

FH3040BG6

N-Channel Enhancement Mode Power MOSFET

General Description

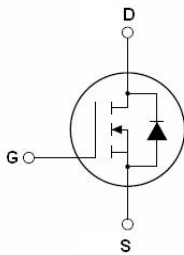
This Power MOSFET is produced using Msemitek's advanced TRENCH technology. This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

Application

- PWM Application
- Load Switch
- Power Management

Features

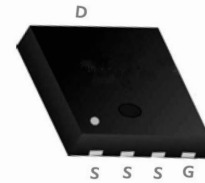
- ◆ $V_{DS} = 30V ; I_D = 38A$
- ◆ $R_{DS(ON)} = 6.0 m\Omega (Typ) @V_{GS} = 10V$
- ◆ $R_{DS(ON)} = 9.5 m\Omega (Typ) @V_{GS} = 4.5V$
- ◆ Very Low On-resistance $R_{DS(ON)}$
- ◆ Low C_{rss}
- ◆ Fast switching
- ◆ 100% avalanche tested
- ◆ Improved dv/dt capability



Schematic diagram



Marking and Pin Assignment



PDFN3.3x3.3-8L top view

Absolute Maximum Ratings

$T_c = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	30	V
I_D	Drain Current	Continuous ($T_c = 25^\circ C$)	38
		Continuous ($T_c = 100^\circ C$)	23
I_{DM}	Drain Current - Pulsed (Note 1)	120	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	121	mJ
E_{AR}	Repetitive Avalanche Energy	25	mJ
dv/dt	Peak diode recovery dv/dt	5	V/ns
P_D	Power Dissipation ($T_c = 25^\circ C$)	12	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	10.4	$^\circ C/W$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ C$

* Drain current limited by maximum junction temperature.

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 uA	30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 30 V, V _{GS} = 0 V	--	--	1	uA
		V _{DS} = 24V, T _C = 125°C	--	--	10	uA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 20V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -20 V, V _{DS} = 0 V	--	--	-100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 uA	1.1	1.6	2.2	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 15A	--	6.0	8.5	mΩ
		V _{GS} = 4.5 V, I _D = 10A	-	9.5	13	

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 15 V, V _{GS} = 0 V, f = 1.0 MHz	--	1270	-	pF
C _{oss}	Output Capacitance		--	132	-	pF
C _{rss}	Reverse Transfer Capacitance		--	110	-	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{GS} = 10 V, V _{DS} = 15 V, R _G = 3 Ω, I _D = 15A (Note 3)	--	12	--	ns
t _r	Turn-On Rise Time		--	18	--	ns
t _{d(off)}	Turn-Off Delay Time		--	28	--	ns
t _f	Turn-Off Fall Time		--	21	--	ns
Q _g	Total Gate Charge	V _{DS} = 15 V, I _D = 15A, V _{GS} = 10V (Note 3)	--	22	--	nC
Q _{gs}	Gate-Source Charge		--	4.6	--	nC
Q _{gd}	Gate-Drain Charge		--	3.3	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current	--	--	38	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	120	A
V _{SD}	Drain to Source Diode Forward Voltage, V _{GS} = 0V, I _{SD} = 15A, T _J = 25°C	--	--	1.2	V
t _{rr}	Body Diode Reverse Recovery Time, I _F = 15A, dI/dt = 100A/μs	--	20	--	nS
Q _{rr}	Body Diode Reverse Recovery Charge, I _F = 15A, dI/dt = 100A/μs	--	23	--	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T_J = 25°C, V_{DD} = 15V, V_G = 10V, R_G = 25Ω, L = 0.5mH,
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycles ≤ 0.5%

