

SC1R0N170Y4

5 Amps, 1700 Volts N-Channel Sic Power MOSFET

Features

- 5A, 1700V, $R_{DS(ON)MAX}=1.3\ \Omega @V_{GS}=20V/2A$
- High Blocking Voltage with low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive
- Ultra-low Drain-gate capacitance
- Avalanche Ruggedness

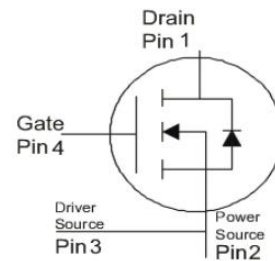
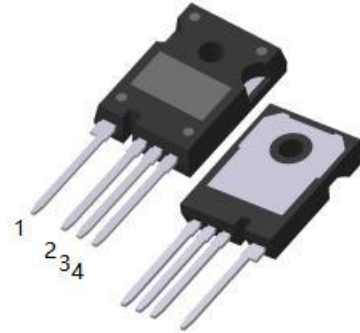
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Auxiliary Power Supplies
- Switch Mode Power Supplies

TO-247-4L



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

Parameter	Symbol	Value	UNIT	Test Conditions
Drain-Source Voltage	V_{DSmax}	1700	V	$V_{GS}=0V, I_{DS}=100\mu A$
Gate-Source Voltage (dynamic)	V_{GSmax}	-10/+25		Absolute maximum values
Gate-Source Voltage (static)	V_{GSop}	-5/+20		Recommended operational values
Continuous Drain Current	I_D	5	A	$V_{GS}=20V, T_c=25^\circ\text{C}$
		3.5	A	$V_{GS}=20V, T_c=100^\circ\text{C}$
Pulsed Drain Current	$I_{D(pulse)}$	6	A	Pulse width t_p limited by T_{Jmax}
Power Dissipation	P_D	69	W	$T_c=25^\circ\text{C}, T_J=150^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$	
Solder Temperature	T_L	260	$^\circ\text{C}$	1.6mm(0.063") from case for 10s

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Units
Maximum Junction-to-Case	R_{thJC}	1.8	2.0	$^\circ\text{C}/\text{W}$

Electrical Characteristics ($T_c=25^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=100\mu A$	1700	—	—	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=1700V, V_{GS}=0V$	—	1	100	μA
Gate-Body Leakage Current, Forward	I_{GSSF}	$V_{GS}=20V, V_{DS}=0V$	—	—	250	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=1mA$	2.5	3.0	4.5	V
		$V_{DS}=V_{GS}, I_D=1mA, T_J=150^\circ\text{C}$	—	2.2	—	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=20V, I_D=2A$	—	1.0	1.3	Ω
		$V_{GS}=20V, I_D=2A, T_J=150^\circ\text{C}$	—	1.5	—	
Transconductance	g_{fs}	$V_{DS}=20V, I_D=2A$	—	1.15	—	S
		$V_{DS}=20V, I_D=2A, T_J=150^\circ\text{C}$	—	1.30	—	
Input Capacitance	C_{iss}	$V_{DS}=1000V,$	—	186	—	pF
Output Capacitance	C_{oss}	$V_{GS}=0V,$	—	12	—	pF
Reverse Transfer Capacitance	C_{rss}	$f=1.0\text{MHz},$	—	1.6	—	pF
Coss Stored Energy	E_{oss}	$V_{AC}=25mV$	—	6.2	—	μJ
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=1200V, V_{GS}=-5V/20V,$ $I_D=30A, R_g=2.5\Omega, R_L=600\Omega$	—	5.2	—	ns
Turn-On Rise Time	t_r		—	9.4	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	13.2	—	ns
Turn-Off Fall Time	t_f		—	22.0	—	ns
Turn-On Switching Energy	E_{ON}	$V_{DS}=1200V, V_{GS}=-5V/20V$	—	48	—	μJ
Turn-Off Switching Energy	E_{OFF}	$I_D=2A, R_g=2.5\Omega, L=1500\mu H$	—	18	—	μJ
Internal Gate Resistance	R_G	$f=1\text{MHz}$ open drain	—	22	—	Ω
Total Gate Charge	Q_g	$V_{DS}=1200V, I_D=2A,$ $V_{GS}=-5V/20V$	—	21.8	—	nC
Gate-Source Charge	Q_{gs}		—	5.2	—	
Gate-Drain Charge	Q_{gd}		—	7.3	—	
Reverse Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=-5V, I_F=1A$	—	4.2	—	V
		$V_{GS}=-5V, I_F=1A, T_J=150^\circ\text{C}$	—	3.9	—	
Continuous Diode Forward Current	I_S	$T_C=25^\circ\text{C}$	—	—	4.0	A
Reverse Recover Time	t_{rr}	$V_{GS}=-5V, I_{SD}=2A, V_R=1200V$	—	25	—	ns
Reverse Recovery Charge	Q_{rr}		—	15	—	nC
Peak Reverse Recovery Current	I_{rrm}		—	2.8	—	A

