

P-Channel Enhancement Mode Power MOSFET

Description

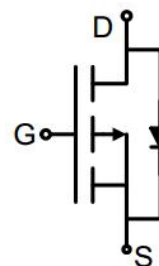
The GT650P20T uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

- V_{DS} -200V
- I_D (at $V_{GS} = -10V$) -50A
- $R_{DS(ON)}$ (at $V_{GS} = -10V$) < 65m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-220

Ordering Information

Device	Package	Marking	Packaging
GT650P20T	TO-220	GT650P20	50pcs/Tube

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-200	V
Continuous Drain Current	I_D	$T_C = 25^\circ\text{C}$ -50	A
		$T_C = 100^\circ\text{C}$ -32	
Pulsed Drain Current (note1)	I_{DM}	-200	A
Gate-Source Voltage	V_{GS}	± 20	V
Power Dissipation	P_D	320	W
Single pulse avalanche energy (note2)	E_{AS}	484	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	50	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	R_{thJC}	0.39	$^\circ\text{C/W}$

Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-200	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -200V, V _{GS} = 0V	--	--	-1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-2.0	-3.1	-4.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -30A	--	49	65	mΩ
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _D = -30A	--	28	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = -100V, f = 0.5MHz	--	7900	--	pF
Output Capacitance	C _{oss}		--	300	--	
Reverse Transfer Capacitance	C _{rss}		--	15	--	
Total Gate Charge	Q _g	V _{DD} = -100V, I _D = -30A, V _{GS} = -10V	--	116	--	nC
Gate-Source Charge	Q _{gs}		--	54	--	
Gate-Drain Charge	Q _{gd}		--	12	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = -100V, I _D = -30A, R _G = 1.6Ω	--	64	--	ns
Turn-on Rise Time	t _r		--	58	--	
Turn-off Delay Time	t _{d(off)}		--	114	--	
Turn-off Fall Time	t _f		--	44	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	-50	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = -30A, V _{GS} = 0V	--	--	-1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = -30A, V _{GS} = 0V di/dt=-100A/us	--	640	--	nC
Reverse Recovery Time	T _{rr}		--	340	--	ns

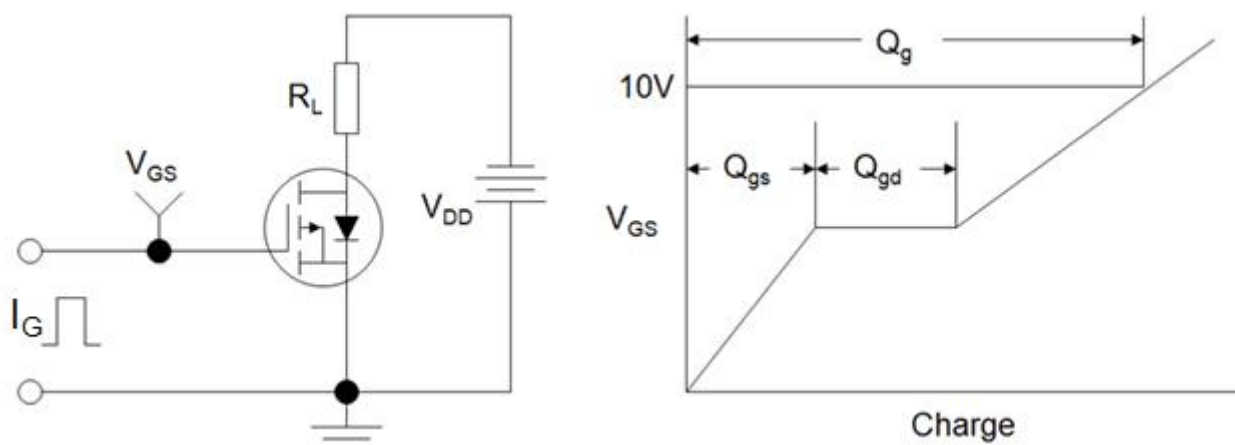
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : $T_J = 25^{\circ}\text{C}$, $V_{DD} = -50V$, $V_{GS} = -10V$, $L = 0.5mH$, $R_g = 25\Omega$

