

N-Channel Enhancement Mode Power MOSFET

Description

The GC190N65FF uses advanced super junction technology and design to provide excellent $R_{DS(on)}$, low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

General Features

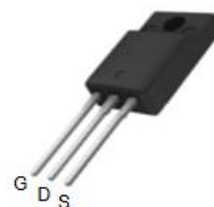
- V_{DS} 650V
- I_D (at $V_{GS} = 10V$) 19A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 190m Ω
- 100% Avalanche Tested
- RoHS Compliant
- Ultra-fast body diode

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-220F

Ordering Information

Device	Package	Marking	Packaging
GC190N65FF	TO-220F	GC190N65F	50pcs/Tube

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	19	A
	$T_C = 100^\circ\text{C}$	12	
Pulsed Drain Current (note1)	I_{DM}	57	A
Gate-Source Voltage	V_{GS}	± 30	V
Power Dissipation	P_D	35	W
Single pulse avalanche energy (note2)	E_{AS}	14	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}	65	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	R_{thJC}	3.6	$^\circ\text{C/W}$

Specifications $T_J = 25^\circ\text{C}$, 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	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V	--	--	5	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	3.2	4.0	4.6	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 10A	--	155	190	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D = 10A	--	11	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 400V, f = 1.0MHz	--	1100	--	pF
Output Capacitance	C _{oss}		--	35	--	
Reverse Transfer Capacitance	C _{rss}		--	3	--	
Total Gate Charge	Q _g	V _{DD} = 400V, I _D = 10A, V _{GS} = 10V	--	36	--	nC
Gate-Source Charge	Q _{gs}		--	10	--	
Gate-Drain Charge	Q _{gd}		--	20	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 400V, I _D = 10A, R _G = 5Ω	--	46	--	ns
Turn-on Rise Time	t _r		--	61	--	
Turn-off Delay Time	t _{d(off)}		--	120	--	
Turn-off Fall Time	t _f		--	34	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	19	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 10A, V _{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = 10A, V _{GS} = 0V di/dt=500A/us	--	0.32	--	μC
Reverse Recovery Time	T _{rr}		--	95	--	ns

Notes

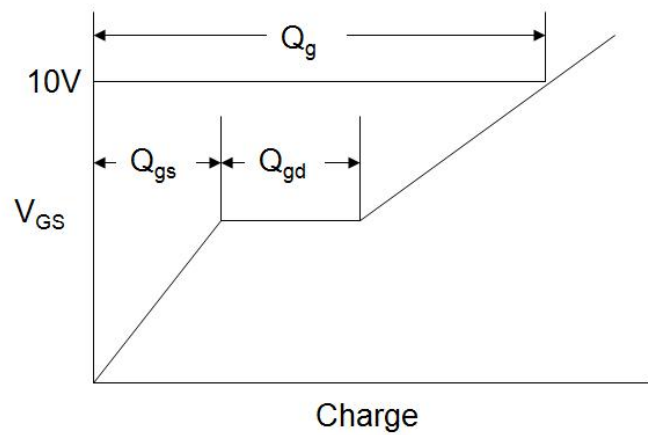
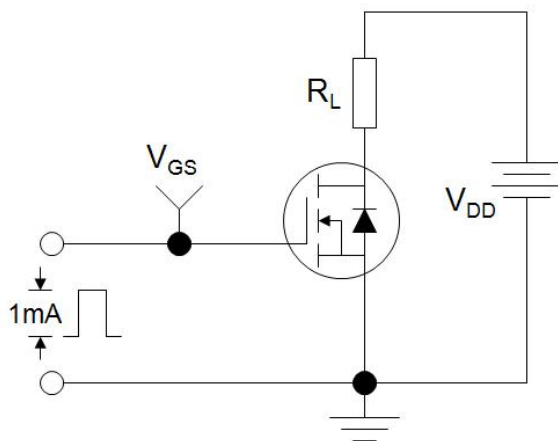
1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition : $T_J = 25^\circ\text{C}, V_{DD} = 50V, V_{GS} = 10V, L = 10mH, R_G = 25\Omega$

