N-Channel Enhancement Mode Power MOSFET

Description

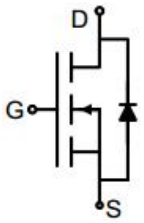
The GC180N65F uses advanced super junction technology and design to provide excellent Ros(on), low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

General Features

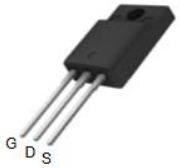
- V_{DS} 650V
- I_D (at V_{GS} = 10V) 20A
- $R_{DS(ON)}$ (at V_{GS} = 10V) < 180mΩ
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-220F

Ordering Information

Device	Package	Marking	Packaging
GC180N65F	TO-220F	GC180N65	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	T_C = 25ºC	I_D	20	A
	T_C = 100ºC		12	
Pulsed Drain Current (note1)		I_{DM}	80	A
Gate-Source Voltage		V_{GS}	±30	V
Power Dissipation		P_D	37	W
Single pulse avalanche energy （note2）		E_{AS}	180	mJ
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}	61	ºC/W
Maximum Junction-to-Case	R_{thJC}	3.4	ºC/W

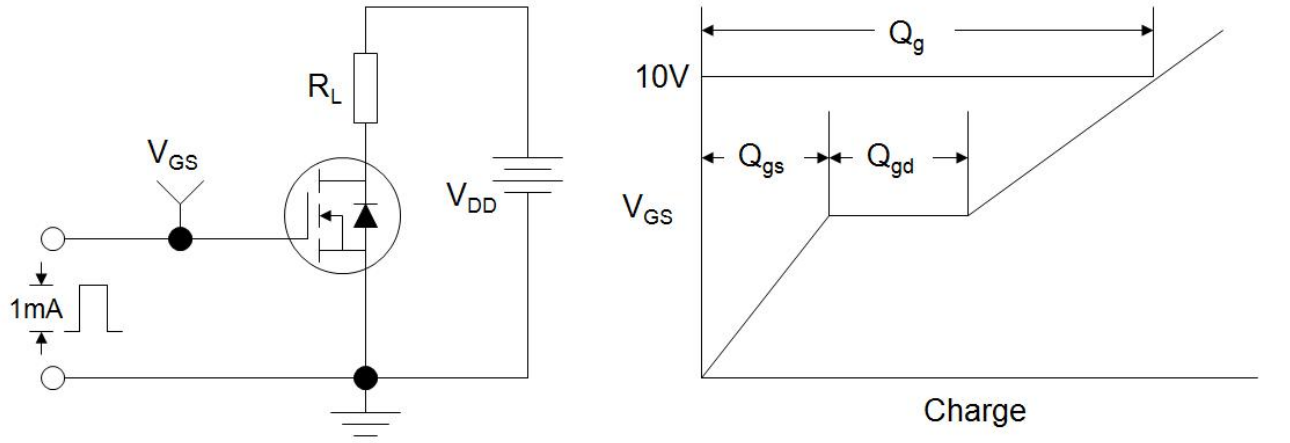
Specifications T_J = 25ºC, unless otherwise noted

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	3.0	3.5	4.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 10A	--	145	180	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 10A	--	11	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 400V, f = 1.0MHz	--	1150	--	pF
Output Capacitance	C_{oss}		--	35	--	
Reverse Transfer Capacitance	C_{rss}		--	3	--	
Total Gate Charge	Q_g	V_{DD} = 400V, I_D = 10A, V_{GS} = 10V	--	36	--	nC
Gate-Source Charge	Q_{gs}		--	8	--	
Gate-Drain Charge	Q_{gd}		--	18	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 400V, I_D = 10A, R_G = 5Ω	--	23	--	ns
Turn-on Rise Time	t_r		--	34	--	
Turn-off Delay Time	$t_{d(off)}$		--	124	--	
Turn-off Fall Time	t_f		--	30	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	20	A
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 10A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Qrr	I_F = 10A, V_{GS} = 0V di/dt=100A/us	--	6	--	μC
Reverse Recovery Time	Trr		--	348	--	ns

