

Description

The TFS040N03N uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other switching application.

General Feature

$V_{DS} = 30V$, $I_D = 48A$

$R_{DS(ON) Typ} = 3.9m\Omega @ V_{GS}=10V$

$R_{DS(ON) Typ} = 5.5m\Omega @ V_{GS}=4.5V$

High Power and current handling capability

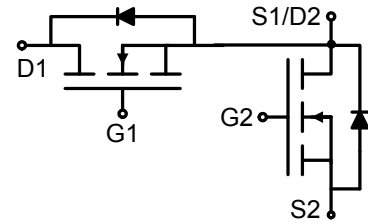
Lead free product is acquired

Surface mount package

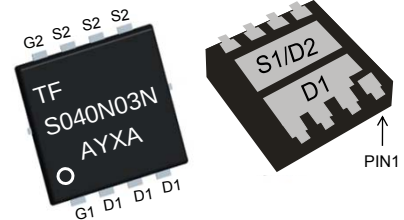
Application

Battery switch

DC/DC converter



Schematic diagram



DFN5060-8L

●Package Marking and Ordering Information:

Part NO.	TFS040N03N
Marking1	S040N03N: TFS040N03N
Marking2	TF:tuofeng; Y:year code; X:Week; AA:device code;
Basic ordering unit (pcs)	5000

●Absolute Maximum Ratings ($T_C = 25^\circ C$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@TC=25^\circ C}$	48	A
	$I_{D@TC=75^\circ C}$	34	A
	$I_{D@TC=100^\circ C}$	29	A
Pulsed Drain Current ^①	I_{DM}	120	A
Total Power Dissipation	$P_{D@TC=25^\circ C}$	30	W
Total Power Dissipation	$P_{D@TA=25^\circ C}$	1.9	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$
Single Pulse Avalanche Energy	E_{AS}	75	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	4.5	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	45	° C/W
Soldering temperature, wavesoldering for 8 s	T_{sold}	-	-	265	° C

●Electronic Characteristics($T_j=25^{\circ}\text{C}$, unless otherwise notse)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.1	1.6	2.0	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	3.9	5.5	m Ω
		$V_{GS}=4.5V, I_D=15A$	-	5.5	7.5	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=25V, I_D=20A$	-	12	-	S
Source-drain voltage	V_{SD}	$I_S=20A$	-	-	1.20	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	f = 1MHz $V_{DS}=15V$ $V_{GS}=0V$	-	1615	-	pF
Output capacitance	C_{oss}		-	245	-	
Reverse transfer capacitance	C_{rss}		-	216	-	

●Gate Charge characteristics($T_a = 25^{\circ}\text{C}$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	$V_{DD} = 15V$	-	33.8	-	nC
Gate - Source charge	Q_{gs}	$I_D = 20A$	-	8.5	-	
Gate - Drain charge	Q_{gd}	$V_{GS} = 10V$	-	7.5	-	

Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Typical Electrical and Thermal Characteristics