RATING AND CHARACTERISTIC CURVES

Figure.1 Output Characteristics $T_j=25^\circ\text{C}$

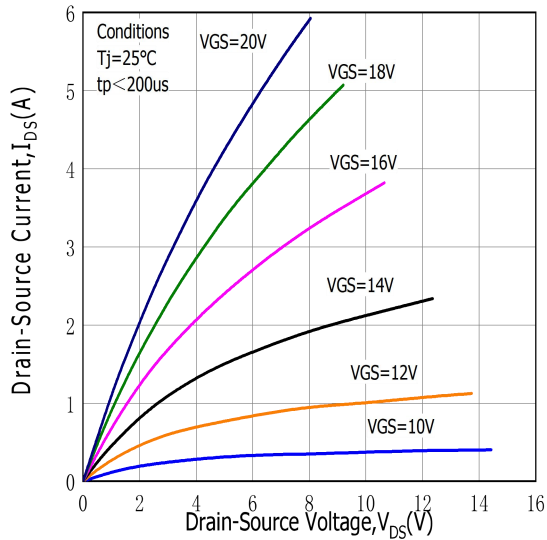


Figure.2 Output Characteristics $T_j=150^\circ\text{C}$

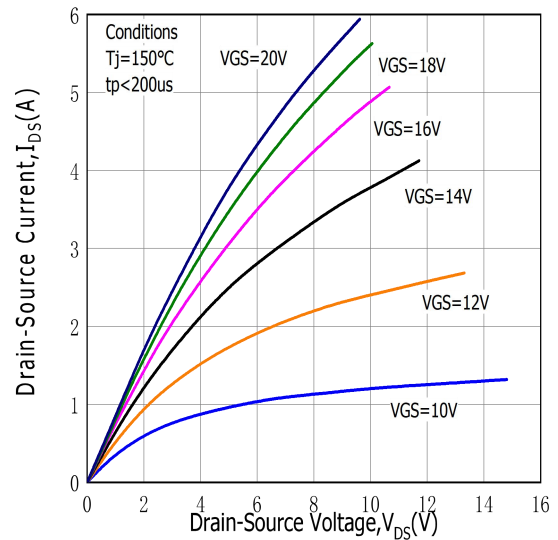


Figure.3 On-Resistance vs. Temperature

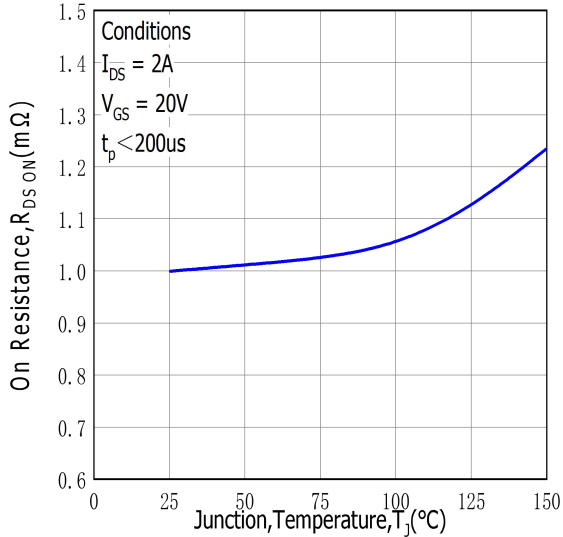


Figure.4 On-Resistance vs. Drain Current for Various Temperatures

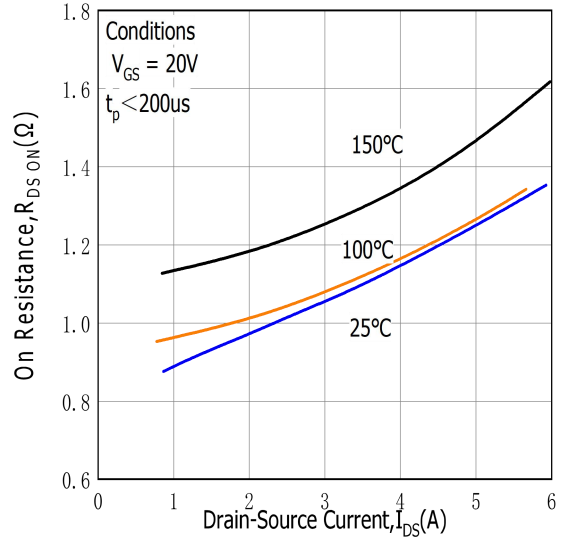


