

N-Channel Enhancement Mode Power MOSFET

Description

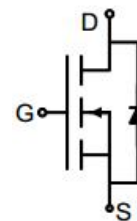
The GC125N65QF uses advanced super junction technology and design to provide excellent $R_{DS(on)}$, low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

General Features

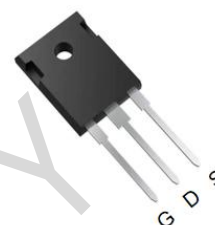
- V_{DS} 650V
- I_D (at $V_{GS} = 10V$) 27A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 125m Ω
- 100% Avalanche Tested
- RoHS Compliant
- Ultra-fast body diode

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-247

Ordering Information

Device	Package	Marking	Packaging
GC125N65QF	TO-247	GC125N65F	30pcs/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	I_D	27	A
		17	
Pulsed Drain Current (note1)	I_{DM}	81	A
Gate-Source Voltage	V_{GS}	± 30	V
Power Dissipation	P_D	205	W
Single pulse avalanche energy (note2)	E_{AS}	300	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}	62	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	R_{thJC}	0.6	$^\circ\text{C/W}$

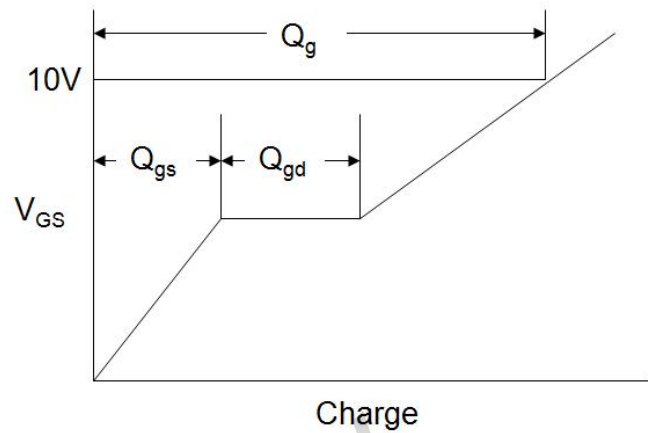
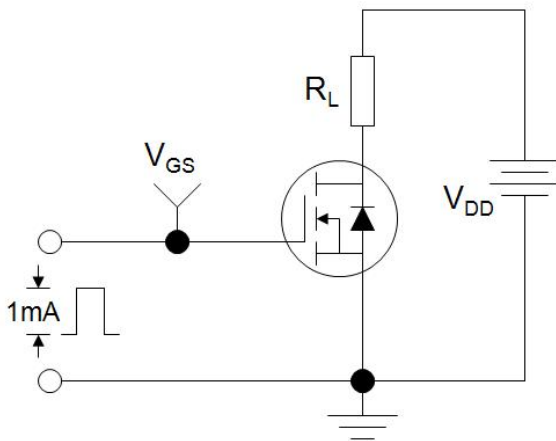
Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$	--	--	5	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.2	--	4.6	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 12A$	--	103	125	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 20V, I_D = 12A$	--	17	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 100V,$ $f = 0.1MHz$	--	1580	--	pF
Output Capacitance	C_{oss}		--	88	--	
Reverse Transfer Capacitance	C_{rss}		--	1.2	--	
Total Gate Charge	Q_g	$V_{DD} = 480V,$ $I_D = 12A,$ $V_{GS} = 10V$	--	52	--	nC
Gate-Source Charge	Q_{gs}		--	14	--	
Gate-Drain Charge	Q_{gd}		--	30	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 400V,$ $I_D = 12A,$ $R_G = 2\Omega$	--	25	--	ns
Turn-on Rise Time	t_r		--	50	--	
Turn-off Delay Time	$t_{d(off)}$		--	65	--	
Turn-off Fall Time	t_f		--	28	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ C$	--	--	27	A
Body Diode Voltage	V_{SD}	$T_J = 25^\circ C, I_{SD} = 12A, V_{GS} = 0V$	--	--	1.2	V
Reverse Recovery Charge	Q_{rr}	$I_F = 12A, V_{GS} = 0V$ $di/dt = 100A/\mu s$	--	0.4	--	μC
Reverse Recovery Time	T_{rr}		--	97	--	ns

