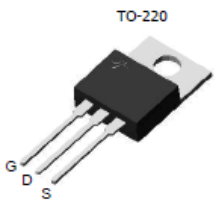
TMP4N90(G)/TMPF4N90(G)

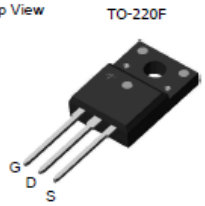
N-channel MOSFET

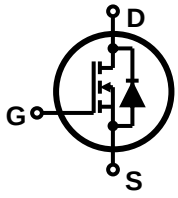
BV_{DSS}	I_D	$R_{DS(on)}$
900V	4A	<4.0Ω

Features

- Low gate charge
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant
- Halogen free package
- JEDEC Qualification







Device	Package	Marking	Remark
TMP4N90 / TMPF4N90	TO-220 / TO-220F	TMP4N90 / TMPF4N90	RoHS
TMP4N90G / TMPF4N90G	TO-220 / TO-220F	TMP4N90G / TMPF4N90G	Halogen Free

Absolute Maximum Ratings

Parameter		Symbol	TMP4N90(G)	TMPF4N90(G)	Unit
Drain-Source Voltage		V_{DSS}	900		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C = 25 ℃	I_D	14	4 *	A
	T_C = 100 ℃		2.22	2.22 *	A
Pulsed Drain Current (Note 1)		I_{DM}	16	16 *	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	8.5		mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	4		A
Repetitive Avalanche Energy (Note 1)		E_{AR}	12.3		mJ
Power Dissipation	T_C = 25 ℃	P_D	123	38.7	W
	Derate above 25 ℃		0.98	0.30	W/℃
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5		V/ns
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~150		℃
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300		℃

* Limited only by maximum junction temperature

Thermal Characteristics

Parameter	Symbol	TMP4N90(G)	TMPF4N90(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	1.01	3.23	℃/W
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	℃/W

Electrical Characteristics : T_C=25℃, unless otherwise noted

Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 900 V, V_{GS} = 0 V	--	--	10	μA
		V_{DS} = 720 V, T_C = 125°C	--	--	100	μA
Forward Gate-Source Leakage Current	I_{GSSF}	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
Reverse Gate-Source Leakage Current	I_{GSSR}	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
ON						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2	--	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 2 A	--	3.2	4.0	Ω
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 2 A	--	6	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	955	--	pF
Output Capacitance	C_{oss}		--	80	--	pF
Reverse Transfer Capacitance	C_{rss}		--	13	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 450 V, I_D = 4 A, R_G = 25 Ω	--	49	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	38	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	146	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	50	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 720V, I_D = 4 A, V_{GS} = 10 V	--	25	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	4.8	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	10.2	--	nC
SOURCE DRAIN DIODE						
Maximum Continuous Drain-Source Diode Forward Current	I_S	---	--	--	4	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	--	--	16	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 4 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 4 A, dI_F / dt = 100 A/μs	--	487	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}		--	2.8	--	μC

Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L=1mH, I_{AS} = 4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J= 25 ℃, not subject to production test – verified by design/characterization
3 I_{SD} ≤ 4A, di/dt ≤ 200A/μs , V_{DD} ≤ BV_{DS}, Starting T_J= 25 ℃
4. Pulse Test :Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Fig. 1 Output Characteristics

