

N-Channel Enhancement Mode Power MOSFET

Description

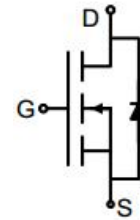
The GC041N65QF uses advanced super junction technology and design to provide excellent $R_{DS(on)}$, low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

General Features

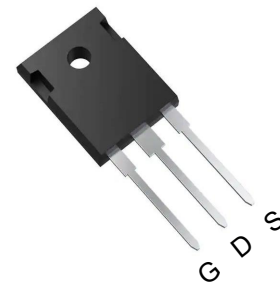
- V_{DS} 650V
- I_D (at $V_{GS} = 10V$) 70A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 43m Ω
- 100% Avalanche Tested
- RoHS Compliant
- Ultra-fast body diode

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-247

Ordering Information

Device	Package	Marking	Packaging
GC041N65QF	TO-247	GC041N65F	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	70	A
Pulsed Drain Current (note1)	I_{DM}	210	A
Gate-Source Voltage	V_{GS}	± 30	V
Power Dissipation	P_D	500	W
Single pulse avalanche energy (note2)	E_{AS}	1620	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

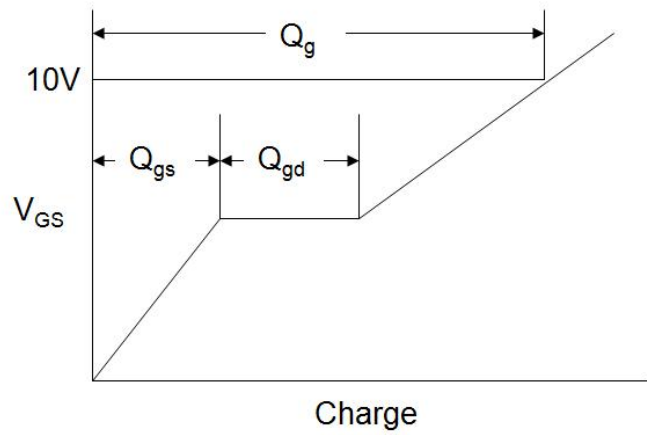
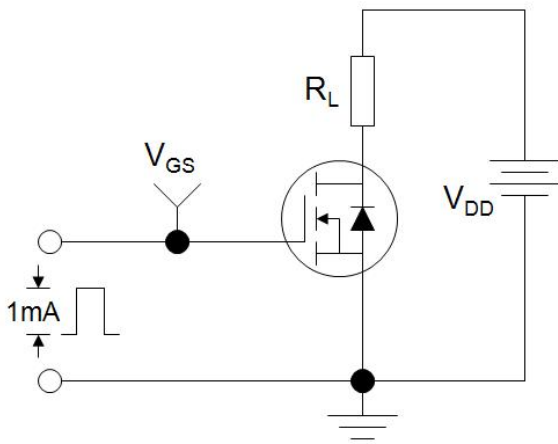
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	40	$^\circ\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	0.25	$^\circ\text{C/W}$

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}	$V_{DS} = 650V, V_{GS} = 0V$	--	--	10	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	4.0	5.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	--	36	43	m Ω
Forward Transconductance	g_{FS}	$V_{GS} = 5V, I_D = 20A$	--	35	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 400V,$ $f = 0.25\text{MHz}$	--	7668	--	pF
Output Capacitance	C_{oss}		--	157	--	
Reverse Transfer Capacitance	C_{rss}		--	0.6	--	
Total Gate Charge	Q_g	$V_{DD} = 400V,$ $I_D = 20A,$ $V_{GS} = 10V$	--	160	--	nC
Gate-Source Charge	Q_{gs}		--	35	--	
Gate-Drain Charge	Q_{gd}		--	55	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 400V,$ $I_D = 20A,$ $R_G = 4.7\Omega$	--	55	--	ns
Turn-on Rise Time	t_r		--	65	--	
Turn-off Delay Time	$t_{d(off)}$		--	175	--	
Turn-off Fall Time	t_f		--	48	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	70	A
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 20A, V_{GS} = 0V$	--	--	1.2	V
Reverse Recovery Charge	Q_{rr}	$I_F = 20A, V_{GS} = 0V$ $di/dt = 100A/\mu s$	--	1.5	--	nC
Reverse Recovery Time	T_{rr}		--	207	--	ns

