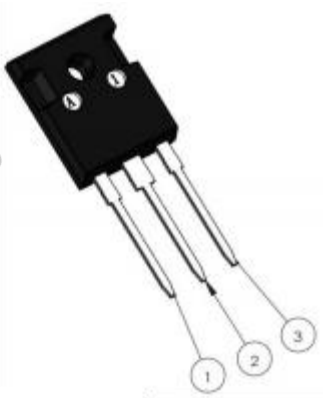
Description

Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size.

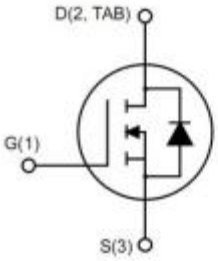


Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Easy to parallel and simple to drive
- ROHS Compliant, Halogen free

Application

- EV motor drive
- High Voltage DC/DC Converters
- Switch Mode Power Supplies
- Solar inverters
- EV charging



Ordering Information

Part Number	Marking	Package	Packaging
JX3S0020120M	JX3S0020120M	TO-247	Tube

Absolute Maximum Ratings(Tc=25°C)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	1200	V
I_D	Drain Current(continuous)at Tc=25°C	115	A
I_D	Drain Current(continuous)at Tc=100°C	85	A
I_{DM}	Drain Current (pulsed)	250	A
V_{GS}	Gate-Source Voltage	-10/+22	V
P_D	Power Dissipation T_C = 25°C	550	W
T_J, Tstg	Junction and Storage Temperature Range	-55 to +150	°C

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

Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DS}	Drain-source Breakdown Voltage	I_D=250uA,V_{GS}=0V	1200			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =1200V, V_{GS} =0V, T_J=25°C			100	uA
I_{GSS}	Gate-body Leakage Current	V_{DS} =0V ; V_{GS} =-10 to 20V			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=22mA	2	3	4	V
V_{GSon}	Recommended turn-on Voltage	Static		20		V
V_{GSoff}	Recommended turn-off Voltage			-5		V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS}=20V, I_D=50A		16	22	mΩ
		V_{GS}=20V, I_D=50A T_J=150°C		25.2		mΩ

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{DS}=1000V,f=1MHz , V_{AC}=25mV		6378		pF
C_{oss}	Output Capacitance			245		pF
C_{rss}	Reverse Transfer Capacitance			15		pF
g_{fs}	Transconductance	V_{DS}=20V , I_D=50A		51		S
E_{OSS}	C_{OSS} Stored Energy	V_{DS}=1000V,f=1MHz		141		μJ
E_{ON}	Turn-On Energy （Body Diode）	V_{DS}=800V,V_{GS}=-5/20V, I_D=50A， L=68uH T_J=150°C		8.20		mJ
E_{OFF}	Turn-Off Energy （Body Diode）			3.26		mJ
Q_g	Total Gate Charge	V_{DS}=800V, V_{GS}=-5V/20V, I_D = 50 A		238		nC
Q_{gs}	Gate-source Charge			76.7		nC
Q_{gd}	Gate-Drain Charge			78.3		nC
$R_{G\ (int)}$	Internal Gate Resistance	f=1MHz,V_{AC}=25mV		3.5		Ω
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=800V,V_{GS}=-5V/20V, I_D =50A, L=68 μH Rext=2.5Ω		185		ns
t_r	Rise Time			75		ns
$t_{d(off)}$	Turn-off Delay Time			28		ns
t_f	Fall Time			26		ns

Typical Performance-Reverse Diode(T_J = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{FSD}	Forward Voltage	V_{GS}=0V,I_F=37.5A,T_J=25°C		4.6	6	V
		V_{GS}=0V,I_F=37.5A,T_J=150°C		4.2	6	V
Is	Continuous Diode Forward Current	V_{GS}=0V， T_C=25°C		110		A
t_{rr}	Reverse Recovery Time	V_{GS}=-5 V, I_F=50 A, V_R=800 V, d*i*/d*t*=900 A/μs， T_J=150°C		98		nS
Q_{rr}	Reverse Recovery Charge			613		nC
I_{rrm}	Peak Reverse Recovery Current			18		A

Thermal Characteristics

Symbol	Parameter	Value.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.23	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	°C/W