N- Channel Typical Characteristics

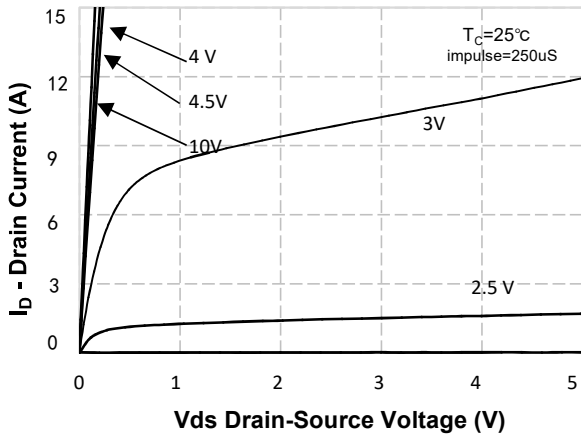


Figure 1. On-Region Characteristics

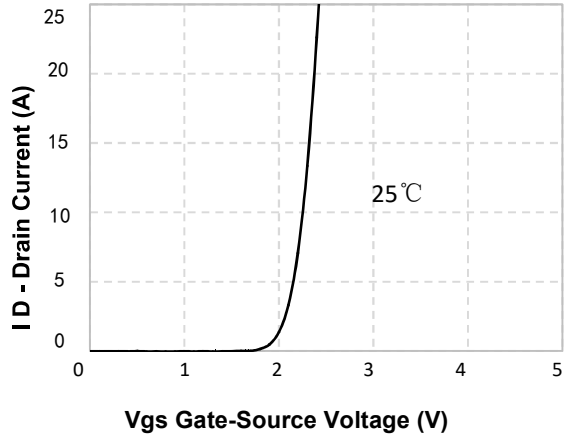


Figure 2. Transfer Characteristics

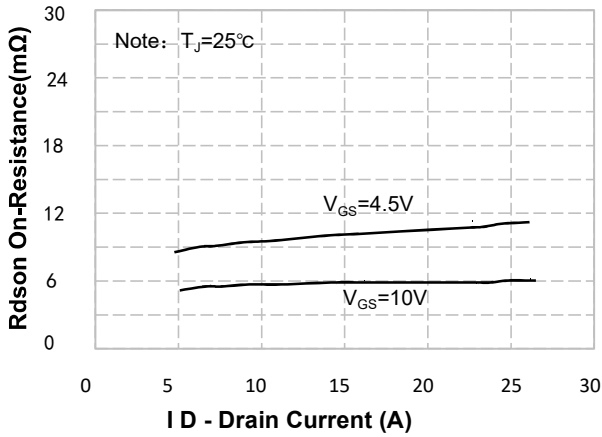


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

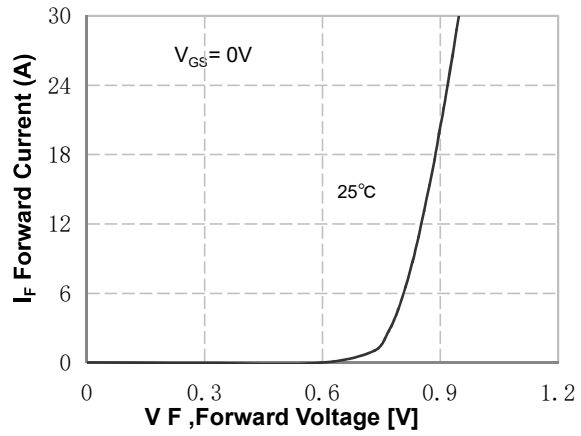


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

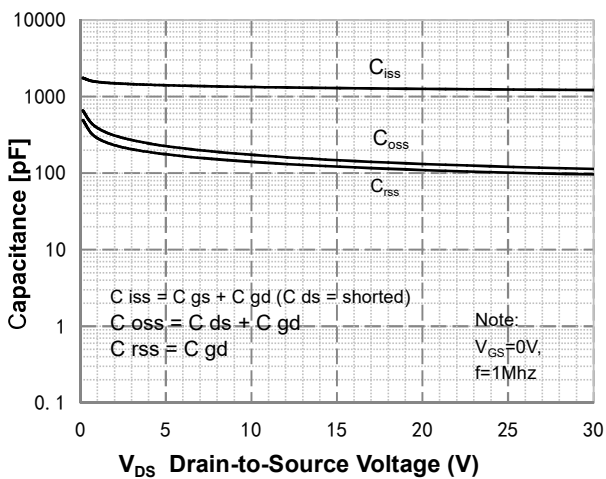


Figure 5. Capacitance Characteristics

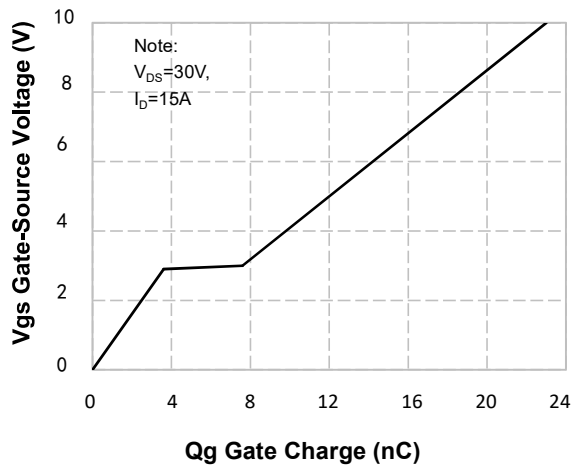


Figure 6. Gate Charge Characteristics

N-Channel Typical Characteristics (Continued)

