N-Channel Enhancement Mode Power MOSFET

Description

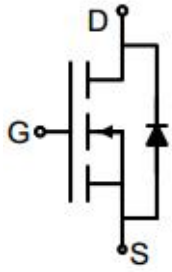
This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

General Features

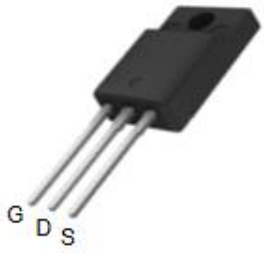
- V_{DS} 650V
- I_D (at V_{GS} = 10V) 12A
- $R_{DS(ON)}$ (at V_{GS} = 10V) < 0.78Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- LED power supplies
- Cell Phone Charger
- Standby Power



Schematic diagram



TO-220F

Ordering Information

Device	Package	Marking	Packaging
G12N65F	TO-220F	G12N65	50pcs/Tube

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Continuous Drain Current	I_D	12	A
Pulsed Drain Current (note1)	I_{DM}	48	A
Gate-Source Voltage	V_{GS}	±30	V
Power Dissipation	P_D	45	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62	ºC/W
Maximum Junction-to-Case	R_{thJC}	2.78	ºC/W

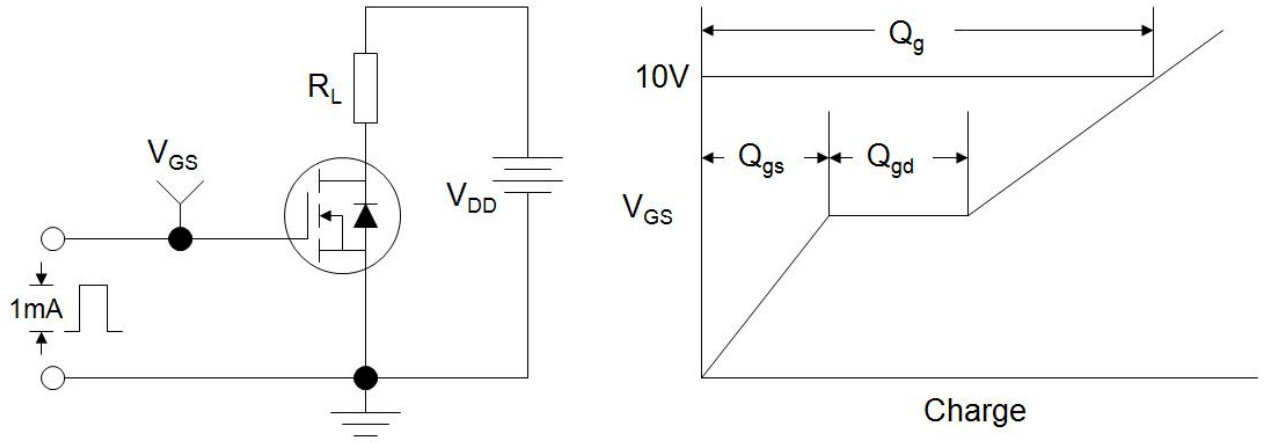
Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650V, V_{GS} = 0V	--	--	1	μA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0	3.0	3.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 6A	--	0.64	0.78	Ω
Forward Transconductance	g_{FS}	V_{GS} = 5V, I_D = 6A	--	7	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 400V, f = 1.0MHz	--	1956	--	pF
Output Capacitance	C_{oss}		--	42	--	
Reverse Transfer Capacitance	C_{rss}		--	6	--	
Total Gate Charge	Q_g	V_{DD} = 400V, I_D = 6A, V_{GS} = 10V	--	35	--	nC
Gate-Source Charge	Q_{gs}		--	12	--	
Gate-Drain Charge	Q_{gd}		--	11	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 400V, I_D = 6A, R_G = 50Ω	--	94	--	ns
Turn-on Rise Time	t_r		--	35	--	
Turn-off Delay Time	$t_{d(off)}$		--	159	--	
Turn-off Fall Time	t_f		--	21	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	12	A
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 6A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Qrr	I_F = 6A, V_{GS} = 0V di/dt=100A/us	--	16	--	uC
Reverse Recovery Time	T_{rr}		--	1530	--	ns

