

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process)

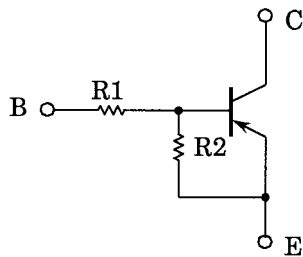
## RN2221,RN2222,RN2223 RN2224,RN2225,RN2226,RN2227

Switching, Inverter Circuit, Interface Circuit  
And Driver Circuit Applications

Unit: mm

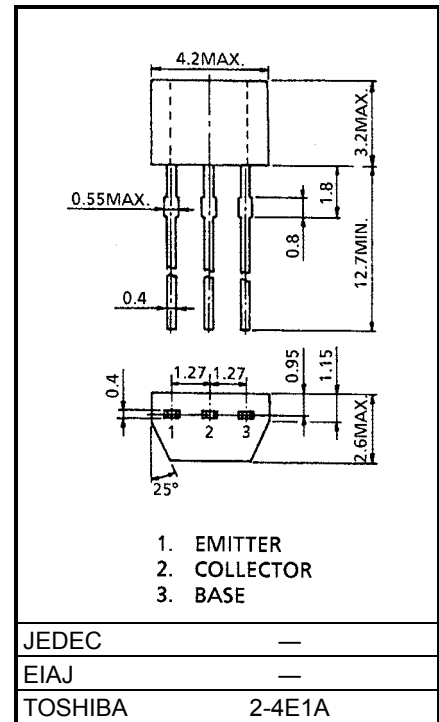
- High current type ( $I_C(\text{MAX}) = -800\text{mA}$ )
- With built-in bias resistors
- Simplify circuit design
- Reduce a quantity of parts and manufacturing process
- Low  $V_{CE}(\text{sat})$
- Complementary to RN1221~RN1227

### Equivalent Circuit



### Bias Resistor Values

Type No.	R1 (kΩ)	R2 (kΩ)
RN2221	1	1
RN2222	2.2	2.2
RN2223	4.7	4.7
RN2224	10	10
RN2225	0.47	10
RN2226	1	10
RN2227	2.2	10



