



SPTECH

深圳市质超微电子有限公司

SPT25N135F1A

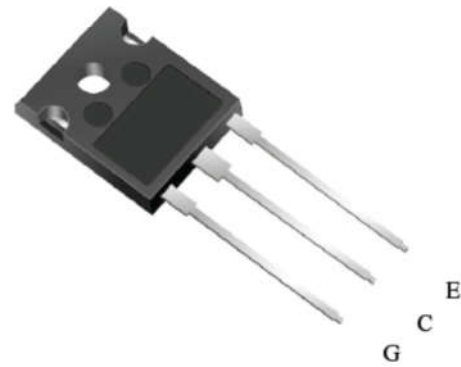
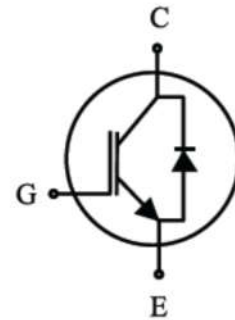
1350V /25A Trench Field Stop IGBT

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



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
Static						
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	μA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0V, V_{GE} = 20V$	-	-	100	nA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Dynamic						
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
Dynamic , at $T_j = 25^\circ\text{C}$						
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
Dynamic , at $T_j = 150^\circ\text{C}$						
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
Dynamic						
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

