

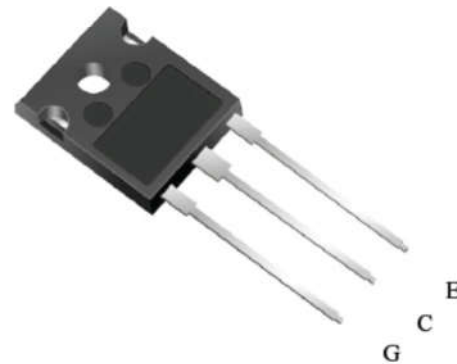
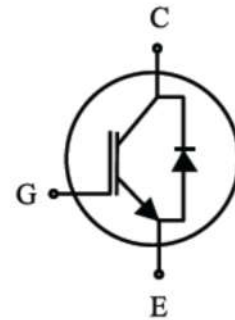
## 1350V /25A Trench Field Stop IGBT

Field Stop Trench IGBTs offer low switching losses, high energy efficiency and high avalanche ruggedness for soft switching applications such as inductive heating, microwave oven, etc.

$V_{CE}$	1350	V
$I_C$	25	A
$V_{CE(SAT)} I_C=25A$	2.0	V

### FEATURES

- High breakdown voltage to 1350V for improved reliability
- Trench-Stop Technology offering :
  - High speed switching
  - High ruggedness, temperature stable
  - Low  $V_{CEsat}$
  - Easy parallel switching capability due to positive temperature coefficient in  $V_{CEsat}$
- Soft current turn-off waveforms
- Enhanced avalanche capability



### APPLICATION

- Inductive cooking
- Inverterized microwave ovens
- Resonant converters
- Soft switching applications

### Ordering Information

Product	Package	Packaging
SPT25N135F1AT8TL	TO-247	Tube



## Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	$V_{CE}$	1350	V
DC collector current, limited by $T_{jmax}$ $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	$I_C$	50 25	A
Diode Forward current, limited by $T_{jmax}$ $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	$I_F$	50 25	A
Pulsed collector current, $t_p$ limited by $T_{jmax}$	$I_{Cpuls}$	75	A
Turn off safe operating area $V_{CE} \leq 1350\text{V}$ , $T_j \leq 150^\circ\text{C}$	-	75	A
Operating junction temperature $T_j$	-	-40...+150	$^\circ\text{C}$
Storage temperature	$T_s$	-55...+150	$^\circ\text{C}$
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s	-	260	$^\circ\text{C}$

## Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT thermal resistance, junction - case	$R_{\theta(j-c)}$	0.48	K/W
Diode thermal resistance, junction - case	$R_{\theta(j-c)}$	1.2	K/W
Thermal resistance, junction - ambient	$R_{\theta(j-a)}$	40	K/W



## Electrical Characteristics of the IGBT ( $T_j = 25^\circ\text{C}$ unless otherwise specified) :

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Collector-Emitter breakdown voltage	$BV_{CES}$	$V_{GE}=0V, I_C=1mA$	1350	1450	-	V
		$V_{GE}=0V, I_C=10mA$	1350	1450	-	V
Gate threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	5.1	5.8	6.4	V
Collector-Emitter Saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=25A$	-	2.0	2.5	V
		$T_j = 150^\circ\text{C}$	-	2.5	-	
Zero gate voltage collector current	$I_{CES}$	$V_{CE} = 1350V, V_{GE} = 0V$ $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	- -	<1 -	100 1000	$\mu A$
Gate-emitter leakage current	$I_{GES}$	$V_{CE} = 0V, V_{GE} = 20V$	-	-	100	nA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Dynamic</b>						
Input capacitance	$C_{ies}$	$V_{CE} = 25V, V_{GE} = 0V,$ $f = 1MHz$	-	2500	-	pF
Output capacitance	$C_{oes}$		-	70	-	
Reverse transfer capacitance	$C_{res}$		-	50	-	
Gate charge	$Q_G$	$V_{CC} = 600V, I_C = 25A,$ $V_{GE} = 15V$	-	125	-	nC

## Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Dynamic , at <math>T_j = 25^\circ\text{C}</math></b>						
Turn-off delay time	$td_{(off)}$	$V_{CC} = 600V, I_C = 25A,$ $V_{GE} = 0/15V,$ $R_g=10\Omega$	-	180	-	ns
Fall time	$t_f$		-	40	-	ns
Turn-off energy	$E_{off}$		-	0.32	-	mJ
<b>Dynamic , at <math>T_j = 150^\circ\text{C}</math></b>						
Turn-off delay time	$td_{(off)}$	$V_{CC} = 600V, I_C = 25A,$ $V_{GE} = 0/15V,$ $R_g=10\Omega$	-	220	-	ns
Fall time	$t_f$		-	90	-	ns
Turn-off energy	$E_{off}$		-	0.65	-	mJ



## Electrical Characteristics of the DIODE ( $T_j = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Dynamic</b>						
Diode Forward Voltage	$V_{FM}$	$I_F = 25\text{A}$	-	2.3	-	V
Reverse Recovery Time	$T_{rr}$	$I_F = 25\text{A},$ $di/dt = 200\text{A}/\mu\text{s}$	-	460	-	ns
Reverse Recovery Current	$I_{rr}$		-	17	-	A
Reverse Recovery Charge	$Q_{rr}$		-	3600	-	nC