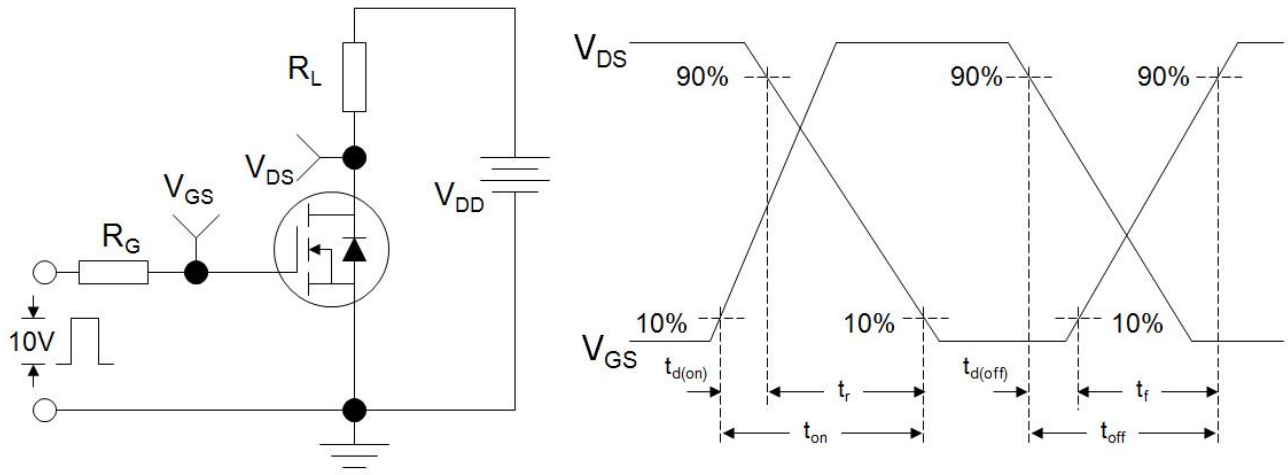
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=50V,VGS=10V,L=10mH,Rg=25Ω
   The table shows the minimum avalanche energy, which is 500mJ when the device is tested until failure
3. Identical low side and high side switch with identical R_G

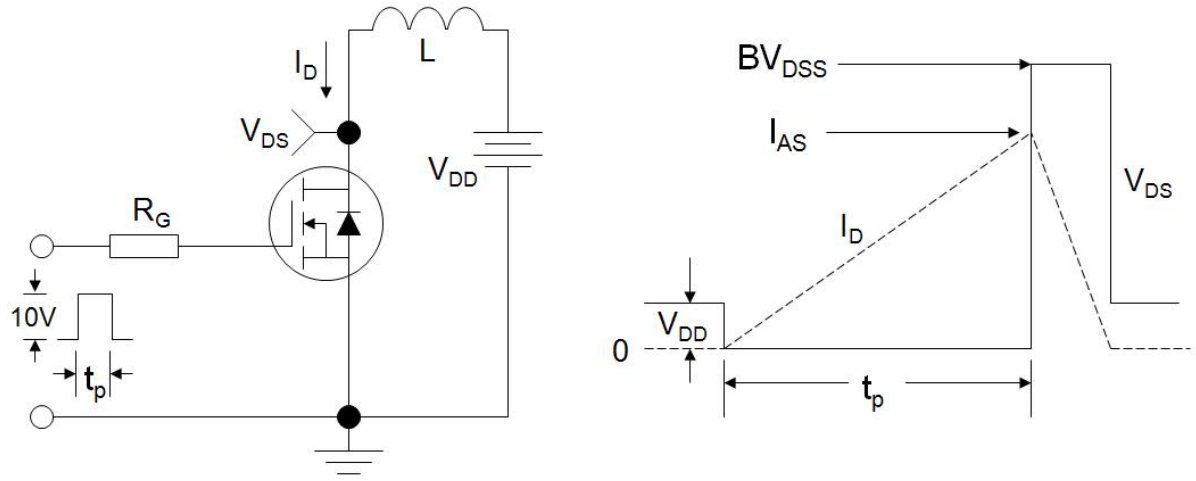
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