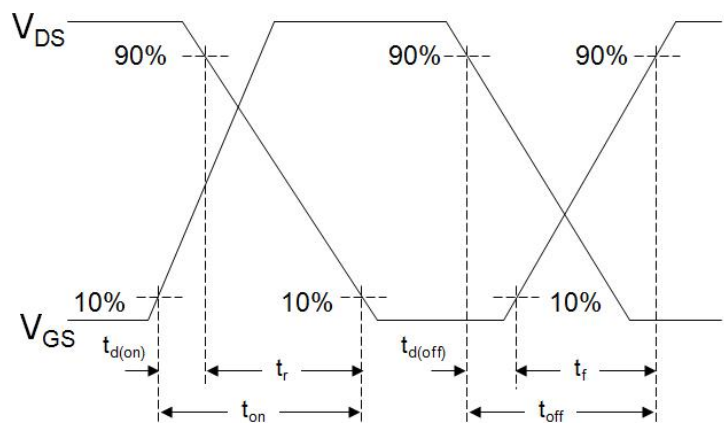
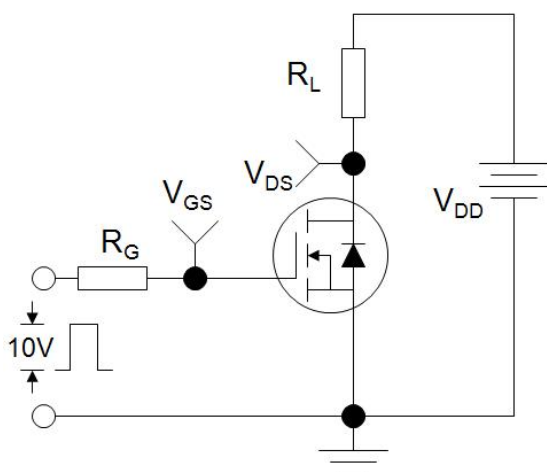
The table shows the minimum avalanche energy, which is 39mJ when the device is tested until failure

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

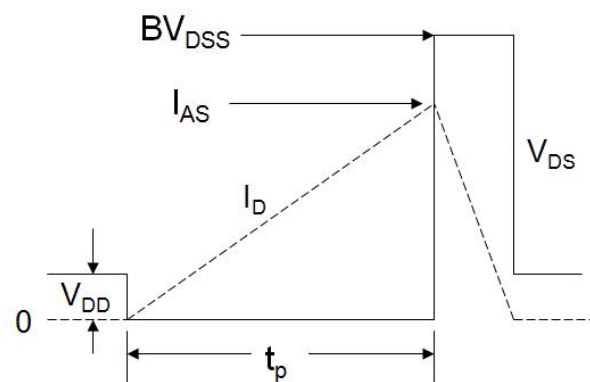
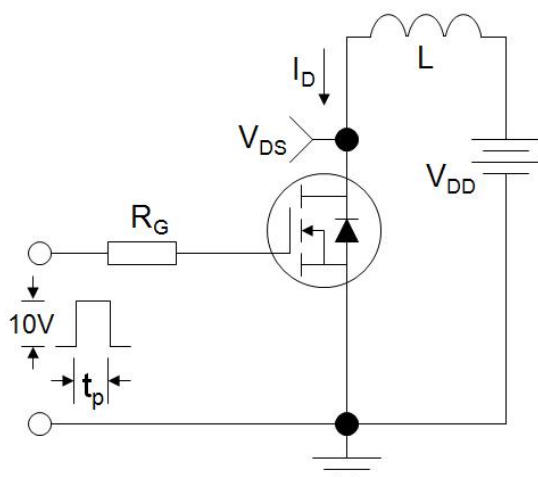
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

