650V N-Channel Power MOSFET

Features

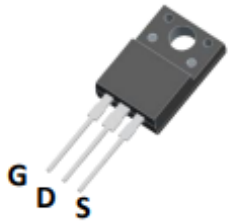
- Multi-Epi Super Junction MOSFET
- Fast Switching
- East to Drive/Use

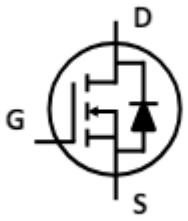
Applications

- SMPS
- Motor Drivers
- Charger/Power Supply

TO-220F Pin Description

TO-220F-3L





Absolute Ratings (T_A = 25℃ unless otherwise noted)

Parameter	Symbol	Value	Units
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current, T_C = 25°C	I_{DS}	30	A
Pulsed Drain Current	$I_{DS, pulse}$	69	A
Total Power Dissipation	P_D	270	W
Thermal Resistance	$R_{th(J-C)}$	1.73	°C/W
Operating Junction Temperature Range	T_J	-40 to 150	°C
Storage Temperature Range	T_{STG}	-40 to 150	°C

Electrical Characteristics

Static (T_J=25℃ unless otherwise specified)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250uA	650	---	---	V
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V	---	---	±70	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650V, V_{GS} = 0V	---	0.01	---	uA
		V_{DS} = 650V, V_{GS} = 0V, T_J = 150℃	---	12.7	---	
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 8A	---	130	140	mΩ
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250uA	3.4	3.9	4.4	V
Gate Resistance	R_G	f = 1MHz, Open Drain	---	4.9	---	Ω

Dynamic (T_J=25℃ unless otherwise specified)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 400V, f = 250KHz	---	1943	---	pF
Output Capacitance	C_{oss}		---	50	---	
Reverse Transfer Capacitance	C_{rss}		---	3.6	---	
Total Gate Charge	Q_g	V_{DS} = 400V, I_D = 8A, V_{GS} = 0-12V	---	62	---	nC
Gate-Source Charge	Q_{gs}		---	16	---	
Gate-Drain Charge	Q_{gd}		---	18	---	
Gate Plateau Voltage	V_{Plat}		---	5.9	---	V
Turn-on delay time	$T_{d(on)}$	V_{DS} = 400V, I_D = 8A, V_{GS} = 12V, R_G=5Ω	---	55	---	nS
Rise time	T_r		---	20	---	
Turn-off delay time	$T_{d(off)}$		---	124	---	
Fall time	T_f		---	24	---	

Body Diode Reverse Characteristics (T_J=25℃ unless otherwise specified)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Diode Forward Voltage	V_{SD}	V_{GS} = 0V, I_F = 8A,	---	0.8	---	V
Reverse Recovery Time	t_{rr}	V_{DS} = 400V, I_S = 8A, di_F / dt = 100A / uS	---	402	---	nS
Reverse Recovery Charge	Q_{rr}		---	6.8	---	uC
Peak Reverse Recovery Current	I_{rrm}		---	34	---	A