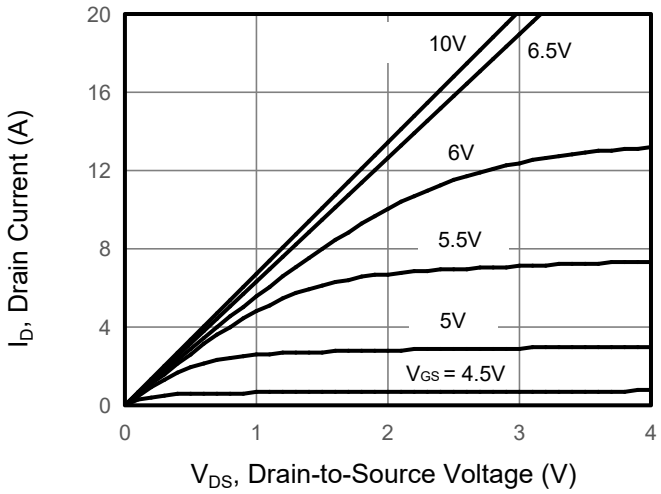


Figure 2. Transfer Characteristics

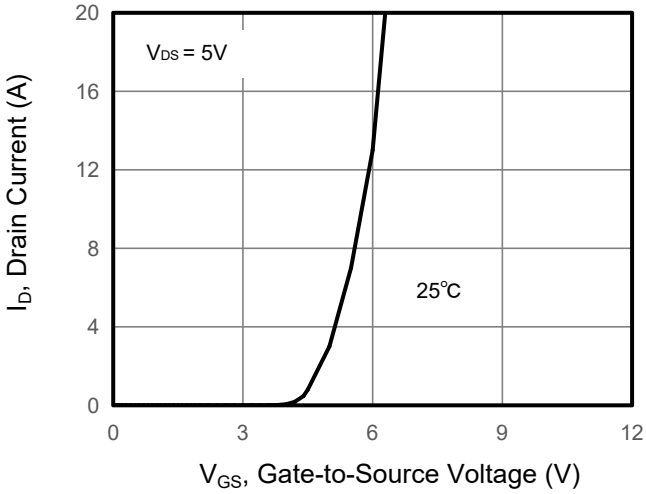


Figure 3. Drain Source On Resistance

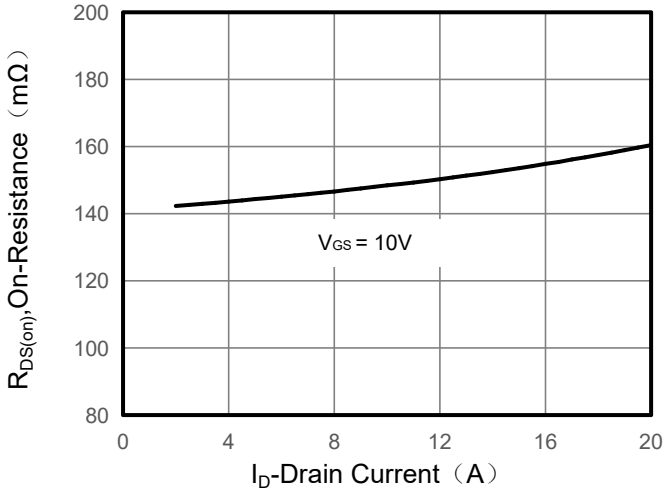