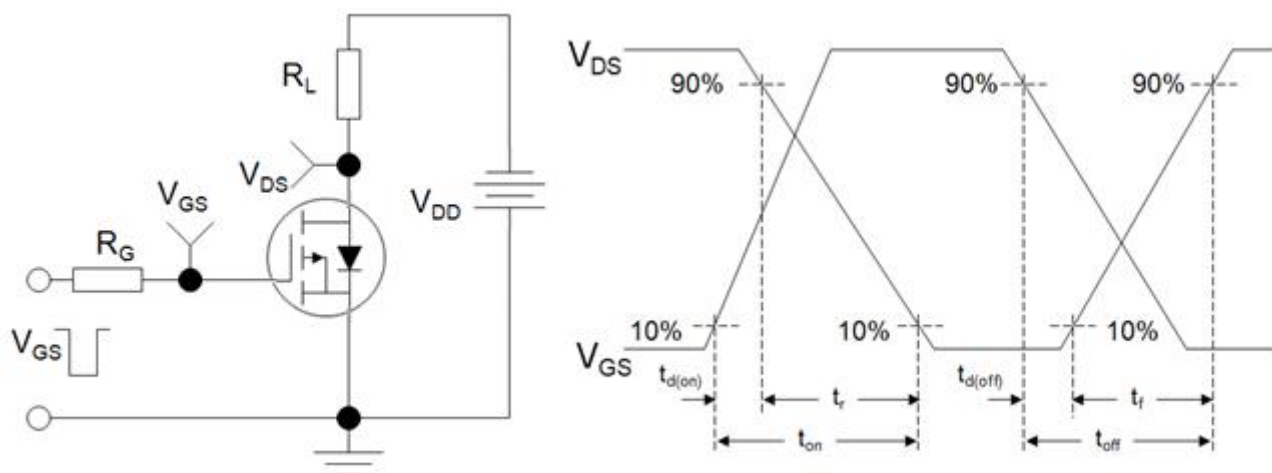
The table shows the minimum avalanche energy, which is 1332mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

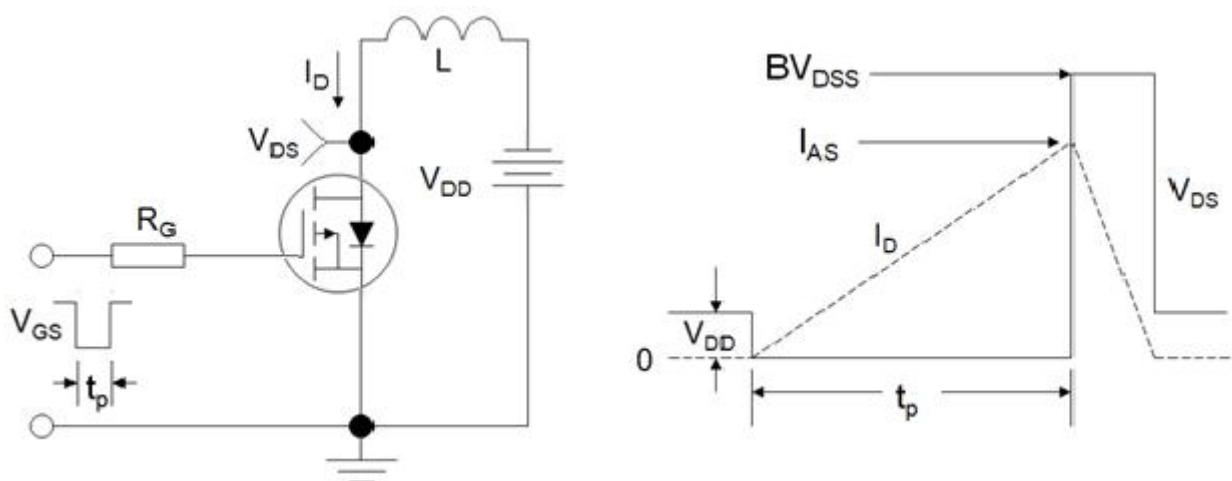
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

