

### Description

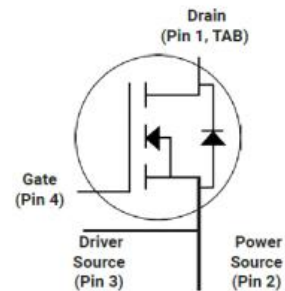
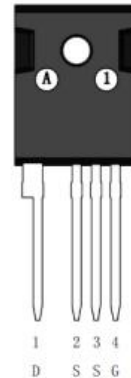
Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency, 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)
- Optimized package with separate driver source pin
- 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
JX4S0010R120M	JX4S0010R120M	TO-247-4	Tube

**Absolute Maximum Ratings(Tc=25°C)**

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-Source Voltage	1200	V
I <sub>D</sub>	Drain Current(continuous)at Tc=25°C	200	A
I <sub>D</sub>	Drain Current(continuous)at Tc=100°C	165	A
I <sub>DM</sub>	Drain Current (pulsed)	385	A
V <sub>GS</sub>	Gate-Source Voltage	-10/+22V	V
P <sub>D</sub>	Power Dissipation T <sub>C</sub> = 25°C	681	W
T <sub>J</sub> , T <sub>stg</sub>	Junction and Storage Temperature Range	-55 to +175	°C

**Electrical Characteristics(T<sub>J</sub> = 25°C unless otherwise specified)**
**Typical Performance-Static**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV <sub>DS</sub>	Drain-source Breakdown Voltage	I <sub>D</sub> =250uA, V <sub>GS</sub> =0V	1200			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =1200V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C		10	100	uA
I <sub>GSS</sub>	Gate-body Leakage Current	V <sub>DS</sub> =0V ; V <sub>GS</sub> =-5 to 20V		155	280	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =20mA	2	3	4	V
V <sub>GS(on)</sub>	Recommended turn-on Voltage	Static		18		V
V <sub>GS(off)</sub>	Recommended turn-off Voltage			-5		V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> =18V, I <sub>D</sub> =100A		9.8	12	mΩ
		V <sub>GS</sub> =18V, I <sub>D</sub> =100A T <sub>J</sub> =175°C		13.5		mΩ

**Typical Performance-Dynamic**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =1000V, f=1MHz, V <sub>AC</sub> =25mV		14		nF
C <sub>OSS</sub>	Output Capacitance			568		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			158		pF
g <sub>fs</sub>	Transconductance	V <sub>DS</sub> =20V, I <sub>D</sub> =100A		68		S
E <sub>OSS</sub>	C <sub>OSS</sub> Stored Energy	V <sub>DS</sub> =1000V, f=1MHz		285		μJ
E <sub>ON</sub>	Turn-On Energy (Body Diode)	V <sub>DS</sub> =800V, V <sub>GS</sub> =-5V/18V, I <sub>D</sub> =100A, L=68μH T <sub>J</sub> =175°C		6.2		mJ
E <sub>OFF</sub>	Turn-Off Energy (Body Diode)			3.2		mJ
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =800V, V <sub>GS</sub> =-5V/18V, I <sub>D</sub> =100A		415		nC
Q <sub>gs</sub>	Gate-source Charge			70		nC
Q <sub>gd</sub>	Gate-Drain Charge			30		nC
R <sub>G(int)</sub>	Internal Gate Resistance	f=1MHz, V <sub>AC</sub> =25mV		2.0		Ω
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =800V, V <sub>GS</sub> =-5V/18V, I <sub>D</sub> =100A, L=68μH Rext=2.5Ω		60		ns
t <sub>r</sub>	Rise Time			75		ns
t <sub>d(off)</sub>	Turn-off Delay Time			108		ns
t <sub>f</sub>	Fall Time			27		ns