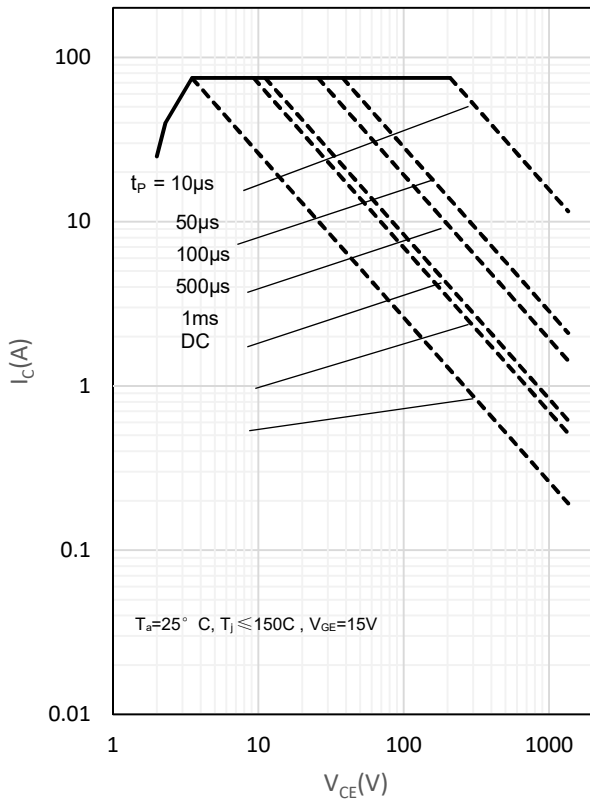


Fig. 2 Load Current vs. Frequency

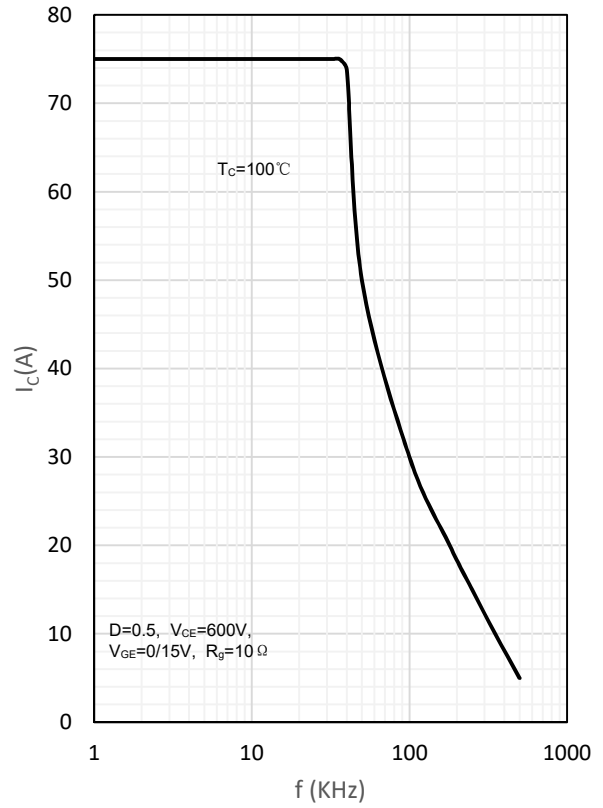


Fig. 3 Output characteristics

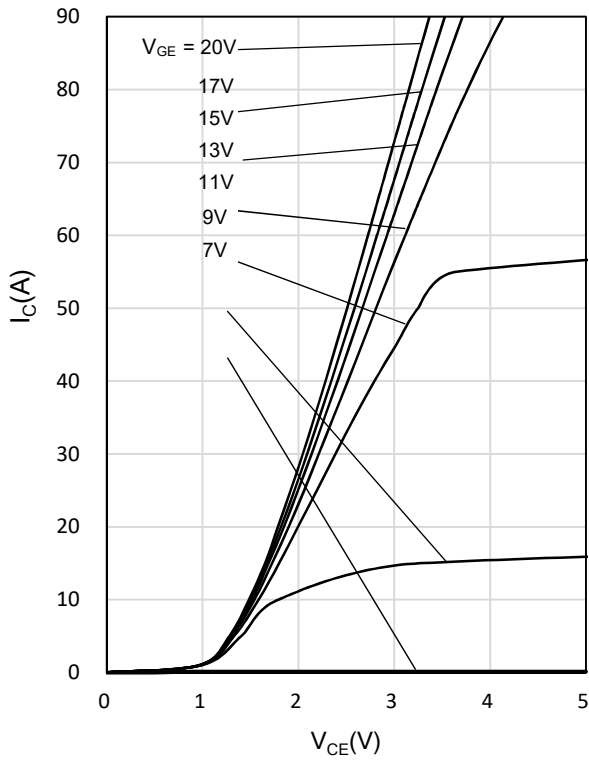


Fig. 4 Saturation voltage characteristics