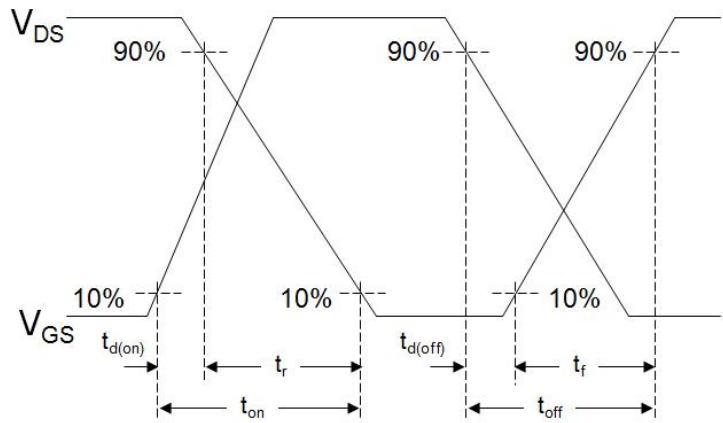
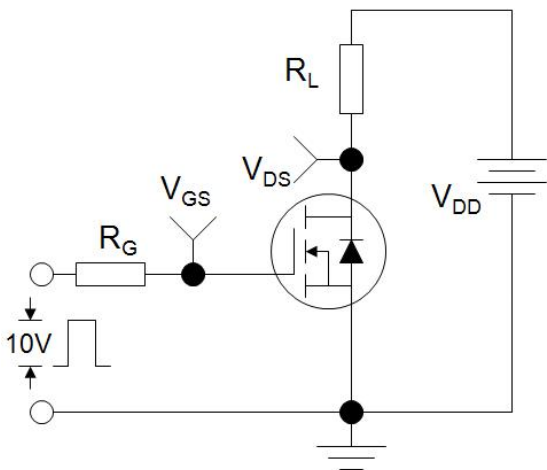
Notes

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

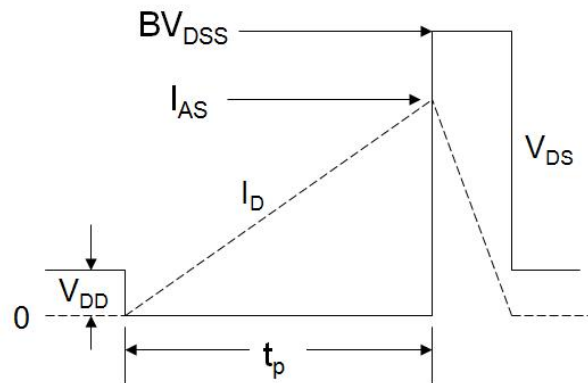
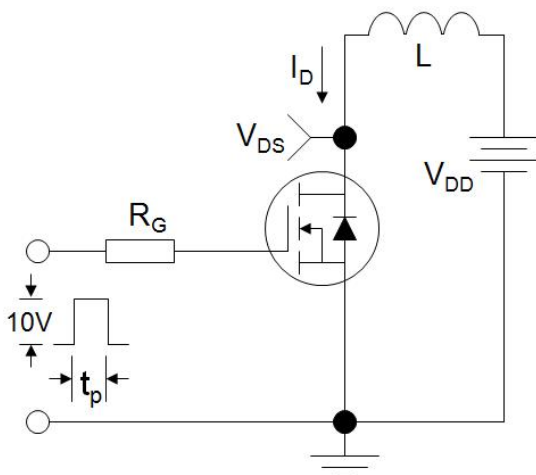
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



