SGS-THOMSON MICROELECTRONICS

STP80NE06-10

N - CHANNEL ENHANCEMENT MODE
" SINGLE FEATURE SIZE™ " POWER MOSFET

| TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STP80NE06-10	60 V	<0.01 Ω	80 A

- TYPICAL $R_{DS(on)}$ = 0.0085 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION

DESCRIPTION
This Power MOSFET is the latest development of SGS-THOMSON unique "Single Feature Size™ " strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS
- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC CONVERTERS
- AUTOMOTIVE ENVIRONMENT

TO-220

INTERNAL SCHEMATIC DIAGRAM

SC06140
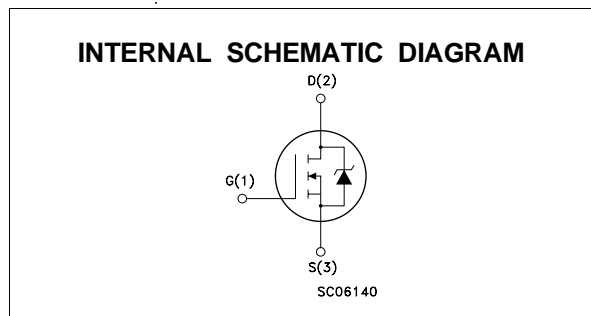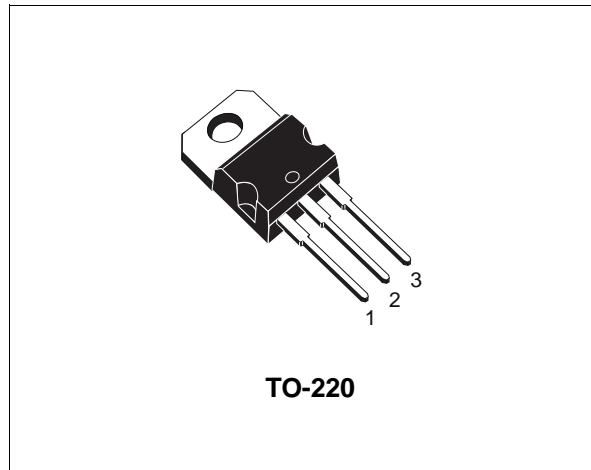
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	60	V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	60	V
V_{GS}	Gate-source Voltage	± 20	V
I_D	Drain Current (continuous) at T_c = 25 ^{o}C	80	A
I_D	Drain Current (continuous) at T_c = 100 ^{o}C	57	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	320	A
P_{tot}	Total Dissipation at T_c = 25 ^{o}C	150	W
	Derating Factor	1	W/^{o}C
dv/dt	Peak Diode Recovery voltage slope	7	V/ns
T_{stg}	Storage Temperature	-65 to 175	^{o}C
T_j	Max. Operating Junction Temperature	175	^{o}C

(•) Pulse width limited by safe operating area   (1) $I_{SD} \le 80$ A, di/dt ≤ 300 A/μs, $V_{DD} \le V_{(BR)DSS}$, $T_j \le T_{JMAX}$

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	1	$^{o}C/W$
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	62.5	oC/W
$R_{thc-sink}$	Thermal Resistance Case-sink	Typ	0.5	$^{o}C/W$
T_l	Maximum Lead Temperature For Soldering Purpose		300	^{o}C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max, $\delta < 1\%$)	80	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25\ ^{o}C$, $I_D = I_{AR}$, $V_{DD} = 30$ V)	250	mJ

ELECTRICAL CHARACTERISTICS ($T_{case} = 25\ ^{o}C$ unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\ \mu A$ $V_{GS} = 0$	60			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	V_{DS} = Max Rating V_{DS} = Max Rating $T_c = 125\ ^{o}C$			1 10	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20$ V			± 100	nA

