

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology
- ★ 100% EAS Guaranteed

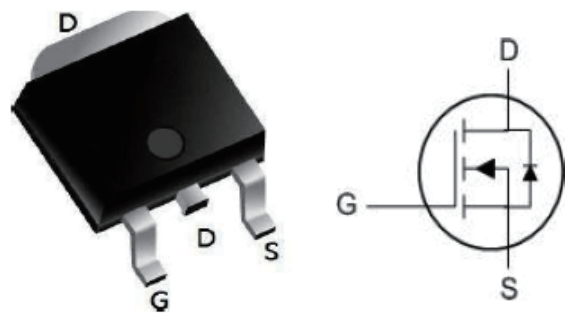
Product Summary

BVDSS	R _{DS(on)}	I _D
30V	7.6mΩ	50A

Description

The 50N03 is the high cell density trenched N-ch MOSFETs, which provide excellent R_{DS(on)} and gate charge for most of the synchronous buck converter applications.

The 50N03 meet the RoHS and Green Product, requirement 100% EAS guaranteed with full function reliability approved.

TO252 Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		10s	Steady State	
V _{DS}	Drain-Source Voltage	30		V
V _{GS}	Gate-Source Voltage	±20		V
I _{D@T_C=25°C}	Continuous Drain Current, V _{GS} @ 10V ¹	50		A
I _{D@T_C=100°C}	Continuous Drain Current, V _{GS} @ 10V ¹	26		A
I _{DM}	Pulsed Drain Current ²	168		A
E _{AS}	Single Pulse Avalanche Energy ³	33		mJ
I _{AS}	Avalanche Current	23.8		A
P _{D@T_C=25°C}	Total Power Dissipation ⁴	30.5		W
T _{STG}	Storage Temperature Range	-55 to 175		°C
T _J	Operating Junction Temperature Range	-55 to 175		°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJC}	Thermal Resistance Junction-Case ¹	---	5.26	°C/W

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V,$	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.5	2.5	V
$R_{DS(on)}$ <small>note3</small>	Static Drain-Source on-Resistance	$V_{GS}=10V, I_D=20A$	-	7.6	10	m Ω
		$V_{GS}=4.5V, I_D=10A$	-	11.5	17	m Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1.0MHz$	-	1011	-	pF
C_{oss}	Output Capacitance		-	142	-	pF
C_{riss}	Reverse Transfer Capacitance		-	119	-	pF
Q_g	Total Gate Charge	$V_{DS}=15V, I_D=20A,$ $V_{GS}=10V$	-	19	-	nC
Q_{gs}	Gate-Source Charge		-	6.3	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	4.5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=30V, I_D=2A,$ $R_{GEN}=3\Omega, V_{GS}=10V$	-	6	-	ns
t_r	Turn-on Rise Time		-	5	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	25	-	ns
t_f	Turn-off Fall Time		-	7	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	50	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	160	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=30A$	-	-	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F=30A, di/dt=100A/\mu s$	-	7	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	6.3	-	nC

Note :

- 1.Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
- 2.EAS condition: $T_J=25^\circ\text{C}, V_{DD}=15V, V_G=10V, R_G=25\Omega, L=0.5mH, I_{AS}=11.5A$
- 3.Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

