

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
650V	105mΩ@18V	30A
	94mΩ@20V	

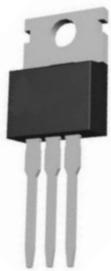
Feature

- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)

Application

- Switch mode power supplies
- Renewable energy
- On board charger
- High voltage DC/DC converters

Package



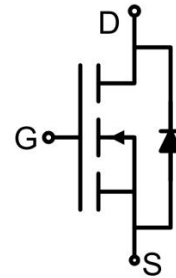
TO-220AB

Marking



G D S

Circuit diagram



Absolute maximum ratings ($T_C=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V_{DSmax}	$V_{GS}=0V, I_D=100\mu A$	650	V
Gate-Source Voltage	V_{GSmax}	AC ($f > 1Hz$)	-10/+25	V
Gate-Source Voltage	V_{GSOP}	Static	-4/+18	V
Continuous Drain Current	I_D	$V_{GS}=20V$	30	A
	I_D	$V_{GS}=20V, T_C=100^{\circ}C$	21	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{Jmax} at 1ms	52	A
		Pulse with t_p limited by T_{Jmax} at 100μs	128	A
Power Dissipation	P_D	$T_J=175^{\circ}C$	125	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	1.2	$^{\circ}C/W$
Operating Junction Temperature	T_J		-55~ +175	$^{\circ}C$
Storage Temperature	T_{STG}		-55~ +175	$^{\circ}C$

Electrical characteristics (T_J=25°C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =100μA	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =650V, V _{GS} =0V		1	50	μA
Gate-Source leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =20V			250	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =5mA		2.7		V
		V _{DS} =V _{GS} , I _D =5mA, T _J =175℃		1.8		
Drain-source on-resistance	R _{DS(on)}	V _{GS} =18V, I _D =10A		105	150	mΩ
		V _{GS} =20V, I _D =10A		94		
		V _{GS} =18V, I _D =10A, T _J =175℃		140		
		V _{GS} =20V, I _D =10A, T _J =175℃		130		
Transconductance	g _{fs}	V _{GS} =20V, I _D =10A		13		S
		V _{GS} =20V, I _D =10A, T _J =175℃		9		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =600V, V _{GS} =0V V _{AC} = 25mV, f =1MHz		767		pF
Output Capacitance	C _{oss}			55		
Reverse Transfer Capacitance	C _{rss}			7		
Total Gate Charge	Q _g	V _{DS} =400V, V _{GS} =-4V/18V I _D =10A		35.8		nC
Gate-Source Charge	Q _{gs}			8.3		
Gate-Drain Charge	Q _{gd}			12.1		
Internal Gate Resistance	R _{G(int)}	V _{AC} =25mV, f =1MHz		2.8		Ω
Source-Drain Diode characteristics						
Diode Forward Current	I _S	V _{GS} =-5V, T _C =25℃		25		A
Diode Forward voltage	V _{SD}	V _{GS} =-5V, I _{SD} =7.5A		4		V
		V _{GS} =-5V, I _{SD} =7.5A, T _J =175℃		3.5		

