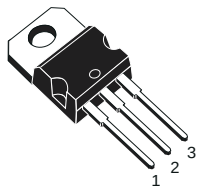
STP100NH02L

N-CHANNEL 24V - 0.0052 Ω - 60A TO-220
STripFET™ III POWER MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP100NH02L	24 V	< 0.006 Ω	60 A (2)

- TYPICAL R_{DS}(on) = 0.0052 Ω @ 10 V
- TYPICAL R_{DS}(on) = 0.007 Ω @ 5 V
- $R_{DS(ON)}$ * Qg INDUSTRY's BENCHMARK
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED
- LOW THRESHOLD DEVICE



TO-220

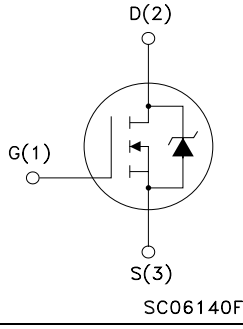
DESCRIPTION

The STP100NH02L utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This is suitable fot the most demanding DC-DC converter applications where high efficiency is to be achieved.

APPLICATIONS

- SPECIFICALLY DESIGNED AND OPTIMISED FOR HIGH EFFICIENCY DC/DC CONVERTERS

INTERNAL SCHEMATIC DIAGRAM



Ordering Information

SALES TYPE	MARKING	PACKAGE	PACKAGING
STP100NH02L	P100NH02L	TO-220	TUBE

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{spike(1)}$	Drain-source Voltage Rating	30	V
V_{DS}	Drain-source Voltage (V_{GS} = 0)	24	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	24	V
V_{GS}	Gate- source Voltage	± 20	V
I_D(2)	Drain Current (continuous) at T_C = 25°C	60	A
I_D(2)	Drain Current (continuous) at T_C = 100°C	60	A
I_{DM}(3)	Drain Current (pulsed)	240	A
P_{tot}	Total Dissipation at T_C = 25°C	100	W
	Derating Factor	0.67	W/°C
E_{AS} (4)	Single Pulse Avalanche Energy	600	mJ
T_{stg}	Storage Temperature	-55 to 175	°C
T_j	Max. Operating Junction Temperature		

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.5	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose		300	°C

ELECTRICAL CHARACTERISTICS (T_{CASE} = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 25 mA, V_{GS} = 0	24			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = 20 V V_{DS} = 20 V T_C = 125°C			1 10	µA µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 20 V			±100	nA

ON (5)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = 250 µA	1	1.8		V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10 V I_D = 30 A V_{GS} = 5 V I_D = 15 A		0.0052 0.007	0.006 0.011	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (5)	Forward Transconductance	V_{DS} = 10 V I_D = 30 A		40		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 15V f = 1 MHz V_{GS} = 0		2850 800 120		pF pF pF
R_G	Gate Input Resistance	f=1 MHz Gate DC Bias=0 Test Signal Level =20 mV Open Drain		1		Ω

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} = 10 V I_D =30 A R_G = 4.7 Ω V_{GS} = 10 V (Resistive Load, Figure 3)		13 75		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD}=10 V I_D=60 A V_{GS}=10 V		47.5 10 7	64	nC nC nC

SWITCHING OFF

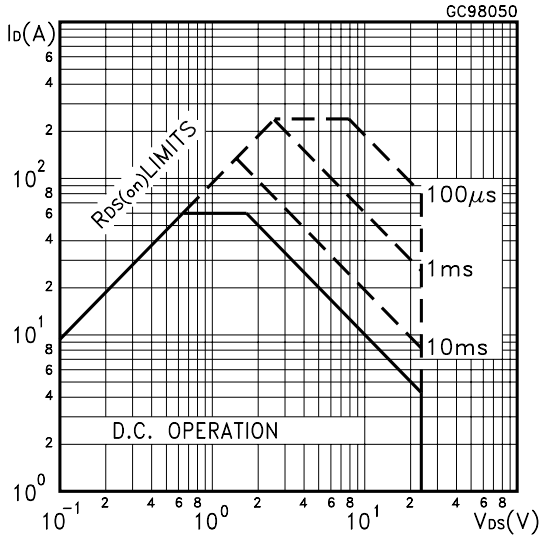
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	V_{DD} = 10 V I_D = 30 A R_G = 4.7Ω, V_{GS} = 10 V (Resistive Load, Figure 3)		50 18	 24.3	ns ns