ON ($*$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\ \mu A$	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10V$ $I_D = 40$ A		8.5	10	$m\Omega$
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)}$ x $R_{DS(on)max}$ $V_{GS} = 10$ V	80			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} ($*$)	Forward Transconductance	$V_{DS} > I_{D(on)}$ x $R_{DS(on)max}$ $I_D = 40$ A	19	38		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25$ V f = 1 MHz $V_{GS} = 0$		7600 890 150	10000 1100 200	pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	$V_{DD} = 30$ V $I_D = 40$ A $R_G = 4.7$ Ω $V_{GS} = 10$ V (see test circuit, figure 3)		50 150	65 200	ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 48$ V $I_D = 80$ A $V_{GS} = 10$ V		140 20 50		nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 48$ V $I_D = 40$ A $R_G = 4.7$ Ω $V_{GS} = 10$ V (see test circuit, figure 5)		45 75 130	60 100 170	ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				80 320	A A
V_{SD} (*)	Forward On Voltage	$I_{SD} = 80$ A $V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 80$ A di/dt = 100 A/μs $V_{DD} = 30$ V $T_j = 150$ ^{o}C (see test circuit, figure 5)		100 0.4 8		ns μC A

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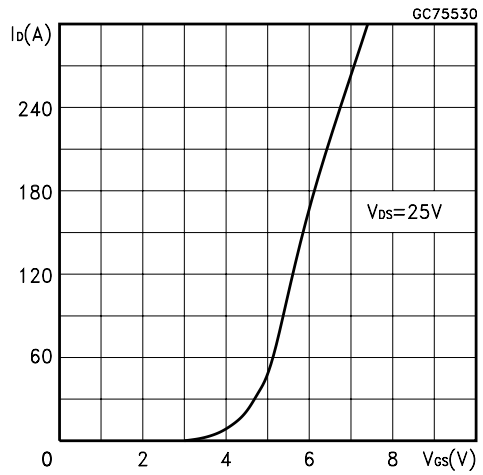($\bullet$) Pulse width limited by safe operating area

Safe Operating Area for
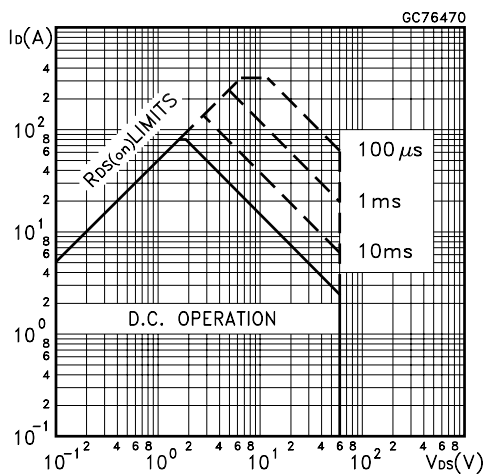
Thermal Impedance
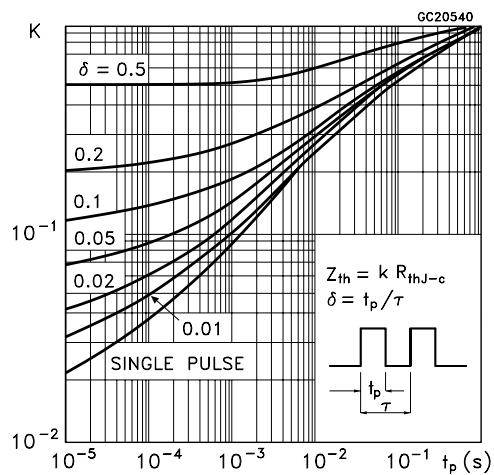
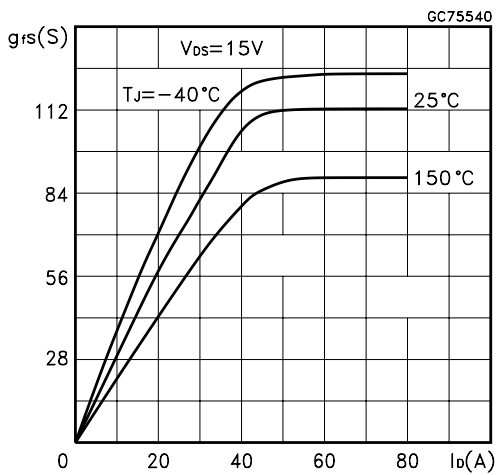Output Characteristics

