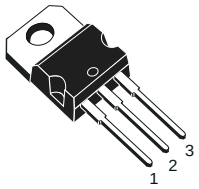
STP62NS04Z

N-CHANNEL CLAMPED 12.5mΩ - 62A TO-220
FULLY PROTECTED MESH OVERLAY™ MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP62NS04Z	CLAMPED	<0.015 Ω	62 A

- TYPICAL $R_{DS}(on)$ = 0.0125 Ω
- 100% AVALANCHE TESTED
- LOW CAPACITANCE AND GATE CHARGE
- 175 ºC MAXIMUM JUNCTION TEMPERATURE



TO-220

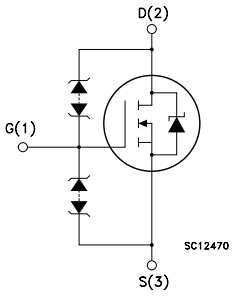
DESCRIPTION

This fully clamped Mosfet is produced by using the latest advanced Company's Mesh Overlay process which is based on a novel strip layout.
The inherent benefits of the new technology coupled with the extra clamping capabilities make this product particularly suitable for the harshest operation conditions such as those encountered in the automotive environment. Any other application requiring extra ruggedness is also recommended.

APPLICATIONS

- ABS, SOLENOID DRIVERS
- POWER TOOLS

INTERNAL SCHEMATIC DIAGRAM



Ordering Information

SALES TYPE	MARKING	PACKAGE	PACKAGING
STP62NS04Z	P62NS04Z	TO-220	TUBE

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	CLAMPED	V
V_{DG}	Drain-gate Voltage	CLAMPED	V
V_{GS}	Gate- source Voltage	CLAMPED	V
I_D	Drain Current (continuous) at T_C = 25°C	62	A
I_D	Drain Current (continuous) at T_C = 100°C	37.5	A
I_{DG}	Drain Gate Current (continuous)	± 50	mA
I_{GS}	Gate SourceCurrent (continuous)	± 50	mA
I_{DM}(•)	Drain Current (pulsed)	248	A
P_{tot}	Total Dissipation at T_C = 25°C	110	W
	Derating Factor	0.74	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	8	V/ns
E_{AS} (2)	Single Pulse Avalanche Energy	500	mJ
V_{ESD}	ESD (HBM - C = 100pF, R=1.5 kΩ)	8	kV
T_{stg}	Storage Temperature	-55 to 175	°C
T_j	Operating Junction Temperature		

(•) Pulse width limited by safe operating area.

(1) I_{SD} ≤40A, di/dt ≤100A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ T_{JMAX}
(2) Starting T_j = 25 ºC, I_D = 20A, V_{DD}= 20V

THERMAL DATA

$R_{thj\text{-}case}$ $R_{thj\text{-}amb}$ T_l	Thermal Resistance Junction-case Thermal Resistance Junction-ambient Maximum Lead Temperature For Soldering Purpose (for 10 sec., 1.6mm from case)	Max Max	1.36 62.5 300	°C/W °C/W °C

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Clamped Voltage	I_D = 1 mA, V_{GS} = 0	33			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = 16 V			10	µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 10 V			10	µA
V_{GSS}	Gate-Source Breakdown Voltage	I_{GS} = 100 µA	18			V

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = 250 µA	2		4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10 V I_D = 30 A		12.5	15	mΩ

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	V_{DS} = 15 V I_D=30A		20		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		1330 420 135		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	V_{DD} = 20 V I_D = 20 A R_G = 4.7 Ω V_{GS} = 10 V (Resistive Load, Figure 3)		13 104		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD}= 20 V I_D= 40 A V_{GS}= 10V		34 10 11.5	47	nC nC nC

SWITCHING OFF

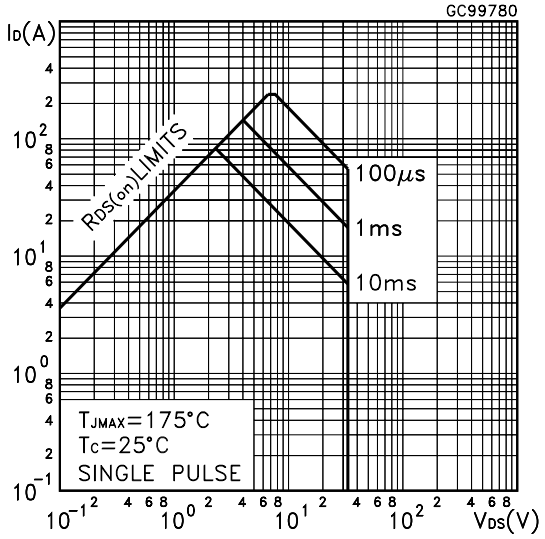
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	V_{DD} = 20 V I_D = 20 A R_G = 4.7 Ω V_{GS} = 10 V (Resistive Load, Figure 3)		41 42		ns ns
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	V_{clamp} = 30 V I_D = 40 A R_G = 4.7Ω, V_{GS} = 10 V (Inductive Load, Figure 5)		30 54 90		ns ns ns

