

TOSHIBA RN1221,RN1222,RN1223,RN1224,RN1225,RN1226,RN1227

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process)

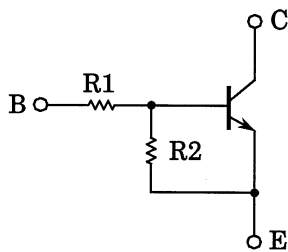
RN1221,RN1222,RN1223,RN1224 RN1225,RN1226,RN1227

Switching, Inverter Circuit, Interface Circuit
And Driver Circuit Applications

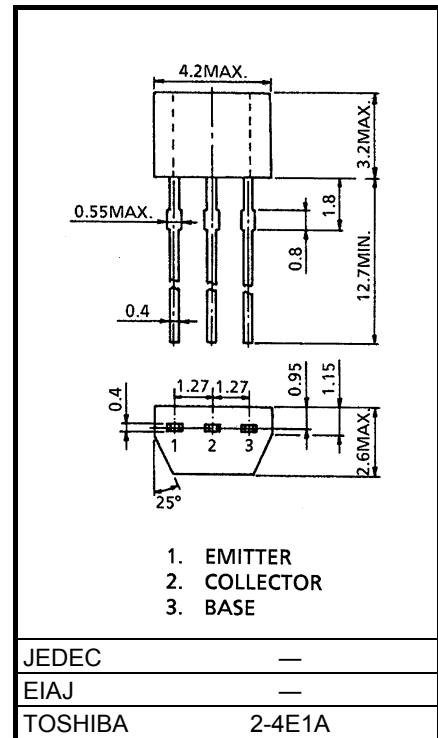
Unit: mm

- 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 RN2221~2227

Equivalent Circuit



Type No.	R1 (kΩ)	R2 (kΩ)
RN1221	1	1
RN1222	2.2	2.2
RN1223	4.7	4.7
RN1224	10	10
RN1225	0.47	10
RN1226	1	10
RN1227	2.2	10



Weight: 0.13g

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

Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN1221~1227	V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage	RN1221~1224	V_{EBO}	10	V
	RN1225, 1226		5	
	RN1227		6	
Collector current	RN1221~1227	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	$^\circ\text{C}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