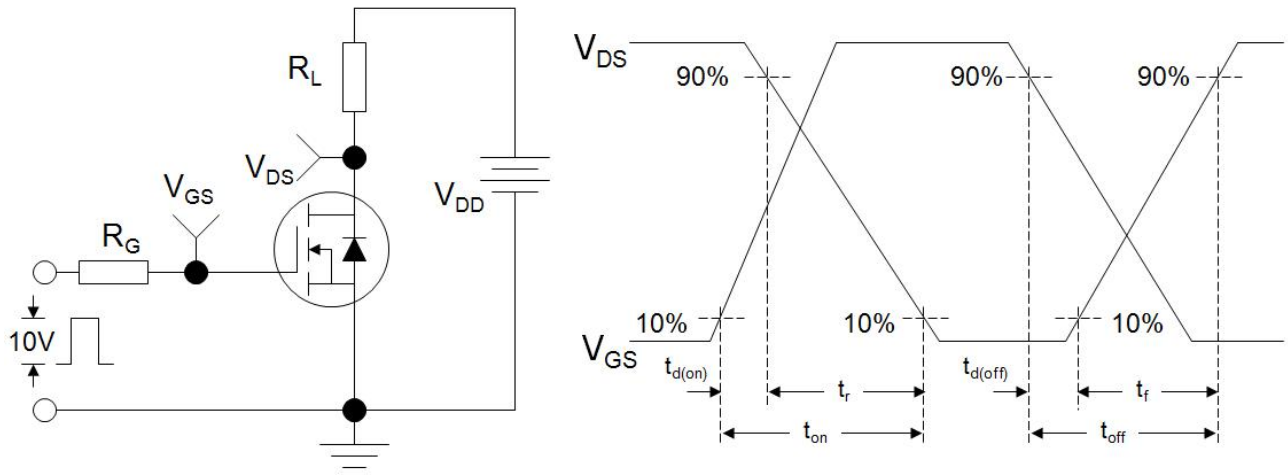
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical R_G

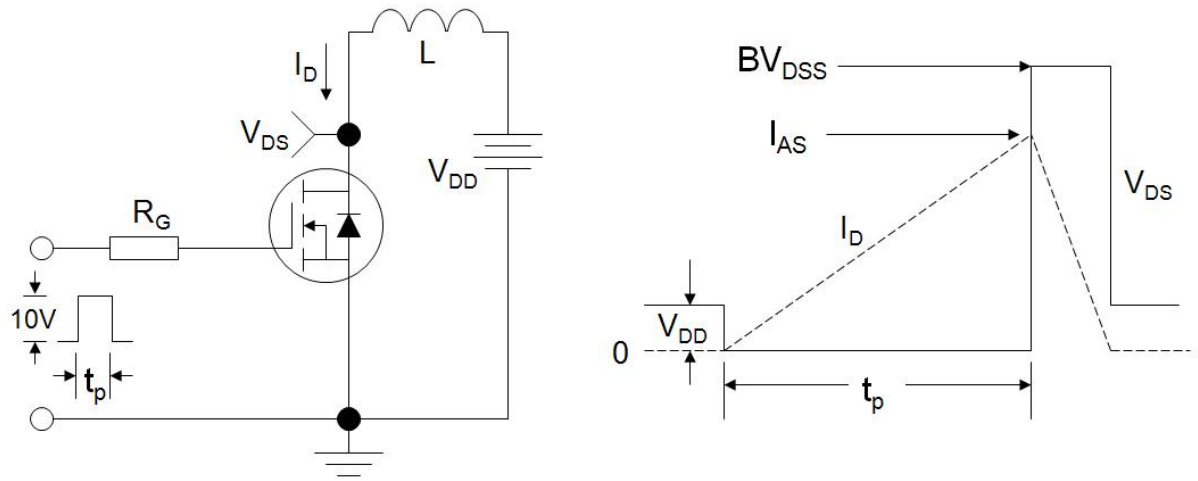
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