SOURCE DRAIN DIODE

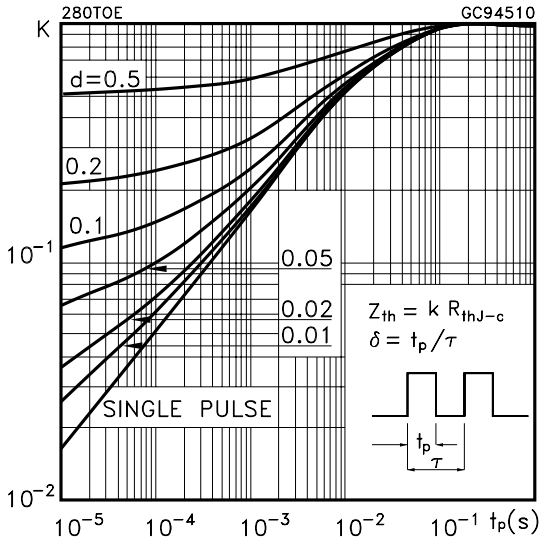
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}	Source-drain Current Source-drain Current (pulsed)				60 240	A A
V_{SD} (5)	Forward On Voltage	I_{SD} = 30 A V_{GS} = 0			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 60 A di/dt = 100A/µs V_{DD} = 16 V T_j = 150°C (see test circuit, Figure 5)		35 35 2		ns nC A

(1) Garanted when external Rg=4.7 Ω and $t_f < t_{fmax}$.
(2) Value limited by wire bonding
(3) Pulse width limited by safe operating area.
(4) Starting T_j = 25 °C, I_D = 30A, V_{DD} = 15V
(5) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(6) $Q_{oss} = C_{oss}*\Delta V_{in}$, $C_{oss} = C_{gd} + C_{ds}$. See Appendix A
(7) Gate charge for synchronous operation

