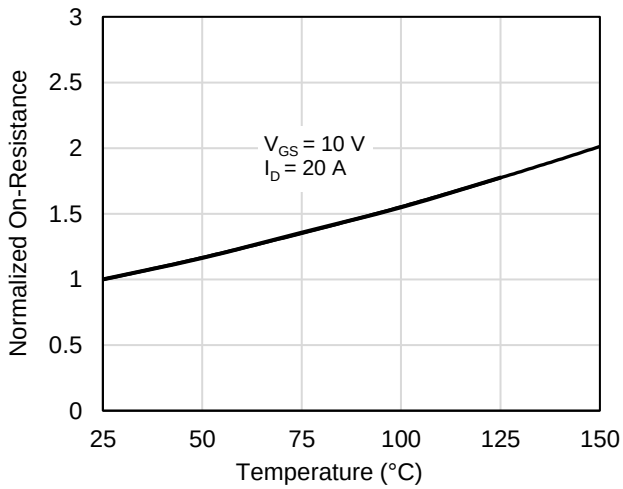


Figure 4: On-Resistance vs. Junction Temperature

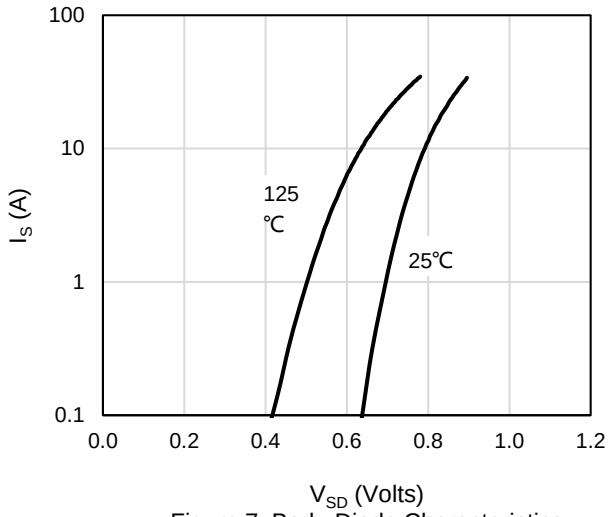


Figure 7: Body-Diode Characteristics

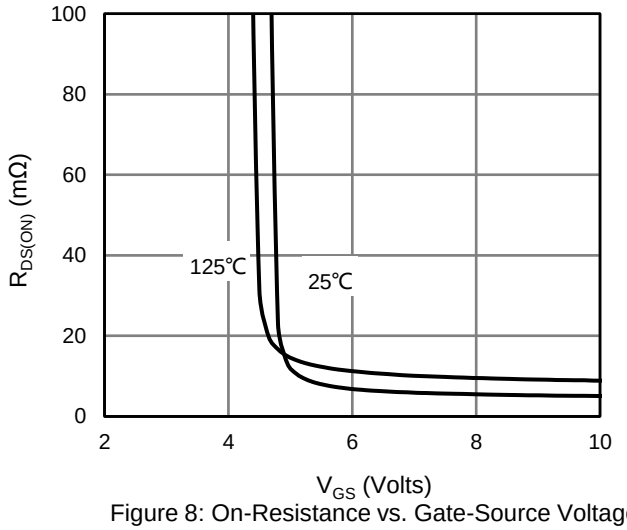


Figure 8: On-Resistance vs. Gate-Source Voltage