Typical Electrical Characteristics

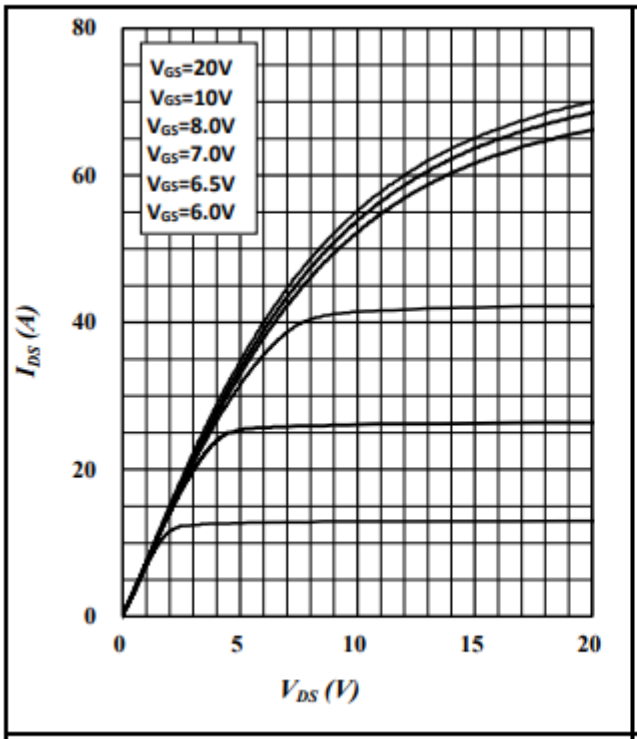


Fig.1 Typ. Output Characteristics T_j = 25 °C

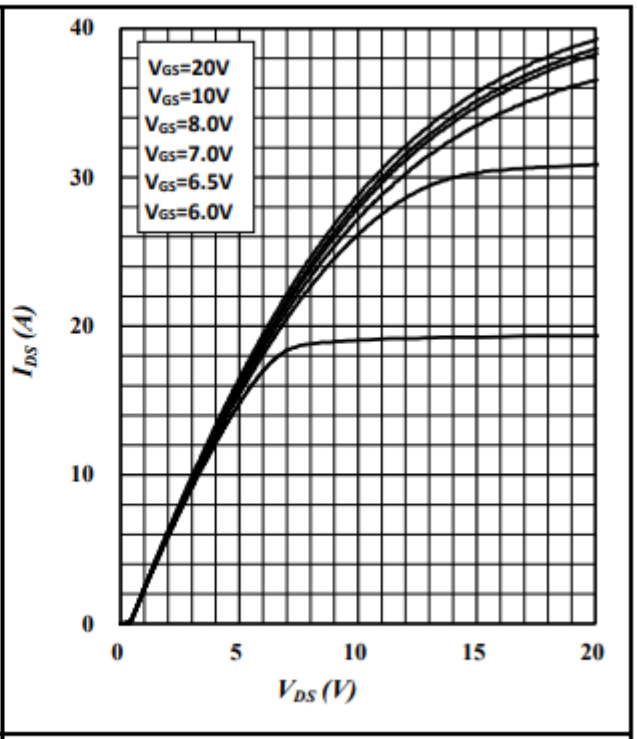


Fig.2 Typ. Output Characteristics T_j = 125 °C