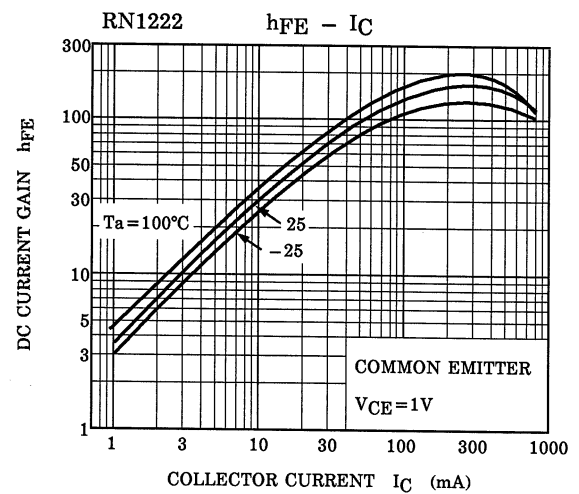
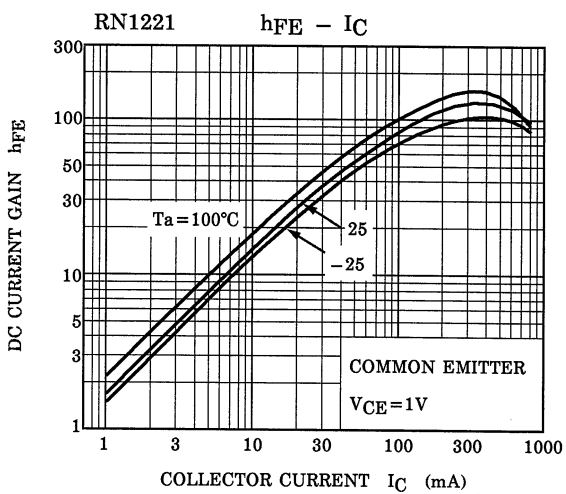
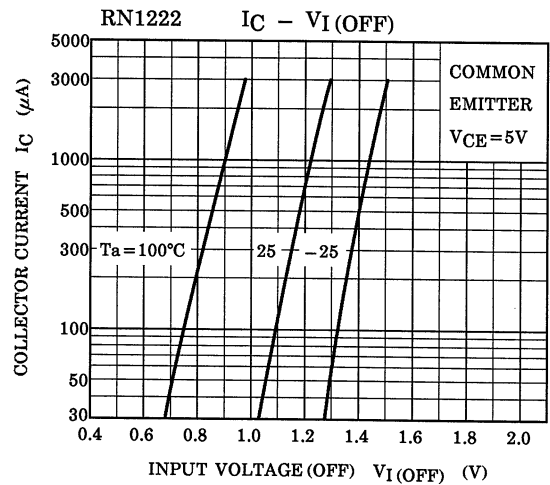
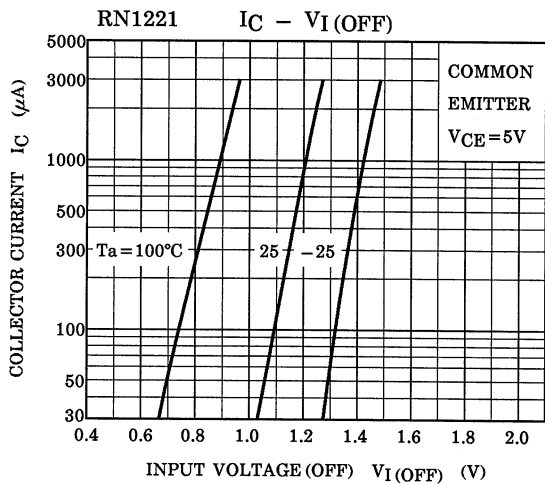
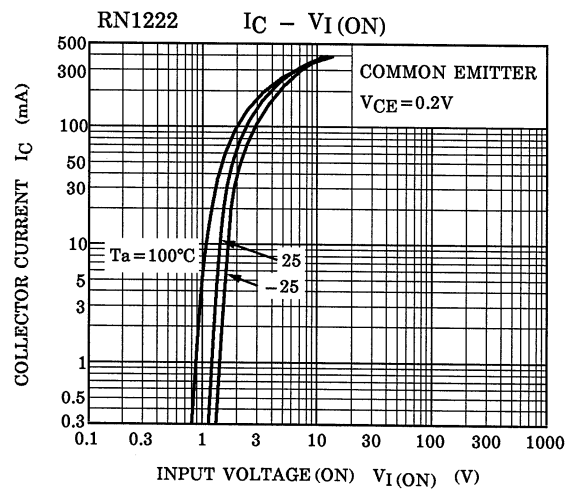
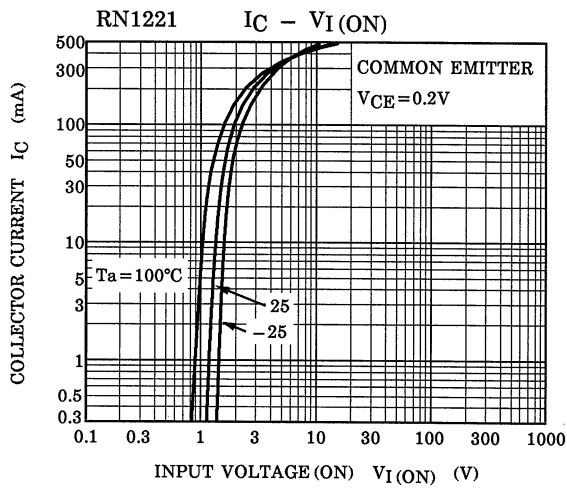
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