Figure.5 On-Resistance vs. Temperature for Various Gate Voltage

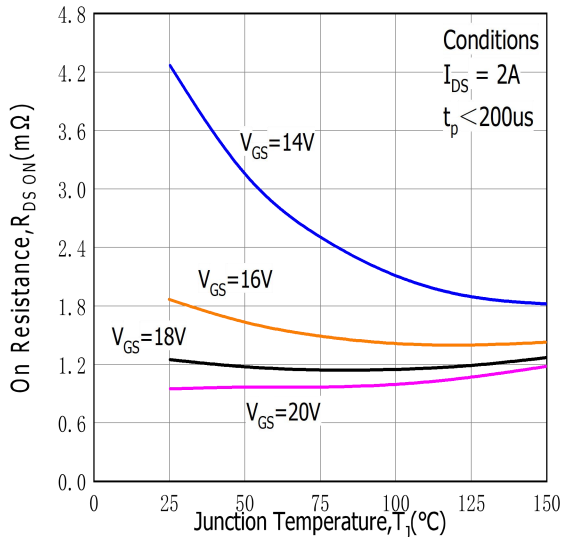


Figure.6 Transfer Characteristic for Various Junction Temperatures

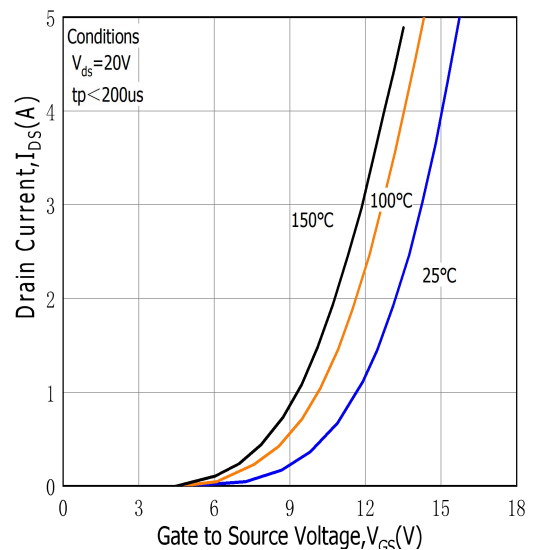


Figure.7 Body Diode Characteristic at 25°C

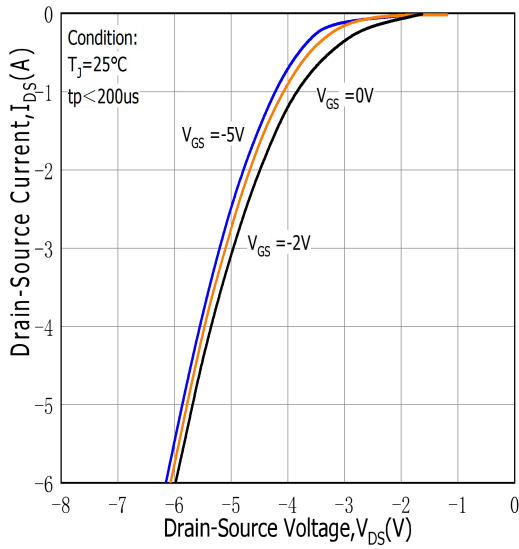


Figure.8 Body Diode Characteristic at 150°C

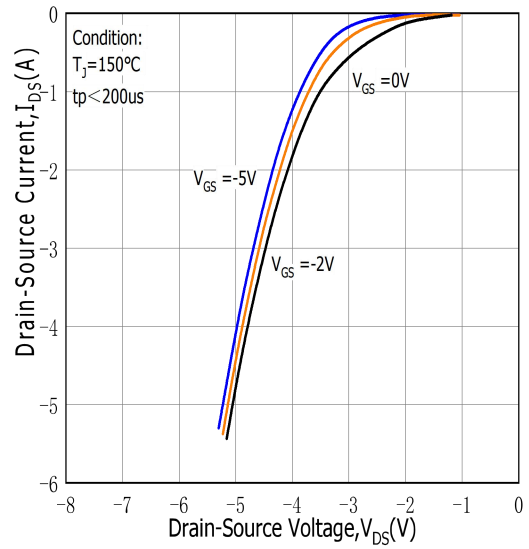


Figure.9 Threshold Voltage vs. Temperature

