

1200V N-Channel Silicon Carbide Power MOSFET

MAIN CHARACTERISTICS

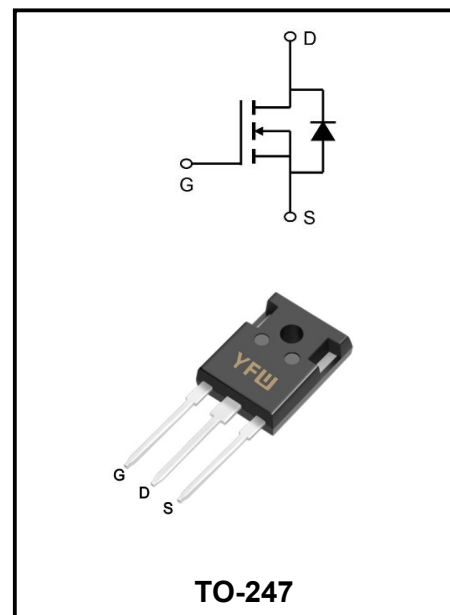
I_D	30A
V_{DS}	1200V
$R_{DS(on)-typ}(@V_{GS}=10V)$	$<110m\Omega$ (Typ:80m Ω)

APPLICATIONS

- ◆ Solar Inverters
- ◆ Switch Mode Power Supplies
- ◆ High Voltage DC/DC Converters
- ◆ Battery Chargers

FEATURES

- ◆ High Blocking Voltage with Low On-Resistance
- ◆ High Speed Switching with Low Capacitances
- ◆ Easy to Parallel and Simple to Drive
- ◆ Avalanche Ruggedness



Maximum Ratings at $T_c=25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbols	Value	Units
Drain-Source Voltage	V_{DS}	1200	V
Gate - Source Voltage Absolute maximum values	V_{GS}	-10 / +25	V
Gate source voltage Recommended operational values	V_{GSop}	-5 / +20	V
Continue Drain Current $V_{GS}=0, T_c=25^\circ\text{C}$ $V_{GS}=20V, T_c=100^\circ\text{C}$	I_D	30 22	A
Pulsed Drain Current Pulse width t_p limited by T_{max}	I_{DM}	80	A
Power Dissipation $T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	P_D	178 89	W
Peak diode recovery dv/dt	dv/dt	4.5	W/ns
Operating Temperature Range	T_J	-55 to +175	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to +175	$^\circ\text{C}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.8	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	$^\circ\text{C/W}$

Electrical Characteristics at Tc=25°C unless otherwise specified

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	1200	-	-	V
Drain-Source Leakage Current	$V_{DS}=1200V, V_{GS}=0V$	I_{DSS}	-	-	100	μA
Gate Leakage Current	$V_{DS}=0V, V_{GS}=+20V/-10V$	I_{GSS}			± 1	nA
Gate-Source Threshold Voltage	$V_{DS}=V_{GS}, I_D=5mA$	$V_{GS(th)}$	2	-	4	V
	$V_{DS}=V_{GS}, I_D=5mA, T_J=150^\circ C$		-	2.4	-	
Drain-source on-state resistance	$V_{GS}=10V, I_D=20A$	$R_{DS(on)}$	-	80	110	m Ω
Forward Transconductance	$V_{DS}=20V, I_D=20A$	gfs	-	13	-	S
Input Capacitance	$V_{DS}=1000V$ $V_{GS}=0V$ $f=1MHz$ $V_{AC}=25mV$	C_{iss}	-	1130	-	pF
Output Capacitance		C_{oss}	-	92	-	
Reverse Transfer Capacitance		C_{rss}	-	7.5	-	
Coss stored energy		E_{oss}	*	50	-	
Avalanche energy, single pluse	$V_{DD}=50V, I_D=20A$	E_{AS}	-	1	-	J
Turn-on switching energy	$V_{DS}=800V, V_{GS}=-5/+20V$ $I_D=20A, R_{G(ext)}=2.5\Omega, L=156\mu H$	E_{on}	-	523	-	μJ
Turn off switching energy		E_{off}	-	72	-	μJ
Turn-on Delay Time	$V_{DS}=800V, V_{GS}=-5/+20V$ $I_D=20A, R_{G(ext)}=2.5\Omega,$ $R_L=40\Omega$	$t_{d(on)}$	-	15	-	ns
Rise Time		T_r	-	22	-	
Turn-Off Delay Time		$t_{d(OFF)}$	-	24	-	
Fall Time		t_f	-	14	-	
Internal gate resistance	$f=1MHz, V_{AC}=25mV$	R_G	-	3.9	-	Ω
Total Gate Charge	$V_{DS}=800V, V_{GS}=-5/+20V$ $I_D=20A$	Q_g	-	17	-	nC
Gate to Source Charge		Q_{gs}	-	29	-	
Gate to Source Charge		Q_{gd}	-	71	-	
Diode forward voltage	$V_{GS}=-5V, I_{SD}=10A$	V_{SD}	-	4.3	-	V
	$V_{GS}=-5V, I_{SD}=10A, T_J=150^\circ C$		-	3.8	-	
Diode forward current	$T_C=25^\circ C$	I_S	-	-	30	A
Reverse recovery time	$V_{GS}=-5V, I_{SD}=20A,$ $V_R=800V$ $di/dt=1950A/\mu s$	trr	-	24	-	nS
Reverse recovery charge		Q_{rr}	-	152	-	μC
Peak reverse recovery current		I_{rrm}	-	10	-	A