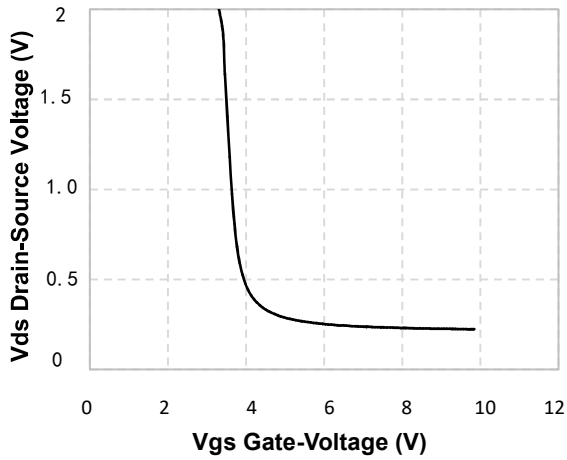


Figure 7. Vds Drain-Source Voltage vs Gate Voltage



Figure 8. On-Resistance vs Gate Voltage

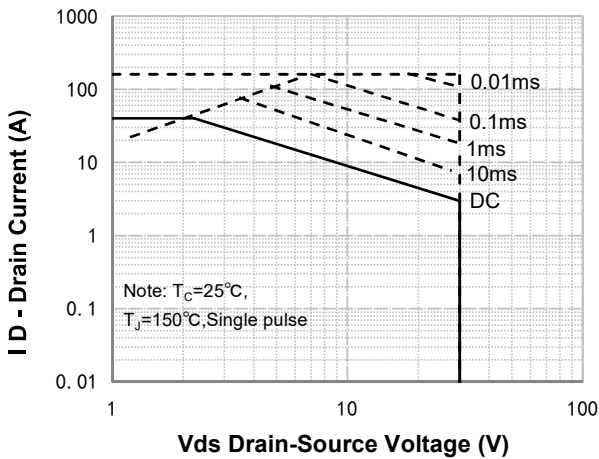


Figure 9. Maximum Safe Operating Area

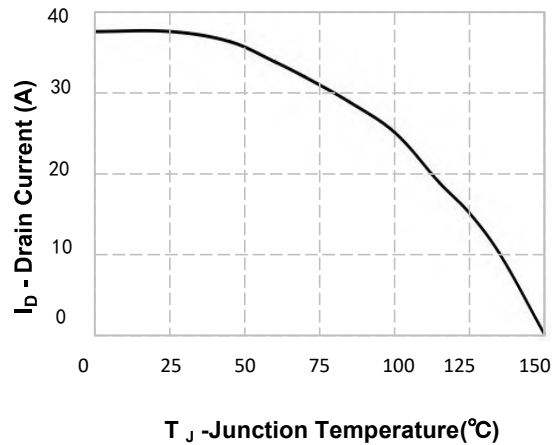


Figure 10. Maximum Continuous Drain Current vs Temperature

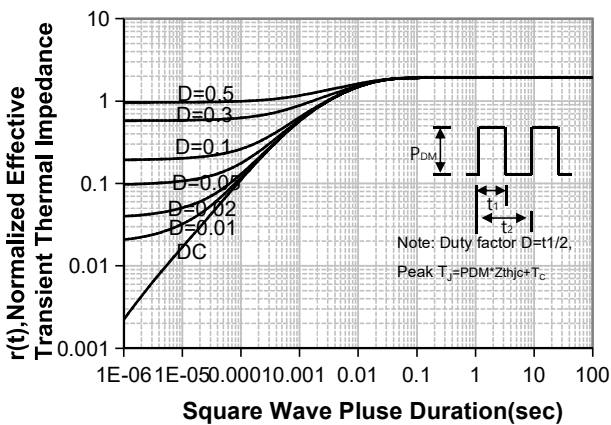
