N-Ch 100V Fast Switching MOSFETs

- ★ Super Low Gate Charge
- ★ Green Device Available
- ★ Excellent Cdv/dt effect decline
- ★ Advanced high cell density Trench technology

Product Summary

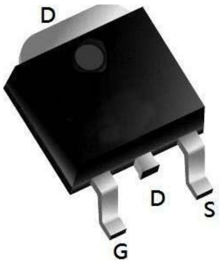
BVDSS	RDSON	ID
100V	13.5mΩ	60A

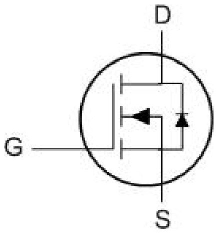
Description

TheXXWS60N10 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The XXWS60N10 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

TO252 Pin Configuration





Absolute Maximum Ratings（T_A = 25°C, unless otherwise noted）

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25°C	I_D	60	A
	T_C=100°C		28.5	
Pulsed Drain Current[1]		I_{DM}	180	A
Single Pulse Avalanche Energy[2]		EAS	80	mJ
Total Power Dissipation	T_C=25°C	P_D	67.5	W
Operating Junction and Storage Temperature Range		T_J , T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient[3]	$R_{\theta JA}$	45	°C/W
Thermal Resistance from Junction-to-Lead	$R_{\theta JC}$	1.85	°C/W

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

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	100	-	-	V
Gate-Body Leakage Current		I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS} = 100V, V_{GS} = 0V	-	-	1	μA
	T_J=100°C			-	-	100	
Gate-Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1	1.7	2.5	V
Drain-Source on-Resistance[4]		$R_{DS(on)}$	V_{GS} = 10V, I_D = 20A	-	13.5	17	mΩ
			V_{GS} = 4.5V, I_D = 10A	-	17	20	
Forward Transconductance[4]		g_{fs}	V_{DS} = 10V, I_D = 20A	-	54	-	S
Dynamic Characteristics[5]							
Input Capacitance		C_{iss}	V_{DS} = 50V, V_{GS} =0V, f =1MHz	-	1208	-	pF
Output Capacitance		C_{oss}		-	144	-	
Reverse Transfer Capacitance		C_{rss}		-	11.3	-	
Gate Resistance		R_G	f =1MHz	-	1.8	-	Ω
Switching Characteristics[5]							
Total Gate Charge		Q_g	V_{GS} = 10V, V_{DS} = 50V, I_D= 20A	-	22.7	-	nC
Gate-Source Charge		Q_{gs}		-	3	-	
Gate-Drain Charge		Q_{gd}		-	5	-	
Turn-on Delay Time		$t_{d(on)}$	V_{GS} =10V, V_{DD}= 50V, R_G = 3Ω, I_D= 20A	-	9.2	-	ns
Rise Time		t_r		-	3.6	-	
Turn-off Delay Time		$t_{d(off)}$		-	25.6	-	
Fall Time		t_f		-	4.4	-	
Body Diode Reverse Recovery Time		t_{rr}	I_F = 20A, dI/dt = 100A/μs	-	30	-	ns
Body Diode Reverse Recovery Charge		Q_{rr}		-	42	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage[4]		V_{SD}	I_S = 20A, V_{GS} = 0V	-	-	1.2	V
Continuous Source Current	T_C=25°C	I_S	-	-	-	60	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
2. The EAS data shows Max. rating . The test condition is V_{DD}=25V, V_{GS}=10V, L=0.4mH, I_{AS}=20A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test..