**Typical Performance-Reverse Diode(T<sub>J</sub> = 25°C unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>FSD</sub>	Forward Voltage	V <sub>GS</sub> =0V, I <sub>F</sub> =70A, T <sub>J</sub> =25°C		3.8	6	V
		V <sub>GS</sub> =0V, I <sub>F</sub> =70A, T <sub>J</sub> =175°C		3.4	6	V
I <sub>S</sub>	Continuous Diode Forward Current	V <sub>GS</sub> =0V, T <sub>C</sub> =25°C		180		A
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =-4V, I <sub>F</sub> =70 A,		115		nS
Q <sub>rr</sub>	Reverse Recovery Charge	V <sub>R</sub> =400 V, di/dt=900A/μs,		735		nC
I <sub>rrm</sub>	Peak Reverse Recovery Current	T <sub>J</sub> =175°C		30		A

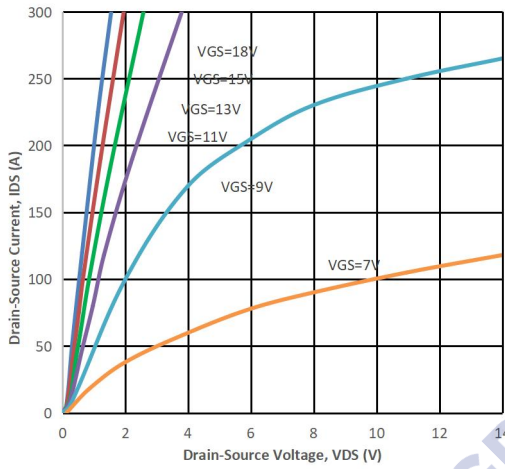
**Thermal Characteristics**

Symbol	Parameter	Value.	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case	0.22	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient	40	°C/W

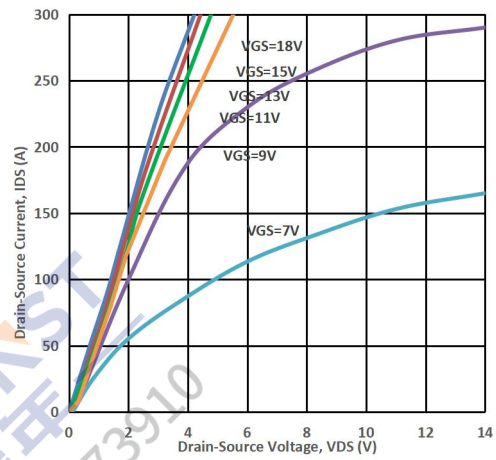
The values are based on the junction-to case thermal impedance which is measured with the device mounted to a large heat sink assuming maximum junction temperature of T<sub>J</sub>(max)=175°C

### Electrical Characteristics

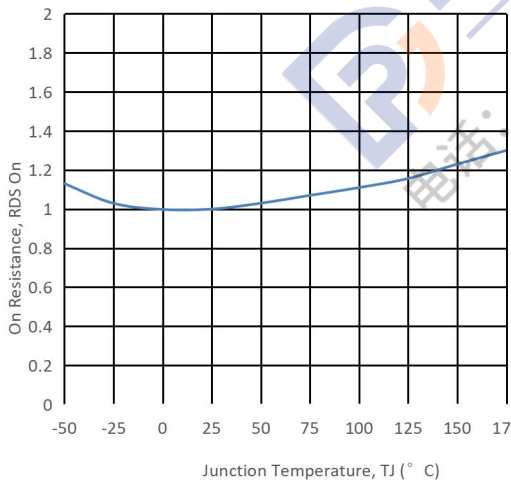
**Fig1. Output characteristics ( $T_J = 25\text{ }^\circ\text{C}$ )**



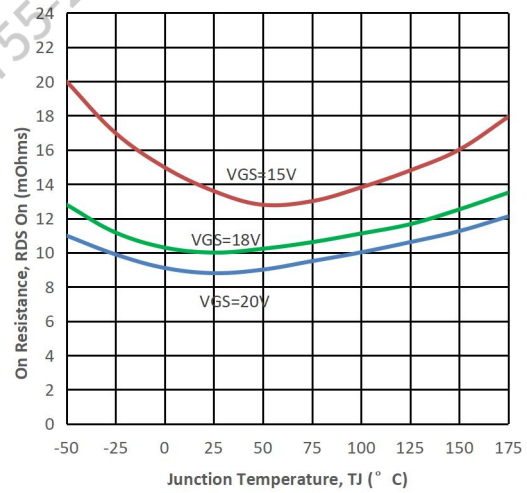
**Fig2. Output characteristics ( $T_J = 175\text{ }^\circ\text{C}$ )**