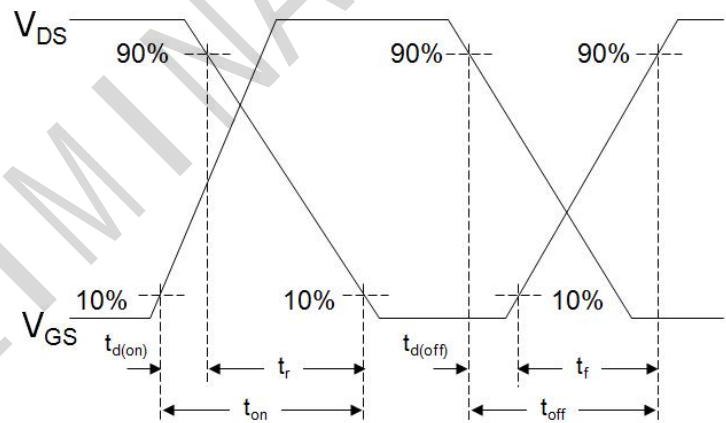
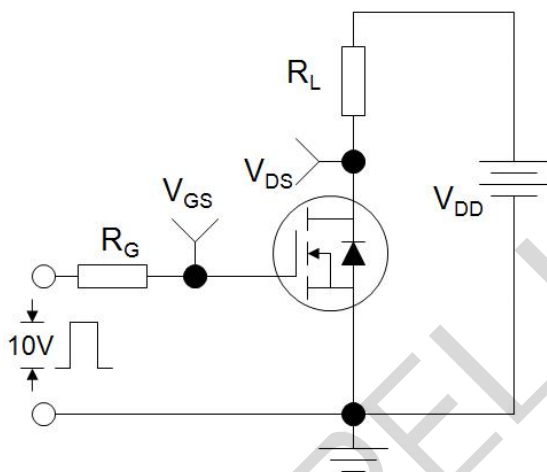
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : $T_J = 25^\circ\text{C}$, $V_{DD} = 50V$, $V_{GS} = 10V$, $L = 30mH$, $R_G = 25\Omega$
3. Identical low side and high side switch with identical R_G

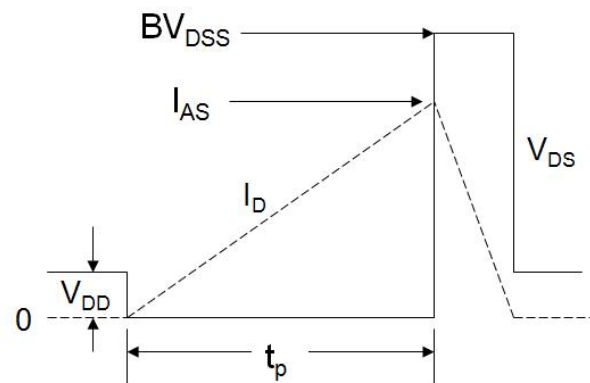
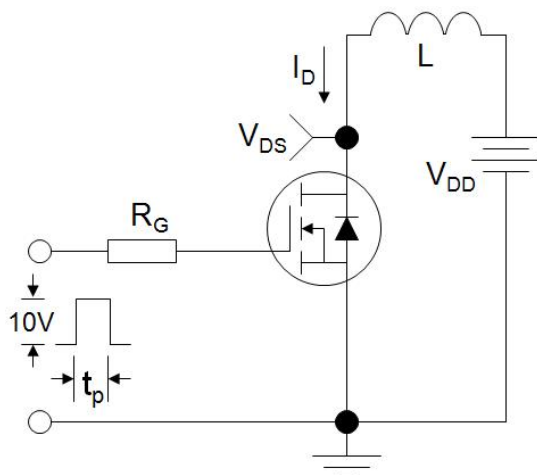
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