GC75520
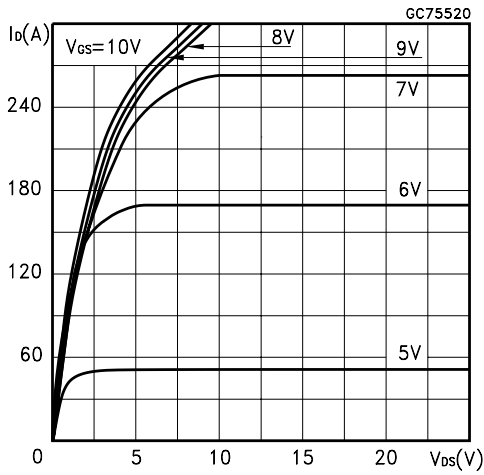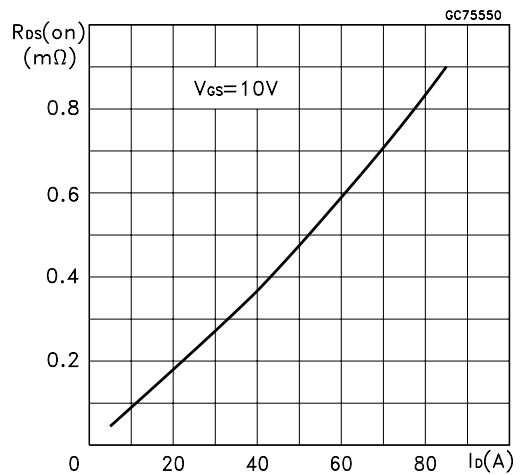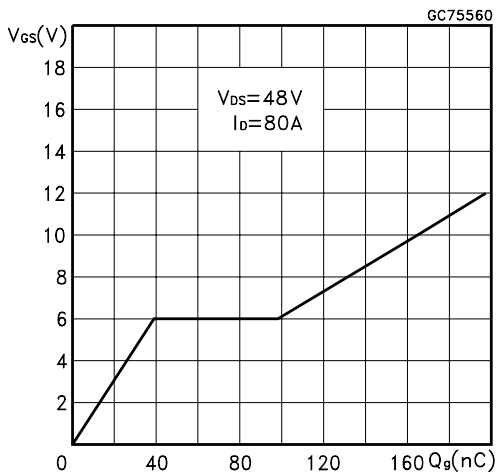

Transfer Characteristics

GC75530

Transconductance

GC75540

Static Drain-source On Resistance
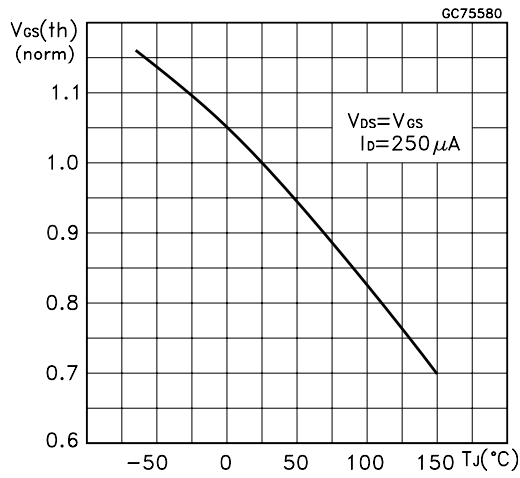
GC75550

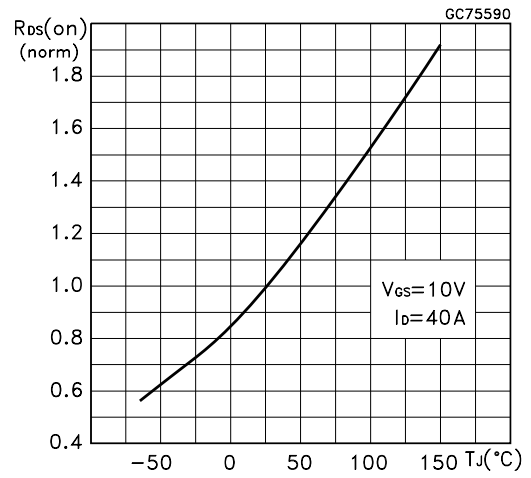Gate Charge vs Gate-source Voltage

GC75560

Capacitance Variations

GC75570
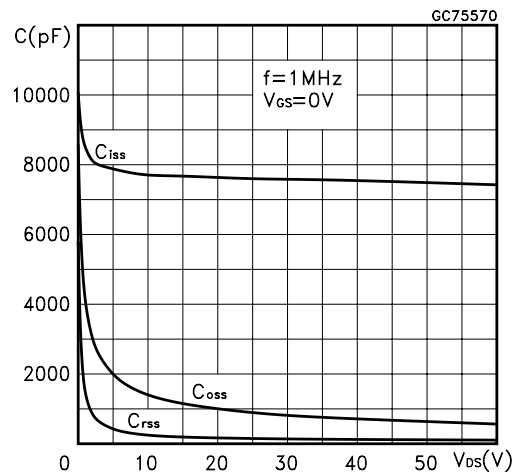
Normalized Gate Threshold Voltage vs Temperature