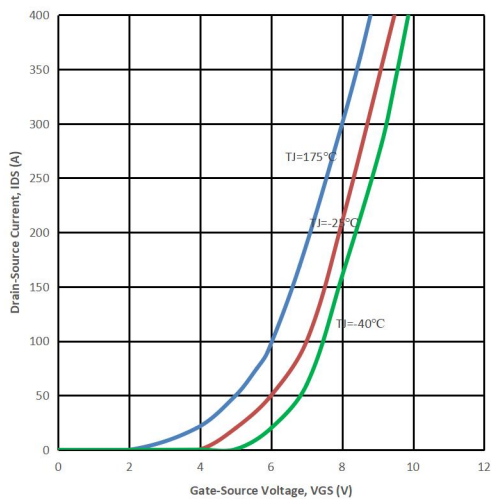
**Fig3. Normalized On-Resistance vs. Temperature**



**Fig4. On-Resistance vs. Temperature**



**Fig5. Transfer Characteristic**



**Fig6. Body Diode Characteristic at 25 °C**

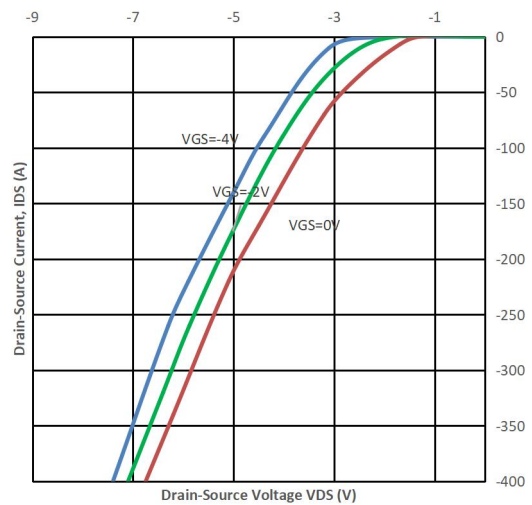


Fig7. Threshold Voltage vs. Temperature

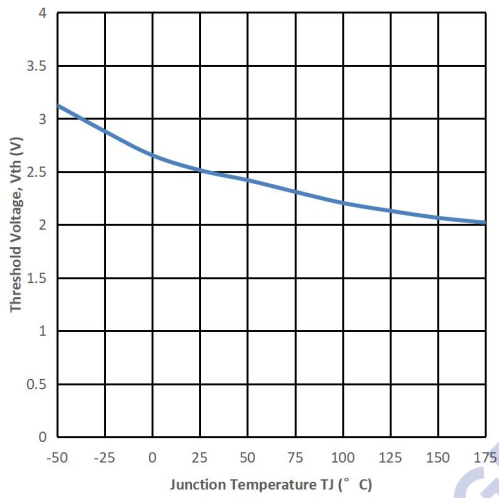


Fig8. Gate Charge Characteristics

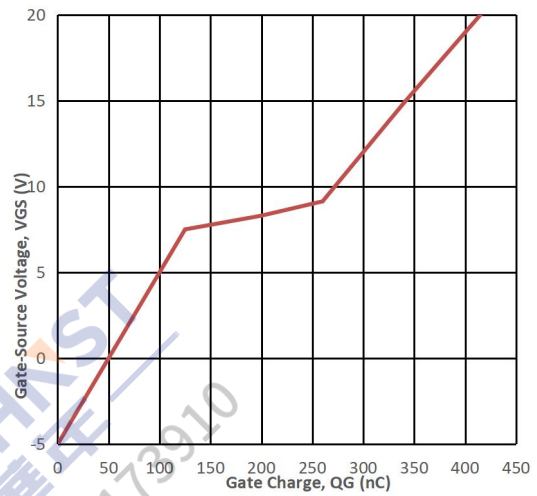


