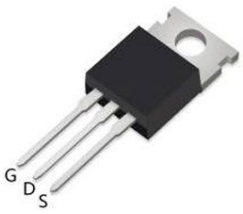
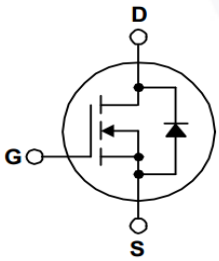
TH13N50PC

500V 13A 338mΩ Silicon N-Channel Planar Power MOSFET

Features of this MOSFET are 150℃ operating junction temperature and high repetitive peak current capability. These features combine to make this MOSFET a highly efficient, robust and reliable device for PDP driving applications.





Package view and circuit symbol

General Features

- V_{DS}=500V,I_D=13A
- Low ON Resistance,$R_{DS(on)}$,typ.=338mΩ@V_{GS}=10V,I_D=6.5A
- Low reverse transfer capacitance
- Low Qg for fast response
- Short fall & rise times for fast switching
- 100% single pulse avalanche energy Test

Applications

- Power switching application
- Digital amplifier
- Adapter and charger

Key Performance Parameters

Parameter	Value	Unit
V_{DSS}, min @ T_{J} = 25 °C	**500**	V
T_J, maximum junction temperature	**150**	°C
I_D @ T_C = 25 °C(Silicon Limit)	**13**	A
$I_{D,pulse}$ @ T_C = 25 °C, tp limited by Tjmax.	**52**	A
$R_{DS(on)}$, typ. @ T_J = 25 °C ,V_{GS} = 10 V	**338**	mΩ
E_{AS}, typ. @ T_J = 25 °C	**960**	mJ

RoHS SGS

Marking Information

Product Name	Package	Marking
TH13N50PC	TO-220C	TH13N50PC

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Maximum Ratings (T_J = 25℃ unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain to Source Voltage		V_{DSS}	500	V
Gate to Source Voltage		V_{GSS}	±30	V
Drain Current(Silicon limit)	T_C=25℃	I_D	13	A
Pulsed Drain Current	T_C=25℃ tp limited by T_{vjmax}	I_{DM}	52	A
Avalanche energy, single pulse	L=10mH, R_g=25Ω	E_{AS}	960	mJ
Power Dissipation	T_C=25℃	P_D	158	W
Operating Junction and Storage Temperature Range		T_J,T_{stg}	-55 To +150	℃
Lead Temperature for Soldering Purposes		T_L	270	

Thermal Characteristics

Parameter	Symbol	Max Value	Unit
Thermal Resistance, Junction−to−Case	R_{thJC}	0.79	℃/W
Thermal Resistance, Junction−to−Ambient	R_{thJA}	62	

Electerical Characteristics (T_J = 25℃ unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Drain-to-Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V,I_D=250μA	500	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V V_{DS}=V_{DSS} T_J=25℃	-	-	1	μA
		V_{GS}=0V V_{DS}=80%V_{DSS} T_J=125℃	-	-	10	
Gate−to−Source leakage Current	I_{GSS}	V_{GS}=±30V,V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D=250uA T_J=25℃	2.0	-	4.0	V
Drain-Source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=6.5A T_J=25℃	-	338	405	mΩ
Gate resistance	Rg	V_{GS}=0V,V_{DS}=0V,f=1MHz	-	0.9	-	Ω
Transconductance	g_{fs}	V_{DS}=40V,I_D=6.5A	-	10	-	S
Input Capacitance	C_{ISS}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	-	2230	-	pF
Output Capacitance	C_{OSS}		-	185	-	
Reverse Transfer Capacitance	C_{RSS}		-	5	-	
Total Gate Charge	Qg	V_{DS} = 400 V, V_{GS} = 0/10 V, I_D = 13 A	-	46	-	nC
Gate- Source charge	Qgs			11		
Gate-Drain charge	Qgd			23		
Turn−On Delay Time	td(on)	V_{DS} = 250 V V_{GS} = 10 V I_D = 13 A R_G = 25Ω T_J = 25℃	-	38	-	ns
Turn−Off Delay Time	td(off)		-	105	-	
Rise time	tr		-	145	-	
Fall time	tf		-	83	-	