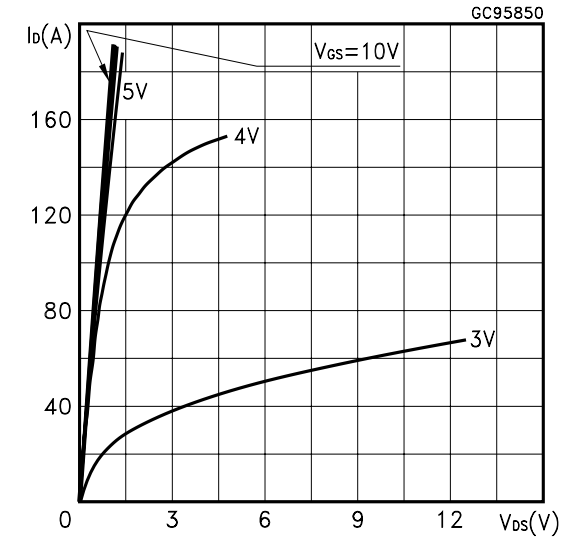
Safe Operating Area



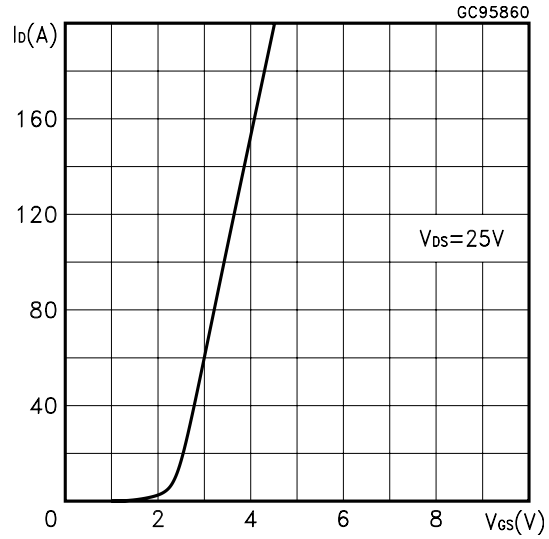
Thermal Impedance



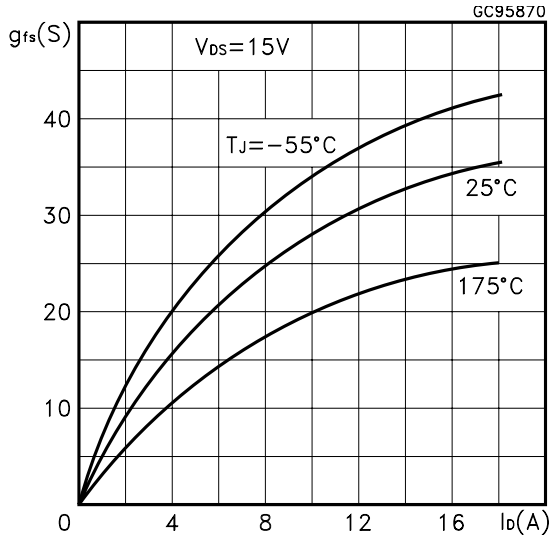
Output Characteristics



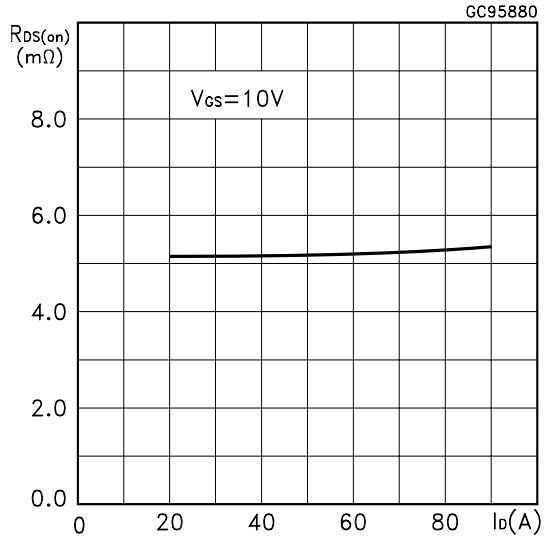
Transfer Characteristics



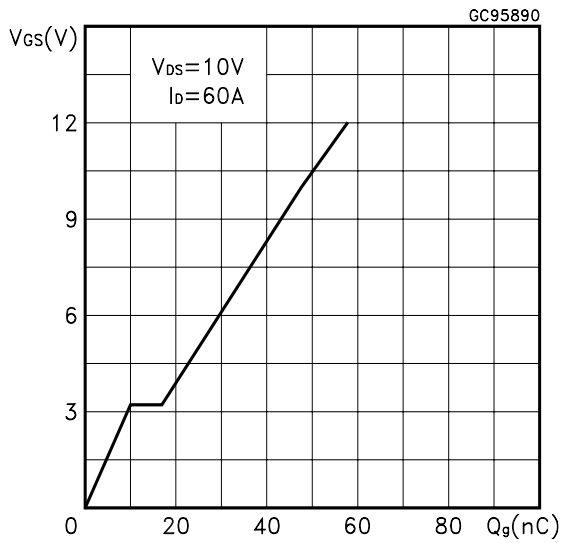
Transconductance



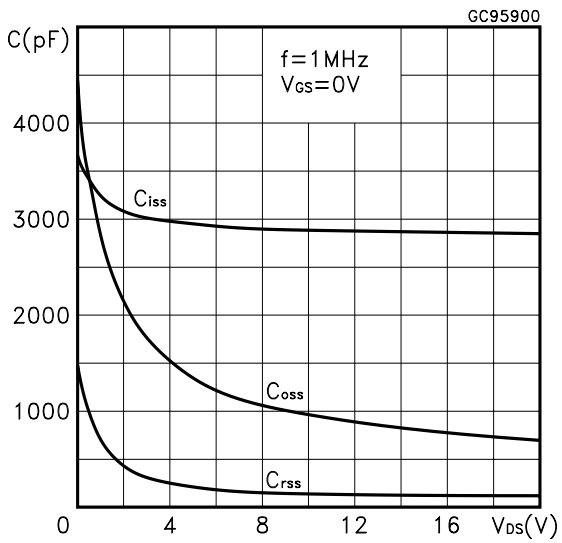
Static Drain-source On Resistance



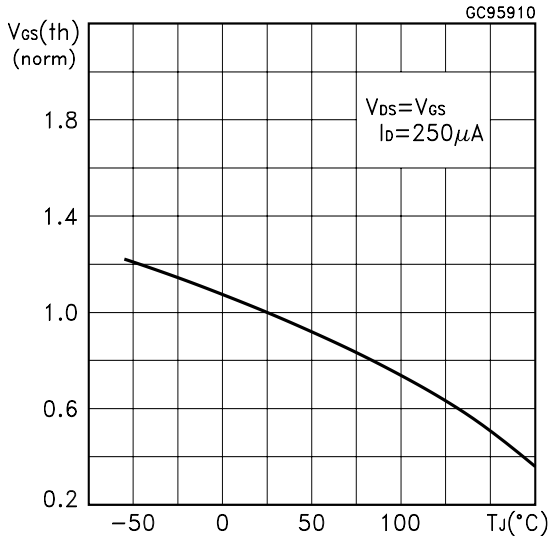