The values are based on the junction-to case thermal impedance which is measured with the device mounted to a large heat sink assuming maximum junction temperature of Tj(max)=150°C

Electrical Characteristics

Fig1. Output characteristics (T_J = 25 °C)

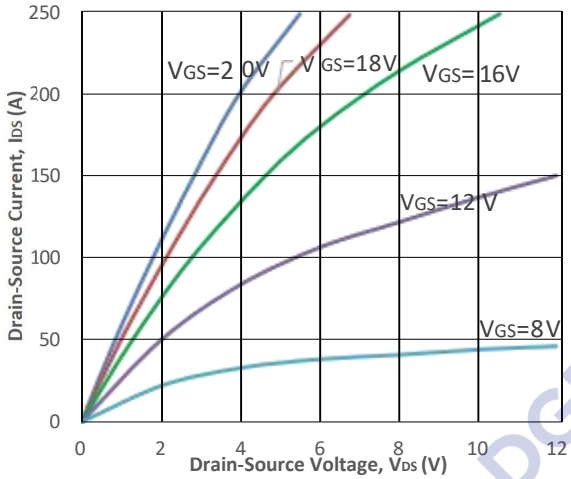


Fig2. Output characteristics (T_J = 150 °C)

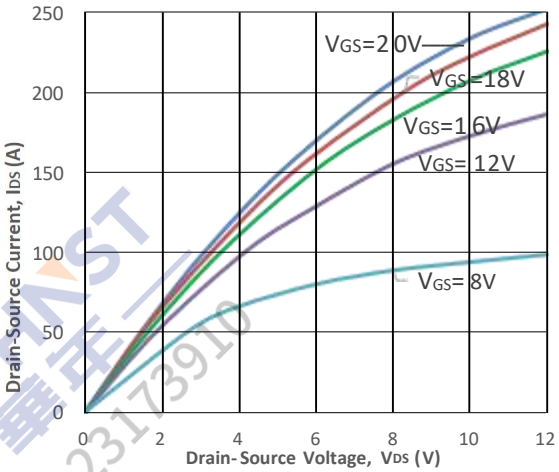


Fig3.Normalized On-Resistance vs. Temperature