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

Figure 1. Output Characteristics

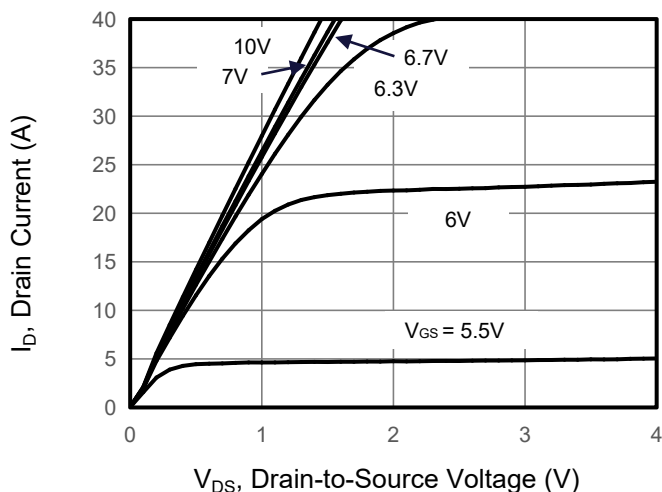


Figure 2. Transfer Characteristics

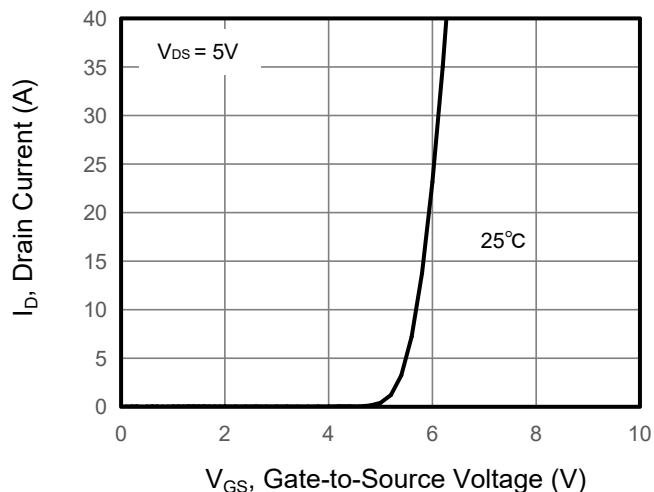


Figure 3. Drain Source On Resistance