Typical Characteristics

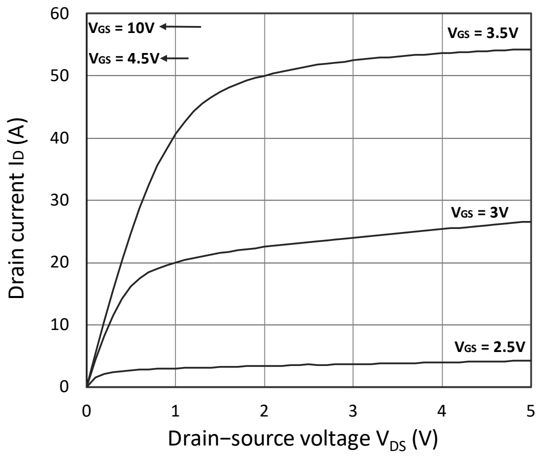


Figure 1. Output Characteristics

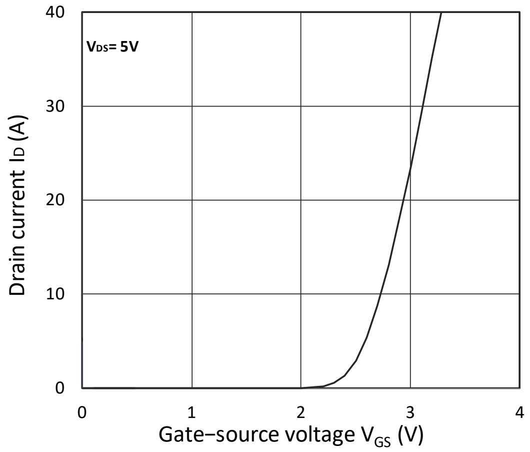


Figure 2. Transfer Characteristics

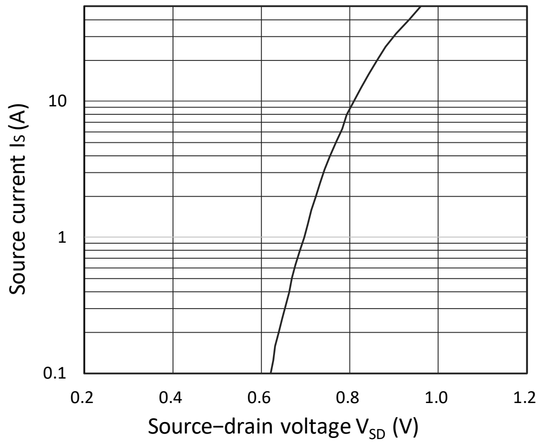


Figure 3. Forward Characteristics of Reverse

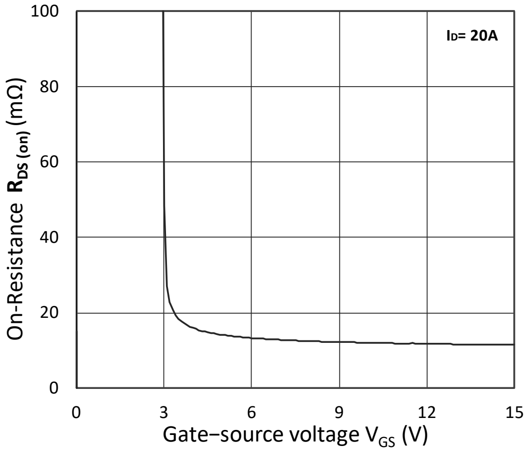


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

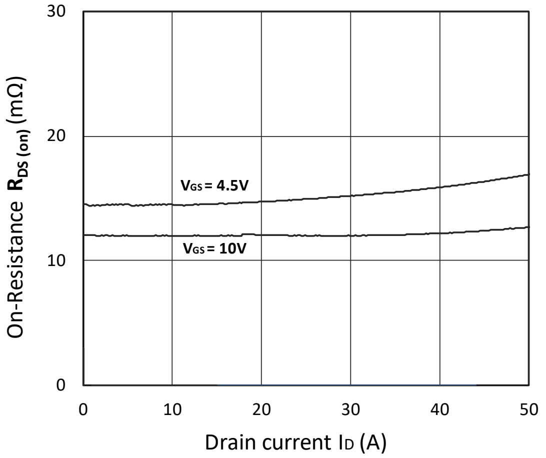


Figure 5. $R_{DS(ON)}$ vs. I_D

