Thunder High Power Products

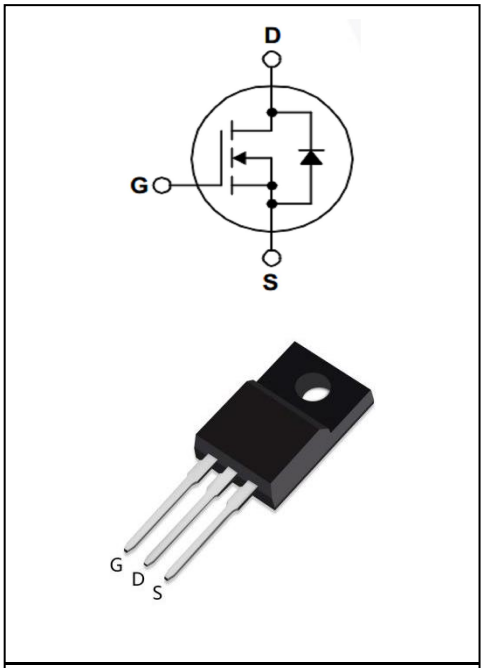
Silicon N-Channel Super Junction Power MOSFET

Description

- Very Low FOM ($R_{DS(on)}$ X Q_g)
- Extremely low switching loss
- Excellent stability and uniformity
- 100% Avalanche Tested

Features

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- Motor Control & LED Lighting Power
- DC-DC Converters



THUNDER TO-220F

Product Summary

V_{DS}	800V
$R_{DS(on),typ}$	0.25Ω
I_D	18A

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Parameter			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	800	V
Gate-Source Voltage			V_{GS}	±30	V
Drain Current	– Continuous(T_C=25℃)		I_D	18*	A
Drain Current	– Continuous(T_C=100℃)			11*	A
Drain Current	– Pulsed	(Note 1)	I_{DM}	54*	A
Single Pulsed Avalanche Energy		(Note 2)	E_{AS}	300	mJ
MOSFET dv/dt ruggedness, V_{DS}=0…480V			dv/dt	50	V/ns
Reverse diode dv/dt, V_{DS}=0…480V, I_{DS}≤I_D			dv/dt	15	V/ns
Power Dissipation (T_C=25℃)			P_D	34	W
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +150	℃
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds			T_L	300	℃

* Drain current limited by maximum junction temperature

Thermal Resistance Characteristics

Parameter	Symbol	Max	Units
Junction-to-Case	R_{thJC}	3.6	℃/W
Junction-to-Ambient	R_{thJA}	80	

Electrical Characteristics T_C=25℃ unless otherwise specified

Parameter	Symbol	Value			Units	Test Conditions
		min.	typ.	max.		
On Characteristics						
Gate Threshold Voltage	V_{GS}	2.5	-	4.5	V	V_{DS} = VGS, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	0.25	0.29	Ω	V_{GS} = 10 V, I_D = 9 A
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	800	-	-	V	V_{GS} = 0 V, I_D = 250μA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1	μA	V_{DS} = 800 V, V_{GS} = 0 V
		-	-	100	μA	V_{DS} = 800 V, T_J = 125℃
Gate-Body Leakage Current	I_{GSS}	-	-	±100	μA	V_{GS} = ±30 V, V_{DS} = 0 V
Dynamc Characteristics						
Input Capacitance	C_{iss}	-	1728	-	pF	V_{DS} = 100 V, V_{GS} = 0 V, f = 100kHz
Output Capacitance	C_{oss}	-	48	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	0.78	-	pF	
Gate Series Resistance	R_g	-	25	-	Ω	f=1.0MHz
Switching Characteristics						
Turn-On Time	$t_{d(on)}$	-	29	-	ns	V_{DS} = 400 V, I_D = 18 A, R_G = 25Ω
Turn-On Rise Time	t_r	-	42	-	ns	
Turn-Off Delay Time	$t_{d(off)}$	-	137	-	ns	
Turn-Off Fall Time	t_f	-	36	-	ns	
Total Gate Charge	Q_g	-	39	-	nC	V_{DS} = 600 V, I_D = 18 A V_{GS} = 10 V
Gate-Source Charge	Q_{gs}	-	8.6	-	nC	
Gate-Drain Charge	Q_{gd}	-	13.5	-	nC	