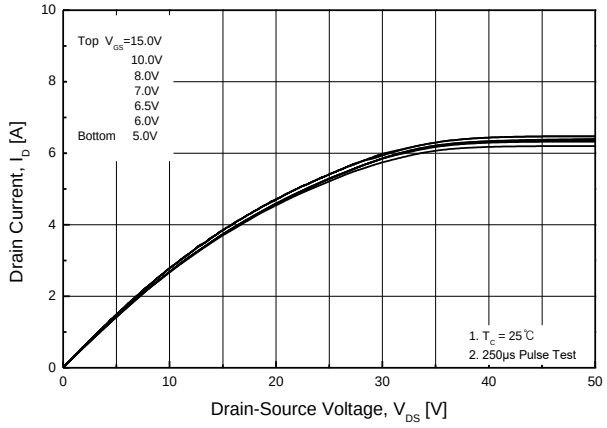


Fig. 2 Transfer Characteristics

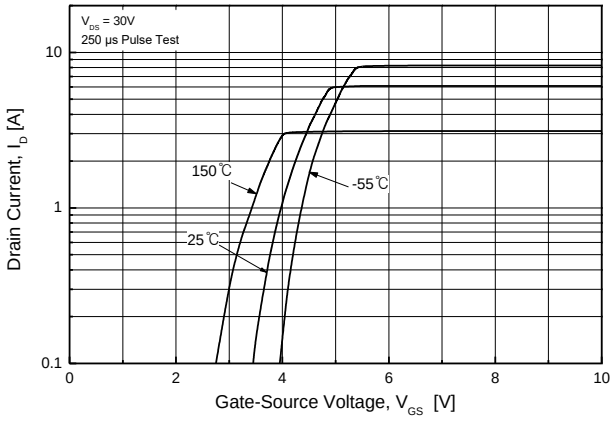


Fig. 3 On-Resistance vs.
Drain Current and Gate voltage

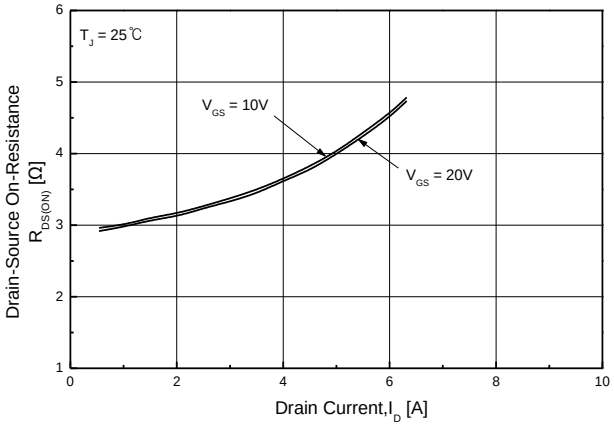


Fig. 4 Body Diode Forward Voltage vs.
Source Current and Temperature

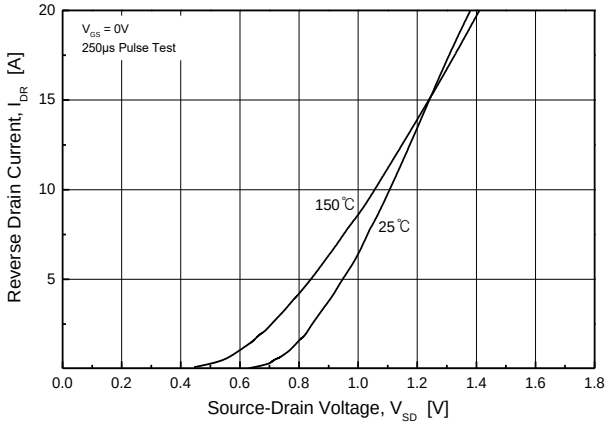


Fig. 5 Capacitance Characteristics

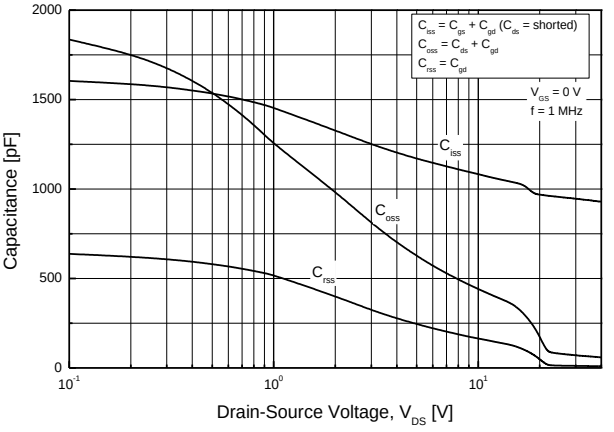


Fig. 6 Gate Charge Characteristics