Normalized On Resistance vs Temperature
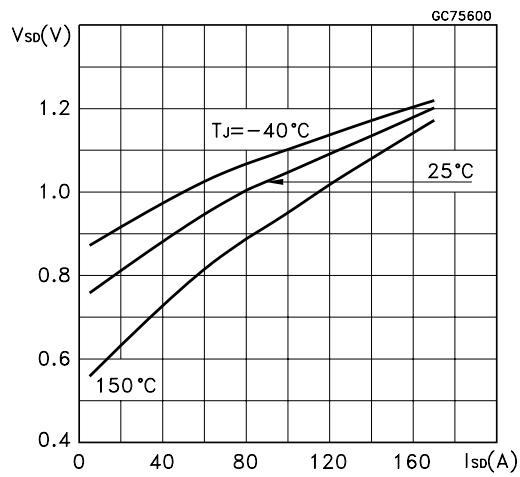

Source-drain Diode Forward Characteristics

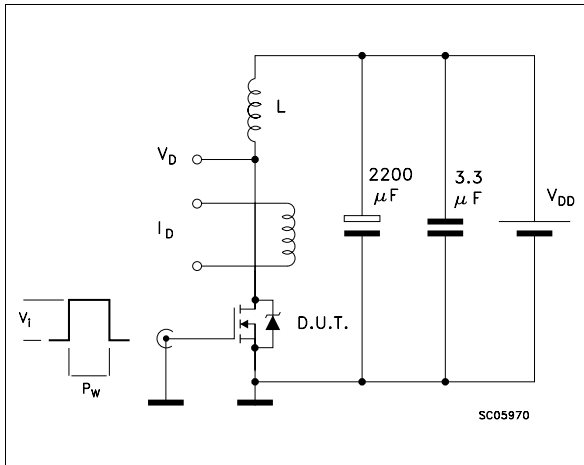**Fig. 1:** Unclamped Inductive Load Test Circuit
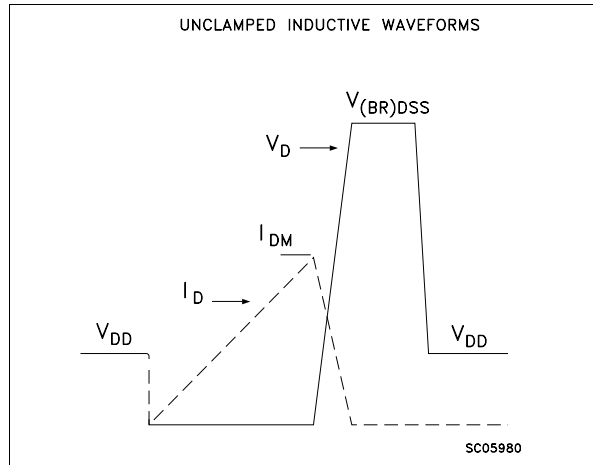
Fig. 2: Unclamped Inductive Waveform