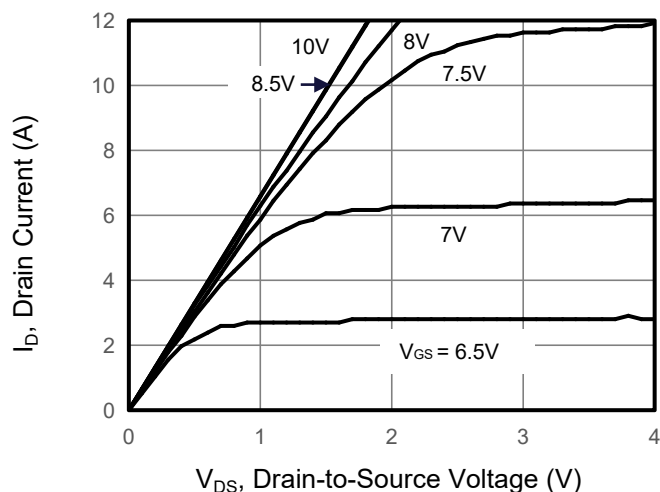


Figure 2. Transfer Characteristics

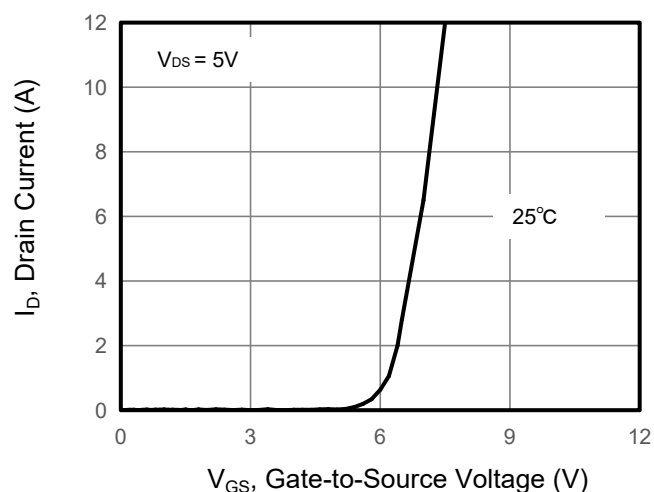


Figure 3. Drain Source On Resistance

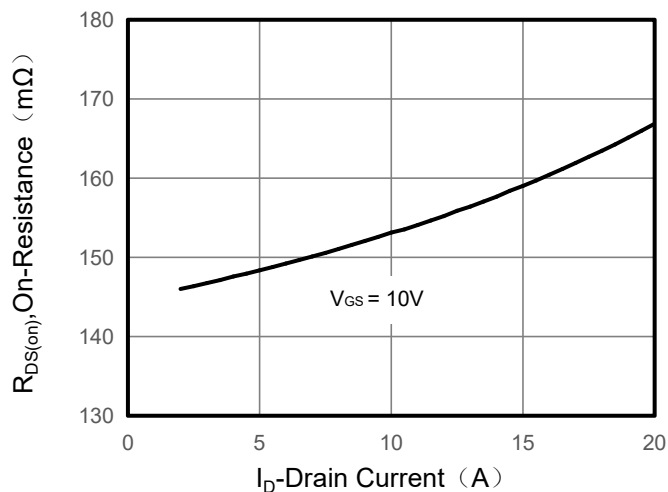


Figure 4. Gate Charge

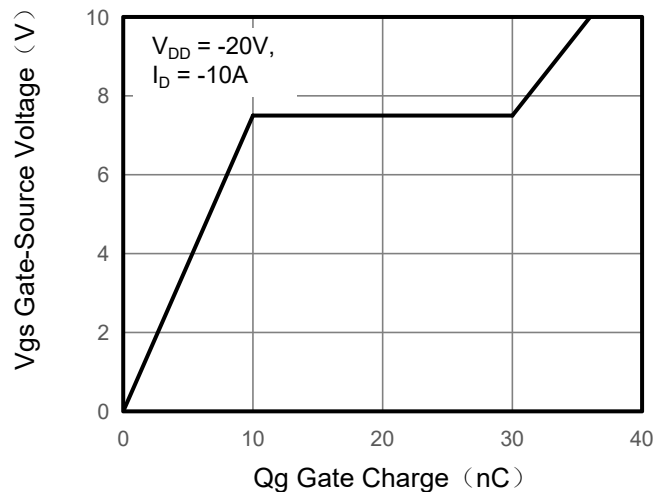


Figure 5. Capacitance

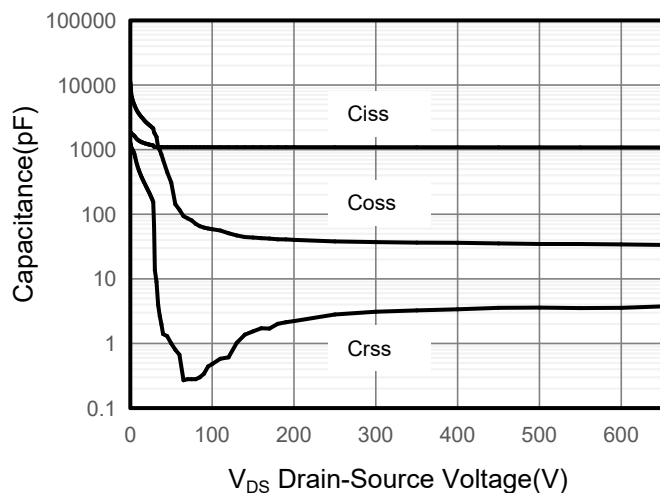
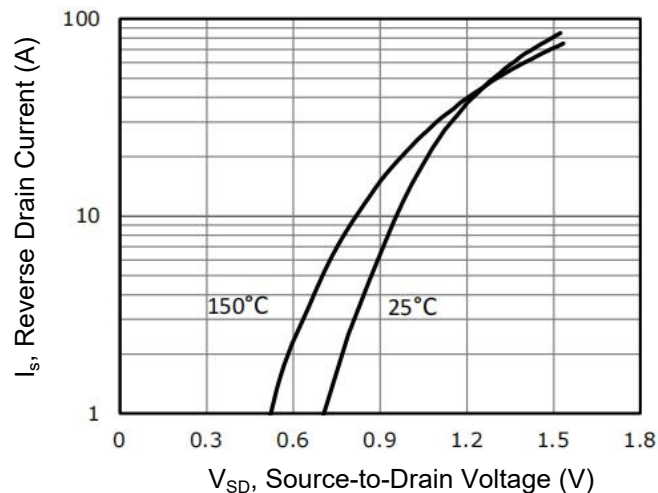