Gate Charge vs Gate-source Voltage



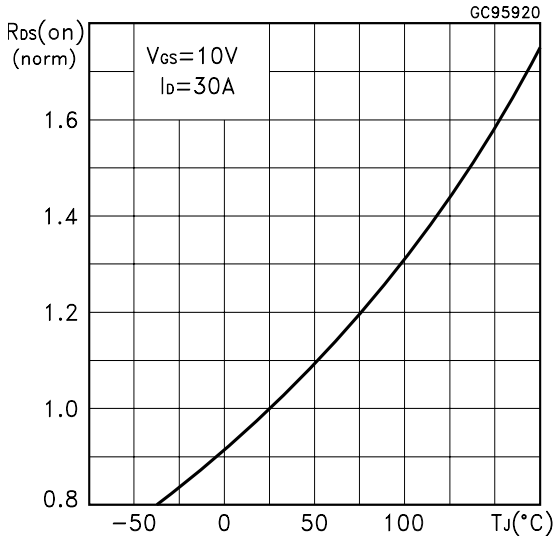
Capacitance Variations



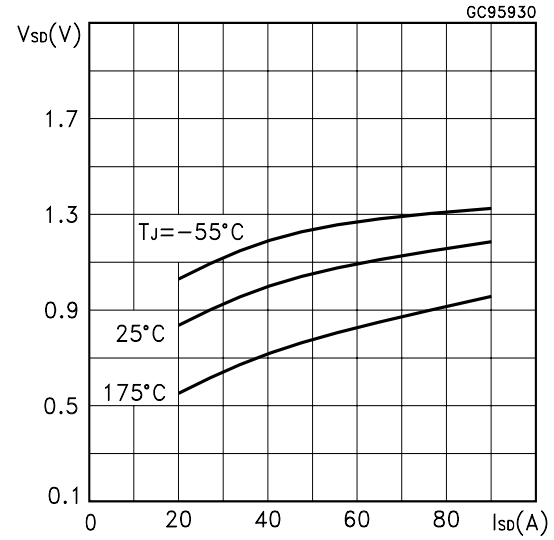
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



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Normalized Breakdown Voltage vs Temperature.

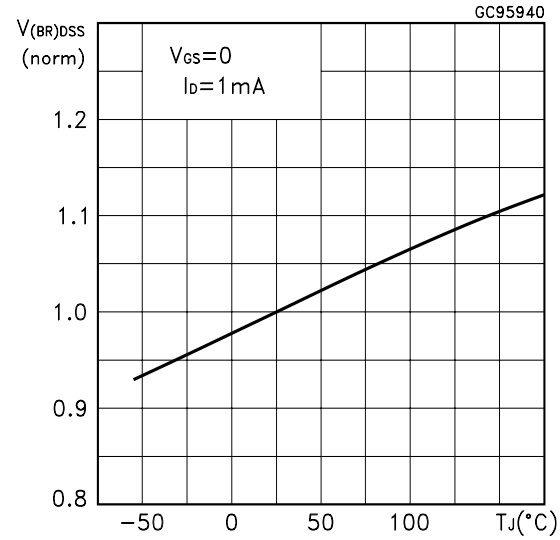

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Fig. 1: Unclamped Inductive Load Test Circuit