Note (1): When using SiC Body Diode the maximum recommended $V_{GS} = -5V$

Typical Characteristics

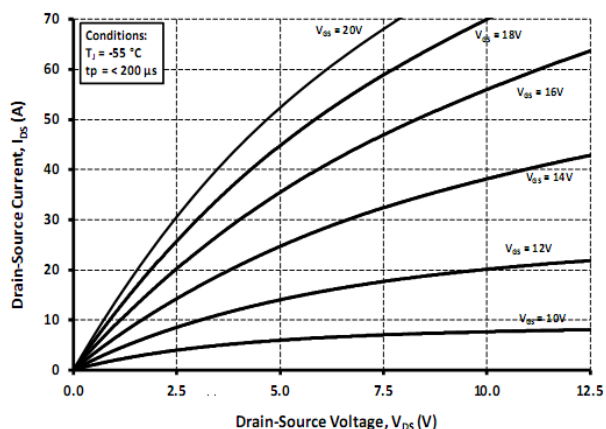


Figure 1. Output Characteristics $T_j = -55\text{ }^{\circ}\text{C}$

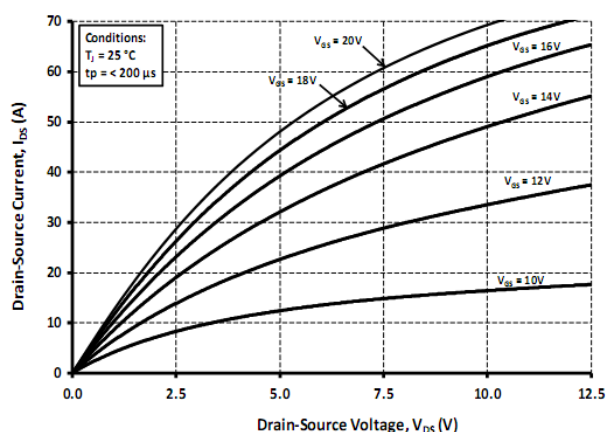


Figure 2 .Output Characteristics $T_j = 25\text{ }^{\circ}\text{C}$

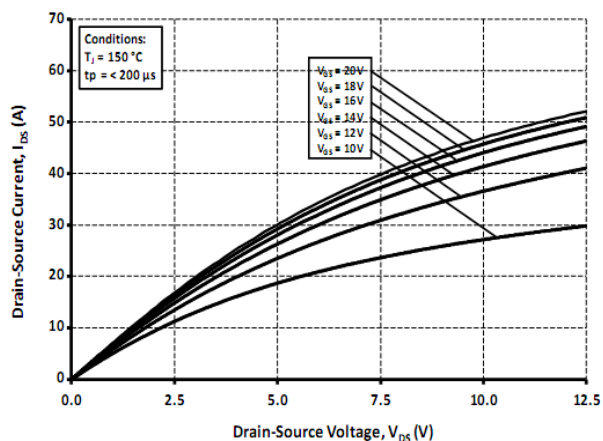