Figure 4. Gate Charge

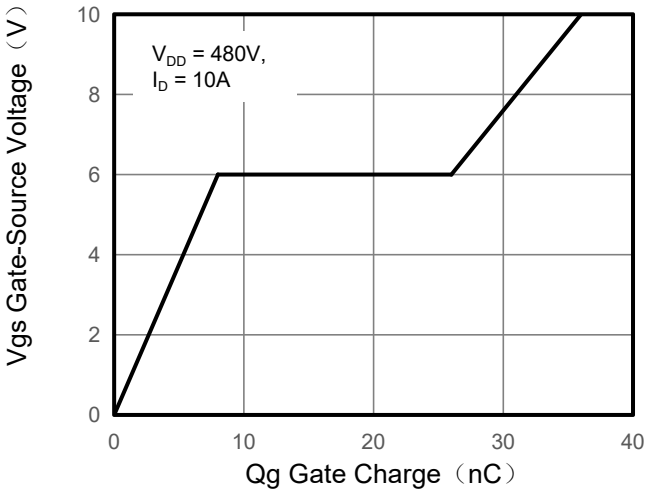


Figure 5. Capacitance

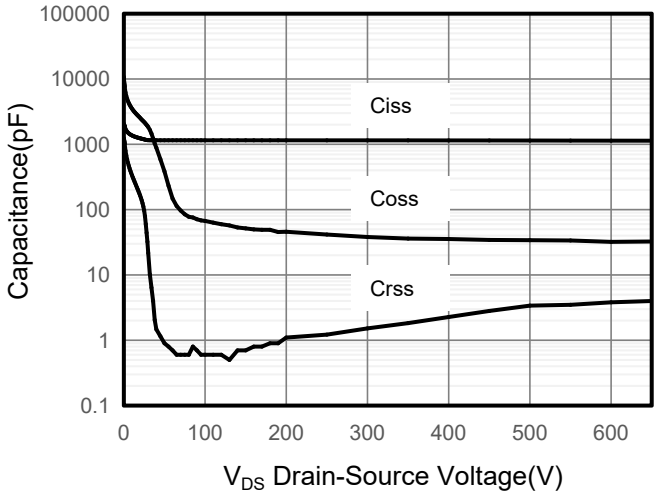
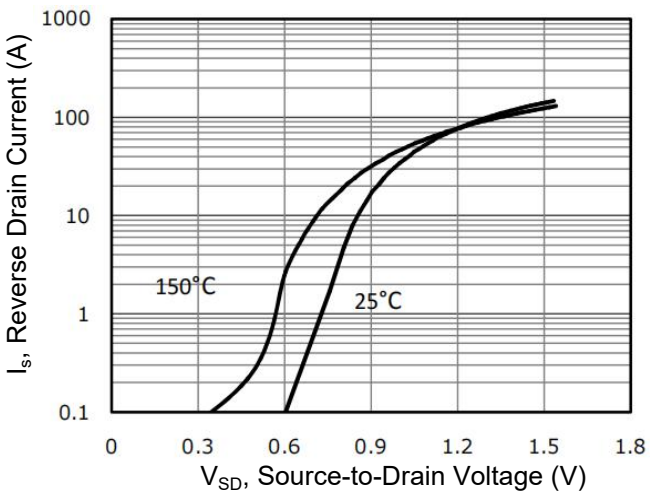