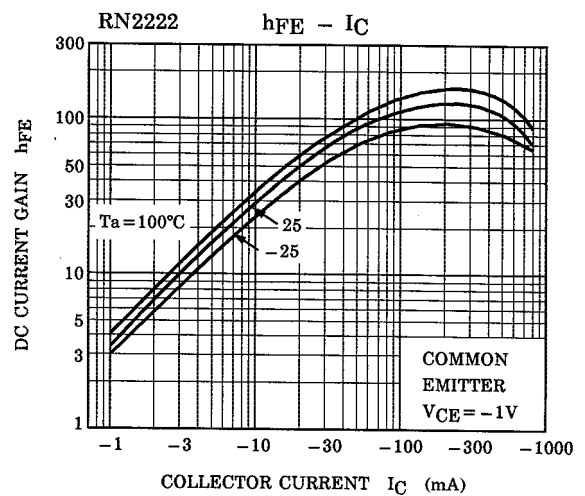
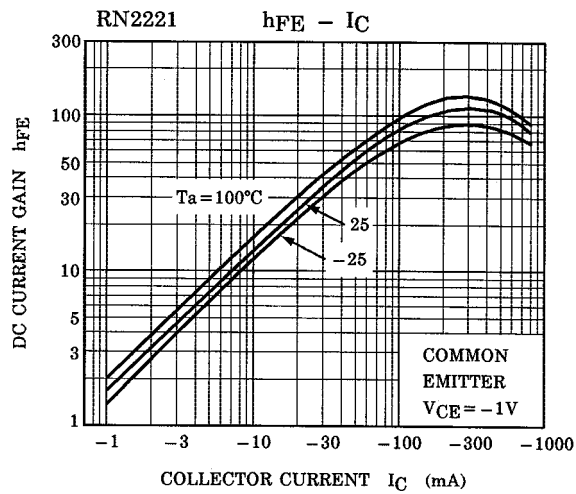
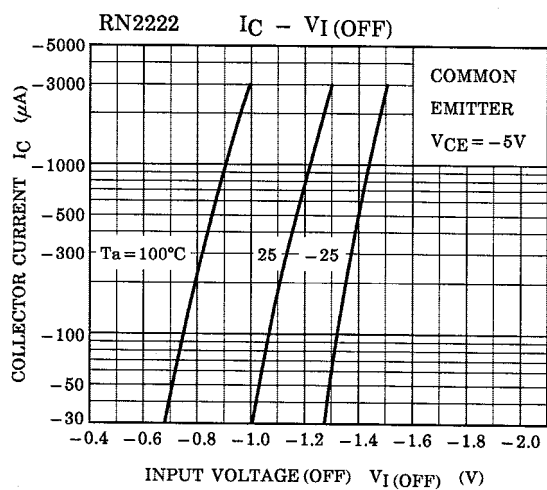
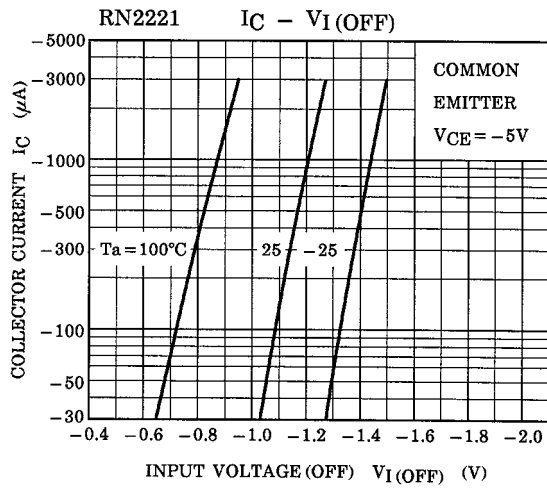
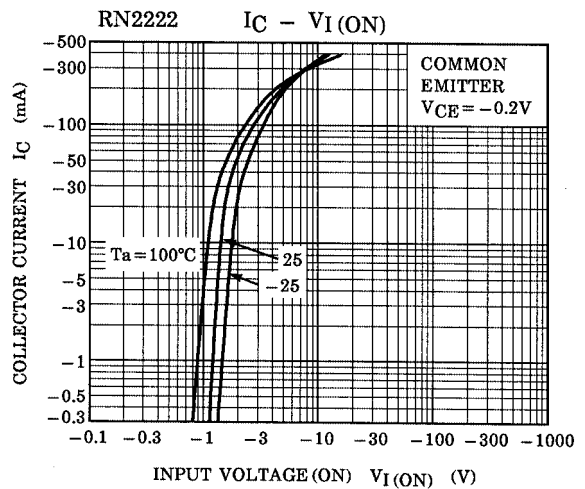
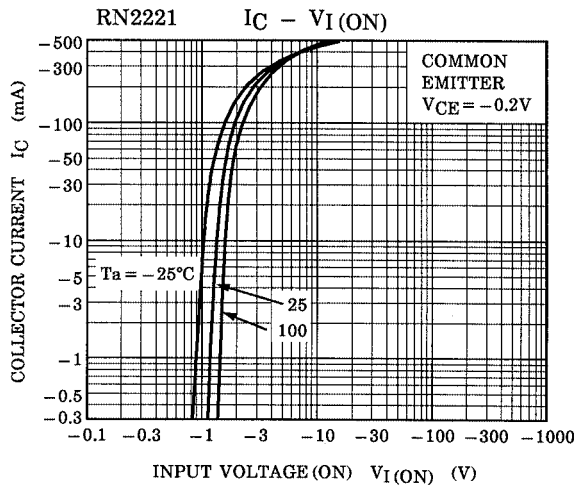
Weight: 0.13g