Source-Drain Diode Maximum Ratings and Characteristics

Continuous Source-Drain Diode Forward Current	I_S	-	-	18	A	
Pulsed Source-Drain Diode Forward Current	I_{SM}	-	-	54		
Source-Drain Diode Forward Voltage	V_{SD}	-	-	1.3	V	I_S = 18 A, V_{GS} = 0 V
Reverse Recovery Time	trr	-	427	-	ns	I_S = 18 A, V_{DD} = 400 V
Reverse Recovery Charge	Qrr	-	6.8	-	μC	di_F/dt = 100 A/μs

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. I_{AS}=7.5A,V_{DD}=50V,R_G=25Ω,Starting T_J=25℃
3. I_{SD}≤I_D,di/dt≤200A/μs,V_{DD}≤BV_{DSS},Starting T_J=25℃
4. Pulse Test : Pulse Width≤300μs,Duty Cycle≤2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Characteristics

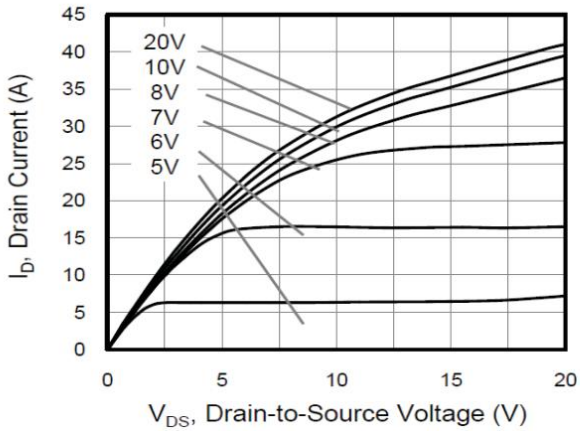


Figure 1. On Region Characteristics

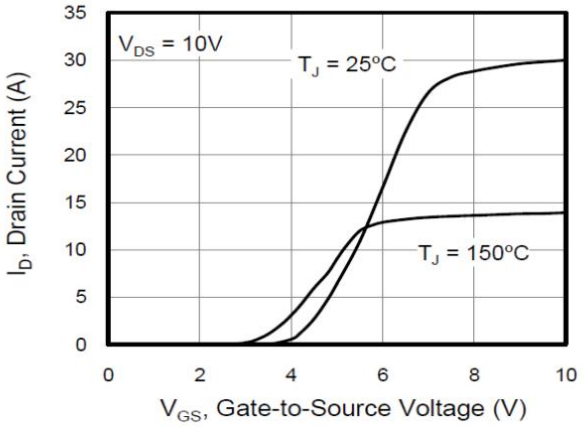


Figure 2. Transfer Characteristics

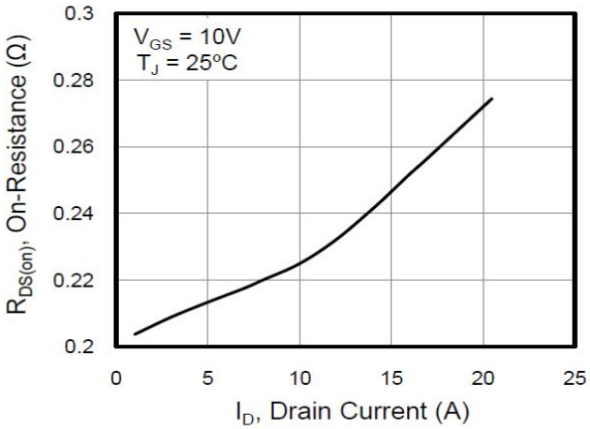


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

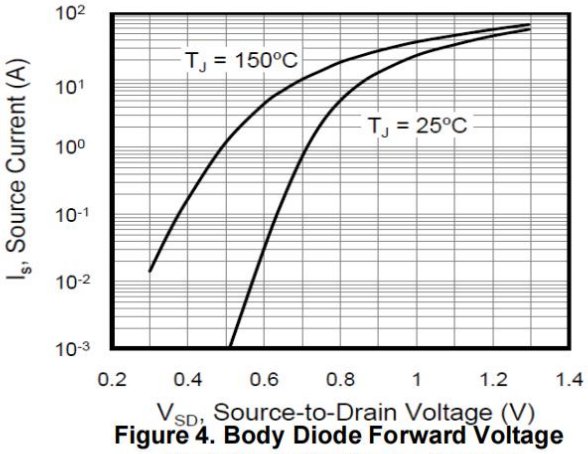


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

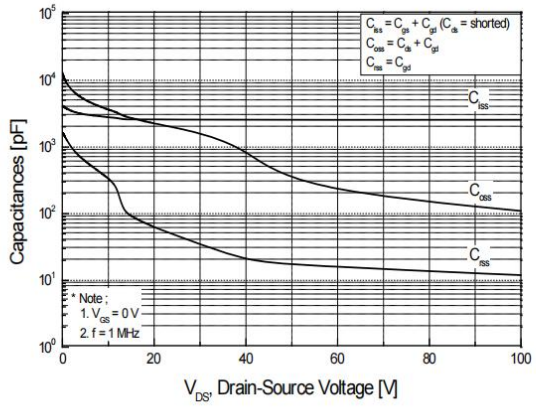


Figure 5. Capacitance Characteristics

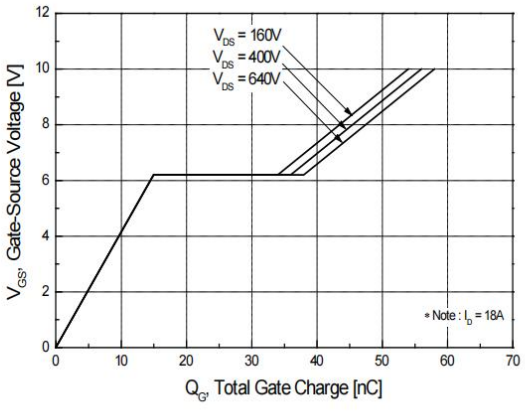


Figure 6. Gate Charge Characteristics

Typical Characteristics (continued)