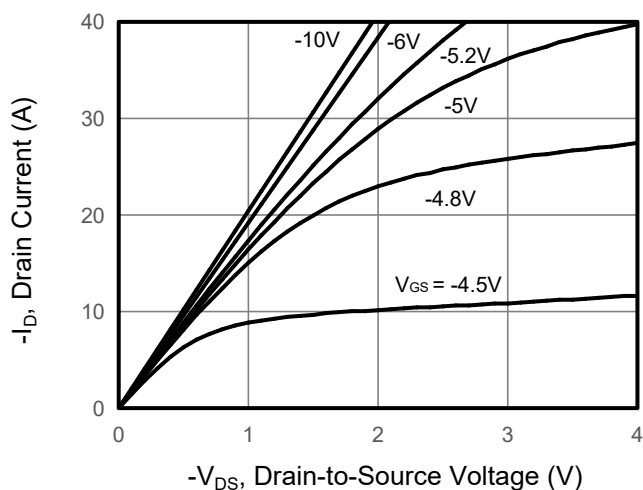


Figure 2. Transfer Characteristics

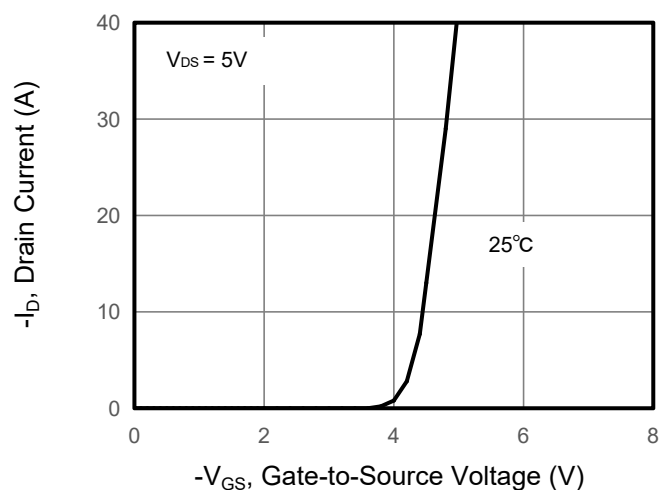


Figure 3. Drain Source On Resistance

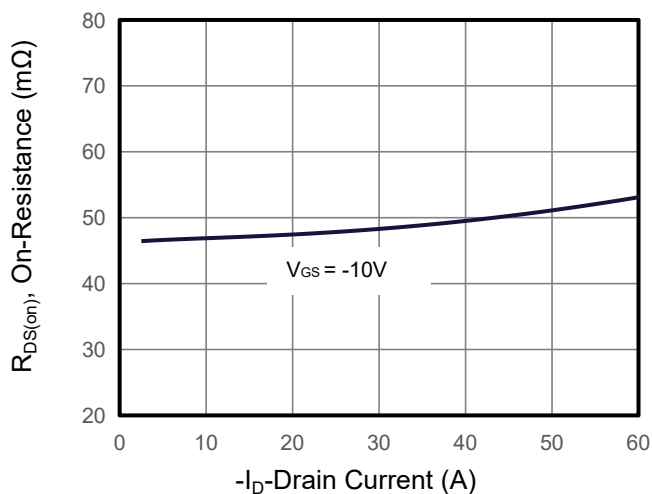


Figure 4. Gate Charge

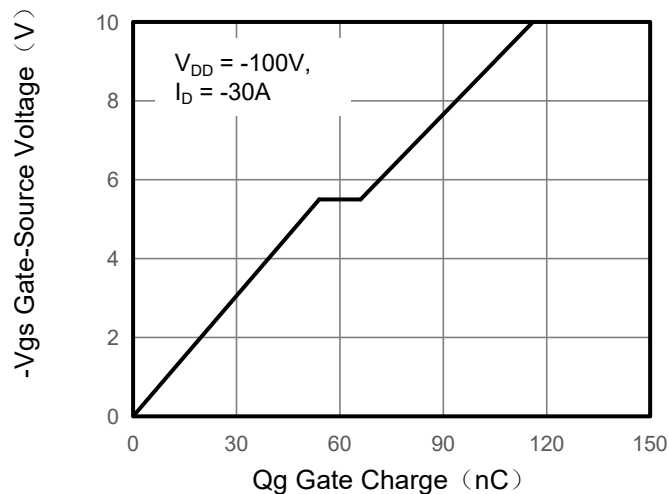


Figure 5. Capacitance

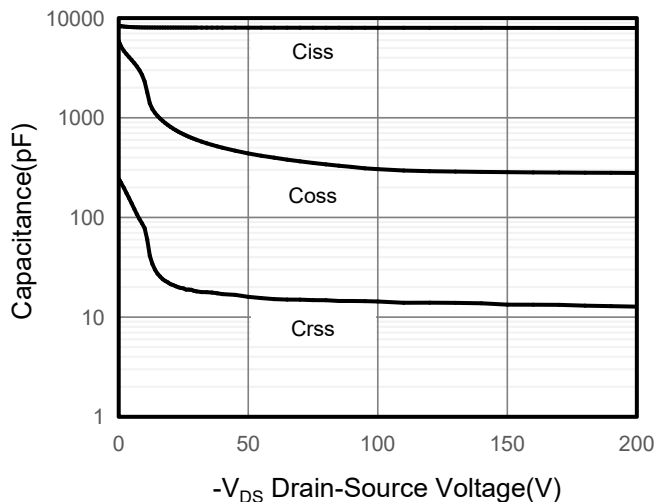
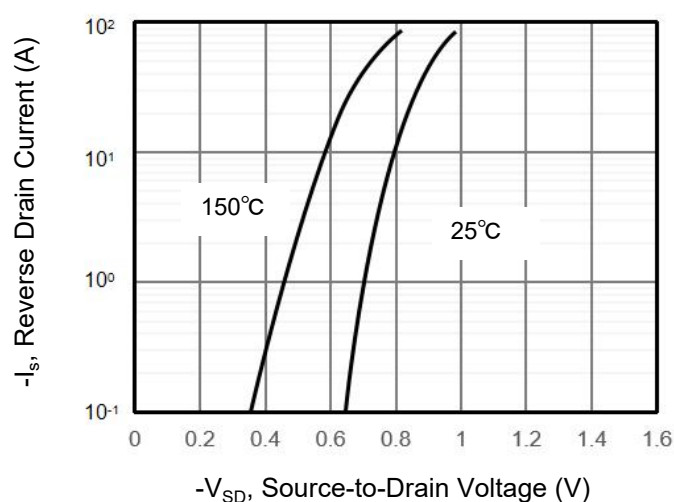