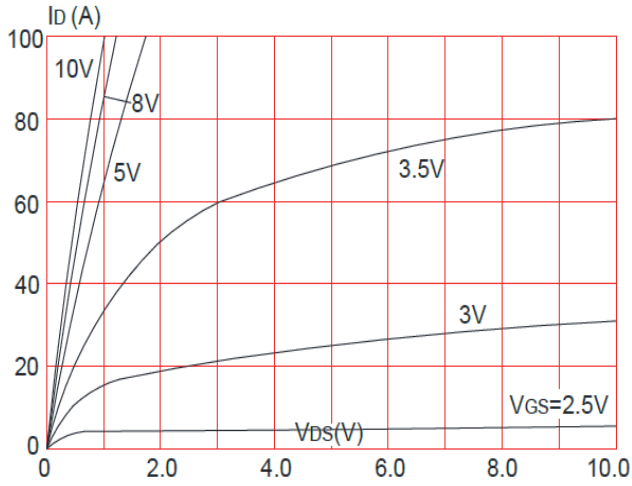


Figure 2: Typical Transfer Characteristics

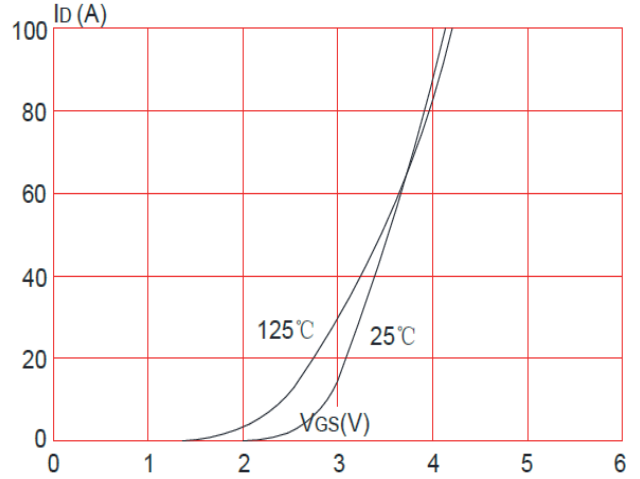


Figure 3: On-resistance vs. Drain Current

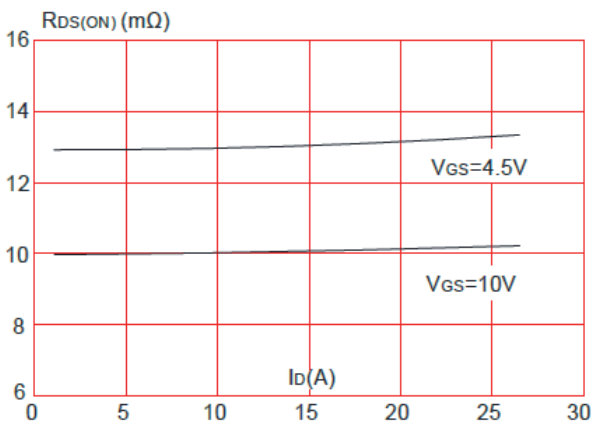


Figure 4: Body Diode Characteristics

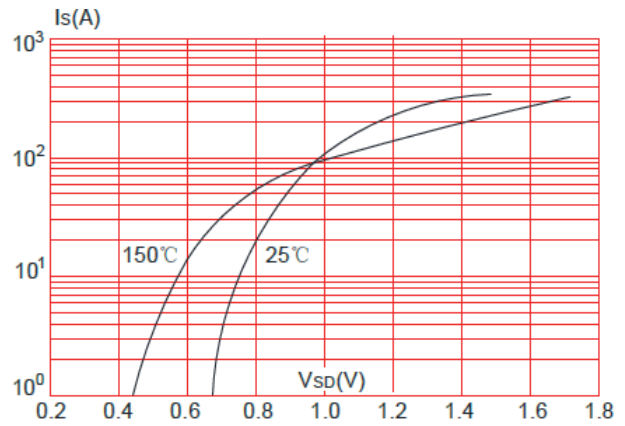


Figure 5: Gate Charge Characteristics

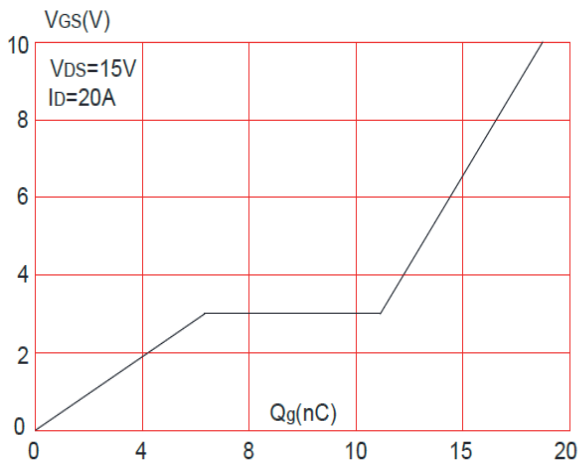
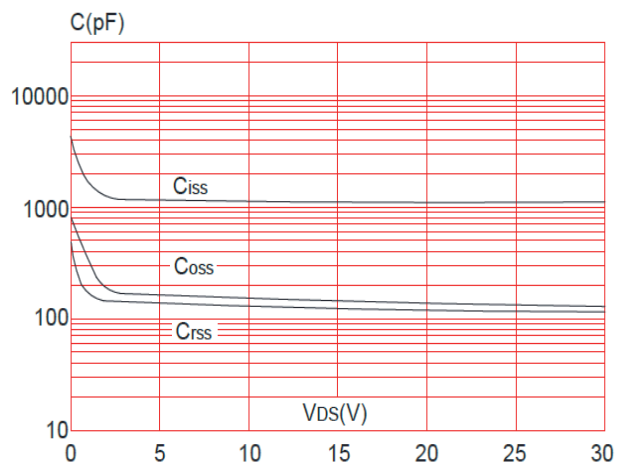