Typical Characteristics

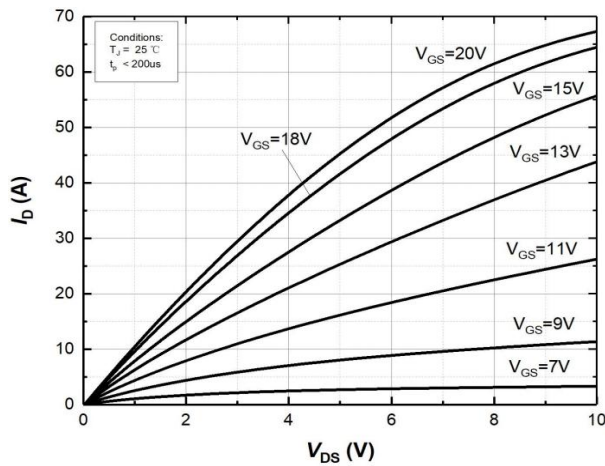


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

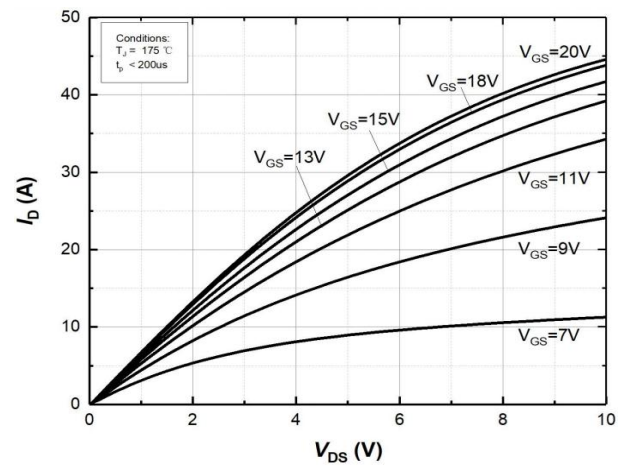


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

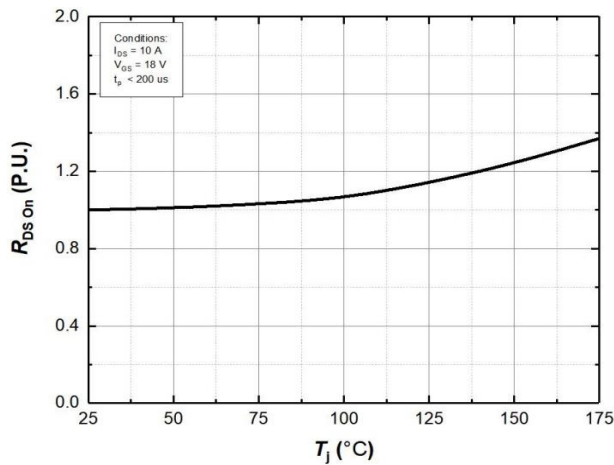


Figure 3. Normalized On-Resistance vs. Temperature

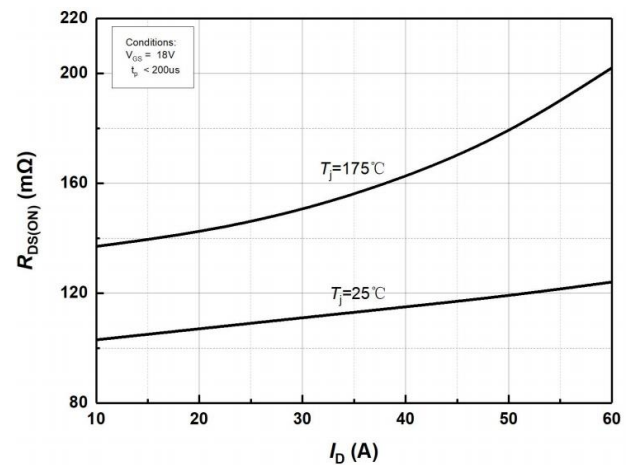