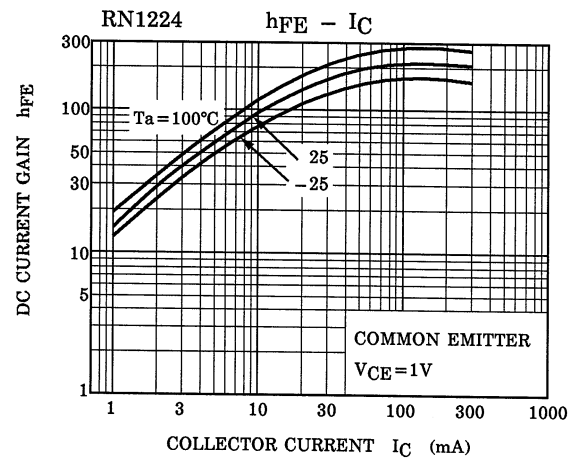
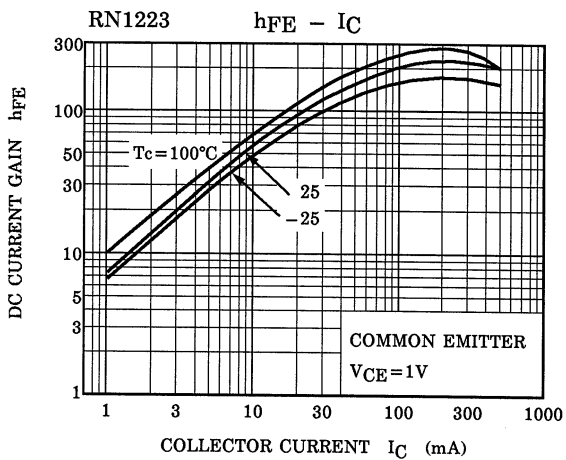
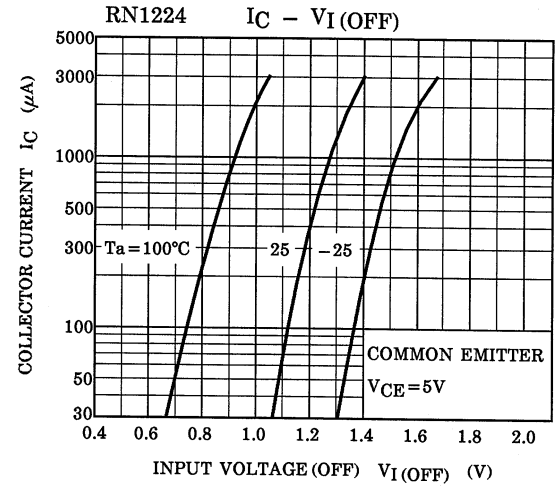
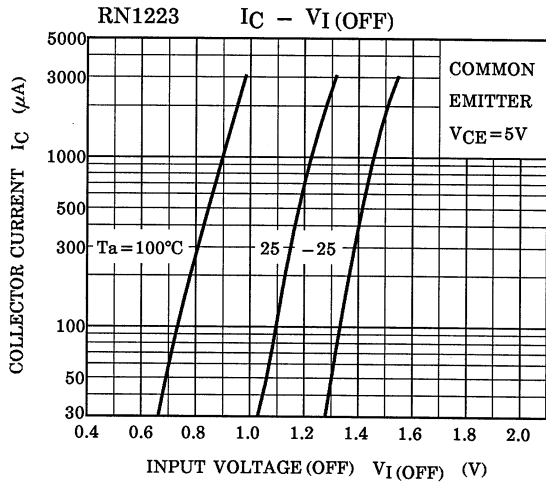
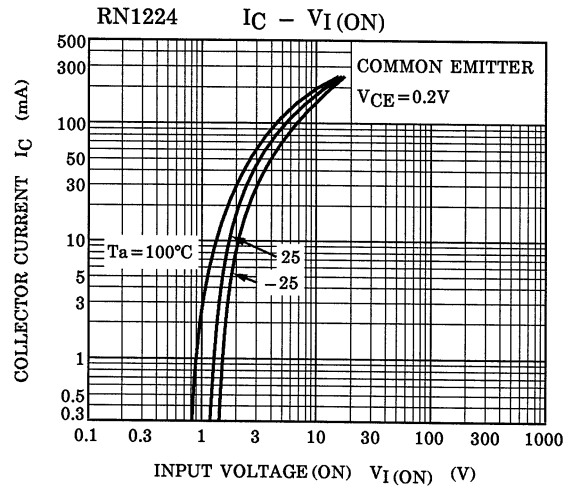
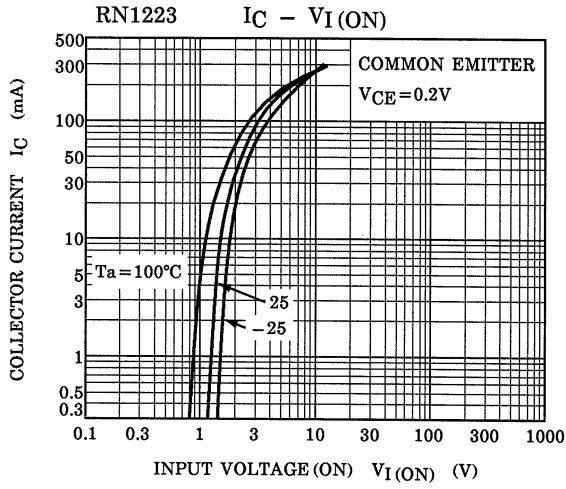
Electrical Characteristics (Ta = 25°C)