SOURCE DRAIN DIODE

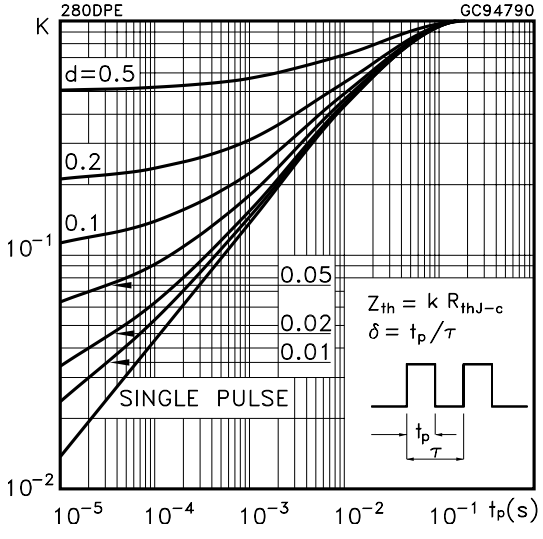
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (•)	Source-drain Current Source-drain Current (pulsed)				62 248	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 62 A V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 40 A di/dt = 100A/µs V_{DD} = 20 V T_j = 150°C (see test circuit, Figure 5)		45 65 2.9		ns nC A

(*)Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(•)Pulse width limited by safe operating area.