Figure 4. On-Resistance vs. Drain current for Various Temperature

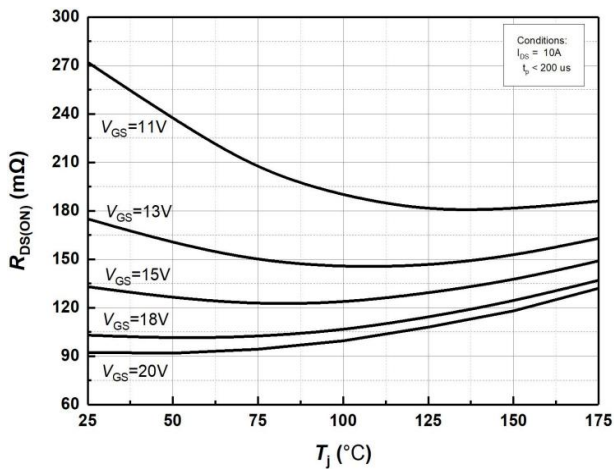


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

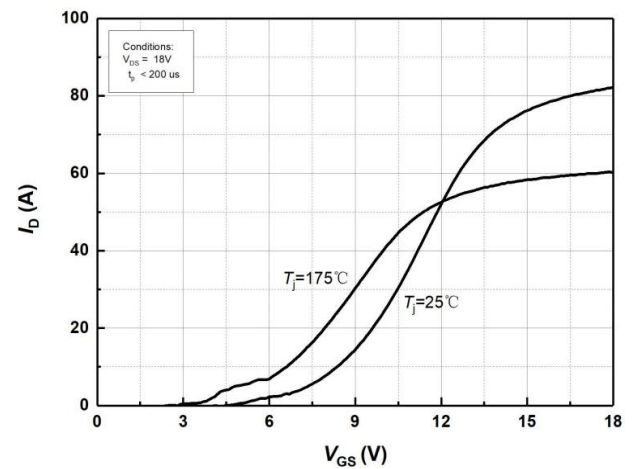


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

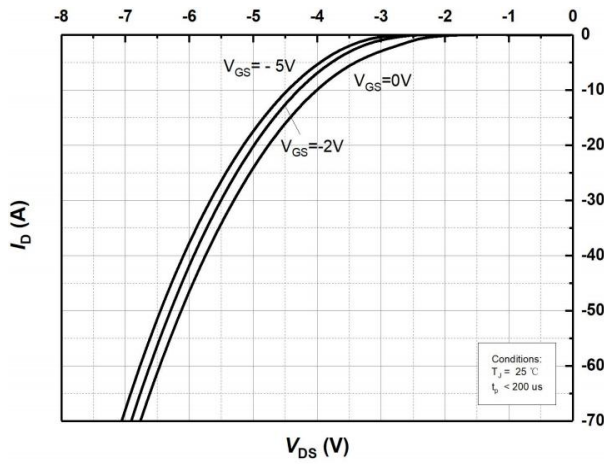


Figure 7. Body Diode Characteristics at $T_j=25^{\circ}\text{C}$

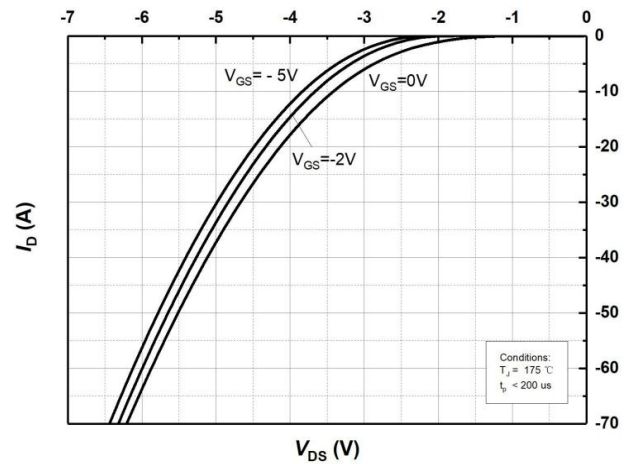