Fig9. 3rd Quadrant Characteristic at 25 °C

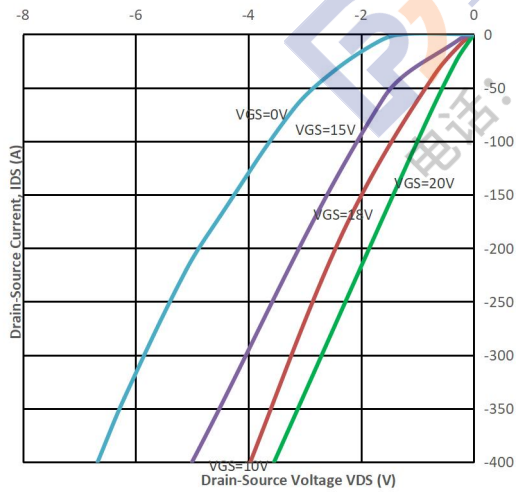


Fig10. Output Capacitor Stored Energy

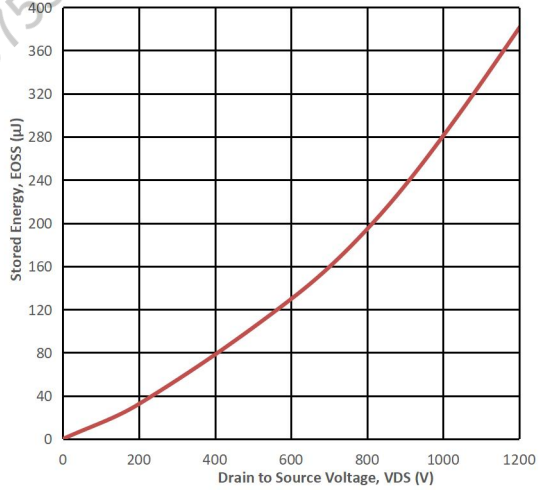


Fig11. Capacitances vs. Drain-Source

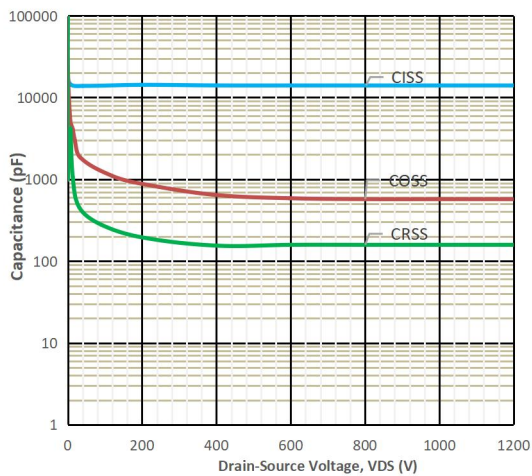


Fig12. Max Power Dissipation Derating Vs Tc

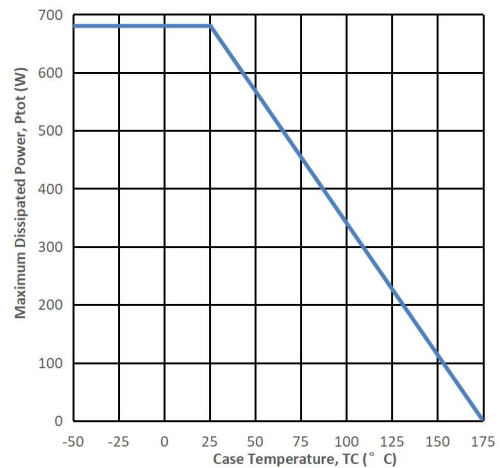


Fig13. Switching Energy vs. Drain Current

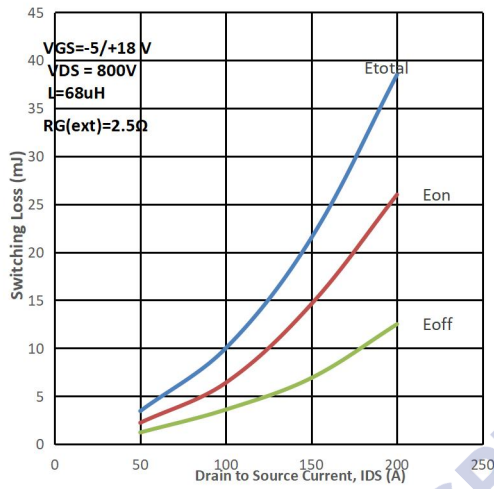


Fig14. Switching Energy vs. RG(ext)