Diode Characteristics (T_J = 25℃ unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Diode Continous Forward Current	I_S	T_C=25℃	-	-	13	A
Pulsed Diode Forward Current	I_{SM}		-	-	52	
Diode Forward Voltage	V_{SD}	I_S = 13A T_J = 25℃	-	-	1.5	V
Reverse Recovery Time	trr	V_R = 400 V, I_S = 13 A, dI_S/dt = 100 A/μs,T_J = 25℃	-	300	-	ns
Reverse Recovery Charge	Qrr		-	2.7	-	uC

Typical Performance Characteristics

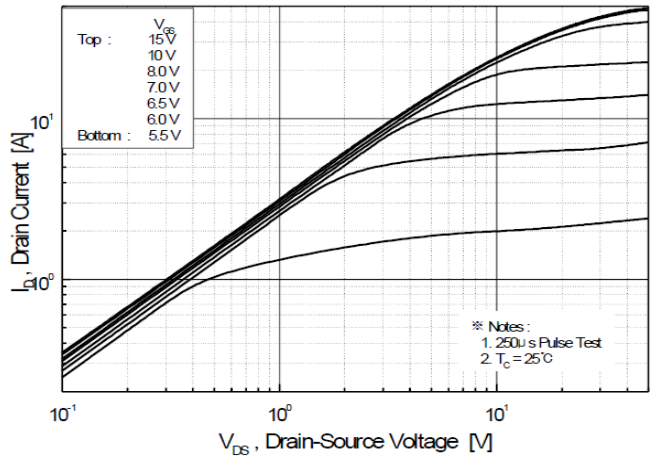


Fig 1. Typical output characteristic

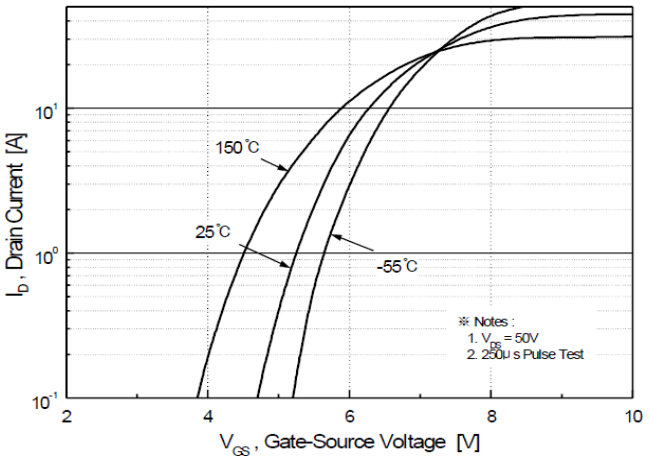


Fig 2. Typical transfer characteristic

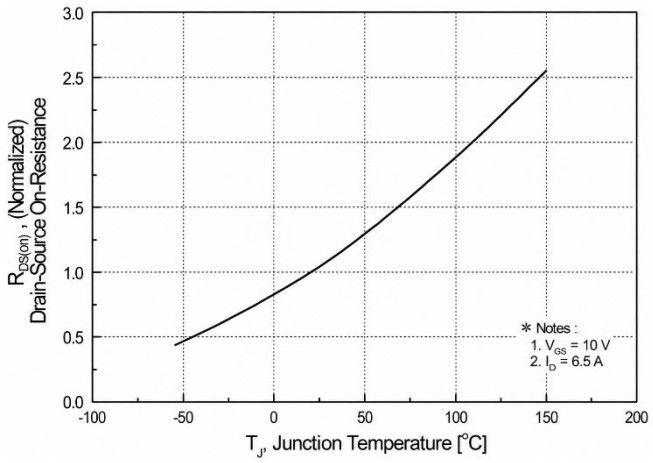


Fig 3. On-Resistance vs. Junction Temperature

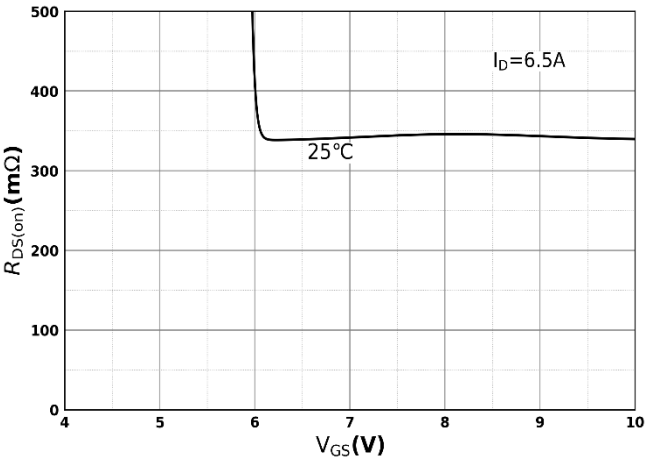