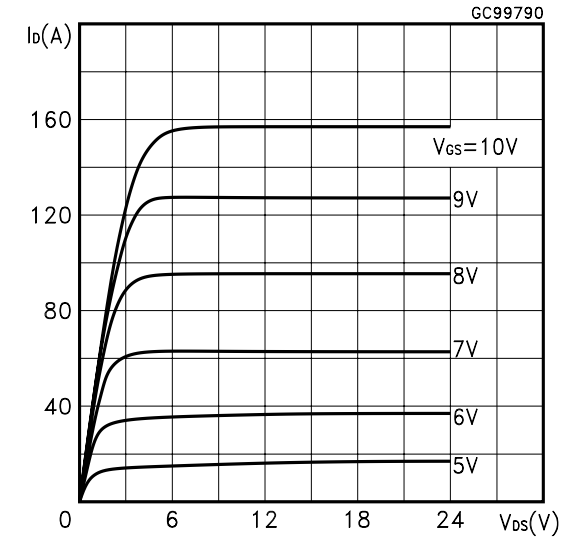
Safe Operating Area



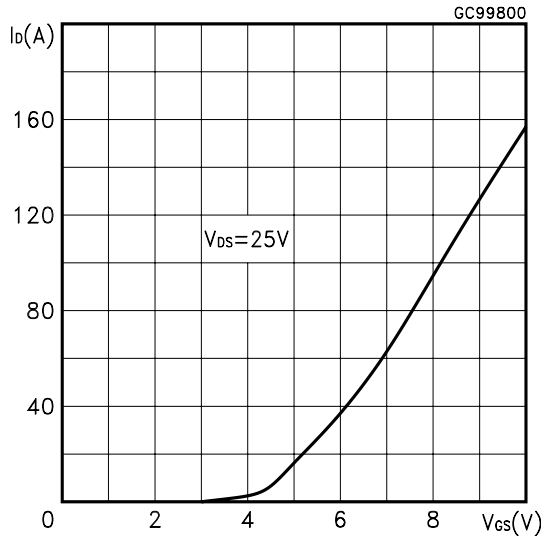
Thermal Impedance



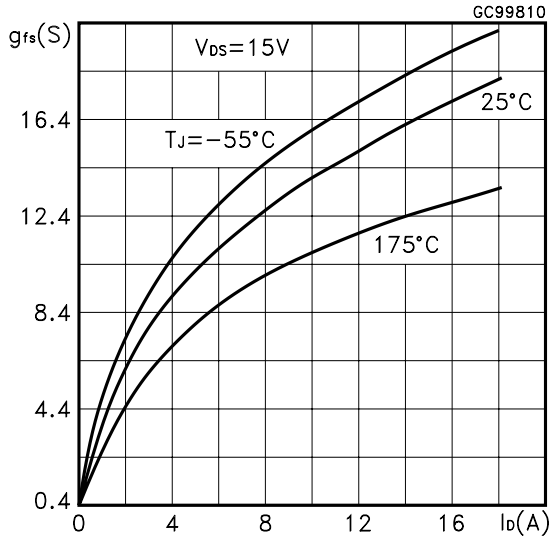
Output Characteristics



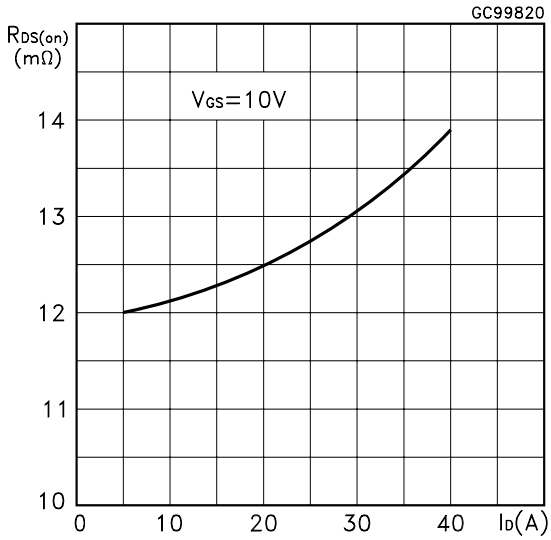
Transfer Characteristics



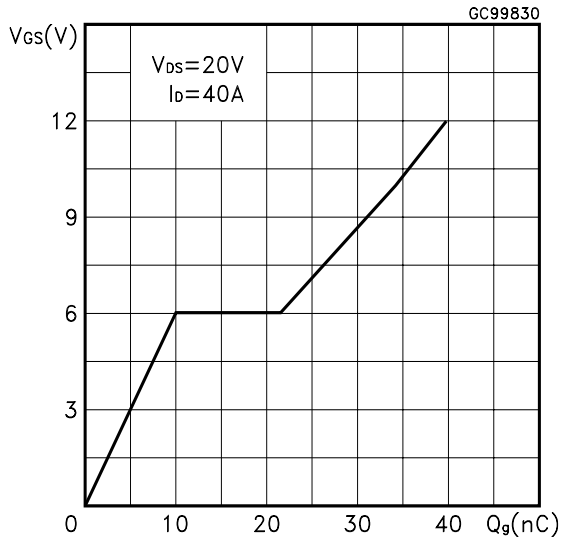
Transconductance



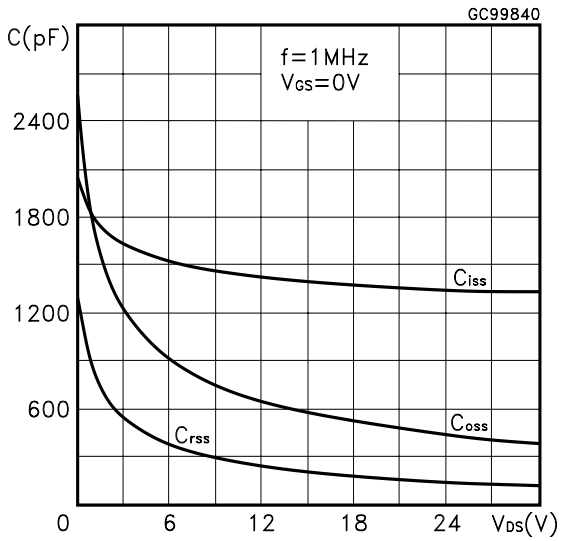
Static Drain-source On Resistance



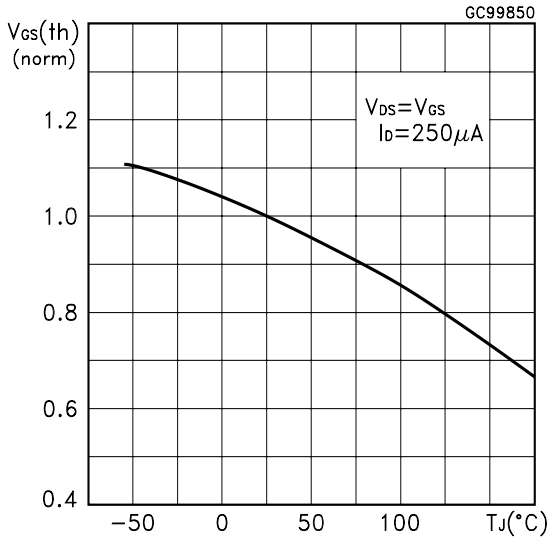