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

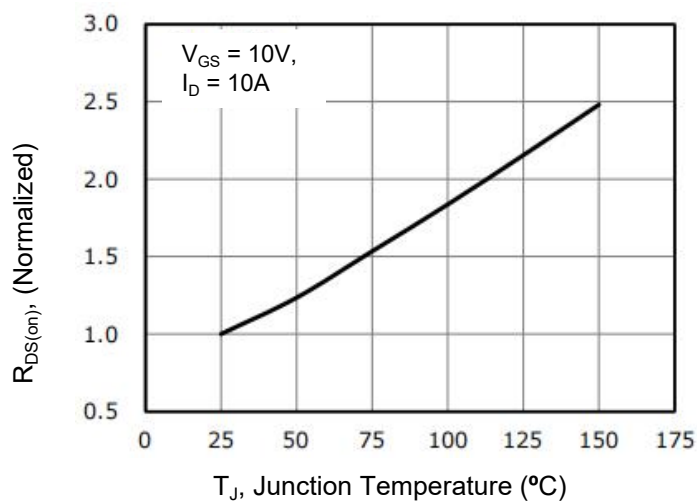


Figure 8. Safe Operation Area

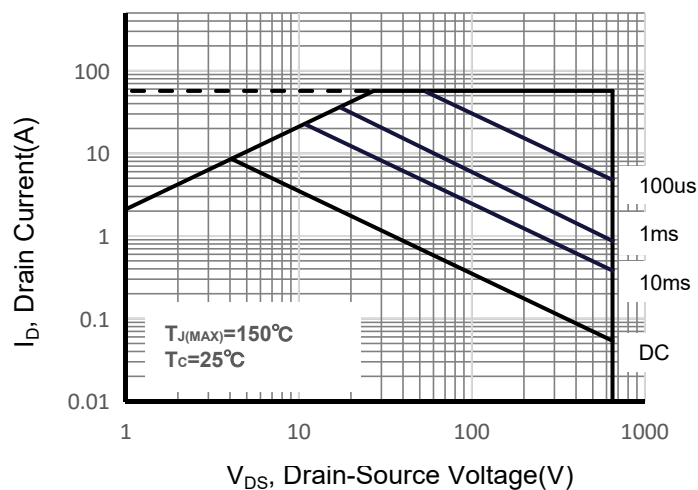


Figure 9. Maximum Continuous Drain Current vs Case Temperature

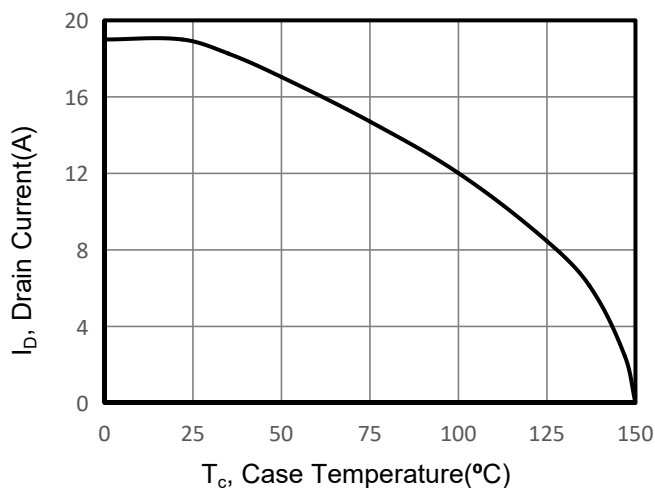
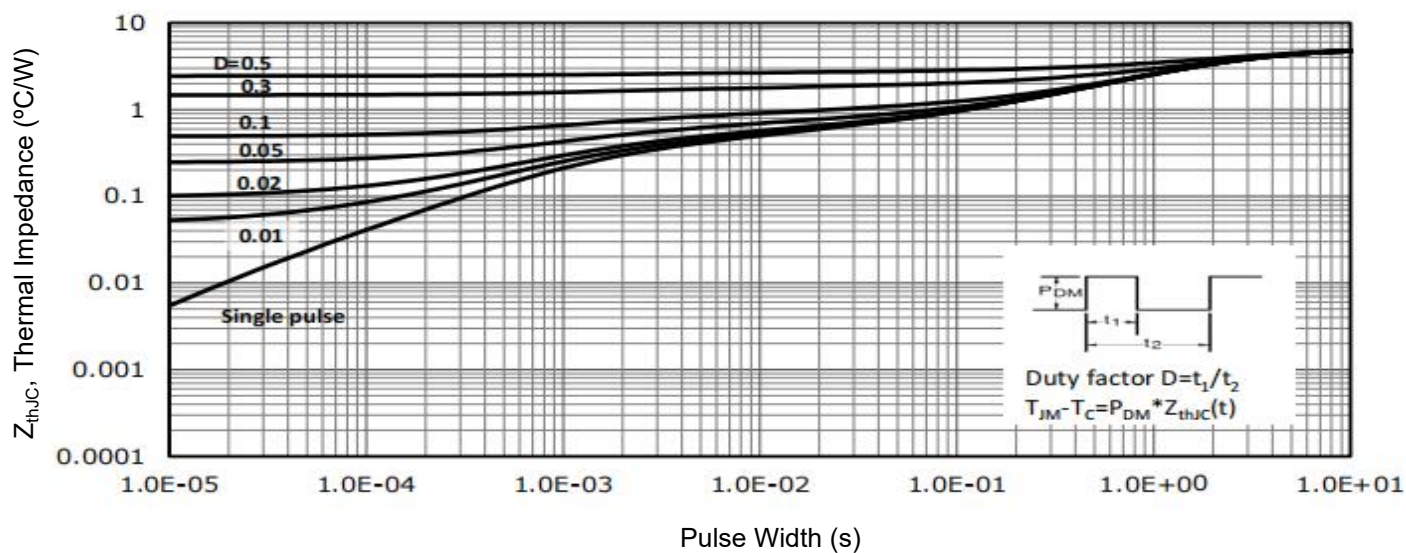