Fig 4. Rds(on) vs Gate Voltage

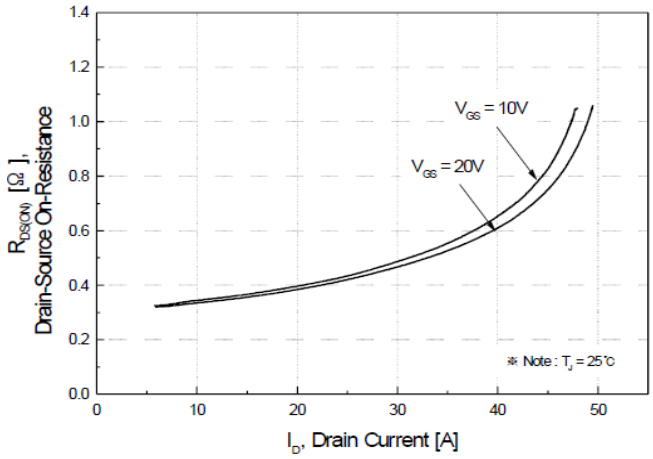


Fig 5. Rds(on) vs Drain Currentand Gate Voltage

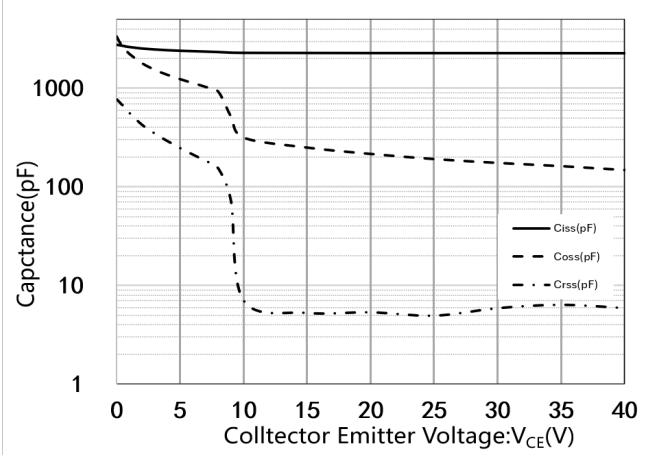


Fig 6. Capacitance Characteristics

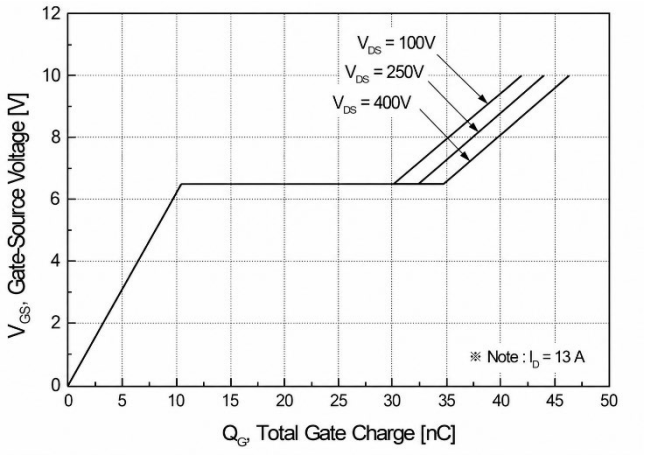


Fig 7. Gate Charge Characteristics

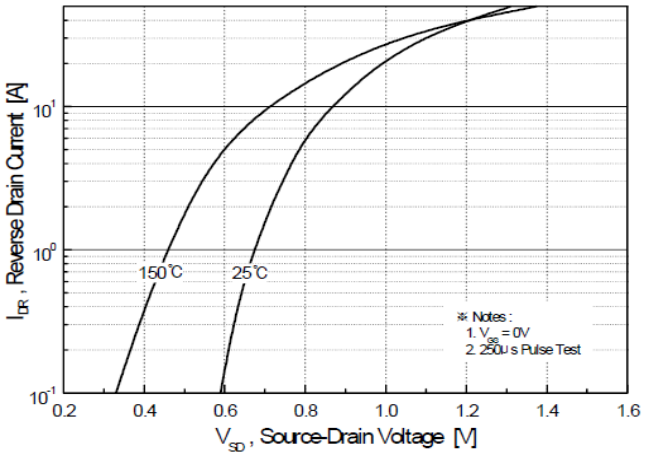


Fig 8. Body-diode Forward Characteristics