Figure 8. Body Diode Characteristics at $T_j=175^{\circ}\text{C}$

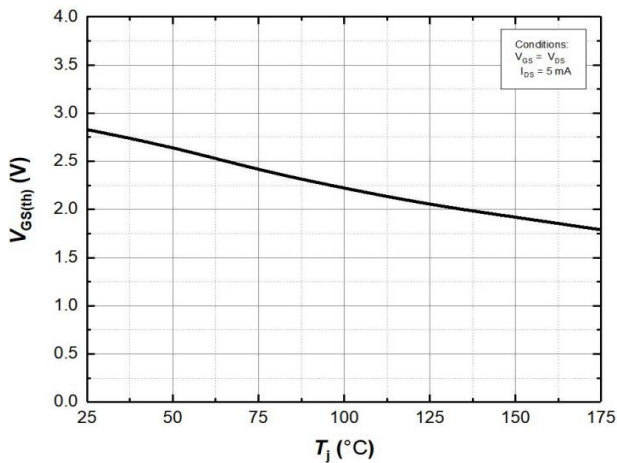


Figure 9. Threshold Voltage vs. Temperature

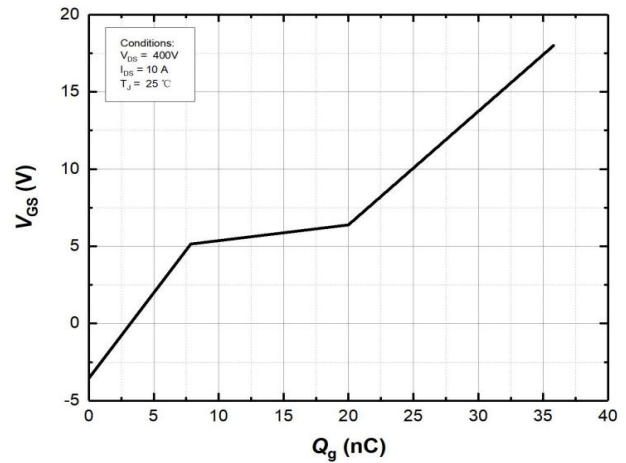


Figure 10 Gate Charge Characteristics

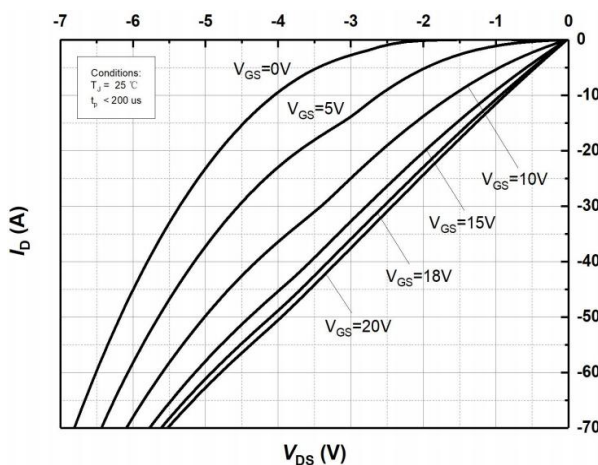


Figure 11. 3rd Quadrant Characteristic at $T_j=25^{\circ}\text{C}$

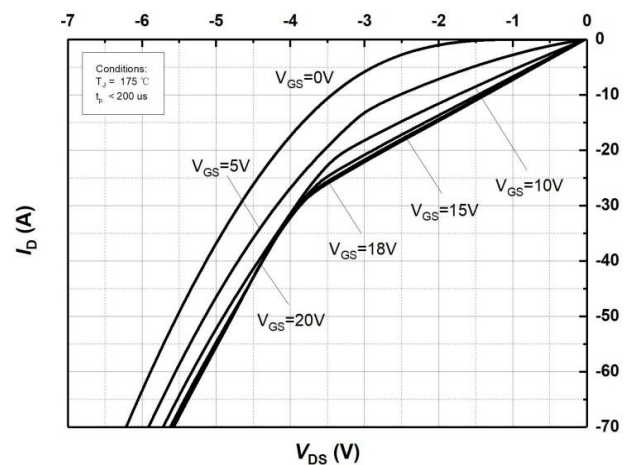