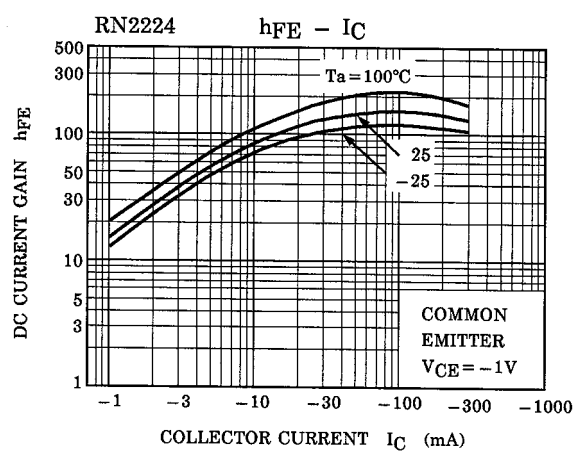
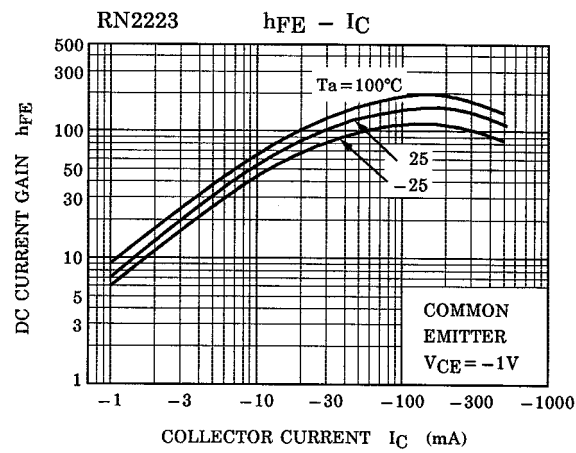
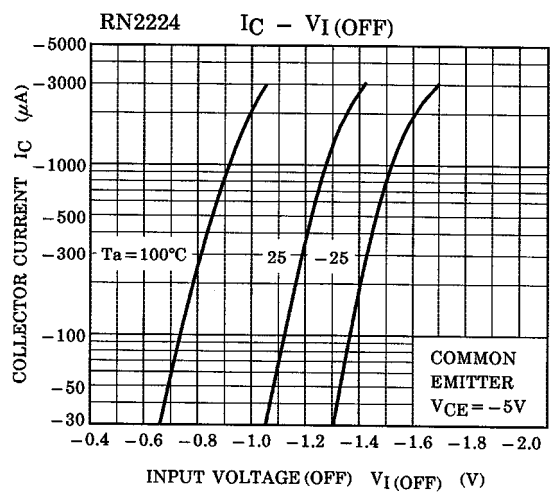
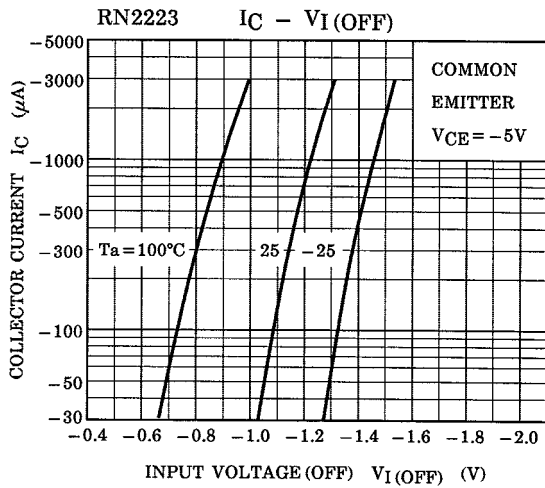
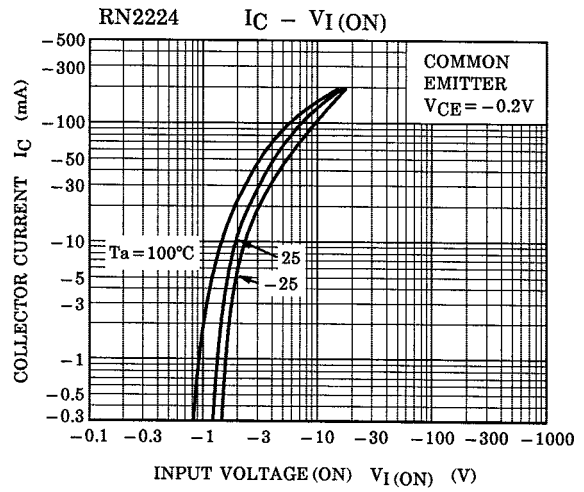
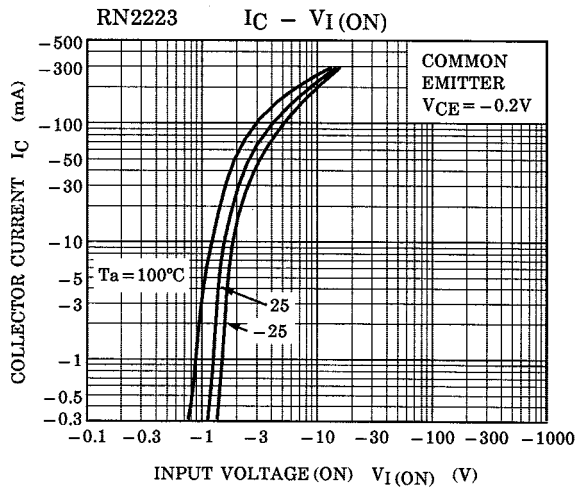
### Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