Figure 2 .Output Characteristics $T_j = 25\text{ }^{\circ}\text{C}$

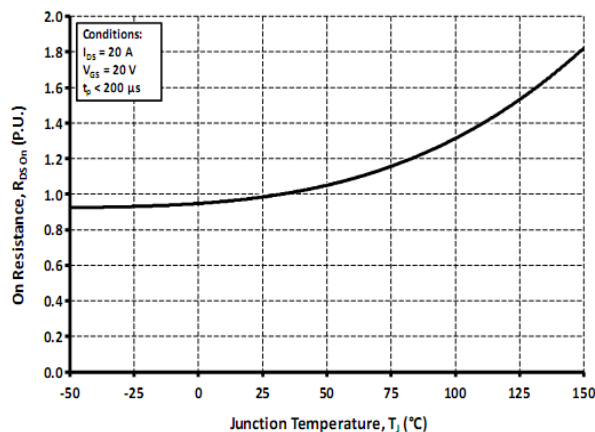


Figure 4. Normalized On-Resistance vs. Temperature

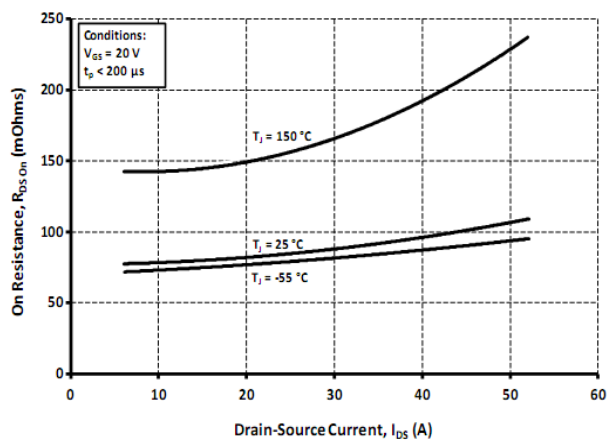


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

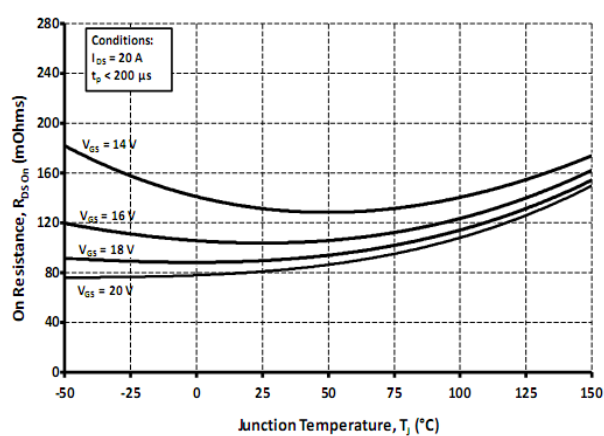


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Characteristics (Continued)