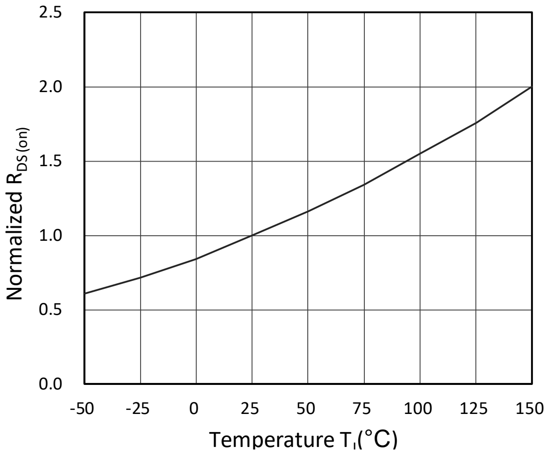


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

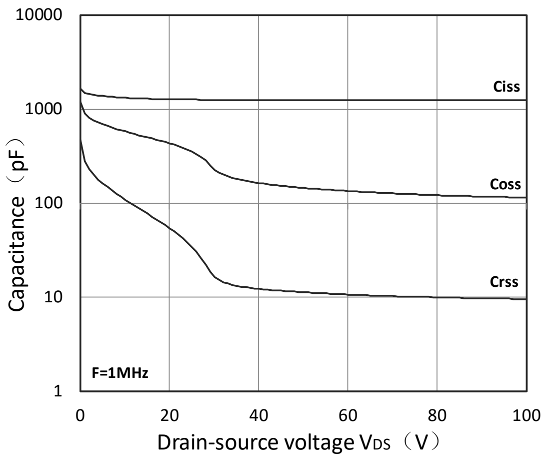


Figure 7. Capacitance Characteristics

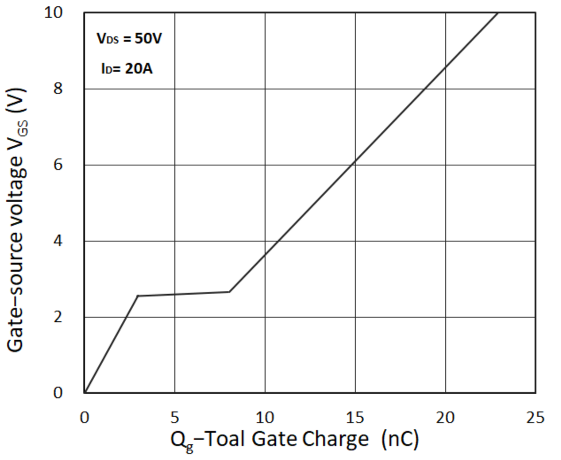


Figure 8. Gate Charge Characteristics

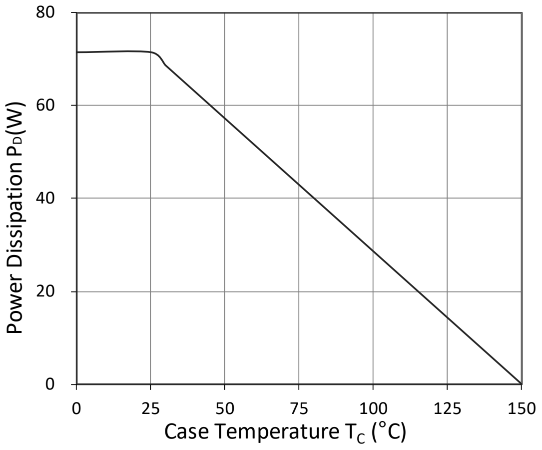


Figure 9. Power Dissipation

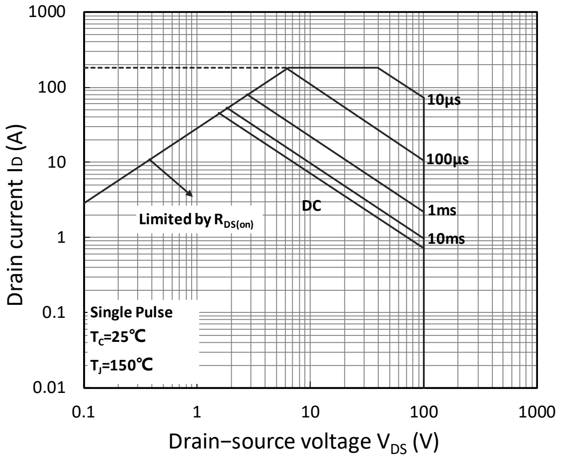
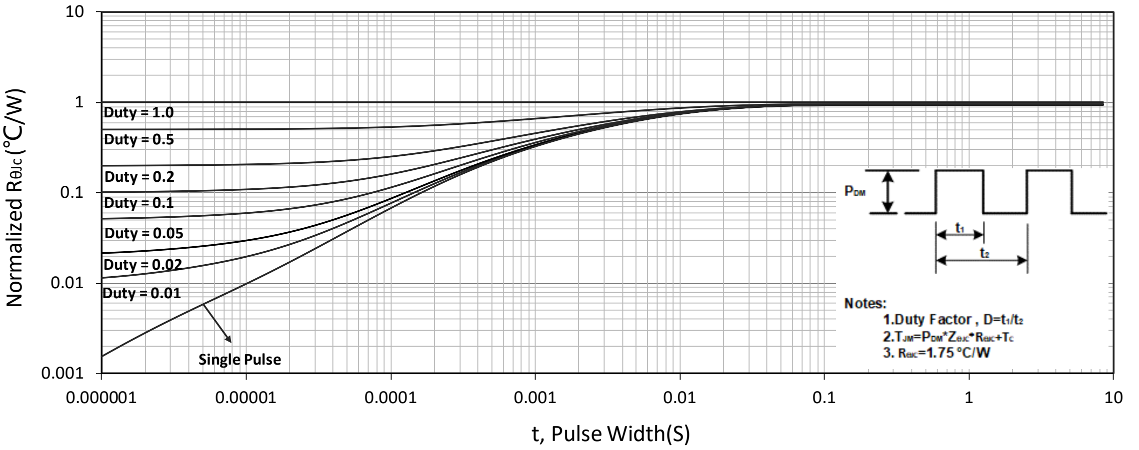