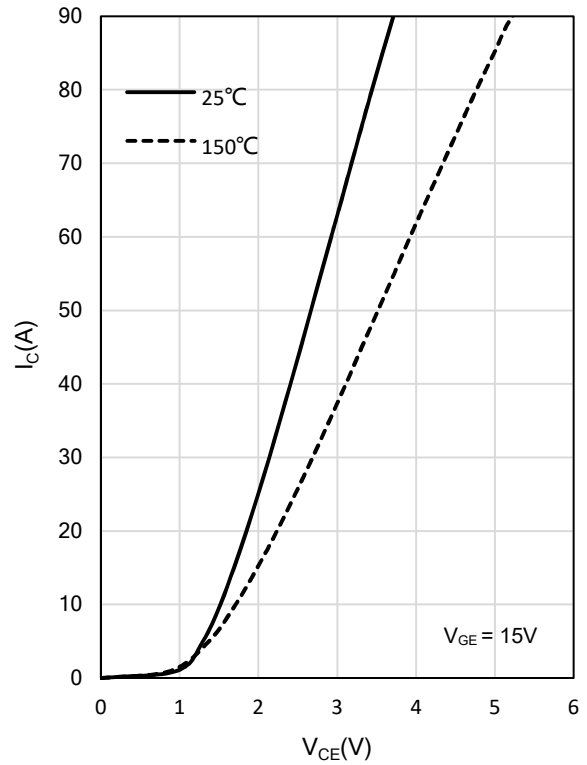




Fig. 5 Turn-off time vs. gate resistor

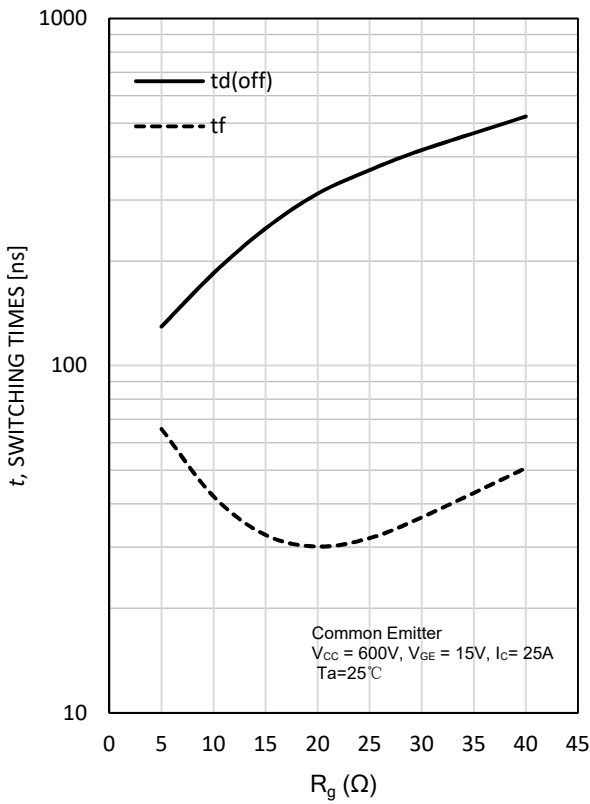


Fig. 6 Turn-off time vs. collector current

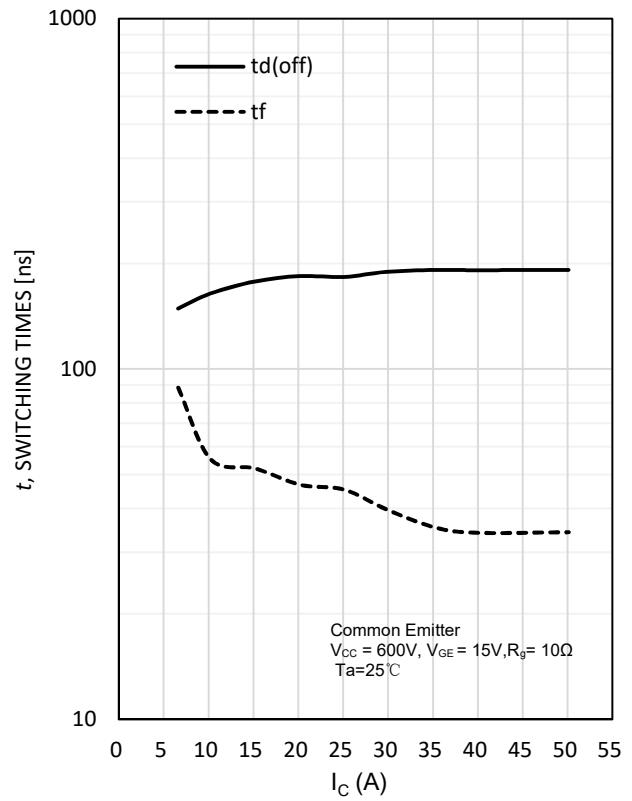