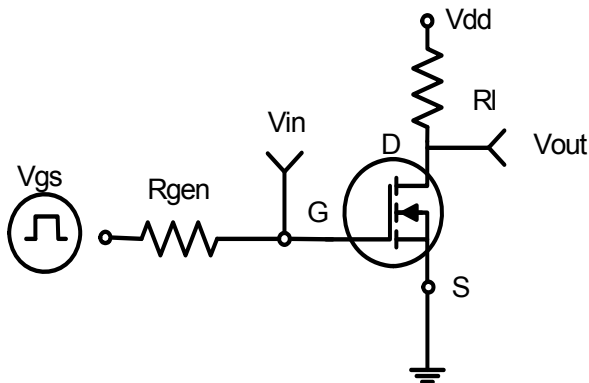


Figure 1 Switching Test Circuit

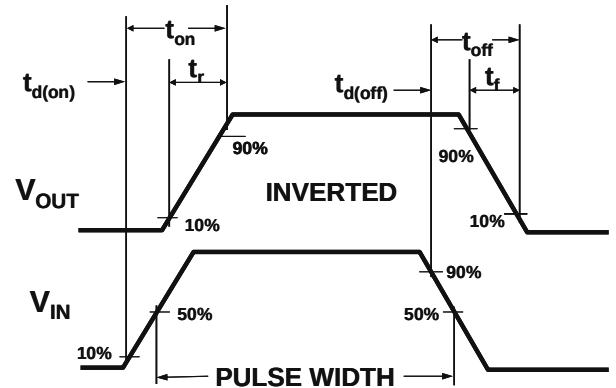


Figure 2 Switching Waveforms

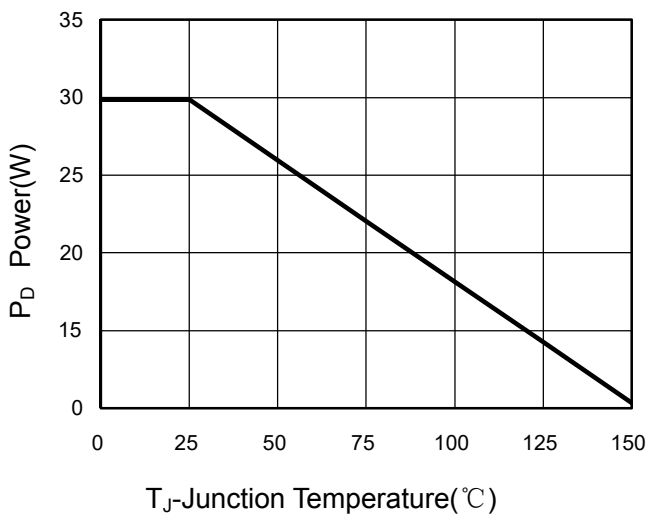


Figure 3 Power Dissipation

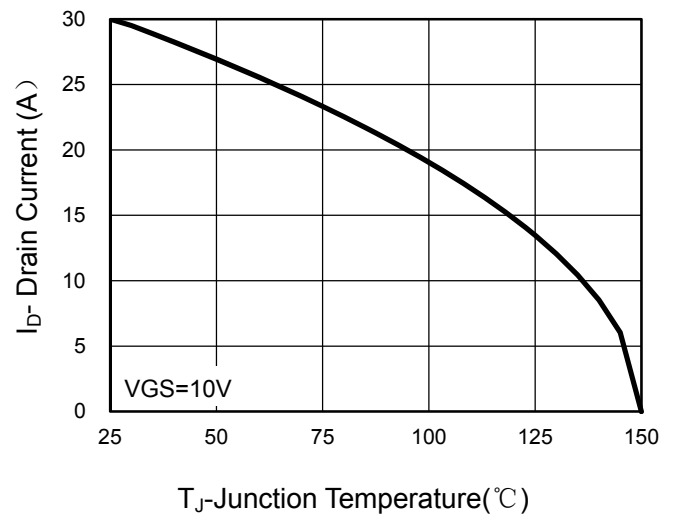


Figure 4 Drain Current