Figure 6. Source-Drain Diode Forward



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Drain-Source On-Resistance

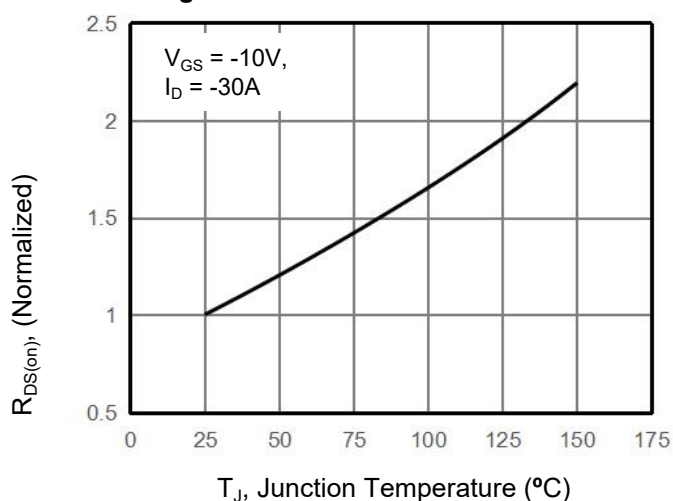


Figure 8. Safe Operation Area

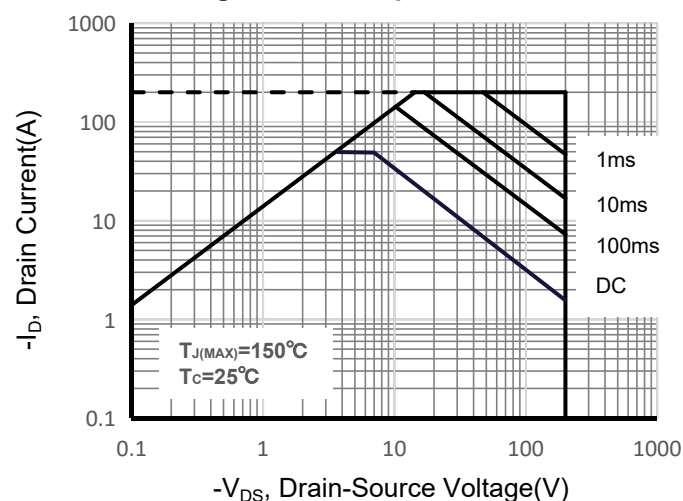


Figure 9. Maximum Continuous Drain Current vs Case Temperature

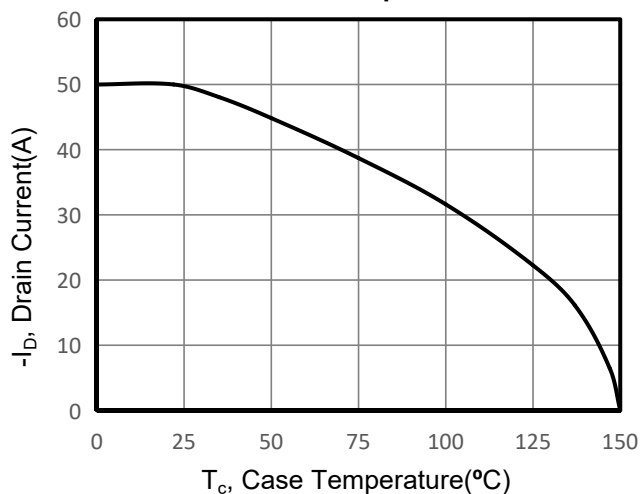
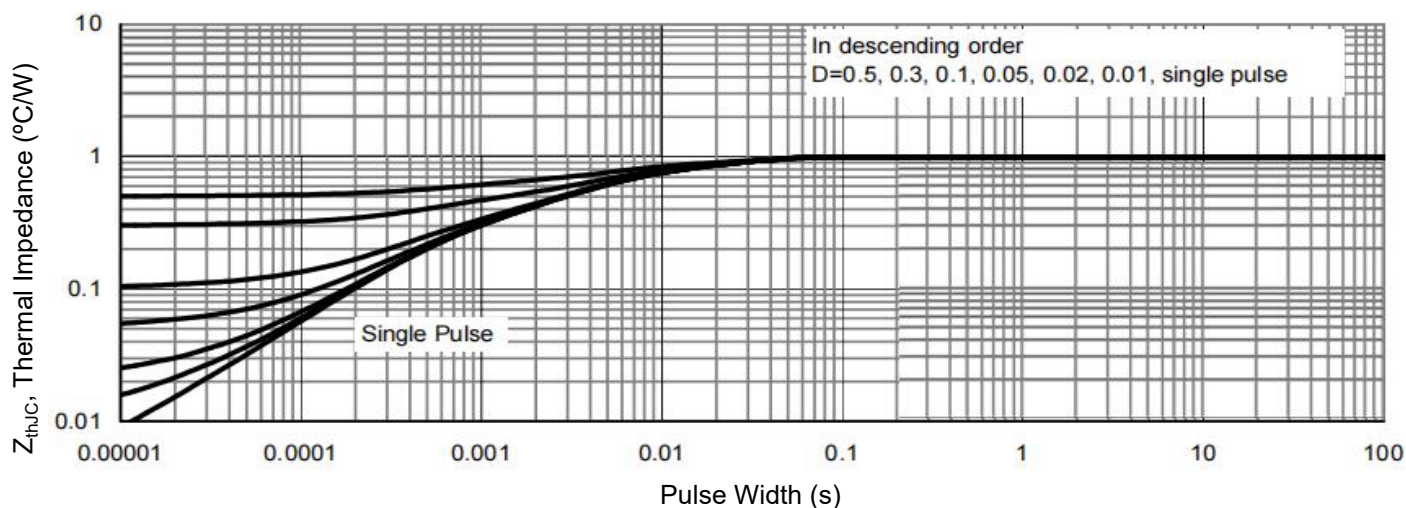
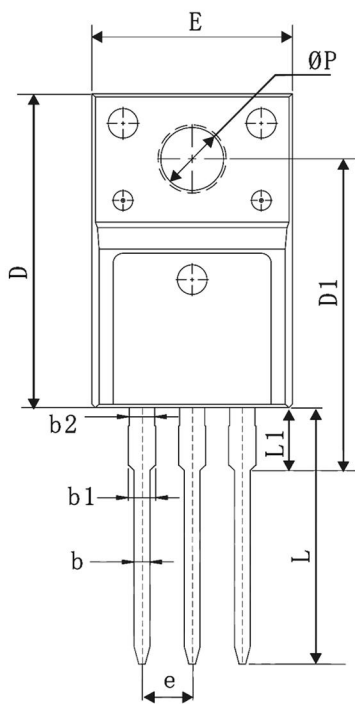