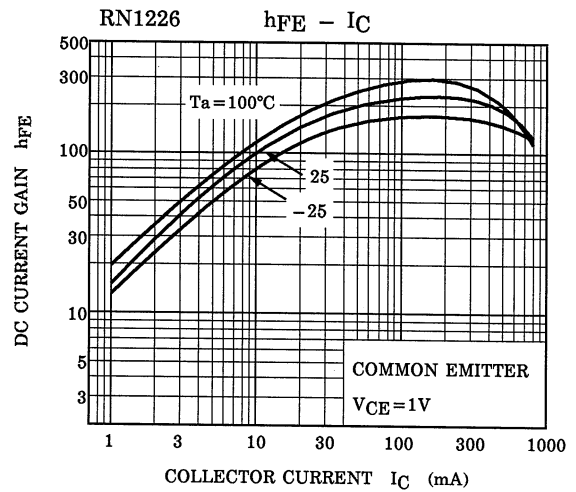
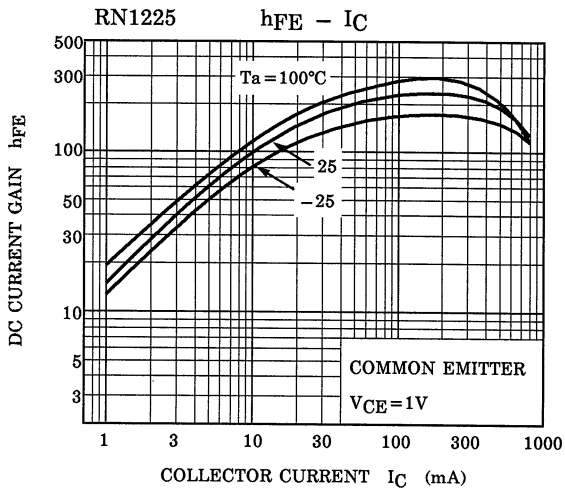
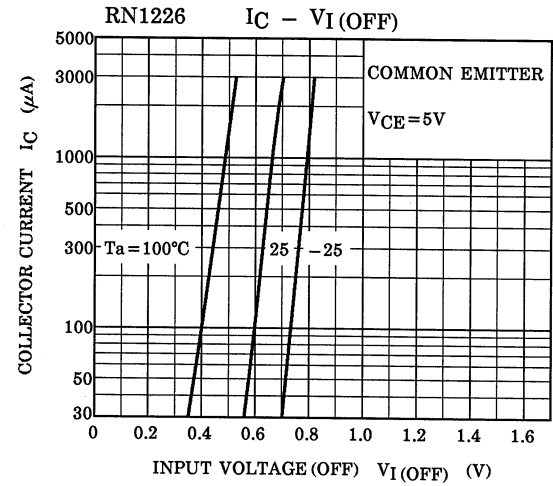
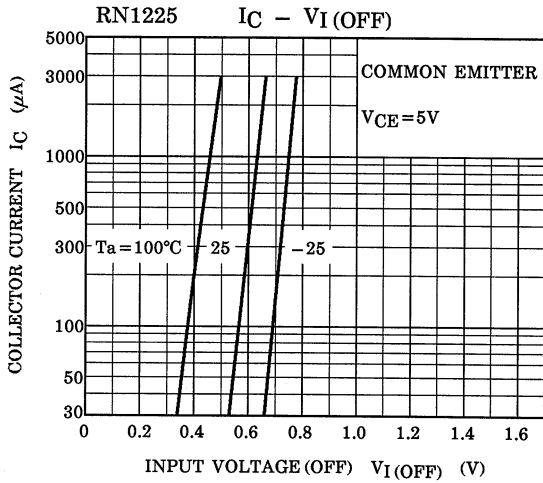
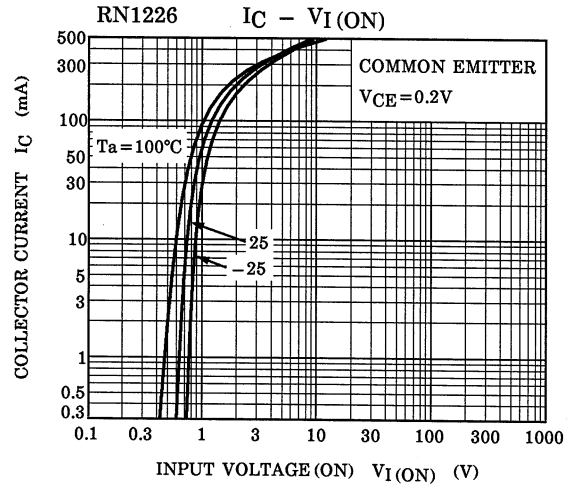
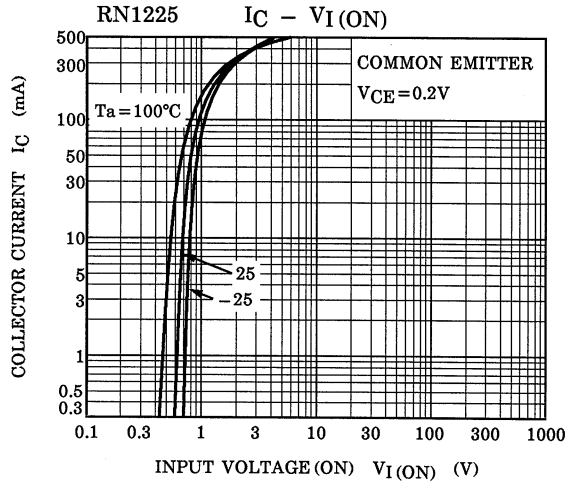
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN1221~1227	I_{CBO}	—	$V_{CB} = 50V, I_E = 0$	—	—	100	nA
		I_{CEO}	—	$V_{CE} = 50V, I_B = 0$	—	—	500	
Emitter cut-off current	RN1221	I_{EBO}	—	$V_{EB} = 10V, I_C = 0$	3.85	—	7.14	mA
	RN1222		—		1.75	—	3.25	
	RN1223		—		0.82	—	1.52	
	RN1224		—	$V_{EB} = 5V, I_C = 0$	0.38	—	0.71	
	RN1225		—		0.365	—	0.682	
	RN1226		—		0.35	—	0.65	
	RN1227		—		$V_{EB} = 6V, I_C = 0$	0.378	—	
DC current gain	RN1221	h_{FE}	—	$V_{CE} = 5V, I_C = 100mA$	60	—	—	—
	RN1222		—		65	—	—	