Figure 12. 3rd Quadrant Characteristic at $T_j=175^{\circ}\text{C}$

Typical Characteristics

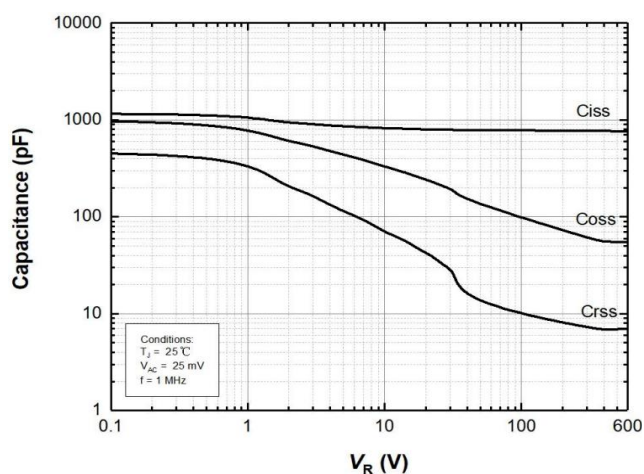


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

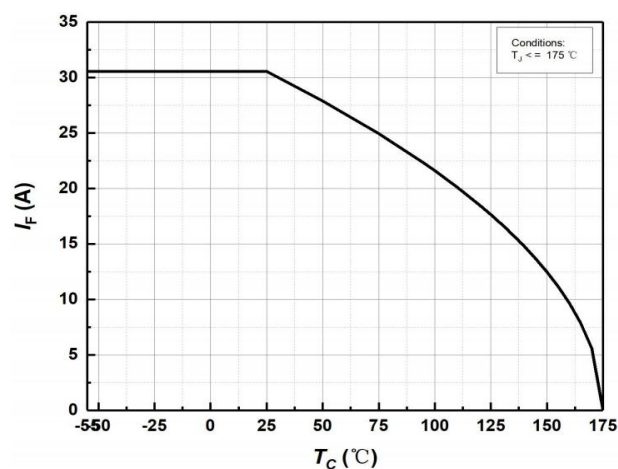


Figure 14. Continuous Drain Current Derating vs Case Temperature

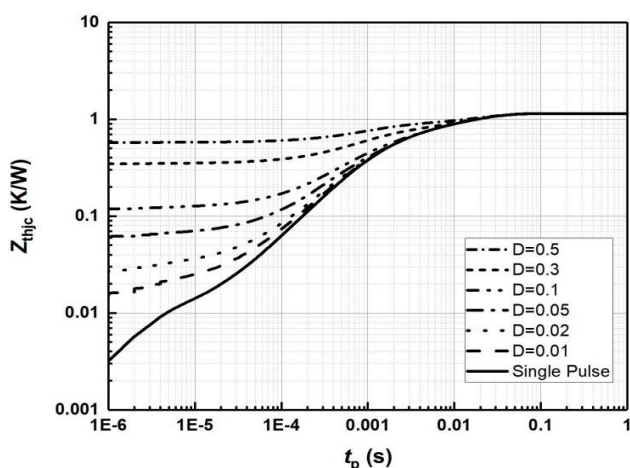


Figure 15. Transient Thermal Impedance (Junction – Case)