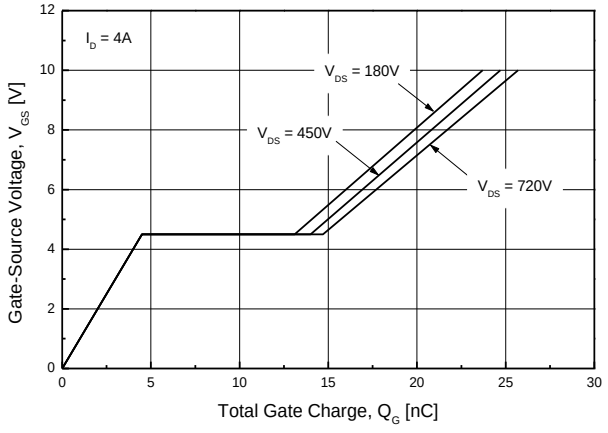


Fig. 7 Breakdown Voltage vs. Temperature

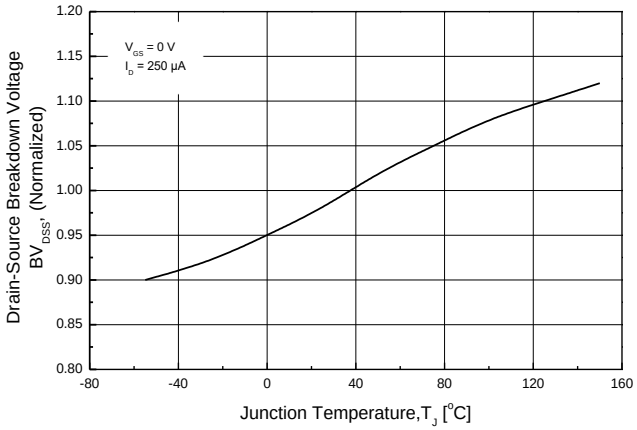


Fig. 8 On-Resistance vs. Temperature

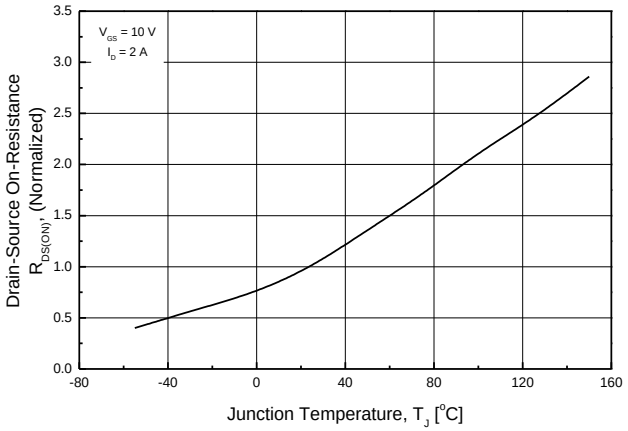


Fig. 9 Maximum Drain Current vs. Case Temperature

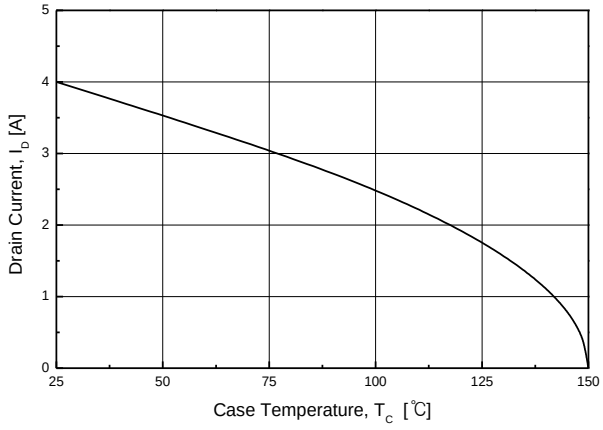


Fig. 10 Gate Threshold Voltage vs. Junction Temperature

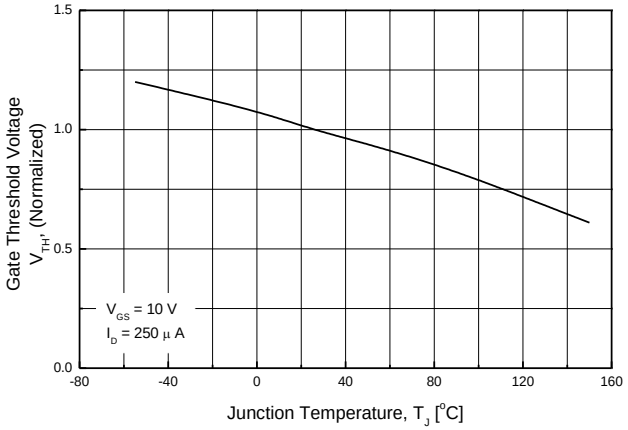
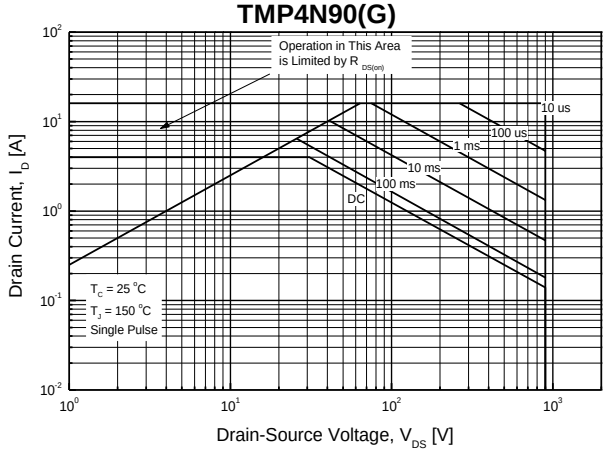