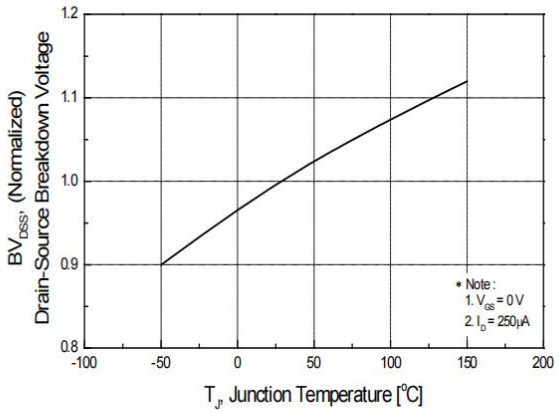


Figure 7. Breakdown Voltage Variation vs Temperature

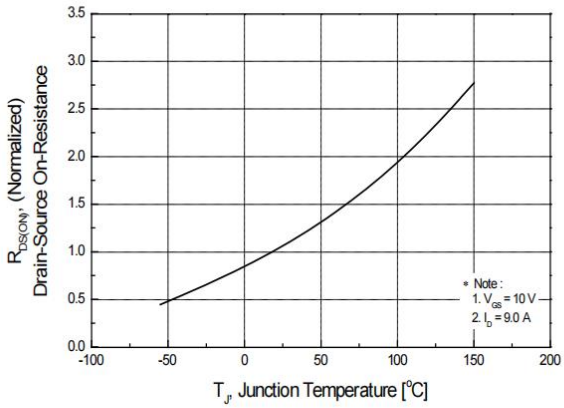


Figure 8. On-Resistance Variation vs Temperature

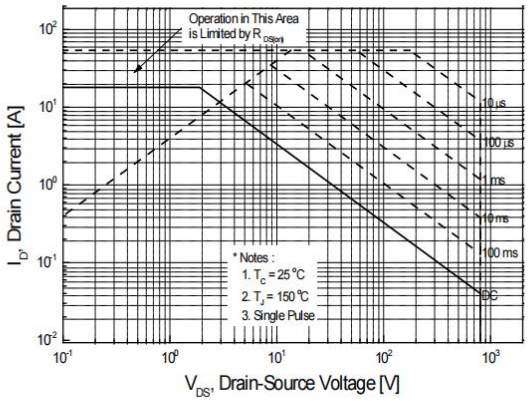


Figure 9. Maximum Safe Operating Area