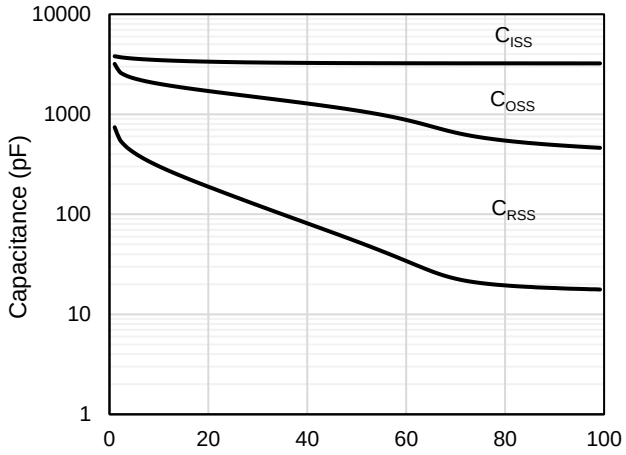


Figure 9: Capacitance Characteristics

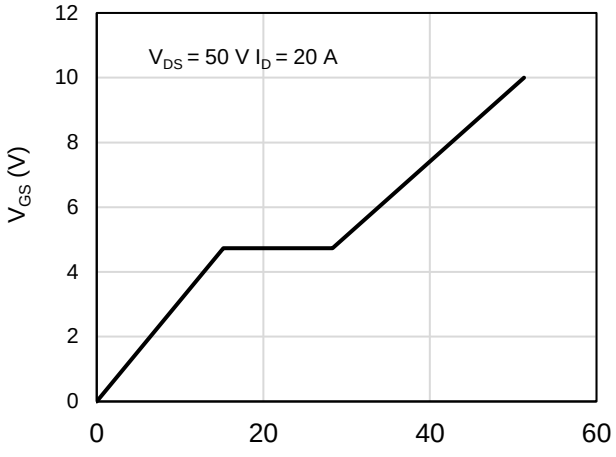


Figure 10: Gate-Charge Characteristics

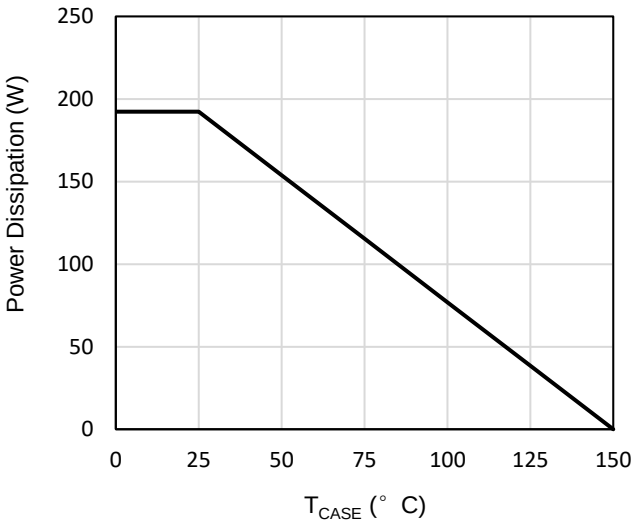


Figure 11: Power De-rating

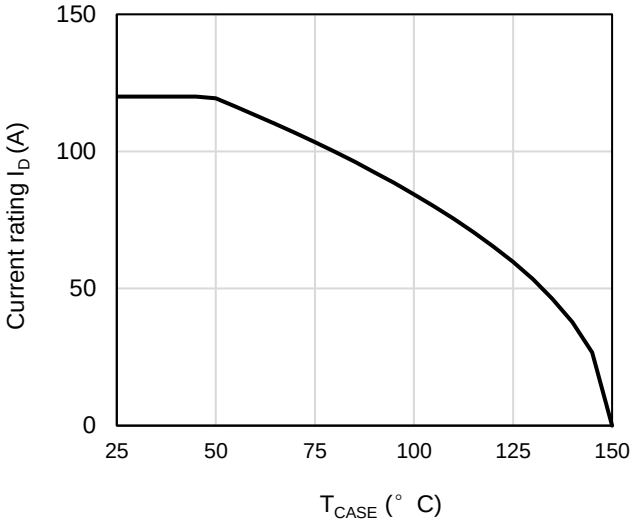


Figure 12: Current De-rating