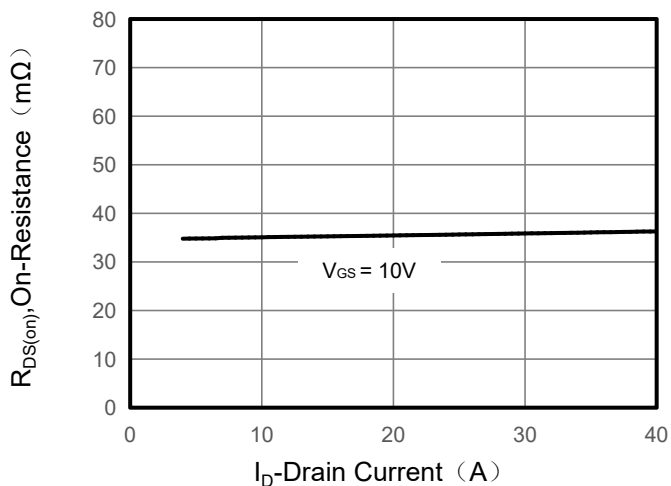


Figure 4. Gate Charge

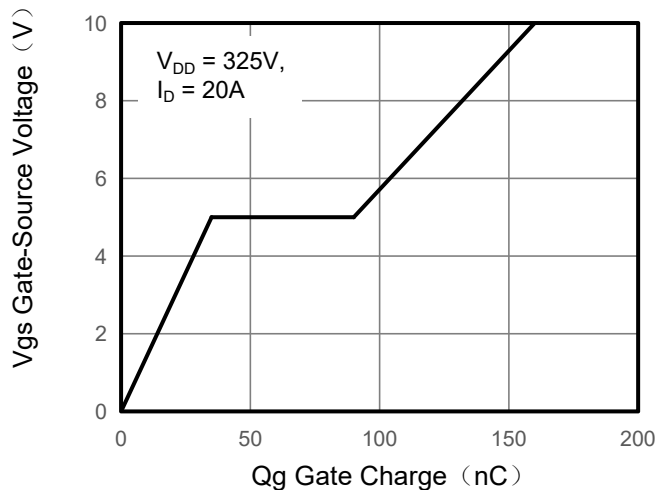


Figure 5. Capacitance

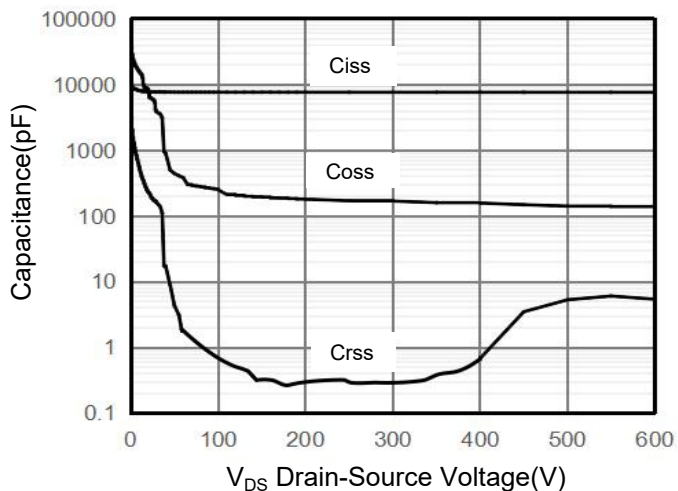
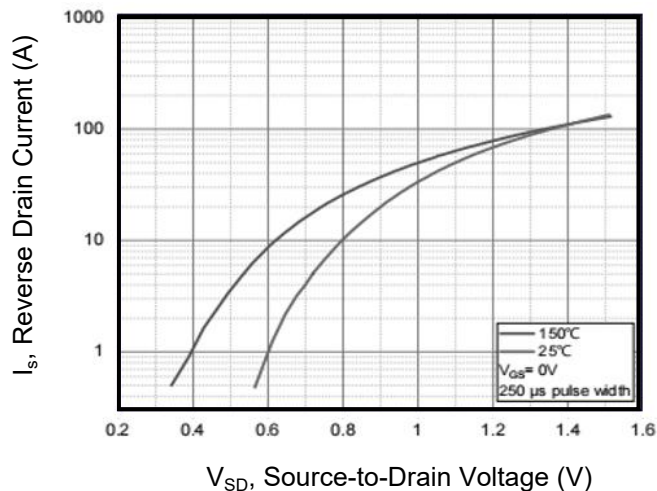