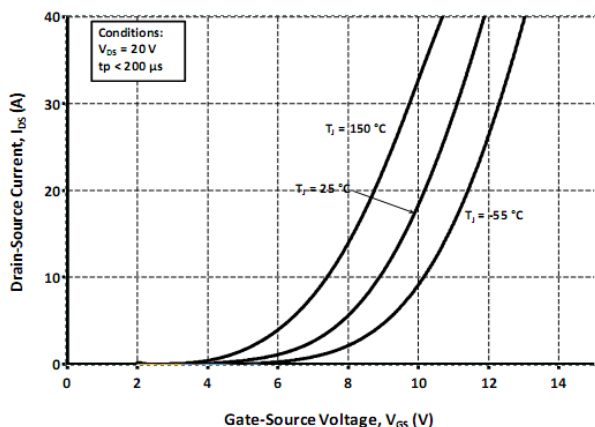


Figure 7. Transfer Characteristic for Various Junction Temperatures

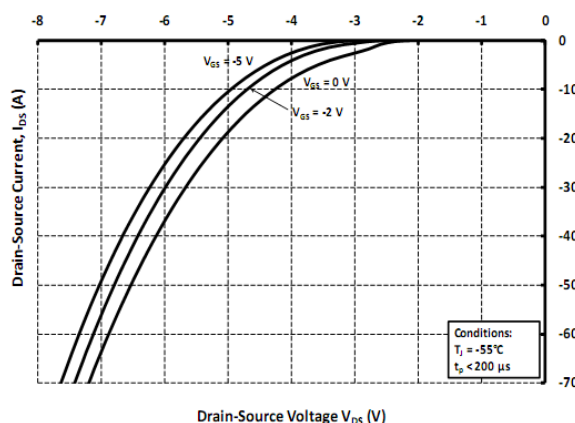


Figure 8. Body Diode Characteristic at -55 °C

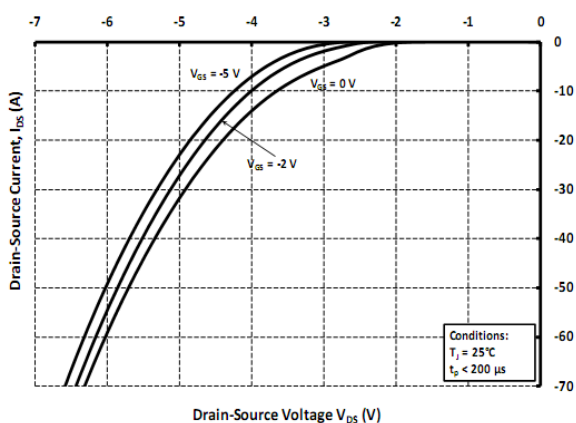


Figure 9. Body Diode Characteristic at 25 °C

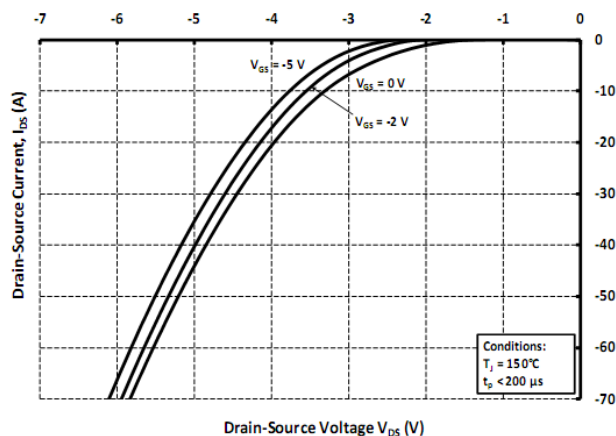


Figure 10. Body Diode Characteristic at 150 °C

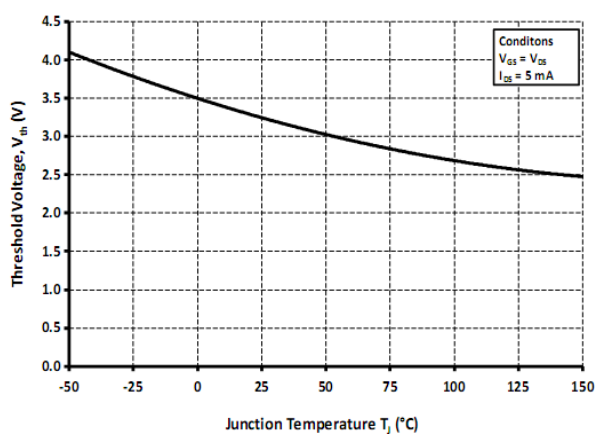


Figure 11. Threshold Voltage vs. Temperature

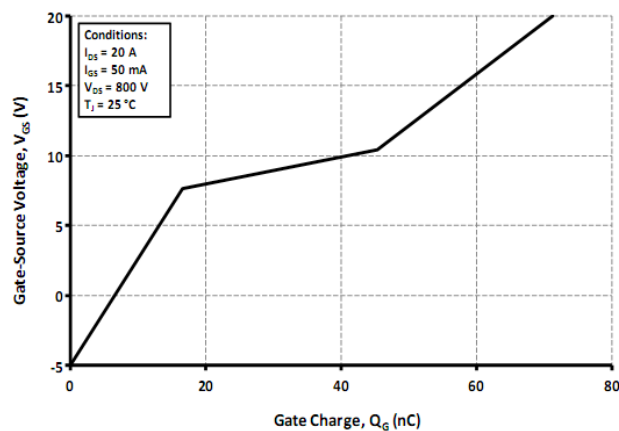


Figure 12. Gate Charge Characteristics

Typical Characteristics (Continued)