Fig. 1 FBSOA characteristics

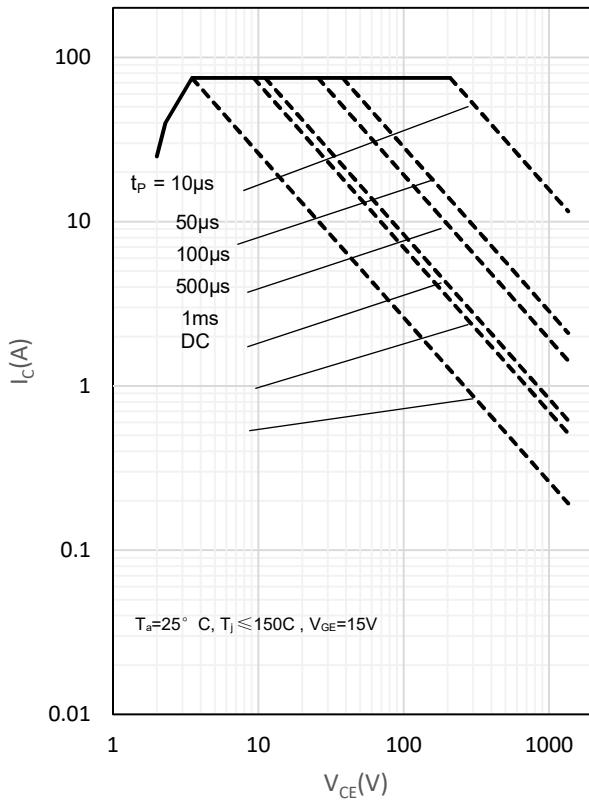


Fig. 2 Load Current vs. Frequency

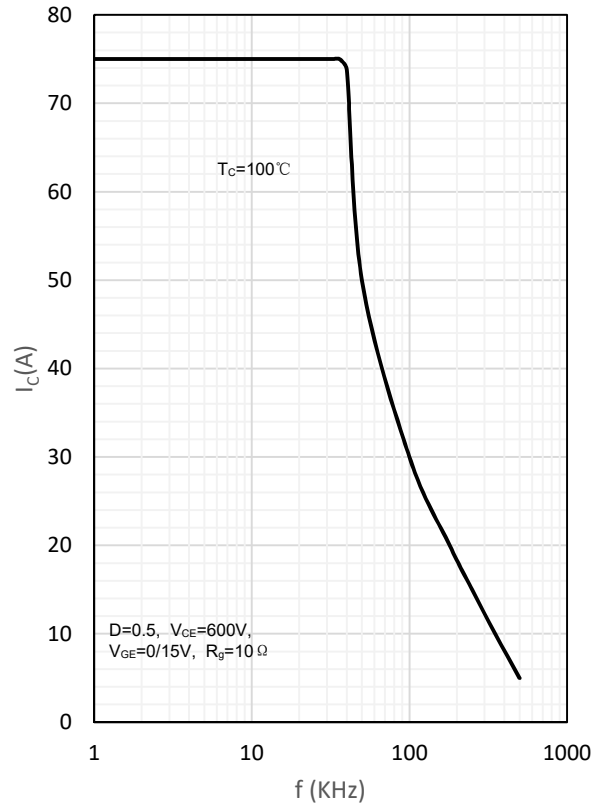


Fig. 3 Output characteristics

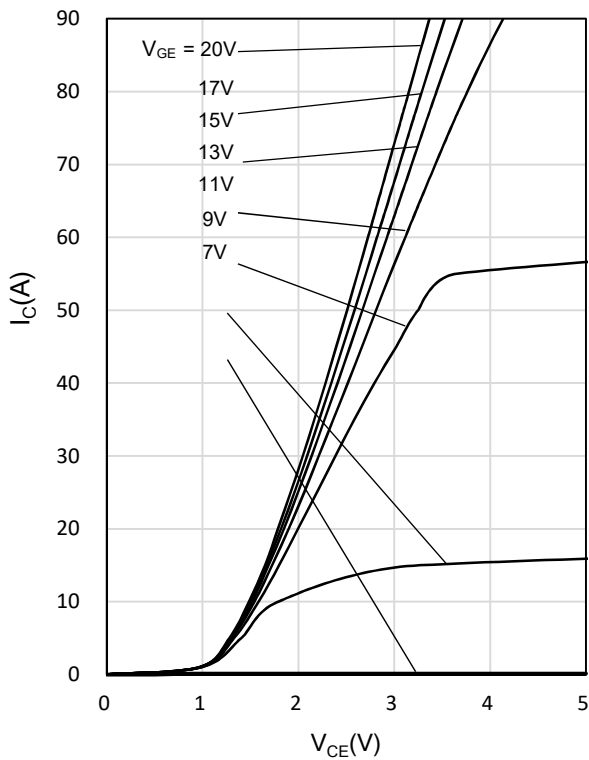


Fig. 4 Saturation voltage characteristics

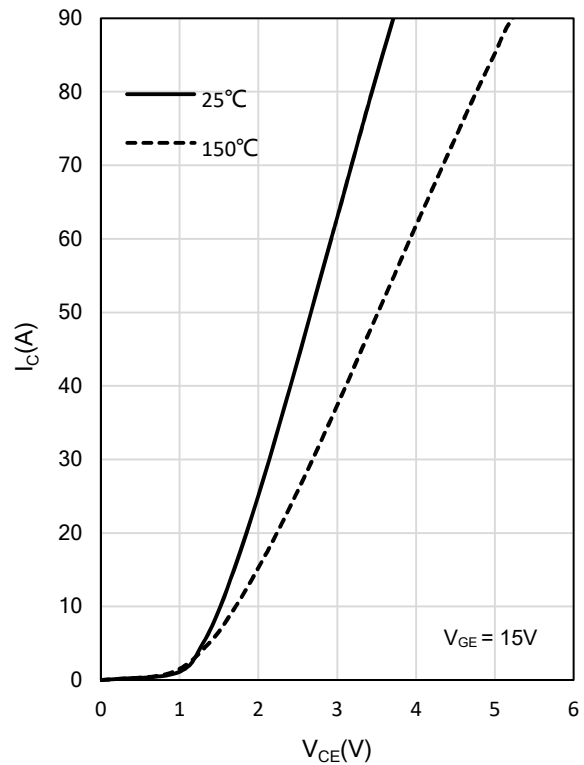