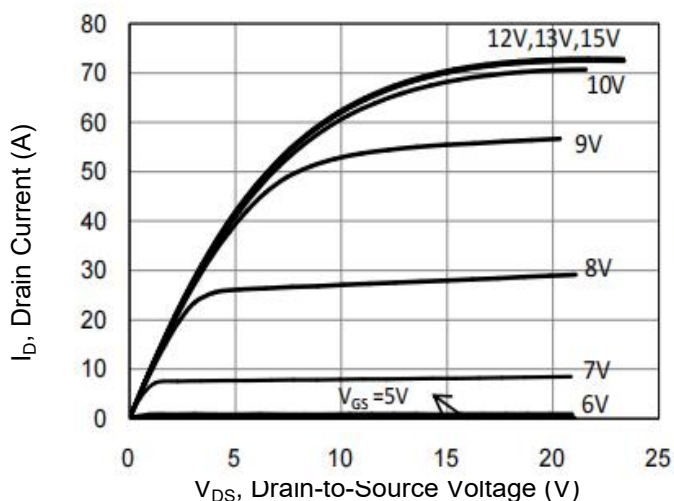


Figure 2. Transfer Characteristics

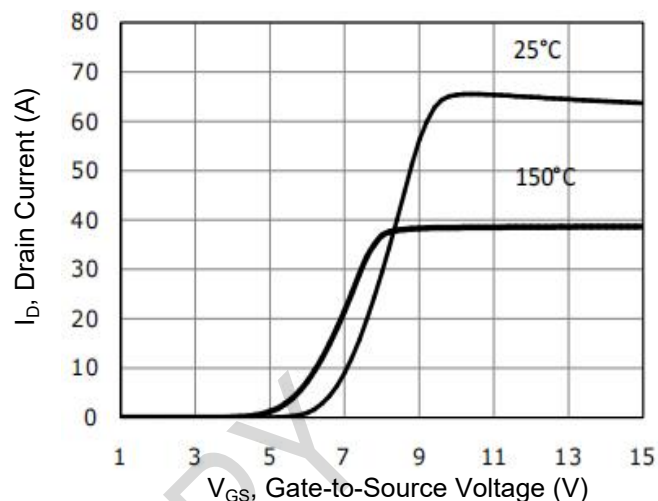


Figure 3. Drain Source On Resistance

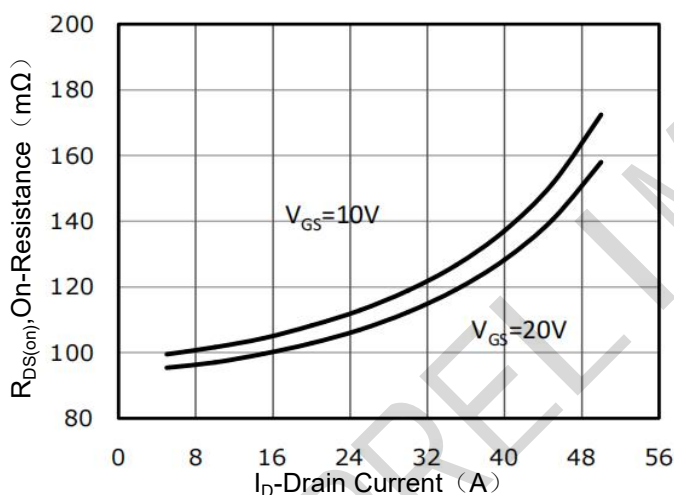