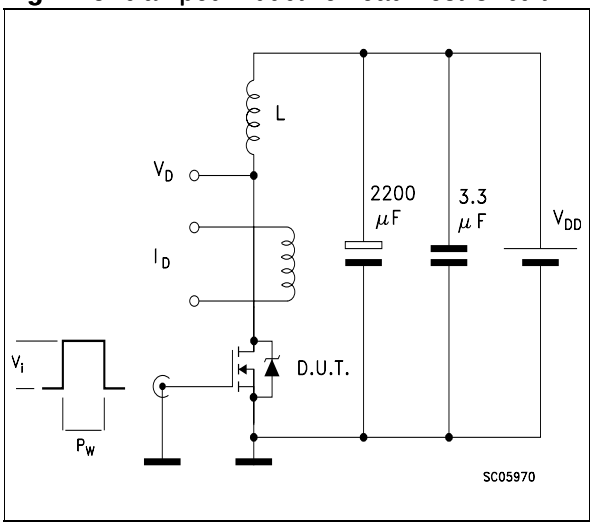


Fig. 2: Unclamped Inductive Waveform

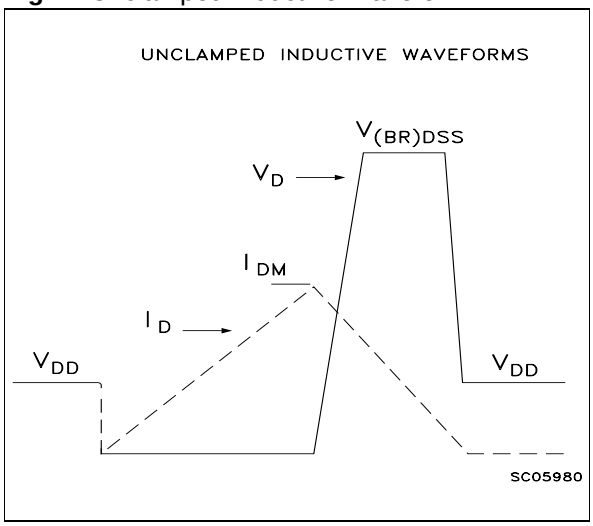


Fig. 3: Switching Times Test Circuits For Resistive Load

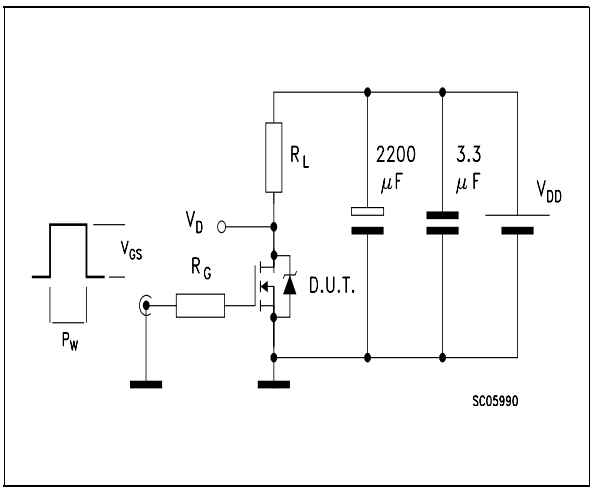


Fig. 4: Gate Charge test Circuit

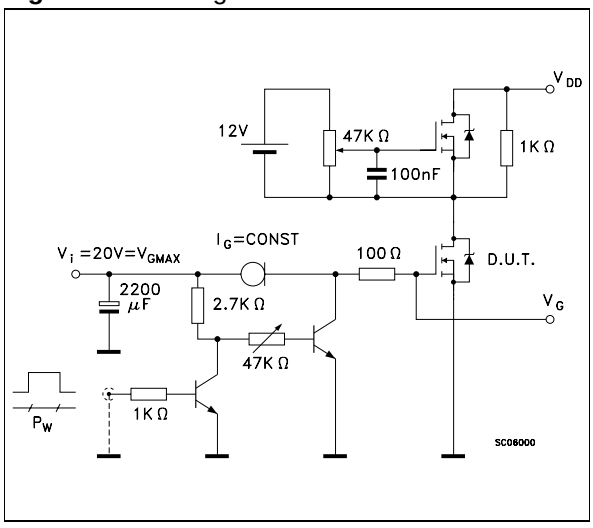
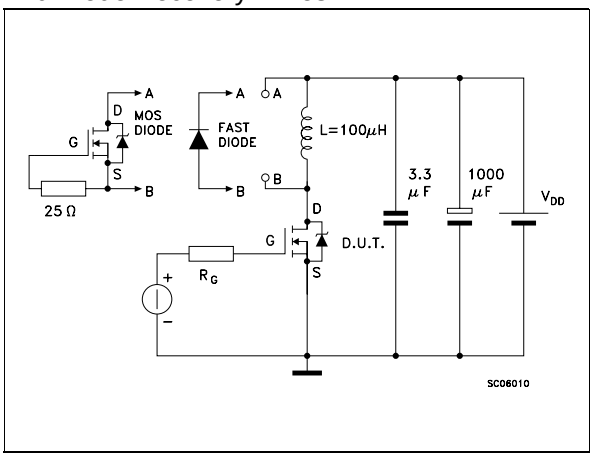


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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
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		16.40			0.645	
L3		28.90			1.137	
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