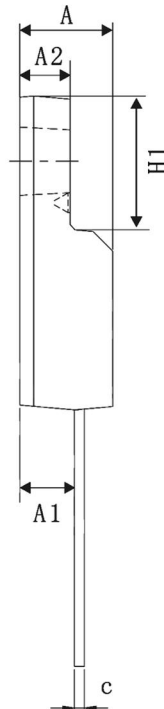
Figure 10. Normalized Maximum Transient Thermal Impedance



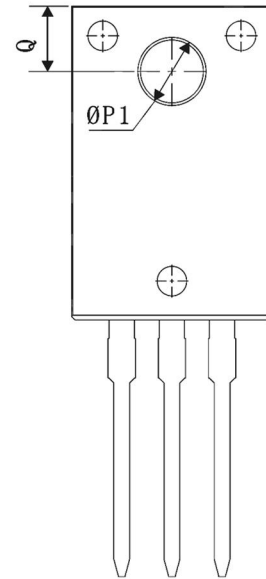
TO-220 Package Information



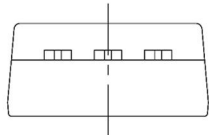
TOP VIEW



SIDE VIEW



Back VIEW



BOTTOM VIEW

COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.90
A1	2.56	2.76	2.96
A2	2.34	2.54	2.74
b	0.70	0.80	0.90
b1	1.28	1.38	1.48
b2	1.18	1.28	1.38
c	0.40	0.50	0.60
D	15.67	15.87	16.07
D1	15.50	15.75	16.00
e	2.54BSC		
E	9.96	10.16	10.36
H1	6.75REF		
L	12.78	12.98	13.18
L1			3.50
Q	3.20	3.30	3.40
ØP	3.08	3.18	3.28
ØP1	3.35	3.45	3.55