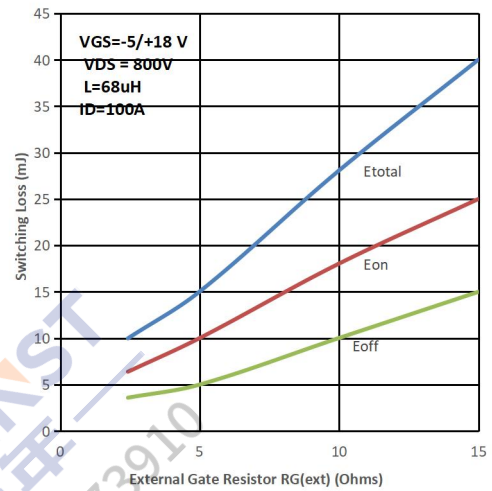


Fig15. Switching Energy vs. Temperature

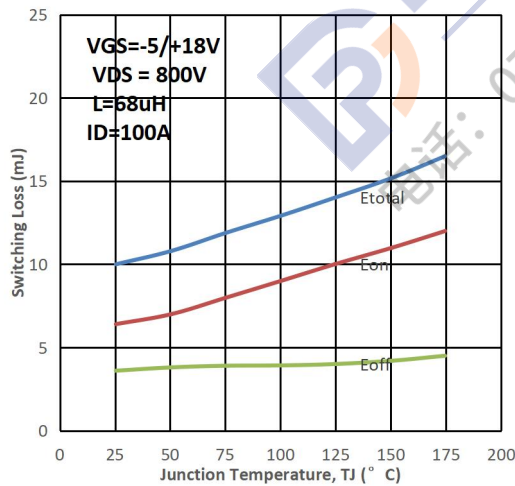


Fig16. Switching Times vs. RG(ext)