Fig. 5 Turn-off time vs. gate resistor

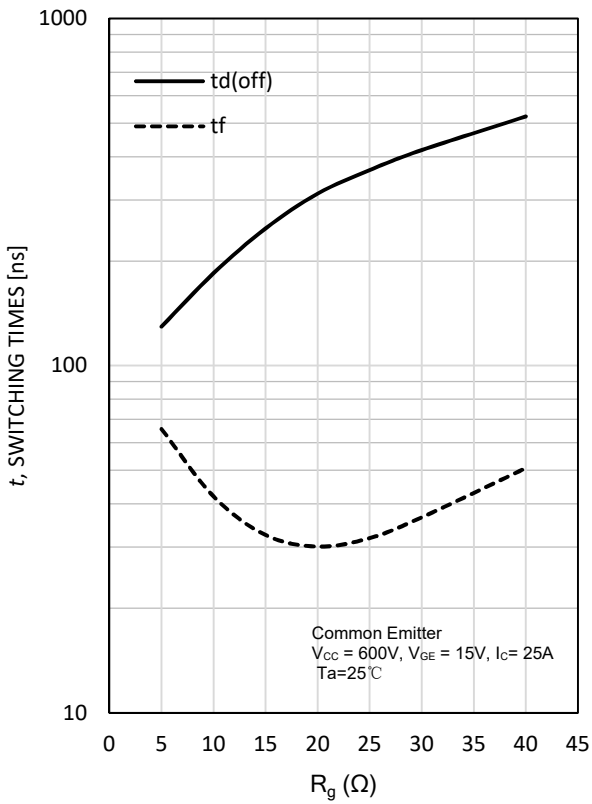


Fig. 6 Turn-off time vs. collector current

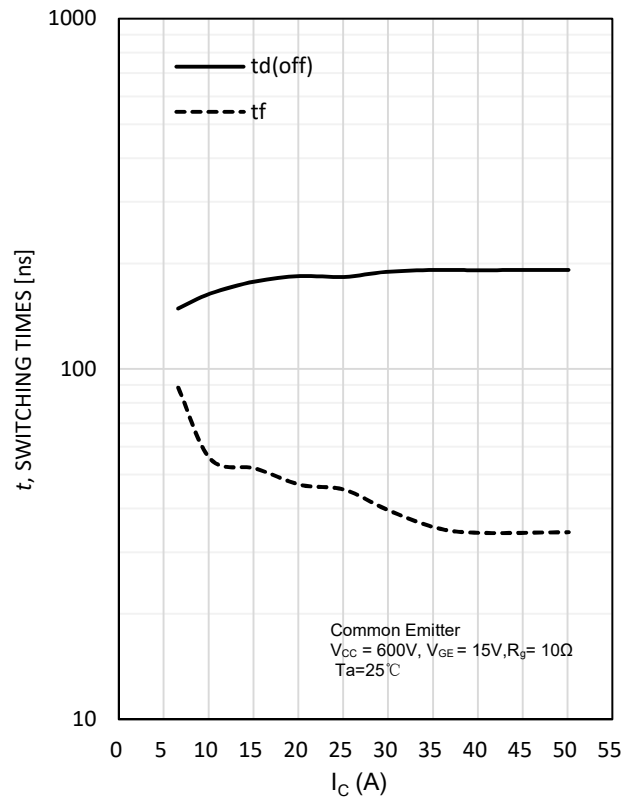


Fig. 7 Switching loss vs. gate resistor

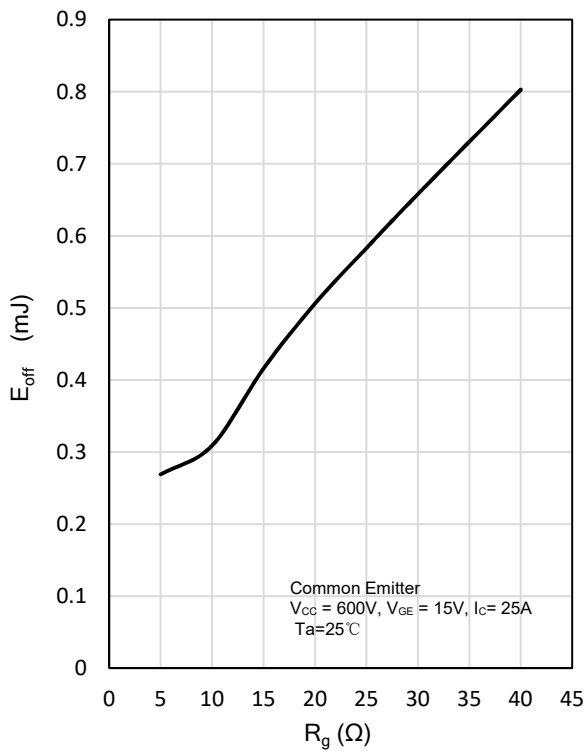


Fig. 8 Switching loss vs. collector current

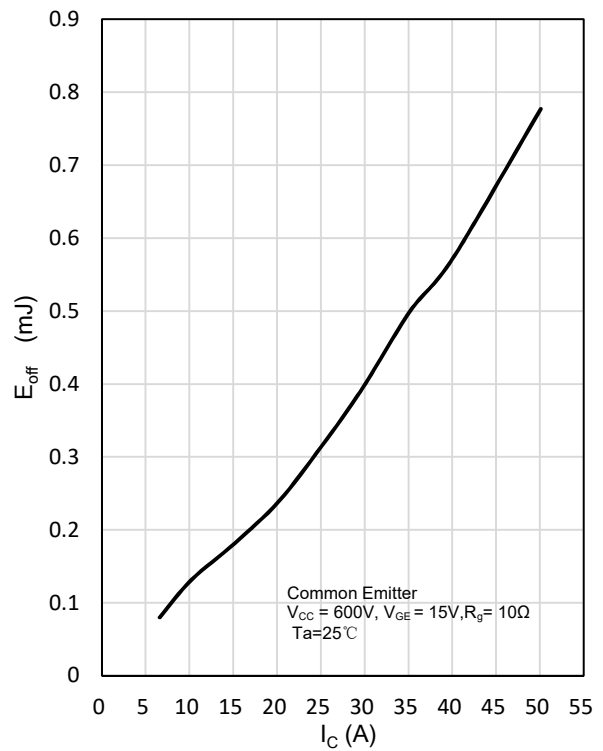