Fig. 11 Maximum Safe Operating Area

TMP4N90(G)



TMPF4N90(G)

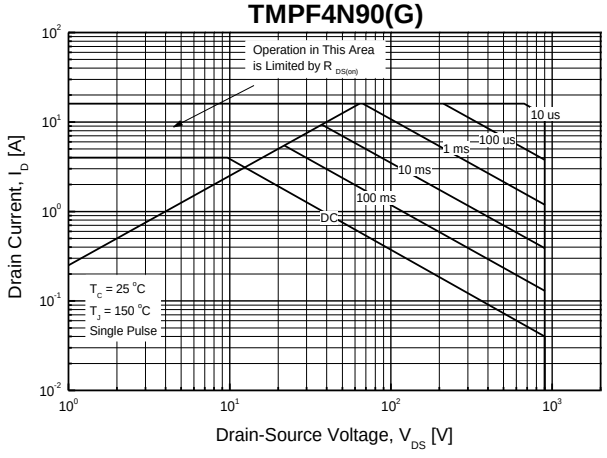
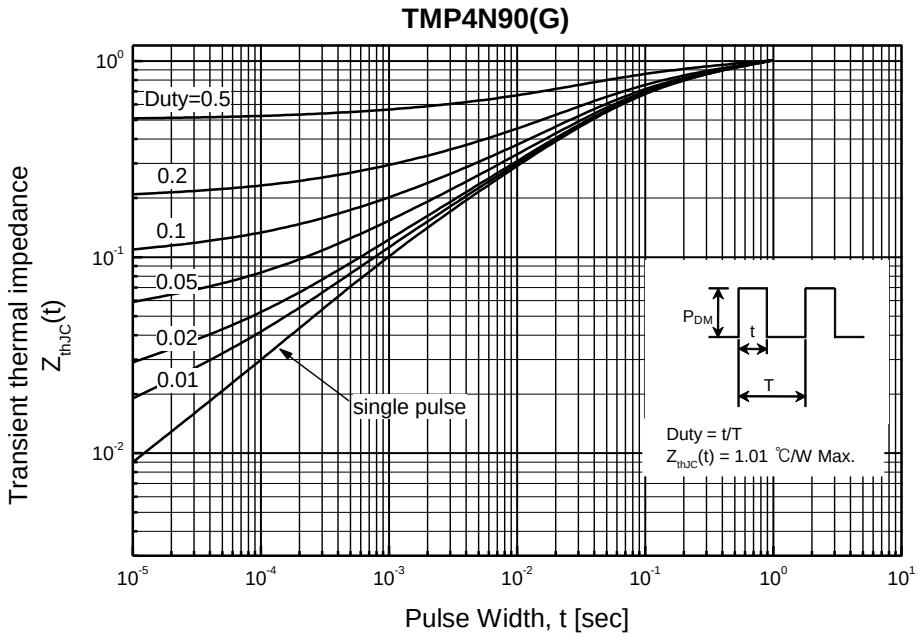
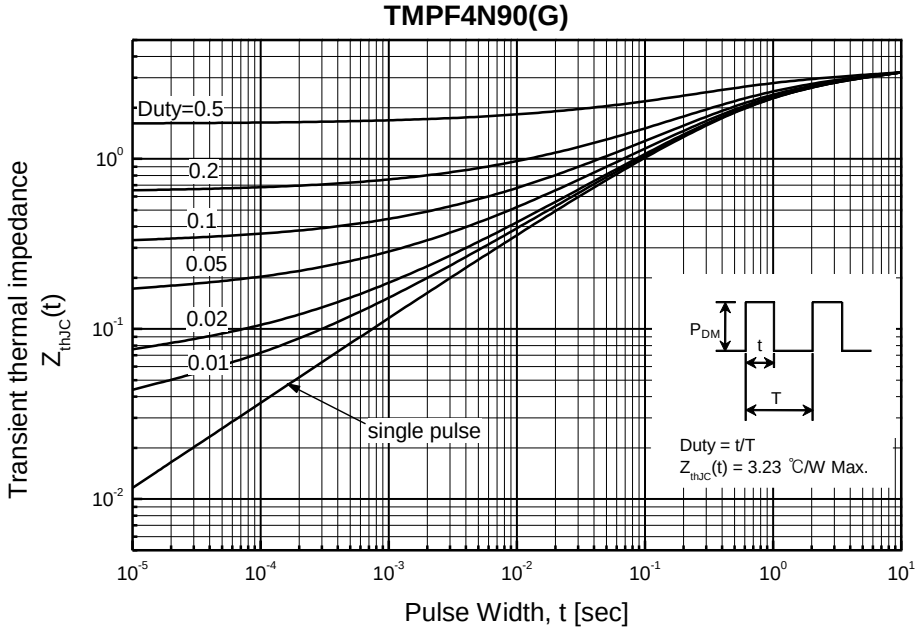
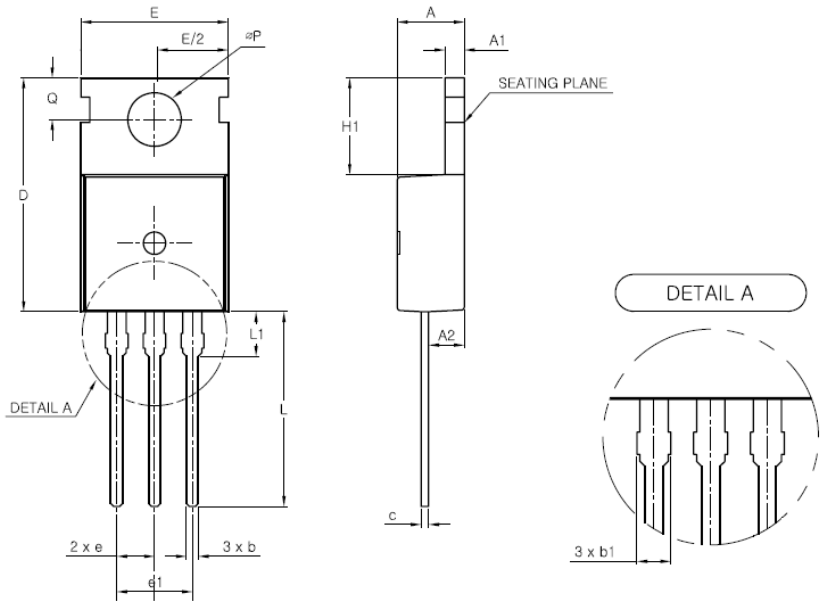