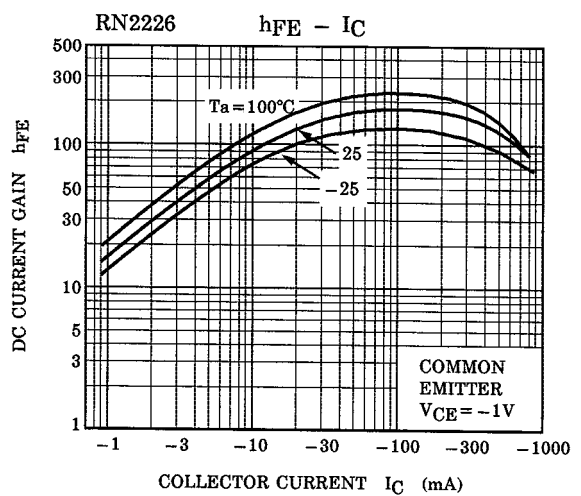
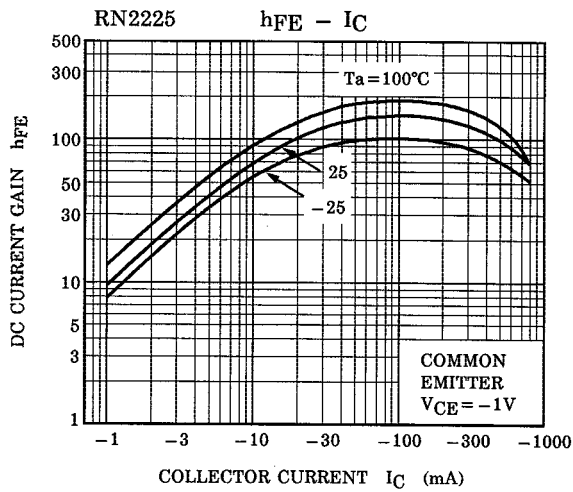
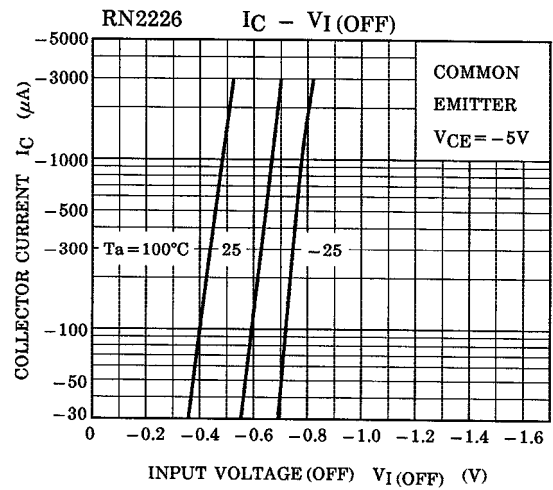
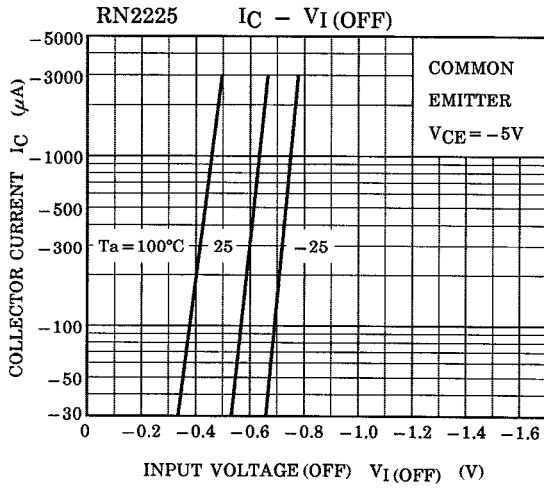
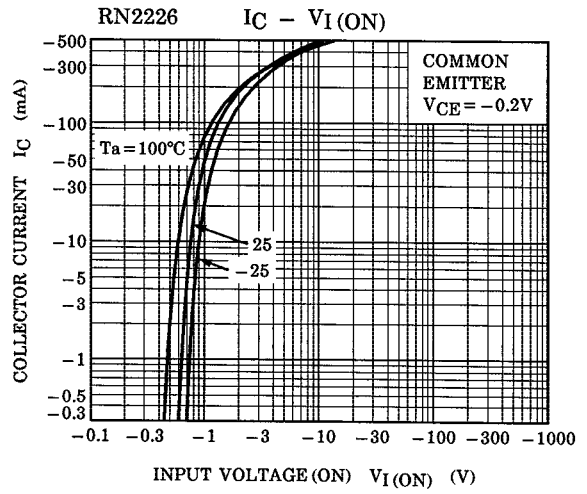
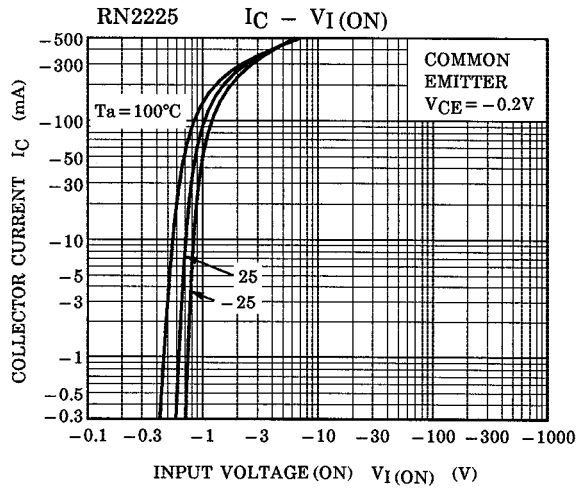
Characteristic	Symbol	Rating	Unit	
Collector-base voltage	RN2221~2227	$V_{CB0}$	-50	V
Collector-emitter voltage		$V_{CEO}$	-50	V
Emitter-base voltage	RN2221~2224	$V_{EBO}$	-10	V
	RN2225, 2226		-5	
	RN2227		-6	
Collector current	RN2221~2227	$I_C$	-800	mA
Collector power dissipation		$P_C$	300	mW
Junction temperature		$T_j$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55~150	$^\circ\text{C}$