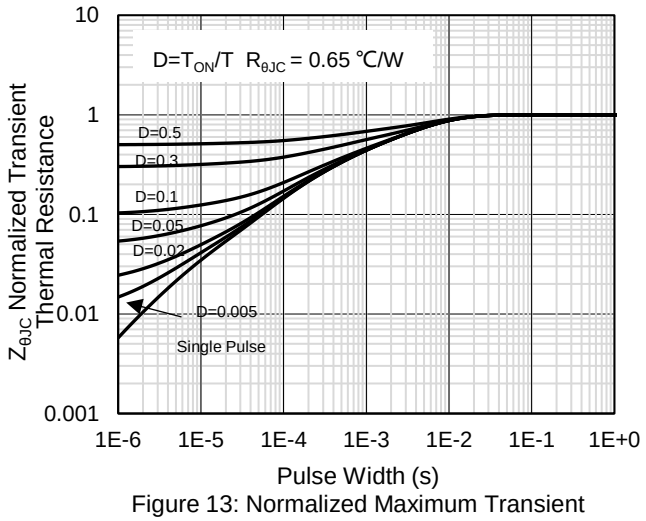


Figure 13: Normalized Maximum Transient Thermal Impedance

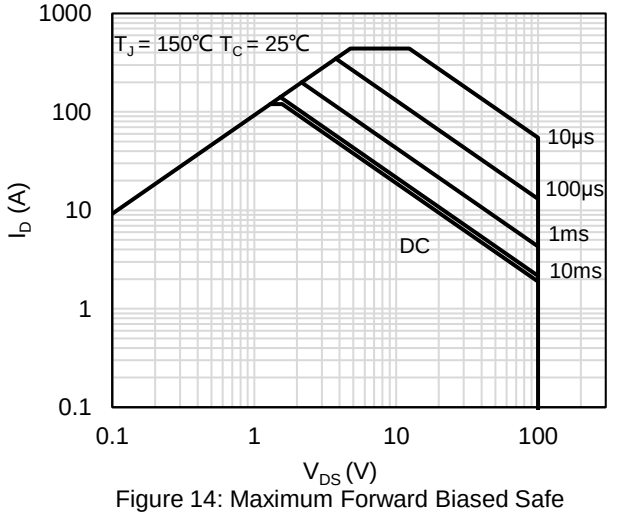
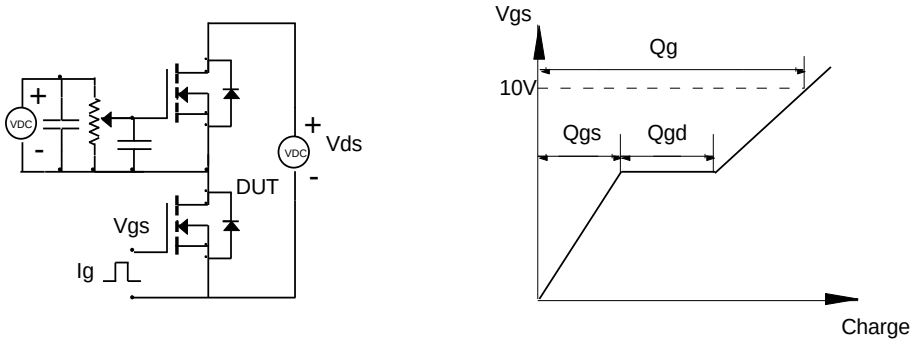


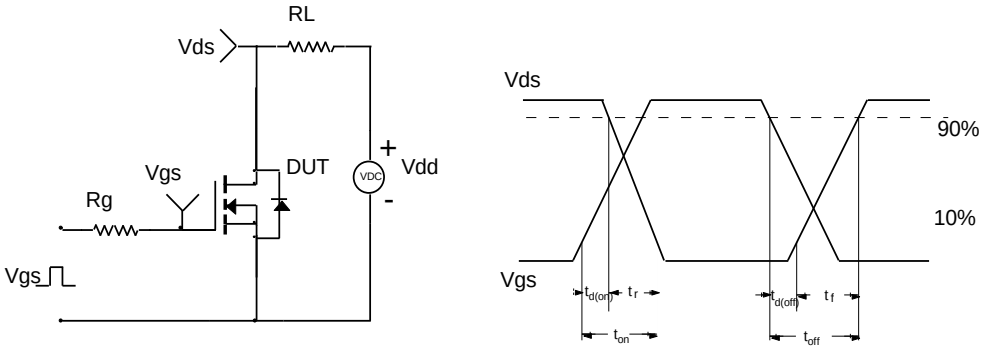
Figure 14: Maximum Forward Biased Safe Operating Area