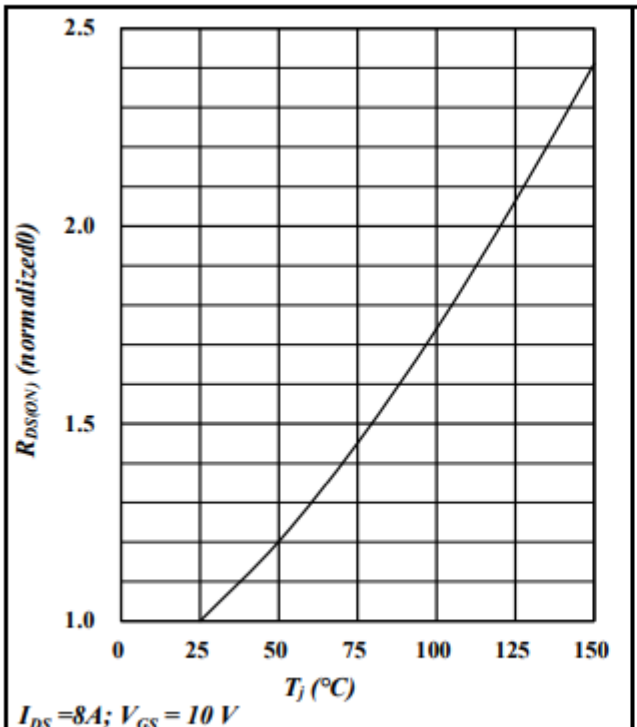


Fig.3 $R_{DS(ON)}$ vs. Junction Temperature

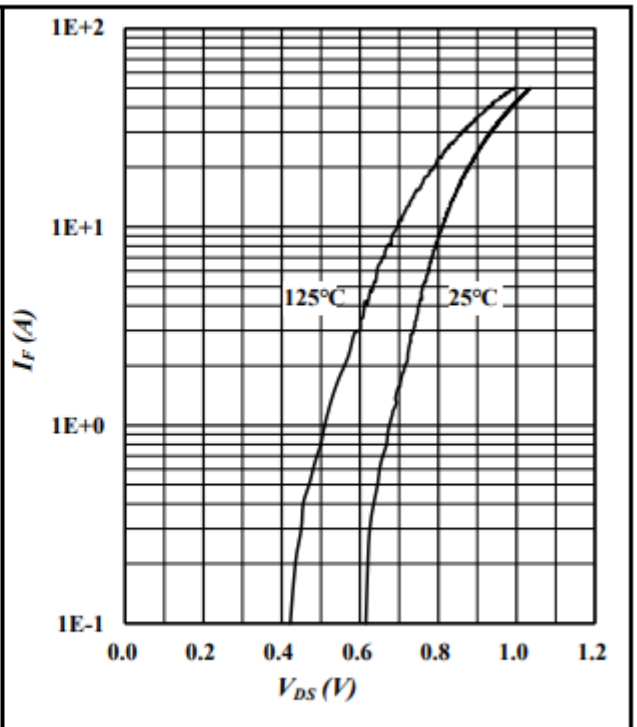


Fig.4 Forward Characteristics of Body Diode

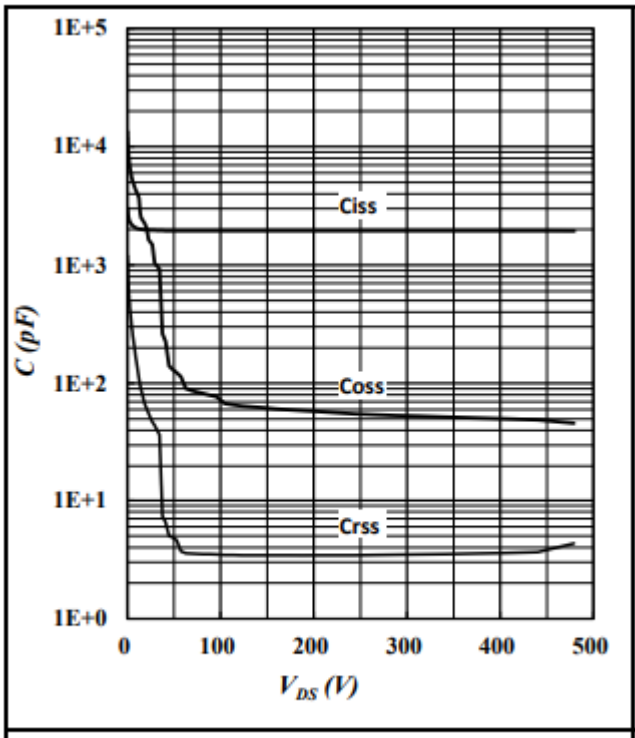