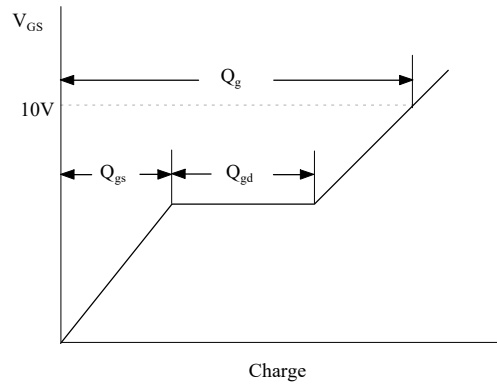
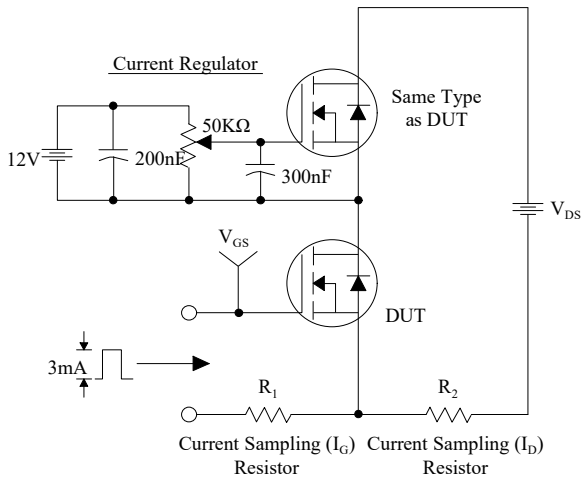
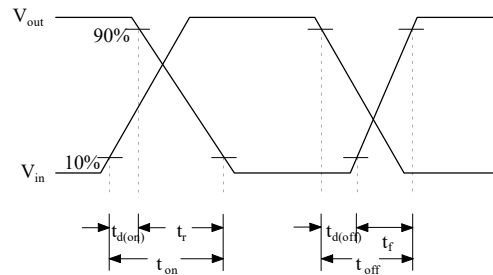
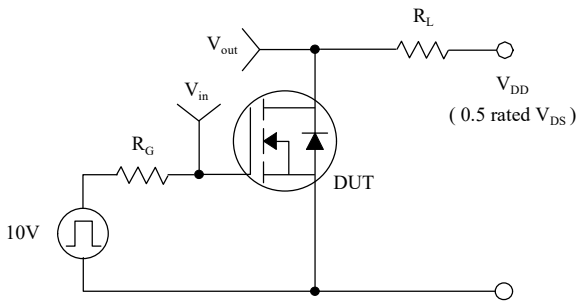


Figure 11. Transient Thermal Response Curve

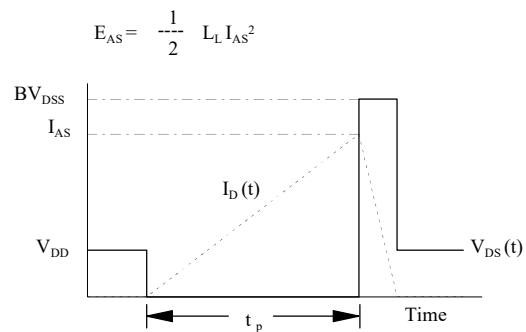
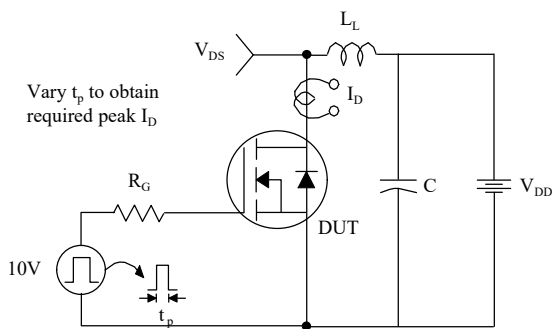
Gate Charge Test Circuit & Waveform