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage

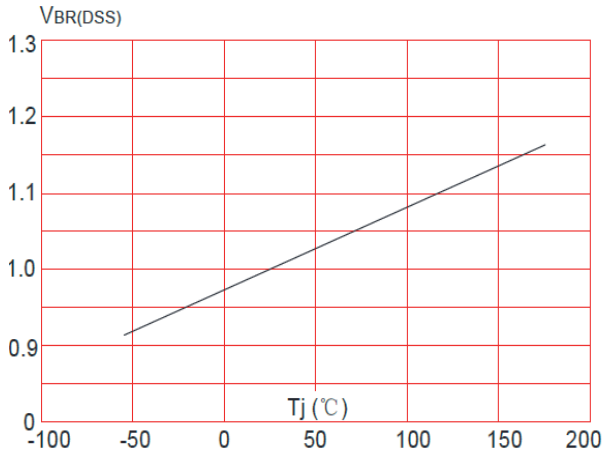


Figure 8: Normalized on Resistance vs. Junction Temperature

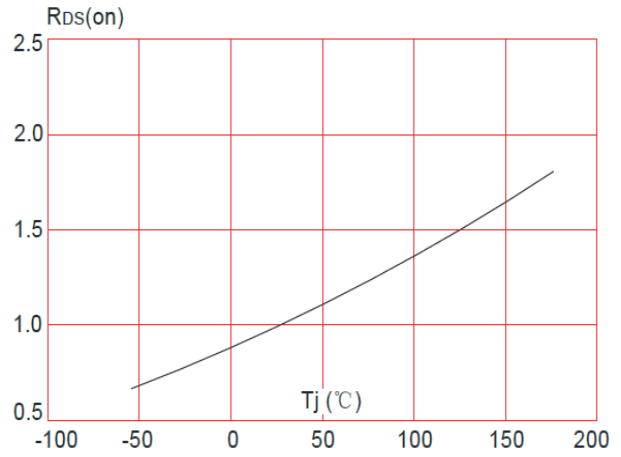


Figure 9: Maximum Safe Operating Area

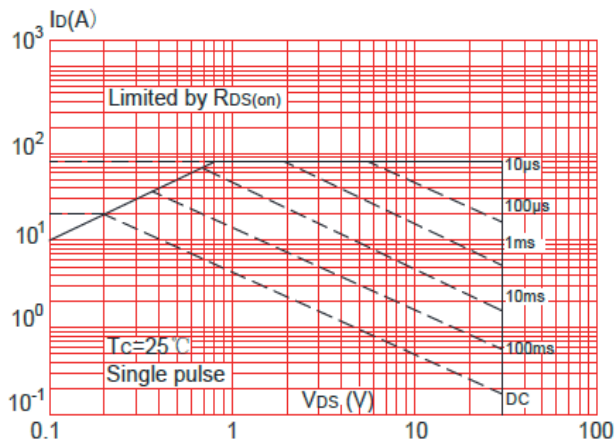


Figure 10: Maximum Continuous Drain Current vs. Junction Temperature

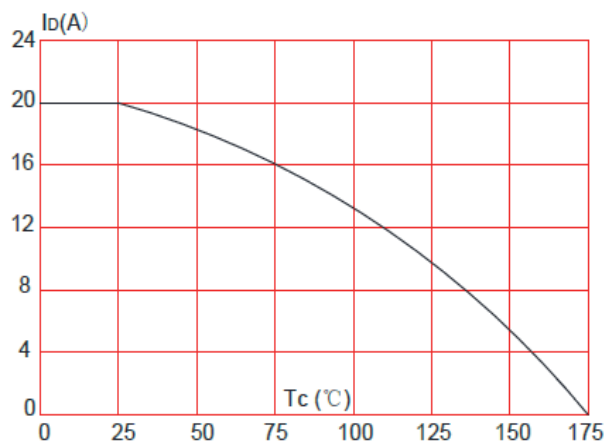
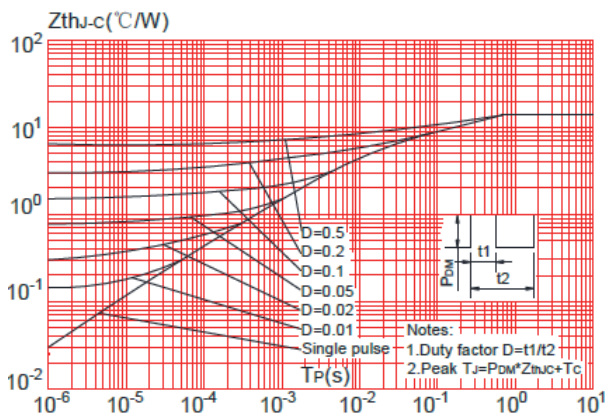