Fig. 3: Switching Times Test Circuits For Resistive Load
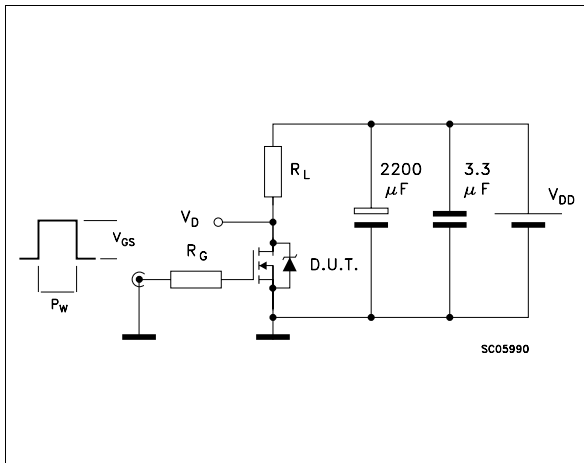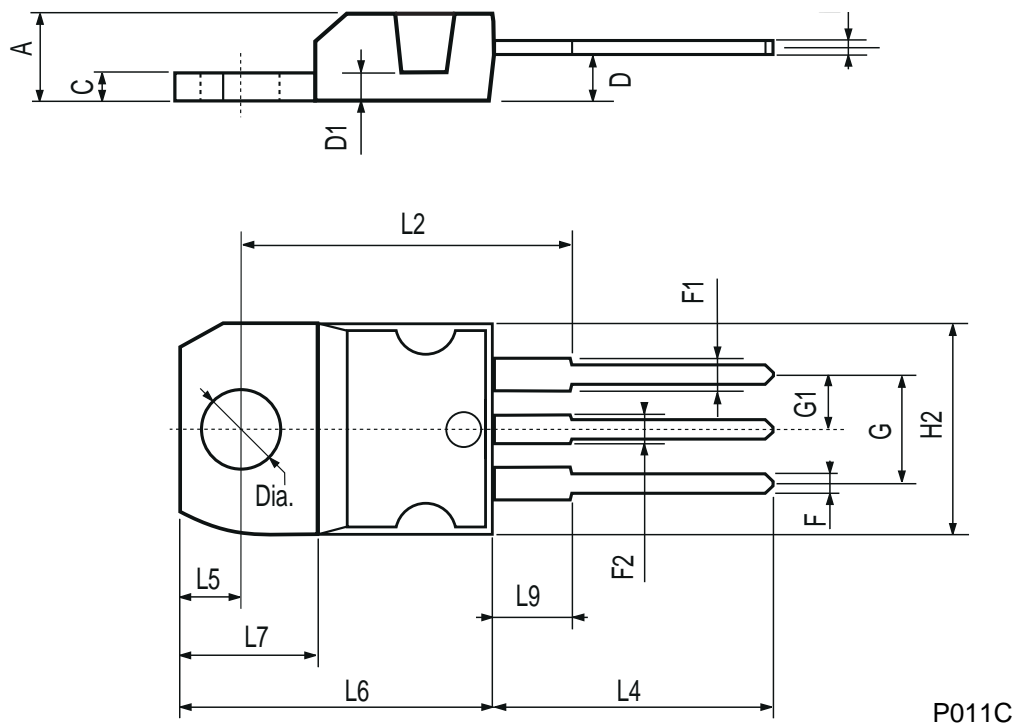
Fig. 4: Gate Charge test Circuit
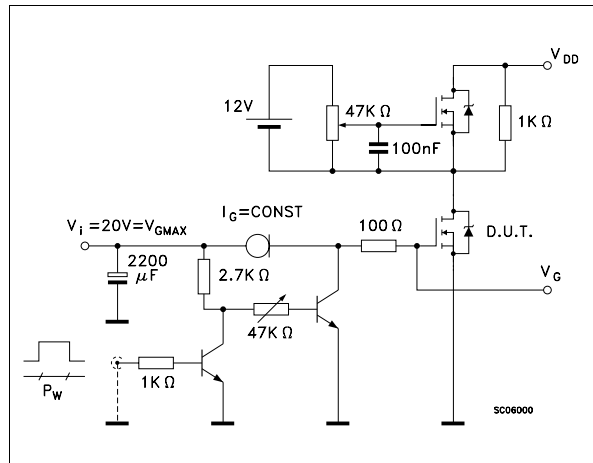
Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times
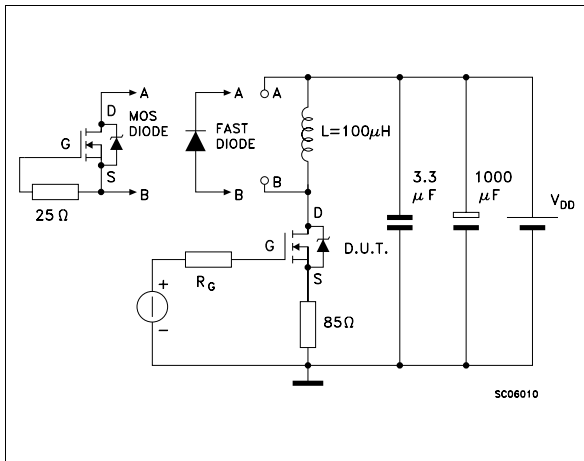
TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	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	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151

P011C

. . .