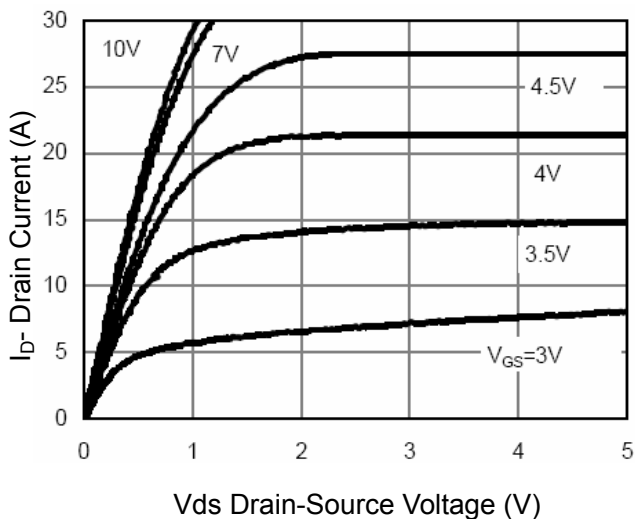


Figure 5 Output Characteristics

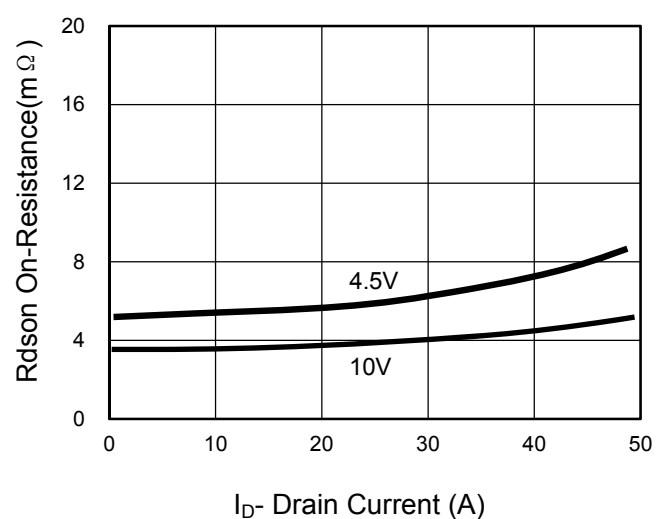


Figure 6 Drain-Source On-Resistance

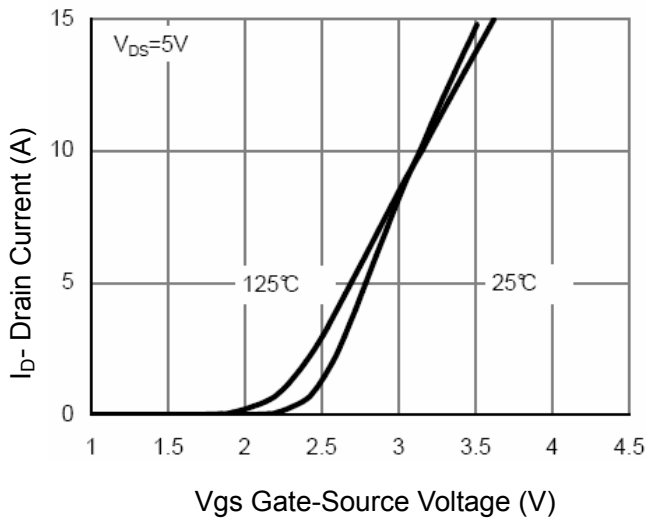


Figure 7 Transfer Characteristics

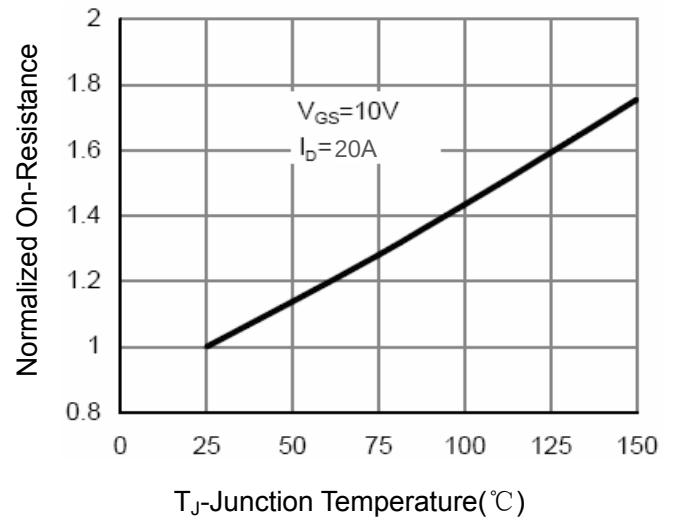


Figure 8 Drain-Source On-Resistance