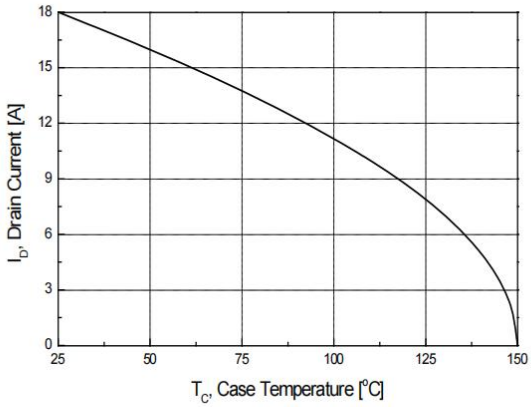


Figure 10. Maximum Drain Current vs Case Temperature

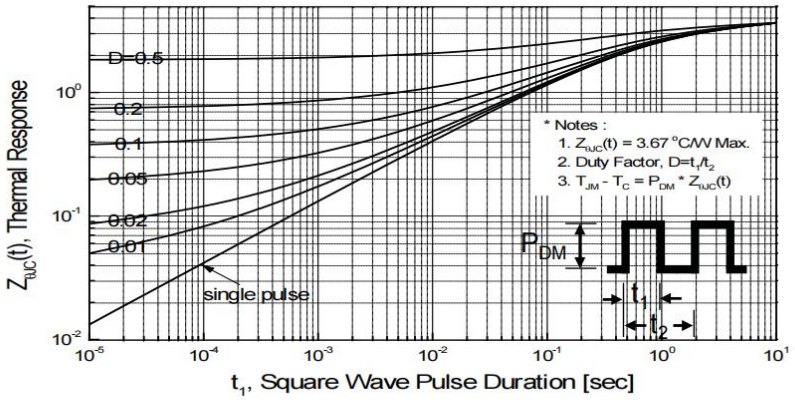


Figure 11. Transient Thermal Response Curve

Fig 12. Gate Charge Test Circuit & Waveform

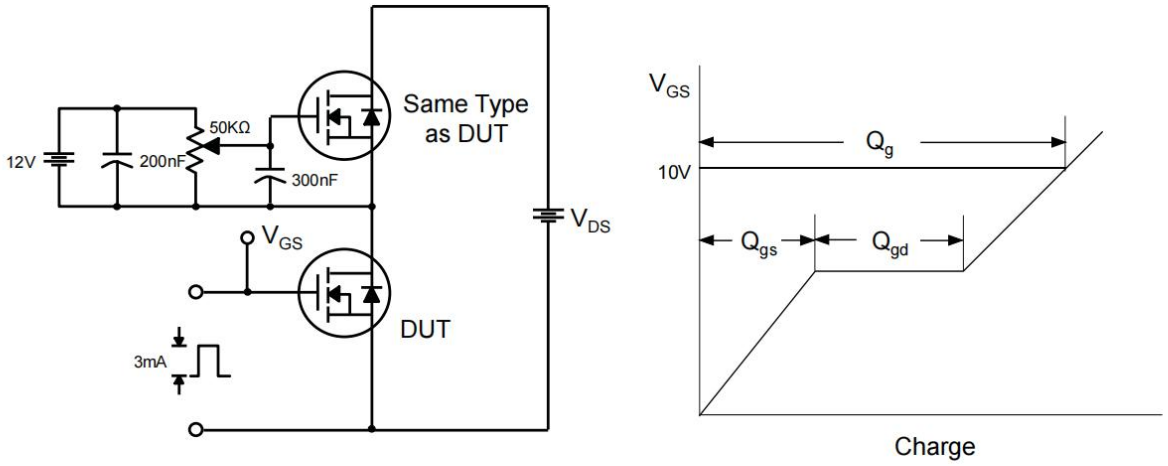