Fig. 7 Switching loss vs. gate resistor

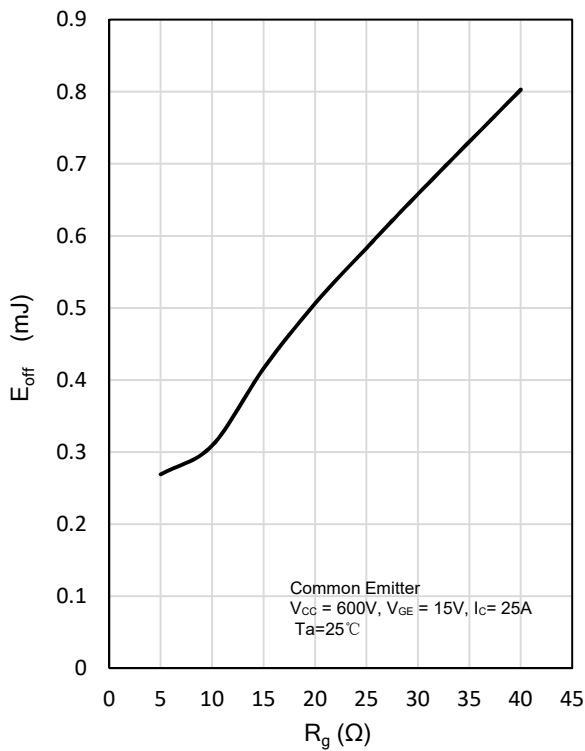


Fig. 8 Switching loss vs. collector current

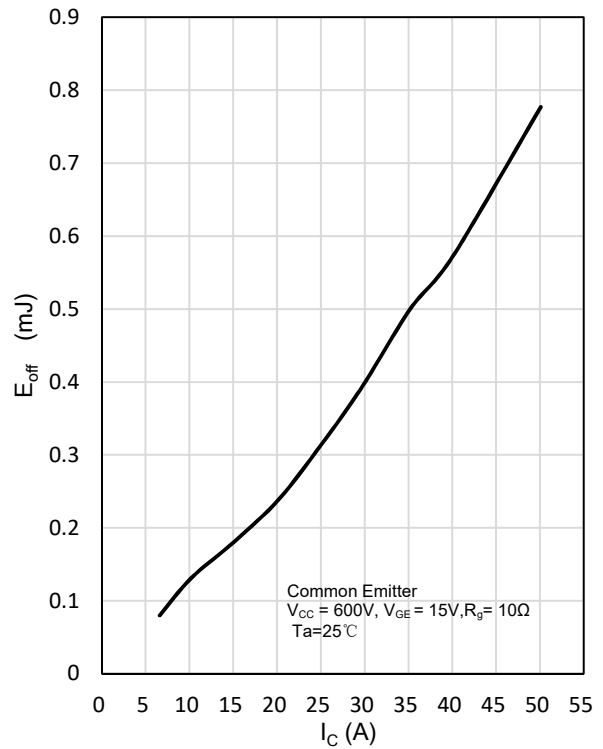




Fig. 9 Gate charge characteristics

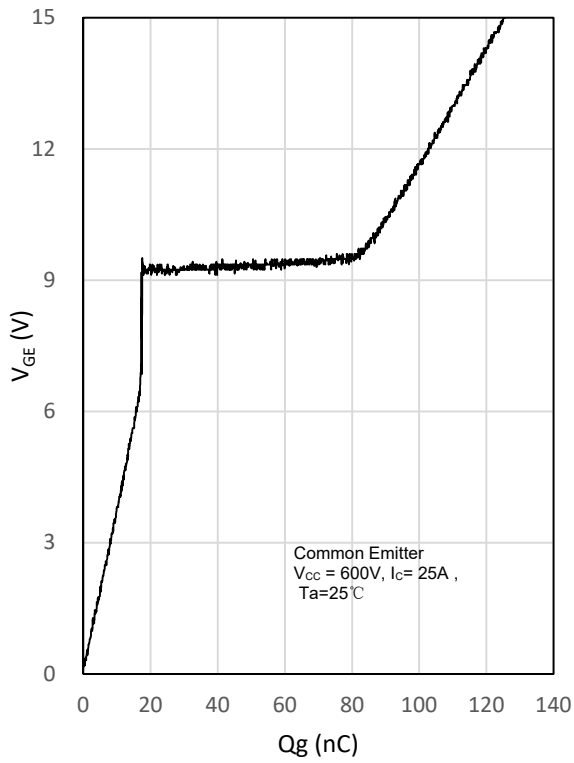