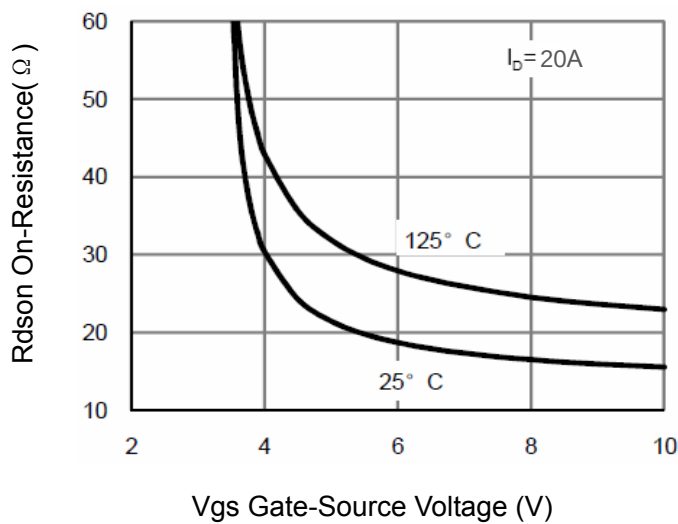


Figure 9 Rdson vs Vgs

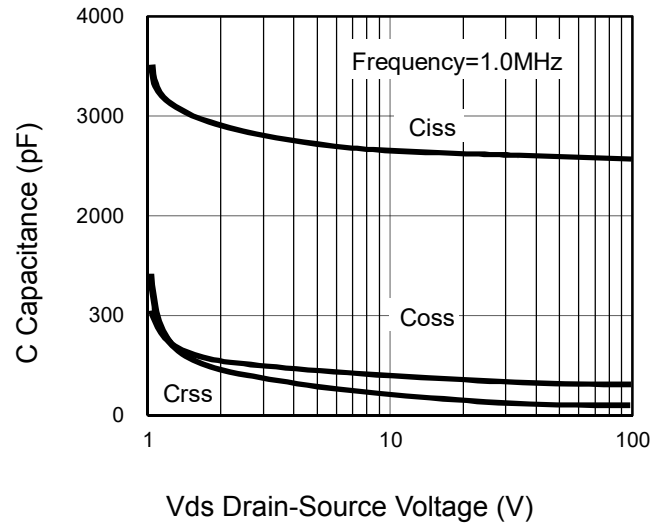


Figure 10 Capacitance vs Vds

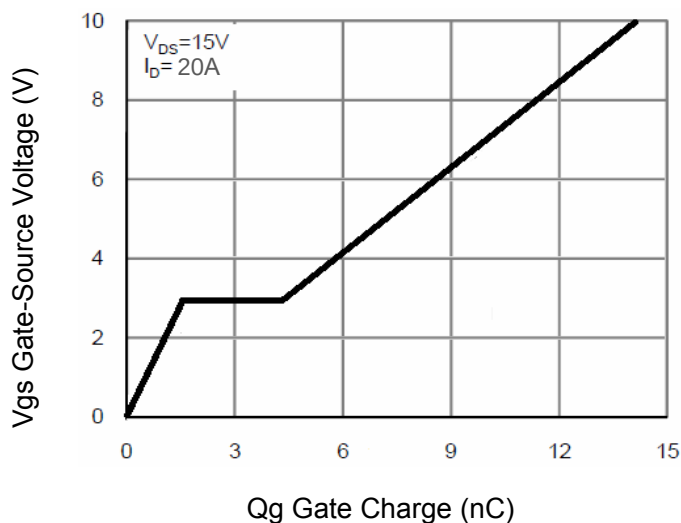


Figure 11 Gate Charge

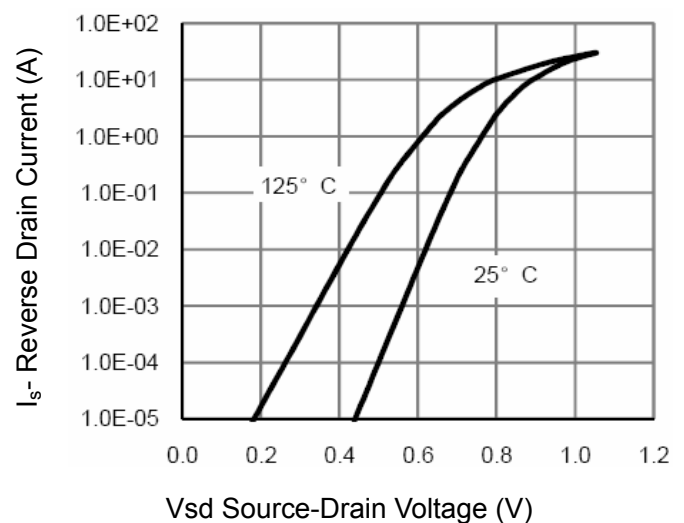


Figure 12 Source- Drain Diode Forward