Fig 13. Resistive Switching Test Circuit & Waveforms

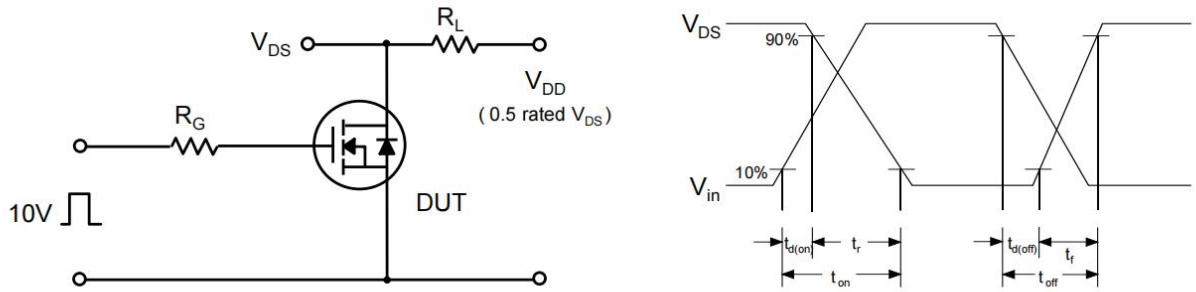


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

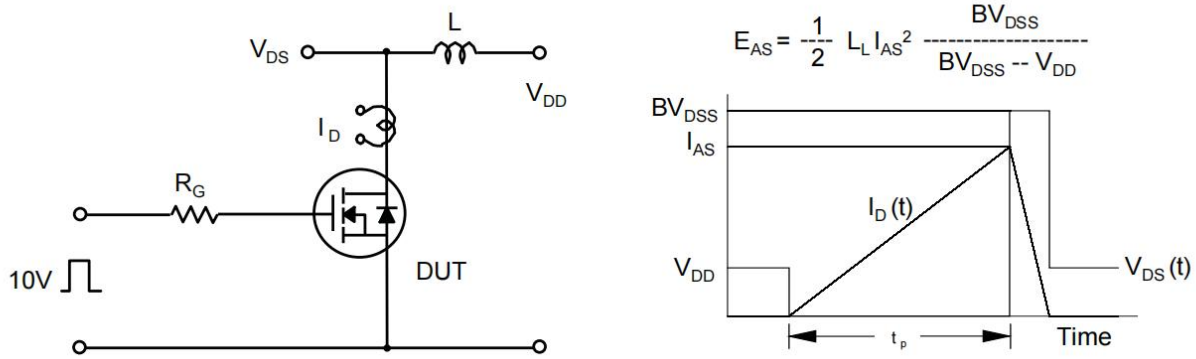
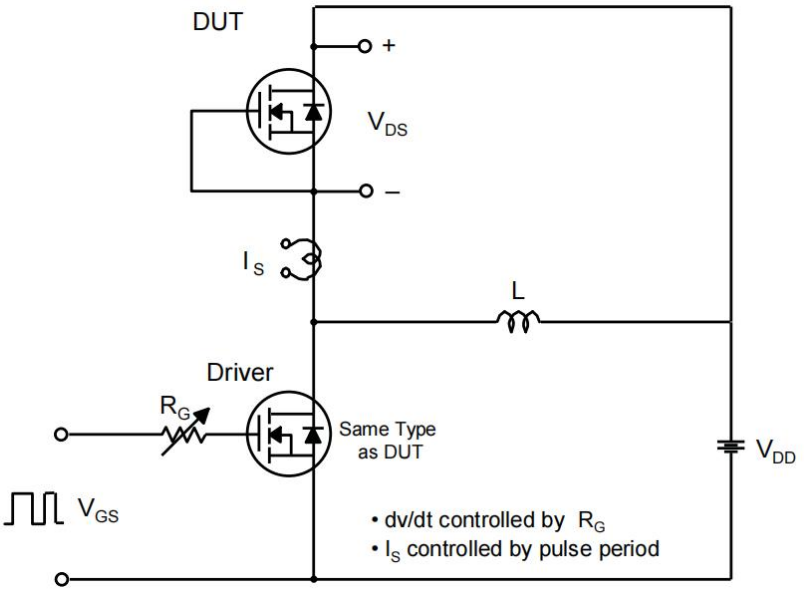
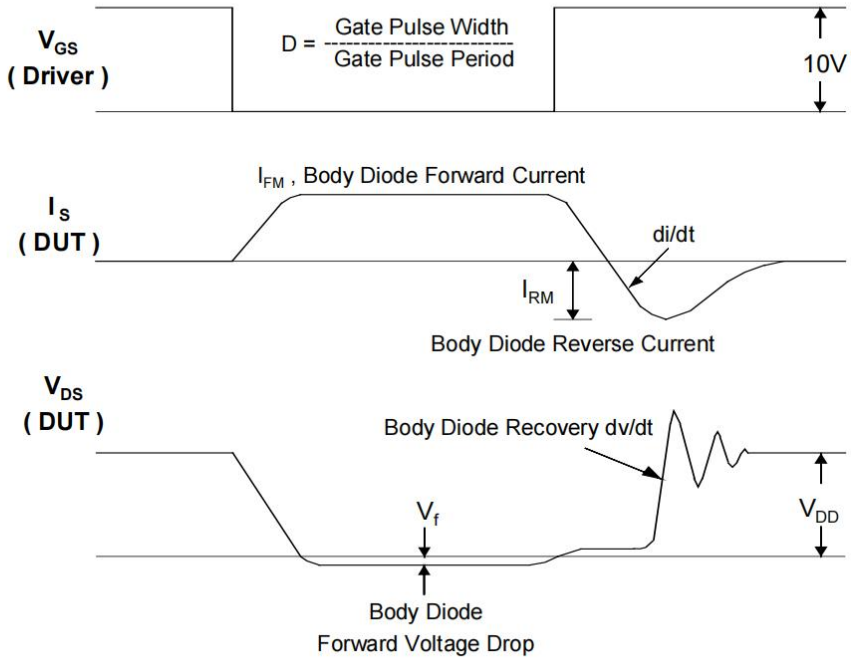