Fig. 9 Gate charge characteristics

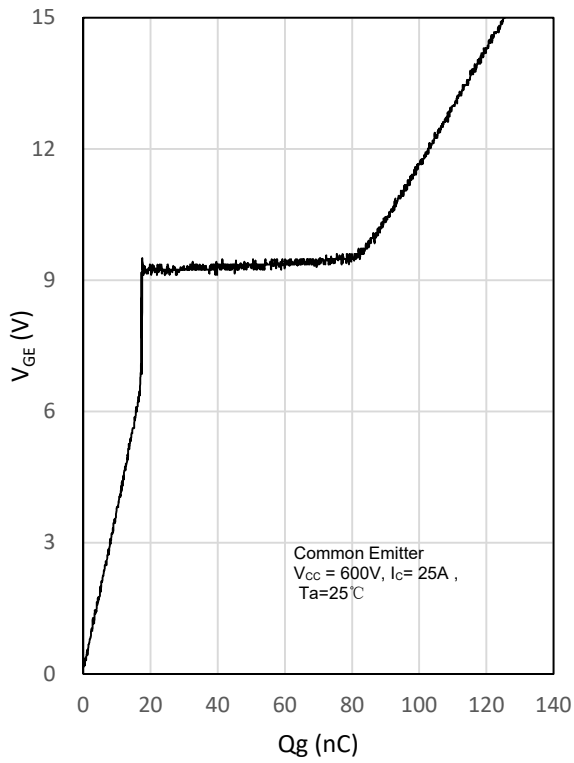
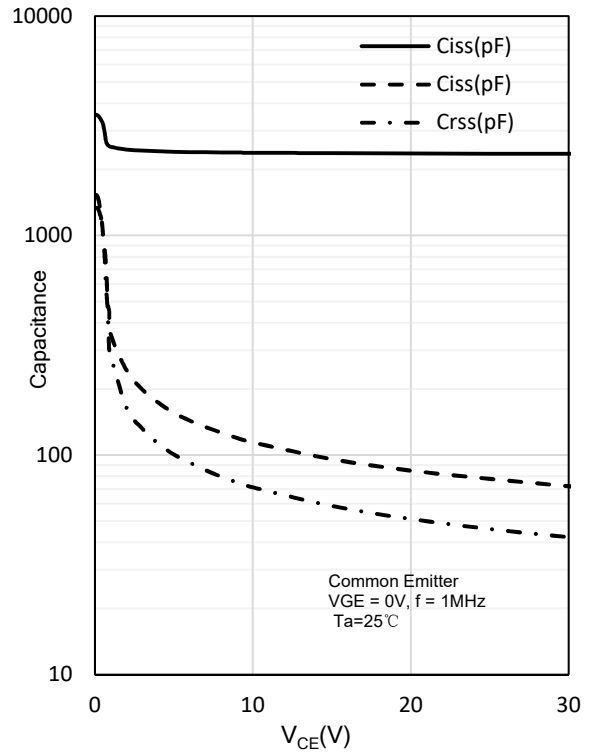
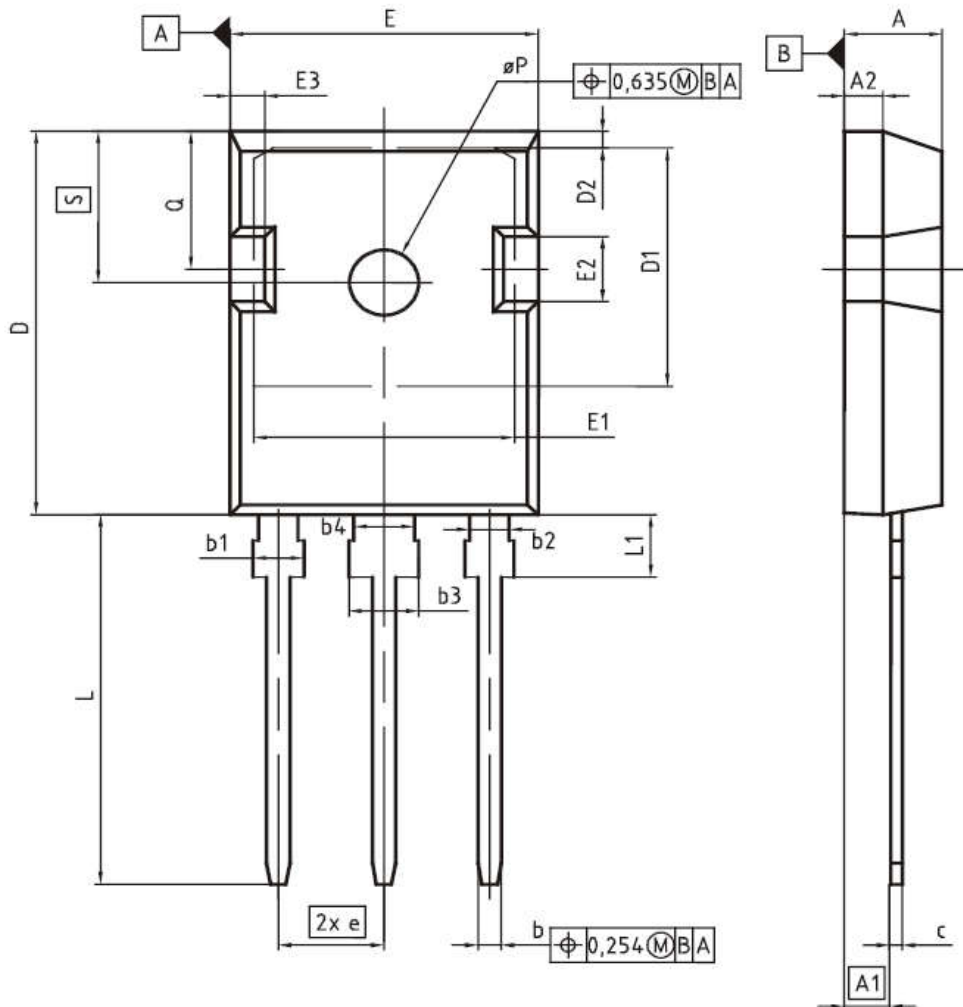


Fig. 10 Capacitance characteristics



## PG-TO247-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	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	16.13	0.618	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	2.60	0.039	0.102
e	5.44 (BSC)		0.214 (BSC)	
N	3		3	
L	19.80	20.32	0.780	0.800
L1	4.10	4.47	0.161	0.176
øP	3.50	3.70	0.138	0.146
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248



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