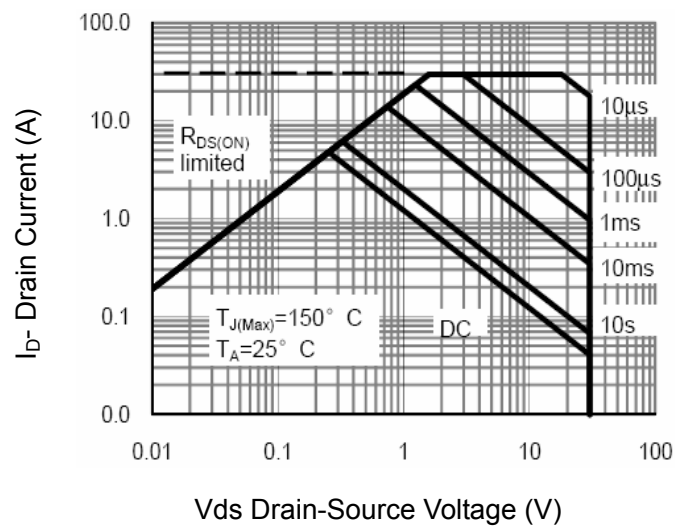


Figure 13 Safe Operation Area

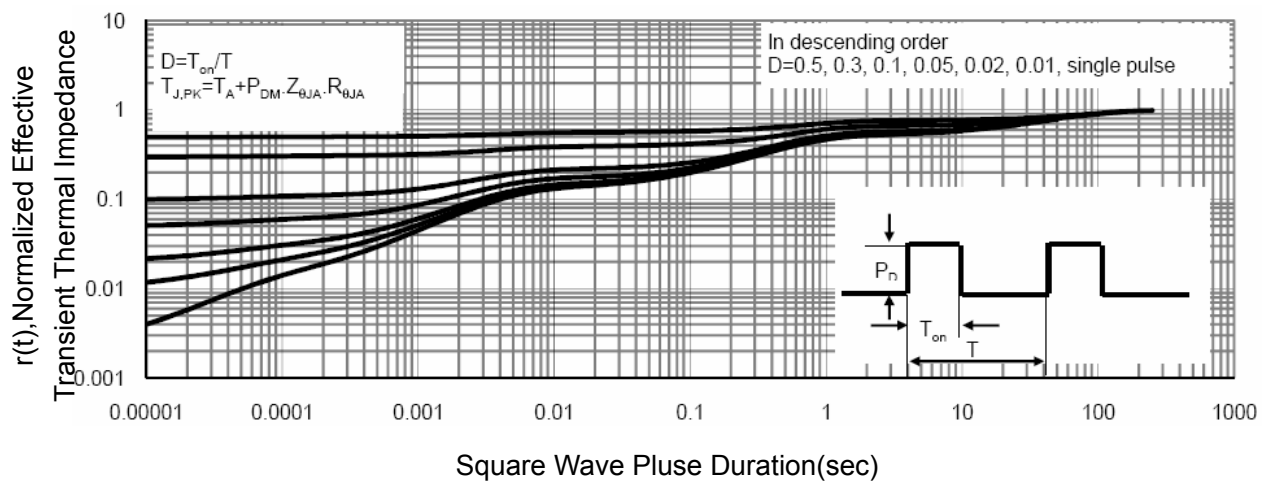
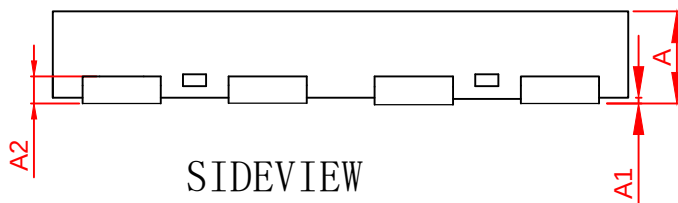
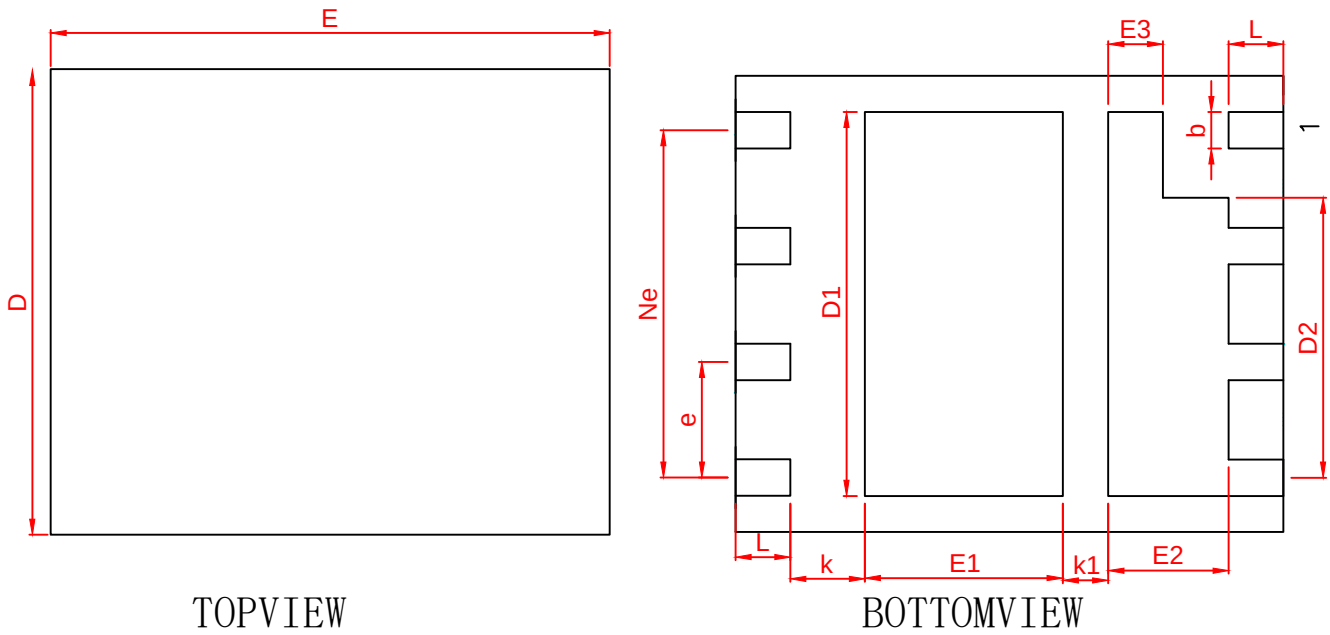


Figure 14 Normalized Maximum Transient Thermal Impedance

DFN5060-8L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
* A1	0.00	0.02	0.05
* b	0.36	0.41	0.46
* A2	0.203 BSC		
* D	4.90	5.00	5.10
* D1	4.15	4.20	4.25
* D2	2.87	3.07	3.27
* E	5.90	6.00	6.10
* E1	2.02	2.17	2.32
* E2	1.22	1.32	1.42
* E3	0.55	0.60	0.65
* e	1.27 REF		
Ne	BSC 3.81		
* k	0.71	0.81	0.91
* k1	0.40	0.50	0.60
* L	0.55	0.60	0.65