Figure 6. Source-Drain Diode Forward



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Drain-Source On-Resistance

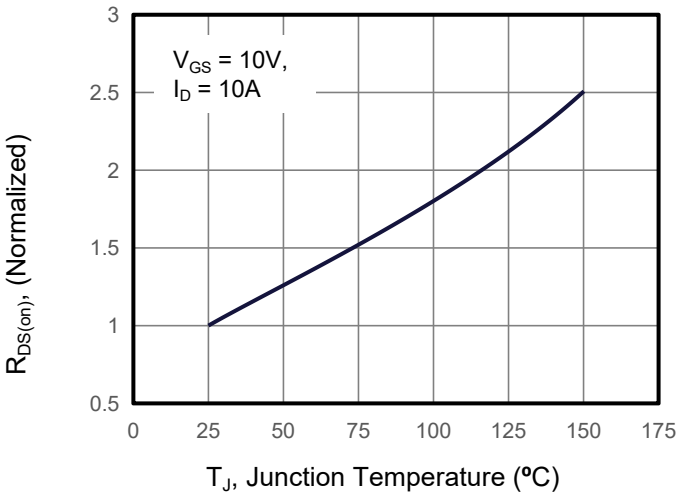


Figure 8. Safe Operation Area

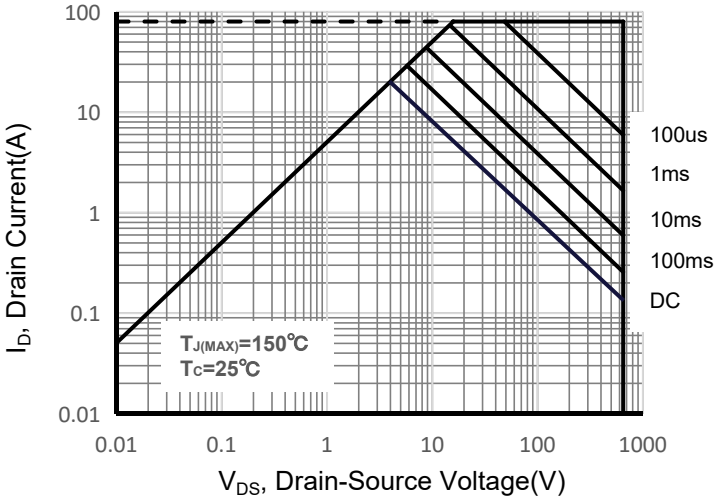


Figure 9. Maximum Continuous Drain Current vs Case Temperature

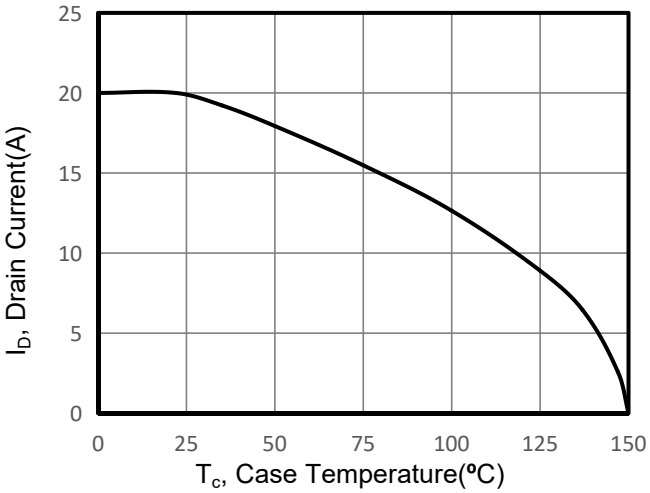
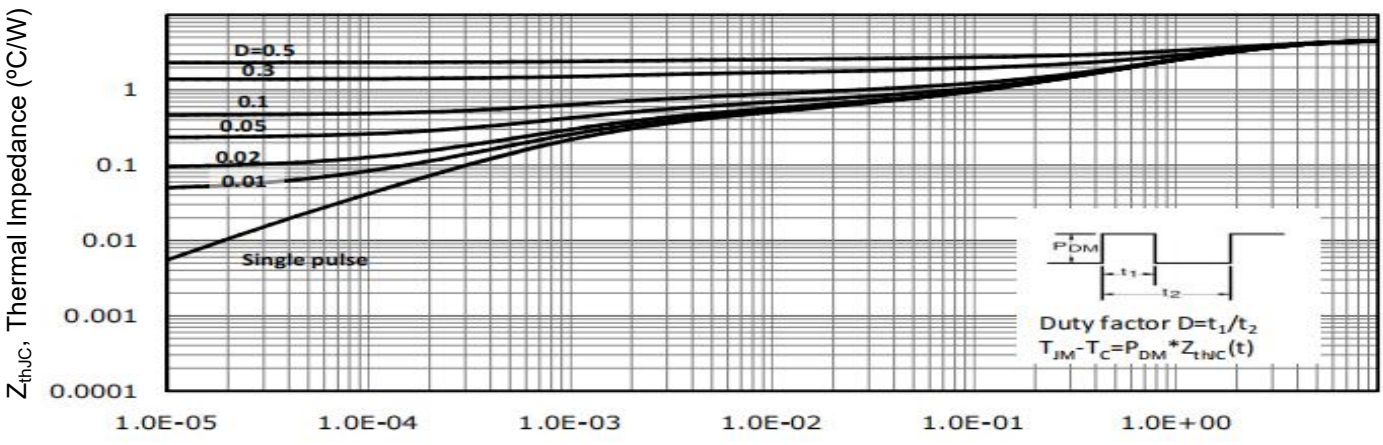
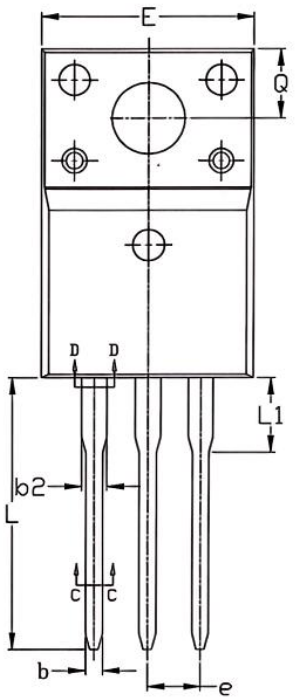