Fig. 12 Transient Thermal Response Curve



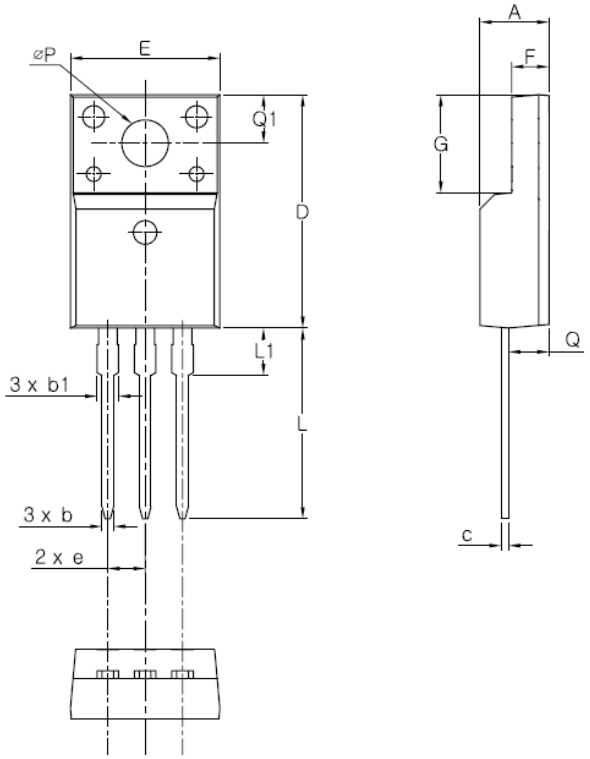


TO-220AB-3L MECHANICAL DATA



SYMBOL	MIN	MAX
A	4.30	4.70
A1	1.22	1.40
A2	2.20	2.79
b	0.70	0.91
b1	1.15	1.62
c	0.36	0.60
D	14.99	15.90
E	9.70	10.41
e	2.54 TYP	
e1	5.08 BSC	
H1	5.97	6.70
L	12.88	13.97
L1	3.31	3.81
ØP	3.40	3.88
Q	2.60	2.90

TO-220F-3L MECHANICAL DATA



SYMBOL	MIN	MAX
A	4.50	4.93
b	0.70	0.91
b1	1.15	1.47
c	0.36	0.60
D	15.67	16.07
E	6.96	10.36
e	2.54 BSC	
F	2.34	2.74
G	6.48	6.90
L	12.37	13.18
L1	2.23	3.43
Q	2.56	2.96
Q1	3.10	3.50
ØP	2.98	3.38