Figure.11: Maximum Effective Transient Thermal Impedance



Test Circuit

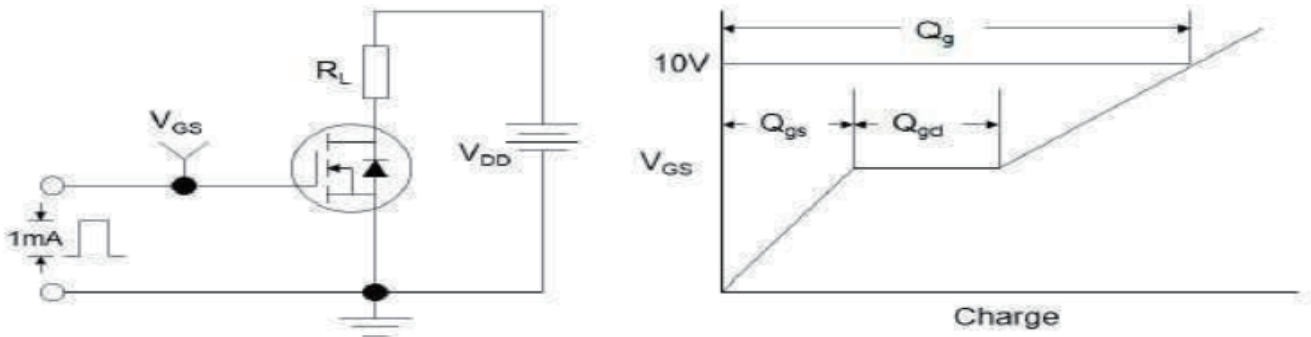


Figure 1: Gate Charge Test Circuit & Waveform

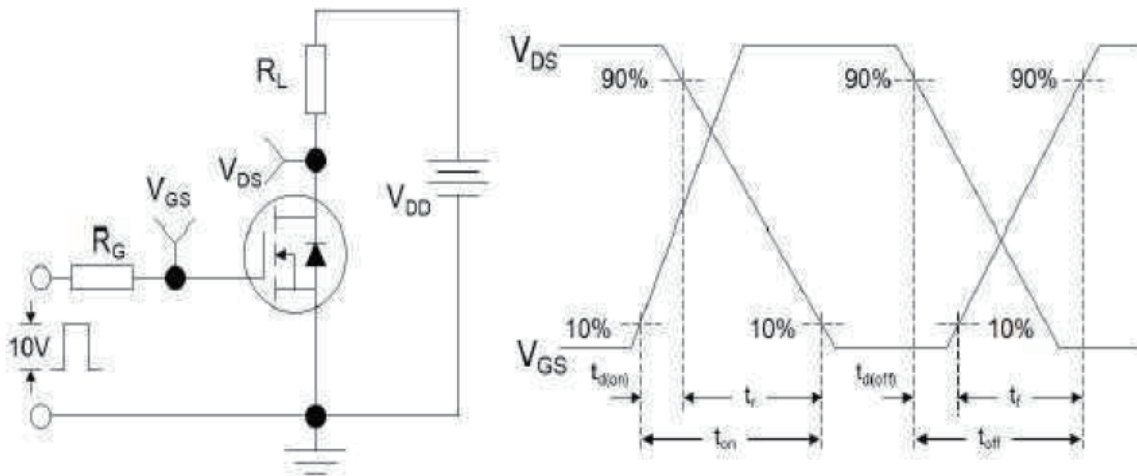


Figure 2: Resistive Switching Test Circuit & Waveforms

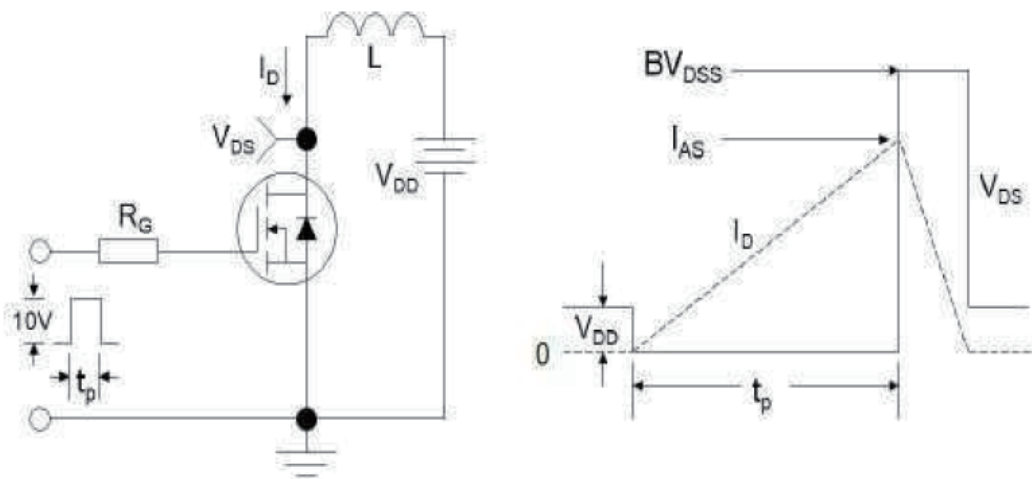
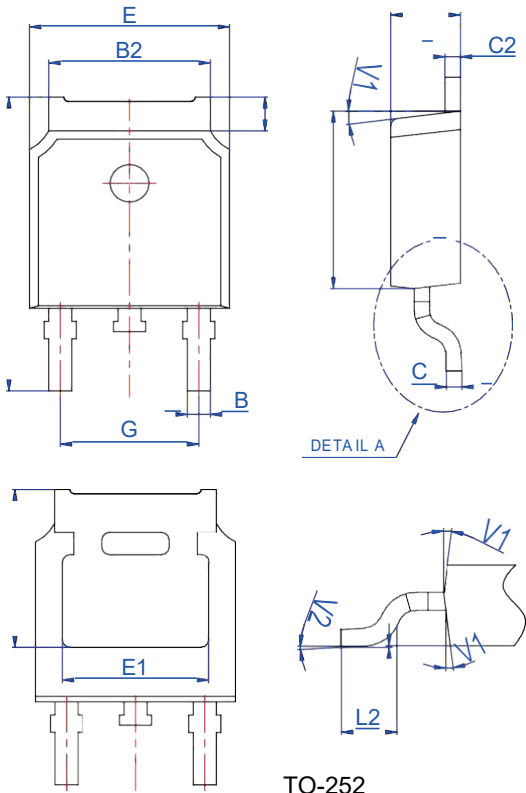


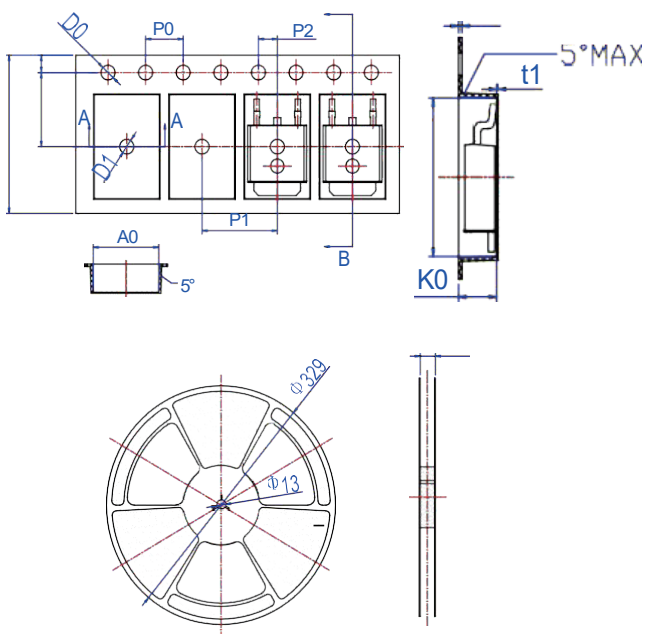
Figure 3: Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data-TO-252-4R



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.1		2.5	0.083		0.098
A2	0		0.1	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.4		0.6	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.9		6.3	0.232		0.248
D1	5.30REF			0.209REF		
E	6.4		6.8	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.5		10.7	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	15.9	16	16.1	0.626	0.63	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.4	7.5	7.6	0.291	0.295	0.299
D0	1.4	1.5	1.6	0.055	0.059	0.063
D1	1.4	1.5	1.6	0.055	0.059	0.063
P0	3.9	4	4.1	0.154	0.157	0.161
P1	7.9	8	8.1	0.311	0.315	0.319
P2	1.9	2	2.1	0.075	0.079	0.083
A0	6.85	6.9	7	0.27	0.271	0.276
B0	10.45	10.5	10.6	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	0.1			0.004		
10P0	39.8	40	40.2	1.567	1.575	1.583