Gate Charge vs Gate-source Voltage



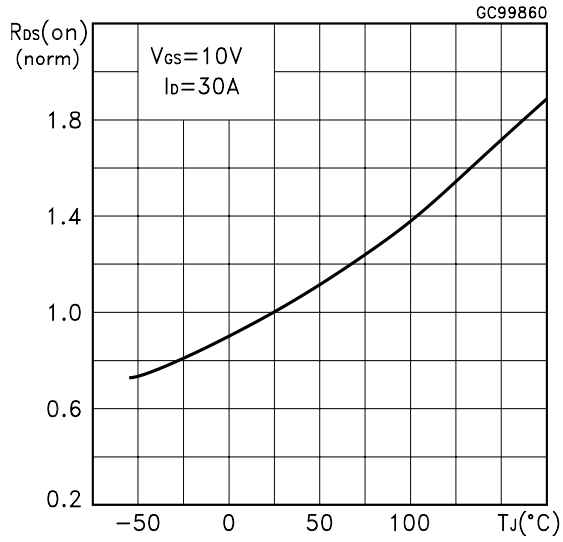
Capacitance Variations



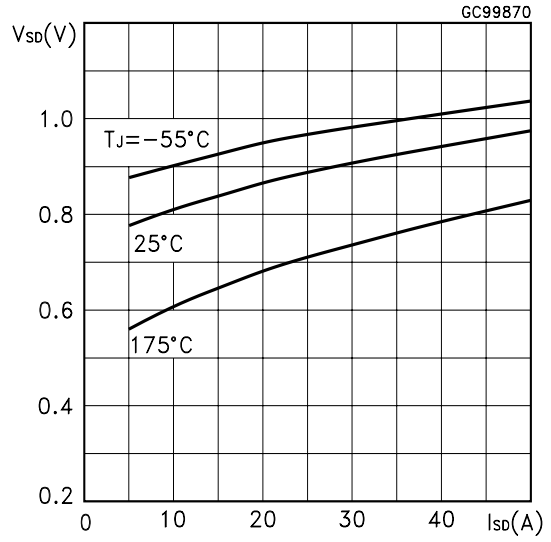
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



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Normalized Breakdown Voltage Temperature.

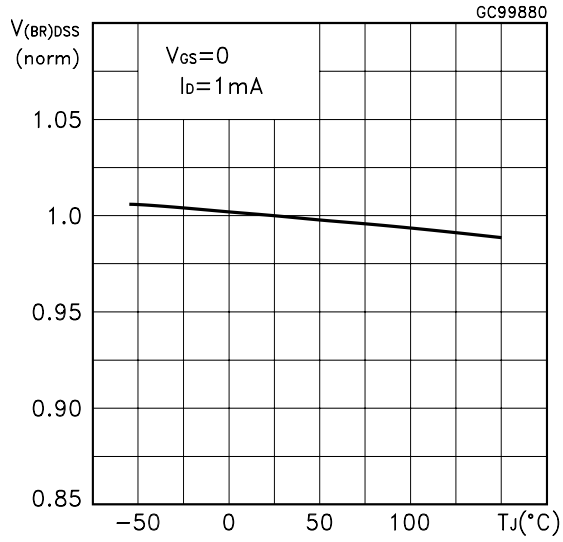

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Fig. 1: Unclamped Inductive Load Test Circuit

