

105V, 120A N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

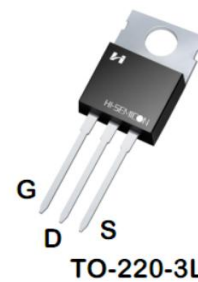
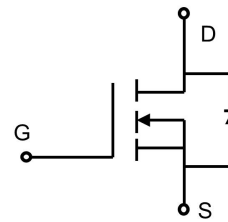
The SGP105R5T uses advanced SGT technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

Features

- ◆ $V_{DS}=105V$, $I_D=120A$
- ◆ $R_{DS(on)}$
TYP: $4.8m\Omega$ @ $V_{GS}=10V$

Applications

- ◆ Motor Driving in Power Tool, E-vehicle, Robotics
- ◆ Current Switching in DC/DC & AC/DC (SR) Sub-systems
- ◆ Power Management in Telecom., Industrial Automation, CE



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SGP105R5T	TO-220-3L	SGP105R5T	Pb Free	Tube

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	105	V
Gate-Source Voltage	V_{GS}	± 20	
Drain Current	I_D	$T_C = 25^{\circ}\text{C}$ 120	A
		$T_C = 100^{\circ}\text{C}$ 90	
Drain Current Pulsed(Note 1)	I_{DM}	480	
Power Dissipation($T_C=25^{\circ}\text{C}$)	P_D	178	W
Single Pulsed Avalanche Energy (Note 2)	E_{AS}	676	mJ
Operation Junction Temperature Range	T_J	$-55\sim+150$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$-55\sim+150$	
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300	

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.8	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	56	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDSS}	V _{GS} =0V, I _D =250μA	105	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	--	--	1.0	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-20V, V _{DS} =0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	2.0	3.0	4.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A	--	4.8	5.5	mΩ
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V, f=1.0MHZ	1	2.5	10	Ω
Input Capacitance	C _{iss}	V _{DS} =50V V _{GS} =0V f=1.0MHZ	--	4102	--	pF
Output Capacitance	C _{oss}		--	592	--	
Reverse Transfer Capacitance	C _{rss}		--	19.8	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =50V V _{DS} =10V R _G =3Ω	--	18	--	ns
Turn-on Rise Time	t _r		--	23	--	
Turn-off Delay Time	t _{d(off)}		--	37	--	
Turn-off Fall Time	t _f		--	15.7	--	

Total Gate Charge	Q_g	$V_{DS}=50V, I_D=20A$ $V_{GS}=10V$ (Note 3.4)	--	69	--	nC
Gate-Source Charge	Q_{gs}		--	24	--	
Gate-Drain Charge	Q_{gd}		--	18.5	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	120	A
Pulsed Source Current	I_{SM}		--	--	480	
Diode Forward Voltage	V_{SD}	$I_S=30A, V_{GS}=0V$	--	0.8	1.2	V
Reverse Recovery Time	T_{rr}	$I_F=20A, V_R=10V,$ $dI_F/dt=100A/\mu S$	--	64	--	ns
Reverse Recovery Charge	Q_{rr}		--	126	--	nC

1. Pulse width limited by maximum junction temperature

2. $L=0.5mH, V_{DD}=50V, R_G=25\Omega$, starting $T_J=25^\circ C$

3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1: Saturation Characteristics