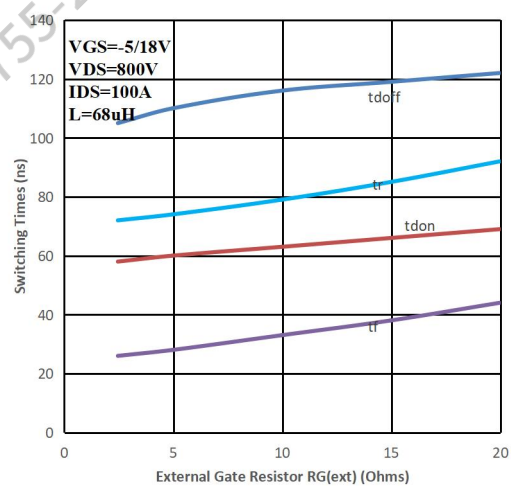


Fig17. Transient Thermal Impedance

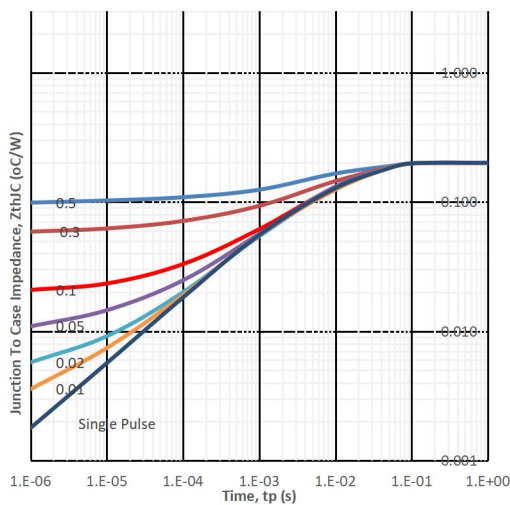
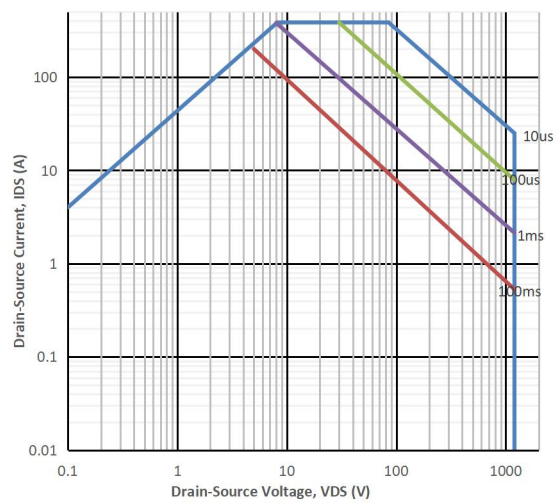
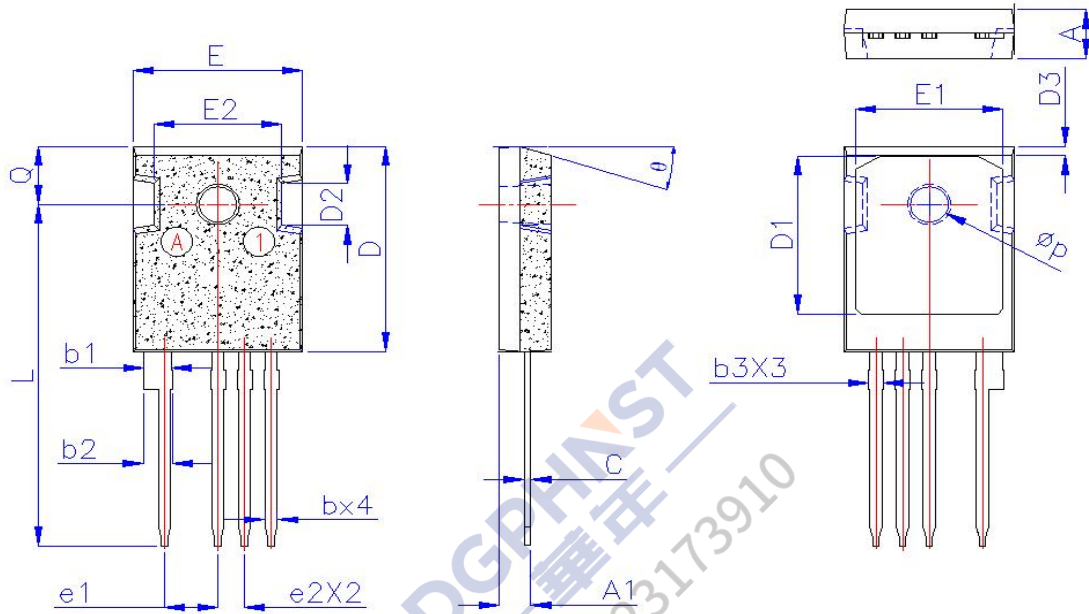


Fig18. Safe Operating Area



**Package Drawing:**

**Dimensions (UNIT: mm)**

SYMBDLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	TYPE	MAX	MIN	TYPE	MAX
A	4.80	5.00	5.20	0.189	0.197	0.205
A1	2.85	3.00	3.15	0.112	0.118	0.124
b	1.15	1.20	1.25	0.045	0.047	0.049
b1	2.40	2.50	2.60	0.094	0.098	0.102
b2	2.61	2.76	2.91	0.103	0.109	0.115
b3	1.30	1.42	1.57	0.051	0.056	0.062
C	0.55	0.60	0.65	0.022	0.024	0.026
D	20.80	21.00	21.20	0.819	0.827	0.835
D1	15.94	16.24	16.54	0.628	0.639	0.651
D2	4.3TYPE			0.169TYPE		
e1	4.93	5.08	5.23	0.194	0.200	0.206
e2	2.39	2.54	2.69	0.094	0.100	0.106
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	12.00	12.20	12.40	0.472	0.480	0.488
L	34.65	35.05	35.45	1.364	1.380	1.396
Q	5.85	5.95	6.05	0.230	0.234	0.238
∅P	3.45	3.60	3.75	0.136	0.142	0.148
θ	17.5°			0.689°		