Figure 6. Source-Drain Diode Forward



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

Figure 7. Drain-Source On-Resistance

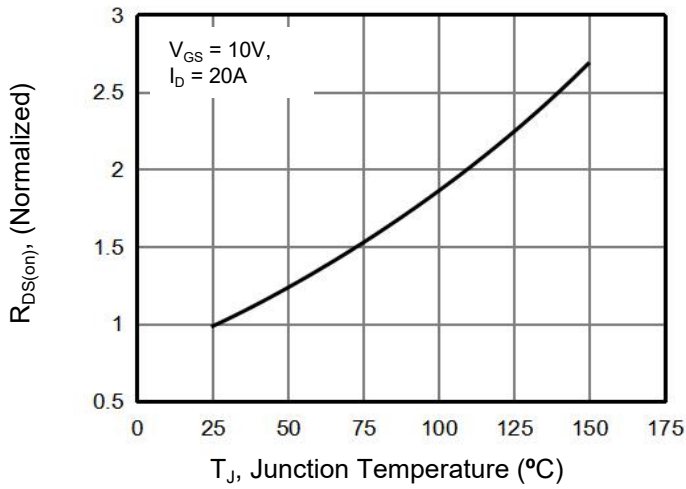


Figure 8. Safe Operation Area

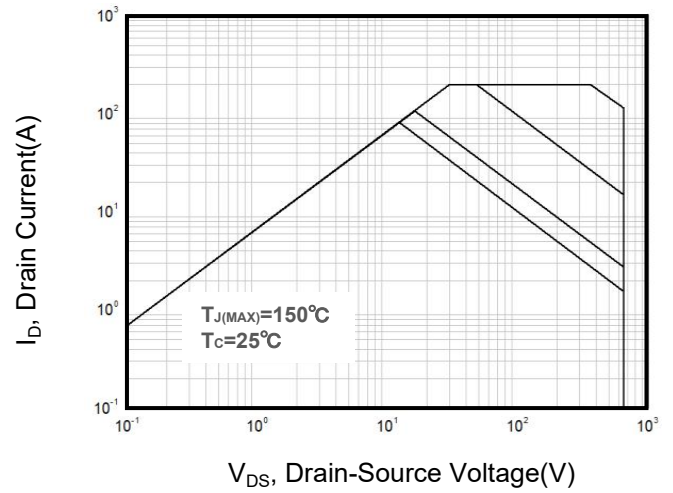