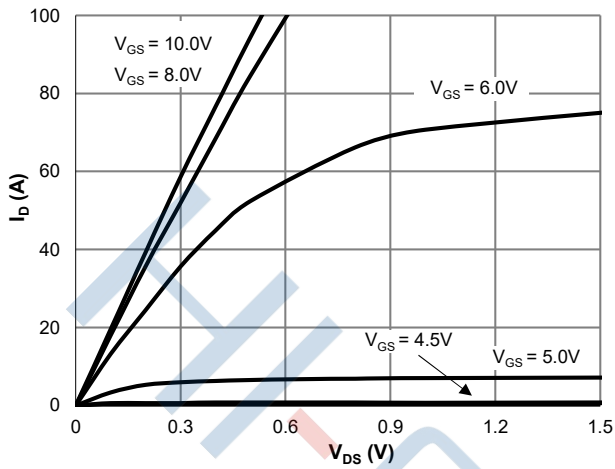


Figure 2: Transfer Characteristics

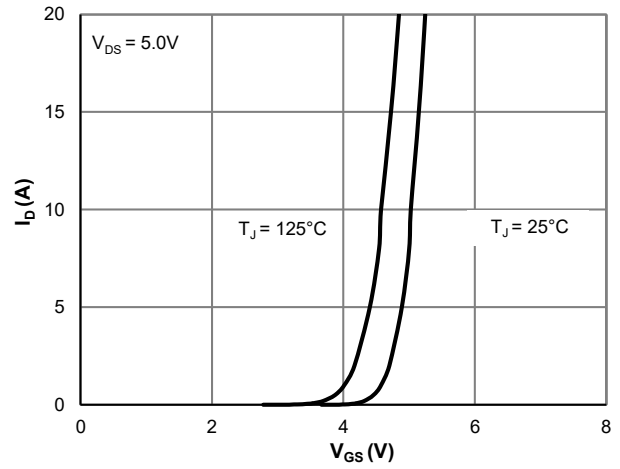


Figure 3: $R_{DS(ON)}$ vs. Drain Current

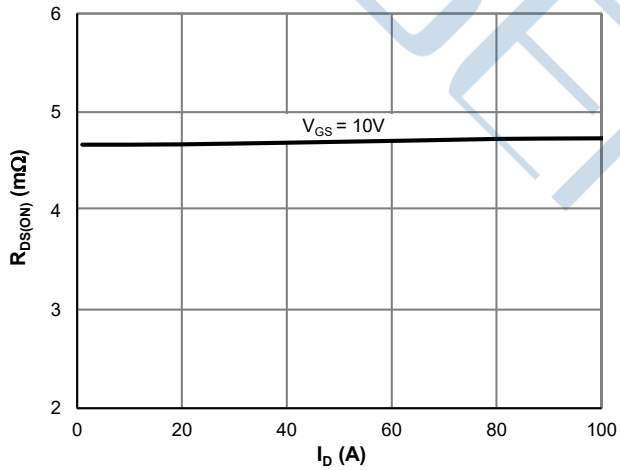


Figure 4: Body-Diode Characteristics

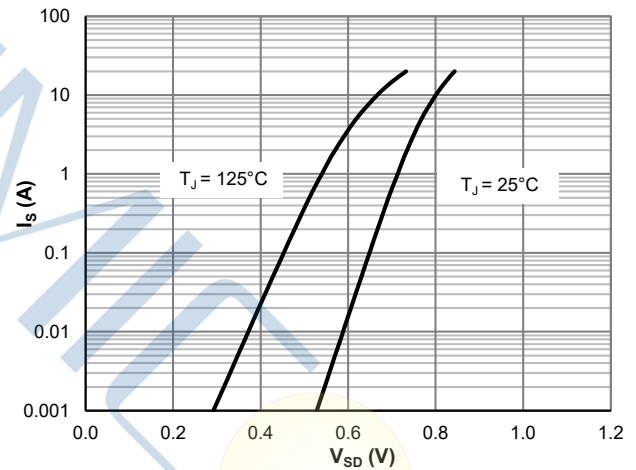


Figure 5: Capacitance Characteristics

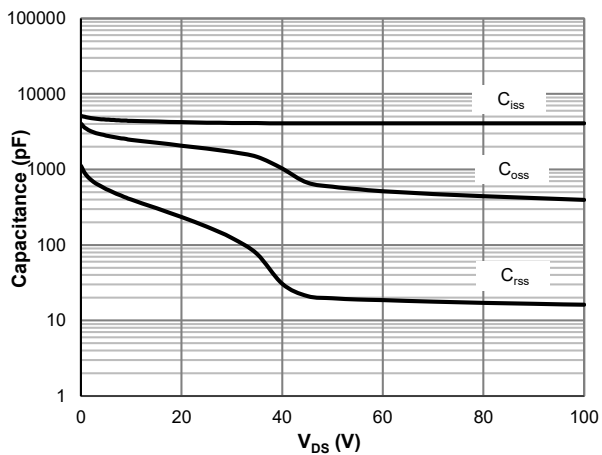
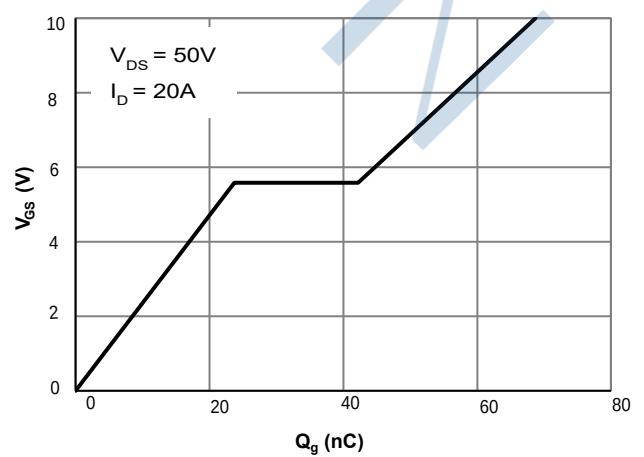