	RN1223		—		70	—	—	
	RN1224		—		90	—	—	
	RN1225		—		90	—	—	
	RN1226		—		90	—	—	
	RN1227		—		90	—	—	
Collector-emitter saturation voltage	RN1221	$V_{CE(sat)}$	—	$I_C = 50mA, I_B = 2mA$	—	—	0.25	V
	RN1222~1227		—	$I_C = 50mA, I_B = 1mA$	—	—	0.25	
Input voltage (ON)	RN1221	$V_I(ON)$	—	$V_{CE} = 0.2V, I_C = 100mA$	1.0	—	3.5	V
	RN1222		—		1.4	—	4.5	
	RN1223		—		2.0	—	6.5	
	RN1224		—		3.0	—	12.0	
	RN1225		—		0.6	—	2.0	
	RN1226		—		0.7	—	2.5	
	RN1227		—		1.0	—	3.0	
Input voltage (OFF)	RN1221~1224	$V_I(OFF)$	—	$V_{CE} = 5V, I_C = 0.1mA$	0.8	—	1.3	V
	RN1225, 1226		—		0.4	—	0.8	
	RN1227		—		0.5	—	1.0	
Transition frequency	RN1221~1227	f_T	—	$V_{CE} = 5V, I_C = 20mA$	—	300	—	MHz
Collector output capacitance	RN1221~1227	C_{ob}	—	$V_{CB} = 10V, I_E = 0, f = 1MHz$	—	7	—	pF