Test Circuit and Waveform

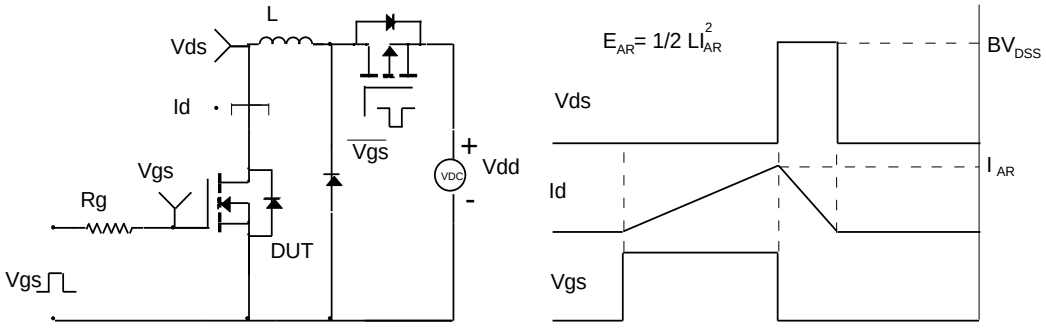
Gate Charge Test Circuit & Waveform



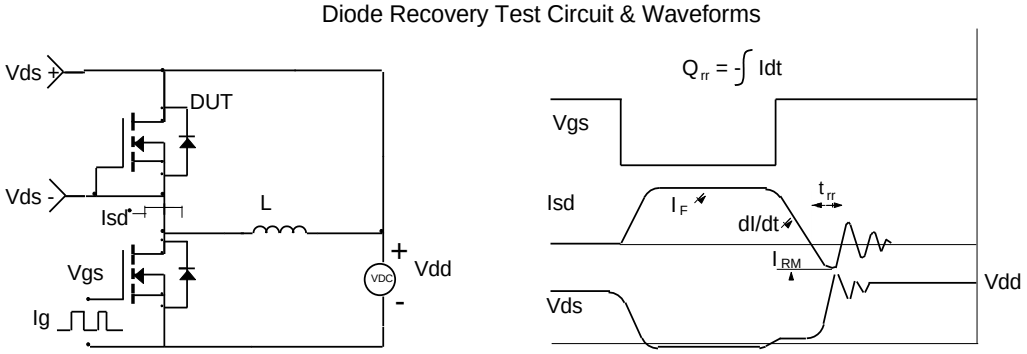
Resistive Switching Test Circuit & Waveforms



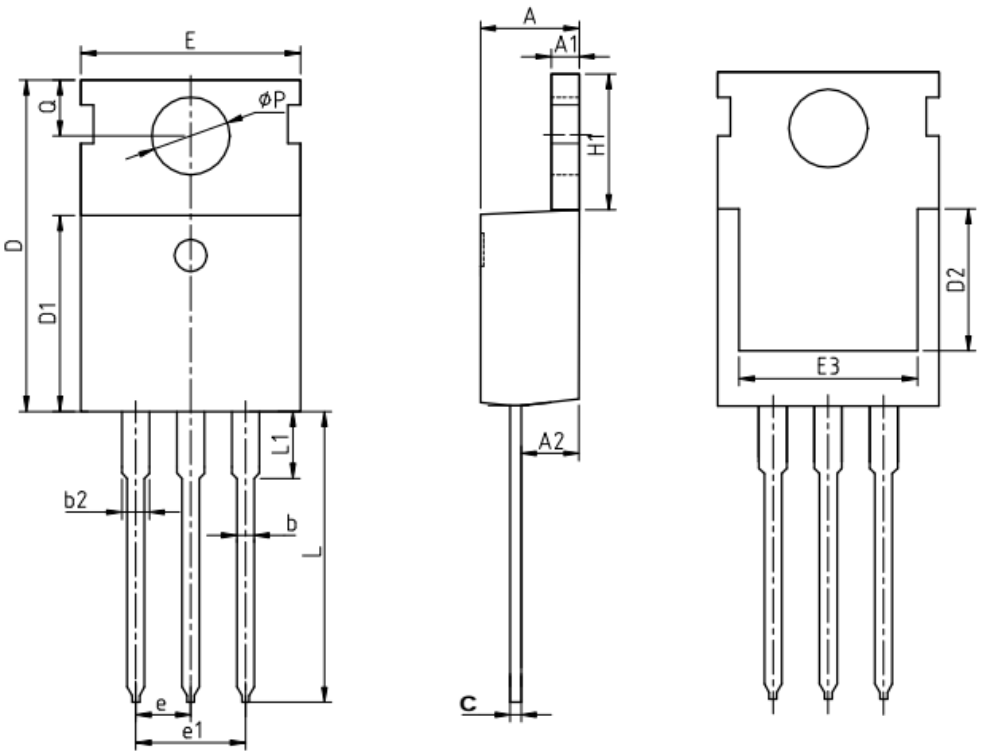
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Information ：TO-220



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.15	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00