Figure 4. Gate Charge

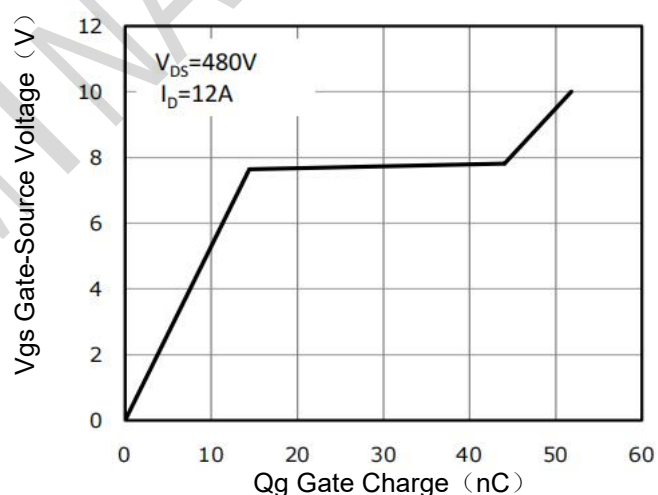


Figure 5. Capacitance

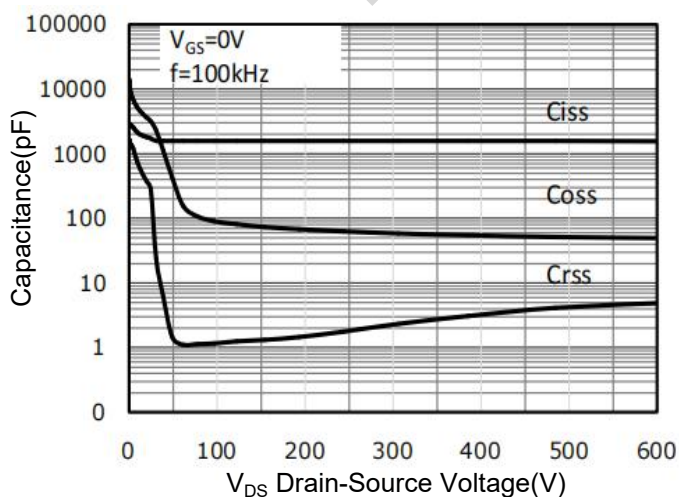
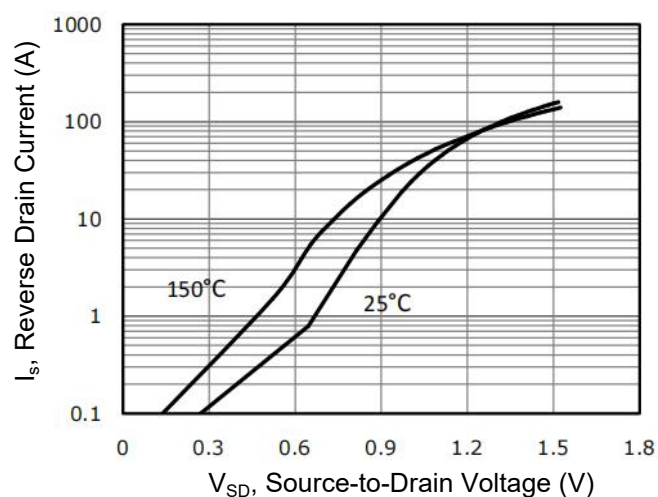