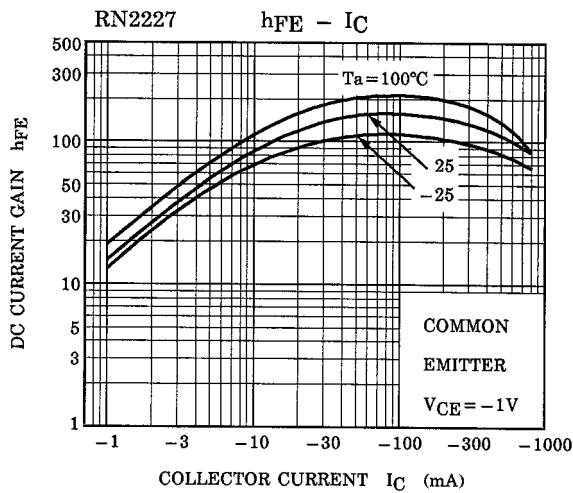
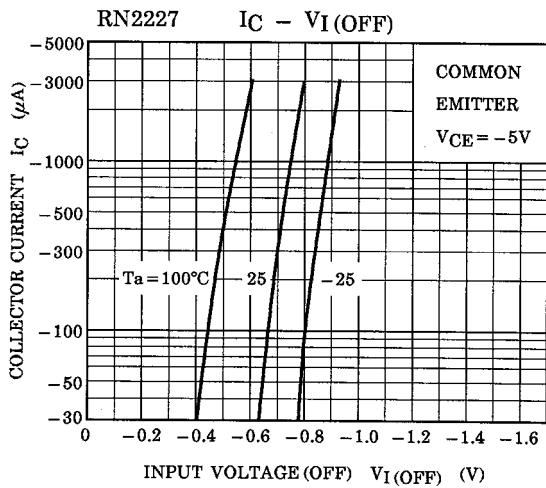
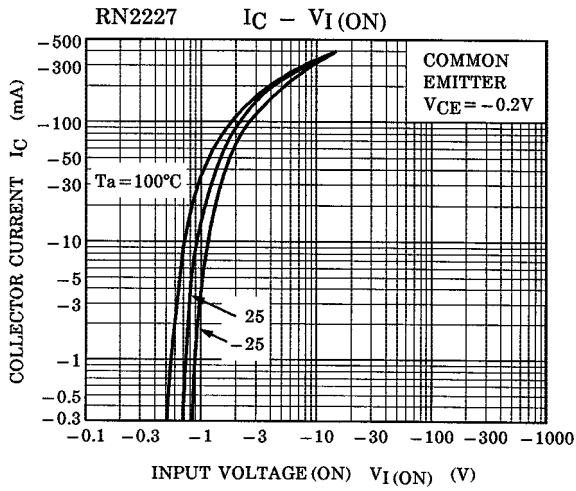
## Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2221~2227	—	—	$V_{CB} = -50V, I_E = 0$	—	—	-100	nA
		—	—	$V_{CE} = -50V, I_B = 0$	—	—	-500	
Emitter cut-off current	RN2221	$I_{EBO}$	—	$V_{EB} = -10V, I_E = 0$	-3.85	—	-7.14	mA
	RN2222		—		-1.75	—	-3.25	
	RN2223		—		-0.82	—	-1.52	
	RN2224		—	$V_{EB} = -5V, I_C = 0$	-0.38	—	-0.71	
	RN2225		—		-0.365	—	-0.682	
	RN2226		—		-0.35	—	-0.65	
	RN2227		—		$V_{EB} = -6V, I_C = 0$	-0.378	—	
DC current gain	RN2221	$h_{FE}$	—	$V_{CE} = -1V, I_C = -100mA$	60	—	—	—
	RN2222		—		65	—	—	
	RN2223		—		70	—	—	
	RN2224		—		90	—	—	
	RN2225		—		90	—	—	
	RN2226		—		90	—	—	
	RN2227		—		90	—	—	
Collector-emitter saturation voltage	RN2221	$V_{CE(sat)}$	—	$I_C = -50mA, I_B = -2mA$	—	—	-0.25	V
	RN2222~2227		—	$I_C = -50mA, I_B = -1mA$				
Input voltage (ON)	RN2221	$V_{I(ON)}$	—	$V_{CE} = -0.2V, I_C = -100mA$	-1.0	—	-3.5	V
	RN2222		—		-1.4	—	-4.5	
	RN2223		—		-2.0	—	-6.5	
	RN2224		—		-3.0	—	-12.0	
	RN2225		—		-0.6	—	-2.0	
	RN2226		—		-0.7	—	-2.5	
	RN2227		—		-1.0	—	-3.0	
Input voltage (OFF)	RN2221~2224	$V_{I(OFF)}$	—	$V_{CE} = -5V, I_C = -0.1mA$	-0.8	—	-1.3	V
	RN2225, 2226		—		-0.4	—	-0.8	
	RN2227		—		-0.5	—	-1.0	
Transition frequency	RN2221~2227	$f_T$	—	$V_{CE} = -5V, I_C = -20mA$	—	200	—	MHz
Collector output capacitance	RN2221~2227	$C_{ob}$	—	$V_{CB} = -10V, I_E = 0, f = 1MHz$	—	13	—	pF
Input resistor	RN2221	R1	—	—	0.7	1.0	1.3	kΩ
	RN2222		—		1.54	2.2	2.86	
	RN2223		—		3.29	4.7	6.11	
	RN2224		—		7	10	13	
	RN2225		—		0.329	0.47	0.61	
	RN2226		—		0.7	1.0	1.3	
	RN2227		—		1.54	2.2	2.86	
Resistor ratio	RN2221~2224	R1/R2	—	—	0.9	1.0	1.1	—
	RN2225		—		0.0423	0.047	0.0517	
	RN2226		—		0.09	0.1	0.11	
	RN2227		—		0.2	0.22	0.24	









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