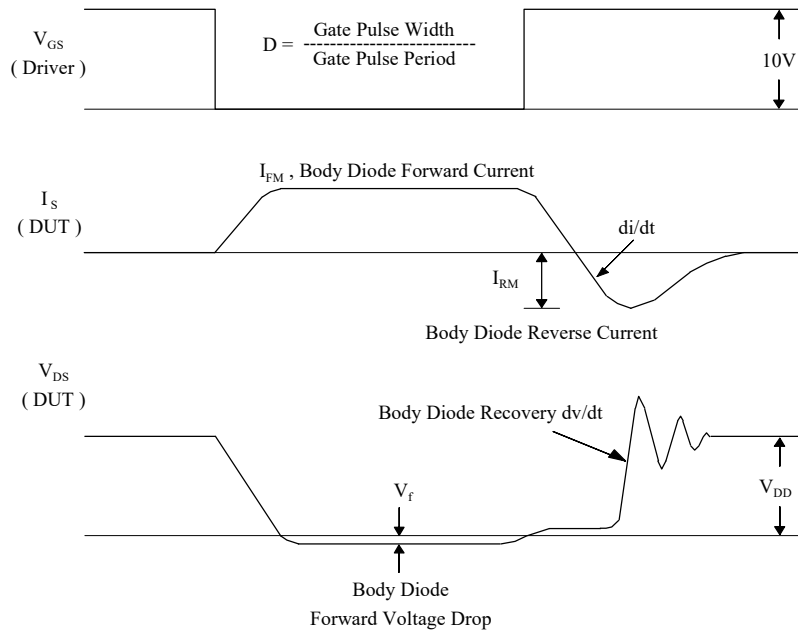
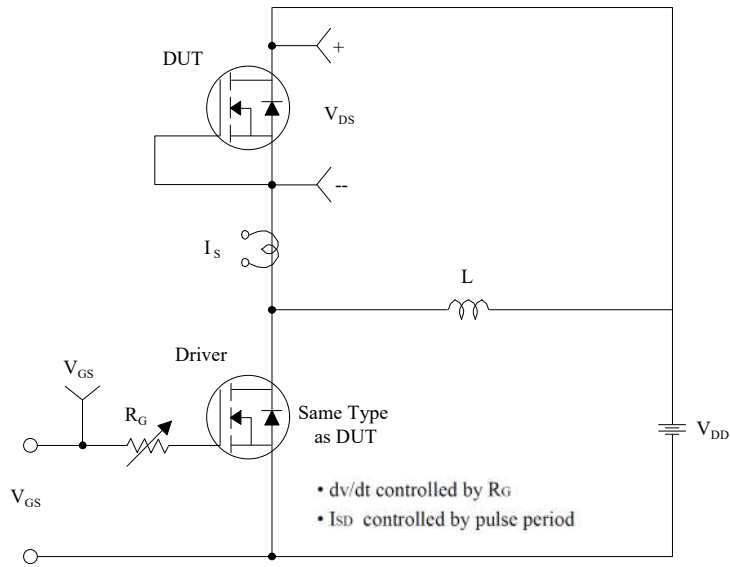
Resistive Switching Test Circuit & Waveforms



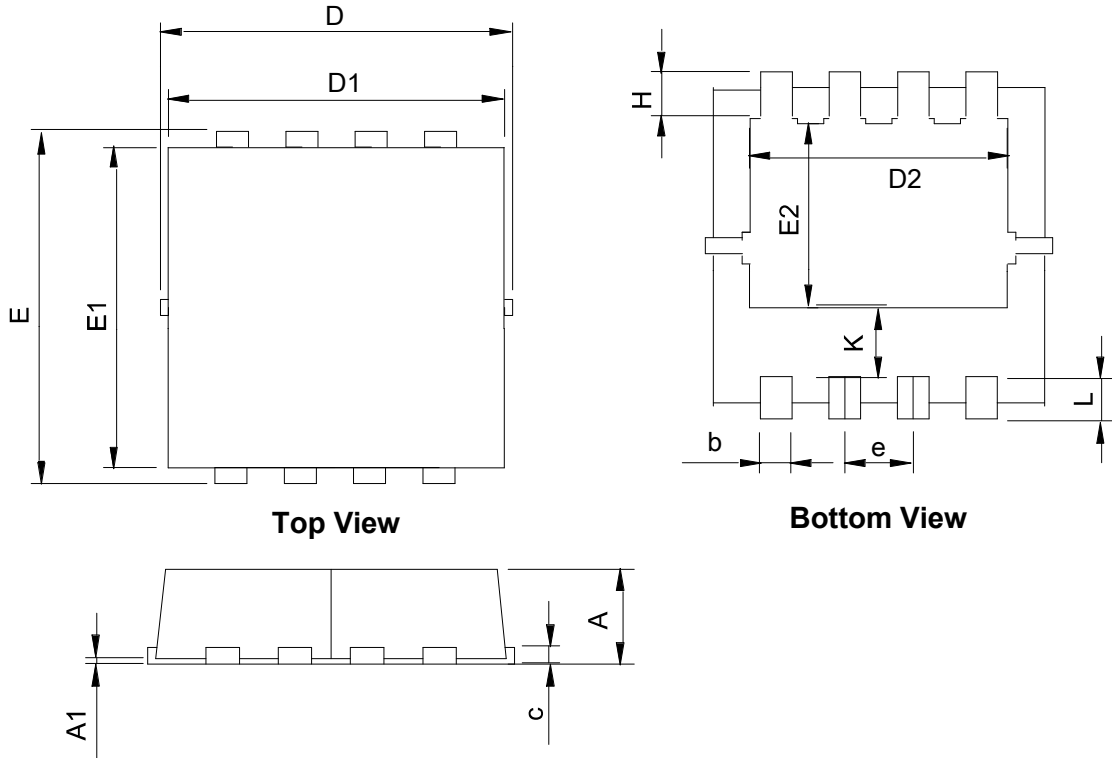
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Information : PDFN3.3x3.3-8L



SYMBOL	PDFN3.3x3.3-8L			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022