Fig.5 Typ. Capacitance vs. V_{DS}

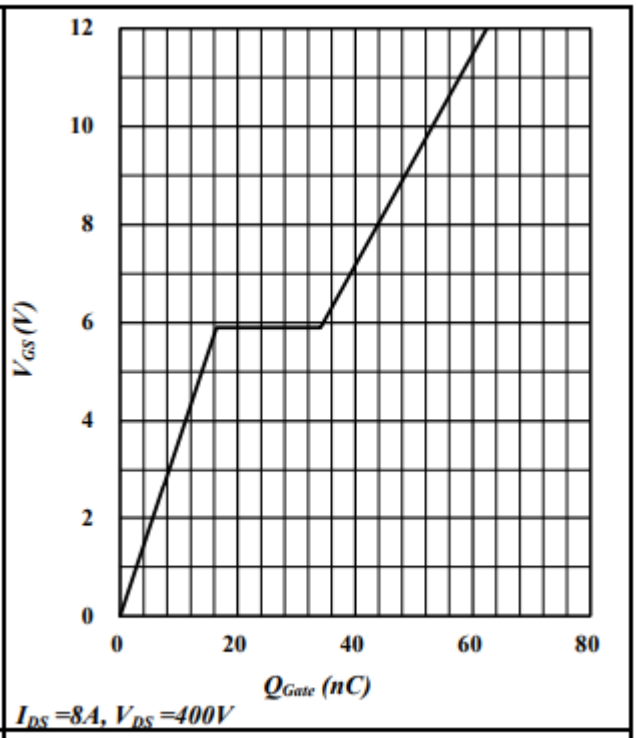


Fig.6 Typ. Gate Charge

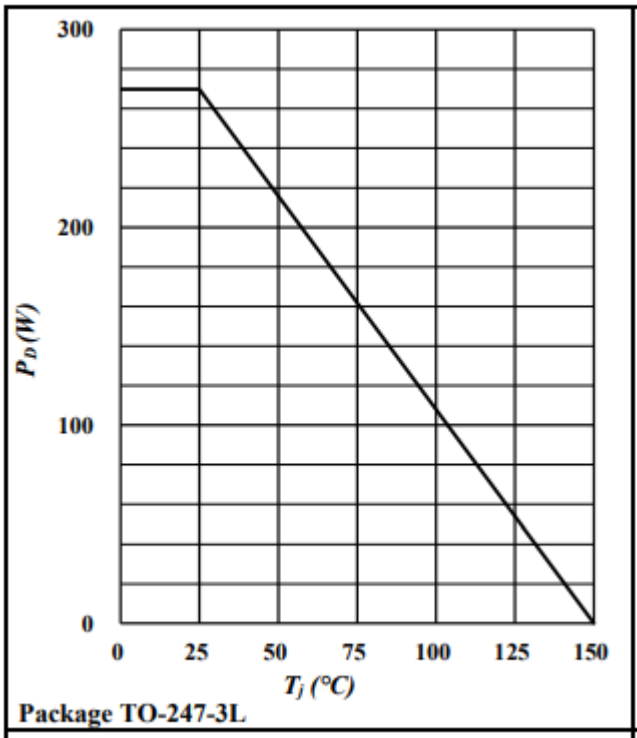


Fig.7 Power Dissipation Derating Curve

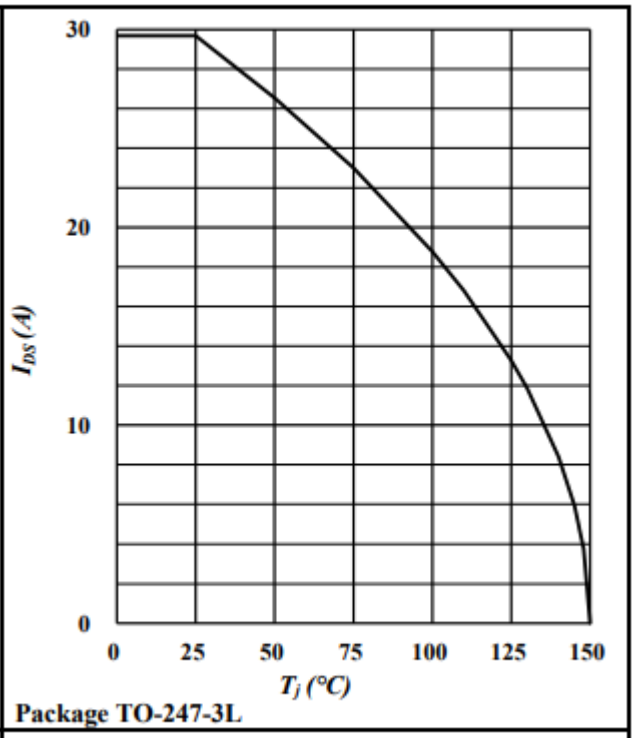