Figure 6: Gate Charge



Typical Performance Characteristics

Figure 7: $V_{BR(DSS)}$ vs. Junction Temperature

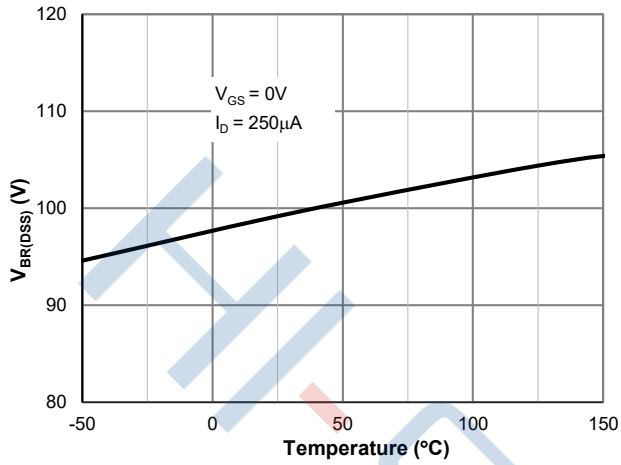


Figure 8: $R_{DS(ON)}$ vs. Junction Temperature

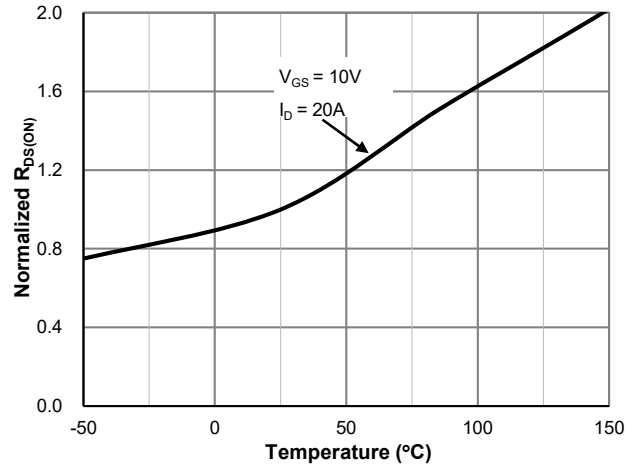