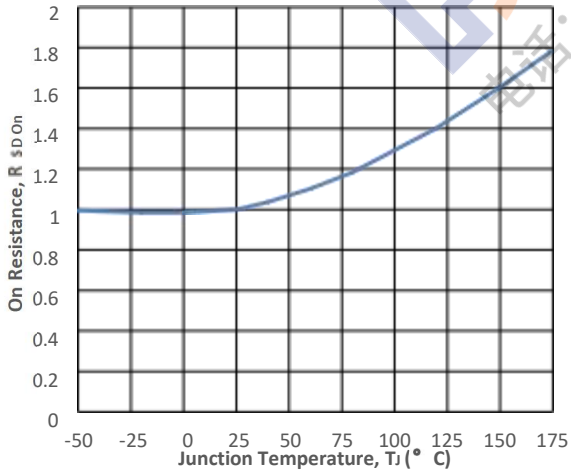


Fig4. On-Resistance vs. Temperature

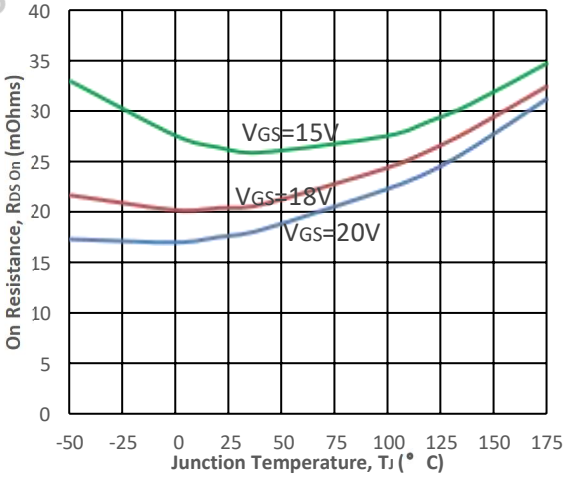


Fig5. Transfer Characteristic

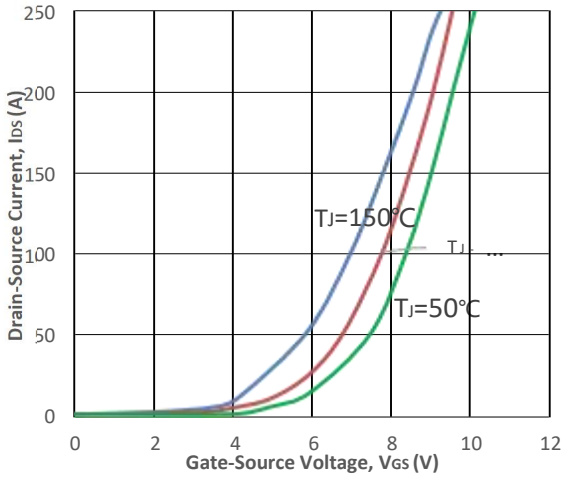


Fig6. Body Diode Characteristic at 25 °C

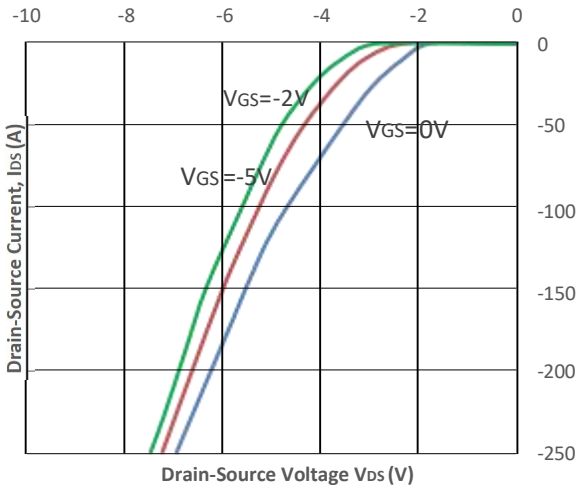


Fig7.Threshold Voltage vs. Temperature

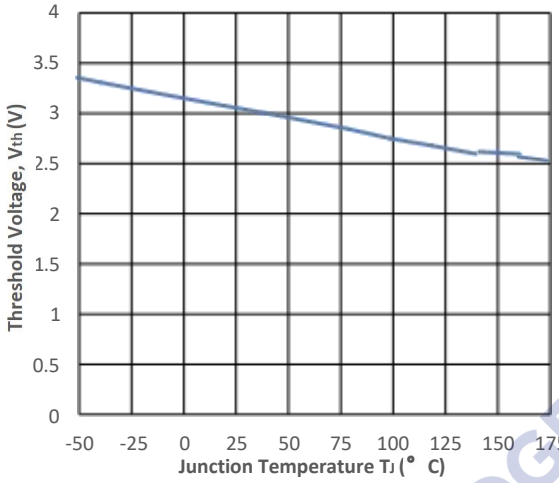


Fig8. Gate Charge Characteristics

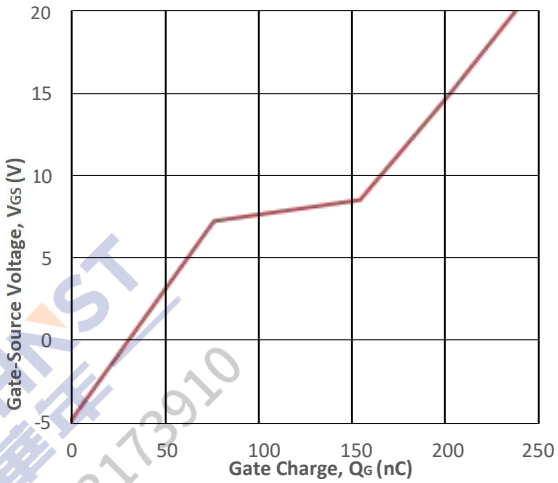