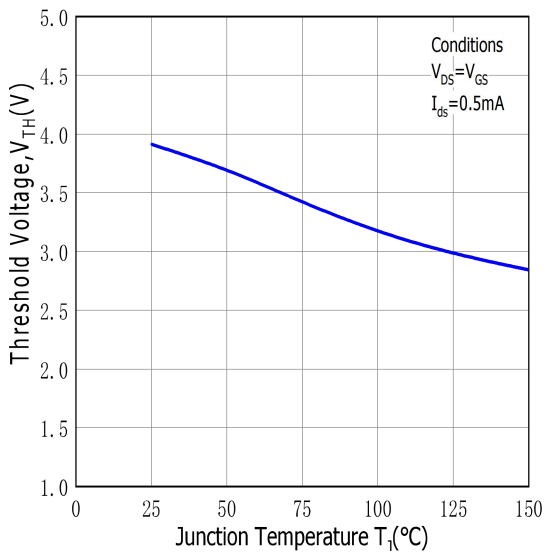


Figure.10 Gate Charge Characteristic

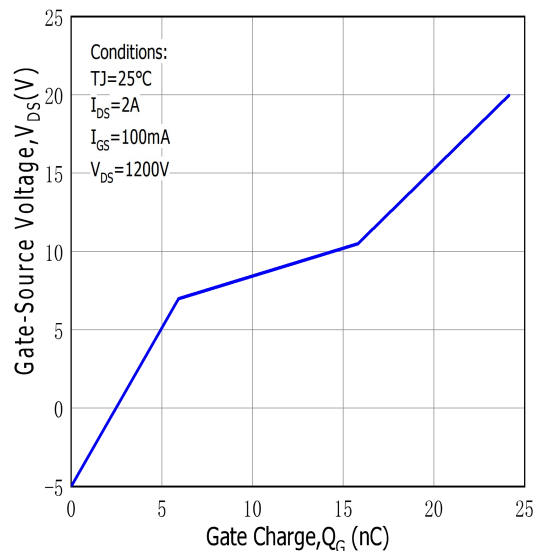


Figure.11 3rd Quadrant Characteristic at 25°C

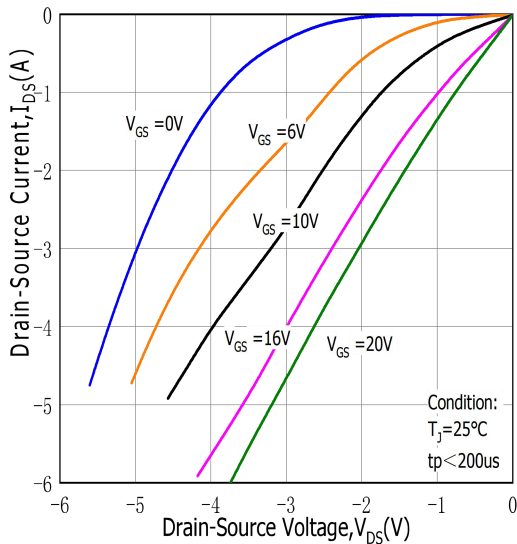


Figure.12 3rd Quadrant Characteristic at 150°C

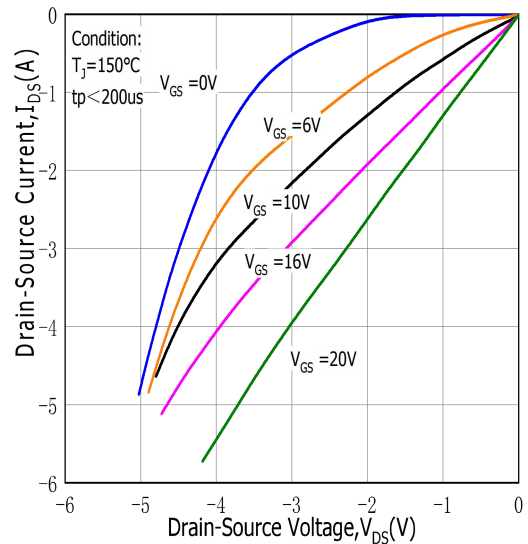


Figure.13 Output Capacitor Stored Energy

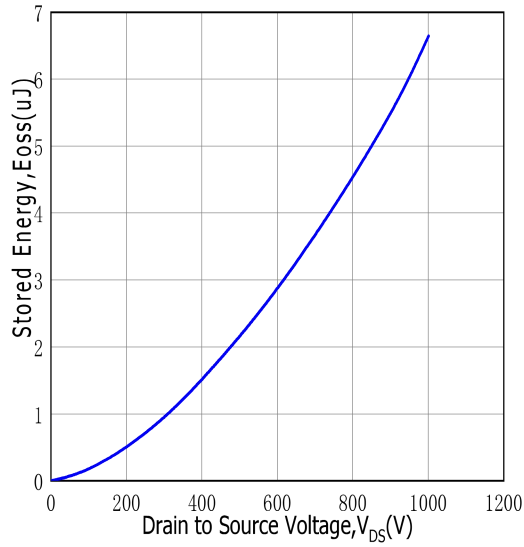


Figure.14 Capacitances vs. Drain-Source Voltage(0-200V)