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

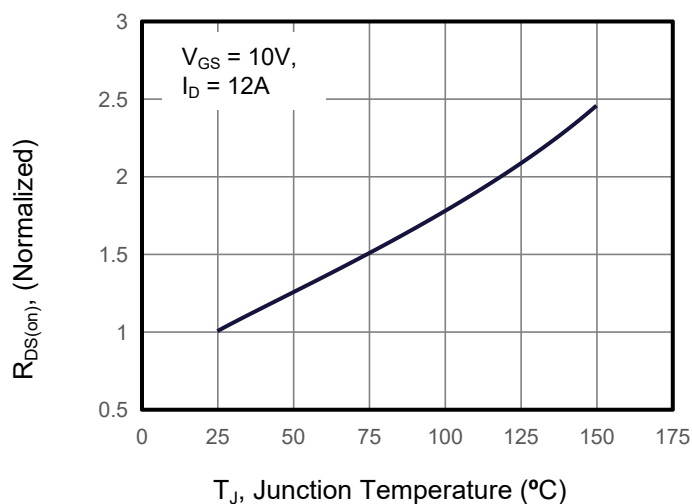


Figure 8. Safe Operation Area

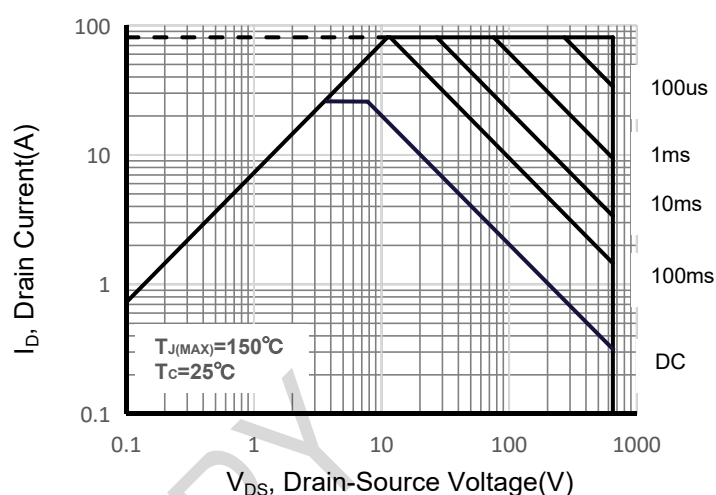


Figure 9. Maximum Continuous Drain Current vs Case Temperature

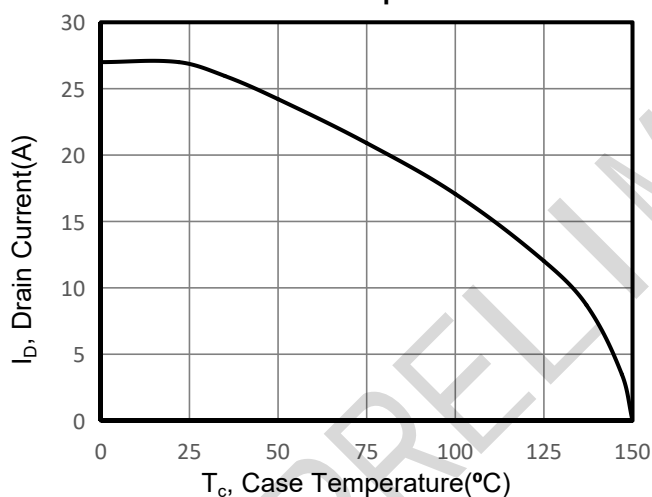
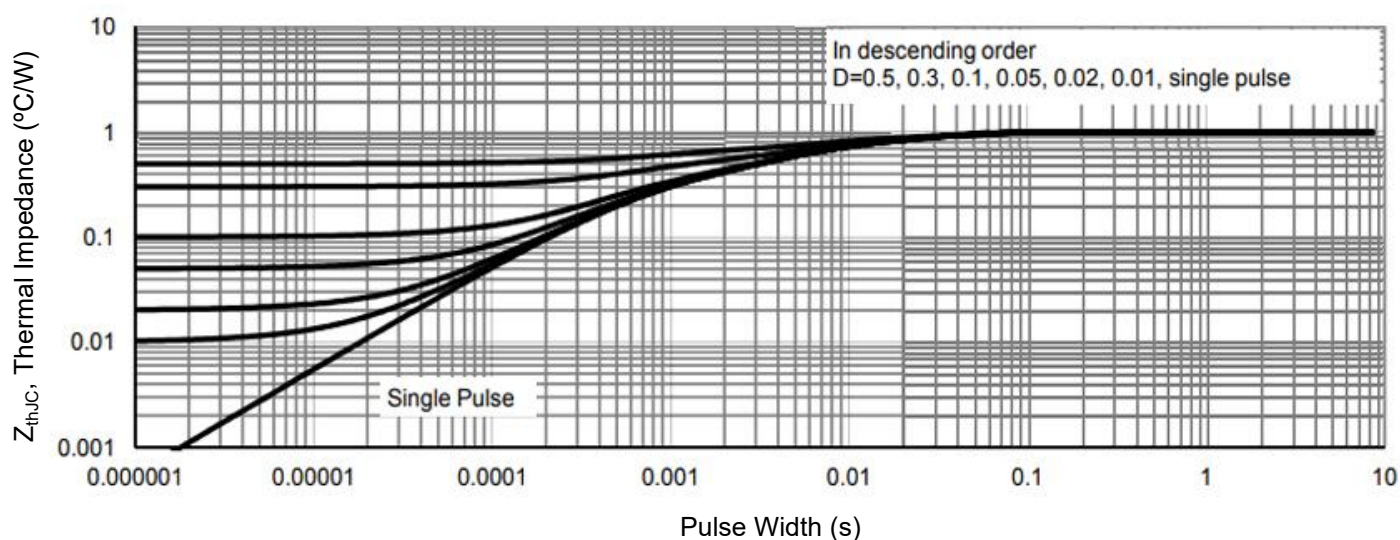
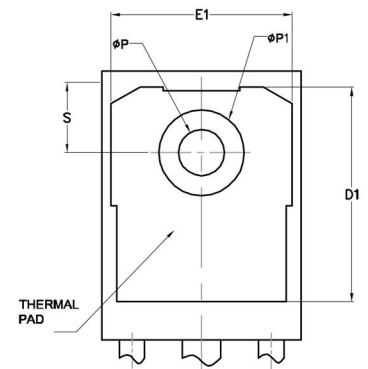
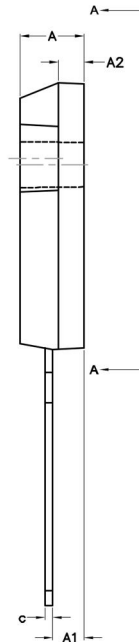
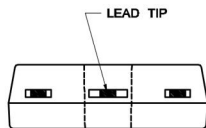
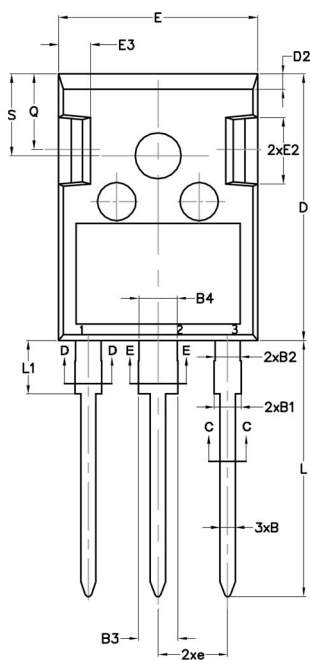


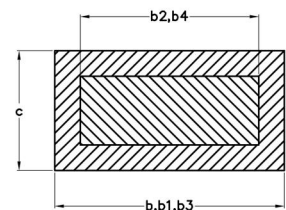
Figure 10. Normalized Maximum Transient Thermal Impedance



TO-247 Package Information



VIEW A-A



SECTION C-C, D-D, E-E

SYMBOLS	DIMENSIONS			
	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A	4.85	5.15	0.191	0.203
A1	2.25	2.55	0.088	0.100
A2	1.85	2.15	0.073	0.085
B	1.04	1.33	0.041	0.052
B1	1.90	2.35	0.075	0.093
B2	1.90	2.15	0.075	0.085
B3	2.90	3.35	0.114	0.132
B4	2.90	3.15	0.114	0.124
c	0.55	0.68	0.022	0.027
D	20.8	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.10	0.618	0.634
E1	13.50	14.20	0.531	0.559
E2	3.80	5.00	0.150	0.197
E3	1.00	2.6	0.039	0.102
e	5.46BSC		0.215BSC	
L	19.80	20.3	0.779	0.799
L1	4.00	4.50	0.157	0.177
φP	3.50	3.70	0.138	0.145
φP1	—	7.19	—	0.291
Q	5.40	6.00	0.212	0.236
S	6.2BSC		0.244BSC	