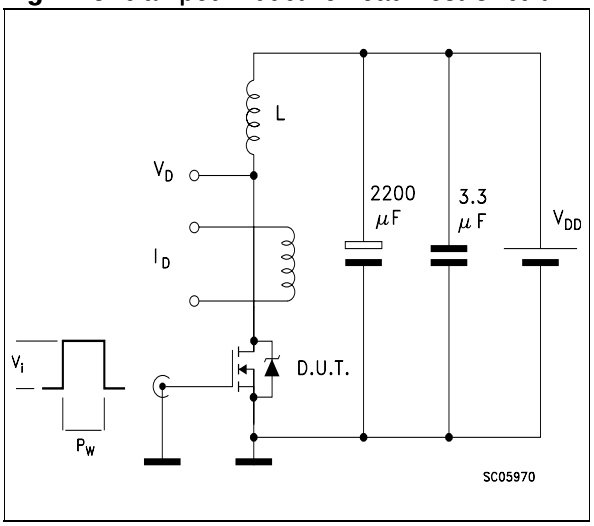


Fig. 2: Unclamped Inductive Waveform

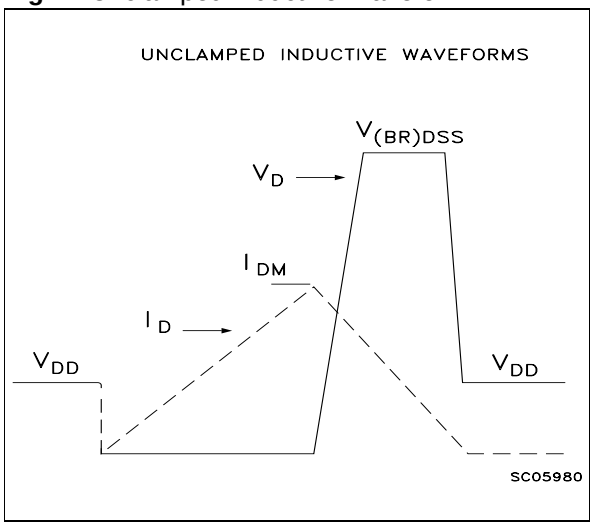


Fig. 3: Switching Times Test Circuits For Resistive Load

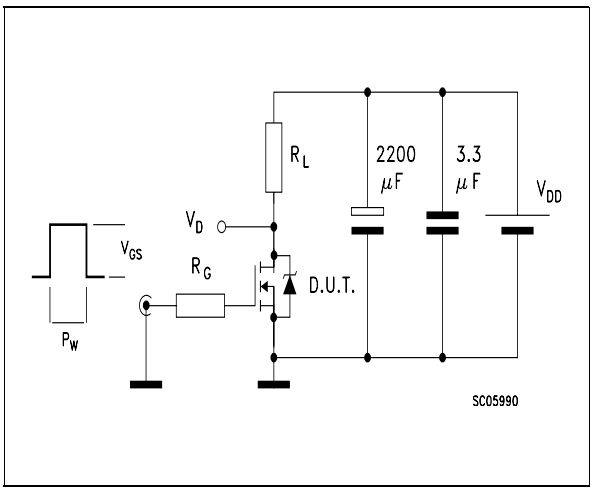


Fig. 4: Gate Charge test Circuit

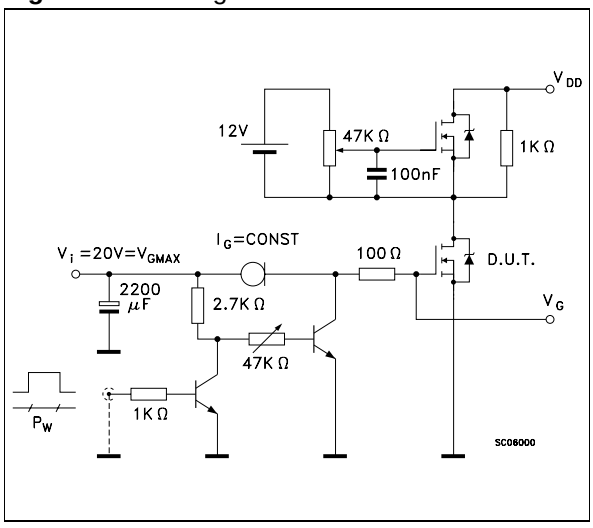
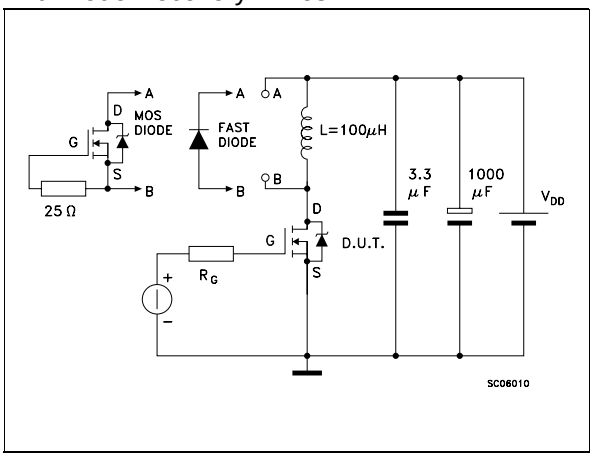


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-220 MECHANICAL DATA

DIM.	mm.			inch.		
	MIN.	TYP.	MAX.	MIN.	TYP.	TYP.
A	4.4		4.6	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.40		2.70	0.094		0.106
H2	10		10.40	0.393		0.409
L2	16.10	16.40	16.73	0.633	0.645	0.658
L4	13		14	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.20		6.60	0.244		0.260
L9	3.50		3.93	0.137		0.154
DIA	3.75		3.85	0.147		0.151