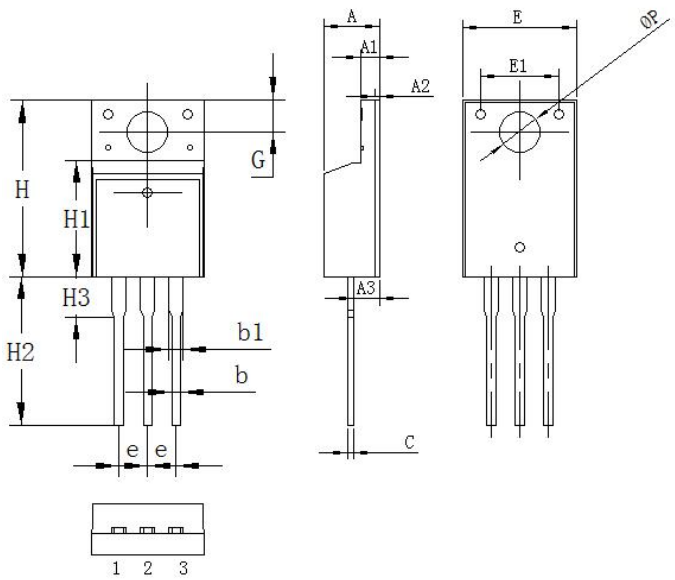
Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





Package Information

TO-220F PACKAGE



基本尺寸

Symbol	单位 mm		
	Min	Nom	Max
A	4.55	4.75	4.95
A1	2.40	2.60	2.80
A2	0.40	0.60	0.80
A3	2.10	2.30	2.50
b1	1.10	1.30	1.50
b	0.60	0.80	1.00
c	0.42	0.50	0.58
e	2.34	2.54	2.74
E	9.9	10.1	10.3
E1	6.8	7	7.2
H	15.8	16.0	16.2
H1	9.10	9.30	9.50
H2	12.5	13.0	13.5
H3	3.10	3.30	3.50
G	3.00	3.20	3.40
ΦP	3.00	3.20	3.40

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