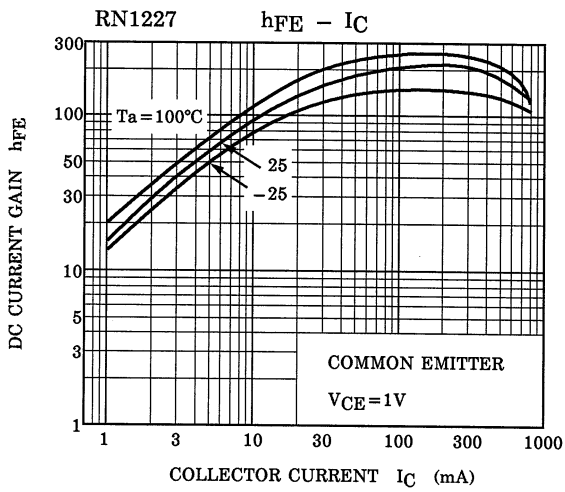
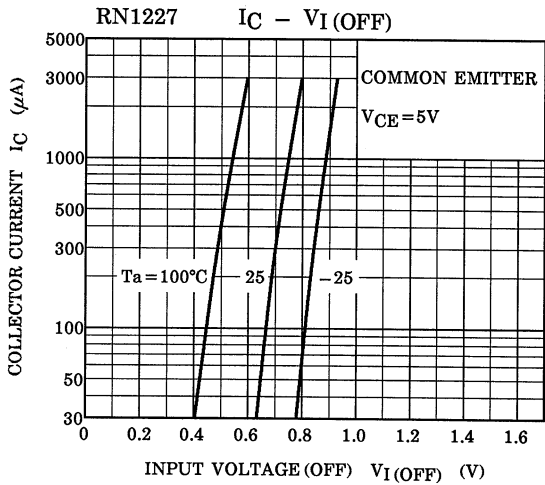
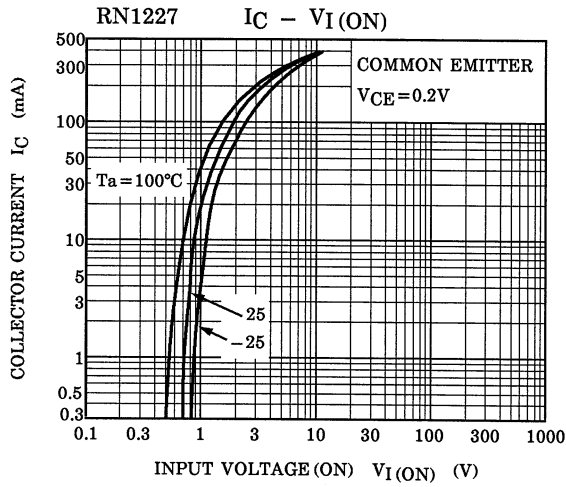
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input resistor	RN1221	R1	—	—	0.7	1.0	1.3	kΩ
	RN1222		—		1.54	2.2	2.86	
	RN1223		—		3.29	4.7	6.11	
	RN1224		—		7	10	13	
	RN1225		—		0.329	0.47	0.61	
	RN1226		—		0.7	1.0	1.3	
	RN1227		—		1.54	2.2	2.86	
Resistor ratio	RN1221~1224	R1/R2	—	—	0.9	1.0	1.1	—
	RN1225		—		0.0423	0.047	0.0517	
	RN1226		—		0.09	0.1	0.11	
	RN1227		—		0.2	0.22	0.24	









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20070701-EN GENERAL

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