Fig9. 3rd Quadrant Characteristic at 25 °C

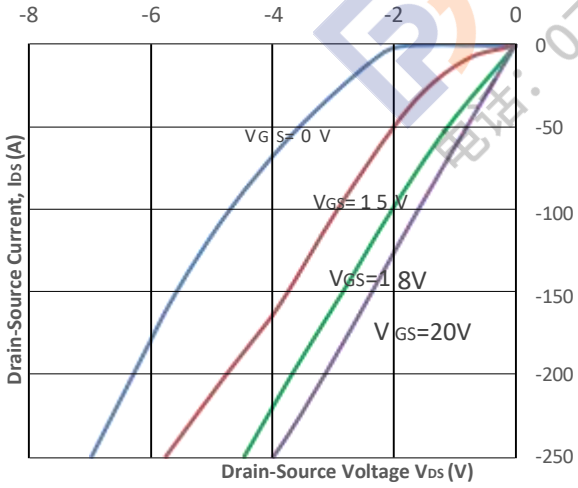


Fig10. Output Capacitor Stored Energy

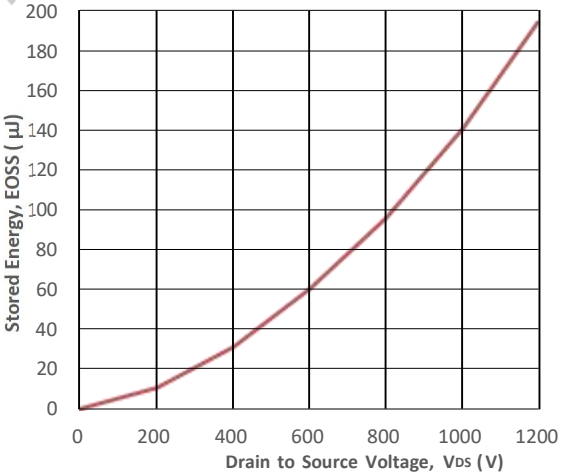


Fig11. Capacitances vs. Drain-Source

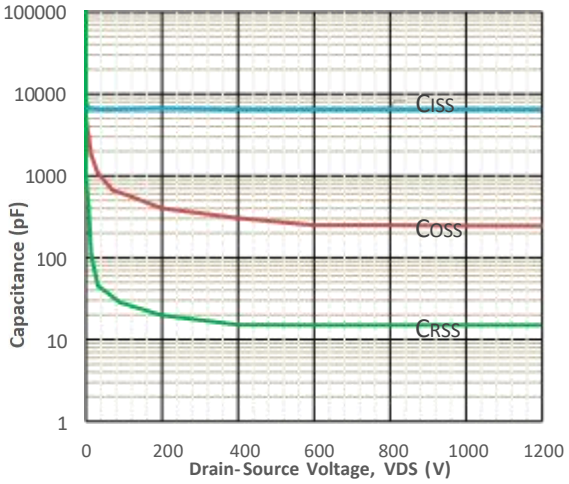


Fig12. Max Power Dissipation Derating Vs TC

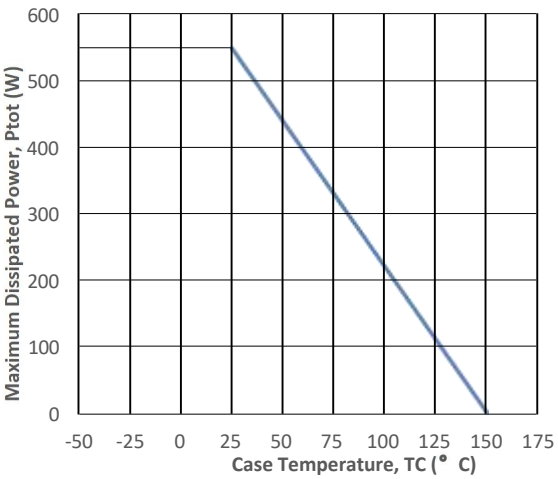


Fig13. Switching Energy vs. Drain Current

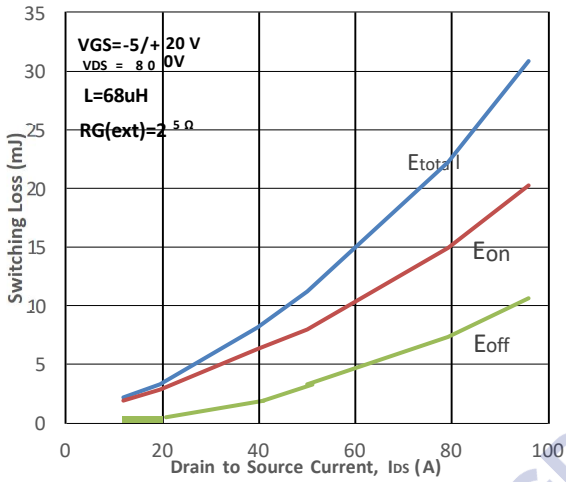


Fig14. Switching Energy vs. RG(ext)