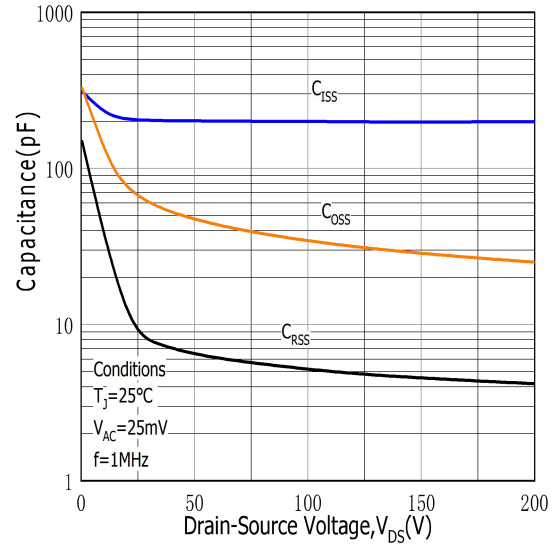
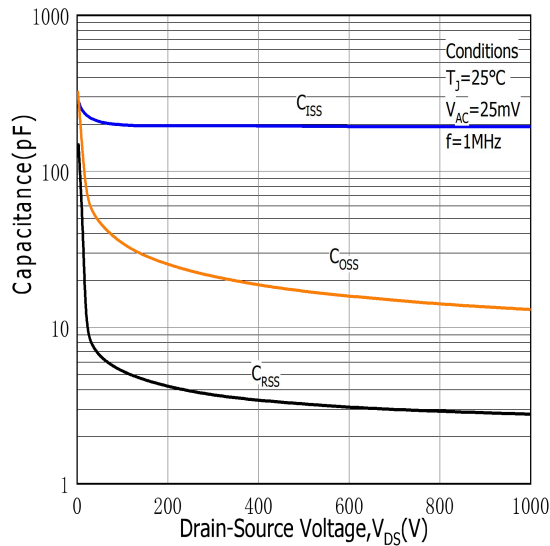
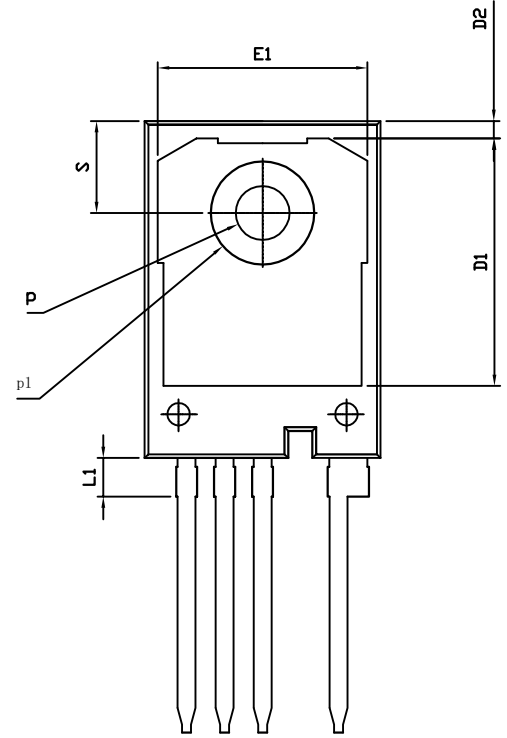
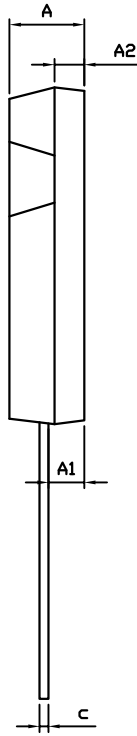
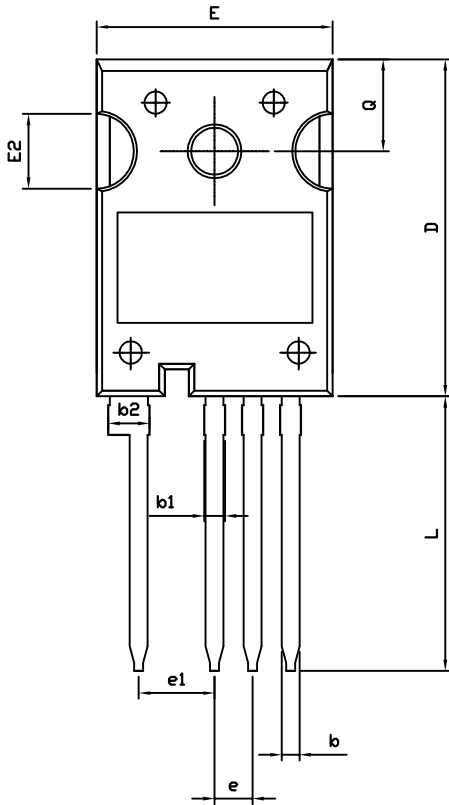


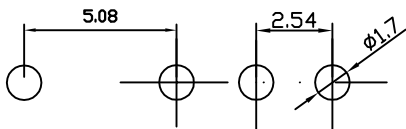
Figure.15 Capacitances vs. Drain-Source Voltage(0-1000V)



TO-247-4L PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.25	2.40	2.45
A2	1.85	2.00	2.15
b	1.05	1.20	1.35
b1	1.00	1.30	1.60
b2	2.35	2.65	2.95
c	0.50	0.60	0.70
D	22.34	22.54	22.74
D1	16.00	16.50	17.00
D2	0.97	1.17	1.37
e	2.34	2.54	2.74
e1	4.88	5.08	5.28
E	15.60	15.80	16.00
E1	13.50	14.00	14.50
E2	4.80	5.00	5.20
L	18.08	18.38	18.68
L1	2.38	2.58	2.78
p	3.50	3.60	3.70
p1	6.60	6.80	7.00
Q	6.00	6.15	6.30
S	6.00	6.15	6.30