Figure 9: Current De-rating

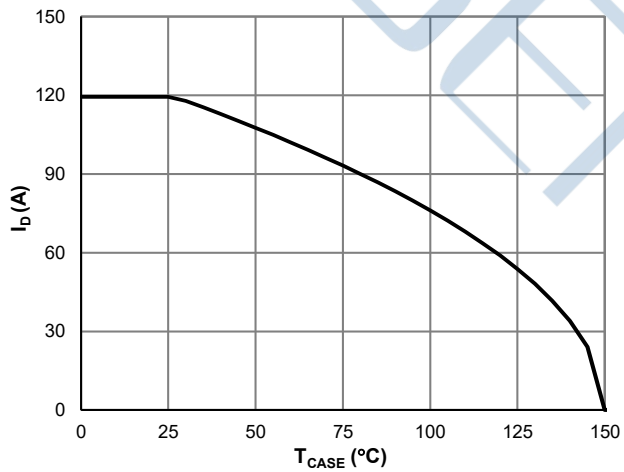


Figure 10: Power De-rating

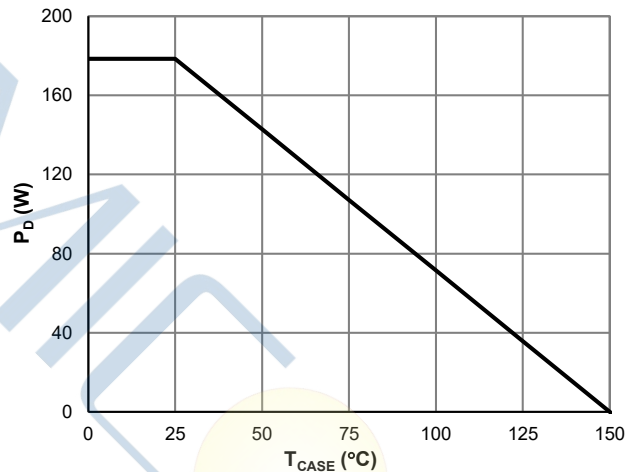
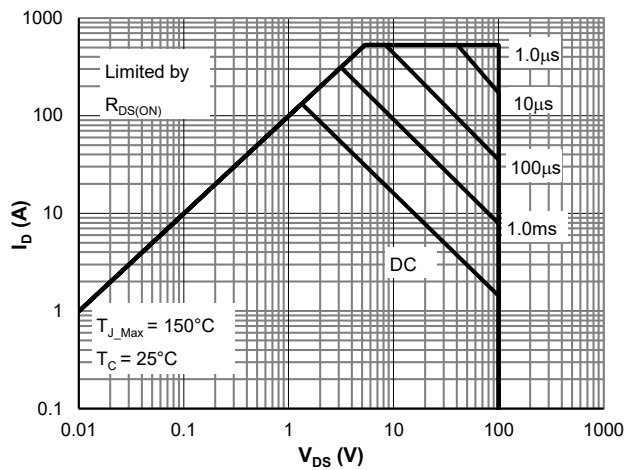
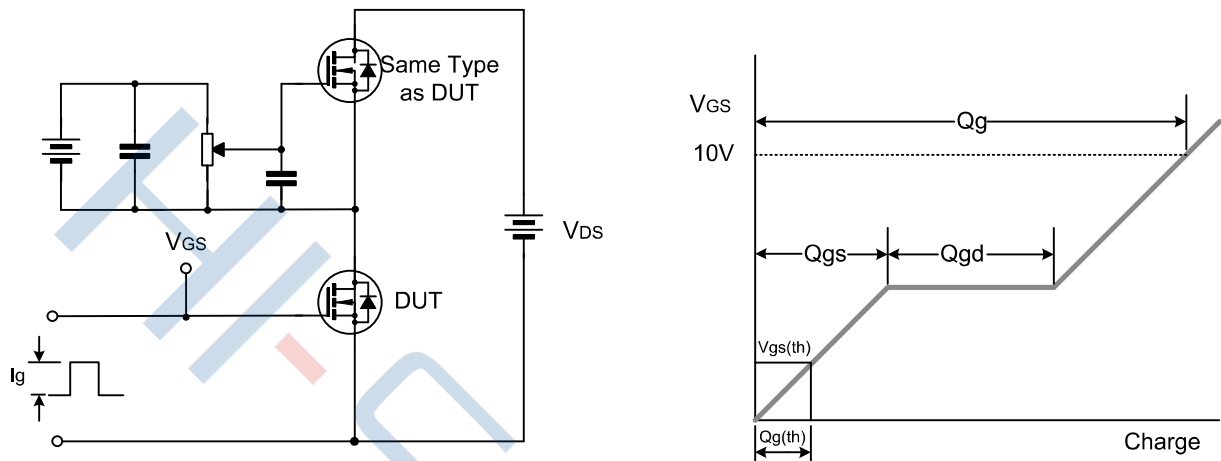