Figure10. Safe Operating Area



Notes:
1.Duty Factor , $D=t_1/t_2$
2.$T_{JM}=P_{DM}*Z_{θJC}*R_{θJC}+T_C$
3. $R_{θJC}$=1.75 °C/W

Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

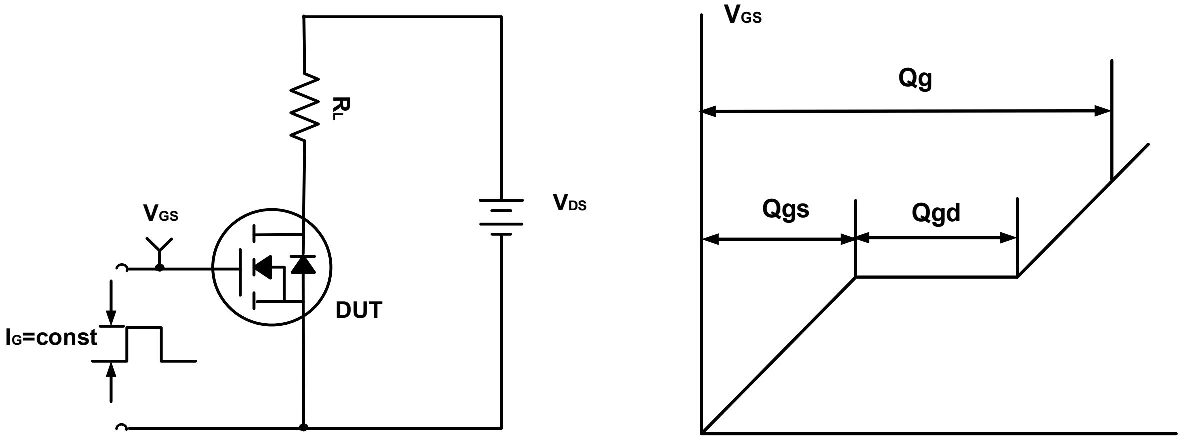


Figure A. Gate Charge Test Circuit & Waveforms

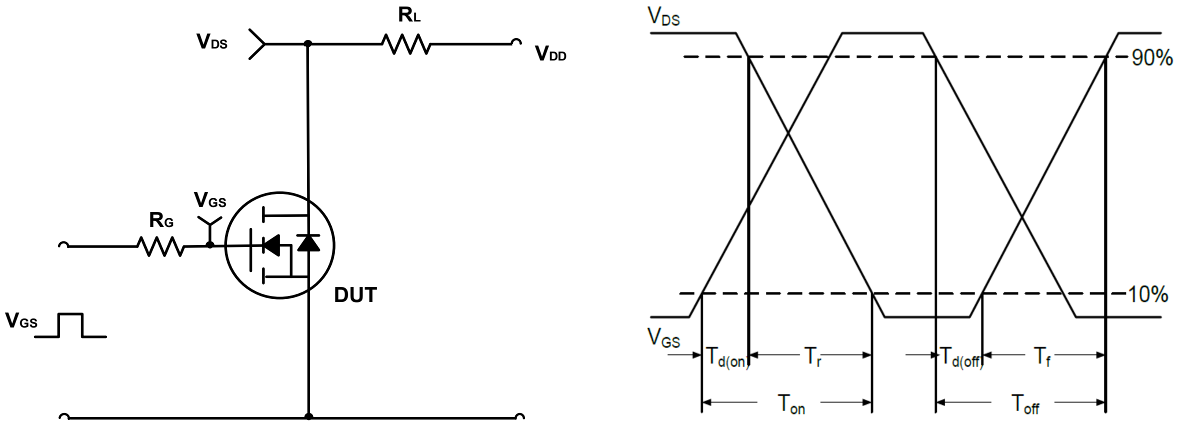


Figure B. Switching Test Circuit & Waveforms

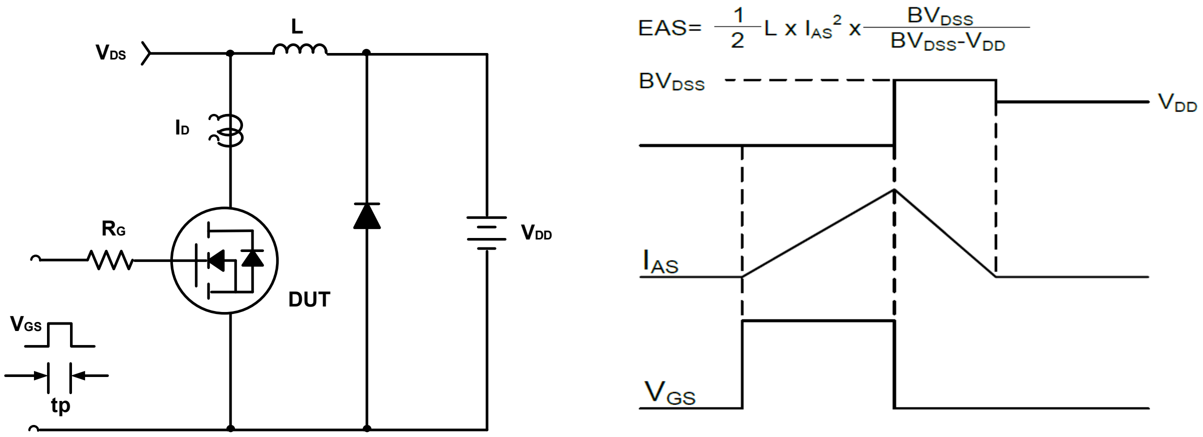