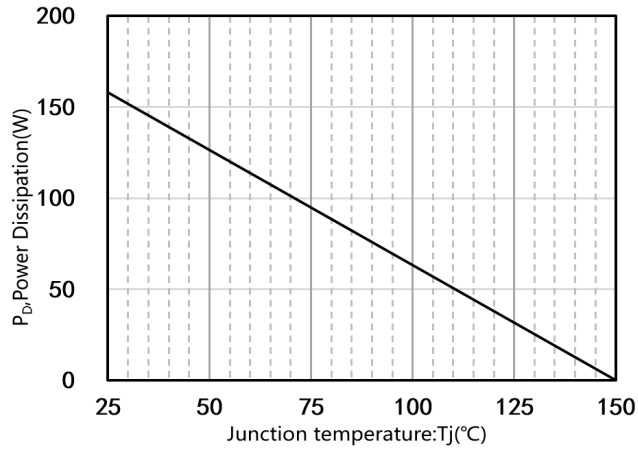


Fig 9. Power Dissipation

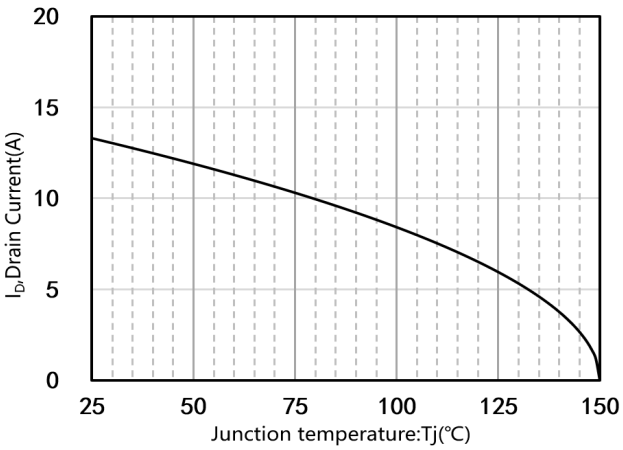


Fig 10. Drain Current Derating

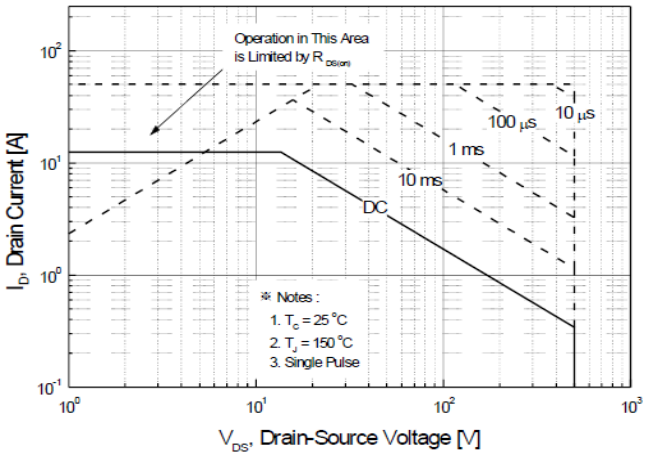


Fig 11. Safe Operating Area

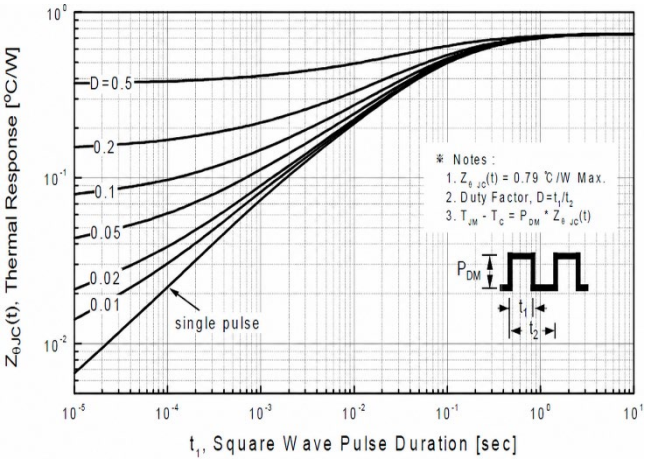
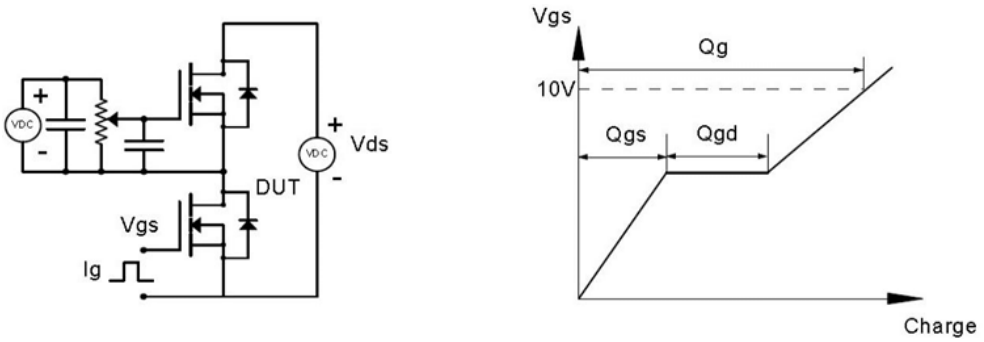
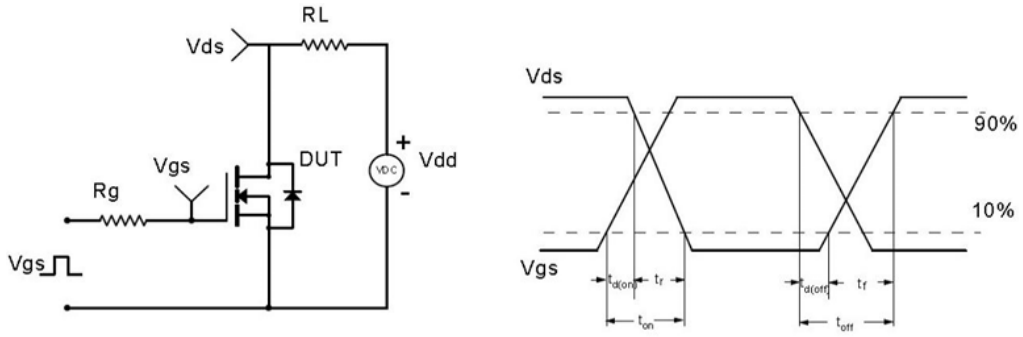