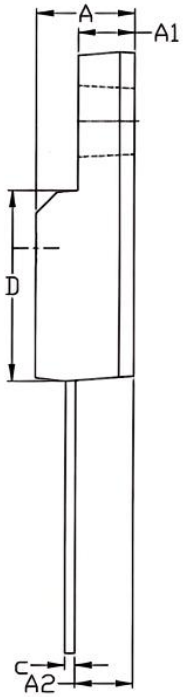
Figure 10. Normalized Maximum Transient Thermal Impedance



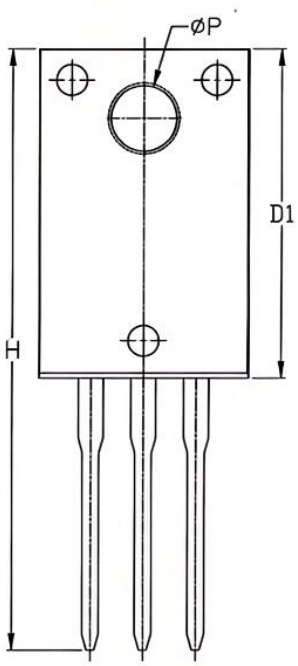
TO-220F Package Information



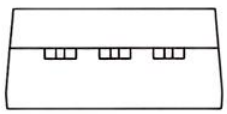
TOP VIEW



SIDE VIEW(Right)



BOTTOM VIEW



SIDE VIEW(Front)

DIM / SYMBOL	MIN.	NOM.	MAX.
A	4.600	4.700	4.800
A1	2.600	2.700	2.800
A2	2.660	2.760	2.860
b	0.740	0.840	0.940
b1	0.700	0.800	0.900
b2	1.140	1.240	1.340
b3	1.100	1.200	1.300
c	0.440	0.540	0.640
c1	0.400	0.500	0.600
D	9.090	9.190	9.290
D1	15.770	15.870	15.970
E	10.060	10.160	10.260
e	2.540 BSC.		
H	28.800	29.000	29.200
L	12.930	13.130	13.330
L1	3.400	3.600	3.800
øP	3.080	3.180	3.280
Q	3.150	3.350	3.550