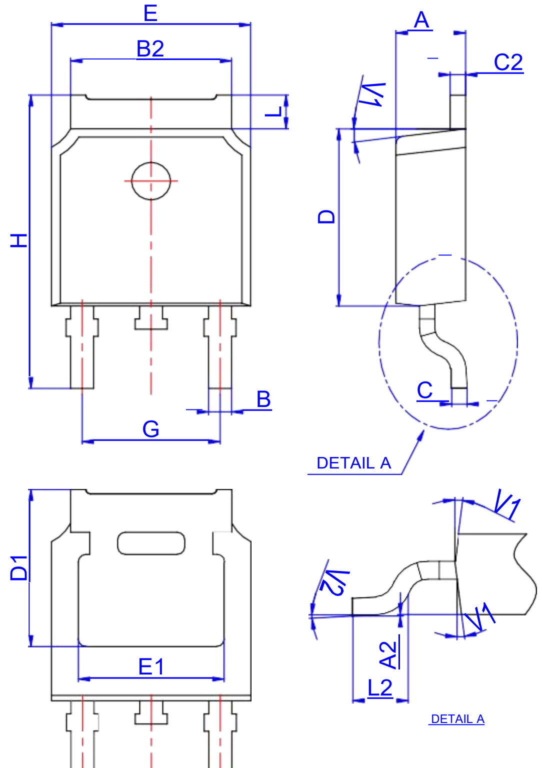

$$EAS=\frac{1}{2}L\times I_{AS}^{2}\times\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

Figure C. Unclamped Inductive Switching Circuit & Waveforms

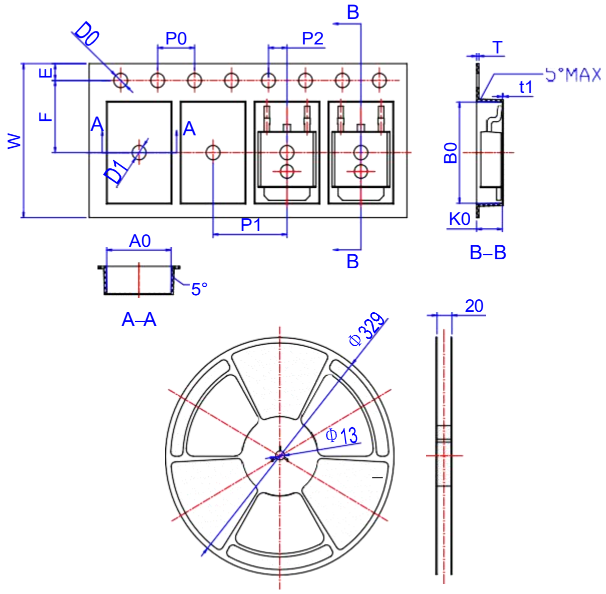
Package Mechanical Data TO 252



TO-252

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Reel Specification-TO-252-4R



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583