Fig.8 Drain Current Derating Curve

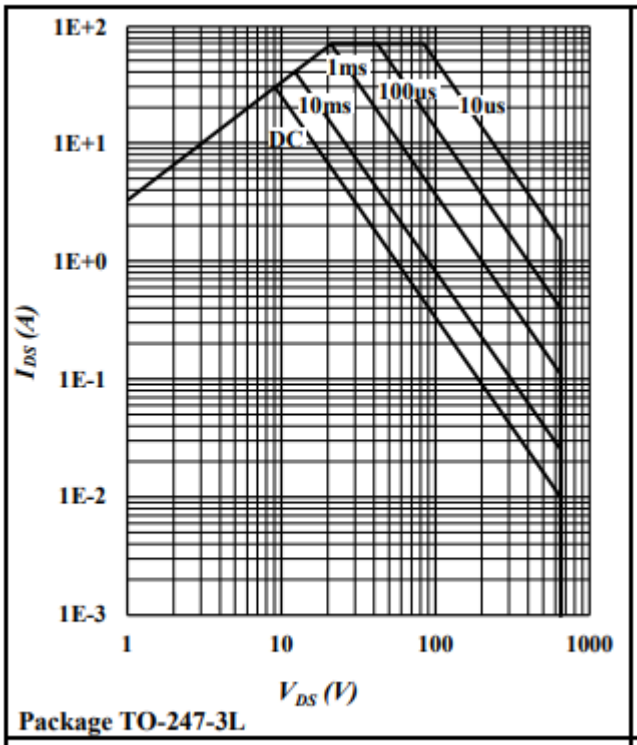


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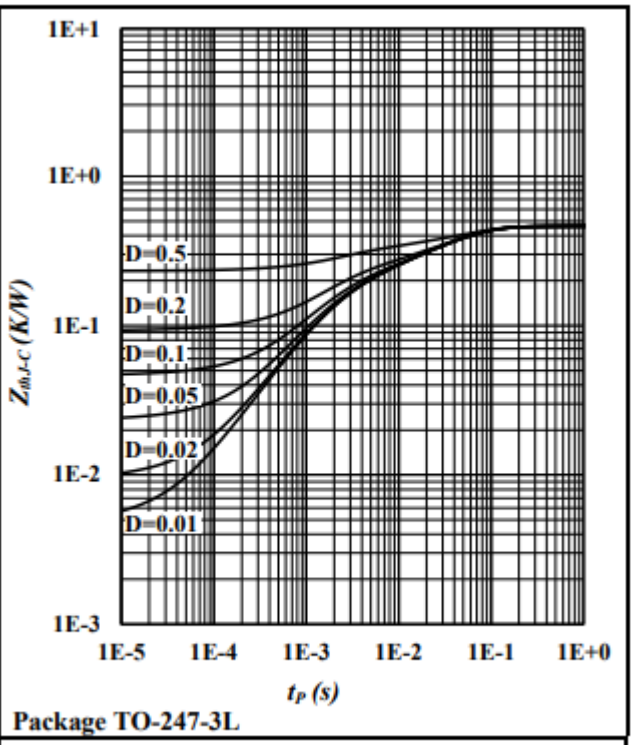
Fig.9 Safe Operating Area