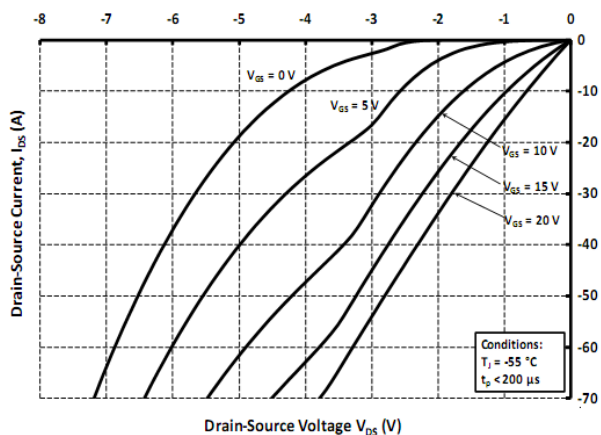


Figure 13. 3rd Quadrant Characteristic at -55 °C

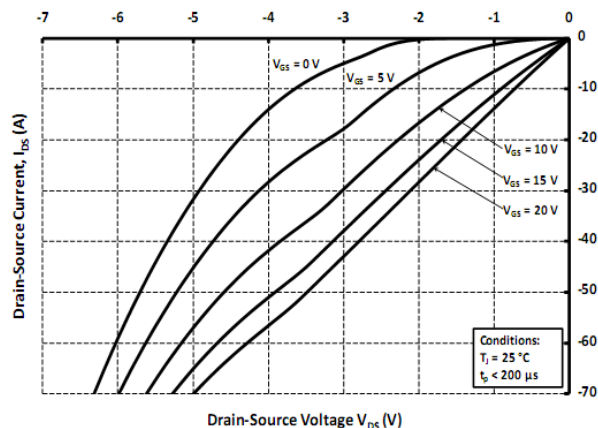


Figure 14. 3rd Quadrant Characteristic at 25 °C

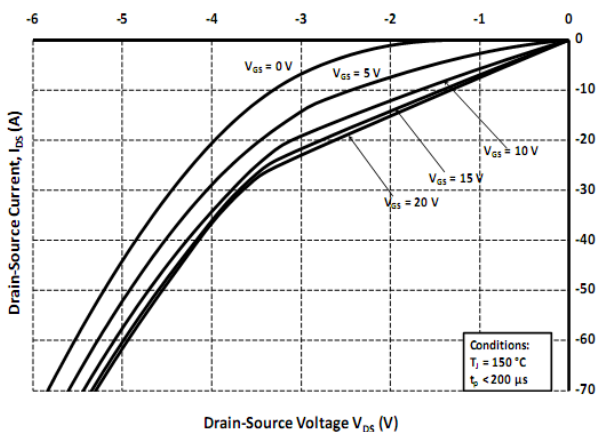


Figure 15. 3rd Quadrant Characteristic at 150 °C

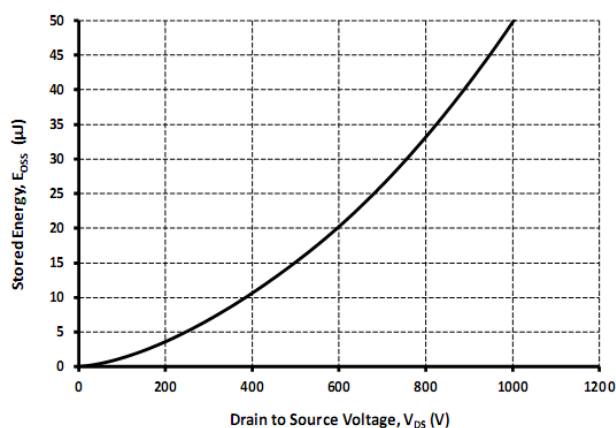


Figure 16. Output Capacitor Stored Energy

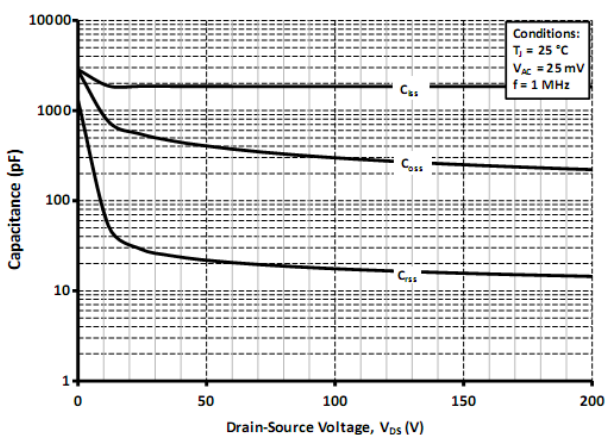


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

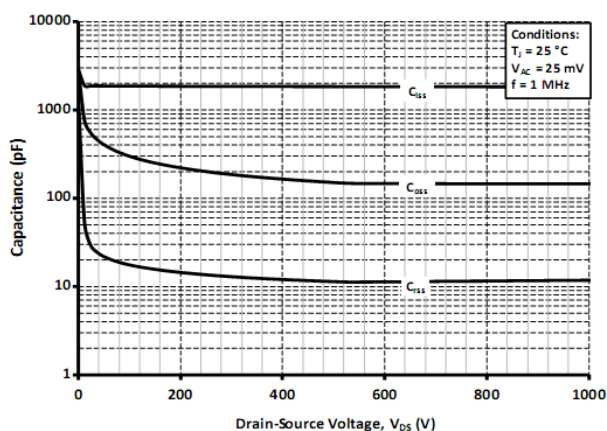
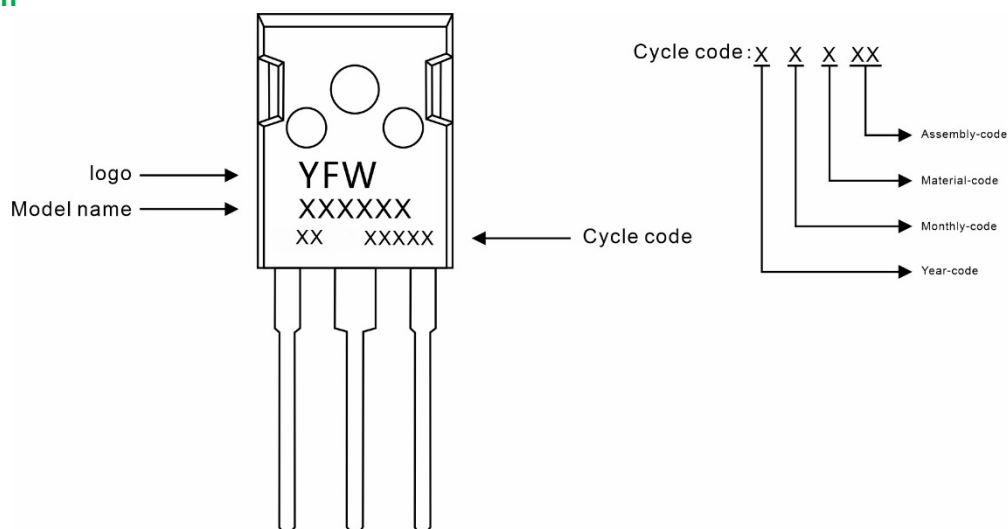


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1000V)

Marking Diagram



Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWM3080120APG3	TO-247	0.209oz(5.93g)	30pcs/tube	600PCS/Box 2400PCS/Carton

Package Dimensions

TO-247

Symbol	Dimensions in mm		Dimensions in Inch	
	Min.	Max.	Min.	Max.
A	4.90	5.10	0.193	0.201
A1	1.90	2.10	0.075	0.083
A2	2.29	2.54	0.090	0.100
b	1.00	1.40	0.039	0.055
b1	2.00	2.20	0.079	0.087
b2	3.00	3.20	0.118	0.126
c	0.50	0.70	0.020	0.028
D	15.75	16.05	0.620	0.632
E	20.20	20.80	0.795	0.819
e	5.45 (BSC)		0.215 (BSC)	
e1	10.90 (BSC)		0.429 (BSC)	
F	6.05	6.25	0.238	0.246
F1	5.80	6.00	0.228	0.236
L	20.10	20.40	0.791	0.803
L1	4.05	4.35	0.159	0.171
Φ	3.50	3.70	0.138	0.146

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