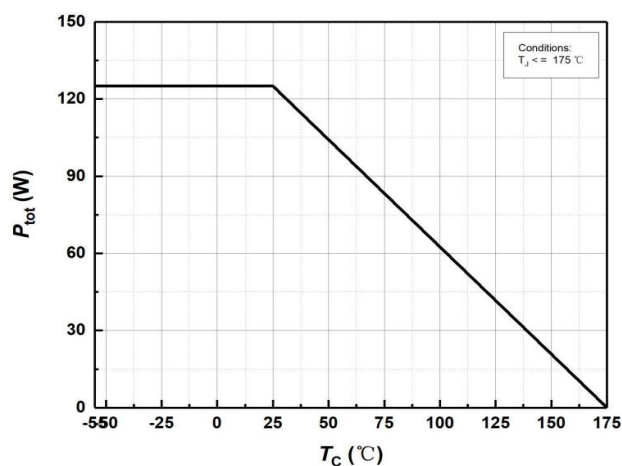


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

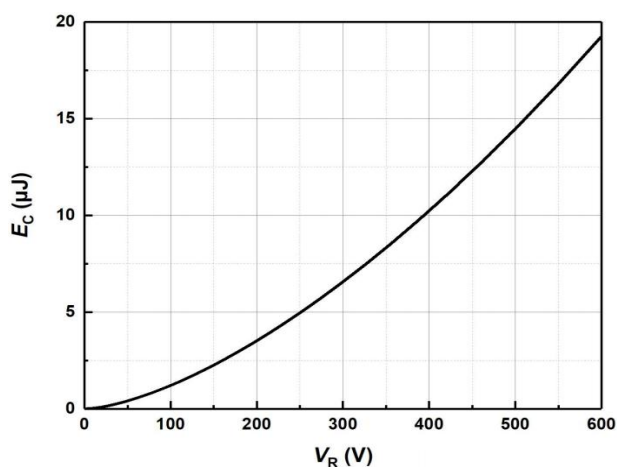


Figure 17. Output Capacitor Stored Energy

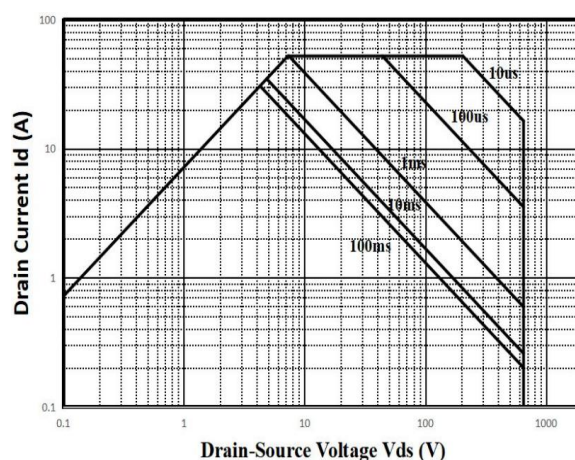
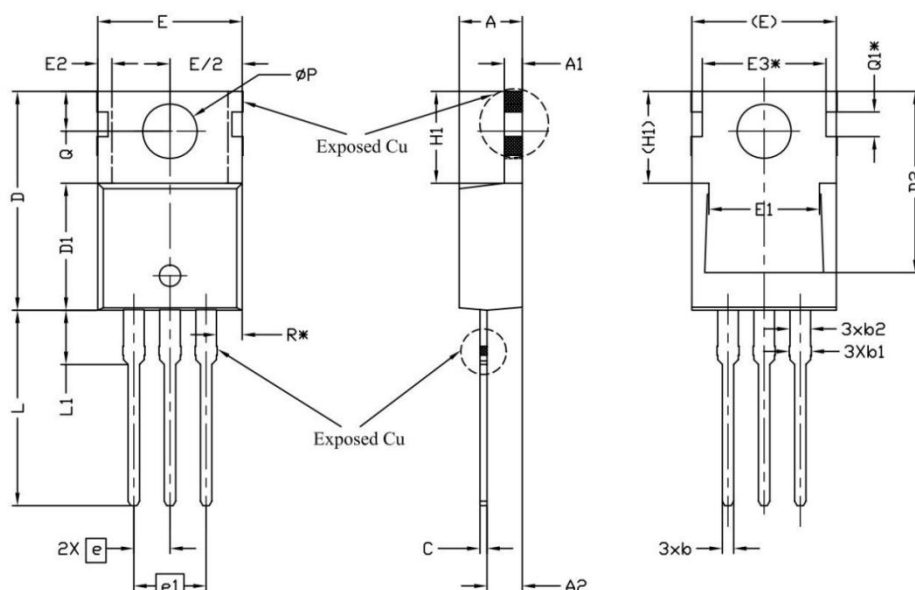


Figure 18. Safe Operating Area

TO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.240	4.640	0.167	0.183
A1	1.150	1.400	0.045	0.055
A2	2.300	2.700	0.091	0.106
b	0.700	0.900	0.028	0.035
b1	1.200	1.750	0.047	0.069
b2	1.200	1.700	0.047	0.067
c	0.400	0.600	0.016	0.024
D	14.700	16.00	0.579	0.630
D1	8.820	9.020	0.347	0.355
D2	12.430	12.830	0.489	0.505
E	9.960	10.360	0.392	0.408
E1	6.860	8.890	0.270	0.350
E2	-	0.760	-	0.030
E3	8.700 REF.		0.343 REF.	
e	2.540 BSC.		0.100 BSC.	
e1	5.080 BSC.		0.200 BSC.	
H1	6.300	6.600	0.248	0.260
L	13.470	13.970	0.530	0.550
L1	3.600	4.000	0.142	0.157
φP	3.750	3.930	0.148	0.155
Q	2.600	3.000	0.102	0.118
Q1	1.730 REF.		0.068 REF.	
R	1.820 REF.		0.072 REF.	