Package TO-247-3L

Fig.10 ZthJ-C, D = tP / T

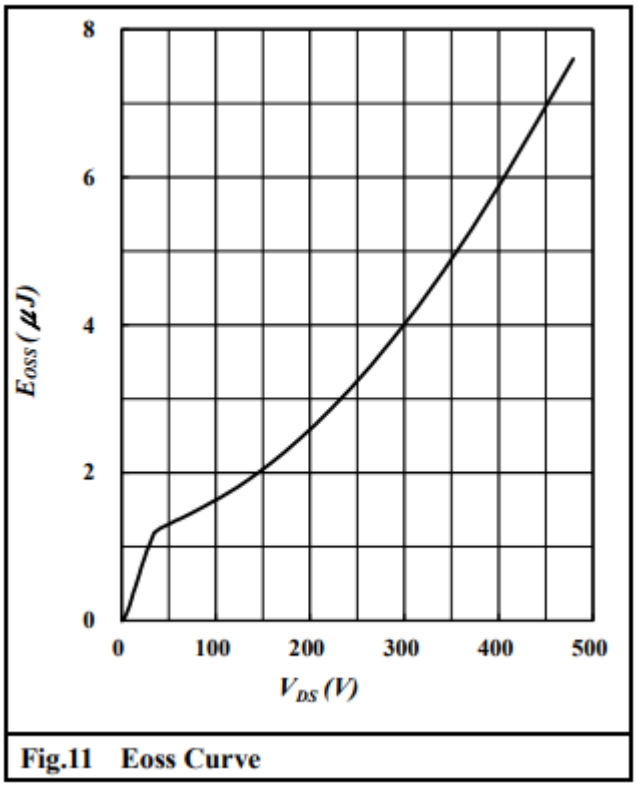
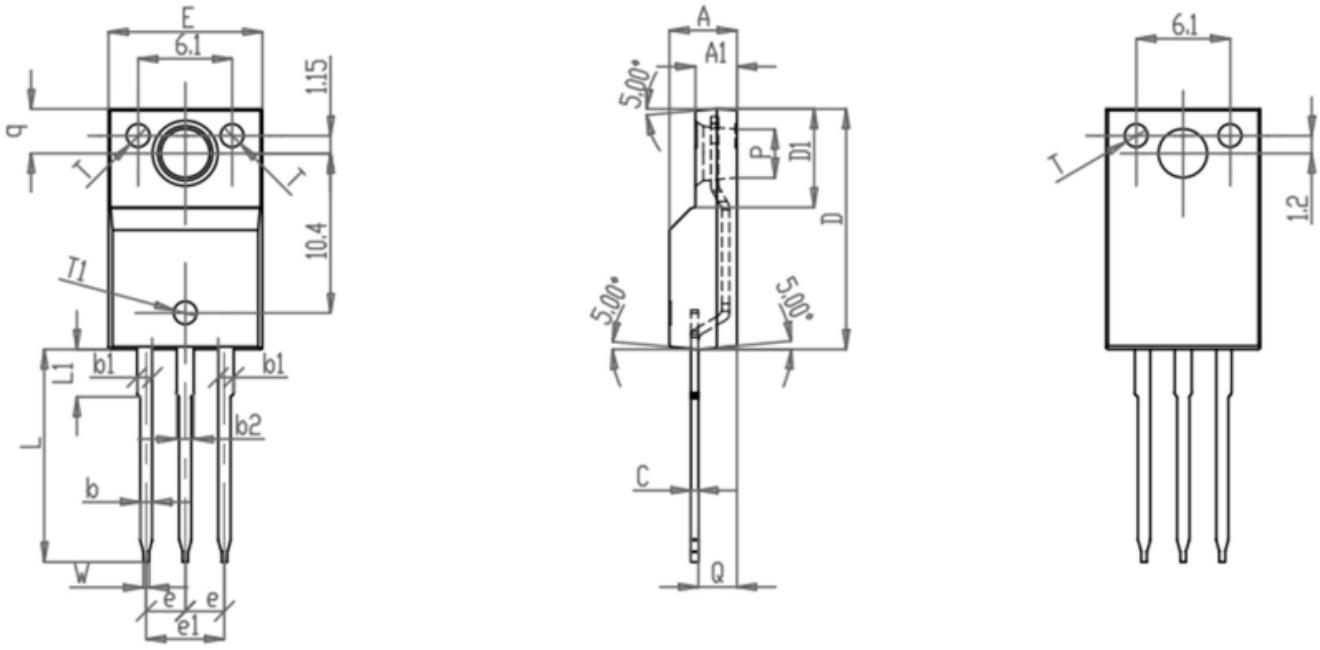


Fig.11 Eoss Curve

TO-220F Package Information



SYMBOL	MILLIMETERS			NOTES	SYMBOL	MILLIMETERS			NOTES
	Normal	MIN.	MAX.			Normal	MIN.	MAX.	
A	4.4	4.2	4.6		e1	5.08	5	5.12	
A1	2.7	2.5	2.9		L	13.90	13.5	14.4	
b	0.8	0.7	0.9		L1	3.12	2.8	3.3	
b1	1.07	0.9	1.3		P	3.14	3.00	3.20	
b2	1.17	1	1.4		Q	2.44	2.3	2.6	
C	0.5	0.4	0.6		q	2.87	2.6	3	
D	15.63	15.4	15.8		W	0.37	0.3	0.5	
D1	6.22	6	6.4		T	1.52	1.3	1.7	
E	10.06	9.7	10.3		T1	1.20	1.1	1.3	
e	2.54	2.5	2.58						