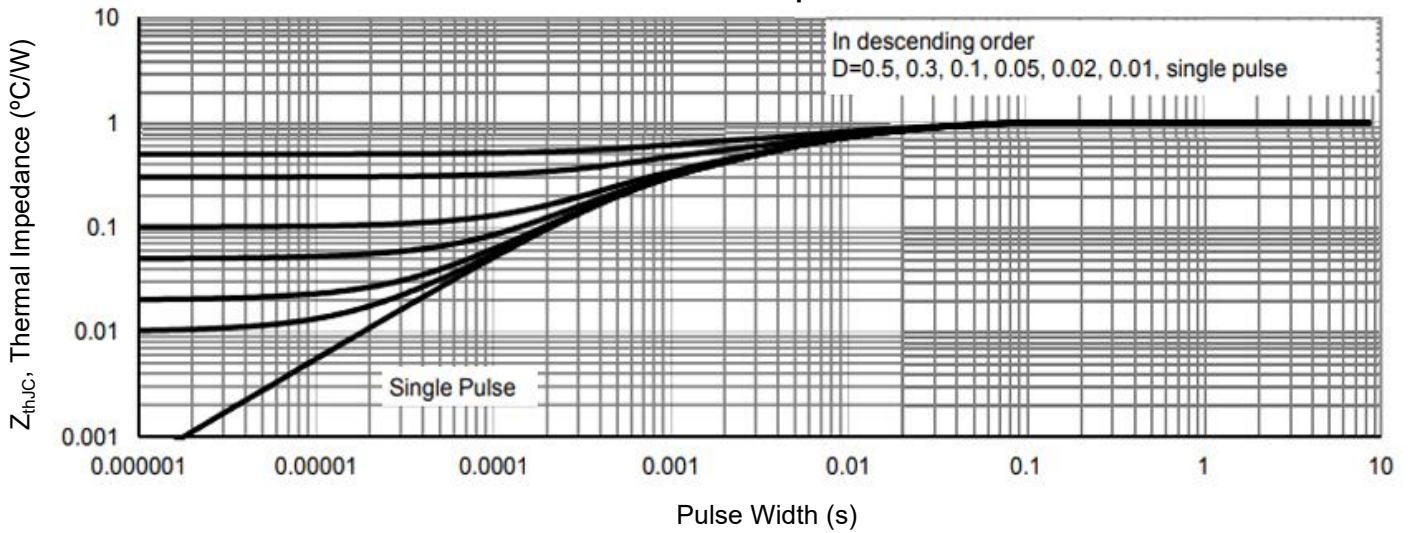
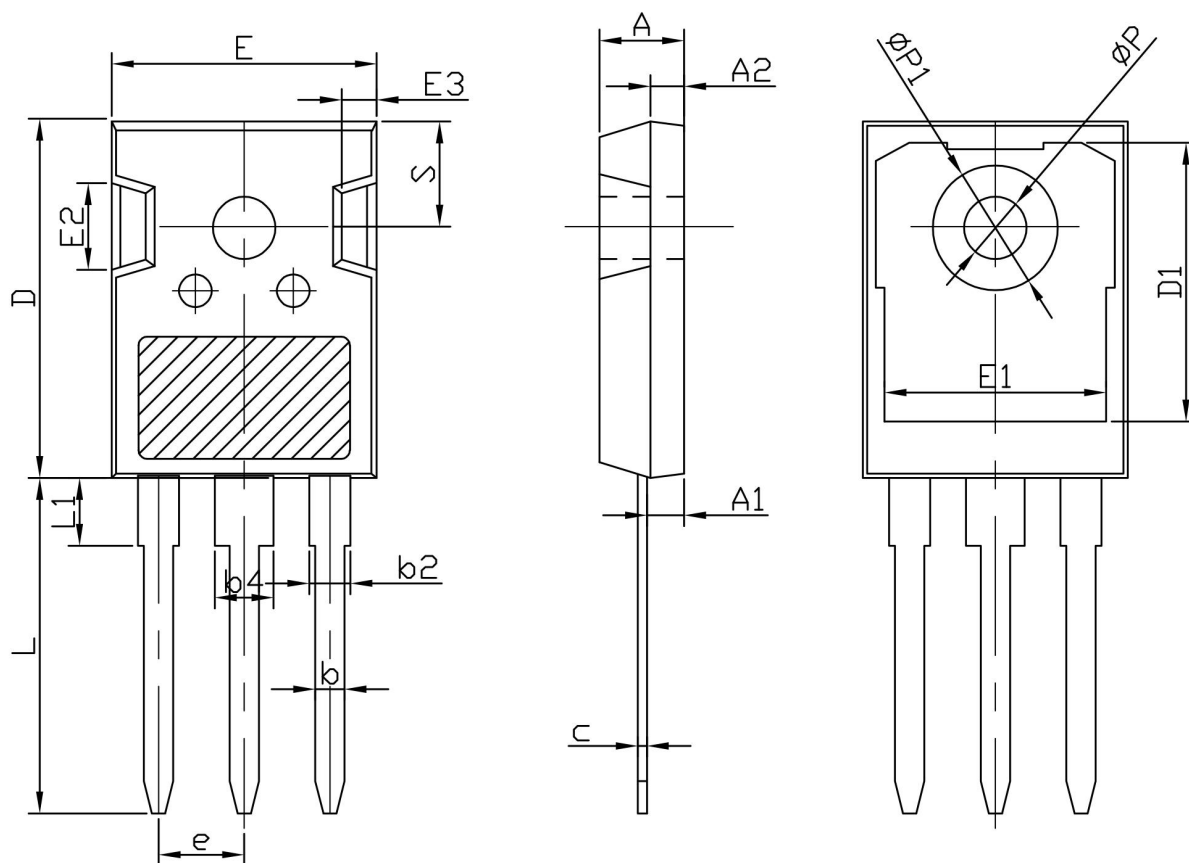


Figure 9. Normalized Maximum Transient Thermal Impedance



TO-247 Package Information



SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ØP	3.40	3.60	3.80
ØP1	-	-	7.30
S	6.15BSC		