Fig 12. Transient Thermal Response Curve

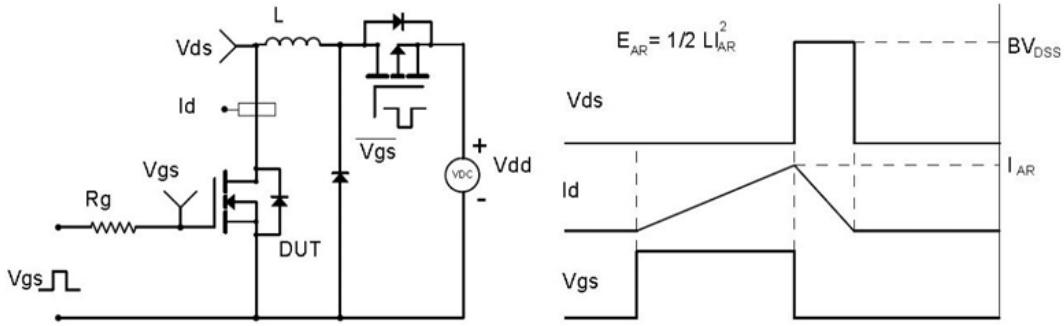
Test Circuit & Waveform



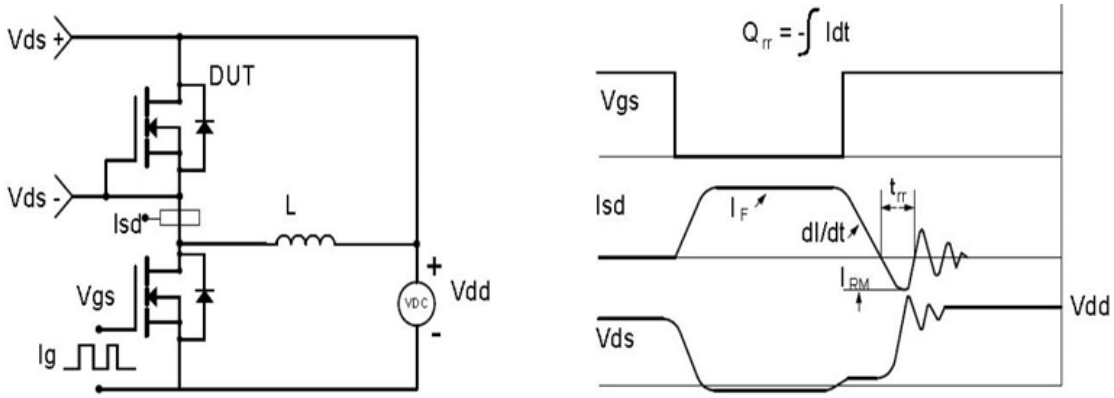
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

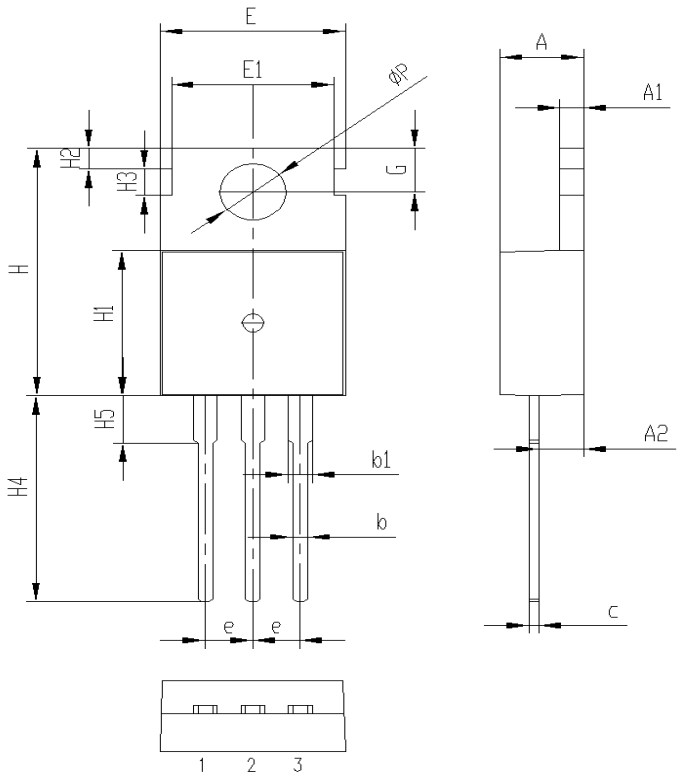


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

Package Information



Symbol	单位 mm		
	Min	Nom	Max
A	4.30	4.5	4.70
A1	1.20	1.30	1.40
A2	2.20	2.4	2.60
b	0.60	0.8	1.00
b1	1.20	1.30	1.40
c	0.40	0.5	0.60
e	2.44	2.54	2.64
E	9.80	10.0	10.2
E1	8.50	8.70	8.90
H	15.5	15.7	15.9
H1	9.00	9.2	9.40
H2	1.10	1.34	1.50
H3	1.50	1.7	1.90
H4	12.9	13.3	13.7
H5	2.80	3.0	3.20
G	2.60	2.8	3.00
ΦP	3.40	3.6	3.80

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