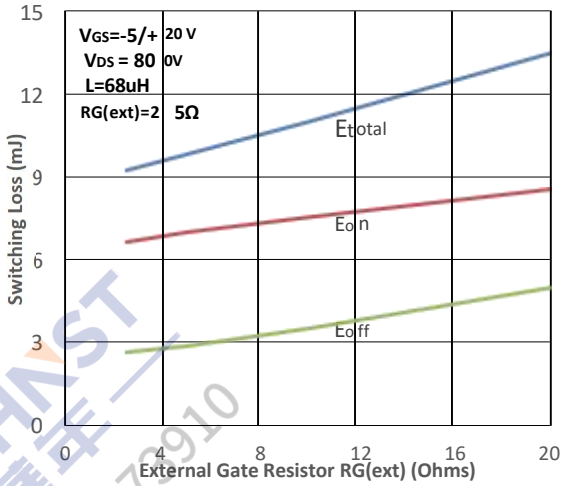


Fig15. Switching Energy vs. Temperature

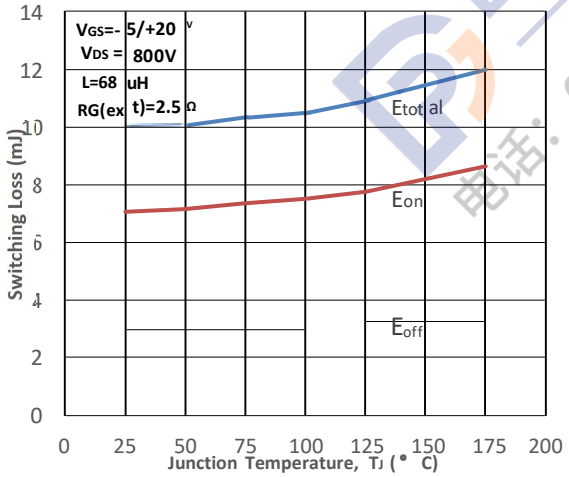


Fig16. Switching Times vs. RG(ext)