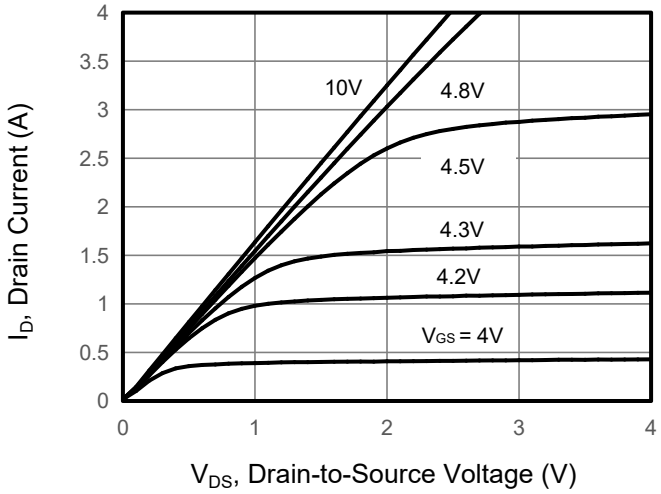


Figure 2. Transfer Characteristics

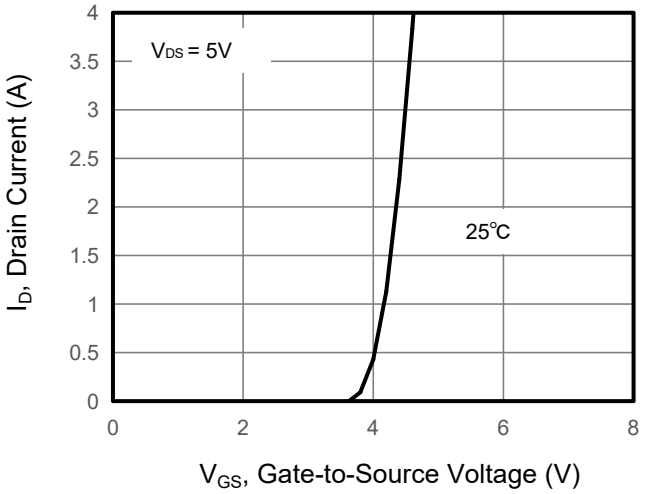


Figure 3. Drain Source On Resistance

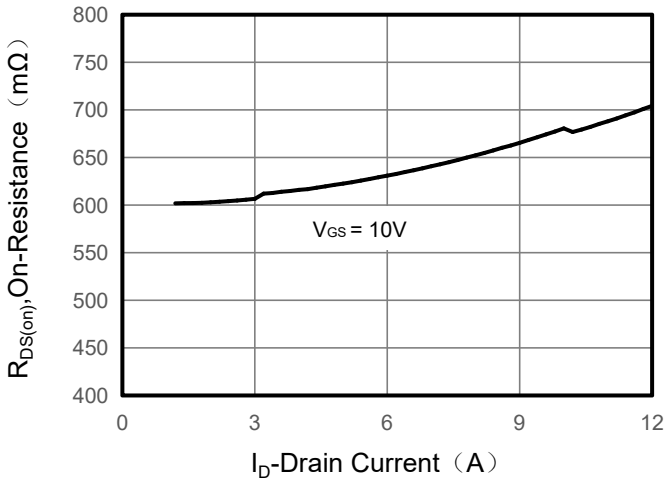