Figure 11: Maximum Safe Operating Area

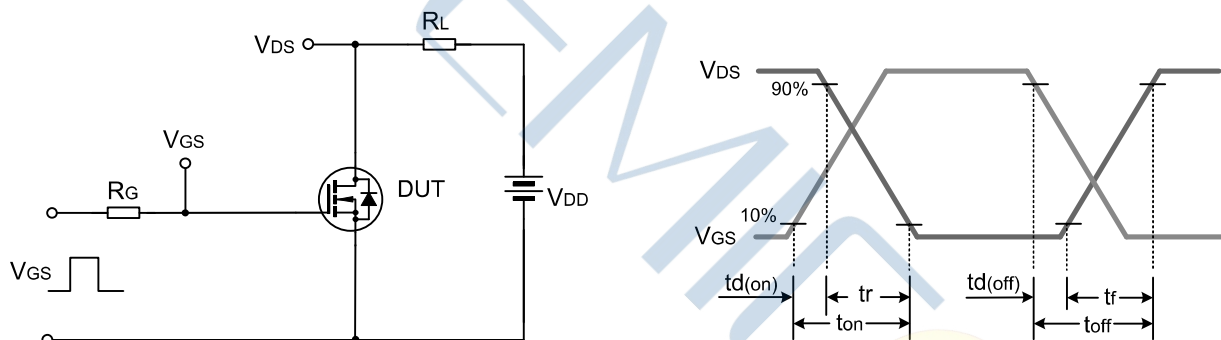


Test Circuit

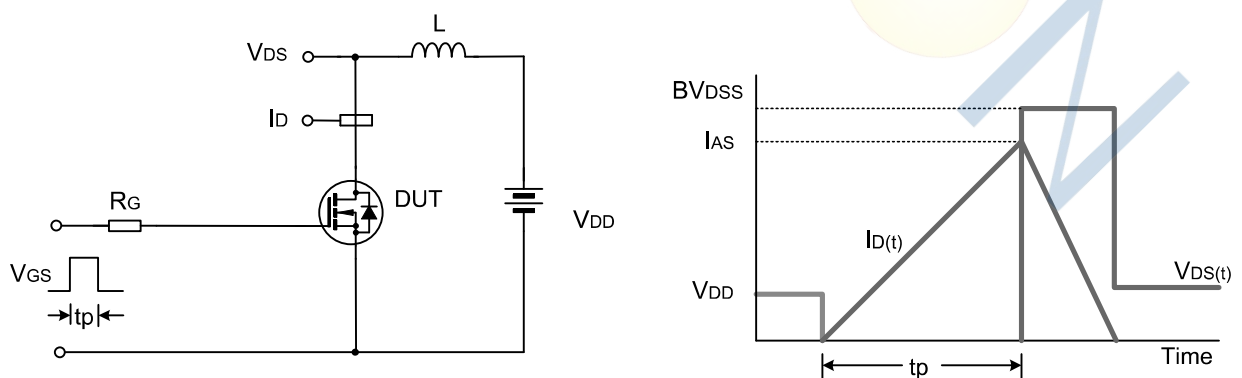
Gate Charge Test Circuit & Waveform



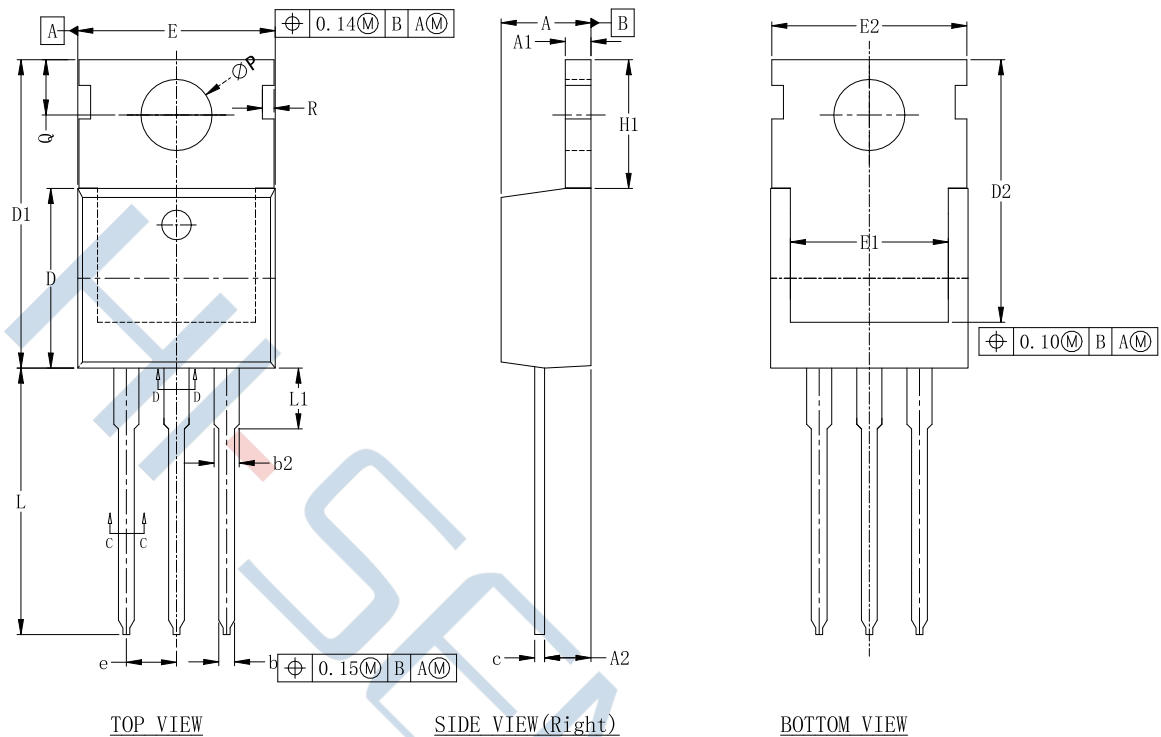
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of TO-220-3L



DIM SYMBOL	MIN.	NOM.	MAX.
A	4.450	4.550	4.650
A1	1.240	1.340	1.440
A2	2.250	2.350	2.450
b	0.740	0.840	0.940
b1	0.700	0.800	0.900
b2	1.210	1.310	1.410
b3	1.170	1.270	1.370
c	0.440	0.540	0.640
c1	0.400	0.500	0.600
D	9.000	9.100	9.200
D1	15.420	15.620	15.820
D2	13.100	13.300	13.500
E	9.900	10.000	10.100
E1	7.800	8.000	8.200
E2	9.680	9.880	10.080
e	2.540 BSC.		
H1	6.420	6.520	6.620
L	13.300	13.500	13.700
L1	2.880	3.080	3.280
□P	3.500	3.600	3.700
Q	2.600	2.800	3.000
R	0.590 REF.		

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