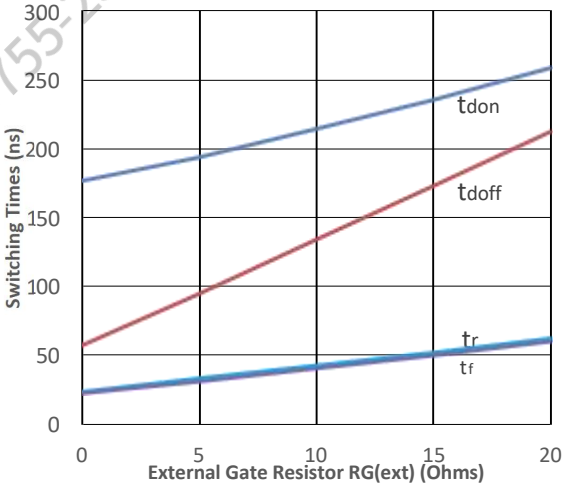


Fig17.Transient Thermal Impedance

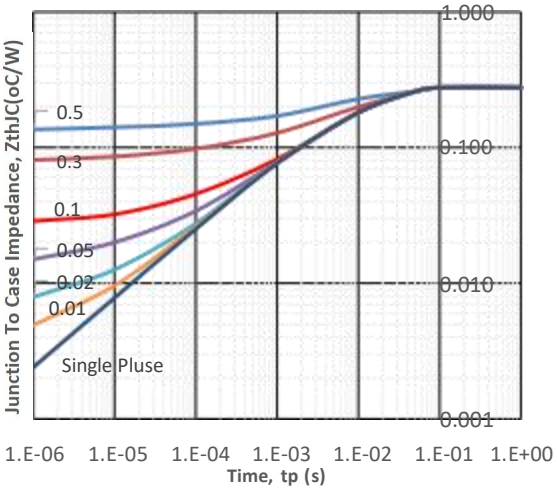
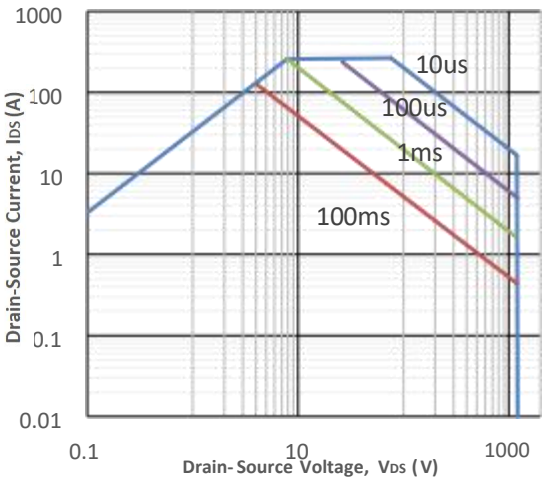
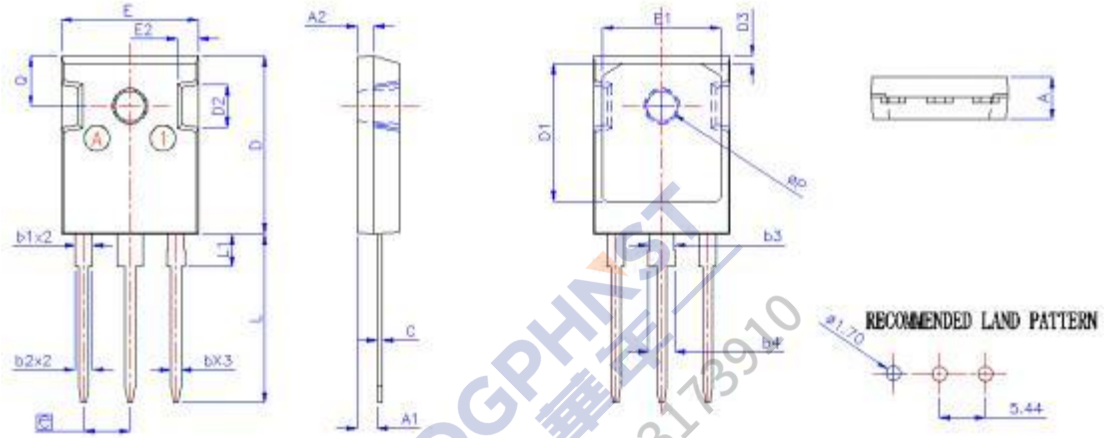


Fig18. Safe Operating Area



Package Drawing:



Dimensions （ UNIT：mm）

SYMBDLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.90	5.00	5.10	0.193	0.197	0.201
A1	2.31	2.42	2.52	0.091	0.095	0.099
A2	1.90	2.00	2.10	0.075	0.079	0.083
b	1.16	1.22	1.27	0.046	0.048	0.050
b1	1.96	2.02	2.07	0.079	0.080	0.081
b2	2.03	2.07	2.10	0.080	0.0815	0.083
b3	2.96	3.02	3.07	0.117	0.119	0.121
b4	3.03	3.07	3.1	0.119	0.120	0.122
C	0.59	0.62	0.66	0.023	0.024	0.026
D	20.90	21.00	21.10	0.823	0.827	0.831
D1	15.96	16.26	16.56	0.628	0.640	0.652
D2		4.3			4.3	
D3	0.8	0.95	1.1	0.031	0.037	0.043
e		5.44 BSC			0.214 BSC	
E	15.95	16.15	16.35	0.628	0.636	0.644
E1	13.82	14.02	14.26	0.544	0.552	0.561
E2		4.3			0.169	
L	19.72	19.92	20.12	0.776	0.784	0.792
L1	___	___	3.86	___	___	0.152
Q		5.95 BSC			0.234BSC	
ØP	3.55	3.60	3.70	0.140	0.142	0.146