Figure 4. Gate Charge

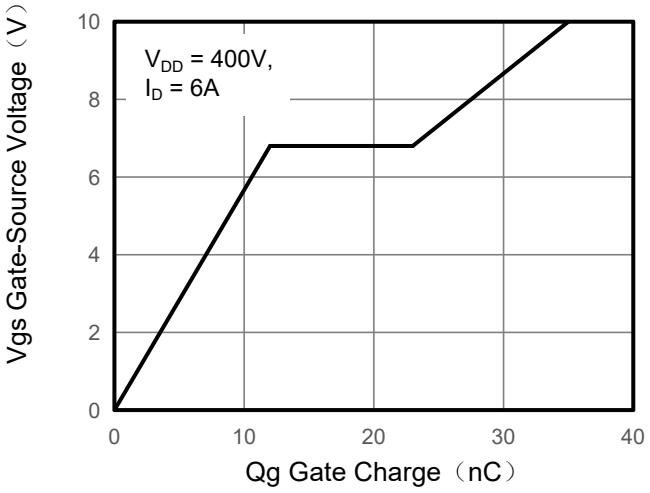


Figure 5. Capacitance

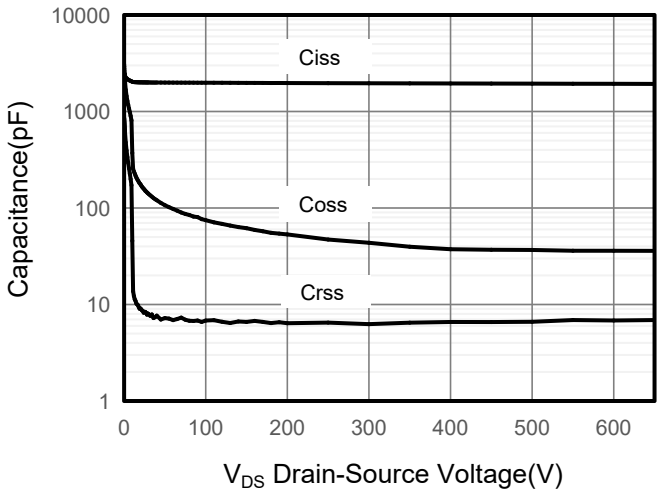
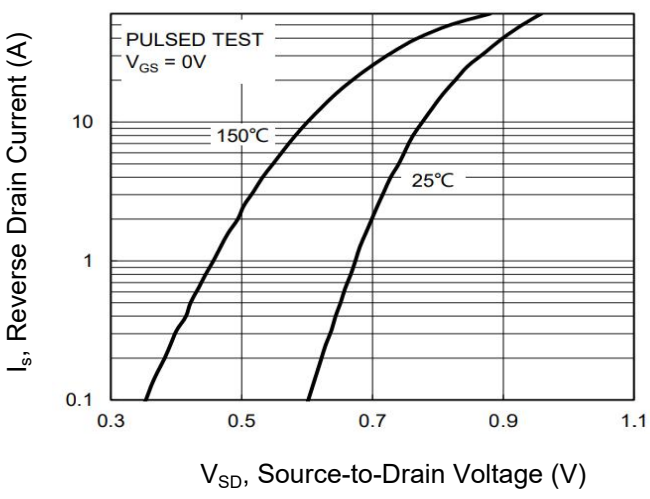