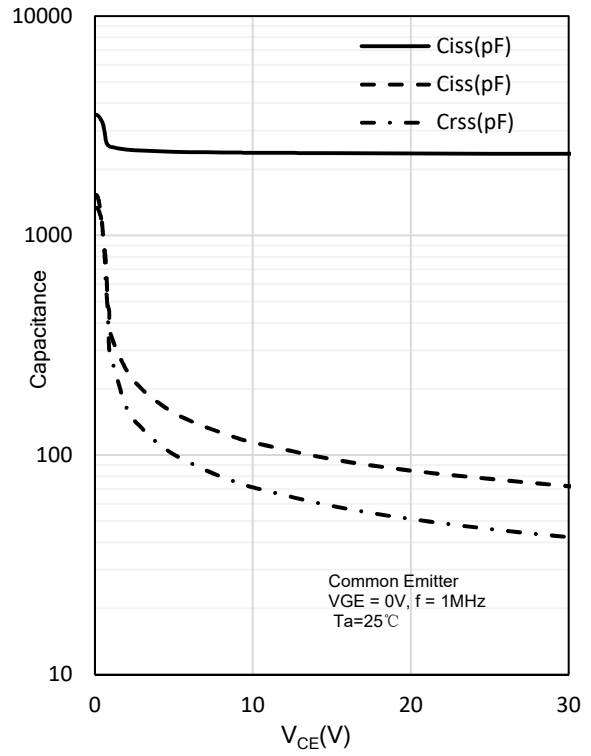
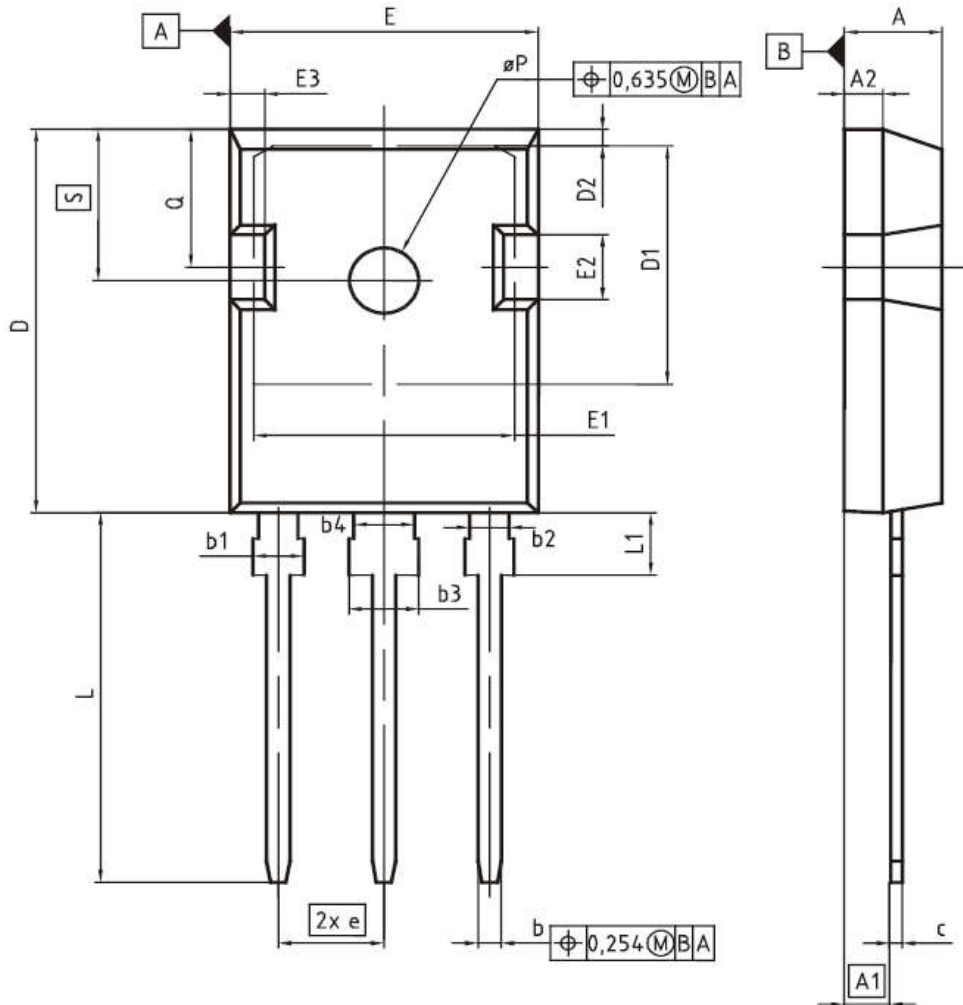


Fig. 10 Capacitance characteristics





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
ϕP	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