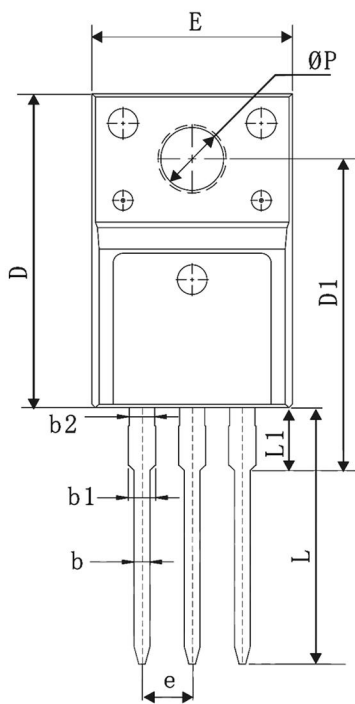


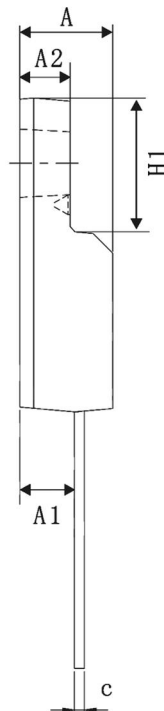
Figure 10. Normalized Maximum Transient Thermal Impedance



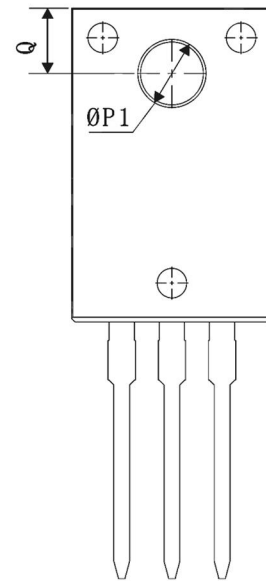
TO-220F Package Information



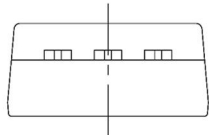
TOP VIEW



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