Figure 6. Source-Drain Diode Forward



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Drain-Source On-Resistance

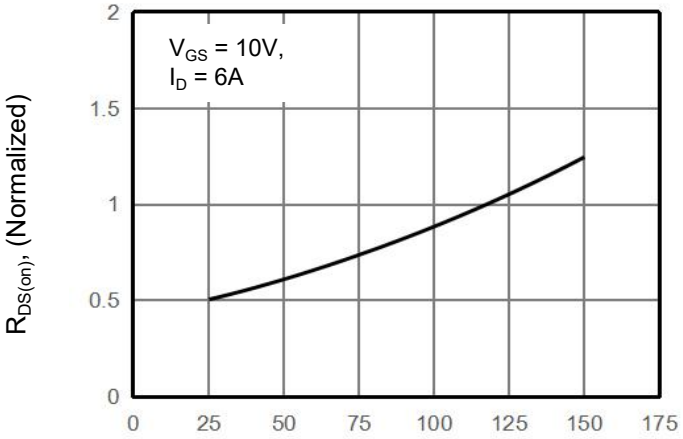


Figure 8. Safe Operation Area

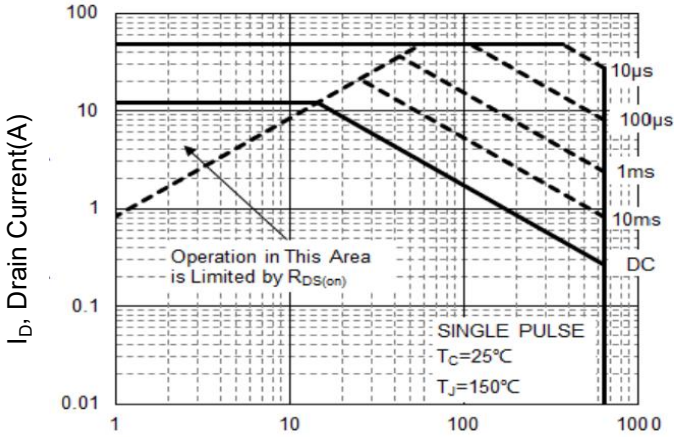
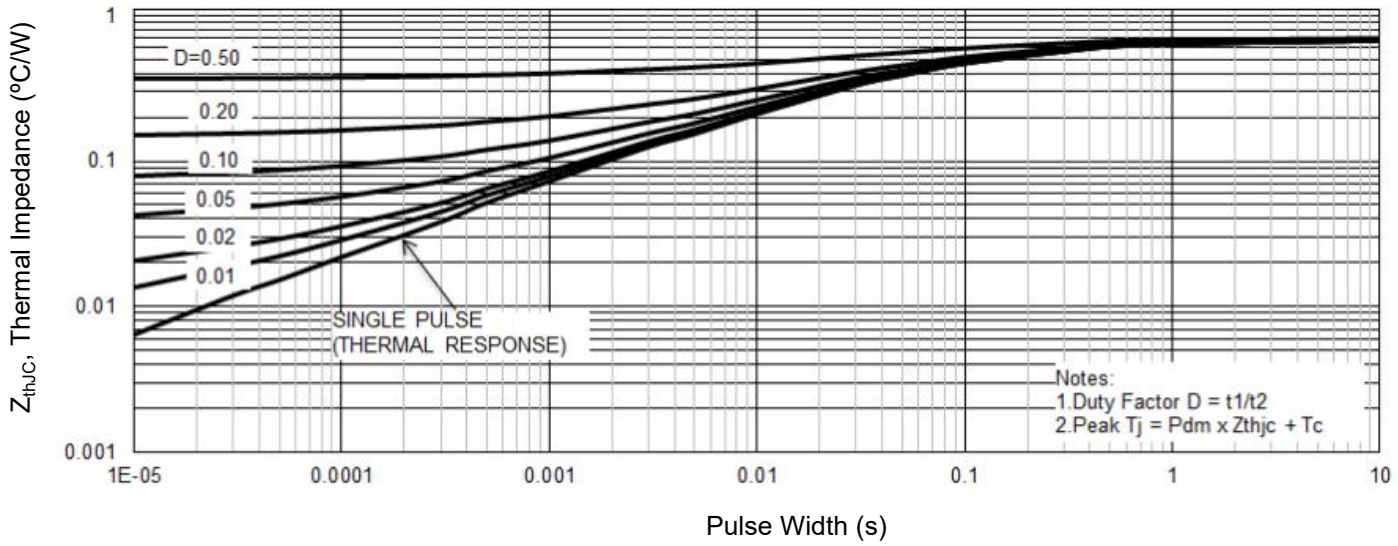
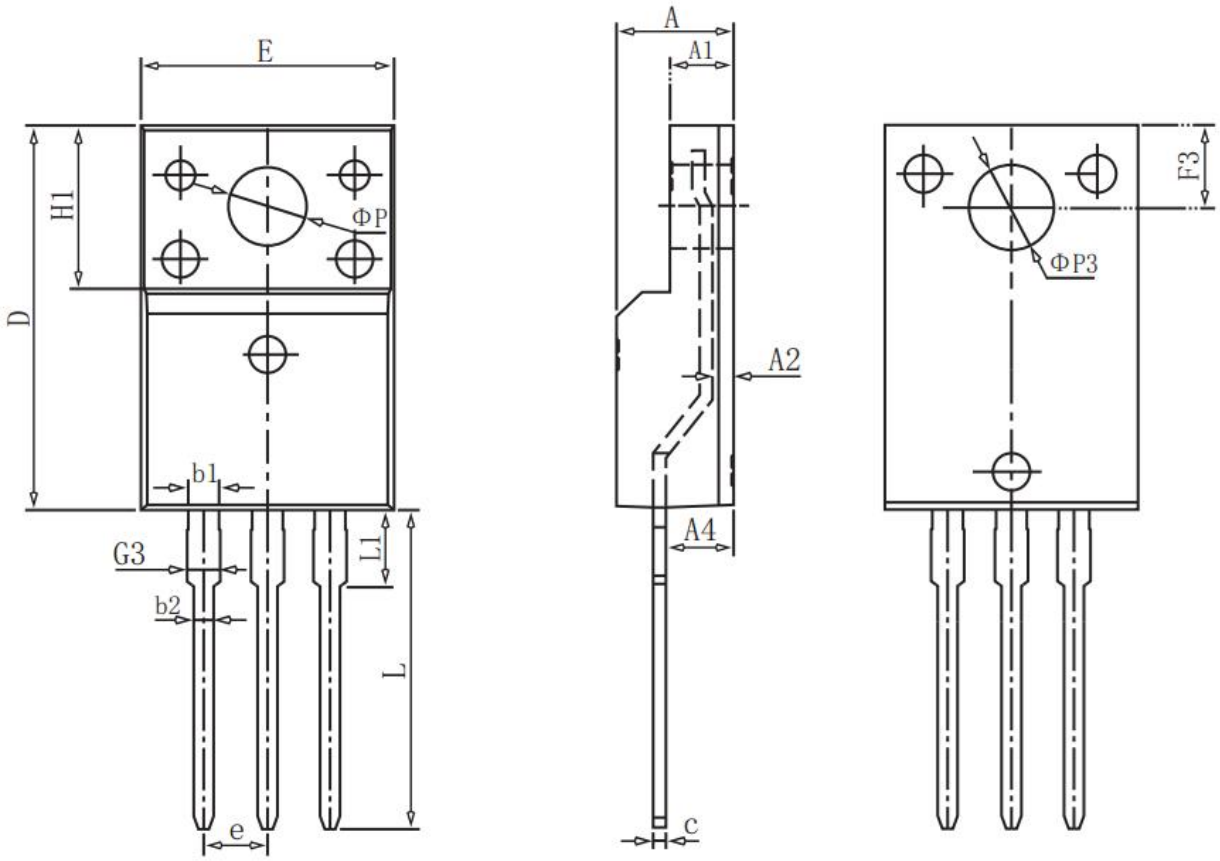


Figure 9. Normalized Maximum Transient Thermal Impedance



TO-220F Package Information



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
E	10.00	10.20	10.40
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.65	0.85	1.30
A4	2.55	2.75	2.95
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
ΦP	3.183REF		
L	12.68	12.98	13.28
L1	3.25	3.45	3.65
ΦP3	3.45REF		
F3	3.10	3.30	3.50
G3	1.10	1.30	1.50
b1	1.05	1.20	1.35
b2	0.70	0.80	0.92